



WORKSHOP MANUAL

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V7 E5



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WORKSHOP MANUAL

V7 E5

This workshop manual has been produced for consultation by the technical staff of Dealerships, Service Centres, Authorised Service Network Workshops.

This manual is addressed to service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle mounting techniques and procedures.

Any technical changes made to the vehicles or to specific mounting operations will be promptly reported by updates to this manual.

In order to achieve satisfactory operations, it is necessary to have adequate work areas and the necessary specific equipment or hierarchies.

N.B.

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

IMPORTANT

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

WARNING

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



Personal Safety

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



Environmental Protection

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



Vehicle Integrity

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

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LIST OF TOPICS

Pre-delivery

Carry out the listed tests before delivering the vehicle.

CAUTION

PROCEED WITH THE UTMOST CAUTION WHEN HANDLING PETROL.

1.1 Appearance check

- Paintwork
- Fitting of Plastics
- Scratches
- Dirt

1.2 Safety locks check

Safety fasteners:

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

1.3 Electrical system

- Main switch
- Headlamps: high beam lights, low beam lights, tail-lights (front and rear) and relevant warning lights
- Headlight adjustment according to regulations in force
- Front and rear stop light switches and their bulbs
- Turn indicators and their warning lights
- Instrument cluster lights
- Instrument cluster
- Instrument panel warning lights
- Horn
- Electric starter
- Engine stop via emergency stop switch and side stand
- Through the diagnostic tool, check that the last mapping version is present in the control unit/s and, if required, program the control unit/s again: consult the technical service website to know about available upgrades and details regarding the operation.

WARNING

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

WARNING

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

CAUTION

THE BATTERY ELECTROLYTE IS TOXIC, CORROSIVE AND, AS IT CONTAINS SULPHURIC ACID, MAY CAUSE BURNING IF IT COMES INTO CONTACT WITH THE SKIN.

WHEN HANDLING BATTERY ELECTROLYTE, WEAR TIGHT-FITTING GLOVES AND PROTECTIVE APPAREL. IN THE EVENT OF SKIN CONTACT WITH THE ELECTROLYTIC FLUID, RINSE WELL WITH PLENTY OF CLEAN WATER.

IT IS PARTICULARLY IMPORTANT TO PROTECT THE EYES BECAUSE EVEN TINY AMOUNTS OF BATTERY ACID MAY CAUSE BLINDNESS.

IF THE FLUID GETS INTO CONTACT WITH THE EYES, WASH WITH ABUNDANT WATER FOR FIFTEEN MINUTES AND CONSULT AN EYE SPECIALIST IMMEDIATELY.

THE BATTERY RELEASES EXPLOSIVE GASES. KEEP IT AWAY OF FLAMES, SPARKS, CIGARETTES OR ANY OTHER HEAT SOURCE.

ENSURE ADEQUATE VENTILATION WHEN SERVICING OR RECHARGING THE BATTERY.

KEEP OUT OF THE REACH OF CHILDREN.

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

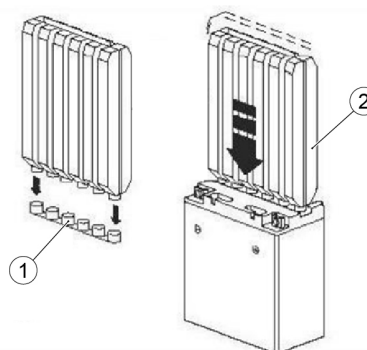
ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY BEING ACTIVATED.

CAUTION

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

TRADITIONAL BATTERY ACTIVATION PROCEDURE

- Place the battery on a flat surface.
- Remove the cell's protective sticker.
- Take the acid container.
- Remove the cap 1 of the container 2.
- Place the container upside down, perpendicularly above the battery, aligning the outlets with the battery cells.
- Apply pressure to the container to break the seals. The liquid will begin to flow into the cells.



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



N.B.:



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

1.4 Level 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

1.5 Test drive

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

1.6 Static check

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

1.7 Functional checks

- Hydraulic braking system
- Brake and clutch lever stroke (where applicable)
- Clutch - check proper operation
- Engine - check for proper general operation and absence of abnormal noise
- Check documents, frame number and engine number
- Check included tools (where applicable)
- License plate fitting
- Locks check
- Tyre pressure check
- Installation of mirrors and any accessories
- Battery installation

CAUTION



NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

WARNING



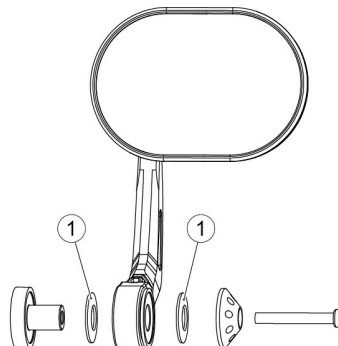
CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

1.8 Specific operations for vehicle

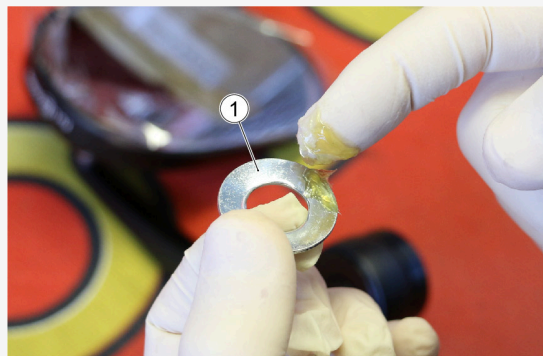
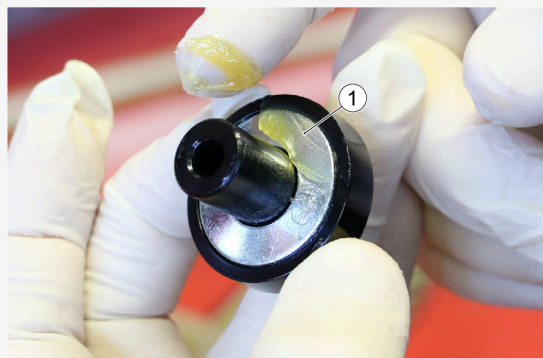
FITTING THE SIDE REAR-VIEW MIRRORS

(if applicable)

- Unlock the nut that fastens the components of the mirror and remove it, keeping in mind the mounting direction of the spring washers (1), which must be fitted with the concave part toward outside.



- If there is no grease, apply a thin layer on both sides of the spring washers (1).



- Apply **Loctite 243** threadlocking on the thread of the M6 screw.

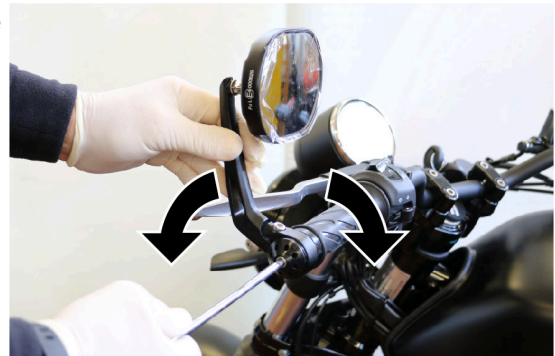


- Tighten the screw for fixing the handlebar rear-view mirror to the specified torque.

CHARACTERISTIC	DESCRIPTION / VALUE
Rear-view mirror fixing screw	10 Nm (7.38 lbf ft)



- Keeping the screw in position, turn the mirror a few times from both sides.



LIST OF TOPICS

Specifications

2.1 Regulations

2.1.1 Safety rules

Carbon monoxide

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

CAUTION



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

Fuel

CAUTION



FUEL USED TO DRIVE EXPLOSION ENGINES IS HIGHLY INFLAMMABLE AND CAN BECOME EXPLOSIVE UNDER SPECIFIC CONDITIONS.

IT IS THEREFORE RECOMMENDED TO CARRY OUT REFUELLING AND MAINTENANCE PROCEDURES IN A VENTILATED AREA WITH THE ENGINE SWITCHED OFF. DO NOT SMOKE DURING REFUELLING AND NEAR FUEL VAPOURS, AVOIDING ANY CONTACT WITH NAKED FLAMES, SPARKS OR OTHER SOURCES WHICH MAY CAUSE THEM TO IGNITE OR EXPLODE.

DO NOT ALLOW FUEL TO DISPERSE INTO THE ENVIRONMENT.

KEEP OUT OF THE REACH OF CHILDREN.

Hot parts

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

Used engine oil and transmission oil

CAUTION



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

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

WASH YOUR HANDS CAREFULLY AFTER HANDLING OIL.

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

DO NOT DISPOSE OF OIL INTO THE ENVIRONMENT.

KEEP OUT OF THE REACH OF CHILDREN.

Brake and clutch fluid

CAUTION



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

KEEP OUT OF THE REACH OF CHILDREN.

Battery electrolyte and hydrogen gas

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

2.1.2 maintenance instructions

GENERAL PRECAUTIONS AND INFORMATION

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

BEFORE REMOVING 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.

COMPONENTS REMOVAL

- Do not loosen and/or tighten the screws and nuts using pliers or other tools, but always use the specific wrench.
- Mark the positions on all the connection joints (hoses, cables, etc.) before separating them and identify them with different distinctive marks.
- Each piece should be clearly marked in order to be identified during the installation phase.
- Carefully clean and wash the disassembled components with detergents with a low flammability grade.
- Keep the coupled parts together because they have "adapted" to one another following normal wear.
- Some components must be used together or replaced entirely.
- Keep away from heat sources.

REASSEMBLING THE COMPONENTS

WARNING



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

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

- Clean all coupling surfaces, oil seal rims and gaskets before refitting them. Smear a light layer of lithium-based grease on the oil seal rims. Reassemble oil seals and bearings with the brand or lot number facing outward (visible side).

ELECTRICAL CONNECTORS

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

If present, press on the specific safety catches.

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

WARNING



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

N.B.:



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

TIGHTENING TORQUES

WARNING



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

CAUTION



REMEMBER THAT THE TIGHTENING TORQUE FOR ALL THE FIXING ELEMENTS LOCATED ON WHEELS, BRAKES, WHEEL AXLES AND OTHER SUSPENSION COMPONENTS PLAY A FUNDAMENTAL ROLE IN GUARANTEEING THE SAFETY OF THE VEHICLE AND MUST BE KEPT AT THE PRESCRIBED VALUES.

REGULARLY CHECK THE TIGHTENING TORQUE OF THE FIXING ELEMENTS AND ALWAYS USE A TORQUE WRENCH WHEN REFITTING.

IF THESE WARNINGS ARE NOT OBSERVED, ONE OF THESE COMPONENTS COULD LOOSEN AND COME OFF, BLOCKING A WHEEL OR CAUSING OTHER PROBLEMS THAT WOULD COMPROMISE MANOEUVRABILITY, LEADING TO A CRASH WITH THE RISK OF SERIOUS INJURY OR EVEN DEATH.

2.2 Running-in

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

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.

WARNING



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

Follow these guidelines:

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

CAUTION



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.

2.3 vehicle identification

SERIAL NUMBER LOCATION

These numbers are necessary for vehicle registration.

WARNING



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

FRAME NUMBER

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

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

ZGULD00017MXXXXXX

KEY:

ZGU: WMI (World Manufacturer Identifier) code;

LD: model;

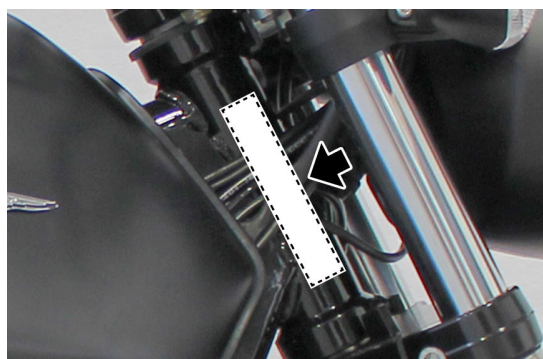
000 : version;

0 : free digit

19 : variable year of manufacture (19 - for 2019)

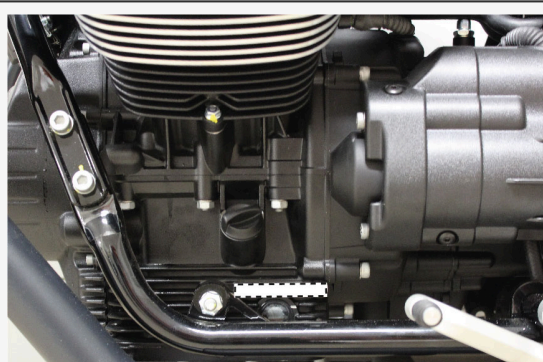
M: production plant (M= Mandello del Lario);

XXXXXX: serial number (6 digits);



ENGINE NUMBER

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



2.4 Dimensions and mass

DIMENSIONS AND MASS	
Max. length.	2165 mm (85.24 in)
Max. width	800 mm (31.50 in)
Max. height	1,100 mm (43.31 in)
Wheelbase	1,450 mm (57.09 in)
Kerb weight (Stone)	218 kg (481 lb)
Kerb weight (Special)	223 kg (492 lb)

2.5 Engine

ENGINE	
Type	traverse-mounted twin-cylinder four-stroke V 90°
Number of cylinders	2
Engine capacity	853 cc (52.05 cu in)
Bore / stroke	84x77 mm (3.30x3.03 in)
Compression ratio	10.5 +/- 0.5: 1
Ignition	Electric
Idle engine speed	1,250 +/- 100 (rpm)
Clutch	single disc dry clutch with flexible coupling
Lubrication system	pressure-fed, controlled by valves and trochoidal pump
Air filter	cartridge-type dry filter
Cooling	air

2.6 Transmission

GEARBOX	
Type	mechanical, 6 speeds with foot lever on the left hand side of the engine

TRANSMISSION	
Primary drive	with gears, ratio: $18 / 23 = 1 : 1.277$
Gear ratios 1st gear	$16 / 39 = 1 : 2.437$
Gear ratios 2nd gear	$18 / 32 = 1 : 1.777$
Gear ratios 3rd gear	$21 / 28 = 1 : 1.333$
Gear ratios 4th gear	$24 / 26 = 1 : 1.083$
Gear ratios 5th gear	$25 / 24 = 1 : 0.96$
Gear ratios 6th gear	$28 / 24 = 1 : 0.857$
Final drive	with shaft, ratio $8 / 33 = 1 : 4.125$

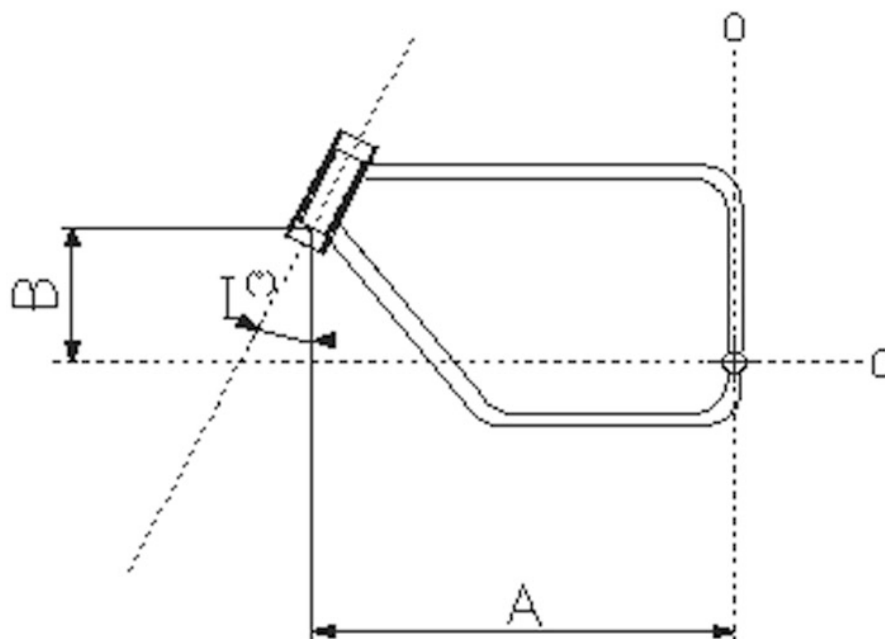
2.7 Capacity

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

2.8 Electrical system

ELECTRICAL SYSTEM	
Battery	12 V – 12 Ah
Permanent magnet alternator	12V - 430W
Fuses	(halogen headlamps) 10 - 7.5 - 15 - 5 (2) - 30 - 20 A (led headlamps) 10 - 7.5 - 15 - 5 (2) - 30 - 20 A
High beam/low beam light	(halogen 12 V - 55 W / 60 W H4) or (led)
Front DRL	(halogen 12 V - 5 W) or (led)
taillight /stop lights	(halogen 12 V - 5 / 21 W) or (led)
Turn indicators	(halogen 12 V - 10 W (RY 10 W orange bulb)) or (led)
SPARK PLUGS	
Standard	NGK IR MR8BI-8
Spark plug electrode gap	0.8 mm (0.031 in)
Resistance	5 kOhm
INDICATOR LAMPS	
Gearbox in neutral	LED
Turn indicators	LED
Fuel reserve	LED
High beam headlight	LED
General alarm	LED
MI warning light	LED
ABS warning light	LED
MGCT warning light	LED

2.9 Frame and suspension



Dimensions A and B

Size A	692 mm (27.24 in)
Size B	186 mm (7.32 in)

CHASSIS

Type	Modular double cradle, high-strength steel tubular chassis
Steering rake angle	26.4°
Trail (no rider or passenger - wheels on the ground - without use of side stand)	104.2 mm (4.10 in)

SUSPENSION

Front	hydraulic telescopic fork, Ø 40 mm (1.57 in)
Travel	137 mm (5.39 in)
Rear (standard)	Swingarm in die-cast light alloy, 2 shock absorbers with adjustable spring pre-loading

SUSPENSION	
Rear (race)	Swingarm in die-cast light alloy, 2 shock absorbers with adjustable extension, compression and spring pre-loading
Stroke (standard)	98 mm (3.86 in)
Stroke (race)	75 mm (2.95 in)

2.10 Brakes

BRAKES	
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

2.11 Wheels and tyres

WHEEL RIMS	
Type	spoked wheels with alloy rims, for tyres with inner tubes, or alloy tubes wheels for tubeless tyres.
Front	2.5"x18"
Rear	4.25" x 17"
TYRES	
Front (size)	100 / 90 - 18 56V
Front (inflation pressure)	2.5 bar (250 kPa) (36.26 PSI)
Front (inflation pressure with passenger)	2.6 bar (260 kPa) (37.71 PSI)
Rear (size)	150 / 70B - 17 69V
Rear (inflation pressure)	2.5 bar (250 kPa) (36.26 PSI)
Rear (inflation pressure with passenger)	2.6 bar (260 kPa) (37.71 PSI)

2.12 Power feed

FUEL SYSTEM	
Type	Electronic injection (Marelli MIU G4)
Diffuser	Ø 38 mm (1.50 in)
Fuel	Unleaded gasoline E10 (95 R.O.N.)

2.13 Tightening torques

If the following tables do not expressly indicate the tightening torque values, refer to the table with the generic torque values indicated below.

SELF-TAPPING SCREW TORQUES FOR PLASTIC

	2.9 mm	3.9 mm	4.2 mm	4.9 mm
Tightening torque:	1 Nm (0.73 lbf ft)	1.5 Nm (1.10 lbf ft)	2 Nm (1.47 lbf ft)	2.5 Nm (1.84 lbf ft)

METRIC SCREW TIGHTENING TORQUES

	M4	M5	M6	M8	M10	M12
Tightening torque:	3 Nm (2.21 lbf ft)	5.5 Nm (4.05 lbf ft)	9.5 Nm (7.00 lbf ft)	25 Nm (18.43 lbf ft)	50 Nm (36.87 lbf ft)	80 Nm (59.00 lbf ft)

METRIC SCREW TIGHTENING TORQUES ON FASTENERS WITH PLASTIC COMPRESSION WITHOUT INSERTED COLLAR OR BUSH

	M4	M5	M6
Tightening torque:	1.5 Nm (1.10 lbf ft)	2 Nm (1.47 lbf ft)	3 Nm (2.21 lbf ft)

WARNING

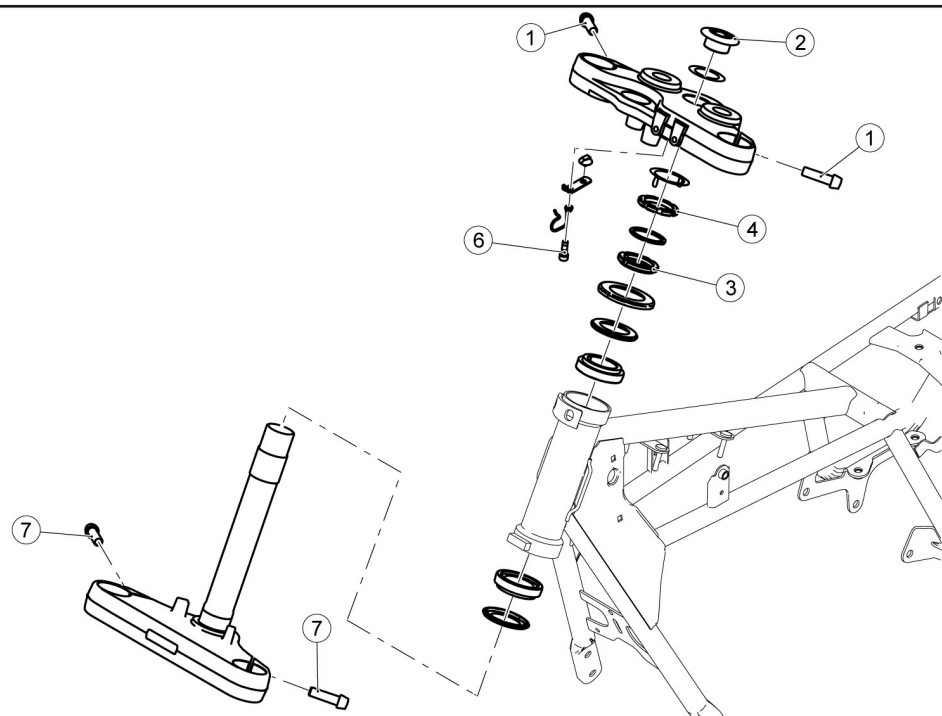
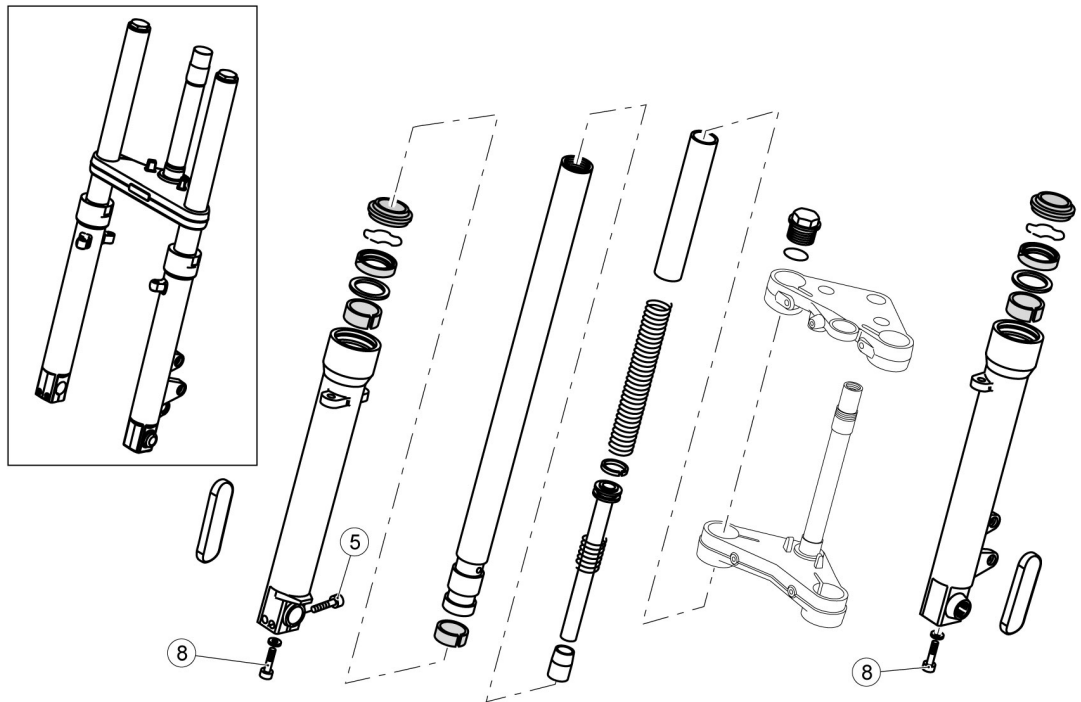


THE SCREWS WITH THREAD-LOCK SEALANT (PRE-IMPREGNATED) MUST BE REPLACED WITH NEW SCREWS AFTER THEY HAVE BEEN LOOSENED.

BEFORE FITTING THE NEW SCREWS, CLEAN THE THREADED HOLES CAREFULLY, MAKING SURE THAT ALL TRACES OF THE OLD THREAD-LOCK SEALANT HAVE BEEN ELIMINATED.

2.13.1 Chassis architecture

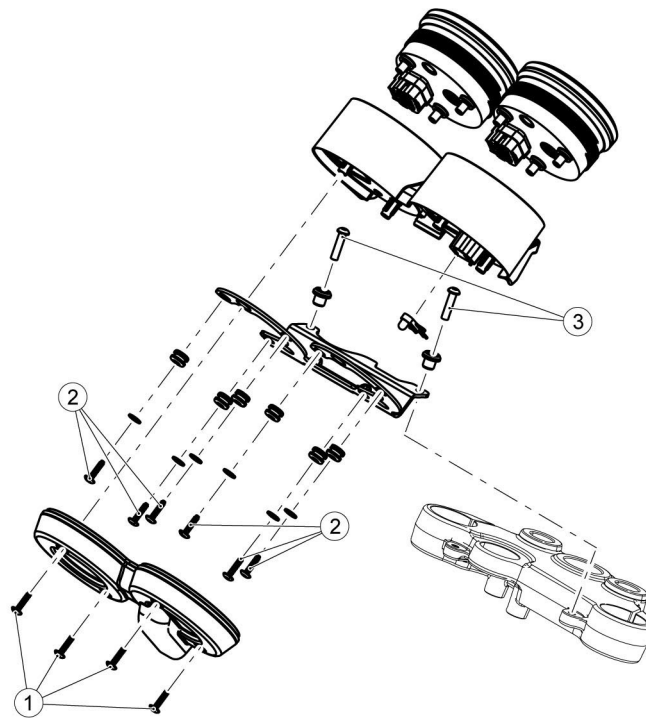
2.13.1.1 Front of vehicle



FRONT SUSPENSION - STEERING

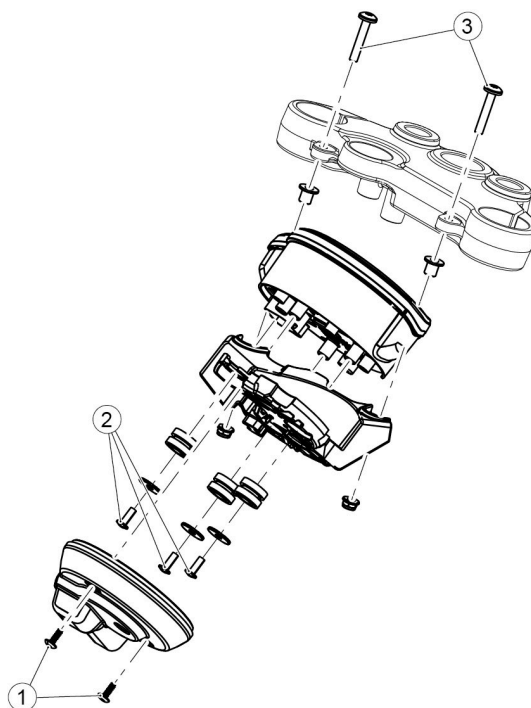
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-
2	Steering head fastening bushing	-	1	100 Nm (73.76 lbf ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lbf ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter- lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lbf ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lbf ft)	-

(SPECIAL)

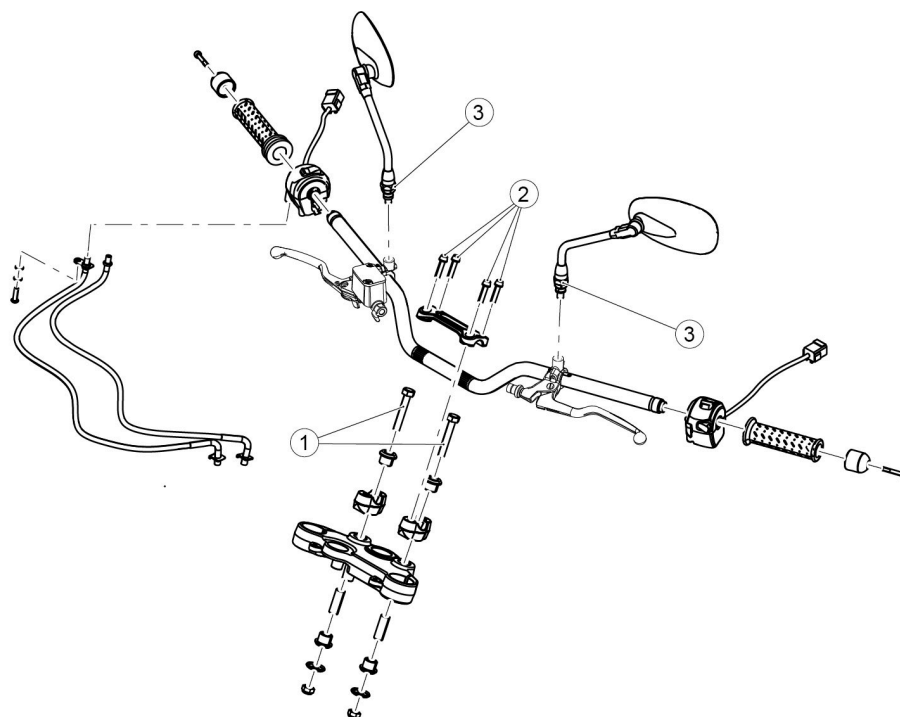
**INSTRUMENT CLUSTER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Instrument cluster cover fastening screws	Self-tapping 4.2 x 19	4	2 Nm (1.46 lbf ft)	-
2	Screws fastening instrument cluster to support bracket	Self-tapping 3.9 x 16	6	2 Nm (1.46 lbf ft)	-
3	Support plate fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

(STONE)

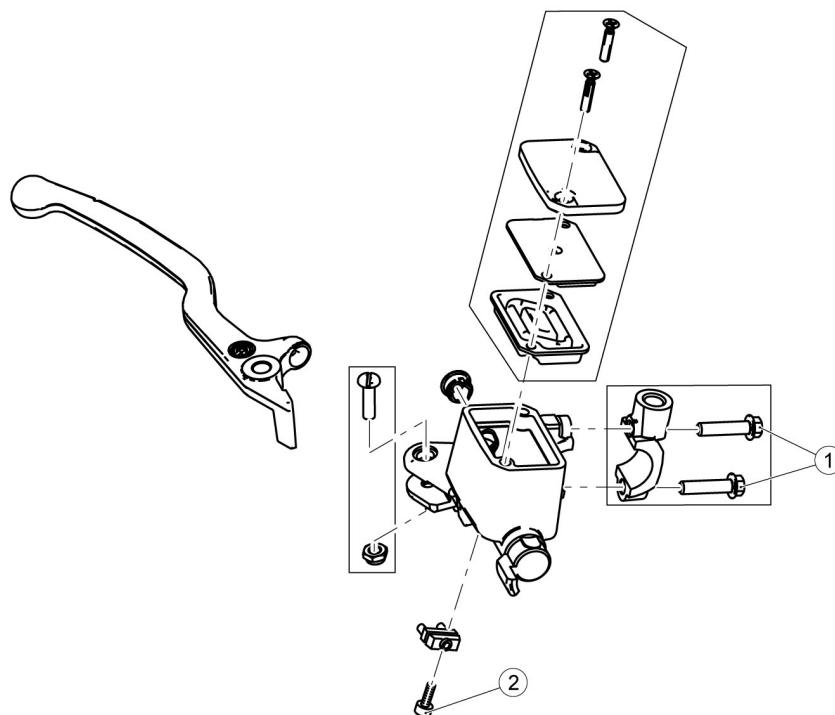
**INSTRUMENT CLUSTER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Instrument cluster cover fastening screws	Self-tapping 4.2x13	2	2 Nm (1.46 lbf ft)	-
2	Screws fastening instrument cluster to support bracket	Self-tapping 5x14	3	3 Nm (2.21 lbf ft)	-
3	Support plate fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
4	Support plate fastening nuts	M6	2	10 Nm (7.38 lbf ft)	-



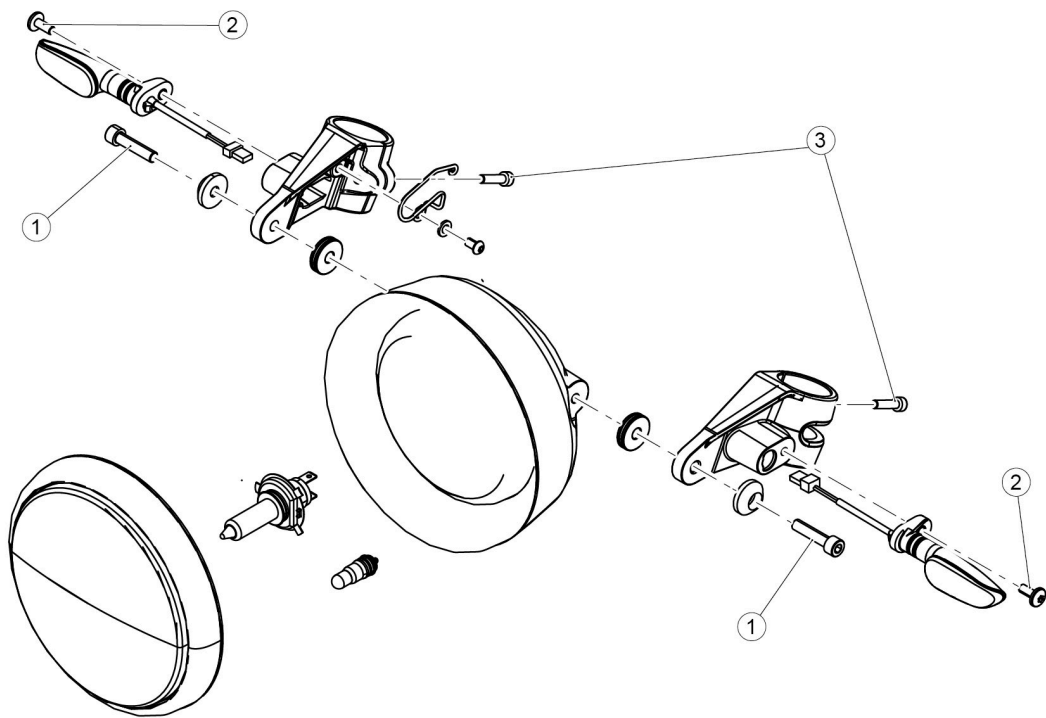
HANDLEBAR AND CONTROLS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screw fixing handlebar support U-bolts to steering plate	M10	2	50 Nm (36.88 lbf ft)	-
2	Handlebar U-bolt fastener screws	M8	4	25 Nm (18.44 lbf ft)	-
3	Mirror fixing	M10	2	Manual	-
-	Light switch fastening screws	SWP 5	2	1.5 Nm (1.11 lbf ft)	-
-	Throttle cable cover fastening screws	M5	3	6 Nm (4.43 lbf ft)	-

**FRONT BRAKE MASTER CYLINDER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-

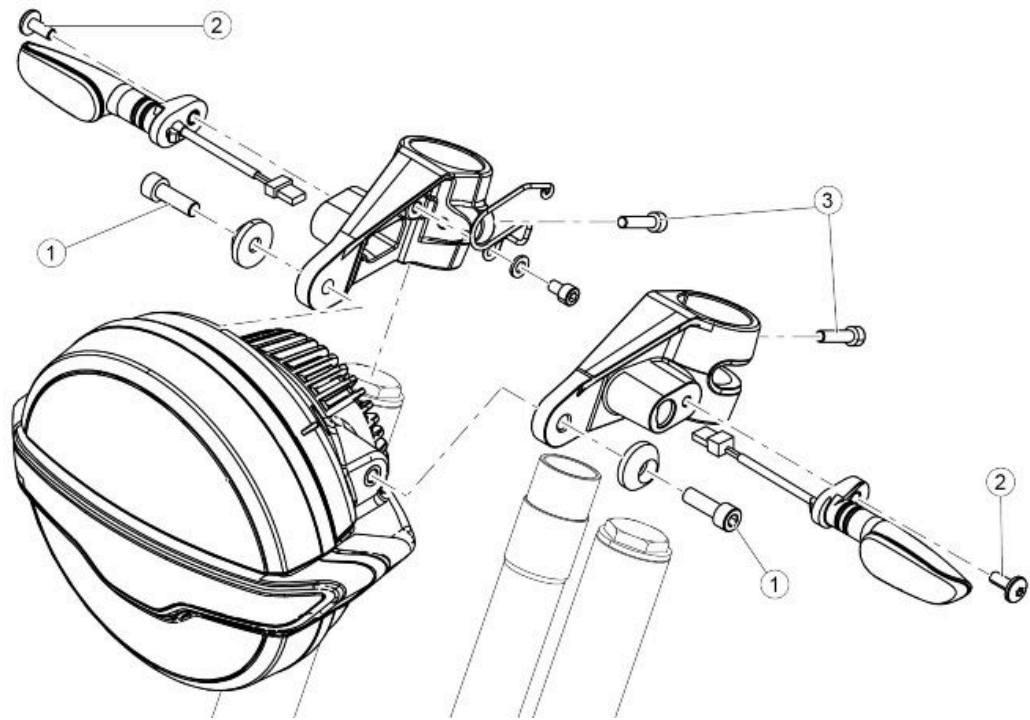
(SPECIAL)



FRONT LIGHTS

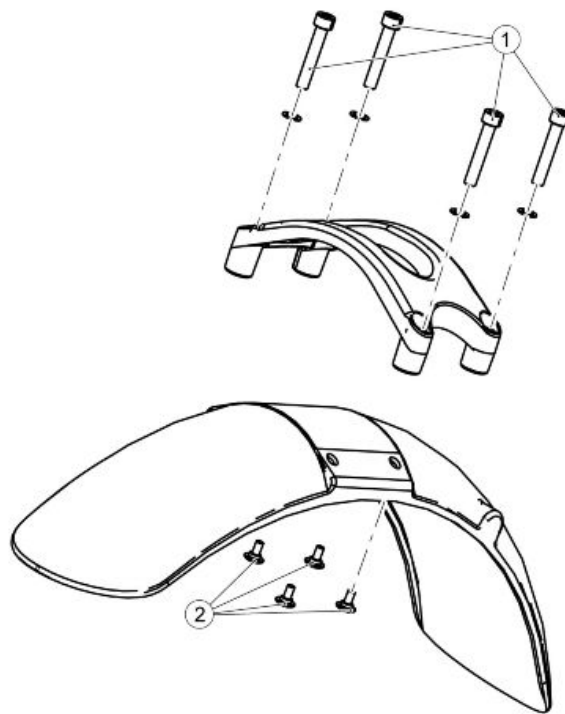
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lbf ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

(STONE)



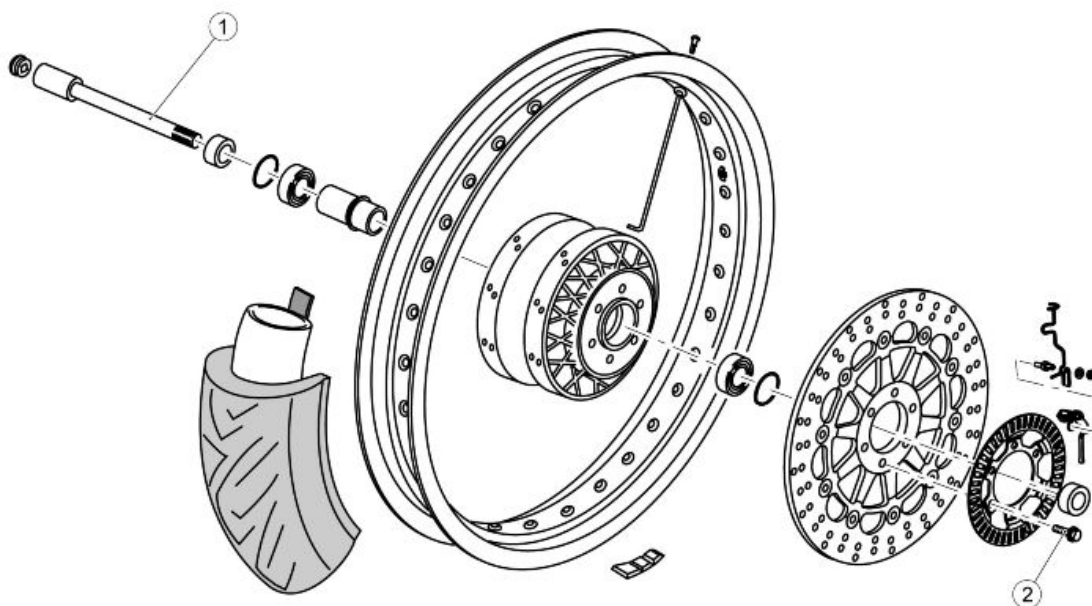
FRONT LIGHTS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lbf ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

**FRONT MUDGUARD**

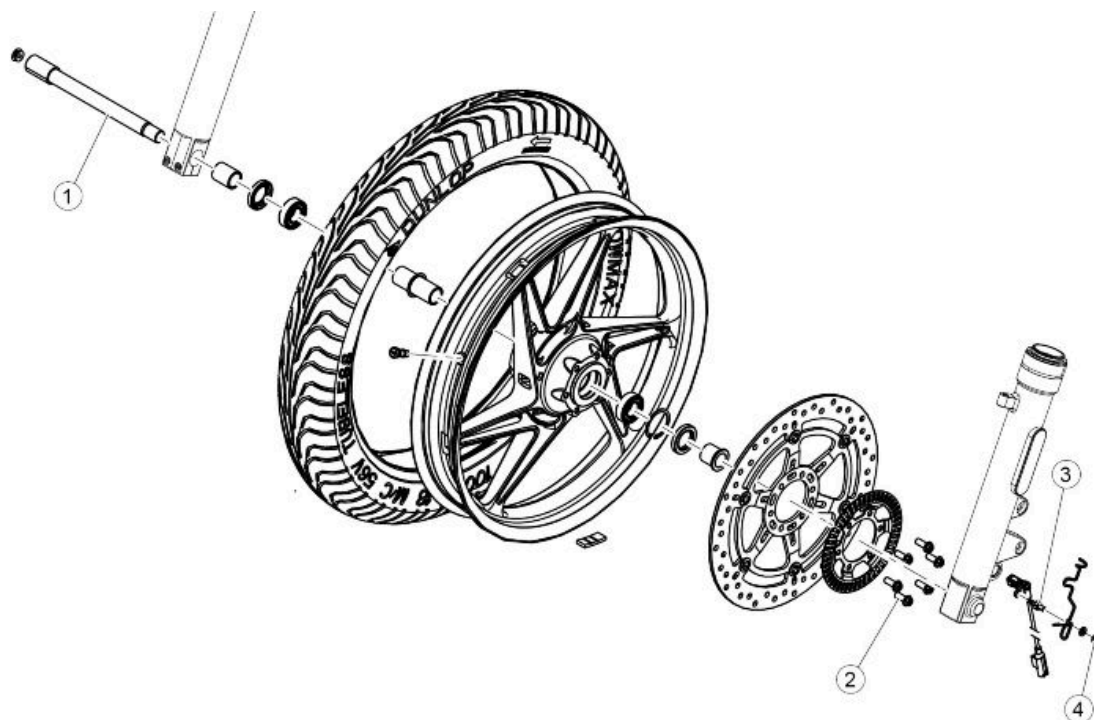
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.10 lbf ft)	-
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lbf ft)	-

(SPECIAL)

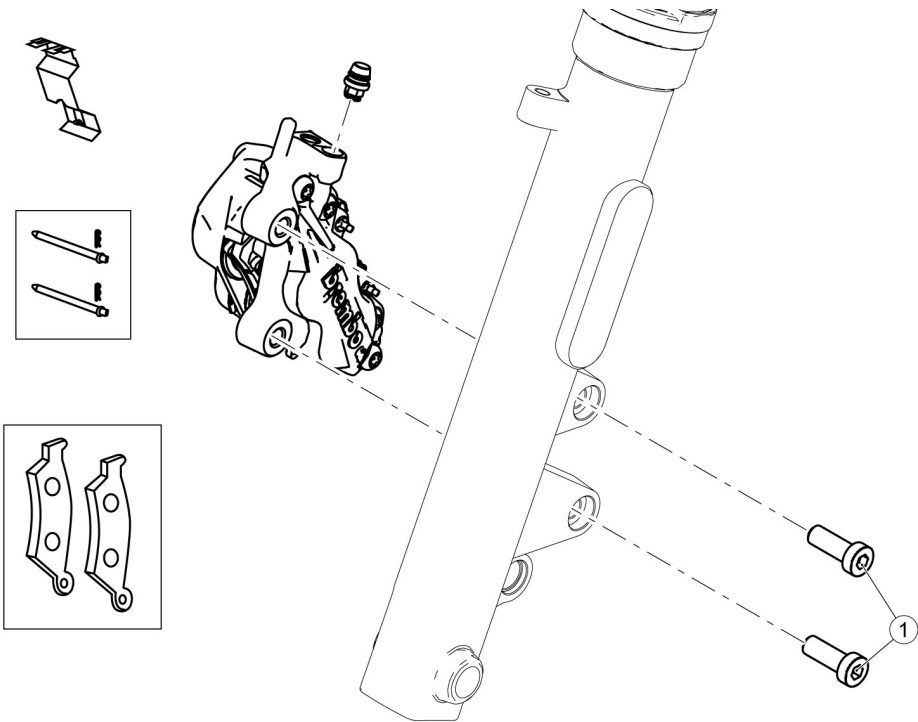
**FRONT WHEEL**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

(STONE)



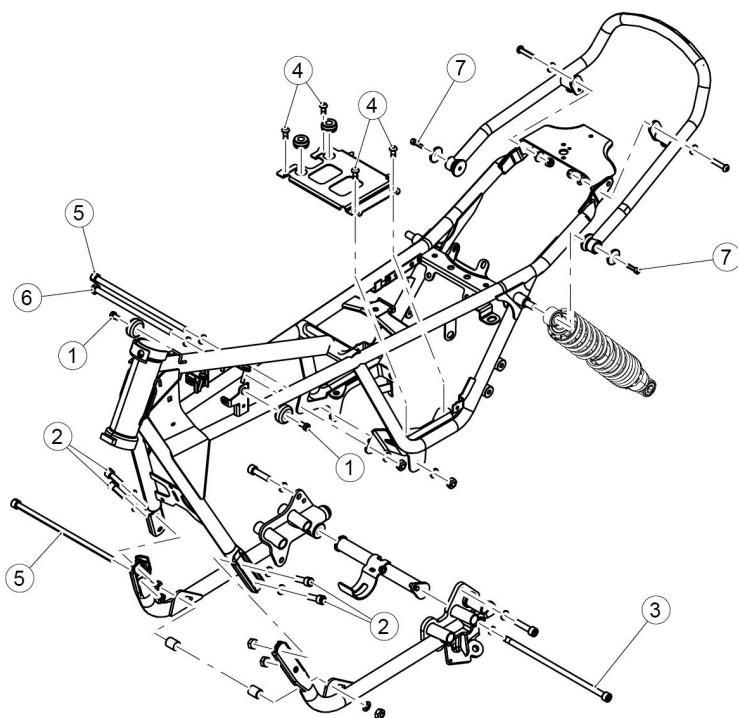
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-



FRONT BRAKE CALLIPER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lbf ft)	-

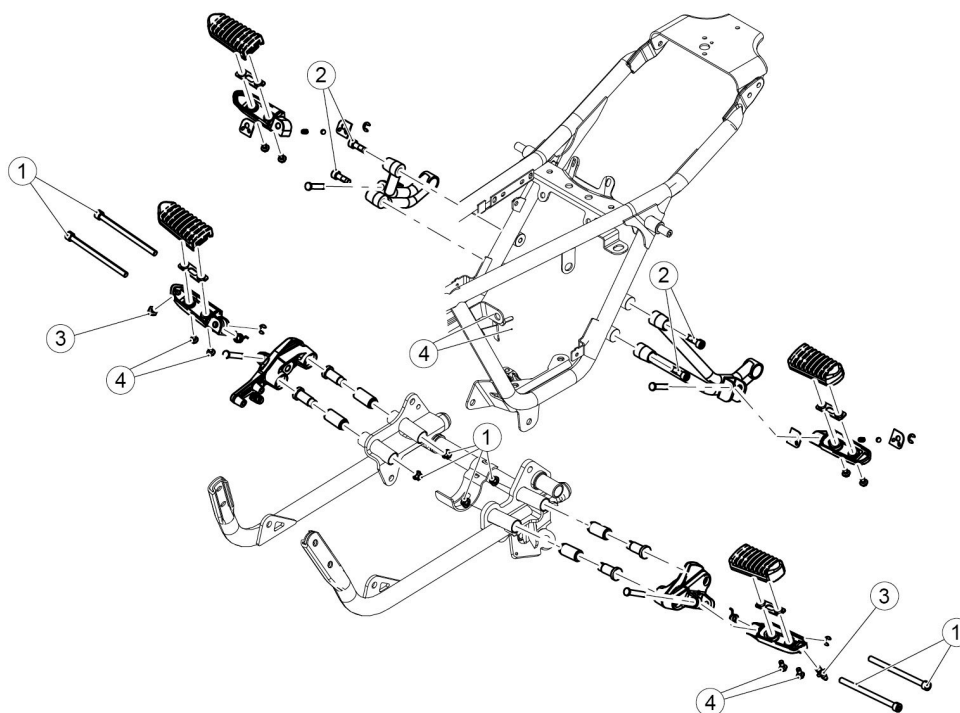
2.13.1.2 Centre of vehicle



CHASSIS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lbf ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lbf ft)	Pre-permeated
3	Screw fastening the stand crosspiece to the cradles	M10	1	50 Nm (36.88 lbf ft)	Pre-permeated
4	Battery holder plate fixing screw	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
5	Screws fastening engine/gearbox to frame	M10	3	50 Nm (36.88 lbf ft)	-

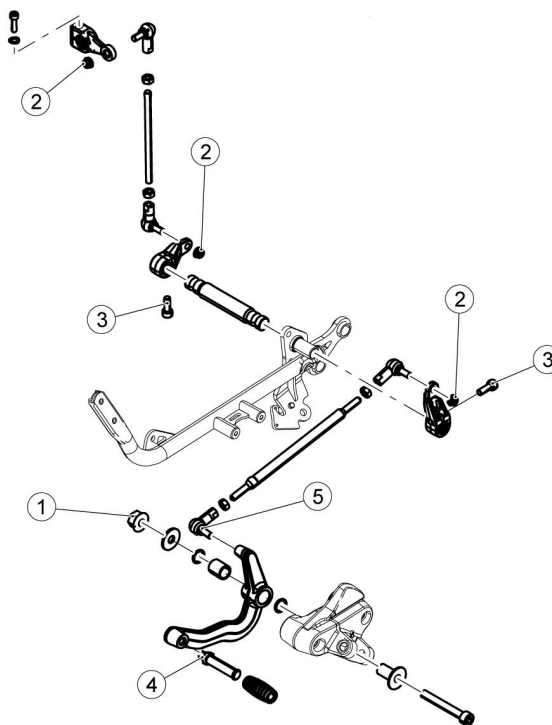
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
6	Screws fastening gearbox to frame	M10	2	50 Nm (36.88 lbf ft)	-
7	Rear grab handle fastening screws	M6	2	10 Nm (7.38 lbf ft)	-



FOOTRESTS

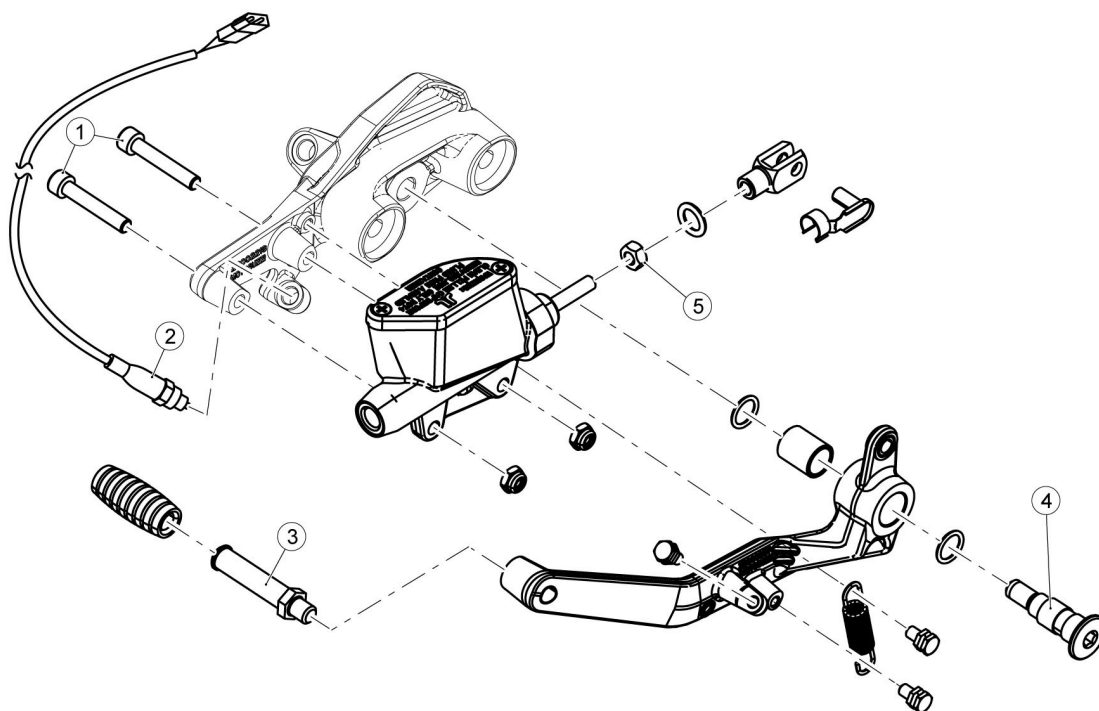
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening rider footrest support to the frame	M8	4	25 Nm (18.44 lbf ft)	Screw + nut
2	Screws fastening passenger footrest support to the frame	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
3	Anti-sliding pin	-	2	10 Nm (7.38 lbf ft)	Loctite 243

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
4	Footrest rubber fastening screws	M6	8	10 Nm (7.38 lbf ft)	-



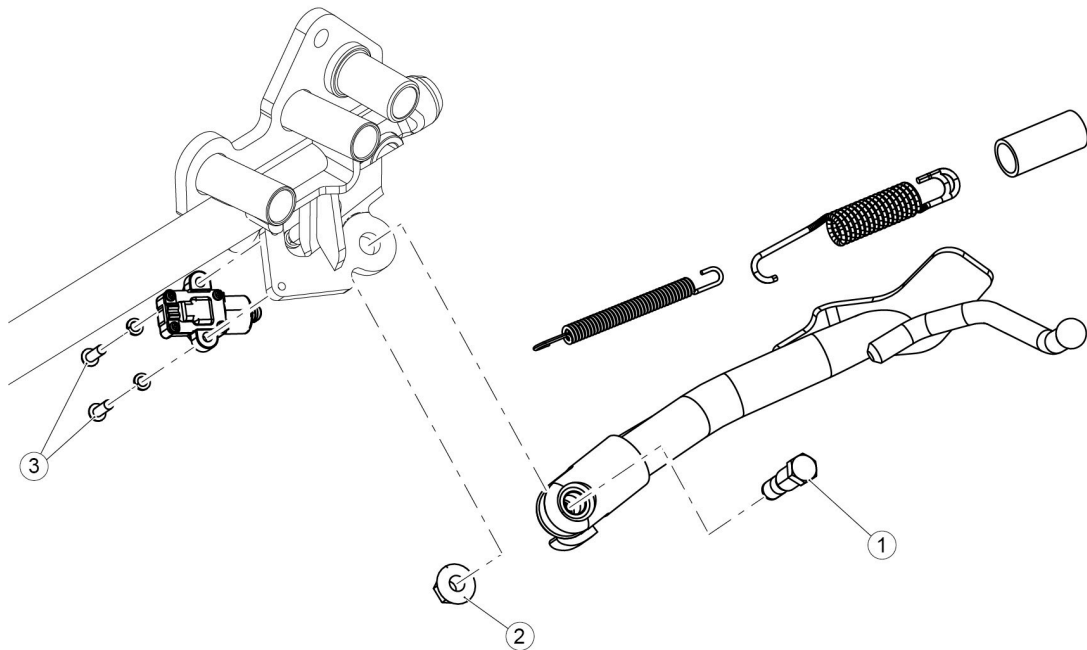
GEARBOX LEVER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Gearbox lever fixing nut	M8	1	25 Nm (18.44 lbf ft)	-
2	Tie-rod fastening nuts	M6	3	6.5 Nm (4.78 lbf ft)	-
3	Gearbox control lever fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
4	Gearbox lever peg fastener	-	1	20 Nm (14.75 lbf ft)	Loctite 243
5	Ball joint fixing	M6	1	6.5 Nm (4.78 lbf ft)	Loctite 243



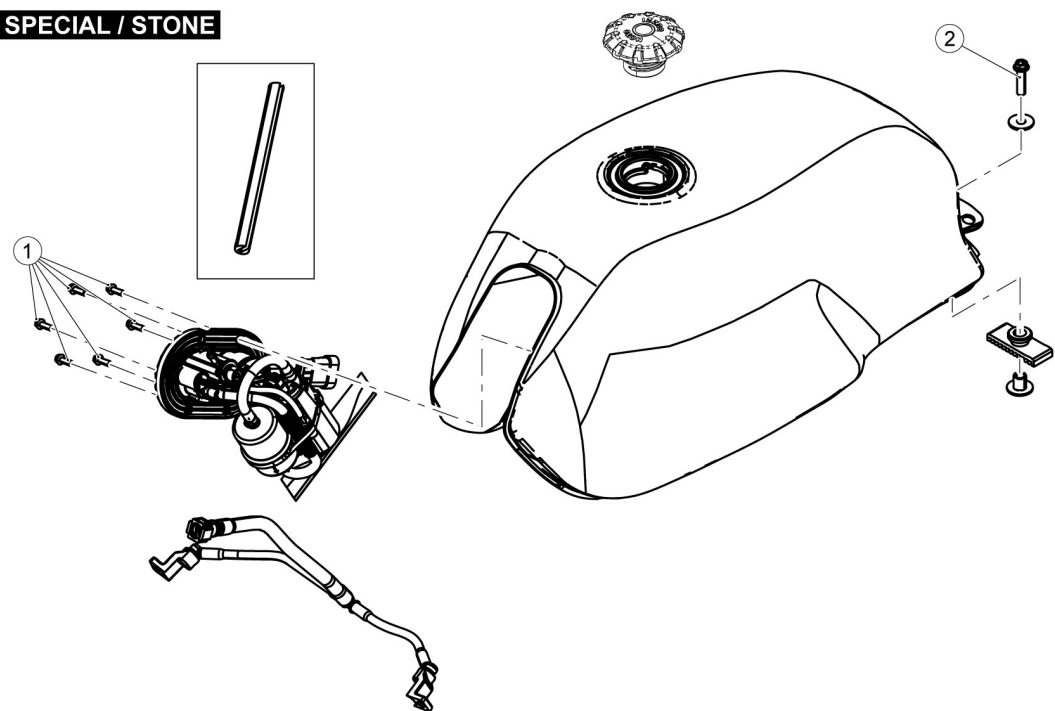
REAR BRAKE MASTER CYLINDER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lbf ft)	Loctite 243
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-

**SIDE STAND**

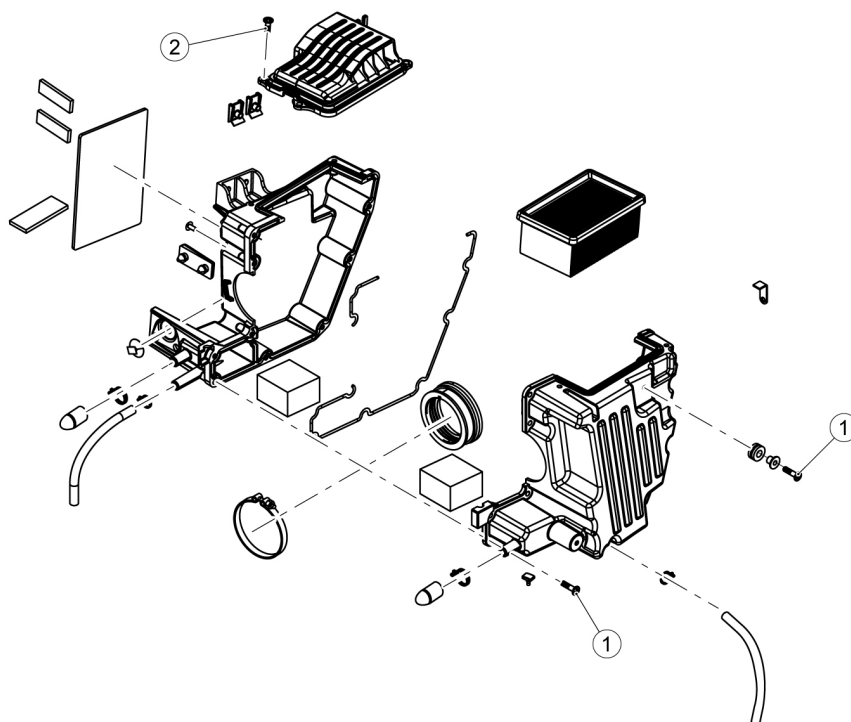
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Side stand retainer pin	M10x1.25	1	10 Nm (7.38 lbf ft)	-
2	Lock nut for stand bolt	M10x1.25	1	30 Nm (22.13 lbf ft)	-
3	Switch fixing screw	M5x16	2	6 Nm (4.42 lbf ft)	-

SPECIAL / STONE



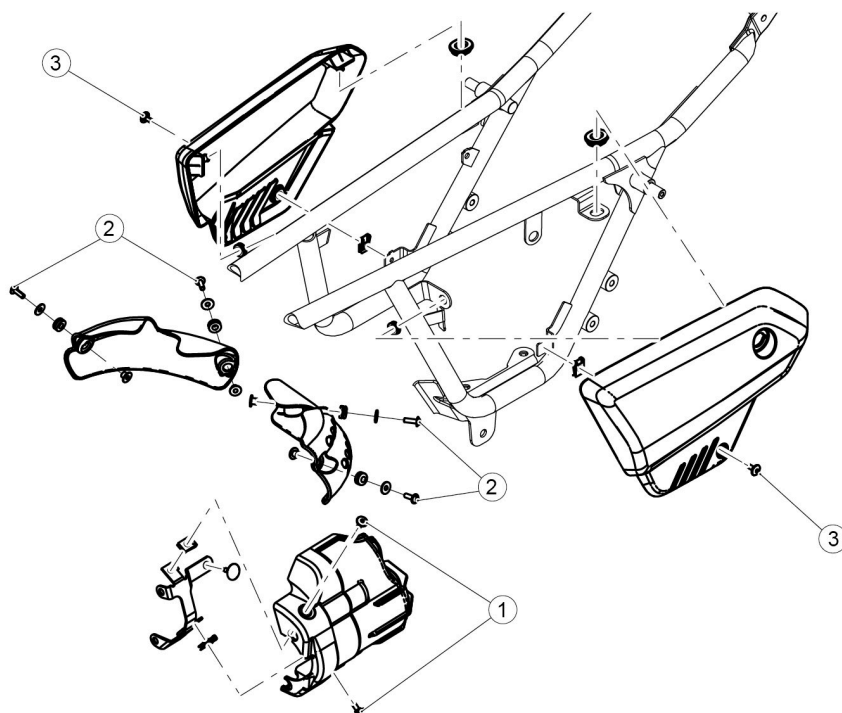
FUEL TANK

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lbf ft)	Pre-permeated
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-



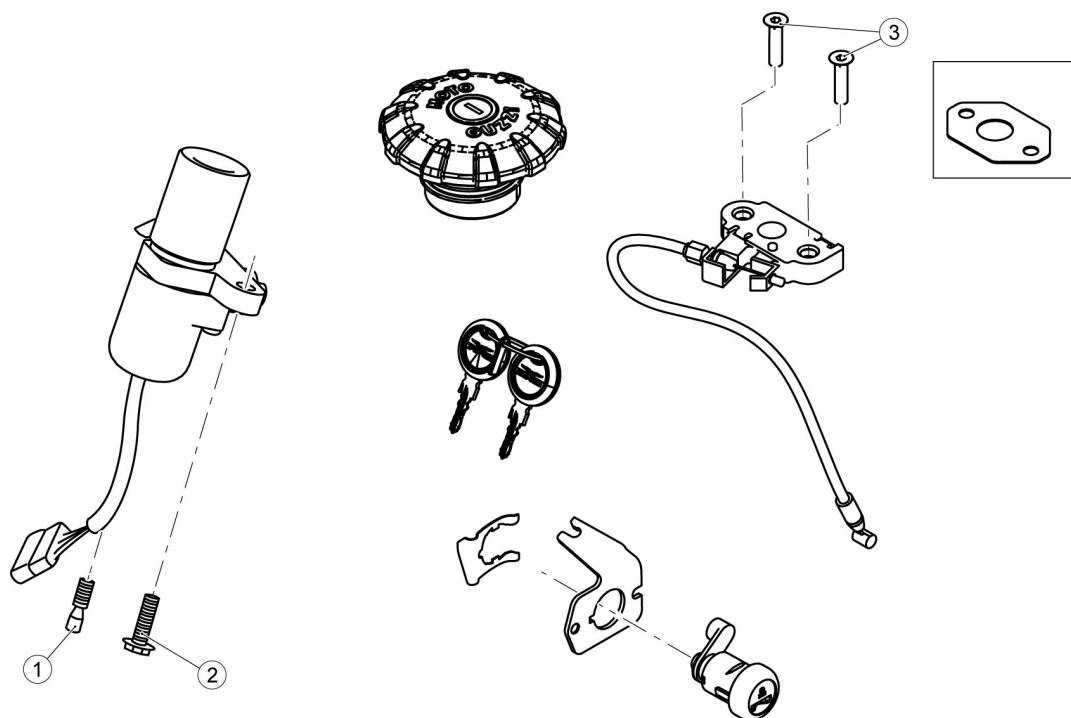
FILTER HOUSING

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

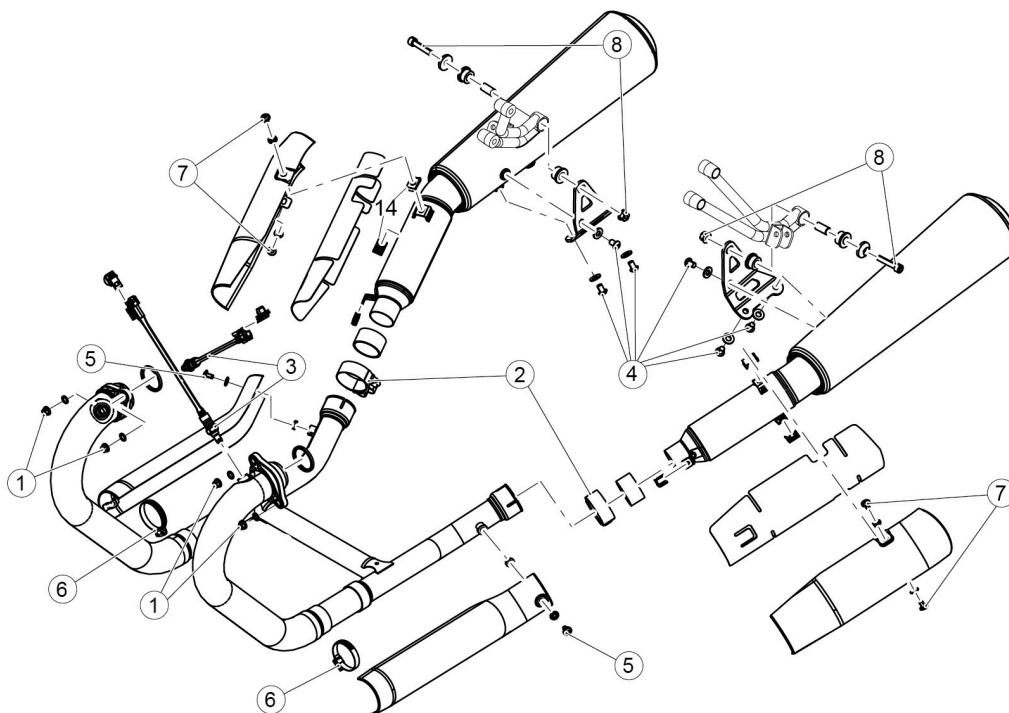


CENTRAL BODYWORK

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lbf ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lbf ft)	-

**LOCK KIT**

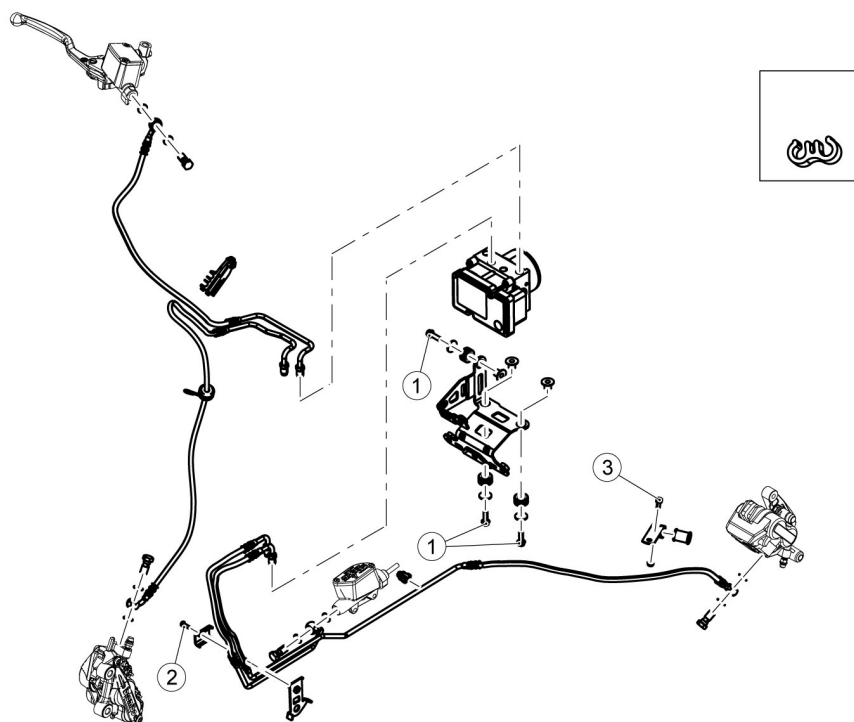
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	(Shear head) screw fixing ignition lock	M8	1	At the point of failure	Loctite 243
2	Ignition lock fixing screw	M8	1	25 Nm (18.44 lbf ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	8 Nm (5.9 lbf ft)	-



EXHAUST SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Fastening the exhaust pipe to the engine	M8	4	25 Nm (18.44 lbf ft)	-
2	Fastening the exhaust pipe to the silencer	M8	2	25 Nm (18.44 lbf ft)	-
3	Lambda probes fastener	M12x1.25	2	25 Nm (18.44 lbf ft)	-
4	Fastening the silencers to the support	M8	6	25 Nm (18.44 lbf ft)	-
5	Fastening the RH/LH manifold heat shield	M6	2	8 Nm (5.9 lbf ft)	-
6	RH/LH manifold heat shield clamp	-	2	3.5 Nm (2.58 lbf ft)	-
7	Fastening the RH/LH silencer heat shield	M6	4	8 Nm (5.9 lbf ft)	-

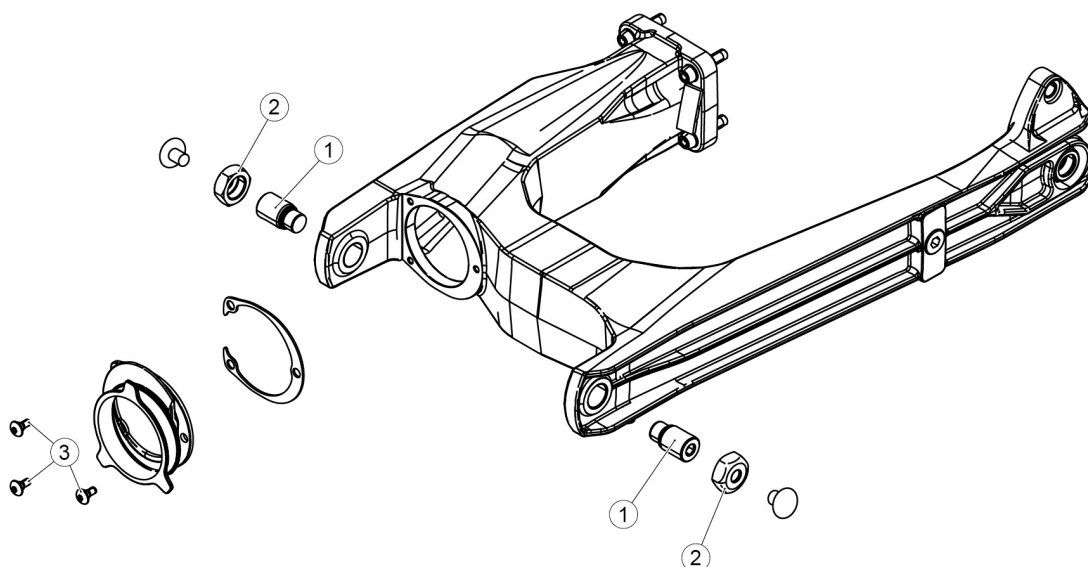
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
8	Fastening the silencer to the support on the chassis	M8	4	25 Nm (18.44 lbf ft)	-



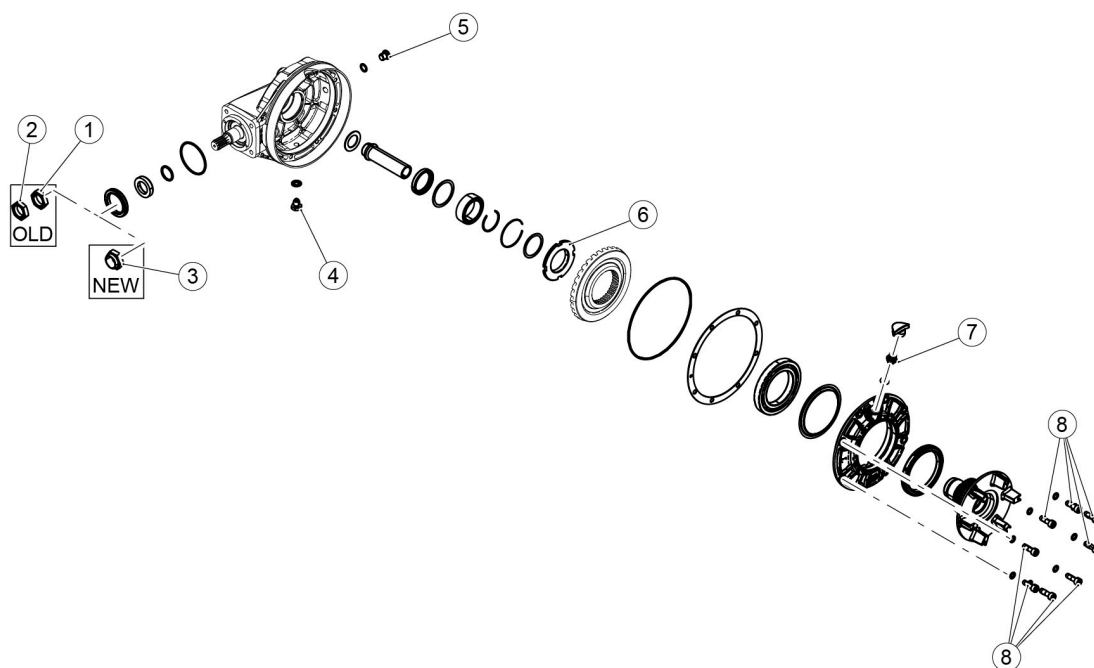
ABS SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Control unit bracket fastening to the frame	M6x16	2	10 Nm (7.38 lbf ft)	-
2	Screw fastening brake lines fastening plates	M4	1	3 Nm (2.21 lbf ft)	-
3	Clamp fastening screw	M5	1	6 Nm (4.43 lbf ft)	-

2.13.1.3 Rear section

**SWINGARM**

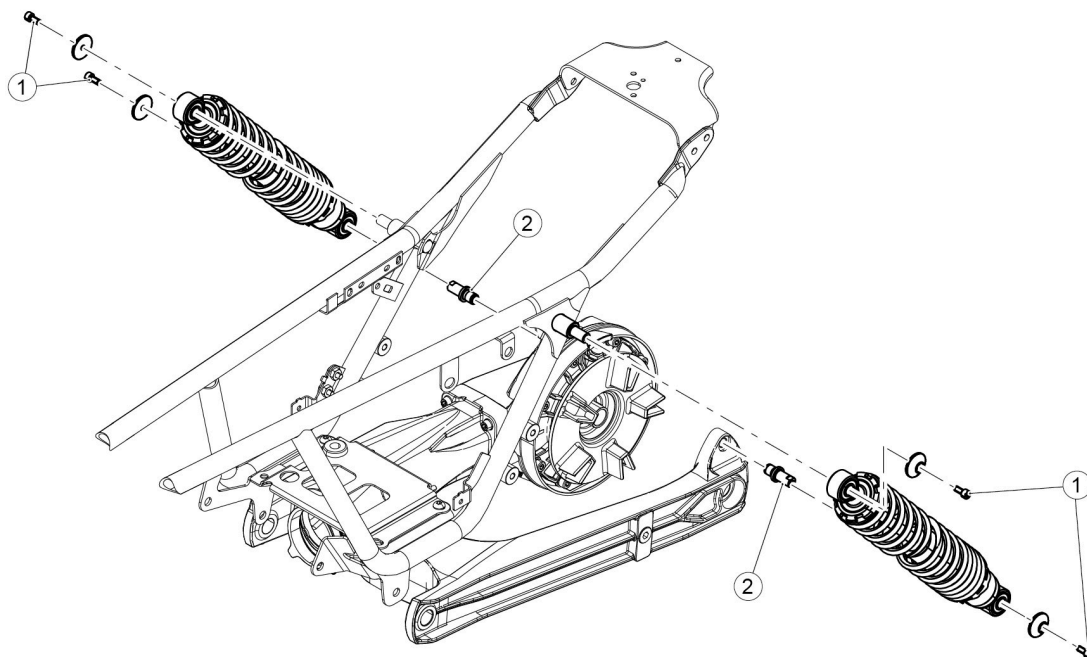
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Pins fixing swingarm to gearbox	-	2	-	Manual
2	Counter-nuts fixing swingarm to gearbox	-	2	50 Nm (36.88 lbf ft)	-
3	Rubber bellows torx fixing screws	-	3	6 Nm (4.43 lbf ft)	-



BEVEL GEAR

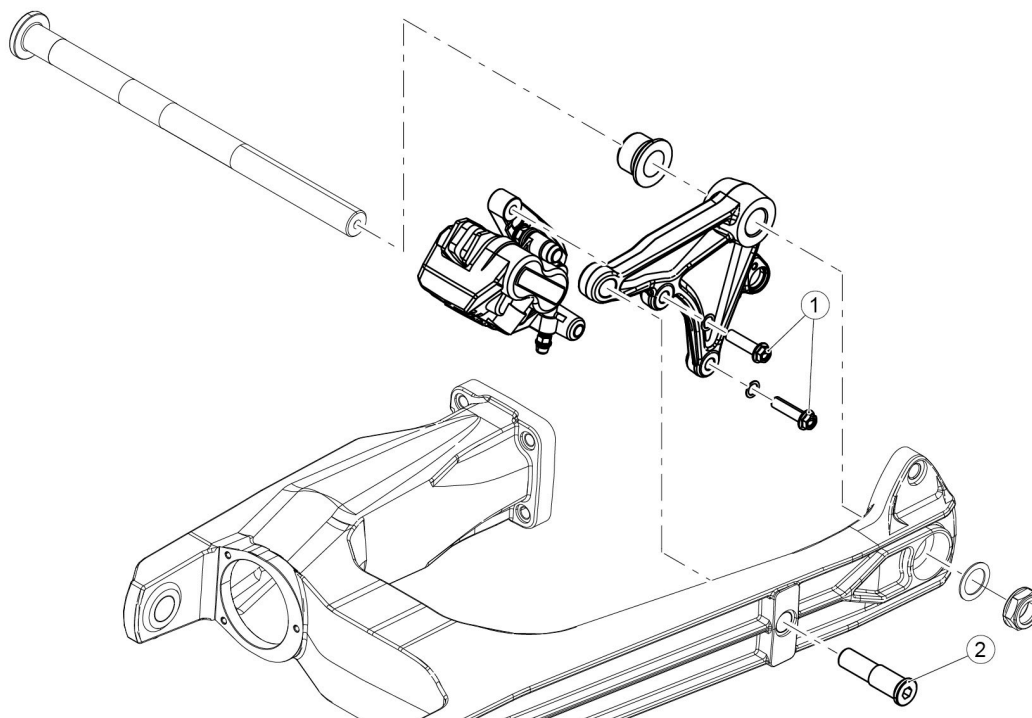
Pos.	Description	Type	Quantity	Torque	Notes
1	Pinion unit fixing nut - OPTION 01	M25	1	100 Nm (73.76 lbf ft)	Loct. 243
2	Pinion unit fixing lock nut - OPTION 01	M25	1	20 Nm (14.75 lbf ft)	Loct. 243
3	Pinion unit fixing nut - OPTION 02	M25	1	100 Nm (73.76 lbf ft)	Loct. 243 + Nut rebating on hollow pinion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

Pos.	Description	Type	Quantity	Torque	Notes
8	Gearbox cover fastening screws	M8x25	8	25 Nm (18.44 lbf ft)	-



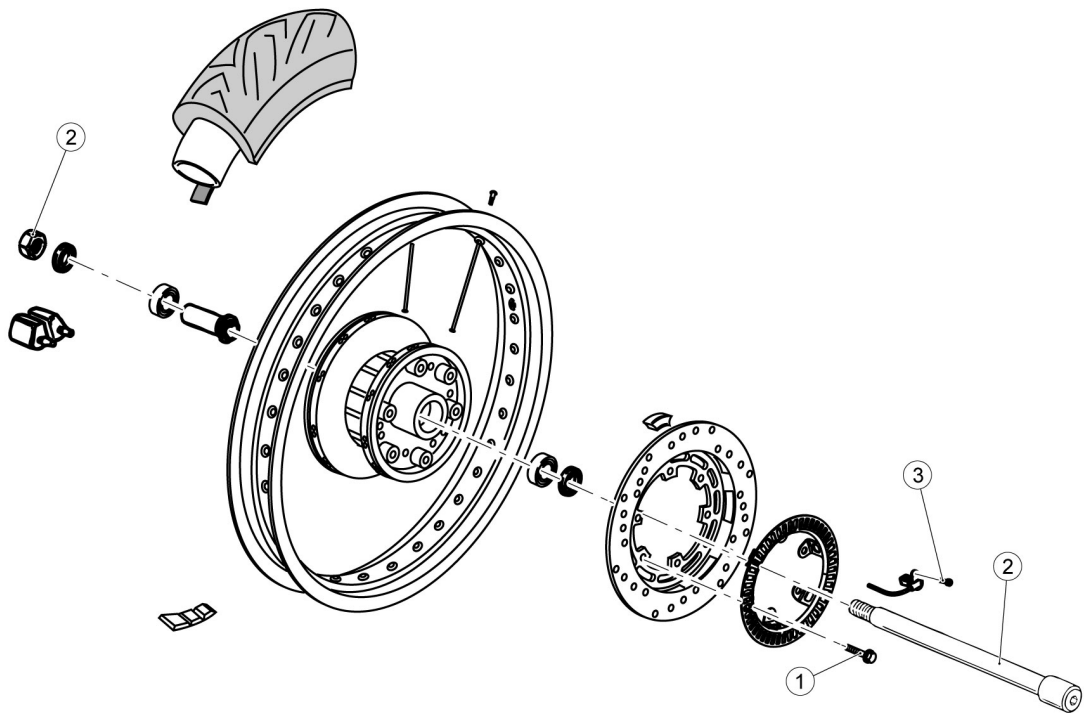
REAR SHOCK ABSORBERS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear shock absorber upper/lower fixing screws	M6	4	10 Nm (7.38 lbf ft)	Pre-permeated
2	Pin fastening the shock absorber to the gearbox/swingarm	M12	2	35 Nm (25.81 lbf ft)	Pre-permeated

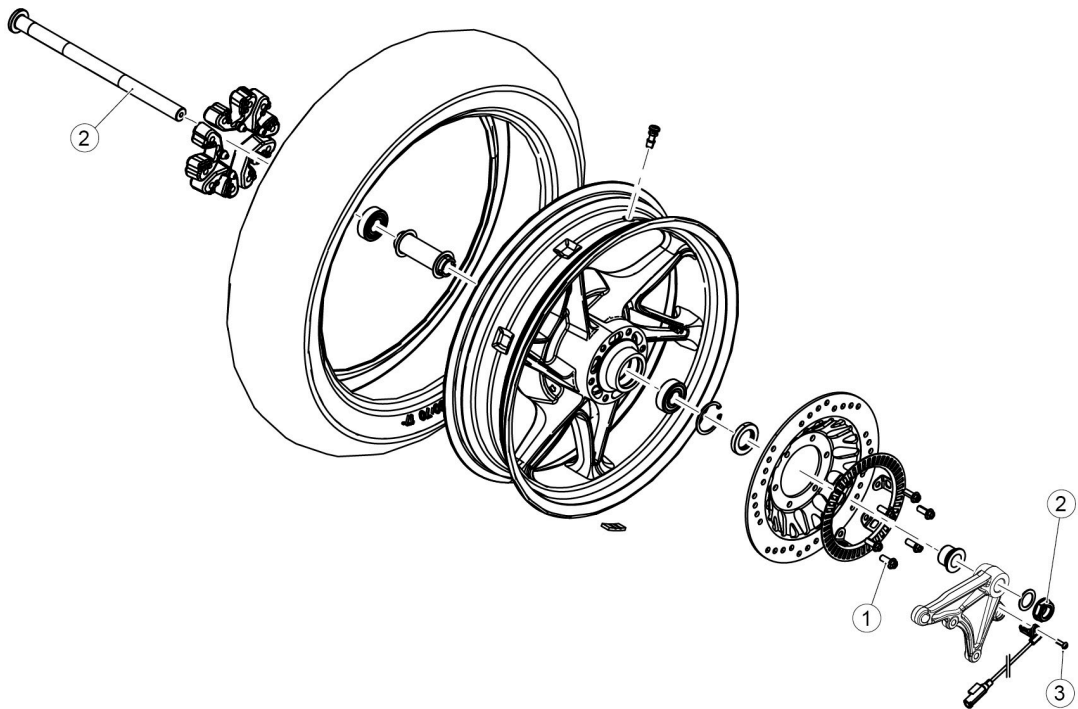
**REAR BRAKE CALLIPER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lbf ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 Nm (25.81 lbf ft)	-

(SPECIAL)

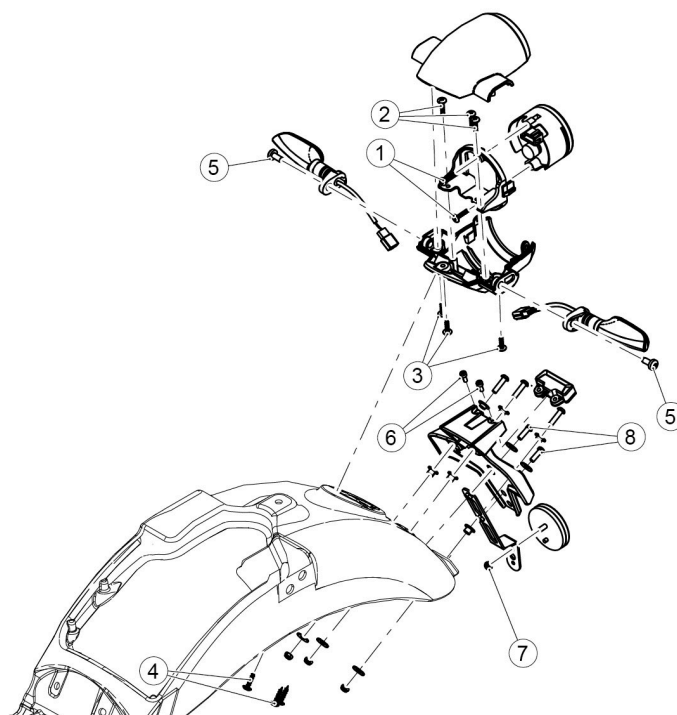


(STONE)



REAR WHEEL

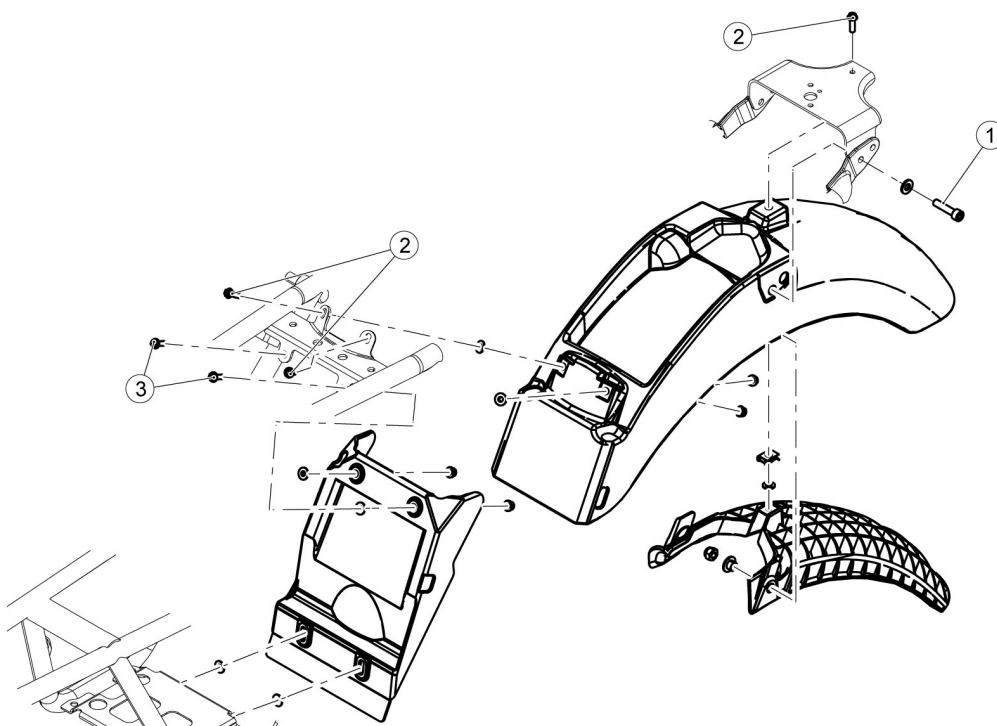
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	100 Nm (73.77 lbf ft)	-
3	ABS sensor fixing screw	M6	1	6 Nm (4.43 lbf ft)	Loctite 243



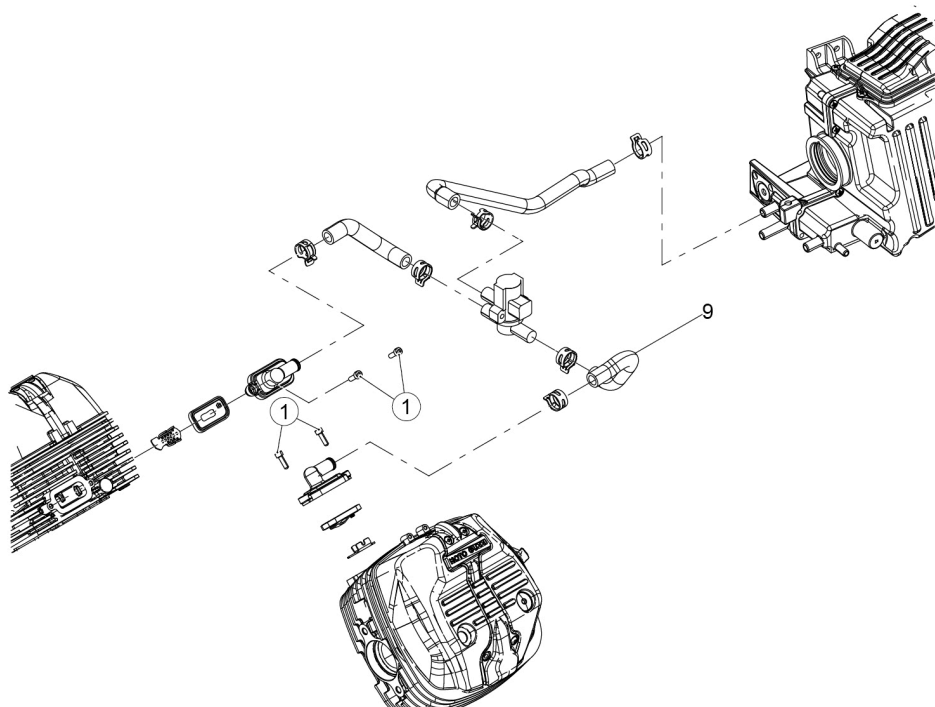
REAR LIGHT ASSEMBLY

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Tail-light to internal support fixing screws	SWP 3	2	2 Nm (1.48 lbf ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lbf ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lbf ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lbf ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lbf ft)	-

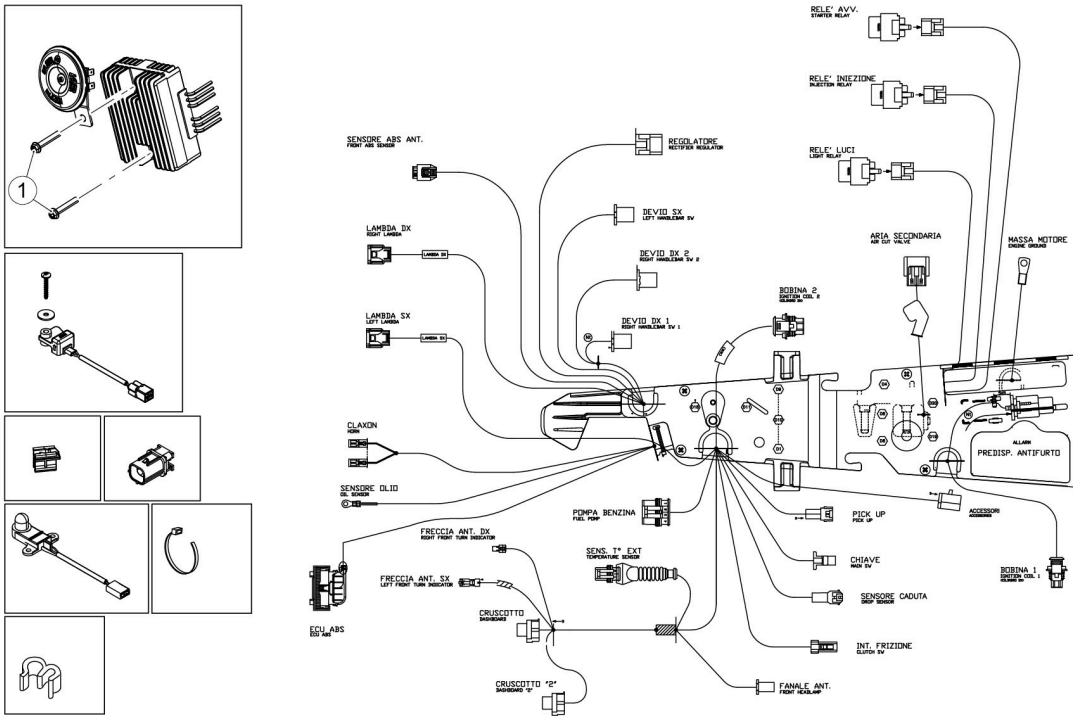
**REAR MUDGUARD**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	-
2	Front and centre fastening screw rear mudguard	M6	3	8 Nm (5.9 lbf ft)	-
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	-



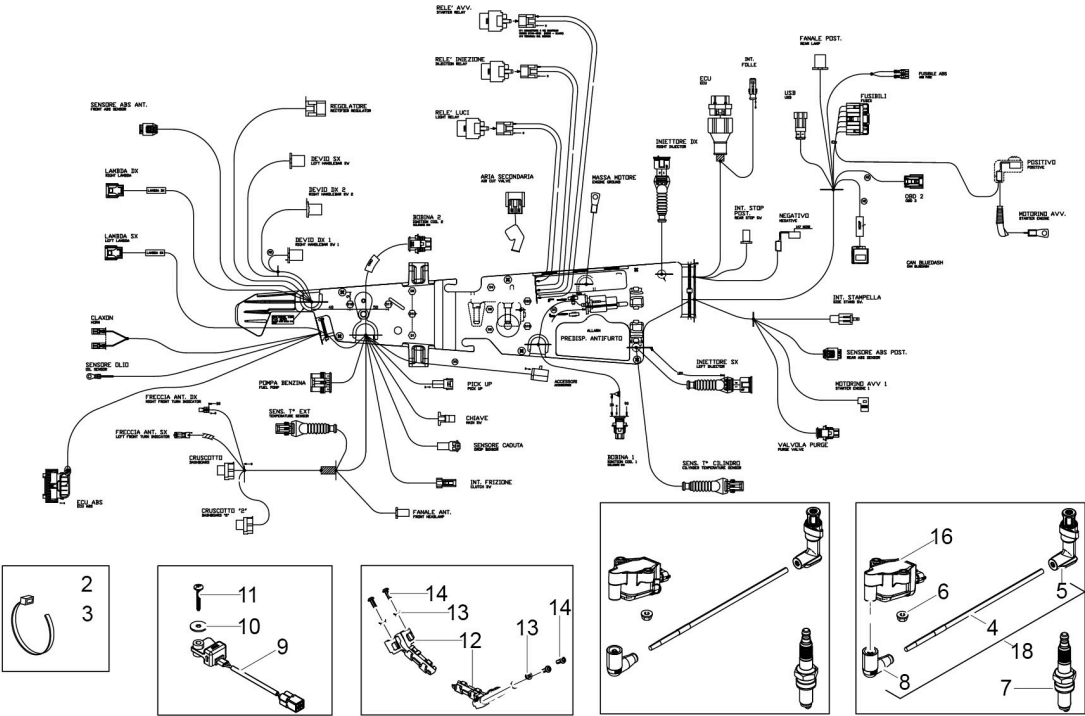
SECONDARY AIR SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Red valve cover fixing SHC screws	M5x16	4	3-4 Nm (2.21-2.95 lb ft)	-



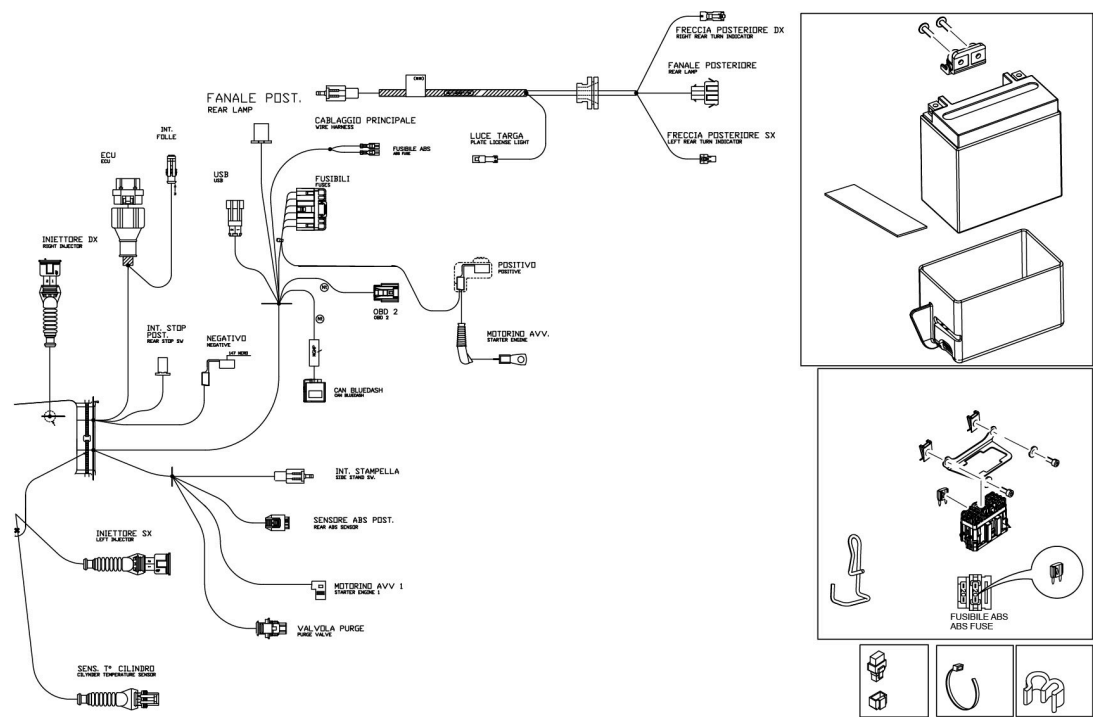
FRONT ELECTRICAL SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Clutch switch fixing screw	M8	1	5 Nm (3.69 lbf ft)	-



CENTRAL ELECTRICAL SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
-	Coils fastening nuts	M6	4	10 Nm (7.38 lbf ft)	-
-	Starter motor fixing screws	M8	2	25 Nm (18.44 lbf ft)	-

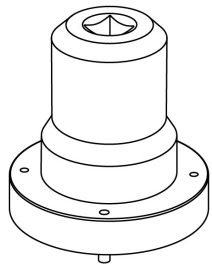
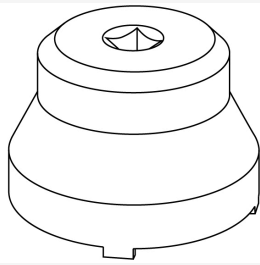
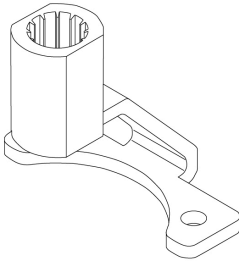
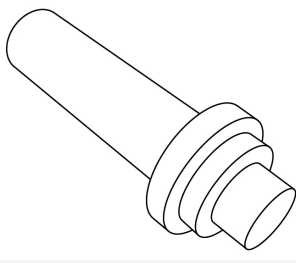
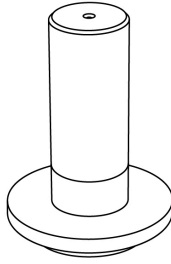


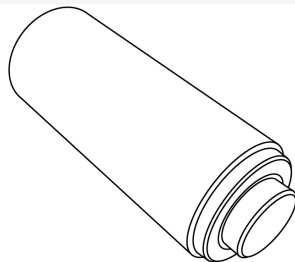
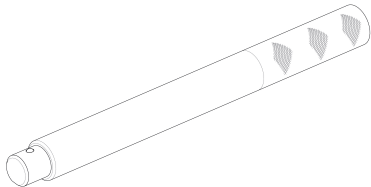
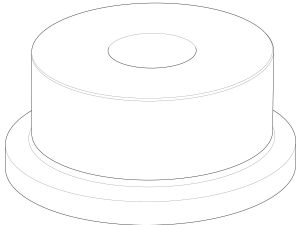
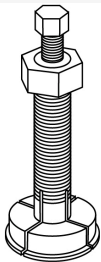
REAR ELECTRICAL SYSTEM

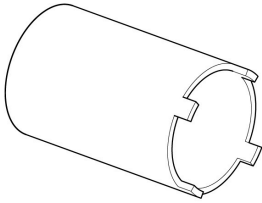
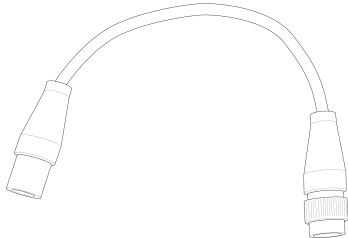
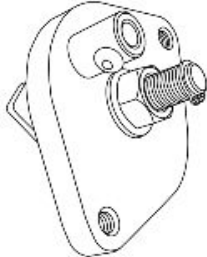
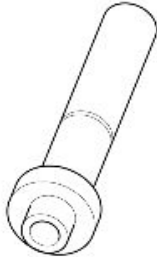
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
-	Control unit cable grommet fastening screw	M4	1	3 Nm (2.21 lbf ft)	Thread-forming screws
-	Battery holder bracket fastening screws	M6	2	Manual	-
-	Fuse box bracket fastening screws	M5	2	4 Nm (2.95 lbf ft)	-

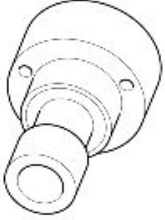
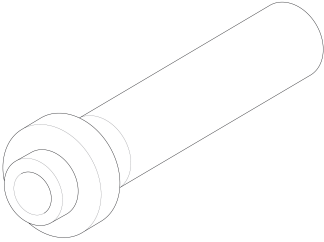
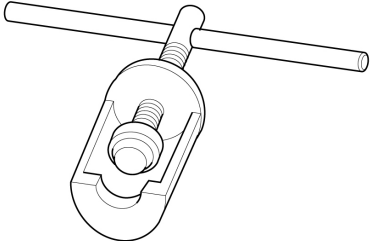
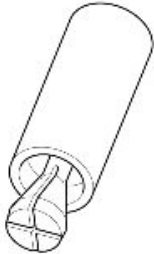
LIST OF TOPICS

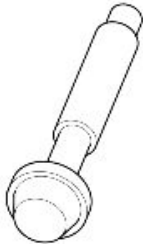
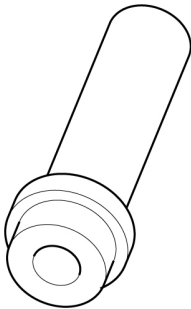
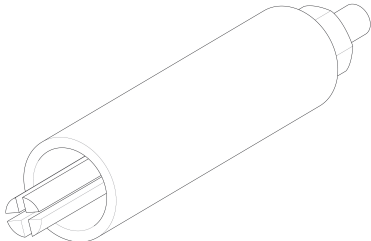
Special tools

CODE	DESCRIPTION	IMAGE
020998Y	Pinion case wrench	
020999Y	Crown counter-lock ring wrench	
021000Y	Bevel gear pinion shoes	
021003Y	Bevel gear external cover oil seal punch	
021005Y	Bevel gear cover oil seal punch	

CODE	DESCRIPTION	IMAGE
020978Y	Secondary cardan shaft oil seal installation punch	
GU19927900	Punch for drilled bolt bearing	
020376Y	Adaptor handle	
020360Y	Punch 52x55 mm	
001467Y036	Bearing internal cup extractor	

CODE	DESCRIPTION	IMAGE
020966Y	steering adjustment socket	
021999Y	PADS 4.0	
021017Y	PADS EOBD E5 diagnostics cable	
021009Y	Engine axial clearance check tool	
GU19926100	Punch for seal ring of bevel gear set pinion	

CODE	DESCRIPTION	IMAGE
GU19928800	Bevel gear set alignment pre-fitting tool	
GU19926000	Punch for gearcase sealing ring	
GU19907000	Extractor for internal ring on drilled bolt on cardan shaft	
GU19927500	Extractor for external ring of gearcase bearing	
GU19926200	Punch for bearing on bevel gear set pinion	

CODE	DESCRIPTION	IMAGE
GU19926400	Punch for external ring of tapered bearing on bevel gear set pinion holding body	
GU19926500	Punch for transmission bearing external ring	
GU19927600	Extractor for swing arm bearing	

LIST OF TOPICS

Maintenance

4.1 Scheduled maintenance table

N.B.:



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.

N.B.:



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

Km x 1.000 (mi x 1.000)	1,5 (0.9)	10 (6.2)	20 (12.4)	30 (18.6)	40 (24.9)	50 (31.1)	60 (37.3)	EVERY 12 MONTHS	EVERY 24 MONTHS
Oil filter cover O-ring	R	R	R	R	R	R	R	R	R
Gearbox oil filler plug O- ring				I			I		
Engine oil filler plug O-ring	I	I	I	I	I	I	I	I	I
Spark plugs		I	I	R	I	I	R		
Filter box (7)		C	C	C	C	C	C		
Steering bearings and steering play	I	I	I	I	I	I	I	I	I
Wheel bearings - Wheels		I	I	I	I	I	I	I	I
Diagnosis by tool	I	I	I	I	I	I	I	I	I
Brake discs - Pads wear (5)	I	I	I	I	I	I	I	I	I
Air filter		R	R	R	R	R	R		
Engine oil filter	R	R	R	R	R	R	R	R	R
Vehicle general operation	I	I	I	I	I	I	I	I	I

Km x 1.000 (mi x 1.000)	1,5 (0.9)	10 (6.2)	20 (12.4)	30 (18.6)	40 (24.9)	50 (31.1)	60 (37.3)	EVERY 12 MONTHS	EVERY 24 MONTHS
Valve clearance	A	A	A	A	A	A	A		
Head cover gasket	I	I	I	I	I	I	I		
Gearbox oil discharge plug aluminium gasket				R			R		
Engine oil discharge plug aluminium gasket	R	R	R	R	R	R	R	R	R
Transmission oil discharge plug gasket				R			R		
Gasket for the engine oil filter fastening screw	R	R	R	R	R	R	R	R	R
Brake systems	I	I	I	I	I	I	I	I	I
Light circuit	I	I	I	I	I	I	I	I	I
Safety switches	I	I	I	I	I	I	I	I	I
Brake fluid	I	I	I	I	I	I	I	I	R
Gearbox oil				R			R		
Fork oil (6)					R				
Engine oil (4)	R	R	R	R	R	R	R	R	R
Final drive oil				R			R		
Headlight aiming		I	I	I	I	I	I		
Fork oil seals (1)		I	I	I		I	I		
Tyres - pressure / wear (3)	I	I	I	I	I	I	I	I	I
Clutch clearance adjustment	A	A	A	A	A	A	A	A	A

Km x 1.000 (mi x 1.000)	1,5 (0.9)	10 (6.2)	20 (12.4)	30 (18.6)	40 (24.9)	50 (31.1)	60 (37.3)	EVERY 12 MONTHS	EVERY 24 MONTHS
Transmission oil filler plug washer				R			R		
Nut/bolt tightness	I	I	I	I	I	I	I		
Suspensions and stability			I		I		I	I	I
Head cover fastening screws dampers	I	I	I	I	I	I	I		
Filter box drain plug	C	C	C	C	C	C	C	C	C
Brake lines		I	I	I	I	I	I		
Fuel lines (2)		I	I	I	I	I	I	I	I
Labour time (minutes)	80	90	90	110	120	90	110	60	60

- **I** : CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY
- **C**: CLEAN
- **R**: REPLACE
- **A**: ADJUST
- **L**: LUBRICATE
- **(1)** Replace in case of leaks.
- **(2)** Replace every 4 years.
- **(3)** Check every month.
- **(4)** Check every 5,000 km (3.106 mi).
- **(5)**: Check and clean, adjust or replace if necessary every 1000 km (621 miles).
- **(6)**: Replace at whichever of the following occurs first: 40,000 km (24.855 mi) or 4 years.
- **(7)**: At each service (except the first one), check inside the filter box, if there is oil. Clean if necessary.

N.B.:

AT EACH SCHEDULED SERVICE, USE THE DIAGNOSTIC TOOL TO CHECK FOR ERRORS AND CHECK THAT ALL PARAMETERS ARE CORRECT.

ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.

4.2 Recommended Products

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

Only use lubricants and fluids which meet or exceed the performance characteristics specified. This also applies when topping up only.



PRODUCT	DESCRIPTION	SPECIFICATIONS
Engine oil 10W-60	Synthetic based lubricant for high-performance four-stroke engines	SAE 10W 60; JASO MA, MA2; API SG
75W-140 lubricant for gearboxes and transmissions	Synthetic lubricant for gearboxes and transmissions	SAE 75W-140 - API GL5
Fork oil 7.5W	Fork oil	SAE 7.5W
Molybdenum disulphide grease	Oily lithium grease containing molybdenum disulphide	Grey-black grease
Vaseline	Neutral grease for battery terminals	-
DOT 4 brake fluid	Synthetic brake fluid	SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4

4.3 Transmission oil

4.3.1 Replacement

N.B.:



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

N.B.:

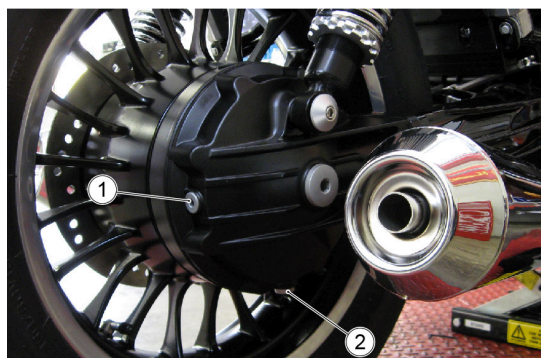


RIDE SOME km (miles) TO WARM UP ENGINE OIL.

WARNING

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

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

**WARNING**

DURING REPLACEMENT, USE A NEW SEALING WASHER.

PRODUCT	DESCRIPTION	SPECIFICATIONS
75W-140 lubricant for gearboxes and transmissions	Synthetic lubricant for gearboxes and transmissions	SAE 75W-140 - API GL5

WARNING

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

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

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

WARNING

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

4.4 Engine oil

4.4.1 Check

Check the engine oil level frequently.

N.B.:



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.

WARNING

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

WARNING

DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT A STANDSTILL TO WARM UP THE ENGINE AND OBTAIN THE OPERATING TEMPERATURE OF ENGINE OIL.

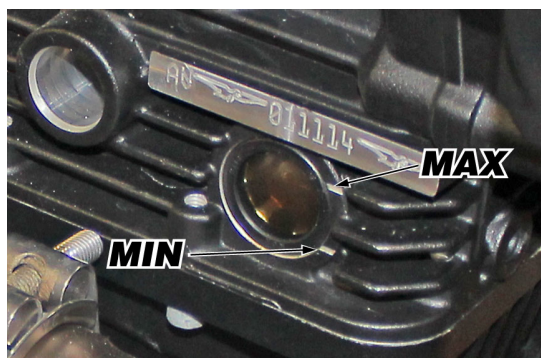
PREFERABLY CHECK THE OIL AFTER A JOURNEY OF AFTER TRAVELLING APPROXIMATELY 15 Km (10 miles) IN EXTRA-URBAN CONDITIONS (ENOUGH TO WARM UP THE ENGINE OIL TO OPERATING TEMPERATURE).

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

MAX (top notch) = maximum level.

MIN (bottom notch) = minimum level

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



4.4.2 Replacement

WARNING



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.

N.B.:



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

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

NOTE



DURING REPLACEMENT, USE A NEW SEALING WASHER.



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

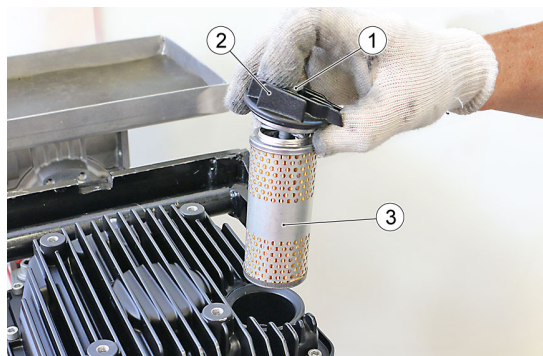
CAUTION

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



4.5 Engine oil filter

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

**WARNING**

NEVER REUSE AN OLD FILTER.

WARNING

DURING REPLACEMENT, USE A NEW SEALING WASHER.

NOTE

DURING REFITTING USE A NEW SEALING O-RING.

4.6 Gearbox oil

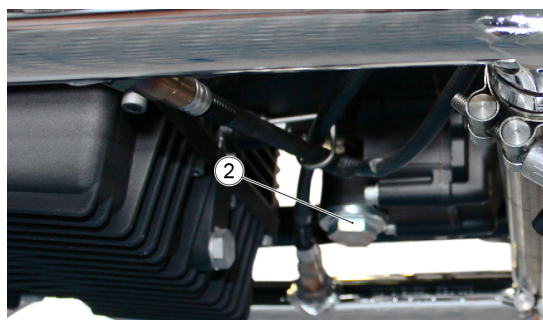
4.6.1 Replacement

N.B.:

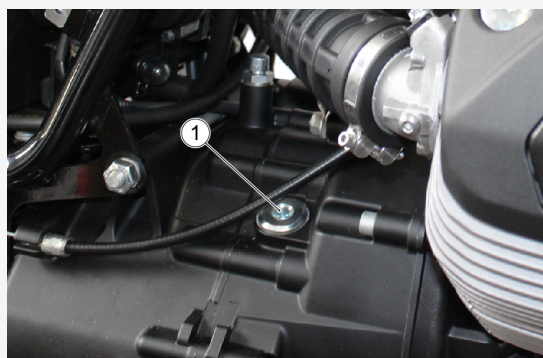


HOT OIL IS MORE FLUID AND WILL DRAIN OUT MORE EASILY AND COMPLETELY.

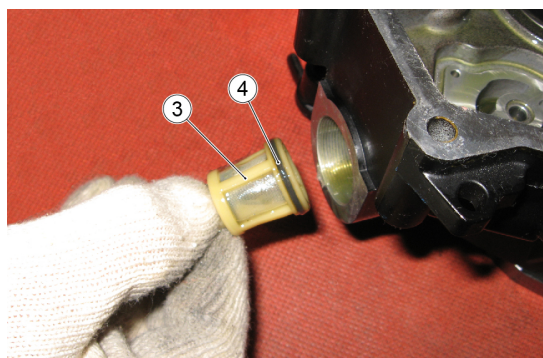
- Place a container with suitable capacity under the drainage plug (2).
- Unscrew and remove the drainage plug (2).



- 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).

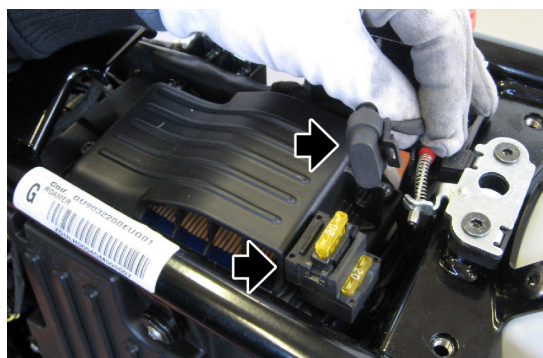
WARNING

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

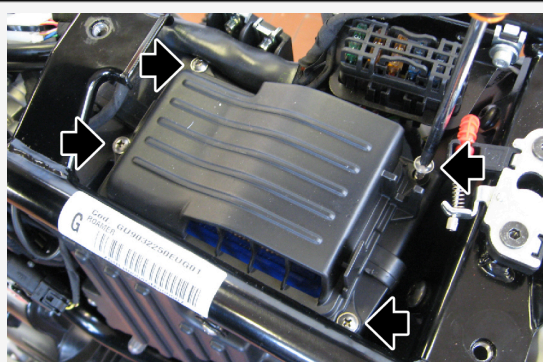
4.7 Air filter

Removal

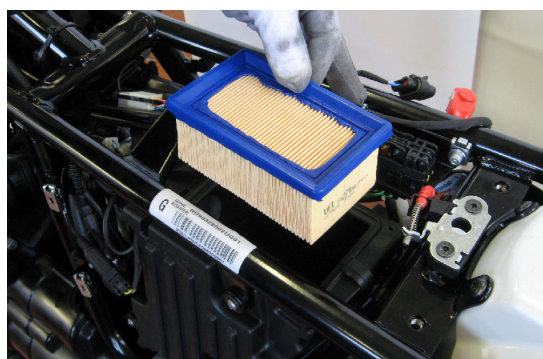
- Remove the saddle
- Unhook the connector from the air-box cover



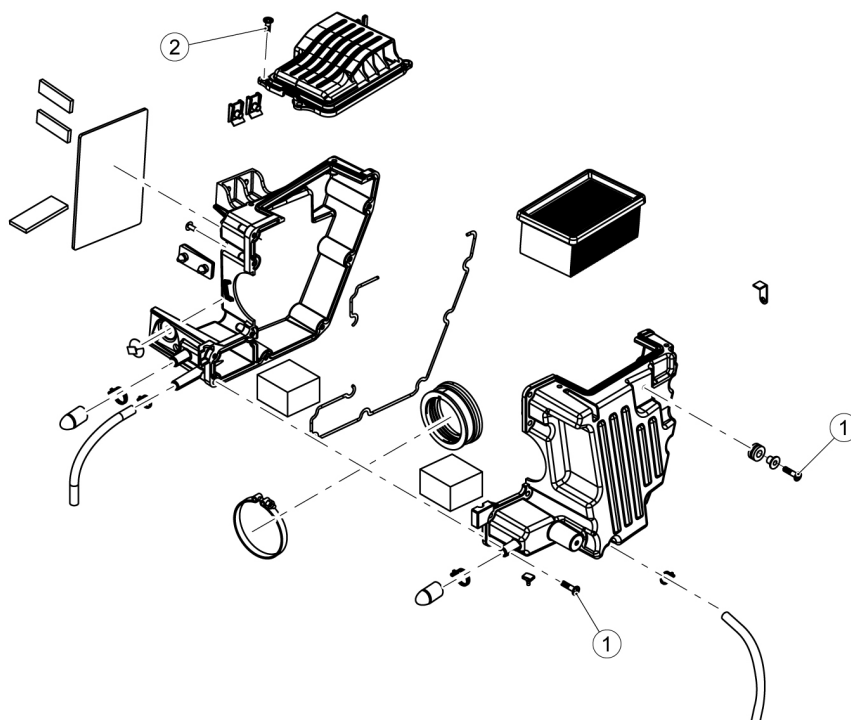
- Remove the air-box cover fixing screw



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



4.8 Air filter box

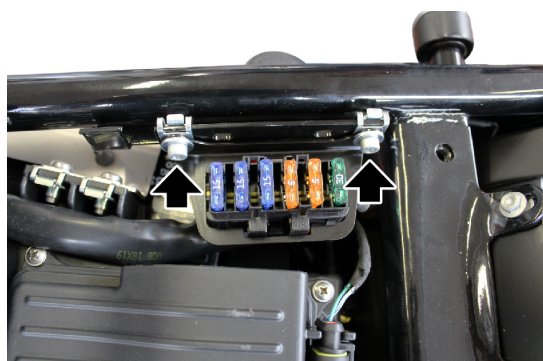


FILTER HOUSING

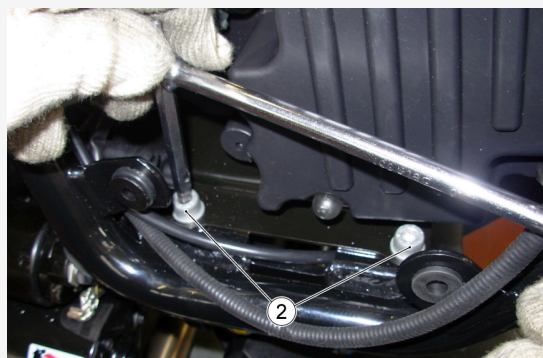
Pos.	Description	Type	Quantity	Torque	Notes
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-
3	Filter casing/ frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

4.8.1 Air filter box removal

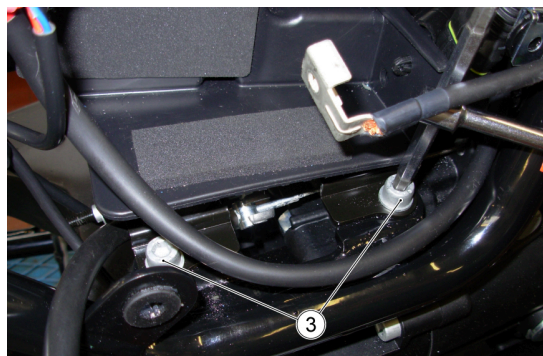
- Remove the saddle and the side fairings
- Remove the battery
- Remove the rear wheel
- Remove the splash guard
- Remove the fuse box support fixing screws (1)



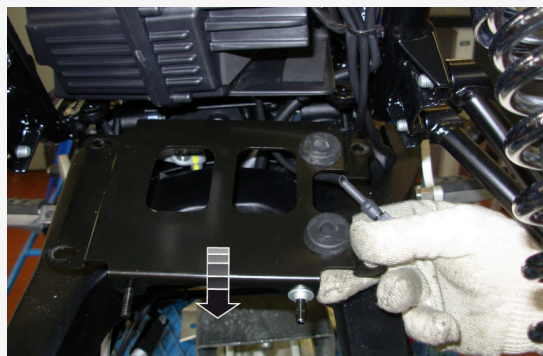
- Move the filter box to the side enough to allow removal of the fixing screws (2) on the left side of the filter box support.



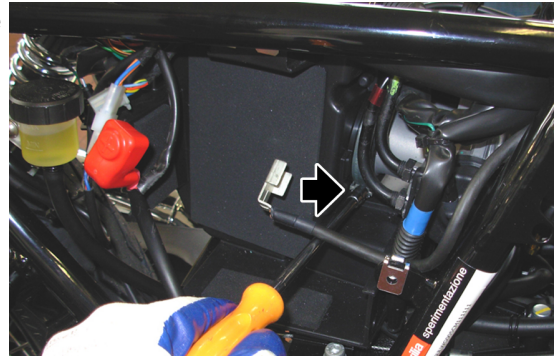
- Move the filter box to the side enough to allow removal of the fixing screws (3) on the right side of the filter box support.



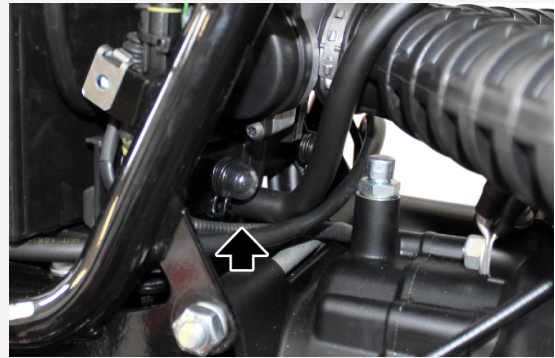
- Disconnect the neutral switch connector
- Lift the air filter box enough to allow the support plate to be removed, sliding out neutral switch cabling



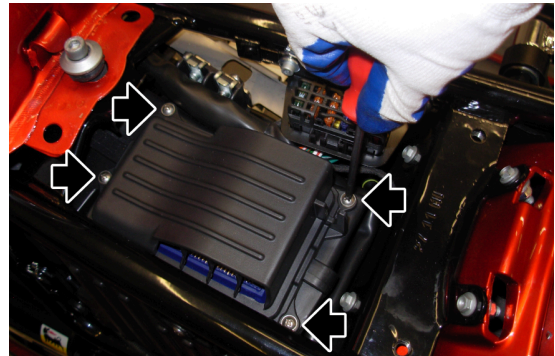
- Unscrew the clamp that fastens the throttle body to the air filter box



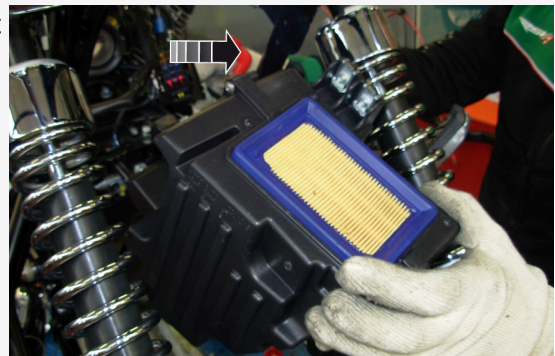
- Disconnect the blow-by pipe



- Remove the air-box cover

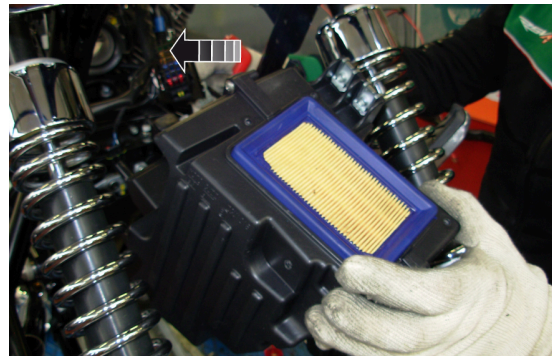


- Remove sliding the complete filter box out toward the rear



4.8.2 Air filter box installation

- Insert the filter box from the rear

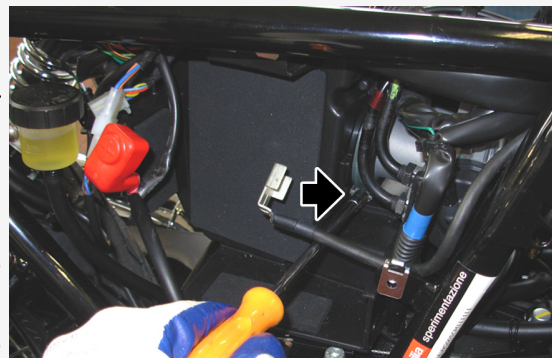


- Insert the throttle body in the sleeve and tighten the clamp to secure it

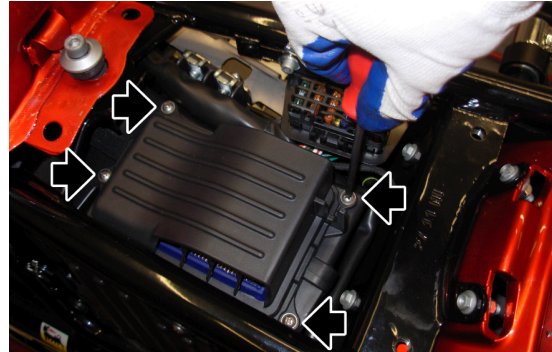
WARNING



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



- Install the air-box cover



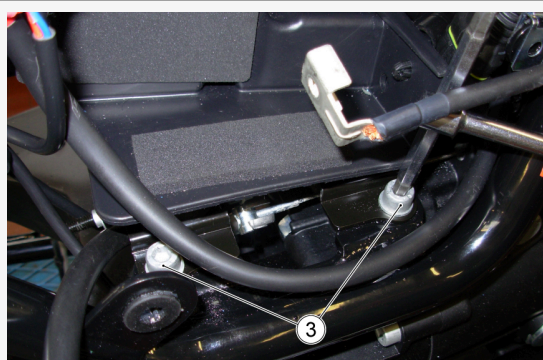
- Connect the blow-by and breather tubes



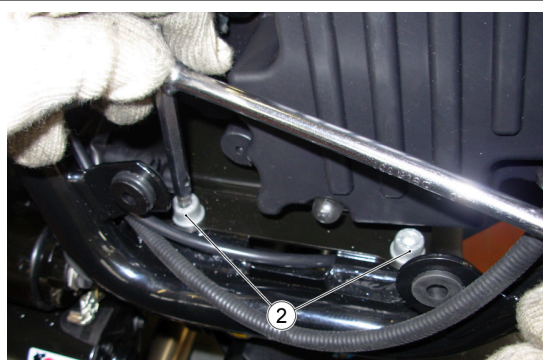
- Position the air filter box support, taking care to pass the neutral switch cabling through the hole



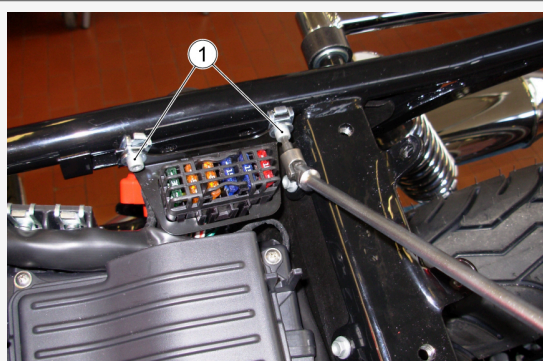
- Move the filter box to the side enough to allow tightening of the fixing screws (3) on the right side of the filter box support.



- 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



4.9 Throttle body removal

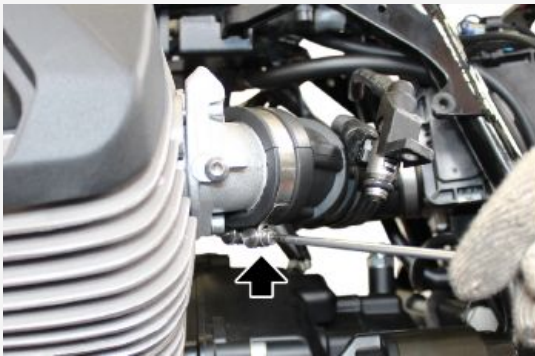
- Remove the clip clamp fixing the sleeve to the filter box.

WARNING

DURING REFITTING, USE A NEW CLAMP.



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



- Remove the sleeve.



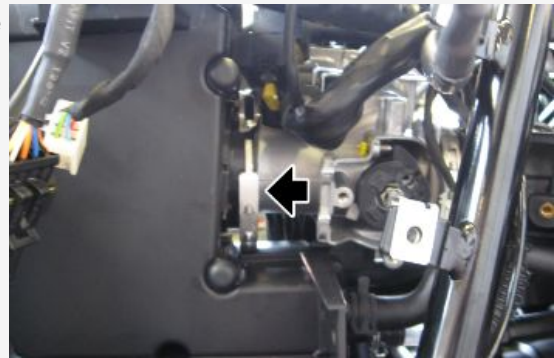
- Remove the battery.
- Remove the MIU G4 control unit connector support bracket fixing screw.



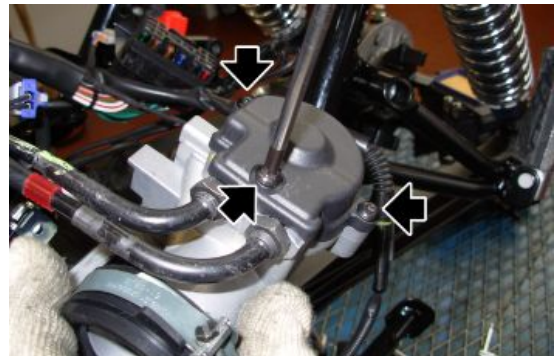
- Disconnect the MIU G4 control unit connector.



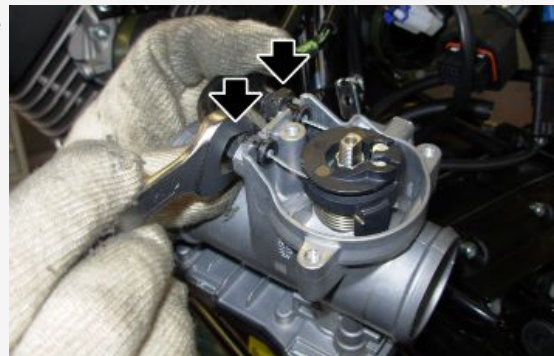
- Remove the clip clamp fixing the throttle body to the filter box.
- Extract the throttle body laterally.



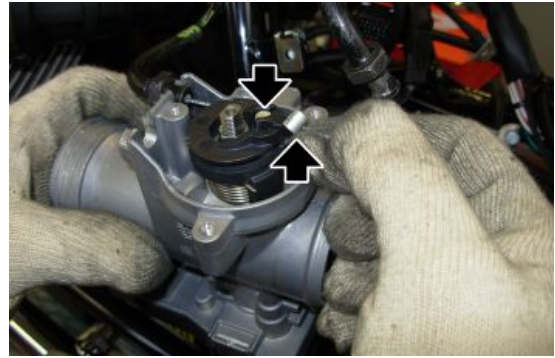
- Remove the throttle body guard



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

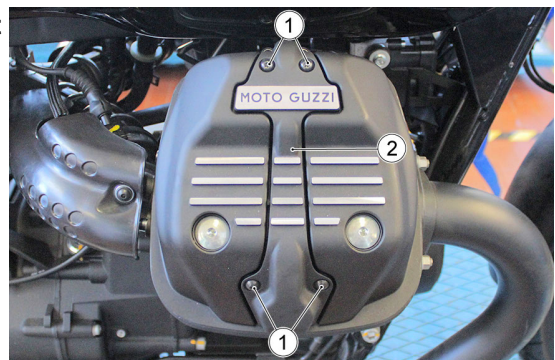


- Remove the throttle body.



4.10 Valve clearance check

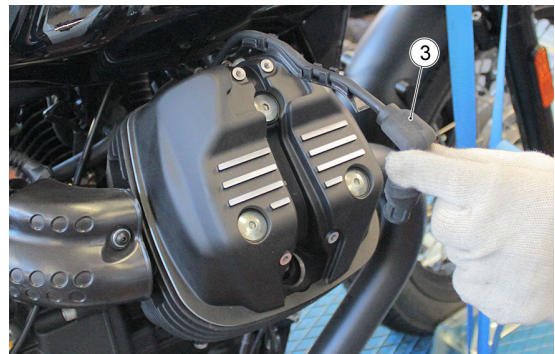
- First, check the valve clearance in the **left** cylinder, then remove the four fixing screws (1) on the spark plug cover (2)



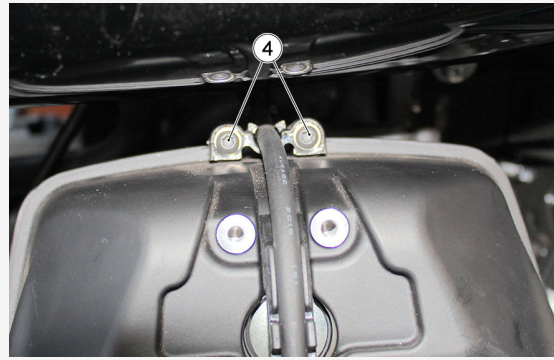
- Remove the spark plug cover (2)



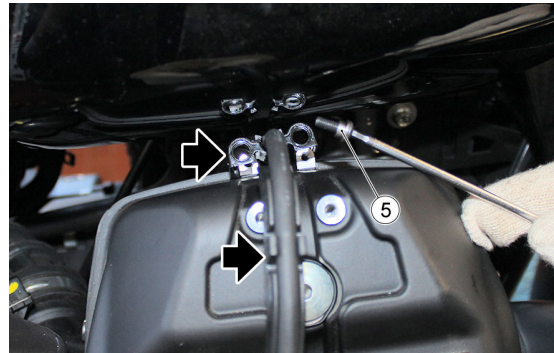
- Disconnect the spark plug cap (3)



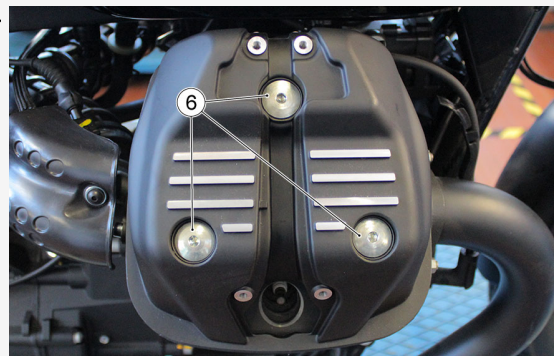
- Unscrew and remove the two spark plug support retaining screws (4)



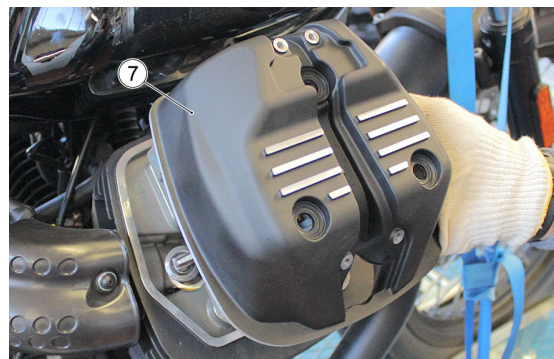
- Retrieve the two spacers (5)
- Push the spark plug cable complete with support, as indicated in the figure, towards the front of the vehicle



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



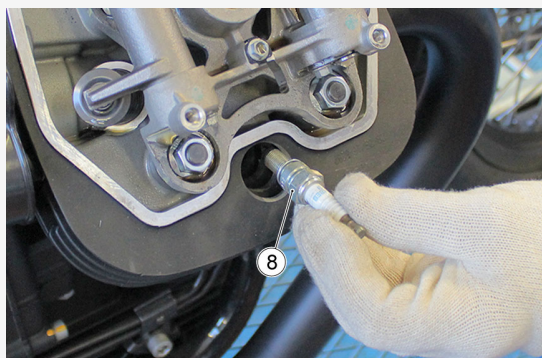
- Remove the head cover (7)



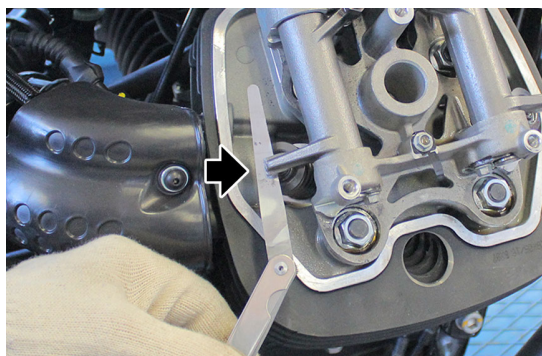
- Unscrew the spark plug (8) and remove it

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

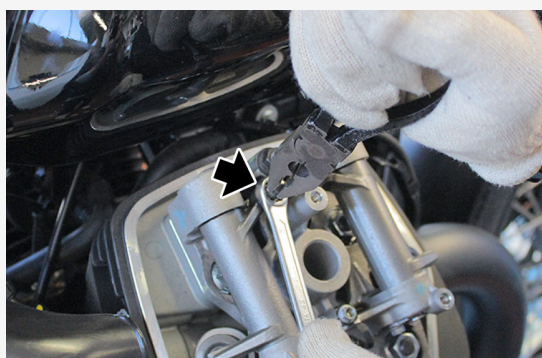


- Use a feeler gauge to check that the clearance between the valve and the set screw corresponds with the indicated values.
- The corresponding intake and outlet valve clearances are different than what is indicated below, proceed with adjusting them.

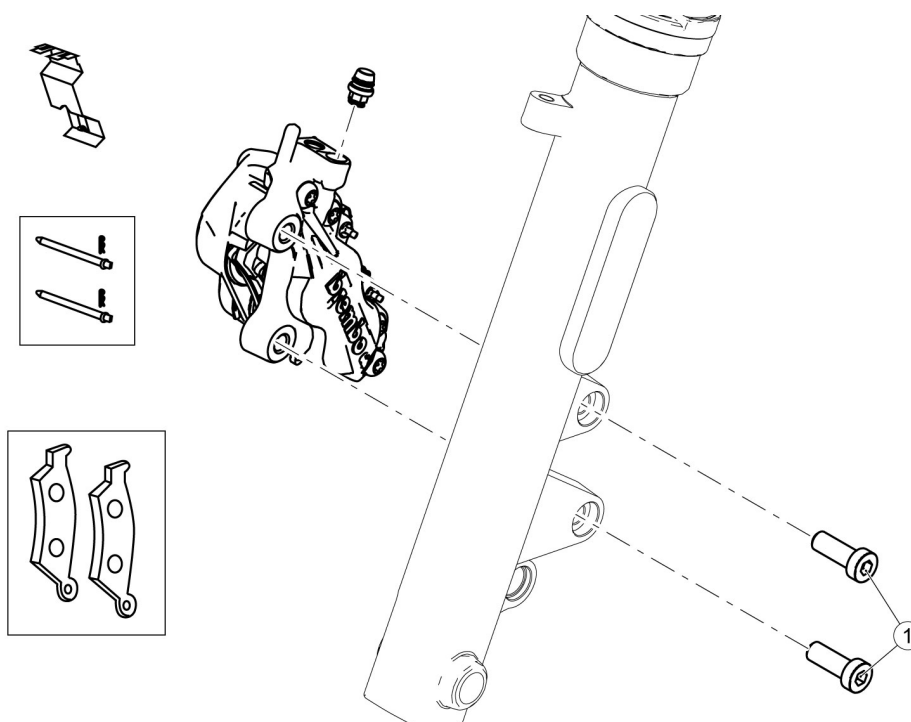


CHARACTERISTIC	DESCRIPTION / VALUE
Intake valve clearance	0.10 mm (0.0039 in)
Exhaust valve clearance	0.15 mm (0.0059 in)

- 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

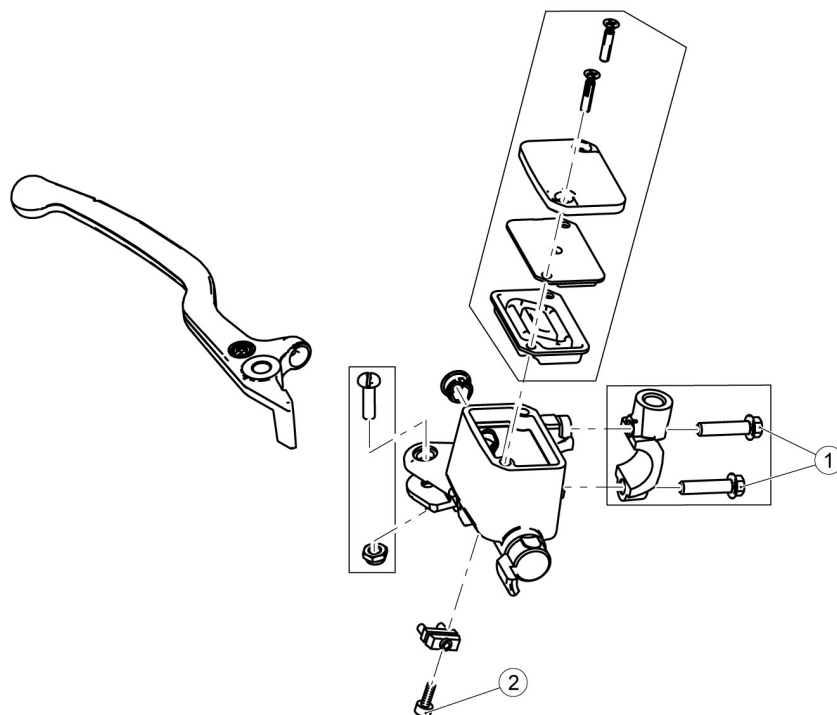


4.11 Braking system

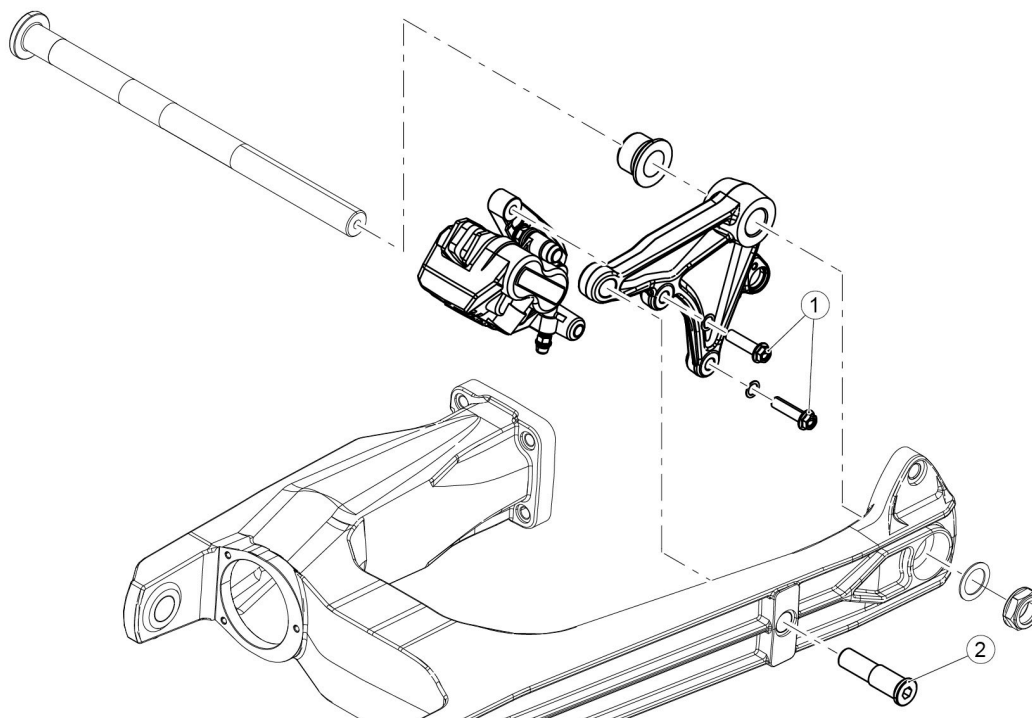


FRONT BRAKE CALLIPER

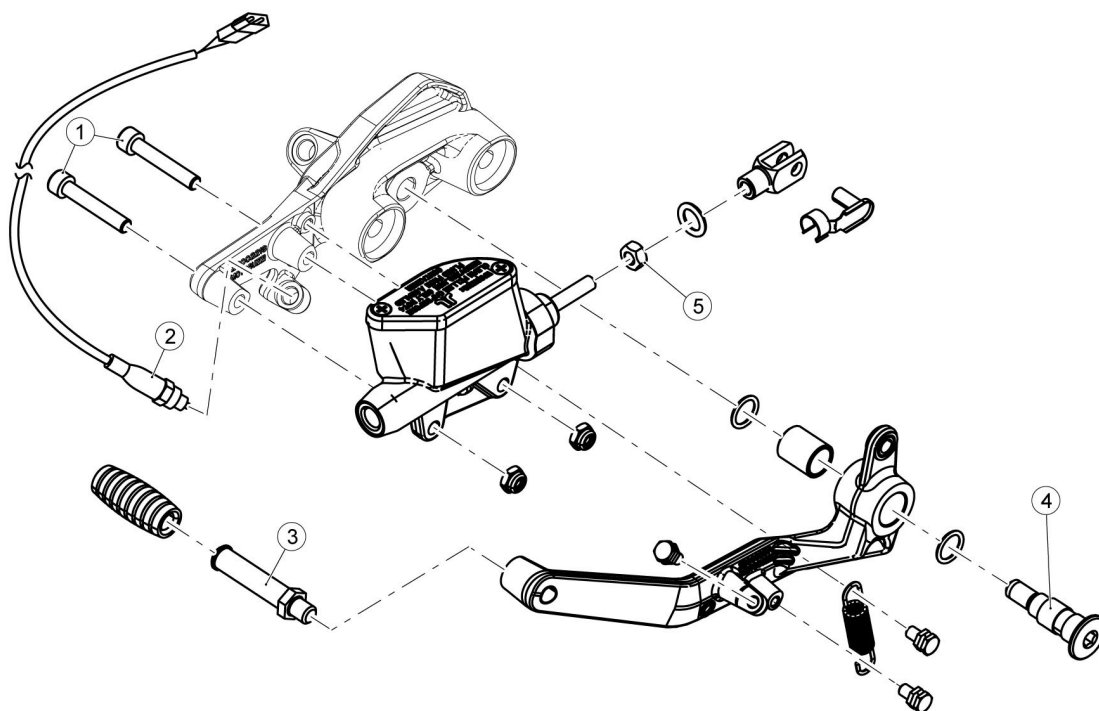
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lbf ft)	-

**FRONT BRAKE MASTER CYLINDER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-

**REAR BRAKE CALLIPER**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear brake calliper fixing screw	M8	2	25 Nm (18.44 lbf ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 Nm (25.81 lbf ft)	-



REAR BRAKE MASTER CYLINDER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lbf ft)	Loctite 243
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-

4.11.1 Level check

WARNING



FLUID LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR DOWN.

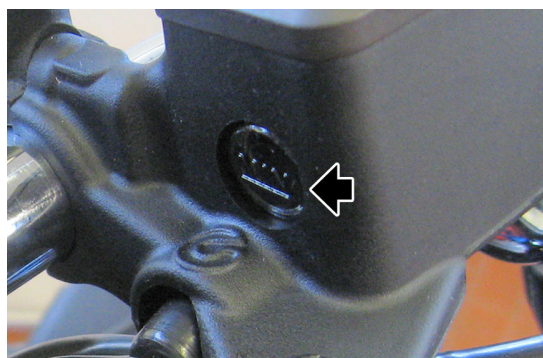
FRONT BRAKE

- 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:

- 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**

- 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:

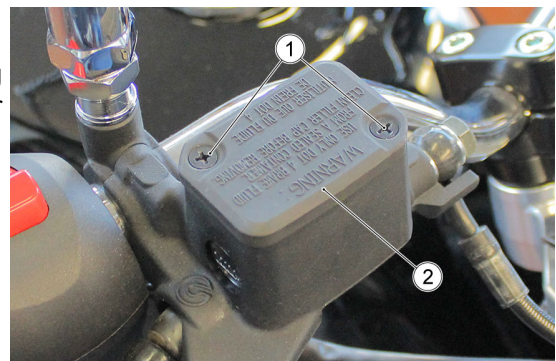
- Check the brake pads and discs for wear.
- If the pads and/or the disc do not need replacing, top-up the fluid

**4.11.2 Top-up****WARNING**

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.

FRONT BRAKE

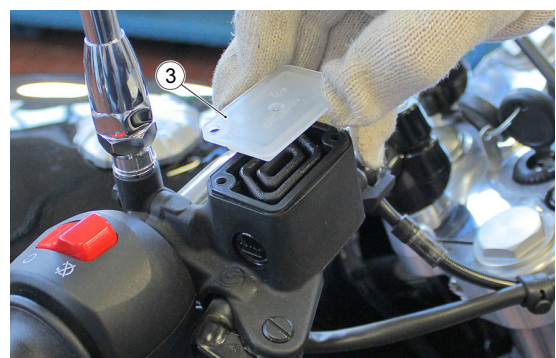
- Unscrew and remove the two fastening screws (1) on the brake fluid reservoir cover (2).



- Remove the brake fluid reservoir cover (2)



- Remove the inner cover (3)

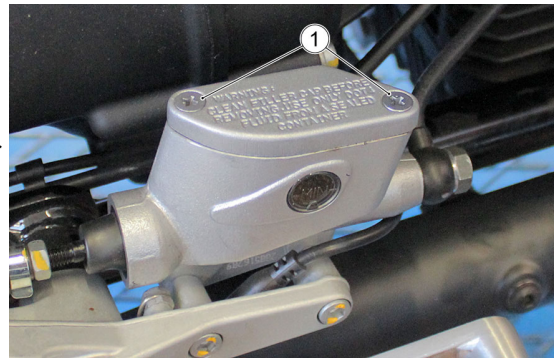


- Remove the diaphragm (4)
- Top up the brake fluid reservoir

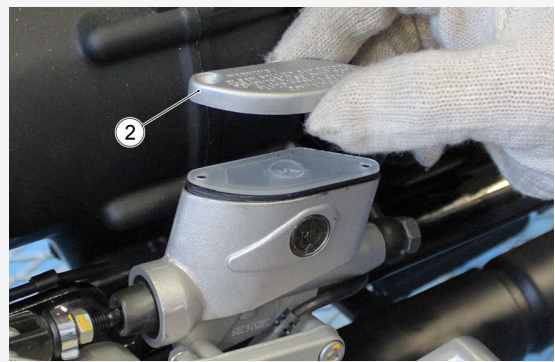


REAR BRAKE**(SPECIAL/STONE/ANNIVERSARIO)**

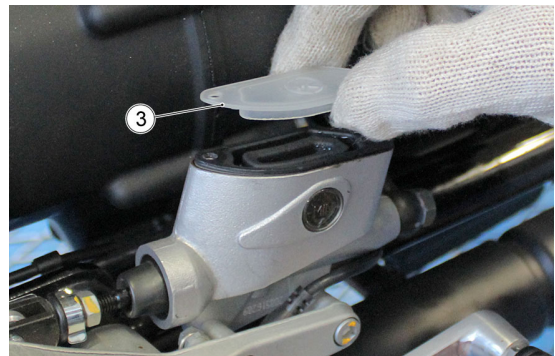
- Unscrew and remove the two fastening screws (1) on the brake fluid reservoir cover (2).



- Remove the brake fluid reservoir cover (2)



- Remove the inner cover (3)

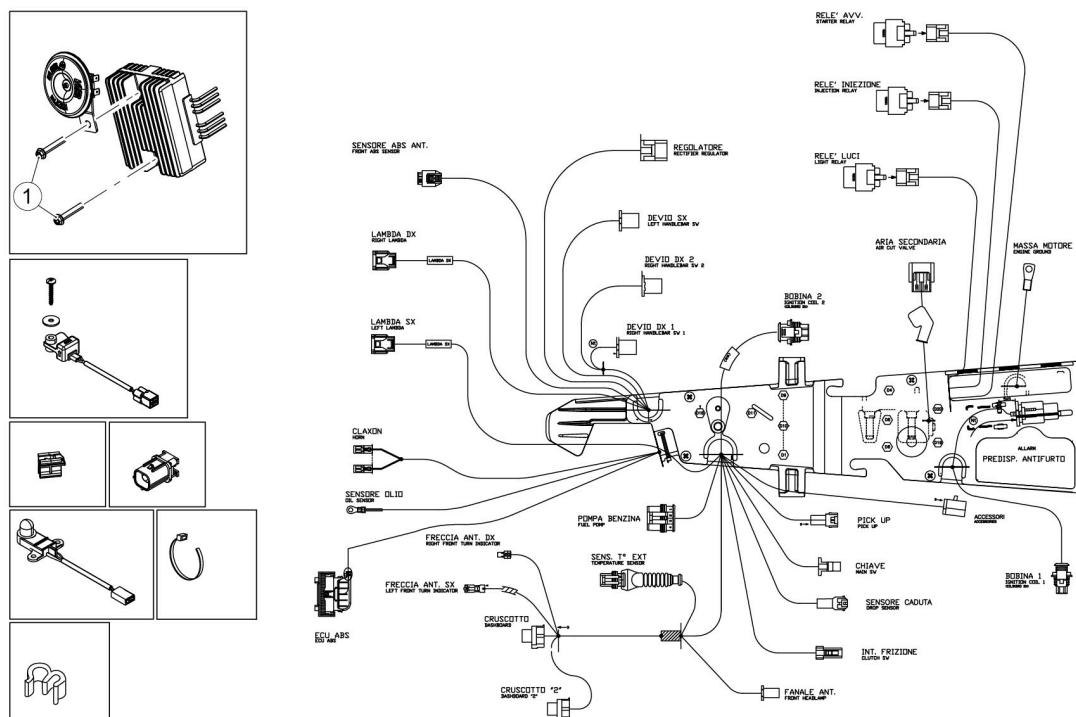


- Remove the diaphragm (4)
- Top up the brake fluid reservoir



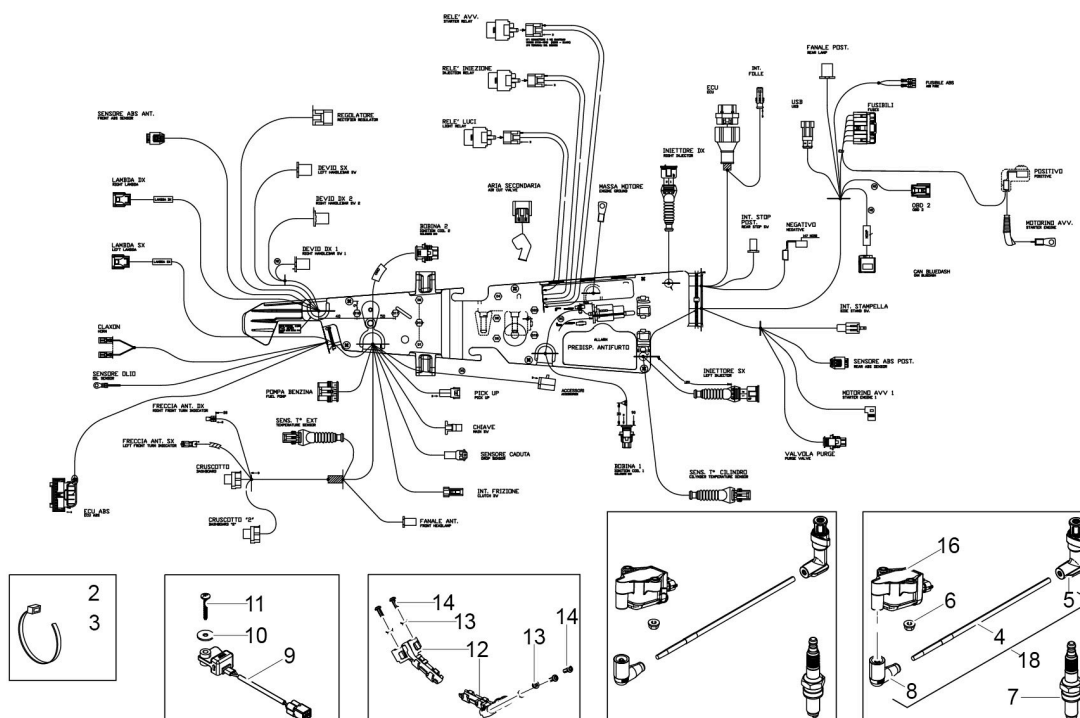
LIST OF TOPICS

Electrical system



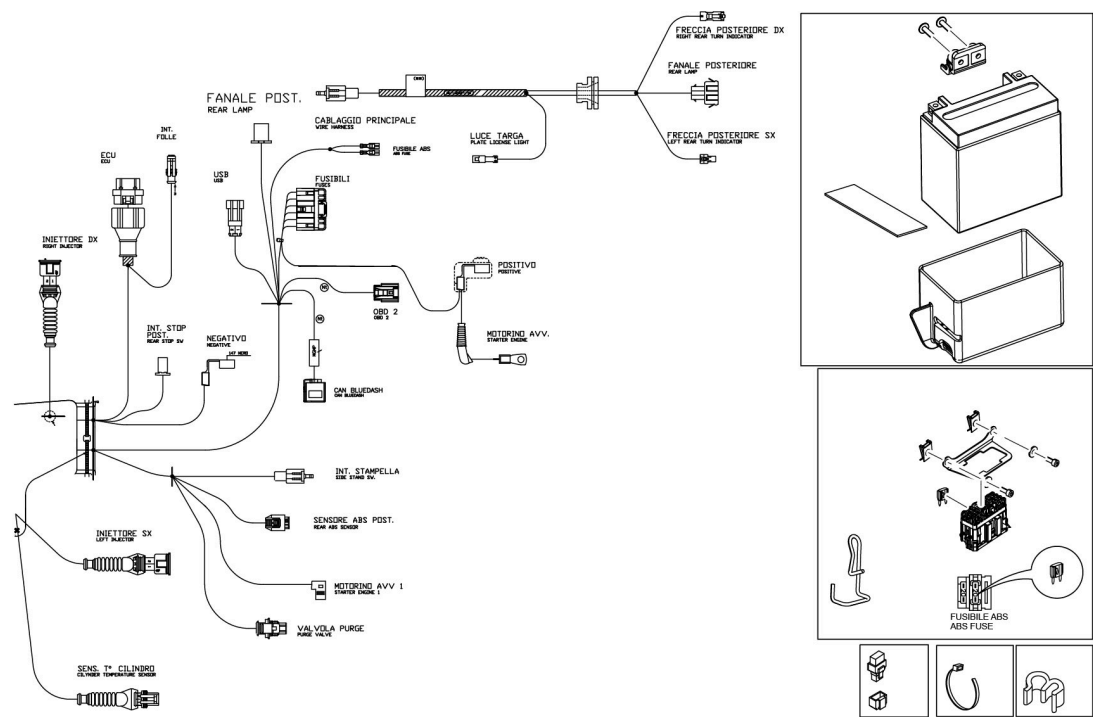
FRONT ELECTRICAL SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Voltage regulator and horn fastening screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Clutch switch fixing screw	M8	1	5 Nm (3.69 lbf ft)	



CENTRAL ELECTRICAL SYSTEM

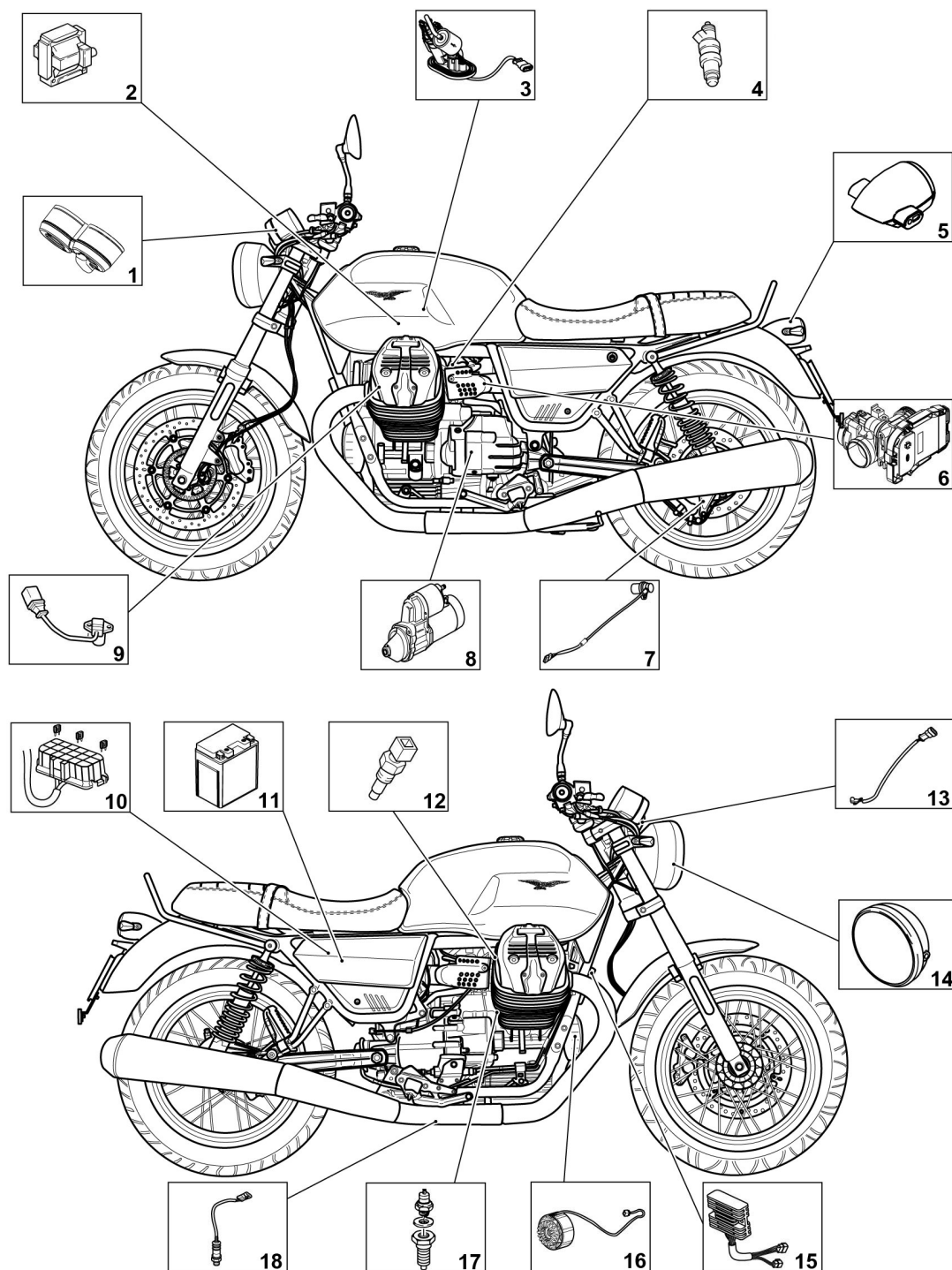
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
-	Coils fastening nuts	M6	4	10 Nm (7.38 lbf ft)	-
-	Starter motor fixing screws	M8	2	25 Nm (18.44 lbf ft)	



REAR ELECTRICAL SYSTEM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
-	Control unit cable grommet fastening screw	M4	1	3 Nm (2.21 lbf ft)	Thread-forming screws
-	Battery holder bracket fastening screws	M6	2	Manual	-
-	Fuse box bracket fastening screws	M5	2	4 Nm (2.95 lbf ft)	-

5.1 Component layout



Key:

- 1 . Instrument cluster
- 2 . Coil
- 3 . Fuel pump

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

5.2 Checks and controls

5.2.1 Instrument cluster

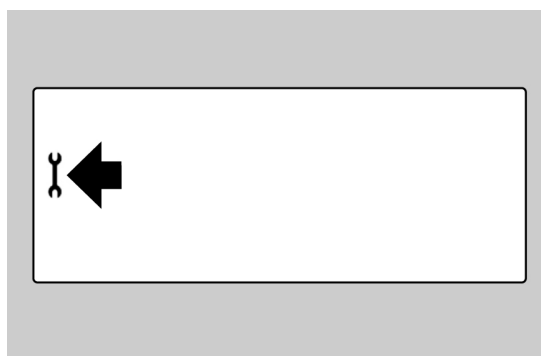
5.2.1.1 Maintenance icon reset

The system displays the function as follows:

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

To reset Service proceed as follows:

- Connect the diagnostic tool;
- Select the concerned model;
- Enter in the "**INSTRUMENT CLUSTER**" section;
- Select "**SELF-DIAGNOSTIC**";
- Select " **ADJUSTMENTS** ";
- Enable the command "**SERVICE RESET**".



5.2.2 Battery recharge circuit

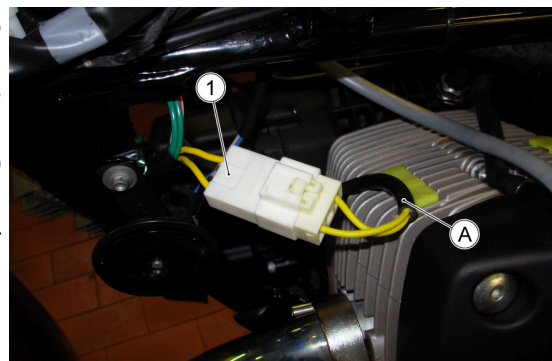
RECHARGING SYSTEM

- 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).

N.B.:

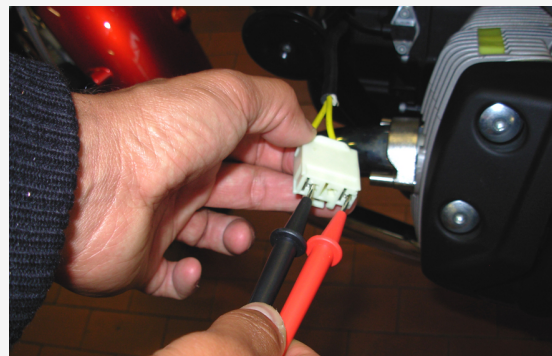
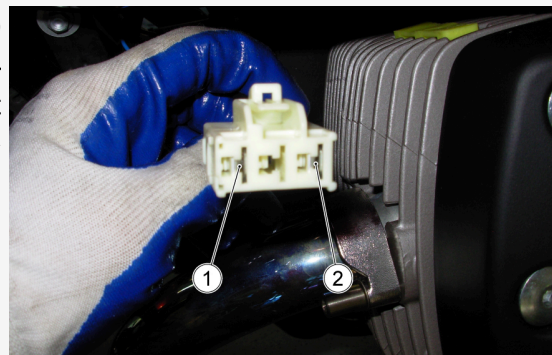


THE ENGINE SIDE IS IDENTIFIED WITH THE LETTER "A"



Measurement of resistance (with engine off)

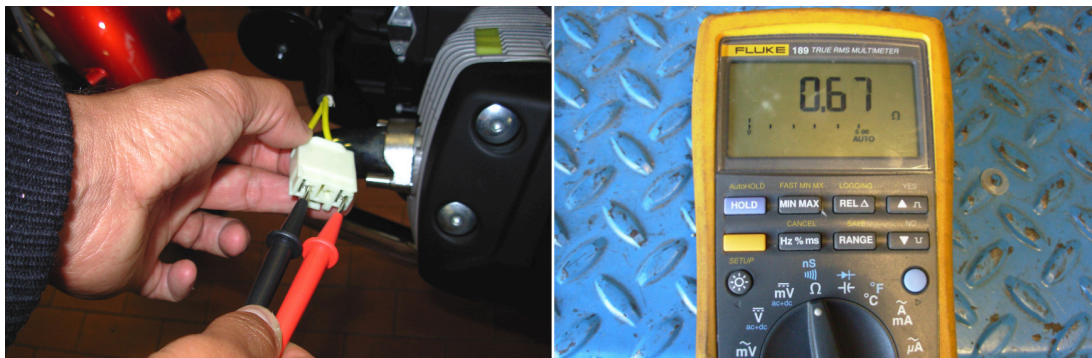
- For a correct detection of the alternator resistance, must be performed an ambient temperature measurement and then a further heat stabilisation with a tester.



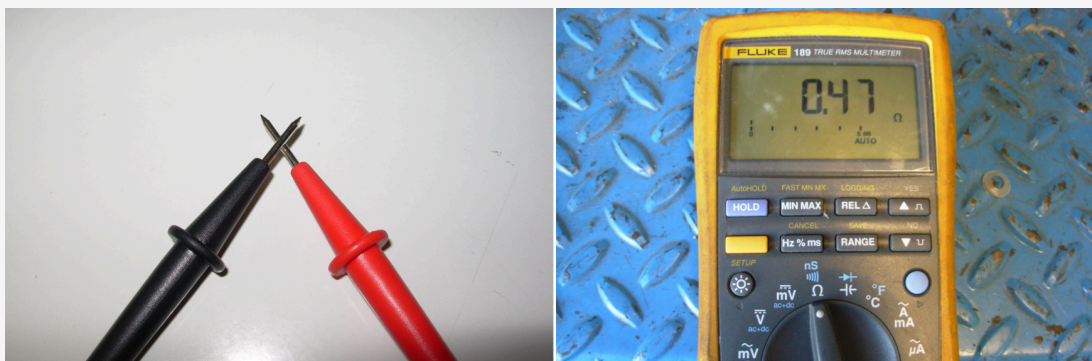
- Take the measurement; The correct value is determined by subtracting the wire resistance of the tester obtained by touching the two pins.

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 phase	Ambient Temperature (ohm)	After thermal stabilisation (ohm)
Phase	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.

WARNING



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

Zero load voltage

RPM	2000	4000	6000
Vm line-to-line voltage Reference values (V rms)	40 - 45	82 - 87	132-138

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



WARNING



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)	18	20.4	20.6	20.7

Voltage on battery terminals with engine running between 3,000 - 5,000 RPM

- Start the engine. After about one minute of operation, rev the engine to 3,000-5,000 RPM, then use a tester to measure the voltage at the battery terminals which should be between 13V and 15V. Otherwise, if correct operation of the alternator has already been confirmed, replace the regulator.

WARNING

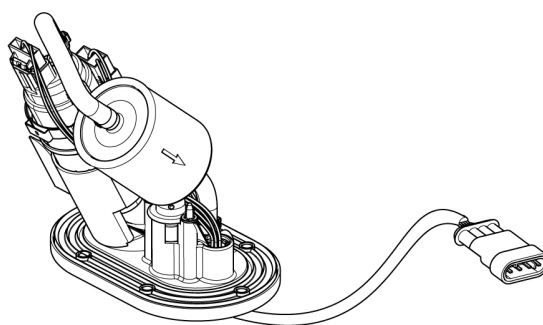
CONDUCT THE CHECK DESCRIBED ABOVE WITH A BATTERY WHICH IS IN GOOD CONDITION (STARTING VOLTAGE AROUND 13V) AND DOES NOT HAVE ELEMENTS IN SHORT CIRCUIT.

5.2.4 level indicators**Fuel 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)

**5.2.5 Lighting system****BULBS (SPECIAL)**

Low/high beam light (halogen)	12 V - 55 W / 60 W H4
-------------------------------	-----------------------

Front DRL	12 V - 5 W
-----------	------------

taillight /stop lights	LED
------------------------	-----

Turn indicators	LED
-----------------	-----

Dashboard lighting	
--------------------	--

BULBS (STONE)

High beam/low beam light	LED
--------------------------	-----

Front DRL	LED
-----------	-----

taillight /stop lights	LED
------------------------	-----

Turn indicators	LED
-----------------	-----

BULBS (STONE)

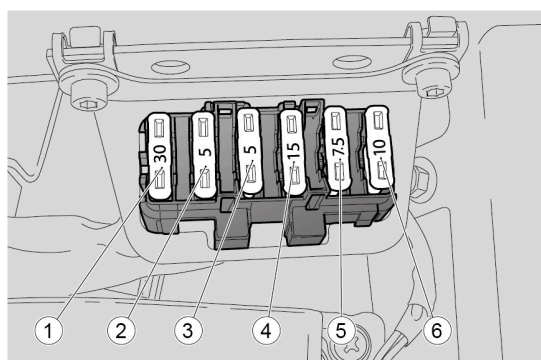
Dashboard lighting

5.2.6 Fuses**FUSE LOCATION****(HALOGEN)**

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

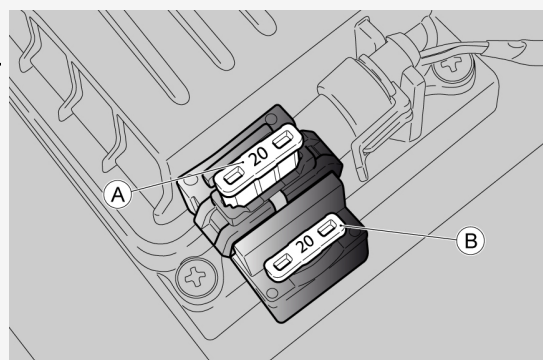
(LED)

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



ABS FUSE LAYOUT

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

**5.2.7 ECU****ENGINE TONE WHEEL PROGRAMMING PROCEDURE**

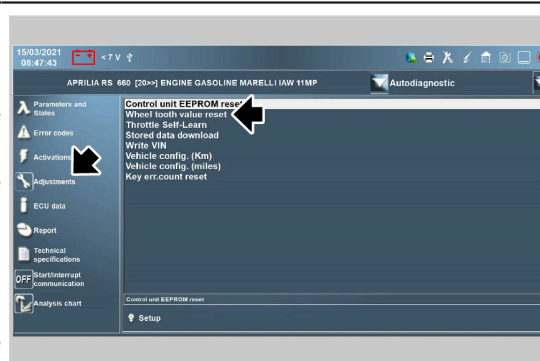
- Using the PADS diagnostic tool, perform the "Reset wheel tooth values";
- Bring the engine to a temperature above 80°;

Then proceed as described:

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

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

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

**WARNING**

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

IN CERTAIN CASES, EVEN SMALL VIBRATIONS GENERATED BY THE ENGINE (WITH THE ENGINE IN NEUTRAL POSITION AND THE SIDE STAND EXTENDED/OPEN, THE INSTRUMENT PANEL DOES NOT DETECT THE VEHICLE'S SPEED), MAY CAUSE THE PROCEDURE TO FAIL, WHICH MEANS IT HAS TO BE REPEATED.

IN THIS CASE, REPEAT THE PROCEDURE WITH THE SIDE STAND CLOSED AND VEHICLE IN NEUTRAL ALWAYS PAYING EXTREME ATTENTION. FOR MORE SAFETY, POSSIBLY BLOCK THE VEHICLE AGAINST A WALL.

WARNING

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

5.2.8 Battery

Function

Provide electrical supply, the battery is YUASA.

Level in electrical circuit diagram

Charging the battery

Position

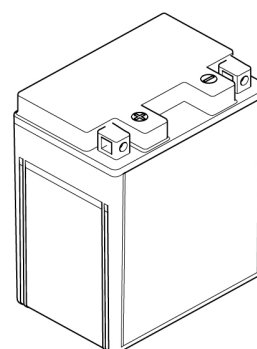
- on the vehicle: right side, under fairing
- connector: on the battery

Electrical specifications

- 12 V / 12 Ah

Pin-out:

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



WARNING

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

Diagnostic tool - Parameters and statuses

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

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 cluster 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.

5.2.9 Engine 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

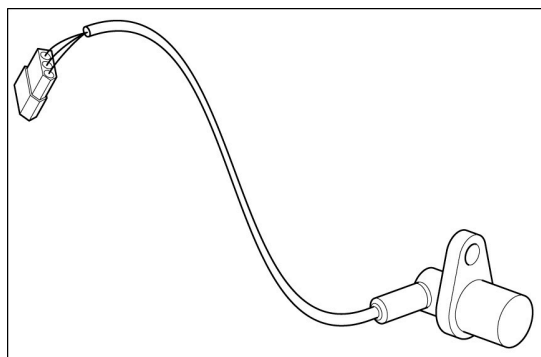
ABS system

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)



WARNING



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

Diagnostic tool - Parameters 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 validTroubleshooting

- Connect to the ABS control unit diagnostic

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 5D92Error cause

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

Troubleshooting

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

Missing signal or speed measured too low in relation to the rear wheel 5D93Error 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

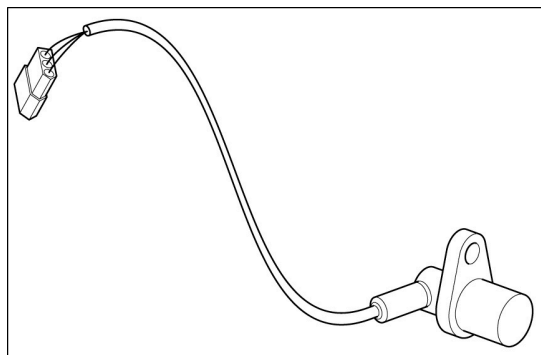
ABS system

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)



WARNING



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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 diagnostic.

Diagnostics tool - Logic errors

The signal works irregularly 5DA1

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 5DA4Error 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 5DA5Error 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.
-

5.2.10 Engine speed sensor**Function**

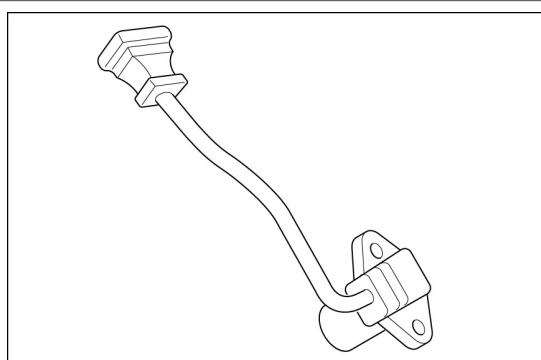
It informs crankshaft position and speed to the Marelli control unit

Operation / Operating principle

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

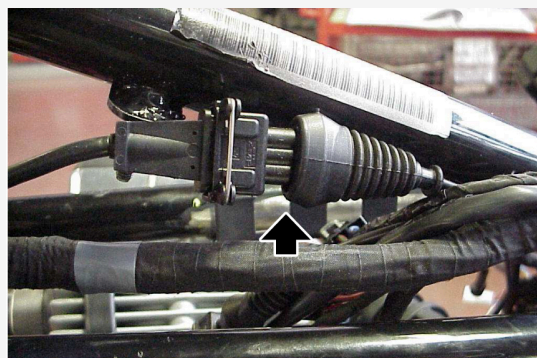
Level in electrical circuit diagram

Engine speed sensor



Position

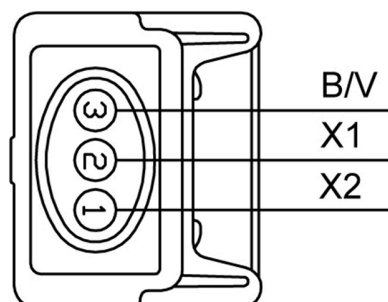
- Sensor: engine front left section, under the left cylinder
- Connector: under the fuel tank

**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)

**WARNING**

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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 air 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

5.2.11 Engine temperature sensor

Function

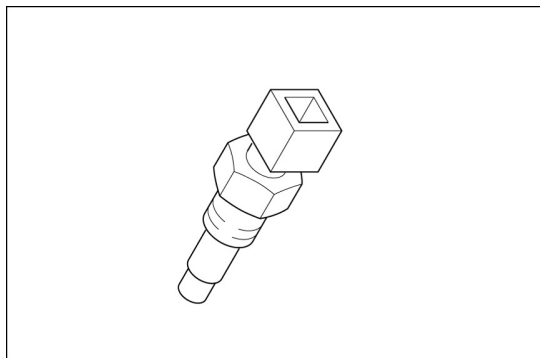
indicates the engine temperature to the control unit so as to optimise mixture and idle control

Operation / Operating principle

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

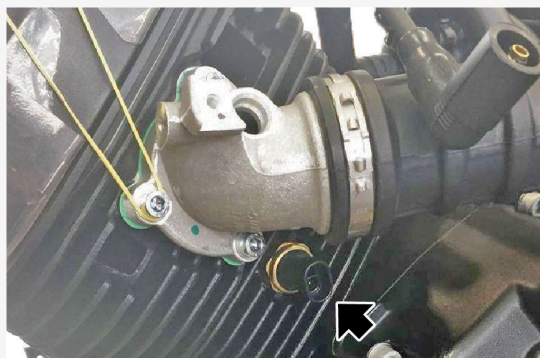
Level in electrical circuit diagram

Temperature sensors



Position

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

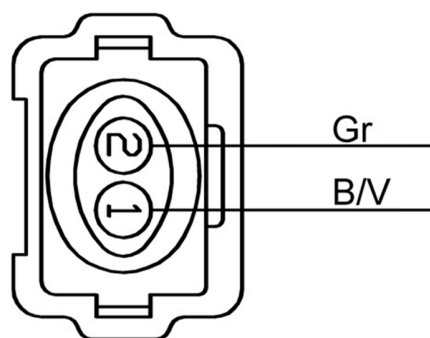


Electrical specifications

- 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)

**WARNING**

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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.
- Check the 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. Repair the wiring harness if necessary.
- 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.

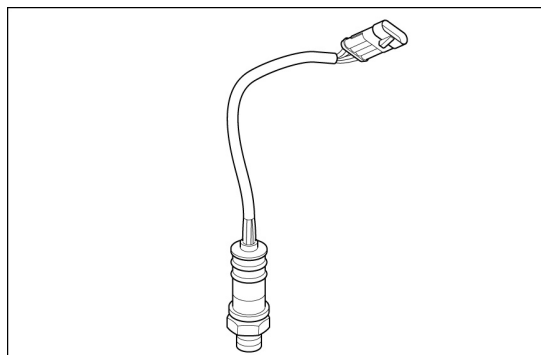
5.2.12 Lambda probe

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

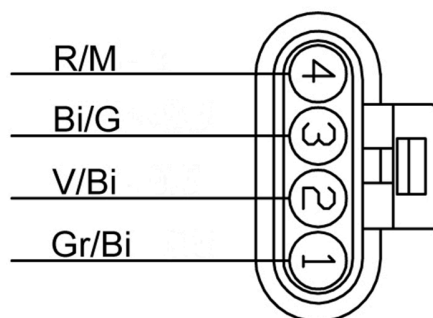
- Sensor: right exhaust pipe
- Connector: near the throttle body right side

Electrical specifications

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

Pin-out

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



WARNING



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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 to 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.
- Check the 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. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Short-circuit to negative:

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

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

Error cause

- Short-circuit to positive: excessive voltage to 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.
- Check the continuity of the wiring harness between the sensor connector and the control unit connector: Control unit PIN 2 - sensor PIN 3. Repair the wiring harness if necessary.
- Verify continuity of the wiring harness between the sensor connector and the injection relay: sensor PIN 4 - injection relay PIN 3. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Short-circuit to negative:

- Disconnect the sensor connector.
- Check the sensor connector PIN 3 ground insulation. If there is no 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

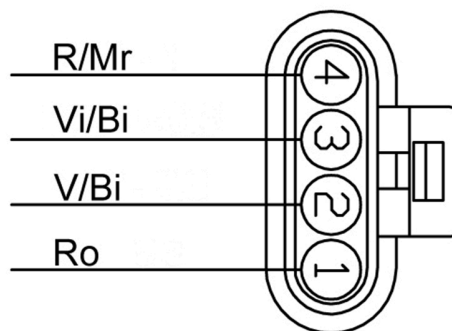
- Sensor: left exhaust pipe
- Connector: adjacent to the filter box, left side

Electrical specifications:

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

Pin-out

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



Diagnostic tool - Parameters and statuses

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

Diagnostic tool - Activation

- Lambda probe heater 1

Diagnostic tool - Electrical errors

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

Error cause

- Short-circuit to positive: excessive voltage to PIN 11 or PIN 12 of the control unit connector

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

Troubleshooting

Short-circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 1 (corresponding to control unit connector PIN 11); if there is a short, restore the wiring harness.
- Verify that there is no short to battery positive on sensor connector PIN 2 (corresponding to control unit connector PIN 12); if there is a short, restore the wiring harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Check the 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. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks.

Short-circuit to negative:

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

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

Error cause

- Short-circuit to positive: excessive voltage to 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. If there is no 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.
- Check the continuity of the wiring harness between the sensor connector and the control unit connector: control unit PIN 31 - sensor PIN 3. Repair the wiring harness if necessary.

- Verify continuity of the wiring harness between the sensor connector and the injection relay: sensor PIN 4 - injection relay PIN 3. Repair the wiring harness if necessary.
- If the wiring harness is intact and the error persists, proceed with the following checks.

5.2.13 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

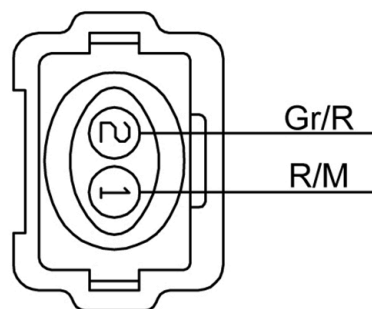
- On the intake manifold
- Connector: on injector

Electrical specifications

- 14.8 Ohm +/- 5% (at 20 °C - 68 °F)

Pin-out

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



WARNING



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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 to 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). If there is no continuity, restore the wiring harness.

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

Coils and injectors

Left injector position:

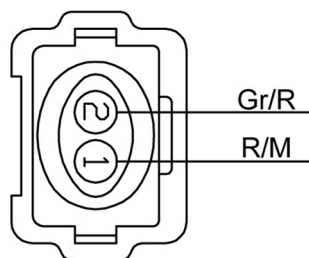
- On the intake manifold
- Connector: on injector

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 to 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). If there is no continuity, restore the wiring harness.

5.2.14 Fuel pump**Function**

Fuel pump: keeps pressure of the injectors supply duct.

Low fuel: tells to the instrument cluster about low fuel

Operation / Operating principle

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

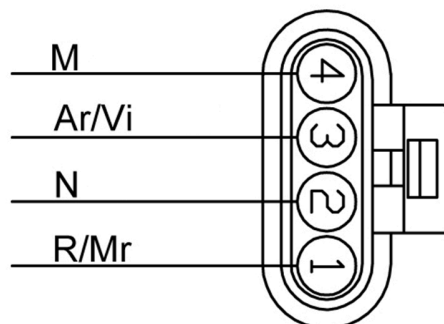
Level in electrical circuit diagram

Injection loads relay

Low fuel and oil pressure

Position

- On the vehicle: on the tank.
- Connector: 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 lead (Black)
 - 3 . Positive signal to instrument panel (orange/violet)
 - 4 . Ground (brown)
-

WARNING

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). Repair the wiring harness if necessary.

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. Repair the wiring harness if necessary.

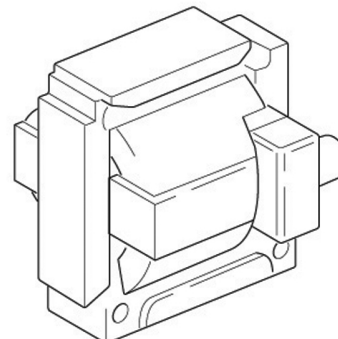
5.2.15 Coil

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

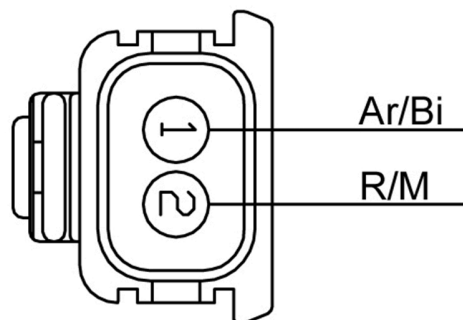
- Centred under the fuel tank.
- Connector: on the coil.

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)



WARNING



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

- 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 to 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. If there is no 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). Repair the wiring harness if necessary.

RIGHT COIL

Level in electrical circuit diagram

Right cylinder coil 2

Position

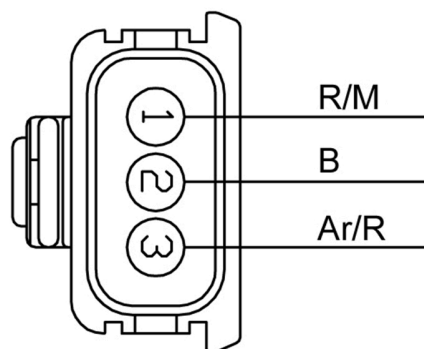
- Centred under the fuel tank.
- Connector: on the coil.

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)



WARNING



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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 to 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. If there is no 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). Repair the wiring harness if necessary.

5.2.16 Gearbox in 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

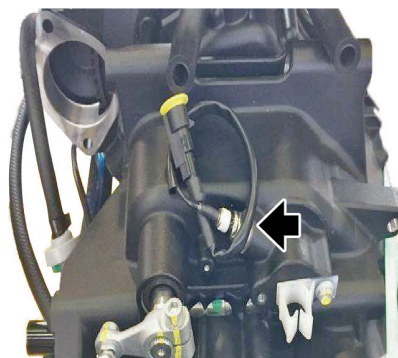
- Sensor: rear / upper side of the gearbox
- Connector: on the sensor

Electrical specifications

- Gearbox 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)
-



WARNING



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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 cluster 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.

5.2.17 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 switches.

Position

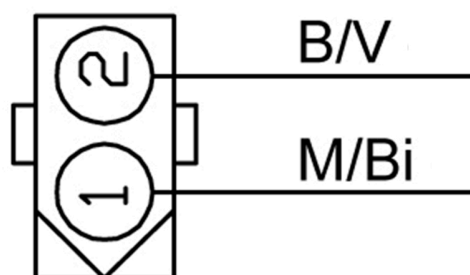
- Sensor: under clutch lever
- Connector: under the fuel tank on right side

Electrical specifications

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

Pin-out

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



WARNING



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Diagnostic tool - Parameters and statuses

- Clutch - (Pulled, Released)

Diagnosis

Even with the clutch lever engaged, 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 engaged, 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.

5.2.18 Side stand sensor

Function

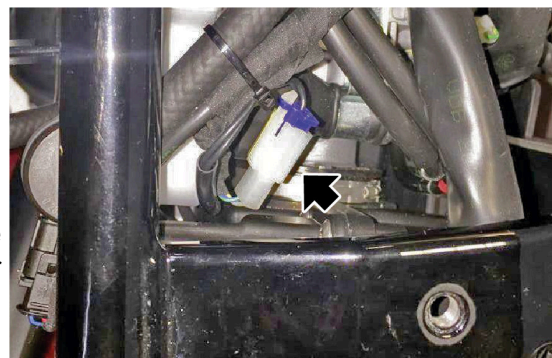
Indicates the side stand position to the control unit

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 enable switches



Position

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

Electrical specifications

- Stand up: closed circuit (continuity)
- Stand down: open circuit (infinite resistance)

Pin-out

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

WARNING

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Diagnostic tool - Parameters and statuses

- Side stand - (Up, Down)

Diagnosis

The vehicle with clutch engaged, 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.

5.2.19 fall sensor

Function

Operation / Operating principle

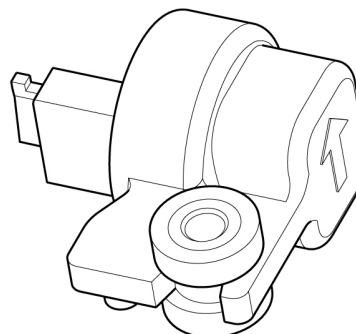
The sensor operates by sending an engine stop signal to the control unit, in cases where the vehicle detects an inclination greater than $\sim 60^\circ$ (for example, due to slips or falls)

Level in electrical circuit diagram

Start enable switches

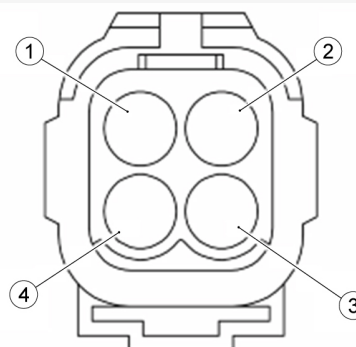
Position

- 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)



WARNING



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Diagnostic tool - Parameters and statuses

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

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

5.2.20 SAS valve actuator

Function

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:

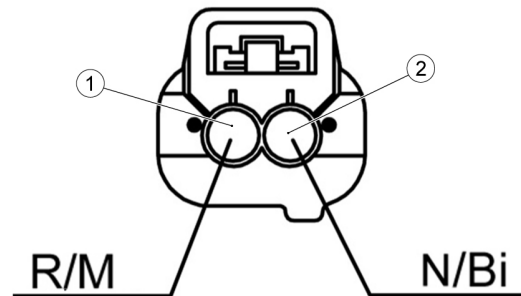
- on the vehicle: under the fuel tank, in the middle of the "V" of the engine, attached to the chassis
- connector: on the valve

Electrical specifications

- Resistance at ambient temperature: $21 \pm 3/-1 \Omega$

Pin-out

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



WARNING



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Diagnostic tool - Parameters

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

Used only at 0 or 100%

Diagnostic tool - Activation

- Secondary air EV

Diagnostics tool - Logic errors

Error cause

- Possible malfunction

Troubleshooting

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

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

Error cause

- Short-circuit to positive: excessive voltage measured at PIN 24 of the engine control unit
- If shorted to negative/open circuit: no voltage has been detected. The instrument cluster 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

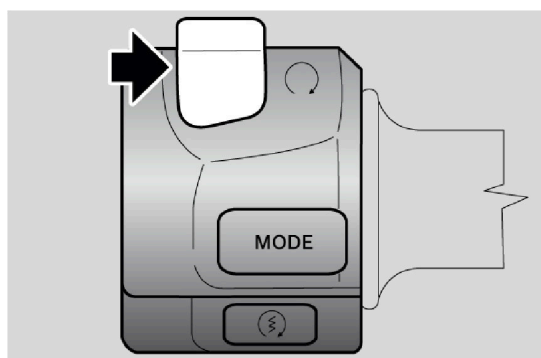
5.2.21 RUN/STOP switch

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 enable 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)

WARNING

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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

5.3 Connectors

5.3.1 ECU

Function

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

Level in electrical circuit diagram

Secondary air system

Bluedash pre-installation

Anti-theft device

ABS system

Diagnosis

Low beam and running lights logic

High-beam lights logic

CAN Line

Temperature sensors

Lambda probe

Neutral sensor

Engine speed sensor

Coils and injectors

Injection loads relay

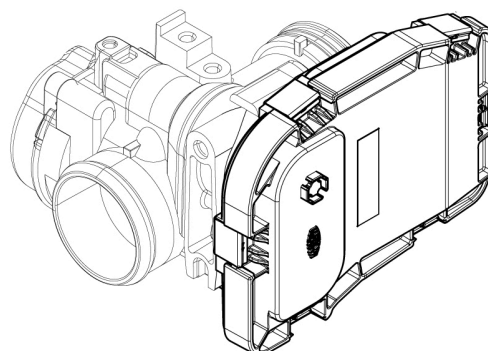
ECU base power circuit

Ignition

Start enable switches

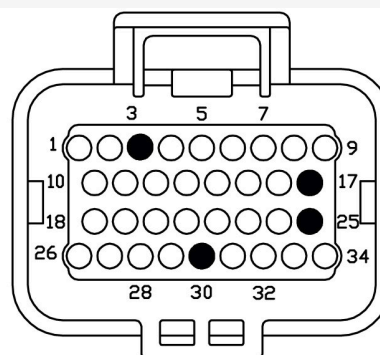
Position

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



Pin-out

- | | |
|-----|--|
| 1 . | Left coil command output (1) |
| 2 . | Right Lambda heater command output (2) |
| 3 . | - |
| 4 . | Run-off control input |
| 5 . | Start button inlet |
| 6 . | Ignition switch positive |
| 7 . | Ground 1 (-) |
| 8 . | Right coil command output (2) |
| 9 . | Battery positive 12V |

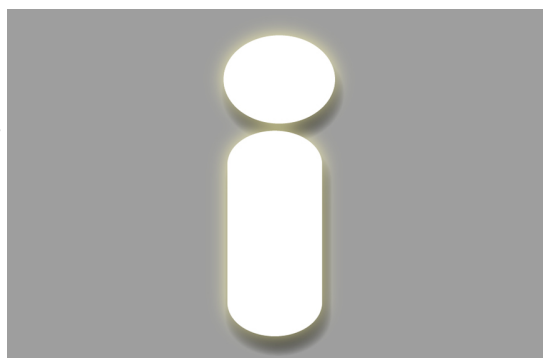


- 10 . Starter motor relay command output
- 11 . Left lambda probe positive signal (1)
- 12 . Left lambda probe negative signal (1)
- 13 . Temperature sensor input
- 14 . Clutch switch signal
- 15 . External sensor ground
- 16 . Right lambda probe negative signal (2)
- 17 . -
- 18 . Right lambda probe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

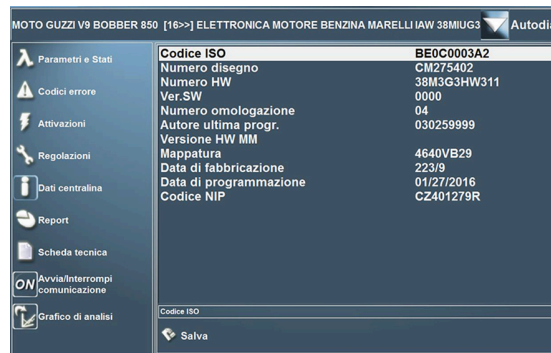
Diagnostic tool - Control unit info screen page

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

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



- NIP code



WARNING



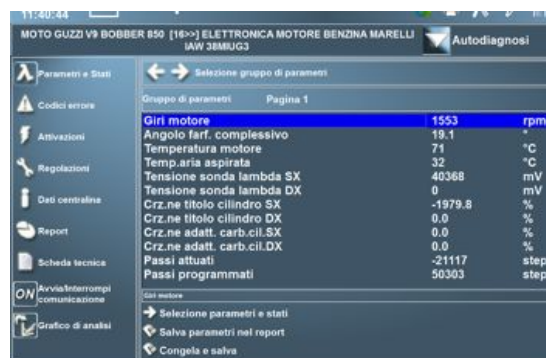
BEFORE CARRYING OUT ANY TROUBLESHOOTING, CAREFULLY READ THE GENERAL TROUBLESHOOTING CONCEPTS FOR ELECTRICAL DEVICES AT THE BEGINNING OF THE CHECK AND CONTROL SECTION IN THE ELECTRICAL SYSTEM CHAPTER.

Diagnostic tool - Parameters and statuses

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



- Engine speed - (rpm)
- Complete throt. angle - (°)
- Engine temperature - (°C)
- Intake air temperature - (°C)
- Oxygen sensor voltage LH - (mV)
- Oxygen sensor voltage RH - (mV)
- Corr. title cylinder LH - (%)
- Corr. title cylinder RH - (%)
- Corr. title carb. cyl. LH - (%)
- Corr. title carb. cyl. RH - (%)
- Steps carried out - (step)
- Programmed steps - (step)
- Advance cylinder LH - (°)
- Advance programmed - (°)
- Advance cylinder RH - (°)
- Injection time cyl. LH - (ms)
- Injection time cyl. RH - (ms)



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

Diagnostic tool - Activation

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

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



Diagnostic tool - Errors screen page

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



Diagnostic tool - Adjustment

This screen is used to adjust some control unit parameters.

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

**Diagnostic tool - Electrical errors**

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

Error cause

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

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

Error cause

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

Error EEPROM P0601 - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

Error RAM P0604 - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

Error ROM P0605 - circuit not working

Error cause

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

Troubleshooting

- Replace the engine control unit

Saved data file (for safety) P1607 - filled

Error 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

Error cause

- Malfunction of sensor inside the control unit

Troubleshooting

- Replace the control unit

Diagnostic tool - Adjustment

Throttle positioner self-acquisition

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

Reset of self-adaptive parameters

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

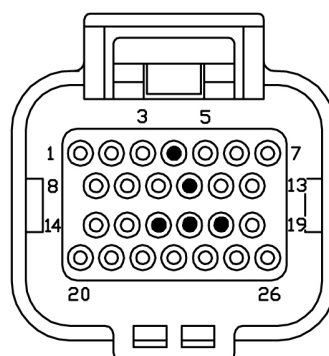
Diagnostic tool - Reset

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

5.3.2 Instrument cluster

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
- 7 . Ground
- 8 . CAN L line
- 9 . Instrument panel backlighting control inlet (DRL)
- 10 . Fuel sensor inlet
- 11 . /
- 12 . Inlet (hazard)
- 13 . Sensor 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)



WARNING



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

Diagnostic tool - Electrical errors

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

Error code B0008 (ALARM DISCONNECTED)

Error cause

- Occurs during the encoding of the first key connection, if the CAN line from the engine control unit is missing, the error is activated

Identification

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

Troubleshooting

- Check the integrity and the continuity of the cables of the CAN line between PIN 8 instrument cluster and PIN 27 injection control unit and between PIN 1 instrument cluster and PIN 26 injection control unit
- Further check that in the CAN line is no continuity with the vehicle mass or with positive

Error code B0009 (ALARM DISCONNECTED)

Error cause

- The instrument cluster is not able to send data on the CAN line

Identification

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

Troubleshooting

- Check the integrity, the continuity and the absence of the cables of the CAN line between PIN 8 instrument cluster and PIN 27 injection control unit and between PIN 1 instrument cluster and PIN 26 injection control unit
- Further check that in the CAN line is no continuity with the vehicle mass and with positive

Error code B0300 (ALARM DISCONNECTED)

Error cause

- Occurs during the encoding of the first key connection, if the CAN line from the left light switch control is missing, the error is activated

Identification

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

Troubleshooting

- Check that there is no continuity between the two cables of the CAN line; if not OK restore, if OK check the integrity and the continuity between PIN 8 instrument cluster and PIN 4 left light switch; if not OK restore, if OK check the integrity and the continuity between PIN 1 instrument cluster and PIN 3 left light switch; if not OK restore, if OK check that the CAN lines are not in continuity with the vehicle ground or with positive

ENGINE OIL PRESSURE SENSOR**Function**

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

Operation / Operating principle

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

Level in electrical circuit diagram

Low fuel and oil pressure.

Position

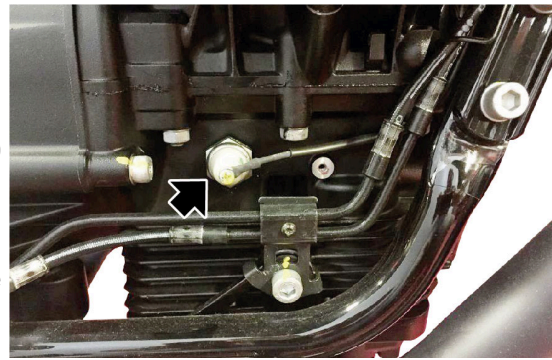
- Sensor: between the two heads, at the back.
- Connector: on the sensor.

Electrical specifications

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

Pin-out

- 1 . Voltage 12V (violet).

**WARNING**

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

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

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

Error cause

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

Identification

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

Troubleshooting

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

Error code B0002 (ALARM OIL PRESSURE)

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

Error cause

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

Identification

- General alarm warning flashing (red) and indication "ALARM OIL PRESSURE" on the display.

Troubleshooting

- Check the engine and its operation before continuing with the verifications related to the sensor. Check the sensor connector and the instrument panel connector PIN 3: if not OK restore, if OK disconnect the sensor and check that there is no continuity between vehicle sensor connector and vehicle ground, if not OK restore, if OK check with running engine with disconnected sensor that there is no continuity between sensor and vehicle ground, if not OK restore, if OK replace sensor.

AIR TEMPERATURE SENSOR

Function

Indicates the ambient air temperature to the instrument panel

Operation / Operating principle

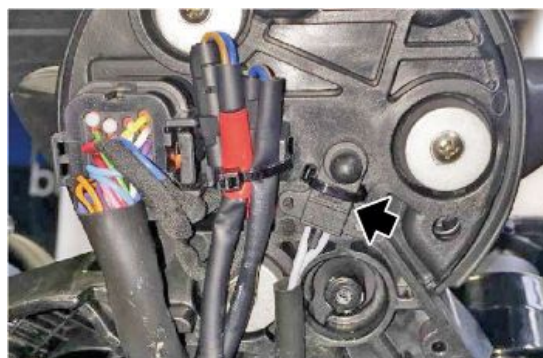
NTC type sensor (resistance sensor, inversely variable with temperature)

Level in electrical circuit diagram

Temperature sensors

Position

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

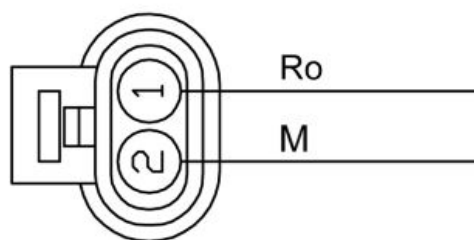


**Electrical specifications**

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

Pin-out

- 1 . Voltage 5V (pink)
- 2 . Ground (brown)

**WARNING**

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

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

Error cause

- Possible malfunction

Troubleshooting

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

case of short circuit to ground detected on PIN 15 of the instrument cluster connector, check isolation from ground of the pink cable from the sensor connector; If connected to ground, restore the cabling. If insulated from ground, check correct resistance of the sensor; if not OK, replace the sensor; if it is OK, replace the instrument panel

5.4 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 significantly simplifies the layout of the electrical system and its overall ground. With this communication line, needless duplication of several sensors present on the motorbike has been obviated. The sensor signals are shared by the two electronic elaboration units (instrument panel and control unit).

- Cable number reduction: The CAN line travels through a twisted cable to several nodes.
- These nodes can also isolate the errors without causing a system breakdown (FaultsConfination).
- Immunity to interference: the signal travels through two cables and the signal reading is differential (voltage difference between the two signals on both cables). If the two signals are disturbed by an external factor, their difference remains unaltered.
- Communication speed: messages travel at a speed of 250 kbps (data arrive at nodes every 20 ms, i.e. 50 times/second).

CAN PROTOCOL (CONT. NETWORK AREA)

The communication protocol is CSMA/CD (Carrier Sense Multiple Access w/ Collision Detection).

In order to transmit, every nod must first check that the BUS (the connection among all devices) is free before attempting to send a message with BUS (Carrier Sense).

If during this period there is no activity on BUS, every nod has the same chance to send a message (Multiple Access). If two nodes start transmitting simultaneously, the nodes recognise the "collision" (Collision Detection) and initiate an exchange action based on message priority (messages remain unaltered during exchange and there is no delay for high priority messages).

CAN protocol is based on messages and not on addresses. The message itself is divided into several parts (frames), each of which has a meaning: message priority, data contained, error detection, reception confirmation, etc.

Every network nod receives all the messages sent through the BUS (with reception confirmation or error messages) and each nod decides if the message is to be processed or rejected. Besides, every nod can request information from the other nodes (RTR = Remote Transmit Request).

Level in electrical circuit diagram

CAN Line

Pin-out

- Between PIN 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 absentError cause

- Missing reception of CAN line to engine control unit

Troubleshooting

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

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

- CAN error during acquisition

Troubleshooting

- In case of CAN error during acquisition, system warns that the procedure can not be completed due to a communication problem on the CAN line. In case of invalid value, it means that on key-ON an error of transcription occurred - from the non-volatile memory (EEPROM) to the volatile one (RAM) - of the value concerning the rear wheel radius. In this case the default value is used.

CAN line 5E1F - incorrect vehicle codeError cause

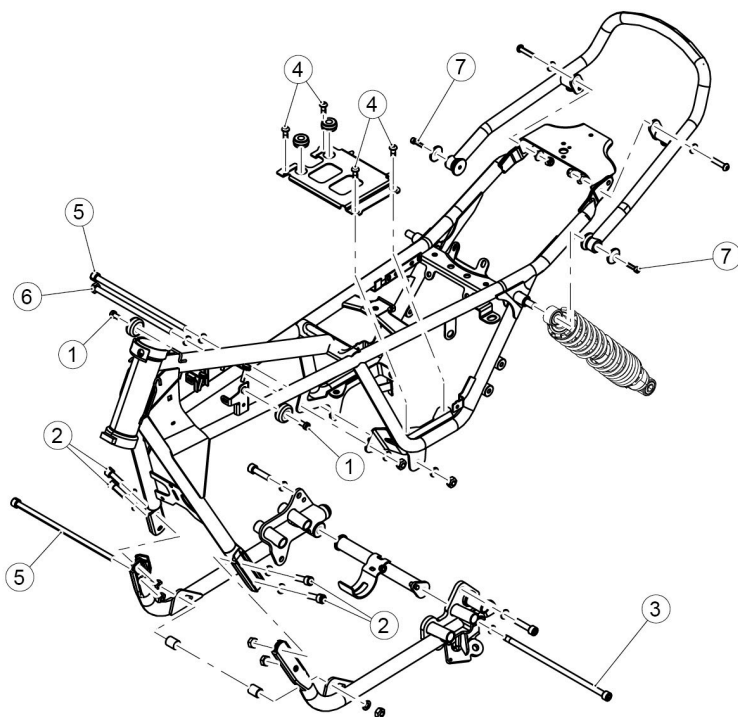
- The ABS control unit was installed in a wrong vehicle

Troubleshooting

- Replace the control unit

LIST OF TOPICS

Engine from the vehicle



CHASSIS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening the tank support buffers to the frame	M8	2	25 Nm (18.44 lbf ft)	-
2	Front cradle fixing screws	M10	4	50 Nm (36.88 lbf ft)	Pre-permeated
3	Screw fastening the stand crosspiece to the cradles	M10	1	50 Nm (36.88 lbf ft)	Pre-permeated
4	Battery holder plate fixing screw	M8	4	25 Nm (18.44 lbf ft)	Pre-permeated
5	Screws fastening engine/gearbox to frame	M10	3	50 Nm (36.88 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
6	Screws fastening gearbox to frame	M10	2	50 Nm (36.88 lbf ft)	-
7	Rear grab handle fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

6.1 Preparation of the vehicle

- 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

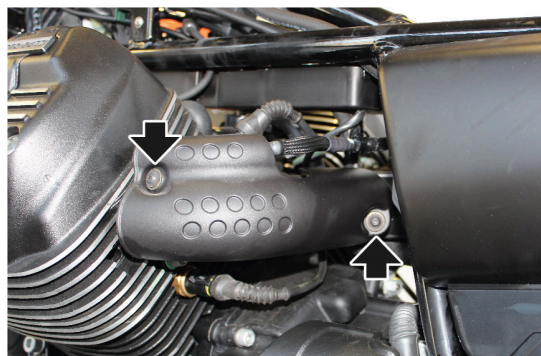
6.2 removal of the engine from the vehicle

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

N.B.:



REPEAT THIS OPERATION ON THE OPPOSITE SIDE.

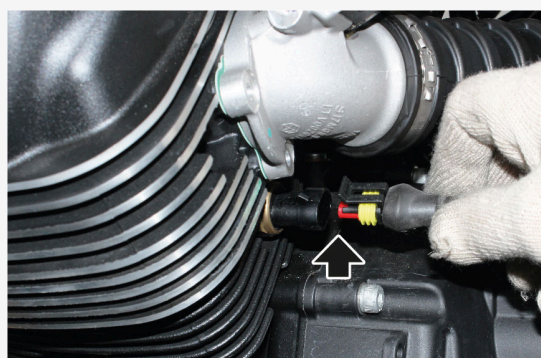


- Disconnect the cylinder temperature sensor connector.

N.B.:



REPEAT THIS OPERATION ON THE OPPOSITE SIDE.

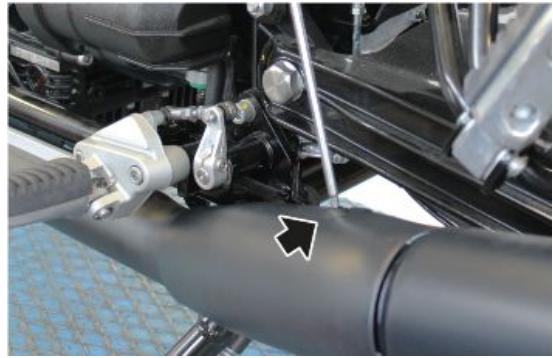


N.B.:



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

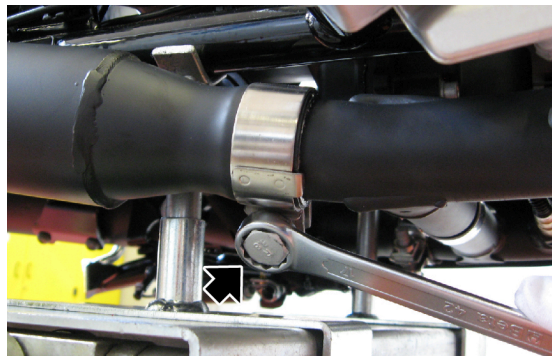
- Remove the three fixing screws of the silencer guard.



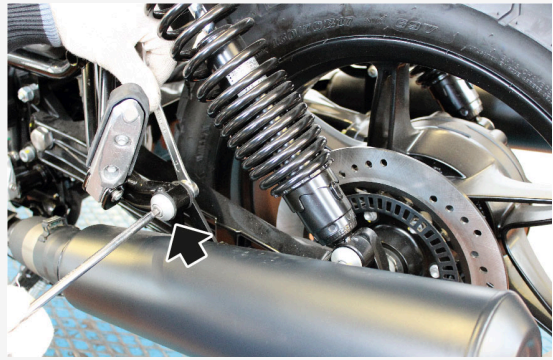
- Remove the silencer guard, sliding it toward the front of the vehicle.



- Loosen the clamp between the silencer and manifold.



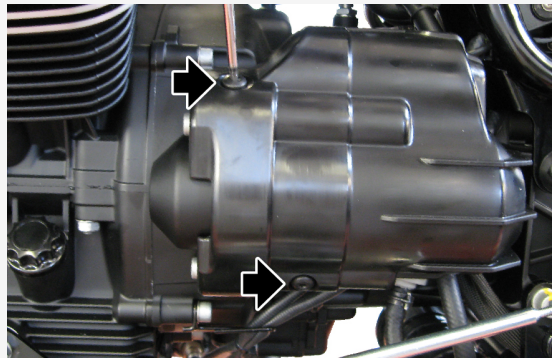
- Remove the screw that fastens the silencer to the support bracket



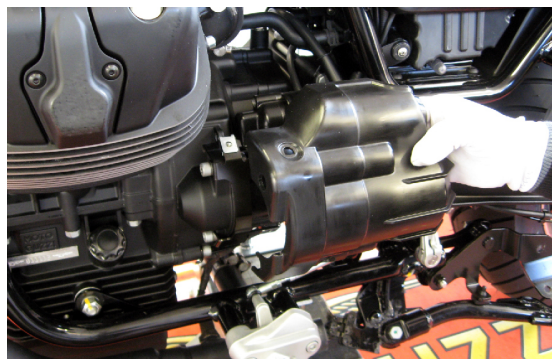
- Slide and remove the silencer from the collector



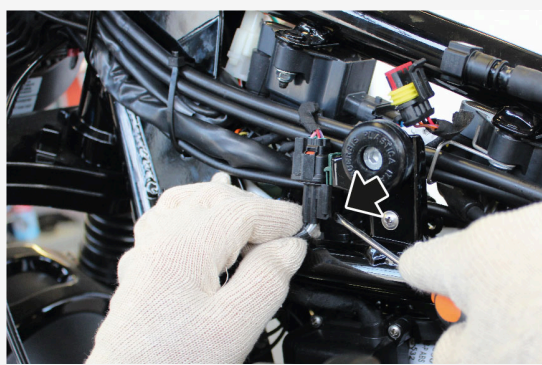
- Remove the two starter motor cover fixing screws



- Remove the starter motor cover.



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

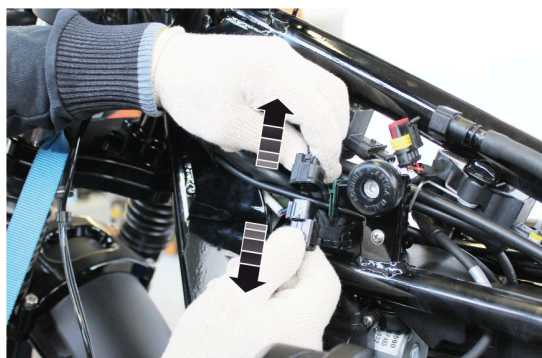


- Disconnect the connectors of the lambda probe wiring harness

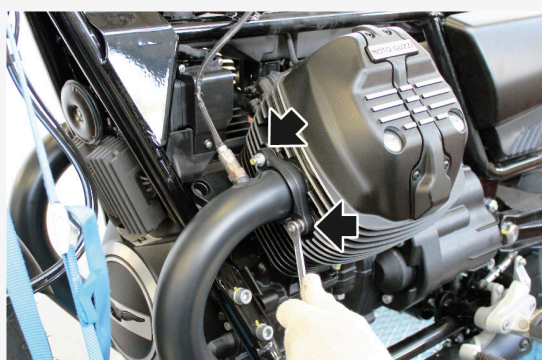
N.B.:



REPEAT THIS OPERATION ON THE OPPOSITE SIDE.



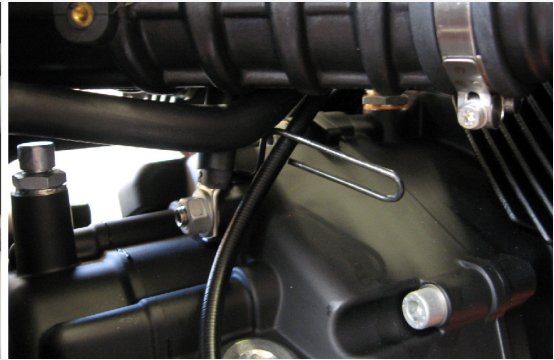
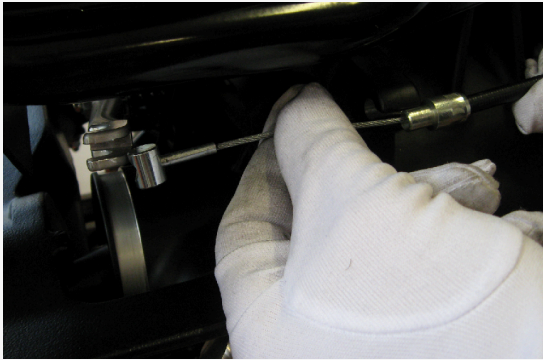
- Remove the nuts and the corresponding fixing washers of the exhaust manifolds



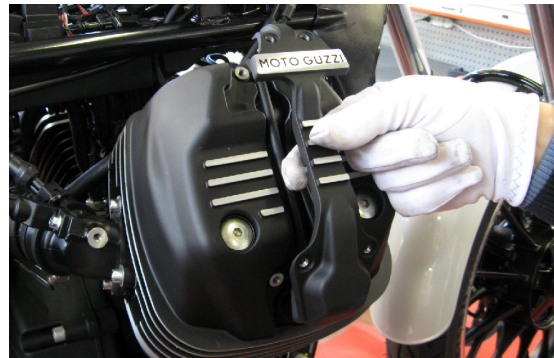
- Remove the exhaust manifolds at the same time



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



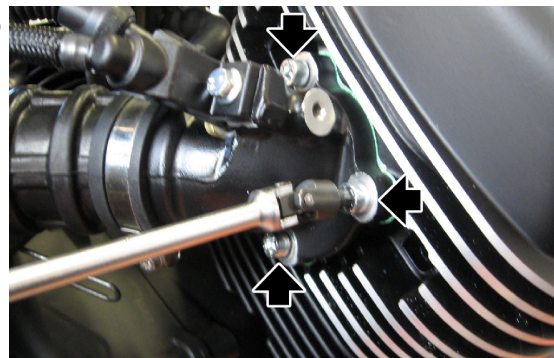
- Undo the screws fixing the spark plug covers, remove the covers.



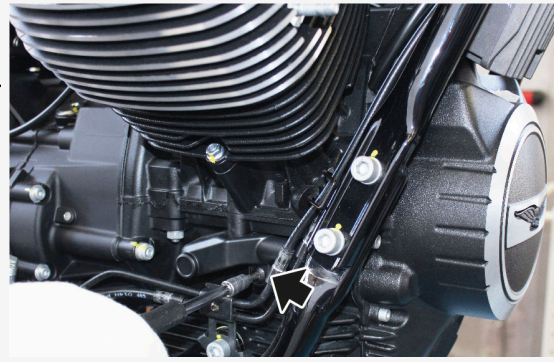
- Disconnect the tubes from the spark plugs.



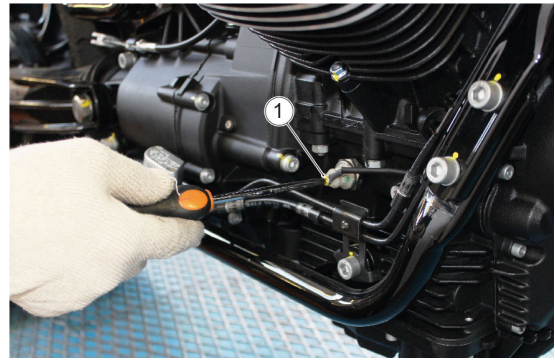
- Remove the screws fixing the manifold to the cylinder heads.



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



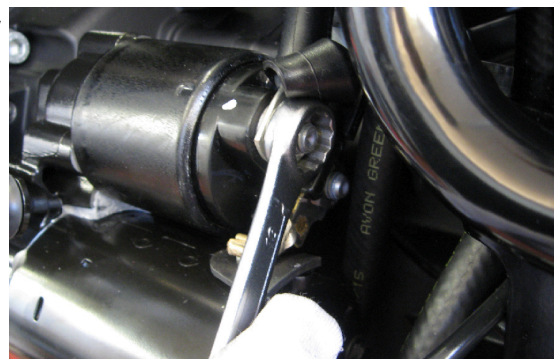
- Remove the fixing screw (1) and then remove the engine oil pressure sensor.



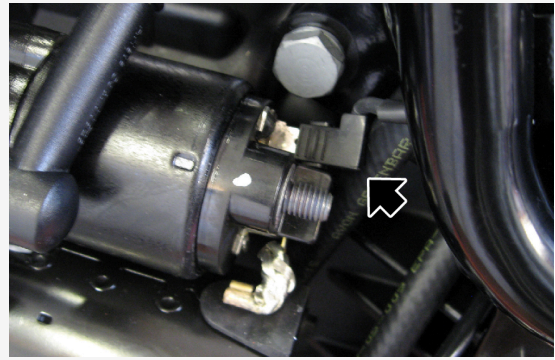
- Remove the fixing nut of the engine ground cable.



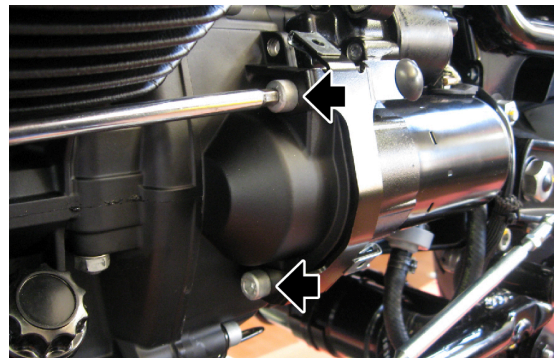
- Remove the fixing nut of the power supply cable located on the starter motor. Then remove the cable.



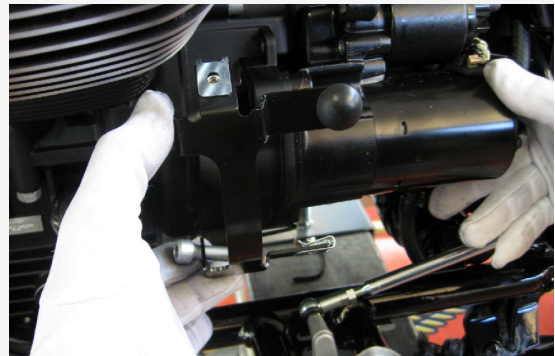
- Disconnect the starter motor faston.



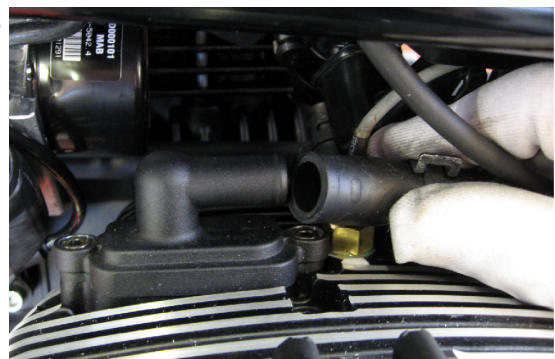
- Remove the two starter motor fixing screws.



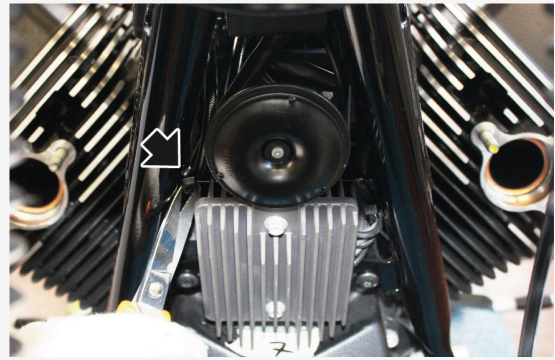
- Remove the starter motor complete with support bracket for the cover.



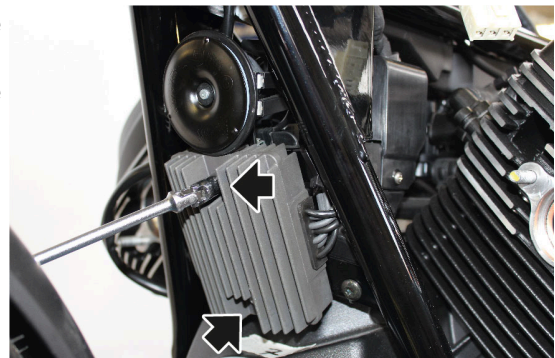
- Disconnect the secondary air pipes from the cylinder heads.



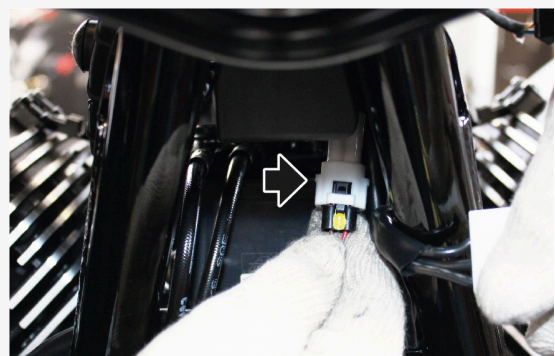
- Remove the clamp fixing the flywheel wiring harness to the brake pipes.



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



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



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



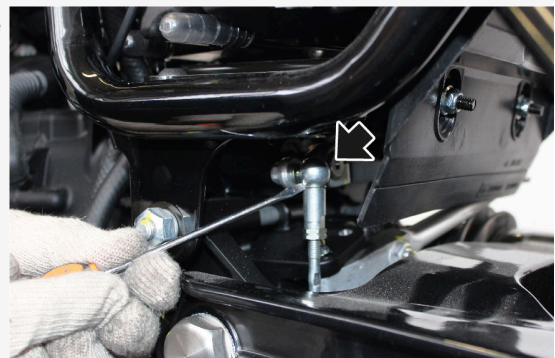
- Remove the rider right footrest / rear brake pump assembly from the chassis cradle and retrieve the two bushings.



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



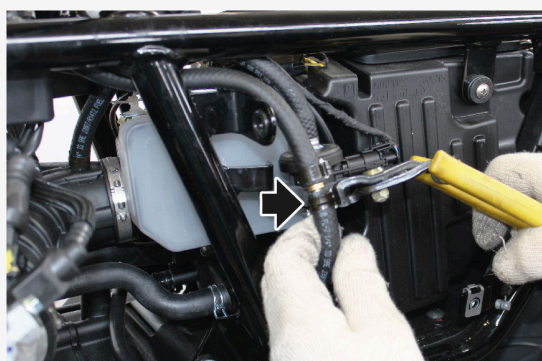
- Disconnect the uniball that connects the gear lever transmission to the vehicle's gearbox.



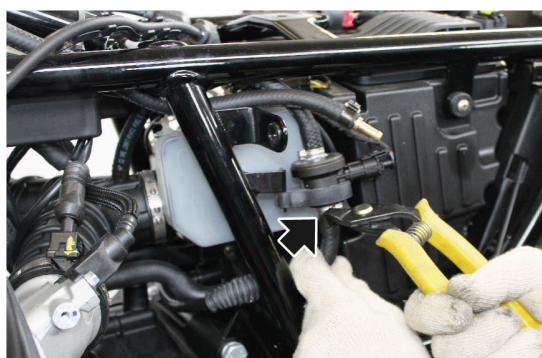
- Disconnect the uniball that connects the gear lever to the gear lever transmission.



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



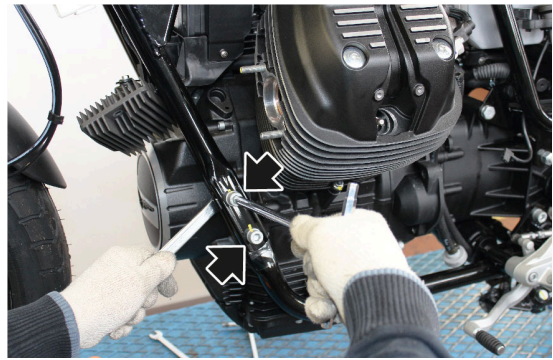
- Remove the clamp and disconnect the pipe that connects the valve to the canister.
- Remove the pipe by extracting it from the lower side of the vehicle.



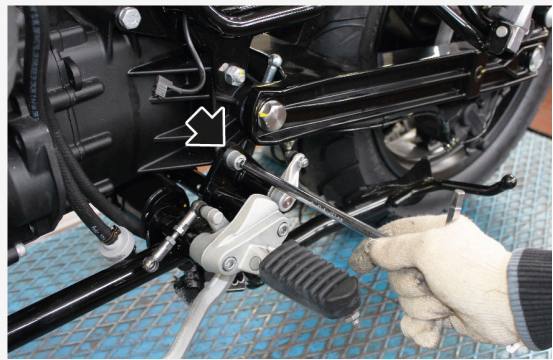
- Remove the cradle lower fixing screw.
- Repeat this operation on the opposite side.



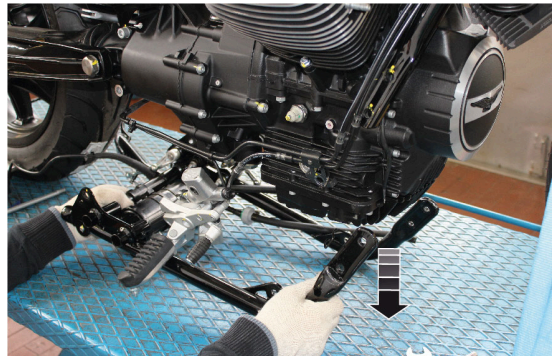
- Remove the front screws fixing the cradle, making sure to recover the associated nuts and washers.
- Repeat this operation on the opposite side.



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



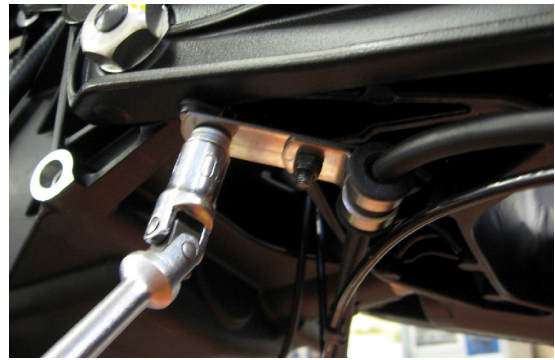
- Remove the cradle from the vehicle's chassis together with the canister and the left footrest/gear lever assembly.



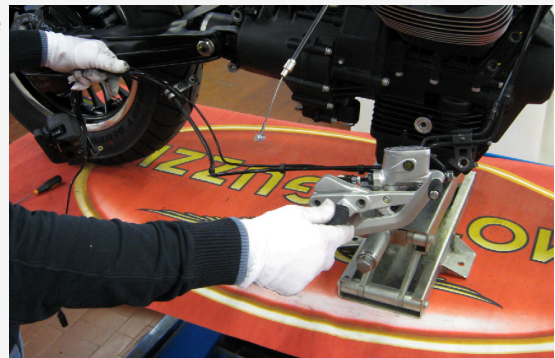
- Remove the rear brake calliper and the ABS sensor.



- Remove the cable grommet plate placed under the swingarm.



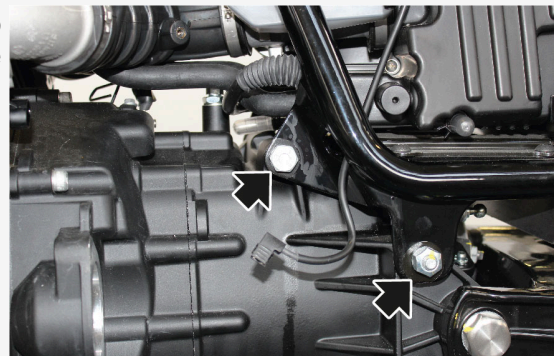
- Disconnect the rear ABS sensor, rear brake switch and neutral sensor connectors.
- Move the rear brake system complete.



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



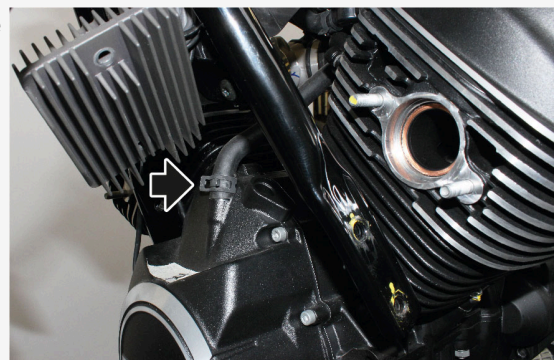
- Remove the pins fastening the gearbox to the chassis, making sure to retrieve the associated nuts and washers.



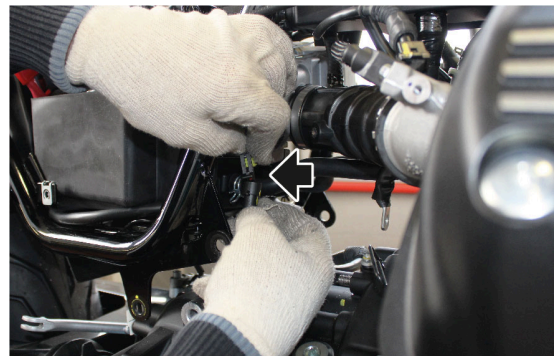
- Remove the lower fixing screws of the rear shock absorbers and move them from the support pins on the swingarm/bevel gear.



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



- Disconnect the gear sensor connector.



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



LIST OF TOPICS

Engine

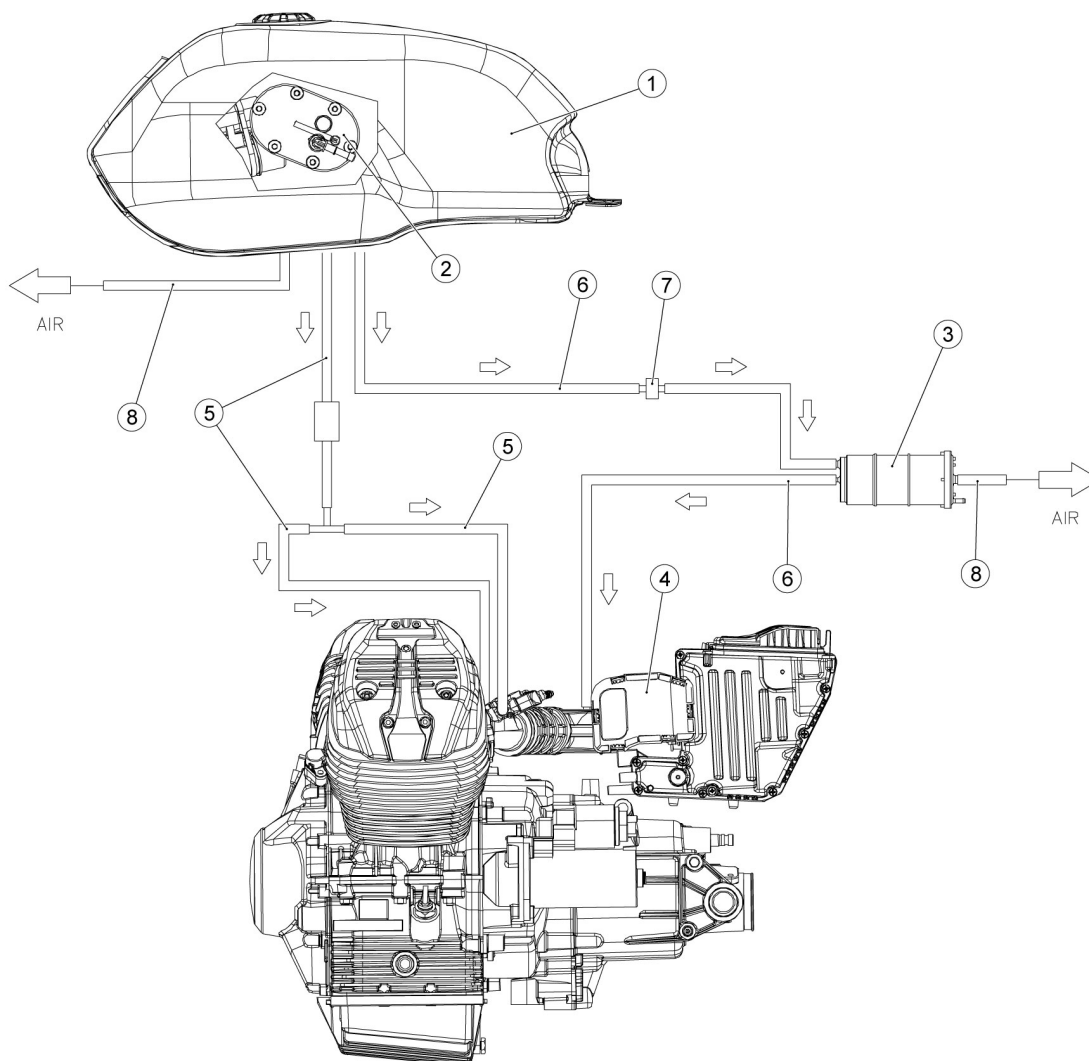
**TO CONSULT THE CHAPTER ABOUT THE ENGINE AND ITS COMPONENTS PLEASE
REFER TO THE APPROPRIATE MANUAL:**

"MSS Engine 850 Euro 5"

LIST OF TOPICS

Power feed

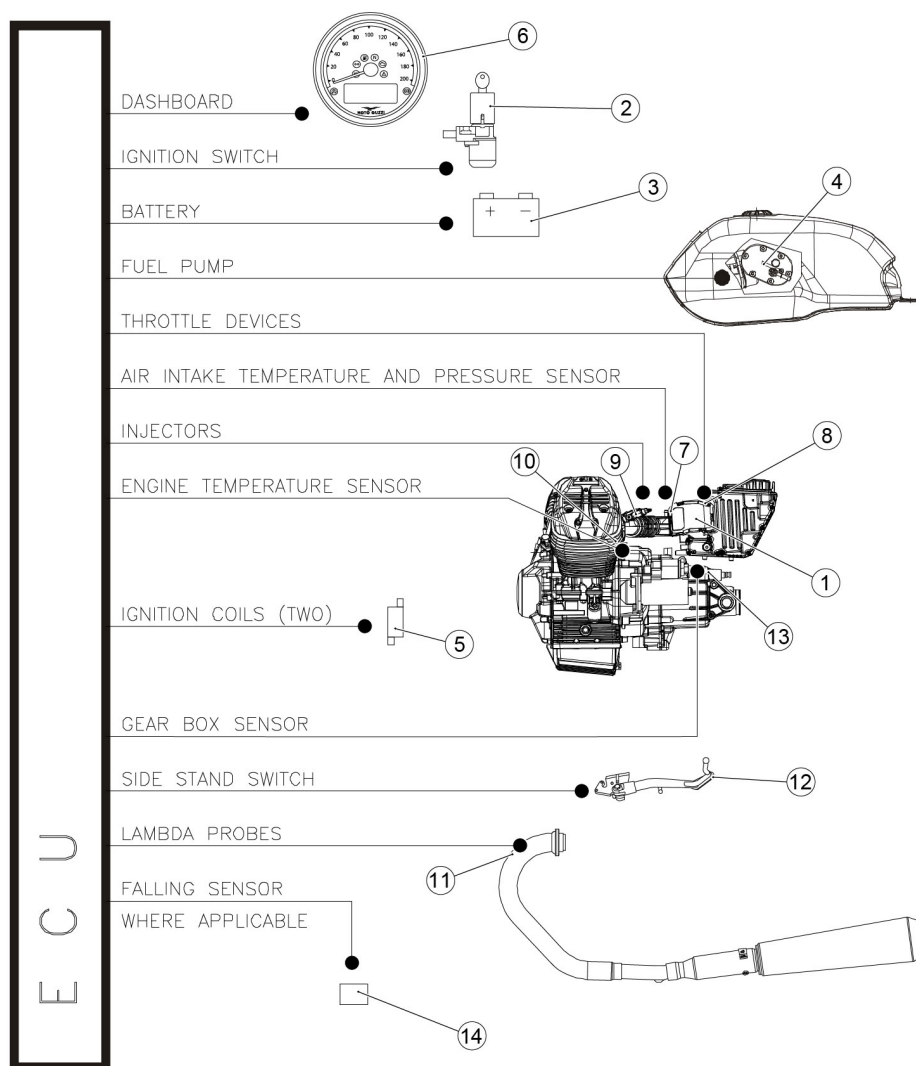
8.1 Circuit diagram

**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

8.2 Injection

8.2.1 Diagram



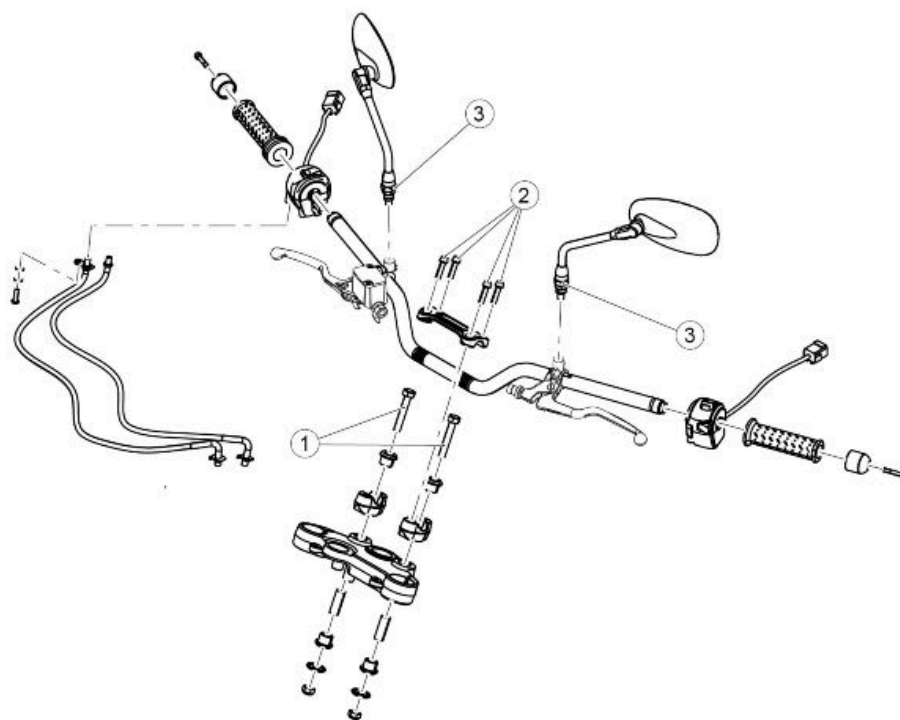
Key:

- 1 . Control unit position
- 2 . Ignition switch
- 3 . Battery
- 4 . Fuel pump
- 5 . Coils
- 6 . Instrument cluster
- 7 . Air temperature sensor
- 8 . Throttle valve position sensor
- 9 . Injectors
- 10 . Engine temperature sensor
- 11 . Lambda probe
- 12 . Side stand switch
- 13 . Gear sensor
- 14 . fall sensor

LIST OF TOPICS

Suspension

9.1 Handlebar



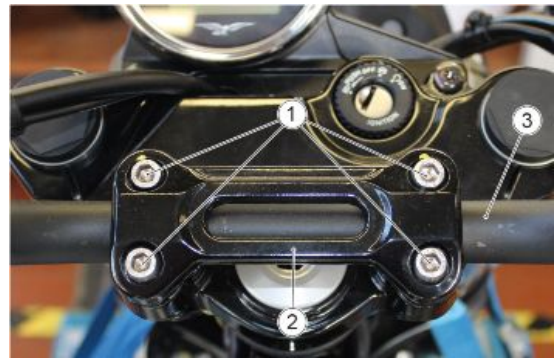
HANDLEBAR AND CONTROLS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screw fixing handlebar support U-bolts to steering plate	M10	2	50 Nm (36.88 lbf ft)	-
2	Handlebar U-bolt fastener screws	M8	4	25 Nm (18.44 lbf ft)	-
3	Mirror fixing	M10	2	Manual	-
-	Light switch fastening screws	SWP 5	2	1.5 Nm (1.11 lbf ft)	-
-	Throttle cable cover fastening screws	M5	3	6 Nm (4.43 lbf ft)	-

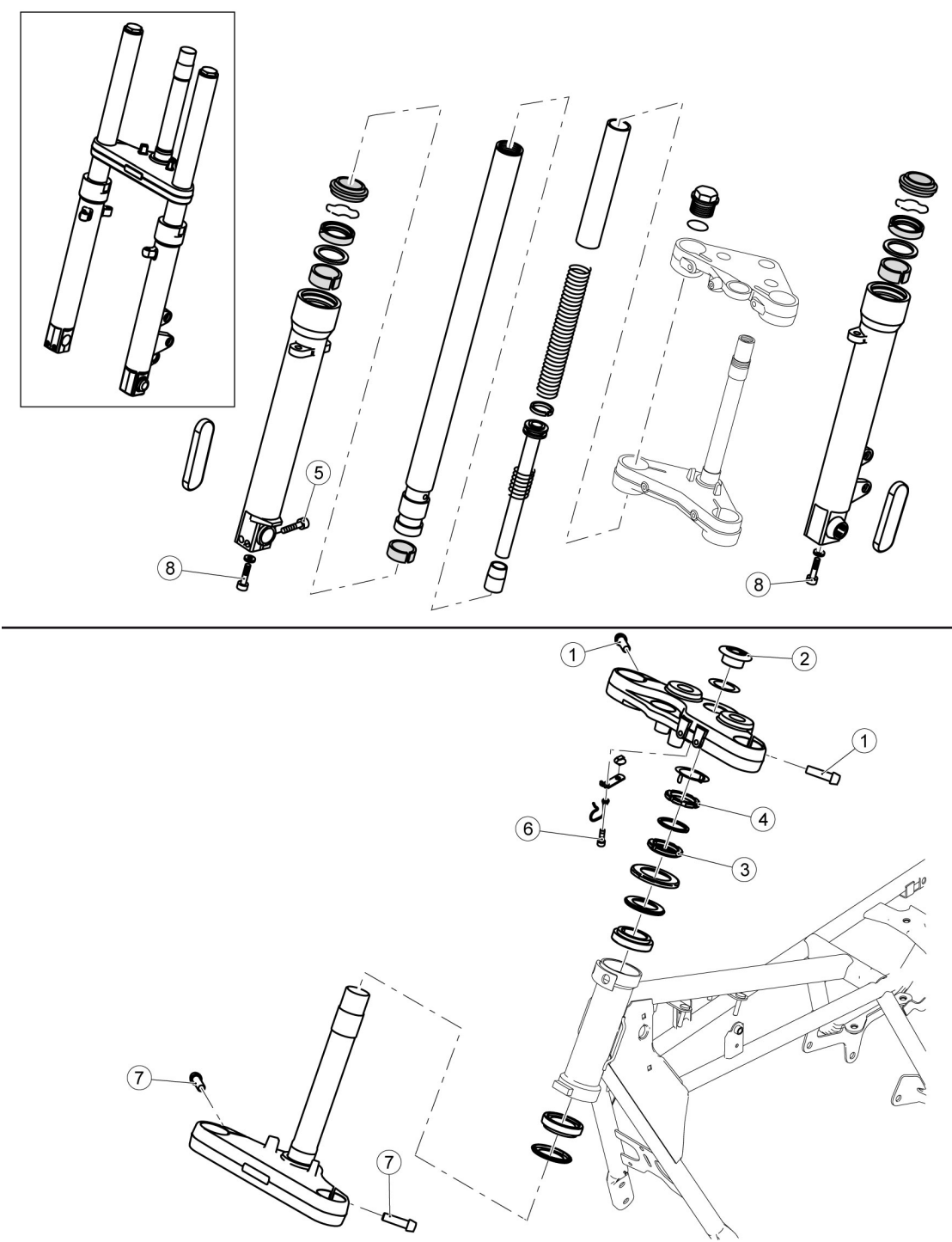
9.1.1 Removal

(SPECIAL/STONE)

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



9.2 Front fork

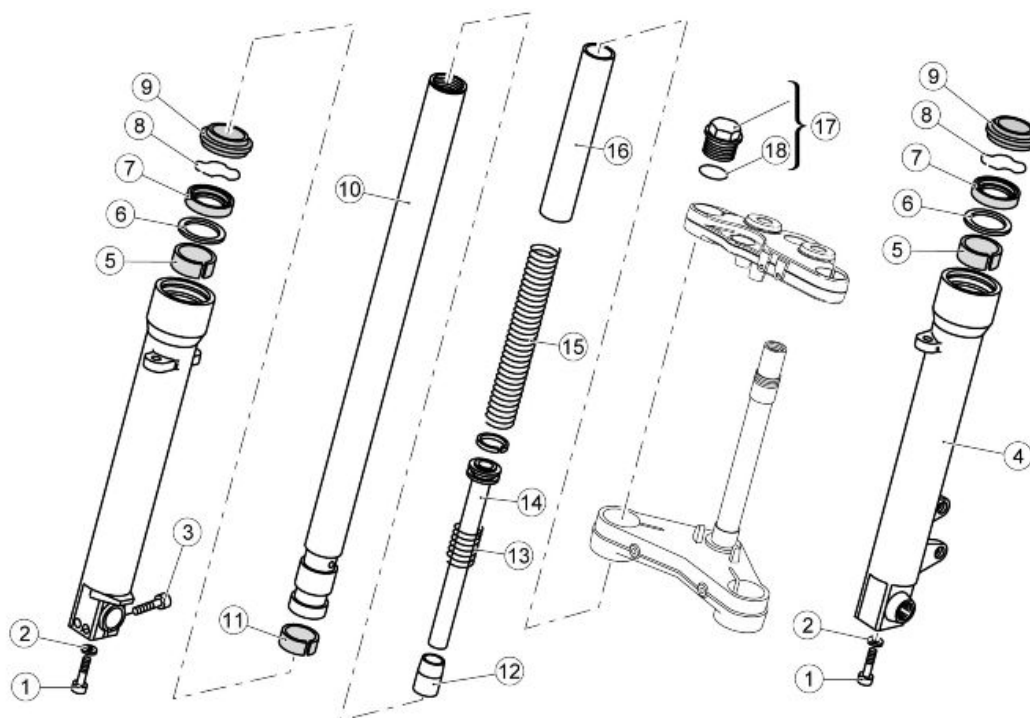


FRONT SUSPENSION - STEERING

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
2	Steering head fastening bushing	-	1	100 Nm (73.76 lbf ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lbf ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter-lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lbf ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lbf 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 gaiter
 - 10 . stanchion
 - 11 . Lower bushing
 - 12 . Buffer
 - 13 . Counter spring
 - 14 . Complete pumping member
 - 15 . Spring
 - 16 . Pipe
 - 17 . Complete cap
 - 18 . O-ring

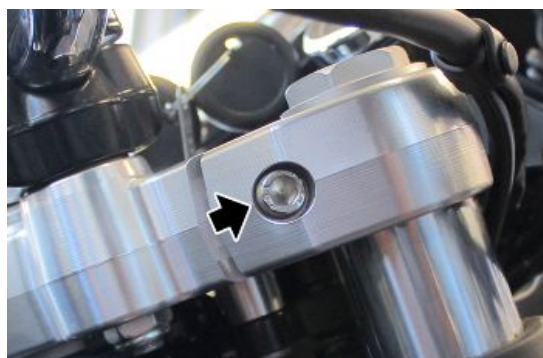
9.2.1 Stanchion removal

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

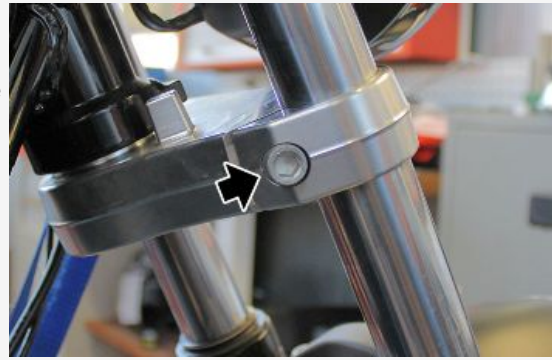
WARNING

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.



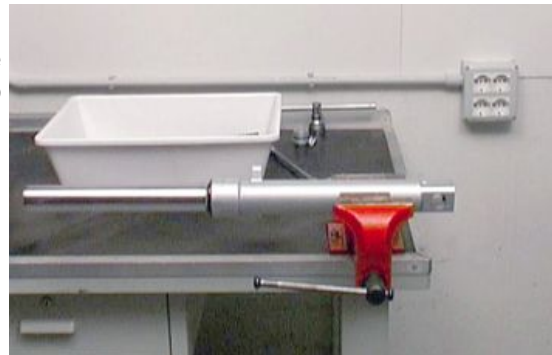
- Undo the lower sealing screw.
- Slide off the stem downwards by turning it slightly first in one direction then to the opposite direction.



9.2.2 Oil emptying

To drain out the oil follow these operations:

- 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.

N.B.:



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.

N.B.:



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



9.2.3 Fork removal

- 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.

WARNING

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.

WARNING

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



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

WARNING

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 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.

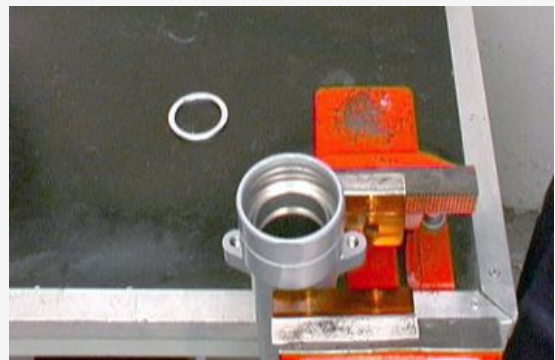
**9.2.4 fork assembly****WARNING**

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.
- Tighten the plug to the prescribed torque.



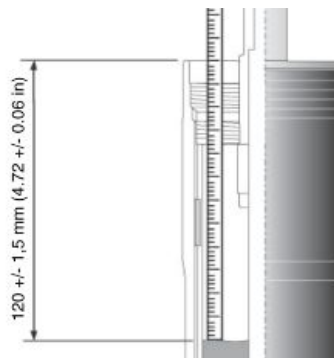
OIL FILLING

WARNING



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

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



CHARACTERISTIC	DESCRIPTION / VALUE
Oil level (from sleeve rim, without the spring and with stem at end of stroke)	120 ± 1.5 mm (4.72 ± 0.06 in)
Oil quantity (for each stanchion)	385 ± 2 cc (23.49 ± 0.12 cu in)

- Once the correct amount of oil has been poured into the rod, insert the spring.



- Insert the preload pipe.



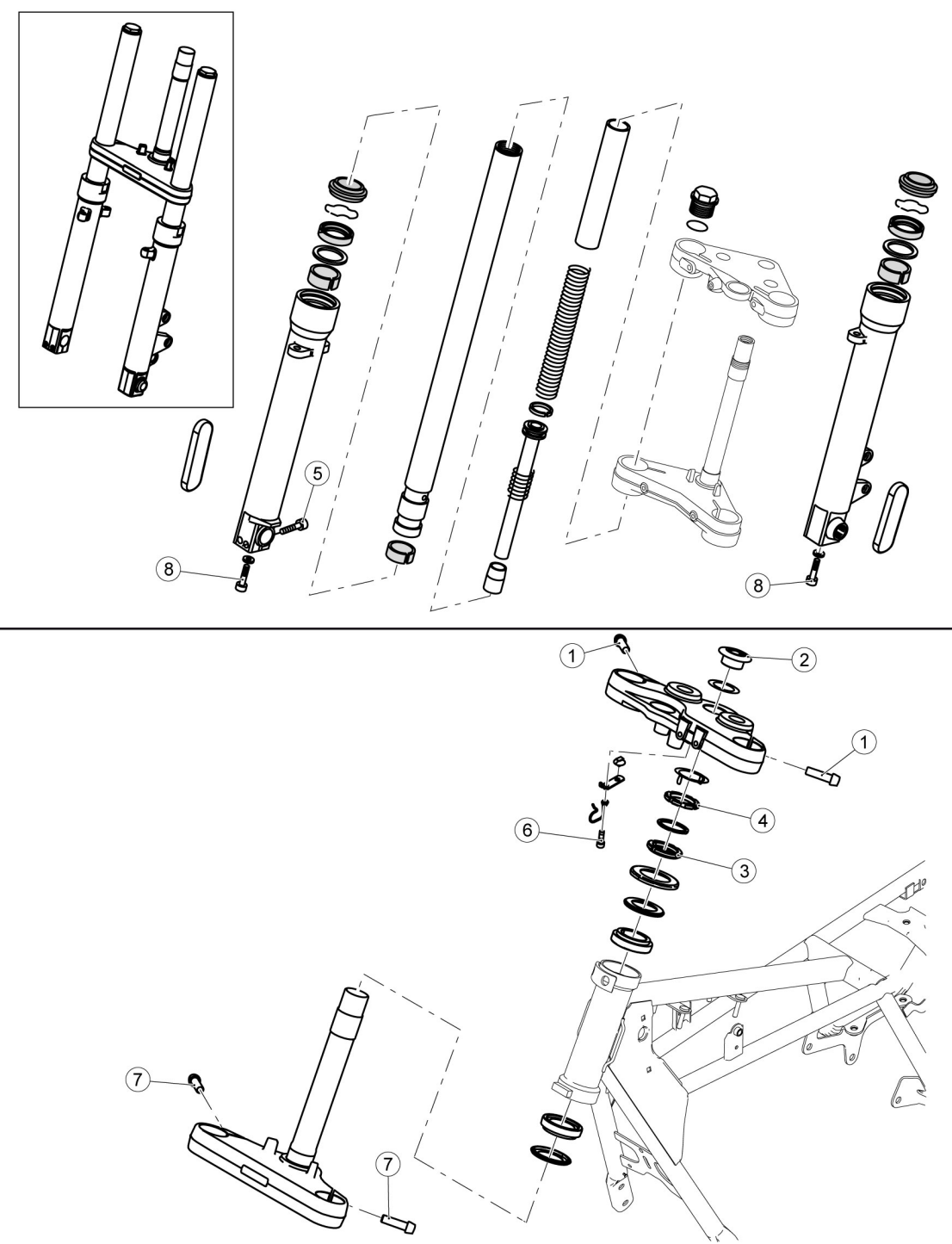
- Place the cap on the bearing tube, taking care not to damage the O-ring.



- Then, tighten the cap to the prescribed torque.



9.3 Steering bearing



FRONT SUSPENSION - STEERING

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening stanchion on upper plate	M8x35	4	25 Nm (18.44 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
2	Steering head fastening bushing	-	1	100 Nm (73.76 lbf ft)	-
3	Steering headstock lock nut	-	1	50 Nm (36.88 lbf ft)	Pre-torque 60 Nm (44.25 lb ft)
4	Headstock counter-lock ring	-	1	Manual	-
5	Calliper bracket fixing screws	M6x30	2	10 Nm (7.38 lbf ft)	-
6	Connector plate fastening screw	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Screws fastening stanchion on lower plate	M10	2	45 Nm (33.19 lbf ft)	-
8	Pumping unit fastening screw	M10	2	50 Nm (36.88 lbf ft)	-

9.3.1 Clearance adjustment

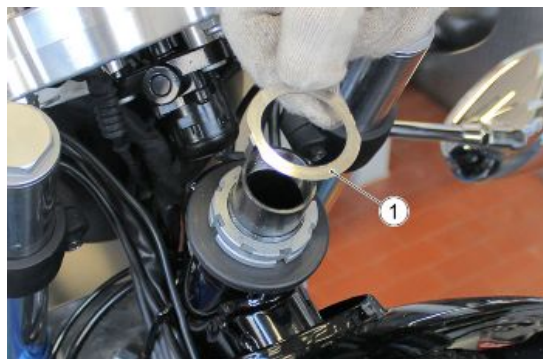
- Place the vehicle so that the front wheel is off the ground.
- Carry out a handlebar rotation test, using a dynamometer at the hand grip external end.
- Adjust if clearance is detected.

N.B.:



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).

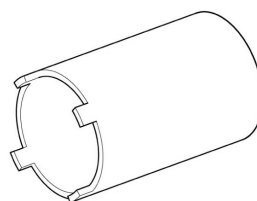


- Remove the steering counter-lock ring (2) using the special tool.

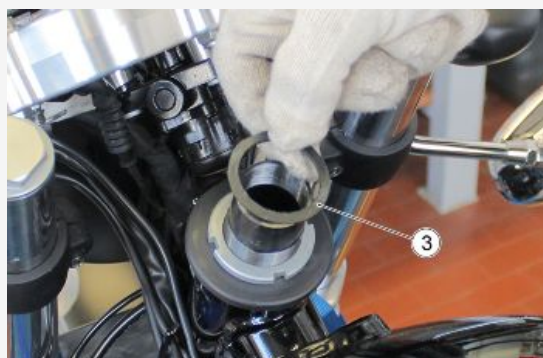


CODE	DESCRIPTION	IMAGE
------	-------------	-------

AP8140190

Steering ring nut
tightening tool

- Remove the rubber spacer (3).



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



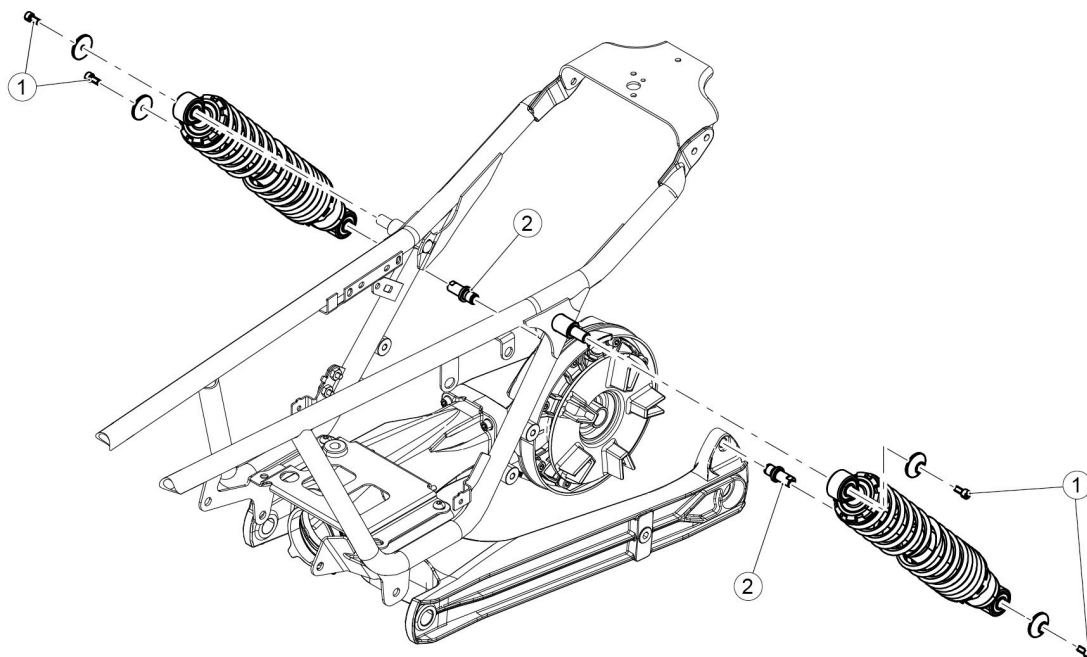
- Using the specific tool, pre-tighten the lower ring nut to the torque of **60 Nm (44.25 lb ft)**.
- Steer repeatedly completely left and completely right to allow the bearings to settle.
- Loosen the ring nut.
- Check again the pre-tightening torque and then tighten the ring nut again to a torque of **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.

CODE	DESCRIPTION	IMAGE
AP8140190	Steering ring nut tightening tool	

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

9.4 Rear

9.4.1 Shock absorbers



REAR SHOCK ABSORBERS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear shock absorber upper/lower fixing screws	M6	4	10 Nm (7.38 lbf ft)	Pre-permeated
2	Pin fastening the shock absorber to the gearbox/swingarm	M12	2	35 Nm (25.81 lbf ft)	Pre-permeated

9.4.1.1 Removal

(SPECIAL/STONE)

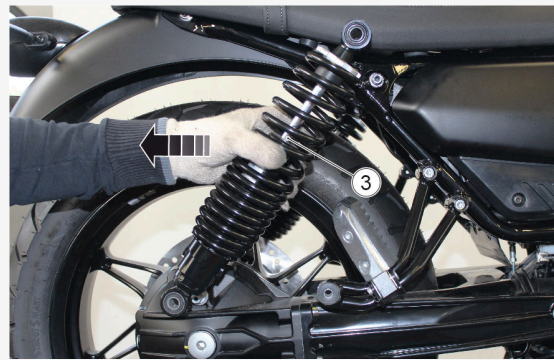
- Remove the silencers

REAR RIGHT SHOCK ABSORBER

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

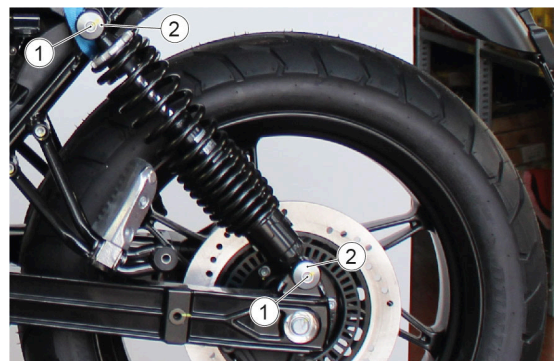


- Remove the RH rear shock absorber (3)



REAR LEFT SHOCK ABSORBER

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



- Remove the rear shock absorber (3)



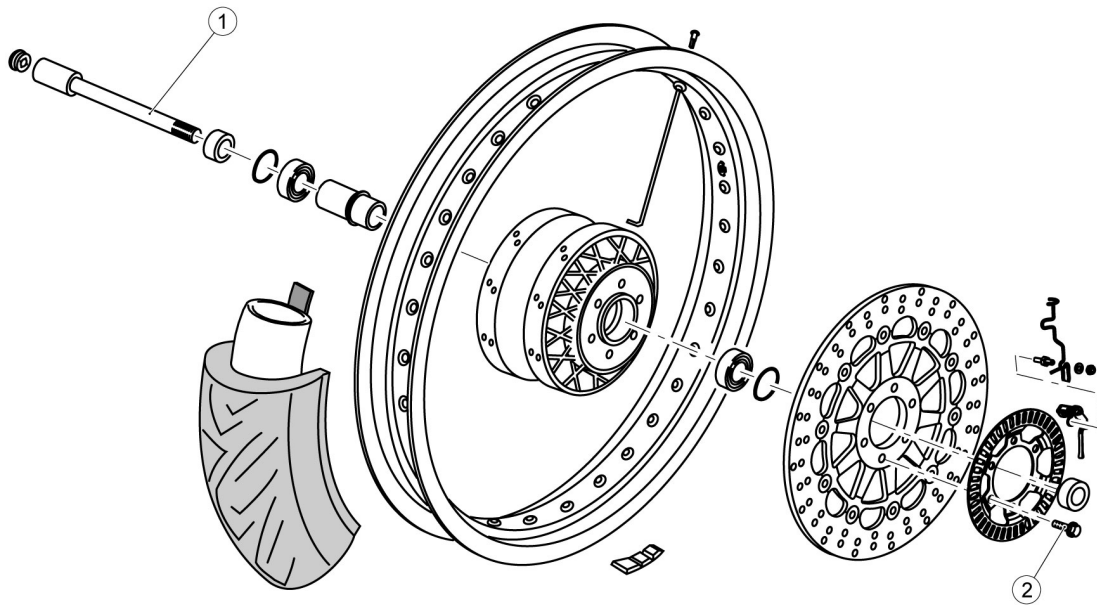
LIST OF TOPICS

Chassis architecture

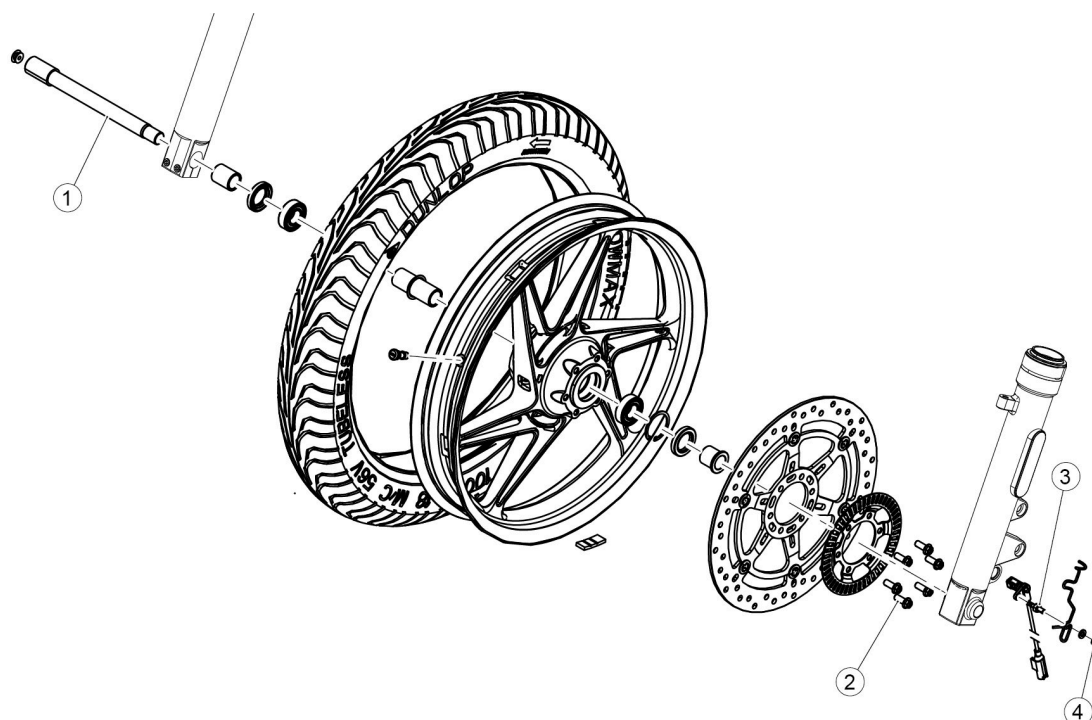
10.1 Wheels

10.1.1 Front wheel

(SPECIAL)



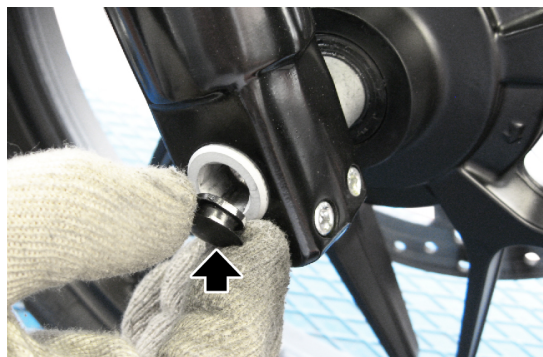
(STONE)



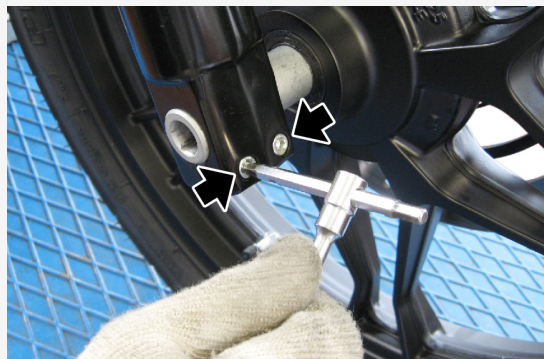
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

10.1.1.1 Removal

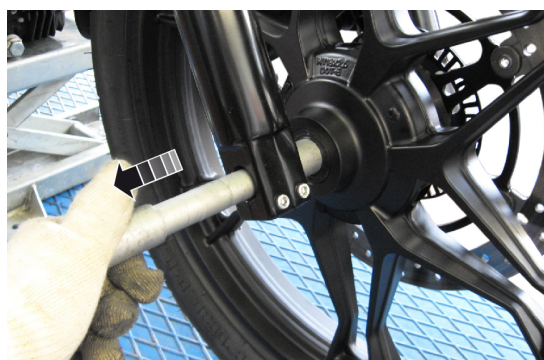
- Place the vehicle on a stable support so that the front wheel does not touch the ground;
- Remove the brake calliper without disconnecting the oil pipes;
- Working on the right side of the motorcycle, remove the cap from the pin;



- Loosen the two wheel pin locking screws;



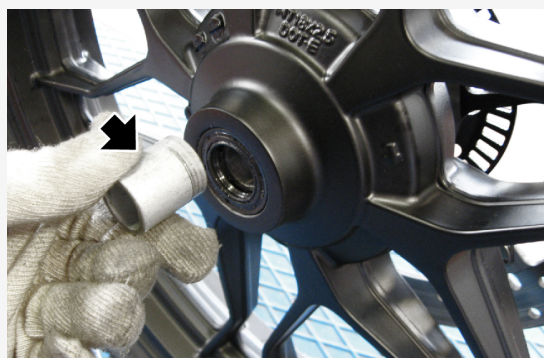
- Unscrew and remove the wheel pin;



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

WARNING

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



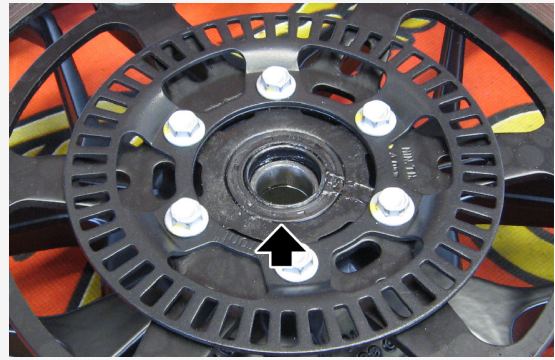
- Working on the opposite side, remove the left spacer;

WARNING

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



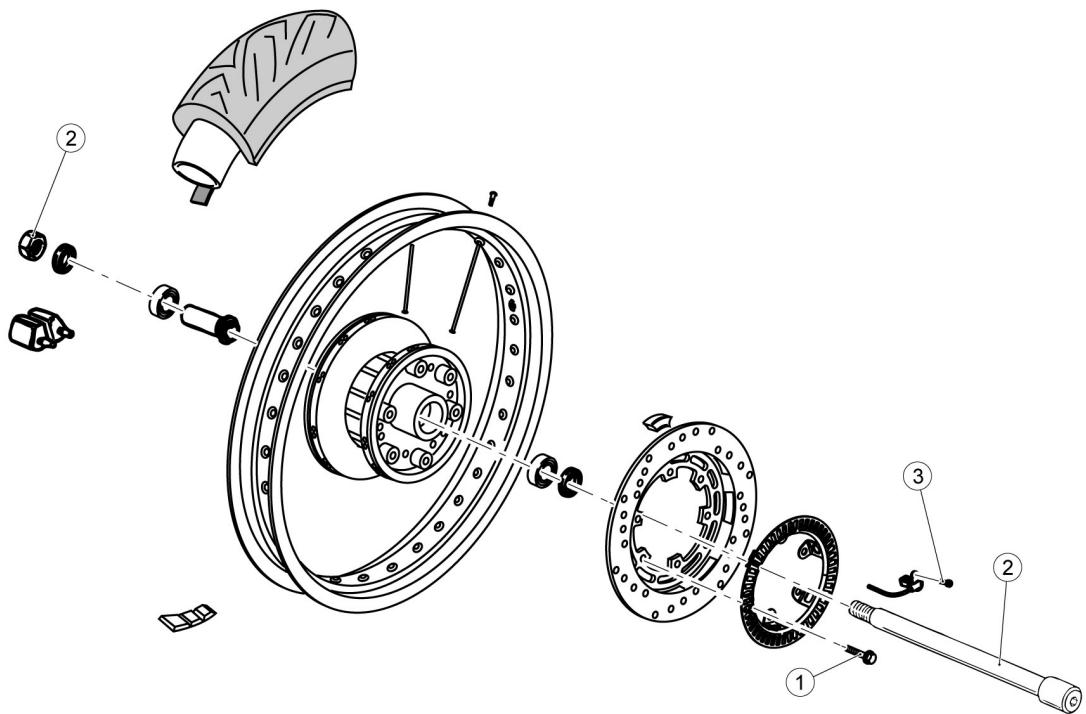
- Remove the dust seal from both sides



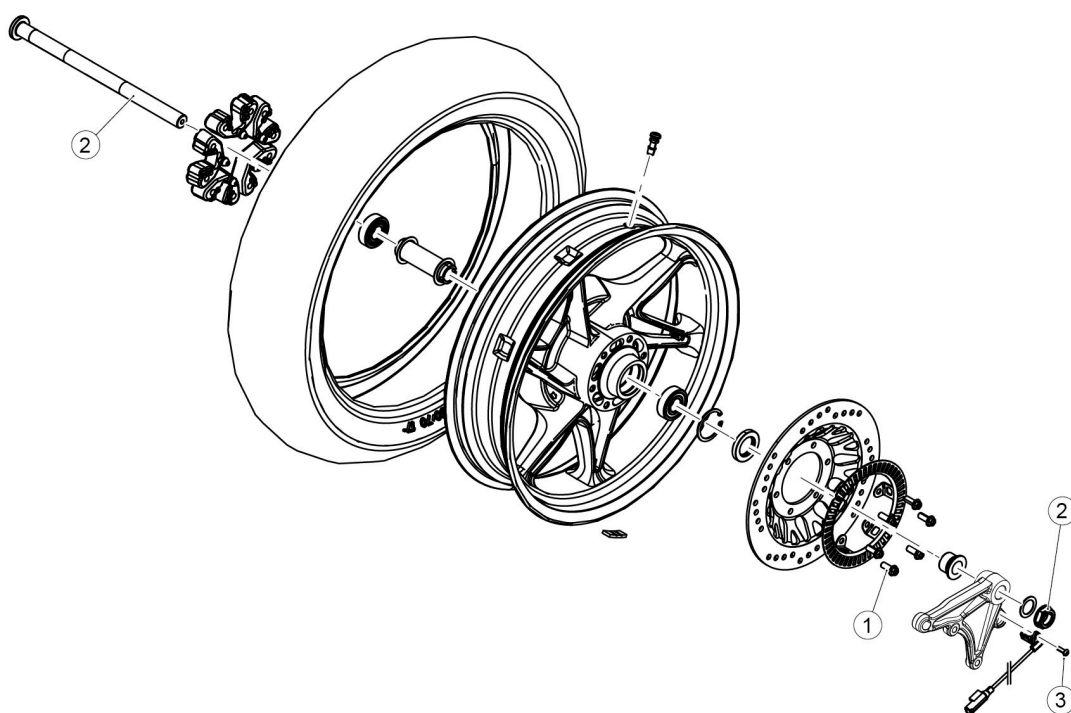
- Using a generic bearing extractor remove the bearings from both sides

10.1.2 Rear wheel

(SPECIAL)



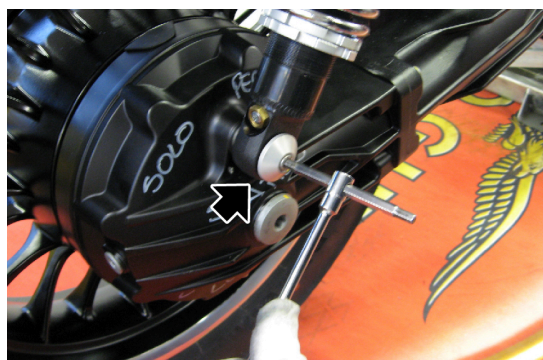
(STONE)



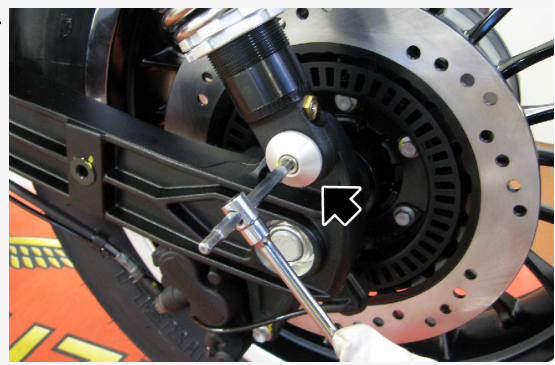
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear brake disc fastening screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
2	Rear wheel axle fastener pin + nut	M20	1	100 Nm (73.77 lbf ft)	-
3	ABS sensor fixing screw	M6	1	6 Nm (4.43 lbf ft)	Loctite 243

10.1.2.1 Removal

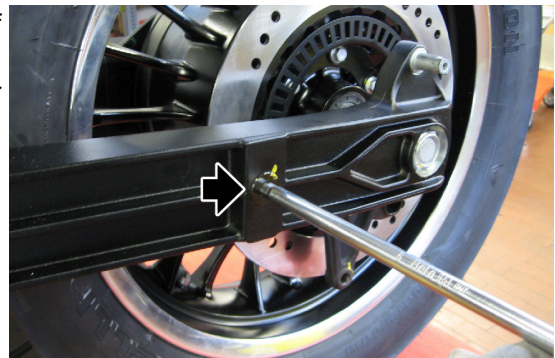
- Remove the screw fixing the right-hand rear right shock absorber and pull it from the pin on the drive shaft



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



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



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



- Remove the rear brake calliper support



- Collect the spacer

WARNING

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



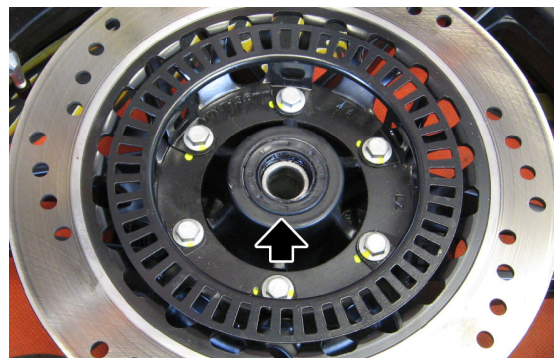
- Remove the rear wheel



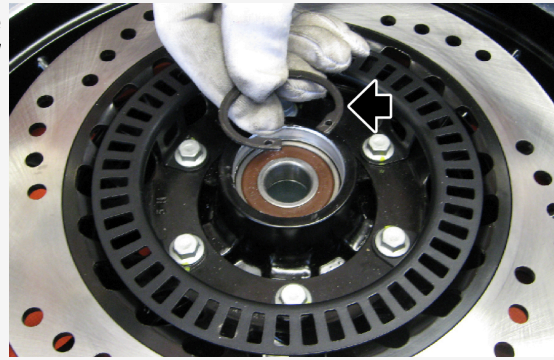
- Remove and if necessary replace the six flexible couplings



- Remove the dust seal



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



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

10.1.3 Spoke tension adjustment

WARNING



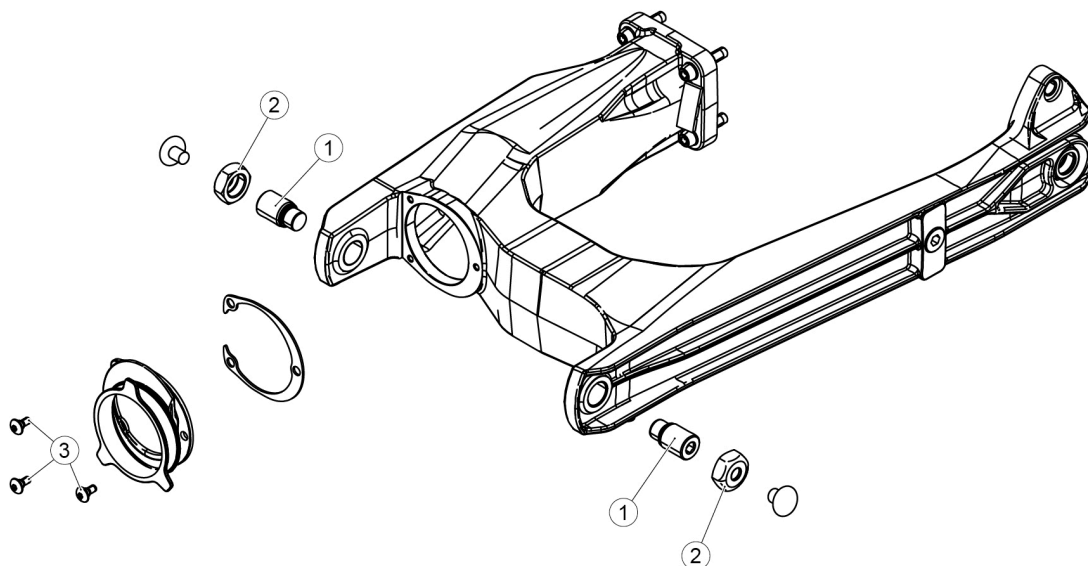
DO NOT ADJUST THE TENSION OF THE WHEEL SPOKES WITH THE TIRES FITTED ON THE WHEEL RIM, AS THIS COULD CAUSE BREAKING OF THE NIPPLE GUARDS AND RESULTING IN HOLES OF THE AIR CHAMBER.

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.

10.2 Fork

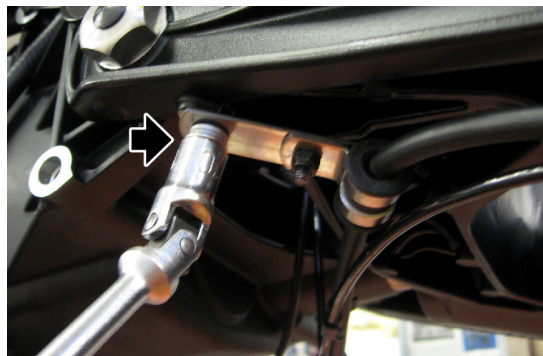


SWING ARM

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Pins fixing swingarm to gearbox	-	2	-	Manual
2	Counter-nuts fixing swingarm to gearbox	-	2	50 ± 5 Nm (36.88 ± 3.69 lb ft)	-
3	Rubber bellows torx fixing screws	-	3	6 ± 0.6 Nm (4.43 ± 0.44 lb ft)	-

10.2.1 Removal

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

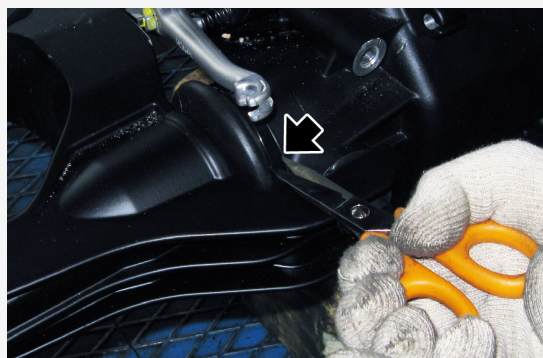


- Cut the sealing clamp and lift the folding

WARNING



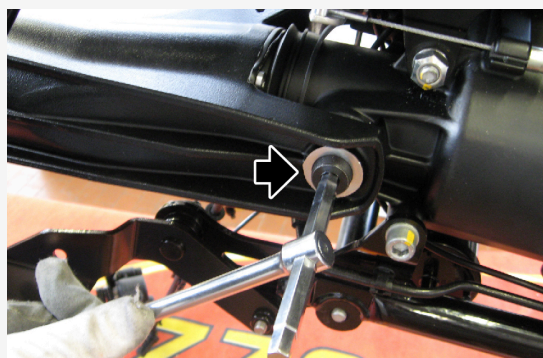
PAY ATTENTION NOT TO CUT AND DAMAGE THE RUBBER FOLDING



- Unscrew the nuts on both sides of the swingarm



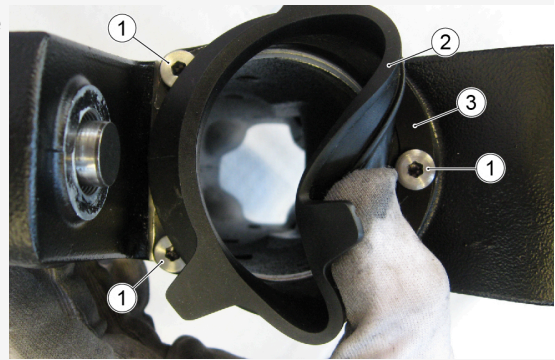
- Loosen the pins so that the oscillating swingarm can be removed from the gearbox.



- Remove the complete swingarm from the gearbox



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



10.2.2 Control

- 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; replace if necessary.
- Check that the sleeve outer toothing and internal grooves are not damaged.

10.3 Cardan shaft

REMOVAL

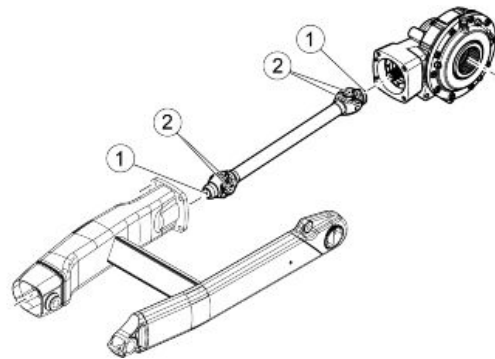
- Remove the rear wheel
- Remove the swingarm
- Strike a few times with a mallet to remove the cardan shaft (1)



CHECK**Carefully check:**

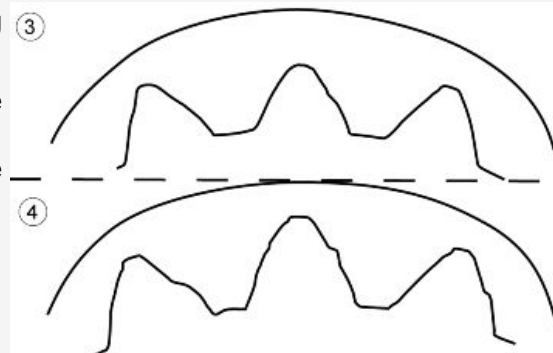
The splines on the cardan shaft (1) must be intact, free from grain or dents.

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



In the figure are shown two worn toothing profiles:

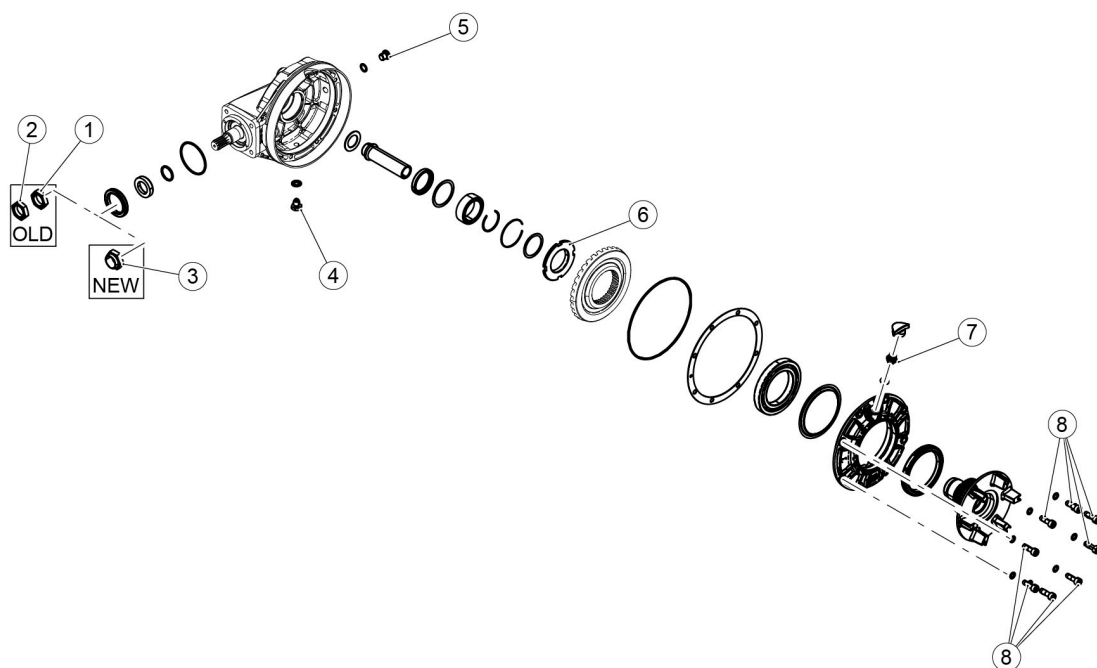
- Profile (3) shows acceptable wear, the cardan shaft should not be replaced.
- Profile (4) shows unacceptable wear, the cardan shaft must be replaced.

**10.4 Bevel gear****CAUTION**

SINCE THE BEVEL GEAR IS A SAFETY COMPONENT, IT IS STRICTLY FORBIDDEN TO PERFORM ANY PINION/SPROCKET CLEARANCE ADJUSTMENTS FOR THE ENTIRE DURATION OF THE COMPONENT'S SERVICE LIFE.

IF THE CLEARANCE IS NOT WITHIN THE REQUIRED TOLERANCE, THE ENTIRE BOX WILL HAVE TO BE REPLACED.

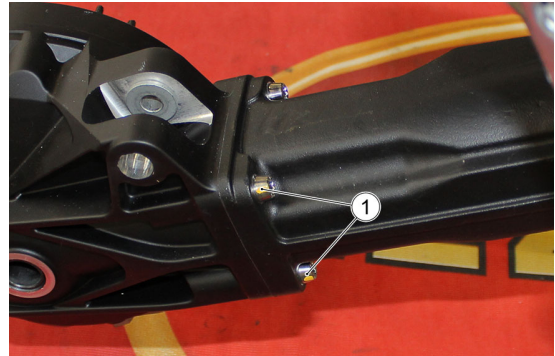
IF OIL LEAKAGES ARE DETECTED ON THE SPROCKET SIDE, REPLACE THE OIL SEALS ACCORDING TO THE DESCRIPTION BELOW.



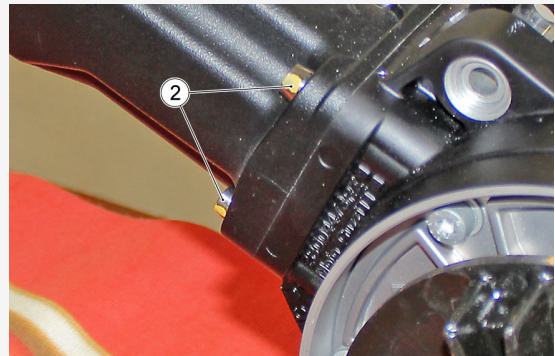
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Pinion unit fixing nut - OPTION 01	M25	1	100 Nm (73.76 lbf ft)	Loct. 243
2	Pinion unit fixing lock nut - OPTION 01	M25	1	20 Nm (14.75 lbf ft)	Loct. 243
1	Pinion unit fixing nut	M25x1.25	1	100 Nm (73.76 lbf ft)	Loct. 243
3	Oil drainage plug	M10x1.5	1	30 Nm (22.13 lbf ft)	-
4	Oil load cap	M12x1.5	1	25 Nm (18.44 lbf ft)	-
5	Crown fixing ring nut	-	1	100 Nm (73.76 lbf ft)	Loct. 243
2	Pinion unit fixing counter-nut	M25x1.25	1	20 Nm (14.75 lbf ft)	Loct. 243
6	Crown torx fixing screws	M8x25	8	25 Nm (18.44 lbf ft)	-

10.4.1 Removal

- Loosen and remove the screws (1).



- Loosen and remove the screws (2).

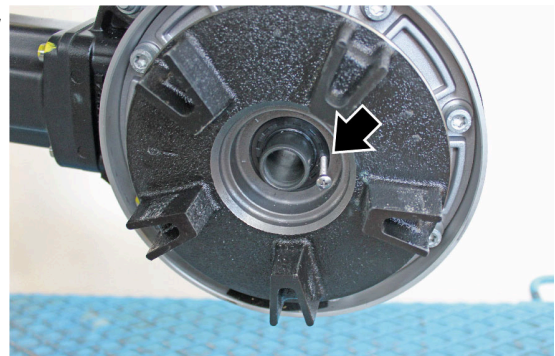


- Remove the gearbox (3).



Replacement of the oil seal on the wheel hub with the bevel gear fitted on the vehicle

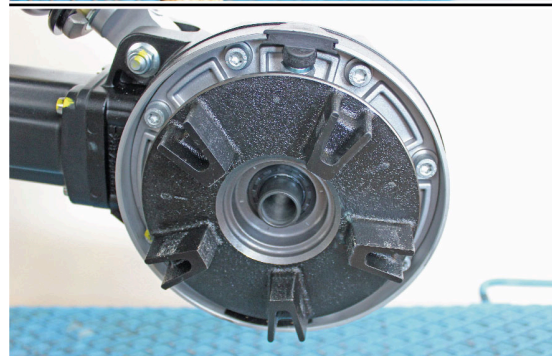
- Firmly screw a small self-tapping screw (M5-M6) on the oil seal



- Use a clamp to grab the screw and remove the oil seal from the wheel hub seat



- Insert a new oil seal in the specific seat, tap it inside with a tube with a slightly smaller diameter than the external diameter of the oil seal
- The oil seal is inserted when it reaches the end



10.4.2 Removal

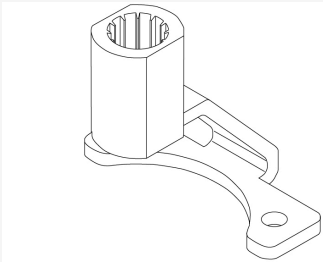
WARNING



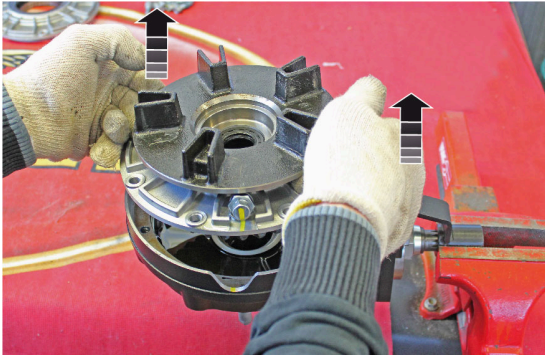
CARRY OUT OIL DRAINING AND PROCEED WITH THE REMOVAL OF THE BREATHER BEFORE DISASSEMBLING THE GEARBOX.

- Using the specific tool, clamp the complete gearbox in the vice.
- Loosen and remove the 8 fastener screws of the flange.



CODE	DESCRIPTION	IMAGE
021000Y	Bevel gear pinion shoes	

- Use threaded stud bolts as a guide and remove the flange.



- Remove the ring gear axle thickness.



- Remove the inner spacer.



- Remove the bearing's roller cage.



- Using a suitable tool, disengage the axial snap ring and remove it.

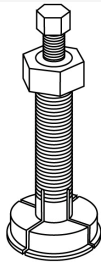


- Heat the outer track seat of the roller bearing using an air heater.



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



CODE	DESCRIPTION	IMAGE
001467Y036	Bearing internal cup extracto	

- Insert a bush with a suitable diameter on the specific tool and tighten the nut keeping the extractor locked.



- Remove the outer track of the roller bearing.



- Remove the washer.



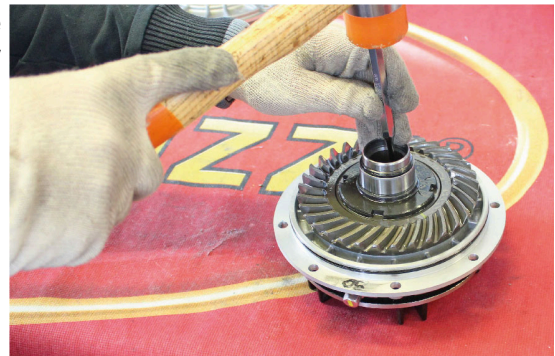
- Remove the sealing ring.
- When reassembling use a new ring.

CAUTION

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



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



- Using the protective jaws, block the complete flange in the vice and remove the radial stop ring using a specific tool.



- Unscrew the ring nut, using the special tool, to loose the riveting.
- After unscrewing the ring nut to the end of the thread, re-tighten it until it stops in such a way as to create the space between the ring nut and the shoulder washer.



CODE	DESCRIPTION	IMAGE
020999Y	Crown counter-lock ring wrench	

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



CODE	DESCRIPTION	IMAGE
GU19907000	Extractor for internal ring on drilled bolt on cardan shaft	

- Remove the inner track of the roller bearing.



- Remove the shoulder washer.



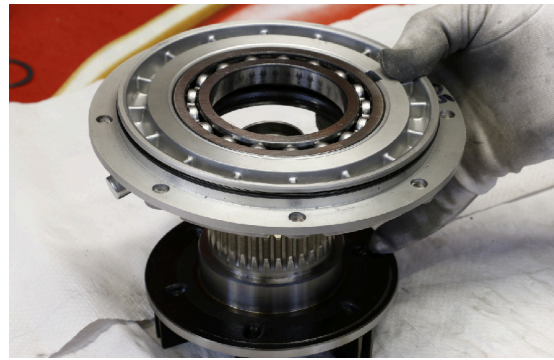
- Remove the ring nut.



- Remove the crown gear.



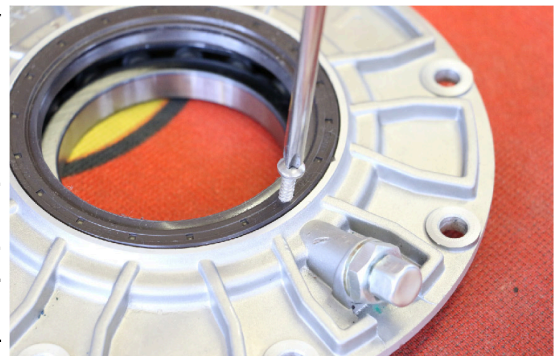
- Remove the gearbox flange from the splash guard hub.



- Remove the O-ring.
- When reassembling use a new O-ring.

**CAUTION**

PAY SPECIAL ATTENTION TO THE CORRECT REMOVAL PROCEDURE OF THE OIL SEAL TO AVOID THE DAMAGE OF THE STEEL SHEET UNDER THE OIL SEALER.

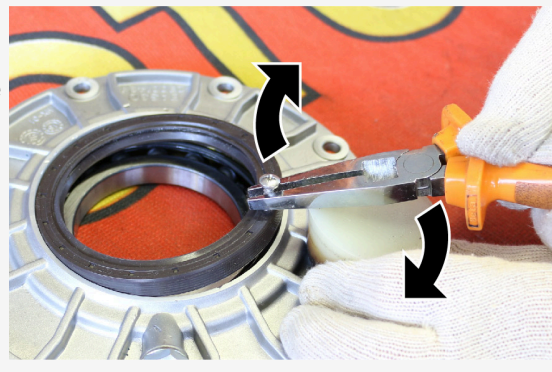


- Use a small self-tapping screw (M5-M6) and screw it slightly to grip on the oil seal.

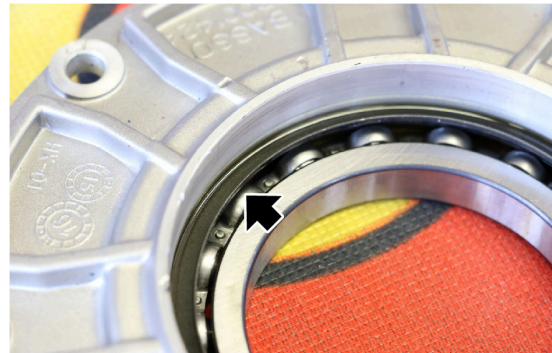
CAUTION

DO NOT TIGHTEN THE SCREW AS IT COULD DAMAGE THE UNDERLYING THIN SHEET.

- Using a clamp to remove the oil seal from the seat, using a Teflon or wooden support to avoid damaging the flange of the gearbox.



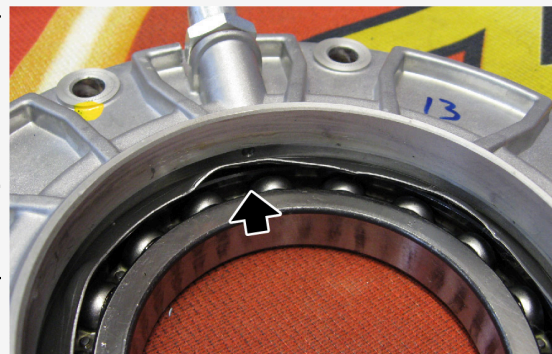
- Check the correct integrity of the underlying thin sheet.



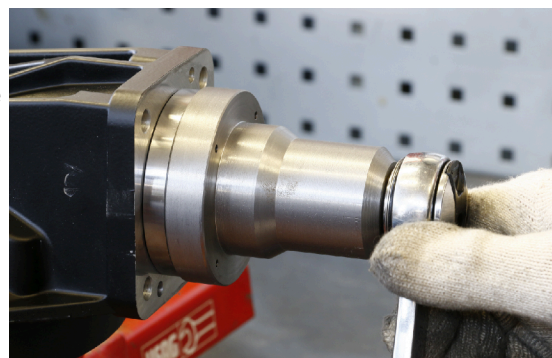
CAUTION

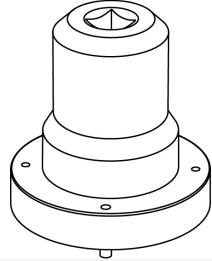


IF THE THIN SHEET IS DAMAGED, THE FLANGE TOGETHER WITH THE BEARING MUST BE REPLACED, AS INDICATED.

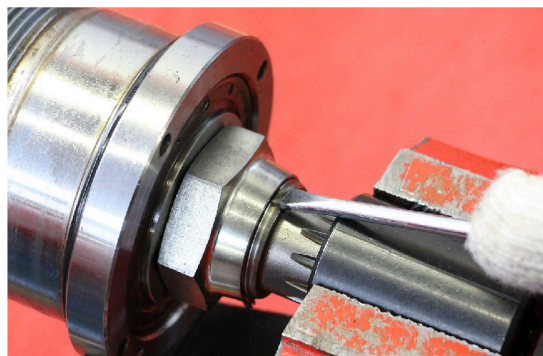


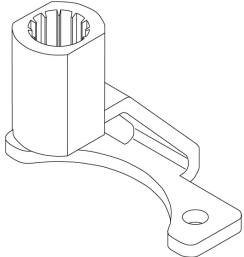
- Heat the outer area of the pinion bearings holder case.
- Using the special tool, loose and remove the pinion bearings holder case.



CODE	DESCRIPTION	IMAGE
020998Y	Pinion case wrench	

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

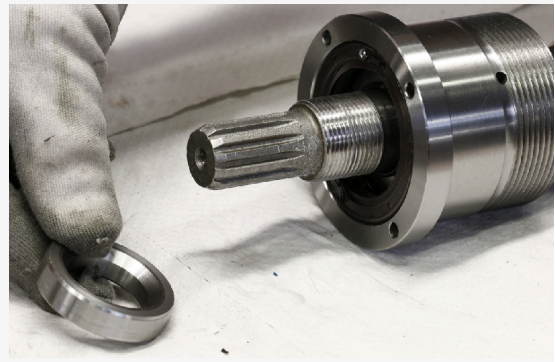


CODE	DESCRIPTION	IMAGE
021000Y	Bevel gear pinion shoes	

- Loosen the pinion bearings holder case locking nut and remove it.



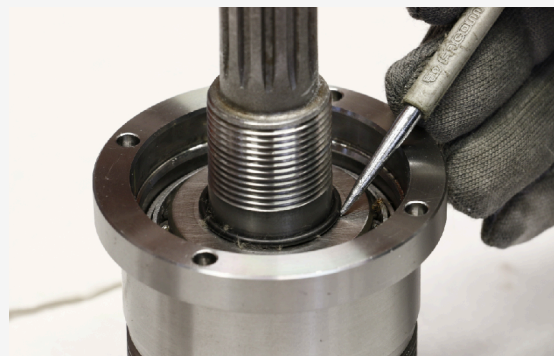
- Remove the spacer closing bearings.



- Remove the sealing ring.



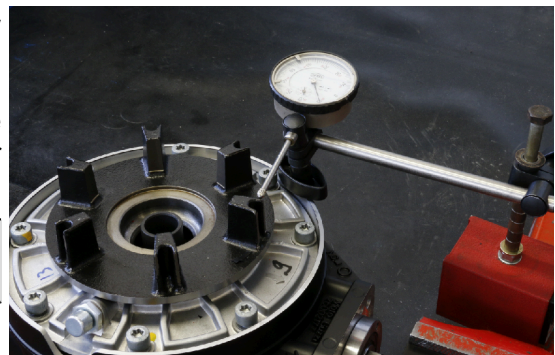
- Remove the O-ring.



10.4.3 Control

- After assembly of the box, it is necessary to check the play between the pinion and the crown. Clamp in a vice and install a dial gauge by means of a suitable support. The dial gauge tester must be placed the outer end of a tooth positioned at 90°.

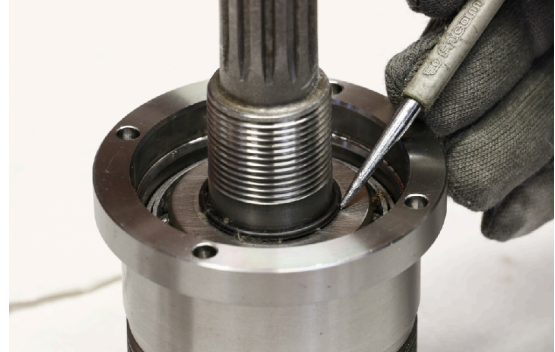
CHARACTERISTIC	DESCRIPTION / VALUE
Maximum clearance allowed	0.08-0.2 mm (0.059-0.147 in)



- If the measured play is not compliant with the permitted values, proceed to the correction by selecting and replacing an adequate rear sprocket axle thickness.

10.4.4 Fitting

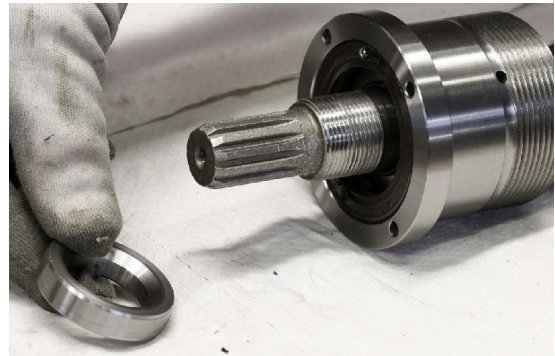
- Insert the new internal O-ring in the pinion unit.



- Insert a new seal ring until it stops.

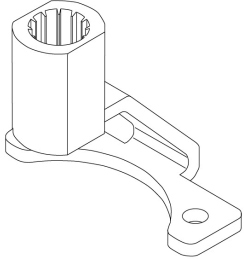


- Insert the bearings closing spacer paying attention that the chamfer is placed in contact with the O-ring.



- After having placed a new nut, using the specific tool, lock the assembly of the pinion bearing support case in the vice and tighten the nut to the prescribed torque.



CODE	DESCRIPTION	IMAGE
021000Y	Bevel gear pinion shoes	

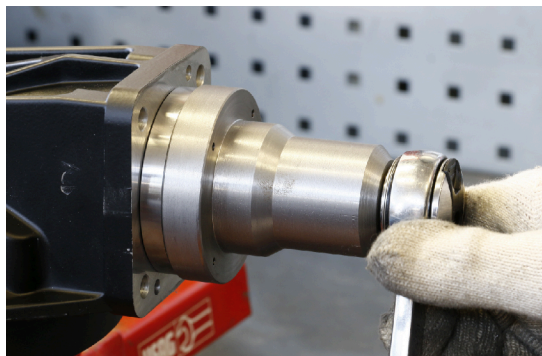
- Rivet the nut at the groove on the pinion.

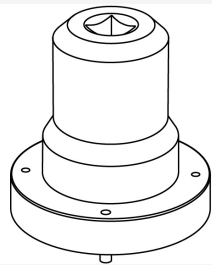
CAUTION

CAREFULLY CLEAN THE THREAD OF THE GEARBOX FROM LOCTITE RESIDUES BEFORE INSERTING THE PINION BEARING SUPPORT CASE AGAIN.



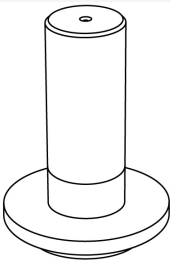
- Using the protective jaws, block the gearbox in vice
- Apply the loctite along the entire circumference, for a length of 3 threads and, using the specific tool, tighten the pinion bearing holder case to the specified torque.



CODE	DESCRIPTION	IMAGE
020998Y	Pinion case wrench	

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



CODE	DESCRIPTION	IMAGE
021005Y	Bevel gear cover oil seal punch	

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

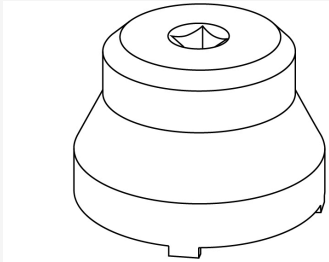


- Place the gearbox flange on the splash guard hub.



- Place a new ring nut and using the specific tool tighten it to the prescribed torque.



CODE	DESCRIPTION	IMAGE
020999Y	Crown counter-lock ring wrench	

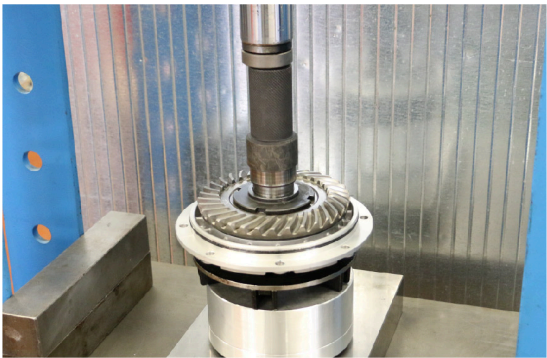
- Reattach the ring nut in two opposite points, in correspondence with the grooves on the hub.



- Insert the shoulder washer.



- Using the specific tool, put it in a press and insert the inner track of the roller bearing.



CODE	DESCRIPTION	IMAGE
GU19927900	Punch for drilled bolt bearing	

- Insert the axial snap ring.



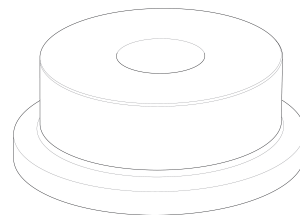
- Using the specific tool, fit the internal oil seal of the bevel gear hub, bringing it to the end



CODE	DESCRIPTION	IMAGE
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020359Y

42x47 mm Adaptor



- Place the flat washer on the gearbox.

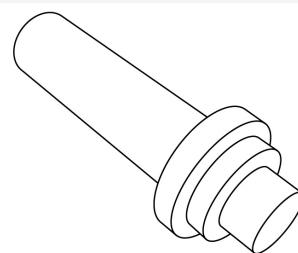


- Insert a new sealing ring on the gearbox using the specific tool, paying attention to the direction of assembly.

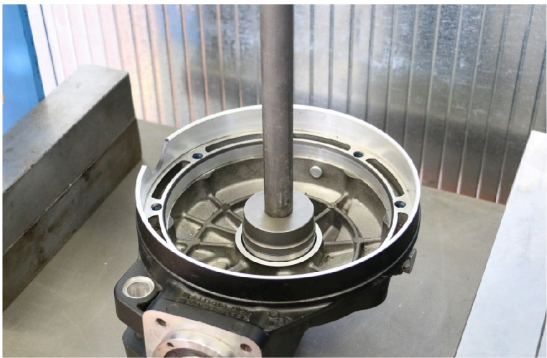


CODE	DESCRIPTION	IMAGE
------	-------------	-------

021003Y

Bevel gear external
cover oil seal punch

- Using the specific tool, put it in a press and insert the outer track of the roller bearing until it stops.



CODE	DESCRIPTION	IMAGE
020360Y	Punch 52x55 mm	

- Insert the axial snap ring.



- Insert the roller cage.



- Before proceeding with the assembly of the inner spacer, clean it thoroughly with an oil-soaked cloth.



- Insert the inner spacer until it stops.



- Reposition the crown axle thickness.

NOTE



THE THICKNESS HAS A UNIQUE POSITION IN THE BOX. PAY ATTENTION TO THE CORRECT POSITION BY CHECKING THE CORRESPONDENCE OF THE HOLES WITH THE FASTENING SCREWS.

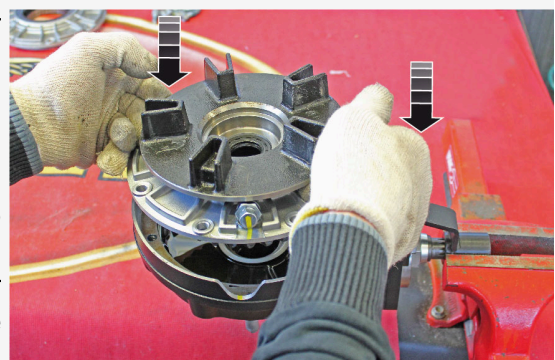


CAUTION

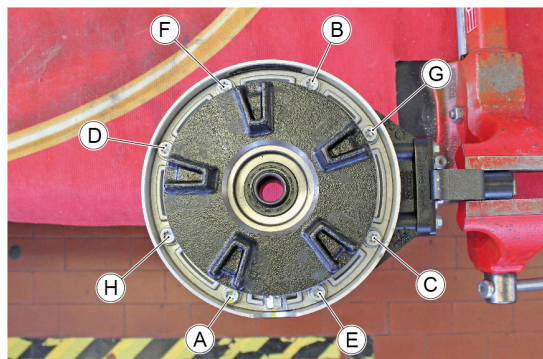


CAREFULLY CLEAN THE THREADS OF THE GEARBOX FROM LOCTITE RESIDUES BEFORE INSERTING THE FLANGE AGAIN.

- Insert the centring pins and reposition the complete flange in its seat in the gearbox.



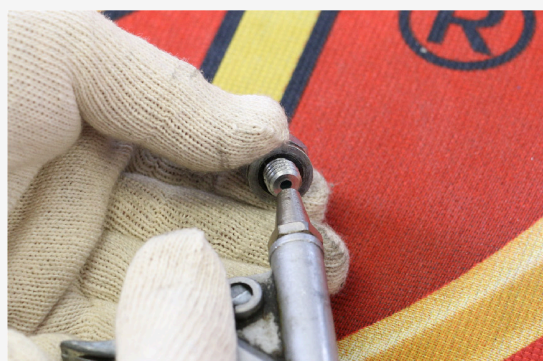
- Insert the fixing screws of the flange and tighten it to the prescribed torque operating diagonally with the indicated sequence..



- After blowing the breather with compressed air, carefully remove any oil residues and check its correct functioning, put it in its seat again and tighten it to the prescribed torque.

NOTE

DURING REPLACEMENT, USE A NEW SEALING WASHER.

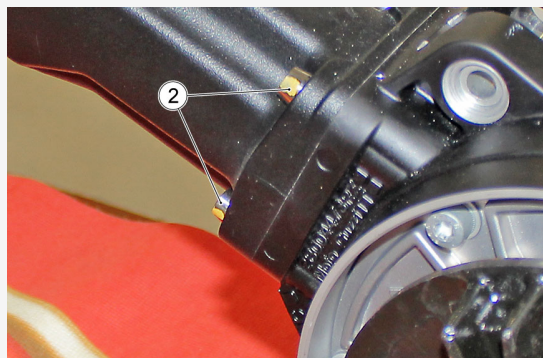


10.4.5 Installation

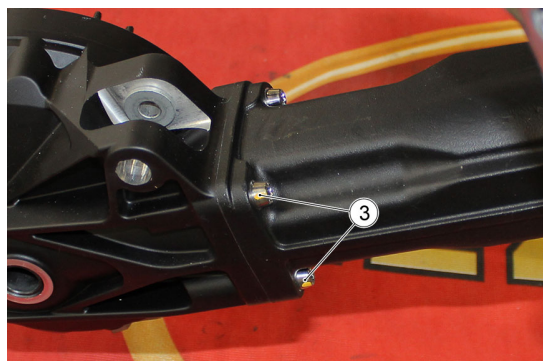
- Insert the bevel gear (1) on the swingarm



- Insert and tighten the fastening screws (2) to the prescribed torque

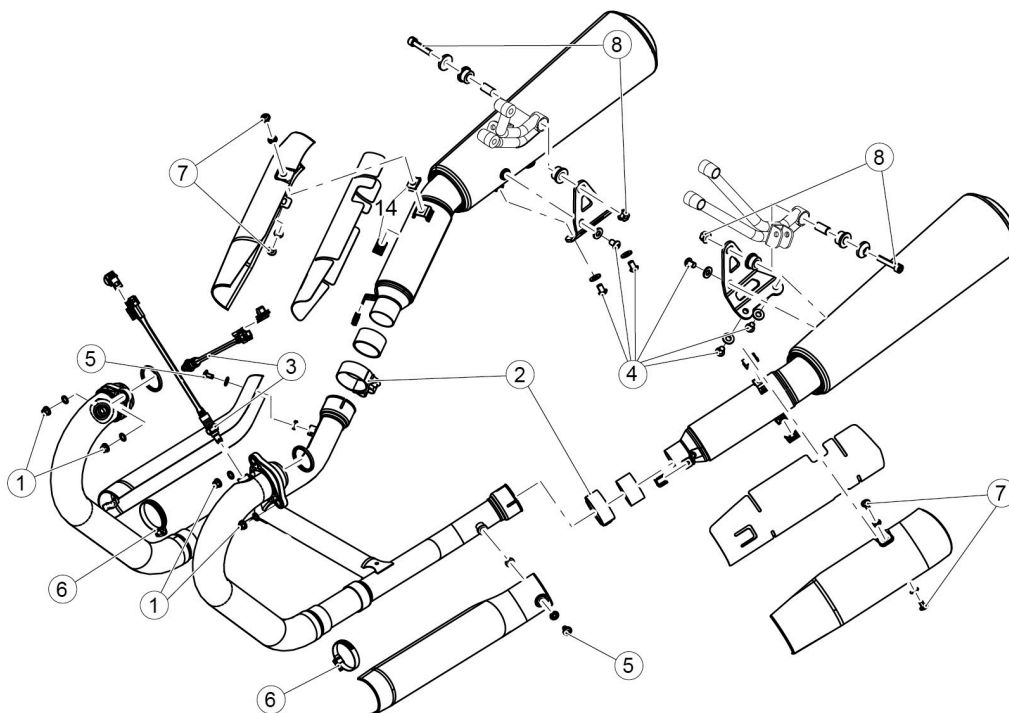


- Insert and tighten the fastening screws (3) to the prescribed torque



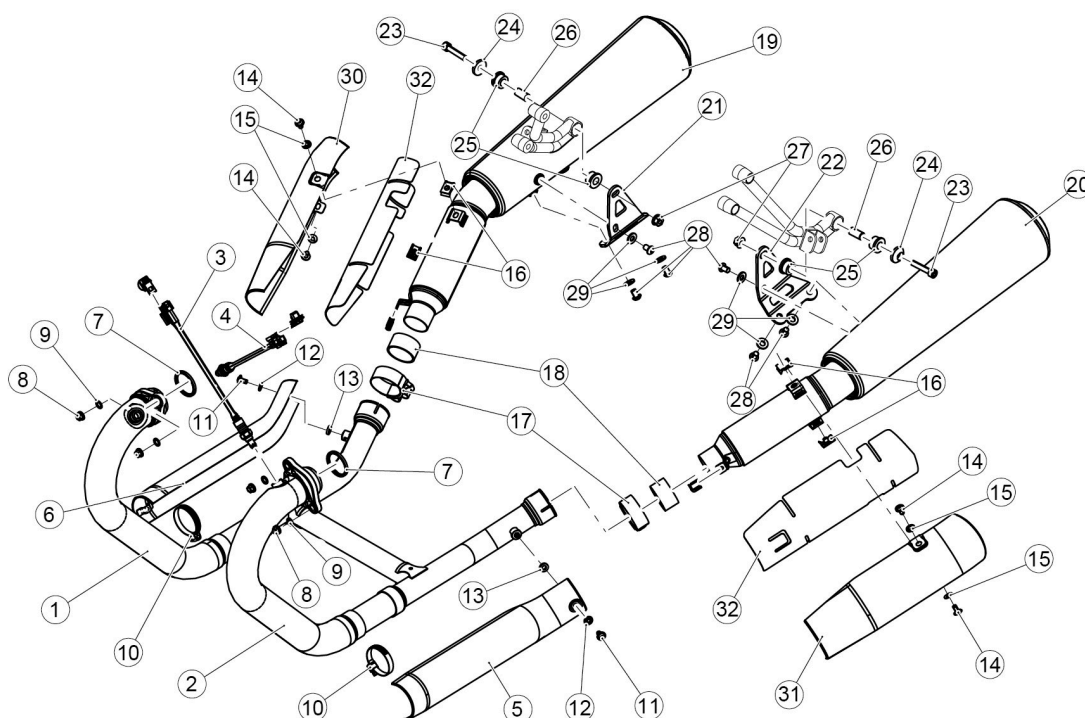
- Top up the oil following the instructions in the "**Maintenance / Transmission oil / Replacement**" chapter

10.5 Exhaust



POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Fastening the exhaust pipe to the engine	M8	4	25 Nm (18.44 lbf ft)	-
2	Fastening the exhaust pipe to the silencer	M8	2	25 Nm (18.44 lbf ft)	-
3	Lambda probes fastener	M12x1.25	2	25 Nm (18.44 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
4	Fastening the silencers to the support	M8	6	25 Nm (18.44 lbf ft)	-
5	Fastening the RH/LH manifold heat shield	M6	2	8 Nm (5.9 lbf ft)	-
6	RH/LH manifold heat shield clamp	-	2	3.5 Nm (2.58 lbf ft)	-
7	Fastening the RH/LH silencer heat shield	M6	4	8 Nm (5.9 lbf ft)	-
8	Fastening the silencer to the support on the chassis	M8	4	25 Nm (18.44 lbf ft)	-

DIAGRAM**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

10.5.1 Exhaust terminal removal

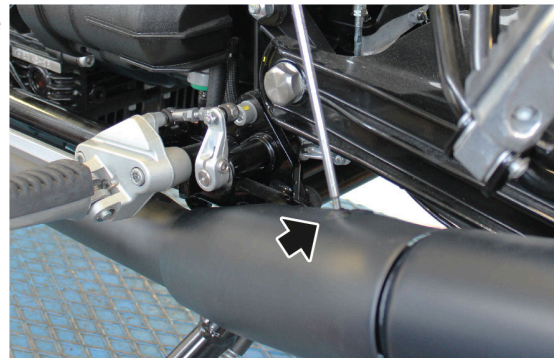
The engine and the exhaust system components get very hot and remain in this condition for a certain time interval after the engine has been switched off. Before handling these components, make sure that you are wearing insulating gloves or wait until the engine and the exhaust system have cooled down.

N.B.:



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

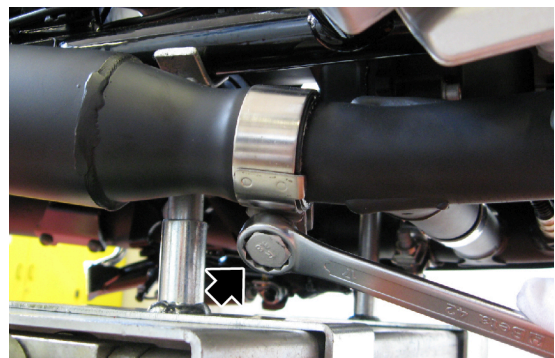
- Remove the three fixing screws of the silencer guard



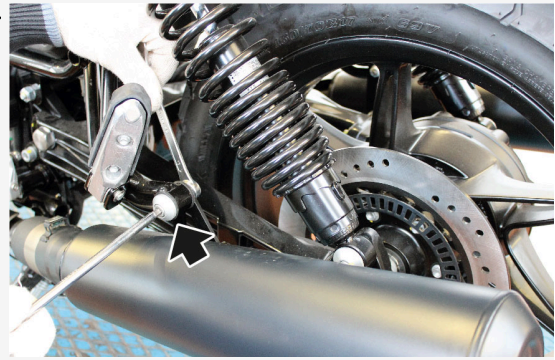
- Remove the silencer guard, sliding it toward the front of the vehicle



- Loosen the clamp between the silencer and manifold



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



- Slide and remove the silencer from the collector

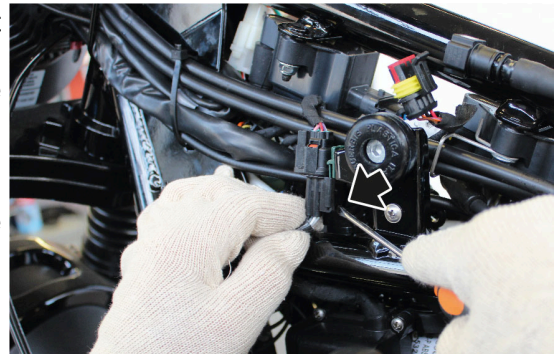


- Slide and remove the silencer from the collector



10.5.2 Removal of exhaust manifold

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

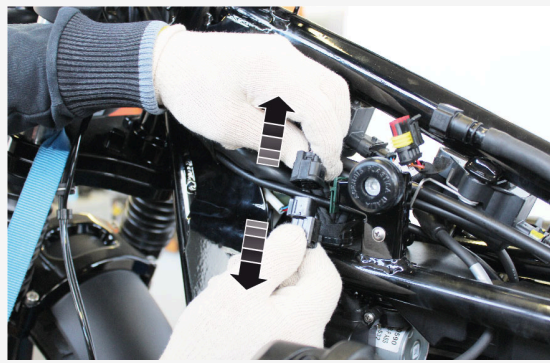


- Disconnect the connectors of the lambda probe wiring harness

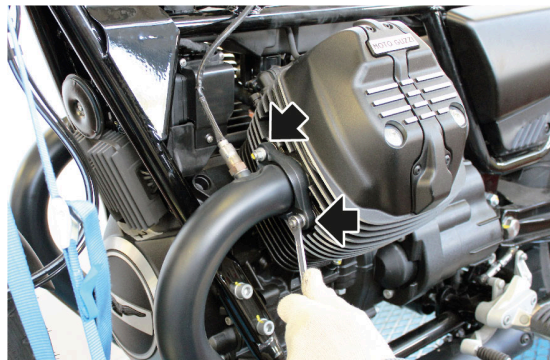
N.B.:



REPEAT THIS OPERATION ON THE OPPOSITE SIDE.



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

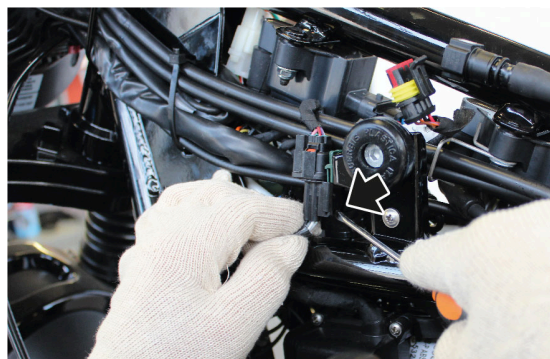


- Remove the exhaust manifolds at the same time



10.5.3 Lambda probe removal

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

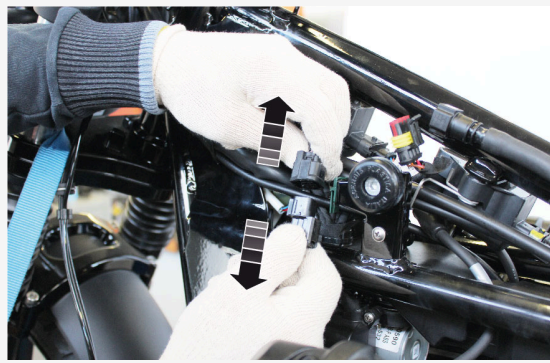


- Disconnect the connectors of the lambda probe wiring harness

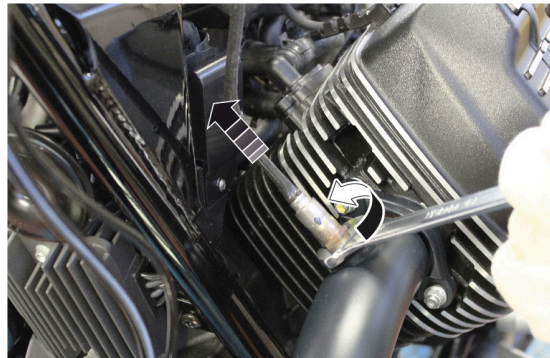
N.B.:



REPEAT THIS OPERATION ON THE OPPOSITE SIDE.

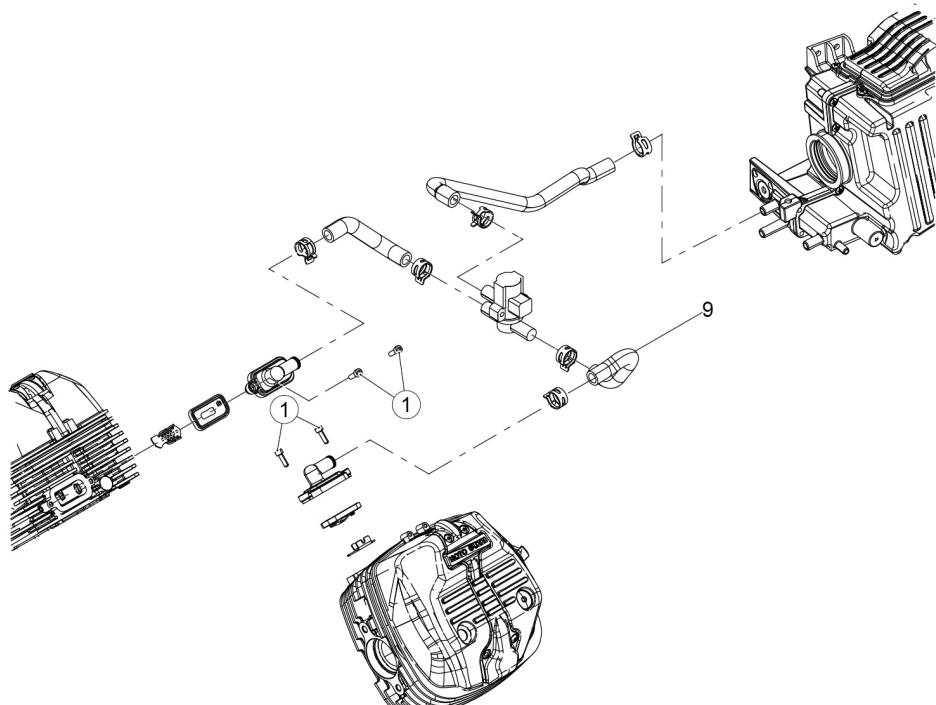


- Unscrew and remove the lambda probe from the exhaust manifold

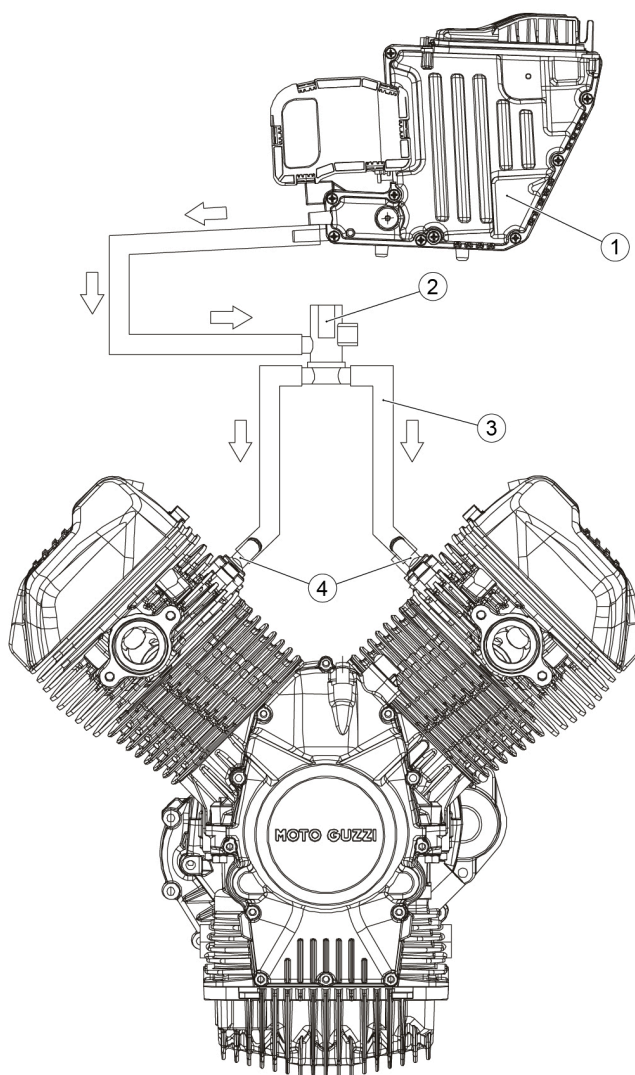


10.6 Secondary air system

Tightening torques



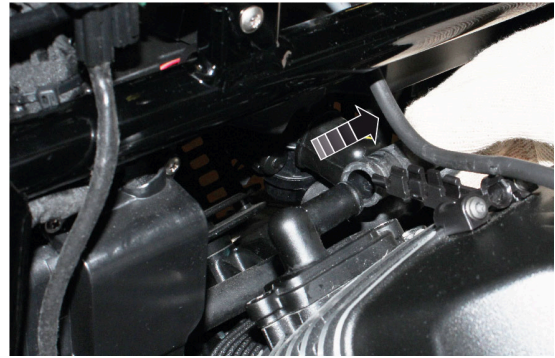
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Red valve cover fixing SHC screws	M5x16	4	3-4 Nm (2.21-2.95 lb ft)	-

Diagram**Key:**

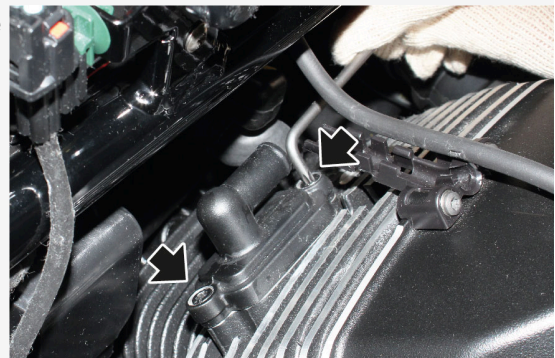
1. Air filter box
2. Secondary air valve
3. Secondary air system pipe
4. Secondary air system inlets on the engine

Two auxiliary air inlets have been included in the cylinder head which, in combination with the injection system with oxygen sensor and three-way catalytic converter, ensure compliance with severe new Euro 5 emissions regulations

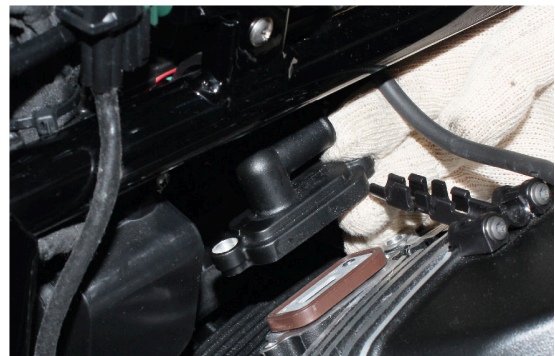
- Disconnect the Blow-by pipe from the reed valve cover



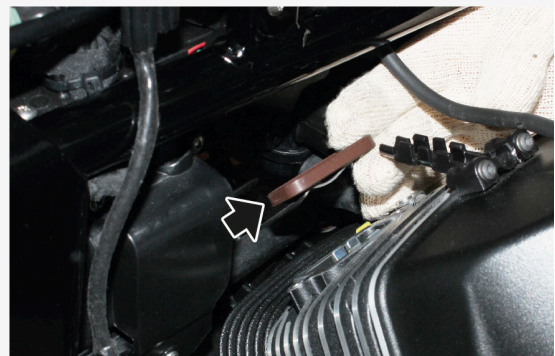
- Undo the screws fastening the reed valve cover.



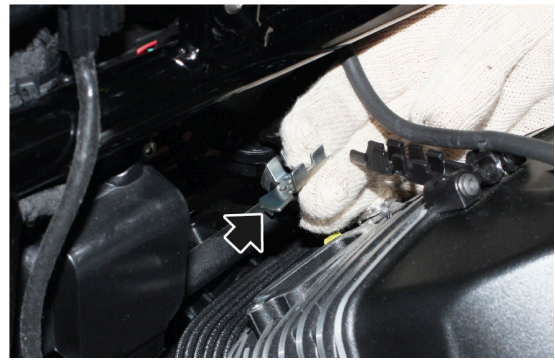
- Remove the reed valve cover



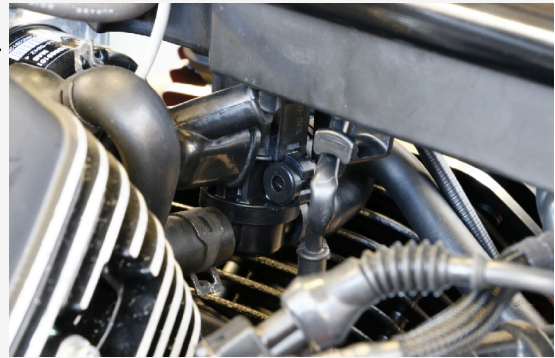
- Remove the reed valve.



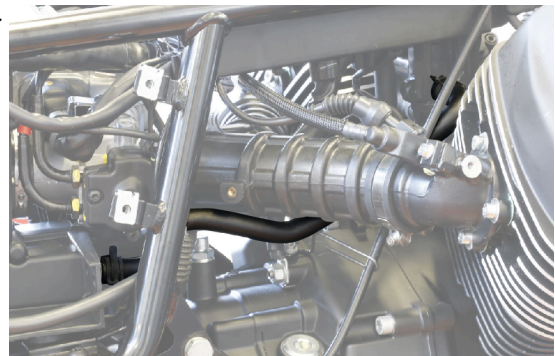
- Remove the flame trap.



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

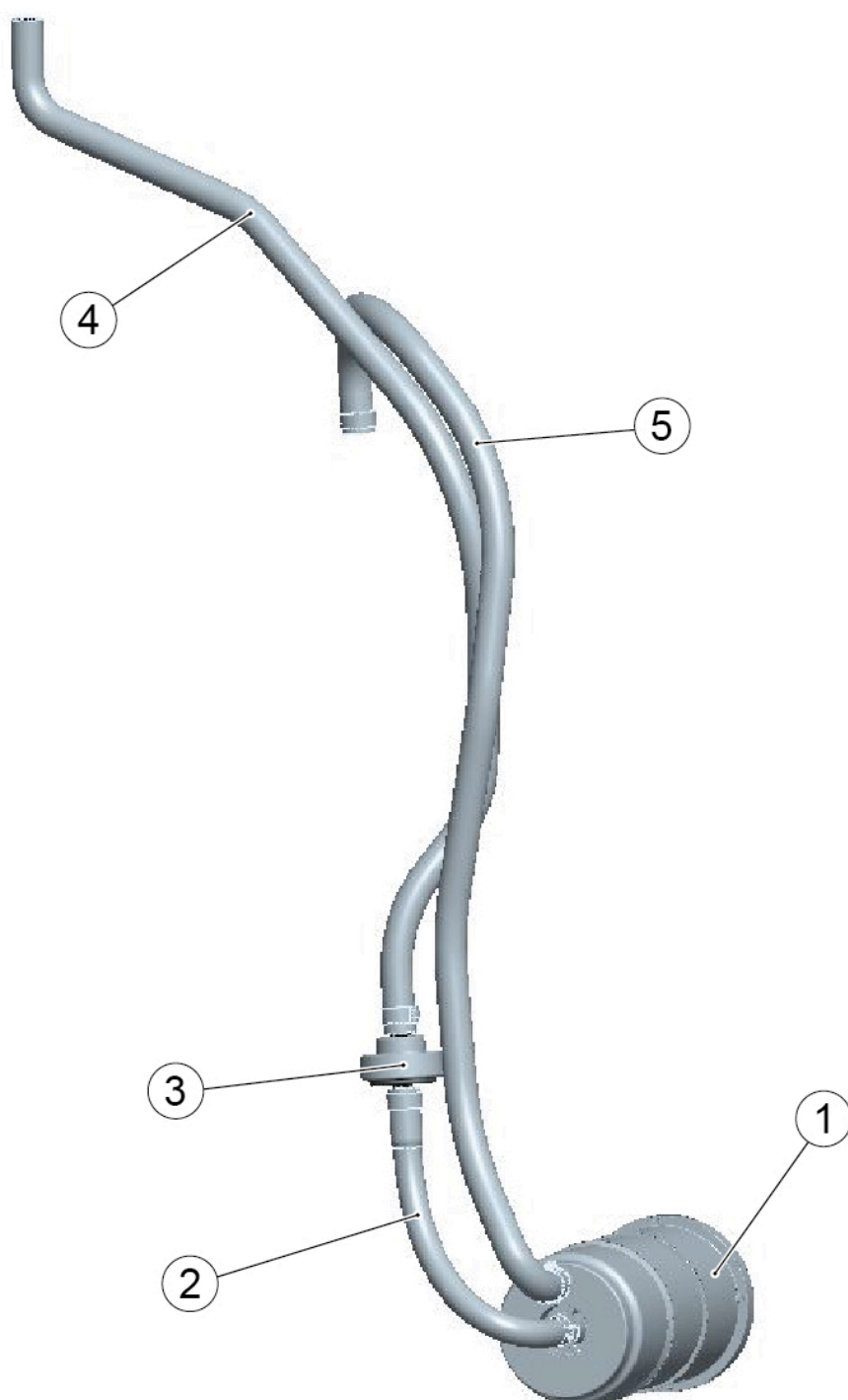


- This valve is connected directly to the filter box via a flexible hose.



10.7 Evaporative emission control system

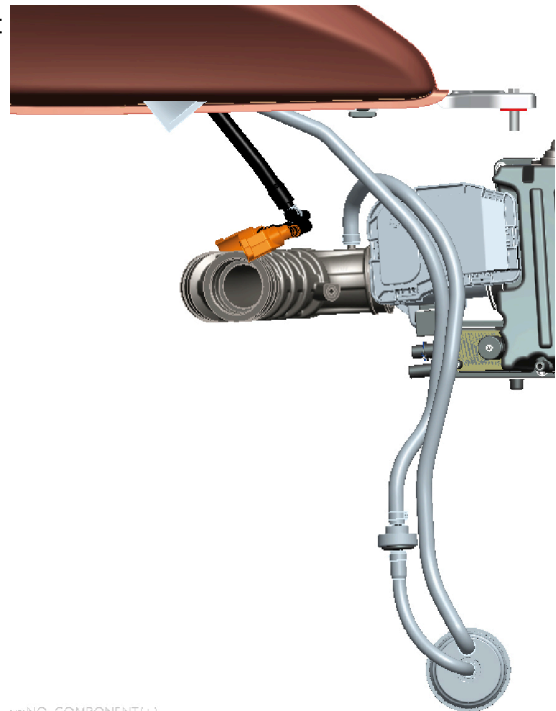
Diagram

**Key:**

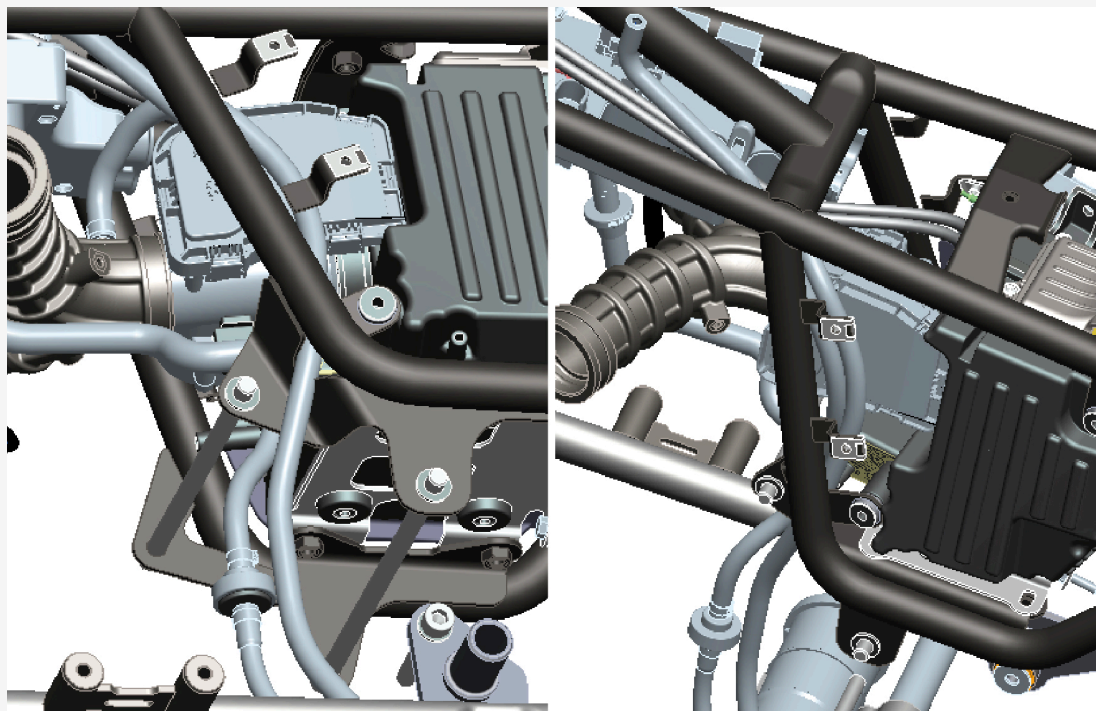
- 1. Canister
- 2. SAE 30 R12A-3/16 pipe
- 3. Breather valve
- 4. SAE 30 R12A-1/4 pipe

5. SAE 30 R12A-1/4 pipe

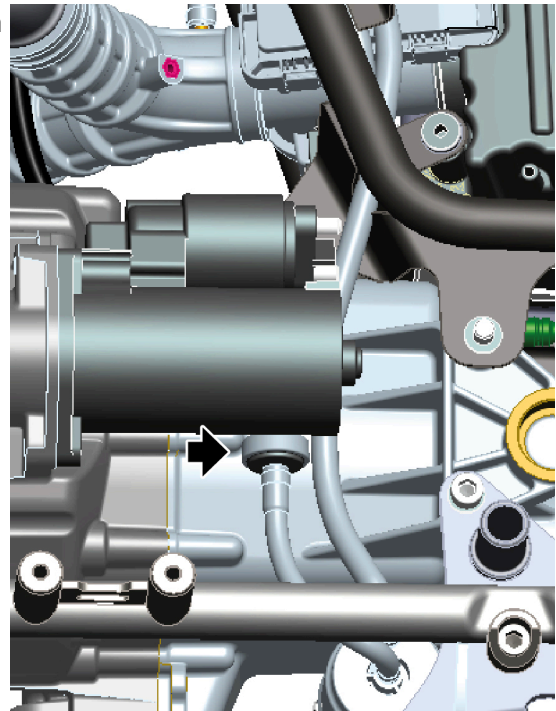
- The canister is installed with the intake inlet above the tank inlet



- Check the correct passage of the pipes on the chassis



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

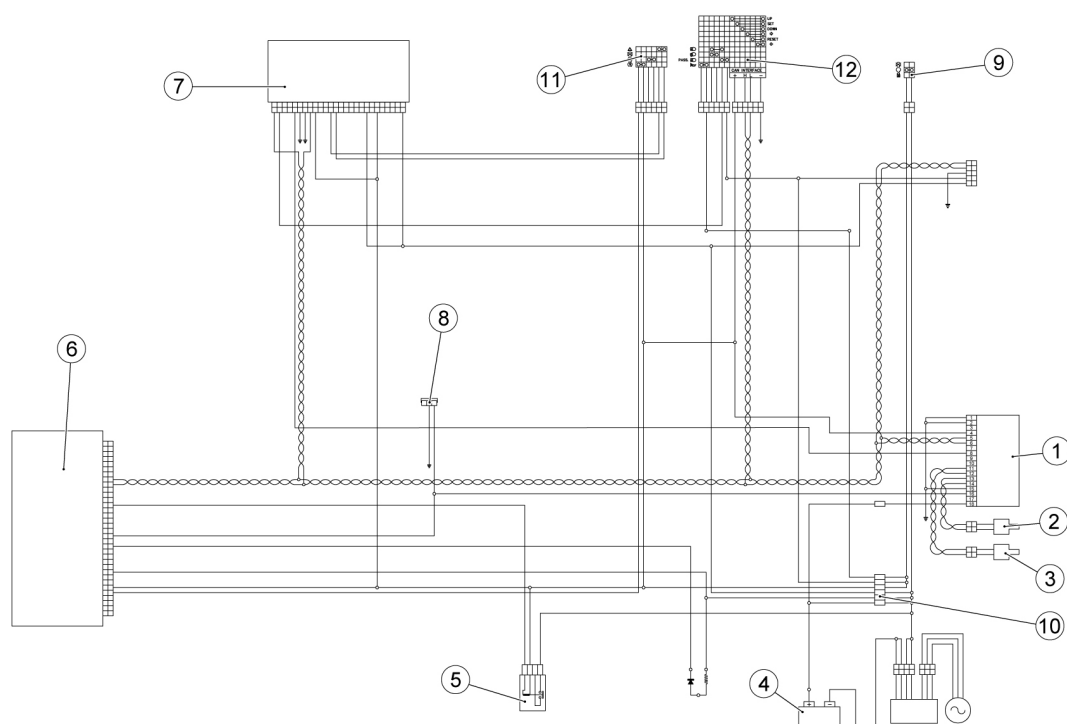


LIST OF TOPICS

Braking system

11.1 ABS

Diagram



Key:

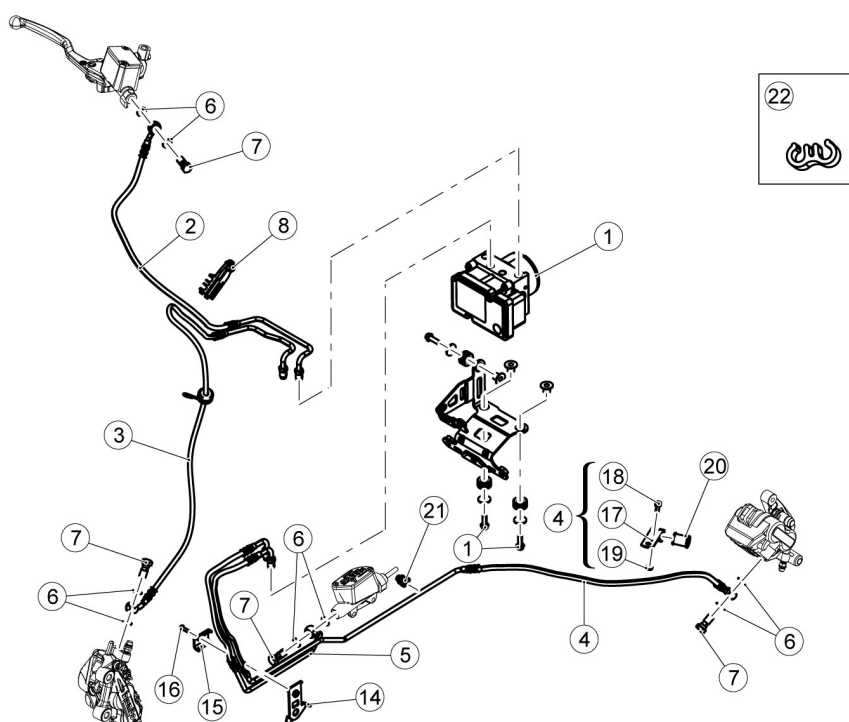
- 1 . ABS control unit
- 2 . Front ABS sensor
- 3 . Rear ABS sensor
- 4 . Battery
- 5 . Injection loads relay
- 6 . ECU
- 7 . Instrument cluster
- 8 . K line (diagnostic)
- 9 . Ignition switch
- 10 . Fuses
- 11 . Right light switch
- 12 . Light switch left

ABS control unit pin out

- 1 . Ground
- 2 . Ground
- 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
- 16 . K diagnostic line
- 17 . Control unit power

11.1.1 Foreword

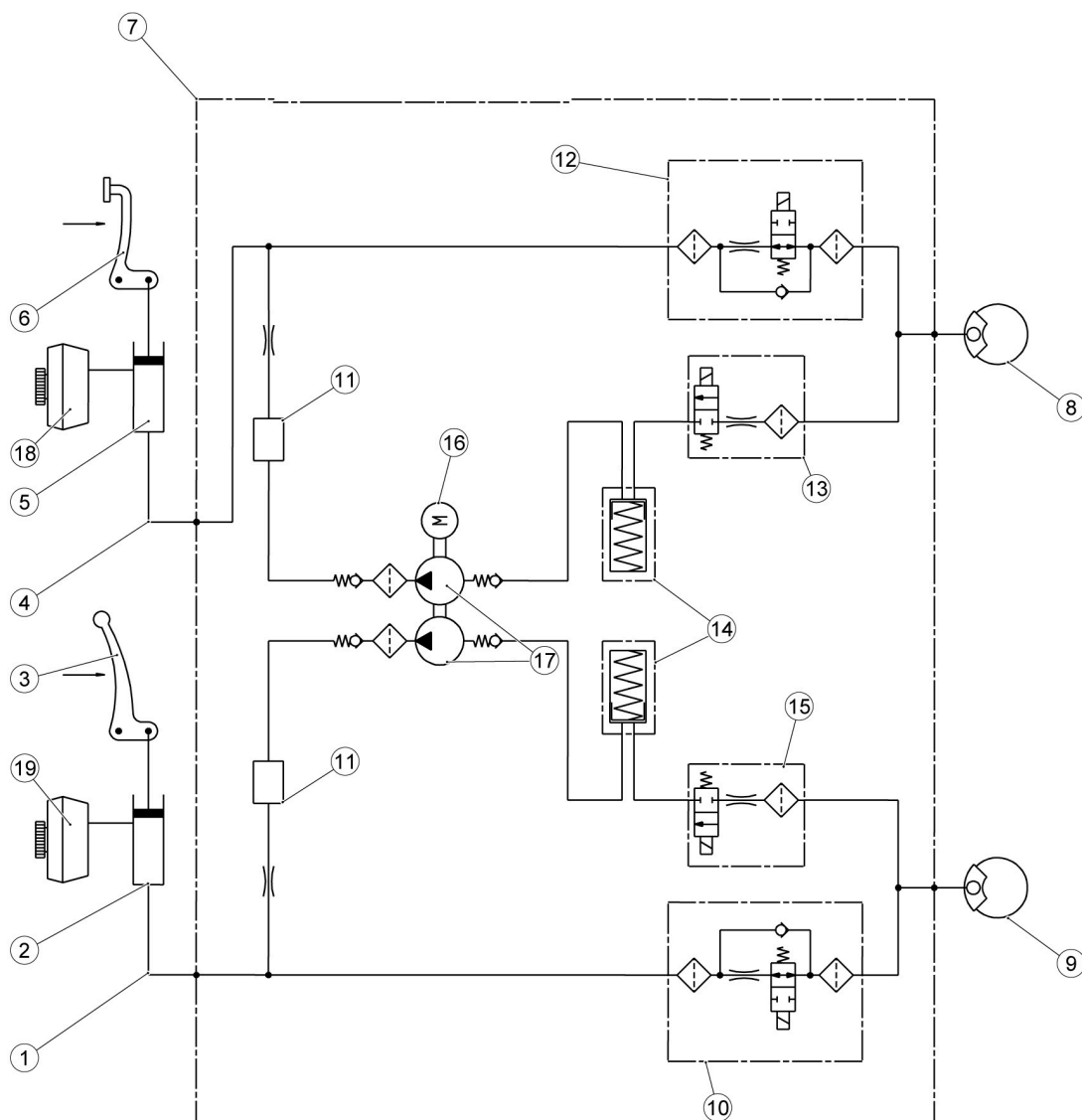


Key:

- 1 . ABS control unit
- 2 . ABS control unit front pump pipe
- 3 . ABS control unit front calliper pipe
- 4 . ABS control unit rear calliper pipe
- 5 . ABS control unit rear pump pipe
- 6 . Washer
- 7 . Oil pipe screw
- 8 . Brake pipe support
- 9 . Bushing
- 10 . Rubber ring
- 11 . Screw
- 12 . Washer
- 13 . Control unit support bracket

- 14 .** Brake pipe mounting plate
- 15 .** Pipe fixing plate
- 16 .** Screw
- 17 .** Clamp
- 18 .** Screw
- 19 .** Nut
- 20 .** Ring
- 21 .** Cable guide
- 22 .** Clip

11.1.2 Functional diagram



ABS functional diagram key

- 1 . Front system circuit
- 2 . Front brake master cylinder
- 3 . Front brake control lever
- 4 . Rear system circuit

- 5 . Rear brake master cylinder
- 6 . Rear brake pedal
- 7 . ABS control unit
- 8 . Rear brake calliper
- 9 . Front Calliper
- 10 . Front brake circuit inlet solenoid valve (normally open)
- 11 . Humidifier
- 12 . Rear brake circuit inlet solenoid valve (normally open)
- 13 . Rear brake circuit outlet solenoid valve (normally closed)
- 14 . Rear/front brake circuit low pressure accumulator
- 15 . Front brake circuit outlet solenoid valve (normally closed)
- 16 . DC electric motor
- 17 . Dual hydraulic circuit pump (ABS)
- 18 . Rear brake reservoir
- 19 . Front brake reservoir

ABS OPERATION

General specifications:

The front circuit is the same as the rear one.

- The ABS inlet valve (10 - 12) is normally open and it is closed only when the system intervenes to avoid wheel locking.
- The exhaust valve (13 - 15) is normally closed and it is opened only when the system intervenes to avoid wheel locking.
- With the system in stand-by mode, the ABS processor controls the wheel speed instant by instant to assess any slippage of the wheels.
- When in standby, the system does not intervene at all when the rider brakes; the braking system is the same as the one without ABS.

ABS Cycle phases (the following operations refer to the front circuit but they are also valid for the rear):

A - Start braking: the rider starts braking as he would usually do.

B - Pressure reduction: coincides with the recognition of the dangerous situation (wheel slippage exceeds the threshold): the system closes the inlet valve (10-12) and opens the exhaust valve (13-15) temporarily.

At this stage the rider cannot increase the pressure on the callipers (8-9) and the system reduces the pressure on the callipers partially. The excess fluid temporarily fills the front reservoir (18-19) until the ABS pump (17) self-activates and delivers the fluid back to the brake pump (2-5).

C - Maintaining pressure: the pressure in the callipers (8-9) remains low until total recovery of speed / wheel grip.

The system restores the fluid taken from the calliper (8-9) in the section of the system between the brake pump (2-5) and the ABS inlet valve (10-12).

D - Pressure restoration: by opening the inlet valve (10-12) momentarily, the pressure of the callipers (8-9) is increased until maximum deceleration is reached. Then, the system gives the control over the braking back to the rider.

E - If the wheel does not reach complete grip, the system continues operating as before until complete grip is obtained or until the vehicle stops. An error may be generated, however, if the pressure reduction stage persists for longer than a predetermined limit.

ABS SYSTEM DESCRIPTION

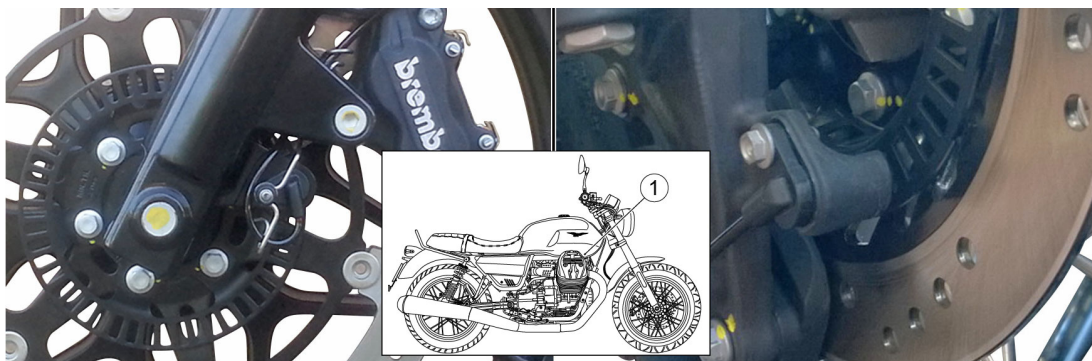
N.B.:**WHEN THE ABS STARTS WORKING, A PULSING IS FELT ON THE BRAKE LEVER.**

CAUTION**THE ANTI-LOCK BRAKING SYSTEM OF THE WHEEL DOES NOT PREVENT FALLS WHILE CORNERING.****AN EMERGENCY BRAKING WITH THE VEHICLE INCLINED, HANDLEBAR TURNED, ON UNEVEN OR SLIPPERY ROADS, OR WITH POOR GRIP, CREATES A LACK OF STABILITY DIFFICULT TO HANDLE. RIDE CAREFULLY AND SENSIBLY AND ALWAYS BRAKE GRADUALLY.****DO NOT SPEED RECKLESSLY. THE VEHICLE GRIP ON THE ROAD IS SUBJECT TO LAWS OF PHYSICS WHICH NOT EVEN THE ABS SYSTEM CAN ELIMINATE.**

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.



When the sensors (3) detect a significant speed difference between the rear and the front wheels (for example, when rearing up on the back wheel), the ABS system could take this as a dangerous situation.

In this case, there are two possible results:

- The ABS system intervenes by releasing pressure from the calliper until the wheel turns again at the same speed of the other wheel. Braking is not possible for an instant.
- if the speed difference lasts long, the system may detect an error and deactivates the ABS system. As a consequence, the system works as any regular braking system.

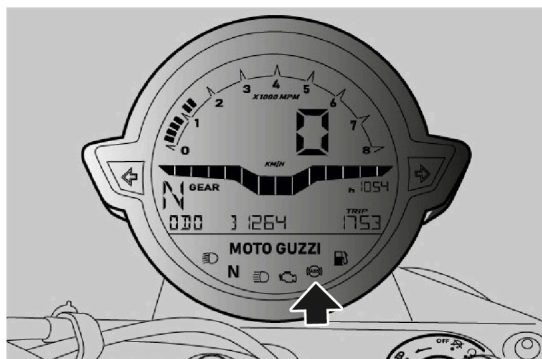
Riding with the ABS system active

- 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.

WARNING



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.



11.1.3 Diagnosis guide

FOREWORD

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!

However, the system is perfectly operative 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 exceeding 5 km/h (3.11 mph):

- if errors are not detected
 - the ABS warning light turns off
- if at least one malfunction is detected
 - the ABS warning light turns on permanently

The ABS system is disabled!

However, the system is perfectly operative as any other braking system without ABS.

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

Error detection logic foresees that for the errors to be diagnosed one or more conditions must persist within a given time.

If during that time, one of the conditions is no longer present and reappears afterwards, the timer is reset and the system is not able to diagnose the error.

The ABS system continues to be inactive.

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 point 3; YES, go to point 4)

3. PERFORM THESE CHECKS:

- A. PIN 1 Ground
- 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 point 6)

5. CHECK THE ERRORS TABLE

6. ABS WARNING LIGHT ACTIVATION

IS IT ACTIVATED?(YES, go to point7; 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 cluster malfunction

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.

11.1.4 Use of diagnostic tool for ABS system

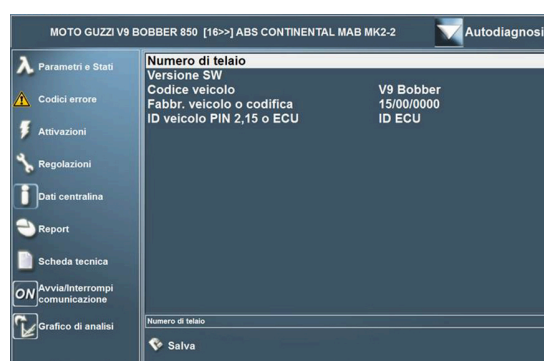
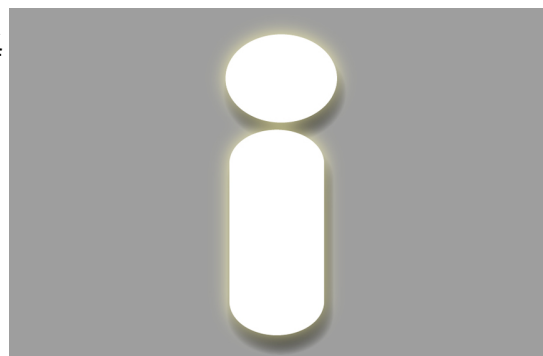
11.1.4.1 ABS Screens

Screen page INFO ECU

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



Parameter screen

Diagnostic tool - Parameters

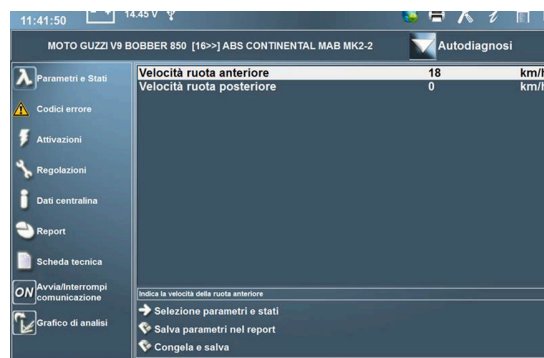
This screen page is used to adjust some control unit parameters

- Front wheel speed
- Rear wheel speed

Quality test of the sensors

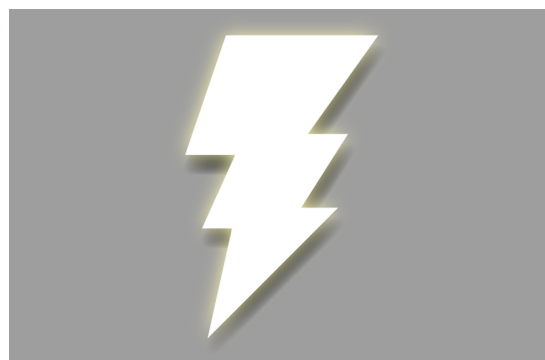
When turning the wheel or acting on the brake, a variation of parameters must be detected.





Activation screen

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



Diagnostic tool characteristics	Value/example	Unit 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

Error screen

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 characteristics	Notes
Front wheel speed sensor: Electric malfunction 5D90	Electronically 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; the surface of the wheel bearings may be deteriorated; 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	Electronically 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; the surface of the wheel bearings may be deteriorated; 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;

Diagnostic tool characteristics	Notes
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, Vehicle identification line - Pins 2-15 of ABS control unit)
Control unit F01F	Possible control unit fault

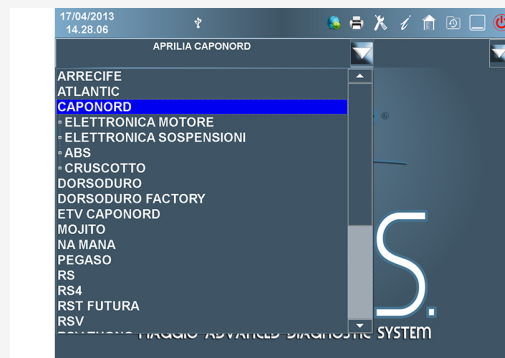
Diagnostic tool report diagnostic tool

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.



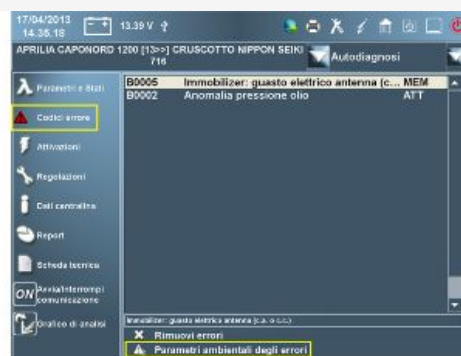
- Select the vehicle and the component.



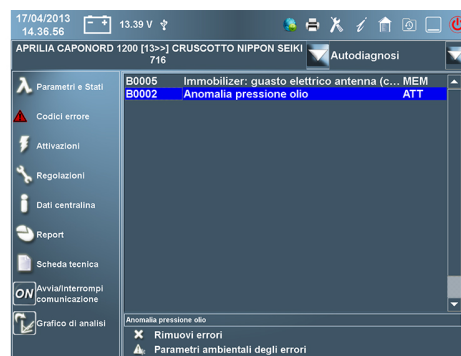
- Select **Self-diagnostic**.
- Go to the page Error codes.



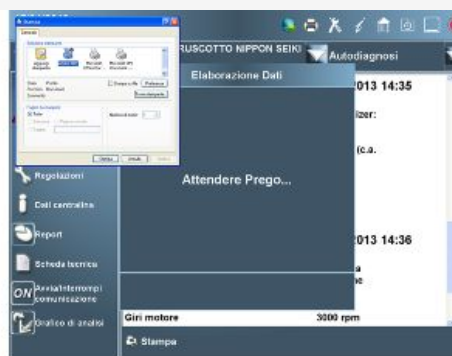
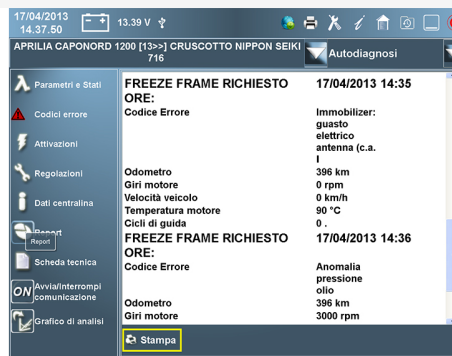
- Select an error and show the **Ambient parameter error**(where provided).



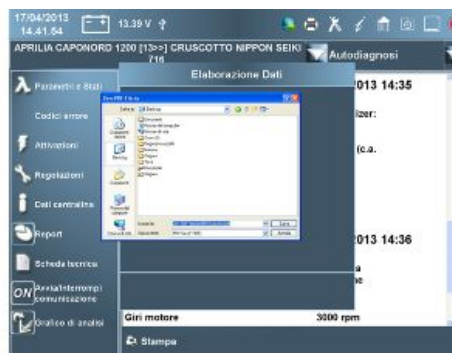
- Repeat the operation by selecting each error and showing the corresponding **Ambient parameter error** (where provided).



- 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 cluster.

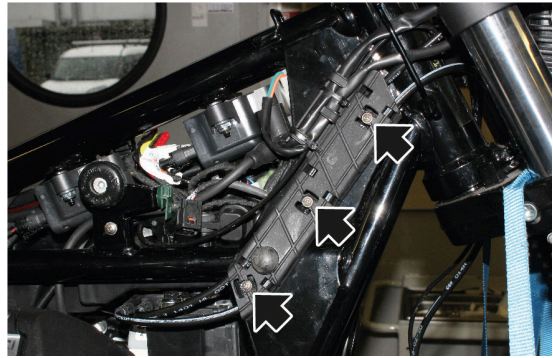


11.1.5 Modulator

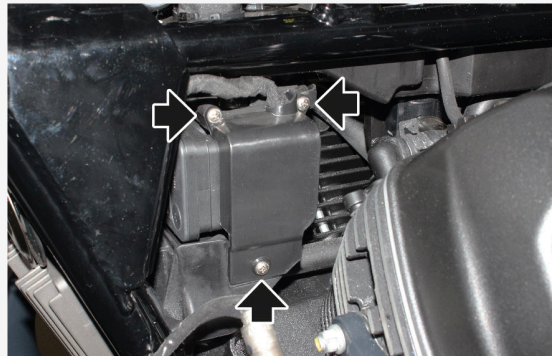
REMOVAL

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

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



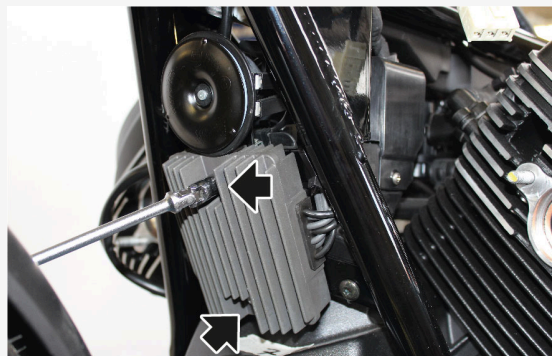
- Remove the left lambda probe from the exhaust manifold
- Remove the three connector cover fixing screws



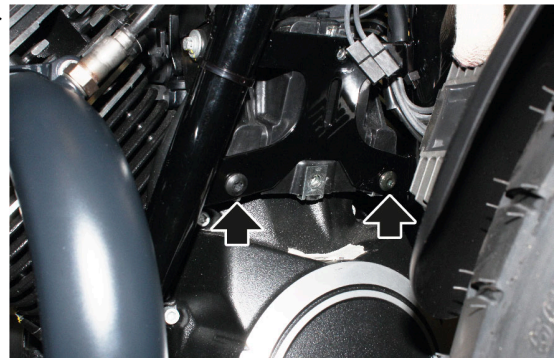
- Disconnect the connector from the modulator



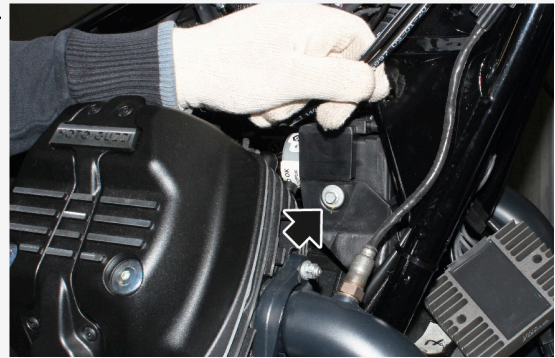
- Remove the screws that fasten the voltage regulator to the chassis
- Remove the regulator and the horn from the vehicle



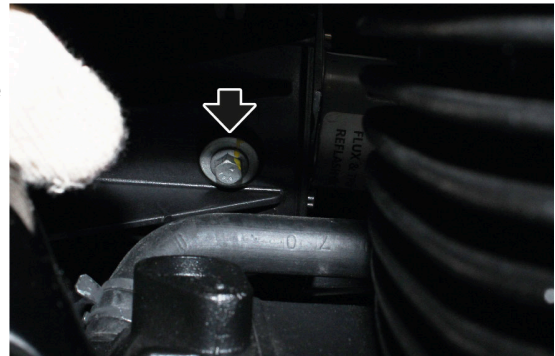
- Remove the front screws of the modulator support



- Remove the side screw of the modulator support



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



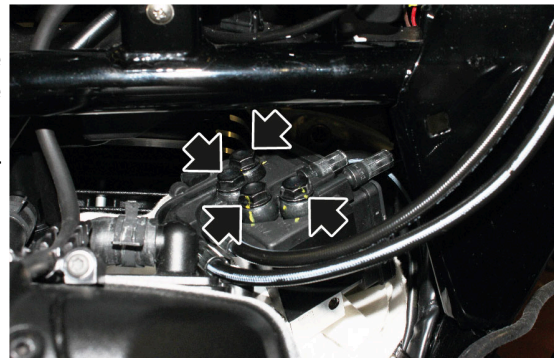
- Remove the modulator support from the vehicle, taking it out from the left side



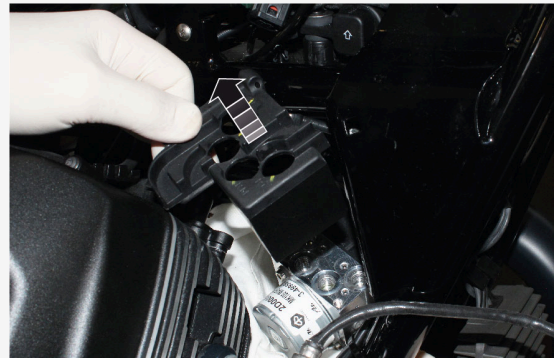
- Put a wipe under the modulator
- Remove the brake pipe couplings from the modulator, making sure to retrieve all the copper seal washers

WARNING

DURING REFITTING, USE NEW SEALING WASHERS.



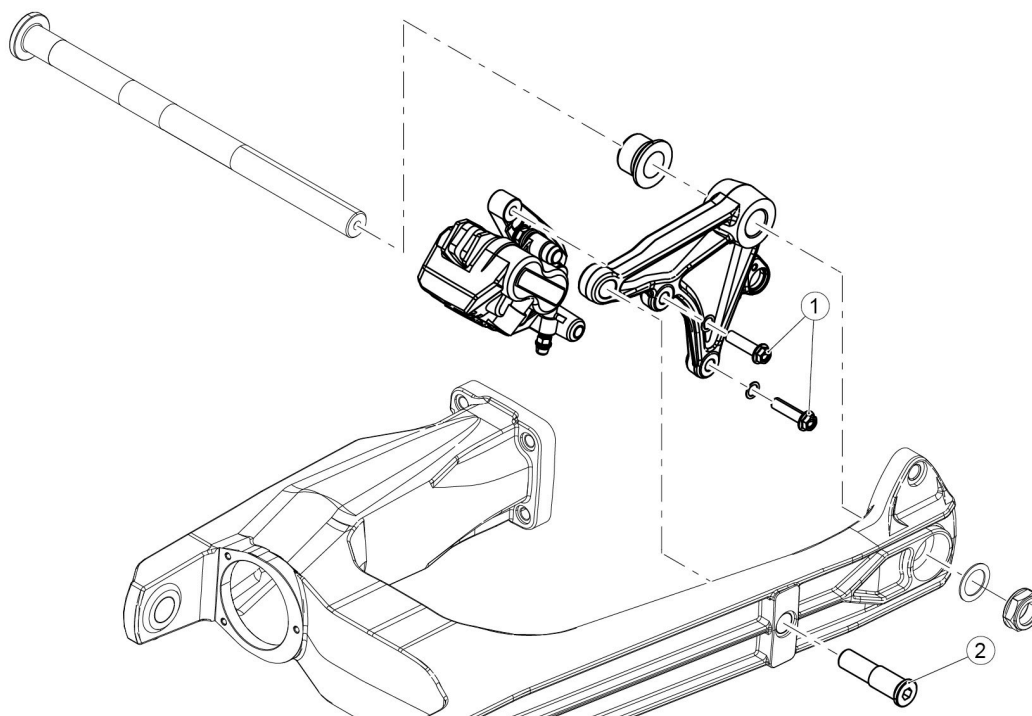
- Remove the modulator's pipe guide



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

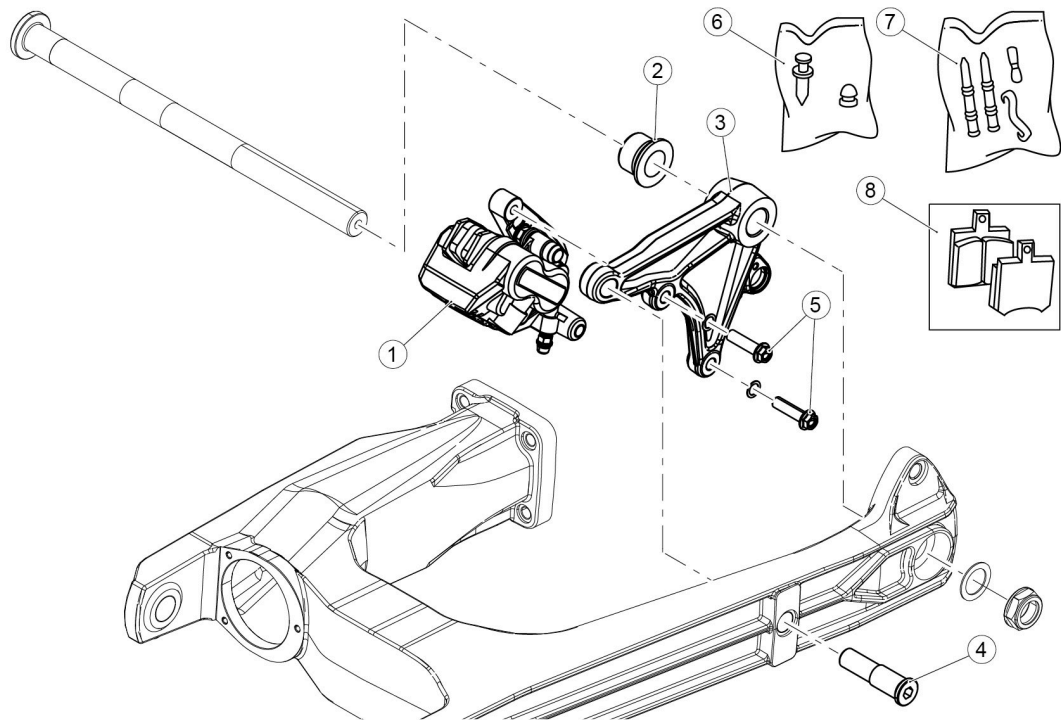


11.2 Rear brake calliper



REAR BRAKE CALLIPER

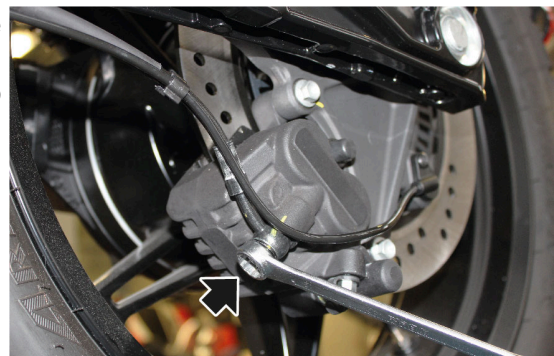
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear brake calliper fixing screw	M8	2	25 ± 3.75 Nm (18.44 ± 2.77 lb ft)	-
2	Screw fastening the calliper holder plate to the swingarm	M16x1	1	35 ± 5.3 Nm (25.81 ± 3.9 lb ft)	-

**Key:**

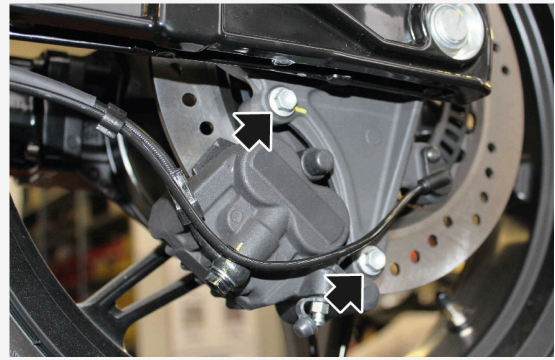
- 1 . Rear brake calliper
- 2 . Spacer
- 3 . Brake calliper mounting plate
- 4 . Screw fastening the plate to the swingarm
- 5 . Screws fastening the calliper to the plate
- 6 . Bleed + cap
- 7 . Pins + spring kit
- 8 . Brake pads copy

11.2.1 Removal

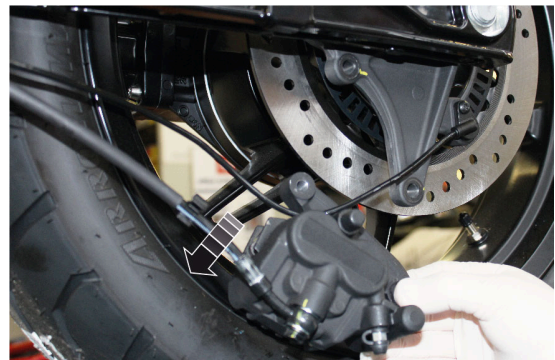
- Obtain a special container and empty the system
- Remove the screw fixing the brake pipe to the clamp



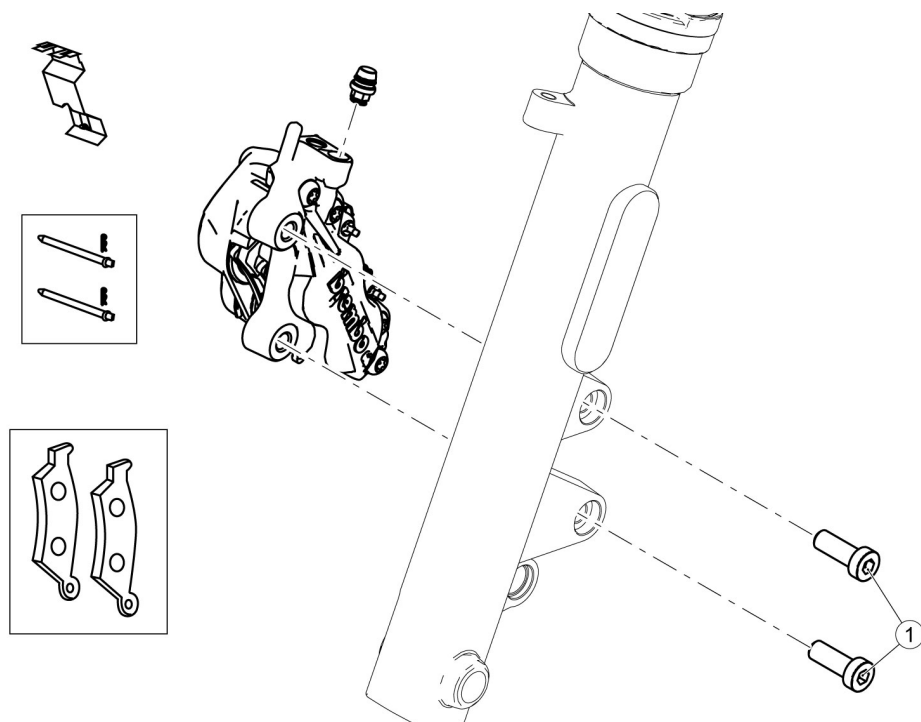
- Remove the two calliper fixing screws



- Remove the brake calliper

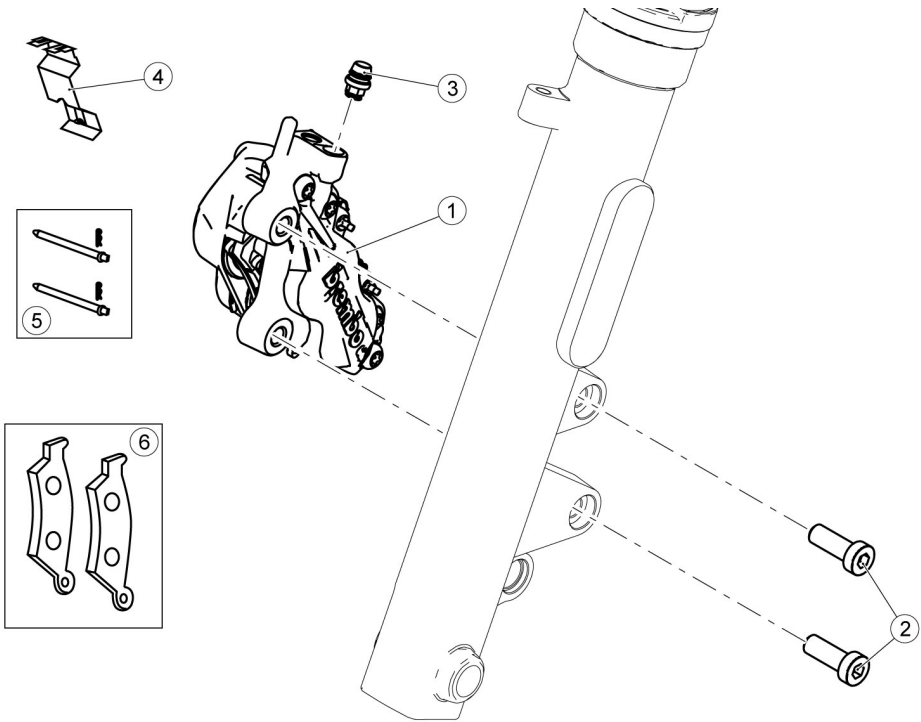


11.3 Front brake calliper



FRONT BRAKE CALLIPER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening front brake calliper	M10	2	50 Nm (36.88 lbf ft)	-



Key:

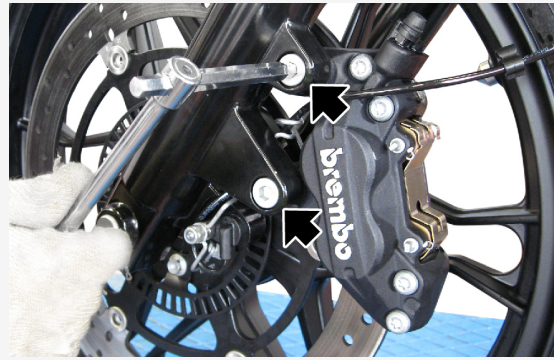
- 1 . Front left brake calliper
- 2 . Screw
- 3 . Bleed + cap
- 4 . Spring
- 5 . Pins + calliper springs
- 6 . Pair of pads

11.3.1 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



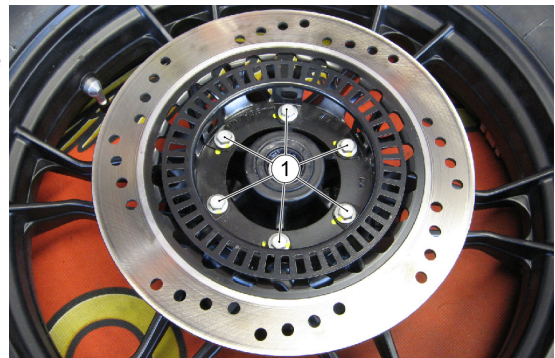
- Remove the brake calliper



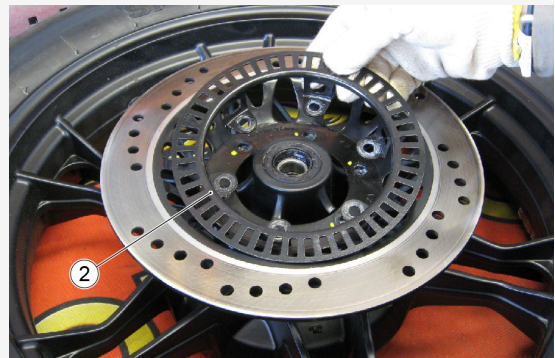
11.4 Rear brake disc

11.4.1 Removal

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



- Remove the phonic wheel (2)



- Remove the brake disc (3)

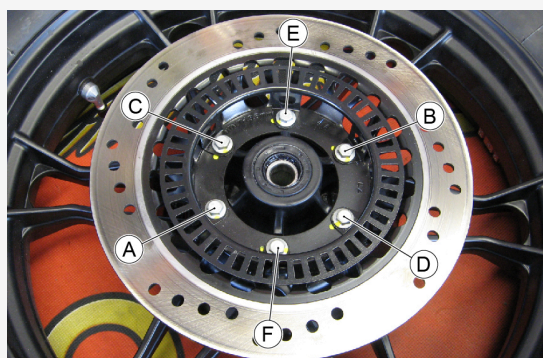


WARNING



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

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



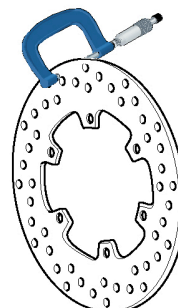
11.4.2 Disc check

N.B.:



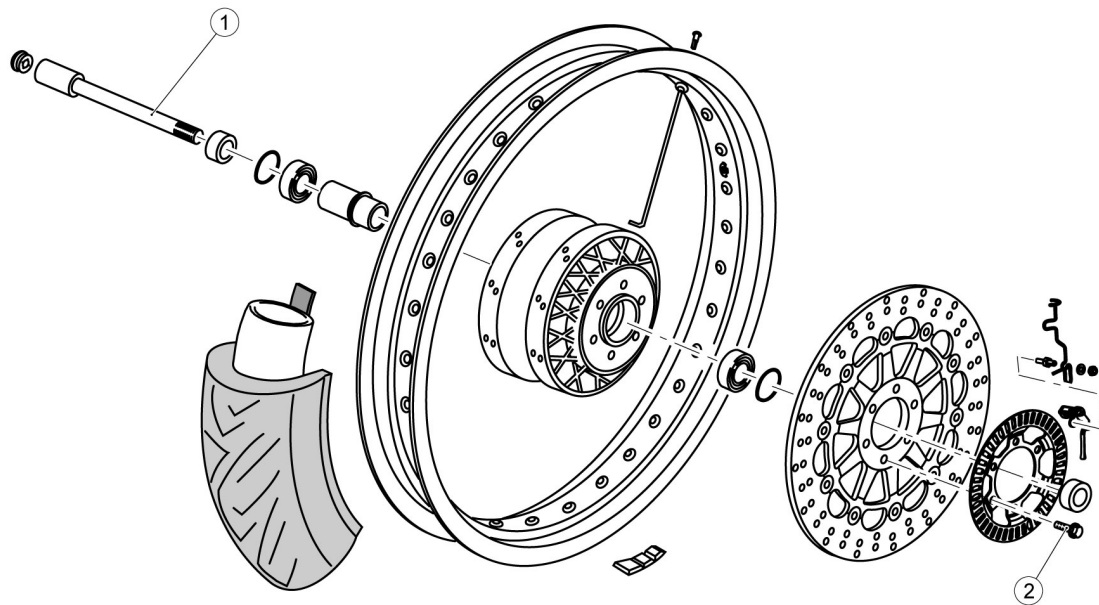
THE BRAKE DISC SHAPE DOES NOT CHANGE THE OPERATING AND MAINTENANCE SPECIFICATIONS OF THE SYSTEM.

- 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.

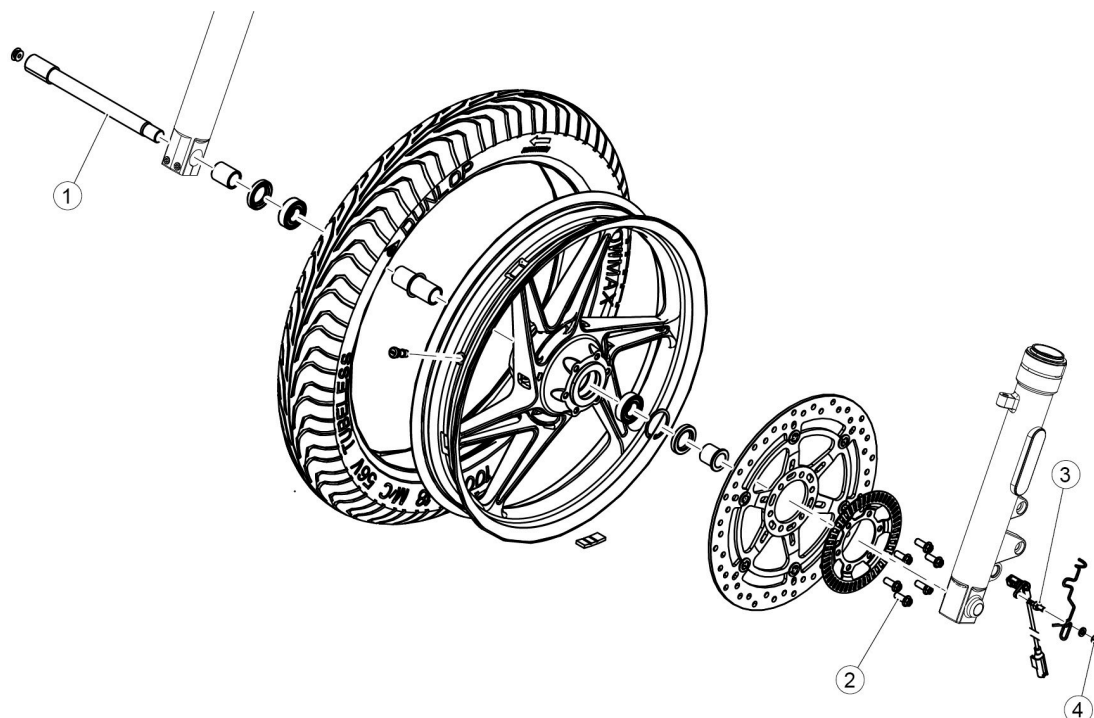


CHARACTERISTIC	DESCRIPTION / VALUE
Disc thickness minimum value:	4.5 mm (0.18 in)

11.5 Front brake disc (SPECIAL)



(STONE)



FRONT WHEEL

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Wheel axle	M18	1	80 Nm (59.00 lbf ft)	-
2	Front brake disc fixing screws	M8	6	25 Nm (18.44 lbf ft)	Loctite 243
3	ABS-sensor fixing stud bolt	M5	1	6 Nm (4.43 lbf ft)	Pre-permeated
4	Cable grommet nut	M6	1	6 Nm (4.43 lbf ft)	-

11.5.1 Removal

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



- Remove the phonic wheel (2)



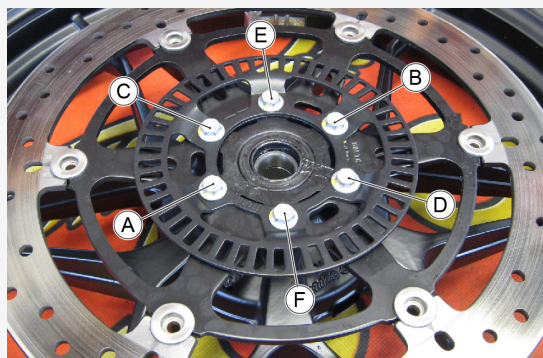
- Remove the brake disc (3)



WARNING

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

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



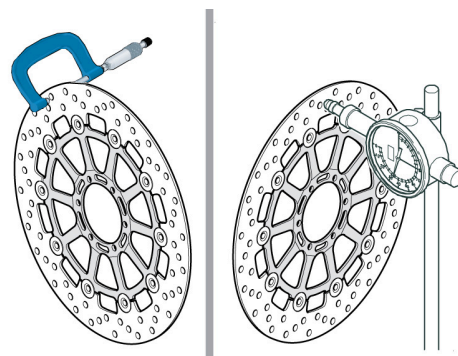
11.5.2 Disc check

N.B.:



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

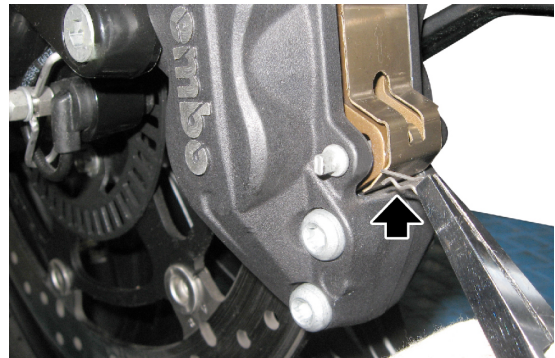


CHARACTERISTIC	DESCRIPTION / VALUE
Disc thickness minimum value:	4 mm (0.16 in)
Disc oscillation tolerance:	0.15 mm (0.0059 in)

11.6 Front brake pads

11.6.1 Removal

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



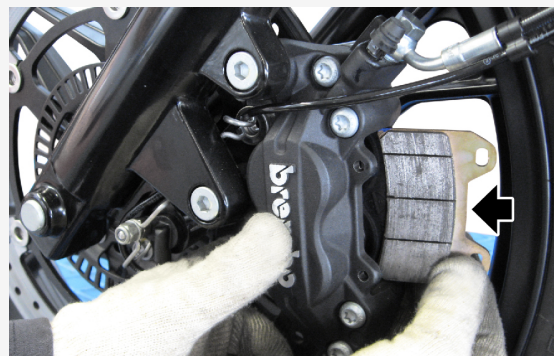
- Remove the brake pad retaining pins



- Collect the protection plate.



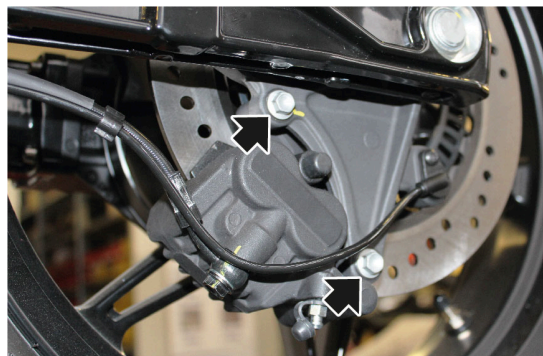
- Remove the brake pads



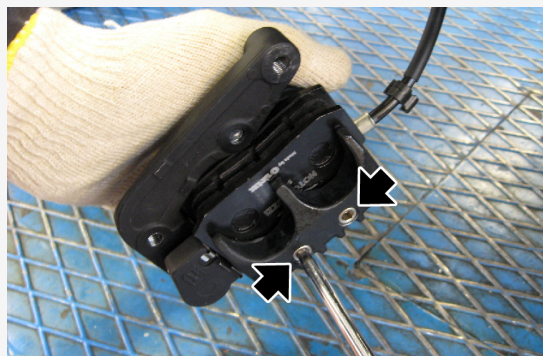
11.7 Rear pads

11.7.1 Removal

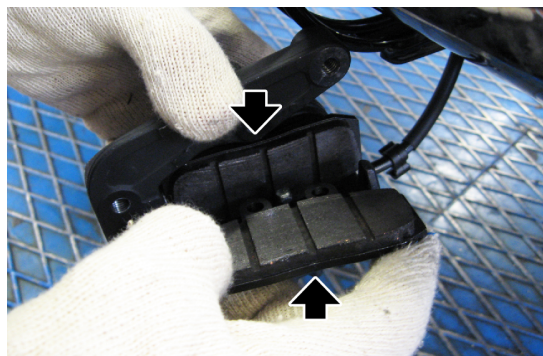
- Remove the rear brake calliper



- Remove the screws locking the brake pads



- Remove the brake pads



11.8 Brake system bleeding

11.8.1 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 THE BRAKE CALLIPERS TO RESTORE THE BREAKING SYSTEM TO ITS REGULAR USE CONDITIONS, SO THAT THE HYDRAULIC CIRCUIT IS AIR PURGED.

NOTE



THE FOLLOWING OPERATIONS REFER TO ONE FRONT BRAKE CALLIPER ONLY, BUT ARE VALID FOR BOTH.

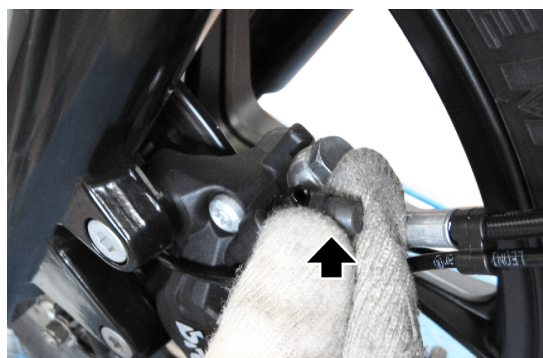
THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE TANK WITH THE NECESSARY QUANTITY OF BRAKE FLUID.

CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE TANK.

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.

11.8.2 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 THE BRAKE CALLIPERS TO RESTORE THE BREAKING SYSTEM TO ITS REGULAR USE CONDITIONS, SO THAT THE HYDRAULIC CIRCUIT IS AIR PURGED.

NOTE

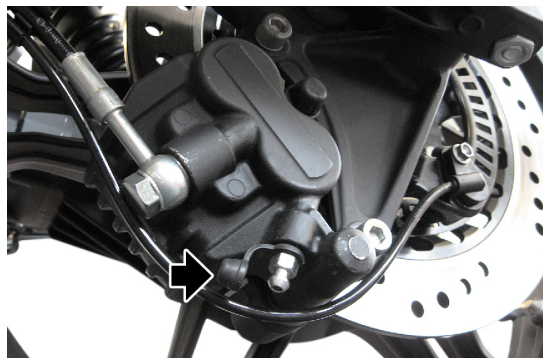


THE FOLLOWING OPERATIONS REFER TO ONE FRONT BRAKE CALLIPER ONLY, BUT ARE VALID FOR BOTH.

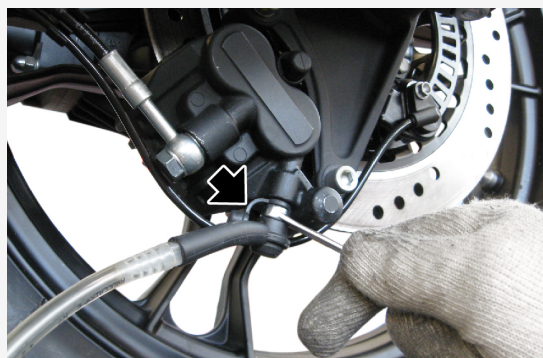
THE VEHICLE MUST BE ON LEVEL GROUND TO BE BLED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE TANK WITH THE NECESSARY QUANTITY OF BRAKE FLUID.

CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE TANK.

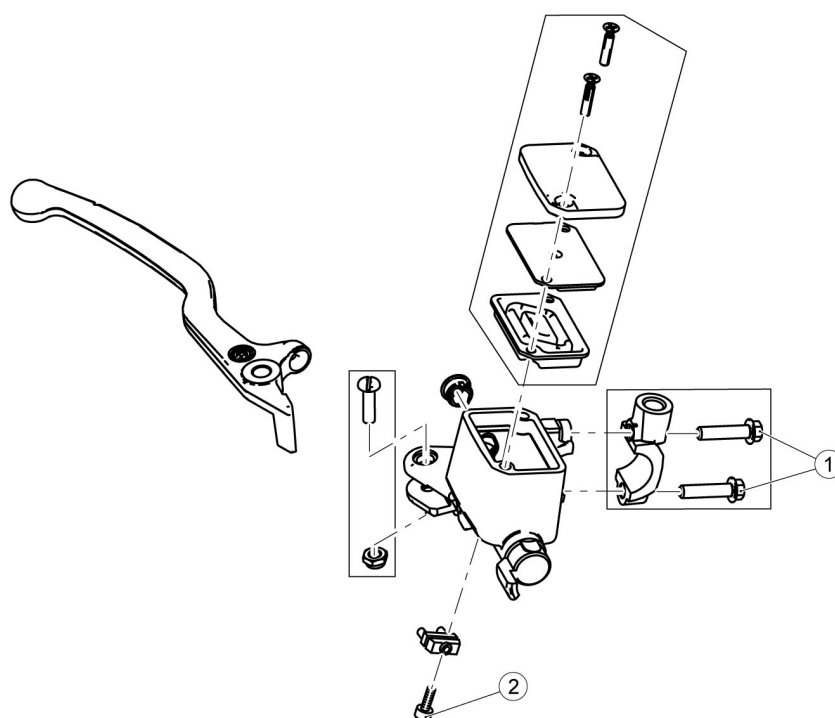
- Remove the rubber protection cover from the bleed valve.



- 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.



11.9 Front brake master cylinder

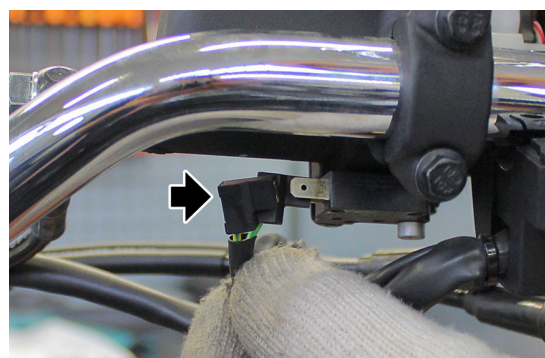


FRONT BRAKE MASTER CYLINDER

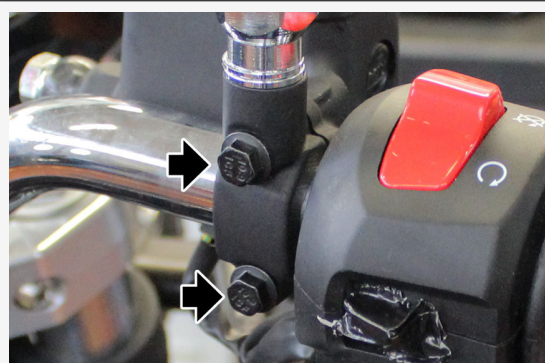
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Front brake master cylinder U-bolt fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening screws	M4	1	3 Nm (2.21 lbf ft)	-

11.9.1 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

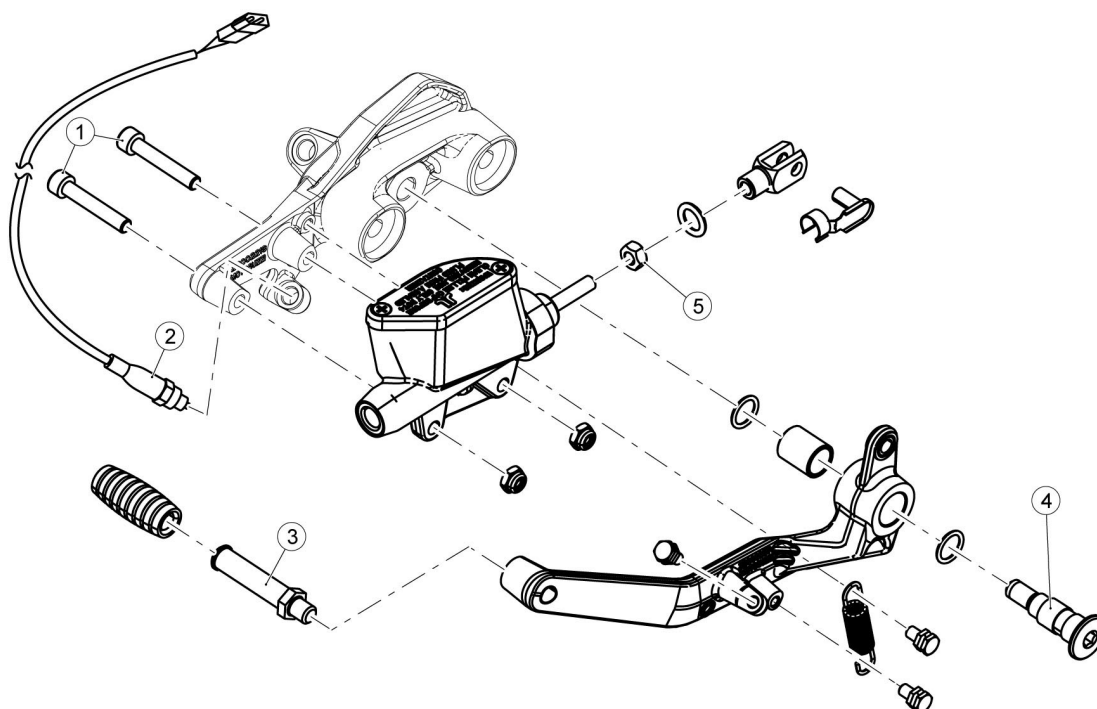
CAUTION



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



11.10 Rear brake master cylinder



REAR BRAKE MASTER CYLINDER

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Brake master cylinder reservoir fixing screws	M6	2	10 Nm (7.38 lbf ft)	-
2	Brake light switch fastening	-	1	5 Nm (3.69 lbf ft)	Loctite 243
3	Rear brake lever peg fastening	-	1	20 Nm (14.75 lbf ft)	Loctite 243
4	Rear brake lever fixing pin	-	1	20 Nm (14.75 lbf ft)	-
5	Fork fixing nut	M6	1	10 Nm (7.38 lbf ft)	-

11.10.1 Removal (SPECIAL/STONE)

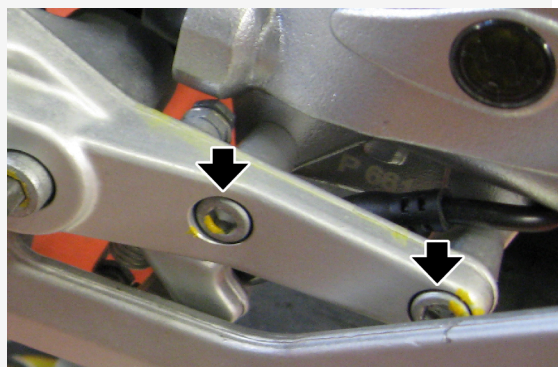
- Use an appropriate container to recover the oil inside the brake system.
- Remove the brake pipe by acting on the fitting and empty the system

WARNING

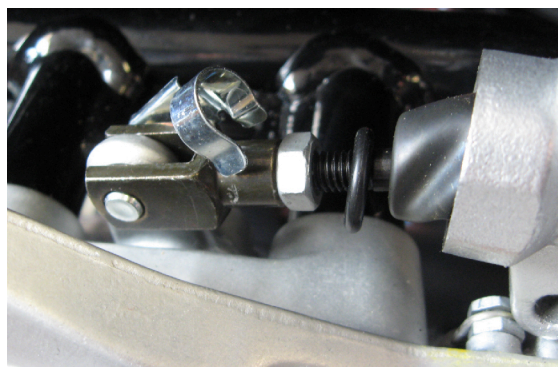
DURING REFITTING, USE NEW SEALING WASHERS.



- 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

CAUTION

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



11.11 Braking system pipes

11.11.1 Removal

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

N.B.:

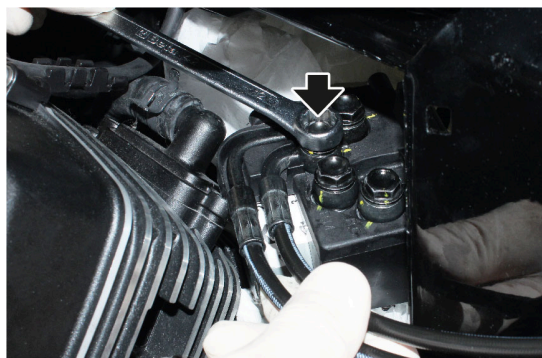


WHILE IT IS NOT MANDATORY TO REMOVE THE SILENCERS, WE RECOMMEND DOING SO IN ORDER TO AVOID CAUSING ANY SUPERFICIAL DAMAGE TO BOTH SILENCERS.

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

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

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



WARNING



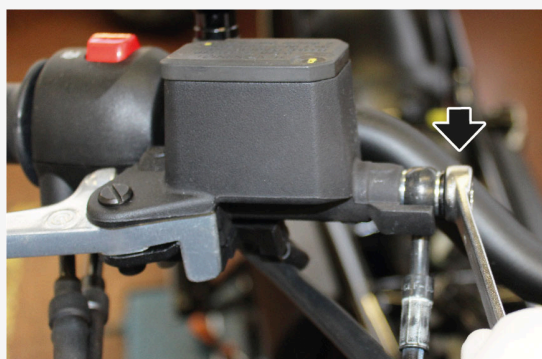
DURING REFITTING, USE NEW SEALING WASHERS.

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

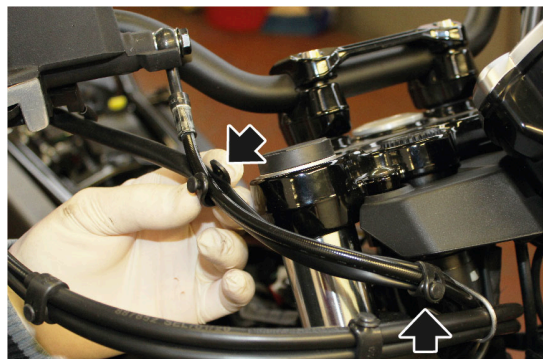
WARNING



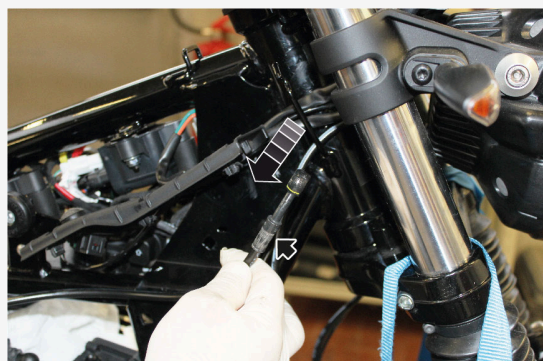
DURING REFITTING, USE NEW SEALING WASHERS.



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



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



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

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

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

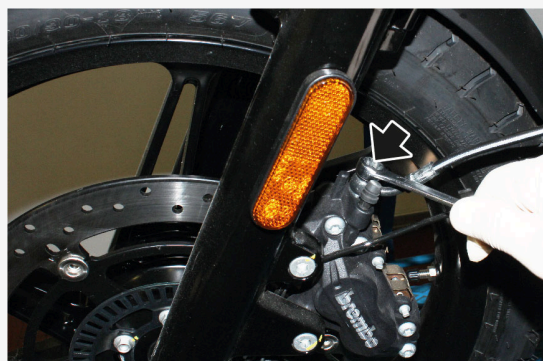
WARNING



DURING REFITTING, USE NEW SEALING WASHERS.



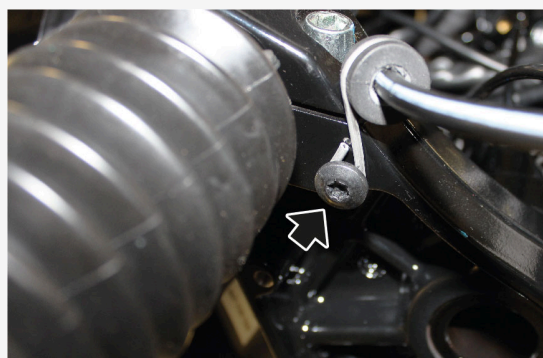
- Remove the brake pipe coupling from the front brake calliper
- Retrieve the screw and the associated seal washers



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



- Remove the screw fixing the pipe feedthrough to the lower plate of the forks



- Remove the vehicle's brake pipe

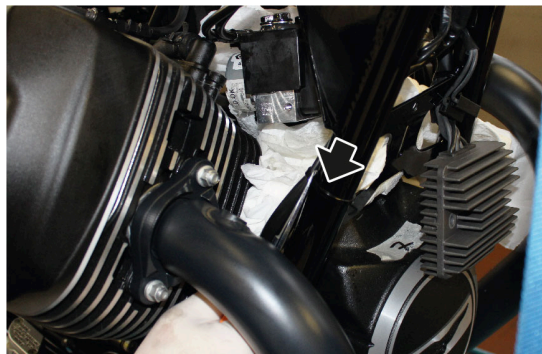


REMOVING THE REAR BRAKE PIPE (BETWEEN THE BRAKE FLUID TANK AND THE ABS CONTROL UNIT)

- Remove the right lambda probe

- Remove the ABS modulator support according to the indication in the **Modulator** section

- Remove the clamp fastening the brake pipes to the chassis



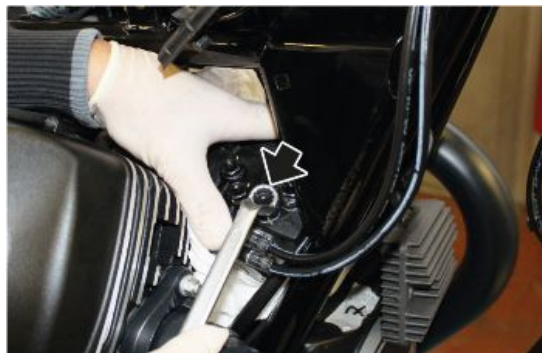
- Open the brae pipe fastener tab



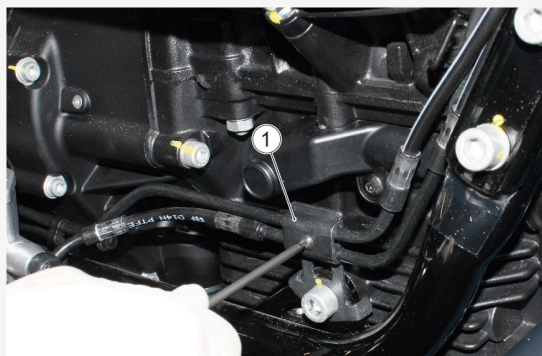
- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers

WARNING

DURING REFITTING, USE NEW SEALING WASHERS.



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



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

WARNING

DURING REFITTING, USE NEW SEALING WASHERS.



- Remove the vehicle's brake pipe

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

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



- Open the brae pipe fastener tab



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



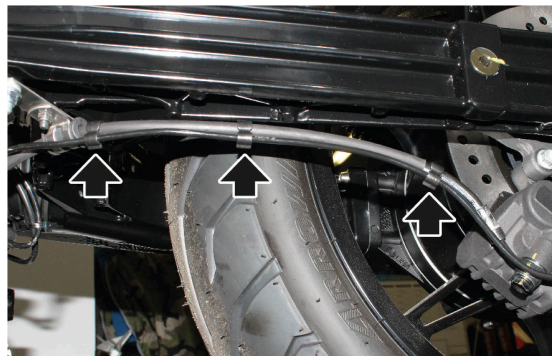
- Remove the brake pipe connector from the ABS modulator
- Retrieve the screw and the associated seal washers

WARNING

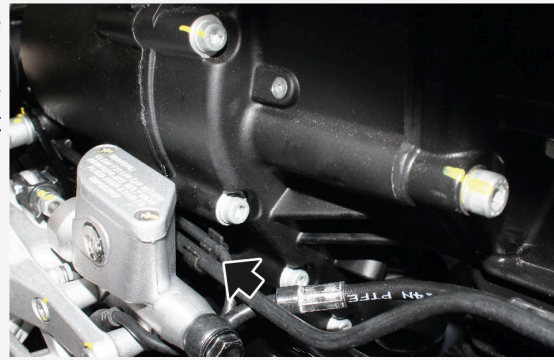
DURING REFITTING, USE NEW SEALING WASHERS.



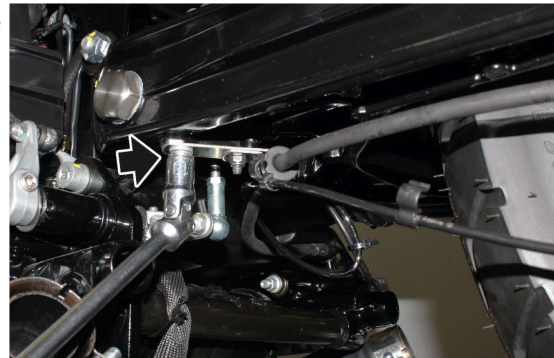
- Remove the cable ties fastening the ABS sensor cable to the rear brake pipe



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



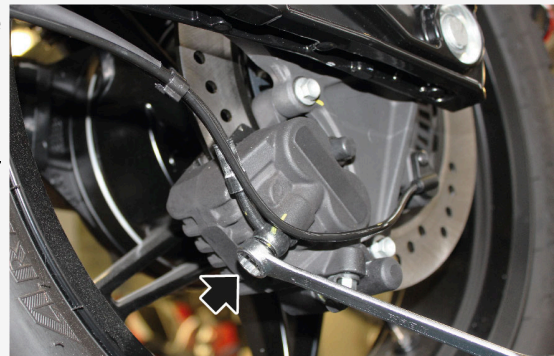
- Remove the screw fixing the pipe feedthrough to the swingarm



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

WARNING

DURING REFITTING, USE NEW SEALING WASHERS.

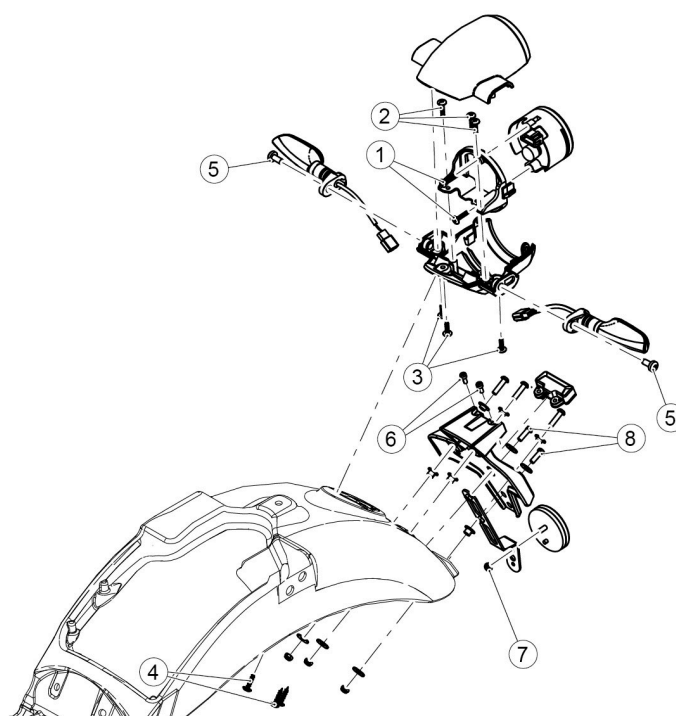


- Remove the vehicle's brake pipe



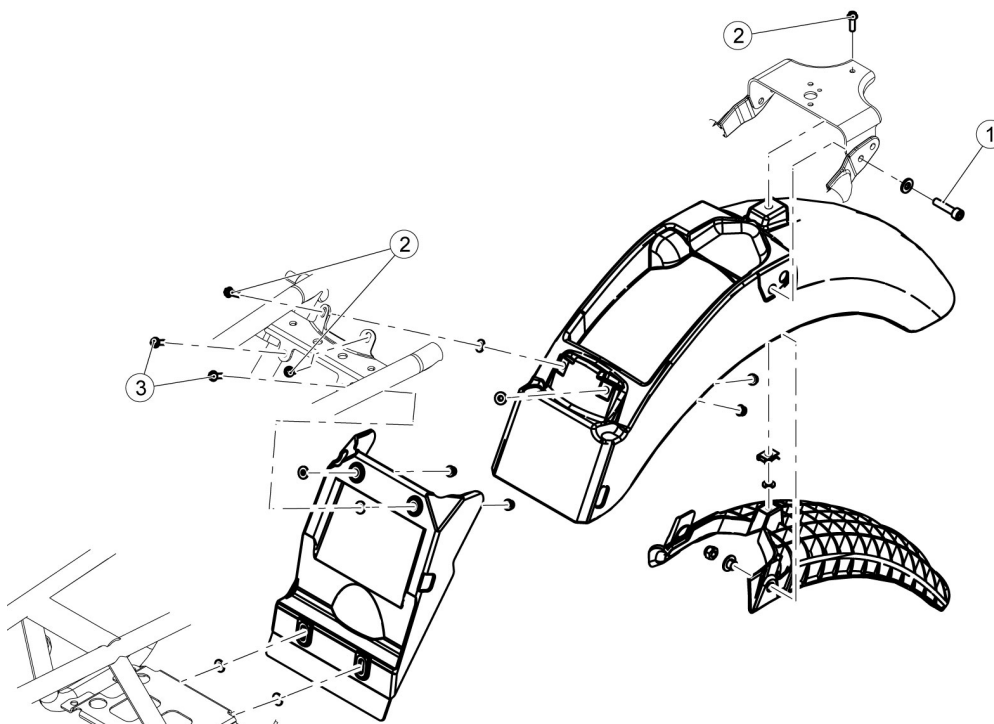
LIST OF TOPICS

Bodywork

**REAR LIGHT ASSEMBLY**

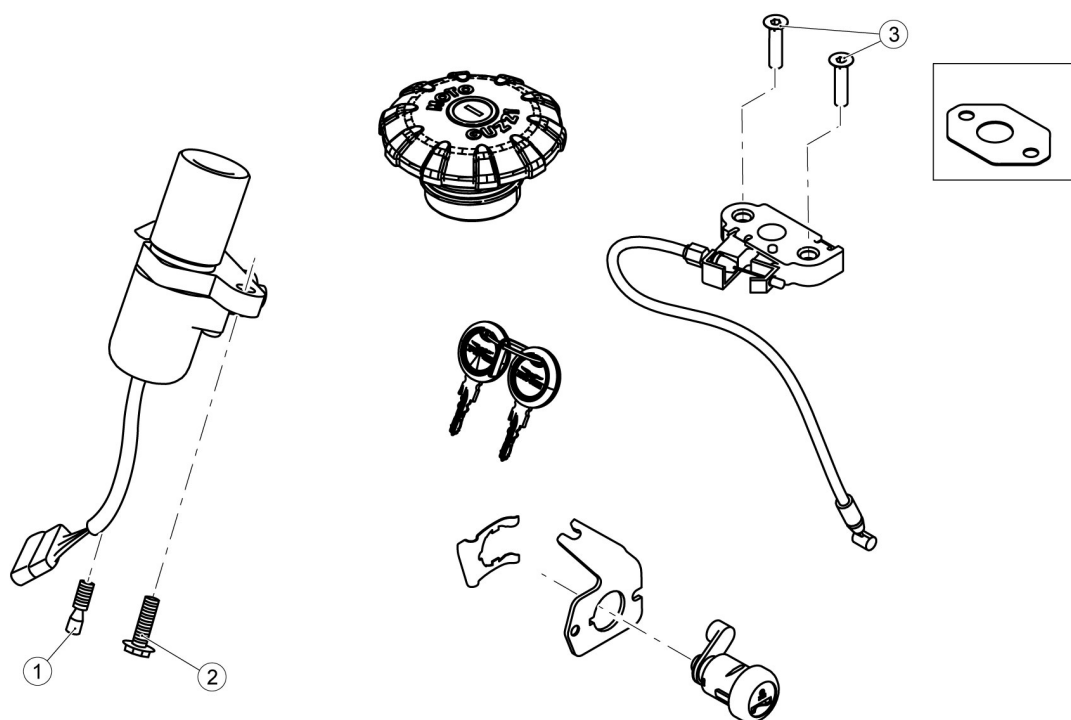
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Tail-light to internal support fixing screws	SWP 3	2	2 Nm (1.48 lbf ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lbf ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lbf ft)	-
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lbf ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lbf ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lbf ft)	-

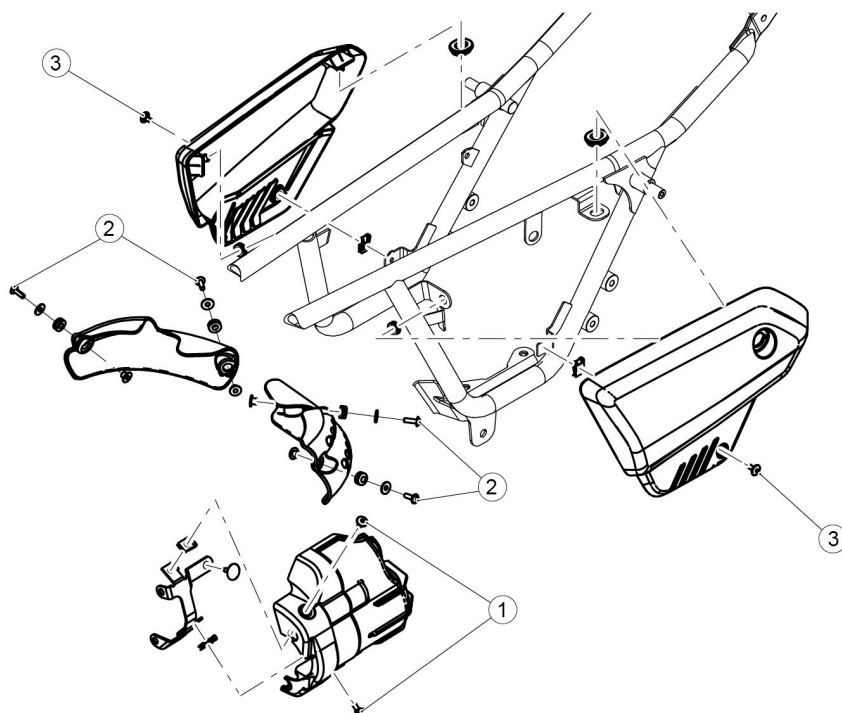


REAR MUDGUARD

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	-
2	Front and centre fastening screw rear mudguard	M6	3	8 Nm (5.9 lbf ft)	-
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

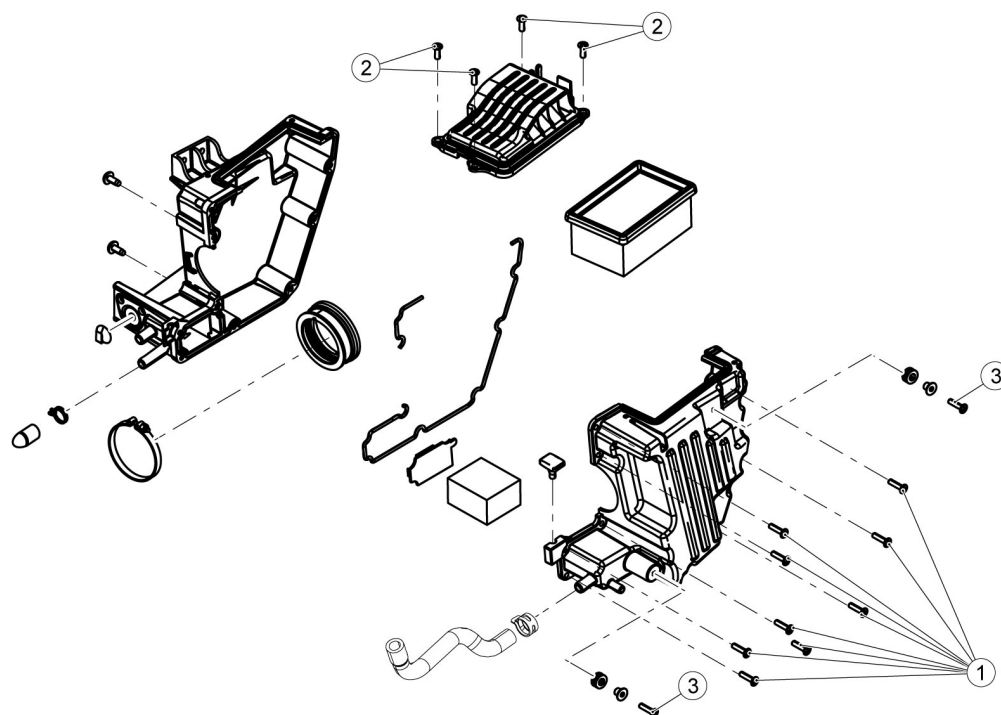
**LOCK KIT**

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	(Shear head) screw fixing ignition lock	M8	1	At the point of failure	Loctite 243
2	Ignition lock fixing screw	M8	1	25 Nm (18.44 lbf ft)	Pre-permeated
3	Saddle release block fixing screws	M6	2	10 Nm (7.38 lbf ft)	-



CENTRAL BODYWORK

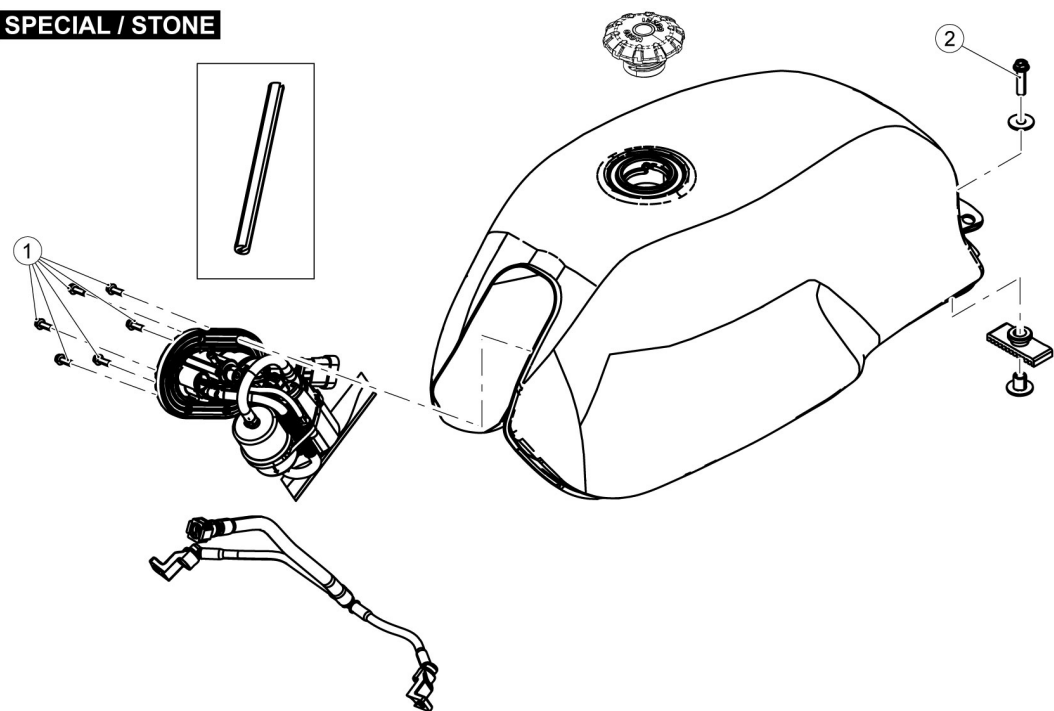
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lbf ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lbf ft)	-



FILTER HOUSING

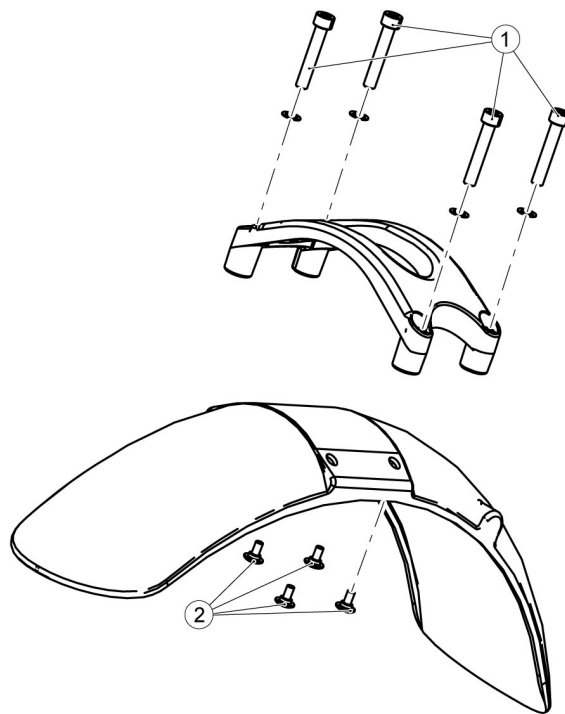
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-
3	Filter casing/ frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

SPECIAL / STONE



FUEL TANK

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lbf ft)	Pre-permeated
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-

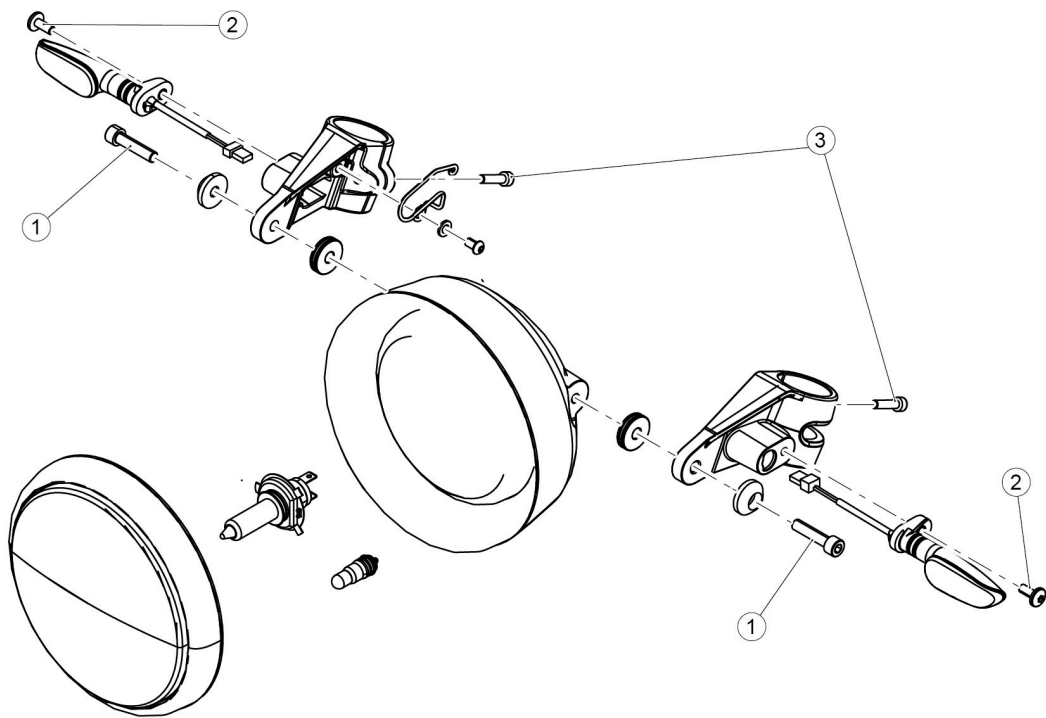


FRONT MUDGUARD

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lbf ft)	-
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lbf ft)	-

12.1 Front light cluster

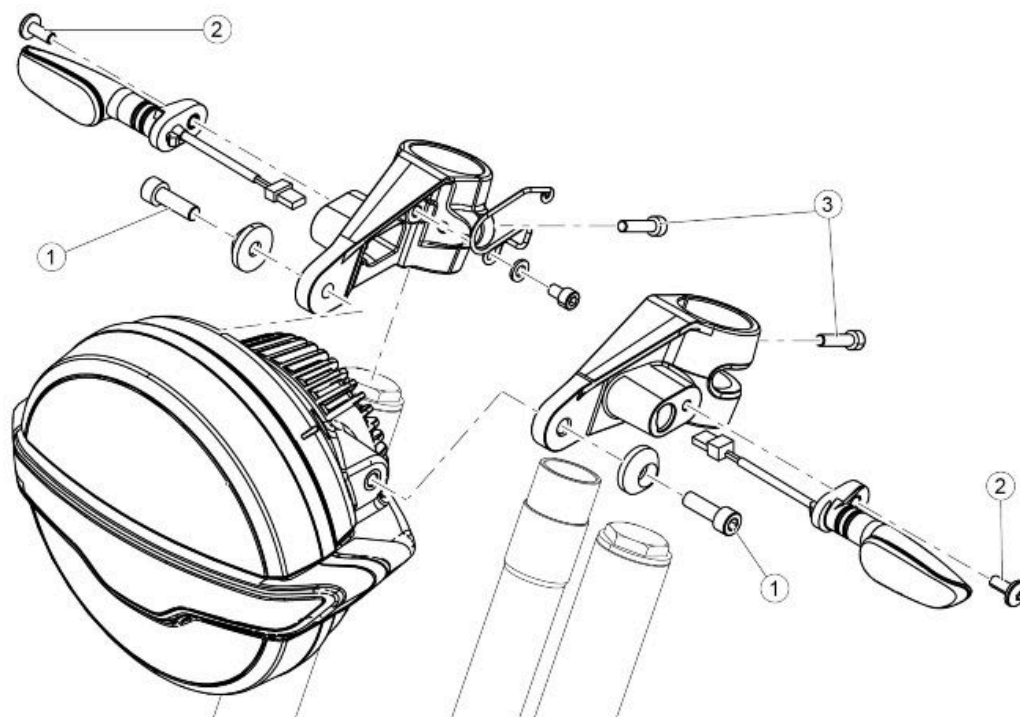
(SPECIAL)



FRONT LIGHTS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lbf ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

(STONE)

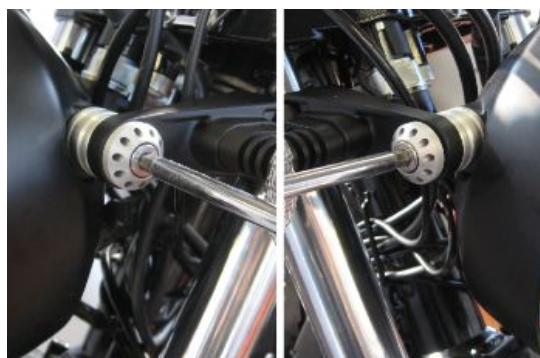


FRONT LIGHTS

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Headlamp fastening screws	M8	2	15 Nm (11.10 lbf ft)	-
2	Front turn indicators fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
3	Screws fastening the headlight support strips	M6	2	10 Nm (7.38 lbf ft)	-

(HALOGEN VERSION)

- Remove the two screws fixing the headlamp to the supports



- Move the headlamp from the supports and remove the spacers

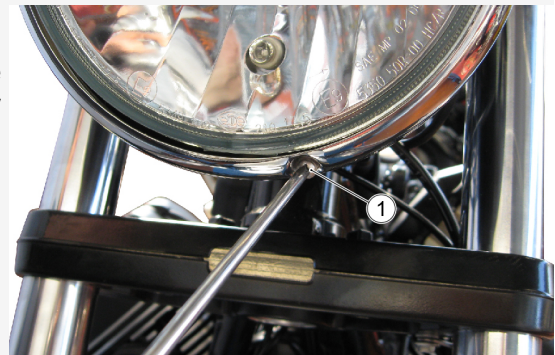


- Disconnect the connector from the headlamp and remove it



BULB REPLACEMENT

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

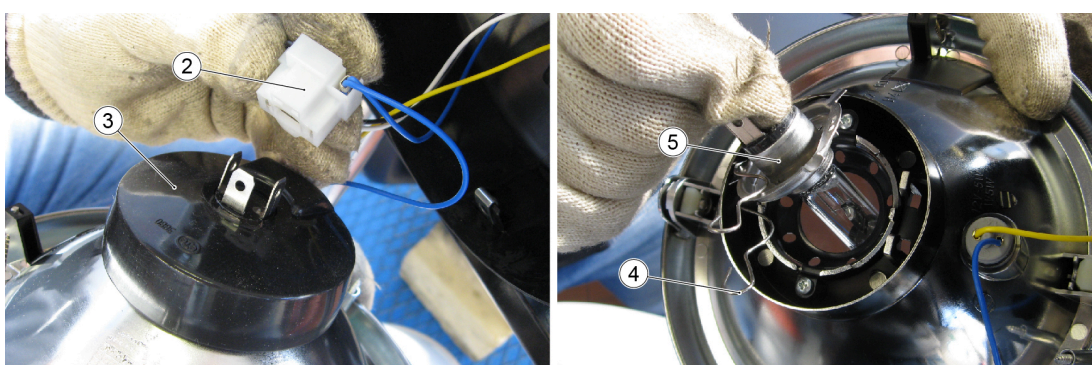


LOW BEAM / HIGH BEAM LIGHT BULB

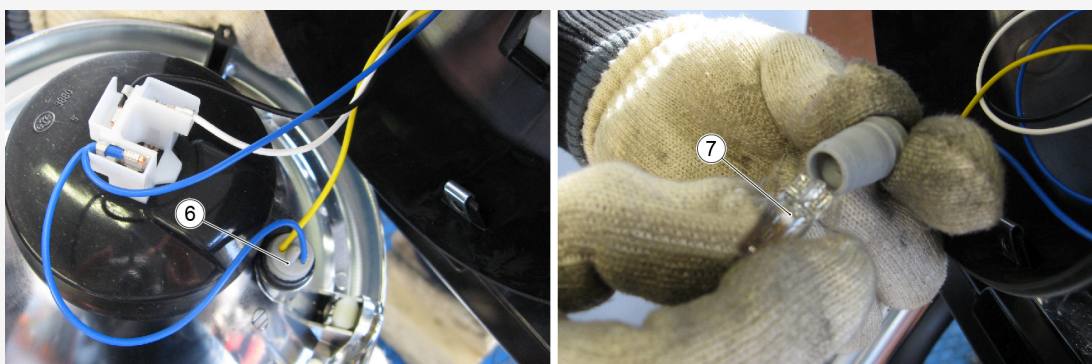
- Pull out the electrical connection to the bulb (2), and disconnect it from the bulb.
- Move hood (3) manually.
- Release the two ends of the retaining spring (4) located on the bulb holder.
- Pull the bulb (5) out of its fitting.

N.B.:

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

**DAYLIGHT RUNNING LIGHT BULB**

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

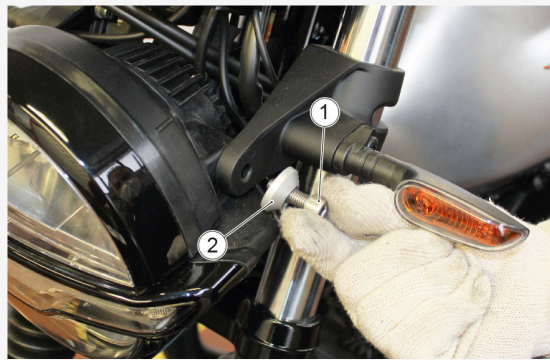


(LED VERSION)

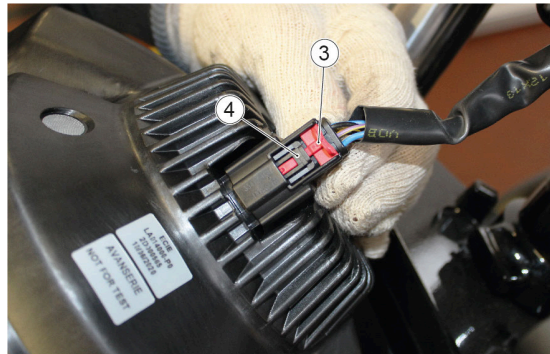
- Unscrew the two headlamps fixing screws



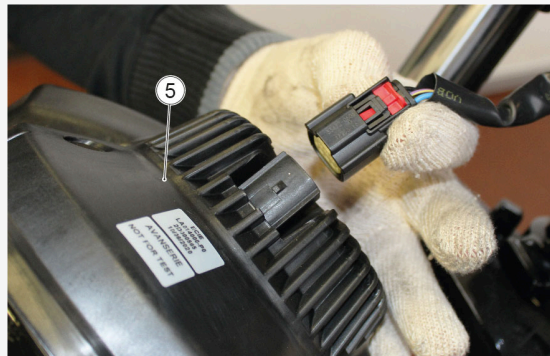
- Support the headlamp and then remove the screws (1) and the bushings (2)



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

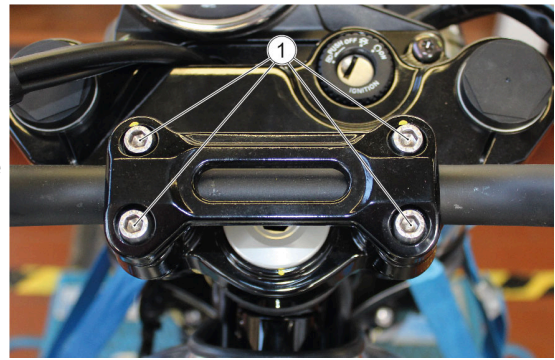


- Remove the headlamp (5) from the vehicle

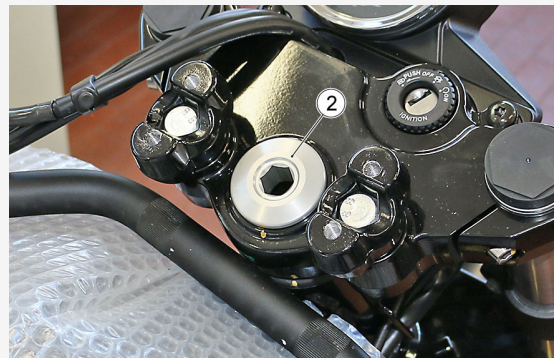


FRONT HEADLIGHT SUPPORT REMOVAL

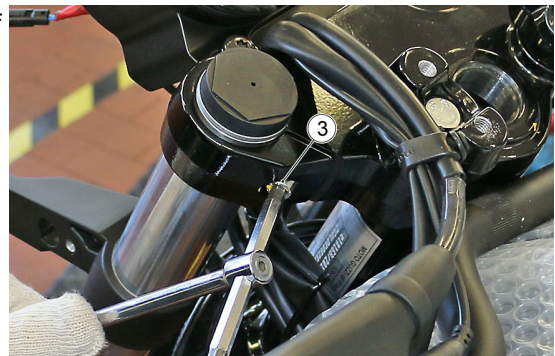
- Remove the front light assembly
- Remove the front turn indicators
- Unscrew and remove the screws (1)
- Remove the upper U-bolt
- Temporarily remove the handlebar from the lower U-bolts



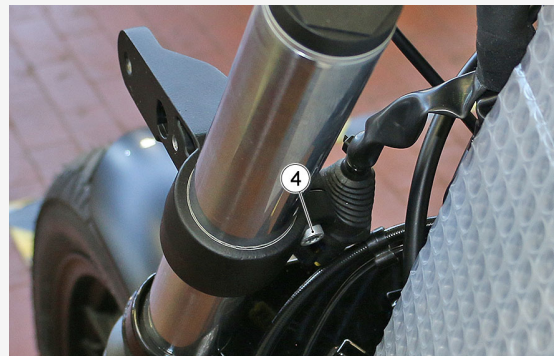
- Unscrew and remove the ring nut (2)



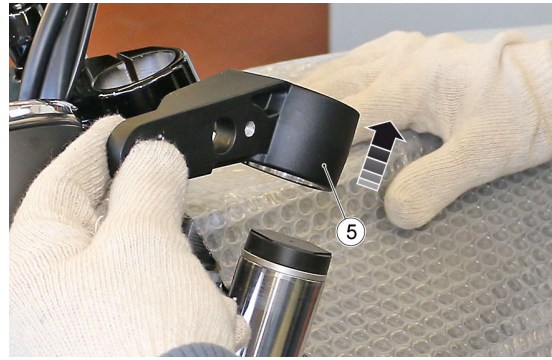
- Loosen the screws (3) from both sides of the vehicle
- Remove the upper steering plate



- Undo and remove the screw (4)



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



12.2 Turn indicators

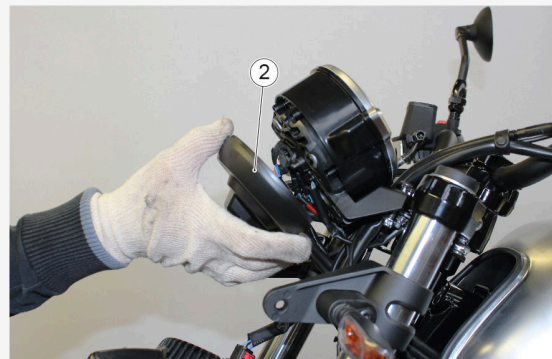
REMOVING FRONT TURN INDICATORS

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

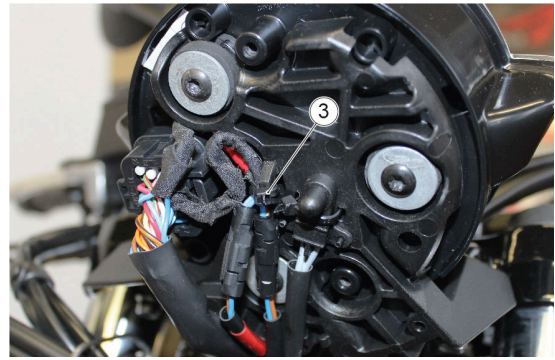
- Remove the front light cluster
- Unscrew and remove the two screws (1)



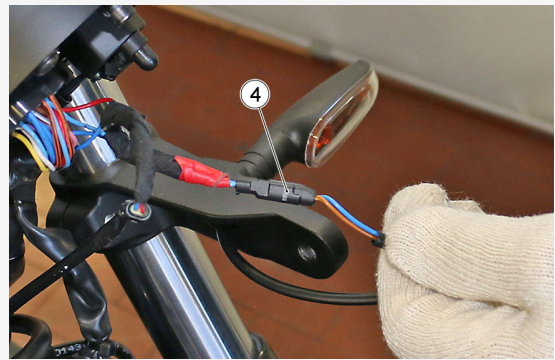
- Remove the cover (2)



- Remove the clamp (3)



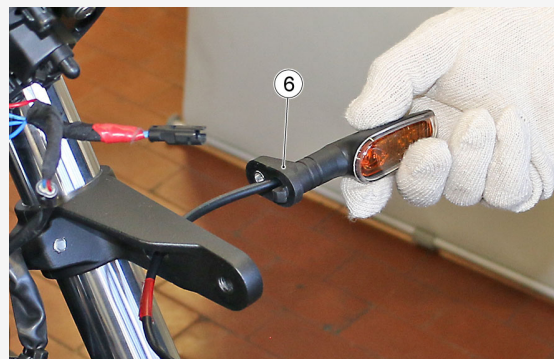
- Disconnect the connector (4)



- Undo and remove the screw (5)



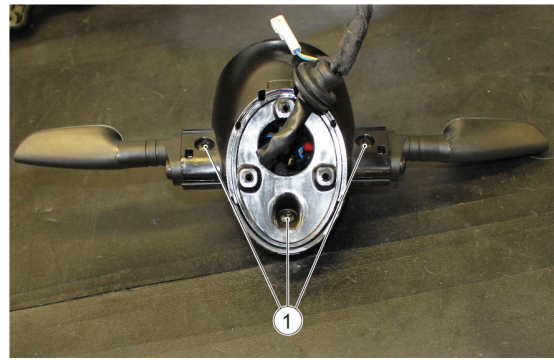
- Remove the front turn indicator (6)



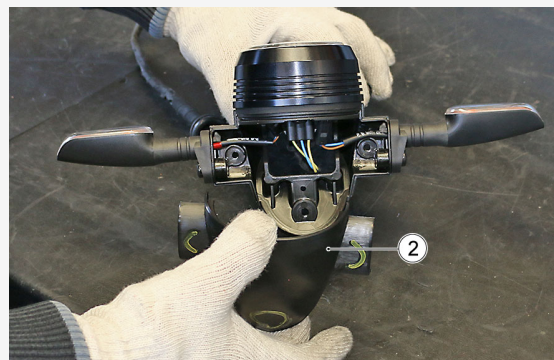
REAR TURN INDICATORS REMOVAL

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

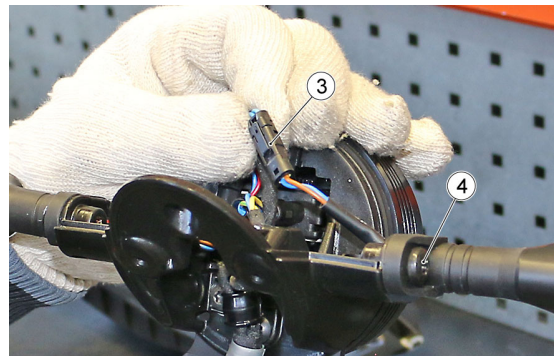
- Remove the rear light cluster
- Unscrew and remove the three fastening screws (1) from the cover



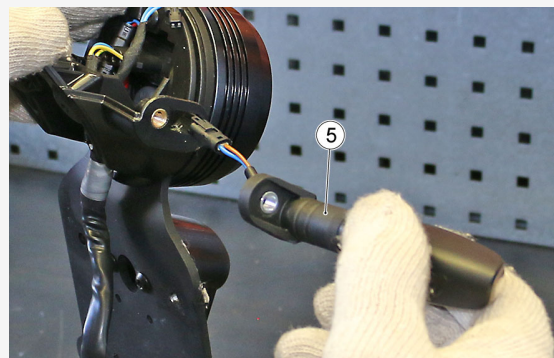
- Remove the cover (2)



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

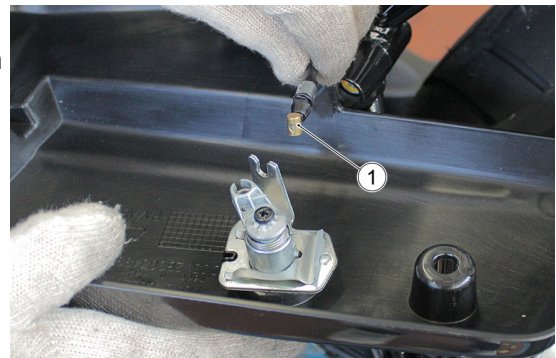


- Remove the turn indicator (5)

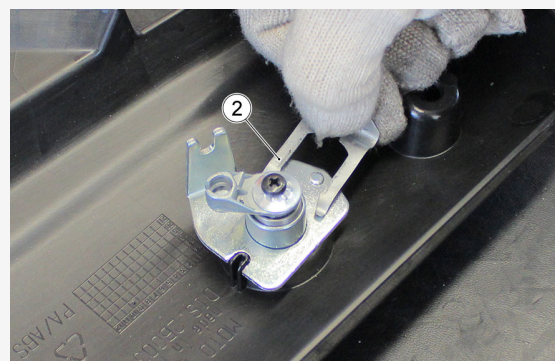


12.3 lock removal

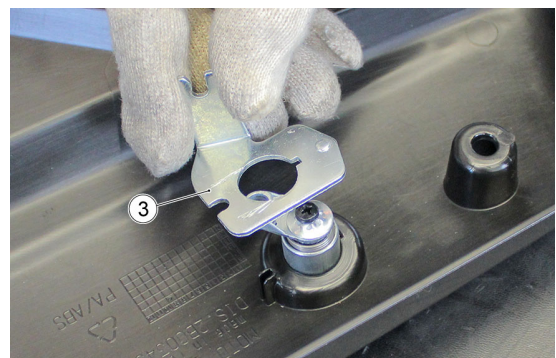
- Remove the LH side fairing
- Remove the saddle opening cable (1) from its housing



- Remove the fork spring (2)



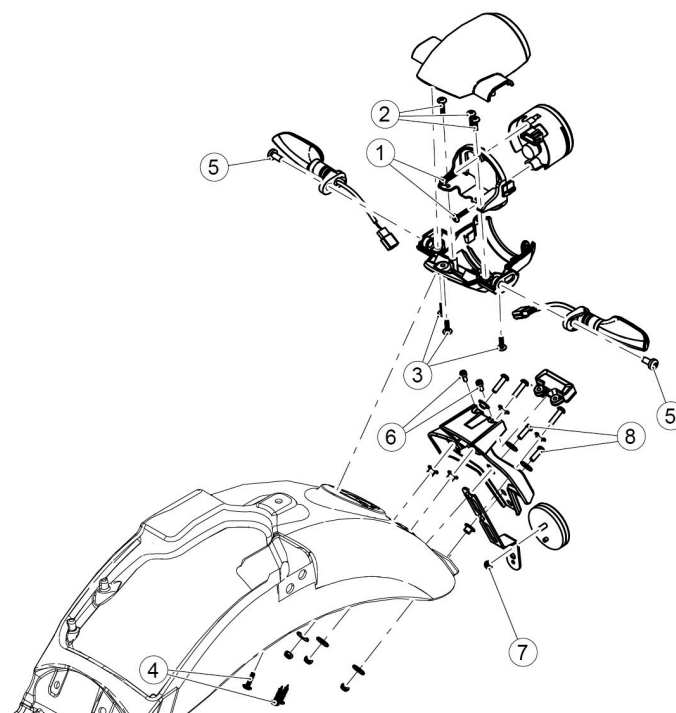
- Remove the cable support plate (3)



- Remove the ignition switch assembly (4)



12.4 Rear light assembly



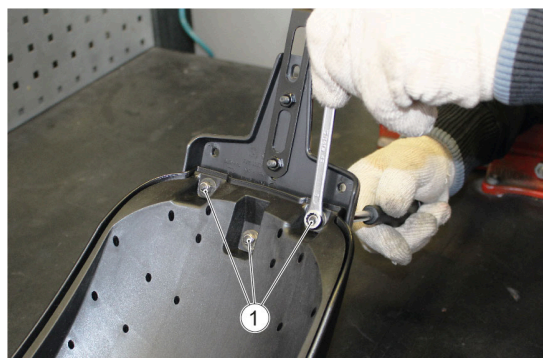
REAR LIGHT ASSEMBLY

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Tail-light to internal support fixing screws	SWP 3	2	2 Nm (1.48 lbf ft)	-
2	Screws fastening the internal support to the lower cover	SWP 3	3	2 Nm (1.48 lbf ft)	-
3	Upper cover fixing screws	SWP 3	3	2 Nm (1.48 lbf ft)	-
4	Screws fastening the taillight to the mudguard	SWP 3	3	5 Nm (3.69 lbf ft)	-
5	Direction indicator fastening screws	M6	2	5 Nm (3.69 lbf ft)	-
6	Licence plate light fastening screws	M4	2	3 Nm (2.21 lbf ft)	-

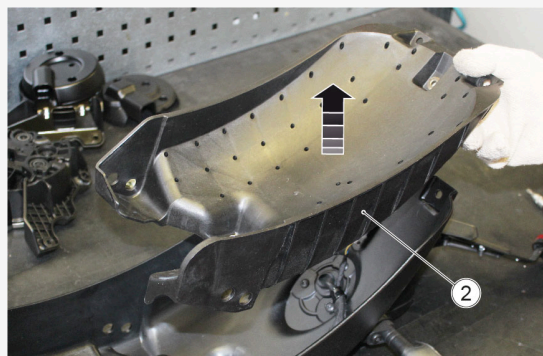
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
7	Screw fixing the reflector to the support	M5	1	4 Nm (2.95 lbf ft)	-
8	Screws fastening reflector support to the plate holder	M5	2	4 Nm (2.95 lbf ft)	-

LICENCE PLATE LIGHT REMOVAL

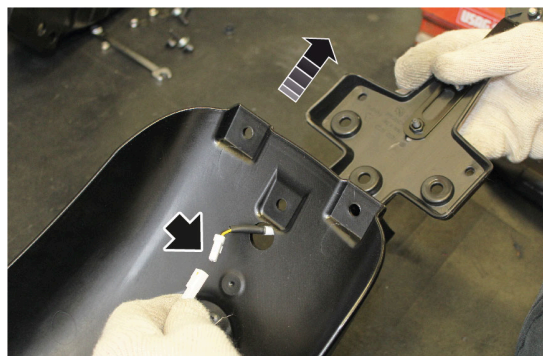
- Remove the rear mudguard from the vehicle
- Remove the screws (1) that fasten the licence plate holder to the rear mudguard and retrieve the centring bushings



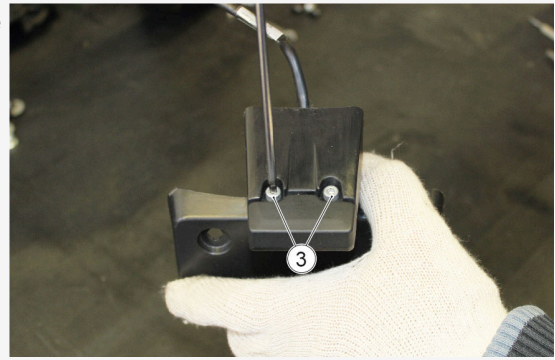
- Remove the lower reinforcement (2) from the mudguard



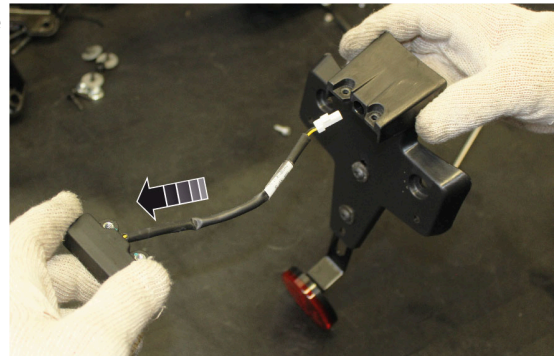
- Disconnect the licence plate light wiring harness connector
- Remove the plate holder from the rear mudguard



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



- Remove the licence plate light from the plate holder

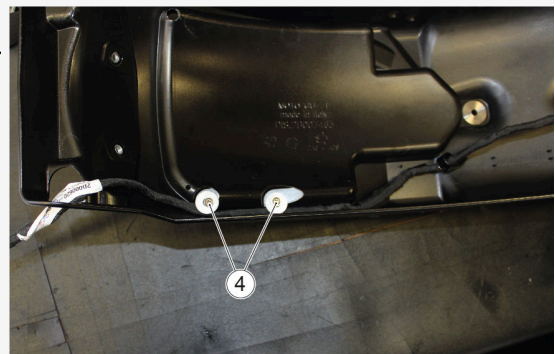


TAIL-LIGHT REMOVAL

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



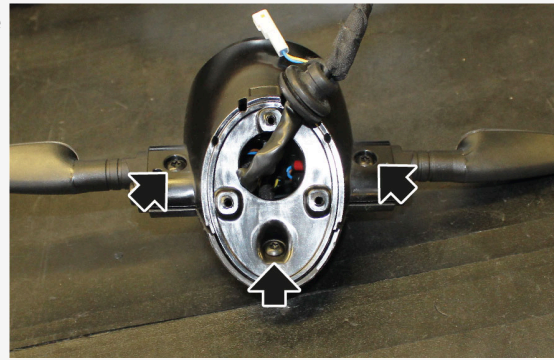
- Loosen the screws (4) that fasten the wiring harness to be able to displace the rear mudguard



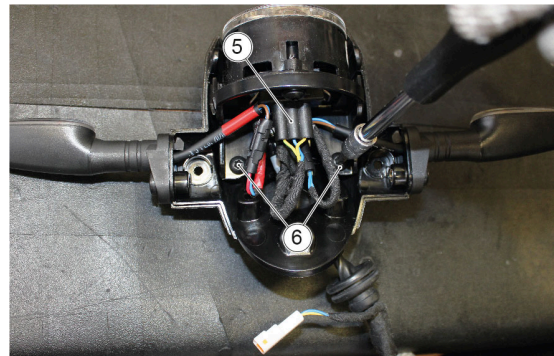
- Remove the taillight from the mudguard



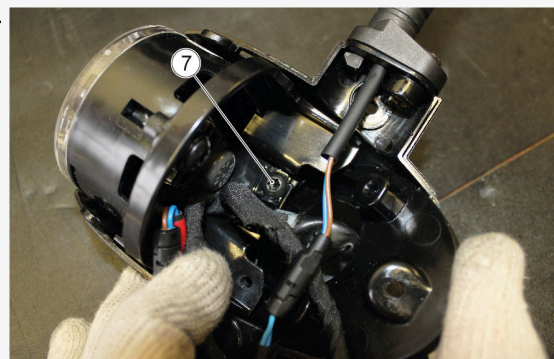
- Remove the three fixing screws of the taillight half cases
- Remove the upper half case of the taillight



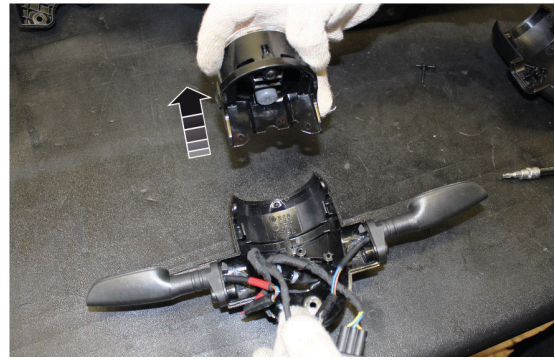
- Disconnect the taillight connector (5)
- Remove the fixing screws (6);



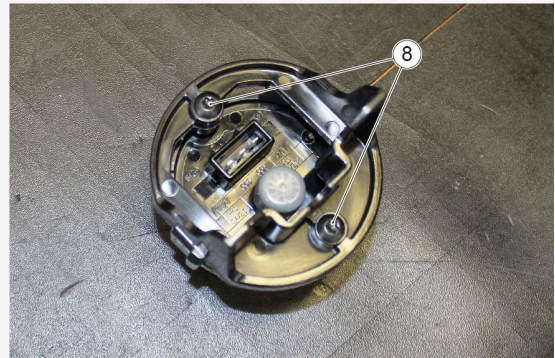
- Remove the fixing screw (7) that was under the taillight connector



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



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

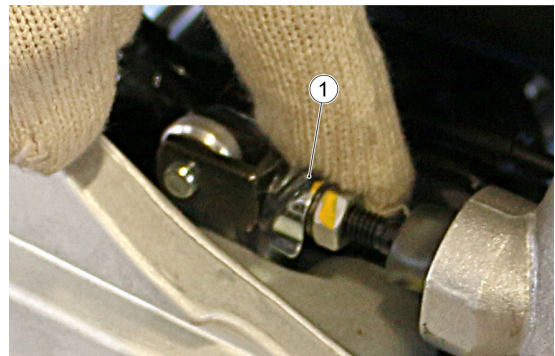


12.5 footrests

(SPECIAL/STONE)

REMOVAL OF THE RIGHT-HAND RIDER FOOTREST SUPPORT

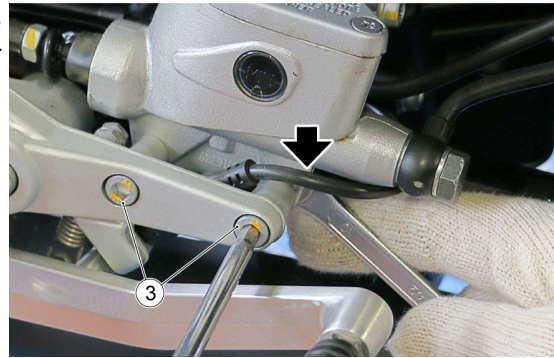
- Remove the gasket (1)



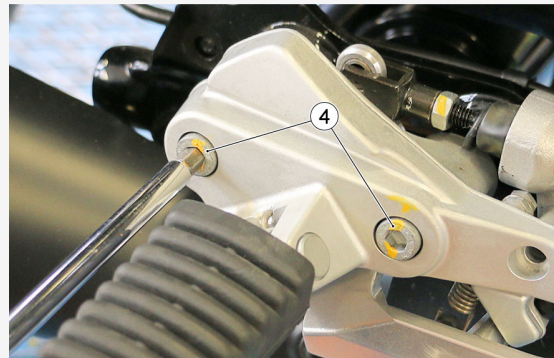
- Unhook and remove the clip (2)



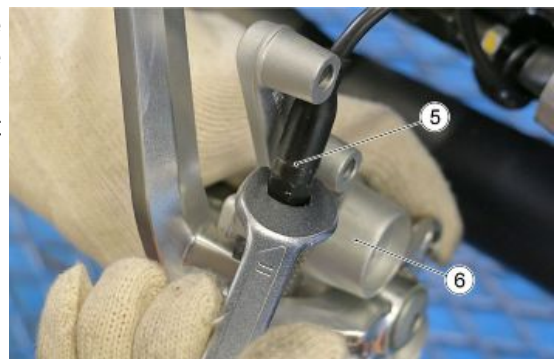
- Holding the nut in place as illustrated in the figure, unscrew and remove the two rear brake master cylinder fastening screws (3)



- Undo and remove the two fastening screws (4)



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

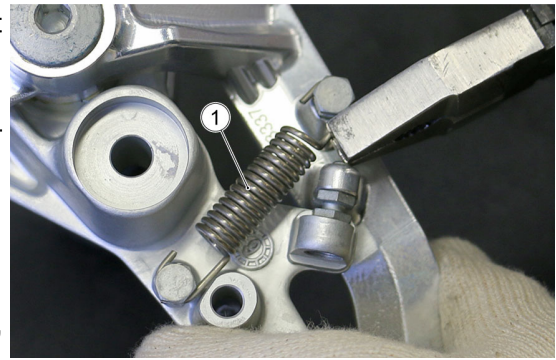


REMOVAL OF THE REAR BRAKE LEVER

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

WARNING

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)

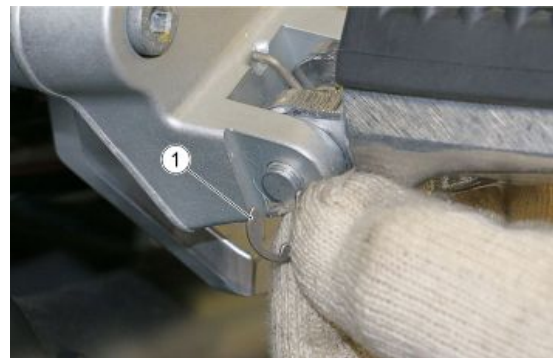


- Collect the O-Ring (5)



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)

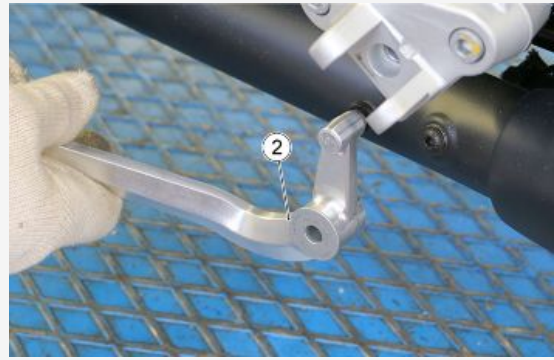


REMOVAL OF THE GEAR SHIFT LEVER

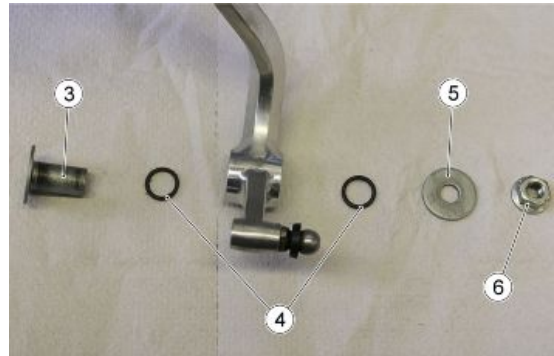
- Remove the right-hand rider footrest
- Holding the nut in place as illustrated in the figure, undo and remove the fastening screw (1)



- Remove the gear shift lever (2)



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

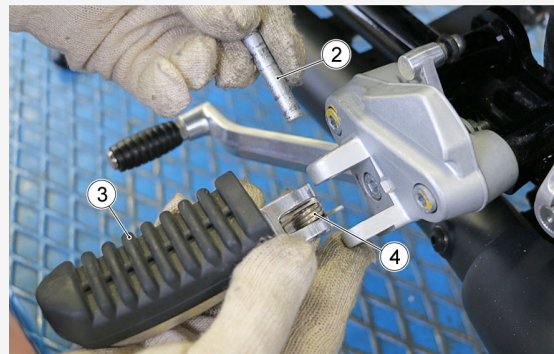


REMOVAL OF THE LEFT-HAND RIDER FOOTREST

- Remove the snap ring(1)

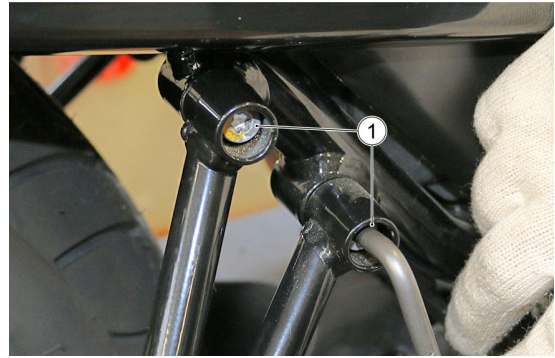


- Remove the pin (2)
- Remove the left-hand rider footrest (3)
- Retrieve the spring (4)

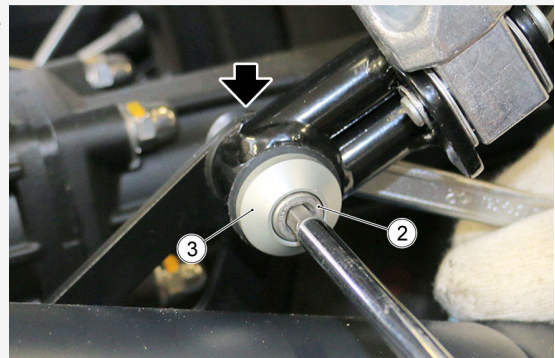


REMOVING THE PASSENGER FOOTREST SUPPORT

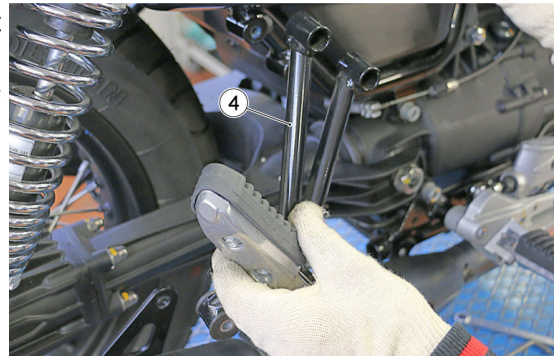
- Undo and remove the two fastening screws (1)



- Holding the nut in place as illustrated in the figure, undo and remove the screw (2)
- Retrieve the bushing (3)

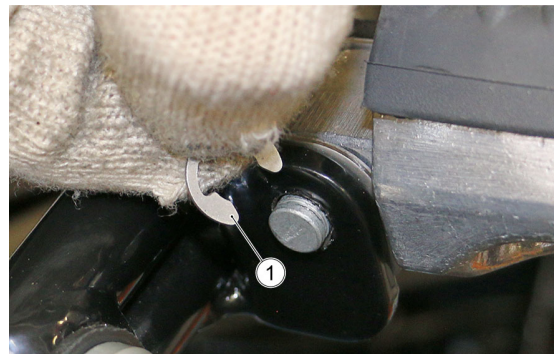


- Remove the right-hand passenger footrest support (4)
- Repeat the entire operation to remove the left-hand passenger footrest support



REMOVAL OF THE PASSENGER FOOTREST

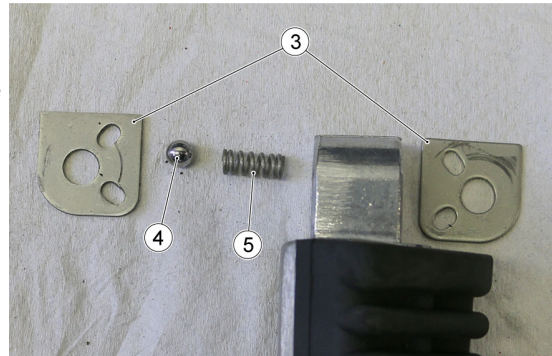
- Remove the snap ring(1)



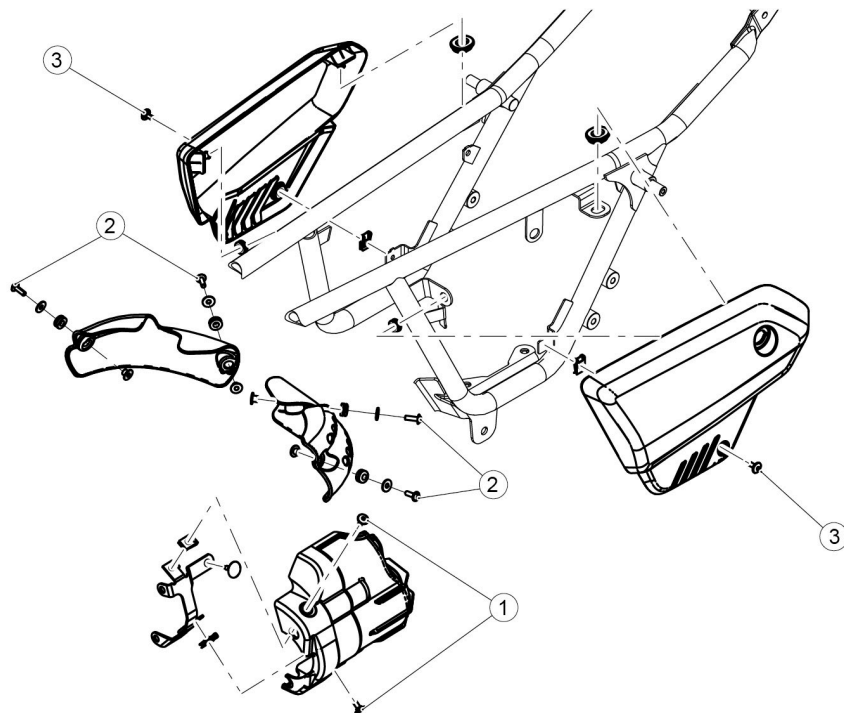
- Remove the pin (2)
- Remove the right-hand passenger footrest (3)



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



12.6 Side fairings



CENTRAL BODYWORK

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Starter motor cover fastening screws	M5	2	4 Nm (2.95 lbf ft)	-
2	Throttle body cover fastening screws	M5	4	3 Nm (2.21 lbf ft)	-
3	Side panel fastening screws	M5	2	4 Nm (2.95 lbf ft)	-

- Remove the saddle
- Remove the side fairing fixing screw



- Lift the rear part of the side fairing to detach it from the coupling to the chassis



- Slide the side fairing forward



- Disconnect the cable from the latch and then remove the side fairing from the vehicle

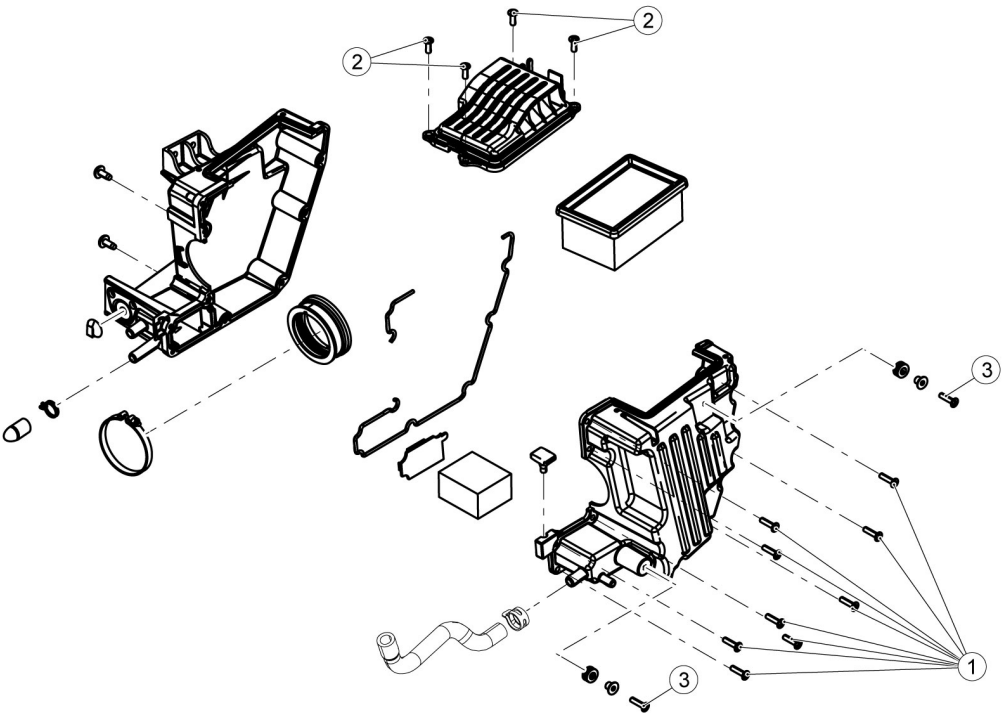
N.B.:



THE PROCEDURE DESCRIBED REFERS TO THE LEFT SIDE FAIRING BUT IT IS VALID FOR BOTH, EXCEPT FOR THE LATCH CABLE THAT DOESN'T EXIST ON THE RIGHT SIDE.



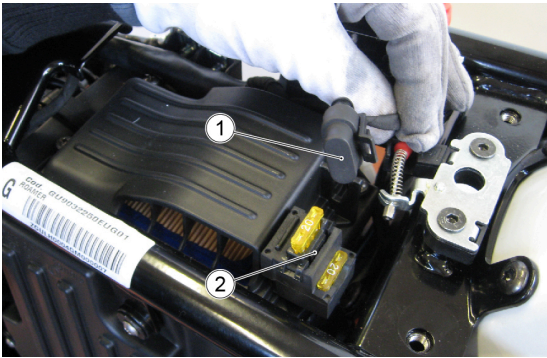
12.7 Air filter box



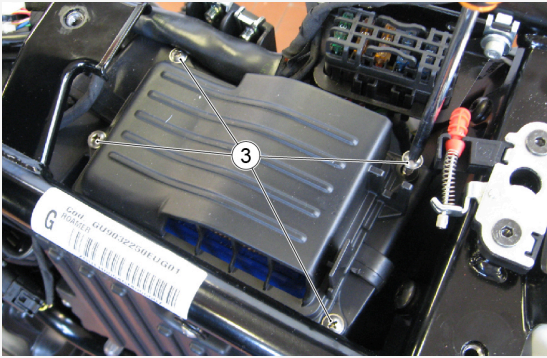
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Filter box fastening screws	SWP M5	9	3 Nm (2.21 lbf ft)	-
2	Air filter cover fastening screws	SWP M5	4	3 Nm (2.21 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
3	Filter casing/ frame fastening screw	SWP M5	2	3 Nm (2.21 lbf ft)	-

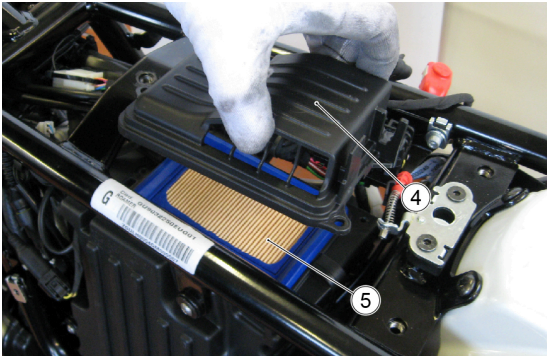
- Remove the saddle, the side panels and the battery complete with the rubber support
- Slide from the support present in the filter casing connector (1) and the ABS fuses (2)



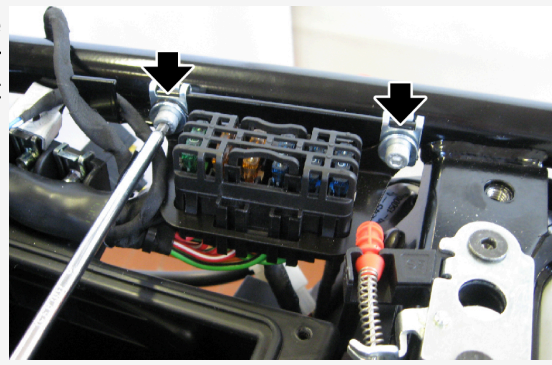
- Remove the four fastening screws (3) of the air filter cover



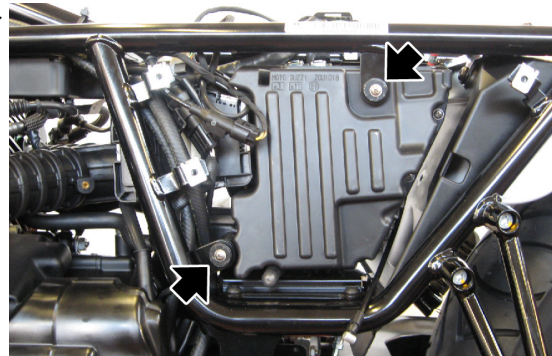
- Remove the air filter cover (4) and the filter (5)



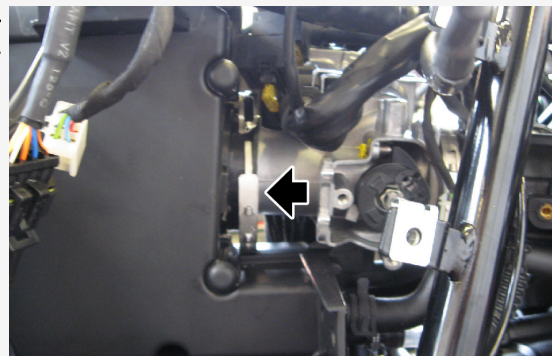
- Remove the two screws securing the fuse box support and move it to have greater freedom of movement for subsequent operations



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



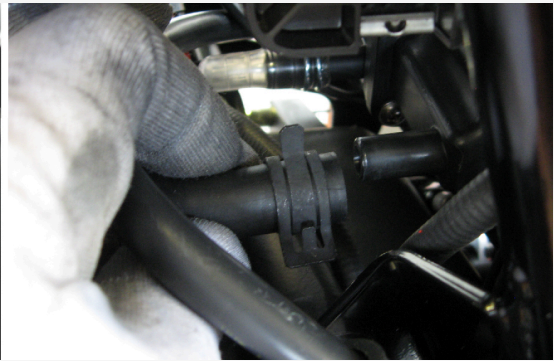
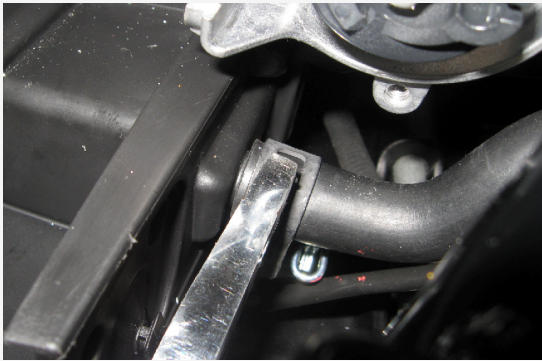
- Remove the clamp present in the collector that blocks the filter case to the throttle body



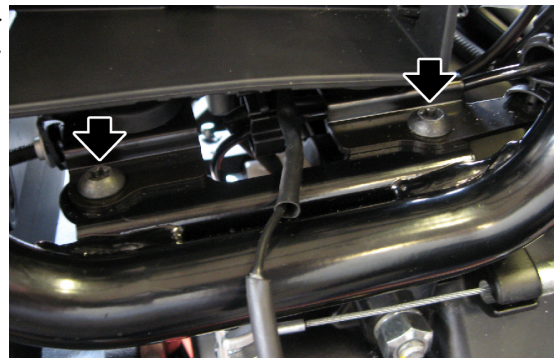
- Remove the two bottom fastening nuts of the splash guard



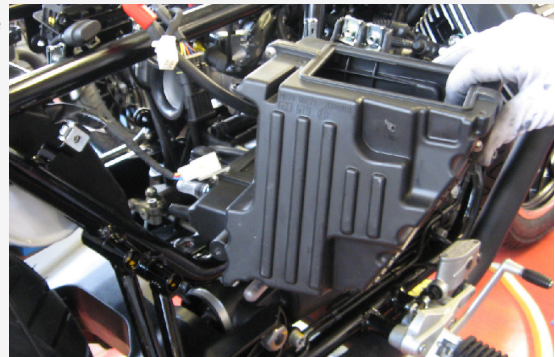
- Operating on the left side of the motorcycle, remove the blow-by pipe (6) from the filter case, while the right side, remove the secondary air pipe (7)



- Remove the four screws securing the filter case support bracket and remove it by slightly raising the box itself



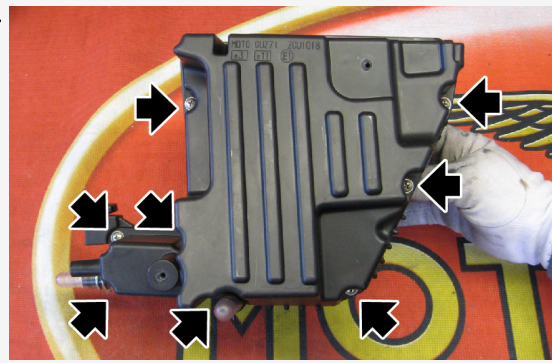
- Pull the filter case from the right side of the motorcycle



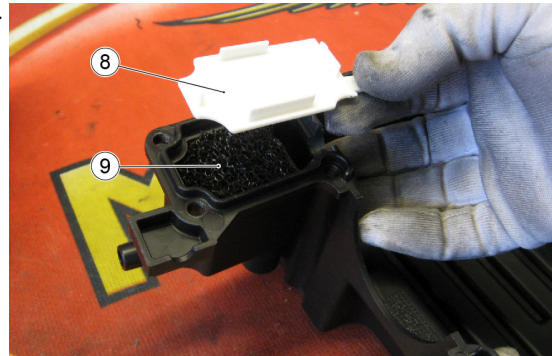
- Remove the collector from the filter case



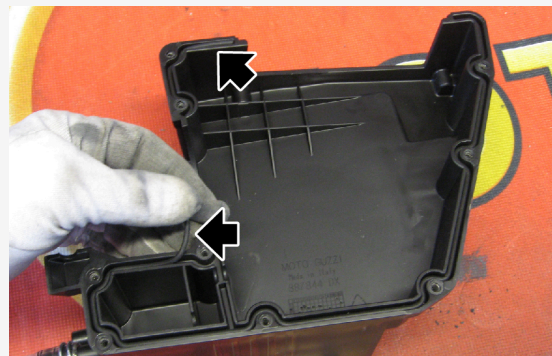
- Remove the locking screws from the filter case



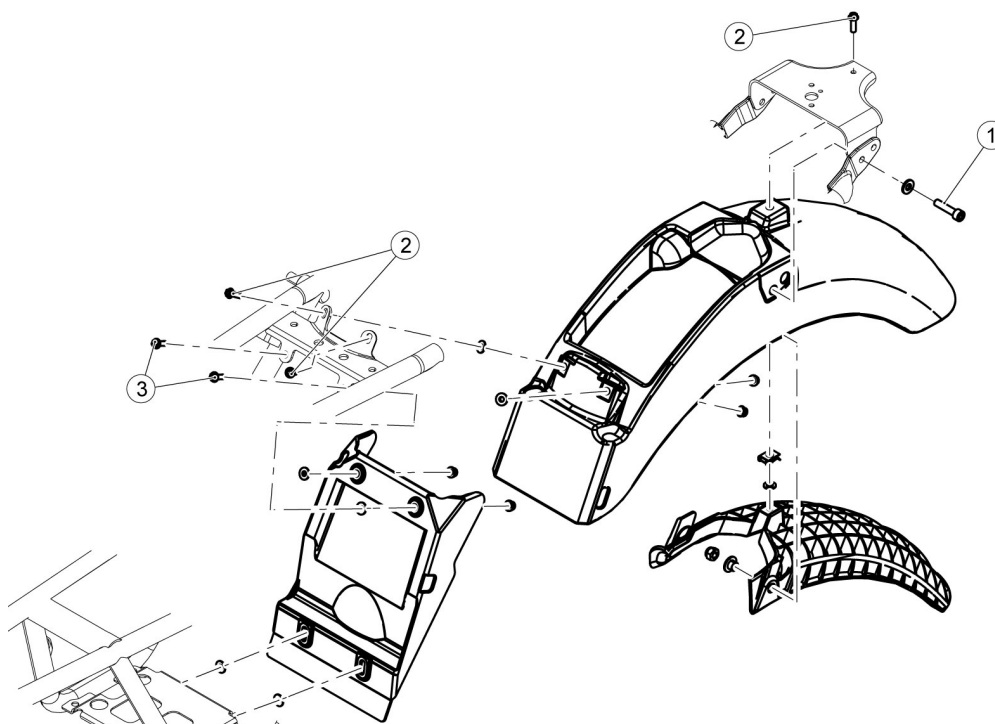
- Remove the cover (8) and the blow-by filter (9)



- Check and replace the two seals present in the cover



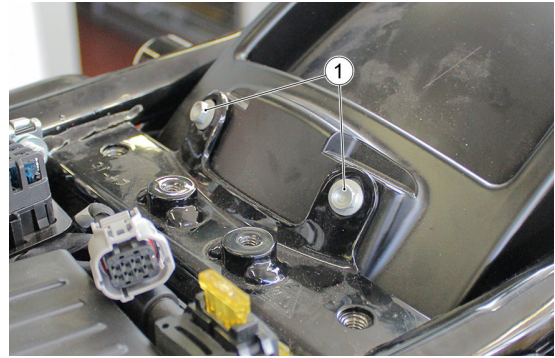
12.8 Rear mudguard



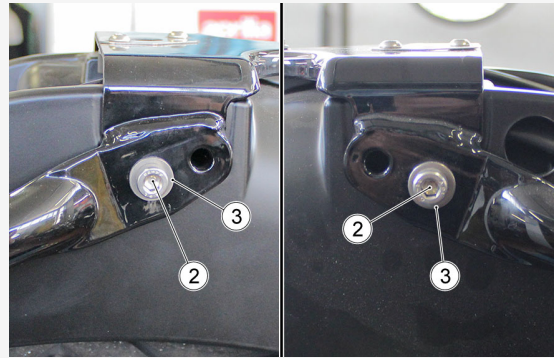
REAR MUDGUARD

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	-
2	Front and centre fastening screw rear mudguard	M6	3	8 Nm (5.9 lbf ft)	-
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

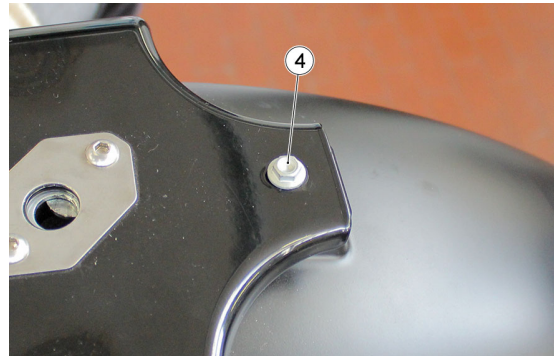
- Remove the saddle
- Unscrew and remove the two screws (1)



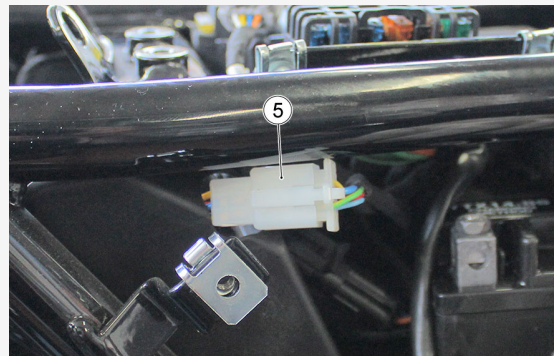
- Unscrew and remove the two fixing screws (2) from both sides of the vehicle
- Retrieve the two washers (3)



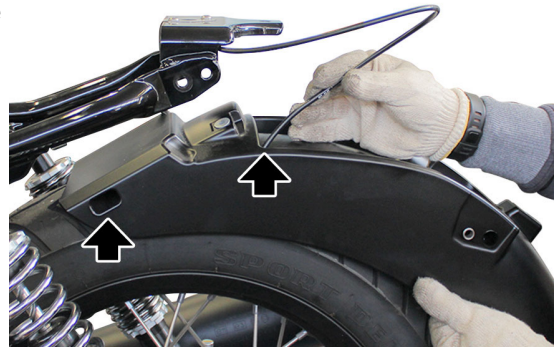
- Undo and remove the screw (4)



- Disconnect the connector (5)



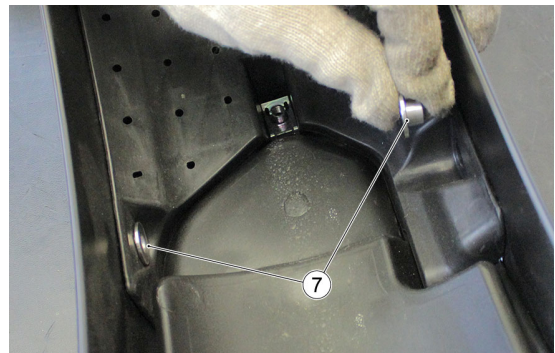
- Remove the saddle opening cable from the points indicated in figure



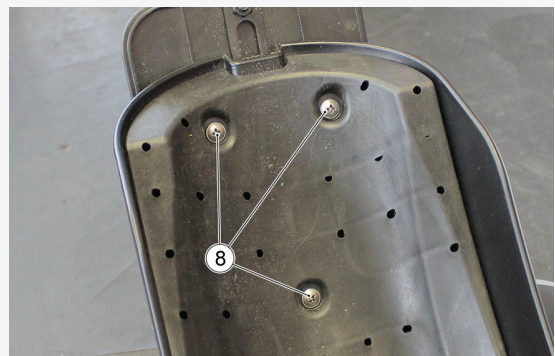
- Remove the rear mudguard (6) complete with the rear light cluster



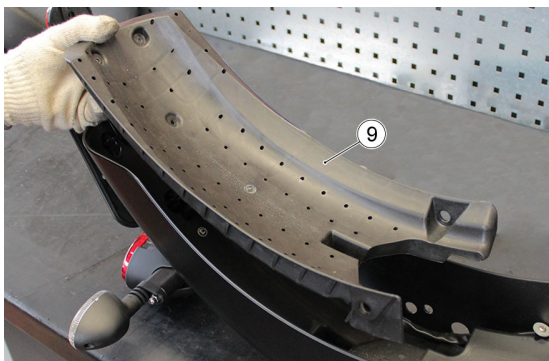
- Remove the two bushings (7)



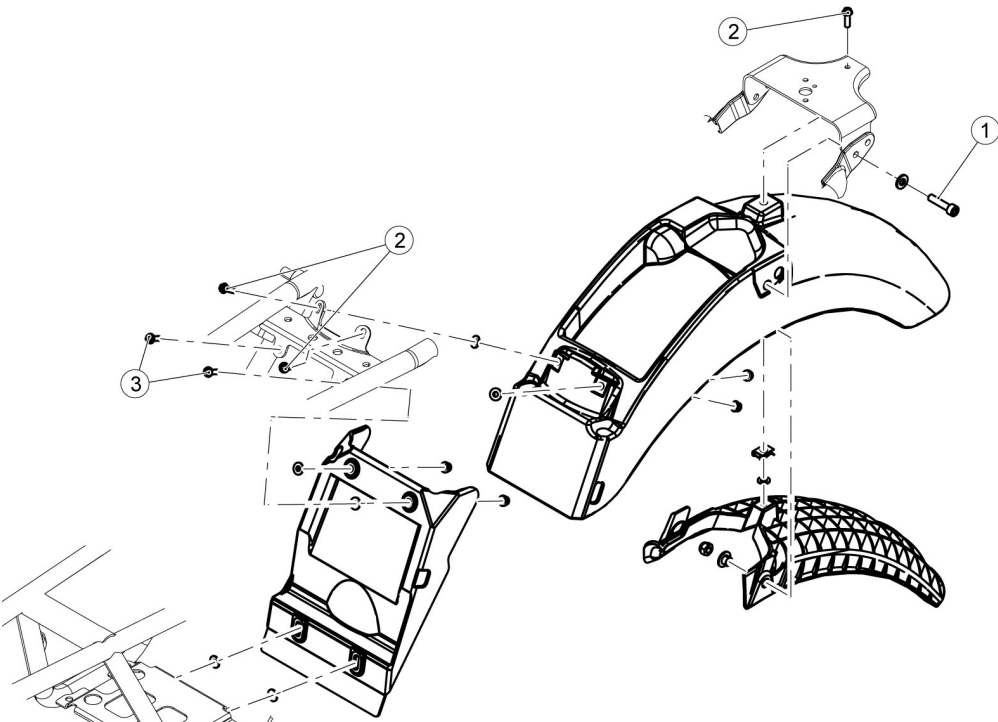
- Unscrew and remove the three screws (8)



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



12.9 Splash guard

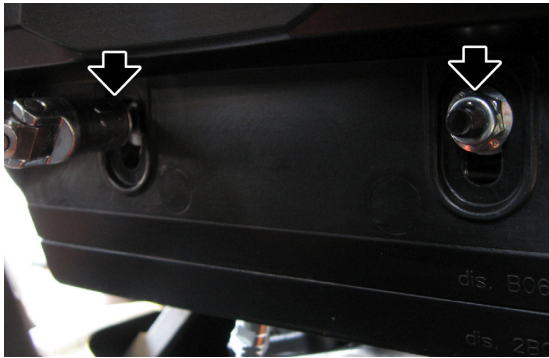


REAR MUDGUARD

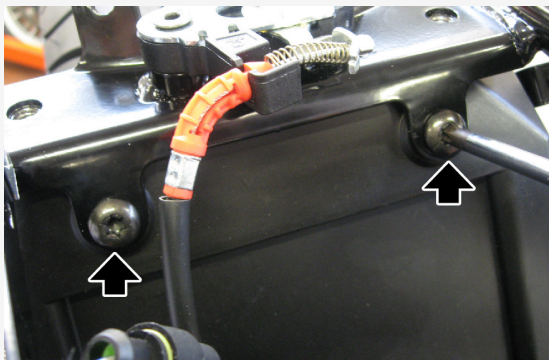
POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Rear mudguard fixing screws	M8	2	20 Nm (14.75 lbf ft)	-
2	Front and centre fastening screw rear mudguard	M6	3	8 Nm (5.9 lbf ft)	-

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
3	Rear splash guard fastening screws	M6	2	10 Nm (7.38 lbf ft)	-

- Remove the rear mudguard
- Remove the two lower nuts



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

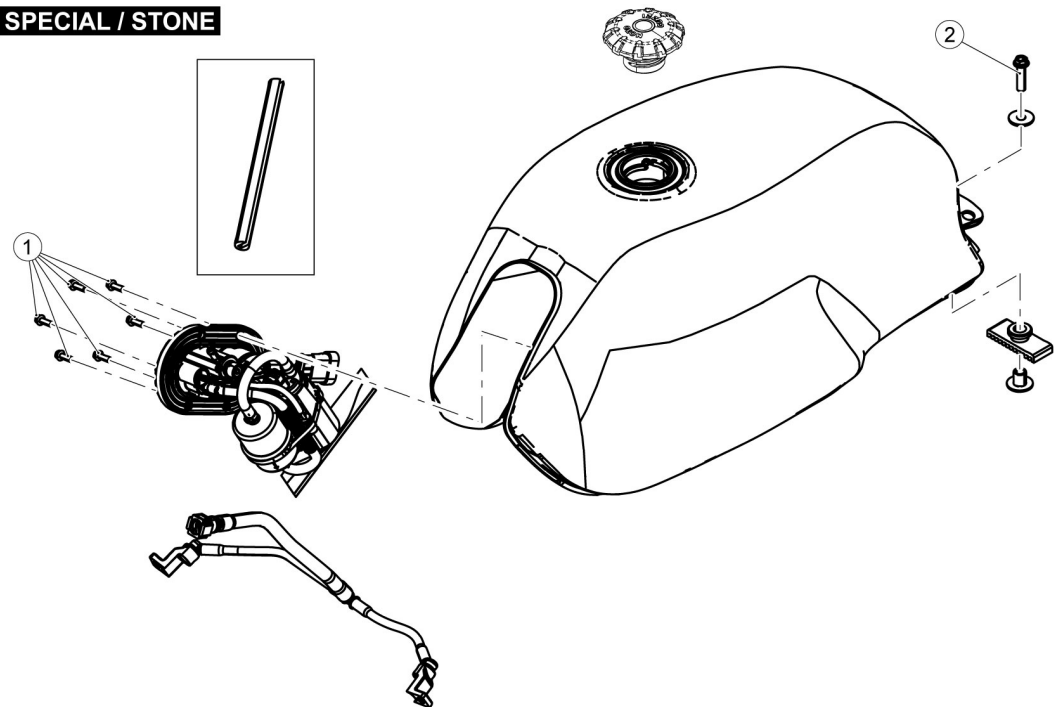


- Remove the splash guard



12.10 Fuel tank

SPECIAL / STONE



FUEL TANK

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening fuel pump to fuel tank	M5	6	5 Nm (3.69 lbf ft)	Pre-permeated
2	Rear tank fastening screw	M8	1	25 Nm (18.44 lbf ft)	-

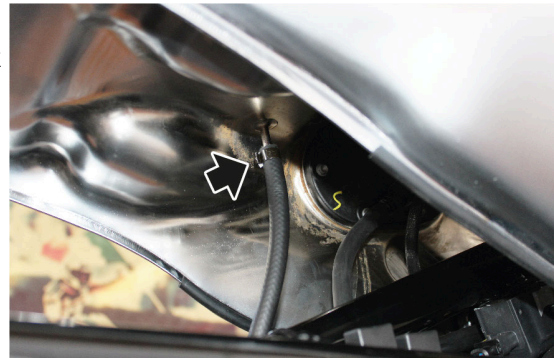
- Remove the saddle
- Unscrew the tank fixing screw and retrieve the washer



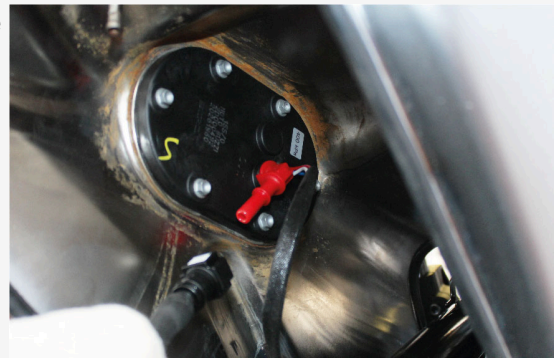
- Move the tank toward the back of the vehicle and lift it from the chassis



- Remove the metal clamp
- Remove the breather pipe from the tank coupling



- Disconnect the fuel pipe coupling from the pump



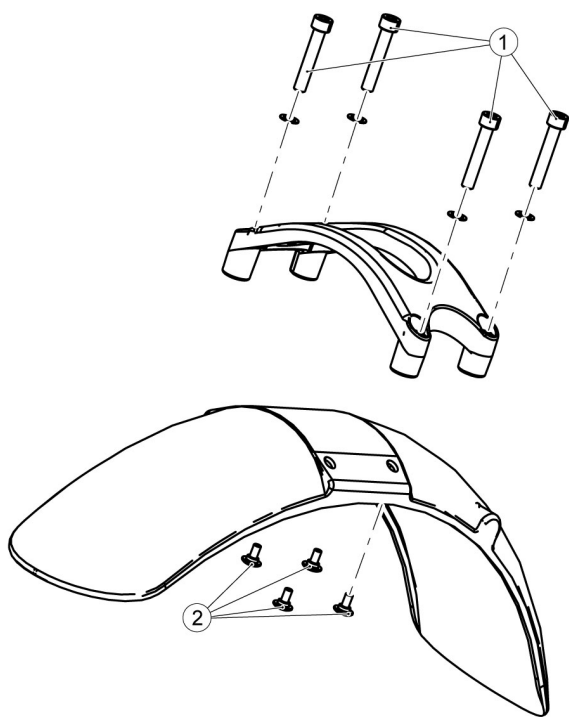
- Disconnect the fuel pump wiring harness connector



- Remove the fuel tank from the vehicle



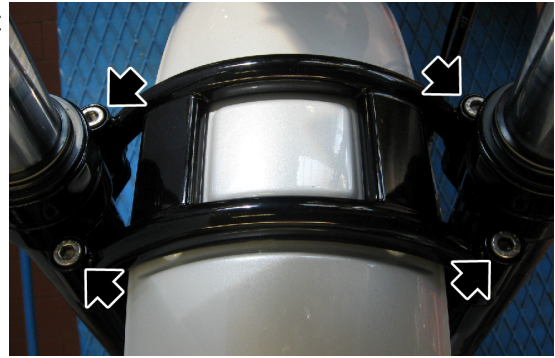
12.11 Front mudguard



FRONT MUDGUARD

POSITION	DESCRIPTION	TYPE	QUANTITY	TORQUE	NOTES
1	Screws fastening the stabiliser plate to the fork	M8	4	15 Nm (11.06 lbf ft)	Loctite 243
2	Screw fastening the mudguard to the stabiliser plate	M6	4	10 Nm (7.38 lbf ft)	Loctite 243

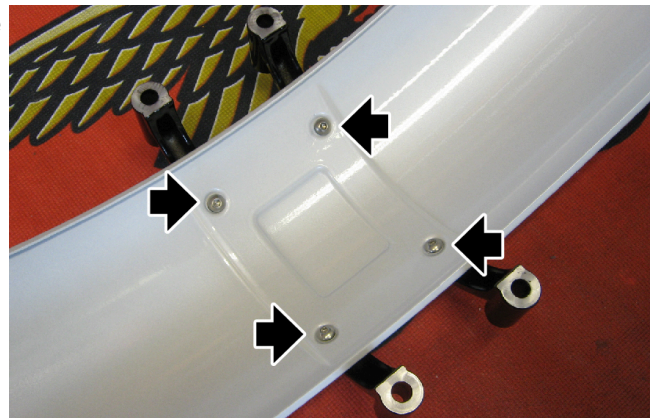
- Remove the four front mudguard support fixing screws at the fork sleeves



- Remove the mudguard complete



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



- Remove the mudguard support from the mudguard

