



SERVICE STATION MANUAL

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V7 E5 Special-Stone



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THE VALUE OF SERVICE

As a result of continuous updates and specific technical training programmes 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 reliability of the vehicle also depends on its mechanical conditions. Checking the vehicle before riding it, its regular maintenance and the use of **original Moto Guzzi spare parts** only are essential factors!

For information on the nearest **Official Dealer and/or Service Centre** consult 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.

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SERVICE STATION MANUAL

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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, Moto Guzzi 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.

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

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



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



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



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



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BODYW

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PRE-DELIVERY

PRE DE

Carry out the listed checks before delivering the motorcycle.

WARNING

HANDLE FUEL WITH CARE.

Aesthetic inspection

- Paintwork
- Fitting of Plastic Parts
- 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
- Plastic parts fixing screws

Electrical system

- Main switch
- Headlamps: high beam lights, low beam lights, tail lights (front and rear) and their 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 panel lights
- Instrument panel: fuel and temperature indicator (if present)
- Instrument panel warning lights
- Horn
- Electric starter
- Engine stop via emergency stop switch and side stand
- Through the diagnosis 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.

CAUTION



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

CAUTION



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

CAUTION



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.

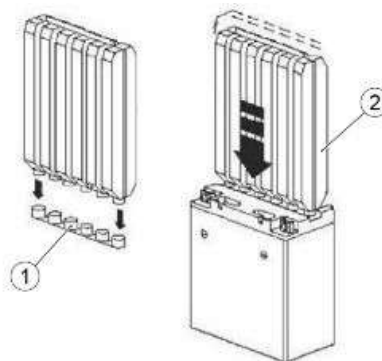
CAUTION



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).

Levels check

- Hydraulic braking system fluid level
- Clutch system fluid level (if present)
- Gearbox oil level (if present)
- Transmission oil level (if present)
- Engine oil level

Road test

- Cold start
- Instrument panel operation
- Response to throttle control
- Stability when accelerating and braking
- Front and rear brake efficiency

- Front and rear suspension efficiency
- Abnormal noise

Static test

Static check after test drive:

- Restarting when warmed up
- Starter operation (if present)
- Minimum holding (turning the handlebar)
- Uniform turning of the steering
- Possible leaks
- Radiator electric fan operation (if present)

Functional inspection

- Hydraulic braking system
- Stroke of brake and clutch levers (if present)
- Clutch - Check for correct operation
- Engine - Check for correct general operation and absence of abnormal noise
- Other
- Documentation check:
- Chassis and engine numbers check
- Supplied tools check
- License plate fitting
- Locks checking
- Tyre pressure check
- Installation of mirrors and any possible accessories



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

CAUTION



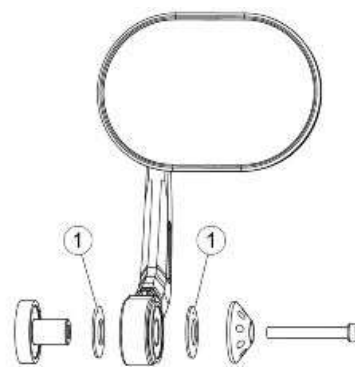
CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

Specific operations for the vehicle

INSTALLAZIONE SPECCHI RETROVISORI LATERALI

(IF AVAILABLE)

- Svitare il dado che blocca i componenti dello specchio e rimuoverlo prestando particolare attenzione al verso di montaggio delle molle a tazza (1) che devono avere la parte concava verso l'esterno.



- In caso di mancanza del grasso, applicare un velo su ambo i lati delle molle a tazza (1).



- Applicare la loctite 243 sul tratto filettato della vite M6.



- Serrare alla coppia di 10 Nm (7.38 lbf ft) la vite per il fissaggio dello specchio retrovisore a manubrio.



- Mantenendo ferma la vite, ruotare da ambo i lati lo specchio per un paio di volte.



INDEX OF TOPICS

CHARACTERISTICS

CHAR

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.

CAUTION



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

Fuel

CAUTION



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

CAUTION



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 and clutch fluid

BRAKE AND CLUTCH FLUIDS CAN DAMAGE THE PLASTIC OR RUBBER PAINTED SURFACES. WHEN SERVICING THE BRAKING OR THE CLUTCH SYSTEM PROTECT THESE COMPONENTS WITH A CLEAN CLOTH. ALWAYS WEAR PROTECTIVE GOGGLES WHEN SERVICING THESE SYSTEMS. BRAKE AND CLUTCH FLUIDS ARE EXTREMELY HARMFUL FOR YOUR EYES. IN THE EVENT OF ACCIDENTAL CONTACT WITH THE EYES, RINSE THEM IMMEDIATELY WITH PLENTY OF COLD, CLEAN WATER AND SEEK MEDICAL ADVICE. KEEP OUT OF THE REACH OF CHILDREN.

Battery electrolyte and hydrogen gas**CAUTION**

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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

CAUTION

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

- Only use ORIGINAL Moto Guzzi SPARE PARTS.
- Comply with lubricant and consumables use guidelines.
- Lubricate parts (whenever possible) before reassembling them.
- When tightening nuts and screws, start from the ones with the largest section or from the internal ones, moving diagonally. Tighten nuts and screws in successive steps before applying the tightening torque.
- Always replace self-locking nuts, washers, sealing rings, circlips, O-rings (OR), cotter pins and screws with new ones if their tread is damaged.
- When assembling the bearings, make sure to lubricate them well.
- Check that each component is assembled correctly.
- After a repair or routine maintenance procedure, carry out pre-ride checks and test the vehicle on private grounds or in an area with low traffic density.
- Clean all coupling surfaces, oil guard rims and gaskets before refitting them. Smear a light layer of lithium-based grease on the oil guard rims. Reassemble oil guards 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").

CAUTION

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 TORQUE

CAUTION

IN THE EVENT THAT A SELFBRAKING NUT IS UNSCREWED, IT IS NECESSARY TO REPLACE IT WITH A NEW ONE.

CAUTION

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

Engine run-in is essential to ensure engine long life and correct operation. Twisty roads and gradients are ideal to run in engine, brakes and suspensions effectively. Vary your riding speed during the run-in. This ensures that components operate under both "loaded" and "unloaded" conditions, allowing the engine components to cool.

CAUTION

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.

CAUTION

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 twist the throttle grip abruptly and completely when the engine is working at a low revs, either during or after run-in.
- During the first 100 Km (62 miles) use the brakes gently, avoiding sudden or prolonged braking. That is to permit the adequate adjustment of the pad friction material to 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.

CHASSIS 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.

ZGULD00017MXXXXXX

KEY:

ZGU: WMI (World Manufacturer Identifier) code;

LD: model;

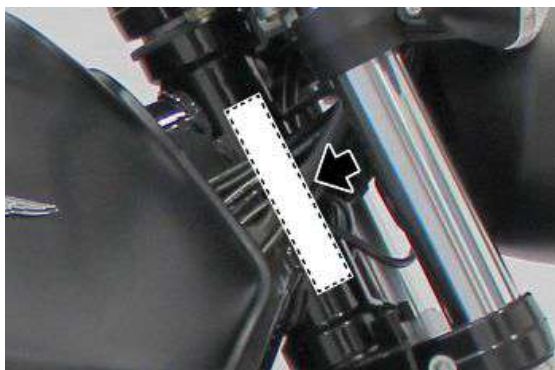
000: version;

0: free digit

19: variable year of manufacture (19 - 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
Max. length.	2165 mm (85.24 in)
Max. width	800 mm (31.50 in)
Max. height	1,100 mm (43.31 in)
Wheelbase	1,450 mm (57.09 in)
Kerb weight (Stone)	218 kg (481 lb)
Kerb weight (Special)	223 kg (492 lb)

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 (3.30x3.03 in)
Compression ratio	10.5 +/- 0.5: 1
Starting	Electric

Specification	Desc./Quantity
Idle engine speed	1,250 +/- 100 (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

GEARBOX

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

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	28 / 24 = 1: 0.857
Final drive	with shaft, ratio 8 / 33 = 1 : 4.125

Capacities

CAPACITY

Specification	Desc./Quantity
Fuel tank capacity (including reserve)	21 l (4.62 UK gal; 5.55 US gal)
Fuel tank reserve capacity	4 l (0.88 UK gal; 1.06 US gal)
Engine oil	Oil change and oil filter replacement: 1750 cm ³ (106.79 cu.in)
Gearbox oil	500 cm ³ (30.51 cu.in)
Transmission oil	180 cc (10.37 cu in)
Seats	2
Maximum weight limit (Stone)	428 kg (944 lb) (rider + passenger + luggage)
Maximum weight limit (Special)	433 kg (954 lb) (rider + passenger + luggage)

Electrical system

ELECTRICAL SYSTEM

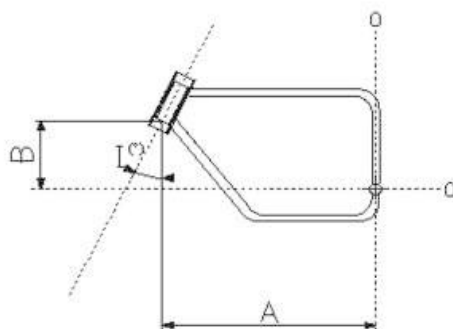
Specification	Desc./Quantity
Battery	12 V - 12 Ah
Permanent magnet alternator	12V - 430W
Fuses	(halogen headlamps) 10 - 7.5 - 15 - 5 (2) - 30 - 20 A (led headlamps) 10 - 7.5 - 15 - 5 (2) - 30 - 20 A
High beam/low beam light	(halogen 12 V - 55 W / 60 W H4) or (led)
Front DRL	(halogen 12 V - 5 W) or (led)
taillight /stop lights	(halogen 12 V - 5 / 21 W) or (led)
Turn indicators	(halogen 12 V - 10 W (RY 10 W orange bulb)) or (led)

SPARK PLUGS

Specification	Desc./Quantity
Standard	NGK IR MR8BI-8
Spark plug electrode gap	0.8 mm (0.031 in)
Resistance	5 kOhm

INDICATOR LAMPS

Specification	Desc./Quantity
Gearbox in neutral	LED
Turn indicators	LED
Fuel reserve	LED
High beam light	LED
General alarm	LED
MI warning light	LED
ABS warning light	LED
MGCT warning light	LED

Frame and suspensions**SIZES A AND B**

Specification	Desc./Quantity
Size A	692 mm (27.24 in)
Size B	186 mm (7.32 in)

CHASSIS

Specification	Desc./Quantity
Type	Modular double cradle, high-strength steel tubular chassis
Steering rake angle	26,4°
Trail (no rider or passenger - wheels on the ground - without use of side stand)	104.2 mm (4.10 in)

SUSPENSIONS

Specification	Desc./Quantity
Front	hydraulic telescopic fork, Ø 40 mm (1.57 in)
Travel	137 mm (5.39 in)
Rear (standard)	Swingarm in die-cast light alloy, 2 shock absorbers with adjustable spring pre-loading
Rear (race)	Swingarm in die-cast light alloy, 2 shock absorbers with adjustable extension, compression and spring pre-loading
Stroke (standard)	98 mm (3.86 in)
Stroke (race)	75 mm (2.95 in)

Brakes**BRAKES**

Specification	Desc./Quantity
Front	Ø 320-mm (12.59 in) stainless steel floating disc, calliper with 4 different and counteracting plungers
Rear	260 mm (10.24 in) stainless steel disc, floating calliper with two 22 mm (0.87 in) diameter pistons

Wheels and tyres

WHEEL RIMS

Specification	Desc./Quantity
Type	spoked wheels with alloy rims, for tyres with inner tubes, or alloy tubes wheels for tubeless tyres.
Front	2.5"x18"
Rear	4.25" x 17"

TYRES

Specification	Desc./Quantity
Front (size)	100 / 90 - 18 56V
Front (inflation pressure)	2.5 bar (250 kPa) (36.26 PSI)
Front (inflation pressure with passenger)	2.6 bar (260 kPa) (37.71 PSI)
Rear (size)	150 / 70B - 17 69V
Rear (inflation pressure)	2.5 bar (250 kPa) (36.26 PSI)
Rear (inflation pressure with passenger)	2.6 bar (260 kPa) (37.71 PSI)

Supply

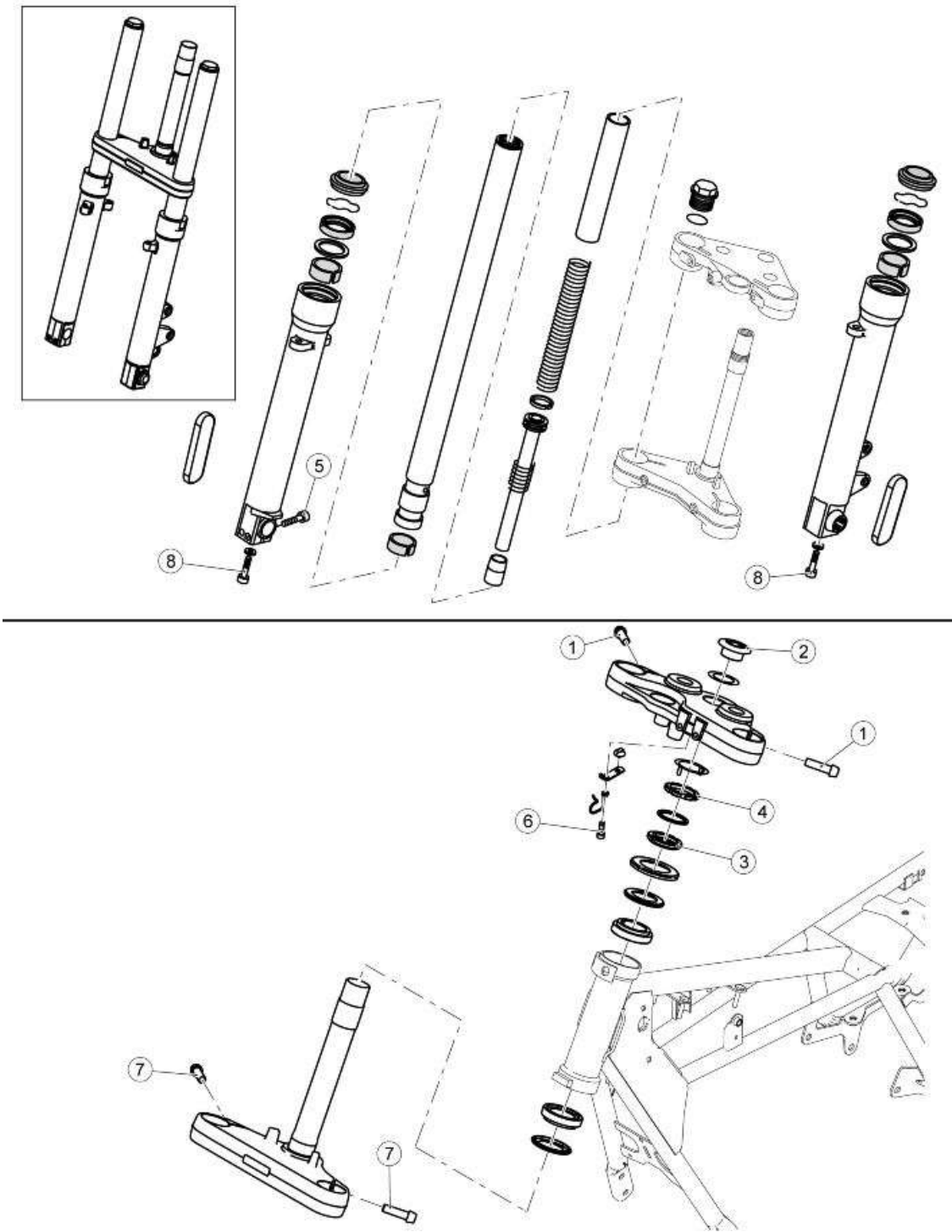
POWER SUPPLY

Specification	Desc./Quantity
Type	Electronic injection (Marelli MIU G4)
Diffuser	Ø 38 mm (1.50 in)
Fuel	Unleaded gasoline E10 (95 R.O.N.)

Tightening Torques

Chassis

Front side

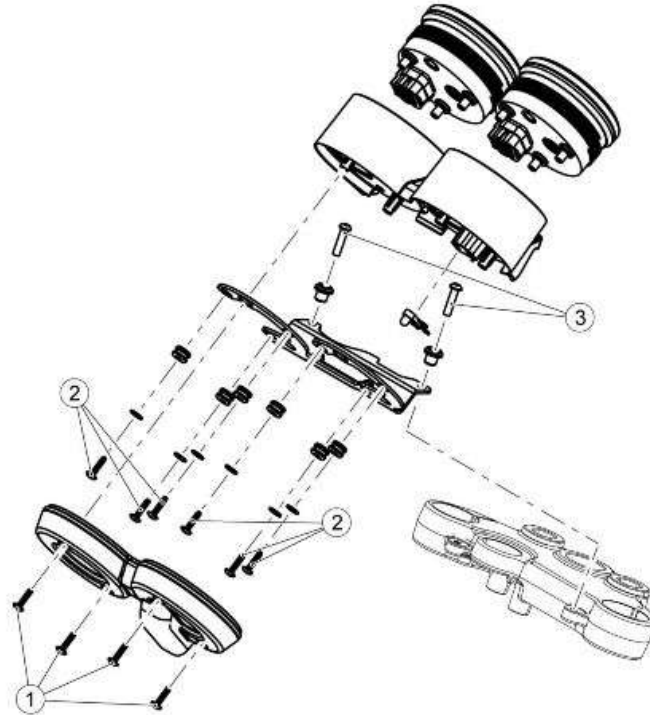


FRONT SUSPENSION - STEERING

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-
2	Steering head fastening bushing	-	1	100 Nm (73.76 lb ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lb ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter-lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-

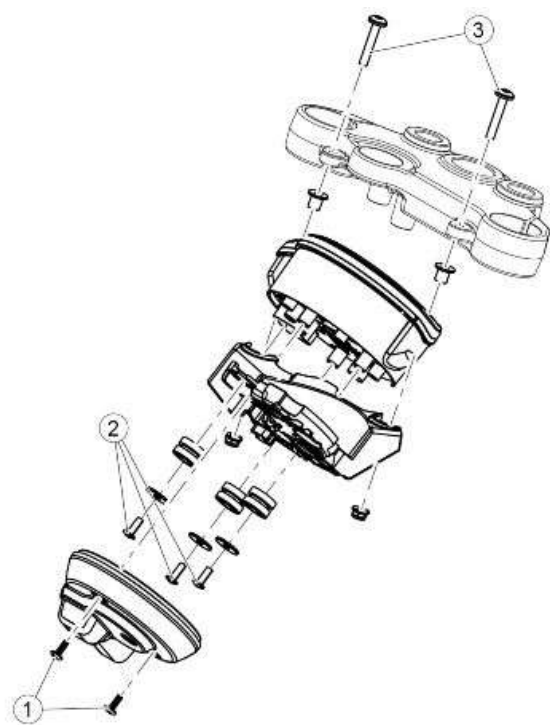
Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lb ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lb ft)	-

(SPECIAL)

**INSTRUMENT CLUSTER**

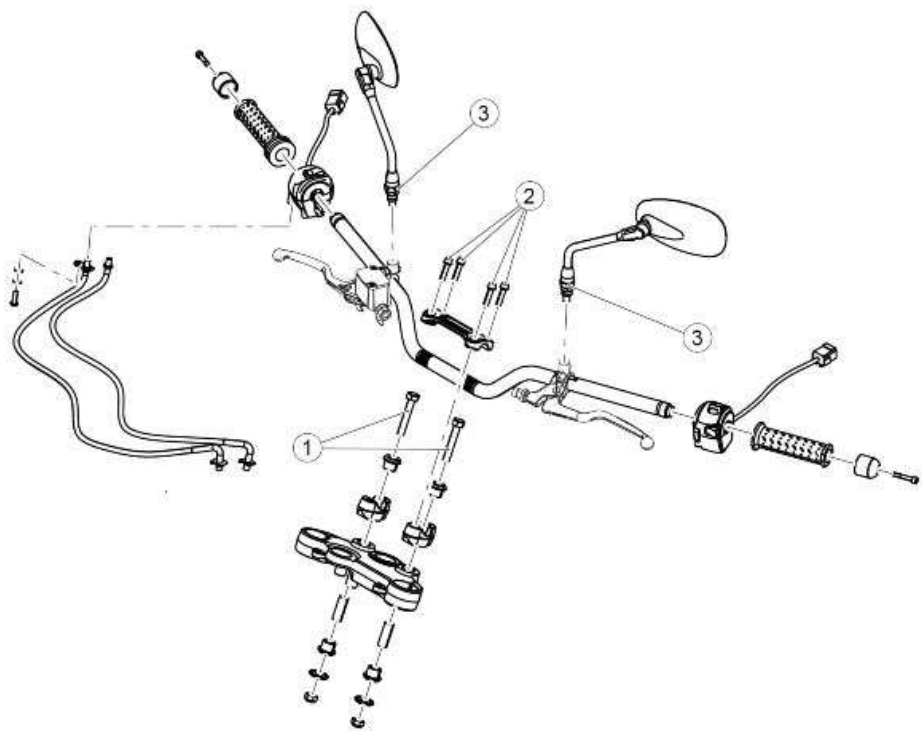
Pos.	Description	Type	Quantity	Torque	Notes
1	Instrument cluster cover fastening screws	Self-tapping 4.2x19	4	2 Nm (1.48 lb ft)	-
2	Screws fastening instrument cluster to support bracket	Self-tapping 3.9x16	6	2 Nm (1.48 lb ft)	-
3	Support plate fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

(STONE)



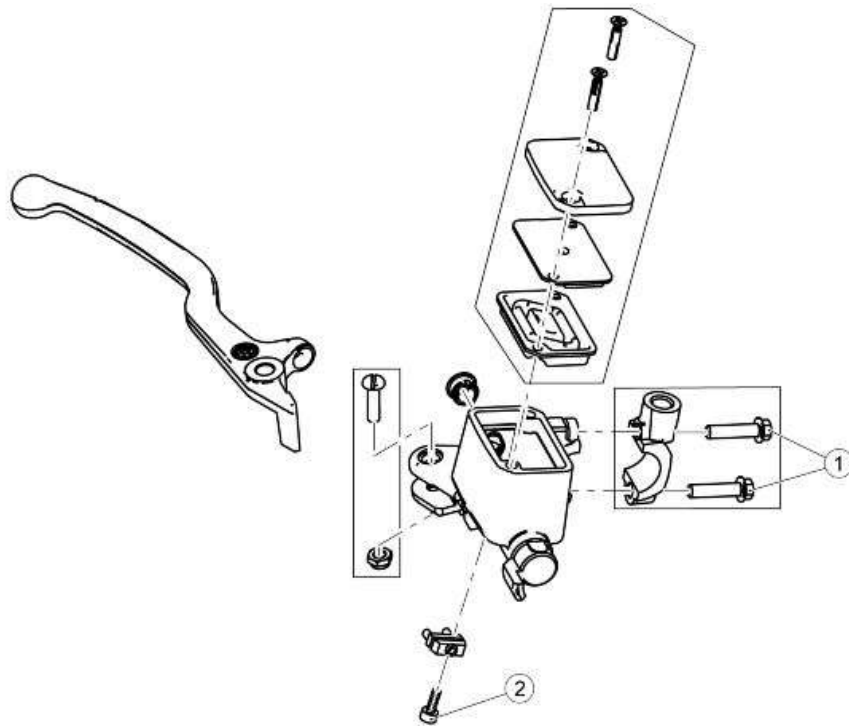
INSTRUMENT CLUSTER

Pos.	Description	Type	Quantity	Torque	Notes
1	Instrument cluster cover fastening screws	Self-tap-ping 4.2x13	2	2 Nm (1.46 lbf ft)	-
2	Screws fastening instrument cluster to support bracket	Self-tap-ping 5x14	3	3 Nm (2.21 lbf ft)	-
3	Support plate fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
4	Support plate fastening nuts	M6	2	10 Nm (7.38 lbf ft)	-



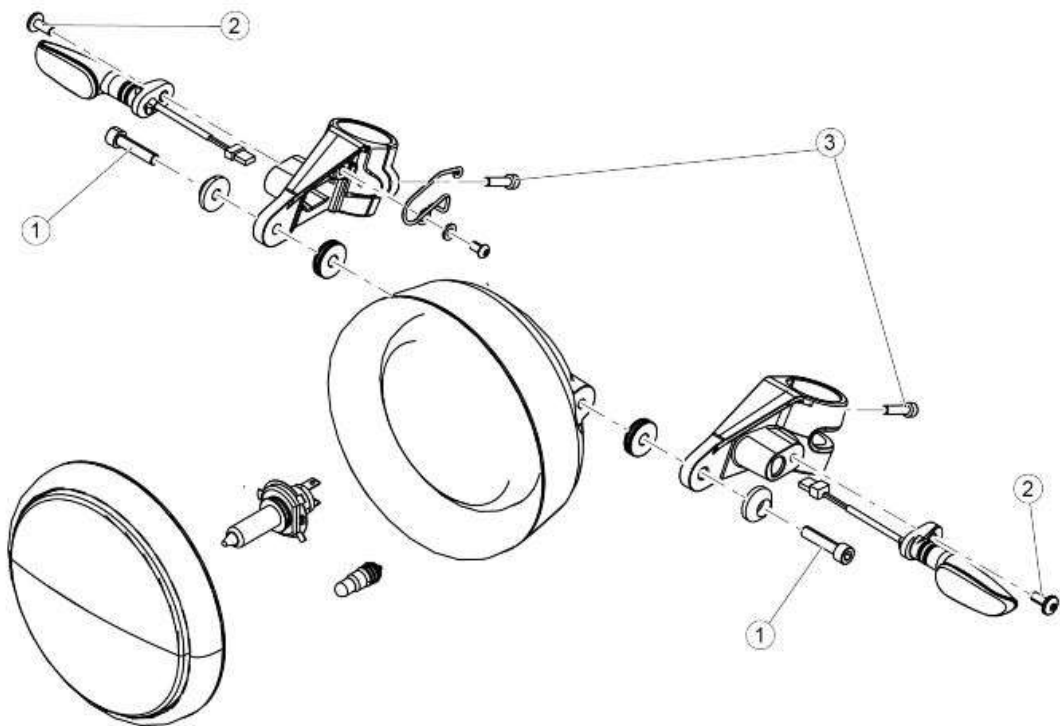
HANDLEBAR AND CONTROLS

Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fixing handlebar support U-bolts to steering plate	M10	2	50 Nm (36.88 lbf ft)	-
2	Handlebar U-bolt fastener screws	M8	4	25 Nm (18.44 lbf ft)	-
3	Mirror fixing	M10	2	Manual	-
-	Light switch fastening screws	SWP 5	2	1.5 Nm (1.11 lbf ft)	-
-	Throttle cable cover fastening screws	M5	3	6 Nm (4.43 lbf ft)	-

**FRONT BRAKE MASTER CYLINDER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-

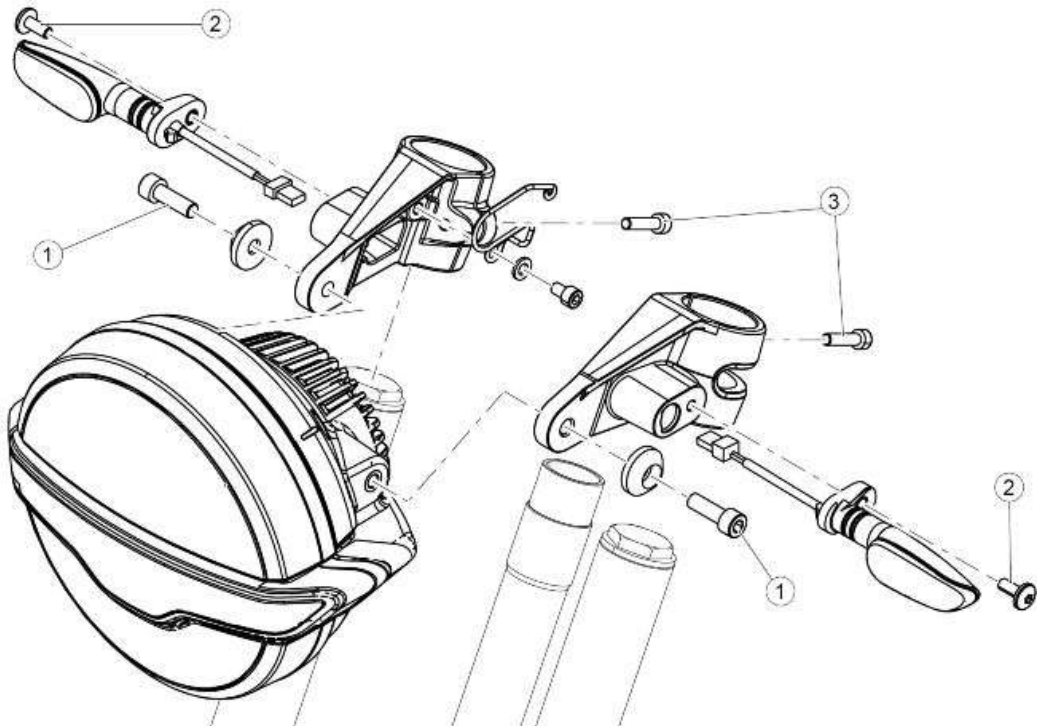
(SPECIAL)



HEADLIGHT UNIT

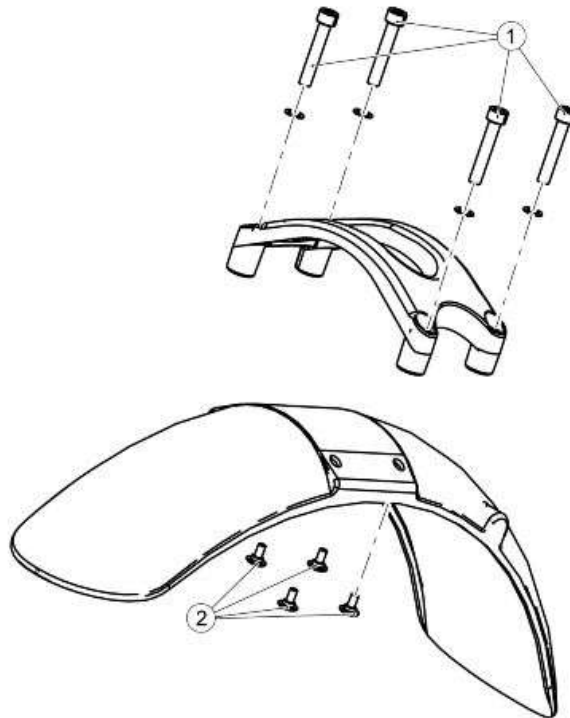
Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lb ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lb ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

(STONE)



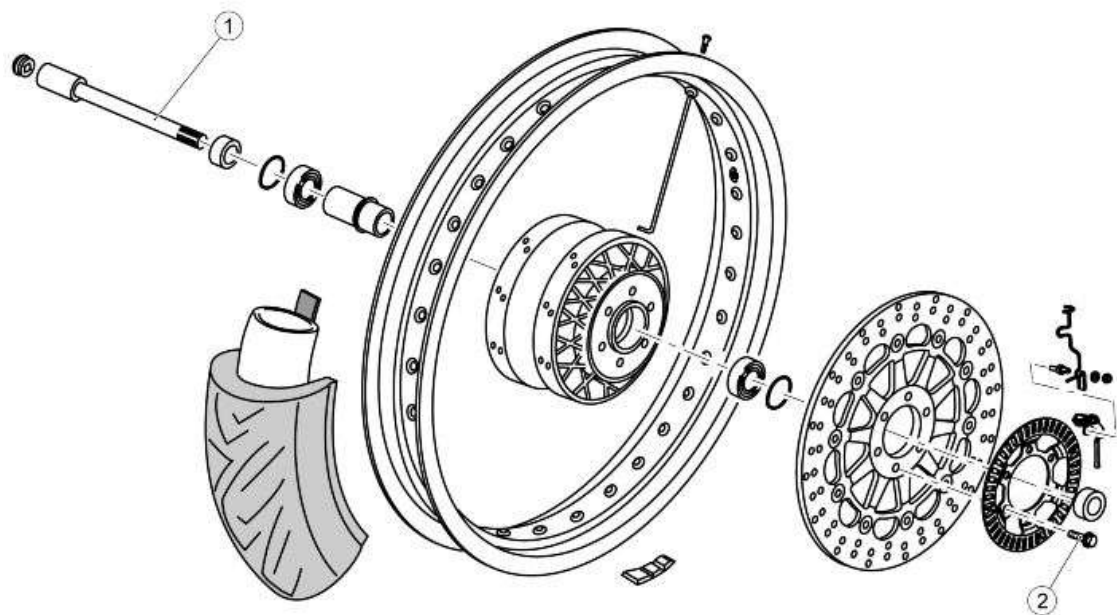
HEADLIGHT UNIT

Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lb ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lb ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

**FRONT MUDGUARD**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lbf ft)	
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lbf ft)	

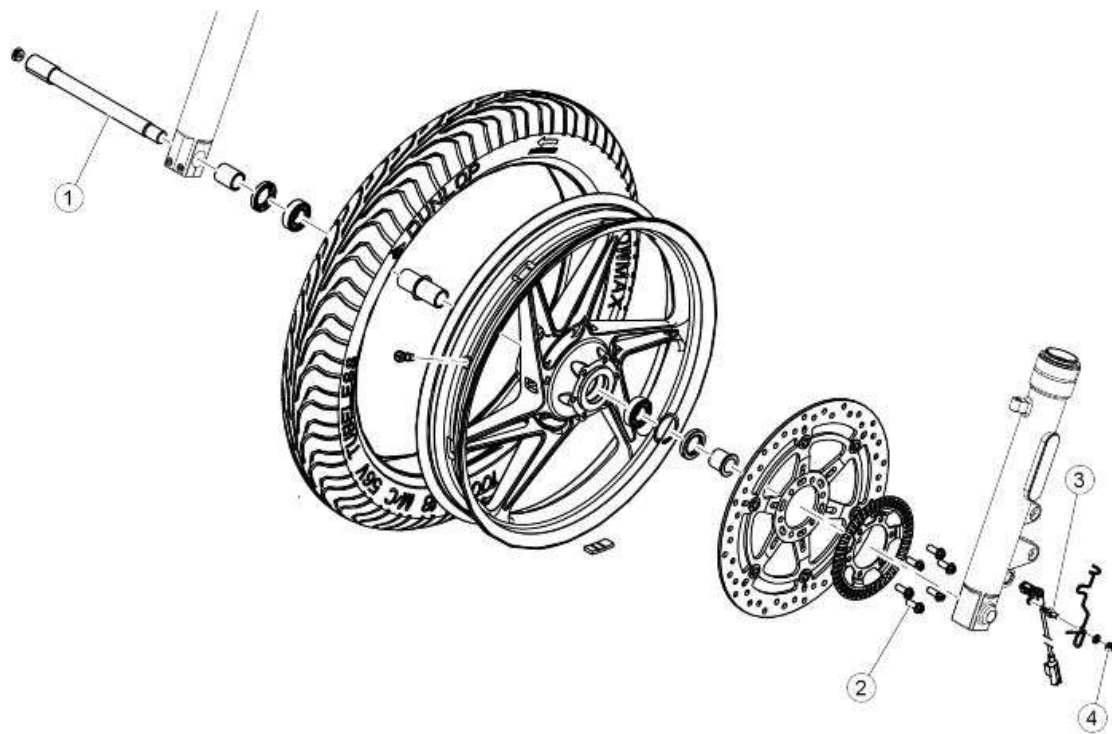
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FRONT WHEEL

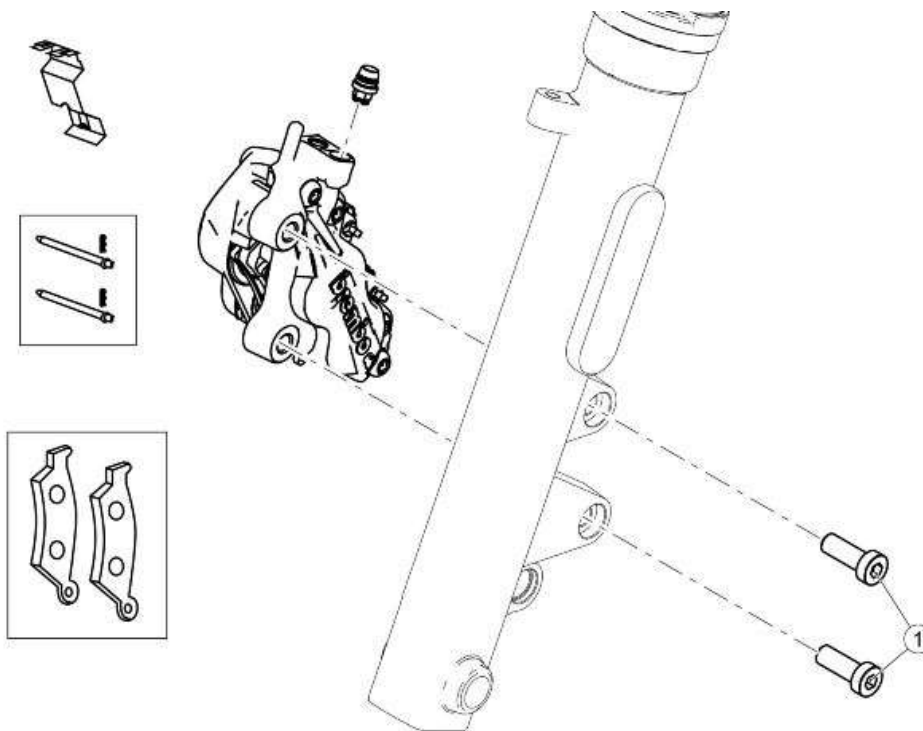
Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

(STONE)



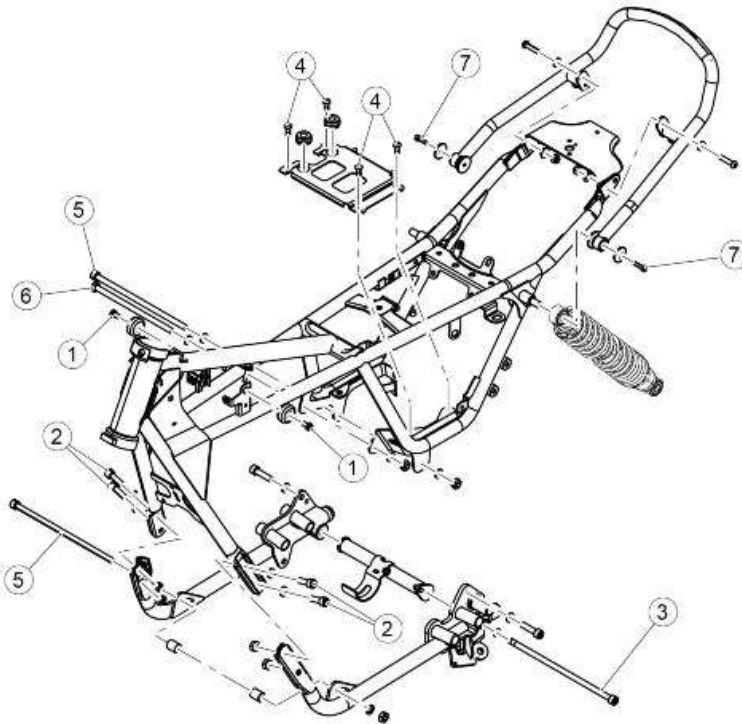
FRONT WHEEL

Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lb ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

**FRONT BRAKE CALLIPER**

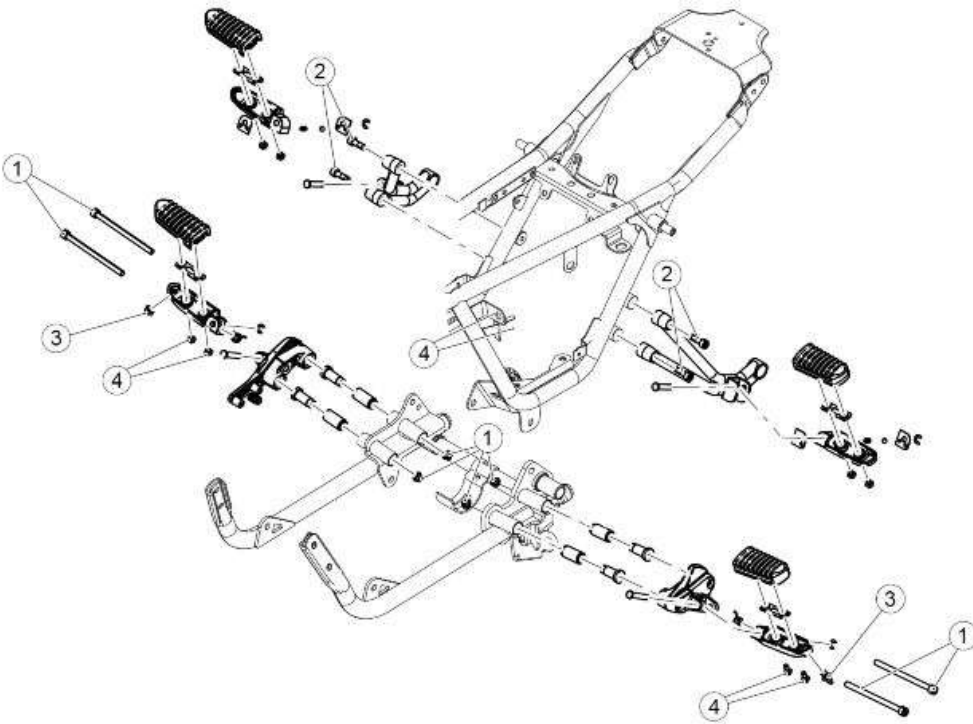
Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lb ft)	-

Central part



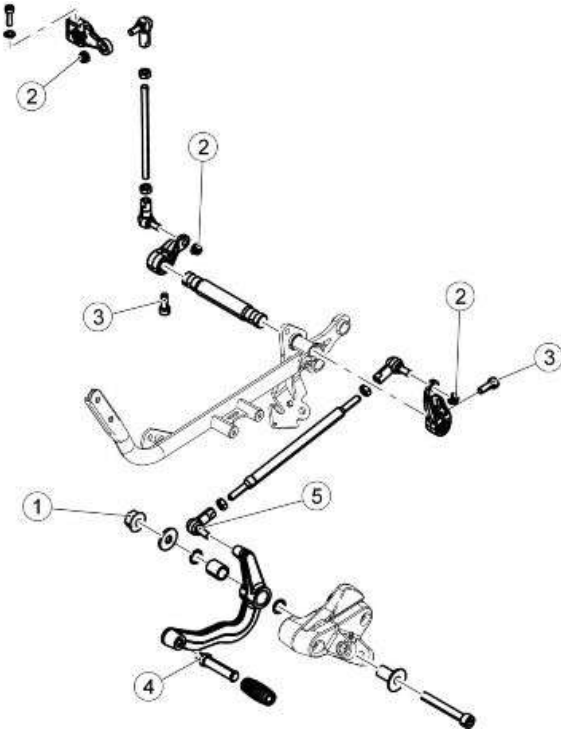
FRAME

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lbf ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lb ft)	Pre-permeated
3	Screw fastening the stand cross-piece to the cradles	M10	1	50 Nm (36.88 lb ft)	Pre-permeated
4	Battery holder plate fixing screw	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
5	Screws fastening engine/gearbox to frame	M10	3	50 Nm (36.88 lb ft)	-
6	Screws fastening gearbox to frame	M10	2	50 Nm (36.88 lb ft)	-
7	Rear grab handle fastening screws	M6	2	10 Nm (7.38 lbf ft)	-



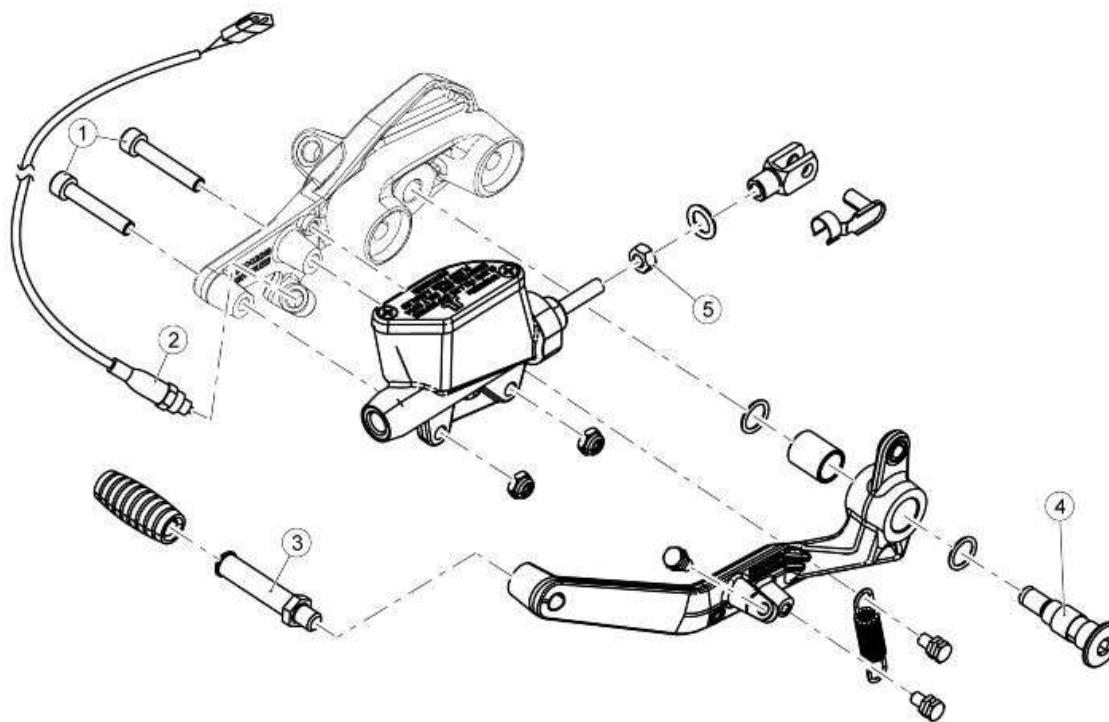
FOOTRESTS

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening rider footrest support to the frame	M8	4	25 Nm (18.44 lbf ft)	Screw + nut
2	Screws fastening passenger footrest support to the frame	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
3	Anti-sliding pin	-	2	10 Nm (7.38 lbf ft)	Loctite 243
4	Footrest rubber fastening screws	M6	8	10 Nm (7.38 lbf ft)	-

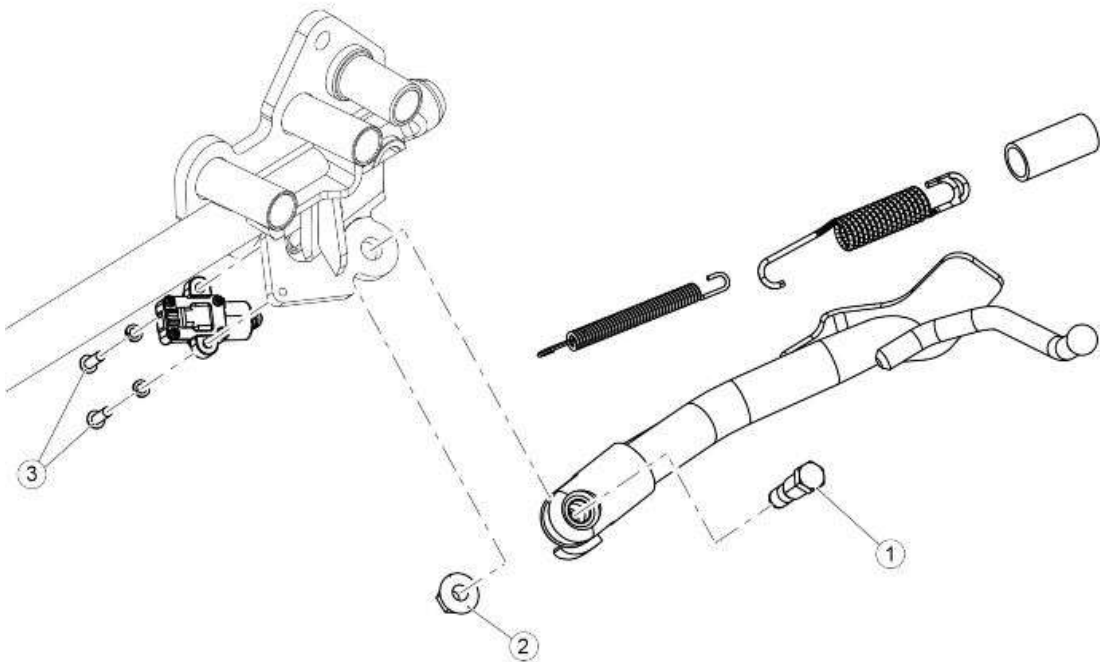


GEARBOX LEVER

Pos.	Description	Type	Quantity	Torque	Notes
1	Gearbox lever fixing nut	M8	1	25 Nm (18.44 lbf ft)	-
2	Tie-rod fastening nuts	M6	3	6.5 Nm (4.78 lbf ft)	-
3	Gearbox control lever fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
4	Gearbox lever peg fastener	-	1	20 Nm (14.75 lbf ft)	Loctite 243
5	Ball joint fixing	M6	1	6.5 Nm (4.78 lbf ft)	Loctite 243

**REAR BRAKE PUMP**

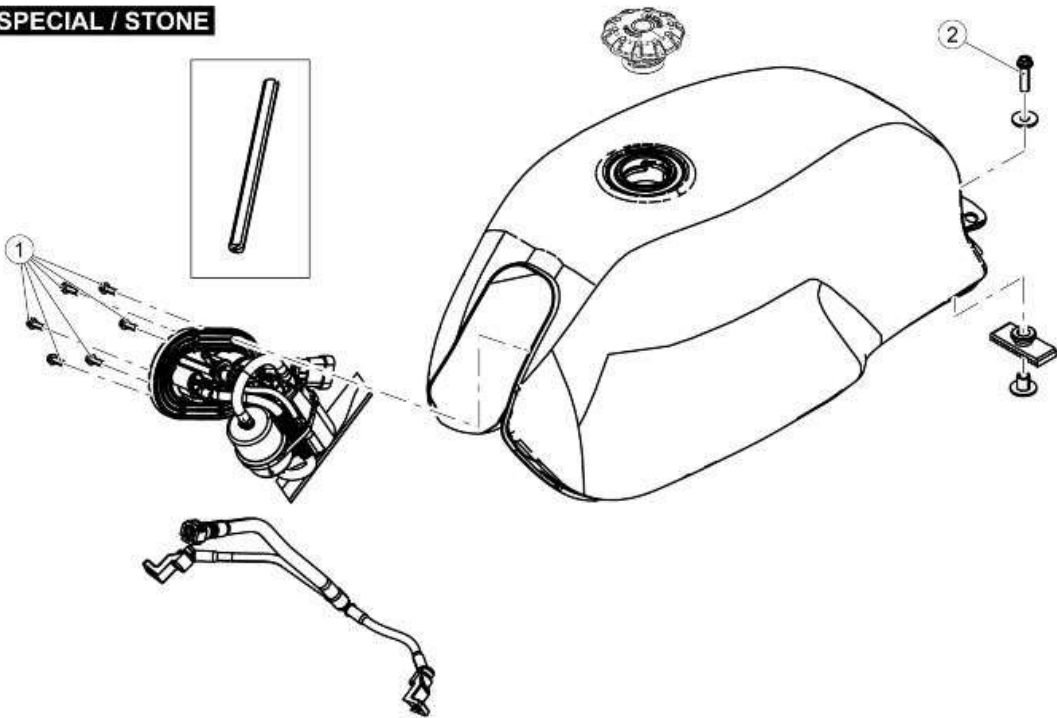
Pos.	Description	Type	Quantity	Torque	Notes
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lb ft)	Loctite 243
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-



SIDE STAND

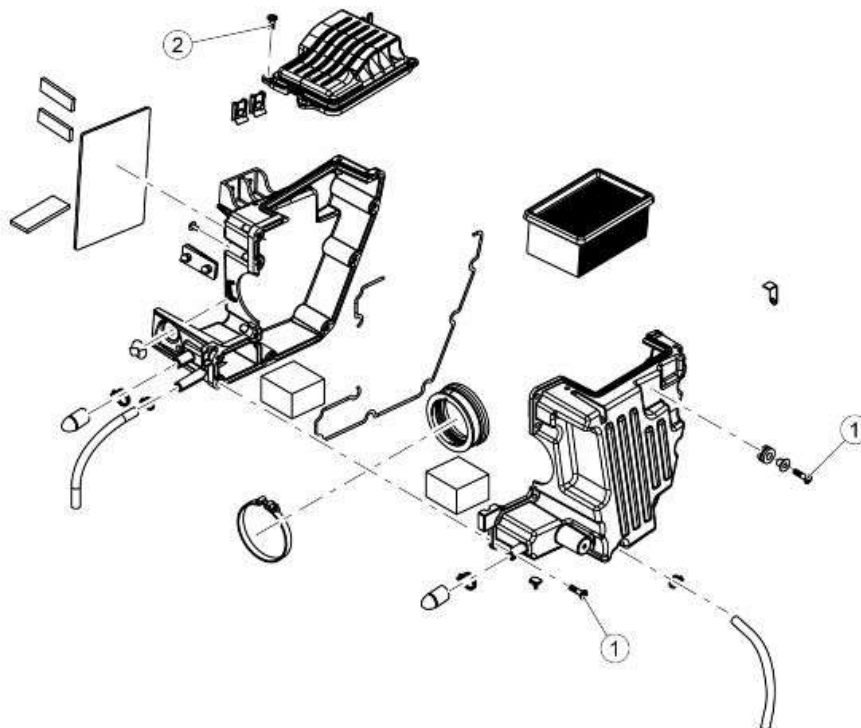
Pos.	Description	Type	Quantity	Torque	Notes
1	Side stand retainer pin	M10x1.2 5	1	10 Nm (7.38 lbf ft)	-
2	Lock nut for stand bolt	M10x1.2 5	1	30 Nm (22.13 lb ft)	-
3	Switch fixing screw	M5x16	2	6 Nm (4.43 lbf ft)	-

SPECIAL / STONE



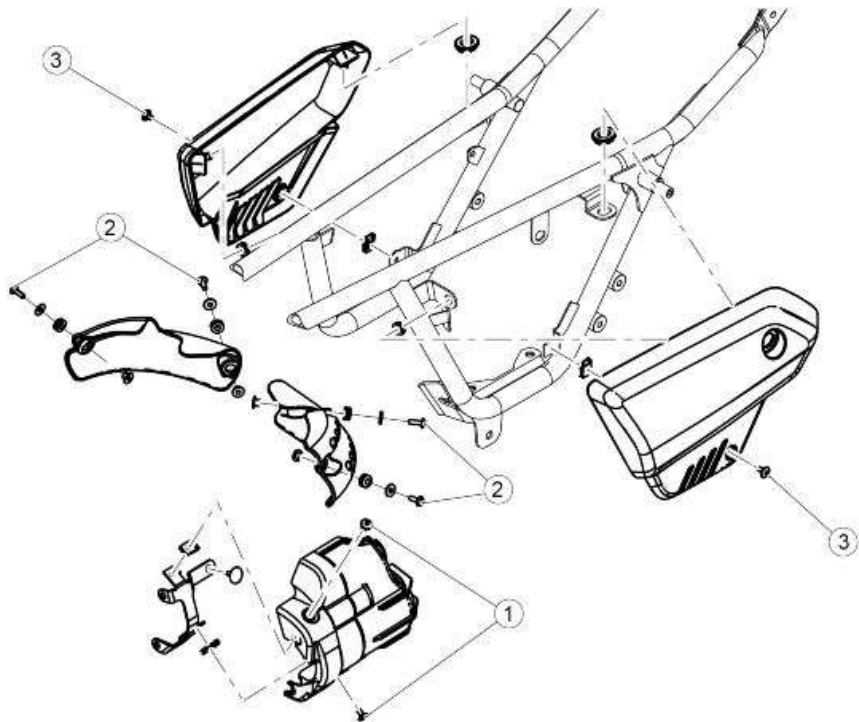
FUEL TANK

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lbf ft)	Pre-permeated
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-



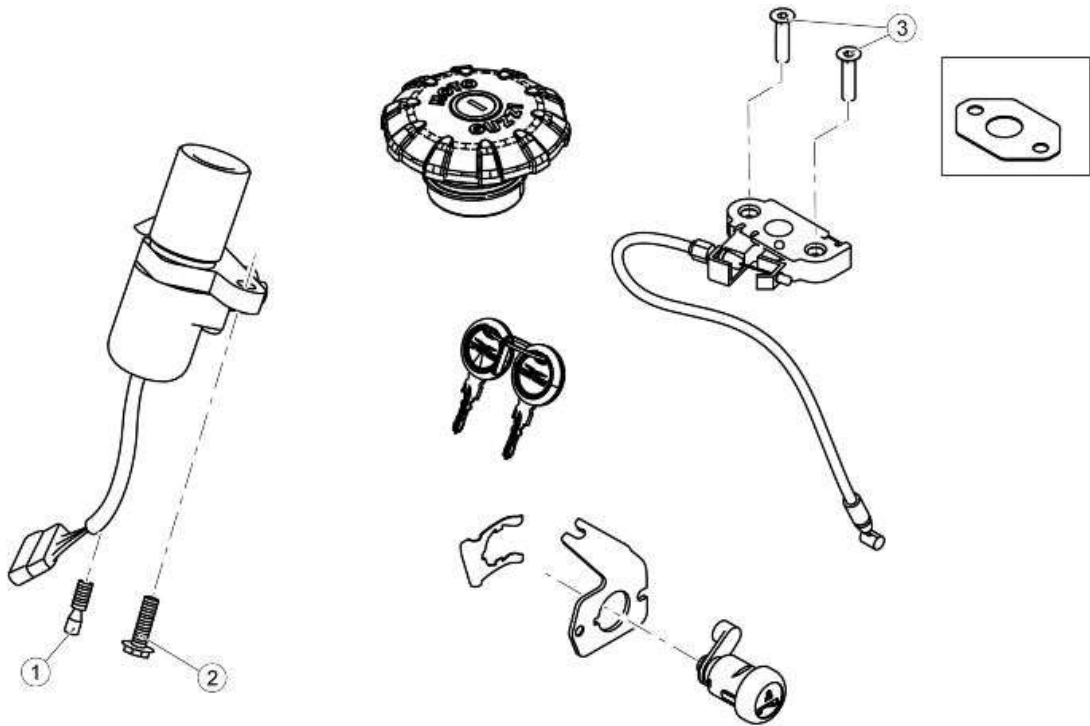
FILTER BOX

Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-
3	Filter casing/frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-



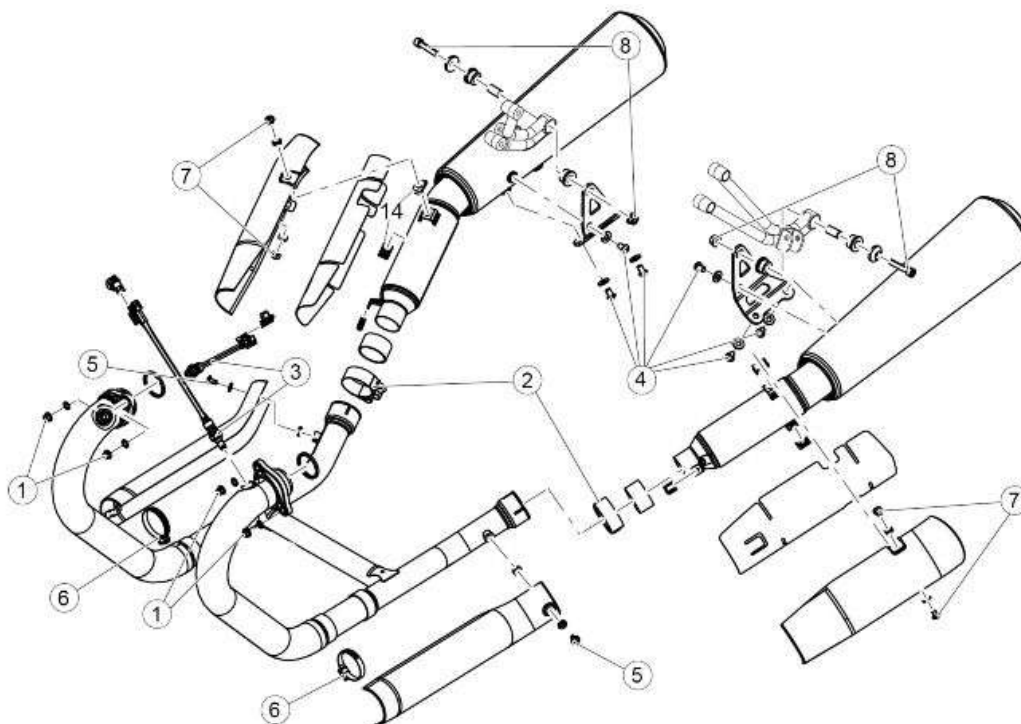
CENTRAL BODYWORK

Pos.	Description	Type	Quantity	Torque	Notes
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lb ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lb ft)	-



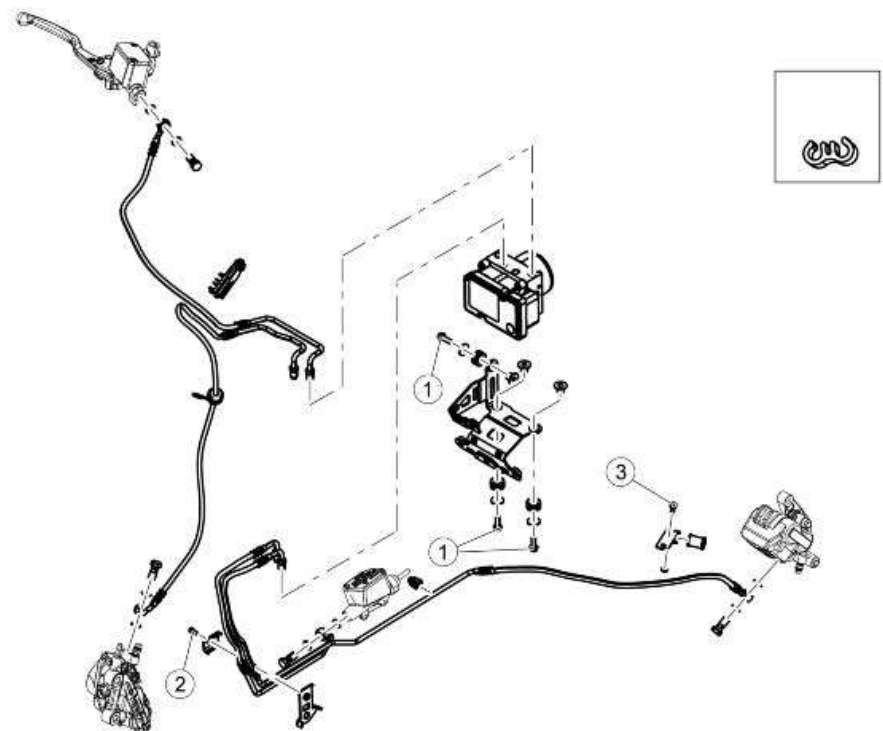
LOCK KIT

Pos.	Description	Type	Quantity	Torque	Notes
1	(Shear head) screw fixing ignition lock	M8	1	At the point of failure	Loctite 243
2	Ignition lock fixing screw	M8	1	25 Nm (18.44 lbf ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	8 Nm (5.9 lb ft)	-



EXHAUST SYSTEM

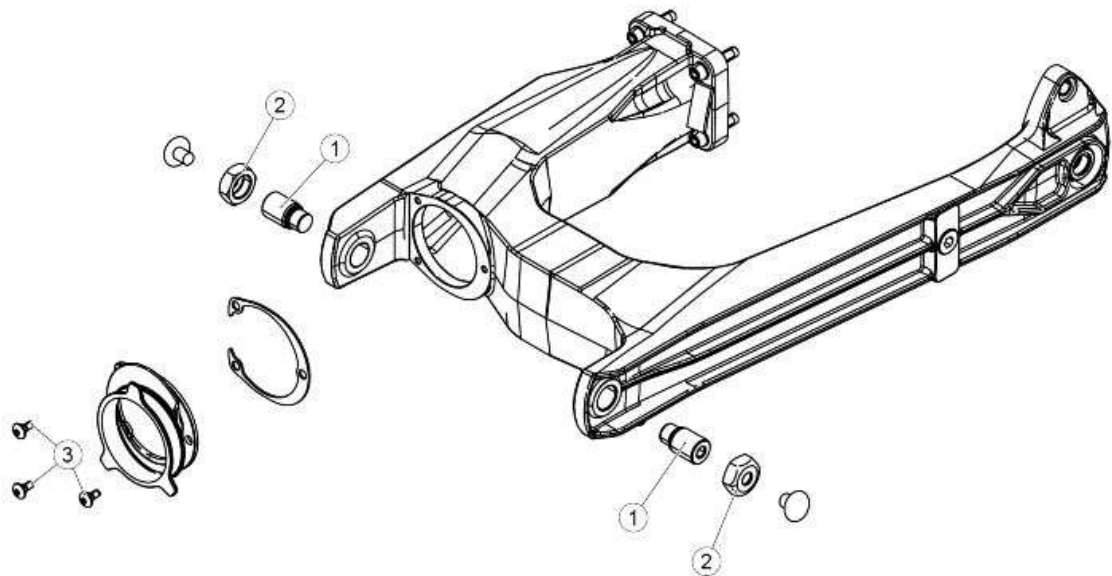
Pos.	Description	Type	Quantity	Torque	Notes
1	Fastening the exhaust pipe to the engine	M8	4	25 Nm (18.44 lbf ft)	-
2	Fastening the exhaust pipe to the silencer	M8	2	25 Nm (18.44 lbf ft)	-
3	Lambda probes fastener	M12x1.25	2	25 Nm (18.44 lbf ft)	-
4	Fastening the silencers to the support	M8	6	25 Nm (18.44 lbf ft)	-
5	Fastening the RH/LH manifold heat shield	M6	2	8 Nm (5.9 lb ft)	-
6	RH/LH manifold heat shield clamp	-	2	3.5 Nm (2.58 lb ft)	-
7	Fastening the RH/LH silencer heat shield	M6	4	8 Nm (5.9 lbf ft)	-
8	Fastening the silencer to the support on the chassis	M8	4	25 Nm (18.44 lbf ft)	-



ABS SYSTEM

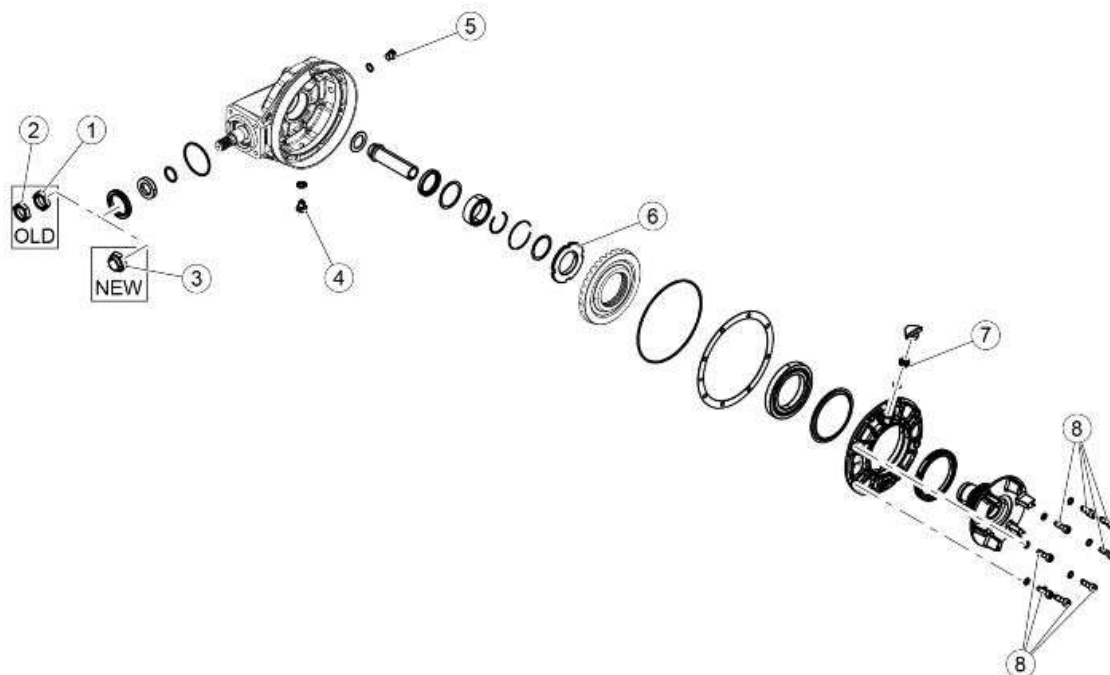
Pos.	Description	Type	Quantity	Torque	Notes
1	Control unit bracket fastening to the frame	M6x16	2	10 Nm (7.38 lbf ft)	-
2	Screw fastening brake lines fastening plates	M4	1	3 Nm (2.21 lbf ft)	-
3	Clamp fastening screw	M5	1	6 Nm (4.43 lbf ft)	-

Back side



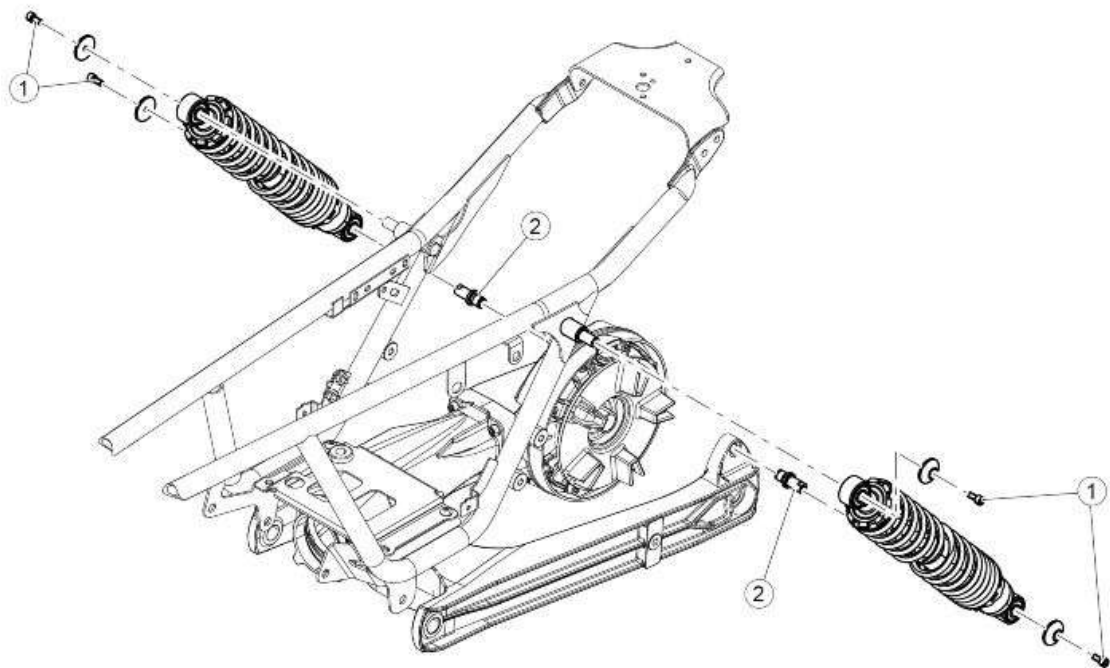
SWINGARM

Pos.	Description	Type	Quantity	Torque	Notes
1	Pins fixing swingarm to gearbox	-	2	-	Manual
2	Counter-nuts fixing swingarm to gearbox	-	2	50 Nm (36.88 lb ft)	-
3	Rubber bellows torx fixing screws	-	3	6 Nm (4.43 lbf ft)	-



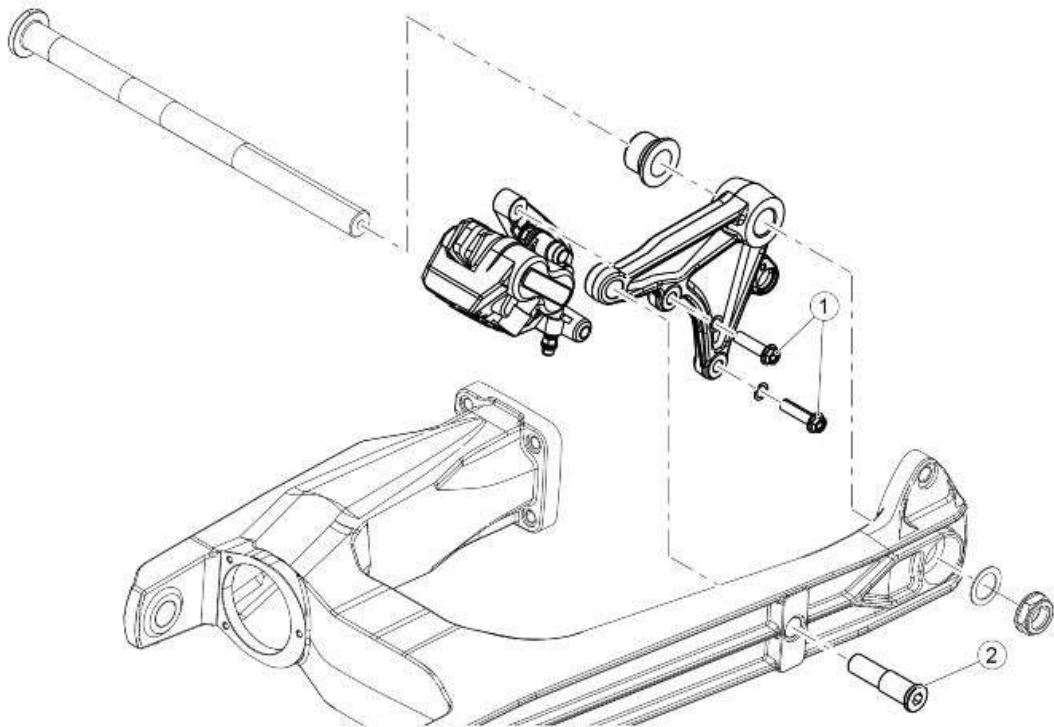
BEVEL GEAR

Pos.	Description	Type	Quantity	Torque	Notes
1	Pinion unit fixing nut - OPTION 01	M25	1	100 Nm (73.76 lb ft)	Loct. 243
2	Pinion unit fixing lock nut - OPTION 01	M25	1	20 Nm (14.75 lbf ft)	Loct. 243
3	Pinion unit fixing nut - OPTION 02	M25	1	100 Nm (73.76 lb ft)	Loct. 243 + Nut re-bating on hollow pinion
4	Oil drainage plug	M10	1	30 Nm (22.13 lb ft)	-
5	Oil load cap	M12	1	25 Nm (18.44 lbf ft)	-
6	Ring nut	-	1	100 Nm (118.01 lbf ft)	Loct. 243 + Riveting on the splash guard hub
7	Bleeder cap	-	1	10 Nm (7.38 lbf ft)	-
8	Gearbox cover fastening screws	M8x25	8	25 Nm (18.44 lbf ft)	-



REAR SHOCK ABSORBERS

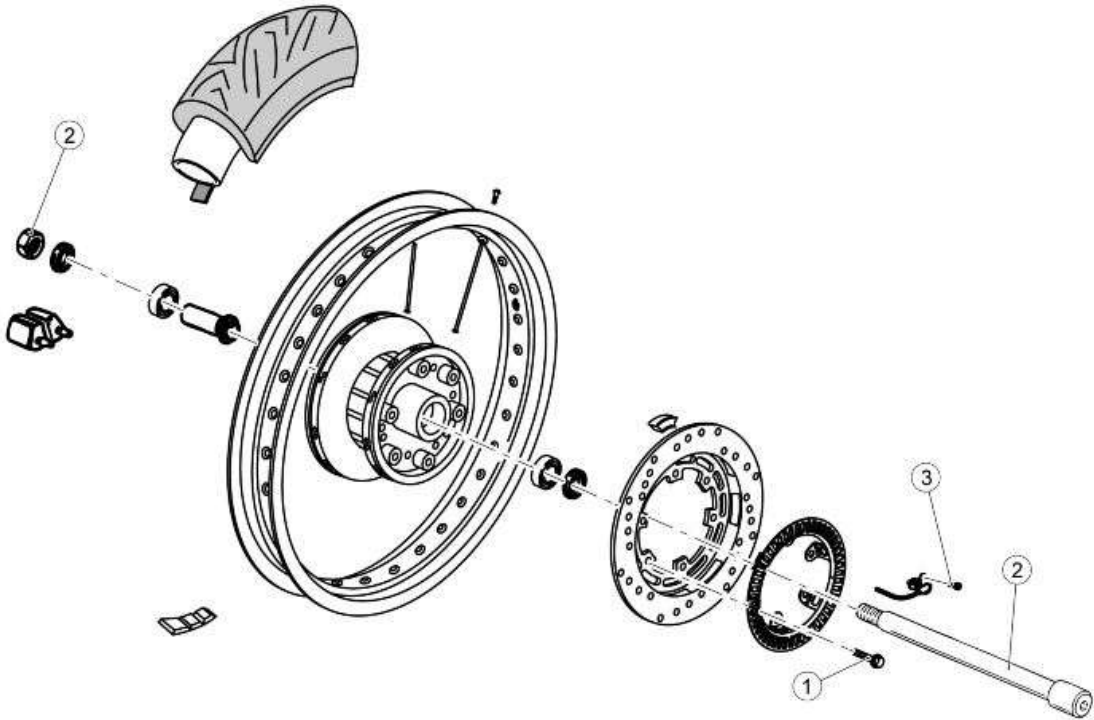
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear shock absorber upper/lower fixing screws	M6	4	10 Nm (7.38 lbf ft)	Pre-permeated
2	Pin fastening the shock absorber to the gear-box/swingarm	M12	2	35 Nm (25.81 lb ft)	Pre-permeated



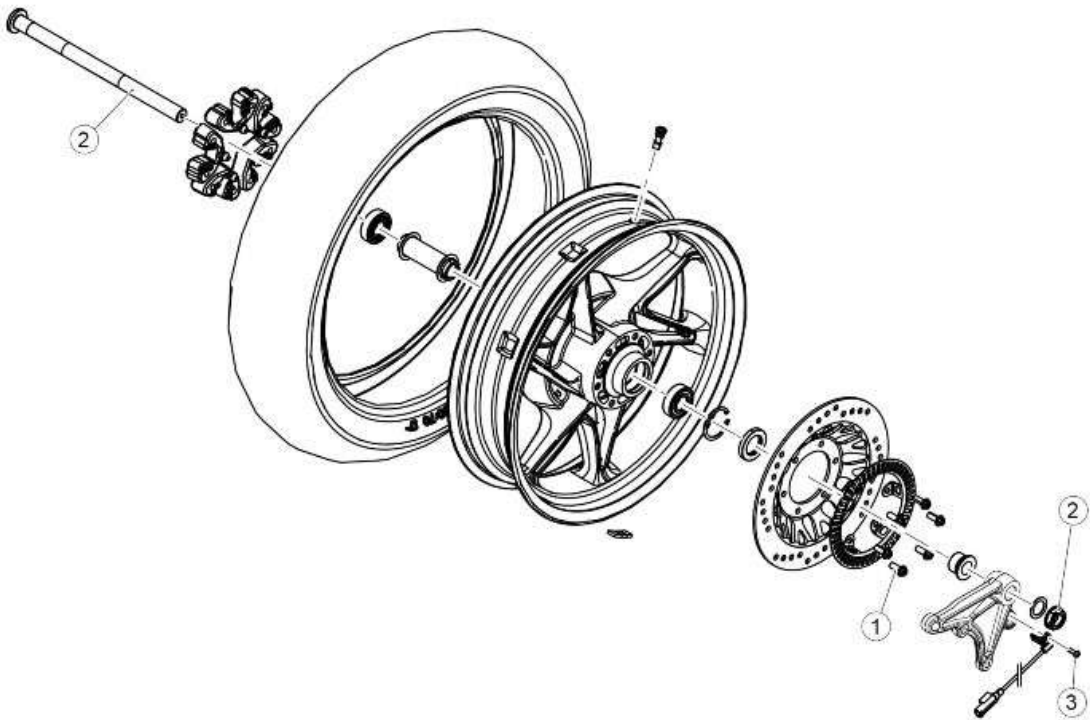
REAR BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lbf ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 Nm (25.81 lb ft)	-

(SPECIAL)

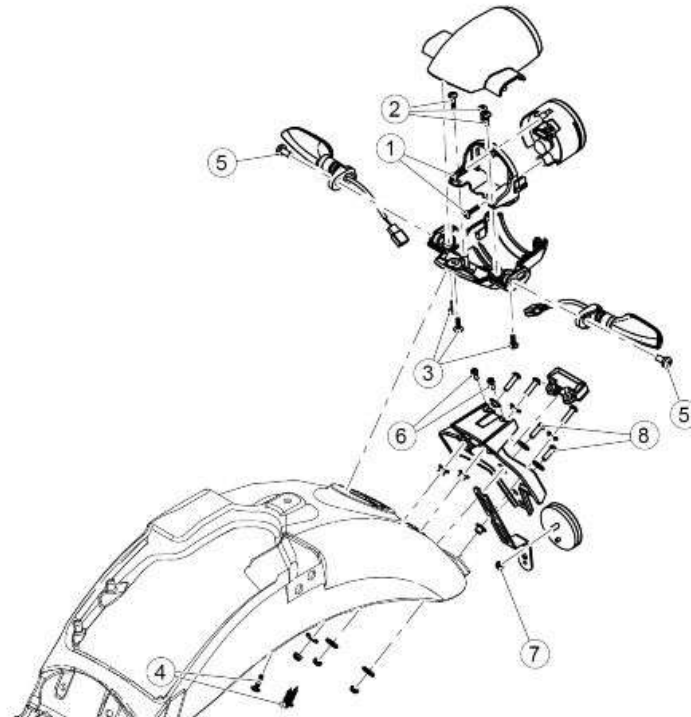


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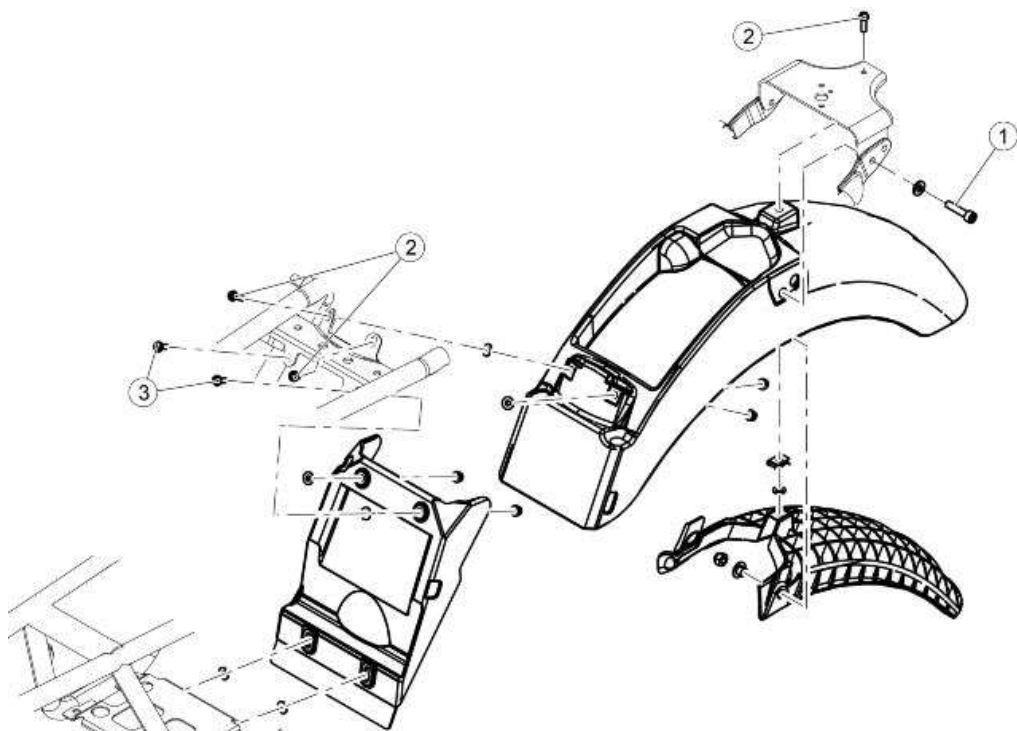


REAR WHEEL

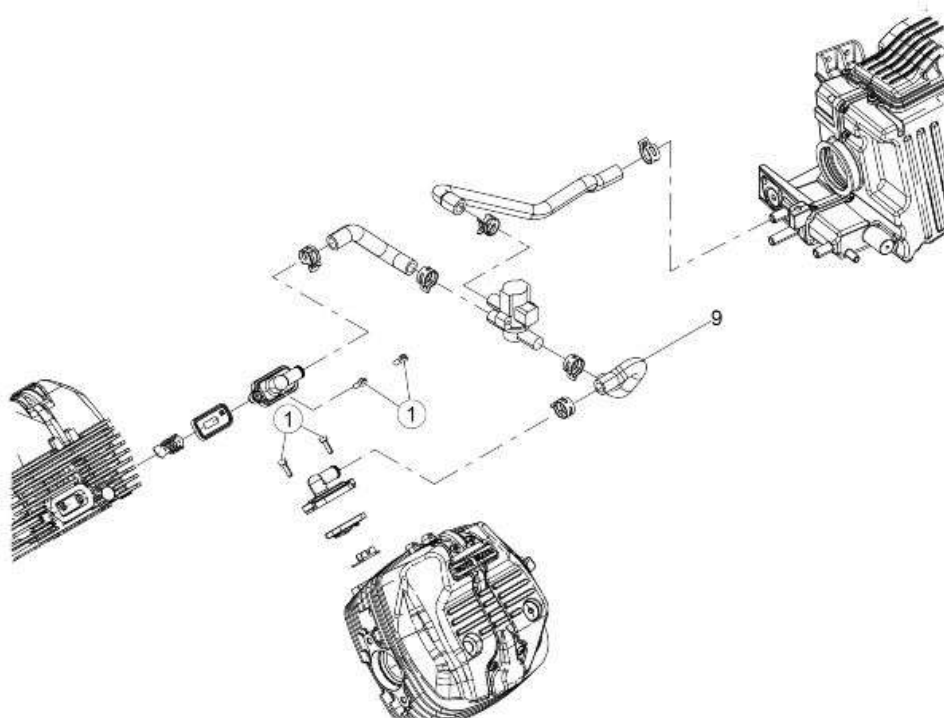
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	100 Nm (73.77 lb ft)	-
3	ABS sensor fixing screw	M6	1	6 Nm (4.43 lbf ft)	Loctite 243

**REAR LIGHT ASSEMBLY**

Pos.	Description	Type	Quantity	Torque	Notes
1	Taillight to internal support fixing screws	SWP 3	2	2 Nm (1.48 lb ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lb ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lb ft)	-
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lb ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lb ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lb ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lb ft)	-

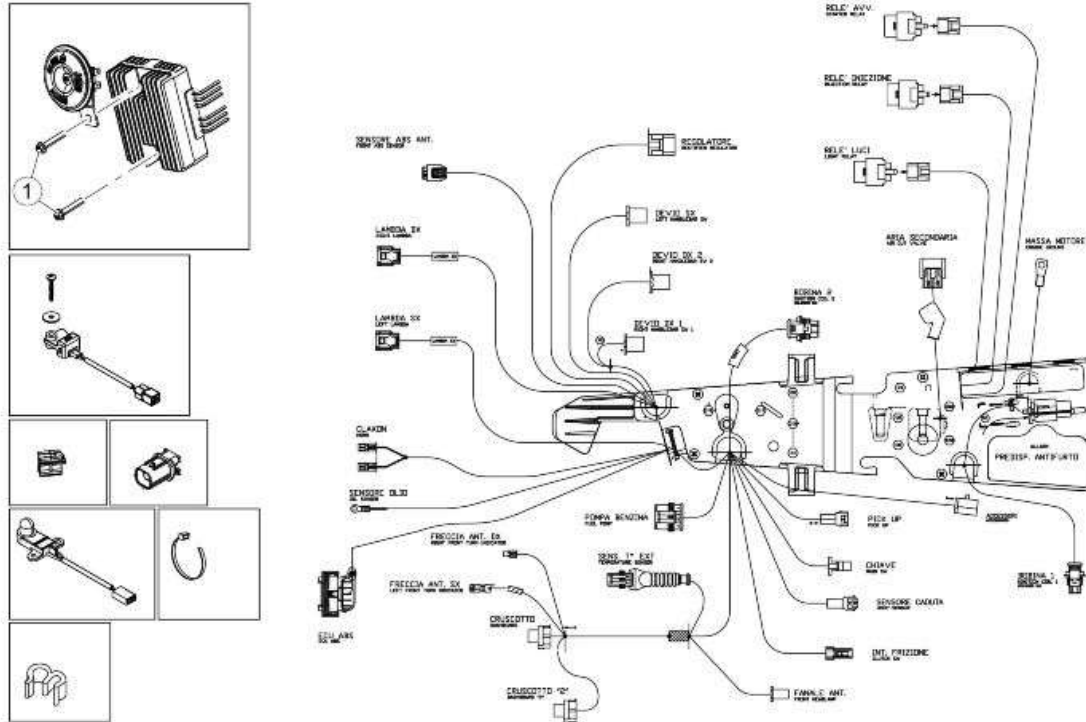
**REAR MUDGUARD**

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	
2	Front and centre fastening screw rear mud-guard	M6	3	8 Nm (5.9 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	



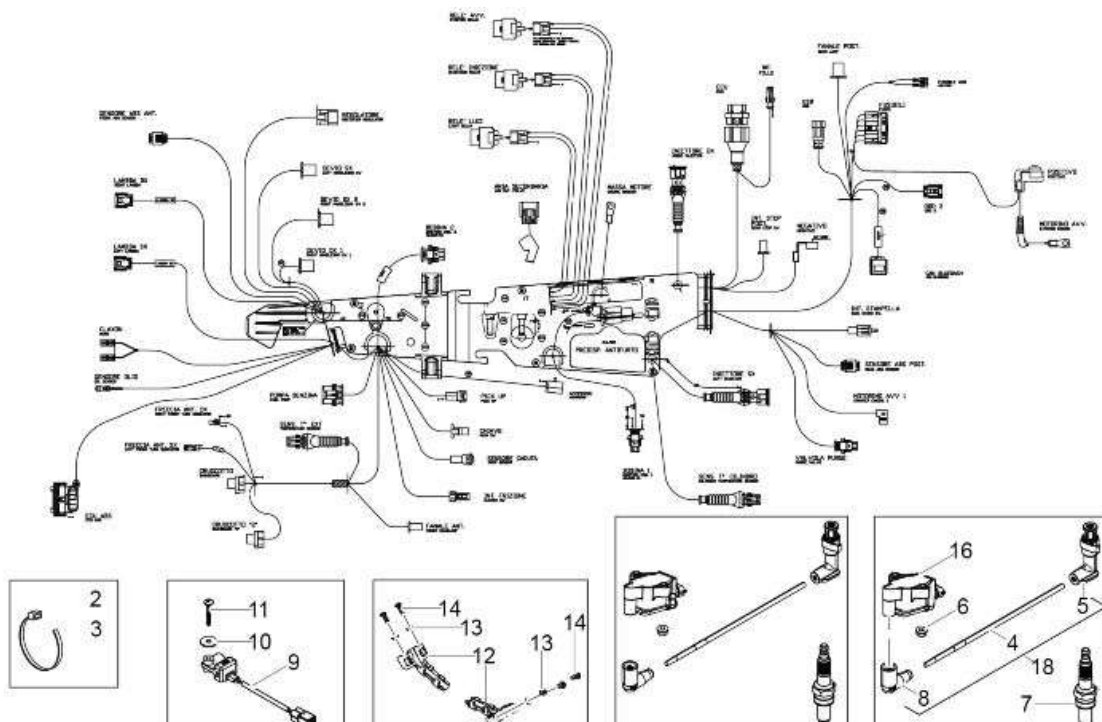
SECONDARY AIR SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Red valve cover fixing SHC screws	M5x16	4	3-4 Nm (2.21-2.95 lb ft)	-



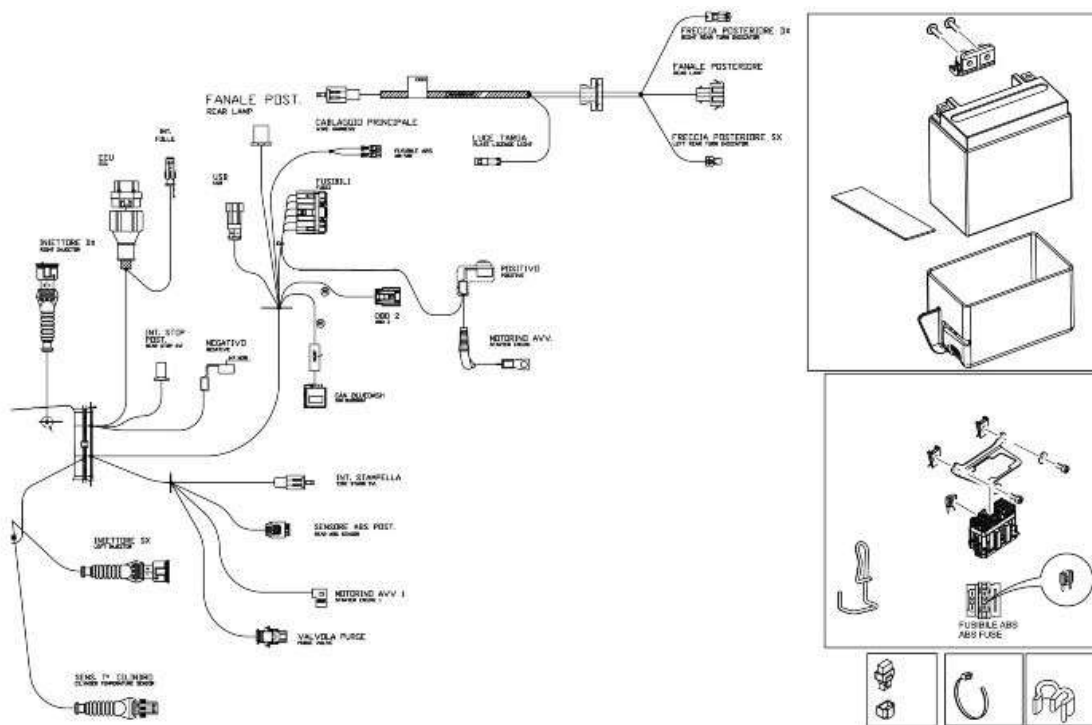
FRONT ELECTRICAL SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Clutch switch fixing screw	M8	1	5 Nm (3.69 lb ft)	



CENTRAL ELECTRICAL SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
-	Coils fastening nuts	M6	4	10 Nm (7.38 lbf ft)	-
-	Starter motor fixing screws	M8	2	25 Nm (18.44 lbf ft)	-

**REAR ELECTRICAL SYSTEM**

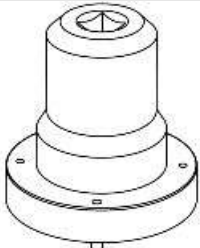
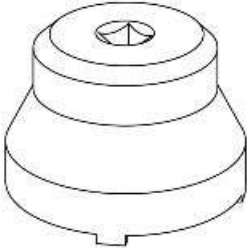
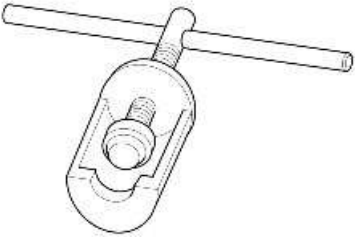
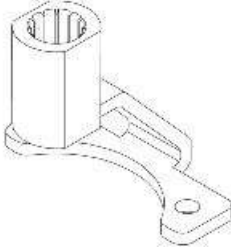
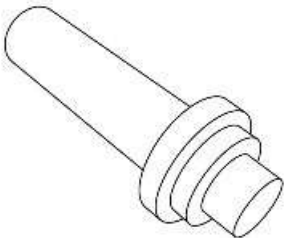
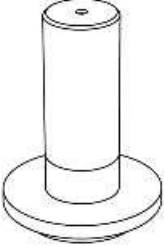
Pos.	Description	Type	Quantity	Torque	Notes
-	Control unit cable grommet fastening screw	M4	1	3 Nm (2.21 lbf ft)	Thread-forming screws
-	Battery holder bracket fastening screws	M6	2	Manual	-
-	Fuse box bracket fastening screws	M5	2	4 Nm (2.95 lb ft)	-

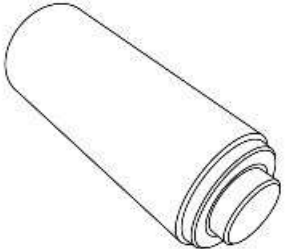



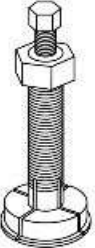
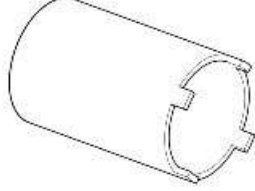

INDEX OF TOPICS


SPECIAL TOOLS

S-TOOLS

SPECIAL TOOLS

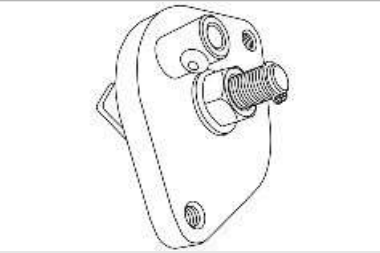

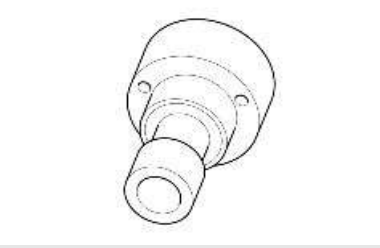
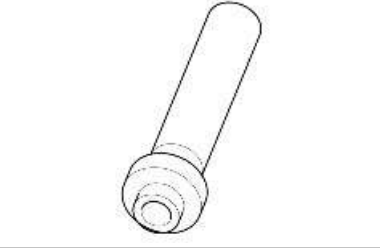
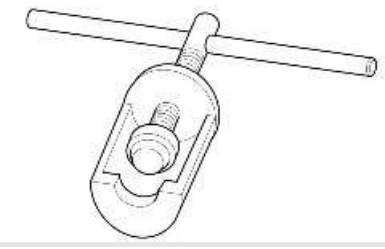
Stores code	Description	
020998Y	Pinion case wrench	
020999Y	Crown counter- lock ring wrench	
GU19907000	Internal bearing ring extractor	
021000Y	Bevel gear set mounting	
021003Y	Bevel gear oil seal punch	
021005Y	Bevel gear cover oil seal punch	

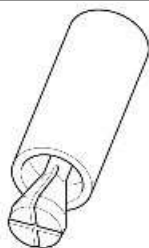

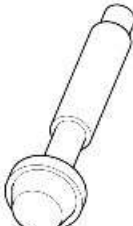
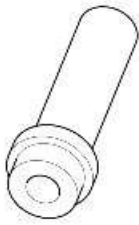
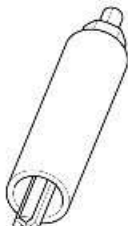
Stores code	Description	
020978Y	Cardan secondary oil seal mounting punch	
GU19927900	Punch for pressing the ring inside the bearing	
020376Y	Adaptor handle	
020360S	Adaptor 52x54 mm	
001467Y036	Bearing internal cup extractor	
020966Y	Steering adjustment socket	
020922Y	Diagnostic tool	

Stores code	Description	
021017Y	OBD cable for E5 vehicles	

Special tools are necessary for the correct removal and refitting and a good set-up. By using these special tools damages deriving from the use of incorrect tools and/or improvised operations will be avoided. Here is a list of the special tools suitably designed for this vehicle. If necessary, ask for the special tools.

SPECIAL TOOLS

Stores code	Description	
021009Y	Engine axial clearance check tool	
19.92.61.00	Punch for seal ring of bevel gear set pinion	
19.92.88.00	Bevel gear set alignment pre-fitting tool	
19.92.60.00	Punch for gearcase sealing ring	
GU19907000	Internal bearing ring extractor	

Stores code	Description	
19.92.75.00	Extractor for external ring of gearcase bearing	
19.92.62.00	Punch for bearing on bevel gear set pinion	
19.92.64.00	Punch for external ring of tapered bearing on bevel gear set pinion holding body	
GU19926500	Punch for transmission case bearing external ring	
19.92.76.00	Extractor for swinging arm holder bearing on gearbox cover	

INDEX OF TOPICS

MAINTENANCE

MAIN

Scheduled maintenance table

NOTE

HALVE THE SERVICE INTERVALS INDICATED IF THE VEHICLE IS USED IN PARTICULARLY RAINY OR DUSTY CONDITIONS, ON POOR ROADS OR FOR HIGH PERFORMANCE RIDING.

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): Replace every 4 years

(3): Check every month

(4): Check every 5,000 km (3,106 miles)

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

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

(7): At each service (except the first one), check inside the filter box, if there is oil. Clean if necessary

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)	EVERY 12 MONTH S	EVERY 24 MONTH S
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
Spark plugs		R	R	R	R	R	R		
Filter box (7)		C	C	C	C	C	C		
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 (5)	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 (6)					R				
Engine oil (4)	R	R	R	R	R	R	R	R	R
Final drive oil				R			R		

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)	EVERY 12 MONTH S	EVERY 24 MONTH S
Headlight aiming		I	I	I	I	I	I		
Fork oil seals (1)		I	I	I		I	I		
Tyres - pressure / wear (3)	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	C
Brake lines		I	I	I	I	I	I		
Fuel lines (2)		I	I	I	I	I	I	I	I
Labour time (minutes)	80	90	90	110	120	90	110	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.**

SCHEDULED MAINTENANCE TABLE RESERVED FOR THE US-LATAM MARKET

I: CONTROLLARE E PULIRE, REGOLARE, LUBRIFICARE O SOSTITUIRE SE NECESSARIO

C: PULIRE

R: SOSTITUIRE

A: REGOLARE

L: LUBRIFICARE

(1): Sostituire in caso di trafilaggi

(2): Sostituire ogni 4 anni

(3): Controllare ogni mese

(4): Verificare ogni 3.106 mi (5.000 Km)

(5): Controllare e pulire, regolare o sostituire se necessario ogni 621 mi (1.000 Km)

(6): Sostituire al raggiungimento della prima opzione tra le due seguenti: 24.855 mi (40.000 Km) oppure 4 anni

(7): Ad ogni tagliando (escluso il primo) controllare all'interno della cassa filtro se c'è presenza di olio.

In tal caso procedere alla pulizia

TABELLA DI MANUTENZIONE PROGRAMMATA

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				I			I
Engine oil filler plug O-ring	I	I	I	I	I	I	I
Spark plugs		R	R	R	R	R	R
Filter box (7)		C	C	C	C	C	C
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 (5)	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

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)
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 (6)					R		
Engine oil (4)	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 (3)	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	C
Brake lines		I	I	I	I	I	I
Fuel lines (2)		I	I	I	I	I	I
Labour time (minutes)	80	90	90	110	120	90	110

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.

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 high performance four-stroke 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.
Vaseline	neutral grease for battery terminals	-
Brake fluid DOT 4	Synthetic brake fluid.	SAE J 1703; FMVSS 116; ISO 4925; CU-NA NC 956 DOT4

Transmission fluid

Replacement

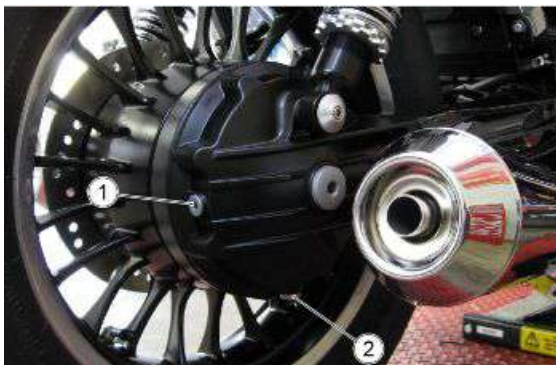
CAUTION

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).

**CAUTION**

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

WHILE REFITTING, USE A NEW SEAL WASHER.

CAUTION

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.

CAUTION

WHILE REFITTING, USE A NEW SEAL WASHER FOR THE BREATHER CAP.

Engine oil

Check

Check the engine oil level frequently.

NOTE

HALVE THE SERVICE INTERVALS INDICATED IF THE VEHICLE IS USED IN PARTICULARLY RAINY OR DUSTY CONDITIONS, ON POOR ROADS OR FOR HIGH PERFORMANCE RIDING.



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

CAUTION

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.

- Posizionare un contenitore con capacità di raccolta adeguata in corrispondenza del tappo di scarico (1)
- Svitare e togliere il tappo di scarico (1)

**NOTE**

WHILE REFITTING, USE A NEW SEAL 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 deposits attached to the drainage plug (1) magnet.
- Screw and tighten the drainage plug (1).

**CAUTION**

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



**DO NOT DISPOSE OF OIL INTO 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

WHILE REFITTING, USE A NEW SEAL WASHER.

NOTE

WHILE REFITTING, USE A NEW SEAL O-RING.

Gearbox Oil

Replacement

NOTE

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

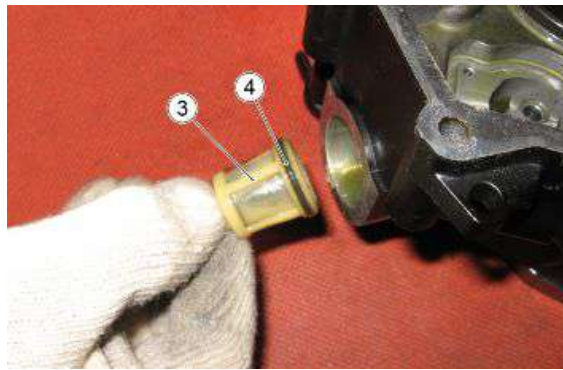
- Place a container with suitable capacity under the drainage plug (2).
- Unscrew and remove the drainage plug (2).



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



- Remove the air filter (3) and clean it
- Check the O-Ring (4) and if necessary replace it
- Screw and tighten the drainage plug (2)



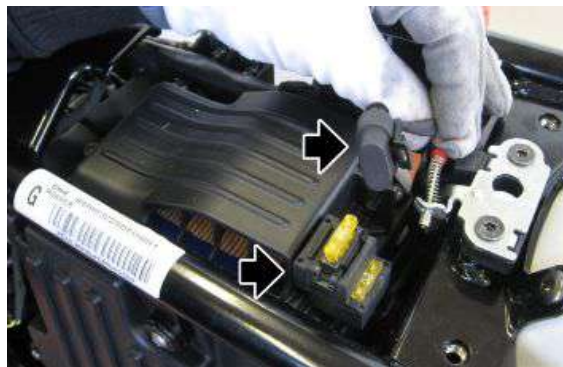
- Pour in new oil, observing the quantity indicated in the table "capacity"
- Tighten the filler cap (1).

CAUTION

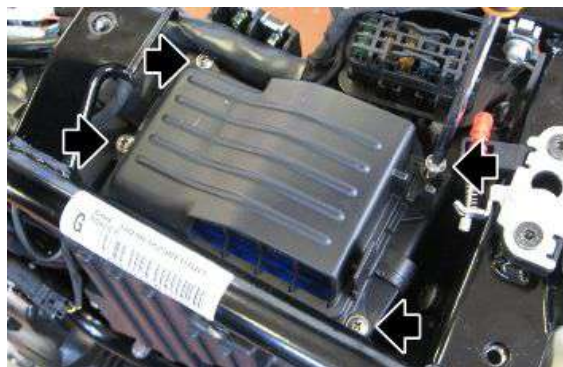
DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID. WHEN USING A FUNNEL OR ANY OTHER ELEMENT, MAKE SURE IT IS PERFECTLY CLEAN.

Air filter

- Remove the saddle
- Unhook the connector from the air-box cover



- Remove the air-box cover fixing screw



- Remove the air-box cover
- Extract the air filter



Throttle body removal

- Remove the clip clamp fixing the sleeve to the filter box

CAUTION

DURING REFITTING, REPLACE THE CLIP CLAMP



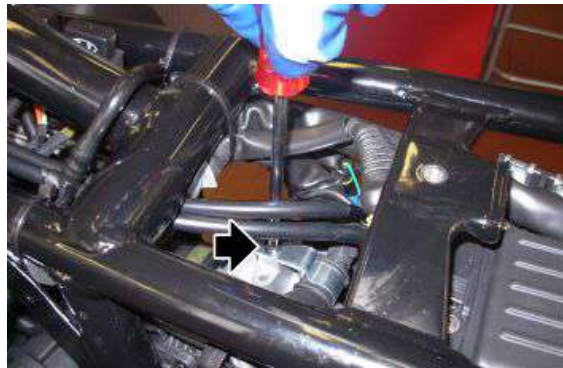
- Loosen the clamps that secure the sleeve to the intake manifolds



- Remove the sleeve



- Remove the battery
- Remove the MIU G4 control unit connector support bracket fixing screw



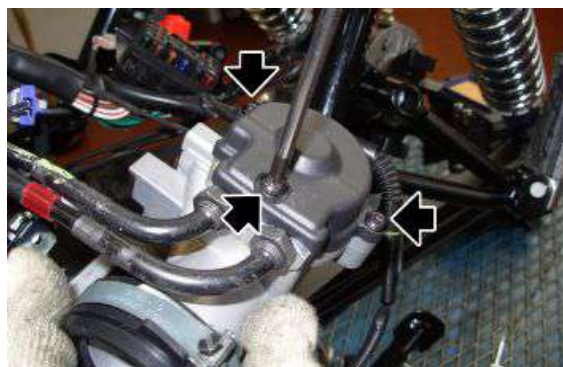
- Disconnect the MIU G4 control unit connector



- Remove the clip clamp fixing the throttle body to the filter box
- Extract the throttle body laterally



- Remove the throttle body guard



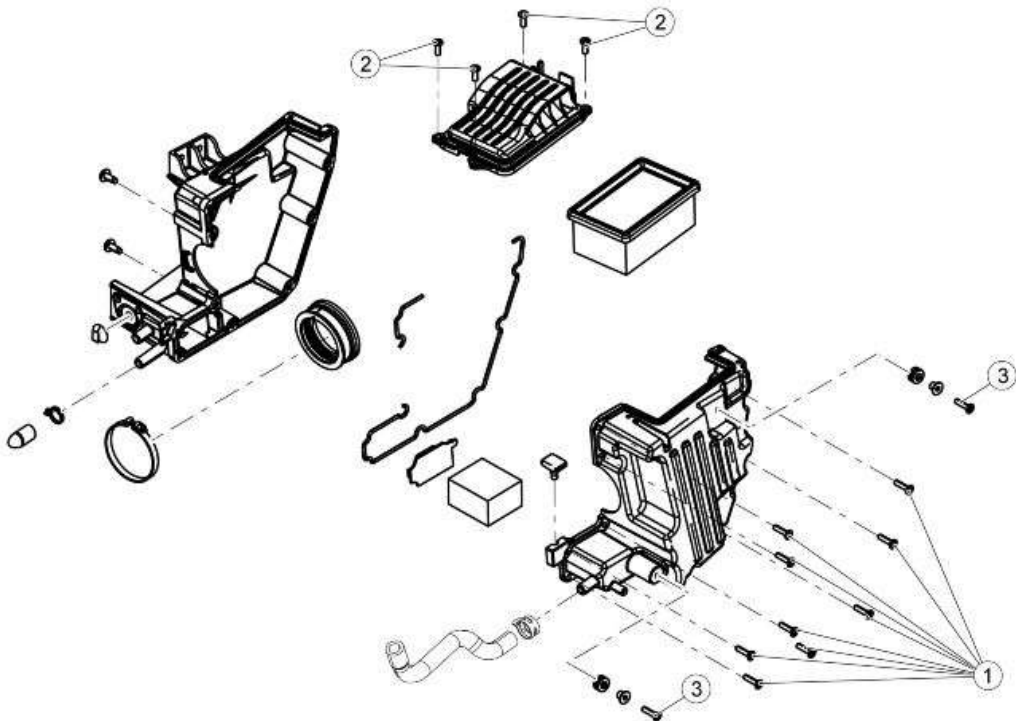
- Loosen the gas cables fixing nuts on the throttle body and unhook them



- Remove the throttle body



Air filter housing



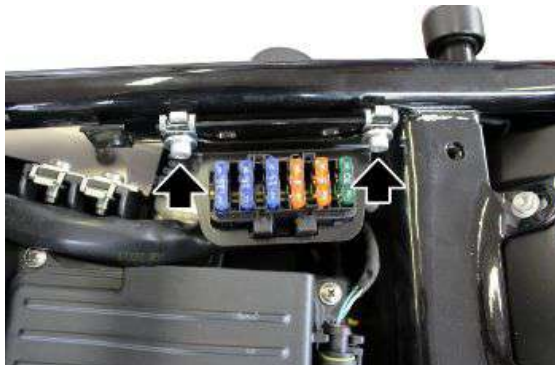
FILTER BOX

Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
3	Filter casing/frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

Air filter housing removal

- Remove the saddle and the side fairings
- Remove the battery
- Remove the rear wheel.
- Remove the splash guard
- Remove the fuse box support fixing screws (1)



- Move the filter box to the side enough to allow removal of the fixing screws (2) on the left side of the filter box support.



- Move the filter box to the side enough to allow removal of the fixing screws (3) on the right side of the filter box support.



- Disconnect the neutral switch connector
- Lift the air filter box enough to allow the support plate to be removed, sliding out neutral switch cabling



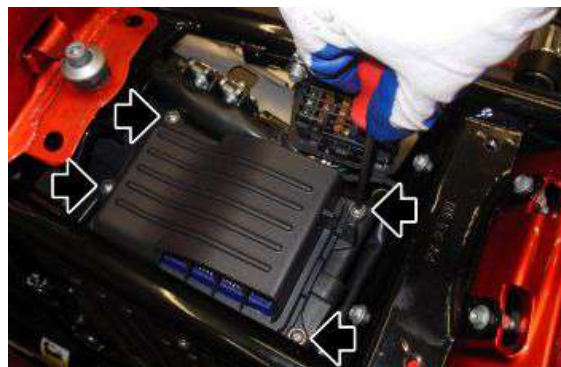
- Unscrew the clamp that fastens the throttle body to the air filter box



- Disconnect the blow-by pipe



- Remove the air-box cover

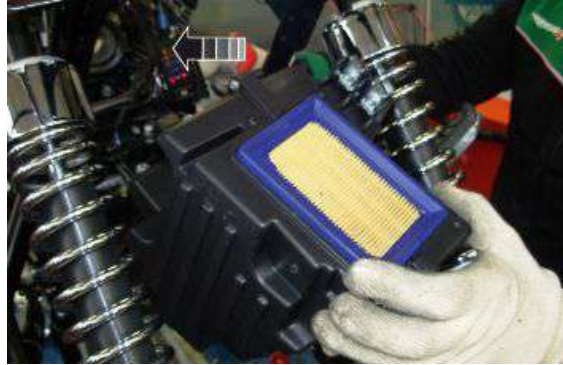


- Remove sliding the complete filter box out toward the rear



Air filter housing installation

- Insert the filter box from the rear



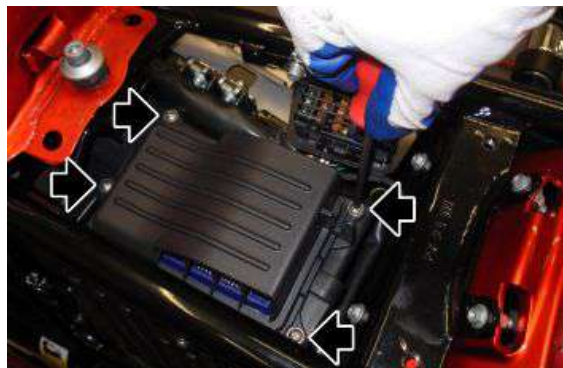
- Insert the throttle body in the sleeve and tighten the clamp to secure it

CAUTION

TAKE PARTICULAR CARE THAT THE CLAMP IS POSITIONED CORRECTLY. INCORRECT POSITIONING WILL CAUSE VEHICLE MALFUNCTIONS



- Install the air-box cover



- Connect the blow-by and breather tubes



- Position the air filter box support, taking care to pass the neutral switch cabling through the hole



- Move the filter box to the side enough to allow tightening of the fixing screws (3) on the right side of the filter box support.



- Move the filter box to the side enough to allow tightening of the fixing screws (2) on the left side of the filter box support.



- Correctly position the air filter box on the support
- Fix the screws (1) of the fuse box support



Checking the valve clearance

- First, check the valve clearance in the left cylinder, then remove the four fixing screws (1) on the spark plug cover (2)



- Remove the spark plug cover (2)



- Disconnect the spark plug cap (3)



- Unscrew and remove the two spark plug support retaining screws (4)



- Retrieve the two spacers (5)
- Push the spark plug cable complete with support, as indicated in the figure, towards the front of the vehicle



- Unscrew and remove the three head cover retaining screws (6)



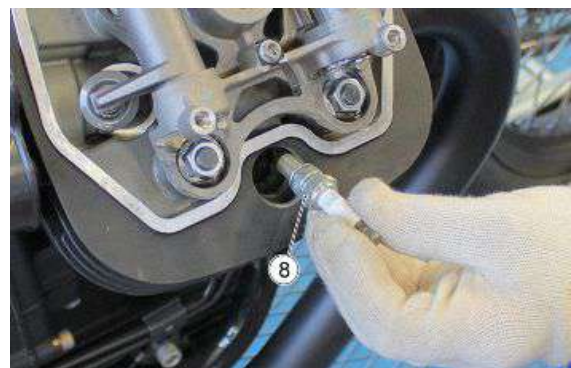
- Remove the head cover (7)



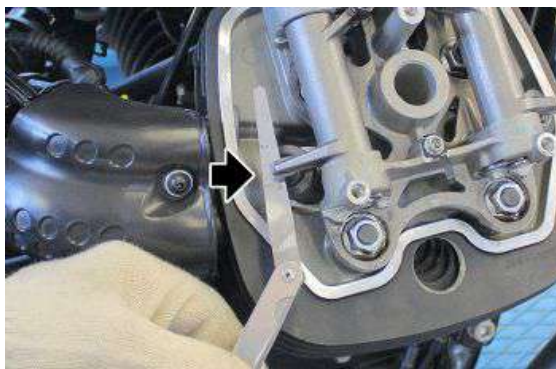
- Unscrew the spark plug (8) and remove it

REMOVE THE RIGHT HAND CYLINDER SPARK PLUG TOO SO THAT IT IS POSSIBLE TO TURN THE ENGINE OVER MANUALLY, ENGAGE FIRST GEAR AND ROTATE THE REAR WHEEL

- Stop rotating when the top dead centre point is reached and check that there is enough clearance on the rockers to perform the measurement



- 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)

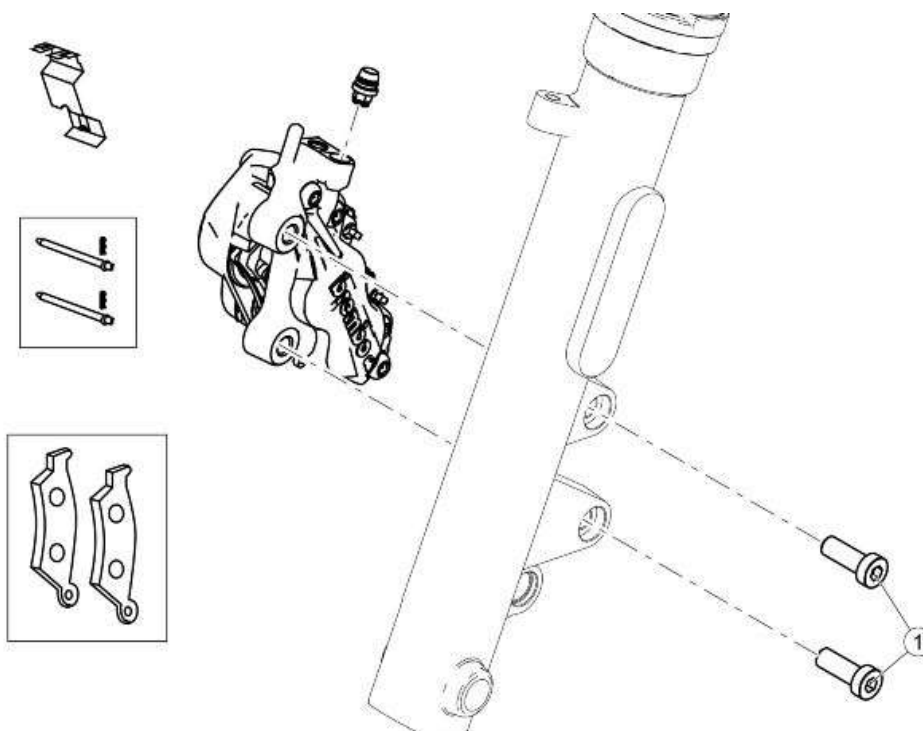
Exhaust valve clearance

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

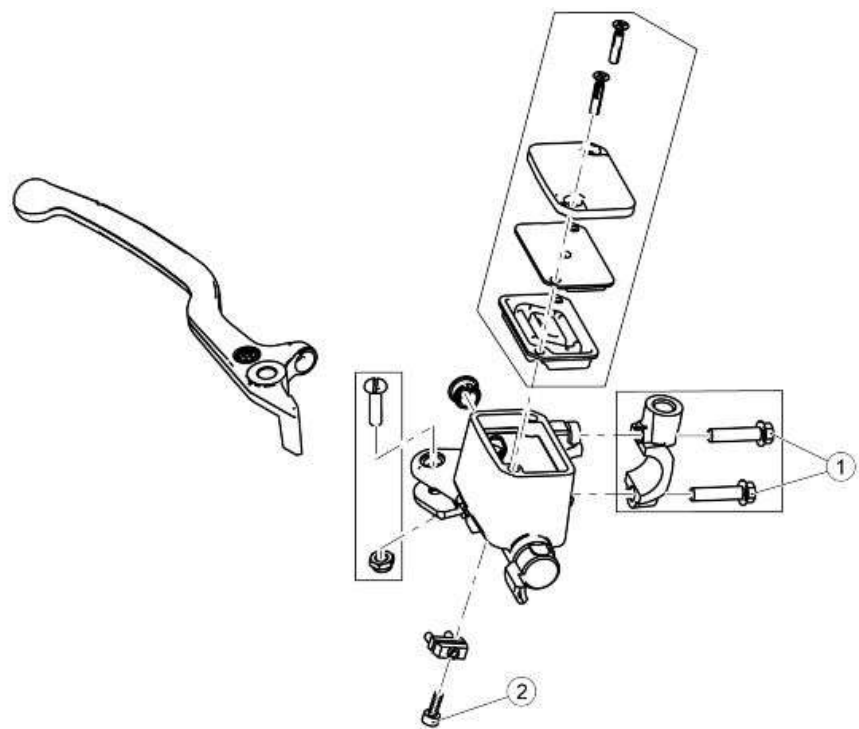


Braking system



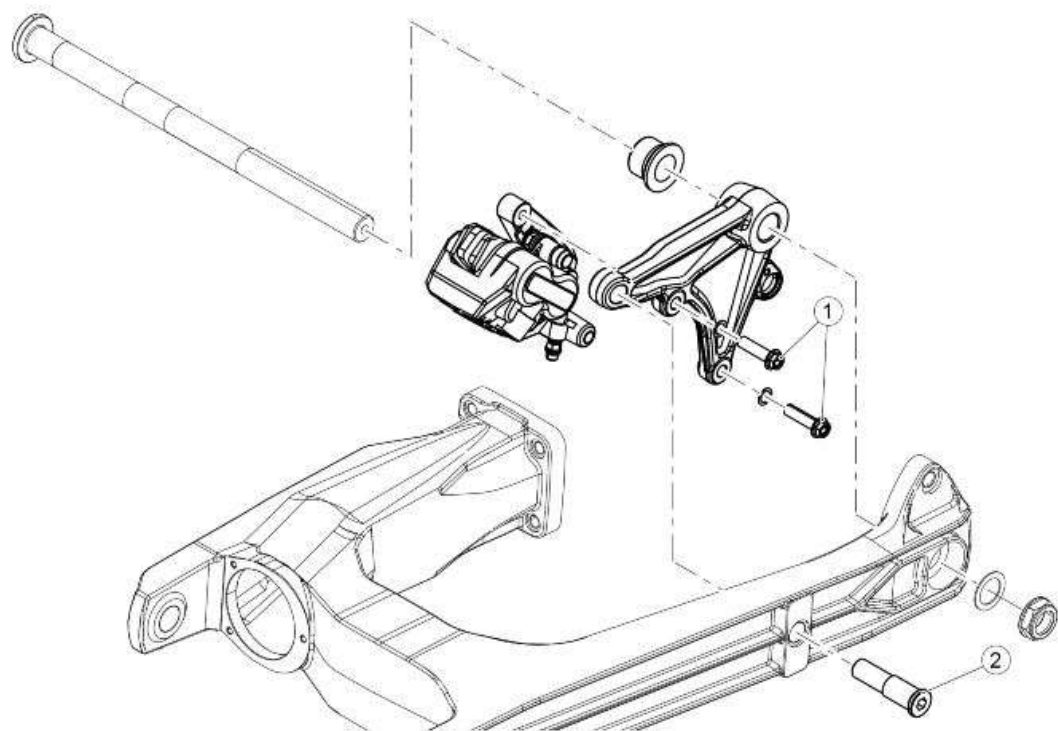
FRONT BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lb ft)	-



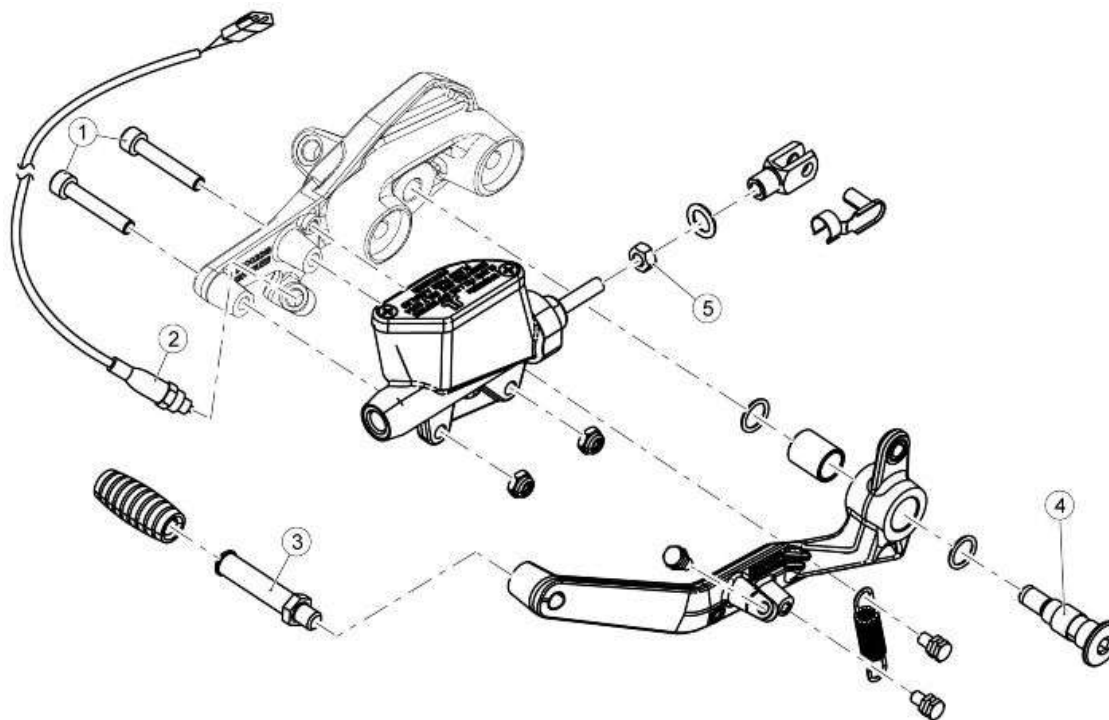
FRONT BRAKE MASTER CYLINDER

Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-



REAR BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lbf ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 Nm (25.81 lb ft)	-

**REAR BRAKE PUMP**

Pos.	Description	Type	Quantity	Torque	Notes
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lb ft)	Loctite 243
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-

Level check**FRONT BRAKE
CHECK**

- Rest the vehicle on its stand
- Turn the handlebar so that the fluid is at the same level as the plug.
- Check that the fluid contained in the tank (1) exceeds the 'MIN' level reference mark



MIN = minimum level

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

CAUTION

FLUID LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR DOWN.

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

(SPECIAL/STONE/ANNIVERSARIO)**REAR BRAKE****CHECK**

- 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

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

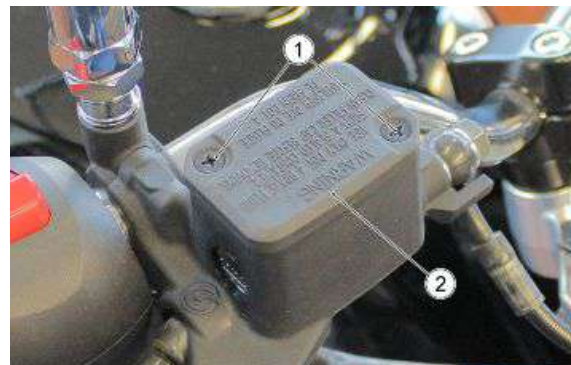
CAUTION

FLUID LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR DOWN.

- Check the 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 two fastening screws (1) on the brake fluid reservoir cover (2).



- Remove the brake fluid reservoir cover (2)



- Remove the inner cover (3)



- Remove the diaphragm (4)
- Top up the brake fluid reservoir



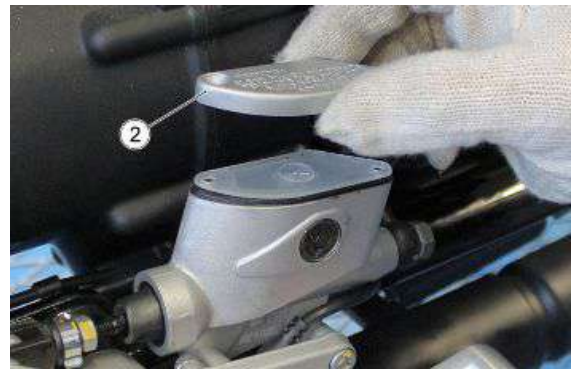
(SPECIAL/STONE/ANNIVERSARIO)

REAR BRAKE

- Unscrew and remove the two fastening screws (1) on the brake fluid reservoir cover (2).



- Remove the brake fluid reservoir cover (2)



- Remove the inner cover (3)



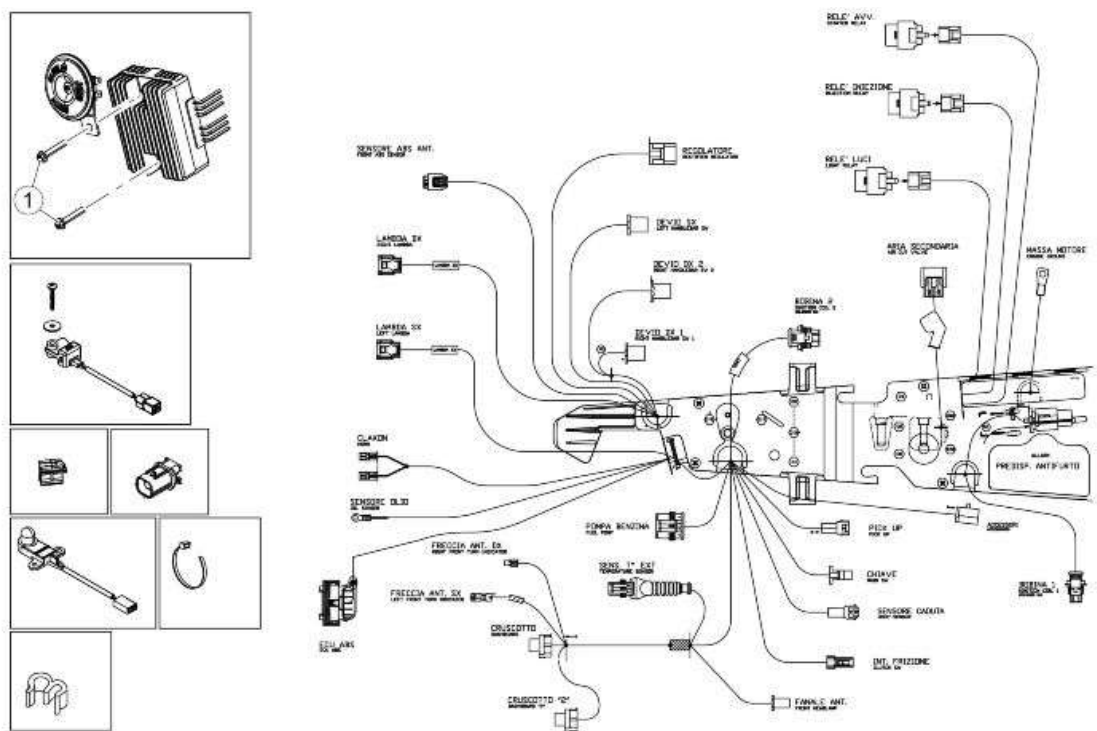
- Remove the diaphragm (4)
- Top up the brake fluid reservoir



INDEX OF TOPICS

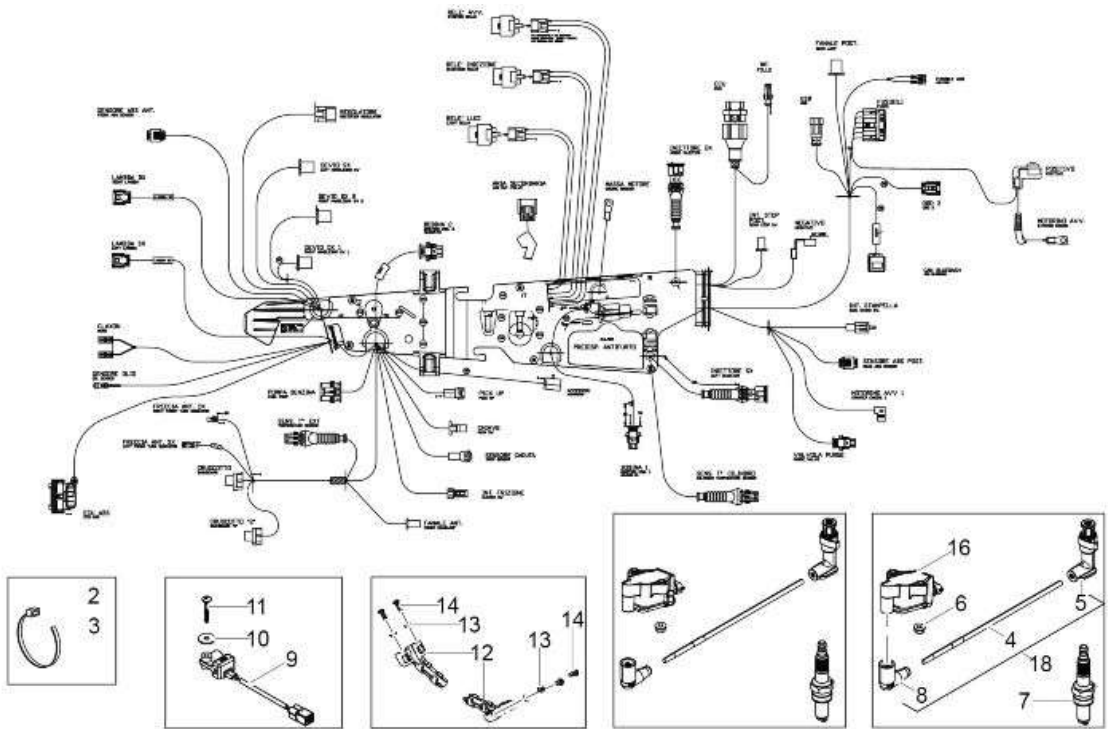
ELECTRICAL SYSTEM

ELE SYS



FRONT ELECTRICAL SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Clutch switch fixing screw	M8	1	5 Nm (3.69 lb ft)	-



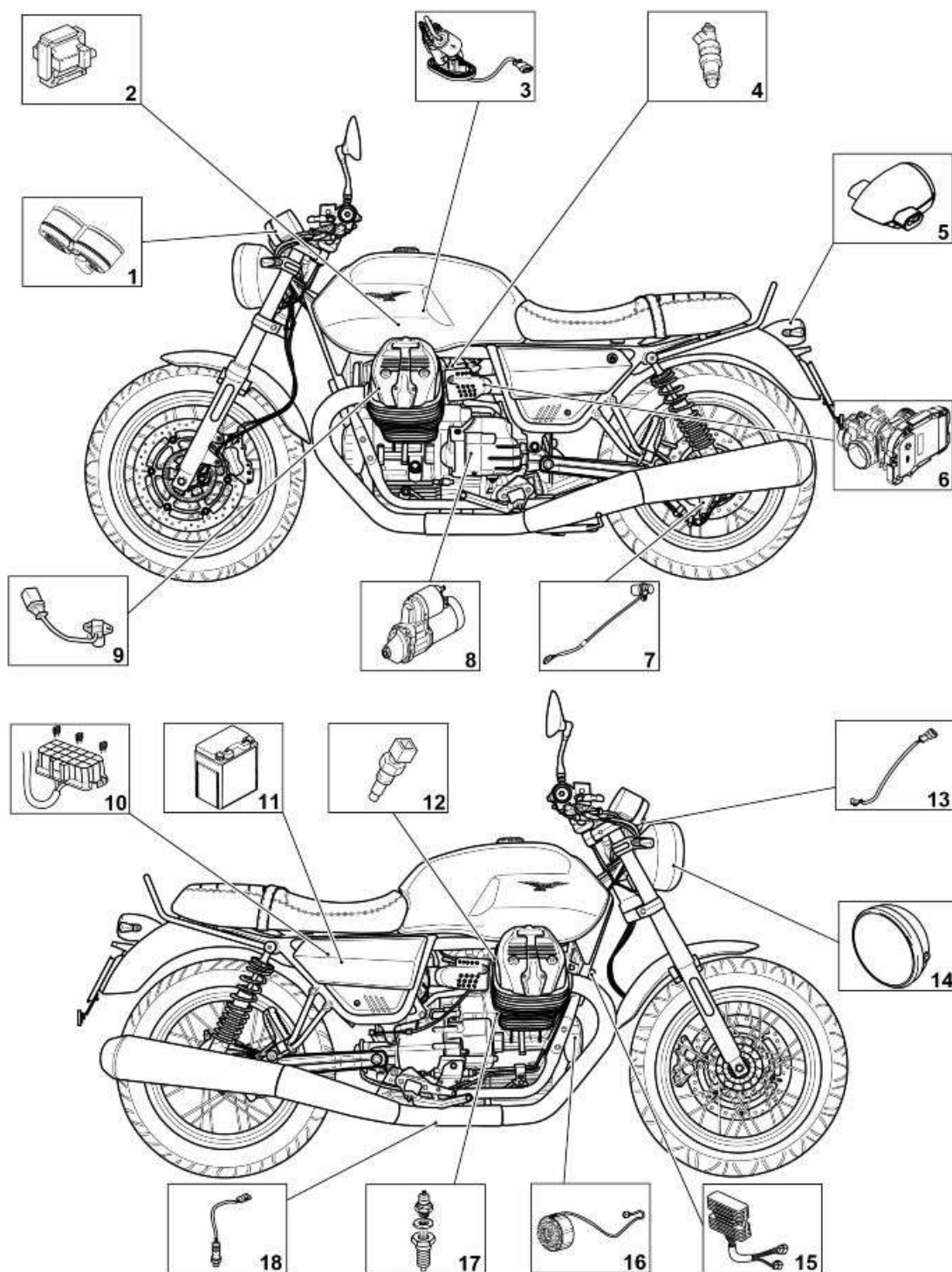
CENTRAL ELECTRICAL SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
-	Coils fastening nuts	M6	4	10 Nm (7.38 lbf ft)	-
-	Starter motor fixing screws	M8	2	25 Nm (18.44 lbf ft)	-



Pos.	Description	Type	Quantity	Torque	Notes
-	Control unit cable grommet fastening screw	M4	1	3 Nm (2.21 lbf ft)	Thread-forming screws
-	Battery holder bracket fastening screws	M6	2	Manual	-
-	Fuse box bracket fastening screws	M5	2	4 Nm (2.95 lb ft)	-

Components arrangement



Key:

1. Instrument cluster
2. Coil
3. Fuel pump
4. Injector

5. Taillight
6. MIU G4 control unit
7. Engine speed sensor
8. Starter motor
9. Engine speed sensor
10. Fuses
11. Battery
12. Head temperature sensor
13. Instrument cluster air sensor
14. Headlamp
15. Voltage regulator
16. Alternator
17. Oil pressure sensor
18. Lambda probes

Electrical system installation

INTRODUCTION

Scope and applicability

The position of the wiring harnesses, how they are fixed to the motorcycle and potential problems are defined on the following sections 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 Vehicle wiring harness
- 1 Taillight Cable harness
- 2 ABS speed sensor
- 1 Horn
- 2 Lambda probe
- 1 Stand switch
- 1 Fall sensor (grey connector)

Small parts and mountings

- 10 large black clamps
- 10 medium black clamps
- 1 Small cable guide rubber clamp
- 2 Large cable guide rubber clamps
- 1 metal clamp on the ECU
- 2 AMP connector supports
- 1 Cable grommet clamp

- 1 Black sheath
- 7 ABS Cable grommets
- 1 connector clip

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 panel connector (is engaged and the boot well inserted)
- Rear and front wheel ABS sensor connector
- Check the correct connection of the ABS ECU connector
- Taillight connector
- Right and Left light switch connectors
- Clutch connector
- Ignition switch connector (check that the cable is not live)
- ECU connector (G4) and the correct insertion of the relative rubber plug
- Check the correct fastening of metallic bracket screw on the throttle body
- Check the correct passage and fixing of the ABS fuse
- Check the right and left injectors connection
- Check the connection of the engine head temperature sensor
- Check the insertion of the starter motor faston
- Check the correct insertion of H.V. Cables with the Coils (RH and LH).
- Check whether the Grey H.V. Cable connects on the Coil with the Grey tape
- Check whether the Grey H.V. Cable goes to the Left engine head
- Check the coils connection (and their correct positioning on the frame)
- Check ground fastening on the engine
- Check NEUTRAL cable fastening
- Check whether the right lambda probe is connected to the output labelled "RH LAMBDA"
- Check the Regulator and Flywheel connection
- Check the Pick Up connection

- Check correct insertion of the starter motor hood and engine start faston
- Check the presence of the Red protective hood on the battery Positive
- Check that the stand switch connector is blue
- Check the side stand connection and the left lambda
- Check the rear stop connection
- Check the stand switch cable ties on the frame under the vehicle
- Check the assembly of the fall sensor (if the arrow is upward and the connector is grey)
- Check the connection of the secondary air valve and the correct positioning of the cap
- Check the connection of the front stop faston
- Check the connection of the purge valve

CAUTION

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. It is also important and essential that the instructions regarding the routing and fixing of the wiring harness in the various areas are followed meticulously in order to guarantee functionality and reliability

COMPONENTS PRE-FITTING**TABLE A - ENGINE**

- Check that the HV cable of the left cylinder has grey taping

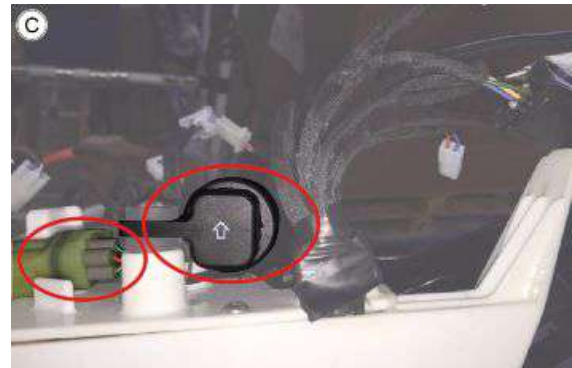
**TABLE B - REAR COIL ON THE FRAME**

- Check that the coil in this position has the connector (wiring harness side) with two contacts

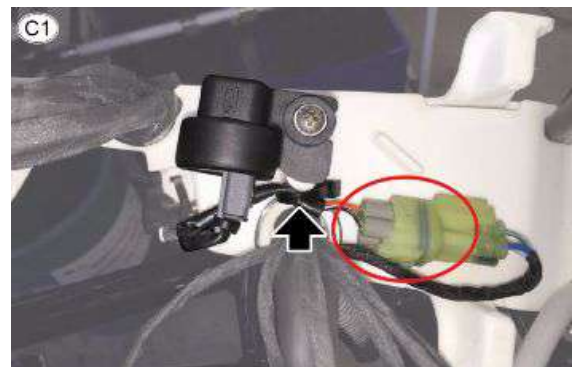


TABLE C - CONDUIT

- Check that the fall sensor arrow is upwards and that the connector is grey



- Place a large clamp so that the sensor cable is positioned as indicated



- Insert the regulator and horn connectors from top to bottom in the hole created between the conduit and the chassis.



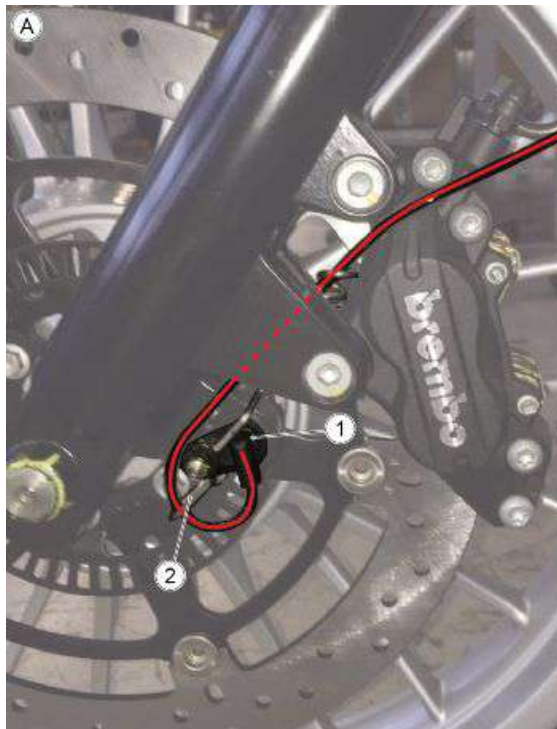
Front side

TABLE A - FRONT WHEEL ABS SENSOR PASSAGE

1. Front ABS sensor

2. Cable grommet

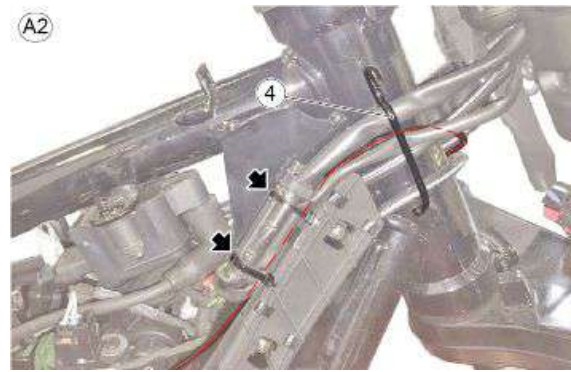
- Pass the front ABS sensor wiring harness through the cable grommet as indicated.



- Connect the front ABS sensor wiring harness with the brake pipe using cable guides (3)



- Pass the ABS sensor wiring harness around the steering headstock through the metal cable grommet (4) on the chassis and then fasten it with 2 plastic clamps in the dedicated seat on the conduit.

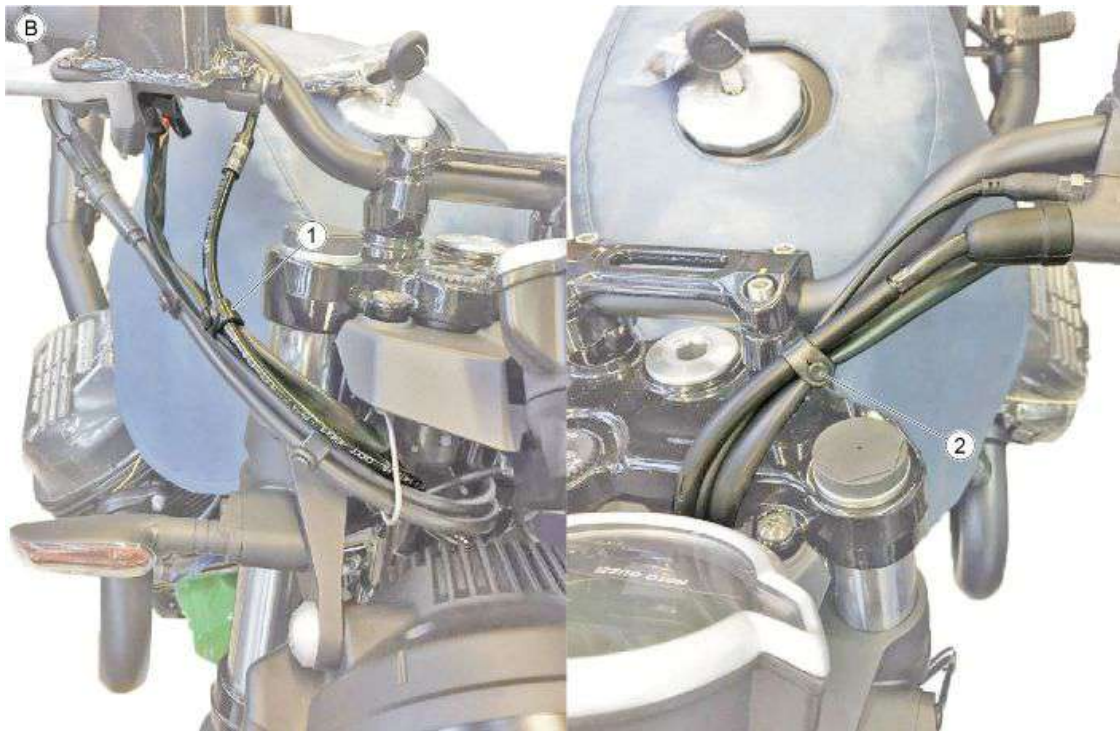


- Insert the wiring harness in the chassis "compartment" (under the coils) and then connect the ABS sensor wiring harness to the wiring harness of the vehicle. Insert the connector in the dedicated fastener clip (5).



TABLE B - LIGHTS SWITCH CABLE PASSAGE ON THE HANDLEBAR (STONE)

- Fasten the RH light switch wiring harness on the front brake pipe using the cable guide (1)
- Using the cable guide (2), fasten the LH light switch and the clutch switch wiring harness to the clutch cable

**TABLE B1**

- Check that the front stop fastons are well fastened, by slightly pulling them

**TABLE B2 - LIGHT SWITCH CABLE PASSAGE ON THE HANDLEBAR (SPECIAL)**

- Fasten the RH light switch wiring harness on the front brake pipe using the cable guide (1)
- Using the cable guide (2), fasten the LH light switch and the clutch switch wiring harness to the clutch cable

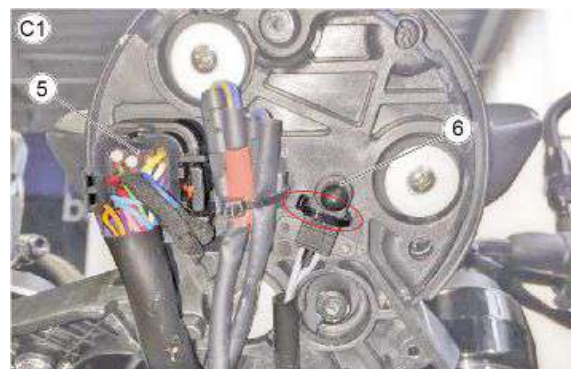


TABLE C - INSTRUMENT CLUSTER

1. Connector support bracket
2. Air temperature sensor connector
3. Connector support
4. Large clamp
 - The large sized clamp fastens the air temperature sensor connector and the main branch of the instrument cluster to one of the ignition switch assembly fasteners

**TABLE C1 - INSTRUMENT CLUSTER**

- Connect the connector (5) of the main wiring harness branch to the instrument cluster. Using a small plastic clamp, fasten the air temperature sensor (6) to the instrument cluster support bracket.

**TABLE C2 - INSTRUMENT CLUSTER (STONE)**

- Once fully assembled, the instrument cluster appears as shown in the figure

**TABLE C3 - INSTRUMENT CLUSTER (SPECIAL)**

1. Medium sized clamp
2. Small clamp
3. Air temperature sensor



TABLE C4 - INSTRUMENT CLUSTER (SPECIAL)

- Once fully assembled, the instrument cluster appears as shown in the figure

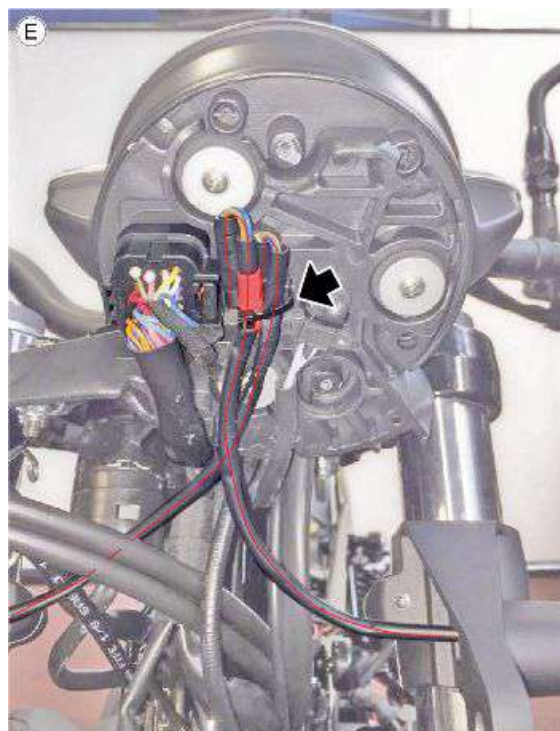
**TABLE D - CABLE RUN ON THE STEERING HEADSTOCK**

1. Medium sized clamp
 2. Small sized clamps
- The throttle cables must be passed through the metal cable grommet on the chassis and fastened to the wiring harnesses using a medium clamp (1)



TABLE E - INSTRUMENT CLUSTER AND FRONT ARROWS (STONE)

- Proceed as indicated in the figure: using a small clamp, fasten both arrow wiring harnesses to the instrument cluster, next to the red strip on the left arrow

**TABLE E1 - INSTRUMENT CLUSTER AND FRONT ARROWS (SPECIAL)**

- Proceed as indicated in the figure

**TABLE F - CLUTCH SWITCH**

- Using the cable guide (1), fasten the clutch and the LH light switch wiring harness to the clutch cable

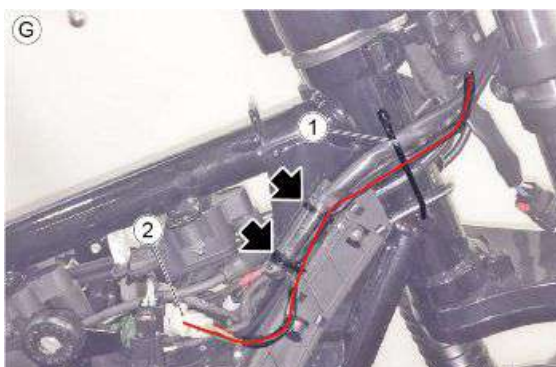


TABLE F1

- Pass the clutch cable wiring harness through the metal cable grommet on the chassis, fasten it with a large plastic clamp to the wiring harnesses along the steering headstock and hide the connection behind it

**TABLE G - IGNITION UNIT**

- Pass the ignition unit wiring harness through the metal cable grommet (1) on the chassis, then fasten it with 2 plastic clamps to the dedicated compartment on the conduit
- Connect the wiring harness to the connector 2 on the vehicle

**TABLE G1**

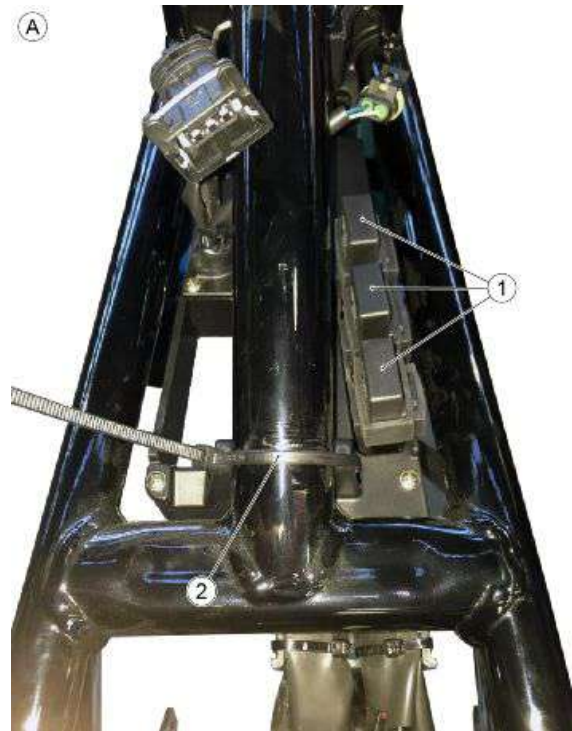
- Fit the connectors on the ignition unit behind the steering headstock plates



Central part

TABLE A - CONDUIT ON THE FRAME

- Check that the relays are well inserted.
The quantities vary depending on the models: Special 3 relays - Stone 2 relays
- Fasten the lower part of the conduit using a large clamp (2)

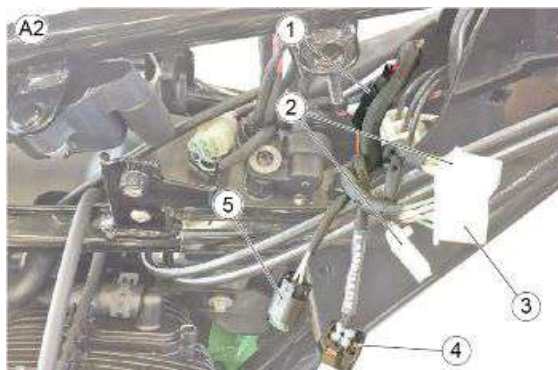
**TABLE A1**

- Pass the connector of the voltage regulator (1) and the horn connector (2) in the hole created by the conduit with the frame at the bottom, to facilitate their connection



TABLE A2

- Voltage regulator connector (1)
- RH light switch connector (2)
- LH light switch connector (3)
- RH Lambda probe connector (4)
- Front ABS sensor connector (5)

**TABLE A3**

- Heated handgrips provision (1)
- RH cylinder coil (2)
- Key connector (3)
- Fuel pump connector (4)
- LH Lambda sensor connector (5)

**TABLE A4**

- Check that the PICK UP (1) connector is well connected

**TABLE A5**

- Check that the engine head (1) temperature sensor connector located on the left cylinder is well connected
- The wiring harness must pass between the intake manifolds, as shown in the figure



TABLE B - COIL AND LEFT CYLINDER CONNECTION

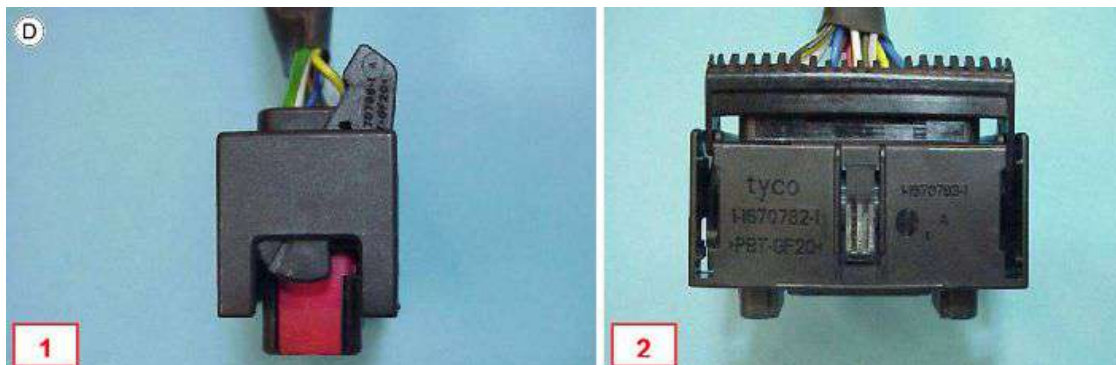
- Check that the HV cable with grey mark (left engine head) is well inserted in the coil with grey mark on the connector

**TABLE C - COIL AND RIGHT CYLINDER CONNECTION**

- Check that the HV cable without grey mark (right engine head) is well inserted in the front coil

**TABLE D - PROCEDURE FOR CORRECTLY FITTING THE ABS CONTROL UNIT CONNECTOR**

- The initial position of the connector fastener lever must be as shown in the figure

**TABLE D1**

- Place the connector on the opposite side of the control unit and lower the driving lever until the "click" that signals the end of the stroke is heard.

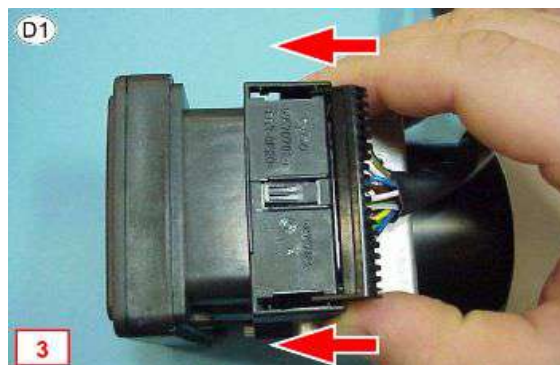
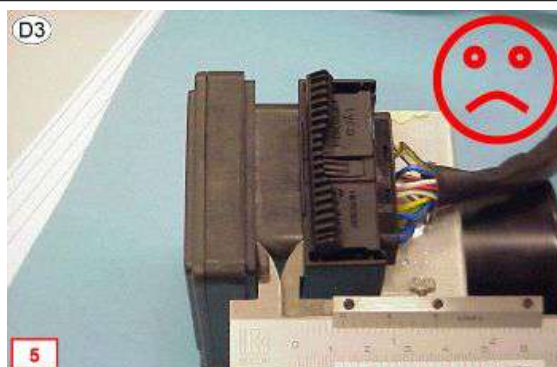


TABLE D2

- When the connector is fully inserted, the distance between the connector and the ABS control unit must be 7.5 mm (0.29 in)

**TABLE D3**

- If the initial position of the connector and driving lever is not as the one shown in "TABLE D". The connector will not be coupled correctly and the measured distance will be greater, approximately 12 mm (0.47 in). In this case, repeat the operations according to the instructions in "TABLES D1/D2". It is recommended to create a template to check the correct insertion of the connector.

**TABLE D4**

- Place the ABS ECU wiring harness as shown in the figure



TABLE D5

- Fit the bracket (1) that connects the ECU to the associated support using the three fixing screws (2)



TABLE E - RH LAMBDA SENSOR

- Pass the wiring harness between the brake pipes and the chassis and then connect it to the connector (1) fastened to the chassis



TABLE F - LEFT LAMBDA PROBE

- Connect the wiring harness to the connector (1) fastened to the chassis

**TABLE G - HORN AND REGULATOR**

1. Voltage regulator
 2. Horn
- The regulator's cable must pass behind the frame bracket



TABLE G1

- Check the connection of the flywheel white connector and regulator's black connector that must have a safety clamp to avoid disconnection
- Once connected, the connectors must be placed behind the steering head-stock plates and above the main wiring harness conduit.



TABLE G2

- Operating on the left side and using a medium clamp, fasten the regulator's cable to the regulator's support plate
- Operating on the right side and using a medium clamp, fasten the regulator's and pick up's cable to the support plate

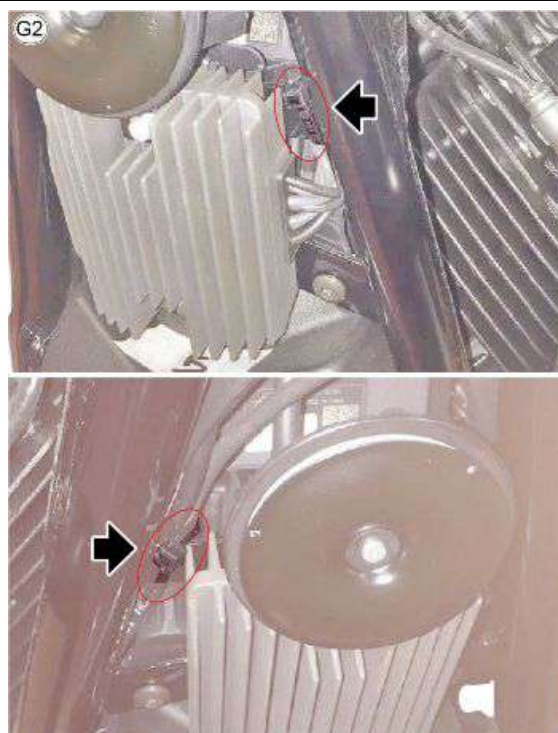
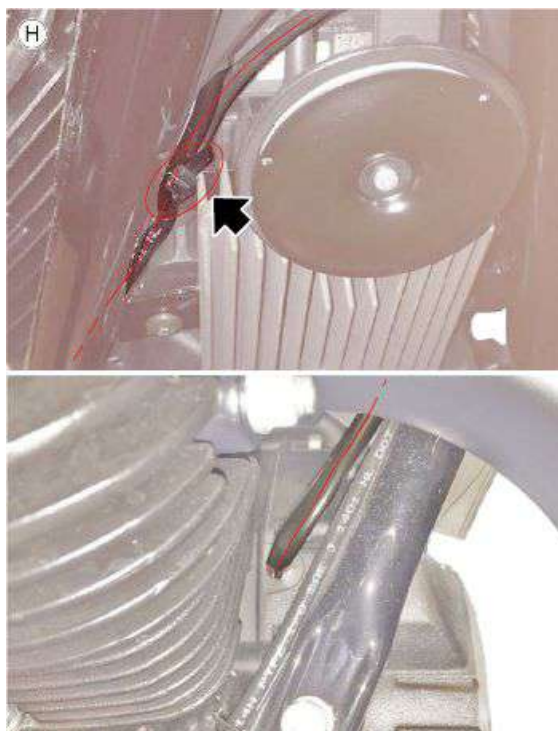


TABLE H - FLYWHEEL CABLES PASSAGE

- Using a medium clamp, fasten the fly-wheel cable and the regulator cable to the voltage regulator support bracket

**TABLE I - NEUTRAL SENSOR CABLES PASSAGE**

- The wiring harness (1) of the neutral sensor must pass through the filter box support and in the cable guide (2)



TABLE I2

- Connect the neutral sensor cable to the associated connector on the vehicle. Using a small clamp, fasten the cable to the rear cables of the ABS and Stop sensor

**TABLE A - OIL PRESSURE SENSOR**

- Connect the cable to the oil pressure sensor (1) and orient it as shown in the picture
- Pass the sensor cable behind the brake pipes and then fasten the cable and the pipes to the chassis using the metal tab on the chassis



TABLE A - OIL PRESSURE SENSOR

- Connect the cable to the oil pressure sensor (1) and orient it as shown in the picture
- Pass the sensor cable behind the brake pipes and then fasten the cable and the pipes to the chassis using the metal tab on the chassis

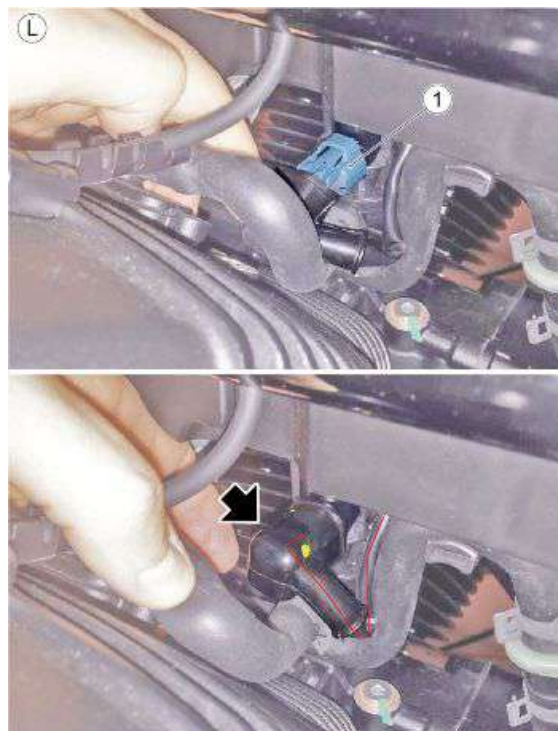
**TABLE K - INJECTORS**

- Check the correct connection of the right injector (1) and left injector (2) wiring harness



TABLE L - SECONDARY AIR VALVE

- Check the correct connection of the secondary air valve sensor (1) and then apply the protective cap on the connector

**TABLE M - ANTI-THEFT FITTING**

- Check the correct connection of the ignition bridge (1) to the anti-theft wiring harness on the vehicle

**TABLE N - POSITIONING OF THE HEATED HANDGRIPS FITTING**

- Place the connector of the heated handgrips wiring harness between the chassis plates, behind the steering headstock



TABLE O - REAR STOP SWITCH WIRING HARNESS PASSAGE

- Pass the wiring harness under the brake pipe coupling, behind the pump and then insert it between the chassis and the gearbox
- Fasten the wiring harness to the cable guide (1) located on the chassis

**TABLE O1**

- Pass the wiring harness behind the cardan shaft output and then fasten it to the cable guide that was previously fitted on the engine, behind the clutch actuator

**TABLE O2**

- Connect the wiring harness to the connector (2) on the vehicle
- Using a small clamp, fasten the rear stop wiring harness to the other wiring harnesses in the area

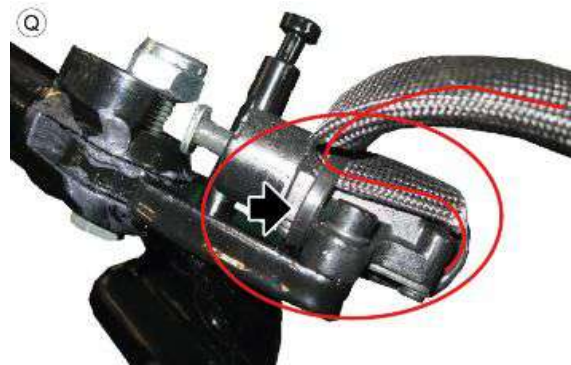


TABLE P - ENGINE BATTERY GROUND

- An incorrect fastening of the fixing screws of the engine battery ground eyelet may cause the vehicle to catch fire
- Check the tightening to the prescribed torque

**TABLE Q - SIDE STAND SENSOR**

- Using a small clamp, fasten the wiring harness of the side stand switch, as indicated

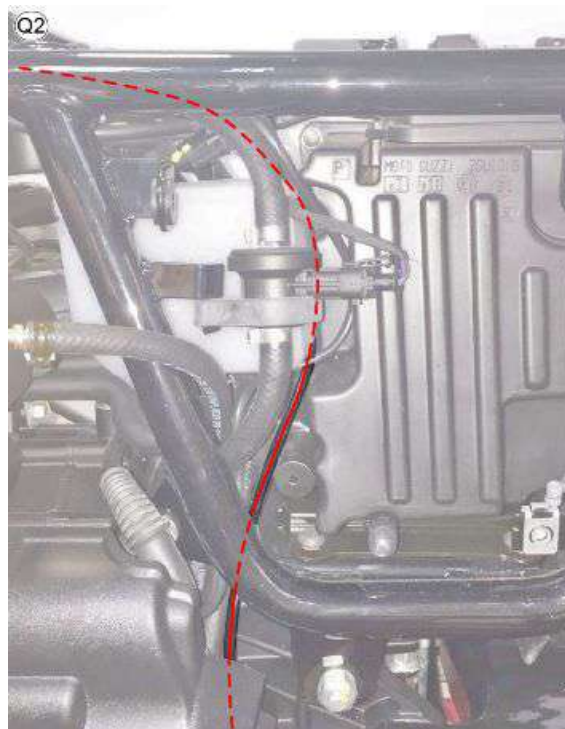
**TABLE Q1**

- Using a medium clamp, fasten the wiring harness of the side stand switch to the frame



TABLE Q2

- Proceed as shown in the figure, making sure to pass the switch wiring harness behind the MIU G4 ECU

**TABLE Q3**

- Using a plastic clamp, fasten the wiring harness to the canister valve pipe and connect it to the wiring harness on the vehicle

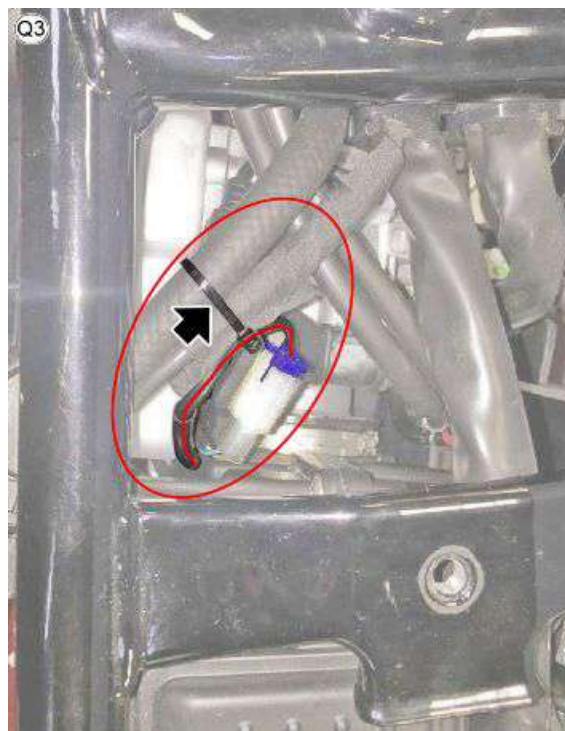
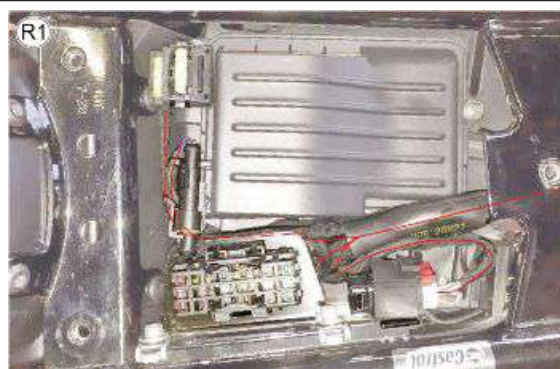


TABLE R - ROUTING THE CABLES IN THE FILTER BOX/UNDER-SEAT AREA

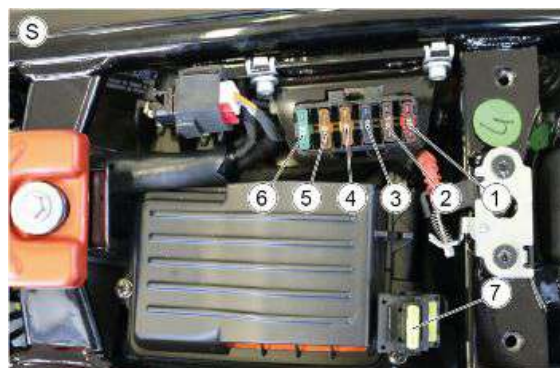
- The main wiring harness must pass under the central beam of the frame

**TABLE R1**

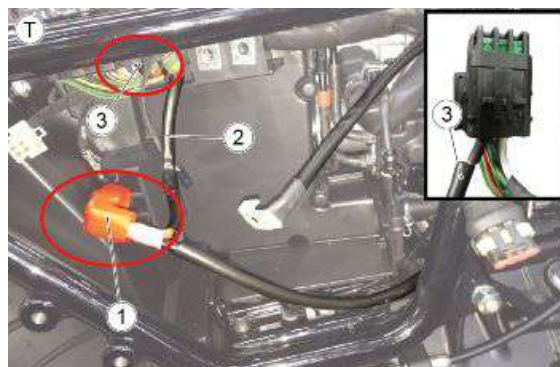
- The layout of the main wiring harness and of the various branches in the filter box area must be as illustrated in the image

**TABLE S - MAIN FUSES AND ABS**

1. Fuse "A" (10A)
2. Fuse "B" (7.5A)
3. Fuse "C" (15A)
4. Fuse "D" (5A)
5. Fuse "E" (5A)
6. Fuse "F" (30A)
7. Fuse "G" (20A)

**TABLE T - PASSAGE OF THE STARTER MOTOR BATTERY**

- The cap of the battery positive (1) must be red
- The cable that goes from the battery positive to the fuse box must be covered with sheath (2) and the terminal must be covered with heat shrink material (3)



**INCORRECT SECURING OF THIS COMPONENT MAY
CAUSE THE VEHICLE TO CATCH FIRE**

TABLE T1

- The starter motor cable must pass under the filter box pipe



TABLE T2

- Check that the starter positive cap is correctly inserted and that the nut is fastened to the prescribed torque



**INCORRECT SECURING OF THIS COMPONENT MAY
CAUSE THE VEHICLE TO CATCH FIRE**

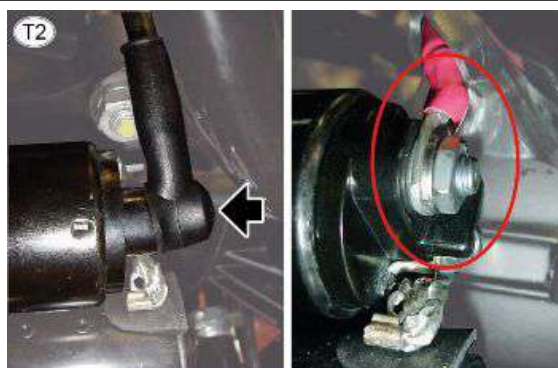


TABLE T3

- Check that the faston is correctly inserted



TABLE T4

- The protection cap may remain outside for maximum 2-3 mm (0.078-0.118 in)



TABLE U - OBD 2 PORT

- Insert the plug (1) in the OBD 2 port and then insert the port in the associated rubber support, located next to the fuse box

**TABLE V - USB PORT FITTING**

- Place the wiring harness as shown in the figure and then insert the USB port fitting in its coupling on the air filter box

**TABLE W - GMP FITTING**

- Make sure that the plug of the fitting connector is correctly inserted
- Insert the GMP fitting connector between the rear mudguard and the air filter box



TABLE X - MIU G4 ECU

- The MIU G4 ECU wiring harness branch must be placed as shown in the figure
- Make sure that the connector's rubber protection is well fitted

**TABLE X1**

- With the rubber protection well fitted on the connector, fasten it to the wiring harness branch with the bracket (1)
- Tighten the screw (2) to the prescribed torque and fasten the wiring harness to the conduit using a plastic clamp

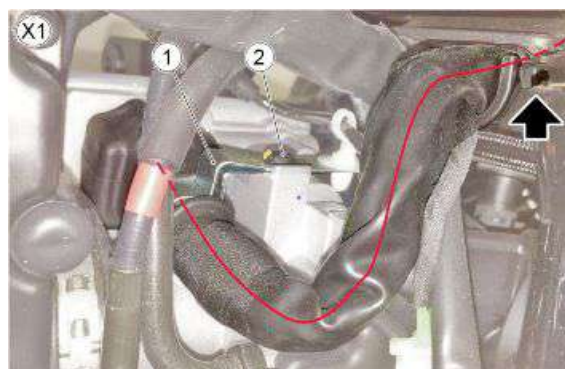
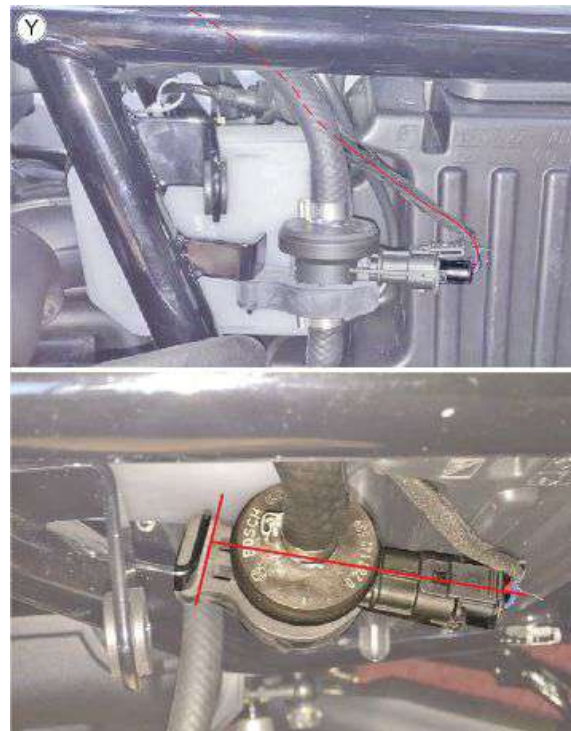


TABLE Y - CANISTER VALVE

- Proceed as indicated in the figure
- Make sure that the canister valve is positioned as in the figure so as to have the connection perpendicular to the support bracket



Back side

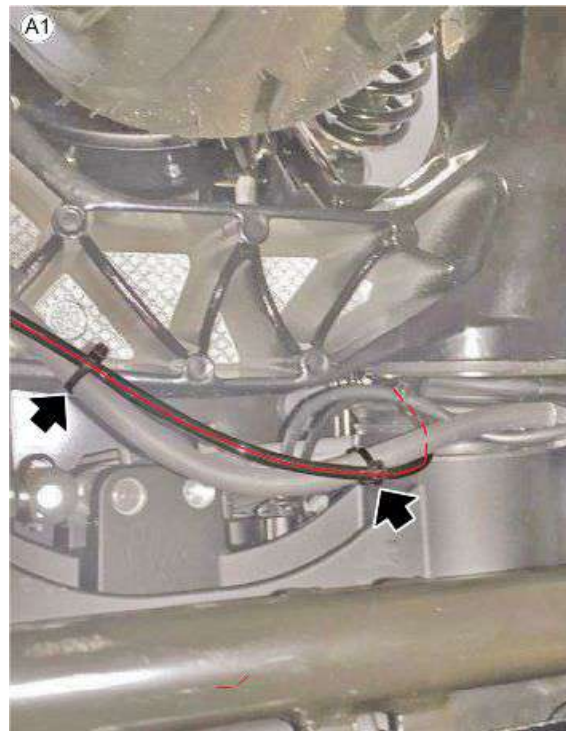
TABLE A - REAR WHEEL ABS SENSOR ROUTING

- Pass the ABS sensor cable behind the brake calliper coupling
- Using a cable guide (1), fasten the ABS sensor cable to the rear brake pipe



TABLE A1

- Using the two small clamps, fasten the ABS sensor cable to the rear brake pipe
- Pass the cable through the space between the gearbox and the swingarm, next to the cardan shaft output

**TABLE A2**

- Connect the ABS sensor cable to the connector (1) on the vehicle
- Using a small clamp, fasten to the canister valve pipe the ABS sensor cable together with the other cables in the area

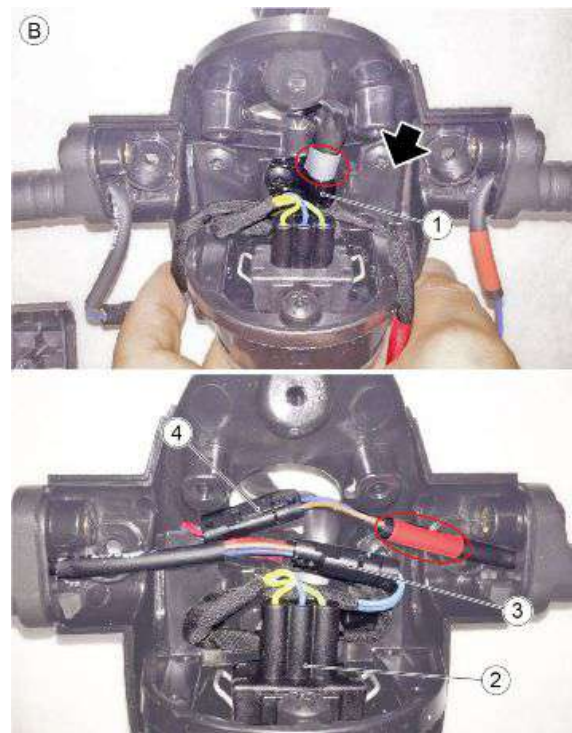


TABLE B - TAILLIGHTS AND REAR ARROWS

- Fasten the wiring harness through the cable grommet (1), next to the grey reference mark on it
- Connect the connectors of the following: taillight (2), left arrow (3) and right arrow (4)

NOTE

The right arrow cables are marked with RED taping

**TABLE B1**

- Fit the upper case on the taillight and tighten the three fixing screws (5)
- Make sure to avoid damaging the arrow cables while fitting the upper case



TABLE C - LICENSE PLATE LIGHT

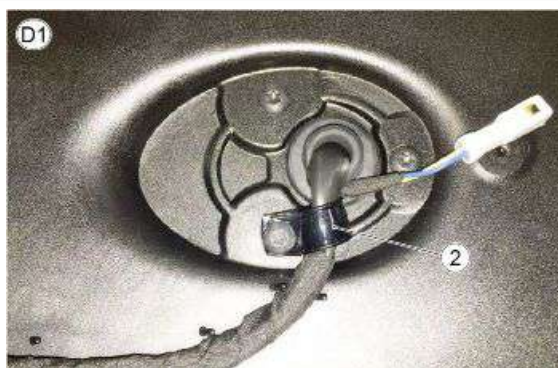
- Install the licence plate light on the plate holder

**TABLE D - REAR MUDGUARD PRE-FITTING**

- Fit the taillight on the mudguard, making sure to apply the cable grommet rubber seal (1) correctly, as shown in the figure

**TABLE D1**

- Fasten the taillight wiring harness through the cable grommet (2), using one of the screws used to fasten the taillight to the mudguard

**TABLE D2**

- Fit the licence plate holder on the rear mudguard and then connect the licence plate light to the connector (3) on the taillight wiring harness



TABLE D3

- Spread the cable as shown in the figure, making sure to insert it in the specific places inside the mudguard
- Fit the screws (4) and the washer until the end, to prevent the cable from becoming loose from its seat

**TABLE D4**

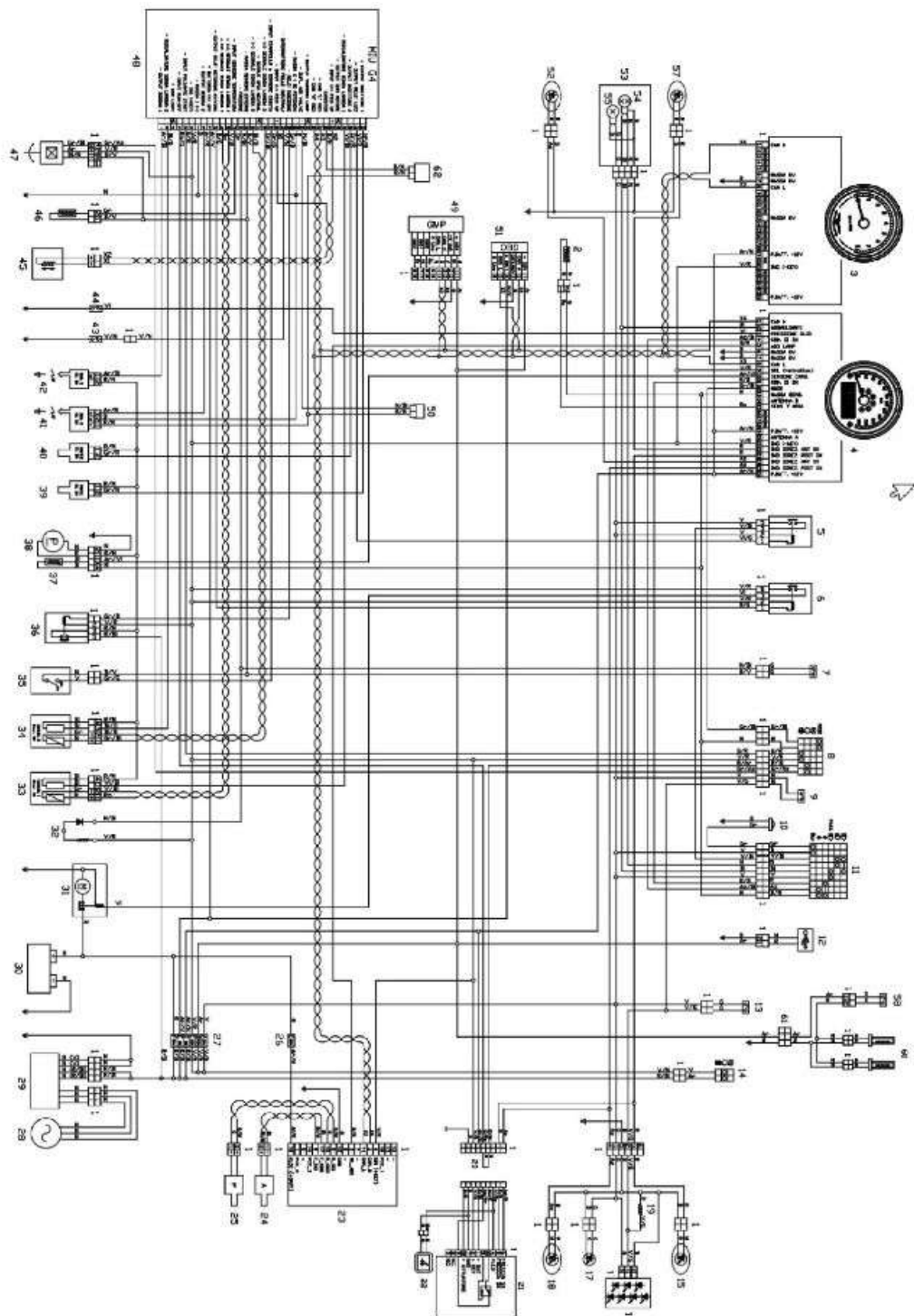
- Fit the lower latch on the mudguard
- Pass the cable through the hole on the rear side of the mudguard and then fasten the cable using a small clamp



General wiring diagram

(HALOGEN)

(SPECIAL)

**Key:**

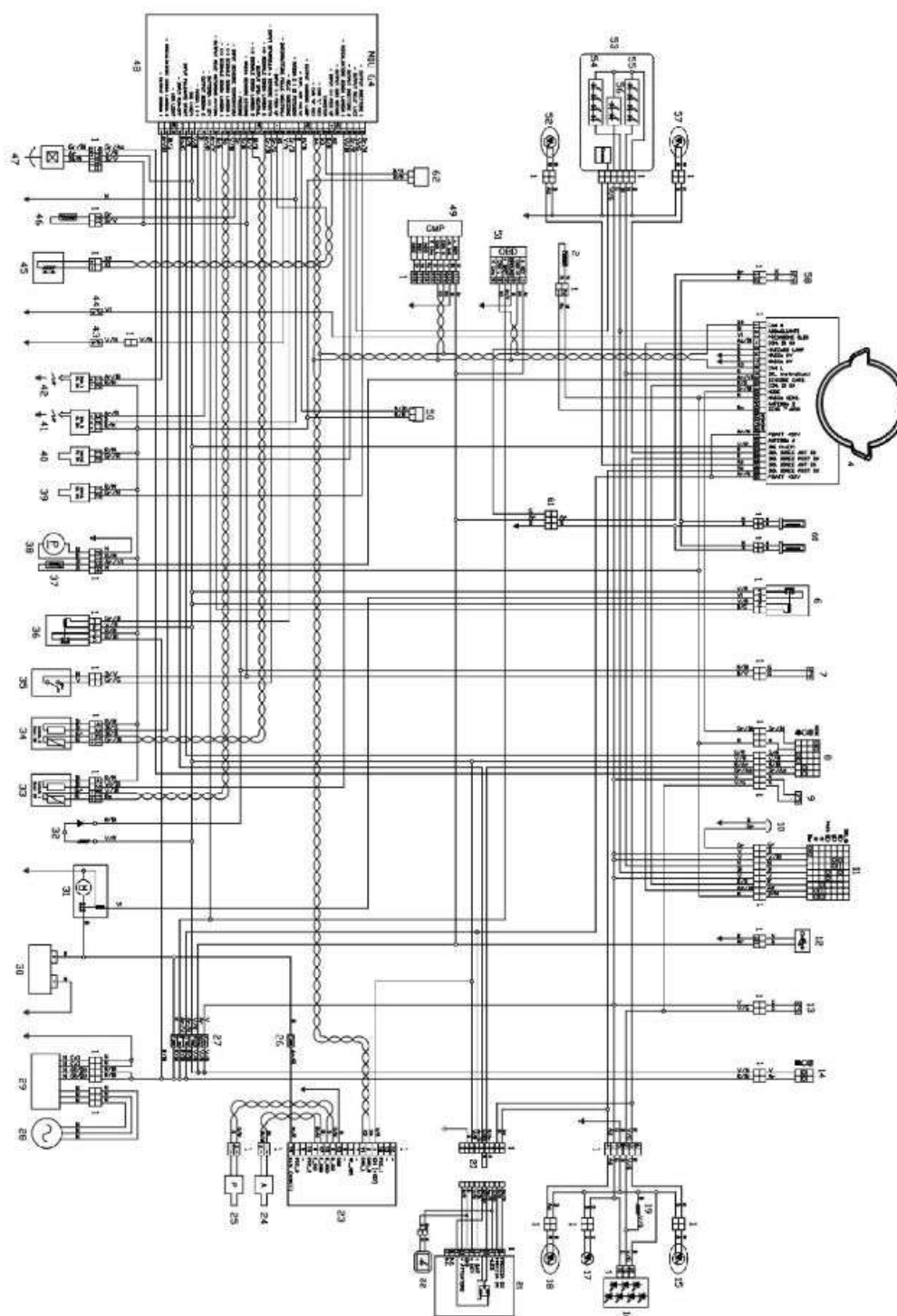
1. Multiple connectors
2. air temperature sensor
3. Instrument cluster
4. Instrument cluster
5. Lights relay
6. Starter motor relay

7. Clutch switch
8. Right light switch
9. Front stop switch
10. Horn
11. Left light switch
12. USB socket (where applicable)
13. Brake light switch
14. Ignition switch
15. Rear right turn indicator (LED)
16. Taillight (LED)
17. Licence plate light (LED)
18. Rear left turn indicator (LED)
19. Resistance ($R=220\ \Omega$ 3W)
20. Connector with the bridge
21. Anti-theft (if fitted)
22. Anti-theft led (if fitted)
23. ABS control unit
24. Front ABS sensor
25. Rear ABS sensor
26. ABS fuse
27. Fuses
28. Alternator
29. Controller
30. Battery
31. Starter motor
32. Pull-up ($R=220\ \Omega$ 3W - 1N4007)
33. Lambda probe 1 left exhaust
34. Lambda probe 2 right exhaust
35. Side stand switch
36. Injection loads relay
37. Fuel reserve sensor
38. Fuel pump
39. Left cylinder injector 1
40. Right cylinder injector 2
41. Right cylinder coil 2
42. Left cylinder coil 1
43. Gearbox in neutral sensor
44. Oil pressure sensor

- 45.Pick-up
- 46.Engine head temperature sensor
- 47.Fall sensor
- 48.MIU G4 control unit
- 49.GMP (if fitted)
- 50.Secondary air system
- 51.OBD connector
- 52.Front left turn indicator (LED)
- 53.Headlight
- 54.High/low beam bulb
- 55.Front daylight running light bulb
- 56.-
- 57.Front right turn indicator (LED)
- 58.Heated handgrips switch (if fitted)
- 59.-
- 60.Heated handgrips (where provided)
- 61.Heated handgrips kit provision
- 62.Canister

(LED)

(STONE)

**Key:**

1. Multiple connectors
2. air temperature sensor
3. -
4. Instrument cluster
5. -
6. Starter motor relay

7. Clutch switch
8. Right light switch
9. Front stop switch
10. Horn
11. Left light switch
12. USB socket (where applicable)
13. Brake light switch
14. Ignition switch
15. Rear right turn indicator (LED)
16. Taillight (LED)
17. Licence plate light (LED)
18. Rear left turn indicator (LED)
19. Resistance (R=220 ohm 3W)
20. Connector with the bridge
21. Anti-theft (if fitted)
22. Anti-theft led (if fitted)
23. ABS control unit
24. Front ABS sensor
25. Rear ABS sensor
26. ABS fuse
27. Fuses
28. Alternator
29. Controller
30. Battery
31. Starter motor
32. Pull-up (R=220 ohm 3W - 1N4007)
33. Lambda probe 1 left exhaust
34. Lambda probe 2 right exhaust
35. Side stand switch
36. Injection loads relay
37. Fuel reserve sensor
38. Fuel pump
39. Left cylinder injector 1
40. Right cylinder injector 2
41. Right cylinder coil 2
42. Left cylinder coil 1
43. Gearbox in neutral sensor
44. Oil pressure sensor

- 45.Pick-up
- 46.Engine head temperature sensor
- 47.Fall sensor
- 48.MIU G4 control unit
- 49.GMP (if fitted)
- 50.Secondary air system
- 51.OBD connector
- 52.Front left turn indicator (LED)
- 53.Headlight
- 54.High beam light LED
- 55.Low beam light LED
- 56.Position/DRL LED
- 57.Front right turn indicator (LED)
- 58.Heated handgrips switch (if fitted)
- 59.-
- 60.Hazard/heated handgrips kit provision
- 61.Canister

Cable colour:

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

Dashboard

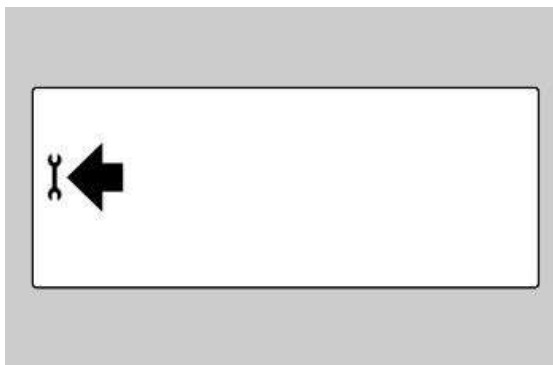
Maintenance icon reset

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 PANEL" section;
- Select "SELF-DIAGNOSIS";
- Select "ACTIVATIONS";
- Enable the command "SERVICE RE-SET".



Battery recharge circuit

RECHARGING SYSTEM

- Slightly lift the fuel tank, being careful not to pull the pipes with the relative hooks;
- Remove the connectors from the compartment behind the steering column
- Disconnect the three-way connector (1) (white).



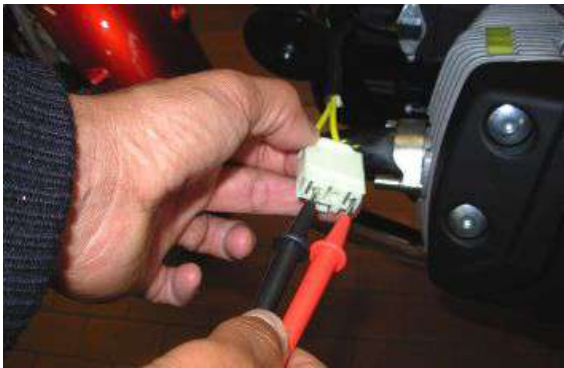
NOTE

THE ENGINE SIDE IS IDENTIFIED WITH THE LETTER "A"

Measurement of resistance (with engine off)

- For a correct detection of the alternator resistance, must be performed an ambient temperature measurement and then a further heat stabilisation with a tester.





- Take the measurement; The correct value is determined by subtracting the wire resistance of the tester obtained by touching the two pins.

Example:

- Resistance of stage 1 read on the display = 0.67 Ohm



- Resistance of the wires read on the display = 0.47 Ohm



- Effective resistance stage 1 = $0.67 - 0.47 = 0.20$ Ohm

RESISTANCE MEASURE		
Winding stage	Ambient temperature (ohm)	Afterwards heat stabilisation (ohm)
Stage 1	0.18 - 0.23	0.20 - 0.25

Zero load voltage

- Disconnect the three-way connector (1);
- For a correct detection of the alternator voltage, a measurement must be carried out using alternatively the 3 engine side connector pins: stage "1" (pin 1-2), stage "2" (pin 1-3), stage "3" (pin 2-3)
- Take the measurements;
- If there is a significant difference between one stage and another (other than 15 V), this means that the alternator is defective and must be replaced.

CAUTION

WITH THE ENGINE HOT THE VALUES RECORDED ARE ON AVERAGE 4-5 V LESS THAN THOSE DETECTED WITH THE ENGINE COLD.

TENSIONE A VUOTO

Giri / min	2000	4000	6000
Vm tensione concatenata Valori di riferimento (V rms)	40 - 45	82 - 87	132 - 138

Short-circuit current

- For a correct detection of the short-circuit current, a connector must be prepared that generates a downstream short circuit between the three alternator cables;
- Start the engine and with a clamp ammeter measure each single cable.
- If there is a significant difference between the measure of the single cables (other than 10 A), this means that the alternator is defective and must be replaced.

**CAUTION**

WITH THE ENGINE HOT THE VALUES RECORDED ARE ON AVERAGE 2-3 A LESS THAN THOSE DETECTED WITH THE ENGINE COLD.

WARNING

NEVER KEEP THE ENGINE RUNNING FOR MORE THAN ONE MINUTE; FAILURE TO DO SO COULD CAUSE SERIOUS OVERHEATING DAMAGES TO THE MOTORCYCLE CIRCUITS.

COLD SHORT-CIRCUIT CURRENT

RPM	2000	4000	6000	8,000
RMS DC current (Arms) (average of the 3 stage currents)	18	20.4	20.6	20.7

Voltage on battery poles with engine speed always between 3000 - 5000 RPM

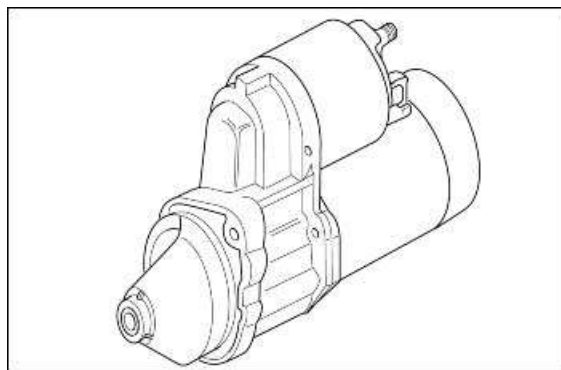
- Start the engine, after about one minute of operating bring the speed to 3000-5000 RPM, then measure with a tester the voltage at the battery poles that must always be between 13V and 15V. Otherwise, if the correct operation of the alternator has already been checked, replace the regulator.

CAUTION

PERFORM THE CHECK DESCRIBED ABOVE WITH A BATTERY IN GOOD CONDITION (START VOLTAGE ABOUT 13V) MAKING SURE THAT THERE ARE NO ELEMENTS IN THE SHORT CIRCUIT.

Start-up system check

pick-up input about 100 A



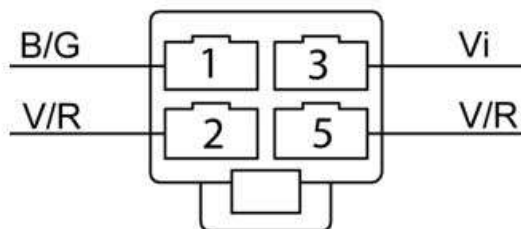
START-UP

Function

Communicates the motor start request to the control unit

Operation / Operating principle

By pressing the start button, the related circuit closes and brings PIN 5 of the control unit to a voltage equal to zero (ground closure). The starter button, the clutch switch, the No. 6 starter motor relay and the injection control unit between PIN 6 and 10 are involved



Level in electrical circuit diagram

Start up

Start-up enabling switches

Position

Under the fuel tank, right side

Electrical specifications

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

Starter relay pin out

1. control unit relay output (blue/yellow)
2. Control unit ignition switched live (red/green)
3. Starter motor (violet)
4. /
5. Control unit ignition switched live (red/green)

Diagnostic tool - Parameters and statuses

- Starting request - (Absent, Present, Closed Loop, Closed)
- Start enable - (NO, YES)

Diagnostics tool - Logic errors

Starter button P0512 - signal not valid

Error cause

- Fault in the switch (lock) of the engine start-up or short circuit to ground

Troubleshooting

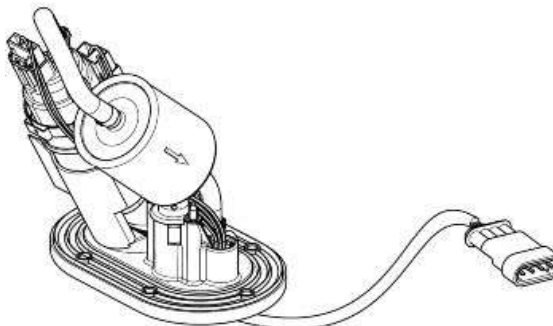
- Check if the button remains in start position; if not OK, restore, if OK check that there is no short circuit to ground of the grey/red cable; if it is not, restore. If it is OK, replace

level indicators**Petrol pump:**

Input 4A (to be measured between pins 1 and 2 with 12V supply voltage)

Fuel level sensor:

Resistance 1.4 Ohm (to be measured between pins 3 and 4 with fuel level equal to 0 litres)



Lights list**BULBS (SPECIAL)**

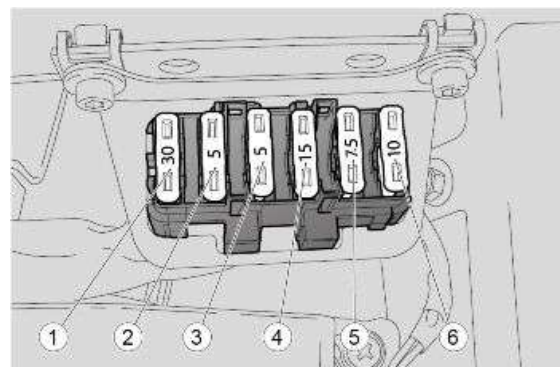
Specification	Desc./Quantity
Low/high beam light (halogen)	12 V - 55 W / 60 W H4
Front DRL	12 V - 5 W
taillight /stop lights	LED
Turn indicators	LED
Dashboard lighting	LED

BULBS (STONE)

Specification	Desc./Quantity
High beam/low beam light	LED
Front DRL	LED
taillight /stop lights	LED
Turn indicators	LED
Dashboard lighting	LED

Fuses**(HALOGEN)****FUSE DISTRIBUTION**

1. Main fuse, coil 1 and 2, fuel pump, injectors 1 and 2, lambda 1 and 2. (30 A).
2. (Battery positive) MIU G4 ECU, (battery positive) OBD2. (5 A).
3. (Battery positive) instrument cluster, turn indicators, anti-theft. (5 A).
4. ECU, instrument cluster, anti-fall sensor, start-up relay, injection load/ABS relay, clutch, start, anti-theft, canister. (15 A).
5. USB provision, bluedash provision, OBD2 provision, heated handles (if present). (7.5 A).
6. Low beam/high beam lights, passing, DRL/ position lights, stop, horn. (10 A).

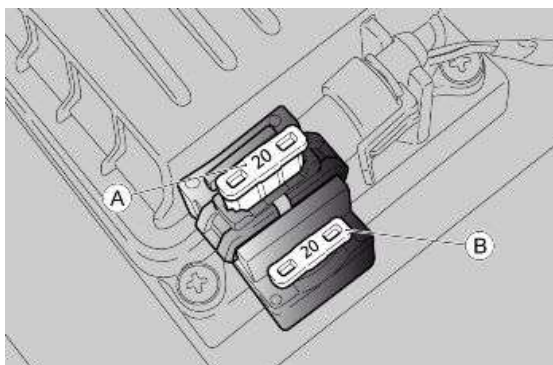
**(LED)****FUSE DISTRIBUTION**

1. Main fuse, coil 1 and 2, fuel pump, injectors 1 and 2, lambda 1 and 2. (30 A).
2. (Battery positive) MIU G4 ECU, (battery positive) OBD2. (5 A).
3. Instrument cluster permanent position, turn indicators, anti-theft. (5 A).
4. ECU, instrument cluster, anti-fall sensor, start-up relay, injection load/ABS relay, clutch, start, anti-theft, canister. (15 A).
5. USB provision, bluedash provision, OBD2 provision, heated handles (if present). (7.5 A).

6. Low beam/high beam lights, passing, DRL/
position lights, stop, horn. (10 A).

ABS FUSE LAYOUT

1. ABS ECU (20 A).
2. Spare fuse (20 A).



Battery

Function

Provide electrical supply, the battery is YUASA.

Level in electrical circuit diagram

Battery charge

Position

- on the vehicle: right side, under fairing
- connector: on the battery

Electrical specifications

- 12 V / 12 Ah

Pin-out:

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

Diagnostic tool - Parameters and statuses

- Battery voltage - (V) - (Example value
with key ON: 12.0 V, example value
with engine on: 14.2 V)

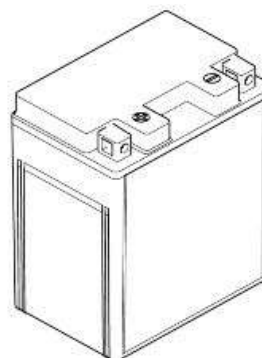
CAUTION

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

Diagnostics tool - Logic errors

Battery voltage P0560 - too high/too low

Error cause



- If too high: too high a voltage has been detected at PIN 9. If too low: too low a voltage has been detected at PIN 9. The instrument panel does not indicate the presence of this error even in the ATT status.

Troubleshooting

- If too high: verify correct operation of the alternator or voltage regulator.
- If too low: carry out the verification procedure for the alternator connector, the engine - vehicle cabling harness connector and the ECU 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, restore wiring harness; if OK, check correct operation of the electrical alternator; if it is not, replace it. If it is OK, replace the battery.

Speed sensor

FRONT SPEED SENSOR

Function

To indicate the vehicle speed by reading the front wheel turning speed

Operation / Operating principle

Magneto-resistive sensor: a square-wave pulse is generated with voltage approx. between 11.55 V and 11.25 V

Level in electrical circuit diagram

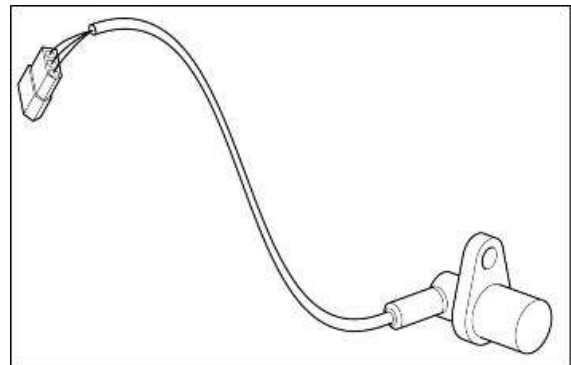
ABS system

Position

- On the fork, left stanchion, near the brake calliper mounting bracket

Pin-out

1. Ground (White)
2. Power supply voltage/Output signal (white/brown)



Diagnostic tool - Parameters and statuses

- Vehicle speed - (km/h)
- Front wheel speed - (km/h)

Diagnostic tool - Electrical errors

Electric malfunction 5D90

Error cause

- Electrically defective wiring or sensor

Troubleshooting

- Check the sensor connector and the ABS control unit connector. If they are not OK, restore the connectors. If they are OK, check continuity of the white/brown cable between PIN 2 of the sensor on the wiring harness side and PIN 14 of the ABS control unit connector. 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 the continuity of the white cable between PIN 1 of the sensor on the wiring harness side and PIN 13 of the ABS control unit connector. If there is no continuity, restore the wiring harness. If there is, replace the logic errors sensor.

Front wheel speed signal/sensor P0501 - signal not valid

Troubleshooting

- Connect to the ABS control unit diagnostics

Diagnostics tool - Logic errors

The signal changes irregularly 5D91

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.

The signal decreases periodically 5D92

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 tone 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.

Missing signal or speed measured too low in relation to the rear wheel 5D93

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

missing acceleration after pressure reduction 5D94Error 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.

Excessive speed detected 5D95Error 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

REAR SPEED SENSOR**Function**

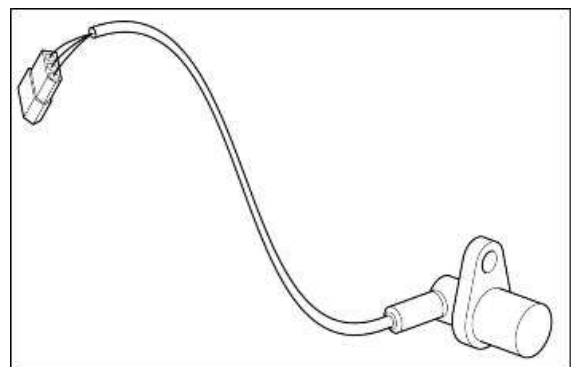
To indicate the vehicle speed by reading the rear wheel turning speed

Operation / Operating principle

Magneto-resistive sensor: a square-wave pulse is generated with voltage approx. between 11.55 V and 11.25 V

Level in electrical circuit diagram

ABS system

Position

- On the swingarm, left side, on the rear brake calliper support plate

Pin-out

1. Earth (Yellow)
2. Power supply voltage/Output signal (yellow/brown)

Diagnostic tool - Parameters and statuses

- Vehicle speed - (km/h)
- Rear wheel speed - (km/h)

Diagnostic tool - Electrical errors**Electrical malfunction 5DA0****Error cause**

- Electrically defective wiring or sensor

Troubleshooting

- Check the sensor connector and the ABS control unit connector; If it is not OK, restore the connectors; if it is OK, check continuity of the yellow/brown cable between sensor PIN 2 on the wiring harness side and PIN 11 ABS control unit connector; 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 12 of the ABS control unit connector if not OK, restore the wiring harness; if OK, replace the sensor

Rear wheel speed signal/sensor P2158 - signal not valid**Troubleshooting**

- Connect to the ABS control unit diagnostics

Diagnostics tool - Logic errors**The signal works irregularly 5DA1****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

The signal decreases periodically 5DA2**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 tone 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

No signal or speed measured too low in relation to the front wheel 5DA3**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

Missing acceleration after pressure reduction 5DA4**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

Excessive speed detected 5DA5**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

Function

It informs crankshaft position and speed to the Marelli 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

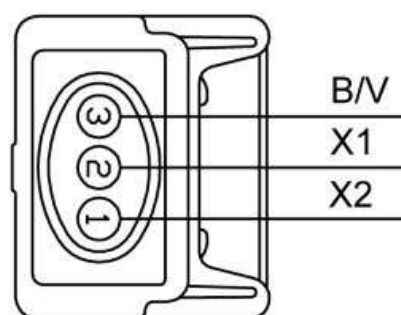
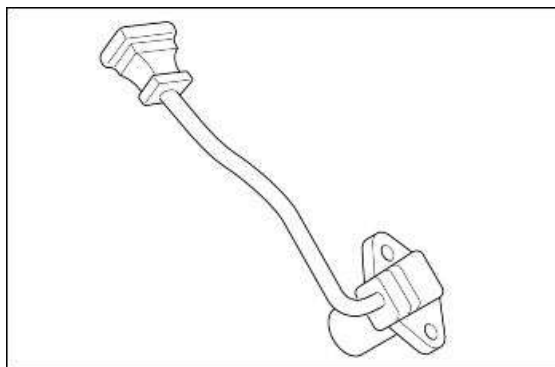
- Sensor: engine front left section, under the left cylinder
- Connector: under the fuel tank

Electrical specifications

- Winding resistance: $650 \Omega \pm 15\%$ Output alternating voltage, value range: minimum: 0.5 V - maximum 5 V

Pin-out

1. Engine revolution sensor positive signal (X2)
2. Engine revolution sensor negative signal (X1)
3. Engine speed sensor anti-jamming cable (blue/green)



Diagnostic tool - Parameters and statuses

- Engine speed - (rpm)
- Target engine revs - (rpm) (Parameter valid at idle, setting depends especially on engine temperature: the ECU unit will try to keep the engine running at this revs, acting on the ignition advance)

Diagnostic tool - Electrical errors

Engine revolution sensor P0335 - open circuit

Error cause

- Faulty wiring harness or engine revolution sensor (pick up)

Troubleshooting

- An interruption in the sensor circuit has been detected, from PIN 20 to PIN 29 of the control unit connector.
- Check the sensor connector and the injection ECU connector: If the values are incorrect restore them.
- If the values are correct, check the continuity of the two cables that go from PIN 20 to PIN 29 of the control unit connector; if not OK, restore the wiring harness; if OK, check the continuity of the sensor; replace it if not OK.

Installation

The gap width should be between 0.7 and 0.9 mm.

Engine revolution sensor P0336 - inconsistent signal

Error cause

- Possible false contact in the electric circuit detected at PIN 20 and 29 of the engine control unit connector

Troubleshooting

- Check the electric circuit is in good conditions and the flywheel teeth cleaning and correct positioning of the sensor in its own housing; if it is not, replace it. If it is OK, replace the sensor

Engine temperature sensor

Function

indicates the engine temperature to the control unit so as to optimise carburetion and idle control

Operation / Operating principle

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

Level in electrical circuit diagram

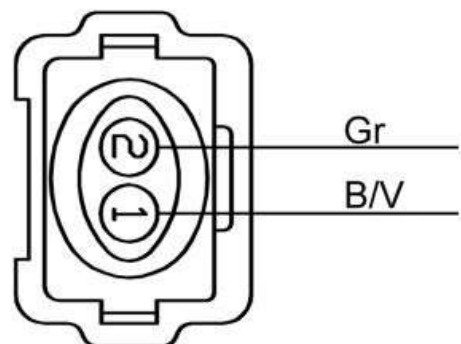
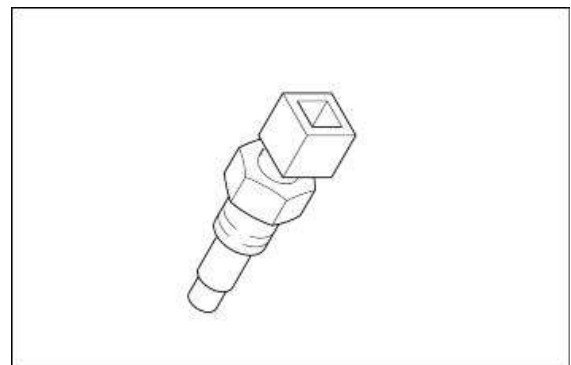
Temperature sensors

Position

- On the right head, towards the inside of the "V" of the engine
- Connector: on the sensor

Electrical specifications

- Resistance at 0°C: $9.75 \text{ k}\Omega \pm 5\%$
- Resistance at 20°C: $3.747 \text{ k}\Omega \pm 5\%$
- Resistance at 40°C: $1.598 \text{ k}\Omega \pm 5\%$
- Resistance at 60°C: $0.746 \text{ k}\Omega \pm 5\%$



- Resistance at 80°C: 0.377 kΩ ± 5%
- Resistance at 100°C: 0.204 kΩ ± 5%

Pin-out

- 0-5 V signal (grey wiring harness side)
- Ground (blue/green wiring harness side)

**Diagnostic tool - Parameters and statuses**

- Engine temperature - (°C)

Diagnostic tool - Electrical errors

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

Error cause

- Short-circuit to positive or open circuit: interruption of the circuit or excessive voltage at PIN 13 of the control unit connector
- Short-circuit to negative: zero voltage between PIN 13 and 15 of the control unit connector

Troubleshooting

Short-circuit to positive:

- With the sensor connector and the control unit disconnected, verify that the fault is shorted with the battery positive of sensor connector PIN 2 (or control unit PIN 13) and restore the wiring harness.

Open circuit:

- Disconnect the connector of the control unit.
- Measure the resistance value of the sensor at different temperatures between PIN 13 and 15.
- Disconnect the sensor connector.
- Verify continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 13 - sensor PIN 2 and control unit PIN 15 - sensor PIN 1. If necessary, restore the wiring harness.
- If the wiring harness is intact but the sensor resistance value is incorrect, this means that the sensor is faulty and must be replaced, otherwise proceed with the checks.

Short-circuit to negative:

- Disconnect the sensor connector.
- Check the sensor connector PIN 2 ground insulation.
- If there is no ground insulation restore the wiring harness.

- If PIN 2 is insulated from the ground and the error persists, this means that there is a probable fault in the control unit.

Lambda sensor

Function

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

Operation / Operating principle

The Marelli injection control unit reads and interprets a voltage generated by the difference in oxygen content between the exhaust fumes and the ambient. 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

RIGHT LAMBDA

Level in electrical circuit diagram

Lambda probe

Position

- Sensor: right exhaust pipe
- Connector: near the throttle body right side

Electrical specifications

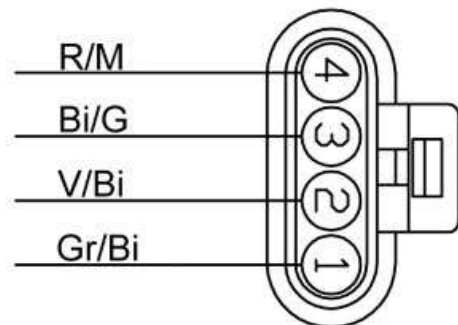
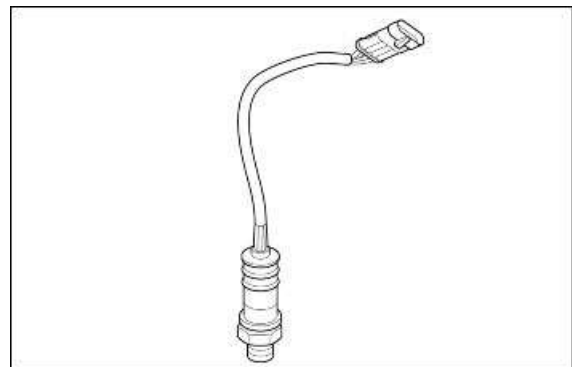
- Heater circuit: 12 -14 Ω at 20 °C (68 °F)

Pin-out

1. Positive signal sensor (grey/white)
2. Negative signal sensor (green/white)
3. Heater ground (white/yellow)
4. Heater power (red/brown cable)

Diagnostic tool - Parameters and statuses

- Oxygen sensor voltage RH - (mV)
- Right lambda probe - (---, Not enabled, Not active (start), Not active (heat.), Not active (rich), Operating, Not active (lean), Fault



Diagnostic tool - Activation

- Lambda probe heater 2

Diagnostic tool - Electrical errors

Control of the air-fuel ratio / Right lambda probe P0150 - positive short circuit / open circuit, short circuit to negative / signal not valid.

Error cause

- Short-circuit to positive: excessive voltage at PIN 18 or PIN 12 of the control unit connector.
- Open circuit or short-circuit to negative: interruption of the circuit or null voltage between control unit connector PIN 18 and 12

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 1 (corresponding to control unit connector PIN 18); 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 12); if there is a short, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Verify continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 18 - sensor PIN 1 and control unit PIN 12 - sensor PIN 2. If necessary, restore the wiring harness.
- 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. In the absence of insulation restore the wiring harness.
- Check the sensor connector PIN 2 ground insulation. In the absence of 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.

Lambda probe heater P0155 - short circuit to positive / open circuit / short circuit to negative.

Error cause

- Short-circuit to positive: excessive voltage at PIN 2 of the control unit connector.
- Short-circuit to negative: lack of insulation from ground on the sensor connector PIN 4
- Open circuit: circuit interruption.

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 3 (corresponding to control unit connector PIN 2); if there is a short, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Verify continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 2 - sensor PIN 3. If necessary, restore the wiring harness.
- Verify continuity of the wiring harness between the sensor connector and the injection relay: sensor PIN 4 - injection relay PIN 3. If necessary, restore the wiring harness.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Short-circuit to negative:

- Disconnect the sensor connector.
- Check the sensor connector PIN 3 ground insulation. In the absence of insulation restore the wiring harness.
- If PIN 3 is insulated from ground and in the absence of other errors (fuel pump, injector, coil), this means that the control unit is most likely faulty.

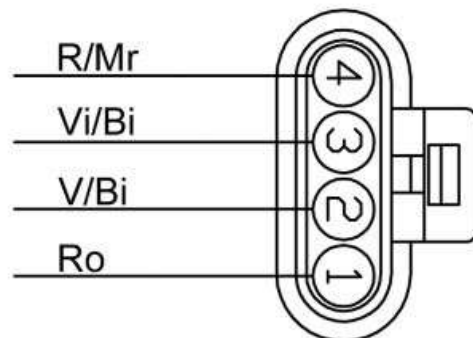
LEFT LAMBDA

Level in electrical circuit diagram

Lambda probe

Position

- Sensor: left exhaust pipe
- Connector: adjacent to the filter box, left side



Electrical specifications:

- Heater circuit: 12 -14 Ω at 20 °C (68 °F)

Pin-out

1. Positive sensor signal (pink)
2. Negative signal sensor (green/white)
3. Heater ground (violet/white)
4. Heater power (red/brown cable)

Diagnostic tool - Parameters and statuses

- Oxygen sensor voltage LH - (mV)
- Left lambda probe - (---, Not enabled, Not active (start), Not active (heat.),

Not active (rich), Operating, Not active
(lean), Fault

Diagnostic tool - Activation

- Lambda probe heater 1

Diagnostic tool - Electrical errors

Control of the air-fuel ratio / Left lambda probe P0130 - positive short circuit / open circuit, short circuit to negative / signal not valid.

Error cause

- Short-circuit to positive: excessive voltage to PIN 11 or PIN 12 of the control unit connector
- Open circuit or short-circuit to negative: interruption of the circuit or null voltage between control unit connector PIN 11 and 12

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 1 (corresponding to control unit connector PIN 11); 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 12); if there is a short, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Verify continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 11 - sensor PIN 1 and control unit PIN 12 - sensor PIN 2. If necessary, restore the wiring harness.
- 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. In the absence of insulation restore the wiring harness.
- Check the sensor connector PIN 2 ground insulation. In the absence of 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.

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

Error cause

- Short-circuit to positive: excessive voltage at PIN 31 of the control unit connector
- Short-circuit to negative: lack of insulation from ground on the sensor connector PIN 4

- Open circuit: circuit interruption.

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 3 (corresponding to control unit connector PIN 31); if there is a short, restore the wiring harness.

Short-circuit to negative:

- Disconnect the sensor connector.
- Check the sensor connector PIN 3 ground insulation. In the absence of insulation restore the wiring harness.
- If PIN 3 is insulated from ground and in the absence of other errors (fuel pump, injector, coil), this means that the control unit is most likely faulty.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Verify continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 31 - sensor PIN 3. If necessary, restore the wiring harness.
- Verify continuity of the wiring harness between the sensor connector and the injection relay: sensor PIN 4 - injection relay PIN 3. If necessary, restore the wiring harness.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Injector

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

RIGHT INJECTOR

Level in electrical circuit diagram

Coils and injectors

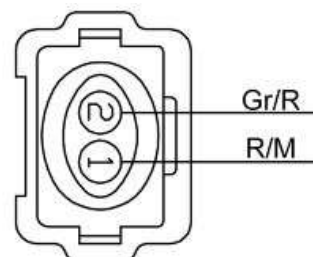
Right injector position

- On the intake manifold
- Connector: on injector

Electrical specifications

- 14.8 Ohm +/- 5% (at 20 °C - 68 °F)

Pin-out



1. Power 12V (red/brown)
2. Ground (grey/red)

Diagnostic tool - Parameters and statuses

- Injection time cyl. RH - (ms)

Diagnostic tool - Activation

- Right injector
- Injector control

Diagnostic tool - Electrical errors

Front injector P0202 - shorted to positive / shorted to negative / open circuit.

Error cause

- Short-circuit to positive: excessive voltage at PIN 32 of the control unit connector
- Short-circuit to negative: zero voltage at PIN 1 of the right injector connector
- Open circuit: circuit interruption

Troubleshooting

Short-circuit to positive:

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

Short-circuit to negative:

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

Open circuit:

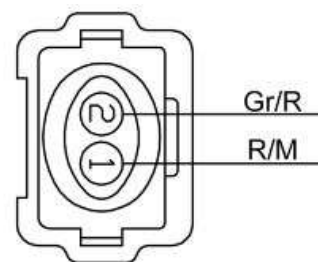
- Carry out the check procedure of the right injector and control unit connectors.
- Verify continuity of the wiring harness between the control unit connector and the right injector connector (control unit PIN 32 - right injector PIN 2). In the absence of continuity restore the wiring harness.

LEFT INJECTOR**Level in electrical circuit diagram:**

Coils and injectors

Left injector position:

- On the intake manifold
- Connector: on injector



Electrical specifications

- 14.8 Ohm +/- 5% (at 20 °C - 68 °F)

Pin-out:

1. Power 12V (red/brown)
2. Ground (grey/black)

Diagnostic tool - Parameters and statuses

- Injection time cyl. LH - (ms)

Diagnostic tool - Activation

- Left injector
- Injector control

Diagnostic tool - Electrical errors

Left injector P0201 - shorted to positive / shorted to negative / open circuit.

Error cause

- Short-circuit to positive: excessive voltage at PIN 34 of the control unit connector
- Short-circuit to negative: zero voltage at PIN 1 of the left injector connector
- Open circuit: circuit interruption

Troubleshooting

Short-circuit to positive:

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

Short-circuit to negative:

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

Open circuit:

- Carry out the check procedure of the left injector and control unit connectors.
 - Verify continuity of the wiring harness between the control unit connector and the left injector connector (control unit PIN 34 - left injector PIN 2). In the absence of continuity restore the wiring harness.
-

Fuel pump

Function

Fuel pump: keeps pressure of the injectors supply duct.

Low fuel: tells to the instrument panel 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

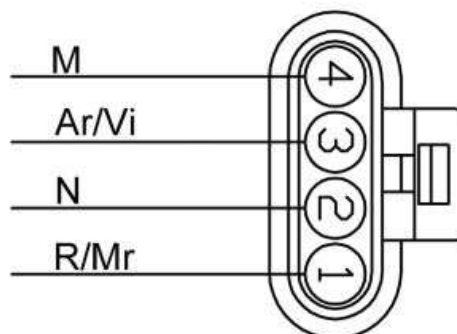
Level in electrical circuit diagram

Injection load solenoid

Low fuel and oil pressure

Position

- On the vehicle: on the tank.
- Connector: on the front left part of the bike, under the fuel tank.



Fuel pump pin-out and fuel reserve sensor

1. Power 12V (red/brown)
2. Ground (black)
3. Positive signal to instrument panel (orange/violet)
4. Ground (brown)

CAUTION

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 - Activation

- Fuel pump

Diagnostic tool - Electrical errors

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

Error cause

Short-circuit to positive:

- Excessive voltage to PIN 22 of the control unit connector.

Short-circuit to negative:

- null voltage at PIN 2 of the injection loads relay.

Open circuit:

- Circuit interruption.

Troubleshooting

Short-circuit to positive:

- Disconnect the injection loads relay (No. 28 on the electrical circuit diagram), turn the key to the ON position and activate the injection loads relay through the diagnostic tool.
- Verify the presence of voltage between injection loads relay connector PIN 1 and 2 toward the wiring harness.
- If no voltage is read, disconnect the control unit and verify insulation from battery positive of the injection loads relay PIN 1 (or control unit PIN 22). If necessary, restore the wiring harness.

Short-circuit to negative:

- Disconnect the injection loads relay (No. 28 on the electrical circuit diagram) and the control unit.
- Verify ground insulation of the injection loads relay connector PIN 1 and 2 toward the wiring harness: if there is no insulation, restore the wiring harness.

Open circuit:

- Disconnect the injection loads relay (No. 28 on the electrical circuit diagram) and the control unit.
- Verify continuity of the wiring harness between the injection loads relay and control unit: Injection loads relay PIN 1 - control unit PIN 22. If necessary, restore the wiring harness.

Coil

Function

It controls the ignition spark plug in order to generate the fuel ignition spark.

Operation / Operating principle

Inductive discharge system.

LEFT COIL

Level in electrical circuit diagram

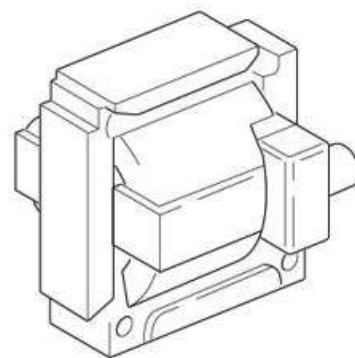
Coils and injectors

Position

- Centred under the fuel tank.
- Connector: on the coil.

Electrical specifications

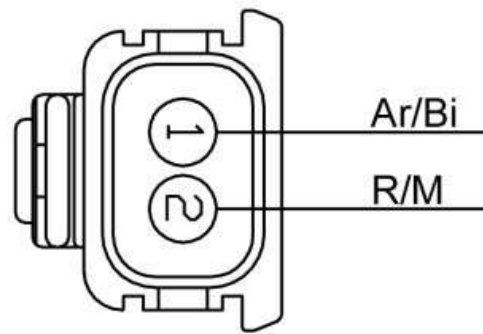
- Primary winding resistance: $550\text{ k}\Omega \pm 10\%$



- Secondary winding resistance: $3\text{ k}\Omega \pm 10\%$
- Tube resistance $5\text{ k}\Omega$

Pin-out

1. Circuit ground (orange/white)
2. Power supply (red/brown)

**Diagnostic tool - Activation**

- Left coil
- Coil command

Diagnostic tool - Electrical errors

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

Error cause

- Short-circuit to positive: excessive voltage at PIN 1 of the control unit connector
- Open circuit or short-circuit to negative: interruption of the circuit or zero voltage at PIN 1 of the control unit connector

Troubleshooting

Short-circuit to positive:

- Disconnect the left coil connector, turn the key to ON and activate the component through the diagnostic tool.
- Verify the presence of voltage on the left coil connector PIN 1: if present, restore the wiring harness, otherwise replace the left coil.

Open circuit:

- Carry out the check procedure of the left coil and control unit connectors.
- Verify continuity of the wiring harness between the left coil and control unit: Left coil PIN 1 - control unit PIN 1. In the absence of continuity restore the wiring harness.
- Verify, with the key turned ON, the presence of voltage on the left coil connector PIN 2. If no voltage is read, verify the continuity of the wiring harness between left coil and injection loads relay (No. 28 on the electrical circuit diagram): Left coil PIN 2 - injection loads relay PIN 3.
- If the above tests provided a positive result, the left coil should be replaced.

Short-circuit to negative:

- Disconnect the control unit connector and the left coil connector.
- Verify the left coil connector PIN 1 ground insulation (or control unit connector PIN 1). If necessary, restore the wiring harness.

RIGHT COIL**Level in electrical circuit diagram**

Coil 2 (right cylinder)

Position

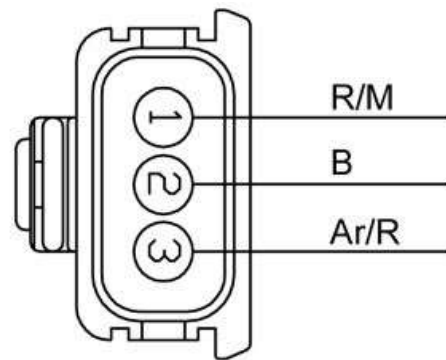
- Centred under the fuel tank.
- Connector: on the coil.

Electrical specifications

- Primary winding resistance: $550\text{ k}\Omega \pm 10\%$
- Secondary winding resistance: $3\text{ k}\Omega \pm 10\%$
- Tube resistance $5\text{ k}\Omega$

Pin-out

1. Power supply (red/brown)
2. Power ground 2 (blue)
3. Circuit ground (orange/red)

**Diagnostic tool - Activation**

- Right coil
- Coil command

Diagnostic tool - Electrical errors**H.V. Coil P0352** - shorted to positive / open circuit or short-circuit to negative.**Error cause**

- Short-circuit to positive: excessive voltage at PIN 8 of the control unit connector
- Open circuit or short-circuit to negative: interruption of the circuit or zero voltage at PIN 8 of the control unit connector

Troubleshooting

Short-circuit to positive:

- Disconnect the right coil connector, turn the key to ON and activate the component through the diagnostic tool.
- Verify the presence of voltage on the right coil connector PIN 3: if present, restore the wiring harness, otherwise replace the right coil.

Open circuit:

- Carry out the check procedure of the right coil and control unit connectors.
- Verify continuity of the wiring harness between the right coil and control unit: Right coil PIN 3 - control unit PIN 8. In the absence of continuity restore the wiring harness.

- Verify, with the key turned ON, the presence of voltage on the right coil connector PIN 1. If no voltage is read, verify the continuity of the wiring harness between right coil and injection loads relay (No. 28 on the electrical circuit diagram): Right coil PIN 1 - relay PIN 3.
- If the above tests provided a positive result, the right coil should be replaced.

Short-circuit to negative:

- Disconnect the control unit connector and the right coil connector.
- Verify the right coil connector PIN 3 ground insulation (or control unit connector PIN 8). If necessary, restore the wiring harness.

Neutral sensor

Function

Indicates the gear position to the instrument panel:
if it is in neutral or in gear

Operation / Operating principle

For neutral gear, the circuit is closed to ground connection: the instrument panel turns on the neutral warning light

Level in electrical circuit diagram

Neutral sensor

Position

- Sensor: rear / upper side of the gear-box
- Connector: on the sensor

Electrical specifications

- Gear in neutral: closed circuit (0 V on wire from control unit to sensor / switch in continuity).
- Gearshift engaged: open circuit (12 V on the wire from control unit to sensor)

Pin-out:

1. Voltage 12V (green/black)

Diagnostic tool - Parameters and statuses

- Gear in neutral - (YES, NO)

Diagnosis

Warning light "N" always off

Error cause



- Possible malfunction

Troubleshooting

- Carry out the check procedure on the green/black sensor/control unit cable.
- Restore if damaged.
- If OK, with the transmission in neutral, check for continuity to ground of the sensor connector.
- If there is no continuity, replace the sensor.
- Restore if damaged.
- If OK, check continuity.
- If there is no continuity, restore the wiring harness.
- If OK, replace the instrument panel if the vehicle performs properly.

Warning light "N" always on

Error cause

- Possible malfunction

Troubleshooting

- Disconnect the terminals from the sensor and verify that, with the transmission in gear, there is continuity with the ground.
- If there is continuity, replace the sensor.
- If there is no continuity this means that there is a short to ground of the green black cable which goes to PIN 3 of the control unit, therefore restore the wiring harness.
- If there is no continuity, restore the wiring harness.
- If there is no continuity, replace the wiring harness.

Clutch lever sensor

Function

Indicates the clutch lever position to the control unit

Operation / Operating principle

In order to start the engine, pull the clutch also with the gear in neutral

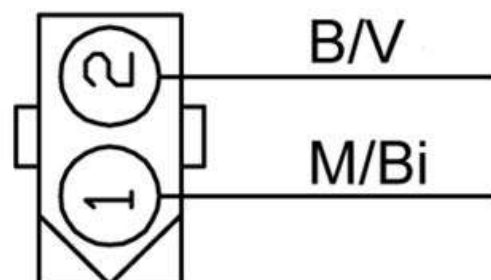
Level in electrical circuit diagram

Start enable.

Position

- sensor: under clutch lever
- Connector: under the fuel tank on right side

Electrical specifications



- Clutch pulled: closed circuit (continuity)
- Clutch released: open circuit (infinite resistance)

Pin-out

1. 12 V Voltage (brown/white)
2. Ground (blue/green)

Diagnostic tool - Parameters and statuses

- Clutch - (Pulled, Released)

Diagnosis

Even with the clutch lever pulled, the vehicle does not start

Error cause

- Possible malfunction

Troubleshooting

- Verify that, if a gear is engaged, the stand is up.
- If it is up, check continuity of the brown/white cable and control unit PIN 14.
- If there is no continuity, restore the wiring harness.
- If there is continuity, disconnect the sensor and, with the clutch pulled, check for continuity between the two sensor PINs.
- If absent, replace the sensor.
- If present, check for continuity of the blue/green cable between the sensor and control unit PIN 15.
- If absent, restore the wiring harness.

The vehicle starts even without pulling the clutch lever

Error cause

- Possible malfunction

Troubleshooting

- Disconnect the terminals from the sensor and check that, with the clutch released, there is continuity between the two PINs.
 - If there is continuity, replace the sensor.
 - If there is no continuity, this means that the blue/green cable which goes from the sensor PIN 2 to the control unit PIN 15 is shorted to ground.
-

Side stand sensor

Function

Indicates the side stand position to the control unit

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-up enabling switches

Position

- Sensor: on side stand supporting plate
- Connector: left side, near the starter motor

Electrical specifications

- Side Stand Up: closed circuit (continuity)
- Side Stand Down: open circuit (infinite resistance)

Pin-out

1. Ground (blue/green)
2. 12 V voltage (grey/yellow)

Diagnostic tool - Parameters and statuses

- Side stand - (Up, Down)

Diagnosis

The vehicle with clutch pulled, gear engaged and side stand retracted does not start (side stand switch always open)

Error cause

- Possible malfunction

Troubleshooting

- verify continuity of the grey/yellow cable between the sensor and PIN 19 of the control unit.
- If absent, restore the wiring harness, if present, with the stand up, check for continuity between the two PINs on the sensor. If absent, replace the sensor. If present, check for continuity to ground of the blue/green cable on the wiring harness side connector.

The vehicle, with clutch operated and gear engaged, starts but with the side stand extended

Error cause



- Possible malfunction

Troubleshooting

- disconnect the sensor connector and check that, with side stand extended, there is not continuity between the two PINS.
- If present, replace the sensor. If absent, disconnect from control unit PIN 19 and check insulation from the ground of the grey/yellow cable between sensor and control unit.

Bank angle sensor

Function

It tells the vehicle position to the control unit

Operation / Operating principle

The sensor operates by sending an engine stop signal to the control unit, in cases where the vehicle detects an inclination greater than $\sim 60^\circ$ (for example, due to slips or falls)

Level in electrical circuit diagram

Start-up enabling switches

Position

- On the vehicle: under the tank.
- Connector: near the sensor.

Pin-out

1. /
2. Ground (blue/green)
3. Power supply (grey/green)
4. Signal/consent (grey/sky blue)

Diagnostic tool - Parameters and statuses

- Tipping sensor - (Engine inhibited, Gear allowed, YES, Lean, Rich, Rich title, Error, Lean title)

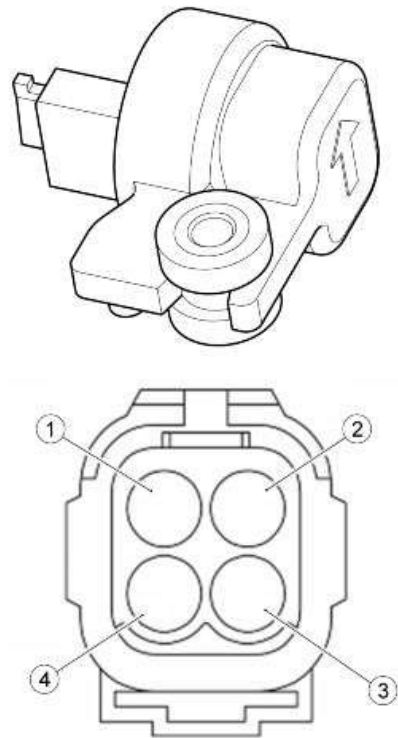
CAUTION

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.

Diagnosis

The engine stop button is in "ON" but its status remains in "OFF"

Error cause



- Possible malfunction caused by the fall sensor or RUN-STOP switch

Troubleshooting

- See diagnosis "RUN-STOP switch", if not ok check the correct status of the fall sensor

SAS valve actuator

Function

Improves the reaction of oxide, reduction after combustion

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 valve

Position:

- on the vehicle: under the fuel tank, in the middle of the "V" of the engine, attached to the chassis
- connector: on the valve

Electrical specifications

- Resistance at ambient temperature: 21
+3/- 1 Ω

Pin-out

1. Power supply (red/brown)
2. Ground (black/white)

Diagnostic tool - Parameters

- Example value with key ON: 0 %
- Example value with engine on: %

Used only at 0 or 100%

CAUTION

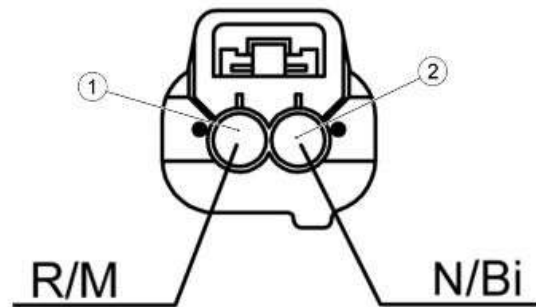
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Diagnostic tool - Activation

- EV secondary air system

Diagnostics tool - Logic errors

Error cause



- Possible malfunction

Troubleshooting

- Disconnect the connector and check the resistance between PIN of the valve connector; if the resistance value is close to 10-20 Ω the valve is ok, if the value of the resistance is equal to 0 it can be said that there is a short circuit on the valve, instead if there is a resistance equal to a ∞ this means that inside the valve occurs an open circuit; in both cases it is necessary to replace the valve

Secondary air valve P0410 - shorted to positive / shorted to negative / open circuit

Error cause

- Short-circuit to positive: excessive voltage measured at PIN 24 of the engine control unit
- If shorted to negative/open circuit: no voltage has been detected. The instrument panel does not indicate the presence of this error even in the ATT status.

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 wiring 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 they are 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 at PIN 1: if there is not voltage, check red/brown cable; if there is voltage, check component electrical characteristics and replace the component

RUN/STOP switch

Function

Indicates the control unit if the rider wishes to enable engine start-up or to keep the engine running

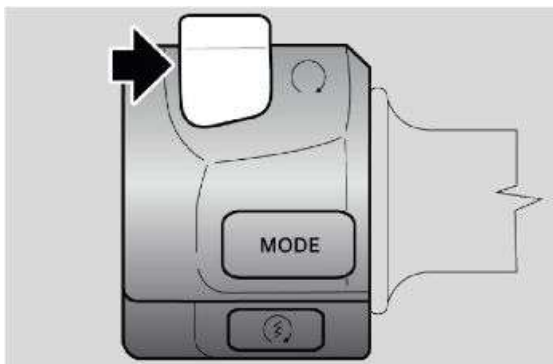
Operation / Operating principle

If the driver wants to shut off the engine or to disable engine start-up, the switch should be open, i.e. the Marelli control unit should not detect voltage at PIN 4 of the control unit connector

Level in electrical circuit diagram

Start-up enabling switches

Position



- Sensor: right light switch
- Connector: next to the headstock, right side

Electrical specifications

- STOP position: open circuit
- RUN position: closed circuit (continuity)

Pin-out

1. Voltage 0 V with engine kill in STOP; 12V if engine kill in RUN (pink/yellow cable)
2. Always voltage 12 V (with key on) (red/yellow cable)

Diagnostic tool - Parameters and statuses

- RUN/OFF Switch - (RUN-OFF)

Diagnosis**Engine does not start****Error cause**

- Possible malfunction

Troubleshooting

- Disconnect the connector and check, with the switch set to RUN, that there is continuity between the two grey/light blue and red/grey cables (sensor side); If not ok, replace the sensor; if ok, check the connector; if not ok, restore the wiring harness; if ok, check, with key set to ON, if there is voltage on Yellow/Red cable (wiring harness side). If not ok, restore the wiring harness; if ok, check the red/yellow cable ground insulation (wiring harness side); If there is continuity with ground connection, restore the wiring harness; if it is OK, set the key to KEY OFF and check the engine control unit connector; if it is OK, replace the engine control unit

Engine does not shut off with switch in "STOP"**Error cause**

- Possible malfunction

Troubleshooting

- Disconnect the connector and verify, with the switch set to STOP, that there is continuity between the two grey/light blue and red/grey cables (sensor side). If present, replace the switch; if absent this means that, with the key ON, the pink/yellow cable shorts to positive; if not OK, restore the wiring harness; if OK, replace the engine control unit
-

Connectors

ECU

Function

It manages injection/ignition, the system safety checks and the self-diagnosis function. The control unit is Magneti Marelli MIU G4

Level in electrical circuit diagram

Secondary air system

Bluedash pre-installation

Antitheft device

ABS system

Diagnosis

Low beam and running lights logic

High-beam lights logic

CAN Line

Temperature sensors

Lambda probe

Neutral sensor

Engine speed sensor

Coils and injectors

Injection loads relay

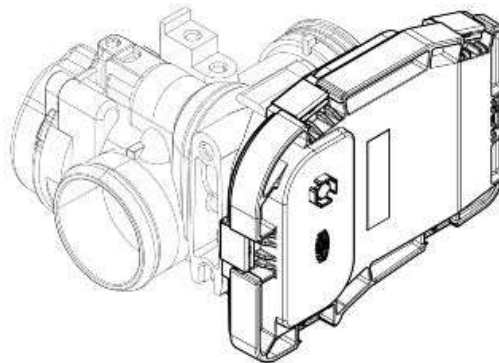
ECU base power circuit

Starting

Start enable switches

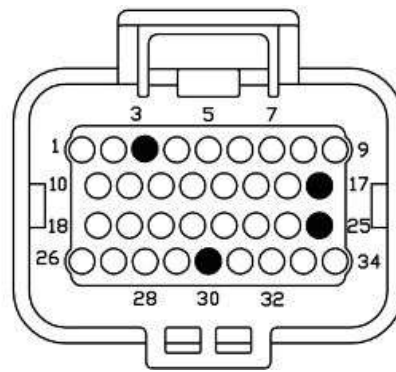
Position

- on the vehicle: under the tank, near the battery
- connector: on the control unit from 34 PIN



Pin-out

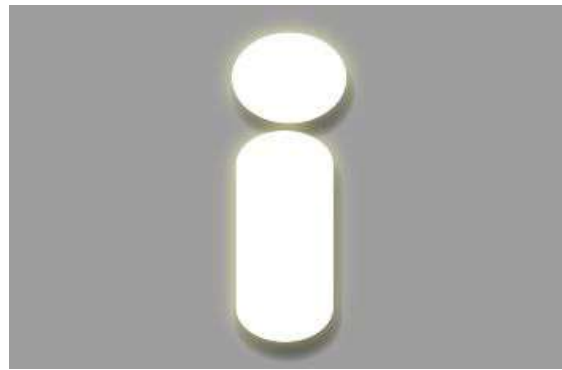
1. Left coil command output (1)
2. Right Lambda heater command output (2)
3. -
4. Run-off control input
5. Start button inlet
6. Ignition switch positive
7. Ground 1 (-)
8. Right coil command output (2)
9. Battery positive 12V
10. Starter motor relay command output
11. Left lambda probe positive signal (1)
12. Left lambda probe negative signal (1)
13. Temperature sensor input
14. Clutch switch signal
15. External sensor ground
16. Right lambda probe negative signal (2)
17. -
18. Right lambda probe positive signal (2)
19. Side stand switch and fall sensor input
20. Engine revolution sensor negative signal
(pick up)
21. Gearbox in neutral sensor
22. Injection relay command output
23. Ground 2 (power)
24. Secondary air system control
25. -
26. CAN H line
27. CAN L line
28. Canister
29. Engine revs positive signal (pick up)
30. -
31. Left Lambda heater command output (1)
32. Right injector command output (2)
33. Lights relay command output
34. Left injector command output(1)



Diagnostic tool - Control unit info screen page

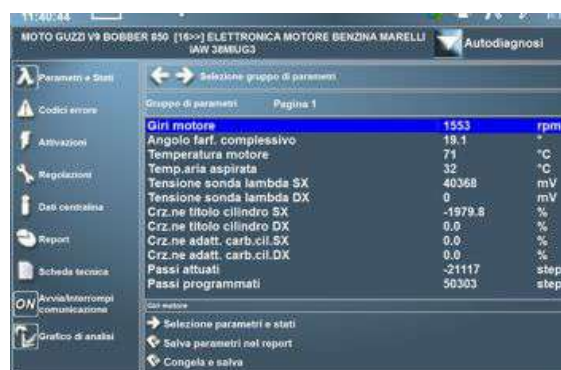
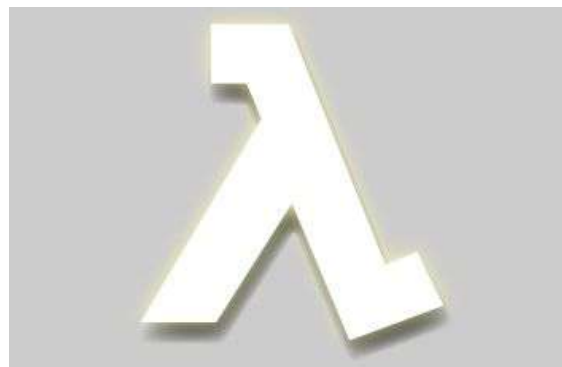
In this screen page are read the general data regarding the control unit, for example: type of software, mapping, control unit programming data

- ISO code
- Drawing number (identification inserted by manufacturer)
- HW number (hardware number)
- SW ver. (software version)
- Approval number
- Author last progr. (author of the last programming)
- HW MM version (hardware MM version)
- Mapping (indicates the mapping number)
- Manufacturing data (control unit manufacturing data)
- Programming data (control unit programming data)
- NIP code

**Diagnostic tool - Parameters and statuses**

This screen page shows the parameters measured by the several sensors (engine revs, engine temperature, etc.) or values set by the control unit (injection time, ignition advance); in addition to the parameters in this screen page, are also shown the status of the vehicle devices or the operation condition of some vehicle systems (for example, lambda probe functioning status)

- Engine speed - (rpm)
- Complete throt. angle - (°)
- Engine temperature - (°C)
- Intake air temperature - (°C)
- Oxygen sensor voltage LH - (mV)
- Oxygen sensor voltage RH - (mV)
- Corr. title cylinder LH - (%)



- Corr. title cylinder RH - (%)
- Corr. title carb. cyl. LH - (%)
- Corr. title carb. cyl. RH - (%)
- Steps carried out - (step)
- Programmed steps - (step)
- Advance cylinder LH - (°)
- Advance programmed - (°)
- Advance cylinder RH - (°)
- Injection time cyl. LH - (ms)
- Injection time cyl. RH - (ms)
- Atmospheric pressure - (mbar)
- Intake pressure - (mbar)
- Battery voltage - (V)
- Minimum target revs - (rpm)
- Throttle valve equiv. stepper - (°)
- Vehicle speed - (km/h)
- Ctrl title cylinder LH - (Open Loop, Closed Loop, Not allowed, Ecu universal code, ---, Recovery, Fault, Key not OK, Timeout)
- Lean title cyl. LH - (NO, YES)
- Rich title cyl. LH - (NO, YES)
- Right lambda probe - (---, Not enabled, Not active (start), Not active (heat.), Not active (rich), Operating, Not active (lean), Fault)
- Left lambda probe - (---, Not enabled, Not active (start), Not active (heat.), Not active (rich), Operating, Not active (lean), Fault)
- Ctrl title cylinder RH - (Open Loop, Closed Loop)
- Lean title cyl. RH - (NO, YES)
- Rich title cyl. RH - (NO, YES)
- Idle motor - (start ready, Open Loop, Closed Loop, delayed start, accelerated start, Minimum compensated, Stable out of min., Minimum, Acceler-

ation, Deceleration, Cut-off, Restore Cut-off)

- Throttle valve status - (---, Minimum, Full power, partial position)
- Engine status - (Undetermined, PowON/Engine off, KeyON/engine off, Rotation, Engine Stall, Pwr latch in progress, Pow.Latch Term, Stop, Synchronis. 4 strokes)
- Engine mode - (Undetermined, Start, Stabilised, delayed start, accelerated start, Minimum compensated, Stable out of min., Minimum, Acceleration, Deceleration, Cut-off, Restore Cut-off)
- Synchronised panel - (NO, YES, Partially, ---, Error)
- 4Stroke cycle - (Not synchronised, Synchronised)
- Starting request - (Absent, Present, Closed Loop, Closed)
- Start enable - (NO, YES)
- RUN/OFF Switch - (RUN-OFF)
- Tipping sensor - (Engine inhibited, Gear allowed, YES, Lean, Rich, Rich title, Error, Lean title)
- Side stand - (Up, Down)
- Gear in neutral - (YES, NO)
- Clutch - (Pulled, Released)
- Front wheel speed - (km/h)
- Rear wheel speed - (km/h)
- Traction control (MGCT) - (Disabled, Enabled, Complete, Lean, Rich, Operating)
- Number of enabled keys - (.)
- Previously unused Ecu - (NO, YES)
- Start enabled - (NO, YES)
- Previously unused Ecu-universal c. - (NO, YES)

- Unlock with gas - (NO, YES)
- Key or antenna faulty - (NO, YES)
- Wrong code - (NO, YES)
- Communication timeout - (NO, YES)

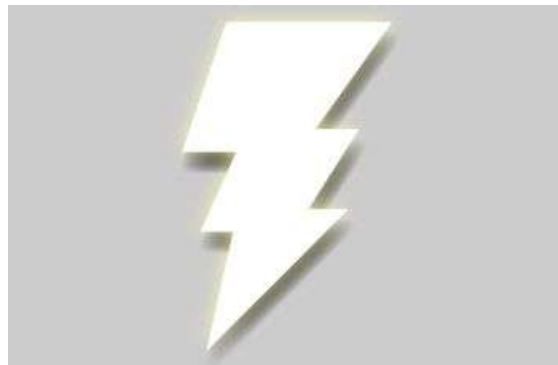
CAUTION

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 - Activation

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

- Left coil
- Right coil
- Left injector
- Right injector
- Stepper control
- MGCT warning light
- Lambda probe heater 1
- Lambda probe heater 2
- Injector control
- Headlights relay
- Stepper
- Coil command
- Fuel pump
- General warning light
- Secondary air EV

**Diagnostic tool - Errors screen page**

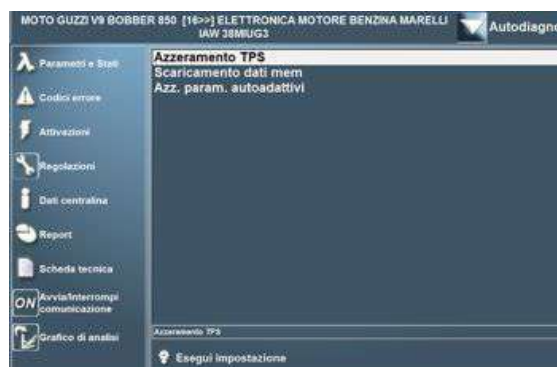
This display shows potential errors detected in the vehicle (ATT) or stored in the control unit (MEM) and it allows to check error clearing (STO).



Diagnostic tool - Adjustment

This screen page is used to adjust some control unit parameters

- Resetting
- Downloading Mem Data
- Self-adaptive parameters reset

**Diagnostic tool - Electrical errors**

Air pressure sensor P0105 - short circuit to positive / open circuit, short circuit to negative, signal not valid

Error cause

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

Air temperature sensor P0110 - short circuit to positive, open circuit / short circuit to negative

Error cause

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

Error EEPROM P0601 - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

Error RAM P0604 - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

Error ROM P0605 - circuit not workingError cause

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

Troubleshooting

- Replace the engine control unit

Saved data file (for safety) P1607 - filledError cause

- This indication appears only if the Level 2 safety has reset the engine (C gravity). The instrument panel does not indicate the presence of this error even in the ATT status.

Troubleshooting

- Replace the engine control unit
-

Sensor potentiometer throttle valve position P0120 - short circuit to positive, open circuit / short circuit to negative

Cause of error

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

Diagnostic tool - AdjustmentThrottle positioner autodetection

- It allows the control unit to detect the closed throttle position; just press the Enter key

Reset of self-adaptive parameters

- operation to be carried out after the throttle body is cleaned or in the case a new engine, a new lambda probe or a new injector is fitted, or the correct operation of the injection system or the valves is restored.

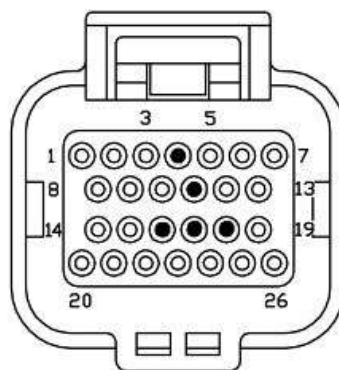
Diagnostic tool - Reset

- Once the throttle body or the injection control unit is replaced, it is necessary to connect to the diagnostic tool selecting FUEL INJECTION and carry out the operation "THROTTLE POSITIONER AUTODETECTION"
-

Dashboard

PIN:

1. CAN H line
2. High beam warning light inlet
3. Engine oil pressure sensor inlet
4. /
5. ABS Warning light control inlet
6. Ground lead
7. Ground lead
8. CAN L line
9. Instrument panel backlighting control inlet (DRL)
10. Fuel sensor inlet
11. /
12. Inlet (hazard)
13. Sensors ground
14. /
15. Air temperature input
16. /
17. /
18. /
19. Instrument panel power supply (+ 12V)
20. /
21. Key-on positive (+ key)
22. RH front turn indicator control
23. RH rear turn indicator control
24. LH front turn indicator control
25. LH Rear turn indicator control
26. Instrument panel power supply (+ 12V)



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 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 8 instrument cluster and PIN 27 injection control unit and between PIN 1 instrument cluster and PIN 26 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 8 instrument cluster and PIN 27 injection control unit and between PIN 1 instrument cluster and PIN 26 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 8 instrument cluster and PIN 4 left light switch; if not OK restore, if OK check the integrity and the continuity between PIN 1 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

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

fuel reserve and oil pressure.

Position

- Sensor: between the two heads, at the back.
- Connector: on the sensor.

Electrical specifications

- With engine off: closed circuit (continuity).
- With engine started: open circuit (infinite resistance).

Pin-out

1. Voltage 12V (violet).

Diagnostic tool - Electrical errors**Error code B0001 (ALARM OIL SENSOR)**

Occurs when the sensor is disconnected or faulty. When detected, the diagnostic tool shows the error only if this is still active after having performed two TRIP followed by a third key switching OFF-ON.

Error cause

- An oil sensor fault is signalled when, with engine running, it is detected that the sensor circuit is closed. The test is performed only once when the key is set to ON

Identification

- General alarm warning continuously on (red) and indication "ALARM OIL SENSOR" on the display

Troubleshooting

- Check that the sensor connector is properly connected; Check the sensor connector and the instrument panel connector (PIN 3): if they are not OK, restore. If OK, check with engine off, continuity of the purple cable between the sensor connector and the instrument panel



connector PIN 3: if not OK, restore the wiring harness, if OK check continuity between the positive of the sensor and the vehicle ground, if not OK restore, if OK replace the sensor

Error code B0002 (ALARM OIL PRESSURE)

This alarm occurs when the engine is on and the pressure of the engine oil is low. Just above 650 rpm.

Error cause

- An oil sensor fault is signalled when, with engine running, it is detected that the sensor circuit is open.

Identification

- General alarm warning flashing (red) and indication "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 panel connector PIN 3: 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.

AIR TEMPERATURE SENSOR

Function

Indicates the ambient air temperature to the instrument panel

Operation / Operating principle

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

Level in electrical circuit diagram

Temperature sensors

Position

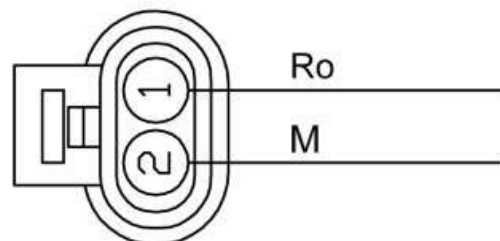
- Fastened to the instrument cluster support, behind the cover
- Connector: under the ignition lock

Electrical specifications

- Resistance at 0°C: 32.5 kOhm +/- 5%
- Resistance at 25°C: 10.0 kOhm +/- 5%

Pin-out

- Voltage 5V (pink)



2. Ground (brown)



Diagnosis

An instrument cluster temperature sensor failure is signalled when it is detected that the sensor circuit is open or shorted to positive/negative

Error cause

- Possible malfunction

Troubleshooting

- Check the sensor connector and the instrument panel connector (PIN 15); If they are not OK, restore. If OK, check continuity of the pink cable between the sensor connector (wiring harness side) and the instrument panel connector PIN 15; if it is not OK, restore the wiring harness; if OK, check the correct sensor resistance; If not OK, replace the sensor; if OK, with key set to ON, check if there is voltage at the sensor connector PIN 1 if not OK, replace the instrument panel; if there is approximately 12V, restore the wiring harness, as there is a short circuit in the battery. If there is instead 5V voltage, connect a 10 kOhm resistance to PIN 1 of the sensor connector and to the vehicle ground connection. If, with the key ON, the voltage measured upstream of the resistance drops, replace the instrument panel. If it continues to stay at about 5 V restore the pink cable, as there is a short circuit to + 5V. In case of short circuit to ground detected on PIN 15 of the instrument cluster connector, check isolation from ground of the pink cable from the sensor connector; If connected to ground, restore the cabling. If insulated from ground, check correct resistance of the sensor; if not OK, replace the sensor; if it is OK, replace the instrument panel

Can line

Function

Allows the communication between injection control unit, instrument cluster, ABS control unit, right light switch

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 allows to significantly simplify the layout of the electric system and so 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 26 and 27 of the engine control unit
- Between PIN 1 and 8 of the instrument panel
- Between PIN 5 and 6 of the ABS control unit
- Between PIN 3 and 4 of the left light switch
- Between PIN 1 and 2 of the bluedash preparation

Diagnostic tool - Electrical errors

CAN line U0001 NO SIGNAL (BUS OFF) - Bus Off.

Error cause

- No communication on CAN line (PIN 26 and/or PIN 27): problem on the whole network (for example, battery cut-off or short circuited or shorted to ground).

Troubleshooting

- Check the engine control unit connector if not OK, restore; if OK, check the ground insulation of the two CAN lines from PIN 26 and PIN 27 of the engine control unit connector if not OK, restore wiring harness; if OK, check the continuity of the two CAN lines from the engine control unit connector to the instrument panel connector if not OK restore cabling, if OK check that the two lines are not short circuited to positive testing from each of the connectors (engine control unit, instrument panel connector) with connector at a time disconnected and turning the key to the ON position If not OK, restore; if OK, replace the engine control unit.

CAN line U0002 MUTE NODE - Mute node.Error cause

- The engine control unit is not able to send CAN signals, but to receive signals from the instrument cluster, ABS control unit, right light switch, it might be necessary to replace the engine control unit.

Troubleshooting

- Replace the engine control unit.

ABS control unit "NO NODE" U0121 - No node/frame counterError cause

- Missing communication of the ABS control unit to the CAN line

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 5 and 6 ABS control unit and PIN 26 and 27 engine control unit; if not ok restore, if ok check continuity between PIN 5 and 6 ABS control unit and PIN 1 and 8 of the instrument cluster; if not ok restore, if ok check continuity between PIN 5 and 6 ABS control unit and PIN 3 and 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

CAN line D347 - transmission time-outError 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

CAN line 5E11 - 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

CAN line 5E16 - vehicle code message absentError cause

- Missing reception of CAN line to engine control unit

Troubleshooting

- Check the control unit software version; if not ok restore, if ok remove the battery and check continuity of the CAN line; if not ok restore, if ok reconnect the battery and check that there is no continuity between CAN line to positive and/or negative; if not ok restore, if ok check and if necessary replace the ABS control unit

Diagnostics tool - Logic errors**Rear wheel radius acquisition P1800** - signal not validError cause

- CAN error during acquisition

Troubleshooting

- 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. In case of invalid value, it means that on key-ON an error of transcription occurred - from the non-volatile memory (EEPROM) to the volatile one (RAM) - of the value concerning the rear wheel radius. In this case the default value is used.

CAN line 5E1F - incorrect vehicle codeError cause

- The ABS control unit was installed in a wrong vehicle

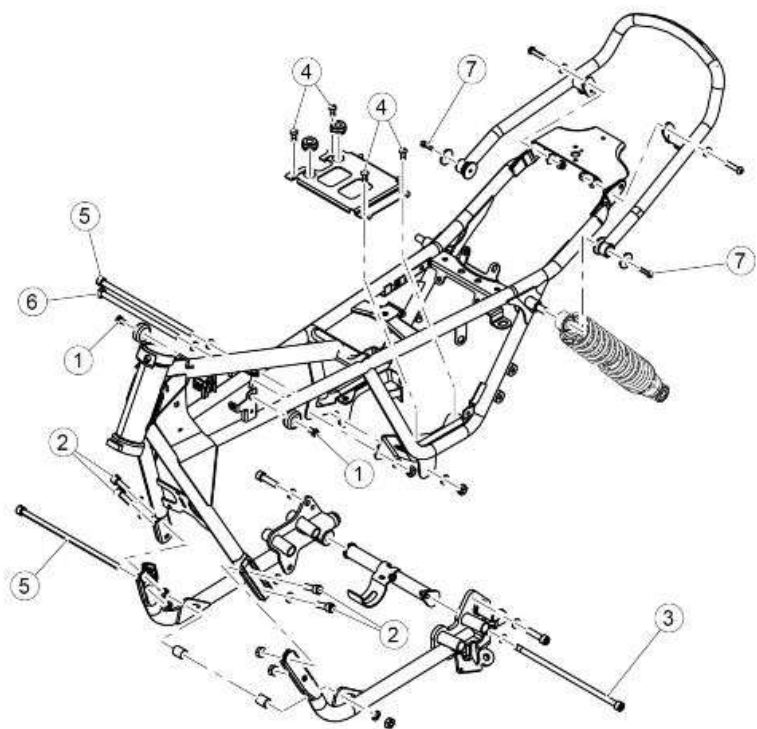
Troubleshooting

- Replace the control unit
-

INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE



FRAME

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lbf ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lb ft)	Pre-permeated
3	Screw fastening the stand cross-piece to the cradles	M10	1	50 Nm (36.88 lb ft)	Pre-permeated
4	Battery holder plate fixing screw	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
5	Screws fastening engine/gearbox to frame	M10	3	50 Nm (36.88 lb ft)	-
6	Screws fastening gearbox to frame	M10	2	50 Nm (36.88 lb ft)	-
7	Rear grab handle fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

Vehicle preparation

- To arrange for the removal of the engine block, you must first remove the saddle, fuel tank, side fairings and the battery
- From the front, secure the vehicle with belts attached to a hoist
- Position a centre stand under the engine sump
- Position an engine support so as not to damage the rubber bellows of the drive shaft

Removing the engine from the vehicle

- Remove the two fixing screws of the collector cover and remove the latter

NOTE

REPEAT THE OPERATION FOR THE RIGHT COVER AS WELL



- Disconnect the cylinder temperature sensor connector.

NOTE

REPEAT THIS OPERATION ON THE OPPOSITE SIDE

**NOTE**

THE OPERATIONS FOR REMOVING THE EXHAUST TERMINAL, APPLY TO BOTH ENDS

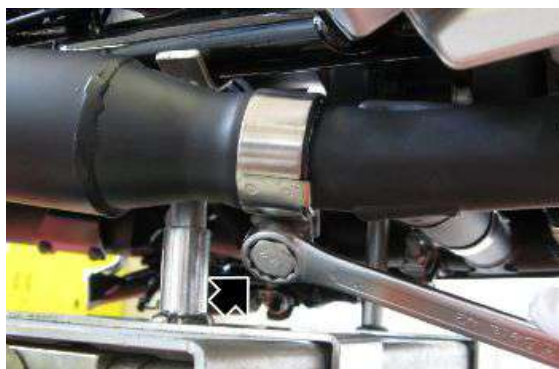
- Remove the three fixing screws of the silencer guard



- Remove the silencer guard, sliding it toward the front of the vehicle



- Loosen the clamp between the silencer and manifold



- Remove the screw that fastens the silencer to the support bracket



- Slide and remove the silencer from the collector



- Remove the two starter motor cover fixing screws



- Remove the starter motor cover



- Disconnect from their support the connectors of the lambda probe wiring harness.
- Using a screwdriver, press the tab and pull the wiring harness downward at the same time



- Disconnect the connectors of the lambda probe wiring harness

**NOTE**

REPEAT THIS OPERATION ON THE OPPOSITE SIDE

- Remove the nuts and the corresponding fixing washers of the exhaust manifolds



- Remove the exhaust manifolds at the same time



- Disconnect the clutch cable from the lever and free it from the cable grommet



- Undo the screws fixing the spark plug covers, remove the covers



- Disconnect the spark plugs tubes



- Remove the screws fixing the manifold to the cylinder heads



- Remove the fixing screw of the engine oil pressure sensor cover
- Remove the engine oil pressure sensor cover



- Remove the fixing screw (1) and then remove the engine oil pressure sensor



- Remove the fixing nut of the engine ground cable



- Remove the fixing nut of the power supply cable located on the starter motor. Then remove the cable



- Disconnect the starter motor faston



- Remove the two starter motor fixing screws



- Remove the starter motor complete with support bracket for the cover



- Disconnect the secondary air system pipes from the cylinder heads



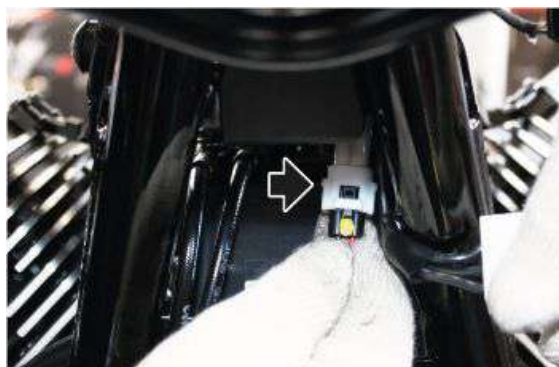
- Remove the clamp fixing the flywheel wiring harness to the brake pipes



- Remove the screws that fasten the voltage regulator to the chassis
- Remove the regulator and the horn from the vehicle



- Disconnect the flywheel/alternator connectors and release them from the passage in the frame



- Remove the fixing screws of the rider right footrest / rear brake pump assembly



- Remove the rider right footrest / rear brake pump assembly from the chassis cradle and retrieve the two bushings



- Disconnect the side stand sensor connector and then remove the wiring harness from the lower side of the vehicle



- Disconnect the uniball that connects the gear lever transmission to the vehicle's gearbox



- Disconnect the uniball that connects the gear lever to the gear lever transmission



- Remove the clamp and disconnect the pipe that connects the tank to the canister. Remove the pipe by extracting it from the lower side of the vehicle



- Remove the clamp and disconnect the pipe that connects the valve to the canister. Remove the pipe by extracting it from the lower side of the vehicle



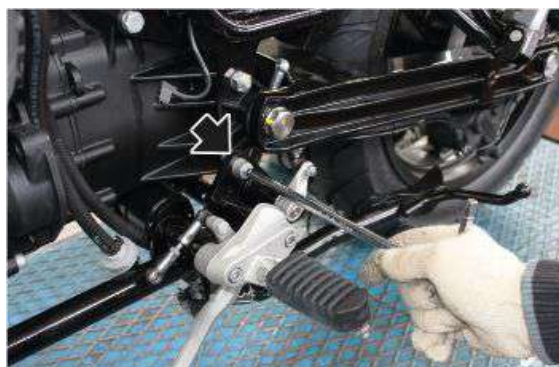
- Remove the cradle lower fixing screw
- Repeat this operation on the opposite side.



- Remove the front screws fixing the cradle, making sure to recover the associated nuts and washers
- Repeat this operation on the opposite side.



- Remove the cradle rear fixing screw
- Repeat this operation on the opposite side.



- Remove the cradle from the vehicle's chassis together with the canister and the left footrest/gear lever assembly



- Remove the rear brake calliper and the ABS sensor



- Remove the cable grommet plate placed under the swingarm



- Disconnect the rear ABS sensor, rear brake switch and neutral sensor connectors
- Move the rear brake system complete



- Secure the chassis on a lifting device and place a pantograph stand under the oil sump



- Remove the pins fastening the gear-box to the chassis, making sure to retrieve the associated nuts and washers



- Remove the lower fixing screws of the rear shock absorbers and move them from the support pins on the swing-arm/bevel gear



- Slightly lift the frame and disconnect the blow-by pipe



- Disconnect the gear sensor connector



- Lift the frame sufficiently and remove the engine complete with swingarm



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ENGINE

ENG

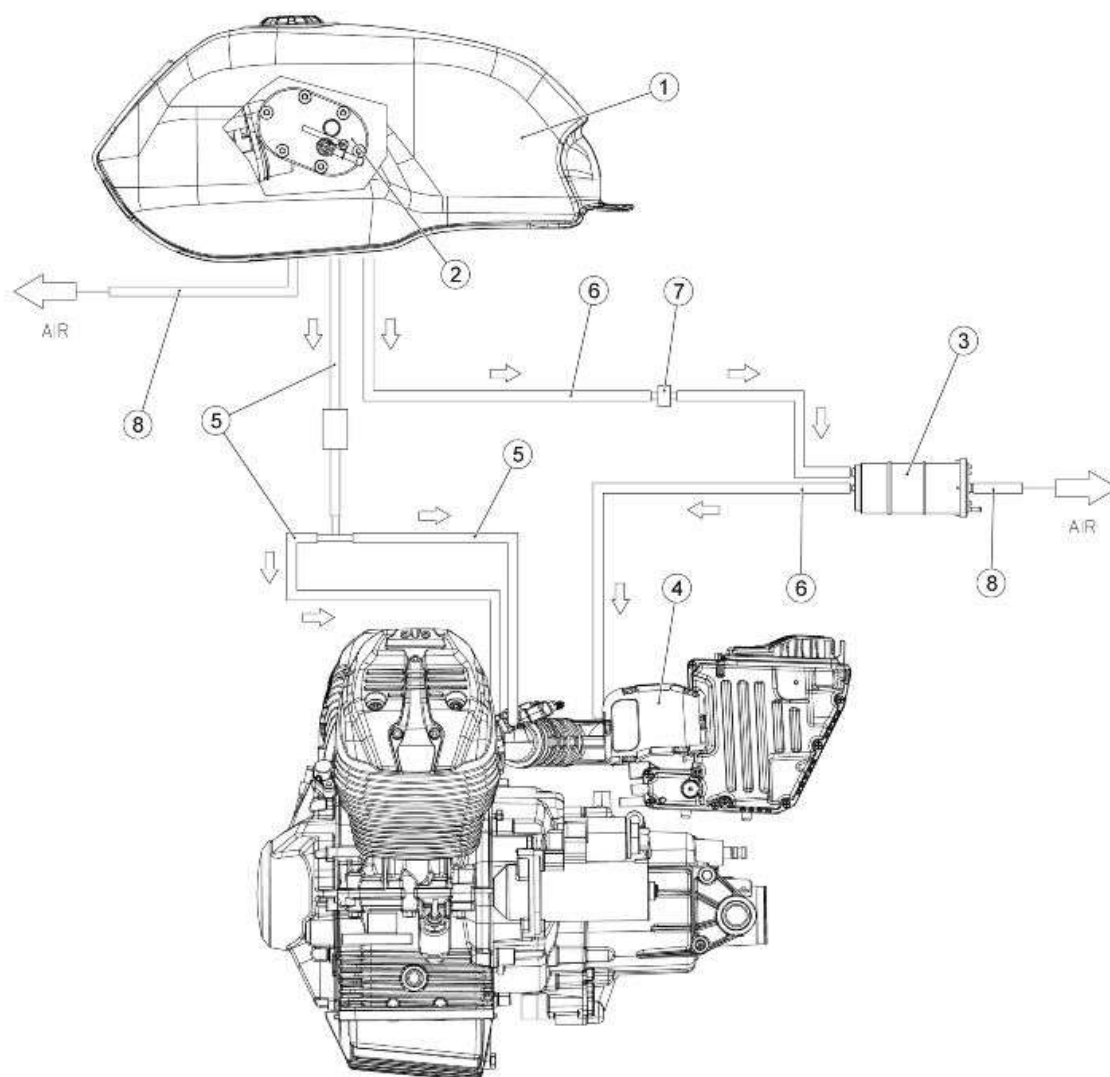
TO CONSULT THE CHAPTER ABOUT THE ENGINE AND ITS COMPONENTS PLEASE REFER TO THE APPROPRIATE MANUAL:

"MSS Engine 850 Euro 5"

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POWER SUPPLY

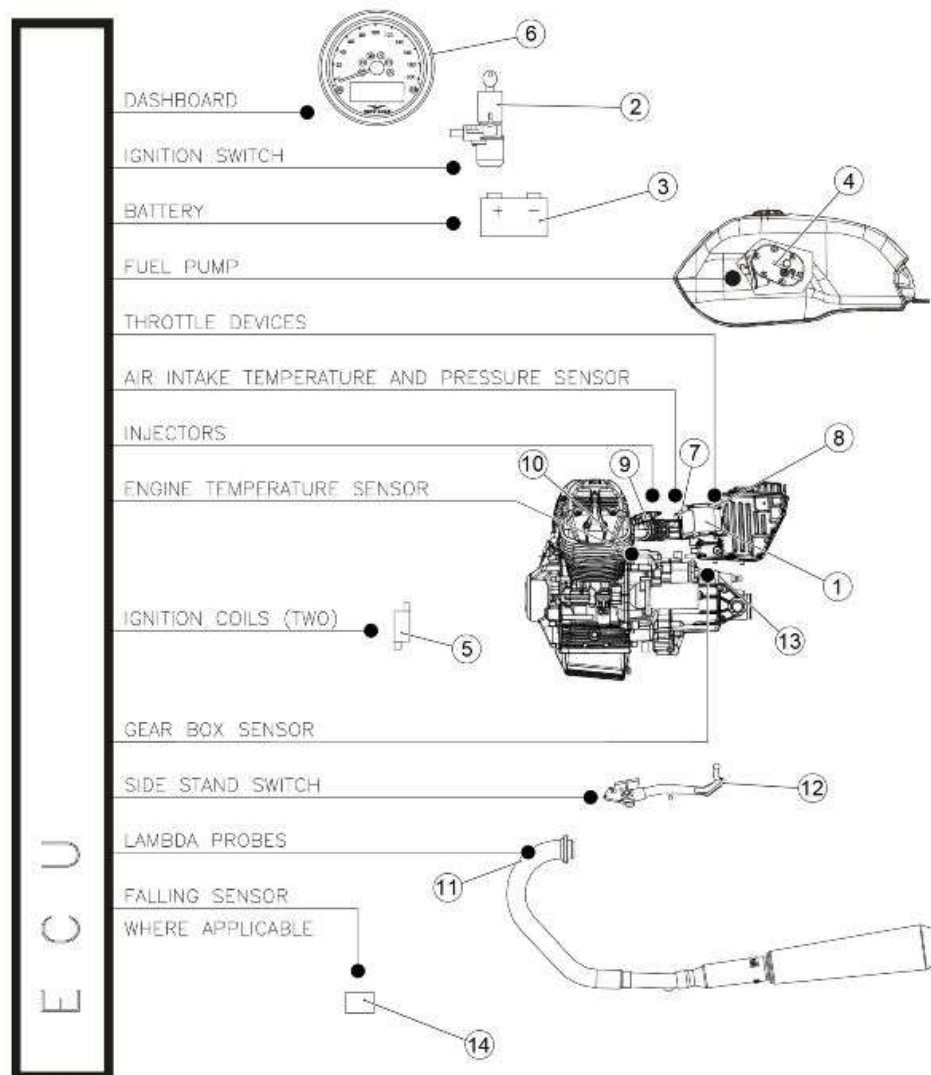
P SUPP

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

Injection

Diagram

**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. Engine temperature sensor
11. Lambda probe
12. Side stand switch

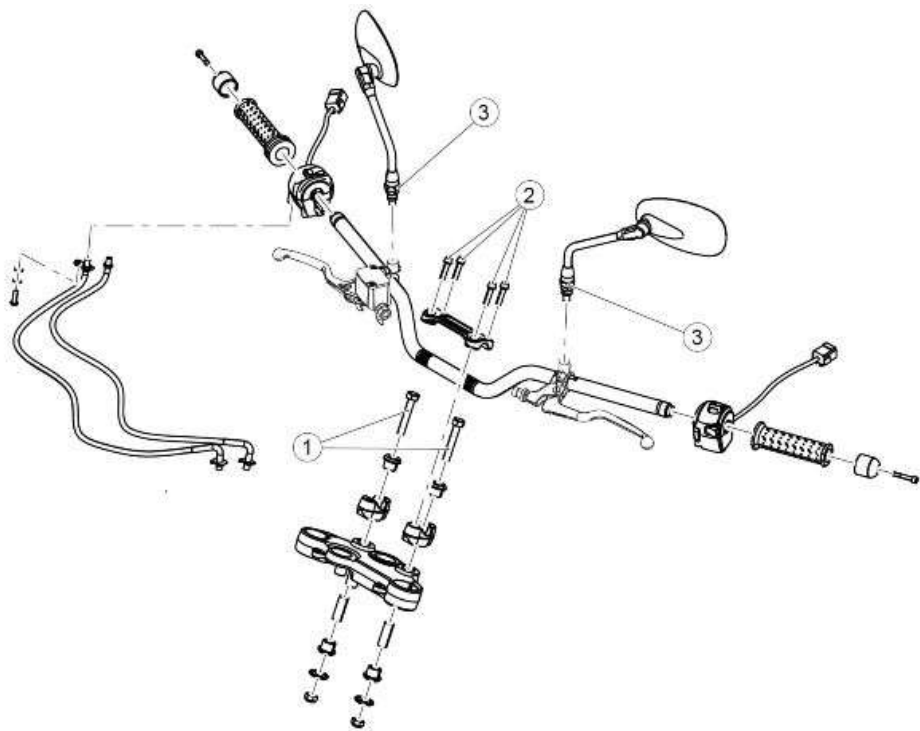
13.Gear sensor

14.fall sensor

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SUSPENSIONS	SUSP
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Handlebar



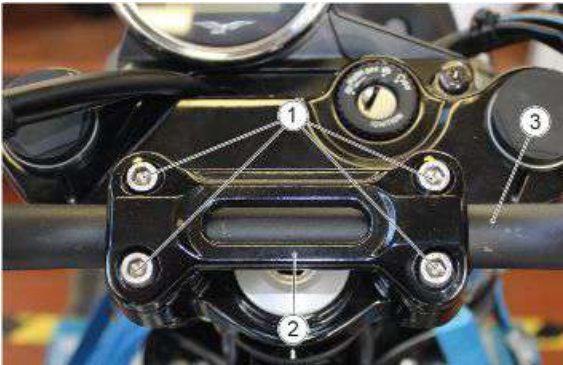
HANDLEBAR AND CONTROLS

Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fixing handlebar support U-bolts to steering plate	M10	2	50 Nm (36.88 lb ft)	-
2	Handlebar U-bolt fastener screws	M8	4	25 Nm (18.44 lbf ft)	-
3	Mirror fixing	M10	2	Manual	-
-	Light switch fastening screws	SWP 5	2	1.5 Nm (1.11 lb ft)	-
-	Throttle cable cover fastening screws	M5	3	6 Nm (4.43 lbf ft)	-

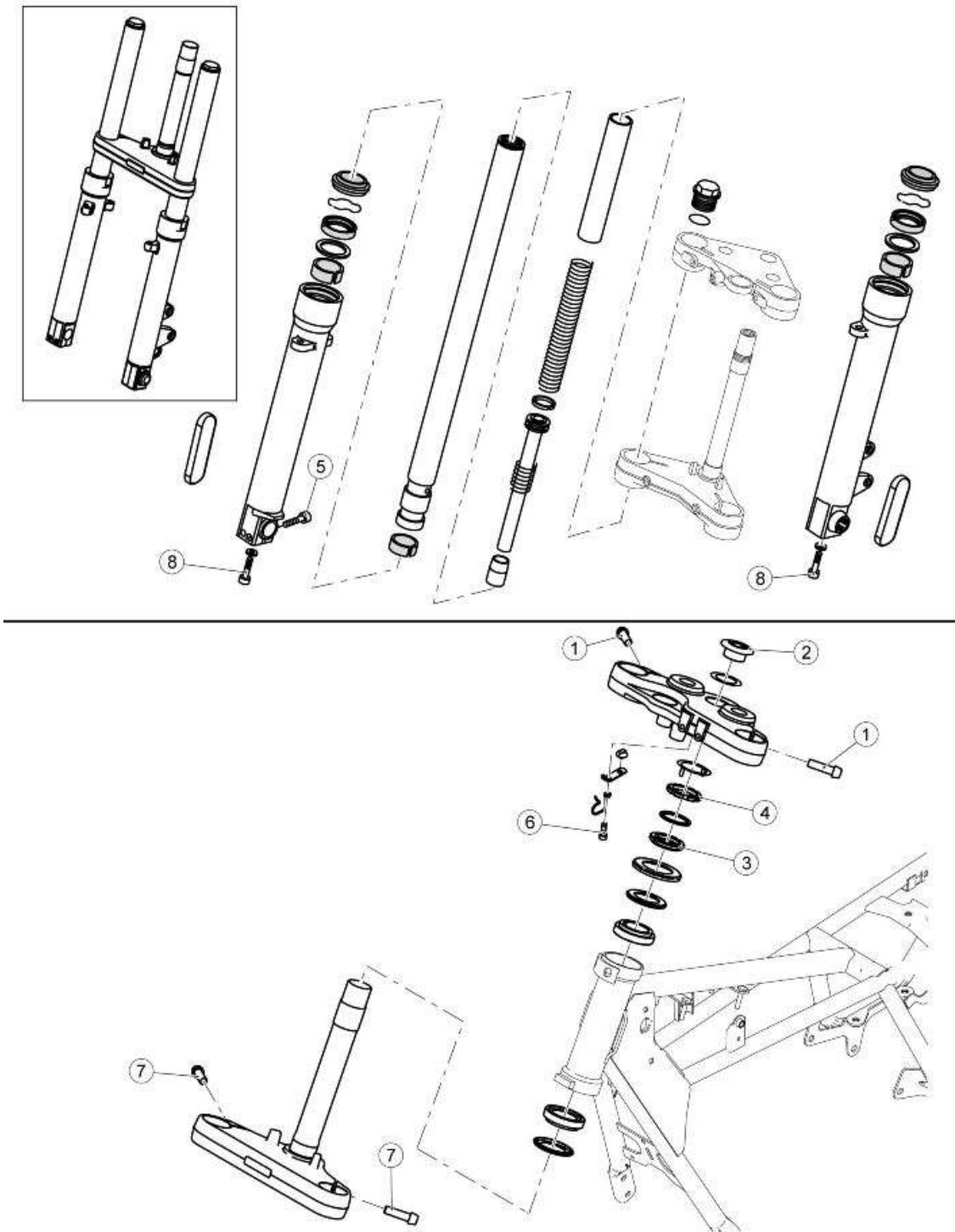
Removing

(SPECIAL/STONE)

- Remove the light switches
- Unscrew and remove the four fastening screws (1)
- Remove the upper U-bolt (2)
- Remove the handlebar (3)



Front fork

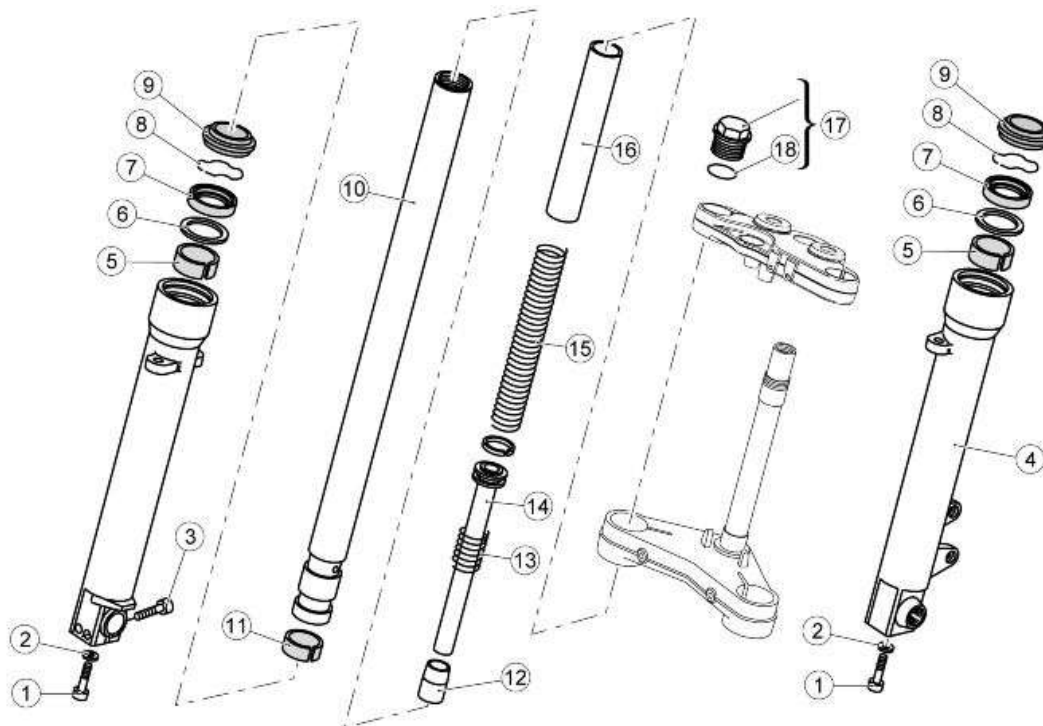


FRONT SUSPENSION - STEERING

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-
2	Steering head fastening bushing	-	1	100 Nm (73.76 lb ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lb ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter-lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lb ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lb ft)	-

Diagram



Key:

1. Screw
2. Washer
3. Screw
4. Left sleeve
5. Upper bushing
6. Washer
7. Seal ring
8. Retainer ring
9. Dust guard
10. Stem
11. Lower bushing
12. Buffer
13. Counter spring
14. Complete pumping member
15. Spring
16. Pipe

17.Complete cap

18.O-ring

Removing the fork legs

The following procedure is only shown from one side of the vehicle, but is valid for both stanchions

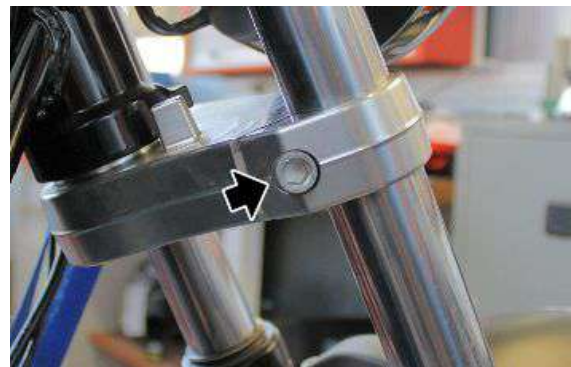
CAUTION

DURING THE OPERATIONS DESCRIBED BELOW, THE STANCHIONS AND THEIR INTERNAL COMPONENTS SHOULD BE TIGHTENED ON A VICE. MAKE SURE NOT TO DAMAGE THEM BY OVERTIGHTENING; ALWAYS USE ALUMINIUM JAW CAPS

- - Remove the front wheel.
- Remove the front mudguard.
- Undo the upper sealing screw.



- Undo the lower sealing screw.



- Slide off the stem downwards by turning it slightly first in one direction then to the opposite direction.

Draining oil

To drain out the oil follow these steps.

- Remove the stanchion.

- Tighten the removed stanchion in a vice fitted with aluminium jaw caps in order to avoid damaging them.



- Unscrew the upper closing cap. Pay attention to the possible thrust that the spring can cause to the loosened cap.



- Be careful not to damage the O-Ring during extraction.
- Press the bearing tube inside the wheel holder fork leg.
- Remove the preload tube and the spring.



- Drain out all the oil inside the stanchion.

NOTE

FOR EASY DRAINAGE OF THE OIL INSIDE THE PISTON ROD, PRESS THE STANCHION IN THE WHEEL HOLDER SLEEVE TO PUMP OIL OUT.



- Carefully check each part of the stanchion and make sure that there are no damaged elements.
- If there are no damaged or worn elements, refit the stanchion; otherwise, replace the damaged elements.

NOTE

FOR EASY DRAINAGE OF THE OIL INSIDE THE PISTON ROD, PRESS THE STANCHION IN THE WHEEL HOLDER SLEEVE TO PUMP OIL OUT.



Disassembling the fork

- Drain all the oil from the stem.
- Block the wheel holder fork leg on the vice.
- Undo the bottom screw and remove it with the corresponding gasket.



- Remove the dust scraper using a screwdriver as a lever.

CAUTION

BE CAREFUL NOT TO DAMAGE THE FORK LEG RIM AND THE DUST SCRAPER.



- Slide the dust scraper off and upwards.



- Remove the locking ring inside the fork leg using a thin screwdriver.

CAUTION

BE CAREFUL NOT TO DAMAGE THE FORK LEG RIM.



- Slide off the bearing tube from the wheel holder fork leg together with the sealing ring, the cap, the upper bushing and lower bushings.

NOTE

WHEN REMOVING THE PIPE FROM THE WHEEL HOLDER FORK LEG SOME PARTS MAY REMAIN INSIDE THE FORK LEG. IF THIS OCCURS, THESE PARTS MUST BE REMOVED AFTERWARDS, BEING CAREFUL NOT TO DAMAGE THE FORK LEG RIM AND THE UPPER BUSHING SEAT



Checking the components

- Check every component removed from the fork leg, specially: the sealing ring and the dust guard as they are elements that guarantee sealing; replace them if some of them are damaged.
- Check the bushing on the bearing tube; remove it and replace it if damaged or worn.
- Slide off the pumping member unit from the holding tube; if it is damaged, replace the counter spring and the ring.



Reassembling the fork

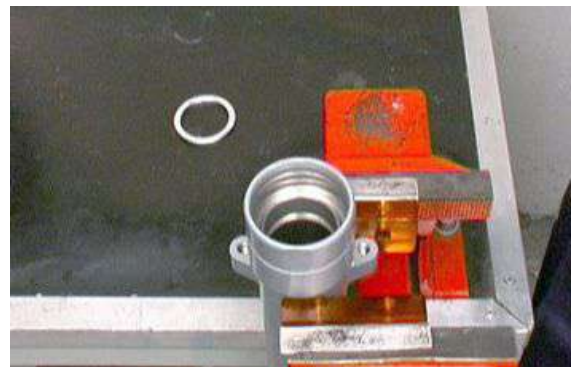
CAUTION

ALL COMPONENTS MUST BE CAREFULLY WASHED AND DRIED WITH COMPRESSED AIR BEFORE REFITTING.

- Carry out any necessary service operation.
- Insert the pumping member unit with the counter spring and the ring in the bearing tube.



- Check that the upper guide bushing is fitted on the wheel holder fork leg.



- Insert the lower sliding bushing in its seat on the bearing tube.



- Reassemble the bearing tube in the wheel holder fork leg.



- Insert the bearing tube in the wheel holder and push it until it stops.



- Screw the bottom screw and tighten it to the prescribed torque.



- Insert the cap and the well-lubricated sealing ring on the bearing tube.
- Use a suitable inserting tool to push the sealing ring in the fork leg until it stops.



- Fit the locking ring.

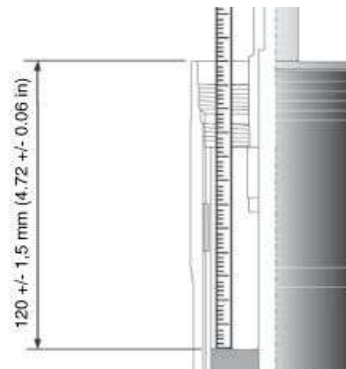


- Fit the dust scraper.
- Pour oil into the bearing tube so that it also fills the internal grooves of the pumping member rod.
- Pump with the bearing tube, making sure the oil has completely filled the pumping member rod.
- Introduce the spring and the preload tube.
- Place the cap on the bearing tube, taking care not to damage the O-ring. Then, tighten the cap to the prescribed torque.



Filling oil

- Place the sleeve upright in a vice fitted with protection shoes.
- Compress the sleeve in the stanchion.
- Pour part of the fork oil into the sleeve.
- Wait a few minutes until the oil fills all the ducts.
- Pour the remaining oil.
- Pump out oil a few times.
- Measure the air gap between the oil level and the rim.



THE SLEEVE MUST BE PERFECTLY UPRIGHT IN ORDER TO MEASURE THE CORRECT OIL LEVEL. THE OIL LEVEL MUST BE THE SAME IN BOTH STANCHIONS.

Characteristic

Oil level (from sleeve rim, without the spring and with stem at end of stroke)

120 +/- 1.5 mm (4.72 +/- 0.06 in)

Oil quantity (for each stanchion)

385 +/- 2 cc (23.49 +/- 0.12 cu in)

- Introduce the spring and the preload tube.



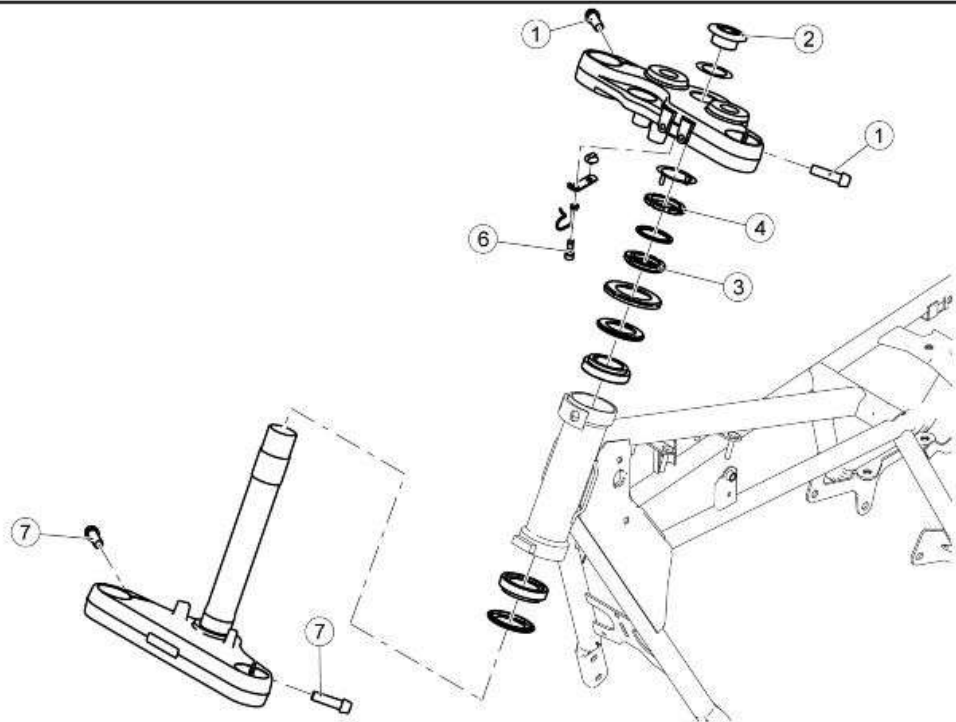
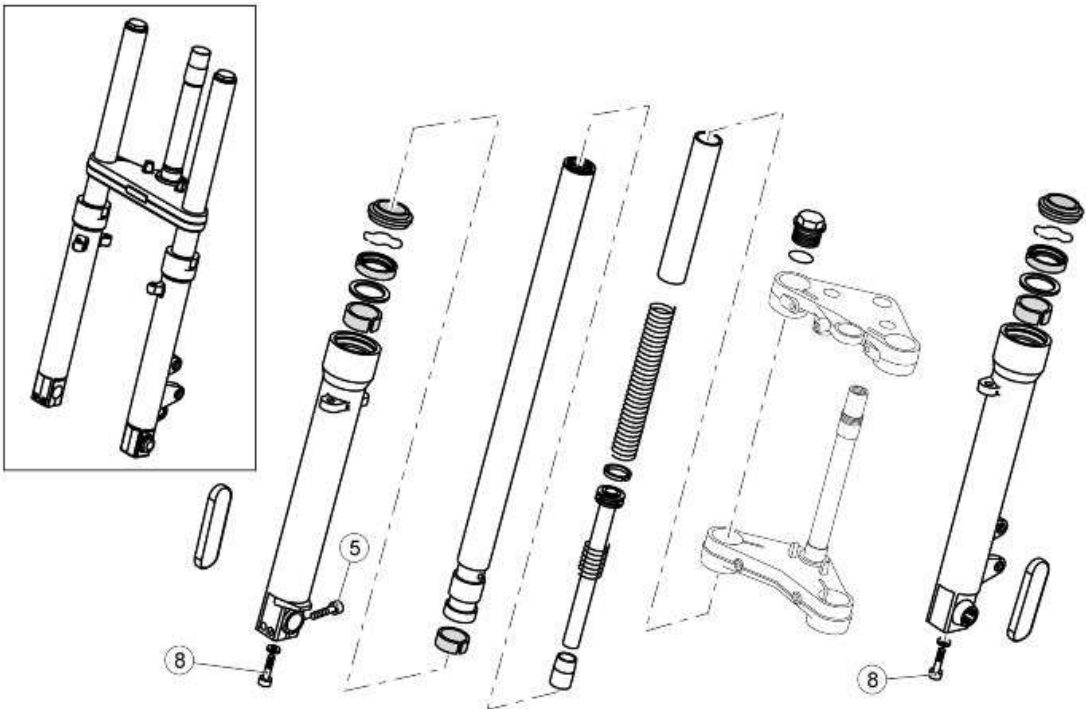
- Place the cap on the bearing tube, taking care not to damage the O-ring.



- Then, tighten the cap to the prescribed torque.



Steering bearing



FRONT SUSPENSION - STEERING

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-
2	Steering head fastening bushing	-	1	100 Nm (73.76 lb ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lb ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter-lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lb ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lb ft)	-

Adjusting play

- Place the vehicle so that the front wheel is off the ground.
- Carry out a handlebar rotation test, using a dynamometer at the hand grip external end.
- Adjust if clearance is detected.

NOTE

THE STEERING COLUMN RESISTANCE TO ROTATION MUST BE PERFORMED IN THE TWO OPPOSITE ROTATION DIRECTIONS.

- Remove temporarily, moving the instrument cluster, handlebars (complete with column switch and brake and clutch levers) and the upper steering plate towards the front of the vehicle
- Remove the safety washer (1)



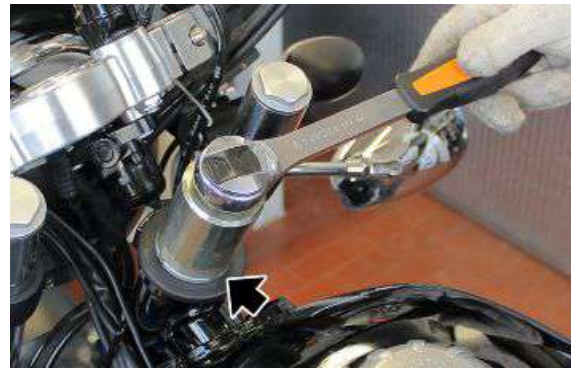
- Remove the steering counter-lock ring (2) using the special tool



- Remove the rubber spacer (3)



- Unscrew the lower ring nut in order to repeat the steering play adjustment procedure correctly.



- Pre-tighten the lower ring nut to the torque of 60 Nm (44.25 lb ft).
- Steer repeatedly completely left and completely right to allow the bearings to settle.
- Loosen the ring nut.
- Check again the pre-tightening torque and then tighten the ring nut again to a torque of 50 +/- 5 Nm (36.88 +/- 3.69 lb ft).
- Steer completely left and completely right and check that the steering rotates smoothly and without excessive resistance.
- If any problems are noted, repeat the procedures described above.

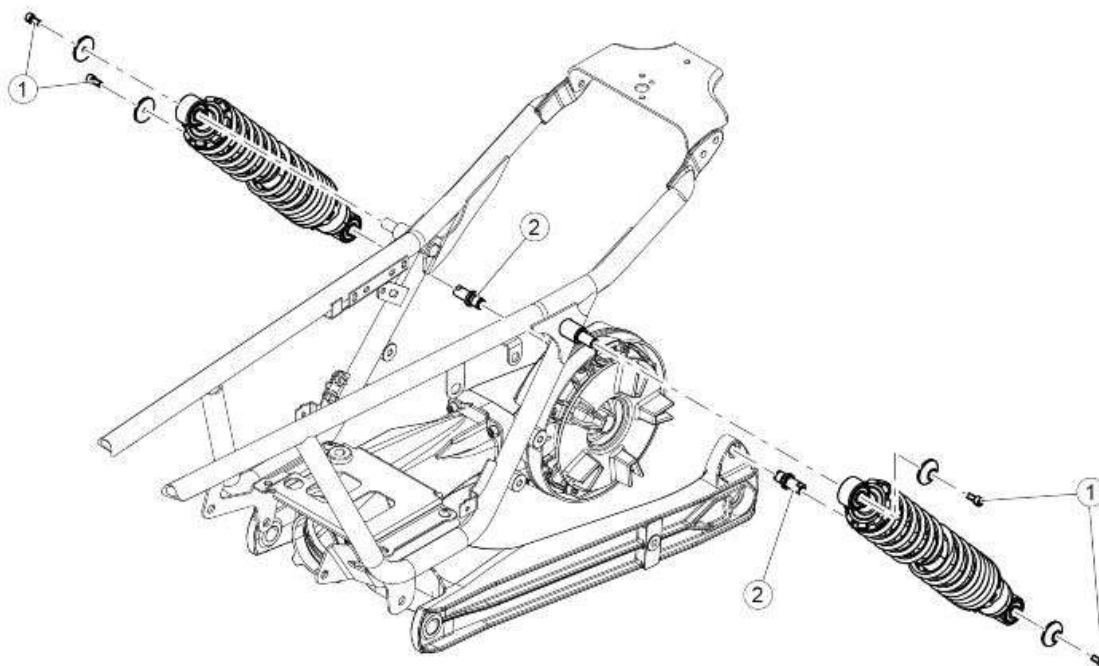
Specific tooling

AP8140190 Steering tightening tool

- Reposition the rubber spacer (3)
- Insert and tighten the steering counter-lock ring (2) so that the grooves are aligned
- Reposition the safety washer (1)
- Refit the upper steering plate, handlebars and instrument cluster

Rear

Shock absorbers



REAR SHOCK ABSORBERS

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear shock absorber upper/lower fixing screws	M6	4	10 Nm (7.38 lbf ft)	Pre-permeated
2	Pin fastening the shock absorber to the gear-box/swingarm	M12	2	35 Nm (25.81 lb ft)	Pre-permeated

Removing

(SPECIAL/STONE)

- Remove the silencers

REAR RIGHT SHOCK ABSORBER

- Unscrew and remove the two screws (1)
- Retrieve the two bushings (2)



- Remove the RH rear shock absorber (3)



REAR LEFT SHOCK ABSORBER

- Unscrew and remove the two screws (1)
- Retrieve the two bushings (2)



- Remove the rear shock absorber (3)



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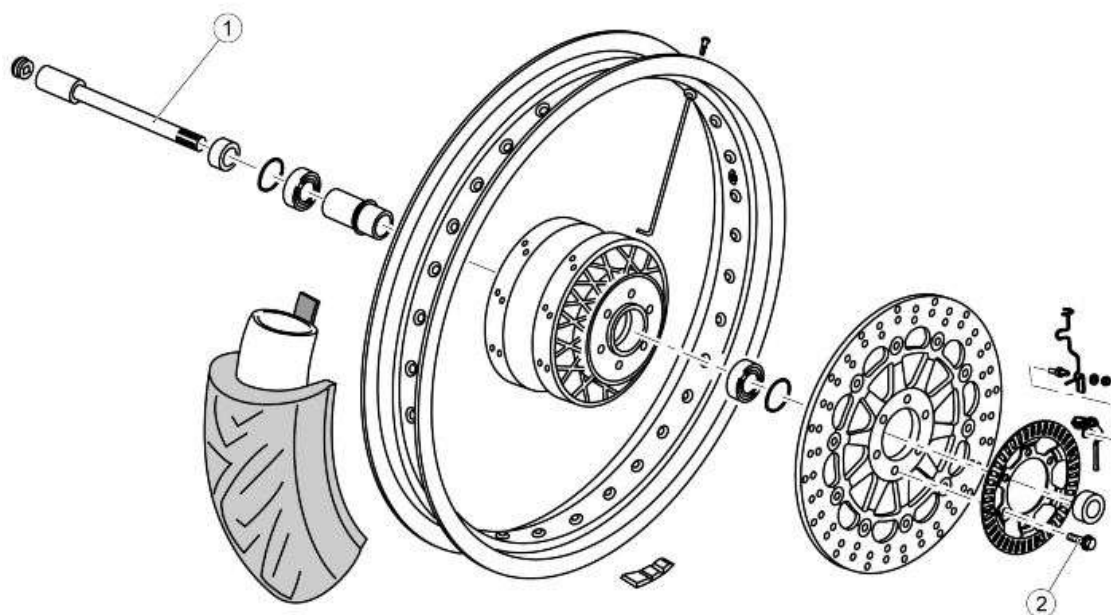
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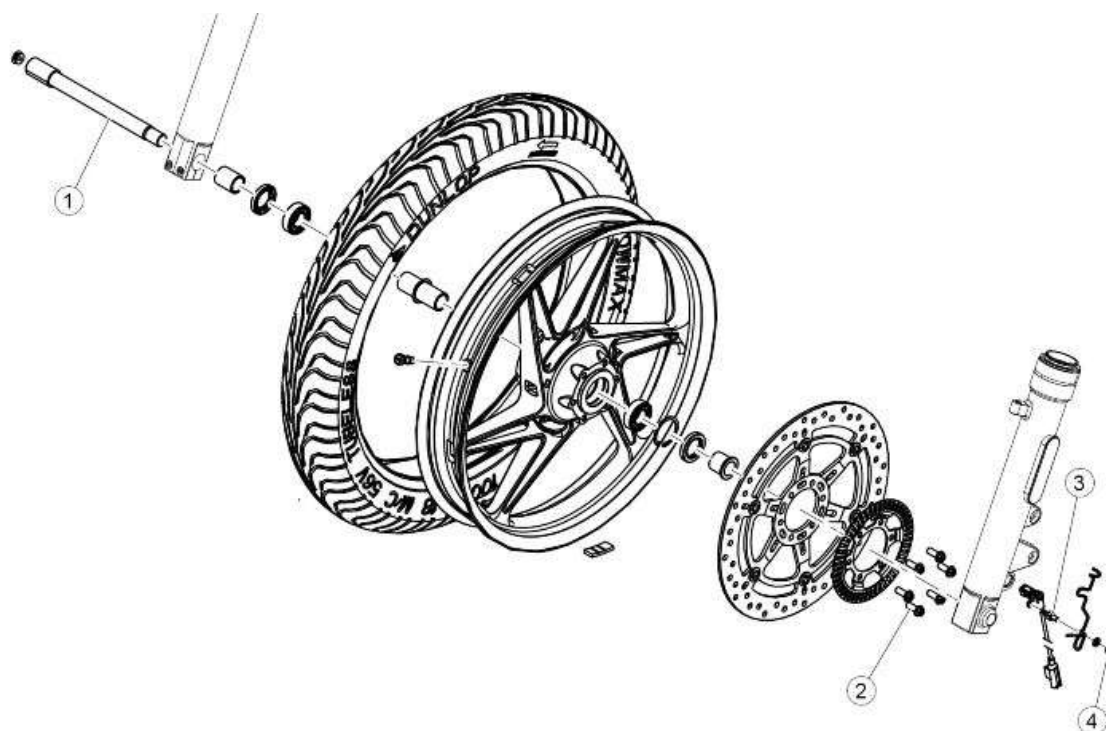
Wheels

Front wheel

(SPECIAL)



(STONE)



FRONT WHEEL

Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

Removal

- Place the vehicle on a stable support so that the front wheel does not touch the ground;
- Remove the brake calliper without disconnecting the oil pipes;
- Working on the right side of the motor-cycle, remove the cap from the pin;



- Loosen the two wheel pin locking screws;



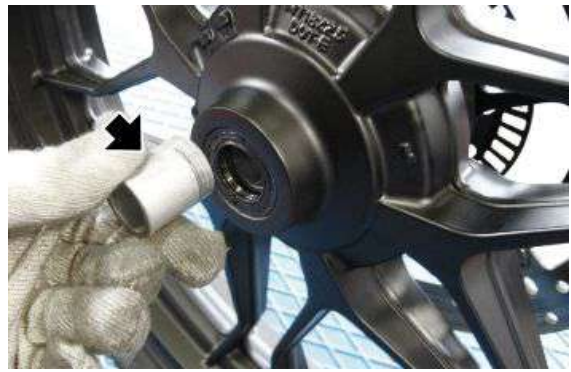
- Unscrew and remove the wheel pin;



- Working on the opposite side, remove the left spacer;

NOTE

DURING REFITTING, PAY ATTENTION TO THE CORRECT POSITIONING OF THE SPACER WHICH MUST BE INSERTED IN THE DUST SEAL UNTIL IT REACHES THE BEARING



- Working on the opposite side, remove the left spacer;

NOTE

DURING REFITTING, PAY ATTENTION TO THE CORRECT POSITIONING OF THE SPACER WHICH MUST BE INSERTED IN THE DUST SEAL UNTIL IT REACHES THE BEARING



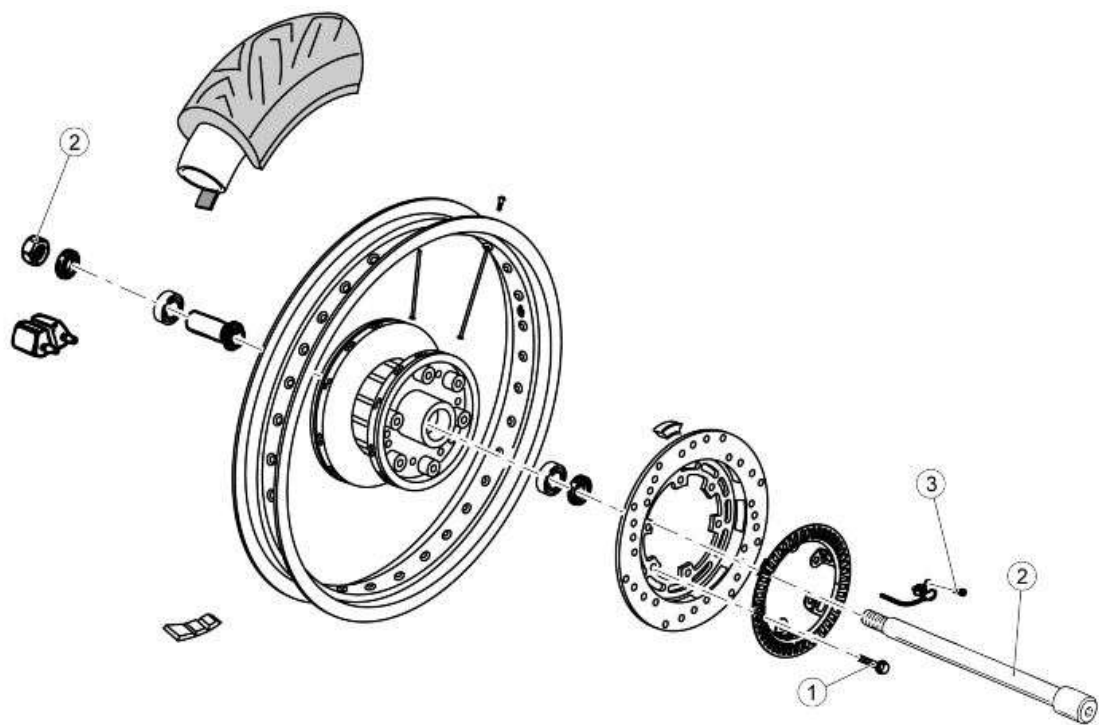
- Remove the dust seal from both sides



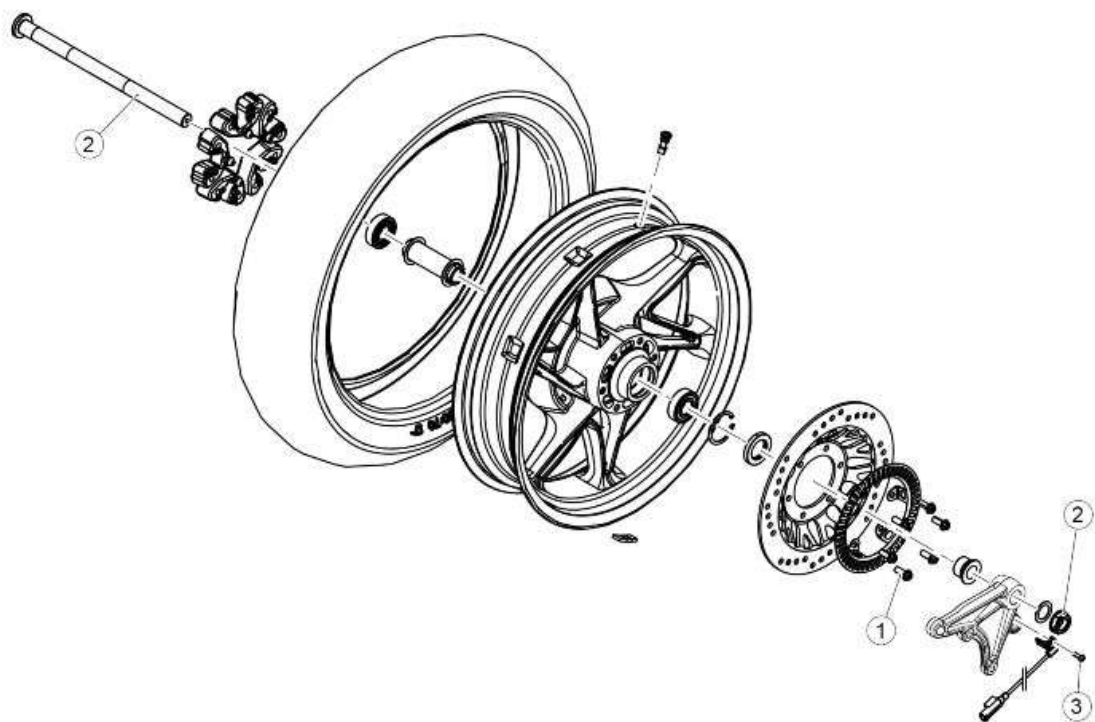
- Using a generic bearing extractor remove the bearings from both sides

Rear wheel

(SPECIAL)



(STONE)



REAR WHEEL

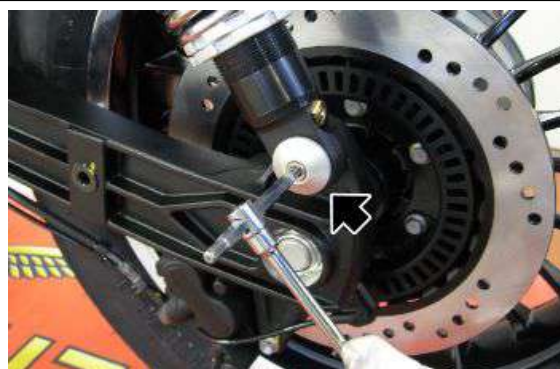
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	100 Nm (73.77 lb ft)	-
3	ABS sensor fixing screw	M6	1	6 Nm (4.43 lbf ft)	Loctite 243

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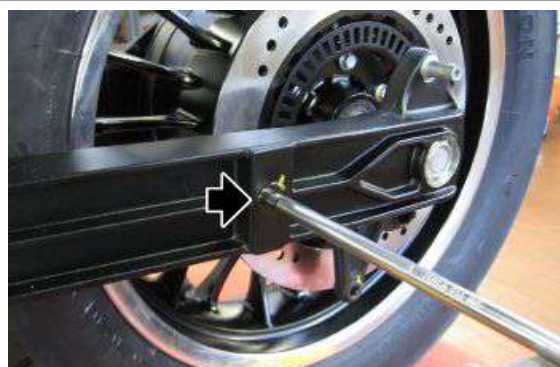
- Remove the screw fixing the right-hand rear right shock absorber and pull it from the pin on the drive shaft



- Remove the screw fixing the left-hand rear shock absorber and remove it from the pin



- Using a jack, lift the rear of the motorcycle.
- Unscrew the rear fixing screw of the rear brake calliper support



- Unscrew the wheel axle nut, making sure to take the washer from the left side and pull the pin itself from the right side.



- Remove the rear brake calliper support



- Collect the spacer

NOTE

DURING REFITTING, PAY ATTENTION TO THE CORRECT POSITIONING OF THE SPACER WHICH MUST BE INSERTED IN THE DUST SEAL UNTIL IT REACHES THE BEARING



- Remove the rear wheel



- Remove and if necessary replace the six flexible couplings



- Remove the dust seal



- Remove the locking Seeger ring of the bearing from the side where the encoder/brake disc wheel is present



- Using a generic bearing extractor remove the bearings from both sides

Spoke tension adjustment

CAUTION



DO NOT ADJUST THE TENSION OF THE WHEEL SPOKES WITH TIRES FITTED ON THE WHEEL RIM, AS THIS COULD CAUSE BREAKING OF THE NIPPLE GUARDS AND RESULTING IN HOLES OF THE AIR CHAMBER.

IT IS IMPORTANT TO LOCK THE ROTATION OF ALL NIPPLES.

LOOSENING THE NIPPLE MODIFIES THE TENSION OF THE WHEEL SPOKES COMPROMISING THE SAFETY OF THE WHEEL RIMS AND THE STABILITY OF THE VEHICLE

- Remove the wheel
 - Remove the tires, the air chamber and the nipple guards;
 - Locate the wheel spokes (1) to be tightened;
 - Operate on the nipple (2) to adjust the relative spoke tension (1);
- screw to tighten the spoke;
 - unscrew to loose the spoke;
- The indicative tightening torque of the nipples is:
 - front wheel 3 Nm (2.21 lb ft)
 - rear wheel 4 Nm (2.95 lb ft).
 - Repeat the operation for all spokes by proceeding in successive order;

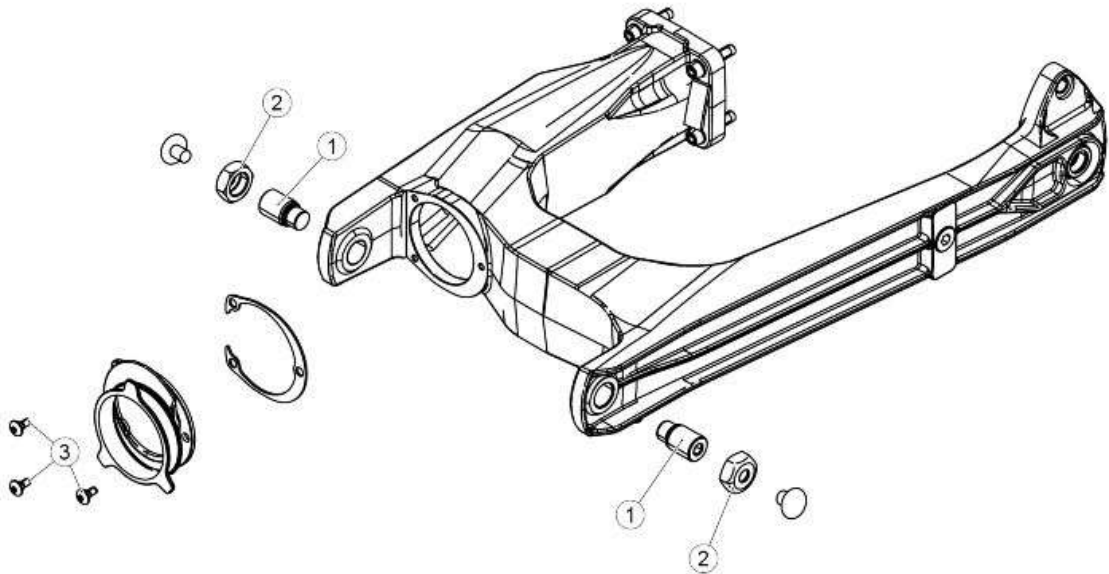
- After having adjusted the tension of the wheel spokes, check the axial and radial clearance of the wheel rim.

CAUTION



DO NOT ADJUST THE TENSION OF THE WHEEL SPOKES WITH TIRES FITTED ON THE WHEEL RIM, AS THIS COULD CAUSE BREAKING OF THE NIPPLE GUARDS AND RESULTING IN HOLES OF THE AIR CHAMBER.
IT IS IMPORTANT TO LOCK THE ROTATION OF ALL NIPPLES.
LOOSENING THE NIPPLE MODIFIES THE TENSION OF THE WHEEL SPOKES COMPROMISING THE SAFETY OF THE WHEEL RIMS AND THE STABILITY OF THE VEHICLE

Swinging arm



SWINGARM

Pos.	Description	Type	Quantity	Torque	Notes
1	Pins fixing swingarm to gearbox	-	2	-	Manual
2	Counter-nuts fixing swingarm to gearbox	-	2	50 Nm (36.88 lb ft)	-
3	Rubber bellows torx fixing screws	-	3	6 Nm (4.43 lbf ft)	-

Removing

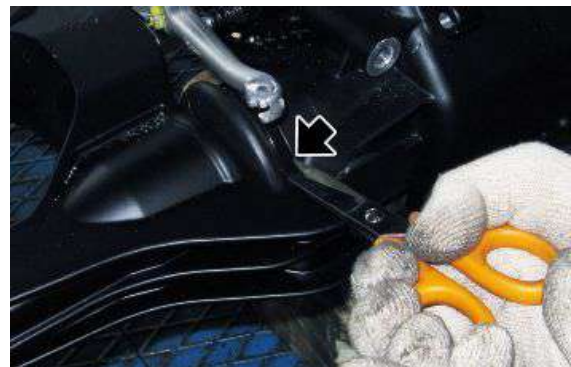
- Remove the mufflers, the rear wheel, and the brake calliper support complete with clamp / ABS sensor, and disconnect the shock absorbers from the support pins.
- Remove the fixing nut of the cable grommet plate and disconnect it from the swingarm



- Cut the sealing clamp and lift the folding

CAUTION

PAY ATTENTION NOT TO CUT AND DAMAGE THE RUBBER FOLDING



- Unscrew the nuts on both sides of the swingarm



- Loosen the pins so that the oscillating swingarm can be removed from the gearbox.



- Remove the complete swingarm from the gearbox



- Remove the three screws (1) to remove the folding (2) complete with retaining ring (3)



Checking

- Check that the universal joint is not damaged, the gear teeth inserting in the sleeve grooves and the grooves on the joint are not deformed or damaged; otherwise, replace the joint.
- Check that the rubber bellows are not cut or pierced; otherwise, replace it.
- Check that the swingarm pin threads and the swingarm fixing nuts are not damaged, deformed or flattened; otherwise, replace them.
- Check that the sleeve grooves are not damaged, deformed or deteriorated; otherwise, replace the sleeve.
- Check that the sleeve outer tothing and internal grooves are not damaged.

Removing

- Remove the rear wheel
- Remove the swingarm
- Strike a few times with a mallet to remove the cardan shaft (1)

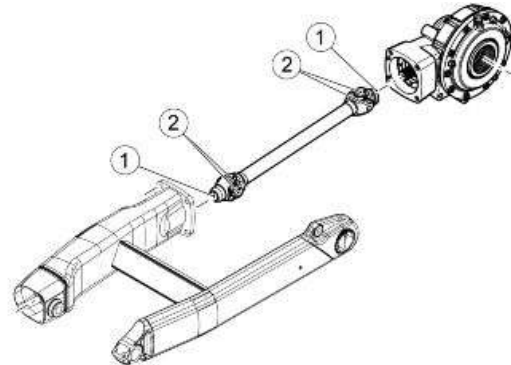


Checking

Carefully check:

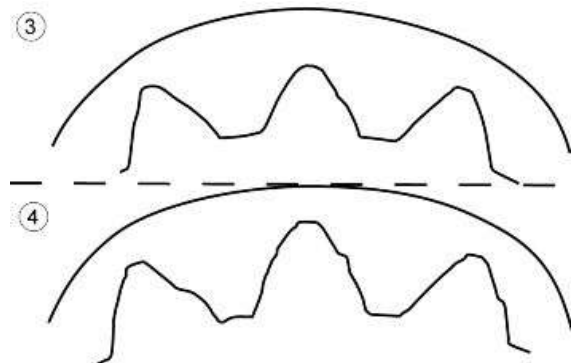
The splines on the cardan shaft (1) must be intact, free from grain or dents.

Check that the joints (2) are not hardened or excessively loose, otherwise replace it.

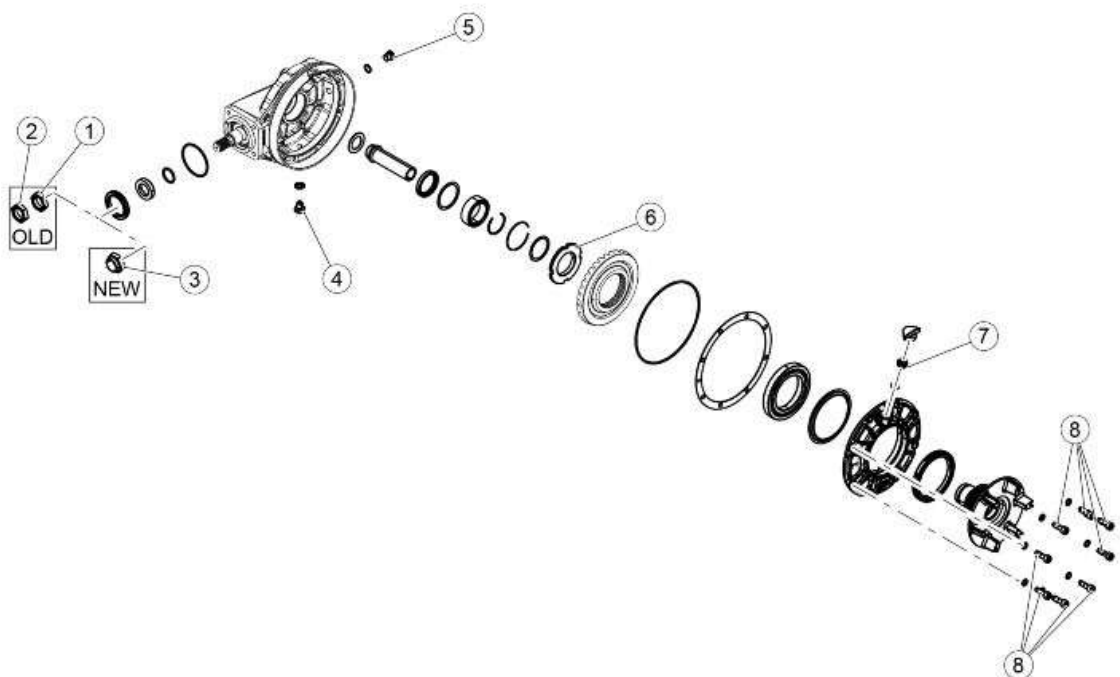


In the figure are shown two worn toothing profiles:

- 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



BEVEL GEAR

Pos.	Description	Type	Quantity	Torque	Notes
1	Pinion unit fixing nut - OPTION 01	M25	1	100 Nm (73.76 lb ft)	Loct. 243
2	Pinion unit fixing lock nut - OPTION 01	M25	1	20 Nm (14.75 lbf ft)	Loct. 243
3	Pinion unit fixing nut - OPTION 02	M25	1	100 Nm (73.76 lb ft)	Loct. 243 + Nut re-bating on hollow pinion
4	Oil drainage plug	M10	1	30 Nm (22.13 lb ft)	-
5	Oil load cap	M12	1	25 Nm (18.44 lbf ft)	-
6	Ring nut	-	1	100 Nm (118.01 lbf ft)	Loct. 243 + Riveting on the splash guard hub
7	Bleeder cap	-	1	10 Nm (7.38 lbf ft)	-
8	Gearbox cover fastening screws	M8x25	8	25 Nm (18.44 lbf ft)	-

CAUTION

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 bevel gear mounted on the vehicle

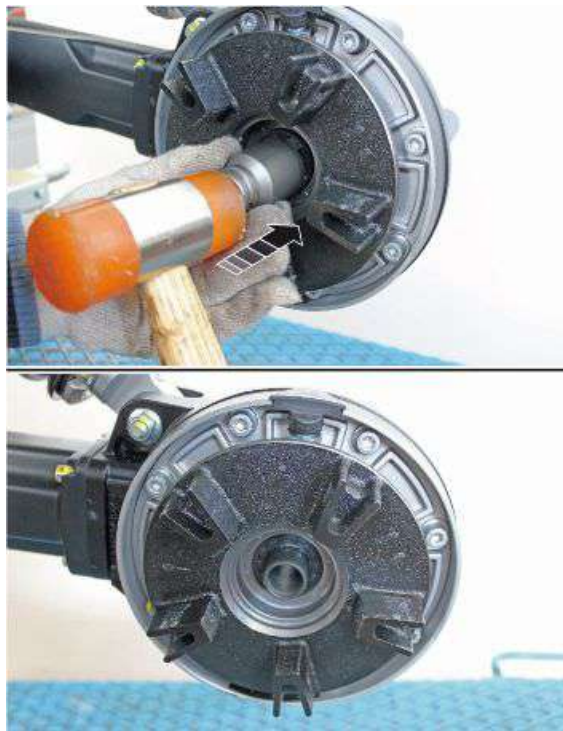
- Firmly screw a small self-tapping screw (M5-M6) on the oil seal



- 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



Removal

CAUTION

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.

Specific tooling

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.

Specific tooling

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.

CAUTION

DURING REASSEMBLY BE CAREFUL, AS THE SEALING RING MUST BE INSERTED UNTIL IT STOPS, USING THE SPECIFIC PRESS-FIT PAD.



- Operating from the internal side of the flange, remove the hub's internal oil seal by tapping it with a punch



- 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.

**Specific tooling****020999Y Crown counter- lock ring wrench**

- Insert the special tool under the shoulder washer and screw the cursor.

Specific tooling**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.



CAUTION

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.

CAUTION

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

**CAUTION**

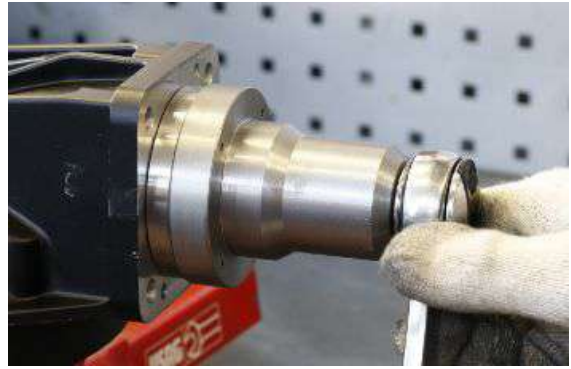
IF THE THIN SHEET IS DAMAGED, THE FLANGE TOGETHER WITH THE BEARING MUST BE REPLACED, AS INDICATED



- Heat the outer area of the pinion bearings holder case
- Using the special tool, loose and remove the pinion bearings holder case.

Specific tooling

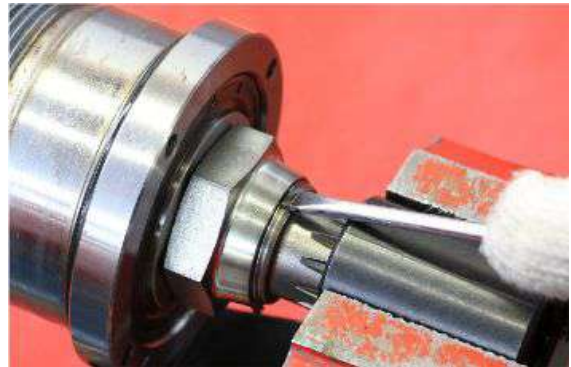
020998Y Pinion case wrench



- Using the specific tool, clamp the assembly in the vice and lift the nut again before removing it.

Specific tooling

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

- Dopo il montaggio della scatola, è necessario verificare il gioco tra pignone e corona. Bloccare in morsa il pignone e installare un comparatore mediante un supporto idoneo. Il tastatore del comparatore deve appoggiarsi all'estremità esterna di un dente posizionato a 90°.

Characteristic

Gioco massimo ammesso

0.08-0.2 mm (0.059-0.147 in)

- Nel caso in cui il gioco misurato risulti discordante rispetto ai valori ammessi, procedere alla correzione mediante selezione e sostituzione di in adeguato spessore asse corona.



Assembling

- 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.



Specific tooling

021000Y Bevel gear set mounting

- Rivet the nut at the groove on the pinion.

**CAUTION**

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.

**Specific tooling****020998Y Pinion case wrench**

- Using the special tool, insert a new seal ring on the cover.

Specific tooling**021005Y Bevel gear cover oil seal punch**

- On the opposite side of the cover, insert a new O-ring.



- 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.

Specific tooling

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.

Specific tooling

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

Specific tooling

020359S 42 x 47 mm punch



- Place the flat washer on the gearbox.



- Insert a new sealing ring on the gear-box using the specific tool, paying attention to the direction of assembly.

Specific tooling**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.

Specific tooling**020360S 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.

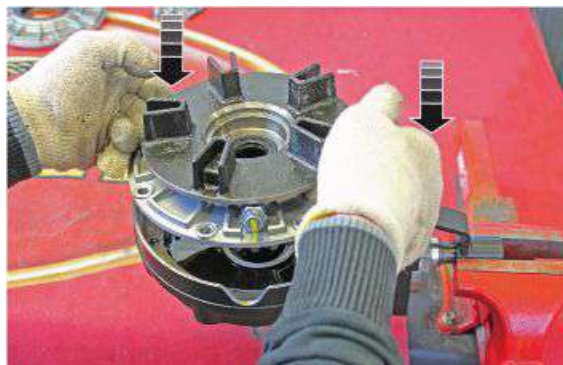
NOTE

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.

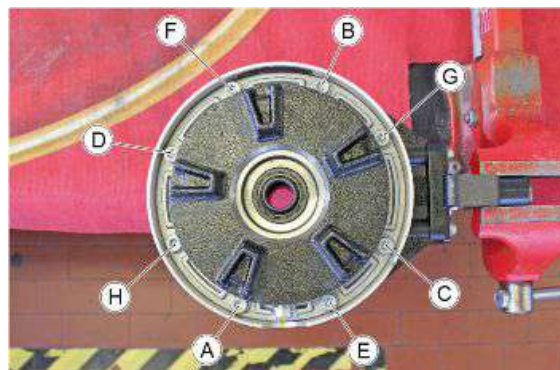
**CAUTION**

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..



- 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.

CAUTION
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



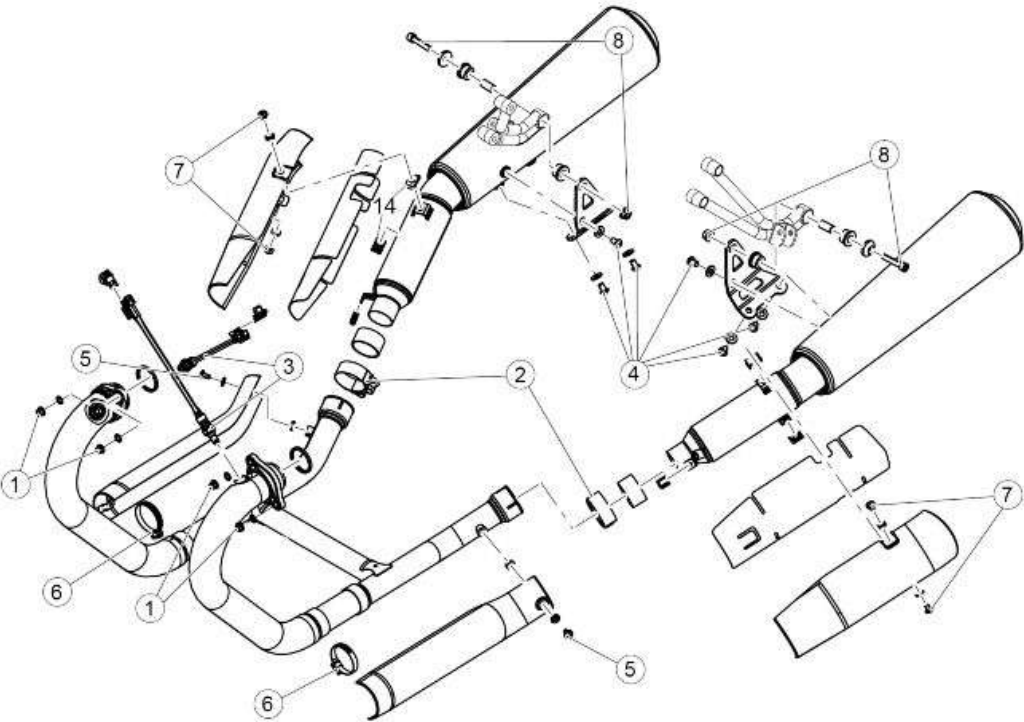
- Insert and tighten the fastening screws (3) to the prescribed torque



- Effettuare il riempimento olio seguendo quanto riportato nel capitolo "Manutenzione / Olio trasmissione / Sostituzione"

See also
[Replacement](#)

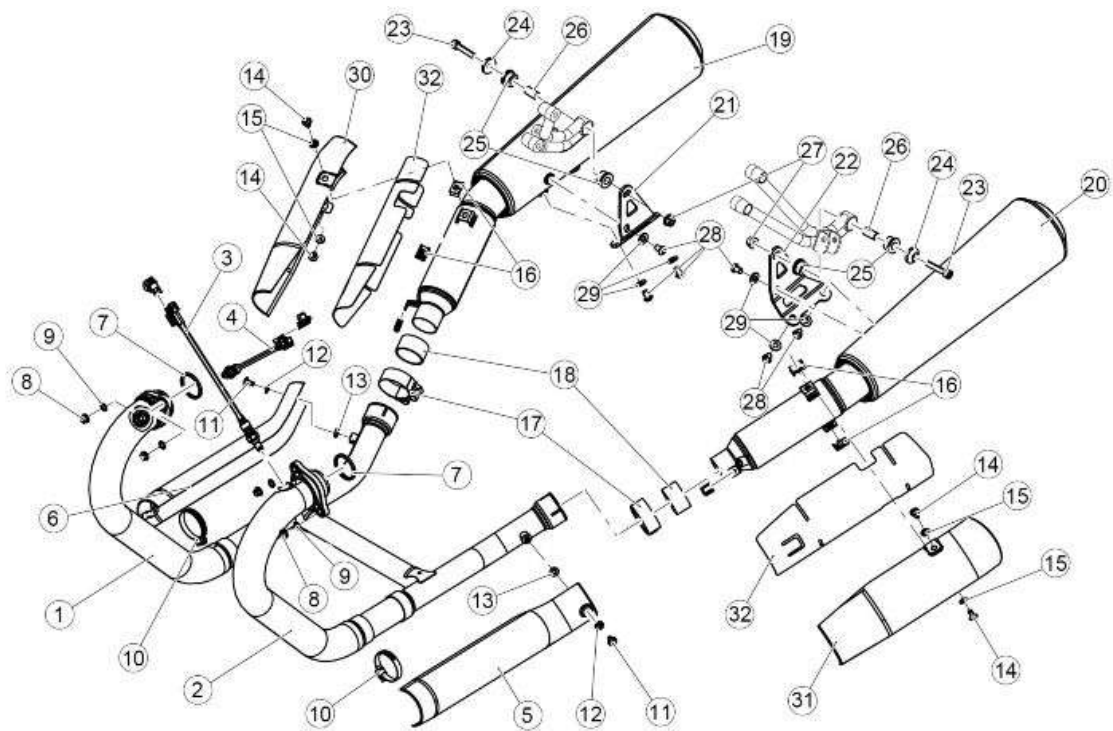
Exhaust



EXHAUST SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Fastening the exhaust pipe to the engine	M8	4	25 Nm (18.44 lbf ft)	-
2	Fastening the exhaust pipe to the silencer	M8	2	25 Nm (18.44 lbf ft)	-
3	Lambda probes fastener	M12x1.25	2	25 Nm (18.44 lbf ft)	-
4	Fastening the silencers to the support	M8	6	25 Nm (18.44 lbf ft)	-
5	Fastening the RH/LH manifold heat shield	M6	2	8 Nm (5.9 lb ft)	-
6	RH/LH manifold heat shield clamp	-	2	3.5 Nm (2.58 lb ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
7	Fastening the RH/LH silencer heat shield	M6	4	8 Nm (5.9 lbf ft)	-
8	Fastening the silencer to the support on the chassis	M8	4	25 Nm (18.44 lbf ft)	-



Key:

- 1. Right exhaust manifold
- 2. Left exhaust manifold
- 3. Lambda probe
- 4. Lambda probe
- 5. Left manifold protection
- 6. Right manifold protection
- 7. Exhaust gasket
- 8. Nut
- 9. Washer
- 10. Clamp
- 11. Screw
- 12. Washer
- 13. Elastic spacer
- 14. Screw
- 15. Washer
- 16. Elastic plate
- 17. Clamp
- 18. Bushing

- 19.Right silencer
- 20.Left silencer
- 21.Right silencer support bracket
- 22.Left silencer support bracket
- 23.Screw
- 24.Bushing
- 25.Spacer
- 26.Rubber ring
- 27.Nut
- 28.Screw
- 29.Washer
- 30.Right silencer protection
- 31.Left silencer protection
- 32.Thermal cover

Removing the tail pipe

- Slide and remove the silencer from the collector



NOTE

THE OPERATIONS FOR REMOVING THE EXHAUST TERMINAL, APPLY TO BOTH ENDS

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.

NOTE

THE OPERATIONS FOR REMOVING THE EXHAUST TERMINAL, APPLY TO BOTH ENDS

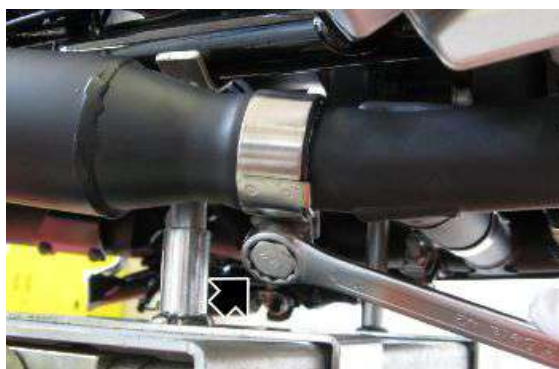
- Remove the three fixing screws of the silencer guard



- Remove the silencer guard, sliding it toward the front of the vehicle



- Loosen the clamp between the silencer and manifold



- Remove the screw that fastens the silencer to the support bracket



- Slide and remove the silencer from the collector



Removing the exhaust manifold

- First remove the fuel tank and the exhaust tailpipes
- Disconnect from their support the connectors of the lambda probe wiring harness.
- Using a screwdriver, press the tab and pull the wiring harness downward at the same time
- Disconnect the connectors of the lambda probe wiring harness



NOTE

REPEAT THIS OPERATION ON THE OPPOSITE SIDE



- Remove the nuts and the corresponding fixing washers of the exhaust manifolds



- Remove the exhaust manifolds at the same time



Removing the lambda sensor

- First remove the fuel tank
- Disconnect from their support the connectors of the lambda probe wiring harness.
- Using a screwdriver, press the tab and pull the wiring harness downward at the same time



- Disconnect the connectors of the lambda probe wiring harness

NOTE

REPEAT THIS OPERATION ON THE OPPOSITE SIDE

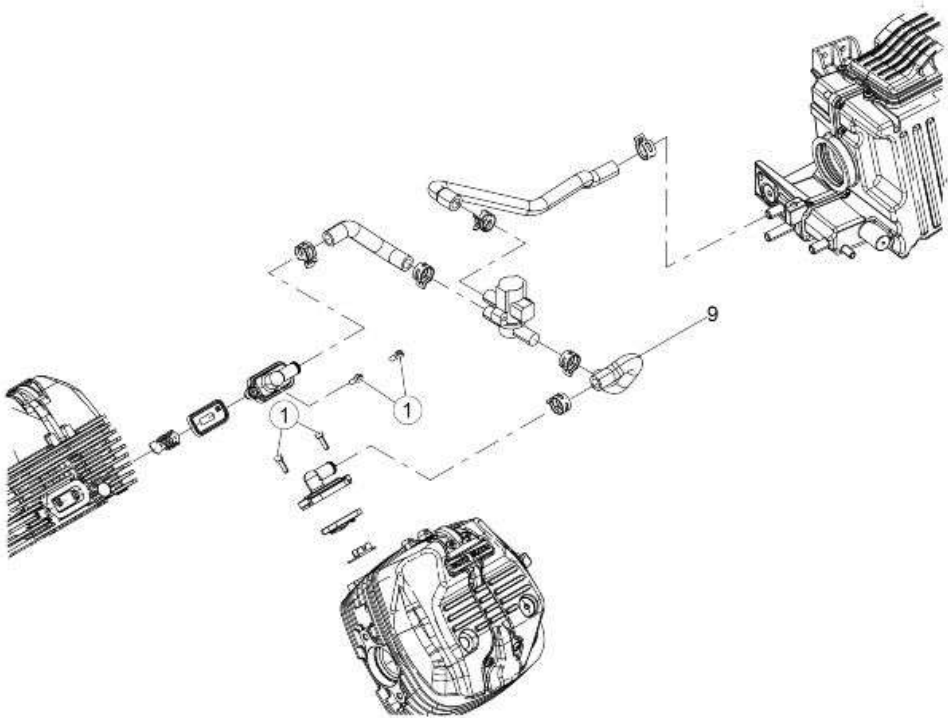


- Unscrew and remove the lambda probe from the exhaust manifold



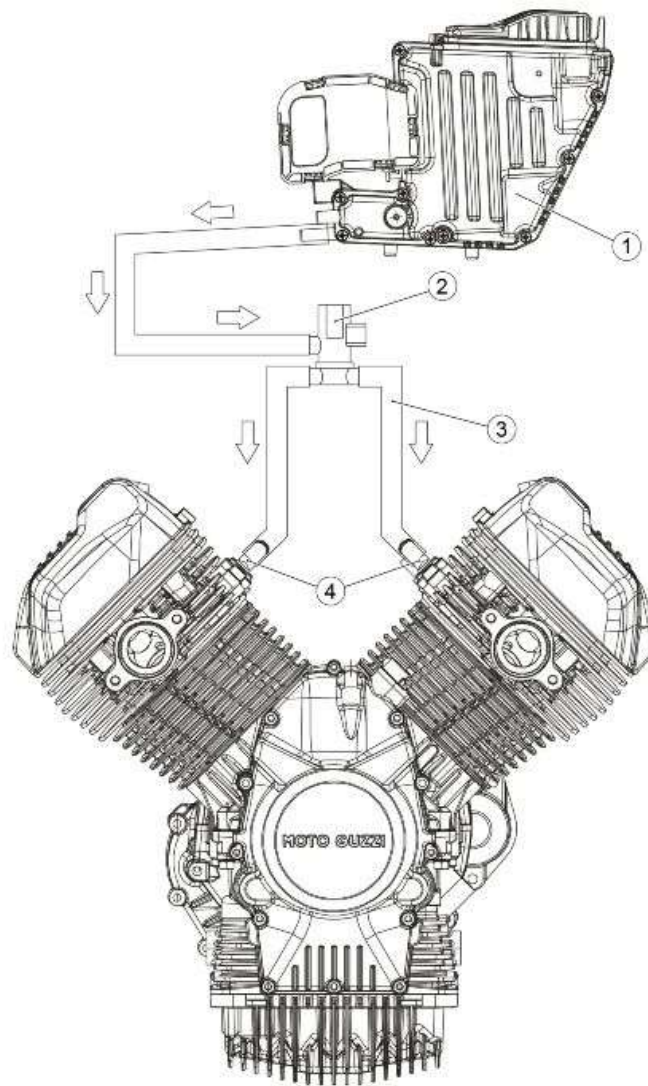
Secondary air system

Tightening torques



SECONDARY AIR SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Red valve cover fixing SHC screws	M5x16	4	3-4 Nm (2.21-2.95 lb ft)	-

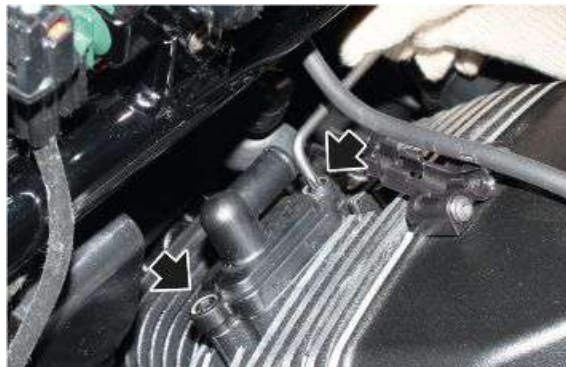
**Key:**

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 5 emissions regulations

- Disconnect the Blow-by pipe from the reed valve cover



- Undo the screws fastening the reed valve cover.



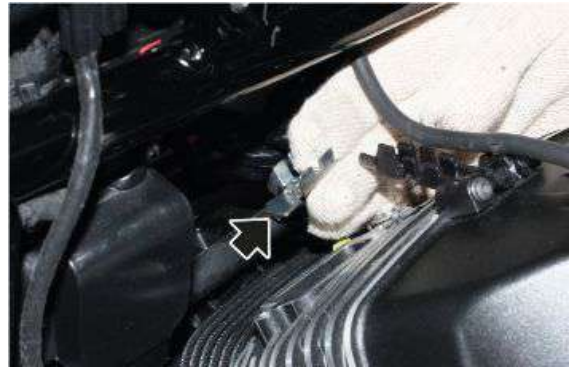
- Remove the reed valve cover



- Remove the reed valve.



- Remove the flame trap.



- A valve controlled by the engine ECU is installed under the tank, which allows the air from cylinders to flow via two flexible hoses.



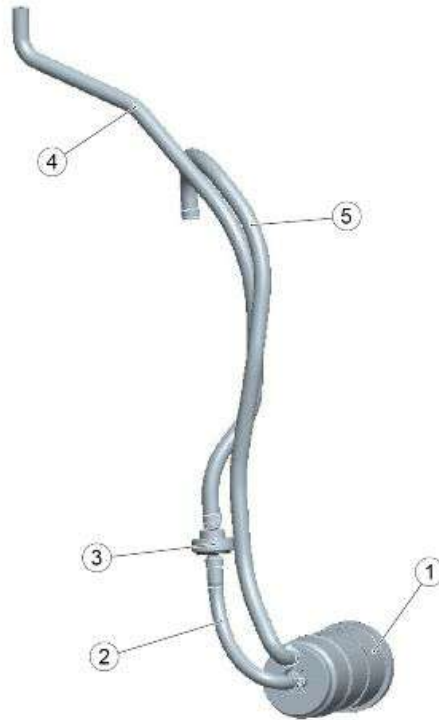
- This valve is connected directly to the filter box via a flexible hose.



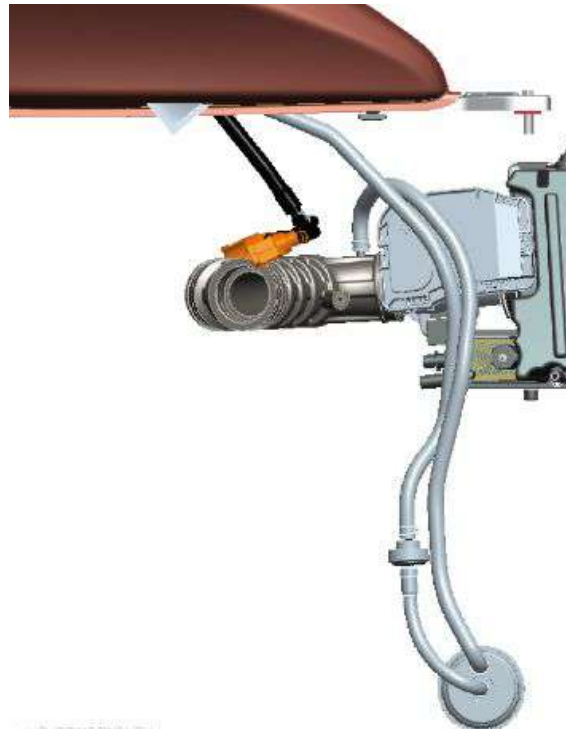
Evaporative emissions control system

key:

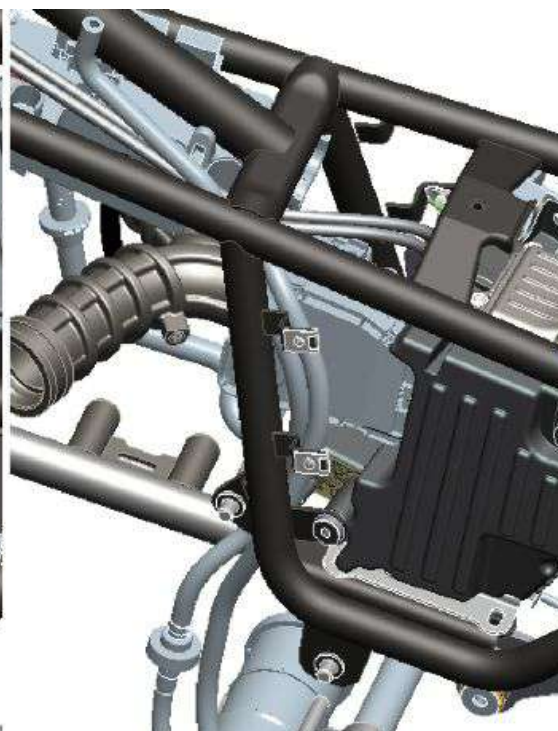
- 1. Canister
- 2. SAE 30 R12A-3/16 pipe
- 3. Breather valve
- 4. SAE 30 R12A-1/4 pipe
- 5. SAE 30 R12A-1/4 pipe



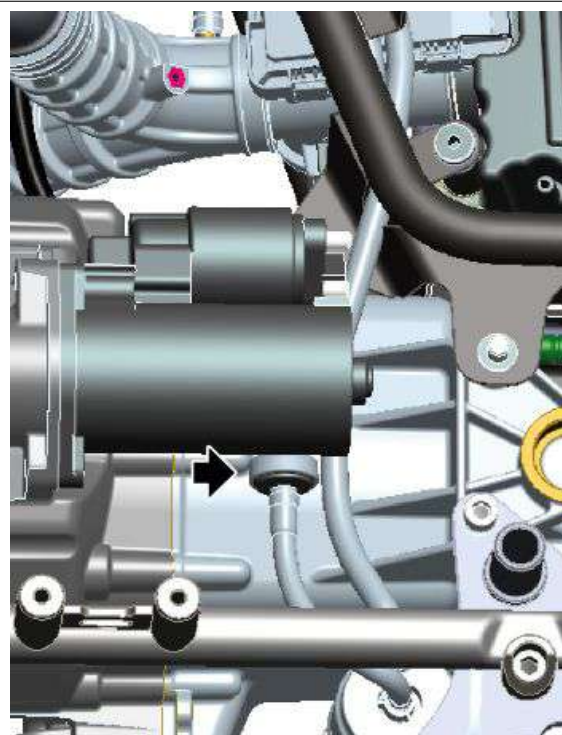
- The canister is installed with the intake inlet above the tank inlet



- Check the correct passage of the pipes on the chassis



- Check the correct passage of the pipes on the starter motor

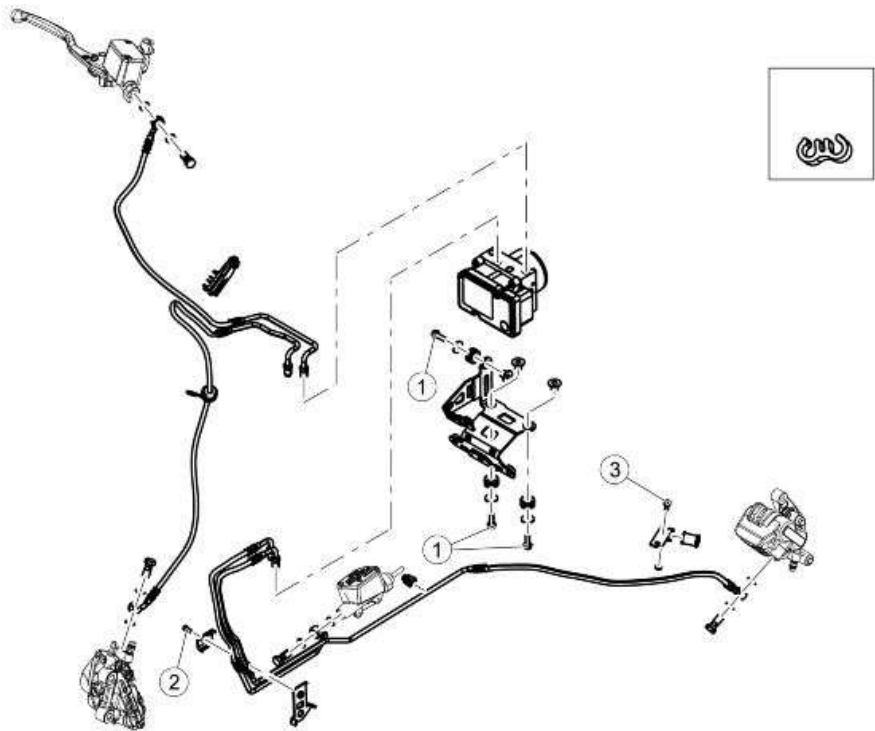


INDEX OF TOPICS

BRAKING SYSTEM

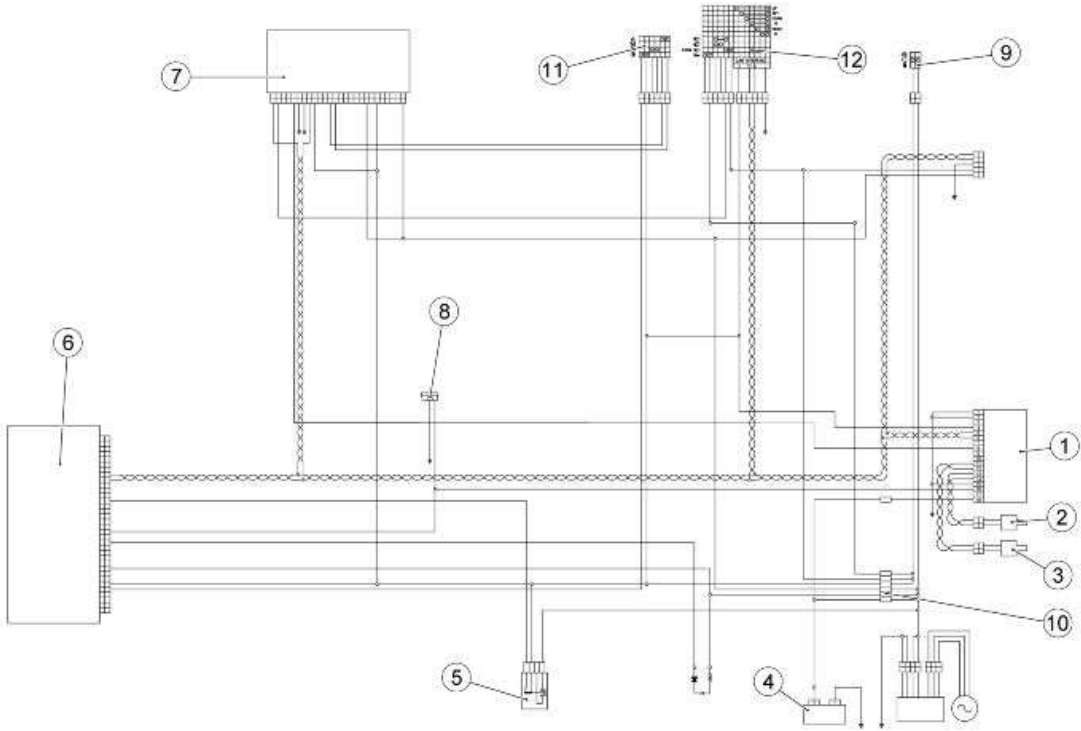
BRAK SYS

ABS



ABS SYSTEM

Pos.	Description	Type	Quantity	Torque	Notes
1	Control unit bracket fastening to the frame	M6x16	2	10 Nm (7.38 lbf ft)	-
2	Screw fastening brake lines fastening plates	M4	1	3 Nm (2.21 lbf ft)	-
3	Clamp fastening screw	M5	1	6 Nm (4.43 lbf ft)	-



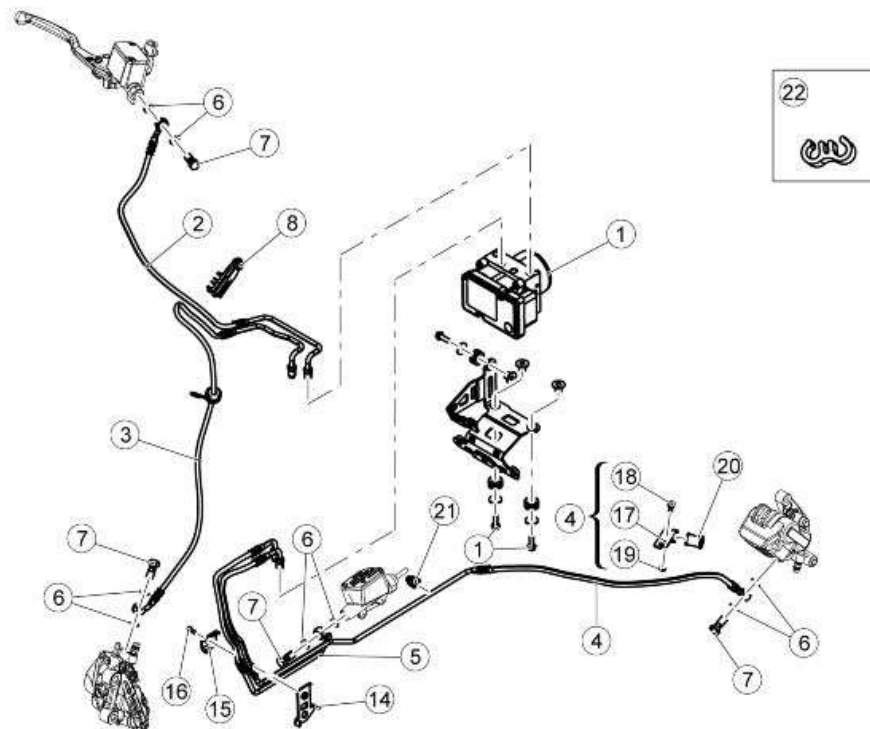
Key:

1. ABS control unit
2. Front ABS sensor
3. Rear ABS sensor
4. Battery
5. Injection loads relay
6. ECU
7. Instrument panel
8. K line (diagnosis)
9. Ignition switch
10. Fuses
11. Right light switch
12. Light switch left

ABS control unit pin out

1. Ground lead
 2. Ground lead
 3. /
 4. Live supply (+ key)
 5. CAN H line
 6. CAN L line
 7. /
 8. ABS Warning light control
 9. /
 10. /
 11. Rear ABS sensor positive signal
 12. Rear ABS sensor ground
 13. Front ABS sensor ground
 14. Front ABS sensor positive signal
 15. Ground lead
 16. K diagnostic line
 17. Control unit power
-

Foreword

**Key:**

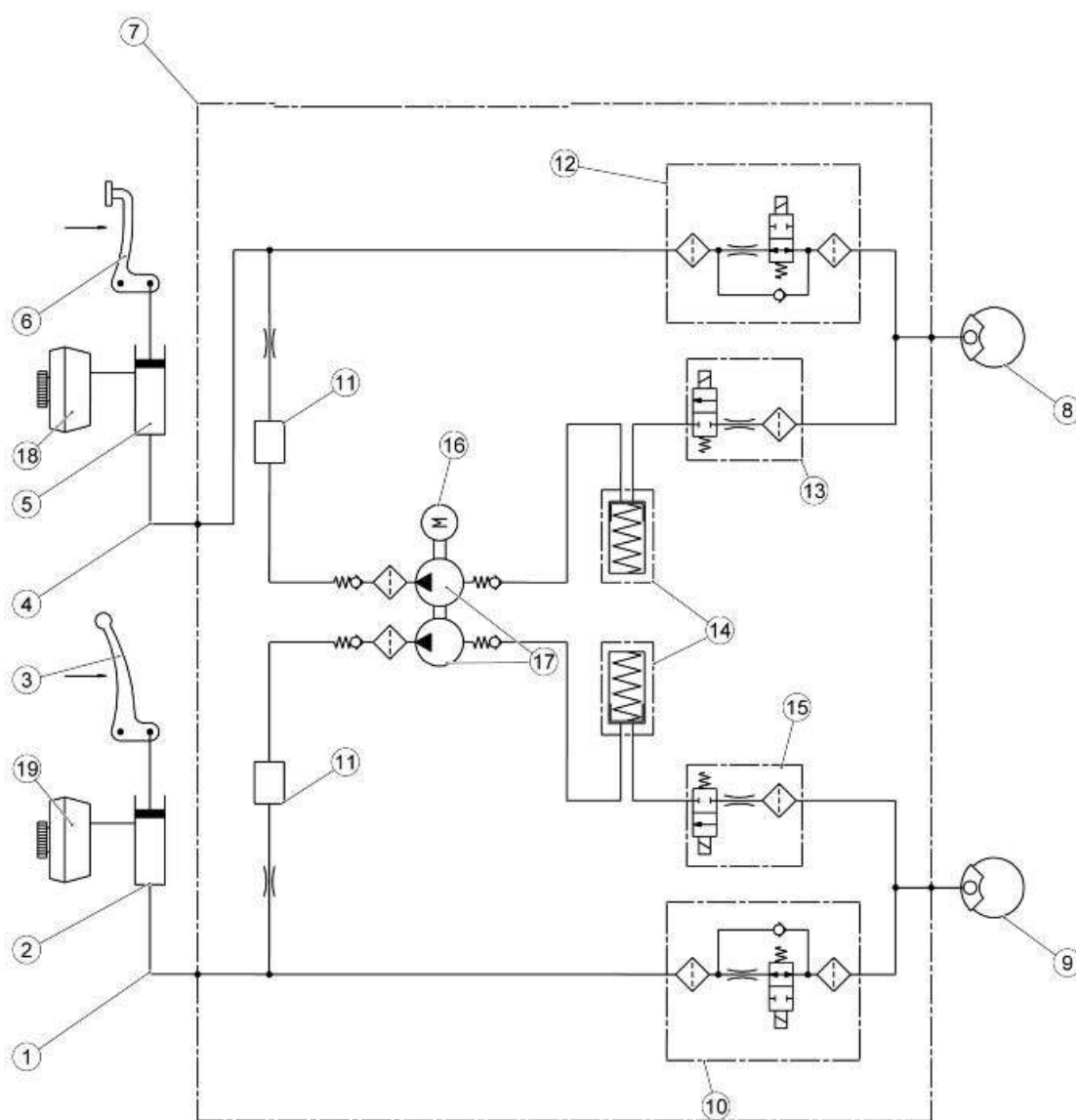
1. ABS control unit
2. ABS control unit front pump pipe
3. ABS control unit front calliper pipe
4. ABS control unit rear calliper pipe
5. ABS control unit rear pump pipe
6. Washer
7. Oil pipe screw
8. Brake pipe support
9. Bushing
10. Rubber ring
11. Screw
12. Washer
13. Control unit support bracket
14. Brake pipe mounting plate
15. Pipe fixing plate
16. Screw
17. Clamp
18. Screw
19. Nut

20. Ring

21. Cable guide

22. Clip

Operating diagram



ABS functional diagram key

1. Front system circuit
2. Front brake pump
3. Front brake lever
4. Rear system circuit
5. Rear brake pump
6. Rear brake pedal control
7. ABS control unit
8. Rear brake calliper
9. Front Calliper
10. Front brake circuit intake solenoid valve (normally open)
11. Humidifier
12. Rear brake circuit intake solenoid valve (normally open)
13. Rear brake exhaust circuit solenoid valve (normally closed)
14. Rear/front brake circuit low pressure accumulator
15. Front brake exhaust circuit solenoid valve (normally closed)
16. DC electric motor
17. Double circuit hydraulic 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 shown in the event that the duration of the pressure reduction phase exceeds a predetermined time 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 UN-EVEN 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. It is not possible to brake 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.

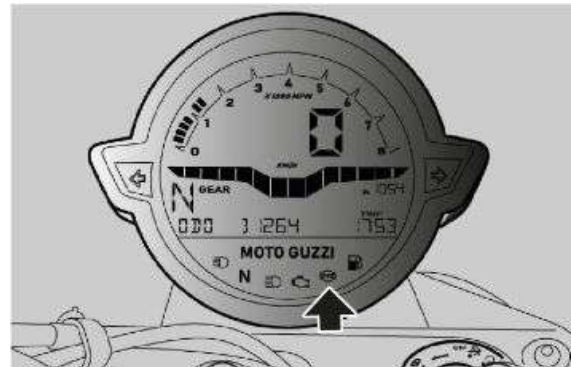
Riding with an active ABS system

- When turning the key on, the ABS warning light turns on and flashes until reaching 5 km/h (3.11 mph); at this point it turns off.

CAUTION



THE STEADY LIGHTING OR THE CONTINUOUS FLASHING OF THE ABS WARNING LIGHT INDICATES THE PRESENCE OF AN ANOMALY AND THE DEACTIVATION OF THE ABS FUNCTIONALITY.



20 A fuse (ABS Main fuse) (6)

Protects: ABS Control unit.



Guide to diagnosis

PREMISE

Each time the key is ON, at least one current or stored* error of the ABS system is often detected:

- the ABS warning light turns on permanently

The ABS system is deactivated!

The system operates perfectly just as any other braking system without ABS

*** The diagnosis requires exceeding the 5 km/h.**

Each time the key is ON, if at least one current or stored* error of the ABS system is not detected:

- the ABS warning light flashes

When the 5 km/h (3.11 mph) are exceeded:

- 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!

The system operates perfectly just 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 this given time one of the conditions is missing but then it comes back, the timer is reset and the system is no longer able to diagnose the error.

The ABS system is still inactive.

Example:

- error code 5D93 requires some minutes before it is diagnosed during the given time:
- the ABS warning light ABS keeps flashing

GUIDE TO ABS FAULT DIAGNOSIS

1. ABS LAMP ON
2. CONNECT PADS

PADS COMMUNICATE? (NO, go to 3; YES, go to 4)

3. PERFORM THESE CHECKS:

- A. PIN 1 Ground connection
- B. +12V at PIN 18
- C. +12V at PIN 4 with key ON

4. ARE THERE ANY ERRORS? YES, go to point 5; NO, go to 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 PIN8 of the ABS control unit connector and the instrument panel warning light.
- 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 panel malfunction

NOTE: to carry out a check using the diagnostic tool on the wheel speed sensor, refer to the operations described in chapter ""ELECTRICAL SYSTEM/CHECKS AND CONTROLS/SPEED SENSOR" chapter.

Use of diagnostics instrument for ABS system

Abs screen pages

ECU INFO screen page

Diagnostic tool - Control unit info screen page

In this screen page are read the general data regarding the control unit, for example: type of software, mapping, control unit programming data

- Frame number
- SW version (software version)
- Vehicle code
- Vehicle manuf. or encoding
- Vehicle ID PIN 2, 15 or ECU

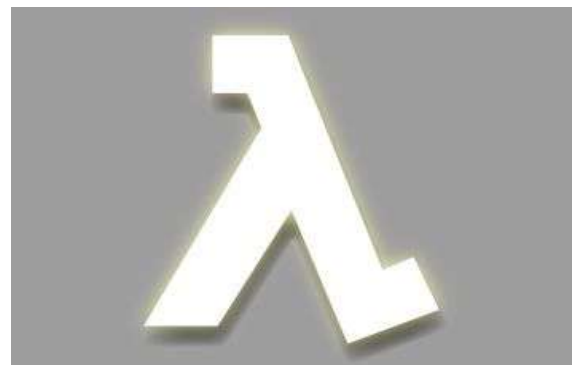


PARAMETERS screen page

Diagnostic tool - Parameters

This screen page is used to adjust some control unit parameters

- Front wheel speed
- Rear wheel speed



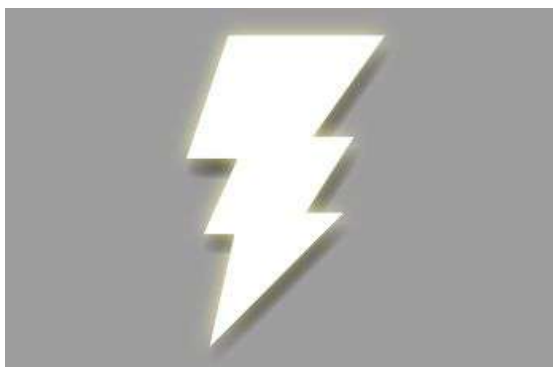


Quality test of the sensors

When turning the wheel or acting on the brake, a variation of parameters must be detected.

ACTIVATION screen page

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

Diagnostic tool characteristics	Value/example	Units of measurement	Notes
ABS Warning Light	-	-	During the test the warning light flashes
Front brake bleed	-	-	Useful in the event of sponginess of the lever, despite the bleeding having been performed like in a traditional brake system
Rear brake bleed	-	-	Useful in the event of sponginess of the lever, despite the bleeding having been performed like in a traditional brake system

ERRORS screen page

This display shows potential errors detected in the vehicle (ATT) or stored in the control unit (MEM) and it allows to check error clearing (STO).



ERRORS

Diagnostic tool characteristics	Notes
Front wheel speed sensor: Electric malfunction 5D90	Electrically defective wiring or sensor
Front wheel speed sensor: The signal changes irregularly 5D91	Faulty sensor; Signal interference
Front wheel speed sensor: the signal decreases periodically 5D92	Possible tone wheel fault due to deformations or dirt; possible alterations on the wheel bearing surface; abnormal tone wheel vibrations
Front wheel speed sensor: Missing signal or speed too low in relation to the rear wheel 5D93	Faulty sensor; missing sensor or tone wheel; excessive distance between the sensor and the tone wheel; tone wheel with wrong number of teeth;
Front wheel speed sensor: missing acceleration after pressure reduction 5D94	Faulty sensor; missing sensor or tone wheel; excessive distance between the sensor and the tone wheel
Front wheel speed sensor: Excessive speed detected 5D95	Faulty sensor; tone wheel with wrong number of teeth; wrong tyre size
Rear wheel speed sensor: electrical malfunction 5DA0	Electrically defective wiring or sensor
Rear wheel speed sensor: the signal works irregularly 5DA1	Faulty sensor; Signal interference
Rear wheel speed sensor: the signal decreases periodically 5DA2	Possible tone wheel fault due to deformations or dirt; possible alterations on the wheel bearing surface; abnormal tone wheel vibrations
Rear wheel speed sensor: No signal or speed measured too low in relation to the front wheel 5DA3	Faulty sensor; missing sensor or tone wheel; excessive distance between the sensor and the tone wheel; tone wheel with wrong number of teeth;
Rear wheel speed sensor: missing acceleration after pressure reduction 5DA4	Faulty sensor; missing sensor or tone wheel; excessive distance between the sensor and the tone wheel
Rear wheel speed sensor: Excessive speed detected 5DA5	Faulty sensor; tone wheel with wrong number of teeth; wrong tyre size
Control unit 5DD3	Possible control unit fault
Recirculation pump 5DF0	Possible control unit fault
Recirculation pump 5DF1	Possible control unit fault
Control unit 5DF2	Possible control unit fault
Low electrical voltage - long period detection 5DF3	Excessively low voltage detected at PIN 18 of ABS ECU for 30 seconds. Possible fault at regulator / battery discharge
Low electrical voltage 5DF4	Insufficient high voltage detected at PIN 18 of ABS ECU. Check that the PIN 18 of the 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
Control unit 5DF5	Possible control unit fault
High electrical voltage 5DF7	Excessively high voltage detected at PIN 18 of ABS ECU. Possible fault at regulator
Vehicle encoding 5E59	Inconsistency detected between memory coding (INFO ECU/ Vehicle code) and what is measured at wiring harness identification PIN (INFO ECU screen page, Vehicle identification line - Pins 2-15 of ABS control unit)
Control unit F01F	Possible control unit fault

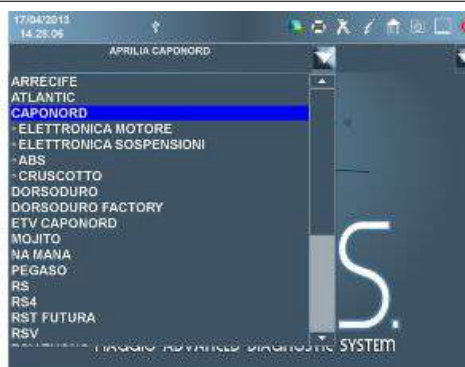
Diagnostic tool report diagnostic tool

In the following are described the procedure to be performed through the diagnostic tool in order to generate an errors report:

- When started the program, select the brand.



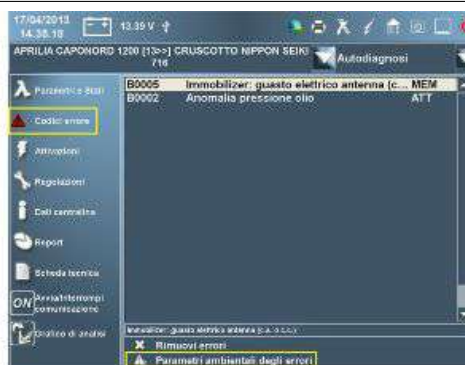
- Select the vehicle and the component.



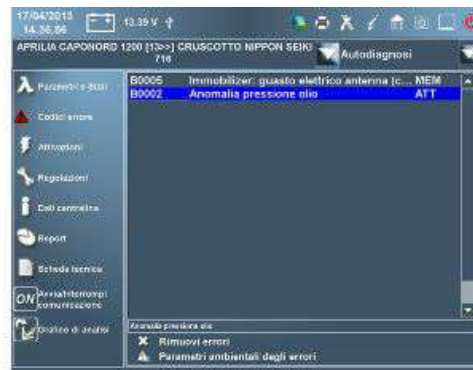
- Select Self-diagnosis.



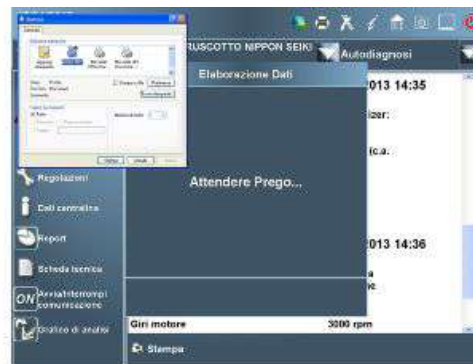
- Go to the page Error codes.
- Select an error and show the Ambient parameter error(where provided).



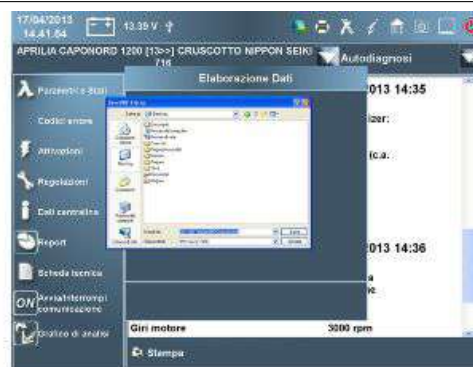
- Repeat the operation by selecting each error and showing the corresponding Ambient parameter error (where provided).



- Go to the page Report and then on Print and select the virtual PDF printer.



- If there is no PDF printer, there are several free programs, ask the information systems to install it.
- Name the file with a name that contains the main information of the vehicle and the analysed component e.g. CN1200-Chassis0465-Instrument panel.

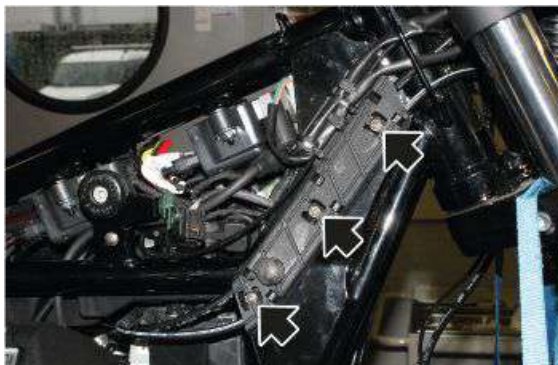


Modulator

Before removing the modulator, the braking system must be completely emptied.

MODULATOR REMOVAL

- Disconnect the connector of the lambda probe and move the wiring harness from the area in which the operations will be performed
- Remove the three screws of the pipe feedthrough and then move it away from the chassis, to release the pipes of the front brake



- Remove the left lambda probe from the exhaust manifold
- Remove the three connector cover fixing screws



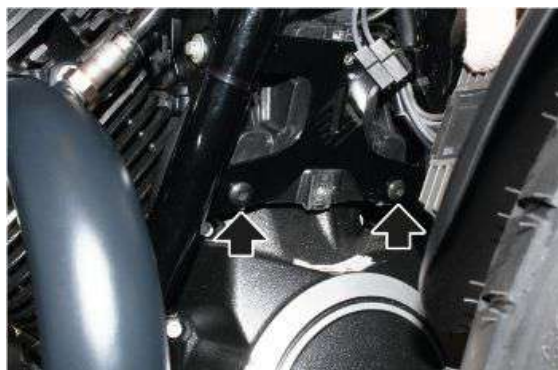
- Disconnect the connector from the modulator



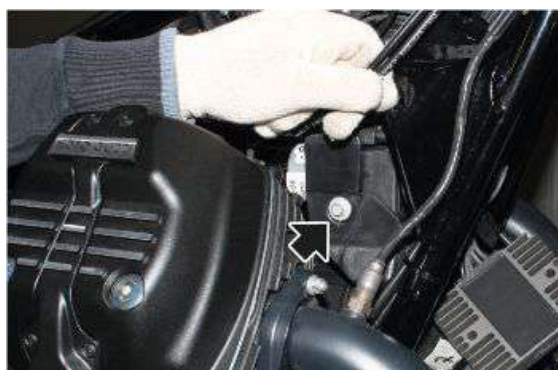
- Remove the screws that fasten the voltage regulator to the chassis
- Remove the regulator and the horn from the vehicle



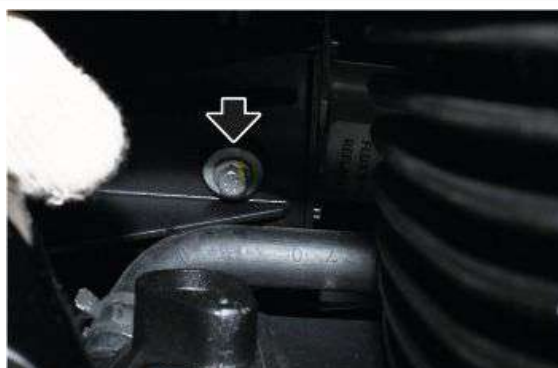
- Remove the front screws of the modulator support



- Remove the side screw of the modulator support



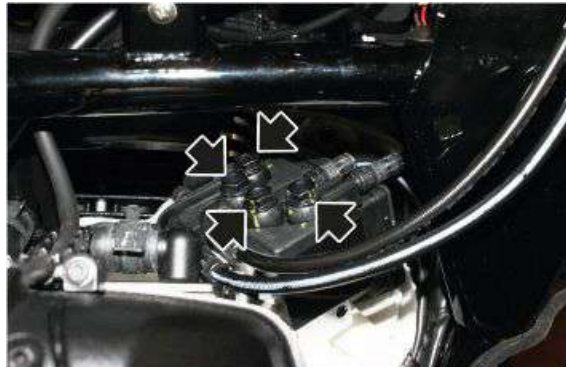
- Turn the modulator to the left to gain access to the lower fixing screw
- Remove the fixing screw and detach the modulator from its support



- Remove the modulator support from the vehicle, taking it out from the left side



- Put a wipe under the modulator
- Remove the brake pipe couplings from the modulator, making sure to retrieve all the copper seal washers



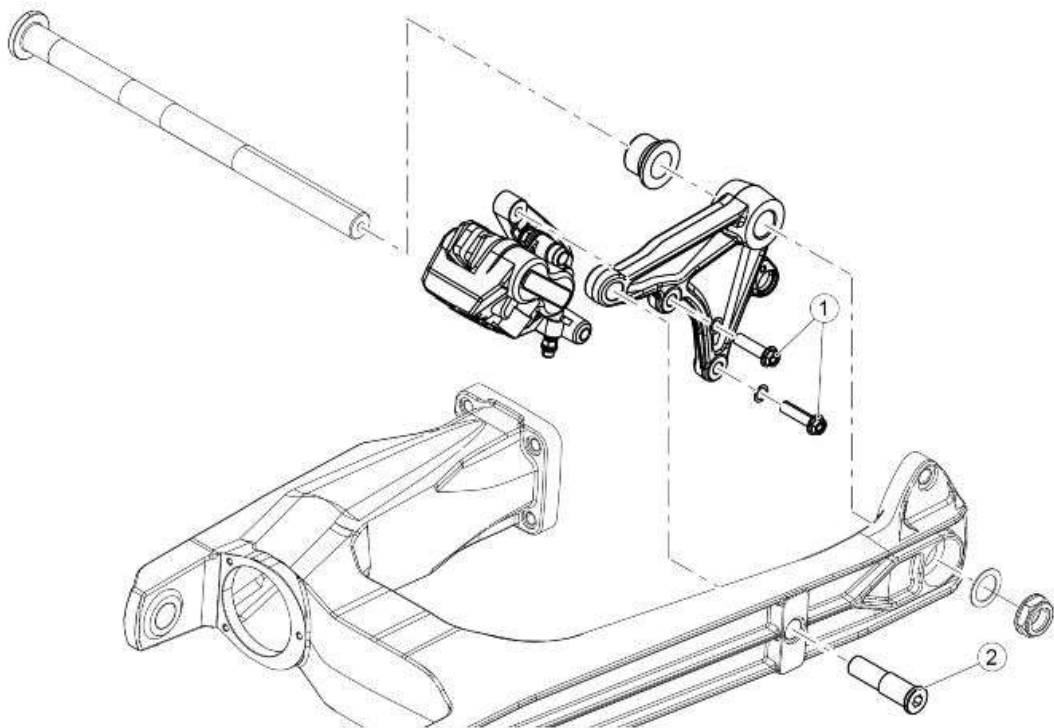
- Remove the modulator's pipe guide



- Remove the modulator from the vehicle, taking it out from the right side

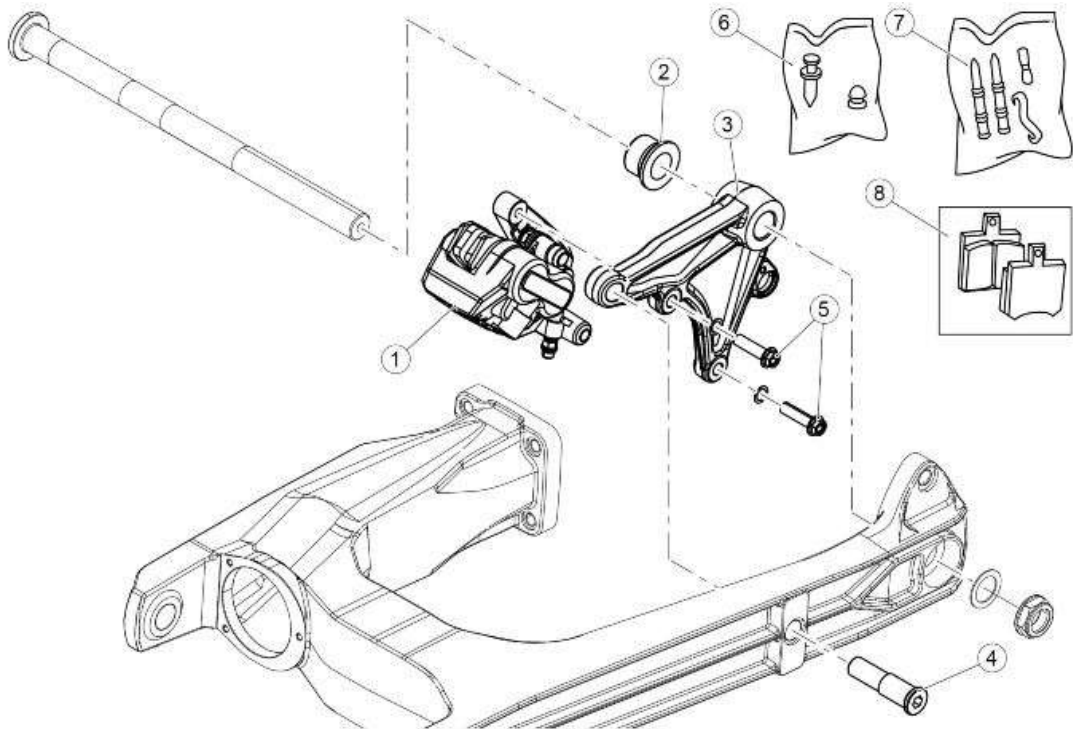


Rear brake calliper



REAR BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lbf ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 Nm (25.81 lb ft)	-



Key:

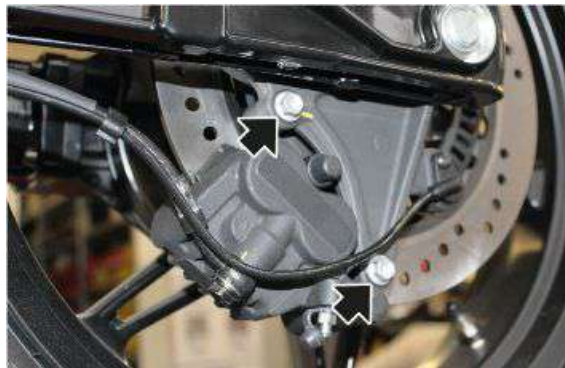
1. Rear brake calliper
2. Spacer
3. Brake calliper mounting plate
4. Screw fastening the plate to the swingarm
5. Screws fastening the calliper to the plate
6. Bleed + cap
7. Pins + spring kit
8. Brake pads copy

Removal

- Obtain a special container and empty the system
- Remove the screw fixing the brake pipe to the clamp



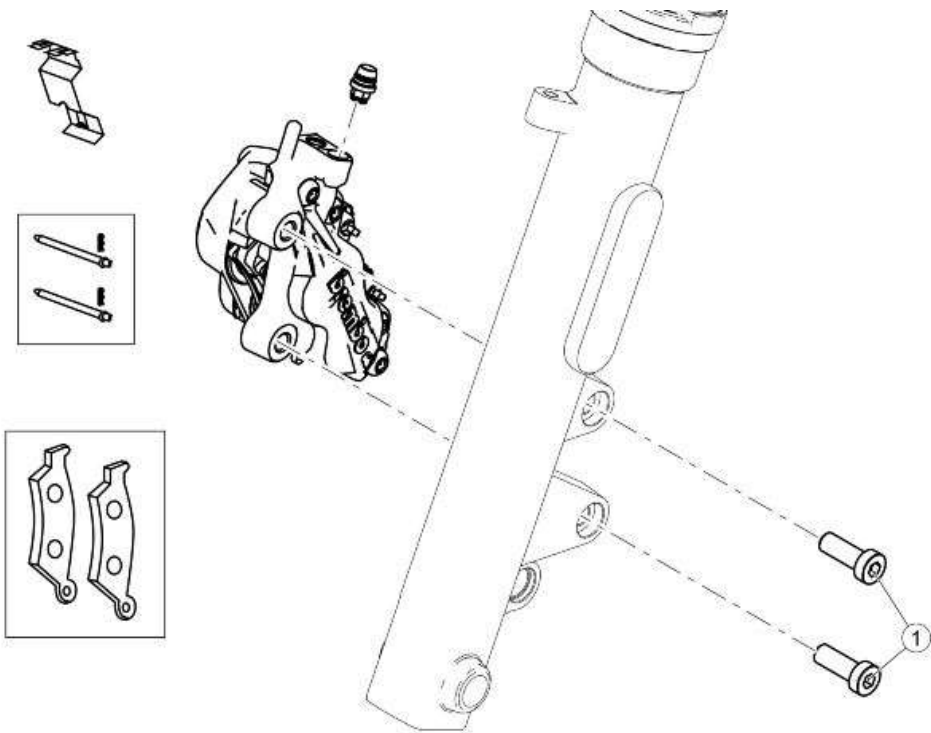
- Remove the two calliper fixing screws



- Remove the calliper

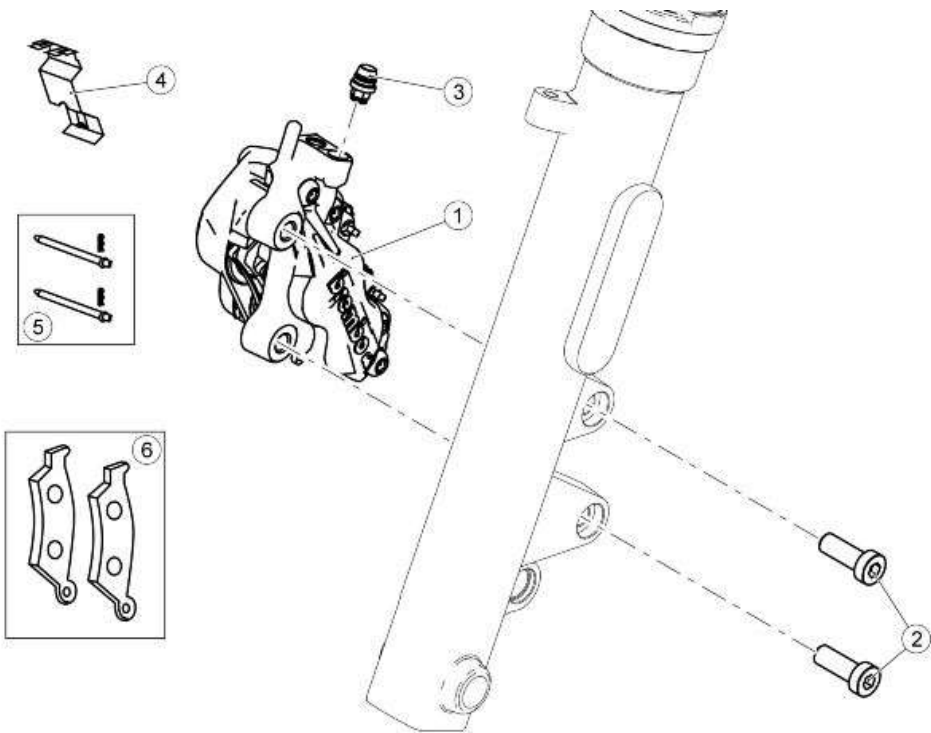


Front brake calliper



FRONT BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lb ft)	-



Key:

- 1. Front left brake calliper

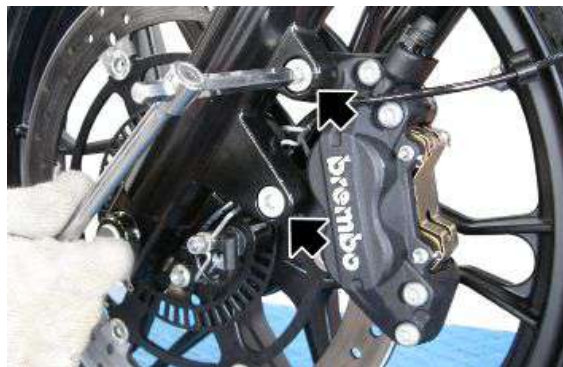
2. Screw
3. Bleed + cap
4. Spring
5. Pins + calliper springs
6. Pair of pads

Removal

- Obtain a special container and empty the system
- Remove the screw fixing the brake pipe to the clamp



- Remove the two calliper fixing screws

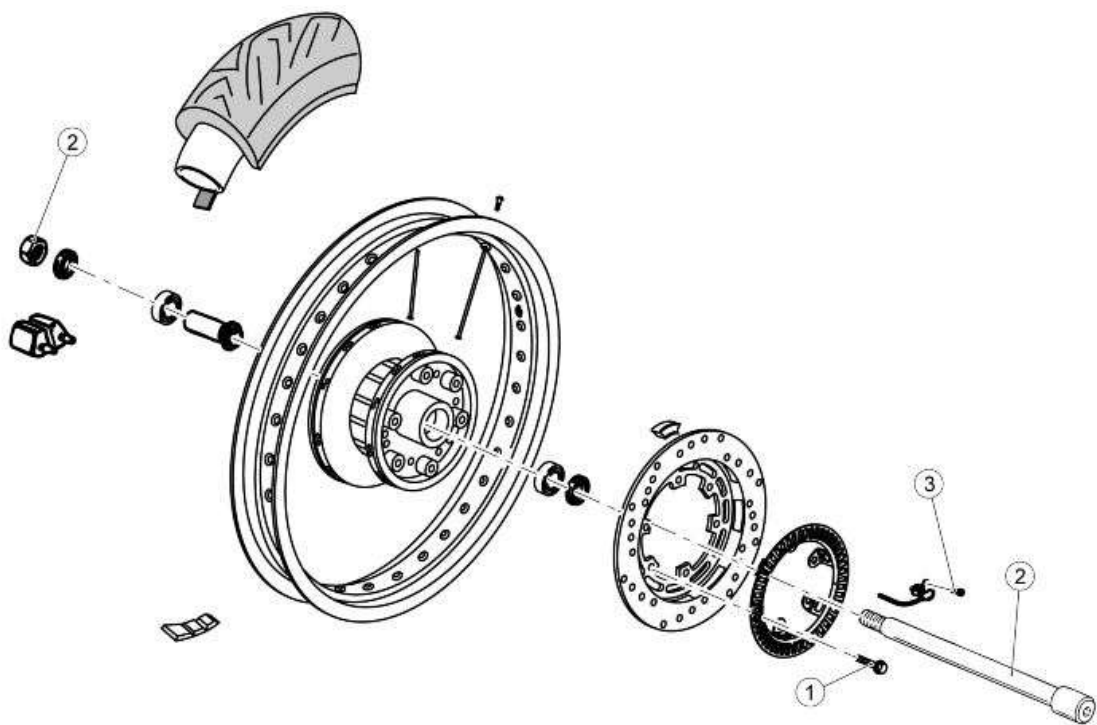


- Remove the calliper

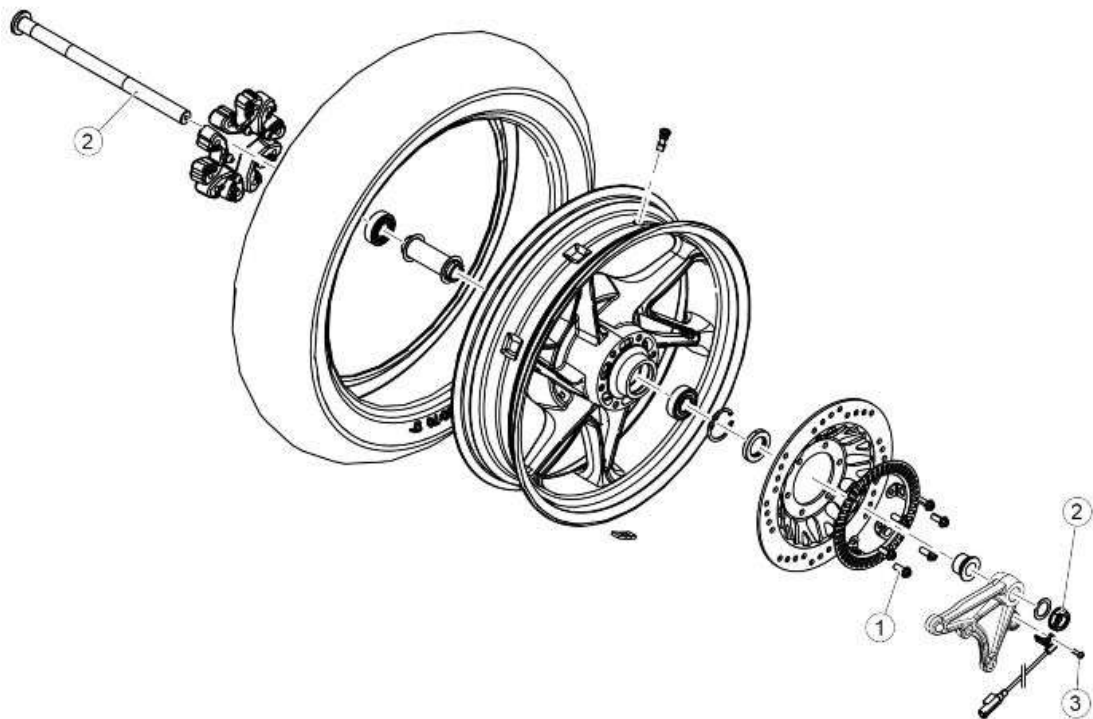


Rear brake disc

(SPECIAL)



(STONE)



REAR WHEEL

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	100 Nm (73.77 lb ft)	-
3	ABS sensor fixing screw	M6	1	6 Nm (4.43 lbf ft)	Loctite 243

Removal

- Remove the rear wheel
- Remove the six fixing screws (1) of the tone wheel and the front disc



- Remove the tone wheel (2)



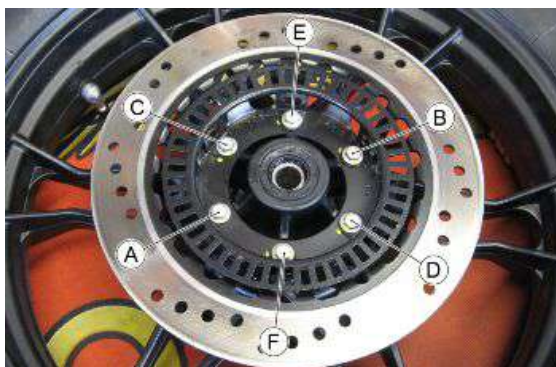
- Remove the brake disc (3)



DURING REFITTING, APPLY LOCTITE 243 ON THE THREAD OF THE BRAKE DISC SCREWS (1).

CAUTION

DURING REFITTING, SCREW ALL THE SCREWS (1) MANUALLY AND TIGHTEN THEM OPERATING DIAGONALLY FOLLOWING THIS SEQUENCE: A-B-C-D-E-F.



Disc Inspection

CAUTION

THE BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.

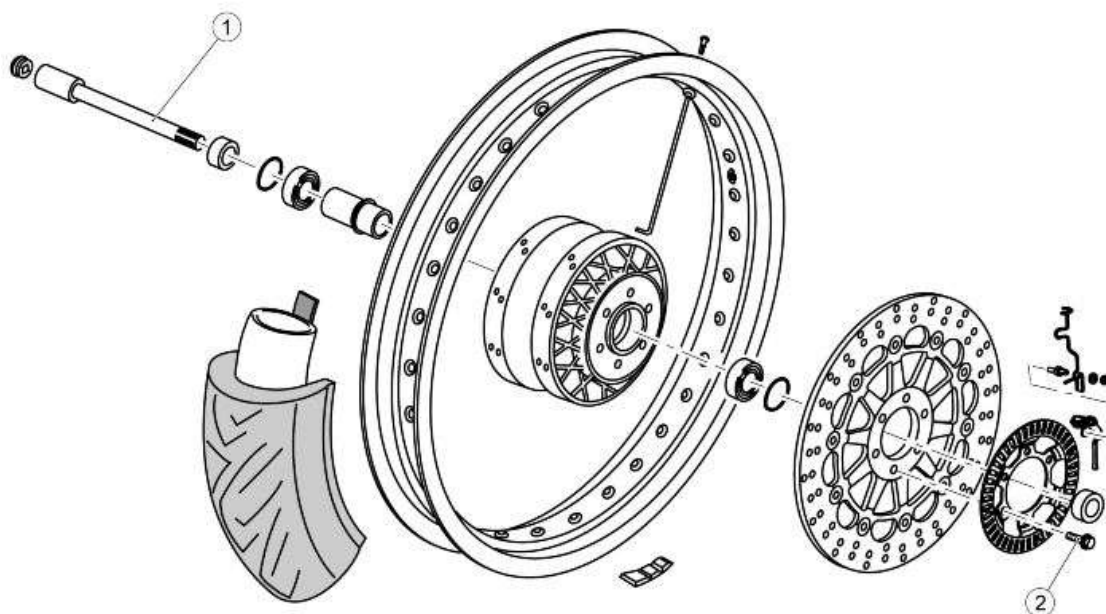
- The following operations are to be carried out with brake disc fitted on the wheel.
- Check the disc for wear by measuring the minimum thickness with a micrometer in different points. If the minimum thickness, even in a single point of the disc, is less than the minimum value, replace the disc.



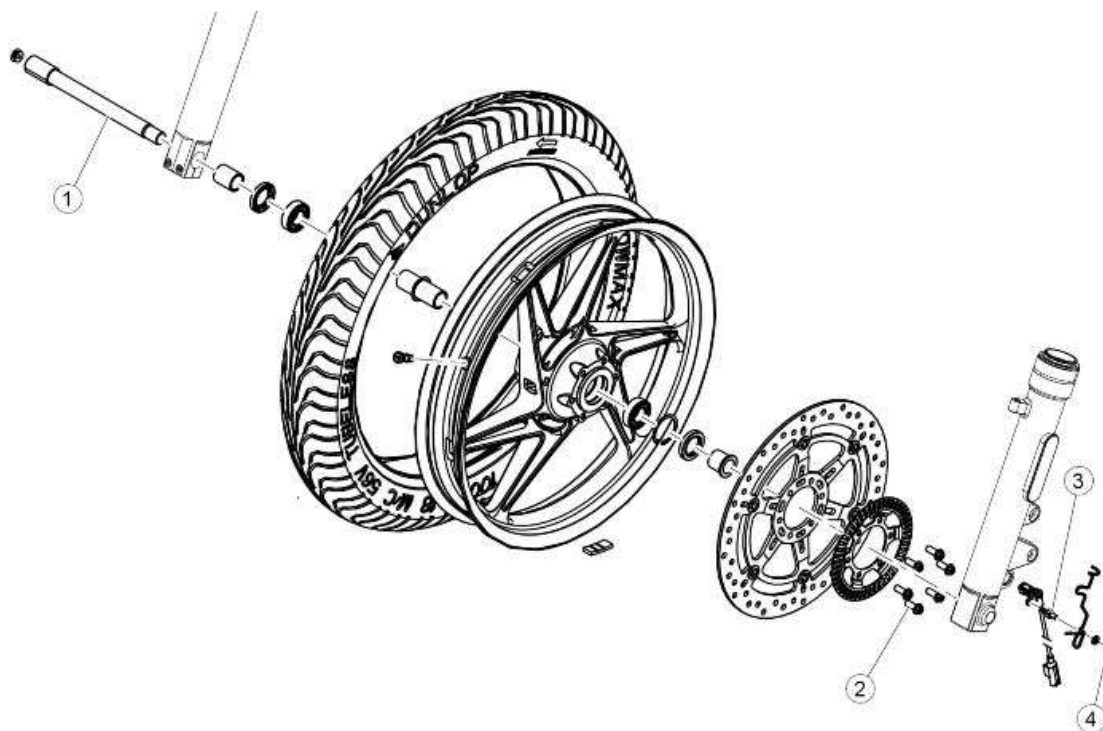
Disc thickness minimum value: 4.5 mm (0.18 in)

Front brake disc

(SPECIAL)



(STONE)

**FRONT WHEEL**

Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lb ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

Removal

- Remove the rear wheel
- Remove the six fixing screws (1) of the tone wheel and the front disc



- Remove the tone wheel (2)



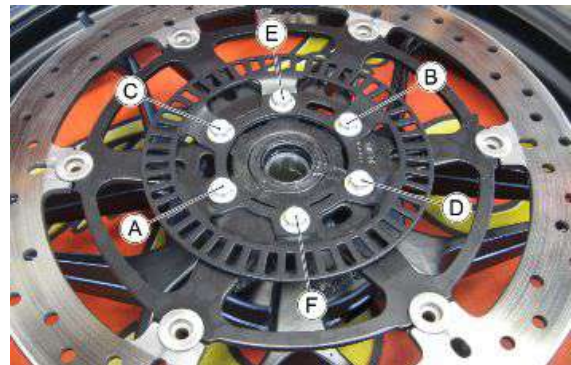
- Remove the brake disc (3)



DURING REFITTING, APPLY LOCTITE 243 ON THE THREAD OF THE BRAKE DISC SCREWS (1).

CAUTION

DURING REFITTING, SCREW ALL THE SCREWS (1) MANUALLY AND TIGHTEN THEM OPERATING DIAGONALLY FOLLOWING THIS SEQUENCE: A-B-C-D-E-F.

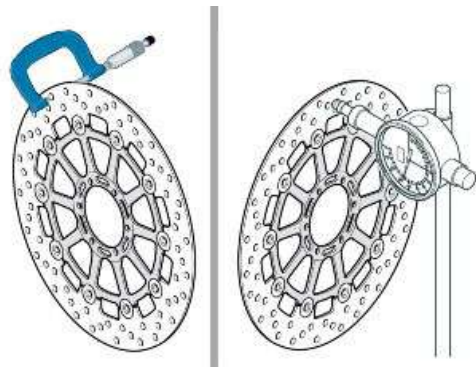


Disc Inspection

CAUTION

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)

Front brake pads

Removal

- Remove the Seeger locking the retaining pins of the brake pads



- Remove the brake pad retaining pins



- Collect the protection plate.



- Remove the brake pads



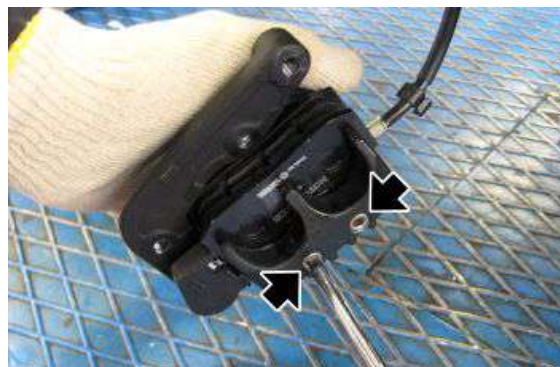
Rear brake pads

Removal

- Remove the rear brake calliper



- Remove the screws locking the brake pads



- Remove the brake pads



Bleeding the braking system

Front

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 control and by poor braking efficiency.

CAUTION

IN VIEW OF THE DANGER THIS POSES FOR VEHICLE AND RIDER, THE HYDRAULIC CIRCUIT MUST BE BLED AFTER REFITTING THE BRAKES AND RESTORING THE BRAKING SYSTEM TO ITS NORMAL OPERATING CONDITIONS.

NOTE

THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE BLEEDING 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.

The bleeding procedure can be performed in a traditional way or using specific tools such as vacuum pumps or similar.

In the following is shown the "traditional" bleeding procedure.

- Remove the rubber protection cover from 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.
- Operate the brake lever and then open the bleed valve on the calliper 1/4 of a turn to let the air out.
- Close the bleed again before reaching the lever end of the stroke and repeat the operation until there is no air.
- Repeat the procedure for both callipers.



- 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.

Rear

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 control and by poor braking efficiency.

CAUTION

IN VIEW OF THE DANGER THIS POSES FOR VEHICLE AND RIDER, THE HYDRAULIC CIRCUIT MUST BE BLED AFTER REFITTING THE BRAKES AND RESTORING THE BRAKING SYSTEM TO ITS NORMAL OPERATING CONDITIONS.

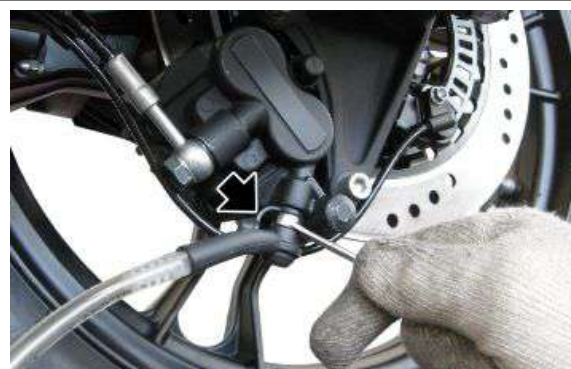
NOTE

THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE BLEEDING 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 from the bleed valve.

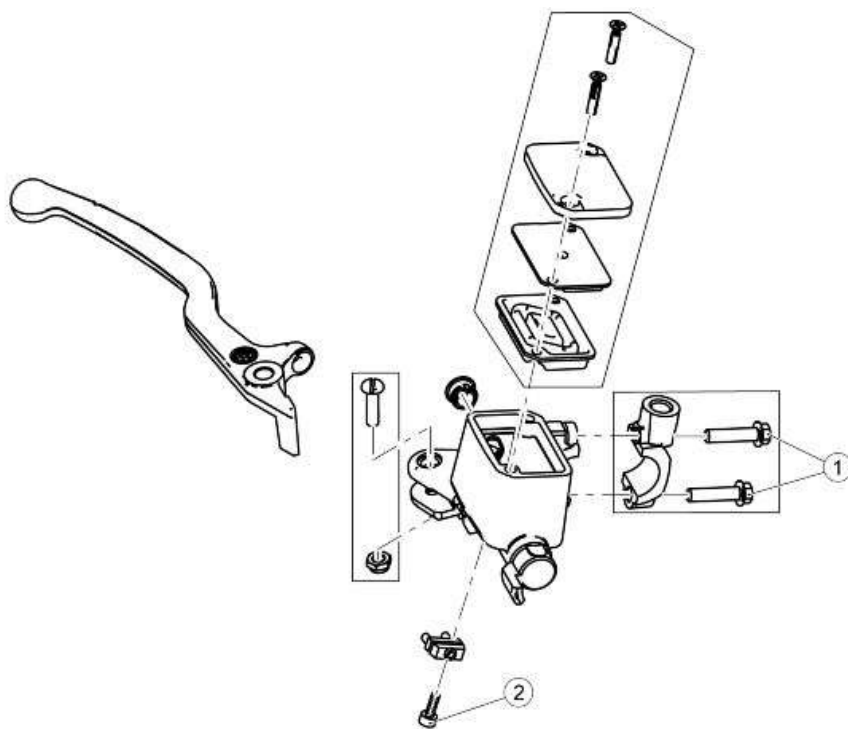


- Insert the transparent plastic pipe in the rear brake calliper bleed valve and insert the other end of this pipe into a container to collect the fluid.
- Remove the rear brake fluid reservoir cap.
- Operate the brake lever and then open the bleed valve on the calliper 1/4 of a turn to let the air out.
- Close the bleed again before reaching the lever end of the stroke and repeat the operation until there is no air.
- Screw the bleeding valve and remove the pipe.
- Top-up the reservoir until the correct brake fluid level is obtained.



- Refit and lock the rear brake oil reservoir cap.
- Refit the rubber protection cover.

Front brake pump



FRONT BRAKE MASTER CYLINDER

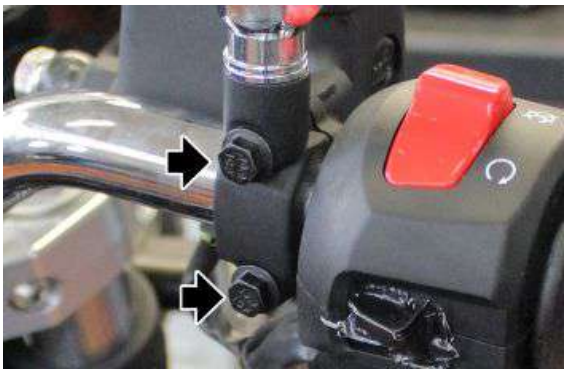
Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-

Removal

- Remove the rear-view mirror
- Drain off the front brake system
- Disconnect the brake switch connectors



- Remove the two brake pump fixing screws

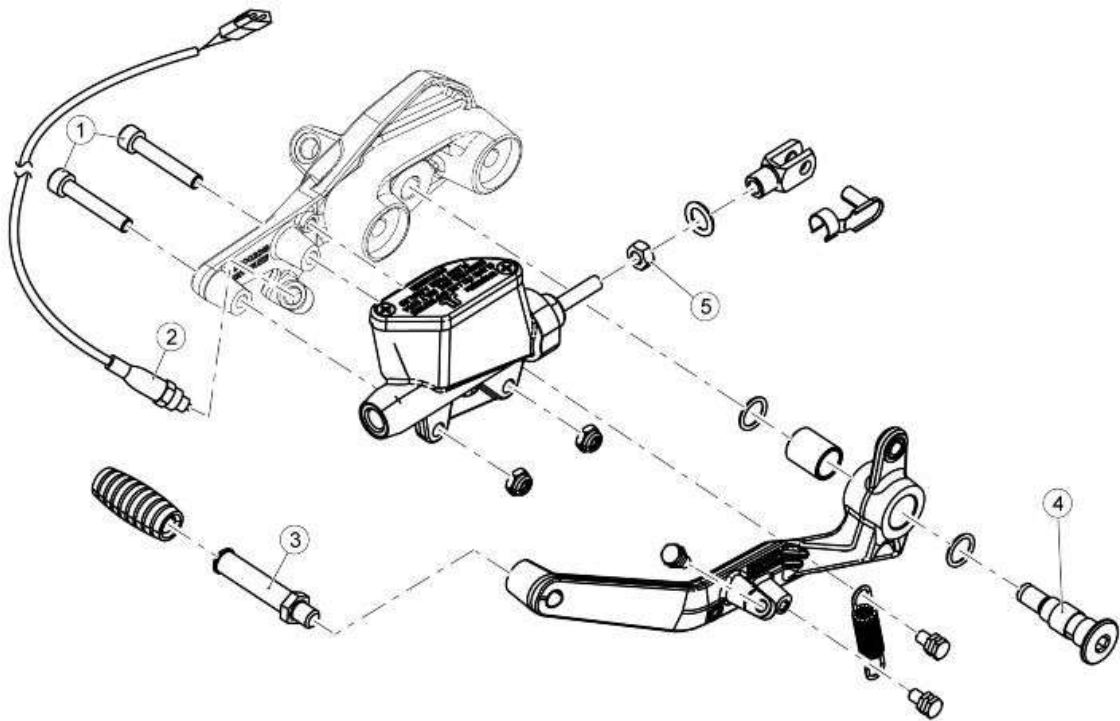


- Remove the brake pump

CAUTION
DURING REFITTING FILL UP THE BRAKE SYSTEM WITH THE RELATIVE BLEEDING PROCEDURE TO AVOID AIR BUBBLES IN THE SYSTEM



Rear brake pump



REAR BRAKE PUMP

Pos.	Description	Type	Quantity	Torque	Notes
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lb ft)	Loctite 243

Pos.	Description	Type	Quantity	Torque	Notes
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-

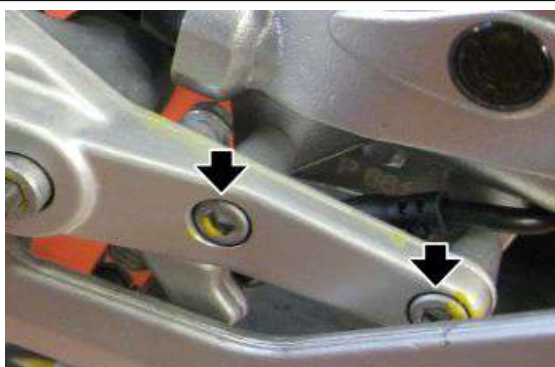
Rimozione

(SPECIAL/STONE)

- Use an appropriate container to recover the oil inside the brake system.
- Remove the brake pipe by acting on the fitting and empty the system



- Remove the two brake pump rear fixing screws at the support plate



- Move the O-Ring from the retainer plate and remove it



- Remove the brake pump



Brake system lines

Removal

- Drain the braking system
- Remove the saddle
- Remove the fuel tank
- Remove the silencers

CAUTION

WHILE IT IS NOT MANDATORY TO REMOVE THE SILENCERS, WE RECOMMEND DOING SO IN ORDER TO AVOID CAUSING ANY SUPERFICIAL DAMAGE TO THEM.

REMOVING THE FRONT BRAKE PIPE (BETWEEN THE BRAKE FLUID TANK AND THE ABS CONTROL UNIT)

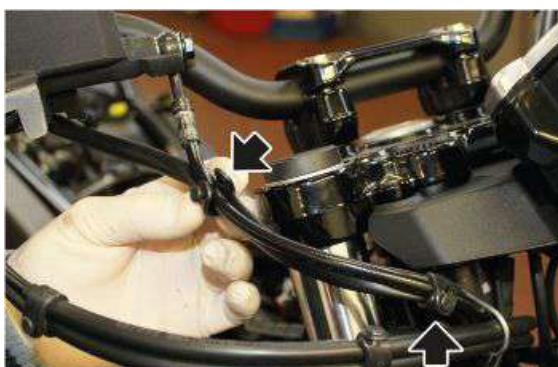
- Remove the right lambda probe
- Remove the ABS modulator support according to the indication in the Modulator section
- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers



- Remove the brake pipe coupling from the front brake master cylinder
- Retrieve the screw and the associated seal washers



- Remove the rubber clamps fastening the switch cables to the brake pipe



- Slide the brake pipe out of the vehicle, as indicated in figure, sliding it through the vehicle's cable ties



REMOVING THE FRONT BRAKE PIPE (BETWEEN THE BRAKE CALLIPERS AND THE ABS CONTROL UNIT)

- Remove the right lambda probe
- Remove the ABS modulator support according to the indication in the Modulator section
- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers



- Remove the brake pipe coupling from the front brake calliper
- Retrieve the screw and the associated seal washers



- Remove the cable ties fastening the ABS sensor cable to the brake pipe



- Remove the screw fixing the pipe feed-through to the lower plate of the forks



- Remove the vehicle's brake pipe



REMOVING THE REAR BRAKE PIPE (BETWEEN THE BRAKE FLUID TANK AND THE ABS CONTROL UNIT)

- Remove the right lambda probe
- Remove the ABS modulator support according to the indication in the Modulator section

- Remove the clamp fastening the brake pipes to the chassis



- Open the brae pipe fastener tab



- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers



- Remove the plate (1) from the brake pipe support bracket
- Release the pipes from the bracket



- Remove the brake pipe coupling from the rear brake master cylinder
- Retrieve the screw and the associated seal washers



- Remove the vehicle's brake pipe



REMOVING THE REAR BRAKE PIPE (BETWEEN THE BRAKE CALLIPERS AND THE ABS CONTROL UNIT)

- Remove the right lambda probe
- Remove the ABS modulator support according to the indication in the Modulator section
- Remove the clamp fastening the brake pipes to the chassis



- Open the brae pipe fastener tab



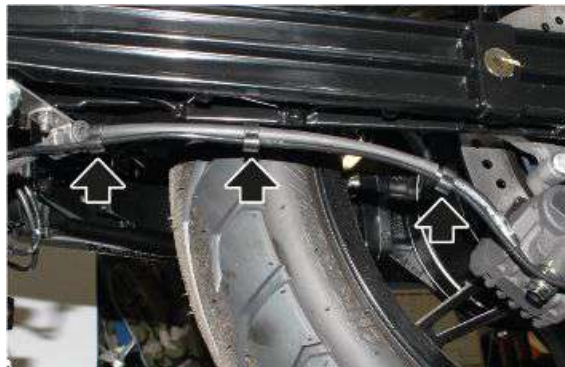
- Remove the plate (1) from the brake pipe support bracket
- Release the pipes from the bracket



- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers



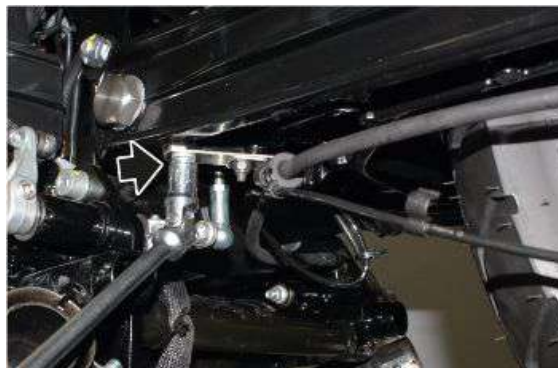
- Remove the cable ties fastening the ABS sensor cable to the rear brake pipe



- Remove the cable tie behind the rear brake pump
- Remove the cable tie located under the swingarm, next to the gearbox cardan shaft output



- Remove the screw fixing the pipe feed-through to the swingarm



- Remove the brake pipe coupling from the rear brake calliper
- Retrieve the screw and the associated seal washers



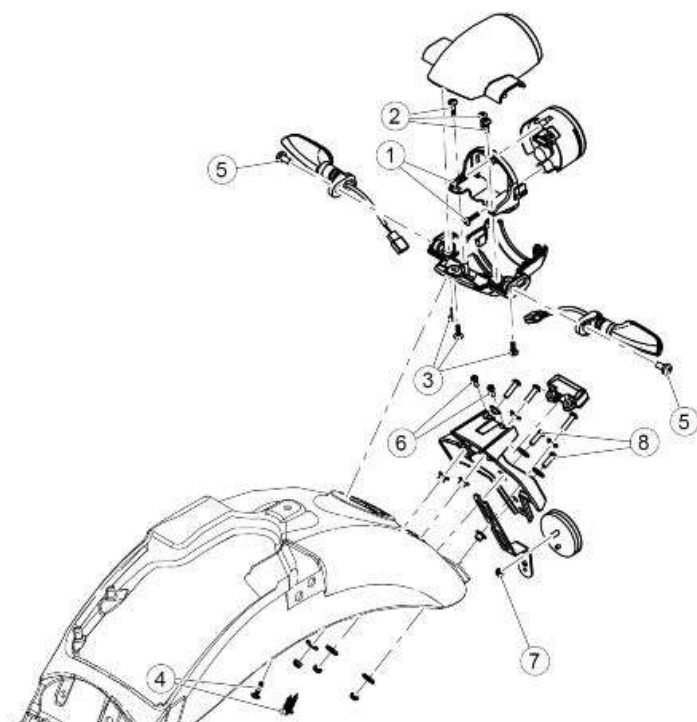
- Remove the vehicle's brake pipe



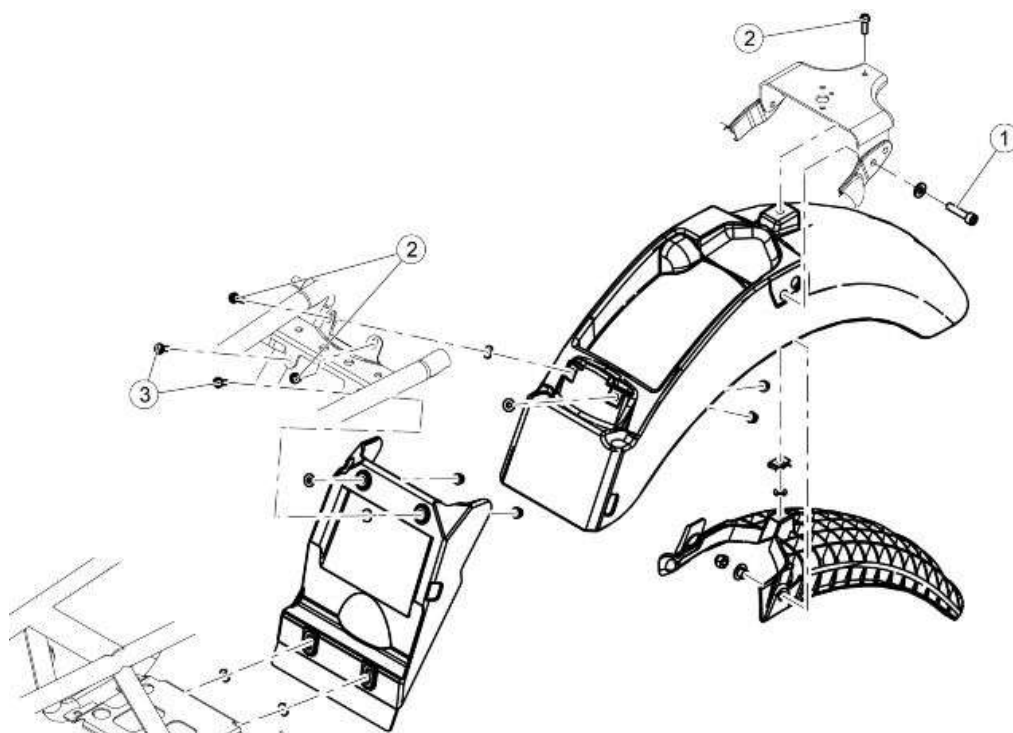
INDEX OF TOPICS

BODYWORK

BODYW

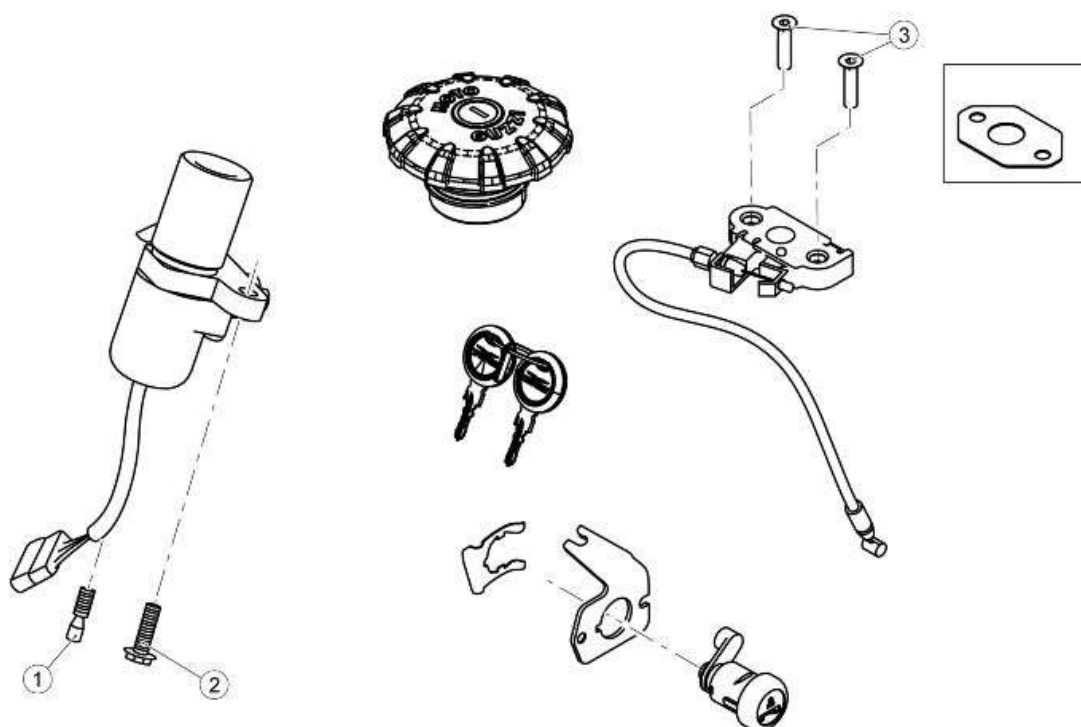
**REAR LIGHT ASSEMBLY**

Pos.	Description	Type	Quantity	Torque	Notes
1	Taillight to internal support fixing screws	SWP 3	2	2 Nm (1.48 lb ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lb ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lb ft)	-
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lb ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lb ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lb ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lb ft)	-



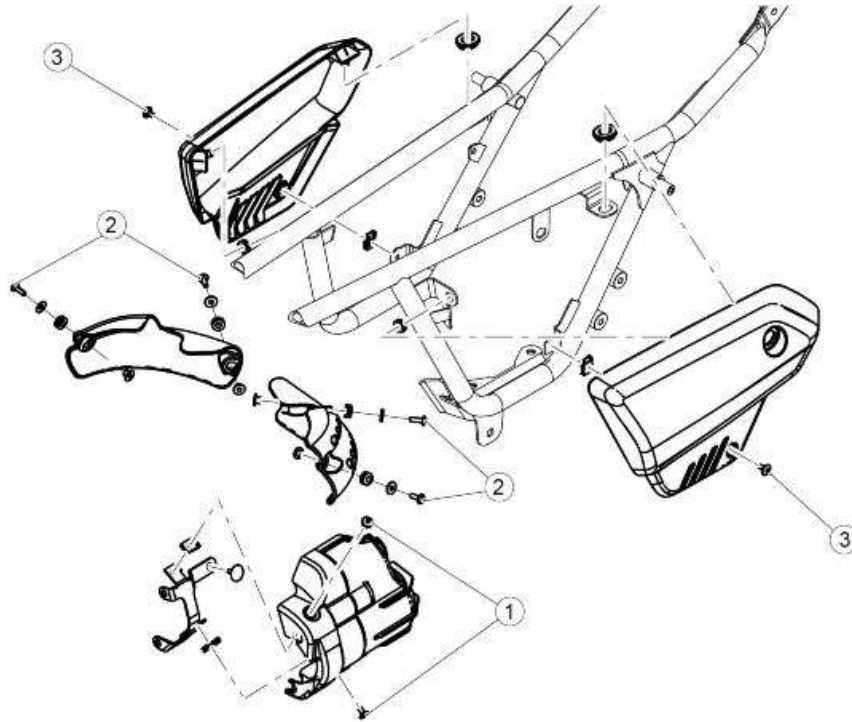
REAR MUDGUARD

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	
2	Front and centre fastening screw rear mud-guard	M6	3	8 Nm (5.9 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	

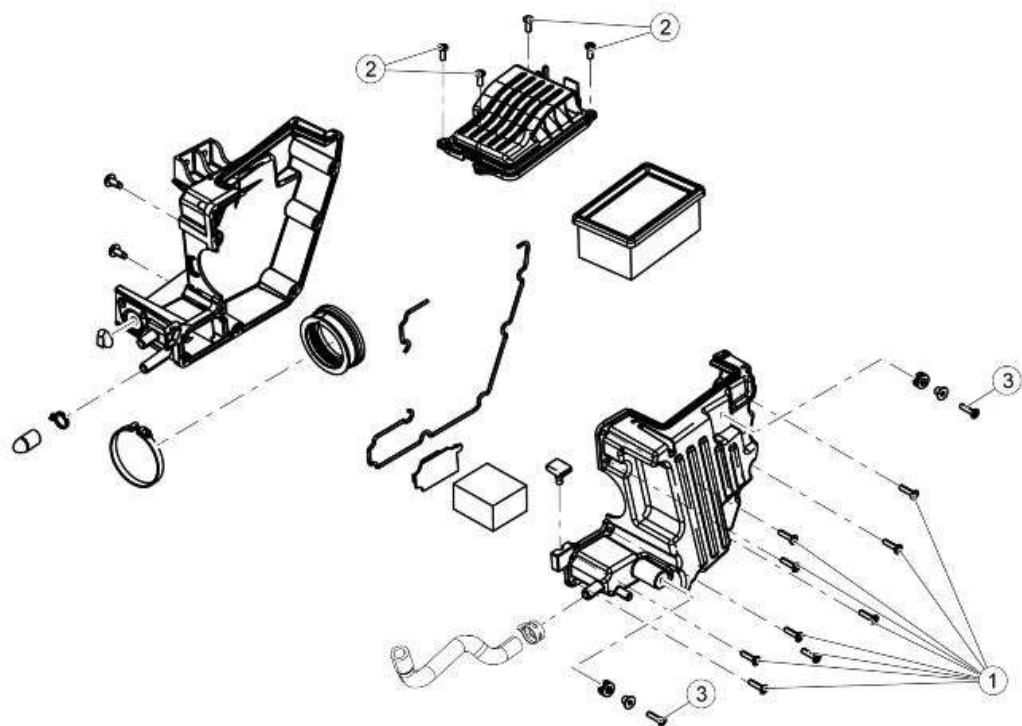


LOCK KIT

Pos.	Description	Type	Quantity	Torque	Notes
1	(Shear head) screw fixing ignition lock	M8	1	At the point of failure	Loctite 243
2	Ignition lock fixing screw	M8	1	25 Nm (18.44 lbf ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	10 Nm (7.38 lbf ft)	-

**CENTRAL BODYWORK**

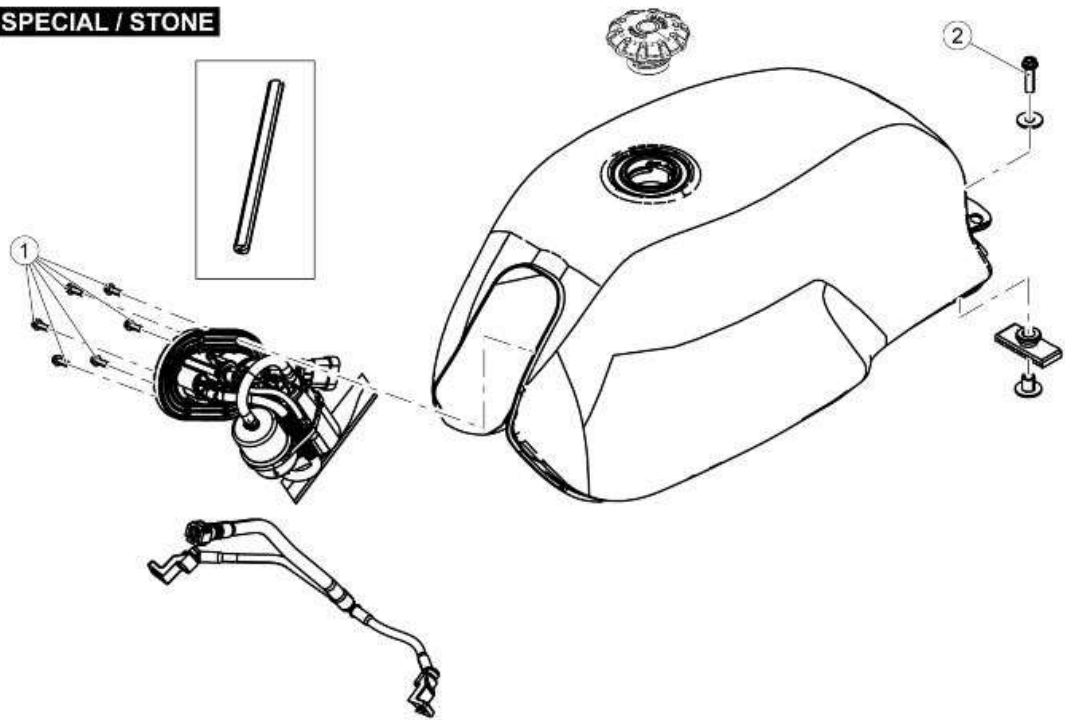
Pos.	Description	Type	Quantity	Torque	Notes
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lb ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lb ft)	-



FILTER BOX

Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-
3	Filter casing/frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

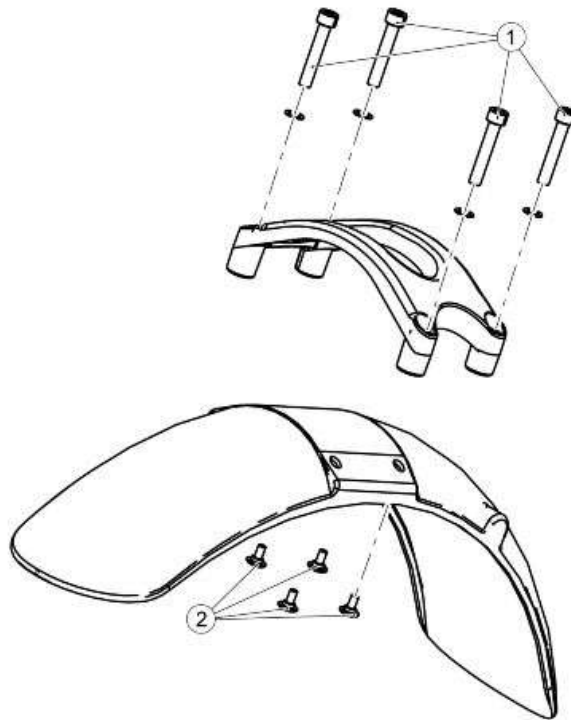
SPECIAL / STONE



FUEL TANK

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lb ft)	Pre-permeated

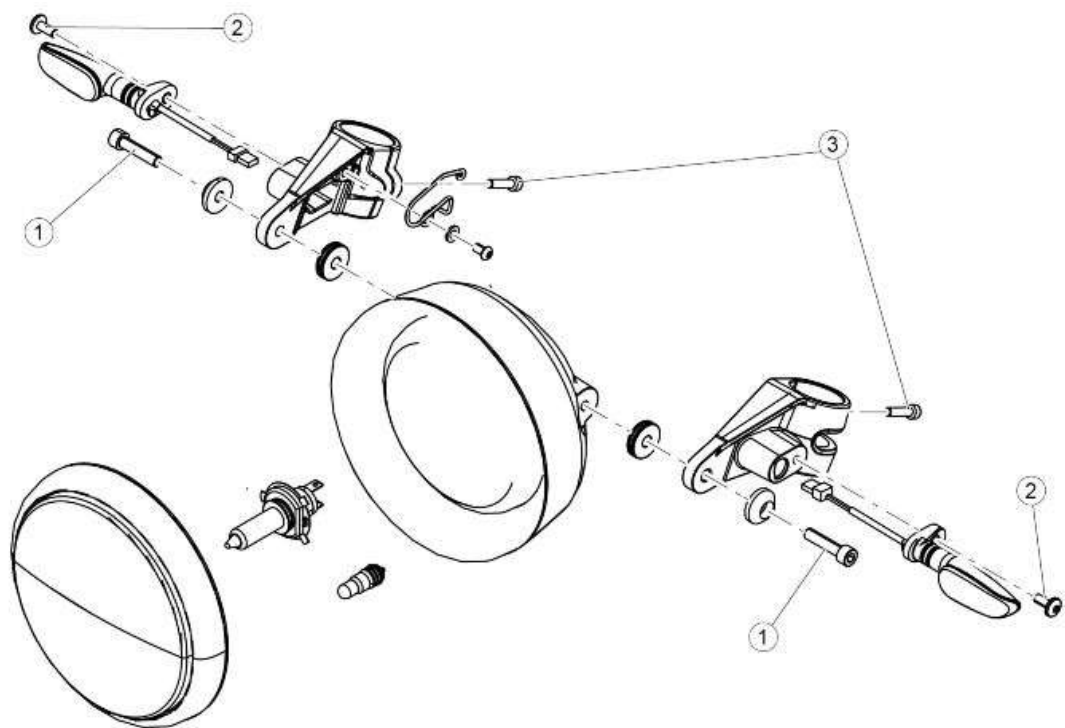
Pos.	Description	Type	Quantity	Torque	Notes
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-

**FRONT MUDGUARD**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lbf ft)	
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lbf ft)	

Headlight assy.

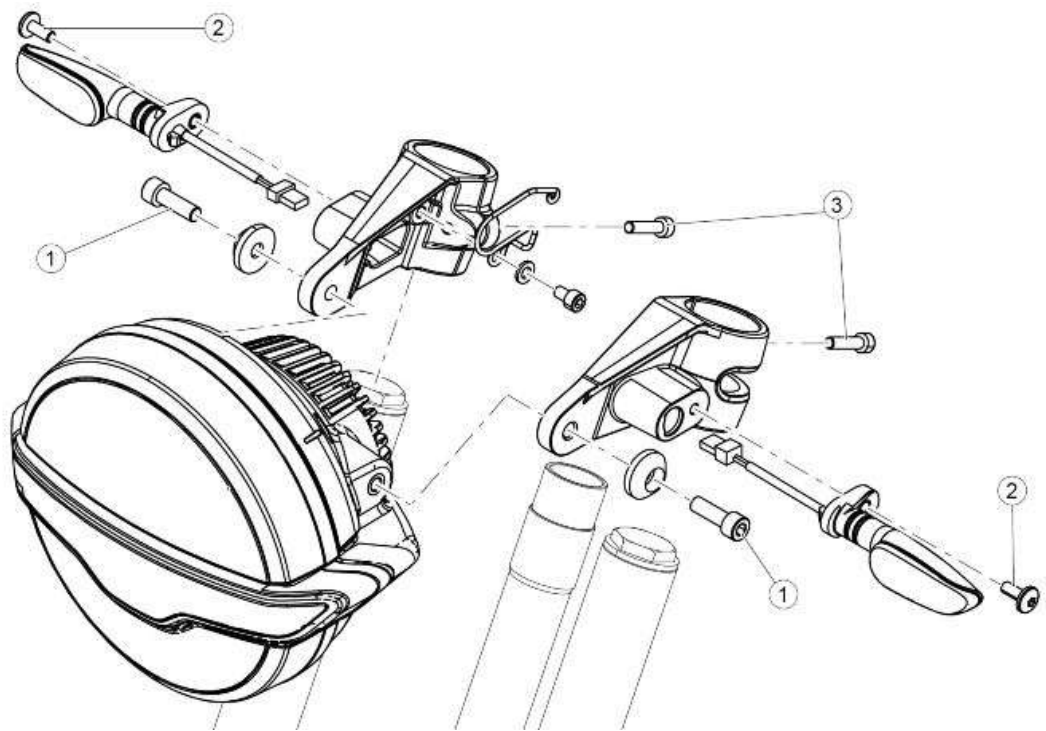
(SPECIAL)



HEADLIGHT UNIT

Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8x45	2	15 Nm (11.06 lbf ft)	-
2	Front turn indicators SHC fastening screws	M6x25	2	10 Nm (7.38 lbf ft)	-
3	SHC screws fastening the headlight support strips	M6x25	2	10 Nm (7.38 lbf ft)	-

(STONE)

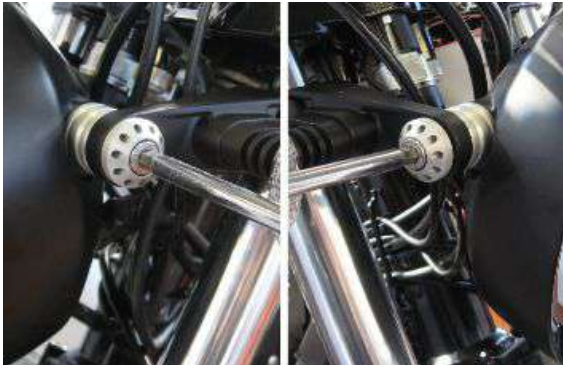


HEADLIGHT UNIT

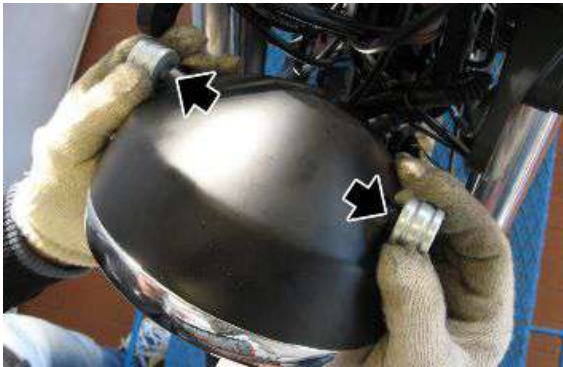
Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lb ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lb ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

(HALOGEN VERSION)

- Remove the two screws fixing the headlamp to the supports



- Move the headlamp from the supports and remove the spacers



- Disconnect the connector from the headlamp and remove it



BULB REPLACEMENT

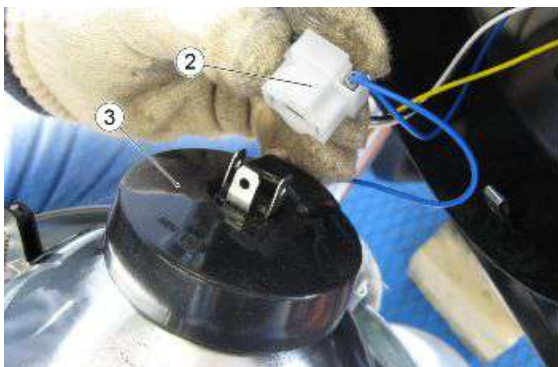
- To replace the bulbs, remove the complete parabole from the headlight body by undoing the screw (1)

**LOW BEAM / HIGH BEAM LIGHT BULB**

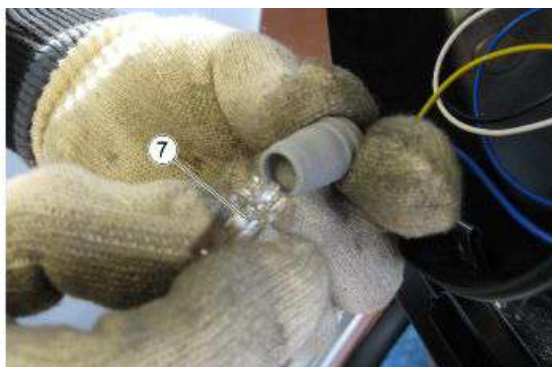
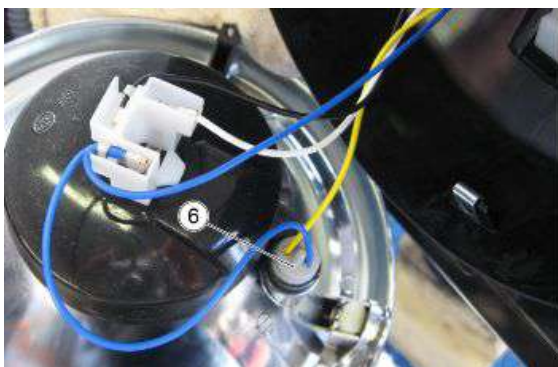
- Pull out the electrical connection to the bulb (2), and disconnect it from the bulb.
- Move hood (3) manually.
- Release the two ends of the retaining spring (4) located on the bulb holder.
- Pull the bulb (5) out of its fitting.

NOTE

INSERT THE BULB INTO THE BULB HOLDER, MAKING SURE THE REFERENCE FITTINGS MATCH.

**TAIL LIGHT BULB**

- Pull out the daylight running light bulb holder (6) from its seat.
- Remove the bulb (7) and replace it with another of the same type.
- Check the proper insertion of the bulb in the bulb holder.

**(LED VERSION)**

- Unscrew the two headlamps fixing screws



- Support the headlamp and then remove the screws (1) and the bushings (2)



- Release the safety (3) by sliding it in opposite direction to the headlamp
- Press the tab (4) and simultaneously disconnect the connector from the headlamp

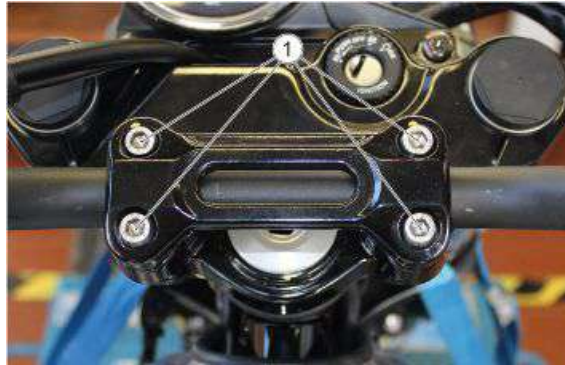


- Remove the headlamp (5) from the vehicle



FRONT HEADLIGHT SUPPORT REMOVAL

- Remove the front light assembly
- Remove the front turn indicators
- Unscrew and remove the screws (1)
- Remove the upper U-bolt
- Temporarily remove the handlebar from the lower U-bolts



- Unscrew and remove the ring nut (2)



- Loosen the screws (3) from both sides of the vehicle
- Remove the upper steering plate



- Undo and remove the screw (4)



- Remove the headlamp supports (5) from both sides of the vehicle



Turn indicators

REMOVING FRONT TURN INDICATORS

The following procedure is described for one turn indicator, but it is valid for both turn indicators

- Remove the front light cluster
- Unscrew and remove the two screws (1)



- Remove the cover (2)



- Remove the clamp (3)



- Disconnect the connector (4)



- Undo and remove the screw (5)



- Remove the front turn indicator (6)



- Undo and remove the screw (5)



- Remove the front turn indicator (6)



REAR TURN INDICATORS REMOVAL

The following procedure is described for one turn indicator, but it is valid for both turn indicators

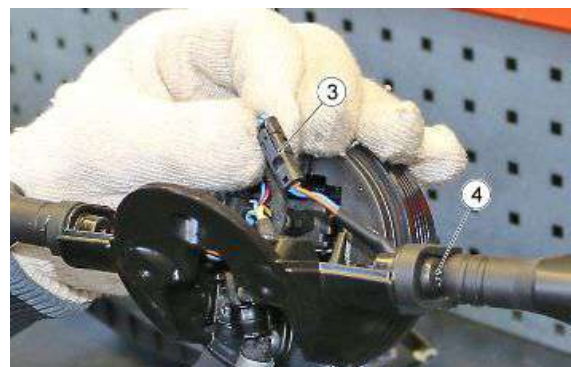
- Remove the rear light cluster
- Unscrew and remove the three fastening screws (1) from the cover



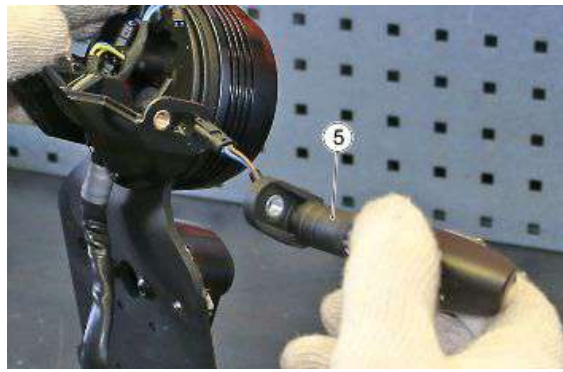
- Remove the cover (2)



- Disconnect the connector (3)
- Undo and remove the screw (4)



- Remove the turn indicator (5)



Disassembling the lock

- Remove the LH side fairing
- Remove the saddle opening cable (1) from its housing



- Remove the fork spring (2)



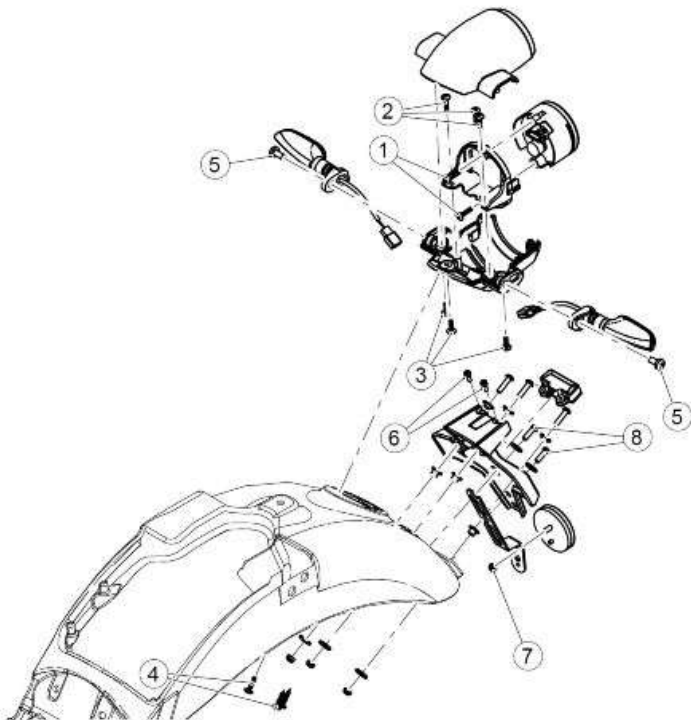
- Remove the cable support plate (3)



- Remove the ignition switch assembly
(4)



Taillight assy.



REAR LIGHT ASSEMBLY

Pos.	Description	Type	Quantity	Torque	Notes
1	Taillight to internal support fixing screws	SWP 3	2	2 Nm (1.48 lb ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lb ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lb ft)	-
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lb ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lb ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lb ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lb ft)	-

LICENCE PLATE LIGHT REMOVAL

- Remove the rear mudguard from the vehicle
- Remove the screws (1) that fasten the licence plate holder to the rear mudguard and retrieve the centring bushings



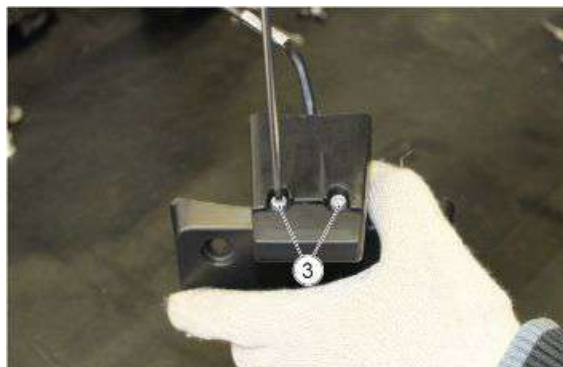
- Remove the lower reinforcement (2) from the mudguard



- Disconnect the licence plate light wiring harness connector
- Remove the plate holder from the rear mudguard



- Remove the two screws (3) fixing the licence plate light to the plate holder



- Remove the licence plate light from the plate holder



TAILLIGHT REMOVAL

- Remove the plate holder from the rear mudguard
- Remove the three nuts (3) that fasten the taillight to the mudguard



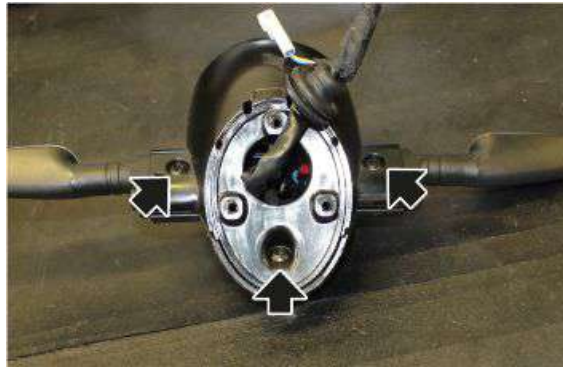
- Loosen the screws (4) that fasten the wiring harness to be able to displace the rear mudguard



- Remove the taillight from the mudguard



- Remove the three fixing screws of the taillight half cases
- Remove the upper half case of the taillight



- Disconnect the taillight connector (5)
- Remove the fixing screws (6);



- Remove the fixing screw (7) that was under the taillight connector



- Remove the taillight together with its support from the lower half case



- Remove the fixing screws (8) and detach the taillight from its support



Footrest

(SPECIAL/STONE)

REMOVAL OF THE RIGHT-HAND RIDER FOOTREST SUPPORT

- Remove the gasket (1)



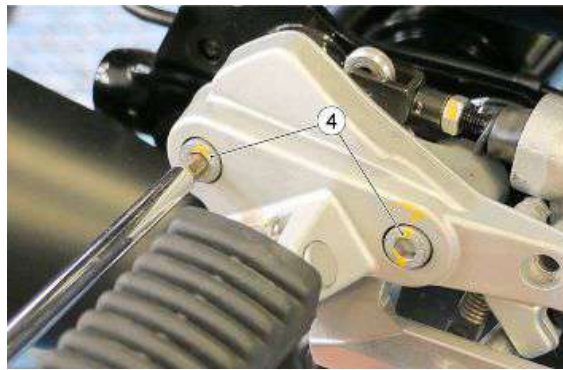
- Unhook and remove the clip (2)



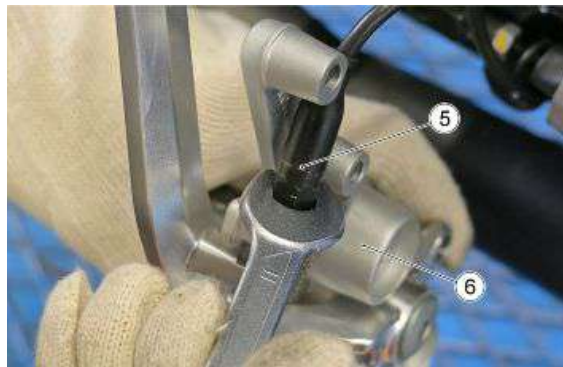
- Holding the nut in place as illustrated in the figure, unscrew and remove the two rear brake master cylinder fastening screws (3)



- Undo and remove the two fastening screws (4)



- Remove the microswitch (5) turning the footrest support in order not to damage the microswitch cabling
- Remove the right-hand rider footrest support (6)



REMOVAL OF THE REAR BRAKE LEVER

- Remove the right-hand rider footrest support
- Remove the lever return spring (1)

CAUTION

REMOVE THE BRAKE LEVER RETURN SPRING FROM THE FOOTREST SUPPORT, TAKING CARE NOT TO WEAKEN IT.



- Undo and remove the screw (2)



- Retrieve the O-ring (3)



- Remove the rear brake lever (4)



- Retrieve the O-ring (5)



REMOVAL OF THE RIGHT-HAND RIDER FOOTREST

- Remove the snap ring(1)



- Remove the pin (2)
- Remove the right-hand rider footrest (3)
- Retrieve the spring (4)



- Remove the clip (1)



- Remove the gear shift lever tie-rod (2) from the ball joint



- Undo and remove the two fastening screws (3)

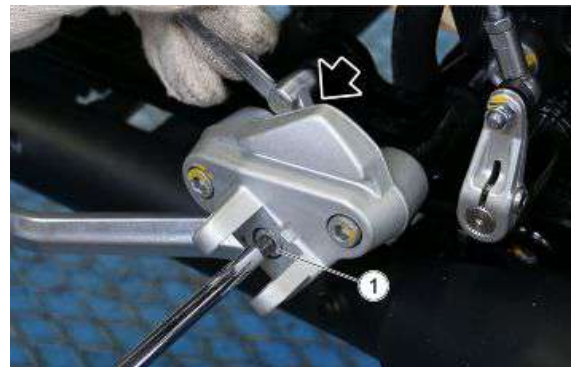


- Remove the left-hand rider footrest support (4)

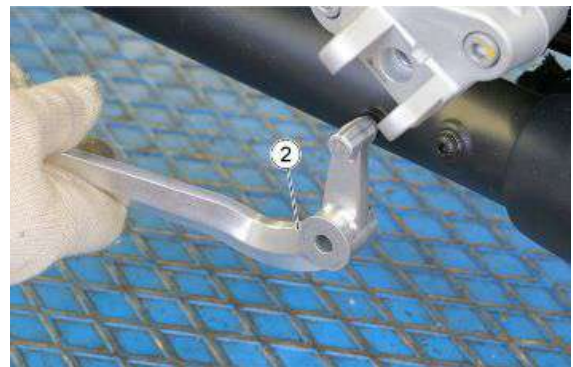


REMOVAL OF THE GEAR SHIFT LEVER

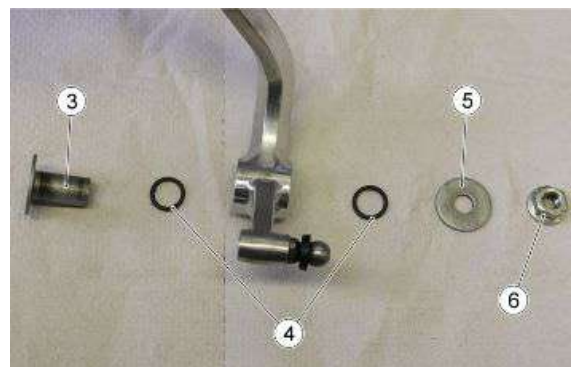
- Remove the right-hand rider footrest
- Holding the nut in place as illustrated in the figure, undo and remove the fastening screw (1)



- Remove the gear shift lever (2)



- Retrieve the bushing (3), the two O-rings (4), the washer (5) and the nut (6)



REMOVAL OF THE LEFT-HAND RIDER FOOT-REST

- Remove the snap ring(1)

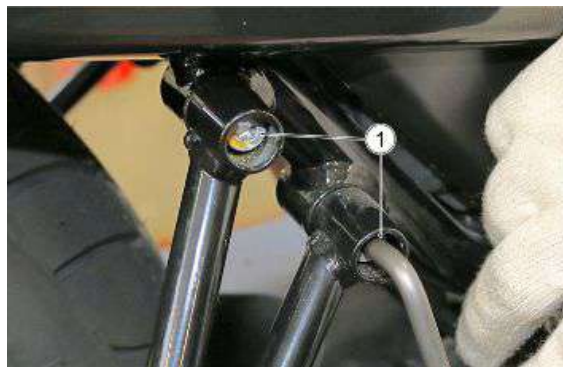


-
- Remove the pin (2)
 - Remove the left-hand rider footrest (3)
 - Retrieve the spring (4)

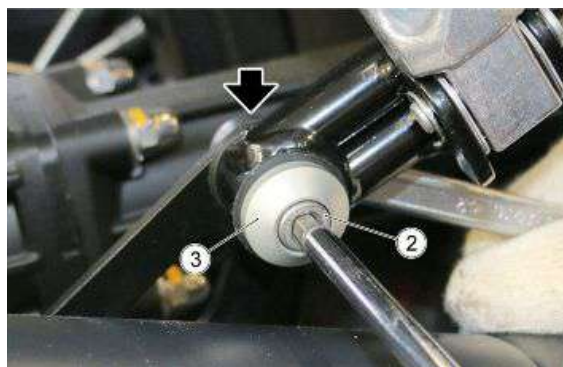


REMOVAL OF THE PASSENGER FOOTRESTS SUPPORT

- Undo and remove the two fastening screws (1)



-
- Holding the nut in place as illustrated in the figure, undo and remove the screw (2)
 - Retrieve the bushing (3)



- Remove the right-hand passenger footrest support (4)
- Repeat the entire operation to remove the left-hand passenger footrest support



REMOVAL OF THE PASSENGER FOOTREST

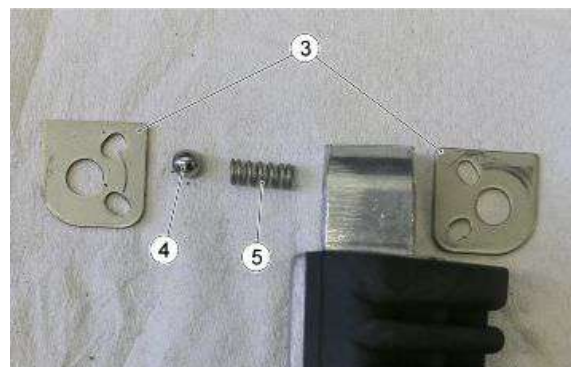
- Remove the snap ring(1)



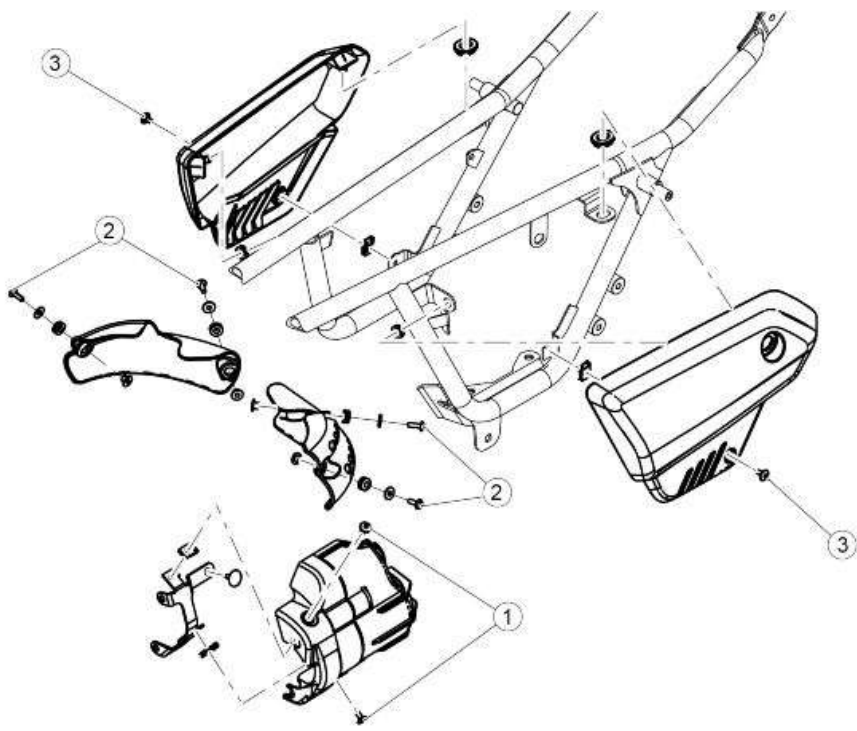
- Remove the pin (2)
- Remove the right-hand passenger footrest (3)



- Retrieve the two plates (3), the ball (4) and the spring (5)
- Repeat the entire operation to remove the left-hand passenger footrest



Side body panels



CENTRAL BODYWORK

Pos.	Description	Type	Quantity	Torque	Notes
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lb ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lb ft)	-

- Remove the saddle
- Remove the side fairing fixing screw



- Lift the rear part of the side fairing to detach it from the coupling to the chassis



- Slide the side fairing forward



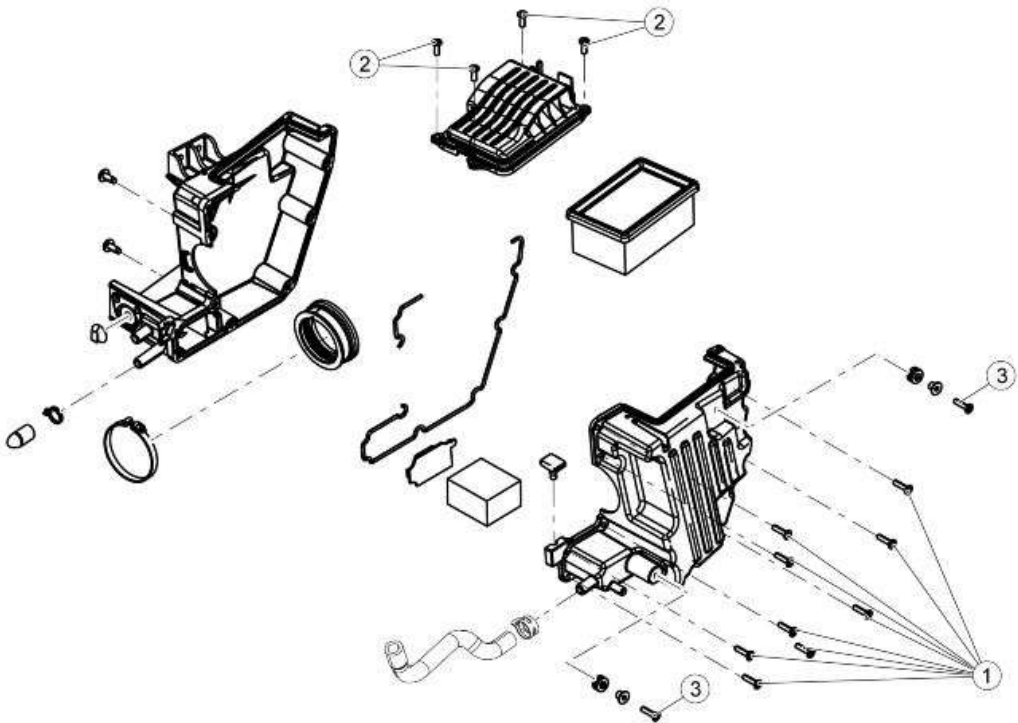
- Disconnect the cable from the latch and then remove the side fairing from the vehicle

NOTE

The procedure described refers to the left side fairing but it is valid for both, except for the latch cable that doesn't exist on the right side.



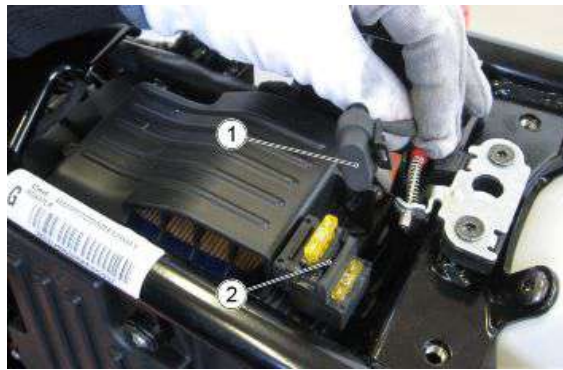
Air box



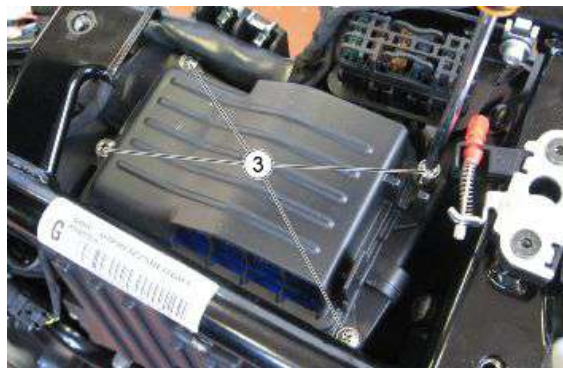
FILTER BOX

Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-
3	Filter casing/frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

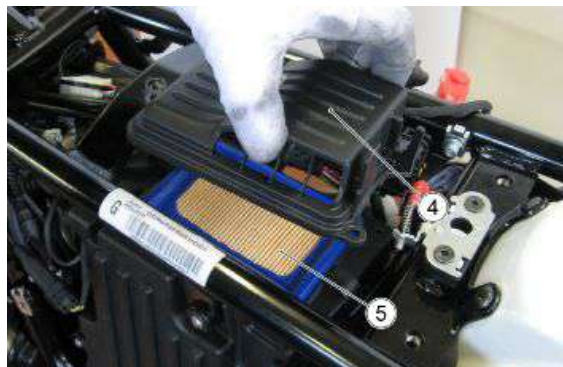
- Remove the saddle, the side panels and the battery complete with the rubber support
- Slide from the support present in the filter casing connector (1) and the ABS fuses (2)



- Remove the four fastening screws (3) of the air filter cover



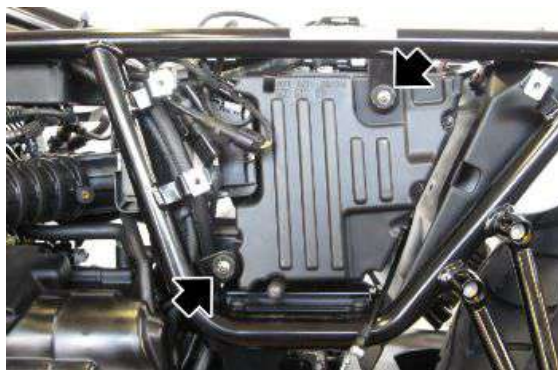
- Remove the air filter cover (4) and the filter (5)



- Remove the two screws securing the fuse box support and move it to have greater freedom of movement for subsequent operations



- Remove the two screws that fasten the air filter case to the chassis



- Remove the clamp present in the collector that blocks the filter case to the throttle body



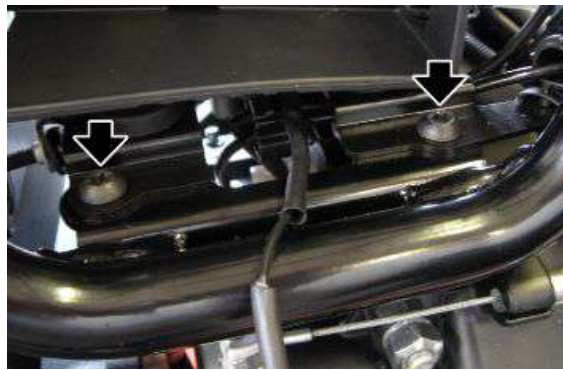
- Remove the two bottom fastening nuts of the splash guard



- Operating on the left side of the motorcycle, remove the blow-by pipe (6) from the filter case, while the right side, remove the secondary air pipe (7)



- Remove the four screws securing the filter case support bracket and remove it by slightly raising the box itself



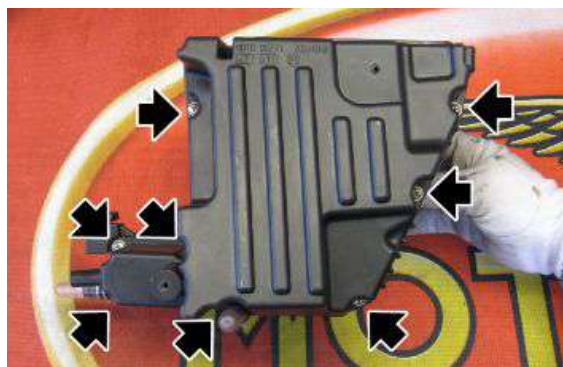
- Pull the filter case from the right side of the motorcycle



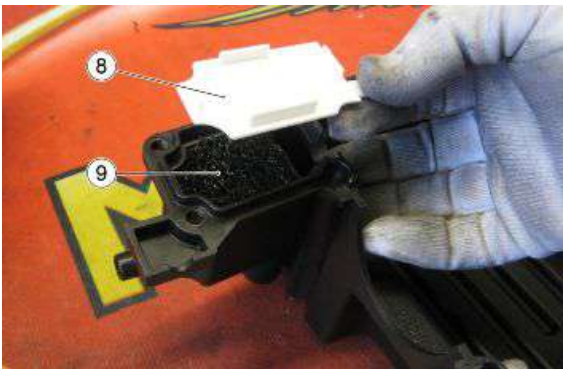
- Remove the collector from the filter case



- Remove the locking screws from the filter case



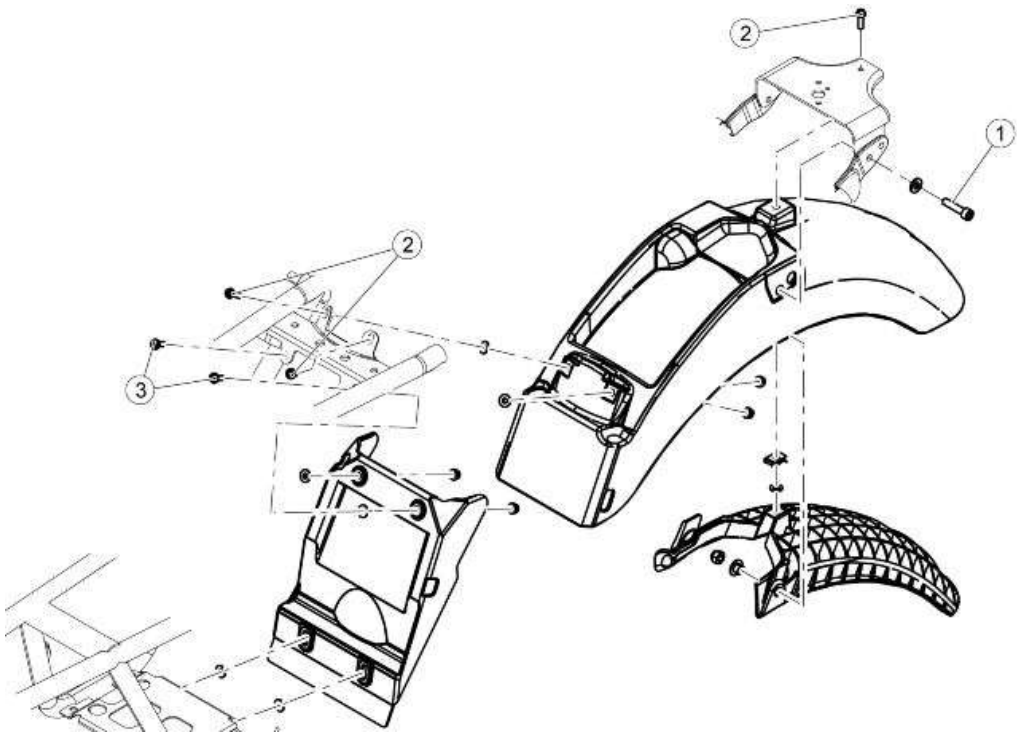
- Remove the cover (8) and the blow-by filter (9)



- Check and replace the two seals present in the cover



Rear mudguard



REAR MUDGUARD

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	
2	Front and centre fastening screw rear mud-guard	M6	3	8 Nm (5.9 lb ft)	

Pos.	Description	Type	Quantity	Torque	Notes
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	

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



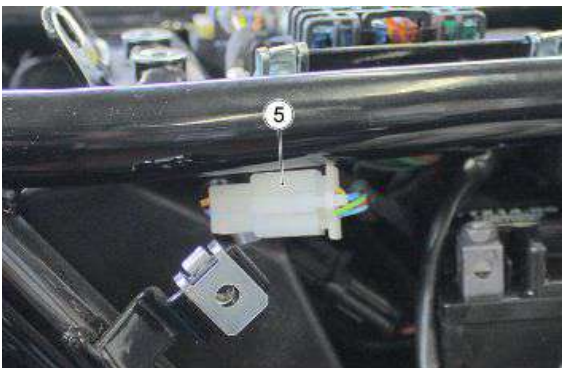
- Unscrew and remove the two fixing screws (2) from both sides of the vehicle
- Retrieve the two washers (3)



- Undo and remove the screw (4)



- Disconnect the connector (5)



- Remove the saddle opening cable from the points indicated in figure



- Remove the rear mudguard (6) complete with the rear light cluster



- Remove the two bushings (7)



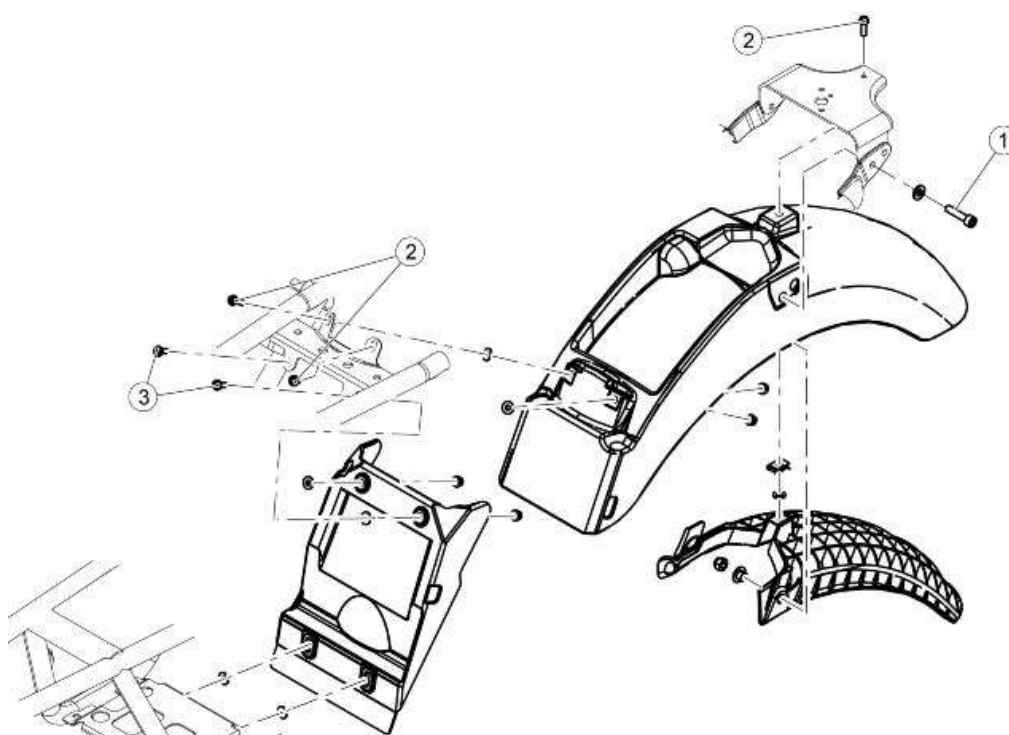
- Unscrew and remove the three screws (8)



- Remove the strengthener (9)
- Remove the rear light cluster



Splash guard



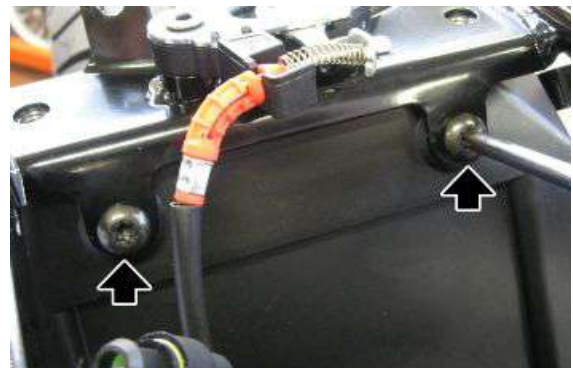
REAR MUDGUARD

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	
2	Front and centre fastening screw rear mud-guard	M6	3	8 Nm (5.9 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	

- Remove the rear mudguard
- Remove the two lower nuts



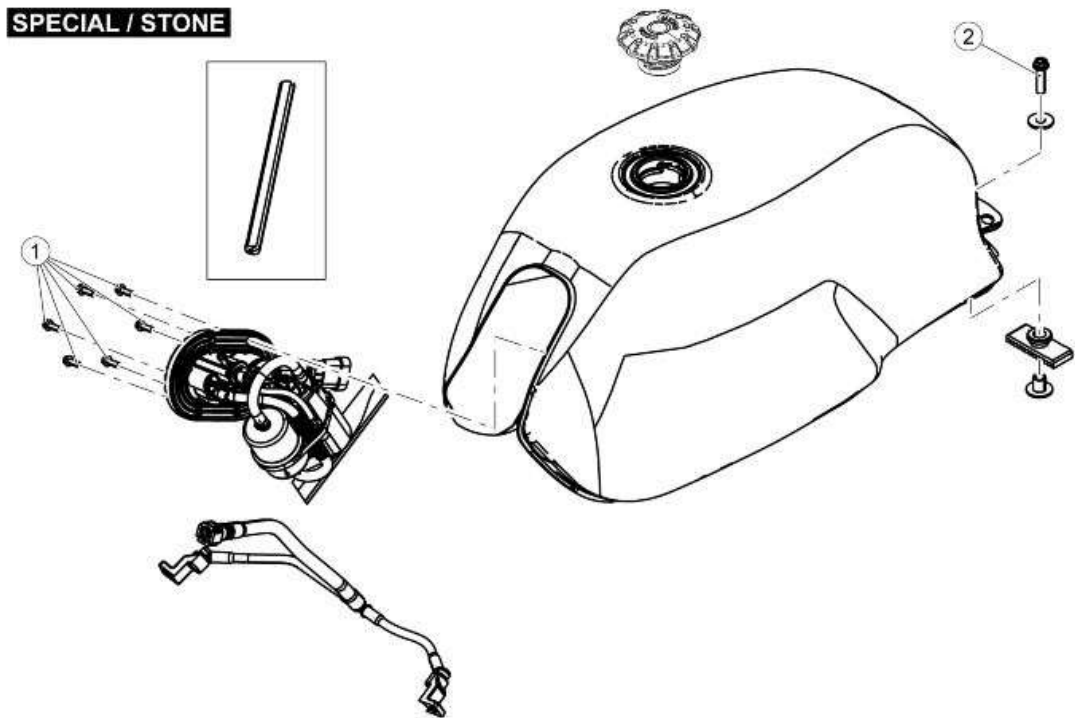
- Remove the two upper screws complete with self-locking nuts



- Remove the splash guard



Fuel tank



FUEL TANK

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lbf ft)	Pre-permeated
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-

- Remove the saddle
- Unscrew the tank fixing screw and retrieve the washer



- Move the tank toward the back of the vehicle and lift it from the chassis



- Remove the metal clamp
- Remove the breather pipe from the tank coupling



- Disconnect the fuel pipe coupling from the pump



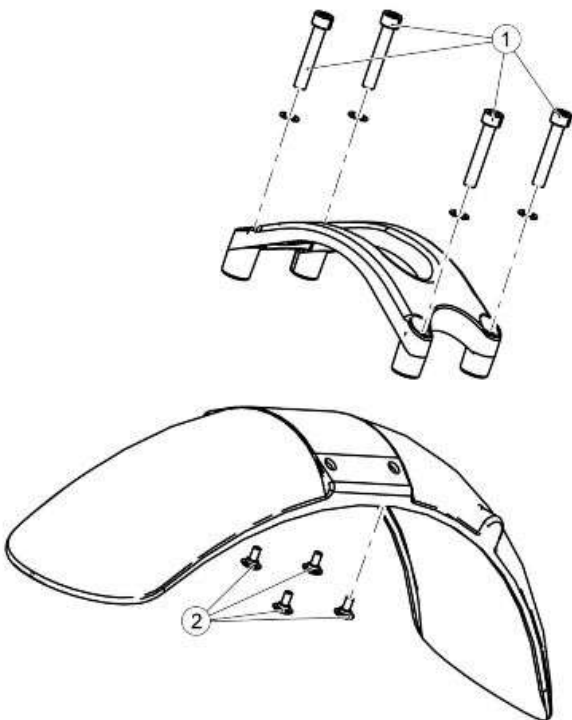
- Disconnect the fuel pump wiring harness connector



- Remove the fuel tank from the vehicle



Front mudguard



FRONT MUDGUARD

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lb ft)	Loctite 243
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lb ft)	Loctite 243

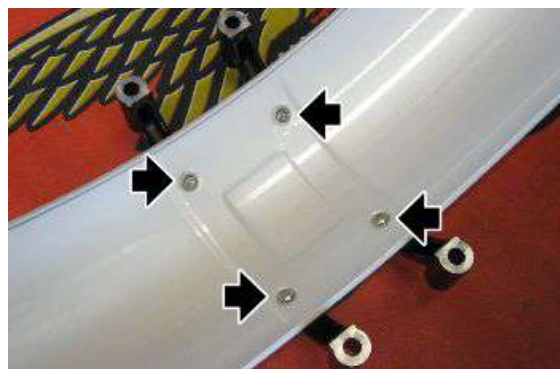
- Remove the four front mudguard support fixing screws at the fork sleeves



- Remove the mudguard complete



- Remove the four screws fixing the mudguard to the mudguard support



- Remove the mudguard support from the mudguard



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