



MOTO GUZZI®

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SERVICE STATION MANUAL

2Q000400



V85 TT



SERVICE STATION MANUAL

V85 TT

THE VALUE OF GOOD SERVICE

As a result of continuous updates and specific technical training programs for Moto Guzzi products, only **Moto Guzzi** Official Network mechanics know this vehicle fully and have the specific tools necessary to carry out maintenance and repair operations correctly.

The bike's reliability also depends on its mechanical condition. Checking the vehicle before riding it, its regular maintenance and the use of **original Moto Guzzi spare parts** only are essential factors!

To find out which is your nearest **Official Dealer and/or Service Center** visit our website:

www.motoguzzi.com

Only by requesting Moto Guzzi original spare parts can you be sure of purchasing products that were developed and tested during the actual vehicle design stage. All Moto Guzzi original spare parts undergo quality control procedures to guarantee reliability and durability.

The descriptions and images in this publication are given for illustrative purposes only.

While the basic features as described and illustrated in this manual remain unchanged, Moto Guzzi reserves the right, at any time and without being required to update this publication beforehand, to make any changes to components, parts or accessory supplies which it deems necessary to improve the product, or which are required for manufacturing or commercial reasons.

Not all versions shown in this publication are available in all countries. The availability of individual versions should be checked with the official Moto Guzzi Sales Network.

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

www.piaggio.com

SERVICE STATION MANUAL

V85 TT

This manual provides the main information to carry out regular maintenance operations on your vehicle. This manual is intended to **Moto Guzzi Dealers** and their qualified mechanics; several concepts have been deliberately omitted as they are considered unnecessary. As it is not possible to include complete mechanical notions in this manual, users should have basic mechanical knowledge or minimum knowledge about the procedures involved when repairing scooters. Without this knowledge, repairing or checking the vehicle may be inefficient or even dangerous. As the vehicle repair and check procedures are not described in detail, be extremely cautious so as not to damage components or injure individuals. In order to optimise customer satisfaction when using our vehicles, **Piaggio & C. s.p.a.** commits itself to continually improve its products and the relative documentation. The main technical modifications and changes in repair procedures are communicated to all **Moto Guzzi Sales Outlets and its International Subsidiaries**. These changes will be introduced in the subsequent editions of the manual. In case of need or further queries on repair and check procedures, consult **Moto Guzzi CUSTOMER DEPARTMENT**, which will be prepared to provide any information on the subject and any further communications on updates and technical changes related to the vehicle.

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

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

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



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



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



Vehicle condition The incomplete or lack of observance to these regulations can lead to risk of serious damage to the vehicle and may even invalidate the warranty.



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INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Carry out the listed tests before delivering the vehicle.

WARNING

PROCEED WITH THE UTMOST CAUTION WHEN HANDLING PETROL.

IMPORTANT

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.

Aesthetic inspection

- Paintwork
 - Fitting of Plastics
 - Scratches
 - Dirt
-

Tightening torques inspection

Safety fasteners:

- Front and rear suspension unit
 - Front and rear brake calliper retainer unit
 - Front and rear wheel unit
 - Engine - chassis retainers
 - Steering assembly
 - Plastics fastening screws
-

Electrical system

- Main switch
 - Headlamps: high beam lights, low beam lights, tail-lights (front and rear) and relevant warning lights
 - Headlight adjustment according to regulations in force
 - Front and rear stop light switches and their bulbs
 - Turn indicators and their warning lights
 - Instrument cluster lights
 - Instrument cluster: fuel and temperature indicator (if present)
 - Instrument panel warning lights
 - Horn
 - Electric starter
 - Engine stop via emergency stop switch and side stand
-

- Electric helmet compartment lock release switch (if applicable)
- Through the diagnostic tool, check that the last mapping version is present in the control unit/s and, if required, program the control unit/s again: consult the technical service website to know about available upgrades and details regarding the operation.

IMPORTANT

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW LEVEL OF ELECTROLYTE BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.

IMPORTANT

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

IMPORTANT

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. IN THE EVENT OF CONTACT WITH THE EYES, RINSE WITH PLENTY OF 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.

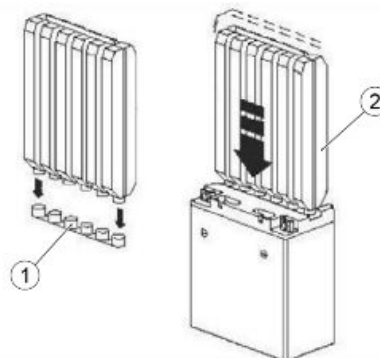
BATTERY LIQUID IS CORROSIVE. DO NOT POUR OR SPILL ON PLASTIC COMPONENTS IN PARTICULAR. ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY BEING ACTIVATED.

IMPORTANT

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.

TRADITIONAL BATTERY ACTIVATION PROCEDURE

- Place the battery on a flat surface.
- Remove the cell's protective sticker.
- Take the acid container.
- Remove the cap 1 of the container 2.
- Place the container upside down, perpendicularly above the battery, aligning the outlets with the battery cells.



- Apply pressure to the container to break the seals. The liquid will begin to flow into the cells.
- Check that air bubbles come out of the cells; let the liquid flow into the cells for at least 20 minutes.
- If no air bubbles escape and the liquid does not flow, tap lightly on the bottom of the container until the liquid begins to flow into the cells. Never remove the container from the battery, pierce it or cut it to facilitate the exit of the liquid.
- Make sure the liquid container is completely empty before removing it.
- Allow the battery to stand for at least 1 hour, before starting the charging process, without closing the six cells. This operation is extremely important in order to have the best battery performance over time.
- Recharge the battery following the specifications indicated on the battery (see photo) and using a suitable battery charger.

**NOTE**

IN THE SHOWN EXAMPLE IT IS IMPORTANT TO USE A BATTERY CHARGER WITH 1.2 AMPERE (CHARGING TIME 5-10 HOURS) OR 5 AMPERE (CHARGING TIME 1 HOUR).

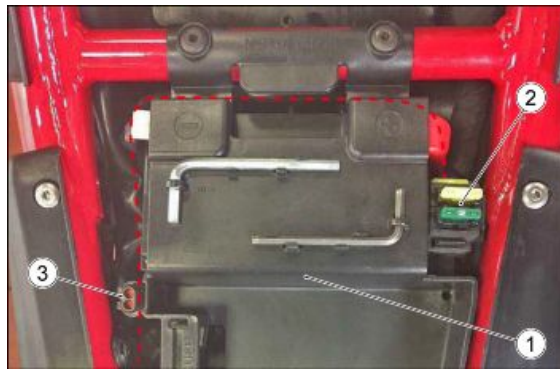
After performing the battery activation procedure, install the battery in the vehicle, in the dedicated compartment, taking care to pass the fuse holder secondary wiring harness as shown in the figure. Then connect the cables to the battery, starting with the positive one.



Install the glove compartment (1) and attach to it the fuse box (2) and the connector (3) of the USB 2 preparation.

WARNING

Make sure that the fuse box (2) and its wiring harness are correctly positioned and do not interfere with other vehicle components.



Levels check

- Braking system liquid level (front and rear)
- Engine oil level

Road test

- Cold start
- Instrument operations
- Throttle control response
- Stability on acceleration and braking
- Front and rear brake efficiency
- Front and rear suspension efficiency
- Abnormal noise

Static test

Static control after the test drive:

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

Functional inspection

- Hydraulic braking system
- Brake and clutch lever stroke (where applicable)
- Clutch - check proper operation
- Engine - check for proper general operation and absence of abnormal noise
- Check documents, frame number and engine number

- Check included tools (where applicable)
- License plate fitting
- Locks check
- Tyre pressure check
- Installation of mirrors and any accessories
- Battery installation



NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES SINCE THE TYRES MAY BURST.

IMPORTANT

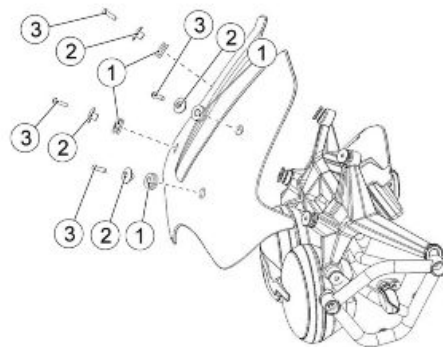


CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

Specific operations for the vehicle

WINDSHIELD KIT ASSEMBLY

- The box containing the windshield is in the vehicle packaging. The installation hardware is mounted on the windshield bracket assembled to the vehicle
- Installation begins with the removal of the mounting hardware from the windshield bracket (for each of the four fastening points, made up of: rubber piece, bushing and screw)
- Subsequently, the four rubber pieces (1) are fitted in the respective holes on the windshield, avoiding the use of tools that can damage or scratch the component
- The bushings (2) should be inserted in the holes of the rubber pieces from the front side of the windshield
- The windshield should then be rested on the relative bracket on the vehicle and, supporting it firmly, the screws should be fastened (3), tightening them to the torque indicated on the chart



WINDSHIELD KIT TIGHTENING TORQUES

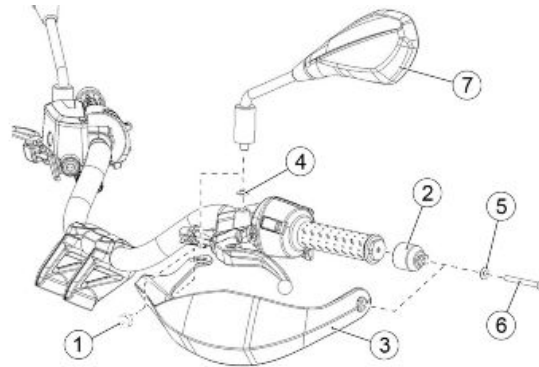
Tightening torque chart

Tightening torques
Nm (lbf ft)Residual torque Nm
(lbf ft)

| | | |
|--|---------------------|--------------------|
| Windshield fastening to windshield bracket | 10 Nm (7.38 lbf ft) | 8 Nm (5.90 lbf ft) |
|--|---------------------|--------------------|

HANDGUARDS AND REAR VIEW MIRRORS**KIT ASSEMBLY**

- The box containing the right and left handguards, the anti-vibration weights and the hardware required for assembling the aforementioned components is in the vehicle packaging
- There is also a box containing the rear view mirrors
- Installation of the handguards begins with the insertion of the rubber piece (1) in the specific cylindrical lodging on the internal side of the handguards.
- Then, rest the anti-vibration weight (2) in correspondence to the end of the handlebar and on this handguard (3), taking care to line up the inside with the shape of the anti-vibration weight; then, the "T" bushing (4) (diam.15 mm) should be inserted on the handguard and the screw (5) inserted without tightening it all the way.
- Then, insert the other "T" bushing (5) (diam.18 mm) from below on the second handguard fastening hole and screw in the rear view mirror (7)
- Then, tighten the screw (6), observing the tightening torque indicated on the attached chart
- Repeat the same procedure to mount the handguard/rear view mirror on the opposite side

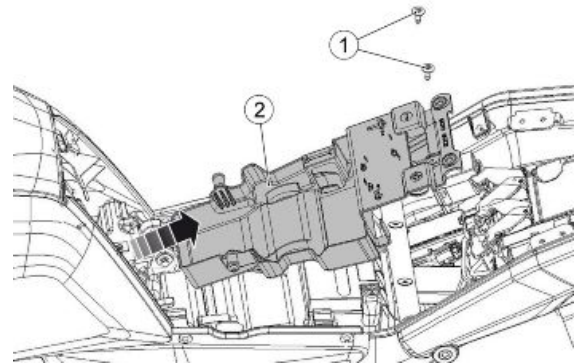


HANDGUARDS/REAR VIEW MIRRORS KIT TIGHTENING TORQUES

| Tightening torque chart | Tightening torques Nm (lbf ft) | Residual torque Nm (lbf ft) |
|--|-----------------------------------|--------------------------------|
| Fastening handguard / anti-vibration weight to handlebar | 6 Nm (4.43 lbf ft) | 4.8 Nm (3.54 lb ft) |

BATTERY COVER ASSEMBLY

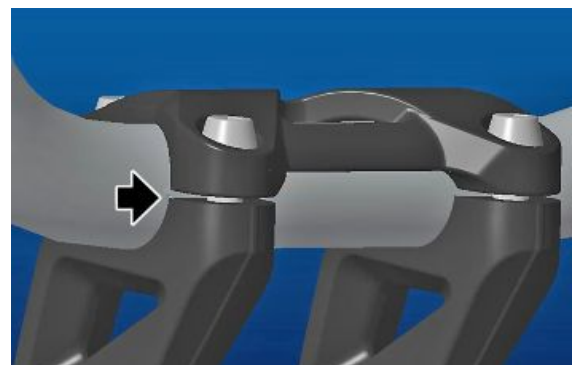
- Remove the saddle, acting on the lock positioned on the licence plate holder and lift it from the rear part, unhooking it from its lodgings in correspondence to the fuel tank
- Remove the screws (1) and extract the battery cover (2) from the front lodgings, sliding it toward the rear
- Place the battery in the appropriate lodging and connect it, taking care to observe the polarity
- Refit the battery cover, inserting it in the appropriate lodgings as indicated in figure "C"
- Insert the screws (1) in the appropriate holes, observing the tightening torque indicated on the attached chart
- Refit the saddle, hooking it in the front part in the appropriate lodgings in correspondence to the fuel tank and lower it at the rear, ensuring that the saddle lock has clicked.

**BATTERY COVER KIT TIGHTENING TORQUES**

| Tightening torque chart | Tightening torques Nm (lbf ft) | Residual torque Nm (lbf ft) |
|---------------------------------|-----------------------------------|--------------------------------|
| Fastening batter cover to frame | 10 Nm (7.38 lbf ft) | 8 Nm (5.90 lbf ft) |

RESTORING THE HANDLEBAR

- Position the centre of the punch mark indicated in the figure in correspondence with the corner of the lower left U-bolt
- Tighten the four fixing screws by hand



- Place a 1 mm (0.04 in) shim to the front between the lower U-bolts and the upper U-bolt
- Tighten the two front screws, in the direction of travel, to 2 Nm (1.48 lbf ft)
- Tighten the two rear screws, in the direction of travel, to 5 Nm (3.69 lbf ft)
- Remove the previously positioned shim.
- In sequence, tighten the front and rear screws to the specified torque

HANDLEBAR KIT TIGHTENING TORQUES

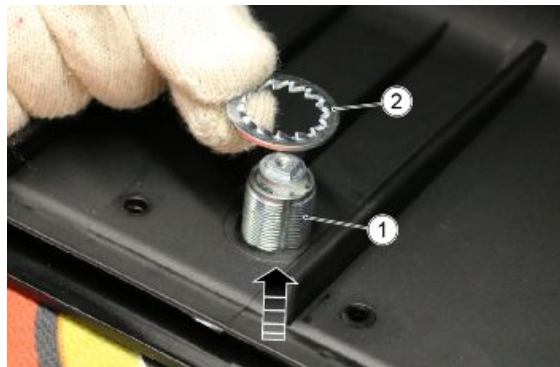
| Tightening torque chart | Tightening torques Nm (lbf ft) | Residual torque Nm (lbf ft) |
|-------------------------|---|--------------------------------|
| Upper U-bolt fastening | 25 Nm +/- 10% (18.44 lbf ft +/- 10%) | 20 Nm (14.75 lbf bft) |

LOCK ASSEMBLY ON THE CASES

In the Travel Pack version, the motorcycle is supplied with two assembly kits to accompany the lock kit already present in the under-seat compartment to assemble and install the cases.

The first kit is used to assemble the lock of the cases:

- Insert the pawl (1) in the case from the outside to the inside and position the knurled washer (2).
- Insert the locking nut (3) of the pawl and tighten it to the prescribed torque.



Locking torques (N*m)

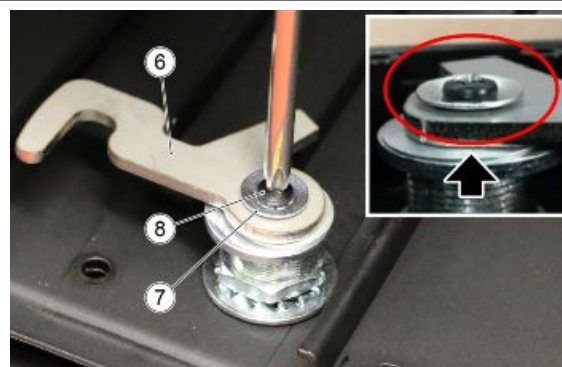
Pawl lock nut 10 Nm (7.38 lbf ft)



- Position the spacer washer (4) and the spring washer (5) and check the correct position



- Position the latch bolt (6) in the direction indicated, the spring washer (7) and relative fixing screw (8).



NOTE

MAKE SURE THE SPRING WASHER IS ASSEMBLED CORRECTLY AS SHOWN IN THE IMAGE.

Locking torques (N*m)

Locking hook locking screw 3 Nm (2.21 lbf ft) + Loct. 243

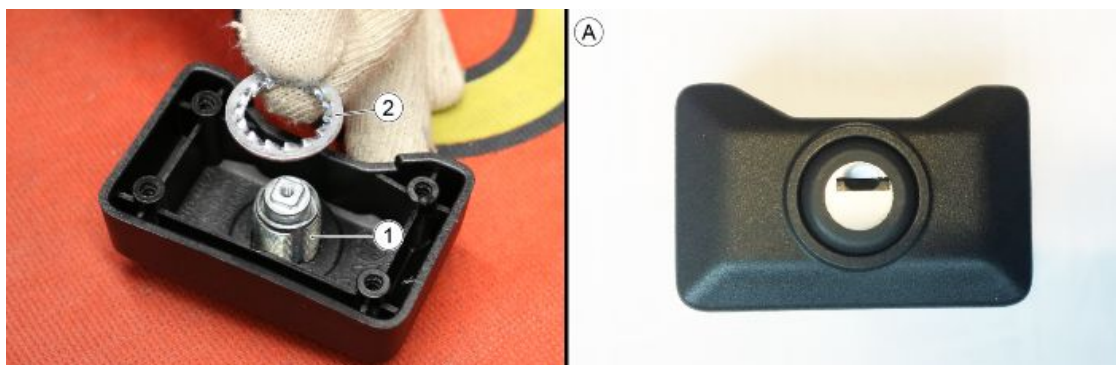
- Position the protective cover (9) of the latch bolt and press it onto the cover until it hooks onto the cover itself.



LOCK ASSEMBLY ON THE CASE SUPPORT

The second kit is used to assemble the latch of the cases:

- Insert the pawl (1) in the support as shown in image (A) and position the knurled washer (2).



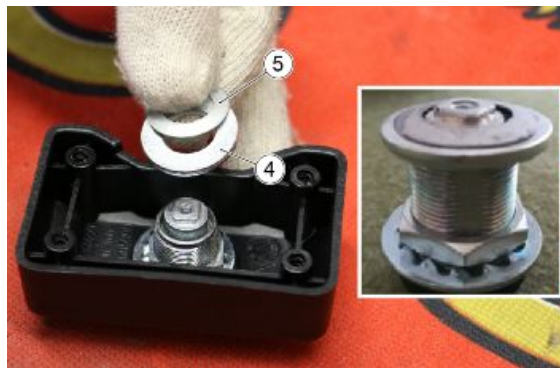
- Insert the locking nut (3) of the pawl and tighten it to the prescribed torque.

Locking torques (N*m)

Pawl lock nut 10 Nm (7.38 lbf ft)



- Position the spacer washer (4) and the spring washer (5) and check the correct position



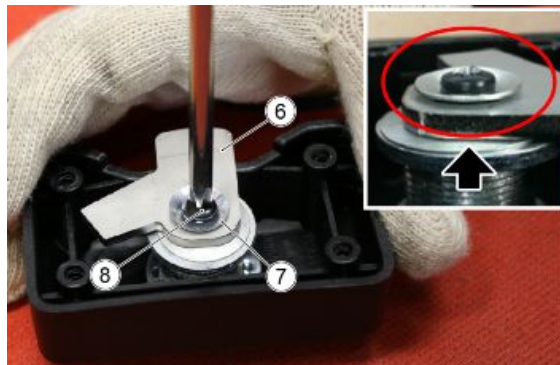
- Position the lock plate (6) in the direction indicated, the spring washer (7) and relative fixing screw (8).

NOTE

MAKE SURE THE SPRING WASHER IS ASSEMBLED CORRECTLY AS SHOWN IN THE IMAGE.

Locking torques (N*m)

Locking hook locking screw 3 Nm (2.21 lbf ft) + Loct. 243



- Position the protective cover (9) of the locking hook on the support (10) with the four screws (11) tightening them to the prescribed torque.

Locking torques (N*m)

Locking screws of the cover on the support 3.5 Nm (2.58 lbf ft)



- Position the pre-assembled support on the case and secure it with the four screws (12) tightening them to the prescribed torque.

Locking torques (N*m)

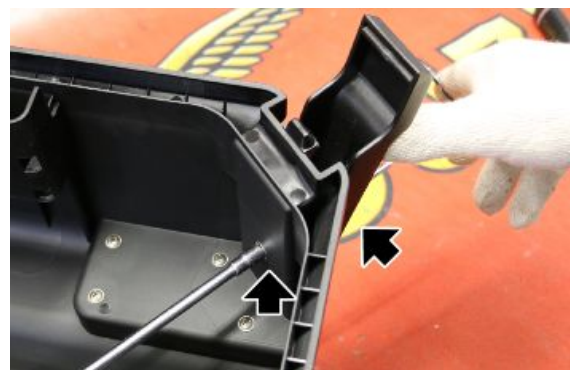
Case support fixing screws 3.5 Nm (2.58 lbf ft)



INSTALLATION OF CLOSURE LEVERS ON CASES

THE OPERATION DESCRIBED IS RELATED TO A SINGLE CLOSURE LEVER BUT IS VALID FOR BOTH

- Position the complete closure lever on the case and insert the screw from the outside towards the inside (with relative washer).
- From the inside of the case, insert the nut (with its washer).
- Holding the nut, tighten the screw to the prescribed torque.



Locking torques (N*m)

Closure lever locking screws 2.5 Nm (1.84 lbf ft)

HOOKING THE CASES TO THE VEHICLE

- Position the lower centring element (1) of the case on the pad (2) of the lower centring bracket.
- Insert the hooks of the case (3) on the slots of the connectors.



- Turn the key of the side lock fully anti-clockwise and move the case forward for the entire length of the connector slots.
- With a final push on the rear of the case, make sure the case has arrived at the end of the connector slots.
- Turn the key clockwise to lock the case to the connector.

**IMPORTANT**

MAKE SURE THAT THE CASE IS CORRECTLY ALIGNED BY CHECKING THAT THE CASE CONNECTOR IS ALIGNED WITH THE HOOKING SLOT ON THE SUPPORT

IMPORTANT

REMOVE THE KEY ONLY AFTER HAVING CHECKED THAT THE CASE IS CORRECTLY ATTACHED.

INDEX OF TOPICS

CHARACTERISTICS

CHA

Rules

Safety rules

Carbon monoxide

If you need to keep the engine running while working on the vehicle, please ensure that you do so in an open or very well ventilated area. Never run the engine in an enclosed area. If you do work in an enclosed area, make sure to use a fume extraction system.

IMPORTANT



EXHAUST EMISSIONS CONTAIN CARBON MONOXIDE, A POISONOUS GAS WHICH CAN CAUSE LOSS OF CONSCIOUSNESS AND EVEN DEATH.

Fuel

IMPORTANT



FUEL USED TO DRIVE EXPLOSION ENGINES IS HIGHLY INFLAMMABLE AND CAN BECOME EXPLOSIVE UNDER SPECIFIC CONDITIONS. IT IS THEREFORE RECOMMENDED TO CARRY OUT REFUELLING AND MAINTENANCE PROCEDURES IN A VENTILATED AREA WITH THE ENGINE SWITCHED OFF. DO NOT SMOKE DURING REFUELLING OR NEAR FUEL VAPOUR. AVOID ANY CONTACT WITH NAKED FLAME, SPARKS OR OTHER HEAT SOURCES WHICH MAY CAUSE IGNITION OR EXPLOSION.

**DO NOT ALLOW FUEL TO DISPERSE INTO THE ENVIRONMENT.
KEEP OUT OF THE REACH OF CHILDREN.**

Hot parts

The engine and the exhaust system components get very hot and remain in this condition for a certain time interval after the engine has been switched off. Before handling these components, make sure that you are wearing insulating gloves or wait until the engine and the exhaust system have cooled down.

Used engine oil and transmission oil

IMPORTANT



WHEN CARRYING OUT MAINTENANCE OPERATIONS, IT IS ADVISABLE TO WEAR PROTECTIVE IMPERMEABLE GLOVES.

THE ENGINE OR GEARBOX OIL MAY CAUSE SERIOUS INJURIES TO THE SKIN IF HANDLED FOR PROLONGED PERIODS OF TIME AND ON A REGULAR BASIS.

WASH YOUR HANDS CAREFULLY AFTER HANDLING OIL.

HAND THE OIL OVER TO OR HAVE IT COLLECTED BY THE NEAREST USED OIL RECYCLING COMPANY OR THE SUPPLIER.

**DO NOT DISPOSE OF OIL IN THE ENVIRONMENT
KEEP OUT OF THE REACH OF CHILDREN.**



BRAKE FLUID CAN DAMAGE PAINT FINISH, PLASTIC AND RUBBER. WHEN SERVICING THE BRAKING SYSTEM, PROTECT THESE COMPONENTS WITH A CLEAN CLOTH. ALWAYS WEAR PROTECTIVE EYEWEAR WHEN WORKING ON THE BRAKE SYSTEM. BRAKE FLUID IS EXTREMELY HARMFUL FOR THE EYES. IN THE EVENT OF ACCIDENTAL CONTACT WITH THE EYES, RINSE THE EYES IMMEDIATELY WITH PLENTY OF COOL, CLEAN WATER AND SEEK IMMEDIATE MEDICAL ATTENTION. KEEP OUT OF THE REACH OF CHILDREN.

Battery electrolyte and hydrogen gas

IMPORTANT



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. IN THE EVENT OF CONTACT WITH THE EYES, RINSE WITH PLENTY OF 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 SPILL ON PLASTIC COMPONENTS IN PARTICULAR. ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY BEING ACTIVATED.

Maintenance rules

GENERAL PRECAUTIONS AND INFORMATION

When repairs, disassembly and reassembly of the vehicle is carried out, follow the following recommendations strictly.

BEFORE DISASSEMBLING COMPONENTS

- Remove the dirt, mud, dust and foreign objects from the vehicle before disassembling components. Wherever required, use the special tools designed for this vehicle.

DISASSEMBLING COMPONENTS

- Do not loosen and/or tighten the screws and nuts using pliers or other tools, but always use the specific wrench.
- Mark the positions on all the connection joints (hoses, cables, etc.) before separating them and identify them with different distinctive marks.
- Each piece should be clearly marked in order to be identified during the installation phase.
- Carefully clean and wash the disassembled components with detergents with a low flammability grade.

- Keep the coupled parts together because they have "adapted" to one another following normal wear.
- Some components must be used together or replaced entirely.
- Keep away from heat sources.

REASSEMBLING THE COMPONENTS

IMPORTANT

THE BEARING MUST ROTATE FREELY, WITHOUT JAMMING AND/OR NOISE, OTHERWISE THEY MUST BE REPLACED.

- Only use ORIGINAL Moto Guzzi SPARE PARTS.
- Always use the recommended lubricants and consumable material.
- Lubricate the parts (when possible) before reassembling them.
- When tightening screws and nuts, begin with the larger diameter or internal ones, proceeding diagonally. Tighten with subsequent steps before applying the prescribed torque.
- Always replace the locknuts, gaskets, seal rings, snap rings, O-Rings (OR), cotter pins and screws if they have damaged thread, with new ones.
- When disassembling the bearings, lubricate them abundantly.
- Ensure that each component has been assembled correctly.
- After a repair or periodic maintenance operation, carry out the preliminary checks and test the vehicle on private property or in an area with light traffic.
- Clean all coupling surfaces, oil seal rims and gaskets before refitting them. Smear a light layer of lithium-based grease on the oil seal rims. Reassemble oil seals and bearings with the brand or lot number facing outward (visible side).

ELECTRICAL CONNECTORS

The electrical connectors should be disconnected as follows. Failure to observe these procedures will cause irreparable damage to the connector and the wiring:

If present, press on the specific safety catches.

- Grip the two connectors and unplug them, pulling them apart in opposite directions.
- If there is dirt, rust, moisture, etc., carefully clean the inside of the connector using pressurised air.
- Ensure that the cables make correct contact with the terminals inside the connectors.
- Then plug in the two connectors, ensuring correct coupling (if the specific catches are present, you will hear a typical "click").

IMPORTANT

TO UNPLUG THE TWO CONNECTORS, DO NOT PULL ON THE CABLES.

NOTE

THE TWO CONNECTORS CAN BE PLUGGED IN ONLY IN ONE DIRECTION, THEREFORE JOIN THEM TOGETHER IN THE RIGHT DIRECTION.

TIGHTENING TORQUES

IMPORTANT

REMEMBER THAT THE TIGHTENING TORQUE FOR ALL THE FIXING ELEMENTS LOCATED ON WHEELS, BRAKES, WHEEL AXLES AND OTHER SUSPENSION COMPONENTS PLAY A FUN-

DAMENTAL ROLE IN GUARANTEEING THE SAFETY OF THE VEHICLE AND MUST BE KEPT AT THE PRESCRIBED VALUES. REGULARLY CHECK THE TIGHTENING TORQUE OF THE FIXING ELEMENTS AND ALWAYS USE A TORQUE WRENCH WHEN REFITTING. IF THESE WARNINGS ARE NOT OBSERVED, ONE OF THESE COMPONENTS COULD LOOSEN AND COME OFF, BLOCKING A WHEEL OR CAUSING OTHER PROBLEMS THAT WOULD COMPROMISE MANOEUVRABILITY, LEADING TO A CRASH WITH THE RISK OF SERIOUS INJURY OR EVEN DEATH.

Running-in

Running the engine in correctly is essential for ensuring engine longevity and functionality. Twisty roads and gradients are ideal for running in the engine, brakes and suspension effectively. Vary your riding speed during the running in period. This ensures that components operate in "loaded" conditions and then "unloaded" conditions, allowing the engine components to cool.

IMPORTANT

THE CLUTCH MAY EMIT A SLIGHT BURNING SMELL WHEN FIRST USED. THIS PHENOMENON SHOULD BE CONSIDERED NORMAL AND WILL DISAPPEAR AS SOON AS THE CLUTCH PLATES GET ADAPTED.

IT IS IMPORTANT TO STRAIN ENGINE COMPONENTS DURING RUN-IN, HOWEVER, MAKE SURE NOT TO OVERDO THIS.

IMPORTANT

THE FULL PERFORMANCE OF THE VEHICLE IS ONLY AVAILABLE AFTER THE SERVICE AT THE END OF THE RUNNING IN PERIOD.

Follow these guidelines:

- Do not fully open the throttle grip abruptly at low engine speeds, either during or after the running in period.
- During the first 100 Km (62 miles) use the brakes gently, avoiding sudden or prolonged braking. This allows the brake pad friction material to bed in correctly with the brake discs.



AFTER THE SPECIFIED MILEAGE, TAKE THE VEHICLE TO AN OFFICIAL Moto Guzzi DEALER FOR THE CHECKS INDICATED IN THE "AFTER RUN-IN" TABLE IN THE SCHEDULED MAINTENANCE SECTION TO AVOID INJURING YOURSELF, OTHERS AND /OR DAMAGING THE VEHICLE.

Vehicle identification

SERIAL NUMBER LOCATION

These numbers are necessary for vehicle registration.

NOTE

ALTERING IDENTIFICATION NUMBERS MAY BE SERIOUSLY PUNISHABLE BY LAW. IN PARTICULAR, MODIFYING THE CHASSIS NUMBER IMMEDIATELY VOIDS THE WARRANTY.

FRAME NUMBER

The chassis number is stamped on the RH side of the headstock.

This number consists of numbers and letters, as in the example shown below.

ZGUKWA000MXXXXXX

Key:

ZGU: WMI (World Manufacturer Identifier) code;

KW: model;

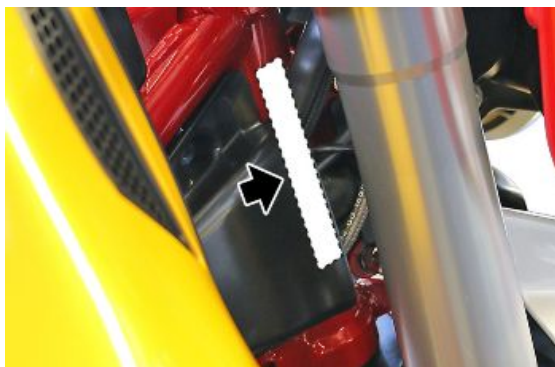
A00: version variant;

0: free digit

G: variable year of manufacturer (G - for 2019)

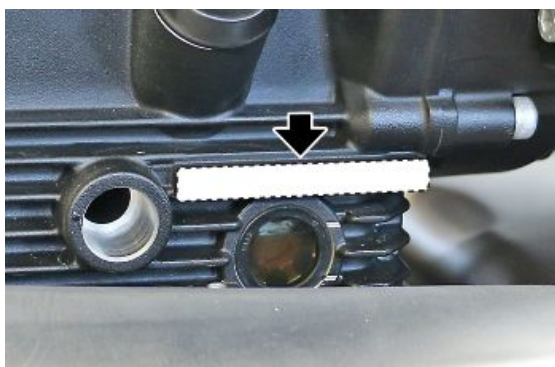
M: production plant (M= Mandello del Lario);

XXXXXX: serial number (6 digits);



ENGINE NUMBER

The engine number is stamped on the left side, close to the engine oil level check cap.



Dimensions and mass

DIMENSIONS AND MASS

| Specification | Desc./Quantity |
|---|-----------------------------------|
| Maximum Length | 2,240 mm (88.19 in) |
| Maximum width | 950 mm (37.40 in) |
| Height (with adjustable windshield) (V85 TT) | 1300 - 1325 mm (51.18 - 52.17 in) |
| Height (with adjustable windshield) (V85 TT Travel) | 1420 - 1445 mm (55.90 - 56.89 in) |
| Wheelbase | 1530 mm (60.24 in) |
| Kerb weight (V85 TT) | 229 kg (504.86 in) |
| Kerb weight (V85 TT Travel) | 242 kg (533.52 in) |

Engine

ENGINE

| Specification | Desc./Quantity |
|---------------------|--|
| Type | traverse-mounted twin-cylinder four-stroke V 90° |
| Number of cylinders | 2 |
| Engine capacity | 853 cc (52.05 cu in) |
| Bore / stroke | 84x77 mm (3.31x3.03 in) |
| Compression ratio | 10.5 ± 0.5: 1 |

| Specification | Desc./Quantity |
|--------------------|--|
| Starting | Electric |
| Idle engine speed | 1250 +/- 100 rpm. (rpm) |
| Clutch | single disc dry clutch with flexible coupling |
| Lubrication system | pressure-fed, controlled by valves and trochoidal pump |
| Air filter | cartridge-type dry filter |
| Cooling | air |

Transmission

TRANSMISSION

| Specification | Desc./Quantity |
|-----------------------|--------------------------------------|
| Primary drive | with gears, ratio: 18/23 = 1 : 1,277 |
| Gear ratios, 1st gear | 16 / 39 = 1: 2,437 |
| Gear ratios, 2nd gear | 18 / 32 = 1: 1,777 |
| Gear ratios, 3rd gear | 21 / 28 = 1: 1,333 |
| Gear ratios, 4th gear | 24 / 26 = 1: 1,083 |
| Gear ratios, 5th gear | 25 / 24 = 1: 0,96 |
| Gear ratios, 6th gear | 27 / 24 = 1 : 0,888 |
| Final drive | with shaft, ratio 8 / 33 = 1 : 4,125 |

GEARBOX

| Specification | Desc./Quantity |
|---------------|--|
| Type | mechanical, 6 speeds with foot lever on the left hand side of the engine |

Capacities

CAPACITY

| Specification | Desc./Quantity |
|---|---|
| Fuel tank capacity (including reserve) | 6.08 +/- 0.26 US gal (5.06 +/- 0.22 UK gal; 23 +/- 1 l) |
| Fuel tank reserve capacity | 1.32 +/- 0.13 US gal (1.10 +/- 0.11 UK gal; 5 +/- 0.5 l) |
| Engine oil | Oil change and oil filter replacement: 107.40 cu in (1760 cc) |
| Gearbox oil | 42.72 cu in (700 cc) |
| Bevel gear set oil | 10.98 cu in (180 cc) |
| Bevel gear oil (in case of replacement) | 9.76 cu in (160 cc) MAX |
| Seats | 2 |
| Maximum carrying load (V85 TT) | 987.67 (448 Kg) (rider + passenger + luggage) |
| Maximum carrying load (V85 TT Travel) | 1016.33 lb (461 Kg) (rider + passenger + luggage) |

Electrical system

ELECTRICAL SYSTEM

| Specification | Desc./Quantity |
|-----------------------------|------------------------------|
| Battery | 12 V - 12 Ah |
| Fuses | 30 - 20 - 15 (3) - 7.5 (4) A |
| Permanent magnet alternator | 12V - 430W |

BULBS

| Specification | Desc./Quantity |
|----------------------------------|----------------|
| High beam/low beam light | LED |
| Fog lights | LED |
| Front DRL | LED |
| Turn signal lights | LED |
| Rear running light / brake light | LED |
| Dashboard lighting | LED |

INDICATOR LAMPS

| Specification | Desc./Quantity |
|---|----------------|
| Gearbox in neutral | LED |
| High beam headlight | LED |
| Cruise control warning light | LED |
| ABS warning light | LED |
| MI warning light | LED |
| Turn indicators | LED |
| Overspeed threshold / gear shift warning lights | LED |
| Immobilizer warning light | LED |
| Fuel reserve | LED |
| MGCT warning light | LED |
| General alarm | LED |
| Daytime running lights warning light | LED |
| Side stand warning light | LED |

SPARK PLUGS

| Specification | Desc./Quantity |
|--------------------------|-------------------|
| Standard | NGK IR MR8BI-8 |
| Spark plug electrode gap | 0.8 mm (0.031 in) |
| Resistance | 7.5 KOhm (MAX) |

Frame and suspensions**CHASSIS**

| Specification | Desc./Quantity |
|---------------------|-----------------------------------|
| Type | high strength tubular steel frame |
| Steering rake angle | 25,7° |
| Trail | 128.3 mm (5.05 in) |

SUSPENSION

| Specification | Desc./Quantity |
|---------------|--|
| Front | Hydraulic telescopic fork.diam. 41 mm (1.61 in) |
| Travel | 168 mm (6.61 in) |
| Rear | Swingarm in die-cast light alloy with 1 shock absorber with adjustable spring pre-loading and hydraulic brake extension. |
| Travel | 102 mm (4.02 in) |

Brakes**BRAKES**

| Specification | Desc./Quantity |
|---------------|--|
| Front | stainless steel floating disc of diameter 320 mm (12.59 in) caliper with 4 counteracting pistons of diameter 32 mm (1.26 in) |
| Rear | stainless steel disc of diameter 260 mm (10.24 in) floating caliper with two pistons of diameter 22 mm (0.87 in) |

Wheels and tyres**TYRES**

| Specification | Desc./Quantity |
|---------------|-------------------------------|
| Front | 110 / 80 R19 59V |
| Tyre pressure | 2.5 bar (250 kPa) (36.26 PSI) |
| Rear | 150 / 70 R17 69V |
| Tyre pressure | 2.8 bar (280 Kpa) (40.61 PSI) |

| Specification | Desc./Quantity |
|---------------|---|
| CAUTION | When using anti-skid wheels it is recommended to decrease the inflation pressure by 0.2 bar (20 Kpa) (2.90 PSI) at the front and 0.3 bar (30 Kpa) (4.35 PSI) at the rear. |

WHEEL RIMS

| Specification | Desc./Quantity |
|---------------|--------------------|
| Type | alloy, with spokes |
| Front | 2.5" x 19" |
| Rear | 4.25" x 17" |

Supply

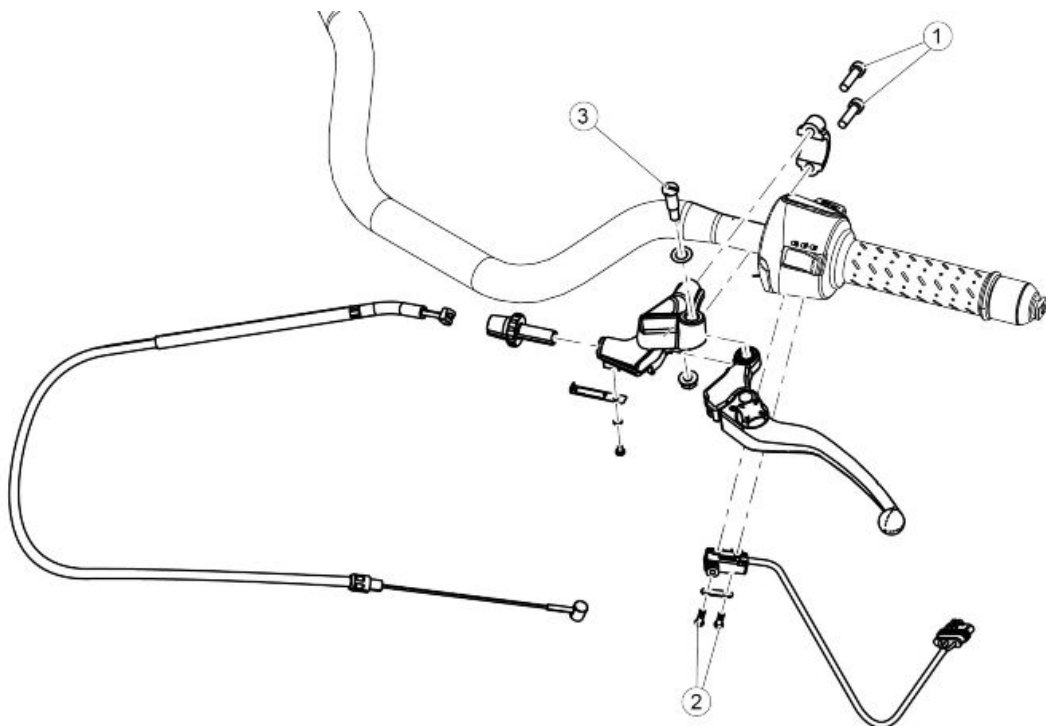
FUEL SYSTEM

| Specification | Desc./Quantity |
|---------------|--|
| Type | Electronic injection (E4: Marelli 7SM2 - E5: Marelli 11MP) |
| Diffuser | diam. 52 mm (2.05 in) |
| Fuel | Unleaded gasoline E10 (95 R.O.N.) |

Tightening torques

Chassis

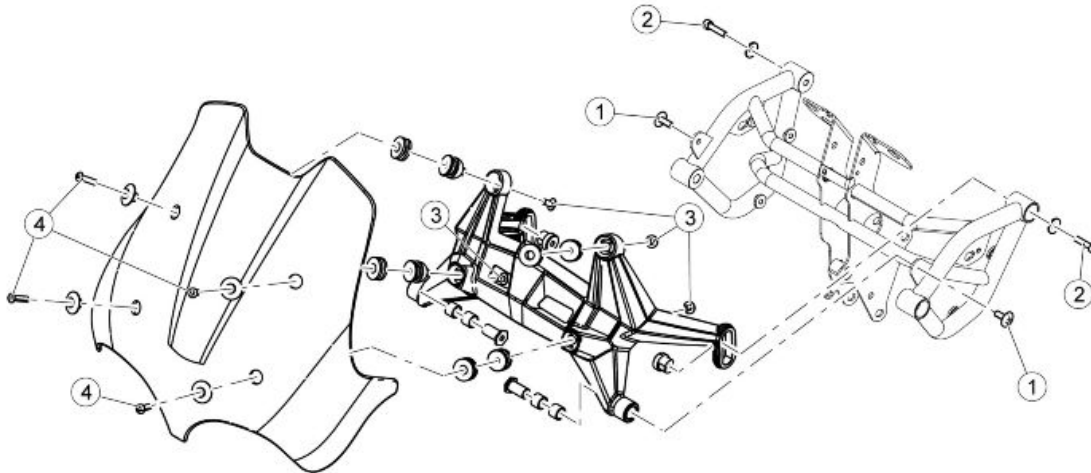
Front side



CLUTCH CONTROL

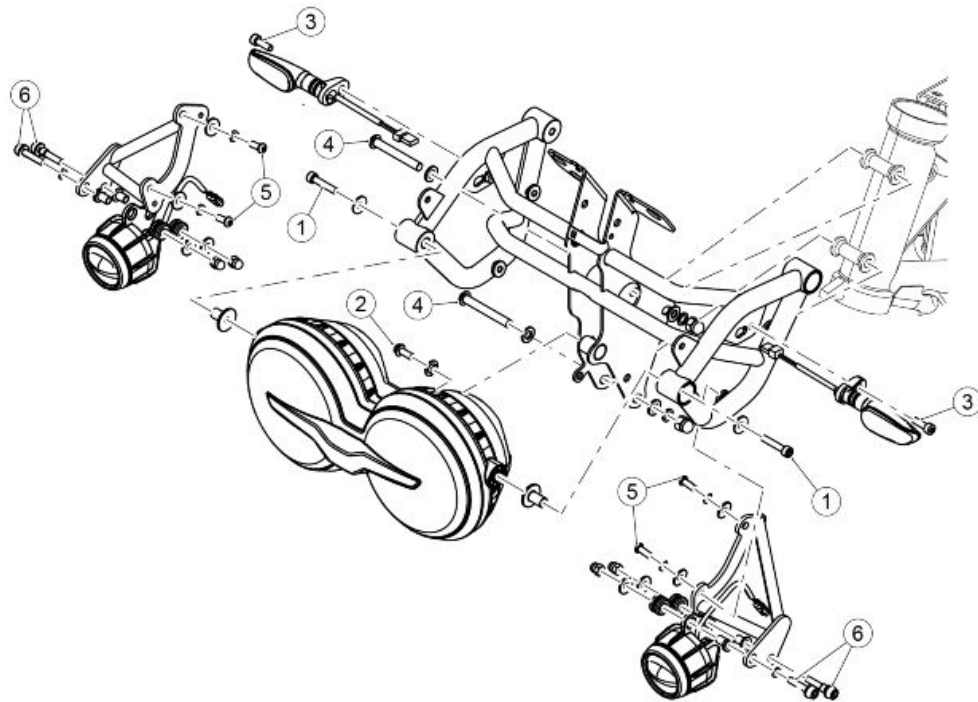
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-----------------------------------|
| 1 | Screws fixing the clutch command unit to the handlebar | M6 | 2 | 10 Nm (7.38 lbf ft) | Screws pre-mounted on the control |

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|-------------------|-----------------------------------|
| 2 | Screws fixing the clutch switch to clutch control lever | M2 | 2 | - | Manual |
| 3 | Clutch control lever fastening screw | M4 | 1 | 8 Nm (5.9 lbf ft) | Screws pre-mounted on the control |



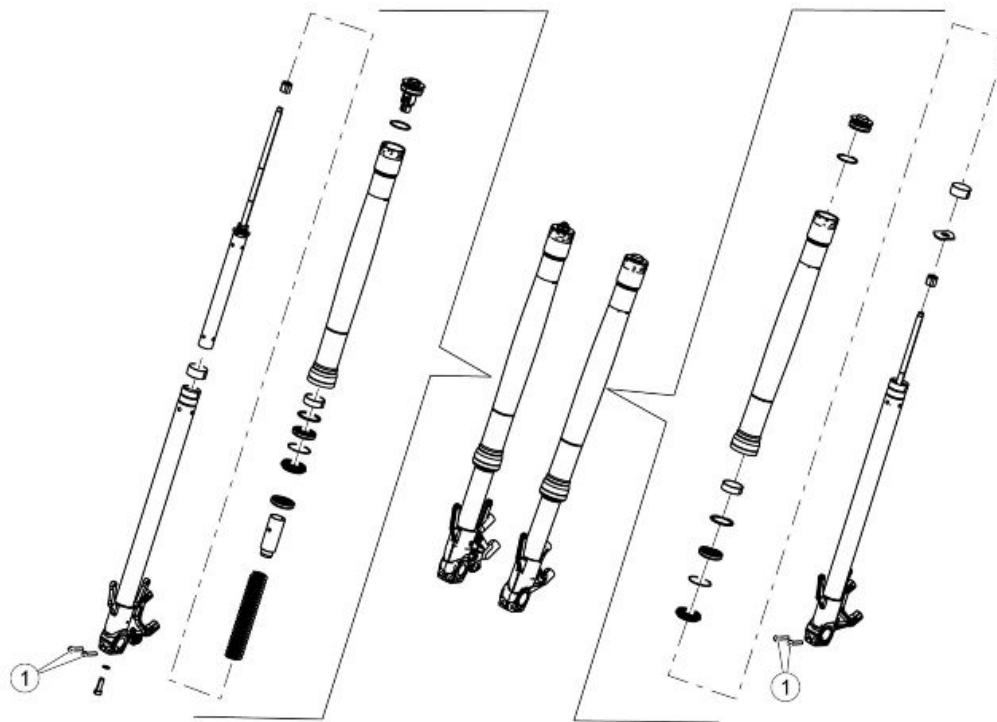
TOP FAIRING-WINDSHIELD

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|---------------------|-------|
| 1 | Front screw fastening the windshield to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Rear screw fastening the windshield to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screw fastening the windshield support bushings to the windshield bracket | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening the windshield to the windshield bracket | M6 | 4 | 10 Nm (7.38 lbf ft) | - |



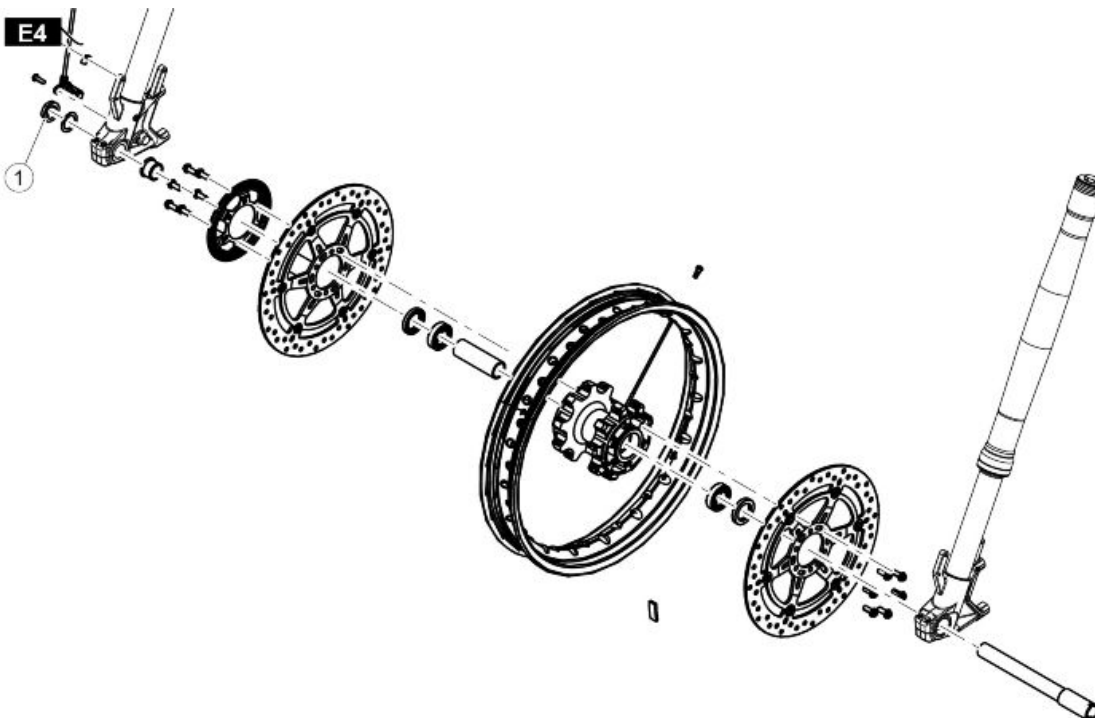
HEADLIGHT UNIT

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------|----------|---------------------------|--------------|
| 1 | Upper screws fastening the front headlamp to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Lower screw fastening the front headlamp to the front frame | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screws fastening the direction indicator to the front frame | M6 | 2 | 8 Nm (5.90 lbf ft) | - |
| 4 | Screws fastening the front frame to the headstock | M8 | 2 | 25 Nm (18.44 lbf ft) | With cap nut |
| 5 | HSC screws fastening the headlight supports to the front chassis | M6x15 | 4 | 10 Nm (7.38 lbf ft) | - |
| 6 | Cyl. head, hex. socket screws used for fastening the headlights to the supports | M6 | 4 | 8 Nm (5.90 lbf ft) (nuts) | With cap nut |



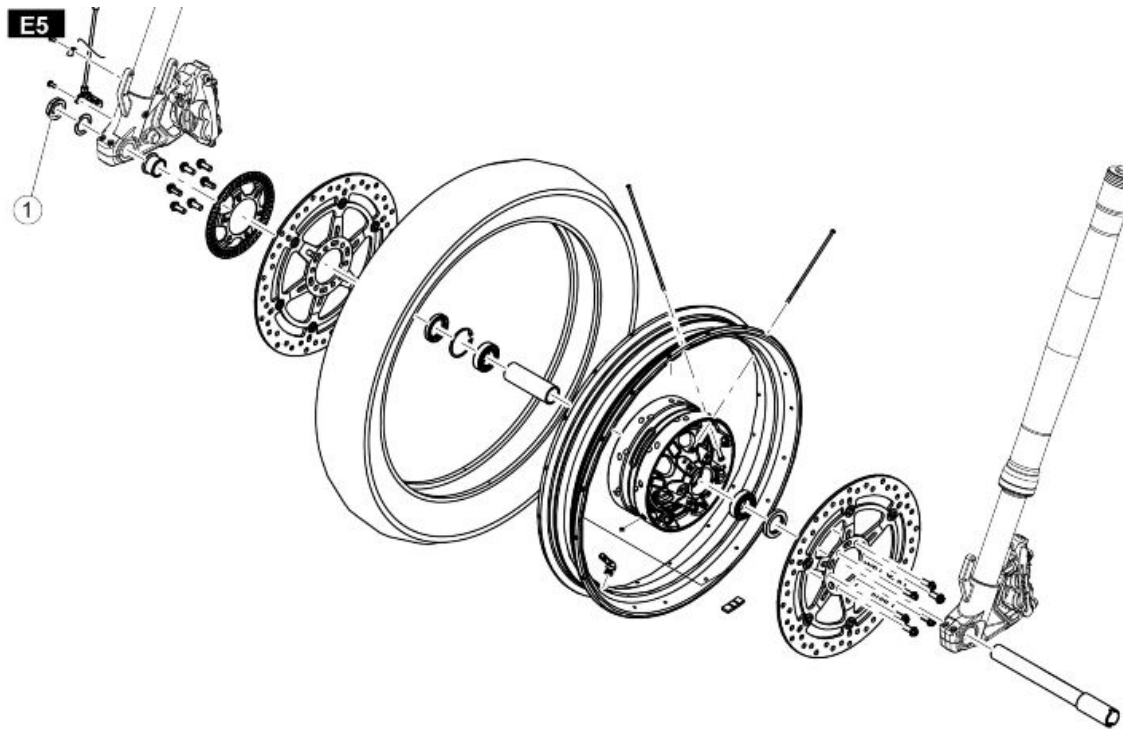
FRONT FORK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws fastening the calliper mounting bracket to the wheel axle | M6 | 4 | 10 Nm (7.38 lbf ft) | - |



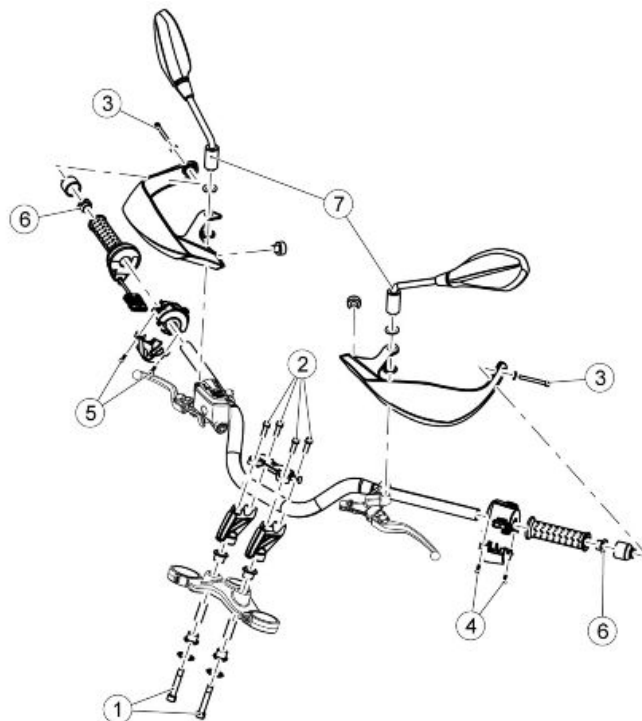
FRONT WHEEL - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------------|---------|----------|----------------------|-------|
| 1 | Nut fastening the front wheel axle | M25x1.5 | 1 | 80 Nm (59.01 lbf ft) | |



FRONT WHEEL - E5

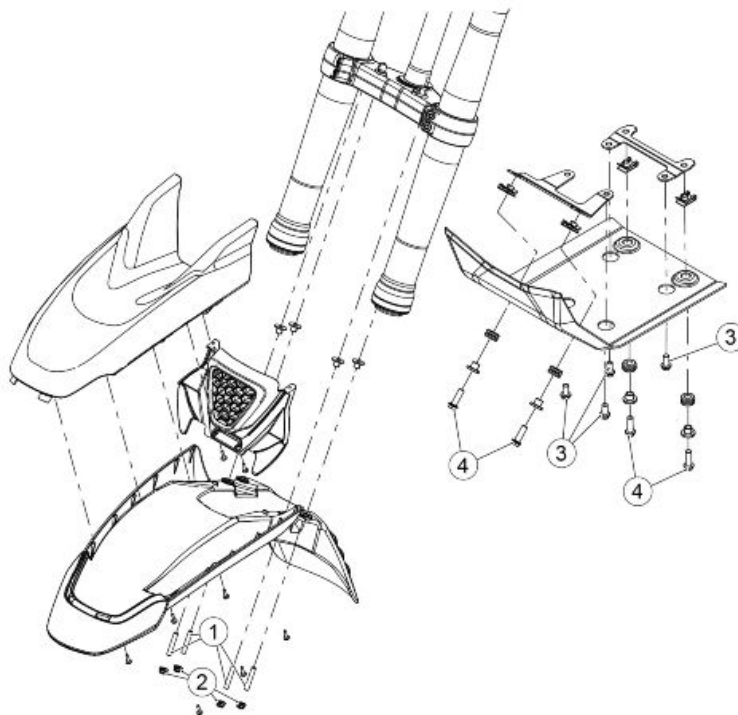
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------------|---------|----------|----------------------|-------|
| 1 | Nut fastening the front wheel axle | M25x1.5 | 1 | 80 Nm (59.01 lbf ft) | |



HANDLEBAR-CONTROLS

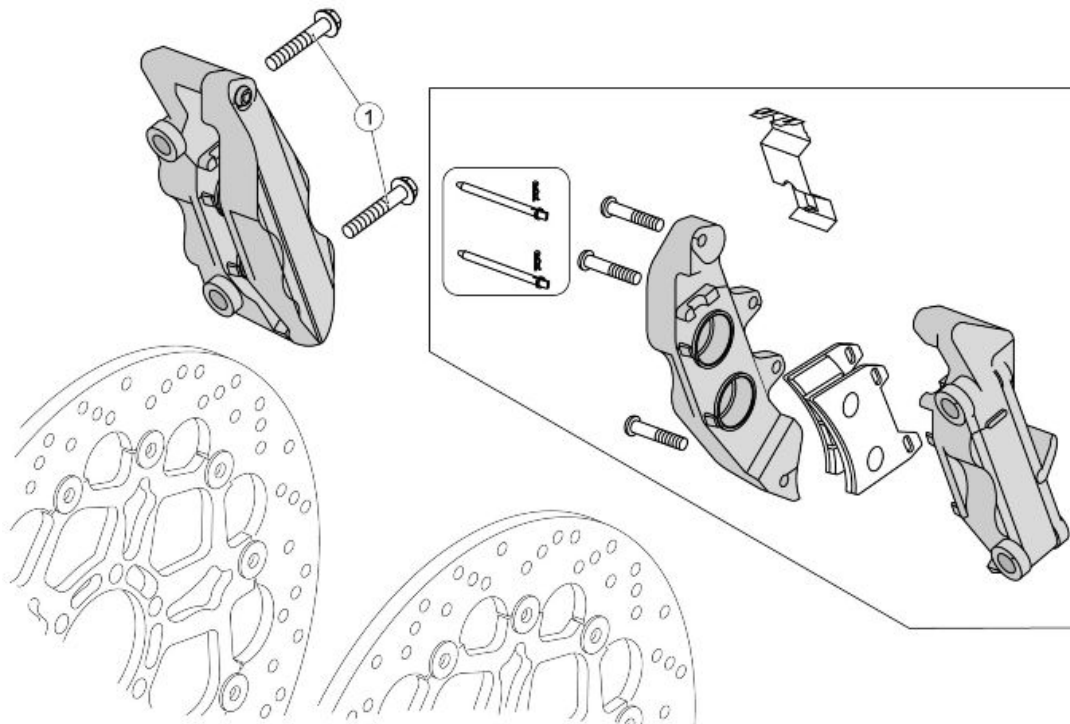
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Screws fastening the lower U-bolts to the upper steering yoke | M10 | 2 | 50 Nm (36.88 lbf ft) | - |

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|--|
| 2 | Screws fastening the lower U-bolt clamp to the handlebar | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Screws fastening the handguards and anti-vibration weights to the handlebar | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screws fastening the rear left shell to the left control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 5 | Screws fastening the rear right shell to the right control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 6 | Terminal fastening the anti-vibration weight to handlebar | - | 2 | 10 Nm (7.38 lbf ft) | - |
| 7 | Rear view mirror attachment | - | 2 | Manual | - |
| - | Screws fastening the electronic accelerator control to the handlebar | M4 | 1 | 4 Nm (2.95 lbf ft) | Screws pre-mounted on the throttle control |



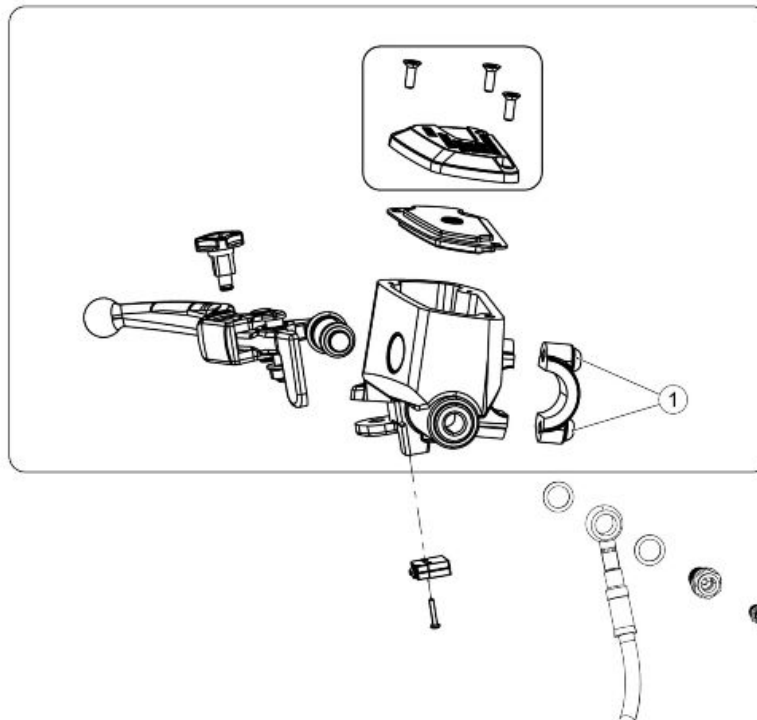
FRONT MUDGUARD - ENGINE FAIRING

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-----------|
| 1 | Stud bolt fastening the front mudguard to the lower steering yoke | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 2 | Nuts fastening the front mudguard to the lower steering yoke | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screws fastening the sump guard to the engine | M8 | 4 | 25 Nm (18.44 lbf ft) | Loct. 243 |
| 4 | Screws fastening the sump guard to the sump guard support bracket | M8 | 4 | 15 Nm (11.06 lbf ft) | Loct. 243 |



FRONT BRAKE CALLIPER

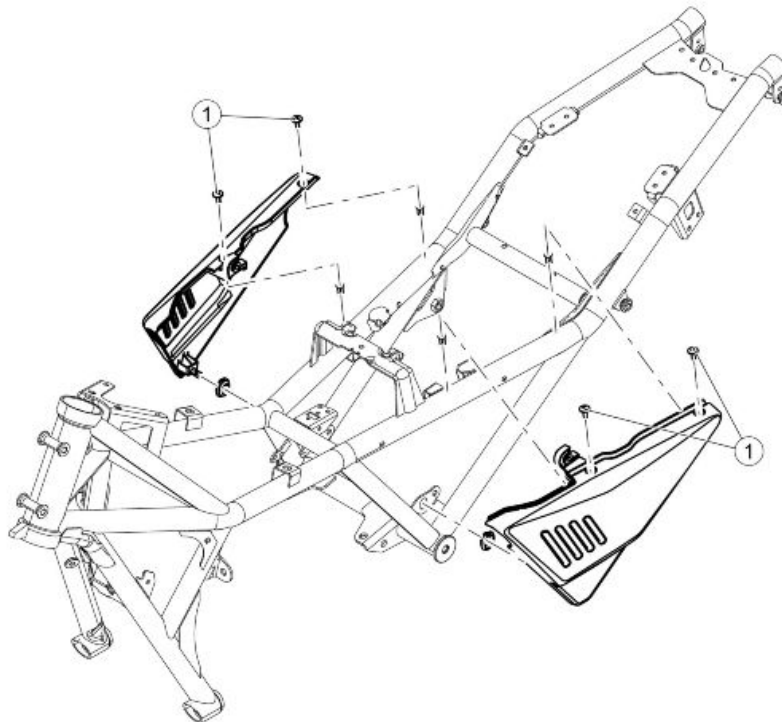
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|---------------------|-------|
| 1 | Screws fastening the front brake calliper to the calliper mounted bracket | M10 | 4 | 50 Nm (36.88 lb ft) | - |



FRONT BRAKE MASTER CYLINDER

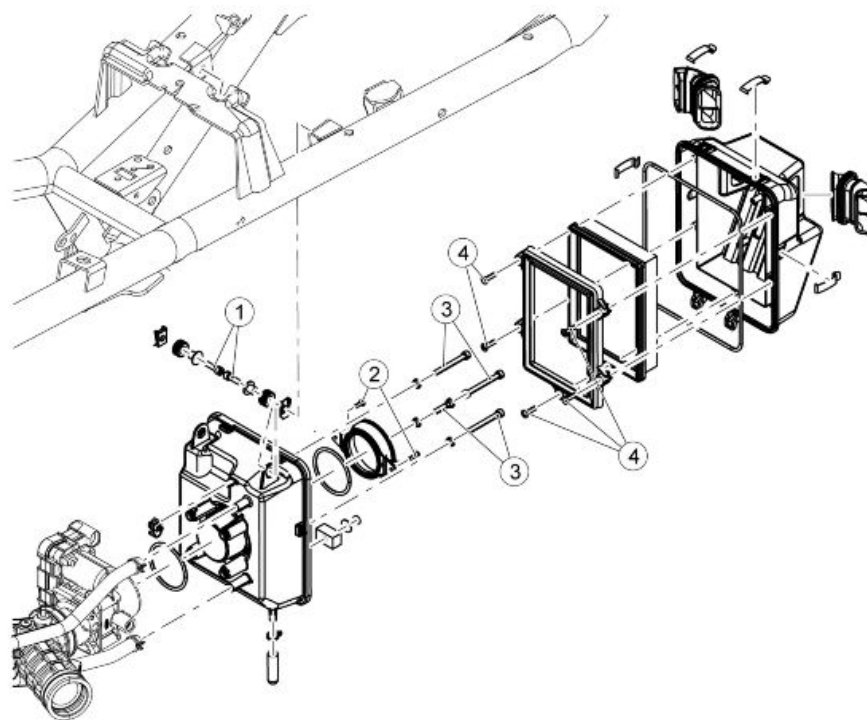
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|-------------------------------|---|
| 1 | Screws fastening the front brake master cylinder clamp to the handle-bars | M6 | 2 | 10 Nm (7.38 lbf ft) | Screws pre-assembled on the master cylinder |
| 2 | Brake pump cover fixing screws | - | 3 | 0.8-1.5 Nm (0.59-1.11 lb ft) | - |
| 3 | Special oil pipe fixing screw | - | 1 | 23-26 Nm (16.96-19.18 lbf ft) | - |
| 4 | Bleeder screw | - | 1 | 4-7 Nm (2.95-5.16 lb ft) | - |

Central part



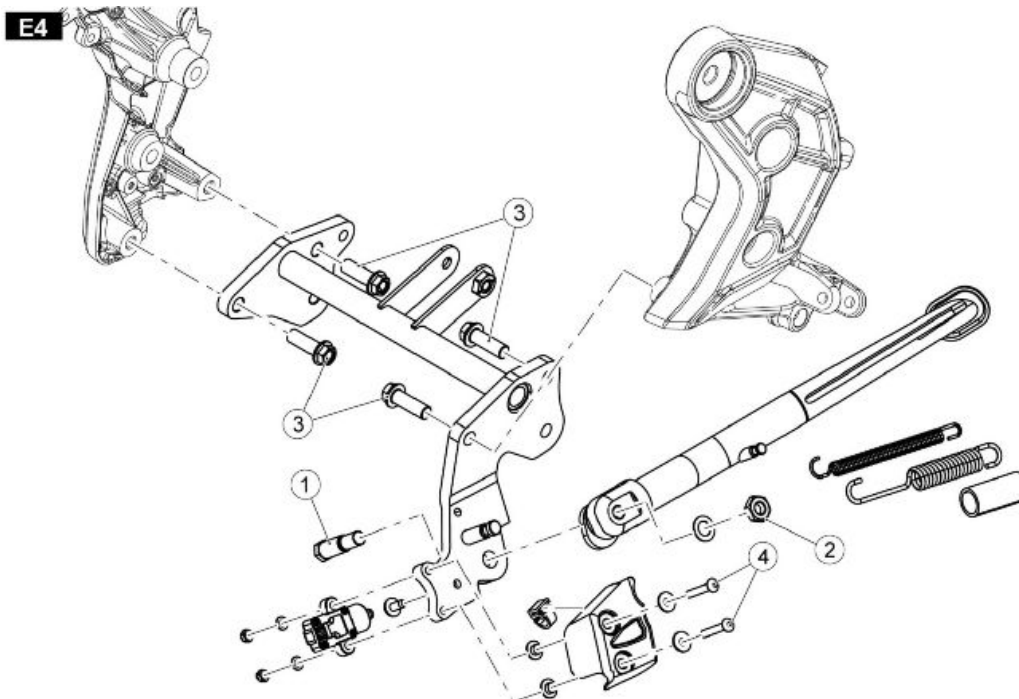
CENTRAL BODYWORK

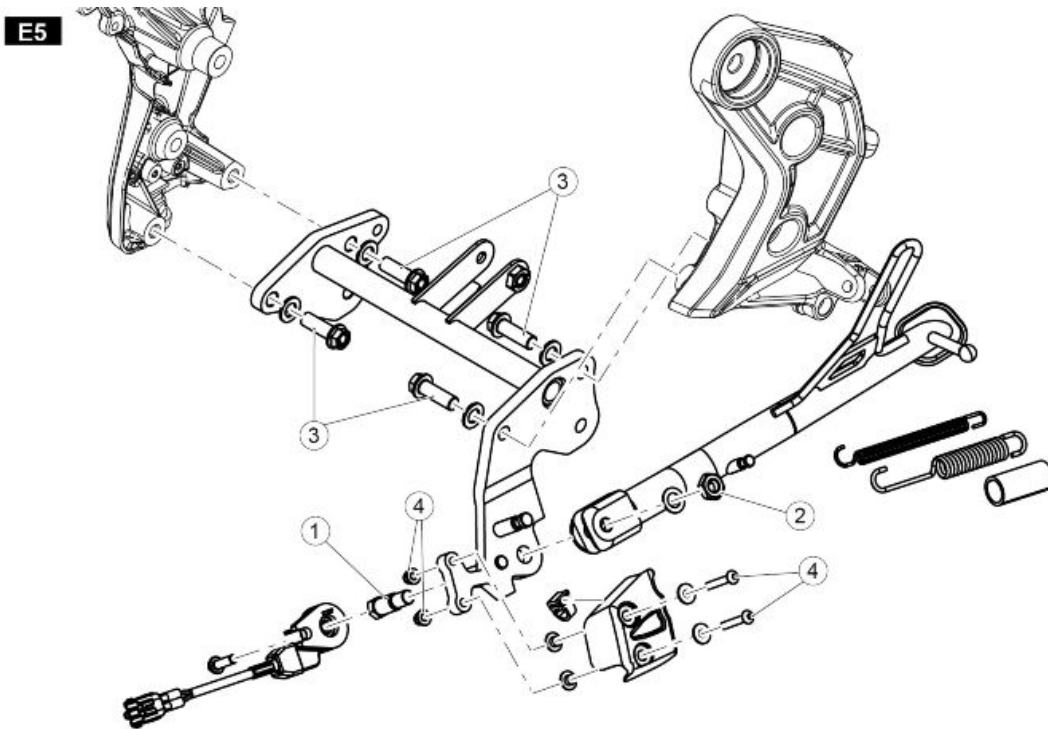
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screws fastening the side panels to the frame | M5 | 4 | 6 Nm (4.43 lbf ft) | - |



FILTER HOUSING

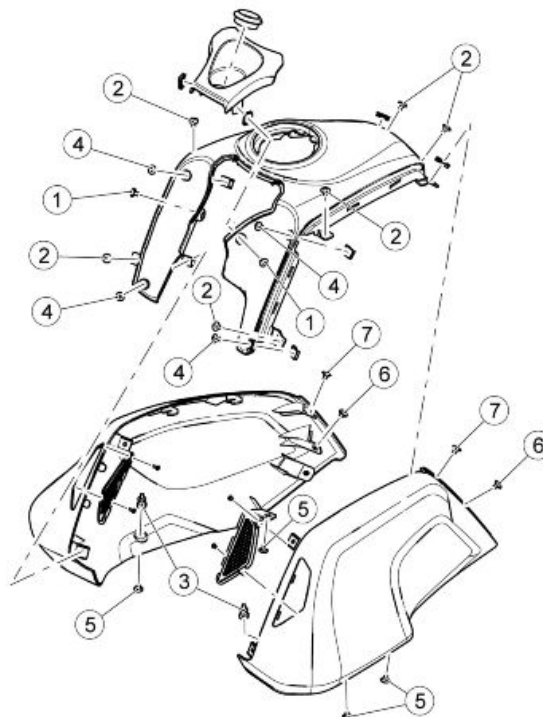
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------------|----------|---------------------|-------|
| 1 | Screws fastening the filter casing to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening the intake duct to the filter casing cover | TCB 4.2x16 | 2 | 3 Nm (2.21 lbf ft) | - |
| 3 | Screws fastening the throttle body to the filter casing cover | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screws fastening the air filter to the filter casing | M5 | 5 | 3 Nm (2.21 lbf ft) | - |





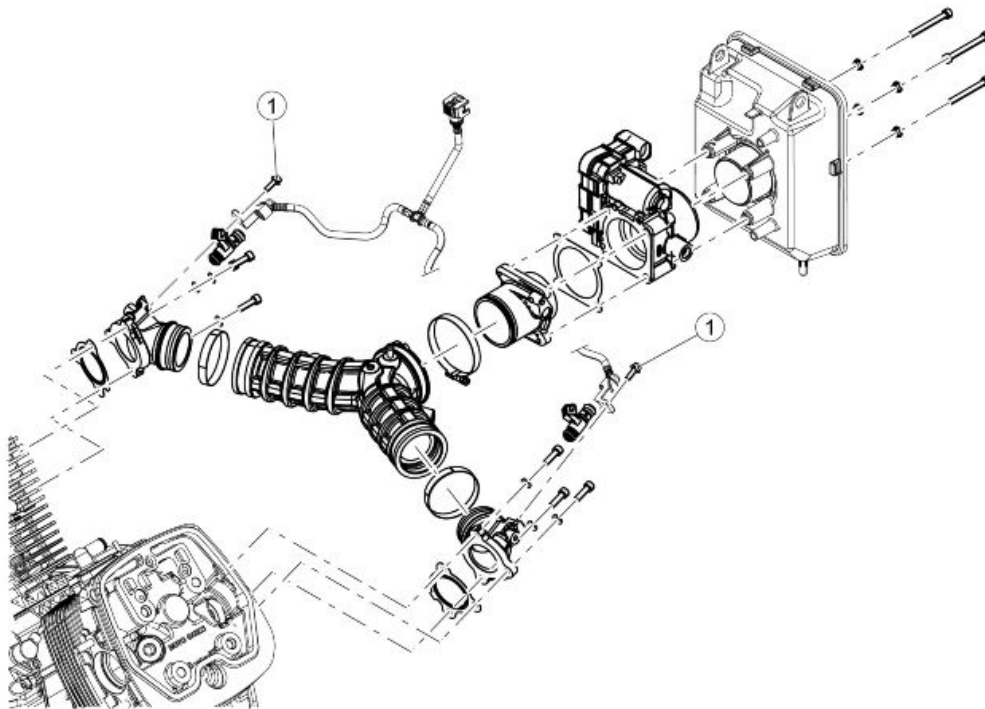
STAND

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------------|
| 1 | Side stand retainer pin | - | 1 | 10 Nm (7.38 lbf ft) | - |
| 2 | Nut fastening the side stand to the stand mounting | M10 | 1 | 30 Nm (22.13 lbf ft) | Loctite 243 |
| 3 | Screws fastening the stand mounting to the frame | M10 | 4 | 50 Nm (36.88 lbf ft) | - |
| 4 | Screws fastening side stand switch and related protection to the stand mounting | M5 | 4 | 10 Nm (7.38 lbf ft) | - |

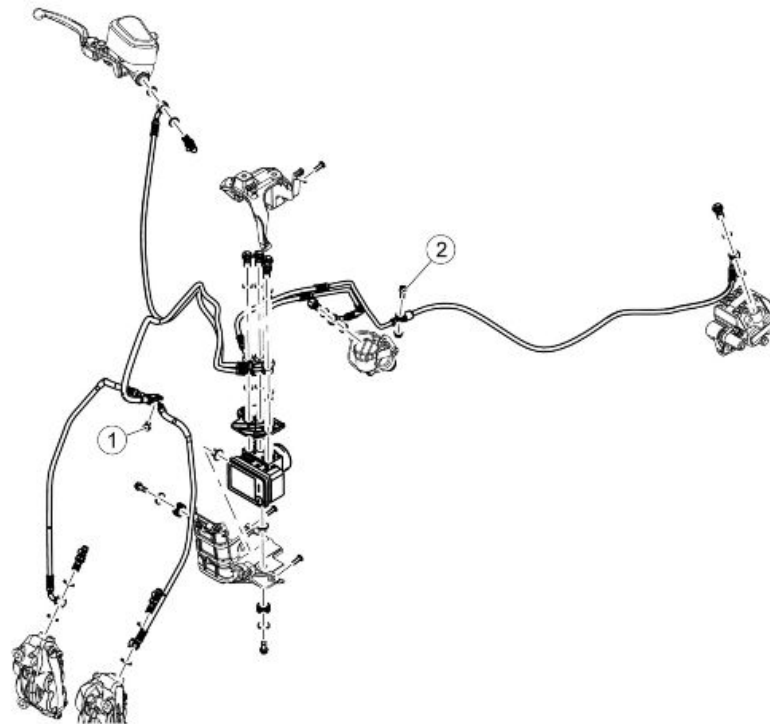


FUEL TANK COVER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|--------------------|-------|
| 1 | Screws fastening the ignition block cover to the tank cap cover | M5 | 2 | 4 Nm (2.95 lbf ft) | - |
| 2 | Screws fastening the tank cap cover to the fuel tank | M5 | 6 | 4 Nm (2.95 lbf ft) | - |
| 3 | Stud bolt fastening the side tank cover support to the fuel tank | - | 2 | 4 Nm (2.95 lbf ft) | - |
| 4 | Front screws fastening the tank cover to the fuel cap cover | M5 | 4 | 4 Nm (2.95 lbf ft) | - |
| 5 | Lower screws fastening the side tank cover to the fuel tank | M5 | 4 | 4 Nm (2.95 lbf ft) | - |
| 6 | Rear screws fastening the tank cover to the fuel tank | M5 | 2 | 4 Nm (2.95 lbf ft) | - |
| 7 | Rear screws fastening the tank cover to the tank cap cover | M5 | 2 | 4 Nm (2.95 lbf ft) | - |

**THROTTLE BODY**

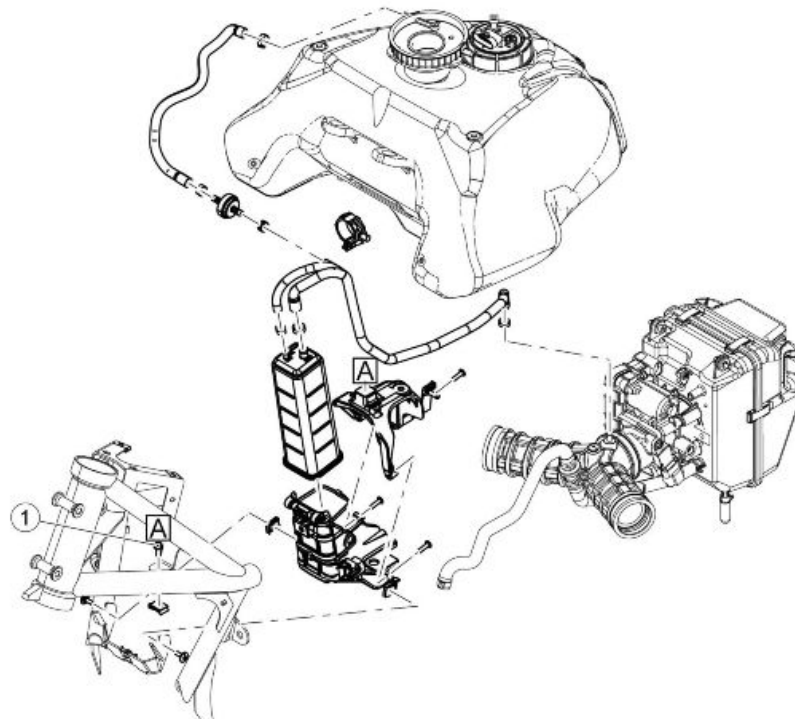
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screw fastening the injector caps to the in take fittings | - | 2 | 6 Nm (4.43 lbf ft) | - |



ABS BRAKING SYSTEM

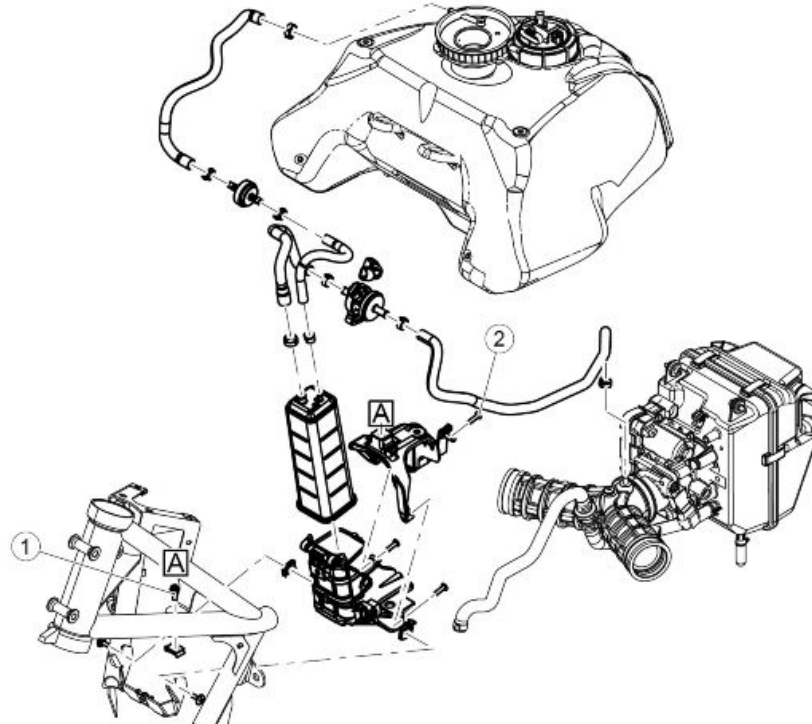
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screw fastening the brake pipe to the lower steering plate | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 2 | Rear screw fastening the brake pipe to the frame | M6 | 1 | 10 Nm (7.38 lbf ft) | - |

E4

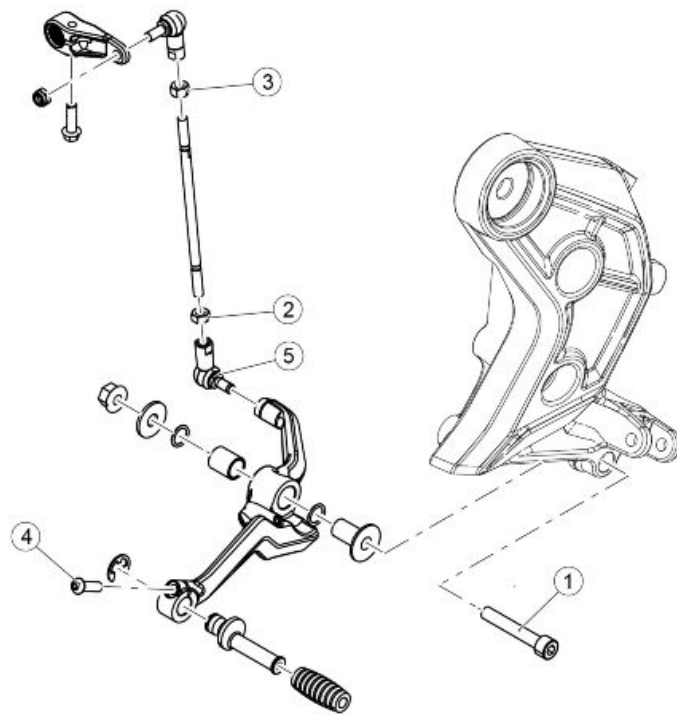


PETROL VAPOUR RECOVERY SYSTEM - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screw fastening the coil support plate to the ABS system | M6 | 1 | 10 Nm (7.38 lbf ft) | - |

E5**PETROL VAPOUR RECOVERY SYSTEM - E5**

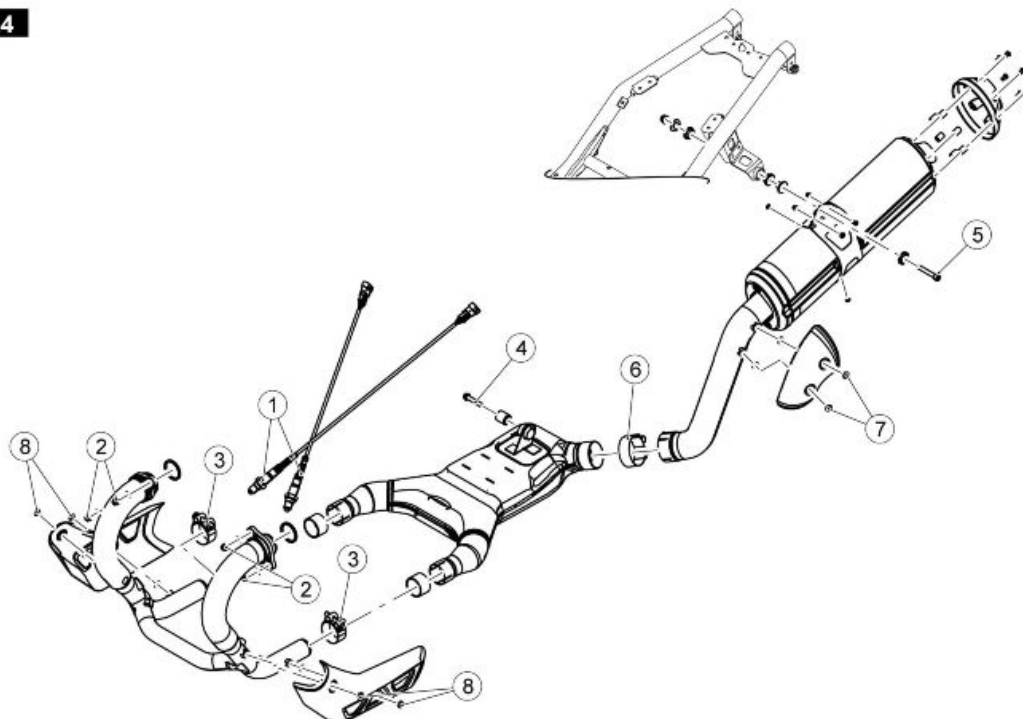
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screw fastening the coil support plate to the ABS system | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screw fastening the PURGE valve to the coil mounting bracket | M6 | 1 | 10 Nm (7.38 lbf ft) | - |



GEARBOX LEVER

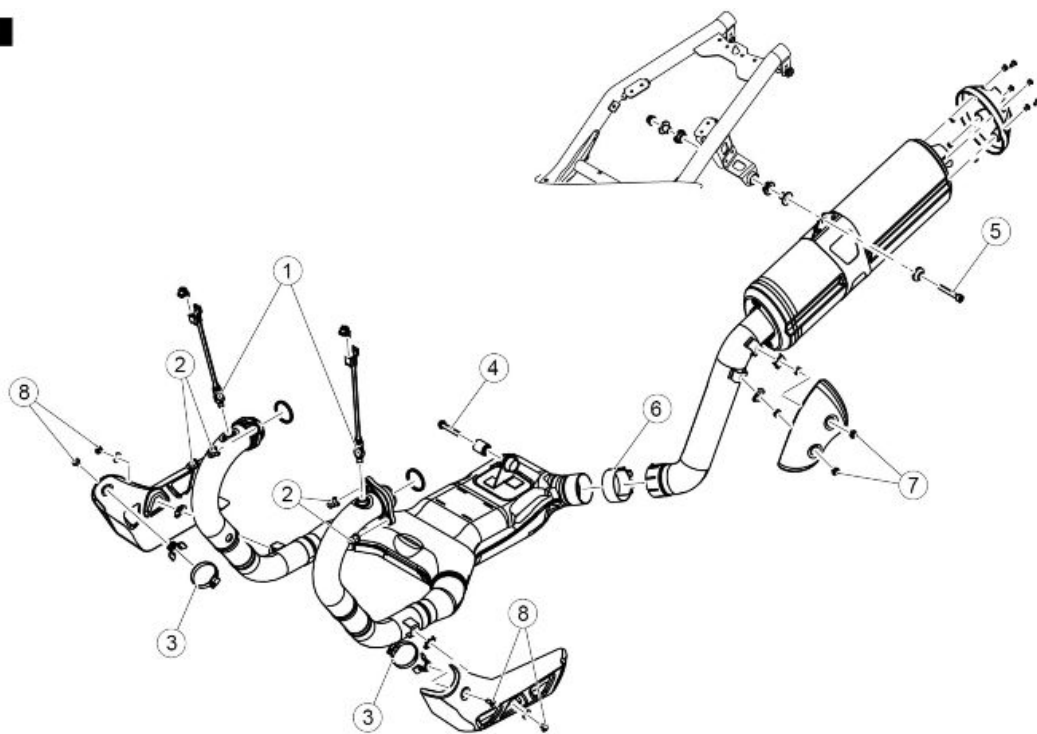
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|----------------------|
| 1 | Screw fastening left frame plate to the gearbox | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 2 | Nut fastening the gear control linkage to the gear lever | M6 | 1 | - | Manual with template |
| 3 | Nut fastening the gear control linkage to the pre-selector lever | M6 | 1 | - | Manual with template |
| 4 | Peg fixing screw | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Pre-impregnated ball joint | M6 | 1 | 6.5 Nm (4.79 lb ft) | - |

E4

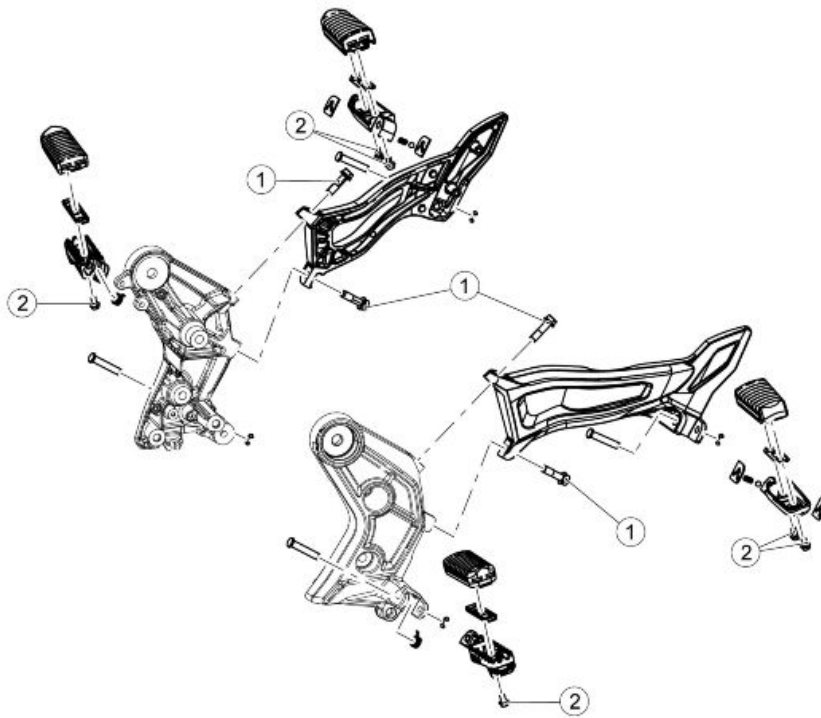


SILENCER - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Lambda probe fastener | - | 2 | 38 Nm (28.03 lbf ft) | - |
| 2 | Nut fixing exhaust manifolds to engine | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Clamp fastening the compensator to the exhaust manifold | - | 2 | 25 Nm (18.44 lbf ft) | - |
| 4 | Screw fastening the compensator to the stand mounting | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 5 | Muffler/frame fastening screw | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Clamp fixing the muffler to the compensator | - | 1 | 25 Nm (18.44 lbf ft) | - |
| 7 | Screws fastening the muffler heat-shield to the muffler | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 8 | Screw fastening the heat-shield to the manifolds | M6 | 4 | 10 Nm (7.38 lbf ft) | - |

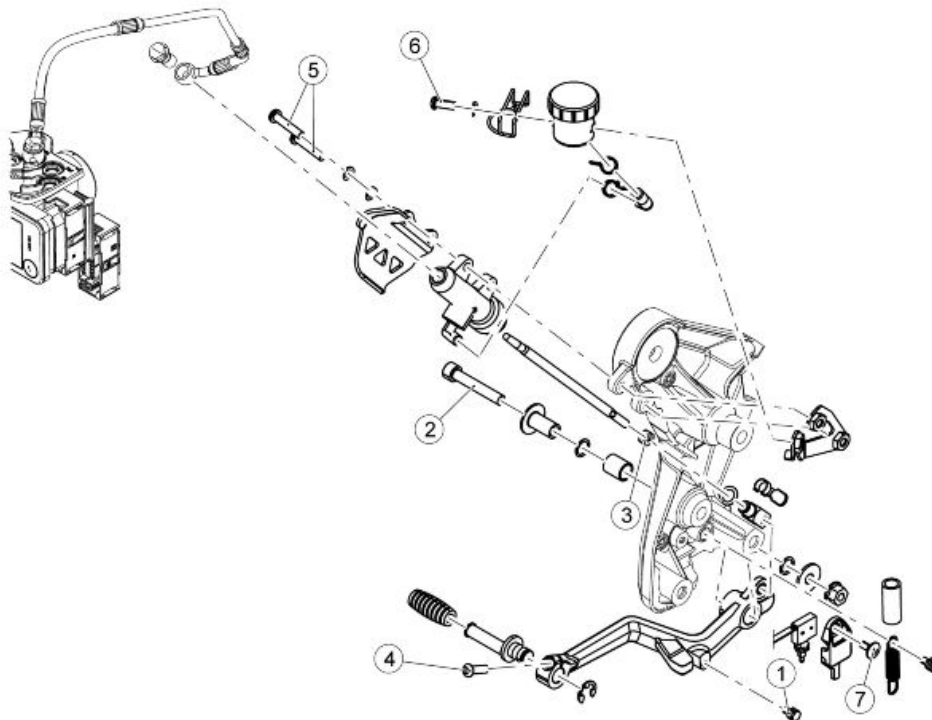
E5**SILENCER - E5**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Lambda probe fastener | - | 2 | 38 Nm (28.03 lbf ft) | - |
| 2 | Nut fixing exhaust manifolds to engine | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Pipe clamp fixing to fasten the heat shield to the manifold | - | 2 | 3.5 Nm (2.58 lbf ft) | - |
| 4 | Screw fastening the compensator to the stand mounting | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 5 | Muffler/frame fastening screw | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Clamp fixing the muffler to the compensator | - | 1 | 25 Nm (18.44 lbf ft) | - |
| 7 | Screws fastening the muffler heat-shield to the muffler | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 8 | Screw fastening the heat-shield to the manifolds | M6 | 4 | 10 Nm (7.38 lbf ft) | - |



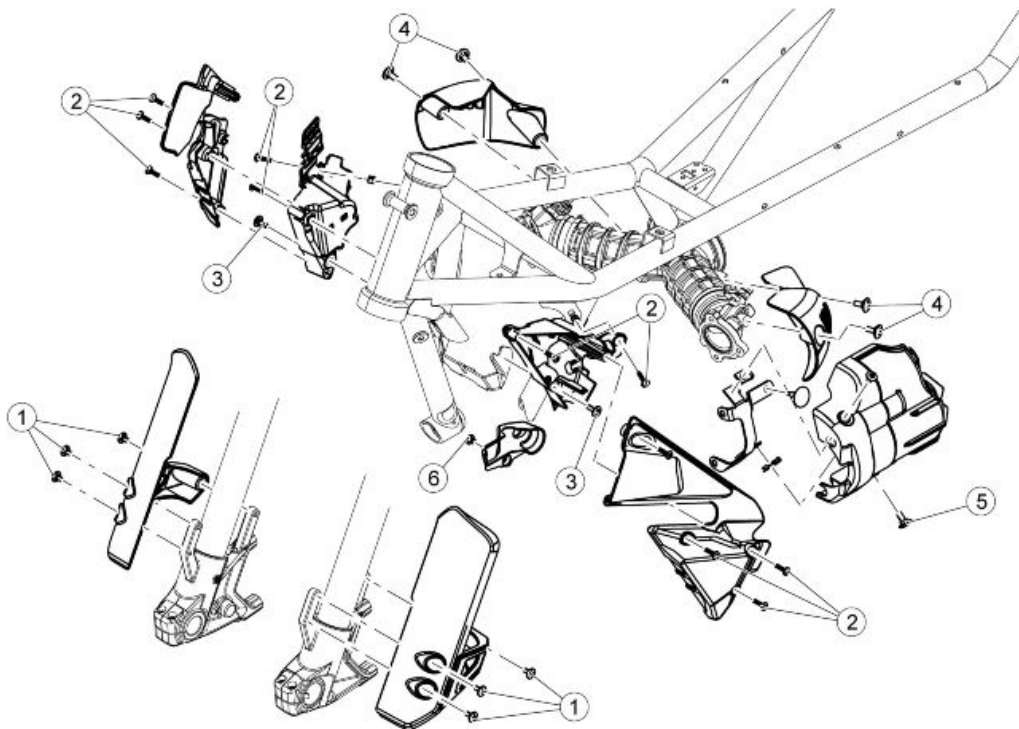
FOOTRESTS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws for fastening the passenger's footrests supports to the frame support | M8 | 4 | 25 Nm (18.4 lb ft) | - |
| 2 | Screws fastening the footrest rubber to the footrest | M6 | 6 | 10 Nm (7.38 lbf ft) | - |
| - | Screws fastening the passenger heel guard to the passenger footrest support | M6 | 2 | 10 Nm (7.38 lbf ft) | - |

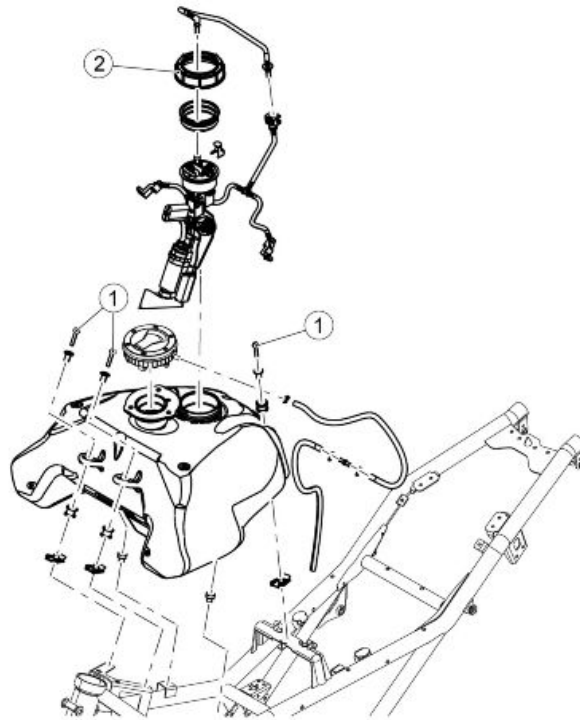


REAR BRAKE MASTER CYLINDER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Pin fastening the rear brake lever spring coupling to the frame plate | - | 1 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screw fastening the rear brake lever to the frame plate | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 3 | Nut fastening the rear master cylinder rod to the lever | M6 | 1 | - | - |
| 4 | Peg fixing screw | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Screws fastening the rear master cylinder and oil reservoir support to the frame plate | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 6 | Screws fastening the oil reservoir and cap retainer to the oil reservoir support bracket | M6 | 1 | 6 Nm (4.43 lbf ft) | - |
| 7 | Screw fastening the rear stop switch to the right frame plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Pin fastening the rear brake lever spring coupling to the complete rear brake lever | - | 1 | 6 Nm (4.43 lbf ft) | - |

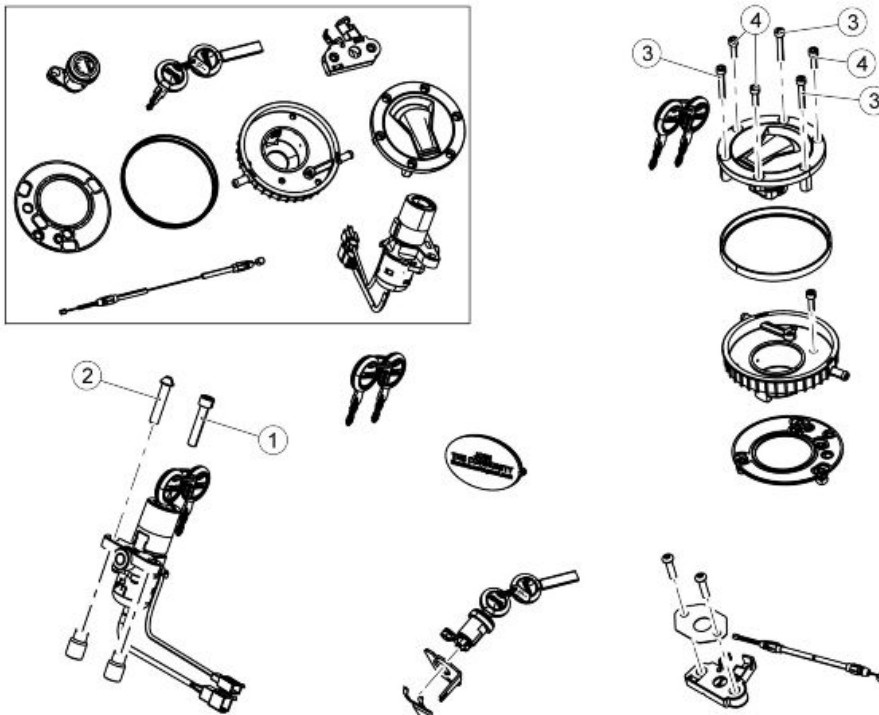
**GUARDS**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------------------|----------|--------------------|-------|
| 1 | Screws fastening the fork guards to the fork stanchions | M5 | 6 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the headstock cover to the connectors box | Self-tapping 3x20 | 11 | 3 Nm (2.21 lbf ft) | - |
| 3 | Lower screws fastening the connectors box to the frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 4 | Pin fastening the rear brake lever spring coupling to the frame plate | M5 | 4 | 3 Nm (2.21 lbf ft) | - |
| 5 | Screws fastening the starter motor to the support bracket | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 6 | Screw fastening the oil pressure sensor cover to the engine | M5 | 1 | 6 Nm (4.43 lbf ft) | - |



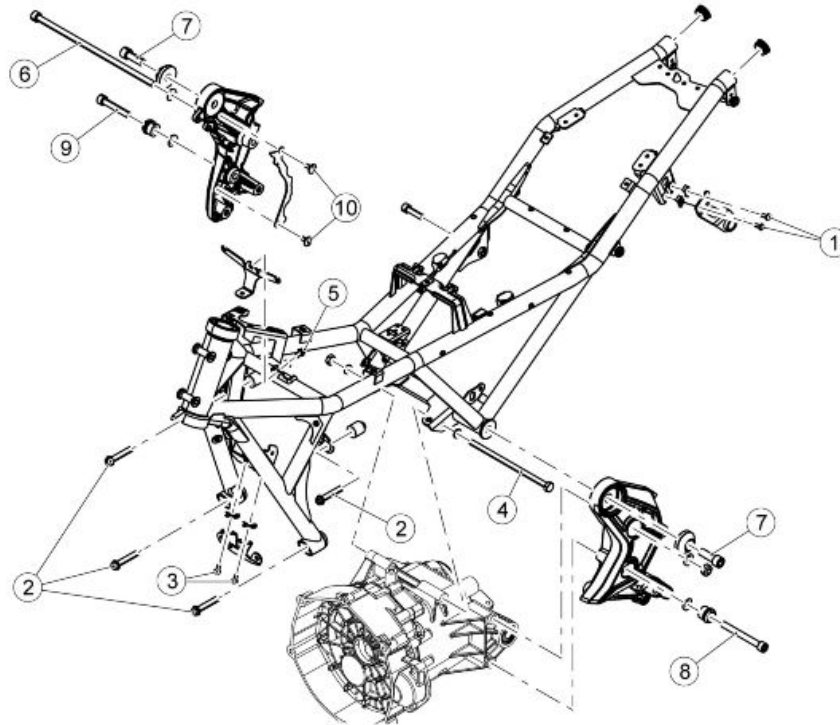
FUEL TANK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Screws fastening the fuel tank to frame | M6 | 3 | 10 Nm (7.38 lbf ft) | - |
| 2 | Ring nut fastening the fuel pump to the fuel tank | - | 1 | 20 Nm (14.75 lbf ft) | - |



LOCKS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|----------------------------------|
| 1 | Screw fastening the starter switch to the frame | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 2 | Screw fastening the starter switch to the frame | M8 | 1 | - | Shear head screw until it breaks |
| 3 | Screws fastening the fuel tank cap to the fuel tank | M5 | 3 | 6 Nm (4.43 lbf ft) | - |
| 4 | Screws fastening the fuel tank cap to the fuel tank | M5 | 4 | 6 Nm (4.43 lbf ft) | - |

**CHASSIS**

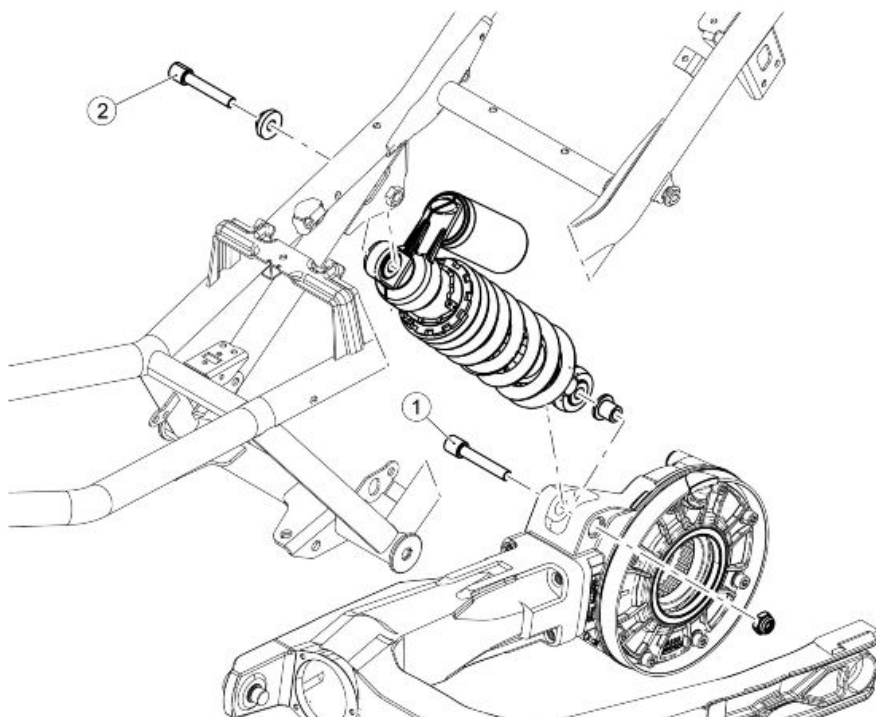
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|----------|
| 1 | Screws fastening muffler support bracket to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening frame to the engine | M10 | 4 | 50 Nm (36.88 lbf ft) | - |
| 3 | Screws fastening voltage regulator support bracket to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening frame to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 5 | Screw fixing coils mounting plate to the frame | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Screw fastening right frame plate and left frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | With nut |
| 7 | Screw fastening the right frame plate to the frame | M12 | 2 | 80 Nm (59.00 lbf ft) | - |
| 8 | Screw fastening left frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 9 | Screw fastening right frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 10 | Screw fastening the rear stop switch cable cover to the right frame plate | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



SADDLE

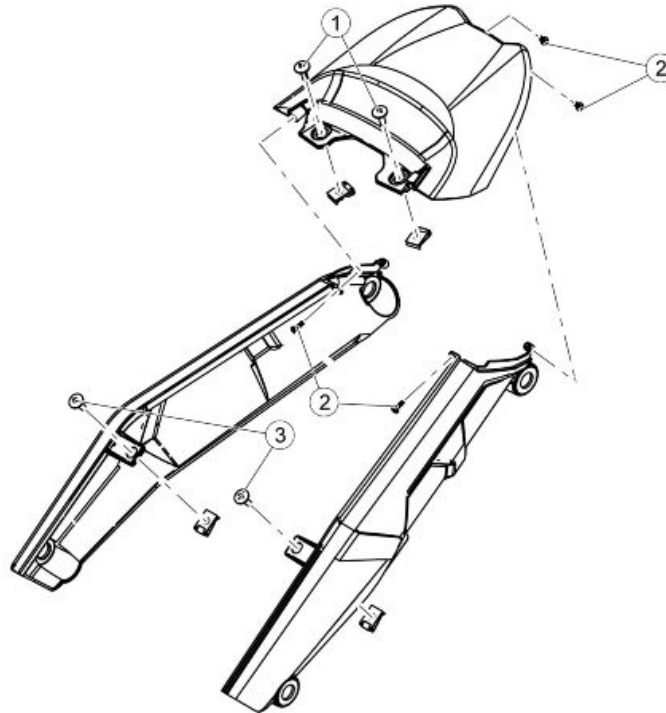
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| - | Self-locking nuts fixing the lumbar support | M5 | 2 | 2.5 Nm (1.84 lbf ft) | - |

Back side



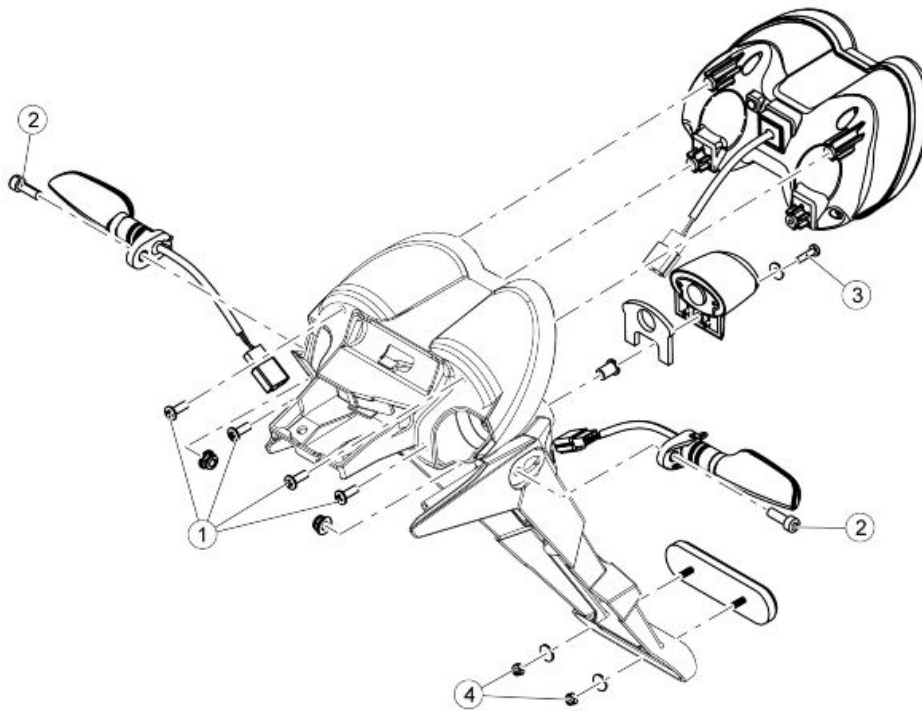
SHOCK ABSORBER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Rear shock absorber to gearbox fixing screw | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 2 | Rear shock absorber to frame fixing screw | M10 | 1 | 50 Nm (36.88 lbf ft) | - |



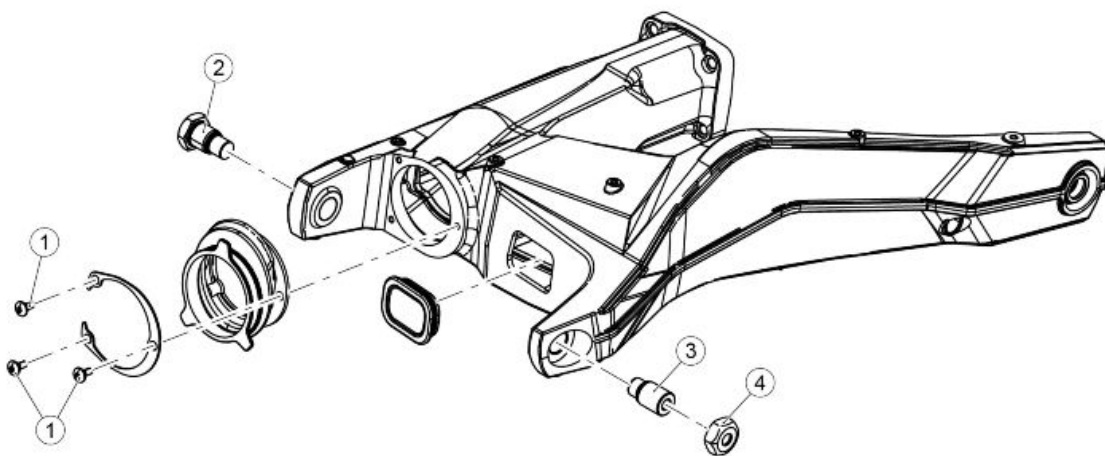
REAR BODYWORK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|---------------------|----------|--------------------|-------|
| 1 | Rear cover fixing screw | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 2 | Central rear cover to side rear cover fixing screw | Self-tapping 3.5x10 | 4 | 2 Nm (1.48 lbf ft) | - |
| 3 | Right and left side rear cover to frame fixing screws | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



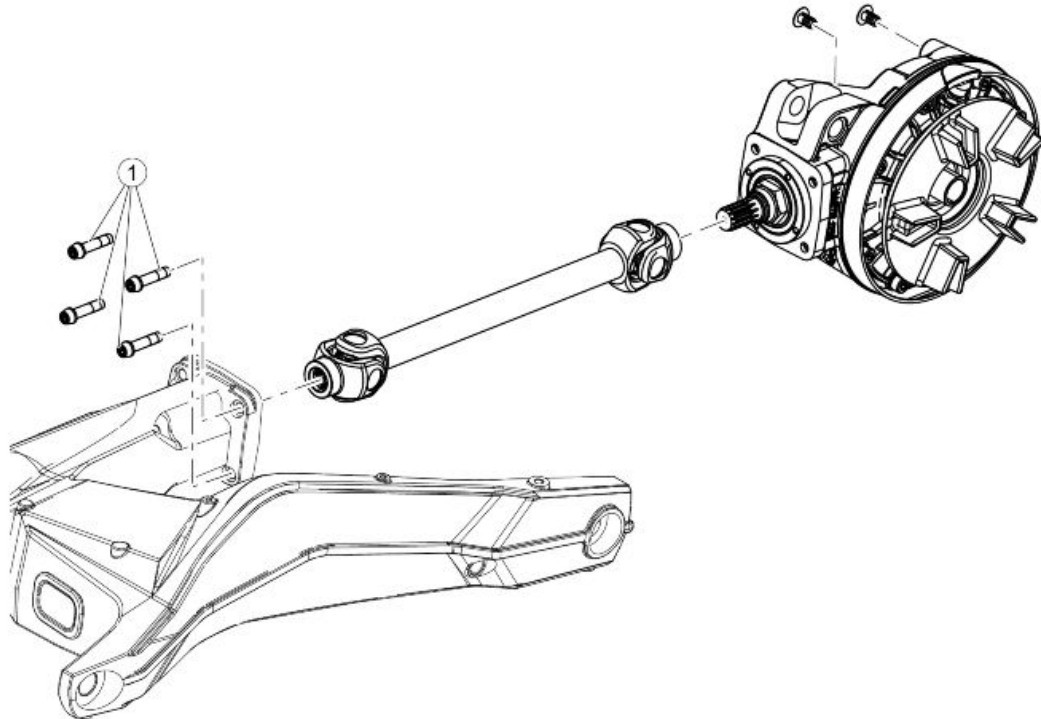
TAIL-LIGHT

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------------------|----------|--------------------|-----------------------|
| 1 | Taillight to number plate holder fixing screws | Self-tapping 5x14 | 4 | 3 Nm (2.21 lbf ft) | - |
| 2 | Rear direction indicator to number plate holder fixing screws | M6 | 2 | 3 Nm (2.21 lbf ft) | With self-locking nut |
| 3 | Licence plate light to number plate holder fixing screws | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| 4 | Nuts fastening the rear reflector to the number plate holder | M4 | 2 | 4 Nm (2.95 lbf ft) | - |

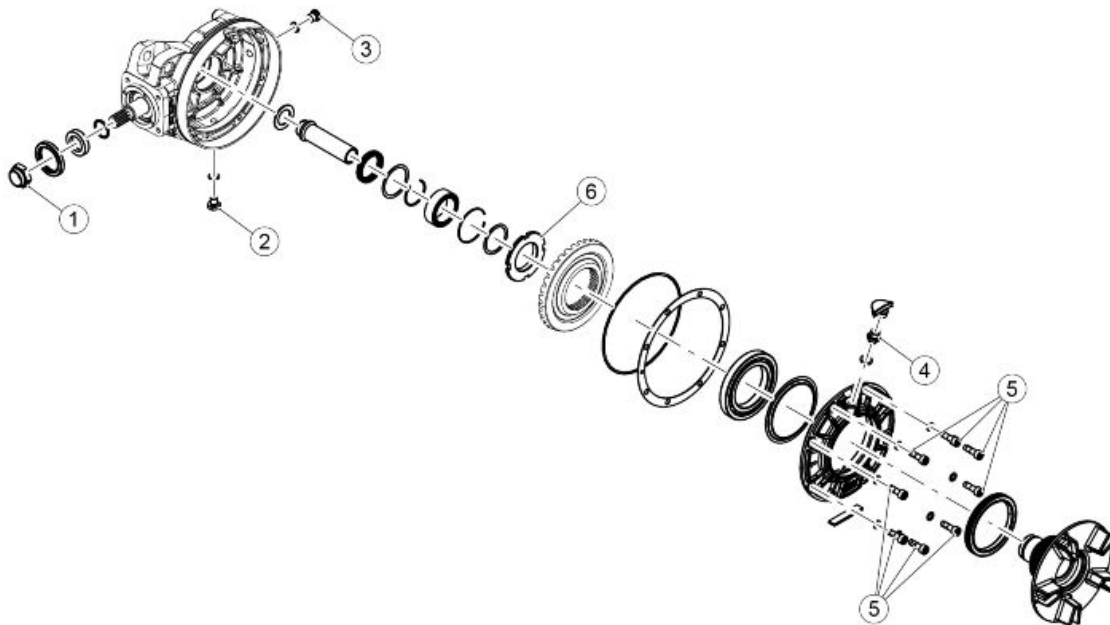


SWINGARM

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|--|
| 1 | Bellow to swingarm fixing screw | M5 | 3 | 6 Nm (4.43 lbf ft) | - |
| 2 | Swingarm pivot bolt fastening nut | - | 1 | 50 Nm (36.88 lbf ft) | - |
| 3 | Swingarm fastening pin | - | 1 | - | Screw until the end and unscrew by 1/4 of a turn |
| 4 | Swingarm pivot bolt fastening nut | - | 1 | 50 Nm (36.88 lbf ft) | - |
| - | Rear brake pipe feedthrough to swingarm fixing screw | M5 | 2 | 6 Nm (4.43 lbf ft) | - |

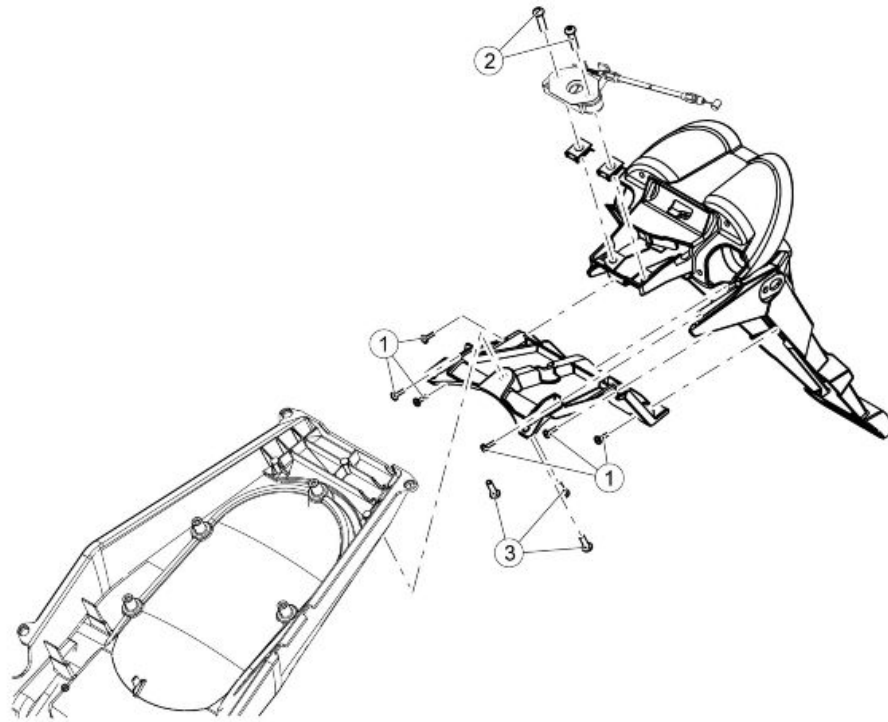
**GEARBOX**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------|----------|----------------------|-------|
| 1 | Gearbox preimpregnated TCC torx fixing screws | M8x35 | 4 | 25 Nm (18.44 lbf ft) | - |



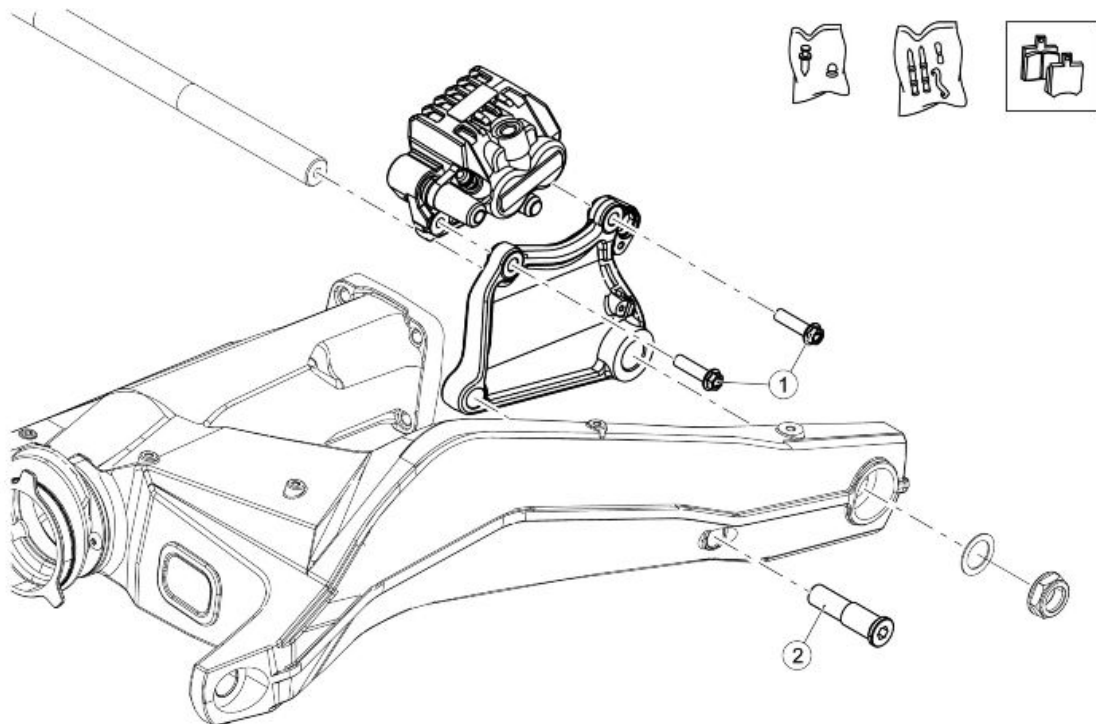
GEARBOX - COMPONENTS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--------------------------------|-------|----------|-----------------------|--|
| 1 | Pinion fastening nut | M25 | 1 | 100 Nm (73.76 lbf ft) | Loct. 648 + Nut re-bating on hollow pinion |
| 2 | Oil drainage plug | M10 | 1 | 30 Nm (22.13 lbf ft) | - |
| 3 | Oil load cap | M12 | 1 | 25 Nm (18.44 lbf ft) | - |
| 4 | Bleeder cap | - | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Gearbox cover fastening screws | M8x25 | 8 | 25 Nm (18.44 lbf ft) | - |
| 6 | Ring nut | - | 1 | 160 Nm (118.01 lb ft) | Loct. 243 + Riveting on the splash guard hub |
| - | Pinion bearings holder case | - | 1 | 50 Nm (36.88 lbf ft) | Loct. 243 |



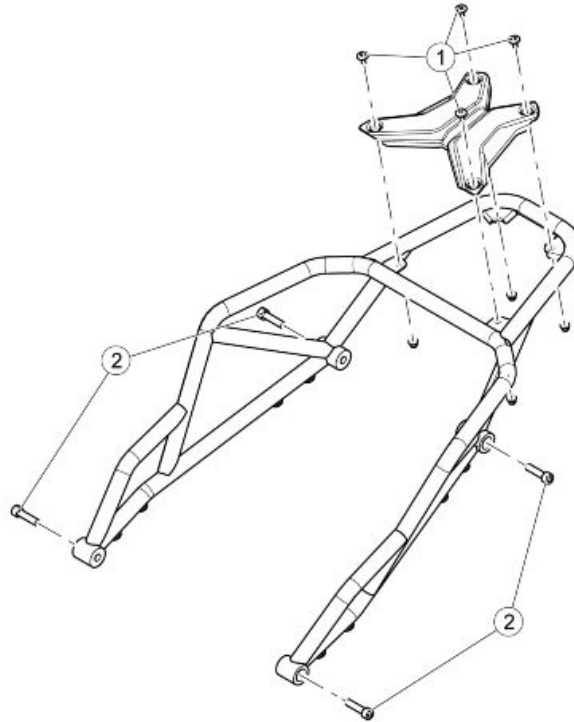
REAR MUDGUARD

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|---------------------|----------|--------------------|-------|
| 1 | Screws fastening the licence plate holder fastener to the licence plate holder | Self-tapping 3.9x14 | 6 | 3 Nm (2.21 lbf ft) | - |
| 2 | Screws fastening the licence plate holder to the frame | M6 | 2 | 8 Nm (5.90 lbf ft) | - |
| 3 | Screws fastening the licence plate holder to the battery box | Self-tapping 5x14 | 3 | 3 Nm (2.21 lbf ft) | - |



REAR BRAKE CALLIPER

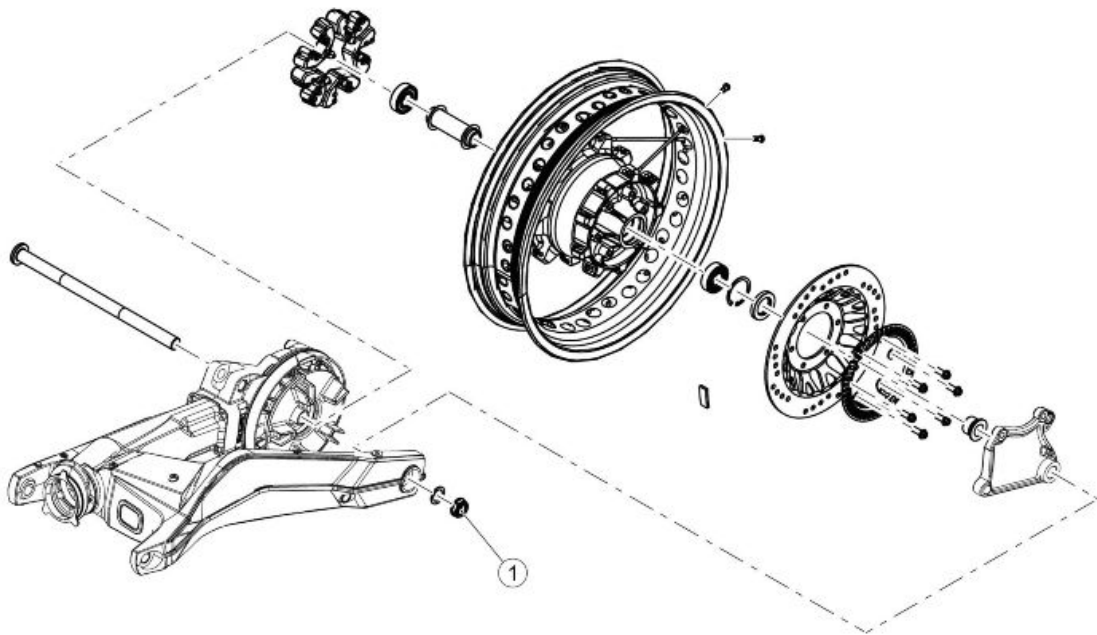
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Screws fastening the rear brake calliper to the calliper support bracket | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| 2 | Pin fastening the rear brake calliper support bracket | - | 1 | 35 Nm (25.81 lbf ft) | - |



LUGGAGE RACK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Screws fastening the luggage rack to the grab handle | M5 | 4 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening grab handle to the chassis | M8 | 4 | 25 Nm (18.44 lbf ft) | - |

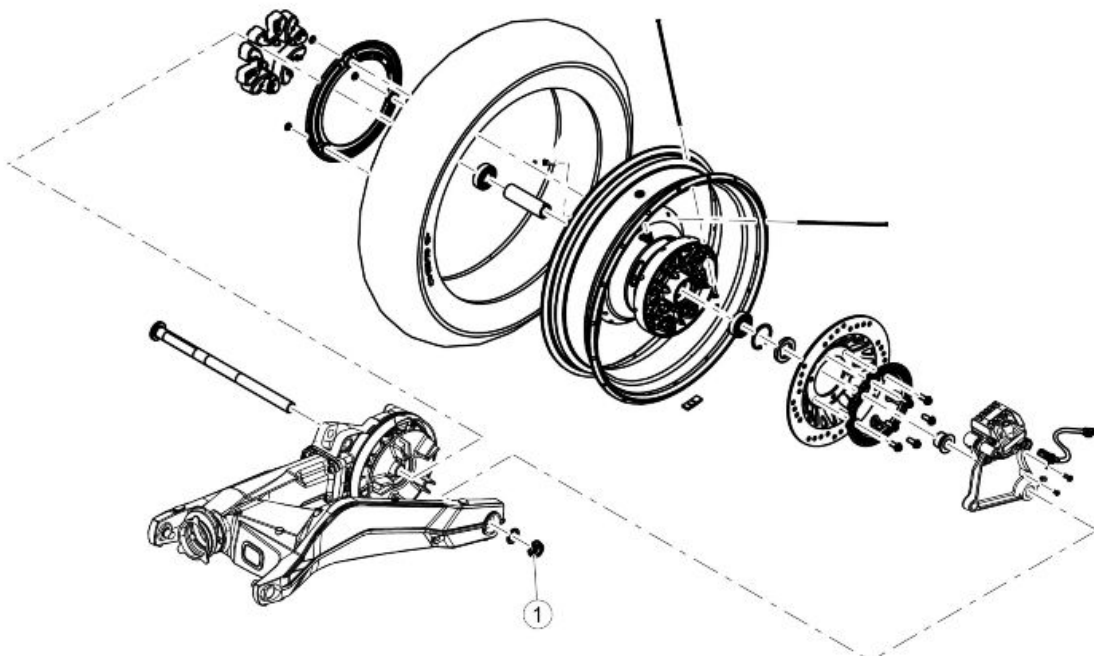
E4



REAR WHEEL - E4

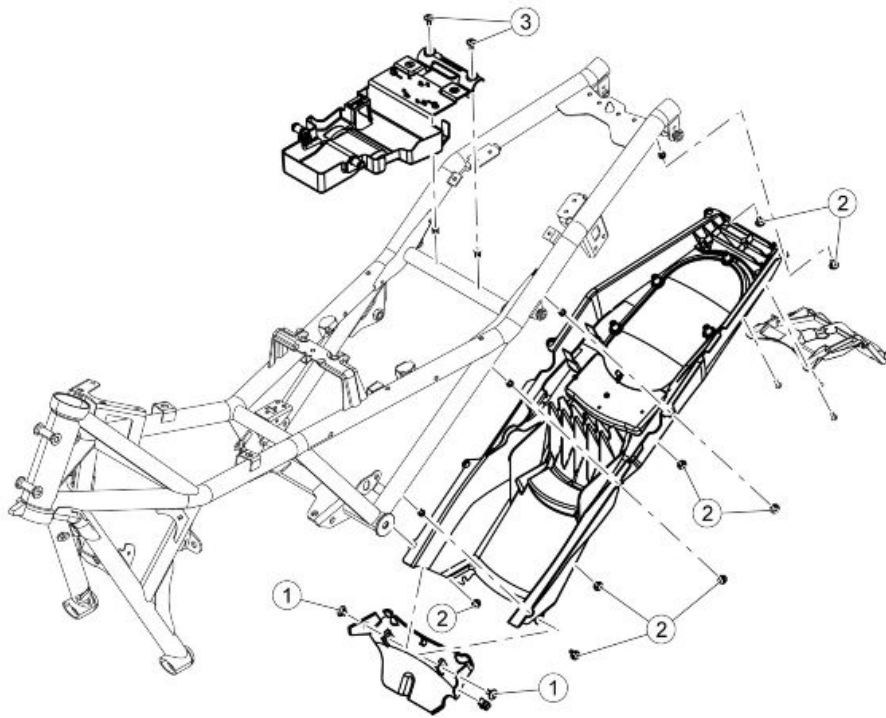
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------|---------|----------|-----------------------|-------|
| 1 | Rear wheel axle fastener nut | M20x1.5 | 1 | 100 Nm (73.76 lbf ft) | - |

E5



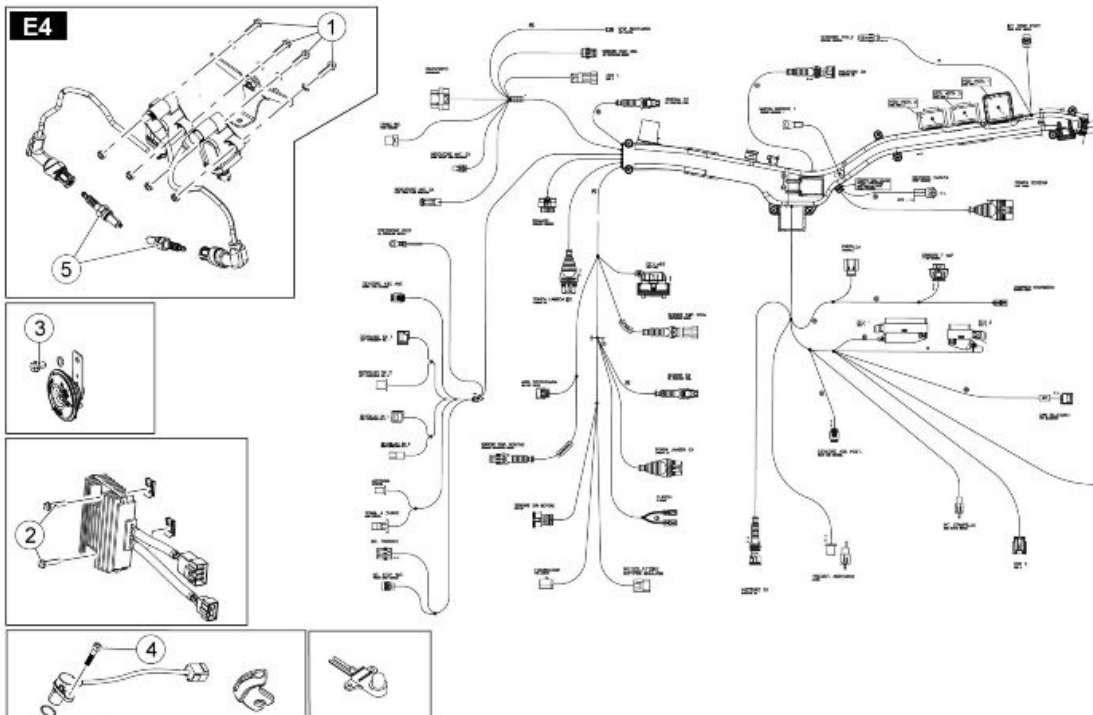
REAR WHEEL - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------|---------|----------|-----------------------|-------|
| 1 | Rear wheel axle fastener nut | M20x1.5 | 1 | 100 Nm (73.76 lbf ft) | - |



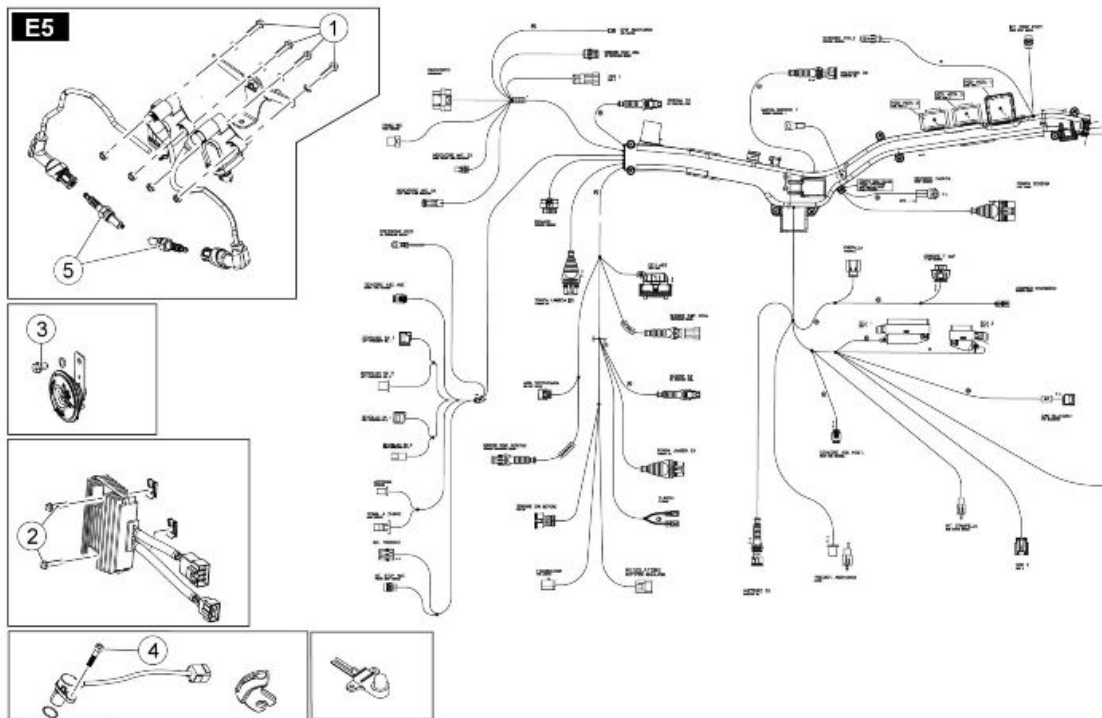
UNDER-SEAT COMPARTMENT

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screw fastening the front brake pipe feedthrough to the battery box | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the battery box to the frame | M5 | 8 | 6 Nm (4.43 lbf ft) | - |
| 3 | Screws fastening battery bracket/storage compartment to the frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



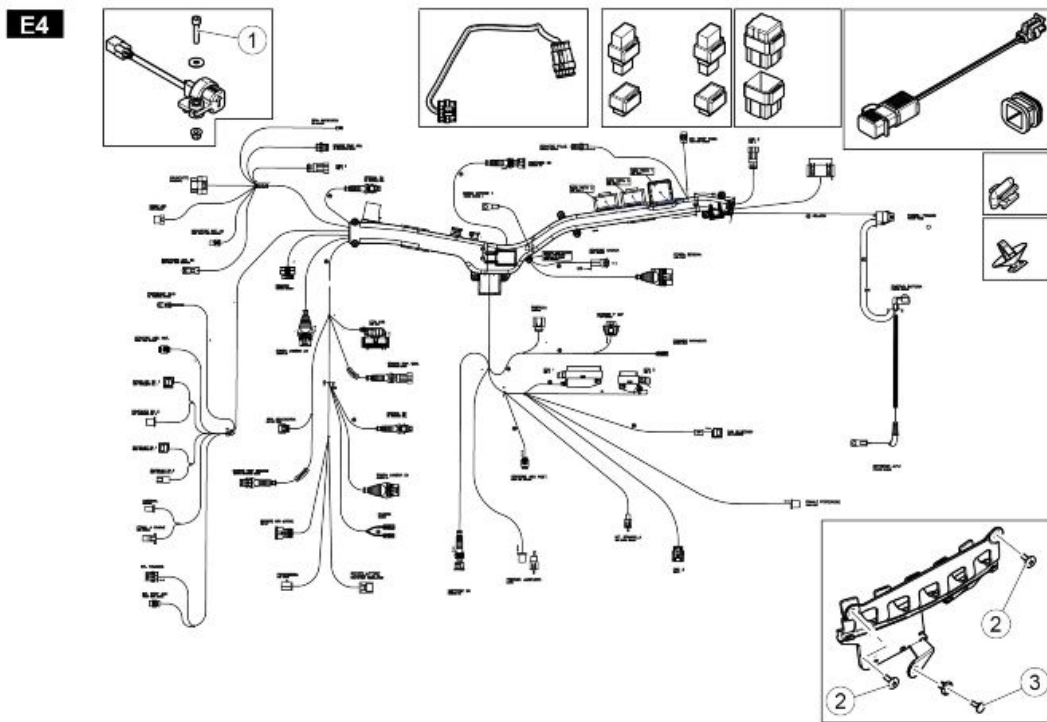
FRONT ELECTRICAL SYSTEM - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|-----------------------------|-------|
| 1 | Screws fastening the coil to the frame | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening the voltage regulator to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screw fastening the horn to the frame | M5 | 1 | 25 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening the ABS sensor to the right fork stanchion | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Screw fastening the ABS sensor cable gland plate to the right fork stanchion | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| 5 | Spark plugs | - | 2 | 10-12 Nm (7.38-8.85 lbf ft) | - |



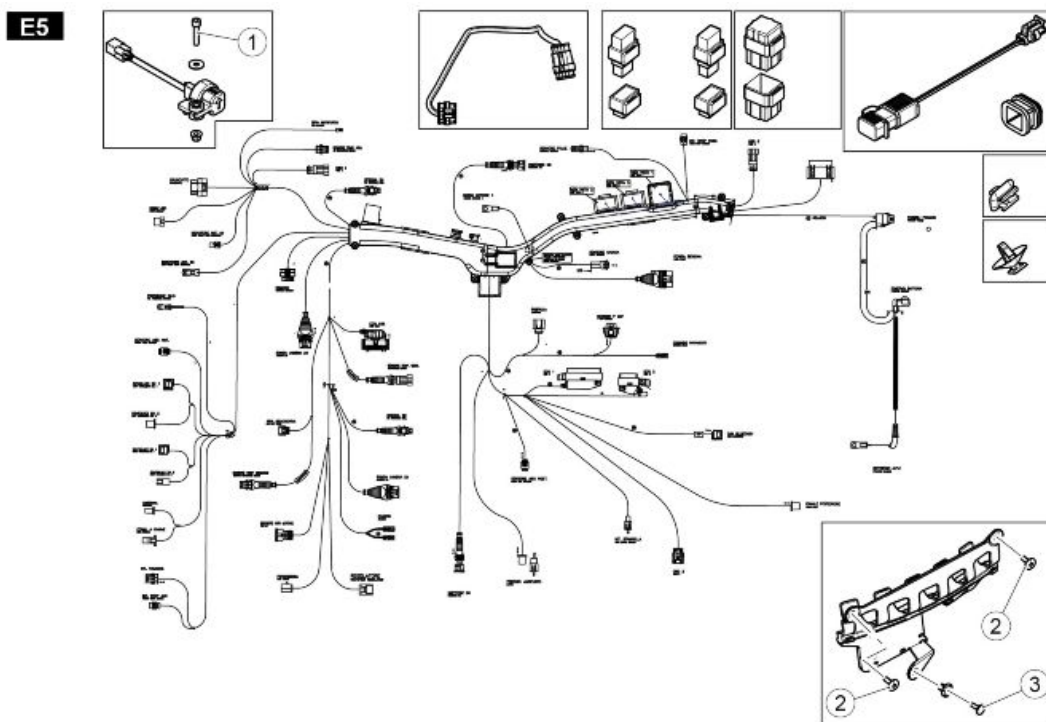
FRONT ELECTRICAL SYSTEM - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|-----------------------------|-------|
| 1 | Screws fastening the coil to the frame | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening the voltage regulator to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screw fastening the horn to the frame | M8 | 1 | 25 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening the ABS sensor to the right fork stanchion | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Screw fastening the ABS sensor cable gland plate to the right fork stanchion | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| 5 | Spark plugs | - | 2 | 10-12 Nm (7.38-8.85 lbf ft) | - |



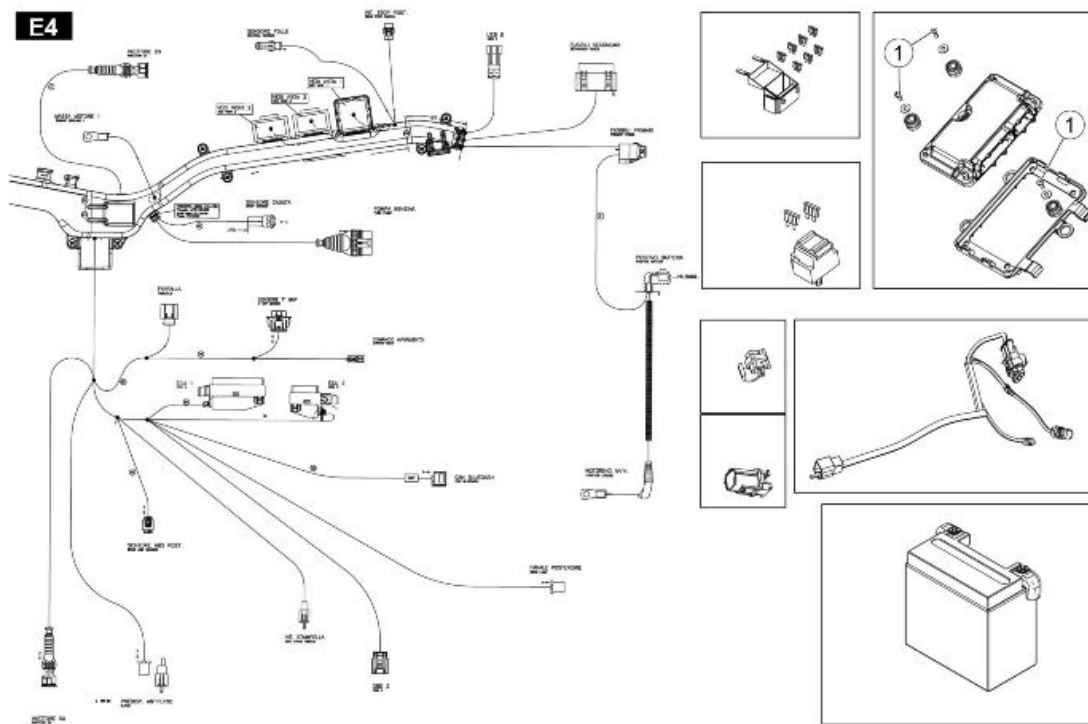
CENTRAL ELECTRICAL SYSTEM - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-----------|
| 1 | Screw fastening the anti-rollover sensor | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the left side wiring harness support to the frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 3 | Rivets fastening the left side wiring harness support to the frame | - | 2 | - | Press fit |
| - | Nut used for fastening the power supply cable to the starter motor | M8 | 1 | 12 Nm (8.85 lbf ft) | - |
| - | Rivets fastening the main wiring harness conduit to the frame | - | 2 | - | Press fit |
| - | Screws fastening the starter motor to the clutch housing | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| - | Screw fastening the temperature/ air pressure sensor to the throttle body fitting | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| - | Screw fastening the stand switch to the stand bolt | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| - | Screw fastening the rear stop switch to the right chassis plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Screw fastening the rear stop cable cover switch to the right chassis plate | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



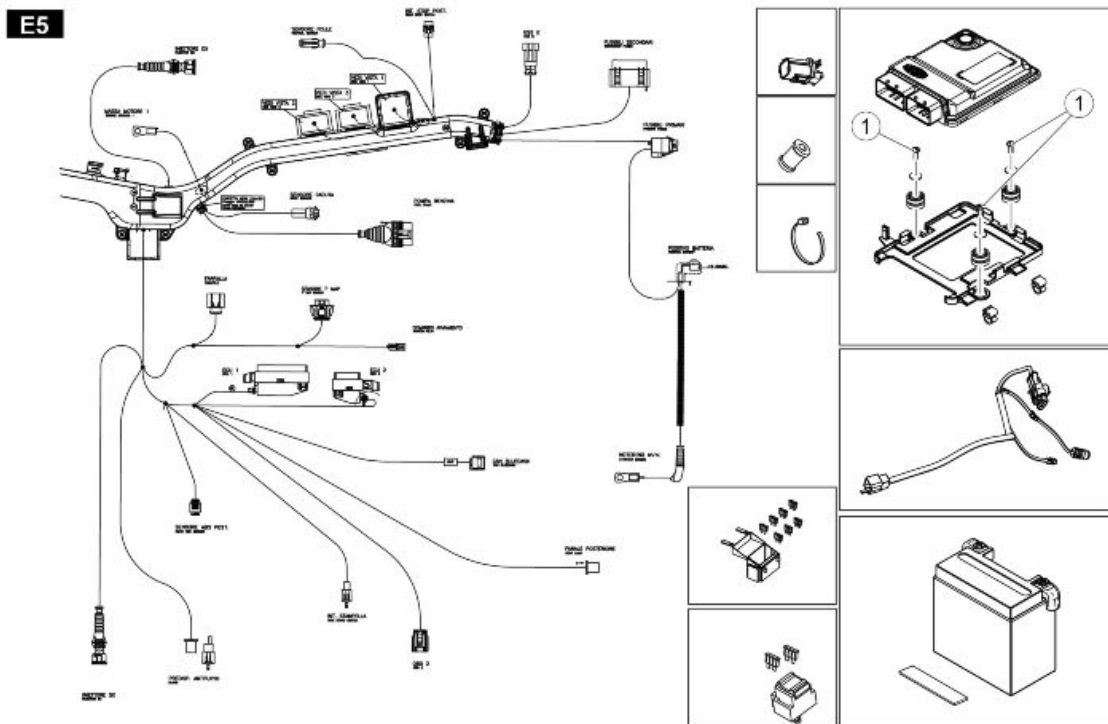
CENTRAL ELECTRICAL SYSTEM - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-----------|
| 1 | Screw fastening the anti-rollover sensor | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the left side wiring harness support to the frame | M5 | 2 | 4 Nm (2.95 lbf ft) | - |
| 3 | Rivets fastening the left side wiring harness support to the frame | - | 2 | - | Press fit |
| - | Nut used for fastening the power supply cable to the starter motor | M8 | 1 | 12 Nm (8.85 lbf ft) | - |
| - | Rivets fastening the main wiring harness conduit to the frame | - | 2 | - | Press fit |
| - | Screws fastening the starter motor to the clutch housing | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| - | Screw fastening the temperature/ air pressure sensor to the throttle body fitting | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| - | Screw fastening the stand switch to the stand bolt | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| - | Screw fastening the rear stop switch to the right chassis plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Screw fastening the rear stop cable cover switch to the right chassis plate | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



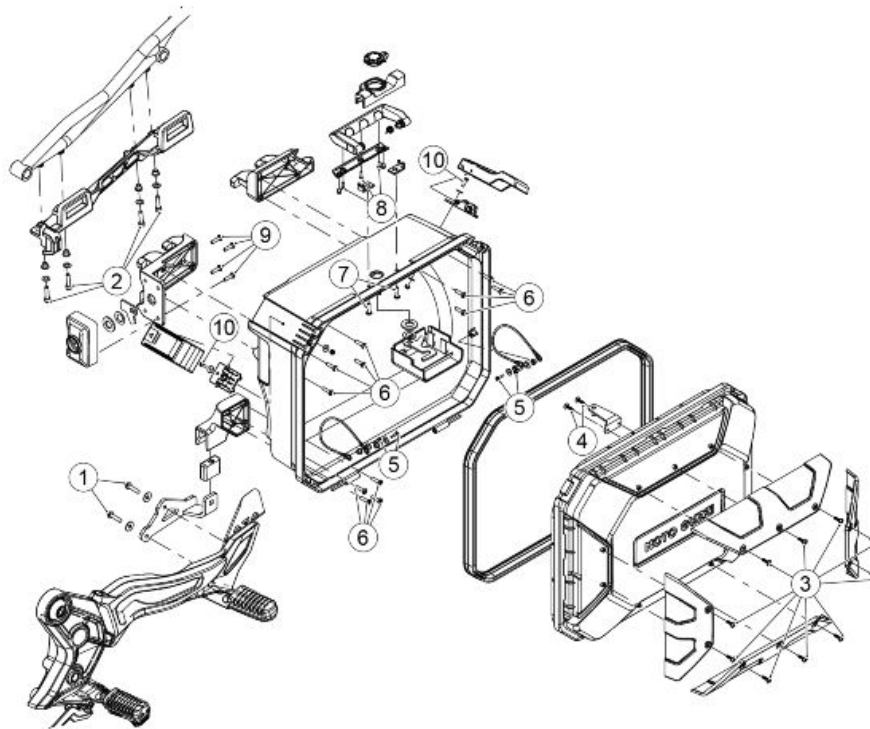
REAR ELECTRICAL SYSTEM - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|--------------|----------|---------------------|-------|
| 1 | Screws fastening the electronic ECU support to the battery box | Self-tapping | 3 | 3 Nm (2.21 lbf ft) | - |
| - | Screw fastening the ABS sensor cable gland plate to the rear calliper support plate | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| - | Screw fastening the ABS sensor to the rear calliper support plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Nut fastening the ground cables to the gearbox | M8 | 1 | 10 Nm (7.38 lbf ft) | - |



REAR ELECTRICAL SYSTEM - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|--------------|----------|---------------------|-------|
| 1 | Screws fastening the electronic ECU support to the battery box | Self-tapping | 3 | 3 Nm (2.21 lbf ft) | - |
| - | Screw fastening the ABS sensor cable gland plate to the rear calliper support plate | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| - | Screw fastening the ABS sensor to the rear calliper support plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Nut fastening the ground cables to the gearbox | M8 | 1 | 10 Nm (7.38 lbf ft) | - |



CASE

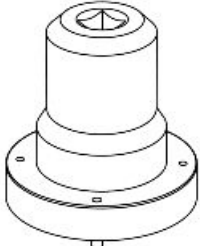
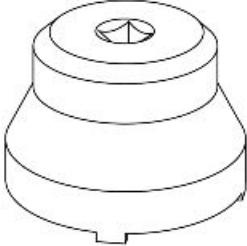
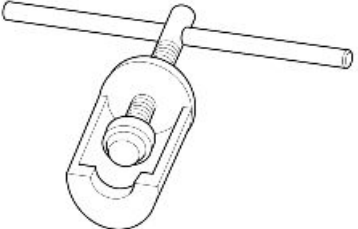
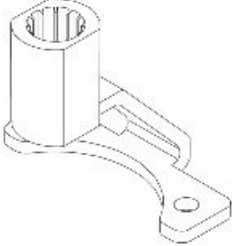
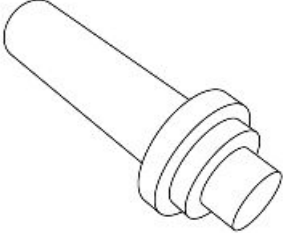
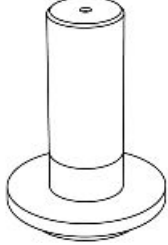
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|--------|----------|----------------------|-----------|
| 1 | TEF fixing screws of lower centering bracket (left) | M6x25 | 2 | 10 Nm (7.38 lbf ft) | - |
| 1 | TEF fixing screws of lower centering bracket (right) | M6x20 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | TCEI fixing screws of supports to luggage rack frame | M6x25 | 8 | 10 Nm (7.38 lbf ft) | - |
| 3 | Torx self-tapping screws to cover the cover | - | 20 | 1.5 Nm (1.11 lbf ft) | - |
| 4 | Torx self-tapping screws fixing the bracket to the cover | - | 4 | 1.5 Nm (1.11 lbf ft) | - |
| 5 | SWP self-tapping screws fixing cable hooking bushings | 2.9x12 | 8 | 1 Nm (0.74 lb ft) | - |
| 6 | SWP flanged screws for fixing inserts for case coupling | M5x20 | 24 | 3.5 Nm (2.58 lbf ft) | - |
| 7 | SWP flanged screws for fixing the handles | M5x20 | 4 | 3.5 Nm (2.58 lbf ft) | - |
| 8 | SWP self-tapping screws fixing handle covers | 2.9x12 | 6 | 1 Nm (0.74 lb ft) | - |
| 9 | SWP flanged screws for fixing the lock cover | M5x20 | 8 | 3.5 Nm (2.58 lbf ft) | - |
| 10 | TBEI screws fixing locking levers + Self-locking nut | M4x14 | 4 | 2.5 Nm (1.84 lbf ft) | - |
| - | Fixing nut for locks | - | 4 | 10 Nm (7.38 lbf ft) | - |
| - | Fixing screws for locks/latches plates | M4x6 | 4 | 3 Nm (2.21 lbf ft) | Loct. 243 |

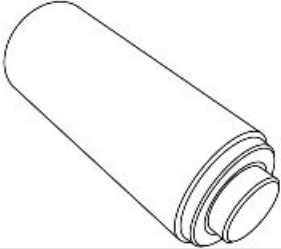


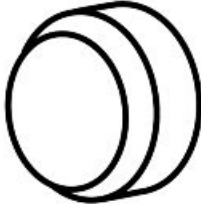
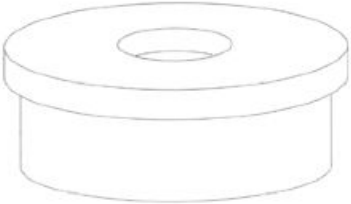
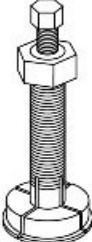
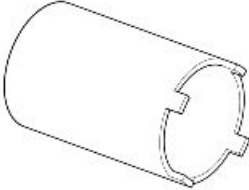
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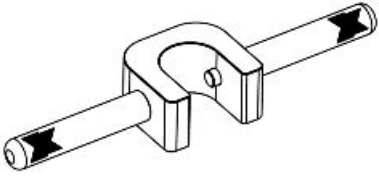
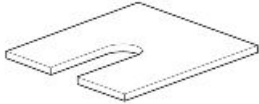
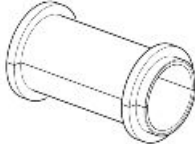
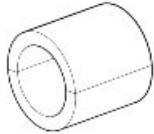
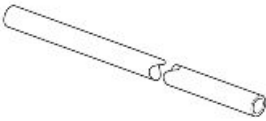
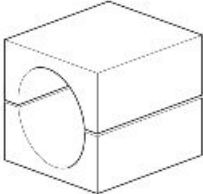

SPECIAL FEATURES

SF

SPECIAL TOOLS

| Stores code | Description | |
|-------------|---------------------------------|---|
| 020998Y | Pinion case wrench |  |
| 020999Y | Crown counter- lock ring wrench |  |
| GU19907000 | Internal bearing ring extractor |  |
| 021000Y | Bevel gear set mounting |  |
| 021003Y | Bevel gear oil seal punch |  |
| 021005Y | Bevel gear cover oil seal punch |  |

| Stores code | Description | |
|-------------|--|---|
| 020978Y | Cardan secondary oil seal mounting punch |  |
| GU19927900 | Punch for pressing the ring inside the bearing |  |
| 020376Y | Adaptor handle |  |
| 020359Y | 42 x 47 mm punch |  |
| 020360Y | 52 x 55 mm adaptor |  |
| 001467Y036 | Bearing internal cup extractor |  |
| 020966Y | Steering adjustment socket |  |

| Stores code | Description | |
|-------------|---|---|
| 020888Y | Pre-load tube clamp |  |
| AP8140148 | Plunger-spacer separator plate |  |
| AP8140189 | Tool for mounting the oil seal for holes with diam. 43 mm (1.69 in) |  |
| AP8140146 | Weight |  |
| AP8140150 | Bored shaft for bleeding plunger air |  |
| AP8140149 | Guard for assembly operations |  |
| 020922Y | Diagnostic tool |  |

Stores code

021017Y

Description

OBD cable for E5 vehicles



INDEX OF TOPICS

MAINTENANCE

MTN

Maintenance chart

NOTE

CARRY OUT MAINTENANCE OPERATIONS AT HALF THE INTERVALS SPECIFIED IF THE VEHICLE IS USED IN PARTICULAR RAINY OR DUSTY CONDITIONS, OFF ROAD OR FOR TRACK USE.

NOTE

THE TIMES LISTED ON THE SCHEDULED MAINTENANCE TABLE INCLUDE TIME DEDICATED TO MANAGEMENT ACTIVITIES.

I: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY

C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

(1): Replace in case of leaks

(2): Check every month

(3): Check every 500 km (310 miles)

(4): Check and clean, adjust or replace if necessary every 1000 km (621 miles)

(5): Replace at whichever of the following occurs first: 40,000 km (24,855 mi) or 4 years

SCHEDULED MAINTENANCE TABLE

| Km x 1,000 (mi x 1,000) | 1,5 (0.9) | 10 (6.2) | 20 (12.4) | 30 (18.6) | 40 (24.9) | 50 (31.1) | 60 (37.3) | EVER Y 12 MONT HS | EVER Y 24 MONT HS |
|--|--------------|-------------|--------------|--------------|--------------|--------------|--------------|----------------------------|----------------------------|
| Oil filter cover O-ring | R | R | R | R | R | R | R | R | R |
| Gearbox oil filler plug O-ring | | | | I | | | I | | |
| Engine oil filler plug O-ring | I | I | I | I | I | I | I | I | I |
| Fork plug O-ring | | | | | I | | | | |
| Spark plugs | | I | I | R | I | I | R | | |
| Steering bearings and steering play | I | I | I | I | I | I | I | I | I |
| Wheel bearings - Wheels | | I | I | I | I | I | I | I | I |
| Diagnosis by tool | I | I | I | I | I | I | I | I | I |
| Brake discs - Pads wear (4) | I | I | I | I | I | I | I | I | I |
| Air filter | | R | R | R | R | R | R | | |
| Engine oil filter | R | R | R | R | R | R | R | R | R |
| Vehicle general operation | I | I | I | I | I | I | I | I | I |
| Valve clearance | A | A | A | A | A | A | A | | |
| Head cover gasket | I | I | I | I | I | I | I | | |
| Gearbox oil discharge plug aluminium gasket | | | | R | | | R | | |
| Engine oil discharge plug aluminium gasket | R | R | R | R | R | R | R | R | R |
| Transmission oil discharge plug gasket | | | | R | | | R | | |
| Gasket for the engine oil filter fastening screw | R | R | R | R | R | R | R | R | R |
| Brake systems | I | I | I | I | I | I | I | I | I |
| Light circuit | I | I | I | I | I | I | I | I | I |
| Safety switches | I | I | I | I | I | I | I | I | I |
| Brake fluid | I | I | I | I | I | I | I | I | R |
| Gearbox oil | | | | R | | | R | | |
| Fork oil (5) | | | | | R | | | | |
| Engine oil (3) | R | R | R | R | R | R | R | R | R |
| Final drive oil | | | | R | | | R | | |
| Headlight aiming | | I | I | I | I | I | I | | |
| Fork oil seals (1) | | I | I | I | | I | I | | |
| Tyres - pressure / wear (2) | I | I | I | I | I | I | I | I | I |
| Clutch clearance adjustment | A | A | A | A | A | A | A | A | A |
| Transmission oil filler plug washer | | | | R | | | R | | |
| Nut/bolt tightness | I | I | I | I | I | I | I | | |
| Suspensions and stability | | | I | | I | | I | I | I |
| Head cover fastening screws dampers | I | I | I | I | I | I | I | | |
| Filter box drain plug | | C | C | C | C | C | C | C | C |

| Km x 1,000 (mi x 1,000) | 1,5 (0.9) | 10 (6.2) | 20 (12.4) | 30 (18.6) | 40 (24.9) | 50 (31.1) | 60 (37.3) | EVER Y 12 MONT HS | EVER Y 24 MONT HS |
|-------------------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|----------------------------|----------------------------|
| Brake lines | | | | | | | | | |
| Fuel pipes | | | | | | | | | |
| Labour time (minutes) | 100 | 100 | 100 | 120 | 190 | 110 | 120 | 60 | 60 |

NOTE

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

IMPORTANT

AFTER THE PROVIDED MAINTENANCE PROGRAM IS INDICATED TO PROCEED WITH THE MAINTENANCE OF THE VEHICLE STARTING FROM THE SERVICE OF 10,000 Km OR 10 MONTHS

SCHEDULED MAINTENANCE TABLE RESERVED FOR THE US-LATAM MARKET

I: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY

C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

(1): Replace in case of leaks

(2): Check every month

(3): Check every 310 mi (500 Km)

(4): Check and clean, adjust or replace if necessary every 621 mi (1,000 Km)

(5): Replace at whichever of the following occurs first: 24,855 miles (40,000 Km) or 4 years

SCHEDULED MAINTENANCE TABLE

| mi x 1.000 (km x 1.000) | 0.9 (1,5) | 6.2 (10) | 12.4 (20) | 18.6 (30) | 24.9 (40) | 31.1 (50) | 37.3 (60) |
|--|-----------|----------|--------------|--------------|--------------|--------------|--------------|
| Oil filter cover O-ring | R | R | R | R | R | R | R |
| Gearbox oil filler plug O-ring | | | | | | | |
| Engine oil filler plug O-ring | | | | | | | |
| Fork plug O-ring | | | | | | | |
| Spark plugs | | | | R | | | R |
| Steering bearings and steering play | | | | | | | |
| Wheel bearings - Wheels | | | | | | | |
| Diagnosis by tool | | | | | | | |
| Brake discs - Pads wear (4) | | | | | | | |
| Air filter | | R | R | R | R | R | R |
| Engine oil filter | R | R | R | R | R | R | R |
| Vehicle general operation | | | | | | | |
| Valve clearance | A | A | A | A | A | A | A |
| Head cover gasket | | | | | | | |
| Gearbox oil discharge plug aluminium gasket | | | | R | | | R |
| Engine oil discharge plug aluminium gasket | R | R | R | R | R | R | R |
| Transmission oil discharge plug gasket | | | | R | | | R |
| Gasket for the engine oil filter fastening screw | R | R | R | R | R | R | R |
| Brake systems | | | | | | | |
| Light circuit | | | | | | | |
| Safety switches | | | | | | | |
| Brake fluid | | | | | | | |
| Gearbox oil | | | | R | | | R |
| Fork oil (5) | | | | | R | | |
| Engine oil (3) | R | R | R | R | R | R | R |
| Final drive oil | | | | R | | | R |
| Headlight aiming | | | | | | | |
| Fork oil seals (1) | | | | | | | |
| Tyres - pressure / wear (2) | | | | | | | |
| Clutch clearance adjustment | A | A | A | A | A | A | A |

| mi x 1.000 (km x 1.000) | 0.9 (1,5) | 6.2 (10) | 12.4 (20) | 18.6 (30) | 24.9 (40) | 31.1 (50) | 37.3 (60) |
|-------------------------------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| Transmission oil filler plug washer | | | | R | | | R |
| Nut/bolt tightness | I | I | I | I | I | I | I |
| Suspensions and stability | | | I | | I | | I |
| Head cover fastening screws dampers | I | I | I | I | I | I | I |
| Filter box drain plug | | C | C | C | C | C | C |
| Brake lines | | I | I | I | I | I | I |
| Fuel pipes | | I | I | I | I | I | I |
| Labour time (minutes) | 100 | 100 | 100 | 120 | 190 | 110 | 120 |

NOTE

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

IMPORTANT

AFTER THE SCHEDULED MAINTENANCE PROGRAM, IT IS RECOMMENDED TO PROCEED WITH THE MAINTENANCE OF THE VEHICLE STARTING FROM THE 6,200 MI OR 10 MONTHS SERVICE INTERVENTION

SCHEDULED MAINTENANCE TABLE RESERVED FOR THE ASIA-PACIFIC MARKET

I: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY

C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

(1): Replace in case of leaks

(2): Check every month

(3): Check every 500 km (310 miles)

(4): Check and clean, adjust or replace if necessary every 1000 km (621 miles)

(5): Replace at whichever of the following occurs first: 40,000 km (24,855 mi) or 4 years

SCHEDULED MAINTENANCE TABLE

| Km x 1,000 (mi x 1,000) | 1,5 (0.9) | 10 (6.2) | 20 (12.4) | 30 (18.6) | 40 (24.9) | 50 (31.1) | 60 (37.3) |
|--|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| Oil filter cover O-ring | R | R | R | R | R | R | R |
| Gearbox oil filler plug O-ring | | | | I | | | I |
| Engine oil filler plug O-ring | I | I | I | I | I | I | I |
| Fork plug O-ring | | | | | I | | |
| Spark plugs | | I | I | R | I | I | R |
| Steering bearings and steering play | I | I | I | I | I | I | I |
| Wheel bearings - Wheels | | I | I | I | I | I | I |
| Diagnosis by tool | I | I | I | I | I | I | I |
| Brake discs - Pads wear (4) | I | I | I | I | I | I | I |
| Air filter | | R | R | R | R | R | R |
| Engine oil filter | R | R | R | R | R | R | R |
| Vehicle general operation | I | I | I | I | I | I | I |
| Valve clearance | A | A | A | A | A | A | A |
| Head cover gasket | I | I | I | I | I | I | I |
| Gearbox oil discharge plug aluminium gasket | | | | R | | | R |
| Engine oil discharge plug aluminium gasket | R | R | R | R | R | R | R |
| Transmission oil discharge plug gasket | | | | R | | | R |
| Gasket for the engine oil filter fastening screw | R | R | R | R | R | R | R |
| Brake systems | I | I | I | I | I | I | I |
| Light circuit | I | I | I | I | I | I | I |
| Safety switches | I | I | I | I | I | I | I |
| Brake fluid | I | I | I | I | I | I | I |
| Gearbox oil | | | | R | | | R |
| Fork oil (5) | | | | | R | | |
| Engine oil (3) | R | R | R | R | R | R | R |
| Final drive oil | | | | R | | | R |
| Headlight aiming | | I | I | I | I | I | I |

| Km x 1,000 (mi x 1,000) | 1,5 (0.9) | 10 (6.2) | 20 (12.4) | 30 (18.6) | 40 (24.9) | 50 (31.1) | 60 (37.3) |
|-------------------------------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| Fork oil seals (1) | | I | I | I | | I | I |
| Tyres - pressure / wear (2) | I | I | I | I | I | I | I |
| Clutch clearance adjustment | A | A | A | A | A | A | A |
| Transmission oil filler plug washer | | | | R | | | R |
| Nut/bolt tightness | I | I | I | I | I | I | I |
| Suspensions and stability | | | I | | I | | I |
| Head cover fastening screws dampers | I | I | I | I | I | I | I |
| Filter box drain plug | | C | C | C | C | C | C |
| Brake lines | | I | I | I | I | I | I |
| Fuel pipes | | I | I | I | I | I | I |
| Labour time (minutes) | 100 | 100 | 100 | 120 | 190 | 110 | 120 |

NOTE

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

IMPORTANT

AFTER THE PROVIDED MAINTENANCE PROGRAM IS INDICATED TO PROCEED WITH THE MAINTENANCE OF THE VEHICLE STARTING FROM THE SERVICE OF 10,000 Km OR 10 MONTHS

Recommended Products

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

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

This also applies when topping up only.



TABLE OF RECOMMENDED PRODUCTS

| Product | Description | Specifications |
|---|---|--|
| Engine oil 10W-60 | Synthetic based Lubricant for four stroke high performance engines. | SAE 10W 60; JASO MA, MA2; API SG |
| 75W-140 lubricant for gearboxes and transmissions | Synthetic lubricant for gearboxes and transmissions | SAE 75W-140 - API GL5 |
| Fork oil 7.5W | Fork oil. | SAE 7.5W |
| Molybdenum disulphide grease | Lithium grease with molybdenum disulphide. | Grey black grease |
| Petroleum jelly | neutral grease for battery terminals | - |
| DOT 4 brake fluid | Synthetic brake fluid. | SAE J 1703; FMVSS 116; ISO 4925; CU-NA NC 956 DOT4 |

Spark plug

- Unscrew and remove the screws (1)



- Remove the cover (2)



- Disconnect the spark plug cap (3)



- Unscrew the spark plug (4) and remove it



Transmission fluid

Replacement

IMPORTANT

THE UNIT MUST BE HOT WHEN THE OIL IS CHANGED AS UNDER SUCH CONDITIONS OIL IS FLUID AND THEREFORE EASY TO DRAIN.

NOTE

RIDE SOME km (miles) TO WARM UP ENGINE OIL

- Place a recipient with a capacity of at least 400 cc (25 cu.in) under the drain plug (2).
- Unscrew and remove the drainage plug (2).
- Unscrew and remove the filler plug (1).
- Drain the oil into the container for at least 5 minutes for oil to drain out completely.
- Replace the sealing washer of the discharge plug (2).
- Remove any metal scrap attached to the drainage plug (2) magnet.
- Screw and tighten the drainage plug (2).
- Fill with new oil via the inlet hole.
- Quantity 160 cc MAX (9.76 cu in) (filling amount after emptying; - 20 cc (1.22 cu in) compared to the nominal amount of 180 cc (10.98 cu in), to compensate for the oil residue remaining in the gear-case).



IMPORTANT

DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID. WHEN USING A FUNNEL OR ANY OTHER ELEMENT, MAKE SURE IT IS PERFECTLY CLEAN.

NOTE

THE RECOMMENDED QUANTITY OF OIL FOR REPLACEMENT IS 160 cc (9.76 cu in)

Recommended products

75W-140 lubricant for gearboxes and transmissions Synthetic lubricant for gearboxes and transmissions

SAE 75W-140 - API GL5

- Screw and tighten the cap (1).

NOTE

DURING REPLACEMENT, USE A NEW SEALING WASHER.

IMPORTANT**IF IT IS NECESSARY TO INSTALL A NEW TRANSMISSION GEARBOX, PAY SPECIAL ATTENTION TO THE PROCEDURE BELOW**

Since they are already run-in at the factory, the complete transmission boxes coming from the Spare parts department contain a minimum residual oil quantity and therefore after installing them on the vehicle, the following procedure must be performed:

- Open the filler plug and drain any residual oil from the lower drain plug leaving it to drip for at least 5 minutes.
- Refit and tighten the lower drain plug and refill through the filler plug with 160 cu cm (9.76 cu in) of oil.
- Refit and tighten the filler plug.
- Assemble the breather plug. If the gearbox arrived with the breather plug already assembled, remove it and blow it with compressed air to carefully remove any oil residues.

IMPORTANT**DURING REPLACEMENT, USE A NEW SEALING WASHER FOR THE BREATHER CAP.**

Engine oil

Check

Check the engine oil level frequently.

NOTE

CARRY OUT MAINTENANCE OPERATIONS AT HALF THE INTERVALS SPECIFIED IF THE VEHICLE IS USED IN PARTICULAR RAINY OR DUSTY CONDITIONS, OFF ROAD OR FOR TRACK USE.



THE OIL LEVEL MUST BE CHECKED WHEN THE ENGINE IS WARM.

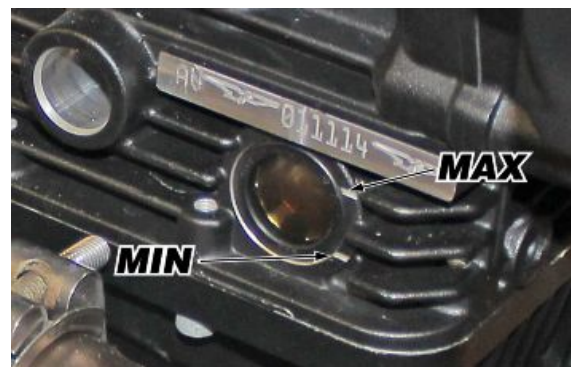
IMPORTANT

DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT A STANDSTILL TO WARM UP THE ENGINE AND OBTAIN THE OPERATING TEMPERATURE OF ENGINE OIL. PREFERABLY CHECK THE OIL AFTER A JOURNEY OF AFTER TRAVELLING APPROXIMATELY 15 Km (10 miles) IN EXTRA-URBAN CONDITIONS (ENOUGH TO WARM UP THE ENGINE OIL TO OPERATING TEMPERATURE).

- Shut off the engine.
- Keep the vehicle upright with both wheels on the earth.
- Using the relative opening on the engine casing, check the oil level.

MAX (top notch) = maximum level.

MIN (bottom notch) = minimum level



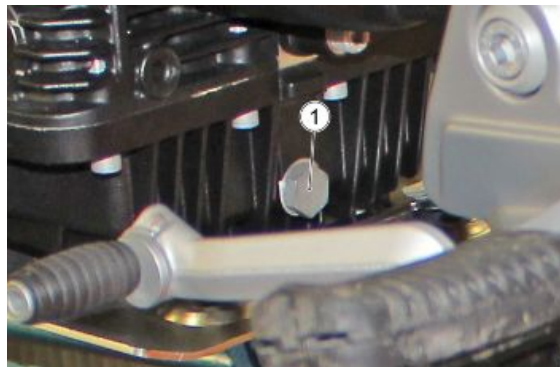
- The level is correct if it reaches the "MAX" level.

Replacement

NOTE

HOT OIL IS MORE FLUID AND WILL DRAIN OUT MORE EASILY AND COMPLETELY.

- Remove the sump guard
- Place a collection container of suitable capacity under the drain plug (1).
- Unscrew and remove the drainage plug (1).



NOTE

DURING REPLACEMENT, USE A NEW SEALING WASHER.

- Unscrew and remove the filler plug (2)
- Drain the oil into the container; allow several minutes for oil to drain out completely.
- Check and if necessary, replace the sealing washer of drainage plug (1).
- Remove any metal scrap attached to the drainage plug (1) magnet.
- Screw and tighten the drainage plug (1).



IMPORTANT

CHECK THE O-RING PRESENT ON THE FILLING CAP AND REPLACE IF DAMAGED.



**DO NOT DISPOSE OF OIL IN THE ENVIRONMENT.
DISPOSE OF ENGINE OIL IN A SEALED CONTAINER AND TAKE IT TO YOUR SUPPLIER OR TO THE NEAREST USED OIL COLLECTION CENTRE.**

Engine oil filter

- Undo the two screws (1) and remove the cover (2).
- Remove the engine oil filter (3).
- Spread a thin layer of oil on the sealing ring of the new engine oil filter
- Fit the new engine oil filter with the spring facing downwards
- Refit the cover (2), screw and tighten the screw (1).



NOTE

NEVER REUSE AN OLD FILTER.

NOTE

DURING REPLACEMENT, USE A NEW SEALING WASHER.

NOTE

DURING REFITTING USE A NEW SEALING O-RING.

Gearbox oil

Replacement

NOTE

HOT OIL IS MORE FLUID AND WILL DRAIN OUT MORE EASILY AND COMPLETELY.

- Remove the sump guard
- Remove the manifold-terminal
- Place a container of suitable capacity under the drain plug (1).
- Unscrew and remove the drainage plug (1).



- Unscrew and remove the filler cap (2).
- Drain the oil into the container; allow several minutes for oil to drain out completely.
- Remove any metal scrap attached to the drainage plug (1) magnet.
- Pour in new oil, observing the quantity indicated in the "Capacity" table



IMPORTANT

DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID. WHEN USING A FUNNEL OR ANY OTHER ELEMENT, MAKE SURE IT IS PERFECTLY CLEAN.

IMPORTANT

CHECK THE O-RING PRESENT ON THE FILLING CAP AND REPLACE IF DAMAGED.

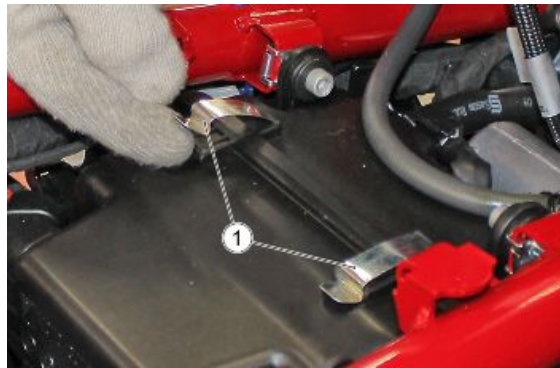
NOTE

DURING REPLACEMENT, USE A NEW SEALING WASHER.

Air filter

REMOVAL

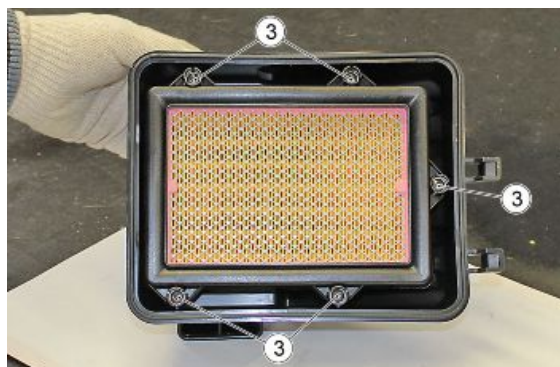
- Remove the saddle
- Remove the glove compartment
- Remove the side fairing panels
- Unhook and remove the four springs (1) located around the airbox filter, two in the upper area, one on the left side and one on the right side



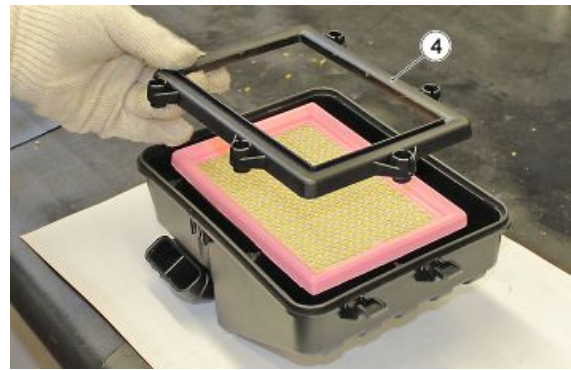
- Remove the filter box (2)



- Unscrew and remove the screws (3)



- Remove the cover (4)



- Remove the filter element (5)



DO NOT START THE ENGINE WITHOUT THE AIR FILTER. TO CLEAN THE FILTERING ELEMENT, USE A PRESSURISED JET OF AIR, AIMING IT FROM THE INSIDE OUTWARD.



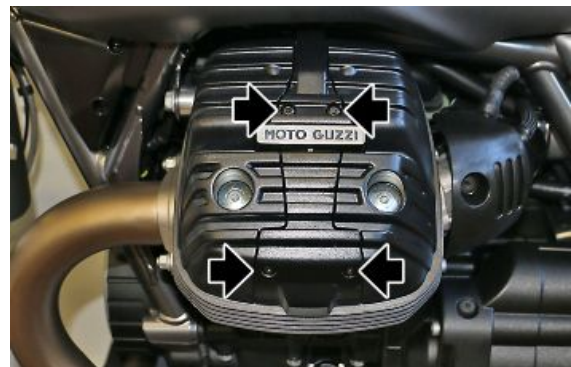
Checking the valve clearance

If the timing system is very noisy, check the clearance between the valves and the rocking levers.

NOTE

ADJUST WITH COLD ENGINE, WITH PISTON AT TOP DEAD CENTRE (TDC) IN COMPRESSION STROKE (VALVES CLOSED).

- Initially check the valve clearance in the left cylinder, then remove the four fixing screws of the spark plug cover



- Remove the spark plug cover



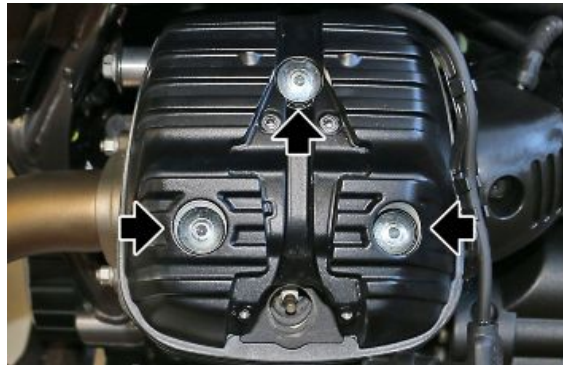
- Remove the spark plug tube



- Remove the three head cover fixing screws

IMPORTANT

CHECK AND IF NECESSARY REPLACE THE DAMPENING RUBBER GASKETS ON THE BIG END COVER, IF THEY ARE DAMAGED.



- Remove the head cover

IMPORTANT

CHECK AND IF NECESSARY REPLACE THE BIG END COVER GASKETS, IF THEY ARE DAMAGED.



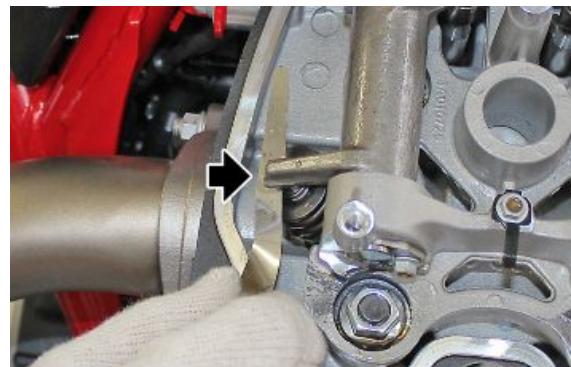
- Remove the spark plug

ALSO REMOVE THE SPARK PLUG OF THE RIGHT CYLINDER TO BE ABLE TO MANUALLY ROTATE THE ENGINE, ENGAGE THE FIRST GEAR AND TURN THE REAR WHEEL

- Intercept the top dead centre checking that the rockers have clearance to be able to measure it



- Use a feeler gauge to check that the clearance between the valve and the set screw corresponds with the indicated values. The corresponding intake and outlet valve clearances are different than what is indicated below, proceed with adjusting them.



Characteristic

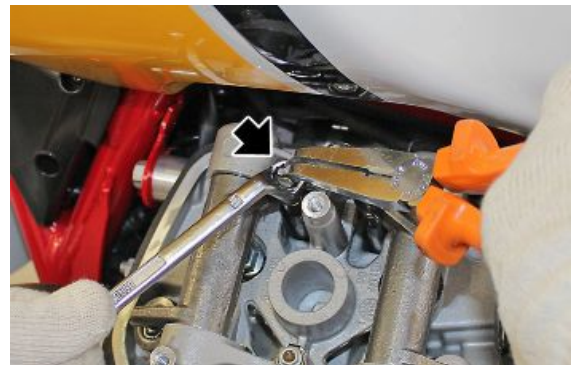
Intake valve clearance

0.10 mm (0.0039 in)

Exhaust valve clearance

0.15 mm (0.0059 in)

- Loosen the lock nut, adjust the clearance by acting on the adjuster until reaching the prescribed values
- Tighten the lock nut



- To perform the valve clearance of the right cylinder, it is necessary to bring the cylinder to the top dead centre, rotating the engine 270 degree

Braking system

Level check

FRONT BRAKE

- Rest the vehicle on its stand.
- Turn the handlebar so that the fluid is at the same level as the plug.
- Make sure that the fluid level in the reservoir is above the "MIN" reference mark:



MIN = minimum level

If the fluid does not reach at least the "**MIN**" reference mark:

- Check brake pads and discs for wear.
- If the pads and/or the disc do not need replacing, top up the fluid.

REAR BRAKE

- Keep the vehicle upright so that the fluid in the reservoir is at the same level as the plug.
- Make sure that the fluid level in the reservoir is above the "MIN" reference mark:



MIN = minimum level

MAX = maximum level

If the fluid does not reach at least the "**MIN**" reference mark:

- Check brake pads and discs for wear.
- If the pads and/or the disc do not need replacing, top up the fluid.

Top-up

FRONT BRAKE

- Unscrew and remove the screws (1)



- Remove the cover (2)



- Remove the diaphragm (3) and the gasket (4)



- Top up



REAR BRAKE

- Undo and remove the screw (1)



- Remove the bracket (2)



- Unscrew and remove the cap (3)



- Remove the gasket (4)



RISK OF BRAKE FLUID SPILLING. DO NOT OPERATE THE BRAKE LEVER IF THE BRAKE FLUID RESERVOIR CAP IS LOOSE OR HAS BEEN REMOVED.

IMPORTANT



AVOID PROLONGED AIR EXPOSURE OF THE BRAKE FLUID. BRAKE FLUID IS HYGROSCOPIC AND ABSORBS MOISTURE WHEN IN CONTACT WITH AIR. LEAVE THE BRAKE FLUID RESERVOIR OPEN ONLY FOR THE TIME NEEDED TO COMPLETE THE TOPPING-UP PROCEDURE.



TO AVOID SPILLING FLUID WHILE TOPPING-UP, KEEP THE TANK PARALLEL TO THE RESERVOIR EDGE (IN HORIZONTAL POSITION).

DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID.

WHEN USING A FUNNEL OR ANY OTHER ELEMENT, MAKE SURE IT IS PERFECTLY CLEAN.



WHEN TOPPING UP, DO NOT EXCEED THE "MAX" LEVEL.

TOPPING UP TO THE "MAX" LEVEL MUST BE CARRIED OUT ONLY WITH NEW PADS. DO NOT TOP UP TO THE "MAX" LEVEL WITH WORN PADS BECAUSE THIS WILL CAUSE FLUID TO LEAK OUT IN THE EVENT OF BRAKE PAD REPLACEMENT.

CHECK BRAKING EFFICIENCY. IN THE EVENT OF EXCESSIVE BRAKE LEVER TRAVEL OR A LOSS OF EFFICIENCY WITH THE BRAKING SYSTEM, THE BRAKING SYSTEM MAY NEED TO BE BLED.

Clutch system

Adjusting the lever

It is possible to adjust the distance between the end of the lever (1) and the grip (2), turning the adjuster (3).

- Push the control lever (1) forwards and turn the adjuster (3) until the lever (1) is at the desired distance.
- Turning the adjuster anticlockwise, the lever (1) gets closer to the grip (2).

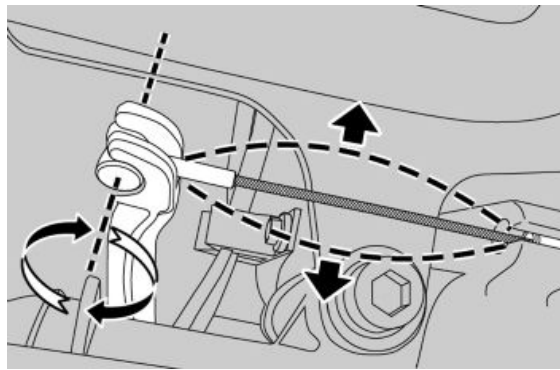


Adjust the clutch when the engine stops or the vehicle tends to move forward even when clutch lever is operated and the gear engaged, or if the clutch "slides", resulting in acceleration delay considering the engine revs.

- In order to maintain a correct tension and an optimal clutch operation, it is necessary to check and if necessary provide tension to the cable:
- Urban use every 1,000 km (621.37 mi)
- Extra urban use every 5,000 km (3,106.86 mi)
- In any case, every time you detect that the clutch has disengaged before the standard factory setting.

To adjust, do the following:

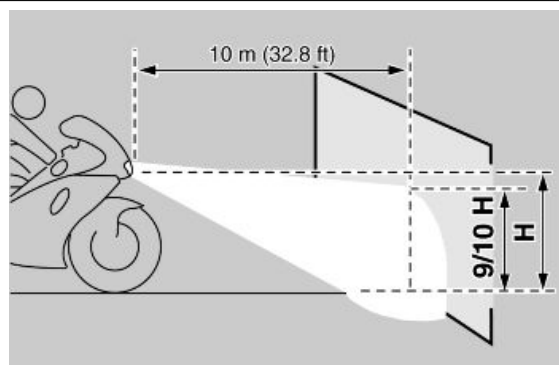
- Loosen the ring nut (4)
- Turn the set screw (5) with straight handlebar until the empty travel corresponding to the fixed abutment on the handlebar is 2 mm (0.08 in)
- Push the clutch control lever on the gearbox housing towards the rear wheel
- Pull the clutch control lever placed on the gearbox towards the opposite side (as in "point 3") checking that the cable is not tightened.
- During the previous operation, check that the cable lug turns freely around its axis, regarding the clutch lever
- Tighten the ring nut (4), holding the adjuster nut (5) to prevent it from turning
- If after the adjustment it is not possible to ascertain the condition of "point 5", contact an Authorised Moto Guzzi Dealer to verify the proper operation of the clutch control.
- If the adjuster stroke (5) is not sufficient to ensure the required clearance, contact an Authorised Moto Guzzi Dealer



Headlight adjustment

To carry out vertical adjustment of the light beam:

- Stand the motorcycle in a vertical position.
- Slightly loosen the headlamp fixing screws (1) on both sides.

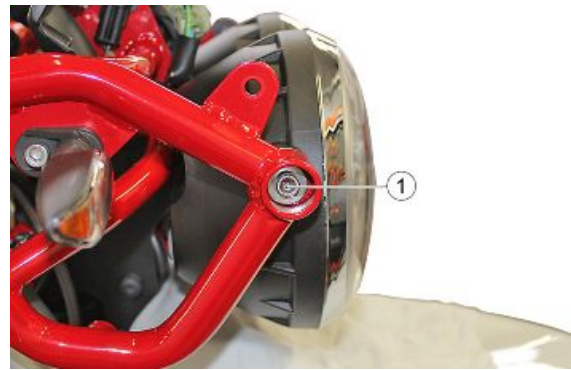


- Slightly loosen the headlamp fixing screw (2), and move the light beam manually to the desired position.
- Once the adjustment is finished tighten all screws.

After adjusting:

NOTE

CHECK THAT THE VERTICAL ALIGNMENT OF THE BEAM IS CORRECT.



For a quick check of the correct direction of the front light beam:

- Place the vehicle 10 m (32.81 ft) away from a vertical wall and make sure the ground is level.
- Turn on the low beam light, sit on the vehicle and check that the light beam projected to the wall is a little below the headlight horizontal straight line (about 9/10 of the total height).

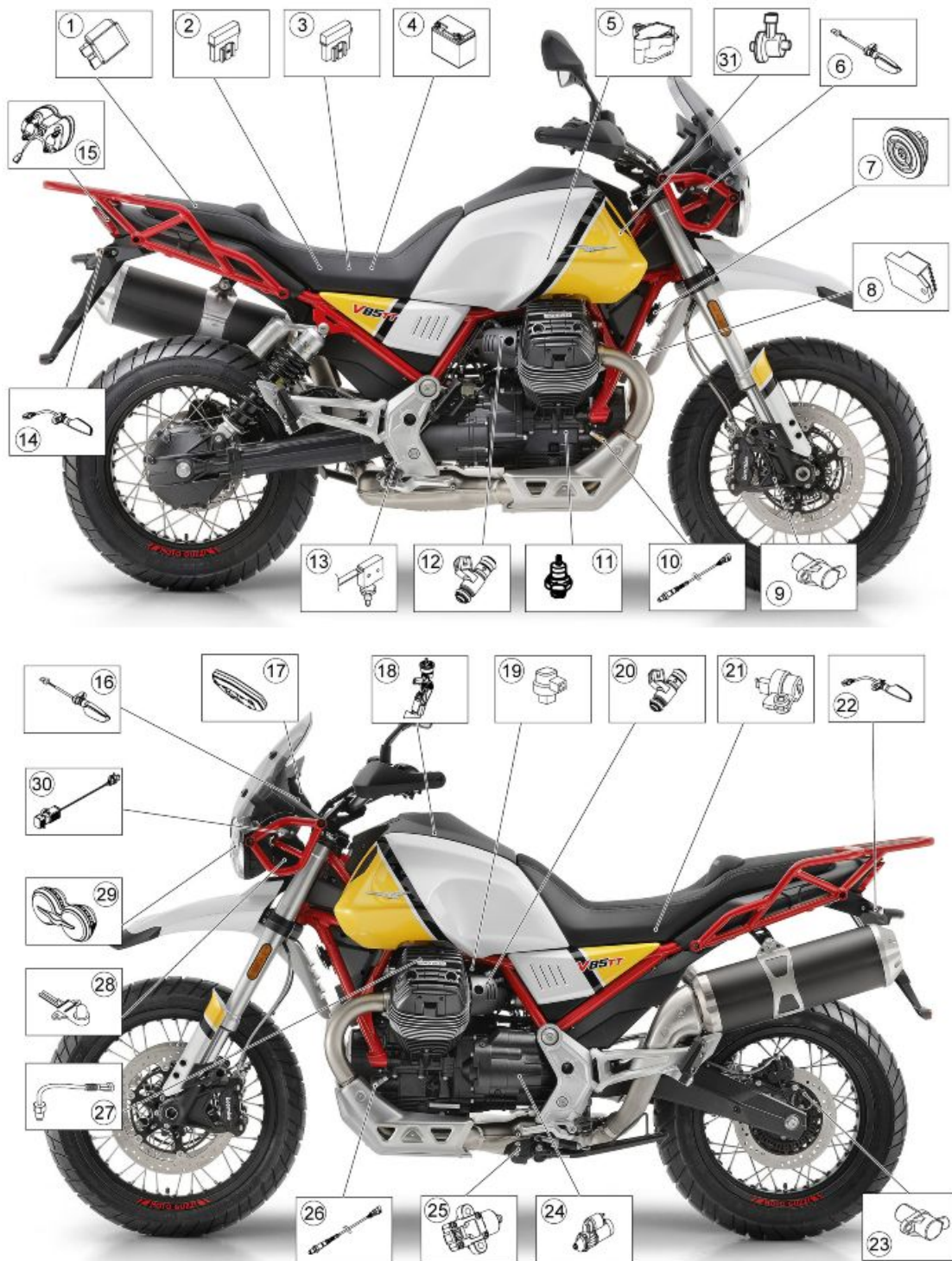


INDEX OF TOPICS

ELECTRICAL SYSTEM

ES

Components arrangement



Key:

- 1. Engine control unit
- 2. Secondary fuses
- 3. Main fuses

4. Battery
5. Coils
6. Front right turn indicator
7. Horn
8. Voltage regulator
9. Front speed sensor
10. Right Lambda probe
11. Oil pressure sensor
12. Right injector
13. Stop switch
14. Rear right turn indicator
15. Tail-light
16. Front left turn indicator
17. Instrument cluster
18. Fuel pump
19. Secondary air sensor
20. Left injector
21. Fall sensor
22. Rear left turn indicator
23. Rear speed sensor
24. Starter motor
25. Stand switch
26. LH oxygen sensor
27. Engine temperature sensor
28. Air temperature sensor
29. Headlamp
30. USB port
31. PURGE valve (ONLY E5)

Electrical system installation

INTRODUCTION

Scope and applicability

The wiring routing, its positioning and fastening to the motorcycle and potential problems are defined on the following section in order to reach the objectives of vehicle reliability.

Materials used and corresponding quantities

The electrical system consists of the following wiring harnesses and parts:

- 1 Main Cable Harness

- 1 x Taillight wiring
- 1 x Fuel pump wiring
- 1 x Left cylinder HV wire
- 1 x Right cylinder HV wire
- 1 x Fog light wiring (not standard)

Consumable such as cable clamps, cable fasteners or cable grommets are indicated in the images

Motorcycle division

The wiring harnesses on the vehicle are subdivided into three main sections, as indicated in the figure.

1. Front of vehicle
2. Centre of vehicle
3. Rear section



SPECIAL CHECKS FOR THE CORRECT CONNECTION AND ROUTING OF CABLES

It is extremely important that any security-locks for the following connectors are properly connected and correctly tightened to ensure proper engine, and therefore proper vehicle, operation.

Carry out the checks listed below.

- Instrument cluster connector
- Demand connector
- Pick-up and alternator connector
- Side stand switch connector
- Right and left cylinder coil connectors
- Control unit connectors
- Fuel pump connector
- Key and immobilizer antenna connector
- Right hand column light switch connector
- Left light switch connector
- ABS connector
- Front and rear speed sensor connectors
- Secondary and primary fuses (fitting correctly and closing rubber box)
- Throttle valve motor connector
- T-Map sensor connector
- Fuel injector connectors
- Check the ground fastenings on the engine body
- Check that the battery-starter relay is routed correctly

- Check that the positive cable is fastened correctly to the starter motor and that the cap is fitted correctly

IMPORTANT

THE ENCIRCLED CONNECTORS ARE CONSIDERED CRITICAL IN COMPARISON WITH ANY OTHER BECAUSE THE VEHICLE WILL STOP OR PRESENT A MALFUNCTION IF THEY ARE ACCIDENTALLY DISCONNECTED.

Undoubtedly the connection of the rest of connectors is also important and essential for the correct operation of the vehicle. The instructions for routing and fastening the wiring harness throughout the vehicle must be followed precisely to ensure that the vehicle functions correctly and reliably

The following procedures describe the operations necessary for pre-assembling the main wiring harness on the frame.

TABLE A - PRELIMINARY PHASES

- Proceed as indicated in the figure

**TABLE B - PRELIMINARY PHASES**

- Proceed as indicated in the figure

**TABLE C - PRELIMINARY PHASE**

- Proceed as indicated in the figure



TABLE D - PRELIMINARY PHASE

1. Plastic rivet (female) + plastic rivet (male)

**TABLE E - PRELIMINARY PHASE**

- Proceed as indicated in the figure

**TABLE F - PRELIMINARY PHASE**

1. Medium sized clamp

**TABLE G - PRELIMINARY PHASE**

1. Medium sized clamp



TABLE H - PRELIMINARY PHASE

- Arrange the wiring as illustrated in the figure

**TABLE I - PRELIMINARY PHASE**

- Arrange the wiring as illustrated in the figure

**TABLE J - PRELIMINARY PHASE**

- Arrange the wiring as illustrated in the figure

**TABLE K - ABS SYSTEM PRE-MOUNTING**

1. Large clamp (for canister filter)



TABLE L - ABS SYSTEM PRE-MOUNTING

1. Large clamp (for canister filter)
2. Medium sized clamp

**TABLE M - ABS SYSTEM PRE-MOUNTING**

1. Large clamp (for canister filter)
2. Medium clamps (pre-mounted for subsequent flywheel cables fastening)

**TABLE N - ASSEMBLY OF FRAME UNIT TO ENGINE**

1. Temperature bulb connector

**TABLE O - ASSEMBLY OF FRAME UNIT TO ENGINE**

1. Temperature bulb connector

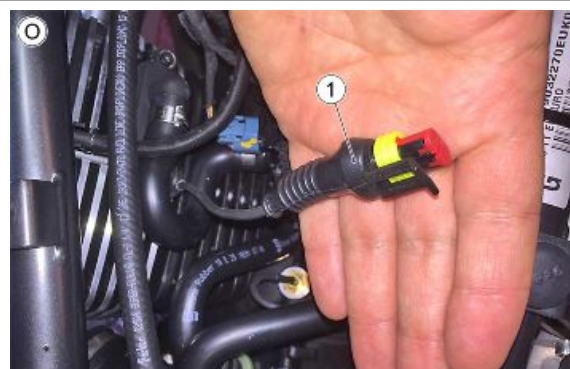
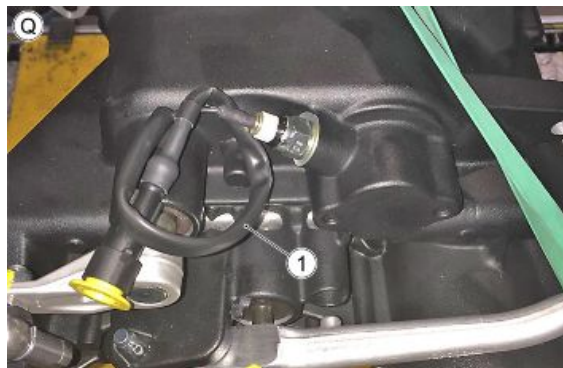


TABLE P - ASSEMBLY OF FRAME UNIT TO ENGINE

- Temperature bulbs connections carried out and objectified

**TABLE Q - ASSEMBLY OF FRAME UNIT TO ENGINE**

1. Gear in neutral switch

**TABLE R - ASSEMBLY OF FRAME UNIT TO ENGINE**

1. Pick up sensor rubber piece

**TABLE S - ASSEMBLY OF FRAME UNIT TO ENGINE**

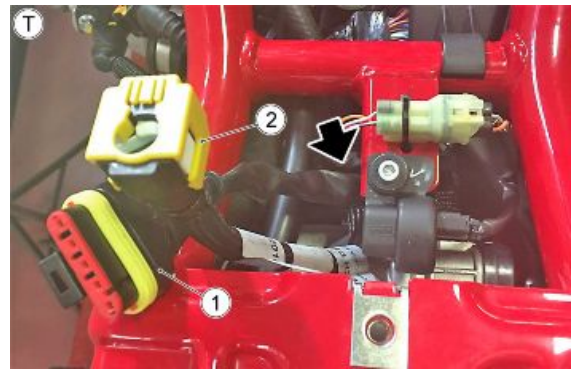
1. Medium sized clamp
2. Large clamp



TABLE T - ASSEMBLY OF FRAME UNIT TO ENGINE

1. Fall sensor
2. Fuel pump

Pass the fall sensor and fuel pump outputs under the frame bracket as illustrated in the figure

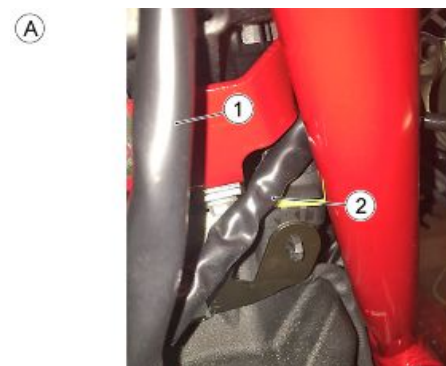
**TABLE U - ASSEMBLY OF FRAME UNIT TO ENGINE**

1. Large clamp

Pass the branch that goes to the instrument cluster over the frame crosspiece as illustrated in the figure

**Front side****TABLE A - VOLTAGE REGULATOR ASSEMBLY**

1. Regulator side flywheel cable
2. Regulator cable to wiring harness

**TABLE A1 - VOLTAGE REGULATOR ASSEMBLY**

1. Medium clamps (previously mounted)
2. Engine side flywheel cable
3. Regulator side flywheel cable
4. Horn cable



TABLE A2 - VOLTAGE REGULATOR ASSEMBLY

1. Horn connectors
2. Horn

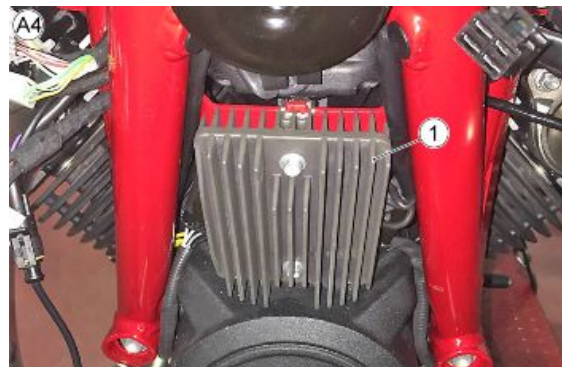

TABLE A3 - VOLTAGE REGULATOR ASSEMBLY

- Position the excess cable as illustrated in the figure


TABLE A4 - VOLTAGE REGULATOR ASSEMBLY

1. Voltage regulator

Fasten the voltage regulator as illustrated in the figure


TABLE B - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. air temperature sensor

Assemble the external air temperature sensor as the first operation



TABLE B1 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. Plug socket with rubber piece
2. air temperature sensor

Assemble the turn indicators and run the wiring in the frame pipes

**TABLE B2 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE**

1. Support for AMP connection
2. Small clamp

**TABLE B3 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE**

1. Plug socket with rubber piece

**TABLE B4 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE**

1. Small clamp
- Air temperature sensor fastenings



TABLE B5 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. Front right turn indicator connector
2. Front left turn indicator connector

Run the connections in the instrument cluster head

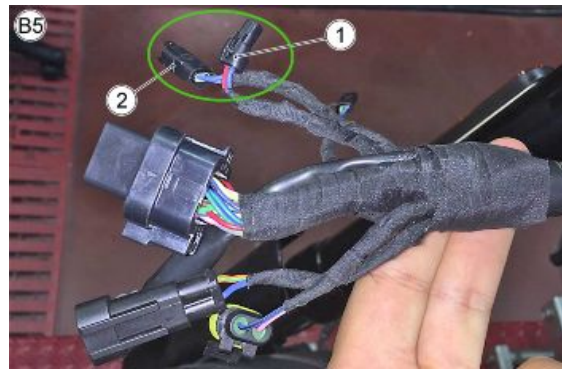


TABLE B6 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. Wiring to the instrument cluster
2. Small clamp
3. Front speed sensor wiring



TABLE B7 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. Air temperature sensor connection
2. Power socket connection with rubber piece

Both connections are objectivated with brackets for AMP connections



TABLE B8 - INSTRUMENT CLUSTER PRE-ASSEMBLY AND ASSEMBLY ON THE BIKE

1. Instrument cluster connector
2. Front headlamp connector

Assemble the front light cluster and, after connecting it, fastened the connector to the frame support as illustrated in the figure

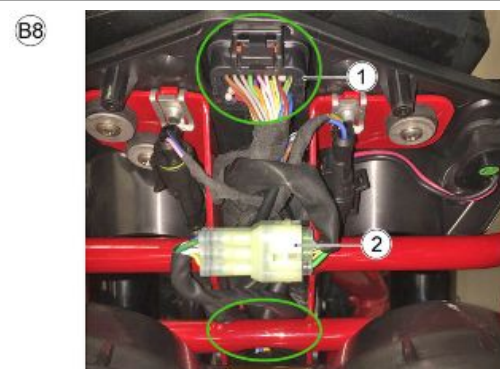


TABLE C - FRONT TURN INDICATORS

1. Right turn indicator connection

During installation one wire must be covered and the other with sheath

**TABLE C1 - FRONT TURN INDICATORS**

1. Left turn indicator connection

During installation one wire must be covered and the other with sheath

**TABLE C2 - FRONT TURN INDICATORS**

- Proceed as indicated in the figure

Once the turn connectors are connected, fasten the cables behind the instrument cluster

**TABLE D - HANDLEBAR**

1. Rubber cable guide



TABLE D1 - HANDLEBAR

1. Front stop switch

**TABLE D2 - HANDLEBAR**

1. Right light switch

**TABLE D3 - HANDLEBAR**

1. Left light switch

**TABLE D4 - HANDLEBAR**

1. Clutch switch



TABLE E - FRONT WHEEL SPEED SENSOR

1. Front speed sensor
2. Speed sensor fastening
3. Cable grommet

**TABLE E1 - FRONT WHEEL SPEED SENSOR**

1. Cable grommet

**TABLE E2 - FRONT WHEEL SPEED SENSOR**

1. Cable grommet

**TABLE E3 - FRONT WHEEL SPEED SENSOR**

1. Clip



TABLE E4 - FRONT WHEEL SPEED SENSOR

- 1. Speed sensor cable

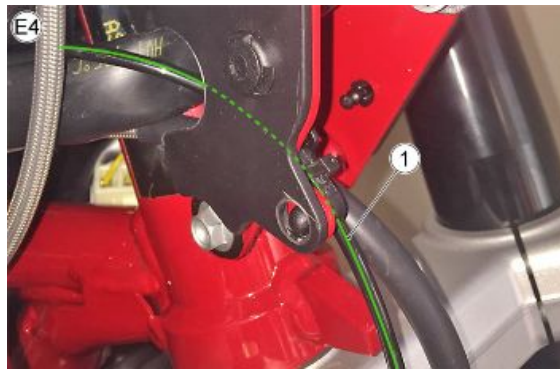


TABLE E5 - FRONT WHEEL SPEED SENSOR

- 1. Speed sensor cable

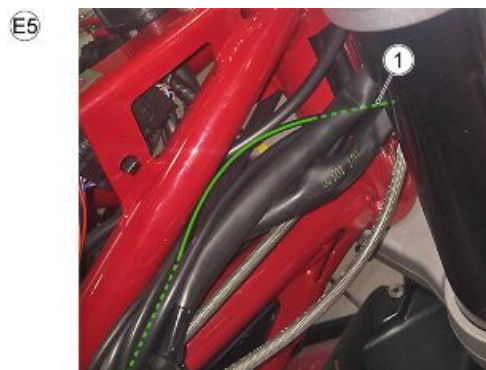


TABLE F - RIGHT CONNECTOR POCKET

- 1. Small clamp
- 2. Large clamp
- 3. Medium sized clamp



TABLE G - LEFT CONNECTOR POCKET

- 1. Medium sized clamp
- 2. Large clamp



TABLE H - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Key connectors (no mark)

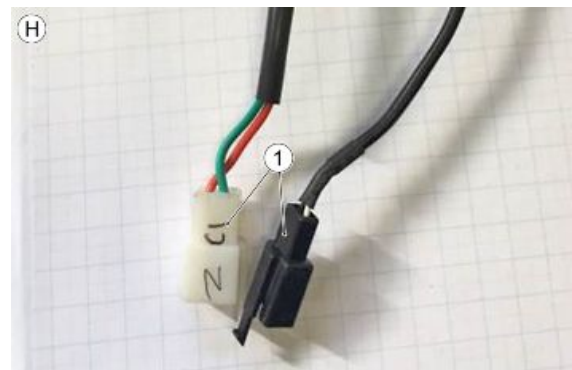


TABLE H1 - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Speed sensor connector

Make the mark 100 mm (3.94 in) from the connector

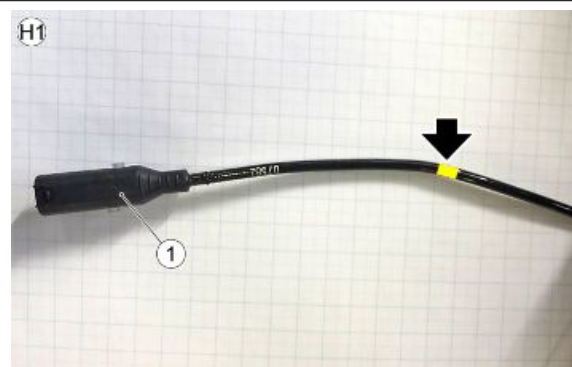


TABLE H2 - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Left light switch connectors

Make the mark 170 mm (6.69 in) from the connectors



TABLE H3 - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Clutch switch connector

Make a mark 120 mm (4.72 in) from the connector



TABLE H4 - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Front stop switch

Make a mark 100 mm (3.94 in) from the connector

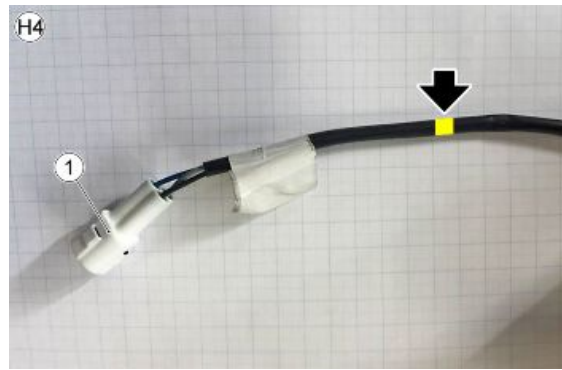


TABLE H5 - PREPARATION OF THE ELECTRICAL COMPONENTS TO BE ASSEMBLED ON THE LIGHT SWITCH

1. Right light switch connectors

Make the mark 120 mm (4.72 in) from the connectors

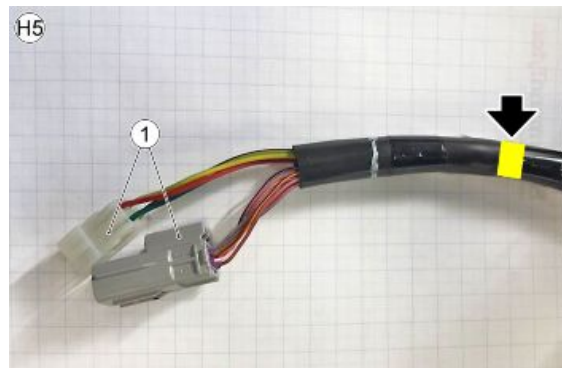


TABLE I - OBJECTIFICATION OF THE ELECTRICAL COMPONENTS ON THE RIGHT BOX

1. Large clamp
2. Small clamp

Fix all wiring harnesses in the relative clamps and at the height of the reference marks previously prepared (from left: aerial key and speed sensor, left light switch and clutch switch, right light switch and front stop switch)

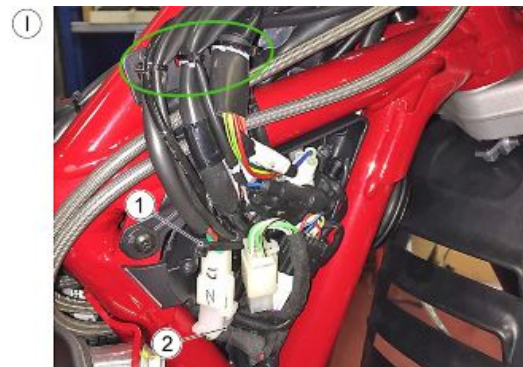


TABLE I1 - OBJECTIFICATION OF THE ELECTRICAL COMPONENTS ON THE RIGHT BOX

- Route of the left light switch and clutch switch wiring harnesses



TABLE I2 - OBJECTIFICATION OF THE ELECTRIC COMPONENTS ON THE RIGHT BOX

1. Clip

End result after mounting the right side protection



TABLE J - OBJECTIFICATION OF THE ELECTRIC COMPONENTS ON THE LEFT BOX

1. Small clamp
2. Small clamp

Assemble the box and tighten the two clamps as shown in the figure. Secure the cable coming from the main wiring harness with the previously prepared clamp (1) and fix the pick-up and regulator cables with the pre-prepared clamp (2).

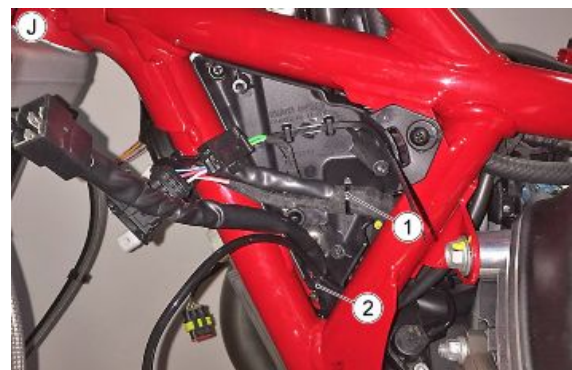


TABLE J1 - OBJECTIFICATION OF THE ELECTRIC COMPONENTS ON THE LEFT BOX

1. Fog lights preparation
2. Pick-up connector
3. Regulator connector

Make the connections of the connector (2) and (3) and do not connect the connector (1)



TABLE J2 - OBJECTIFICATION OF THE ELECTRIC COMPONENTS ON THE LEFT BOX

1. Large clamp

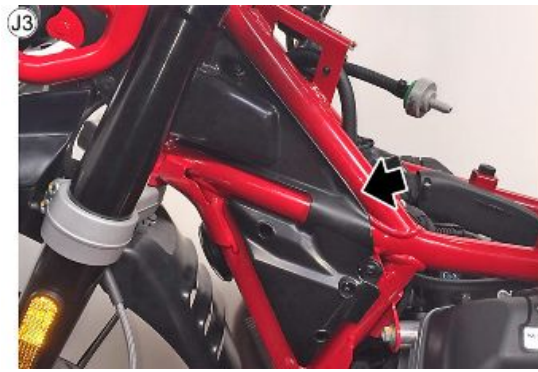
Tighten the clamp (1) to hold all the connections



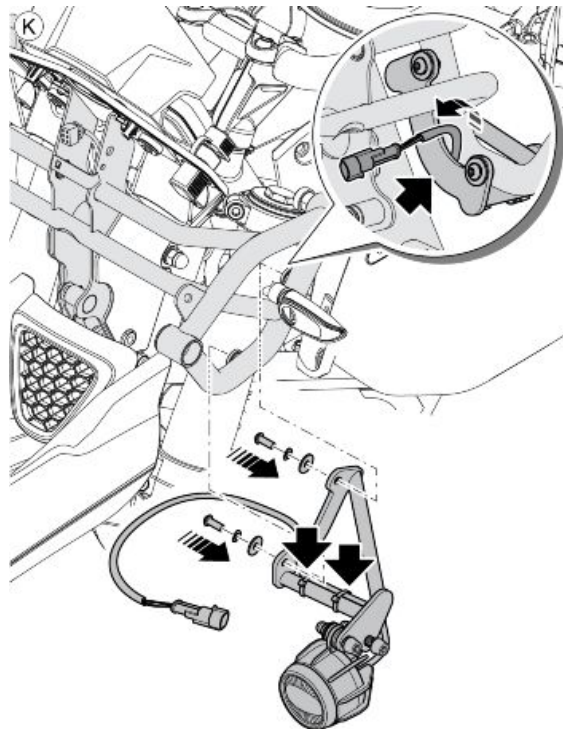
TABLE J3 - OBJECTIFICATION OF THE ELECTRIC COMPONENTS ON THE LEFT BOX

- Proceed as indicated in the figure

End result after mounting the left side protection


TABLE K - FOG LIGHTS

- After having first installed the fog light in its support, fit the two clamps at the indicated points and pass the wiring harness of the fog light as illustrated.


TABLE K1 - FOG LIGHTS

- Fasten the fog light wiring harness to the front frame using the three indicated clamps.
- Repeat the operation for the fog light on the opposite side of the vehicle.

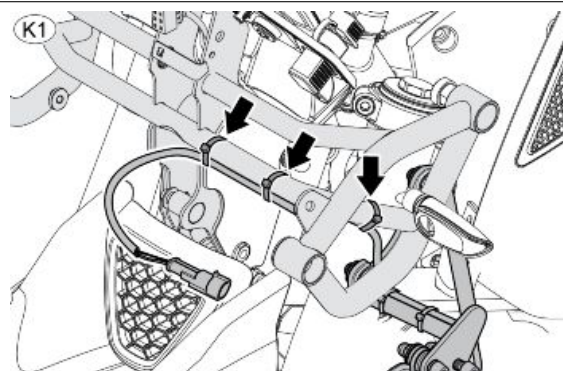
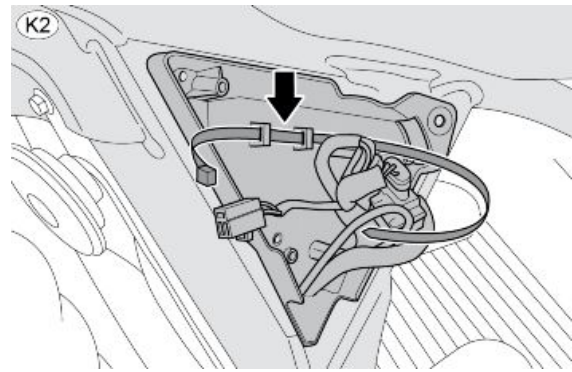


TABLE K2 - FOG LIGHTS

- Place the "L280" clamp on the junction box.

**TABLE K3 - FOG LIGHTS**

- Pass and place the cable harness as indicated.

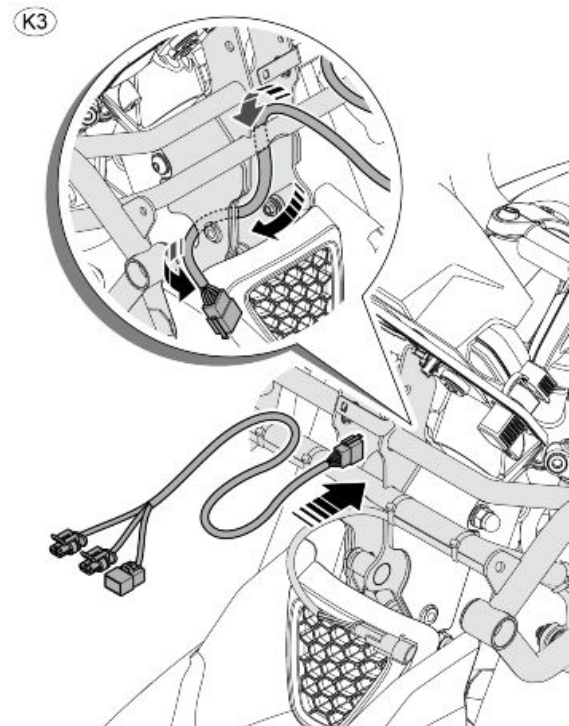
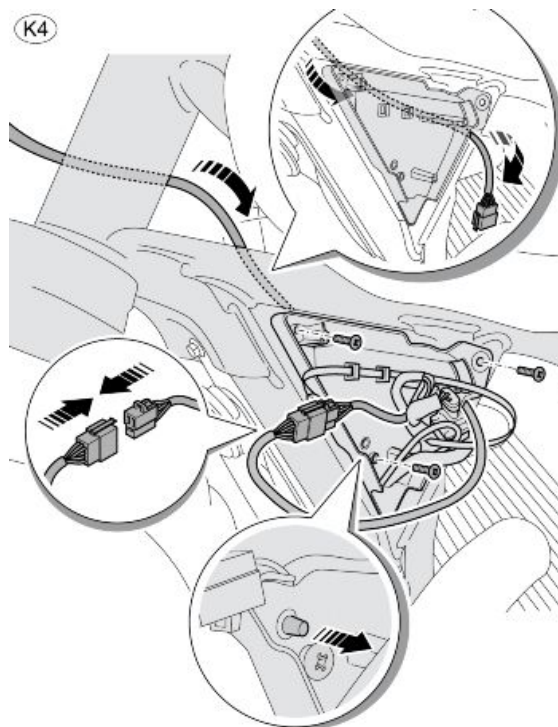


TABLE K4 - FOG LIGHTS

- Fasten the left side junction box with the three screws, aligning the positioning bolt on the hole of the box and then connect the fog light wiring harness to the vehicle's connector.

**TABLE K5 - FOG LIGHTS**

- Gather the wiring harnesses and close the clamp, placing its head slightly to the right or to the left, flatten the wiring harnesses as much as possible and cut the clamp excess.

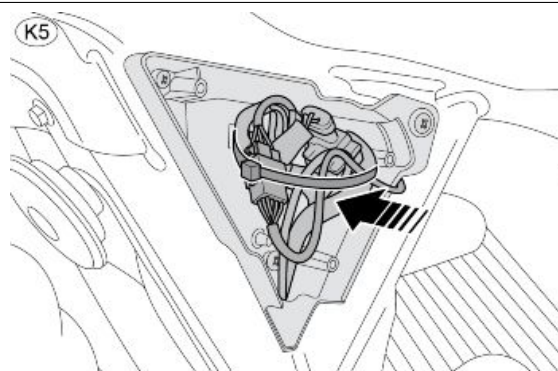
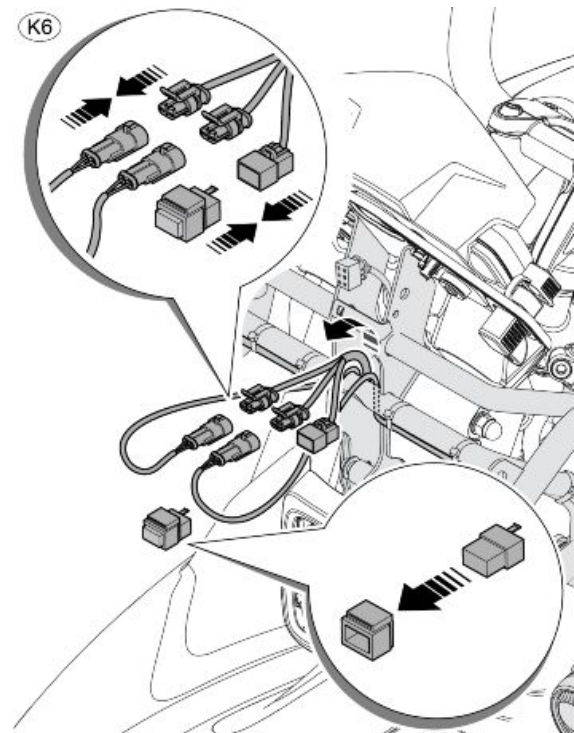
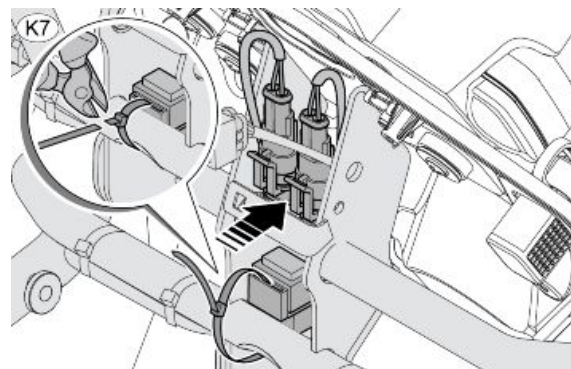


TABLE K6 - FOG LIGHTS

- After having assembled the relay with the rubber gasket, pass the connectors of the headlight and of the fog lights as indicated.
- Connect the fog light connectors and the relay to the specific connectors of the wiring harness.

**TABLE K7 - FOG LIGHTS**

- Pass the clamp on the relay and place it inside the headlight support as indicated, together with the fog light connectors.
- Fasten the relay with the clamp.

**TABLE L - PURGE VALVE**

- Check that the connector of the PURGE valve is correctly connected.

NOTE
ONLY FOR E5 VEHICLES



TABLE M - OBJECTIFICATION OF THE PICK UP CONNECTOR

- Fasten the Pick Up wiring harness connector to the flywheel's cables using a small clamp, as shown in the figure

NOTE

ONLY FOR E5 VEHICLES

IMPORTANT

The position of the Pick Up connector and its connection must be **STRICTLY** observed. If left loose, the connector could get close to the coils, generating disturbances that would cause an erratic idle speed.



Parte centrale

TABLE A - RIGHT INJECTOR CABLE ROUTING

1. Right injector connector

The cable must run as illustrated in the figure



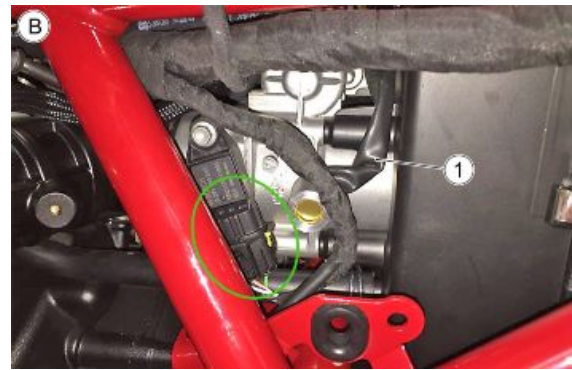
TABLE A1 - LEFT INJECTOR CABLE ROUTING

1. Left injector connector

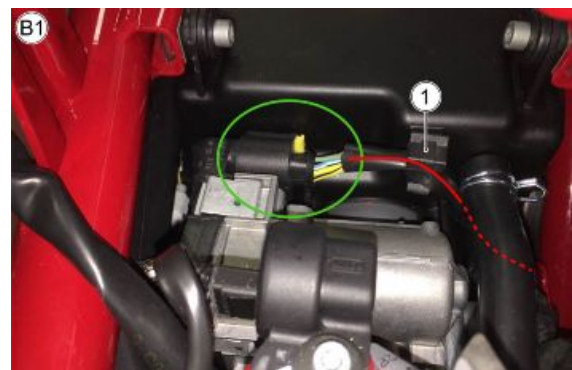


TABLE B - FILTER BOX AND THROTTLE BODY CONNECTIONS

1. Throttle valve cable

**TABLE B1 - FILTER BOX AND THROTTLE BODY CONNECTIONS**

1. Fastener clip

**TABLE B2 - FILTER BOX AND THROTTLE BODY CONNECTIONS**

- Pull the following cable to the outside of the frame

**TABLE B3 - FILTER BOX AND THROTTLE BODY CONNECTIONS**

- Pull the following cable to the outside of the frame



TABLE C - SIDE STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE

- Overall view of pre-assembly

**TABLE C1 - SIDE STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

1. Fastener clip

**TABLE C2 - STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

1. Clip

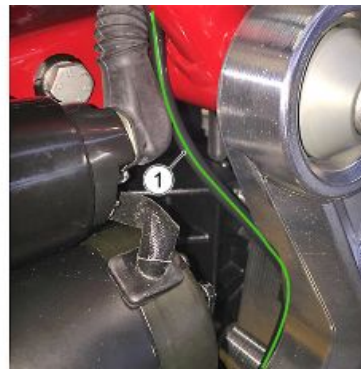
**TABLE C3 - STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

1. Fastener clip



TABLE C4 - STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE

1. Side stand cabling

**TABLE C5 - STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

- Place the wiring harness in the specific guide, as illustrated in the figure

**TABLE C6 - STAND SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

- Place the wiring harness as shown in the figure and, using a small clamp, fasten it to the other wiring harnesses in the area
- Place the connector (1) of the wiring harness as shown in the figure

**TABLE D - BRAKE LIGHT SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE**

- Overall view



TABLE D1 - BRAKE LIGHT SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE

1. Brake light switch support



TABLE D2 - BRAKE LIGHT SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE

1. Gearbox in neutral switch connection (mounted on support)
2. Brake light switch



TABLE D3 - BRAKE LIGHT SWITCH AND CORRECT ASSEMBLY ON THE VEHICLE

1. Support for AMP connection
2. Small clamp



TABLE E - HIGH VOLTAGE CABLES

1. Left cylinder H.V. cable
- H.V. cable route



TABLE E1 - HIGH VOLTAGE CABLES

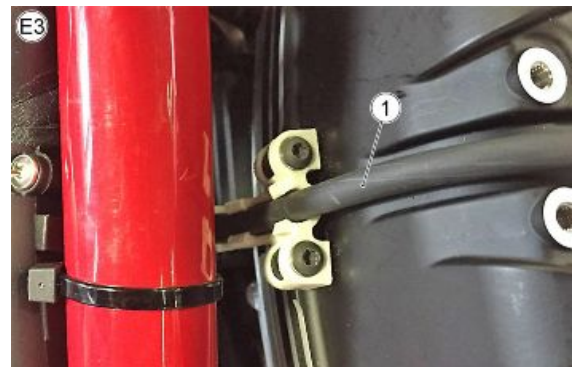
1. Left cylinder cable guide

**TABLE E2 - HIGH VOLTAGE CABLES**

1. Left cylinder coil connector
H.V. cable route to the left cylinder coil

**TABLE E3 - HIGH VOLTAGE CABLES**

1. Right cylinder H.V. cable
H.V. cable route

**TABLE E4 - HIGH VOLTAGE CABLES**

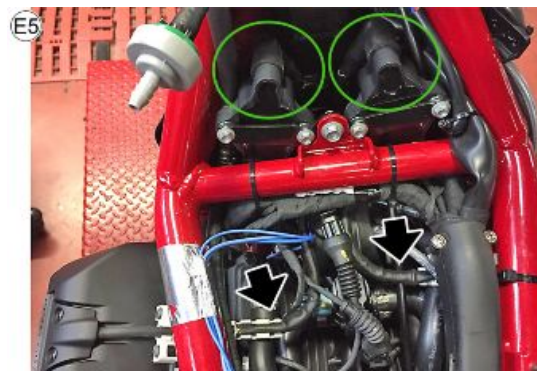
1. Right cylinder cable guide



TABLE E5 - HIGH VOLTAGE CABLES

- Proceed as indicated in the figure

Overall view of how the two H.V. cables look with the respective cable guides indicated in the figure

**TABLE E6 - HIGH VOLTAGE CABLES**

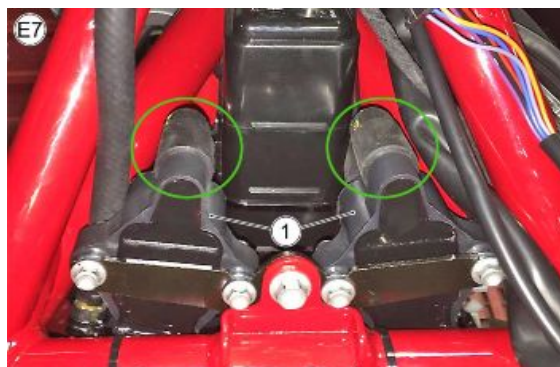
1. H.V. cables

The two H.V. cables must be fastened under the specific clips located in the ABS modulator support

**TABLE E7 - HIGH VOLTAGE CABLES**

1. Coils

View of completed coils assembly

**TABLE F - ABS**

1. ABS control unit connector

Does not require dust boot. For correct connection, see "installation of the ABS modulator"



FIGURE G - STARTER MOTOR

1. Start relay cable

**FIGURE G1 - STARTER MOTOR**

1. Power cable

Fasten the power cable to the clamp with nut and washer and cover everything with the specific black cap

**FIGURE G2 - STARTER MOTOR**

1. Power cable

**FIGURE G3 - STARTER MOTOR**

- Proceed as indicated in the figure



TABLE H - EARTH POINT ON ENGINE

1. Earth cable



TABLE H1 - EARTH POINT ON ENGINE

1. Earth cable
2. Nut

Fasten everything as illustrated in the figure



TABLE I - RIGHT SIDE PANEL

1. Rear switch connector
2. Neutral switch connector

The neutral switch connection is fastened in its specific support



TABLE I1 - RIGHT SIDE PANEL

1. Support for AMP connection
2. Small clamp

Fasten the excess brake light switch cable as illustrated in the figure

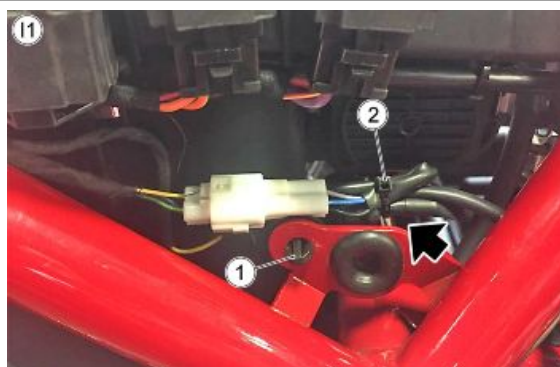


TABLE J - LEFT FAIRING

1. Stand switch connector
2. Rear ABS sensor connector with clip

**TABLE J1 - LEFT FAIRING**

1. Small clamp

Secure the electrical part support and secure with the straps (1) the anti-theft preparation and the stand switch cable, as shown

**TABLE K - RH LAMBDA PROBE**

1. Right Lambda probe

**TABLE K1 - RH LAMBDA PROBE**

1. Right Lambda probe connector
2. Support for AMP connection
3. Voltage regulator support bracket

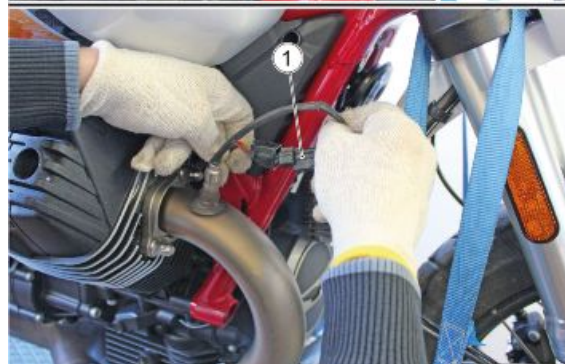


TABLE K2 - RH LAMBDA PROBE (E5 VEHICLES)

1. Right Lambda probe

**TABLE K3 - RH LAMBDA PROBE (E5 VEHICLES)**

1. Right Lambda probe connector

**TABLE L - LEFT LAMBDA PROBE**

1. LH oxygen sensor



TABLE L1 - LEFT LAMBDA PROBE

1. Left lambda probe connector
2. Support for AMP connection
3. Voltage regulator support bracket

**TABLE L2 - LH LAMBDA PROBE (E5 VEHICLES)**

1. LH oxygen sensor

**TABLE L3 - LH LAMBDA PROBE (E5 VEHICLES)**

1. Left lambda probe connector

**TABLE M - OIL PRESSURE BULB**

1. oil pressure bulb eyelet
- The inclination of the eyelet must be 25°

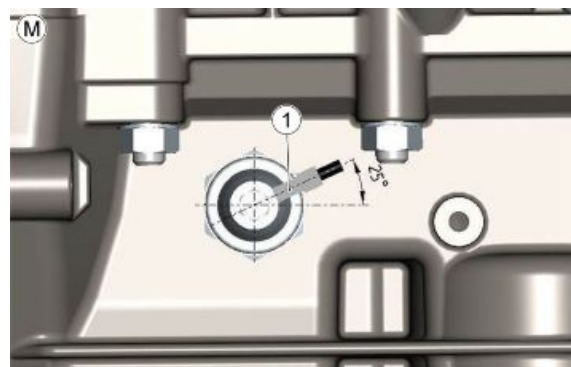
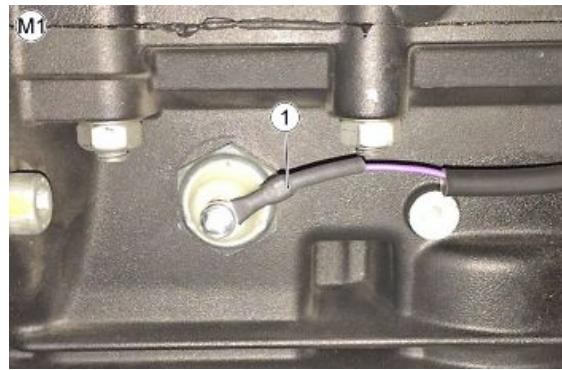


TABLE M1 - OIL PRESSURE BULB

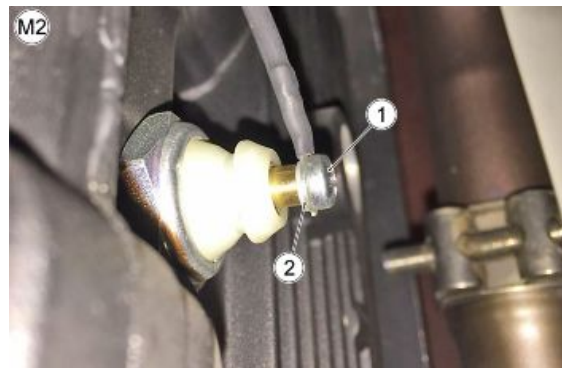
1. oil pressure bulb eyelet

Real view

**TABLE M2 - OIL PRESSURE BULB**

1. oil pressure bulb eyelet
2. Washer

The washer must be under the eyelet

**TABLE M3 - OIL PRESSURE BULB**

1. Cover

Cover the bulb with the cover taking care not to damage the cable

**TABLE N - CURRENT OUTLET ASSEMBLY (ACCESSORY)**

- View of the battery compartment



**TABLE N1 - CURRENT OUTLET ASSEMBLY
(ACCESSORY)**

1. Battery cover

Remove the cover (1).

**TABLE N2 - CURRENT OUTLET ASSEMBLY
(ACCESSORY)**

1. USB cable gland

**TABLE N3 - CURRENT OUTLET ASSEMBLY
(ACCESSORY)**

- Proceed as indicated in the figure

Assemble the current socket with the rubber cable gland

**TABLE N4 - CURRENT OUTLET ASSEMBLY
(ACCESSORY)**

1. Medium sized clamp

Assemble the USB port as shown in the figure



TABLE N5 - CURRENT OUTLET ASSEMBLY (ACCESSORY)

- Proceed as indicated in the figure
- Remove the plug of the provision and USB port connector

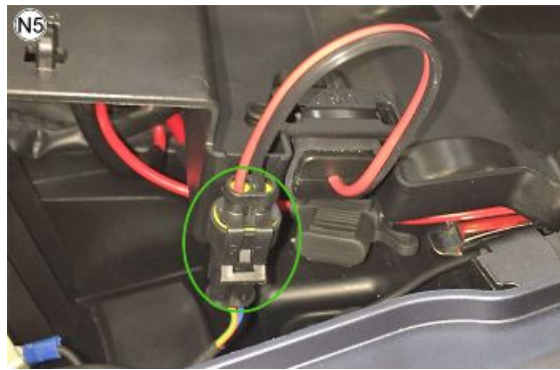


TABLE N6 - CURRENT OUTLET ASSEMBLY (ACCESSORY)

- Proceed as indicated in the figure
- Refit the battery cover



TABLE N7 - CURRENT OUTLET ASSEMBLY (ACCESSORY)

- End result



TABLE O - ASSEMBLY OF THE FUEL PUMP WIRING HARNESS ON THE TANK

1. Fuel pump wiring harness

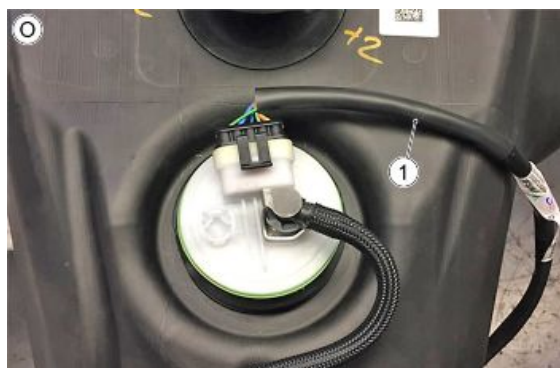


TABLE O1 - ASSEMBLY OF THE FUEL PUMP WIRING HARNESS ON THE TANK

1. Fuel pump connector

Connector fixed in the correct position on the support for AMP connection

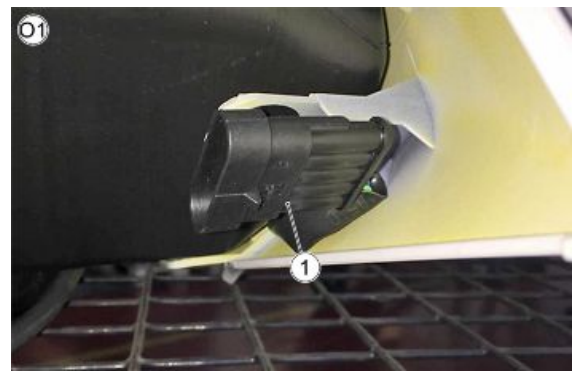


TABLE O2 - ASSEMBLY OF THE FUEL PUMP WIRING HARNESS ON THE TANK

1. Support for AMP connections



TABLE O3 - ASSEMBLY OF THE FUEL PUMP WIRING HARNESS ON THE TANK

1. Fuel pump wiring harness

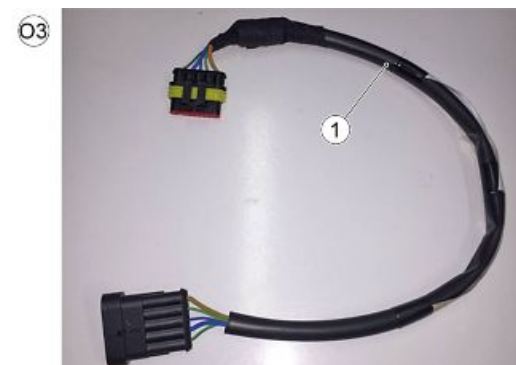


TABLE P - DERATING TEMPERATURE BULB

1. Derating temperature bulb

Pass the wiring harness as indicated in figure

NOTE

ONLY FOR E5 VEHICLES

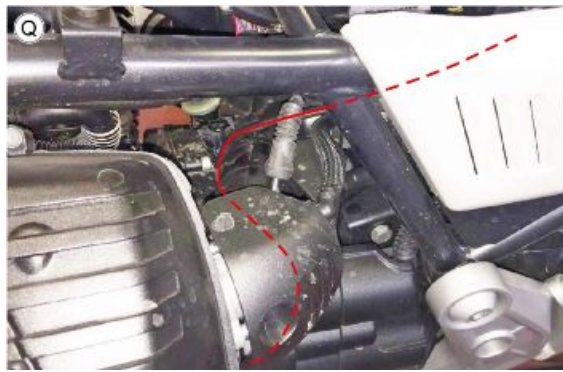


TABLE Q - ENGINE HEAD TEMPERATURE**BULB**

- Pass the wiring harness of the temperature bulb over the intake manifold

NOTE

ONLY FOR E5 VEHICLES

**TABLE Q1 - ENGINE HEAD TEMPERATURE****BULB**

1. Engine head temperature bulb

NOTE

ONLY FOR E5 VEHICLES

**TABLE R - GEAR CHANGE SENSOR**

- Pass the wiring harness as indicated in figure
- Fasten the wiring harness and the rear stop connector to the chassis using a small clamp

NOTE

ONLY FOR E5 VEHICLES

**TABLE R1 - GEAR CHANGE SENSOR**

- Pass the wiring harness as indicated in figure
- Place the connector (1) as illustrated in the figure

NOTE

ONLY FOR E5 VEHICLES



Back side

TABLE A - WIRING ON THE SEAT PILLAR

1. Medium sized cable ties

Once the lower seat pillar closing is mounted, remove the two clamps (1)

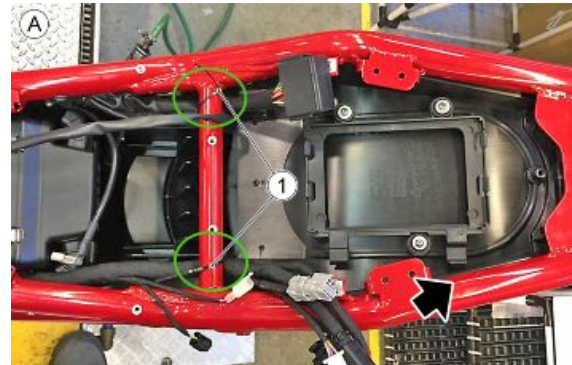


TABLE A1 - WIRING ON THE SEAT PILLAR

- Proceed as indicated in the figure



TABLE A2 - WIRING ON THE SEAT PILLAR

1. Engine control unit

Connect the engine ECU (1) and hook it to the specific plastic base

NOTE

ONLY FOR E4 VEHICLES



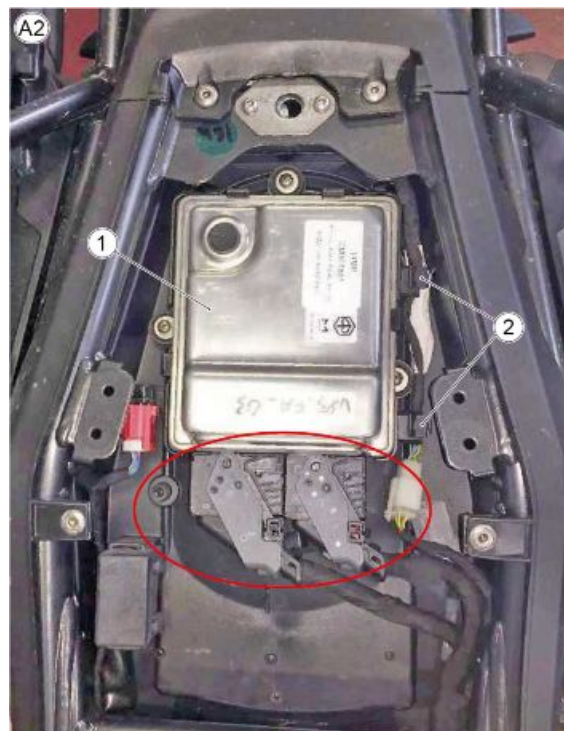
TABLE A2 - WIRING ON THE SEAT PILLAR

1. Engine control unit

- Connect the ECU connectors to the engine ECU (1) and engage it in the specific plastic base. The connectors are well engaged if the locking lever makes a "CLICK" sound when it is closed
- Pass the wiring harness of the taillight in the fastener clips (2)

NOTE

ONLY FOR E5 VEHICLES

**TABLE A3 - WIRING ON THE SEAT PILLAR**

1. Secondary fuses

Fasten the secondary fuses box in the specific supports, taking care to run the wiring on the external side

**TABLE A4 - WIRING ON THE SEAT PILLAR**

1. Battery

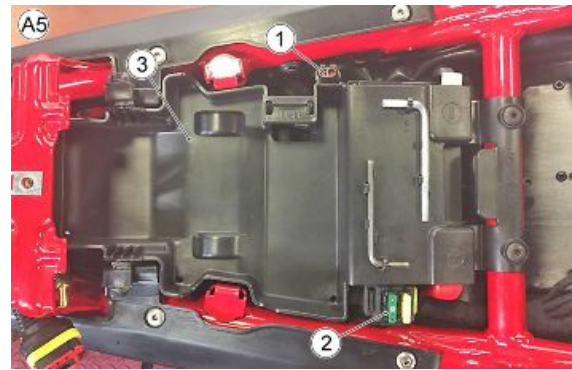
Place the battery as illustrated in the figure



TABLE A5 - WIRING ON THE SEAT PILLAR

1. USB 2 power socket predisposition
2. Main fuses
3. Battery cover (mounted)

Fasten the USB2 power socket predisposition in the specific support and the main fuses as illustrated in the figure

**TABLE A6 - OBD CONNECTOR**

1. OBD connector
 - Check that the OBD connector is fitted in the specific cap (2), as shown in the figure

NOTE

ONLY FOR E5 VEHICLES

**TABLE B - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)**

1. Licence plate holder

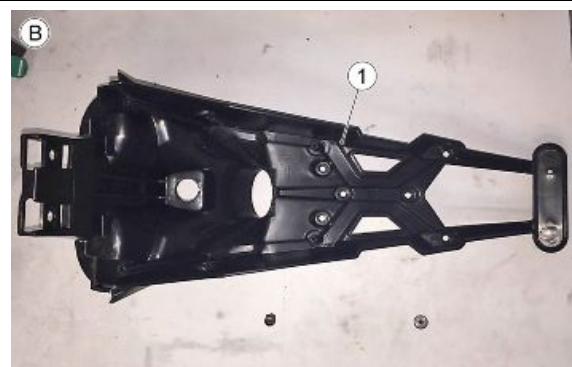
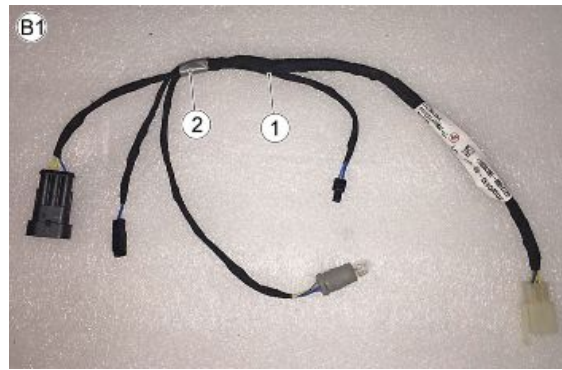


TABLE B1 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Taillight wiring harness
2. Grey reference for positioning


TABLE B2 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Fastening clip
2. Grey reference for positioning


TABLE B3 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Wire from wiring harness
2. Taillight wire

Connect the taillight and hook it to the support


TABLE B4 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Fastener clip
2. Licence plate lamp

Insert the licence plate light (2) in the specific lodging and connect the right indicator to the wiring harness. Arrange the cables as illustrated in the figure.



TABLE B5 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Fastener clip



TABLE B6 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Screws
2. Licence plate holder

Close the licence plate holder (2) with the specific cover, using the screws (1)

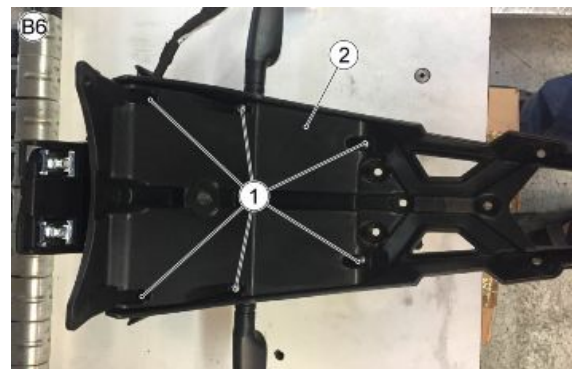


TABLE B7 - COMPLETE TAILLIGHT AND LICENCE PLATE HOLDER (PRE-ASSEMBLY)

1. Licence plate holder

Licence plate holder (1) complete and closed



TABLE C - REAR WHEEL SPEED SENSOR

1. Rear speed sensor
2. Speed sensor fastening
3. Cable grommet

Run the wire inside the slot in the rubber cap



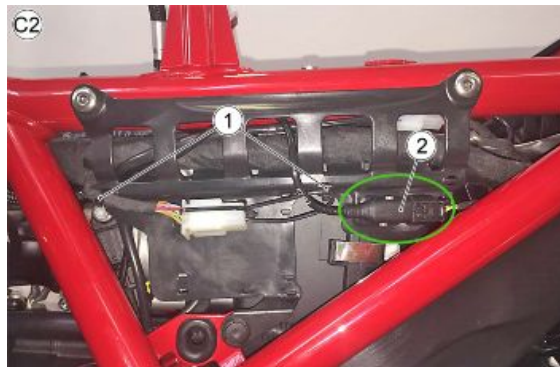
TABLE C1 - REAR WHEEL SPEED SENSOR

1. Clip
2. Cable grommet

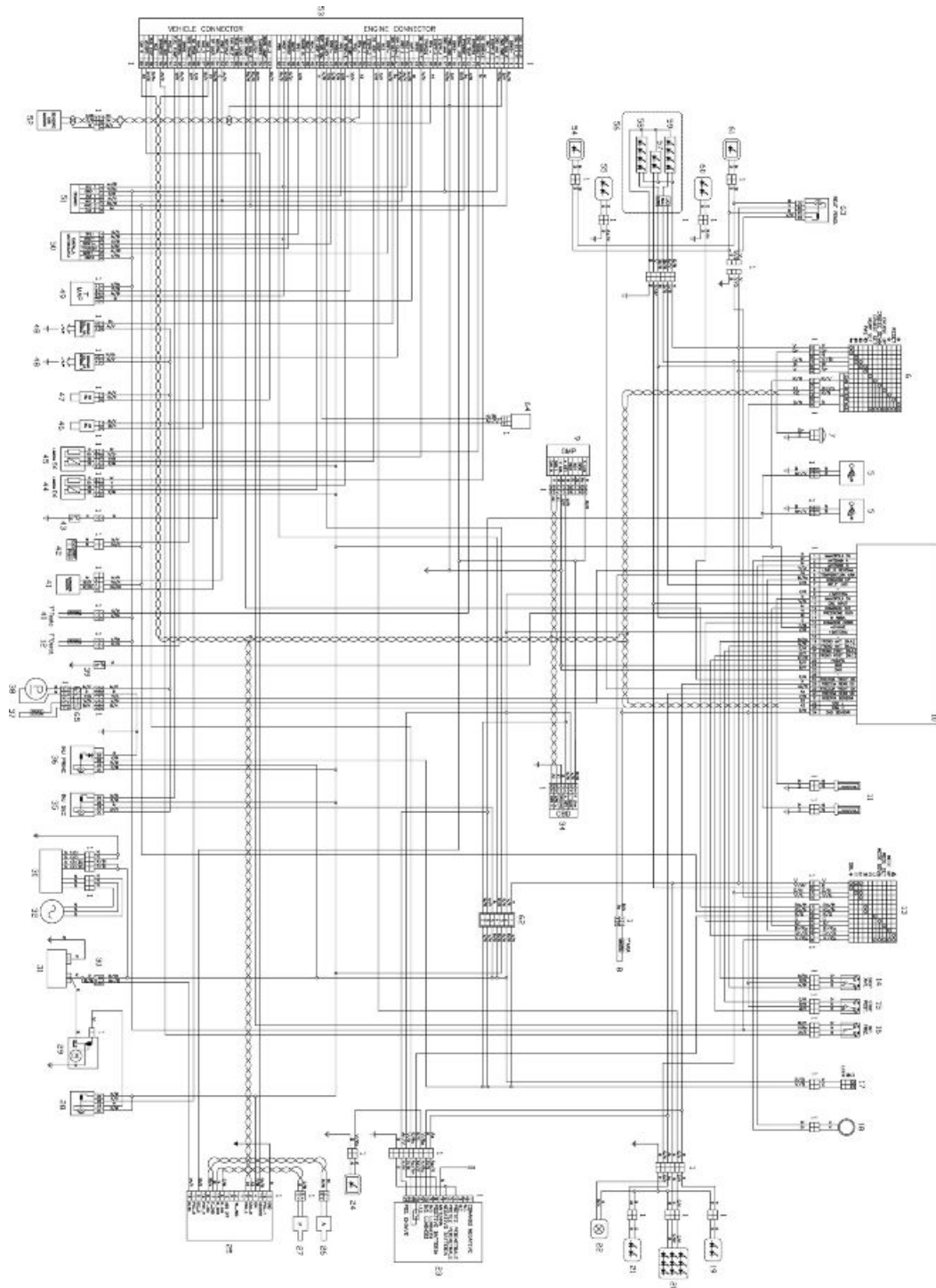
**TABLE C2 - REAR WHEEL SPEED SENSOR**

1. Small clamp
2. Speed sensor connector

Connection of the speed sensor is fastened with a clip

**General wiring diagram****NOTE**

ONLY FOR E4 VEHICLES



Key:

1. Multiple connectors
2. -
3. -
4. -
5. Power sockets USB (not standard)
6. Left light switch

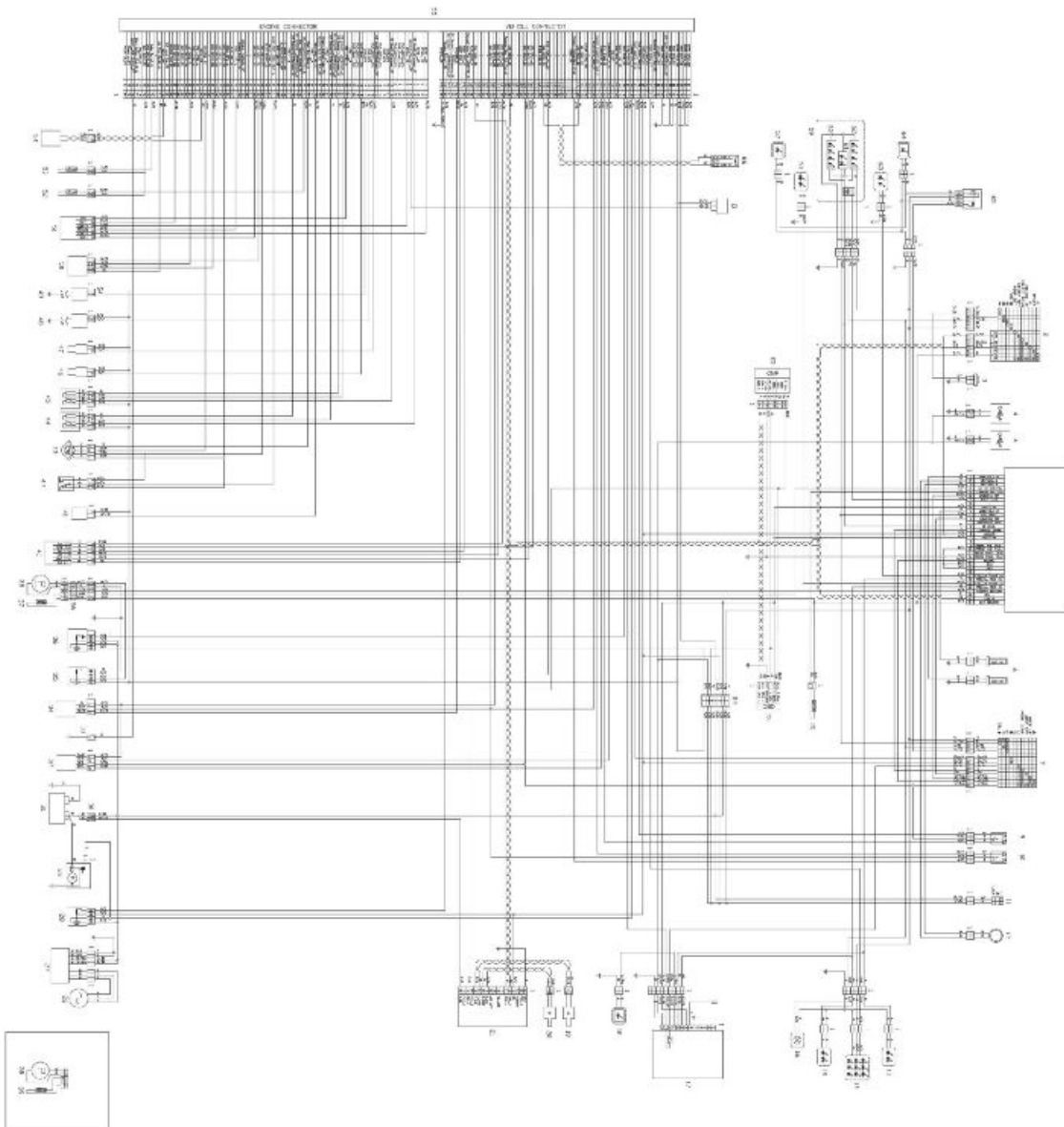
7. Horn
8. air temperature sensor
9. Predisp. GMP/Tyre pressure
10. Instrument cluster
11. Heated hand grips (not standard)
12. Derating Temp. Sens.
13. Right light switch
14. Frt. brake switch.
15. Rear brake switch
16. Clutch switch
17. Ignition switch
18. Immobilizer antenna
19. Right rear turn indicator
20. Tail-light
21. Left rear turn indicator
22. Licence plate lamp
23. Anti-theft system (not standard)
24. Antitheft system LED
25. ABS control unit
26. Front ABS sensor
27. Rear ABS sensor
28. Starter motor relay
29. Starter motor
30. Voltage regulator
31. Battery
32. Alternator
33. Low fuel probe
34. OBD connector
35. Secondary injection relay
36. Primary injection relay
37. Fuel level sensor
38. Fuel pump
39. Oil pressure sensor
40. Engine temperature sensor
41. Fall Sens.
42. Stand switch
43. Neutral sensor
44. Right cylinder lambda

- 45.Left cylinder lambda
- 46.Right cylinder injector
- 47.Left cylinder injector
- 48.Coils
- 49.T-Map sensor
- 50.Motorised throttle valve
- 51.Demand sensor
- 52.Engine speed sensor
- 53.Engine control unit
- 54.Left fog light (not standard)
- 55.Left Frt. turn indicator
- 56.Front headlamp
- 57.Position lights and DRL
- 58.High beam LED module
- 59.Low beam LED module
- 60.Right Frt. turn indicator
- 61.Right fog light (not standard)
- 62.Secondary fuses
- 63.Fog light relay (not standard)
- 64.Secondary air system
- 65.Ferrite
- 66.-

Colour key:

- Ar Orange
- Az Light blue
- B Blue
- Bi White
- G Yellow
- Gr Grey
- M Brown
- N Black
- R Red
- V Green
- Vi Purple
- Ro Pink

NOTE**ONLY FOR E5 VEHICLES**



Key:

1. Multiple connectors
2. Left light switch
3. Horn
4. Power socket USB (not standard)
5. Instrument cluster
6. Heated hand grips (not standard)

7. Right light switch
8. Canister control (PURGE valve)
9. Rear brake switch
10. Clutch switch
11. Ignition switch
12. Immobilizer antenna
13. Right rear turn indicator
14. Tail-light
15. Left rear turn indicator
16. Licence plate lamp
17. Anti-theft system (not standard)
18. Antitheft system LED
19. Front ABS sensor
20. Rear ABS sensor
21. ABS control unit
22. Air temperature sensor
23. OBD connector (ISO 19689)
24. Secondary fuses
25. GMP provision
26. Alternator
27. Voltage regulator
28. Starter motor relay
29. Starter motor
30. Main fuses
31. Battery
32. Side stand switch
33. Oil pressure sensor
34. Fall sensor
35. Fuel pump relay
36. Injection relay
37. Fuel level sensor
38. Fuel pump
39. Fuel reserve sensor
40. Demand sensor
41. Secondary air system
42. Quick shift (non standard)
43. Gear sensor
44. Lambda probe 2 (right)

- 45.Lambda probe 1 (left)
- 46.Right cylinder injector
- 47.Left cylinder injector
- 48.Right cylinder coil
- 49.Left cylinder coil
- 50.T-Map sensor
- 51.Motorised throttle valve
- 52.Derating temperature sensor
- 53.Engine temperature sensor
- 54.Engine speed sensor
- 55.11MP ECU
- 56.EMI filter
- 57.Left fog light (not standard)
- 58.Left turn indicator
- 59.Complete headlamp
- 60.High beam LED
- 61.Position lights and DRL
- 62.Low beam LED
- 63.Front right turn indicator
- 64.Right fog light (not standard)
- 65.Fog light relay (not standard)
- 66.Diagnostics connector (CAN)

Colour key:

- Ar Orange
- Az Light blue
- B Blue
- Bi White
- G Yellow
- Gr Grey
- M Brown
- N Black
- R Red
- Ro Pink
- V Green
- Vi Purple

Checks and inspections**GENERAL NOTIONS FOR TROUBLESHOOTING ELECTRICAL FAULTS**

THE SECTIONS RELATIVE TO THE ELECTRICAL SYSTEM CONTAIN DRAWINGS OF CONNECTORS; NOTE THAT THE DRAWING ALWAYS DEPICT THE CONNECTOR/COMPONENT VIEWED FROM THE WIRING HARNESS SIDE, I.E. FROM THE SIDE ON WHICH THE CABLES LEADING FROM THE MAIN WIRING HARNESS ENTER THE CONNECTOR/COMPONENT.

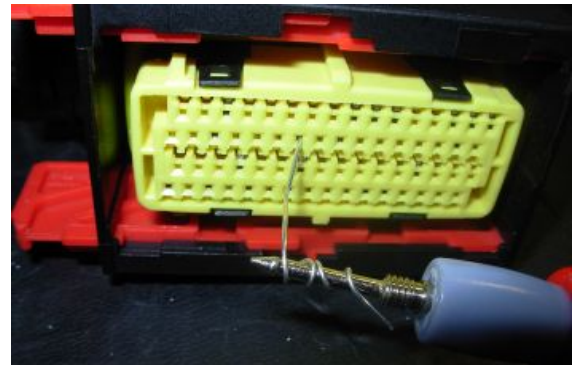
IMPORTANT

BEFORE STARTING ANY TROUBLESHOOTING PROCEDURES ON THE VEHICLE, CHECK THAT THE BATTERY VOLTAGE IS ABOVE 12V.

PROCEDURE FOR CHECKING CONNECTOR

This procedure consists of the following checks and inspections:

1. Visually inspect connector and check that it is fitted correctly onto the component or onto the relative connection point, and where applicable, check that the connector retainer or clip is correctly fastened.
2. Visually inspect the terminals on the connector: no rust marks or dirt should be present and it is important to check terminal correct positioning on the connector (i.e., all terminals aligned at the same depth) and terminal integrity (i.e., that terminals are not loose, open/bent, etc.). For connectors whose terminals are not visible (e.g. Marelli control unit) use a metal cable of suitable diameter and introduce it carefully in the connector slot at the same depth as for the other terminals of the connector.

**IMPORTANT**

IN THE CASE OF SPORADIC FAULTS, MOVE OR WIGGLE THE RELATIVE WIRING HARNESS SLIGHTLY WHILE PERFORMING EACH OF THE CHECKS INDICATED FOR TROUBLESHOOTING.

3. Pull cables gently from the back of the connector to check that the terminals are fitted correctly on the connector and that the wires are fastened correctly to the terminals.

Checking electrical CONTINUITY

Purpose of check: the purpose of this check is ensure that there are no interruptions or excess resistance (due to corroded terminals, for example) in the circuit under inspection.

Tester: set the tester selector to the "continuity" symbol and place the probes of the tested at the two ends of the circuit: Normally, the tester will sound an audible signal to confirm continuity in the section of circuit tested; Continuity may also be tested by setting the tester selector to the "Ohm" symbol and checking that the resistance in the circuit is zero or of a few tenths of an Ohm.

WARNING: THE CIRCUIT MUST BE UNPOWERED DURING THIS TEST. IF THE CIRCUIT IS POWERED, THE RESULTS OF THIS TEST ARE MEANINGLESS.

Checking GROUND CONNECTION

Purpose of check: the purpose of this check is to verify that a cable or circuit is correctly connected to the ground (-) of the vehicle.

Tester: set the tester selector to the "continuity" symbol and place one of the tester probes on the vehicle ground point (or on the battery negative pole) and the other probe on the cable under inspection: Normally, the tester will sound an audible signal to confirm continuity in the section of circuit tested. Continuity may also be tested by setting the tester selector to the "Ohm" symbol and checking that the resistance in the circuit is zero or of a few tenths of an Ohm.

IMPORTANT: WHERE GROUND IS PROVIDED BY THE ECU, CHECK THAT THE ECU IS EFFECTIVELY PROVIDING THE GROUND CONNECTION FOR THE CIRCUIT DURING THE TEST.

Checking VOLTAGE

Purpose of check: the purpose of this check is to determine if a cable is carrying voltage, in other terms, to verify whether it powered by the battery or ECU.

Tester: set the tester selector to the "DC voltage" symbol and place the red tester probe on the cable under inspection and the black tester probe on the vehicle ground point (or on the battery negative pole).

IMPORTANT

IN THE CASE OF SPORADIC FAULTS, MOVE OR WIGGLE THE RELATIVE WIRING HARNESS SLIGHTLY WHILE PERFORMING EACH OF THE CHECKS INDICATED FOR TROUBLESHOOTING.

GENERAL NOTIONS FOR TROUBLESHOOTING ELECTRICAL FAULTS

THE SECTIONS RELATIVE TO THE ELECTRICAL SYSTEM CONTAIN DRAWINGS OF CONNECTORS; NOTE THAT THE DRAWING ALWAYS DEPICT THE CONNECTOR/COMPONENT VIEWED FROM THE WIRING HARNESS SIDE, I.E. FROM THE SIDE ON WHICH THE CABLES LEADING FROM THE MAIN WIRING HARNESS ENTER THE CONNECTOR/COMPONENT.

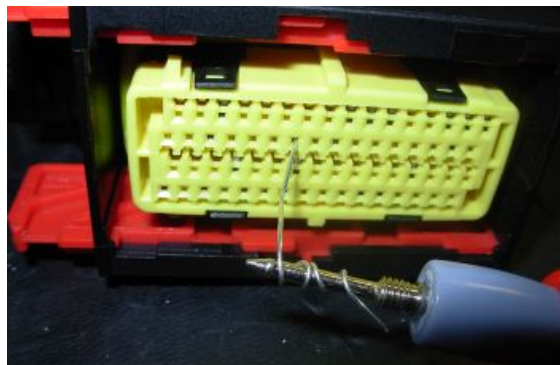
IMPORTANT

BEFORE STARTING ANY TROUBLESHOOTING PROCEDURES ON THE VEHICLE, CHECK THAT THE BATTERY VOLTAGE IS ABOVE 12V.

PROCEDURE FOR CHECKING CONNECTOR

This procedure consists of the following checks and inspections:

1. Visually inspect connector and check that it is fitted correctly onto the component or onto the relative connection point, and where applicable, check that the connector retainer or clip is correctly fastened.



2. Visually inspect the terminals on the connector: no rust marks or dirt should be present and it is important to check terminal correct positioning on the connector (i.e., all terminals aligned at the same depth) and terminal integrity (i.e., that terminals are not loose, open/bent, etc.). For connectors whose terminals are not visible (e.g. Marelli control unit) use a metal cable of suitable diameter and introduce it carefully in the connector slot at the same depth as for the other terminals of the connector.

IMPORTANT

IN THE CASE OF SPORADIC FAULTS, MOVE OR WIGGLE THE RELATIVE WIRING HARNESS SLIGHTLY WHILE PERFORMING EACH OF THE CHECKS INDICATED FOR TROUBLESHOOTING.

3. Pull cables gently from the back of the connector to check that the terminals are fitted correctly on the connector and that the wires are fastened correctly to the terminals.

Checking electrical CONTINUITY

Purpose of check: the purpose of this check is ensure that there are no interruptions or excess resistance (due to corroded terminals, for example) in the circuit under inspection.

Tester: set the tester selector to the "continuity" symbol and place the probes of the tested at the two ends of the circuit: Normally, the tester will sound an audible signal to confirm continuity in the section of circuit tested; Continuity may also be tested by setting the tester selector to the "Ohm" symbol and checking that the resistance in the circuit is zero or of a few tenths of an Ohm.

WARNING: THE CIRCUIT MUST BE UNPOWERED DURING THIS TEST. IF THE CIRCUIT IS POWERED, THE RESULTS OF THIS TEST ARE MEANINGLESS.

Checking GROUND CONNECTION

Purpose of check: the purpose of this check is to verify that a cable or circuit is correctly connected to the ground (-) of the vehicle.

Tester: set the tester selector to the "continuity" symbol and place one of the tester probes on the vehicle ground point (or on the battery negative pole) and the other probe on the cable under inspection: Normally, the tester will sound an audible signal to confirm continuity in the section of circuit tested. Continuity may also be tested by setting the tester selector to the "Ohm" symbol and checking that the resistance in the circuit is zero or of a few tenths of an Ohm.

IMPORTANT: WHERE GROUND IS PROVIDED BY THE ECU, CHECK THAT THE ECU IS EFFECTIVELY PROVIDING THE GROUND CONNECTION FOR THE CIRCUIT DURING THE TEST.

Checking VOLTAGE

Purpose of check: the purpose of this check is to determine if a cable is carrying voltage, in other terms, to verify whether it powered by the battery or ECU.

Tester: set the tester selector to the "DC voltage" symbol and place the red tester probe on the cable under inspection and the black tester probe on the vehicle ground point (or on the battery negative pole).

IMPORTANT

IN THE CASE OF SPORADIC FAULTS, MOVE OR WIGGLE THE RELATIVE WIRING HARNESS SLIGHTLY WHILE PERFORMING EACH OF THE CHECKS INDICATED FOR TROUBLESHOOTING.

Immobiliser

The vehicle is equipped with an electronic engine disabling system that is activated automatically when the ignition key is removed. Each key in the grip has an electronic device - transponder - which modulates the radio frequency signal emitted by a special aerial inside the switch when the vehicle is started. The modulated signal is the "password" by which the appropriate central unit recognises the key and only after this occurs, it allows the engine start-up.

The vehicle is delivered to the customer with two pre-programmed keys. The instrument cluster accepts a maximum of four keys at the same time. Approximately ten seconds after the key is set to ON, the instrument cluster requests a personal five-digit code to be entered.

On the leftmost value of the display, a variable value is shown that can be modified from 0 to 9, by using the MODE selector. Press the centre of the MODE selector to confirm each of the five digits. Once confirmed, the display shows the code in a fixed manner, this is so the user can check the code that has been entered. To remove the screen showing the code that has been entered, carry out a KEY OFF- KEY ON cycle. In the future you can always change the last code entered. This request message is no longer displayed once the personal code is entered.

It is important to remember the personal code because:

- the vehicle can be started if the immobilizer system is faulty
- the dashboard need not be replaced should the ignition switch be changed
- new keys can be programmed

NOTE

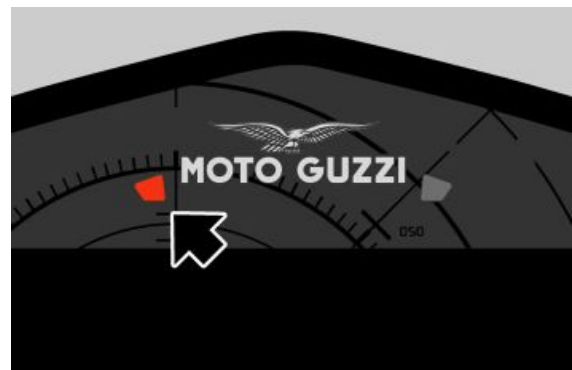
IF THE PERSONA CODE IS NOT MEMORISED AND THE VEHICLE IS USED, THE MESSAGE DISAPPEARS AFTER 10 SECONDS BUT REAPPEARS WITH EACH KEY ON.

NOTE

THE FACTORY SET CODE IS COMPOSED OF FIVE ZEROES.

All the functions for changing, storing or resetting the immobilizer codes can be carried out by the dealer, whereas some of the instrument cluster settings can also be carried out by the customer.

With the key set to "KEY OFF" the general alarm warning light flashes to indicate activation of the locking system.



If there is an immobilizer failure at ignition, the dashboard requests you to enter a user code. If the code is entered correctly, the dashboard signals the failure by displaying the word SERVICE and the red general warning light turns on. Once the code has been correctly entered, the error will be displayed on the screen, and you can still start the motorcycle.



IMPORTANT

PRESSING OR MOVING ANY CONTROL ON THE LEFT SWITCH CLUSTER, IT IS POSSIBLE TO REMOVE THE ERROR NOTIFICATION SCREEN, BUT THE SCREEN WILL BE VISIBLE AGAIN AFTER ABOUT 10 SECONDS.

Change user code (Change user code)

This function may be used to modify the existing code (you must be in possession of the code itself in order to do this). The user code enables engine start even in the event of an immobiliser system fault. The user code is set by default as five zeros (00000) on a new vehicle, and the message "INSERT CODE" is shown on the display for ten seconds.



This function allows you to change the code itself and remove this message.

On the value to the leftmost of the display a value from 0 to 9 will be shown (which can be modified by moving the MODE selector upward or downward). Press the centre of the "MODE" selector briefly to confirm the selection. Repeat the operation for all the digits. Once the code is confirmed, the new code is shown steadily on the display to

let the user verify that the code has been entered correctly. Turn the ignition off and then on again to unlock the dashboard. The last code set may be modified again in future. Access the setting mode again, enter the last user code used (OLD CODE), then enter a new user code (NEW CODE) as described previously.

Code recovery (Code recovery)

This function must be used should it be necessary to change the user code when the user no longer remembers the current code. Both keys stored in the vehicle memory are needed to access this function.

When the function is activated, by pressing briefly on the middle of the MODE selector, the screen "INSERT KEY 1" is displayed to signal the recognition request of the first key. Insert the key. If the correct key is recognised within twenty seconds, the message "INSERT KEY 2" is shown on the display. Insert the second key. If the second key is also recognised within twenty seconds, the dashboard resets the user code to the default code (five zeros - 00000). Enter the new user code following the "CHANGE USER CODE " procedure.



IMMOBILIZER ANTENNA

Function

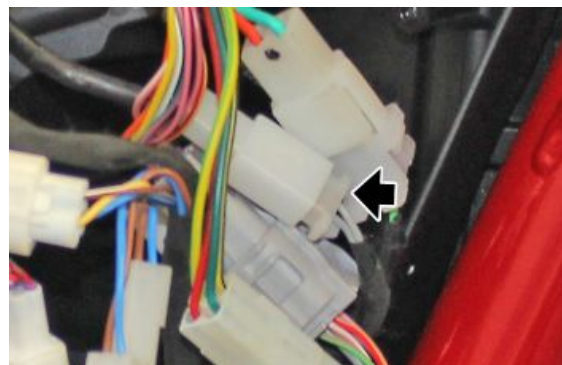
detects the transponder code in the key and sends it to the instrument cluster

Level in electrical circuit diagram:

Immobilizer

Position:

- on the vehicle: in the instrument cluster
- connector: two-way, grey, below the right side steering sleeve

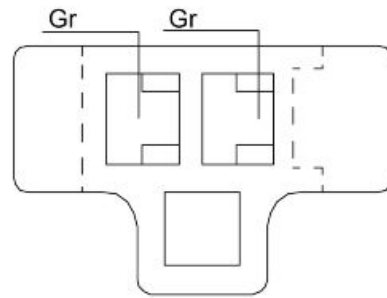


Electrical specifications

- 14 Ohm

Pin out

not significant

**Diagnostic tool - Electrical errors**

The instrument cluster errors are detected by means of the diagnostic tool. It is therefore necessary to connect it to the vehicle.

Error code B0003 (ALARM IMMO B0003)**Error cause**

- Occurs, when the transponder is working, but it is not within the recognised ones.

Identification

- General alarm warning continuously on (red) and indication "ALARM IMMO B0003" on the display

Troubleshooting

- Store the new key

Error code B0004 (ALARM IMMO B0004)**Error cause**

- Occurs, when the key has no transponder or the transponder is damaged

Identification

- General alarm warning continuously on (red) and indication "ALARM IMMO B0004" on the display

Troubleshooting

- Replace the key and store it

Error code B0005 (ALARM IMMO B0005)**Error cause**

- Occurs when an electric interruption or a ground short circuit or voltage to the circuit have been detected.

Identification

- General alarm warning continuously on (red) and indication "ALARM IMMO B0005" on the display

Troubleshooting

-
- Check the sensor connector on the wiring harness and the instrument panel connector. Check that the antenna is connected, if OK remove it and check the continuity of the antenna between the PIN of the connector (resistance between 10 - 100 Ohm), if not OK replace the sensor; if OK reconnect the connector to the antenna and check from the wiring harness side that there is continuity between the two PIN (resistance between 10-100 Ohm), if not OK restore the wiring harness; if OK check continuity between the two PIN 2 and 3 of the instrument panel, if not OK replace the instrument panel.
-

Error code B0006 (ALARM IMMO B0006)

Error cause

- Occurs when a fault in the instrument panel has been detected

Identification

- General alarm warning continuously on (red) and indication "ALARM IMMO B0006"

Troubleshooting

- Replace the instrument cluster

Error code B0007 (ALARM 1 KEY STORED)

Error cause

- Occurs when the number of stored keys is less than two

Identification

- General alarm warning continuously on (red) and indication "ALARM 1 KEY STORED" on the display

Troubleshooting

- Store the two keys again
-

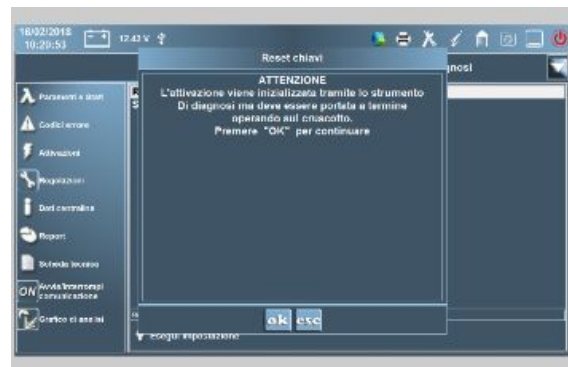
System not programmed

Storing new keys

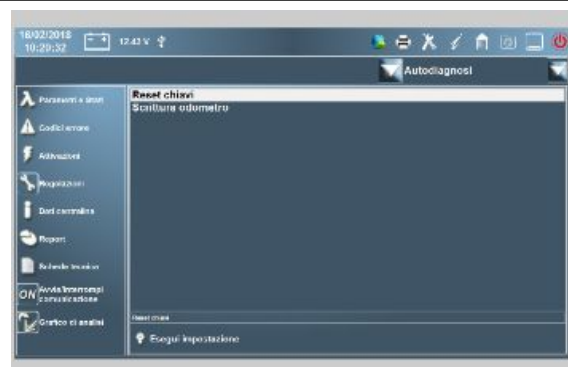
NOTE

REGARDLESS OF THE LANGUAGE SET IN THE DASHBOARD FUNCTIONS, THE KEY PROGRAMMING PROCEDURE CAN ONLY BE VIEWED IN ENGLISH.

- To carry out the one or more key programming procedures, up to a maximum of four, you must connect the motorcycle to the diagnostic tool.
- Turn key to "ON" and insert the USER CODE where required.
- Carry out the self-diagnostic of the dashboard and enter the "SETTINGS" section by clicking on "RESET KEYS".
- At this point, a screen with a warning message will be visible. Press "OK" and start programming the keys.

**NOTE**

IF THE IMMOBILIZER ANTENNA IS DISCONNECTED, YOU WILL NOT BE ABLE TO START KEY PROGRAMMING.



- Enter the USER CODE to continue.
- If the code entered is correct, the first key is stored.



- At this point, on the digital display of the motorcycle, after the automatic restart of the dynamic presentation screen, a message will appear with a countdown of 20 seconds to insert the second key to be programmed.
- Set key to "OFF", insert the second key and set to "ON".

**IMPORTANT**

IF YOU DO NOT HAVE A SECOND KEY OR YOU DON'T WANT TO STORE ONE, THE DIAGNOSTIC TOOL WILL SHOW AN ERROR SAYING "1 KEY STORED"

- The second key is stored and you will be asked to enter the third key (if you have one). The same operation will be repeated to store the fourth key.
- To complete AND end the memorisation procedure, set key to "OFF".
- You should then test the correct functioning of all keys stored.



Dashboard

Function:

It has the function of displaying the parameters and any alarms/errors during the use of the vehicle

Level in electrical circuit diagram:

Instrument cluster

Position:

On the front of the motorcycle, fixed to the support connected to the frame.



Electrical specifications:

- Rated power supply voltage: 13,5V +/- 0,5V
- Operating power supply voltage: 10-16V
- Frequency range: 119-135 KHz at 13,5V

INFO SCREEN

This screen shows the general data relating to the instrument cluster, for example software version, hardware, etc.



INSTRUMENT CLUSTER DATA

| P.A.D.S. CHARACTERISTIC. | Value/ example | MEASUR EMENT UNIT | NOTES |
|--------------------------|-------------------|-------------------------|-------|
| Hardware version | - | - | - |

| P.A.D.S. CHARACTERISTIC. | Value/ example | MEASUR EMENT UNIT | NOTES |
|--------------------------|-------------------|-------------------------|-------------------|
| Boot version | - | - | - |
| Software version | - | - | - |
| Map | - | - | - |
| Use index | 0.3 | - | Vehicle user code |

PARAMETERS AND STATUS SCREEN

This screen shows the parameters detected by the various sensors (engine oil temperature, engine oil pressure, ...) or values set by the control unit (Number of stored keys, ...)



PARAMETERS AND STATES

| P.A.D.S. CHARACTERISTIC. | Value/ example | MEASUR EMENT UNIT | NOTES |
|------------------------------|--------------------------------|-------------------------|---|
| Number of stored keys | - | 2 | Up to a maximum of 4 keys |
| Total equivalent km | - | - | Total number of equivalent km travelled by the vehicle. This counter CANNOT BE ZEROED |
| Partial equivalent km | - | - | Number of equivalent km travelled since the last service. This counter MUST BE ZEROED at each service. This counter is reset at the same time as the SERVICE icon |
| km remaining to the service | - | - | Number of Km that can be travelled before the next service (signalled to the User by turning on the SERVICE icon). This counter returns to 10000 km each time the SERVICE icon is reset |
| High beam light input | Powered / Not powered | - | - |
| Joyypad menu button up | Pressed/ Released/ Fault | - | - |
| Joyypad menu button down | Pressed/ Released/ Fault | - | - |
| Joyypad button central | Pressed/ Released/ Fault | - | - |
| Daytime running lights input | Powered / Not powered | - | - |
| Oil input | Powered / Not powered | - | - |
| Left direc. indi. | Pressed/ Released/ Fault | - | - |
| Right direc. indi. | Pressed/ Released/ Fault | - | - |
| Indicator reset command | Pressed/ Released/ Fault | - | - |
| Inter. Hand grip heating | Pressed/ Released/ Fault | - | - |

| P.A.D.S. CHARACTERISTIC. | Value/ example | MEASUR EMENT UNIT | NOTES |
|-----------------------------|--------------------------------|-------------------------|-------|
| Acceleration Cruise button | Pressed/ Released/ Fault | - | - |
| Deceleration Cruise Button. | Pressed/ Released/ Fault | - | - |
| Cruise control set button | Pressed/ Released/ Fault | - | - |
| Front brake NO | Open/ Closed | - | - |
| Front brake NC | Open/ Closed | - | - |
| Rear brake NO | Open/ Closed | - | - |
| Rear brake NC | Open/ Closed | - | - |

ACTIVATION AND SETTINGS SCREEN

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



ACTIVATIONS

| P.A.D.S. CHARACTERISTIC. | Value/ example | MEASUR EMENT UNIT | NOTES |
|--------------------------|-------------------|-------------------------|-------|
| Service reset | - | - | - |
| User code reset | - | - | - |
| Keys Reset | - | - | - |
| Odometer coding | - | - | - |

Azzeramento icona manutenzione

The system displays the function as follows:

- After the maintenance interval thresholds are exceeded (excepting the first), an icon with the adjustable wrench is shown on the digital display.

To reset Service proceed as follows:

- Connect the diagnostic tool;
- Select the concerned model;
- Enter in the "INSTRUMENT CLUSTER" section;



- Select "SELF-DIAGNOSTIC";
- Select "ACTIVATIONS";
- Enable the command "SERVICE RE-SET".

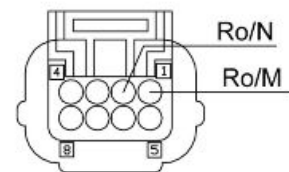
Start up system check

Function

Communicates to the control unit the will to start-up the engine.

Operation / Operating principle

Press the start-up button to close the specific circuit taking the PIN 58 of the control unit to a voltage equal to zero (ground closing).



Level in electrical circuit diagram:

Start-up enabling switch

Position:

- sensor: on right hand light switch.
- connector: right side of the vehicle inside the electrical components box.

Electrical specifications:

- key released: open circuit
- key pressed: closed circuit



Pin out:

1. Power supply (Red/Brown cable)
2. Ground (pink/black cable)
3. -
4. -
5. -
6. -



IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

DIAGNOSTIC TOOL: ELECTRICAL ERRORS

P0615 Starter relay

- short circuit to positive / open circuit, short circuit to negative.

Error cause

- Short-circuit to positive: excessive voltage identified at PIN 69, at the command time; if open circuit, short circuit to negative: a voltage close to zero was identified when there is no command to the start-up relay.

DIAGNOSTIC TOOL: LOGIC ERRORS

P0512 Starter switch

- signal not plausible.

Error cause

- Fault in the switch (lock) of the engine start-up. A continuous voltage close to 0 was detected for a certain time (e.g. locked button).
- The instrument cluster does not indicate the presence of this error even in the ATT status.

Troubleshooting

- Check the locking cause and restore.

Fuses

To check:

- Set the ignition switch to 'OFF' to avoid an accidental short circuit.
- Remove the saddle.
- Remove the fuse box cover.
- Take out one fuse at a time and check if the filament is broken.
- Before replacing the fuse, find and solve, if possible, the reason that caused the problem.
- If the fuse is damaged, replace it with one of the same current rating.

NOTE

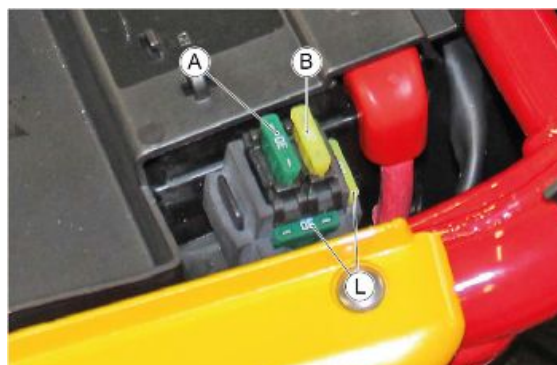
IF THE SPARE FUSE IS USED, REPLACE WITH ONE OF THE SAME TYPE IN THE CORRESPONDING FITTING.

E4 VEHICLES FUSE LAYOUT

MAIN FUSES

| Specification | Desc./Quantity |
|----------------|--|
| A) 30A fuse | battery recharge, main injection relay, key, injection loads, position lights, starter relay |
| B) 20A fuse | ABS power feed |
| L) spare fuses | |

They are located under the saddle on the left side



SECONDARY FUSES

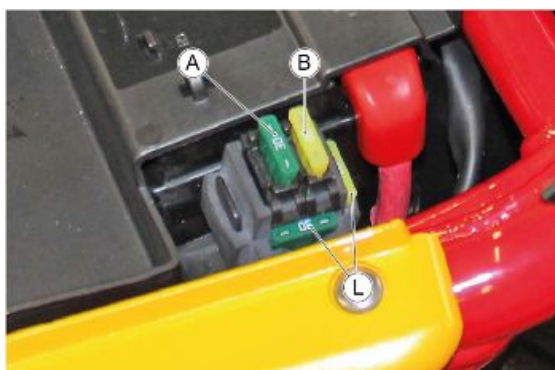
| Specification | Desc./Quantity |
|----------------|--|
| C) 15A fuse | Low beam/high beam and passing lights, brake lights, DRL/position lights, horn, fog lights (if provided) |
| D) 7.5A fuse | Instrument cluster power supply, antitheft device power supply, hand grips and turn indicators |
| E) 15A fuse | ECU live positive lead |
| F) 7.5A fuse | ECU permanent positive lead |
| G) 15A fuse | Coils, secondary air injectors, fuel pump |
| H) 7.5A fuse | USB socket, antitheft device |
| I) 7.5A fuse | Bluedash (GPS), OBD |
| L) spare fuses | |

They are located under the saddle on the right side

**E5 VEHICLES FUSE LAYOUT****MAIN FUSES**

| Specification | Desc./Quantity |
|----------------|--|
| A) 30A fuse | Battery charging, all vehicle utilities. |
| B) 20A fuse | ABS power feed |
| L) spare fuses | |

They are located under the saddle on the left side

**SECONDARY FUSES**

| Specification | Desc./Quantity |
|---------------|---|
| C) 15A fuse | Low beam/high beam lights and passing, brake lights, DRL/position lights, horn, fog lights (where required), lights control |
| D) 7.5A fuse | Instrument cluster power supply, antitheft device power supply, hand grips and turn indicators |
| E) 15A fuse | ECU positive switched live, instrument cluster positive switched live, ABS positive switched live, starter relay, CAN left light switch |
| F) 7.5A fuse | ECU permanent positive lead |

| Specification | Desc./Quantity |
|----------------|--|
| G) 7.5A fuse | Bluedash (GMP), OBD |
| H) 7.5A fuse | USB socket, antitheft device |
| I) 15A fuse | ECU power, secondary air system, injectors, starter coils, fuel pump, canister |
| L) spare fuses | |

They are located under the saddle on the right side



Control unit

ONLY FOR VEHICLES VERSION EURO 5

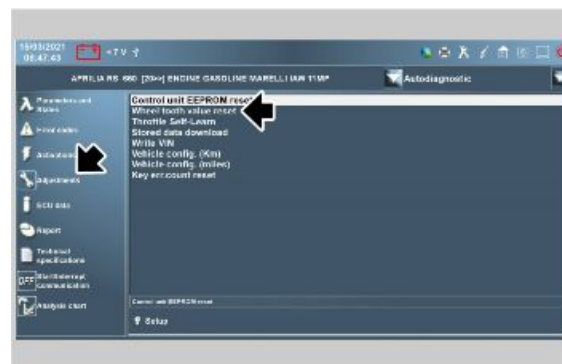
ENGINE TONE WHEEL PROGRAMMING PROCEDURE

- Using the PADS diagnostic tool, perform the "Reset wheel tooth values";
- Bring the engine to a temperature above 80°;

Then proceed as described:

- In neutral position, with the side stand extended/open and with the vehicle absolutely immobile, quickly bring the engine above 8000 rpm (it is not necessary to stay there, it is sufficient to exceed it);
- Close the throttle completely and wait for the engine to go down to idle speed;
- Repeat this procedure three times.

The success of the procedure is confirmed by the immediate turning off of the MIL light (in the presence of other errors the MIL light may remain on but in any case stops flashing).



Switch off the panel and wait for at least one minute (Power Latch).

IMPORTANT

DURING THE ENGINE TONE WHEEL PROGRAMMING PROCEDURE, THE VEHICLE'S SPEED MUST ALWAYS BE 0 km/h.

IN CERTAIN CASES, EVEN SMALL VIBRATIONS GENERATED BY THE ENGINE (WITH THE ENGINE IN NEUTRAL POSITION AND THE SIDE STAND EXTENDED/OPEN, THE INSTRUMENT PANEL DOES NOT DETECT THE VEHICLE'S SPEED), MAY CAUSE THE PROCEDURE TO FAIL, WHICH MEANS IT HAS TO BE REPEATED. IN THIS CASE, REPEAT THE PROCEDURE WITH THE SIDE STAND CLOSED AND VEHICLE IN NEUTRAL ALWAYS PAYING EXTREME ATTENTION. FOR MORE SAFETY, POSSIBLY BLOCK THE VEHICLE AGAINST A WALL.

IMPORTANT

PROGRAMMING OF THE TONE WHEEL TAKES PLACE DURING THE RELEASE PHASE OF THE THROTTLE (FROM 8000 rpm TO IDLE RPM). IN THIS DESCENDING PHASE THE THROTTLE GRIP MUST REMAIN COMPLETELY CLOSED.

REMOVAL

- Remove the saddle
- Unscrew and remove the screws (1)



- Disconnect the connectors (2)
- Remove the ECU (3)



NOTE

WHEN REASSEMBLING THE CONNECTORS, THE SLIDES MUST SLIDE FREELY UP TO THE LIMIT STOP, THUS FACILITATING THE CONNECTOR'S INSERTION: THE CATCH SHOULD SNAP INTO PLACE ONCE THE LIMIT STOP IS REACHED.

ECU**Function**

It manages the Ride by wire system, the injection/ignition, the system safety checks and the self-diagnostic function

Level in electrical circuit diagram:

Each level in which the main component involves the control unit

**Position:**

- on the vehicle: under the seat at the rear of the vehicle
- connector: on connector control unit of ENGINE PIN 52 (figure A), connector of VEHICLE PIN 28 (figure B)

Pin out: See CONNECTORS paragraph

P0601 EEPROM error**Electrical diagnostic:**

- Circuit not functioning

Error cause:

- Replace the injection control unit.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

NOTE

THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.

P0604 RAM Error**Electrical diagnostic:**

- Circuit not functioning

Error cause:

- Replace the injection control unit.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

NOTE

THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.

P0605 ROM Error**Electrical diagnostic:**

- Circuit not functioning

Error cause:

- Replace the injection control unit.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

NOTE**THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.****P060B A/D converter****Electrical diagnostic:**

- Circuit not functioning

Error cause:

- Replace the injection control unit.

The instrument cluster indicates this error by lighting up in a fixed manner the MI warning light and by flashing the general warning light.

NOTE**THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.****P060C Safety Engine Stop****Error cause:**

- Due to the fact that the safety system detected a serious fault, the control unit has stopped the engine.

The instrument cluster indicates this error by lighting up in a fixed manner the MI warning light and the general warning light.

Troubleshooting:

- Perform the troubleshooting for the other detected errors.

NOTE**THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.****P1607 Saved data file (for safety reasons)****Electrical diagnostic:**

- Filled

Error cause

- This indication appears only if the Level 2 safety has reset the engine (C gravity).

The instrument cluster does not indicate the presence of this error even in the ATT status

Troubleshooting

- Perform the troubleshooting for the other detected errors.

P160C Level 2 safety reset**Error cause:**

- Due to the fact that the level 2 safety system (comparison between requested torque and calculated torque) detected a fault, the control unit reset the engine (severity C).

The instrument cluster does not indicate the presence of this error even in the ATT status.

Troubleshooting:

- Perform the troubleshooting for the other detected errors

P1650 Engine events configuration Checksum calculation error

Error cause:

- Corrupt Flash-EEPROM (hardware problem).
- Upload (e.g. in service) of an incompatible software version, therefore missing the reference check-sum.

The presence of this error is signalled by the fixed lighting of the general warning light.

Troubleshooting:

- Call the Help Desk.

Battery

Function

Provides electrical power to vehicle.

Level in electrical circuit diagram:

Battery charge

Position:

- on the vehicle: under the saddle
- connector: on the battery

Electrical specifications: 12 V / 18 Ah

Pin out:

1. Positive pole (red): approx. 12.6 V
2. negative pole (black): ground

DIAGNOSTIC TOOL: PARAMETERS**Battery voltage**

- Example value with key ON: 12.0 V
- Example value with engine on: 14.2 V

This is one of the values set by the ECU in the event of recovery mode

Battery voltage before prior to Recovery mode

- Example value with key ON: 12.0 V
- Example value with engine on: 14.2 V

Value determined from signal read without taking considering whether recovery mode is implemented

IMPORTANT

PAY ATTENTION TO THE POSITIVE BATTERY CABLE, WHICH MUST PASS BELOW THE UPPER PART OF THE FRAME.

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING



CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

P0560 Battery voltage

- too high/too low

Error cause

- If too high: too high a voltage has been detected at PIN 52. If too low: too low a voltage has been detected at PIN 52.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting

- If too high: check that the voltage regulator is working correctly.
- If too low: check voltage regulator connectors, engine-vehicle wiring harness connector and ECU connector (check in particular for oxidation): if not OK, repair. If OK, check that resistance of the Red/White cable from the voltage regulator connector to the ECU connector is a few tenths of an Ohm; if not OK, repair the wiring harness; if OK, check that the electric generator is operating correctly: if not OK, repair. If OK, check that the voltage regulator is working correctly

P1560 Low battery voltage error - GCC error

Functional diagnostic:

- low voltage

Error cause

- The error is enabled if, after 5 seconds from the key to ON, the battery voltage is judged low by the ECU.
- Low voltage detected to PIN 52 of the Marelli ECU.

The presence of this error is signalled by the fixed lighting of the general warning light.

Troubleshooting

- Try charging / replacing the battery: if NOT OK, carry out the check procedure for the alternator connector and the control unit connector (paying particular attention to any oxidation): if not OK, restore. If OK, check that cable resistance between the alternator cable and the control unit is a few tenths of Ohm: if not OK, repair the wiring harness; if OK, check that the electric generator is operating correctly: Restore if not OK.

NOTE

THE PRESENCE OF THIS ERROR DETERMINE THE DEACTIVATION OF THE TRACTION CONTROL AND THE CRUISE CONTROL.

Speed sensor

VEHICLE ABS SENSOR

Function:

Generates a signal used by the ABS control unit to determine the speed value of the wheel.

Operation / Operating principle:

Magneto-resistive sensor: generation of a square wave having an amplitude of about 1V

- Front (1): PIN 8 and PIN 17 of the ABS control unit.
- Rear (2): PIN 5 and PIN 15 of the ABS control unit.

Electrical circuit diagram - Level in electrical circuit diagram:

Engine speed sensor

Position of front sensor (1):

- sensor: on left-hand stanchion of fork, near the brake calliper mounting bracket
- connector: right side of the vehicle inside the electrical components box

Position of rear sensor (2):

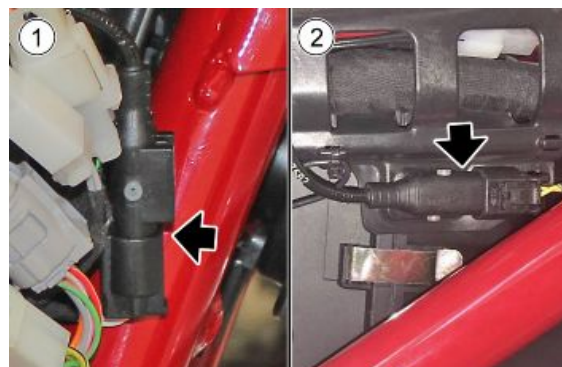
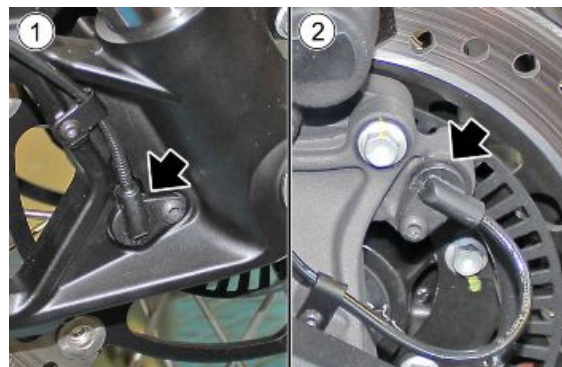
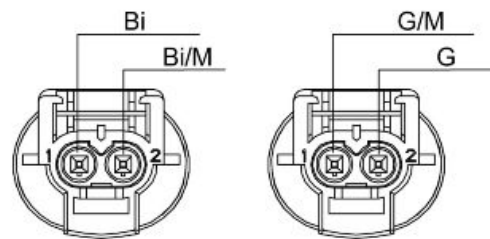
- sensor: on the rear brake calliper support
- connector: right side of vehicle fixed to the frame under the right fairing

Front sensor Pin out (1):

1. Negative power/Negative signal (white cable)
2. Positive power/Positive signal (white/brown cable)

Rear sensor Pin out (2):

1. Negative power/Negative signal (yellow cable)
2. Positive power/Positive signal (yellow/brown cable)



P0501 Front wheel speed sensor/signal

- Connect to the ABS control unit diagnostic.

P2158 Rear wheel speed sensor/signal

- Connect to the ABS control unit diagnostic.

5D90 Front speed sensor - electrical faultError cause

- Electrically defective wiring or sensor

Troubleshooting

- check the sensor connector and the ABS control unit connector, if not, restore the connector, if OK, check continuity of the white/brown cable between sensor wiring harness side PIN 2 and the ABS control unit connector PIN 8; If there is no continuity, restore them. If there is, PIN 2 of the sensor on the wiring harness side, with the sensor disconnected and key set to ON, must have 12V voltage approximately; if there is no voltage, check PIN 2 for continuity with the vehicle ground connection: if not ok to ground, restore the wiring harness. If OK, replace the control unit. If PIN 2 has approx. 12 V, check continuity of the white cable between PIN 1 of the sensor on the wiring harness side and PIN 17 of the ABS control unit connector. If this is not OK, restore the wiring harness. If it is OK, replace the sensor.

5D91 Front speed sensor - functional failure, the signal varies irregularlyError cause

- Faulty sensor or signal interference

Troubleshooting

- Check speed sensor retainer; if not ok restore, if ok, check if the tone wheel is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor.

5D92 Front speed sensor - the signal becomes weak periodicallyError cause

- Possible tone wheel fault due to deformations or dirt; the surface of the wheel bearings may be deteriorated. In very rare cases, abnormal phonic wheel vibrations

Troubleshooting

- Check if the tone wheel is dirty, deformed or wrongly fixed If the tone wheel is not OK, replace it. If it is OK, check for possible faults in the wheel bearings; if it is not OK, replace the bearings.

5D93 Front speed sensor - functional failure signal absent or wheel speed comparisonError cause

- Faulty sensor or missing sensor/tone wheel. Or excessive distance between the sensor and the tone wheel or tone wheel with wrong number of teeth

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor

5D94 Front speed sensor - functional failure, excessive duration of the pressure reduction phase

Error cause

- Faulty sensor or missing sensor/tone wheel or excessive distance between the sensor and the tone wheel

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor.

5D95 Front speed sensor- functional failure, wheel speed too high or too low

Error cause

- Faulty sensor or tone wheel, or tone wheel with wrong number of teeth or wrong tyre size

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; If it is not OK, replace the tone wheel and if it is OK, check that the tyre size is the correct one. If it is not OK, replace it. If it is OK, check that the tyre pressure is the correct one; if it is not, replace it. If it is OK, replace the speed sensor

5DA0 Rear speed sensor - electrical fault

Error cause

- Electrically defective wiring or sensor

Troubleshooting

- Check the sensor connector and the ABS control unit connector; if not OK, restore the connectors; if OK, check continuity between the yellow/brown cable between the wiring harness side sensor PIN 2 and the ABS control unit connector PIN 6; If there is no continuity, restore them. If there is, PIN 2 of the sensor on the wiring harness side, with the sensor disconnected and key set to ON, must have 12V voltage approximately; if there is no voltage, check PIN 2 for continuity with the vehicle ground connection if not ok to ground, restore the wiring

harness. If OK, replace the control unit. If PIN 2 has approx. 12 V, check continuity of the yellow cable between PIN 1 of the sensor on the wiring harness side and PIN 15 of the ABS control unit connector if not OK, restore the wiring harness; if OK, replace the sensor

5DA1 Rear speed sensor - functional failure, the signal varies irregularly

Error cause

- Faulty sensor or signal interference

Troubleshooting

- Check speed sensor retainer; if not ok restore, if ok, check if the tone wheel is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor

5DA2 Rear speed sensor - functional failure, the signal declines frequently

Error cause

- Possible tone wheel fault due to deformations or dirt; the surface of the wheel bearings may be deteriorated. In very rare cases, abnormal phonic wheel vibrations

Troubleshooting

- Check if the tone wheel is dirty, deformed or wrongly fixed. If the tone wheel is not OK, replace it. If it is OK, check for possible faults in the wheel bearings; if it is not OK, replace the bearings

5DA3 Rear speed sensor - functional failure signal absent or wheel speed comparison

Error cause

- Faulty sensor or missing sensor/tone wheel. Or excessive distance between the sensor and the tone wheel or tone wheel with wrong number of teeth

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor

5DA4 Rear speed sensor - functional failure, excessive duration of the pressure reduction phase

Error cause

- Faulty sensor or missing sensor/tone wheel or excessive distance between the sensor and the tone wheel

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone

wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; if it is not OK, replace the tone wheel; if it is OK, replace the speed sensor

5DA5 Rear speed sensor- functional failure, wheel speed too high or too low

Error cause

- Faulty sensor or tone wheel, or tone wheel with wrong number of teeth or wrong tyre size

Troubleshooting

- Check that the speed sensor and the tone wheel are installed; If they are not, install them. If they are, check the speed sensor retainer; If it is not OK, restore it. If it is, check if the tone wheel has the correct number of teeth or if it is dirty, deformed or wrongly fixed; If it is not OK, replace the tone wheel and if it is OK, check that the tyre size is the correct one. If it is not OK, replace it. If it is OK, check that the tyre pressure is the correct one; if it is not, replace it. If it is OK, replace the speed sensor

Engine rpm sensor

NOTE

ONLY FOR E4 VEHICLES

Function

indicates the position and speed of the crankshaft at the engine control unit

Operation / Operating principle

Inductive sensor: sinusoidal-type generated voltage; two teeth are missing on the flywheel for the reference position

Level in electrical circuit diagram:

Engine speed sensor

Position:

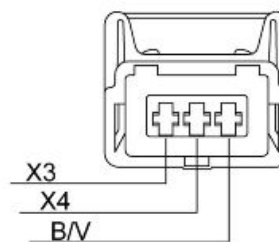
- on the vehicle: right side of vehicle on gearbox
- connector: left side of the vehicle inside the electrical components box.

Electrical specifications:

0.79 kohm at ambient temperature

Pin out:

1. negative signal (X3)
2. positive signal (X4)



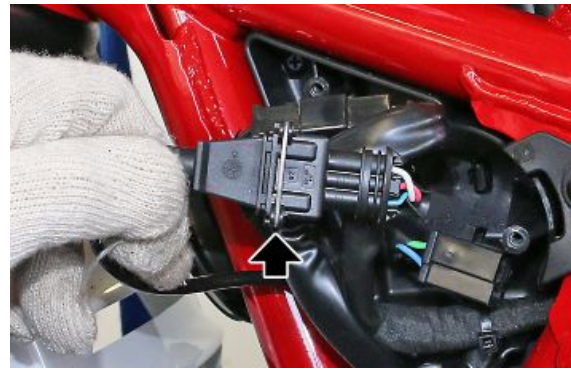
- shielding with ground connection (blue/green cable)

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

IMPORTANT

NO ERROR IS GENERATED IF THE ELECTRICAL CIRCUIT IS INTERRUPTED OR SHORT CIRCUITED. CARRY OUT THE MARELLI CONTROL UNIT AND RPM SENSOR CONNECTORS CHECK PROCEDURE: IF THE CONNECTORS ARE NOT OK, REPAIR OR REPLACE THEM AS NECESSARY, IF THEY ARE OK CHECK THE SENSOR CONFORMS TO THE ELECTRICAL SPECIFICATIONS: IF NECESSARY, REPLACE THE SENSOR, IF IT IS OK, CHECK THE CONTINUITY ON THE TWO CABLES, VERIFYING THAT THEY ISOLATED FROM THE POWER SUPPLY AND EARTH. CARRY OUT THE TESTS ON THE CONNECTOR OF THE SENSOR TOWARDS THE SENSOR, IF IT IS NOT OK REPAIR THE WIRING/REPLACE THE SENSOR, IF IT IS OK, CARRY OUT THE TEST ON PINS 20 TO 35 OF THE MARELLI CONTROL UNIT ENGINE CONNECTOR.

**Engine rpm sensor P0336****Functional diagnostic:**

- Signal not plausible

Error causes:

- Potential false contact in the electrical circuit detected at PIN 20 - 35 of the engine control unit ENGINE connector

The presence of this error is signalled by the fixed lighting of the general warning light.

Troubleshooting:

- Check the integrity of the electrical circuit, the cleanliness of the flywheel teeth and the correct positioning of the sensor in its seat: if not ok restore; if ok, replace the sensor.

NOTE

THIS ERROR GENERATES THE RECOVERY STATUS AND ENGINE SHUT-DOWN.

Intake pressure sensor

Function

The pressure sensor is essential for calculating the torque produced, for calculating the ambient pressure and for correct ignition timing during start-up.

Operation / Operating principle

Membrane sensor that converts the membrane position, in contact with the intake air, to electric voltage.

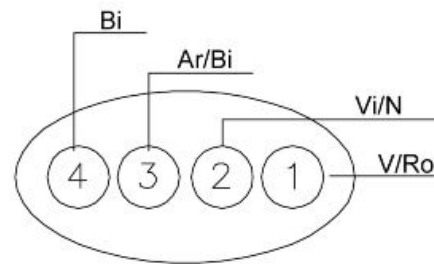


Level in electrical circuit diagram:

intake air pressure sensor

Position:

- on the vehicle: left side, under the fuel tank.
- connector: on the sensor.

**Electrical specifications: -****Pin out:**

1. Ground
2. Temperature signal
3. Power supply 5V
4. Signal

DIAGNOSTIC TOOL: PARAMETERS

Reference pressure Intake above sea level

- Example value with key ON: 1009 mbar
- Example value with engine on: 670 mbar
- NOTES: pressure estimated by the control unit according to the throttle position

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

DIAGNOSTIC TOOL: ELECTRICAL ERRORS**Left cylinder air pressure sensor P0105**

- short circuit to positive / open circuit, short circuit to negative.

Error cause

- Short-circuit to positive: excessive voltage has been detected on PIN 24. If open circuit, short circuit to negative: voltage equal to zero detected at PIN 24.

Troubleshooting

- Short-circuit to positive: verify that the parameter of the cylinder air Pressure Sensor on the diagnostic instrument is approx. 1200 mbar; disconnect the sensor connector: if the value does not change, this means there is a short circuit in the cable between the control unit connector and the sensor connector, restore the wiring harness; if the value changes, replace the sensor.
- If open circuit, short circuit to negative: check the control unit connector and the sensor connector; if not ok restore, if everything is OK, with key OFF, check the continuity between PIN 24 control unit connector and PIN 4 sensor connector: if there is no continuity, restore the wiring harness, if there is continuity, check the ground insulation of the cable: if there is continuity to ground, restore the wiring harness, if there is no continuity check, with key ON,

that voltage of approx. 5 V is present at PIN 3 of the sensor connector: if not ok, turn the key to OFF and check continuity between PIN 51 ECU connector and PIN 3 of the sensor connector: if not OK, restore the wiring harness; if OK, replace the control unit; if a voltage of 5 V is present at PIN 3 check, with key ON, the continuity to ground of PIN 4 of the sensor connector: if not OK, restore the wiring harness; if OK, replace the sensor.

cylinder bank air pressure sensor P0106

- short circuit to positive/ open circuit or short circuit to negative

Error cause

- An average value of the intake pressure is estimated based on the engine operating data (rpm, throttle valve, ...): if the read value differs with a certain percentage, then this error is activated. The most frequent cases can be: abnormal resistance in the sensor circuit (for example, rusted terminals) or sensor with poor performance.

Troubleshooting

- check the engine control unit connector and the sensor connector; if not OK, restore. If everything is OK, check that resistance between ECU connector PIN 24 and sensor connector PIN 4 is a few tenths of an Ohm; If it is above that value, restore cable harness. Replace the sensor if it is correct.

Air temperature sensor P0110

- open circuit, short circuit to positive / short circuit to negative

Error cause

- If open circuit, short circuit to positive: an excessive voltage was detected at PIN 37 of the ENGINE connector. If short circuit to negative: voltage equal to zero has been detected. The instrument cluster does not indicate this error by switching on the MI warning light in a steady manner.

Troubleshooting

- If open circuit, short circuit to positive: check the sensor connector and the control unit connector. If they are OK, check sensor continuity: replace the sensor if not OK; if OK, check continuity between the ENGINE connector PIN 37 and the sensor PIN 2: If continuity is absent, restore the wiring harness; if ok reconnect the control unit connector and with key ON check the continuity between PIN 1 of the sensor connector and vehicle ground: if OK, it means that the error is caused by the cable being shorted to positive and it is necessary to restore the cable harness between ENGINE PIN 37 and sensor PIN 2; check the sensor connector and the engine control unit connector. If not OK, restore the cable harness. If OK, check continuity between the ENGINE connector PIN 6 or 17 and the sensor connector PIN 1: restore the cable harness if there is no continuity. If there is, it means that the control unit does not supply the ground connection and therefore should be replaced

- If short circuit to negative, check the correct resistance of the sensor: if resistance = 0, replace the sensor; if resistance is correct, it means that the Purple/Black cable has ground connection: restore the cable harness

Error due to unexpected air intake into the cylinder manifold P1600

- signal not plausible.

Error cause

- Small difference detected between the estimated pressure and the measured pressure: the measured pressure is higher than the estimated one (for example, the pipe between sensor and throttle body is squashed or there is a hole in the intake manifold).

Troubleshooting

- Check the pneumatic system between the pressure sensor and the socket to read pressure on the throttle body; check that the intake manifold is in good conditions and the pressure reading hole is clean.
-

Intake manifold pressure estimate error P1602

- pressure too high/pressure too low.

Error cause

- A substantial difference between the estimated pressure and the measured pressure has been detected (for example, the pipe between sensor and throttle body is fully detached/ clogged or squashed).

Troubleshooting

- Check the pneumatic system between the pressure sensor and the socket to read pressure on the throttle body; check that the intake manifold is in good conditions and the pressure reading hole is clean: there is a very evident defect in the intake and pressure reading system.

Cylinder band manifold pressure too low error P1604

- signal not plausible.

Error cause

- Small difference detected between the estimated pressure and the measured pressure: the measured pressure is below the estimated one (for example, smeared throttle body).

Troubleshooting

- Check the pneumatic system between the pressure sensor and the socket to read pressure on the throttle body; check that the intake manifold is in good conditions and the pressure reading hole is clean.
-

Engine temperature sensor

OIL TEMPERATURE SENSOR

Function

Serves the purpose of communicating the engine oil temperature to the control unit in order to optimise its operation.

Operation / Operating principle

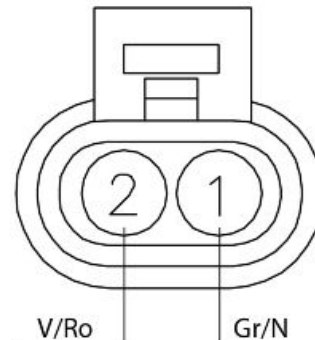
NTC type sensor (resistance sensor, inversely variable with temperature).

Level in electrical circuit diagram: Temperature sensors

Position:

- Sensor: inside the "V" of the engine
- Connector: on the sensor

Electrical specifications:



ENGINE TEMPERATURE SENSOR RESISTANCE

| | Specification | Desc./Quantity |
|----|--------------------------------|----------------|
| 1 | Resistance at -40 °C (-40 °F) | 100.950 kOhm |
| 2 | Resistance at -30 °C (-22 °F) | 53.100 kOhm |
| 3 | Resistance at -20 °C (-4 °F) | 29.120 kOhm |
| 4 | Resistance at -10 °C (14 °F) | 16.600 kOhm |
| 5 | Resistance at 0 °C (32 °F) | 9.750 kOhm |
| 6 | Resistance at +10 °C (50 °F) | 5.970 kOhm |
| 7 | Resistance at +20 °C (68 °F) | 3.750 kOhm |
| 8 | Resistance at +30 °C (86 °F) | 2.420 kOhm |
| 9 | Resistance at +40 °C (104 °F) | 1.600 kOhm |
| 10 | Resistance at +50 °C (122 °F) | 1.080 kOhm |
| 11 | Resistance at +60 °C (140 °F) | 0.750 kOhm |
| 12 | Resistance at +70 °C (158 °F) | 0.530 kOhm |
| 13 | Resistance at +80 °C (176 °F) | 0.380 kOhm |
| 14 | Resistance at +90 °C (194 °F) | 0.280 kOhm |
| 15 | Resistance at +100 °C (212 °F) | 0.204 kOhm |
| 16 | Resistance at +110 °C (230 °F) | 0.153 kOhm |
| 17 | Resistance at +120 °C (257 °F) | 0.102 kOhm |

Pin-out:

- PIN 1: 0-5 V signal
- PIN 2: Ground

Engine oil temperature sensor P0195

- open circuit, short circuit to positive / short circuit to negative, signal not plausible.

Error cause:

- If open circuit, short circuit to positive: excessive voltage has been detected at PIN 72 of the VEHICLE connector.
- If short circuit to negative: a voltage equal to PIN 72 of the VEHICLE connector was detected.

Troubleshooting:

- If open circuit, short circuit to positive: check the sensor connector and engine ECU connector, if not ok restore the wiring harness, if ok check sensor continuity; if it is not OK, replace the sensor; if it is OK, check continuity between PIN 72 of the VEHICLE connector and PIN 1 of the sensor: If continuity is absent, restore the wiring harness; if ok reconnect the control unit connector and with key ON check the continuity between PIN 2 of the sensor connector and vehicle ground: if there is no continuity restore the wiring harness, if there is continuity this means that the cause of the error is the presence of a cable short circuit to positive and therefore restore the wiring harness between PIN 72 VEHICLE and PIN 1 of the sensor.
- If short circuit to negative, check the correct resistance of the sensor: if resistance is null, replace the sensor; if resistance is correct, it means that the green/pink cable has ground connection: restore the wiring harness.

ENGINE TEMPERATURE SENSOR

Function

Serves the purpose of communicating the internal engine temperature to the control unit in order to optimise its operation.

Operation / Operating principle

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

Level in electrical circuit diagram: Temperature sensors

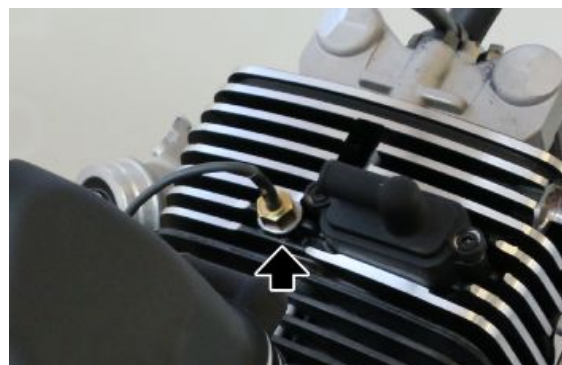
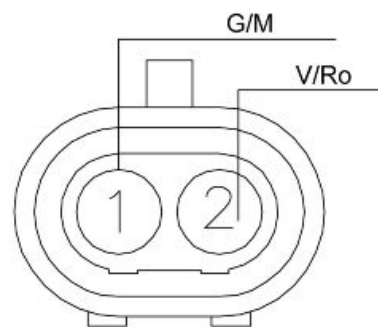
Position:

- Sensor: on the internal part of the left cylinder
- Connector: on the sensor

Electrical specifications:

Pin-out:

- PIN 1: 0-5 V signal
- PIN 2: Ground



ENGINE TEMPERATURE SENSOR RESISTANCE

| | Specification | Desc./Quantity |
|----|--------------------------------|----------------|
| 1 | Resistance at -40 °C (-40 °F) | 100.950 kOhm |
| 2 | Resistance at -30 °C (-22 °F) | 53.100 kOhm |
| 3 | Resistance at -20 °C (-4 °F) | 29.120 kOhm |
| 4 | Resistance at -10 °C (14 °F) | 16.600 kOhm |
| 5 | Resistance at 0 °C (32 °F) | 9.750 kOhm |
| 6 | Resistance at +10 °C (50 °F) | 5.970 kOhm |
| 7 | Resistance at +20 °C (68 °F) | 3.750 kOhm |
| 8 | Resistance at +30 °C (86 °F) | 2.420 kOhm |
| 9 | Resistance at +40 °C (104 °F) | 1.600 kOhm |
| 10 | Resistance at +50 °C (122 °F) | 1.080 kOhm |
| 11 | Resistance at +60 °C (140 °F) | 0.750 kOhm |
| 12 | Resistance at +70 °C (158 °F) | 0.530 kOhm |
| 13 | Resistance at +80 °C (176 °F) | 0.380 kOhm |
| 14 | Resistance at +90 °C (194 °F) | 0.280 kOhm |
| 15 | Resistance at +100 °C (212 °F) | 0.204 kOhm |
| 16 | Resistance at +110 °C (230 °F) | 0.153 kOhm |
| 17 | Resistance at +120 °C (257 °F) | 0.102 kOhm |

Error code B0010 (ENGINE OVERTEMPERATURE)

- Excessive engine temperature was detected.

Identification

- Warning light (red) on, plus the temperature alarm icon in the display.

Troubleshooting

Check the engine and its operation before continuing with the verifications related to the sensor. Check the connectors of the instrument cluster, injection control unit and sensor. Check the integrity and continuity of the wiring harnesses:

- between injection control unit PIN 12 and sensor PIN 1 (Yellow/Brown cable)
- between injection control unit PIN 6 -17 and sensor PIN 2 (Green/Pink cable)

Engine temperature sensor P0115

- open circuit, shorted to positive / shorted to negative.

Error cause

- If open circuit, short circuit to positive: an excessive voltage was detected at PIN 12 of the ENGINE connector.
- If short circuit to negative: a voltage equal to PIN 12 of the ENGINE connector was detected.

Troubleshooting

- If open circuit, short circuit to positive: check the sensor connector and engine ECU connector, if not ok restore the wiring harness, if ok check sensor continuity; if it is not OK, replace the sensor; if it is OK, check continuity between PIN 12 of the ENGINE connector and PIN 1 of the sensor: If continuity is absent, restore the wiring harness; if ok reconnect the control unit connector and with key ON check the continuity between PIN 2 of the sensor connector and vehicle ground: if there is no continuity restore the wiring harness, if there is continuity this means that the cause of the error is the presence of a cable short circuit to positive and therefore restore the wiring harness between PIN 12 ENGINE and PIN 1 of the

sensor. If the air temperature sensor is also displayed at the same time, this means that the short circuit to positive is present in the grey cable shared by the two sensors.

- If short circuit to negative, check the correct resistance of the sensor: if resistance is null, replace the sensor; if resistance is correct, it means that the green/pink cable has ground connection: restore the wiring harness.

DIAGNOSTIC TOOL: LOGIC ERRORS

Engine temperature sensor P0116

- Signal not plausible

Error cause

- An excessive temperature variation was detected: the cause could be a contact resistance between the terminals, for example. The instrument cluster indicates this error by switching on the MI warning light in a steady manner.

Troubleshooting

- Check the sensor connector and the engine ECU ENGINE connector.

Lambda sensor

Function

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

Operation / Operating principle

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

Level in electrical circuit diagram:

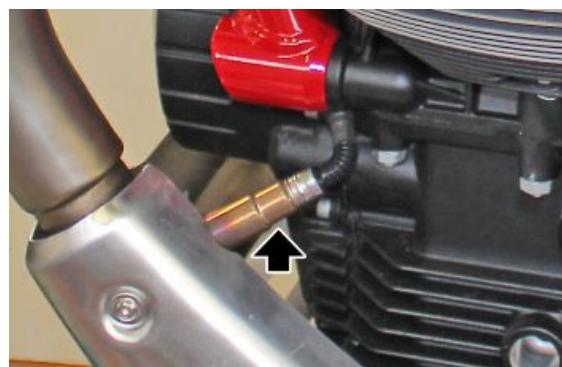
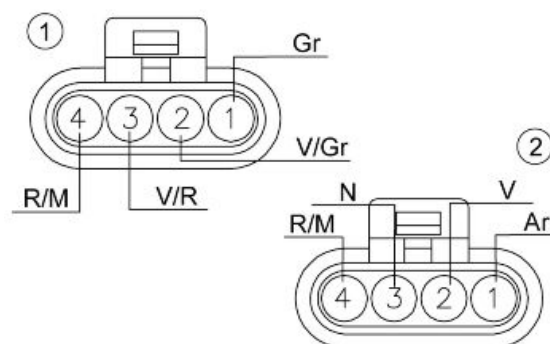
Lambda probe

Left lambda position:

- sensor: on the left exhaust manifold
- connector: front left side fixed to the regulator support bracket

Right lambda position:

- sensor: on the right exhaust manifold



- connector: front right side fixed to the regulator support bracket

Electrical specifications

- Heating circuit: 7-9Ω at ambient temp.

Left lambda pin out (1):

1. Sensor signal + (grey wire)
2. Sensor signal - (green/grey wire)
3. Heater ground (green/red cable)
4. Heater power supply (red/brown cable)

Right lambda pin out (2):

1. Sensor signal + (orange wire)
2. Sensor signal - (green wire)
3. Heater ground (black wire)
4. Heater power supply (red/brown cable)

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

DIAGNOSTIC TOOL:PARAMETERS

Lambda probe

- Example value with key ON: 0 mV
- Example value with engine on: 100-900 mV

If there is a short circuit at + 5 V or higher, the lambda probe parameter is not equal to the value read by the control unit, but a recovery value is displayed

Lambda correction

- Example value with key ON: 1,00 mV
- Example value with engine on: 0.90 - 1.10mV

In closed loop the value must oscillate near the value of 1,00 (values outside of the 0,90 - 1,10 range indicate an anomaly): for example the value 0,75 corresponds to +25% with respect to the injection time of reference, 1,25 corresponds to -25%. If there is an open circuit, lambda probe signal very low, the control unit interprets this as a lean combustion condition and will therefore try to grease, therefore the read value will be 0,75: once this correction has been tried, the value shifts to 1.00 fixed and the Oxygen sensor error is signalled

DIAGNOSTIC TOOL: STATES

Left/Right Lambda probe

- Cranking - Lean - Rich - Lean Fault - Rich Fault



- If the probe connector is disconnected (voltage almost equal to zero) it switches to the Lean Fault status

Left/Right cylinder title control

- Open loop - Closed loop - Half closed loop - Lean/half cl. loop
- Closed loop indicates that the control unit is using the lambda probe signal to keep the combustion is close as possible to the stoichiometric value.

DIAGNOSTIC TOOL: ACTIVATIONS

Left/Right Lambda probe heater

- The secondary injection relay is energized and the heating circuit is closed to ground 5 times (PIN 3 of the lambda probe connector). Electrical continuity is required in the wiring for the relay to activate correctly: no errors are generated if the relay fails to activate

DIAGNOSTIC TOOL: ELECTRICAL ERRORS

Left cylinder lambda probe P0130

- short circuit to positive/ short circuit to ground / open circuit

Error cause

- Excessive voltage detected (battery voltage) at PIN 10 and 22 of the ENGINE connector. Warning: the "lambda probe" parameter is not the actual read value but a recovery value is displayed. The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector
- Verify that there is no short to battery positive on sensor connector PIN 1 (corresponding to control unit connector PIN 10); if there is a short circuit, restore the wiring harness.
- Verify that there is no short to battery positive on sensor connector PIN 2 (corresponding to control unit connector PIN 22); if there is a short circuit, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector
- Check the continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 10 - sensor PIN 1 and control unit PIN 22 - sensor PIN 2. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks

Short circuit to negative:

- Disconnect the sensor connector and the control unit connector.

- Check the sensor connector PIN 1 ground insulation. If there is no insulation, restore the wiring harness.
- Check the sensor connector PIN 2 ground insulation. If there is no insulation, restore the wiring harness.
- If PIN 1 and PIN 2 are insulated from the ground and the error persists, this means that there is a probable fault in the control unit.

Left lambda sensor P0134

Functional diagnostic:

- no switching from high / no switching from low

Error cause:

- If no switching from high: is shown when the ratio control is in closed loop and when the secondary air valve is not operating. The error is validated if the engine is in CUTOFF status and the probe signal is close to 1V, or if the engine is in another operating condition that requires the injection but the switching from the "HIGH RATIO" to "LOW RATIO" is missing for a certain "adjusted" number of dead points (PMS or TDC).
- If no switching from low: is shown when the ratio control is in closed loop and when the secondary air valve is not operating. The error is validated if during the ratio control stage, the switching from "HIGH RATIO" to "LOW RATIO" is missing for a certain "adjusted" number of upper dead points (PMS or TDC).

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting:

- If no switching from high: the fault may be generated in the supply system (poor pin sealing) or in the probe. Check the wiring harness: if NOT OK restore; if OK, replace the lambda probe.
- If no switching from low: the fault may be generated in the supply system (dirty injector, low fuel supply system pressure) or in the probe. Check the wiring harness: if NOT OK restore; if OK, replace the lambda probe.
- For the (non polarised) type of probes, this error may be caused also by a short circuit to the wiring harness ground.

NOTE

THIS ERROR DISABLES THE RATIO CONTROL IN CLOSED LOOP.

Left lambda probe heater P0135

Electrical diagnostic:

- short circuit to positive/ open circuit, short circuit to negative

Error cause

- Short-circuit to positive: an excessive voltage was detected at PIN 32 of the ENGINE connector.
- If open circuit, short circuit to negative: a voltage equal to zero was detected at PIN 32 of the ENGINE connector.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting

- Short-circuit to positive: disconnect the probe connector and check the correct sensor resistance: if Not OK, replace the sensor; if OK, restore the wiring harness (Green/Red cable).
- If open circuit, short circuit to negative: check the continuity from the probe connector (PIN 3 and 4) to the probe: if not ok replace the sensor; if ok, check the sensor connector and engine control unit connector: if NOT OK restore; if OK, with the key ON and the sensor connector disconnected, check if there is battery voltage at PIN 4: if NOT OK, check the continuity of the Red/Brown cable between the probe connector and the secondary injection relay (no. 35 in the electrical circuit diagram; however, CHECK the relay identification with the cable colours); if there are also errors regarding the coils, upper and lower injectors and secondary air, check the relay and its energy and power line; if the voltage at PIN 4 is present, check the ground insulation of the green/red cable (PIN 3): if not ok restore the wiring harness, if ok check the continuity of the green/red cable (between PIN 3 of the sensor connector and PIN 32 ENGINE) and restore the wiring harness
- If open circuit, short circuit to negative: check the continuity from the probe connector (PIN 3 and 4) to the probe: if NOT OK, replace the probe; if ok, perform the check procedure for the sensor connector and for the Marelli control unit connector: if NOT OK restore; if OK, with the key ON and the sensor connector disconnected, check if there is battery voltage at PIN 4: if it is not OK, check the red/brown cable continuity between the probe connector and the injection relay (No. 33 in the electrical circuit diagram, placed under the saddle next to the battery positive, CHECK, however, the identification of the relay with the colour of the cables). If there are also coil, lower and upper injector and secondary air errors, check the relay and its excitation and power line; if there is voltage at PIN 4, check ground insulation of the green cable (PIN 3): if not OK, restore the cable harness. If it is OK, check the continuity of the green cable (between the sensor connector PIN 3 and the ENGINE PIN 32) and restore the cable harness.

CAUTION

The control unit does not detect the following malfunctions of the lambda probe circuit relative to the signal: interrupted circuit, short circuit to ground or malfunction of the sensor (for example, voltage not variable). If the indication is abnormal, perform the troubleshooting indicated below.

Troubleshooting

- Check the continuity of the circuit from the probe connector (PIN 1 and PIN 2) towards the probe: replace the lambda probe if there is no continuity; if there is continuity, check the sensor connector and the Marelli control unit connector: if NOT OK, restore; if OK, check the continuity between the ENGINE connector PIN 10 and PIN 22 and restore the wiring harness.

Right Lambda probe P0150

- short circuit to positive / open circuit, short circuit to negative

Error cause

- Excessive voltage detected (battery voltage) at PIN 9 and 38 of the ENGINE connector. Warning: the "lambda probe" parameter is not the actual read value but a recovery value is displayed.
- Open circuit or short-circuit to negative: circuit interruption or zero voltage between control unit connector PIN 9 and 38

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 1 (corresponding to control unit connector PIN 9); if there is a short, restore the wiring harness.
- Verify that there is no short to battery positive on sensor connector PIN 2 (corresponding to control unit connector PIN 38); if there is a short, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Check the continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 9 - sensor PIN 1 and control unit PIN 38 - sensor PIN 2. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Short-circuit to negative:

- Disconnect the sensor connector and the control unit connector.
- Check the sensor connector PIN 1 ground insulation. If there is no insulation, restore the wiring harness.
- Check the sensor connector PIN 2 ground insulation. If there is no insulation, restore the wiring harness.
- If PIN 1 and PIN 2 are insulated from the ground and the error persists, this means that there is a probable fault in the control unit.

Right Lambda probe P0154**Functional diagnostic:**

- no switching from high / no switching from low

Error cause:

- If no switching from high: is shown when the ratio control is in closed loop and when the secondary air valve is not operating. The error is validated if the engine is in CUTOFF status and the probe signal is close to 1V, or if the engine is in another operating condition that requires the injection but the switching from the "HIGH RATIO" to "LOW RATIO" is missing for a certain "adjusted" number of dead points (PMS or TDC).
- If no switching from low: is shown when the ratio control is in closed loop and when the secondary air valve is not operating. The error is validated if during the ratio control stage, the switching from "HIGH RATIO" to "LOW RATIO" is missing for a certain "adjusted" number of upper dead points (PMS or TDC).

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting:

- If no switching from high: the fault may be generated in the supply system (poor pin sealing) or in the probe. Check the wiring harness: if NOT OK restore; if OK, replace the lambda probe.
- If no switching from low: the fault may be generated in the supply system (dirty injector, low fuel supply system pressure) or in the probe. Check the wiring harness: if NOT OK restore; if OK, replace the lambda probe.
- For the (non polarised) type of probes, this error may be caused also by a short circuit to the wiring harness ground.

NOTE

THIS ERROR DISABLES THE RATIO CONTROL IN CLOSED LOOP.

Right lambda probe heater P0155**Electrical diagnostic:**

- short circuit to positive/ open circuit, short circuit to negative

Error cause:

- Short-circuit to positive: an excessive voltage was detected at PIN 44 of the ENGINE connector.
- If open circuit, short circuit to negative: a voltage equal to zero was detected at PIN 44 of the ENGINE connector.

The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting:

- Short-circuit to positive: disconnect the probe connector and check the correct sensor resistance: if not OK replace the sensor; if OK restore the cable harness (black/purple cable).
- If open circuit, short circuit to negative: check the continuity from the probe connector (PIN 3 and 4) to the probe: if NOT OK, replace the probe; if ok, perform the check procedure for the sensor connector and for the Marelli control unit connector: if NOT OK restore; if OK,

with the key ON and the sensor connector disconnected, check if there is battery voltage at PIN 4: if it is not OK, check the red/brown cable continuity between the probe connector and the injection relay (No. 33 in the electrical circuit diagram, placed under the saddle next to the battery positive, CHECK, however, the identification of the relay with the colour of the cables). If there are also coil, lower and upper injector and secondary air errors, check the relay and its excitation and power line; if there is voltage at PIN 4, check the black/purple cable ground insulation (PIN 3): if not OK, restore the cable harness. If it is OK, check the continuity of the black/purple cable (between the sensor connector PIN 3 and the ENGINE PIN 44) and restore the cable harness.

CAUTION

The control unit does not detect the following malfunctions of the lambda probe circuit relative to the signal: interrupted circuit, short circuit to ground or malfunction of the sensor (for example, voltage not variable). If the indication is abnormal, perform the troubleshooting indicated below.

Troubleshooting

- Check the continuity of the circuit from the probe connector (PIN 1 and PIN 2) towards the probe: replace the lambda probe if there is no continuity; if there is continuity, check the sensor connector and the Marelli control unit connector: if NOT OK, restore; if OK, check the continuity between the ENGINE connector PIN 9 and PIN 38 and restore the wiring harness.

Injector

INJECTORS

Function

To supply the correct amount of petrol at the right timing

Operation / Operating principle

Injector coil is energised for the petrol passage to open

Level in electrical circuit diagram:

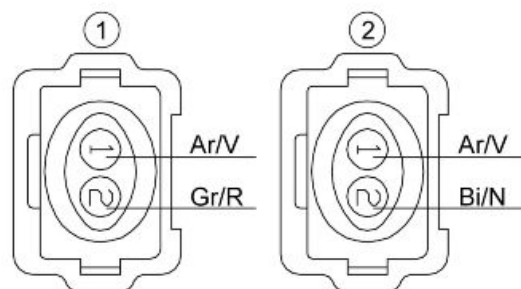
Coils and injectors

Left injector position:

- On the left intake manifold
- Connector: on injector

Right injector position:

- On the right intake manifold



- Connector: on injector

Electrical specifications

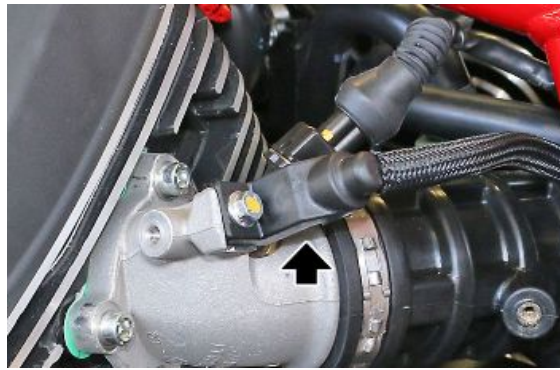
- 14.8 Ohm +/- 5% (at ambient temperature)

Left injector Pin out :

1. 12 V power supply (orange/green)
2. Ground (grey/red)

Right injector Pin out :

1. 12 V power supply (orange/green)
2. Ground (black/white)



Diagnostic tool - Parameters

- Left/Right cylinder injection time

DIAGNOSTIC TOOL: ELECTRICAL ERRORS

Left cylinder injector P0205

- short circuit to positive / short circuit to negative / open circuit

Error cause

- Short-circuit to positive: excessive voltage has been detected on VEHICLE PIN 53. If short circuit to negative: no voltage has been detected. If open circuit: an interruption has been detected

Troubleshooting

- Short-circuit to positive: disconnect the injector connector, set key to ON, activate the component with the diagnostic tool and check the voltage on the grey/red cable on the injector connector (if present): if there is voltage, restore the filter box cable harness. If there is no voltage, replace the sensor
- If short circuit to negative: disconnect the injector connector, set the key to ON and check if there is a ground connection on the orange/red cable: if the connection is present, restore the cable harness. If there is no connection, replace the injector
- If open circuit: check the component correct electrical characteristic: if it is not the correct one, replace the component; if it is correct, check the connector on the component and the engine control unit connector: if not OK, restore. If OK, check cable continuity between VEHICLE PIN 53 and component PIN - and restore the cable harness

Right cylinder injector P0206

- short circuit to positive / short circuit to negative / open circuit

Error cause

- Short-circuit to positive: excessive voltage has been detected on VEHICLE PIN 67. If short circuit to negative: no voltage has been detected. If open circuit: an interruption has been detected

Troubleshooting

- Short-circuit to positive: disconnect the injector connector, set key to ON, activate the component with the diagnostic tool and check the voltage on the Black/White cable on the injector connector: if there is voltage, restore the filter box cable harness. If there is no voltage, replace the sensor
- If short circuit to negative: disconnect the injector connector, set the key to ON and check if there is a ground connection on the white/green cable: if the connection is present, restore the cable harness. If there is no connection, replace the injector
- If open circuit: check the component correct electrical characteristic: if it is not the correct one, replace the component; if it is correct, check the connector on the component and the engine control unit connector: if not OK, restore. If OK, check cable continuity between VEHICLE PIN 67 and component PIN - and restore the cable harness

fuel pump

Function

Fuel pump: keeps pressure of the injectors supply duct.

Low fuel: tells to the instrument cluster about low fuel

Operation / Operating principle

The fuel reserve is a resistance that if correctly supplied varies its electrical resistance if it is damped or not by petrol

Level in electrical circuit diagram

Injection loads relay

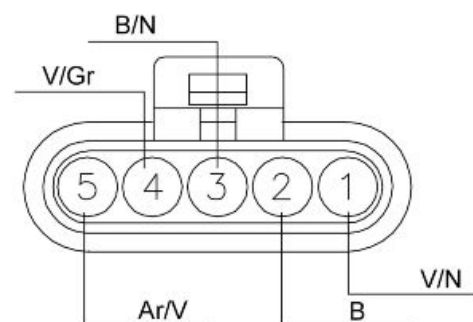
Low fuel and oil pressure

Position

- On the vehicle: on the tank.
- Connector: under the tank.

Fuel pump pin-out and fuel reserve sensor

1. Fuel reserve signal (green/black)
2. Fuel pump ground
3. Fuel level sensor ground



4. Fuel level sensor positive signal
5. Power supply 12V

PETROL SENSOR

Error code B0012 (PETROL SENSOR ERROR)

- The petrol sensor is disconnected.

Identification

- Reserve warning light flashing.

Troubleshooting

Check the connectors of the instrument cluster and the sensor. Check the integrity and continuity of the wiring harnesses:

- between PIN 3 fuel pump and PIN 34 instrument cluster (blue/black cable)
- between PIN 4 fuel pump and PIN 4 instrument cluster (green/grey cable)

DIAGNOSTIC TOOL: ACTIVATIONS

Fuel pump

NOTES: The injection relay (No 33 in the wiring diagram, position under the saddle, next to the battery positive, CHECK, however, the identification of the relay with the colour of the cables) is energised for 30 seconds. Electrical continuity is required in the wiring for the relay to activate correctly: no errors are generated if the relay fails to activate

DIAGNOSTIC TOOL: ELECTRICAL ERRORS

Fuel pump relay command P0230

- short circuit to positive/ open circuit, short circuit to negative.

Error cause

- Short-circuit to positive: excessive voltage has been detected at PIN 73 of the VEHICLE connector. If open circuit, short circuit to negative: a voltage equal to zero was detected at PIN 73 of the ENGINE connector.

Troubleshooting

- Short-circuit to positive: check the relay electrical specifications are correct by disconnecting it from the cable harness. If not OK, replace the relay; if OK, restore the cable harness (Brown/Black cable).
 - If open circuit, short circuit to negative: check the relay electrical characteristics are correct by disconnecting it from the cable harness; if it is not OK, replace the relay, if it is OK, check relay connector, engine-vehicle cable harness connector and VEHICLE connector of the Marelli control unit: if not OK, restore; if OK, check continuity of cable harness (Brown/Black cable).
-

Coil

Function

Spark generation

Operation / Operating principle

With inductive discharge

Level in electrical circuit diagram:

coils and injectors

Position:

- connector: under the tank near the canister filter
- sensor: front of vehicle fixed to the frame under the tank

Electrical specifications:

0.7- 0.9 Ω at ambient temperature

Right coil pin out (1):

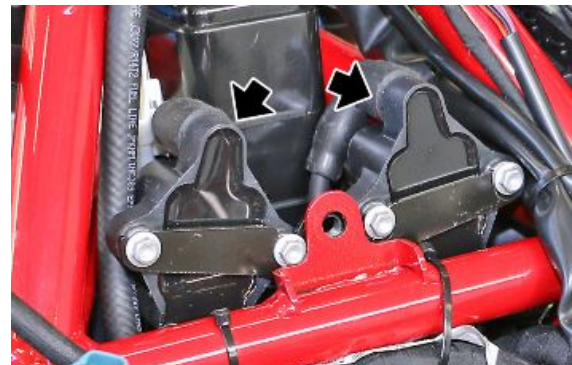
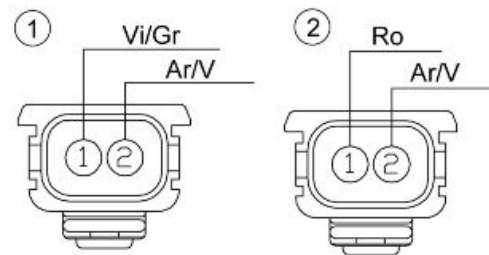
1. Power supply (purple/grey cable)
2. Ground (orange/green cable)

Left coil pin out (2):

1. Power supply (Red cable)
2. Ground (orange/green cable)

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.



DIAGNOSTIC TOOL: LOGIC ERRORS

Left cylinder coil P0351

- short circuit to positive / short circuit to negative, open circuit.

Error cause

- Short-circuit to positive: an excessive voltage was detected at PIN 28 of the ENGINE connector. If open circuit, short circuit to negative: a voltage equal to zero was detected at PIN 28 of the ENGINE connector.

Troubleshooting

- Short-circuit to positive: disconnect the coil connector, set the key to ON, activate the coil with the diagnostic instrument and check voltage at connector PIN 28: if there is voltage, restore the wiring harness, if the voltage is 0, replace the coil.

- If open circuit, short circuit to negative: check the electrical characteristics of the coil: if not ok, replace the coil; if ok, perform the check procedure for the coil connector and for the Marelli control unit connector; if not ok restore; if everything is ok, check the continuity of the cable between the two ends of the cable: if there is no continuity, restore the wiring harness; if there is continuity, with key ON, check the cable ground insulation (from the coil connector or control unit connector); if not ok, restore the wiring harness.

Right cylinder coil P0352

- short circuit to positive / short circuit to negative, open circuit.

Error cause

- Short-circuit to positive: an excessive voltage was detected at PIN 27 of the ENGINE connector. If open circuit, short circuit to negative: voltage equal to zero was detected at PIN 27 of the ENGINE connector

Troubleshooting

- Short-circuit to positive: disconnect the coil connector, set the key to ON, activate the coil with the diagnostic instrument and check voltage at connector PIN 27: if there is voltage, restore the wiring harness, if the voltage is 0, replace the coil.
- If open circuit, short circuit to negative: check the electrical characteristics of the coil: if not ok, replace the coil; if ok, perform the check procedure for the coil connector and for the Marelli control unit connector; if not ok restore; if everything is ok, check the continuity of the cable between the two ends of the cable: if there is no continuity, restore the wiring harness; if there is continuity, with key ON, check the cable ground insulation (from the coil connector or control unit connector); if not ok, restore the wiring harness.

Throttle body

Function

To send the throttle position to the injection control unit and to activate the throttle itself based on the request from the control unit

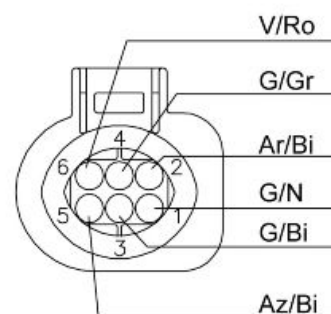
Operation / Operating principle

All the unit internal components (potentiometer and electric motor) are contactless; therefore, no electrical diagnostic is possible for the throttle body, but for the circuits connected to it only.

Level in electrical circuit diagram:

Throttle and handgrip sensor control (Demand)

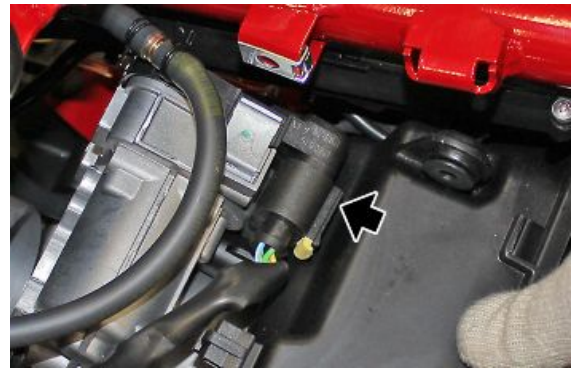
Position:



- on the vehicle: under the tank
- connector: on the throttle body

Pin out:

1. potentiometer signal 1 (yellow/black cable)
2. + 5 V voltage (Orange/white cable)
3. throttle drive command (+) (yellow/white cable)
4. potentiometer signal 2 (yellow/grey cable)
5. throttle drive command (-) (light blue/white cable)
6. ground (green/pink cable)

**DIAGNOSTIC TOOL: PARAMETERS****Throttle correction**

- Example value with key ON: 0,0°
- Example value with hot engine at idle: -0.5°

An acceptable value is between -1.5° and + 1.5°

Throttle Potentiometer 1 (degrees)

- Example value with key ON: 6°-7°
- Example value with engine at idle: engine hot 5.5°, engine cold 6.5°

Throttle Potentiometer 1 (voltage)

- Example value with key ON: 800 mV
- Example value with engine on: engine hot 760 mV, engine cold 800 mV

Throttle Potentiometer 2 (degrees)

- Example value with key ON: 5.5°
- Example value with engine on: engine hot 5.5°, engine cold 6.5°

Throttle Potentiometer 2 (voltage)

- Example value with key ON: 4200 mV
- Example value with engine on: engine hot 4240 mV, engine cold 4200 mV

Throttle valve Limp Home position

- Example value with key ON: 824 mV at 6.7°

Voltage stored in the control unit corresponding to the Limp home position

Throttle valve lower position

- Example value with key ON: 480-510 mV

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

DIAGNOSTIC TOOL: STATES

Automatic throttle valve self-learning

- Ice/Interrupted/Performed/Limp home/Throttle valve stopper closed/Spring check/Limp home acquisition/Initialization

Indicates if the self-learning performed by the control unit was performed/not performed: this is fundamental for understanding if the acquisition was successful at the last key ON

Throttle self-learning with diagnostic instrument

- Performed/Not performed

Indicates if the self-learning with the diagnostic tool was performed/not performed: if it was performed one time, it will always remain performed unless a control unit EEPROM reset is carried out

DIAGNOSTIC TOOL: ELECTRICAL ERRORS**'potentiometer sensor 1 throttle valve position P0120**

- short circuit to positive / open circuit, short circuit to negative

Error cause

- Short-circuit to positive: excessive voltage has been detected on PIN 48. If open circuit, short circuit to negative: voltage equal to zero detected at PIN 48

Troubleshooting

- Short-circuit to positive: check the value indicated by the Potentiometer throttle valve 1 parameter (voltage): disconnect the connector and read the value indicated by the diagnostic tool: if the voltage does not vary, there is a short circuit of the cable, if the voltage goes to zero, replace the throttle body
- If open circuit, short circuit to negative: check the throttle body connector and the control unit connector, if not ok restore, if everything is ok check the continuity of the circuit between the two terminals, if not ok restore the wiring harness, if ok check the ground insulation of the circuit (from the throttle valve sensor connector or control unit connector), if ground insulated, check that the power supply (+5 V) is present at PIN 2 of the throttle body connector and that ground is present at PIN 6, if present correctly replace the throttle body

DIAGNOSTIC TOOL: LOGIC ERRORS**Sensor potentiometer throttle valve position P0121**

- Signal not plausible

Error cause

- Signal outside the specified value determined based on the values of the intake pressure

Troubleshooting

- Check the Throttle Valve Potentiometer 1 parameter (voltage) to understand which signal the control unit receives. Check the throttle body connector and the control unit connector.

Check that the resistance of the cable between the throttle body connector PIN 1 and the control unit PIN 48 is a few tenths of ohm. Otherwise, restore the wiring harness if ok replace the complete throttle body

Sensor potentiometer throttle valve position P0220

- short circuit to positive / open circuit, short circuit to negative

Error cause

- Short-circuit to positive: excessive voltage has been detected on PIN 36. If open circuit, short circuit to negative: voltage equal to zero detected at PIN 36

Troubleshooting

- Short-circuit to positive: check the value indicated by the Potentiometer throttle valves 1 parameter (voltage): disconnect the left side connector and read the value indicated in the diagnostic tool: if the voltage does not vary, there is a short circuit in the cable wiring; replace the throttle body if the voltage drops to zero
- If open circuit, short circuit to negative: check the throttle body connector and the control unit connector, if not ok restore, if everything is ok check the continuity of the circuit between the two terminals, if not ok restore the wiring harness, if ok check the ground insulation of the circuit (from the throttle valve sensor connector or control unit connector), if ground insulated, check that the power supply (+5 V) is present at PIN 2 of the throttle body connector and that ground is present at PIN 6, if present correctly replace the throttle body

Sensor potentiometer throttle valve position P0221

- Signal not plausible

Error cause

- Signal outside the specified value determined based on the values of the intake pressure

Troubleshooting

- Check the parameter of the Potentiometer throttle valve 1 (voltage) to get which signal the control unit receives and to compare it to the Potentiometer throttle valve 2 (voltage). Check the throttle body connector and the control unit connector. Check that the resistance of the cable between the throttle body connector (PIN 1) and the control unit (PIN 48) is a few tenths of ohm. Otherwise, restore the wiring harness if ok replace the complete throttle body

Rear throttle valve position error P0638

- Misalignment between control and activation

Error cause

- The throttle valve mechanical control could be damaged

Troubleshooting

- Replace the throttle body

Throttle valve Limp Home self-learning P1400

- Test failed

Error cause

- Position of the throttle valve, maintained by the springs, outside the specified range (at each key ON). The instrument cluster does not indicate the presence of this error even in the ATT status

Troubleshooting

- Check the cleanliness of the throttle body and the intake duct. If ok replace the throttle body

Throttle valve mechanical springs self-learning (opening) P1401**Functional diagnostic:**

- Test failed

Error cause:

- The recognition of this error is enabled during the throttle self-learning procedure.
- Throttle valve return time, in the position maintained by the springs, outside of the specified limits: the causes can be a deterioration of spring performance or excessive throttle valve friction (at each key ON)

This error is indicated by lighting up in a fixed manner the MI warning light.

Troubleshooting:

- Using the diagnostic tool, erase the error, then perform the throttle self-learning procedure. If the error is displayed again, it may mean a mechanical problem at the throttle body.
- Check the cleanliness of the throttle body and the intake duct. Check if there are any mechanical ruptures. Replace the throttle body, if necessary.

Rear throttle valve minimum mechanical position self-learning P1402

- Test failed

Error cause

- Position of the throttle valve stopper outside of the specified range (at each key ON)

Troubleshooting

- Check the cleanliness of the throttle body and the intake duct. If ok replace the throttle body

Throttle recovery conditions detection (Air T., Water T.) P1403

- Ice possibly present

Error cause

- in conditions of low ambient temperature and engine temperature, a correct throttle valve rotation was not detected: possible presence of ice in the duct (at each key ON). The instrument cluster does not indicate the presence of this error even in the ATT status

Troubleshooting

- Check the cleanliness of the throttle body and that there is no ice or condensate in the intake duct. If ok replace the throttle body
-

'Throttle valve power supply voltage during self-learning P1404

- Low power supply voltage

Error cause

- The throttle valve power supply voltage is too low to correctly perform the self-learning test (at each key ON). The instrument cluster does not indicate the presence of this error even in the ATT status

Troubleshooting

- Remove the presence of errors that prevent throttle self-learning.

Throttle valve mechanical (re-closing) springs self-learning P1405

- Test failed

Error cause

- Throttle valve return time, in the position maintained by the springs, outside of the specified limits: the causes can be a deterioration of spring performance or excessive throttle valve friction (at each key ON)

Troubleshooting

- Check the cleanliness of the throttle body and the intake duct. If ok replace the throttle body

Throttle valve driver circuit P2119

- short circuit to positive / short circuit to negative / open circuit, overcurrent, excessive internal temperature

Error cause

- Short-circuit to positive: excessive voltage detected on PIN 29 or 41 of the 7SM control unit. If short circuit to negative: no voltage has been detected. If open circuit: an interruption or excessive absorption of amperes or overheating of the control unit was detected

Troubleshooting

- Short-circuit to positive: disconnect the throttle body connector, turn the key OK and check the voltage at PIN 3: if a voltage greater than or equal to 5 V is read, there is a short circuit of the relative cable, if the voltage is zero, replace the throttle body
 - If short circuit to negative: disconnect the throttle body connector, turn the key ON and check if PIN 3 has continuity with the vehicle ground: if there is continuity restore the wiring harness, if there is no continuity replace the throttle body
 - If there is open circuit, overcurrent, excessive internal temperature: check the throttle body connector and the control unit connector: if not ok restore, if everything is ok disconnect the connector of the throttle body and the control unit connector and check cable continuity; if
-

there is no continuity, restore the cable harness. If there is continuity, with the throttle body connector connected, check that the resistance, from the throttle control unit connector, between PIN 29 and 41 is within 1 and 2.5 Ohm; if not ok replace the throttle body, if ok check that the throttle body is not mechanically blocked: if blocked, remove the cause or replace the body, if not blocked replace the control unit

Throttle valve position potentiometers P2135

- Signal not congruent

Error cause

- Potentiometer 1 and potentiometer 2 do not provide a congruent value: the sum of the two voltages must be constant. The cause could be the malfunction of one of the two sensors or an abnormal resistance in one of the two circuits

Troubleshooting

- Check the throttle body connector and the control unit connector. Check that the resistance of the cable between the throttle body connector (PIN 1) and the control unit (PIN 48) is a few tenths of ohm. Check that the resistance of the cable between the throttle body connector (PIN 4) and the control unit (PIN 50) is a few tenths of ohm. If one of the two is different, restore the wiring harness if ok replace the complete throttle body

Engine oil pressure sensor

ENGINE OIL PRESSURE SENSOR

Function

Indicates the instrument panel if there is enough oil pressure 0.35 +/- 0.2 bar (5.1 +/- 2.9 PSI) in the engine.

Operation / Operating principle

Switch normally open. With oil pressure above 0.35 +/- 0.2 bar (5.1 +/- 2.9 PSI), closed circuit.

Level in electrical circuit diagram

Low fuel and oil pressure.

Position

- Sensor: right side of engine.
- Connector: on the sensor.

Electrical specifications

- Engine off: closed circuit (continuity).
- With engine started: open circuit (infinite resistance).



Pin-out

1. Voltage 12V (violet).

Error B0001 Oil pressure sensor error**Error cause**

- An oil sensor fault is signalled when, with engine off, it is detected that the sensor circuit is open. The test is performed only once when the key is set to ON.

The error is indicated with the fixed activation of the general alarm light and the message "ALARM OIL SENSOR" on the display

Troubleshooting

- Check the sensor connector and the instrument cluster connector (PIN 13): if they are not OK, restore. If OK, check continuity of the purple cable between the sensor connector and the instrument cluster connector PIN 13: if not OK, restore the wiring harness; if OK, replace the sensor.

Error B0002 Engine oil pressure error**Error cause**

- An oil sensor fault is signalled when, with engine running, it is detected that the sensor circuit is closed.

The error is indicated with the flashing activation of the general alarm light and the message "ALARM OIL PRESSURE" on the display

Troubleshooting

- Check the engine and its operation before continuing with the verifications related to the sensor. Check the sensor connector and the instrument cluster connector PIN 13: if not OK restore, if OK disconnect the sensor and check that there is no continuity between vehicle sensor connector and vehicle ground, if not OK restore, if OK check with running engine with disconnected sensor that there is no continuity between sensor and vehicle ground, if not OK restore, if OK replace sensor.

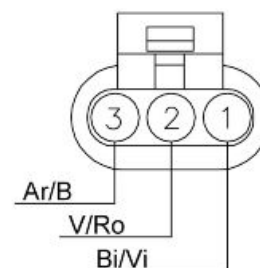
Clutch lever sensor

Function

Indicates the clutch lever position to the control unit.

Operation / Operating principle

If a gear is engaged but the clutch is engaged, that is circuit closed to ground, there is consent to start the vehicle.

Level in electrical circuit diagram:

Start enable switches

Position:

- sensor: under the clutch lever.
- connector: right side of the vehicle inside the electrical components box.

Electrical specifications:

- Clutch engaged: closed circuit (continuity)
- Clutch released: open circuit (infinite resistance).

Pin out:

1. closed switch (white/purple cable)
2. ground (green/pink cable)
3. open switch (orange/blue cable)

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

DIAGNOSTIC TOOL: STATES

Clutch

- Pressed_Released
- Valid_Not Valid

ATTENTION The status that can be normally shown are Pressed and Released.

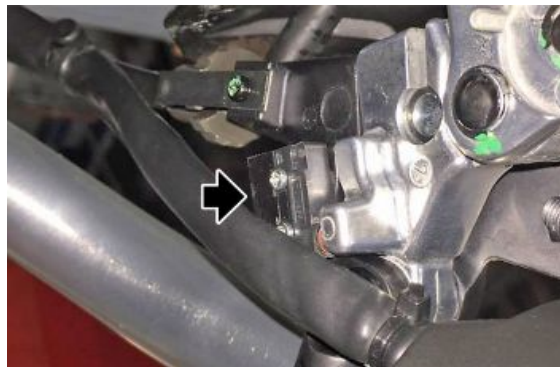
- Indication on the diagnostic tool always Released: check the sensor connector and the control unit connector (special attention to PIN56): if not OK, restore cable harness; if OK, disconnect both terminals from the sensor and check, with key set to ON, continuity to ground of PIN 2 (Green/Pink cable): if there is no continuity, restore cable harness; if there is, replace the sensor.
- Indication on the diagnostic tool always Pressed: check the sensor connector and the control unit connector (special attention to PIN76): if not OK, restore cable harness; if OK, disconnect both terminals from the sensor and check, with key set to ON, continuity to ground of PIN 2 (Green/Pink cable): if there is no continuity, restore cable harness; if there is, replace the sensor.

P0704 Clutch switches plausibility error

Diagnosis:

- signal not plausible.

Error cause:



- If there is one contact: the plausibility diagnostic cannot occur only at key ON but during operation. The control unit logic requires that the released/engaged and engaged/released switching time does not exceed a certain threshold. If the operating time is too long, the error is shown. To check the origin of the problem, it is enough to connect the diagnostic tool to see if, despite the clutch lever operations, the status remains "ENGAGED". Check the wiring harness or the sensor.
- If there are two contacts: the plausibility diagnostic can occur at key ON. Since there are two contacts that cannot be both "CLOSED" or both "OPEN" (excepting fraction of a second while switching from "RELEASED" to "ENGAGED" and vice versa), if they are, the error is shown.

The presence of this error is signalled by the fixed lighting of the general warning light.

Troubleshooting:

- If the error is active only with the lever released: the problem is generated by the released clutch contact of the which is interrupted or by the engaged clutch contact which is in short circuit to ground.
- If the error is active only with the lever engaged: the problem is generated by the engaged clutch contact of the which is interrupted or by the released clutch contact which is in short circuit to ground.
- If the error is always active: both contacts are open or in short circuit to ground.

Depending on the case, check the concerned parts of the wiring harness and the sensor.

NOTE

THIS ERROR DISABLES THE CRUISE CONTROL.

Side stand sensor

Function

indicates to the control unit the position of the side stand

Operation / Operating principle

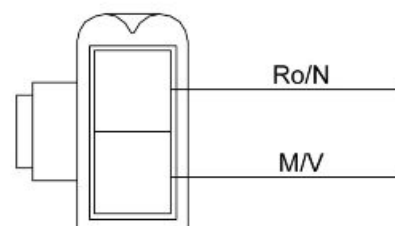
If the gear is engaged and the side stand is unfolded, and therefore the circuit is open, the control unit does not enable vehicle start-up or shuts off the engine if it is rotating

Level in electrical circuit diagram:

Start enable switches

Position:

- sensor: on the stand



- connector: right side of vehicle under the side fairing

Pin out:

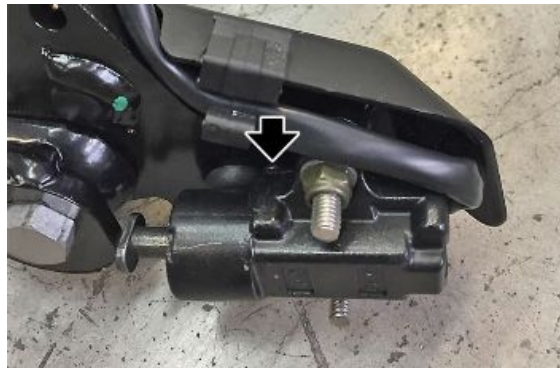
1. Ground (pink/black cable)
2. 12V Voltage (brown/green cable)

Electrical specifications:

- Stand up: closed circuit (continuity)
- Stand down: open circuit (infinite resistance)

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

**DIAGNOSTIC TOOL: STATES**

Side stand sensor

- Engaged / Not engaged

P1850 Side stand diagnostic**Side stand functional diagnostic:**

up/down

Troubleshooting:

- Indication on the diagnostic tool always down: perform the connector check procedure: if not ok, restore; if ok, disconnect the two ends from the sensor and check the PIN 1 continuity to ground: if there is no continuity, restore cable harness; if there is, replace the sensor
- Indication on the diagnostic tool always up: disconnect the two ends from the sensor and check if, with the stand down, there is continuity between the two PINS: if there is continuity replace the sensor; if open circuit, it means that there is short circuit to ground of the brown/green cable that goes from PIN 2 of the sensor to PIN 70 of the VEHICLE connector: restore the wiring harness

SAS valve actuator

Function

Quickly warms up the catalytic converter and keeps the combustion rich in some critical conditions

Operation / Operating principle

The valve coil is excited to open the air passage of the filter box to the exhaust manifold

Level in electrical circuit diagram:

Secondary air system

Position:

- sensor: under the tank
- connector: on the sensor

Electrical specifications:

Resistance at ambient temperature: $21 \pm 3/ - 1 \Omega$

Pin out:

1. Fuel system
2. Ground

IMPORTANT

BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

P0410 Secondary air valve control

Electrical diagnostic:

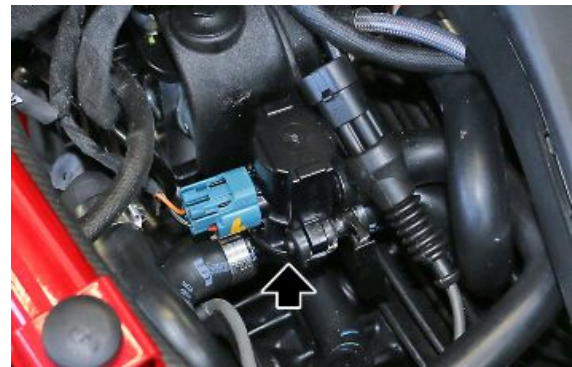
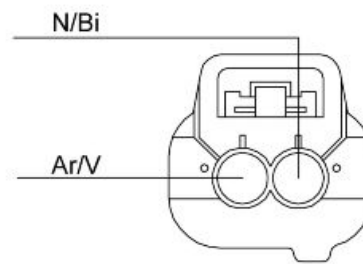
- short circuit to positive / short circuit to negative / open circuit

Error cause:

- Short-circuit to positive: Excessive voltage detected on PIN 43 of the 7SM control unit.
- If shorted to negative/open circuit: no voltage has been detected. The instrument cluster indicates the presence of this error with the MI warning light on fixed.

Troubleshooting:

- Short-circuit to positive: disconnect the component, set the key to ON, start the vehicle and check if the error symptom is still "shorted to positive": it means that short circuit is between black/white cable and a cable in voltage, therefore restore cable harness; if the error symptom is short circuit to ground, it means that short circuit is inside the valve and therefore, you must replace the component.
- If shorted to negative or open circuit: check the component connector and control unit connector: if not OK, restore; if OK, check the continuity of the black/white cable between the



two connectors: if not OK, restore wiring harness; if OK, with key ON, check if there is voltage on PIN 1 of the actuator: if there is not voltage, check orange/green cable; if there is voltage, check component electrical characteristics and replace the component

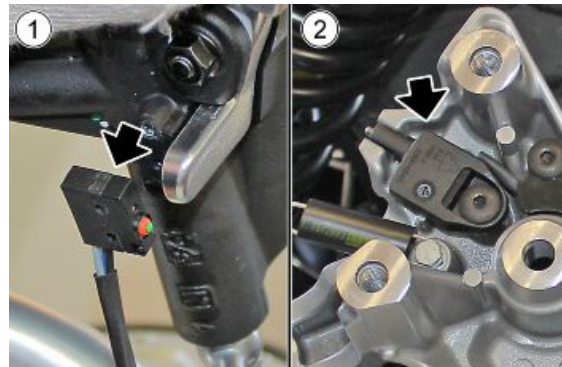
Switch freni

Brake switch

1. Front brake
2. Rear brake

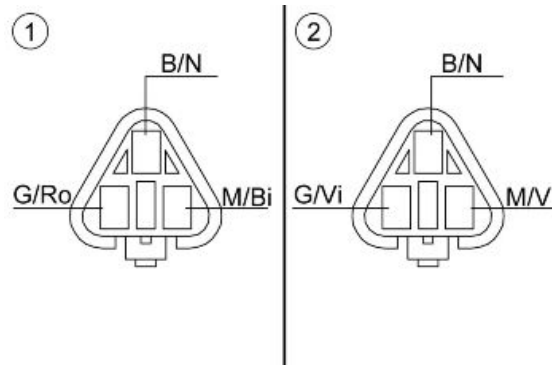
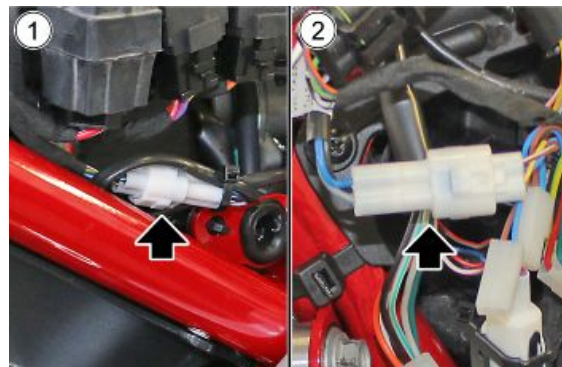
Position of front brake switch

- sensor: under the front brake lever
- connector: right side of the vehicle inside the right electrical components box.



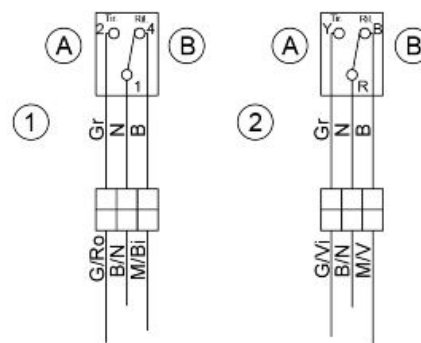
Position of rear brake switch:

- sensor: right side of vehicle inside the rider's footrest plates
- connector: right side of vehicle fixed to the frame under the right fairing



Key:

- (A) Brake pulled
- (B) Brake released



Error code B0203 (ERROR FRONT BRAKE ON THE LINE NORMALLY CLOSED)

Troubleshooting

Check the connectors of the instrument cluster and the button. Check the integrity and continuity of the wiring harnesses:

- between instrument cluster PIN 20 and Brown/White button cable
- between instrument cluster PIN 34 and button Blue/Black cable

Error code B0204 (ERROR FRONT BRAKE ON THE LINE NORMALLY OPEN)Troubleshooting

Check the connectors of the instrument cluster and the button. Check the integrity and continuity of the wiring harnesses:

- between instrument cluster PIN 19 and Yellow/Pink button cable
- between instrument cluster PIN 34 and button Blue/Black cable

Error code B0205 (ERROR REAR BRAKE ON THE LINE NORMALLY CLOSED)Troubleshooting

Check the connectors of the instrument cluster and the button. Check the integrity and continuity of the wiring harnesses:

- between instrument cluster PIN 22 and Brown/Green button cable
- between instrument cluster PIN 34 and button Blue/Black cable

Error code B0206 (ERROR REAR BRAKE ON THE LINE NORMALLY OPEN)Troubleshooting

Check the connectors of the instrument cluster and the button. Check the integrity and continuity of the wiring harnesses:

- between instrument cluster PIN 21 and Yellow/Purple button cable
- between instrument cluster PIN 34 and button Blue/Black cable

The instrument cluster controls the brake switches and sends through the CAN line the status relative to the control unit that activates the stop, the same applies for the cruise button.

Cruise control button - Brake switch P0564**Electrical diagnostic:**

- (brake sensors error) connect to the instrument cluster diagnosis

Error cause

- Communication malfunction and interruption of the button on the light switch control.
- Rear brake switch malfunction or breakage

The presence of this error is signalled by the fixed lighting of the general warning light.

Troubleshooting

- connect the diagnostic tool and verify the correct activation status of the brake levers with regard to the brake switches, physically connected to the instrument cluster: if ok check the stability of the connections, if not ok check the correct maintenance status of the rear brake

connector; if not ok restore, if ok keeping the switch fit on the vehicle, use a tester to check if there is no continuity between PIN 1 and PIN 3 of the switch with the lever pulled/released; if not ok replace the rear switch, if ok check that there is continuity between PIN 2 and PIN 3 of the switch with the brake lever released; if not ok replace the switch, if ok check that there is continuity between PIN 1 and PIN 2 with the brake lever pulled; if not ok replace the switch, if ok check that there is continuity between PIN 1 of the wiring harness side switch and PIN 21 instrument panel;

- If the instrument cluster has not detected errors relating to the brake switches, activate the cruise control selector repeatedly. If the problem persists, replace the left light switch.

NOTE

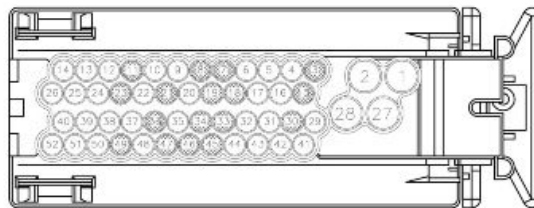
THIS ERROR DISABLES THE CRUISE CONTROL.

Connectors

ECU

Engine pin-out key:

- PIN 1 -
- PIN 2 -
- PIN 3 -
- PIN 4 - Sensors ground 2
- PIN 5 - Power ground 1
- PIN 6 - Sensors ground 1
- PIN 7 -
- PIN 8 -
- PIN 9 - Lambda sensor input 2 (+)
- PIN 10 - Lambda sensor input 1 (+)
- PIN 11 -
- PIN 12 - Water temperature sensor input
- PIN 13 - Track B hand grip input
- PIN 14 - Serial line K for diagnostics
- PIN 15 -
- PIN 16 - Power ground 2
- PIN 17 - Sensors ground 1
- PIN 18 -
- PIN 19 -
- PIN 20 - Engine rpm sensor input (-)

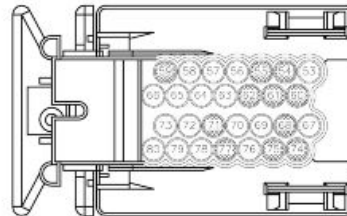


- PIN 21 -
- PIN 22 - Lambda sensor input 1 (-)
- PIN 23 -
- PIN 24 - Rear cylinders intake pressure sensor input
- PIN 25 - Reference voltage output +5
V: tracks A-C, throttle valve and pressure sensor (map)
- PIN 26 - Reference voltage output +5
V: tracks B-D, throttle valve
- PIN 27 - Cylinder coil control output 2
- PIN 28 - Cylinder coil control output 1
- PIN 29 - Rear cylinder bank throttle motor output (-)
- PIN 30 -
- PIN 31 - Recovery logic relay command output (STOP light)
- PIN 32 - Lambda heating control output 1
- PIN 33 -
- PIN 34 -
- PIN 35 - Engine rpm sensor input (+)
- PIN 36 -
- PIN 37 - Air temperature sensor input
- PIN 38 - Lambda sensor input 2 (-)
- PIN 39 - Track A hand grip input
- PIN 40 - Key input
- PIN 41 - Output for throttle motor drive (+)
- PIN 42 - Key input
- PIN 43 - Secondary air valve control output
- PIN 44 - Lambda heating control output 2
- PIN 45 -
- PIN 46 -
- PIN 47 -

- PIN 48 - Throttle potentiometer 1 signal input
- PIN 49 -
- PIN 50 - Throttle potentiometer 2 signal input
- PIN 51 - Reference voltage output +5 V: tracks A-C, throttle valve and pressure sensor (map)
- PIN 52 - Direct power supply to control unit

Control unit - Vehicle pin-out key:

- PIN 53 - Cylinder injector control output 1
- PIN 54 -
- PIN 55 -
- PIN 56 - Clutch sensor input
- PIN 57 - Sensors ground 2
- PIN 58 - Start engine button input
- PIN 59 -
- PIN 60 -
- PIN 61 -
- PIN 62 -
- PIN 63 - Reference voltage output +5 V: tracks B-D, throttle valve
- PIN 64 - Neutral input
- PIN 65 -
- PIN 66 - L CAN line (high speed)
- PIN 67 - Cylinder injector control output 2
- PIN 68 -
- PIN 69 - Starter relay command output
- PIN 70 - Side stand input
- PIN 71 -
- PIN 72 - Temperature sensor input
- PIN 73 - Injection relay control output
- PIN 74 -
- PIN 75 -



- PIN 76 - Clutch sensor input
- PIN 77 -
- PIN 78 - "Engine stop" input
- PIN 79 - Vehicle Identification
- PIN 80 - H CAN line (high speed)

ECU - Info:

- Drawing number / - (identified inserted by the manufacturer)
- HW number / - (indicates the Hardware number)
- Hardware version / -
- Mapping / - (indicates the mapping number)
- Software version / -
- Type approval number / -
- ISO code / -
- Marelli SW code / -
- Serial number (NIP)
- Author of the latest progr. / - (author of the latest programming)
- VIN / - (vehicle identification number)
- BOOT version / -
- Hardware code / - (indicates the hardware code)
- Vehicle ID / - (vehicle identification)

ECU - Parameters:

- Engine rpm / Engine rpm
- Air temperature / -
- Air temperature before Recovery / -
- Engine temperature / -
- Engine temperature before Recovery / -
- Crank engine temperature / Engine start temperature
- Potentiometer A track hand grip position / Hand grip position potentiometer signal (track A)
- Potentiometer B track hand grip position / Hand grip position potentiometer signal (track B)
- Track hand grip position used for PERAPDL / Hand grip position sensor
- Accelerator hand grip aperture percentage / -
- CF1 throttle valve voltage potentiometer 1 / Throttle valve voltage potentiometer 1
- CF1 throttle valve voltage potentiometer 2 / Throttle valve voltage potentiometer 2
- CF1 linearised throttle valve potentiometer 1 / Throttle valve position potentiometer 1
- CF1 linearised throttle valve potentiometer 2 / Throttle valve position potentiometer 2
- Linearised Inlet pressure cylinder 1 (1 and 3) / Intake pressure
- Intake pressure cylinder 1 (1 and 3) / Intake reference pressure

-
- Current cylinder timing / -
 - Cylinder 1 timing / Left cylinder timing
 - Cylinder 2 timing / Right cylinder timing
 - Programmed injection time cylinder 1 / Left cylinder injection time
 - Programmed injection time cylinder 2 / Right cylinder injection time
 - Nominal idle speed / Nominal idle speed
 - DBW idling controller target speed / Target idling
 - Battery voltage / -
 - Battery voltage prior to Recovery / -
 - Lambda probe 1 voltage / Left lambda probe voltage
 - Lambda probe 2 voltage / Right lambda probe voltage
 - Lambda probe 1 correction / Left cylinder ratio correction
 - Lambda probe 2 correction / Right cylinder ratio correction
 - Cylinder bank 1 Lambda result / Left lambda probe
 - Cylinder bank 2 Lambda result / Right lambda probe
 - Air flow rate per cycle / Indicates the amount of intake air for each engine cycle
 - Cylinder filling efficiency / Cylinder injection efficiency
 - PRFL angle correction cylinder 1 (1 and 3) / Throttle valve position correction
 - Fuel capacity / -
 - Cylinder 1 fuel capacity / Left cylinder injection quantity
 - Cylinder 2 fuel capacity / Right cylinder injection quantity
 - Fuel additive capacity / -
 - Fuel capacity per cycle / Front throttle valve low position
 - Adaptive fuel correction / Left cylinder adaptive fuel correction
 - Track 1 CF1 Limp Home position / Throttle valve Limp Home position
 - Track 1 CF1 Lower mechanical position / Throttle valve low position
 - Vehicle speed / -
 - Coil 1 Dwell time / -
 - Coil 2 Dwell time / -
 - Ratio number engaged / Indicates the gear engaged
 - Front wheel speed from ABS / Front wheel speed
 - Rear wheel circumference
 - Final drive ratio
 - Cylinder 2 Adaptive fuel correction / Right cylinder adaptive fuel correction
 - Estimated vehicle Wear / Equivalent km counter track resettable with instrument
 - Vehicle key functionals fails switch counter / KeyOn counter
 - Oil temperature / Engine oil temperature
 - Torque reduction coefficient / Torque reduction

ECU - Status:

- Lambda probe 1 control status - Open Loop / Closed Loop / Half closed loop / Magro-half cl.loop
- Lambda probe 2 control status - Open Loop / Closed Loop / Half closed loop / Magro-half cl.loop
- DBW1 Self learning phase status - Ice breaker / Interrupted / Completed / Limp home / Uma learning / Spring test / NLP learning / Self-learning
- Engine status - Undetermined / Power-on mot.stop / Key-on mot.stop/ Running / Engine stall / Power Latch / PowerLatch-end
- Engine Mode - Undetermined / Cranking / stabilized / Idle / Acceleration / Deceleration / Entered in cut-off / Cut-off / Exited Cut-Off
- Hand Grip status - Minimum opening / Partial opening / Maximum opening
- Gear engaged Flag - Engaged / Not engaged
- Immobilizer status - Released / blocked
- Phonic wheel status - Synchronized / Synchronize pending / Pre sync / Not synchronized
- Side stand status - Engaged / Not engaged
- Tip-Over switch status - Vehicle tipped over / Vehicle not tipped over
- RUN/OFF switch status - RUN / Stop
- Clutch switch status - Pressed / Released
- Clutch switch status - Valid / Not Valid
- Enable ignition status - Enabled / Disabled
- Lambda probe 1 status - Cranking / Poor / Rich / Poor Fault / Rich Fault
- Lambda probe 2 status - Cranking / Poor / Rich / Poor Fault / Rich Fault
- HGS learning status - Performed / Not performed
- SL execution status in EOL - Performed / Not performed
- Map switch Up control status - Active / Not Active / Short Circuit / Open Circuit
- Map switch Down control status - Active / Not Active / Short Circuit / Open Circuit
- Status of cruise and relative switches - ON / OFF / SET
- Status of cruise and relative switches - Pressed / Not pressed
- Status of the front and rear brake switches - Pressed/Released
- Status of the front and rear brake switches - Pressed/Released
- Status of the front and rear brake switches - Pressed/Released
- Status of the front and rear brake switches - Pressed/Released
- Status of the front and rear brake switches - Valid/Invalid
- Status of the front and rear brake switches - Valid/Invalid
- Status of cruise and relative switches "FULL" - Pressed / Not pressed / Fault present
- Status of cruise and relative switches "FULL" - Pressed / Not pressed / Fault present

- Status of cruise and relative switches "FULL" - Pressed / Not pressed / Fault present

ECU - Activation and Settings:

- Coil 1 control / Left cylinder central coil
- Coil 2 control / Right cylinder central coil
- Petrol pump relay / Fuel pump relay
- Rev. counter command / Rev. counter
- Probe 1 heater control / Left lambda probe heater
- Probe 2 heater control / Right lambda probe heater
- Secondary air valve control / Secondary air solenoid valve activation
- Brake light relay control / Brake light
- Coil 3 control / Left cylinder side coil
- Coil 4 control / Right cylinder side coil
- Cylinder bank 2 petrol injector 1 control / Left cylinder injector
- Cylinder bank 2 petrol injector 2 control / Right cylinder injector
- ECU EEPROM reset / ECU EEPROM memory reset
- HGS sensor learning / Hand grip self-learning
- DBW self learning / Throttle valve self-learning
- Data buffer transfer / Download of stored data file
- Vehicle configuration / Vehicle configuration (Km)
- Vehicle configuration / Vehicle configuration (Miles)
- Functional key event counter reset / Ignition switch assembly error counter reset

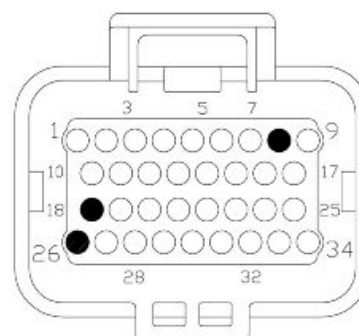
Dashboard

NOTE

ONLY FOR E4 VEHICLES

Instrument cluster - Pin-out key:

- PIN 1 - Left handgrip (brown)
- PIN 2 - Aerial A (grey)
- PIN 3 - Aerial B (grey)
- PIN 4 - Petrol level (green/grey)
- PIN 5 - Air temperature (pink)
- PIN 6 - UP command (white/pink)
- PIN 7 - Lights relay (yellow/blue)
- PIN 8 -
- PIN 9 - Battery positive (green/red)
- PIN 10 - Right handgrip (brown)
- PIN 11 - DRL input (green/orange)

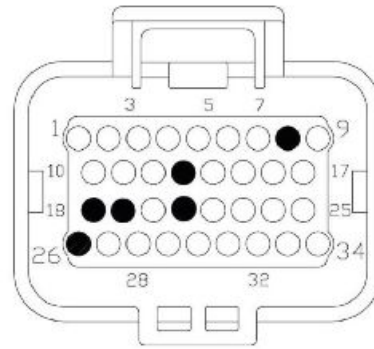


- PIN 12 - SET command (orange)
- PIN 13 - Oil pressure (purple)
- PIN 14 - High beam (white)
- PIN 15 - Down command (yellow)
- PIN 16 - Key positive (Red/Brown)
- PIN 17 - Battery positive (green/red)
- PIN 18 -
- PIN 19 - Front brake (N.O.) (yellow/
pink)
- PIN 20 - Front brake (N.C.) (brown/
white)
- PIN 21 - Rear brake (N.O.) (yellow/pur-
ple)
- PIN 22 - Rear brake (N.C.) (brown/
green)
- PIN 23 - Hazard (grey/white)
- PIN 24 - Ground (blue/green)
- PIN 25 - Ground (blue/green)
- PIN 26 -
- PIN 27 - Front right indicator (red/
black)
- PIN 28 - Right rear indicator (red)
- PIN 29 - Front left indicator (light blue/
black)
- PIN 30 - Rear left indicator (light blue)
- PIN 31 - Fuel reserve (green/black)
- PIN 32 - CAN L (cable X1)
- PIN 33 - CAN H (cable X2)
- PIN 34 - Sensor ground (blue/black)

NOTE**ONLY FOR E5 VEHICLES**

Instrument cluster - Pin-out key:

- PIN 1 - Left handgrip (brown)
- PIN 2 - Aerial A (grey)
- PIN 3 - Aerial B (grey)
- PIN 4 - Petrol level (green/grey)
- PIN 5 - Air temperature (pink)
- PIN 6 - UP command (white/pink)
- PIN 7 - Lights relay (yellow/blue)
- PIN 8 -
- PIN 9 - Battery positive (green/red)
- PIN 10 - Right handgrip (brown)
- PIN 11 - DRL input (green/orange)
- PIN 12 - SET command (orange)
- PIN 13 -
- PIN 14 - High beam (white)
- PIN 15 - Down command (yellow)
- PIN 16 - Key positive (red/black)
- PIN 17 - Battery positive (green/red)
- PIN 18 -
- PIN 19 -
- PIN 20 - Front brake (N.C.) (blue/green)
- PIN 21 -
- PIN 22 - Rear brake (N.C.) (blue/green)
- PIN 23 - Hazard (grey/white)
- PIN 24 - Ground (blue/green)
- PIN 25 - Ground (blue/green)
- PIN 26 -
- PIN 27 - Front right indicator (red/white)
- PIN 28 - Right rear indicator (red)
- PIN 29 - Front left indicator (light blue/black)
- PIN 30 - Rear left indicator (light blue)
- PIN 31 - Fuel reserve (green/black)
- PIN 32 - CAN L (cable X1)



- PIN 33 - CAN H (cable X2)
- PIN 34 - Sensor ground (blue/black)

Instrument cluster - Info:

- Hardware version / Hardware version
- Boot version / Boot version
- Software version / Software version
- Software name / Map identifier

Instrument cluster - Parameters:

- Stored keys number / Stored keys number
- Total equivalent mileage / Total equivalent mileage
- Present equivalent mileage / Equivalent kilometres from the last service
- Mileage to maintenance / Remaining kilometres to the next service
- Derating index / Oil Derating index

Instrument cluster - Status:

- High lamp status - Powered / Not powered
- JU Status - Pressed / Released / Fault
- JD Status - Pressed / Released / Fault
- JC Status - Pressed / Released / Fault
- DRL lamp status - Powered / Not powered
- Oil sensor input status - Powered / Not powered
- Indicator left - Pressed / Released / Fault
- Indicator right - Pressed / Released / Fault
- Indicator reset - Pressed / Released / Fault
- HHG set - Pressed / Released / Fault
- Cruise up - Pressed / Released / Fault
- Cruise down - Pressed / Released / Fault
- Cruise set - Pressed / Released / Fault
- Brake switch front - Pressed / Released / Fault
- Brake switch rear - Pressed / Released / Fault

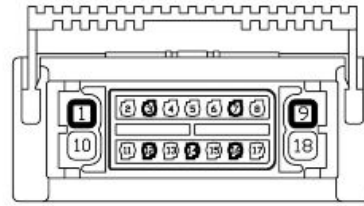
Instrument cluster - Activation and settings:

- Coupon reset service / Service coupon reset
- Code reset service / User code reset
- Key reset service / Keys Reset
- Odometer set service / Odometer coding

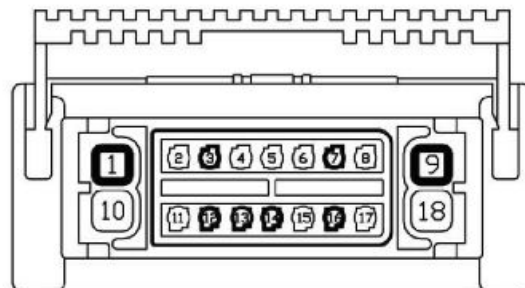
ABS Modulator**NOTE**

ONLY FOR E4 VEHICLES**ABS ECU - Pin-out key:**

- PIN 1 -
- PIN 2 - H CAN line (high speed)
- PIN 3 -
- PIN 4 - Key input
- PIN 5 - Serial line K for diagnostics
- PIN 6 - Rear speed sensor signal
- PIN 7 -
- PIN 8 - Front speed sensor signal
- PIN 9 -
- PIN 10 - Ground
- PIN 11 - CAN L line (low speed)
- PIN 12 -
- PIN 13 - Vehicle Identification
- PIN 14 -
- PIN 15 - Rear speed sensor ground
- PIN 16 -
- PIN 17 - Front speed sensor ground
- PIN 18 - Battery power supply

**NOTE****ONLY FOR E5 VEHICLES****ABS ECU - Pin-out key:**

- PIN 1 -
- PIN 2 - H CAN line (high speed)
- PIN 3 -
- PIN 4 - Key input
- PIN 5 - Serial line K for diagnostics
- PIN 6 - Rear speed sensor signal
- PIN 7 -
- PIN 8 - Front speed sensor signal
- PIN 9 -
- PIN 10 - Ground
- PIN 11 - CAN L line (low speed)
- PIN 12 -
- PIN 13 -
- PIN 14 -
- PIN 15 - Rear speed sensor ground



- PIN 16 -
- PIN 17 - Front speed sensor ground
- PIN 18 - Battery power supply

ABS Modulator - Parameters:

- Front wheel sensor / Indicates front wheel speed
- Rear wheel sensor / Indicates rear wheel speed

ABS Modulator - Activation and settings:

- ABS light / ABS light activation
- ECU encoding / ECU encoding

5DD3 ABS ECU - ECU software errorError cause

- Possible control unit fault

Troubleshooting

- Replace the ABS control unit

5DF0 ABS ECU - Faulty recirculation pumpError cause

- Possible control unit fault

Troubleshooting

- Replace the ABS control unit

5DF1 ABS ECU - Recirculation pump connectionError cause

- Possible control unit fault

Troubleshooting

- Replace the ABS control unit

5DF2 ABS ECU - ECU hardware errorError cause

- Possible control unit fault

Troubleshooting

- Replace the ABS control unit

5DF5 ABS ECU - Hardware error in the ECUError cause

- Possible control unit fault

Troubleshooting

- Replace the ABS control unit

5DF3 ABS ECU - Low electrical voltage / long detectionError cause

- Too low voltage detected for 30 seconds to PIN 18 of the ABS control unit

Troubleshooting

- Possible fault at voltage regulator / battery discharge

5DF4 ABS ECU - Low electrical voltageError cause

- Insufficient high voltage detected at PIN 18 of ABS ECU.

Troubleshooting

- Check that the PIN 18 of the ABS control unit and the connection of the fuse are not oxidised, if not ok restore; if ok check the integrity of the orange/red cable on the ABS control unit side and the red cable on the battery side, restore if not OK.

5DF7 ABS ECU - High electrical voltageError cause

- Excessive high voltage detected at PIN 18 of ABS ECU.

Troubleshooting

- Probable fault to the voltage regulator

5E59 ABS ECU - Incorrect control unit encodingError cause

- Inconsistency detected between memory coding (INFO ECU/Vehicle code) and what is measured at wiring harness identification PIN (INFO ECU screen, Vehicle identification line - Pins status of ABS control unit)

Troubleshooting

- -

F0CB ABS ECU - Check failed PIN code due to low voltage on KL30 or IGNError cause

- -

Troubleshooting

- -

Can line**Function**

Allows communication between injection ECU, instrument cluster, ABS ECU, left light switch, GMP/tyre pressure provision, OBD connector

Operation / Operating principle

A CAN line (Controller Area Network) is a connection between different electronic devices of a vehicle organised like a computer network (internet). The CAN network significantly simplifies the layout of the electrical system and its overall ground. With this communication line, needless duplication of several sensors present on the motorbike has been obviated. The sensor signals are shared by the two electronic elaboration units (instrument panel and control unit).

- Cable number reduction: The CAN line travels through a twisted cable to several nodes.
- These nodes can also isolate the errors without causing a system breakdown (FaultsConfination).
- Immunity to interference: the signal travels through two cables and the signal reading is differential (voltage difference between the two signals on both cables). If the two signals are disturbed by an external factor, their difference remains unaltered.
- Communication speed: messages travel at a speed of 250 kbps (data arrive at nodes every 20 ms, i.e. 50 times/second).

CAN PROTOCOL (CONT. NETWORK AREA)

The communication protocol is CSMA/CD (Carrier Sense Multiple Access w/ Collision Detection).

In order to transmit, every nod must first check that the BUS (the connection among all devices) is free before attempting to send a message with BUS (Carrier Sense).

If during this period there is no activity on BUS, every nod has the same chance to send a message (Multiple Access). If two nodes start transmitting simultaneously, the nodes recognise the "collision" (Collision Detection) and initiate an exchange action based on message priority (messages remain unaltered during exchange and there is no delay for high priority messages).

CAN protocol is based on messages and not on addresses. The message itself is divided into several parts (frames), each of which has a meaning: message priority, data contained, error detection, reception confirmation, etc.

Every network nod receives all the messages sent through the BUS (with reception confirmation or error messages) and each nod decides if the message is to be processed or rejected. Besides, every nod can request information from the other nodes (RTR = Remote Transmit Request).

Level in electrical circuit diagram

CAN Line

Pin-out

- Between PIN 66 and 80 of the engine control unit
- Between PIN 32 and 33 of the instrument panel
- Between PIN 2 and 11 of the ABS control unit
- Between PIN 3 and 4 of the left light switch
- Between PIN 3 and 4 GMP/tyre pressure provision
- Between PIN 5 and 2 OBD connector

Error code B0008 (ALARM DISCONNECTED)

Error cause

- Occurs during the encoding of the first key connection, if the CAN line from the engine control unit is missing, the error is activated

Identification

- General alarm warning continuously on (red) and indication "ALARM DISCONNECTED" on the display

Troubleshooting

- Check the integrity and the continuity of the cables of the CAN line between PIN 32 instrument cluster and PIN 66 injection control unit and between PIN 33 instrument cluster and PIN 80 injection control unit
- Further check that in the CAN line is no continuity with the vehicle mass or with positive

Error code B0009 (ALARM DISCONNECTED)Error cause

- The instrument cluster is not able to send data on the CAN line

Identification

- General alarm warning continuously on (red) and indication "ALARM DISCONNECTED" on the display

Troubleshooting

- Check the integrity, the continuity and the absence of the cables of the CAN line between PIN 32 instrument cluster and PIN 66 injection control unit and between PIN 33 instrument cluster and PIN 80 injection control unit
- Further check that in the CAN line is no continuity with the vehicle mass and with positive

Error code B0300 (ALARM DISCONNECTED)Error cause

- Occurs during the encoding of the first key connection, if the CAN line from the left light switch control is missing, the error is activated

Identification

- General alarm warning continuously on (red) and indication "ALARM DISCONNECTED" on the display

Troubleshooting

- Check that there is no continuity between the two cables of the CAN line; if not OK restore, if OK check the integrity and the continuity between PIN 32 instrument cluster and PIN 4 left light switch; if not OK restore, if OK check the integrity and the continuity between PIN 33 instrument cluster and PIN 3 left light switch; if not OK restore, if OK check that the CAN lines are not in continuity with the vehicle ground or with positive

P1800 Rear wheel radius learning diagnostic

Functional diagnostic:

- CAN error while learning / Signal not plausible.

Error cause:

- In case of CAN error during acquisition, system warns that the procedure can not be completed due to a communication problem on the CAN line.
- If the signal is not plausible, there was a transcription error of the value of the rear wheel radius from the non volatile memory (EEPROM) to the volatile memory (RAM) at key ON. In this case the default value is used.

This error is indicated by lighting up in a fixed manner the MI warning light

NOTE

THIS ERROR DISABLES THE TRACTION CONTROL.

U001 CAN line without signals**Electrical diagnostic:**

- Bus Off.

Error cause:

- No communication on CAN line (PIN 66 and/or PIN 80): problem on the whole network (for example, positive cut-off or short circuited or shorted to ground).

This error is indicated by lighting up in a fixed manner the MI warning light.

Troubleshooting:

- check the Marelli control unit VEHICLE connector and the engine-vehicle cable harness connector: if not OK, restore; if OK, check the ground insulation of the two CAN lines from PIN 66 and PIN 80 of the VEHICLE connector: if not OK, restore cable harness; if OK, check the continuity of the CAN lines from Marelli control unit VEHICLE connector to the instrument cluster connector, or to the left light switch connector, or to the ABS modulator connector: if not OK, restore the cable harness; if OK, check that the lines are not shorted to positive testing each of the 5 connectors (Marelli control unit, engine-vehicle cable harness connector and instrument cluster connector, the left light switch connector, or to the ABS modulator connector) with 1 connector disconnected at a time and by setting the key to ON: If not OK, restore; if OK, replace the Marelli control unit.

NOTE

THE PRESENCE OF THIS ERROR DETERMINE THE DEACTIVATION OF THE TRACTION CONTROL AND THE CRUISE CONTROL.

U0121 ABS ECU "NODE ABSENT"**Functional diagnostic:**

Missing signal / invalid signal / config. error.

Error cause:

- Missing communication of the ABS control unit to the CAN line

This error is indicated by lighting up in a fixed manner the MI warning light

Troubleshooting:

- Disconnect the ABS control unit connector and check that there is no dirty, oxidised or damaged PIN; if not ok restore, if ok check continuity between PIN 2 and PIN 11 ABS control unit and PIN 66 and PIN 80 Marelli VEHICLE control unit; if not ok restore, if ok check continuity between PIN 2 and PIN 11 ABS control unit and PIN 32 and PIN 33 of the instrument cluster; if not ok restore, if ok check continuity between PIN 2 and PIN 11 ABS control unit and PIN 3 and PIN 4 of the left light switch; if not ok restore, if ok check that there is no continuity between the two cables of the CAN line (L and H); if not ok restore, if ok check that there is no continuity between vehicle ground and the battery positive; if not ok restore, if ok replace the ABS control unit.

NOTE

THE PRESENCE OF THIS ERROR DETERMINE THE DEACTIVATION OF THE TRACTION CONTROL AND THE CRUISE CONTROL.

5E11 CAN line - Bus offError cause

- Electric malfunction. Open circuit, short circuit to negative, short circuit to positive of one or both wires of CAN line

Troubleshooting

- Replace the wiring harness
-

INDEX OF TOPICS

VEHICLE ENGINE

V ENG

Vehicle preparation

IMPORTANT

TO CARRY OUT THE MAINTENANCE OPERATIONS AND IF THERE IS THE NEED TO RAISE THE VEHICLE, USE A SCISSOR LIFT PLACED IN CORRESPONDENCE WITH THE OIL SUMP. IN ORDER TO AVOID DAMAGING THE SUMP, REMOVE THE SUMP GUARD BEFORE USING THE SCISSOR LIFT.

Before removing the engine from the vehicle, the following operations must be carried out:

- Position a scissor lift on the oil sump under the vehicle (WARNING: REMOVE THE SUMP GUARD BEFORE HAND);
- Remove the battery, the fuel tank, the rider footrest plates, the side stand, the complete exhaust system, the rear shock absorber and the side panels

Removing the engine from the vehicle

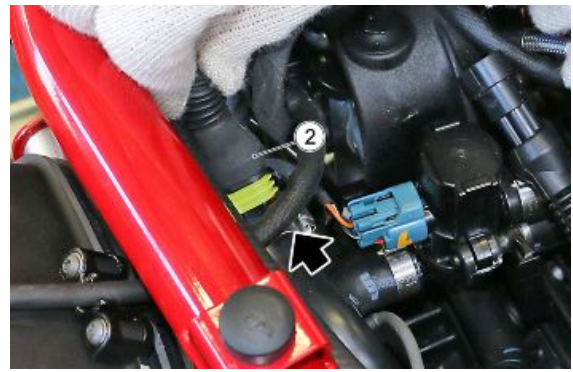
- Disconnect the connector (1)



- Disconnect the connector (2)



- Free the connector (2) from the wiring harness as illustrated in the figure



- Disconnect the connector (3)



- Unscrew and remove the screws (4)



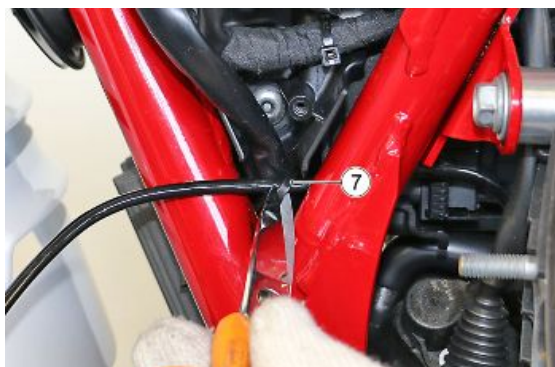
- Remove the left headstock cover (5)



- Disconnect the connector (6)

NOTE**ONLY FOR E4 VEHICLES**

- Remove the clamp (7)

NOTE**ONLY FOR E4 VEHICLES**

- Unscrew and remove the screws (8)



- Remove the connectors box (9)



- Unscrew and remove the screws (10)



- Remove the injector cover (11)



- Undo and remove the screw (12)



- Remove the left injector (13)



- Remove the clamp (14)



- Unscrew and remove the screws (15)



- Remove the left intake fitting (16)
- Repeat the operations from "11" to "17" to remove the right inlet fitting



- Unscrew and remove the screws (17)



- Remove the starter motor cover (18)



- Lift the protective boot (19)



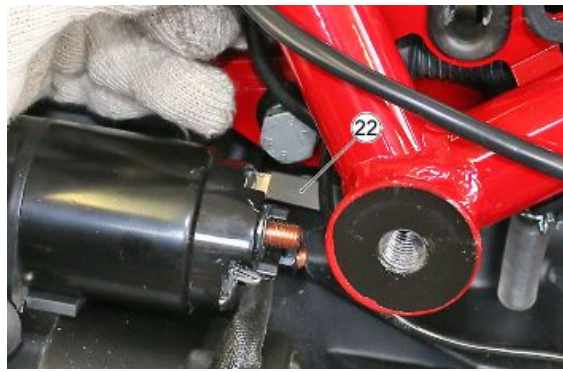
- Unscrew the nut (20) and remove it.



- Remove the cable (21)



- Disconnect the connector (22)



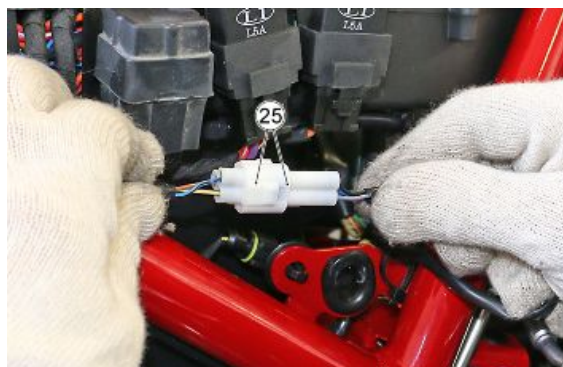
- Unscrew and remove the screws (23)



- Remove the starter motor (24).



- Disconnect the connector (25)



- Unscrew the nut (26) and remove it.
- Remove the cable (27) and (28)



- Unscrew and remove the screw (29)



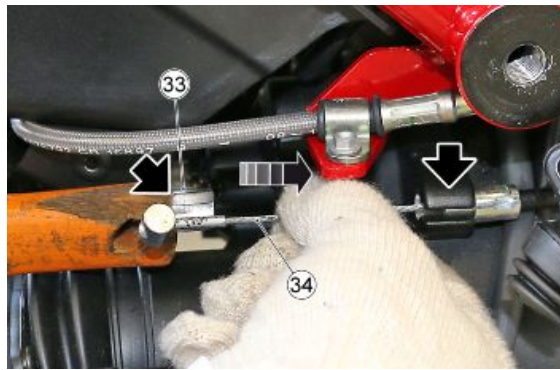
- Remove the oil pressure bulb cover (30)



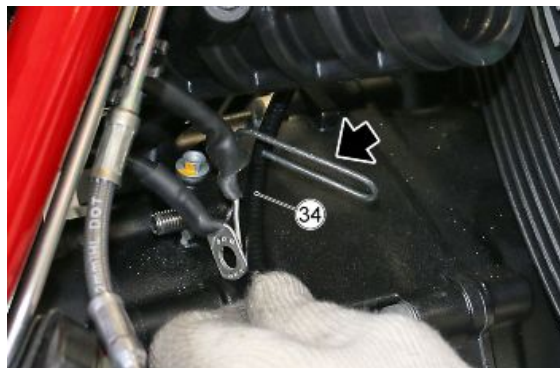
- Unscrew and remove the screw (31)
- Remove the cable (32) from the oil pressure bulb



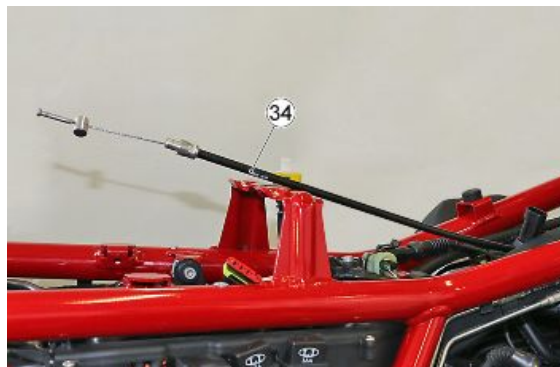
- Press the lever (33) toward the front part of the vehicle, as illustrated in the figure, to eliminate the tension to which the clutch cable is subjected
- Simultaneously slide out and remove the clutch cable (34) from the points indicated in the figure



- Remove the clutch cable (34) from the cable grommet as indicated in the figure



- Remove the clutch cable (34) from the engine and frame area



- Disconnect the connector (35) located on the right side of the vehicle



NOTE
ONLY FOR E4 VEHICLES

- Disconnect the connector (35) located on the left side of the vehicle

NOTE**ONLY FOR E5 VEHICLES**

- Unscrew and remove the screws (36)



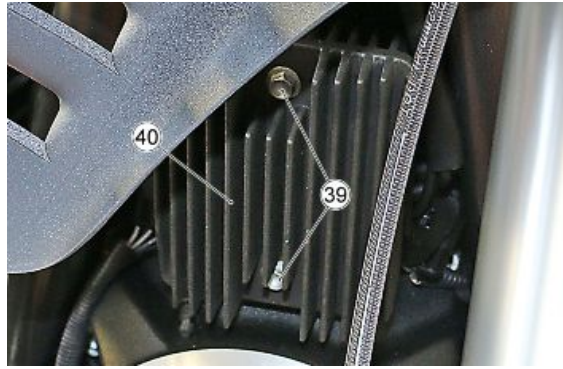
- Remove the cover (37).



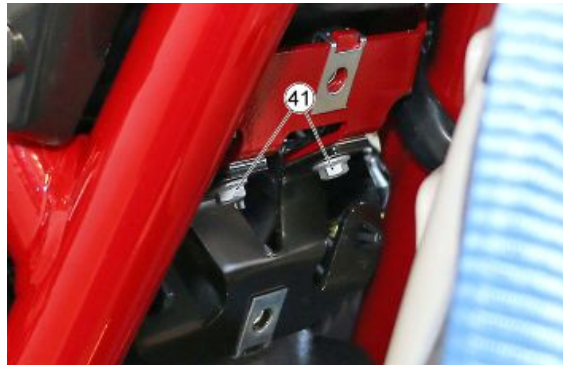
- Disconnect the spark plug cap (38)



- Unscrew and remove the screws (39)
- Remove the voltage regulator (40) from the frame and place it beside the vehicle



- Unscrew and remove the screws (41)



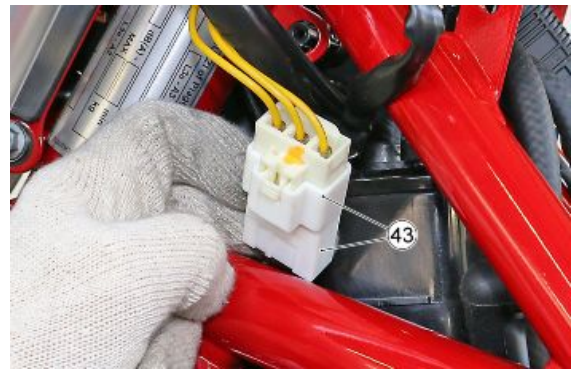
- Remove the voltage regulator support bracket (42)



- Unscrew and remove the screws (44)



- Disconnect the connector (43)



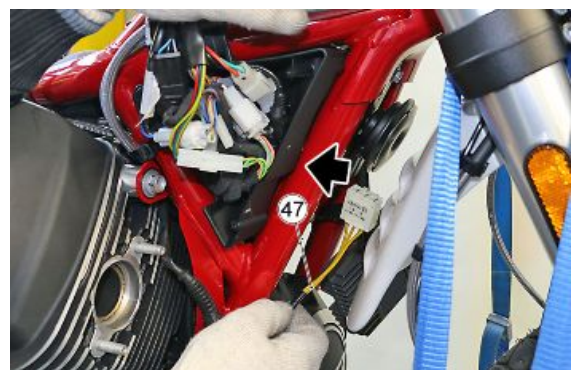
- Unscrew and remove the screws (45)



- Momentarily move the connectors box and remove the clamp (46)



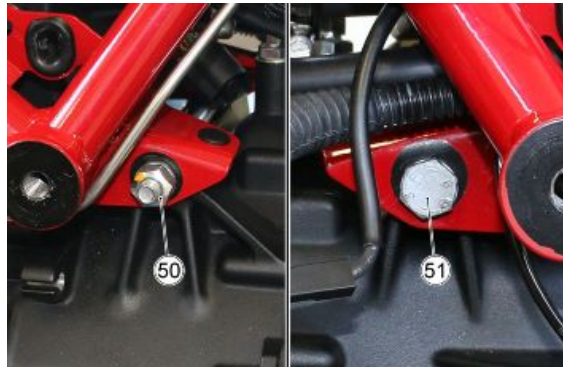
- Keeping the connectors box moved, remove the cable (47) from the chassis area
- Remove the rear wheel
- Remove the swingarm
- Remove the cardan shaft



- Remove the pipe feedthrough (48)
- Disconnect the secondary air pipes (49)



- Blocking the pin (51)
- Unscrew the nut (50) and remove it.
- Remove the pin (51)



- Unscrew and remove the screws (52)



- Unscrew and remove the screws (53)



- Retrieve the washer (54)



- Retrieve the washer (55)



- Secure the engine (56) so that it does not fall and then lift the vehicle's chassis using a hydraulic jack, so that it is separated from the engine



INDEX OF TOPICS

ENGINE

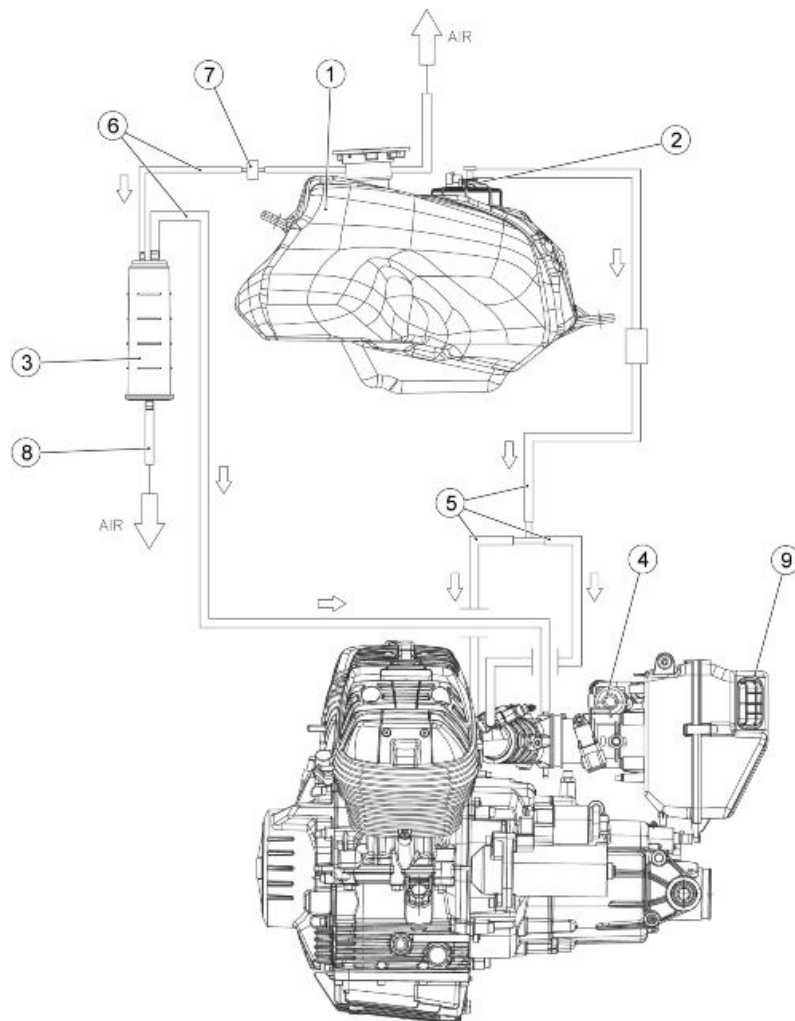
ENG

TO CONSULT THE CHAPTER ABOUT THE ENGINE AND ITS COMPONENTS PLEASE REFER TO THE APPROPRIATE MANUAL: "MSS Engine V85"

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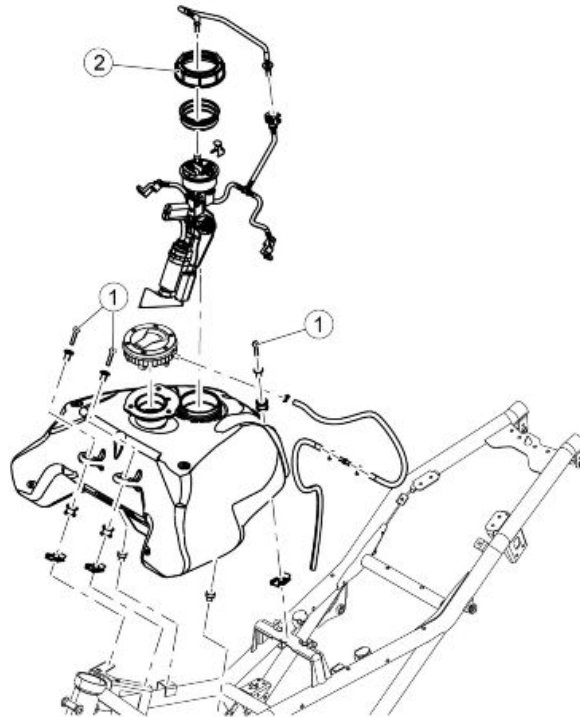
FUEL SUPPLY

FUE

Circuit diagram**Key:**

1. Fuel tank
 2. Fuel pump
 3. Canister
 4. Throttle body
 5. Fuel delivery pipes
 6. Fuel vapour recovery pipe
 7. Check valve
 8. Breather pipe
 9. Intake
-

Fuel pump



FUEL TANK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Screws fastening the fuel tank to frame | M6 | 3 | 10 Nm (7.38 lbf ft) | - |
| 2 | Ring nut fastening the fuel pump to the fuel tank | - | 1 | 20 Nm (14.75 lbf ft) | - |

Removing

- Remove the fuel tank
- Remove the side fairings
- Remove the central tank fairing
- Disconnect the connector (1)



- Remove the lock (2)



- Remove the hose (3)



- Unscrew and remove the ring nut (4)



- Remove the fuel pump (5)



FILTER REPLACEMENT

- Remove the plastic clamp (A) securing the connector.



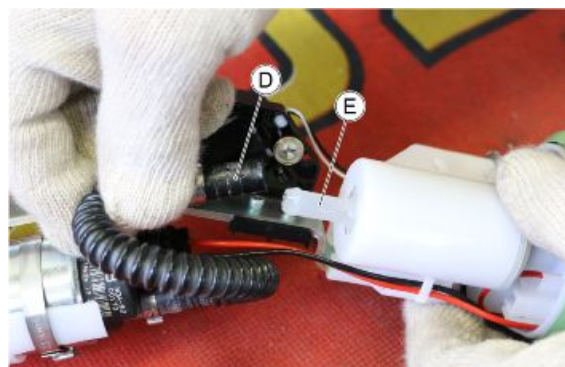
- Disconnect the fuel gauge connector (B).



- Remove the metal collar (C) from the corrugated pipe.



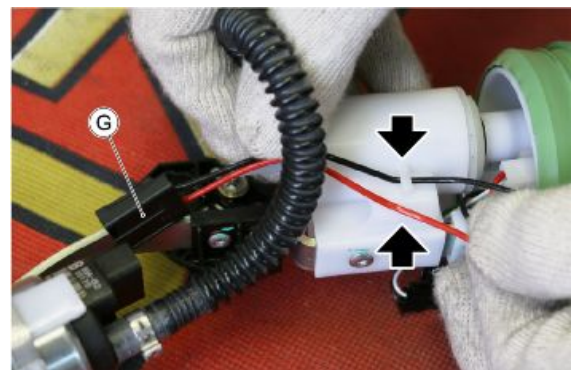
- Remove the corrugated pipe (D) from the filter (E). During the operation, be careful not to damage the fuel level sensor.



- Unscrew the 2 screws (F) between the plastic head and metal bracket



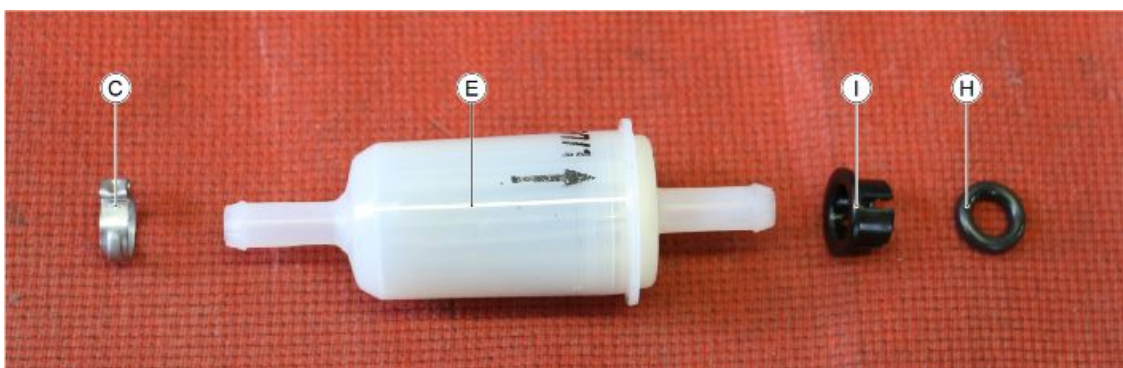
- Disconnect the fuel pump connector (G) and free the wiring harness



- Remove the plastic head from the metal bracket.

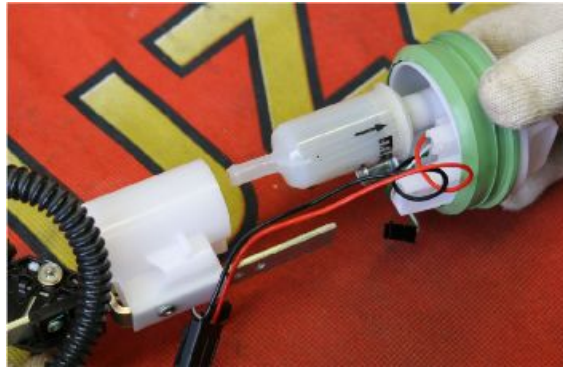


- Replace the filter kit (E) / o-ring (H) / spacer (I) / metal collar (C).



- If the metal plate for fixing the screws had slipped off during the operations, put it back in the appropriate location.

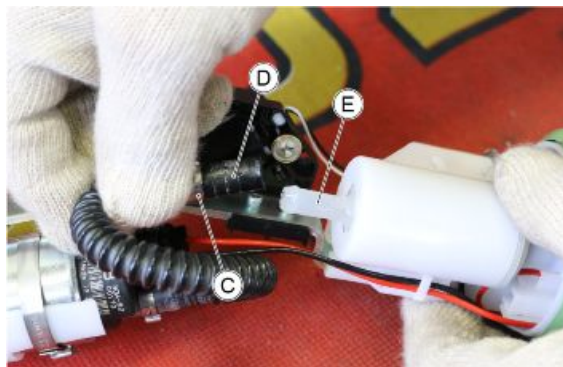
- Insert the spare part kit in the relative seat and then reinsert the bracket into the head



- Proceed by screwing the two screws (F) to block the metal bracket to the head



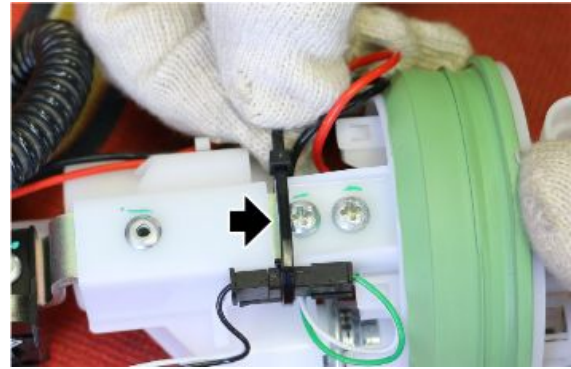
- Insert the metal collar (C) first and then insert the corrugated pipe (D) in the filter shank (E)



- Tighten the metal collar (C) using an appropriate tool.

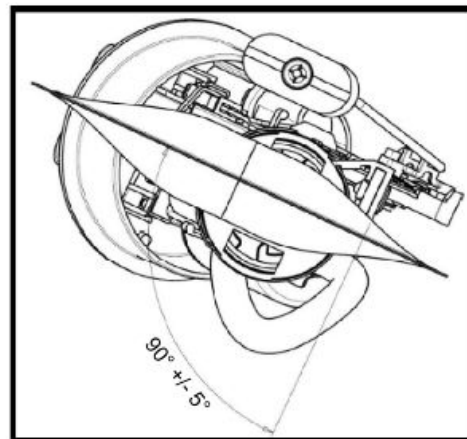
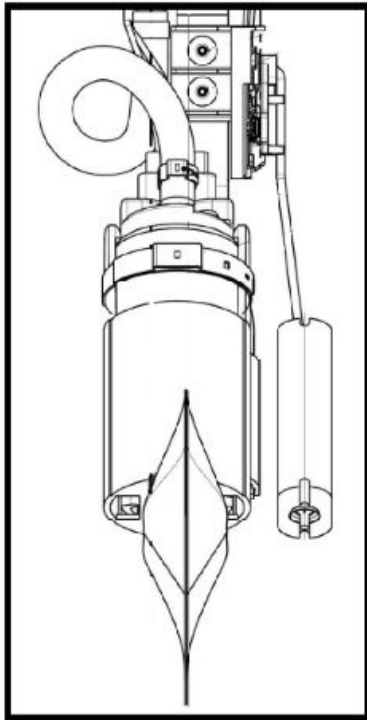


- Secure the connector in the position indicated, using a plastic tie and arrange the cables as shown.



PREFILTER REPLACEMENT

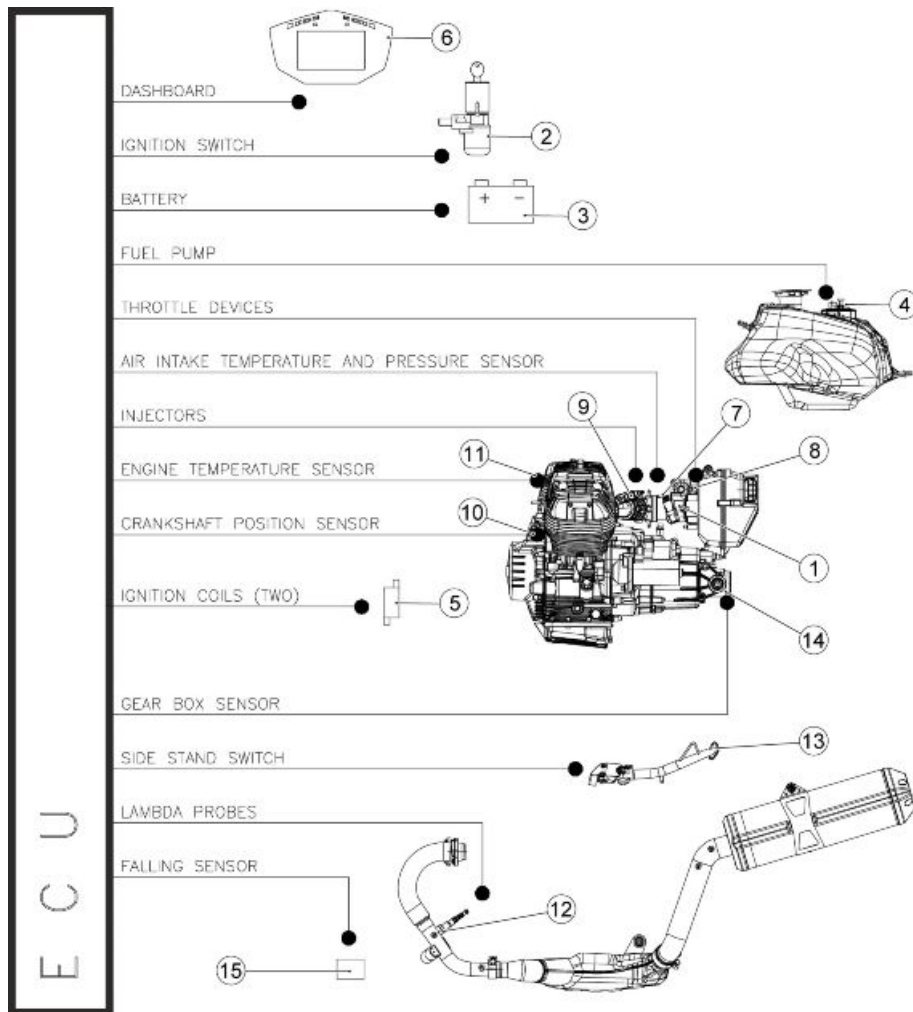
- The prefilter can be replaced manually, without the use of tools. Arrange the prefilter with the angular position indicated in the drawings below



Injection

Diagram

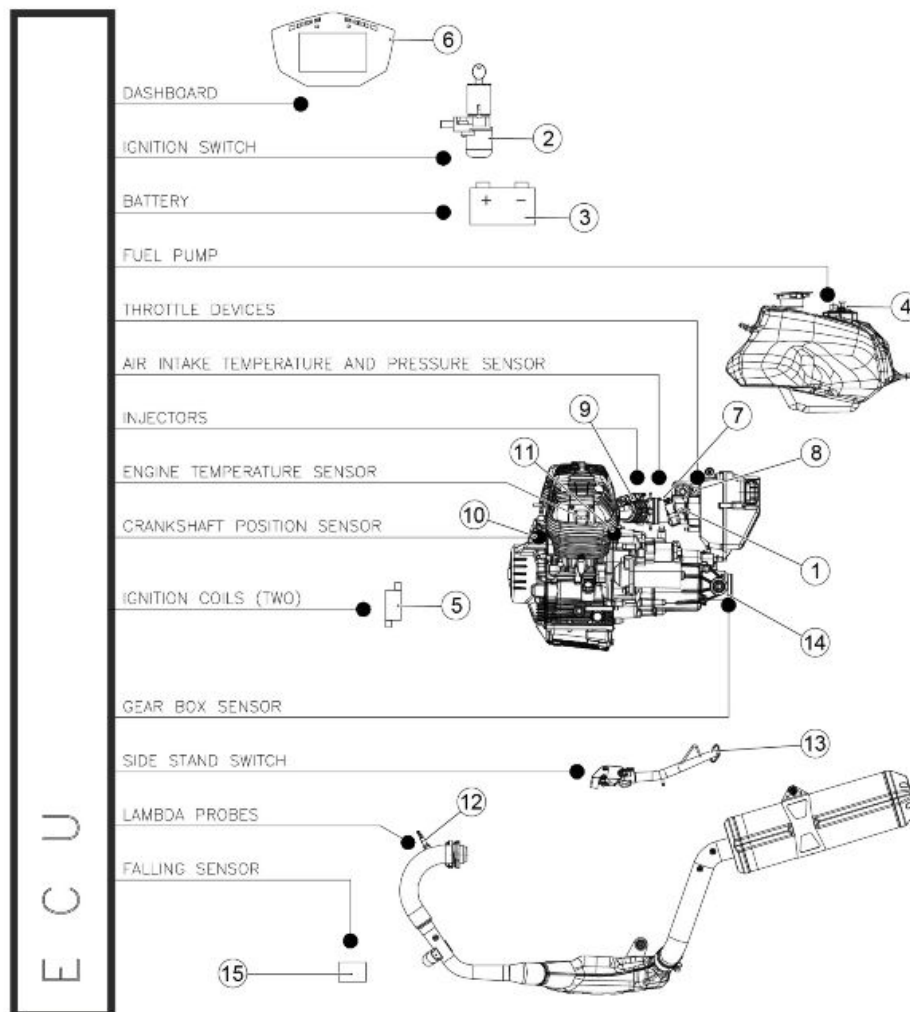
E4 VEHICLES INJECTION SCHEME



Key:

- 1. Control unit position
- 2. Ignition switch
- 3. Battery
- 4. Fuel pump
- 5. Coils
- 6. Instrument cluster
- 7. air temperature sensor
- 8. Throttle valve position sensor
- 9. Injectors
- 10. Crankshaft position sensor
- 11. Engine temperature sensor
- 12. Lambda probe
- 13. Side stand switch
- 14. Gear sensor
- 15. fall sensor

E5 VEHICLES INJECTION SCHEME

**Key:**

1. Control unit position
2. Ignition switch
3. Battery
4. Fuel pump
5. Coils
6. Instrument cluster
7. air temperature sensor
8. Throttle valve position sensor
9. Injectors
10. Crankshaft position sensor
11. Engine temperature sensor
12. Lambda probe

13.Side stand switch

14.Gear sensor

15.fall sensor

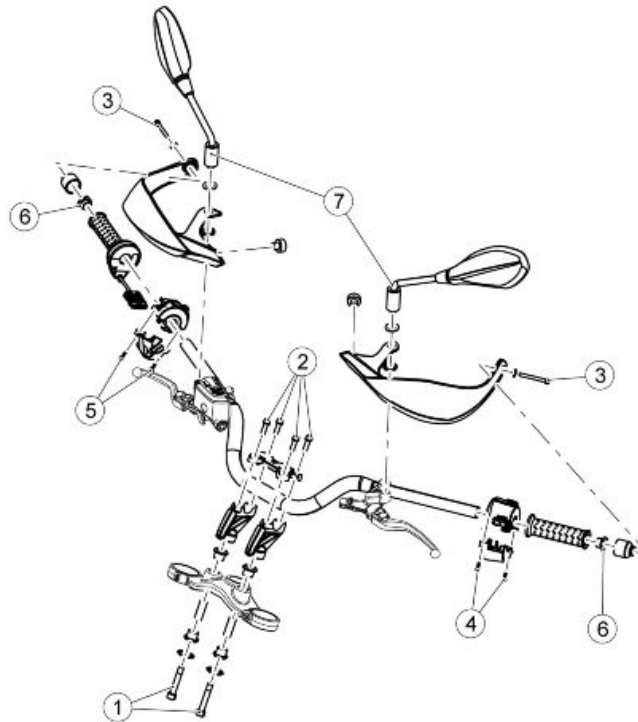
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SUSPENSION SYSTEM

SUS

Front

Handlebar



HANDLEBAR-CONTROLS

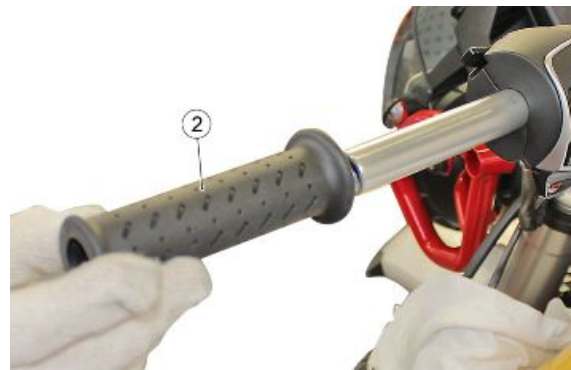
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|--|
| 1 | Screws fastening the lower U-bolts to the upper steering yoke | M10 | 2 | 50 Nm (36.88 lbf ft) | - |
| 2 | Screws fastening the lower U-bolt clamp to the handlebar | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Screws fastening the handguards and anti-vibration weights to the handlebar | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screws fastening the rear left shell to the left control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 5 | Screws fastening the rear right shell to the right control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 6 | Terminal fastening the anti-vibration weight to handlebar | - | 2 | 10 Nm (7.38 lbf ft) | - |
| 7 | Rear view mirror attachment | - | 2 | Manual | - |
| - | Screws fastening the electronic accelerator control to the handlebar | M4 | 1 | 4 Nm (2.95 lbf ft) | Screws pre-mounted on the throttle control |

Removing

- Remove the rear view mirrors
- Remove the handguards
- Remove the front brake pump
- Remove the clutch pump
- Unscrew and remove the bushings (1) from both sides of the vehicle



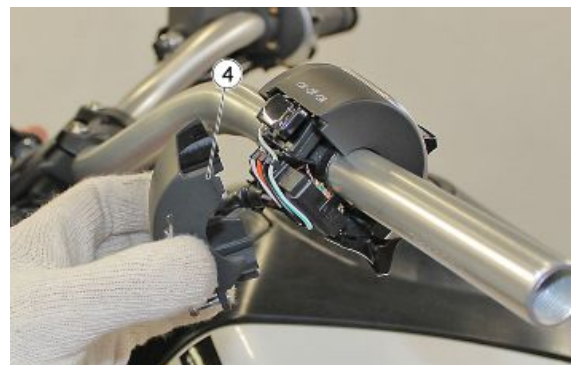
- Remove the left hand grip (2)



- Unscrew and remove the screws (3)



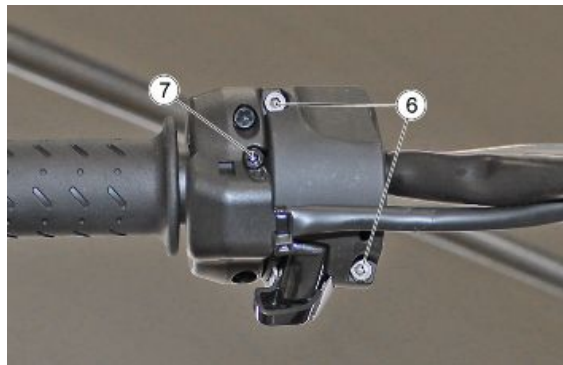
- Remove the left-hand lights switch cover (4)



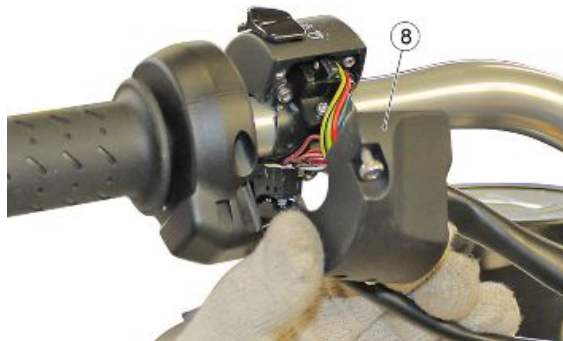
- Loosen the two screws (5)



- Unscrew and remove the screws (6)
- Loosen the screw (7)



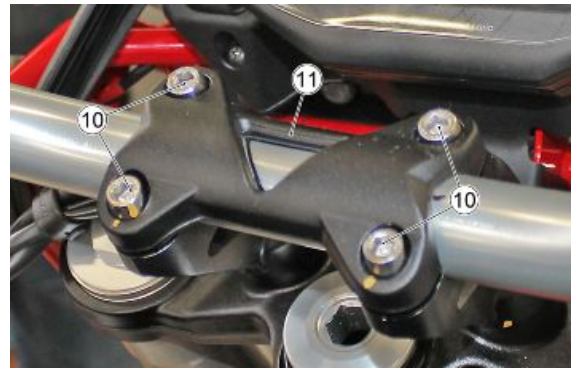
- Remove the right-hand lights switch cover (8)



- Loosen the screws (9)



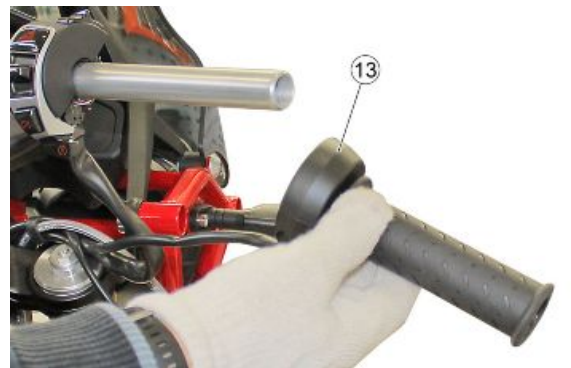
- Unscrew and remove the screws (10)
- Remove the U-bolt (11)



- Support the handlebar
- Remove the left-hand lights switch from the handlebar (12)



- Remove the throttle control from the handlebar (13)



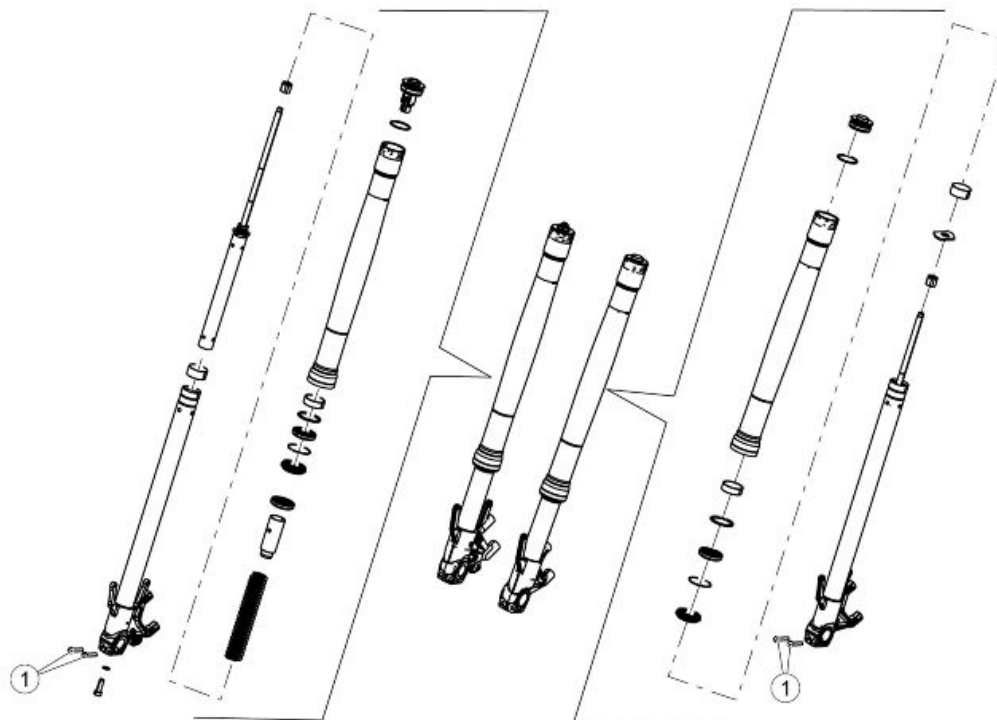
- Remove the right-hand lights switch from the handlebar (14)



- Remove the handlebar (15)

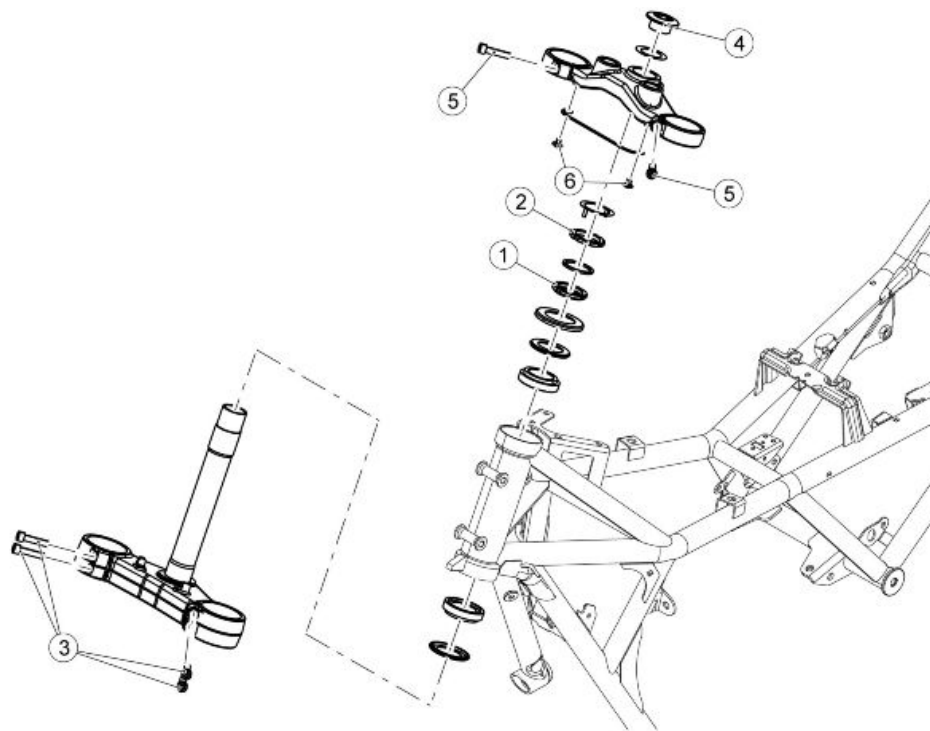


Front fork



FRONT FORK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws fastening the calliper mounting bracket to the wheel axle | M6 | 4 | 10 Nm (7.38 lbf ft) | - |



STEERING

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|-----------------------|--|
| 1 | Ring nut fastening the bottom yoke/steering pin assembly to the headstock | - | 1 | - | First tightening torque 60 Nm (44.25 lbf ft) - Second tightening torque 30 Nm +/- 5 Nm (22.13 +/- 3.69 lbf ft) |
| 2 | Counter-lock ring fastening the bottom yoke/steering pin assembly to the headstock | - | 1 | - | Manual |
| 3 | Screw fastening the fork stanchions to the lower steering yoke | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 4 | Top steering yoke fastener bush | - | 1 | 100 Nm (73.76 lbf ft) | - |
| 5 | Screw fastening the fork stanchions to the upper steering yoke | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| 6 | Screws fastening the cable gland to the upper steering yoke | M6 | 2 | 10 Nm (7.38 lbf ft) | - |

Removing the fork legs

IMPORTANT



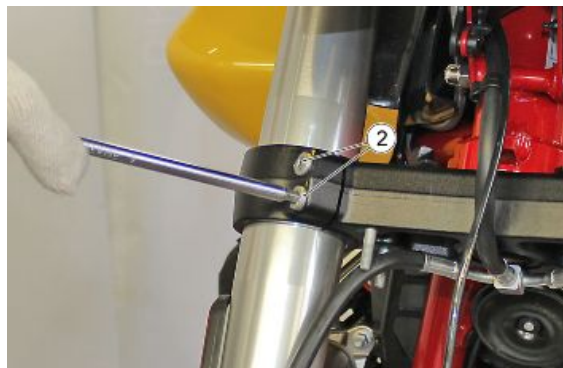
TO CARRY OUT THE MAINTENANCE OPERATIONS AND IF THERE IS THE NEED TO RAISE THE VEHICLE, USE A SCISSOR LIFT PLACED IN CORRESPONDENCE WITH THE OIL SUMP. IN ORDER TO AVOID DAMAGING THE SUMP, REMOVE THE SUMP GUARD BEFORE USING THE SCISSOR LIFT.

The following procedure is described for a single fork stanchion, but is valid for both stanchions.

- Remove the front mudguard
- Remove the front wheel
- Loosen the screw (1)



- Loosen the two screws (2)



- Remove the fork stanchion (3)



Disassembling the fork

NOTE

THE STEMS ARE NOT THE SAME, THEREFORE THEY REQUIRE SEPARATE REMOVAL PROCEDURES.

THE FOLLOWING OPERATIONS APPLY WHEN REMOVING THE RIGHT HAND STEM

- Taking care not to damage it, secure the fork vertically in a vice, using the appropriate protection devices.
- Unscrew the upper cap (1).



Special tools

AP8140149 Guard for assembly operations

- Using the special tool (2), fastened to the pre-loading pipe (3), compress the spring and, with the assistance of a second operator, insert the separator plate (4) under the cap retaining nut (5).



Special tools

020888Y Pre-load tube clamp

AP8140148 Plunger-spacer separator plate

- Ensure that the cap (1) cannot rotate, and then loosen the nut (5).



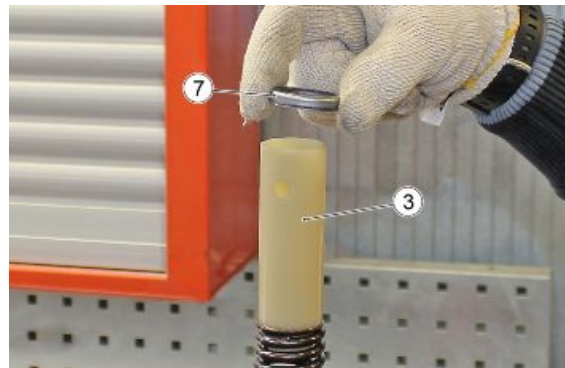
- Unscrew and remove the cap (1).



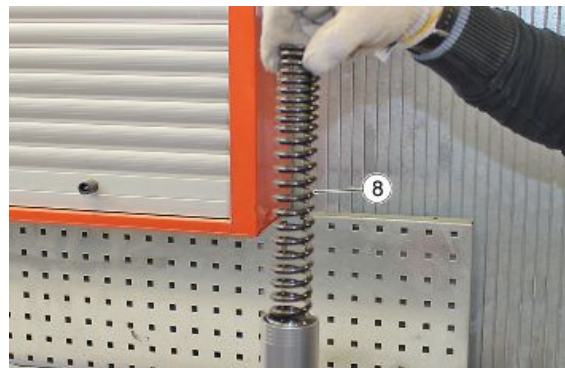
- Extract the shaft (6) and remove it.



- After removing the locking plate and the device used to compress the spring, remove the upper plate (7) and the pre-loading pipe (3).



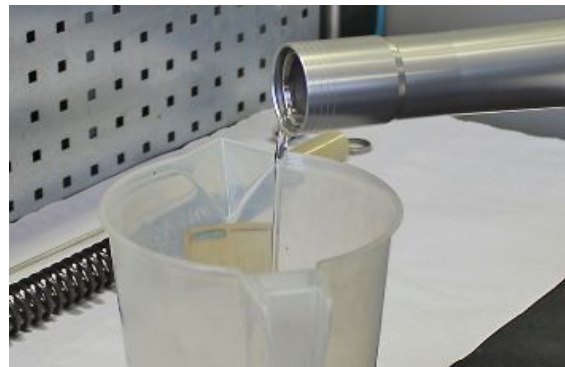
- Remove the spring (8) allowing the oil inside the stem to drip out.



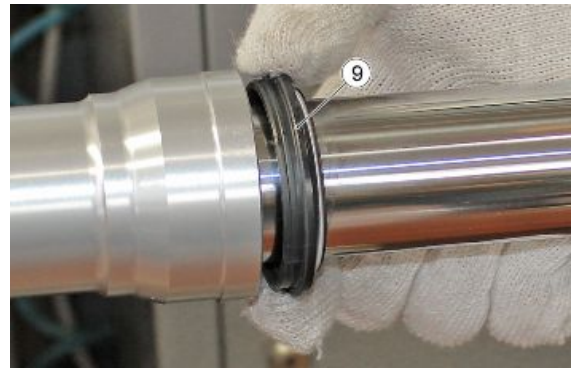
- Drain the oil into a container having sufficient capacity, extending the stan-
chion several times in order to ensure
the oil is drained completely.



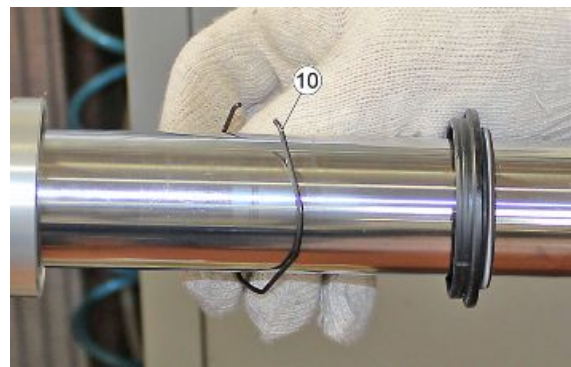
**DO NOT DISPOSE OF OIL IN THE ENVIRONMENT.
DISPOSE OF ENGINE OIL IN A SEALED CONTAINER AND
TAKE IT TO YOUR SUPPLIER OR TO THE NEAREST USED
OIL COLLECTION CENTRE.**



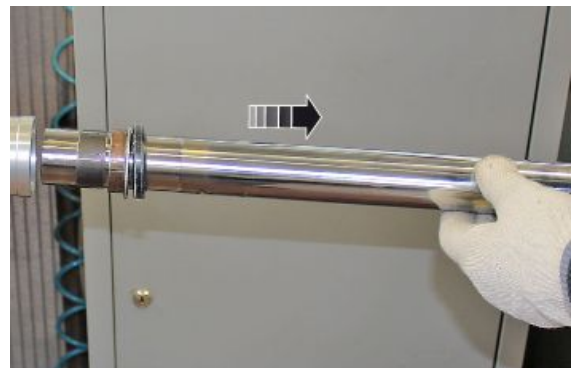
- Taking care not to damage it, secure the sleeve horizontally in a vice, using the appropriate protection devices.
- Extract the dust guard (9).

Special tools**AP8140149 Guard for assembly operations**

- Remove the seeger ring (10) from inside the sleeve.



- Pull the stem repeatedly towards yourself in order to remove it from the sleeve.



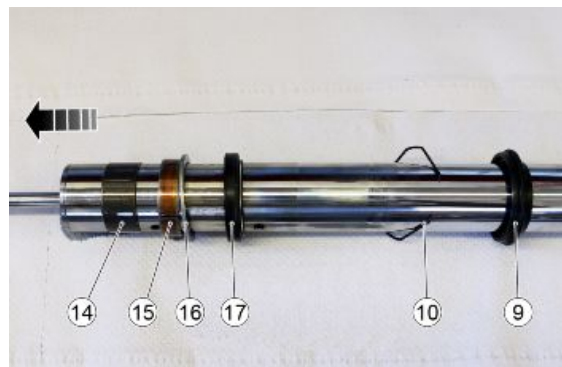
- Secure the stem in a vice and remove the plunger fastening screw (11), taking care not to lose the copper washer (12).



- Remove the complete plunger (13).



- Observing the indicated sequence, extract and remove the slider bushing (14), the guide bushing (15), the ring (16), the oil seal (17), the seeger ring (10) and the dust guard (9).



THE FOLLOWING OPERATIONS APPLY WHEN REMOVING THE RIGHT HAND STEM

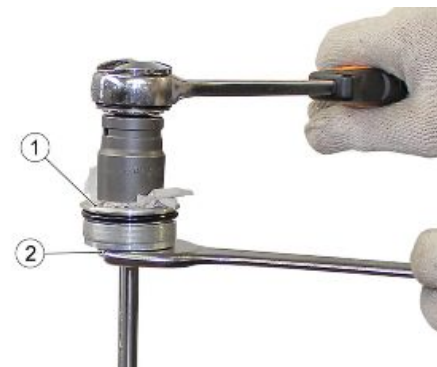
- Taking care not to damage it, secure the fork vertically in a vice, using the appropriate protection devices.
- Unscrew the upper cap (1).



Special tools

AP8140149 Guard for assembly operations

- Ensure that the cap (1) cannot rotate, and then loosen the special nut (2).



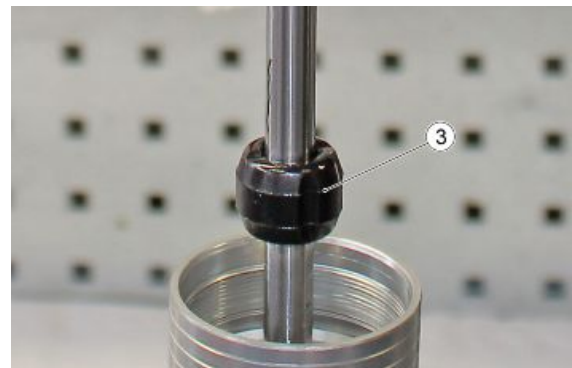
- Unscrew and remove the cap (1).



- Unscrew the special nut (2) and remove it.



- Remove the buffer (3).



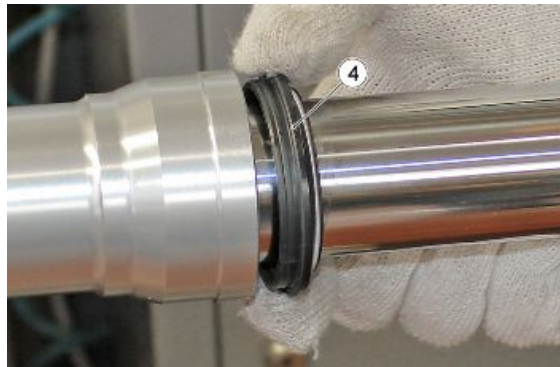
- Drain the oil into a container having sufficient capacity, extending the stanchion several times in order to ensure the oil is drained completely.



DO NOT DISPOSE OF OIL IN THE ENVIRONMENT. DISPOSE OF ENGINE OIL IN A SEALED CONTAINER AND TAKE IT TO YOUR SUPPLIER OR TO THE NEAREST USED OIL COLLECTION CENTRE.



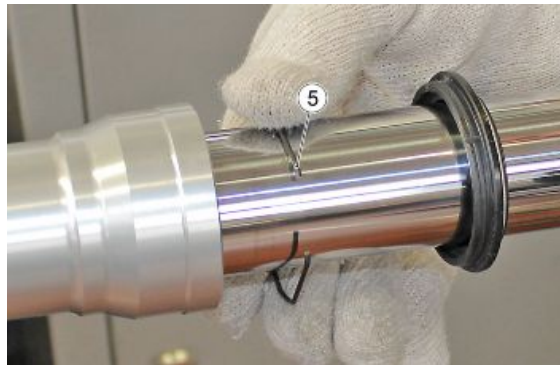
- Taking care not to damage it, secure the sleeve horizontally in a vice, using the appropriate protection devices.
- Extract the dust guard (4).



Special tools

AP8140149 Guard for assembly operations

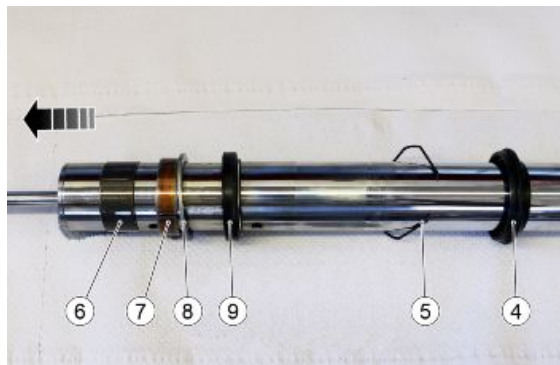
- Remove the seeger ring (5) from inside the sleeve.



- Pull the stem repeatedly towards yourself in order to remove it from the sleeve.



- Observing the indicated sequence, extract and remove the slider bushing (6), the guide bushing (7), the ring (8), the oil seal (9), the seeger ring (5) and the dust guard (4).



Checking the components

stanchion

Check that the sliding surface is not scratched or scored.

Any scoring can be removed by sanding with damp sandpaper (grain 1).

If the scratches are deep, replace the stanchion .

Using a dial gauge, check than any bending of the stanchion is below the limit value.

If it is over the limit, replace the stanchion .

IMPORTANT

A BENT STANCHION SHOULD NEVER BE STRAIGHTENED SINCE ITS STRUCTURE WOULD BE WEAKENED MAKING THE VEHICLE DANGEROUS TO USE.

Characteristic**Bending limit:**

0.2 mm (0.00787 in)

Sleeve

Check for damage and/or cracks; if it is damaged, replace it.

Spring

Check the condition of the spring, making sure that the length is within the acceptable limits.

If not, replace the spring.

MINIMUM LENGTH OF FREE SPRING: ... mm (... in)

Check the condition of the following components:

- slider bushing;
- guide bushing;
- plunger.

If there is evidence of excessive wear or damage, replace the component concerned.

IMPORTANT

REMOVE ANY IMPURITIES FROM THE BUSHINGS, BEING CAREFUL NOT TO SCRATCH THEIR SURFACES.

Replace the following components with new ones:

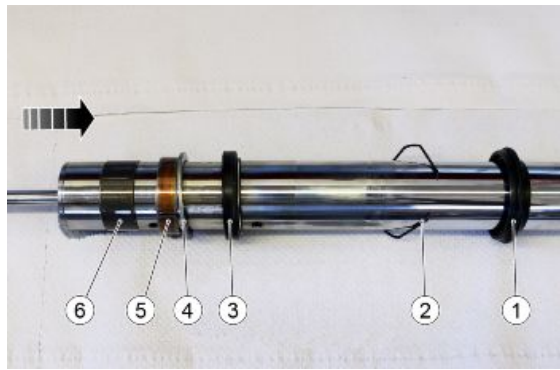
- Oil seal.
- Dust guard.
- - O-ring on the cap.

Reassembling the fork**IMPORTANT**

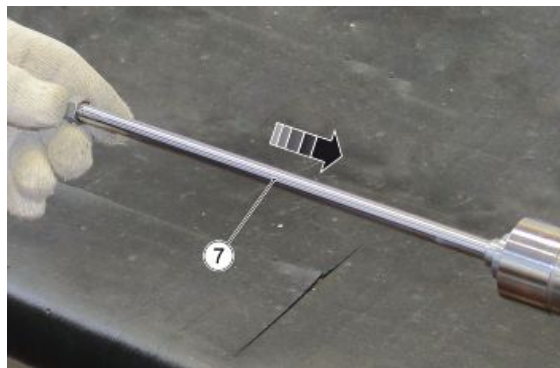
THE STEMS ARE NOT THE SAME, THEREFORE THEY REQUIRE SEPARATE MOUNTING PROCEDURES.

THE FOLLOWING OPERATIONS APPLY WHEN MOUNTING THE RIGHT HAND STEM.

- Observing the indicated sequence, extract and remove the dust guard (1), the seeger ring (2), the oil seal (3), the ring (4), the guide bushing (5) and the slider bushing (6).



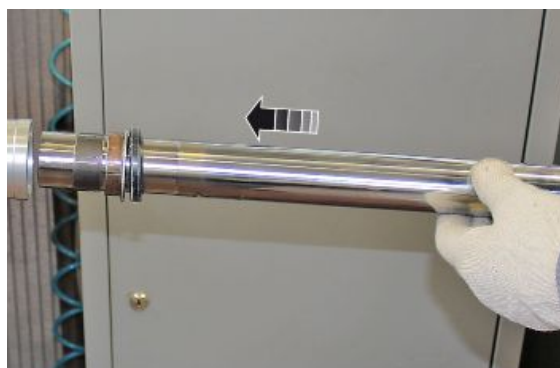
- Insert the complete plunger (7).



- Secure the stem in a vice and, after inserting the screw (8) used to fasten the plunger, complete with the copper washer (9), apply the pre-defined tightening torque.



- - Insert the stem in the sleeve.

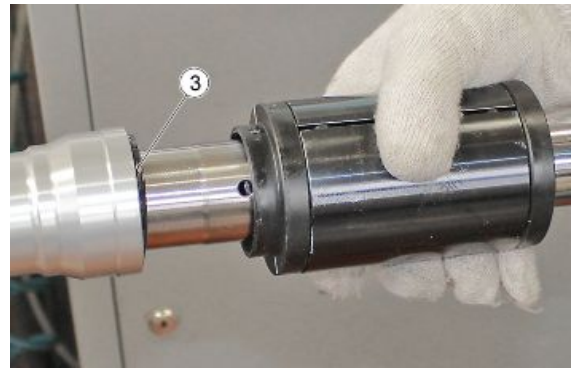


- Using a suitable tool, complete with striking hammer, insert oil seal into its housing (3).

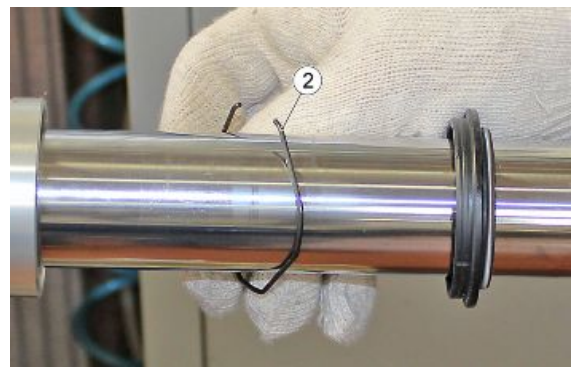
Special tools

AP8140189 Tool for mounting the oil seal for holes with diam. 43 mm (1.69 in)

AP8140146 Weight



- Position the seeger ring (2) inside the sleeve.



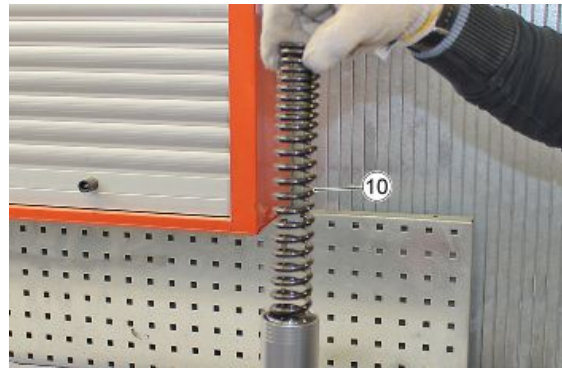
- Insert the dust guard (1) into its housing correctly.



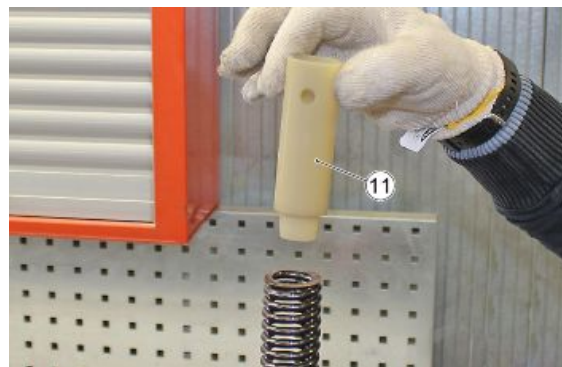
- Place the fork stem vertically on a work surface.
- Fill the stem with the quantity of oil indicated in the "Refilling oil" section.



- Insert the spring (10), making sure that it is aligned correctly. The end where the spirals are more compressed should be facing upwards.



- Insert the pre-load tube (11), making sure that it is aligned correctly. The narrower part must be inserted into the spring.



- Insert the upper plate (12) on the pre-load pipe.



- After positioning the device (13) on the pre-load pipe (11) and the plunger support shaft (14), with the assistance of a second operator, raise the plunger so that it is possible to insert the plate (15) under the cap locking nut.



Special tools

020888Y Pre-load tube clamp

AP8140150 Bored shaft for bleeding plunger air

AP8140148 Plunger-spacer separator plate

- Insert the shaft (16) into the plunger.



- Before positioning the cap, adjust the hydraulic regulator screw so that the internal distance is as close as possible to 13 mm (0.51 in).



- Screw the cap (17) onto the plunger as far as it will go.

IMPORTANT

CHECK THE O-RING PRESENT ON THE FILLING CAP AND REPLACE IF DAMAGED.



- Ensure that the cap cannot rotate, and then tighten the nut.

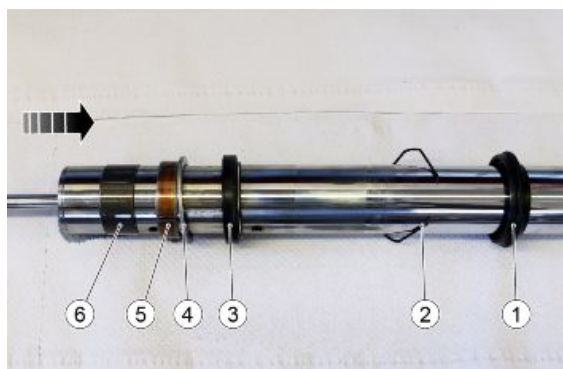


- Tighten the cap on the sleeve, applying the pre-defined torque.



THE FOLLOWING OPERATIONS APPLY WHEN MOUNTING THE LEFT HAND STEM.

- Observing the indicated sequence, extract and remove the dust guard (1), the seeger ring (2), the oil seal (3), the ring (4), the guide bushing (5) and the slider bushing (6).



- - Insert the stem in the sleeve.



- Using a suitable tool, complete with striking hammer, insert oil seal into its housing (3).

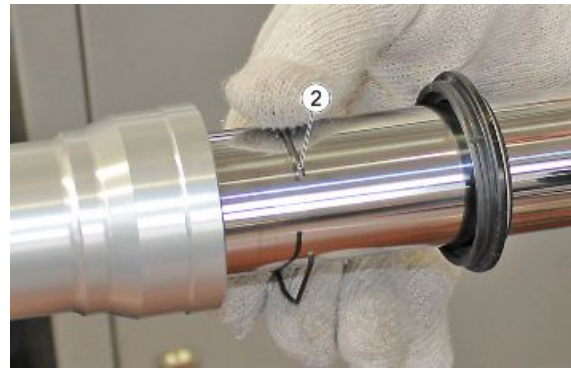


Special tools

AP8140189 Tool for mounting the oil seal for holes with diam. 43 mm (1.69 in)

AP8140146 Weight

- Position the seeger ring (2) inside the sleeve.



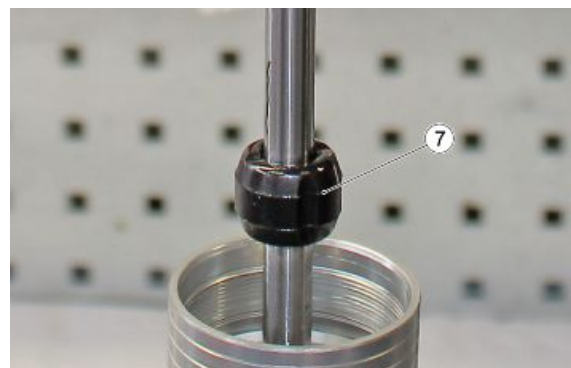
- Insert the dust guard (1) into its housing correctly.



- Place the fork stem vertically on a work surface.
- Fill the stem with the quantity of oil indicated in the "Refilling oil" section.



- Insert the buffer (7).



- Insert the special nut (8) and tighten it as far as it will go.



- Insert the cap (9) and tighten it as far as it will go.

IMPORTANT

CHECK THE O-RING PRESENT ON THE FILLING CAP AND REPLACE IF DAMAGED.



- Ensure that the cap cannot rotate, and then tighten the nut.



- Tighten the cap on the sleeve, applying the pre-defined torque.



Filling oil

THE FOLLOWING OPERATIONS APPLY WHEN MOUNTING THE RIGHT HAND STEM.

- Place the fork stem vertically on a work surface.
- Fill the STEM with the indicated quantity of oil.

WARNING

OPERATE THE PLUNGER MULTIPLE TIMES UNTIL AIR BUBBLES MAY BE SEEN ON THE SURFACE OF THE OIL.



THE FORK MUST BE PERFECTLY UPRIGHT IN ORDER TO MEASURE THE CORRECT OIL LEVEL.

Characteristic

Quantity of oil for RH STEM

446 cc (27.21 cu in)

- Check the oil level from the rim of the sleeve.

Characteristic

Oil level (from sleeve rim, without the spring and with the pump all the way lowered)

144 mm (5.67 in)



THE FOLLOWING OPERATIONS APPLY WHEN MOUNTING THE LEFT HAND STEM.

- Place the fork stem vertically on a work surface.
- Fill the STEM with the indicated quantity of oil.

WARNING

OPERATE THE PLUNGER MULTIPLE TIMES UNTIL AIR BUBBLES MAY BE SEEN ON THE SURFACE OF THE OIL.



THE FORK MUST BE PERFECTLY UPRIGHT IN ORDER TO MEASURE THE CORRECT OIL LEVEL.

Characteristic

Oil level (from sleeve rim, without the spring and with the pump all the way lowered)

143 mm (5.63 in)

Quantity of oil for LH stem

360 cc (21.97 cu in)



Installing the fork legs

The following procedure is described for a single fork stanchion, but is valid for both stanchions

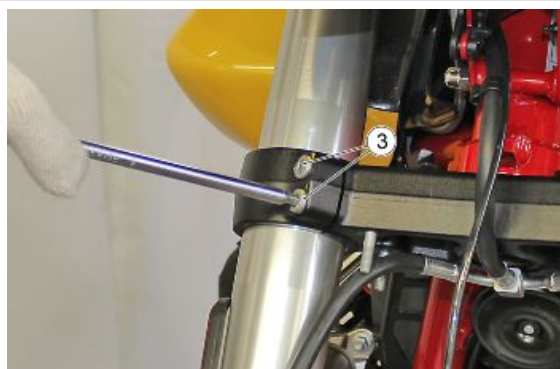
- Insert the fork stanchion (1) into the upper and lower steering yoke holes



- Insert and tighten the screw (2)



- Insert and tighten the screws (3)



Upper steering plate

Removal

- Loosen the screws (1) from both sides of the steering yoke



- Unscrew and remove the screws (2)
- Remove the U-bolt (3)



- Unscrew and remove the fastening bushing (4)



- Undo and remove the screw (5)
- Remove all the wiring from the cable grommet
- Momentarily remove the handlebar, complete with controls, from the yoke



- Remove the steering yoke (6)



Steering bottom yoke

Removing

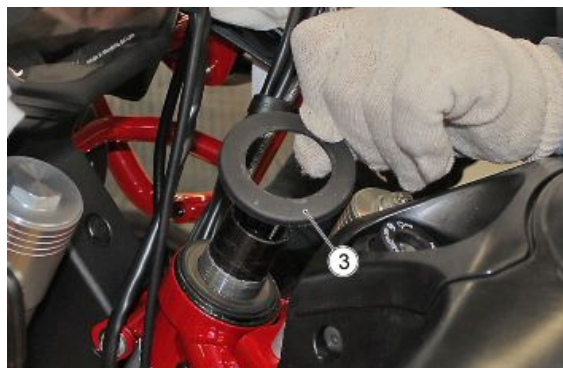
- Remove the upper steering yoke
- Remove the front mudguard
- Remove the front wheel
- Undo and remove the screw (1)



- Unscrew and remove the lower ring nut (2), using the special tool



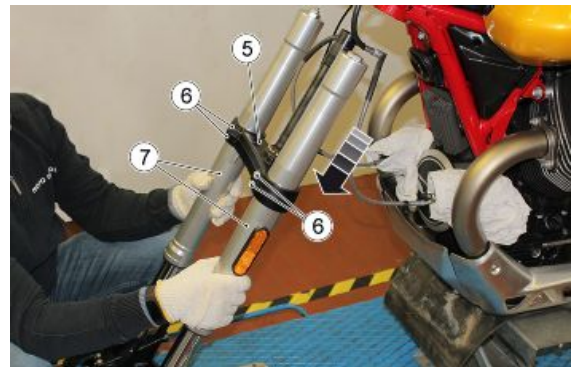
- Remove the dust cover (3)



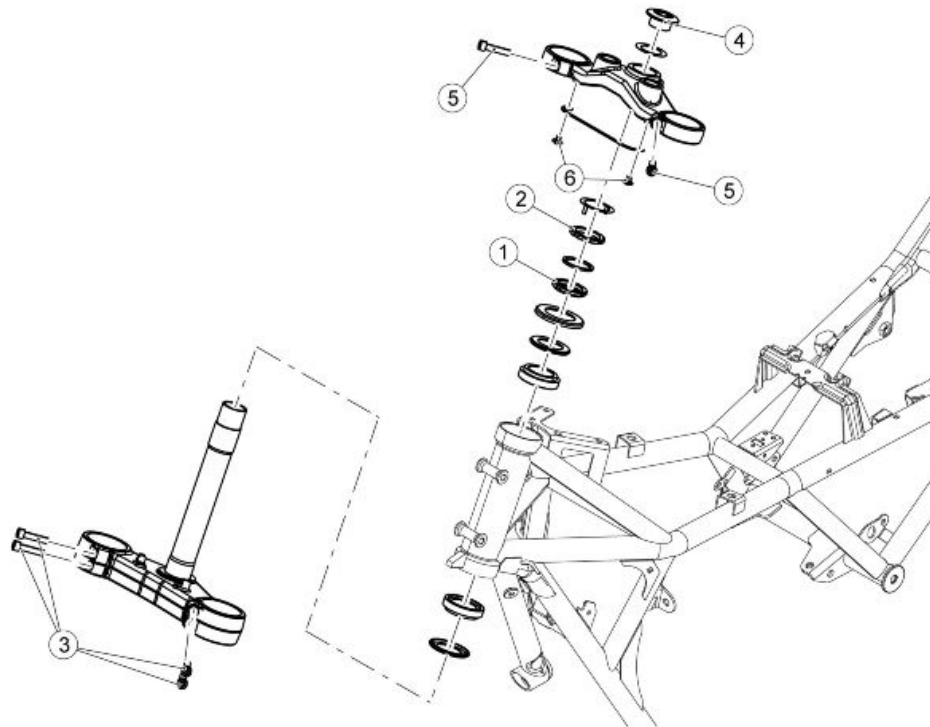
- Remove the dust seal ring (4)



- Remove the lower steering yoke (5) along with the fork stanchions
- Undo and remove the screws (6) and remove the fork stanchions (7)



Steering bearing



STEERING

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|-----------------------|--|
| 1 | Ring nut fastening the bottom yoke/steering pin assembly to the headstock | - | 1 | - | First tightening torque 60 Nm (44.25 lbf ft) - Second tightening torque 30 Nm +/- 5 Nm (22.13 +/- 3.69 lbf ft) |
| 2 | Counter-lock ring fastening the bottom yoke/steering pin assembly to the headstock | - | 1 | - | Manual |
| 3 | Screw fastening the fork stanchions to the lower steering yoke | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 4 | Top steering yoke fastener bush | - | 1 | 100 Nm (73.76 lbf ft) | - |
| 5 | Screw fastening the fork stanchions to the upper steering yoke | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| 6 | Screws fastening the cable gland to the upper steering yoke | M6 | 2 | 10 Nm (7.38 lbf ft) | - |

Adjusting play

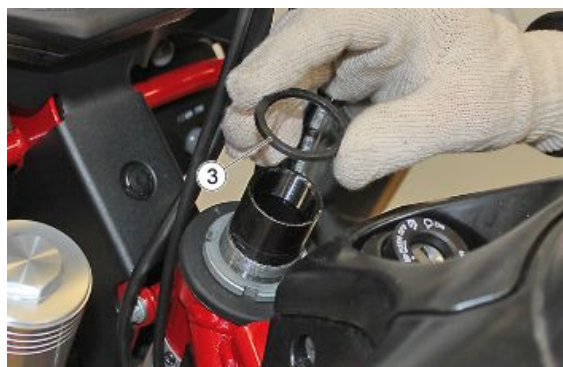
- Remove the upper steering yoke
- Remove the safety washer (1)



- Unscrew and remove the upper ring nut (2), using the special tool



- Remove the rubber gasket (3)



- Adjust by tightening the lower ring nut to the prescribed torque
- With the front wheel lifted off the ground, turn the steering all the way right and left three or four times
- Check the tightening torque of the lower ring nut

**NOTE**

HANDLEBAR TURNING RESISTANCE SHOULD BE 250 ± 150 g IN BOTH DIRECTIONS

- Refit the rubber gasket (3)
- Mount the upper ring nut (2), manually tightening it more than 90° so that the necks of both ring nuts correspond with one another
- Correctly reposition the safety washer (1)

**Disassembling**

- Remove the lower steering yoke

UPPER STEERING BEARING

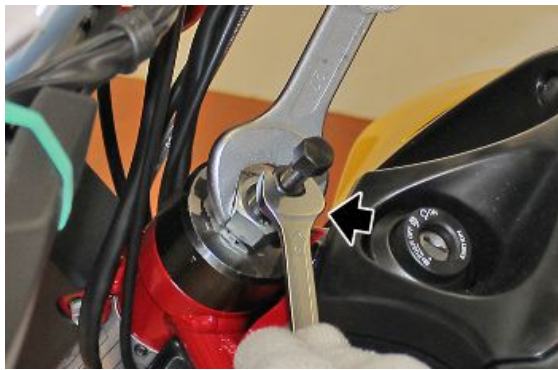
- Remove the upper seat (1) of the upper steering bearing



- Remove the upper steering bearing (2)



- Using a generic bearing puller, remove the lower seat of the steering bearing as illustrated in the figure



LOWER STEERING BEARING

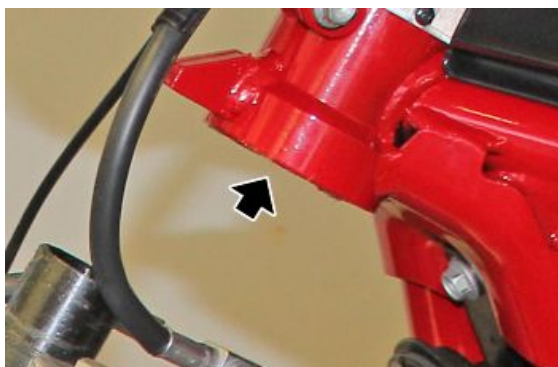
- Remove the lower steering bearing (4)



- Remove the lower seat (5) of the lower steering bearing



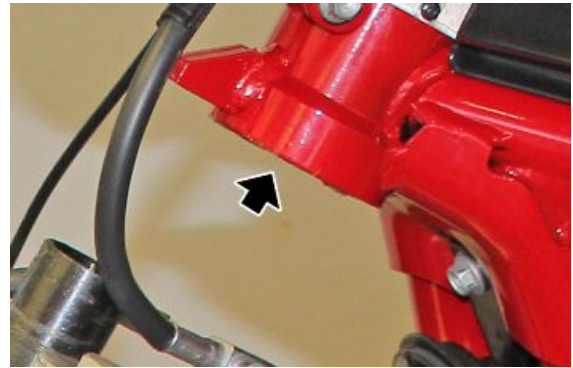
- Using a generic bearing puller, remove the upper seat of the lower steering bearing as indicated in the figure



Assembling

LOWER STEERING BEARING

- Using the appropriate punch, insert the upper seat of the lower steering bearing in the point indicated in the figure



- Insert the lower seat (1) of the lower steering bearing

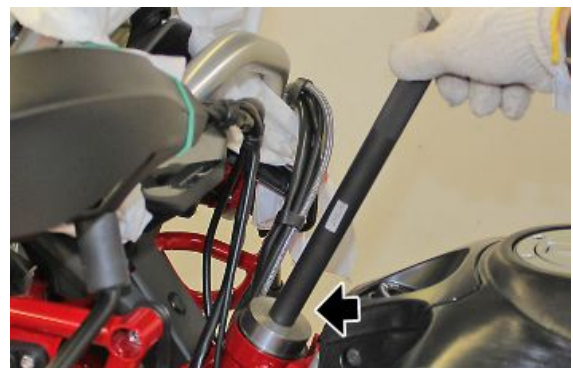


- Insert the lower steering bearing (2)



UPPER STEERING BEARING

- Using the appropriate punch, insert the lower seat of the upper steering bearing as illustrated in the figure



- Insert the upper steering bearing (3)

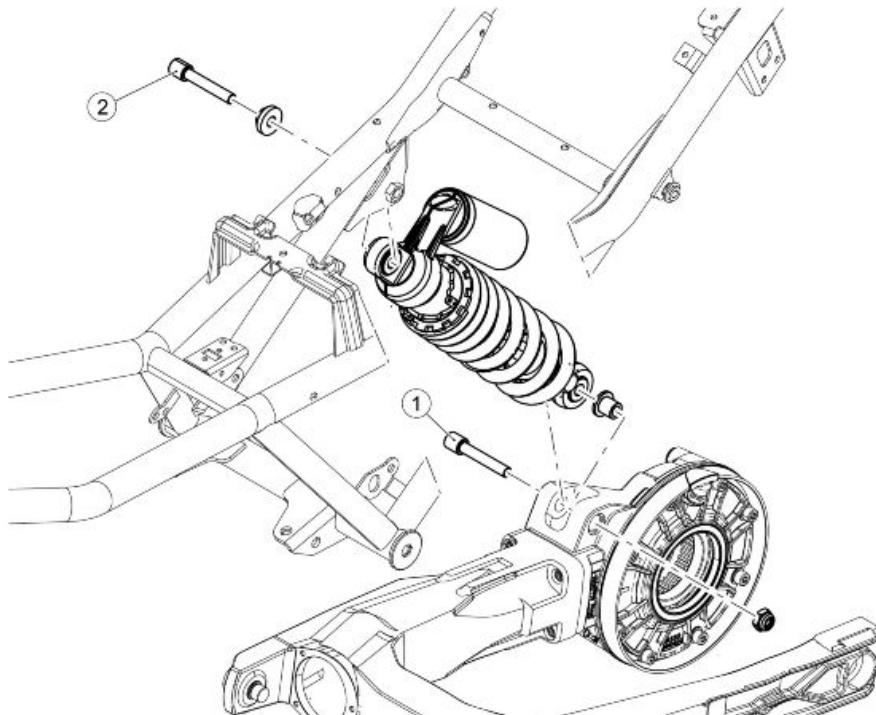


- Insert the upper seat (4) of the upper steering bearing



Rear

Shock absorbers

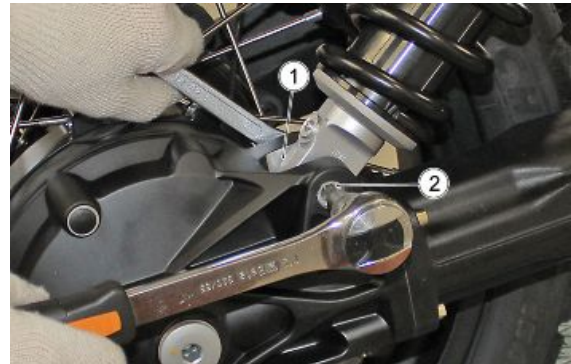


SHOCK ABSORBER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Rear shock absorber to gearbox fixing screw | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 2 | Rear shock absorber to frame fixing screw | M10 | 1 | 50 Nm (36.88 lbf ft) | - |

Removing

- Blocking the nut (1)
- Undo and remove the screw (2)



- Undo and remove the screw (3)
- Retrieve the bushing (4)



- Remove the shock absorber (5)

**Installing**

- To refit, follow the steps but in reverse order.

INDEX OF TOPICS

CHASSIS

GEA

IMPORTANT

TO CARRY OUT THE MAINTENANCE OPERATIONS AND IF THERE IS THE NEED TO RAISE THE VEHICLE, USE A SCISSOR LIFT PLACED IN CORRESPONDENCE WITH THE OIL SUMP. IN ORDER TO AVOID DAMAGING THE SUMP, REMOVE THE SUMP GUARD BEFORE USING THE SCISSOR LIFT.

Ruote**REPLACEMENT PROCEDURE OF THE TPMS SENSOR - VALVE**

Remove the relevant wheel from the vehicle.

NOTE

The following procedure applies to the rear tyre, but is also applicable to the front tyre.

Remove the tyre using a tyre changer.

IMPORTANT

The bead breaking of the tyre must take place at a distance of at least 90° from the inflation valve.

**IMPORTANT**

The positioning of the levers for the removal of the tyre must be at a distance of at least 10 cm (3.93 in) from the inflation valve.



Completely remove the tyre from the rim.



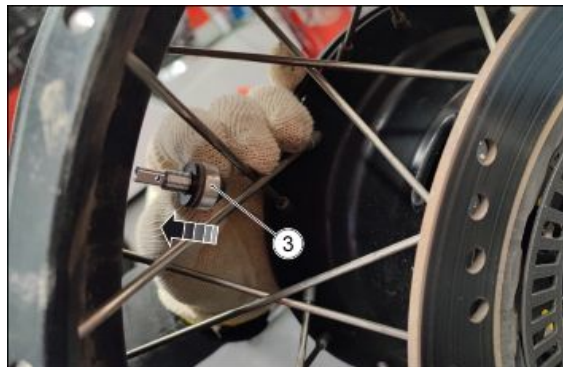
Remove the screw (1) that fastens the TPMS sensor to the valve.



Remove the retaining nut (2) and slide off the valve (3) from inside the rim.



Fit the new valve kit for TPMS (3) - **code. 2D000689** for tubeless wheels.



Insert and tighten the valve retaining nut (2) to the prescribed torque.

Locking torques (N*m)

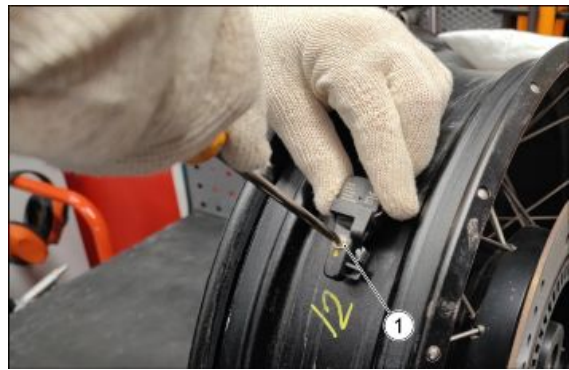
Valve retaining nut 4.7 ± 0.25 Nm (3.47 ± 0.18 lb ft)



Install and tighten to the prescribed torque the screw (1) that fastens the TPMS sensor to the valve.

Locking torques (N*m)

Sensor retaining screw 1.3 ± 0.05 Nm (0.96 ± 0.037 lb ft)



Reassemble the tyre using a tyre changer.

Lubricate the edges of the tyre with grease to aid insertion into the seat.



Once the tire has been inserted in its seat, inflate the tyre to the following pressure:

Rear tyre: 2.8 bar (280 KPa) (40.61 PSI).

Front tyre: 2.5 bar (250 KPa) (36.26 PSI).

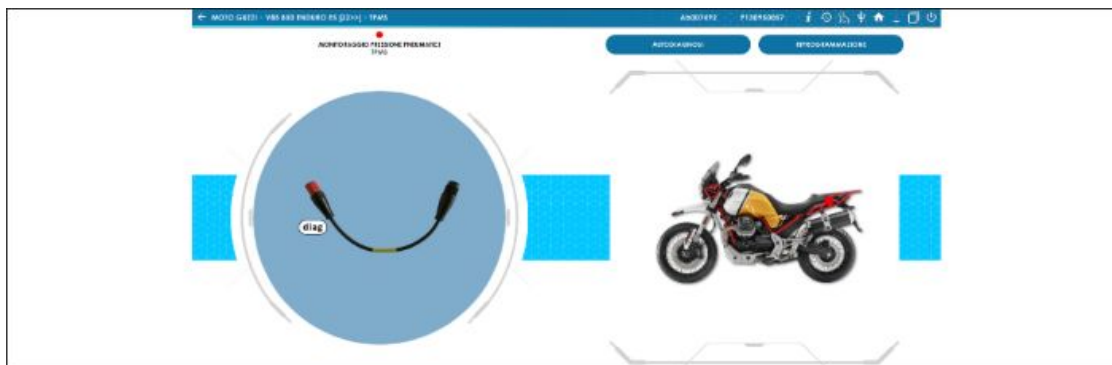


Once the wheels have been reassembled on the vehicle, the following operations are required using the P.A.D.S. diagnostic tool.

- Connect the P.A.D.S. to the vehicle and search for the model "V85 850 EDNURO E 5 [22>>]";
- select the section "TYRE PRESSURE MONITORING - TPMS"



- select the "SELF-DIAGNOSIS" function



- Select the "ADJUSTMENTS" tab



- select "vehicle configuration" and press "OK"



- select "front wheel TPMS learning" and press "OK"



- When required by P.A.D.S., deflate the front tyre, until the learning is complete.

WARNING

THE DEFLATION / LEARNING OPERATION MUST BE PERFORMED WITHIN A MAXIMUM 90 SECONDS.

IMPORTANT

TO BE ABLE TO PERFORM THE CALIBRATION, THE SENSOR MUST DETECT A DECREASE IN TYRE INFLATION PRESSURE.

ONCE THE LEARNING IS COMPLETE, THE TYRE PRESSURE MUST BE BROUGHT BACK TO THE NOMINAL VALUE. EVEN IF THE INITIAL PRESSURE IS ABOVE THE VALUE, IT WILL STILL BE REQUIRED TO ADJUST THE INFLATION PRESSURE TO THE CORRECT VALUE.



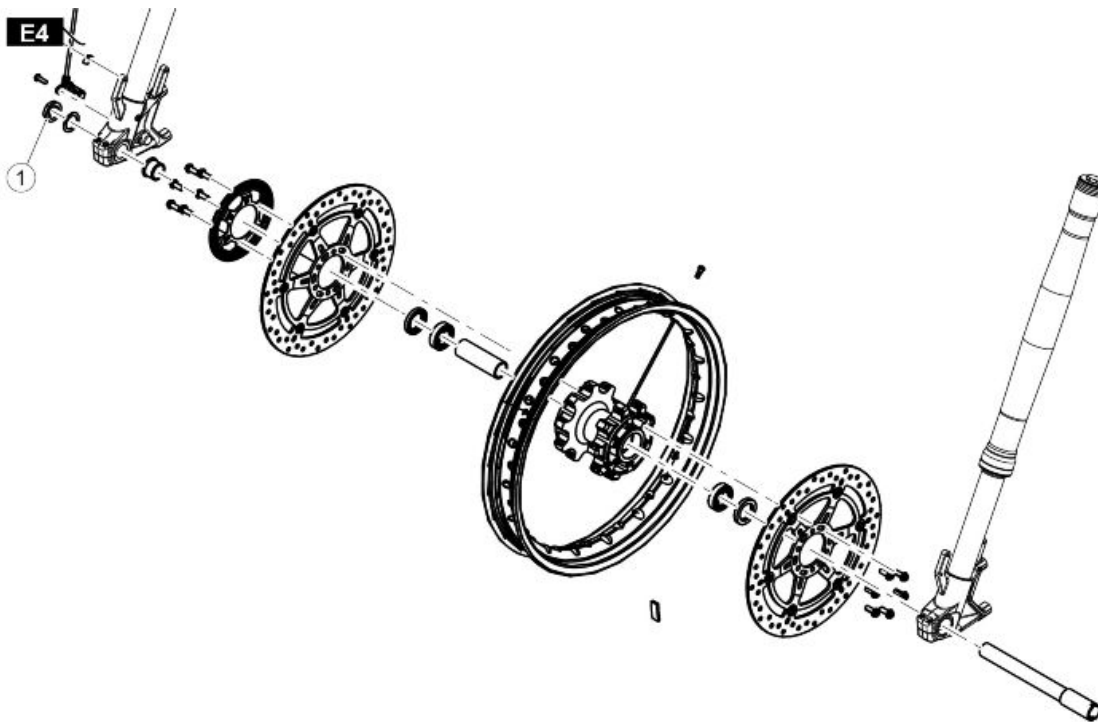
- Repeat the learning operations for the rear wheel also, selecting "Rear wheel TPMS learning".
- After both learning procedures have been performed, wait a few minutes for the sensors to align with the vehicle ECU. Any errors present will pass to the "STORED" status and can be cancelled.
- The current tyre pressure and temperature data will be displayed by selecting the "PARAMETERS AND STATUS" tab.

IMPORTANT

If the pressure is 5.10 bar and temperature is 205 °C, it means that the sensor is not calibrated. If a condition of this type occurs, it is necessary to carry out the TPMS learning procedure again.

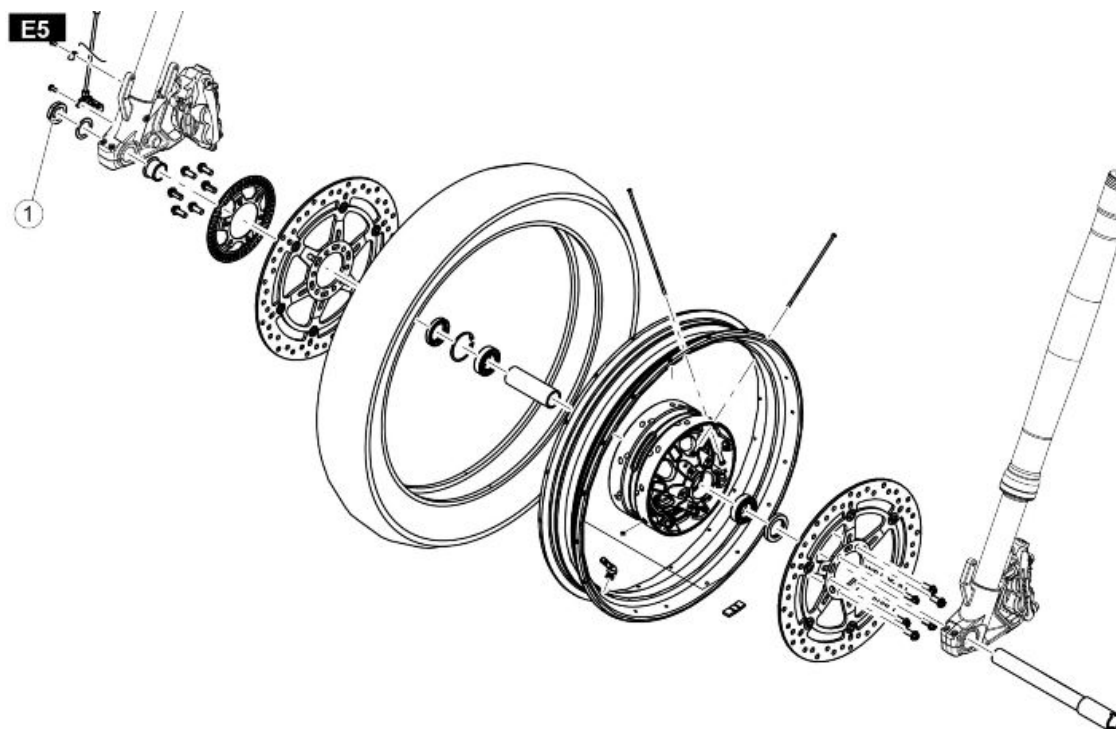
| MOTO GIUZI - V85 850 ENDURO ES [22>] - TFMS | | | A0007492 P130950057 | | |
|---|------------------------------|-------------|---------------------|---------------|--------|
| INFO ECU | PARAMETRI E STATI | REGOLAZIONI | ATTIVAZIONI | CODICI ERRORE | REPORT |
| 1 | Pressione ruota anteriore | 3.04 | bar | | |
| 1 | Temperatura ruota anteriore | 20 | °C | | |
| 1 | Pressione ruota posteriore | 3.10 | bar | | |
| 1 | Temperatura ruota posteriore | 205 | °C | | |

Ruota anteriore



FRONT WHEEL - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------------|---------|----------|----------------------|-------|
| 1 | Nut fastening the front wheel axle | M25x1.5 | 1 | 80 Nm (59.01 lbf ft) | |

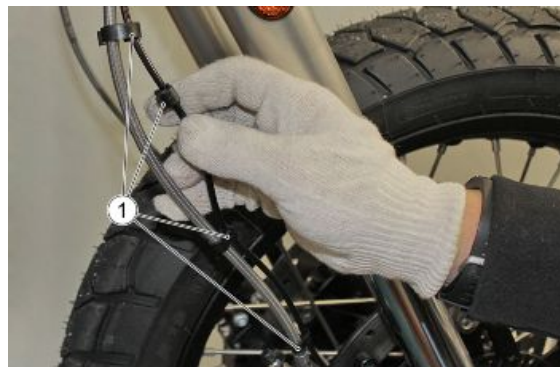


FRONT WHEEL - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------------|---------|----------|----------------------|-------|
| 1 | Nut fastening the front wheel axle | M25x1.5 | 1 | 80 Nm (59.01 lbf ft) | |

Rimozione

- Place a support under the vehicle and secure it using belts so that the wheel can move freely and the vehicle does not fall.
- Remove the ABS sensor cable from the cable glands (1)



- Unscrew and remove the screws (2)



- Remove the ABS sensor (3) from the front right fork



- Unscrew and remove the screws (4)
- Remove the front left brake calliper (5) from the brake disc



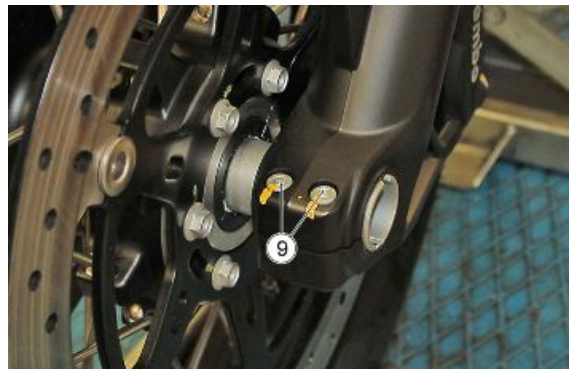
- Unscrew and remove the screws (6)
- Remove the front right brake calliper (7) from the brake disc



- Loosen the screws (8)



- Loosen the screws (9)



- Unscrew the nut (10) and remove it.



- Retrieve the washer (11)



- Remove the wheel axle (12)



- Remove the front wheel (13)



- Retrieve the washer (14)



REMOVING THE FRONT BRAKE DISCS

The following procedure is described for a single brake disc, but is valid for both front brake discs.

- Remove the front wheel
- Unscrew and remove the screws (1)



- Remove the phonic wheel (2)



- Remove the front brake disc (3)



FRONT WHEEL BEARING REMOVAL

- Remove the front wheel
- Remove the dust cover (1)



- Using a generic bearing puller, remove the bearing as illustrated in the figure
- Repeat the entire operation from the opposite side of the wheel to remove the second bearing



Controllo

FRONT WHEEL BEARINGS

Check the bearings installed on the wheel.



CHECK THE CONDITION OF ALL COMPONENTS AND OF THE COMPONENTS INDICATED AS FOLLOWS IN PARTICULAR.

CHECKING ROTATION

- Manually rotate the inner race of each bearing. The race must turn smoothly without impediment or noise.

If one or both bearings do not fall within the control parameters:

- Replace both wheel bearings.

CHECKING RADIAL AND AXIAL PLAY

- Check the radial and axial play.

Axial play: minimal axial play is permitted.

Radial: none.

If one or both bearings do not fall within the control parameters:

- Replace both wheel bearings.



ALWAYS REPLACE BOTH BEARINGS.

ALWAYS REPLACE THE BEARINGS WITH COMPONENTS OF THE SAME TYPE.

SEALS

- Check the condition of the seals; replace if damaged or excessively worn.

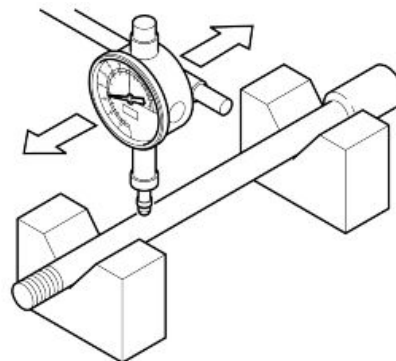


ALWAYS REPLACE BOTH SEALS TOGETHER.

ALWAYS REPLACE THE SEALS WITH COMPONENTS OF THE SAME TYPE.

WHEEL AXLE

- Use a dial gauge to measure the eccentricity of the wheel axle. Replace the wheel axle if the eccentricity measured exceeds the specified limit.



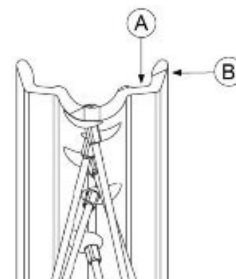
Characteristic

Maximum eccentricity:

0.20 mm (0.0079 in)

- After having removed the tyre from the wheel rim, use a dial gauge to check that the radial (A) and axial (B) eccentricity of the rim do not exceed the specified limits. Excessive eccentricity is usually caused by worn or damaged bearings. If eccentricity is not within the indicated limits after replacing the bearings, replace the wheel.

E4



IMPORTANT

CHECK THE EXCENTRICITY BY PLACING THE DIAL GAUGE ON A SURFACE OF THE WHEEL HUB. BEING A SPOKED WHEEL, THE RIM MAY BE DEFORMED DUE TO SLOW SPOKES THAT MAY CAUSE AN INCORRECT READING OF THE VALUES.

IMPORTANT

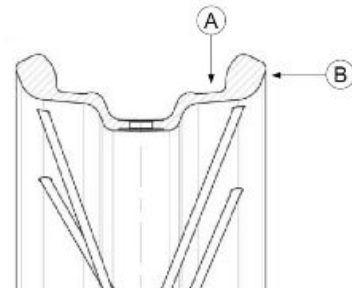
ADJUST THE SPOKE TENSIONING IF THE SPOKES ARE SLOW AND THE RIM IS DEFORMED.

E5

Characteristic

Maximum radial and axial eccentricity:

1 mm (0.039 in)



Installazione

- Insert the spacer (1)



- Place the front wheel (2) between the fork stanchions



- Insert the wheel pin (3)



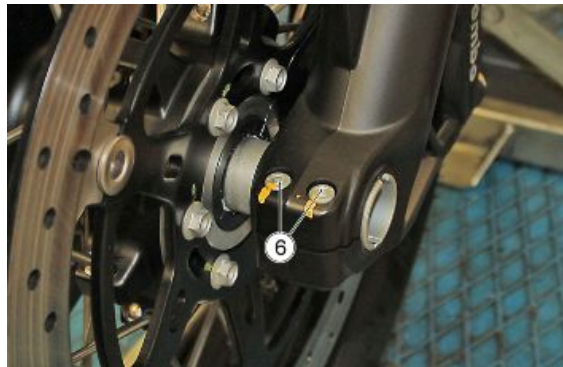
- Insert the washer (4)



- Insert and tighten the nut (5)



- Tighten the screws (6)



- Tighten the screws (7)



- Correctly place the right front brake calliper (8)
- Insert and tighten the screws (9)



- Correctly place the right front brake calliper (10)
- Insert and tighten the screws (11)



- Position the ABS sensor (12) on the calliper mounting bracket



- Insert and tighten the screws (13)



- Insert the ABS sensor cable in the cable glands (14)



FRONT BRAKE DISCS INSTALLATION

The following procedure is described for a single brake disc, but is valid for both front brake discs.

- Place the front brake disc (1)



- Place the phonic wheel (2)



- Insert and tighten the screws (3)



FRONT WHEEL BEARINGS INSTALLATION

- Using an appropriate punch, install the wheel bearing as illustrated in the figure

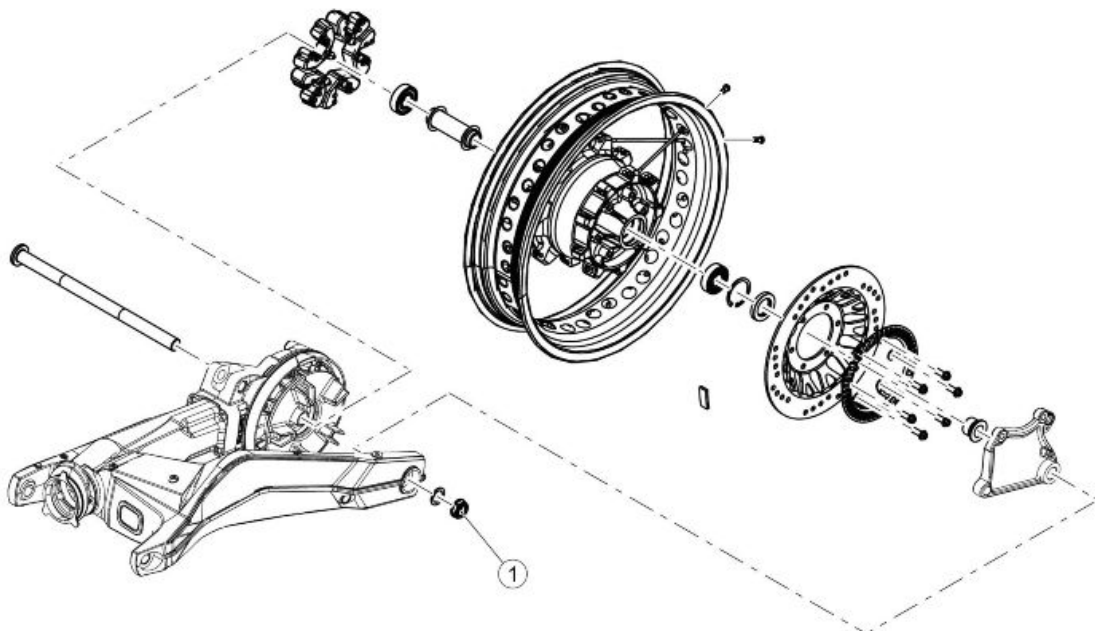


- Insert the dust cover (1)
- Rotate the wheel and repeat the entire operation from the opposite side of the wheel to install the second bearing



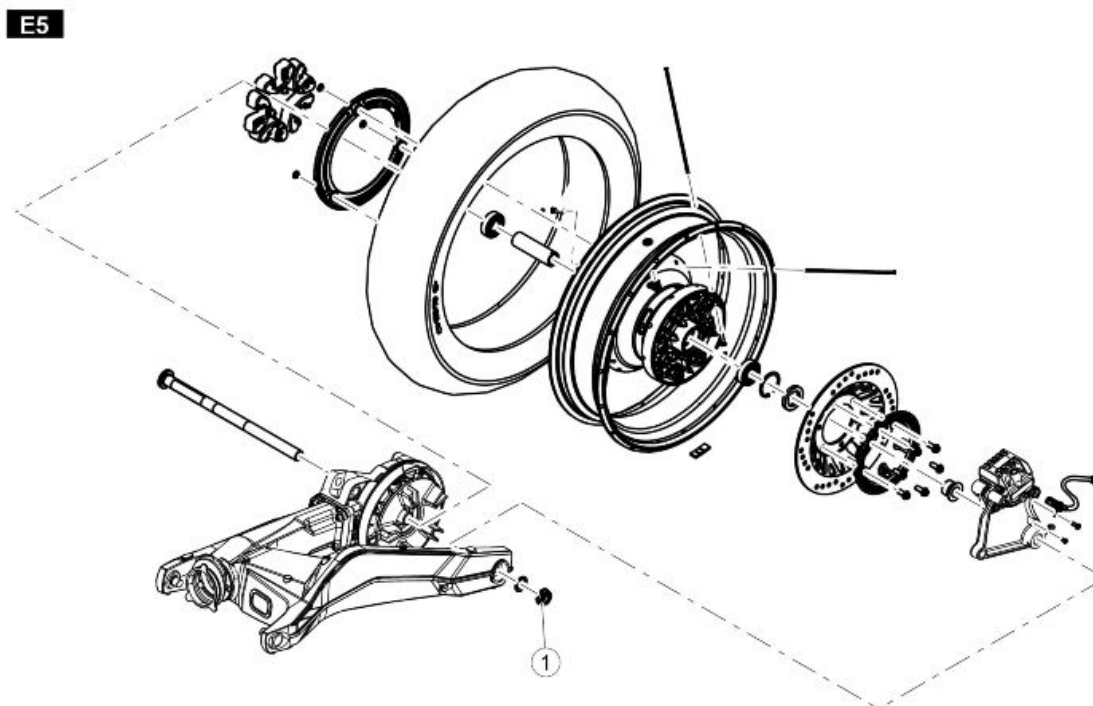
Ruota posteriore

E4



REAR WHEEL - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------|---------|----------|-----------------------|-------|
| 1 | Rear wheel axle fastener nut | M20x1.5 | 1 | 100 Nm (73.76 lbf ft) | - |



REAR WHEEL - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|------------------------------|---------|----------|-----------------------|-------|
| 1 | Rear wheel axle fastener nut | M20x1.5 | 1 | 100 Nm (73.76 lbf ft) | - |

Rimozione

- Undo and remove the screw (1)



- Holding the pin (3) in place, unscrew and remove the nut (2)



- Retrieve the washer (4)



- Remove the pin (3)



- Remove the brake calliper support plate (5) from the brake disc, complete with rear brake calliper



- Remove the rear wheel (6)

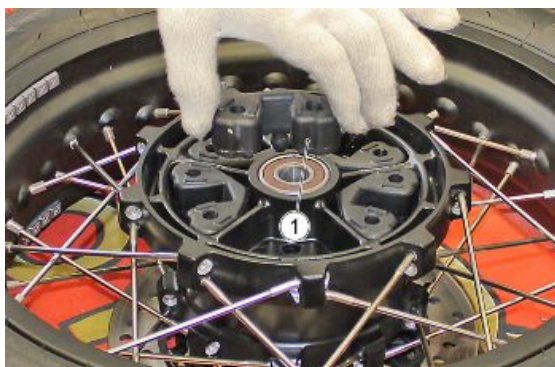


- Retrieve the bushing (7)



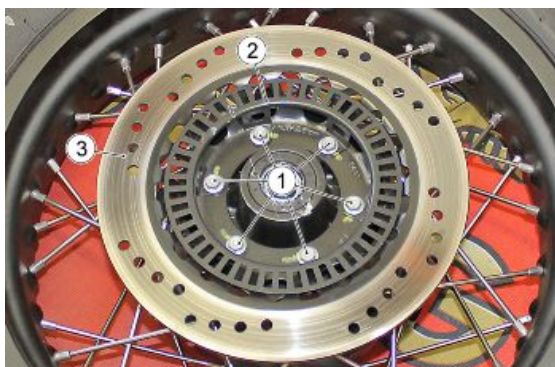
FLEXIBLE COUPLING REMOVAL

- Remove the rear wheel
- Remove the flexible couplings (1)



REMOVING THE REAR BRAKE DISC

- Remove the rear wheel
- Unscrew and remove the screws (1)
- Remove the phonic wheel (2)
- Remove the brake disc (3)



Controllo



CHECK THE CONDITION OF ALL COMPONENTS AND OF THE COMPONENTS INDICATED AS FOLLOWS IN PARTICULAR.

REAR WHEEL BEARINGS

Check the bearings installed on the wheel.

CHECKING ROTATION

- Manually rotate the inner race of each bearing. The race must turn smoothly without impediment or noise.

If one or both bearings do not fall within the control parameters:

- Replace both wheel bearings.



**ALWAYS REPLACE BOTH BEARINGS.
ALWAYS REPLACE THE BEARINGS WITH COMPONENTS OF THE SAME TYPE.**

- Check the radial and axial play.

Axial play: minimal axial play is permitted.

Radial: none.

If one or both bearings do not fall within the control parameters:

- Replace both wheel bearings.

REAR WHEEL GASKETS

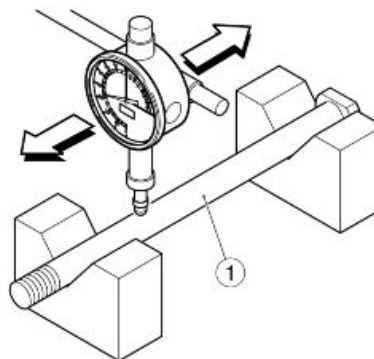
- Check the condition of the seals; replace if damaged or excessively worn.



**ALWAYS REPLACE BOTH SEALS TOGETHER.
ALWAYS REPLACE THE SEALS WITH COMPONENTS OF THE SAME TYPE.**

REAR WHEEL AXLE

- Use a dial gauge to measure the eccentricity of the wheel axle (1). Replace the wheel axle (1) if the eccentricity measured exceeds the specified limit.



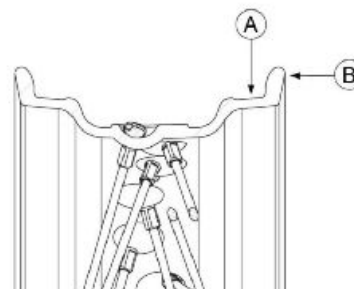
Characteristic

Maximum eccentricity:

0.20 mm (0.0079 in)

- After having removed the tyre from the wheel rim, use a dial gauge to check that the radial (A) and axial (B) eccentricity of the rim do not exceed the specified limits. Excessive eccentricity is usually caused by worn or damaged bearings. If eccentricity is not within the indicated limits after replacing the bearings, replace the wheel.

E4



IMPORTANT

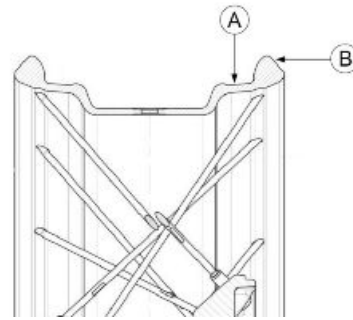
CHECK THE EXCENTRICITY BY PLACING THE DIAL GAUGE ON A SURFACE OF THE WHEEL HUB. BEING A SPOKED WHEEL, THE RIM MAY BE DEFORMED DUE TO SLOW SPOKES THAT MAY CAUSE AN INCORRECT READING OF THE VALUES.

IMPORTANT

ADJUST THE SPOKE TENSIONING IF THE SPOKES ARE SLOW AND THE RIM IS DEFORMED.

Characteristic**Maximum radial and axial eccentricity:**

1 mm (0.039 in)

E5**FINAL DRIVE UNIT BEARINGS**

Carry out the check with the bearings fitted on the final drive unit.

CHECKING ROTATION

- Remove the left spacer.
- Remove the right spacer.
- Manually rotate the inner race of each bearing. Rotation must be constant, smooth and noiseless.

If one or both bearings do not fall within the control parameters:

- Replace both bearings of the final drive unit.

CHECKING RADIAL AND AXIAL PLAY

- Check the radial and axial play. Axial play: minimal axial play is permitted. Radial: none.

If one or both bearings do not fall within the control parameters:

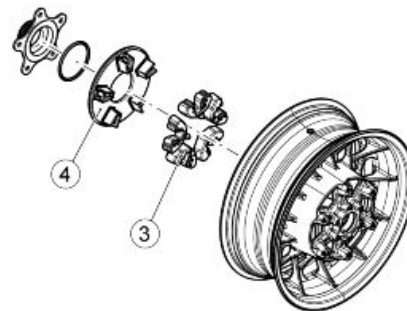
- Replace both bearings of the final drive unit.

FLEXIBLE COUPLINGS

Check that the flexible couplings (3) are not damaged or excessively worn.

To check:

- Position the complete final drive unit on the wheel.
- Manually rotate in both directions the flexible coupling disc (4) and check the clearance between the flexible coupling rubber rings and the coupling holder.

**If there is excessive clearance:**

- Replace all the flexible couplings (3).



ALWAYS REPLACE ALL THE FLEXIBLE COUPLINGS
WITH OTHERS OF THE SAME TYPE.

Installazione

- Place the spacer (1) on the rear wheel



- Place the rear wheel (2) in the swing-arm



- Correctly place the rear brake calliper (3), complete with support bracket



- Insert the wheel pin (4)



- Insert the washer (5)



- Holding the pin (6) in place, tighten the nut (7)

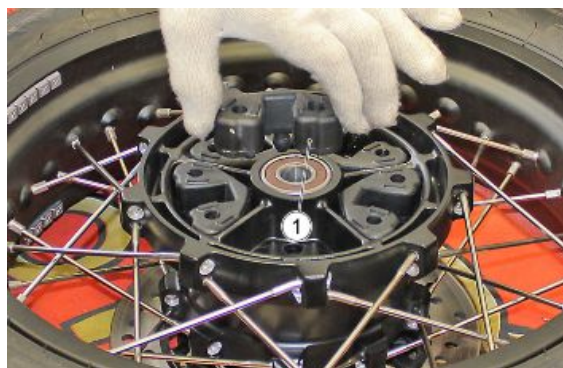


- Insert and tighten the screw (8)



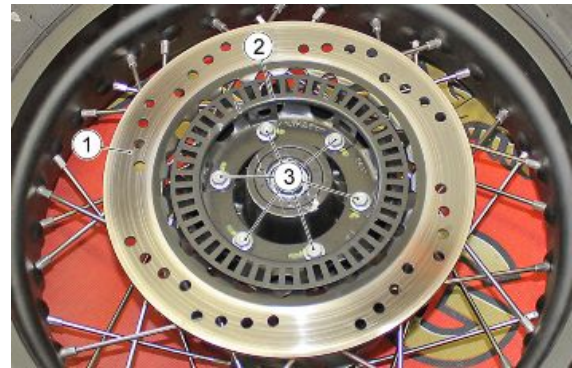
FLEXIBLE COUPLINGS INSTALLATION

- Remove the rear wheel
- Insert the flexible couplings (1) in the specific lodging

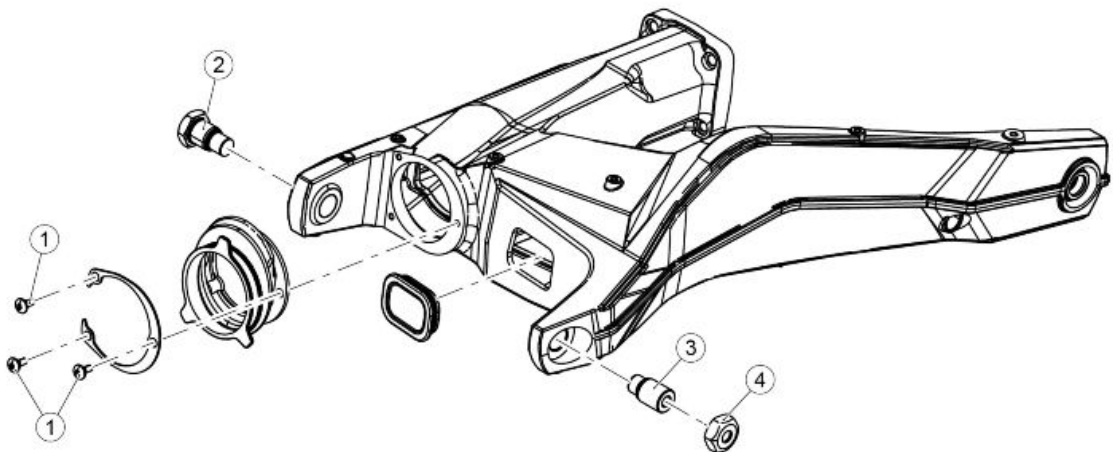


REAR BRAKE DISC INSTALLATION

- Remove the rear wheel
- Place the brake disc (1)
- Place the phonic wheel (2)
- Insert and tighten the screws (3)



Swingarm



SWINGARM

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|--|
| 1 | Bellow to swingarm fixing screw | M5 | 3 | 6 Nm (4.43 lbf ft) | - |
| 2 | Swingarm pivot bolt fastening nut | - | 1 | 50 Nm (36.88 lbf ft) | - |
| 3 | Swingarm fastening pin | - | 1 | - | Screw until the end and unscrew by 1/4 of a turn |
| 4 | Swingarm pivot bolt fastening nut | - | 1 | 50 Nm (36.88 lbf ft) | - |
| - | Rear brake pipe feedthrough to swingarm fixing screw | M5 | 2 | 6 Nm (4.43 lbf ft) | - |

Removing

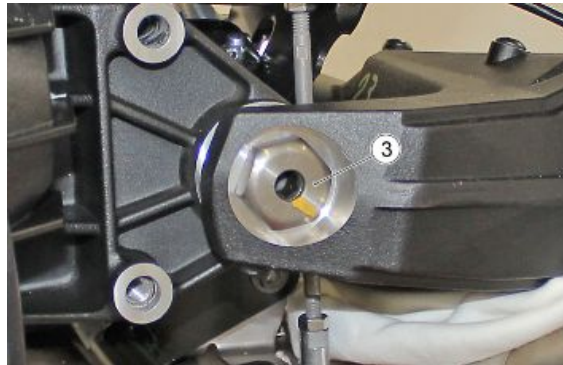
- Removing the clamp (1)



- Unscrew the pin (2) and remove it.



- Unscrew the nut (3) and remove it



- Unscrew the pin (4) and remove it.

NOTE

DURING REFITTING, AFTER MANUALLY TIGHTENING THE PIN TO THE PRESCRIBED TORQUE, LOOSEN IT BY 1/4 OF A TURN. TIGHTEN THE NUT (3) TO THE PRESCRIBED TORQUE.



- Remove the swingarm (5)



Cardan shaft

Removing

- Remove the footrest plates
- Remove the rear wheel
- Remove the swingarm
- Strike a few times with a mallet to remove the cardan shaft (1)

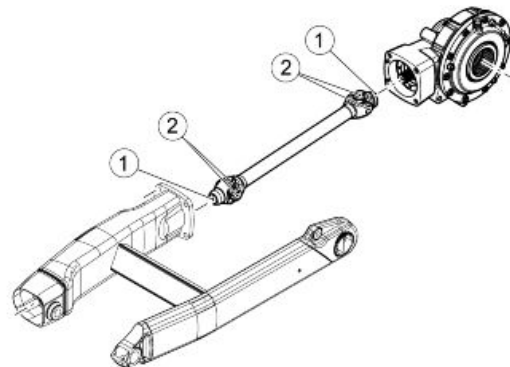


Checking

Carefully check:

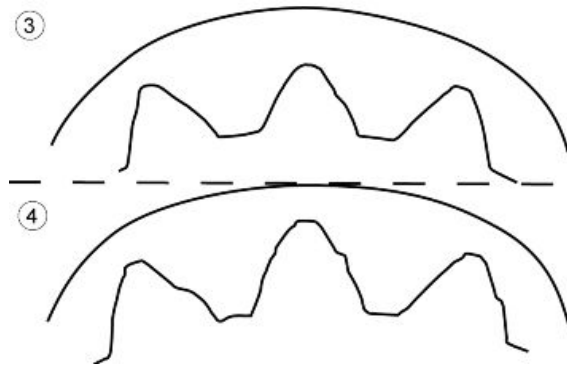
The splines on the cardan shaft (1) must be intact, free from grain or dents.

Check that the joints (2) are not hardened or excessively loose, otherwise replace it.

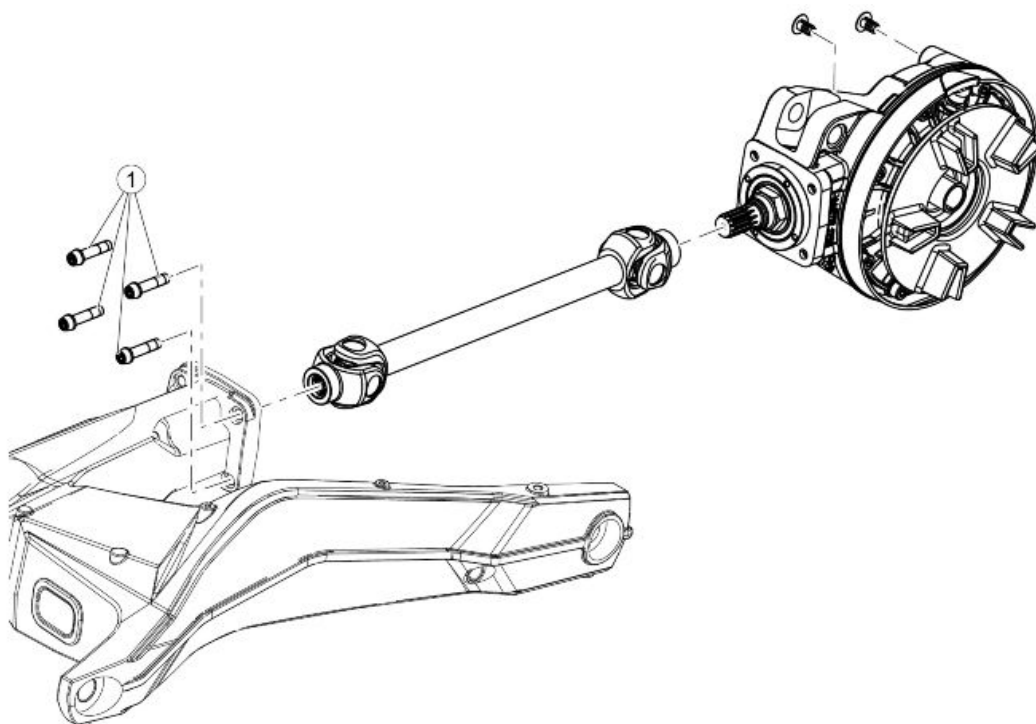


In the figure are shown two worn tooting profiles:

- Profile (3) shows acceptable wear, the cardan shaft should not be replaced.
- Profile (4) shows unacceptable wear, the cardan shaft must be replaced.

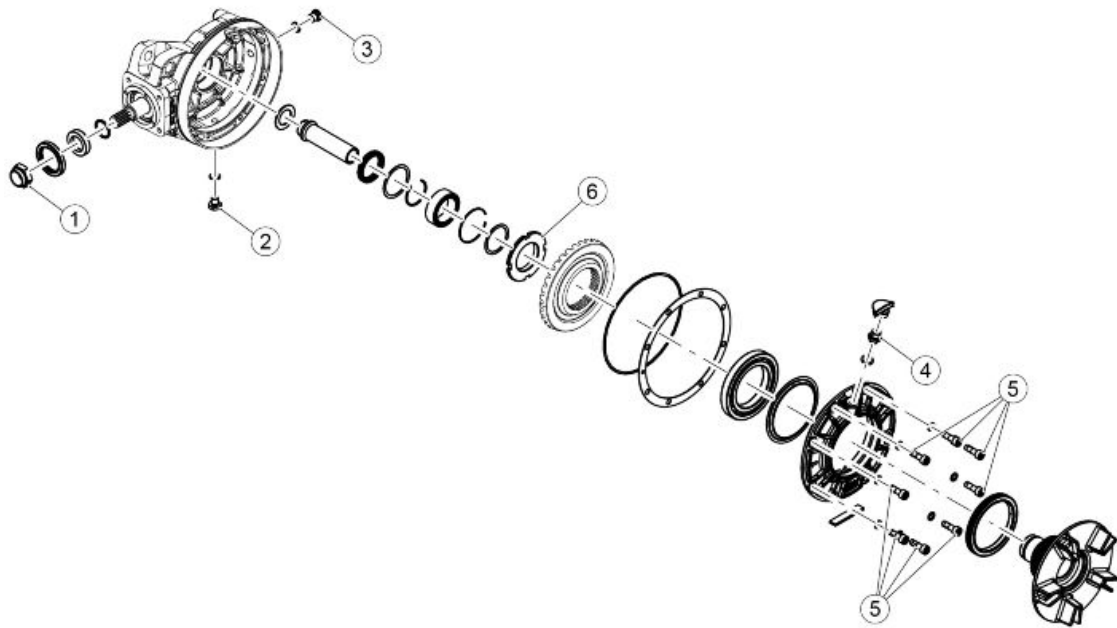


Bevel gears



GEARBOX

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------|----------|----------------------|-------|
| 1 | Gearbox preimpregnated TCC torx fixing screws | M8x35 | 4 | 25 Nm (18.44 lbf ft) | - |



GEARBOX - COMPONENTS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--------------------------------|-------|----------|-----------------------|--|
| 1 | Pinion fastening nut | M25 | 1 | 100 Nm (73.76 lbf ft) | Loct. 648 + Nut re-bating on hollow pinion |
| 2 | Oil drainage plug | M10 | 1 | 30 Nm (22.13 lbf ft) | - |
| 3 | Oil load cap | M12 | 1 | 25 Nm (18.44 lbf ft) | - |
| 4 | Bleeder cap | - | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Gearbox cover fastening screws | M8x25 | 8 | 25 Nm (18.44 lbf ft) | - |
| 6 | Ring nut | - | 1 | 160 Nm (118.01 lb ft) | Loct. 243 + Riveting on the splash guard hub |
| - | Pinion bearings holder case | - | 1 | 50 Nm (36.88 lbf ft) | Loct. 243 |

IMPORTANT

SINCE THE BEVEL GEAR IS A SAFETY COMPONENT, IT IS STRICTLY FORBIDDEN TO PERFORM ANY PINION/SPROCKET CLEARANCE ADJUSTMENTS FOR THE ENTIRE DURATION OF THE COMPONENT'S SERVICE LIFE. IF THE CLEARANCE IS NOT WITHIN THE REQUIRED TOLERANCE, THE ENTIRE BOX WILL HAVE TO BE REPLACED.

IF OIL LEAKAGES ARE DETECTED ON THE SPROCKET SIDE, REPLACE THE OIL SEALS ACCORDING TO THE DESCRIPTION BELOW.

Removing

- Loosen and remove the screws (1).



- Loosen and remove the screws (2).



- Remove the gearbox (3).



Replacement of the oil seal on the wheel hub with the bevel gear fitted on the vehicle

IMPORTANT

PROCEDURE VALID FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.2

- Firmly screw a small self-tapping screw (M5-M6) on the oil seal



- Use a clamp to grab the screw and remove the oil seal from the wheel hub seat



- Insert a new oil seal in the specific seat, tap it inside with a tube with a slightly smaller diameter than the external diameter of the oil seal
- The oil seal is inserted when it reaches the end



Disassembling

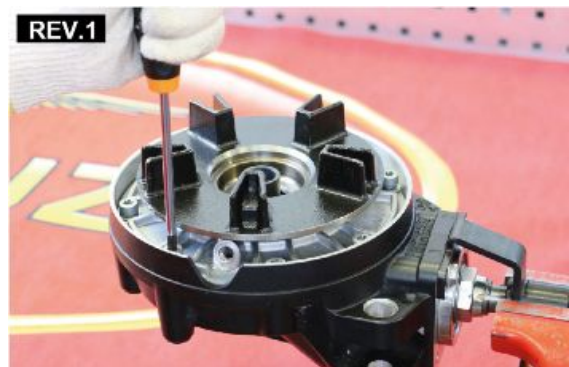
IMPORTANT

CARRY OUT OIL DRAINING AND PROCEED WITH THE REMOVAL OF THE BREATHER BEFORE DISASSEMBLING THE GEARBOX.

- Using the specific tool, clamp the complete gearbox in the vice.
- Loosen and remove the 8 fastener screws of the flange.

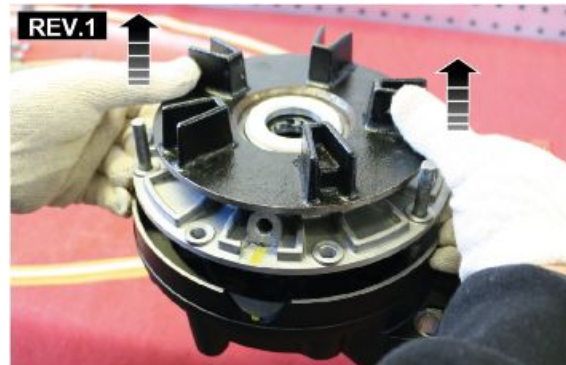
Special tools

021000Y Bevel gear set mounting





- Use threaded stud bolts as a guide and remove the flange.



- Remove the ring gear axle thickness.



- Remove the inner spacer.



- Remove the bearing's roller cage.



- Using a suitable tool, disengage the radial snap ring and remove it.



- Heat the outer track seat of the roller bearing using an air heater.



- Insert the special tool under the washer and screw the cursor.

Special tools**001467Y036 Bearing internal cup extractor**

- Insert a bush with a suitable diameter on the specific tool and tighten the nut keeping the extractor locked.



- Remove the outer track of the roller bearing.



- Remove the washer.



- Remove the sealing ring.
- When reassembling use a new ring.

IMPORTANT

DURING REASSEMBLY BE CAREFUL, AS THE SEALING RING MUST BE INSERTED UNTIL IT STOPS, USING THE SPECIFIC PRESS-FIT PAD.



- If the flange is provided with the cover (A) using a punch and operating in the inner part of the hub (from the opposite direction of insertion), it is possible to remove it

IMPORTANT**ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.1**

- Operating from the internal side of the flange, remove the hub's internal oil seal by tapping it with a punch

IMPORTANT

ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.2



- Using the protective jaws, block the complete flange in the vice and remove the radial stop ring using a specific tool.



- Unscrew the ring nut, using the special tool, to loose the riveting.
- After unscrewing the ring nut to the end of the thread, re-tighten it until it stops in such a way as to create the space between the ring nut and the shoulder washer.



Special tools

020999Y Crown counter- lock ring wrench

- Insert the special tool under the shoulder washer and screw the cursor.

Special tools

GU19907000 Internal bearing ring extractor



- Remove the inner track of the roller bearing.



- Remove the shoulder washer.



- Remove the ring nut.



- Remove the crown gear.



- Remove the gearbox flange from the splash guard hub.



- Remove the O-ring.
- When reassembling use a new O-ring.

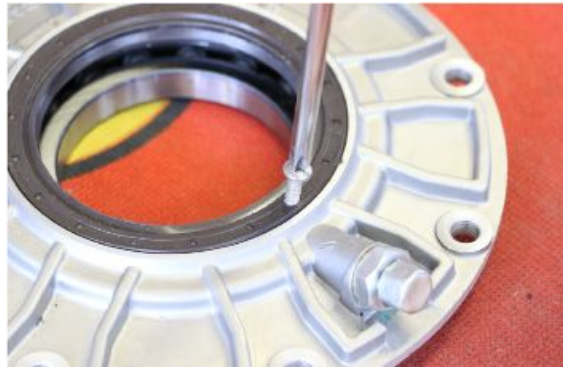
**IMPORTANT**

PAY SPECIAL ATTENTION TO THE CORRECT REMOVAL PROCEDURE OF THE OIL SEAL TO AVOID THE DAMAGE OF THE STEEL SHEET UNDER THE OIL SEALER.

- Use a small self-tapping screw (M5-M6) and screw it slightly to grip on the oil seal.

IMPORTANT

DO NOT TIGHTEN THE SCREW AS IT COULD DAMAGE THE UNDERLYING THIN SHEET.



- Using a clamp to remove the oil seal from the seat, using a Teflon or wooden support to avoid damaging the flange of the gearbox.



- Check the correct integrity of the underlying thin sheet.

**IMPORTANT**

IF THE THIN SHEET IS DAMAGED, THE FLANGE TOGETHER WITH THE BEARING MUST BE REPLACED, AS INDICATED.



- Heat the outer area of the pinion bearings holder case.
- Using the special tool, loose and remove the pinion bearings holder case.

Special tools**020998Y Pinion case wrench**

- Using the specific tool, clamp the assembly in the vice and lift the nut again before removing it.

Special tools**021000Y Bevel gear set mounting**

- Loosen the pinion bearings holder case locking nut and remove it.



- Remove the spacer closing bearings.



- Remove the sealing ring.



- Remove the O-ring.



Checking

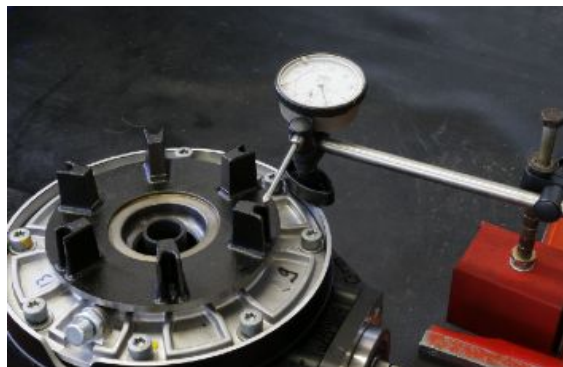
- After assembly of the box, it is necessary to check the play between the pinion and the crown. Clamp in a vice and install a dial gauge by means of a suitable support. The dial gauge tester must be placed the outer end of a tooth positioned at 90°.

Characteristic

Maximum clearance allowed

0.08-0.2 mm (0.059-0.147 in)

- If the measured play is not compliant with the permitted values, proceed to the correction by selecting and replacing an adequate rear sprocket axle thickness.



Montaggio

- Insert the new external O-ring in the pinion unit.



- Insert the new internal O-ring in the pinion unit.



- Insert a new seal ring until it stops.



- Insert the bearings closing spacer paying attention that the chamfer is placed in contact with the O-ring.



- After having placed a new nut, using the specific tool, lock the assembly of the pinion bearing support case in the vice and tighten the nut to the prescribed torque.



Special tools

021000Y Bevel gear set mounting

- Rivet the nut at the groove on the pinion.



IMPORTANT

CAREFULLY CLEAN THE THREAD OF THE GEARBOX FROM LOCTITE RESIDUES BEFORE INSERTING THE PINION BEARING SUPPORT CASE AGAIN.

- Using the protective jaws, block the gearbox in vice
- Apply the loctite along the entire circumference, for a length of 3 threads and, using the specific tool, tighten the pinion bearing holder case to the specified torque.



Special tools

020998Y Pinion case wrench

- Using the specific tool, insert a new seal ring on the cover.

Special tools

021005Y Bevel gear cover oil seal punch



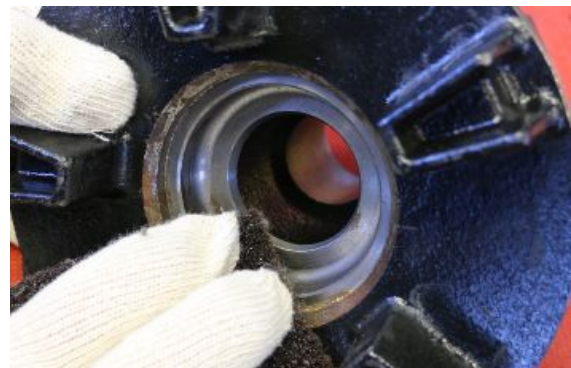
- On the opposite side of the cover, insert a new O-ring.



- Before proceeding with the assembly of the hub, clean the surface on which the external O-rings of the cover will operate, using a sheet of abrasive multipurpose sponge.

IMPORTANT

ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.1



- Complete the cleaning operation using an oil-soaked cloth.

IMPORTANT

ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.1



- Place the gearbox flange on the splash guard hub.



- Place a new ring nut and using the specific tool tighten it to the prescribed torque.

Special tools**020999Y Crown counter- lock ring wrench**

- Reattach the ring nut in two opposite points, in correspondence with the grooves on the hub.



- Insert the shoulder washer.



- Using the specific tool, put it in a press and insert the inner track of the roller bearing.

Special tools**GU19927900 Punch for pressing the ring inside the bearing**

- Insert the radial snap ring.



- Using the specific tool, fit the internal oil seal of the bevel gear hub, bringing it to the end

IMPORTANT

ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.2

Special tools

020359Y 42 x 47 mm punch



- Place the flat washer on the gearbox.



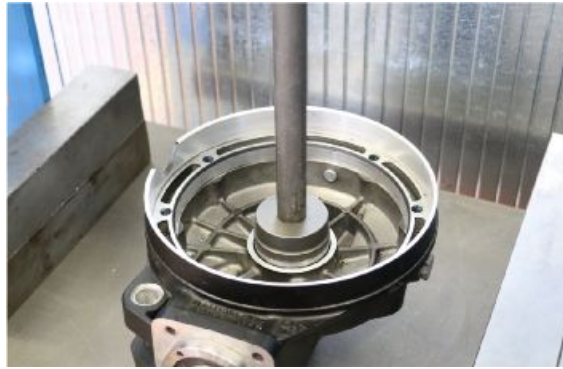
- Insert a new sealing ring on the gearbox using the specific tool, paying attention to the direction of assembly.

Special tools

021003Y Bevel gear oil seal punch



- Using the specific tool, put it in a press and insert the outer track of the roller bearing until it stops.

Special tools**020360Y Adaptor 52x54 mm**

- Insert the radial snap ring.



- Insert the roller cage.



- Before proceeding with the assembly of the inner spacer, clean it thoroughly with an oil-soaked cloth.



- Insert the inner spacer until it stops.



- Reposition the crown axle thickness.

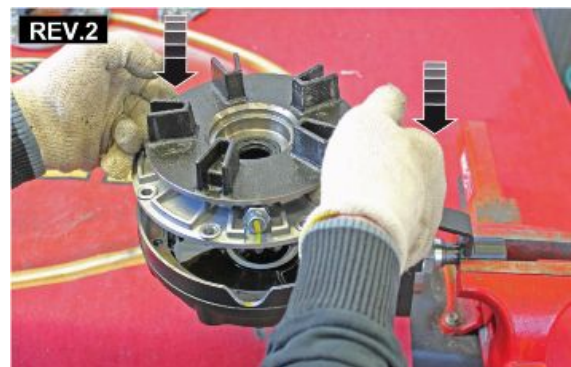
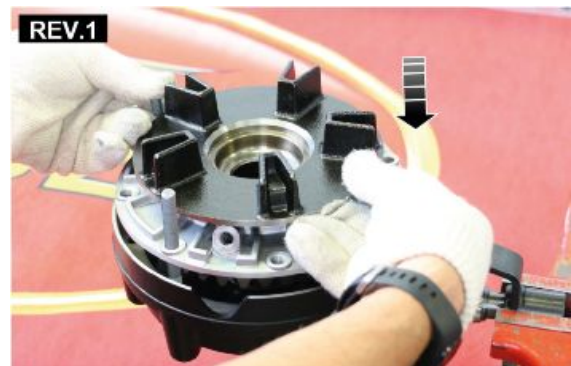
NOTE

THE THICKNESS HAS A UNIQUE POSITION IN THE BOX. PAY ATTENTION TO THE CORRECT POSITION BY CHECKING THE CORRESPONDENCE OF THE HOLES WITH THE FASTENING SCREWS.

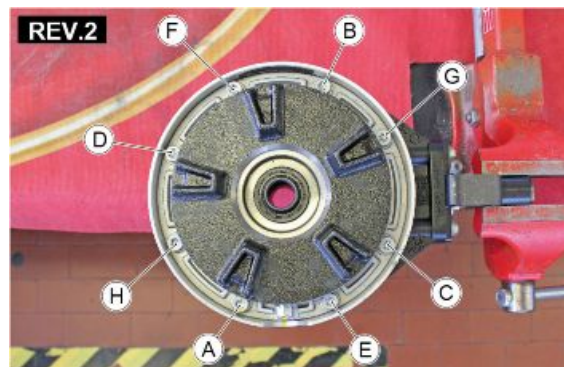
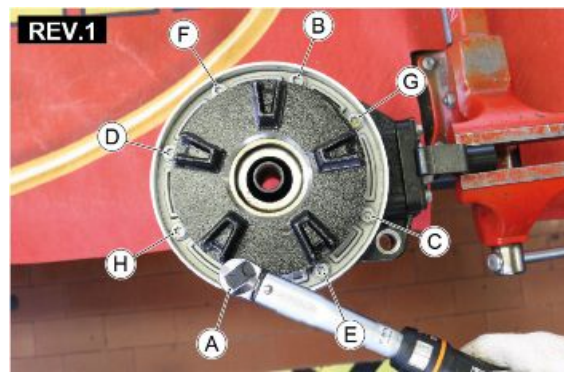
**IMPORTANT**

CAREFULLY CLEAN THE THREADS OF THE GEARBOX FROM LOCTITE RESIDUES BEFORE INSERTING THE FLANGE AGAIN.

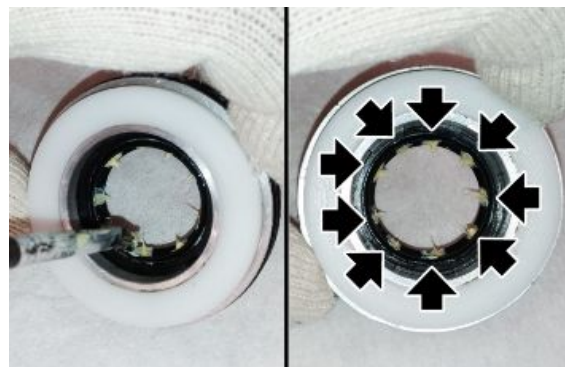
- Insert the centring pins and reposition the complete flange in its seat in the gearbox.



- Insert the fixing screws of the flange and tighten it to the prescribed torque operating diagonally with the indicated sequence..



- Using a small brush, apply mineral grease to fill the area between the two oil seal lips and the dust guard of the cover, respecting the method shown in the photo on the side.
- The external O-rings must be slightly lubricated with the same grease; remove any surplus

**IMPORTANT**

ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.1

- Insert the cover on the spacer pin of the gearbox until it stops taking care to use the clamp, in order to allow the air to exit from the inner side which guarantees the complete insertion of the cover in its seat.
- Then remove the clamp.



TO AVOID DAMAGING THE OIL SEAL LIP, THE CLAMP MUST HAVE THE SMOOTH SIDE FACING TO THE LIP. CAREFULLY CLEAN ANY SURPLUS OF GREASE IN ORDER TO AVOID DRIPPING WHICH COULD BE CONFUSED WITH OIL LEAKS.

IMPORTANT**ONLY FOR VEHICLES EQUIPPED WITH BEVEL GEAR REV.1**

- After blowing the breather with compressed air, carefully remove any oil residues and check its correct functioning, put it in its seat again and tighten it to the prescribed torque.

IMPORTANT**DURING REPLACEMENT, USE A NEW SEALING GASKET.****Installing**

- Insert the bevel gear (1) on the swing-arm



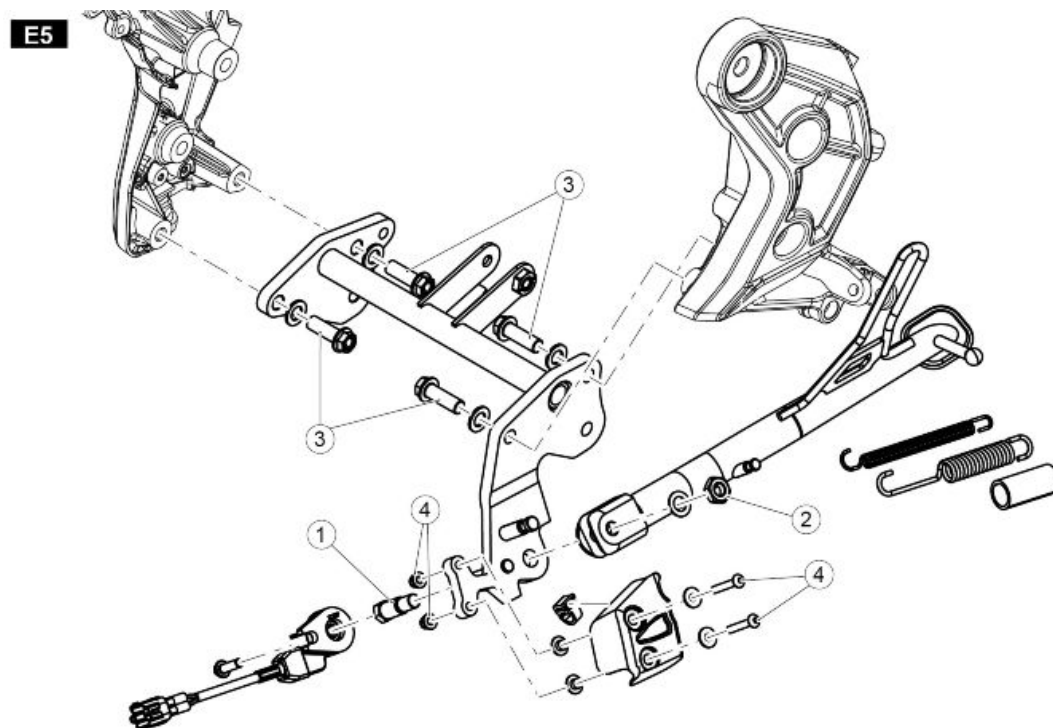
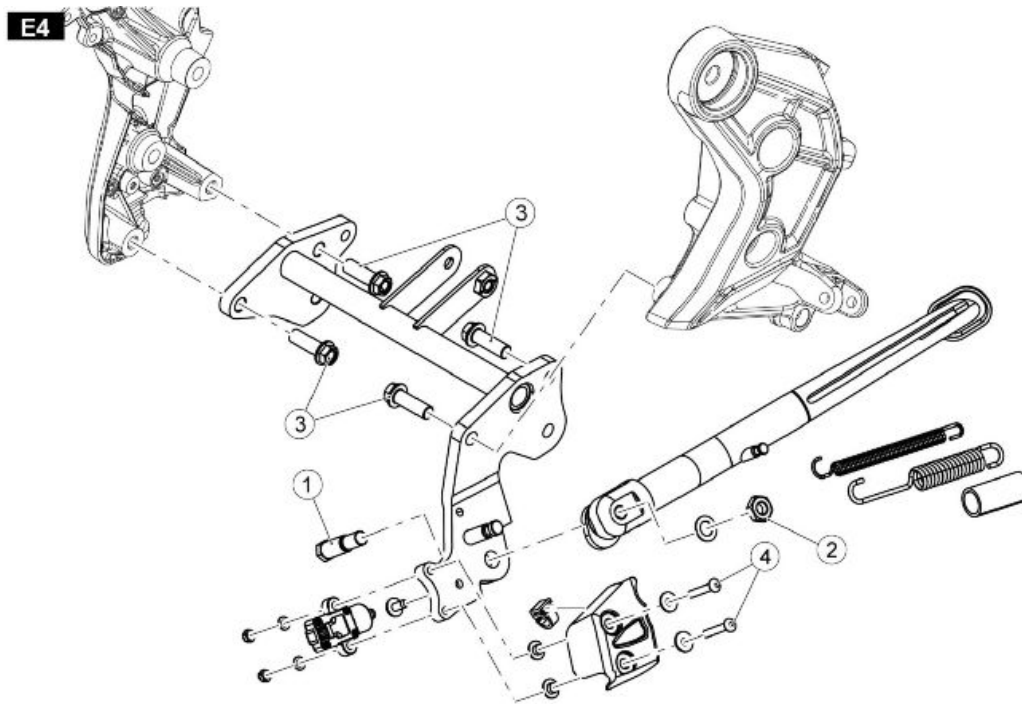
- Insert and tighten the fastening screws (2) to the prescribed torque



- Insert and tighten the fastening screws (3) to the prescribed torque



- Top up the oil following the instructions in the "Maintenance / Transmission oil / Replacement" chapter

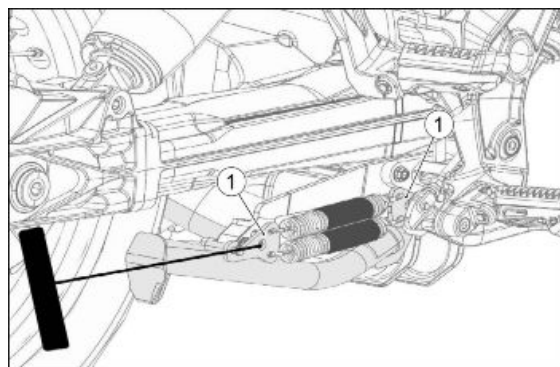
See also[Replacement](#)**Stand**

| STAND | | | | | |
|--------------|---|------|----------|----------------------|-------------|
| Pos. | Description | Type | Quantity | Torque | Notes |
| 1 | Side stand retainer pin | - | 1 | 10 Nm (7.38 lbf ft) | - |
| 2 | Nut fastening the side stand to the stand mounting | M10 | 1 | 30 Nm (22.13 lbf ft) | Loctite 243 |
| 3 | Screws fastening the stand mounting to the frame | M10 | 4 | 50 Nm (36.88 lbf ft) | - |
| 4 | Screws fastening side stand switch and related protection to the stand mounting | M5 | 4 | 10 Nm (7.38 lbf ft) | - |

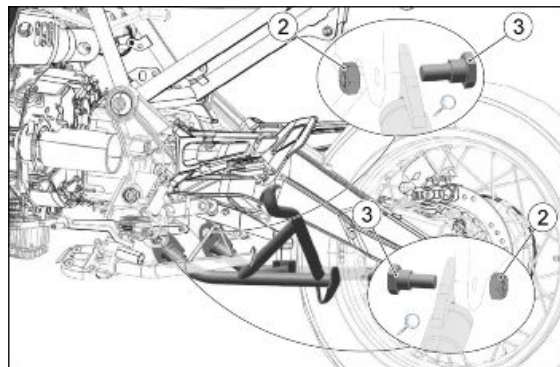
Centre stand

Removal

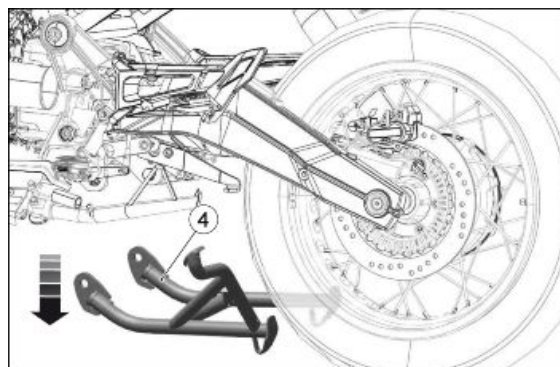
Using a spring puller, release the springs, including the plates (1), from the centre stand and its support on the frame.



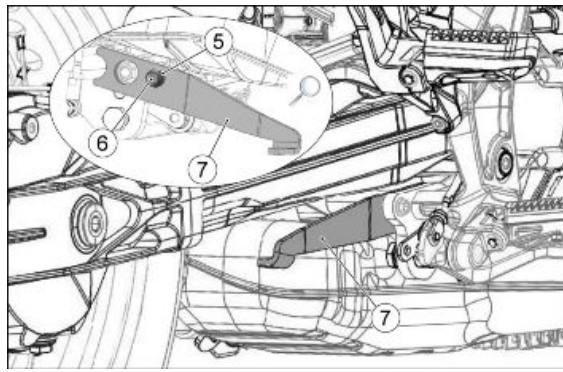
Unscrew the bolts (2) and remove the pins (3) securing the stand.



Remove the centre stand (4) from under the vehicle.



Unscrew the nut (5) and the fixing screw (6) of the stop bracket (7) and remove it from the right side of the stand support.



Fitting

Follow the removal procedures in reverse order and tighten the mountings to the proper tightening torques.

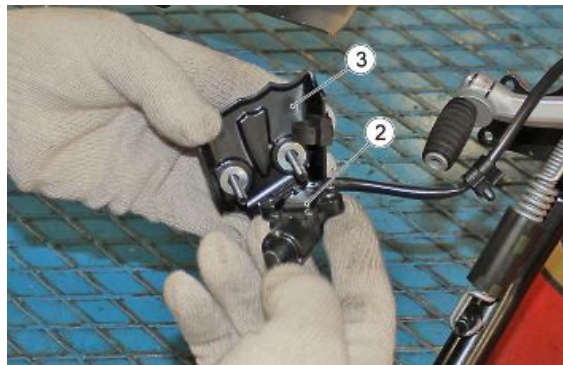
Side stand

REMOVAL

- Unscrew and remove the screws (1)



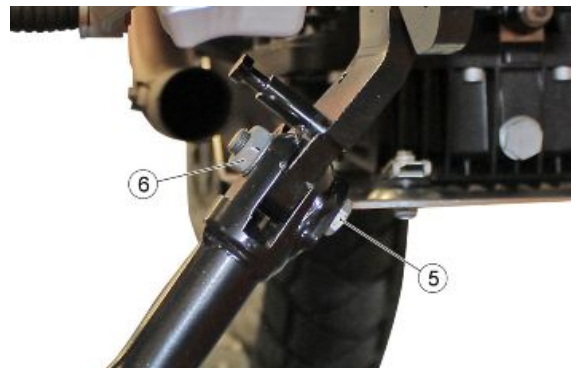
- Remove the sensor (2) and the cover (3) from the stand support



- Remove the spring (4)



- Holding the pin (5) in place, unscrew and remove the nut (6)



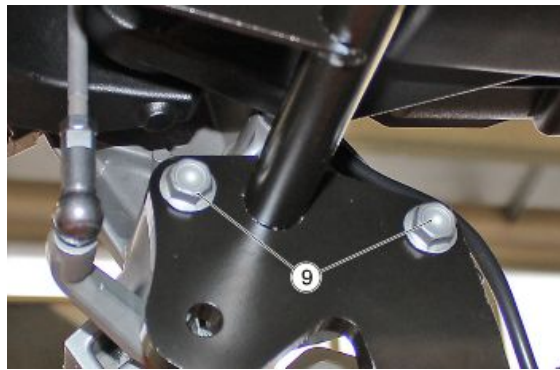
- Remove the side stand (7).



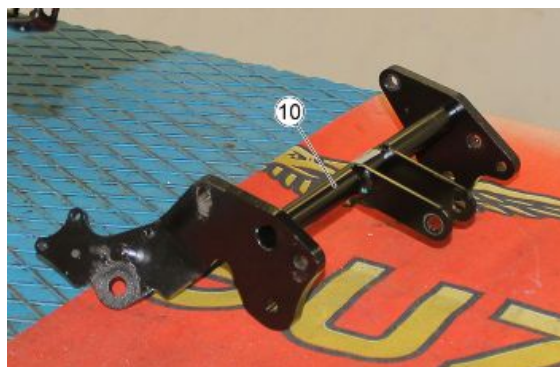
- Unscrew and remove the screws (8)



- Unscrew and remove the screws (9)

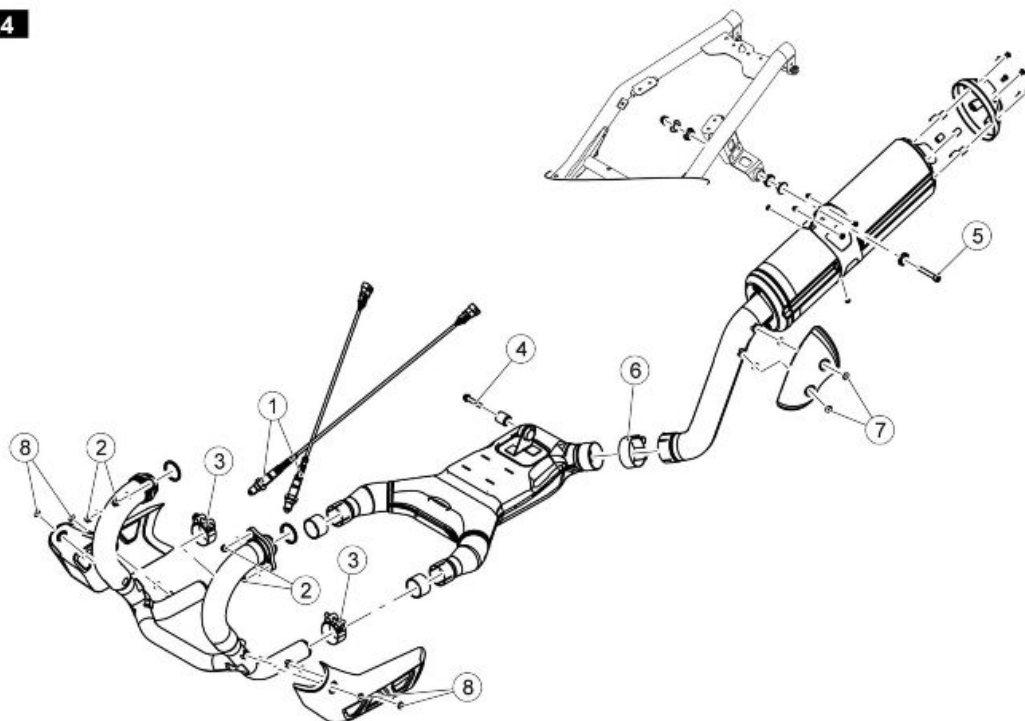


- Remove the stand support (10)



Exhaust

E4

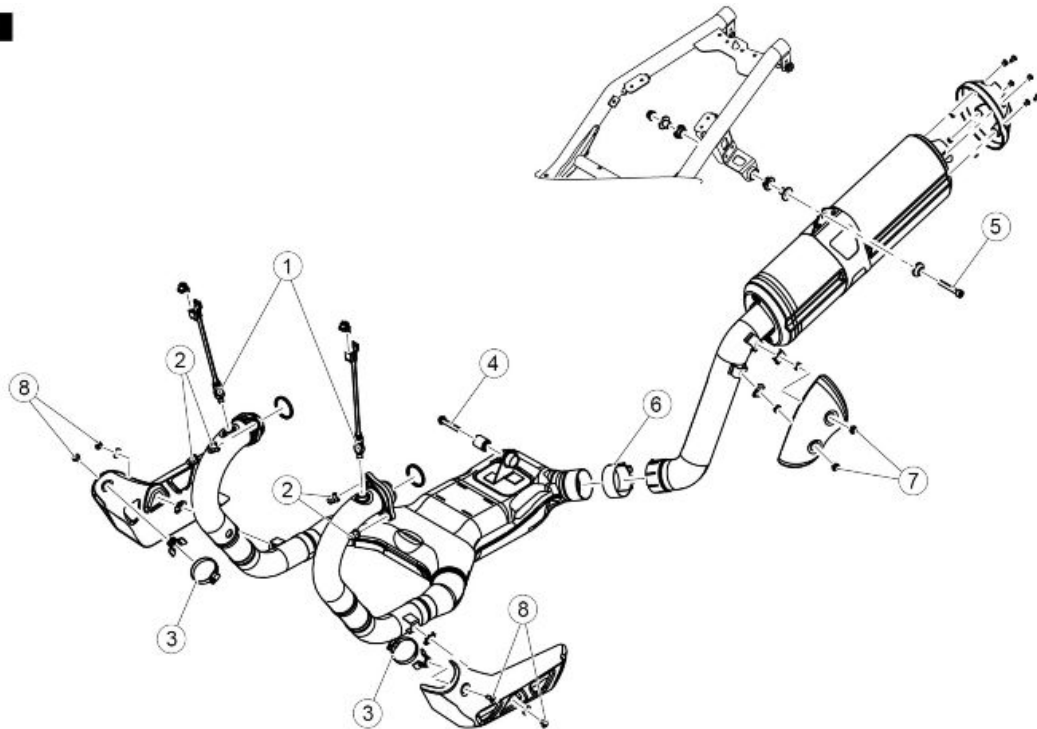


SILENCER - E4

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Lambda probe fastener | - | 2 | 38 Nm (28.03 lb ft) | - |
| 2 | Nut fixing exhaust manifolds to engine | M8 | 4 | 25 Nm (18.44 lbf ft) | - |

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 3 | Clamp fastening the compensator to the exhaust manifold | - | 2 | 25 Nm (18.44 lbf ft) | - |
| 4 | Screw fastening the compensator to the stand mounting | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 5 | Muffler/frame fastening screw | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Clamp fixing the muffler to the compensator | - | 1 | 25 Nm (18.44 lbf ft) | - |
| 7 | Screws fastening the muffler heat-shield to the muffler | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 8 | Screw fastening the heat-shield to the manifolds | M6 | 4 | 10 Nm (7.38 lbf ft) | - |

E5



SILENCER - E5

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Lambda probe fastener | - | 2 | 38 Nm (28.03 lb ft) | - |
| 2 | Nut fixing exhaust manifolds to engine | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Pipe clamp fixing to fasten the heat shield to the manifold | - | 2 | 3.5 Nm (2.58 lbf ft) | - |
| 4 | Screw fastening the compensator to the stand mounting | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 5 | Muffler/frame fastening screw | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Clamp fixing the muffler to the compensator | - | 1 | 25 Nm (18.44 lbf ft) | - |
| 7 | Screws fastening the muffler heat-shield to the muffler | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 8 | Screw fastening the heat-shield to the manifolds | M6 | 4 | 10 Nm (7.38 lbf ft) | - |

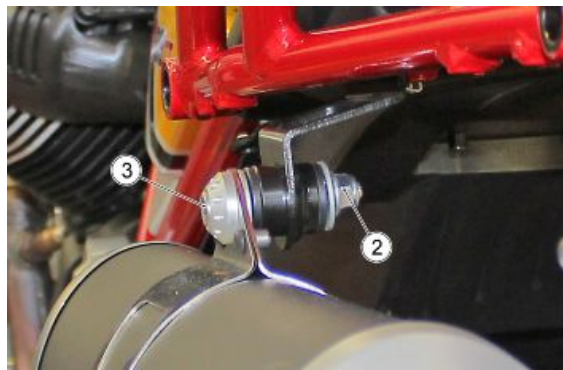
Removing the tail pipe

REMOVAL

- Loosen the clamp (1)



- Block the nut (2) so that it cannot rotate and remove the screw (3)



- Remove the rear silencer (4)

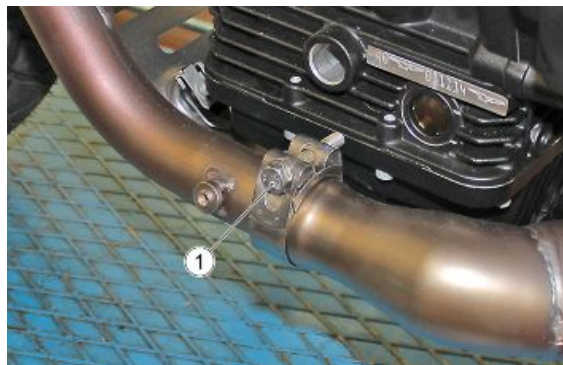


Removing the manifold - tail pipe

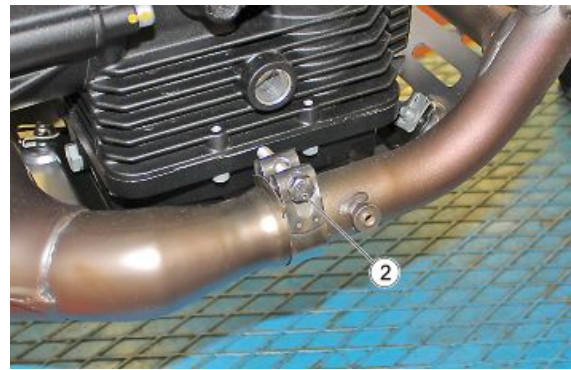
NOTE

PROCEDURE VALID ONLY FOR E4 VEHICLES

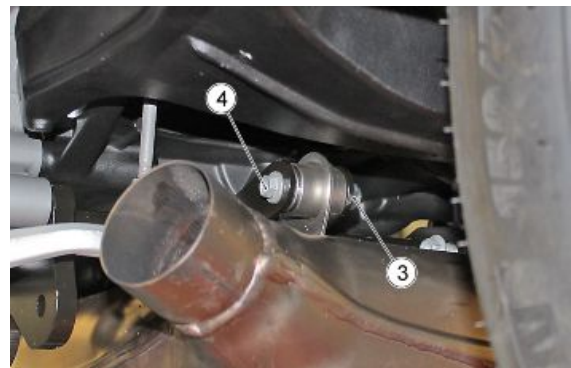
- Remove the terminal
- Remove the heat shield
- Loosen the clamp (1)



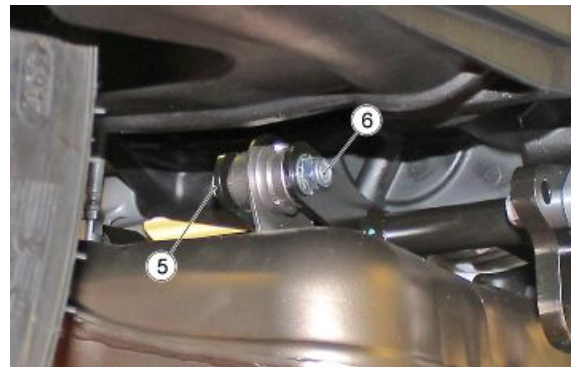
- Loosen the clamp (2)



- Block the nut (3) so that it cannot rotate and remove the screw (4)



- Block the nut (6) so that it cannot rotate and remove the screw (5)



- Remove the central manifold (7)

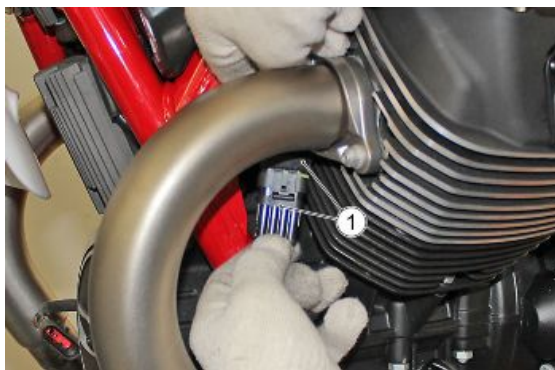


Removing the exhaust manifold

NOTE

PROCEDURE VALID ONLY FOR E4 VEHICLES

- Disconnect the lambda probe connectors (1) from both sides of the vehicle



- Unscrew and remove the nuts (2) from both sides of the vehicle



- Remove the exhaust manifold (3)

**NOTE****PROCEDURE VALID ONLY FOR E5 VEHICLES**

- Remove the fixing screws (1) of the heat shield and remove it from the vehicle
- Repeat this operation also on the opposite side of the vehicle
- Remove the sump guard



- Disconnect the lambda probe connectors (2) from both sides of the vehicle



- Remove the rear fixing screw (3)



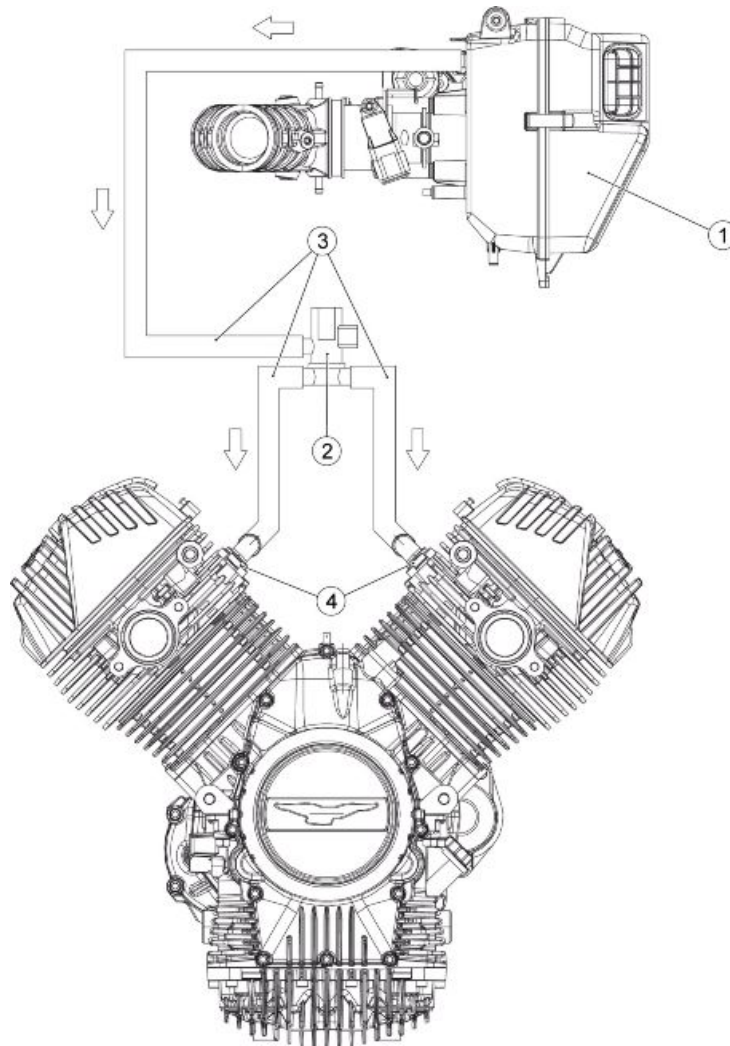
- Remove the fixing screws (4) from both sides of the vehicle



- Remove the manifolds from the vehicle



Sistema aria secondaria

**Key:**

1. Air filter box
 2. Secondary air valve
 3. Secondary air system pipe
 4. Secondary air system inlets on the engine
- Two auxiliary air inlets have been included in the cylinder head which, in combination with the injection system with oxygen sensor and three-way catalytic converter, ensure compliance with severe new Euro 4 emissions regulations

- Undo the screws fastening the reed valve cover.



- Remove the reed valve cover

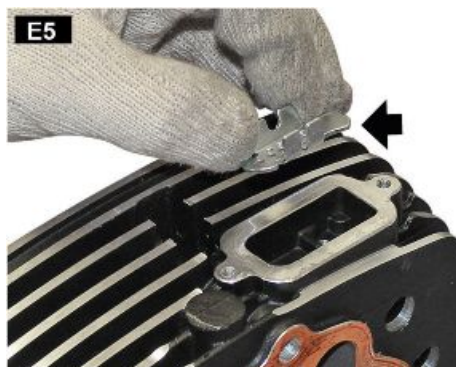


- Remove the reed valve.



E5

- Remove the flame trap.



E5

- A valve controlled by the engine ECU is installed under the tank, which allows air to flow towards the cylinders via two flexible hoses.



- This valve is connected directly to the filter box via a flexible hose.



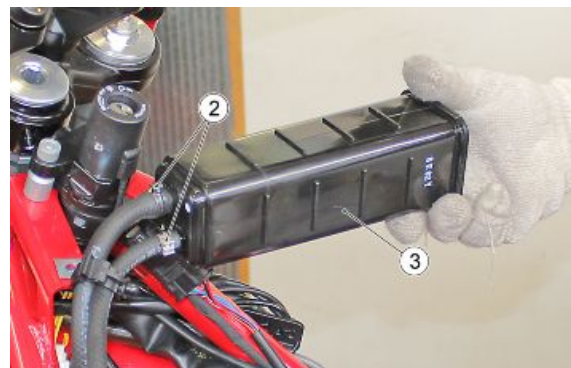
Evaporative emissions control system

REMOVAL

- Remove the fuel tank
- Remove the coil
- Remove the clamp (1)



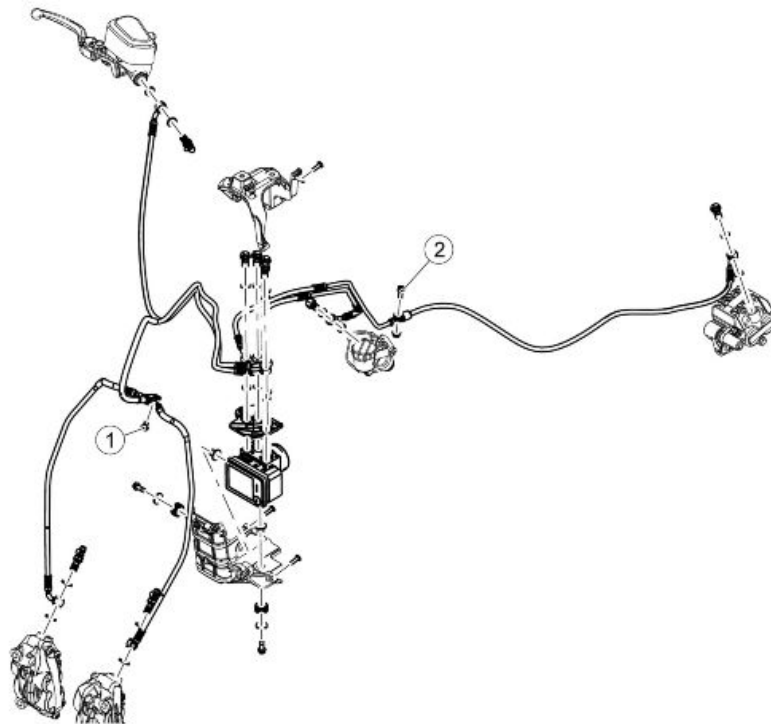
- Remove the clamps (2)
- Remove the canister filter (3)



INDEX OF TOPICS

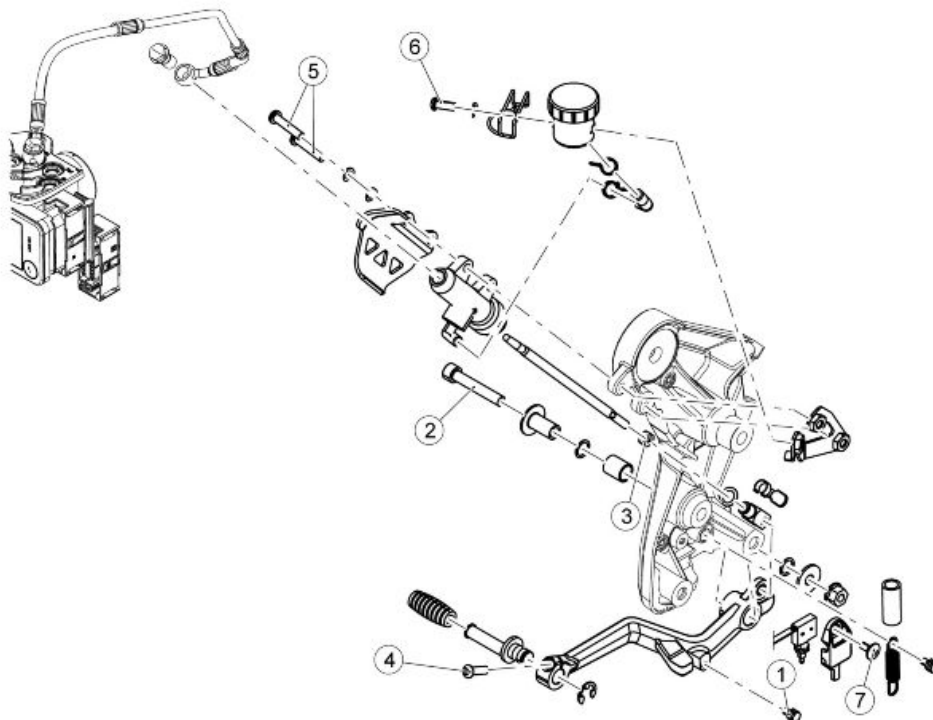
BRAKING SYSTEM

BS



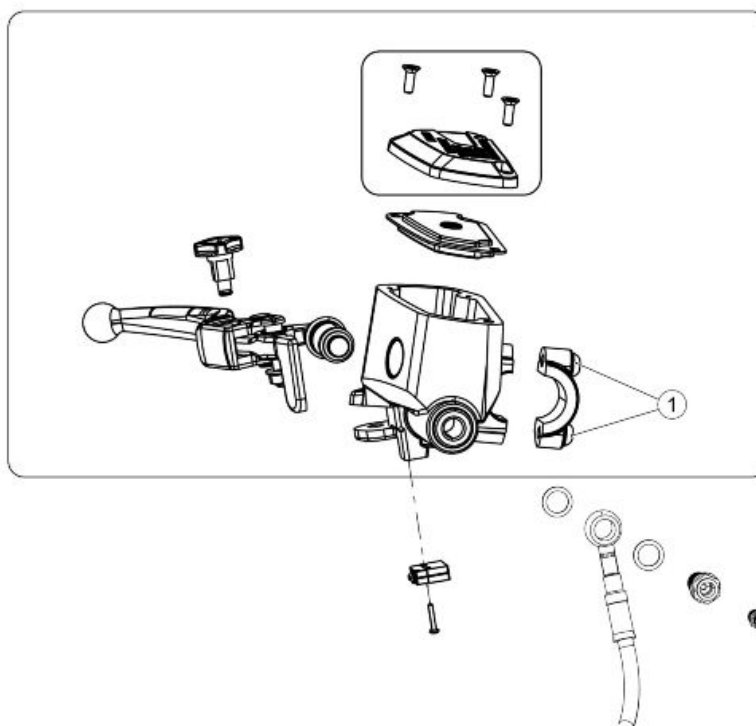
ABS BRAKING SYSTEM

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screw fastening the brake pipe to the lower steering plate | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 2 | Rear screw fastening the brake pipe to the frame | M6 | 1 | 10 Nm (7.38 lbf ft) | - |

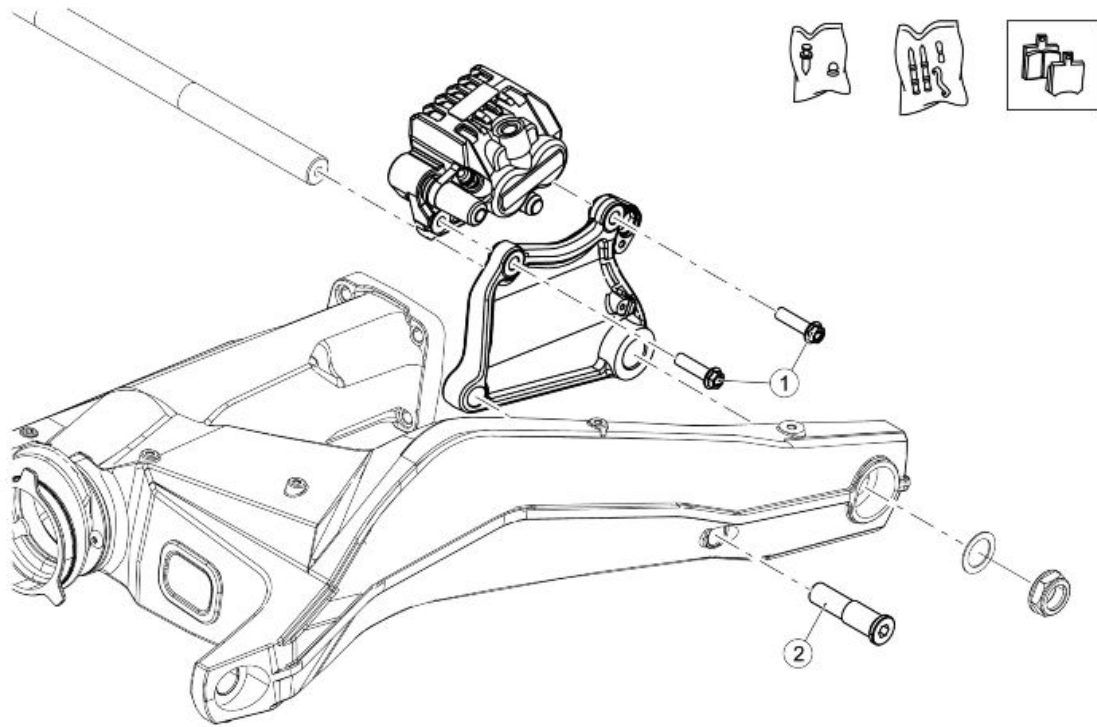


REAR BRAKE MASTER CYLINDER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Pin fastening the rear brake lever spring coupling to the frame plate | - | 1 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screw fastening the rear brake lever to the frame plate | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 3 | Nut fastening the rear master cylinder rod to the lever | M6 | 1 | - | - |
| 4 | Peg fixing screw | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Screws fastening the rear master cylinder and oil reservoir support to the frame plate | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 6 | Screws fastening the oil reservoir and cap retainer to the oil reservoir support bracket | M6 | 1 | 6 Nm (4.43 lbf ft) | - |
| 7 | Screw fastening the rear stop switch to the right frame plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Pin fastening the rear brake lever spring coupling to the complete rear brake lever | - | 1 | 6 Nm (4.43 lbf ft) | - |

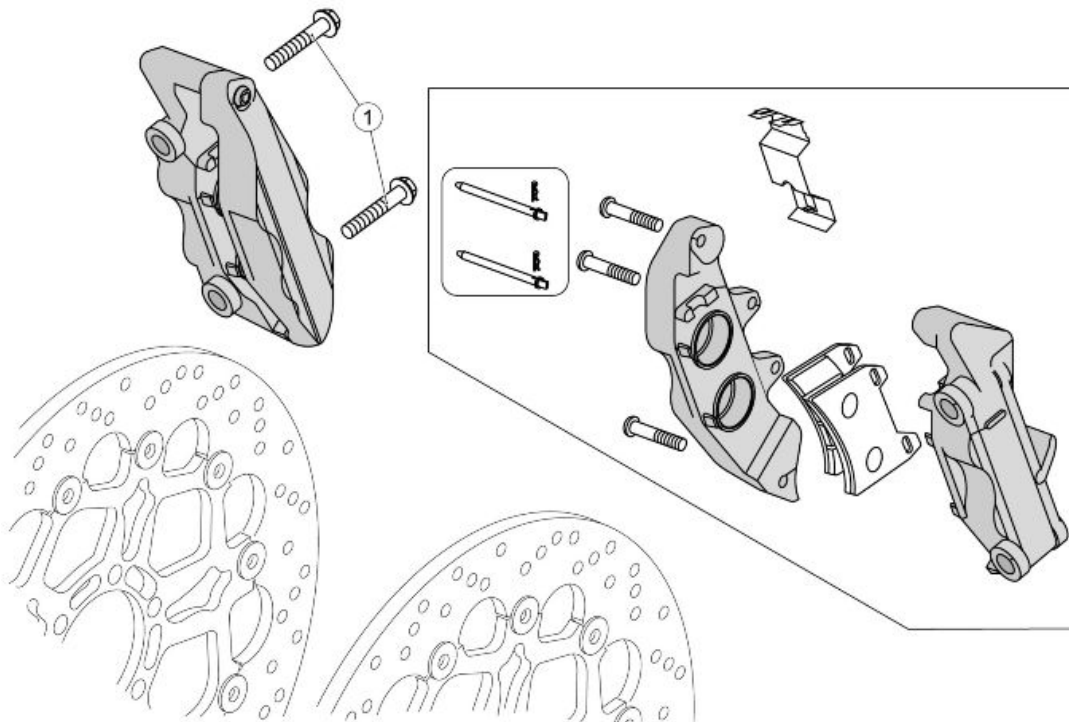
**FRONT BRAKE MASTER CYLINDER**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|-------------------------------|---|
| 1 | Screws fastening the front brake master cylinder clamp to the handlebars | M6 | 2 | 10 Nm (7.38 lbf ft) | Screws pre-assembled on the master cylinder |
| 2 | Brake pump cover fixing screws | - | 3 | 0.8-1.5 Nm (0.59-1.11 lb ft) | - |
| 3 | Special oil pipe fixing screw | - | 1 | 23-26 Nm (16.96-19.18 lbf ft) | - |
| 4 | Bleeder screw | - | 1 | 4-7 Nm (2.95-5.16 lb ft) | - |



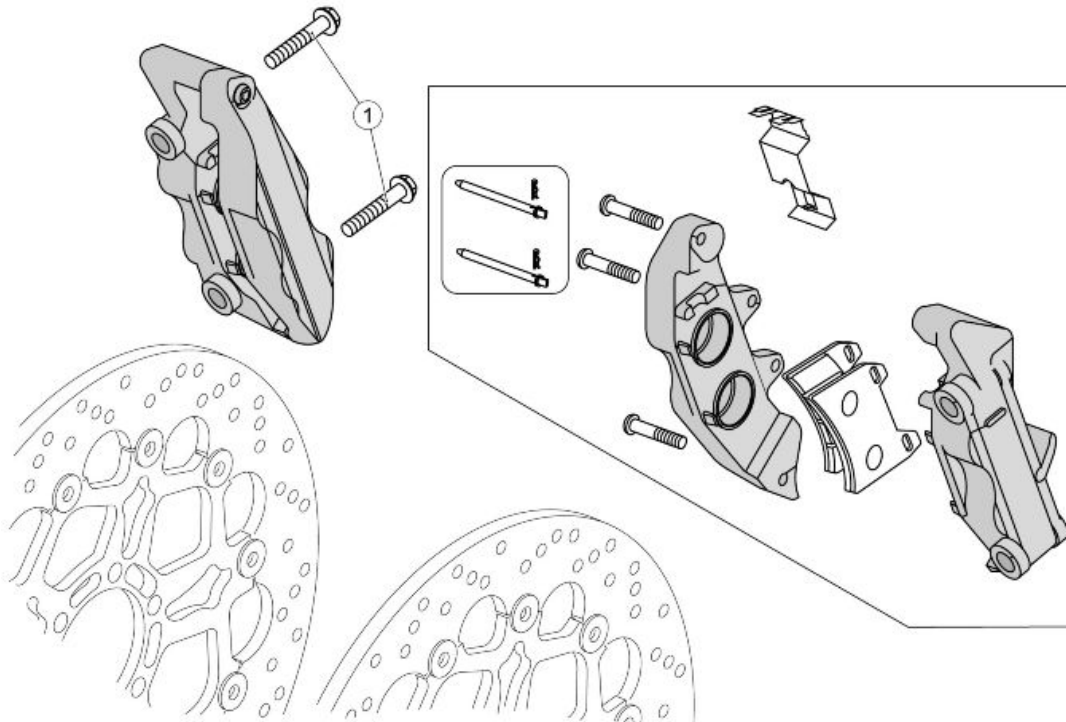
REAR BRAKE CALLIPER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Screws fastening the rear brake calliper to the calliper support bracket | M8 | 2 | 25 Nm (18.44 lbf ft) | - |
| 2 | Pin fastening the rear brake calliper support bracket | - | 1 | 35 Nm (25.81 lbf ft) | - |



FRONT BRAKE CALLIPER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws fastening the front brake caliper to the calliper mounted bracket | M10 | 4 | 50 Nm (36.88 lb ft) | - |

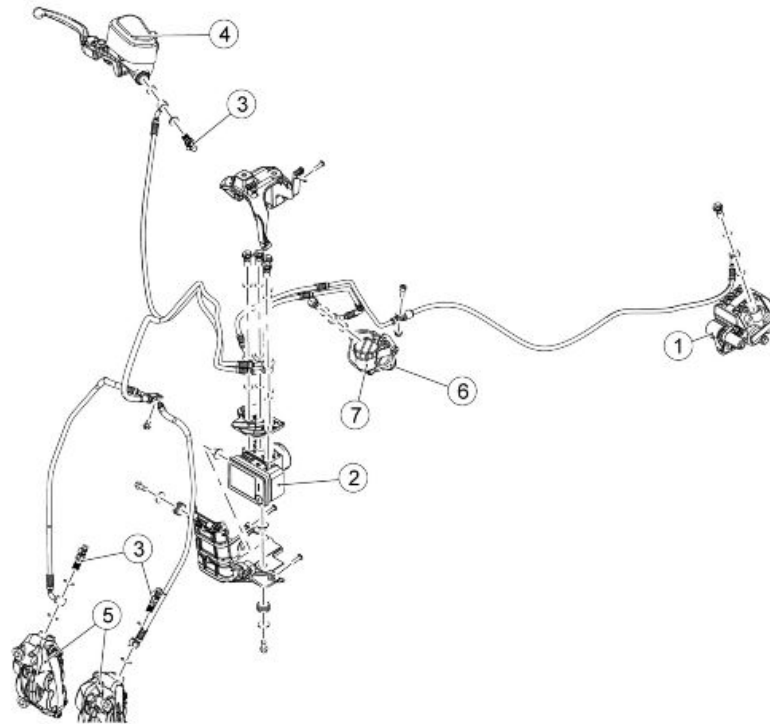
**FRONT BRAKE CALLIPER**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws fastening the front brake caliper to the calliper mounted bracket | M10 | 4 | 50 Nm (36.88 lb ft) | - |

Interventions rules**IMPORTANT**

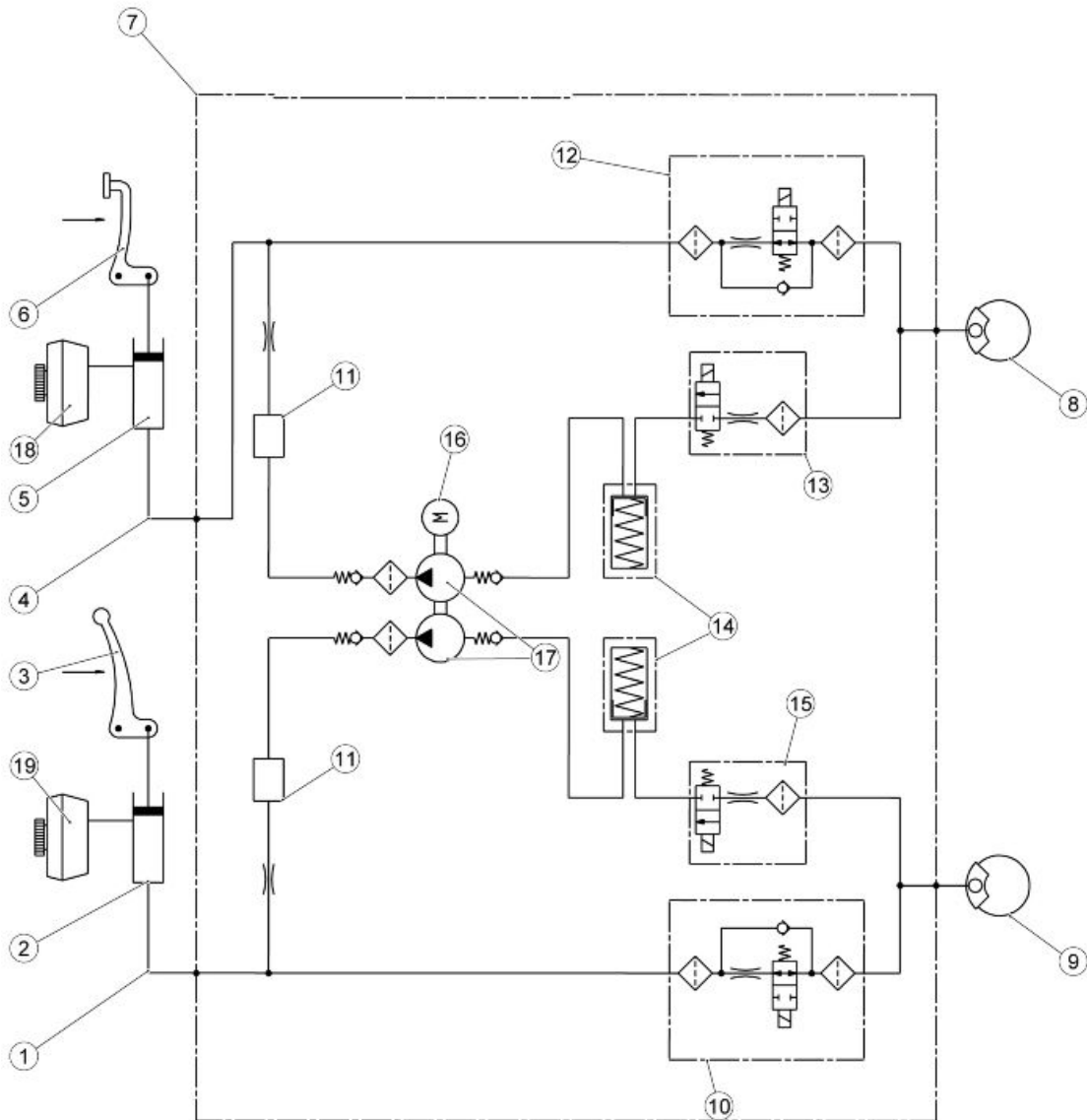
THE FRONT BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.

Foreword

**Key:**

1. Rear brake calliper
2. Modulator
3. Front bleed valve
4. Front brake reservoir
5. Front brake callipers
6. Rear brake master cylinder
7. Rear brake reservoir

Operating diagram



ABS functional diagram key

- 1. Front system circuit
- 2. Front brake master cylinder
- 3. Front brake control lever
- 4. Rear system circuit

5. Rear brake master cylinder
6. Rear brake pedal
7. ABS control unit
8. Rear brake calliper
9. Front calliper (2 callipers)
10. Front brake circuit inlet solenoid valve (normally open)
11. Humidifier
12. Rear brake circuit inlet solenoid valve (normally open)
13. Rear brake circuit outlet solenoid valve (normally closed)
14. Rear/front brake circuit low pressure accumulator
15. Front brake circuit outlet solenoid valve (normally closed)
16. DC electric motor
17. Dual hydraulic circuit pump (ABS)
18. Rear brake reservoir
19. Front brake reservoir

ABS OPERATION

General specifications:

The front circuit is the same as the rear one.

- The ABS inlet valve (10 - 12) is normally open and it is closed only when the system intervenes to avoid wheel locking.
- The exhaust valve (13 - 15) is normally closed and it is opened only when the system intervenes to avoid wheel 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.
- When in standby, the system does not intervene at all when the rider brakes; the braking system is the same as the one without ABS.

ABS Cycle phases (the following operations refer to the front circuit but they are also valid for the rear):

A - Brake activation: 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 inlet valve (10-12) and opens the exhaust valve (13-15) temporarily.

At this stage the rider cannot increase the pressure on the callipers (8-9) and the system reduces the pressure on the callipers partially. The excess fluid temporarily fills the front reservoir (18-19) until the ABS pump (17) self-activates and delivers the fluid back to the brake pump (2-5).

C - Maintaining pressure: the pressure in the callipers (8-9) remains low until total recovery of speed / wheel grip.

The system restores the fluid taken from the calliper (8-9) in the section of the system between the brake pump (2-5) and the ABS inlet valve (10-12).

D - Pressure restoration: by opening the inlet valve (10-12) momentarily, the pressure of the callipers (8-9) is increased until maximum deceleration is reached. Then, the system gives the control over the braking back to the rider.

E - If the wheel does not reach complete grip, the system continues operating as before until complete grip is obtained or until the vehicle stops. An error may be generated, however, if the pressure reduction stage persists for longer than a predetermined limit.

ABS SYSTEM DESCRIPTION

The ABS system is a device to avoid wheels locking in case of emergency braking, increasing vehicle braking stability when compared to a traditional braking system.

Sometimes when the brake is operated, the tyre locks with a consequent loss of grip, which makes it difficult to control the vehicle. A position sensor (3) on the tone wheel (2), forming an integral unit with the vehicle wheel, "reads" the status of the vehicle wheel spotting any possible lock.

A control unit (1) signals this out and adjusts the pressure in the braking circuit accordingly.



NOTE

WHEN THE ABS STARTS WORKING, A PULSING IS FELT ON THE BRAKE LEVER.



THE WHEEL ANTILOCK BRAKING SYSTEM DOES NOT PREVENT FALLS WHILE ON A BEND. AN EMERGENCY BRAKING WITH THE VEHICLE INCLINED, HANDLE BAR TURNED, ON UNEVEN OR SLIPPERY ROADS, OR WITH POOR GRIP CREATES LACK OF STABILITY DIFFICULT TO HANDLE. THEREFORE, RIDE CAREFULLY AND SENSIBLY AND ALWAYS BRAKE GRADUALLY. BRAKING WHILE TURNING A CORNER IS SUBJECT TO LAWS OF PHYSICS WHICH NOT EVEN ABS CAN ELIMINATE.

When the sensors (3) detect a significant speed difference between the rear and the front wheels (for example, when rearing up on the back wheel), the ABS system could take this as a dangerous situation.

In this case, there are two possible results:

- The ABS system intervenes by releasing pressure from the calliper until the wheel turns again at the same speed of the other wheel. Braking is not possible for an instant.
- if the speed difference lasts long, the system may detect an error and deactivate the ABS system. As a consequence, the system works like any regular braking system.

Advanced functions - ABS

- This function allows you to disable the ABS system that is normally active "On".
- Briefly pressing the MODE selector in the middle deactivates the function ("Off") and pressing it again reactivates it ("reactivate").
- Disabling is possible only when the vehicle is in "OFF ROAD" mode. If the riding mode is changed, ABS reactivates.
- To return to the "MENU", briefly press the MODE selector in the middle on "Exit"



IMPORTANT

IT IS DISABLED ONLY TEMPORARILY, WHEN THE KEY IS INSERTED THE SYSTEM IS ALWAYS ACTIVE.

IMPORTANT

DISABLING IS POSSIBLE ONLY WHEN THE VEHICLE IS IN "OFF ROAD" MODE. IF THE RIDING MODE IS CHANGED, ABS REACTIVATES.
IF DISABLED, THE ABS INDICATOR LIGHT STAYS ON STEADY.

- Upon starting the vehicle, after the initial instrument panel check, the ABS warning light flashes until a speed of 5 kph (3.11 mph) is exceeded and then it switches off or continues to flash even after exceeding the speed of 5 kph (3.11 mph).
- If the ABS warning light continues flashing or is permanently on, a failure has been detected and the ABS has been automatically deactivated.



Characteristic

Distance between tone wheel and front sensor

0.1 - 3.17 mm (0.004 - 0.125 in)

Distance between tone wheel and the rear sensor

0.1 - 3.10 mm (0.004 - 0.122 in)

- In OFF ROAD mode, the ABS system deactivates automatically for the rear wheel.

IMPORTANT

ONLY IN THIS MODE DOES THE ABS SYSTEM STAY ACTIVE EXCLUSIVELY FOR THE FRONT WHEEL AND THE DEDICATED SYMBOL APPEARS ON THE DISPLAY TO REMIND THE RIDER TO TAKE PARTICULAR CARE.



Guide to diagnosis

FOREWORD

Each time the key is set to ON, if at least one current or stored error is detected*, the ABS warning light turns on permanently.

The ABS system is automatically deactivated

However, the system is perfectly operative as any other braking system without ABS

* **Diagnosis is possible when exceeding 5 km/h (3.1 mph).**



Each time the key is set to ON, if at least one current or stored error is not detected immediately in the system:

- the ABS warning light flashes.

Once the vehicle speed exceeds 5 km/h (3.1 mph):

- if errors are not detected: the ABS warning light turns off
- if at least one malfunction is detected: the ABS warning light turns on permanently.

The ABS system is deactivated!

However, the system is perfectly operative as any other braking system without ABS.

The detection of malfunctions may require more or less time according to the type of failure.

Error detection logic foresees that for the errors to be diagnosed one or more conditions must persist within a given time.

If during that time, one of the conditions is no longer present and reappears afterwards, the timer is reset and the system is not able to diagnose the error.

The ABS system continues to be inactive.

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. PERFORM THESE CHECKS:

- A. PIN 1 Ground
- B. +12V at PIN 18

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

5. CHECK THE ERRORS 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. Cable continuity between PIN 8 of the ABS control unit connector and PIN 40 of the instrument cluster.
- B. Check connectors - refer to the operations described in the chapter

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

- C. ABS Control unit malfunction
- D. Instrument cluster malfunction

Modulator

REMOVAL

- Remove the engine from the vehicle

PREPARATION OF THE VEHICLE

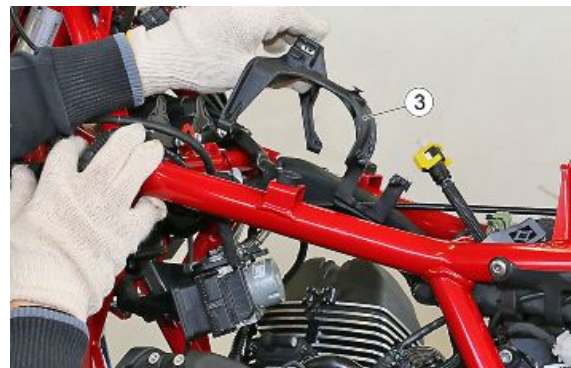
- Connect the bleeder bottles to the front and rear calliper bleeder screws and open them.
- Press the front brake lever and the rear brake pedal as far as they will go and block them in position using the clamping devices. Close the front and rear calliper bleeder screws and remove the bleeder bottle
- Mark a reference on the pipes and on the ABS control unit to avoid inverting them when refitting
- Undo and remove the screw (1)



- Undo and remove the screw (2)



- Remove the support bracket (3)



- Disconnect the connector (4)



- Unscrew and remove the screws (5)
- Remove the ABS control unit (6)

NOTE

FIRST OF ALL, DISCONNECT THE LINES BETWEEN THE ABS CONTROL UNIT AND THE BRAKE MASTER CYLINDERS AND SEAL THE OPEN COUPLINGS ON THE ABS CONTROL UNIT IMMEDIATELY USING PROTECTIVE PLUGS. NEXT, REMOVE THE LINES BETWEEN THE ABS CONTROL UNIT AND THE BRAKE CALLIPERS AND SEAL THESE COUPLINGS USING PROTECTIVE PLUGS TOO.



INSTALLATION

- Remove the ABS modulator
- Install the new completely pre-filled ABS control unit

- In order to ensure that the brake fluid remains inside the ABS control unit, first remove the protective plugs from the braking circuit couplings and connect the corresponding lines.
- Once all the braking circuit lines have been connected, remove the protective plugs from the couplings of the brake master cylinders and connect the respective lines to the ABS control unit.
- Remove the clamp from the front brake lever and the rear brake pedal
- Remove the caps from the reservoirs and fill them with new brake fluid

IMPORTANT

PERFORM THE STANDARD BRAKING SYSTEM BLEEDING PROCEDURE, AS DESCRIBED AT THE END OF THE CHAPTER.

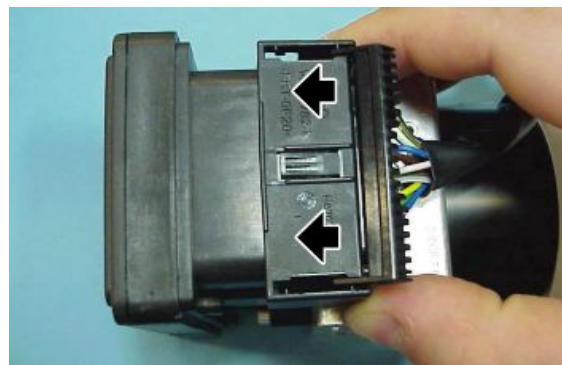
- Fill the reservoirs and refit the caps
- Check the stroke and sensitivity of the front brake lever and the rear brake pedal
- If the brake pedal or lever stroke is too long after carrying out the bleeding procedure, check the braking system for leaks and, if none are found, bleed the system using the diagnostic tool, as described.
- Disconnect the flexible bleeder pipes and re-tighten the bleeder screws, applying the correct torque

ABS CONTROL UNIT CONNECTOR INSERTION PROCEDURE

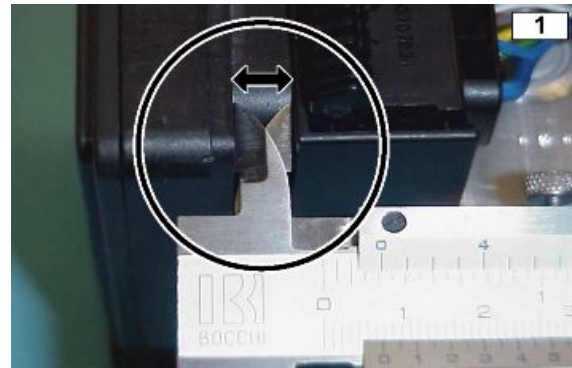
- Check the initial position of the connection clip lever.



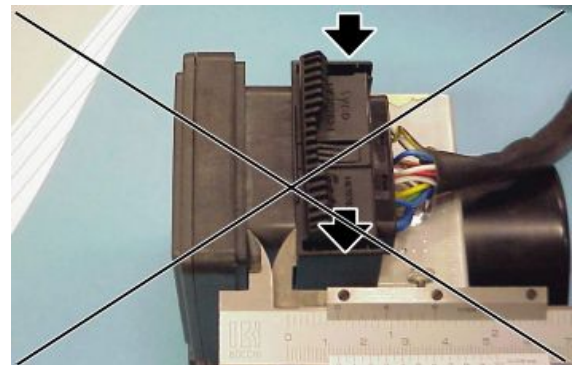
- When the connector is fully inserted, the distance between the connector and the ABS control unit must be 7.5 mm (0.29 in).



- If the initial position of the connector and the driving lever is not that shown in fig. 1, the connector will not be properly coupled and the distance measured will be greater (12 mm approx. (0.47 in)). In this case repeat the operation as described in the two previous points.

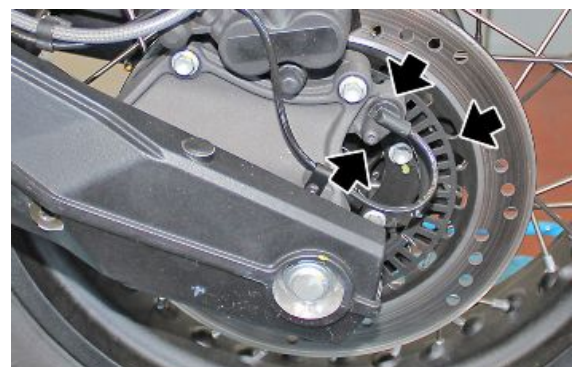
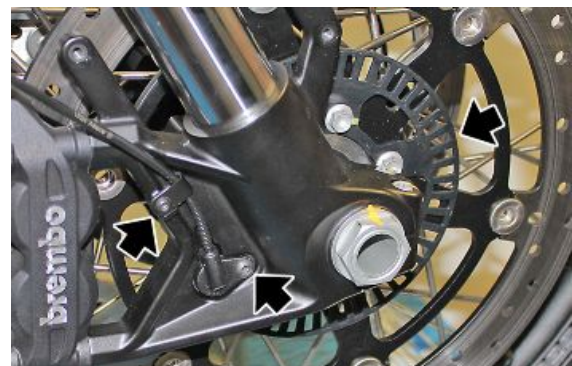


WE RECOMMEND CREATING A TEMPLATE IN ORDER TO ENSURE THAT THE CONNECTOR IS INSERTED CORRECTLY.



Component maintenance

- The vehicle is equipped with two-channel ABS. In other words, it works on both the front and rear wheel. Periodically and each time the wheels are remounted, the phonic wheel or the sensor is replaced, it is important to check that the distance is consistent over all 360°. To do this, use a feeler gauge and check the distance between the sensor and the phonic wheel on three points at a distance of 120°.



IMPORTANT

IF THE READINGS SHOULD RETURN A VALUE OUTSIDE OF THE FIELD OF TOLERANCE, REPLACE THE SENSOR AND/OR THE PHONIC WHEEL AND REPEAT THE CHECK IN ORDER TO ENSURE THAT THE VALUES FALL WITHIN THE FIELD OF TOLERANCE.

Characteristic

Distance between tone wheel and front sensor

0.1 - 3.17 mm (0.004 - 0.125 in)

Distance between tone wheel and the rear sensor

0.1 - 3.10 mm (0.004 - 0.122 in)

CLEANING THE PHONIC WHEELS

- It is important to check that both phonic wheels are always clean. If not: delicately remove any dirt residues using a cloth or wire brush. Do not use solvents or abrasive substances and do not direct air or water jets directly on the phonic wheel.

REPLACING THE PHONIC WHEEL SENSOR

- Disconnect the front phonic wheel sensor connector from the main wiring harness. Unscrew and remove the screws and remove the phonic wheel sensor

IMPORTANT

**BEFORE REFITTING, ENSURE THAT THE CONTACT SURFACES BETWEEN THE SENSOR AND THEIR SEATS ARE FREE OF IMPERFECTIONS AND PERFECTLY CLEAN.
ALWAYS CHECK THE DISTANCE BETWEEN THE SENSOR AND THE PHONIC WHEEL.**

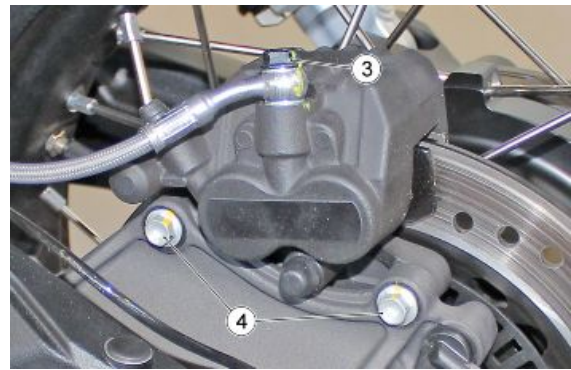
Rear brake calliper

Removal

- Connect the bleeder bottles to the calliper bleeder screw and open
- Press the lever down as far as it will go and block it in position using a clamping device in order to prevent the liquid from escaping from the system when it is open.
- Close the calliper bleeder screw and remove the bleeder bottle.
- Loosen the two grub screws (1)
- Free the brake calliper line from the cable grommet (2)



- Unscrew and remove the joint screw (3) from the rear calliper
- Unscrew and remove the screws (4)



- Remove the rear calliper (5)

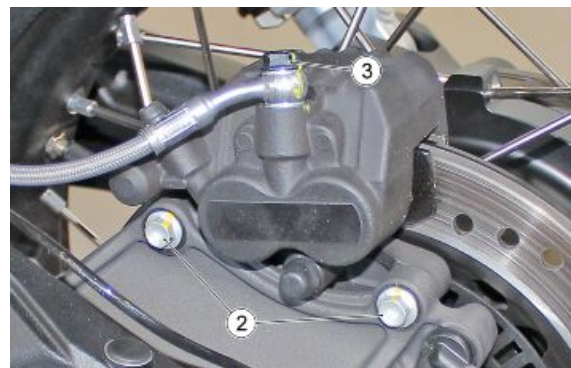


Installing

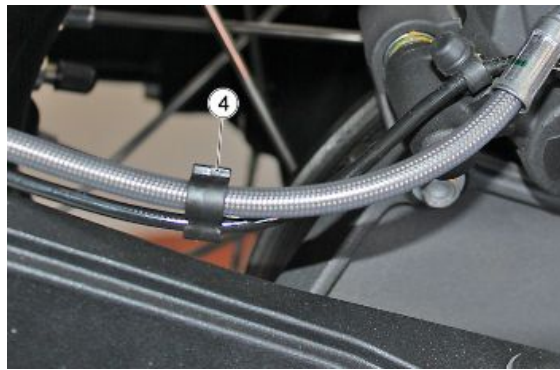
- Remove the rear brake calliper
- Correctly position the new rear brake calliper (1) on the brake disc



- Insert and tighten the screws (2)
- Position the brake line, insert and tighten the screw (3)



- Hook the brake line into the cable grommet (4)



- Insert and tighten the two grub screws (5)



- Remove the clamp from the brake pedal.
- Remove the brake fluid reservoir cap and fill it with new brake fluid

IMPORTANT

PERFORM THE STANDARD BRAKING SYSTEM BLEEDING PROCEDURE, AS DESCRIBED AT THE END OF THE CHAPTER.

- Top up the fluid reservoir and refit the cap
- Check the stroke and sensitivity of the brake pedal
- If the brake pedal stroke is too long after carrying out the bleeding procedure, check the braking system for leaks and, if none are found, bleed the system using the diagnostic instrument, as described
- Disconnect the flexible bleeder pipes and re-tighten the bleeder screws, applying the correct torque

Front brake calliper

Removal

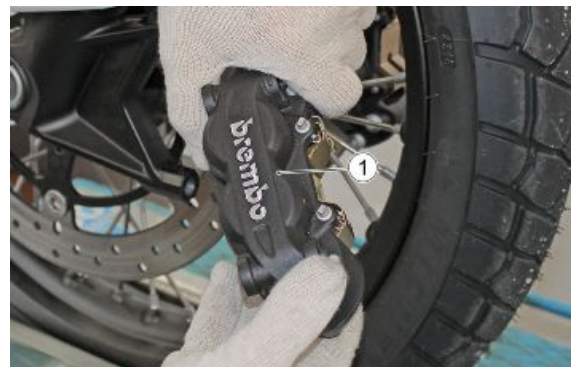
The following procedure is described for a single calliper, but is valid for both front brake callipers.

- Connect the bleeder bottles to the calliper bleeder screw and open
 - Press the lever down as far as it will go and block it in position using a clamping device in order to prevent the liquid from escaping from the system when it is open.
 - Close the calliper bleeder screw and remove the bleeder bottle.
 - Unscrew and remove the joint screw (1) from the front calliper
 - Unscrew and remove the two screws (2)
-
- Remove the front brake calliper (3)

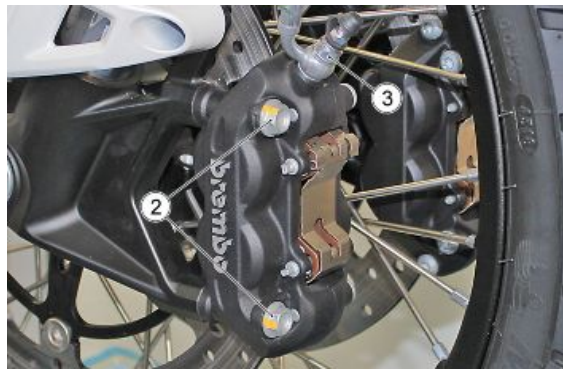


Installing

- Remove the front brake calliper
- Correctly position the new front brake calliper (1) on the brake disc



- Insert and tighten the screws (2)
- Position the brake line on the brake calliper and insert and tighten the screw (3)



- Remove the clamp from the front brake lever.
- Remove the brake fluid reservoir cap and fill it with new brake fluid

IMPORTANT

PERFORM THE STANDARD BRAKING SYSTEM BLEEDING PROCEDURE, AS DESCRIBED AT THE END OF THE CHAPTER.

- Top up the fluid reservoir and refit the cap
- Check the stroke and sensitivity of the brake lever
- If the brake lever stroke is too long after carrying out the bleeding procedure, check the braking system for leaks and, if none are found, bleed the system using the diagnostic instrument, as described
- Disconnect the flexible bleeder pipes and re-tighten the bleeder screws, applying the correct torque

Rear brake disc

Disc Inspection

REAR**IMPORTANT**

THE BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.

- The following operations are to be carried out with brake disc fitted on the wheel.
- Check the disc for wear by measuring the minimum thickness with a micrometer in different points. If the minimum thickness, even in a single point of the disc, is less than the minimum value, replace the disc.



Disc thickness minimum value: 4.5 mm (0.18 in)

Front brake disc

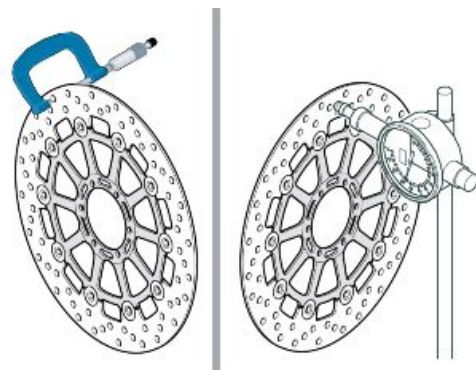
Disc Inspection

FRONT

IMPORTANT

THE FRONT BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.

- The following operations must be carried out with the brake discs fitted on the wheel; they refer to a single disc, but are valid for both.
- Check the disc for wear by measuring the minimum thickness with a micrometer in different points. If the minimum thickness, even in a single point of the disc, is less than the minimum value, replace the disc.



Disc thickness minimum value: 4 mm (0.16 in)

- Using a dial gauge, check that the maximum oscillation of the disc does not exceed the tolerance; otherwise, replace it.

Disc oscillation tolerance: 0.15 mm (0.0059 in), with respect to the wheel centre line.

Front brake pads

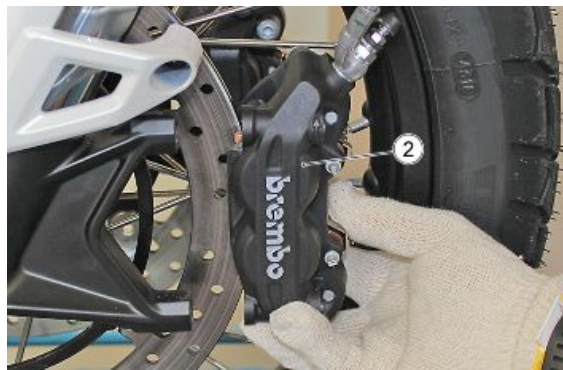
Removal

The following procedure is described for a single calliper, but is valid for both front brake callipers.

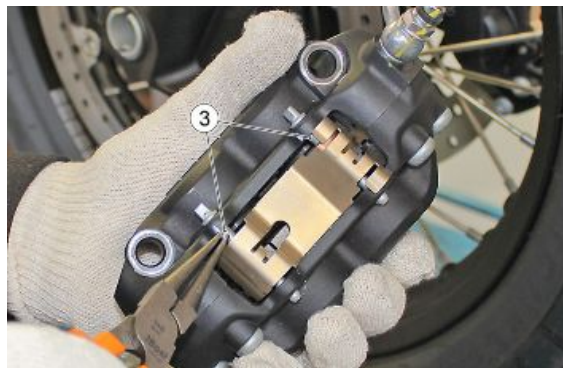
- Unscrew and remove the screws (1)



- Remove the front brake calliper (2) from the brake disc



- Remove the two retaining springs (3)



- Remove the two pins (4)



- Remove the spring (5)



- Remove the brake pads (6) one at a time

IMPORTANT

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER OR THE CALLIPER PLUNGERS COULD GO OUT OF THEIR SEATS RESULTING IN BRAKE FLUID LEAKAGE.



Installing

The following procedure is described for a single calliper, but is valid for both front brake callipers

- Insert the new pads correctly (1)

IMPORTANT

ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.



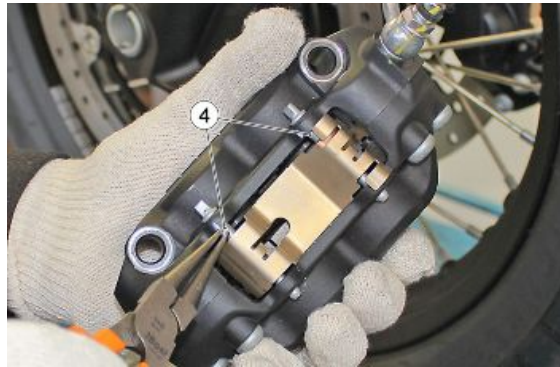
- Insert the spring (2)



- Insert the two pins (3)



- Insert the two retaining springs (4)



- Insert the front brake calliper (5) on the brake disc



- Insert the two screws (6) and tighten them



- Insert the front brake calliper (5) on the brake disc



- Insert the two screws (6) and tighten them



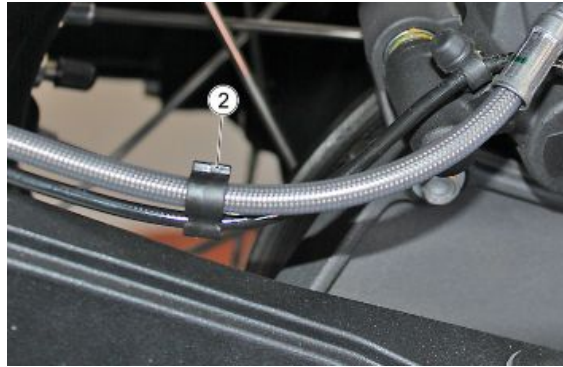
Rear brake pads

Removal

- Connect the bleeder bottles to the calliper bleeder screw and open
- Press the lever down as far as it will go and block it in position using a clamping device in order to prevent the liquid from escaping from the system when it is open.
- Close the calliper bleeder screw and remove the bleeder bottle.
- Loosen the two grub screws (1)



- Free the brake calliper line from the cable grommet (2)



- Unscrew and remove the two screws (3)



- Remove the rear brake calliper (4) from the brake disc



- Unscrew and remove the two grub screws (5).



- Remove the brake pads (6) one at a time

IMPORTANT

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER OR THE CALLIPER PLUNGERS COULD GO OUT OF THEIR SEATS RESULTING IN BRAKE FLUID LEAKAGE.

**Installing**

- Insert the new pads correctly (1)

IMPORTANT

ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.



- Insert and tighten the grub screws (2)



- Insert the rear brake calliper (3) on the brake disc



- Insert and tighten the screws (4)



- Insert the brake calliper line into the cable grommet (5)



- Tighten the two grub screws (2)



Bleeding the braking system

PREPARATION OF THE VEHICLE

- It is important to ensure that there is always a sufficient quantity of brake fluid in the tank.
- These operations may be simplified by using a bleeding device when carrying out the "Replacing the brake fluid" operations.
- In this case, when performing the bleeding procedure, it is also necessary to operate the brake pedal a few times with the bleeder device connected (approximately five times for each wheel circuit).

TRADITIONAL FRONT BLEEDING SYSTEM

Any air trapped in the hydraulic circuit acts as a cushion, absorbing much of the pressure applied by the brake pump and minimising the braking power of the calliper.

The presence of air is signalled by the "sponginess" of the brake and by poor braking.



CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING THE BRAKE CALLIPERS AND RESTORING THE BREAKING SYSTEM TO ITS REGULAR USE CONDITIONS, SO THAT THE HYDRAULIC CIRCUIT IS AIR PURGED.

NOTE

THE FOLLOWING OPERATIONS REFER TO ONE FRONT BRAKE CALLIPER ONLY, BUT ARE VALID FOR BOTH. THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

- Remove the rubber protection cover of the bleed valve.
- Insert the transparent plastic pipe in the front brake calliper bleed valve and slide the other end of this pipe in a container to collect the fluid.
- Remove the front brake fluid reservoir cap.
- Quickly press and release the front brake lever several times and then keep it fully pressed.
- Loosen the bleed valve by a 1/4 turn so that the brake fluid flows into the container, this will release the tension on the brake lever and it will make it arrive at the end stop.
- Close the bleed valve before arriving at the end of the stroke with the lever.
- Repeat the operation until there are no air bubbles in the fluid going into the container.



NOTE

WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

- Screw the bleeding valve and remove the pipe.
- Top-up the reservoir until the correct brake fluid level is obtained.
- Refit and block the front brake oil reservoir cap.
- Refit the rubber protection cover.



FRONT BLEEDING SYSTEM WITH DIAGNOSTIC TOOL

If the brake lever still feels "spongy" after completing all checks, it is necessary to bleed the brakes using this type of procedure.

- With the diagnostic tool properly connected, select the function "FRONT BLEEDING" in the section "SETTINGS".
- The pump starts running.
- While the pump is performing a rotation cycle, operate and release the front brake lever until the message diagnostic tool cycle completion is received.
- This procedure allows the air to circulate and accumulate.
- Once the procedure with diagnostic tool is finished, perform again the REGULAR PURGING to remove the air from the system completely.

TRADITIONAL REAR BLEEDING SYSTEM

Any air trapped in the hydraulic circuit acts as a cushion, absorbing much of the pressure applied by the brake pump and minimising the braking power of the calliper.

The presence of air is signalled by the "sponginess" of the brake and by poor braking.

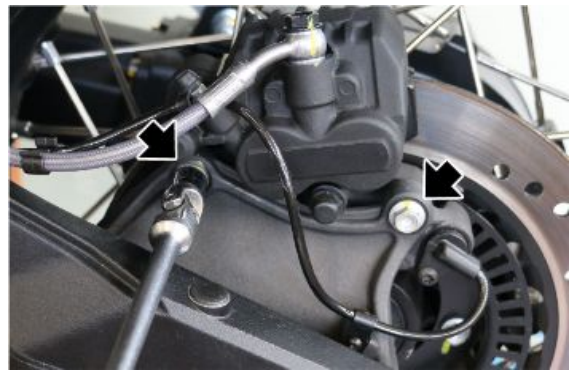


CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING THE BRAKE CALLIPERS AND RESTORING THE BREAKING SYSTEM TO ITS REGULAR USE CONDITIONS, SO THAT THE HYDRAULIC CIRCUIT IS AIR PURGED.

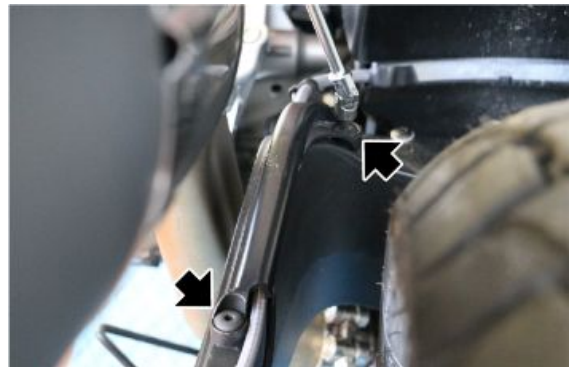
NOTE

THE FOLLOWING OPERATIONS REFER TO ONE FRONT BRAKE CALLIPER ONLY, BUT ARE VALID FOR BOTH. THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

- Remove the rear brake calliper fixing screws.



- Remove the two cable tray fixing screws of the rear brake/rear ABS sensor wiring.



- Release the rear ABS sensor wiring harness from the rubber bleed cap and from the brake pipe by disconnecting the two cable trays.



- Without removing the exhaust terminal, extract the rear brake calliper as indicated from the left side of the vehicle.



- Remove the rubber protection cover from the bleed valve.
- Insert the transparent plastic pipe in the rear brake calliper bleed valve and insert the other end of this pipe into a container to collect the fluid.
- Remove the fixing screw that locks the rear brake oil tank and the safety closure.
- Remove the rear brake oil tank cap and lock the tank to the frame again using the screw.



- Lift the brake calliper as much as possible, making sure that the level (A) of the bleed valve is higher than the level (B) of the oil pipe.
- Insert a shim between the rear brake calliper pads similar to the brake disc.
- Repeatedly quickly pull and release the rear brake lever, then keep it fully pulled.
- Loosen the bleed valve by a 1/4 turn so that the brake fluid flows into the container, this will release the tension on the brake lever and it will make it arrive at the end stop.
- Close the bleed valve before arriving at the end of the stroke with the lever.
- Repeat the operation until there are no air bubbles in the fluid going into the container.

**NOTE**

WHEN BLEEDING THE HYDRAULIC SYSTEM, FILL THE TANK WITH BRAKE FLUID WHEN NECESSARY CHECK THAT DURING THE OPERATION THERE IS ALWAYS BRAKE FLUID.

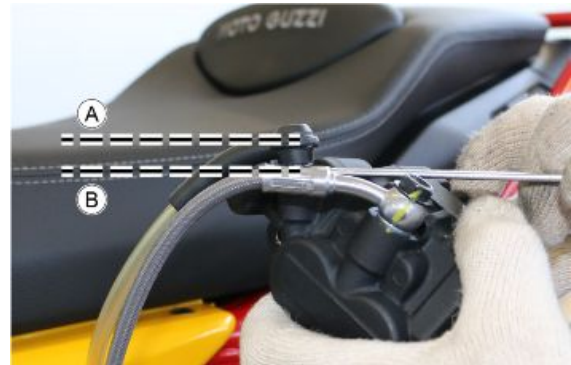
- Screw the bleed valve and remove the pipe.
- Top-up the reservoir until the correct brake fluid level is obtained.
- Refit and lock the rear brake oil tank cap together with the cap closure.

- Refit the brake calliper and place the rubber protection cap again, paying attention during repositioning of the ABS wiring harness.

REAR BLEEDING SYSTEM WITH DIAGNOSTIC TOOL

If the brake pedal still feels "spongy" after completing all checks, it is necessary to bleed the brakes using this type of procedure.

- To perform the bleeding operation using the diagnostic tool, it is necessary to properly position the rear brake calliper, in order to prevent air from remaining inside the circuit.
- Remove the rear brake calliper from the left side of the vehicle (see the procedure described for the traditional bleeding system and lift it as much as possible, making sure that the level (A) of the bleed valve is higher than the level (B) of the oil pipe.
- With the diagnostic tool properly connected, select the function "REAR BLEEDING" in the section "SETTINGS".
- The pump starts running.
- While the pump is performing a rotation cycle, operate and release the rear brake pedal until the message of diagnostic tool cycle completion is received.
- This procedure allows the air to circulate and accumulate. Once the procedure with the diagnostic tool is finished, perform the REGULAR BLEEDING to remove the air from the system completely.



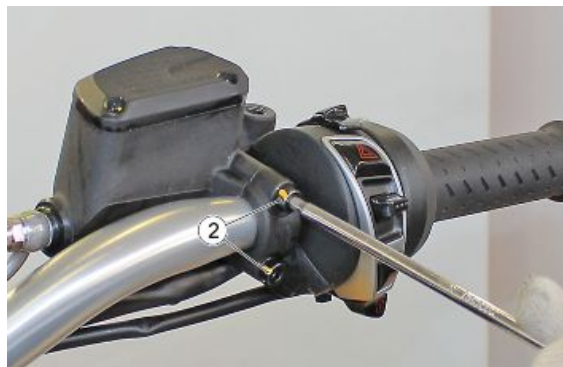
Front brake pump

Removal

- Undo and remove the joint screw (1) from the front brake master cylinder after placing a suitable container underneath to collect the brake fluid



- Unscrew and remove the screws (2)



- Remove the U-bolt (3)



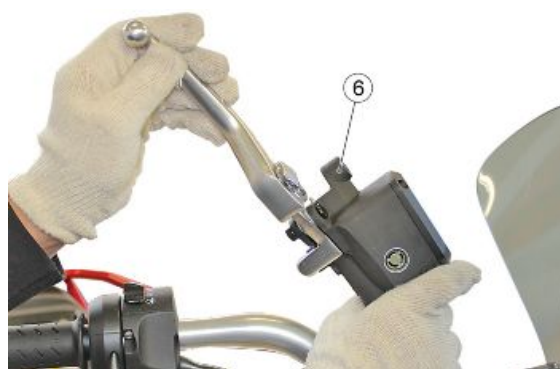
- Unscrew and remove the two screws (4)



- Remove the sensor (5) from the front brake master cylinder



- Remove the front brake master cylinder (6)



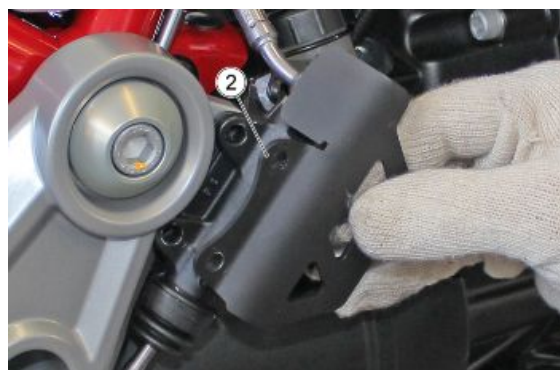
Pompa freno posteriore

Rimozione

- Unscrew and remove the two screws (1)



- Remove the protection cover (2)



- Undo and remove the joint screw (3) from the rear brake master cylinder after placing a suitable container underneath to collect the brake fluid.



- Remove the rear brake master cylinder (4)



REAR BRAKE FLUID RESERVOIR REMOVAL

- Remove the rear brake master cylinder
- Undo and remove the screw (1)
- Retrieve the support bracket (2)
- Remove the hose guide (3)
- Remove the brake fluid reservoir (4)

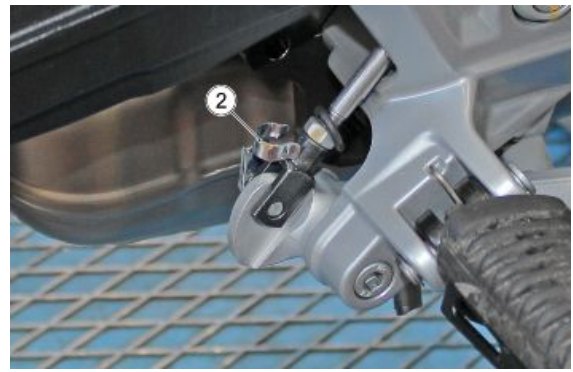


REMOVING THE REAR MASTER CYLINDER PLUNGER

- Slide out the O-ring gasket (1) to free the locking clip



- Remove the locking clip (2)



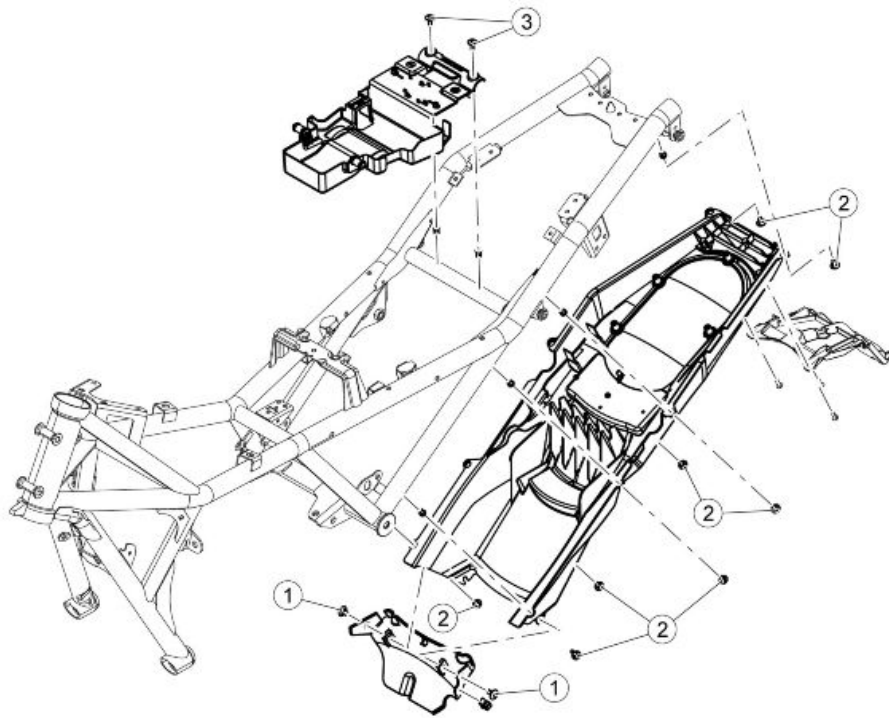
- Remove the rear brake master cylinder plunger (3)



INDEX OF TOPICS

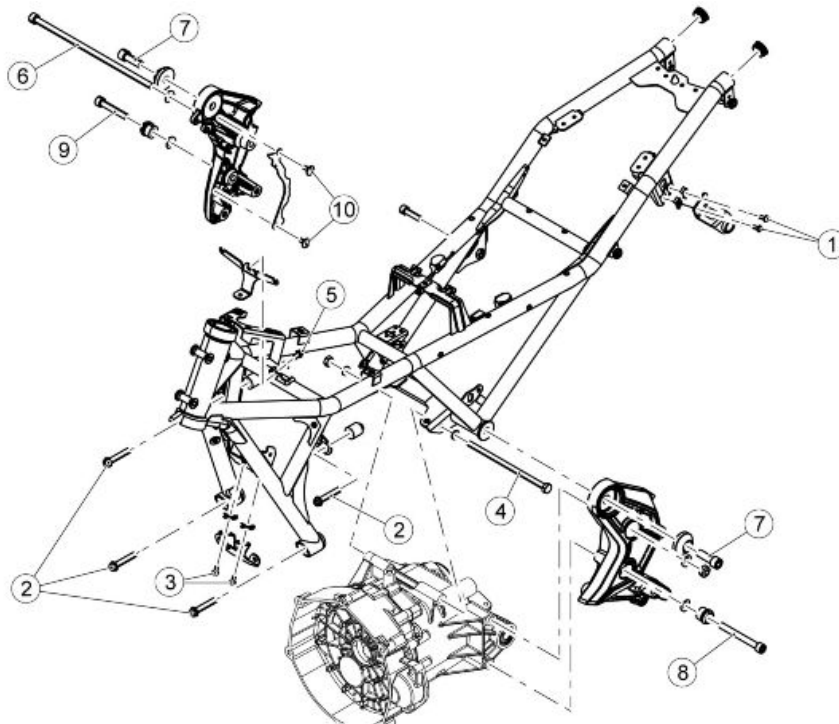
BODYWORK

BOD



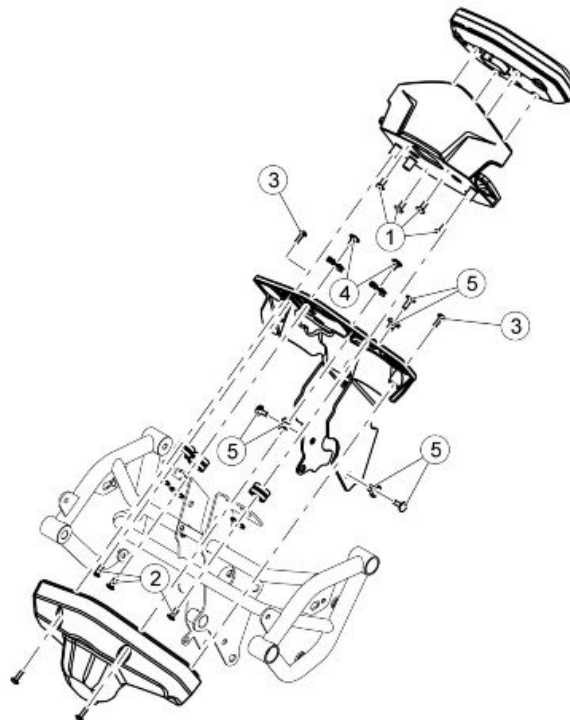
UNDER-SEAT COMPARTMENT

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screw fastening the front brake pipe feedthrough to the battery box | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the battery box to the frame | M5 | 8 | 6 Nm (4.43 lbf ft) | - |
| 3 | Screws fastening battery bracket/storage compartment to the frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



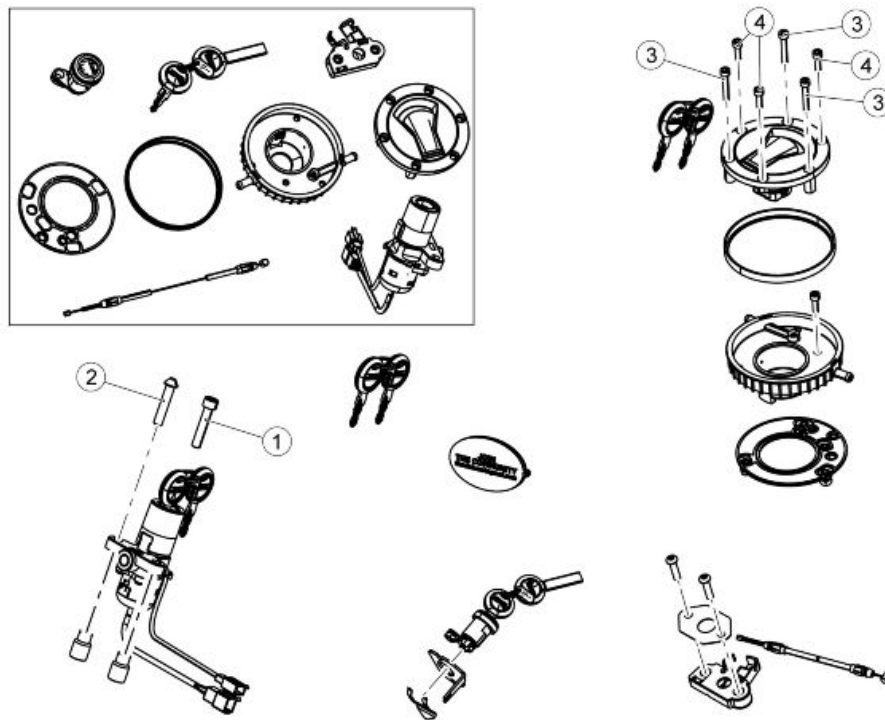
CHASSIS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|----------|
| 1 | Screws fastening muffler support bracket to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening frame to the engine | M10 | 4 | 50 Nm (36.88 lbf ft) | - |
| 3 | Screws fastening voltage regulator support bracket to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening frame to the gear-box | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 5 | Screw fixing coils mounting plate to the frame | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 6 | Screw fastening right frame plate and left frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | With nut |
| 7 | Screw fastening the right frame plate to the frame | M12 | 2 | 80 Nm (59.00 lbf ft) | - |
| 8 | Screw fastening left frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 9 | Screw fastening right frame plate to the gearbox | M10 | 1 | 50 Nm (36.88 lbf ft) | - |
| 10 | Screw fastening the rear stop switch cable cover to the right frame plate | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



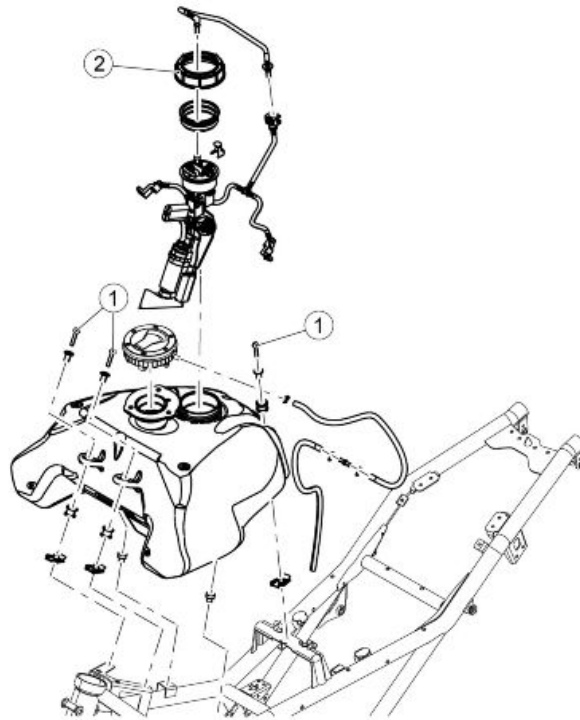
INSTRUMENTS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|---------------------|----------|--------------------|-----------|
| 1 | Screws fastening the instrument cluster to the instrument cluster visor | M5 | 4 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the instrument cluster visor to the upper frame | Self-tapping 5x14 | 3 | 3 Nm (2.21 lbf ft) | - |
| 3 | Screws fastening the instrument panel fastener to the instrument panel | Self-tapping 3.3x16 | 4 | 2 Nm (1.48 lbf ft) | - |
| 4 | Upper screws fastening the instrument panel to the front frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 5 | Lower rivet fastening the instrument panel to the front frame | - | 2 | - | Press fit |



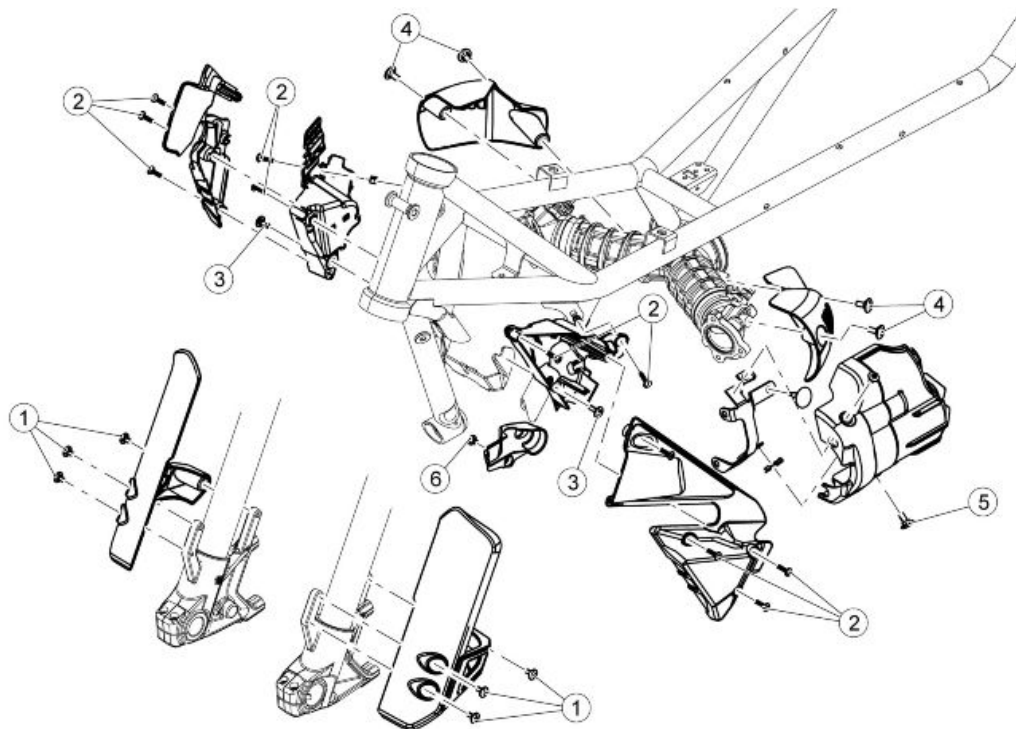
Locks

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|----------------------------------|
| 1 | Screw fastening the starter switch to the frame | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 2 | Screw fastening the starter switch to the frame | M8 | 1 | - | Shear head screw until it breaks |
| 3 | Screws fastening the fuel tank cap to the fuel tank | M5 | 3 | 6 Nm (4.43 lbf ft) | - |
| 4 | Screws fastening the fuel tank cap to the fuel tank | M5 | 4 | 6 Nm (4.43 lbf ft) | - |



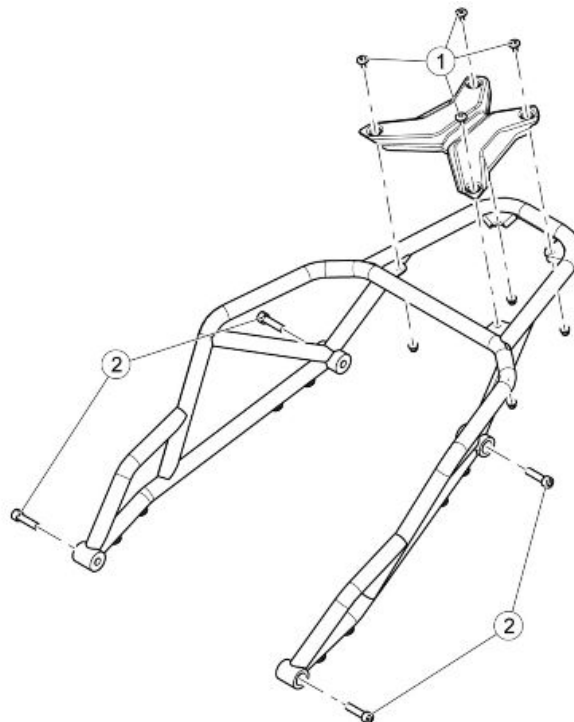
FUEL TANK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-------|
| 1 | Screws fastening the fuel tank to frame | M6 | 3 | 10 Nm (7.38 lbf ft) | - |
| 2 | Ring nut fastening the fuel pump to the fuel tank | - | 1 | 20 Nm (14.75 lbf ft) | - |

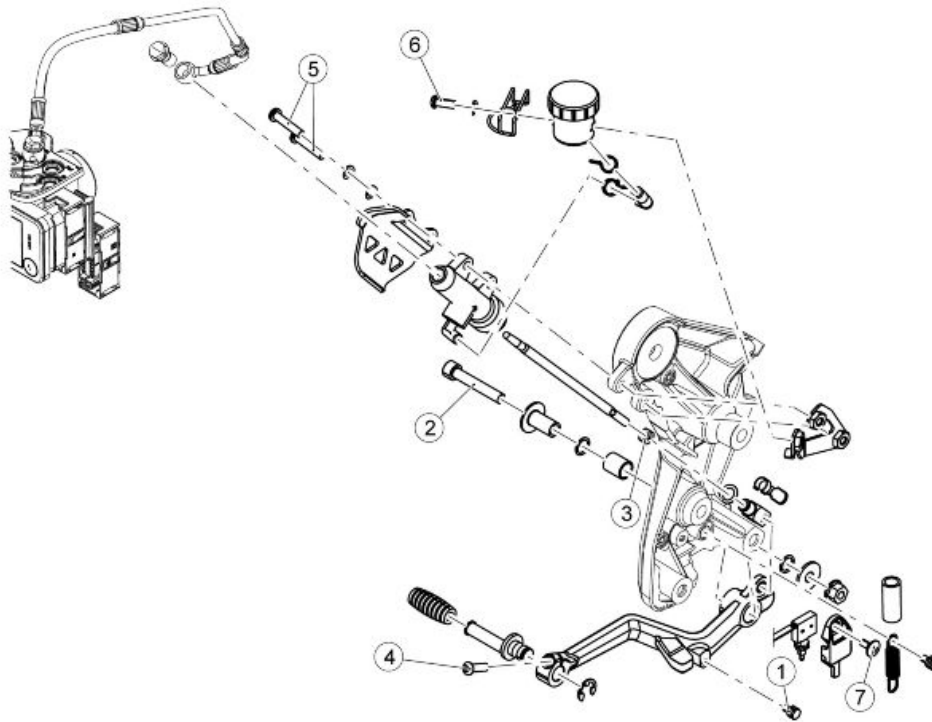


GUARDS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------------------|----------|--------------------|-------|
| 1 | Screws fastening the fork guards to the fork stanchions | M5 | 6 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening the headstock cover to the connectors box | Self-tapping 3x20 | 11 | 3 Nm (2.21 lbf ft) | - |
| 3 | Lower screws fastening the connectors box to the frame | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 4 | Pin fastening the rear brake lever spring coupling to the frame plate | M5 | 4 | 3 Nm (2.21 lbf ft) | - |
| 5 | Screws fastening the starter motor to the support bracket | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 6 | Screw fastening the oil pressure sensor cover to the engine | M5 | 1 | 6 Nm (4.43 lbf ft) | - |

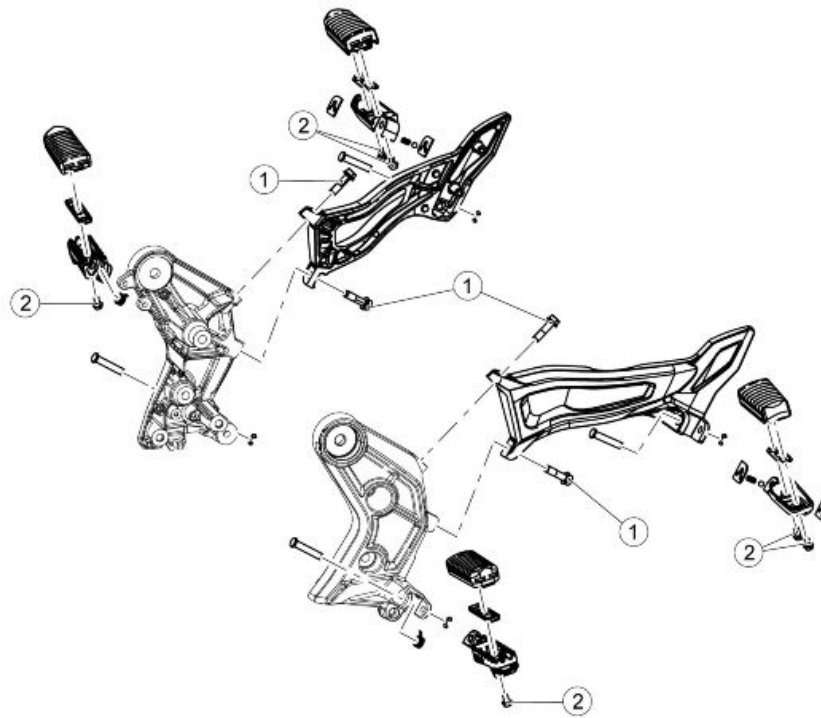
**LUGGAGE RACK**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Screws fastening the luggage rack to the grab handle | M5 | 4 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screws fastening grab handle to the chassis | M8 | 4 | 25 Nm (18.44 lbf ft) | - |



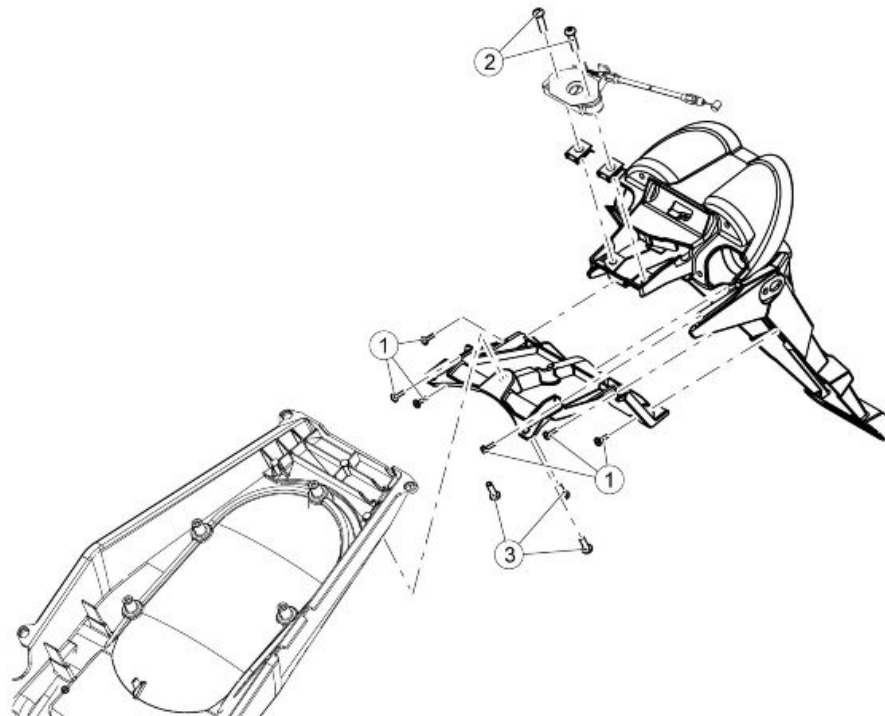
REAR BRAKE MASTER CYLINDER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|-------|
| 1 | Pin fastening the rear brake lever spring coupling to the frame plate | - | 1 | 6 Nm (4.43 lbf ft) | - |
| 2 | Screw fastening the rear brake lever to the frame plate | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 3 | Nut fastening the rear master cylinder rod to the lever | M6 | 1 | - | - |
| 4 | Peg fixing screw | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Screws fastening the rear master cylinder and oil reservoir support to the frame plate | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 6 | Screws fastening the oil reservoir and cap retainer to the oil reservoir support bracket | M6 | 1 | 6 Nm (4.43 lbf ft) | - |
| 7 | Screw fastening the rear stop switch to the right frame plate | M5 | 1 | 6 Nm (4.43 lbf ft) | - |
| - | Pin fastening the rear brake lever spring coupling to the complete rear brake lever | - | 1 | 6 Nm (4.43 lbf ft) | - |



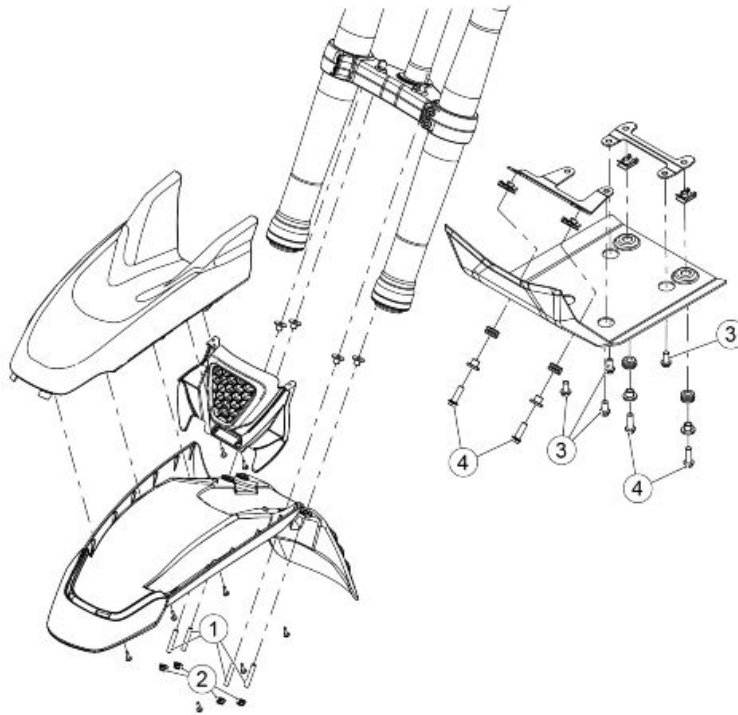
FOOTRESTS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|---------------------|-------|
| 1 | Screws for fastening the passenger's footrests supports to the frame support | M8 | 4 | 25 Nm (18.4 lbf ft) | - |
| 2 | Screws fastening the footrest rubber to the footrest | M6 | 6 | 10 Nm (7.38 lbf ft) | - |
| - | Screws fastening the passenger heel guard to the passenger footrest support | M6 | 2 | 10 Nm (7.38 lbf ft) | - |

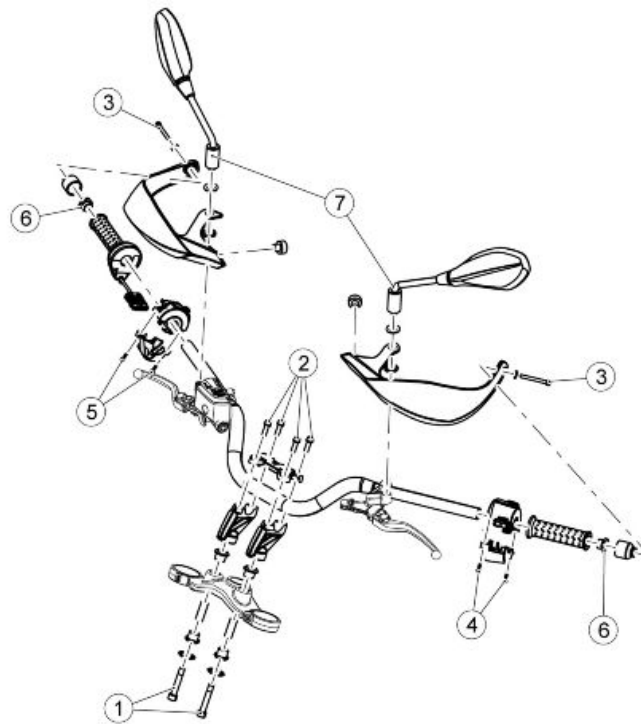


REAR MUDGUARD

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|---------------------|----------|--------------------|-------|
| 1 | Screws fastening the licence plate holder fastener to the licence plate holder | Self-tapping 3.9x14 | 6 | 3 Nm (2.21 lbf ft) | - |
| 2 | Screws fastening the licence plate holder to the frame | M6 | 2 | 8 Nm (5.90 lbf ft) | - |
| 3 | Screws fastening the licence plate holder to the battery box | Self-tapping 5x14 | 3 | 3 Nm (2.21 lbf ft) | - |

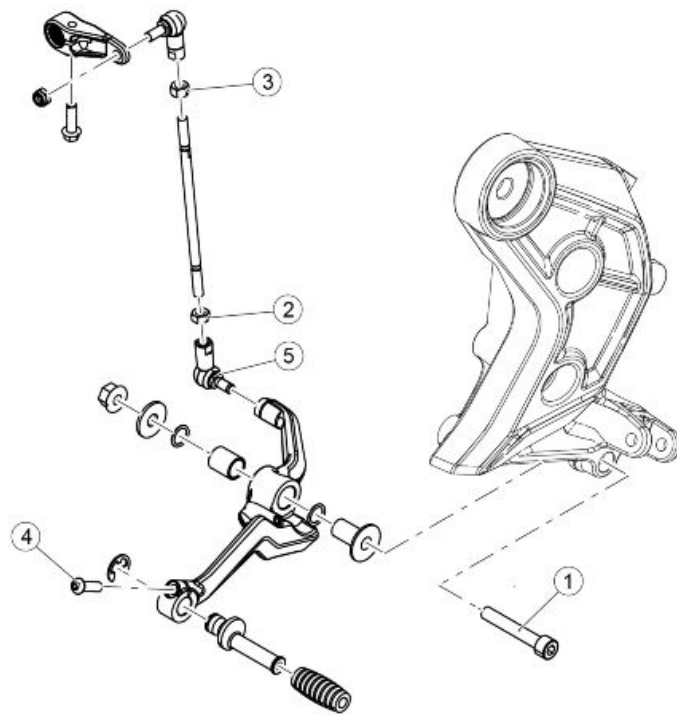
**FRONT MUDGUARD - ENGINE FAIRING**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|-----------|
| 1 | Stud bolt fastening the front mudguard to the lower steering yoke | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 2 | Nuts fastening the front mudguard to the lower steering yoke | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screws fastening the sump guard to the engine | M8 | 4 | 25 Nm (18.44 lbf ft) | Loct. 243 |
| 4 | Screws fastening the sump guard to the sump guard support bracket | M8 | 4 | 15 Nm (11.06 lbf ft) | Loct. 243 |



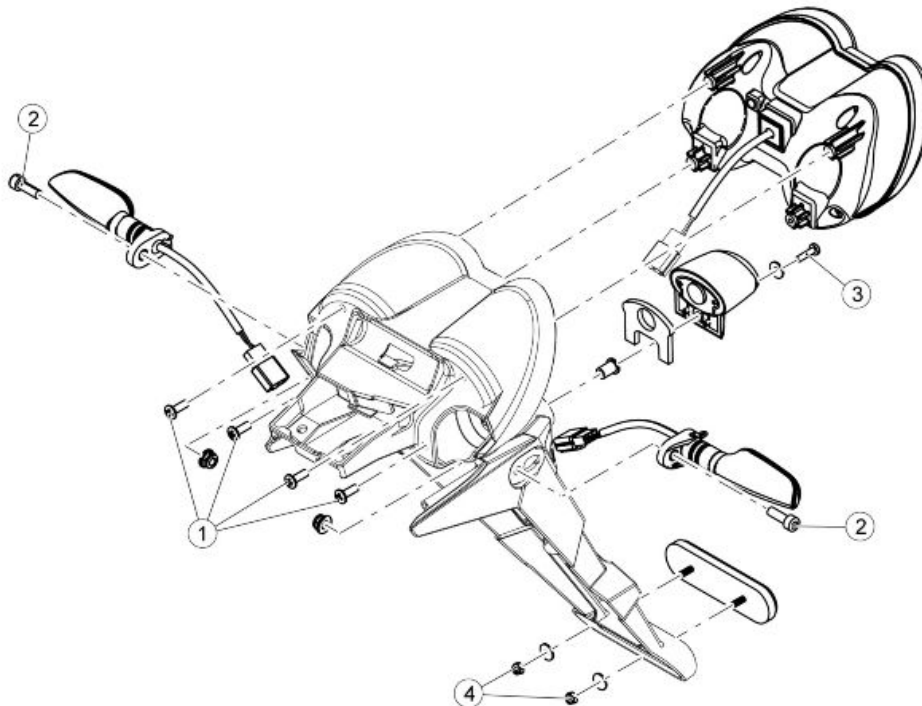
HANDLEBAR-CONTROLS

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|----------------------|--|
| 1 | Screws fastening the lower U-bolts to the upper steering yoke | M10 | 2 | 50 Nm (36.88 lbf ft) | - |
| 2 | Screws fastening the lower U-bolt clamp to the handlebar | M8 | 4 | 25 Nm (18.44 lbf ft) | - |
| 3 | Screws fastening the handguards and anti-vibration weights to the handlebar | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screws fastening the rear left shell to the left control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 5 | Screws fastening the rear right shell to the right control block | M4 | 2 | 1.5 Nm (1.11 lbf ft) | Screws pre-mounted on the shell |
| 6 | Terminal fastening the anti-vibration weight to handlebar | - | 2 | 10 Nm (7.38 lbf ft) | - |
| 7 | Rear view mirror attachment | - | 2 | Manual | - |
| - | Screws fastening the electronic accelerator control to the handlebar | M4 | 1 | 4 Nm (2.95 lbf ft) | Screws pre-mounted on the throttle control |



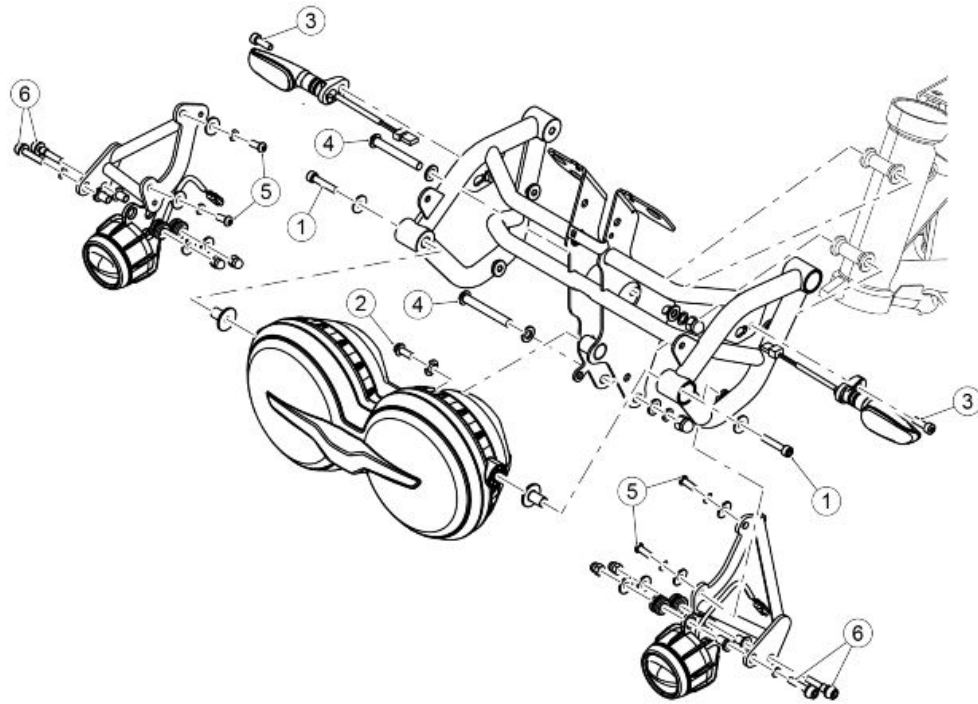
GEARBOX LEVER

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|----------------------|----------------------|
| 1 | Screw fastening left frame plate to the gearbox | M8 | 1 | 25 Nm (18.44 lbf ft) | - |
| 2 | Nut fastening the gear control linkage to the gear lever | M6 | 1 | - | Manual with template |
| 3 | Nut fastening the gear control linkage to the pre-selector lever | M6 | 1 | - | Manual with template |
| 4 | Peg fixing screw | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 5 | Pre-impregnated ball joint | M6 | 1 | 6.5 Nm (4.79 lb ft) | - |

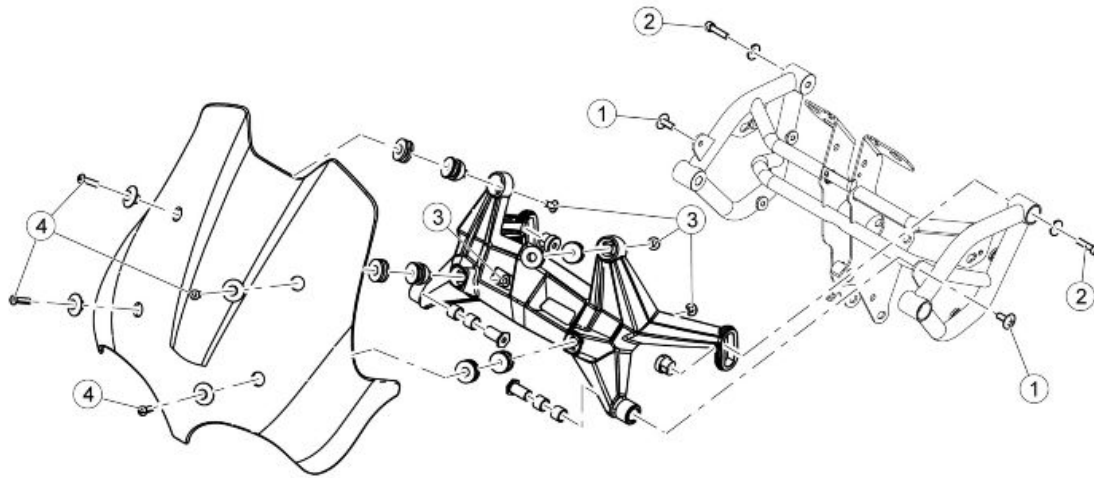


TAIL-LIGHT

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------------------|----------|--------------------|-----------------------|
| 1 | Taillight to number plate holder fixing screws | Self-tapping 5x14 | 4 | 3 Nm (2.21 lbf ft) | - |
| 2 | Rear direction indicator to number plate holder fixing screws | M6 | 2 | 3 Nm (2.21 lbf ft) | With self-locking nut |
| 3 | Licence plate light to number plate holder fixing screws | M4 | 1 | 3 Nm (2.21 lbf ft) | - |
| 4 | Nuts fastening the rear reflector to the number plate holder | M4 | 2 | 4 Nm (2.95 lbf ft) | - |

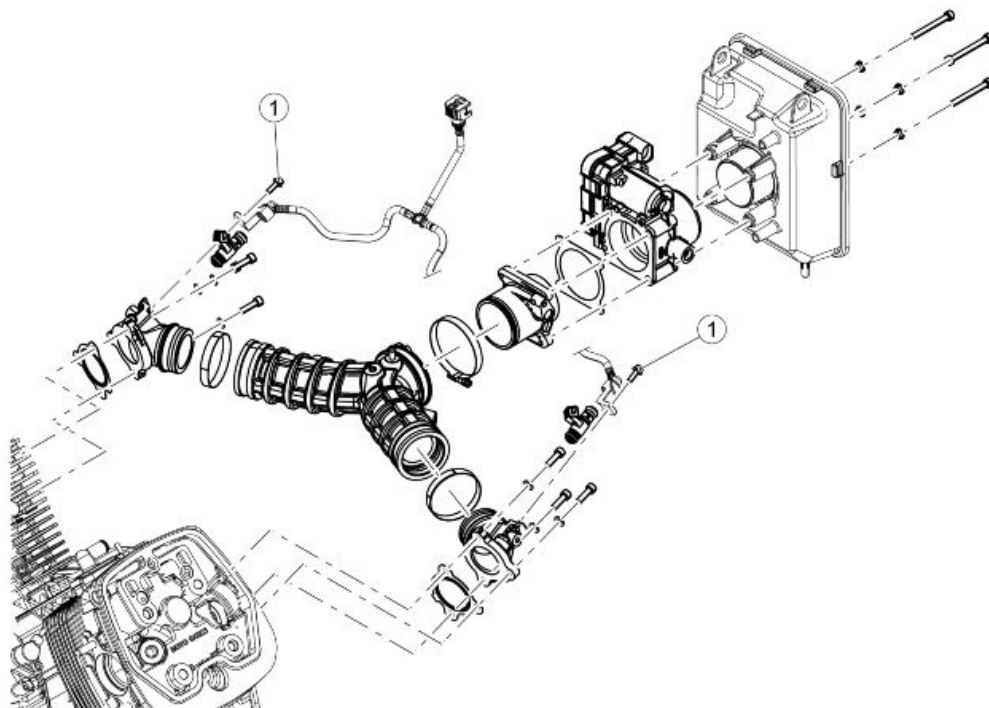
**HEADLIGHT UNIT**

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|-------|----------|---------------------------|--------------|
| 1 | Upper screws fastening the front headlamp to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Lower screw fastening the front headlamp to the front frame | M6 | 1 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screws fastening the direction indicator to the front frame | M6 | 2 | 8 Nm (5.90 lbf ft) | - |
| 4 | Screws fastening the front frame to the headstock | M8 | 2 | 25 Nm (18.44 lbf ft) | With cap nut |
| 5 | HSC screws fastening the headlight supports to the front chassis | M6x15 | 4 | 10 Nm (7.38 lbf ft) | - |
| 6 | Cyl. head, hex. socket screws used for fastening the headlights to the supports | M6 | 4 | 8 Nm (5.90 lbf ft) (nuts) | With cap nut |



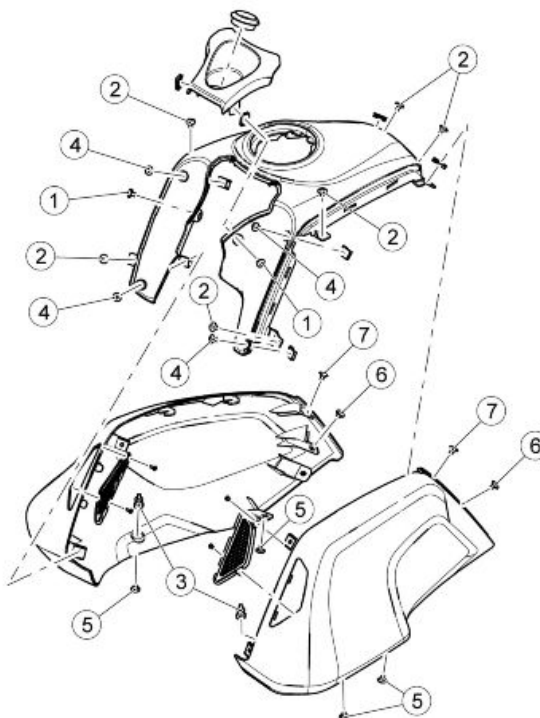
TOP FAIRING-WINDSHIELD

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|---------------------|-------|
| 1 | Front screw fastening the windshield to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Rear screw fastening the windshield to the front frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 3 | Screw fastening the windshield support bushings to the windshield bracket | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screw fastening the windshield to the windshield bracket | M6 | 4 | 10 Nm (7.38 lbf ft) | - |



THROTTLE BODY

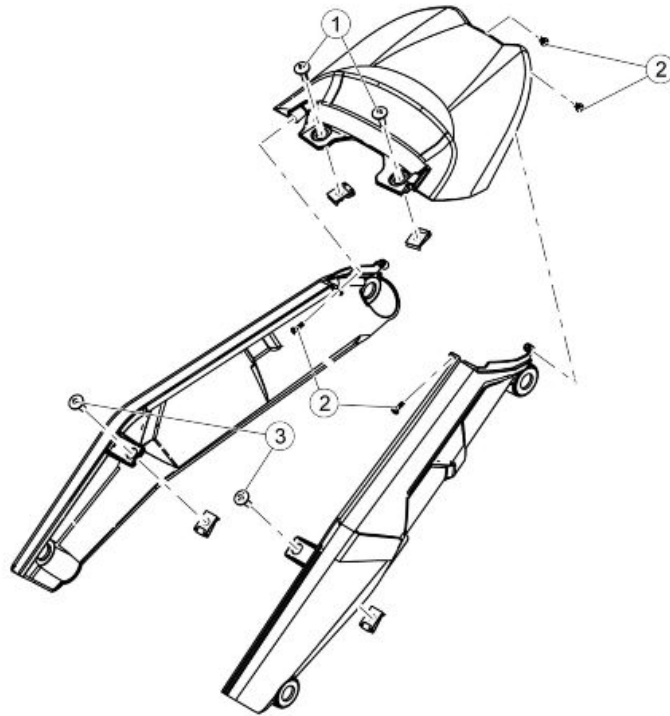
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screw fastening the injector caps to the in take fittings | - | 2 | 6 Nm (4.43 lbf ft) | - |



FUEL TANK COVER

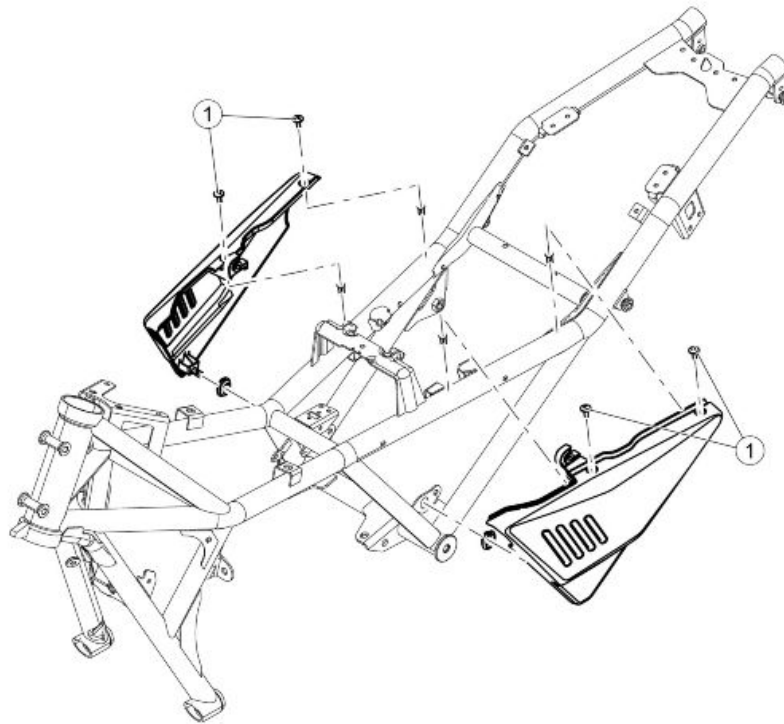
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screws fastening the ignition block cover to the tank cap cover | M5 | 2 | 4 Nm (2.95 lbf ft) | - |

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|--|------|----------|--------------------|-------|
| 2 | Screws fastening the tank cap cover to the fuel tank | M5 | 6 | 4 Nm (2.95 lbf ft) | - |
| 3 | Stud bolt fastening the side tank cover support to the fuel tank | - | 2 | 4 Nm (2.95 lbf ft) | - |
| 4 | Front screws fastening the tank cover to the fuel cap cover | M5 | 4 | 4 Nm (2.95 lbf ft) | - |
| 5 | Lower screws fastening the side tank cover to the fuel tank | M5 | 4 | 4 Nm (2.95 lbf ft) | - |
| 6 | Rear screws fastening the tank cover to the fuel tank | M5 | 2 | 4 Nm (2.95 lbf ft) | - |
| 7 | Rear screws fastening the tank cover to the tank cap cover | M5 | 2 | 4 Nm (2.95 lbf ft) | - |



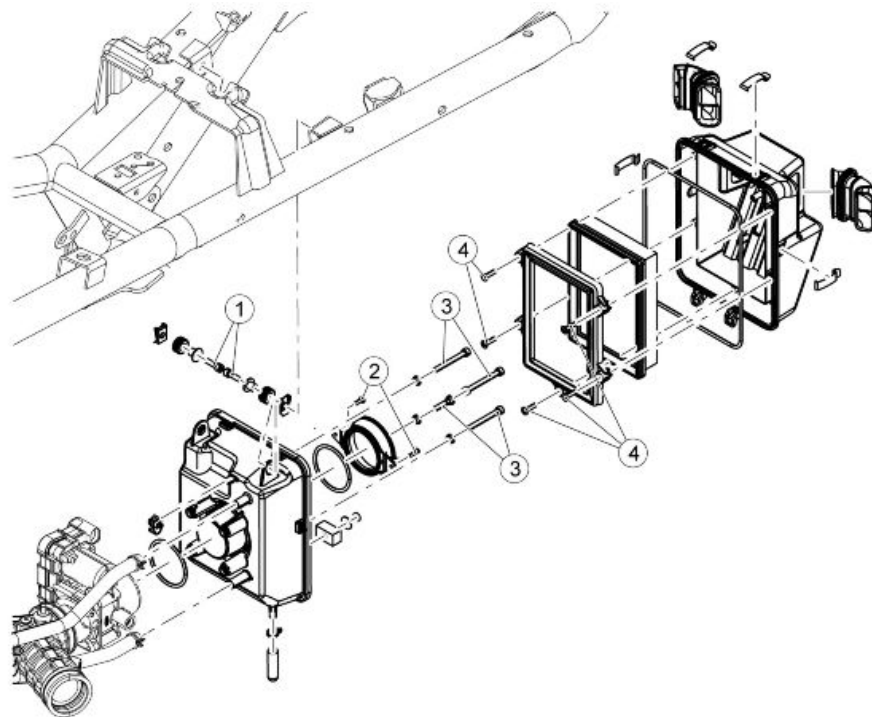
REAR BODYWORK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|---------------------|----------|--------------------|-------|
| 1 | Rear cover fixing screw | M5 | 2 | 6 Nm (4.43 lbf ft) | - |
| 2 | Central rear cover to side rear cover fixing screw | Self-tapping 3.5x10 | 4 | 2 Nm (1.48 lbf ft) | - |
| 3 | Right and left side rear cover to frame fixing screws | M5 | 2 | 6 Nm (4.43 lbf ft) | - |



CENTRAL BODYWORK

| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------|----------|--------------------|-------|
| 1 | Screws fastening the side panels to the frame | M5 | 4 | 6 Nm (4.43 lbf ft) | - |



FILTER HOUSING

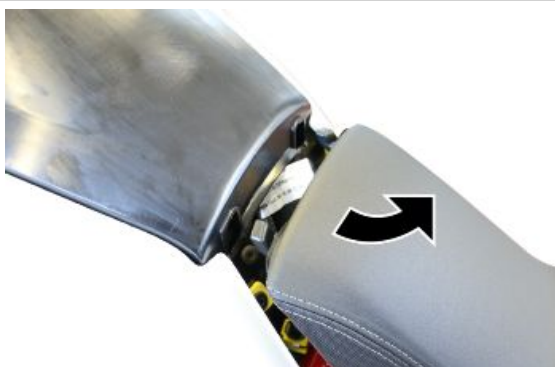
| Pos. | Description | Type | Quantity | Torque | Notes |
|------|---|------------|----------|---------------------|-------|
| 1 | Screws fastening the filter casing to the frame | M6 | 2 | 10 Nm (7.38 lbf ft) | - |
| 2 | Screws fastening the intake duct to the filter casing cover | TCB 4.2x16 | 2 | 3 Nm (2.21 lbf ft) | - |
| 3 | Screws fastening the throttle body to the filter casing cover | M6 | 4 | 10 Nm (7.38 lbf ft) | - |
| 4 | Screws fastening the air filter to the filter casing | M5 | 5 | 3 Nm (2.21 lbf ft) | - |

Seat

- Rotate the key clockwise to remove the saddle, slightly press the centre of the saddle's rear part in order to unhook the pin easily and lift it.



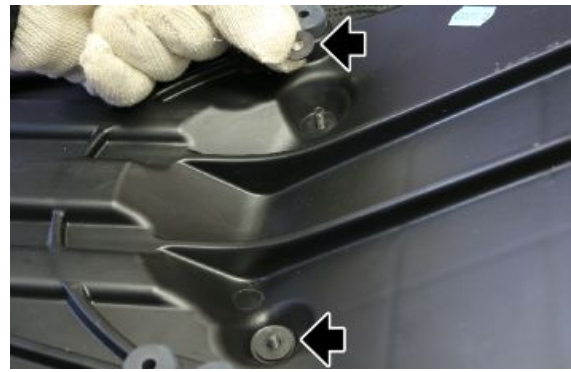
- Unhook the front part of the saddle and remove it



- Remove the two self-locking nuts fixing the lumbar support



- Recover the two washers before removing the lumbar support.



- Remove the lumbar support



- To remove and eventually replace the rubber supports, simply turn them slightly and pull them outwards.



Side fairings

REMOVAL

The following procedure is described for a single side bumper, but is valid for both side bumpers.

- Undo and remove the screw (1)



- Remove the side bumpers (2)



Rear rack

LUGGAGE RACK COVER REMOVAL

- Holding the nuts still located on the lower part of the area indicated in the figure, loosen and remove the screws (1)



- Remove the luggage rack cover (2)



LUGGAGE RACK REMOVAL

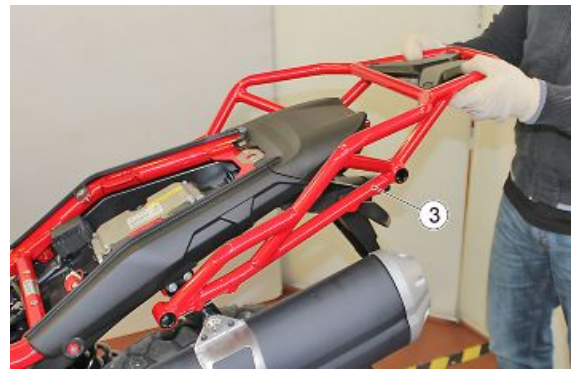
- Unscrew and remove the screws (1)



- Unscrew and remove the screws (2)



- Remove the luggage rack (3)



Hand guards

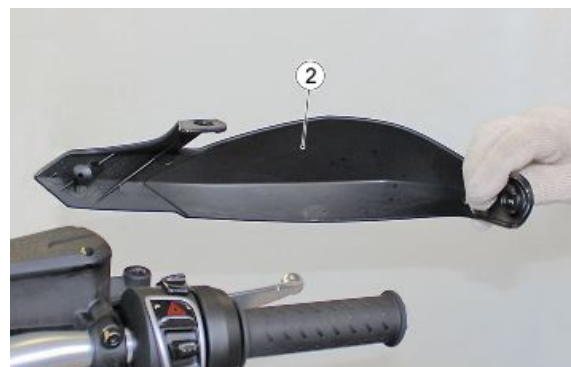
HAND-GUARDS

The following procedure is described for a single handguard, but is valid for both handguards.

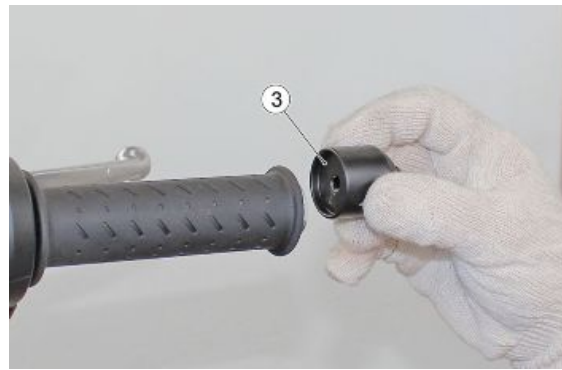
- Remove the rear view mirrors
- Undo and remove the screw (1)



- Remove the handguards (2)



- Retrieve the counterweight (3)



HEATED HANDGRIPS

To remove the heated handles, the fuel tank must be removed first. Then proceed as described:

LEFT HAND HEATED HANDLE

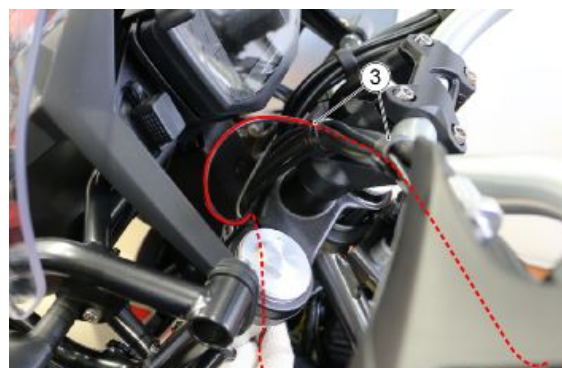
- Operating from both sides of the motorcycle, remove the protective covers (1) from the steering headstock.



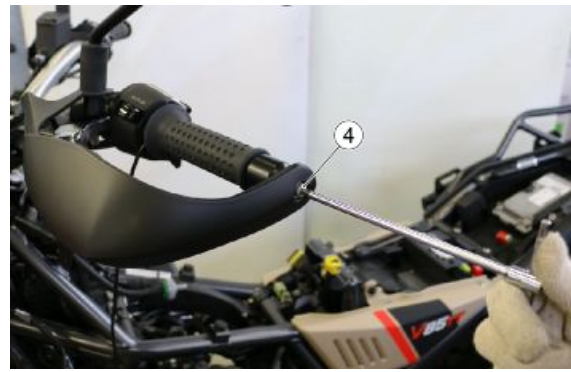
- Disconnect the connector (2) and pull out the wiring harness from the left side of the motorcycle.



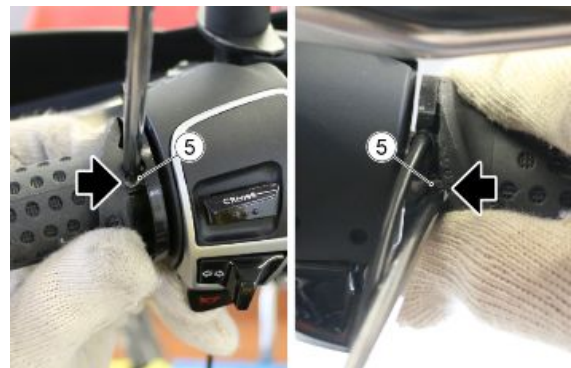
- Pull out the wiring harness of the left side heated handle from under the upper steering plate and through the metallic cable gland.
- Remove the two rubber cable glands (3) and release the wiring harness.



- Remove the screws (4) fixing the handguard to the counterweight.



- Remove the two screws (5) that fasten the heated handle to the handlebar.

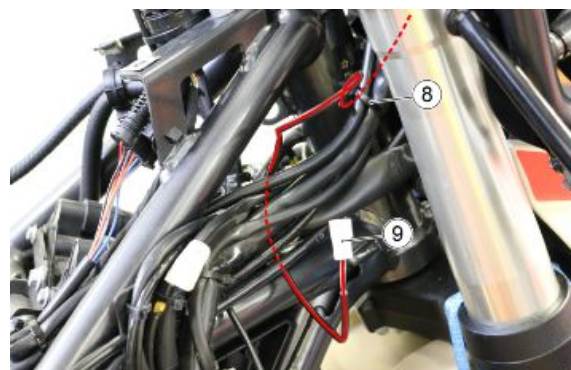


- Unscrew and remove the counterweight (6) and remove the handle (7) from the handlebar.



RIGHT SIDE HEATED HANDLE

- Disconnect the connector (8), cut the clamp (9) that fastens the wiring harness to the heated handle and release the cable harness by extracting it at the front.



- Remove the clamp (10) that fastens the throttle control wiring harness.



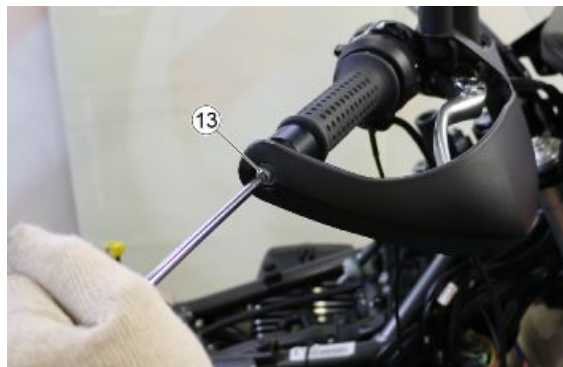
- Disconnect the throttle control connector (11).



- Remove the two rubber cable glands (12) and release the wiring harnesses.



- Remove the screws (13) fixing the handguard to the counterweight.



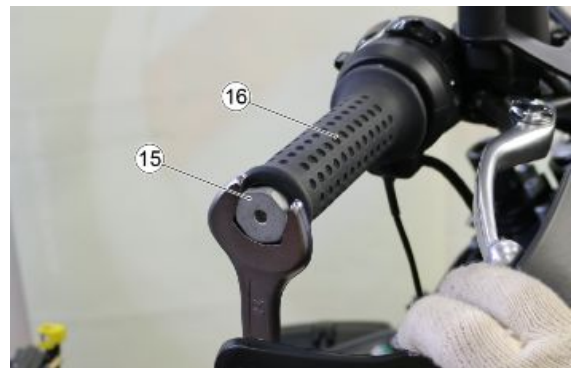
- Remove the screws (14) fixing the throttle control/handle to the handlebar.

IMPORTANT

DURING REFITTING, MAKE SURE TO CORRECTLY POSITION THE THROTTLE CONTROL; IT MUST ALLOW PRESSING THE STARTER BUTTON COMPLETELY, AS INDICATED.



- Unscrew and remove the counterweight (15) and remove the throttle control/heated handle (16) from the handlebar.

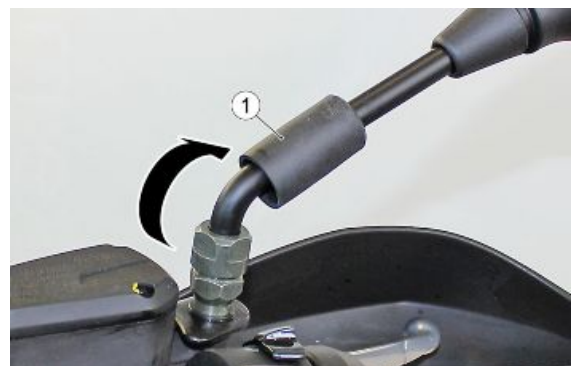


Driving mirrors

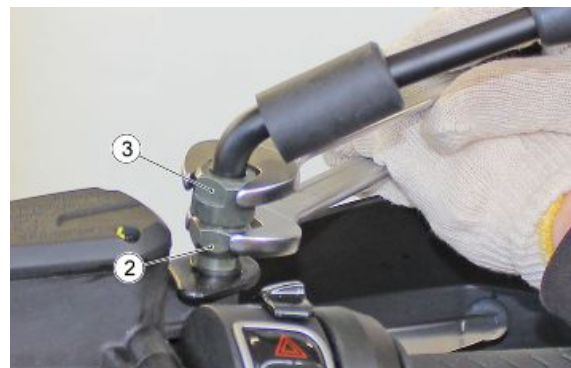
REMOVAL

The following procedure is described for a single rear view mirror, but is valid for both mirrors.

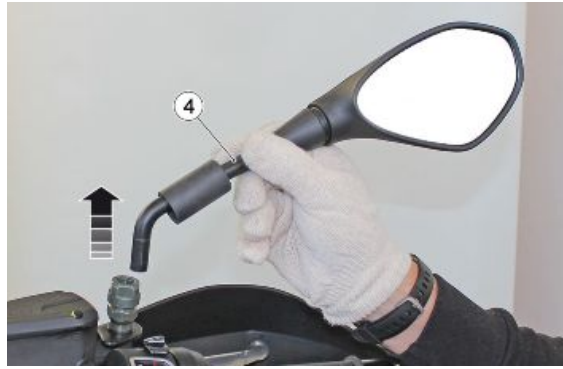
- Remove the rubber piece (1)



- Holding the locknut (2) so it cannot rotate, loosen the nut (3)



- Remove the rear view mirror (4)



- Undo and remove the locknut (2)



Instrument panel

REMOVAL

- Remove the headlight
- Unscrew and remove the screws (1)



- Disconnect the connector (2)



- Remove the instrument panel (3)



Headlight assy.

REMOVAL

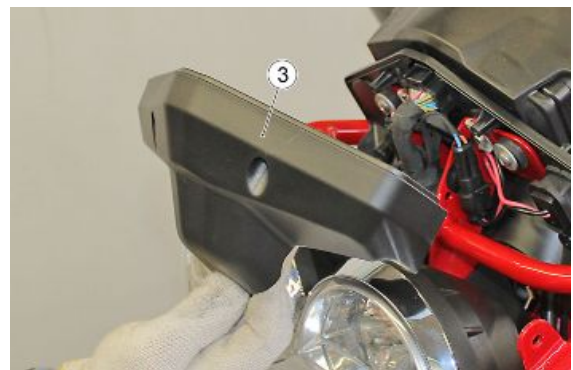
- Remove the top fairing
- Unscrew and remove the screws (1)



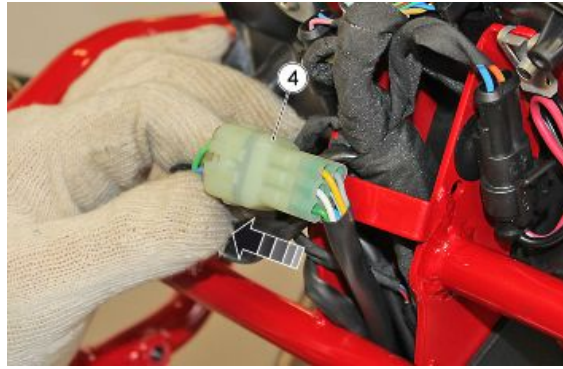
- Unscrew and remove the screws (2)



- Remove the cover (3).



- Remove the connector (4) from the support as indicated in the figure



- Disconnect the connector (4)



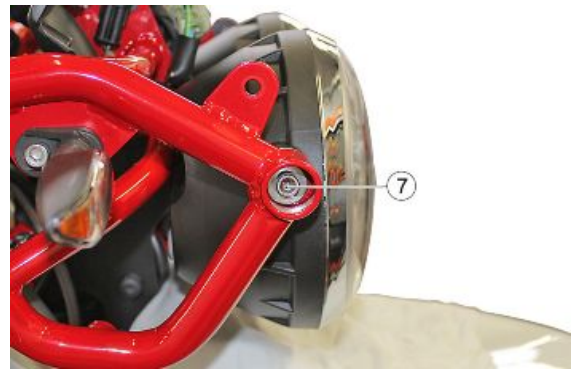
- Undo and remove the screw (5)



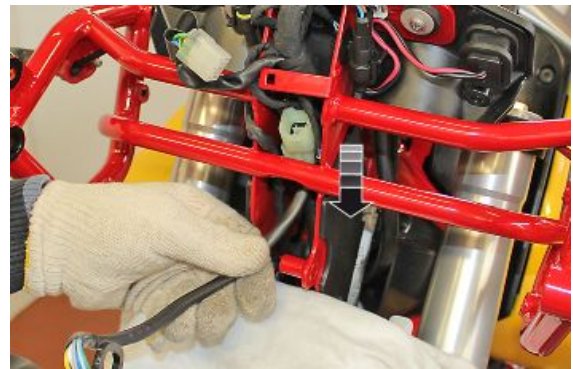
- Undo and remove the screw (6)



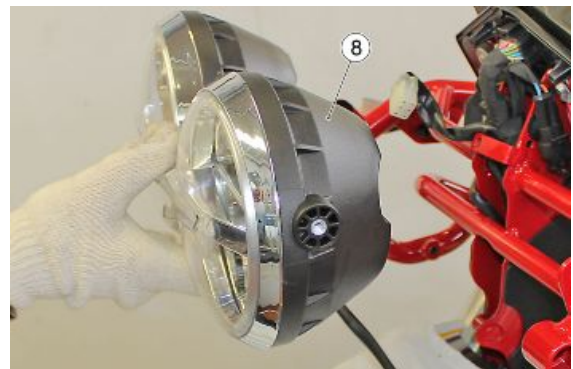
- Undo and remove the screw (7)



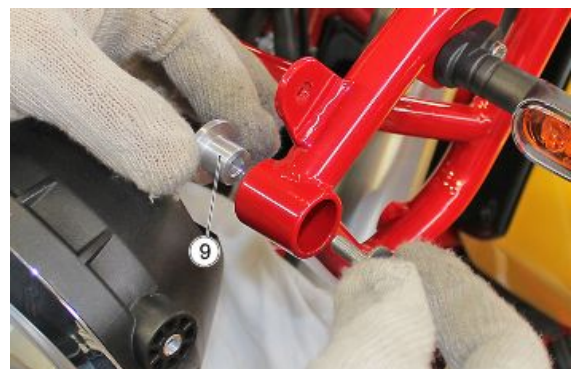
- Remove the wiring as indicated in the figure



- Remove the front light assembly (8)



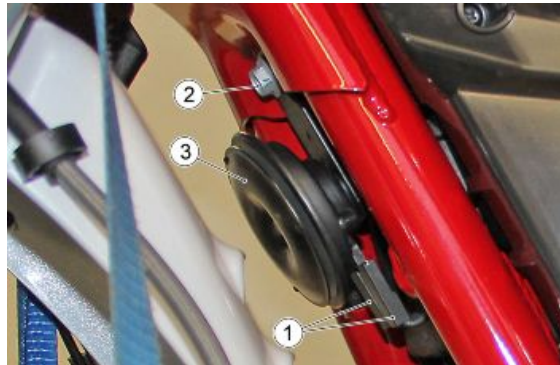
- Retrieve the bushings (9)



Horn

REMOVAL

- Disconnect the connectors (1)
- Undo and remove the screw (2)
- Remove the horn (3)



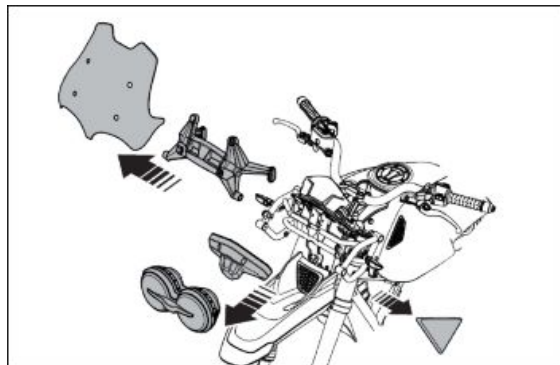
Additional lights

To fit the additional spotlights, first remove:

- The top fairing;
- The top fairing bracket;
- The instrument panel rear cover;
- The headlamp;
- The left fairing.

NOTE

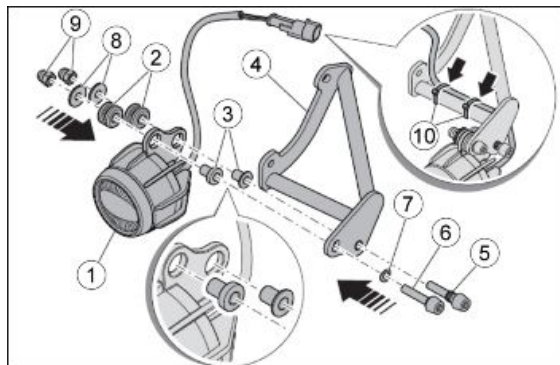
To facilitate the removal operations, keep the tank lifted.



Install the grommets (2) and the bushings (3) on the spotlight (1).

Fit the spotlight (1) to the support (4) using the screws (5) and (6), the wave washer (7), the washers (8) and the blind nuts (9).

Place the spotlight cable as shown in the figure and secure it to the support using two plastic clamps (10).



NOTE

The screw (5), with M6-M8 double thread, operates on the rear hole for horizontal headlamp adjustment.

The screw (6) operates on the front hole, for headlamp vertical adjustment.

IMPORTANT

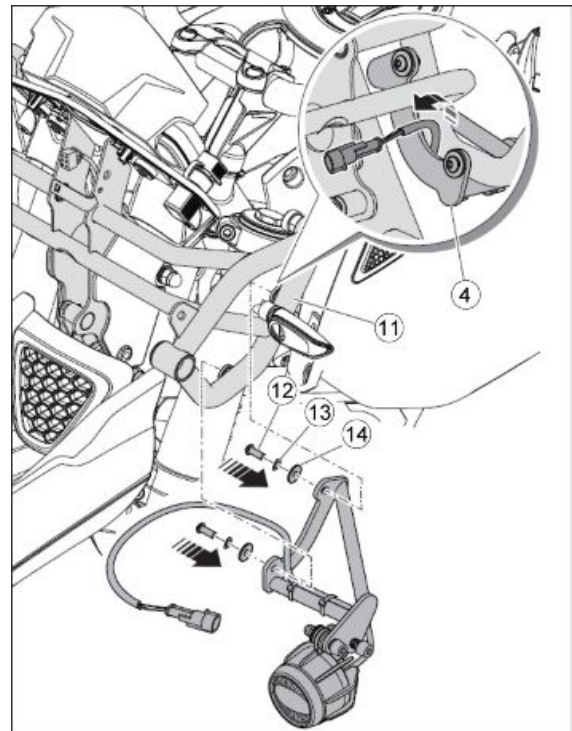
The M8 threaded part of the screw (5) must be screwed on half its length.

Install the spotlight/bracket assembly to the headlamp mount (11), passing the wiring harness as shown in the figure.

Attach the spotlight support (4) to the headlamp support (11) using the two fixing screws (12), the wave washers (13) and the flat washers (14) and tighten the screws to the specified torque.

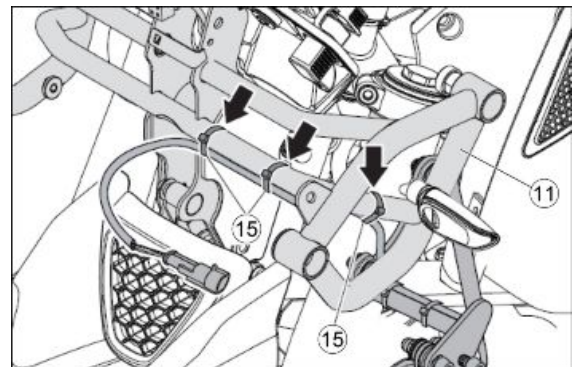
Locking torques (N*m)

Screws (12) 10 Nm (7.37 lbf ft)

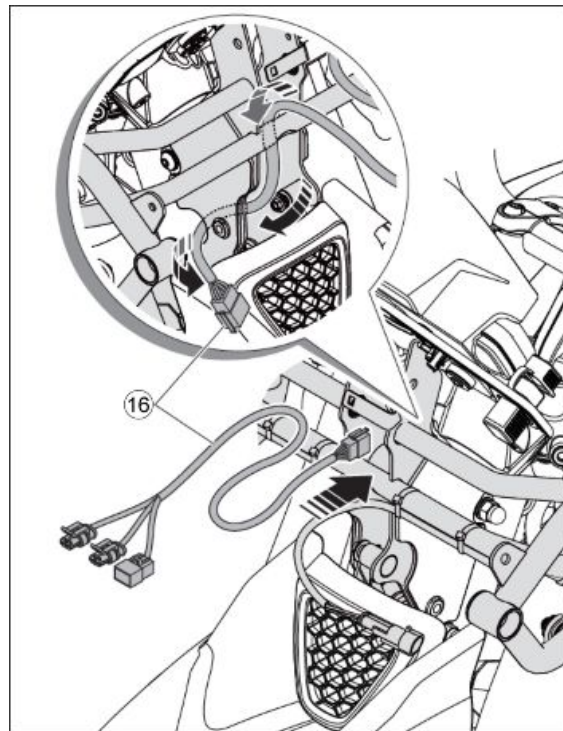


Secure the wiring harness to the headlamp support (11) using three plastic clamps (15) as shown in the figure.

REPEAT THE OPERATIONS FOR THE OPPOSITE SPOTLIGHT.

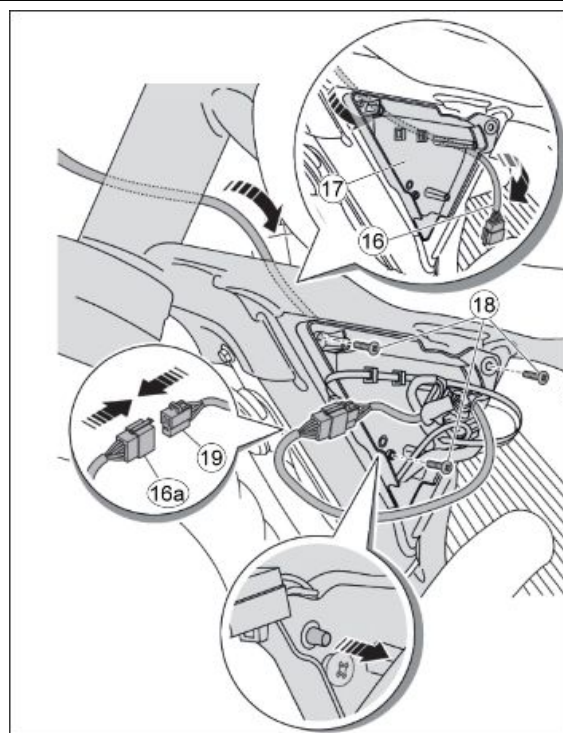


Place the wiring harness of the spotlights (16) as shown in the figure.



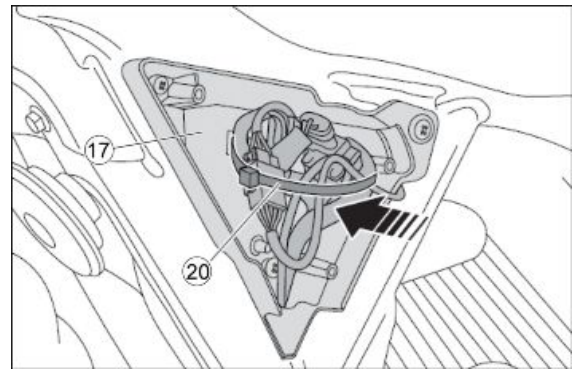
Pass the wiring harness of the spotlights (16) as shown in the figure. Secure the connection unit (17) using the three fixing screws (18), ensuring that the centring pin is correctly inserted in the unit (17).

Then connect the connector (16a) of the wiring harness the vehicle's connector (19).



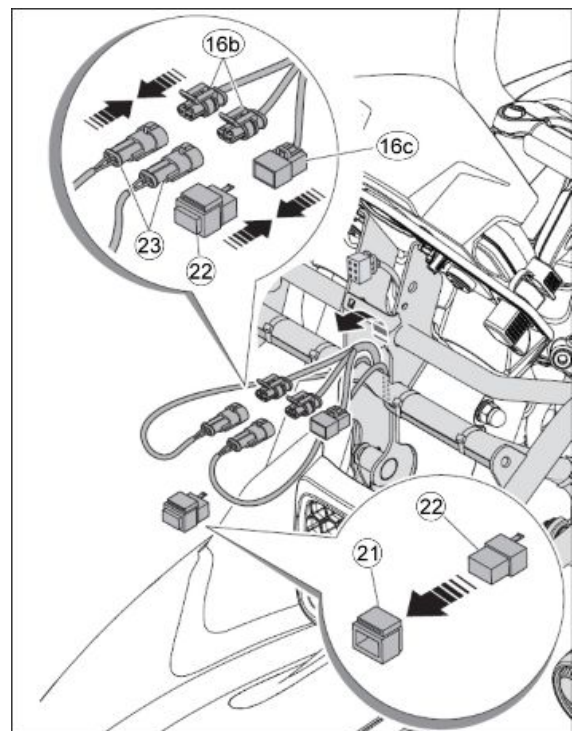
Fit a plastic clamp (20) on the connection unit (17) and group the wiring harnesses and their connectors together so that they are flattened as much as possible once the clamp is tightened.

Place the clamp front end on the right or left side of the unit and cut the excess.



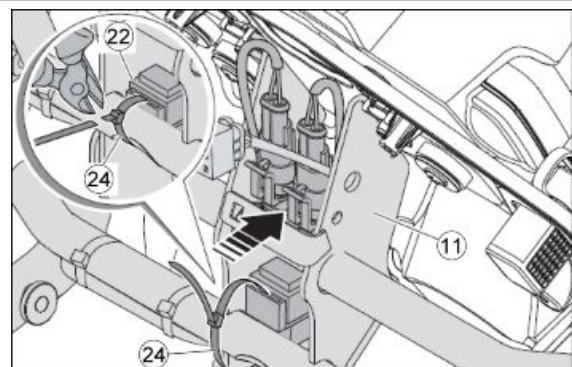
Install the grommet (21) on the relay (22) and position the connectors of the headlamp and of the spotlights, as shown in the figure.

Connect the spotlight connectors (23) to the connectors (16 b) of the wiring harness (it is NOT necessary to differentiate between right and left) and the relay (22) to the connector (16 c) of the wiring harness.



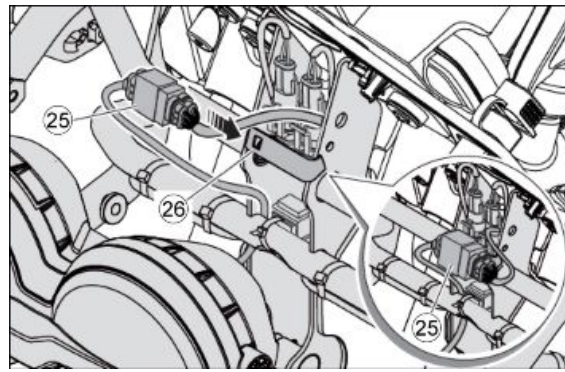
Fit a plastic clamp (24) on the relay (22) and place it inside the headlamp support (11) together with the spotlight connectors, as shown in the figure.

Then fasten the relay (22) by tightening the clamp (24) and cutting the excess.



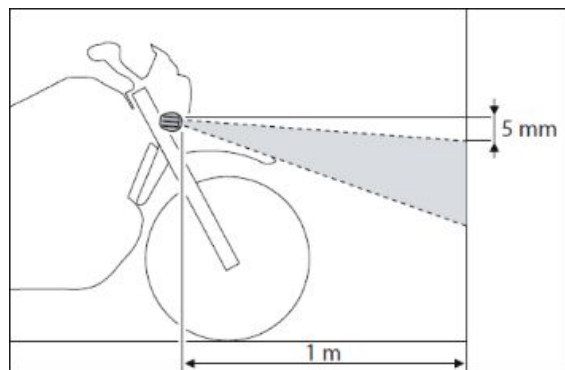
Pass the wiring harness as shown in the figure, then connect the headlamp connector (25) to the vehicle connector (26) and secure them to the relevant support.

Then check that the additional spotlights and headlamp are working correctly.



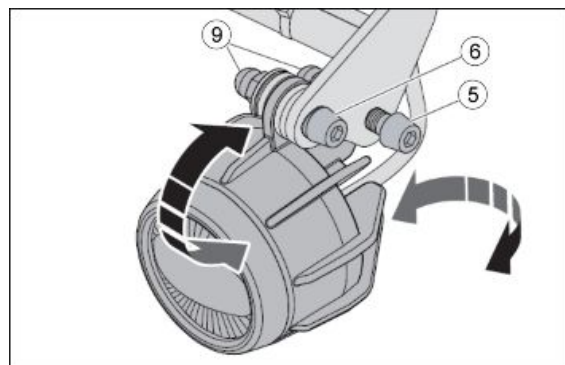
Place the motorcycle in traveling position, with the additional spotlight lenses at a distance of 1 meter from a vertical wall.

In this condition, the projection of the upper edge of the light beam must be at least 5 mm lower than the optical centre of the spotlight, referred to the ground line.



Vertical adjustment: loosen the nut (9) of the screw (6), proceed with the adjustment and tighten the nut (9) to torque.

Horizontal adjustment: turn the screw (5) anti-clockwise to direct the light beam toward the centre of the road and turn it clockwise to direct it in the opposite direction. Then, tighten the nut (9) to the prescribed torque.



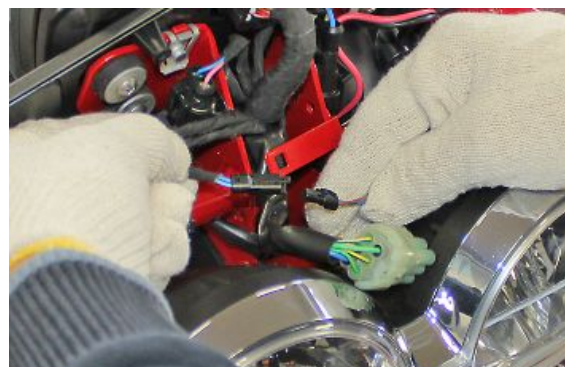
Locking torques (N*m)

Nuts 9 8 Nm (5.9 lbf ft)

Turn indicators

REMOVING FRONT TURN INDICATORS

- Remove the top fairing
- Disconnect the left turn indicator connector (1)



- Disconnect the right turn indicator connector (2)



- Unscrew and remove the screws (3) from both sides of the vehicle

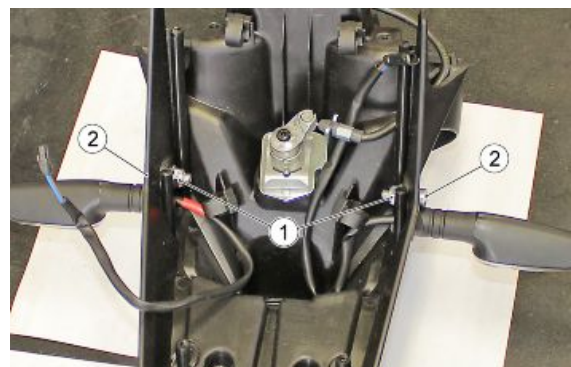


- Remove the front turn indicators (4) from both sides of the vehicle

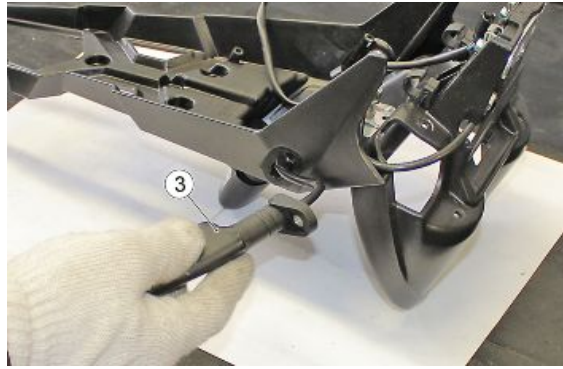


REAR TURN INDICATORS REMOVAL

- Block the nuts (1) so that they cannot rotate and unscrew and remove the screws (2)



- Remove the rear turn indicators (3)



Headlight fairing

REMOVAL

- Unscrew and remove the screws (1)



- Remove the top fairing (2)



TOP FAIRING BRACKET REMOVAL

- Unscrew and remove the screws (1)



- Unscrew and remove the screws (2)



- Remove the support (3)



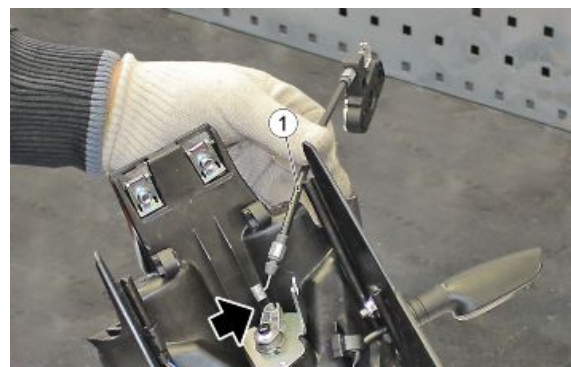
Disassembling the lock

REMOVAL

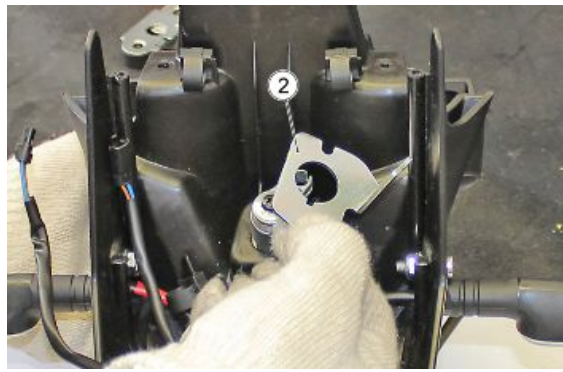
- Remove the licence plate holder bracket
- Unhook and remove the wire (1) from its seat



- Remove the wire (1) from the point indicated in the figure



- Remove the plate (2)

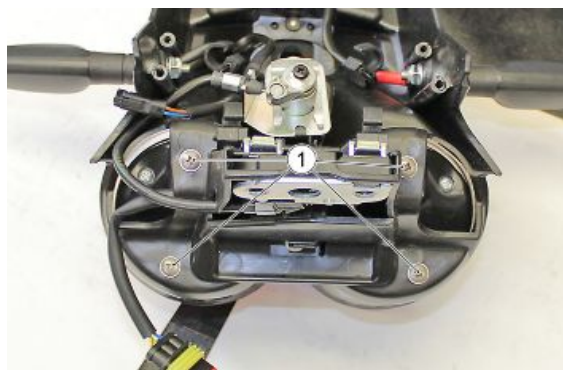


- Remove the saddle lock (3)

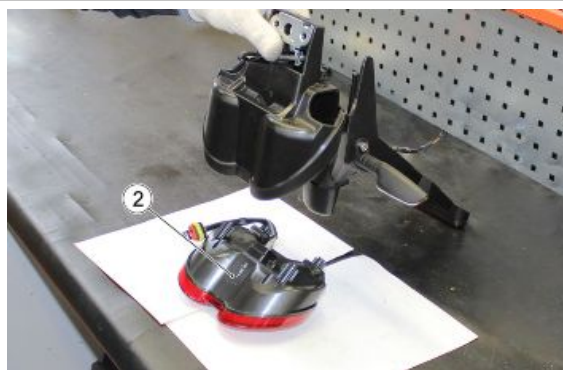


Taillight assy.

- Remove the licence plate holder bracket
- Unscrew and remove the screws (1)



- Remove the rear light assembly (2)



License plate light

REMOVAL

- Remove the licence plate holder bracket
- Undo and remove the screw (1)



- Remove the licence plate light (2)

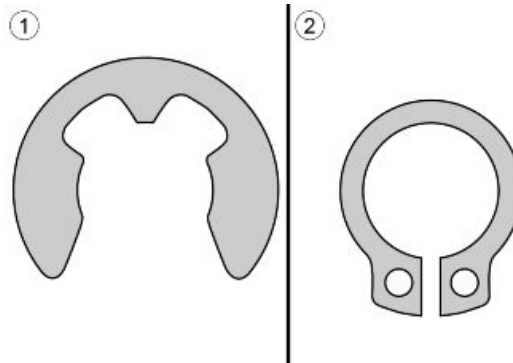


Footrest

IMPORTANT



IF THE TYPE "1" SEEGER-RINGS ARE PRESENT, REPLACE THEM WITH TYPE "2" ONES



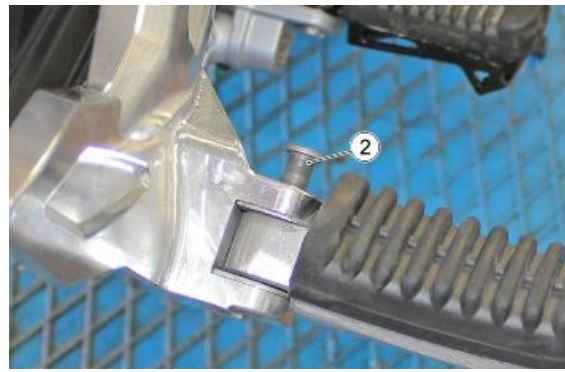
REMOVING THE PASSENGER FOOTRESTS

The following procedure is described for a single footrest, but is valid for both passenger footrests.

- Remove the snap ring(1)



- Remove the pin (2)



- Remove the passenger footrest (3)



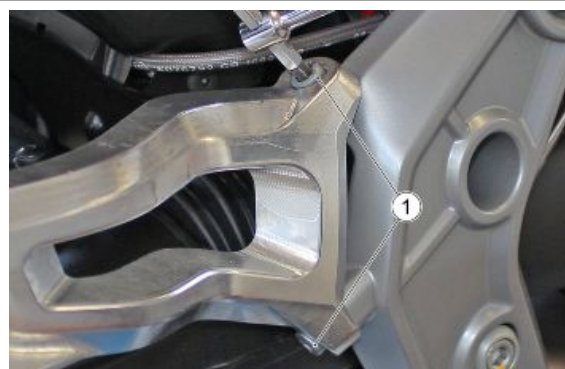
- Retrieve the two plates (4), the sphere (5) and the spring (6)



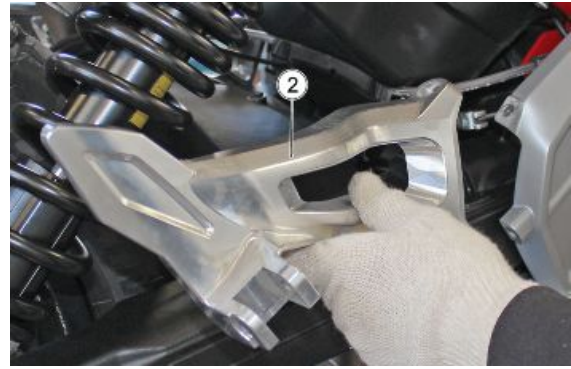
REMOVING THE PASSENGER FOOTREST SUPPORT

The following procedure is described for a single bracket, but is valid for both passenger footrest brackets.

- Unscrew and remove the two screws (1)



- Remove the passenger footrest bracket (2)



RIDER FOOTREST REMOVAL

The following procedure is described for a single footrest, but is valid for both rider footrests.

- Remove the snap ring(1)



- Remove the pin (2)

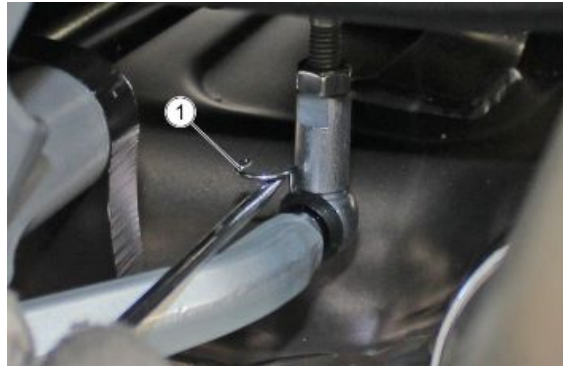


- Remove the rider footrest (3)

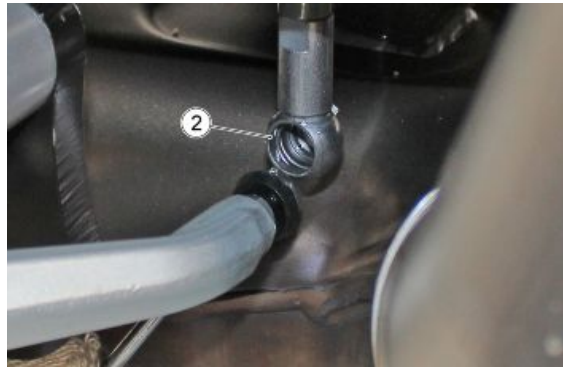


REMOVING THE GEAR SHIFT LEVER

- Remove the safety clip (1) from the gear shift lever



- Remove the gear shift lever from the spherical joint (2)



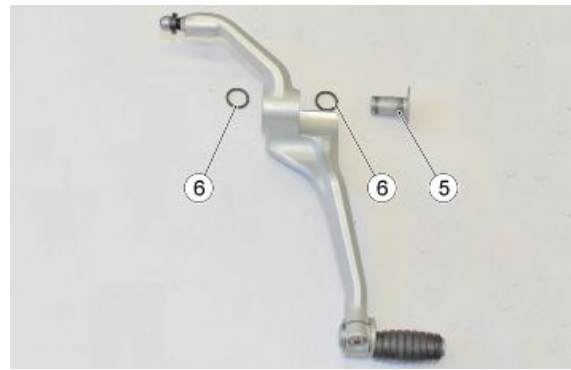
- Undo and remove the screw (3)



- Remove the gear lever (4)

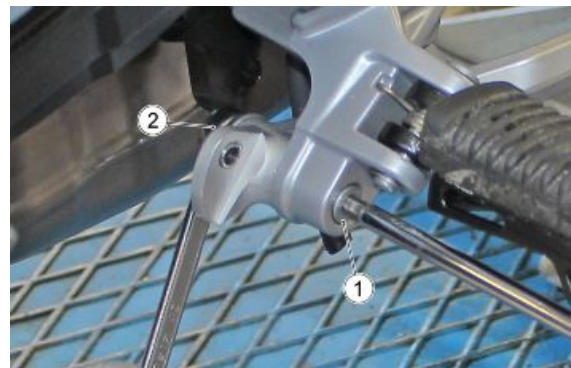


- Retrieve the bushing (5) and the two O-rings (6)



REMOVING THE REAR BRAKE LEVER

- Holding the nut (2) so that it cannot rotate, remove the screw (1)



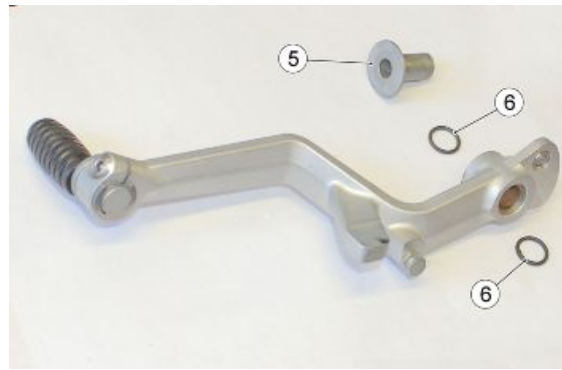
- Remove the rear brake lever (3)



- Retrieve the nut (2) and the washer (4)

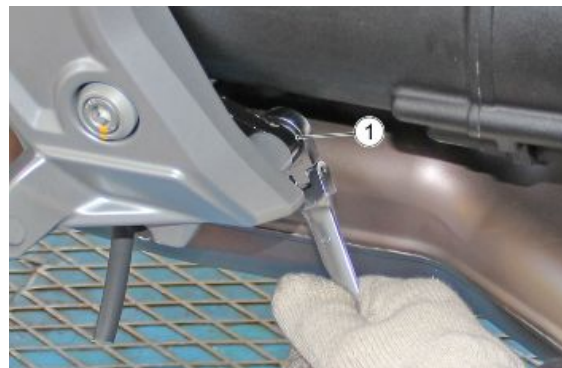


- Retrieve the bushing (5) and the two O-rings (6)



RIGHT RIDER FOOTREST BRACKET REMOVAL

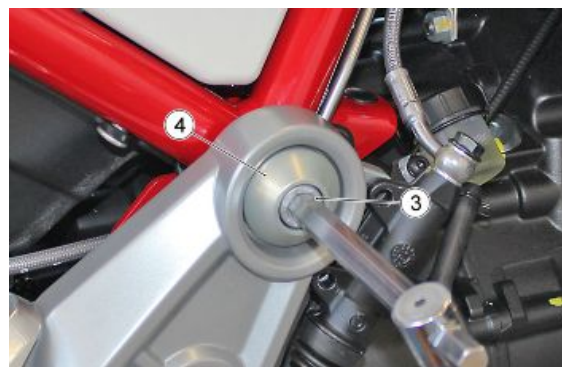
- Remove the rear brake master cylinder, brake master cylinder plunger and front brake lever
- Undo and remove the screw (1)



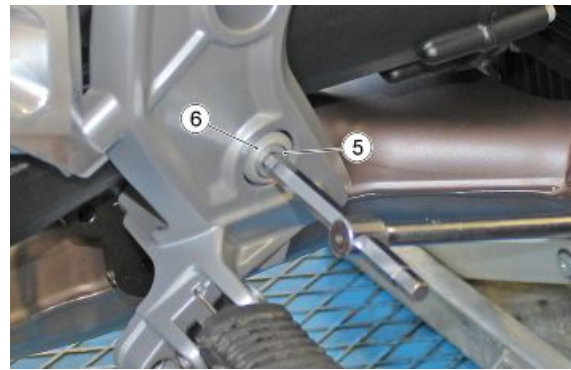
- Undo and remove the screw (2)



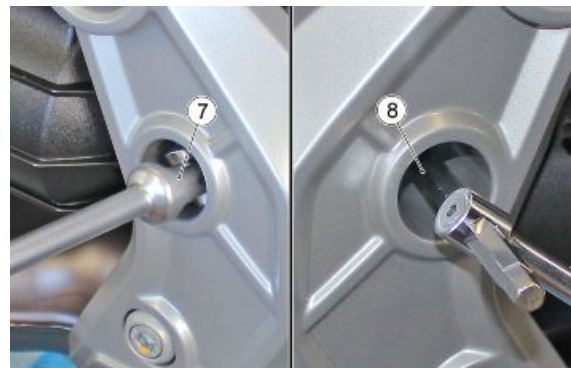
- Undo and remove the screw (3)
- Retrieve the bushing (4)



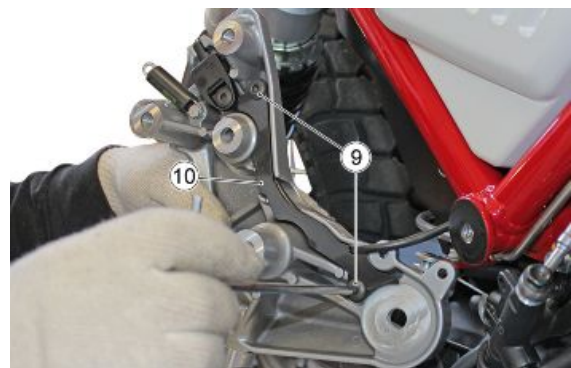
- Undo and remove the screw (5)
- Retrieve the bushing (6)



- Hold the nut (7) from the opposite side so that it cannot rotate and remove the screw (8)



- Rotate the plate 180°, undo and remove the screws (9) and remove the bracket (10)



- Undo and remove the screw (11) and remove the sensor (12) from the bracket



- Remove the right rider footrest bracket plate (13)
- Remove the passenger footrest bracket

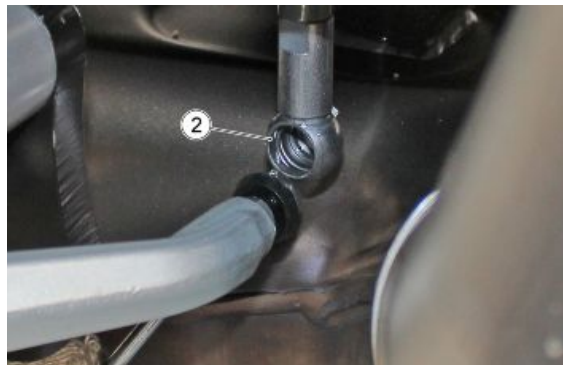


LEFT RIDER FOOTREST BRACKET REMOVAL

- Remove the safety clip (1)



- Remove the gear shift lever from the spherical joint (2)



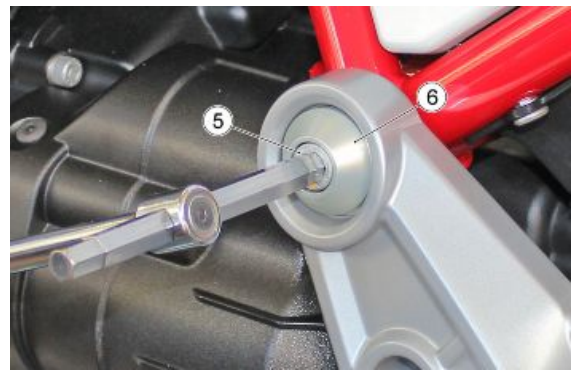
- Undo and remove the screw (3)



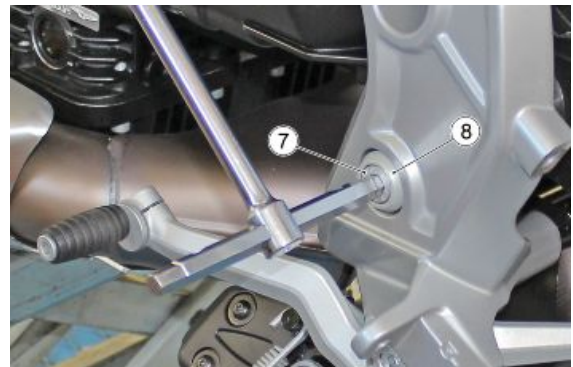
- Undo and remove the screw (4)



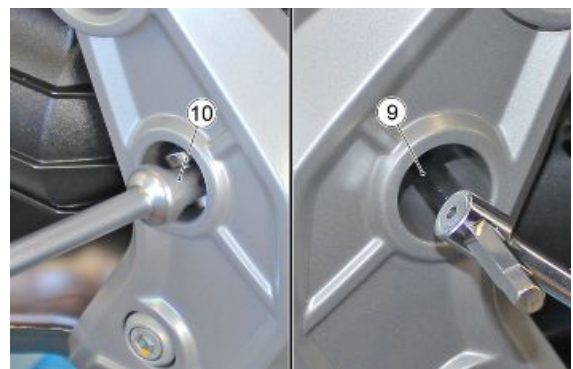
- Undo and remove the screw (5) and retrieve the bushing (6)



- Undo and remove the screw (7) and retrieve the bushing (8)



- Holding the screw (9) from the opposite side so that it cannot rotate, undo and remove the nut (10)



- Rotate the plate 180° and remove the two cable grommets (11)



- Remove the left rider footrest bracket plate (12)



Side body panels

REMOVAL

The following procedure is described for a single side panel, but is valid for both side panels.

- Remove the glove compartment
- Unscrew and remove the screws (1)



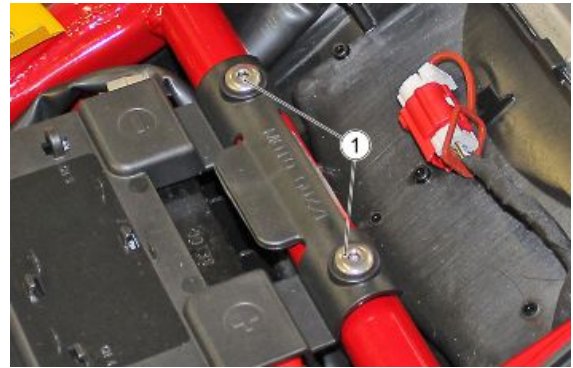
- Remove the side fairing panel (2)



Vano portaoggetti

REMOVAL

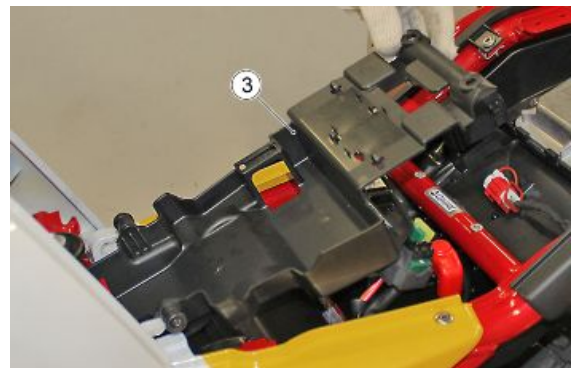
- Remove the saddle
- Unscrew and remove the screws (1)



- Remove the fuses (2) from the support indicated in the figure



- Remove the glove compartment (3)



Side fairings

REMOVAL

- Remove the fuel tank
- Unscrew and remove the screws (1)



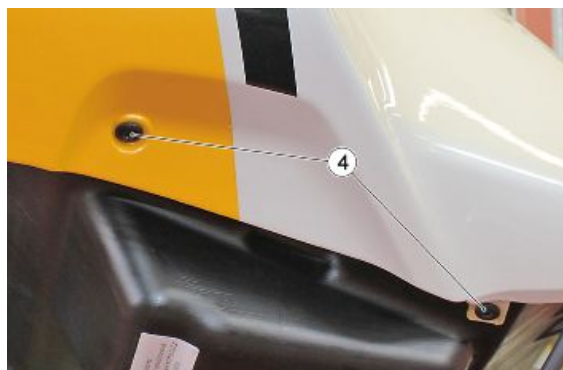
- Unscrew and remove the screws (2)



- Unscrew and remove the screws (3)



- Unscrew and remove the screws (4)



- Remove the left side engine fairing (5)



- Remove the right side engine fairing (6)



Fairing mounting panels

REAR BRAKE HOSE GUIDE REMOVAL

- Undo and remove the screw (1)



- Undo and remove the screw (2)



- Remove the cable grommet (3)



- Remove the rear brake hose guide (4)



UNDER-SADDLE COMPARTMENT/BATTERY BOX REMOVAL

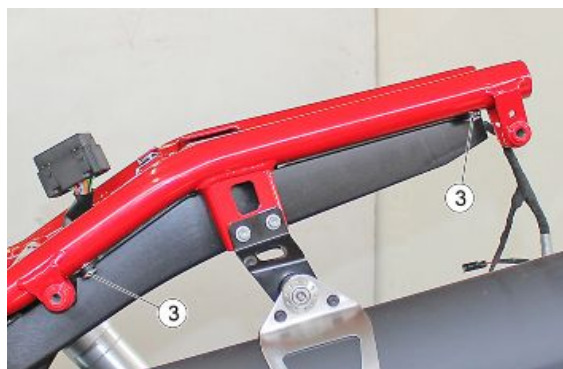
- Remove the side fairing panels
- Remove the licence plate holder bracket
- Remove the fuse box (1)



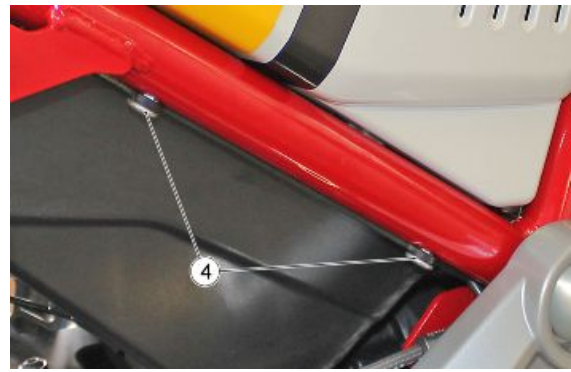
- Unscrew and remove the screws (2)



- Unscrew and remove the screws (3)



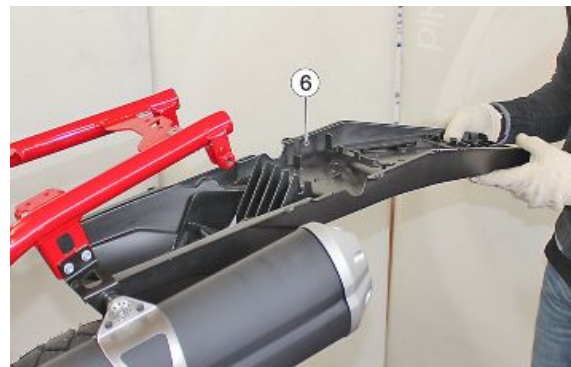
- Unscrew and remove the screws (4)



- Unscrew and remove the screws (5)



- Remove the under-saddle compartment/battery box (6)



License plate holder

LICENCE PLATE HOLDER BRACKET REMOVAL

- Remove the luggage rack
- Unscrew and remove the screws (1)



- Unscrew and remove the screws (2)



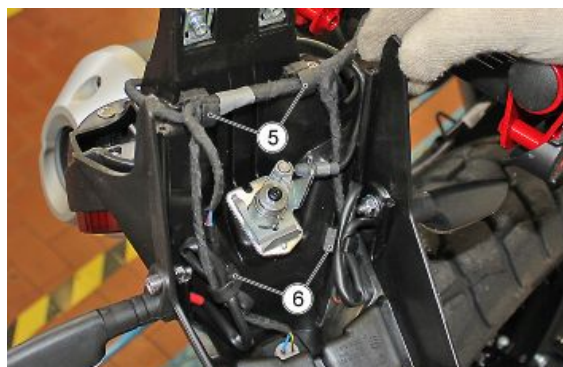
- Support the licence plate bracket
- Unscrew and remove the screws (3)



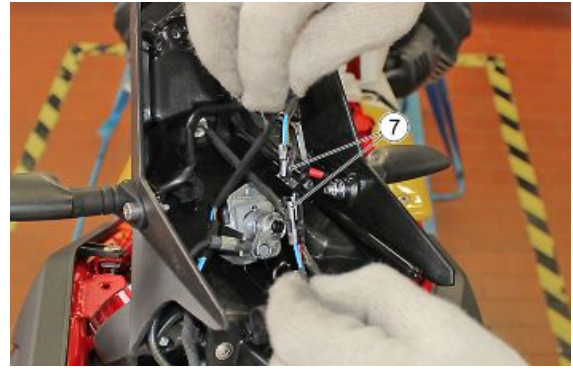
- Remove the licence plate bracket cover (4)



- Remove the wiring from the cable glands (5)
- Remove the wiring from the cable glands (6)



- Disconnect the right turn indicator connector (7)



- Disconnect the left turn indicator connector (8)



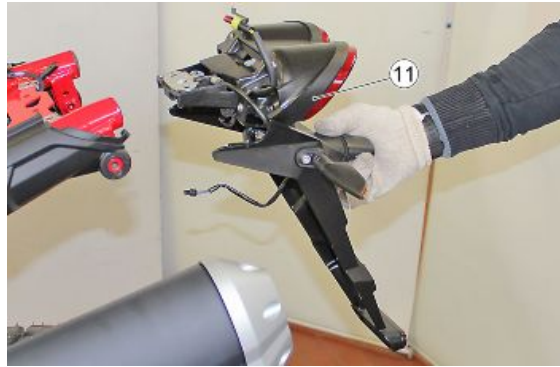
- Disconnect the connector (9)



- Remove the licence plate light (10)



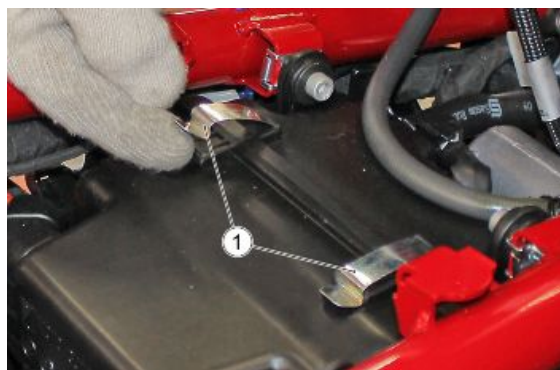
- Remove the licence plate holder (11) complete with rear light assembly and rear turn indicators
- Remove the rear light cluster
- Remove the rear turn indicators



Air box

REMOVAL

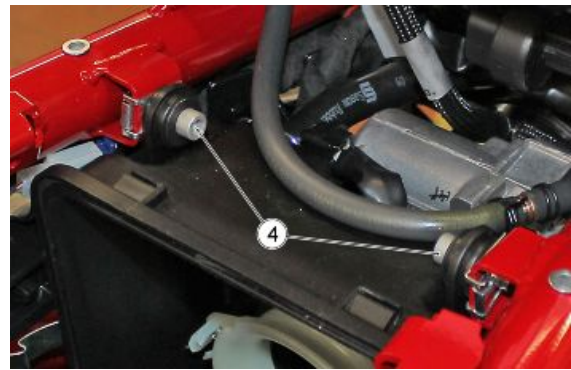
- Remove the saddle
- Remove the glove compartment
- Remove the side fairing panels
- Unhook and remove the four springs (1) located around the airbox filter, two in the upper area, one on the left side and one on the right side
- Remove the filter box (2)



- Unscrew the screws (3)



- Unscrew and remove the screws (4)



- Loosen the clamp (5)
- Disconnect the pipe (6)



- Remove the plastic rivet (7)
- Unscrew and remove the screws (8)



- Disconnect the connector (9)
- Momentarily remove the support bracket (10) from the frame



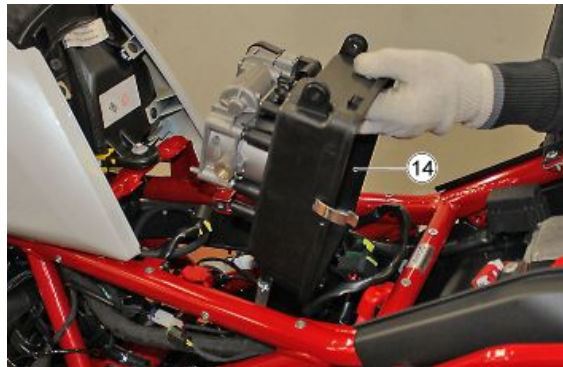
- Loosen the clamp (11)
- Disconnect the pipe (12)



- Disconnect the connector (13)



- Remove the filter box cover (14) complete with throttle body
- Slide the throttle body out and remove it



Paracoppa

REMOVAL

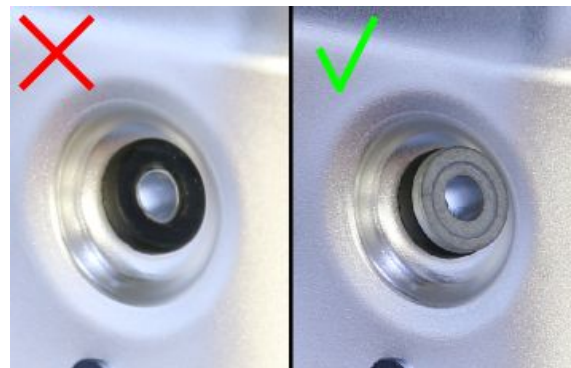
- Unscrew and remove the four screws (1) fastening the sump guard to the support bracket



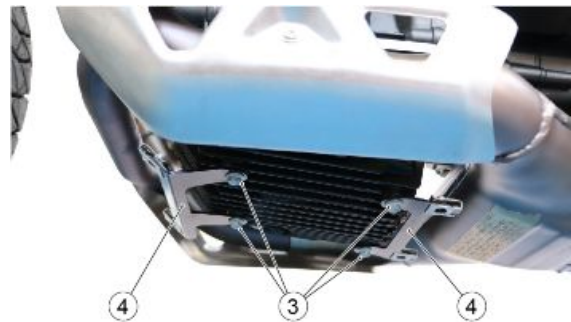
- Remove the sump guard (2).

**IMPORTANT**

DURING THE REASSEMBLY, CHECK THE CORRECT POSITIONING OF THE BUSHINGS ON THE RUBBERS, WHICH SHALL BE AS SHOWN IN THE IMAGE (THE VIEW SHOWS THE INTERNAL SIDE OF THE SUMP GUARD).



- Remove the four screws (3) fastening the support bracket to the sump guard (4).



- Remove the support bracket of the sump guard (4)

IMPORTANT

BEFORE REFITTING THE SUPPORT BRACKETS, CLEAN THE THREADED HOLES ON THE CRANKCASE CAREFULLY FROM LOCTITE RESIDUES.

Fuel tank

- Remove the ignition switch assembly gasket (1)



- Undo and remove the screw (2)



- Undo and remove the screw (3)



- Remove the ignition switch assembly cover (4)



- Unscrew and remove the screws (5)



- Undo and remove the screw (6)



- Disconnect the connector (7)



- Disconnect the fuel pump hose (8)



- Loosen the clamp (9) and disconnect the hose (10)



- Lifting the front part of the fuel tank, loosen the clamp (11) and disconnect the hose (12)



- Remove the fuel tank (13)



TANK FILLER CAP REMOVAL

- Open the tank filler cap
- Unscrew and remove the screws (1)



- Remove the tank filler cap (2)

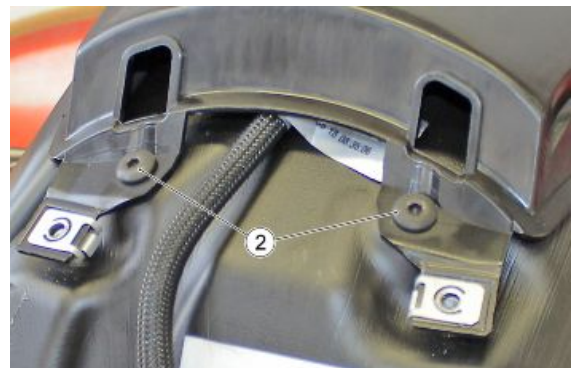


CENTRAL TANK FAIRING REMOVAL

- Undo and remove the screw (1)



- Unscrew and remove the screws (2)



- Undo and remove the screw (3)



- Unscrew and remove the screws (4)



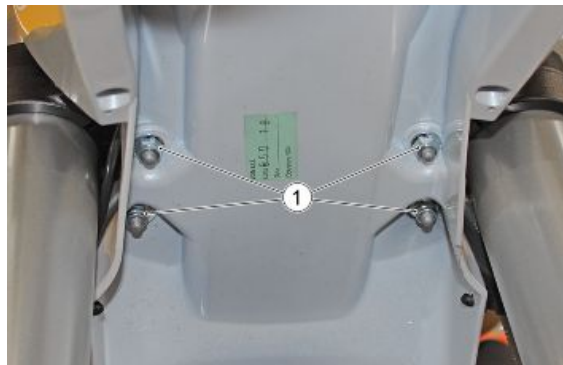
- Remove the central tank fairing (5)



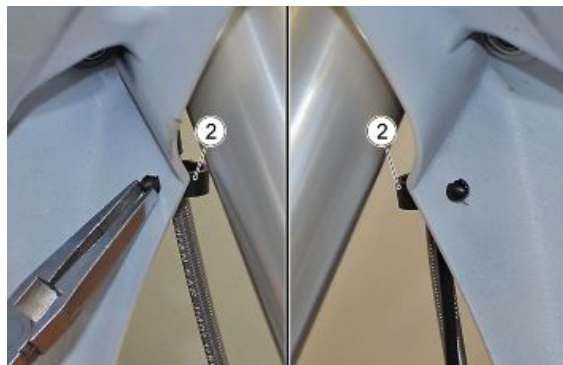
Front mudguard

REMOVAL

- Unscrew and remove the nuts (1)



- Remove the cable grommets from both sides of the mudguard (2)



- Remove the complete front mudguard (3)



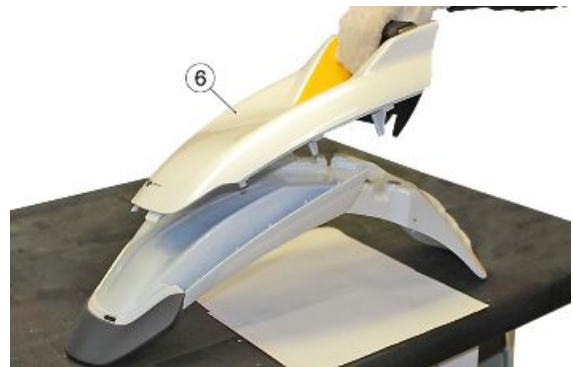
- Retrieve the bushings (4)



- Unscrew and remove the screws (5)



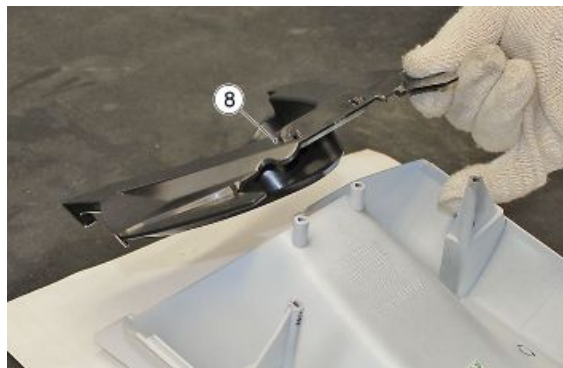
- Remove the mudguard cover (6)



- Undo and remove the screws (7)



- Remove the grille (8)



Side panniers

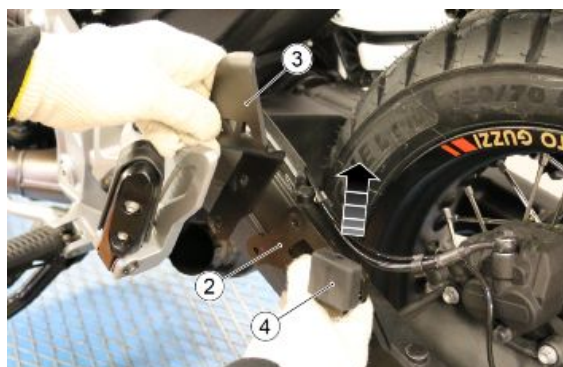
The side cases are attached to the chassis using the specific supports.

To remove them, proceed as follows:

REMOVING THE LOWER CENTERING BRACKET

THE FOLLOWING OPERATIONS REFER TO A SINGLE BRACKET BUT APPLY TO BOTH SIDES

- Remove the two screws (1) used to fasten the lower support bracket.
- Remove the support bracket (2) and the heat shield (only left side) (3) in sequence
- If necessary, to remove the protective rubber (4) from the support bracket, simply slide it from the bracket upwards.



REMOVAL UPPER SUPPORTS

THE FOLLOWING OPERATIONS REFER TO A SINGLE BRACKET BUT APPLY TO BOTH SIDES

- Remove the four fixing screws (1), complete with washers and relative bushings, of the upper support.

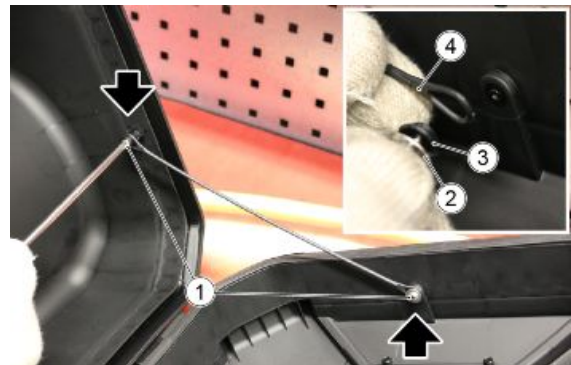


- Remove the upper support (2)

**CASE DISASSEMBLY**

THE FOLLOWING OPERATIONS REFER TO A SINGLE BRACKET BUT APPLY TO BOTH SIDES

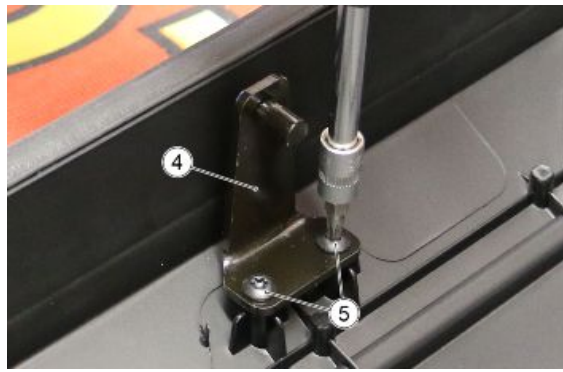
- After removing the case from the motorcycle, open it and remove the fixing screws (1), complete with washers (2) and bushings (3) to remove the two side stands of the cover.



- To remove the gasket from the cover and eventually replace it, simply lift it from the junction point and then remove it.



- To remove the bracket (4) for closing the cover, unscrew and remove the two fixing screws (5).

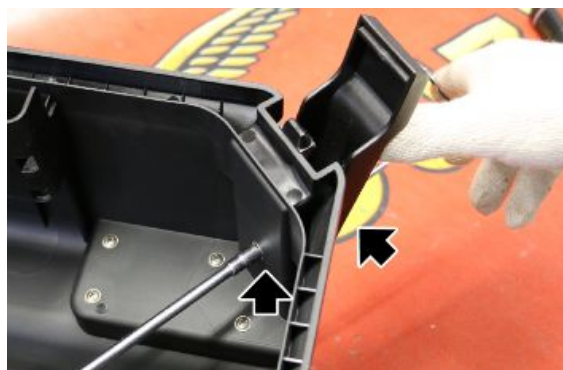


- Remove the ten fixing screws (6) to remove the four covers (7) on the case cover.



THE OPERATION DESCRIBED IS RELATED TO A SINGLE CLOSURE LEVER BUT IS VALID FOR BOTH

- To remove the closing levers of the cases it is necessary to remove the nut (with relative washer) that blocks the screw (with relative washer)
- Then the complete closing lever can be removed.



- Remove the twelve internal screws (8) of the case in order to remove the two upper and lower inserts.



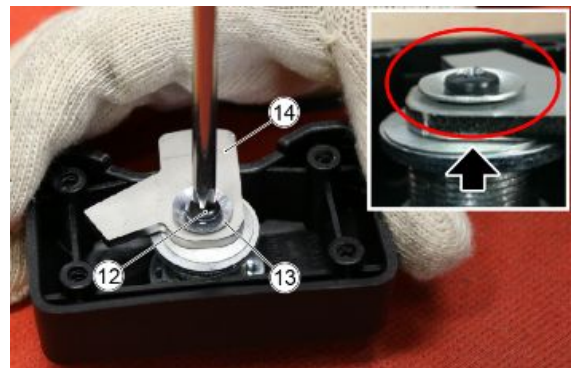
- To dismantle the insert complete with locking latch, remove the four screws (9) and separate the case insert (10) from the cover (11).



- Remove the fixing screw (12) with the spring washer (13) and the lock plate (14).

NOTE

DURING THE REFITTING PAY ATTENTION TO THE DIRECTION OF ASSEMBLY OF THE SPRING WASHER (13) AND THE LOCK PLATE (14).



- Remove the spring washer (15) and the spacer washer (16)

NOTE

DURING THE REFITTING PAY ATTENTION TO THE DIRECTION OF ASSEMBLY OF THE SPRING WASHER



- Remove the fastening nut (17) of the latch.



- Remove the knurled washer (18) and remove the latch (19) from the cover.

NOTE

DURING THE REFITTING, PAY ATTENTION TO THE CORRECT POSITIONING OF THE LATCH, AS SHOWN IN THE IMAGE (A).



- Working on the case, remove the protective cover (20) of the latch

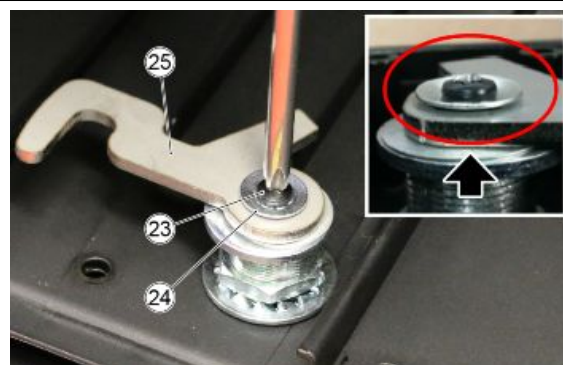


- Remove the two fixing screws (21) and remove the handle complete (22).



- Remove the fixing screw (23) with the spring washer (24) and the latch (25).

NOTE
 DURING THE REFITTING PAY ATTENTION TO THE DIRECTION OF ASSEMBLY OF THE SPRING WASHER (24) AND THE LATCH (25).



- Remove the spring washer (26) and the spacer washer (27)

NOTE

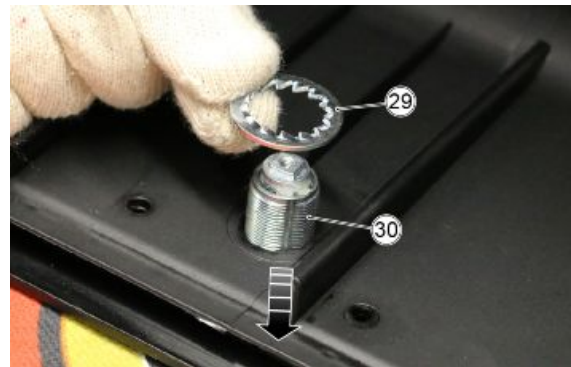
DURING THE REFITTING PAY ATTENTION TO THE DIRECTION OF ASSEMBLY OF THE SPRING WASHER



- Remove the fastening nut (28) of the latch.



- Remove the knurled washer (29) and remove the latch (30) from the case.



- To disassemble the handle, remove the three screws (31) and recover the cover (32).



- Remove the two closing covers of the handle (33).



- Separate the handle (34) from the support (35)



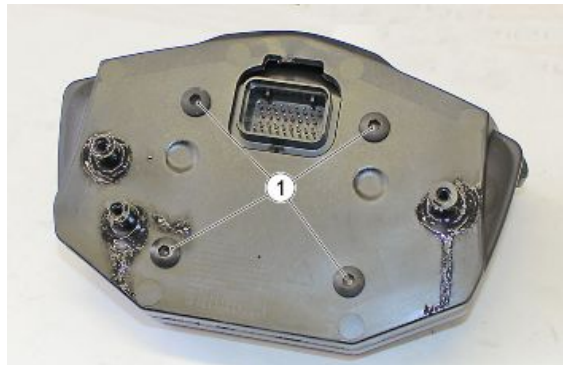
- Remove the return spring (36) from the handle pin, paying attention to the direction of assembly during the reassembly phase.



Instrument cluster support

REMOVAL

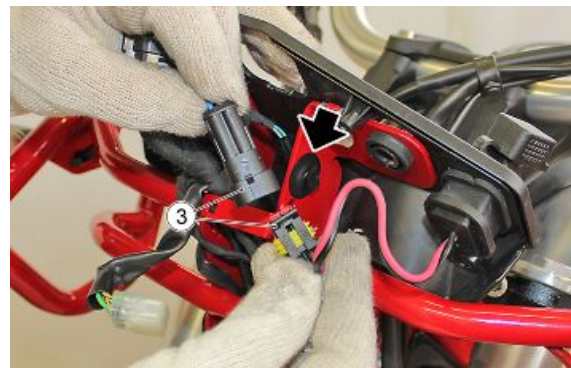
- Remove the instrument panel
- Unscrew and remove the screws (1)



- Remove the instrument panel bracket (2)



- Remove the connector (3) from the guide indicated in the figure
- Disconnect the connector (3)



- Remove the plastic rivet (4)



- Remove the plastic rivets from both sides of the vehicle (5)



- Unscrew and remove the screws (6)



- Remove the support (7)



- Remove the USB socket (8)



- Disconnect the front turn indicator connectors (9)



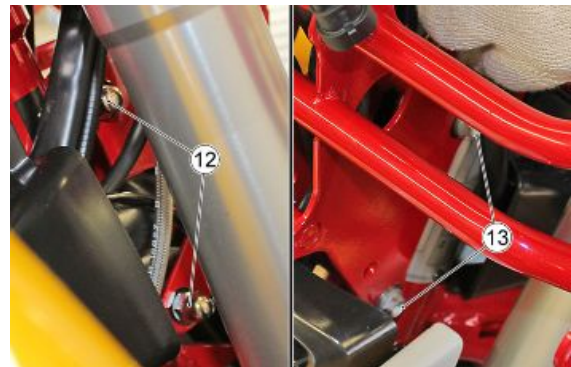
- Unscrew the two screws (10) from both sides of the vehicle



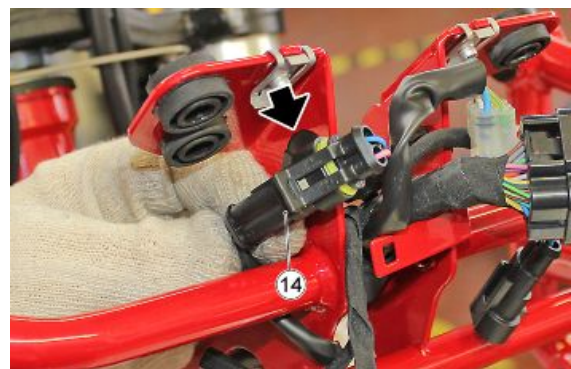
- Remove the front turn indicators from both sides of the vehicle (11)



- Lock the nuts (12) and unscrew and remove the screws (13)



- Remove the connector (14) from the guide indicated in the figure
- Disconnect the connector (14)



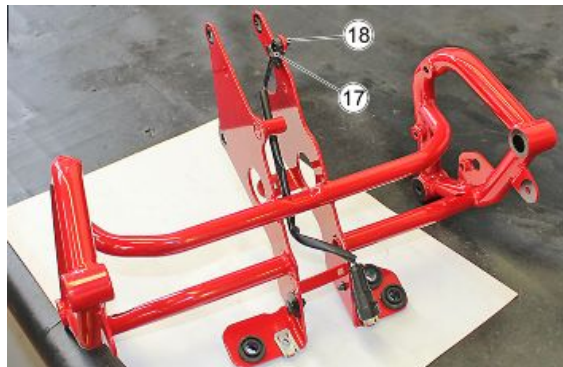
- Remove the main wiring harness (15) from the bracket



- Remove the support (16)



- Remove the clamp (17)
- Remove the air temperature sensor (18)



Battery

REMOVAL

- Remove the glove compartment
- Undo and remove the screw (1)
- Remove the negative cable from the battery (2)
- Refit the screw (1) along with the yoke in the specific seat



- Lift the protective boot (3)
- Undo and remove the screw (4)
- Remove the positive cable (5)
- Refit the screw (4) along with the yoke in the specific seat



- Remove the battery (6)



INSTALLATION

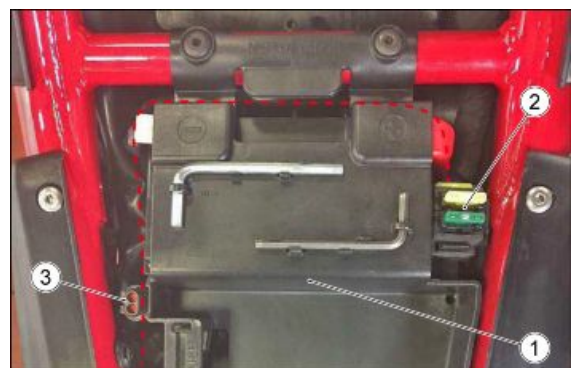
- Follow the removal procedures in reverse order and connect the positive pole to the battery first.
- Take care to position the fuse holder secondary wiring harness as shown in the figure.



- Install the glove compartment (1);
- attach on the glove compartment the fuse box (2) and the connector (3) for the USB 2 preparation.

WARNING

Make sure that the fuse box (2) and its wiring harness are correctly positioned and do not interfere with other vehicle components.



Tail guard

REAR FAIRINGS REMOVAL

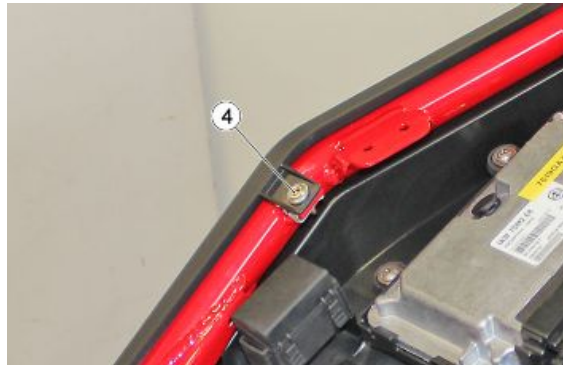
- Remove the luggage rack
- Unscrew and remove the screws (1)
- Unscrew and remove the screws (2)



- Remove the rear fairing (3)



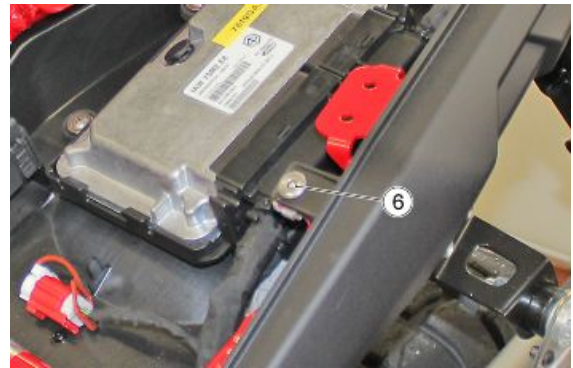
- Undo and remove the screw (4)



- Remove the right rear fairing (5)



- Undo and remove the screw (6)



- Remove the left rear fairing (7)



Copertura terminale

REMOVAL

- Unscrew and remove the screws (1)



- Remove the left cover (2)



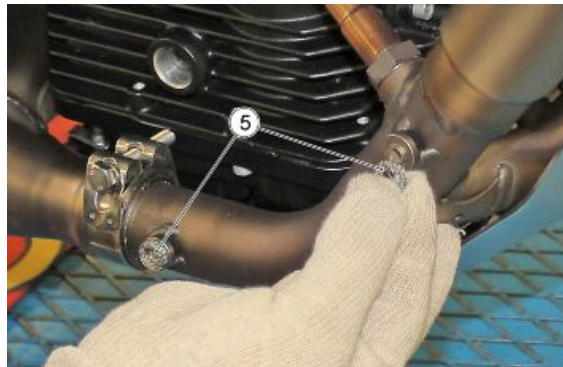
- Unscrew and remove the screws (3)



- Remove the terminal cover (4)



- Retrieve the washers (5)



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