



**MOTO GUZZI®**

PROUDLY AUTHENTIC MOTORCYCLES. SINCE 1921.

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# SERVICE STATION MANUAL

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**2Q000297**

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**V7 III ABS**

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# SERVICE STATION MANUAL

## V7 III ABS

### 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](http://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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Not all versions/models shown in this publication are available in all countries. The availability of individual versions should be checked with the Official Moto Guzzi sales network.

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# SERVICE STATION MANUAL

## V7 III ABS

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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## Rules

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### 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



**THE FUEL USED TO POWER INTERNAL COMBUSTION ENGINES IS HIGHLY FLAMMABLE AND MAY BE EXPLOSIVE UNDER CERTAIN 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 components

The engine and the exhaust system components become very hot and remain hot for some time after the engine has been switched off. When handling these components, wear insulating gloves or wait until the engine and the exhaust system have cooled down.

#### Used engine oil and transmission oil

#### CAUTION



**IT IS ADVISABLE TO WEAR PROTECTIVE IMPERMEABLE GLOVES WHEN SERVICING THE VEHICLE.**

**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



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

**KEEP OUT OF THE REACH OF CHILDREN.**

**BATTERY LIQUID IS CORROSIVE. DO NOT POUR OR 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 COMPONENTS

#### CAUTION

**BEARINGS MUST ROTATE FREELY, WITHOUT JAMMING AND/OR NOISE, OTHERWISE, THEY NEED TO 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

Electric connectors must be disconnected as described below; failure to comply with this procedure causes irreparable damage to both the connector and the wiring harness:

Press the relative safety clips, if applicable.

- Grip the two connectors and disconnect them by pulling them in opposite directions.
- If any signs of dirt, rust, moisture, etc. are noted, clean the inside of the connector carefully with a jet of compressed air.
- Ensure that the cables are correctly fastened to the internal connector terminals.
- Then connect the two connectors, ensuring that they couple correctly (if fitted with clips, you will hear them "click" into place).

#### CAUTION

**DO NOT DISCONNECT CONNECTORS BY PULLING THE CABLES.**

#### NOTE

**THE TWO CONNECTORS CAN ONLY BE CONNECTED IN ONE DIRECTION: CONNECT THEM THE RIGHT WAY ROUND.**

### TIGHTENING TORQUES

#### CAUTION

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**IF UNSCREWING A SELF-LOCKING NUT, IT MUST BE REPLACED 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.**

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## 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.**

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## 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.**

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**CHASSIS NUMBER**

The chassis number is stamped on the right hand side of the headstock.

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

**ZGULD00016MXXXXXX**

**KEY:**

**ZGU:** WMI (World manufacturer identifier) code;

**LD:** model;

**000:** version;

**0:** free digit

**16:** variable year of manufacture (16 - for 2016)

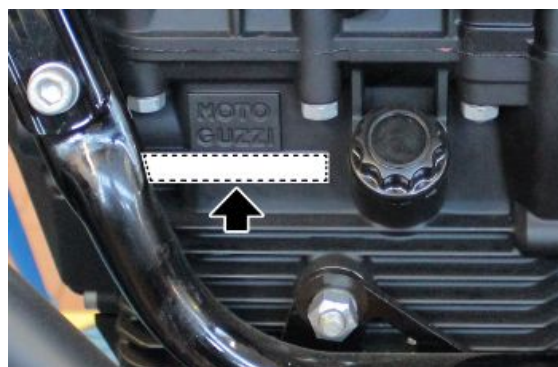
**M:** production plant (M= Mandello del Lario);

**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**

**WEIGHT AND DIMENSIONS**

Specification	Desc./Quantity
Max. length (Special/Stone/Racer)	2,185 mm (86.02 in)
Max. length (Anniversario)	2,235 mm (88.00 in)
Max. width (Special/Stone/Anniversario)	800 mm (31.50 in)
Max. width (Racer)	755 mm (29.72 in)
Max. height	1,100 mm (43.31 in)
Wheelbase	1,445 mm (56.89 in)
Kerb weight (Special/Anniversario)	213 kg (470 lb)
Kerb weight (Stone/Racer)	209 kg (461 lb)

**Engine**

**ENGINE**

Specification	Desc./Quantity
Type	traverse-mounted twin-cylinder four-stroke V 90°
Cylinder number	2
Displacement	744 cm <sup>3</sup> (45.40 cu.in)
Bore / stroke	80x74 mm (3.15x2.91 in)

Specification	Desc./Quantity
Compression ratio	10.5 +/- 0.5: 1
Start up	Electric
Engine idle speed	1,250 +/- 100 rpm
Clutch	dry single-disc clutch with flexible coupling
Lubrication	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 cardan shaft, ratio: 8 / 33 = 1 : 4.125

## Capacities

### CAPACITY

Specification	Desc./Quantity
Fuel tank (reserve included)	21 l (4.62 UK gal; 5.55 US gal)
Fuel tank reserve	4 l (0.88 UK gal; 1.06 US gal)
Engine oil	Oil change and oil filter replacement: 2,000 cm <sup>3</sup> (122.05 cu.in)
Gearbox oil	500 cm <sup>3</sup> (30.51 cu.in)
Transmission oil	170 cm <sup>3</sup> (10.37 cu.in)
Maximum permissible weight (Stone/Racer)	419 kg (924 lb) (rider + passenger + luggage)
Maximum permissible weight (Special/Anniversario)	423 kg (933 lb) (rider + passenger + luggage)
Seats	2

## Electrical system

### ELECTRICAL SYSTEM

Specification	Desc./Quantity
Battery	12 V - 12 Ah
Fuses	5 (2) - 15 (3) - 20 - 30 A
Permanent magnet alternator	12V - 268W
Low/high beam light (halogen)	12 V - 55 W / 60 W H4
Front daylight running lights	12 V - 5 W
tail light /stop lights	12 V - 5 / 21 W
Turn indicator light	12 V - 10 W (orange RY 10 W bulb)

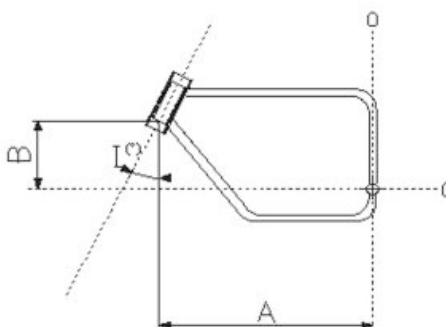
### SPARK PLUGS

Specification	Desc./Quantity
Standard	NGK CPR8EB-9
Spark plug electrode gap	0.9 mm (1.98 in)
Resistance	5 kOhm



**WARNING LIGHTS**

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)

**FRAME**

Specification	Desc./Quantity
Type	Modular double cradle, high-strength steel tubular chassis
Steering rake	26°
Trail (no rider or passenger - wheels on the ground - without use of side stand)	106 mm (4.17 in)

**SUSPENSIONS**

Specification	Desc./Quantity
Front	hydraulic telescopic fork, Ø 40 mm (1.57 in)
Stroke	137 mm (5.39 in)
Rear	Swingarm in die-cast light alloy, 2 shock absorbers with adjustable spring preloading
Stroke	80 mm (3.15 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 (Special/Racer/Anniversario)	with spokes with alloy rims, for tyres with inner tubes
Type (Stone)	Alloy wheels for tubeless tyres
Front	2.5"x18"
Rear	3.50" x 17"

### TYRES

Specification	Desc./Quantity
Front tyre	PIRELLI SPORT DEMON
Front (size)	100 / 90 - 18 56H
Front (size) (alternative)	110 / 80 - R18 58H
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 tyre	PIRELLI SPORT DEMON
Rear (size)	130 / 80 - 17 65H
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

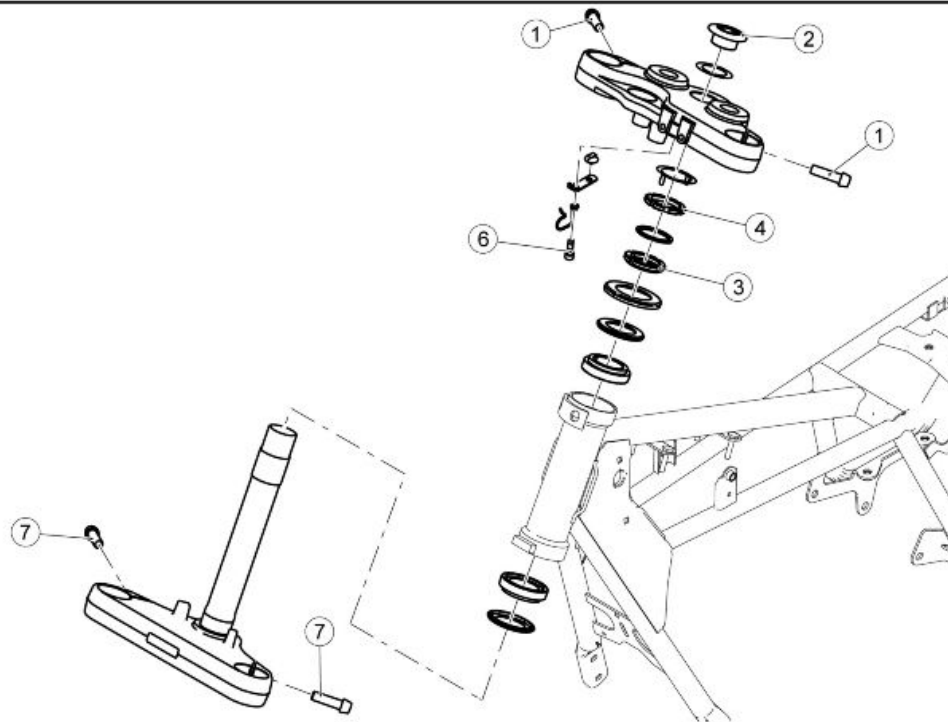
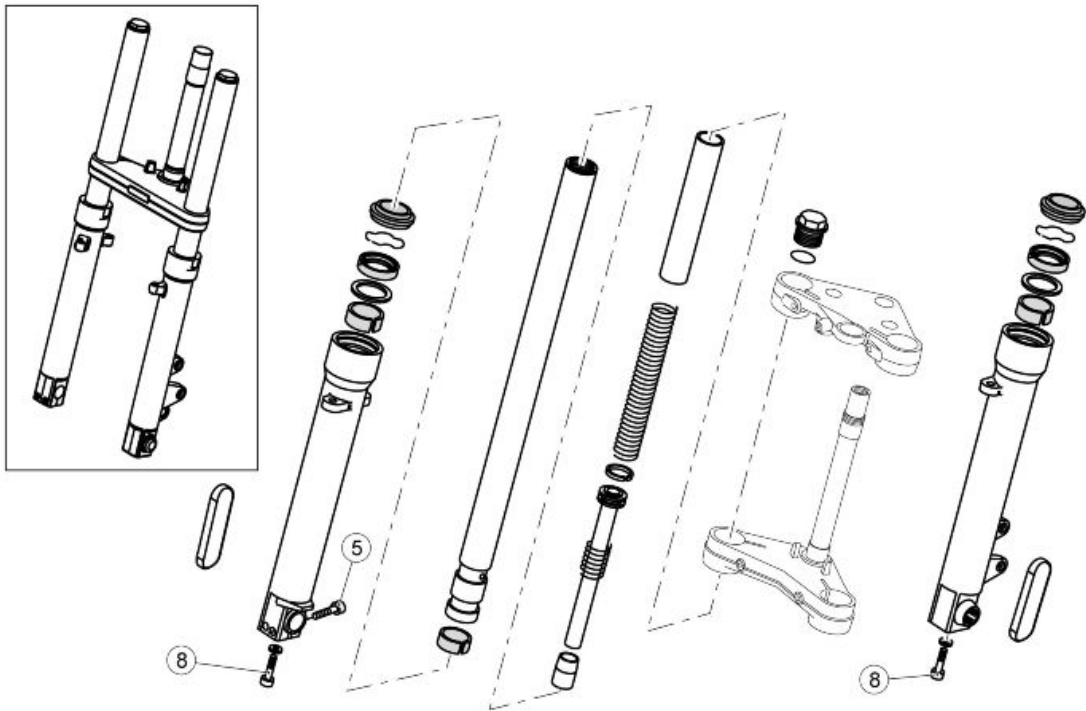
### FUEL SYSTEM

Specification	Desc./Quantity
Type	Electronic injection (Marelli MIU G3)
Venturi	Ø 38 mm (1.50 in)
Fuel	Unleaded petrol max E10 (95 RON).

## Tightening Torques

## Chassis

Front side

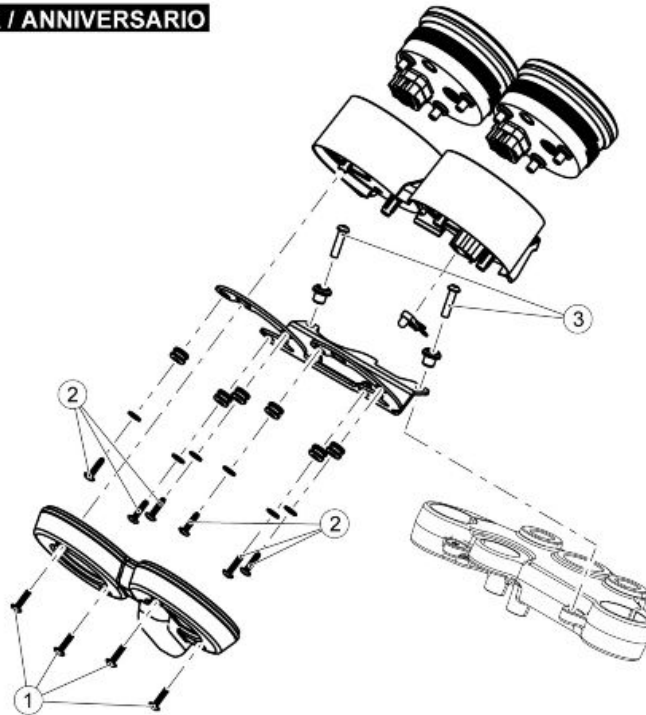


**FRONT SUSPENSION - STEERING**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lb 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 lb ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lb 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)	-

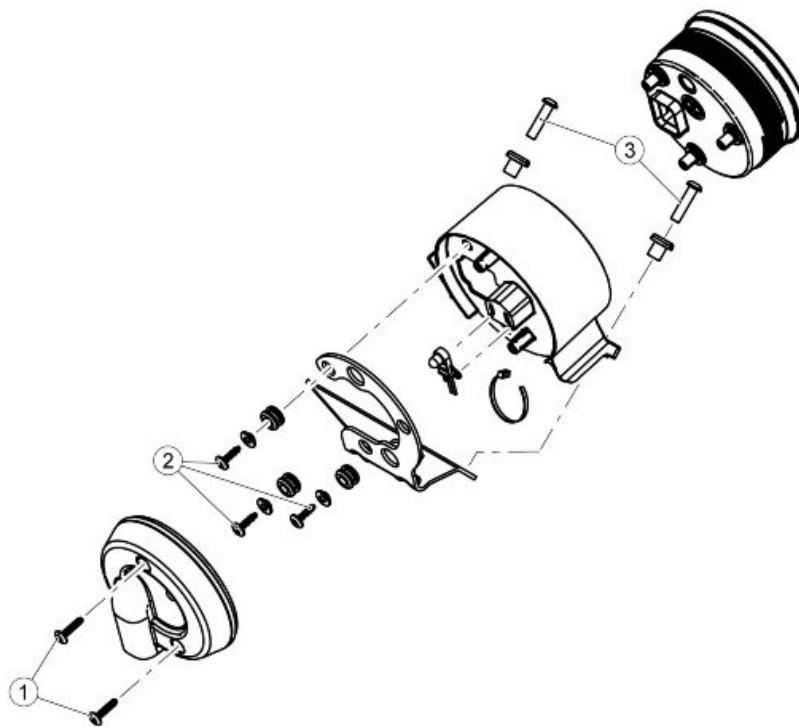
**SPECIAL / RACER / ANNIVERSARIO**



**INSTRUMENT PANEL**

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 lb ft)	-

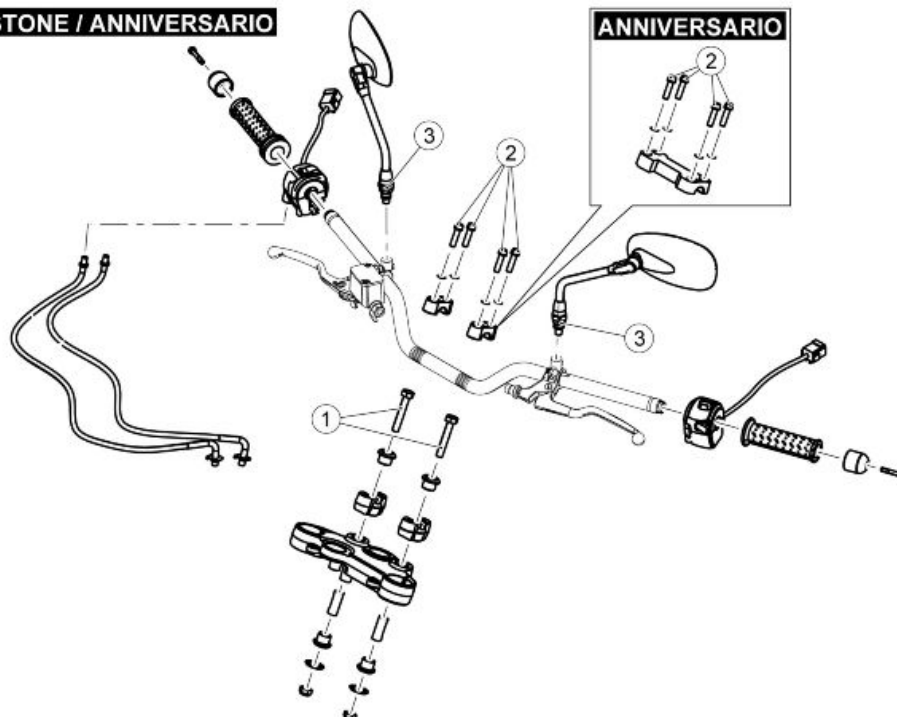
**STONE**



**INSTRUMENT PANEL**

Pos.	Description	Type	Quantity	Torque	Notes
1	Instrument cluster cover fastening screws	Self-tapping 4.2x19	2	1.2 - 1.5 Nm (0.89 - 1.11 lb ft)	-
2	Screws fastening instrument cluster to support bracket	Self-tapping 3.9x16	3	1.2 - 1.5 Nm (0.88 - 1.11 lb ft)	-
3	Support plate fastening screws	M6	2	10 Nm (7.38 lb ft)	-

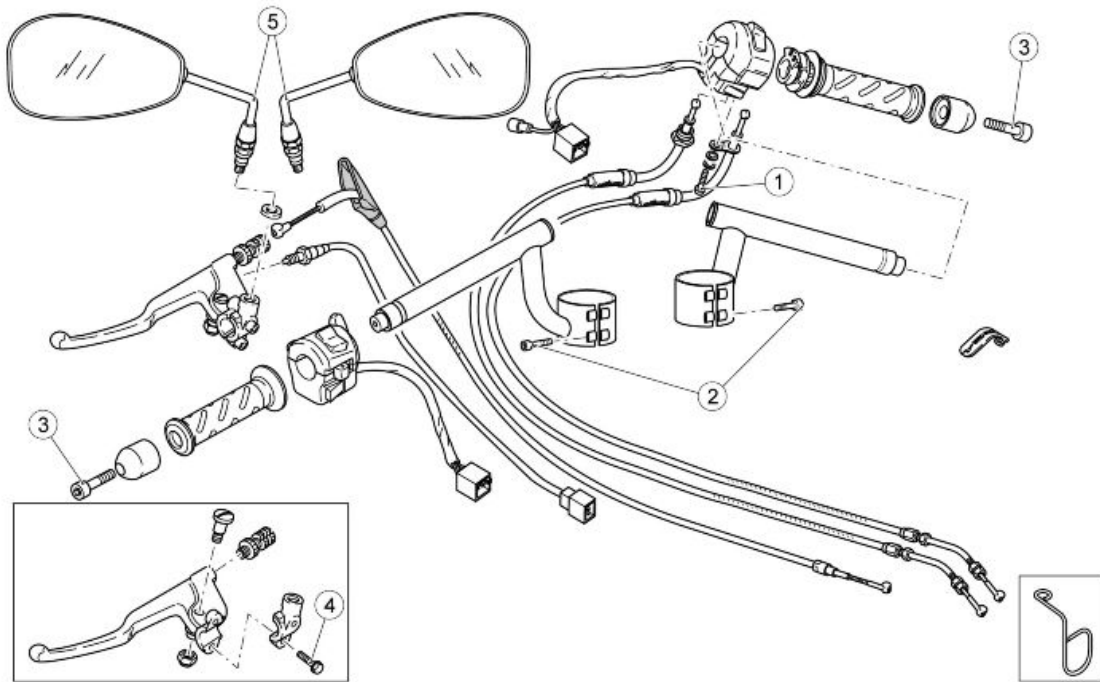
**SPECIAL / STONE / ANNIVERSARIO**



**HANDLEBAR AND CONTROLS**

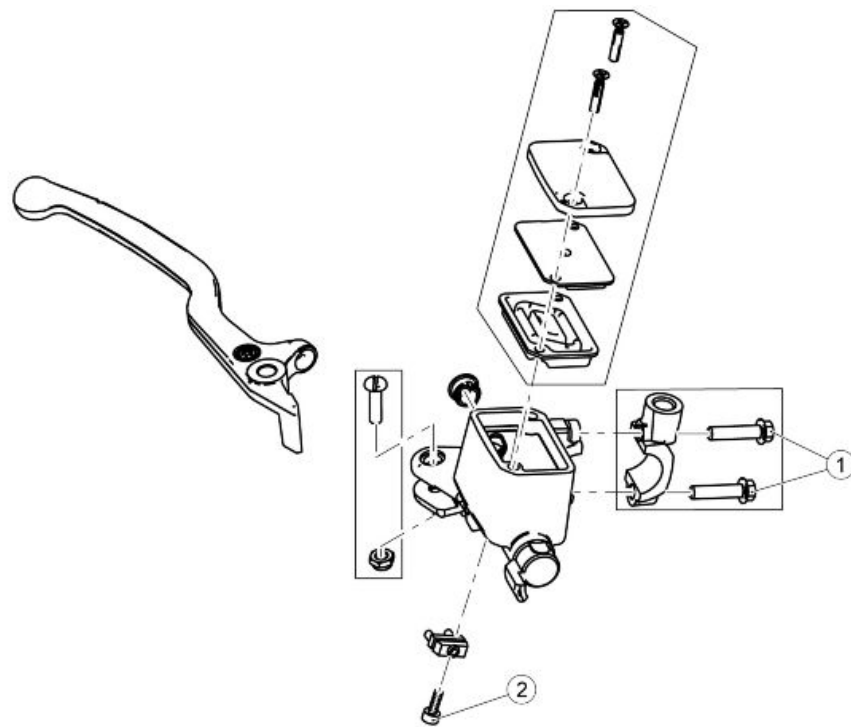
Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fixing handlebar support U-bolts to steering plate	M10	2	50 Nm (36.88 lb ft)	-
2	Handlebar U-bolt fastener screws	M8	4	25 Nm (18.44 lb ft)	-
3	Mirror fixing	M10	2	Manual	-
-	Light switch fastening screws	SWP 5	2	1.5 Nm (1.11 lb ft)	-
-	Throttle cable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

**RACER**



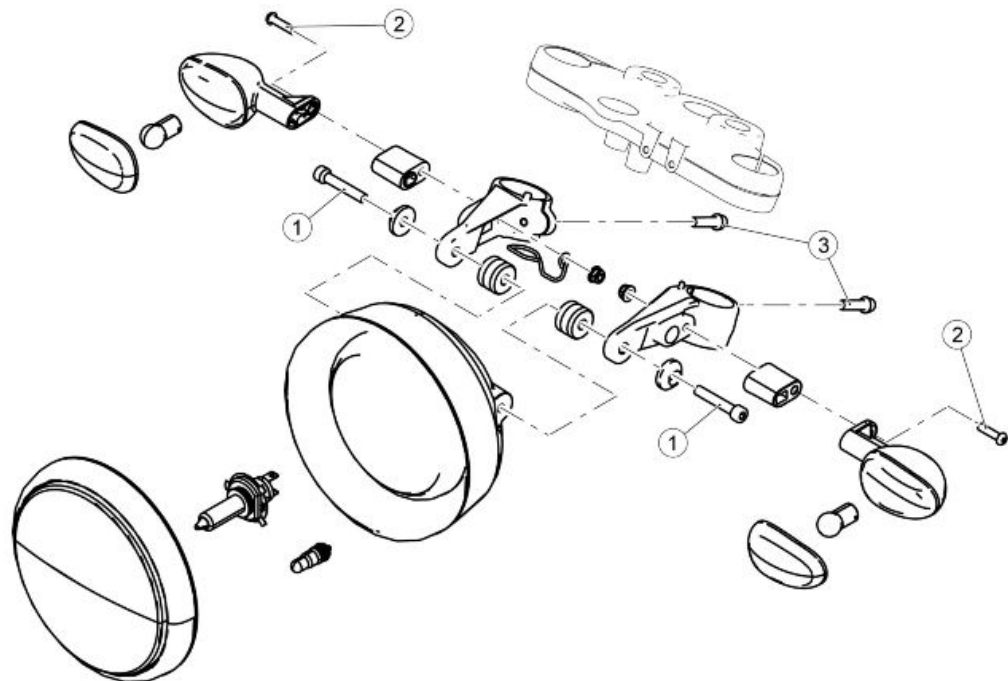
**HANDLEBAR AND CONTROLS**

Pos.	Description	Type	Quantity	Torque	Notes
1	Switch fastener screw	SWP 5	1+1	1.5 Nm (1.11 lb ft)	-
2	Semi-handlebar fixing screw	M6x25	4	10 Nm (7.38 lb ft)	-
3	Counterweight fixing screw	M6	2	10 Nm (7.38 lb ft)	Loctite 243
4	Screw fastening the clutch control U-bolt to the semi-handlebar	M6	2	10 Nm (7.38 lb ft)	-
5	Mirror fixing	M10	1 + 1	-	Manual
-	Gas covers fastener screw	M5	3	6 Nm (4.43 lb ft)	-



**FRONT BRAKE MASTER CYLINDER**

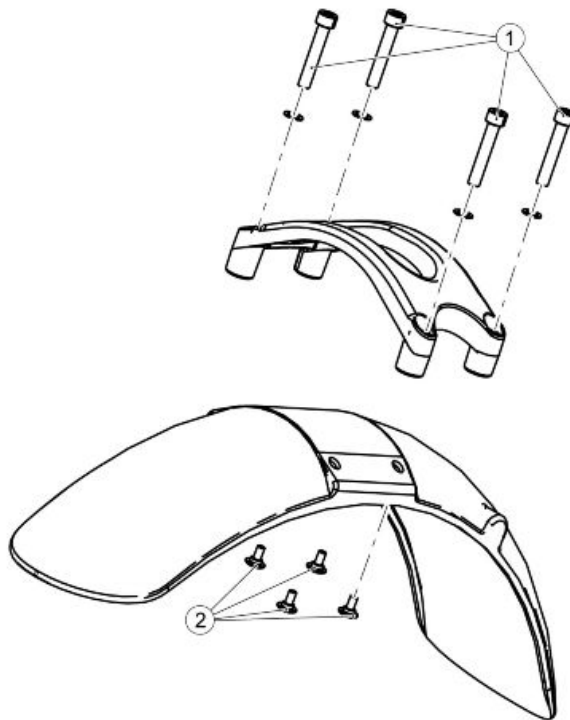
Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lb ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lb ft)	-



**FRONT LIGHTS**

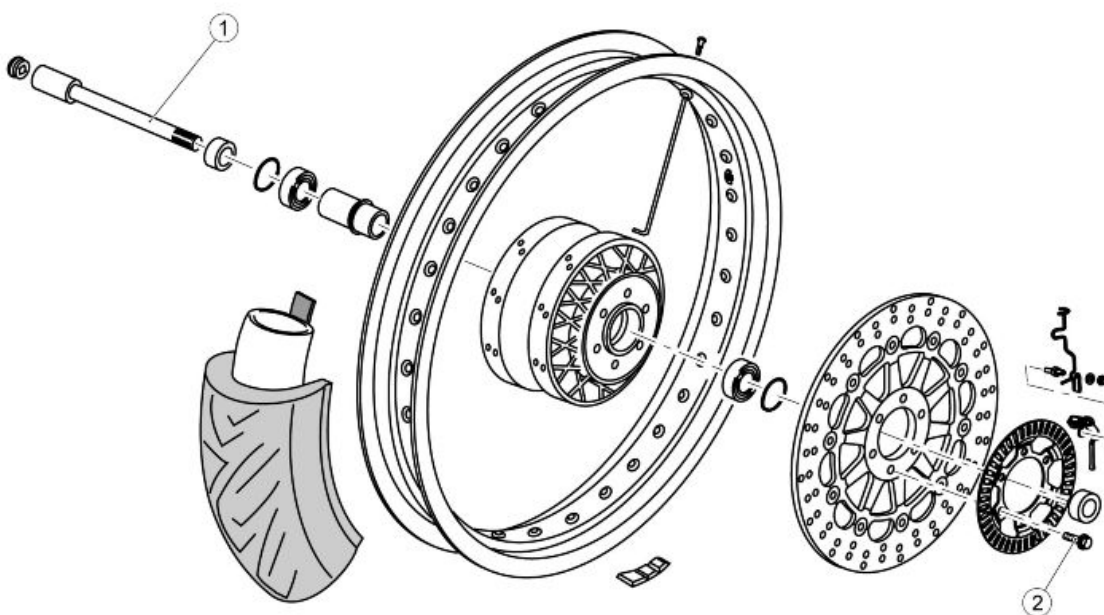
Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lb ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
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 lb ft)	-



**FRONT MUDGUARD**

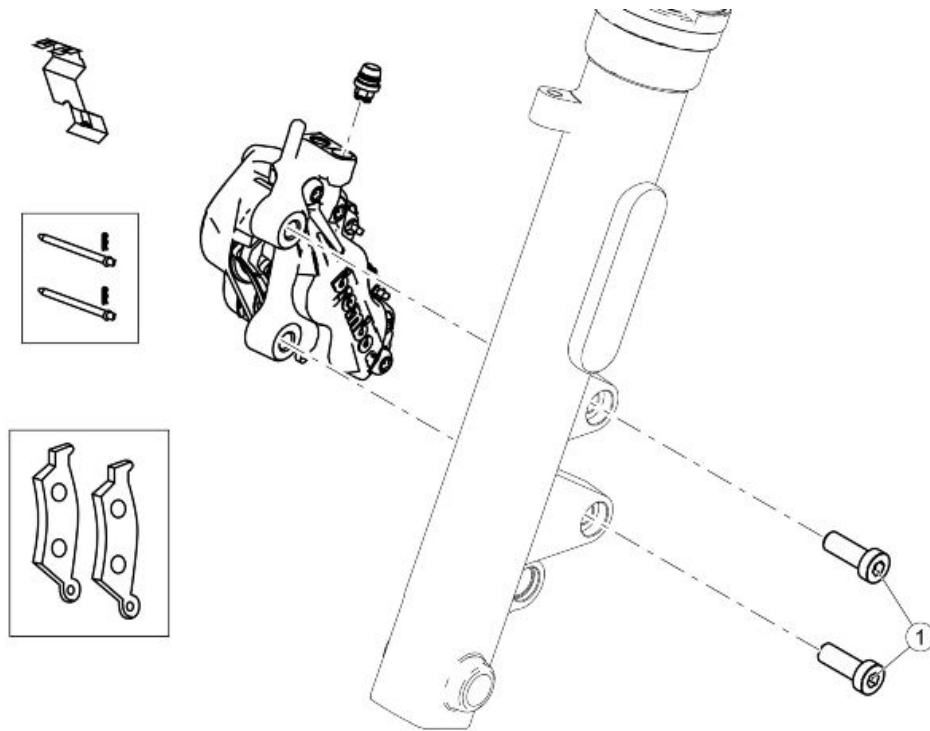
Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lb ft)	Loctite 243
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lb ft)	Loctite 243





**FRONT WHEEL**

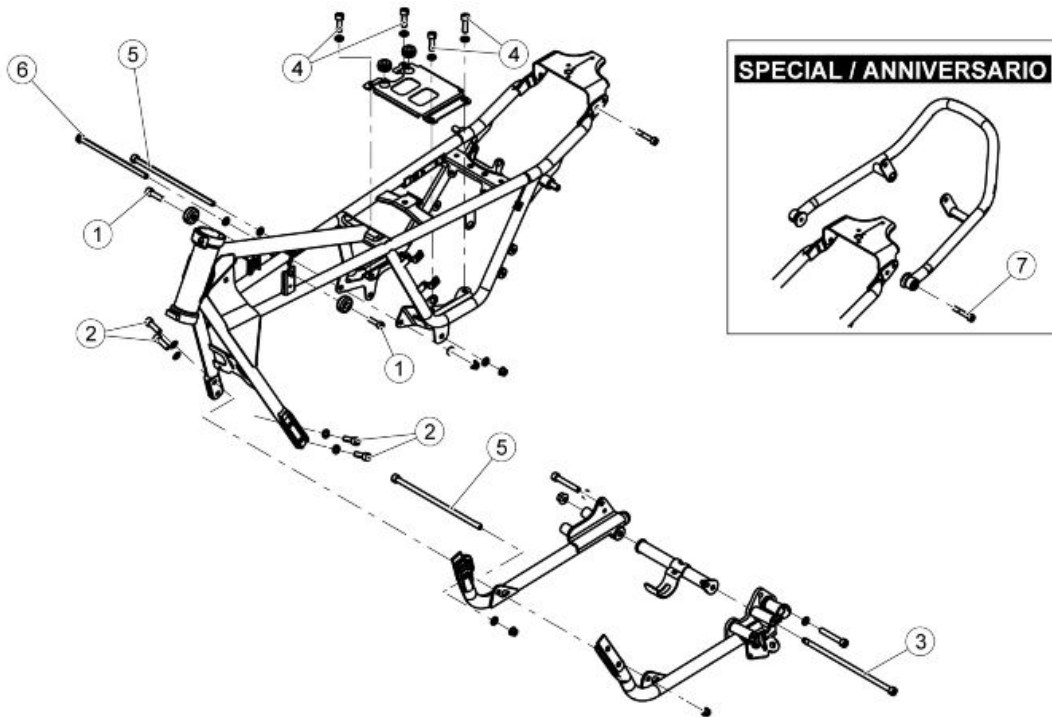
Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lb ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lb ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lb ft)	Pre-permeated
4	Cable gland nut	M6	1	6 Nm (4.43 lb ft)	-



**FRONT BRAKE CALLIPER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake calliper fixing screws	M10	2	50 Nm (36.88 lb ft)	-

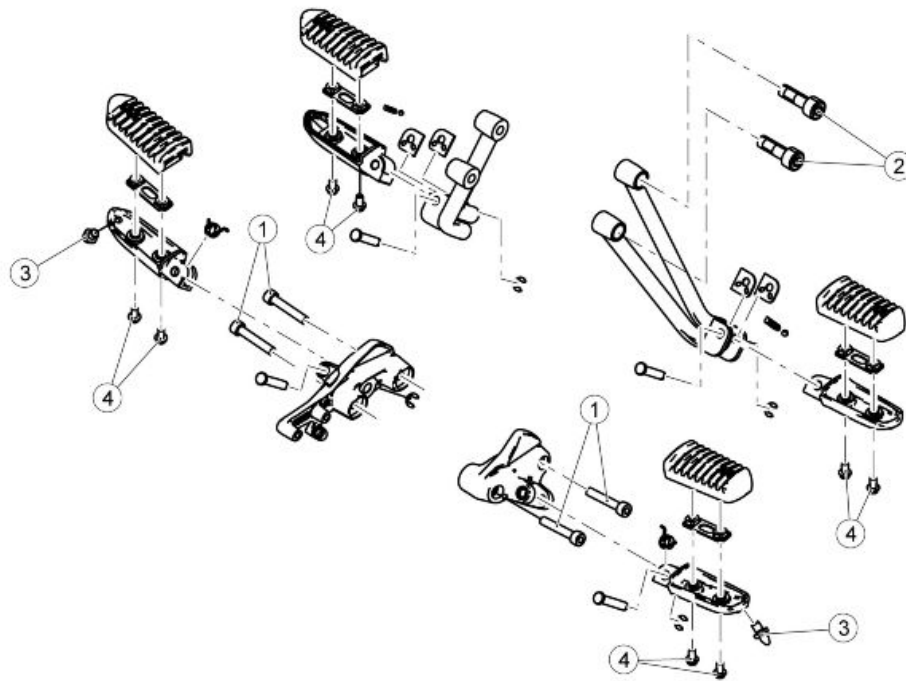
Central part



**CHASSIS**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lb ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lb ft)	-
3	Screw fastening the stand cross-piece to the cradles	M10	1	50 Nm (36.88 lb ft)	Pre-permeated
4	Rear plate fastening screw	M8	4	35 Nm (25.81 lb 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 lb ft)	-

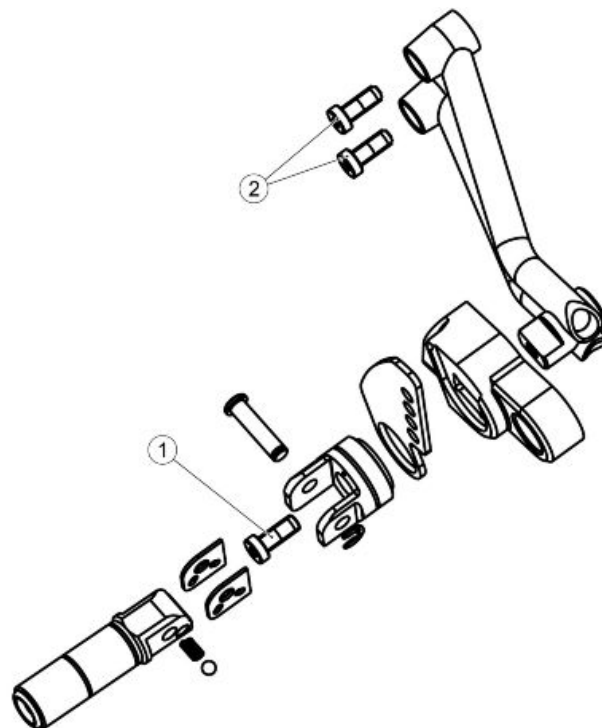
**SPECIAL / STONE / ANNIVERSARIO**



**FOOTRESTS**

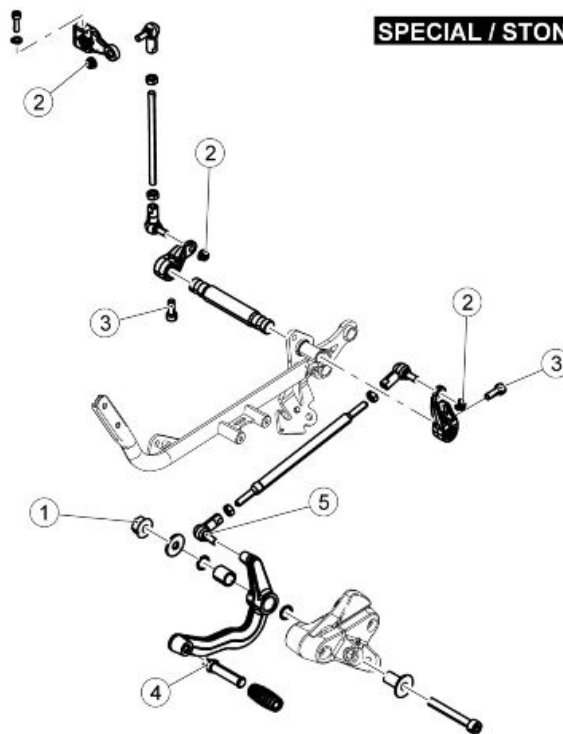
Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening rider footrest support to the frame	M8	4	25 Nm (18.44 lb ft)	Loctite 243
2	Screws fastening passenger footrest support to the frame	M8	4	25 Nm (18.44 lb ft)	Pre-permeated
3	Anti-sliding pin	-	2	10 Nm (7.38 lb ft)	Loctite 243
4	Footrest rubber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

**RACER**



**PASSENGER FOOTRESTS**

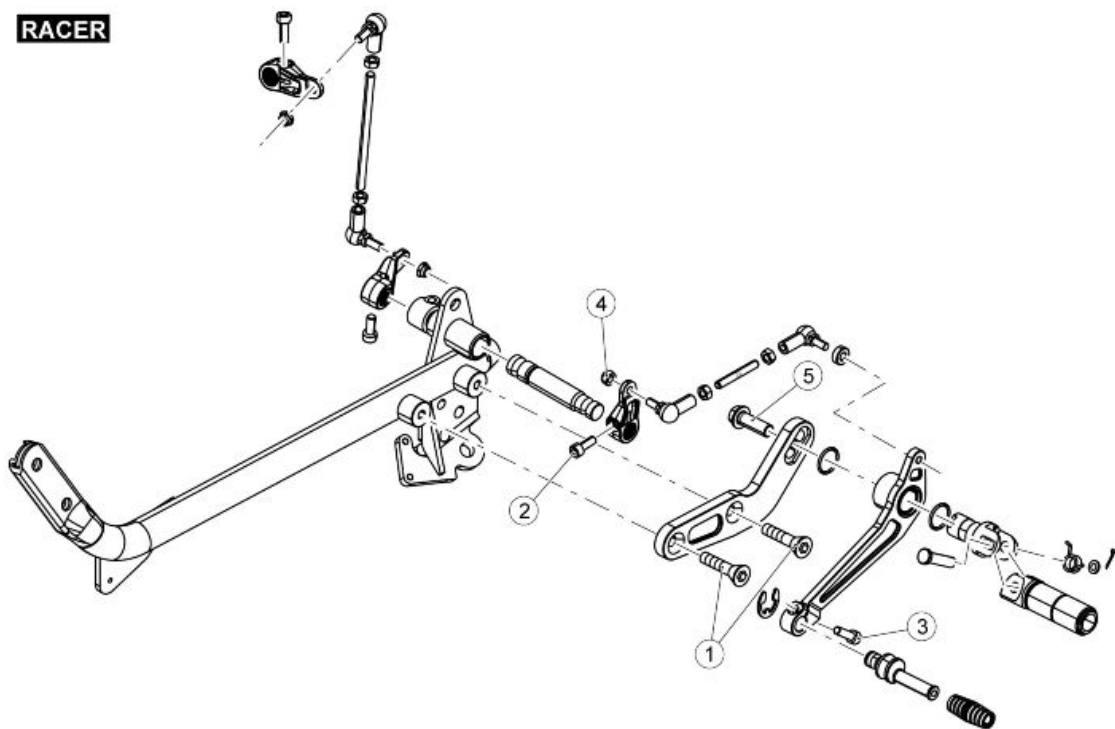
Pos.	Description	Type	Quantity	Torque	Notes
1	Footrest support fastening screw	M8	2	25 Nm (18.44 lb ft)	Pre-permeated
2	Screws fastening passenger footrest support to the frame	M8	4	25 Nm (18.44 lb ft)	Pre-permeated



**GEAR LEVER**

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

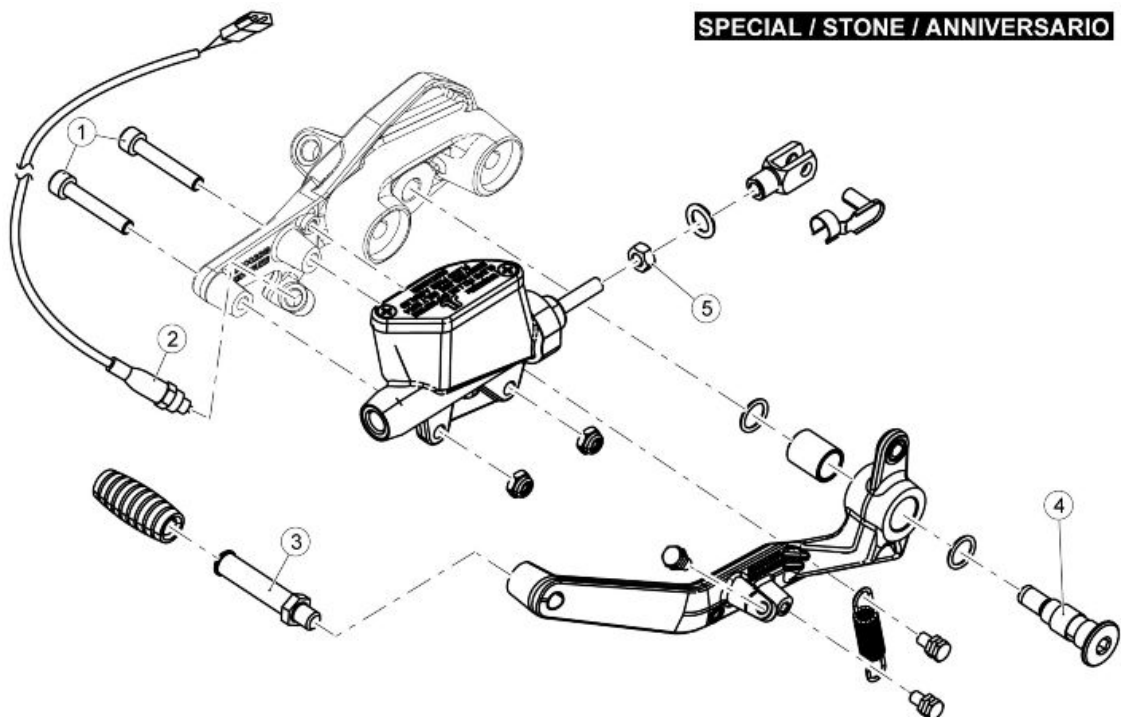
**RACER**



**RIDER FOOTREST / GEAR SHIFT LEVER**

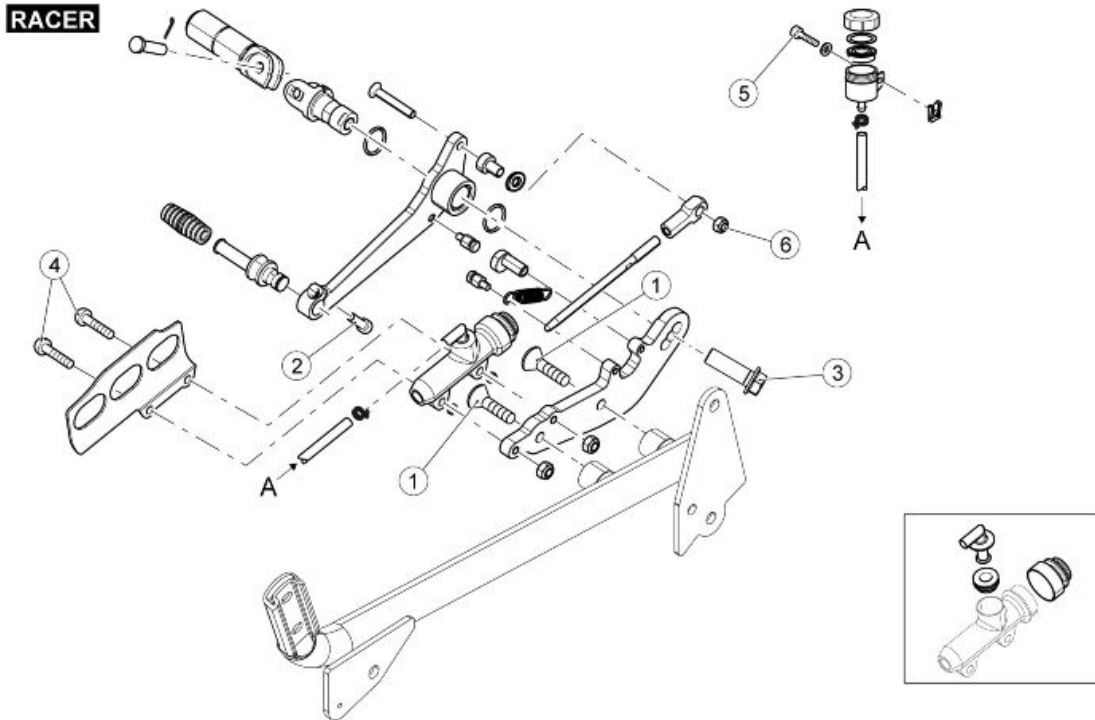
Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fastening left hand rider footrest mounting plate to cradle	M8x20	2	25 Nm (18.44 lb ft)	Loctite 243
2	Preselector lever fixing screw	M6x20	1	10 Nm (7.38 lb ft)	-
3	Gearbox lever fixing screws	M6x20	1	10 Nm (7.38 lb ft)	Loctite 243
4	Gearbox control rod fixing nut	M6x1	1	10 Nm (7.38 lb ft)	Loctite 246
5	Screw fastening rider footrest mounting to plate	M8	1	20 Nm (14.75 lb ft)	Loctite 243

**SPECIAL / STONE / ANNIVERSARIO**



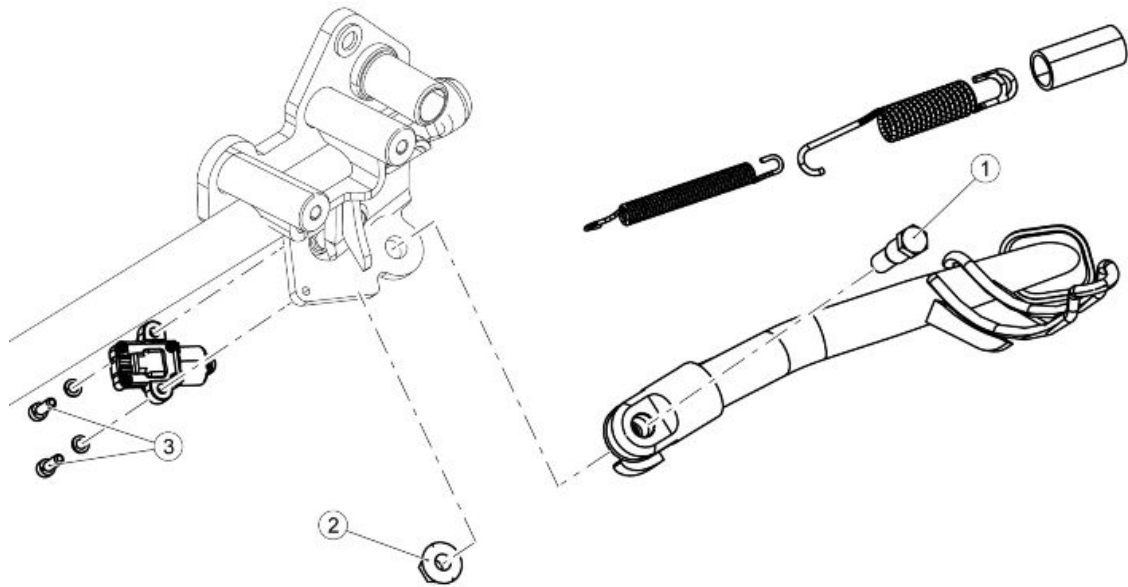
**REAR BRAKE MASTER CYLINDER**

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



**RIDER FOOTREST / REAR BRAKE LEVER**

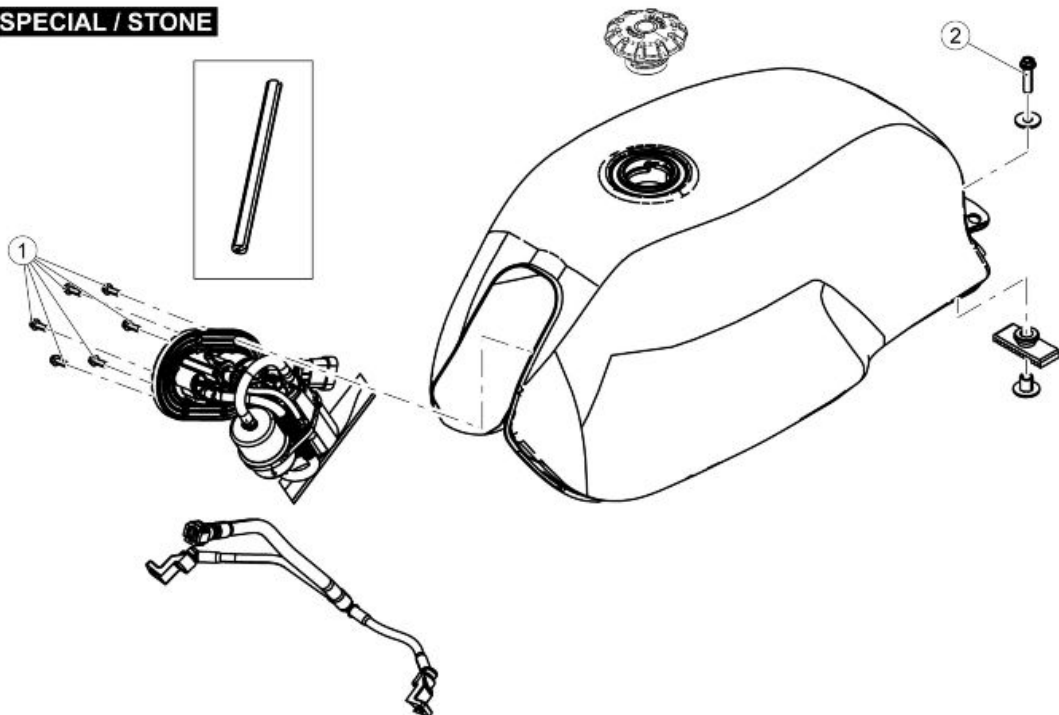
Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fastening right hand rider footrest mounting plate to cradle	M8x20	2	20 Nm (14.75 lb ft)	Loctite 243
2	Rear brake lever fixing screw	M6x20	1	10 Nm (7.38 lb ft)	Loctite 243
3	Screw fastening rider footrest mounting to plate	M8	1	25 Nm (18.44 lb ft)	Loctite 243
4	Rear brake pump fixing screw	M6x25	2	8 Nm (5.90 lb ft)	Loctite 243
5	Rear brake fluid reservoir fixing screw	M5x15	1	6 Nm (4.43 lb ft)	-
6	Nut fastening rod terminal on brake lever	M6	1	10 Nm (7.38 lb ft)	-



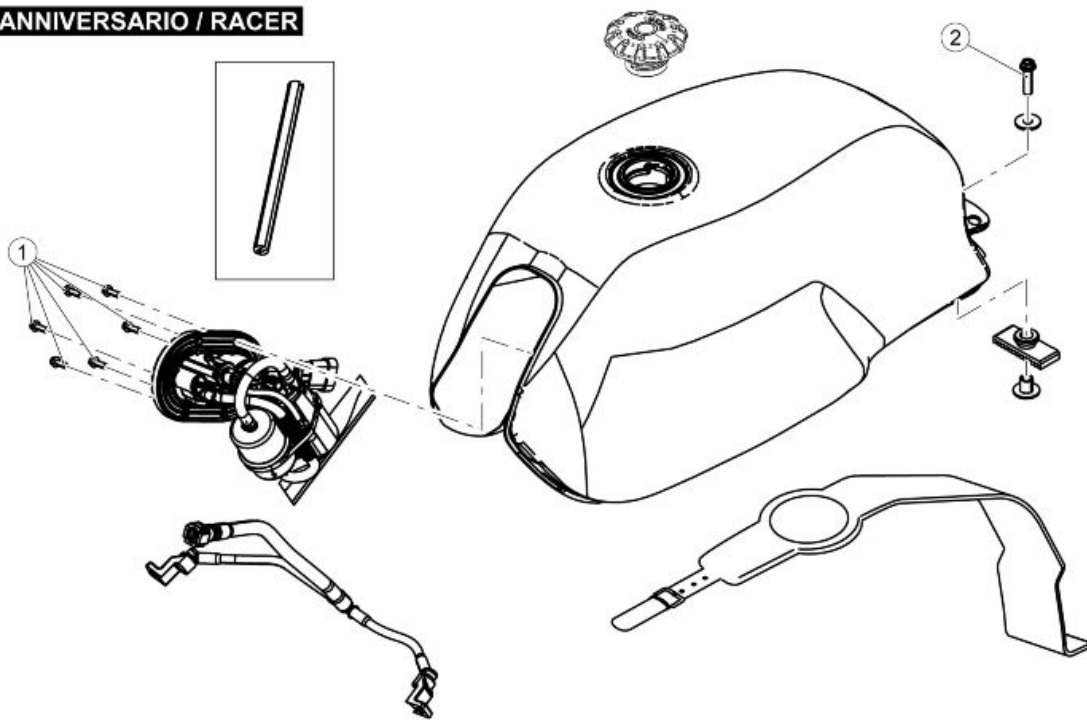
**SIDE STAND**

Pos.	Description	Type	Quantity	Torque	Notes
1	Side stand retainer pin	M10	1	10 Nm (7.38 lb ft)	-
2	Lock washer fastening on side stand pin	M10	1	30 Nm (22.13 lb ft)	-
3	Side stand switch fastening screws	M5	2	6 Nm (4.43 lb ft)	Pre-permeated

**SPECIAL / STONE**

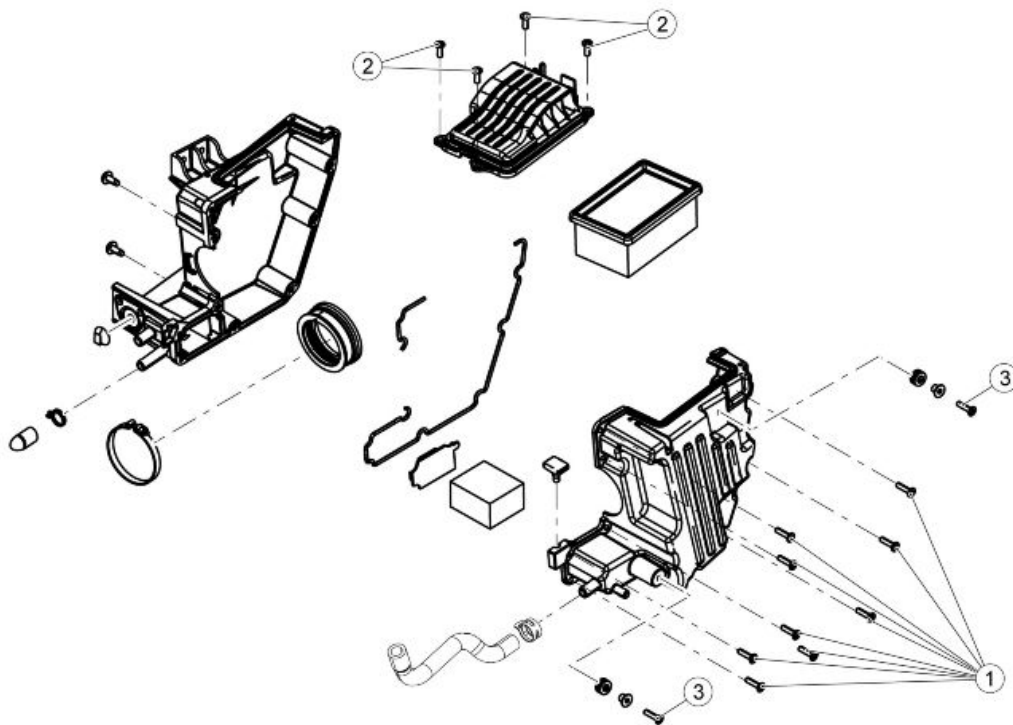


**ANNIVERSARIO / RACER**



**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
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lb ft)	-



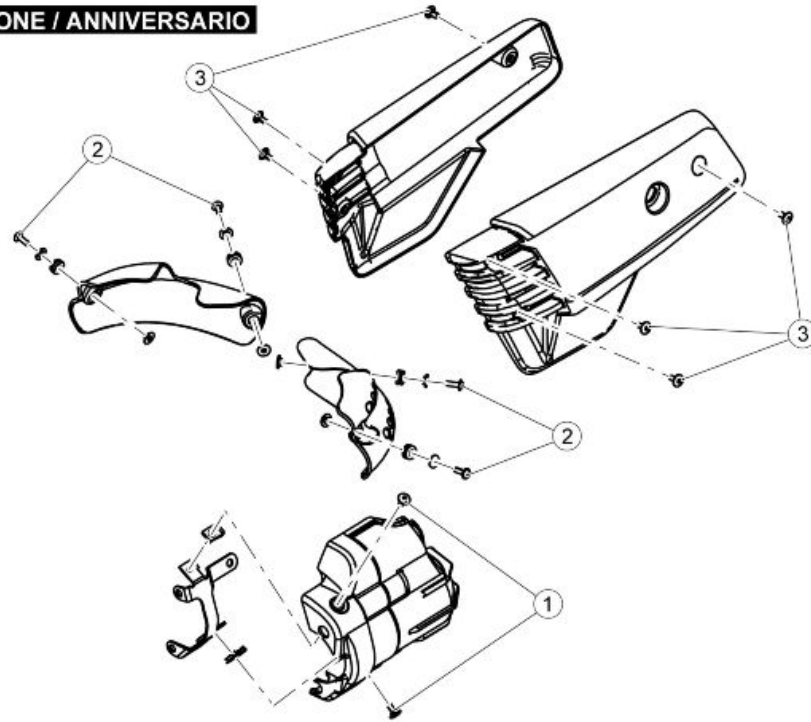
**FILTER BOX**

Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lb ft)	-

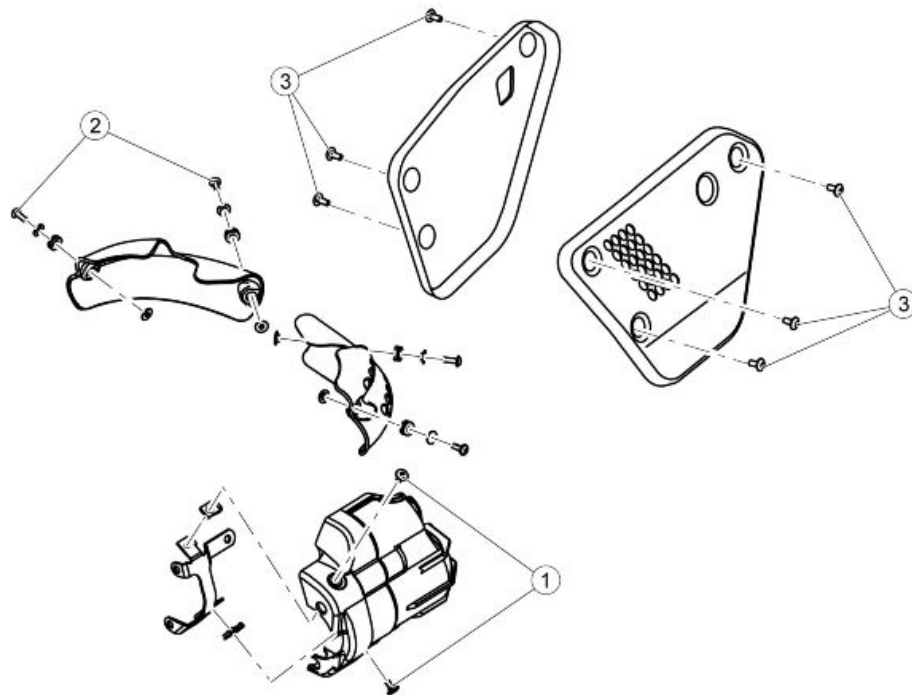


Pos.	Description	Type	Quantity	Torque	Notes
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lb ft)	-
3	Filter casing/frame fastening screw	SWP M5	2	3 Nm (2.21 lb ft)	-

**SPECIAL / STONE / ANNIVERSARIO**

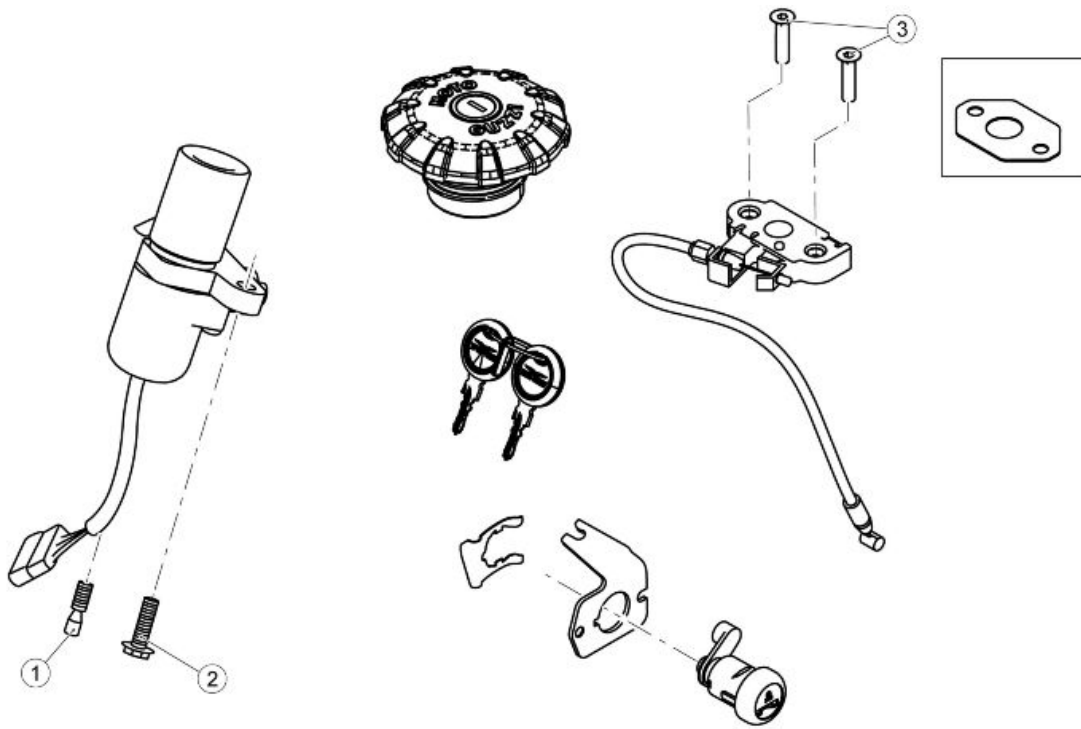


**RACER**



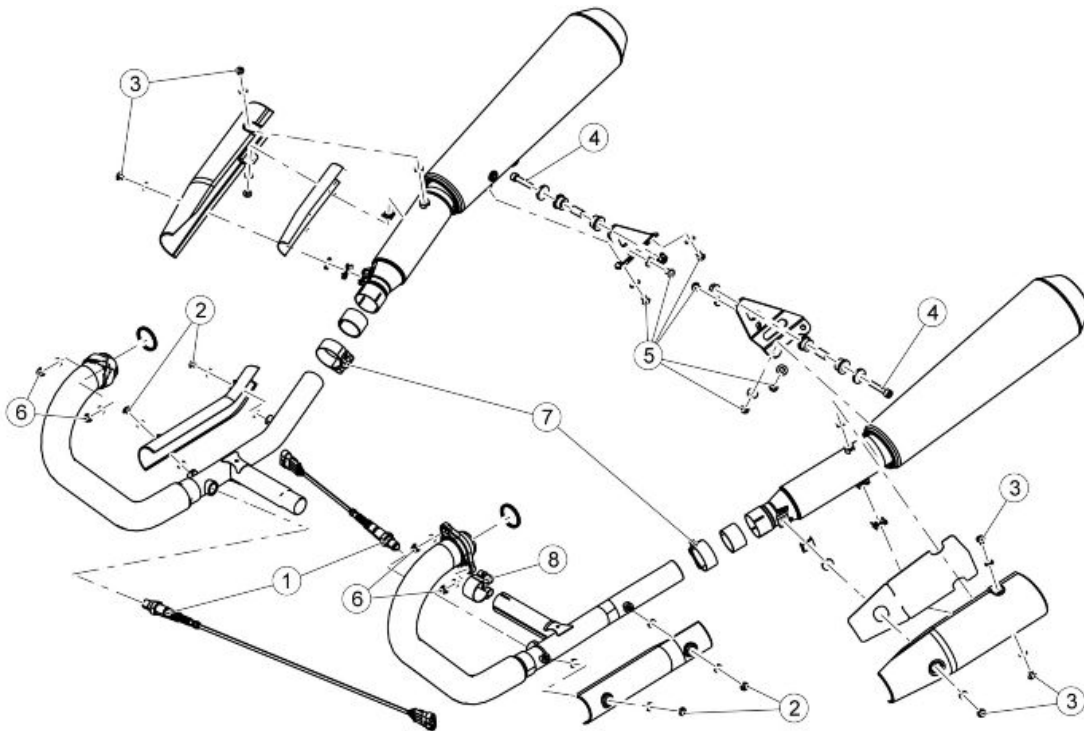
**CENTRAL BODYWORK**

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 lb ft)	-
3	Side panel fastening screws	M5	6	4 Nm (2.95 lb ft)	-



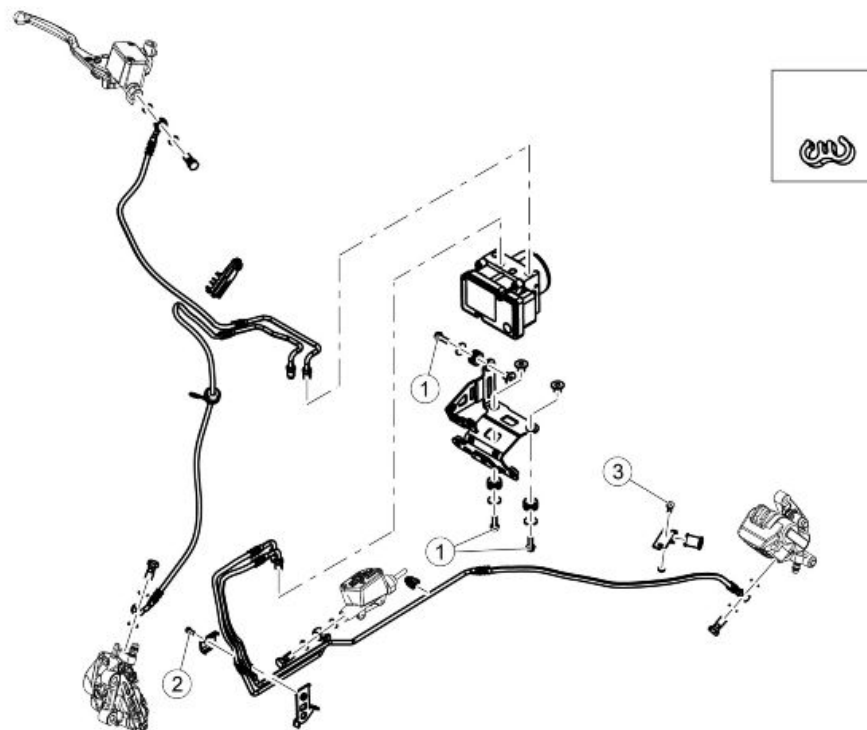
**LOCK KIT**

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 lb ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	10 Nm (7.38 lb ft)	-



**EXHAUST SYSTEM**

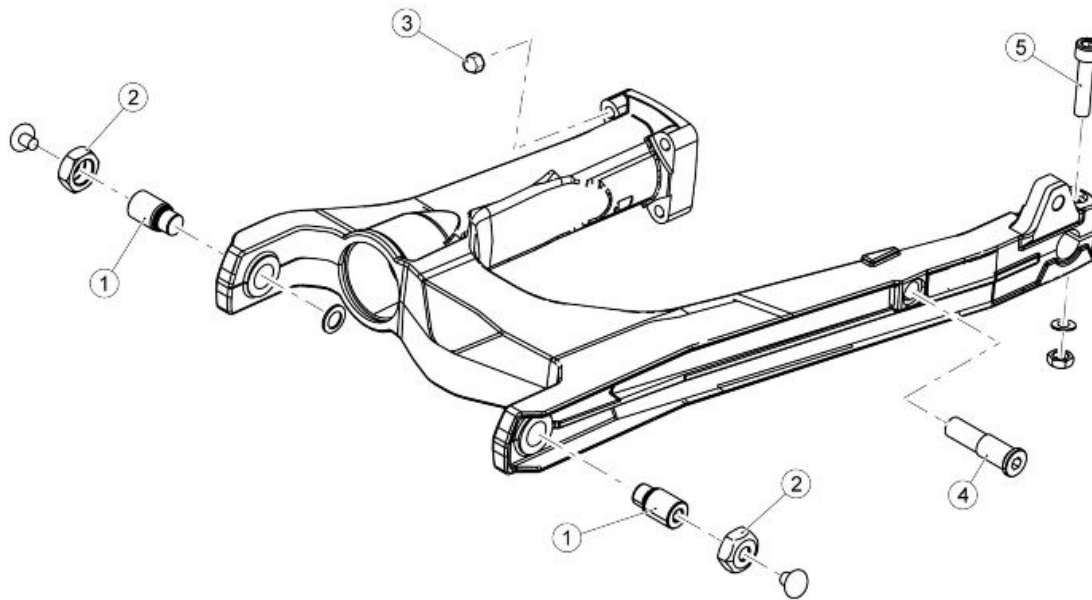
Pos.	Description	Type	Quantity	Torque	Notes
2	Lambda probes fastener	M18	1	38 Nm (28.03 lb ft)	-
2	Screws fastening heat shields to manifolds	M6	4	8 Nm (5.90 lb ft)	Pre-permeated
3	Screws fastening heat shields to silencers	M6	6	8 Nm (5.90 lb ft)	Pre-permeated
4	Screws fastening silencers to frame support	M8	2	25 Nm (18.44 lb ft)	-
5	Screws fastening silencers to the support	M8	6	25 Nm (18.44 lb ft)	Pre-permeated/ Pre-mounted to the silencers
6	Nuts fastening the exhaust pipes to the engine	M8	4	25 Nm (18.44 lb ft)	-
5	Clamps fastening exhaust pipes to the silencers	M8	2	25 Nm (18.44 lb ft)	-
8	Clamp fastening exhaust pipes to the compensator	M8	1	25 Nm (18.44 lb ft)	-



**ABS SYSTEM**

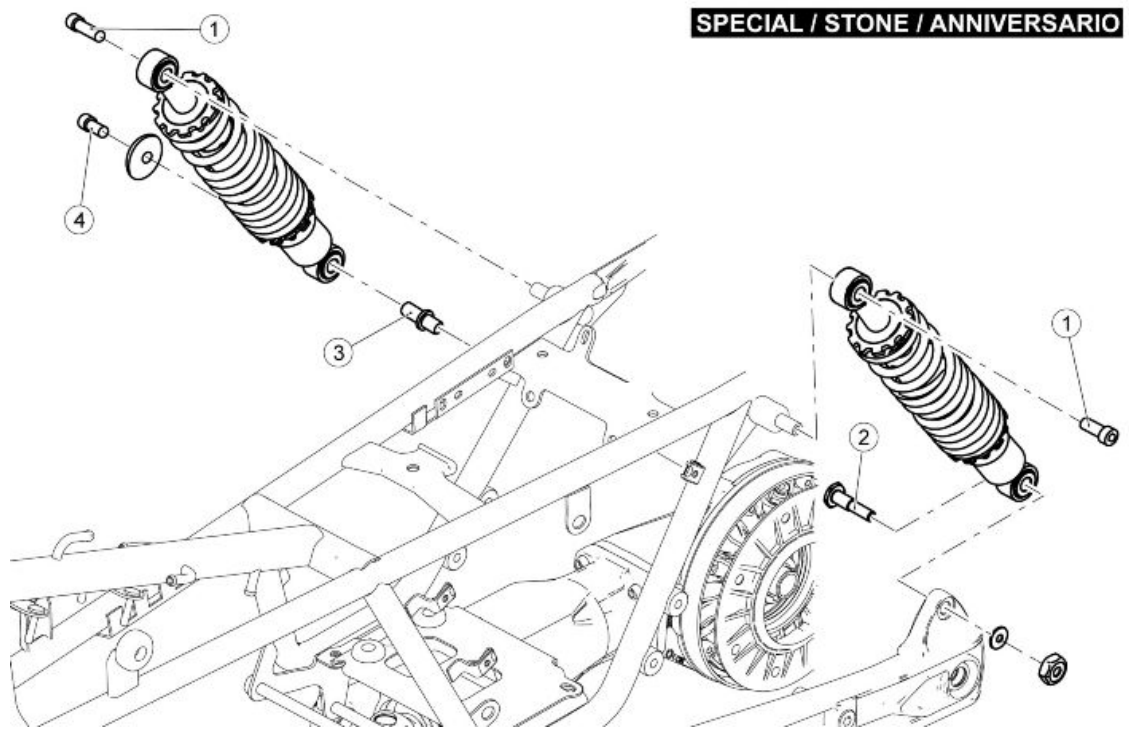
Pos.	Description	Type	Quantity	Torque	Notes
1	Control unit bracket fastening to the frame	M6x16	2	10 Nm (7.38 lb ft)	-
2	Screw fastening brake lines fastening plates	M4	1	3 Nm (2.21 lb ft)	-
3	Clamp fastening screw	M5	1	6 Nm (4.43 lb ft)	-

Back side

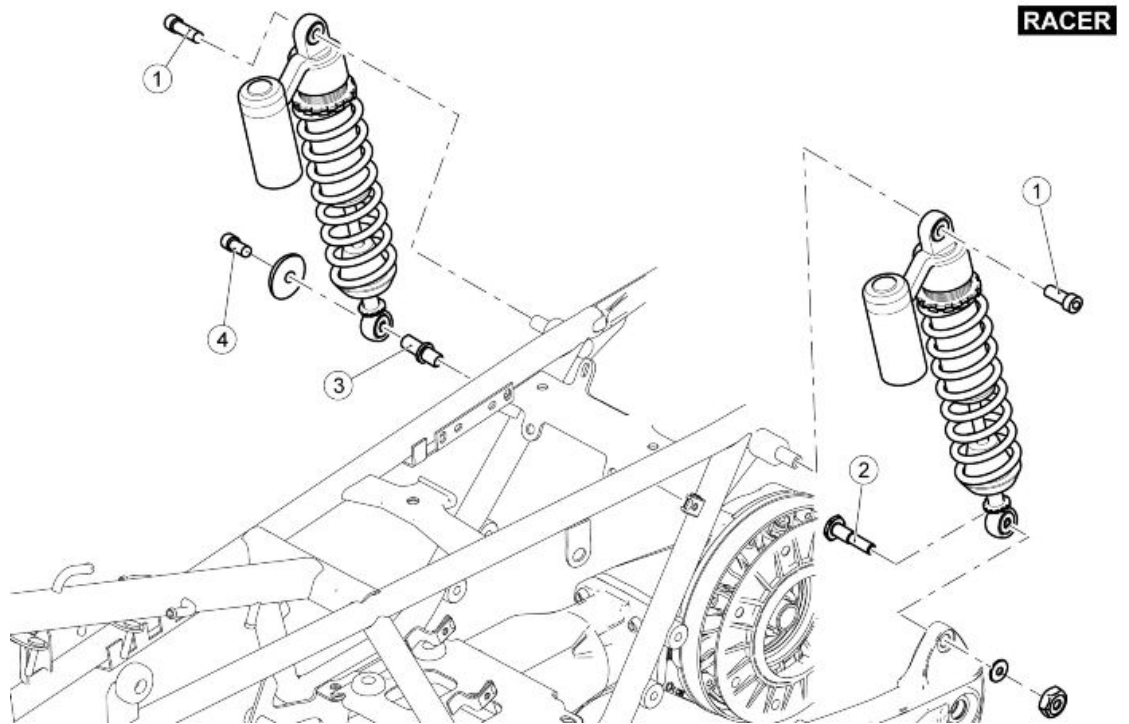


**SWINGARM**

Pos.	Description	Type	Quantity	Torque	Notes
1	Pins fixing swingarm to gearbox	M20	2	-	Fully home with no preload
2	Lock washer fastening on pin	M20	2	50 Nm (36.88 lb ft)	Hold the pin
3	Nut fixing gearcase to swingarm	M8	4	25 Nm (18.44 lb ft)	Hold the pin
4	Pin fixing the rear calliper holding plate to swingarm	M16	1	35 Nm (25.81 lb ft)	-
5	Swingarm clamp retaining screw	M10	1	50 Nm (36.88 lb ft)	-



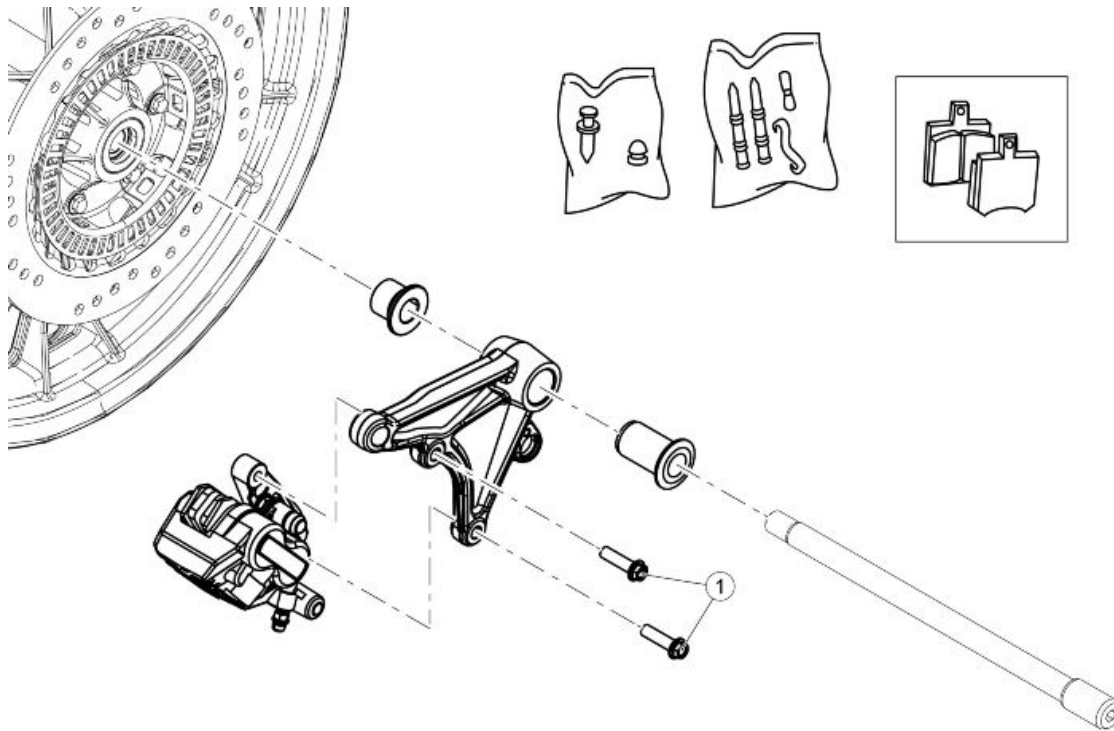
**SPECIAL / STONE / ANNIVERSARIO**



**RACER**

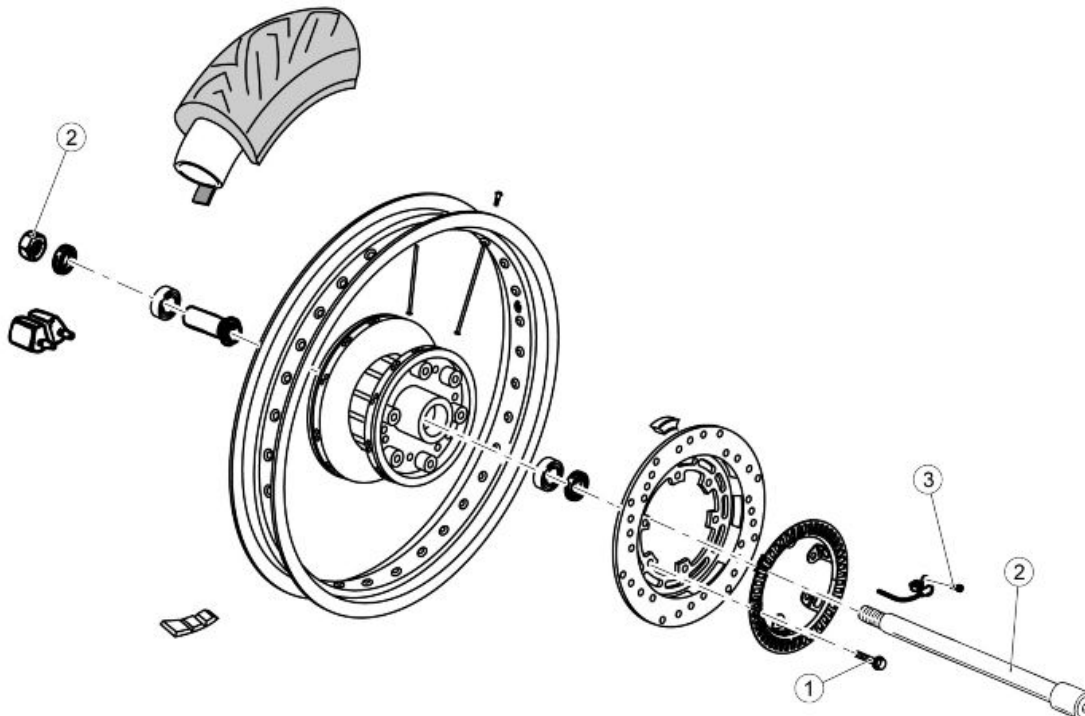
**REAR SHOCK ABSORBERS**

Pos.	Description	Type	Quantity	Torque	Notes
1	Top rear shock absorber fixing screws	M6	2	10 Nm (7.38 lb ft)	Pre-permeated
2	Pin fastening left shock absorber to the swing-arm	M10	1	35 Nm (25.81 lb ft)	
3	Pin fastening the shock absorber to gearbox	M12	1	35 Nm (25.81 lb ft)	
4	Screw fastening right shock absorber to pin	M8	1	10 Nm (7.38 lb ft)	Pre-permeated



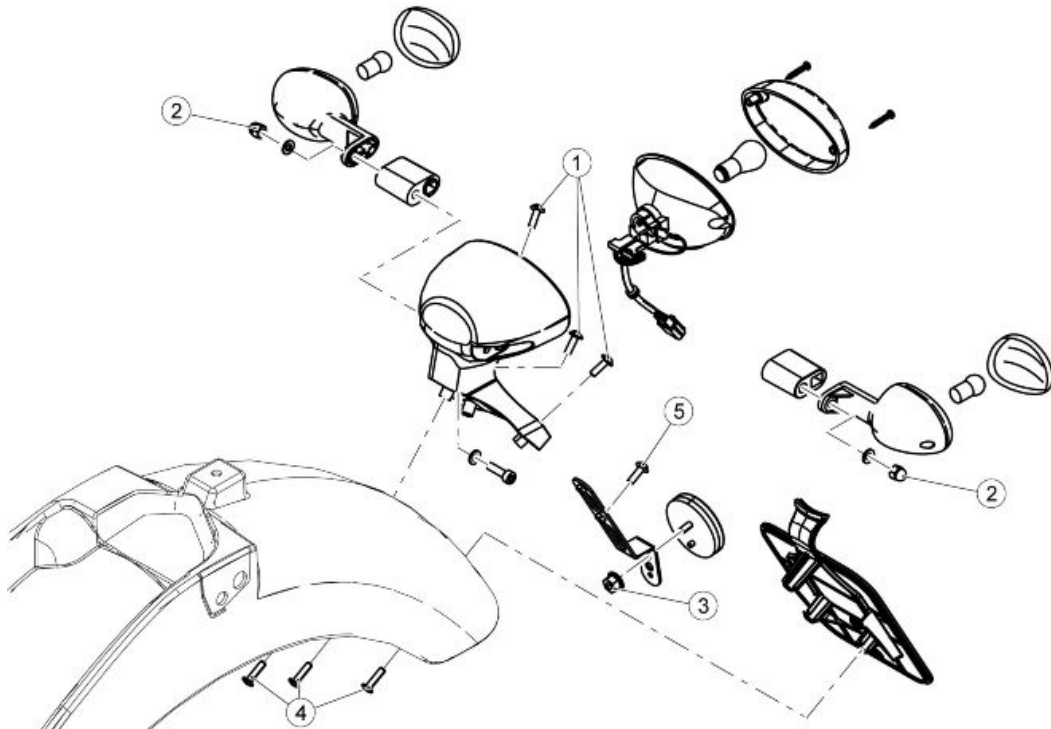
**REAR BRAKE CALLIPER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lb ft)	-

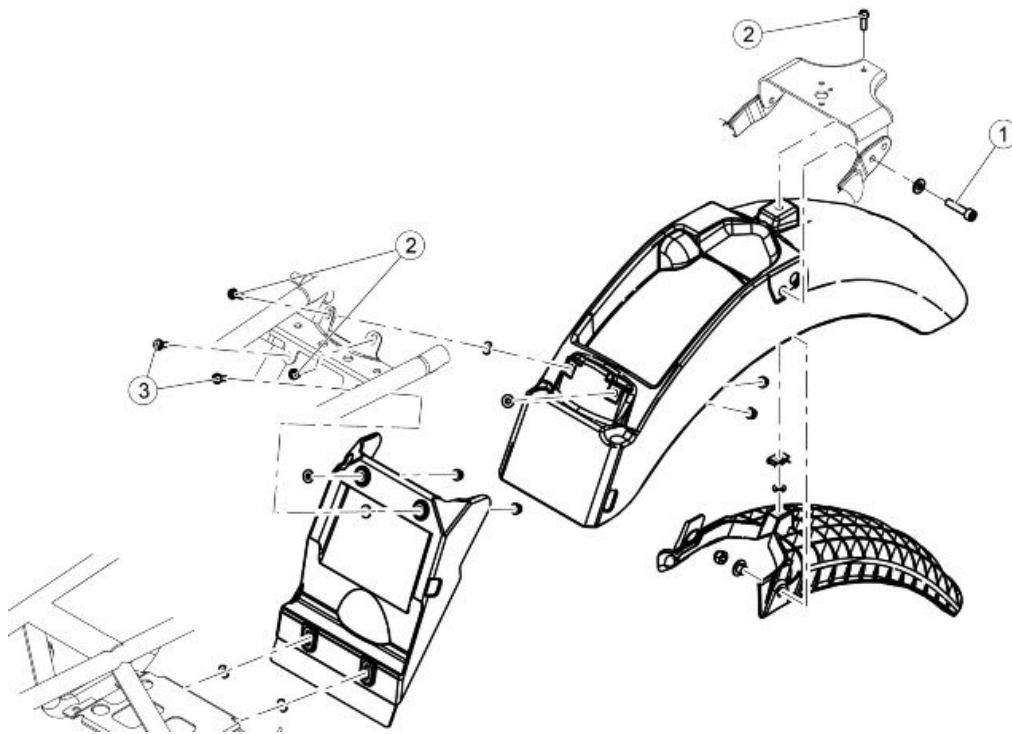


**REAR WHEEL**

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lb ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	120 Nm (88.51 lb ft)	
3	Rear ABS sensor fastening screw	M5	1	6 Nm (4.43 lb ft)	Loctite 243

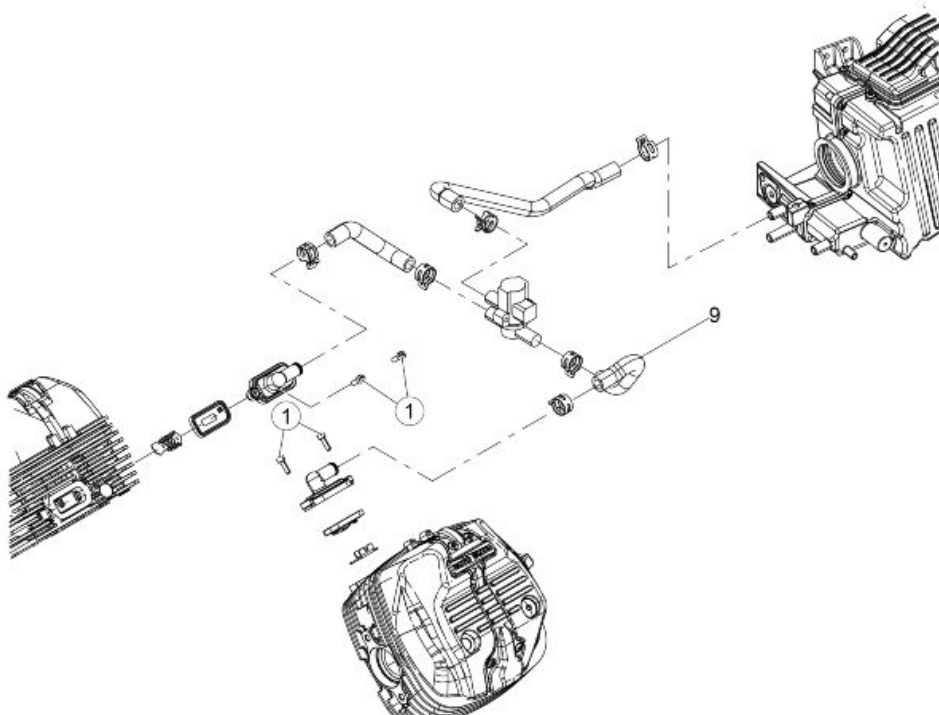
**REAR LIGHT UNIT**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening taillight support to the mudguard	M5	3	4 Nm (2.95 lb ft)	-
2	Rear turn indicator fastener nut	M6	2	6 Nm (4.43 lb ft)	-
3	Reflector fixing nut retainer to the support	M5	1	4 Nm (2.95 lb ft)	-
4	Screw fastening license plate mounting on mudguard mounting	SWP 5	3	3 Nm (2.21 lb ft)	-
5	Screw fastening reflector mounting on license plate mounting	M5	2	4 Nm (2.95 lb ft)	-



**REAR MUDGUARD**

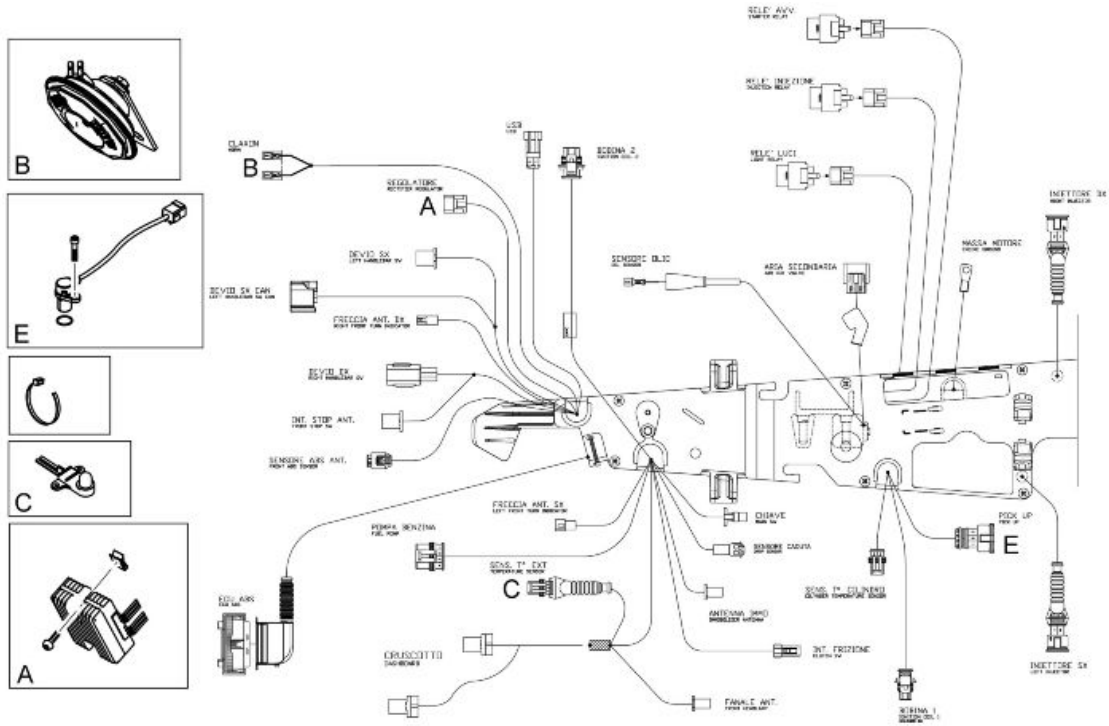
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lb ft)	
2	Front and centre fastening screw rear mudguard	M6	3	10 Nm (7.38 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lb ft)	





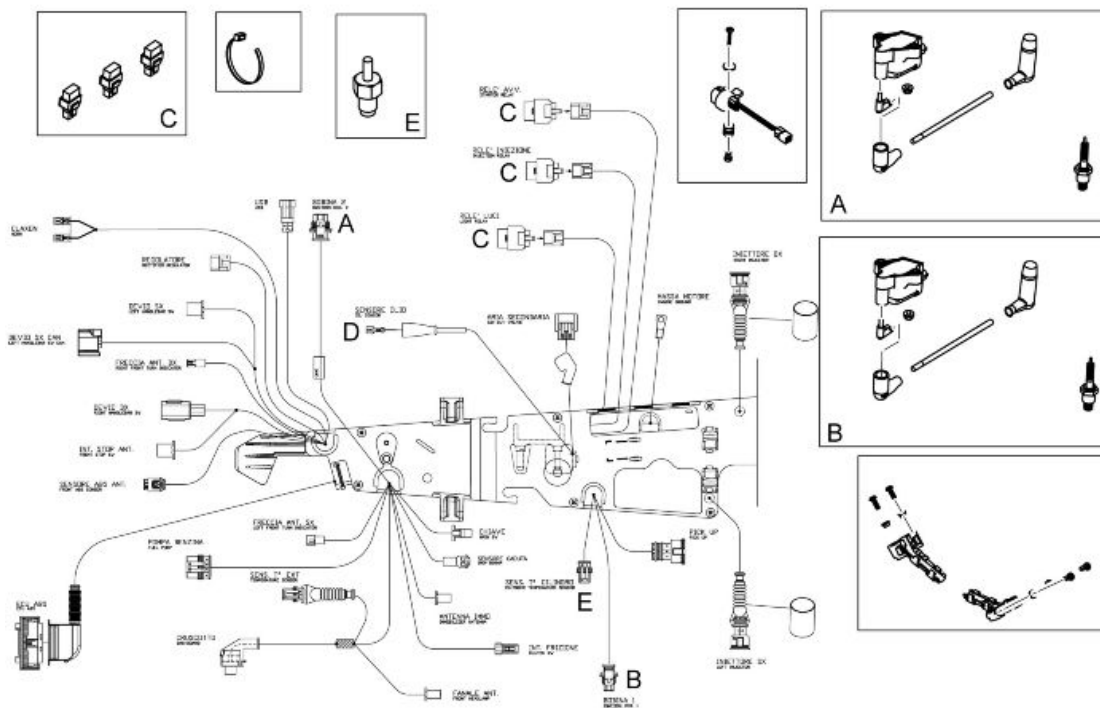
**SECONDARY AIR SYSTEM**

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



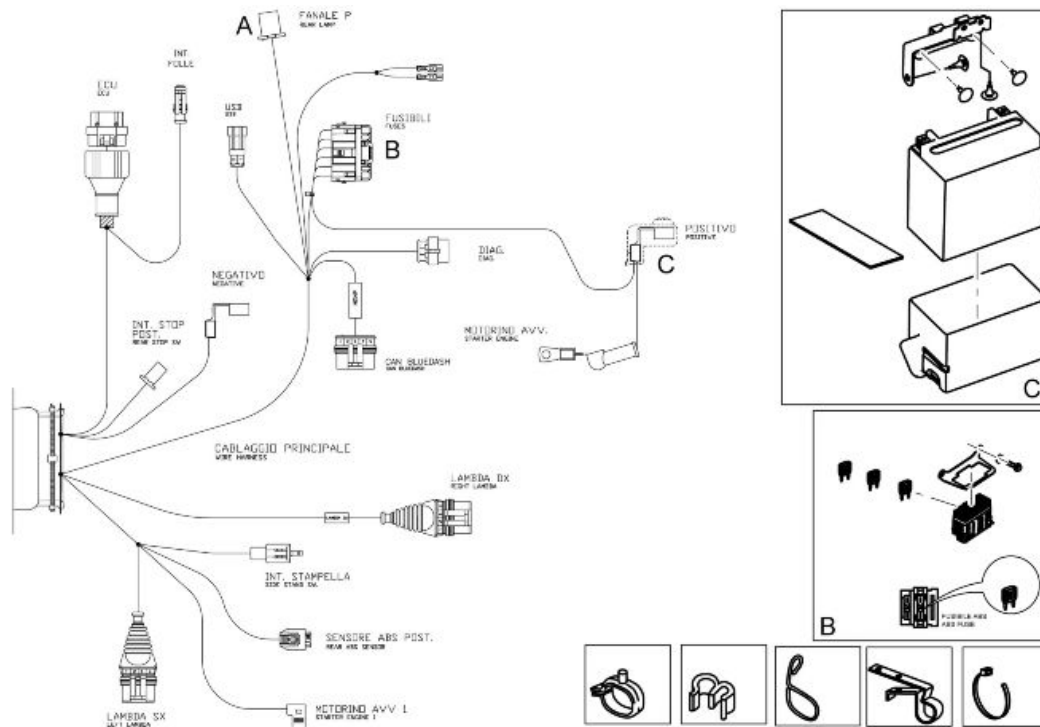
**FRONT ELECTRICAL SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
-	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lb ft)	



**CENTRAL ELECTRICAL SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
-	Coils fastening nuts	M6	4	10 Nm (7.38 lb ft)	-



**REAR ELECTRICAL SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
-	Control unit cable grommet fastening screw	M4	1	4 Nm (2.95 lb 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)	-
-	Battery holder plate fastening screws	M8	4	25 Nm (18.44 lb ft)	Pre-permeated

**Recommended products chart**

**RECOMMENDED PRODUCTS TABLE**

Product	Description	Specifications
Engine oil	SAE 10W - 60 - JASO MA, MA2 - API SG	Lubricant formulated with advanced synthetic technology and high performance additives to cater specifically for 4-stroke engines with high specific power outputs.
Transmission oil	SAE 85W - 140	API GL-4 and GL-5
Gearbox oil	SAE 75W-90	API GL-5
Fork oil	-	SAE 5W / SAE 20W
Grease	Lithium grease with molybdenum for bearings and other points to lubricate	NLGI 2 - ISO L-X-BCHB 2
Neutral grease or petroleum jelly.	Battery poles	
Brake fluid	Synthetic fluid DOT 4 - SAE J 1703	FMVSS 116 - ISO 4925 - CUNA NC 956

**NOTE**

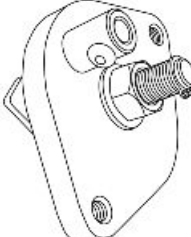
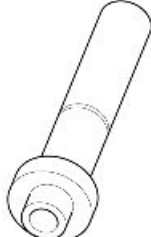

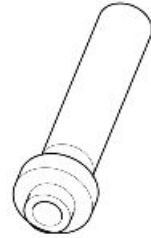
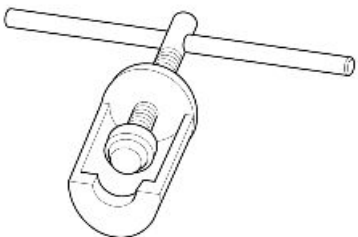

**USE ONLY NEW BRAKE FLUID. DO NOT MIX DIFFERENT BRANDS OR TYPES OF OIL WITHOUT CHECKING THEIR BASE COMPATIBILITY.**


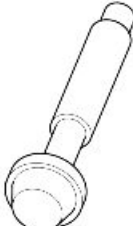
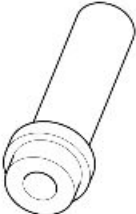

## INDEX OF TOPICS

**S**SPECIAL TOOLS

**S-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	
19.90.70.00	Extractor for internal ring on drilled bolt	
19.92.75.00	Extractor for external ring of gearcase bearing	

Stores code	Description	
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	
19.92.65.00	Punch for external ring of gearcase bearing	
19.92.76.00	Extractor for swinging arm holder bearing on gearbox cover	

# INDEX OF TOPICS

**MAINTENANCE**

**MAIN**

## Scheduled maintenance table

### NOTE

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

### NOTE

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

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

V: INSPECT AND CLEAN, ADJUST OR REPLACE IF NECESSARY

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

(1) Replace in case of leakage.

(2) Replace every 2 years or 20,000 km (12,427.42 mi).

(3) Replace every 4 years.

(4) At each engine start.

(5) Check every month.

(6) Check every 5,000 km (3,106.86 mi).

(7) Check and clean and adjust or replace, if necessary, every 1,000 km (621.37 mi).

(8) Replace at whichever of the following occurs first: 40,000 km (24,854.85 mi) or 4 months.

(9) At each service (except the first one), check inside the filter box, if there is oil. In this case, clean it.

### 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)
Spark plugs		R	R	R	R	R	R
Filter box (9)		C	C	C	C	C	C
Transmission cables and controls	I	I	I	I	I	I	I
Steering bearings and steering clearance	I	I	I	I	I	I	I
Wheel bearings		I	I	I	I	I	I
Diagnosis by tool	I	I	I	I	I	I	I
Brake discs	I	I	I	I	I	I	I
Air filter		R	R	R	R	R	R
Oil filter change	C						C
Engine oil filter	R	R	R	R	R	R	R
Lights operation / aiming		I	I	I	I	I	I
Vehicle general operation	I	I	I	I	I	I	I
Braking 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 (2)	I	I	I	I	I	I	I
Gearbox oil	R						R
Fork oil (8)					R		
Engine oil (6)	R	R	R	R	R	R	R
Final drive oil			R		R		R
Fork oil seal (1)	I	I	I	I		I	I
Tyres - pressure/wear (5)	I	I	I	I	I	I	I
Clutch clearance adjustment	I	I	I	I	I	I	I
Valve clearance adjustment	A	A	A	A	A	A	A
Wheels	I	I	I	I	I	I	I
Bolts and nuts tightening	I	I	I	I	I	I	I
Battery terminals tightening	I						
Suspension and setting	I		I		I		I

km x 1,000 (mi x 1,000)	1.5 (0.9)	10 (6.2)	20 (12.4)	30 (18.6)	40 (24.9)	50 (31.1)	60 (37.3)
Engine oil pressure warning light (4)							
Filter box drain plug	C	C	C	C	C	C	C
Fuel lines (3)		I	I	I	I	I	I
Brake pipes		I	I	I	I	I	I
Clutch wear		I	I	I	I	I	I
Brake pads wear (7)	D	D	D	D	D	D	D
Labour time (minutes)	100	110	120	110	150	110	130

### SCHEDULED MAINTENANCE TABLE ONLY FOR THE ASIA/PACIFIC MARKET

#### SCHEDULED MAINTENANCE TABLE

km x 1,000 or (months) maximum	1.5 (1)	10 (10)	20 (20)	30 (30)	40 (40)	50 (50)	60 (60)
Spark plugs		R	R	R	R	R	R
Filter box (9)		C	C	C	C	C	C
Transmission cables and controls	I	I	I	I	I	I	I
Steering bearings and steering clearance	I	I	I	I	I	I	I
Wheel bearings		I	I	I	I	I	I
Diagnosis by tool	I	I	I	I	I	I	I
Brake discs	I	I	I	I	I	I	I
Air filter		R	R	R	R	R	R
Oil filter change	C						C
Engine oil filter	R	R	R	R	R	R	R
Lights operation / aiming		I	I	I	I	I	I
Vehicle general operation	I	I	I	I	I	I	I
Braking 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 (2)	I	I	I	I	I	I	I
Gearbox oil	R						R
Fork oil (8)					R		
Engine oil (6)	R	R	R	R	R	R	R
Final drive oil			R		R		R
Fork oil seal (1)	I	I	I	I		I	I
Tyres - pressure/wear (5)	I	I	I	I	I	I	I
Clutch clearance adjustment	I	I	I	I	I	I	I
Valve clearance adjustment	A	A	A	A	A	A	A
Wheels	I	I	I	I	I	I	I
Bolts and nuts tightening	I	I	I	I	I	I	I
Battery terminals tightening	I						
Suspension and setting	I		I		I		I
Engine oil pressure warning light (4)							
Filter box drain plug	C	C	C	C	C	C	C
Fuel lines (3)		I	I	I	I	I	I
Brake pipes		I	I	I	I	I	I
Clutch wear		I	I	I	I	I	I
Brake pads wear (7)	D	D	D	D	D	D	D
Labour time (minutes)	100	110	120	110	150	110	130

#### 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.

## Transmission fluid



## Check

- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the cap/dipstick (1).
- The level is correct if the oil is close to the cap/dipstick opening (1).
- If the oil is lower than specified, top-up until it reaches the cap/dipstick hole (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.**

## 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 container with + 400 cm<sup>3</sup> (25 cu in) capacity under the drainage plug (3).
- Unscrew and remove the drainage plug (3).
- Unscrew and remove the breather cap (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 (3).
- Remove any metal scrap attached to the drainage plug (3) magnet.
- Screw and tighten the drainage plug (3).
- Pour new oil through the fill opening (1) until it reaches the cap/dipstick hole (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.**

- Screw and tighten the caps (1 - 2).



## Engine oil

### Check

#### CAUTION

**ENGINE MUST BE WARM TO CHECK ENGINE OIL LEVEL.**



**THE ENGINE MUST BE WARM TO CHECK OIL LEVEL AND THE FILLER PLUG / DIPSTICK FULLY INSERTED BUT NOT SCREWED IN.**

**IF YOU CHECK LEVEL WHEN THE ENGINE IS COLD, OIL LEVEL COULD TEMPORARILY DROP BELOW THE 'MIN' MARK.**

**THIS SHOULD NOT BE CONSIDERED A PROBLEM, PROVIDED THAT THE GENERAL ALARM WARNING LIGHT AND THE DISPLAY MESSAGE REGARDING THE TYPE OF PROBLEM DO NOT APPEAR SIMULTANEOUSLY.**

#### NOTE

**DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT STANDSTILL TO WARM UP THE ENGINE OIL AND REACH THE OPERATING TEMPERATURE OF ENGINE OIL. OIL IS BEST CHECKED AFTER RUNNING FOR ABOUT 15 KM (9.32 miles).**

- Switch off the engine and wait at least five minutes to allow the lubricant to drain back into the sump.
- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the filler plug / oil dipstick, and wipe it clean.
- Fit the oil filler plug / oil dipstick and tighten fully.
- Unscrew and remove the filler plug / oil dipstick and check that the oil level is correct.



'MAX' = maximum level.

'MIN' = minimum level.

The difference between 'MAX' and 'MIN' marks is approx. 400 cm<sup>3</sup> (24.41 cu.in)

- The oil level is correct when it is close to the 'MAX' mark.

Add engine oil if required:

- Unscrew and remove the filler plug/oil dipstick.
- Top up using engine oil until it reaches the correct level.

#### CAUTION



**DO NOT GO BEYOND THE "MAX" AND BELOW THE "MIN" LEVEL MARK TO AVOID SEVERE ENGINE DAMAGE.**

#### 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.**

## Replacement

- Place a recipient with a capacity of at least 2,000 cm<sup>3</sup> (122.05 cu.in) under the drain plug (1).
- Unscrew and remove the drainage plug (1).



- 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).



**Tightening torque for drainage plugs (1): 20 - 22 Nm (14.75 - 16.23 lb ft).**



**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

### NOTE

**NEVER REUSE AN OLD 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 (4) on 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).



## Gearbox Oil

### Replacement

#### NOTE

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

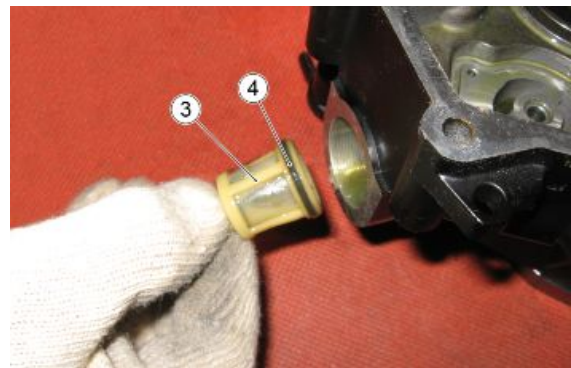
- Place a container with suitable capacity under the drainage plug (2).
- Unscrew and remove the drainage plug (2).



- 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.**

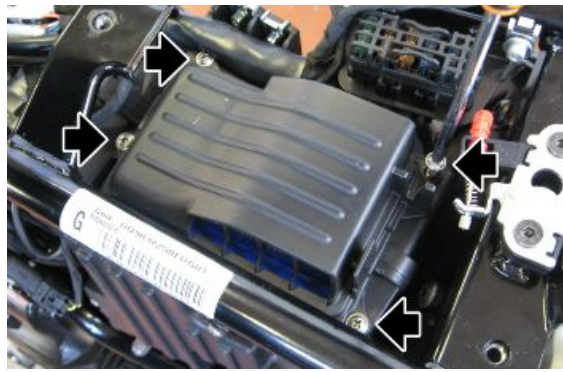
**Air filter**

- 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



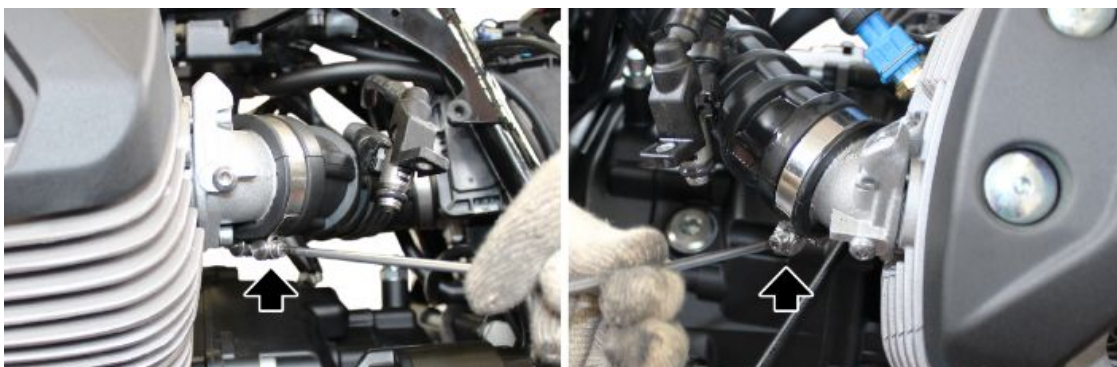
## Throttle body removal

- 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 G3 control unit connector support bracket fixing screw



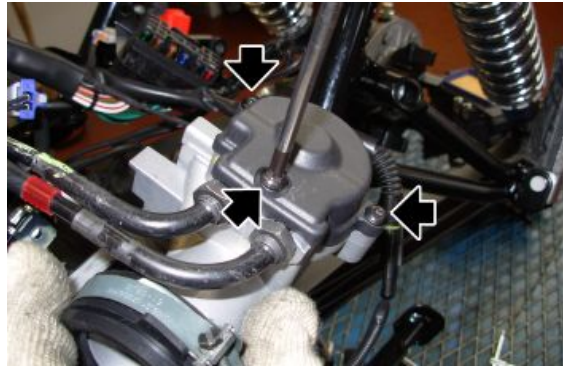
- Disconnect the MIU G3 control unit connector



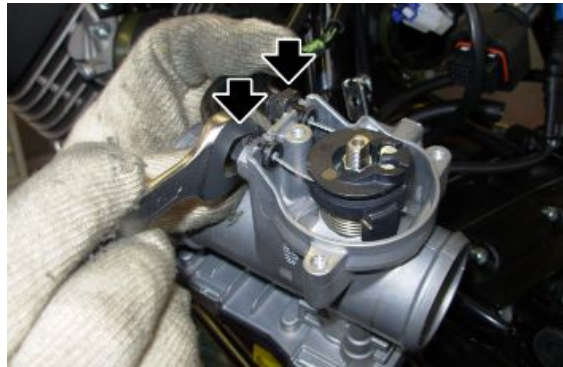
- Remove the clip clamp fixing the throttle body to the filter box
- Extract the throttle body laterally



- Remove the throttle body guard



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

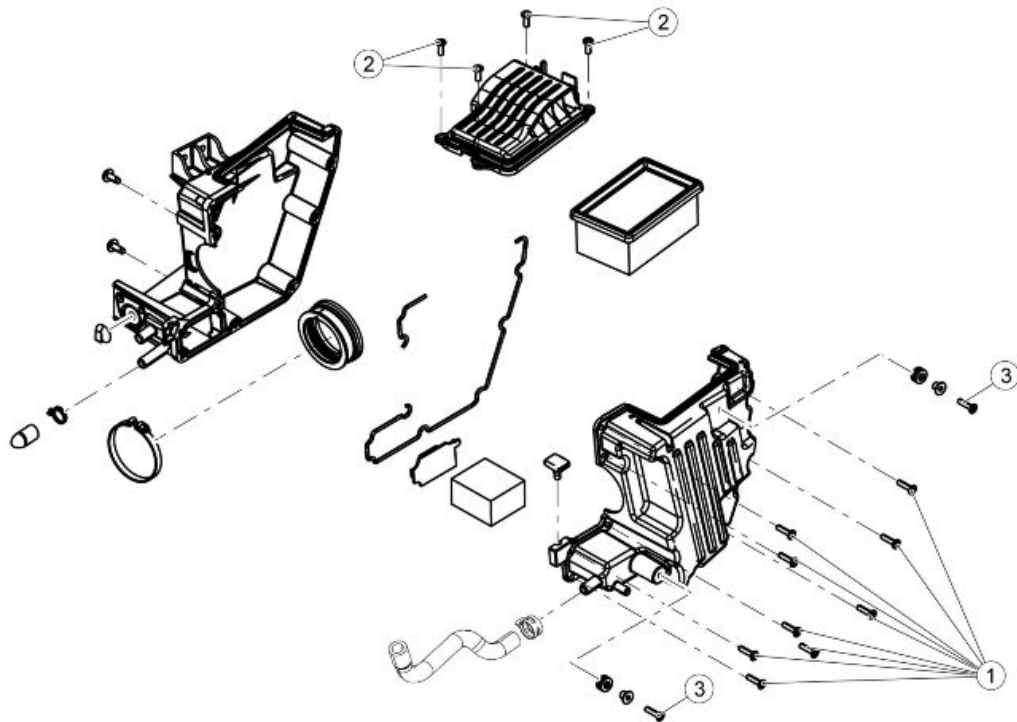


- Remove the throttle body





**Air filter housing**

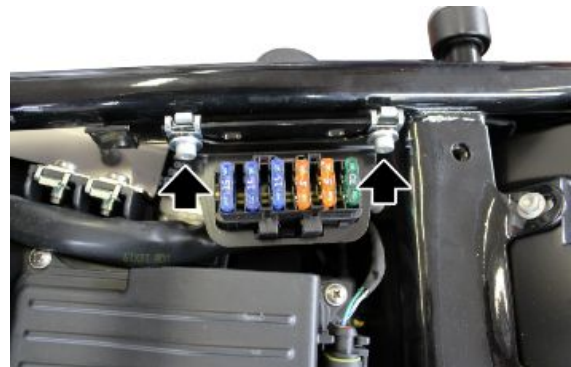


**FILTER BOX**

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



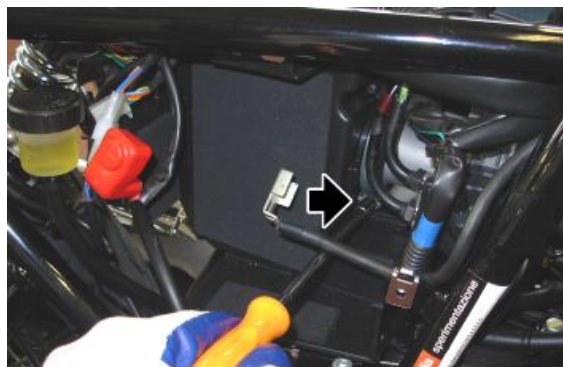
- Move the filter box to the side enough to allow removal of the fixing screws (3) on the right side of the filter box support.



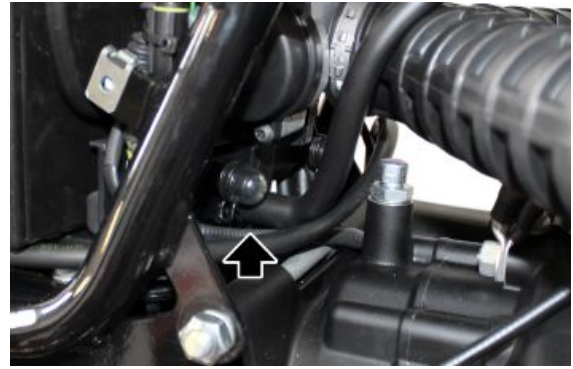
- Disconnect the neutral switch connector
- Lift the air filter box enough to allow the support plate to be removed, sliding out neutral switch cabling



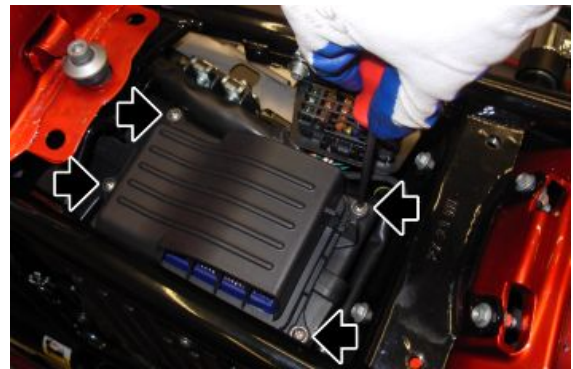
- Unscrew the clamp that fastens the throttle body to the air filter box



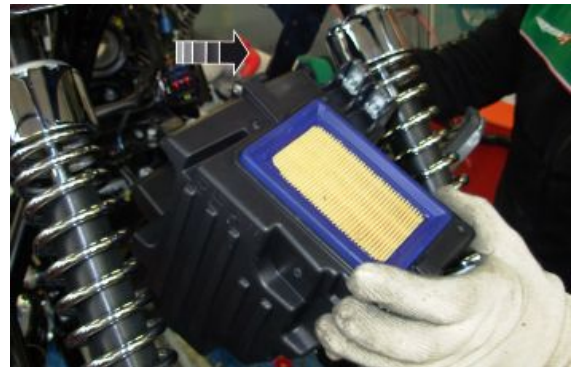
- Disconnect the blow-by pipe



- Remove the air-box cover

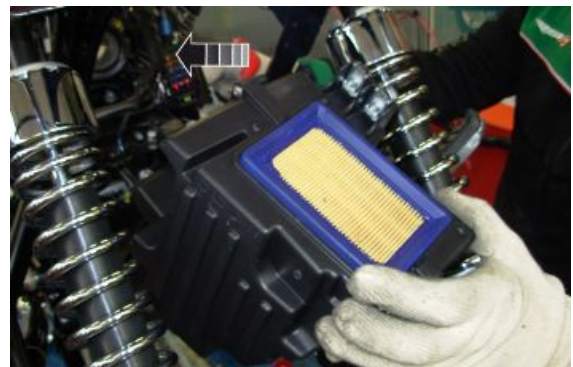


- Remove sliding the complete filter box out toward the rear



## Air filter housing installation

- Insert the filter box from the rear

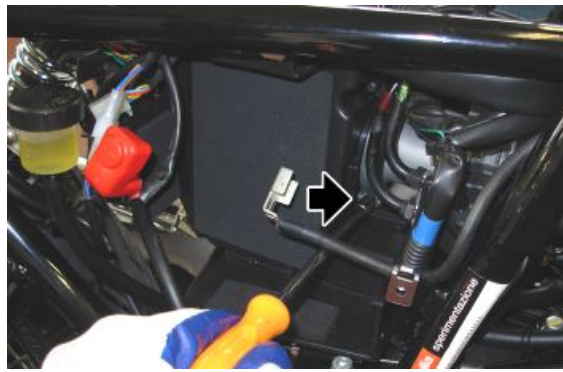




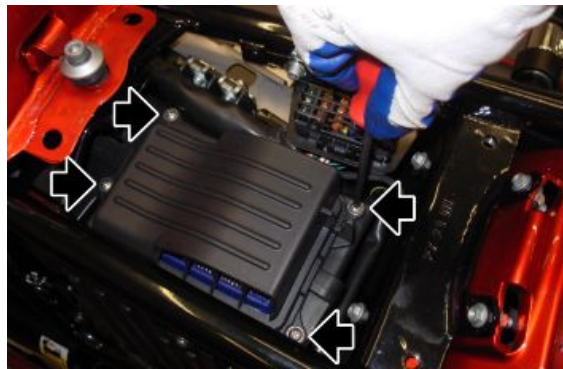
- Insert the throttle body in the sleeve and tighten the clamp to secure it

**CAUTION**

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



- Install the air-box cover



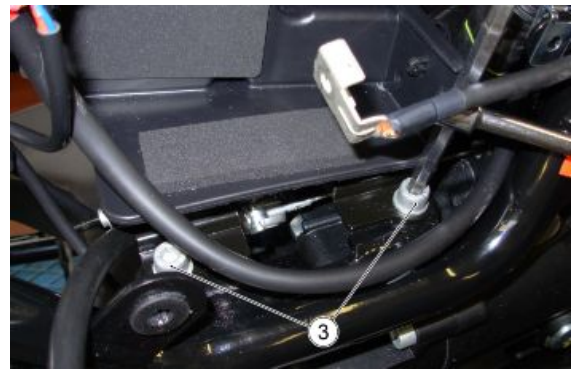
- Connect the blow-by and breather tubes



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



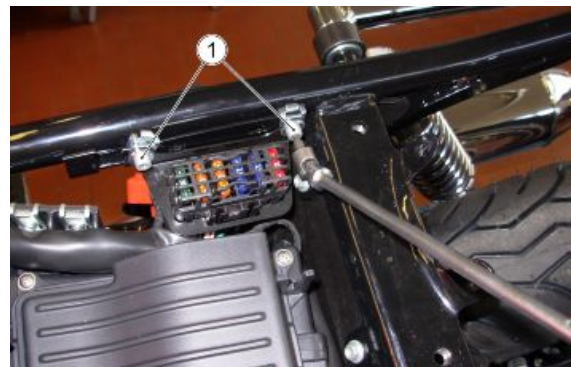
- Move the filter box to the side enough to allow tightening of the fixing screws (3) on the right side of the filter box support.



- 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.

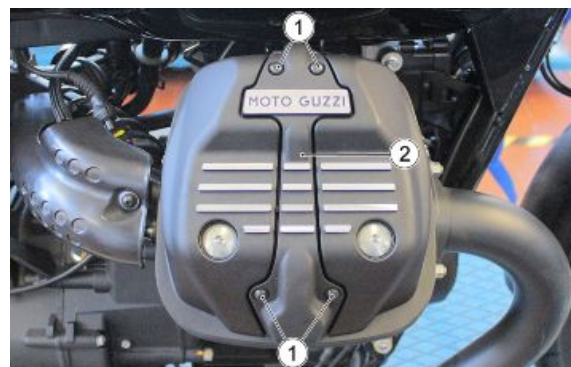


- Correctly position the air filter box on the support
- Fix the screws (1) of the fuse box support



## 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)



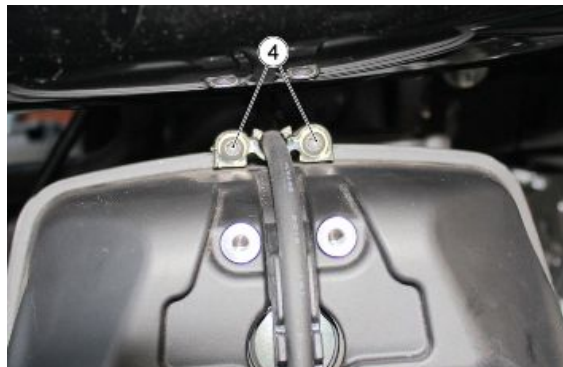
- Remove the spark plug cover (2)



- 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)

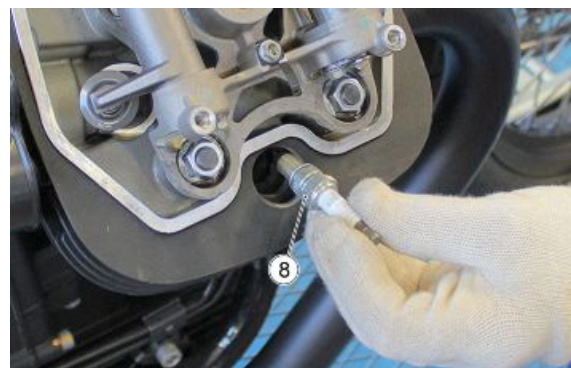


- Remove the head cover (7)



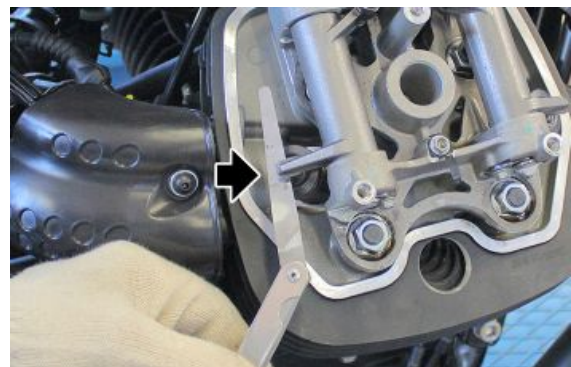
- Unscrew the spark plug (8) and remove it

**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)

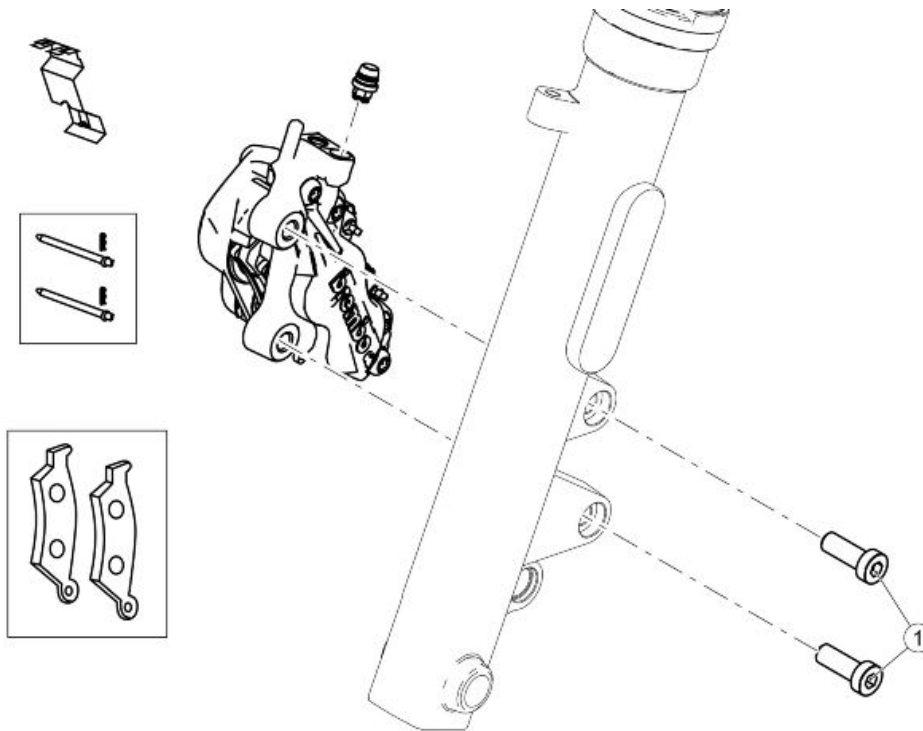
**Exhaust valve clearance**

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



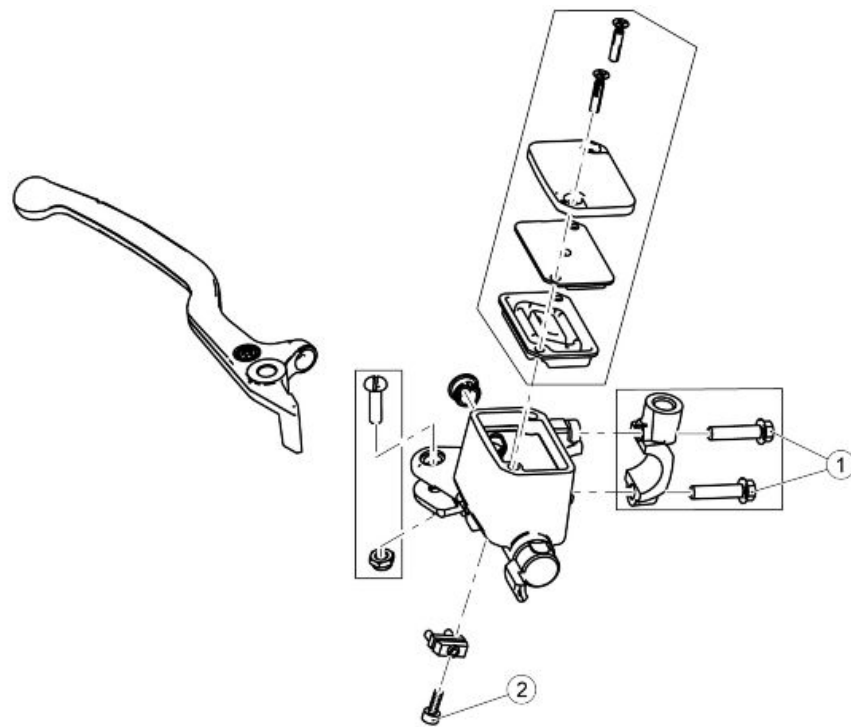
**Braking system**



**FRONT BRAKE CALLIPER**

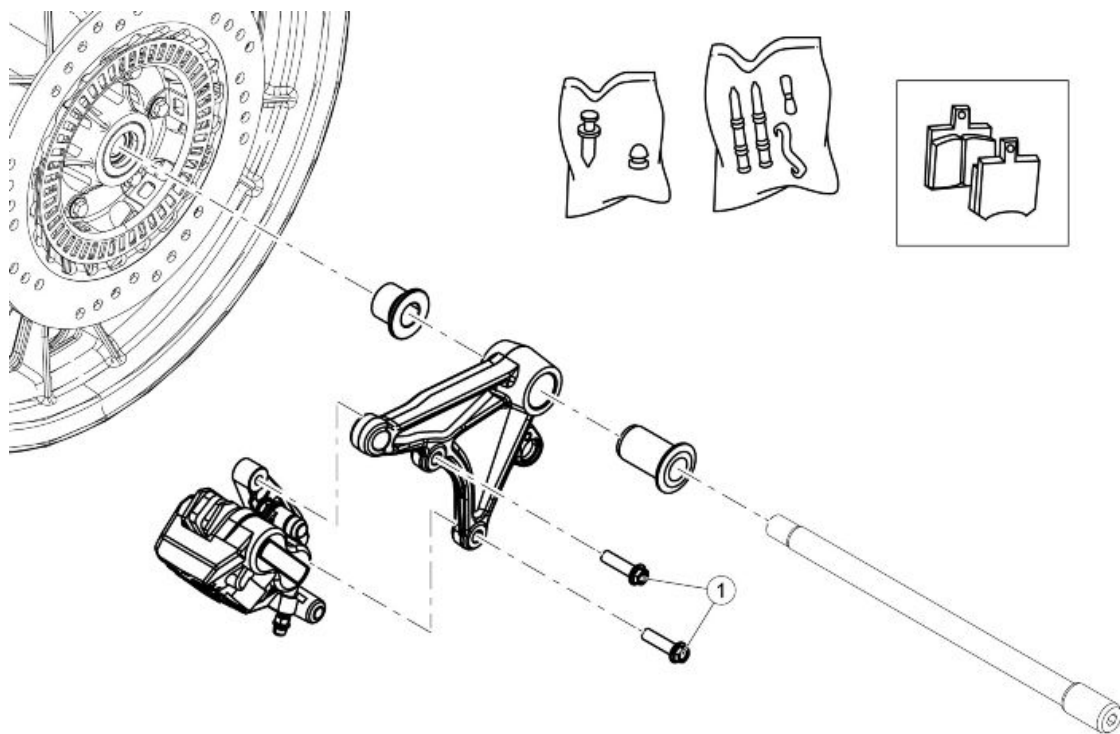
Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake calliper fixing screws	M10	2	50 Nm (36.88 lb ft)	-





**FRONT BRAKE MASTER CYLINDER**

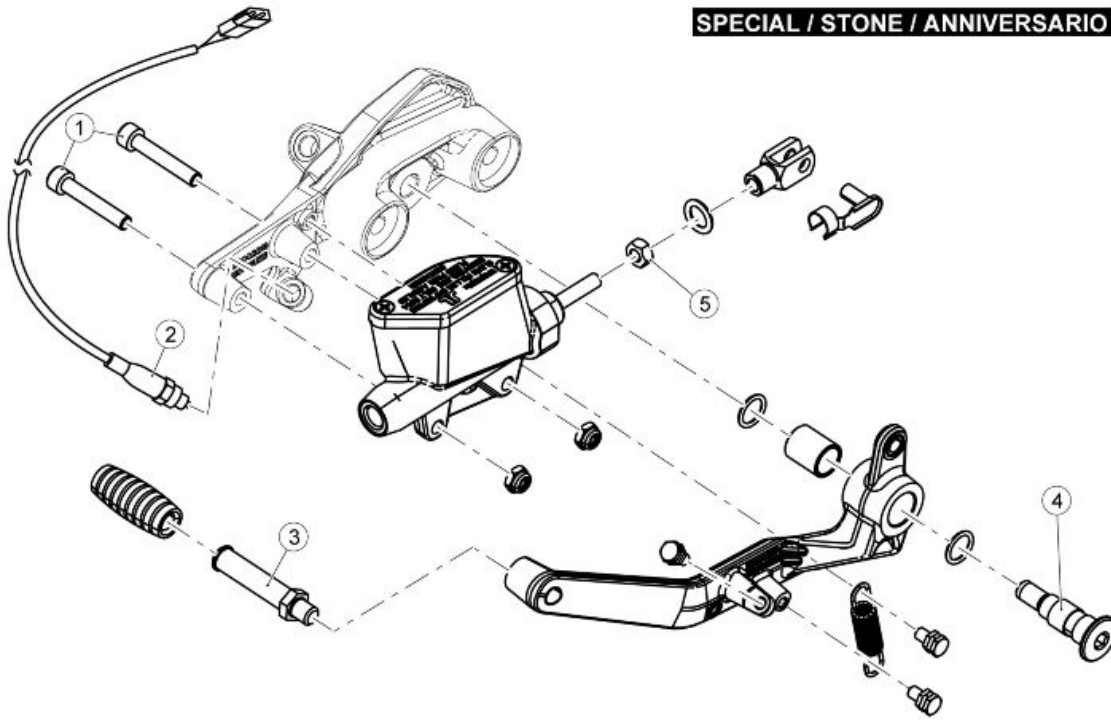
Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lb ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lb ft)	-



**REAR BRAKE CALLIPER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lb ft)	-

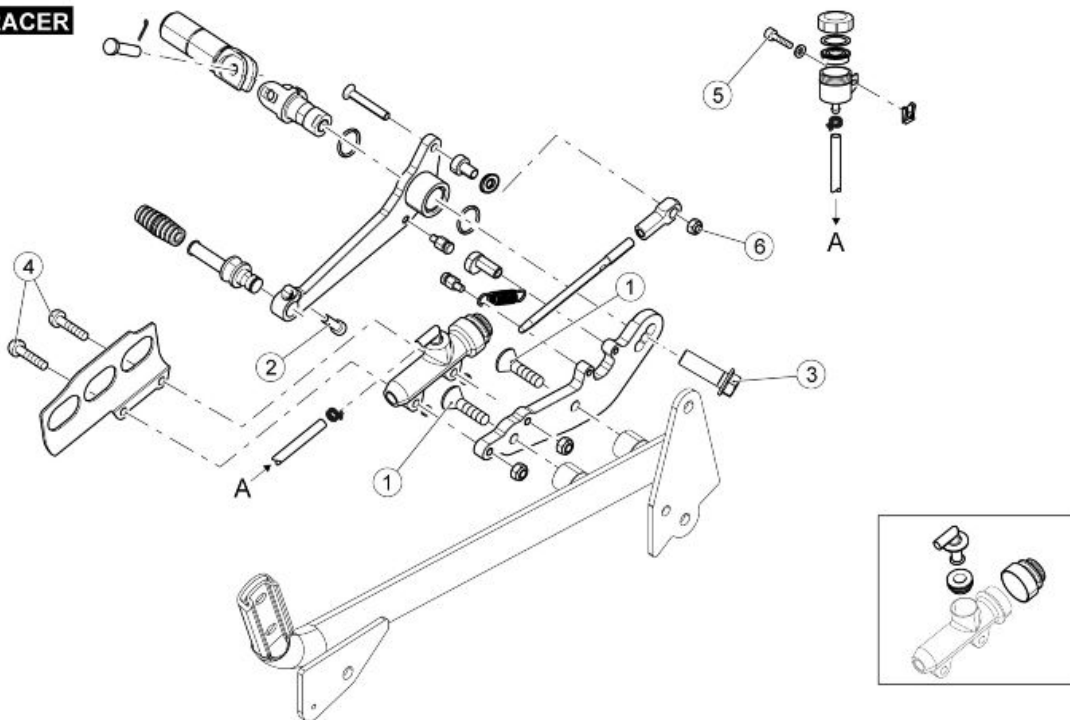
**SPECIAL / STONE / ANNIVERSARIO**



**REAR BRAKE MASTER CYLINDER**

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

**RACER**



**RIDER FOOTREST / REAR BRAKE LEVER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fastening right hand rider footrest mounting plate to cradle	M8x20	2	20 Nm (14.75 lb ft)	Loctite 243
2	Rear brake lever fixing screw	M6x20	1	10 Nm (7.38 lb ft)	Loctite 243
3	Screw fastening rider footrest mounting to plate	M8	1	25 Nm (18.44 lb ft)	Loctite 243
4	Rear brake pump fixing screw	M6x25	2	8 Nm (5.90 lb ft)	Loctite 243
5	Rear brake fluid reservoir fixing screw	M5x15	1	6 Nm (4.43 lb ft)	-
6	Nut fastening rod terminal on brake lever	M6	1	10 Nm (7.38 lb 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

**(RACER)**

**REAR BRAKE**

**CHECK**

- Keep the vehicle upright so that the fluid in the reservoir is at the same level as the plug.
- Through the opening on the right side indicated in then figure, check that the liquid in the tank exceeds 'MIN'.



**MIN** = minimum level

**MAX** = maximum level

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

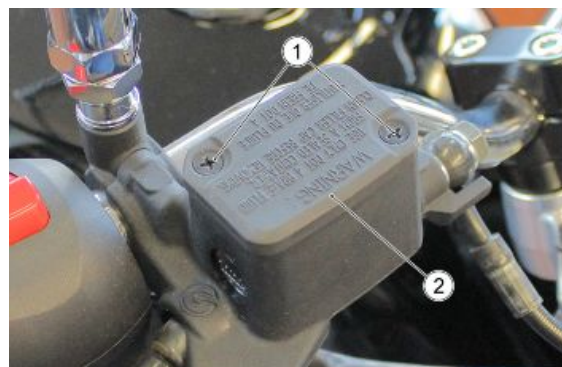
**CAUTION**

**FLUID LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR DOWN.**

**Top-up**

**FRONT BRAKE**

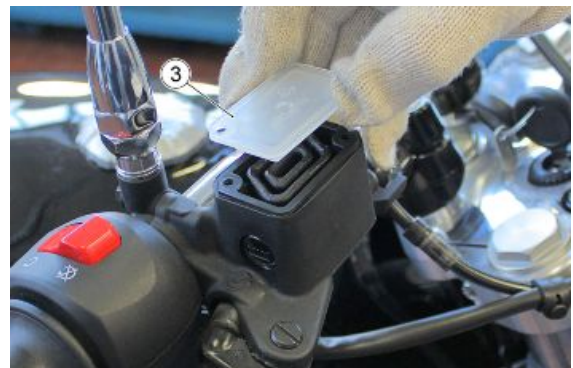
- Unscrew and remove the two fastening screws (1) on the brake fluid reservoir cover (2).



- 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)

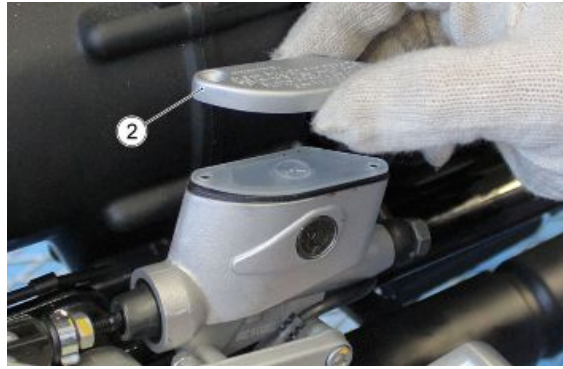
#### REAR BRAKE

- 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.



### (RACER)

- Remove the brake fluid reservoir cap (1)
- Remove the diaphragm (2)
- Top up the brake fluid reservoir



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

**CAUTION**



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



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

**DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID.**

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

## DETERMINATION OF CRANKSHAFT CLEARANCE

### CAUTION

**THE PROCEDURE TO MEASURE THE CRANKSHAFT CLEARANCE MUST BE PERFORMED AT COLD ENGINE**

- Remove the starter motor.
- Place the specific tool and tighten it with the same screws used for the fixing of the starter motor.

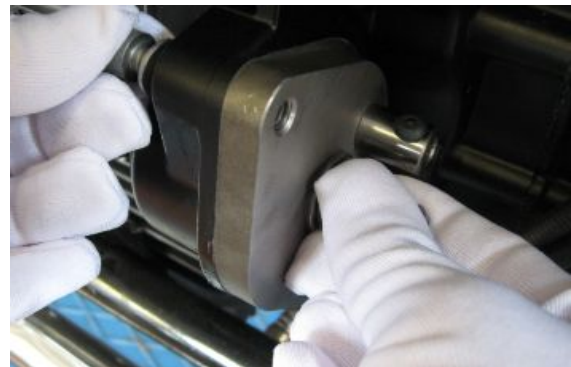
### NOTE

**PAY SPECIAL ATTENTION, AS THE TAB OF THE CENTRAL PIN MUST BE ATTACHED ON THE STARTING SPROCKET.**

### Specific tooling

#### 021009Y Engine axial clearance check tool

- The image serves to show the correct positioning of the tab of the central pin attached on the starting sprocket.



- Insert a dial gauge on the tool, as indicated, to be able to measure the clearance.



- Reset the dial gauge.



- Screw the central nut until the dial gauge indicates a value of 0.5 mm (0.020 in) (the value indicated on the dial gauge is expressed in hundredths of a millimetre) and then loosen completely the nut until the central pin of the tool moves freely.



- Reset the dial gauge again and act on the clutch lever. The maximum allowed clearance is: 0.45 mm (0.018 in).



**CAUTION**

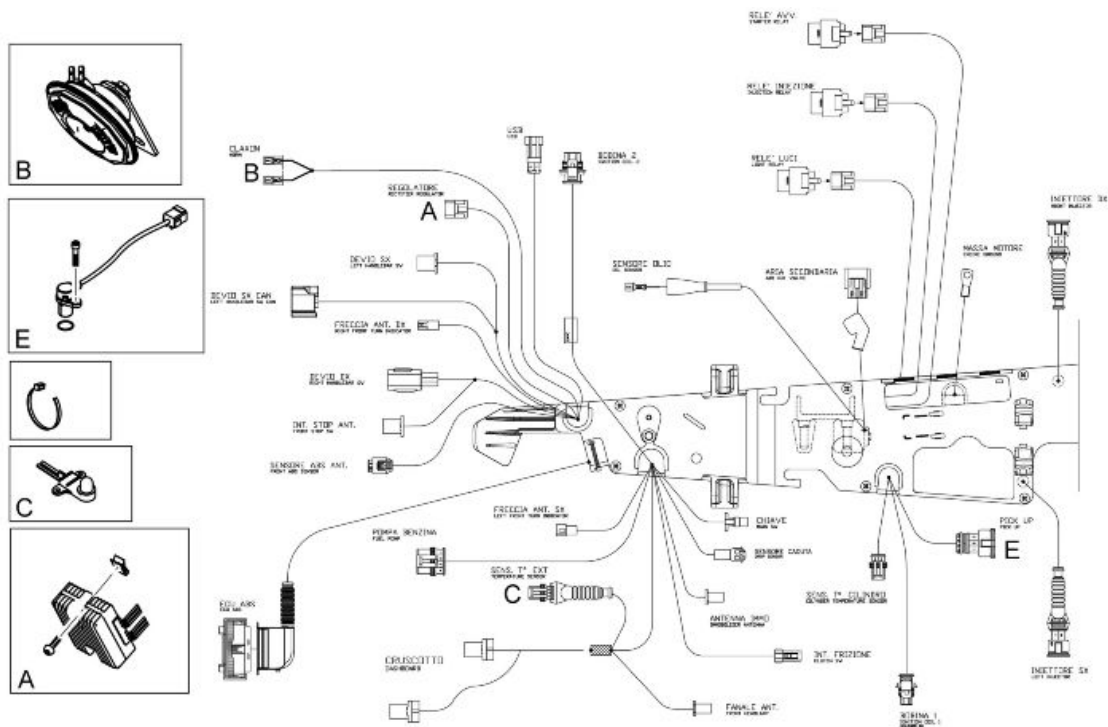
THE CORRECT VALUE OF THE CRANKSHAFT CLEARANCE IS ONLY READ AT THE FIRST ACTIVATION, REACHING THE END OF STROKE, OF THE CLUTCH LEVER ON THE HANDLEBAR.



## INDEX OF TOPICS

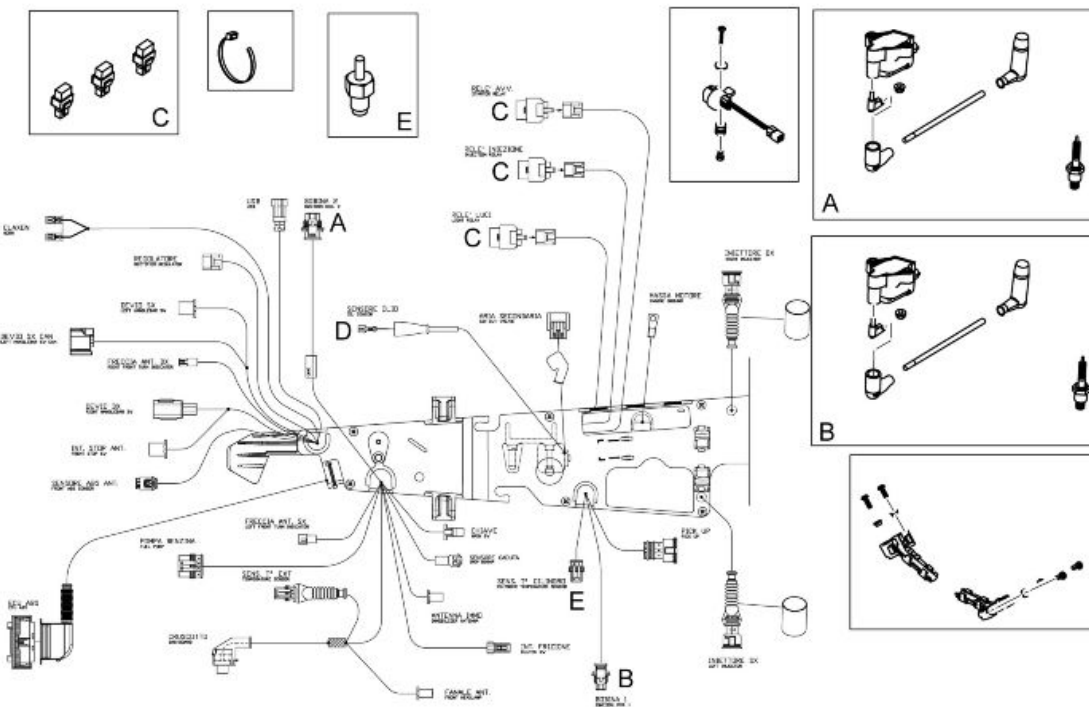
ELECTRICAL SYSTEM

ELE SYS



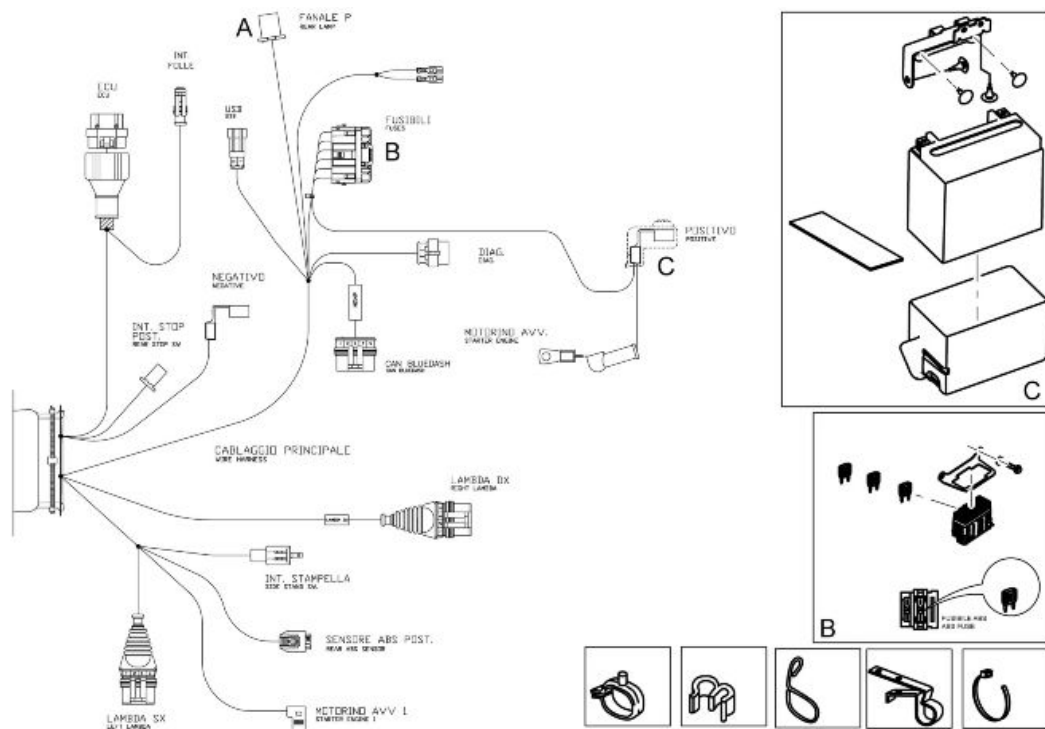
**FRONT ELECTRICAL SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
-	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lb ft)	



**CENTRAL ELECTRICAL SYSTEM**

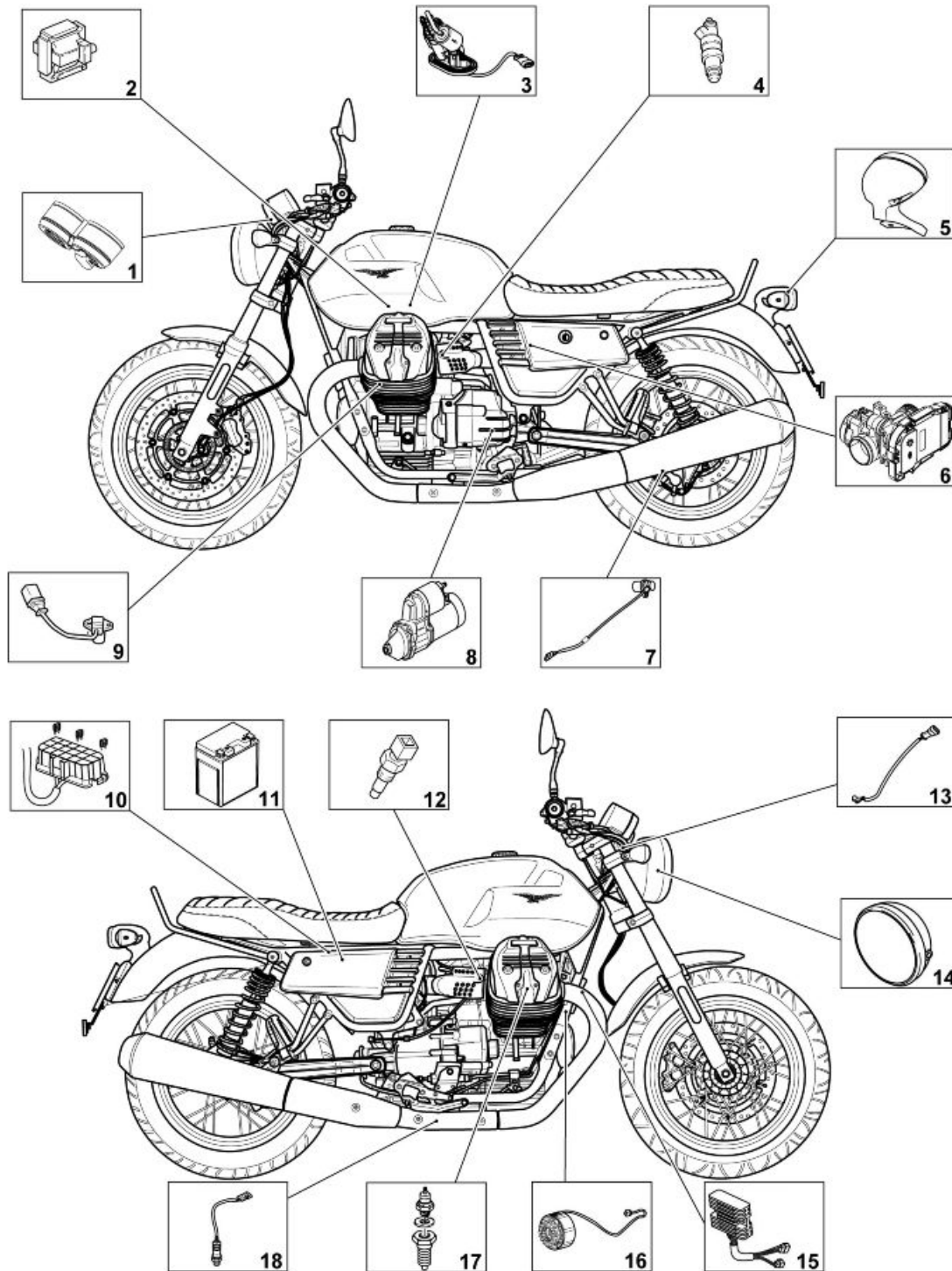
Pos.	Description	Type	Quantity	Torque	Notes
-	Coils fastening nuts	M6	4	10 Nm (7.38 lb ft)	



**REAR ELECTRICAL SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
-	Control unit cable grommet fastening screw	M4	1	4 Nm (2.95 lb 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)	-
-	Battery holder plate fastening screws	M8	4	25 Nm (18.44 lb ft)	Pre-permeated

**Components arrangement**



**key:**

- 1. Instrument panel
- 2. Coil
- 3. Fuel pump
- 4. Injector

5. Taillight
  6. MIU G3 Control Unit
  7. Engine speed sensor
  8. Starter motor
  9. Engine speed sensor
  10. Fuses
  11. Battery
  12. Head temperature sensor
  13. Instrument panel 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 Headlamp wiring harness
- 2 ABS speed sensor
- 1 Horn
- 2 Lambda probe
- 1 Stand switch
- 1 Fall sensor (grey connector)

#### Small parts and mountings

- 11 Large black 290x4 clamps
- 4 Small black 160x2.5 clamps
- 1 Small cable guide rubber clamp
- 2 Large cable guide rubber clamps
- 1 ECU bracket
- 2 Connector supports
- 1 Cable grommet

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

### Motorcycle division

The wiring timing is subdivided in three essential sections, as indicated in the figure.

1. Front section
2. Central section
3. Rear section



### SPECIAL CHECKS FOR THE CORRECT CONNECTION AND LAYING 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 routing of the rear turn indicators cables on the license plate holder (RH and LH)
- Check the correct closing of the ABS ECU and the correct routing of the branch on the conduit
- Taillight connector
- Right and Left light switch connectors
- Clutch connector
- Connector ignition switch connector (check that the cable is not live)
- Immobilizer antenna connector
- ECU connector (G3) and the correct insertion of the relative rubber plug
- Check the correct fastening of metallic bracket screw on the throttle body
- Check the fastening of the positive Battery cable on the starter motor. Check that the cap is well inserted
- Check the insertion of the starter motor faston
- 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 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 that the engine oil cap has been inserted correctly
- Check ground fastening on the engine
- Check NEUTRAL cable fastening
- Check whether the right lambda probe is connected to the output labelled "LAMBDA DX" (RH LAMBDA)
- Check the Regulator and Flywheel connection
- Check whether the right and left lambda probe cable is inserted on the cable grommet under the clutch housing
- Check the right Lambda connections
- 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 and clamped
- 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 upwards 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.

**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.**

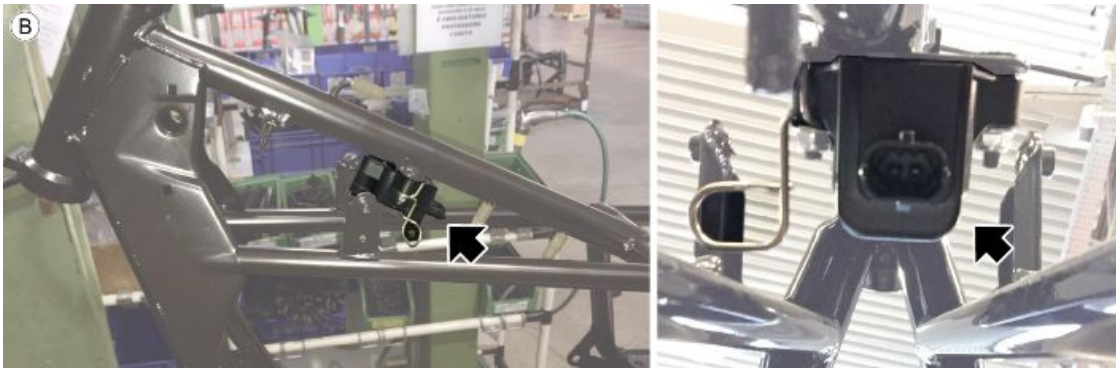
**Undoubtedly the connection of the rest of connectors is also important and essential for the correct operation of the vehicle. It is also important and essential that the instructions regarding the routing and fixing of the wiring harness in the various areas are followed meticulously in order to guarantee 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

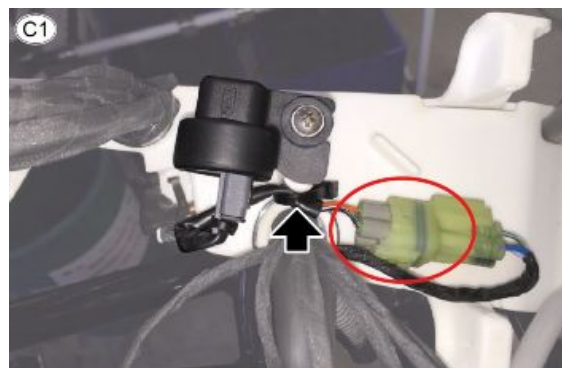


**TABLE C - CONDUIT**

- 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



- Check that the ABS control unit cable is backwards, as illustrated in the image





## Front side

### TABLE A - FRONT WHEEL ABS SENSOR PASSAGE

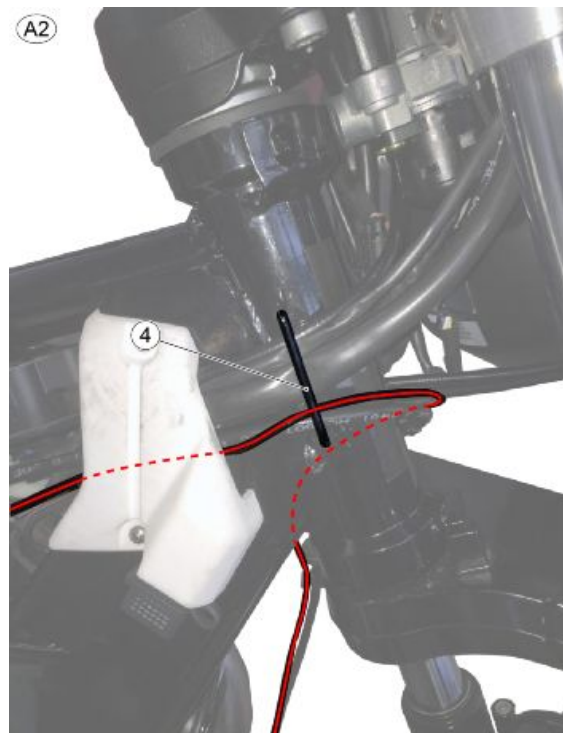
1. Front ABS sensor
2. Cable grommet
  - Pass the front ABS sensor wiring harness through the cable grommet as indicated.



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

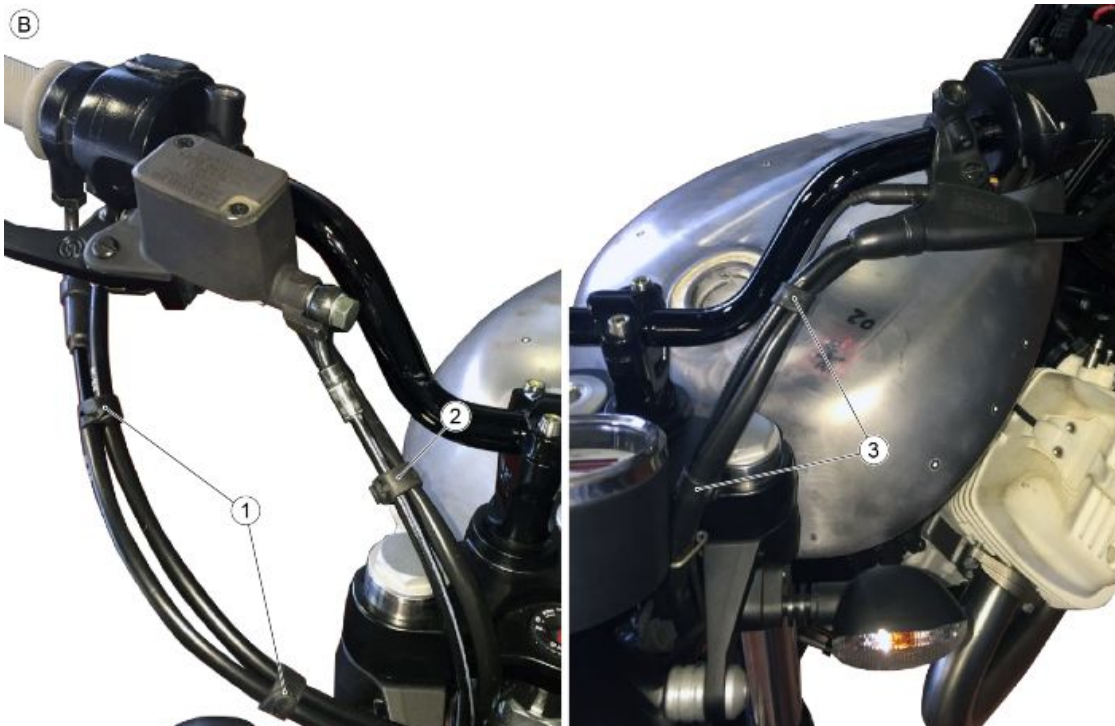


- Pass the ABS sensor wiring harness around the steering column and through the metallic cable grommet (4) on the frame



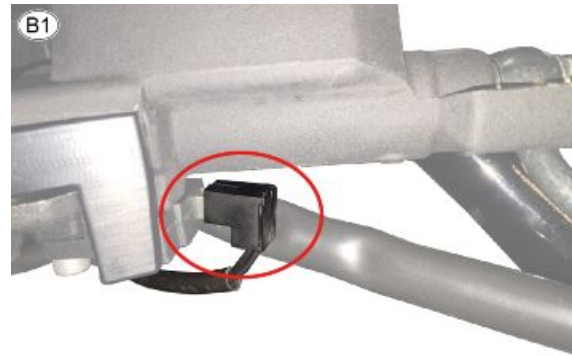
**TABLE B - STEERING LIGHTS CABLE PASSAGE ON THE HANDLE BAR**

- Using the cable guides (1), fasten the RH light switch wiring harness with the throttle cable
- Using the cable guide (2), fasten the front stop switch wiring harness with the front brake pipe
- Using the cable grommets (3), fasten the LH light switch wiring harness with the clutch cable

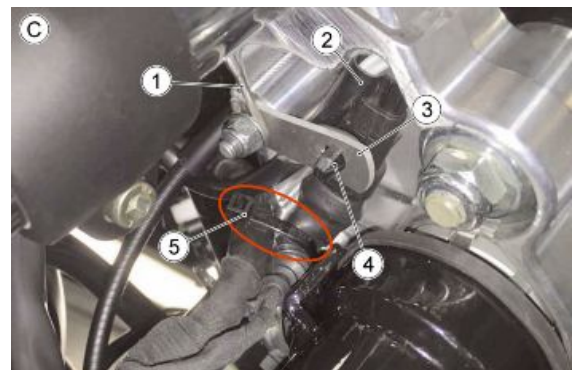


**TABLE B1**

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

**TABLE C - INSTRUMENT CLUSTER**

1. Cable grommet
  2. Air temperature sensor
  3. Connector support bracket
  4. Connector support
  5. Medium sized clamp
- The medium sized clamp fastens the air temperature sensor, the main branch of the instrument cluster and one of the ignition switch assembly fasteners

**TABLE C1 - INSTRUMENT CLUSTER**

1. Cable grommet

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

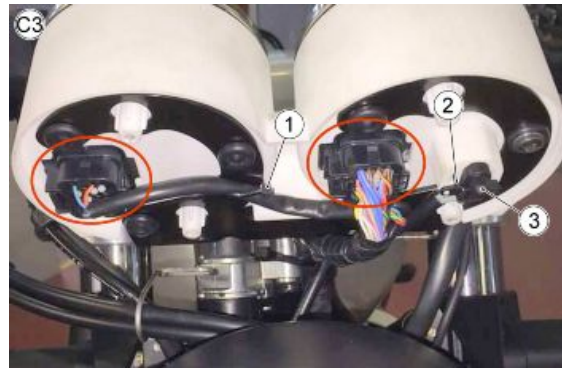
- Once fully assembled, the instrument cluster appears as shown in the figure





**TABLE C3 - INSTRUMENT CLUSTER (ANNIVERSARIO/SPECIAL/RACER)**

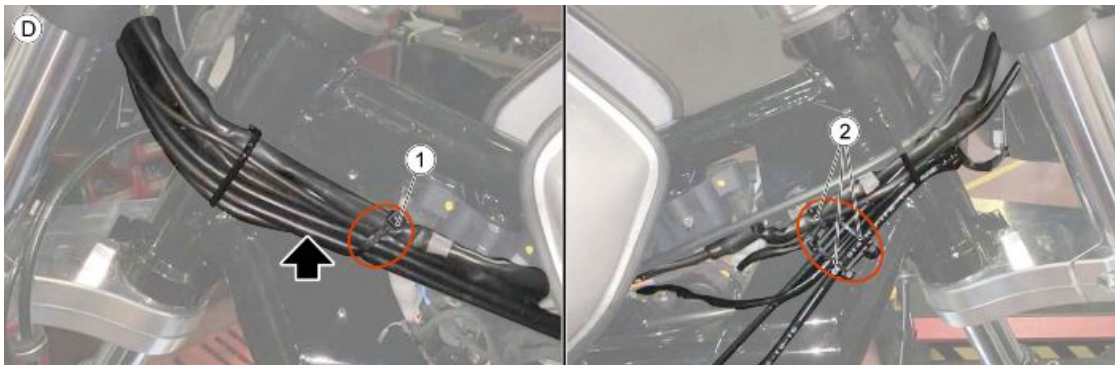
1. Medium sized clamp
2. Small clamp
3. Air temperature sensor

**TABLE C4 - INSTRUMENT CLUSTER (ANNIVERSARIO/SPECIAL/RACER)**

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

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

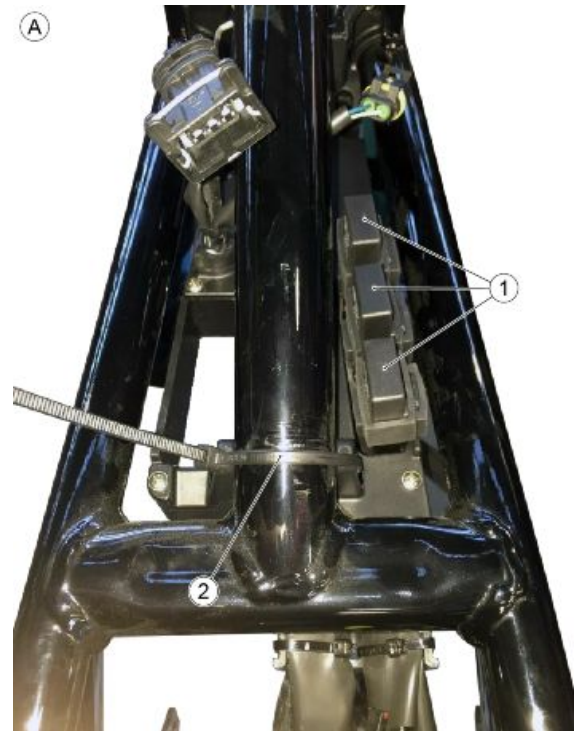
1. Medium sized clamp
  2. Small sized clamps
- The throttle control cables go under the point indicated on the figure



## Central part

**TABLE A - CONDUIT ON THE FRAME**

- Check that the relays (1) are well inserted
- Fasten the rear 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

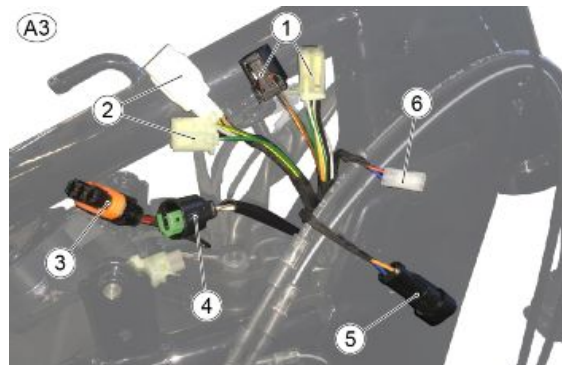


**TABLE A2**

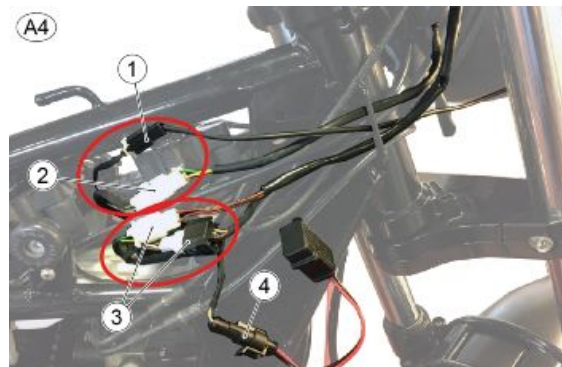
- Main wiring harness (1)

**TABLE A3**

- Right light switch connector (1)
- Left light switch connectors (2)
- Coil connector 2 (3)
- Front ABS sensor connector (4)
- USB socket connector (5)
- Right turn indicator connector (6)

**TABLE A4**

- Key connector (1)
- Immobilizer antenna connector (2)
- Right light switch connector (3)
- USB socket connector (4)

**TABLE A5**

- Left arrow connector (1)
- Left light switch connectors (2)
- Clutch switch connector (3)
- Fuel pump connector (4)

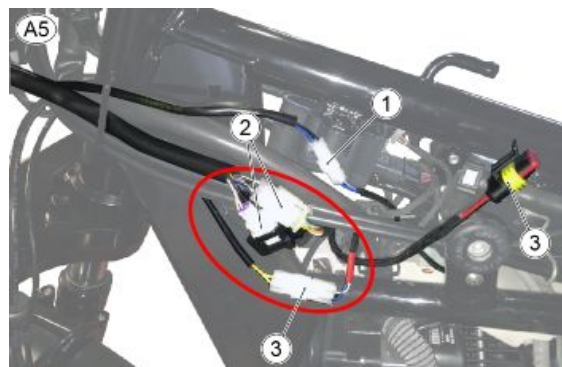


TABLE A6

- Pass t the PICK-UP connector (1) on the right side of the frame



TABLE A7

- Check that the connector of the coil (1) is well coupled



TABLE A8

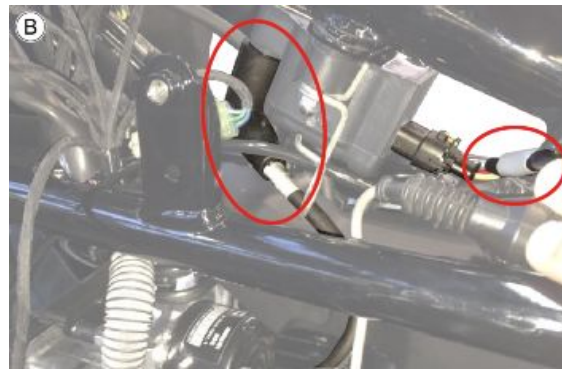
- Check that the connector of the engine head temperature sensor (1) is well coupled
- The HV cable (2) must remain inside the conduit groove





**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



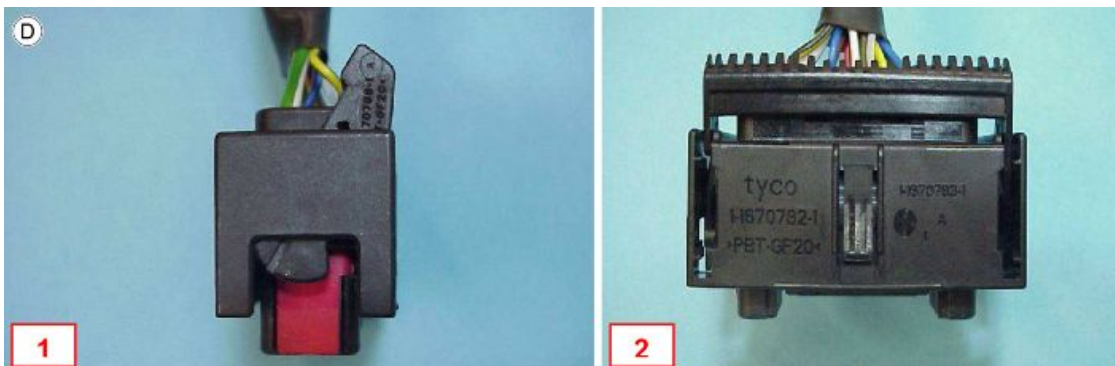
**TABLE C - COIL AND RIGHT CYLINDER CONNECTION**

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



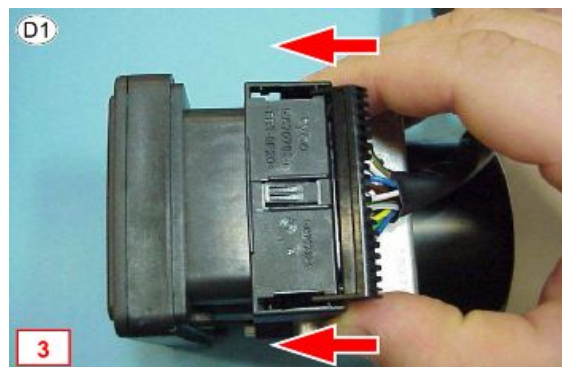
**TABLE D - PROCEDURE FOR CORRECTLY FITTING THE ABS CONTROL UNIT CONNECTOR**

- 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.



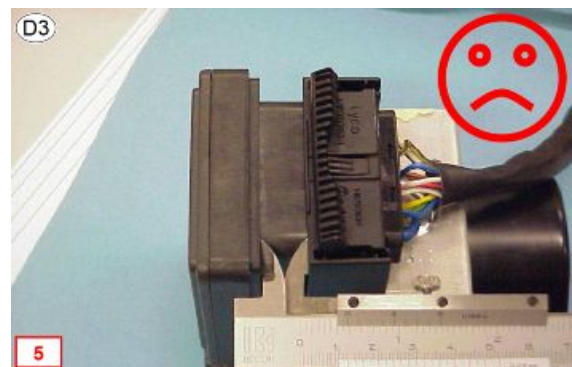


**TABLE D2**

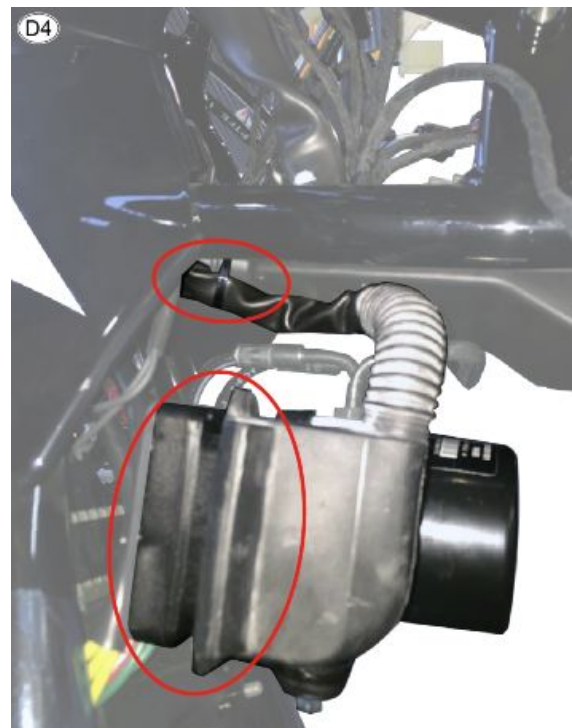
- When the connector is fully inserted, the distance between the connector and the ABS control unit must be 7.5 mm (0.29 in)

**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.

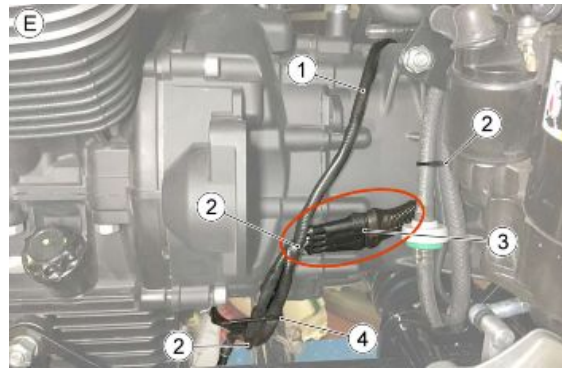
**TABLE D4**

- Check that the ABS control unit connector cap is well inserted and that the cable does not touch the frame



**TABLE E - LAMBDA PROBES PASSAGE UNDER THE ENGINE**

1. Right lambda probe wiring harness
2. Medium sized clamp
3. Left lambda probe connector
4. Cable grommet

**TABLE F - PICK UP CABLE PASSAGE**

- Pass the pick up cable between the ABS modulator and the ABS connector

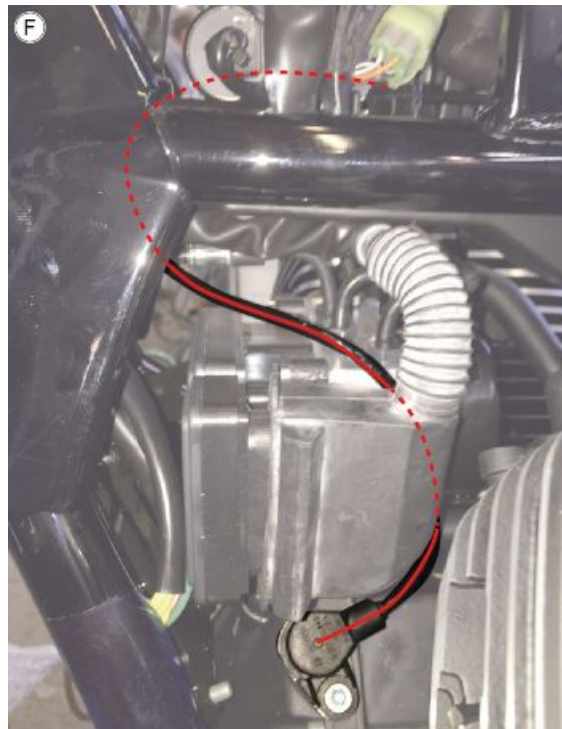


TABLE F1

- Pass the pick up cable through the central flap, towards the right side of the motorcycle

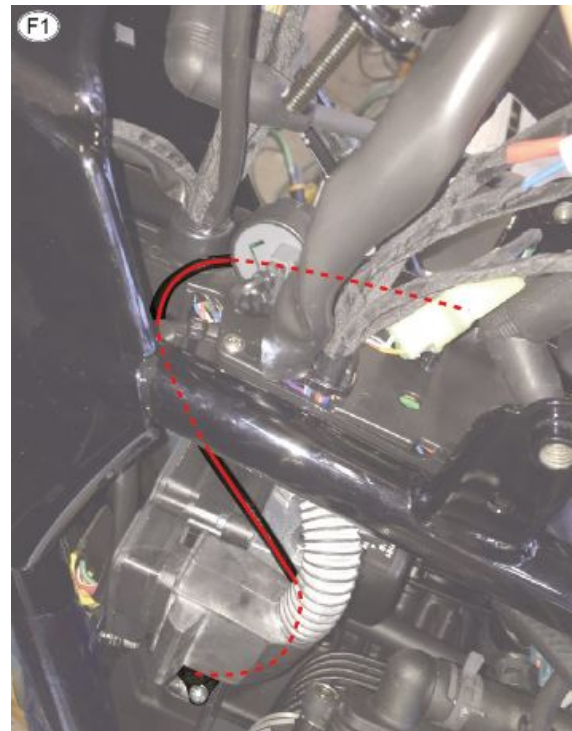


TABLE F2

- Pass the pick up cable to the back of the tank support and throttle cables

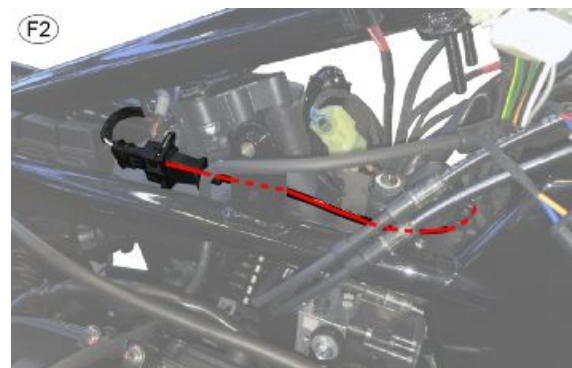


TABLE F3

- Check the correct connection of the pick up connector

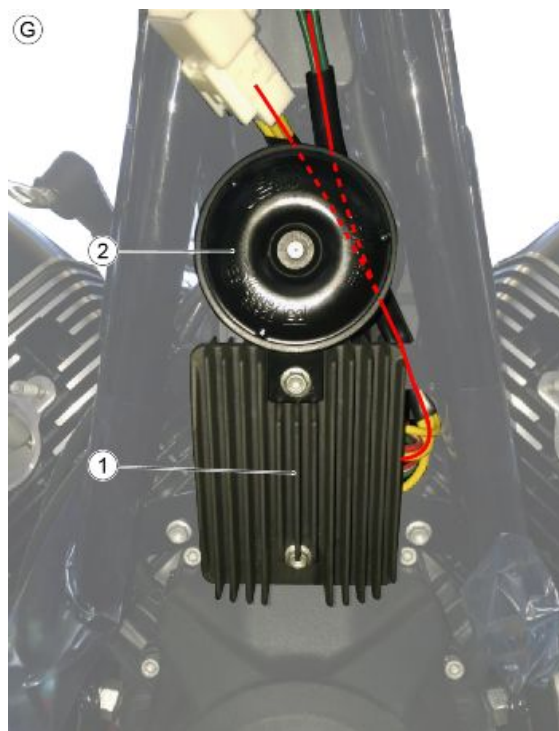


**TABLE G - HORN AND REGULATOR**

1. Voltage regulator

2. Horn

- The regulator's cable must pass behind the frame bracket

**TABLE G1**

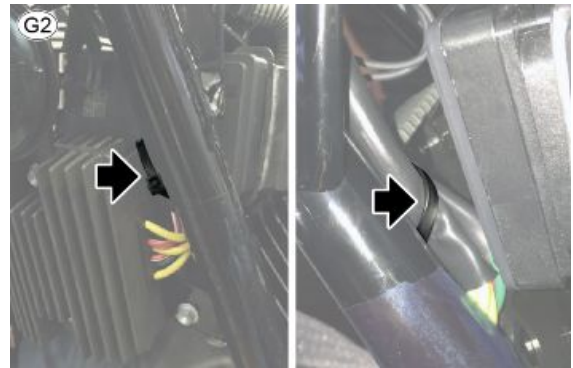
- Check the connection of the flywheel white connector and regulator's black connector that must have a safety clamp to avoid disconnection.



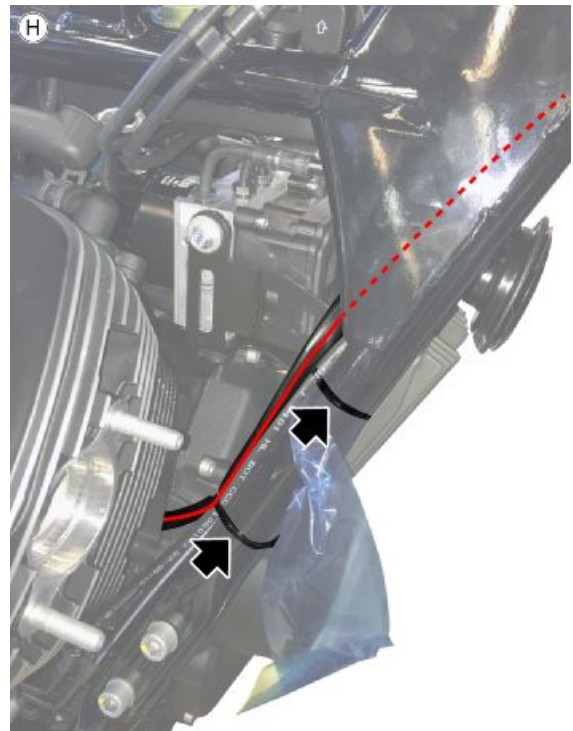


**TABLE G2**

- Using a medium clamp, fasten the regulator's cables along the frame's tube

**TABLE H - FLYWHEEL CABLES PASSAGE**

- Using two medium clamps, fasten the flywheel's wiring harness

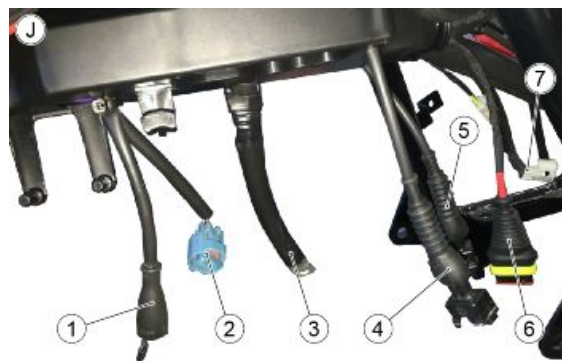


**TABLE I - NEUTRAL SENSOR CABLES PAS-SAGE**

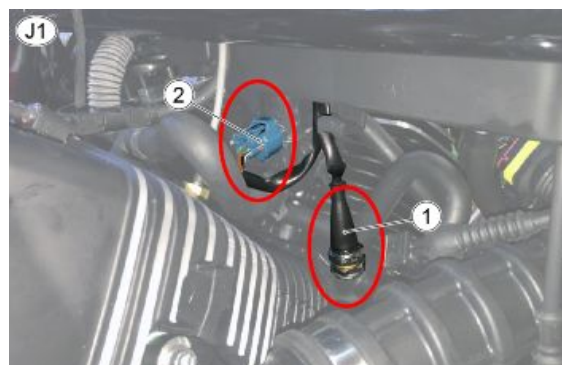
- The wiring harness (1) of the neutral sensor must pass through the filter box support and in the cable guide (2)


**TABLE J - OIL PRESSURE and SECONDARY AIR SENSORS**

- Oil pressure bulb
- Secondary air system
- Engine ground
- Left injector
- Right injector
- Right Lambda probe
- Battery ground

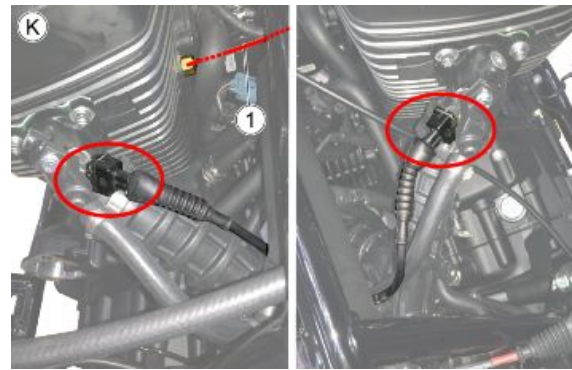

**TABLE J1**

- Check the correct connection of the oil pressure bulb connector (1) and of the secondary air connector (2)

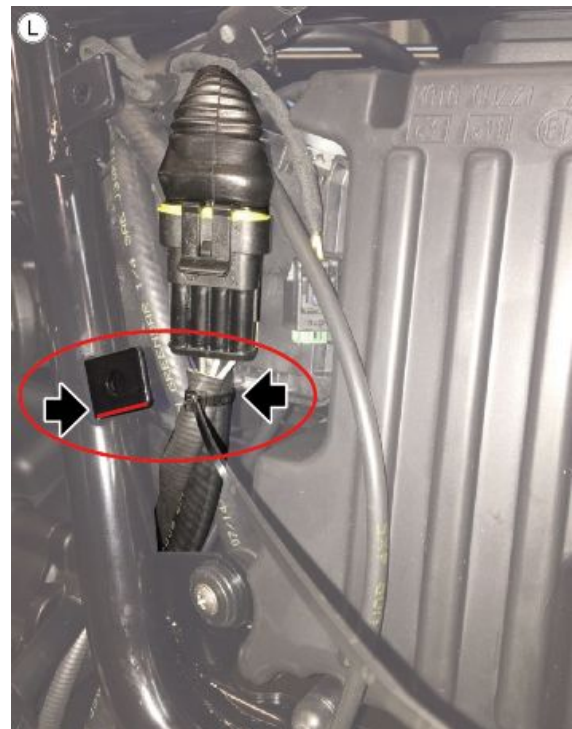


**TABLE K - INJECTORS**

- Check the correct connection of the injectors
- The cable of the engine head temperature bulb (1) must pass under the rubber pipe

**TABLE L - CONNECTION OF THE LEFT LAMBDA AND REAR ABS SENSOR**

- Using a clamp, aligned with the frame flap fixing the side fairing, fasten the lambda probe wiring harness so that the cables are covered

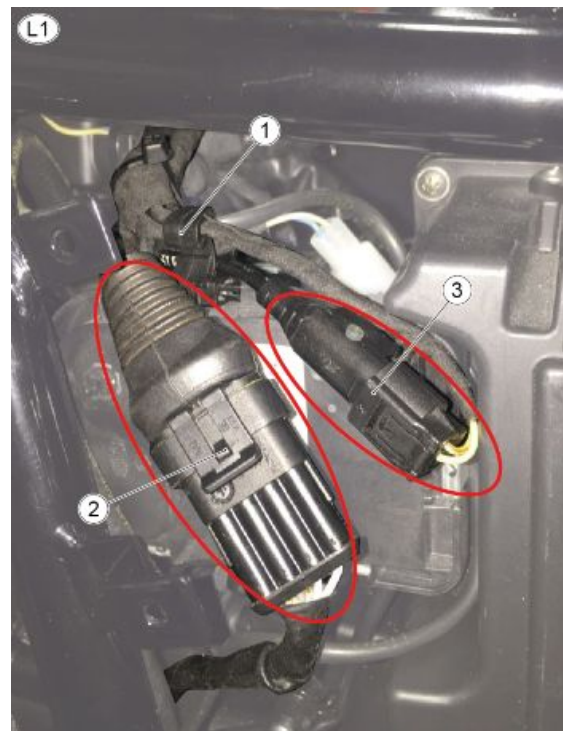


**TABLE L1**

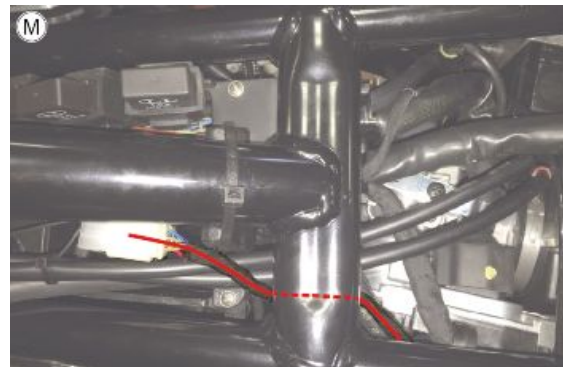
- The wiring harnesses of the rear ABS sensor, the connector of the side stand and the faston for the starter motor must pass through the cable grommet (1)

**THE CONNECTOR OF THE LEFT LAMBDA PROBE AND THE ANTI-THEFT FITTING MUST NOT PASS THROUGH THE CABLE GROMMET**

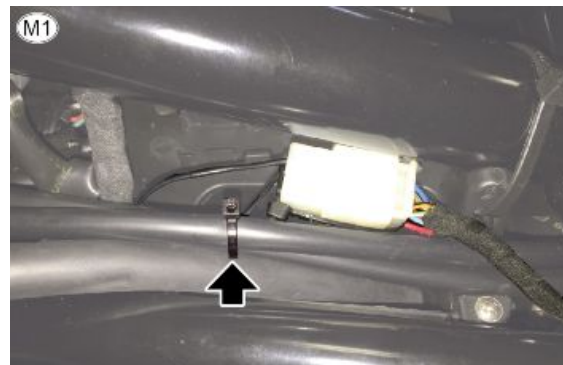
- Check that the connector of the left lambda probe (2) and the rear ABS sensor (3) are correctly connected

**TABLE M - ANTI-THEFT FITTING POSITIONING**

- The wiring harness of the anti-theft fitting must pass under the frame, as indicated

**TABLE M1**

- Using a small clamp, fasten the anti-theft connector to one of the two gas cables





**TABLE N - RIGHT EXHAUST LAMBDA and REAR BRAKE CONNECTION**

1. Check that the neutral sensor connector is well connected
2. Rear stop connector
3. Right Lambda probe connector

**TABLE N1**

- Check that the right lambda probe connector is well connected and that it is hooked to the specific support



**TABLE N2**

- The wiring harness of the lambda probe (1) must pass through the filter box and starter motor positive cable (2)

**TABLE O - REAR BRAKE WIRING HARNESS PASSAGE**

- Check that the rear brake sensor connector is well connected

**TABLE O1**

- Pass the wiring harness of the rear brake sensor (1) and of the rear BAS sensor (2) through the cable grommet (3) mounted on the engine and inside the gearbox clutch lever.

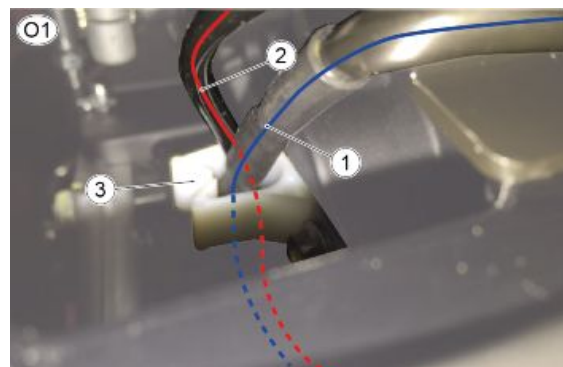


TABLE O2

- Using a clamp, fasten the wiring harness of the rear brake sensor (1) to the wiring harness of the rear ABS sensor (2)
- The rear ABS sensor wiring harness must pass through the cable grommet (3)

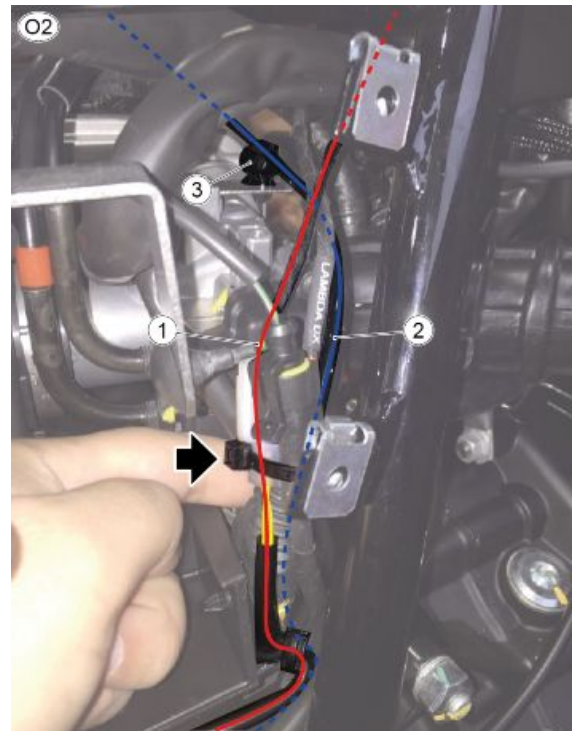
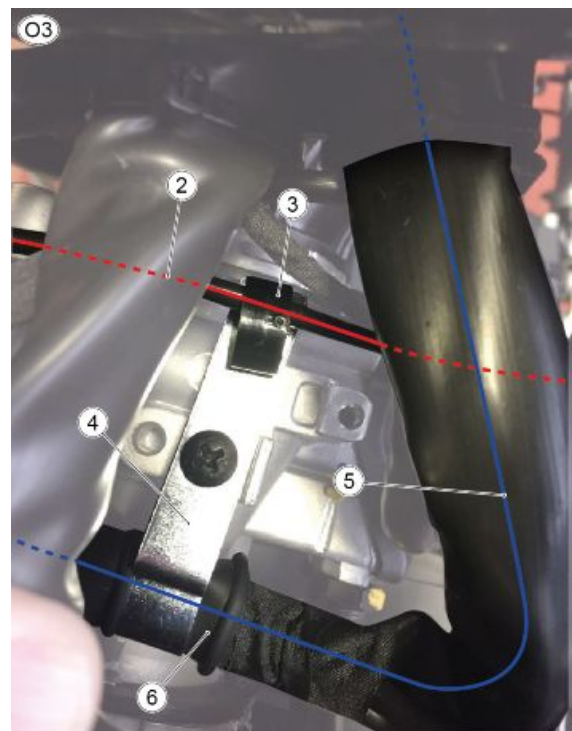


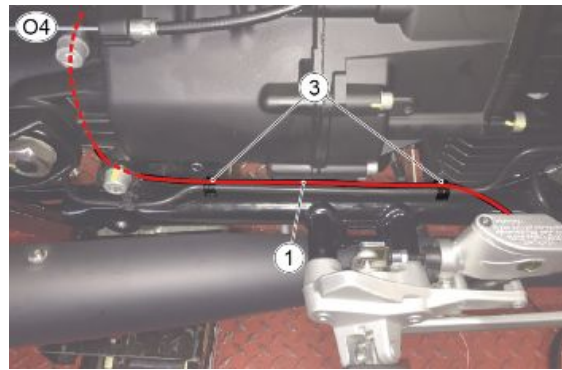
TABLE O3

- The wiring harness of the rear ABS sensor (2) must pass through the cable grommet (3) located on the bracket (4) that, in its turn, fixes the wiring harness of the engine control unit (5) in line with the rubber ring (6)



**TABLE O4**

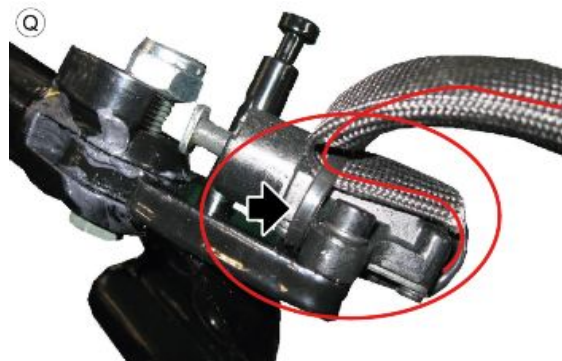
- Fasten the wiring harness of the rear brake sensor (1) using the cable grommets (3)

**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

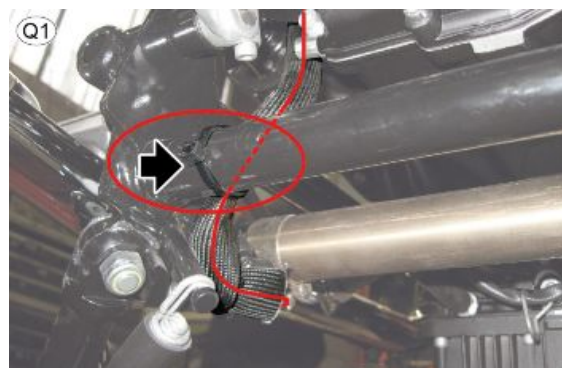




TABLE Q2

- Pass the wiring harness of the side stand switch under the starter motor power supply cable

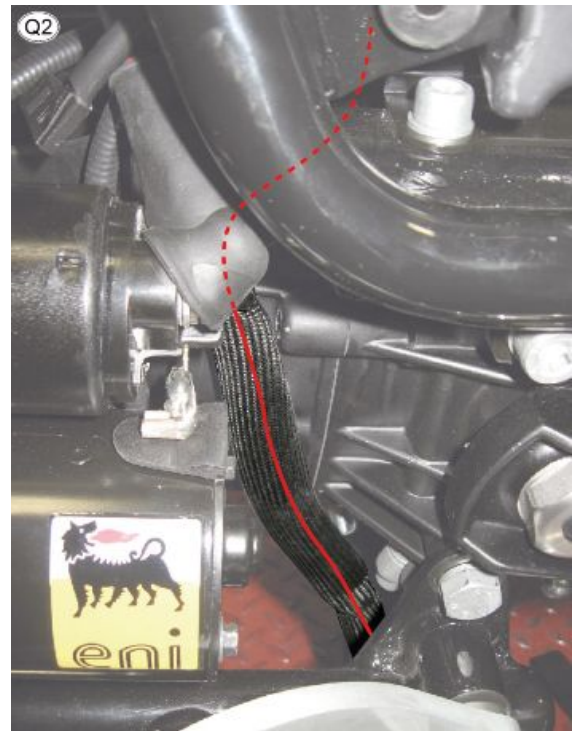
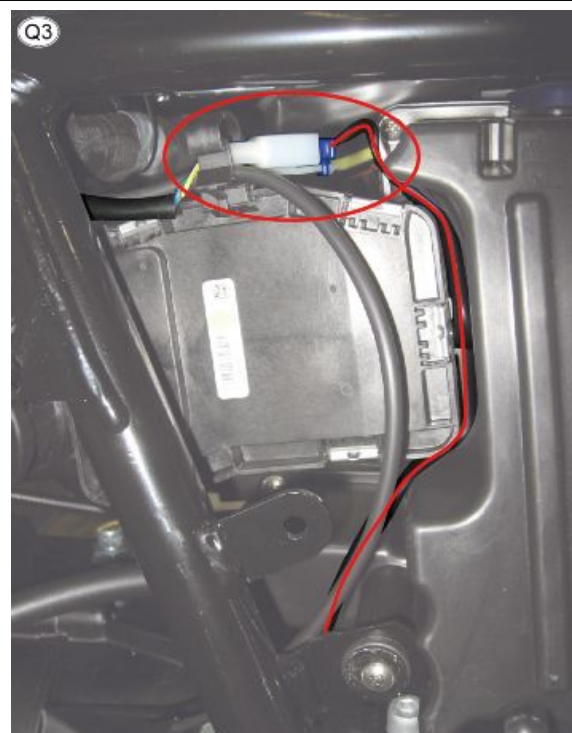


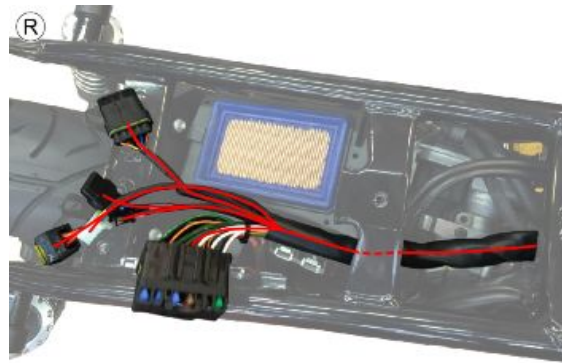
TABLE Q3

- Pass the wiring harness of the side stand switch behind the MIU G3 control unit and check that the connector is well connected



**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



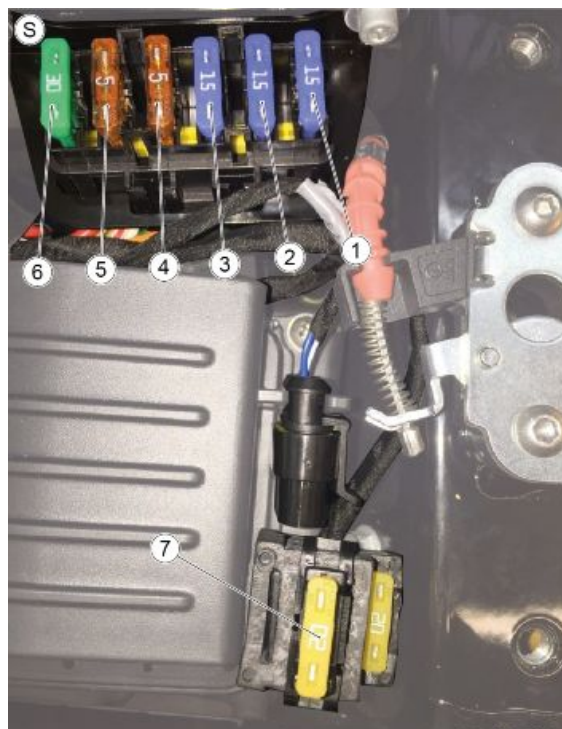
**TABLE R1**

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



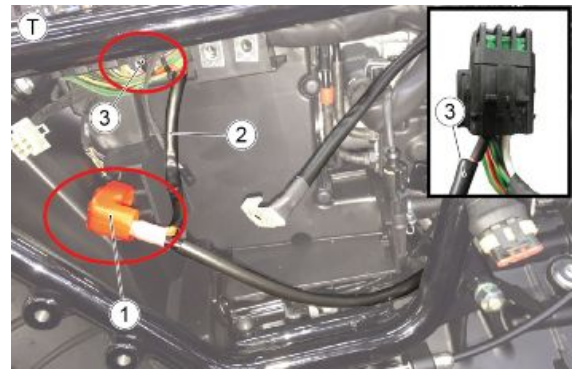
**TABLE S - MAIN FUSES AND ABS**

1. Fuse "A" (15A)
2. Fuse "B" (15A)
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**

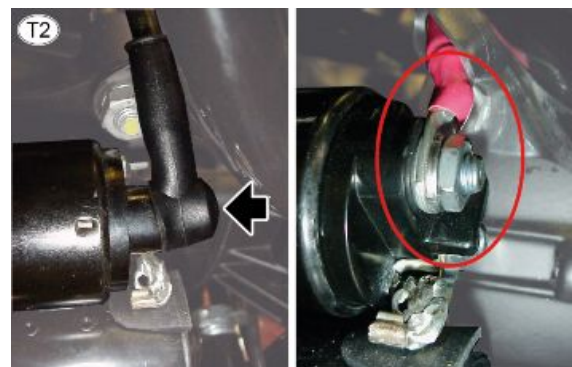
- The motor starter cable must pass over the filter box pipe

**TABLE T2**

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

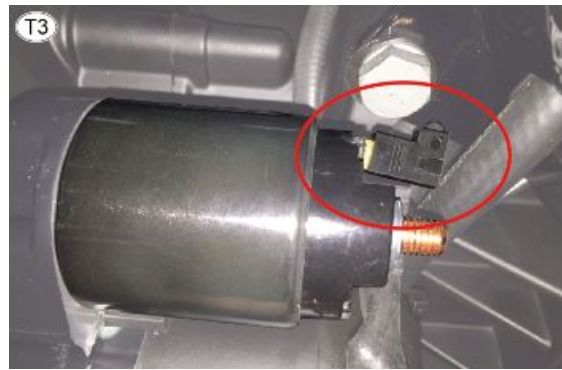


**INCORRECT SECURING OF THIS COMPONENT MAY CAUSE THE VEHICLE TO CATCH FIRE**



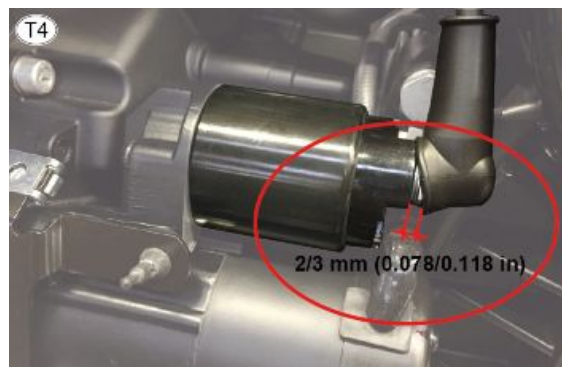
**TABLE T3**

- 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)



**Back side**

**TABLE A - REAR MUDGUARD PRE-FITTING**

- Pre-fit the taillight wiring harness on the mudguard and fasten it to the specific flaps on the mudguard



**TABLE A1 - REAR MUDGUARD PRE-FITTING**

- Secure the wiring as indicated in the figure

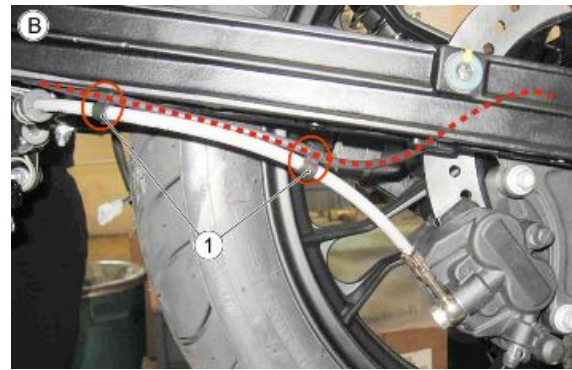




**TABLE B - REAR ABS SENSOR PASSAGE**

## 1. Cable fasteners

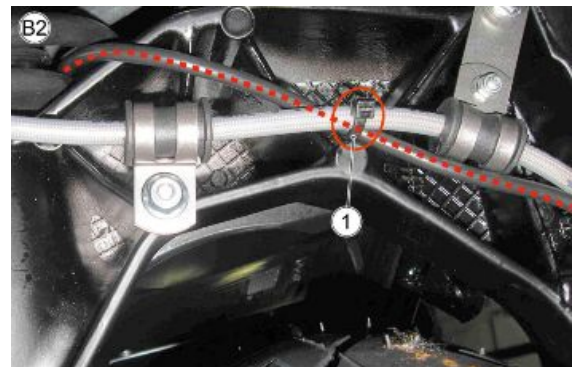
- Secure the ABS sensor cable under the swingarm by means of the cable glands

**TABLE B1 - REAR ABS SENSOR PASSAGE**

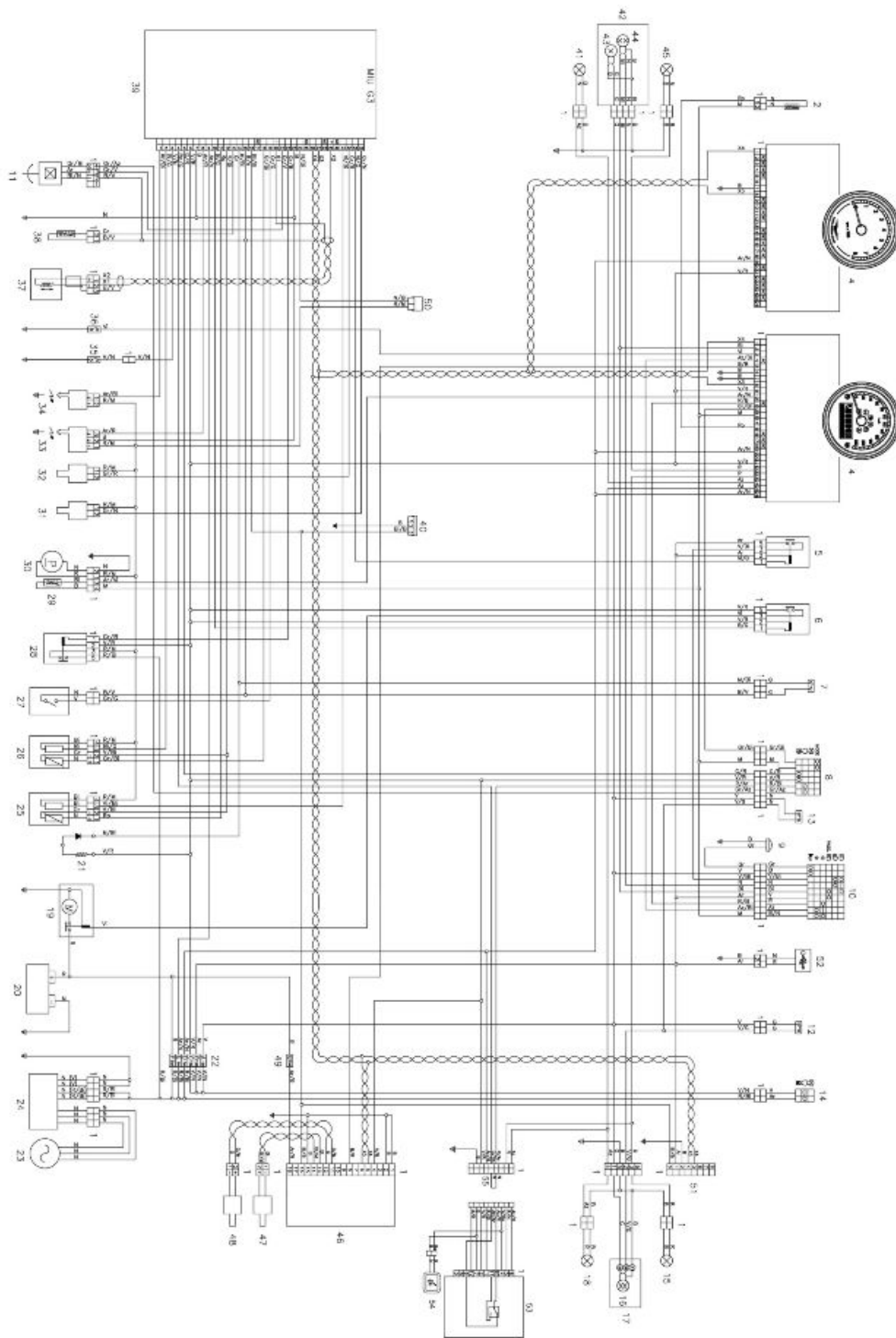
- Route the wiring harness as indicated in figure, taking care not to pinch the speed sensor cable

**TABLE B2 - REAR ABS SENSOR PASSAGE**

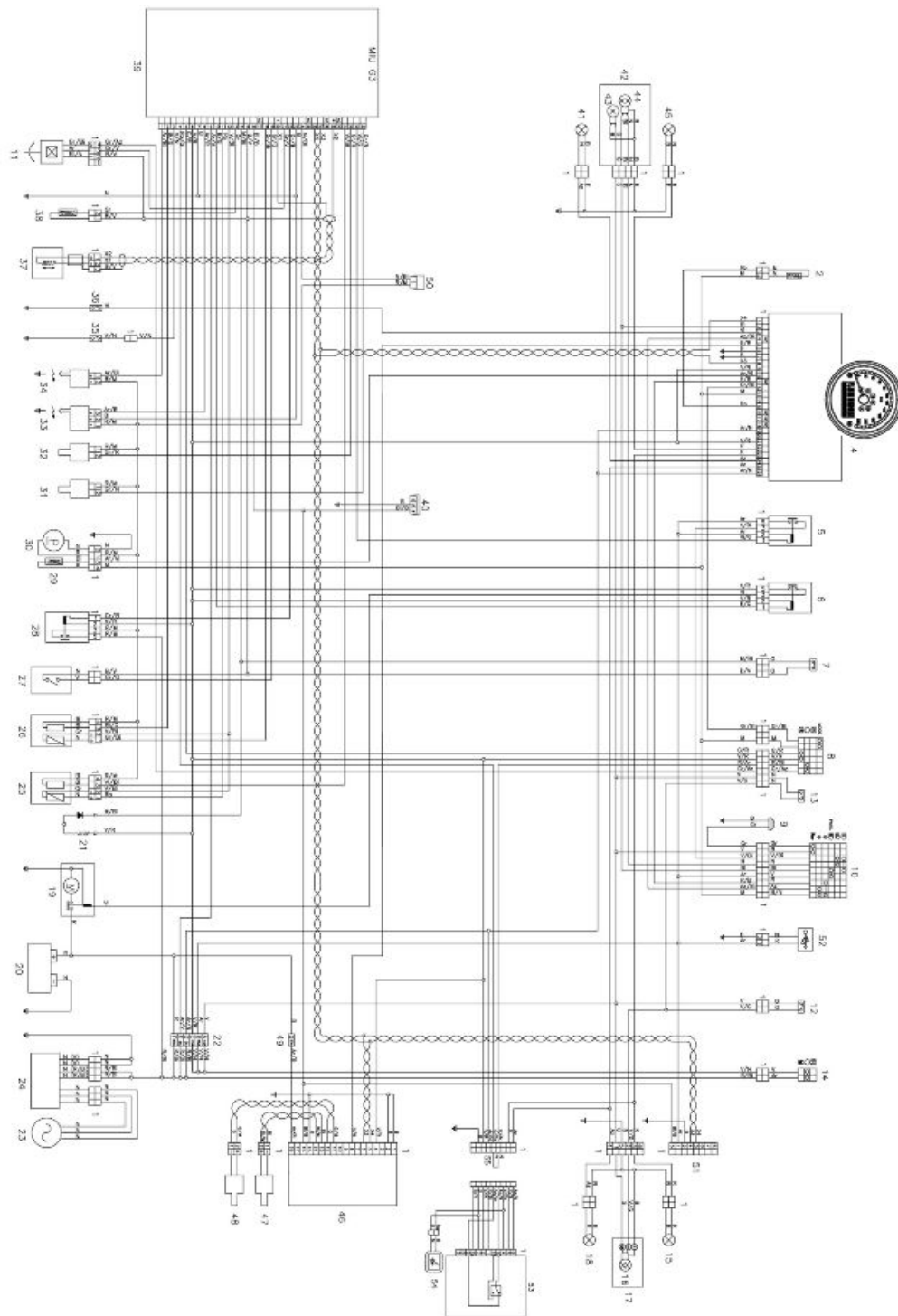
- Medium sized clamp

**General wiring diagram**

(SPECIAL/RACER/ANNIVERSARIO)



(STONE)



**Key:**

1. Multiple connectors
2. Air temperature sensor
3. -
4. Instrument panel
5. Light relay
6. Starter motor relay

- 
7. Clutch switch
  8. Right light switch
  9. Horn
  10. Left light switch
  11. Fall sensor
  12. Rear stop switch
  13. Front stop switch
  14. Ignition switch
  15. Rear right turn indicator
  16. Parking - brake light
  17. Taillight
  18. Rear left turn indicator
  19. Starter motor
  20. Battery
  21. Pull UP (resistance)
  22. Fuses
  23. Alternator
  24. Regulator
  25. Lambda 1 (left exhaust)
  26. Lambda 2 (right exhaust)
  27. Side stand switch
  28. Injection loads relay
  29. Fuel reserve sensor
  30. Fuel pump
  31. Injector 1 (left cylinder)
  32. Injector 2 (right cylinder)
  33. Coil 2 (right cylinder)
  34. Coil 1 (left cylinder)
  35. Neutral sensor
  36. Oil sensor
  37. Pick UP
  38. Engine head temperature sensor
  39. MIU G3 control unit
  40. Diagnosis
  41. Front left turn indicator
  42. Headlight
  43. Front parking light
  44. Low beam/high beam bulb

- 45.Front right turn indicator
- 46.ABS control unit
- 47.Front ABS sensor
- 48.Rear ABS sensor
- 49.ABS fuse
- 50.Secondary air system
- 51.Installation-ready for MGMP
- 52.USB socket (where applicable)
- 53.Pre-installation for anti-theft device
- 54.Antitheft device warning light
- 55.Jumper connector (without anti-theft device)

**Cable colour:**

**Ar** orange

**Az** sky 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**

---

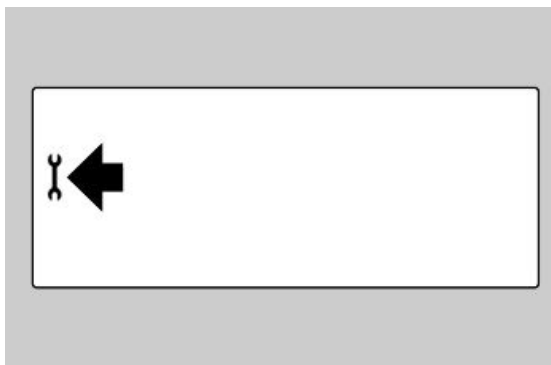
## Azzeramento icona manutenzione

The system displays the function as follows:

- when a maintenance interval threshold is exceeded, an icon with a spanner is shown on the LCD display.

To reset Service proceed as follows:

- Connect the diagnostic tool
- Select the concerned model and inside the section "SELF-DIAGNOSIS" enter the menu "ACTIVATIONS"
- Activate the control "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).



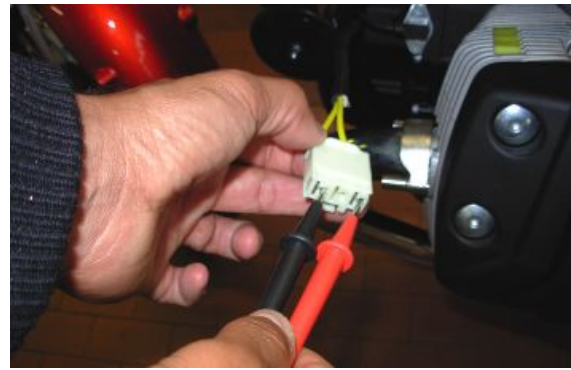
#### NOTE

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 an ammeter clamp 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	8000
RMS DC current (Arms) (average of the 3 stage currents)	26 - 30	20 - 25	30 - 35	30 - 35

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



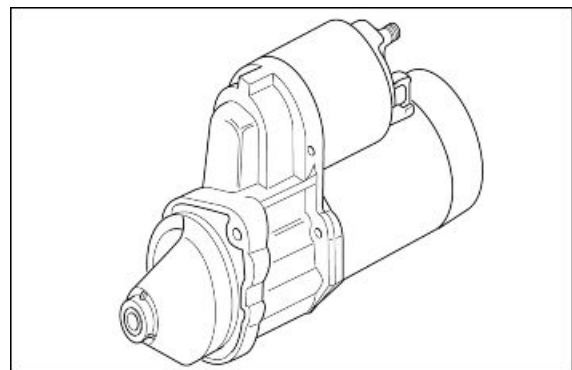
- Start the engine, after about one minute of operating bring the speed to 3000-5000 RPM, then measure with a tester the voltage at the battery poles that must always be between 13V and 15V. Otherwise, if the correct operation of the alternator has already been checked, replace the regulator.

**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

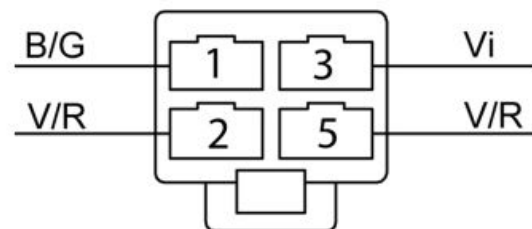
Start-up enabling switches

#### 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

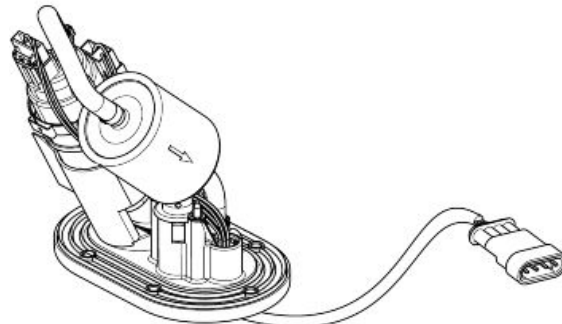
- Check if the button remains in start position; if not OK, restore, if OK check that there is no short circuit to ground of the grey/red cable; if it is not, restore. If it is OK, replace

**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)

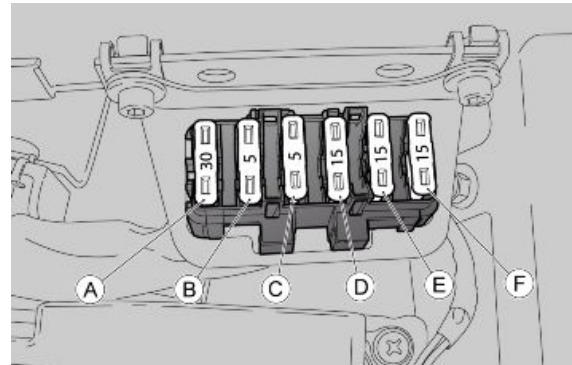
**Lights list****BULBS**

<b>Specification</b>	<b>Desc./Quantity</b>
Low/high beam light (halogen)	12 V - 55 W / 60 W H4
Front daylight running lights	12 V - 5 W
tail light /stop lights	12 V - 5 / 21 W
Turn indicator light	12 V - 10 W (orange RY 10 W bulb)
Dashboard lighting	LED

## Fuses

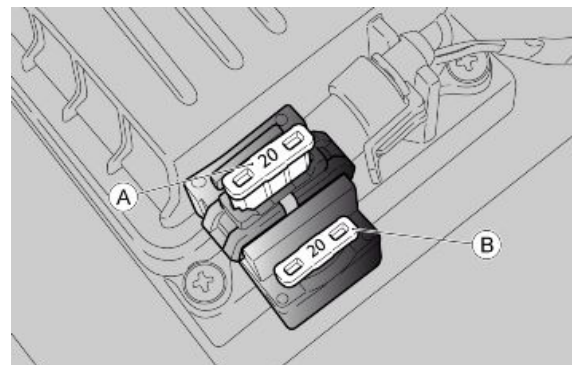
### FUSE DISTRIBUTION

1. Main fuse, coil 1 and 2, fuel pump, injectors 1 and 2, oxygen sensor 1 and 2, secondary air (30 A).
2. (Battery positive) MIU G3 ECU (5 A).
3. (Battery positive) Instrument panel, turn indicators, Blue Dash prewiring (5 A).
4. ECU, engine kill, start relay, instrument panel, injection load relay (15 A).
5. USB prewiring, Blue Dash prewiring, low beams/high beams, passing (15 A).
6. Brake light, front/rear running lights, horn (15 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

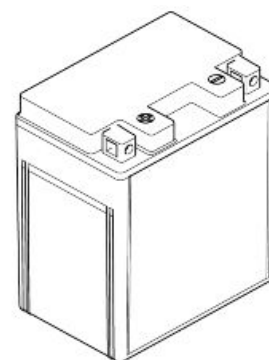
- on the vehicle: right side, under fairing
- connector: on the battery

### 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 BEGINNING 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

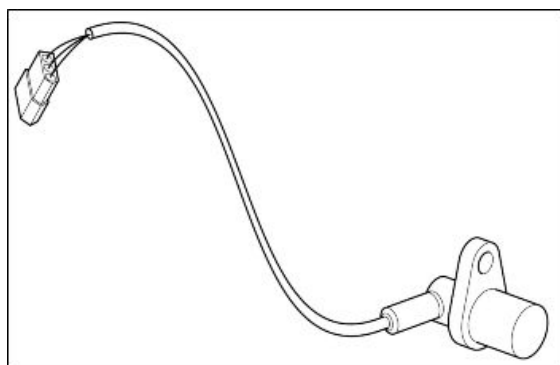
#### **Operation / Operating principle**

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 5D94**

#### 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 5D95**

#### 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
-

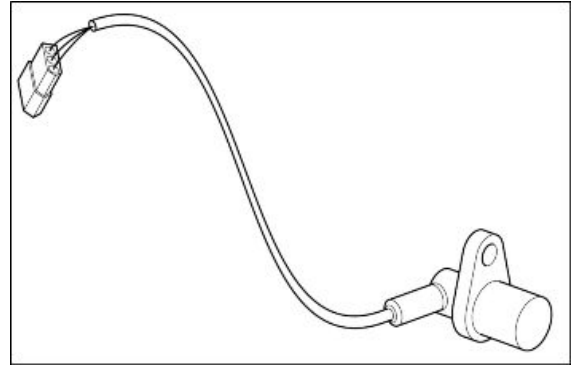


**REAR SPEED SENSOR****Function**

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

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- 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

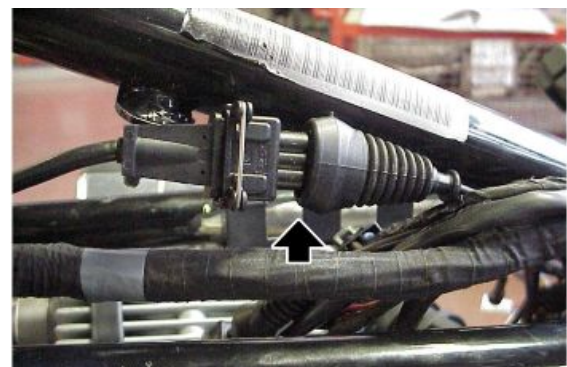
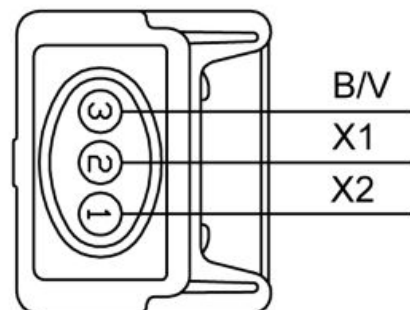
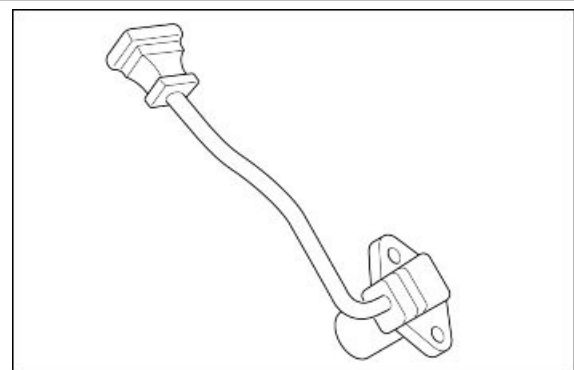
- Sensor: engine front left section, under the left cylinder
- Connector: under the fuel tank

### 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

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## **Engine temperature sensor**

### **Function**

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

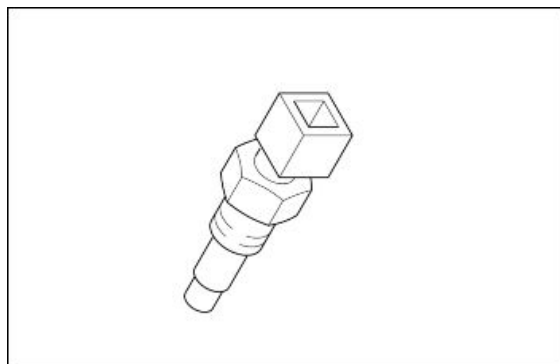
### **Operation / Operating principle**

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

### **Level in electrical circuit diagram**

Temperature sensors

### **Position**



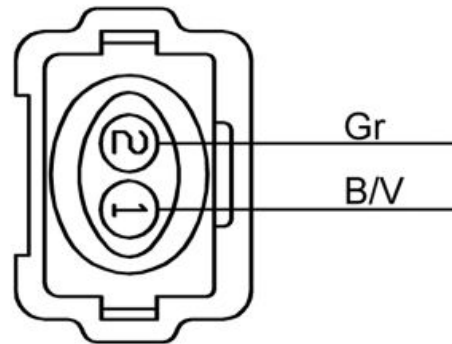
- On the right head, towards the inside of the "V" of the engine
- Connector: on the sensor

#### Electrical specifications

- Resistance at 0°C: 9.75 kΩ ± 5%
- Resistance at 20°C: 3.747 kΩ ± 5%
- Resistance at 40°C: 1.598 kΩ ± 5%
- Resistance at 60°C: 0.746 kΩ ± 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

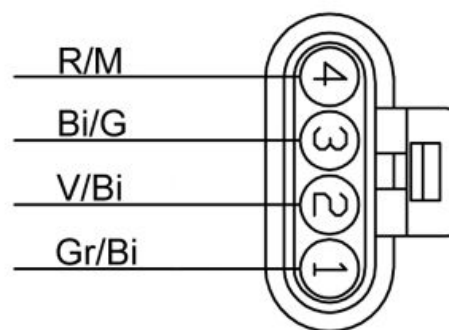
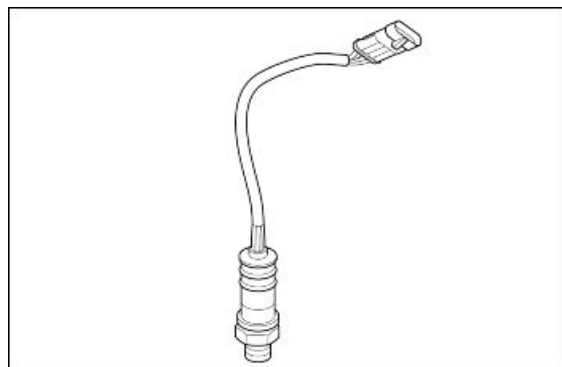
- Sensor: right exhaust pipe
- Connector: near the throttle body right side

### Electrical specifications

- Heater circuit: 12 -14  $\Omega$  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.

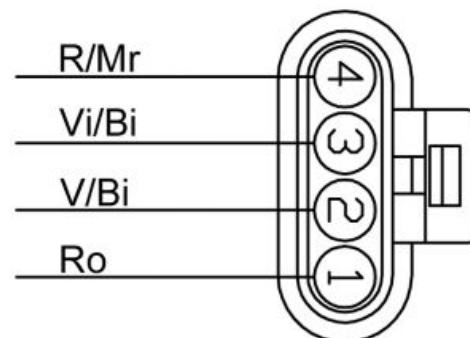
#### **LEFT LAMBDA**

##### **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  $\Omega$  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

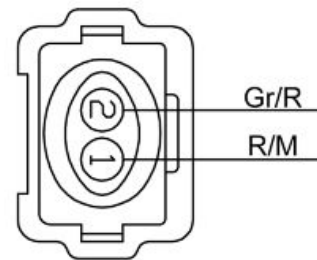
- Short-circuit to positive: excessive voltage at PIN 32 of the control unit connector
- Short-circuit to negative: zero voltage at PIN 1 of the right injector connector
- Open circuit: circuit interruption

#### 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.

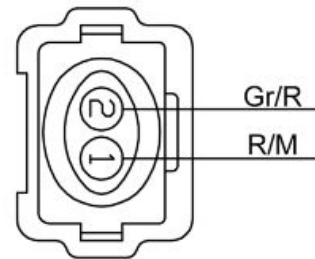
### LEFT INJECTOR

#### 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

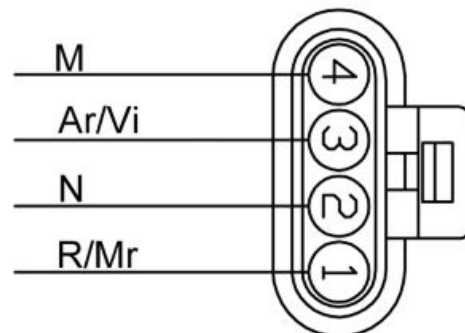
Low fuel and oil pressure

### 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.

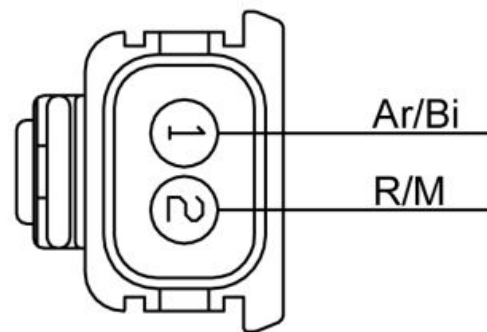
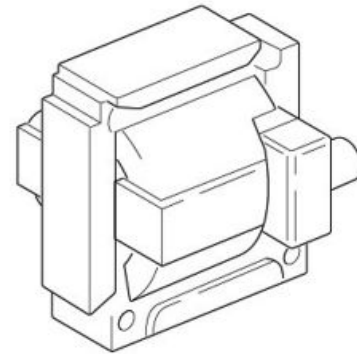
### Error cause

- 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)

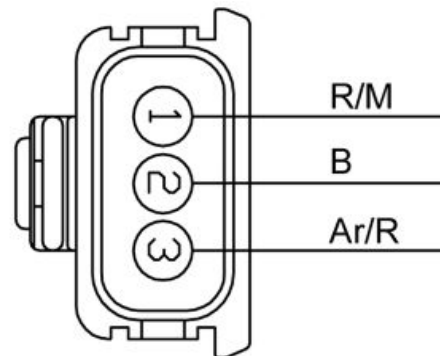
#### Diagnostic tool - Activation

- 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

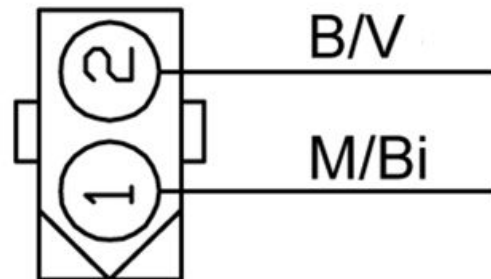
**Even with the clutch lever pulled, the vehicle does not start**

#### 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**

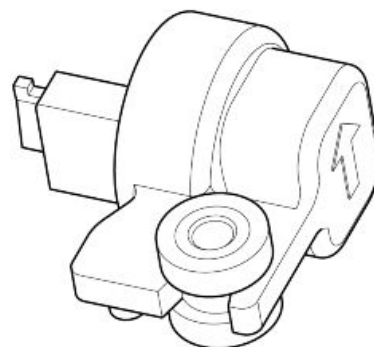
Start-up enabling switches

### **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**

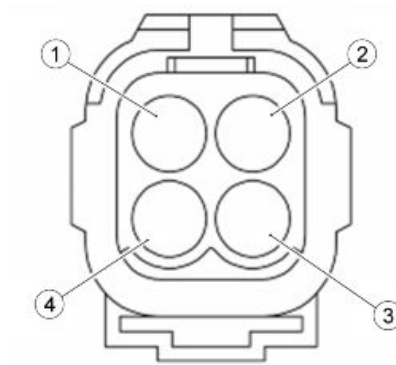
The engine stop button is in "ON" but its status remains in "OFF"

#### **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

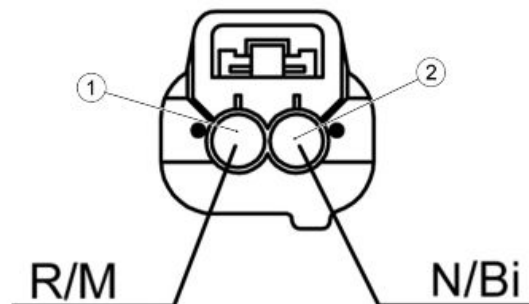
#### **Position:**

- 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**

**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**

- 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  $\Omega$  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  $\infty$  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

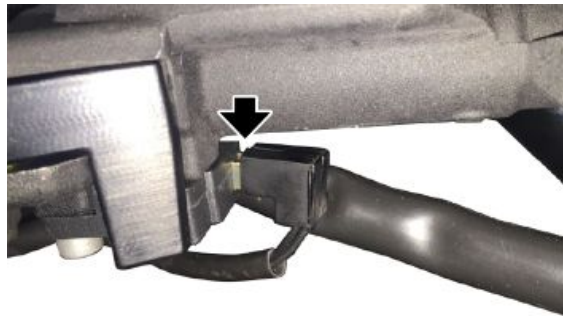
## RUN/STOP switch

### 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 G3

#### **Level in electrical circuit diagram**

Secondary air

Bluedash pre-installation

Antitheft system

ABS system

Diagnosis

Low-beam and running lights logic

High-beam lights logic

CAN Line

Temperature sensors

Lambda probe

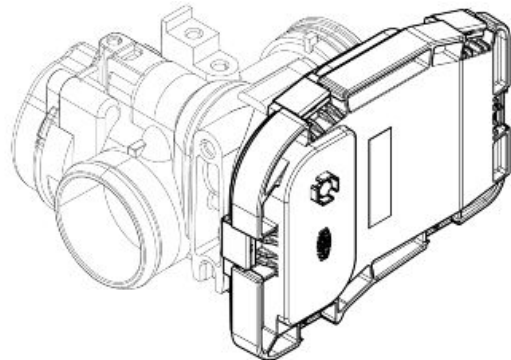
Neutral sensor

Engine speed sensor

Coils and injectors

Injection load solenoid

ECU base power circuit



## Start up

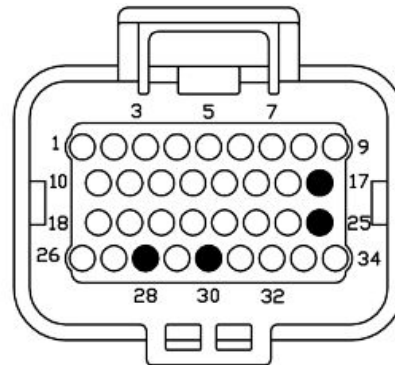
## Start-up enabling switches

**Position**

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

**Pin-out**

1. Left coil control (1)
2. Right lambda probe heater signal (2)
3. Neutral gear switch control inlet (neutral)
4. Run-off control input
5. Start button inlet
6. Key-on positive
7. Ground 1 (-)
8. Right coil control (2)
9. Battery positive 12V
10. Starter motor relay control
11. Left lambda probe positive signal (1)
12. Left (1) and right (2) lambda probe negative signal
13. Temperature signal sensor
14. Clutch switch signal
15. External sensor ground
16. K diagnostic line
17. /
18. Right lambda probe positive signal (2)
19. Hanger switch and fall sensor inlet
20. Engine revolution sensor negative signal (pick up)
21. Sensors power supply
22. Injection relay control
23. Ground 2 (power)
24. Secondary air system control
25. /
26. CAN H line
27. CAN L line



28./

29.Engine revs positive signal (pick up)

30./

31.Left lambda probe heater signal (1)

32.Right injector control (2)

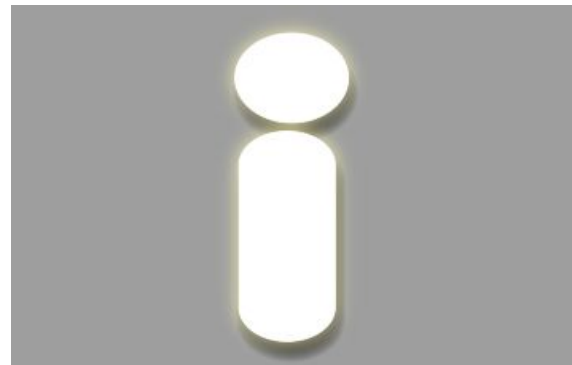
33.Light logic relay control

34.Left injector control (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



MOTO GUZZI V8 BOBBER 850 [16<->] ELETTRONICA MOTORE BENZINA MARELLI IAW 38MIUG3 Autodia

Parametri e Stati	Codice ISO	BE0C0003A2
Codici errore	Numero disegno	GM275402
Attivazioni	Numero HW	38M3G3HW311
Regolazioni	Ver.SW	0000
Dati centralina	Numero omologazione	04
Report	Autore ultima progr.	030259999
Scheda tecnica	Versione HW MM	
Avvia/Interrompi comunicazione	Mappatura	4640VB29
Grafico di analisi	Data di fabbricazione	223/9
	Data di programmazione	01/27/2016
	Codice NIP	CZ401279R
	Codice ISO	
	Salva	

**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)

Gruppo di parametri	Pagina 1		
Giri motore	1553	rpm	
Angolo farf. complessivo	18.1	°	
Temperatura motore	71	°C	
Temp.aria aspirata	32	°C	
Tensione sonda lambda SX	40368	mV	
Tensione sonda lambda DX	0	mV	
Crz.ne titolo cilindro SX	-1979.8	%	
Crz.ne titolo cilindro DX	0.0	%	
Crz.ne adatt. carb.cil.SX	0.0	%	
Crz.ne adatt. carb.cil.DX	0.0	%	
Passi attuati	-21117	step	
Passi programmati	50303	step	



- 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, Acceleration, 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)

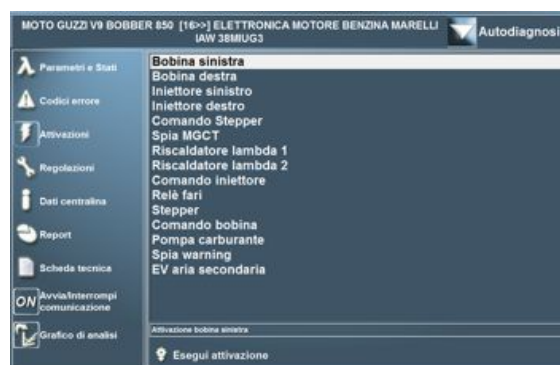
**CAUTION**

**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
- EV secondary air system



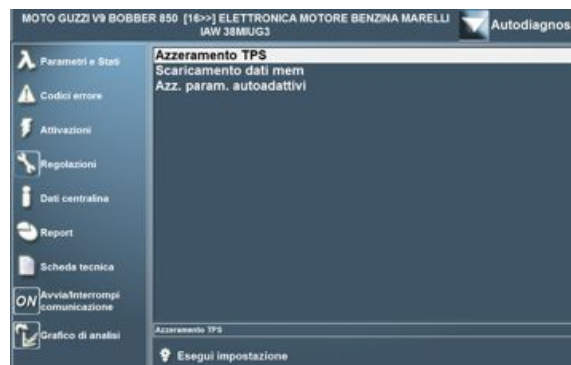
**Diagnostic tool - Errors screen page**

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

**Cause of error**

- 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

**Cause of error**

- Malfunction of sensor inside the control unit

**Troubleshooting**

- Replace the control unit

**Error EEPROM P0601** - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

**Error RAM P0604** - circuit not workingError cause

- The instrument panel 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 panel 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 - Adjustment**Throttle 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**

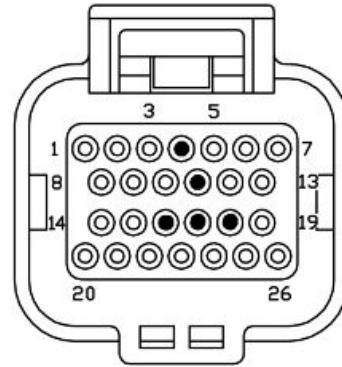
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- Once the throttle body or the injection control unit is replaced, it is necessary to connect to the diagnostic tool selecting FUEL INJECTION and carry out the operation "THROTTLE POSITIONER AUTODETECTION"

## 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 9 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  $0.35 \pm 0.2$  bar ( $5.1 \pm 2.9$  PSI) in the engine.

### Operation / Operating principle

Switch normally open. With oil pressure above  $0.35 \pm 0.2$  bar ( $5.1 \pm 2.9$  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

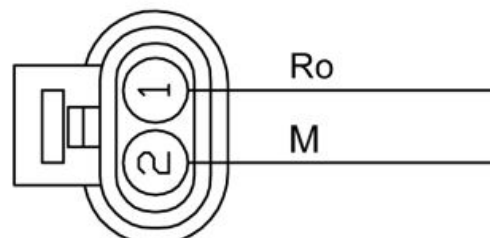
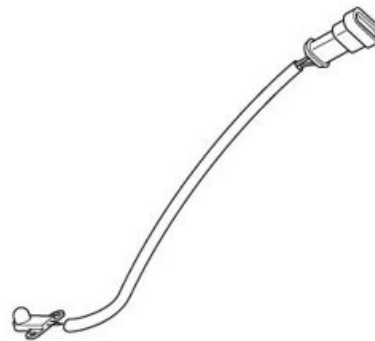
- Under instrument panel supporting bracket
- Connector: under the start-up lock

### Electrical specifications

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

### Pin-out

1. Voltage 5V (pink)



## 2. Ground (brown)

**Diagnosis**

An instrument panel 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 counter**Error 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-out**Error 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 Off**Error 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 absent

#### Error 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 valid

#### Error 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 code

#### Error cause

- The ABS control unit was installed in a wrong vehicle

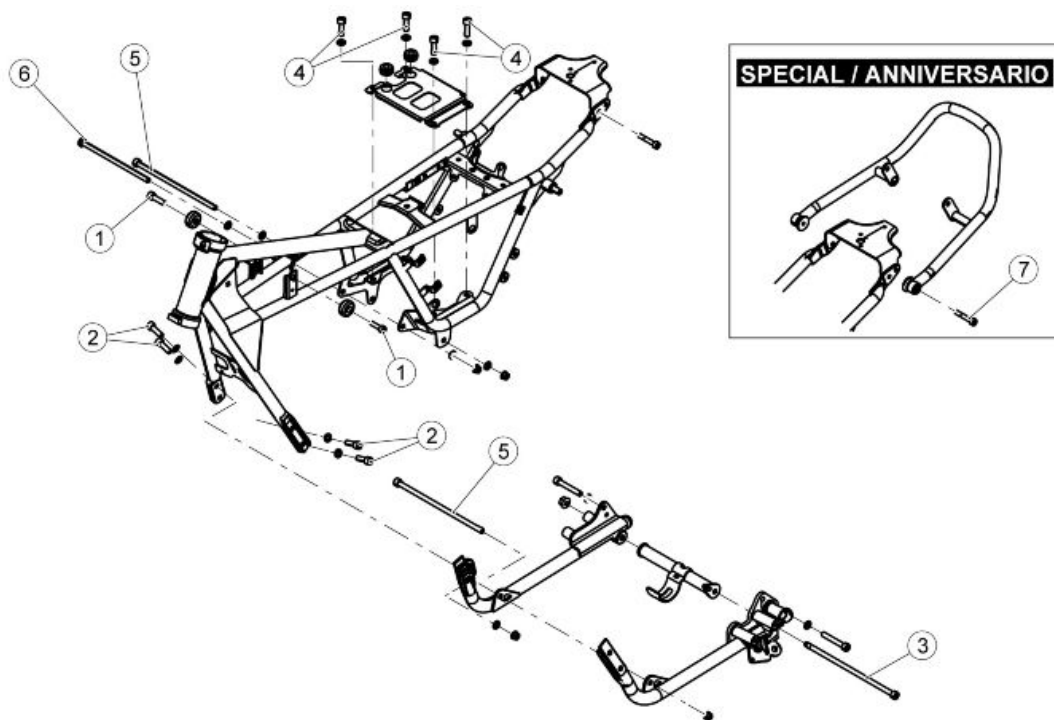
#### Troubleshooting

- Replace the control unit
-

## INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE



**CHASSIS**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lb ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lb ft)	-
3	Screw fastening the stand cross-piece to the cradles	M10	1	50 Nm (36.88 lb ft)	Pre-permeated
4	Rear plate fastening screw	M8	4	35 Nm (25.81 lb 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 lb ft)	-

**Vehicle preparation**

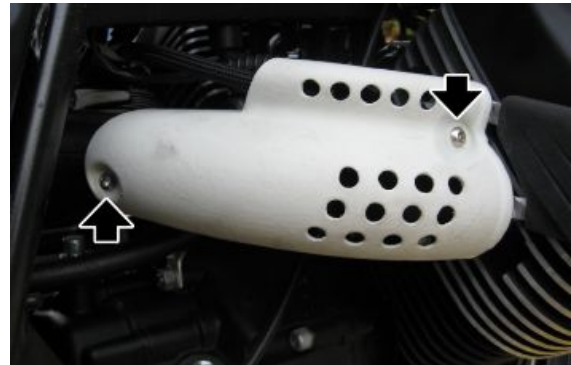
- To arrange for the removal of the engine block, you must first remove the saddle, fuel tank, side fairings and the battery
- From the front, secure the vehicle with belts attached to a hoist
- Position a centre stand under the engine sump
- Position an engine support so as not to damage the rubber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

## Removing the engine from the vehicle

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

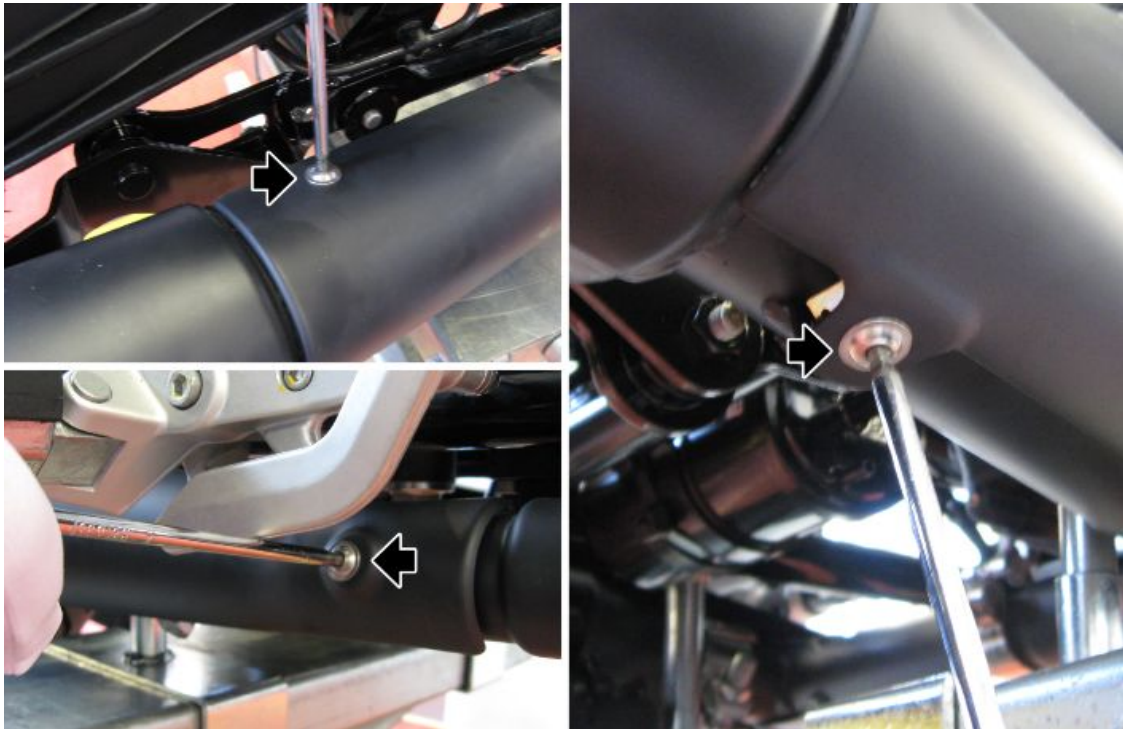
**NOTE**

REPEAT THE OPERATION FOR THE RIGHT COVER AS WELL

**NOTE**

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

- Remove the three fixing screws of the silencer protection

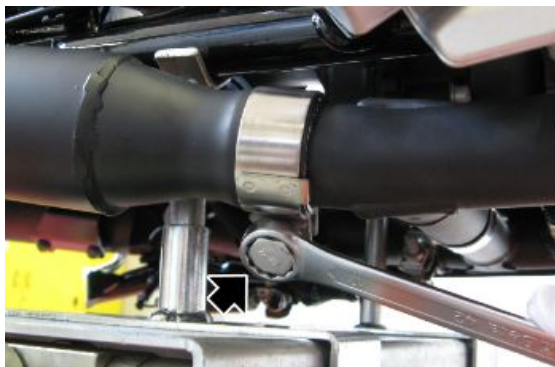


- Remove the silencer protection

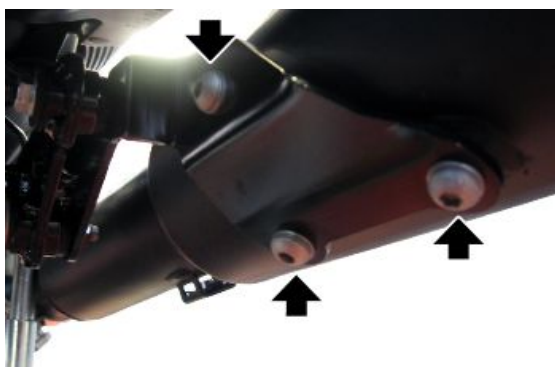




- Loosen the clamp between the silencer and manifold



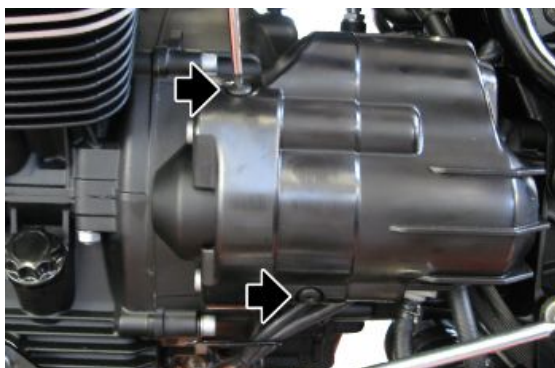
- Remove the three fastening screws of the silencer to the support bracket



- Slide and remove the silencer from the collector



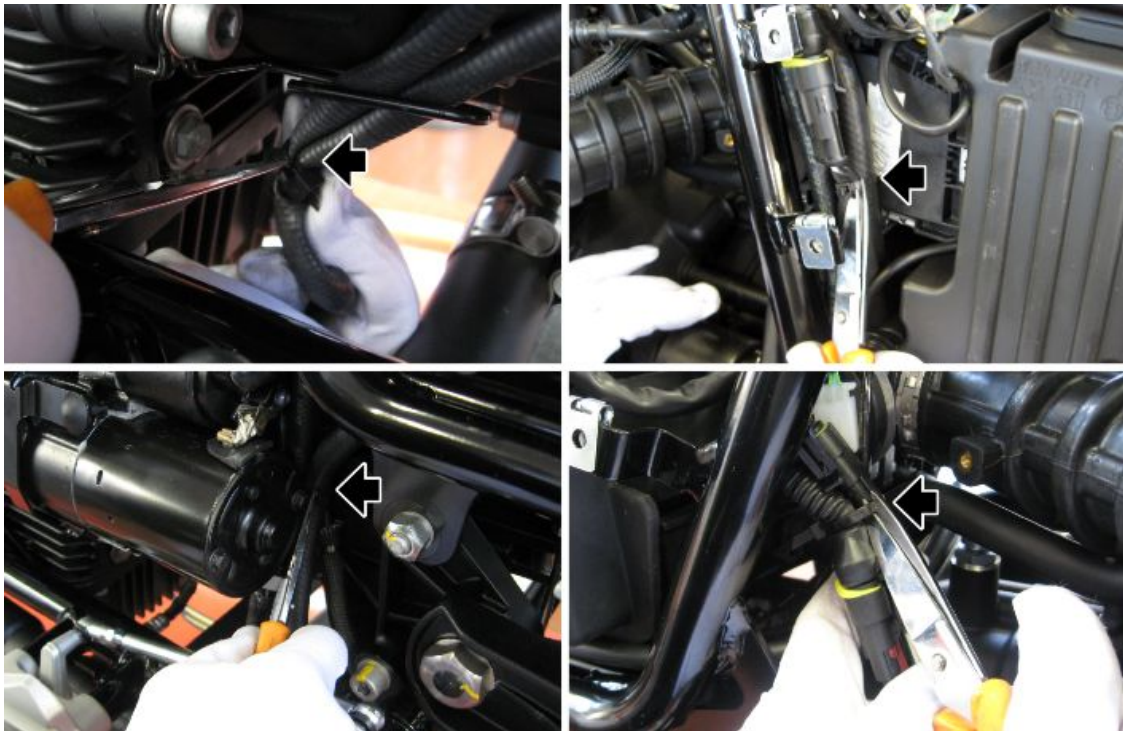
- Remove the two starter motor cover fixing screws



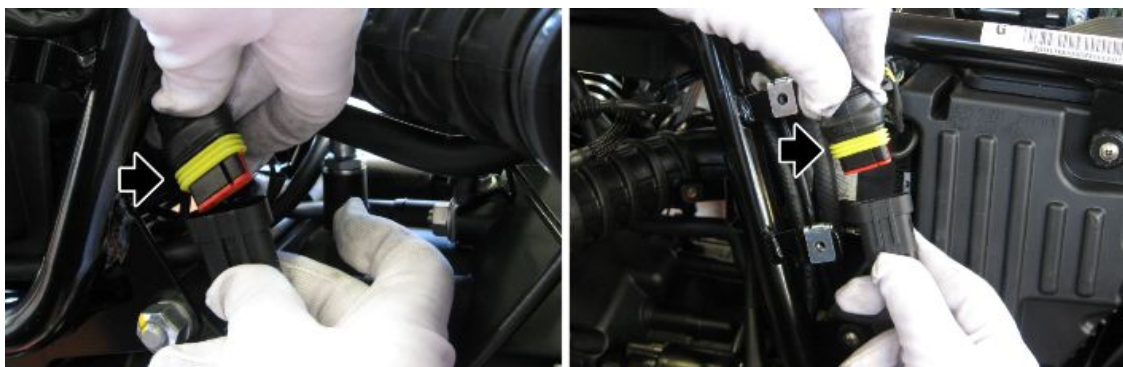
- Remove the starter motor cover



- Remove the clamps that secure the wiring harnesses of the Lambda probes



- Disconnect the connectors of the lambda probes and free the wiring harness from the cable grommet



- 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

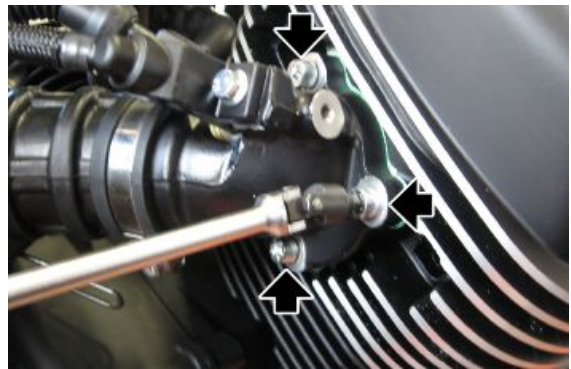




- Disconnect the spark plugs tubes



- Remove the screws fixing the manifold to the cylinder heads



- Disconnect the engine oil pressure sensor connector



- Remove the fixing nut of the engine ground cable



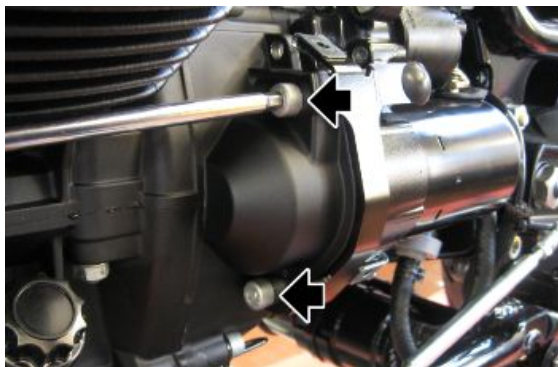
- Remove the fixing nut of the power supply cable located on the starter motor. Then remove the cable



- Disconnect the starter motor faston



- Remove the two starter motor fixing screws



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



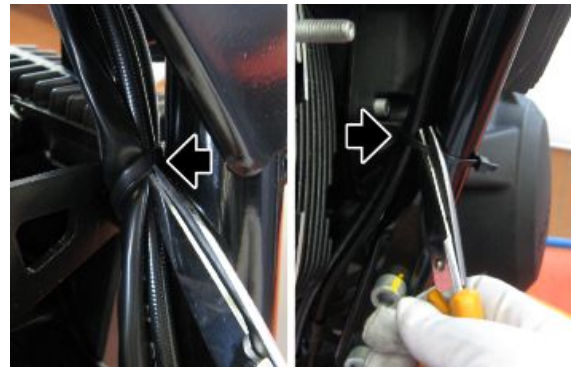
- Disconnect the secondary air system pipes from the cylinder heads



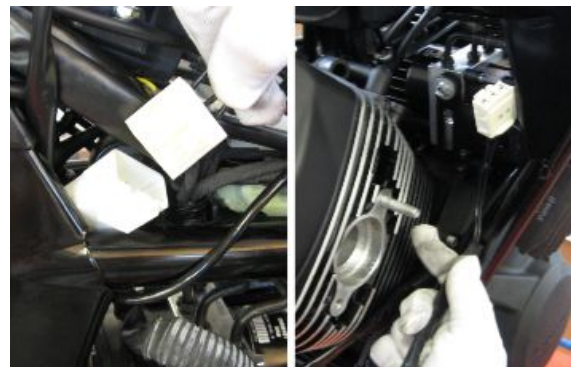
- Remove the tone wheel sensor



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

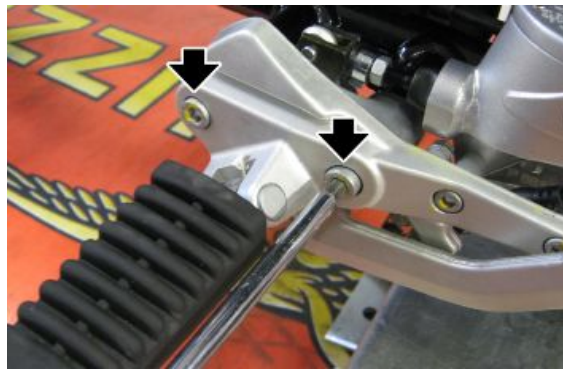


- Disconnect the flywheel/alternator connector and free it from the passage in the frame





- Remove the fixing screws of the right rider footrest



- Remove the front screws fixing the cradle, making sure to recover the nuts and washers



- Remove the lower fixing pin of the cradle making sure to collect the washer and the nut



- Remove the rear fixing screws of the cradle

- Remove the cradle



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



- 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





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



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



## INDEX OF TOPICS

ENGINE

ENG

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

**"MSS Engine 750 Euro 4"**

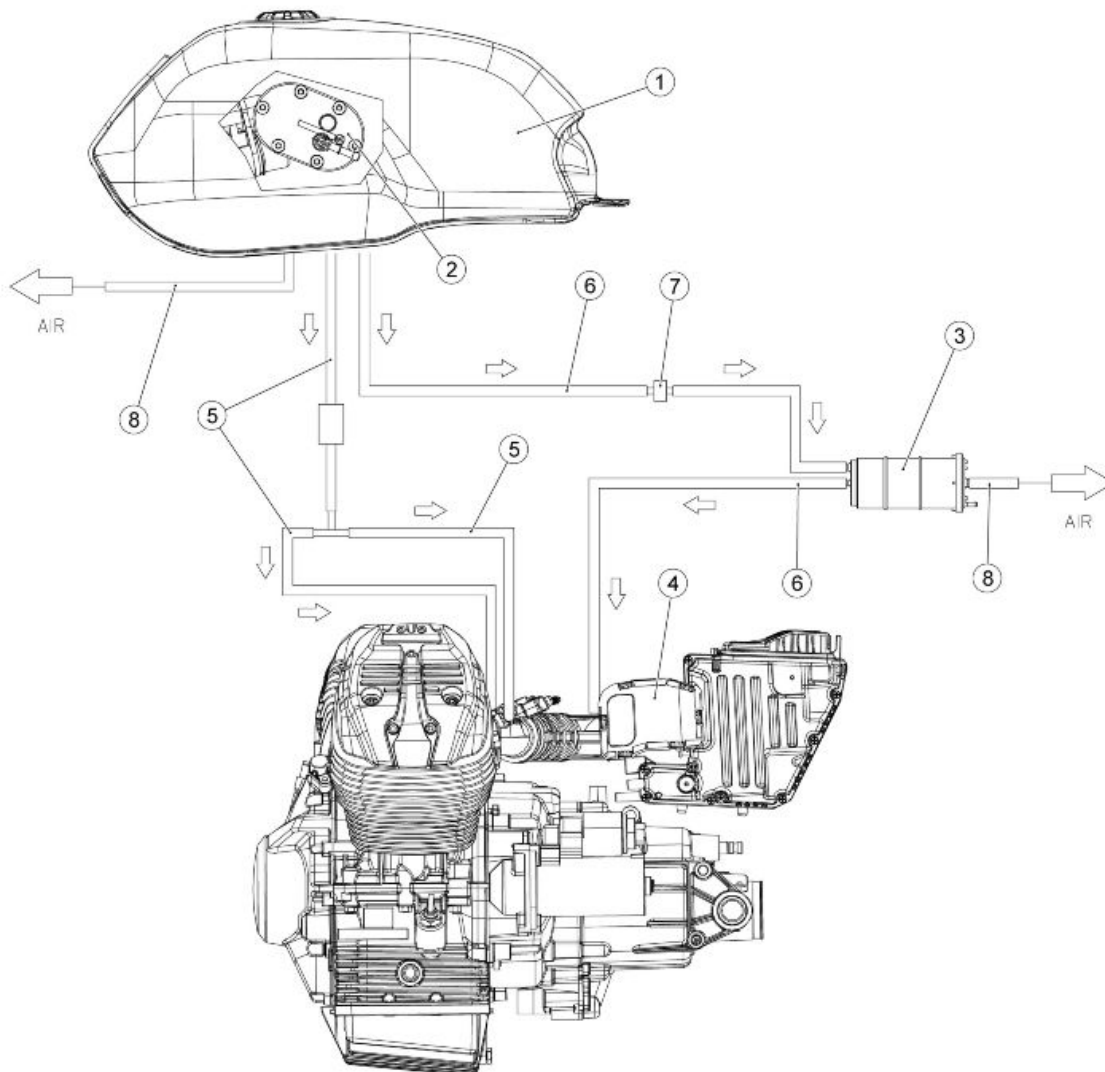
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## INDEX OF TOPICS

POWER SUPPLY

P SUPP

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**Circuit diagram****key:**

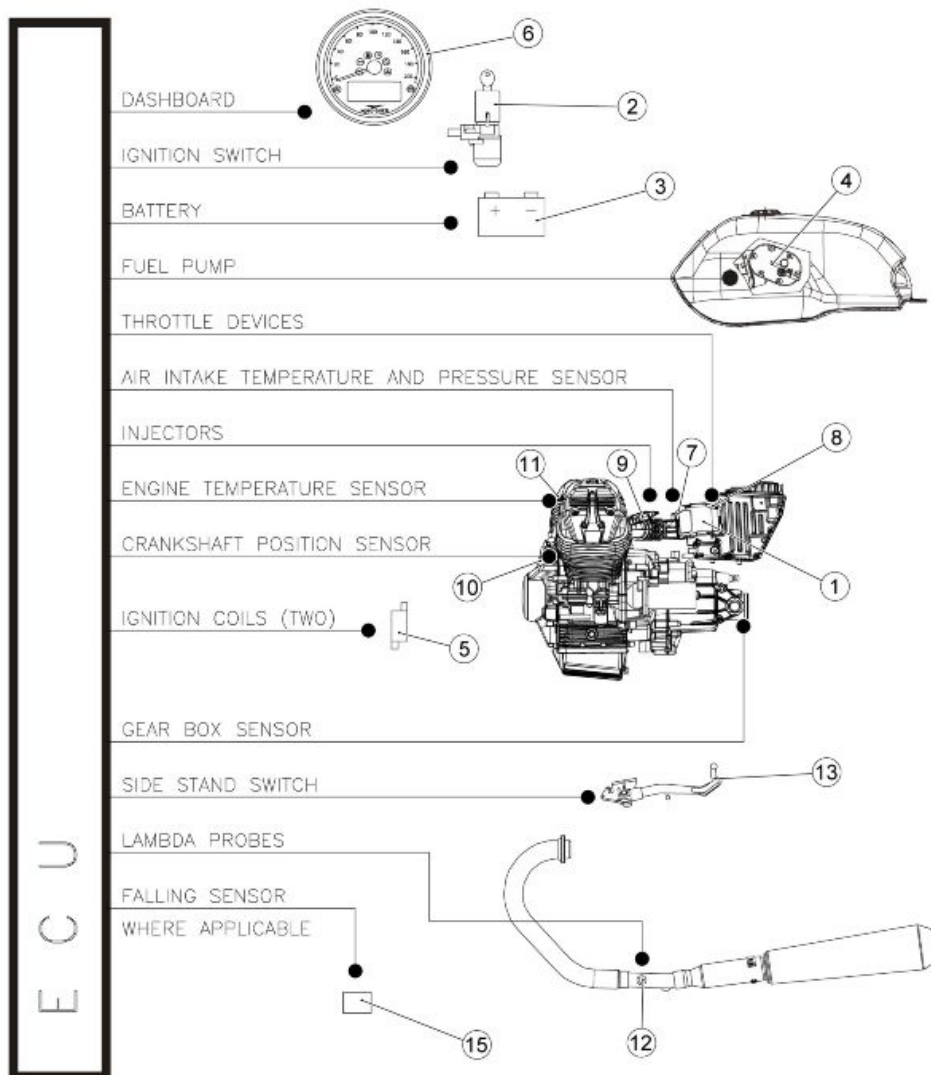
1. Fuel tank
2. Fuel pump
3. Canister
4. Throttle body
5. Fuel delivery pipes
6. Fuel vapour recovery pipe
7. Check valve
8. Breather pipe

---

**Injection**

---

Diagram



key:

- 1. Control unit position
- 2. Ignition switch
- 3. Battery
- 4. Fuel pump
- 5. Coils
- 6. Instrument panel
- 7. Air temperature sensor
- 8. Throttle valve position sensor
- 9. Injectors
- 10. Crankshaft position sensor
- 11. Engine temperature sensor
- 12. Lambda probe

13.Side stand switch

14.Gear sensor

15.Fall sensor

---

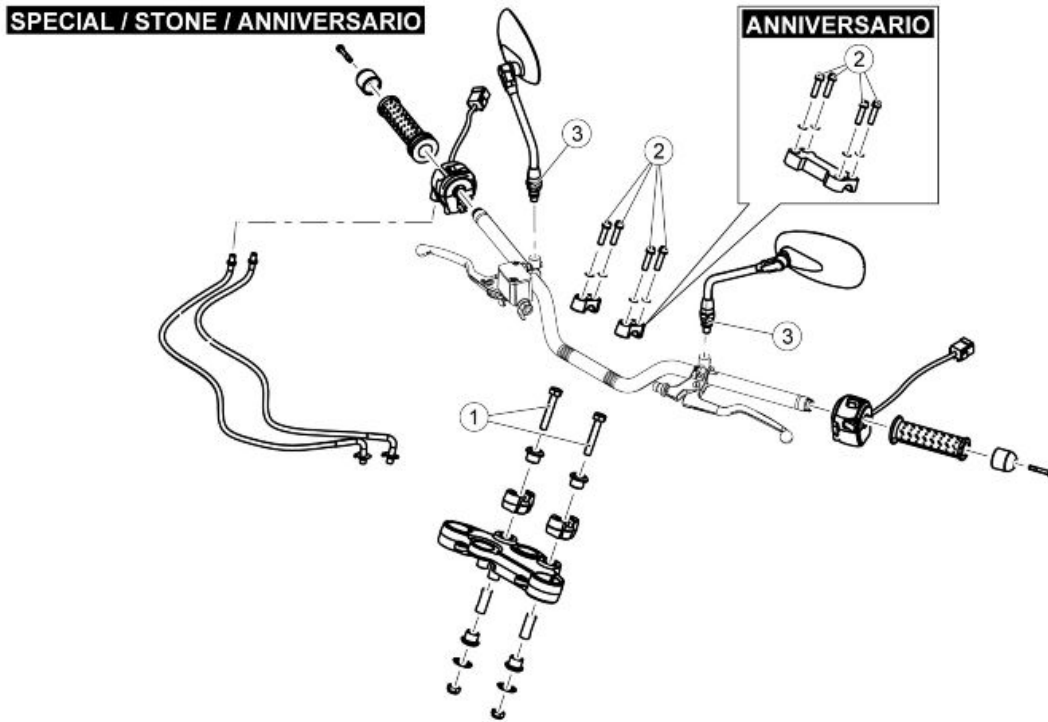


## INDEX OF TOPICS

**S**SUSPENSIONS

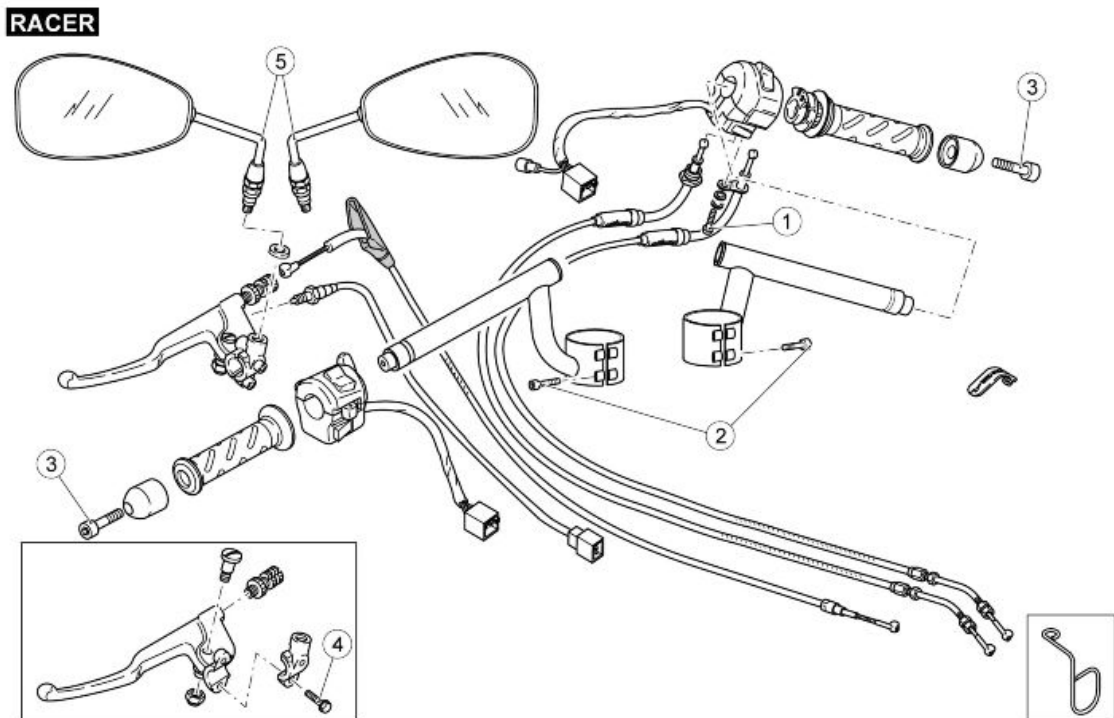
**SUSP**

## 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 lb 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 lb ft)	-



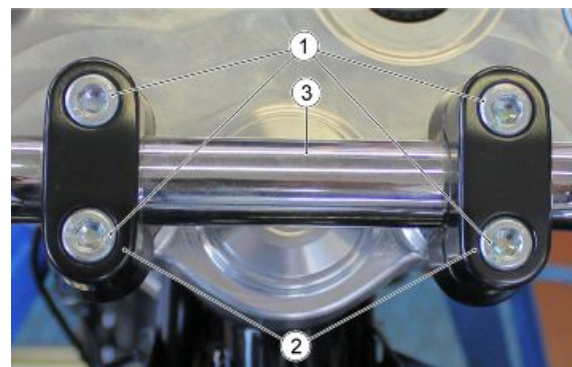
### HANDLEBAR AND CONTROLS

Pos.	Description	Type	Quantity	Torque	Notes
1	Switch fastener screw	SWP 5	1+1	1.5 Nm (1.11 lb ft)	-
2	Semi-handlebar fixing screw	M6x25	4	10 Nm (7.38 lb ft)	-
3	Counterweight fixing screw	M6	2	10 Nm (7.38 lb ft)	Loctite 243
4	Screw fastening the clutch control U-bolt to the semi-handlebar	M6	2	10 Nm (7.38 lb ft)	-
5	Mirror fixing	M10	1 + 1	-	Manual
-	Gas covers fastener screw	M5	3	6 Nm (4.43 lb ft)	-

## Removing

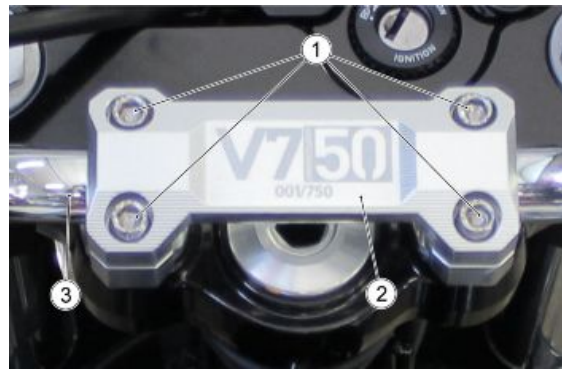
### (SPECIAL/STONE)

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



### (ANNIVERSARIO)

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



**(RACER)**

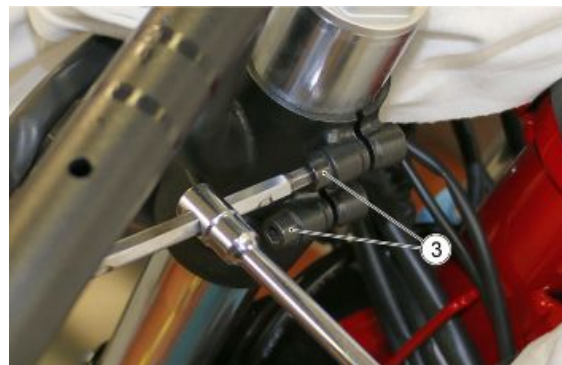
- Remove the upper steering yoke
- Remove the light switches
- Undo and remove the two fastening screws (1)



- Remove the right-hand semi-handlebar (2)



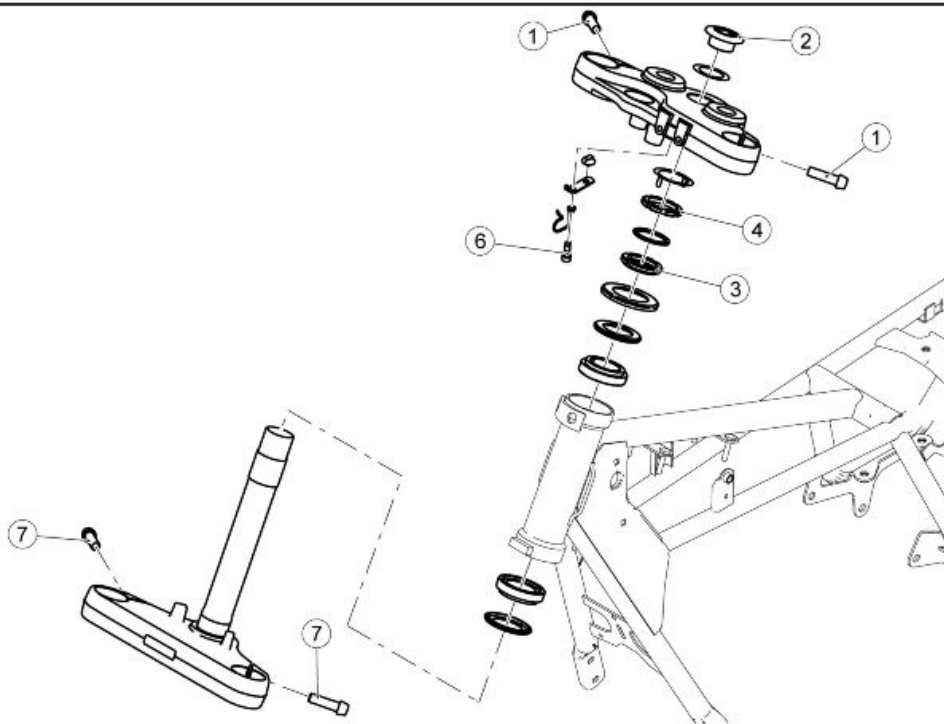
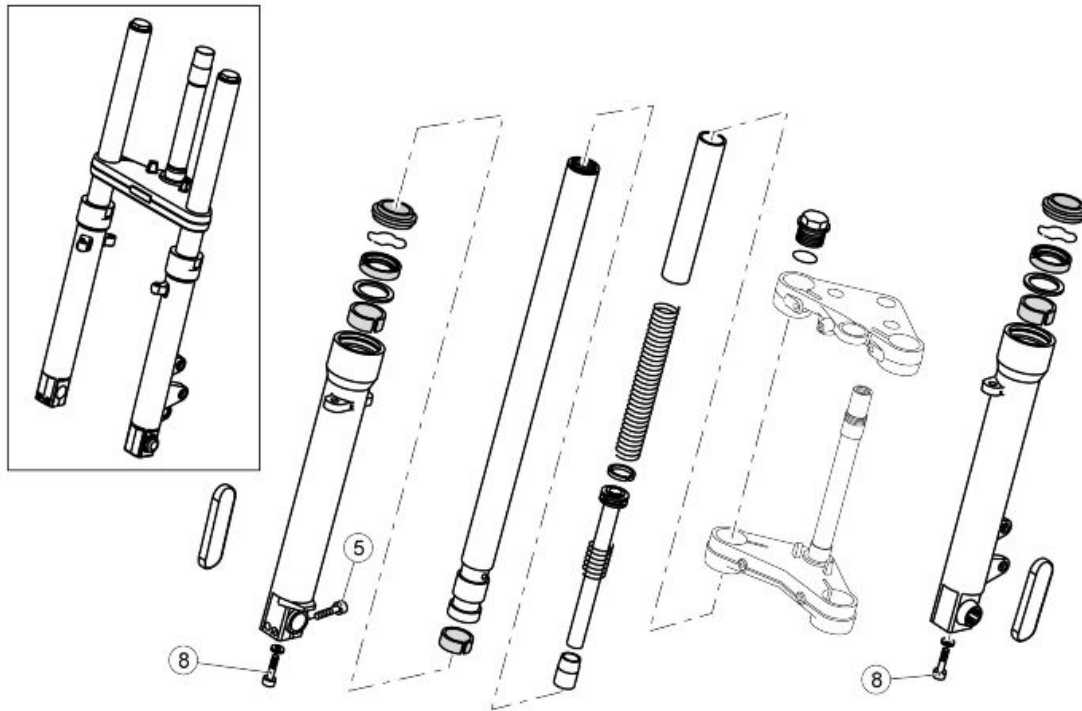
- Undo and remove the two fastening screws (3)



- Remove the left-hand semi-handlebar (4)



Front fork

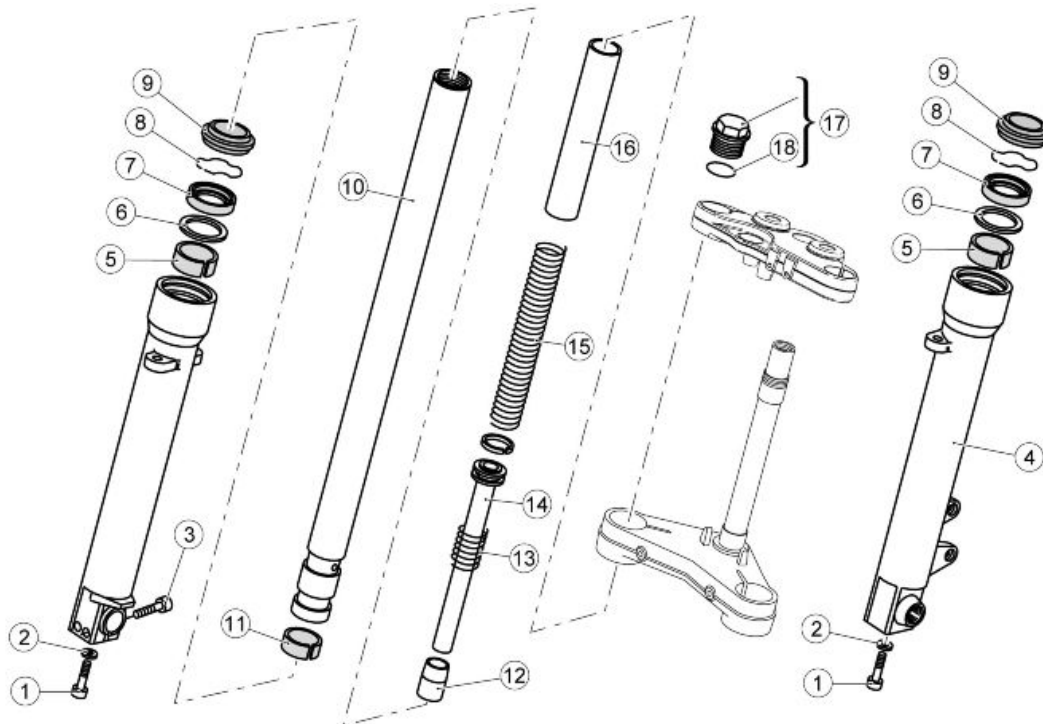


**FRONT SUSPENSION - STEERING**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lb 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 lb ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lb 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

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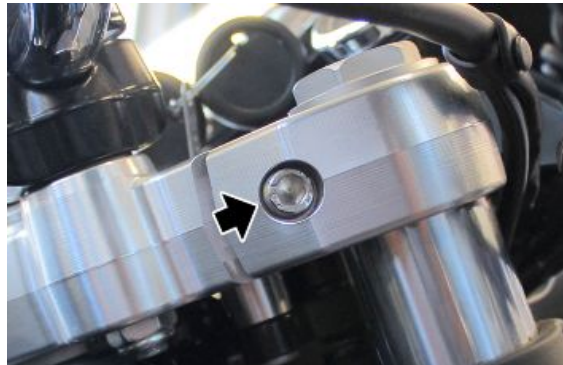
## Removing the fork legs

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.

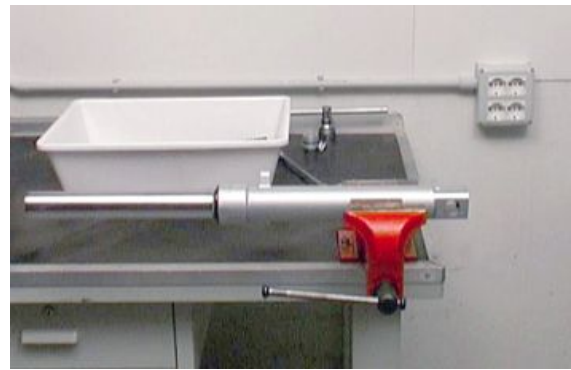
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## Draining oil

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.





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## Reassembling the fork

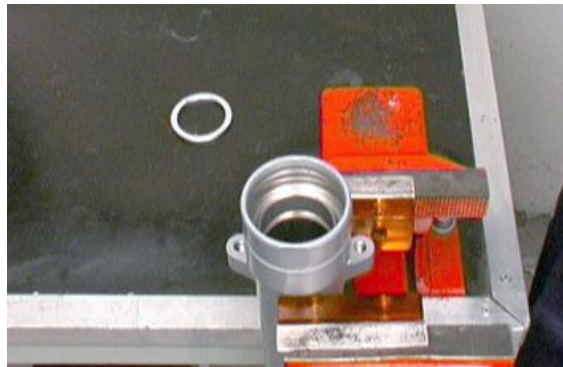
**CAUTION**

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

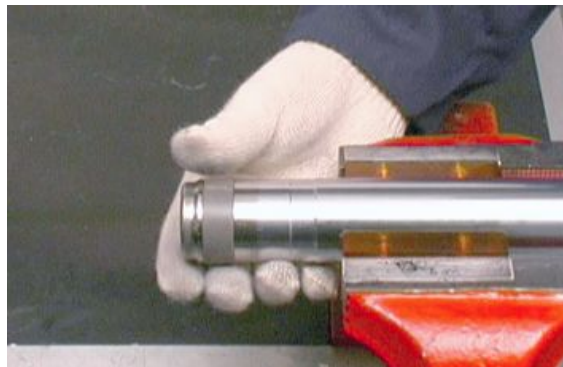
- Carry out any necessary service operation.
- Insert the pumping member unit with the counter spring and the ring in the bearing tube.



- 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.



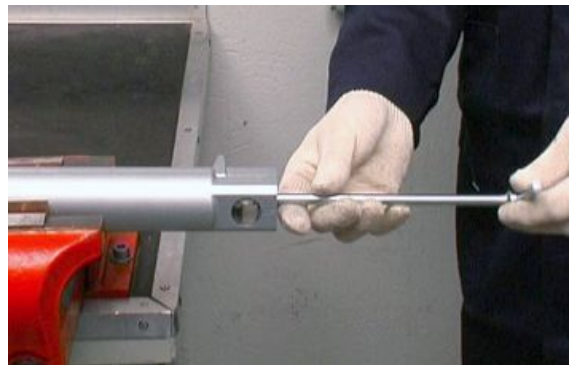
- Reassemble the bearing tube in the wheel holder fork leg.



- 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.

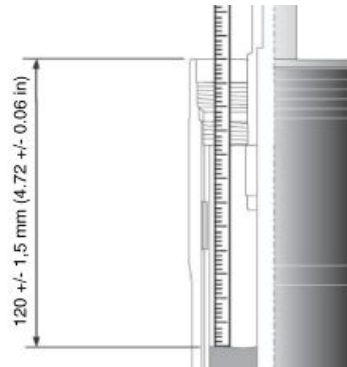


- Fit the dust scraper.
- Pour oil into the bearing tube so that it also fills the internal grooves of the pumping member rod.
- Pump with the bearing tube, making sure the oil has completely filled the pumping member rod.
- Introduce the spring and the preload tube.
- Place the cap on the bearing tube, 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 jaws.
- Compress the sleeve in the stanchion.
- Pour part of the fork oil into the sleeve.
- Wait some 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)



- Introduce the spring and the preload tube.



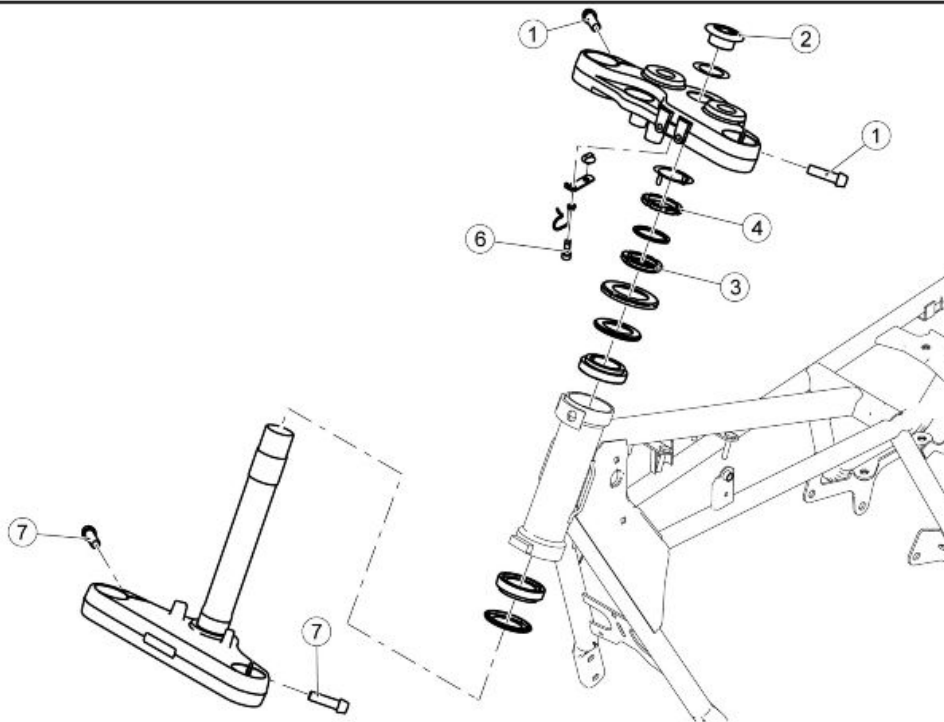
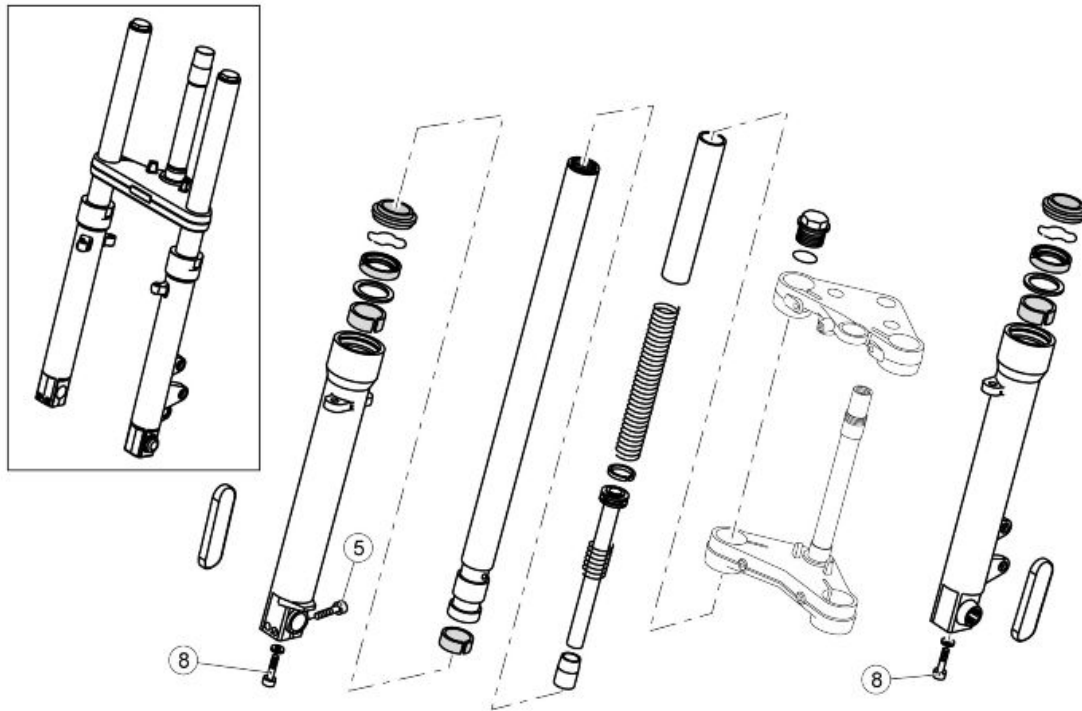
- Place the cap on the bearing tube, taking care not to damage the O-ring.



- 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 lb 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 lb ft)	-

Pos.	Description	Type	Quantity	Torque	Notes
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lb 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)	-

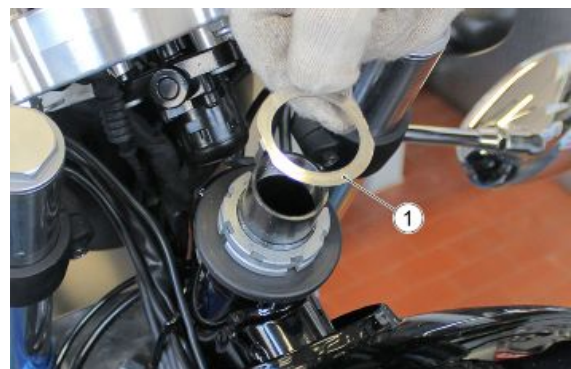
## Adjusting play

- 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)



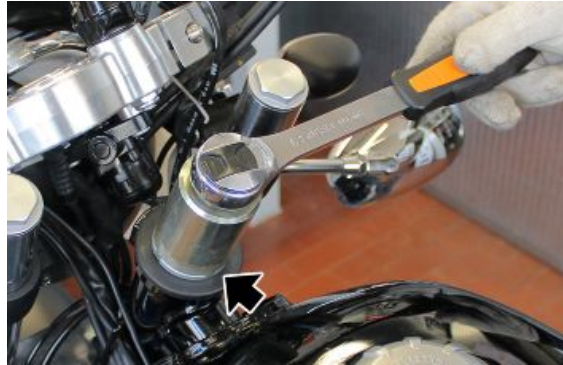
- Remove the steering counter-lock ring (2) using the special tool



- 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 Tool for steering tightening

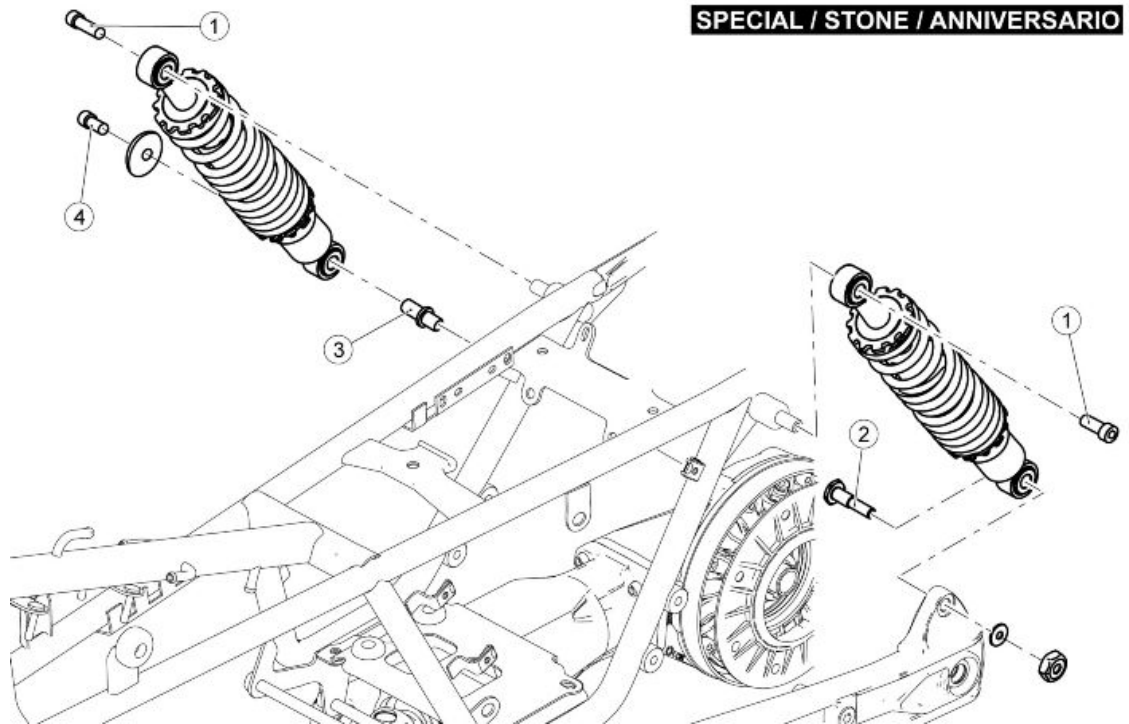
- Reposition the rubber spacer (3)
- Insert and tighten the steering counter-lock ring (2) so that the grooves are aligned
- Reposition the safety washer (1)
- Refit the upper steering plate, handlebars and instrument cluster

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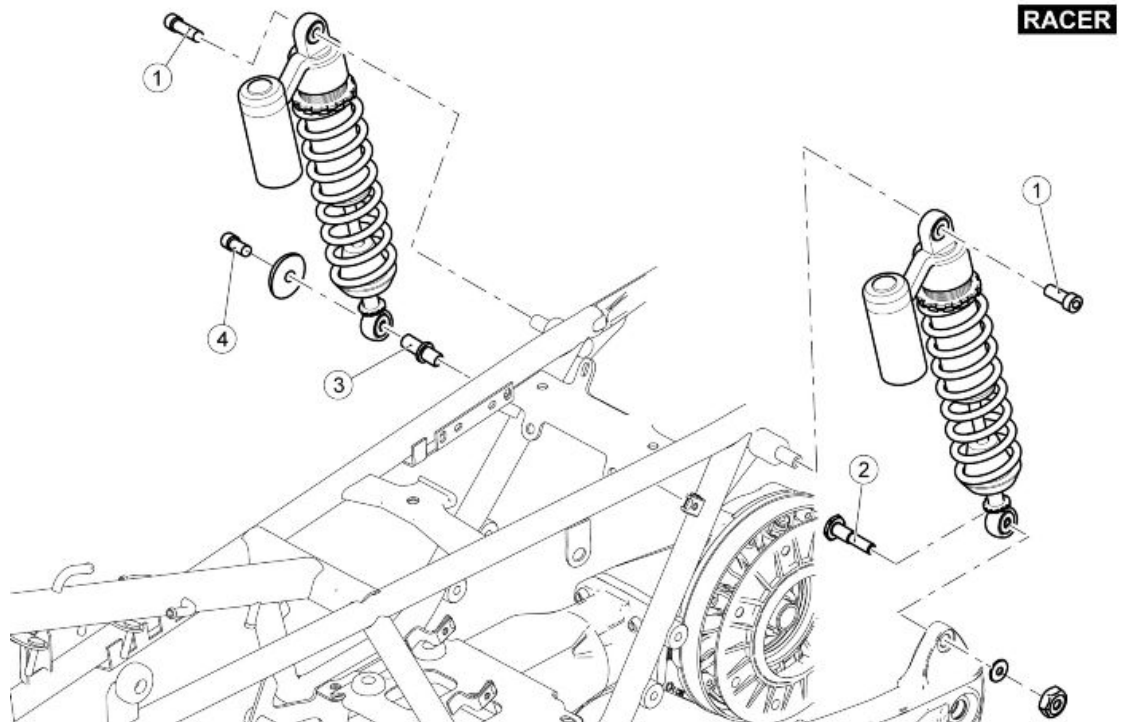
## Rear

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Shock absorbers



**SPECIAL / STONE / ANNIVERSARIO**



**RACER**

**REAR SHOCK ABSORBERS**

Pos.	Description	Type	Quantity	Torque	Notes
1	Top rear shock absorber fixing screws	M6	2	10 Nm (7.38 lb ft)	Pre-permeated
2	Pin fastening left shock absorber to the swing-arm	M10	1	35 Nm (25.81 lb ft)	
3	Pin fastening the shock absorber to gearbox	M12	1	35 Nm (25.81 lb ft)	
4	Screw fastening right shock absorber to pin	M8	1	10 Nm (7.38 lb ft)	Pre-permeated



---

## Removing

### (SPECIAL/STONE/ANNIVERSARIO)

- Remove the silencers

#### RH REAR SHOCK ABSORBER

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



- Remove the RH rear shock absorber (3)



#### LH REAR SHOCK ABSORBER

- Undo and remove the screw (1) and retrieve the bushing (2)
- Unscrew the nut (3) and remove it



- Retrieve the washer (4)
- Remove the threaded pin (5)



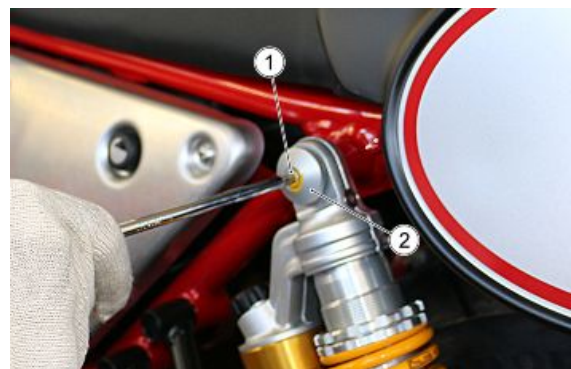
- Remove the rear shock absorber (6)

**(RACER)**

- Remove the silencers

**REAR LEFT SHOCK ABSORBER**

- Undo and remove the screw (1)
- Retrieve the bushing (2)



- Holding the pin (3) in place, unscrew and remove the nut (4)



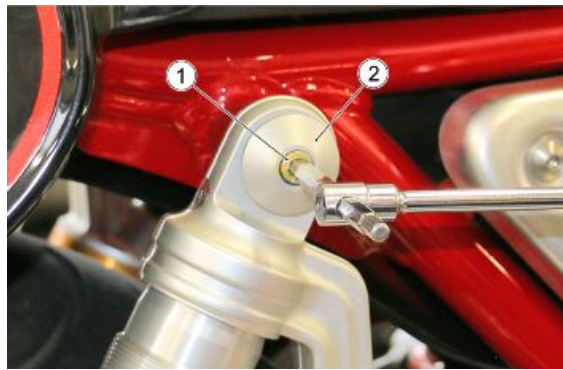
- Remove the rear shock absorber (5)



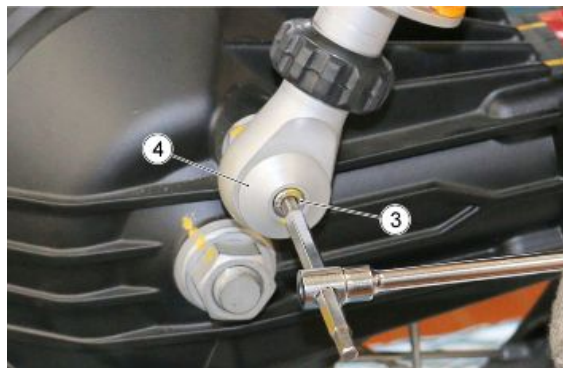


**REAR RIGHT SHOCK ABSORBER**

- Undo and remove the fastening screw (1)
- Retrieve the bushing (2)



- Undo and remove the fastening screw (3)
- Retrieve the bushing (4)



- Removal of right rear shock absorber (5)



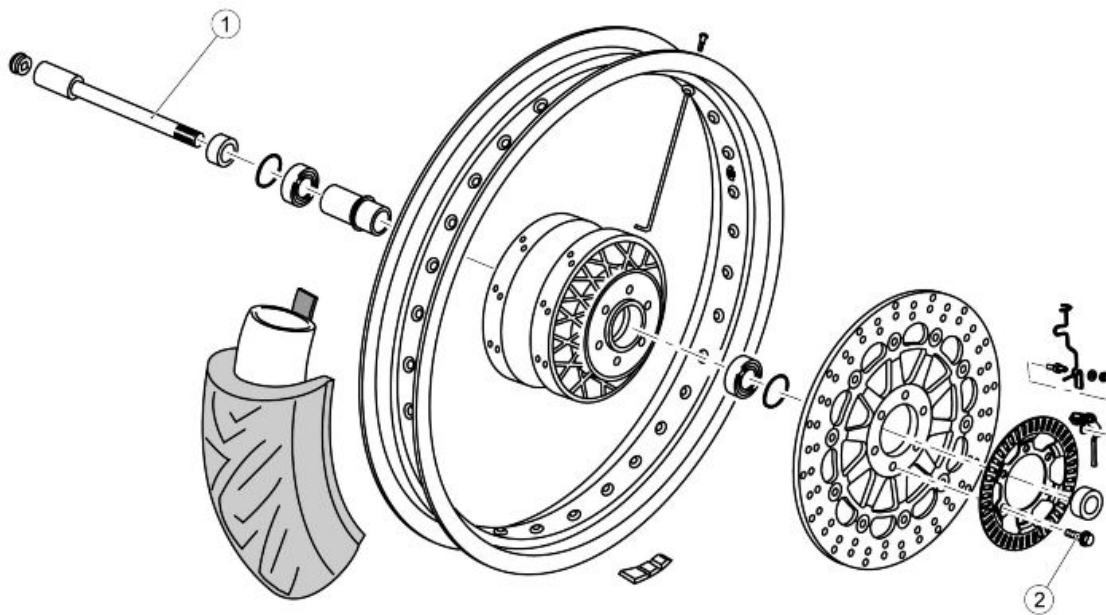
## INDEX OF TOPICS

**CHASSIS**

**CHAS**

## Wheels

### Front wheel



#### FRONT WHEEL

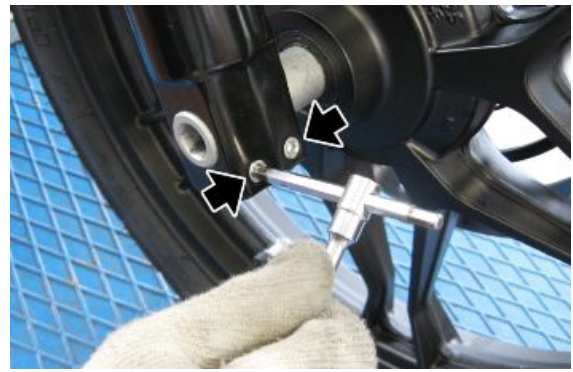
Pos.	Description	Type	Quantity	Torque	Notes
1	Wheel axle	M18	1	80 Nm (59.00 lb ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lb ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lb ft)	Pre-permeated
4	Cable gland nut	M6	1	6 Nm (4.43 lb ft)	-

### 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 motorcycle, remove the cap from the pin;



- Loosen the two wheel pin locking screws;



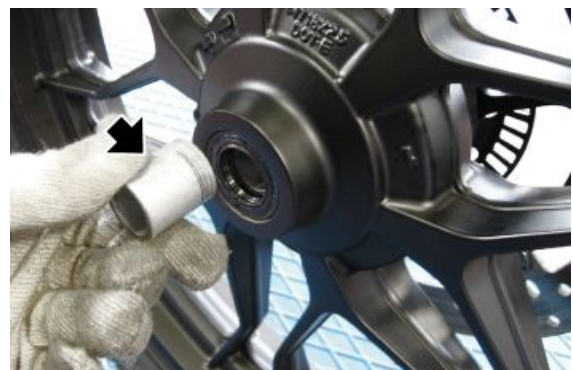
- Unscrew and remove the wheel pin;



- 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**



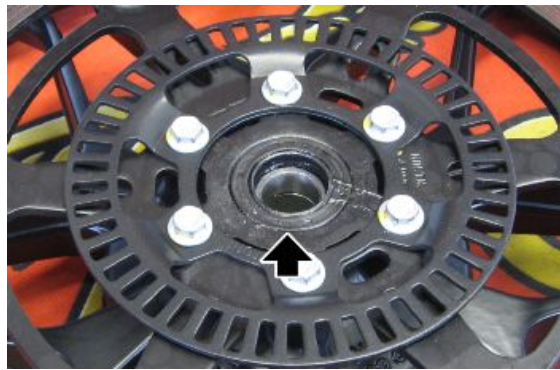
- Working on the opposite side, remove the left spacer;

**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**

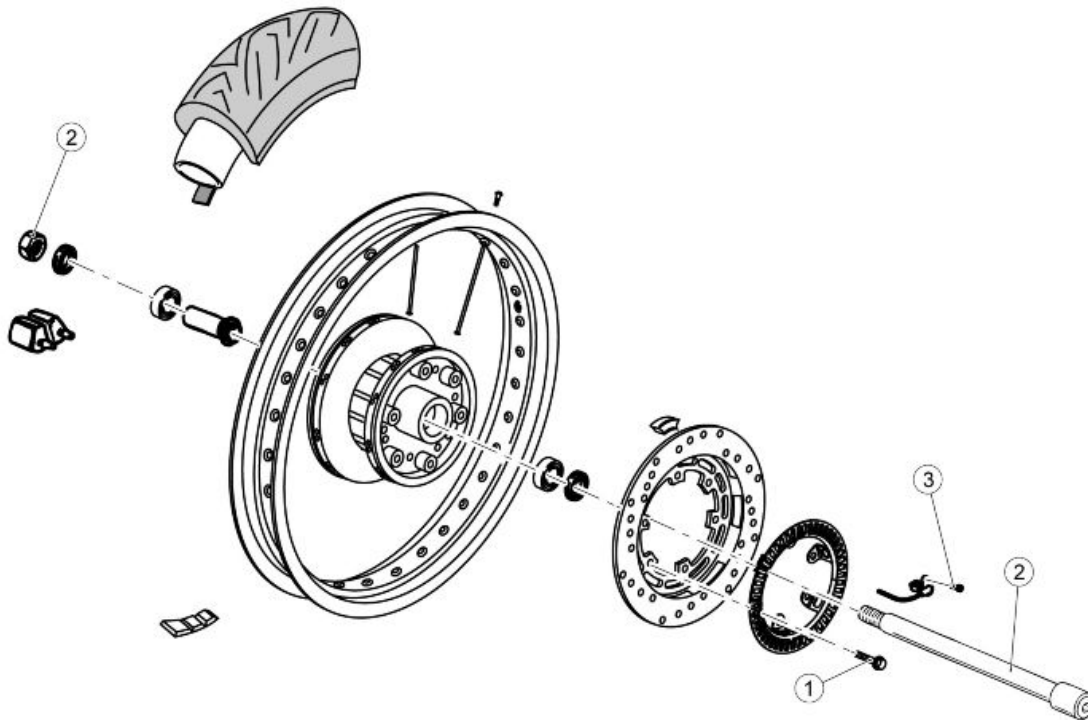


- Remove the dust seal from both sides



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

### Rear wheel



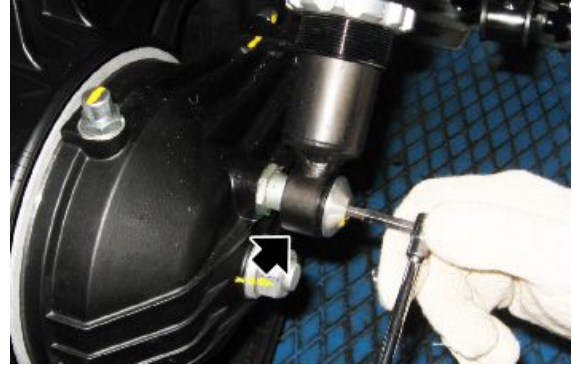
#### REAR WHEEL

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lb ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	120 Nm (88.51 lb ft)	
3	Rear ABS sensor fastening screw	M5	1	6 Nm (4.43 lb ft)	Loctite 243

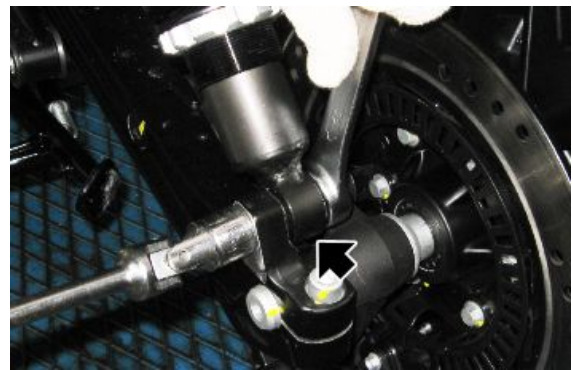


## Rimozione

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



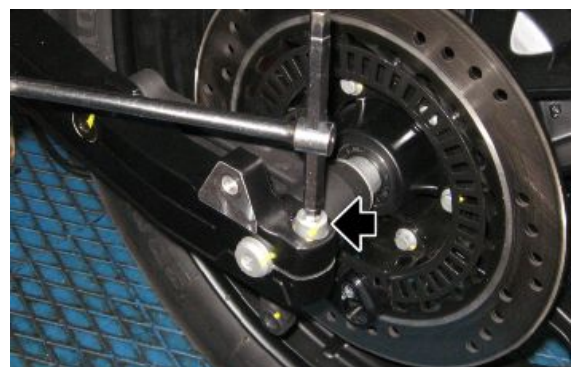
- Remove the screw and the relative nut fixing the left rear shock absorber



- Unscrew and remove the nut and collect the washer.



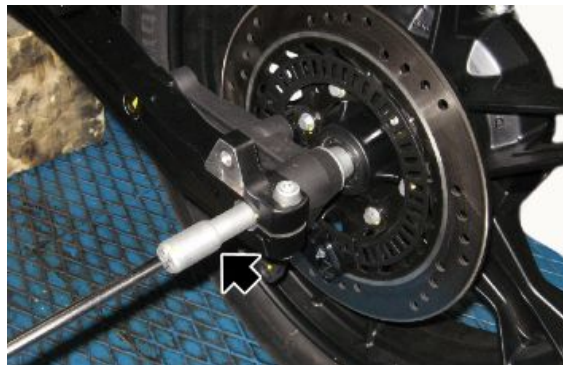
- Loosen the wheel pin locking screw.



- Unscrew and remove the fixing screw of the calliper holder.



- Remove the wheel pin and collect the spacer.



- Remove the complete rear brake calliper support



- Remove the rear wheel



PLACE A SUPPORT UNDER THE SWINGARM TO AVOID THAT THE PROTECTION CASING OF THE CARDAN COULD BE DAMAGED





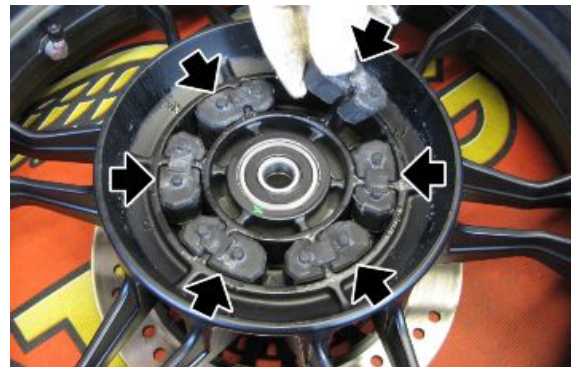
- Working from the LH side, remove the LH spacer;

**NOTE**

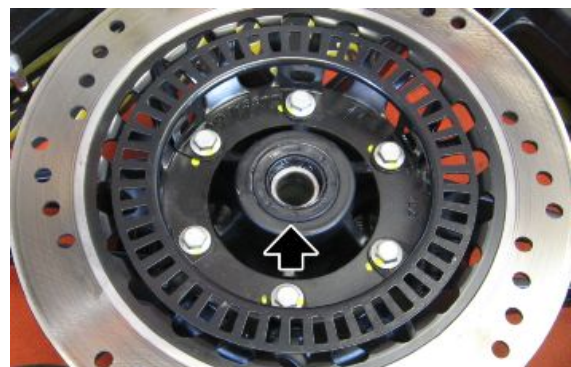
**DURING REFITTING, PAY ATTENTION TO THE CORRECT POSITIONING OF THE SPACER WHICH MUST BE INSERTED IN THE DUST SEAL UNTIL IT REACHES THE BEARING**



- Remove and if necessary replace the six flexible couplings



- Remove the dust seal
- 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**

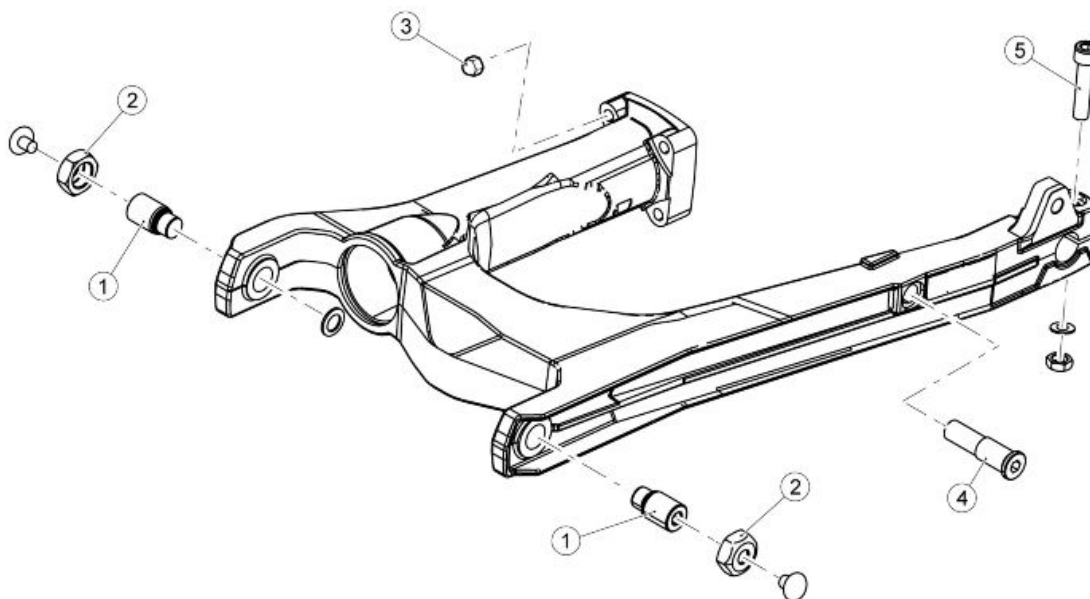


**DO NOT ADJUST THE TENSION OF THE WHEEL SPOKES WITH TIRES FITTED ON THE WHEEL RIM, AS THIS COULD CAUSE BREAKING OF THE NIPPLE GUARDS AND RESULTING IN HOLES OF THE AIR CHAMBER.**

**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	M20	2	-	Fully home with no preload
2	Lock washer fastening on pin	M20	2	50 Nm (36.88 lb ft)	Hold the pin
3	Nut fixing gearcase to swingarm	M8	4	25 Nm (18.44 lb ft)	Hold the pin
4	Pin fixing the rear calliper holding plate to swingarm	M16	1	35 Nm (25.81 lb ft)	-
5	Swingarm clamp retaining screw	M10	1	50 Nm (36.88 lb ft)	-

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## Removing

- Remove the silencers
- Remove the fixing nut of the cable grommet plate and disconnect it from the swingarm



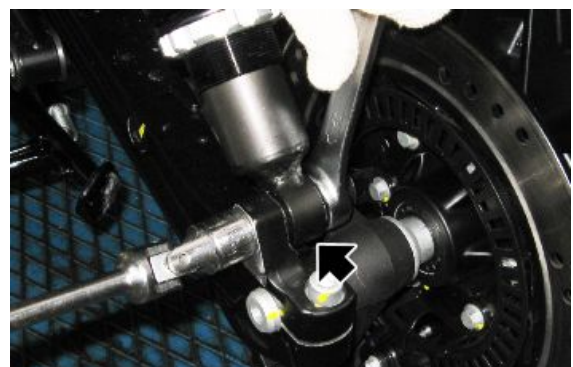
- Remove the ABS sensor and the brake calliper



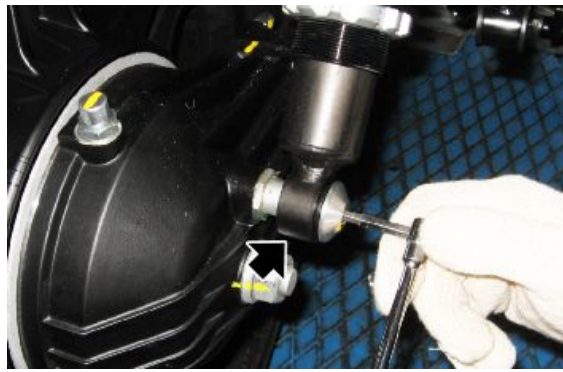
- Unscrew and remove the fixing screw of the calliper holder.



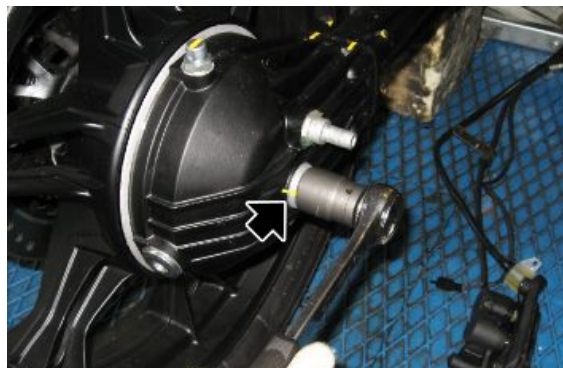
- Remove the screw and the relative nut fixing the left rear shock absorber



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



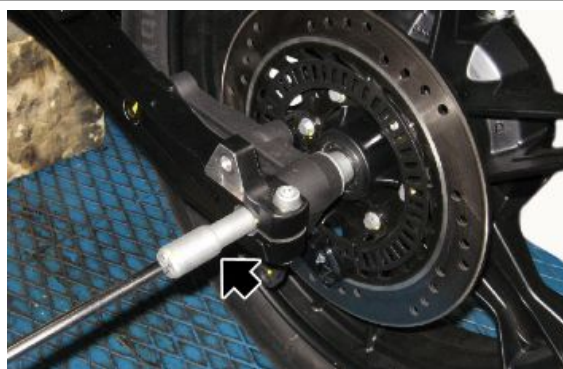
- Unscrew and remove the nut and collect the washer.



- Loosen the wheel pin locking screw.

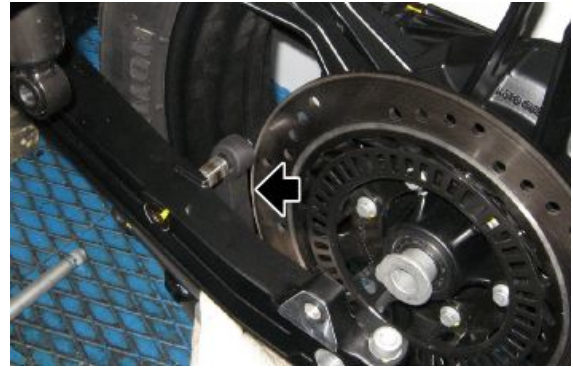


- Remove the wheel pin and collect the spacer.





- Remove the rear brake calliper support

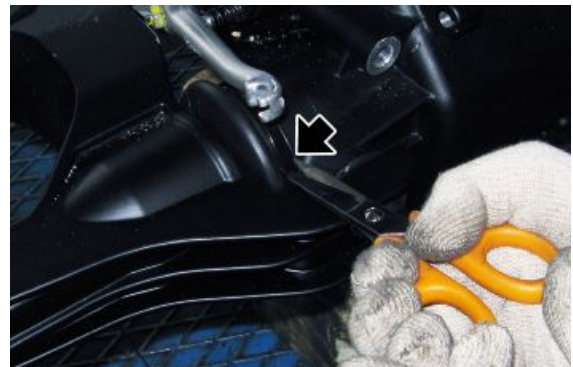


- Remove the rear wheel.



- Cut the sealing clamp and lift the folding

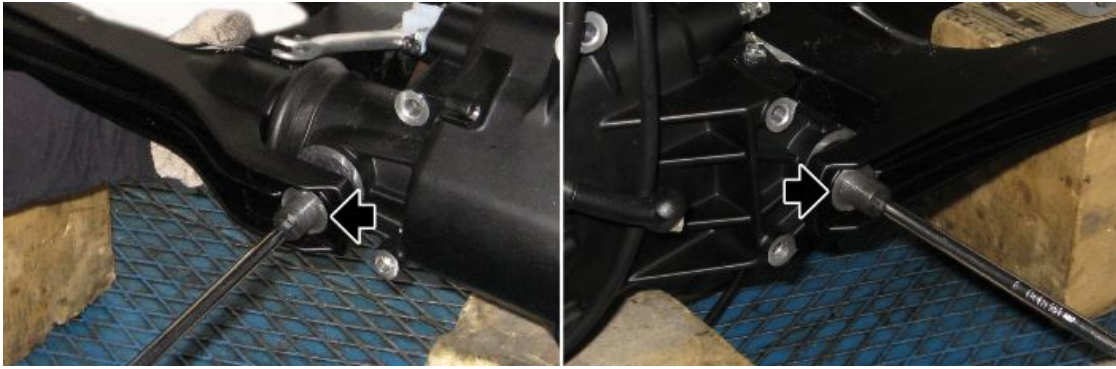
**CAUTION**  
PAY ATTENTION NOT TO CUT AND DAMAGE THE RUBBER FOLDING



- Unscrew the nuts.



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



- Remove the shimming washer between the swingarm right arm and the gearbox.



## 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 spring is not deformed; otherwise, replace it.
- Check that the sealing ring (Seeger) is still flexible and is not deformed.
- Check that the sleeve outer tothing and internal grooves are not damaged.

## Bevel gears

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## Removing

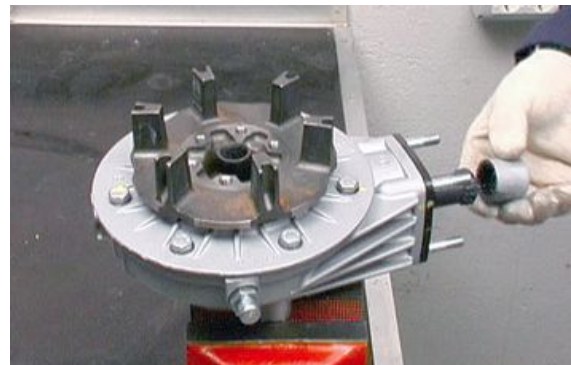
- Undo the four nuts and collect the washers.



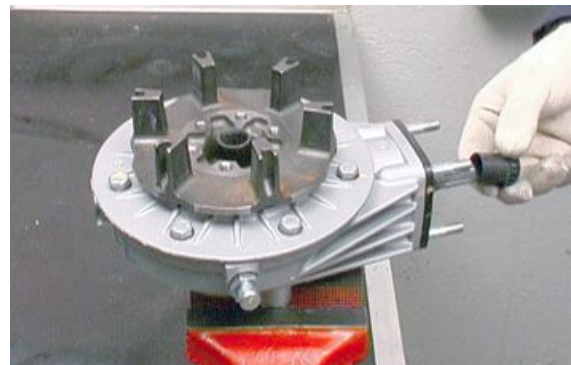
- Slide off the gearcase together with the swingarm.



- 
- Slide off the sleeve from the pinion.
  - Slide off the spring.
  - Slide off the sealing ring.
  - Slide off the base.



- Slide off the gear.



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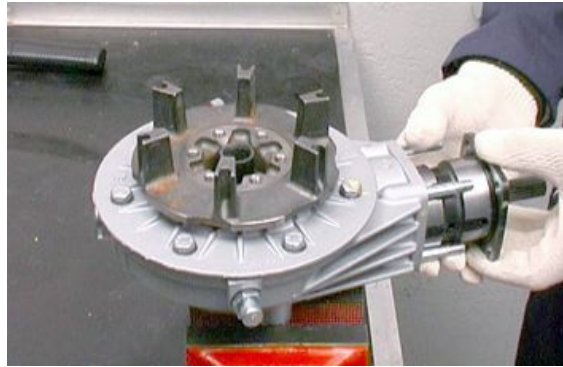
## Checking

### Gruppo pignone

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- Remove the housing of the swingarm .
- Slide the complete case of the gear-case.



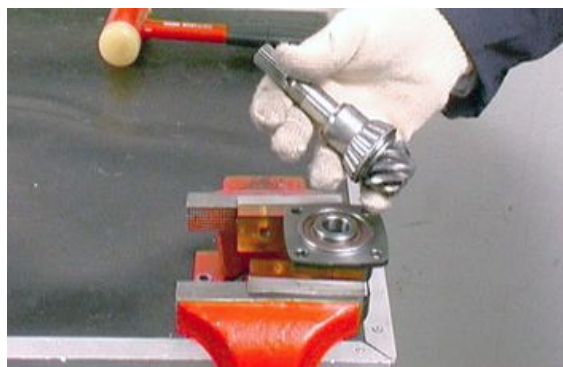
- Lock on the vice the sealing tool (19907100) of the bevel gear pair.



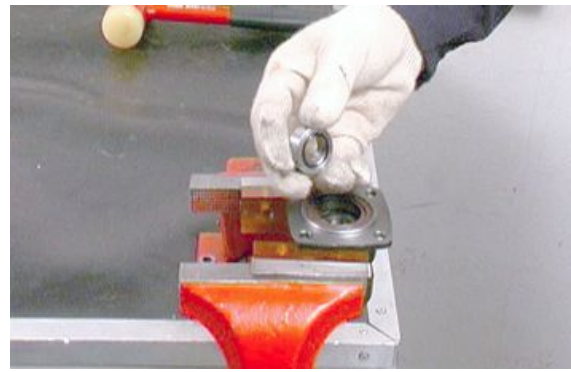
- Insert the grooved shank of the pinion on the tool and unscrew the nut.



- Slide off the spacer.
- Slide off the pinion.



- Slide off the shim adjustment washer.
- Slide off the O-ring.



- Slide off the oil seal.



- Slide of the tapered bearing from the case.
- Slide off the O-ring.
- Slide off the spacer.
- Slide off the two shim washers.



- Slide off the tapered bearing from the case.



### Controllo

- Check that the pinion tothing is not damaged, worn or deformed; otherwise, replace the pair.

- Check that both tapered bearings are not damaged, that the rollers are not damaged or worn; otherwise, replace them.
- Check that the adjustment washers are not deformed or broken; otherwise, replace them.
- Check that the sealing rings are not shattered, spoiled or worn; otherwise, replace them.

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**Montaggio**

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- If the bevel pinion should be replaced, replace also the crown fitted on the housing. The pinion and the crown should have the same number stamped.



- Fit the external ring of the tapered bearings on the bevel pinion holder case using the suitable punch (19926400).



- Fit the adjustment shim washer.



- Fit the internal ring of the bearing on the pinion using the suitable punch (19926200).



- Fit both shim washers on the pinion.
- Fit the spacer on the pinion.
- Fit the O-ring.



- Fit the complete pinion on the case using the suitable punch (19926100).





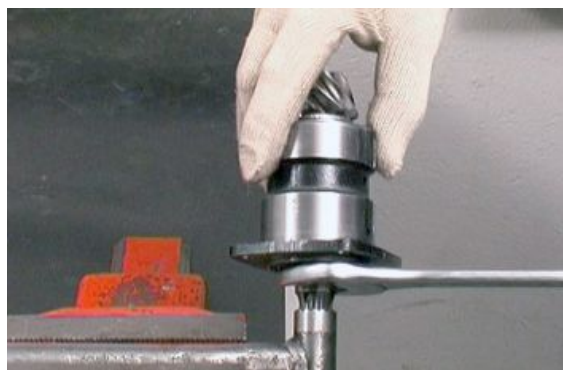
- Fit the oil seal.
- Fit the O-ring.



- Fit the spacer.



- Insert the grooved shank of the pinion on the tool (19907100) and tighten the nut.

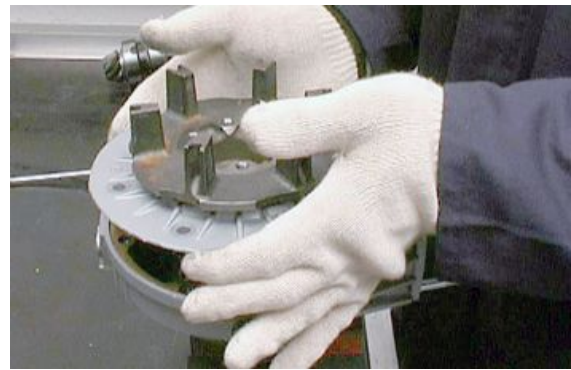


### Smontaggio gruppo scatola

- Undo the screws and collect the washers.



- Remove the braking disc from the drilled bolt.
- Undo the screws and collect the plates and the wave washers.
- Slide off the complete cover.
- Slide off the gaskets.
- Slide off the shimming ring.



- Remove the O-ring from the groove on the drilled bolt.



From the cover, slide off:

- The needle bearing.
- Remove the internal ring of the needle bearing using a suitable punch (19907000).
- Remove the washer.
- Remove the washer.



- Undo the screws and collect the corresponding safety plates.



- Remove the conical crown.



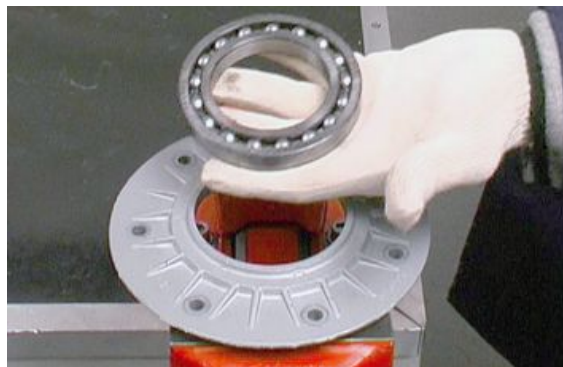
- Slide off the drilled bolt from the bearing.



- Remove the sealing ring.



- Slide off the bearing from the cover using the suitable punch.

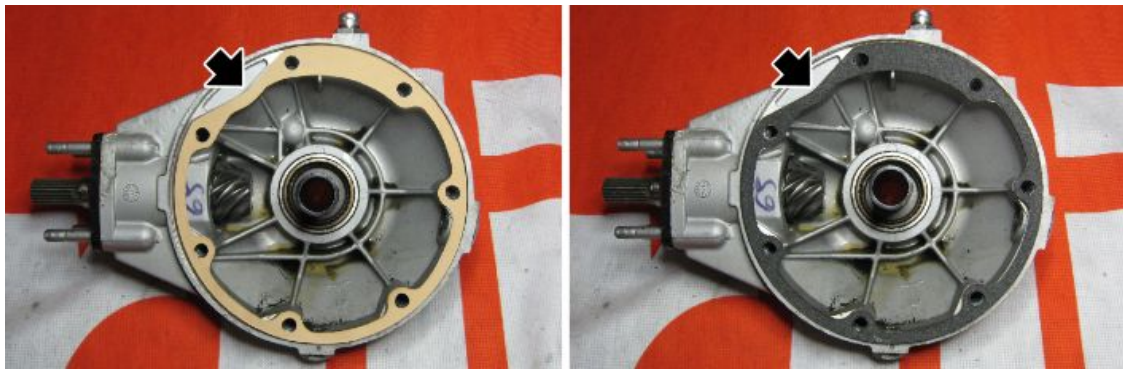


- Remove the gaskets unit made up of paper/steel/paper or foamet/steel/foamet

**CAUTION**

**PAY ATTENTION TO THE TYPE OF GASKETS PRESENT, AS DURING INSTALLATION THE SAME SOLUTION MUST BE INSTALLED**

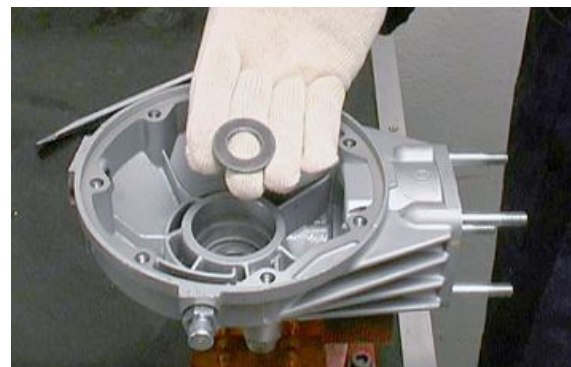




- Remove the external ring of the needle bearing from the housing using the suitable extractor (19927500).



- Remove the sealing ring and the washer.



### Controllo

- Check that the drilled bolt tongues, where the anti-vibration rubbers operate, are not spoiled; that the surfaces of: the sealing ring; the bearing on the cover, the external ring of the bearing on the housing; the groove for the circlip on the drilled bolt are not worn, deformed or spoiled; otherwise, replace them.
- Check that the sealing ring on the housing is not shattered or is still flexible; otherwise, replace it.
- That the needle bearing on the housing does not have flattened or worn rollers; otherwise, replace it.
- Check efficiency of every component and that the coupling surfaces of the housing and cover are not scored or distorted.

### Accoppiamento pignone corona

For coupling, proceed as follows:

- Provisionally lock the complete pinion case on the housing with two nuts and appropriate spacers.
- Fit the corresponding tool on the crown (19928800).



- Insert the tool on the bearing cage in the housing.



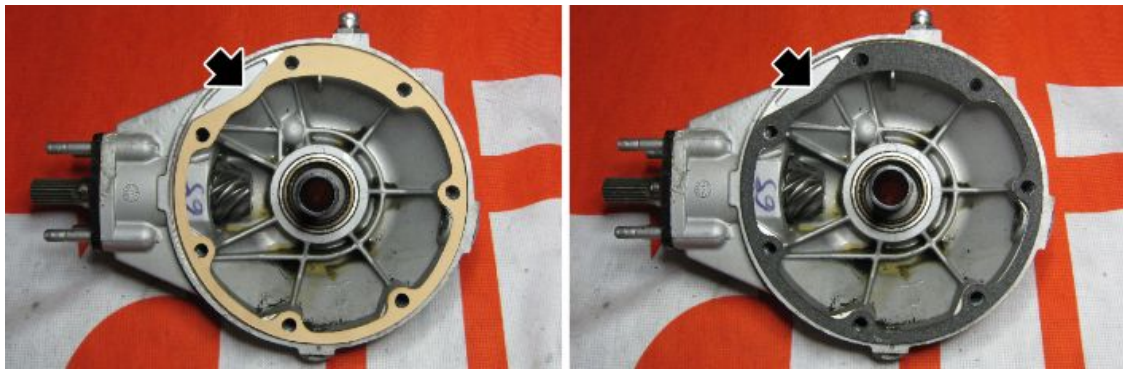
- Check alignment between pinion teeth and the crown teeth.
- If alignment is not regular, properly vary the thickness of the ring between the pinion and the tapered bearing.
- Also check the contact area between the pinion teeth and the crown teeth, proceeding as follows:



- Apply suitable colours available in the market on the pinion teeth.



- Install the same type of gaskets present during the removal, the composition paper/steel/paper or foamet/steel/foamet



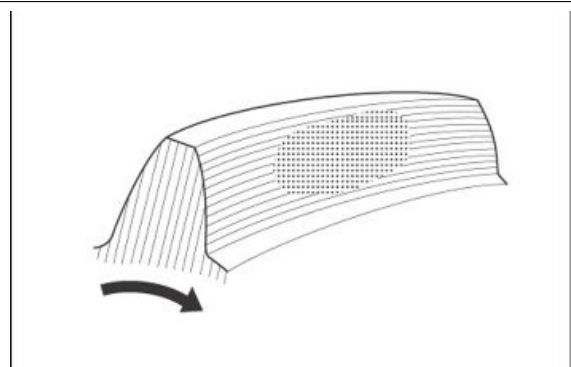
- Fit the drilled bolt-crown unit cover and their spacers and gaskets on the housing and provisionally tighten the screws.



- On the crown holder drilled bolt, fit a "Universal" extractor that with appropriate central spacers slightly presses the crown towards the brake disc side.
- Turn the pinion in the riding direction, with the crown braked so that the rotation is carried out under load, and leaves a contact mark on the pinion surface.

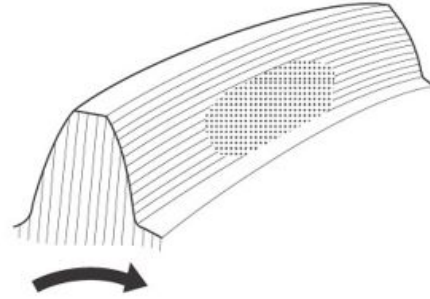


- If the contact is regular, the mark on the pinion teeth will be like this (the pinion is seen from the crankshaft side)

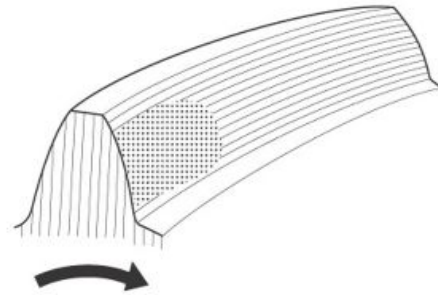




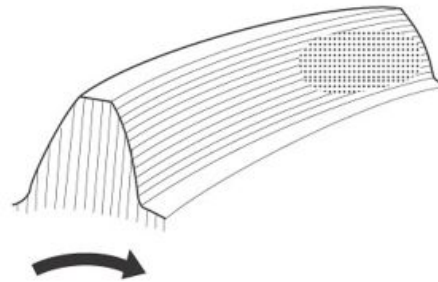
- If the contact is like this, the crown is too near the pinion rotation axis: detach the crown by increasing spacer thickness.



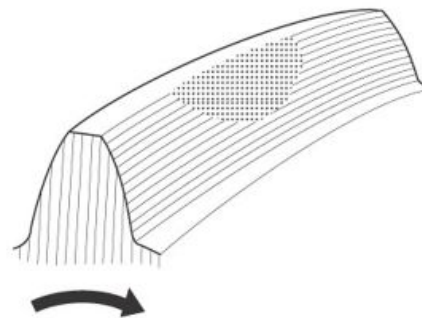
- If the contact is like this, the pinion is too near the rotation axis of the crown: detach the pinion by reducing spacer thickness



- If the contact is like this, the pinion is too far from the rotation axis of the crown: approach the pinion by increasing spacer thickness

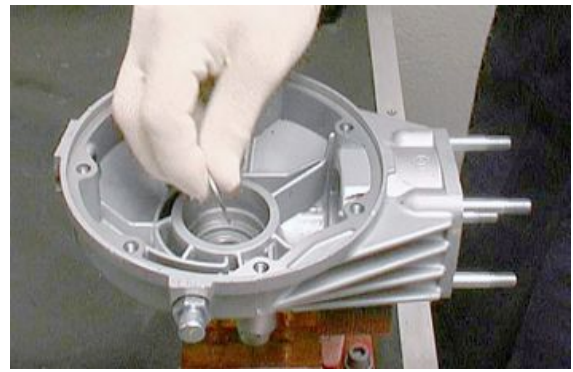


- If the contact is like this, the crown is too far from the pinion rotation axis: approach the crown by reducing spacer thickness.



### Montaggio gruppo scatola

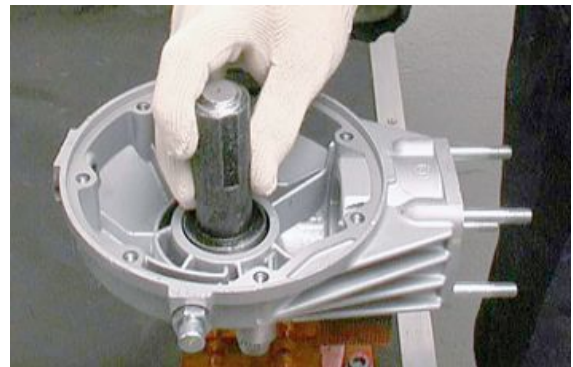
- Fit the washer on the gearcase.



- Fit the sealing ring on the housing using the suitable punch (19926000).

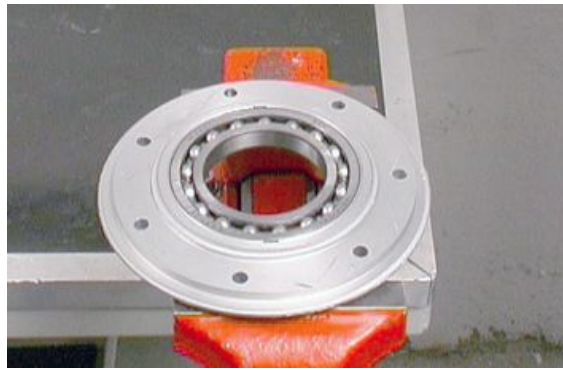


- Fit the external ring of the needle bearing on the housing using the suitable punch (19926500).



- Fit the bearing on the cover using the suitable punch.

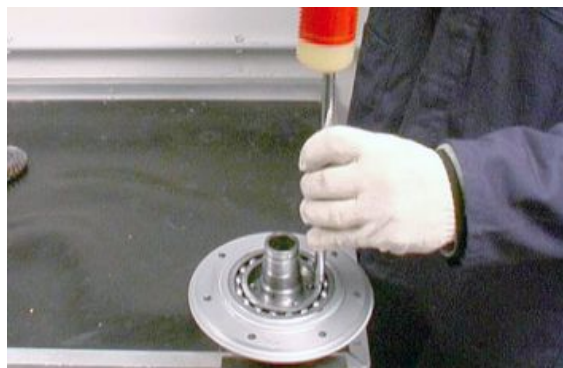




- Fit the internal ring of the needle bearing on the drilled bolt using the suitable punch (19927900).
- Insert the sealing ring in the drilled bolt.



- Fit the drilled bolt on the cover.



- Fit the crown.



- Fit the plates and tighten the screws.



- Insert the washer.



- Insert the washer.

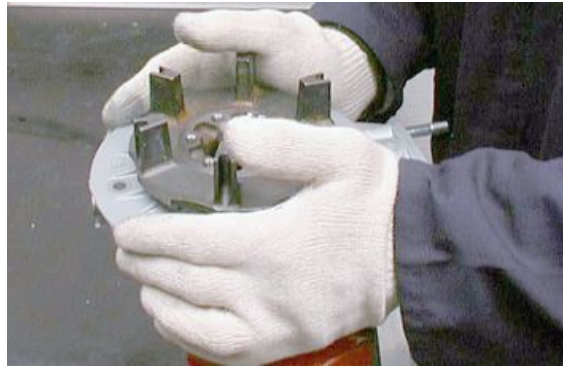


- Fit the O-ring.
- Insert the gaskets and the shimming ring on the cover.
- Tighten the screws with plates and washers.

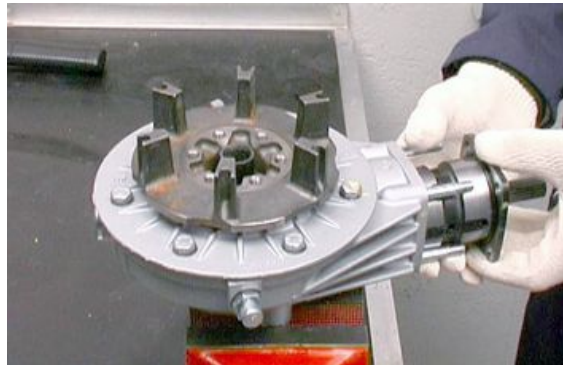




- Fit the braking disc on the drilled bolt by locking the screws with the washers using a torque wrench.

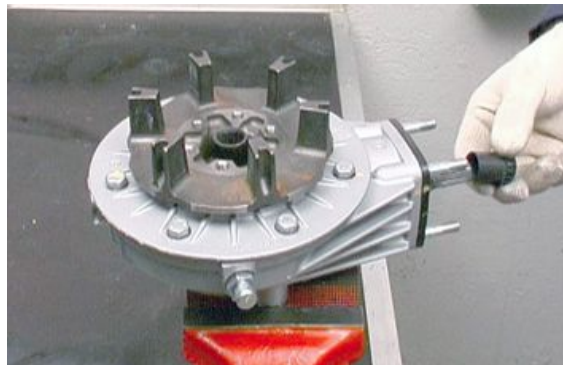


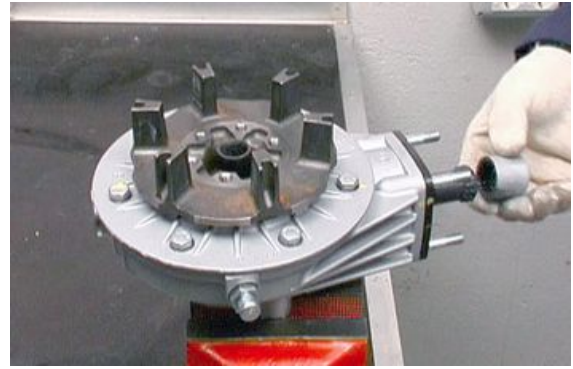
- When refitting the bevel pinion case on the transmission, bear in mind that the oil passage grooves with holes should be fitted vertically (observing the grooves, one should be facing upwards and the other facing the ground).



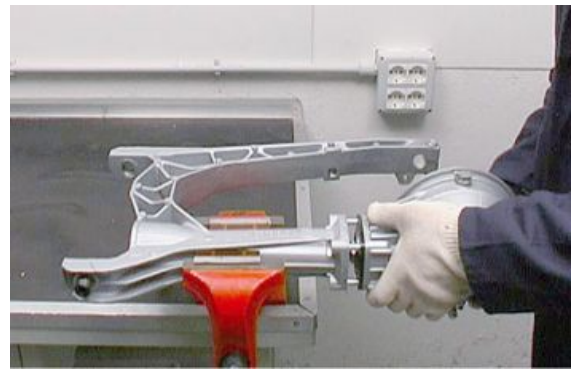
## Installing

- Insert the sleeve and base on the bevel pinion of the gearcase.

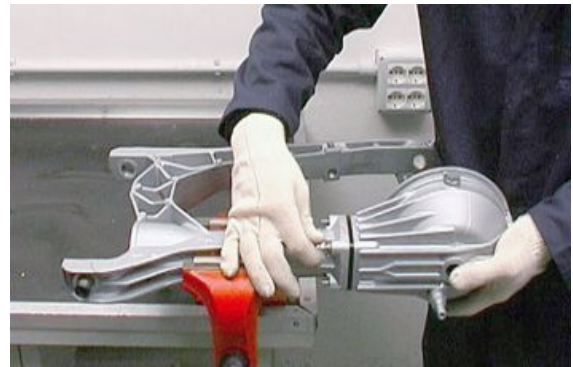




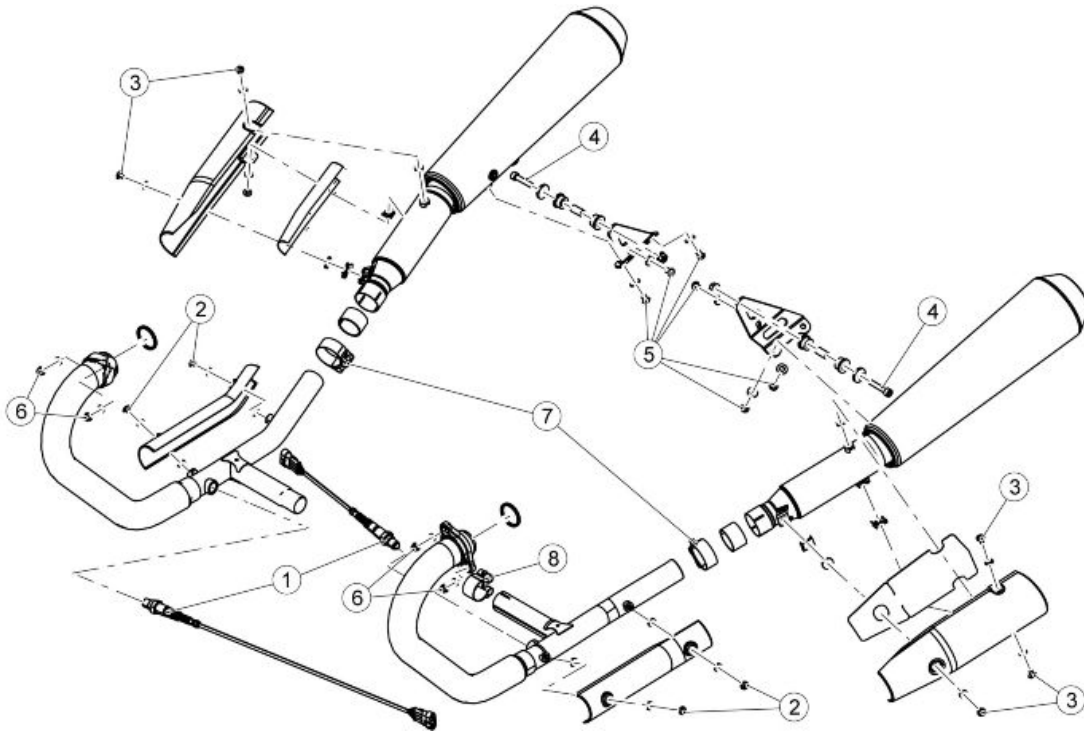
- 
- Correctly insert the stud bolts of the gearcase in the holes of the swingarm .



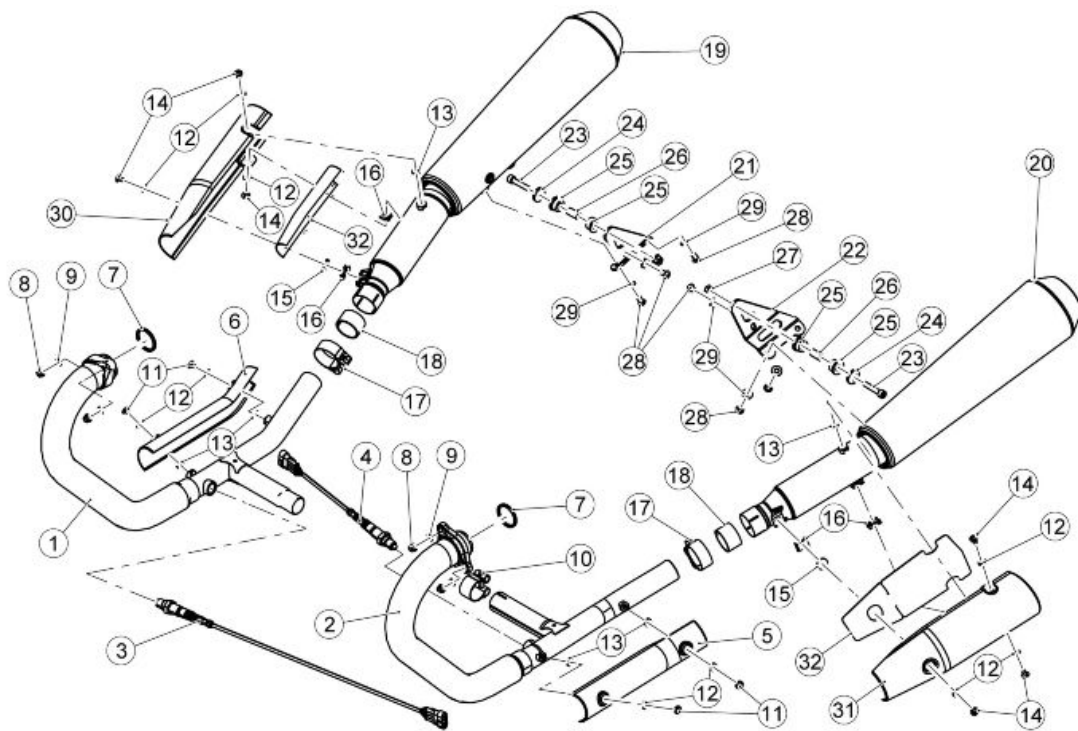
- 
- Screw the nuts with the washers without locking them.



## Exhaust

**EXHAUST SYSTEM**

Pos.	Description	Type	Quantity	Torque	Notes
2	Lambda probes fastener	M18	1	38 Nm (28.03 lb ft)	-
2	Screws fastening heat shields to manifolds	M6	4	8 Nm (5.90 lb ft)	Pre-permeated
3	Screws fastening heat shields to silencers	M6	6	8 Nm (5.90 lb ft)	Pre-permeated
4	Screws fastening silencers to frame support	M8	2	25 Nm (18.44 lb ft)	-
5	Screws fastening silencers to the support	M8	6	25 Nm (18.44 lb ft)	Pre-permeated/ Pre-mounted to the silencers
6	Nuts fastening the exhaust pipes to the engine	M8	4	25 Nm (18.44 lb ft)	-
5	Clamps fastening exhaust pipes to the silencers	M8	2	25 Nm (18.44 lb ft)	-
8	Clamp fastening exhaust pipes to the compensator	M8	1	25 Nm (18.44 lb 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

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.

- Remove the three fixing screws of the silencer protection

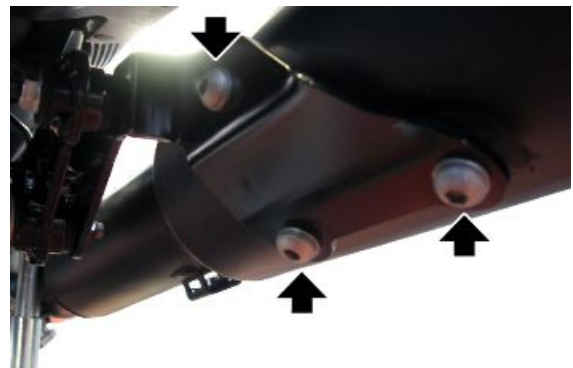




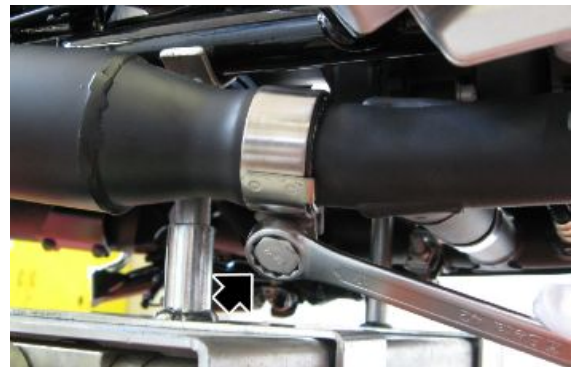
- Remove the silencer protection



- Remove the three fastening screws of the silencer to the support bracket



- Loosen the clamp between the silencer and manifold



- Slide and remove the silencer from the collector

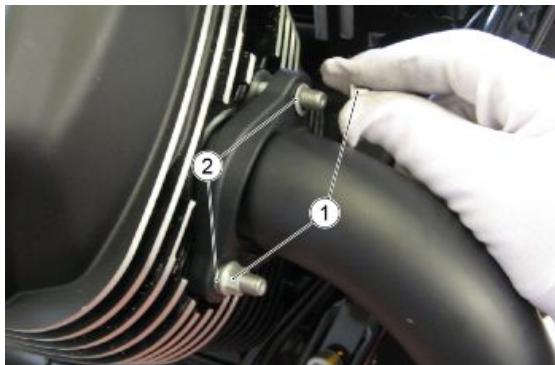
**NOTE**

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



## Removing the exhaust manifold

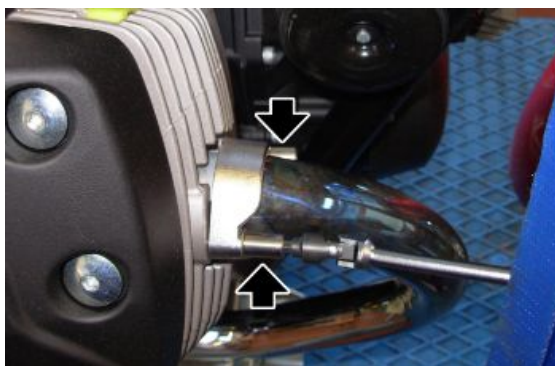
- Remove the fixing nuts (1) of the exhaust manifold paying attention to keep the washers (2)



- Scollegare i connettori delle sonde lambda e liberare i cablaggi dai passaggi cavi/fascette
- Rimuovere contemporaneamente entrambi i collettori di scarico
- Svitare la vite della fascetta centrale per separare i due collettori



- Remove the exhaust ring fixing nuts, taking care to recover the washers



- Remove the spacers



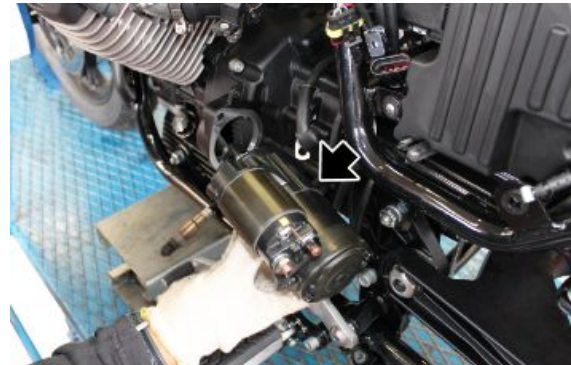
- Remove the ring nuts



- Disconnect the left lambda probe connector



- Remove the starter motor to allow the removal of the left lambda probe wiring.



- Disconnect the right Lambda probe connector and slide the cabling from the cable grommet



- Loosen the clamps between the joint and the exhaust manifolds
- Remove the manifolds



## Removing the lambda sensor

- Remove the starter motor
- Disconnect the left lambda probe connector (1)



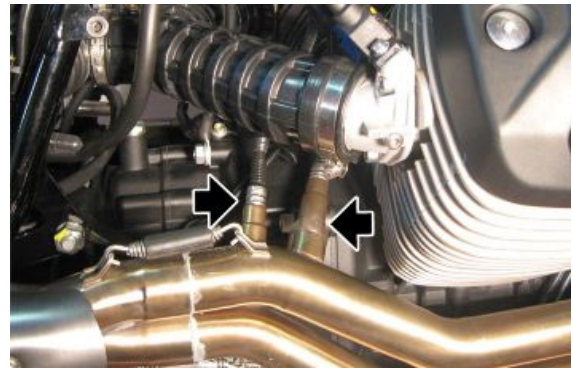
- Disconnect the right Lambda probe connector (2)



- Unscrew and remove the lambda probes (3)

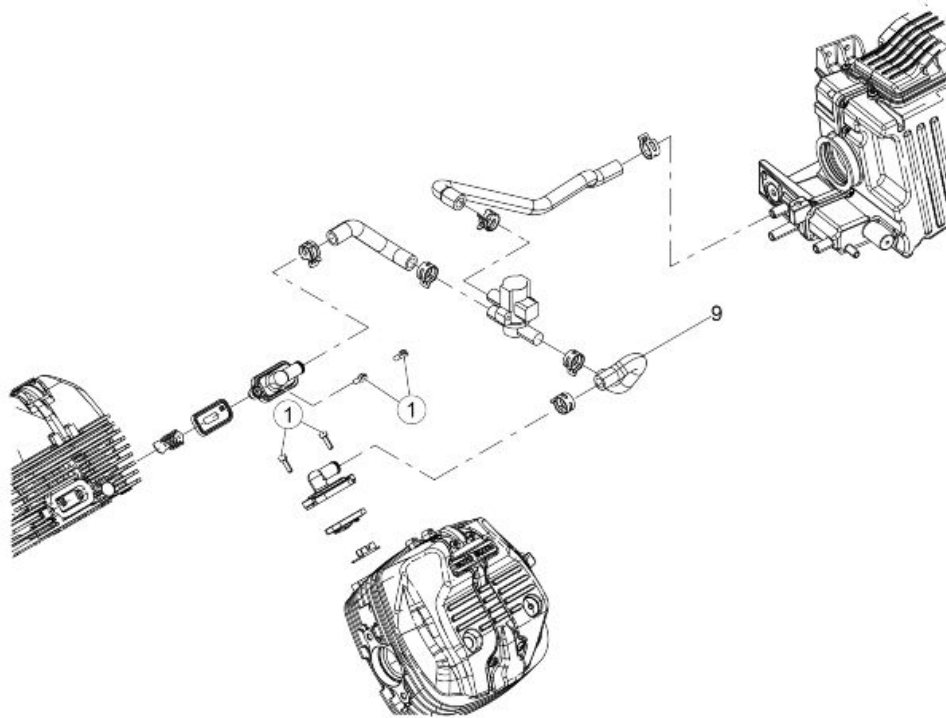


- Unscrew and remove the two lambda probes.



### Aria secondaria

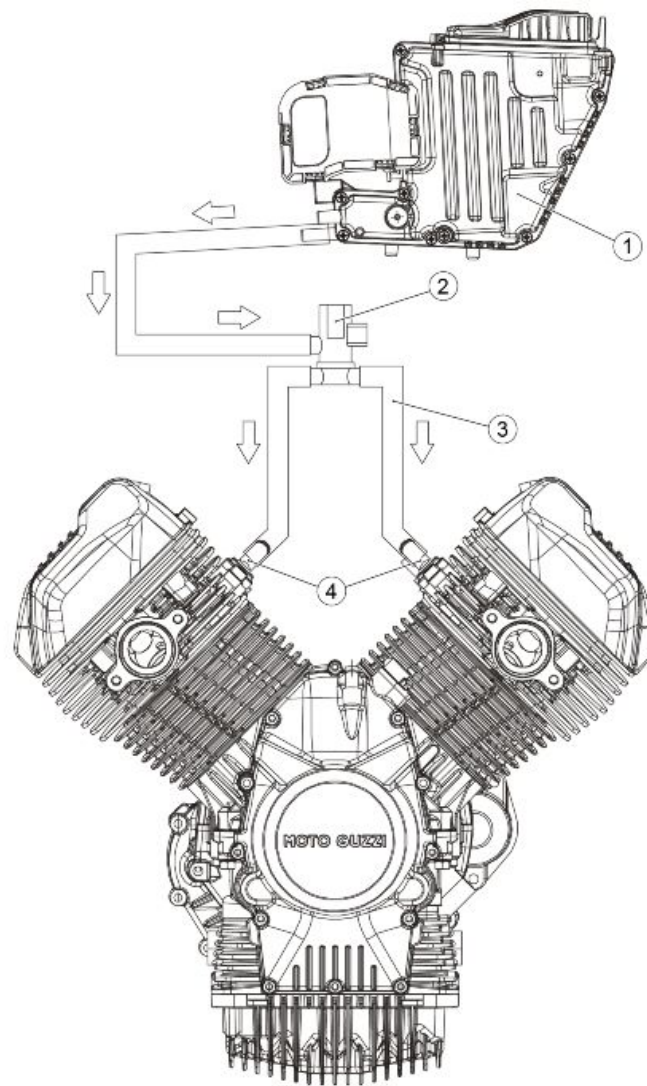
Tightening torque



#### 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 casing
  2. Secondary air valve
  3. Secondary air system pipe
  4. Secondary air system inlets on the engine
- Two auxiliary air inlets have been included in the cylinder head which, in combination with the injection system with oxygen sensor and three-way catalytic converter, ensure compliance with severe new Euro 4 emissions regulations

- Undo the screws fastening the reed valve cover.



- Remove the reed valve cover



- Remove the reed valve.



- Remove the flame trap.

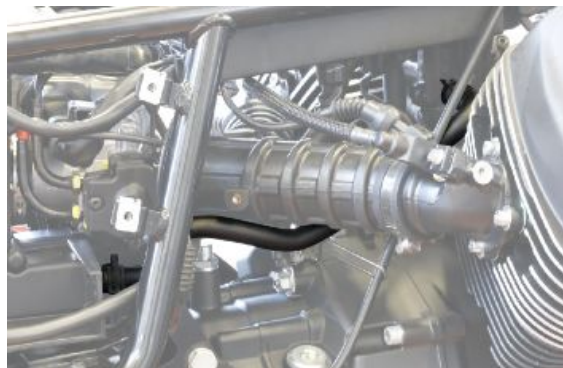




- A valve controlled by the engine ECU is installed under the tank, which allows air to flow towards the cylinders via two flexible hoses.



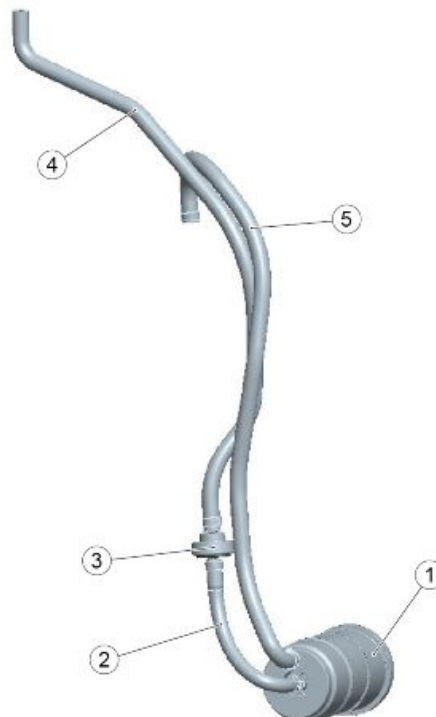
- This valve is connected directly to the filter box via a flexible hose.



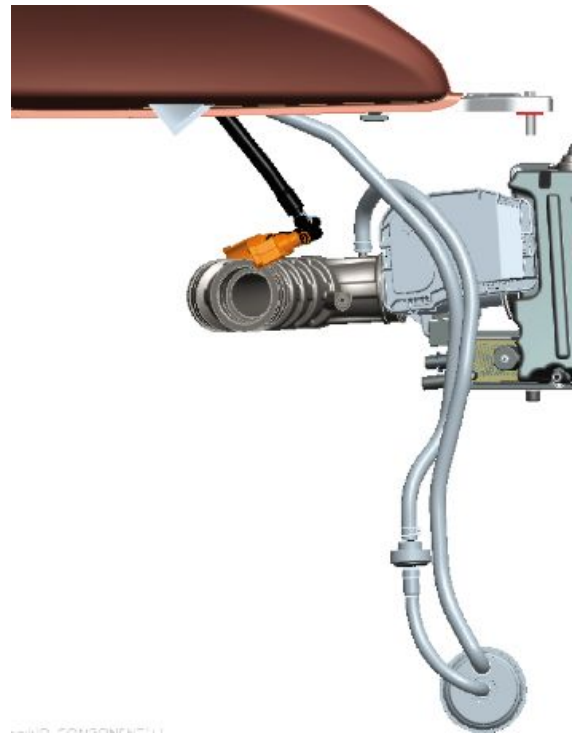
## Sistema evaporativo canister

### key:

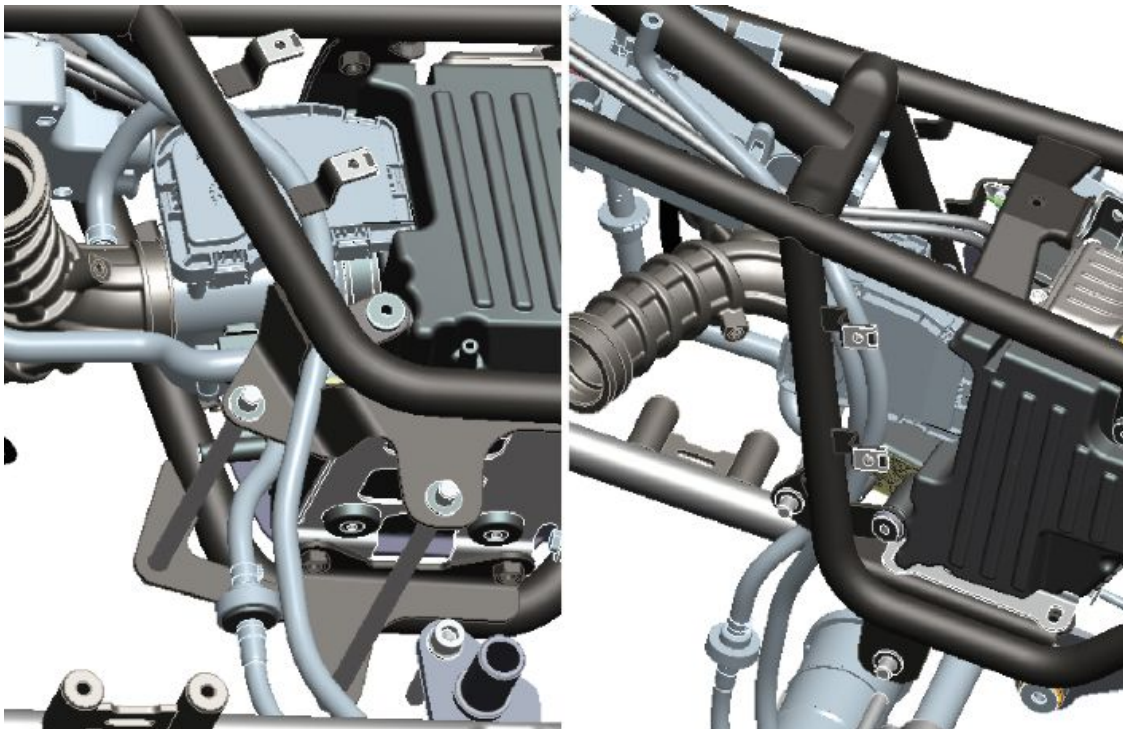
1. Canister
2. SAE 30 R12A-3/16 pipe
3. Breather valve
4. SAE 30 R12A-1/4 pipe
5. SAE 30 R12A-1/4 pipe



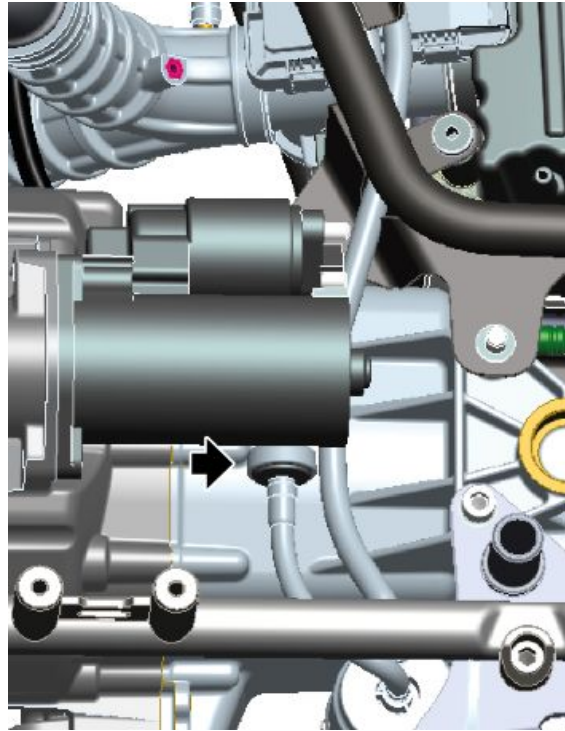
- The canister is installed with the intake inlet above the tank inlet



- Check the correct passage of the pipes on the chassis



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

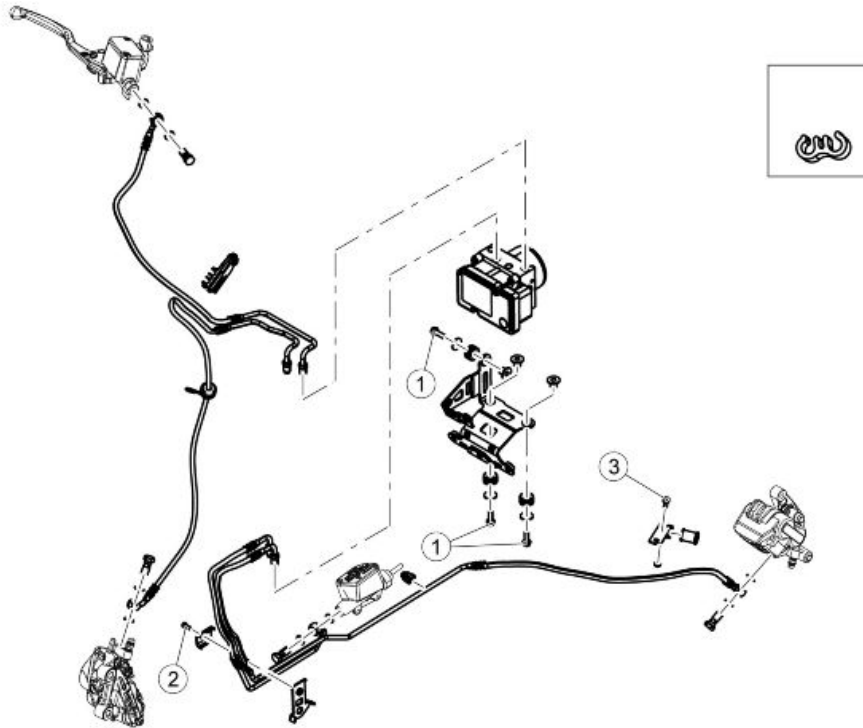


## INDEX OF TOPICS

**B**RAKING SYSTEM

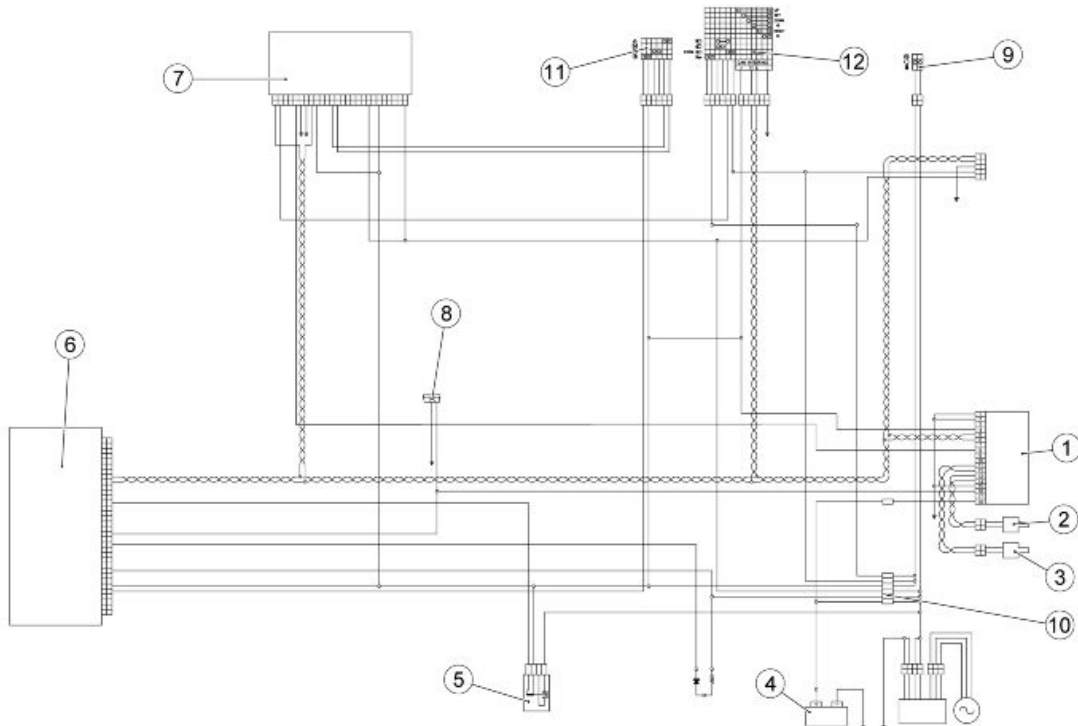
**BRAK SYS**

**ABS**



**ABS SYSTEM**

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



**Key:**

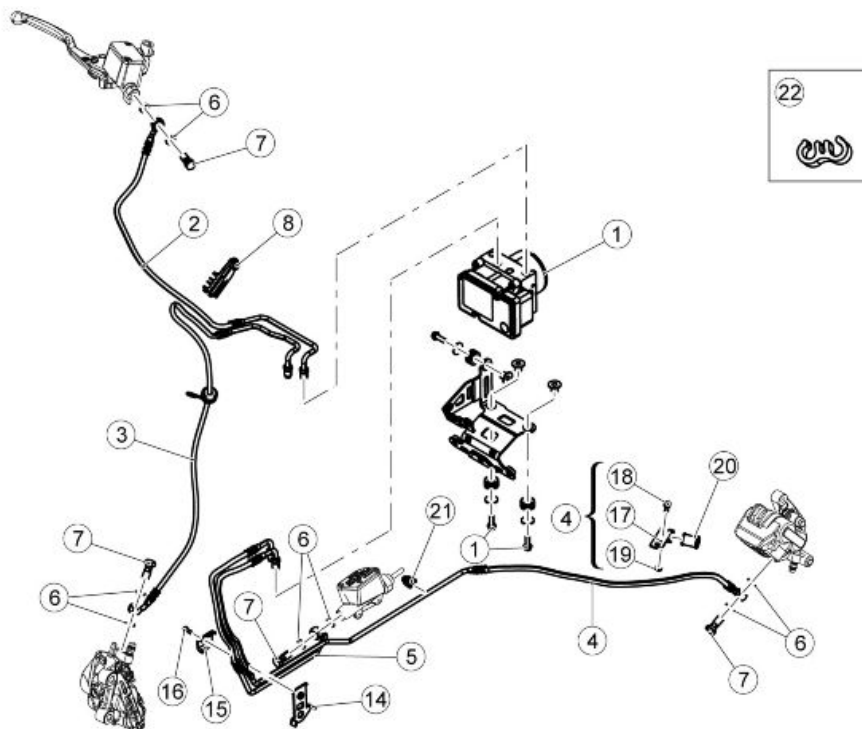
1. ABS control unit
2. Front ABS sensor
3. Rear ABS sensor
4. Battery
5. Injection loads relay
6. ECU
7. Instrument panel
8. K line (diagnosis)
9. Ignition switch
10. Fuses
11. Right light switch
12. Light switch left

**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



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 similar to the rear circuit.

- 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.
- When the system is in standby, the ABS processor never stops monitoring the speed of the wheels in order to assess potential wheel slippage.
- 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.

**Stages in ABS cycle (the following operations refer to the front circuit but are also applicable to the rear one):**

**A - Brake activation: the rider starts braking** as he would usually do.

**B - Pressure reduction:** it coincides with danger recognition (wheel slippage above 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 - Pressure maintained:** 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 restored:** 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 can be detected if the duration of the pressure reduction phase exceeds the pre-set 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, two things may occur:

- 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.**



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## Use of diagnostics instrument for ABS system

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### Abs screen pages

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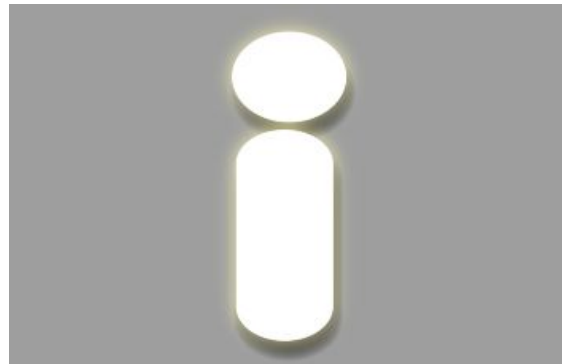
#### ECU INFO screen page

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##### 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 page, 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

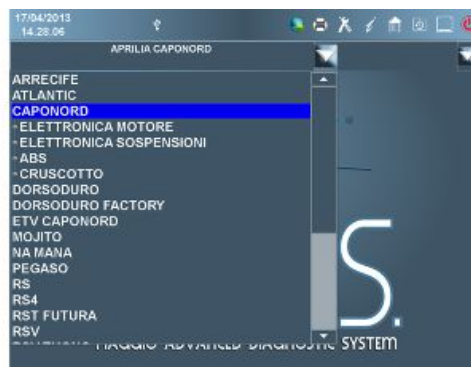
### Diagnostic tool report diagnostic tool

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.



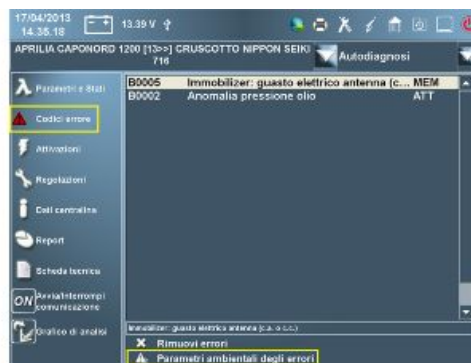
- Select the vehicle and the component.



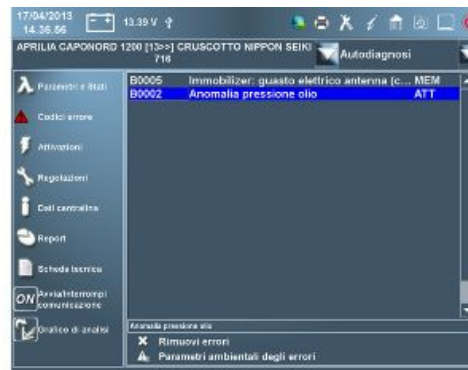
- Select Self-diagnosis.



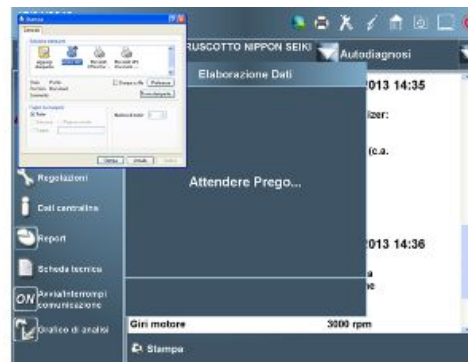
- Go to the page Error codes.
- Select an error and show the Ambient parameter error (where provided).



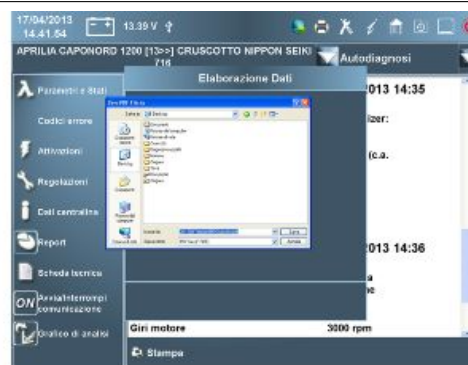
- Repeat the operation by selecting each error and showing the corresponding Ambient parameter error (where provided).



- 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

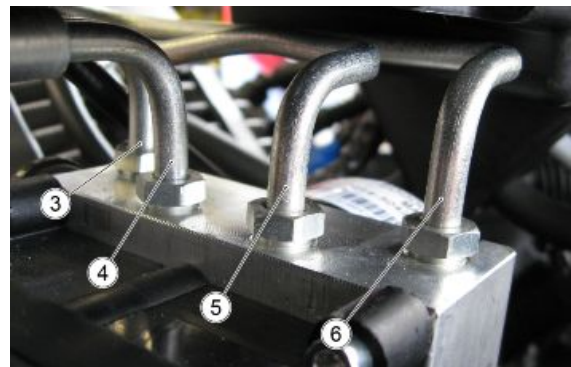
Before removing the modulator, it is necessary to completely purge the braking system.

### MODULATOR REMOVAL

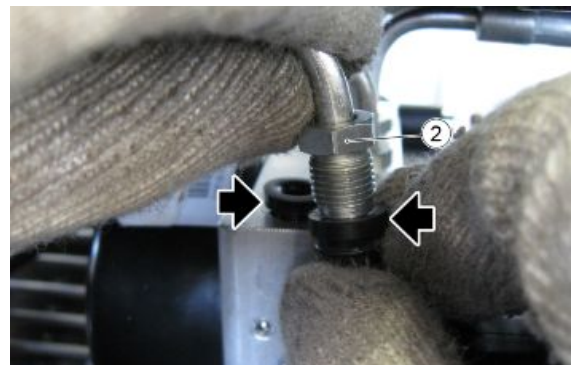
- Remove the horn.
- Disconnect the connector (1).



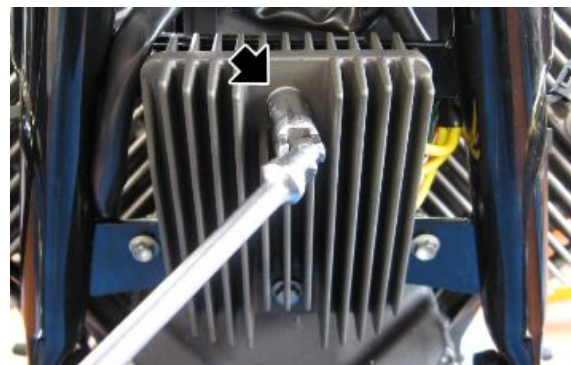
- With a felt-tip pen, mark a reference on the pipes and on the ABS control unit to avoid inverting them when refitting
- Remove the oil pipes in the order (3) - (4) - (6) - (5)



- Unscrew the nut of the oil pipe (3) and cover both the pipe and the hole on the modulator.



- Remove the fixing screw from the voltage regulator that holds the support bracket of the ABS control unit.

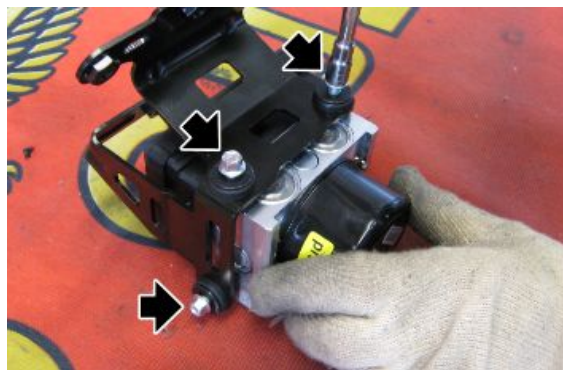




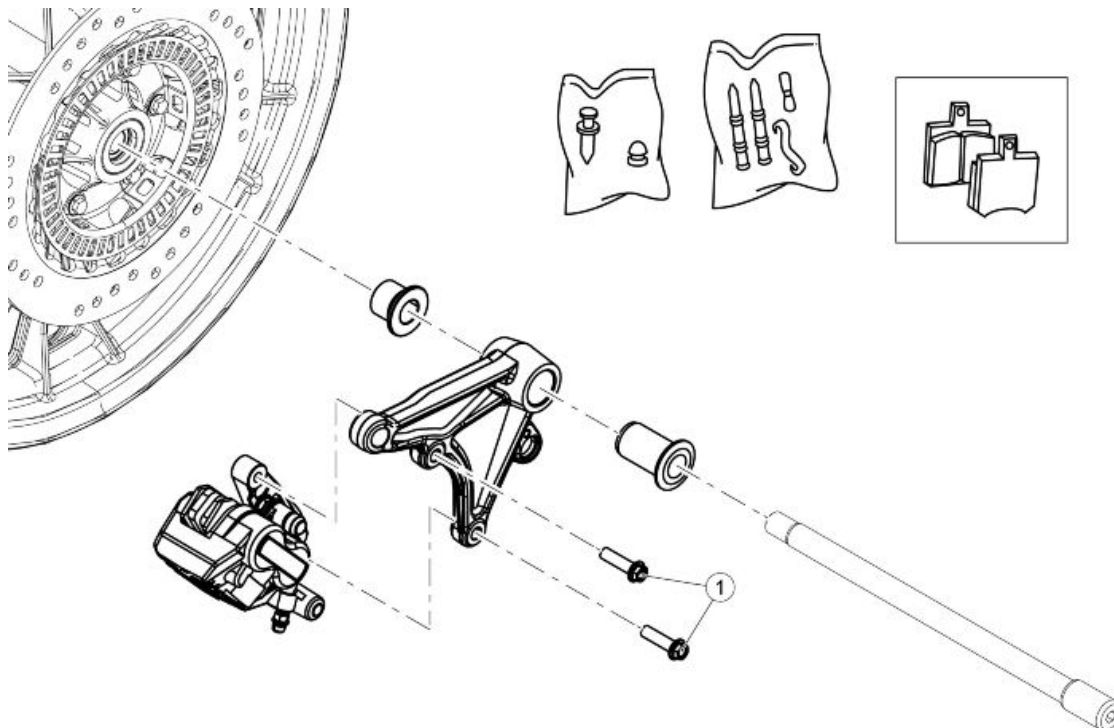
- Operating from the left side of the motorcycle, remove the ABS modulator



- To remove the ABS modulator from the support, remove the three fixing screws

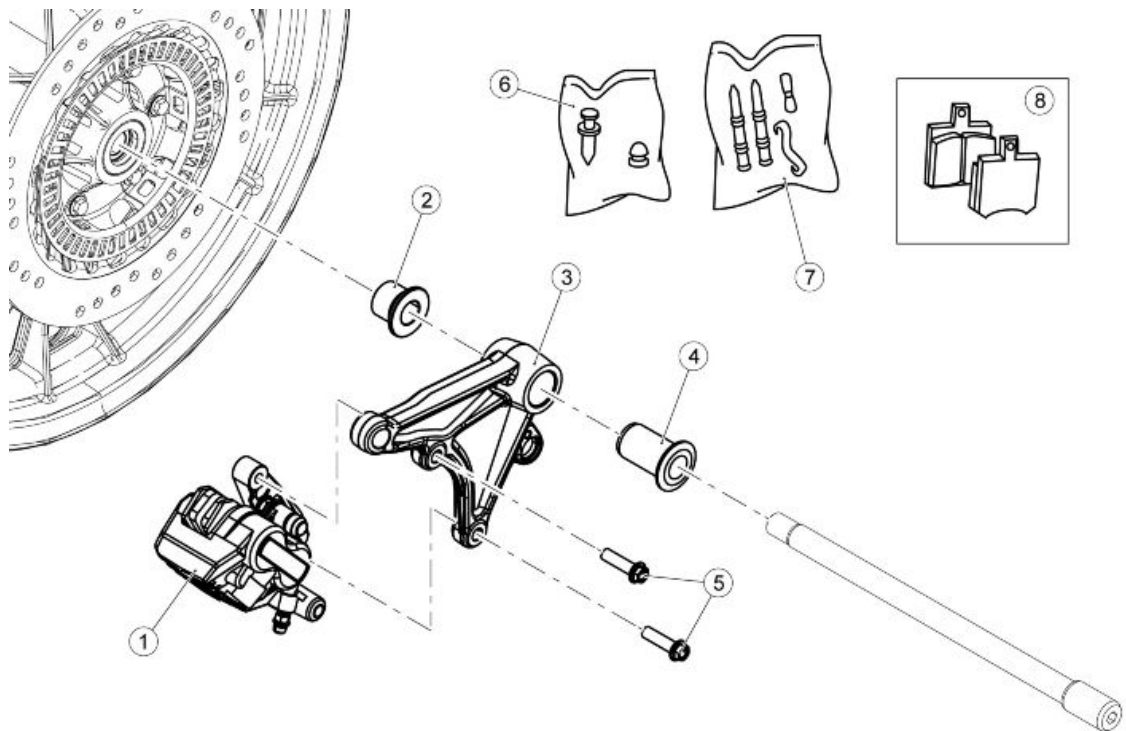


### Rear brake calliper



#### REAR BRAKE CALLIPER

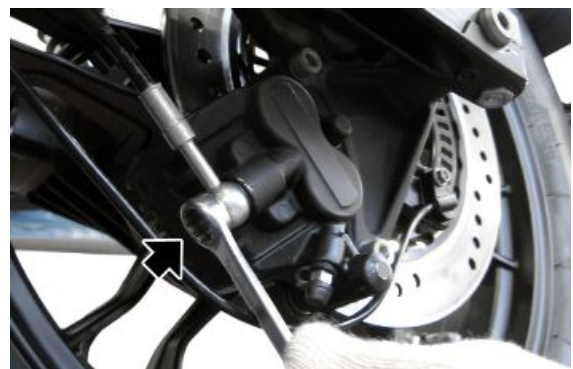
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lb ft)	-

**Key:**

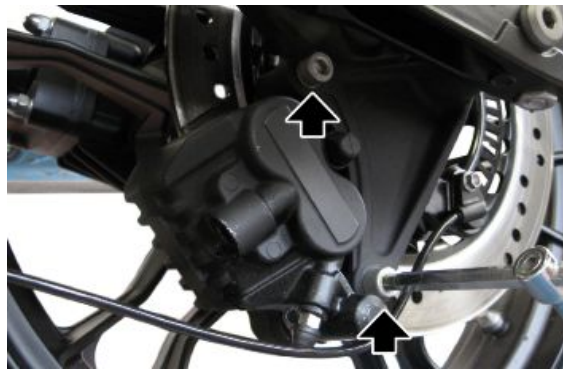
1. Rear brake calliper
2. Spacer
3. Brake calliper mounting plate
4. Bushing
5. Screw
6. Bleed + cap
7. Pins + spring kit
8. Brake pads copy

**Removal**

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



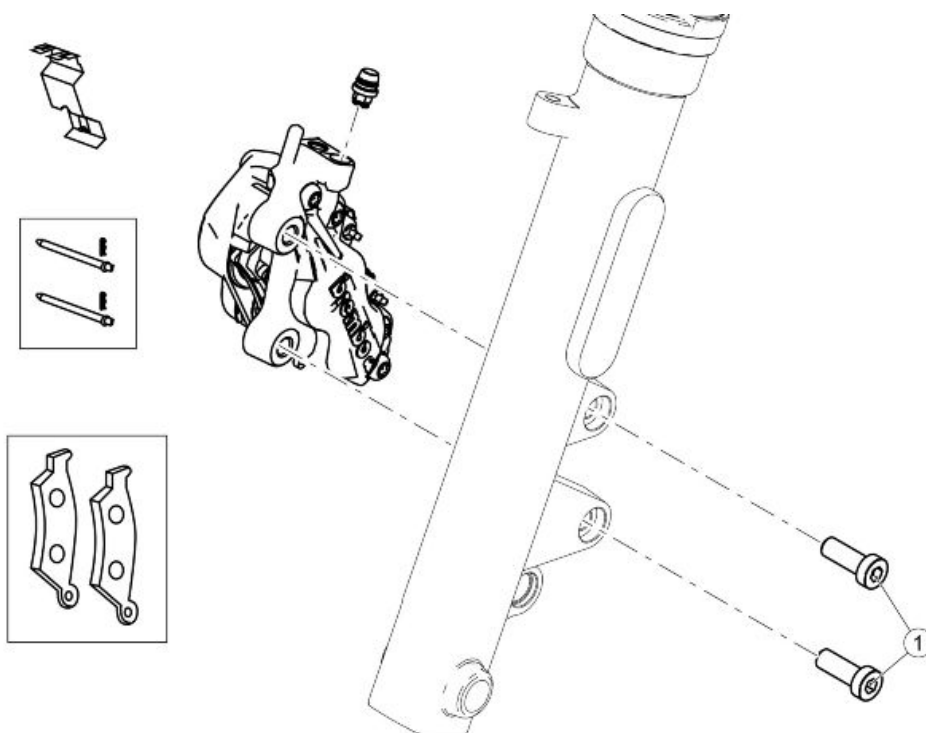
- Remove the two calliper fixing screws



- Remove the calliper

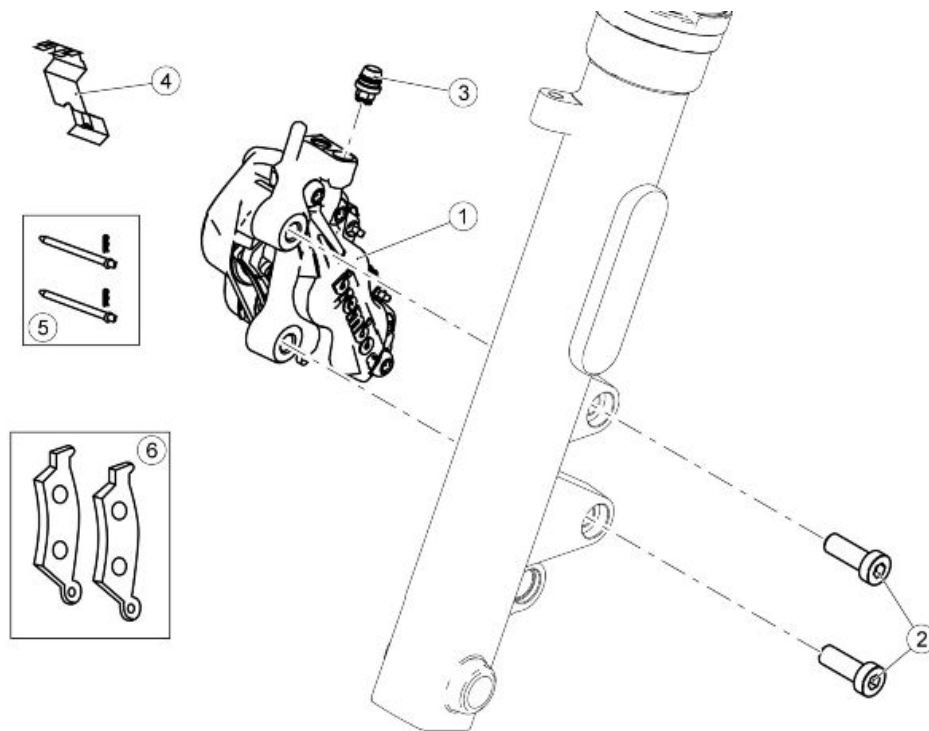


### Front brake calliper



#### FRONT BRAKE CALLIPER

Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake calliper fixing screws	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

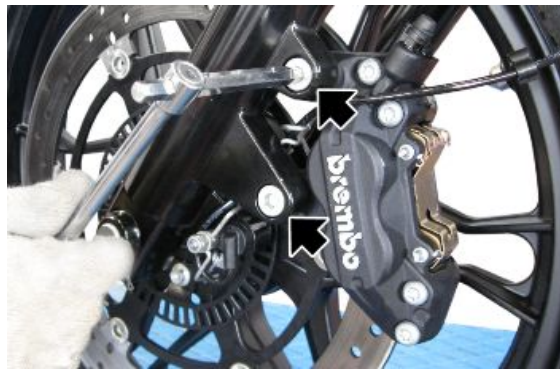
**Removal**

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





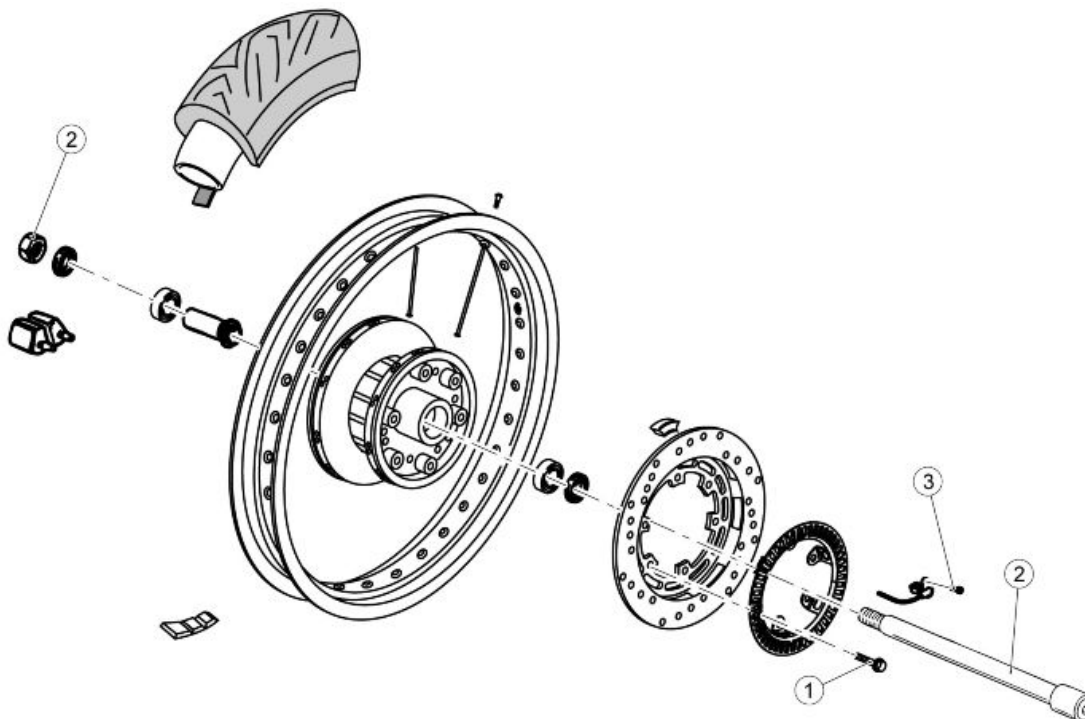
- Remove the two calliper fixing screws



- Remove the calliper



### Rear brake disc



#### REAR WHEEL

Pos.	Description	Type	Quantity	Torque	Notes
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lb ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	120 Nm (88.51 lb ft)	
3	Rear ABS sensor fastening screw	M5	1	6 Nm (4.43 lb 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)



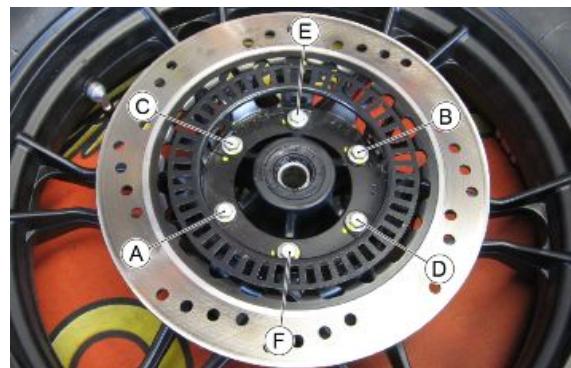
- Remove the brake disc (3)



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.



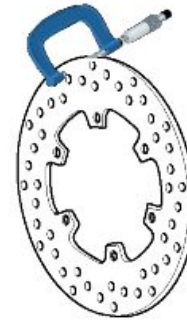
## Disc Inspection

### CAUTION



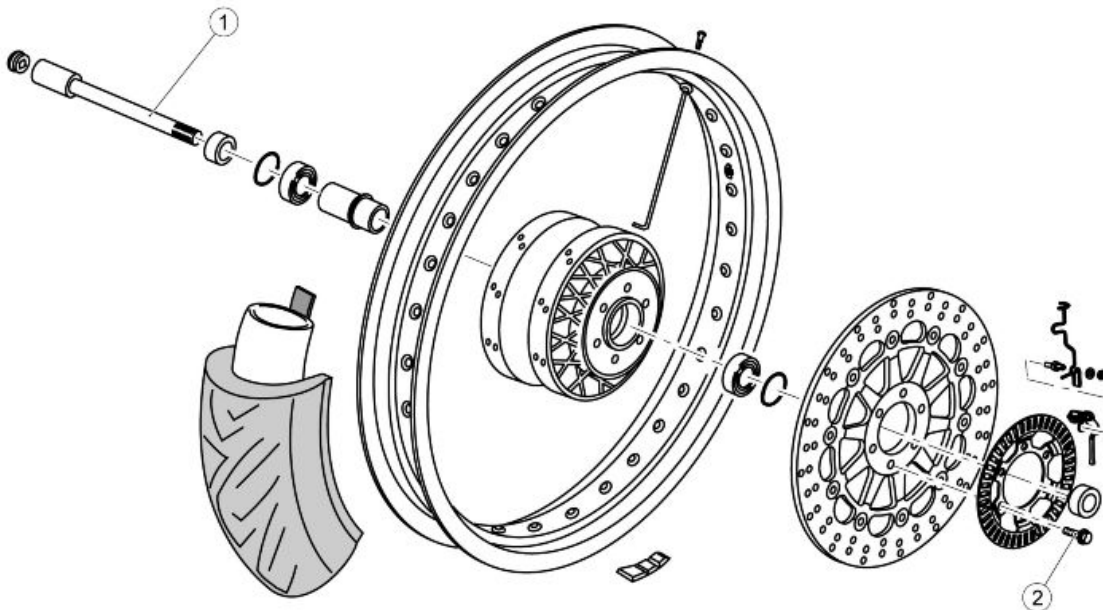
**THE BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.**

- 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**



**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 lb ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lb ft)	Pre-permeated
4	Cable gland nut	M6	1	6 Nm (4.43 lb 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)



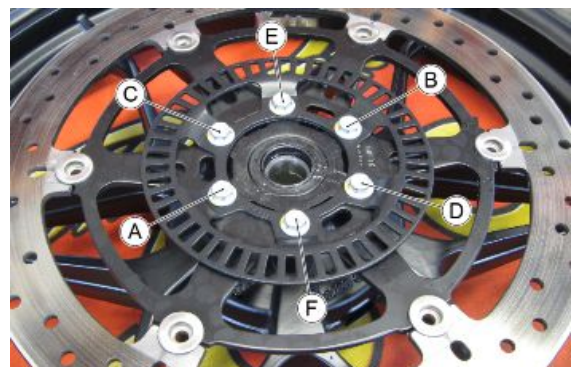
- Remove the brake disc (3)



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.

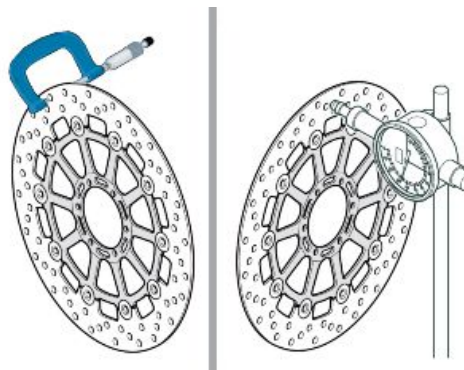


## Disc Inspection

### 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)**

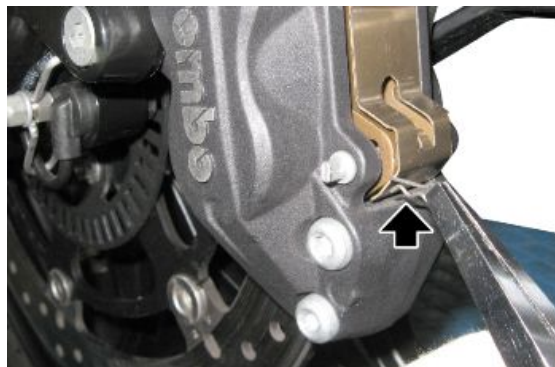
- Using a dial gauge, check that the maximum oscillation of the disc does not exceed the tolerance; otherwise, replace it.

**Disc oscillation tolerance: 0.15 mm (0.0059 in)**

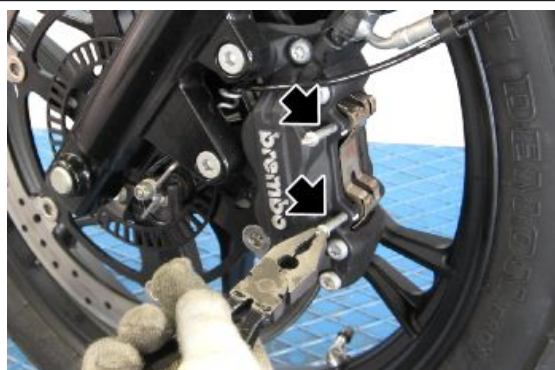
## Front brake pads

### Removal

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



- Remove the brake pad retaining pins





- Collect the protection plate.



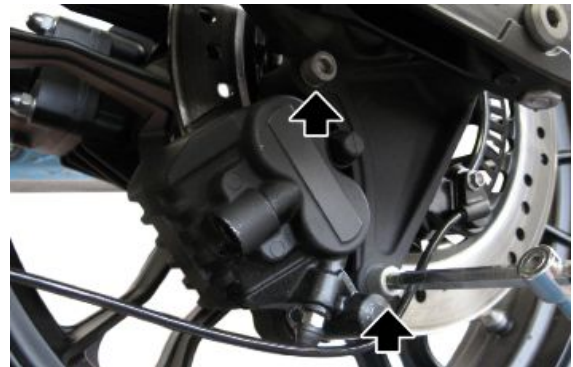
- Remove the brake pads



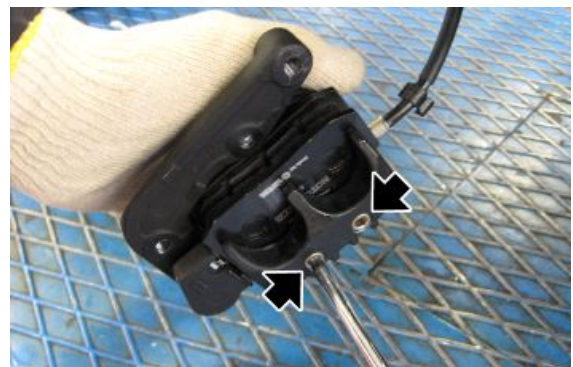
## Rear brake pads

### 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

**CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING BRAKES AND RESTORING THE BRAKING SYSTEM TO THE REGULAR USE CONDITIONS, THAT THE HYDRAULIC CIRCUIT BE AIR PURGED.**

#### NOTE

**THE VEHICLE MUST BE ON LEVEL GROUND TO BE PURGED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.**

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

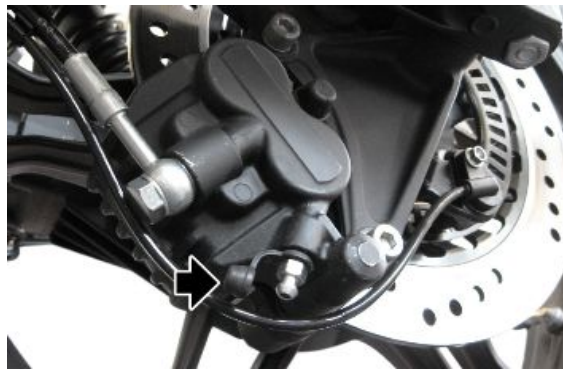
**CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING BRAKES AND RESTORING THE BRAKING SYSTEM TO THE REGULAR USE CONDITIONS, THAT THE HYDRAULIC CIRCUIT BE AIR PURGED.**

### NOTE

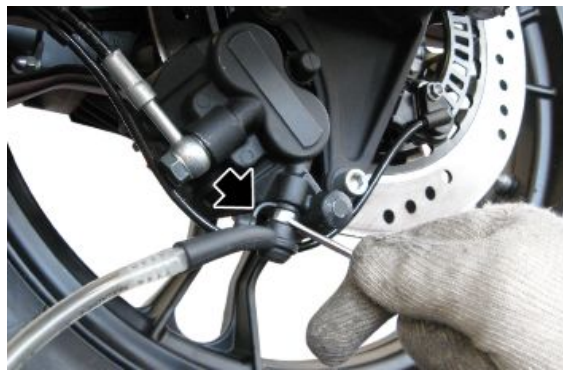
**THE VEHICLE MUST BE ON LEVEL GROUND TO BE PURGED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.**



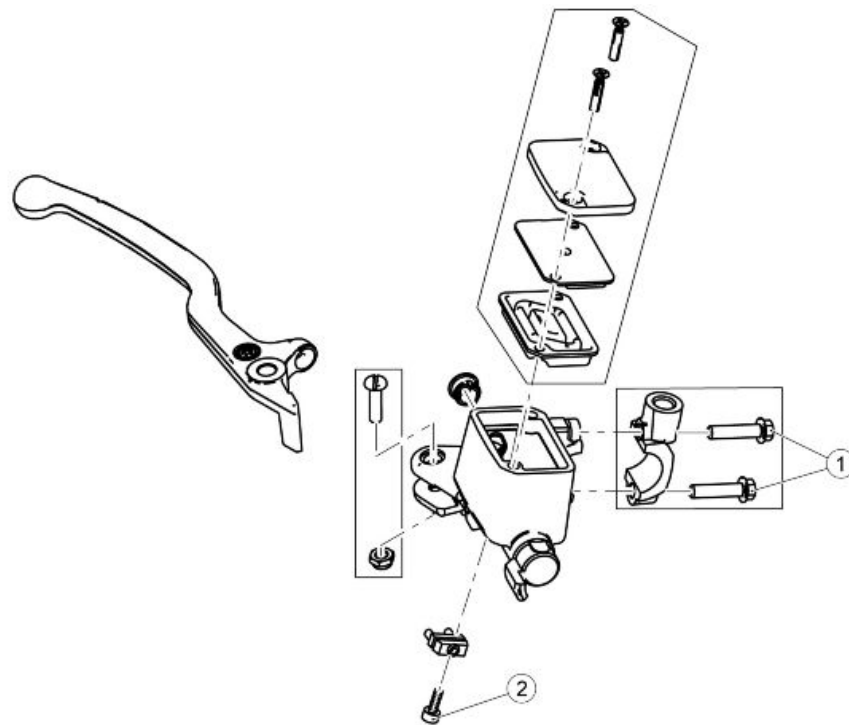
- Remove the rubber protection cover from the bleed valve.



- 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

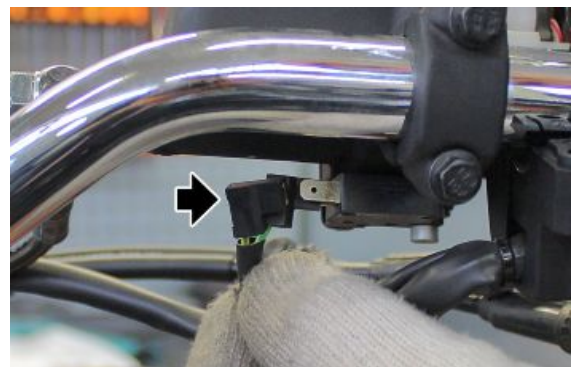


### FRONT BRAKE MASTER CYLINDER

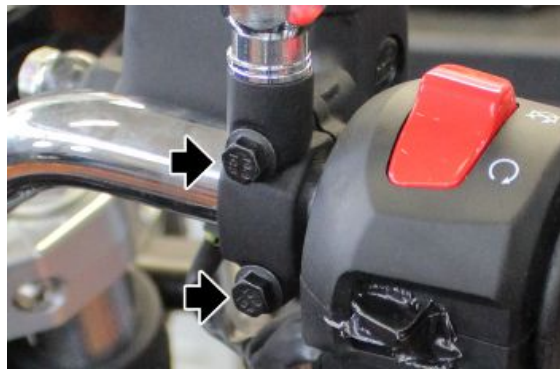
Pos.	Description	Type	Quantity	Torque	Notes
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lb ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lb ft)	-

## 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

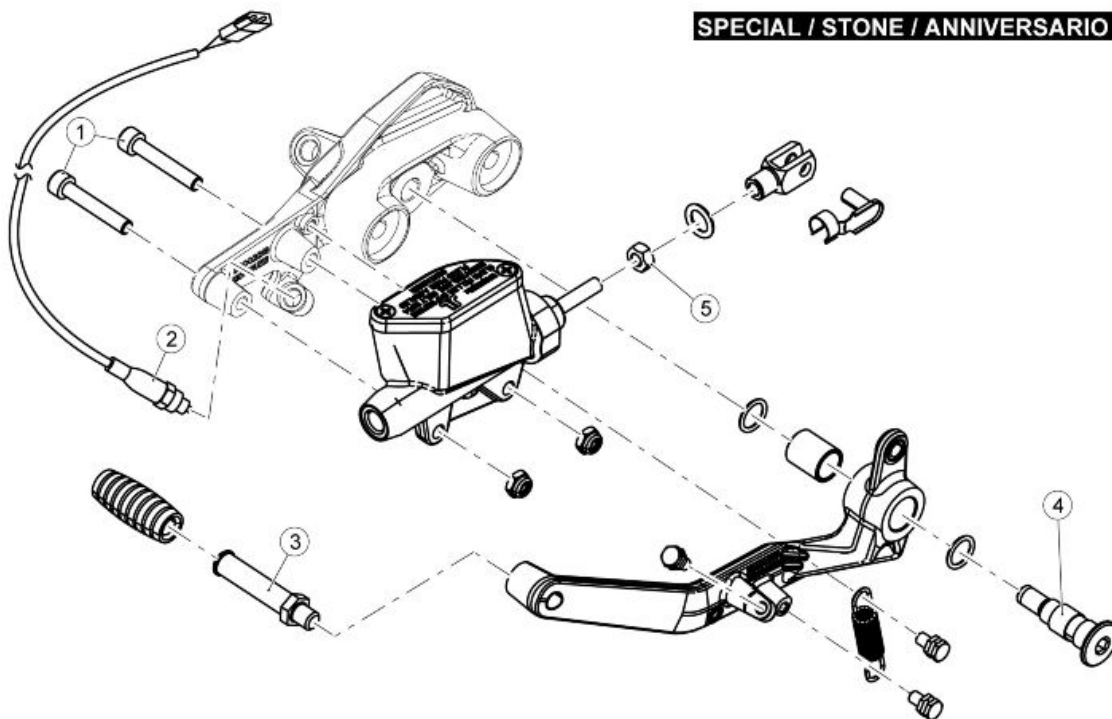
**CAUTION**

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



**Rear brake pump**

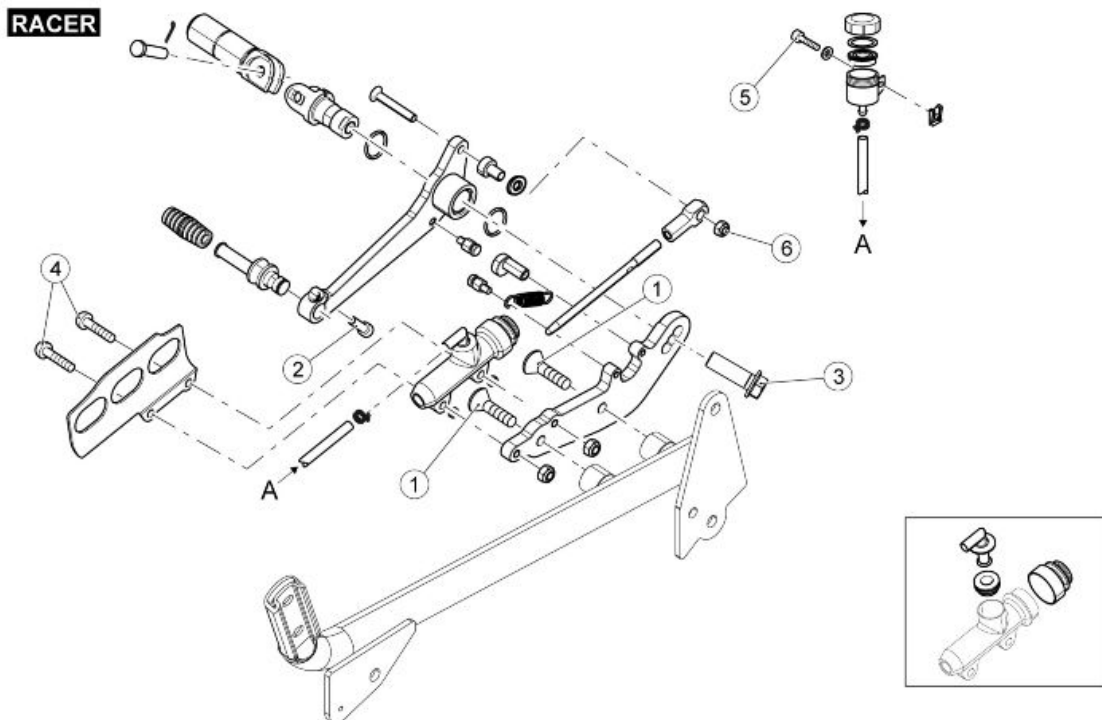
**SPECIAL / STONE / ANNIVERSARIO**



**REAR BRAKE MASTER CYLINDER**

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

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



**RIDER FOOTREST / REAR BRAKE LEVER**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screw fastening right hand rider footrest mounting plate to cradle	M8x20	2	20 Nm (14.75 lb ft)	Loctite 243
2	Rear brake lever fixing screw	M6x20	1	10 Nm (7.38 lb ft)	Loctite 243
3	Screw fastening rider footrest mounting to plate	M8	1	25 Nm (18.44 lb ft)	Loctite 243
4	Rear brake pump fixing screw	M6x25	2	8 Nm (5.90 lb ft)	Loctite 243
5	Rear brake fluid reservoir fixing screw	M5x15	1	6 Nm (4.43 lb ft)	-
6	Nut fastening rod terminal on brake lever	M6	1	10 Nm (7.38 lb ft)	-

**Rimozione**

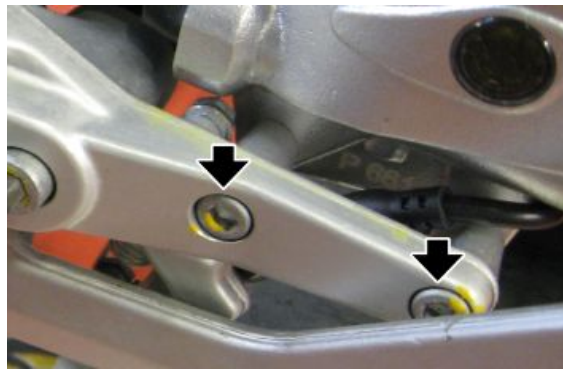
**(SPECIAL/STONE/ANNIVERSARIO)**

- 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

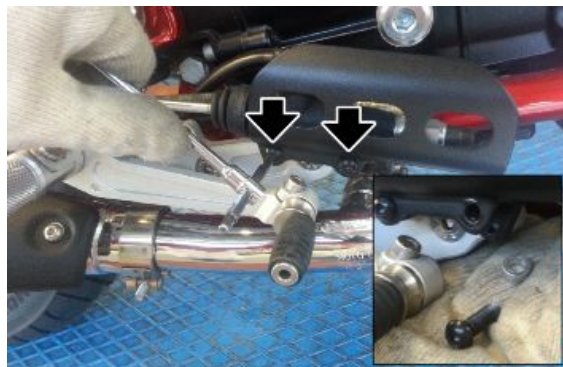


- Remove the brake pump

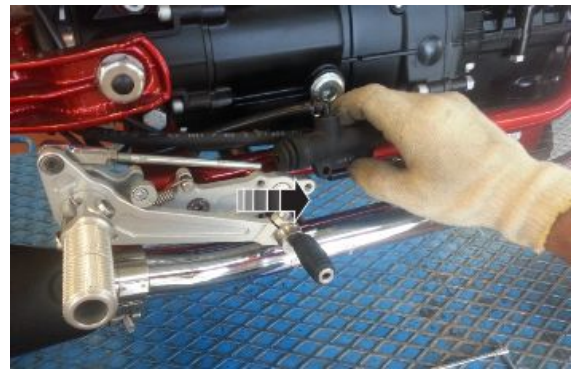


### (RACER)

- Drain off the rear brake system
- Remove the screws fixing the protection plate, making sure to recover the spacer washers



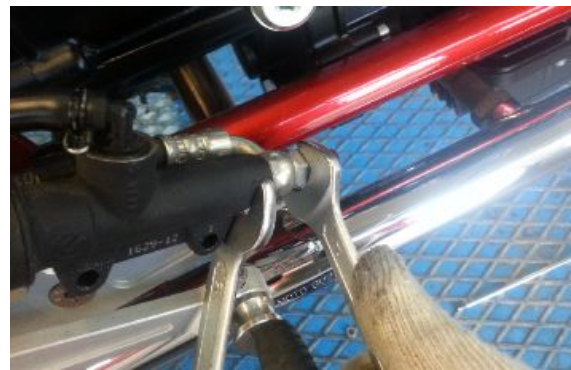
- Take the pump from the brake pump shaft



- Remove the brake pipe by acting on the fitting and remove the complete pump

**CAUTION**

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

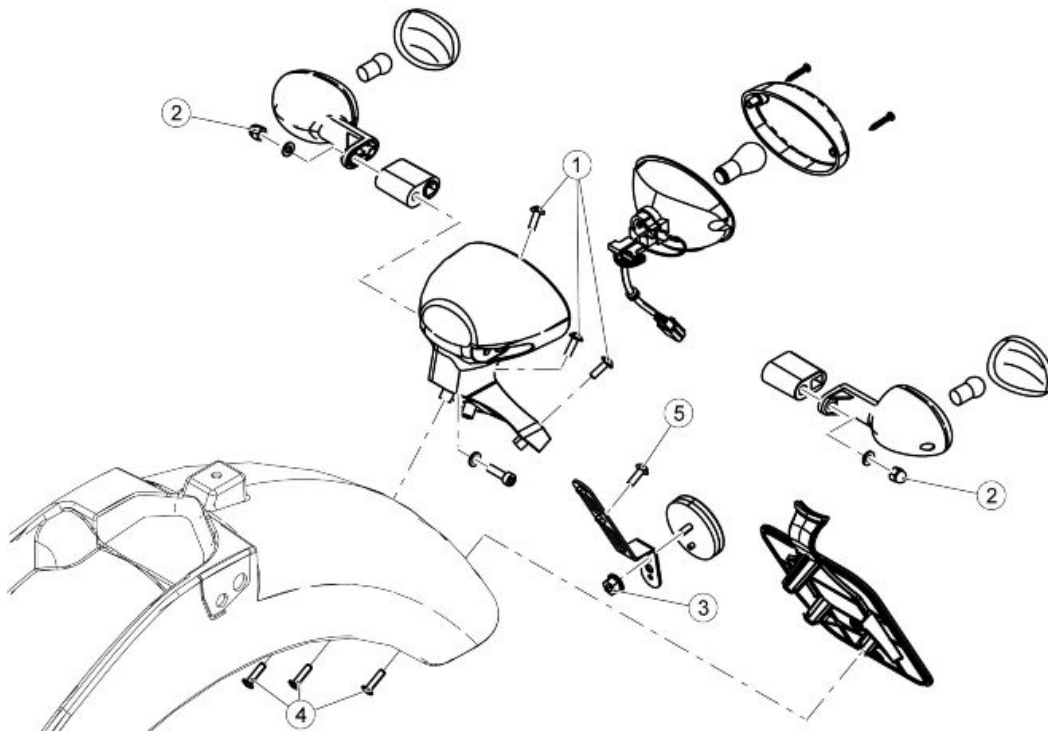




## INDEX OF TOPICS

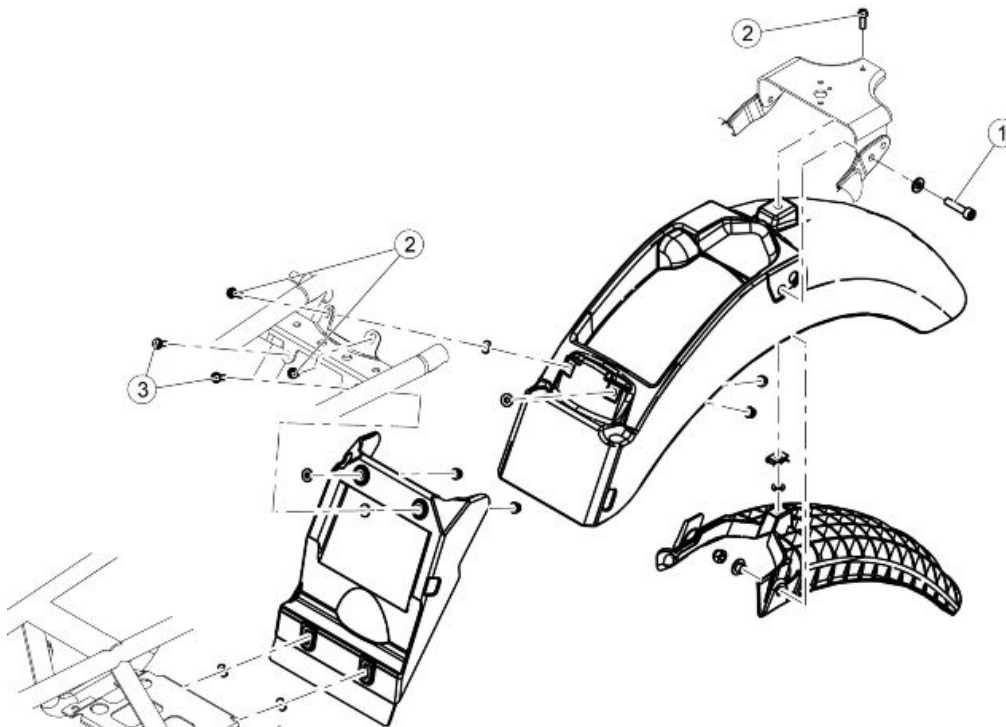
**BODYWORK**

**BODYW**



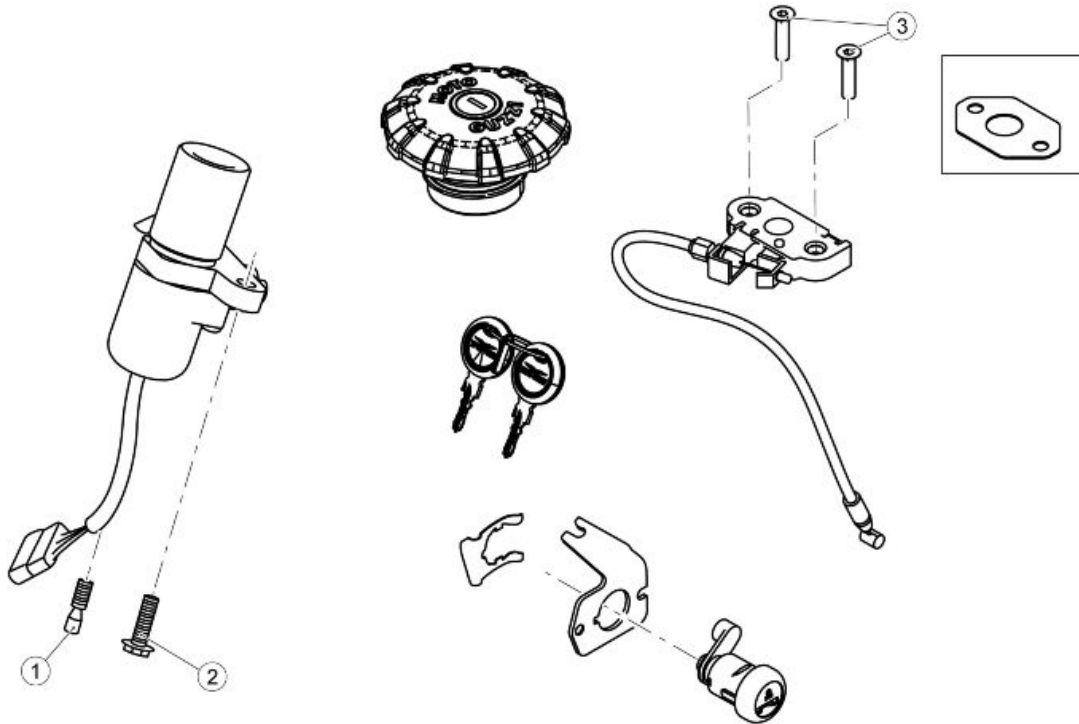
**REAR LIGHT UNIT**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening taillight support to the mudguard	M5	3	4 Nm (2.95 lb ft)	-
2	Rear turn indicator fastener nut	M6	2	6 Nm (4.43 lb ft)	-
3	Reflector fixing nut retainer to the support	M5	1	4 Nm (2.95 lb ft)	-
4	Screw fastening license plate mounting on mudguard mounting	SWP 5	3	3 Nm (2.21 lb ft)	-
5	Screw fastening reflector mounting on license plate mounting	M5	2	4 Nm (2.95 lb ft)	-



**REAR MUDGUARD**

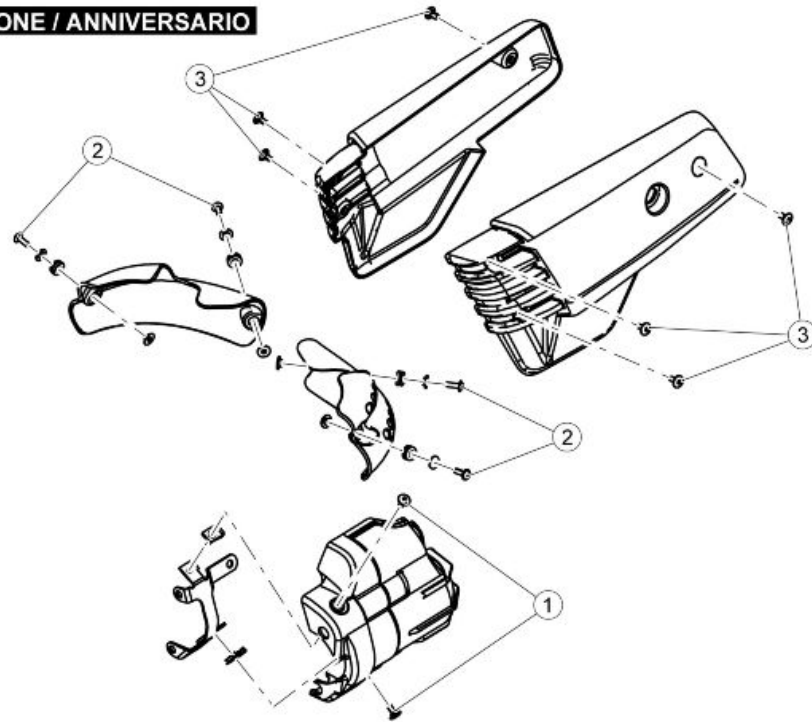
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lb ft)	
2	Front and centre fastening screw rear mudguard	M6	3	10 Nm (7.38 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lb ft)	



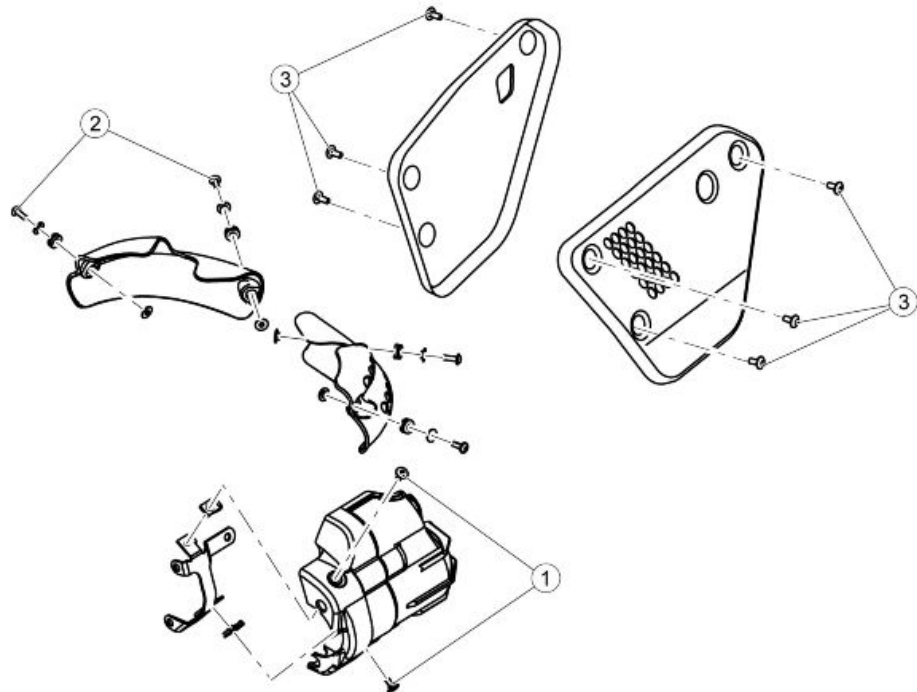
**LOCK KIT**

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 lb ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	10 Nm (7.38 lb ft)	-

**SPECIAL / STONE / ANNIVERSARIO**

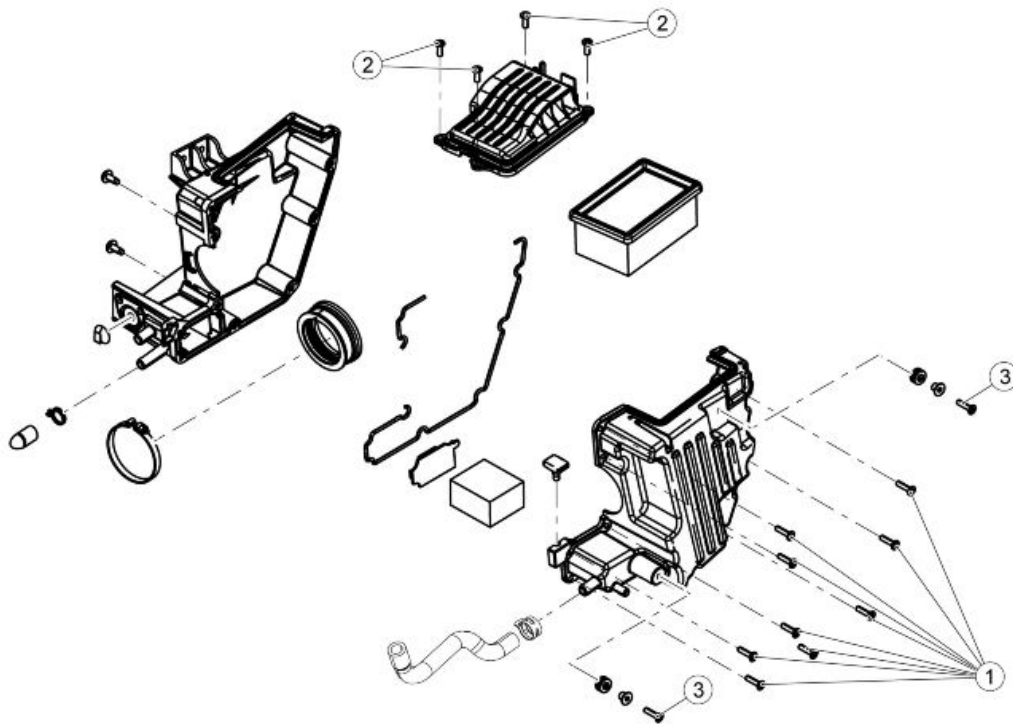


**RACER**



**CENTRAL BODYWORK**

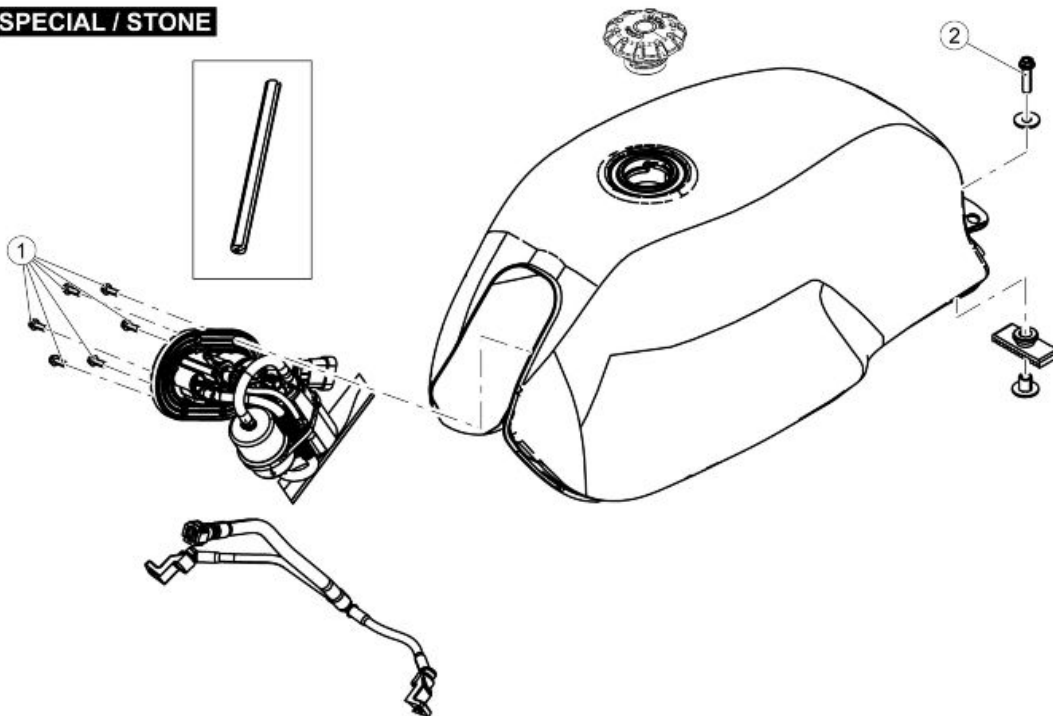
Pos.	Description	Type	Quantity	Torque	Notes
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lb ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lb ft)	-
3	Side panel fastening screws	M5	6	4 Nm (2.95 lb ft)	-



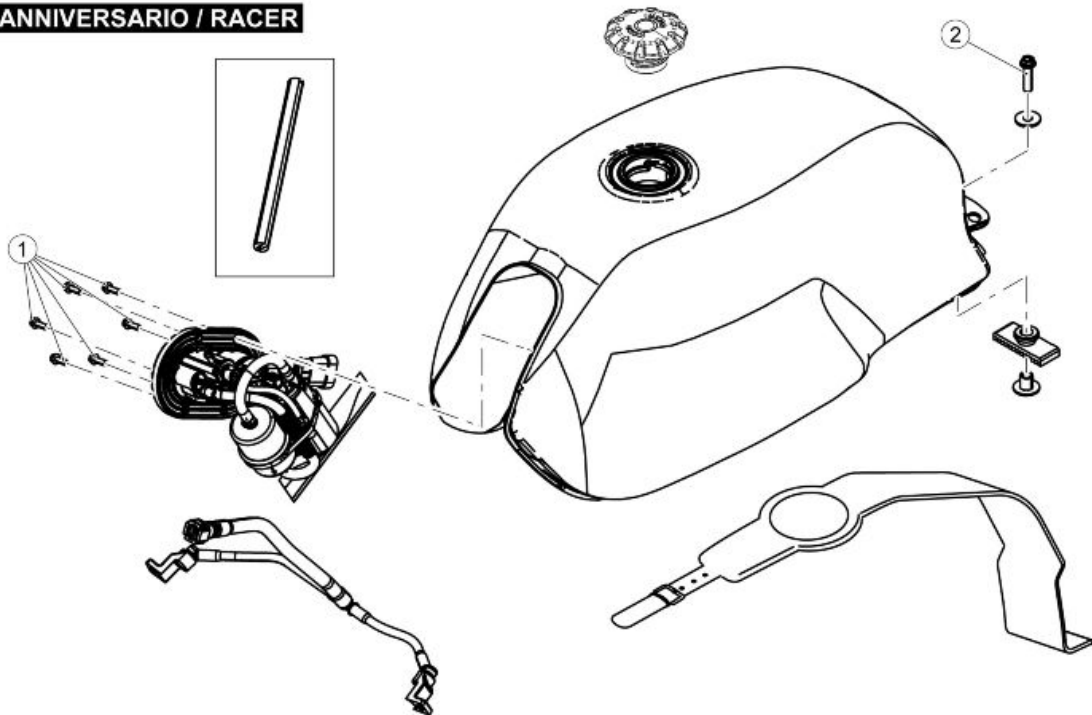
**FILTER BOX**

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

**SPECIAL / STONE**

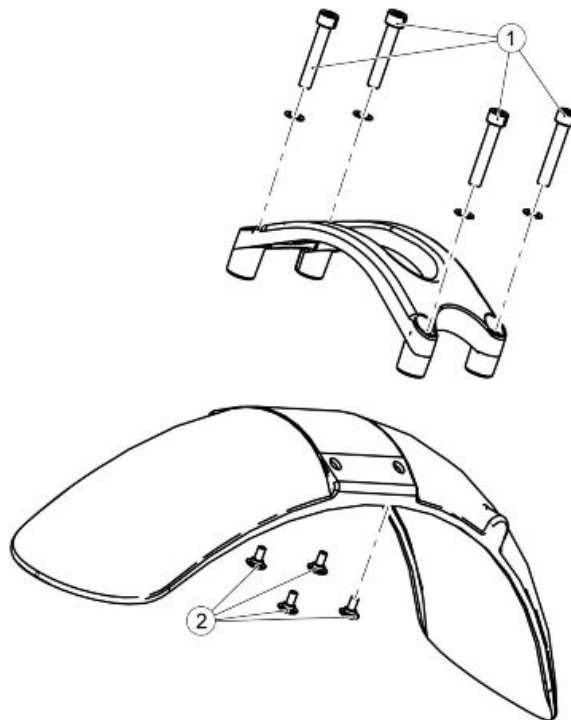


**ANNIVERSARIO / RACER**



**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
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lb ft)	-

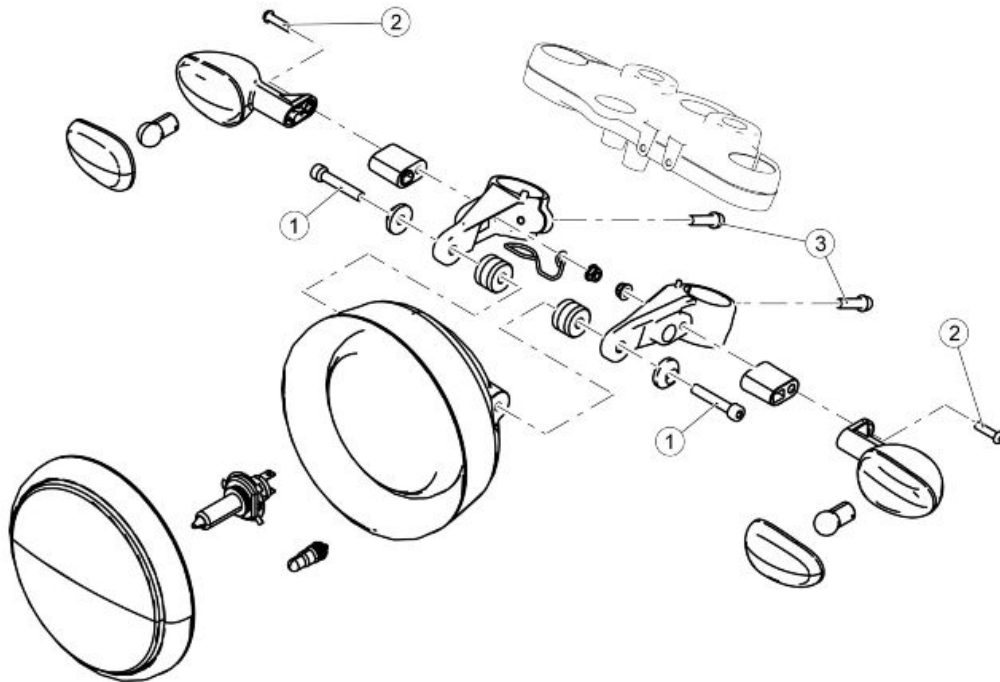


**FRONT MUDGUARD**

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



Pos.	Description	Type	Quantity	Torque	Notes
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lb ft)	Loctite 243

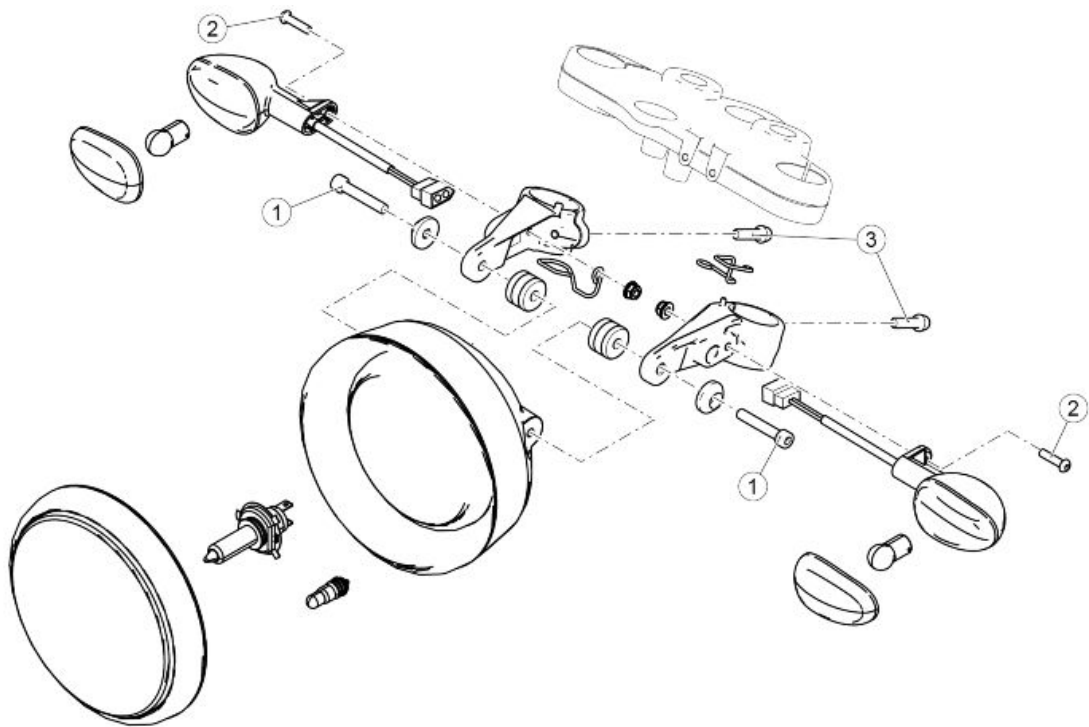


#### FRONT LIGHTS

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 lb ft)	-

## Headlight assy.

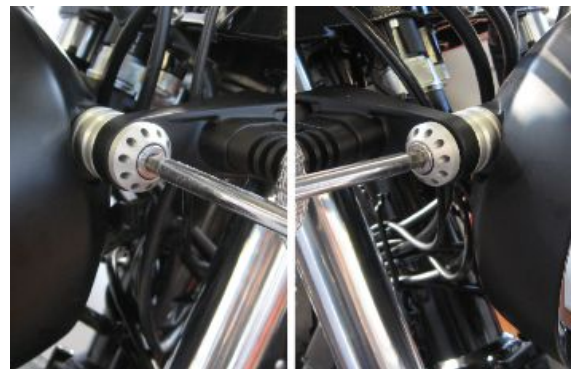
### Tightening torque



#### FRONT LIGHTS

Pos.	Description	Type	Quantity	Torque	Notes
1	Headlamp fastening screws	M8x45	2	15 Nm (11.06 lb ft)	-
2	Front turn indicators SHC fastening screws	M6x25	2	10 Nm (7.38 lb ft)	-
3	Viti TCEI fissaggio braccialetti supporto fanale	M6x25	2	10 Nm (7.38 lb ft)	-

- 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)

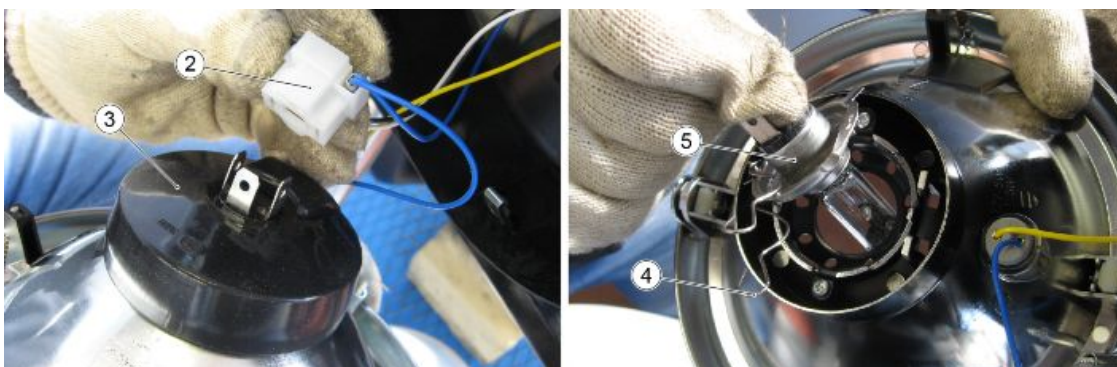


### LOW BEAM / HIGH BEAM LIGHT BULB

- 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.

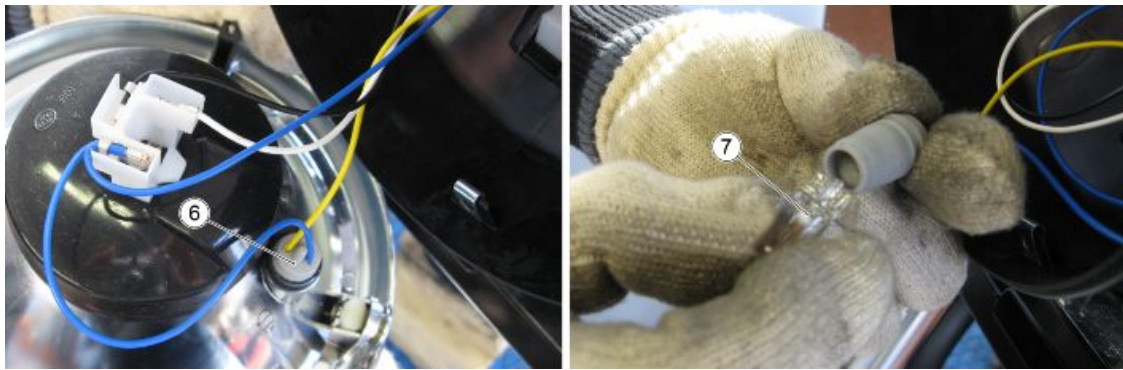
#### NOTE

**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.



## Headlight fairing

(RACER)

### REMOVAL OF THE TOP FAIRING

- Unscrew and remove the two screws (1)



- Remove the top fairing (2)

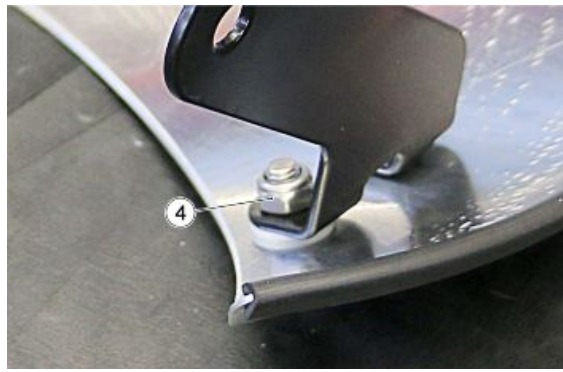


- Retrieve the two washers (3)

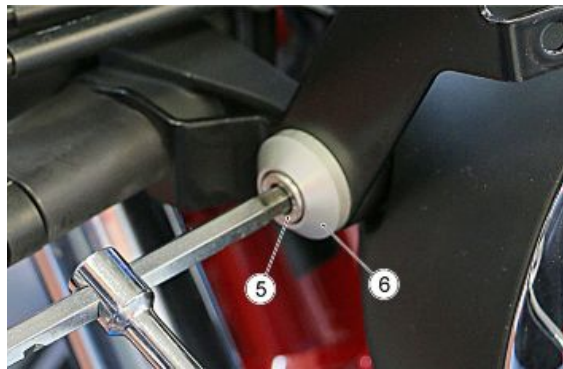




- Retrieve the two fastening nuts (4)



- Undo and remove the fastening screw (5)
- Retrieve the bushing (6)



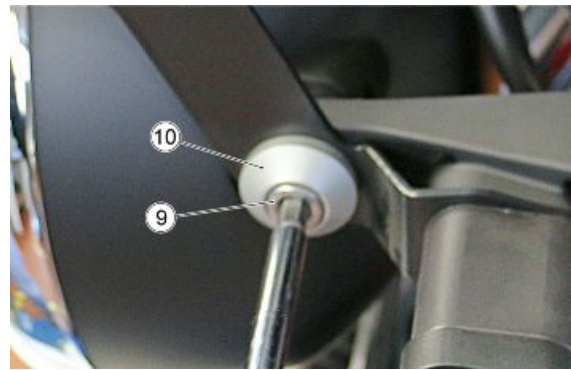
- Undo and remove the fastening screw (7)



- Remove the right-hand top fairing support bracket (8)



- Undo and remove the fastening screw (9)
- Retrieve the bushing (10)



- Undo and remove the fastening screw (11)



- Remove the left-hand top fairing support bracket (12)



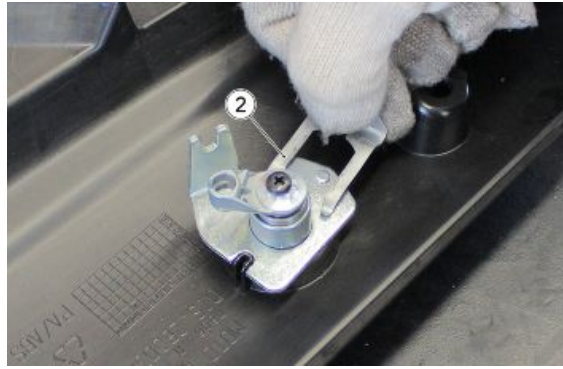
## Disassembling the lock

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





- Remove the fork spring (2)



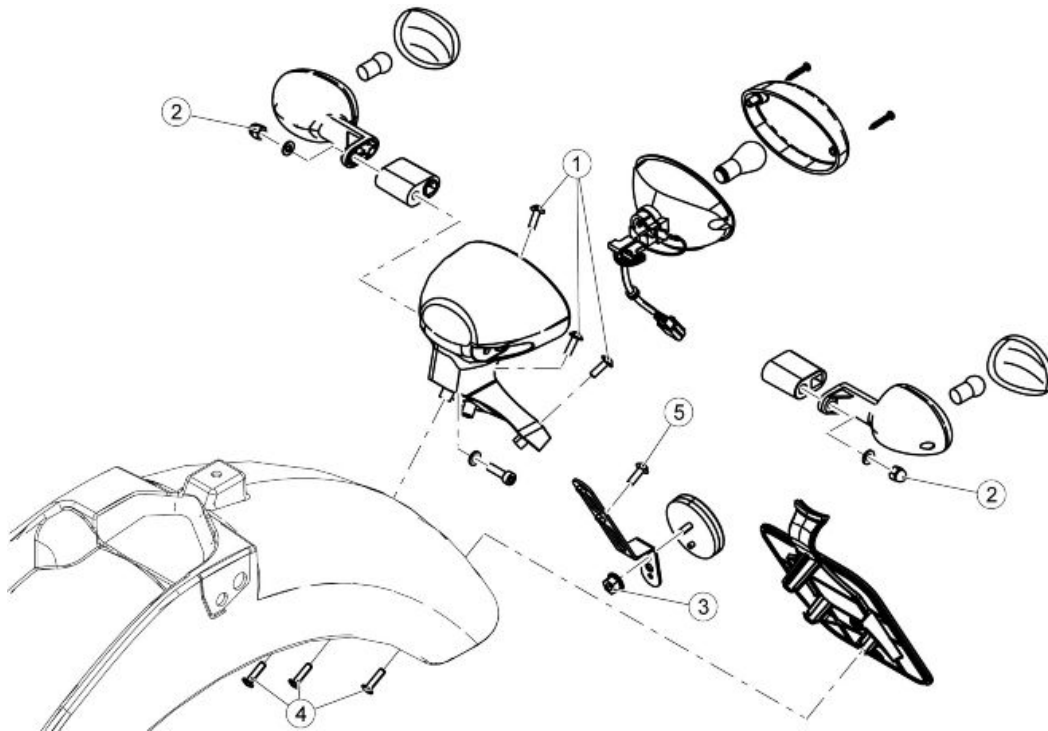
- Remove the cable support plate (3)



- Remove the ignition switch assembly (4)



Taillight assy.



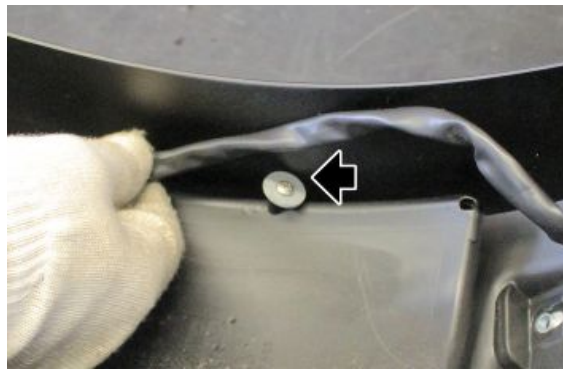
**REAR LIGHT UNIT**

Pos.	Description	Type	Quantity	Torque	Notes
1	Screws fastening taillight support to the mudguard	M5	3	4 Nm (2.95 lb ft)	-
2	Rear turn indicator fastener nut	M6	2	6 Nm (4.43 lb ft)	-
3	Reflector fixing nut retainer to the support	M5	1	4 Nm (2.95 lb ft)	-
4	Screw fastening license plate mounting on mudguard mounting	SWP 5	3	3 Nm (2.21 lb ft)	-
5	Screw fastening reflector mounting on license plate mounting	M5	2	4 Nm (2.95 lb ft)	-

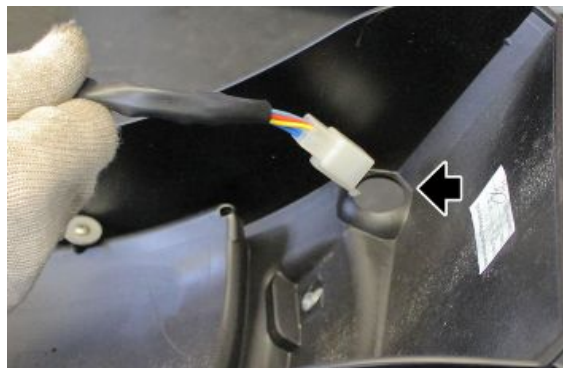
- Remove the rear mudguard
- Remove the three fixing screws (1)



- Detach the wiring harness from the point indicated in figure



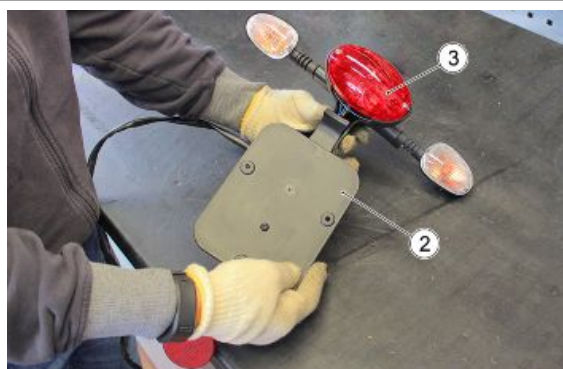
- Extract and remove the wiring connector from the point indicated in figure



- Extract the wiring from the point indicated in figure



- Detach the number plate holder (2) and remove it from its housing
- Retrieve the complete rear light cluster (3)



## Footrest

(SPECIAL/STONE/ANNIVERSARIO)

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**REMOVAL OF THE RIGHT-HAND RIDER  
FOOTREST SUPPORT**

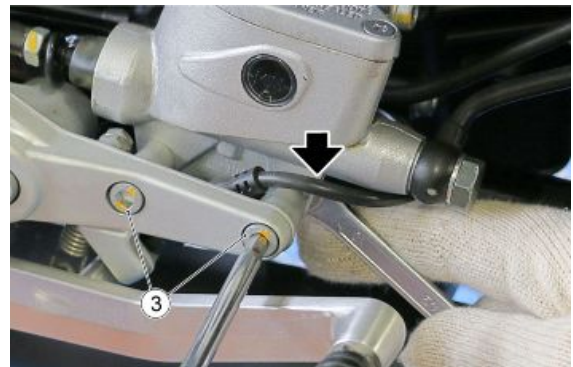
- Remove the gasket (1)



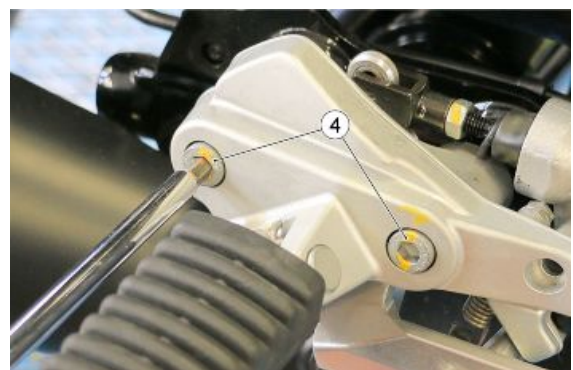
- Unhook and remove the clip (2)



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

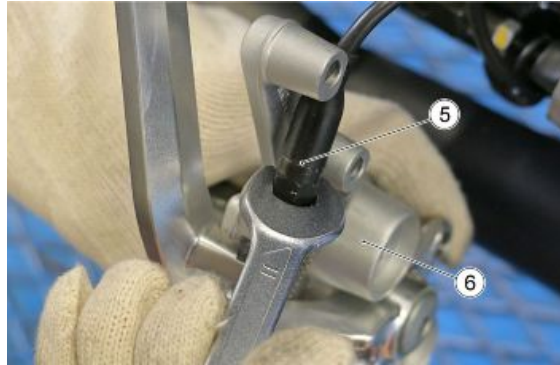


- Undo and remove the two fastening screws (4)





- 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)

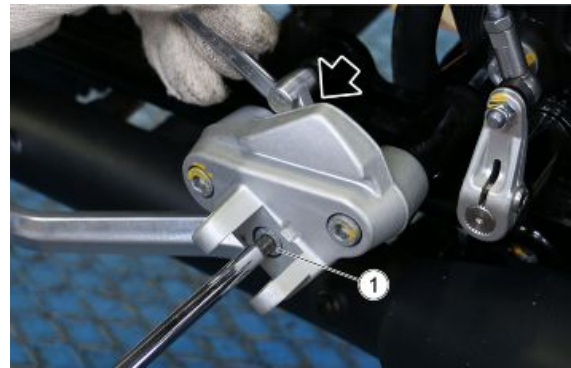


- Remove the left-hand rider footrest support (4)

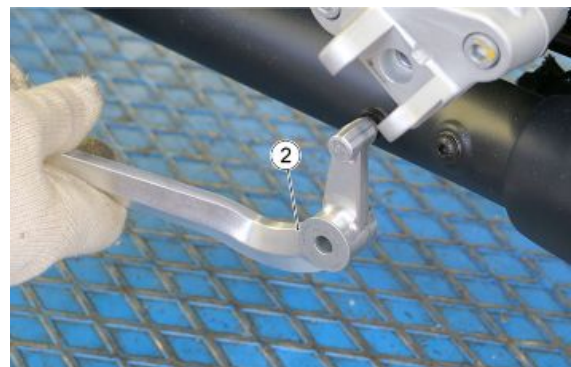


**REMOVAL OF THE GEAR SHIFT LEVER**

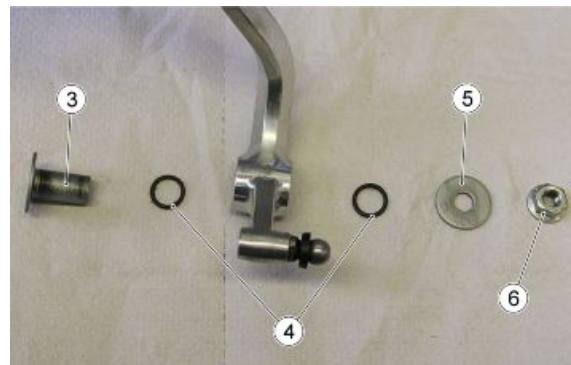
- Remove the right-hand rider footrest
- Holding the nut in place as illustrated in the figure, undo and remove the fastening screw (1)



- 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 FOOTREST**

- Remove the snap ring (1)



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

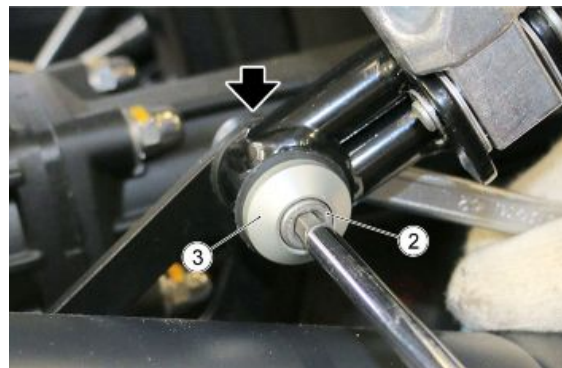


#### REMOVAL OF THE PASSENGER FOOTRESTS SUPPORT

- 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



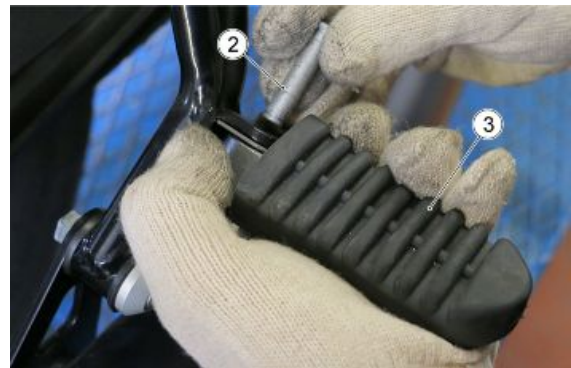


**REMOVAL OF THE PASSENGER FOOTREST**

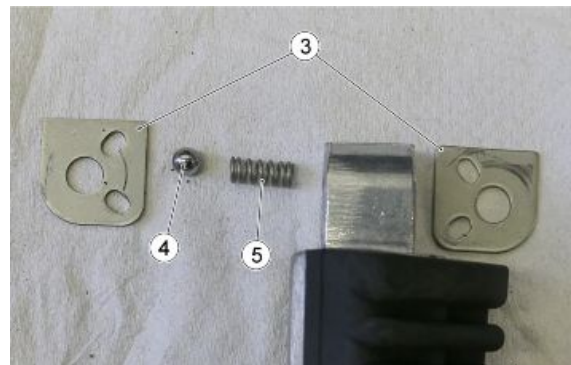
- Remove the snap ring(1)



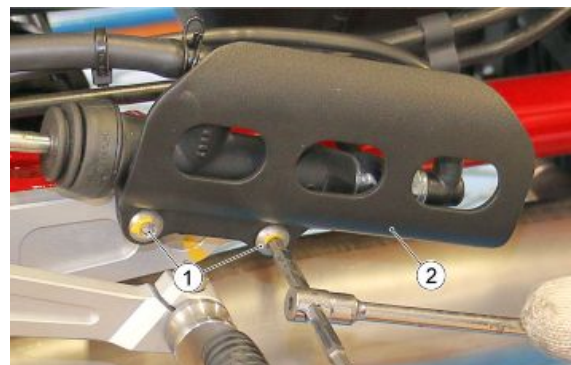
- Remove the pin (2)
- Remove the right-hand passenger footrest (3)



- Retrieve the two plates (3), the ball (4) and the spring (5)
- Repeat the entire operation to remove the left-hand passenger footrest

**(RACER)****REMOVAL OF THE RIGHT-HAND RIDER FOOTREST SUPPORT**

- Unscrew and remove the two screws (1)
- Remove the guard (2)



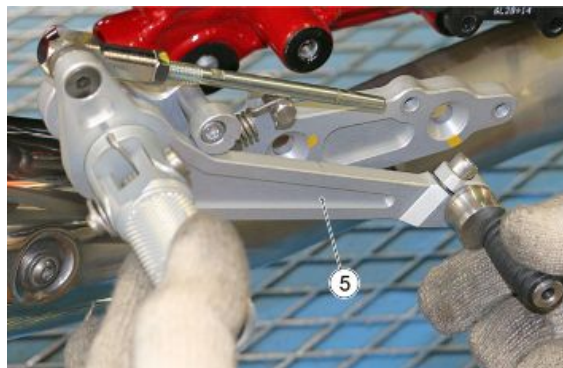
- Remove the two spacers (3)



- Unscrew and remove the two screws (4)

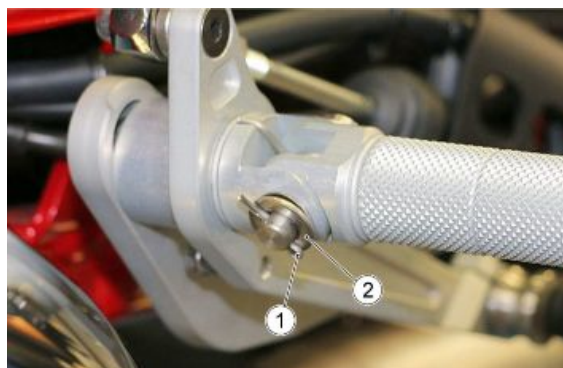


- Remove the right-hand rider footrest support (5)



#### REMOVAL OF THE RIGHT-HAND RIDER FOOTREST

- Remove the clip (1)
- Retrieve the washer (2)



- Remove the pin (3)
- Remove the right-hand rider footrest (4)
- Retrieve the spring (5)



#### REMOVAL OF REAR BRAKE LEVER

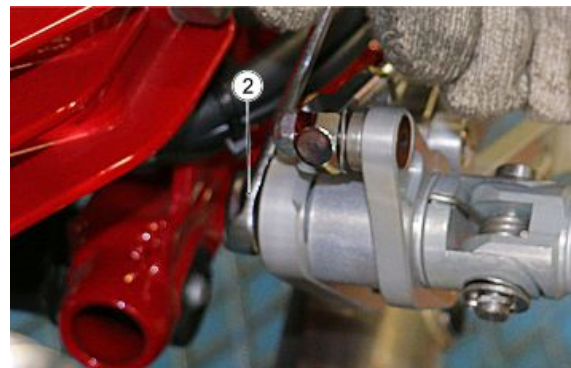
- Remove the lever return spring (1)

#### CAUTION

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



- Undo and remove the screw (2)

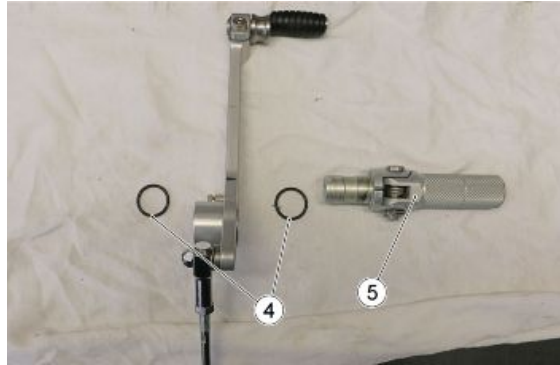


- Remove the rear brake lever (3)



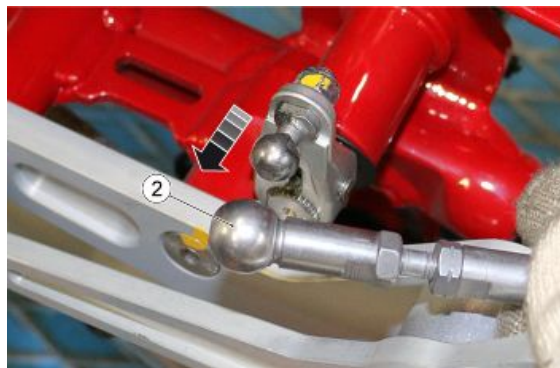


- Retrieve the two O-rings (4)
- Retrieve the right-hand rider footrest (5)

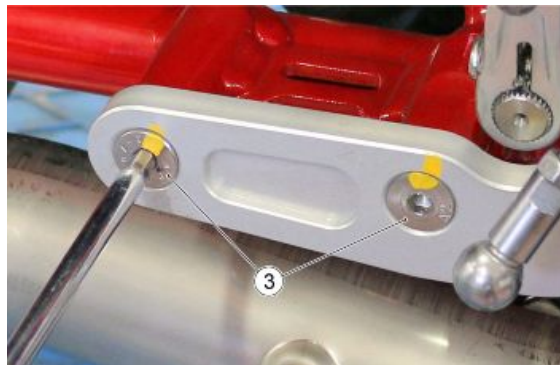


#### REMOVAL OF THE LEFT-HAND RIDER FOOTREST SUPPORT

- Remove the clip (1)
- Disconnect the gear shift lever tie-rod (2) from the ball joint



- Undo and remove the two fastening screws (3)

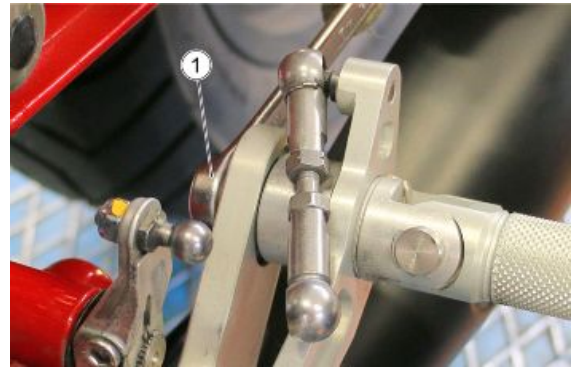


- Remove the footrest support (4)



#### REMOVAL OF THE GEAR SHIFT LEVER

- Undo and remove the fastening screw (1)



- Removal of the gear shift lever (2)



#### REMOVAL OF THE LEFT-HAND RIDER FOOTREST

- Remove the clip (1)



- Retrieve the washer (2)



- Remove the pin (3)



- Remove the left-hand rider footrest (4)
- Retrieve the spring (5)



#### REMOVAL OF THE PASSENGER FOOTREST SUPPORT

- Carry out the footrest removal procedure
- Undo and remove the screw (1)





- Remove the support (2)



- Remove the heel guard (3)



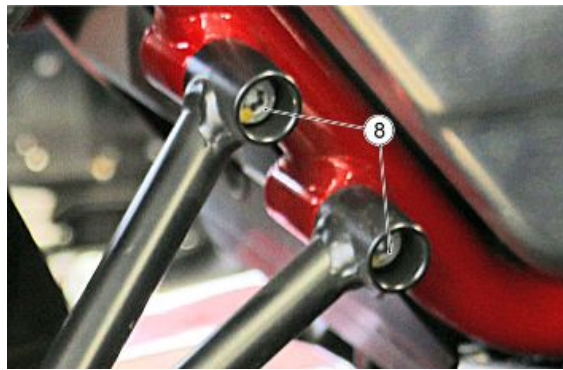
- Holding the nut in place as illustrated in the figure, undo and remove the screw (4)
- Retrieve the bushing (5)



- Retrieve the washer (6) and the nut (7)



- Unscrew and remove the two screws (8)



- Remove the support (9)
- Remove the support (10)
- Repeat the entire procedure to remove the left-hand passenger footrest support



#### REMOVAL OF THE PASSENGER FOOTREST

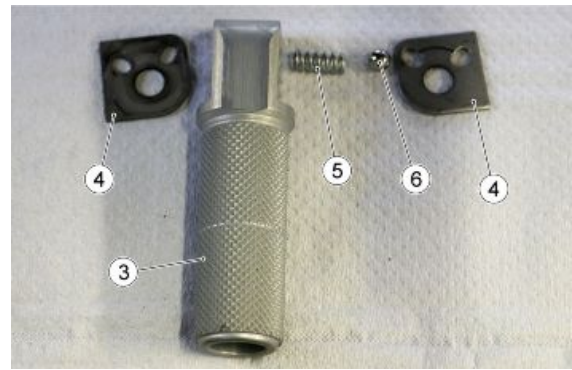
- Remove the snap ring (1)



- Remove the pin (2)

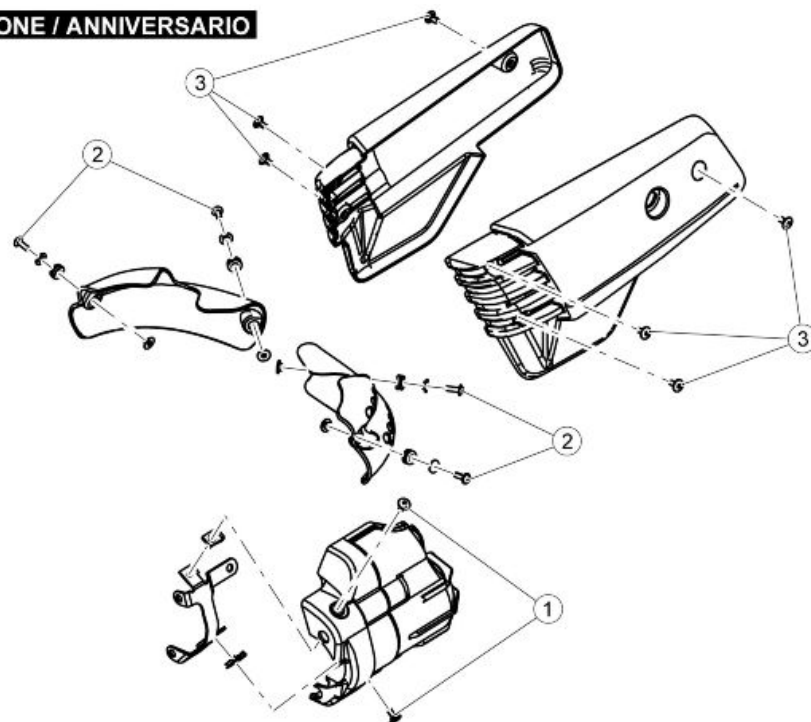


- Remove the right-hand passenger footrest (3)
- Retrieve the two plates (4), the spring (5) and the ball (6)
- Repeat the entire operation to remove the left-hand passenger footrest



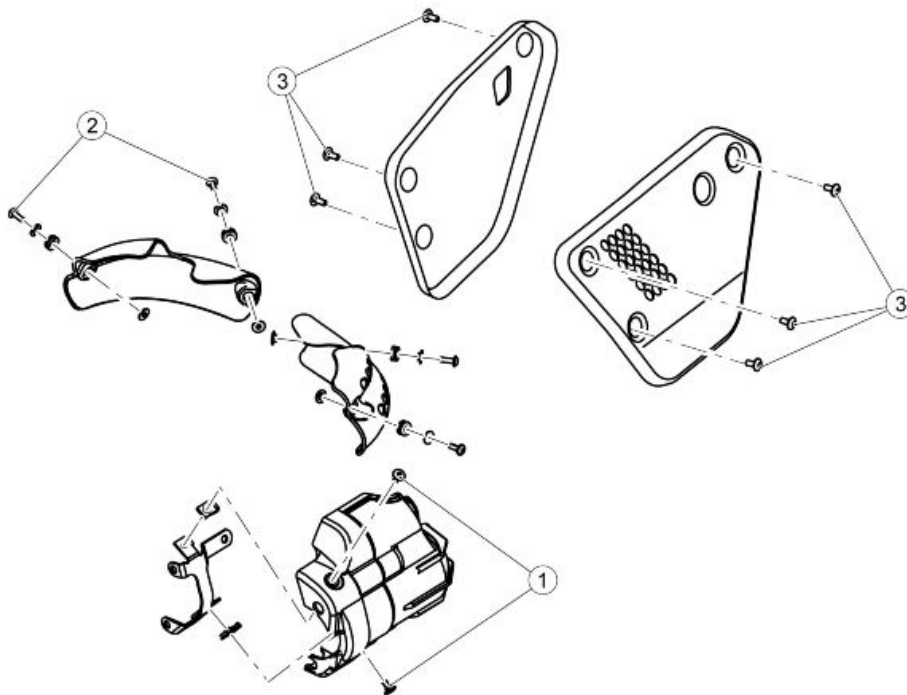
## Side body panels

**SPECIAL / STONE / ANNIVERSARIO**





**RACER**



**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 lb ft)	-
3	Side panel fastening screws	M5	6	4 Nm (2.95 lb ft)	-

**(SPECIAL/STONE/ANNIVERSARIO)**

- Undo and remove the three fastening screws (1)
- Remove the right side fairing panel (2)
- To remove the left side fairing, the operation described above must be repeated and the saddle opening cable must be unhooked from the ignition switch assembly

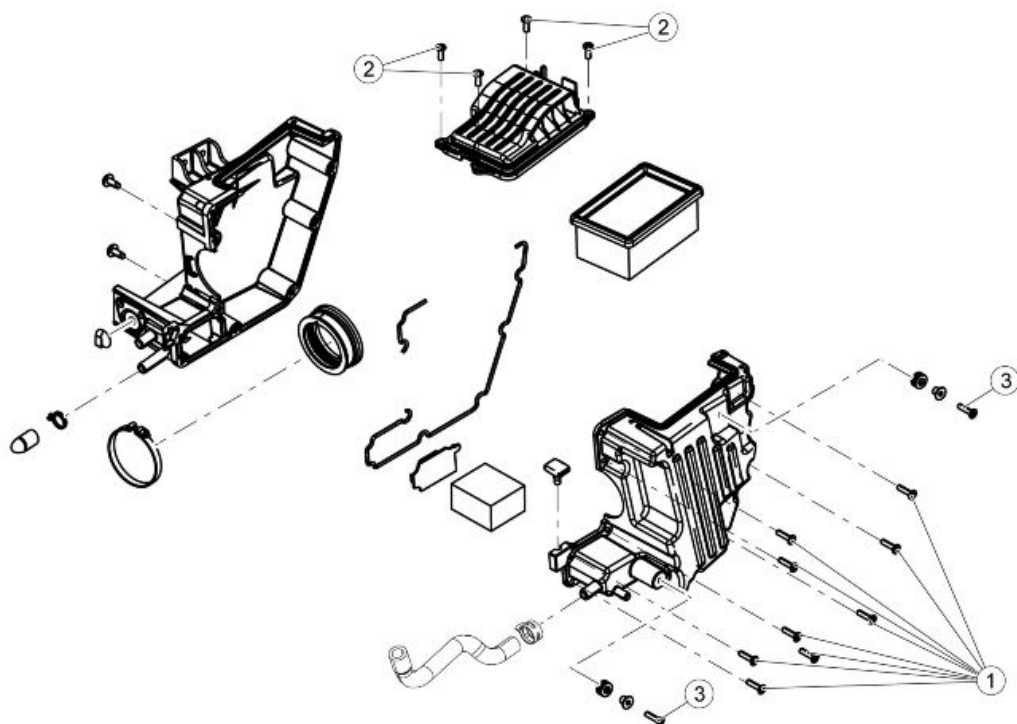


**(RACER)**

- Undo and remove the three fastening screws (1)
- Remove the right side fairing panel (2)
- To remove the left side fairing, the operation described above must be repeated and the saddle opening cable must be unhooked from the ignition switch assembly



**Air box**



**FILTER BOX**

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

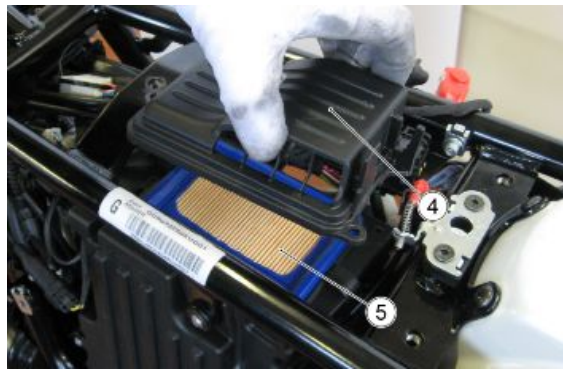
- Remove the saddle, the side panels and the battery complete with the rubber support
- Slide from the support present in the filter casing connector (1) and the ABS fuses (2)



- Remove the four fastening screws (3) of the air filter cover



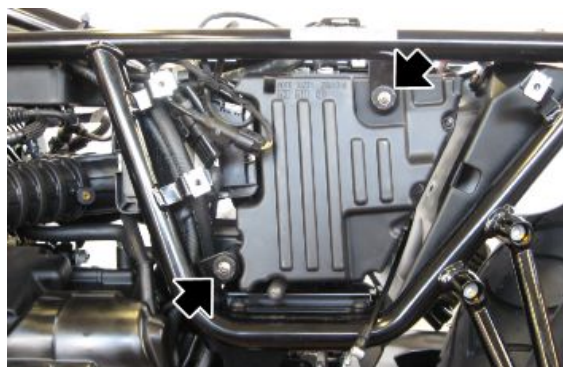
- Remove the air filter cover (4) and the filter (5)



- Remove the two screws securing the fuse box support and move it to have greater freedom of movement for subsequent operations

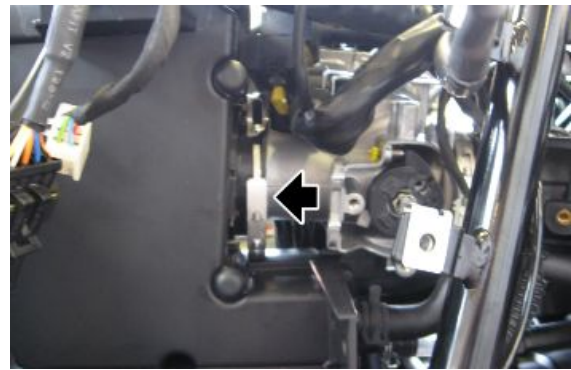


- Remove the two screws that fasten the air filter case to the chassis





- Remove the clamp present in the collector that blocks the filter case to the throttle body



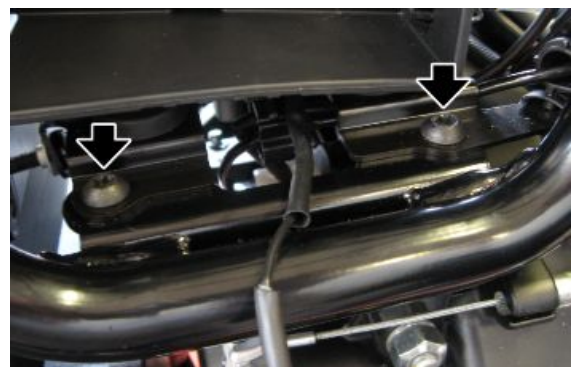
- Remove the two bottom fastening nuts of the splash guard



- 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



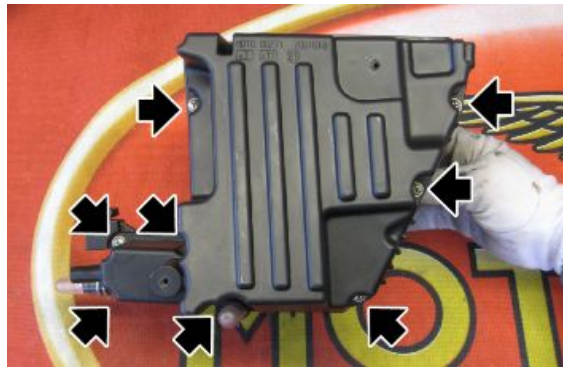
- Pull the filter case from the right side of the motorcycle



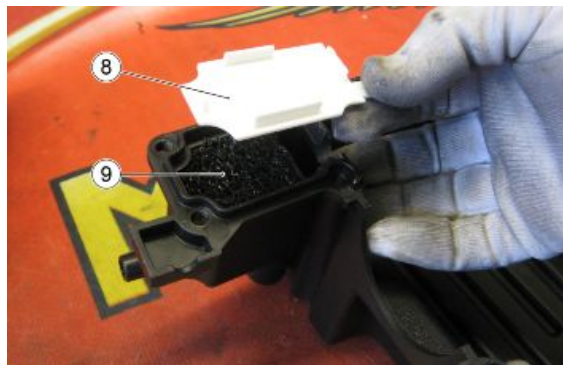
- Remove the collector from the filter case



- Remove the locking screws from the filter case



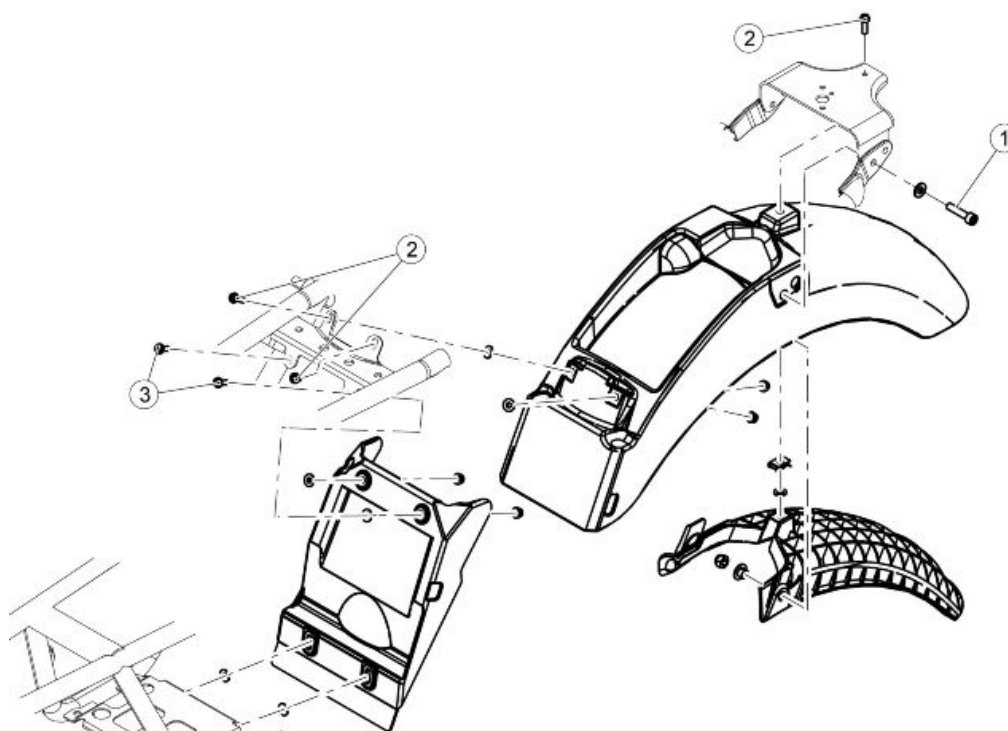
- Remove the cover (8) and the blow-by filter (9)



- Check and replace the two seals present in the cover



### Rear mudguard

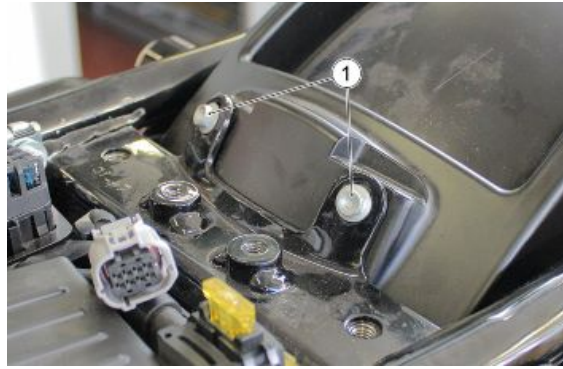


#### REAR MUDGUARD

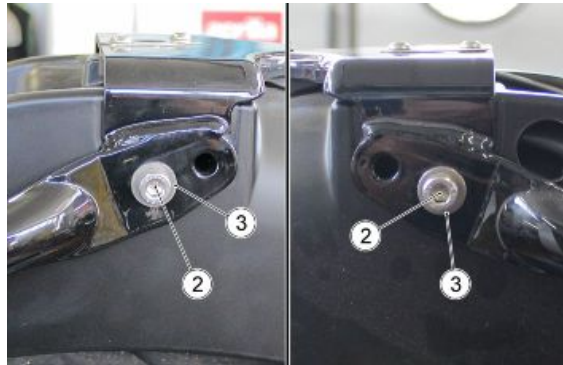
Pos.	Description	Type	Quantity	Torque	Notes
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lb ft)	
2	Front and centre fastening screw rear mudguard	M6	3	10 Nm (7.38 lb ft)	
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lb ft)	



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



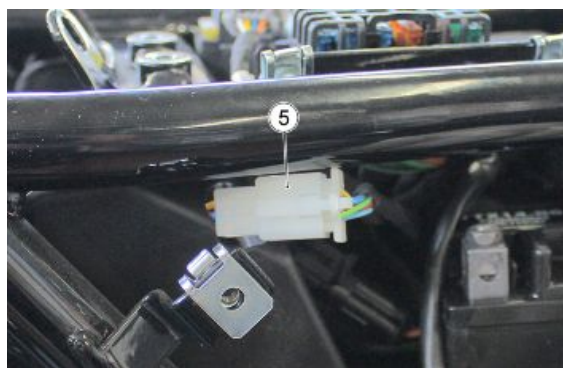
- Unscrew and remove the two fixing screws (2) from both sides of the vehicle
- Retrieve the two washers (3)



- 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



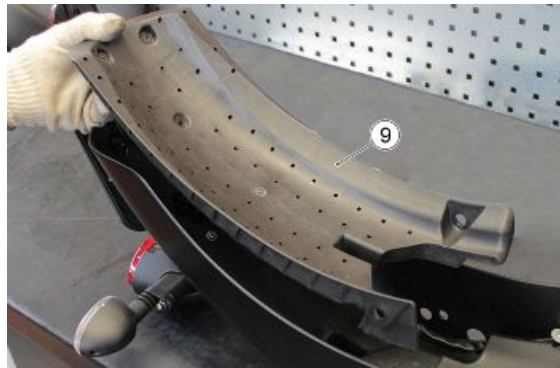
- Remove the two bushings (7)



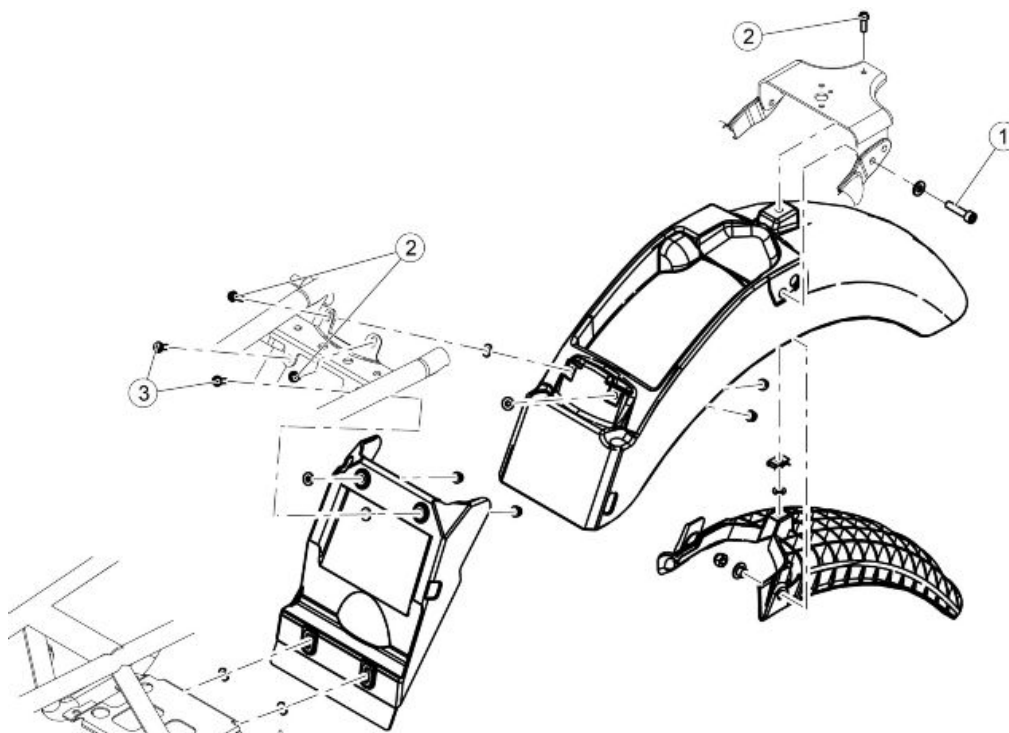
- Unscrew and remove the three screws (8)



- Remove the strengthener (9)
- Remove the rear light cluster



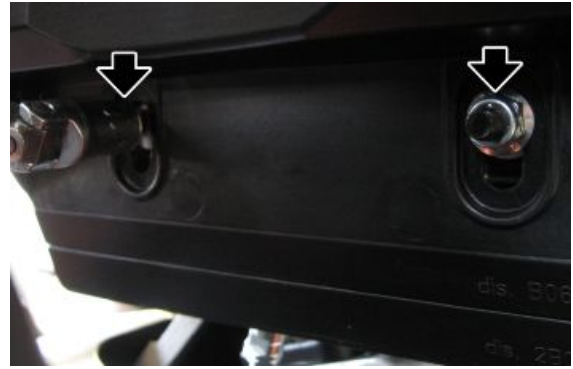
### Splash guard



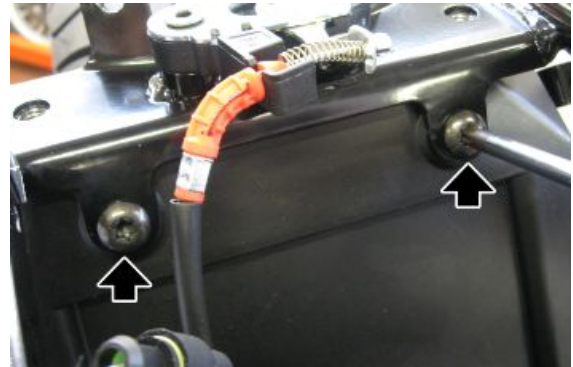
#### REAR MUDGUARD

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

- Remove the rear mudguard
- Remove the two lower nuts



- Remove the two upper screws complete with self-locking nuts

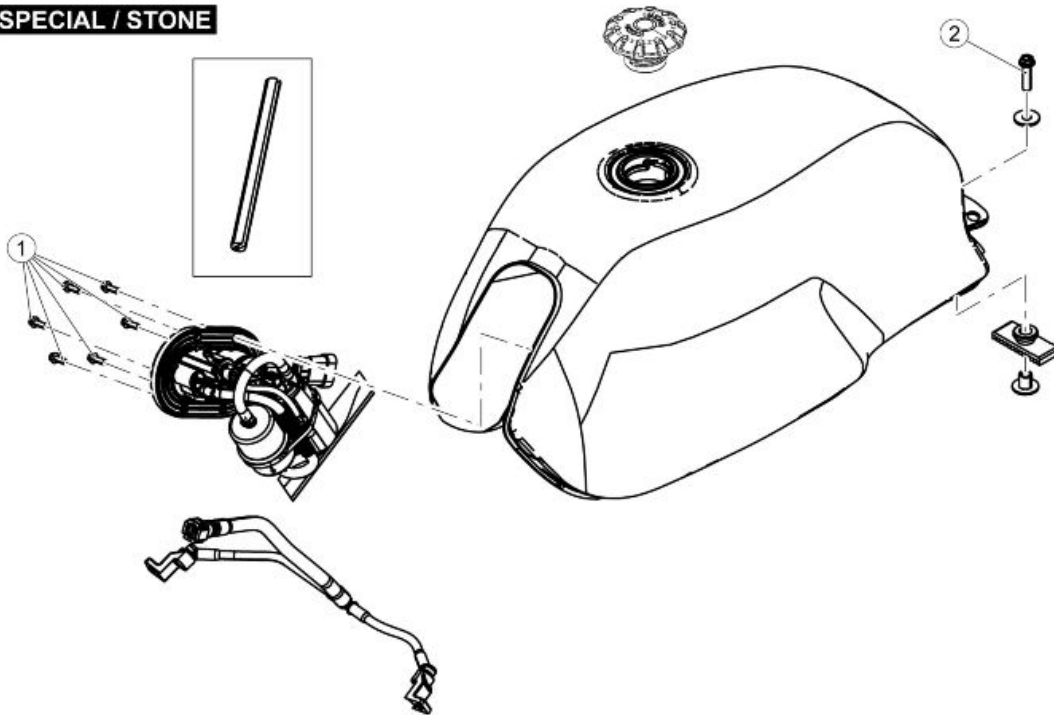


- Remove the splash guard

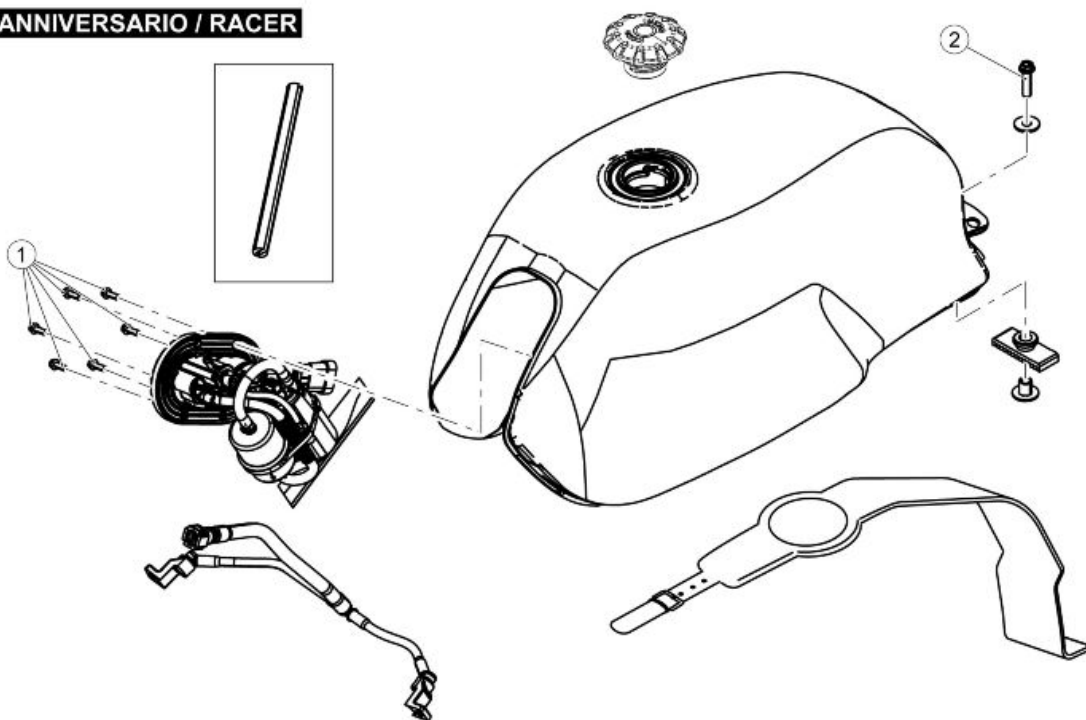


Fuel tank

**SPECIAL / STONE**



**ANNIVERSARIO / RACER**



**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
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lb ft)	-



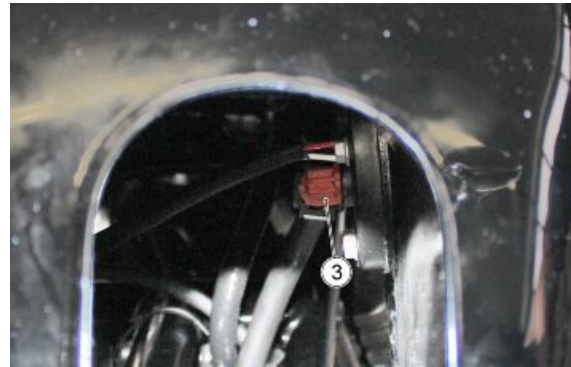
- Undo and remove the screw (1)
- Retrieve the washer (2)



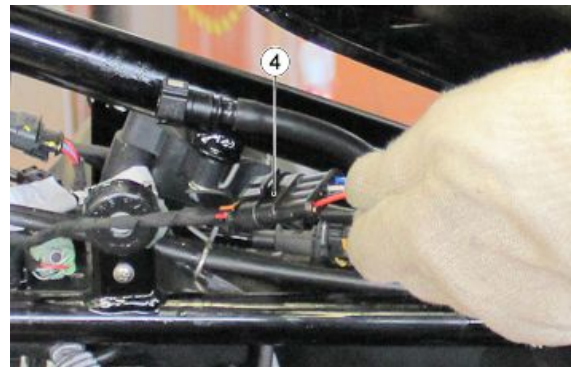
- Partially raise the fuel tank and disconnect the fuel hose coupling (3)

**CAUTION**

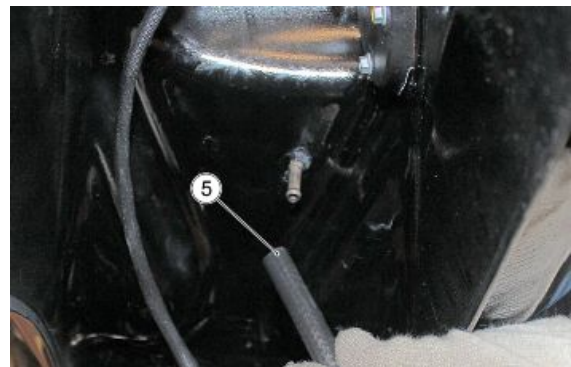
PAY PARTICULAR ATTENTION DURING THE LIFTING OPERATION IN THAT THE FUEL HOSE FITTING CAN BE DAMAGED



- Disconnect the connector (4)



- Remove the vent tube (5) from the coupling





- Remove the fuel tank (6)

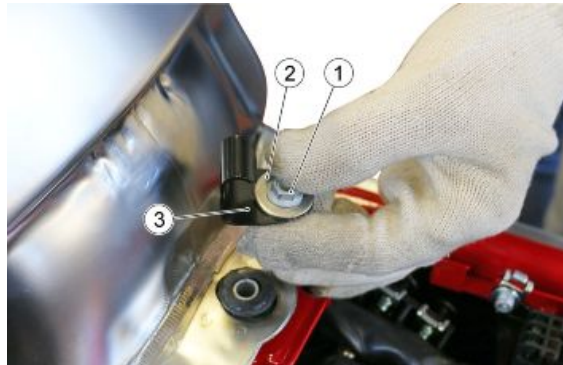


### TANK STRAP REMOVAL (RACER/ANNIVERSARIO)

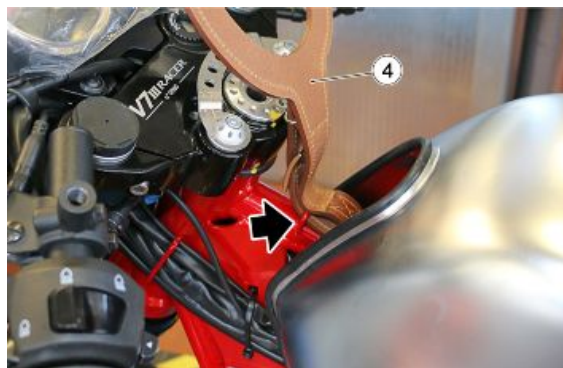
- Unhook the tank strap from the point indicated in the figure



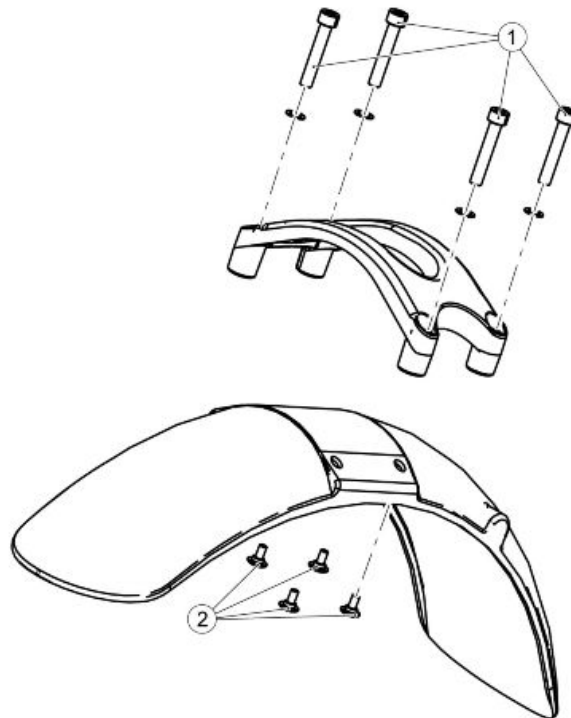
- Undo and remove the screw (1)
- Retrieve the washer (2) and the support hook (3)



- Unhook and remove the tank strap (4) from the point indicated in the figure



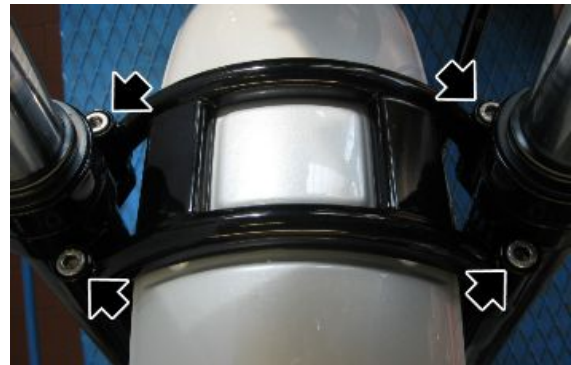
## Front mudguard



### 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

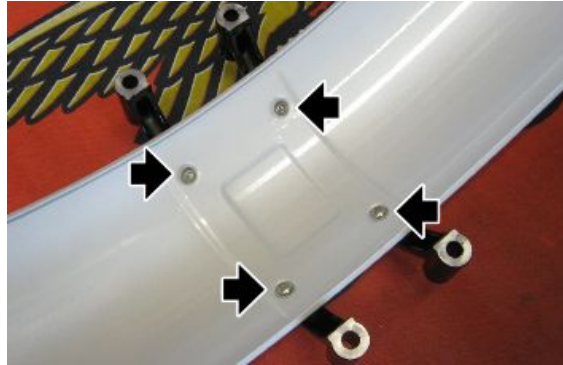
- Remove the four front mudguard support fixing screws at the fork sleeves



- Remove the mudguard complete



- Remove the four screws fixing the mudguard to the mudguard support



- Remove the mudguard support from the mudguard



# INDEX OF TOPICS

**P**RE-DELIVERY

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

**KEEP OUT OF THE REACH OF CHILDREN.**

**BATTERY LIQUID IS CORROSIVE. DO NOT POUR OR 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.**

---

## 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 AS TYRES MAY BURST.**

**CAUTION**

---



**CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.**

---

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