SERVICE STATION MANUAL

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Stelvio 1200 MY11

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THE VALUE OF SERVICE

Only the mechanics of the Official Moto Guzzi Service Network know this vehicle well, thanks to constant technical professional development and Moto Guzzi specific training programmes, and have the tools needed to carry out maintenance and repair operations correctly.

The reliability of the vehicle also depends on its mechanical conditions. Checking the vehicle before riding it, carrying out routine maintenance and using only Moto Guzzi Original Spare parts is fundamental!

For information about the nearest Official Dealer and/or Service Centre, consult the Yellow Pages or search directly on the inset map in our Official Website:

www.motoguzzi.it

Only by purchasing Moto Guzzi Original Spare Parts will you get a product designed and tested during the bike designing phase. Moto Guzzi Original Spare Parts are subject to systematic quality control procedures so that their reliability and performance over time is guaranteed.

The descriptions and illustrations given in this publication are not binding; While the basic features as described and illustrated in this booklet remain unchanged, Moto Guzzi reserves the right, at any time and without being required to update this publication beforehand, to make any changes to components, parts or accessory supplies, which it deems necessary to improve the product or which are required for manufacturing or commercial reasons.

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

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Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

SERVICE STATION MANUAL
Stelvio 1200 MY11

This manual provides the main information to carry out regular maintenance operations on your scooter. This manual is intended to **Moto Guzzi Dealers** and their qualified mechanics; several concepts have been deliberately omitted as they are considered unnecessary. As it is not possible to include complete mechanical notions in this manual, users should have basic mechanical knowledge or minimum knowledge about the procedures involved when repairing scooters. Without this knowledge, repairing or checking the vehicle may be inefficient or even dangerous. As the vehicle repair and check procedures are not described in detail, be extremely cautious so as not to damage components or injure individuals. In order to optimise customer satisfaction when using our vehicles, **Moto Guzzi** s.p.a. commits itself to continually improve its products and the relative documentation. The main technical modifications and changes in repair procedures are communicated to all **Moto Guzzi Sales Outlets and its International Subsidiaries**. These changes will be introduced in the subsequent editions of the manual. In case of need or further queries on repair and check procedures, consult **Moto Guzzi CUSTOMER DEPARTMENT,** which will be prepared to provide any information on the subject and any further communications on updates and technical changes related to the vehicle.
2011

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

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

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

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

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

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

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Rules

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 let the engine run in an enclosed area. If you do work in an enclosed area, make sure to use a fume extraction system.

CAUTION

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

Fuel

CAUTION

THE FUEL USED TO POWER INTERNAL COMBUSTION ENGINES IS HIGHLY FLAMMABLE AND MAY BE EXPLOSIVE UNDER CERTAIN CONDITIONS. IT IS THEREFORE RECOMMENDED TO CARRY OUT REFUELLING AND MAINTENANCE PROCEDURES IN A VENTILATED AREA WITH THE ENGINE SWITCHED OFF. DO NOT SMOKE DURING REFUELLING OR NEAR FUEL VAPOUR. AVOID ANY CONTACT WITH NAKED FLAME, SPARKS OR OTHER HEAT SOURCES WHICH MAY CAUSE IGNITION OR EXPLOSION.
DO NOT ALLOW FUEL TO DISPERSE INTO THE ENVIRONMENT.
KEEP OUT OF THE REACH OF CHILDREN.

Hot components

The engine and the exhaust system components become very hot and remain hot for some time after the engine has been switched off. 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

IT IS ADVISABLE TO WEAR LATEX GLOVES WHEN SERVICING THE VEHICLE.
THE ENGINE OR GEARBOX OIL MAY CAUSE SERIOUS INJURIES TO THE SKIN IF HANDLED FOR PROLONGED PERIODS OF TIME AND ON A REGULAR BASIS.
WASH YOUR HANDS CAREFULLY AFTER HANDLING OIL.
HAND THE OIL OVER TO OR HAVE IT COLLECTED BY THE NEAREST USED OIL RECYCLING COMPANY OR THE SUPPLIER.
DO NOT DISPOSE OF OIL IN THE ENVIRONMENT
KEEP OUT OF THE REACH OF CHILDREN.

Brake and clutch fluid

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

Battery electrolyte and hydrogen gas

CAUTION

THE BATTERY ELECTROLYTE IS TOXIC, CORROSIVE AND, AS IT CONTAINS SULPHURIC ACID, MAY CAUSE BURNING IF IT COMES INTO CONTACT WITH THE SKIN. WHEN HANDLING BATTERY ELECTROLYTE, WEAR TIGHT-FITTING GLOVES AND PROTECTIVE APPAREL. IN THE EVENT OF SKIN CONTACT WITH THE ELECTROLYTIC FLUID, RINSE WELL WITH PLENTY OF CLEAN WATER. IT IS PARTICULARLY IMPORTANT TO PROTECT YOUR EYES BECAUSE EVEN TINY AMOUNTS OF BATTERY ACID MAY CAUSE BLINDNESS. IN THE EVENT OF CONTACT WITH THE EYES, RINSE WITH PLENTY OF WATER FOR FIFTEEN MINUTES AND CONSULT AN EYE SPECIALIST IMMEDIATELY. IF THE FLUID IS ACCIDENTALLY SWALLOWED, DRINK LARGE QUANTITIES OF WATER OR MILK, FOLLOWED BY MILK OF MAGNESIA OR VEGETABLE OIL AND SEEK MEDICAL ADVICE IMMEDIATELY. THE BATTERY RELEASES EXPLOSIVE GASES; KEEP IT AWAY FROM FLAMES, SPARKS, CIGARETTES OR ANY OTHER HEAT SOURCES. ENSURE ADEQUATE VENTILATION WHEN SERVICING OR RECHARGING THE BATTERY.
KEEP OUT OF THE REACH OF CHILDREN.
BATTERY LIQUID IS CORROSIVE. DO NOT POUR IT OR SPILL IT, PARTICULARLY ON PLASTIC COMPONENTS. ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY BEING ACTIVATED.

Maintenance rules

GENERAL PRECAUTIONS AND INFORMATION

When repairing, dismantling and reassembling the vehicle, follow the recommendations given below carefully.

BEFORE DISASSEMBLING COMPONENTS

- Before dismantling components, remove dirt, mud, dust and foreign bodies from the vehicle. Use the special tools designed for this bike, as required.

COMPONENTS REMOVAL

- Do not loosen and/or tighten screws and nuts using pliers or any other tools than the specific wrench.
- Mark the positions on all connection joints (pipes, cables, etc.) before separating them, and identify them with different distinctive symbols.
- Each component needs to be clearly marked to enable identification during reassembly.
- Clean and wash the dismantled components carefully using a low-flammability detergent.

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- Keep mated parts together since they have "adjusted" to each other due to normal wear.
- Some components must be used together or replaced altogether.
- Keep away from heat sources.

REASSEMBLING COMPONENTS

CAUTION

BEARINGS MUST ROTATE FREELY, WITHOUT JAMMING AND/OR NOISE, OTHERWISE, THEY NEED TO BE REPLACED.

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

ELECTRIC CONNECTORS

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

Press the relative safety clips, if applicable.

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

CAUTION

DO NOT DISCONNECT CONNECTORS BY PULLING THE CABLES.

NOTE

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

TIGHTENING TORQUES

CAUTION

REMEMBER THAT THE TIGHTENING TORQUES FOR ALL FASTENING ELEMENTS ON WHEELS, BRAKES, WHEEL AXLES AND ANY OTHER SUSPENSION COMPONENTS PLAY A KEY ROLE

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IN ENSURING VEHICLE SAFETY AND MUST COMPLY WITH SPECIFIED VALUES. CHECK THE TIGHTENING TORQUES OF FASTENING ELEMENTS ON A REGULAR BASIS AND ALWAYS USE A TORQUE WRENCH TO REASSEMBLE THESE COMPONENTS. FAILURE TO COMPLY WITH THESE RECOMMENDATIONS MAY CAUSE ONE OF THESE COMPONENTS TO LOOSEN OR EVEN DETACH, CAUSING A WHEEL TO LOCK OR COMPROMISING VEHICLE HANDLING. THIS MAY LEAD TO FALLS, WITH THE RISK OF SERIOUS INJURY OR DEATH.

Running-in

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

CAUTION

THE CLUTCH MAY EMIT A SLIGHT BURNING SMELL WHEN FIRST USED. THIS PHENOMENON SHOULD BE CONSIDERED NORMAL AND WILL DISAPPEAR AS SOON AS THE CLUTCH DISCS GET ADAPTED.
IT IS IMPORTANT TO STRAIN ENGINE COMPONENTS DURING RUN-IN, HOWEVER, MAKE SURE NOT TO OVERDO THIS.

CAUTION

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

Follow the guidelines detailed below:

- Do not twist the throttle grip abruptly and completely when the engine is working at a low revs, either during or after run-in.
- During the first 100 Km (62 miles) use the brakes gently, avoiding sudden or prolonged braking. That is to permit the adequate adjustment of the pad friction material to the brake discs.

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

Vehicle identification

SERIAL NUMBER LOCATION

These numbers are necessary for vehicle registration.

NOTE

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

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

ZGULZG000YMXXXXXX

KEY:

ZGU: WMI (World manufacturer identifier) code;

LZ: model;

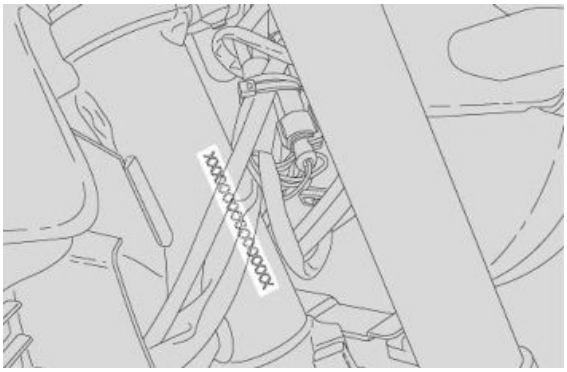
001: version variation;

0: free digit

Y year of manufacture

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

XXXXXX: serial number (6 digits);

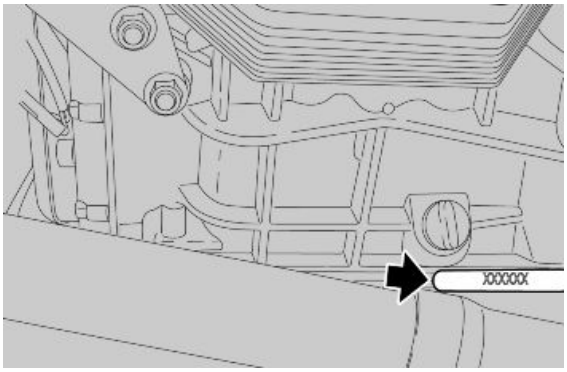


CHASSIS NUMBER

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

ENGINE NUMBER

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



Dimensions and mass

WEIGHT AND DIMENSIONS

Specification	Desc./Quantity
Maximum length (without accessories)	2,305 mm (90.75 in)
Maximum width to handlebar	956 mm (37.64 in)
Maximum width of the vehicle with accessories	1,080 mm (42.52 in)
Minimum / maximum height (adjustable windshield)	1436 / 1492 mm (56.53 / 58.74 in)
Saddle height	800 mm (31.5 in)
Minimum ground clearance	185 mm (7.3 in)
Wheelbase	1,535 mm (60.43 in)
Kerb weight	281 kg (619.50 lb)
Kerb weight of full house vehicle	296 kg (652.57 lb)

Engine

ENGINE

Specification	Desc./Quantity
Type	traverse-mounted twin-cylinder four-stroke V 90°
Number of cylinders	2
Cylinder layout	90° V

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Specification	Desc./Quantity
Bore / stroke	95 x 81.2 mm (3.74 x 3.20 in)
Engine capacity	1151 cm³ (70 cu.in.)
Compression ratio	11 : 1
Ignition	starter
Engine idle speed	1100 ± 100 rpm
Clutch	hydraulically controlled single-plate dry clutch with incorporated flexible coupling
Lubrication system	Pressurised circuit with regulator valves and trochoidal pump
Air filter	cartridge-type dry filter
Cooling	air and oil cooled with independent trochoidal pump and oil pressure control valve
Timing system diagram	single overhead camshaft with bucket tappets and rocker-operated valves
Values valid with control clearance between rocker and valve	intake: 0.15 mm (0.0059 in) outlet: 0.20 mm (0.0079 in)

Transmission

TRANSMISSION

Specification	Desc./Quantity
Primary drive	Helical gears, ratio 26/35 = 1:1.346
Gearbox	Mechanical, 6 speeds with foot lever on the left hand side of the engine
Gear ratios, 1st gear	17/38 = 1:2.2353
Gear ratios, 2nd gear	20/34 = 1:1.7
Gear ratios, 3rd gear	23/31 = 1:1.3478
Gear ratios, 4th gear	26/29 = 1:1.1154
Gear ratios, 5th gear	31/30 = 1:0.9677
Gear ratios, 6th gear	29/25 = 1:0.8621
Final drive	with U-joint
Ratio	12/44 = 1:3.6667

Capacities

CAPACITIES

Specification	Desc./Quantity
Engine oil	Oil change and oil filter replacement: 3,500 cm³ (214 cu.in)
Gearbox oil	500 cm³ (30.5 cu in)
Transmission oil	380 cm³ (23.2 cu in)
Fork oil	650 cm³ (39.66 cu.in) (for each stem)
Fuel (reserve included)	32 l (7.04 UK gal)
Fuel reserve	7 l (1.54 UK gal)
Seats	2
Maximum weight limit	495 kg (1091.29 lb)

Electrical system

ELECTRICAL SYSTEM

Specification	Desc./Quantity
Spark plug	NGK CR8EKB (long life)
Electrode gap	0.6 - 0.7 mm (0.024 - 0.028 in)
Battery	12 V - 18 Ampere/hour
Alternator (permanent magnet type)	12 V - 550 W
Main fuses	20 (ABS version only) - 30 (2) - 40 A
Secondary fuses	3 - 10 - 15A
Front daylight running light	12V - 5W
Low/high beam light (halogen)	12 V - 55 W / 60 W H4
Turn indicators	12V - 10 W

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Specification	Desc./Quantity
Rear daylight running light/stop light	LED
Supplementary headlamps (if fitted)	12 V/55W - H3
Dashboard lighting	LED
License plate light	12V - 5 W
Turn indicator warning light	LED
Neutral gear warning light	LED
Alarm-shift warning light	LED
Side stand down warning light	LED
Low fuel warning light	LED
High beam warning light	LED
ABS warning light	LED

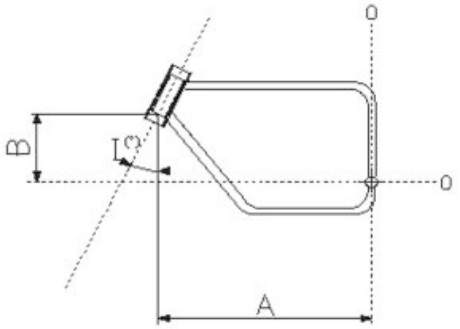
Frame and suspensions

CHASSIS

Specification	Desc./Quantity
Type	high strength tubular steel frame with engine as stressed element
Trail	125 mm (4.92 in)
Headstock angle	27°
Front	Upside down telescopic hydraulic fork, with 45mm (1.77 in) diam., stanchions and radial calliper mounting bracket with adjustable spring preload and hydraulic compression and rebound damping.
Front wheel travel	170 mm (6.69 in)
Rear	single arm with progressive linkage, single shock absorber with spring preload, hydraulic compression and rebound damping adjustment.
Unloaded shock absorber spring length	180 mm (7.09 in)
Rear wheel travel	155 mm (6.10 in)

SIZES A AND B

Specification	Desc./Quantity
Size A	745.0 mm (29.33 in)
Size B	403.16 mm (15.87 in)



Brakes

BRAKES

Specification	Desc./Quantity
Front	Ø 320-mm (12.6 in) stainless steel double floating disc, radial callipers with 4 opposed pistons.
Rear	Ø 282-mm (11.1 in) stainless steel disc, floating calliper with 2 different pins

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Wheels and tyres

WHEELS AND TYRES

Wheel	Model	Wheel rim	Measure ment	Tyre pressure with rider only	Tyre pressure, rider + passenger
Front (standard)	H SPECIFIC Pirelli Scorpion Trail	2.50 x 19"	110/80 R19 - 59V	2.5 bar (250 kPa) (36.3 PSI)	2.5 bar (250 kPa) (36.3 PSI)
Rear (standard)	H SPECIFIC Pirelli Scorpion Trail	4.25 x 17"	150/70 R17 - 69V	2.9 bar (290 kPa) (42.1 PSI)	2.9 bar (290 kPa) (42.1 PSI)

THE USE OF M+S TYRES IS ALLOWED ONLY ON VEHICLES WITHOUT THE ABS SYSTEM. WITH THIS TYRE TYPE, THE MAXIMUM SPEED ALLOWED IS 170 km/h (105.63 mi)

IT IS MANDATORY TO APPLY THE LABEL ONTO THE SPEEDOMETER (SUPPLIED WITH THE TYRES) INDICATING THE MAXIMUM SPEED, WHEN FITTING M + S TYRES. WITH "OFF-ROAD / ALLROUND" TYRES, PAY CLOSE ATTENTION WHEN DRIVING ON PAVED ROAD DUE TO ITS LACK OF GRIP AND STABILITY.

Supply

FUEL SYSTEM

Specification	Desc./Quantity
Fuel system	Electronic injection (Weber . Marelli) with stepper motor
Diffuser	diameter: 50 mm (1.97 in)
Fuel	Premium unleaded petrol, minimum octane rating 95 (NORM) and 85 (NOMM)

Tightening Torques

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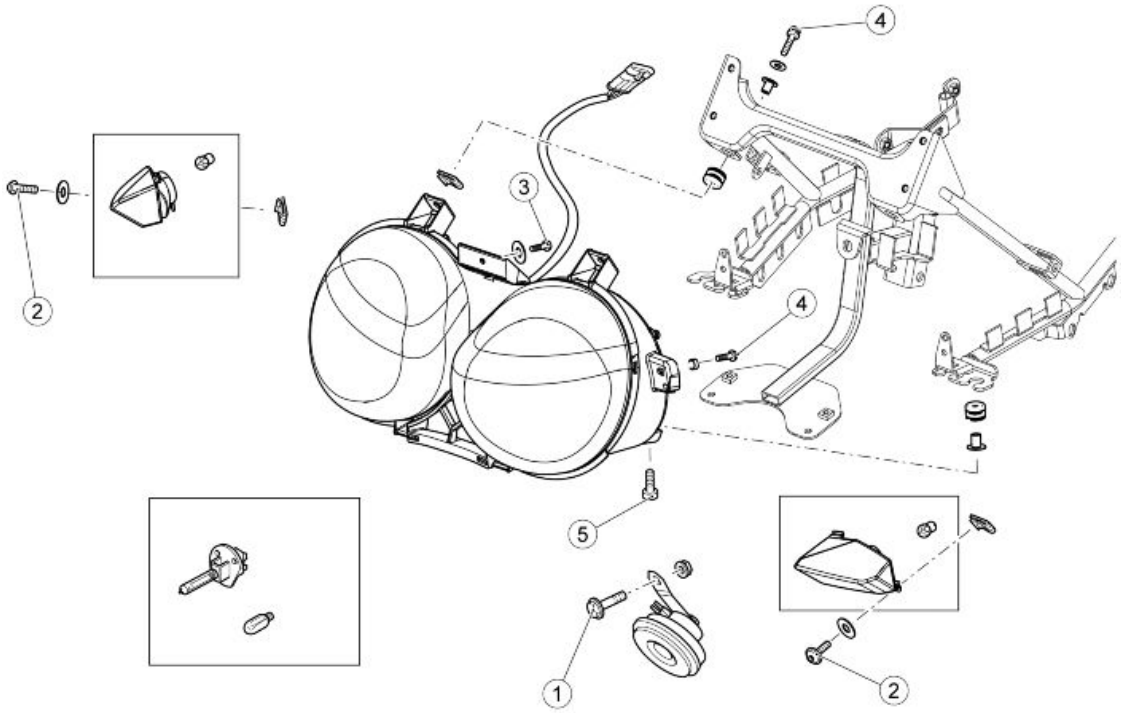
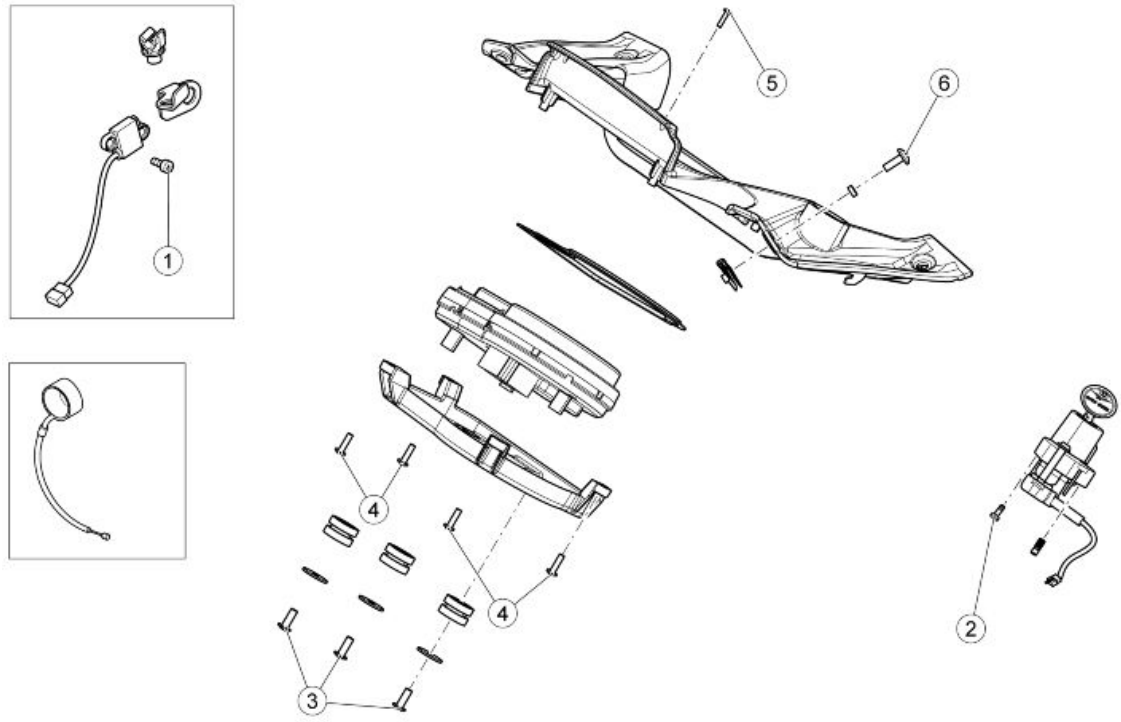
Front side



FRONT LIGHTS

pos.	Description	Type	Quantity	Torque	Notes
1	Horn fixing screw	M6x20	1	15 Nm (11.06 lbf ft)	-
2	Viti fissaggio freccie anteriori	M4	2	3 Nm (2.21 lbf ft)	-
3	Vite fissaggio superiore fanale a carozzeria	M4	1	3 Nm (2.21 lbf ft)	-
4	Viti fissaggio fanale a carozzeria	M4x25	2	3 Nm (2.21 lbf ft)	-
5	Viti TCEI fissaggio fanale a telaietto	M5x25	5	6 Nm (4.42 lbf ft)	-



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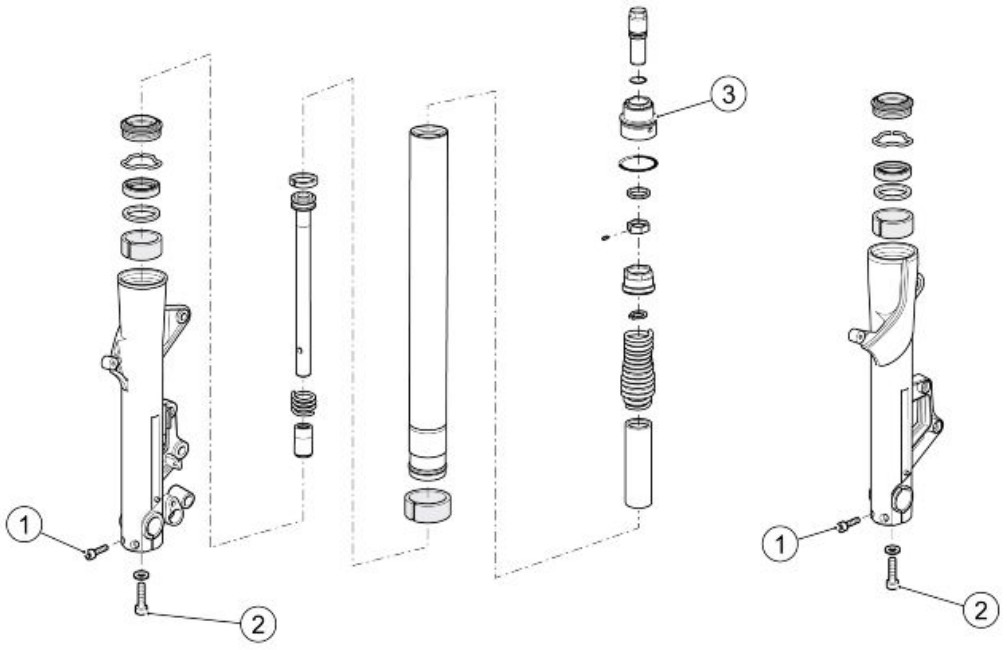
INSTRUMENT PANEL

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCEI fissaggio sensore velocità anteriore	M5x16	2	6 Nm (4.42 lbf ft)	-
2	Viti TCEI fissaggio blocchetto avviamento	M8x30	1	25 Nm (18.44 lbf ft)	-
3	Viti autofil. fissaggio supporto cruscotto	5x14	3	Manual	-
4	Viti autofil. fissaggio supporto cruscotto a cornice	3.9x14	4	Manual	-
5	Viti autofil. fissaggio cornice	-	4	Manual	-
6	Viti TCE	M5	2	6 Nm (4.42 lbf ft)	-



FRONT FORK

pos.	Description	Type	Quantity	Torque	Notes
1	Viti piede forcella	M8	1+1	25 Nm (18.44 lbf ft)	-
2	Viti chiusura mozzetti	M6x30	2+2	10 Nm (7.38 lbf ft)	-
3	Fork cap	-	1+1	- Nm (-.- lbf ft)	-

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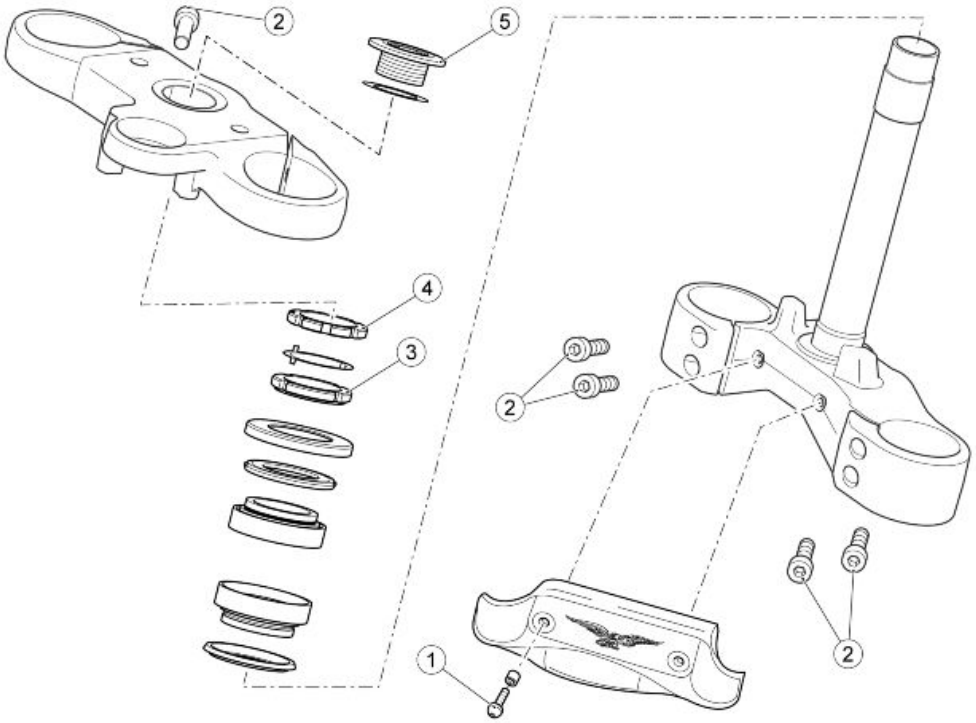
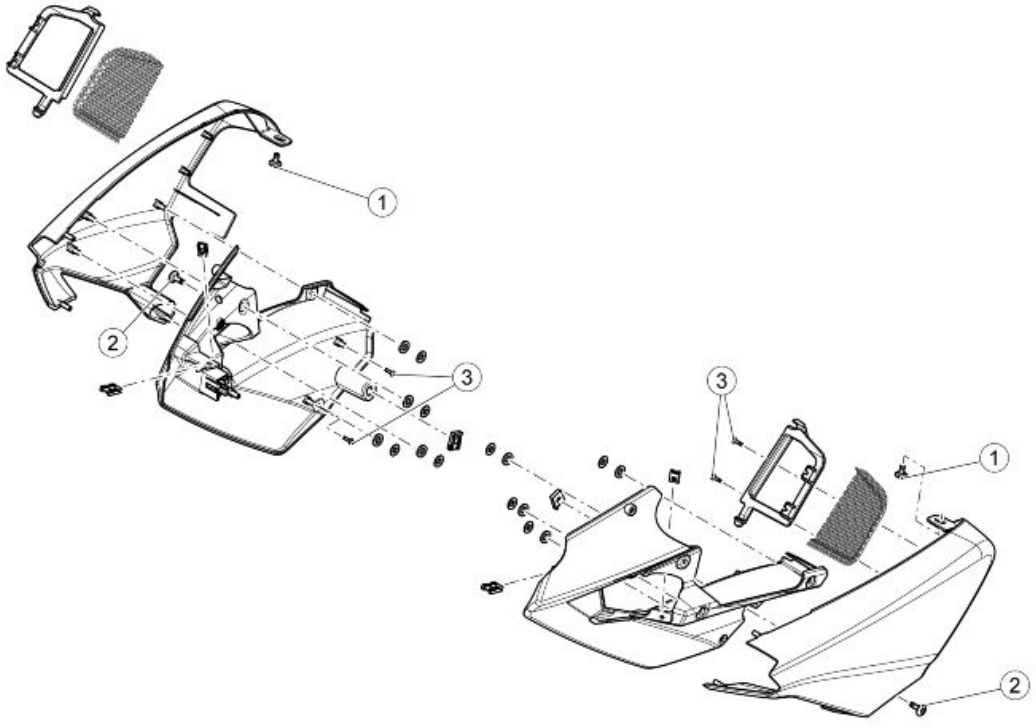


STEERING

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio piastra fermatubi	-	2	6 Nm (4.42 lbf ft)	-
2	Viti fissaggio piastre	M8x30	6	20 Nm (14.75 lbf ft)	-
3	Headstock ring nut	-	1	40 Nm (29.50 lbf ft)	-
4	Headstock counter-lock ring	-	1	manual + 90 degrees	-
5	Upper yoke fixing cap	-	1	100 Nm (73.76 lbf ft)	-



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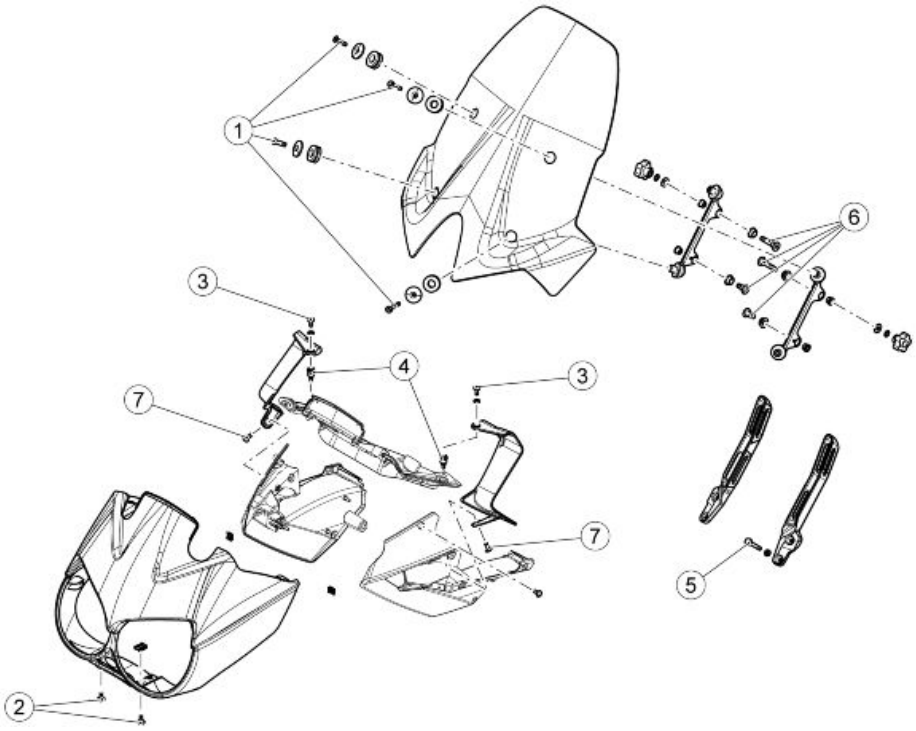
CARROZZERIA ANTERIORE - CONVOGLIATORI

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio convogliatori	M5x9	2	6 Nm (4.42 lbf ft)	-
2	Viti TBEI Flang. fissaggio convogliatori	M5	2	6 Nm (4.42 lbf ft)	-
3	Viti SWP Autofil. fissaggio telaietto griglie	2.9x12	4	Manual	-



CARROZZERIA ANTERIORE - CUPOLINO

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio parabrezza	M6	4	10 Nm (7.38 lbf ft)	-
2	Viti TBEI Flang. fissaggio cupolino	M5x12	4	6 Nm (4.42 lbf ft)	-
3	Viti fissaggio deflettori superiori	M5	4	6 Nm (4.42 lbf ft)	-
4	Colonnette fissaggio deflettori	M5	2	6 Nm (4.42 lbf ft)	-
5	Viti TE Flang. fissaggio staffa parabrezza	M6x16	4	10 Nm (7.38 lbf ft)	-
6	Perno filettato fissaggio supporto parabrezza	M8	2	25 Nm (18.44 lbf ft)	-
7	Viti TBEI Flang. fissaggio deflettori inferiori	M5	2	Manual	-

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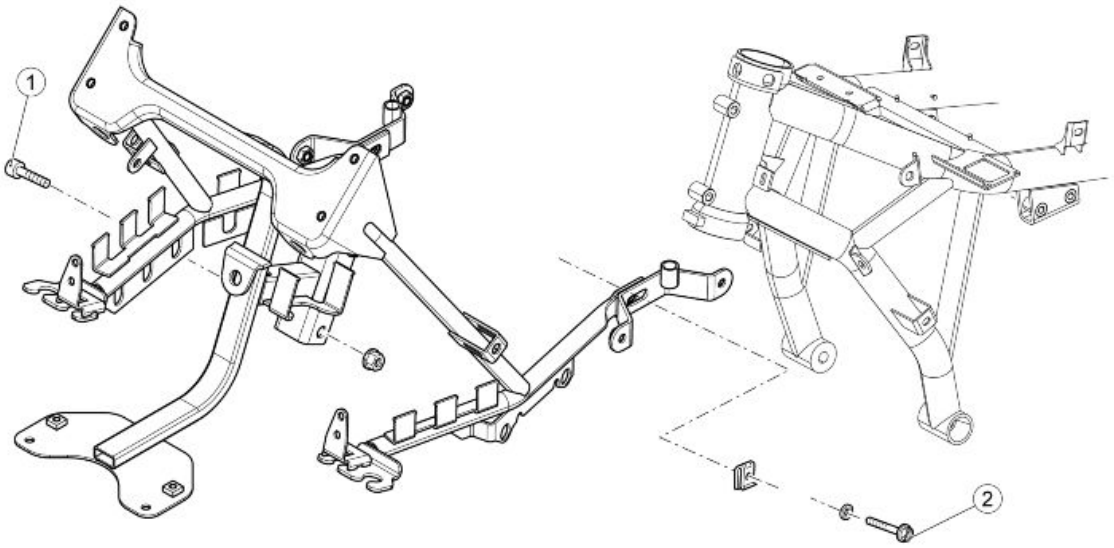
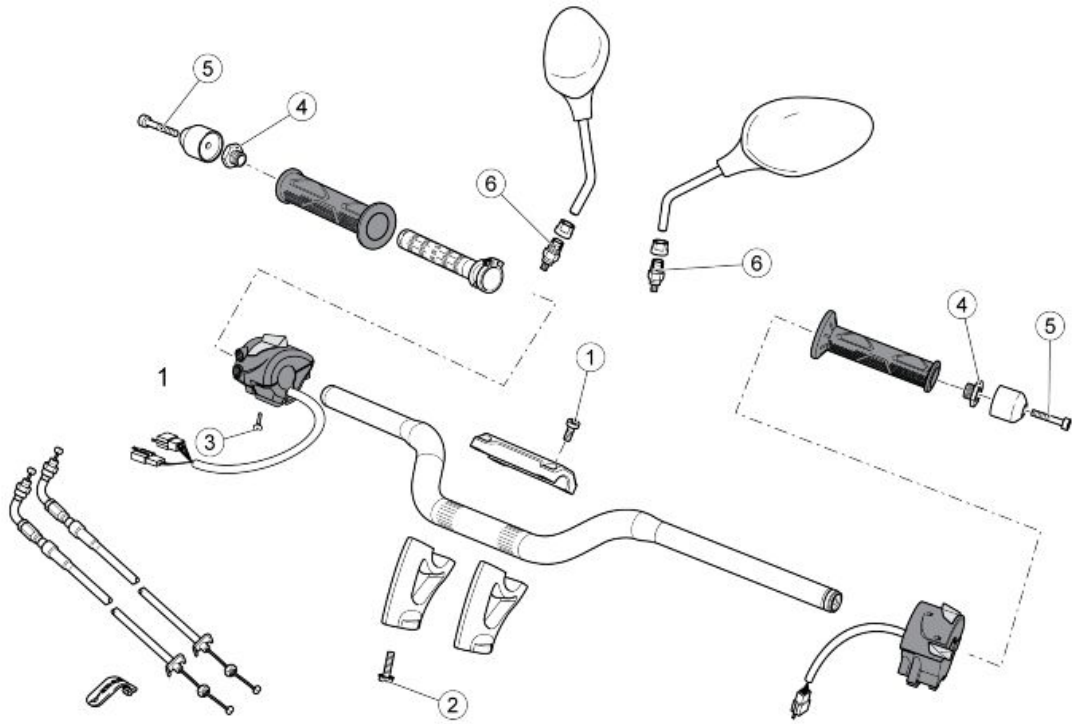


TELAIETTO

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCEI fissaggio telaietto	M8x40	2	25 Nm (18.44 lbf ft)	-
2	Viti TE Flang.	M6x20	2	10 Nm (7.38 lbf ft)	-

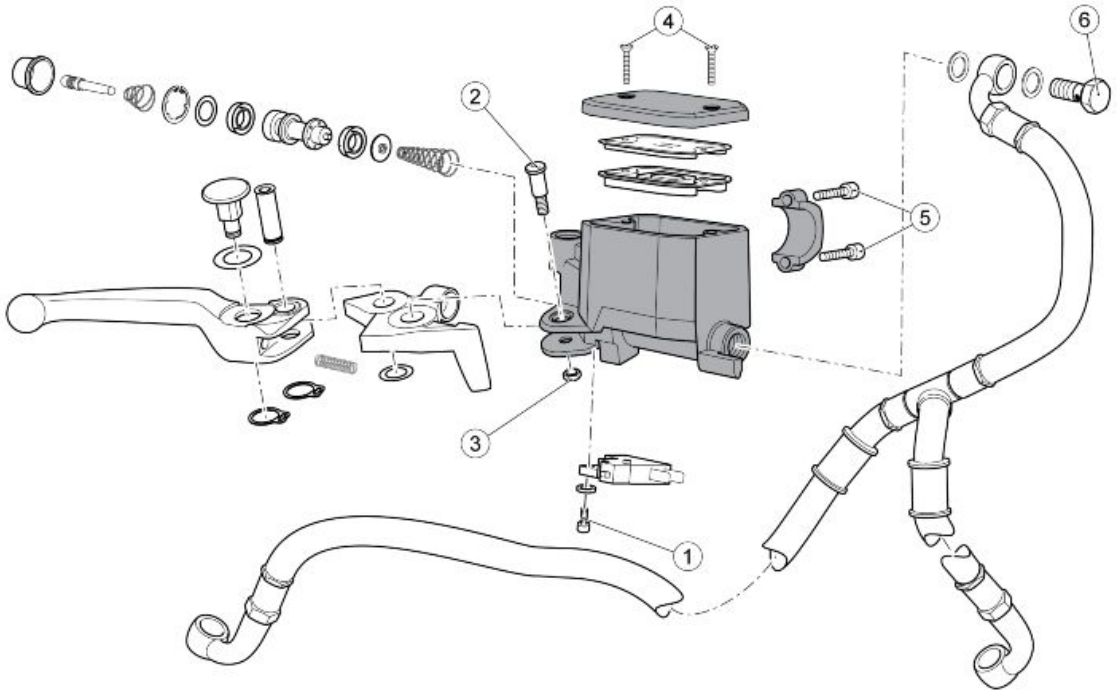


HANDLEBAR AND CONTROLS

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCC fissaggio cavallotti superiori manubrio	M8x30	4	25 Nm (18.44 lbf ft)	-

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

pos.	Description	Type	Quantity	Torque	Notes
2	Viti TE Flangiate fissaggio cavallotti inf. manubrio	-	2	50 Nm (36.88 lbf ft)	-
3	Vite autof.	-	1	1.5 Nm (1.11 lbf ft)	-
4	Raccordo fissaggio pesi antivibranti	M18x15	2	- Nm (-.-- lbf ft)	-
5	Viti TCEI fissaggio pesi antivibranti	-	2	10 Nm (7.38 lbf ft)	Loct. 243
6	Raccordi fissaggio specchi retrovisori	M10	2	30 Nm (22.13 lbf ft)	-



FRONT BRAKE LEVER

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI fissaggio interruttore	M4x12	1	3 Nm (2.21 lbf ft)	-
2	Lever pin	M6	1	5-7 Nm (3.69-5.16 - lbf ft)	-
3	Viti fissaggio tappo serbatoio	-	2	0.8-1.5 Nm (0.59-1.11 lbf ft)	-
4	Dado perno leva	M6	1	10 Nm (7.38 - lbf ft)	-
5	Viti fissaggio cavallotto	M6	2	10 Nm (7.38 lbf ft)	-
6	Viti fissaggio tubo olio	M10	1	23-26 Nm (16.96-19.18 lbf ft)	-

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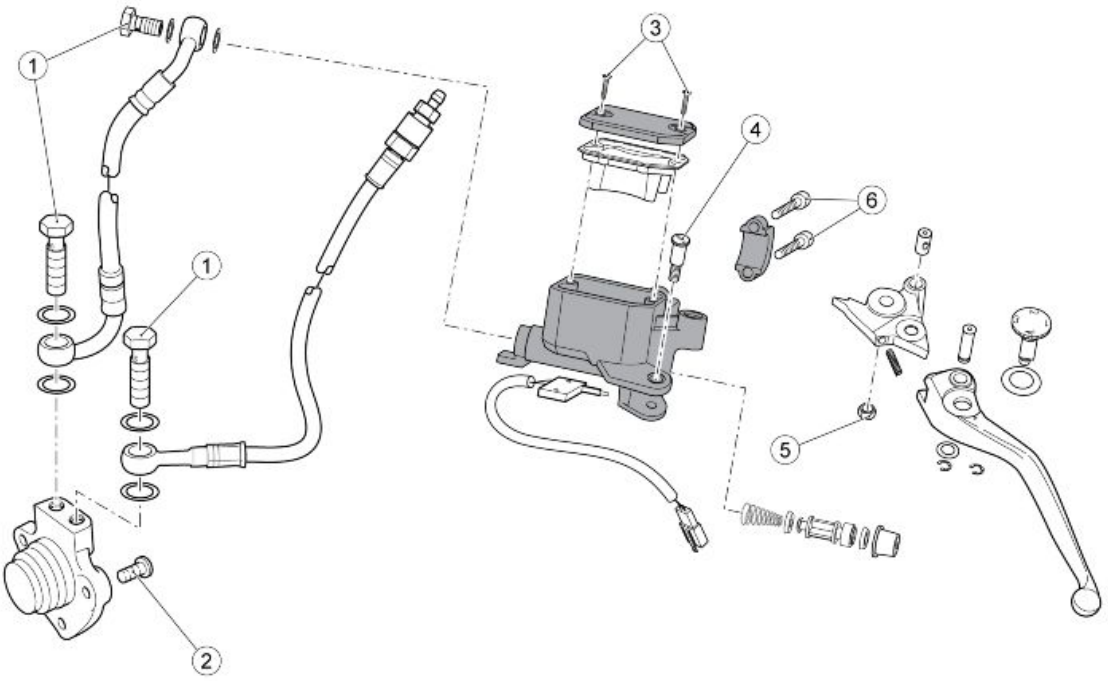
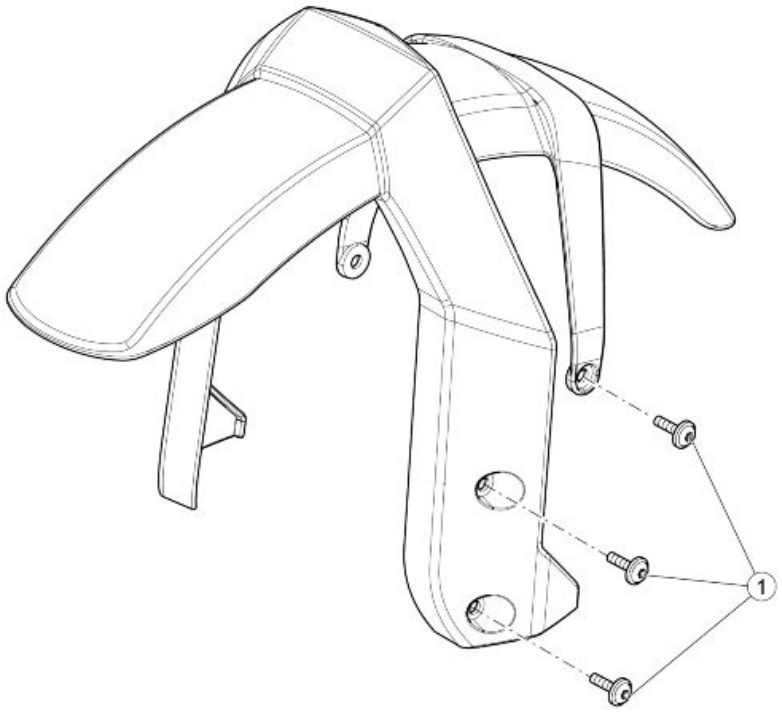


CLUTCH CONTROL

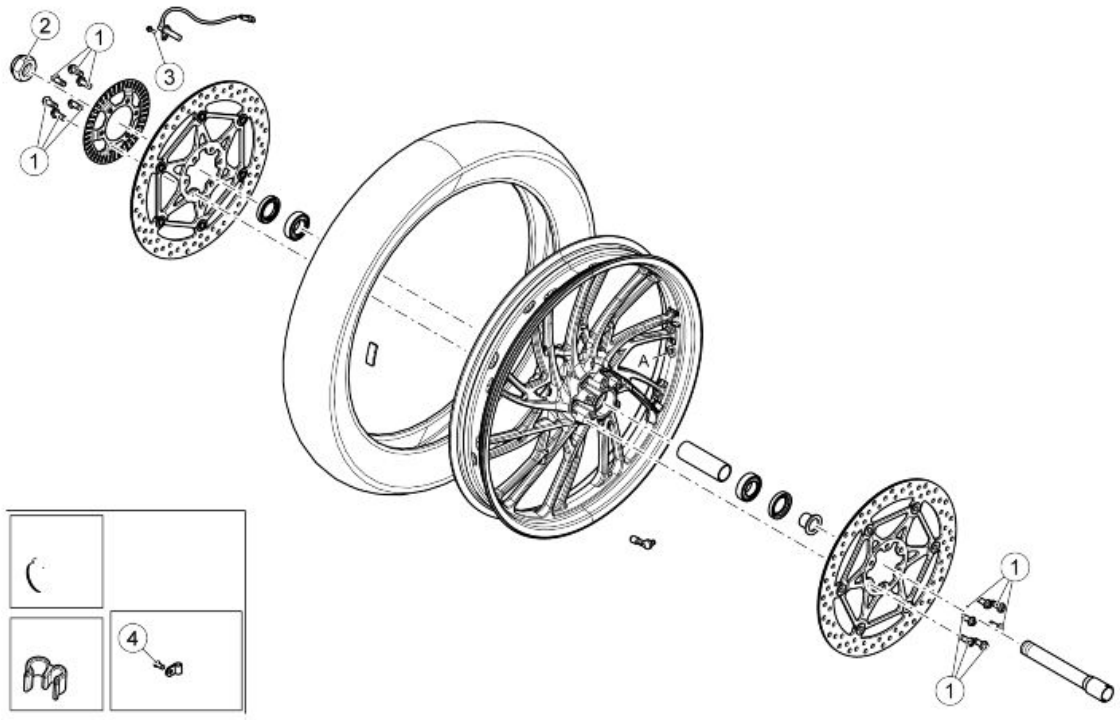
pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio tubo olio	M10	3	23-26 Nm (16.96-19.18 lbf ft)	-
2	Viti TE Flang. fissaggio cilindro comando frizione	M6	3	10 Nm (7.38 lbf ft)	-
3	Viti fissaggio tappo serbatoio	-	2	0.8-1.5 Nm (0.59-1.11 lbf ft)	-
4	Lever pin	-	1	5-7 Nm (3.69-5.16 lbf ft)	-
5	Dado perno leva	M6	1	10 Nm (7.38 lbf ft)	-
6	Viti fissaggio cavallotto	-	2	10 Nm (7.38 lbf ft)	-

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten



FRONT MUDGUARD

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio parafango anteriore	M5x12	6	6 Nm (4.42 lbf ft)	-

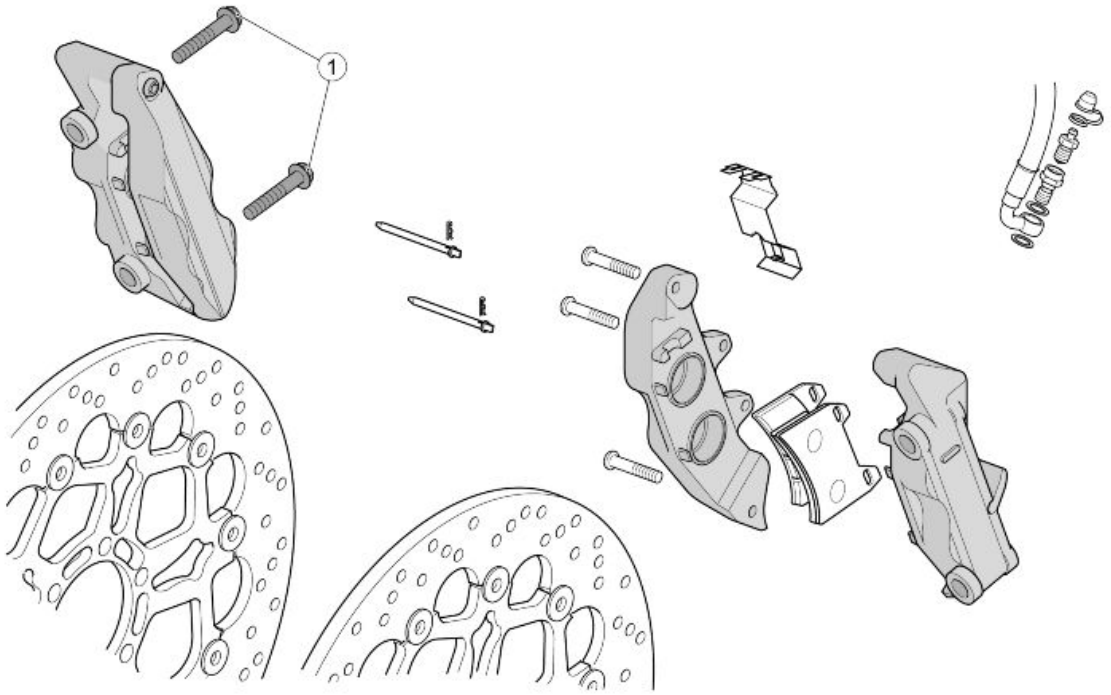


FRONT WHEEL

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio dischi freno	M8x20	12	25 Nm (18.44 lbf ft)	-
2	Nut fixing wheel pin	-	1	80 Nm (59.00 lbf ft)	-
3	Vite flang. fissaggio sensore	-	1	6 Nm (4.42 lbf ft)	Loct. 243

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

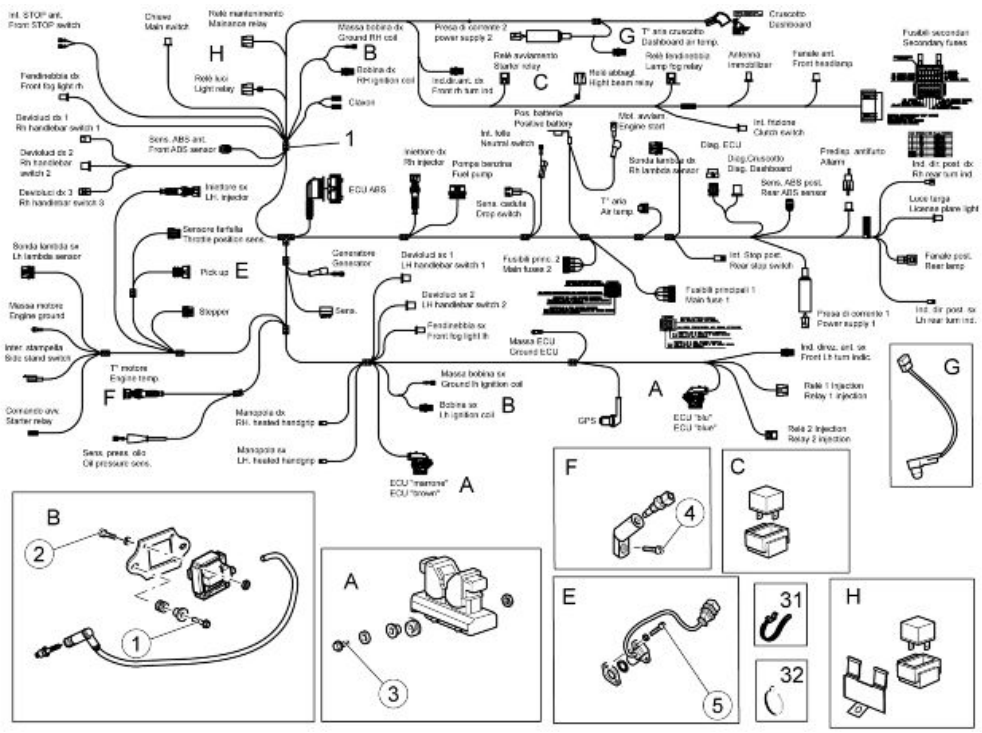
pos.	Description	Type	Quantity	Torque	Notes
4	Vite TCB fissaggio passacavo	M4x6	1	3 Nm (2.21 lbf ft)	-



FRONT BRAKE CALLIPERS

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio pinze	M10x55	4	50 Nm (36.88 lbf ft)	-

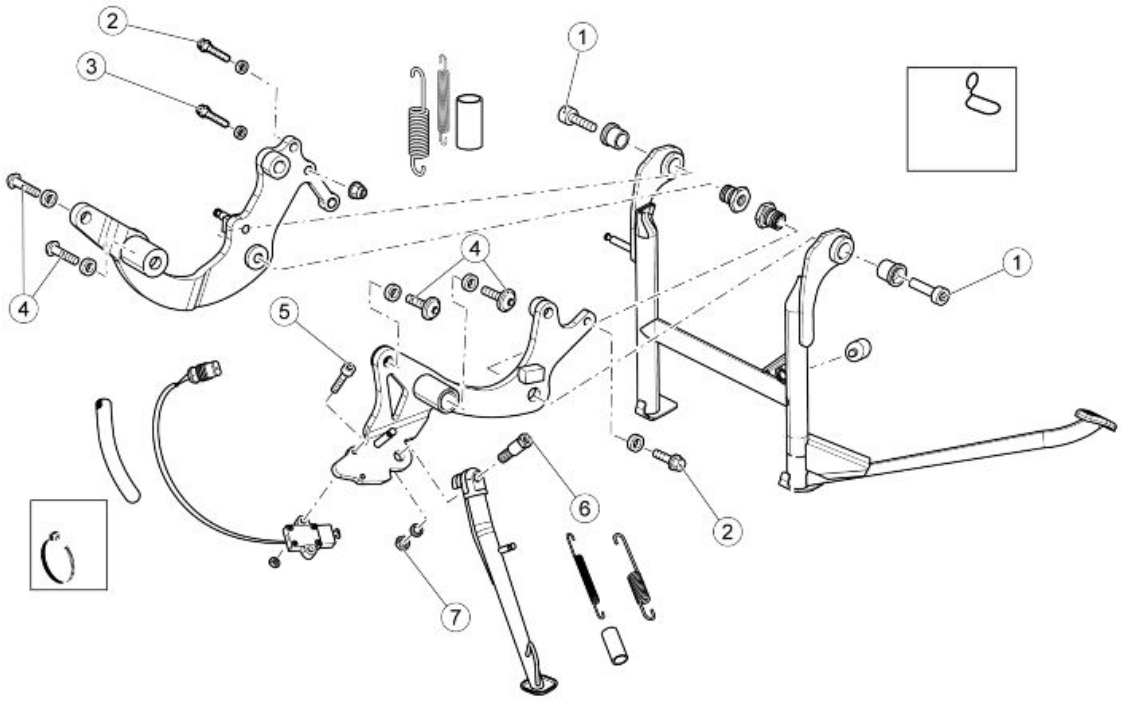
Central part



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

MAIN CABLE HARNESS

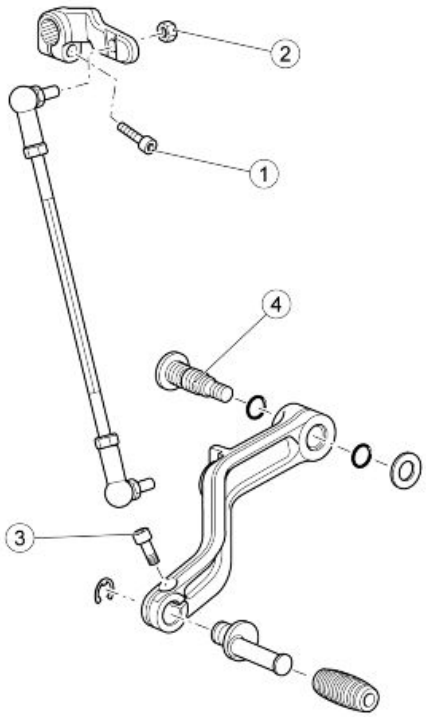
pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio piastre bobine	M6x20	2+2	10 Nm (7.38 lbf ft)	-
2	Viti TCEI fissaggio bobine	-	2+2	2 Nm (1.47 lbf ft)	-
3	Viti TCEI fissaggio centralina	-	2	10 Nm (7.38 lbf ft)	-
4	Viti TCEI fissaggio supporto sensore temp. olio	M10x20	1	11 Nm (8.11 lbf ft)	Loct. 243
5	Viti TCEI fissaggio sensore di fase	-	2	3 Nm (2.21 lbf ft)	-



CAVALLETTO CENTRALE E LATERALE

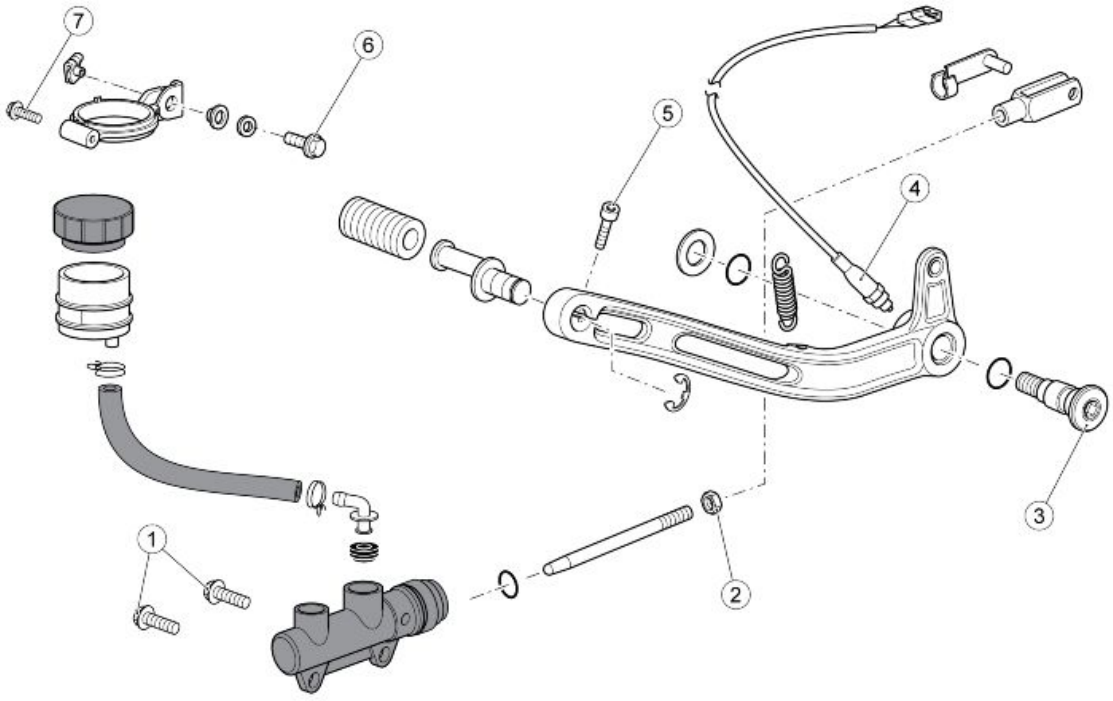
pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCEI fissaggio cavalletto centrale	M10x30	2	50 Nm (36.88 lbf ft)	Loct. 270
2	Viti TE Flang. fissaggio piastre	M8	2	25 Nm (18.44 lbf ft)	-
3	Screw	M8x35	1	25 Nm (18.44 lbf ft)	-
4	Viti TBEI fissaggio piastre	M12x35	4	80 Nm (59.00 lbf ft)	-
5	Viti TCEI fissaggio interruttore cavalletto	M5	2	6 Nm (4.42 lbf ft)	Loct. 243
7	Dado fissaggio cavalletto laterale	M10	1	30 Nm (22.13 lbf ft)	Loct. 243

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten



COMANDO CAMBIO

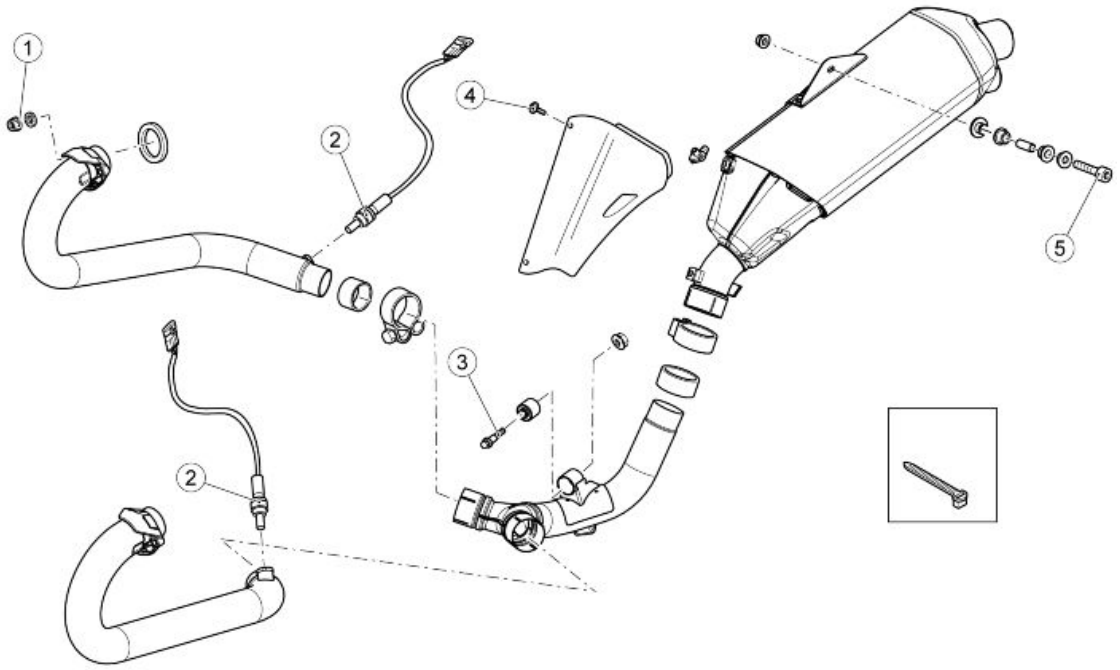
pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCEI fissaggio leva rinvio cambio	M6x20	1	10 Nm (7.38 lbf ft)	-
2	Dadi fissaggio tirante	-	2	10 Nm (7.38 lbf ft)	-
3	Vite TCEI fissaggio piolo leva freno	M6x16	1	10 Nm (7.38 lbf ft)	-
4	Brake lever pin	M8	1	15 Nm (11.06 lbf ft)	Loct. 243



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

REAR BRAKE LEVER

pos.	Description	Type	Quantity	Torque	Notes
1	Viti te Flang. fissaggio pompa freno	M6x20	2	10 Nm (7.38 lbf ft)	Loct. 243
2	Dado bloccaggio asta pompa freno	-	1	10 Nm (7.38 lbf ft)	-
3	Brake lever pin	M8	1	15 Nm (11.06 lbf ft)	Loct. 243
4	Stop switch	M6	1	10 Nm (7.38 lbf ft)	-
5	Vite TCEI fissaggio piolo leva freno	-	1	10 Nm (7.38 lbf ft)	-
6	Vite TE Flang. fissaggio supporto serbatoio	M6x16	1	10 Nm (7.38 lbf ft)	-
7	Vite SWP autofil. per supporto serbatoio	M5x20	1	Manual	-



EXHAUST SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Dadi Flang. fissaggio collettori	M8	4	25 Nm (18.44 lbf ft)	-
2	Oxygen sensor fastener	-	2	38 Nm (28.03 lbf ft)	-
3	Vite TE Flang. fissaggio parte centrale	M10x55	1	25 Nm (18.44 lbf ft)	-
4	Viti fissaggio protezione	-	2	10 Nm (7.38 lbf ft)	-
5	Vite TCEI fissaggio silenziatore a telaio	M8x60	1	25 Nm (18.44 lbf ft)	-

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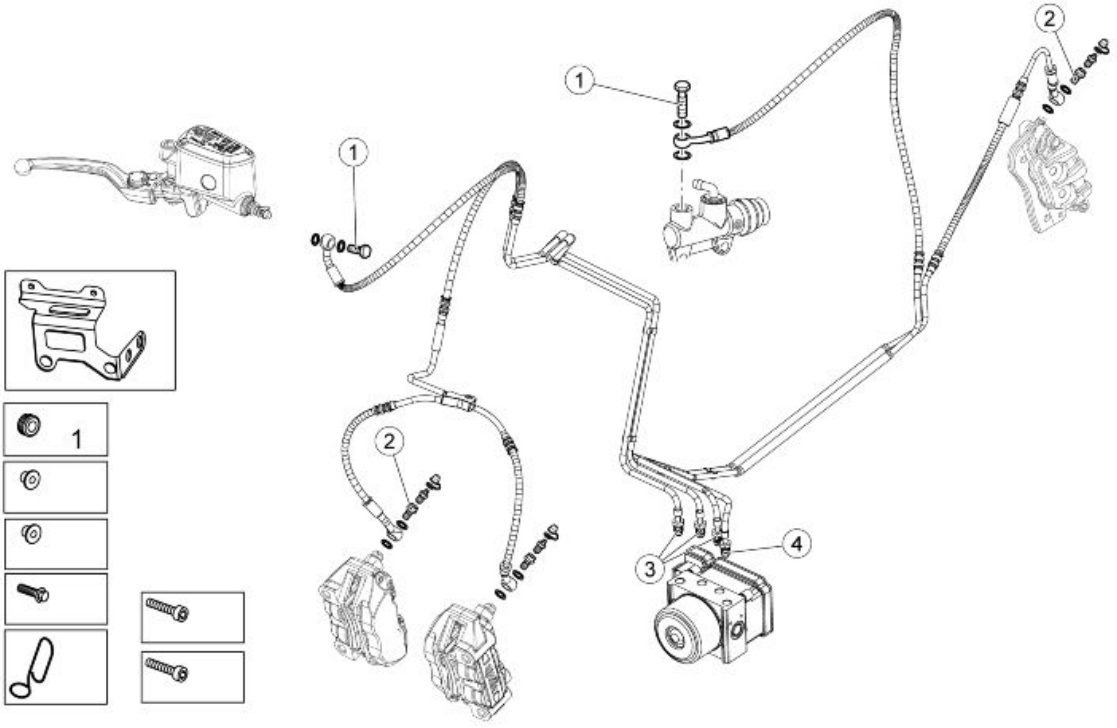
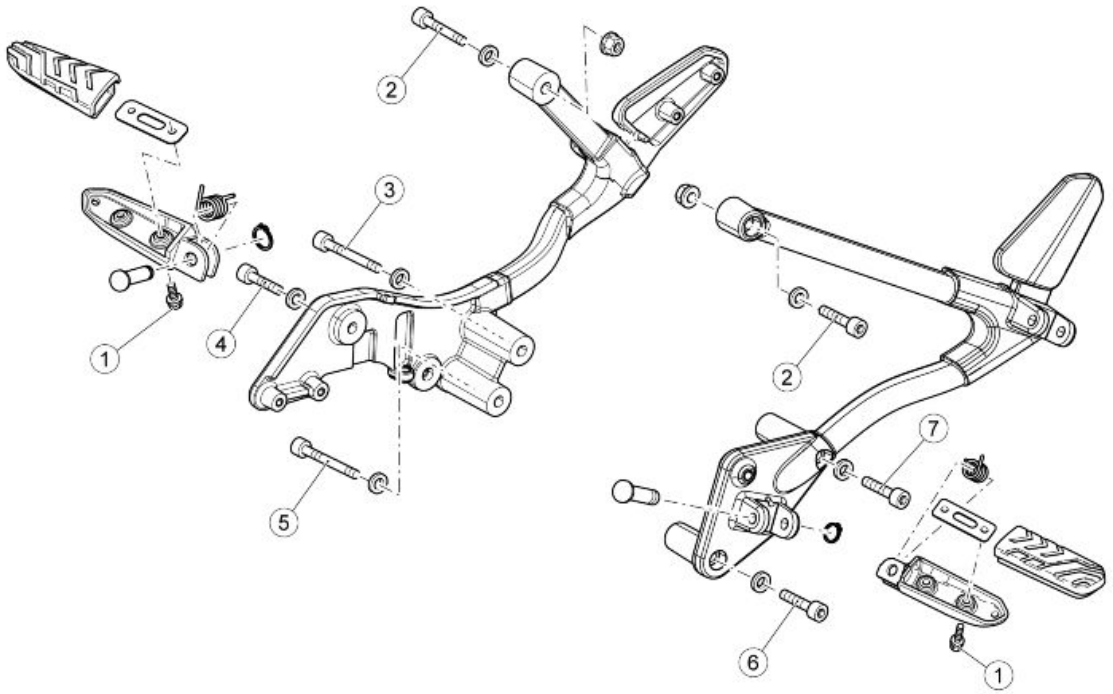


BRAKE SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Brake pipe slot screw on the pump	M10	2	25 Nm (18.44 lbf ft)	-
2	Joint with brake pipes retainer bleeding on the calliper	M10	3	25 Nm (18.44 lbf ft)	-
3	Brake pipes joint on the ABS hydraulic unit	-	3	25 Nm (18.44 lbf ft)	-
4	Brake pipes joint on the ABS hydraulic unit	M12	1	30-34 Nm (22.13-25.08 lbf ft)	-



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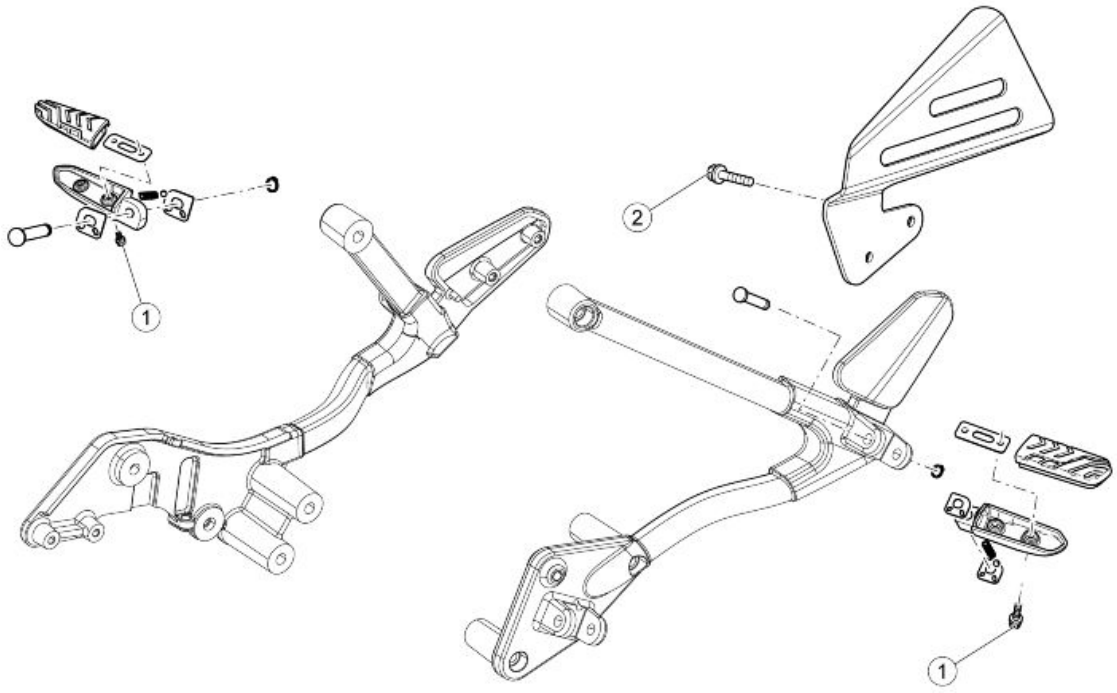
SUPPORTO E PEDANE PILOTA

pos.	Description	Type	Quantity	Torque	Notes
1	Viti Flang. fissaggio piastrine	-	4	10 Nm (7.38 lbf ft)	-
2	Viti TCEI fissaggio supporto pedane	M8x35	2	25 Nm (18.44 lbf ft)	-
3	Vite fissaggio supporto pedane	-	1	25 Nm (18.44 lbf ft)	-
4	Vite TCEI fissaggio supporto pedane	M8x25	1	25 Nm (18.44 lbf ft)	-
5	Vite fissaggio supporto pedane	-	1	25 Nm (18.44 lbf ft)	-
6	Vite TCEI fissaggio supporto pedane	M8x60	1	25 Nm (18.44 lbf ft)	-
7	Vite fissaggio supporto pedane	-	1	25 Nm (18.44 lbf ft)	-



PASSENGER FOOTRESTS

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio piastrine	-	4	10 Nm (7.38 lbf ft)	-
2	Viti TE Flang. fissaggio protezione pedana passeggero SX	M6x12	2	10 Nm (7.38 lbf ft)	-

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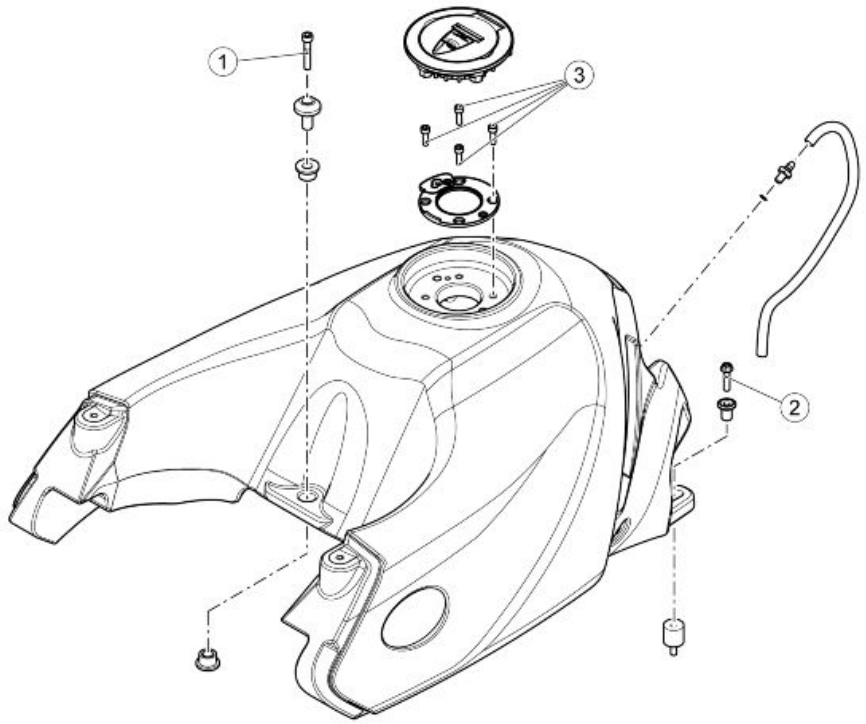
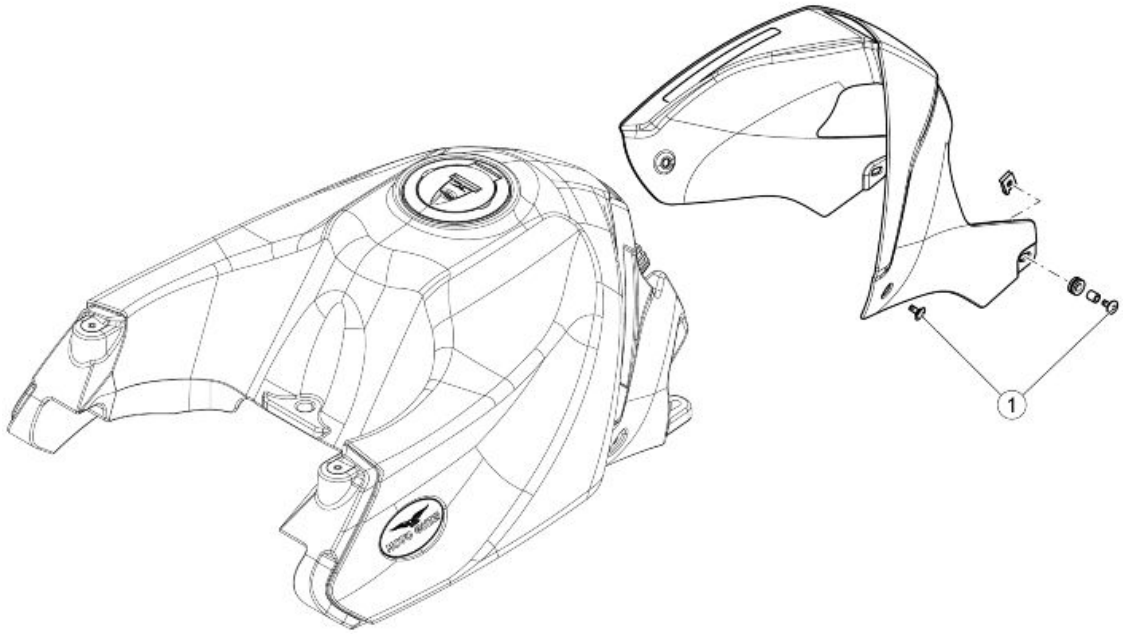


FUEL TANK

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TCEI fissaggio anteriore	M6x35	1	10 Nm (7.38 lbf ft)	-
2	Vite TE Flang. fissaggio posteriore	M6x25	2	10 Nm (7.38 lbf ft)	-
3	Viti TCEI fissaggio tappo benzina	M5x15	4	4 Nm (2.95 lbf ft)	-



COPERTURA SERBATOIO CARBURANTE

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TBEI Flang. fissaggio copertura	-	4	5 Nm (3.69 lbf ft)	-

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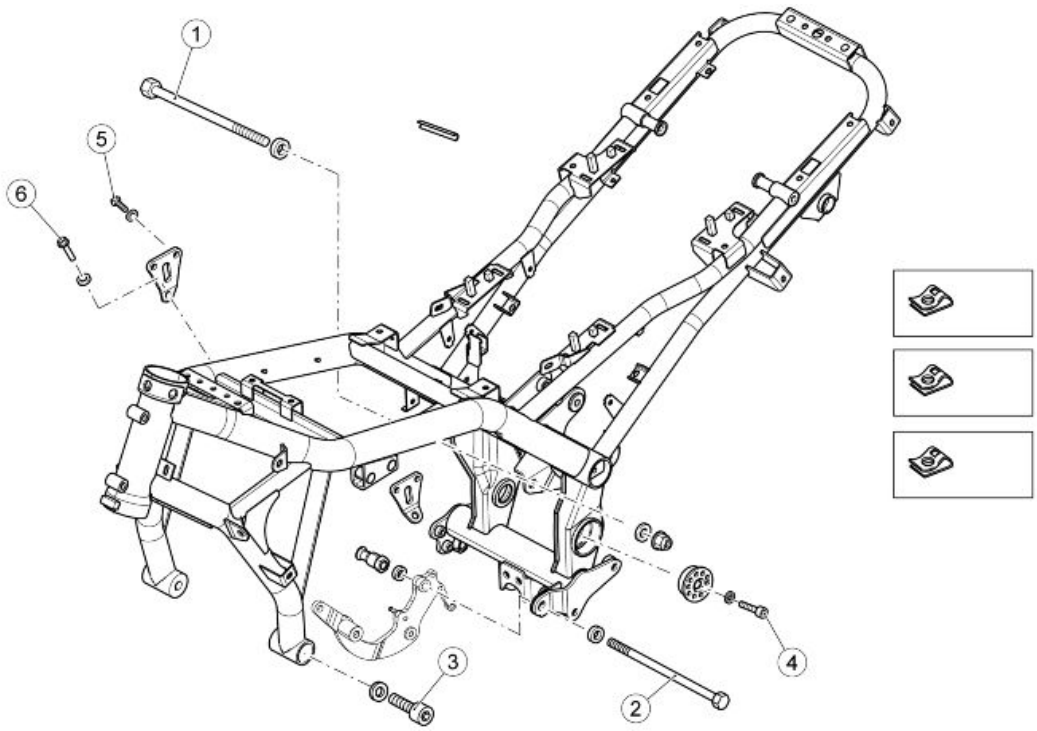

CHASSIS

pos.	Description	Type	Quantity	Torque	Notes
1	Pin	M12	1	50 Nm (36.88 lbf ft)	-
2	Pin	M12x260	1	50 Nm (36.88 lbf ft)	-
3	Viti TCEI fissaggio anteriore motore a telaio	M12x50	2	80 Nm (59.00 lbf ft)	-
4	Screws	M8x14	2	25 Nm (18.44 lbf ft)	-
5	Viti TE Flang.	M8x25	4	25 Nm (18.44 lbf ft)	-
6	Screws	M10	2	50 Nm (36.88 lbf ft)	-

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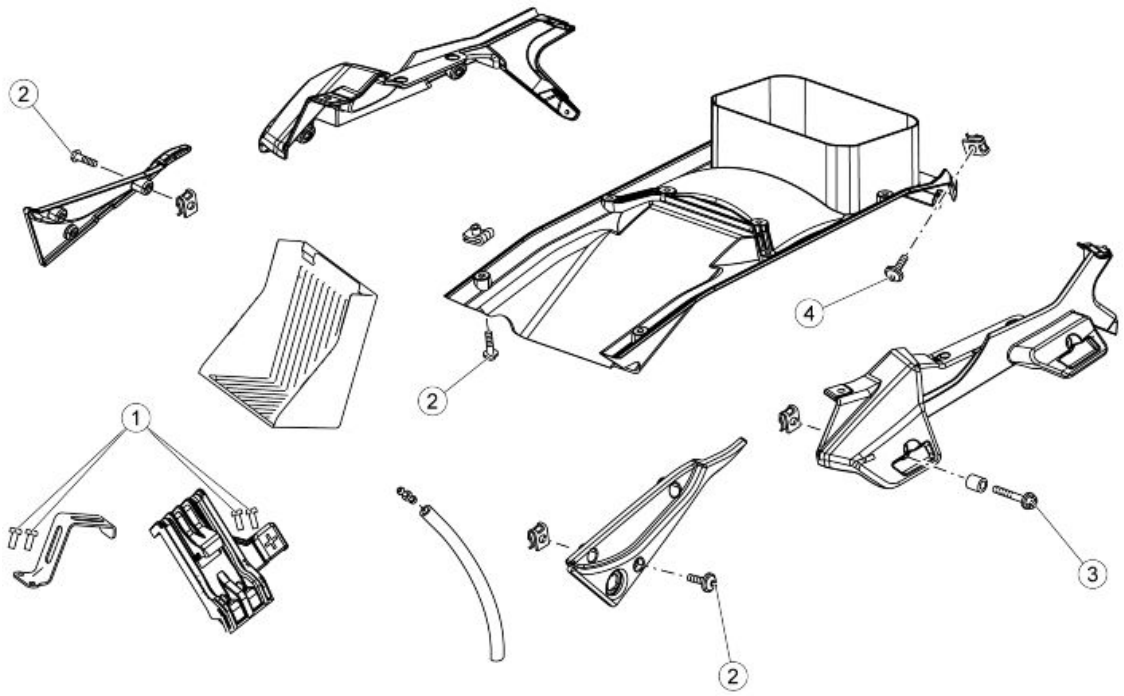
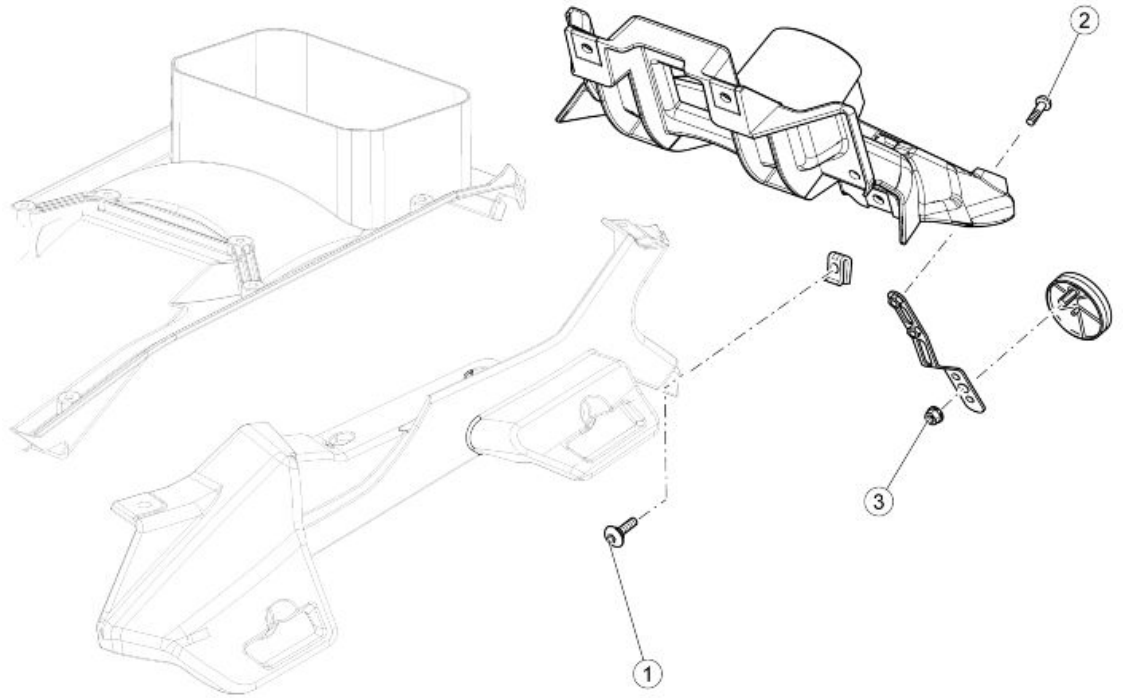
Back side



REAR BODYWORK

pos.	Description	Type	Quantity	Torque	Notes
1	Viti SWP fissaggio piastra batteria	M5x20	4	Manual	-
2	Viti TBEI Flang. fissaggio fianchetti e para-spruzzi	M5x9	10	6 Nm (4.42 lbf ft)	-
3	Viti TE Flang. fissaggio supporti valigie	M6	4	10 Nm (7.38 lbf ft)	-
4	Viti TBEI Flang. fissaggio paraspruzzi	M5x12	2	6 Nm (4.43 lbf ft)	-



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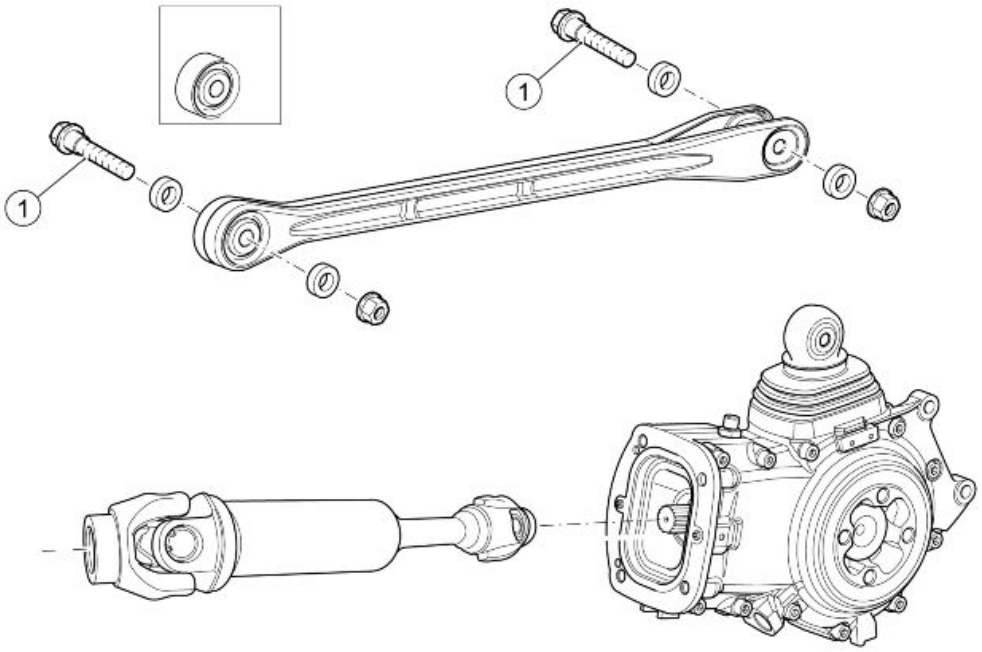
LICENSE PLATE HOLDER

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio portatarga	M5	2	6 Nm (4.43 lbf ft)	-
2	Viti TBEI speciali	-	2	6 Nm (4.43 lbf ft)	-
3	Dado autobloc. flang. fissaggio catadiottro	M5	1	6 Nm (4.43 lbf ft)	-



TRANSMISSION CONNECTION - ENGINE

pos.	Description	Type	Quantity	Torque	Notes
1	Reaction rod fixing screw	M10x55	2	50 Nm (36.87 lbf ft)	-

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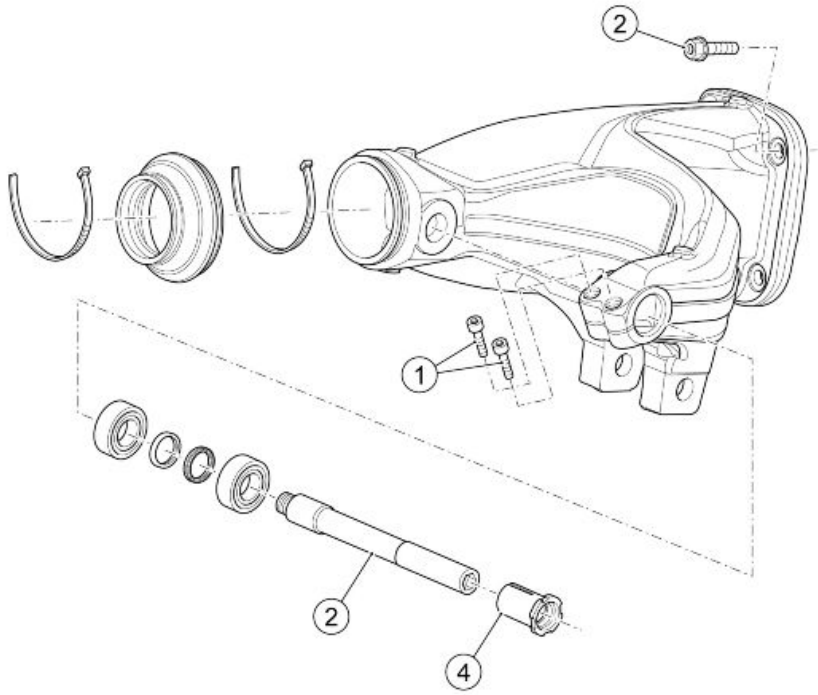
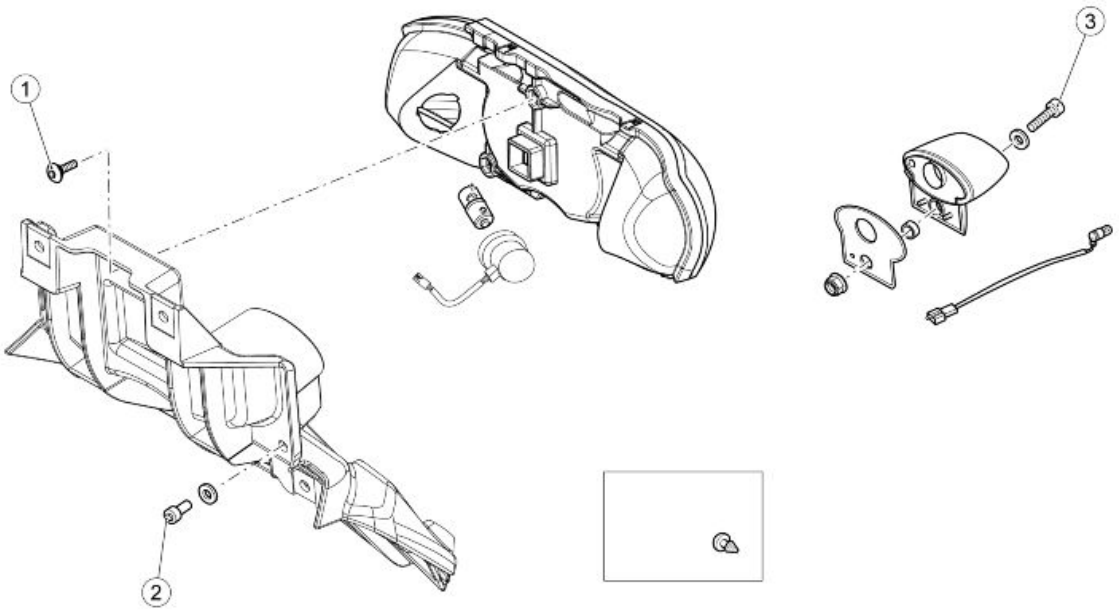


REAR SWINGARM

pos.	Description	Type	Quantity	Torque	Notes
1	Swingarm clamp fixing screw on the bushing	M6x25	2	10 Nm (7.37 lbf ft)	-
2	2 - Swingarm fixing screw on the transmission housing	M10x35	4	50 Nm (36.87 lbf ft)	-
3	Swingarm pin on the swingarm	M12	1	60 Nm (44.25 lbf ft)	-
4	Preloading bushing to the swingarm pin	M25	1	10 Nm (7.37 lbf ft)	-



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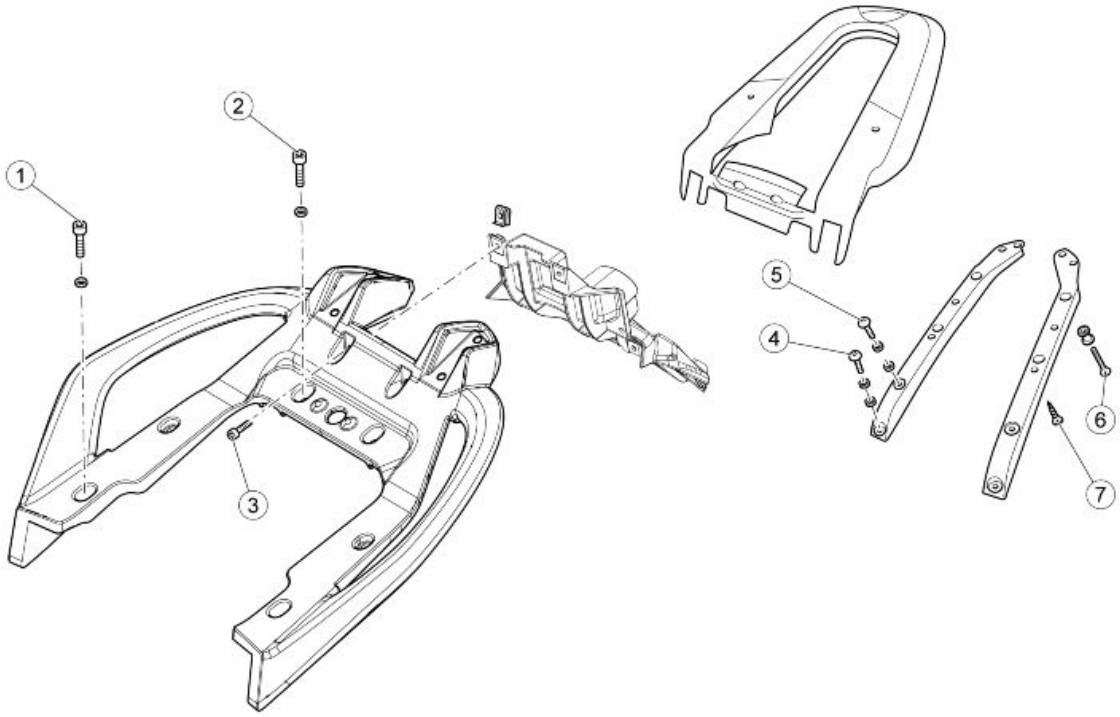
LUCI POSTERIORI

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TBEI Flang. fissaggio fanale	-	1	6 Nm (4.43 lbf ft)	-
2	Vite TCEI fissaggio fanale	-	2	6 Nm (4.43 lbf ft)	-
3	Vite TCEI fissaggio fanale targa	M5x25	1	6 Nm (4.43 lbf ft)	-



MANIGLIONE E PORTAPACCHI

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TCEI fissaggio maniglione passeggero	M6x25	4	10 Nm (7.38 lbf ft)	-
2	Vite TCEI fissaggio maniglione passeggero	M8	2	25 Nm (18.44 lbf ft)	-
3	Vite fissaggio portatarga a maniglione	M5	2	6 Nm (4.42 lbf ft)	-
4	Vite TBEI fissaggio supporti portapacchi	M8x20	2	25 Nm (18.44 lbf ft)	-
5	Vite TBEI fissaggio supporti portapacchi	M8x30	2	25 Nm (18.44 lbf ft)	-
6	Vite TSPEI fissaggio coperchio portapacchi	M6x35	2	10 Nm (7.38 lbf ft)	-
7	Vite autofil. fissaggio coperchio portapacchi	5	4	Manual	-

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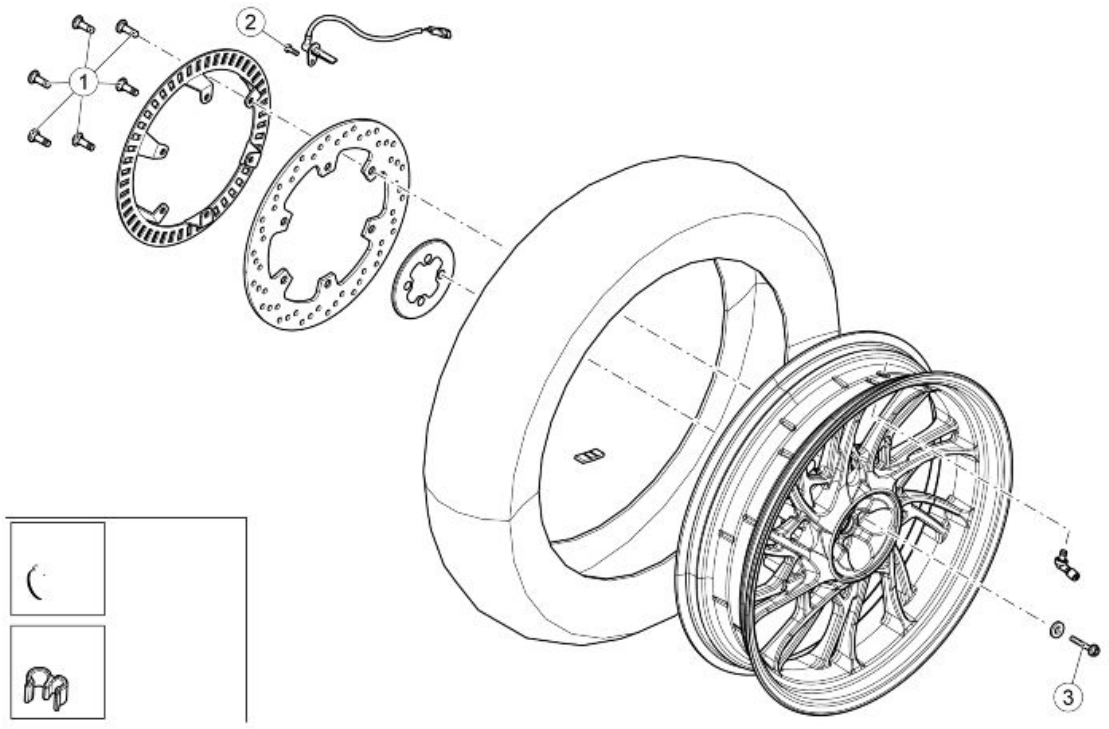
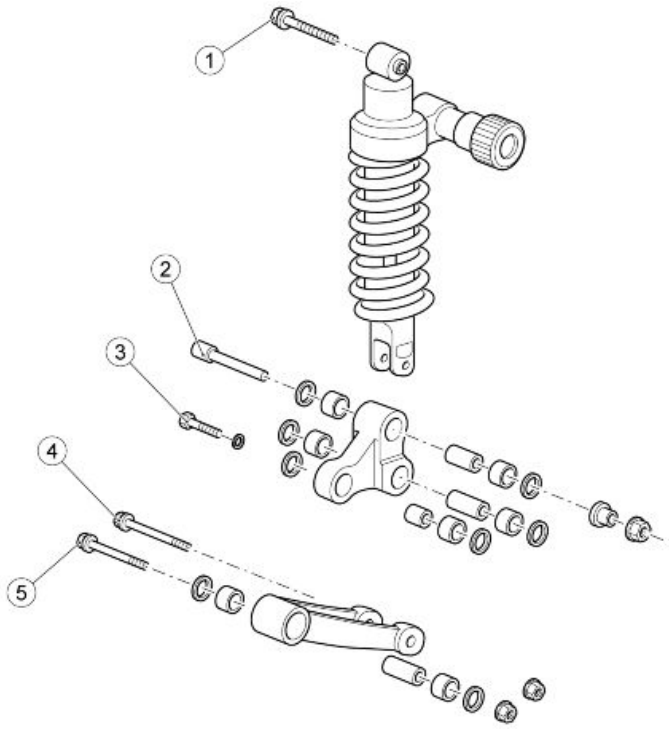


REAR WHEEL

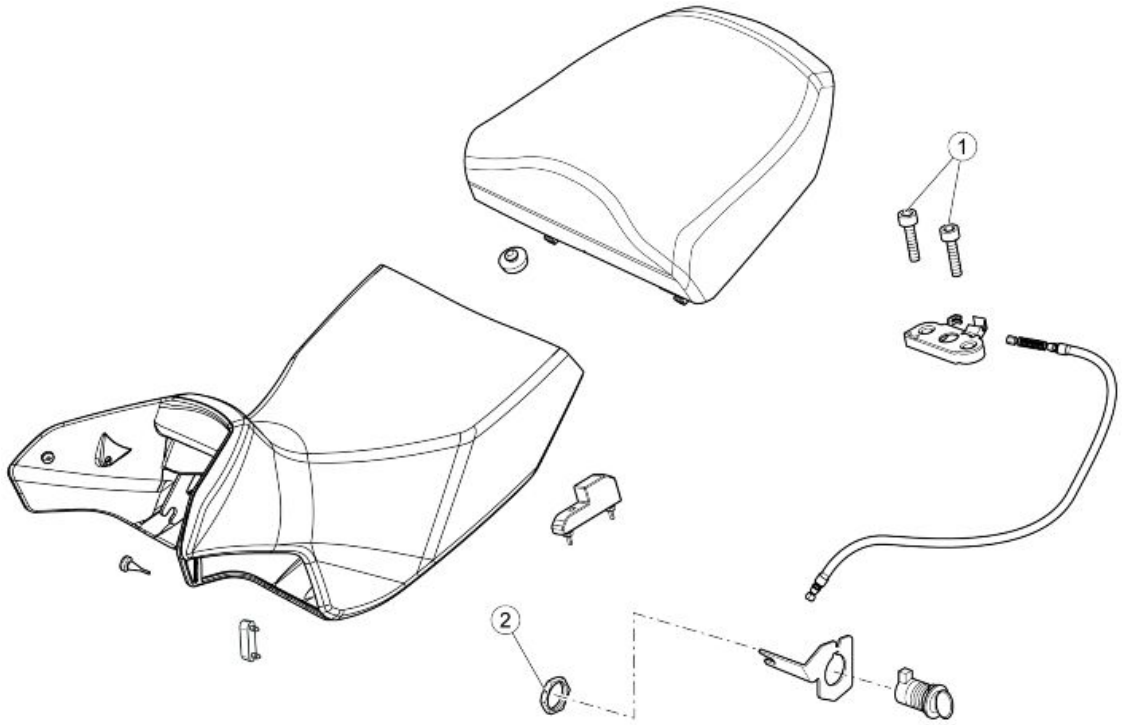
pos.	Description	Type	Quantity	Torque	Notes
1	Vite TE Flang. fissaggio ruota fonica	-	6	25 Nm (18.44 lbf ft)	-
2	Vite TE Flang. fissaggio sensore	-	1	10 Nm (7.38 lbf ft)	-
3	Vite TE Flang. fissaggio sensore	M12x65	1	110 Nm (81.13 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

REAR SUSPENSION

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TE Flang. fissaggio superiore ammortizzatore	M10x80	1	50 Nm (36.88 lbf ft)	-
2	Vite TCEI fissaggio biella doppia/forcellone	M10x82	1	50 Nm (36.88 lbf ft)	-
3	Vite TE fissaggio biella doppia/ammortizzatore	M10x47	1	40 Nm (29.50 lbf ft)	-
4	Vite TE flang. fissaggio biella singola/biella doppia	M10x95	1	50 Nm (36.88 lbf ft)	-
5	Vite TE flang. fissaggio biella singola al telaio	M10x85	1	50 Nm (36.88 lbf ft)	-



SADDLE

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TBEI fissaggio piastra attacco sella	M6	2	10 Nm (7.38 lbf ft)	-
2	Dado serratura	-	1	Manual	-

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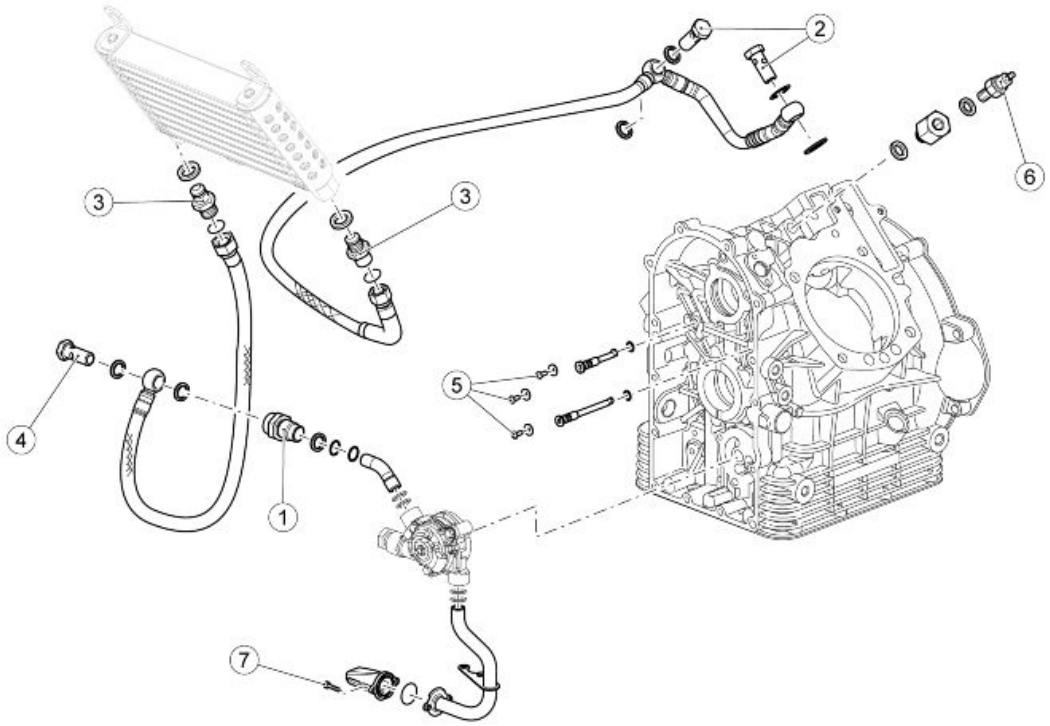
Engine



LUBRICATION SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Pump outlet oil pipe nipple	M14x1.5	1	40 Nm (29.50 lbf ft)	-
2	Slot screw for oil pipe on the cylinder head	M14x1.5	2	20 Nm (14.75 lbf ft)	-
3	Nipple on the radiator and the oil pipe	M16x1.5	2	20 Nm (14.75 lbf ft)	Apply vaseline oil
4	Oil delivery pipe to radiator slot screw	M14x1.5	1	35 Nm (25.81 lbf ft)	-
5	Jets fixing screw	-	3	Using a "T" spanner, close by hand	Loctite 243
6	Minimum oil pressure sensor	M12	1	25 Nm (18.44 lbf ft)	-
7	Intake oil filter fixing screw	-	2	4 Nm (2.95 lbf ft)	-

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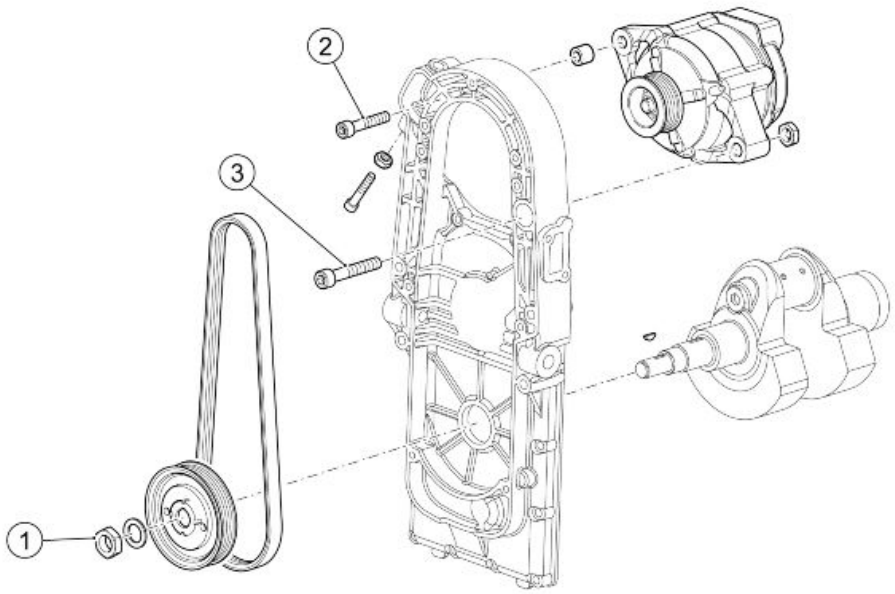
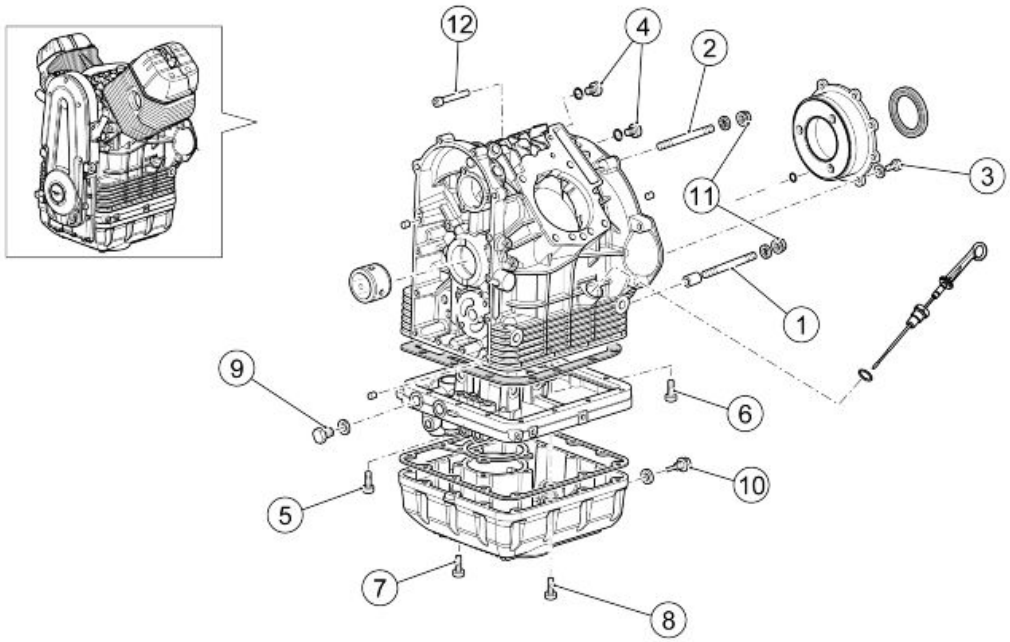


ALTERNATOR

pos.	Description	Type	Quantity	Torque	Notes
1	Generator control pulley locking nut	M16	1	80 Nm (59.00 lbf ft)	Loctite 243
2	Generator upper fixing screw	M8	1	22 Nm (16.23 lbf ft)	-
3	Generator lower fixing screw	M10x60	1	30 Nm (22.13 lbf ft)	-



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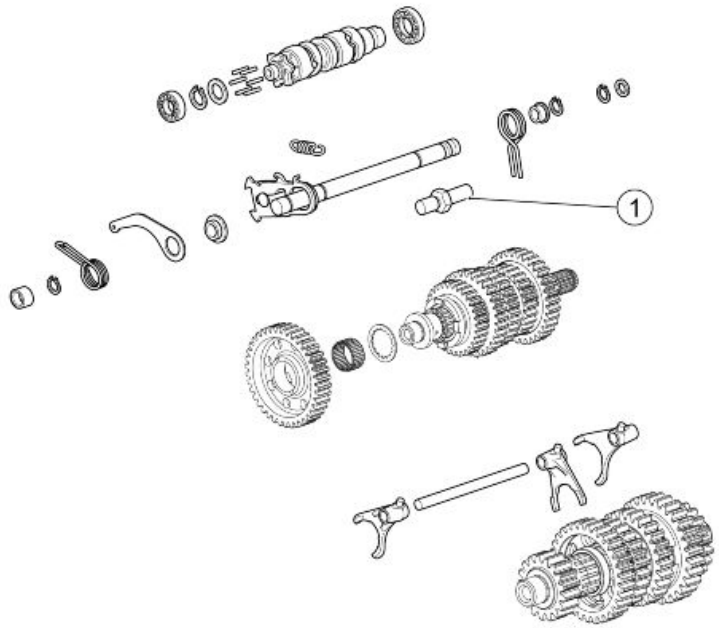
CRANKCASE AND OIL SUMP

pos.	Description	Type	Quantity	Torque	Notes
1	Stud bolt	M8x75	2	10 Nm (7.37 lbf ft)	-
2	Stud bolt	M8x66	3	10 Nm (7.37 lbf ft)	-
3	Crankshaft rear support flange fixing screw	M8x25	8	26 Nm (19.18 lbf ft)	-
4	Oil cap on the crankcase	-	2	25 Nm (18.44 lbf ft)	-
5	Flange fixing screw under the crankcase	M6x60	2	10 Nm (7.37 lbf ft)	-
6	Flange fixing screw under the crankcase	-	2	10 Nm (7.37 lbf ft)	-
7	Oil sump fixing screw (filter contour)	M6x35	4	10 Nm (7.37 lbf ft)	-
8	Oil sump fixing screw	M6	14	10 Nm (7.37 lbf ft)	-
9	Cover on the flange under the crankcase	-	2	20 Nm (14.75 lbf ft)	-
10	Magnetic oil drainage cap	-	1	20 Nm (14.75 lbf ft)	-
11	Gear to engine fixing nut	M8	5	20 Nm (14.75 lbf ft)	-
12	Gear to engine fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 542



GEAR INTERNAL CONTROLS

pos.	Description	Type	Quantity	Torque	Notes
1	Spring guide pin	-	1	24 Nm (17.70 lbf ft)	Loctite 243

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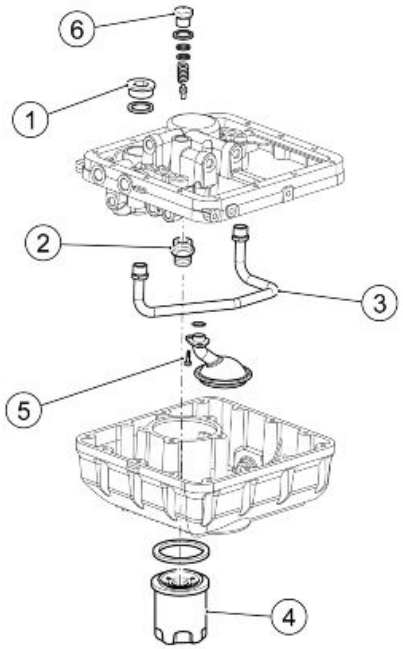
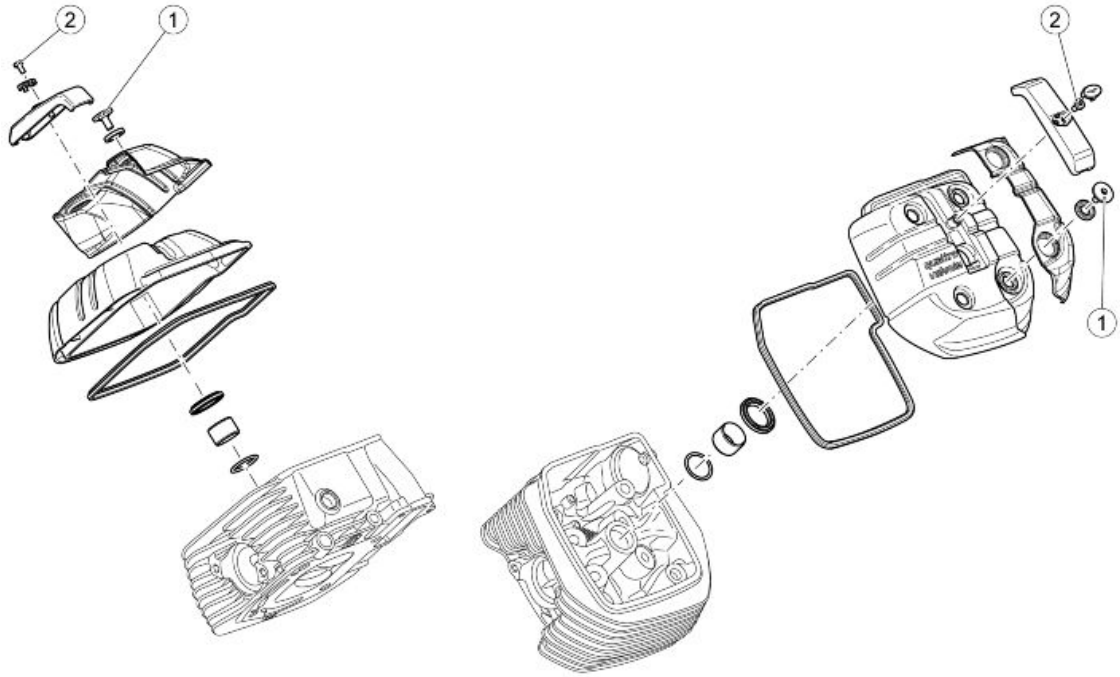


OIL SUMP COMPONENTS

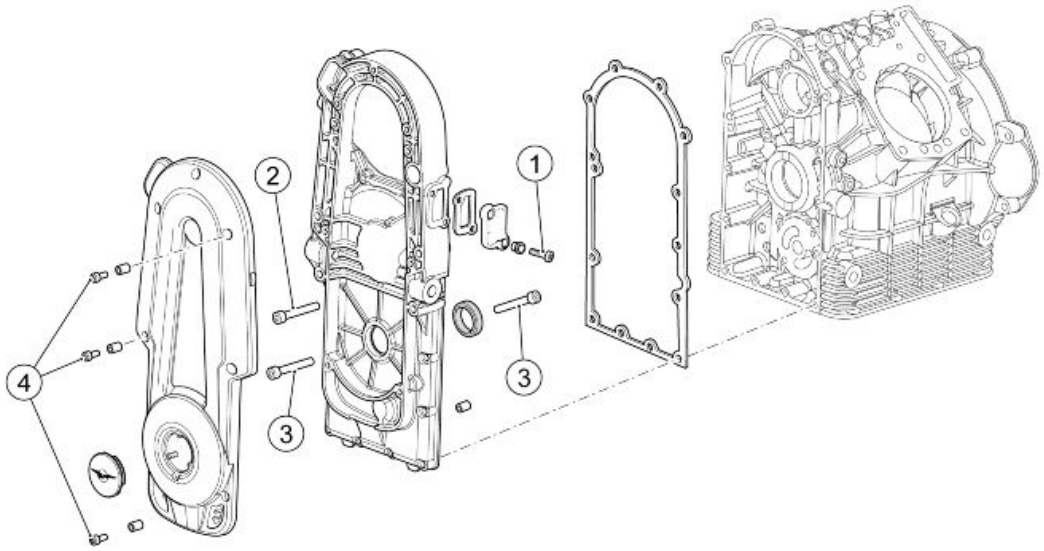
pos.	Description	Type	Quantity	Torque	Notes
1	Cover on the flange under the crankcase	-	1	40 Nm (29.50 lbf ft)	-
2	Oil filter joint	-	1	10 Nm (7.37 lbf ft)	Loctite 243
3	Oil sump pipe	-	1	20 Nm (14.75 lbf ft)	Loctite 648
4	Oil filter	-	1	15 Nm (11.06 lbf ft)	Engine oil
5	Rose pipe fixing screw	M6	-	10 Nm (7.37 lbf ft)	-
6	Maximum pressure valve cover	M18	1	40 Nm (29.50 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

CYLINDER HEAD COVERS

pos.	Description	Type	Quantity	Torque	Notes
1	Special cylinder head fixing screw	-	8	8 Nm (5.90 lbf ft)	Locked with cross sequence
2	Spark plug cover fixing screw	M5x10	2	8 Nm (5.90 lbf ft)	-



GENERATOR COVER

pos.	Description	Type	Quantity	Torque	Notes
1	Timing system cover cap fixing screw	M6x20	2	10 Nm (7.37 lbf ft)	Loctite 243
2	Timing system cover fixing screw	M8x55	4	25 Nm (18.44 lbf ft)	-
3	Timing system cover fixing screw	M6x30	9	12 Nm (8.85 lbf ft)	-
4	Generator cover fixing screw	M6x16	5	12 Nm (8.85 lbf ft)	-

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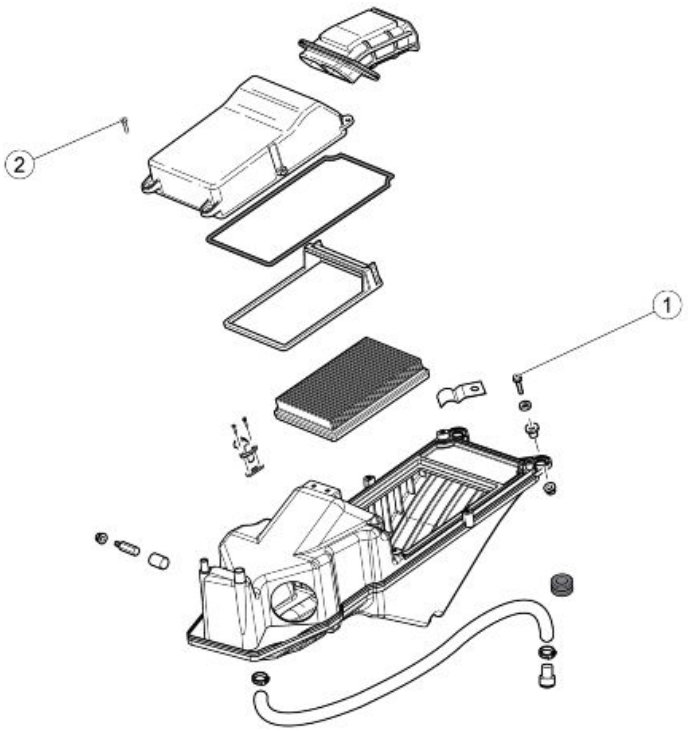
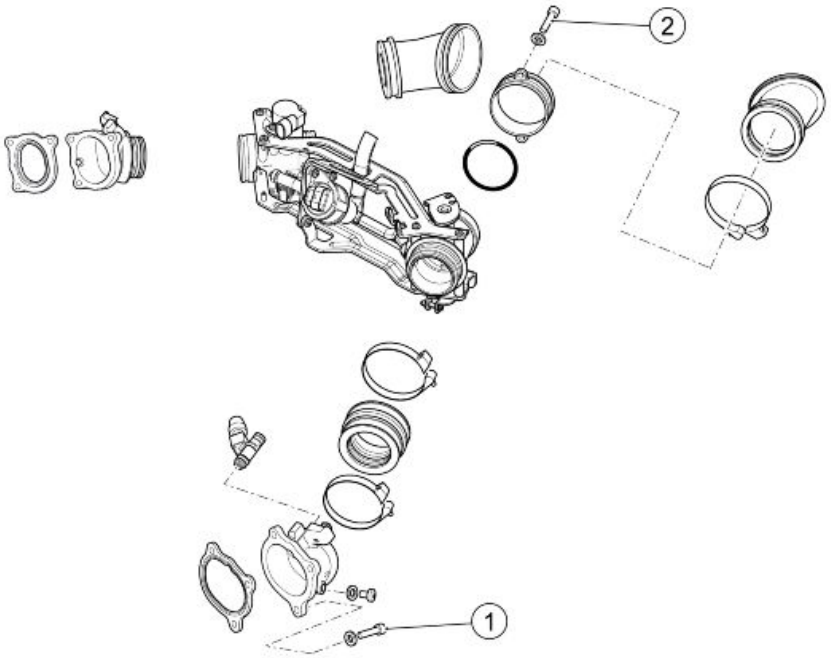


AIR FILTER

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio cassa filtro aria a telaio	-	2	10 Nm (7.38 lbf ft)	-
2	Air filter box cover fastening screw	SWP 5x20	6	3 Nm (2.21 lbf ft)	-

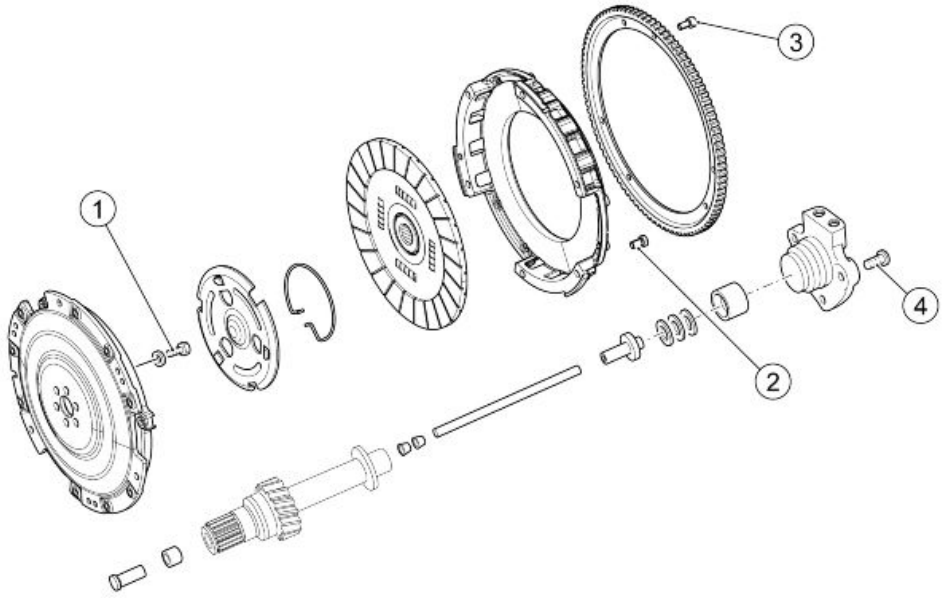


THROTTLE BODY

pos.	Description	Type	Quantity	Torque	Notes
1	Intake pipe fixing screw	-	6	10 Nm (7.37 lbf ft)	-

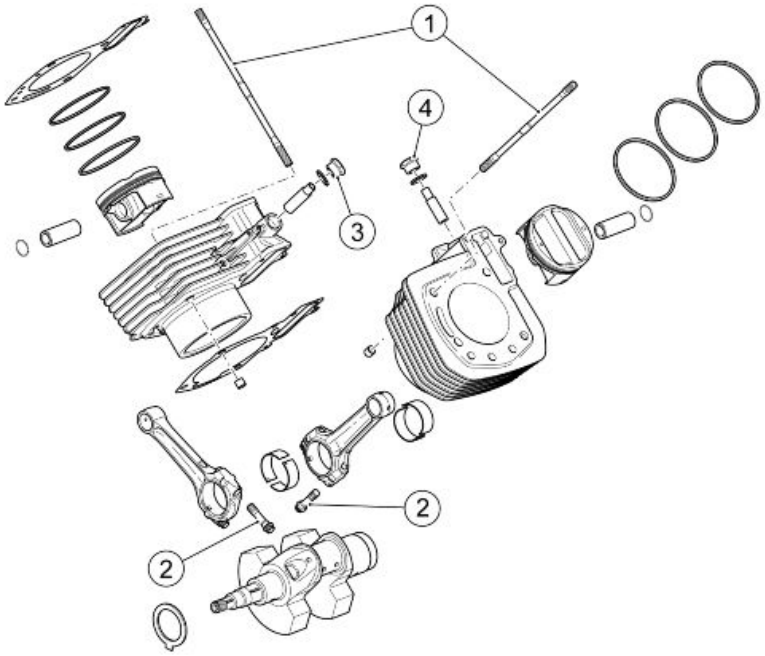
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

pos.	Description	Type	Quantity	Torque	Notes
2	Flange fixing screw on the throttle body	M5x12	2	6 Nm (4.42 lbf ft)	-



CLUTCH

pos.	Description	Type	Quantity	Torque	Notes
1	Clutch to crankshaft fixing screw	-	6	42 Nm (30.98 lbf ft)	Tighten with cross sequence
2	Clutch external flange fixing screw on flywheel	M7x16	6	20 Nm (14.75 lbf ft)	Loctite 243
3	Start-up crown fixing screw on flywheel	-	6	10 Nm (7.37 lbf ft)	Loctite 243
4	Clutch control cylinder fixing screw	-	3	10 Nm (7.37 lbf ft)	Loctite 243



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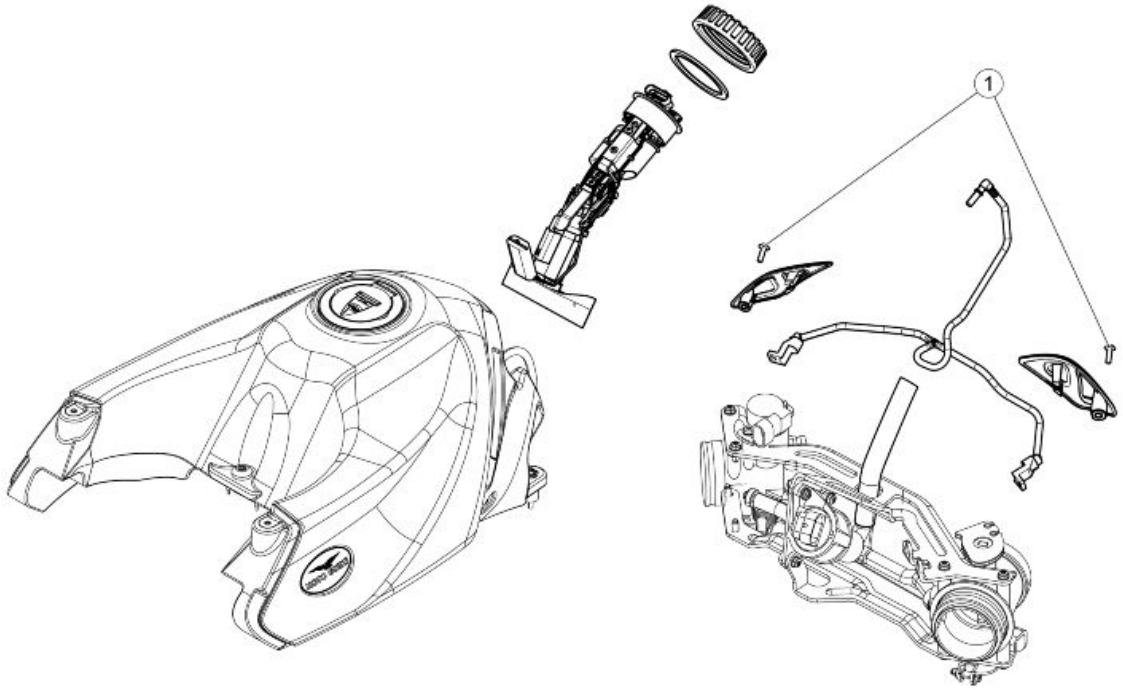
CONNECTING ROD ASSEMBLY - CYLINDERS

pos.	Description	Type	Quantity	Torque	Notes
1	Thermal group fixing stud bolt	M10x1.25	8	5 Nm (3.69 lbf ft)	Loctite 243
2	Connecting rod screws	-	4	40 Nm (29.50 lbf ft)	Pre-tightening
2	Connecting rod screws	-	4	80 Nm (59.00 lbf ft)	Final tightening
3	Right hydraulic tensioner cover	-	1	42 Nm (30.98 lbf ft)	-
4	Left hydraulic tensioner cover	-	1	30 Nm (22.13 lbf ft)	-



FUEL SUPPLY SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio protezioni corpo farfallato	M6	2	10 Nm (7.38 lbf ft)	-

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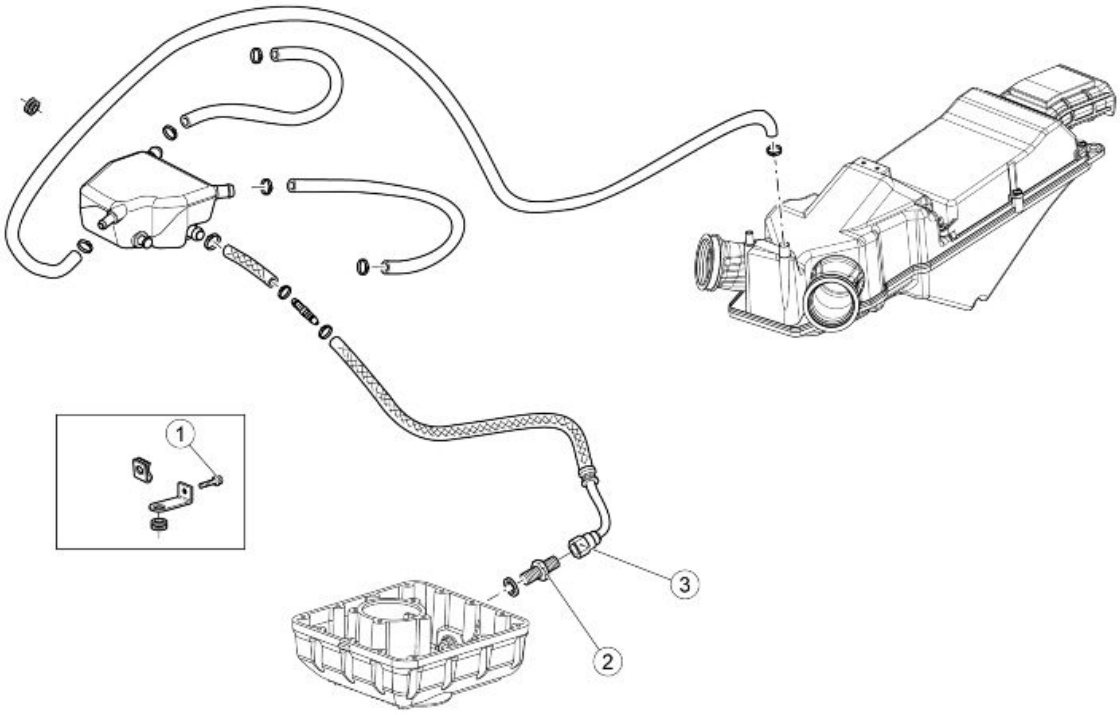
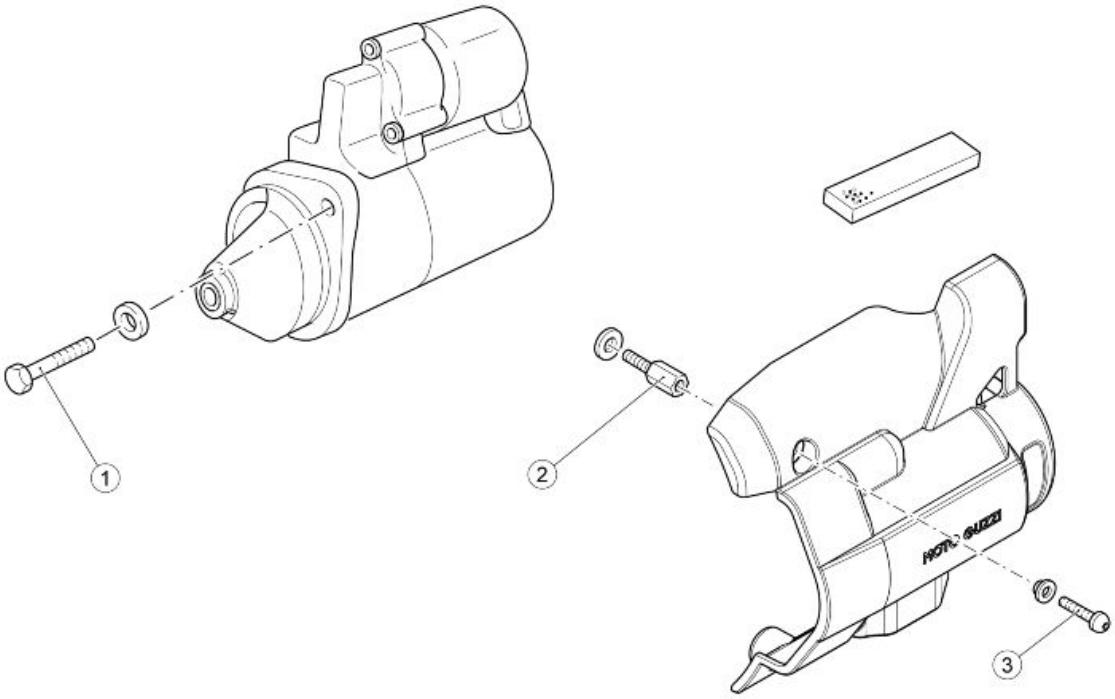


BLOW-BY SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio distanziale vaso espansione Blow - By a motore	SWP M5x14	1	10 Nm (7.38 lbf ft)	-
2	Reduction joint for oil return pipe	-	1	20 Nm (14.75 lbf ft)	-
3	Oil return pipe (on sump)	-	1	20 Nm (14.75 lbf ft)	Vaseline oil



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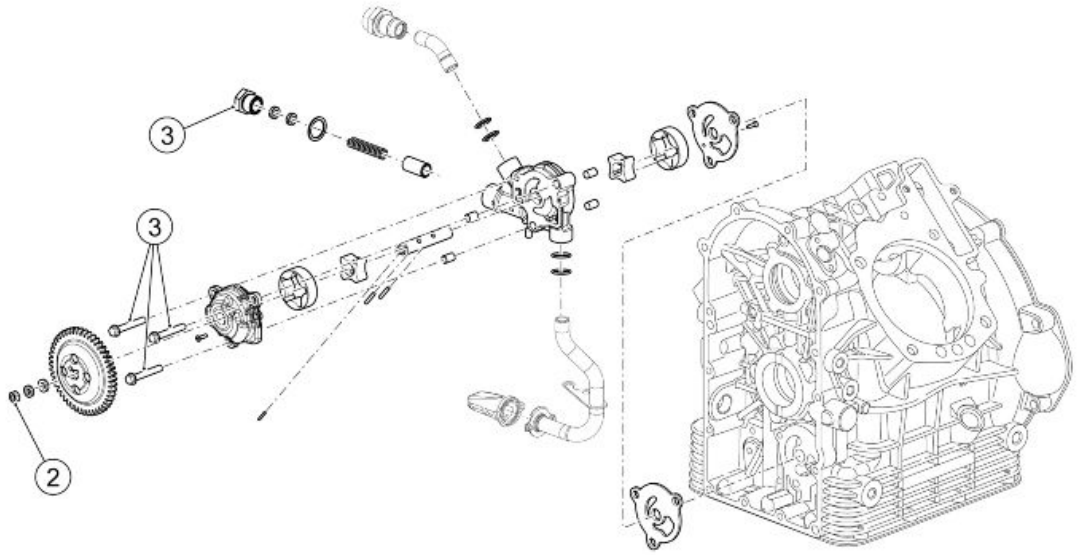
STARTER MOTOR

pos.	Description	Type	Quantity	Torque	Notes
1	Starter motor fixing screw	-	2	25 Nm (18.44 lbf ft)	-
2	Stud bolt	-	1	10 Nm (7.37 lbf ft)	-
3	Starter motor cover fixing screw	M6x10	2	8 Nm (5.90 lbf ft)	-



OIL PUMP

pos.	Description	Type	Quantity	Torque	Notes
1	Oil pump fixing screw	M6x45	3	10 Nm (7.37 lbf ft)	Loctite 243
2	Oil pump driven gear locking nut	M6	1	8 Nm (5.90 lbf ft)	Loctite 243
3	Oil pressure valve cap	-	1	40 Nm (29.50 lbf ft)	-

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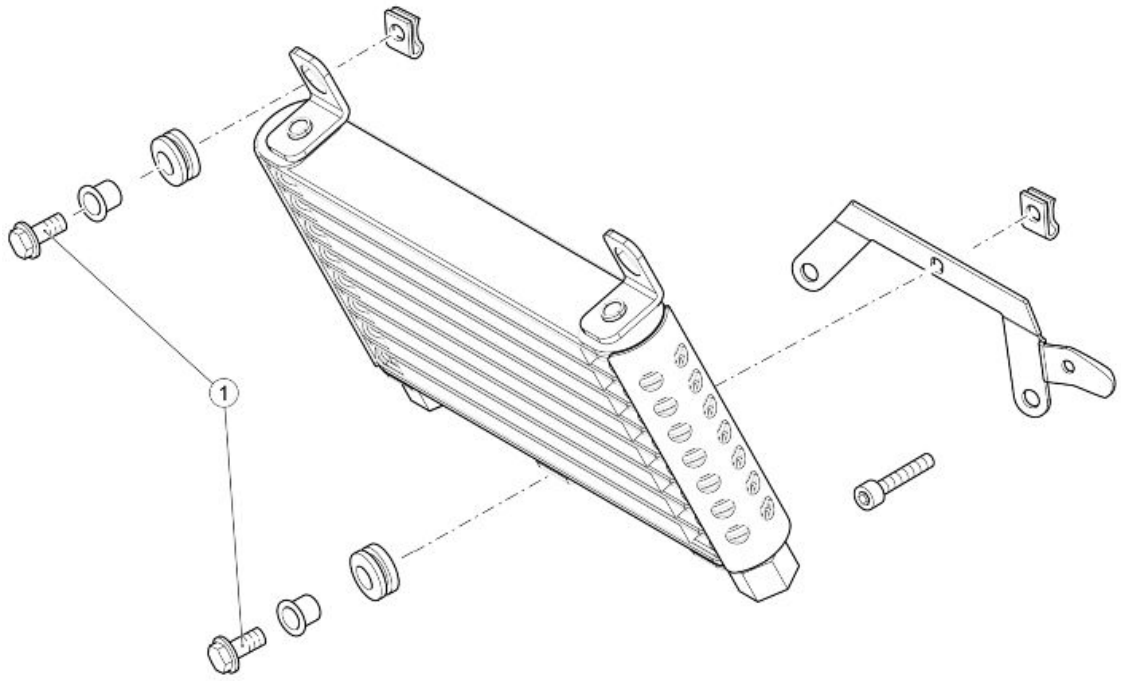
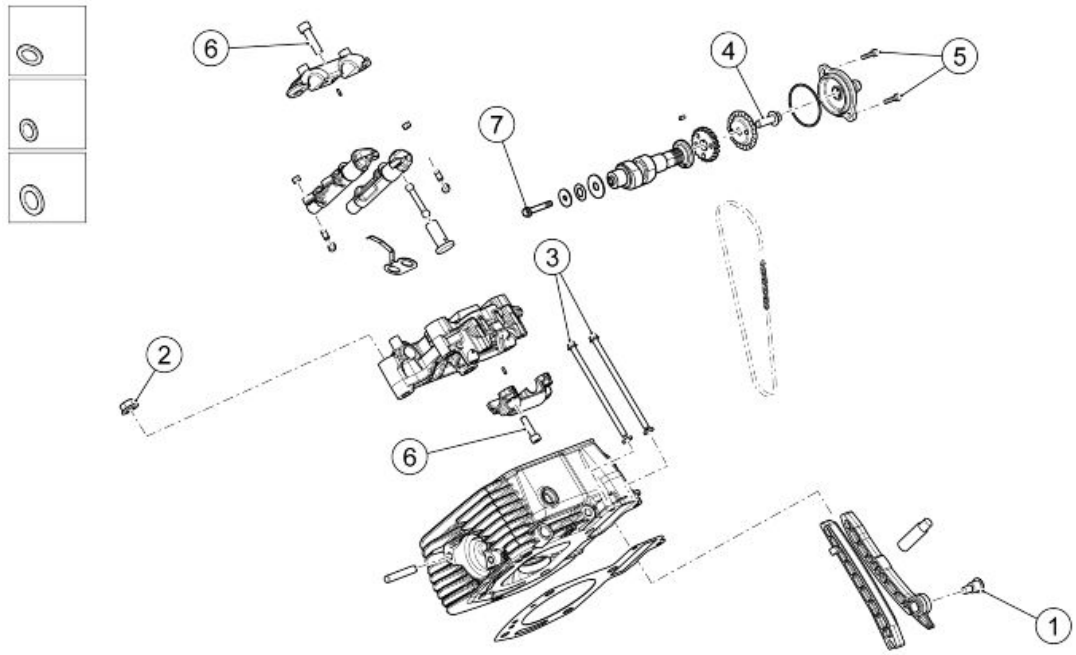


OIL RADIATOR

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio radiatore a telaio	M6x30	3	10 Nm (7.38 lbf ft)	-



TESTA DESTRA

Pos.	Descrizione	Tipo	Quantità	Coppia	Note
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243

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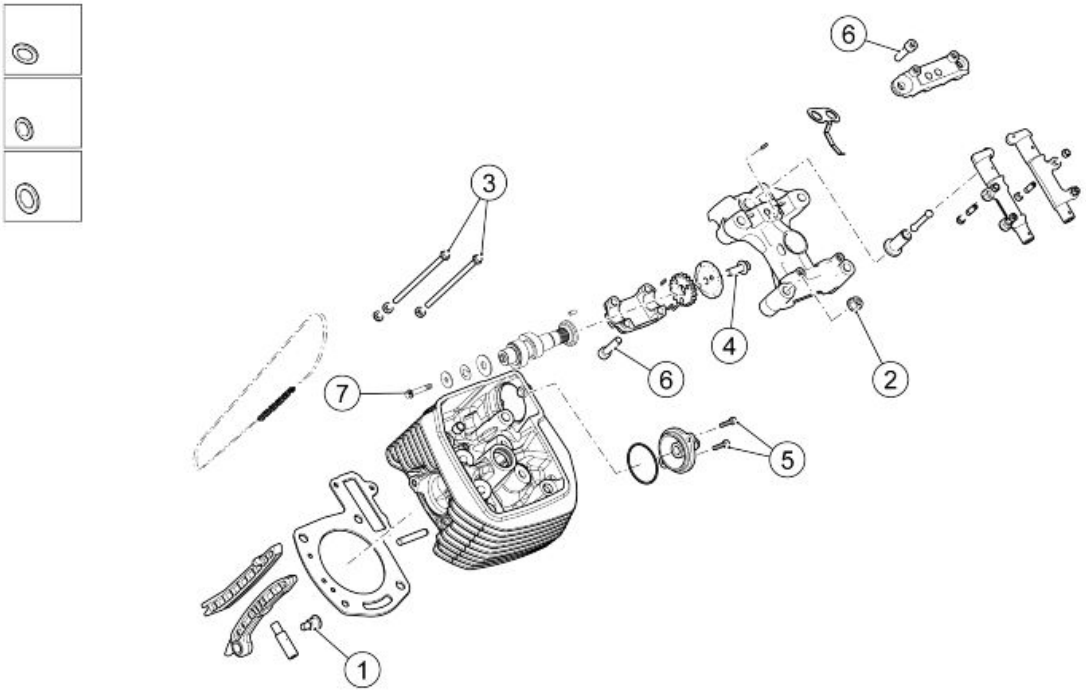
Pos.	Descrizione	Tipo	Quantità	Coppia	Note
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-
7	Vite fissaggio molla a tazza	-	1	18 Nm (13.28 lbf ft)	-



TESTA SINISTRA

Pos.	Descrizione	Tipo	Quantità	Coppia	Note
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-
7	Vite fissaggio molla a tazza	-	1	18 Nm (13.28 lbf ft)	-

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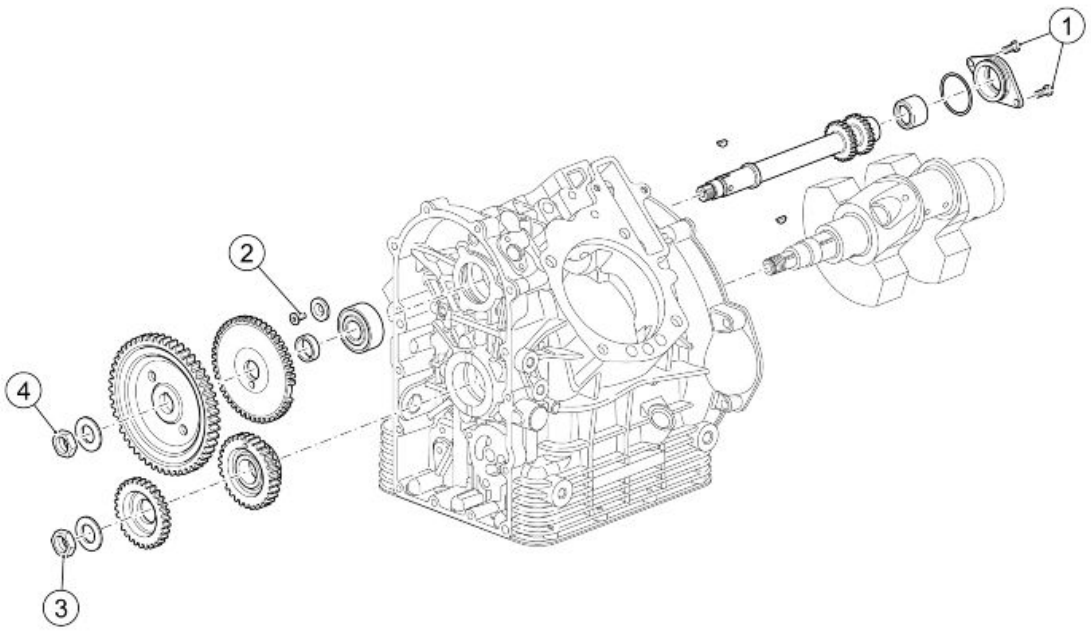
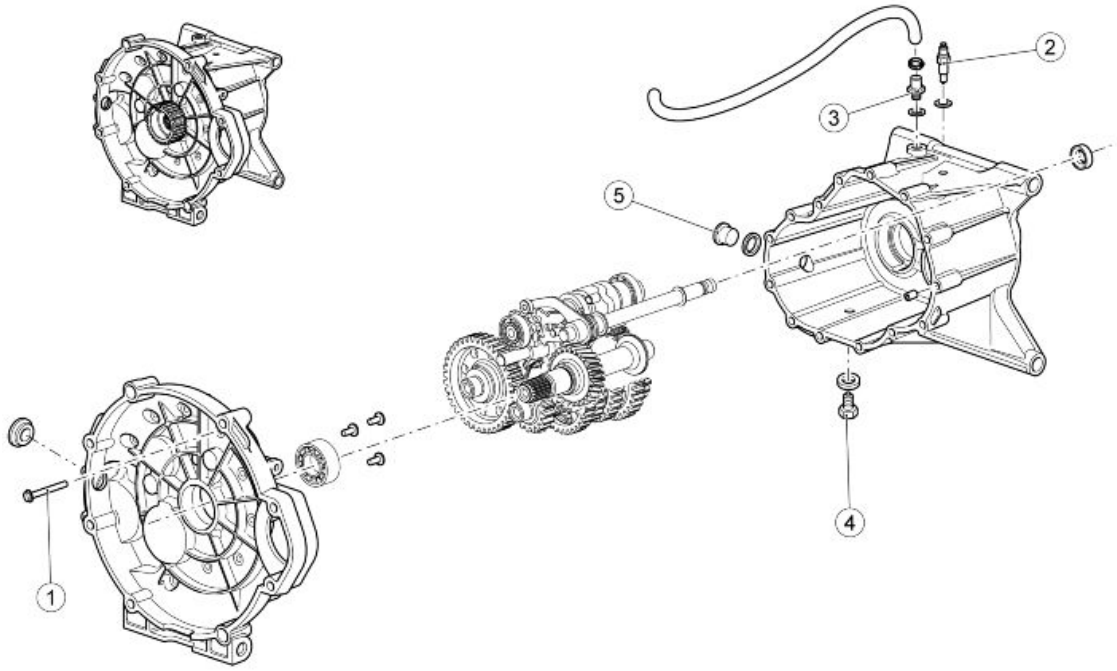


TIMING SYSTEM CONTROL

pos.	Description	Type	Quantity	Torque	Notes
1	Control, timing system, shaft support flange fixing screw	M6x14	2	8 Nm (5.90 lbf ft)	-
2	Bearing fixing screw	M6x16	1	10 Nm (7.37 lbf ft)	Loctite 243
3	Driving gears locking nut on the crankshaft	M25	1	200 Nm (147.51 lbf ft)	Loctite 601
4	Timing system driven gear locking nut	M18	1	25 Nm (18.44 lbf ft)	Pre-tightening
4	Timing system driven gear locking nut	M18	1	150 Nm (110.63 lbf ft)	Final tightening



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GEARBOX

pos.	Description	Type	Quantity	Torque	Notes
1	Clutch housing to gearbox fixing screw	M6x55	14	13 Nm (9.59 lbf ft)	-
2	Neutral sensor	-	1	10 Nm (7.37 lbf ft)	-
3	Breather stud bolt	-	1	8 Nm (5.90 lbf ft)	Loctite 243
4	Gear oil magnetic drainage cap	-	1	24 Nm (17.70 lbf ft)	-
5	Oil filler cap	M18x1.5	1	28 Nm (20.65 lbf ft)	-

Overhaul data

Assembly clearances

Cylinder - piston assy.

Measurement of the cylinder diameter must be done at three heights, turning the dial gauge 90°.

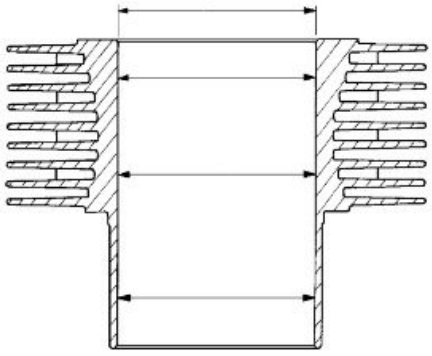
Check that cylinders and pistons are of the same selection types (D, E, F).

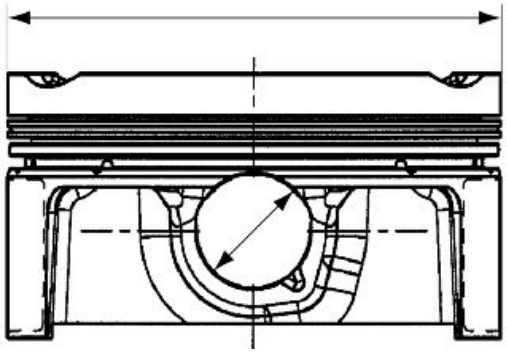
Check clearance between cylinders and pistons on the selected diameter; if it exceeds the value specified, it is necessary to replace cylinders and pistons.

The pistons of an engine must be balanced; a weight difference of up to 1.5 g (0.0033 lb) is allowed.

PISTON - CYLINDER SELECTION TYPES

Specification	Desc./Quantity
Piston diameter - selection D	94.935 - 94.945 mm (3.73759 - 3.73798 in)
Cylinder diameter - selection D	95.000 - 95.010 mm (3.74015 - 3.74054 in)
Piston diameter - selection E	94.945 - 94.955 mm (3.73798 - 3.73837 in)
Cylinder diameter - selection E	95.010 - 95.020 mm (3.74054 - 3.74093 in)
Piston diameter - selection F	94.955 - 94.965 mm (3.73837 - 3.73877 in)
Cylinder diameter - selection F	95.020 - 95.030 mm (3.74093 - 3.74133 in)





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PIN - PISTON COUPLING

Specification	Desc./Quantity
Pin diameter	21.998 - 21.994 mm (0.86606 - 0.86590 in)
Pin hole diameter on piston	22.016 - 22.011 mm (0.86677 - 0.86657 in)
Clearance between pin and holes on piston	0.013 - 0.022 mm (0.00051 - 0.00087 in)

Piston rings

On each piston there are:

- 1 top piston ring;
- 1 middle piston ring;
- 1 oil scraper piston ring.

Turn the rings so that the coupling ends are 120 degrees from each other.

CLEARANCE BETWEEN PISTON RINGS AND SEATS ON PISTON

Specification	Desc./Quantity
Top ring	0.030 - 0.065 mm (0.00118 - 0.00256 in)
Middle ring	0.020 - 0.055 mm (0.00079 - 0.00216 in)
Oil scraper ring	0.010 - 0.045 mm (0.00039 - 0.00177 in)

Gap between the end of the piston rings inserted in the cylinder:

- Top and middle piston ring: 0.40 - 0.65 mm (0.00158 - 0.00255 in)
- Oil scraper piston ring: 0.30 - 0.60 mm (0.00118 - 0.00236 in).

Crankcase - crankshaft - connecting rod

CRANKSHAFT SEAT (TIMING SYSTEM SIDE)

Specification	Desc./Quantity
Diameter of crankshaft main journal, timing system side	37.975 - 37.959 mm (1.49507 - 1.49444 in)
Inside diameter of crankshaft bushing, timing system side	38.016 - 38.0 mm (1.49669 - 1.49606 in)
Clearance between bushing and main journal (timing system side)	0.025 - 0.057 mm (0.00098 - 0.00224 in)

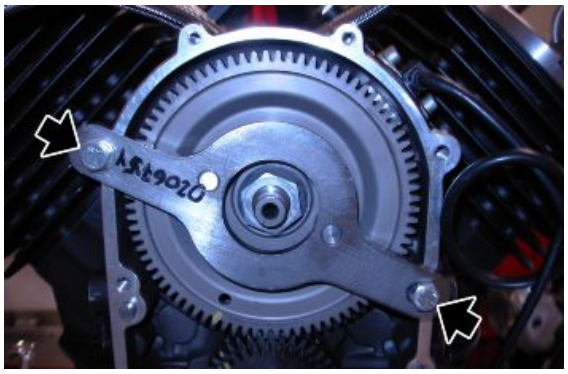
CRANKSHAFT SEAT (CLUTCH SIDE)

Specification	Desc./Quantity
Diameter of crankshaft main journal, clutch side	53.97 - 53.961 mm (2.12480 - 2.12444 in)
Inside diameter of crankshaft bushing on clutch-side flange	54.019 - 54.0 mm (2.12673 - 2.12598 in)
Clearance between bushing and main journal (clutch side)	0.030 - 0.058 mm (0.00118 - 0.00228 in)

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Slot packing system

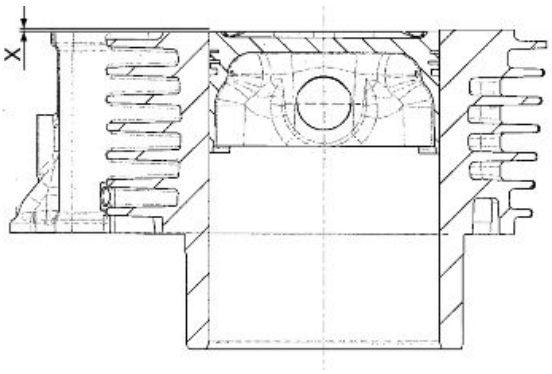
- Fit both pistons on the connecting rods.
- Working from both sides, fit the gasket between the crankcase and the cylinder on the crankcase.
- Fit both cylinders.
- Take the left cylinder piston to TDC and lock crankshaft rotation.



Specific tooling

020675Y Service shaft gear lock

- Thoroughly clean the upper surface of both cylinders.
- Place the tool on the left cylinder to determine the "squish" (X).
- Fasten the tool with the nuts of the stud bolts.



Specific tooling

020676Y Comparator support for piston position checking

- Reset the micrometer on the cylinder rim.
- Move the tool so that the micrometer feeler reaches the top point of the piston crown.
- Take note of the measurement and, according to the values found, consult the chart at the bottom of the page to decide the thickness of the gasket to be fitted between cylinder and head.
- Unlock crankshaft rotation.
- Rotate the crankshaft by 90°until the right cylinder piston reaches the TDC.
- Lock crankshaft rotation.
- Place the tool on the right cylinder stud bolts to determine the "squish" (X).

Specific tooling

020676Y Comparator support for piston position checking

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- Repeat the same operations to determine the thickness of the left cylinder gasket between cylinder and head also for the right cylinder.

CYLINDER GASKET THICKNESS - HEAD

Specification	Desc./Quantity
Value (X) -0.56 / -0.37 mm (-0.022 / -0.0146 in)	gasket thickness: 0.65 mm (0.0256 in)
Value (X) -0.37 / -0.19 mm (-0.0146 / -0.0075 in)	gasket thickness: 0.85 mm (0.0335 in)
Value (X) -0.19 / 0 mm (-0.0075 / 0 in)	gasket thickness: 1.05 mm (0.0413 in)

Recommended products chart

RECOMMENDED PRODUCTS

Product	Description	Specifications
ENI i-RIDE PG RACING 10W-60	Engine oil	SAE 10W - 60. As an alternative to recommended fluids, use top branded oils with performances that meet or exceed the requirements of CCMC G-4 API. SG specifications.
AGIP GEAR SAE 80 W 90	Transmission oil	-
AGIP GEAR MG/S SAE 85 W 90	Gearbox oil	-
AGIP ARNICA SA 32	Fork oil	SAE 0W - ISO VG 32
AGIP GREASE SM2	Lithium grease with molybdenum for bearings and other points needing lubrication	NLGI 2
Neutral grease or petroleum jelly.	BATTERY POLES	
AGIP BRAKE 4 / BRAKE 5.1	Brake fluid	As an alternative for recommended fluids, use top branded fluids that meet or exceed the requirements of SAE J1703, NHTSA 116 DOT 4, ISO 4925 synthetic fluid specifications.
AGIP BRAKE 4 / BRAKE 5.1	Clutch fluid	As an alternative for recommended fluids, use top branded fluids that meet or exceed the requirements of SAE J1703, NHTSA 116 DOT 4, ISO 4925 synthetic fluid specifications.

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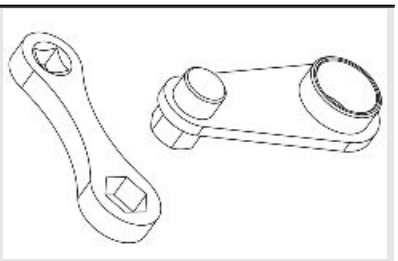
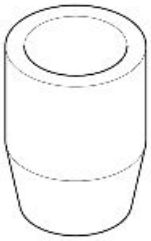
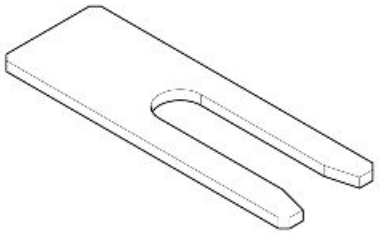
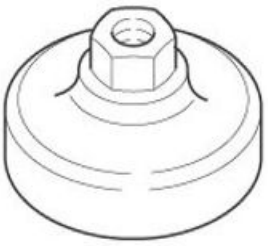
MOTORE

Stores code	Description	
020677Y	Generator belt tensioner, lever for belt tensioning	
05.91.17.30	Front cover insertion cone	
020716Y	Connecting rod locking	
020470Y	Pin snap ring fitting tool	
05.92.72.30	Timing system cover sealing ring punch	
01.92.91.00	Wrench for removing the cover on sump and filter	

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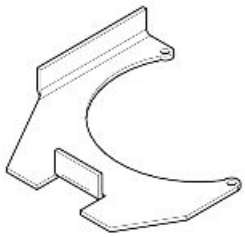
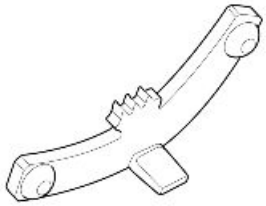
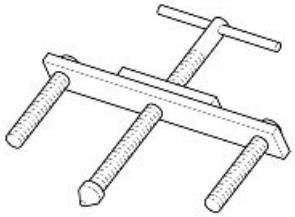
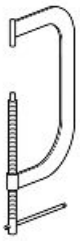
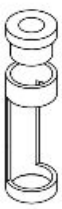
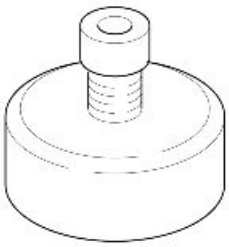
Stores code	Description	
05.90.25.30	Gearbox support	
19.92.96.00	Graduated dial to control ignition timing	
12.91.18.01	Tool to lock the flywheel and the starting ring gear	
12.91.36.00	Tool to remove the flywheel-side flange	
AP8140179	Support for valve fitting/removal	
AP9100838	Tool for valve pressure plate	
14.92.71.00	Tool to fit the sealing ring on the flywheel-side flange	

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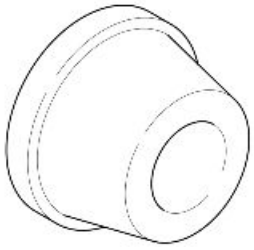
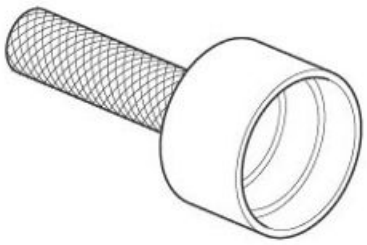
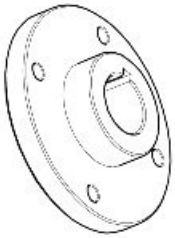
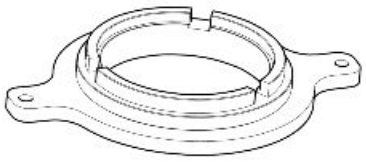
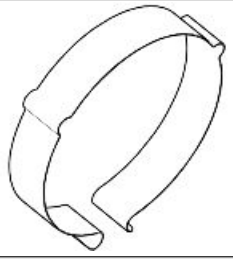
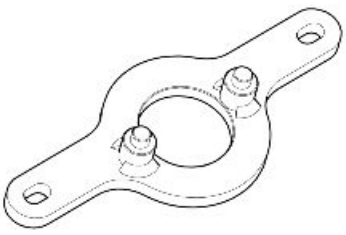
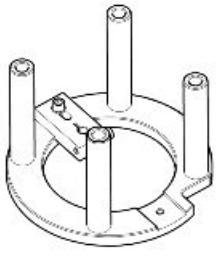
Stores code	Description	
12.91.20.00	Tool to fit the flywheel-side flange together with sealing ring on the crankshaft	
19.92.71.00	Tool to fit the seal ring on the flywheel-side flange	
020673Y	Graduated dial hub	
020672Y	Clutch spring centre and pusher	
020674Y	Piston ring clamp	
020675Y	Service shaft gear lock	
020676Y	Comparator support for piston position checking	

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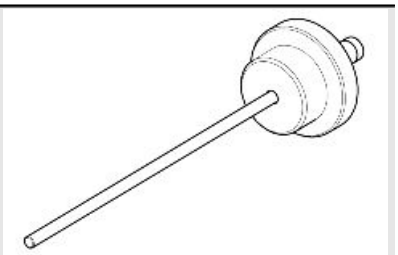
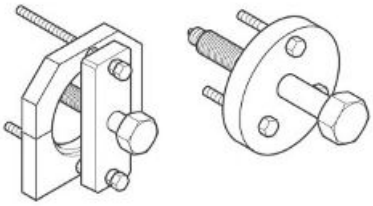
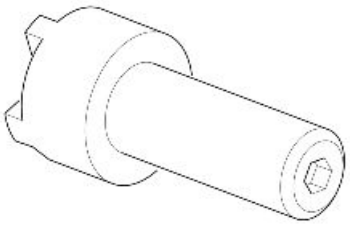
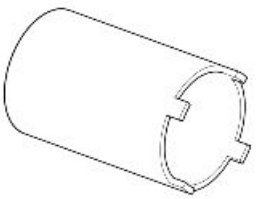
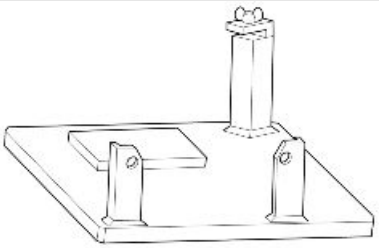
Stores code	Description	
020678Y	Tool for clutch rod checking	
05.91.25.30	Gearbox opening	

CHASSIS

Stores code	Description	
14.91.26.03	Hook spanner for fixing ring nut of the clutch shaft internal body	
AP8140190	Tool for steering tightening	

BEVEL GEAR SET

Stores code	Description	
05.90.27.30	Gearbox support	

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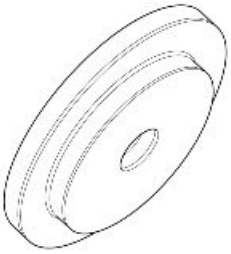
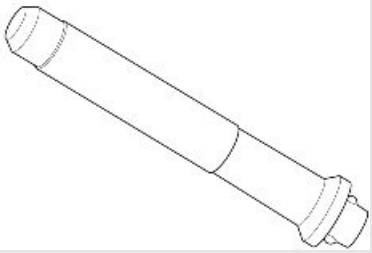
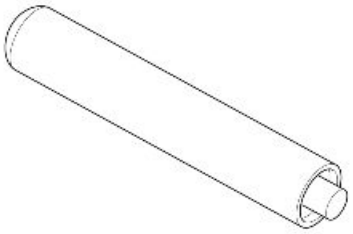
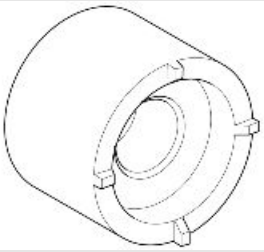
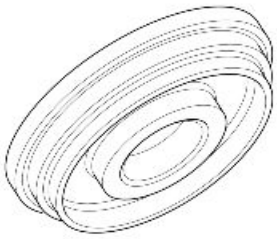
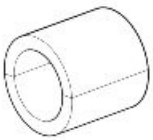
Stores code	Description	
05.90.27.31	Gearbox oil seal buffer	
05.90.27.32	Buffer handgrip	
05.90.27.33	Ball joint sealing buffer	
05.90.27.34	Wrench for pinion ring nut	
05.90.27.35	Pinion oil seal buffer	

FRONT FORK

Stores code	Description	
AP8140146	Weight	

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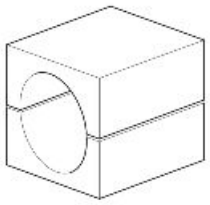
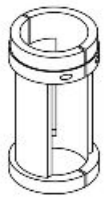
Stores code	Description	
AP8140149	Protection for fitting operations	
9100903	Marzocchi fork oil seal; ø 45 mm (1.77 in)	

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Maintenance chart

NOTE

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

Routine maintenance table

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

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

(1) Check and clean and adjust or replace, if necessary, before every journey.

(2) Replace every 2 years or 20000 Km (12427 mi).

(3) Replace every 4 years.

(4) Check at each engine start.

(5) It is recommended to lubricate stands and footrests periodically with spray grease after use in particularly hard conditions (dirty with salts, dust, etc.) or after long inactivity periods.

(6) Lubricate if you are riding in the rain, on wet roads or after the vehicle has been washed.

ROUTINE MAINTENANCE TABLE

km x 1,000	1.5	10	20	30	40	50	60	70	80
Exhaust pipe flange bolts	I		I		I		I		I
Spark plugs		R	R	R	R	R	R	R	R
Carburetion at idle (CO)		I	I	I	I	I	I	I	I
Throttle body			C		C		C		C
Stands (5)		I	I	I	I	I	I	I	I
Transmission cables and controls	I	I	I	I	I	I	I	I	I
Alternator belt			A		A	R	A		A
Steering bearings and steering clearance	I	I	I	I	I	I	I	I	I
Wheel bearings		I	I	I	I	I	I	I	I
Brake discs	I	I	I	I	I	I	I	I	I
Air filter		I	R	I	R	I	R	I	R
Engine oil filter	R	R	R	R	R	R	R	R	R
Fork	I		I		I		I		I
Vehicle general operation	I	I	I	I	I	I	I	I	I
Braking 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
Brake fluid (2)	I	I	R	I	R	I	R	I	R
Clutch fluid (2)	I	I	I	I	I	I	I	I	I
Gearbox oil	R	R	R	R	R	R	R	R	R
Engine oil	R	R	R	R	R	R	R	R	R
Fork oil / oil seals		R		R		R		R	
Final drive oil	R	R	R	R	R	R	R	R	R
Clutch lever pin (6)	L	L	L	L	L	L	L	L	L
Tyres - pressure / wear (1)	I	I	I	I	I	I	I	I	I
Engine idle speed	A	A	A	A	A	A	A	A	A
Valve clearance adjustment	A	A	A	A	A	A	A	A	A
Wheels	I	I	I	I	I	I	I	I	I
Bolts and nuts tightening	I	I	I	I	I	I	I	I	I
Battery terminals tightening	I		I		I		I		I
Wheel nipple tightening (1)	I	I	I	I	I	I	I	I	I
Cylinder synchronisation	I	I	I	I	I	I	I	I	I
Footrests joint (5)		I	I	I	I	I	I	I	I
Suspension and setting	I		I		I		I		I
Engine oil pressure warning light (4)									
Empty oil drain pipe from the filter housing		C	C	C	C	C	C	C	C
Fuel lines (3)		I	I	I	I	I	I	I	I

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km x 1,000	1.5	10	20	30	40	50	60	70	80
Brake lines (3)		I	I	I	I	I	I	I	I
Clutch wear		I	I	I	I	I	I	I	I
Brake pad wear (1)	I	I	I	I	I	I	I	I	I

Transmission fluid

Check

• Keep the vehicle upright with both wheels on the ground.

• Unscrew and remove the cap/dipstick (1).

• The level is correct if the oil is close to the hole of the cap/dipstick (1).

• If the oil is lower than specified, top-up until it reaches the cap/dipstick hole (1).

CAUTION

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

Replacement

CAUTION

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

NOTE

RIDE SOME km (miles) TO WARM UP ENGINE OIL

- Place a container with + 400 cm³ (25 cu in) capacity under the drainage plug (3).
- Unscrew and remove the drainage plug (3).
- Unscrew and remove the breather cap (2).
- Drain the oil into the container; allow several minutes for oil to drain out completely.
- Check and if necessary, replace the sealing washer of drainage plug (3).
- Remove any metal scrap attached to the drainage plug (3) magnet.
- Screw and tighten the drainage plug (3).
- Pour new oil through the fill opening (1) until it reaches the cap/dipstick hole (1).

CAUTION

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

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

Engine oil

Check

CAUTION

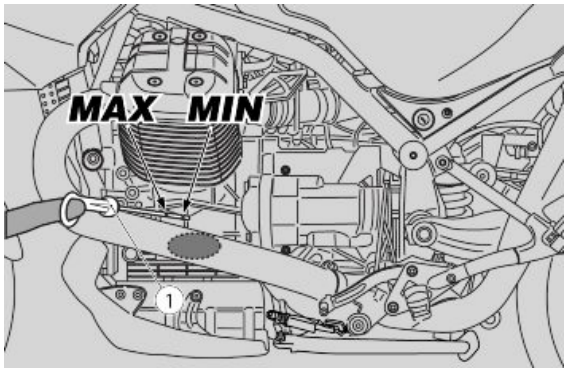
ENGINE MUST BE WARM TO CHECK ENGINE OIL LEVEL

NOTE

DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT STANDSTILL TO WARM UP THE ENGINE AND REACH THE OPERATING TEMPERATURE OF ENGINE OIL. OIL IS BEST CHECKED AFTER RUNNING FOR ABOUT 15 KM (10 miles).

- Shut off the engine.
- Keep the vehicle upright with both wheels on the ground.

- Pull the filler plug / oil level dipstick (1) straight out.
- Wipe the oil level dipstick (1) clean and reinsert it.
- Pull it out again and check the oil level.
- The oil level is correct when it is close to the "MAX" mark. Otherwise, top-up with engine oil.



CAUTION

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

Replacement

NOTE

HOT OIL IS LESS VISCOUS AND WILL DRAIN OUT MORE EASILY AND COMPLETELY.

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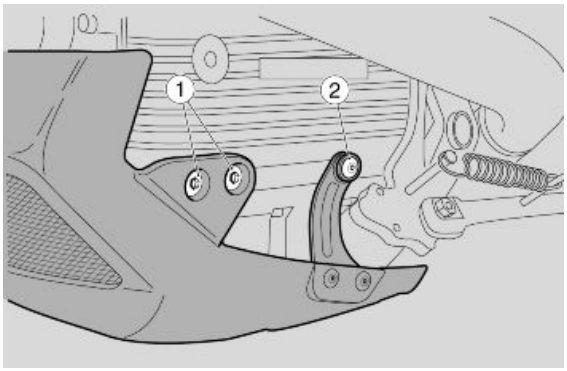
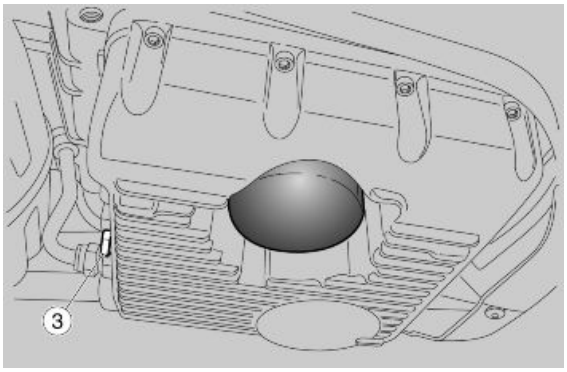
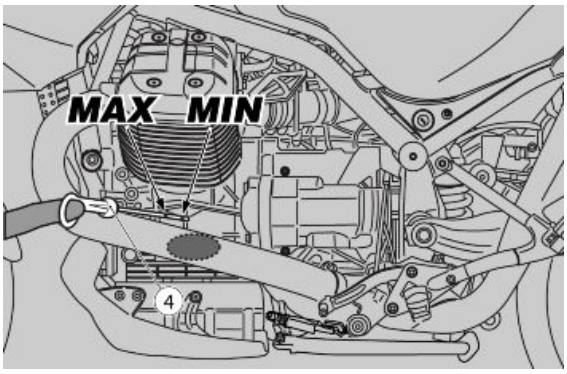
To change the engine oil and to replace the oil filter, remove the oil sump guard.

- Operating from both sides, unscrew and remove the two front screws (1).
- Operating from both sides, unscrew and remove the rear screw (2).
- Remove the oil sump guard.



- Place a container with +4,000 cm³ (244 cu in) capacity under the drainage plug (3).
- Unscrew and remove the drainage plug (3).
- Pull out the oil filler plug / engine oil level dipstick (4).
- Drain the oil into the container; allow several minutes for oil to drain out completely.
- Insert the oil filler plug / engine oil level dipstick (4).
- Check and if necessary, replace the drainage plug (3) sealing washers.
- Remove any metal deposits attached to the drainage plug (3) magnet.
- Screw and tighten the drainage plug (3).





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.

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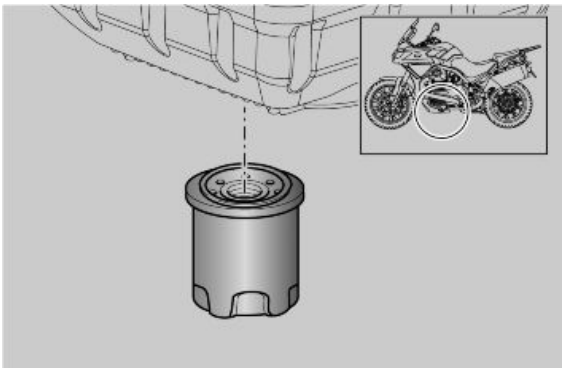
Engine oil filter

Replace the engine oil filter each time you change the engine oil.

- Drain the engine oil completely.
- Unscrew and remove the engine oil filter from its seat.

NOTE

NEVER REUSE AN OLD FILTER.



- Spread a thin layer of oil on the sealing ring of the new engine oil filter.
- Fit and screw the new oil filter in its seat.

Gearbox Oil

Inspection

CHECKING AND TOPPING UP

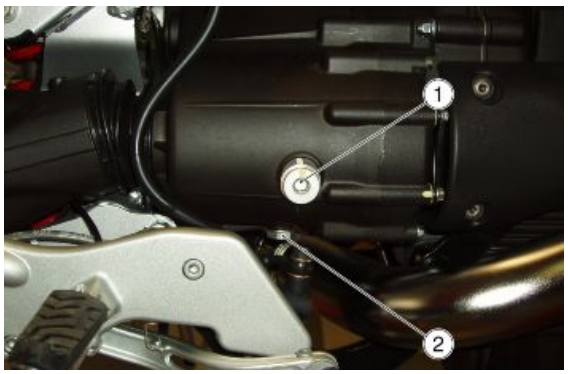
CAUTION

ENGINE MUST BE WARM TO CHECK GEARBOX OIL LEVEL.

NOTE

DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT STANDSTILL TO WARM UP THE ENGINE AND REACH THE OPERATING TEMPERATURE OF ENGINE OIL. OIL IS BEST CHECKED AFTER RUNNING FOR ABOUT 15 KM (10 miles).

- Shut off the engine.
- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the cap/dipstick (1) placed on the gearbox right side.
- • The level is correct if the oil is on the rim of the hole of the cap/dipstick (1).



If necessary:

- Top-up with oil until it reaches the dipstick opening (1).

CAUTION

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

Replacement

NOTE

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

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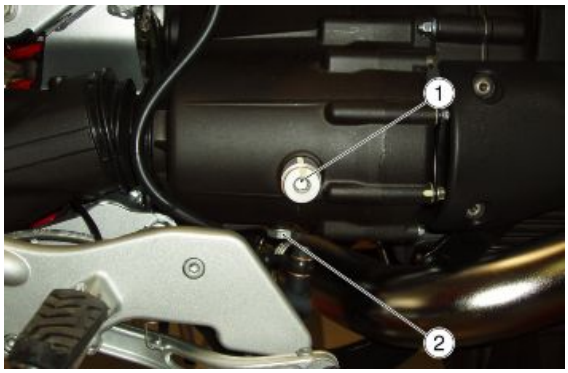
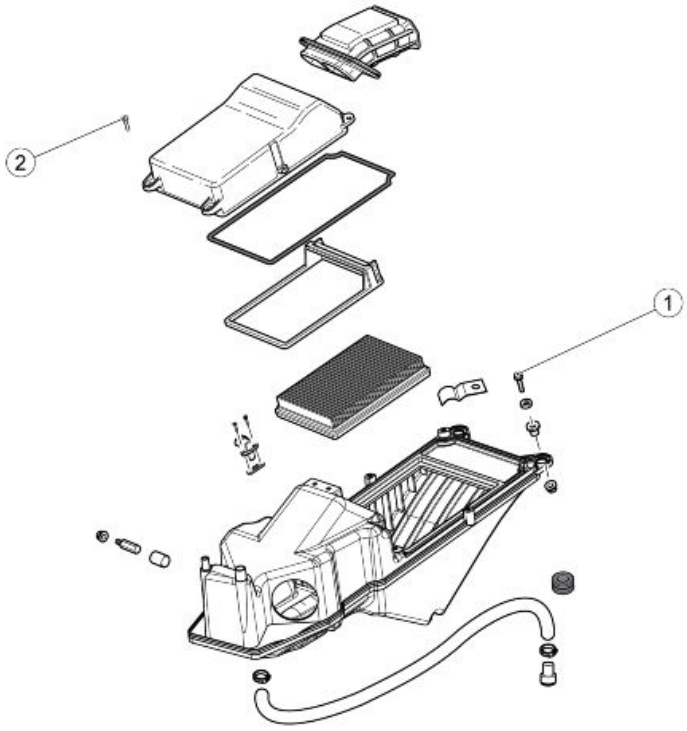
• Place a container with suitable capacity under the drainage plug (2).
• Unscrew and remove the drainage plug (2).
• Unscrew and remove the filler cap (1).
• Drain the oil into the container; allow several minutes for oil to drain out completely.
• Check and replace, if necessary, the sealing washers of drainage plug (2).
• Remove any metal scrap attached to the drainage plug (2) magnet.
• Screw and tighten the drainage plug (2).
• Pour in new oil until it reaches the dipstick opening (1).
• Tighten the filler cap (1).



CAUTION

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

Air filter



AIR FILTER

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio cassa filtro aria a telaio	-	2	10 Nm (7.38 lbf ft)	-
2	Air filter box cover fastening screw	SWP 5x20	6	3 Nm (2.21 lbf ft)	-

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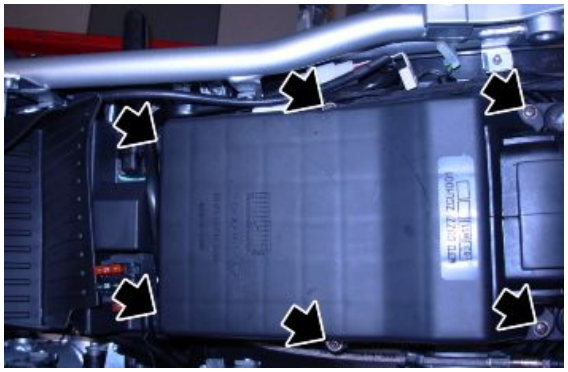
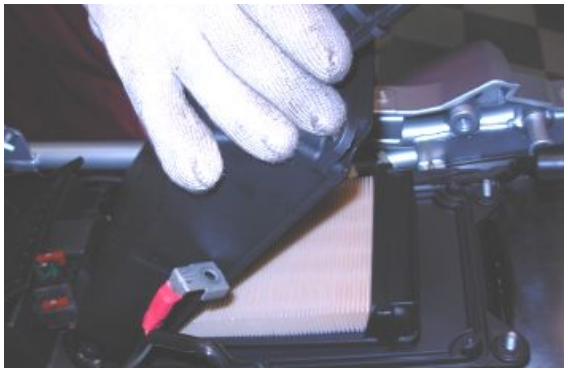
- Undo and remove the six screws.



- Lift the filter housing cover.



- Remove the air filter.
- Cover the inlet duct with a clean cloth so that no foreign bodies get into the inlet ducts.

DO NOT START THE ENGINE WITHOUT THE AIR FILTER.
TO CLEAN THE FILTERING ELEMENT, USE A PRESSURE AIR JET FROM THE INSIDE TO THE OUTSIDE.

Checking the valve clearance

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

NOTE

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

- Scollegare la pipetta candela facendo leva mediante un cacciavite attraverso la feritoia.

CAUTION

PRESTARE ATTENZIONE A FARE LEVA SULLA GOMMA DELLA PIPETTA CANDELA E NON SULLA CANDELA STESSA ONDE EVITARE DI DANNEGGIARLA

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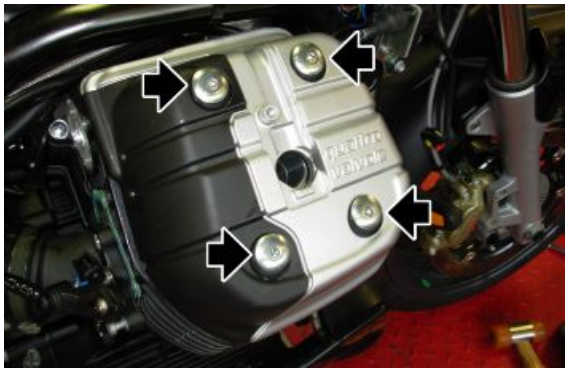
- Unscrew and remove the four head cover fixing screws and collect the sealing O-rings.
- Remove the head cover together with the gasket.



- loosen the nut (1);
- use a screwdriver on the set screw (2) until the following clearances are obtained:

- inlet valve: 0.10 mm (0.0039 in)
- outlet valve: 0.15 mm (0.0059 in).

- The measurement must be done using a thickness gauge (3).

CAUTION

IF CLEARANCE IS LARGER THAN RECOMMENDED, THE TAPPET WILL BE NOISY. OTHERWISE, THE VALVES DO NOT CLOSE CORRECTLY, WHICH CAN LEAD TO PROBLEMS SUCH AS:

- PRESSURE DROP;
- ENGINE OVERHEAT;
- VALVE BURNOUT, ETC.

Braking system

Level check

Brake fluid check

- Rest the vehicle on its stand.
- For the front brake, turn the handlebar fully to the right.
- For the rear brake, keep the vehicle upright so that the fluid in the reservoir is at the same level with the plug.
- Make sure that the fluid level in the reservoir is above the "MIN" reference mark:

MIN = minimum level

MAX = maximum level

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

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

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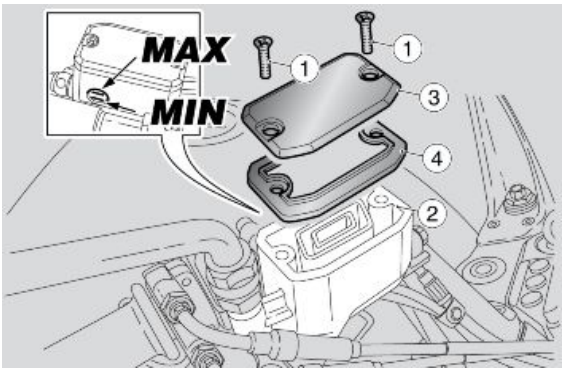
Top-up

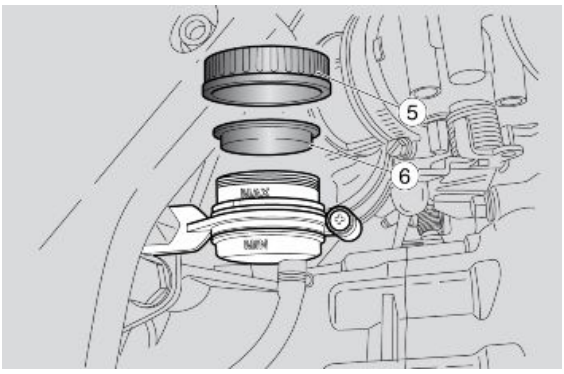
Front brake:

- Unscrew the two screws (1) of the brake fluid reservoir (2) using a Phillips screwdriver.
- Lift and remove the cover (3) and screws (1) as well.
- Remove the gasket (4).



Rear brake:

- Unscrew and remove the cap (5).
- Remove the gasket (6).
- Top-up the reservoir with brake fluid to the correct level, which is between the two "MIN" and "MAX" reference marks.



RISK OF BRAKE FLUID SPILLS. DO NOT OPERATE THE BRAKE LEVER WITH BRAKE FLUID RESERVOIR CAP LOOSENED OR REMOVED.

CAUTION

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

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

DO NOT ADD ADDITIVES OR OTHER SUBSTANCES TO THE FLUID.

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

DO NOT EXCEED THE "MAX" LEVEL MARK WHEN TOPPING UP.
TOP-UP TO "MAX" LEVEL MARK ONLY WHEN BRAKE PADS ARE NEW. WHEN TOPPING UP DO NOT EXCEED THE "MAX" LEVEL MARK WHEN BRAKE PADS ARE WORN AS YOU RISK SPILLING FLUID WHEN CHANGING THE BRAKE PADS.
CHECK BRAKING EFFICIENCY. IN CASE OF EXCESSIVE TRAVEL OF THE BRAKE LEVER OR POOR PERFORMANCE OF THE BRAKING SYSTEM, TAKE YOUR VEHICLE

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**TO AN Official Moto Guzzi Dealer, AS IT MAY BE NECES-
SARY TO PURGE THE AIR IN THE SYSTEM.**

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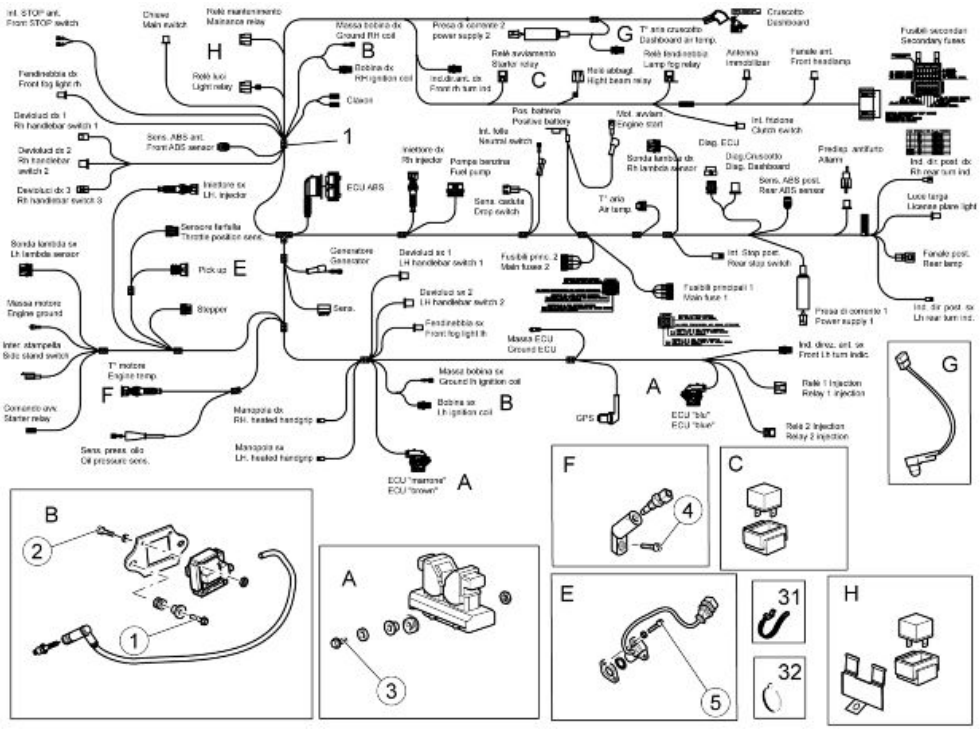

MAIN CABLE HARNESS

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio piastre bobine	M6x20	2+2	10 Nm (7.38 lbf ft)	-
2	Viti TCEI fissaggio bobine	-	2+2	2 Nm (1.47 lbf ft)	-
3	Viti TCEI fissaggio centralina	-	2	10 Nm (7.38 lbf ft)	-
4	Viti TCEI fissaggio supporto sensore temp. olio	M10x20	1	11 Nm (8.11 lbf ft)	Loct. 243
5	Viti TCEI fissaggio sensore di fase	-	2	3 Nm (2.21 lbf ft)	-

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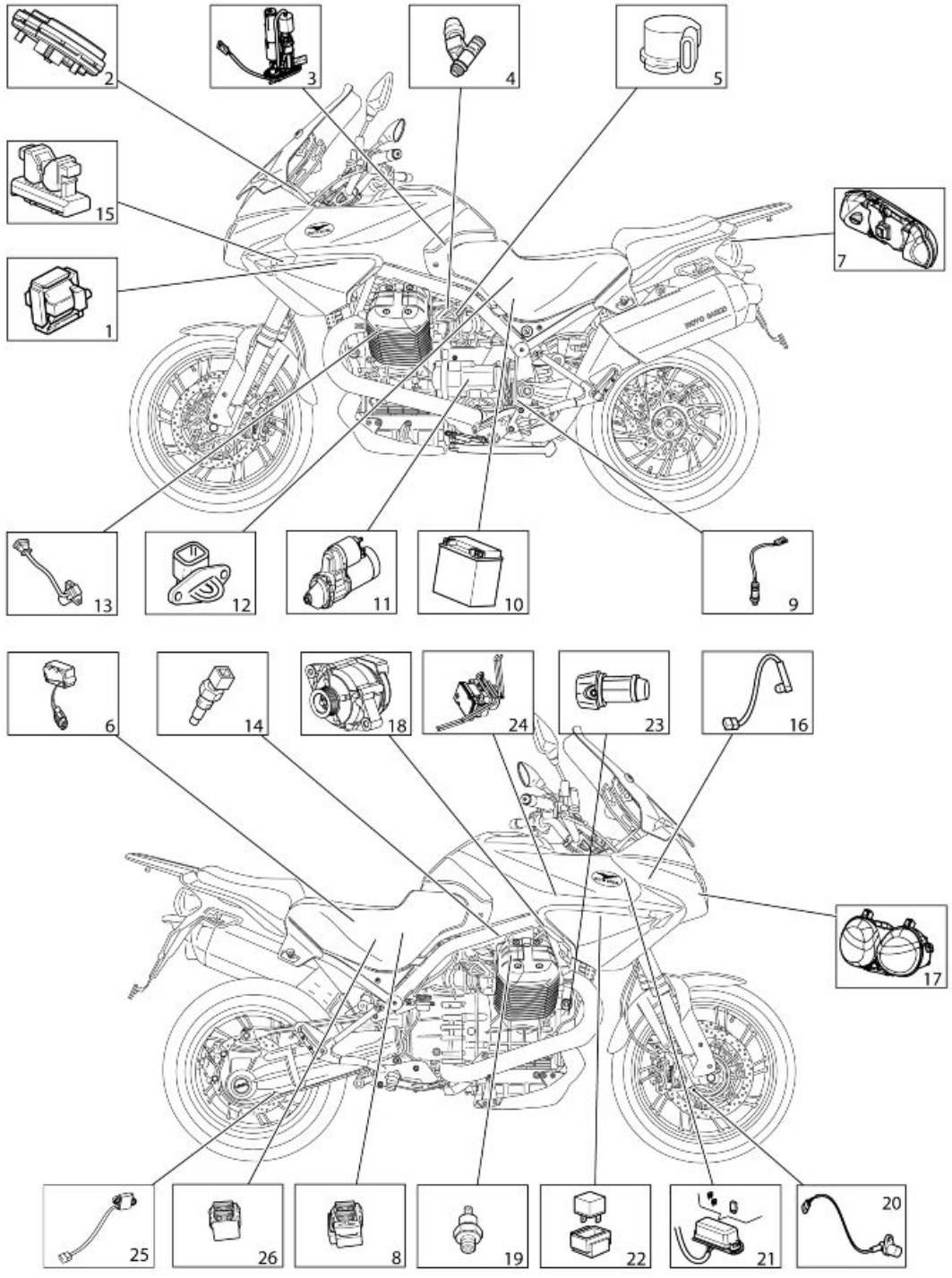
Components arrangement



key:

1 Coil

2 Instrument panel

3 Fuel pump

4 Injector

5 Throttle valve potentiometer

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6 Fall sensor (optional equipment)
7 Rear light
8 Main fuses
9 Lambda probe
10 Battery
11 Starter motor
12 Intake air temperature sensor
13 Engine revolution sensor
14 Head temperature sensor
15 Engine control unit
16 Instrument panel air temperature sensor
17 Front headlamp
18 Alternator
19 Oil pressure sensor
20 Front ABS sensor
21 Auxiliary fuses
22 Relay
23 Supplementary headlamps (optional equipment)
24 ABS Control unit
25 Rear ABS sensor
26 ABS Fuses

Electrical system installation

INTRODUCTION

Scope and applicability

This document aims at defining the cable harness routing in order to achieve the vehicle reliability targets.

Materials used and corresponding quantities

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

- 1 Main cable harness
- 1 Ground lead
- 1 Headlamp cable harness
- 1 Fall sensor connector
- 1 Antitheft cable harness (optional equipment)
- 8 Small clamps
- 18 Medium clamps
- 1 Big clamp

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- 4 Reused clamps
- 7 Cable grommets
- 5 Rubber clamps
- 7 Cable grommets
- 1 Adhesive cable grommet
- 1 Cable grommet with clip

Motorcycle division

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

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

Special checks for the correct connection and laying of cables

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

- Instrument panel connector
- Pick Up connector and alternator
- Side Stand Switch Connector
- Coils connectors
- Control unit connectors
- Fuel pump connector
- Key Connector
- Right Light Switch Connectors
- Left Light Switch Connectors
- ABS connector and correct positioning of the cap
- Front and rear speed sensor connector
- Auxiliary Fuses (rubber housing correct positioning and closing)
- Intake air temperature sensor
- Fuel injector connectors

The connectors in the list are circled in the different pictures. The listed connectors are considered more critical than the others because their disconnection could cause the vehicle to stop or malfunction. Obviously, the correct connection of the other connectors is also important and essential for proper vehicle operation.

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

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Front side

TABLE A

1. Front headlamp
2. Small clamps
3. Cable grommet
4. Headlamp cable harness

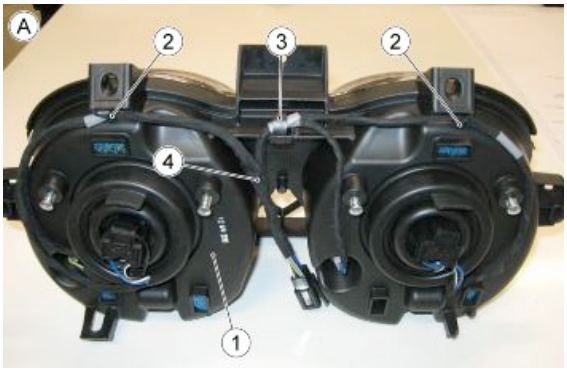

TABLE B

1. Rubber clamps

TABLE C

1. Front brake switch
2. Faston
    - Check the faston are connected up to the end.

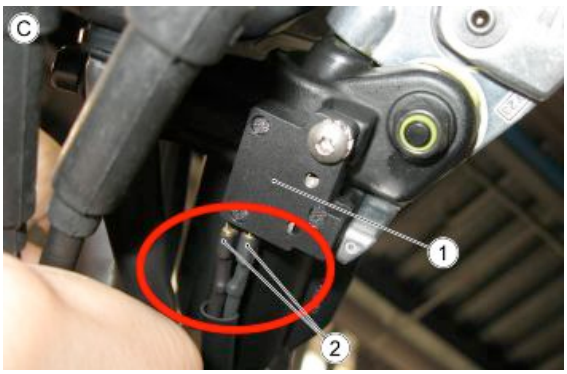

TABLE D

1. Cable grommets
2. Pipe tightening clamp
3. Front ABS sensor

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TABLE E

1. Main cable harness
2. Small clamp
3. Middle clamp

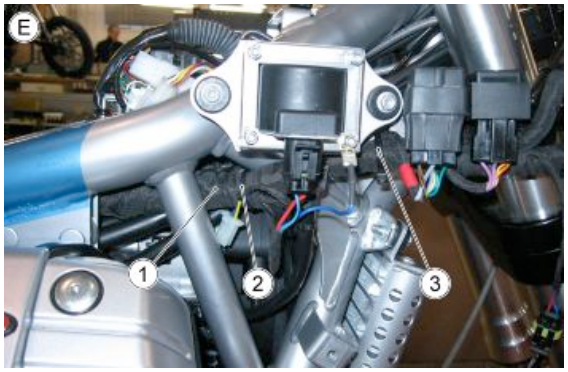

TABLE F

1. Middle clamp
2. Clamp already present on the cable harness

TABLE G

1. Medium clamp

TABLE H

- No part of the cable harness must protrude to the inside of the support so as not to obstruct the forks

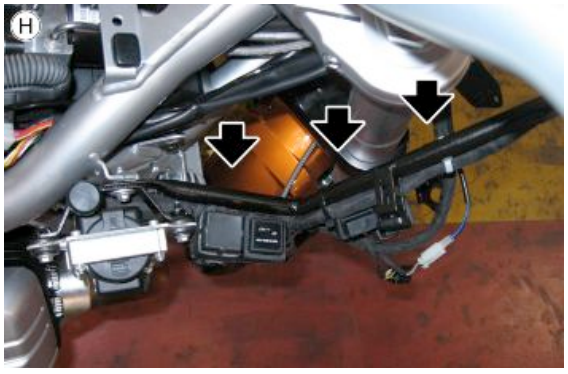

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TABLE I

1. Clamp that groups the cable harness of the right light switch, the front stop switch, the front ABS sensor and the key

TABLE L

1. Medium clamps
2. Small clamps

TABLE M

- Check correct closure of the secondary fuses housing cover

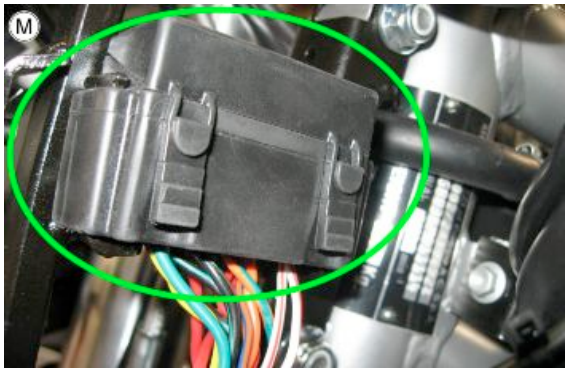

TABLE N

1. Middle clamp
2. Ground lead oriented as in the photo
3. Small clamp
4. Cable grommet

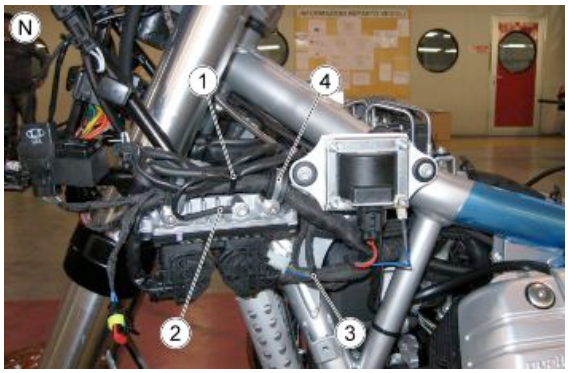

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TABLE O

1. Medium clamps

TABLE P

1. Clamp that has the cable harness of the left light switch and the key on the metal relay
2. Clamp that has the cable harness of the left light switch on the pipe
3. Middle clamp

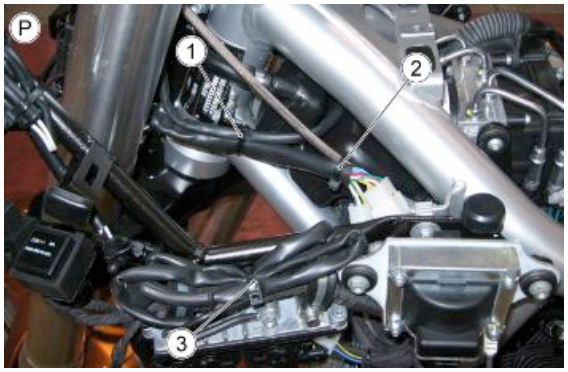

TABLE Q

1. Keep the cable harness outside according to the relays
2. Clamp

TABLE R

1. Middle clamp
2. Position of the foglight relay connector

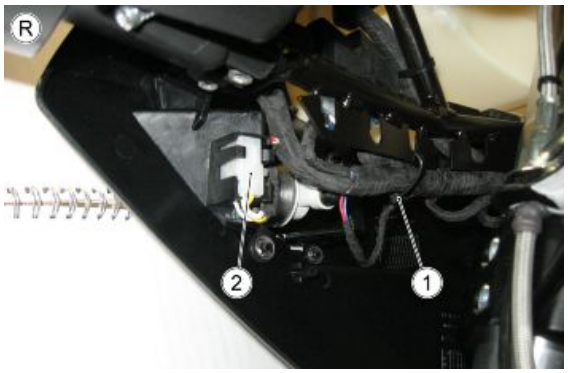

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TABLE S

1. Hook the clamp on the specific hole present in the support.
2. Middle clamp

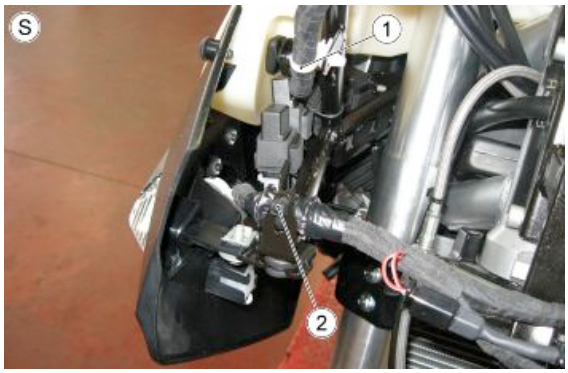

TABLE T

1. Front plug socket
2. Plug socket connector.
3. Correct alignment
4. Medium clamp to be placed after fitting the cap so as to avoid it can remove

TABLE U

1. Instrument panel
2. Instrument panel connector correctly connected

Central part

TABLE A

1. Main cable harness

2 Motor main cable harness

3. Grey taping as reference that must remain between the two covers

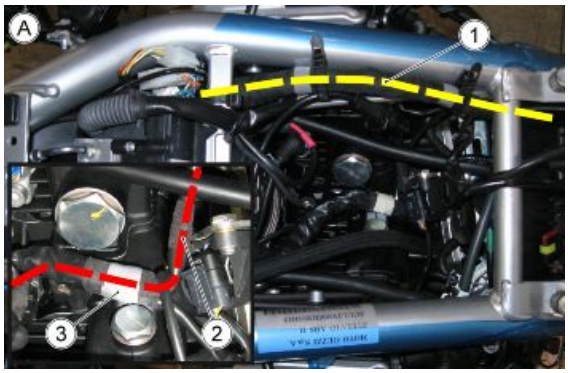

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TABLE B

1. Engine oil pressure sensor
2. Small clamp

TABLE C

1. Generator
2. Sensor
3. Alternator positive

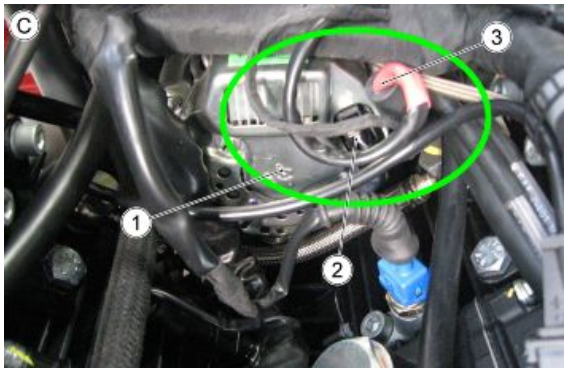

TABLE D

1. Pick up cable harness
2. Medium clamp that fastens the right pick-Up cable to the chassis

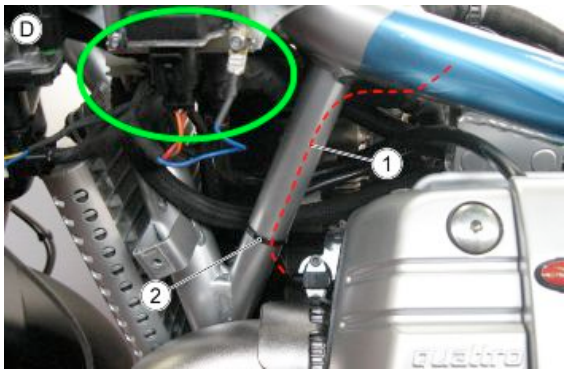

TABLE E

1. Reused clamp

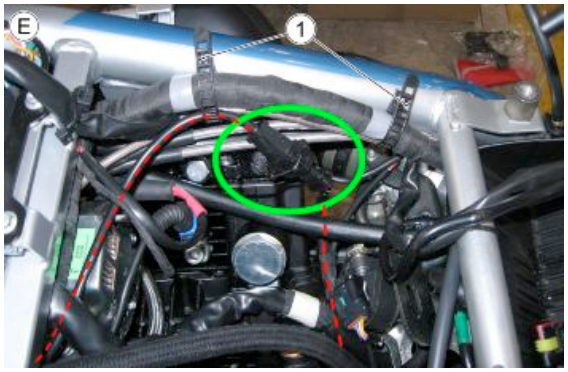

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TABLE F

1. Cable guide
2. Plastic cable guides

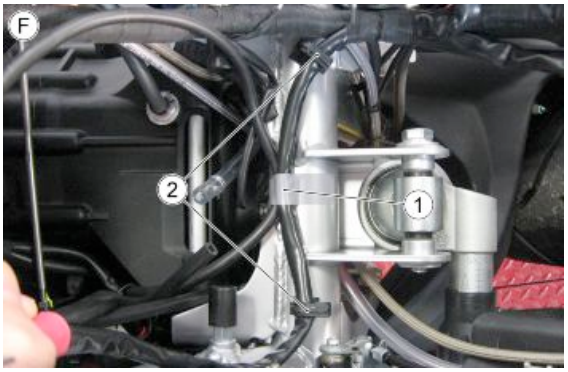

TABLE G

1. Neutral switch
    - Correctly fit the hood on the gear switch

TABLE H

- Correct laying of cables for the injectors

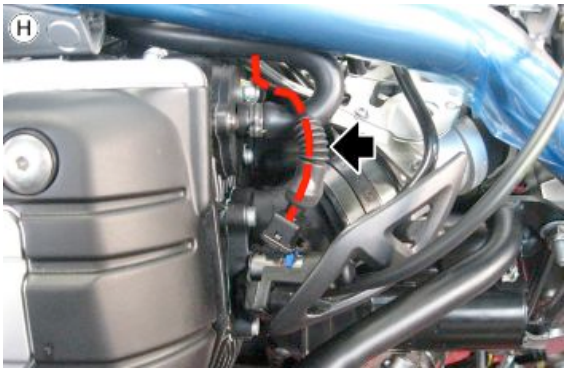

TABLE I

1. Left injector
2. Right injector
    - Check that the steel clip is correctly placed after the connection

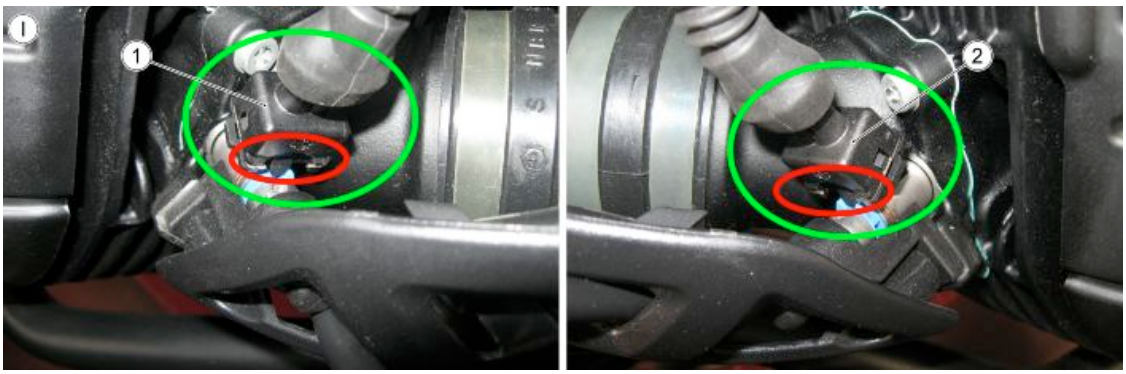

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TABLE L

1. Middle clamp
2. Big clamp
3. Right light switch, key and front ABS sensor connections
4. Heated hand grips connectors
5. Small clamp that blocks the heated hand grips connectors to the brake pipe.

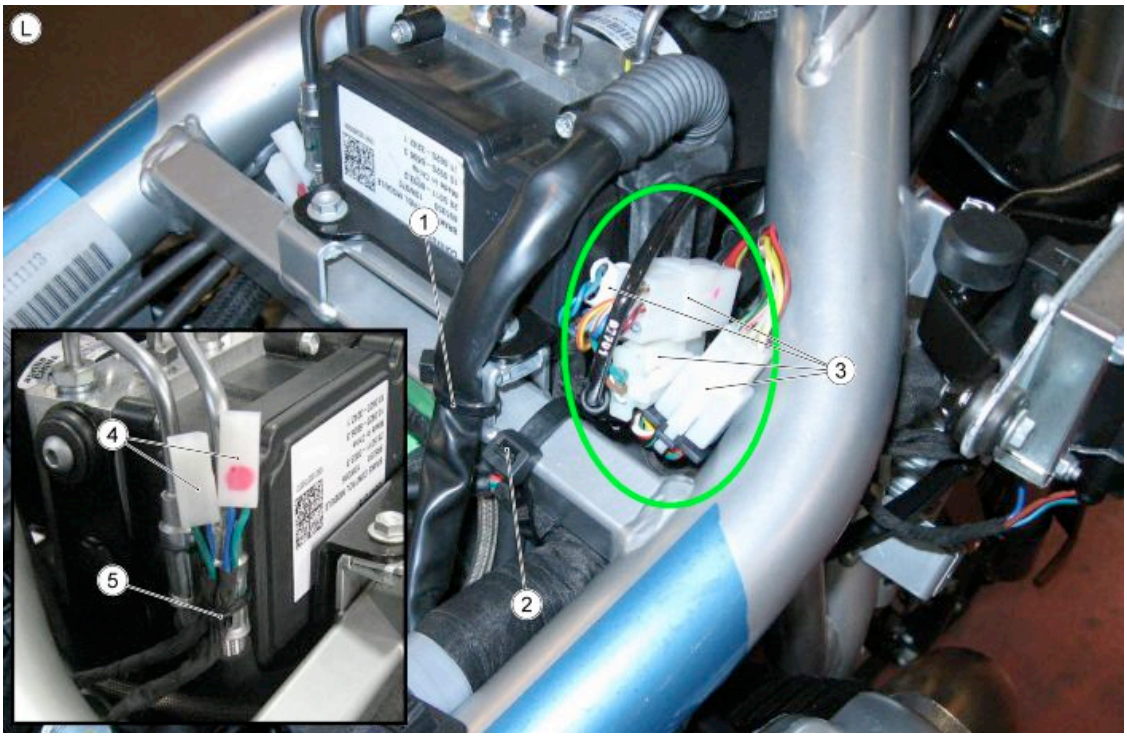

TABLE M

1. Ground cable harness
2. Battery ground lead
3. Left lambda sensor.
4. Clamp to keep the starter motor cable harness far from the throttle bodies control pin

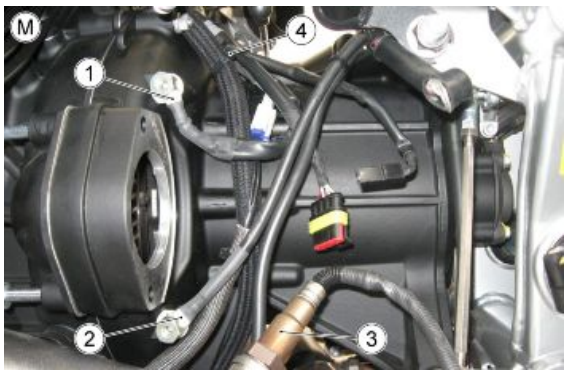

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TABLE N

1. Starter motor

- Make sure that the end is oriented to the inside to avoid touching the protection of the starter motor.

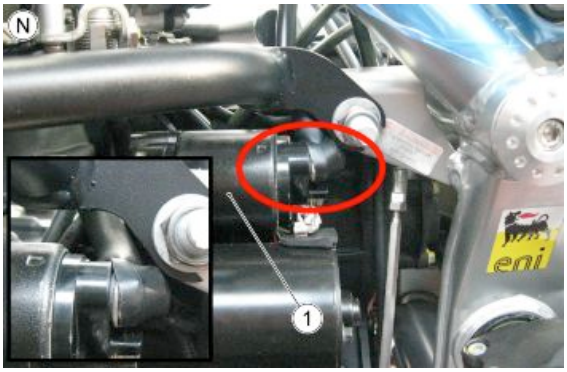

TABLE O

1. Starter motor cover
2. Cable grommet

- If the cable grommet is correctly fitted, it will be hidden by the cover.

TABLE P

1. Oxygen sensor cable harness
2. Cable grommet

- Hook the cable grommet with the internal cable harness of the oxygen sensor

TABLE Q

1. Fuel pump
2. Fuel pump connector
3. Small clamp

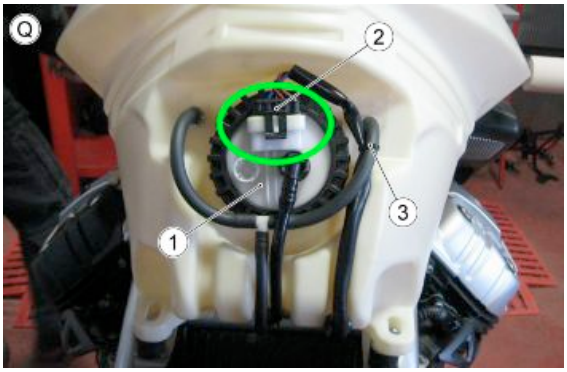

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TABLE R

1. Horn
2. Horn cable harness
3. Middle clamp

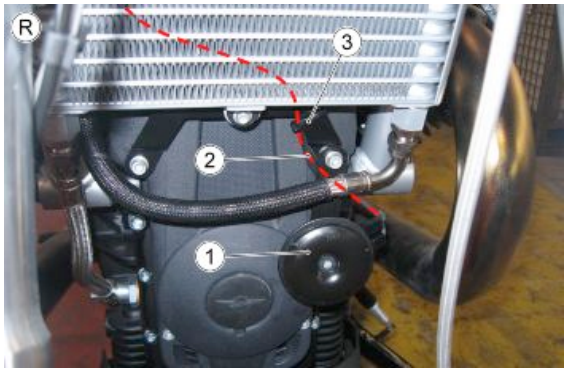
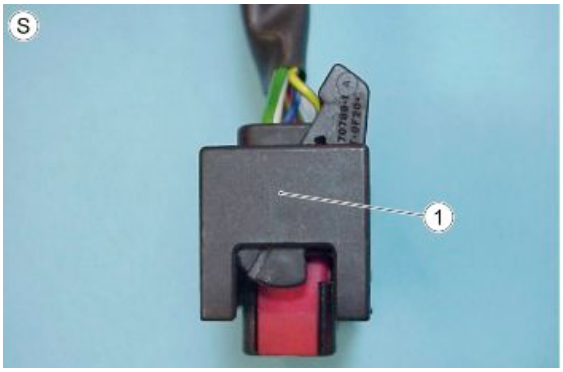


TABLE S

1. ABS control unit connector

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



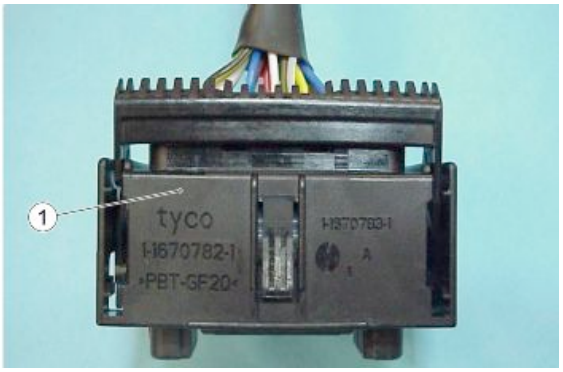


TABLE T

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

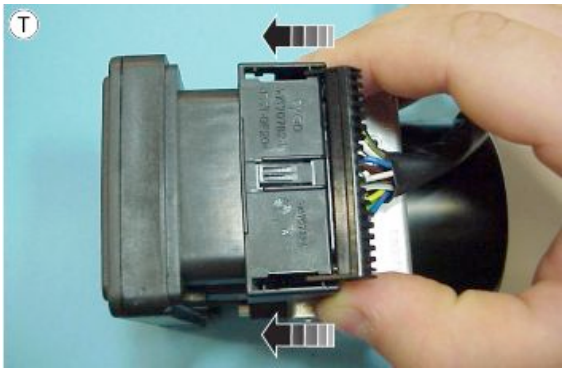


TABLE U

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

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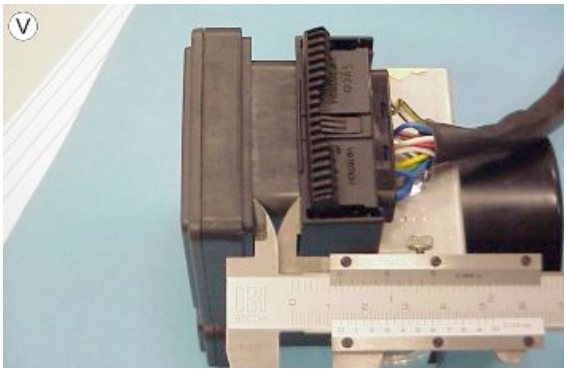
TABLE V

- If the initial position of the connector and the pulling level is not as the one in "TABLE S", the connector will not hook correctly and the distance measured will be higher than approximately 12 mm (0.47 in). In this case, repeat the operation as described in "TABLE T" and "TABLE U".

It is advisable to create a jig in order to check the correct connector insertion.



Back side

TABLE

1. Main fuses
2. Filter box air temperature sensor
3. Filter box

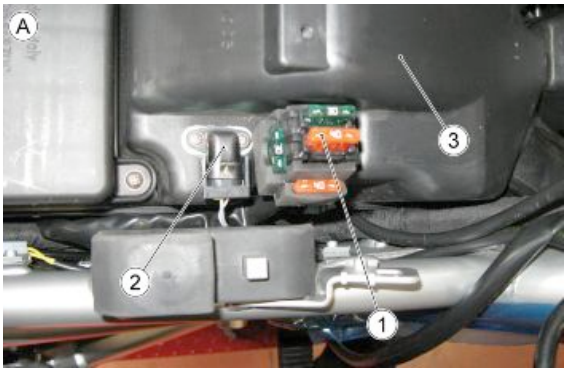


TABLE B

1. Middle clamp
2. Main cable harness

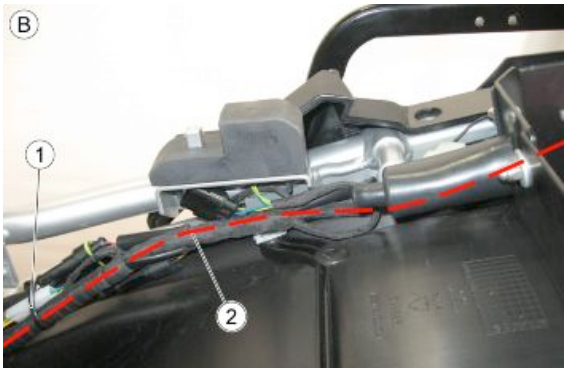


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TABLE C

1. Rear plug socket
2. Cable grommet
3. ECU diagnosis connector

TABLE D

1. Adhesive cable grommet

TABLE E

1. Plastic cable guides

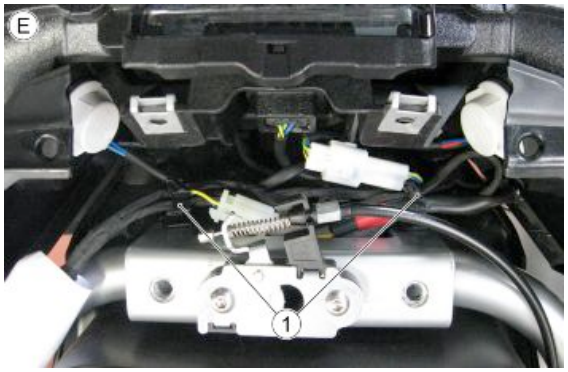

TABLE F

1. Medium clamp that groups the oxygen sensor leads, the rear stop and the rear taillight cable harness

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TABLE G

1. Fall sensor connector with cover

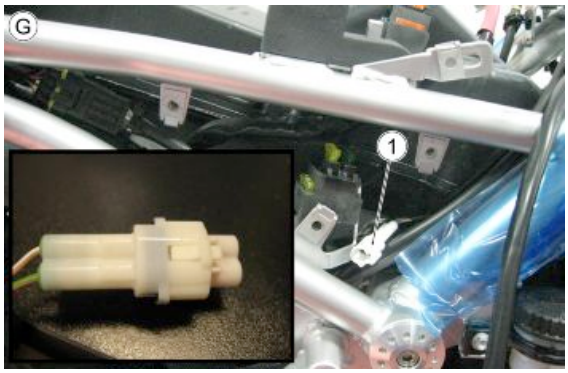


TABLE H

1. Cable grommets

TABLE I

1. Cable grommet
2. Lambda leads

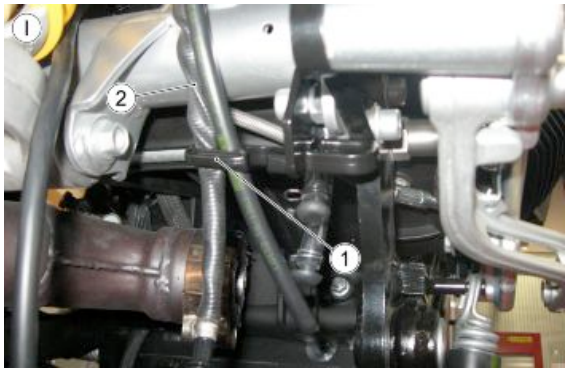
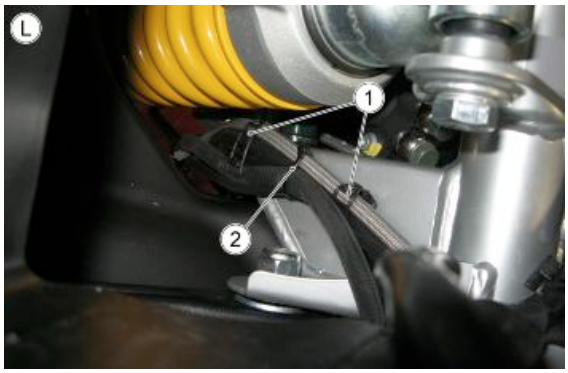


TABLE L

1. Reused clamps
2. Small clamp that has the lambda and the rear stop cable together with the pipes group



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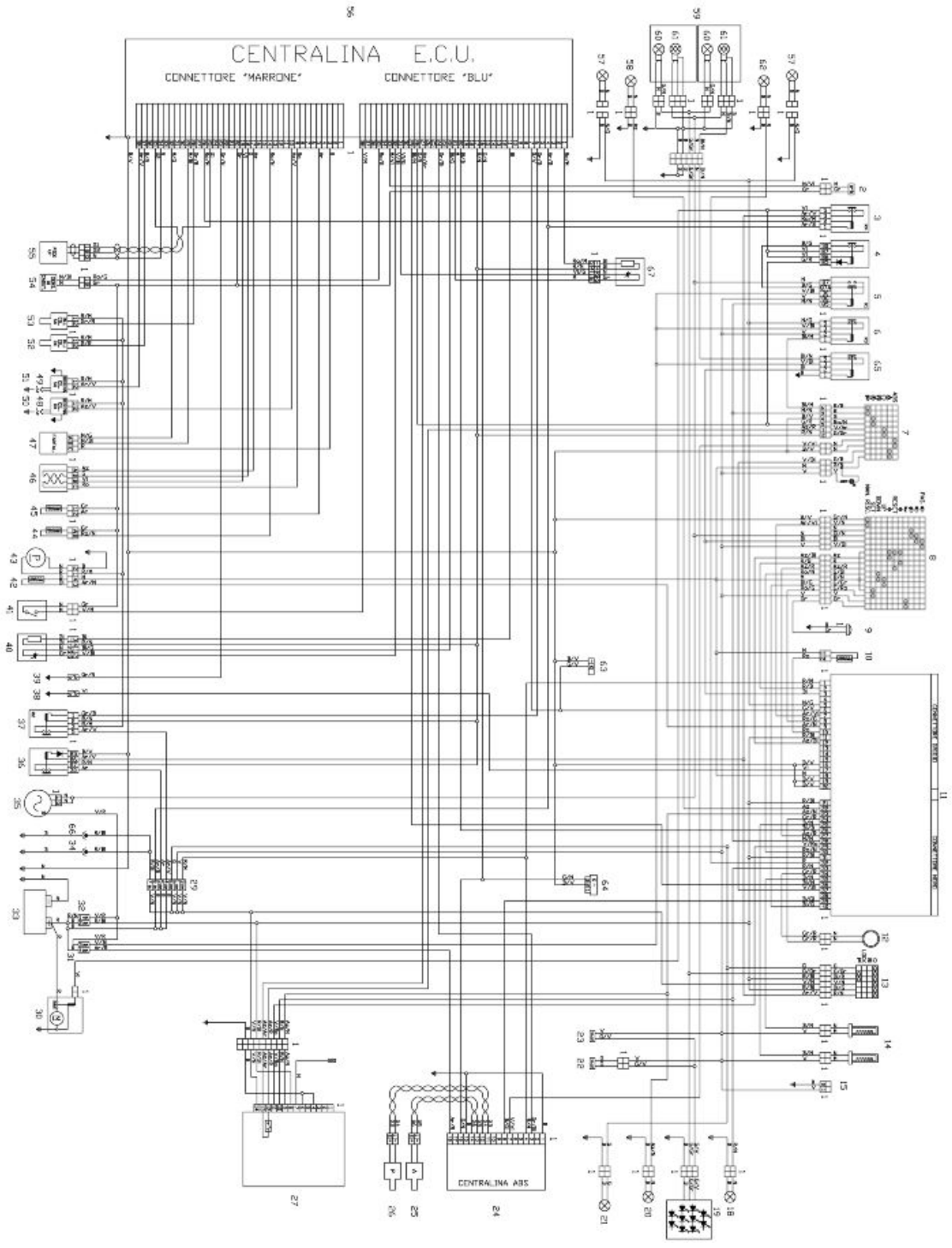
General wiring diagram



key:

1. MULTIPLE CONNECTORS
2. CLUTCH SWITCH
3. START-UP RELAY
4. MAINTENANCE RELAY

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5. LIGHT LOGIC RELAY
6. FOG LIGHTS RELAY (OPTIONAL EQUIPMENT)
7. Right light switch
8. LEFT LIGHT SWITCH
9. HORN
10. AMBIENT AIR TEMPERATURE SENSOR
11. INSTRUMENT PANEL
12. IMMOBILIZER AERIAL
13. IGNITION KEY
14. HEATED HANDGRIPS
15. GPS COUPLING
16. -
17. -
18. Rear right turn indicator
19. TAILLIGHT ASSEMBLY
20. REAR LEFT TURN INDICATOR
21. LICENSE PLATE LIGHT BULB
22. REAR STOP SWITCH
23. FRONT STOP SWITCH
24. ABS CONTROL UNIT
25. FRONT WHEEL SPEED SENSOR
26. REAR WHEEL SPEED SENSOR
27. ANTITHEFT CONTROL UNIT (OPTIONAL EQUIPMENT)
28. -
29. Secondary fuses
30. STARTER MOTOR
31. MAIN FUSES 2
32. MAIN FUSES 1
33. BATTERY
34. PLUG SOCKET "1"
35. ALTERNATOR
36. MAIN INJECTION RELAY
37. AUXILIARY INJECTION RELAY
38. OIL PRESSURE SENSOR
39. NEUTRAL SENSOR
40. LAMBDA PROBE LEFT
41. SIDE STAND SWITCH
42. FUEL RESERVE SENSOR

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43.FUEL PUMP
44.INTAKE AIR TEMPERATURE SENSOR
45.Engine temperature sensor
46.IDLE MOTOR
47.THROTTLE POSITION SENSOR
48.RIGHT CYLINDER COIL
49.LEFT CYLINDER COIL
50.RIGHT SPARK PLUG
51.LEFT SPARK PLUG
52.RIGHT CYLINDER INJECTOR
53.LEFT CYLINDER INJECTOR
54.FALL SENSOR (OPTIONAL EQUIPMENT)
55.PICK-UP
56.ECU
57.FOG LIGHT (OPTIONAL EQUIPMENT)
58.FRONT LEFT TURN INDICATOR
59.COMPLETE HEADLAMP
60.TAIL LIGHT BULB
61.HIGH - LOW BEAM BULB
62.FRONT RIGHT TURN INDICATOR
63.INSTRUMENT PANEL DIAGNOSIS
64.ECU DIAGNOSIS
65.HIGH BEAM LIGHT RELAY
66.PLUG SOCKET "2"
67.LAMBDA PROBE RIGHT

Cable colour:

Ar orange
Az sky blue
B blue
Bi white
G yellow
Gr grey
M brown
N black
R red
Ro pink
V green

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Vi purple

Checks and inspections

Dashboard

Diagnosis

Changing the CODE

If you know the code, just enter it and then a new code that will be automatically stored in the memory.

If the vehicle is new, the user code is: 00000

Resetting the CODE

This function is used to set a new code when the old one is not available; in this case, at least two of the programmed keys have to be inserted in the ignition lock.

After the first key has been inserted, the second one is requested with the following message:

INSERT KEY II

If the second key is not inserted within 20 seconds, the operation is finished.

After recognising the second key, the new code is required with the message:

ENTER NEW CODE

Once the operation is finished, the instrument panel goes back to the SET-UP menu.

DIAGNOSIS

Access to this menu (diagnosis functions), for the technical service only, after requesting a service code.

It will read: ENTER THE SERVICE CODE This vehicle code is: **10695**

The functions in this menu are:

- Exit
- ECU diagnosis
- Instrument Panel Errors
- Error Clearing
- Reset Service
- Update
- Change Keys
- km / Miles

ECU ERRORS

The instrument panel receives only the current errors from the control unit.

Description Error code

Throttle Valve Error DC V DC ECU 10

Throttle Valve Error DC Gnd ECU 11

Engine Temperature Error DC V DC ECU 14

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Engine Temperature Error DC Gnd ECU 15

Air Temperature Error DC V DC ECU 16

Air Temperature Error DC Gnd ECU 17

Low Battery Error ECU 20

Lambda Probe Error ECU 21

Coil 1 Error DC V DC ECU 22

Coil 1 Error DC Gnd ECU 23

Coil 2 Error DC V DC ECU 24

Coil 2 Error DC Gnd ECU 25

Injector 1 Error DC V DC ECU 26

Injector 1 Error DC Gnd ECU 27

Injector 2 Error DC V DC ECU 30

Pump Relay Error ECU 36

Local Loopback Error ECU 37

Start-up Remote Error DC V DC ECU 44

Remote Error Start-up DC Gnd ECU 45

Canister Error DC V DC ECU 46

Canister Error DC Gnd ECU 47

Battery Error Hig ECU 50

Generic ECU Error ECU 51

Signal Panel Error ECU 54

Self-adaptability Value Error ECU 55

Vehicle Speed Error ECU 56

Stepper Error AC ECU 60

Stepper Error DC V DC ECU 61

Stepper Error DC Gnd ECU 62

Not recognised error ECU 00

INSTRUMENT PANEL ERRORS

In this mode a chart is displayed showing potential errors in the immobilizer and its sensors.

This is the error decoding chart:

Description: Immobilizer failure: Key code read but not recognised. Error code: DSB 01

Description: Immobilizer failure: Key code not read (Key not inserted or transponder broken) Error code: DSB 02

Description: Immobilizer failure: Aerial not working (Open or short-circuited). Error code: DSB 03

Description: Immobilizer failure: Internal controller failure. Error code: DSB 04

Description: - Error code: DSB 05

Description: Air temperature sensor failure. Error code: DSB 06

Description: Oil sensor failure. Error code: DSB 07

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Description: Oil pressure failure. Error code: DSB 08

The instrument panel keeps all previous errors stored in its **memory**.

DELETE ERRORS

This option deletes instrument panel errors only, a further confirmation is requested.

INSTRUMENT PANEL SOFTWARE UPGRADE

This function is used to program the instrument panel again with a new software through Navigator.

The Display reads: "Instrument panel disconnected. Now connect the diagnosis instrument"; the instrument panel will connect normally after the key is extracted-inserted.

The white connector is placed under the saddle, beside the fuse box, close to the diagnosis connector for the injection system.

Use the Ditech connector in the Navigator **Aprilia-Moto Guzzi** package to connect to the Navigator cable.

KEY CHANGE FUNCTION

This function can be used:

1) if one key is lost; the dealer can disable this key;

2) to activate up to 4 keys;

3) should a new key lock be necessary and thus program the new set of keys.

In the first phase the user code must be entered and, after confirming the inserted key (key I) has been programmed, the other keys must be entered too.

The procedure finishes once the 4 keys have been programmed or after 20 seconds.

Should a new key lock be necessary, the procedure is: once the key is set to ON but the instrument panel does not recognise it, the user code is requested: enter the user code.

Now enter MENU, DIAGNOSIS (entering the service code), KEY CHANGE and program the new keys.

Battery recharge circuit

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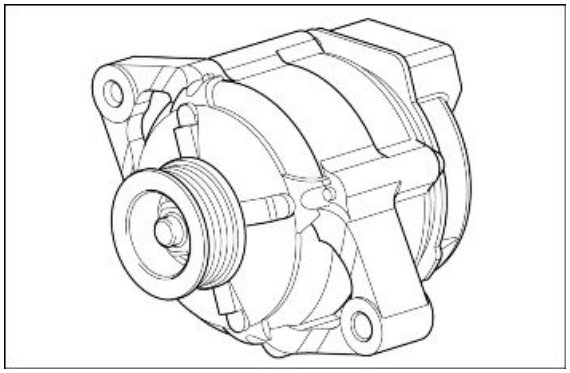
Checking the stator

Single-phase generator with regulated voltage

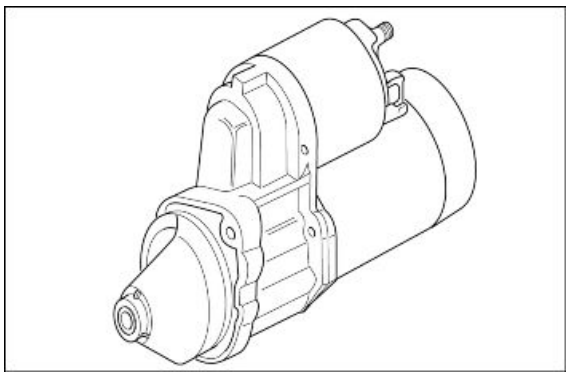
Maximum load 40A (550W)

Charging voltage 14.2 - 14.8 V (5000 rpm)



Start-up system check

pick-up input about 100 A



level indicators

Petrol pump:

Input: 3.5 A (to be measured between pins 1 and 2 with 12V voltage)

Fuel level sensor:

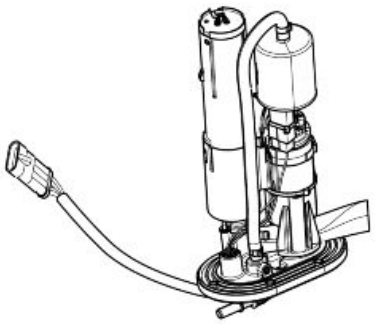
Resistance (to be measured between pins 3 and 4)

250-300 Ohm with fuel level equal to 0 litre

100 Ohm with fuel level equal to 11.25 litres (20.43 pt)

10-20 Ohm with fuel level equal to 22.5 litres (40.86 pt)

The low fuel warning light turns on with values over 230 Ohm.



In case there is anomaly on the fuel probe, the low fuel warning light flashes on the instrument panel.

The alarm warning light on the instrument panel does not light up and the word Service is not displayed.

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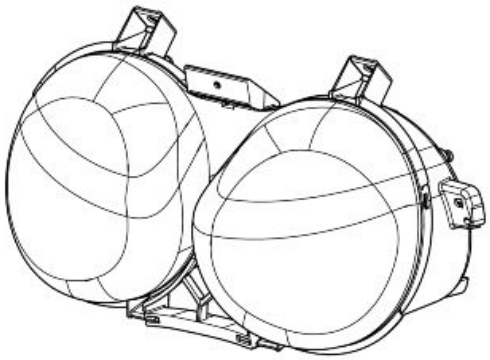
Lights list

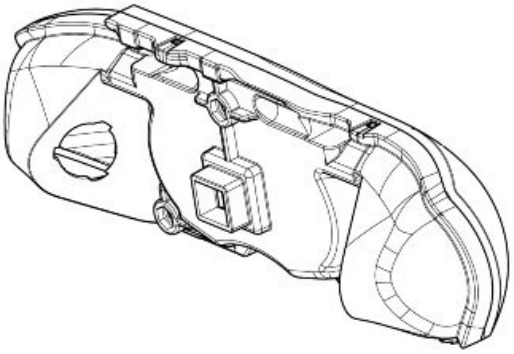
FRONT HEADLAMP

Specification	Desc./Quantity
Front daylight running light	12V - 5W
Low/high beam light (halogen)	12 V - 55 W / 60 W H4



REAR LIGHT

Specification	Desc./Quantity
Rear daylight running light/stop light	LED
License plate light	12V - 5 W



Fuses

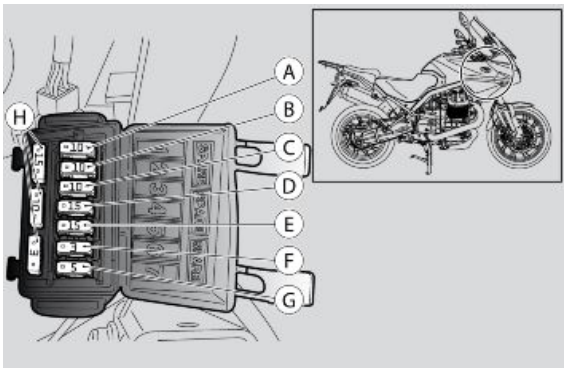
AUXILIARY FUSES

The secondary fuses are located in the front part of the motorcycle, below the instrument panel, on the left side of the front sub-frame.

A - Stop, horn, coil, GPS, hazard button lighting, coils, light relay, passing, heated grips (15 A).

B - Tail lights, license plate lamp (15 A).

C - Live positive, ABS control unit power supply (10 A) (where foreseen)



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D - Fuel pump, coils, injectors (15 A).

D - Lambda burner, secondary injection relay coil, start-up relay coil (15 A).

F- Permanent positive, ECU power supply, starter relay (3A).

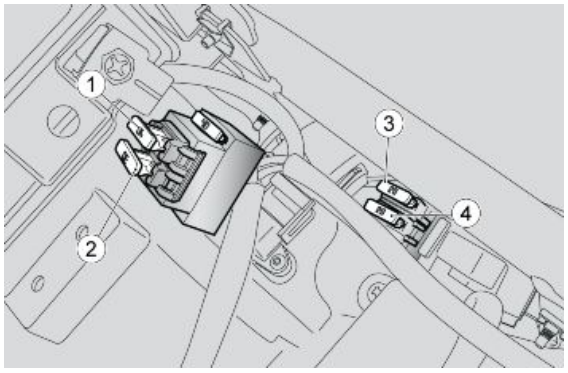
G - Plug socket (5A).

NOTE

THREE OF THE FUSES ARE SPARES (H).

MAIN FUSES

The main fuses are located in the central part of the motorcycle, under the rider saddle, on the right side.



1 - Battery recharge (40 A).

2 - Motion main fuse (30 A).

3 - High beam fuse (20 A).

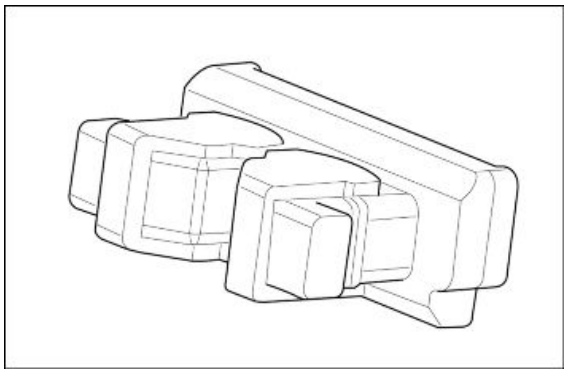
4 - Primary ABS fuse (20 A) (where foreseen).

NOTE

THERE IS ONE SPARE FUSE.

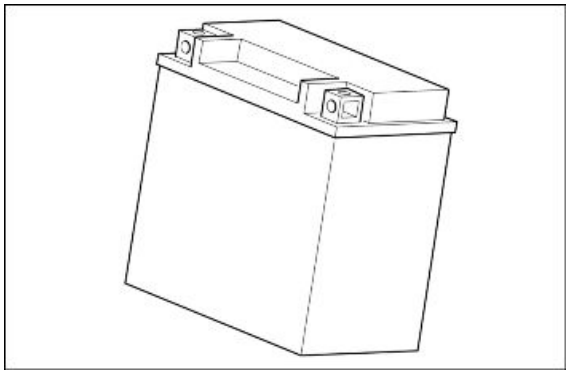
Control unit

Model: Magneti Marelli IAW 5 AM2



Battery

12 V - 18 Ampere/hour



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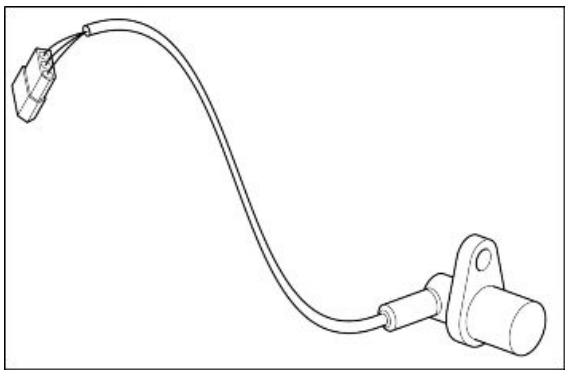
Speed sensor



FRONT

FUNCTION: To indicate the vehicle speed by reading the front wheel turning speed.

OPERATION / OPERATING PRINCIPLE: Magnetoresistive sensor: a square-wave pulse is generated with voltage approx. between 11.55 V and 11.25 V

WIRING DIAGRAM Level in wiring diagram: ABS.

REMOVAL

LOCATION ON THE VEHICLE:on the fork, right stem, next to the brake calliper support.

CONNECTOR LOCATION (if available): under the fuel tank, front position.

PINS

- PIN 1- Ground connection (white)
- PIN 2 - Power supply voltage/Output signal (white/brown)

NAVIGATOR: PARAMETERS

Speed sensor

Vehicle speed: km/h

FRONT SPEED SENSOR, ELECTRICAL ERRORS

5D90 electric malfunction: Electrical fault in sensor or cable harness.

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 cable between sensor PIN 2 on the cable harness side and PIN 14 ABS control unit connector. If there is no continuity, restore them. If there is, PIN 2 of the sensor on the cable 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 it is grounded, restore the cable harness. If OK, replace the control unit. If PIN 2 has approx. 12 V, check continuity of the cable between PIN 1 of the sensor on the cable harness side and PIN 13 of the ABS control unit connector. If this is not OK, restore the cable harness. If it is OK, replace the sensor.

LOGIC ERRORS

Speed sensor

5D91 the signal works irregularly: faulty sensor or signal interference.

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Troubleshooting: Check speed sensor retainer. If it is not OK, restore it. If it is OK, check if the tone wheel is dirty, deformed or wrongly fixed. If any of this happens, replace the tone wheel. Otherwise, replace the speed sensor.

5D92 the signal decreases periodically: Possible tone wheel fault due to deformations or dirt; possible alterations on the wheel bearing surface. 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 and if it is not OK, replace the bearings.

5D93 missing signal or speed measured too low in relation to the rear wheel: 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 and if it is OK, replace the speed sensor.

5D94 no acceleration after pressure reduction: 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 and if it is OK, replace the speed sensor.

5D95 excessive speed measured: 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 OK, restore it; if it is OK, replace the speed sensor.

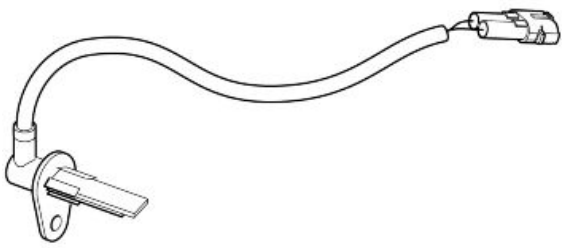
REAR

FUNCTION: It is used by the ABS module, and then by the ECU and the instrument panel.

OPERATION / OPERATING PRINCIPLE: Differential Hall effect sensor.

ELECTRICAL CIRCUIT DIAGRAM- Level in wiring diagram: ABS.

REMOVAL



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LOCATION ON THE VEHICLE: Under the bevel gear set box, right side.

CONNECTOR LOCATION (if available): Under the saddle, right side.

PIN-OUT:

- PIN1 - Ground
- PIN2 - Signal

NAVIGATOR: PARAMETERS

Speed sensor

Vehicle speed: km/h

REAR SPEED SENSOR OPEN CIRCUIT OR SHORT CIRCUIT NAVIGATOR ERROR

Description of the defect: the control unit detects abnormal voltage in the rear speed sensor signal.

Checks:check battery voltage on the cable between pin 2 of the rear speed sensor connector and pin 11 of the ABS module connector. If there is not enough voltage, check cable continuity from the ABS module to the speed sensor connector and make sure that the cable is ground insulated.

Solution:restore wiring. It is normal that when the speed sensor connector is disconnected, no voltage is detected.

If functioning is correct, proceed to the next check

Checks: check the speed sensor signal (0.5 or 1 V) on the cable between pin 1 of the rear speed sensor connector and pin 12 of the ABS module connector. If there is not enough voltage, check cable continuity from the ABS module to the speed sensor connector and make sure that the cable is grounded insulated.

Solution:if the cable is interrupted or grounded, restore wiring.

If the cable harness is not damaged, it means that the speed sensor is defective or the circuit between sensor and connector is interrupted: replace the speed sensor.

FRONT / REAR SPEED SENSOR COHERENCE NAVIGATOR ERROR

Description of the defect: the control unit detects an abnormal condition in the signals coming from the speed sensors: for example, disturbances, signal intensity reduced, speed difference between the two wheels for a certain period of time, etc.

Checks:check the correct distance between speed sensor and tone wheel.

Solution:restore the correct distance between speed sensor and tone wheel.

If functioning is correct, proceed to the next check

Checks:check the tone wheel is not distorted (it should not be deformed or damaged).

Solution:replace tone wheel

If functioning is correct, proceed to the next check

Checks: check the speed sensor position and integrity.

Solution:position the speed sensor correctly or replace it.

If functioning is correct, proceed to the next check.

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Checks:check tyres for wear (there should not be much difference between front and rear) and for correct pressure.

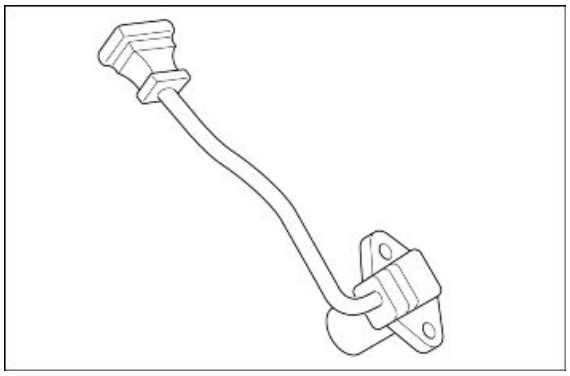
Solution:use tyres with the specified tyre wear condition and pressure.

If functioning is correct, proceed to the next check

Checks:make sure that "the failure" has not been caused by using the vehicle in sport competitions.

Solution:for example, avoid prolonged rearing up on the back wheel

Engine rpm sensor



Function

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

Location:

- Sensor: Front left side of the engine, under the generator.
- Connector: Under the fuel tank.

Electrical characteristics:

- Winding resistance 650 Ohm +/- 15%
- Output alternating voltage, value range: minimum: 0.5 V - maximum: 5 V

PIN:

1. Engine revolution sensor positive signal.
2. Engine revolution sensor negative signal.
3. Revolution sensor anti-jamming cable.

NAVIGATOR: PARAMETERS

Target engine revs

Example value:1100 +/- 100 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.

NAVIGATOR: STATUSES

Synchronisation

Example value: Synchronised / Not synchronised

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Indicates if the control unit detects the revolution sensor signal correctly

DIAGNOSIS

Engine revolution sensor

An interruption in the sensor circuit has been detected, from PIN 25 to PIN 35 of connector A (BROWN) Check the sensor connector and the injection control unit connector A (BROWN): it they are not OK, restore. If OK, check continuity of the two cables leading to PINS 25 and 35 of the control unit connector: if there is not continuity, restore the cable harness; if there is continuity, check the interruption on the sensor and replace it.

WARNING If the electric circuit is short-circuited, no error is displayed. Check the sensor electrical specifications: If they are not correct, replace the sensor. If correct, check supply insulation and ground connection insulation of both cables. Perform the tests from the sensor connector towards the sensor. If they are not OK, restore the cable harness or replace the sensor. If OK, perform the tests for pins 25 and 35 of the Marelli control unit connector A (BROWN) towards the cable harness.

Air gap value:

Place the sensor plus the corresponding spacers; the air gap should be between 0.7 and 0.9 mm (0.027 - 0.035 in).

Throttle position sensor

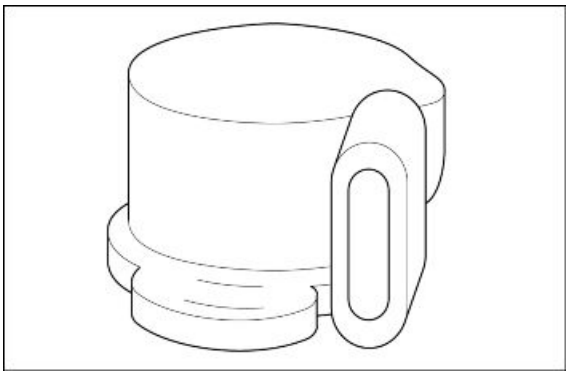
Function

In charge of telling the control unit the position of the throttle valves.

Operation / Operating principle

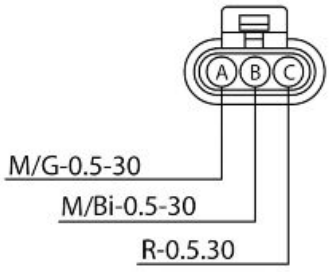
The throttle valve position sensor works as a variable resistance according to the throttle rotation.

Level in electrical circuit diagram: Throttle and idle motor



Location:

- sensor: on the right cylinder throttle body
- connector: on the potentiometer



Electrical characteristics:

- PINS A-C: throttle closed approx. 2.5 kOhm; throttle open approx. 1.5 kOhm.
- PINS A-B: approx. 1.1 kOhm

Pin-out:

- PIN A: ground connection

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- PIN B: supply voltage +5V
- PIN C: potentiometer signal

THE CONNECTION DIAGRAMS ARE IN THE ELECTRICAL SYSTEM SECTIONS; PAY ATTENTION TO THESE DIAGRAMS AS THEY SHOW THE CONNECTOR/COMPONENT AS VIEWED FROM THE CABLE HARNESS SIDE, THAT IS LOOKING AT THE CABLES WHEN GOING OUT OF THE "MAIN" CABLE HARNESS AND INTO THE CONNECTOR/COMPONENT.

CAUTION

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

NAVIGATOR: FUEL INJECTION SYSTEM

NAVIGATOR: PARAMETERS

Throttle

Example value: 4.9°

NAVIGATOR: STATUSES

Throttle position

Example value: Released/Pressed/Full load

Indicates if the throttle potentiometer is open or closed in the released position.

NAVIGATOR: ERRORS

Throttle actuator position sensor P0120

Example value:open circuit, shorted to positive / shorted to negative.

Error cause

- If the circuit is open, shorted to positive: excessive voltage has been detected at PIN 3 of connector A (BROWN).
- If shorted to negative: voltage equal to zero has been detected.

Troubleshooting

- Circuit is open, shorted to positive: check the injection control unit connector and the sensor connector: if they are not OK, restore; if they are OK, check continuity between PIN 3 of connector A (BROWN) and PIN C of the sensor (red cable): if there is not continuity, restore the cable harness; if there is continuity, check continuity of the sensor between PIN A and PIN C: if there is not continuity, replace the potentiometer; if there is continuity, check the resistance. If resistance is over 2.5 kOhm, it means the red cable is shorted to positive and the cable harness should be restored
- shorted to negative: disconnect the sensor connector and check the ground insulation of the red cable (from throttle sensor connector or control unit connector): if there is continuity to ground, restore the cable harness; if it is ground insulated, the resistance between PIN A and PIN C is below 1.3 kOhm; therefore, the throttle body should be replaced

NAVIGATOR: ADJUSTMENT

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Throttle position autodetection: It allows the control unit to detect the closed throttle position; just press the Enter key.

Self-adjustable parameters reset: Lambda probe self-adaptability parameters reset: 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.

NAVIGATOR: RESET PROCEDURE

Once the throttle body or the injection control unit is replaced, it is necessary to connect to the diagnosis instrument selecting FUEL INJECTION and carry out the operation: Throttle position autodetection.

Engine temperature sensor

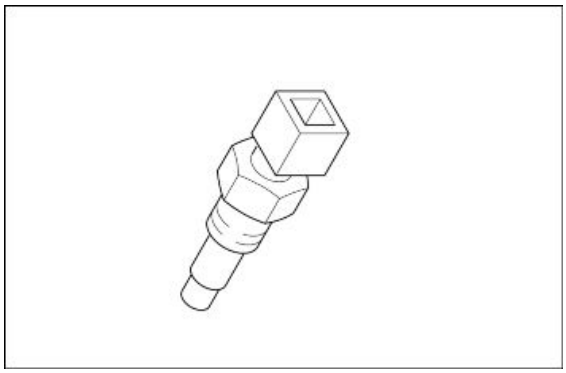
Function

tells the engine temperature to the control unit so as to optimise its operation.

Operation / Operating principle

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

Level in electrical circuit diagram: Temperature sensors



Location:

- sensor: all'interno della "V" del motore
- Connector: on the sensor

Electrical characteristics:

ENGINE TEMPERATURE SENSOR RESISTANCE

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

Pin-out:

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

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NAVIGATOR: FUEL INJECTION SYSTEM

NAVIGATOR: PARAMETERS

Engine temperature

In case of recovery, this value is set by the control unit.

NAVIGATOR: ERRORS

engine temperature sensor P0115 - open circuit, shorted to positive / shorted to negative.

Error cause

- If the circuit is open, shorted to positive: excessive voltage has been detected at PIN 5 of connector A (BROWN).
- If shorted to negative: voltage equal to zero has been detected at PIN 5 of the BROWN connector.

Troubleshooting

- If the circuit is open, shorted to positive: check sensor connector and Marelli control unit connector; if not OK, restore cable harness; if OK, check sensor continuity; if it is not OK, replace the sensor; if it is OK, check continuity between PIN 5 of the BROWN connector and PIN 2 of sensor: restore cable harness if there is not continuity; if it is OK, reconnect the control unit connector and, with key set to key ON, check the continuity between the sensor connector PIN 1 and the vehicle ground connection: if there is not continuity, restore the cable harness; if there is continuity, it means that the cause of the error is that the cable is shorted to positive and now the cable harness between the BROWN PIN 5 and PIN 2 of the sensor should be restored. If the air temperature sensor error is displayed at the same time, this means that the grey cable common for both sensors is shorted to positive.
- If shorted to negative, check sensor correct resistance: if resistance is null, replace the sensor; if resistance is correct, it means that the orange cable has ground connection: restore the cable harness.

NOTES No error is detected if the sensor does not work correctly or the control unit connector or sensor terminals are rusty: then check through Navigator if the temperature indicated is the same as the engine temperature. Check also that the sensor electrical characteristics are observed: replace the sensor if not OK; if it is OK, check the sensor connector and the Marelli control unit connector

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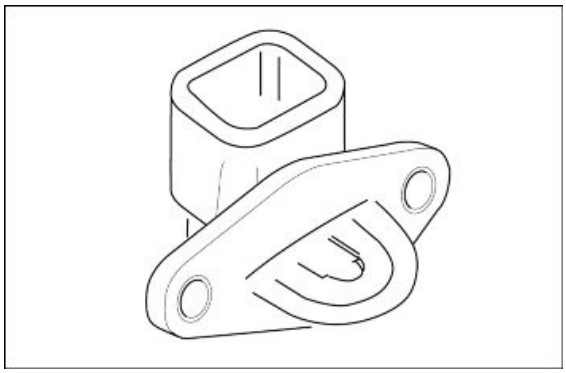
Air temperature sensor



Function

It tells the control unit the intake air temperature in order to calculate oxygen presence so as to optimise the petrol quantity necessary for correct combustion.

Operation / Operating principle

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

Level in electrical circuit diagram: Temperature sensors

Location:

- sensor: on filter casing
- connector: on the sensor

Electrical characteristics:

AIR TEMPERATURE SENSOR RESISTANCE

	Specification	Desc./Quantity
1	Resistance at -40 °C (-40 °F)	100.950 kOhm
2	Resistance at 0 °C (32 °F)	9.750 kOhm
3	Resistance at 10 °C (50 °F)	5.970 kOhm
4	Resistance at 20 °C (68 °F)	3.750 kOhm
5	Resistance at 30 °C (86 °F)	2.420 kOhm
6	Resistance at 40 °C (104 °F)	1.600 kOhm
7	Resistance at 90 °C (194 °F)	0.280 kOhm

Pin-out:

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

NAVIGATOR: PARAMETERS

Air temperature

In case of failure, temperature is set at 25 °C (77 °F)

NAVIGATOR: ERRORS

air temperature sensor P0110 - open circuit, shorted to positive / shorted to negative.

Error cause

- If the circuit is open, shorted to positive: excessive voltage has been detected at PIN 14 of the BROWN connector. If shorted to negative: voltage equal to zero has been detected at PIN 14 of the BROWN connector

Troubleshooting

- If the circuit is open, shorted to positive: check the sensor connector and the Marelli control unit connector. If they are not OK, restore the cable harness; if OK, check the continuity of

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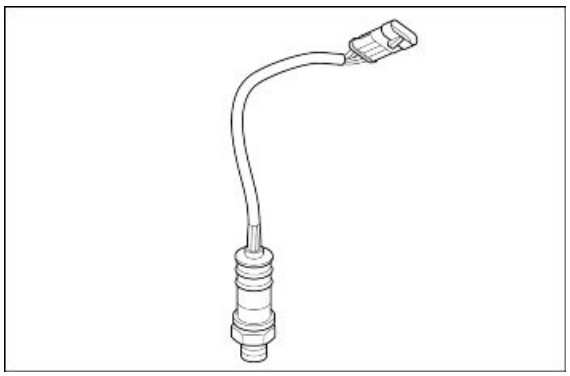
the sensor; if it is not OK, replace the sensor; if it is OK, check continuity between PIN 14 of the BROWN connector and PIN 2 of sensor: restore cable harness if there is not continuity; if it is OK, reconnect the control unit connector and, with key set to key ON, check the continuity between the sensor connector PIN 1 and the vehicle ground connection: if there is not continuity, restore the cable harness; if there is continuity, it means that the cause of the error is that the cable is shorted to positive and now the cable harness between the BROWN PIN 14 and PIN 2 of the sensor should be restored. If the engine temperature sensor error is displayed at the same time, this means that the grey cable common for both sensors is shorted to positive.

- If shorted to negative, check sensor correct resistance: if resistance = 0, replace the sensor; if resistance is correct, it means that the pink/black cable has ground connection: restore the cable harness

NOTES No error is detected if the sensor does not work correctly or the control unit connector or sensor terminals are rusty: then check through Navigator if the temperature indicated is plausible in relation to the ambient temperature. Check also that the sensor electrical characteristics are observed: replace the sensor if not OK; if it is OK, check the sensor connector and the Marelli control unit connector

Lambda sensor



Function

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

Operation / Operating principle

The Marelli injection control unit reads and interprets a voltage generated by the difference in oxygen content between the exhaust fumes and the ambient. It does not require an external supply source but, in order to work properly, it should reach a high operating temperature: that is why there is a heating circuit inside.

Level in electrical circuit diagram: Oxygen sensor

Location:

- sensor: exhaust pipe
- Connector: near the probe

Electrical characteristics:

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

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Pin-out:

1. Sensor signal + (black wire)
2. Sensor signal - (grey wire)
3. Heater ground connection (white)
4. Heater power supply (white)

NAVIGATOR: PARAMETERS

Lambda probe

example value: 0 - 1000 mV

If there is a short circuit at + 5 V or above, the value read is approx. 5.000 mV. If there is a short circuit to ground instead, the value read is equal to 0 mV and the Lambda Sensor Correction parameter shows 25%: no error is displayed, though.

Lambda sensor correction

example value: 1.00

In closed loop, the value must be close to 0 % (values not within the +10 % and -10 % range may indicate a fault): In an open circuit, the lambda sensor signal is too low. Therefore, the control unit takes it as a lean mixture condition and will try to enrich it. The value read will be +25%.

NAVIGATOR: STATUSES

Lambda check

Example value: Open loop / Closed loop

Closed loop indicates that the control unit is using the lambda probe signal to keep the combustion as close as possible to the stoichiometric value.

NAVIGATOR: ELECTRICAL ERRORS

Left lambda sensor P0130 - Shorted to positive.

Error cause

- Excessive voltage (battery voltage) has been detected at PINS 32 and 22 of the BLUE connector.

Troubleshooting

- shorted to positive: with the key set to ON, disconnect the sensor connector and measure voltage at PIN 1 on the cable harness side (white/yellow cable): if there is voltage (5 or 12 V), restore the cable harness; it there is no voltage, measure voltage at PIN 2, cable harness side, (green/white cable) and if there is voltage, restore the cable harness; if there is no voltage, replace the lambda sensor

Left lambda sensor heating P0135 - shorted to positive / open circuit, shorted to negative.

Error cause

- If shorted to positive: excessive voltage has been detected at PIN 11 of the BLUE connector.

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- If the circuit is open, shorted to negative: voltage equal to zero has been detected at PIN 11 of the BLUE connector.

Troubleshooting

- shorted to positive: disconnect the probe connector and check the sensor correct resistance: replace the sensor if not OK; if it is OK, restore the cable harness.
- circuit is open, shorted to negative: check the continuity from probe connector (PIN 3 and 4) towards the probe: if not OK, replace the probe; if it is correct, check the sensor connector and the Marelli control unit connector. If not OK, restore. If OK, and with key set to ON and sensor connector disconnected, check if there is battery voltage at PIN 4: se non ok verificare cavo rosso/nero (lato cablaggio) tra connettore sonda e relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi), se presenti anche errori bobine e iniettori verificare il relè stesso e la sua linea di eccitazione e potenza; if there is voltage at PIN 4, check the white cable ground insulation, cable harness side (PIN 3): if it is not OK, restore the cable harness. If OK, check continuity of the white cable, cable harness side (between PIN 3 of the sensor connector and PIN 11 of the BLUE connector) and restore the cable harness.

LOGIC ERRORS

Left lambda sensor P0134- voltage without variation.

Error cause

- An abnormal behaviour of the voltage at PIN 22 of the BLUE connector has been detected: the voltage, that should vary over time, keeps a constant value instead.

Troubleshooting

- check circuit continuity of the lambda sensor connector (PIN 1 PIN2) toward the probe: replace the probe if there is no continuity; if there is continuity, check the sensor connector and the Marelli control unit connector: If not OK, restore. If OK, check continuity between the BLUE connector PIN 22 and PIN 32 and restore the cable harness.

ELECTRICAL ERRORS

Right lambda sensor P0136 - Shorted to positive.

Error cause

- Excessive voltage (battery voltage) has been detected at PINS 21 and 31 of the BLUE connector.

Troubleshooting

- shorted to positive: con chiave ON, scollegare il connettore del sensore e misurare la tensione al PIN 1 lato cablaggio (cavo viola/giallo): if there is voltage (5 or 12 V), restore the cable harness; it there is no voltage, measure voltage at PIN 2, cable harness side, (brown

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cable) and if there is voltage, restore the cable harness; if there is no voltage, replace the lambda sensor.

Right lambda sensor heating P0141 - shorted to positive / open circuit, shorted to negative.

Error cause

- If shorted to positive: excessive voltage has been detected at PIN 1 of the BLUE connector.
- If the circuit is open, shorted to negative: voltage equal to zero has been detected at PIN 1 of the BLUE connector.

Troubleshooting

- shorted to positive: disconnect the probe connector and check the sensor correct resistance: replace the sensor if not OK; if it is OK, restore the cable harness.
- circuit is open, shorted to negative: check the continuity from probe connector (PIN 3 and 4) towards the probe: if not OK, replace the probe; if it is correct, check the sensor connector and the Marelli control unit connector. If not OK, restore. If OK, and with key set to ON and sensor connector disconnected, check if there is battery voltage at PIN 4: se non ok verificare cavo rosso/nero (lato cablaggio) tra connettore sonda e relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi), se presenti anche errori bobine e iniettori verificare il relè stesso e la sua linea di eccitazione e potenza; se tensione al PIN 4 presente verificare isolamento da massa del cavo rosa/marrone, lato cablaggio (PIN 3): se non ok ripristinare cablaggio, se ok verificare continuità del cavo rosa/marrone, lato cablaggio (tra PIN 3 del connettore sensore e PIN 1 connettore BLU) e ripristinare il cablaggio.

LOGIC ERRORS

Lambda sensor P0140 - voltage without variation.

Error cause

- An abnormal behaviour of the voltage at PIN 31 of the BLUE connector has been detected: the voltage, that should vary over time, keeps a constant value instead.

Troubleshooting

- check circuit continuity of the lambda sensor connector (PIN 1 PIN2) toward the probe: replace the lambda sensor if there is no continuity; if there is continuity, check the sensor connector and the Marelli control unit connector: If not OK, restore. If OK, check continuity between the BLUE connector PIN 31 and PIN 21 and restore the cable harness.

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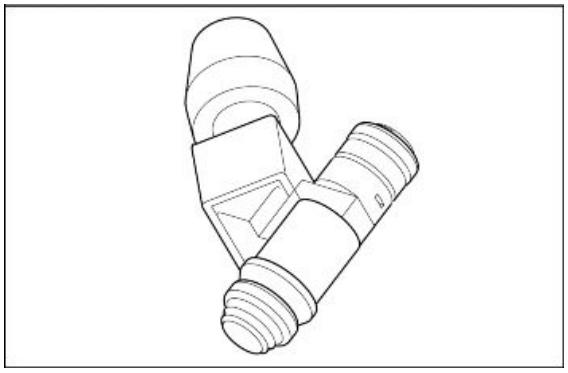
Injector



Function

To supply the correct amount of petrol at the right timing.

Operation / Operating principle

Injector coil is excited for the petrol passage to open.

Level in electrical circuit diagram: Coils and injectors

Location:

- on the intake manifold
- connector: on injector

Electrical characteristics:14.8 Ohm +/- 5% (at 20 °C)

Pin-out:

"+": Supply:

" ": Ground connection

NAVIGATOR:FUEL INJECTION SYSTEM

NAVIGATOR: PARAMETERS

Injection time

NAVIGATOR: ACTIVATION

Left injector: operation for 4 ms, 5 times

Viene eccitato il relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi) per 5 secondi e viene chiuso a massa il cavo grigio/rosso dell'iniettore per 4 ms ogni secondo. Disconnect the 4-way connector of the fuel pump to be able to hear the relay and injector activation. The continuity of the cable harness is necessary for correct activation: no error indications are displayed in case of lack of activation.

NAVIGATOR: ERRORS

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

Error cause

- If shorted to positive: excessive voltage has been detected at PIN 28 of the BROWN connector.
- If shorted to negative: no voltage has been detected.
- If the circuit is open: an interruption has been detected

Troubleshooting

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- If short circuit to positive: disconnect the injector connector, take the key to ON and check if there is voltage on the grey/red cable: if there is voltage, restore the cable harness. If there is no voltage, replace the injector
- If shorted to negative: disconnect the injector connector, take the key to ON and check if the grey/red cable has continuity to the ground connection: if there is continuity to ground, restore the cable harness; if there is not continuity, replace the injector
- The circuit is open: check the component correct electrical characteristic: if it is not the correct one, replace the component; if it is correct, check the connector on the component and the Marelli control unit connector: If they are not OK, restore. If OK, check cable continuity between PIN 28 of the BROWN connector and the component PIN - and restore the cable harness.

NAVIGATOR: ACTIVATION

Right injector: Operation for 4 ms, 5 times

Viene eccitato il relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi) per 5 secondi e viene chiuso a massa il cavo blu/rosso dell'iniettore per 4 ms ogni secondo. Disconnect the 4-way connector of the fuel pump to be able to hear the relay and injector activation. The continuity of the wiring is necessary for correct activation: no error indications are displayed in case of lack of activation.

NAVIGATOR: ERRORS

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

Error cause

- If shorted to positive: excessive voltage has been detected at PIN 37 of the BROWN connector.
- If shorted to negative: no voltage has been detected.
- If the circuit is open: an interruption has been detected

Troubleshooting

- If short circuit to positive: disconnect the injector connector, take the key to ON and check if there is voltage on the blue/red cable: if there is voltage, restore the cable harness. If there is no voltage, replace the injector
- If shorted to negative: disconnect the injector connector, take the key to ON and check if the blue/red cable has continuity to the ground connection: if there is continuity to ground, restore the cable harness; if there is not continuity, replace the injector
- The circuit is open: check the component correct electrical characteristic: if it is not the correct one, replace the component; if it is correct, check the connector on the component and the Marelli control unit connector: If they are not OK, restore. If OK, check cable continuity

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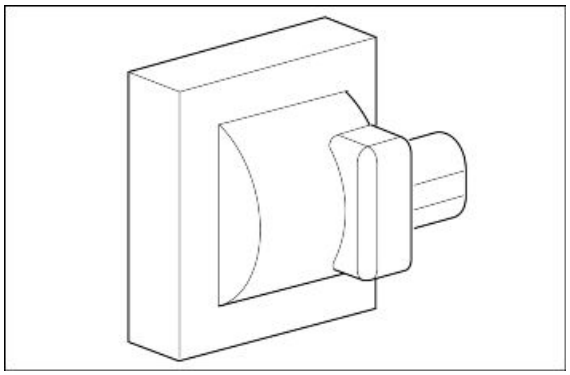
between PIN 37 of the BROWN connector and the component PIN - and restore the cable harness

Coil



Function

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

Operation / Operating principle

Inductive discharge system

Level in electrical circuit diagram: Coils and injectors

Location:

- In front of the fuel tank, left and right side
- Connector: on the coils

Electrical characteristics:

- Primary winding resistance: 550 mΩ ± 10%, at approx. 23 °C (73.4 °F).
- Secondary winding resistance: 3 mΩ ± 10%, at approx. 23 °C (73.4 °F).
- Tube resistance: 5 kΩ.

Pin-out:

1. Power supply + Vbatt
2. Circuit ground

NAVIGATOR: PARAMETERS

Left coil ignition advance.

NAVIGATOR: ACTIVATION

Left coil:

Viene eccitato il relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi) per 5 secondi e viene chiuso a massa il cavo verde/arancio della bobina per 2 ms ogni secondo. Disconnect the 4-way connector of the fuel pump to be able to hear the relay and injector activation. The continuity of the wiring is necessary for correct activation: no error indications are displayed in case of lack of activation

NAVIGATOR: ERRORS

Left coil P0351- shorted to positive / open circuit, shorted to negative

Error cause

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- If shorted to positive: excessive voltage has been detected at PIN 38 of the BROWN connector.
- If the circuit is open, shorted to negative: voltage equal to zero has been detected at PIN 38 of the BROWN connector

Troubleshooting

- If short circuit to positive: disconnect the coil connector, set the key to ON, activate the coil with Navigator and check voltage at connector PIN 2: if there is voltage, restore the cable harness; if voltage = 0, replace the coil.
- If the circuit is open, shorted to negative: check the coil connector and the Marelli control unit connector. If they are not OK, restore; if everything is OK, check cable continuity between PIN 2 of the coil connector and PIN 38 of the BROWN connector. If there is not continuity, restore the cable harness; if there is cable continuity, with the key set to KEY ON, check the cable ground insulation (from coil connector or control unit connector). If this is not OK, restore the cable harness.

NAVIGATOR: PARAMETERS

Right coil ignition advance.

NAVIGATOR: ACTIVATION

Right coil:

Viene eccitato il relè iniezione secondario (n°37 dello schema elettrico, posizione lato sinistro anteriore del motociclo, primo relè a sinistra vicino alla bobina, VERIFICARE comunque l'identificazione del relè con il colore dei cavi) per 5 secondi e viene chiuso a massa il cavo azzurro/verde della bobina per 2 ms ogni secondo. Disconnect the 4-way connector of the fuel pump to be able to hear the relay and injector activation. The continuity of the wiring is necessary for correct activation: no error indications are displayed in case of lack of activation

NAVIGATOR: ERRORS

Right coil P0352 - shorted to positive / open circuit, shorted to negative.

Error cause

- If shorted to positive: excessive voltage has been detected at PIN 10 of the BROWN connector.
- If the circuit is open, shorted to negative: voltage equal to zero has been detected at PIN 10 of the BROWN connector

Troubleshooting

- shorted to positive: disconnect the coil connector, set the key to ON, activate the coil with Navigator and check voltage at connector PIN 2: if there is voltage, restore the cable harness; if voltage = 0, replace the coil
- if the circuit is open, shorted to negative: check the coil connector and the Marelli control unit connector. If they are not OK, restore; if everything is OK, check cable continuity between PIN 2 of the coil connector and PIN 10 of the BROWN connector. If there is not

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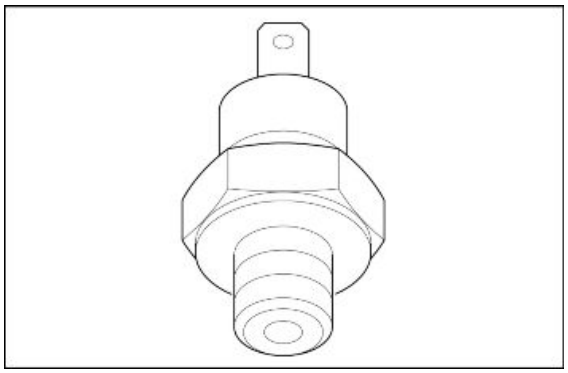
continuity, restore the cable harness; if there is cable continuity, with the key set to KEY ON, check the cable ground insulation (from coil connector or control unit connector). If this is not OK, restore the cable harness.

Engine oil pressure sensor



Function: Indicates the instrument panel if there is enough oil pressure (0.35 +/- 0.15 bar) (5.1 +/- 2.18 PSI) in the engine.

Operation / Operating principle: normally closed switch. With oil pressure above 0.35 +/-0.15 bar (5.1 +/- 2.18 PSI), open circuit.

Level in wiring diagram:fuel reserve and oil pressure.

Location:

- Sensor: in between the engine "V", a little to the left, under the generator
- Connector: on the sensor.

Pin-out: Voltage 12V

Instrument panel

Oil sensor failure DSB 07

Error cause

- An oil sensor failure is signalled when, with engine off, it is detected that the sensor circuit is open. The test is performed only once when the key is set to ON. This error is signalled by the bulb icon and the general warning light turns on as well.

Troubleshooting

- Check the sensor connector and the instrument panel connector (PIN 17): If not OK, restore. If OK, check the continuity of the purple cable between the sensor connector and the instrument panel connector PIN 17: if not OK, restore the cable harness; if OK, replace the sensor.

Oil pressure failure DSB 08

Error cause

- An oil sensor failure is signalled when, with engine running, it is detected that the sensor circuit is closed. This error is signalled by the bulb icon and the general warning light turns on as well.

Troubleshooting

- Detach the sensor connector and check the purple cable is ground insulated: if there is continuity to ground, restore the cable harness; if it is ground insulated, replace the switch.

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It this error persists, use a pressure gauge to check the pressure of the oil in the engine circuit

Neutral sensor

Function

it tells the gear position to the control unit: in neutral or in gear.

Operation / Operating principle

for gear in neutral, the circuit is closed to ground connection: then, via CAN, the control unit sends the signal to the instrument panel which turns on the neutral speed warning light.

Level in electrical circuit diagram:start-up enabling switches

Location:

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

Electrical characteristics:

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

Pin-out:

- PIN 1: Voltage 12V

NAVIGATOR: STATUSES

Gear in neutral

Example value:yes/no

DIAGNOSIS

- Indication on the instrument panel always gear engaged: check the control unit connector and the sensor connector: if they are not OK, restore the cable harness; if OK, disconnect the connector and, with gear in neutral, check continuity to ground of the terminal, sensor side: if there is not continuity, replace the sensor (after checking cable harness continuity on the sensor side and the correct mechanical position); if there is, check cable continuity between the sensor connector and PIN 23 of the BROWN connector: if there is no continuity, restore the cable harness. If there is, replace the instrument panel if the vehicle performance is correct (the engine starts with gear in neutral but the neutral warning light is off) or replace the control unit if the vehicle performance is not correct (the engine does not start with gear in neutral).
- Indication on the instrument panel always gear in neutral: disconnect the terminals from the sensor and check if there is continuity with ground connection at PIN toward the sensor, with gear engaged: if there is continuity, replace the sensor. If it is ground insulated, it means

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that the grey/black cable from PIN 1 of the sensor to PIN 23 of the BROWN connector is shorted to ground: restore the cable harness.

Clutch lever sensor

Function

It tells the clutch lever position to the control unit.

Operation / Operating principle

If the gear is engaged but the clutch is pulled, i.e. circuit closed to ground, vehicle start-up is enabled anyway.

Level in electrical circuit diagram: Start-up enabling switches.

Location:

- sensor: under clutch lever
- Connector: on the sensor

Electrical characteristics:

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

Pin-out:

1. Voltage 12V
2. Ground connection

NAVIGATOR: STATUSES

Clutch

Example value: Yes/No

The statuses regularly viewed are YES / NO

DIAGNOSIS

Troubleshooting:

- Indication on Navigator always No: check the correct position of the cable terminals on the sensor and the correct connection of the cables on the terminals. If they are not correct, restore the cable harness; if correct, disconnect the two terminals from the sensor and check continuity to ground of PIN 2 (cable harness side): if there is no continuity, restore the cable harness; if there is, replace the sensor. Check continuity of the brown/purple cable between PIN 1 of the sensor and PIN 33 of the BLUE connector, cable harness side: if there is no continuity, restore the cable harness; if there is, replace the sensor. With the key set to ON, check that 12 Volt is fed to PIN 33 of the BLUE connector
- Indication on Navigator always Yes: disconnect the terminals from the sensor and check if there is continuity between the two PINS, with clutch released: if there is continuity, replace

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the sensor. If the circuit is open, it means that the brown/purple cable from PIN 1 of the sensor to PIN 33 of the BLUE connector is shorted to ground: restore the cable harness

Side stand sensor

Function

It tells the side stand position to the control unit.

Operation / Operating principle

If the gear is engaged and the side stand is unfolded, and therefore the circuit is open, the control unit does not enable vehicle start-up or shuts off the engine if it is rotating.

Level in electrical circuit diagram: Start-up enabling switches

Location:

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

Electrical characteristics:

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

Pin-out:

1. Ground connection
2. Voltage 12 V (brown, sensor side)

NAVIGATOR: STATUSES

Side stand

Example value:retracted / extended

DIAGNOSIS

- Indication on Navigator always EXTENDED: check the side stand sensor connector and the ECU connector: se non ok ripristinare, se ok scollegare i due terminali dal sensore e verificare continuità a massa del PIN 1 (grigio lato cablaggio): if there is not continuity, restore the cable harness; if there is, check continuity of the green/brown cable: if it is not OK, restore; if OK, replace the sensor.
- Indication on Navigator always RETRACTED: disconnect the terminals from the sensor and check if there is continuity between the two PINS, with stand down: if there is continuity, replace the sensor; if the circuit is open, it means that the brown/green cable (cable harness side) from PIN 2 of the sensor to PIN 38 of the BLUE connector is shorted to ground: restore the cable harness.

Bank angle sensor

(if applicable)

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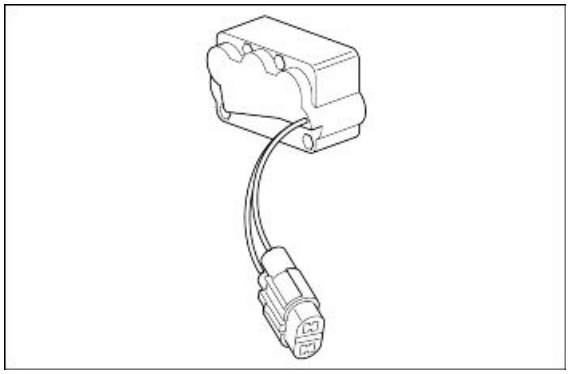

Function

it tells the vehicle position to the control unit.

Operation / Operating principle

When the sensor is inverted, the circuit is closed to ground: when the Marelli control unit detects this earthing, it disables the fuel pump circuit and the engine start-up circuit via the injection relay.

Level in electrical circuit diagram: Start-up enabling switches.

Location:

- Sensor: under the saddle, right side
- Connector: near the sensor

Electrical characteristics:

- Sensor in vertical position: open circuit (resistance: 62 kOhm)
- Sensor inverted: closed circuit (resistance below 0.5 kOhm)

Pin-out:

1. Voltage 12V
2. Ground connection

NAVIGATOR: STATUSES

Fall sensor

Example value: Normal / Tip over

DIAGNOSIS

- Indication on Navigator always Normal, even when the sensor is inverted: disconnect the connector and, with sensor inverted, check if there is continuity between the two PINS of the sensor: if there is no continuity, replace the sensor; if there is, check the connector. If not OK, restore the cable harness; if OK, check continuity to ground of PIN 2: if there is no continuity, restore the cable harness; if there is, with key set to KEY ON, check if there is 12V voltage at PIN 1. If there is not, check the Marelli control unit connector (PIN 35 of the BLUE connector)
- Indication on Navigator always Tip over: disconnect the connector and check if there is continuity between the two PINS when the sensor is in vertical position: if there is continuity, replace the sensor; if there is not, it means that, with key set to KEY ON, there is no 12V voltage at PIN 1: restore the cable harness whose pink/yellow cable will be shorted to ground

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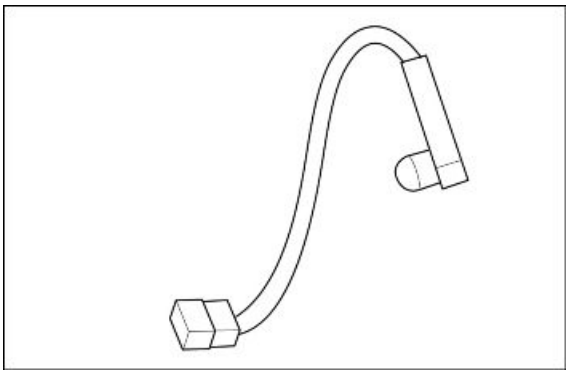
Air temperature sensor - instrument panel



Function

It tells 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

Location:

- sensor: under the instrument panel
- Connector: sotto al cruscotto, lato sinistro

Electrical characteristics:

- Resistance at 0 °C (32 °F): 32.5 kOhm +/- 5%
- Resistance at 25 °C (77 °F): 10.0 kOhm +/- 5%

Pin-out:

1. Voltage 5V
2. Ground connection

Instrument panel

Air temperature sensor failure DSB 06

Error cause

- An oil sensor failure is signalled when it is detected that the sensor circuit is open or shorted to positive

Troubleshooting

- Check the sensor connector and the instrument panel connector (PINS 10 and 18): If they are not OK, restore. If OK, check continuity of the pink cable between the sensor connector and the instrument panel connector PIN 10: if it is not OK, restore the cable harness; if OK, check the correct sensor resistance: if it is not OK, replace the sensor; if it is OK, check continuity of the brown cable between the sensor connector and PIN 18 of the instrument panel connector: If not OK, restore the cable harness; if OK, with key set to ON, check if there is voltage at the sensor connector PIN 1: if there is no voltage, replace the instrument panel; if there is approximately 12V, restore the cable harness (there is a short circuit in the battery). If there is 5V voltage, connect a 10 kOhm resistance to PIN 1 of the sensor connector and to the vehicle ground connection: if, with key set to ON, the voltage measured

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upstream the resistance decreases, replace the instrument panel. If voltage continues to be approximately 5V, restore the pink cable (there is a short circuit at + 5V).

Notes

If a short circuit to ground is detected at PIN 10 of the instrument panel connector, the display will show a full scale air temperature indication of 60 °C (140 °F)

Check the ground insulation of the sensor connector pink cable: if there is a connection, restore the cable harness; if it is earth insulated, check that sensor resistance is correct: if it is not OK, replace the sensor; if it is OK, replace the instrument panel.

RUN/STOP switch

Function

It tells 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 27 of the BLUE connector.

Level in electrical circuit diagram: Start-up enabling switches.

Location:

- right light switch.
- connector: right side, near the coil.

Electrical characteristics:

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

PIN:

- sky blue/orange cable: 0V if engine kill in STOP; 12V if engine kill in RUN
- red/black cable: Voltage 12V

NAVIGATOR: STATUSES

Run / stop switch

Example value:Run/Stop

DIAGNOSIS

- Indication on Navigator always STOP: disconnect the connector and, with the switch set to RUN, check if there is continuity towards the switch of both the green/orange and the grey/yellow cables (sensor side): if there is not continuity, replace the sensor; if there is, check the connector. If it is not OK, restore the cable harness; if it is OK, with the key set to ON, check if there is voltage on the red/black cable (cable harness side): if there is no voltage, restore the cable harness; if there is, check the ground insulation of the sky blue/orange cable (cable harness side): if there is continuity to ground, restore the cable harness; if it is OK, take the key to OFF and check that the BLUE connector is in good conditions and if

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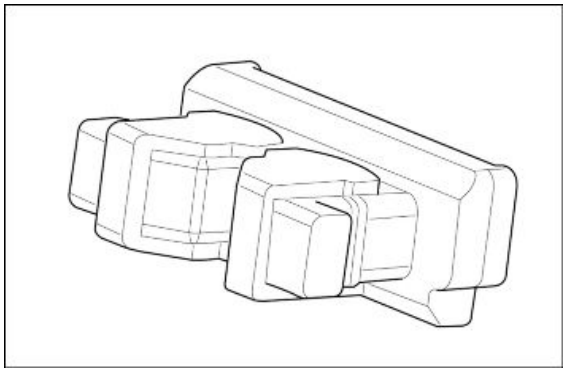
there is continuity of the sky blue/orange cable between the connector in question and PIN 27 of the BLUE connector: if not OK, restore the cable harness; if OK, replace the Marelli control unit.

- Indication on Navigator always RUN: disconnect the connector and, with the switch set to STOP, check if there is continuity between the two cables of the switch (sensor side): if there is continuity, replace the switch; if there is not, it means that, with the key set to KEY ON, the sky blue/orange cable is shorted to positive: restore the cable harness.

Connectors

ECU

BROWN connector pin configuration



Pin Use

1 Not used

2 Not used

3 Ignition potentiometer signal.

4 Not used

5 Engine temperature signal

6 Not used

7 Not used

8 Not used

9 Stepper motor (+)

10 Right cylinder coil control

11 Not used

12 Not used

13 Not used

14 Air temperature signal

15 Not used

16 Not used

17 Stepper motor (+)

18 Stepper motor (-)

19 Stepper motor (-)

20 5V power supply (NTC sensors)

21 Not used

22 Not used

23 Neutral sensor signal

24 Not used

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25 Engine revolution sensor signal
26 Not used
27 Not used
28 Left cylinder injector control
29 Ignition potentiometer negative.
30 Not used
31 Not used
32 Ignition potentiometer power supply.
33 Not used
34 Revolution sensor anti-jamming cable
35 Engine revolution sensor signal
36 Not used
37 Right cylinder injector control
38 Left cylinder coil control

BLUE connector pin configuration

Pin Use
1 Pin 85 ignition relay control
2 Not used
3 Not used
4 Power supply protected from instrument panel
5 Not used
6 Pin 86 auxiliary relay control
7 Immobilizer line
8 Not used
9 Not used
10 Not used
11 Oxygen probe negative control 1 (left)
12 Not used
13 Not used
14 Not used
15 Not used
16 K line (diagnosis)
17 Power supply from main relay
18 Not used
19 Not used
20 CAN - H line (ccm/instrument panel)
21 Ingresso sensore Lambda 2 (destra) (-)
22 Ingresso sensore Lambda 1 (sinistra) (+)

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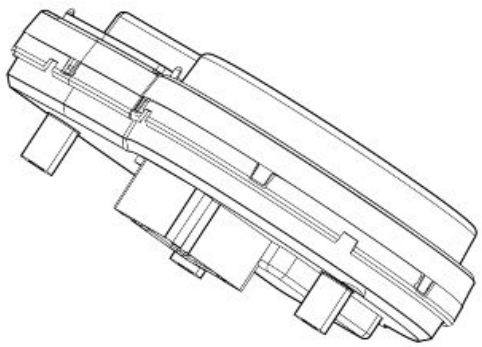
23 Not used
24 Vehicle speed signal input
25 Not used
26 Not used
27 "Engine stop" signal input
28 Ignition signal input
29 CAN - L line (ccm/instrument panel)
30 Not used
31 Ingresso sensore Lambda 2 (destra) (+)
32 Ingresso sensore Lambda 1 (sinistra) (-)
33 Clutch sensor signal
34 Not used
35 Fall sensor signal
36 Not used
37 Not used
38 Side stand sensor signal

Dashboard

The pin configuration of the GREY-bodied connector is as follows:



PIN USE
1 + KEY
2 RIGHT TURN INDICATOR CONTROL
3 HIGH BEAM LIGHT INPUT
4 -
5 FOG LIGHTS ON (OPT)
6 K LINE
7 HEATED HANDGRIP CONTROL
8 CONTROL - SET
9 FUEL LEVEL SENSOR
10 AIR TEMPERATURE SENSOR
11 + BATTERY
12 LEFT TURN INDICATOR CONTROL
13 -
14 -
15 -
16 GENERAL EARTH CONNECTION

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17 OIL PRESSURE SENSOR INTAKE
18 SENSORS EARTH CONNECTION
19 GENERAL GROUND (OPTIONAL)
20 GENERAL GROUND (OPTIONAL)

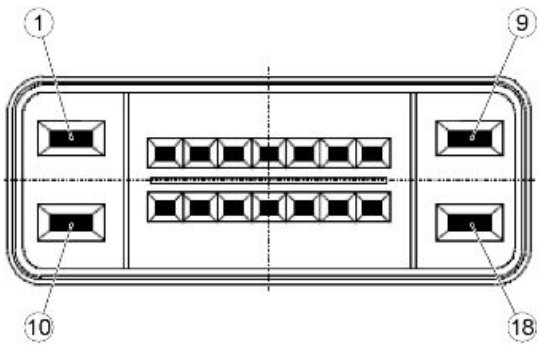
The pin configuration of the BLACK-bodied connector is as follows:

PIN USE
21 + BATTERY
22 FRONT LEFT TURN INDICATOR ACTIVATION
23 REAR LEFT TURN INDICATOR ACTIVATION
24 AERIAL 1
25 LEFT HEATED HANDGRIPS ACTUATOR (OPT)
26 CAN H
27 CONTROL - RESET
28 LIGHTS RELAY ACTIVATION
29 ANTITHEFT DEVICE LED (+12v)
30 CONTROL - DOWN
31 + BATTERY
32 FRONT RIGHT TURN INDICATOR ACTIVATION
33 REAR RIGHT TURN INDICATOR ACTIVATION
34 AERIAL 2
35 RIGHT HEATED HANDGRIPS ACTUATOR (OPT)
36 CAN L
37 HAZARD CONTROL
38 -
39 ABS
40 CONTROL - UP

ABS Modulator

Pin Use

1. Ground connection
2. Not used
3. Speed signal for injection ECU
4. ABS control unit power supply
5. Not used
6. Not used
7. ABS deactivation switch



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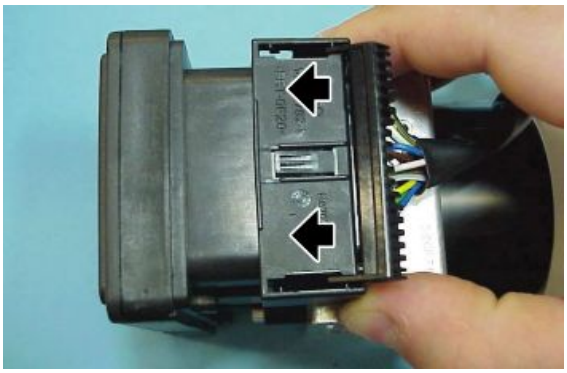
8. ABS warning light
9. Not used
10. Not used
11. Rear (ABS) speed sensor (supply)
12. Rear (ABS) speed sensor (signal / ground)
13. Front (ABS) speed sensor (signal / ground)
14. Front (ABS) speed sensor (supply)
15. Ground connection
16. Diagnosis
17. Not used
18. ABS pump supply



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Vehicle preparation

Before removing the engine block, proceed as follows:

- Rest the vehicle on its centre stand.
- From the back, secure the vehicle with belts attached to a hoist.
- From the front, secure the vehicle with belts attached to the handlebar and fixed to the work bench.
- Remove the exhaust system, the fork with cardan shaft, the fuel tank and the rear shock absorber.

See also

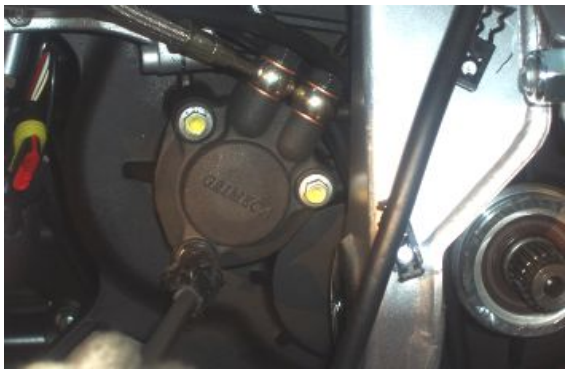
Exhaust
Removing

Fuel tank
Removing

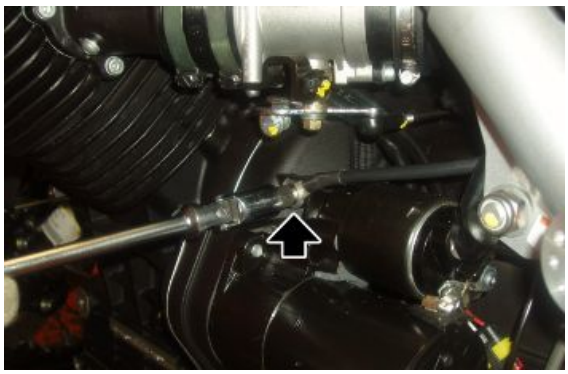
Removing the engine from the vehicle

- Disconnect the spark plug tubes.

- Unscrew and remove the three screws and remove the clutch control cylinder.
- Lock the cylinder using a clamp to prevent oil leaks.



- Remove the starter motor cover.
- Unscrew and remove the stud bolt.
- Disconnect the ground leads.



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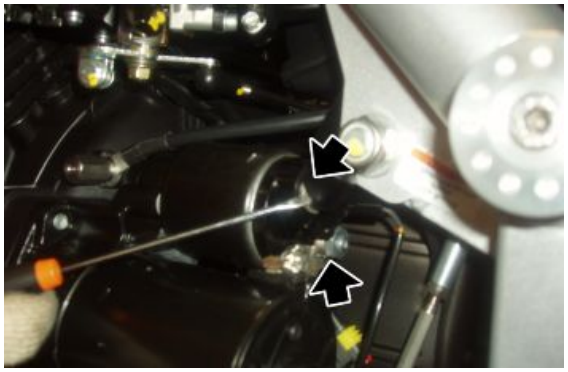
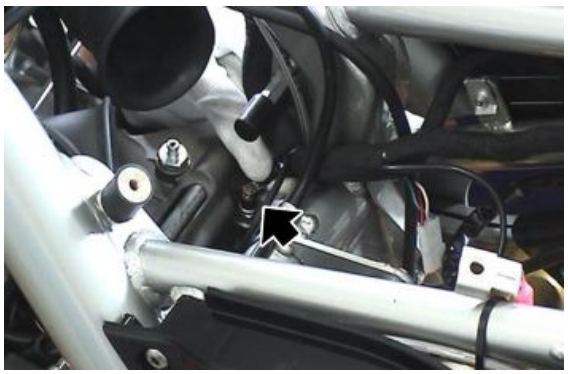
- Disconnect the connectors of the starter motor.



- Disconnect the stand sensor connector and release it from the clamps.

- Slide off the gearbox oil breather pipe.

- Disconnect the gear in neutral sensor connector.



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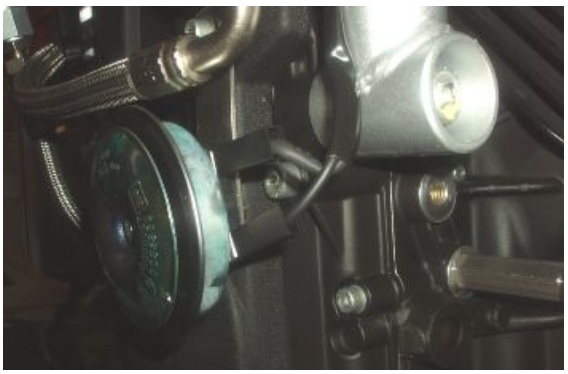
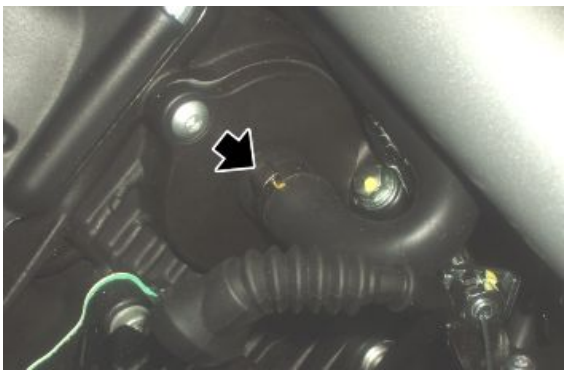
- Disconnect the horn connectors.



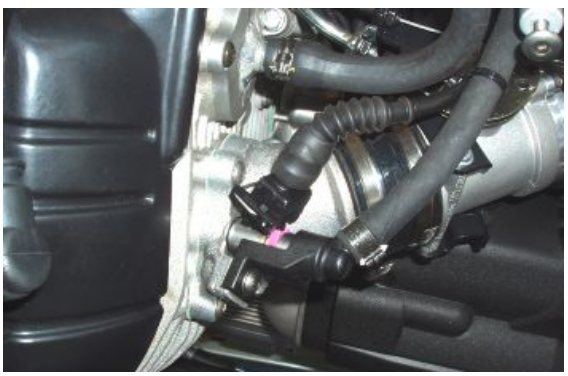
- Operating from both sides, undo and remove the screw fixing the oil radiator to the chassis.

- Loosen the clamp and slide off the oil pipe from the blow-by tank.

- Working on both sides, release the clamp and slide off the engine oil breather pipe.

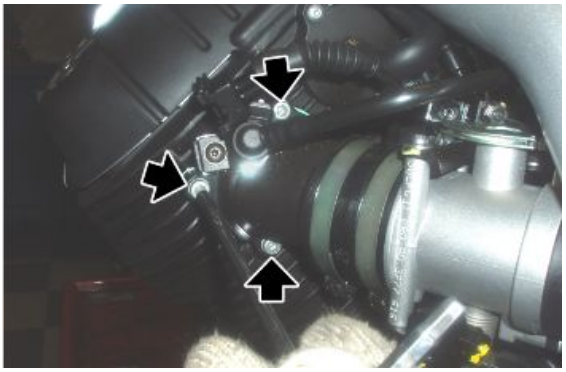


- Working on both sides disconnect the injector connectors.



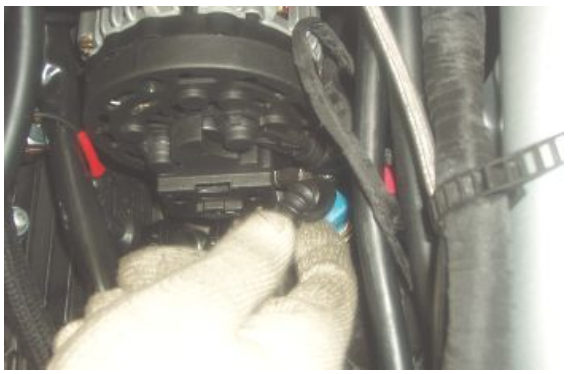
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Working from both sides, undo and remove the three inlet manifold screws.
- Collect the gasket.



- Disconnect the alternator connectors.

- Disconnect the engine temperature sensor connector



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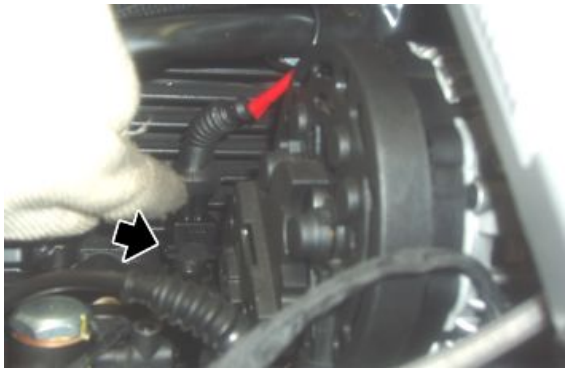
- Disconnect the engine oil pressure sensor connector.



- Disconnect the revolution sensor connector.

- Remove the fairing under the oil sump.
- Support the vehicle with the engine service stand.
- Undo and remove the screws fixing the centre stand plates.
- Remove the centre stand.

- Working on both sides, unscrew and remove the front screw and collect the washer.

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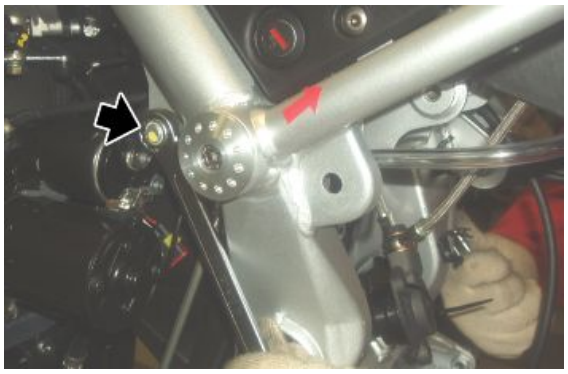
- Operating from both sides, undo and remove the upper engine fixing nut on the internal side of the chassis.

- Unscrew and remove the engine lower fixing nut and collect the washer.
- Remove the lower bolt and collect the washer.

- Unscrew and remove the upper nut fixing the engine and collect the washer.
- Remove the upper pin and collect the washer.



- Lower the engine completely.
- Lift the rear part of the vehicle.
- Release the front belts.
- Hold the rear part of the vehicle, remove the chassis from the engine.

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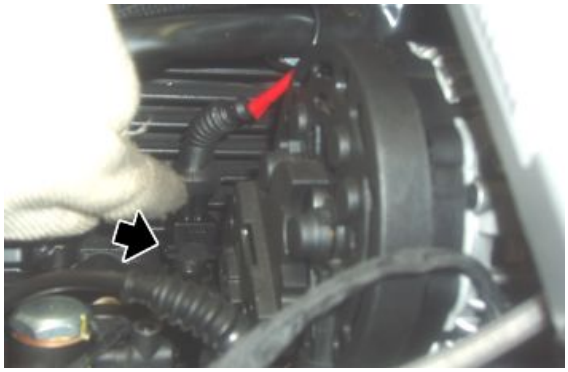
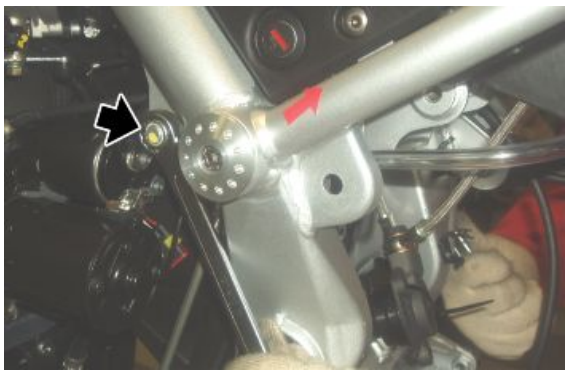
Installing the engine to the vehicle

- Place the vehicle chassis over the engine with the gear.
- From the back, secure the chassis with belts attached to a hoist.
- From the front, secure the vehicle with belts attached to the handlebar and fixed to the work bench.
- Lift the engine placing it in position.
- Connect the oil pressure sensor connector.

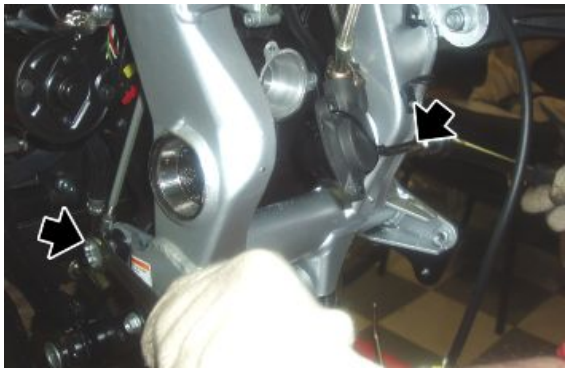


- Working from the left side, fit the engine upper bolt with the washer.
- From the opposite side, fit the washer and screw the nut.



- Working on both sides, insert the washer and screw the screw without tighten it.

- Working from the left side, fit the engine lower bolt with the washer.
- From the opposite side, fit the washer and tighten the nut.

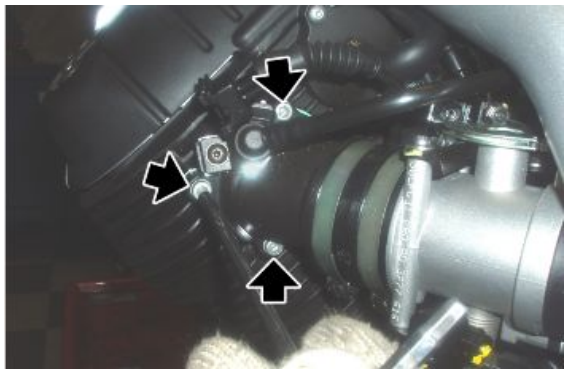


Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Operating from both sides, tighten the upper engine fixing nut on the internal side of the chassis.

- Fit the centre stand.
- Operating from both sides, tighten the screws fixing the centre stand plates.
- Remove the engine service stand from under the oil sump.

- Working from both sides, place the inlet manifold fitting a new gasket between the manifold and head.
- Fasten the inlet manifold with the three screws.



- Connect the stand sensor connector and fix it to the chassis with new clamps.

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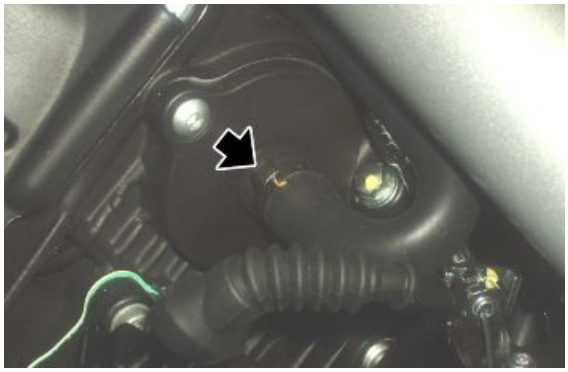
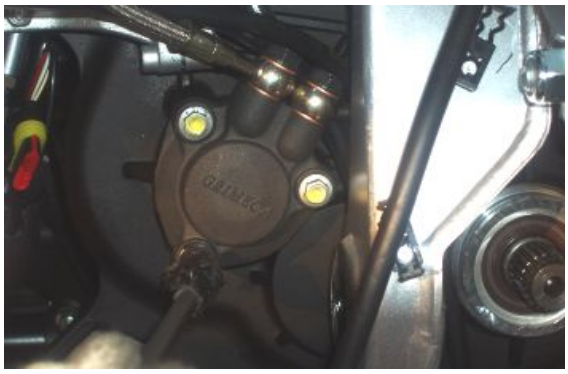
- Insert the oil breather pipe and fasten it with a new clamp.

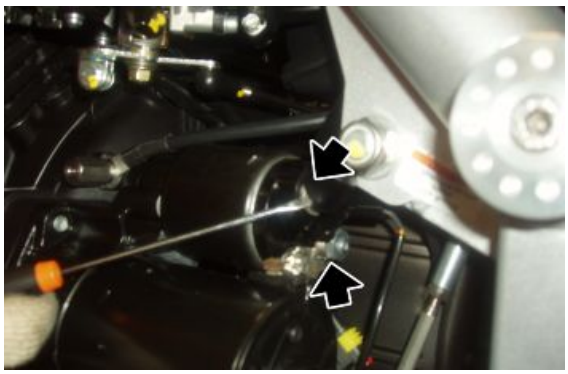


- Fit the gearbox oil breather pipe.

- Fit the clutch control cylinder.
- Tighten the three screws.



- Connect the starter motor connectors.



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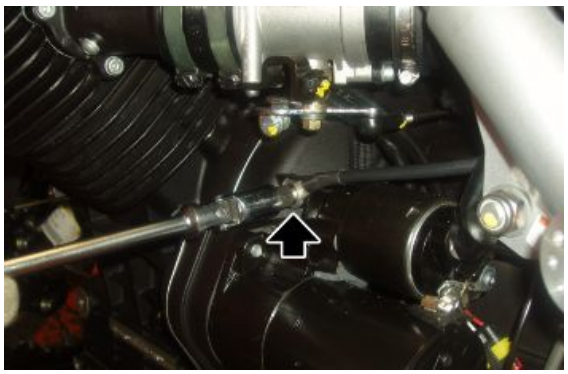
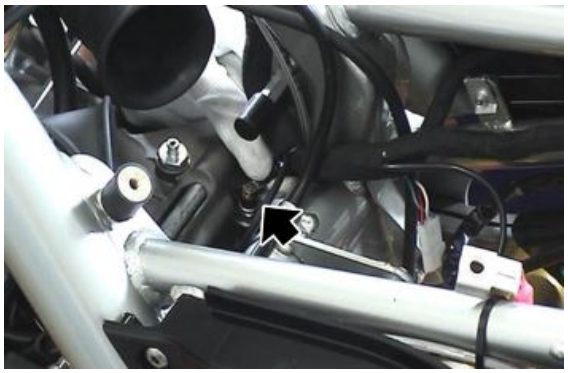
- Connect the ground leads and tighten the stud bolt.
- Fit the starter motor cover.
- Tighten the screws.



- Connect the neutral sensor connector.



- Connect the alternator connectors.

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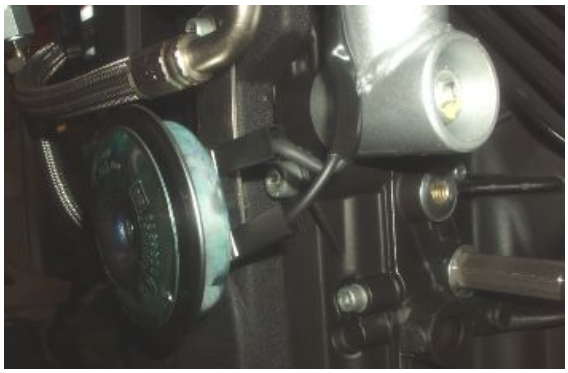
- Connect the revolution sensor connector.

- Connect the horn connectors.



- Connect the engine temperature sensor connector.

- Place the oil radiator.
- Tighten the two screws.

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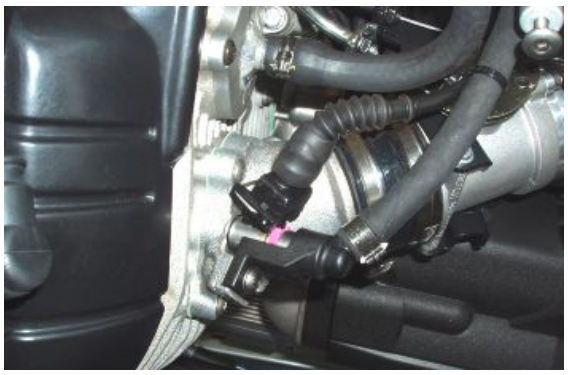
- Place the fork with cardan shaft and the rear wheel.
- Working on both sides, connect the injector connectors.
- Adjust the throttle grip cable clearance.
- Working from both sides, connect the spark plug tube.
- Install the fuel tank.
- Fit the saddle.
- Install the complete exhaust.



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INDEX OF TOPICS

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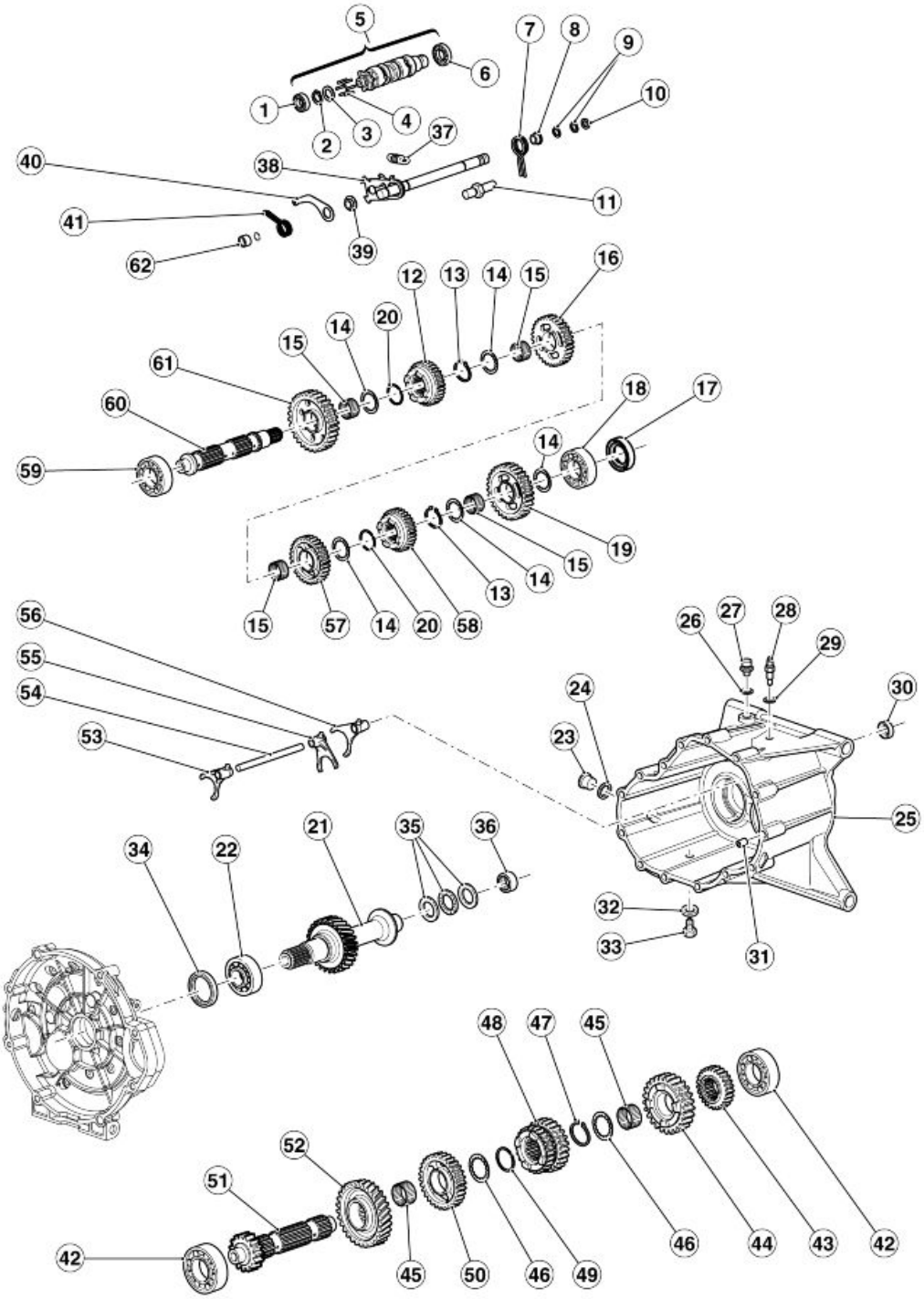
Gearbox

Diagram



Key:

1. Ball bearing

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2. Circlip
3. Thickness
4. Pin
5. Complete desmodromic
6. Ball bearing
7. Spring
8. Spacer
9. Circlip
10. Fifth wheel
11. Linking pin
12. Gear
13. Circlip
14. Thrust washer
15. Ball bearing cage
16. Gear
17. Sealing ring
18. Ball bearing
19. Gear
20. Circlip
21. Clutch shaft
22. Ball bearing
23. Oil plug
24. Washer
25. Gearbox
26. Aluminium washer
27. Breather cap
28. Neutral sensor
29. Gasket
30. Sealing ring
31. Bushing
32. Gasket
33. Oil drainage plug
34. Sealing ring
35. Thrust bearing
36. Roller bearing
37. Spring
38. Complete pre-selector
39. Bushing

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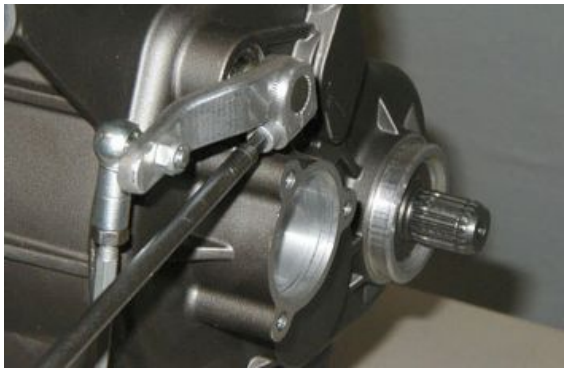
40.Index lever
41.Spring
42.Ball bearing
43.Gear
44.Gear
45.Ball bearing cage
46.Thrust washer
47.Circlip
48.Gear
49.Circlip
50.Gear
51.Main shaft
52.Transmission gear
53.Fork (5th - 1st)
54.Fork shaft
55.Fork (3rd - 4th)
56.Fork (2nd - 4th)
57.Gear
58.Gear
59.Ball bearing
60.Transmission shaft
61.Gear
62.Spacer

Gearbox

Removing the gearbox

- Remove the starter motor.
- Make sure the transmission is in idle.
- Undo and remove the screw and remove the gearbox lever.



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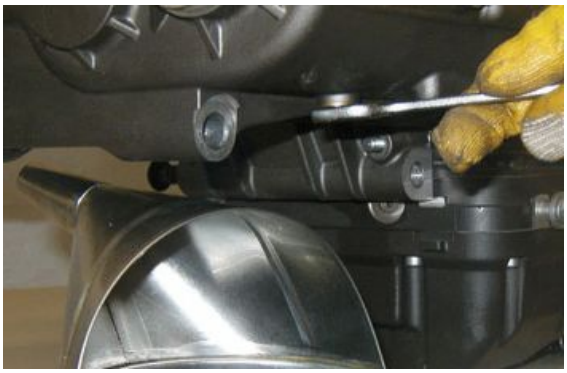
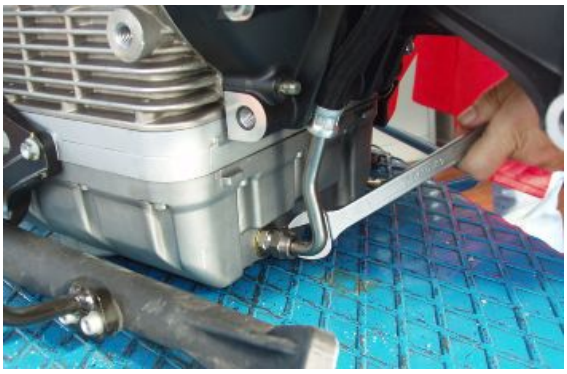
- Unscrew and remove the gearbox oil filler cap.

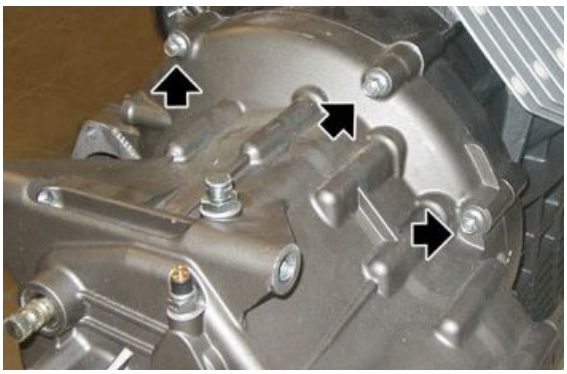
- Place a container of suitable capacity under it, unscrew and remove the cap and then bleed all gearbox oil.



- Loosen and turn the oil pipe joint on the sump.



- Undo and remove the three screws.



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- Undo and remove the two screws.

- Undo and remove the screw.

- Remove the gearbox.

See also

Removing the starter motor
Replacement

Gearbox shafts

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Disassembling the gearbox

- Remove the gearbox.

- Unscrew and slide off the odometer gear and collect the abutment washer that is inside the gearbox.

- From the outside, slide off the thrust cylinder and collect the O-Ring and the washer.

- Remove the thrust bearing and the washer.

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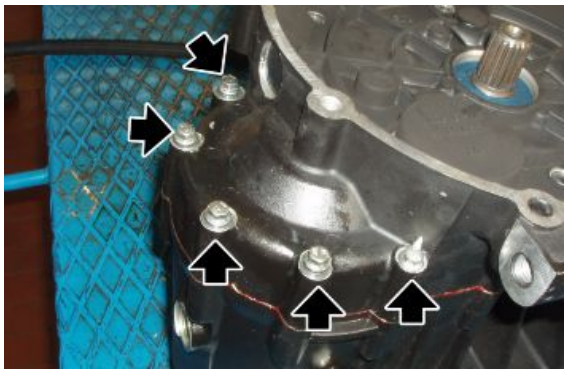
- Slide off the rod with the two bushings.

- Undo and remove the five external screws.



- Place the gearbox on the specific gearbox support tool and on a vice.

Specific tooling

05.90.25.30 Gearbox support

- Undo and remove the nine internal screws.

- Open the gearbox using the specific tool.

Specific tooling

05.91.25.30 Gearbox opening

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- Remove the bearings from the gearbox if necessary.

- Release the spring.

- Pressing the selector, slide off the whole transmission lever.

- Use rubber bands to tie down the transmission shaft unit and extract it.

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- Once the transmission shaft unit is in on a bench, remove the rubber bands, being careful with the group.
- Detach the shafts and label the forks before removal.

- Remove the forks and collect the shaft.

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- Replace bearings if necessary and remove the clutch shaft.

See also

Removing the gearbox

Removing the primary shaft

- Remove the main shaft.
- Operate on the main shaft from the second gear side.

- Remove the gear of the second gear and collect the ball bearing cage.

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- Remove the gear of the sixth gear and collect the shoulder washer.

- Remove the circlip.

- Remove the gear of the third and fourth gears.

- Remove the circlip and collect the shoulder washer.

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- Remove the gear of the fifth gear and collect the ball bearing cage.

- Heat the shaft with a specific heater and remove the helical transmission gear.

Removing the secondary shaft

- Remove the transmission shaft.
- Operate on the shaft from the grooved side.

- Remove the shoulder washer.

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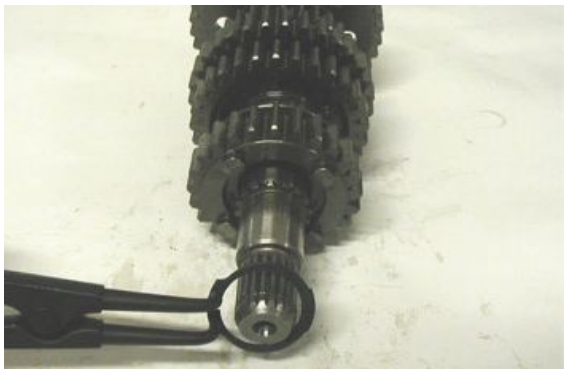
- Remove the gear of the second gear and collect the ball bearing cage and the shoulder washer.

- Remove the circlip.



- Remove the gear of the sixth gear.

- Remove the circlip and collect the shoulder washer.

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- Remove the gear of the fourth gear and collect the ball bearing cage.

- Remove the gear of the third gear and collect the ball bearing cage and the shoulder washer.

- Remove the circlip.

- Remove the gear of the fifth gear.

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- Remove the circlip, the shoulder washer and remove the gear of the first gear, collect the ball bearing cage.
- Remove the bearing if necessary.

See also

Disassembling the gearbox

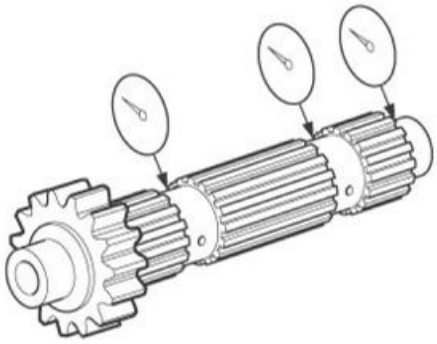
Checking the primary shaft

Measure coaxiality of the main shaft with a dial gauge and a centring device and replace it if not complying with specifications.

Characteristic

Shaft coaxiality limit

0.08 mm (0.0031 in)



Check transmission gears for signs of pitting and wear and replace damaged gears if necessary.
Check the gear fitting teeth for cracks, damage and wear and replace those damaged if necessary.
Check the transmission gears movement and, if it is not regular, replace the damaged part.

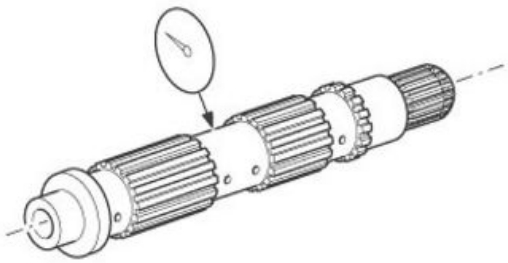
Checking the secondary shaft

Measure the coaxiality of the transmission shaft with a dial gauge and a centring device and replace it if not complying with specifications.

Characteristic

Shaft coaxiality limit

0.08 mm (0.0031 in)



Check transmission gears for signs of pitting and wear and replace damaged gears if necessary.
Check the gear fitting teeth for cracks, damage and wear and replace those damaged if necessary.
Check the transmission gears movement and, if it is not regular, replace the damaged part.

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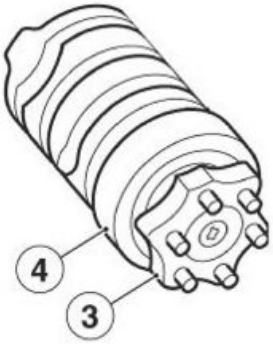
Checking the desmodromic drum

Check gear drum for damage, scratches and wear and replace the desmodromic if necessary.
Check the desmodromic segment «**3**» for damage and wear and replace it if necessary.
Check the desmodromic bearing «**4**» for damage and cracks and replace it if necessary.

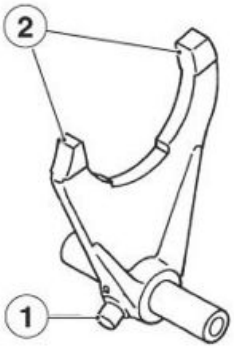


Checking the forks

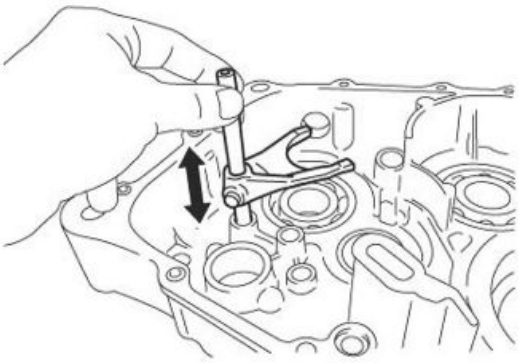
NOTE

THE FOLLOWING PROCEDURE IS VALID FOR ALL GEARBOX FORKS.

- Check the transmission fork cam roller «1» and the transmission fork tooth «2» for damage, deformation and wear.
- Replace the transmission fork if necessary.



- Check the transmission fork movement and if it is not regular, replace the transmission forks.



See also

Disassembling the gearbox

Fitting the primary shaft

NOTE

TO REFIT, FOLLOW THE SAME INSTRUCTIONS AS FOR REMOVAL BUT IN REVERSE ORDER. REMEMBER TO REPLACE ALL SEALING RINGS, CIRCLIPS AND SAFETY RINGS PREVIOUSLY REMOVED.

See also

Removing the

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primary shaft

Fitting the secondary shaft

NOTE

TO REFIT, FOLLOW THE SAME INSTRUCTIONS AS FOR REMOVAL BUT IN REVERSE ORDER. REMEMBER TO REPLACE ALL SEALING RINGS, CIRCLIPS AND SAFETY RINGS PREVIOUSLY REMOVED.

See also

Removing the secondary shaft

Assembling the gearbox

NOTE

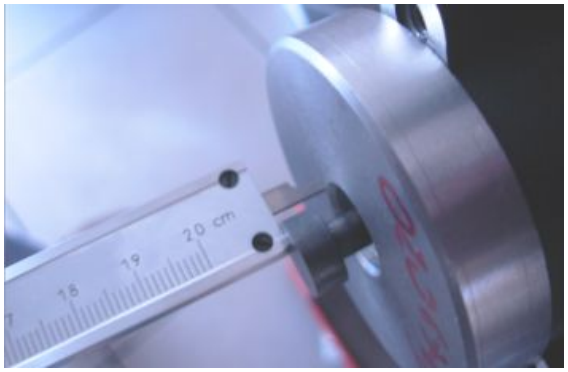
TO REFIT, FOLLOW THE SAME INSTRUCTIONS AS FOR REMOVAL BUT IN REVERSE ORDER. REMEMBER TO REPLACE ALL SEALING RINGS, CIRCLIPS AND SAFETY RINGS PREVIOUSLY REMOVED.

If the clutch is replaced, measure the length of the clutch control rod in order to use the correct rod.

Measure as follows:

- Fit the new clutch on the crankshaft.
- Fit the clutch control bowl in the gear-box.

- Fit the gearbox on the engine block.
- Fit the tool in the gearbox to determine the clutch control rod length.
- Measure rod protrusion using a depth gauge (see picture).
- According to the value found, select the correct rod based on the following table:



Specific tooling

020678Y Tool for clutch rod checking

CLUTCH CONTROL ROD SELECTION

Specification	Desc./Quantity
Protrusion: 9.8 - 11.2 mm (0.386 - 0.441 in)	Clutch control rod length (code 976593) = 183 mm (7.205 in)
Protrusion: 8.3 - 9.7 mm (0.327 - 0.382 in)	Clutch control rod length (code 976594) = 184.5 mm (7.264 in)
Protrusion: 6.8 - 8.2 mm (0.268 - 0.323 in)	Clutch control rod length (code 976595) = 186 mm (7.323 in)
Protrusion: 5.3 - 6.7 mm (0.209 - 0.264 in)	Clutch control rod length (code 976596) = 187.5 mm (7.382 in)

See also

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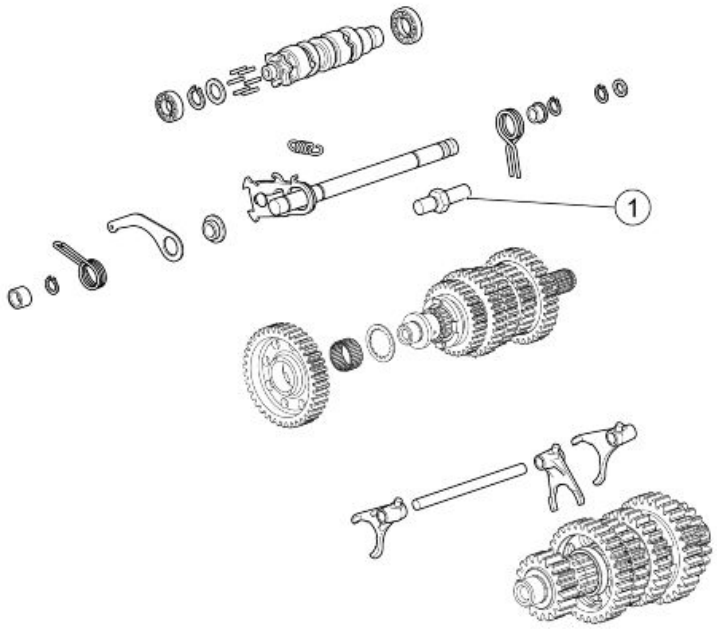
Disassembling the gearbox

Gear selector



GEAR INTERNAL CONTROLS

pos.	Description	Type	Quantity	Torque	Notes
1	Spring guide pin	-	1	24 Nm (17.70 lbf ft)	Loctite 243

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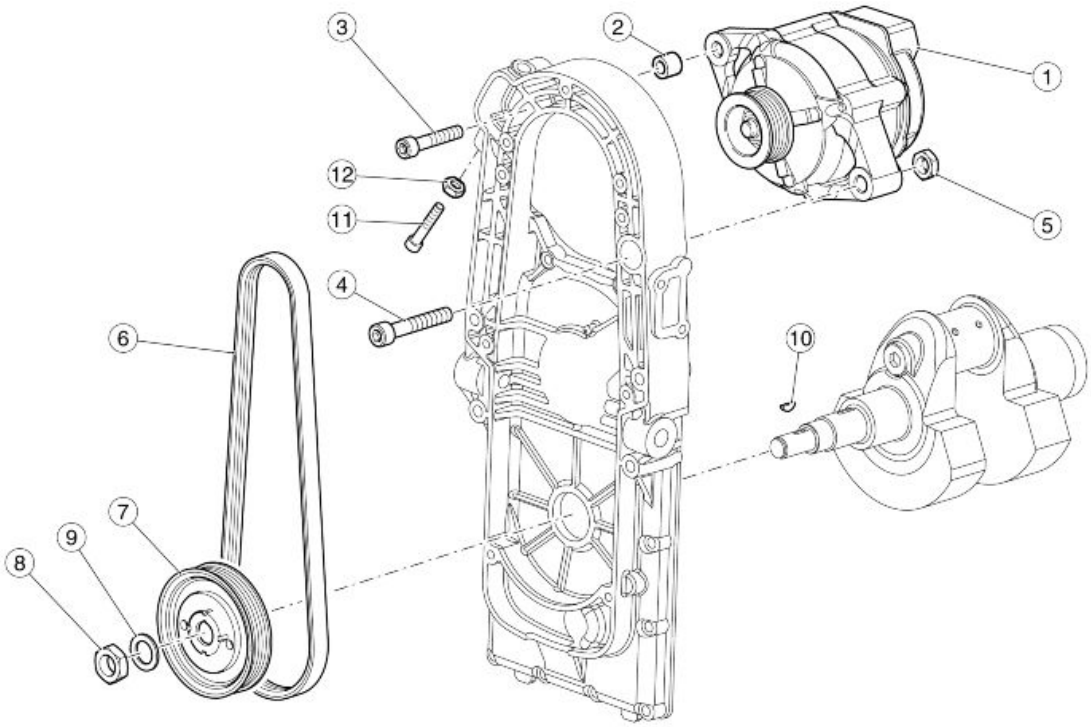
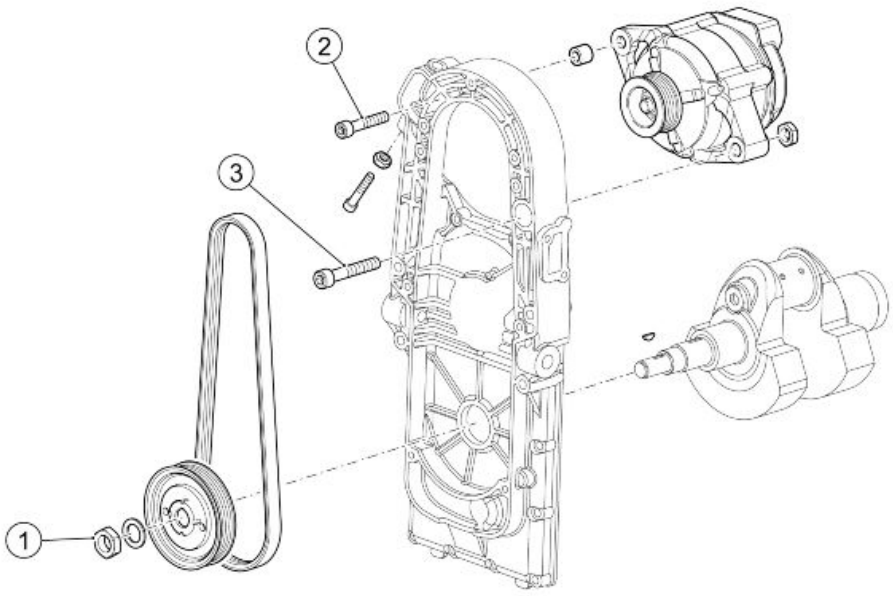
Generator



Key:

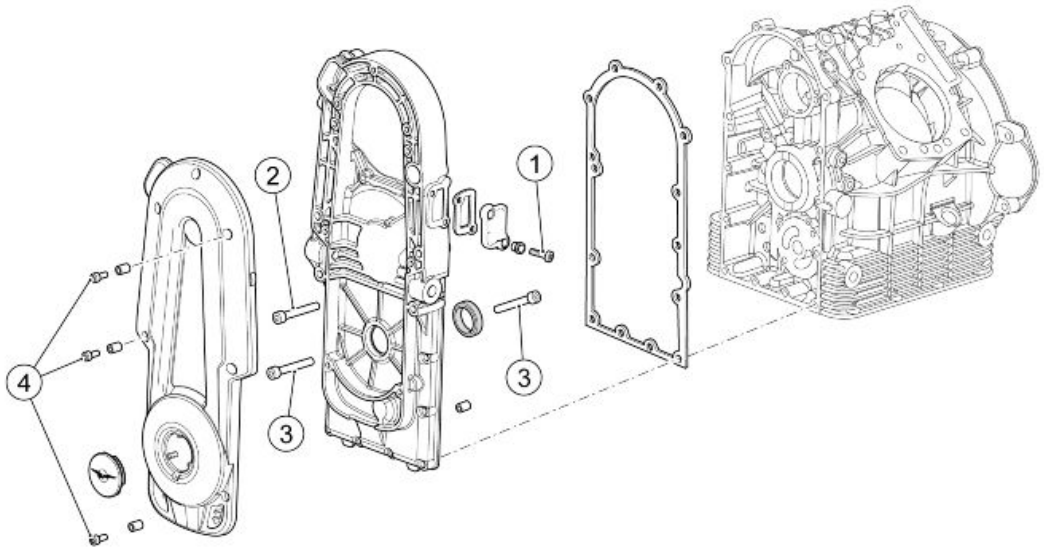
1. Alternator
2. Spacer
3. Screw
4. Screw
5. Nut
6. Belt
7. Generator control pulley
8. Nut
9. Washer
10. Magneto flywheel cotter
11. Screw
12. Nut

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten



ALTERNATOR

pos.	Description	Type	Quantity	Torque	Notes
1	Generator control pulley locking nut	M16	1	80 Nm (59.00 lbf ft)	Loctite 243
2	Generator upper fixing screw	M8	1	22 Nm (16.23 lbf ft)	-
3	Generator lower fixing screw	M10x60	1	30 Nm (22.13 lbf ft)	-



GENERATOR COVER

pos.	Description	Type	Quantity	Torque	Notes
1	Timing system cover cap fixing screw	M6x20	2	10 Nm (7.37 lbf ft)	Loctite 243

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

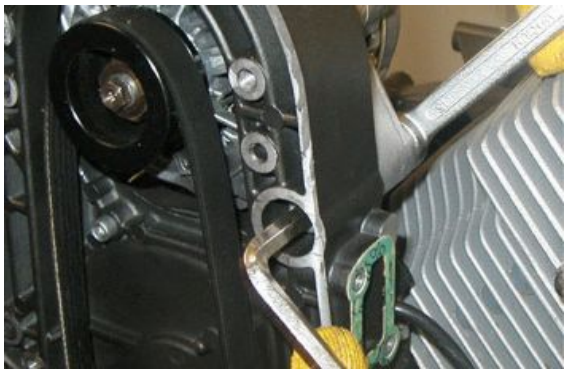
pos.	Description	Type	Quantity	Torque	Notes
2	Timing system cover fixing screw	M8x55	4	25 Nm (18.44 lbf ft)	-
3	Timing system cover fixing screw	M6x30	9	12 Nm (8.85 lbf ft)	-
4	Generator cover fixing screw	M6x16	5	12 Nm (8.85 lbf ft)	-

Removing the generator

- Remove the fuel tank.
- Remove the control unit from its seat.
- Disconnect the alternator connectors.
- Undo and remove the five screws and collect the bushings.

- Remove the cover.

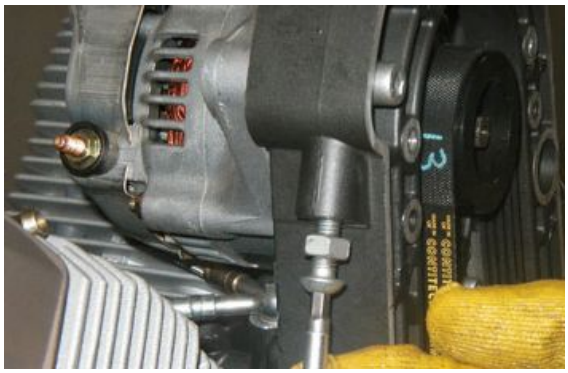
- Unscrew the nut and collect the screw.



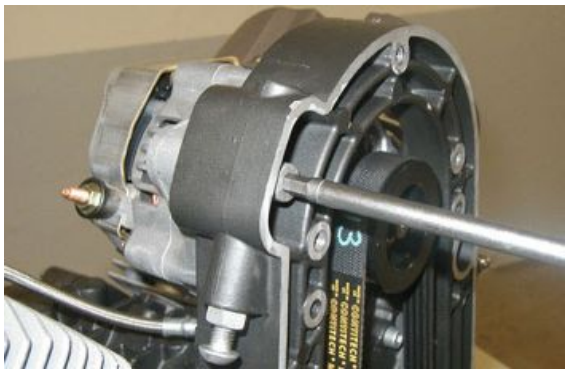
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Loosen the screw.

- Loosen the nut and undo the set screw so that the alternator slides down.



- Completely loosen and remove the screw.

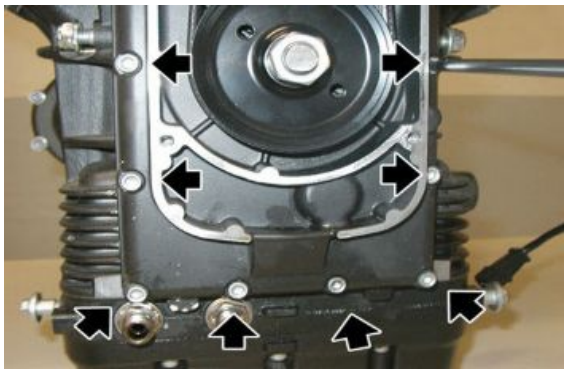


- Remove the belt and the alternator with pulley.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Using a compressed air gun, unscrew and remove the nut and collect the spacer.
- Remove the lower pulley.

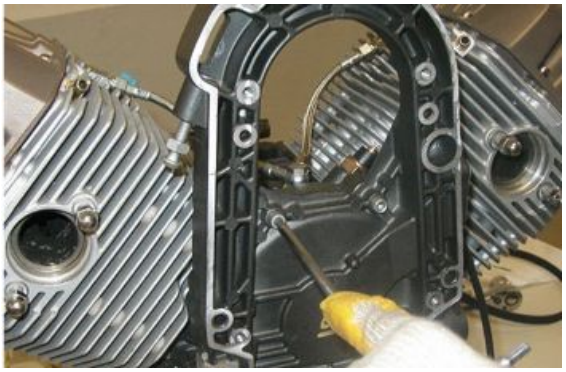
- Undo and remove the eight screws.



- Undo and remove the two screws.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Undo and remove the two screws.



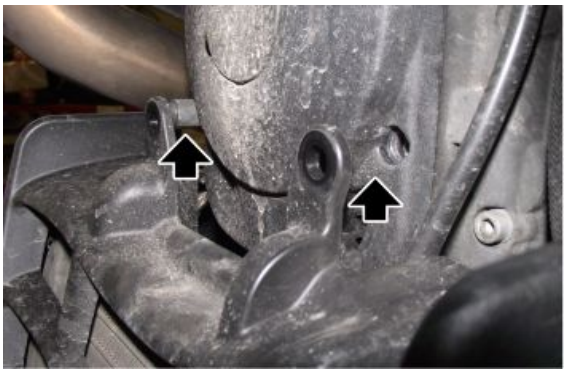
- Remove the alternator frame.
- Remove the sealing ring if necessary.

See also

Fuel tank

Tensioning the belt

- Remove the left fairing lug.
- Undo and remove the two front fixing screws of the oil radiator.
- Collect the spacers.



- Undo and remove the five screws fixing the alternator belt cover.
- Remove the oil radiator lower support bracket and the alternator belt cover.

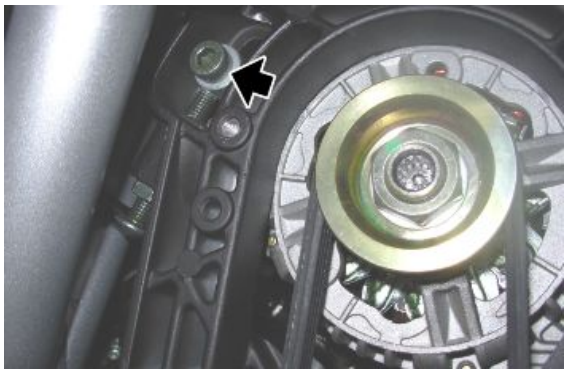
Locking torques (N*m)

Alternator belt cover screw (radiator bracket retainer) TCEI M6x40 (2) 10 Nm (7.38 lbf ft) Alternator belt cover screw - TCEI M6x16 (4) 10 Nm (7.38 lbf ft)

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

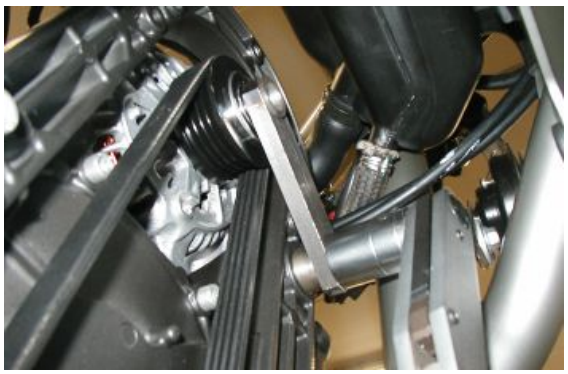
- Remove the generator belt cover by lightly loosening the oil radiator.

- Loosen the screw.



- Loosen the nut and undo the set screw so that the alternator slides down.

- Using the belt tensioning tool, tension the belt to the prescribed torque.
- Screw the set screw.
- Tighten the lock nut.



Specific tooling

020677Y Generator belt tensioner, lever for belt tensioning

Locking torques (N*m)

Belt tension **50 Nm (36.88 lbf ft)**

See also

Engine oil cooler

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Installing the generator

- If the sealing ring has been previously removed, replace it using the punch of the timing system cover sealing ring.

Specific tooling

05.92.72.30 Timing system cover sealing ring punch

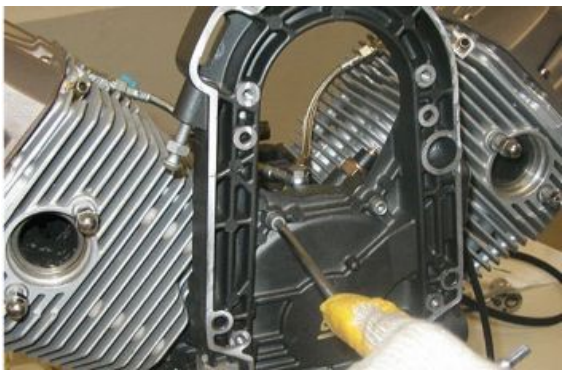
- Place the bolt and the pin in the generator cover.

- Replace the gasket and place the alternator frame using the front cover insertion cone.
- Remove the insertion cone afterwards.

Specific tooling

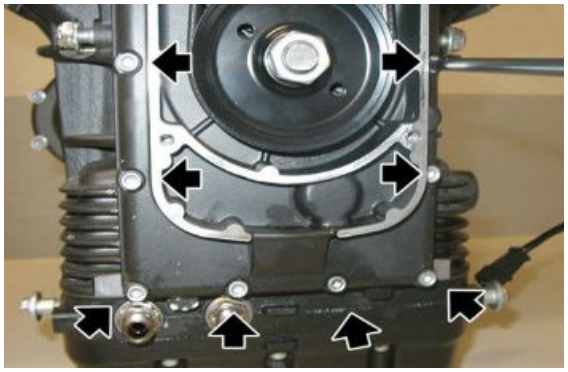
05.91.17.30 Front cover insertion cone

- Tighten the two screws.

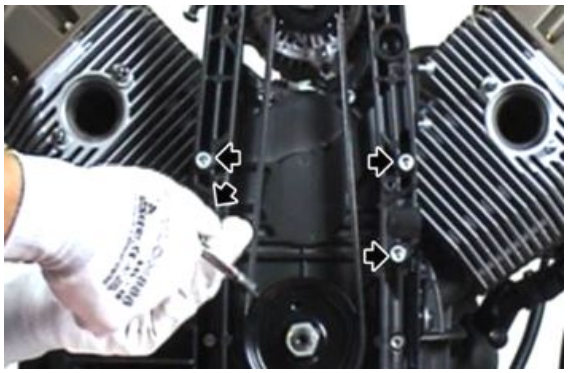


Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Tighten the eight lower screws.
- Operating diagonally and in stages, tighten the ten fixing screws on the alternator fitting.



- Tighten the four screws, operating diagonally and in stages.



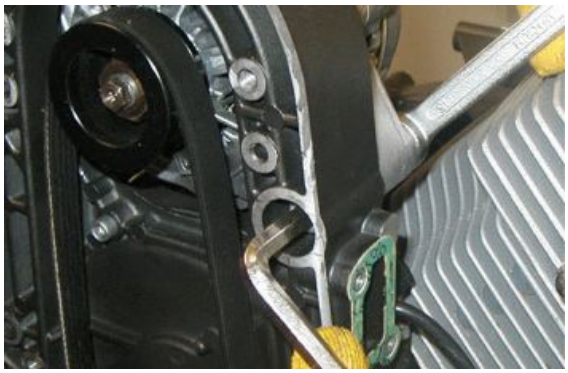
- Position the lower pulley and the spacer.
- Tighten the nut to the prescribed torque.

- Position the alternator and the timing system belt.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Position the screw and pre-tighten it.

- Position the screw and tighten the nut.



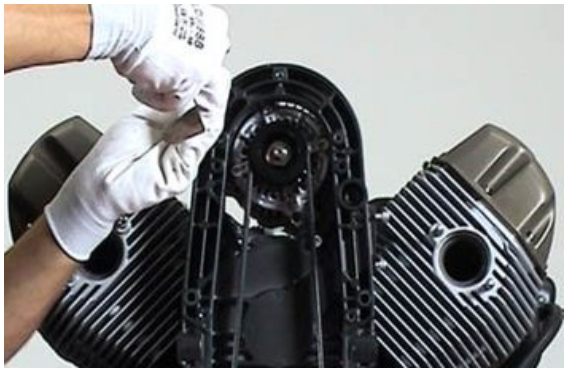
- Using the belt tensioning tool, tension the belt to the prescribed torque and tighten the set screw.
- Remove the belt tensioning tool.
- Lock the set screw in position by screwing the lock nut.

Specific tooling

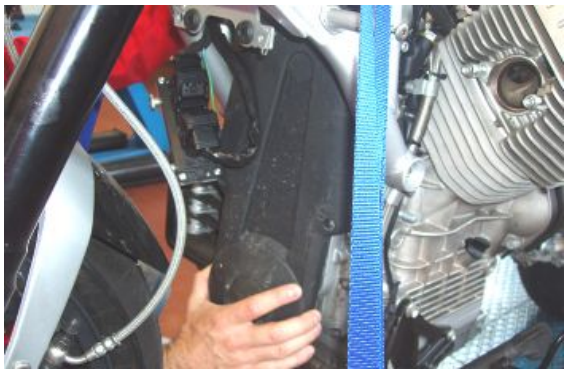
020677Y Generator belt tensioner, lever for belt tensioning

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Tighten the alternator fixing screws.



- Place the alternator belt cover.
- Tighten the five screws operating diagonally and in stages.



Starter motor

Removing the starter motor

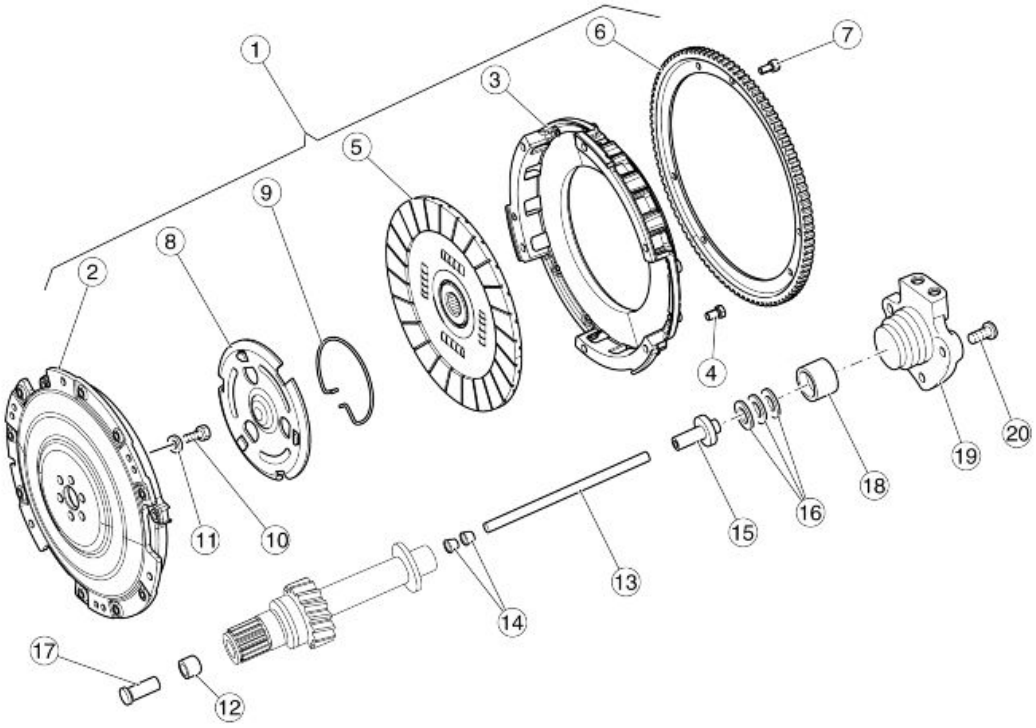
- Undo and remove the two screws and collect the washers.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Slide off the starter motor.

Clutch side

Disassembling the clutch

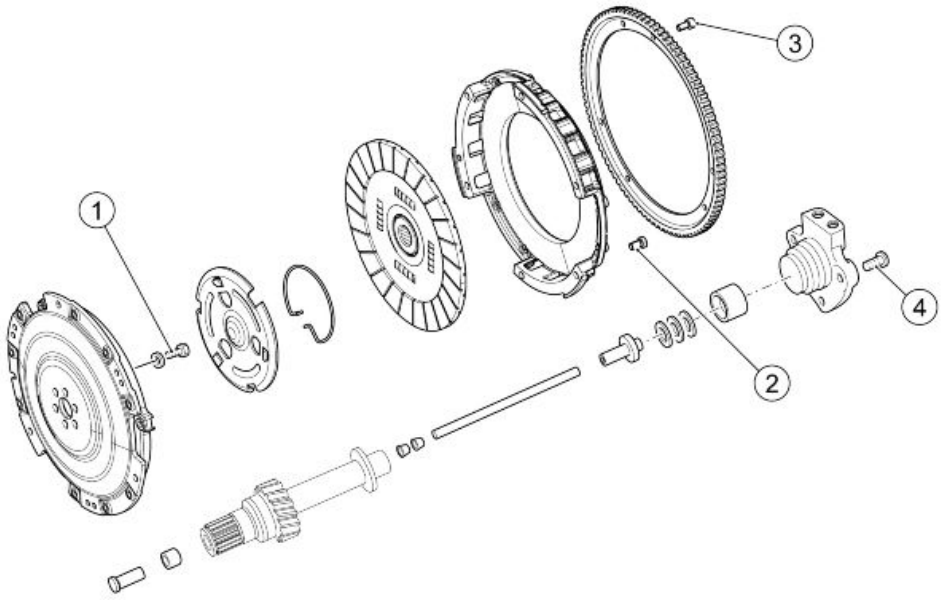


Key:

1. Complete clutch
2. Clutch
3. Clutch bell
4. TCEI screw
5. Clutch plate
6. Sprocket
7. TCEI screw
8. Clutch thrust plate

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

9. Ring
10. TE flanged screw
11. Conical washer
12. Bushing
13. Rod
14. Bushing
15. Intermediate body
16. Thrust bearing
17. Clutch control bowl
18. Thrust cylinder
19. Clutch control cylinder
20. TE flanged screw



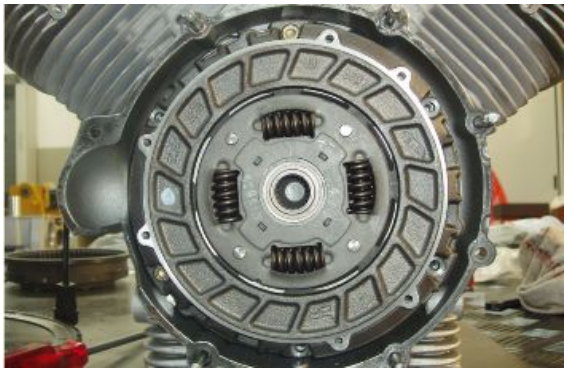
CLUTCH

pos.	Description	Type	Quantity	Torque	Notes
1	Clutch to crankshaft fixing screw	-	6	42 Nm (30.98 lbf ft)	Tighten with cross sequence
2	Clutch external flange fixing screw on flywheel	M7x16	6	20 Nm (14.75 lbf ft)	Loctite 243
3	Start-up crown fixing screw on flywheel	-	6	10 Nm (7.37 lbf ft)	Loctite 243
4	Clutch control cylinder fixing screw	-	3	10 Nm (7.37 lbf ft)	Loctite 243

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

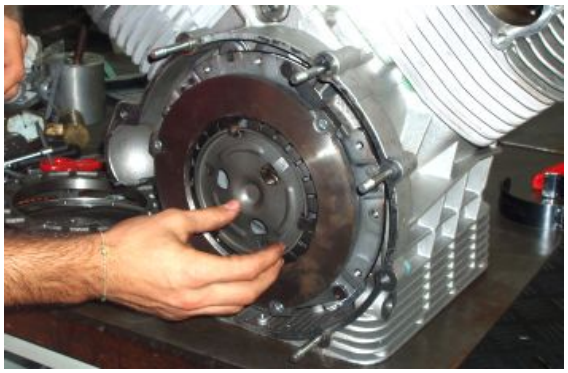
- Remove the complete gearbox.
- Unscrew and remove the six screws.
- Remove the start-up crown gear.

- Remove the clutch bell and the friction disc.



- Remove the retainer ring.
- Remove the clutch pressure plate.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten



- Undo and remove the six screws and collect the belleville springs.
- Remove the clutch plate.

See also

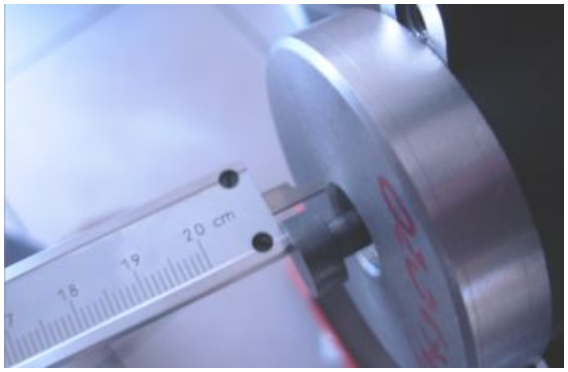
Removing the gearbox

Checking the clutch actuator

If the clutch is replaced, measure the length of the clutch control rod in order to use the correct rod. Measure as follows:

- Fit the new clutch on the crankshaft.
- Fit the clutch control bowl in the gear-box.

- Fit the gearbox on the engine block.
- Fit the tool in the gearbox to determine the clutch control rod length.
- Measure rod protrusion using a depth gauge (see picture).
- According to the value found, select the correct rod based on the following table:



Specific tooling

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

020678Y Tool for clutch rod checking

CLUTCH CONTROL ROD SELECTION

Specification	Desc./Quantity
Protrusion: 9.8 - 11.2 mm (0.386 - 0.441 in)	Clutch control rod length (code 976593) = 183 mm (7.205 in)
Protrusion: 8.3 - 9.7 mm (0.327 - 0.382 in)	Clutch control rod length (code 976594) = 184.5 mm (7.264 in)
Protrusion: 6.8 - 8.2 mm (0.268 - 0.323 in)	Clutch control rod length (code 976595) = 186 mm (7.323 in)
Protrusion: 5.3 - 6.7 mm (0.209 - 0.264 in)	Clutch control rod length (code 976596) = 187.5 mm (7.382 in)

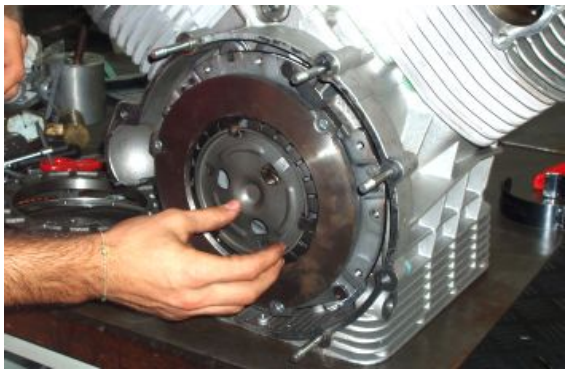
Assembling the clutch

- Lock crankshaft rotation with the crankpin facing upwards.
- Place the clutch disc with the reference facing upwards.
- Fasten the clutch disc on the crankshaft with the six screws, Loctite 243 and the belleville springs.

- Place the clutch pressure plate.
- Fit the tool to centre and compress the plate.
- Fully tighten the two centring tool screws.

Specific tooling

020672Y Clutch spring centre and pusher



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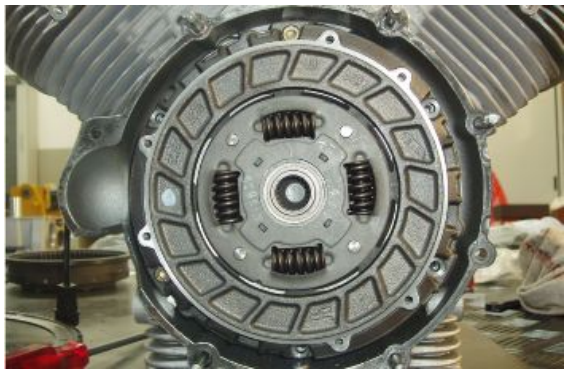
- Once the centring tool is fitted, lock the plate with the snap ring.
- Undo and remove the two screws fixing the tool.
- Remove the special tool.

- Place the friction disc; centre it.

- Place the clutch bell with the reference facing upwards.



- Place the start-up crown gear with the reference facing upwards.
- Tighten the six screws to the prescribed torque operating diagonally and in stages.

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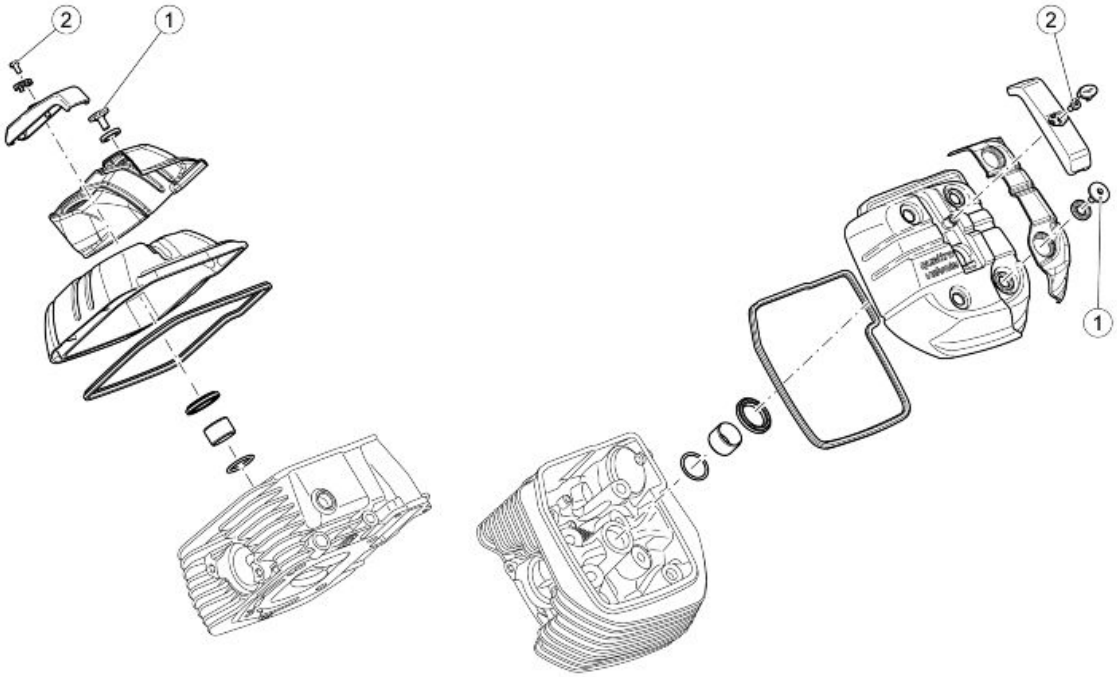
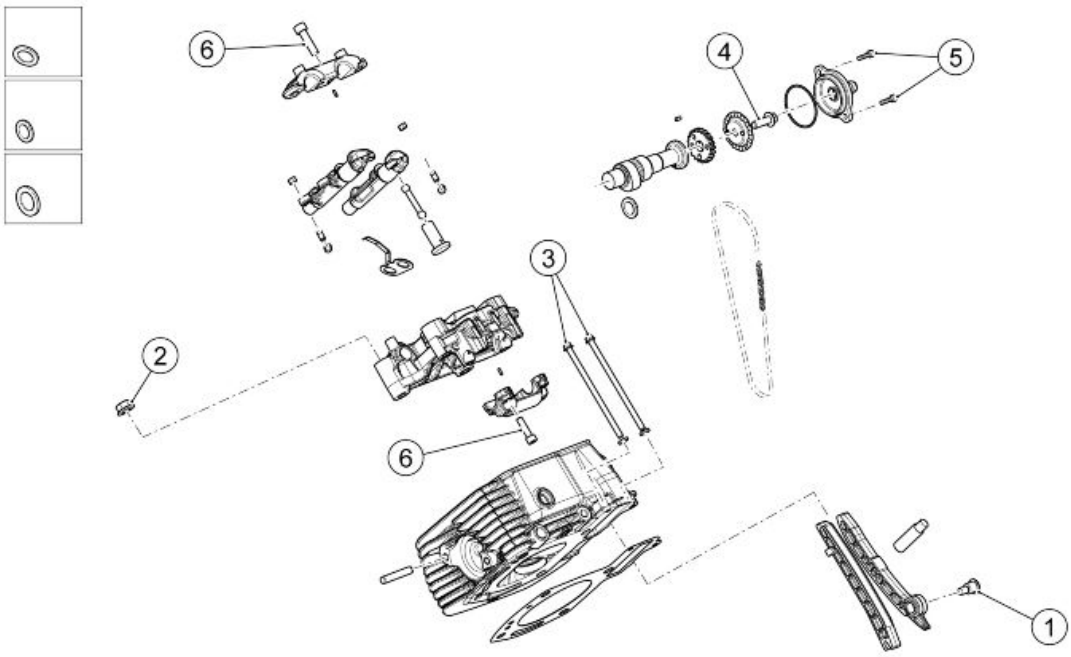
Heads



CYLINDER HEAD COVERS

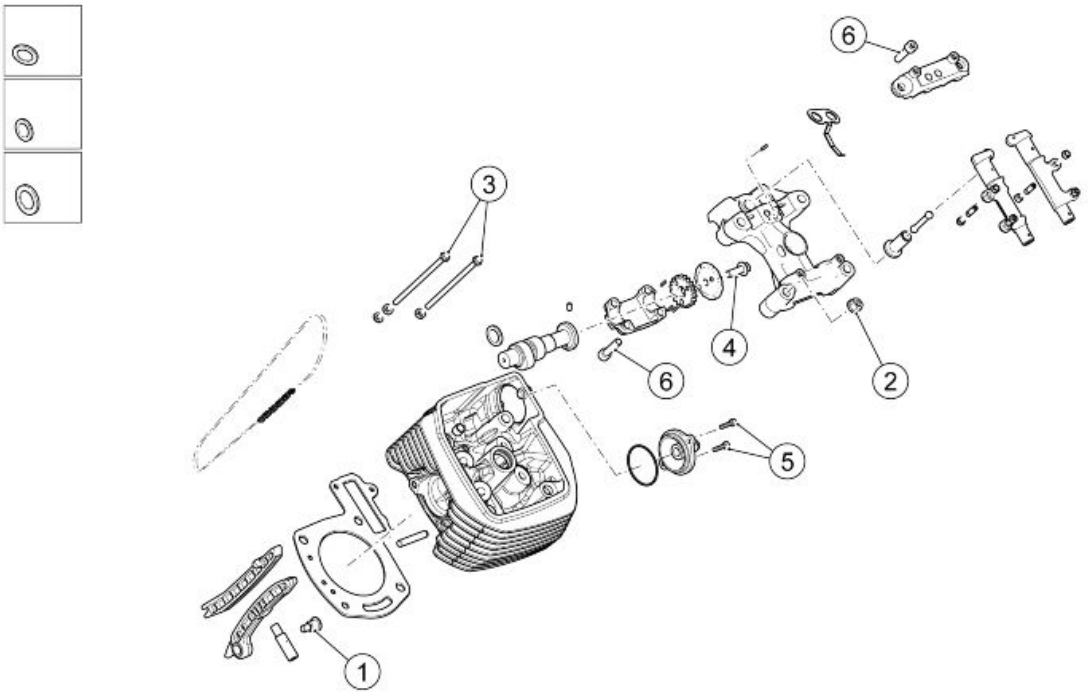
pos.	Description	Type	Quantity	Torque	Notes
1	Special cylinder head fixing screw	-	8	8 Nm (5.90 lbf ft)	Locked with cross sequence
2	Spark plug cover fixing screw	M5x10	2	8 Nm (5.90 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

RIGHT CYLINDER HEAD

pos.	Description	Type	Quantity	Torque	Notes
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-



LEFT CYLINDER HEAD

pos.	Description	Type	Quantity	Torque	Notes
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-

Head and timing

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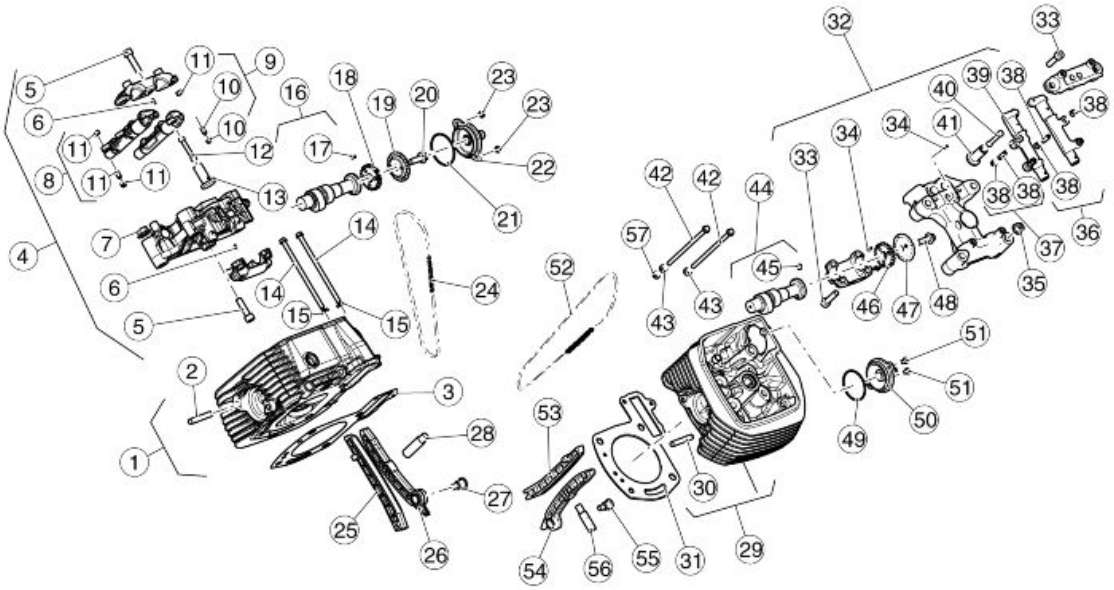

Key:

1. Right cylinder head
2. Stud bolt
3. Cylinder head gasket
4. Right rocking lever support
5. Screw
6. Pin
7. Nut
8. Right exhaust, left intake rocking lever
9. Left exhaust, right intake rocking lever
10. Set screw
11. Nut
12. Rocking lever rod
13. Tappet bowl
14. Flanged screw
15. Spacer
16. Camshaft
17. Pin
18. Timing system gear
19. Breather plate
20. TE flanged screw
21. O-ring

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22.Complete breather cover
23.TBEI screw
24.Timing system chain
25.Chain guide slider
26.Chain tensioner pad
27.Chain tensioner screw
28.Right chain tensioner
29.Left cylinder head
30.Stud bolt
31.Cylinder head gasket
32.Left rocking lever support
33.Screw
34.Pin
35.Nut
36.Right exhaust, left intake rocking lever
37.Left exhaust, right intake rocking lever
38.Set screw
39.Nut
40.Rocking lever rod
41.Tappet bowl
42.Flanged screw
43.Spacer
44.Camshaft
45.Pin
46.Timing system gear
47.Breather plate
48.TE flanged screw
49.O-ring
50.Complete breather cover
51.TBEI screw
52.Timing system chain
53.Chain guide slider
54.Chain tensioner pad
55.Chain tensioner screw
56.Left chain tensioner
57.Spacer

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Removing the head cover

NOTE

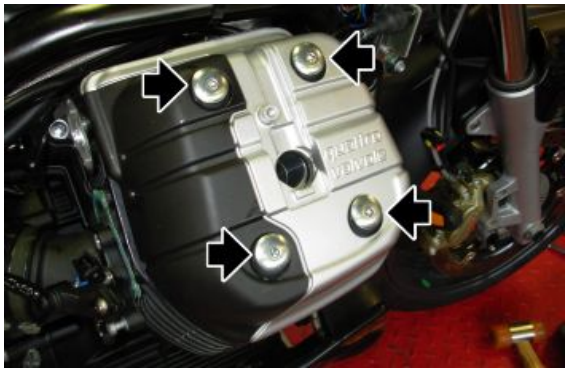
THE OPERATIONS DESCRIBED BELOW REFER TO ONE HEAD REMOVING ONLY BUT APPLY TO BOTH HEADS.

- Scollegare la pipetta candela facendo leva mediante un cacciavite attraverso la feritoia.

CAUTION

PRESTARE ATTENZIONE A FARE LEVA SULLA GOMMA DELLA PIPETTA CANDELA E NON SULLA CANDELA STESSA ONDE EVITARE DI DANNEGGIARLA

- Unscrew and remove the four head cover fixing screws and collect the sealing O-rings.



- Rimuovere il coperchio testa completo di guarnizioni.

Removing the cylinder head

CAUTION

WHEN REMOVING THE COMPONENTS, MARK THE POSITION OF EACH PART VERY CAREFULLY IN ORDER TO PLACE THEM IN THEIR ORIGINAL POSITION UPON FITTING.

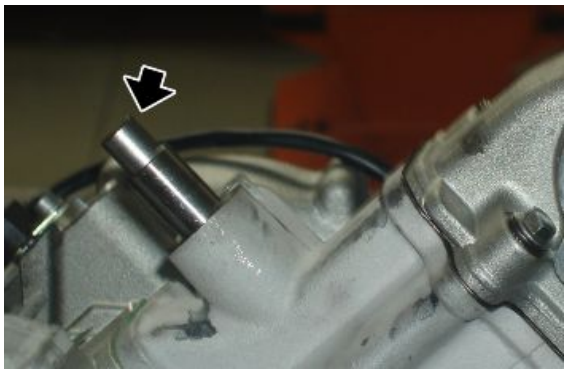
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Remove the head cover.
- Unscrew and remove the two screws
- Remove the cap.

- Unscrew and remove the screw.
- Remove the timing system upper gear bulkhead.

For the right head:

- Unscrew and remove the chain tensioner cap.
- Remove the right chain tensioner.



For the left head:

- Unscrew and remove the screw and the washer.
- Relief oil pressure from the left chain tensioner.

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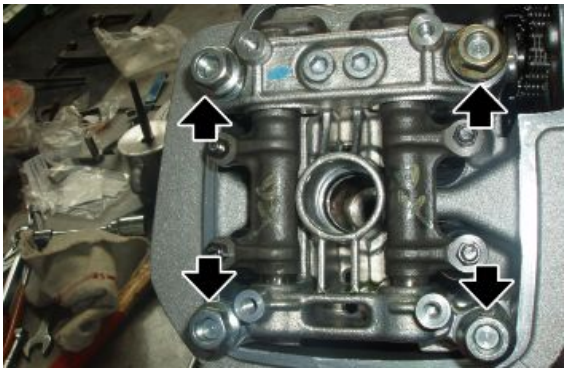
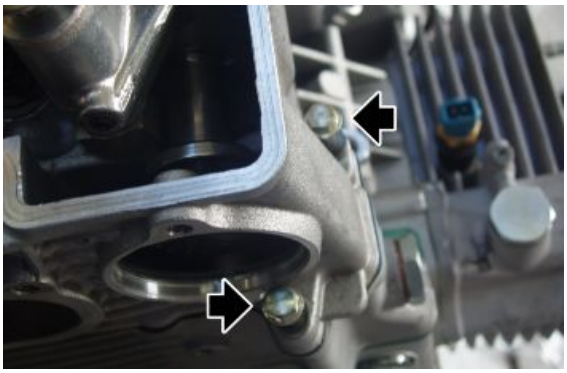
- Slide off the timing system gear from the chain to remove it from the cam-shaft.

- Unscrew and remove the four nuts on the stud bolts.
- Remove the complete cam cap.

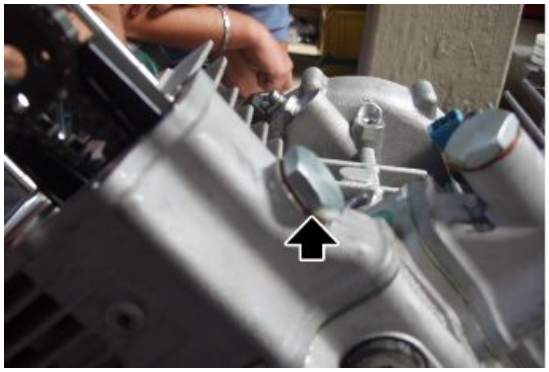


- Unscrew and remove the two screws.
- Remove the head.

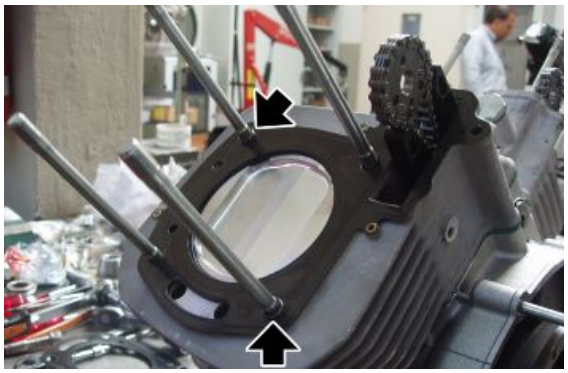


Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Fit the timing system upper gear back to the chain.
- Fit the chain tensioner cap temporarily and keep the chain taut on the service shaft.



- Collect the two head dowel pins.
- Collect the gasket between the head and the cylinder.



See also

Removing the head cover

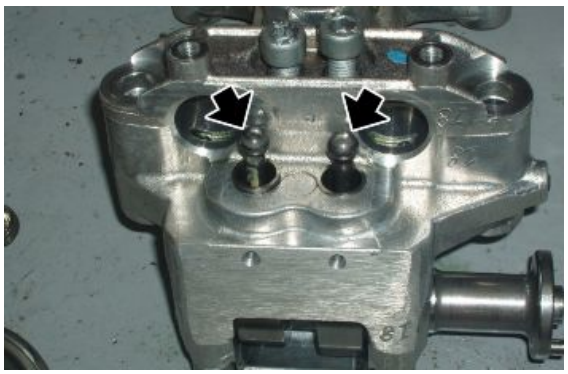
Cylinder head

Removing the overhead camshaft

CAUTION

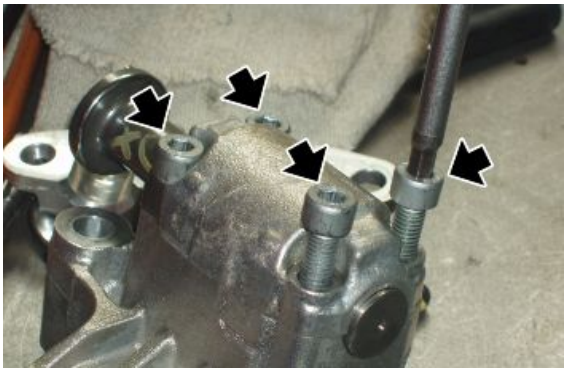
WHEN REMOVING THE COMPONENTS, MARK THE POSITION OF EACH PART VERY CAREFULLY IN ORDER TO PLACE THEM IN THEIR ORIGINAL POSITION UPON FITTING.

- Remove the two rocking levers from the cam cap.
- Remove the two rods.



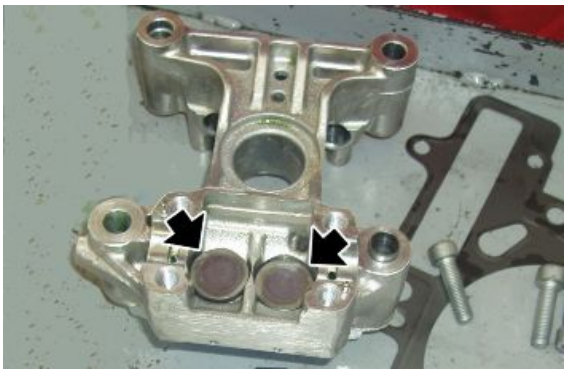
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Undo and remove the four screws.
- Remove the U-bolt.



- Remove the camshaft.

- Remove the bowls from the cam cap, and mark their position so as not inter-change them when refitting.



See also

Removing the rocker arms

Removing the rocker arms

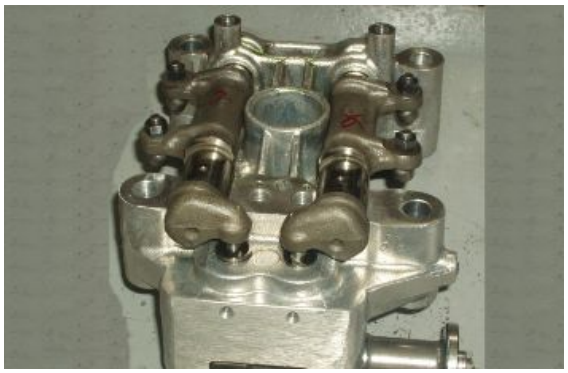
CAUTION

WHEN REMOVING THE COMPONENTS, MARK THE POSITION OF EACH PART VERY CARE-FULLY IN ORDER TO PLACE THEM IN THEIR ORIGINAL POSITION UPON FITTING.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Remove the cam cap from the stud bolts.
- Undo and remove the two screws.
- Remove the U-bolt.

- Remove the two rocking levers from the cam cap.



See also

Removing the cylinder head

Removing the valves

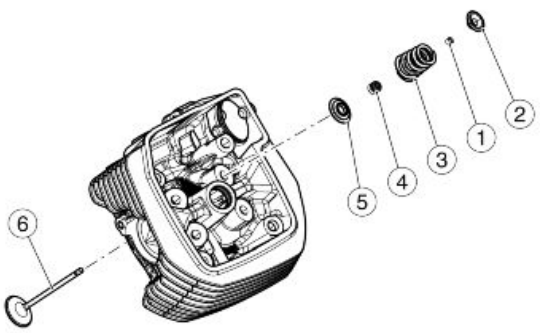
- Remove the head.
- Place the special tool on the upper cap and at the centre of the head of the valve to be removed.

Specific tooling

10.90.72.00 Tool for valve removal and refitting

AP9100838 Tool for valve pressure plate

- Tighten the tool screw until fitted, and then hit the tool head (where the upper cap works) with a mallet so that the two cotters (1) get detached from the upper cap (2).
- Once the two cotters (1) are detached, screw these cotters until they can be



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

slid off the valve seats; unscrew the tool and remove it from the head.

- Slide off the upper cap (2).
- Remove the spring (3).
- Remove the lower cap (5) and the valve guide oil seal (4), if necessary.
- Remove the valve (6) from inside the head.

Checking the valve guides

Use a punch to extract the valve guides from the heads.

The valve guides should be replaced only if the clearance between them and the stem cannot be eliminated by simply replacing the valves.

To refit the valve guides on the head, follow this procedure:

- Heat the head in an oven at about 60°C (140°F).
- Lubricate the valve guide.
- Fit the circlips.
- Press the valve guide with a punch.
- Use a reamer to bore the holes the valve stems slide through so that the inside diameter is at the prescribed value. The interference between the seat on the head and the valve guide must be 0.046 - 0.075 mm (0.0018 - 0.0030 in)

VALVE GUIDE COUPLING - VALVES (INLET)

Specification	Desc./Quantity
Valve guide inside diameter	5.0 ÷ 5.012 mm (0.19685 ÷ 0.19732 in)
Valve stem diameter	4.972 ÷ 4.987 mm (0.19574 ÷ 0.19633 in)
Fitting clearance	0.013 ÷ 0.040 mm (0.00051 ÷ 0.00157 in)

VALVE GUIDE COUPLING - VALVES (OUTLET)

Specification	Desc./Quantity
Valve guide inside diameter	5.0 ÷ 5.012 mm (0.19685 ÷ 0.19732 in)
Valve stem diameter	4.960 ÷ 4.975 mm (0.19527 ÷ 0.19587 in)
Fitting clearance	0.025 ÷ 0.052 mm (0.00098 ÷ 0.00205 in)

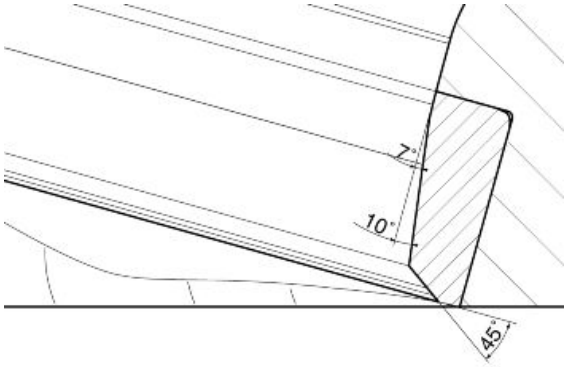
Checking the cylinder head

Check that:

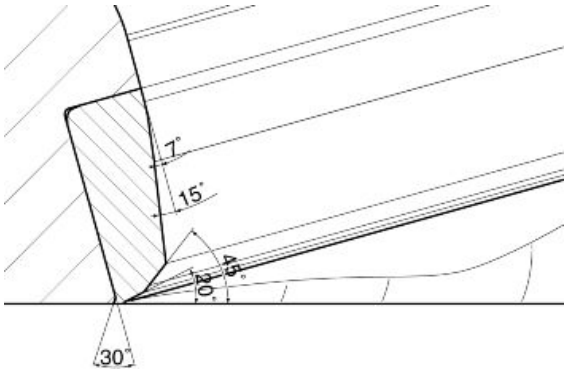
- the faying surfaces with the cover and the cylinder are not scored or damaged, jeopardising a perfect sealing.
- Check that the tolerance between the valve guide holes and the valve stems is within the prescribed limits.
- Check the valve seats are in good conditions.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

INLET VALVE SEAT DETAIL DRAWING



OUTLET VALVE SEAT DETAIL DRAWING



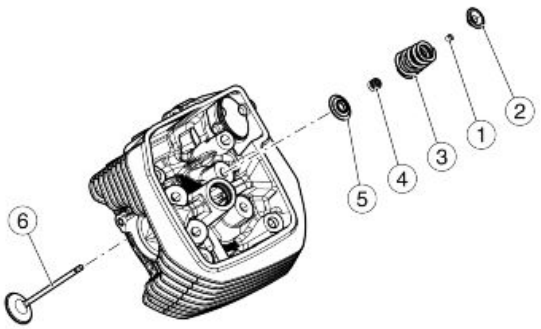
- If the width of the mark on the valve seat is larger than the prescribed limits, true the seats with a 45° milling cutter and then grind.
- Replace the head in case of excessive wear or damage.

Installing the valves

NOTE

THE FOLLOWING OPERATIONS REFER TO REMOVING ONLY ONE HEAD BUT APPLY TO BOTH HEADS.

- Place the valve guide oil seal (4) in the head.
- Place the lower cap (5).
- Place the valve (6) inside the head.
- Place the spring (3).
- Fit the upper cap (2).
- Place the two cotters (1) on the seats in the valves.
- By compressing the spring (3) with the special tool, fit the valve cotters.



Specific tooling

10.90.72.00 Tool for valve removal and refitting

AP9100838 Tool for valve pressure plate

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

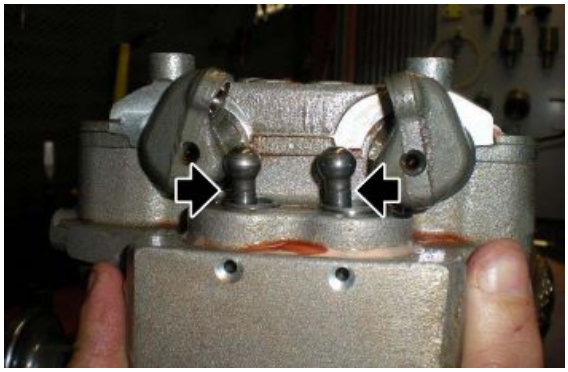
- Remove the special tool

Installing the rocker arms

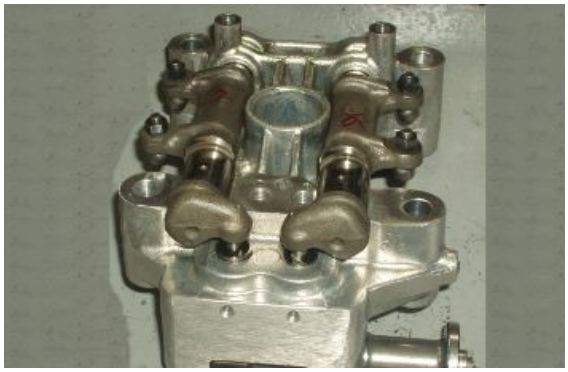
- Fit the camshaft.
- Fit the two rods.

WARNING

MAKE SURE THAT THE NOTCH ON THE DIPSTICK BODY FACES THE ROCKING LEVER.



- Place the two rocking levers in the cam tower seats.



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

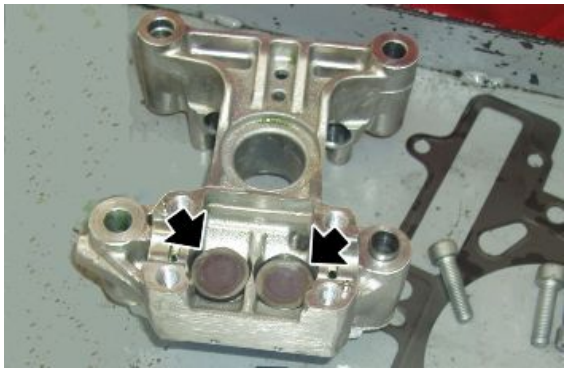
- Place the U-bolt on the rocking levers making sure the two reference pins match the seats on the cam tower.
- Tighten the two screws operating diagonally and in stages.

See also

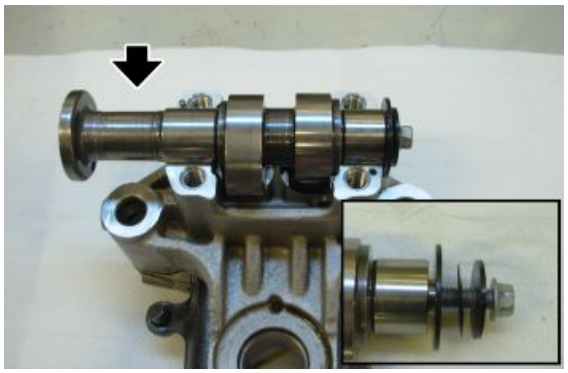
Installing the overhead camshaft

Installing the overhead camshaft

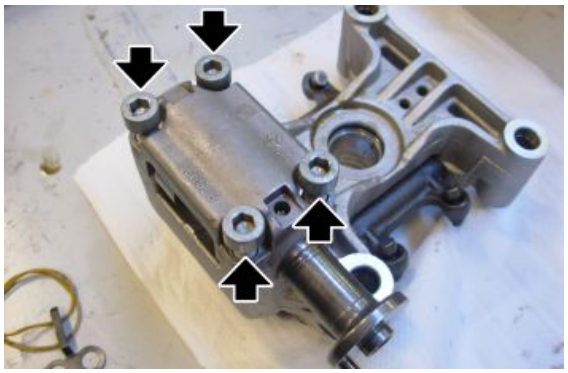
- Place the bowls in the cam tower, if those previously removed are refitted be careful not to interchange them.



- Place the camshaft with the gear seat on the dowel side.
- Inserire e serrare la rondella di rasamento.

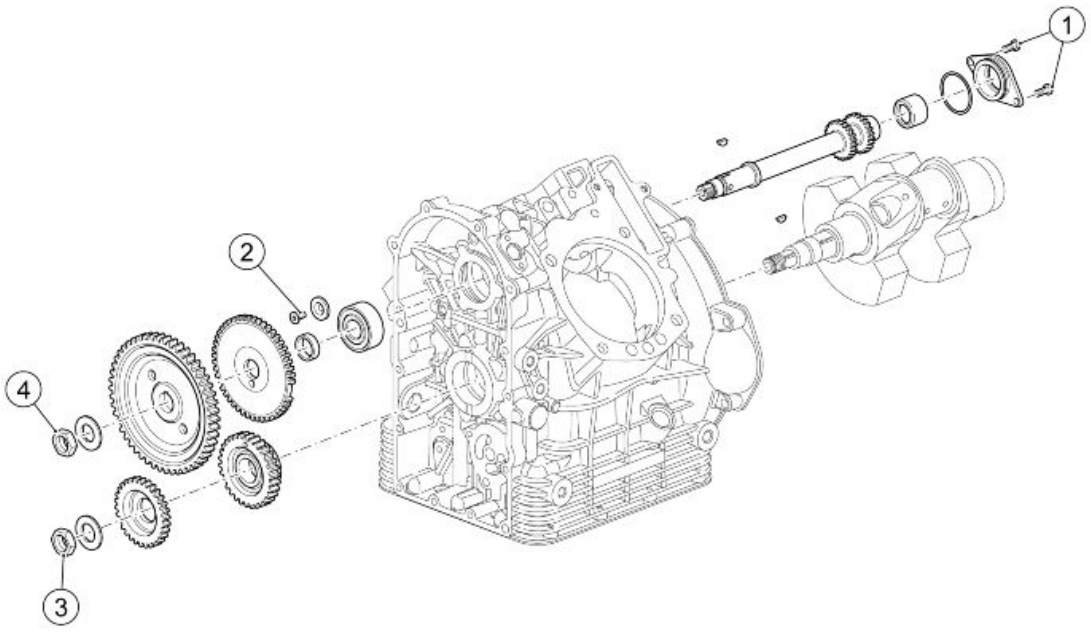


- Place the U-bolt on the camshaft making sure the two reference pins match the seats on the cam tower.
- Tighten the four screws operating diagonally and in stages.



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Timing



TIMING SYSTEM CONTROL

pos.	Description	Type	Quantity	Torque	Notes
1	Control, timing system, shaft support flange fixing screw	M6x14	2	8 Nm (5.90 lbf ft)	-
2	Bearing fixing screw	M6x16	1	10 Nm (7.37 lbf ft)	Loctite 243
3	Driving gears locking nut on the crankshaft	M25	1	200 Nm (147.51 lbf ft)	Loctite 601
4	Timing system driven gear locking nut	M18	1	25 Nm (18.44 lbf ft)	Pre-tightening
4	Timing system driven gear locking nut	M18	1	150 Nm (110.63 lbf ft)	Final tightening

Removing the phonic wheel

- Remove the generator and the timing system cover.
- Unscrew and remove the nut and collect the washer.
- Remove the timing system gear on the service shaft.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

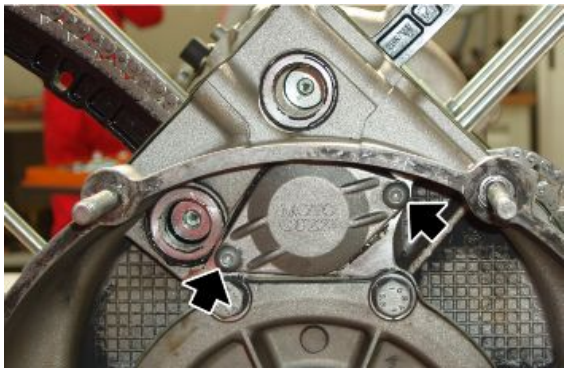
- Remove the timing sensor and any shim washers.
- Remove the tone wheel.
- Remove the cotter and shim washer from the service shaft.

See also

Removing the generator

Service shaft removal

- Remove the tone wheel.
- Remove both cylinders.
- Undo and remove the two screws.
- Remove the service shaft closing cap.



- Mark the timing chains so as not to invert the direction of rotation upon fitting.
- Slide off the service shaft from the chains.
- Remove both chains.

See also

Removing the phonic wheel

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

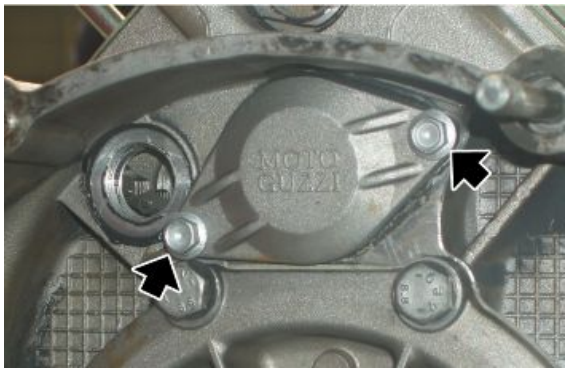
Installing the service shaft

- Place the service shaft bearing (if previously removed) on the crankcase.
- Fix it to the seat with the lock washer and screw.

- Fit the timing chains according to the references marked at the removal phase.
- Lubricate the service shaft.
- Insert the service shaft in its crankcase seat by sliding it through the two chains.
- Fit each chain to the corresponding service shaft gear.

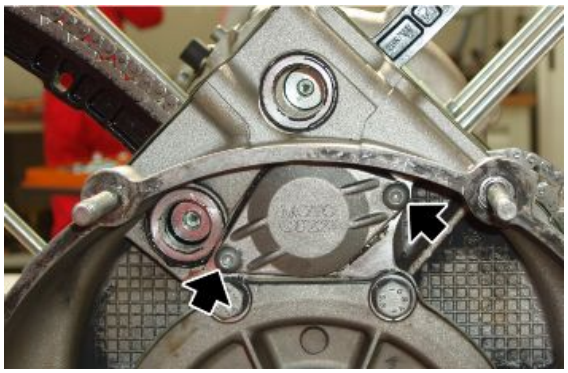
- Fit the roller cage and a new O-ring on the service shaft closing cap.

- Partially fit the service shaft closing cap.
- To screw the cap until it stops, use two M6 flanged screws larger than the original screws.
- Tighten the two M6 flanged screws operating in stages until the cap stops against the crankcase.
- Undo and remove the two M6 flanged screws.



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

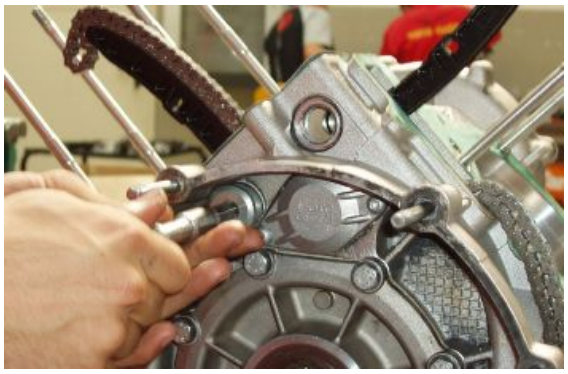
- Tighten the cap with the two original TBEI screws.



Installing sliders

- Fit the crankshaft and the service shaft on the crankcase.
- Fit the fixed chain sliders and tighten the fixing screws.

- Tighten the chain caps with O-rings.
- The operations related to the movable chain sliders are described in the cylinder fitting section.



See also

Installing the crankshaft
Installing the service shaft

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Cam timing

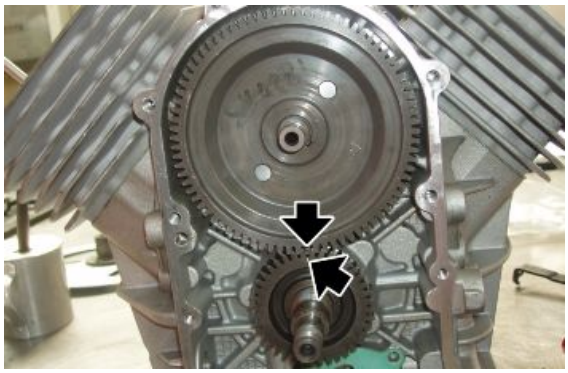
- Fit the crankshaft and the service shaft on the crankcase.
- Fit the cylinders.
- Turn the crankshaft until the left cylinder piston reaches the top dead centre (TDC).
- Fit the cotter and the shim washer on the service shaft.
- Fit the tone wheel with the chamfered side facing the crankcase on the service shaft.

- Lock crankshaft rotation.
- Unscrew and remove the nut fixing the crankshaft gear.
- Remove the oil pump control gear.

Specific tooling

12.91.18.01 Tool to lock the flywheel and the starting ring gear

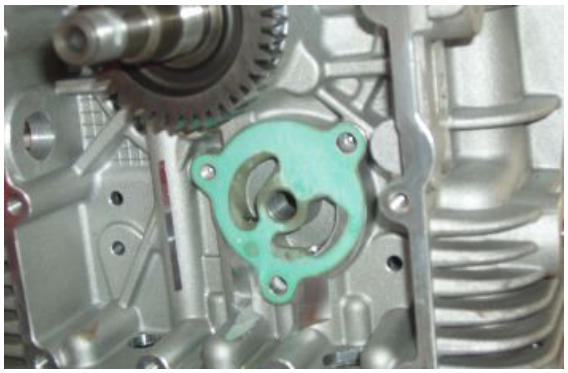
- Fit the timing system gear and align the reference with that on the crankshaft gear. Turn the crankshaft to align the two gears.



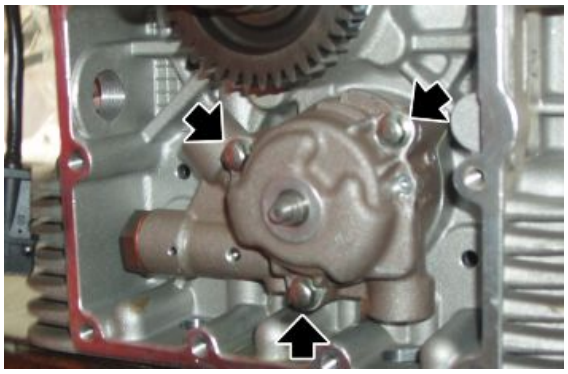
Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- After shimming the timing sensor properly, proceed to fit it.
- Fit the washer and tighten the timing system gear fixing nut of the service shaft.

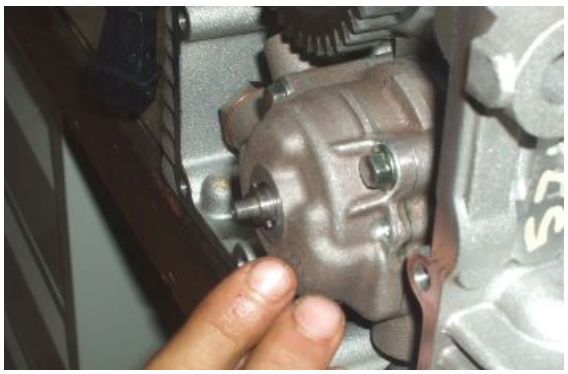
- Place a new gasket between the crankcase and the oil pump.



- Place the oil pump.
- Tighten the three screws fixing the oil pump.



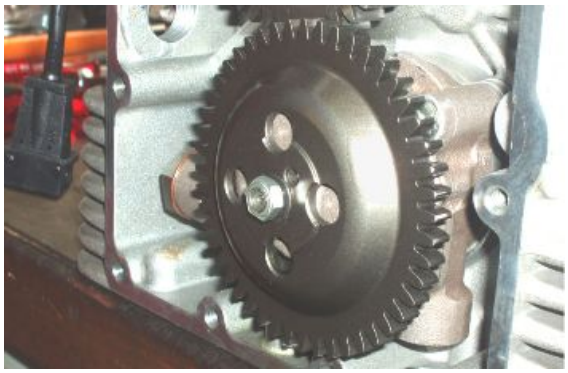
- Place the driving pin on the oil pump shaft.



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

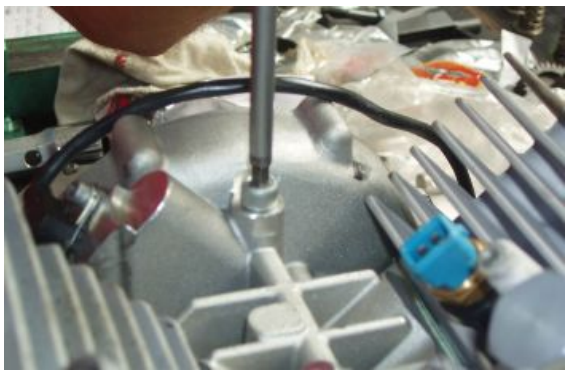
- Place the gear on the oil pump shaft.

- Place the washer on the oil pump shaft.
- Tighten the nut to the specified torque.



- Place the oil pump control gear on the crankshaft and align its reference with that marked during the removal phase on the oil pump driven gear.
- Tighten the nut to the specified torque.

- Tighten the screw with the washer to the prescribed torque.



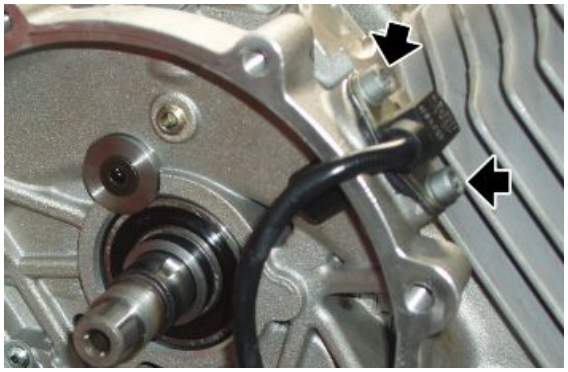
See also

Installing the crankshaft
Installing the service shaft
Measuring air gap

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Measuring air gap

- Undo and remove the two screws and remove the sensor.

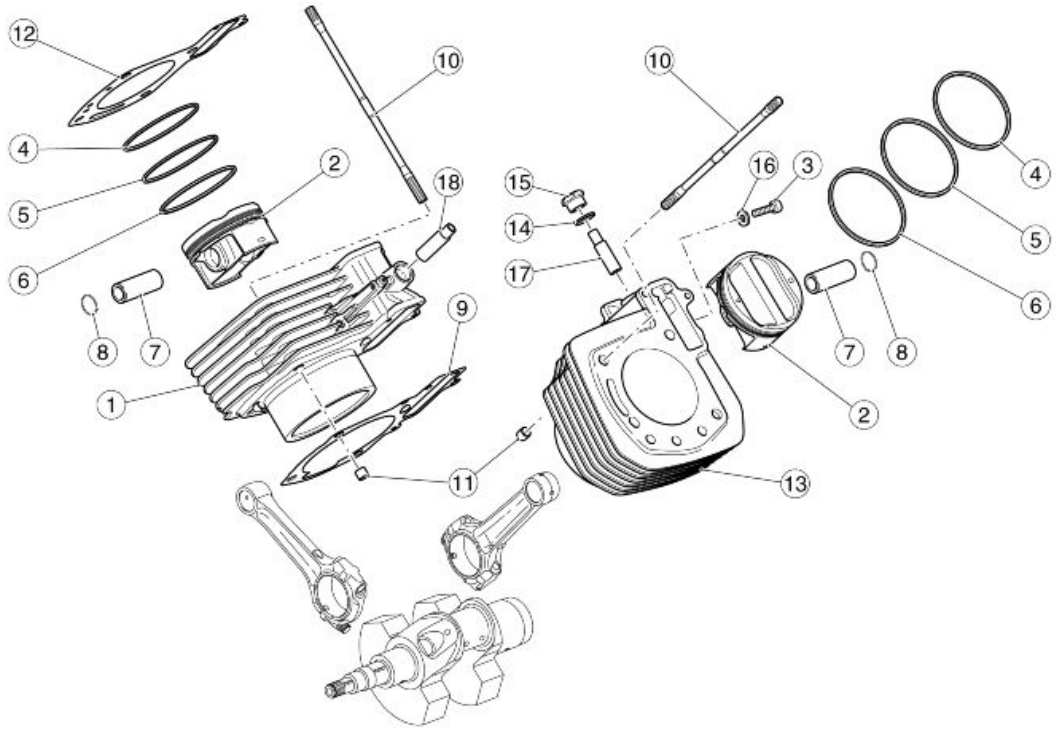


- Insert a suitable plain washer on the sensor and note its thickness.

- Place the sensor on the crankcase and move it until it makes contact with the tone wheel.
- Measure the clearance between the fixing plate and the crankcase with a thickness gauge. Subtract the plain washer value from this measurement to obtain the clearance between the sensor and the tone wheel.
- Remove the washer and fit the sensor after applying adequate sealing paste on the fixing plate, then tighten the screws to the prescribed torque.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Cylinder-piston assembly



Key:

1. Right cylinder
2. Piston
3. Screw
4. Top piston ring
5. Middle piston ring
6. Oil scraper piston ring
7. Pin
8. Retainer ring
9. Cylinder base gasket
10. Stud bolt
11. Pin
12. Cylinder head gasket
13. Left cylinder
14. Washer
15. Chain tensioner cap
16. Washer
17. Left chain tensioner
18. Right chain tensioner

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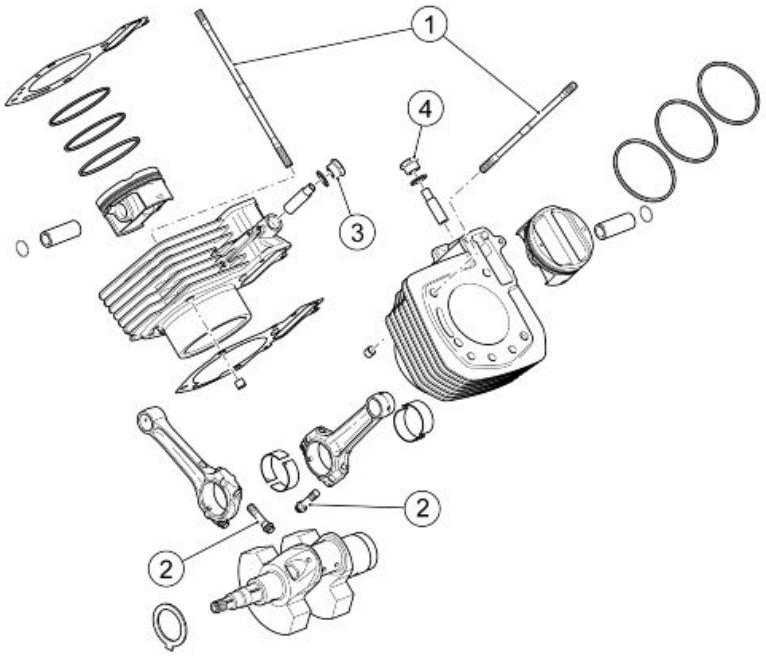
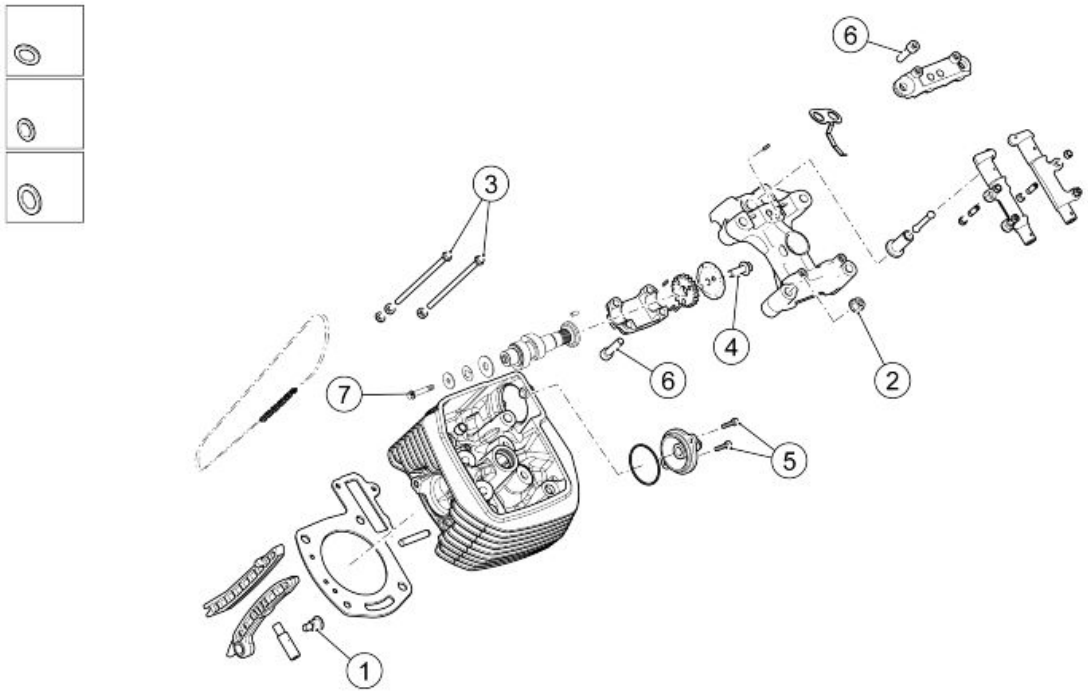


CONNECTING ROD ASSEMBLY - CYLINDERS

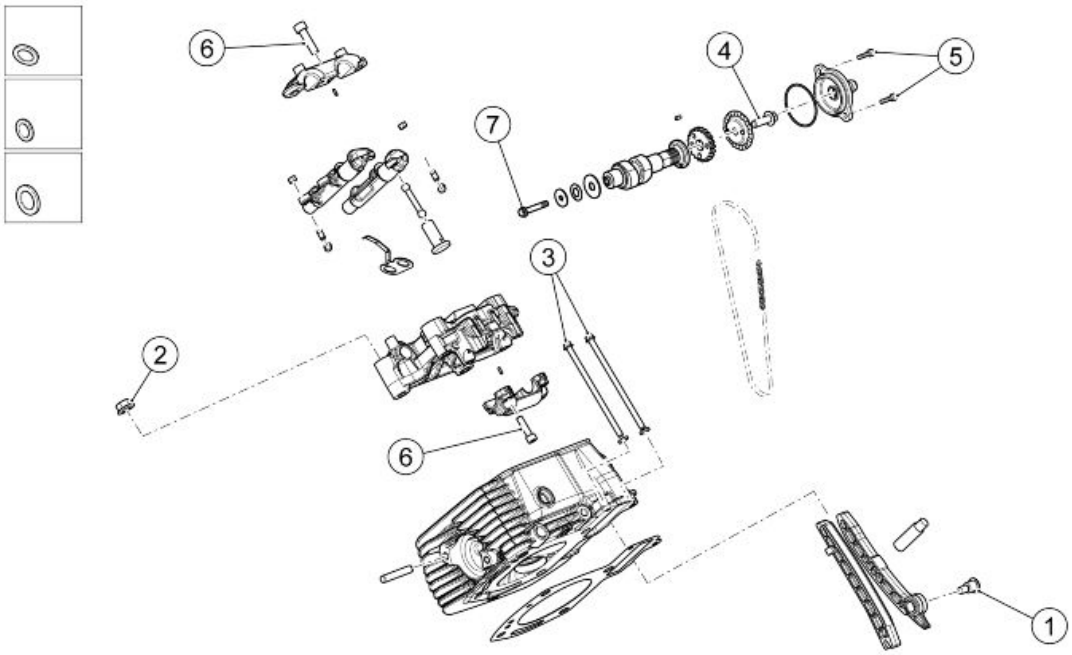
pos.	Description	Type	Quantity	Torque	Notes
1	Thermal group fixing stud bolt	M10x1.25	8	5 Nm (3.69 lbf ft)	Loctite 243
2	Connecting rod screws	-	4	40 Nm (29.50 lbf ft)	Pre-tightening
2	Connecting rod screws	-	4	80 Nm (59.00 lbf ft)	Final tightening
3	Right hydraulic tensioner cover	-	1	42 Nm (30.98 lbf ft)	-
4	Left hydraulic tensioner cover	-	1	30 Nm (22.13 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

TESTA SINISTRA

Pos.	Descrizione	Tipo	Quantità	Coppia	Note
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-
7	Vite fissaggio molla a tazza	-	1	18 Nm (13.28 lbf ft)	-



TESTA DESTRA

Pos.	Descrizione	Tipo	Quantità	Coppia	Note
1	Movable chain tensioner pad fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 243
2	Head tightening nut	M10x1.25	4	15 Nm (11.06 lbf ft)	Engine Oil Pre-tightening
2	Head tightening nut	M10x1.25	4	42 Nm (30.98 lbf ft)	Final tightening
3	Head tightening screws (chain compartment)	M6x120	2	10 Nm (7.37 lbf ft)	-
4	Plate locking screw and timing gear	-	1	30 Nm (22.13 lbf ft)	Loctite 243
5	Timing cover fixing screw on the cylinder head	M5x10	2	8 Nm (5.90 lbf ft)	-
6	Camshaft support fixing screw	-	6	18 Nm (13.28 lbf ft)	-
7	Vite fissaggio molla a tazza	-	1	18 Nm (13.28 lbf ft)	-

Removing the cylinder

NOTE

THE OPERATIONS DESCRIBED BELOW REFER TO ONE HEAD REMOVING ONLY BUT APPLY TO BOTH HEADS.

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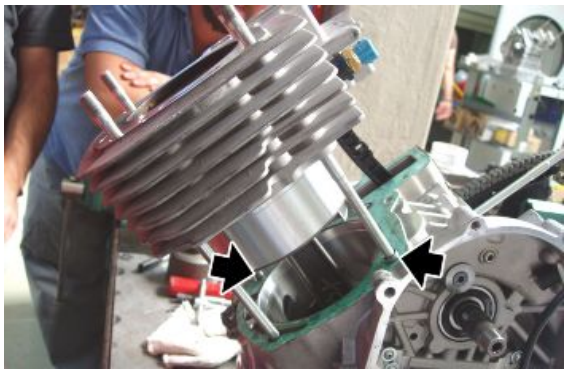
- Remove the head, the gasket between the head and the cylinder and the two dowel pins.
- Slide off the movable chain slider.
- Remove the cylinder from the stud bolts.

- Remove the two dowel pins on the stud bolts.
- Remove the two gaskets between the crankcase and the cylinder.
- Cover the crankcase opening with a clean cloth.



See also

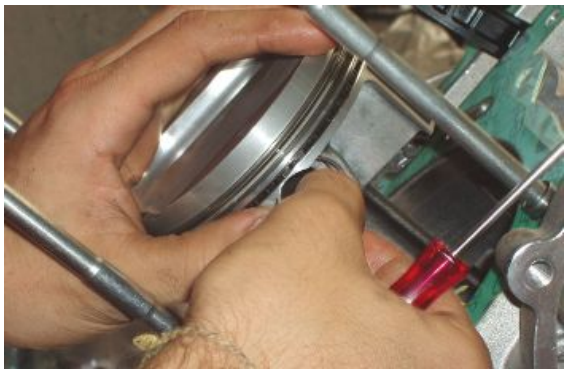
Removing the cylinder head

Disassembling the piston

NOTE

THE OPERATIONS DESCRIBED BELOW REFER TO ONE HEAD REMOVING ONLY BUT APPLY TO BOTH HEADS.

- Remove the cylinder.
- Cover the crankcase opening with a clean cloth.
- Release the snap ring.



- Remove the pin.

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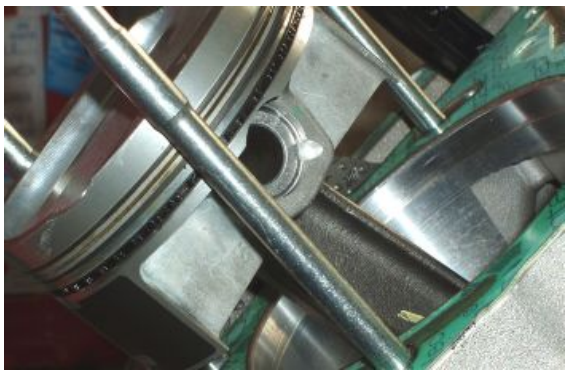
- Mark the piston crown on the exhaust side so as to remember the refitting position.
- Remove the piston.



Fitting the piston

NOTE

THE OPERATIONS DESCRIBED BELOW REFER TO REMOVING ONLY ONE HEAD BUT APPLY TO BOTH HEADS.

- The reference on the piston ring must be facing the piston crown.
- Fit the piston rings on the piston: - the oil scraper in the lower slot; - the thicker smooth ring in the intermediate slot; - the less thick smooth ring in the upper slot.
- The piston rings must be offset at 120° one from the other.
- Fit one of the two pin snap rings on the piston.
- Lock crankshaft rotation.

Specific tooling

12.91.18.01 Tool to lock the flywheel and the starting ring gear

- Fit the piston.

NOTE

CHECK THE PISTON DIRECTION ACCORDING TO THE REFERENCES MARKED ON THE PISTON CROWN. DO NOT ASSEMBLE PISTONS AND CYLINDERS OF DIFFERENT SELECTOR TYPES.

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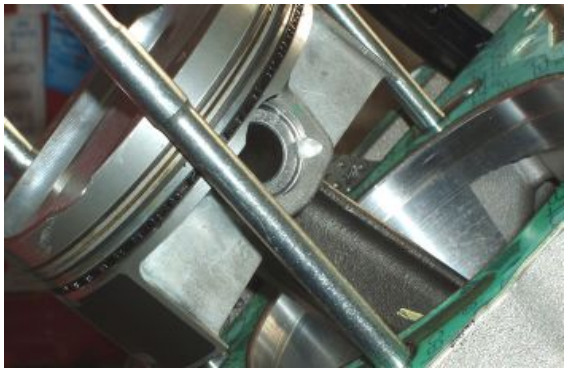
- Insert the pin.



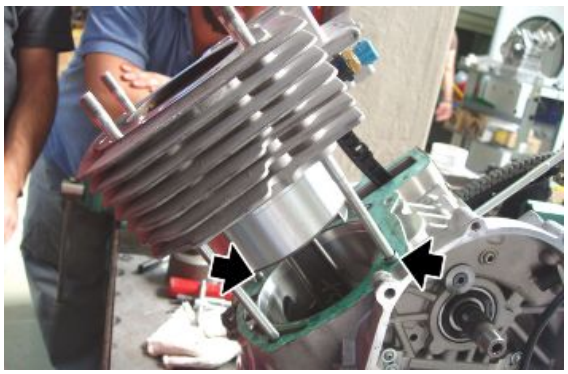
- Insert the snap ring.

Specific tooling

020470Y Pin snap ring fitting tool

Installing the cylinder

RIGHT CYLINDER



- Fit the piston.
- Remove the cloth used to prevent foreign bodies from getting into the crankcase.
- Turn the rings so that the coupling ends are 120 degrees from each other.
- Place a new metal gasket between the crankcase and the cylinder. Place the two dowel pins on the stud bolts. Lubricate the piston and the cylinder. Lock connecting rod motion with the fork tool. Using the suitable piston ring clamp tool, place the cylinder and fit the chain in the timing system plate.

CAUTION

DURING THIS OPERATION, PAY ATTENTION NOT TO DAMAGE THE PISTON.

Specific tooling

020674Y Piston ring clamp

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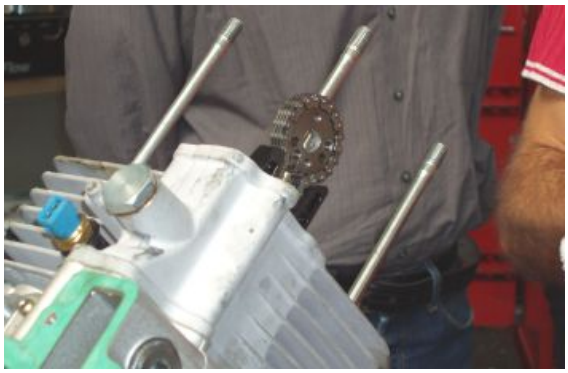
020716Y Connecting rod locking

- Remove the piston ring clamp tool and finish positioning the cylinder.

Specific tooling

020674Y Piston ring clamp

- Fit the movable chain slider.
- Fit the upper gear.
- Fit the chain tensioner and the chain tensioner cap temporarily and keep the chain taut on the service shaft.



LEFT CYLINDER

- Fit the piston.
- Remove the cloth used to prevent foreign bodies from getting into the crankcase.
- Turn the rings so that the coupling ends are 120 degrees from each other.
- Place a new metal gasket between the crankcase and the cylinder.
- Place the two dowel pins on the stud bolts.
- Undo the screw which will be used to time the upper gear.

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- Check that the oil in the left cylinder chain tensioner has been drained off by compressing it. If the operation is difficult, use a pin drive to push the central hole so that the oil is drained off from the circuit.

- Fit the chain tensioner in the cylinder.
- Lubricate the piston and the cylinder.
- Lock connecting rod motion with the fork tool.
- Using the suitable piston ring clamp tool, place the cylinder and fit the chain in the timing system plate.

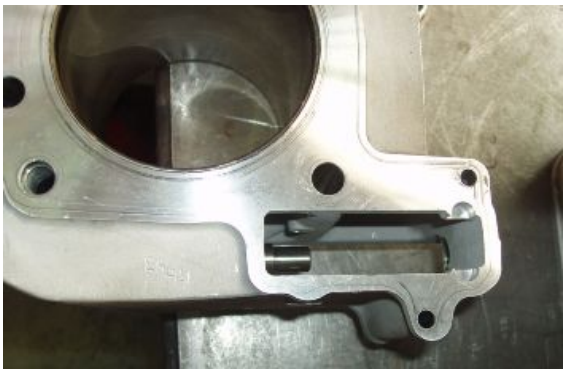
CAUTION

DURING THIS OPERATION, PAY ATTENTION NOT TO DAMAGE THE PISTON.

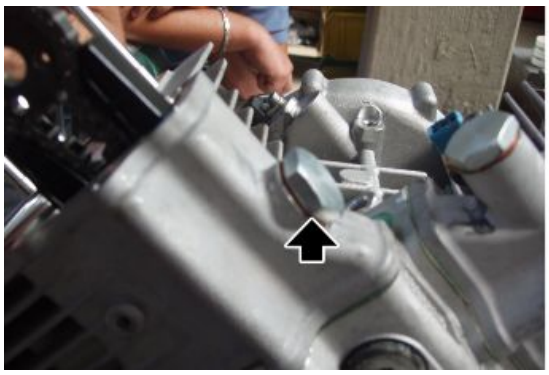
Specific tooling

020674Y Piston ring clamp

020716Y Connecting rod locking



- Fit the movable chain slider.
- Fit the upper gear.
- Fit the chain tensioner cap temporarily and keep the chain taut on the service shaft.



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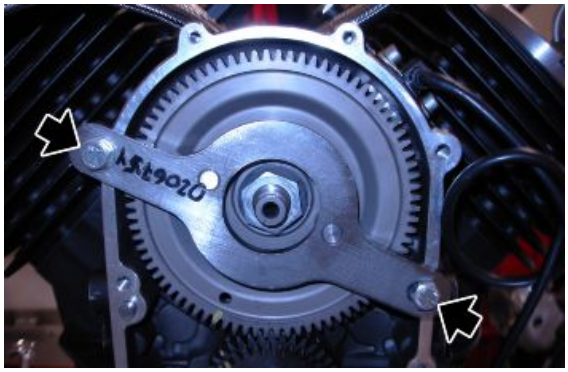
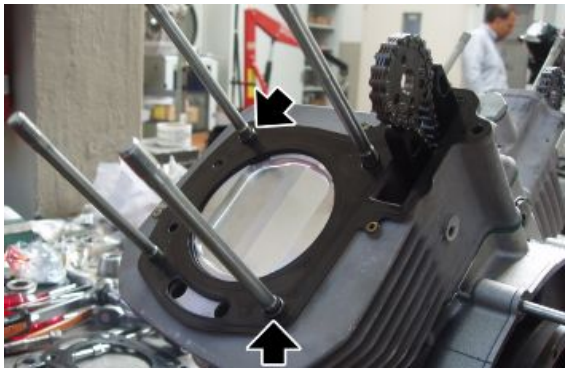
Installing the cylinder head

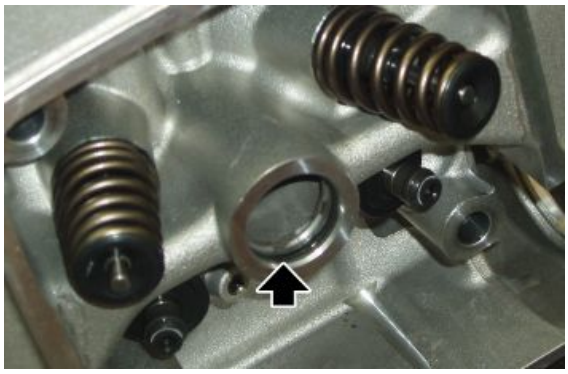
- Fit the valves in the head, if previously removed.
- Take the left cylinder piston to TDC and lock crankshaft rotation.
- Determine the thickness of the gasket to be fitted between the head and the cylinder as described in the section: Shimming system.



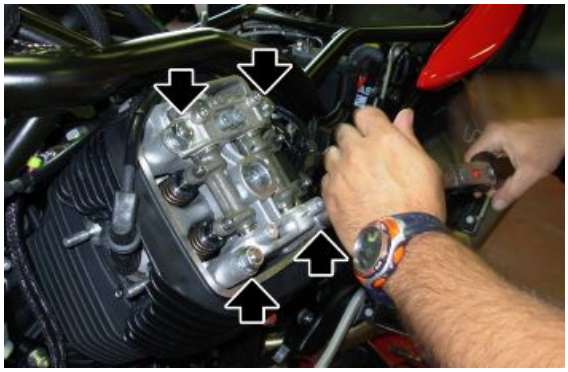
- Place the two dowel pins.
- Fit the gasket with the correct thickness between the head and the cylinder.
- Fit the left cylinder head.



- Fit a new O-ring in the spark plug hole.
- Fit the complete cam cap.



- Fix the cam cap with the four nuts on the stud bolts.



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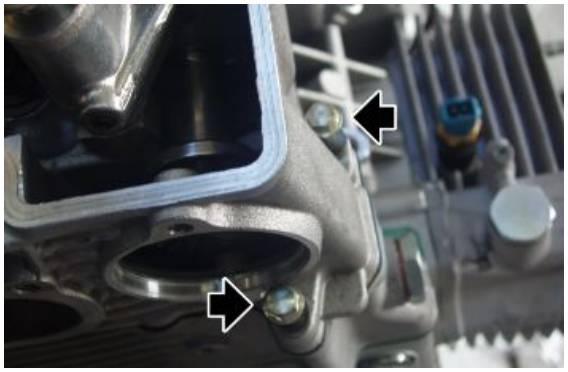
- Fix the head with the two screws.
- Tighten nuts and screws to the prescribed torque operating diagonally and in stages.
- Loosen the valve set screws.



- Using a thin screwdriver relief oil pressure from the left cylinder chain tensioner.

- Screw two screws in the threaded holes of the timing system upper gear.
- Rotate the camshaft so that its pin is aimed towards the hole in the timing system chain.
- Place the gear in the chain.
- On the left camshaft pin, fit the hole marked with the letter "L" of the timing system gear.

- Block the left chain tensioner hole with screw and washer.
- Rotate the crankshaft by 90°so that the right cylinder piston reaches the TDC; lock crankshaft rotation.
- Also determine the thickness of the gasket for the right cylinder, to be fitted between the head and the cylinder as described in the section: Shimming system.
- Place the two dowel pins.

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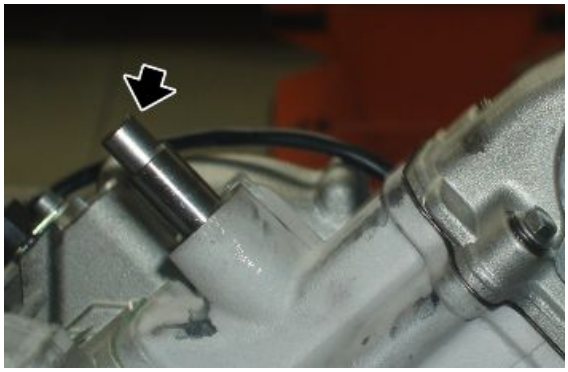
- Fit the gasket with the correct thickness between the head and the cylinder.
- Fit the right cylinder head.

- Unscrew and remove the right chain tensioner cap.



- Screw two screws in the threaded holes of the timing system upper gear.
- Rotate the camshaft so that its pin is aimed towards the hole in the timing system chain.
- Place the gear in the chain.
- On the right camshaft pin, fit the hole marked with the letter "R" of the timing system gear.

- Screw the cap of the right chain tensioner.
- Undo and remove the screws used to place the gear on the camshaft.
- Place the bulkhead and align the holes with the timing system gear.
- Fix the bulkhead on the timing system gear using a screw with Loctite on the thread.
- Tighten the screw to the prescribed torque.
- Also place the bulkhead of the other head.

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- Place the cap.
- Tighten the two screws to the prescribed torque.
- Also place the cap of the other head.
- Adjust valve clearance.

See also

Checking the valve clearance

Installing the head cover

- Sostituire le guarnizioni ed installare il coperchio testa.

- Place the plastic half-cover.
- Replace the four rubber rings.
- Tighten the four screws to the prescribed torque.

- Place the spark plug tube.

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Crankcase - crankshaft

Removing the crankshaft

- Remove the clutch.
- Remove the tone wheel and the oil pump gear.
- Working from the generator side, unscrew and remove the nut.
- Remove both gears.

- Remove the connecting rods.

- Undo and remove the eight fixing screws and collect the washers.

- Hold the crankshaft during flange removal.
- Using the suitable special tool, remove the crankshaft flange.
- Remove the sealing ring from the flange, if necessary.

Specific tooling

12.91.36.00 Tool to remove the flywheel-side flange

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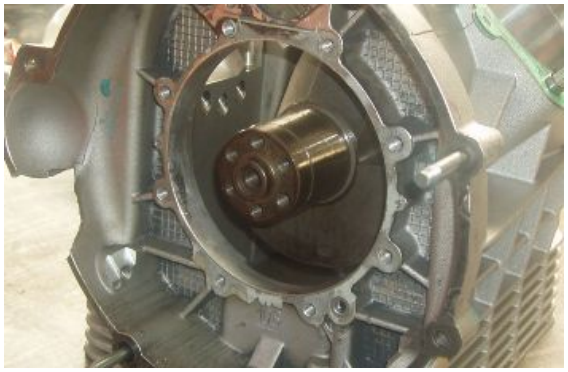
- Remove the crankshaft afterwards.



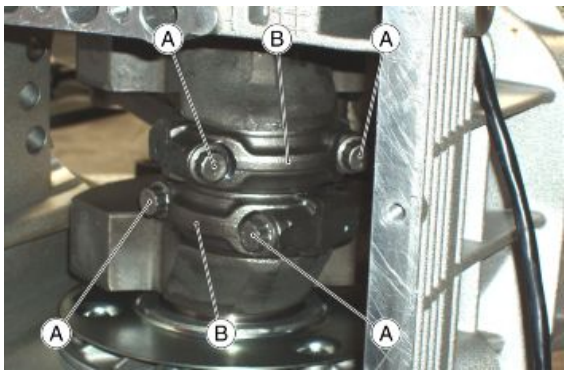
- Collect the shim washer from inside the crankcase.

See also

Disassembling the clutch
Removing the phonic wheel

Disassembling the connecting rod

- Remove both heads.
- Remove the cylinders and the pistons.
- Remove the oil sump.
- Undo the coupling screws (A) inside the crankcase and remove the connecting rods (B).



See also

Removing the flywheel
Disassembling the piston
Removing the cylinder
Removing the cylinder head

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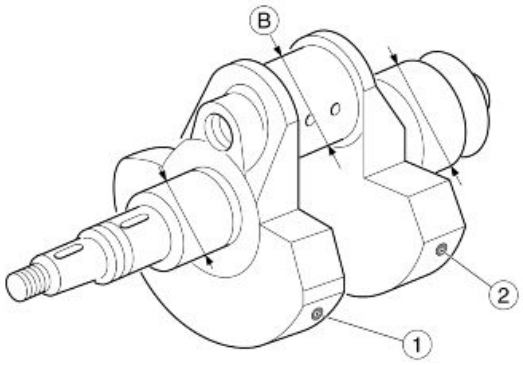
Inspecting the crankshaft components

Check the surfaces of the main journals; if they are scored or oval-shaped, reface them (observing the undersize charts), and replace the main bushing/s.

Reference (1) indicates the position where the coloured reference is applied to select diameter (B).

Reference (2) indicates the position where the coloured reference is applied to select balancing.



CRANKSHAFT SEAT (TIMING SYSTEM SIDE)

Specification	Desc./Quantity
Diameter of crankshaft main journal, timing system side	37.975 - 37.959 mm (1.49507 - 1.49444 in)
Inside diameter of crankshaft bushing, timing system side	38.016 - 38.0 mm (1.49669 - 1.49606 in)
Clearance between bushing and main journal (timing system side)	0.025 - 0.057 mm (0.00098 - 0.00224 in)

CRANKSHAFT SEAT (CLUTCH SIDE)

Specification	Desc./Quantity
Diameter of crankshaft main journal, clutch side	53.97 - 53.961 mm (2.12480 - 2.12444 in)
Inside diameter of crankshaft bushing on clutch-side flange	54.019 - 54.0 mm (2.12673 - 2.12598 in)
Clearance between bushing and main journal (clutch side)	0.030 - 0.058 mm (0.00118 - 0.00228 in)

CRANKPIN DIAMETER (B)

Specification	Desc./Quantity
'Blue' bushing half-shell regular production	44.008 ÷ 44.014 mm (1.73259 ÷ 1.73283 in)
'Red' bushing half-shell regular production	44.014 ÷ 44.020 mm (1.73283 ÷ 1.73307 in)

BALANCING SELECTION COLOURS (2)

Specification	Desc./Quantity
Crankshaft selection colour (2) brown	Type 1 to be used with brown connecting rods. Balance with a **1558 g (54.96 oz) +/- 0.25%** weight fitted on the crankpin (B). Maximum imbalance allowed for each shoulder: **2 g (0.07 oz)**.
Crankshaft selection colour (2) green	Type 2 to be used with green connecting rods. Balance with a **1575 g (55.56 oz) +/- 0.25%** weight fitted on the crankpin (B). Maximum imbalance allowed for each shoulder: **2 g (0.07 oz)**.
Crankshaft selection colour (2) black	Type 2 to be used with black connecting rods. Balance with a **1592 g (56.16 oz) +/- 0.25%** weight fitted on the crankpin (B). Maximum imbalance allowed for each shoulder: **2 g (0.07 oz)**.

Checking the connecting rod

When examining the connecting rods, check that:

- Bushing conditions and bushings-pins clearance;
- Shaft parallelism;
- Connecting rod bearings.

These are thin shell bearings, anti-friction alloy that does not allow for any adaptation; replace them immediately if seizing or wear marks are found.

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Upon replacing the bearings it may be necessary to ream the crankshaft pin.

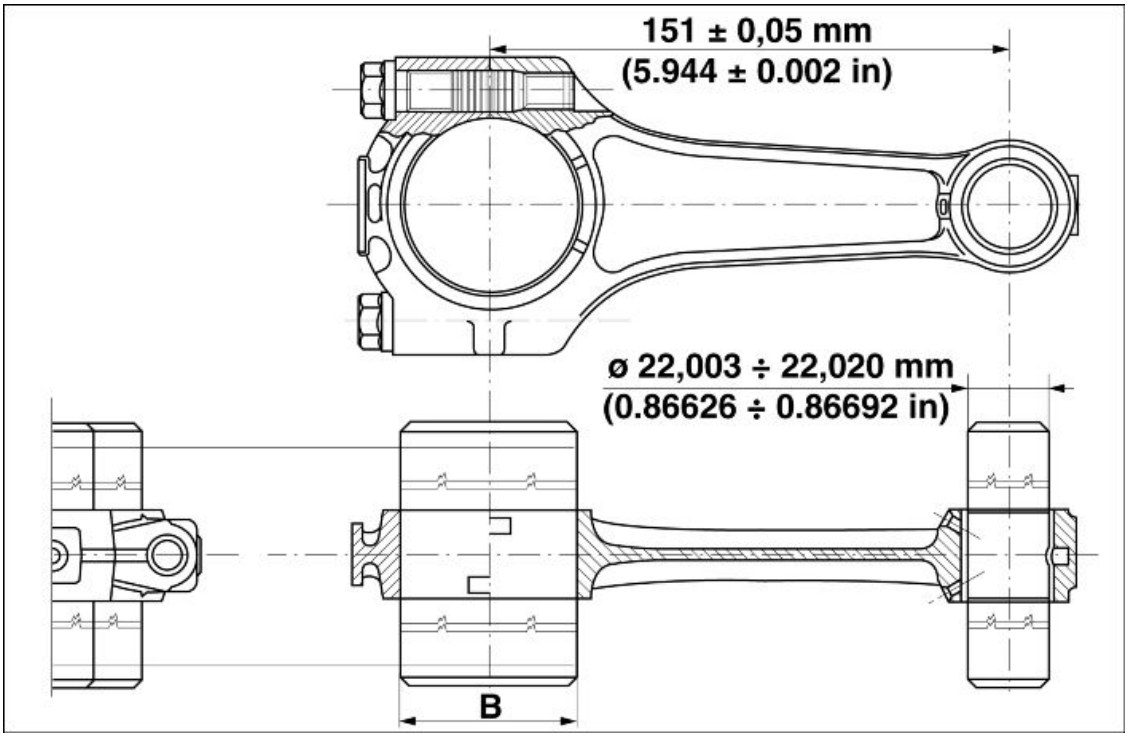
Before reaming the crankpin, measure the pin diameter (B) comparing it with the maximum wear allowed, as indicated in the figure; this defines what kind of undersizing the bearing should have and to which diameter the pin (B) should be reamed.

Checking shaft parallelism

Check shafts for squaring before fitting them.

It is therefore necessary to check that the head holes and the rod small end are parallel and on the same plane.

The maximum parallelism and plane error of the two head shafts and connecting rod small end should be +/- 0.10 mm (0.00393 inch).



CONNECTING ROD BEARING THICKNESS

Specification	Desc./Quantity
Regular 'Blue' connecting rod bearing (production)	1.539 - 1.544 mm (0.06059 - 0.06079 in)
Regular 'Red' connecting rod bearing (production)	1.535 - 1.540 mm (0.06043 - 0.06063 in)

CRANKPIN DIAMETER (B)

Specification	Desc./Quantity
'Blue' bushing half-shell regular production	44.008 ÷ 44.014 mm (1.73259 ÷ 1.73283 in)
'Red' bushing half-shell regular production	44.014 ÷ 44.020 mm (1.73283 ÷ 1.73307 in)

PIN-BUSHING COUPLING DATA

Specification	Desc./Quantity
Fitted and machined bushing - inside Ø	22.003 - 22.020 mm (0.86626 - 0.86692 in)
Pin diameter	21.998 - 21.994 mm (0.86606 - 0.86590 in)
Clearance between pin and bushing	0.005 - 0.026 mm (0.000197 - 0.001024 in)

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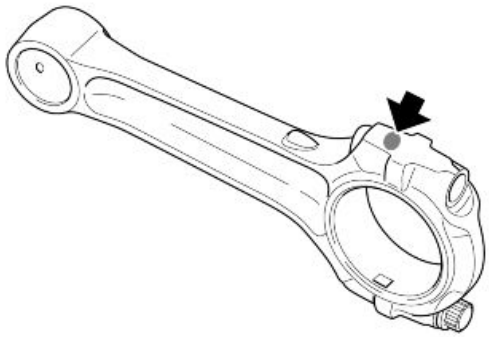
The connecting rods have a marked area for weight selection.
The weight indicated in the chart includes screws, dowels and the bushing.



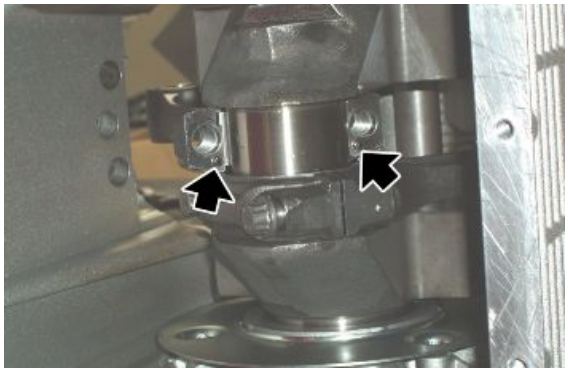
CONNECTING ROD WEIGHT SELECTION

Specification	Desc./Quantity
Connecting rod - brown	0.588 - 0.598 mm (0.02074 - 0.02109 in)
Connecting rod - green	0.598 - 0.608 mm (0.02109 - 0.02145 in)
Connecting rod - black	0.608 - 0.618 mm (0.02145 - 0.02180 in)

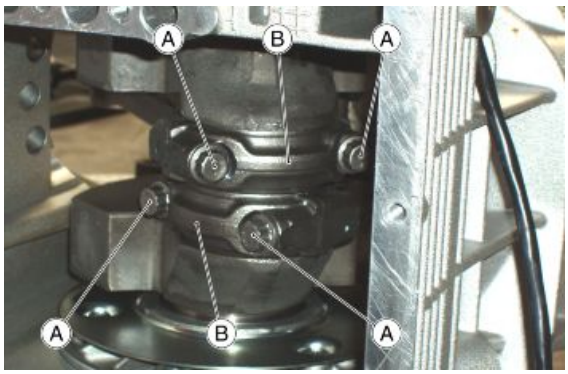
Assembling the connecting rod

- Lubricate the crankpin on which the connecting rods are to be fixed.
- If the connecting rods are not replaced, be careful not to interchange the right connecting rod with the left one and vice versa.

To place the connecting rods: the two pins must be facing the crankcase internal side.



- Place the connecting rods and the caps (B) on the crankshaft and fasten them with new screws (A).
- Remember these recommendations:



- The screws fixing the connecting rods to the crankshaft must be replaced with new ones at the following refitting as they are subject to high loads and stress;
- The fitting clearance between bearing and connecting rod pin is 0.028 mm (0.0011 inch) minimum and 0.052 mm (0.0020 inch) maximum;
- The clearance between the shim washers of the connecting rod and those of the crankshaft is comprised between 0.30 mm (0.01181 in) and 0.50 mm (0.01968 in);
- Lock the screws (A) on the caps (B) with a torque wrench at the prescribed torque.

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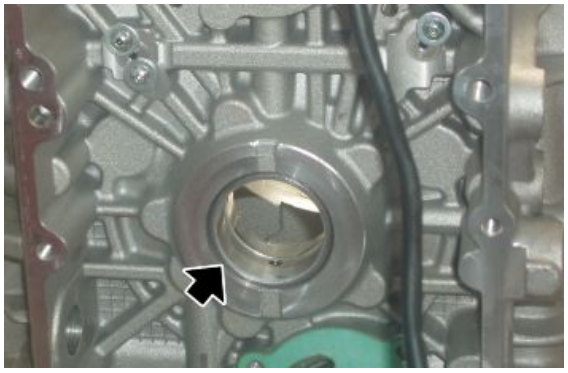
PAY ATTENTION TO CRANKSHAFT ROTATION WHEN ONLY THE CONNECTING RODS ARE FITTED BECAUSE IT COULD HIT THE TWO LUBRICATION JETS INSIDE THE CRANKCASE.

Installing the crankshaft

- Fit the shim washer inside the crankcase with the chamfered side facing the generator side.

- Lubricate the crankshaft bushing on the crankcase, generator side.



- Use the sealing ring fitting tool on the flywheel-side flange to fit the sealing ring on the flange.

Specific tooling

19.92.71.00 Tool to fit the seal ring on the flywheel-side flange

- Predisporre loctite 510 tra carter e flangia albero motore, sul lato volano.

- Fit the crankshaft on the crankcase, flywheel side.
- Mark the crankshaft on the flywheel side with the crankpin facing upwards.
- Place the suitable sealing ring centring tool on the crankshaft.

Specific tooling

12.91.20.00 Tool to fit the flywheel-side flange together with sealing ring on the crankshaft

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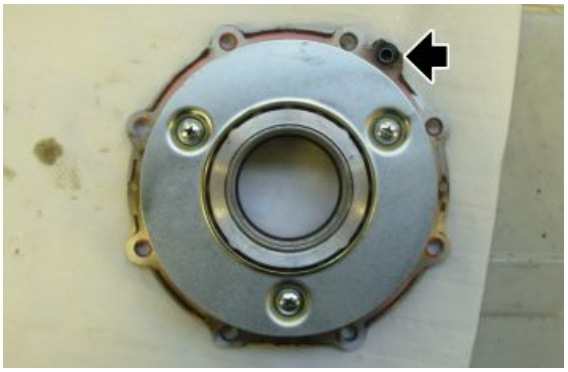
- Place the flywheel-side flange on the crankshaft and check if the dowel pin with the O-ring is correctly placed.



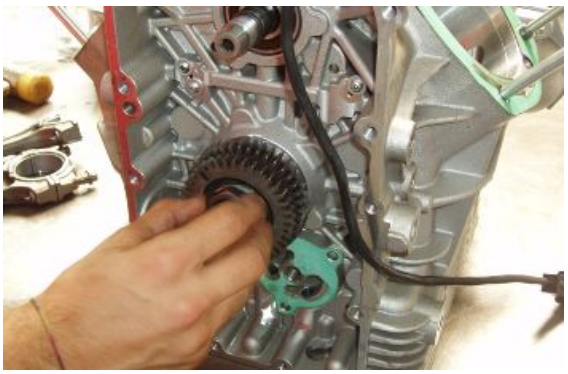
- Apply Teflon tape on the two lower fixing screws at the back in order to prevent oil leaks.
- Screw the eight flange screws on the flywheel side proceeding diagonally.

- Remove the sealing ring centring tool from the crankshaft.

Specific tooling

12.91.20.00 Tool to fit the flywheel-side flange together with sealing ring on the crankshaft

- To avoid that the shim washer inside the crankcase moves out of its seat, fit the two gears and the nut on the crankshaft on the generator side.



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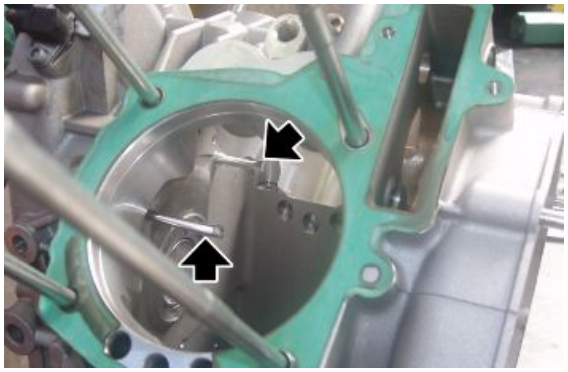
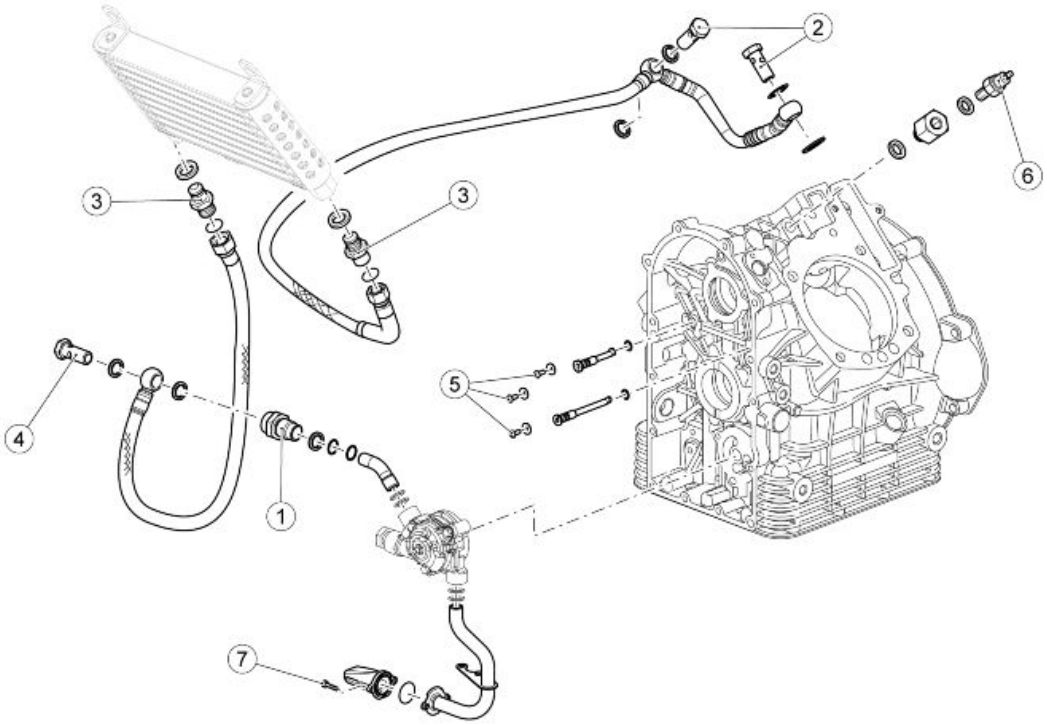
Refitting the crankcase halves

In case the lubrication jets are removed, replace them with two new of the same type. Check that the O-ring is fitted on the jets.
Do not interchange them upon refitting because they have a different length.



Lubrication



LUBRICATION SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Pump outlet oil pipe nipple	M14x1.5	1	40 Nm (29.50 lbf ft)	-
2	Slot screw for oil pipe on the cylinder head	M14x1.5	2	20 Nm (14.75 lbf ft)	-
3	Nipple on the radiator and the oil pipe	M16x1.5	2	20 Nm (14.75 lbf ft)	Apply vaseline oil
4	Oil delivery pipe to radiator slot screw	M14x1.5	1	35 Nm (25.81 lbf ft)	-
5	Jets fixing screw	-	3	Using a "T" spanner, close by hand	Loctite 243
6	Minimum oil pressure sensor	M12	1	25 Nm (18.44 lbf ft)	-
7	Intake oil filter fixing screw	-	2	4 Nm (2.95 lbf ft)	-

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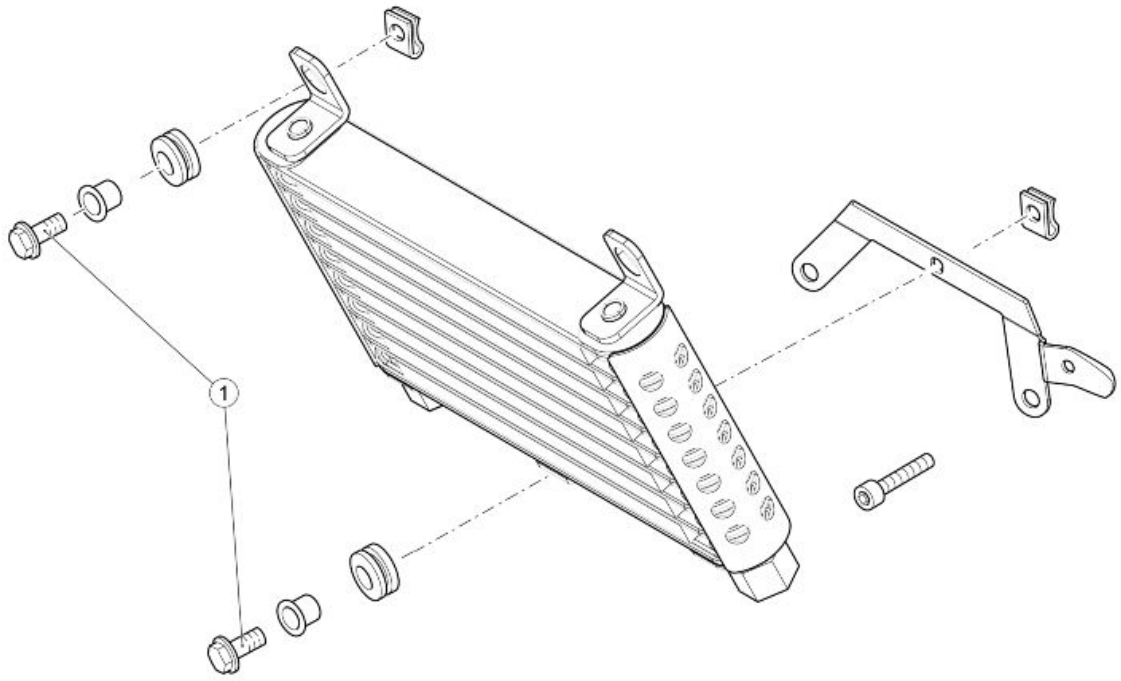
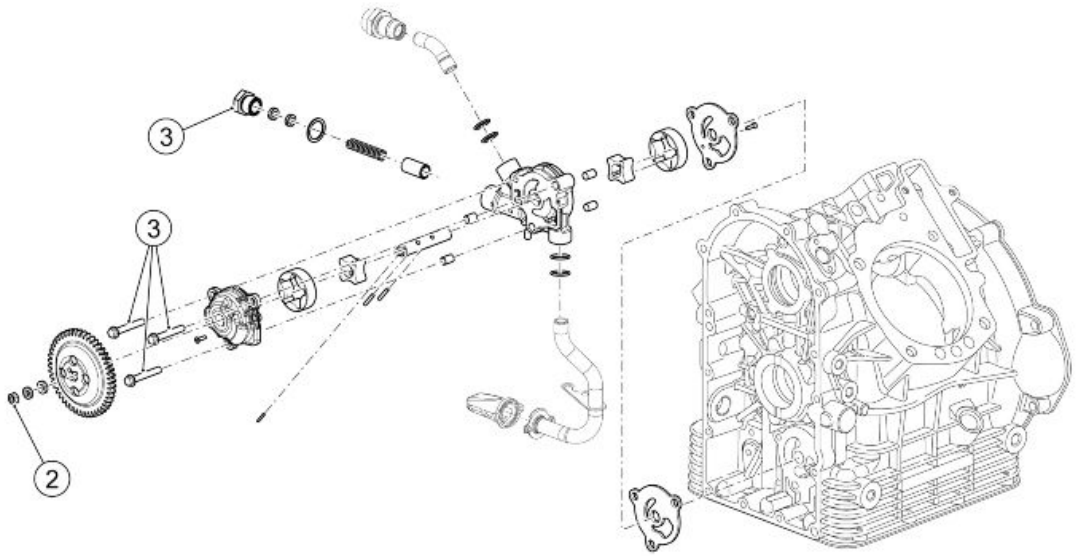


OIL RADIATOR

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio radiatore a telaio	M6x30	3	10 Nm (7.38 lbf ft)	-



OIL PUMP

pos.	Description	Type	Quantity	Torque	Notes
1	Oil pump fixing screw	M6x45	3	10 Nm (7.37 lbf ft)	Loctite 243
2	Oil pump driven gear locking nut	M6	1	8 Nm (5.90 lbf ft)	Loctite 243

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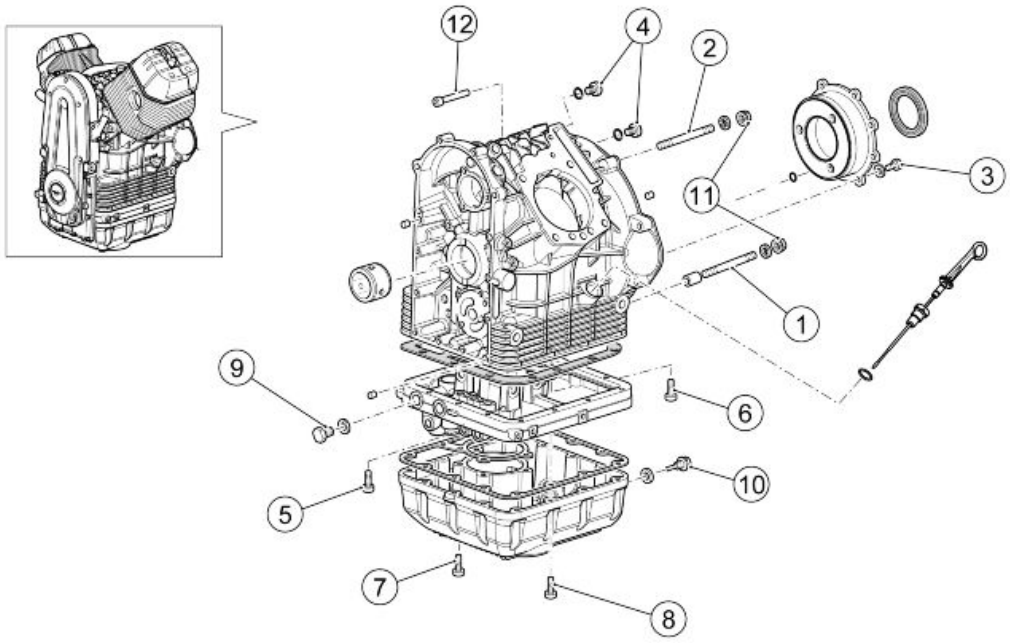
pos.	Description	Type	Quantity	Torque	Notes
3	Oil pressure valve cap	-	1	40 Nm (29.50 lbf ft)	-



CRANKCASE AND OIL SUMP

pos.	Description	Type	Quantity	Torque	Notes
1	Stud bolt	M8x75	2	10 Nm (7.37 lbf ft)	-
2	Stud bolt	M8x66	3	10 Nm (7.37 lbf ft)	-
3	Crankshaft rear support flange fixing screw	M8x25	8	26 Nm (19.18 lbf ft)	-
4	Oil cap on the crankcase	-	2	25 Nm (18.44 lbf ft)	-
5	Flange fixing screw under the crankcase	M6x60	2	10 Nm (7.37 lbf ft)	-
6	Flange fixing screw under the crankcase	-	2	10 Nm (7.37 lbf ft)	-
7	Oil sump fixing screw (filter contour)	M6x35	4	10 Nm (7.37 lbf ft)	-
8	Oil sump fixing screw	M6	14	10 Nm (7.37 lbf ft)	-
9	Cover on the flange under the crankcase	-	2	20 Nm (14.75 lbf ft)	-
10	Magnetic oil drainage cap	-	1	20 Nm (14.75 lbf ft)	-
11	Gear to engine fixing nut	M8	5	20 Nm (14.75 lbf ft)	-
12	Gear to engine fixing screw	-	1	20 Nm (14.75 lbf ft)	Loctite 542

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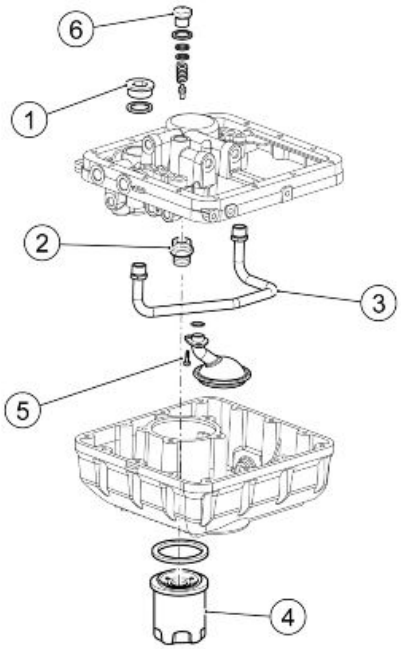

OIL SUMP COMPONENTS

pos.	Description	Type	Quantity	Torque	Notes
1	Cover on the flange under the crankcase	-	1	40 Nm (29.50 lbf ft)	-
2	Oil filter joint	-	1	10 Nm (7.37 lbf ft)	Loctite 243
3	Oil sump pipe	-	1	20 Nm (14.75 lbf ft)	Loctite 648
4	Oil filter	-	1	15 Nm (11.06 lbf ft)	Engine oil
5	Rose pipe fixing screw	M6	-	10 Nm (7.37 lbf ft)	-
6	Maximum pressure valve cover	M18	1	40 Nm (29.50 lbf ft)	-

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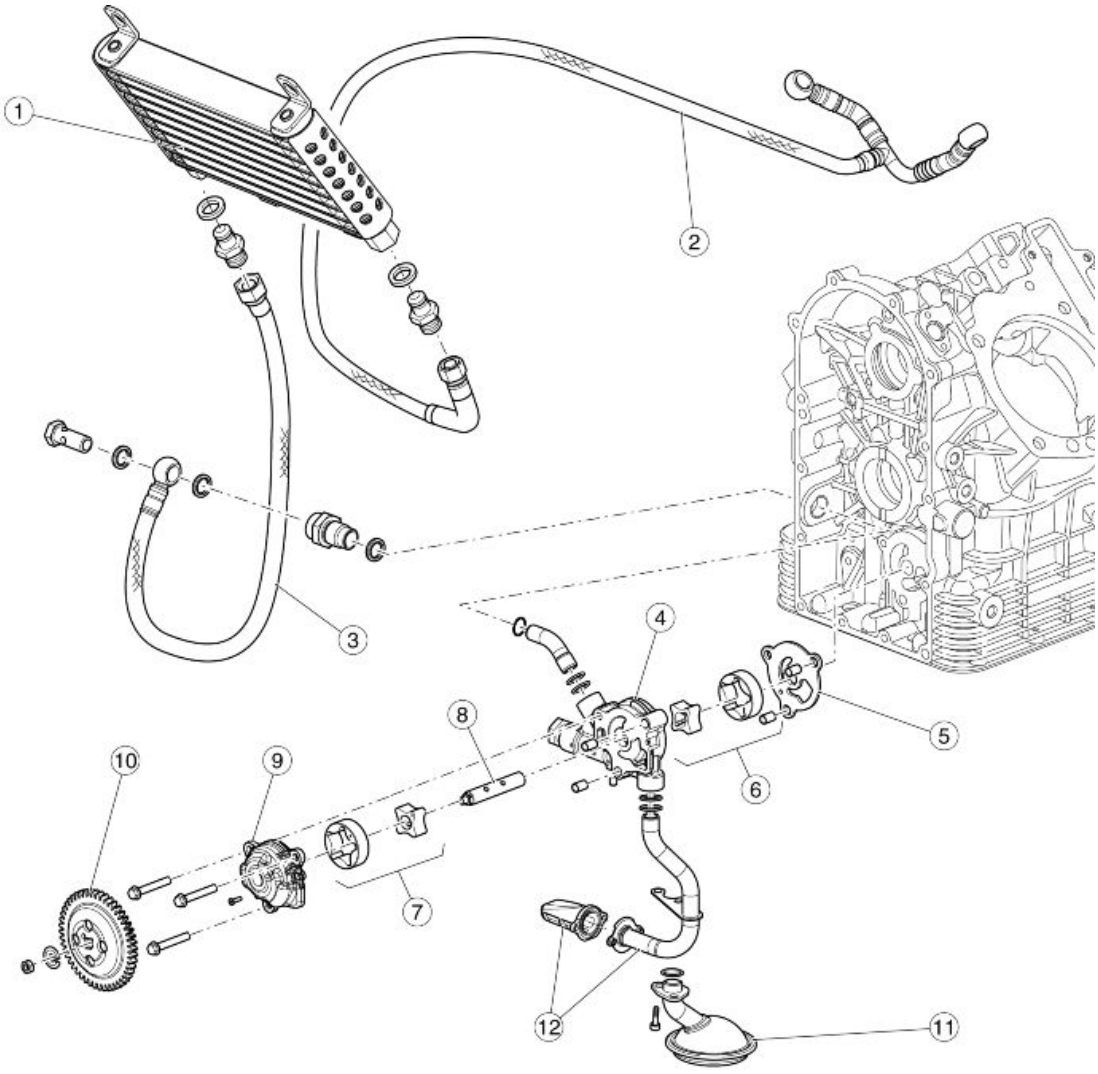
Conceptual diagrams



Key:

1. Oil cooling radiator
2. Oil delivery pipe to heads
3. Oil delivery pipe to radiator
4. Oil pump body
5. Oil pump gasket
6. Rotor for lubrication
7. Rotor for cooling
8. Rotor control shaft
9. Oil pump cover
10. Oil pump control gear
11. Lubrication oil intake filter
12. Cooling oil intake filter

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The oil pump is operated by the gear (10) which receives the motion directly from the crankshaft. The gear (10) is mounted on the shaft (8), on which two rotors are fitted: one for engine cooling (7) and another for lubrication (6).

Cooling:

The rotor (7) takes in oil from the sump through the filter (12); the oil is sent to the radiator (1) through the hoses (3). Oil passes through the radiator (1) dispersing part of the heat and reaches the heads through the hoses (2). Oil goes down to the sump again and joins the oil used for lubrication.

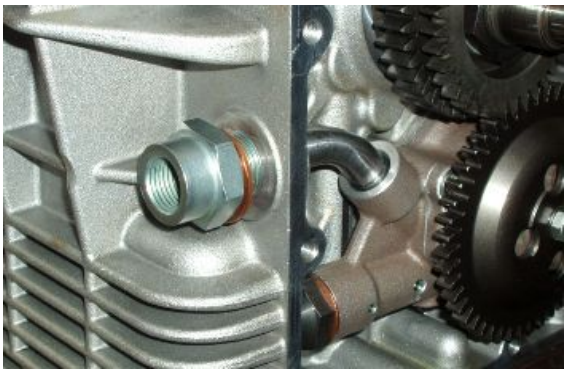
Lubrication:

The rotor (6) takes in oil from the sump through the filter (11); the oil is sent through special ducts in the crankcase to all the parts to be lubricated. Oil goes down to the sump again and joins the oil used for cooling.

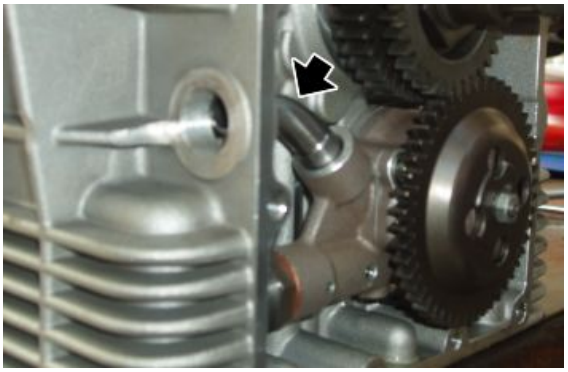
Oil pump

Removing

- Drain off the engine oil.
- Remove the generator and the timing system cover.
- Unscrew and remove the nipple.
- Collect the gasket.



- Remove the nipple - oil pump fitting.



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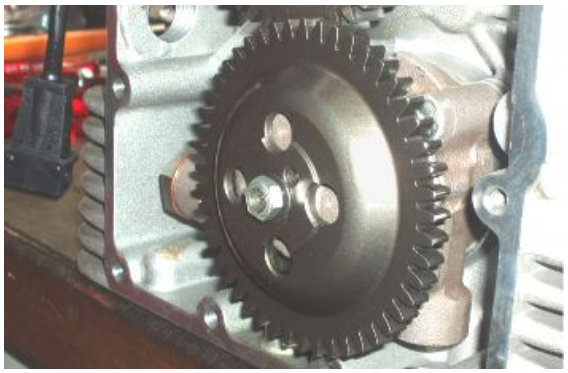
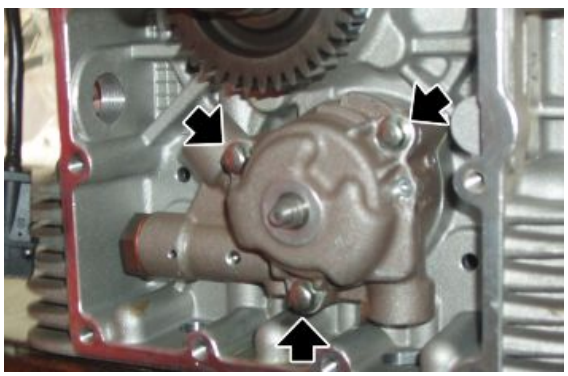
- Bring the left cylinder piston to the TDC in combustion phase.
- Mark a reference on the oil pump control gear and another on the driven gear so as to place them correctly again upon refitting.
- Unscrew and remove the nut on the crankshaft.
- Remove the oil pump control gear.
- Screw the nut again so that the internal shim washer does not fall in the crankshaft crankcase.

- Unscrew and remove the driven gear nut.
- Collect the washer.
- Remove the oil pump driven gear.



- Remove the driving pin.

- Undo and remove the three screws.
- Remove the oil pump.



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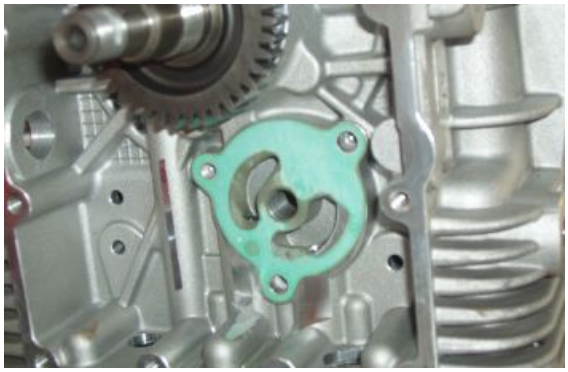
- Remove the gasket between the crankcase and the oil pump.

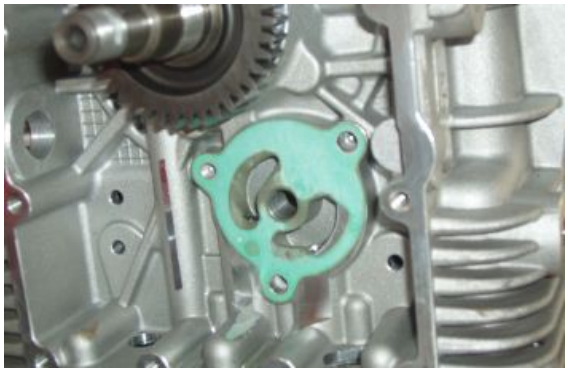


See also

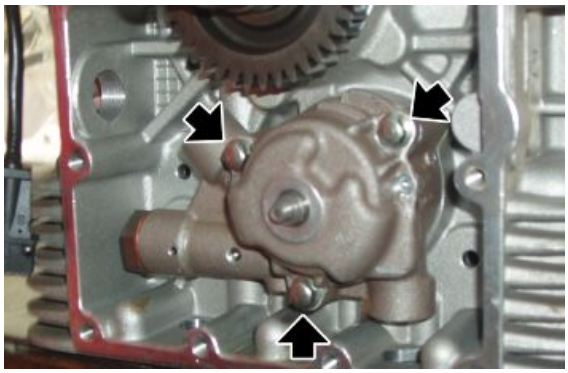
Removing the generator

Installing

- Place a new gasket between the crankcase and the oil pump.



- Place the oil pump.
- Tighten the three screws fixing the oil pump.

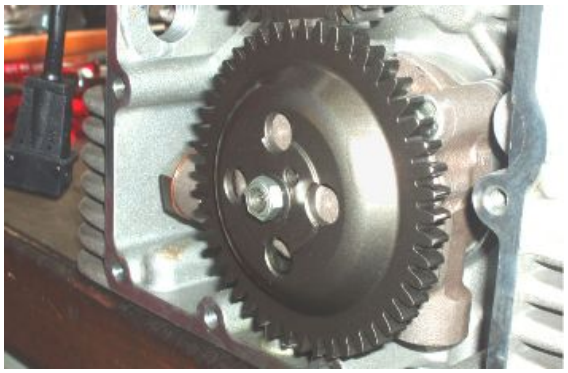


- Place the driving pin on the oil pump shaft.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

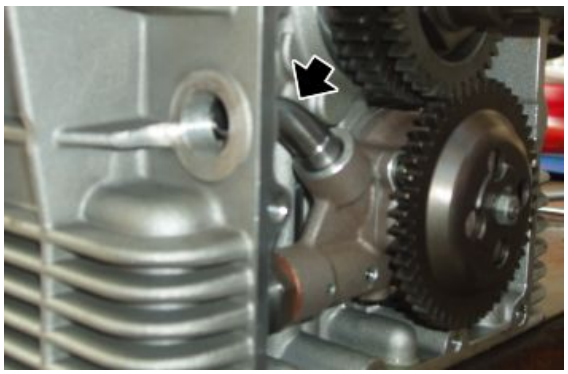
- Place the gear on the oil pump shaft.

- Place the washer on the oil pump shaft.
- Tighten the nut to the specified torque.



- Place the oil pump control gear on the crankshaft and align its reference with that marked during the removal phase on the oil pump driven gear.
- Tighten the nut to the specified torque.

- Insert the joint in the oil pump.



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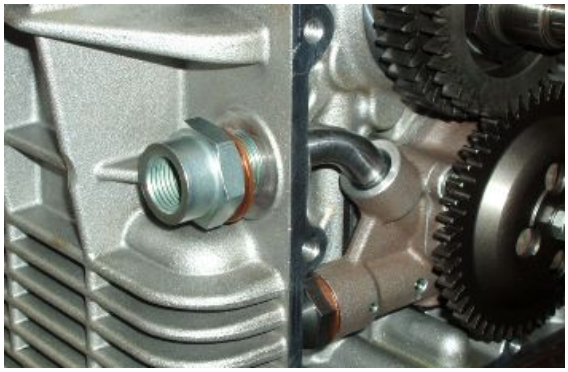
- Fit the nipple with the gasket on the crankcase.
- Tighten the nipple to the prescribed torque.



Removing the oil sump

NOTE

TO REMOVE THE OIL SUMP, PLACE A SUITABLE CONTAINER UNDER IT TO COLLECT THE USED OIL AND DRAIN OUT ALL OIL.

- If necessary, the filter can be removed with the suitable special tool.

Specific tooling

01.92.91.00 Wrench for removing the cover on sump and filter

- Unscrew and remove the oil level plug and collect the O-Ring.

- Undo and remove the fourteen screws fixing the oil sump to the engine crank-case.

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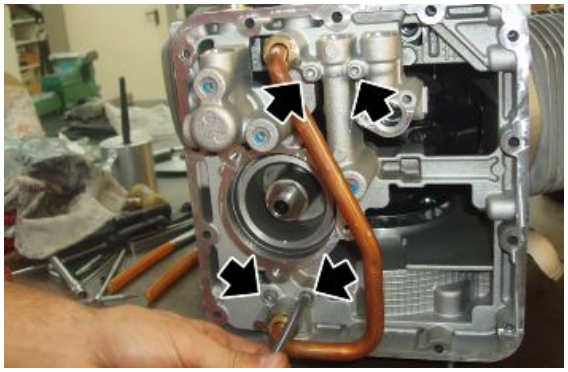
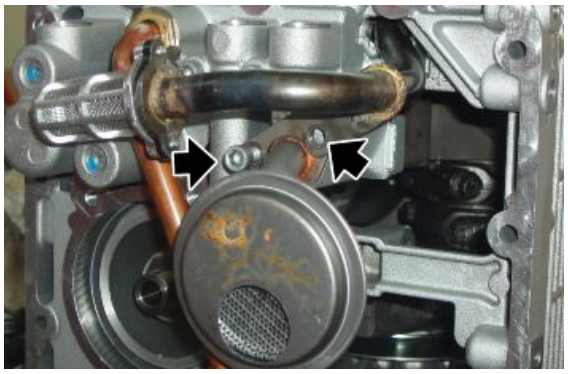
- Undo and remove the four screws.
- Remove the flange.



- Undo and remove the two screws.
- Remove both filters.



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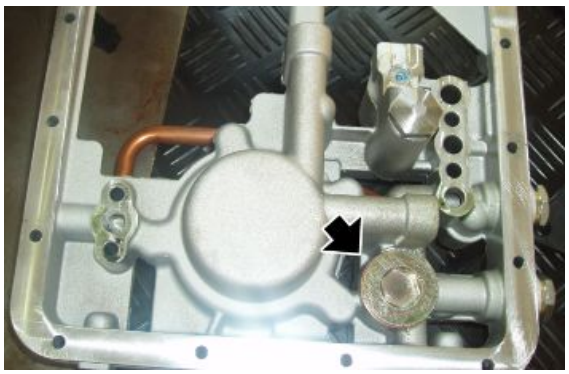
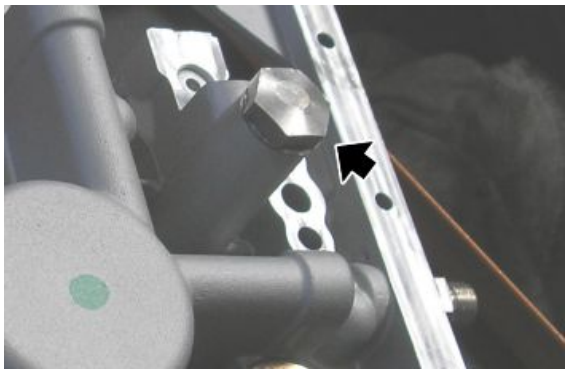
- Unscrew and remove the plug.



- Remove the thermostatic valve.

- Unscrew and remove the pressure relief valve plug.
- Remove the pressure relief valve components



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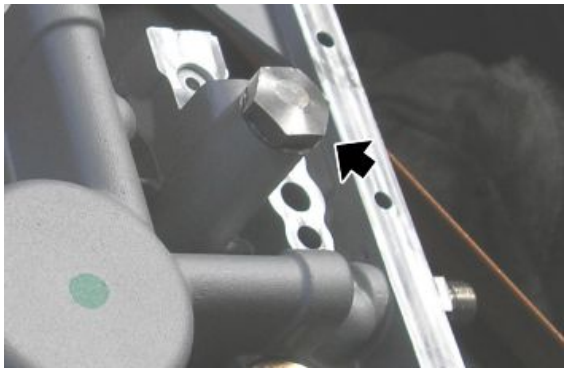
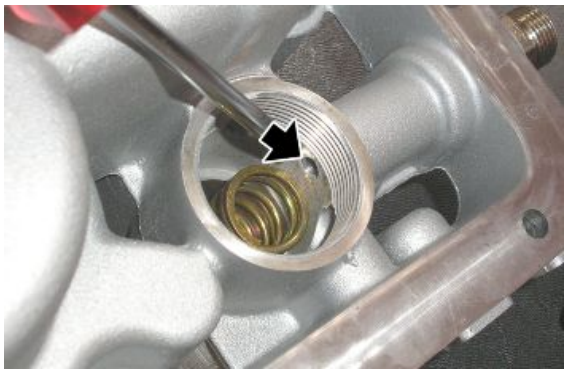
Refitting the oil sump

- Place the pressure relief valve components correctly.
- Screw the pressure relief valve plug.

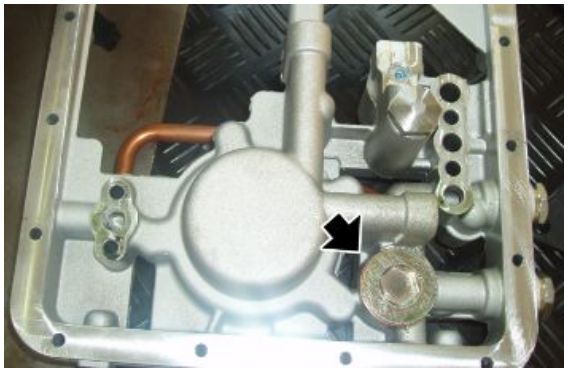


- Place the thermostatic valve.

CHECK THAT THE ENGINE OIL PASSAGE HOLE IS NOT CLOGGED.



- Tighten the thermostatic valve plug.



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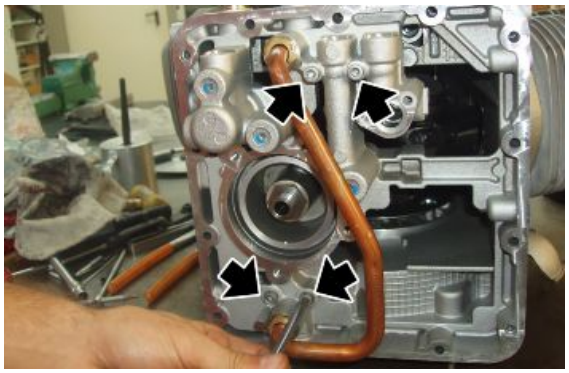
- Place a new gasket between the crank-case and the flange.

- Fit the flange.
- Fix the flange with the four screws.



- Fit the lubrication oil intake filter.

- Check that the O-rings are fitted on the oil pump.
- Fit the cooling oil intake filter.

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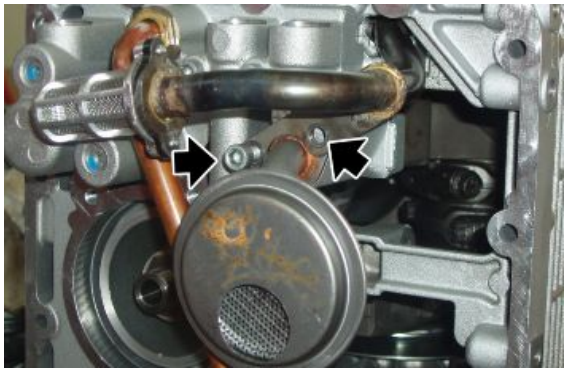
- Fix both filters and tighten the two screws to the prescribed torque.



- Fit a new oil filter and tighten it to the prescribed torque.

- Place a new gasket between the flange and the sump.

- Place the oil sump.
- Tighten the fourteen screws to the prescribed torque.
- Add engine oil up to the correct level.

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INDEX OF TOPICS

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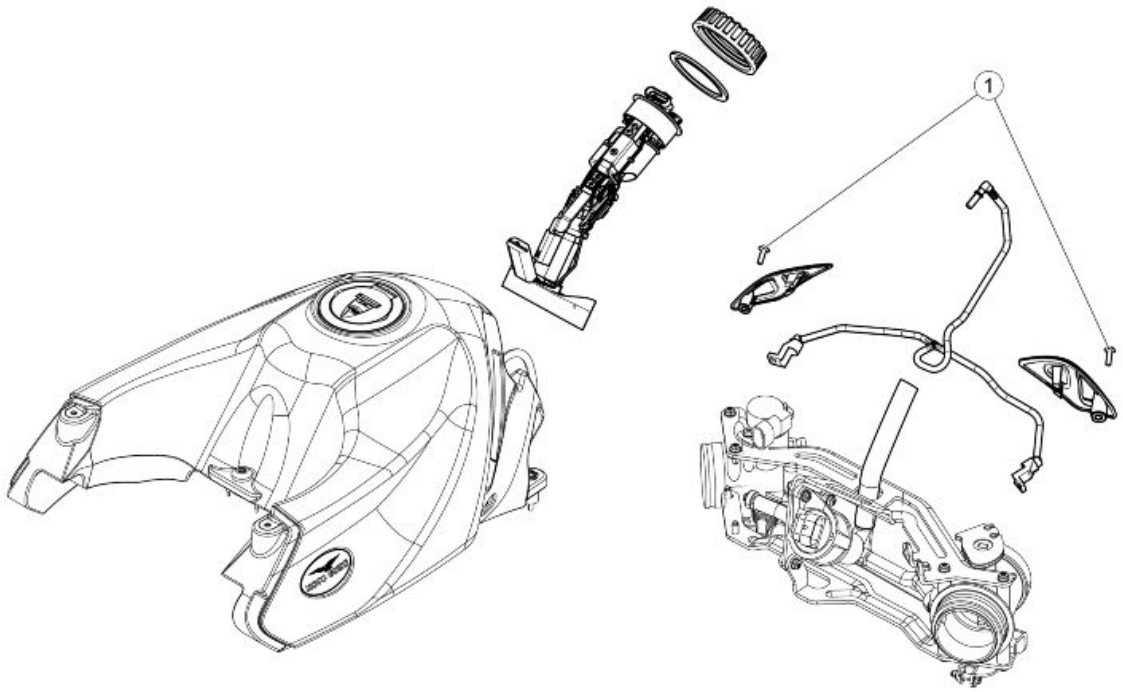
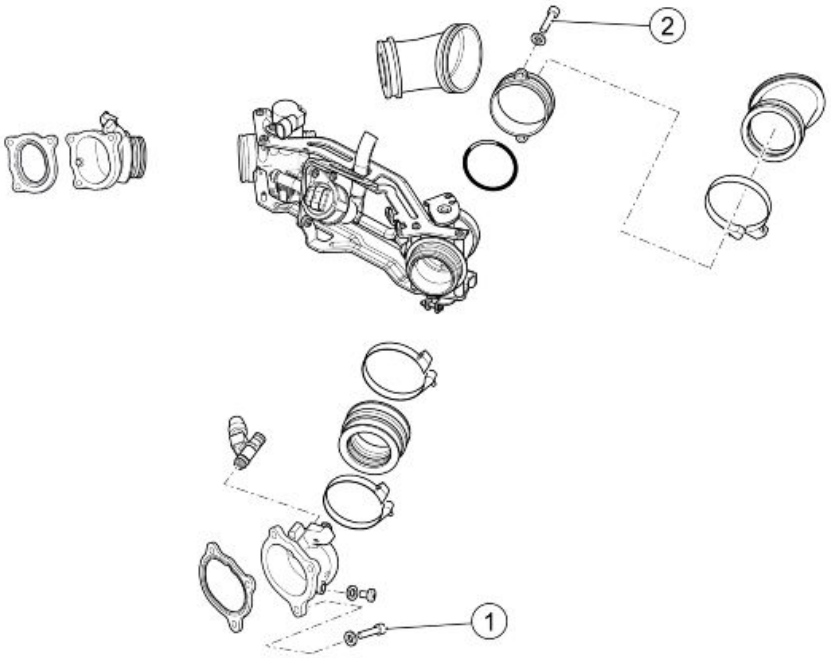


FUEL SUPPLY SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio protezioni corpo farfallato	M6	2	10 Nm (7.38 lbf ft)	-



THROTTLE BODY

pos.	Description	Type	Quantity	Torque	Notes
1	Intake pipe fixing screw	-	6	10 Nm (7.37 lbf ft)	-
2	Flange fixing screw on the throttle body	M5x12	2	6 Nm (4.42 lbf ft)	-

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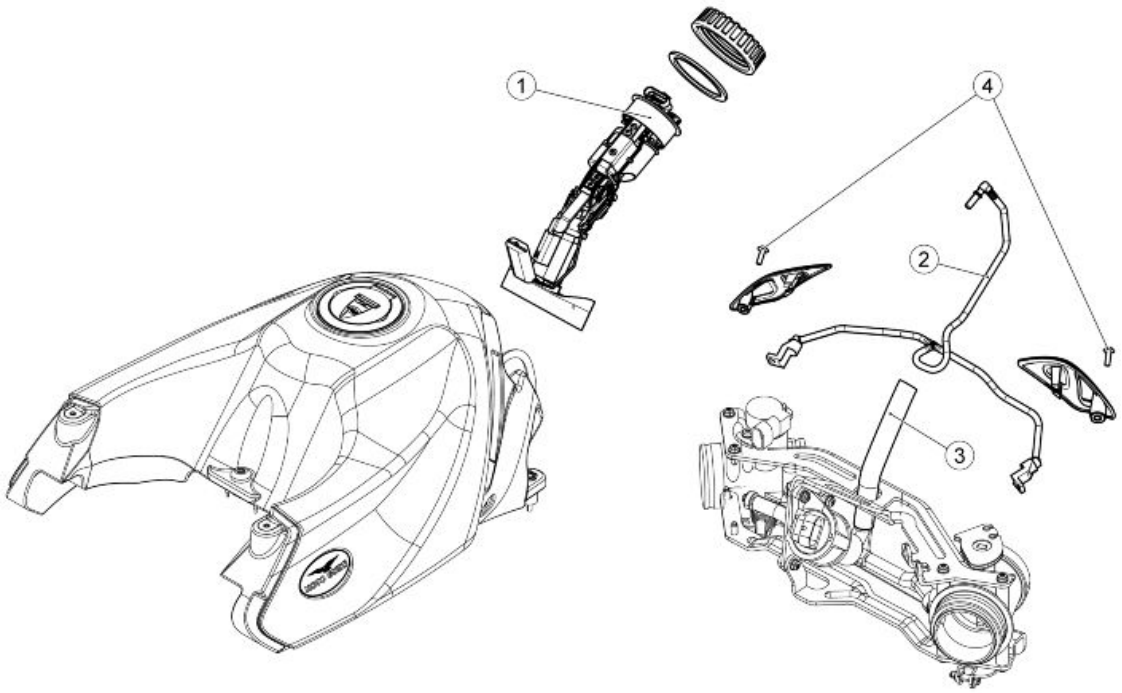
Circuit diagram



key:

1. Complete fuel pump unit
2. Fuel pipe
3. Pipe
4. Screws

Removing

- Rimuovere l'anello di fermo della pompa carburante;

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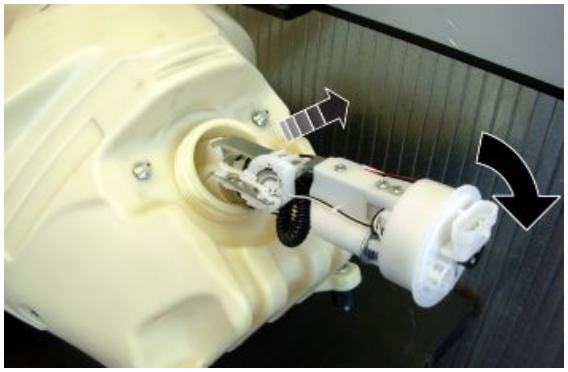
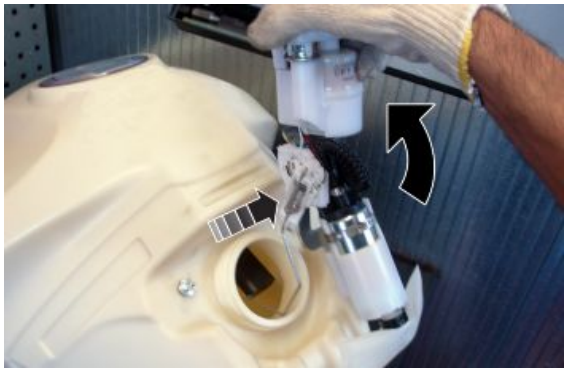
- Estrarre la pompa carburante ruotandola progressivamente verso il basso;



- Terminare l'estrazione della pompa carburante ruotandola progressivamente verso l'alto in modo da non danneggiare il galleggiante.

CAUTION

ESEGUIRE LA PROCEDURA INVERSA DURANTE LA FASE DI RIMONTAGGIO.



Injection

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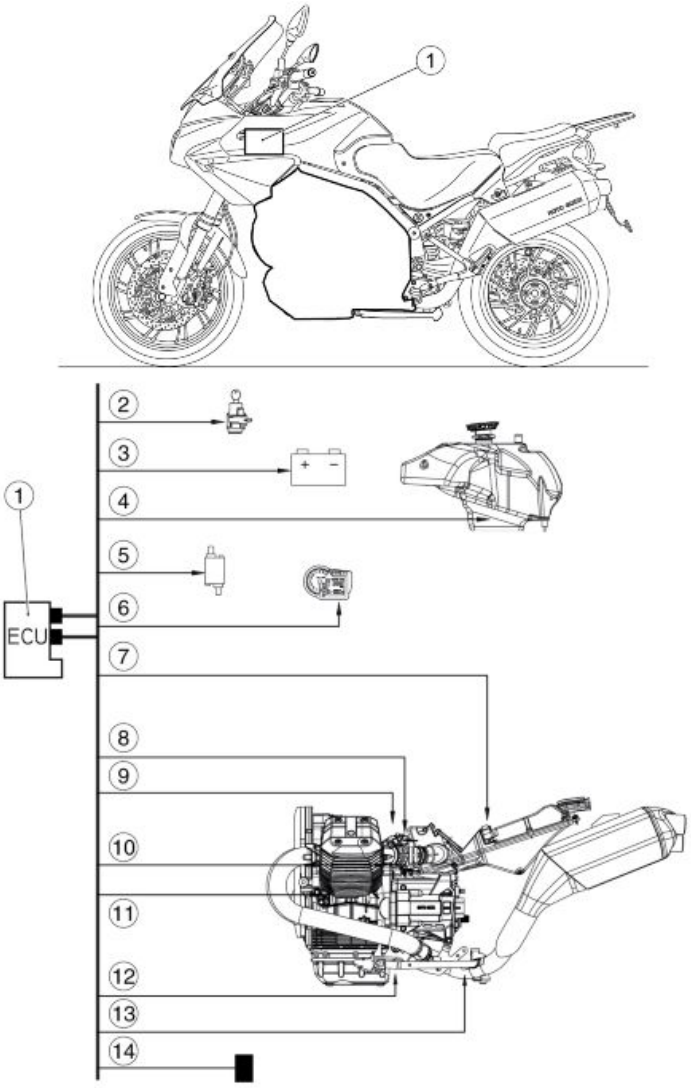
Diagram



Key:

1 Control unit

2 Ignition switch

3 Battery

4 Fuel pump

5 Coils

6 Instrument panel

7 Air temperature sensor

8. Throttle valve position sensor

9 Injectors

10 Engine temperature sensor

11 Crankshaft position sensor

12. Side stand

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13 Lambda probe

14 Fall sensor

THROTTLE BODY PIPES LAYING

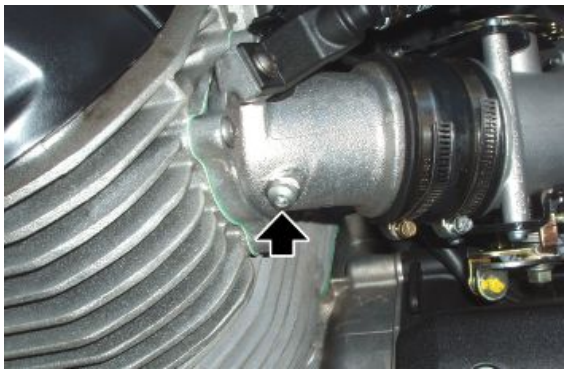
Pipes from the throttle body to the idle motor should be laid so that the shaped part is inserted in the air filter casing.

The shortest part of the fuel pipe connected to the throttle bodies should be placed on the right.

Cylinders synchronisation

- With engine off, connect the Navigator tool to the diagnosis connector and to the vehicle battery.

- Turn on the scanner.
- Screw the joints connecting the vacuometer pipes on the inlet pipe holes.
- Connect the vacuometer pipes to the relative joints.
- Set the key to ON.



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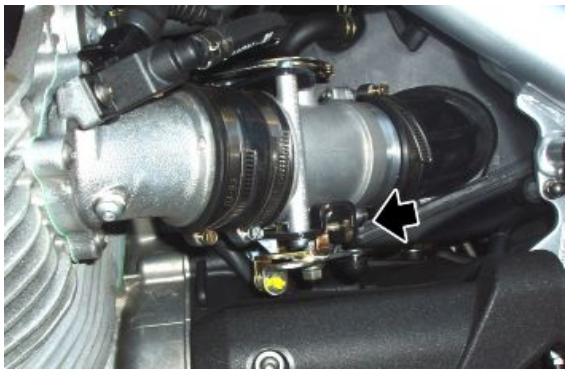
- Make sure there are no errors in the control unit; otherwise, solve them and repeat the procedure.

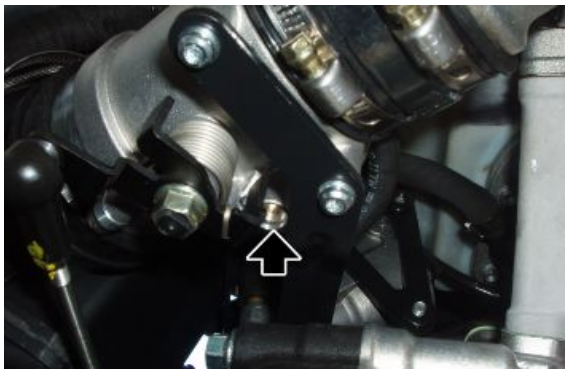
- Make sure the left throttle is fully in.

DO NOT TOUCH THE THROTTLE ABUTMENT SCREW OR THE THROTTLE BODY MUST BE REPLACED. CHECK THAT THE THROTTLE RETURN CABLE IS NOT TAUT.



- The instrument should display the adjustable parameters screen page.
- Autodetect the throttle position.

- Turn the key to "OFF" and leave it for at least 30 seconds.
- Turn the key back to "ON" and restore the instrument session.
- Check that the "Throttle" value reading is 4.7 +/- 0.2°. If the value is incorrect, replace the control unit and repeat the procedure from the start.
- Completely close the two by-pass screws on the throttle bodies.
- Start the engine.
- Take the engine to the prescribed temperature: 60 °C (140 °F).
- Make the engine rev at 2000/3000 rpm and with the vacuometer check that the difference between the two pressures is 1 cm Hg (1.33 kPa) maximum.



If this condition is detected:

- take the engine back to idle and check the depression values so that they are aligned between the two cylinders. Otherwise, open only the screw with higher depression, using the by-pass screws, to compensate.

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If there is a larger difference:

- act on the set screw of the throttle body connecting rod to reduce the pressure difference in the two pipes.
- Repeat the procedure "Throttle position self-acquisition" as explained above.
- Take the engine back to idle and check the depression values so that they are aligned between the two cylinders.
- Otherwise, open only the screw with higher depression, using the by-pass screws, to compensate.

Recovery function

If the signal of the following sensors is interrupted, the control unit determines some values to keep the engine running or it uses a different parameter. The instrument panel and the Navigator also signal the problem.

RECOVERY FUNCTION

Specification	Desc./Quantity
air temperature	25 °C (77 °F)
engine temperature	30 °C (86 °F) with linear increase from the air temperature at ignition
barometric pressure	1010 hPa
throttle valve potentiometer	2.9° at idle, otherwise variable.
idle motor	fixed value variable depending on the vehicle

Using Navigator for injection system

Injection system

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ECU INFO screen page

This screen page shows general data regarding the control unit, for example software type, mapping, control unit programming date

INFO ECU SCREEN PAGE

Specification	Desc./Quantity
Mapping	-

PARAMETERS screen page

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, etc.)

PARAMETERS SCREEN PAGE

Specification	Desc./Quantity
Engine rpm	Engine revolutions per minute: the minimum value is set by the control unit cannot be adjusted
Injection time	- ms
Ignition advance	- °
Air temperature	°C Temperature of the air taken in by the engine, measured by the sensor in the filter casing. This is not the temperature indicated by the instrument panel
Engine temperature	°C
Battery voltage	V
Throttle	Value corresponding to the throttle when closed (approximate value between 4.5 and 4.9°) (left throttle supported by the end of stroke screw). If a different value is read, it is necessary to activate the parameter "Throttle positioner autodetection" and obtain this value.
Atmospheric pressure	1015 mPa (approximate values) The sensor is inside the instrument panel
Lambda probe	100 - 900 mV (approximate values) Signal when energised that the control unit receives from the lambda probe: inversely proportional to the presence of oxygen
Lambda integrator	When the control unit uses the lambda probe signal (see the 'Lambda' parameter on the 'Statuses' screen page) this value should be close to 0%.
Vehicle speed	- km/h

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Specification	Desc./Quantity
Target engine revs	1150 rpm (approximate values) Parameter valid at idle, setting depends especially on the engine temperature: the control unit will try to keep the engine running at this revs, acting on the ignition advance and the Stepper motor
Stepper base	70 - 100 (approximate values) Steps corresponding to the Stepper motor reference position
CL Stepper	70 - 150 (approximate values) Steps set by the control unit for the Stepper motor. At idle, steps so that the engine keeps the target engine revs set by the control unit
Stepper regulator	Difference between current steps of motor at idle and those at the reference position
Virtual throttle angle from Stepper	0° With engine not at idle speed, this value indicates the throttle degrees corresponding to the Stepper motor air flow

STATUS screen page

This screen page shows the status (usually ON/OFF) of the vehicle devices or the operation condition of some vehicle systems (for example, lambda probe functioning status).

STATUSES

Specification	Desc./Quantity
Engine status	ON/run/power-latch/stopped operation conditions
Throttle position	Released / pressed indicates if the throttle potentiometer is open or closed
Stand	Retracted / extended indicates the position of the side stand (only with gear engaged)
Ignition	Enabled / disabled indicates if the control unit consents engine start-up
RUN / STOP switch	Run / stop indicates the position of the safety switch
Clutch	No / Yes indicates the clutch sensor status
Gear engaged	No / Yes indicates the gear sensor status
fall sensor	Normal / Tip over indicates the vehicle fall sensor status
Lambda	Open loop / Closed loop Indicates if the control unit is using (CLOSED) the lambda probe signal to keep the stoichiometric combustion. At idle CLOSED only if: Air T over 20°C (68°F) and engine T over 30° C (86°F) and engine on for at least 2-3 minutes
Synchronisation	Synchronised / Not synchronised Indicates if the control unit detects the revolution sensor signal correctly

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ACTIVATION screen page

This screen page is used to delete errors in the control unit memory and to activate some systems controlled by the control unit.

ACTIVATION

Specification	Desc./Quantity
Left coil	operation for 2.5 m, 5 times
Right coil	operation for 2.5 m, 5 times
Left injector	Operation for 4 m, 5 times
Right injector	Operation for 4 m, 5 times
Error clearing	By pressing the 'enter' button, the stored errors (MEM) become part of the historical data (STO). In the next connection between the Navigator and the control unit, the historical errors (STO) are no longer shown
Fuel pump	Operation for 30''
Stepper control	<span style="FONT-SIZE: 12pt; FONT-FAMILY: "Times New Roman"; mso-fareast-font-family: "Times New Roman"; mso-ansi-language: IT; mso-fareast-language: IT; mso-bidi-language: AR-SA">For 4'' advancement command of 32 steps, for the next 4'' retrocession command of 32 steps and so on for 30''

ERRORS screen page

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

ERRORS

Specification	Desc./Quantity
Pressure sensor	Possible short circuit in the earth lead, battery or open circuit: recovery function noticeable for customer. Careful with the air pressure sensor in the instrument panel
Air temperature	Possible short circuit in the earth lead, battery or open circuit: recovery function hardly noticeable for customer.
Engine temperature	Possible short circuit in the earth lead, battery or open circuit: recovery function.
Throttle actuator position sensor	Possible short circuit in the earth lead, battery or open circuit: recovery function noticeable for customer.

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Specification	Desc./Quantity
Lambda probe	Possible short circuit on the earth lead, battery or open circuit or plausibility: recovery function hardly noticeable for customer.
Left injector	Possible short circuit in the earth lead, battery or open circuit. If both injectors do not work, the engine does not work
Right injector	Possible short circuit in the earth lead, battery or open circuit. If both injectors do not work, the engine does not work
Fuel pump relay	Possible short circuit in the earth lead, battery or open circuit: the engine does not start.
Left coil	Possible short circuit in the earth lead, battery or open circuit. If both coils do not work, the engine does not work.
Right coil	Possible short circuit in the earth lead, battery or open circuit. If both coils do not work, the engine does not work.
Idle regulator	Possible short circuit in the earth lead, battery or open circuit: recovery function noticeable for the customer due to no idle management
Battery voltage	Battery voltage detected is too low (7V) or too high (16V) for a certain period
Starter diagnosis	Possible short circuit in the earth lead, battery or open circuit.
Engine revolution sensor	Possible open circuit.
Lambda heater	Possible short circuit in the earth lead, battery or lambda probe heating circuit open.
SPEED SENSOR	
CAN line diagnosis	<span style="FONT-SIZE: 12pt; FONT-FAMILY: "Times New Roman"; mso-fareast-font-family: "Times New Roman"; mso-ansi-language: IT; mso-fareast-language: IT; mso-bidi-language: AR-SA">Possible error on line CAN: short circuit or line break or no signal or plausibility error detected.
RAM memory	Possible internal control unit error. Also check the control unit supply and earth connections
ROM memory	Possible internal control unit error. Also check the control unit supply and earth connections
Microprocessor	Possible internal control unit error. Also check the control unit supply and earth connections
Checksum EPROM	Possible internal control unit error. Also check the control unit supply and earth connections

SETTINGS screen page

This screen page is used to adjust some control unit parameters.

ADJUSTMENTS

Specification	Desc./Quantity
Throttle positioner autodetection	Allows the control unit to detect the closed throttle position: just press the enter button

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INDEX OF TOPICS

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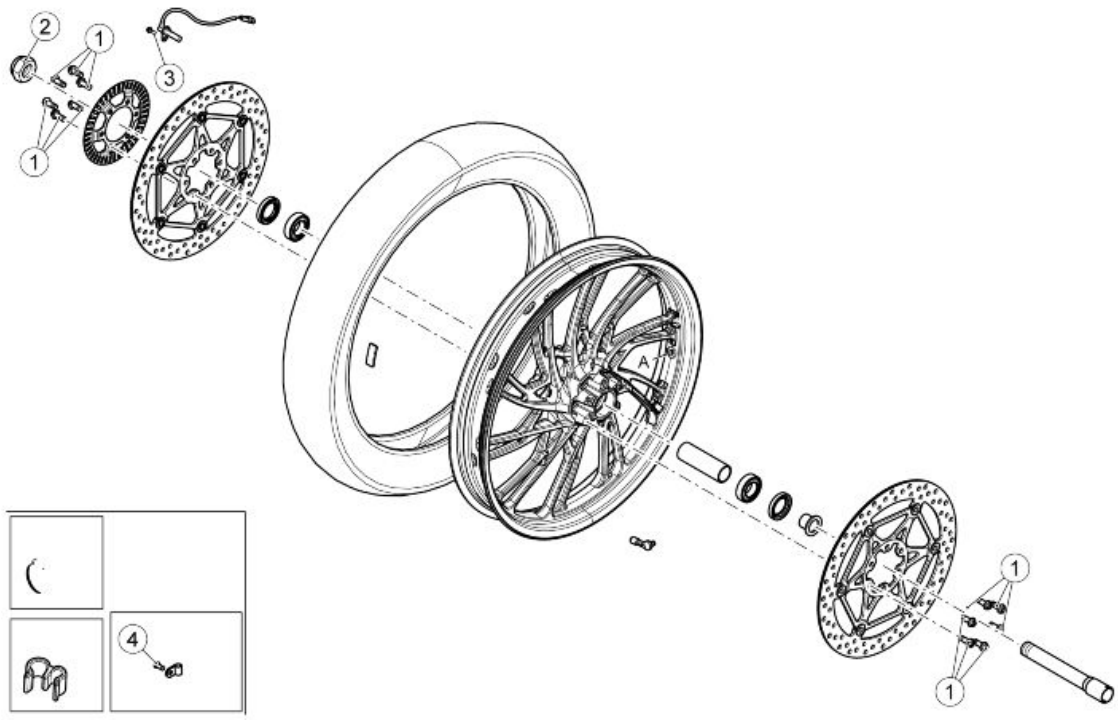
Front



FRONT WHEEL

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio dischi freno	M8x20	12	25 Nm (18.44 lbf ft)	-
2	Nut fixing wheel pin	-	1	80 Nm (59.00 lbf ft)	-
3	Vite flang. fissaggio sensore	-	1	6 Nm (4.42 lbf ft)	Loct. 243
4	Vite TCB fissaggio passacavo	M4x6	1	3 Nm (2.21 lbf ft)	-

Removing the front wheel

- Working from both sides, undo and remove the two fixing screws from the front brake callipers and remove them from their seats.

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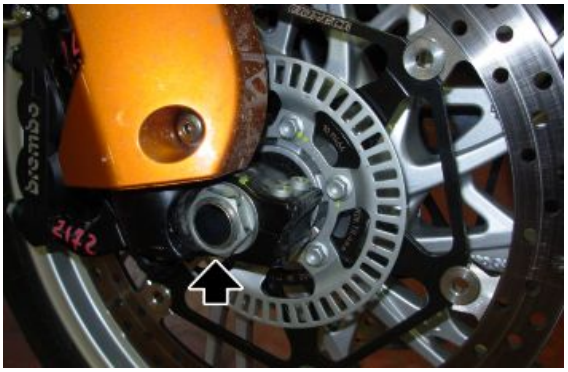
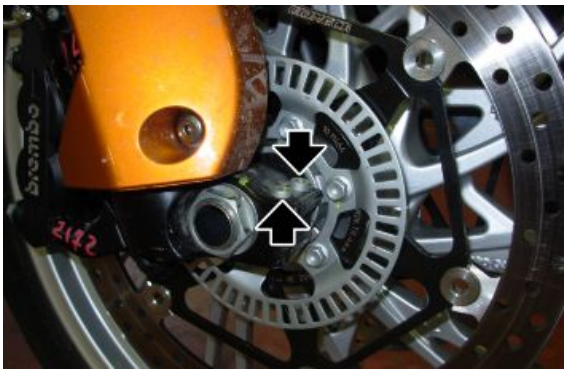
- Hold the vehicle front part.
- Unscrew and remove the wheel axle fixing nut and collect the sealing washer.



- Working from both sides, loosen the screws on the wheel bolt clamps.



- Tap the wheel axle slightly with a rubber mallet so that the hole on the opposite side is exposed.

- Remove the wheel axle by inserting a screwdriver in the holes on the pin.
- During extraction, support the wheel and then remove it.

- Collect the spacer from the front wheel right side.

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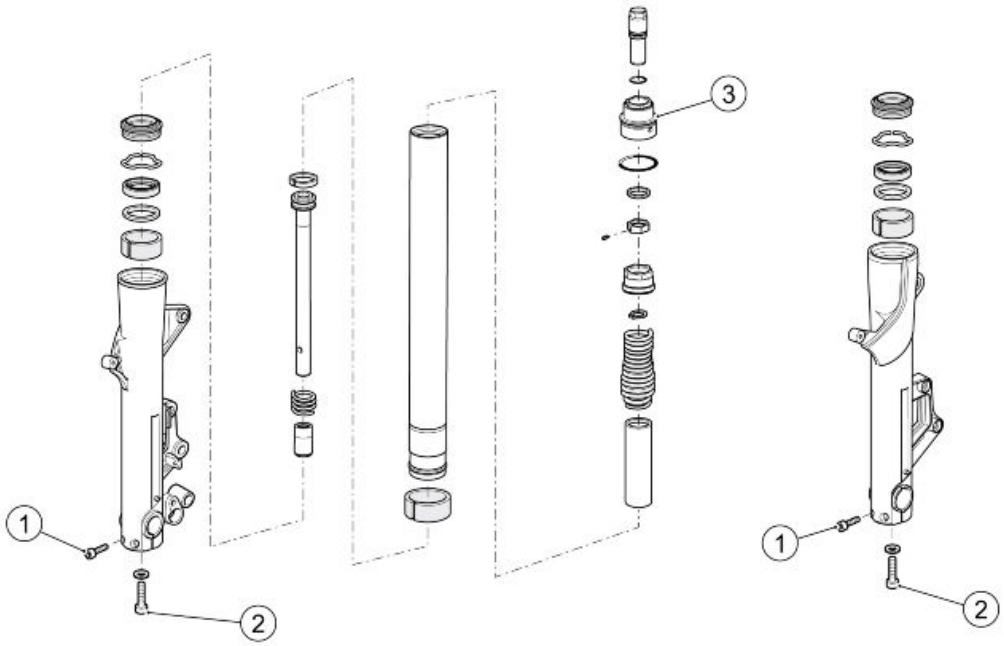
Front fork



FRONT FORK

pos.	Description	Type	Quantity	Torque	Notes
1	Viti piede forcella	M8	1+1	25 Nm (18.44 lbf ft)	-
2	Viti chiusura mozzetti	M6x30	2+2	10 Nm (7.38 lbf ft)	-
3	Fork cap	-	1+1	- Nm (-.- lbf ft)	-

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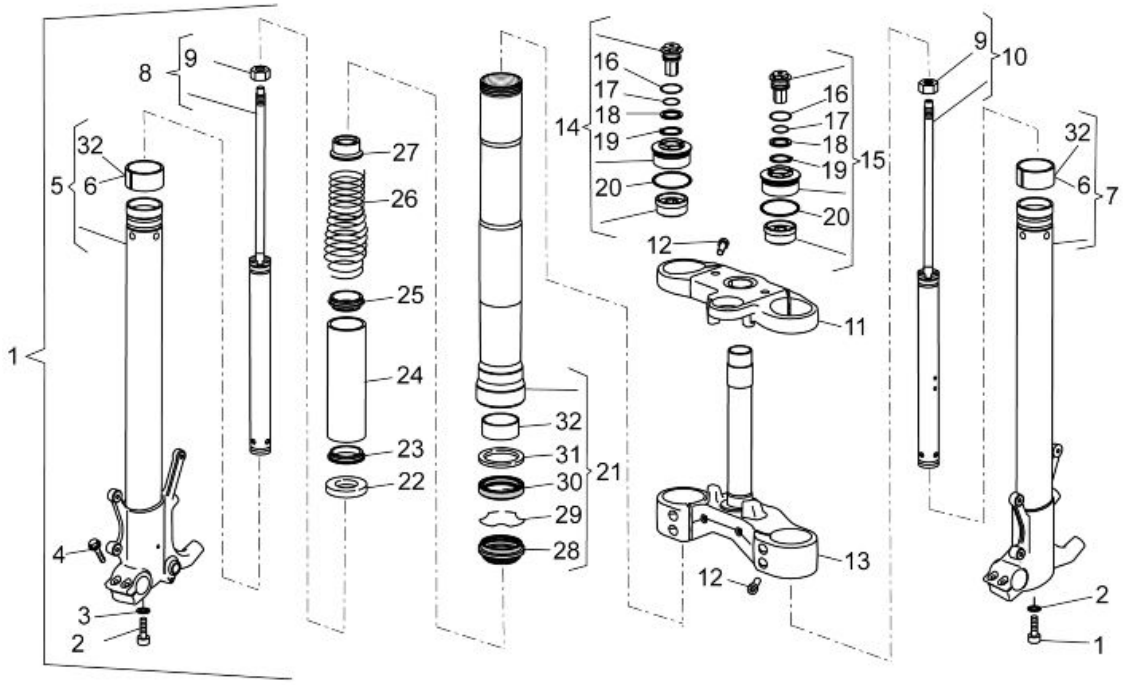
Diagram



Key:

1. Complete front fork
2. TCE screw
3. Washer
4. TE flanged screw
5. Stem + right wheel holder
6. Bushing
7. Stem + left wheel holder
8. Complete right pumping member
9. Nut
10. Complete left pumping member
11. Fork upper plate
12. TCE screw
13. Base with headstock
14. Right sleeve cap
15. Left sleeve cap
16. O-ring
17. O-ring
18. Washer
19. Snap ring

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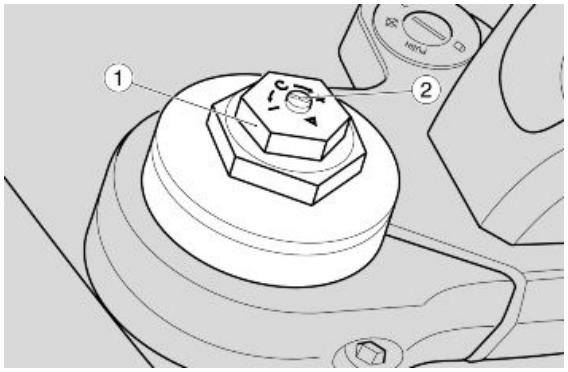
20.O-ring
21.Complete sleeve
22.Spring holder cap
23.Spring guide
24.Preloading pipe
25.Spring guide
26.Spring
27.Bushing
28.Dust guard
29.Snap ring
30.Sealing ring
31.Cap
32.Bushing

Adjustment

The front suspension consists of a hydraulic fork connected to the headstock by means of two plates.
For adjusting the suspension set up, each stanchion has an upper nut (1), for adjusting spring preloading, and an upper set screw (2):

- act on the right stem set screw to adjust hydraulic rebound damping;
- act on the left stem set screw to adjust hydraulic compression damping.



ADJUSTMENTS

Regular adjustment (standard):

- rider only.

Medium load setting:

- (for example, rider with passenger or with luggage).

Maximum load adjustment:

- (e.g. rider, passenger and luggage).

FORK SETTING

Normal load adjustments are the standard settings by manufacturer:

FORK SETTINGS

Specification	Desc./Quantity
Spring preloading, nut (1) - regular load conditions	tighten (clockwise) 8 turns from fully open

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Specification	Desc./Quantity
Spring preloading, nut (1) - half-load conditions	tighten (clockwise) 9 turns from fully open
Spring preloading, nut (1) - maximum load conditions	tighten (clockwise) 9 turns from fully open
Rebound damping, right stem set screw (2) - regular load conditions	unscrew (anticlockwise) 1 turn from fully closed
Rebound damping, right stem set screw (2) - half-load conditions	unscrew (anticlockwise) 1 turn from fully closed
Rebound damping, right stem set screw (2) - maximum load conditions	unscrew (anticlockwise) 1 turn from fully closed
Compression damping, left stem set screw (2) - regular load conditions	unscrew (anticlockwise) 1 turn from fully closed
Compression damping, left stem set screw (2) - half-load conditions	unscrew (anticlockwise) 1 turn from fully closed
Compression damping, left stem set screw (2) - maximum load conditions	unscrew (anticlockwise) 1 turn from fully closed

(1) THE SETTING SHOWN IN THE TABLE MAY NEED TO BE MODIFIED ACCORDING TO THE TYRE AND ROAD TYPE.

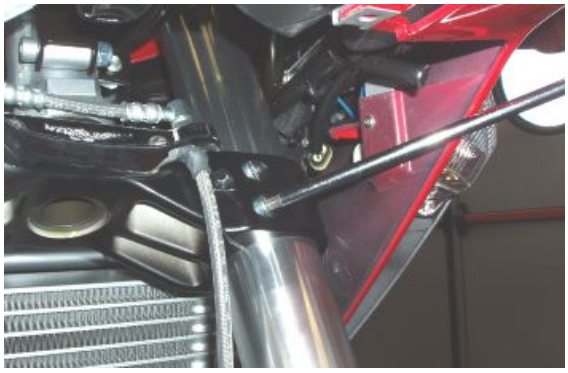
NOTE

(2) IF FITTED.

Removing the fork legs

- Rest the vehicle on its centre stand.
- Secure the rear part of the vehicle through belts in order to lift the front wheel.
- Remove the mudguard.
- Remove the front wheel.

- Support the fork stem and loosen the screws on the upper and then the lower plate.



- Remove the ABS sensor.
- Remove the stanchion.

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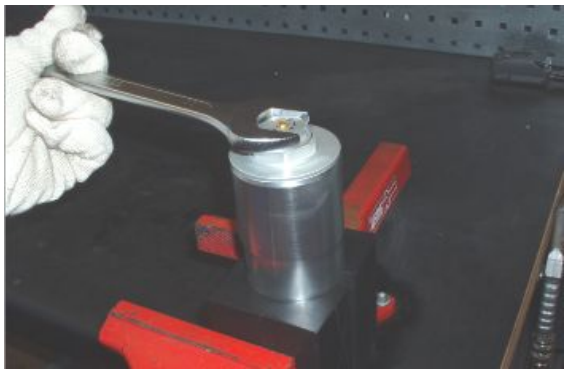
See also

Removing the front wheel

Draining oil

- Lock the sleeve in a vice with the specific tool (code AP8140149).
- Set the minimum spring preloading.



Specific tooling

AP8140149 Protection for fitting operations

- Unscrew the sleeve top cap.

- Remove the complete cap.

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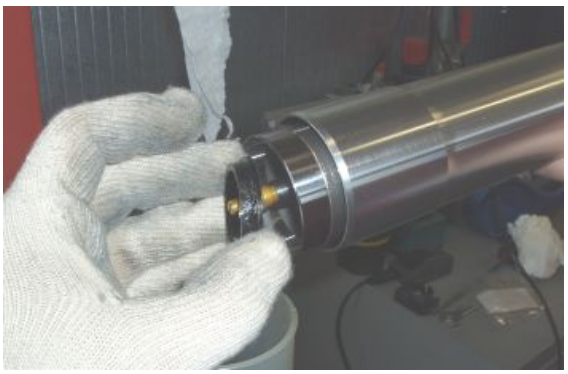
- Remove the spring. Let the oil deposited on the spring turns fully drip into the sleeve.

- Pour the oil into the container.
- Remove in order:

- upper spring guide;
- preload pipe;
- lower spring guide;
- spring holder cap.



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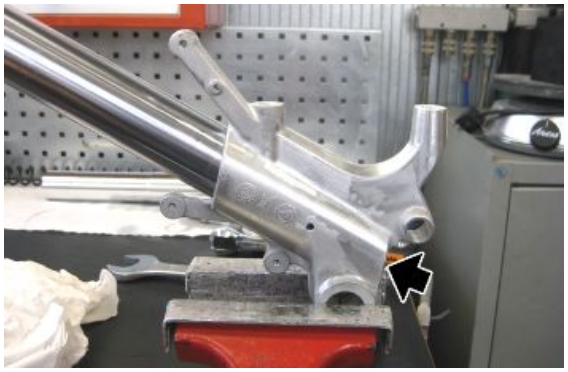
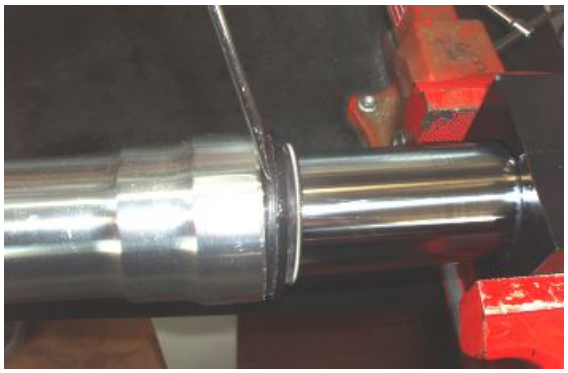
Disassembling the fork

- Drain all the oil from the stem.
- Tighten the wheel holder sleeve in a vice.
- Undo the fork end bottom screw and remove it with the corresponding gasket.



- Remove the pumping member pin.

- Slide off the dust scraper from the sleeve using a screwdriver as a lever.
- During this operation, pay attention not to damage the sleeve rim.



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- Remove the retainer ring.

- Take out the sleeve from the stem using the stem as a hammer puller.

- From the stem remove the fixed fitted bushing, the movable bushing, the ring and the oil seal.

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- Remove the ring and the dust guard.

See also

Draining oil

Checking the components

Stem

Check the sliding surface for scorings and/or scratches.

These scorings can be eliminated by rubbing them with wet sandpaper (grain 1).

If the scorings are deep, replace the stem.

Use a dial gauge to check that the stem bending is below the limit value.

If over the value, replace the stem.

CAUTION

A BENT STEM SHOULD NEVER BE STRAIGHTENED BECAUSE ITS STRUCTURE WOULD BE WEAKENED AND USING THE VEHICLE MAY BECOME DANGEROUS.

Characteristic

Bending limit:

0.2 mm (0.00787 in)

Sleeve

Check that there are no damages and/or cracks; otherwise, replace it.

Spring

Check the spring is in good conditions.

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Check that the following components are in good conditions:

- upper bushing;

- lower bushing;

- piston.

If there are signs of excessive wear or damage, replace the affected component.

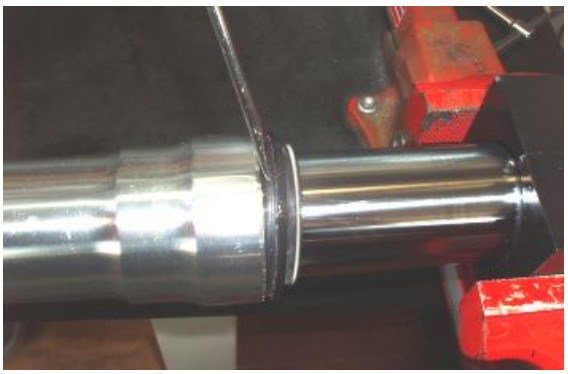
CAUTION

REMOVE ANY IMPURITY IN THE BUSHINGS, TAKING CARE NOT TO SCRATCH THEIR SURFACE.

Replace the following components with new ones:

- seal ring;

- dust gaiter;



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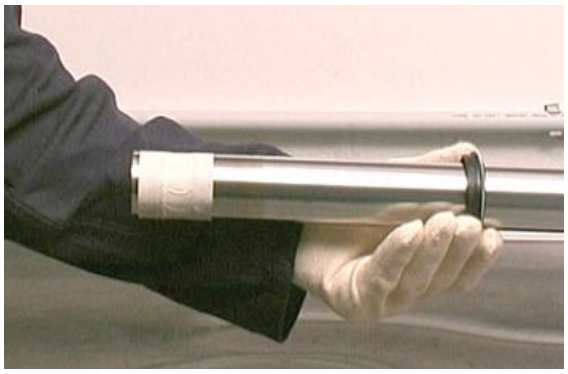
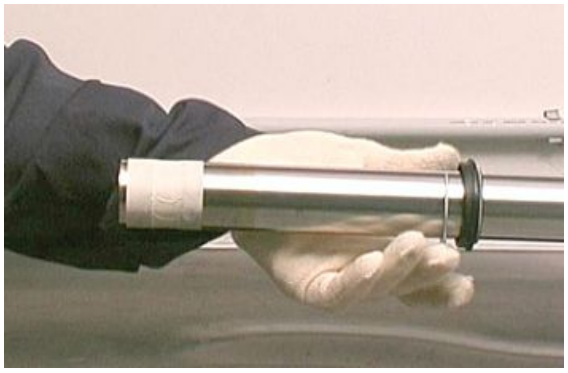
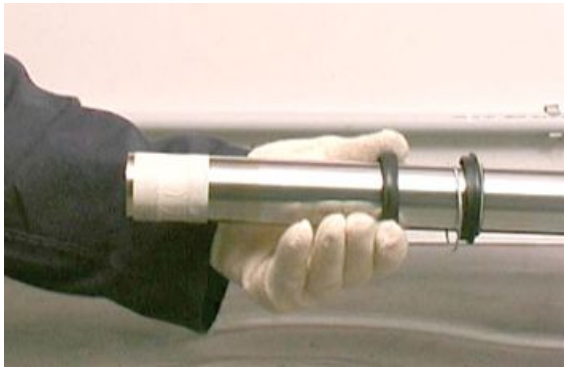
- O-Ring on the cap.

Reassembling the fork

- Lock the stem in a vice without damaging the surface.
- Protect the bearing tube end with adhesive tape.
- Lubricate the sliding edges with fork oil or sealing grease.
- Fit on the slider the dust scraper, the retainer ring and the seal ring.







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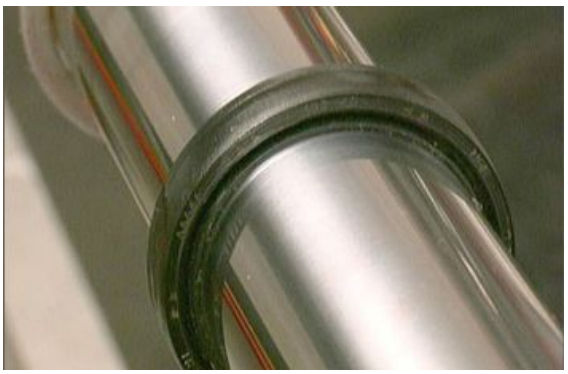
- The sealing ring must be placed with the stamped part facing the dust gaiter.



- Fit the ring, the movable bushing and, after removing the tape, fit the fixed bushing.

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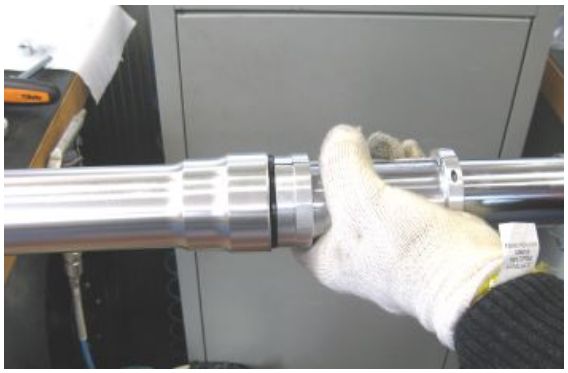
- Fit the sleeve on the stem and set the oil seal into position with the aid of the specific tool.



Specific tooling

9100903 Marzocchi fork oil seal; ø 45 mm (1.77 in)

- Insert the retainer ring in its position.

- Fit the dust gaiter with the specific tool.

Specific tooling

9100903 Marzocchi fork oil seal; ø 45 mm (1.77 in)

- Fit the pumping member pin with the cap in the spring holder sleeve and in the preload pipe.

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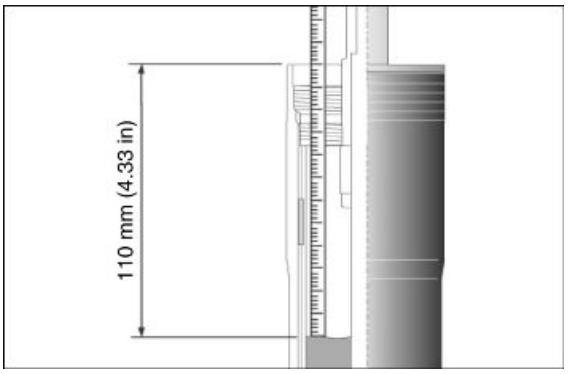
- Tighten the screw fixing the pumping member on the fork end to the prescribed torque.

Filling oil

- Place the sleeve upright in a vice fitted with protection shoes.
- Compress the sleeve in the stem. Place a support under the stem in order to leave it compressed.
- Pour part of the fork oil into the sleeve.
- Wait some minutes until the oil fills all the ducts.
- Pour the remaining oil.
- Pump out oil a few times.
- Measure the air gap between the oil level and the rim.



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

Specific tooling

AP8140149 Protection for fitting operations

Characteristic

Oil level (from sleeve rim, without the spring and preloading pipe)

110 mm (4.33 in).

Fork oil

650 cm^3 (39.66 cu.in) (for each stem)

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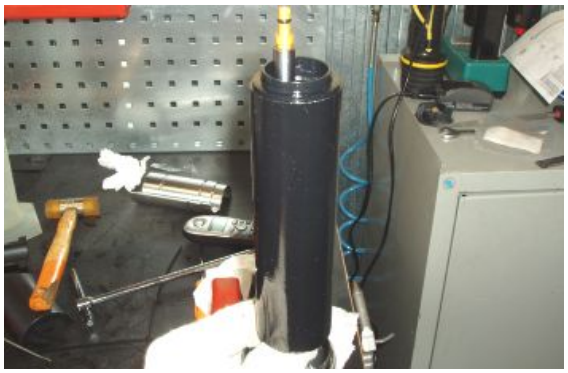
- Insert the spring holder cap in the sleeve.

- Insert the preloading pipe with the two spring guides in the sleeve.



- Fit the spring.

- Tighten the nut completely.
- Support the pumping member pin in order to screw the upper cover.

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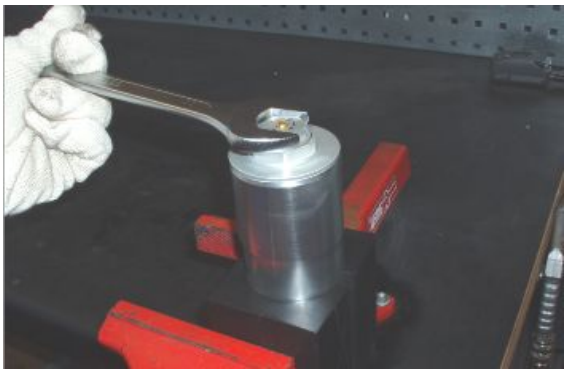
- Screw the upper cap on the pumping member pin.

- Place the sleeve in the vice using the specified tool.
- Screw the upper cover, tightening it to the prescribed torque.

Specific tooling

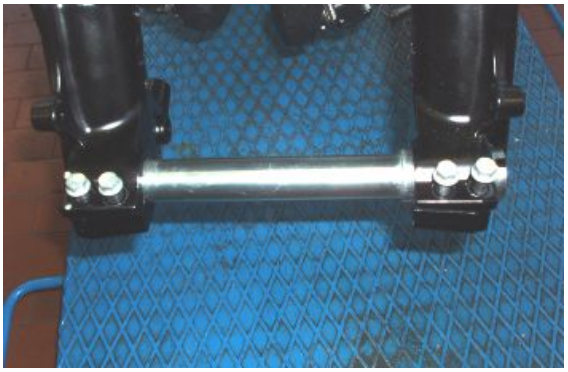
AP8140149 Protection for fitting operations

- Once the operations are completed, restore the spring preloading correct value.



Installing the fork legs

- Insert the fork stem in position.
- Insert the wheel pin so that the stems are aligned.



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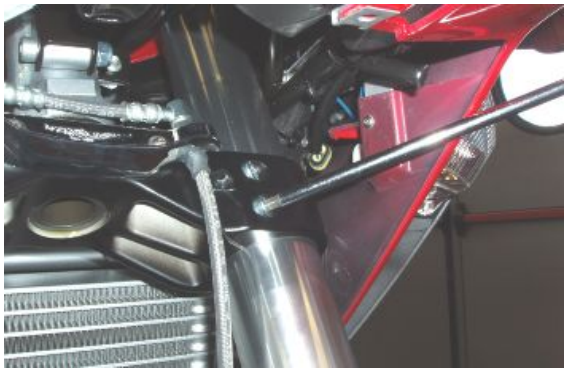
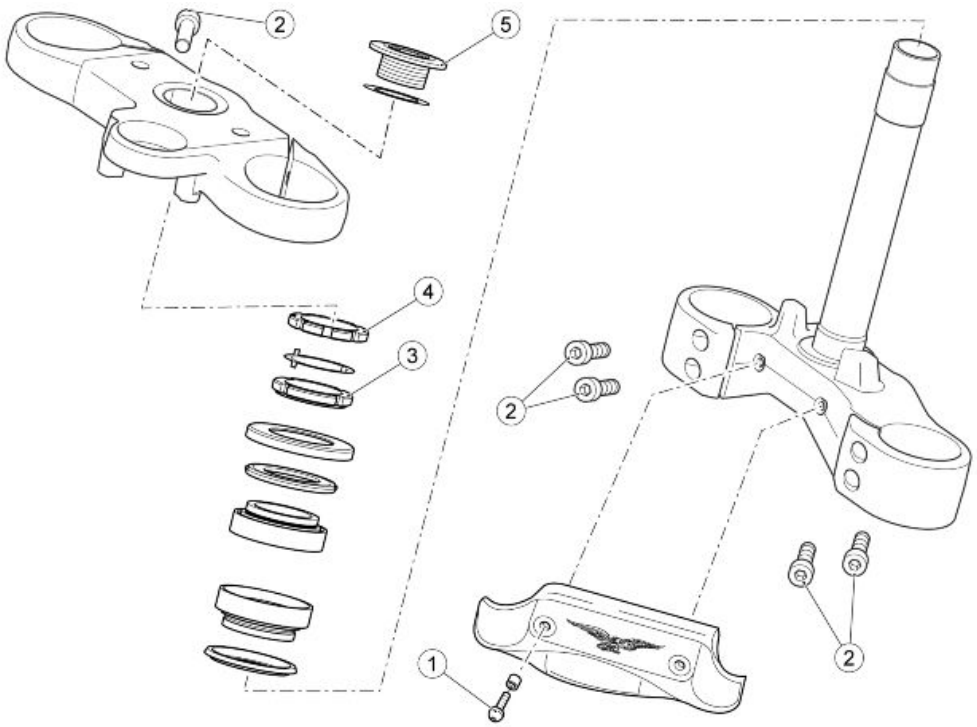
- Tighten the screws on the fork plates to the prescribed torque.



Steering bearing



STEERING

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio piastra fermatubi	-	2	6 Nm (4.42 lbf ft)	-
2	Viti fissaggio piastre	M8x30	6	20 Nm (14.75 lbf ft)	-
3	Headstock ring nut	-	1	40 Nm (29.50 lbf ft)	-

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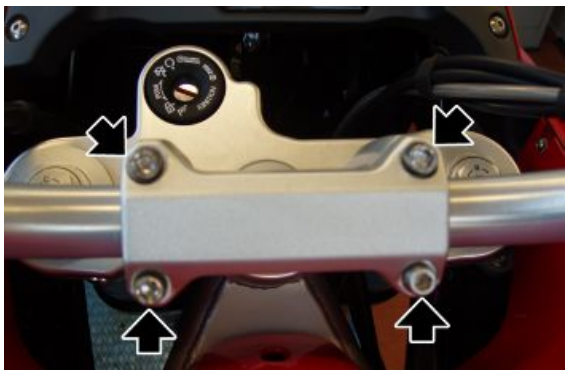
pos.	Description	Type	Quantity	Torque	Notes
4	Headstock counter-lock ring	-	1	manual + 90 degrees	-
5	Upper yoke fixing cap	-	1	100 Nm (73.76 lbf ft)	-

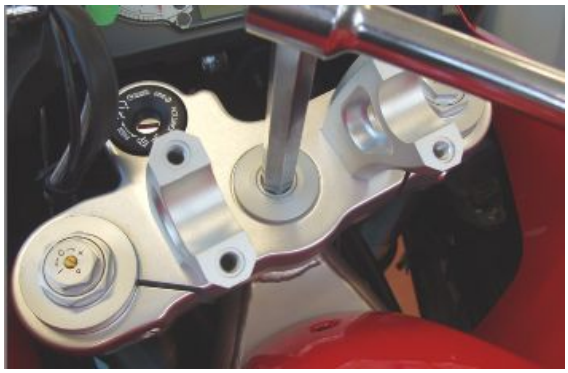
Adjusting play

- Unscrew and remove the U-bolt four fixing screws.
- Remove the U-bolt.
- Remove the handlebar and place it paying attention that oil in the clutch and front brake tanks does not spill out.



- Working on both sides, unscrew and remove the upper plate fixing screw on the fork stems.

- Unscrew and remove the fork upper plate cover; collect the shim.



- Lift the fork upper plate sliding it off from the stems.

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- Rivet the safety washer on the head-stock.

UPON REFITTING, REPLACE THE SAFETY WASHER WITH A NEW ONE

- Using the suitable special tool, un-screw and remove the upper ring nut.

Specific tooling

AP8140190 Tool for steering tightening

- Remove the safety washer.

- Using the suitable special tool, set the preloading of the steering bearings.

Specific tooling

AP8140190 Tool for steering tightening

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Fit a new safety washer.

- Screw the upper ring nut manually and then slightly tighten the clamps on the plate so as to align notches on the ring nut.

Specific tooling

AP8140190 Tool for steering tightening

- Rivet the tongues of the new safety washer.
- Fit the fork upper plate on the stems.

Rear

Removing the rear wheel

- Support the vehicle rear part using a suitable stand.

- Engage the first gear.
- Undo and remove the four screws, collect the spacers and the dust-protection ring.
- Remove rear wheel.

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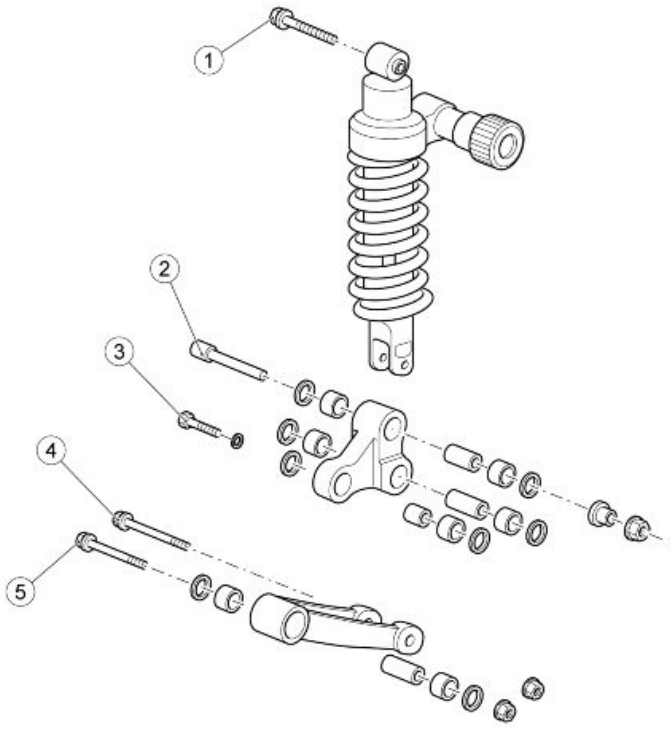
Shock absorbers

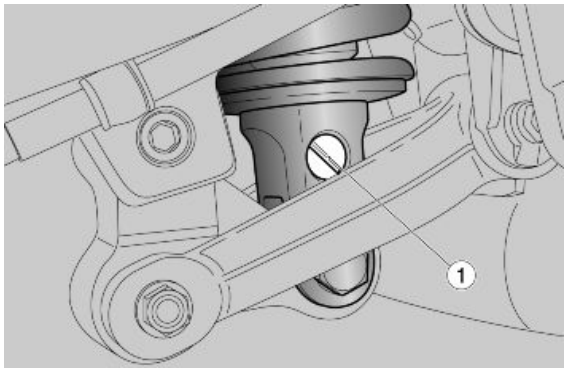


REAR SUSPENSION

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TE Flang. fissaggio superiore ammortizzatore	M10x80	1	50 Nm (36.88 lbf ft)	-
2	Vite TCEI fissaggio biella doppia/forcellone	M10x82	1	50 Nm (36.88 lbf ft)	-
3	Vite TE fissaggio biella doppia/ammortizzatore	M10x47	1	40 Nm (29.50 lbf ft)	-
4	Vite TE flang. fissaggio biella singola/biella doppia	M10x95	1	50 Nm (36.88 lbf ft)	-
5	Vite TE flang. fissaggio biella singola al telaio	M10x85	1	50 Nm (36.88 lbf ft)	-

Adjusting

The rear suspension consists of a spring-shock absorber unit linked to the frame via Silent-block and to the rear fork via a linkage system.
To set the vehicle suspension, the shock absorber has:
- a set screw (1) to adjust the hydraulic rebound damping;
- a set knob (2) for spring (3) preloading adjustment.



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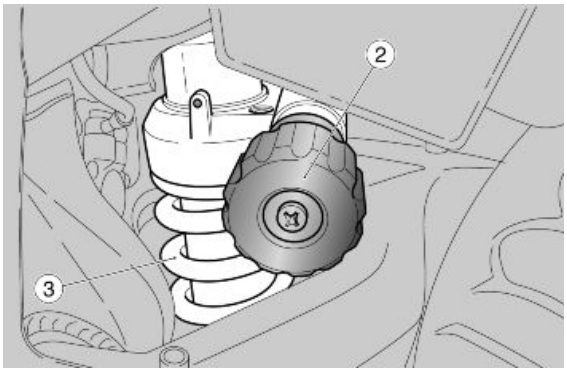
Standard rear shock absorber setting is adjusted to suit most high and low speed riding conditions, to transport the rider plus luggage.

However, this set can be modified for specific needs according to vehicle use.



BEFORE MAKING ANY ADJUSTMENTS, WAIT FOR THE ENGINE AND SILENCER TO COOL COMPLETELY.

ADJUSTMENTS

Regular adjustment (standard):

- rider only.

Half load adjustment:

- (for example, rider with passenger or with luggage).

Maximum load adjustment:

- (e.g. rider, passenger and luggage).

CAUTION

SET SPRING PRELOADING AND SHOCK ABSORBER REBOUND DAMPING ACCORDING TO THE VEHICLE USE CONDITIONS. HYDRAULIC REBOUND DAMPING MUST ALWAYS BE INCREASED TOGETHER WITH SPRING PRELOAD TO PREVENT UNDESIRABLE BOUNCING. IF NECESSARY, CONTACT AN Official Moto Guzzi Dealer. TRY RIDING THE VEHICLE ON THE STREET UNTIL THE OPTIMUM ADJUSTMENT IS OBTAINED.

SHOCK ABSORBER SETTING TABLE

Regular load adjustments are the standard settings by manufacturer

REAR SHOCK ABSORBER ADJUSTMENT

Specification	Desc./Quantity
Preload - regular load conditions	15 clicks starting from knob (2) fully loosened
Preload - half-load conditions	28 clicks starting from knob (2) fully loosened
Preload - maximum load conditions	33 clicks starting from knob (2) fully loosened
Rebound - regular load conditions	24 clicks starting from screw (1) fully tightened
Rebound - half -load conditions	20 clicks starting from screw (1) fully tightened
Rebound - maximum load conditions	18 clicks starting from screw (1) fully tightened

(1) THE SETTING SHOWN IN THE TABLE MAY NEED TO BE MODIFIED ACCORDING TO THE TYRE AND ROAD TYPE.

NOTE

(2) IF FITTED.

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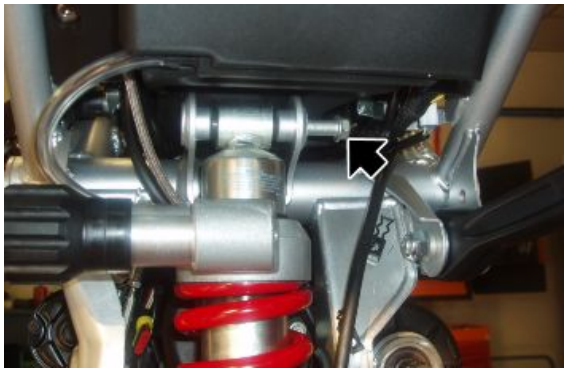
Removing

- Park the vehicle on its centre stand.
- Lock the vehicle handlebar so that the rear wheel is off the ground.
- Remove the fork.
- Undo and remove the shock absorber upper screw.
- Remove the shock absorber.



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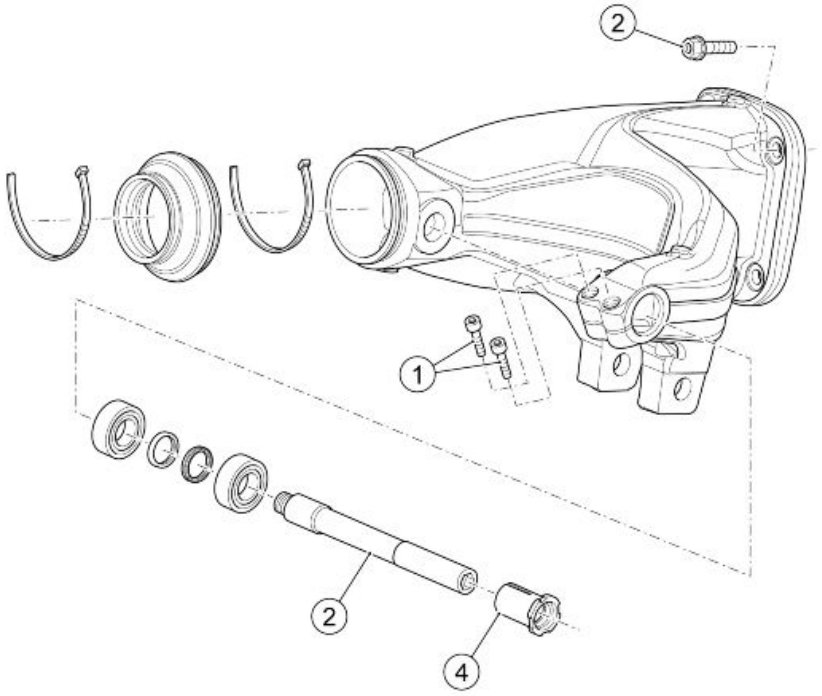
Swinging arm



REAR SWINGARM

pos.	Description	Type	Quantity	Torque	Notes
1	Swingarm clamp fixing screw on the bushing	M6x25	2	10 Nm (7.37 lbf ft)	-
2	2 - Swingarm fixing screw on the transmission housing	M10x35	4	50 Nm (36.87 lbf ft)	-
3	Swingarm pin on the swingarm	M12	1	60 Nm (44.25 lbf ft)	-
4	Preloading bushing to the swingarm pin	M25	1	10 Nm (7.37 lbf ft)	-

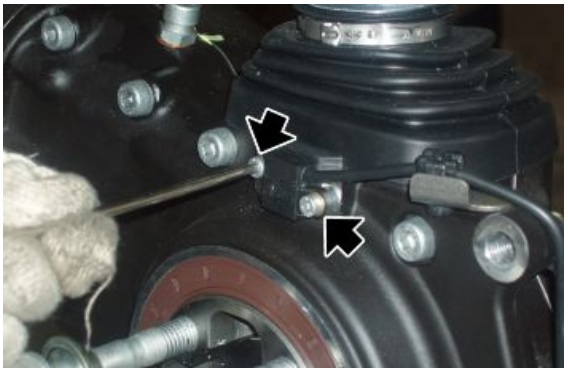
Removing

- To remove the fork, first remove the footrest holding plate and the exhaust silencer.
- Slide off the rear brake calliper from the disc and release the brake pipe.

- Engage the first gear.
- Unscrew and remove the four screws, collecting the spacers and the dust protection ring.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

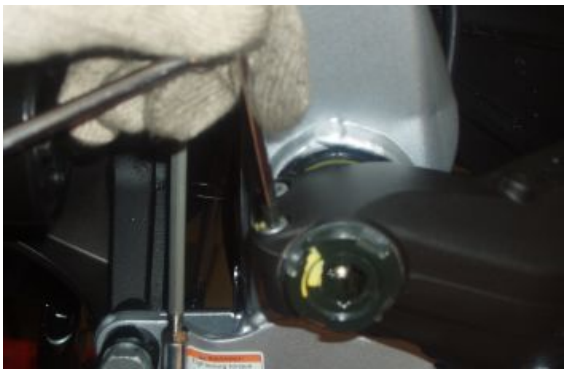
- Remove the rear wheel.
- Unscrew and remove the two screws.
- Remove the speed sensor from the fork.



- Unscrew and remove the nut fixing the reaction rod.
- Remove the screw.
- Fix the reaction rod to the chassis with a clamp.

- Remove the clamp from the dust guard cap.

- Loosen the two swingarm terminal screws.



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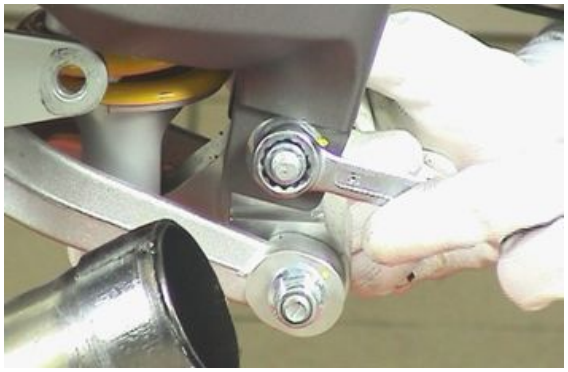
- Unscrew and remove the fixing nut of the connecting rod assembly and collect the screw.



- Loosen the ring nut.

Specific tooling

14.91.26.03 Hook spanner for fixing ring nut of the clutch shaft internal body

- Helped by a second operator, remove the pin and remove the swingarm together with the cardan shaft.

Checking

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

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

- Check that the sleeve grooves are not damaged, deformed or deteriorated; otherwise, replace the sleeve.
- Check that the sleeve outer toothing and grooves are not damaged.

Installing

- Spread a thin layer of lubricating grease all along the swingarm pin.
- Fit the ring nut in the swingarm pin and screw it manually.

- Working from both sides, grease the cardan shaft cables with the recommended product from the recommended products table.
- Block the swingarm, insert the universal joint, align the holes and, at the same time, helped by a second operator, insert the pin completely.
- Tighten the swingarm pin.

- Use the suitable box-spanner to tighten the ring nut.

Specific tooling

05.91.26.30 Tool for tightening the swingarm pin ring nut - clutch hub

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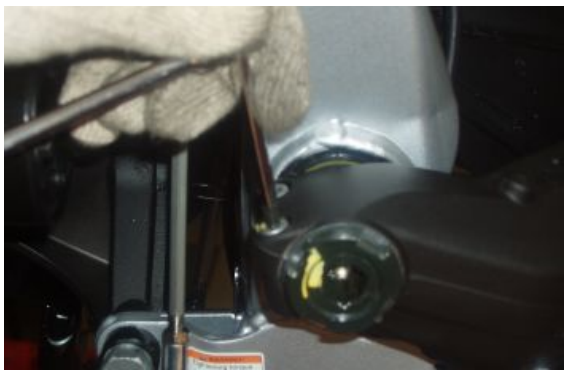
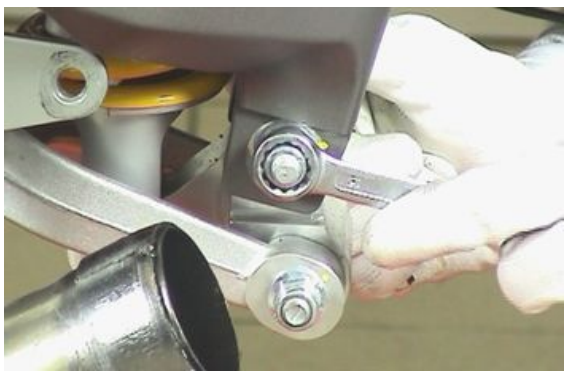
- Tighten the two screws of the swing-arm clamp.



- Fit the dust guard cap in the gearbox.
- Lock the dust guard cap with a new clamp.

- Place the reaction rod into its seat.
- Insert the screw.
- Screw the nut fixing the reaction rod.

- Place the connecting rod assembly on the swingarm.
- Insert the screw.
- Tighten the fixing nut of the connecting rod assembly.



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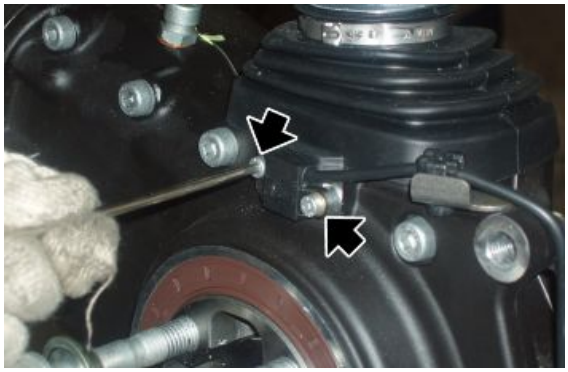
- Place the speed sensor on the fork and screw the two screws.
- Fit the rear wheel.
- Place the rear brake calliper on the disc and the brake pipe on the fork.



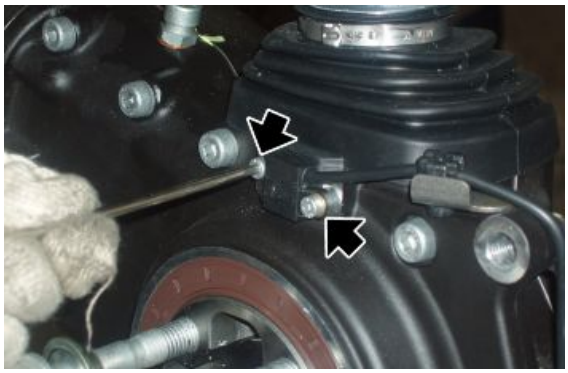
See also

Recommended products chart

Bevel gears

Removing

- Remove the rear wheel.
- Unscrew and remove the two screws.
- Remove the speed sensor from the fork.



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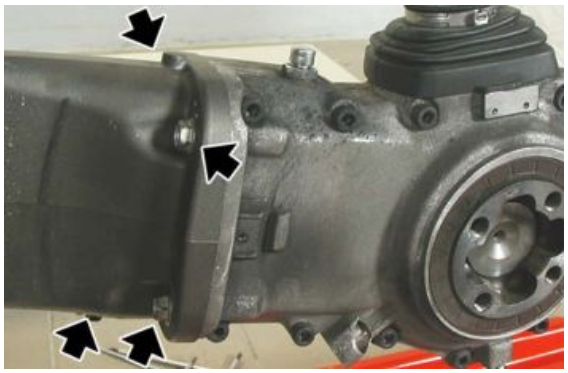
- Unscrew and remove the nut fixing the reaction rod.
- Remove the screw.
- Fasten the reaction rod to the chassis with a clamp.

- Undo and remove the four screws.



- Remove the transmission casing sliding off the universal joint.

Checking

Casing unit removal

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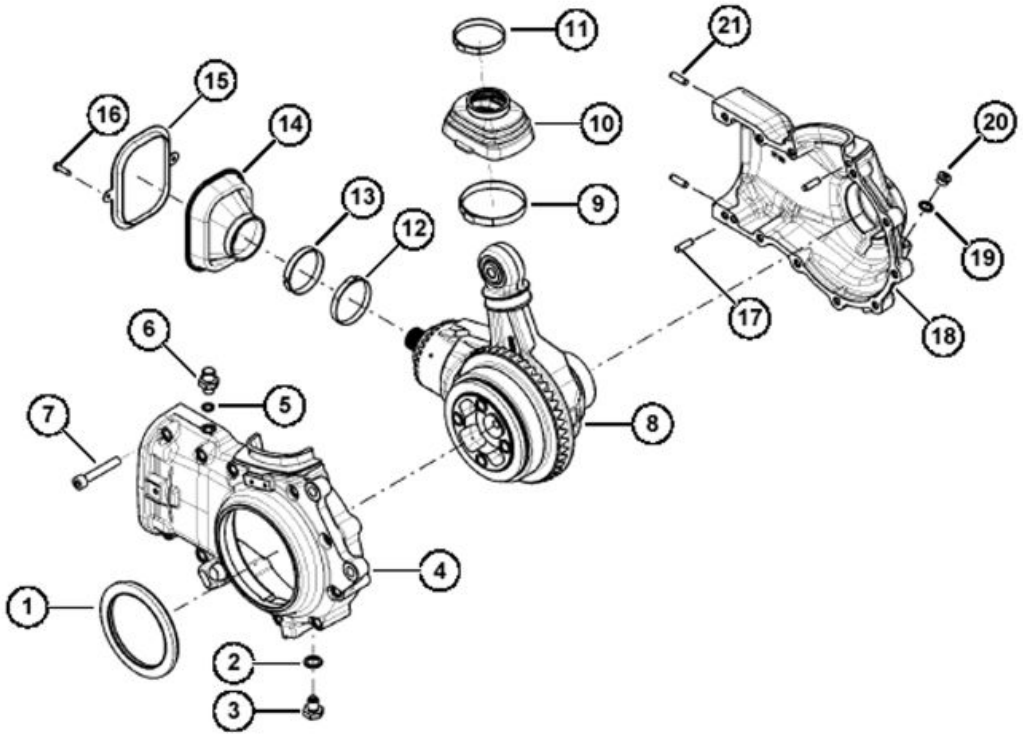
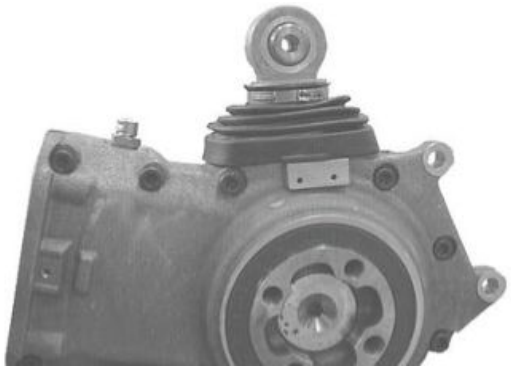


Casing unit removal

Remove the cover (20).

Remove the plug (3) to drain out the oil.

Lift the cap (10).



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Remove the clamps (9) and (11).

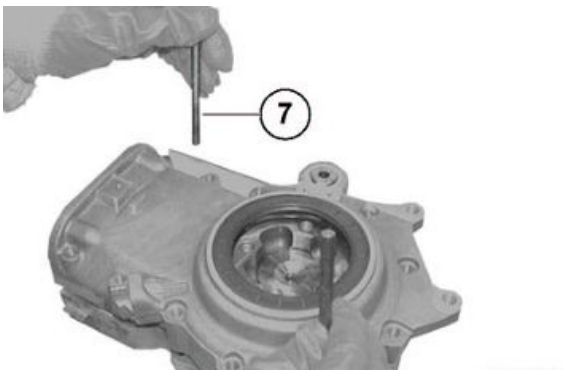
Remove the cap (14).

Remove the screws (16).

Collect the ring (15).

Remove the screws (7).

Remove the casing (4).



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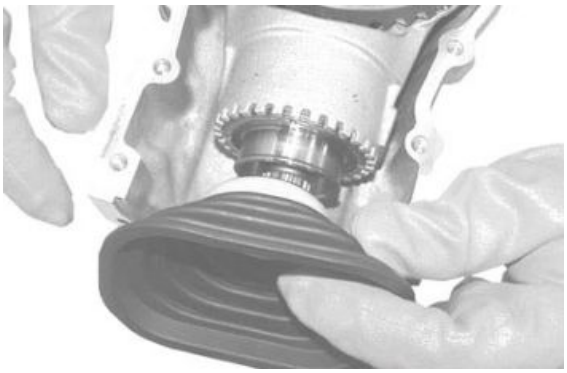
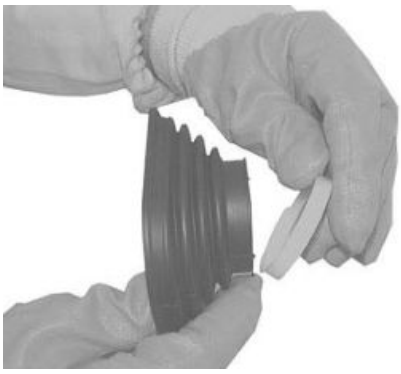
Remove the clamp (12).

Remove the cap (14).



Collect the ring (13).



Remove the support unit (8).

Casing unit fitting

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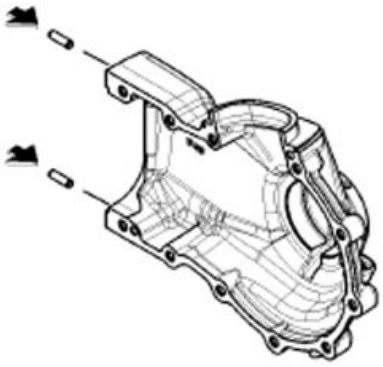
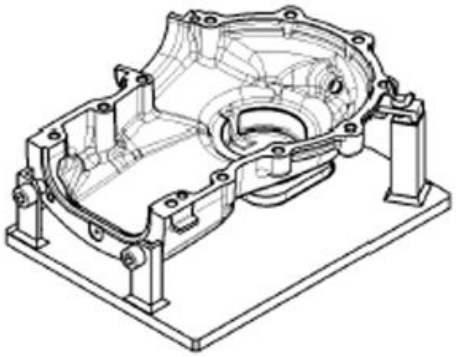
Casing unit fitting

Assemble the dowel pins to the casing with the buffer and a hammer.



Assemble the casing to the special fastening tool.

Clean the casing faying surfaces carefully.



Heat the casing.

Insert the support group in the casing.

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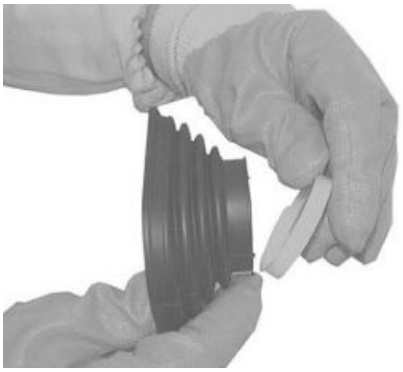
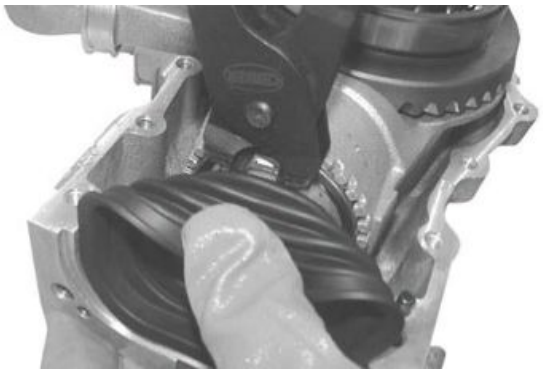
Assemble the cap and the ring.



Fit the cap on the support.

Fit the clamp.

Screw the clamp with the specific pliers.



Apply the prescribed sealant to the casing.

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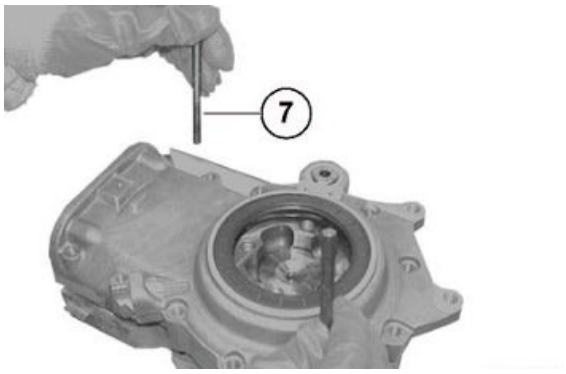
Fit a new sealing ring using the buffer.

Lubricate the sealing ring.

Assemble two centring stud bolts with M8 thread in the threaded holes of the casing as shown in the picture.

Fit the casing.

Remove the two dowel pins.



Assemble the fixing screws (7).

Tighten the screws (7) to the prescribed torque.

Remove excessive sealant.

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

Assemble the ring to the casing.

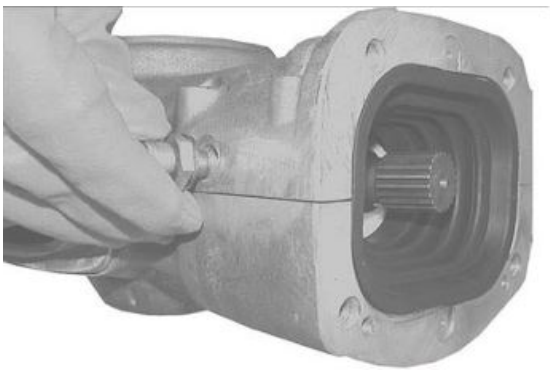
Tighten the fixing screws to the prescribed torque.

Fit the cap with the washer.

Screw the cap to the prescribed torque.

Fit the breather with the washer.

Screw the breather to the prescribed torque.



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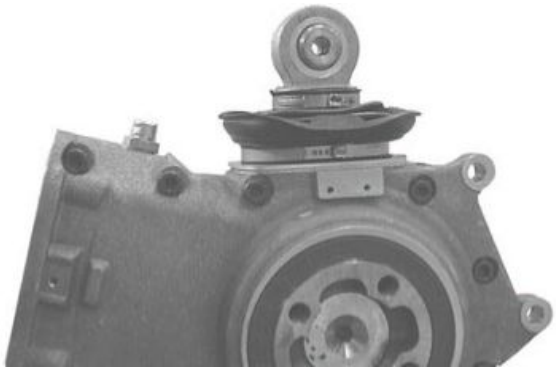
Fill the transmission with the prescribed oil.

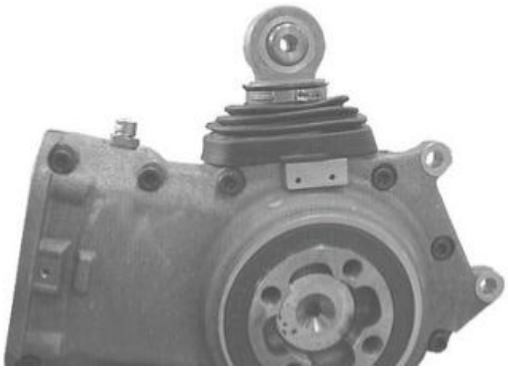
Fit the cap with the washer.

Screw the cap to the prescribed torque.

Assemble the cap with the clamps.



Fit the cap in its seat.

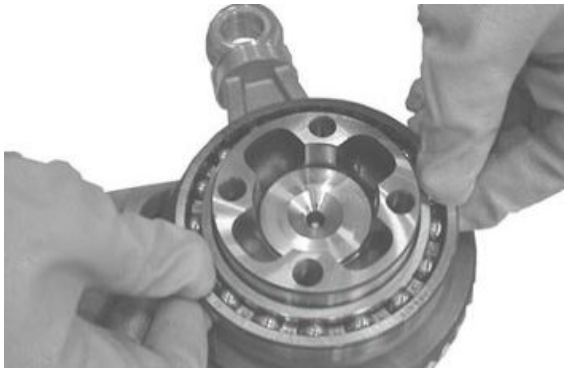


Wheel axle unit

Gruppo asse ruota

Removal

Remove the bearing from the wheel axle with a suitable extractor.



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Turn the unit over.

Remove the bearing from the wheel axle with a suitable extractor.

FITTING

Heat the bearings to 100°C (212 °F).

Assemble the bearings to the wheel axle.

Turn the unit over.

Assemble the bearings to the wheel axle.

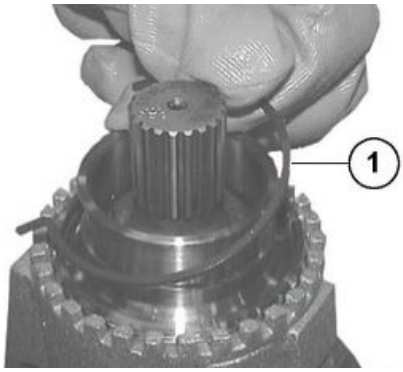
Pinion unit

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

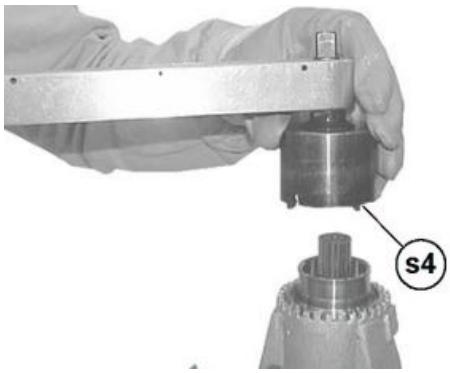
Pinion unit

Removal

Remove the stop ring (1) from the ring nut.



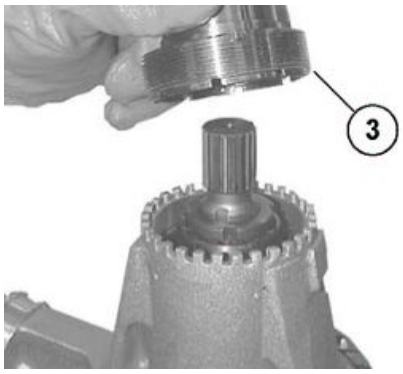
Unscrew the ring nut (2) with the special spanner (s4).



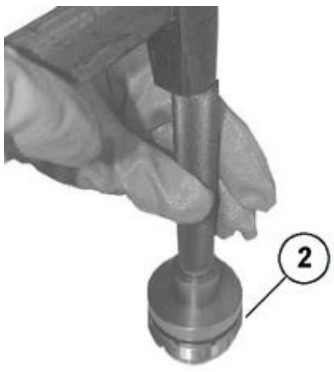
Remove the ring nut (2) and remove the sealing ring from the ring nut.

NOTE

THIS OPERATION DESTROYS THE SEALING RING.



Assemble the sealing ring (3) to the ring nut (2) with the buffer CA715855 (see Fig.1) and a hammer.



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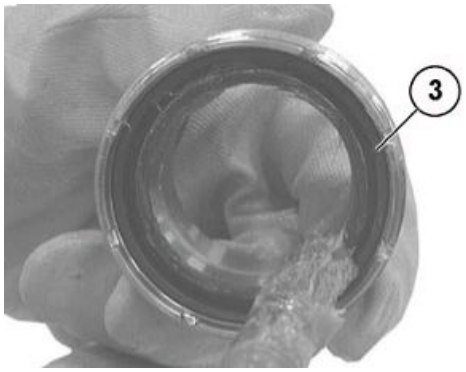
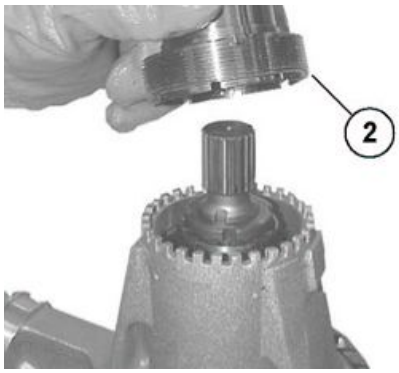
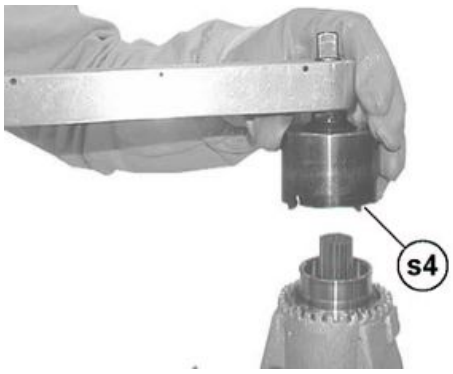
Lubricate the sealing ring (3).



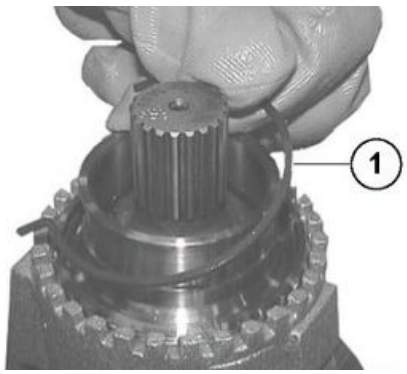
Assemble the ring nut (2).



Tighten the ring nut (2) with the special spanner (s4) to the prescribe torque.



Insert the stop ring (1) in the ring nut (2) in the indicated direction.



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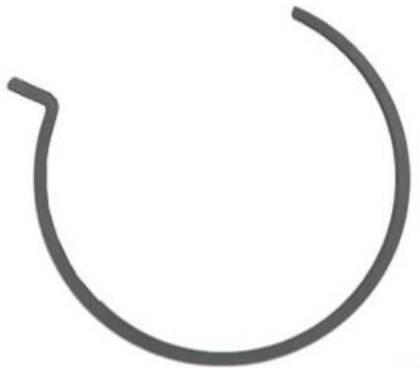
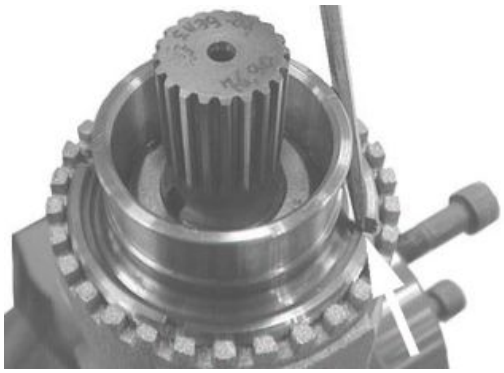
Assembly position of the stop ring (1).

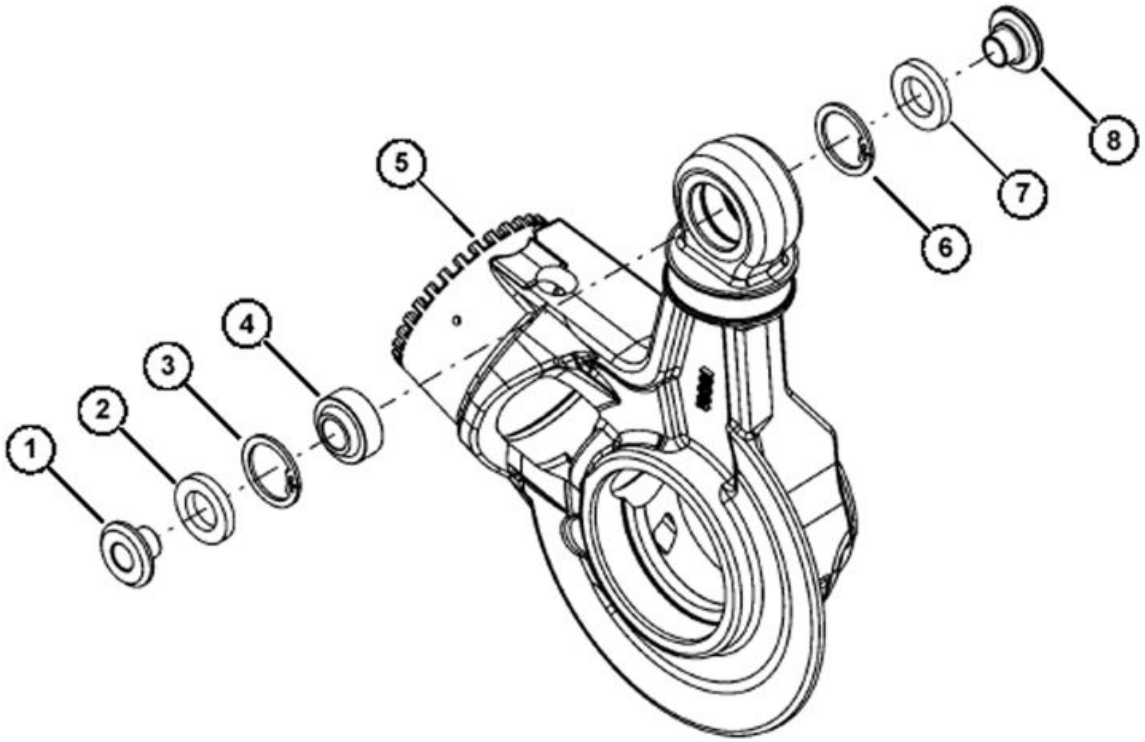


CAUTION

MAKE SURE THE STOP RING IS IN ITS SEAT.



Support unit



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Support unit

Removal

Remove the bushing (1) with a punch.

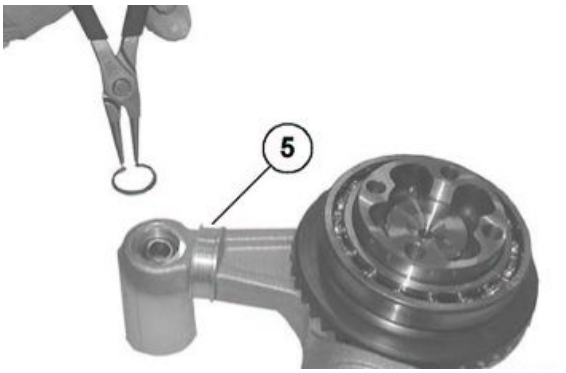
Turn the support (5) over and remove the other bushing (8).

Remove the sealing rings (2) and (7) with a screwdriver.

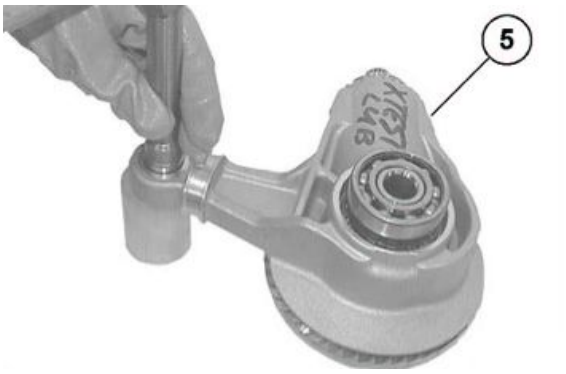
Remove the stop rings (3) and (6) from the support (5) with suitable pliers.

NOTE

THIS OPERATION DESTROYS THE SEALING RING.

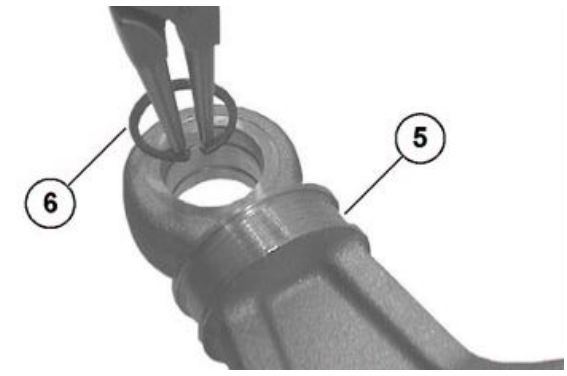


Remove the ball joint (4) with a suitable buffer and a rubber hammer.



FITTING

Fit the stop ring (6) in the support (5) with suitable pliers.



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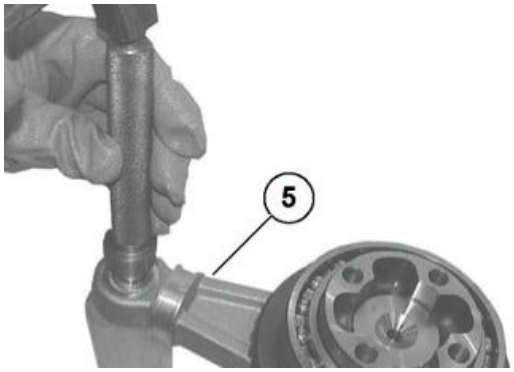
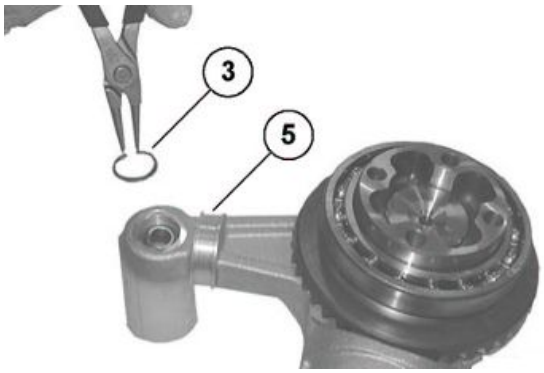
Turn the support (5) over.
Assemble the ball joint (4) with the buffer and a rubber hammer.



Fit the stop ring (3) in the support (5) with suitable pliers.



Manually assemble the new sealing rings (2) and (7).
Assemble the bushing (1).

Drive the bushing (1) in with a plastic hammer.
Turn the support (5) over and assemble the other bushing (8).

TROUBLESHOOTING

Possible Cause	Operation
1. Fitting error of the radial seal or seal damaged 2. Sliding surface of the wheel axle seal spoiled or damaged	1. Replace the sealing ring and fit it correctly with the suitable tool 2. Replace the wheel axle

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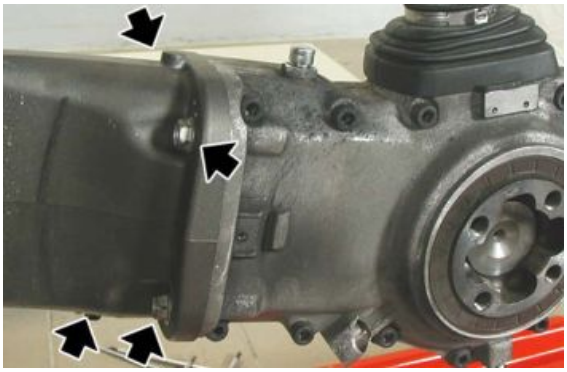
Possible Cause	Operation
1. Casing not sealed 2. Closing screws of the casing shells not tightened to the prescribed torque	1. Open the casing shells, clean the surfaces, seal and reassemble the casing shells 2. Tighten the closing screws to the correct torque
1. Dirt between the sealing ring and the casing 2. A used sealing ring has been fitted 3. Plug not tightened to the prescribed torque	1. Clean and tighten to the correct torque 2. Replace the sealing ring 3. Tighten the plug to the correct torque
1. Cap damaged 2. Retaining clamp or closing cover loose 3. Fitting error of the radial seal or seal damaged 4. Sliding surface of the wheel spacer spoiled or damaged	1. Replace the cap 2. Screw the clamp with suitable pliers 3. Replace the sealing ring and fit it correctly with the suitable tool 4. Replace the spacer
1. Cap damaged 2. Internal retaining clamp or external closing clamp loose	1. Replace the cap 2. Screw the internal or external clamp with suitable pliers
1. Bevel gear pair fitting error 2. Bevel gear pair toothing spoiled or damaged	1. Replace the bevel gear pair
1. Ball bearings on the wheel axle damaged	1. Replace the wheel bearings

Installing

- Insert the transmission casing on the swingarm making sure that the universal joint engages correctly.

- Tighten the four screws to the prescribed torque operating diagonally.



- Place the reaction rod into its seat.
- Insert the screw.
- Screw the nut fixing the reaction rod.

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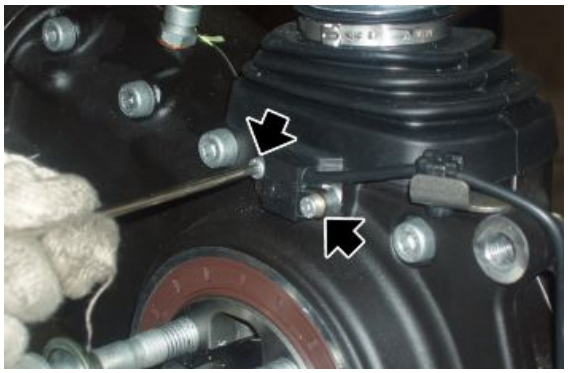
- Place the dust-protection ring between the rim and the cardan shaft taking care to mount it with the collar facing the transmission unit.

- Place the speed sensor and fasten the cable harness with the clamps.
- Place the rear wheel on the fork.
- Tighten the four screws with their spacers and the dust-protection ring.
- Place the rear brake calliper on the disc and the brake pipe on the fork.



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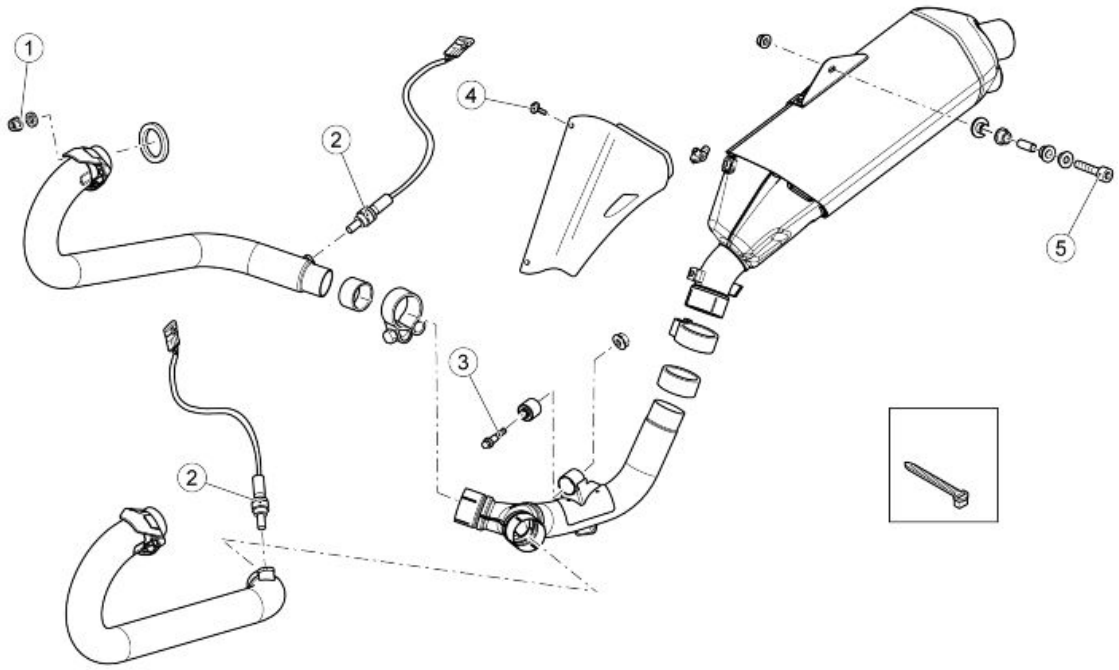
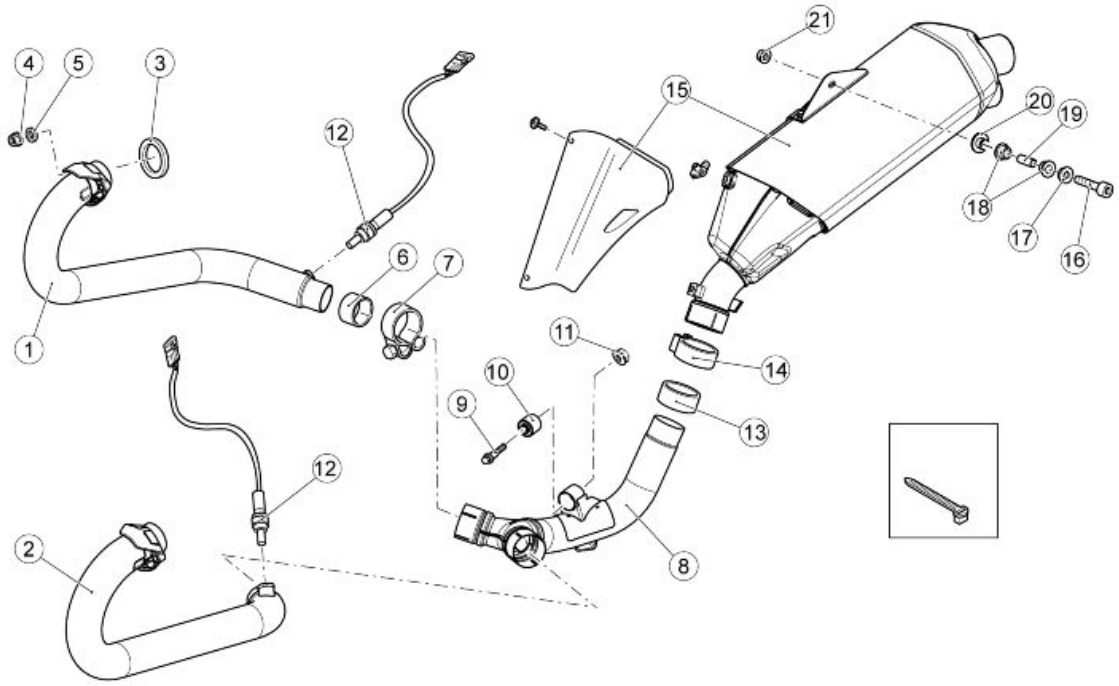
Exhaust



EXHAUST SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Dadi Flang. fissaggio collettori	M8	4	25 Nm (18.44 lbf ft)	-
2	Oxygen sensor fastener	-	2	38 Nm (28.03 lbf ft)	-
3	Vite TE Flang. fissaggio parte centrale	M10x55	1	25 Nm (18.44 lbf ft)	-
4	Viti fissaggio protezione	-	2	10 Nm (7.38 lbf ft)	-
5	Vite TCEI fissaggio silenziatore a telaio	M8x60	1	25 Nm (18.44 lbf ft)	-



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key:

1. Right exhaust pipe
2. Left exhaust pipe
3. Gasket
4. Flanged nut
5. Washer
6. Gasket
7. Clamp
8. Central exhaust pipe
9. TE flanged screw
10. Silent-block
11. Flanged self-locking nut
12. Lambda probe
13. Gasket
14. Clamp
15. Silencer
16. TCEI screw
17. Silencer fixing bushing
18. Muffler rubber ring
19. Spacer
20. Washer
21. Nut

Removing the tail pipe

- Loosen the sealing clamp between the exhaust and the central manifold.

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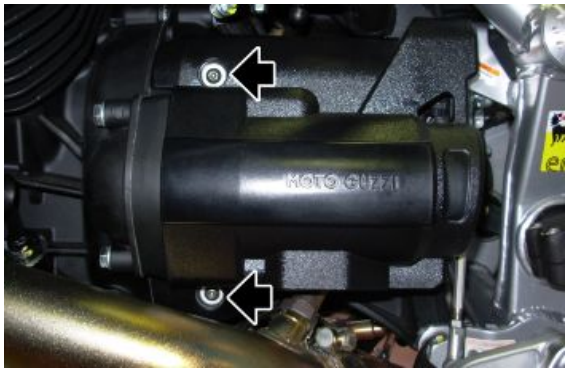
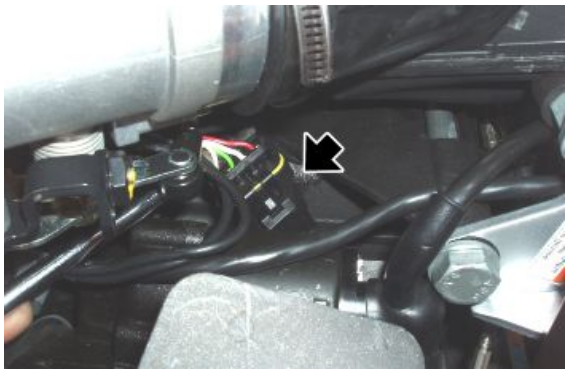
- Undo and remove the screw and collect the nut and the washer.

- Remove the exhaust end.

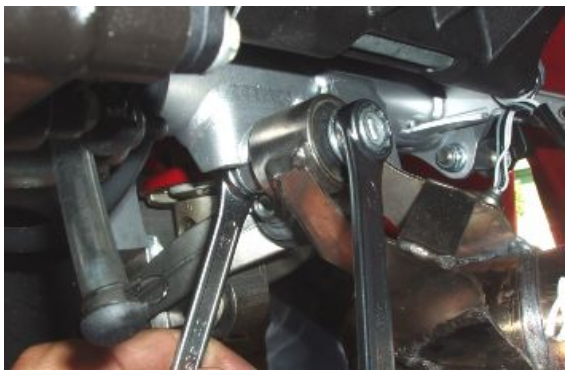
Removing the manifold - tail pipe

- Remove the exhaust end and the exhaust manifolds.
- Remove the starter motor protection in order to disconnect the lambda probe connector.





- Unscrew and remove the nut and remove the fixing screw.
- Remove the manifold - exhaust end coupling together with the lambda probe.



See also

Removing the exhaust manifold

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Removing the tail pipe

Removing the exhaust manifold

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.

- Unscrew and remove the two nuts on the head exhaust stud bolts.
- Retrieve the washers.

- Loosen the clamp.
- Remove the exhaust manifold.

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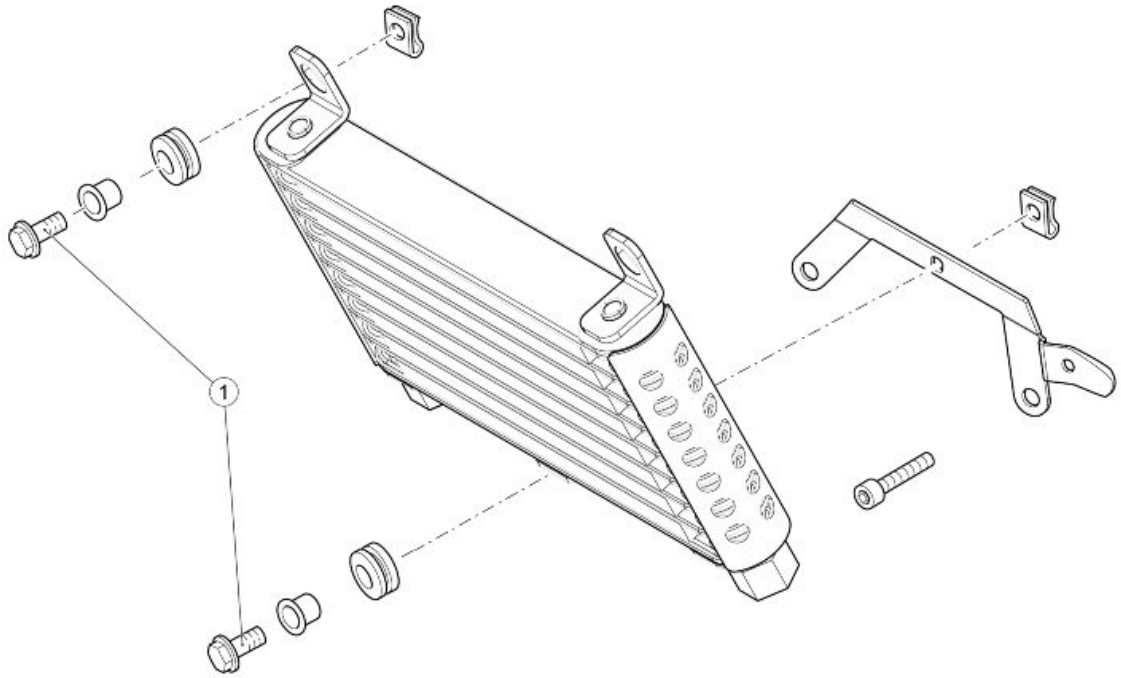
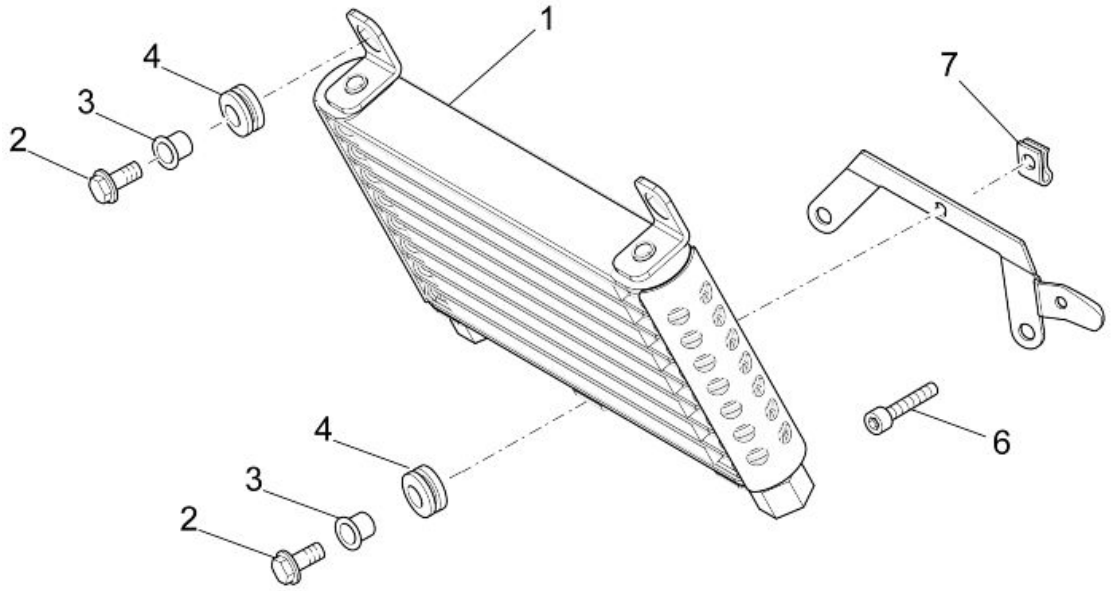
Engine oil cooler



OIL RADIATOR

pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio radiatore a telaio	M6x30	3	10 Nm (7.38 lbf ft)	-



Key:

1. Complete oil radiator

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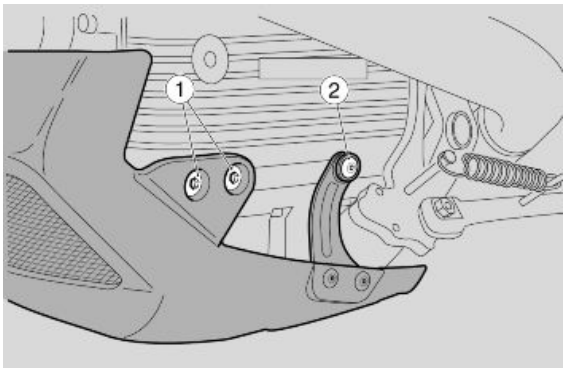
2. TE flanged screw
3. T-shaped bushing
4. Rubber ring
5. Radiator support
6. TCEI screw
7. Clip

Removing

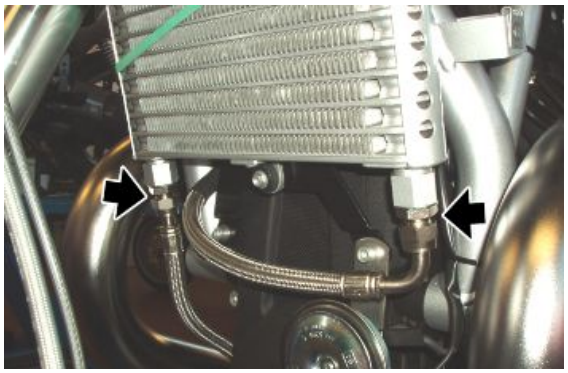
To change the engine oil and to replace the oil filter, remove the oil sump guard.



- Operating from both sides, unscrew and remove the two front screws (1).
- Operating from both sides, unscrew and remove the rear screw (2).
- Remove the oil sump guard.

- Place a collecting container and empty the lubrication system.

- Unscrew and remove the two oil pipes on the radiator.



- Undo and remove the radiator lower screw and collect the washer.

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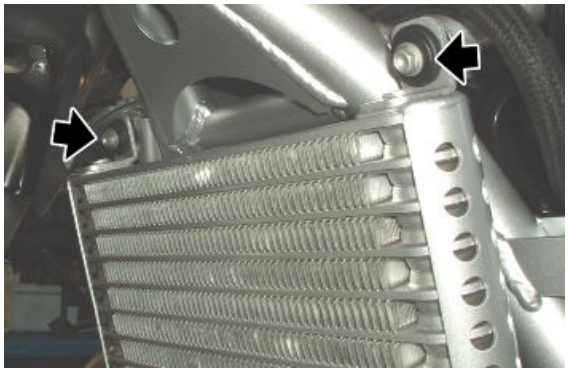
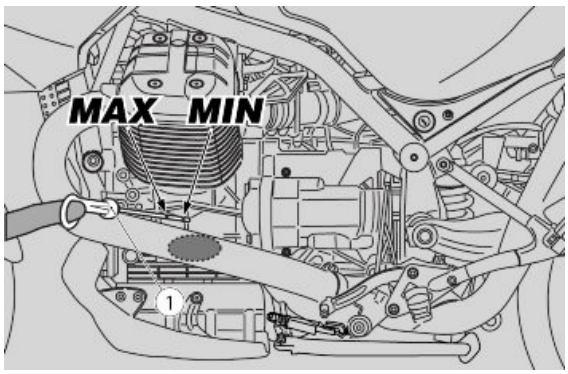
- Undo and remove the two radiator upper screws and collect the washer.



- Remove the oil cooling radiator.

Installing

- Fit the oil cooling radiator on the vehicle following the operations described in the removal chapter but in reverse order.
- Pull out the oil filler plug / oil level dipstick (1).
- Pour new oil until it goes over the minimum level marked "MIN" on the dipstick (1).
- Insert the oil filler plug / oil level dipstick (1).
- Start the vehicle and let the engine run for a few minutes so that the oil circulates and fills the radiator internal ducts.
- Stop the engine and check the oil level with the dipstick (1).
- Fill with engine oil as required.



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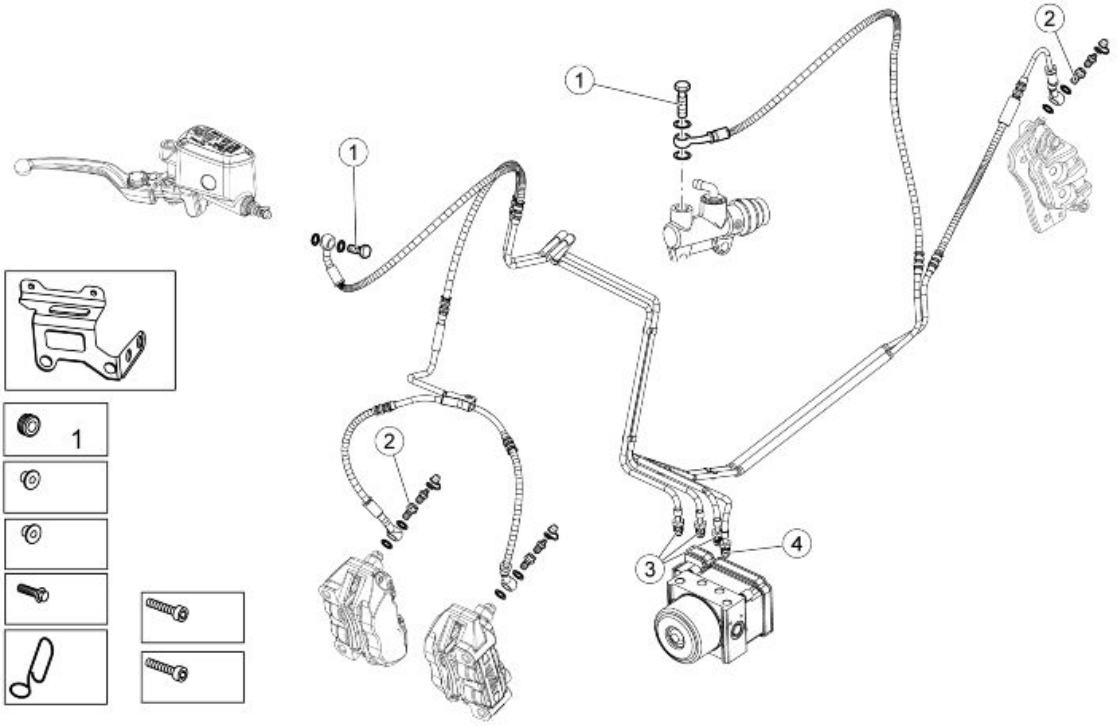

BRAKE SYSTEM

pos.	Description	Type	Quantity	Torque	Notes
1	Brake pipe slot screw on the pump	M10	2	25 Nm (18.44 lbf ft)	-
2	Joint with brake pipes retainer bleeding on the calliper	M10	3	25 Nm (18.44 lbf ft)	-
3	Brake pipes joint on the ABS hydraulic unit	-	4	25 Nm (18.44 lbf ft)	-

Interventions rules

CAUTION

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

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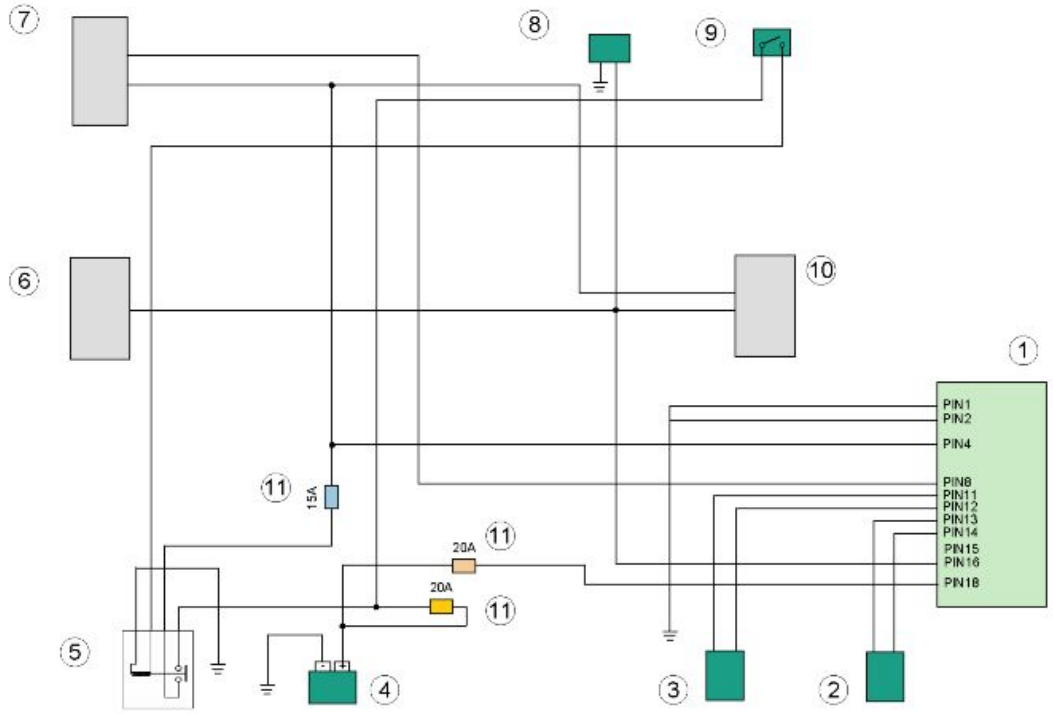
ABS



key:

1. ABS ECU control unit
2. Front ABS sensor
3. Rear ABS sensor
4. Battery
5. Main relay
6. ECU
7. Instrument panel
8. K line (diagnosis)
9. Key
10. Fuses

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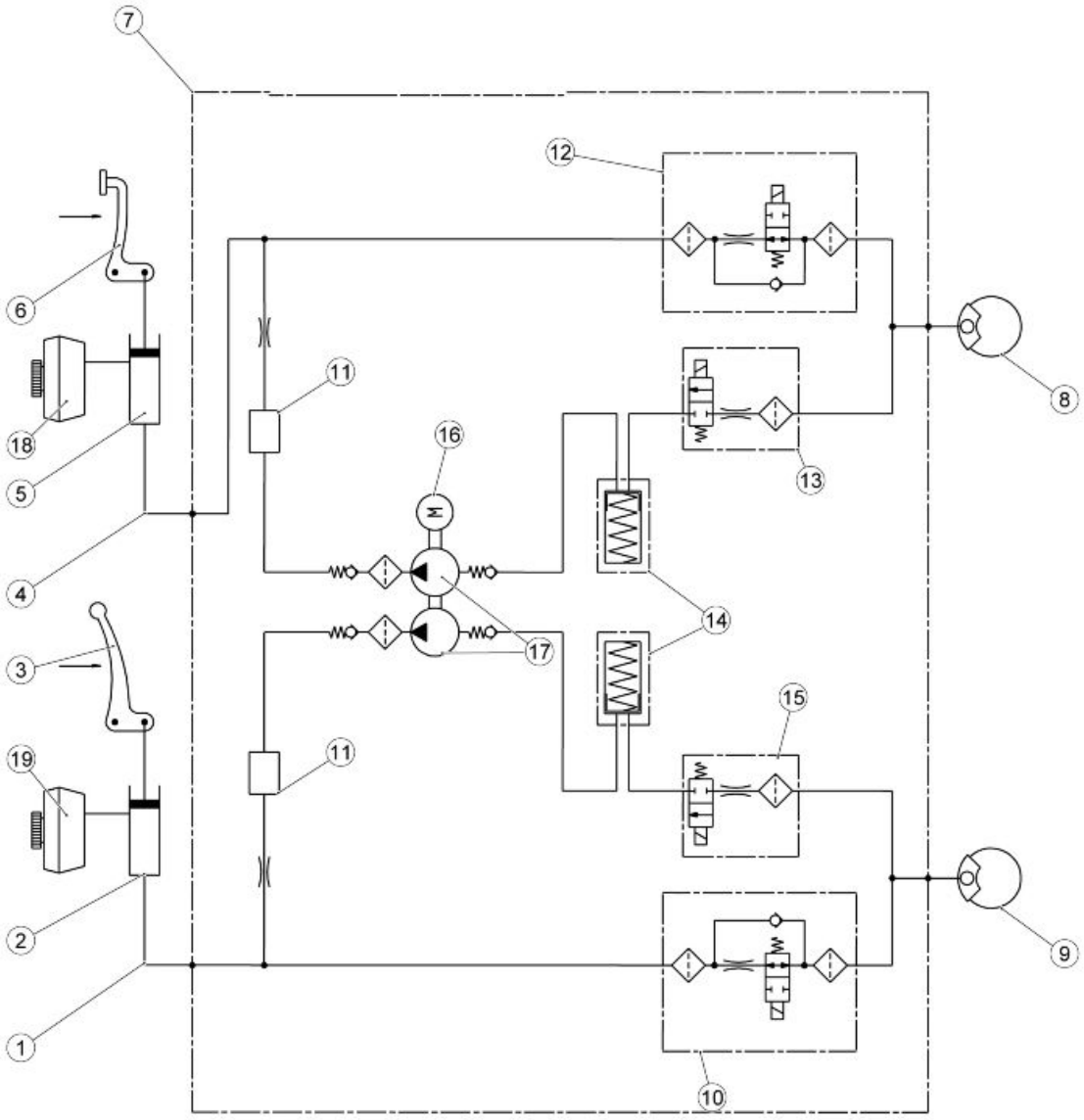
Operating diagram



ABS functional diagram key

1. Front system circuit
2. Front brake pump
3. Front brake lever
4. Rear system circuit

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5. Rear brake pump
6. Rear brake pedal control
7. ABS CONTROL UNIT
8. Rear brake calliper
9. Front calliper (2 callipers)
10. Front brake circuit intake solenoid valve (normally open)
11. Humidifier
12. Rear brake circuit intake solenoid valve (normally open)
13. Rear brake exhaust circuit solenoid valve (normally closed)
14. Rear/front brake circuit low pressure accumulator
15. Front brake exhaust circuit solenoid valve (normally closed)
16. DC electric motor
17. Double circuit hydraulic pump (ABS)
18. Rear brake reservoir
19. Front brake reservoir

ABS OPERATION

General specifications:

The front circuit is similar to the rear circuit.

- The ABS inlet valve (10 - 12) is normally open and it is closed only when the system intervenes to avoid wheel locking.
- The outlet valve (13 - 15) is normally closed and it is opened only when the system intervenes to avoid wheel locking.
- When the system is in standby, the ABS processor never stops monitoring the speed of the wheels in order to assess potential wheel slippage.
- When in standby, the system does not intervene at all when the rider brakes; the braking system is the same as the one without ABS.

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

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

B - Pressure reduction: it coincides with danger recognition (wheel slippage above threshold): the system closes the inlet valve (10-12) and opens the outlet valve (13-15) temporarily.

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

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

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

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

E - If the wheel does not reach complete grip, the system continues operating as before until complete grip is obtained or until the vehicle stops. An error can be detected if the duration of the pressure reduction phase exceeds the pre-set time limit.

ABS SYSTEM DESCRIPTION

The ABS system is a device to avoid wheels locking in case of emergency braking, increasing vehicle braking stability when compared to a traditional braking system.

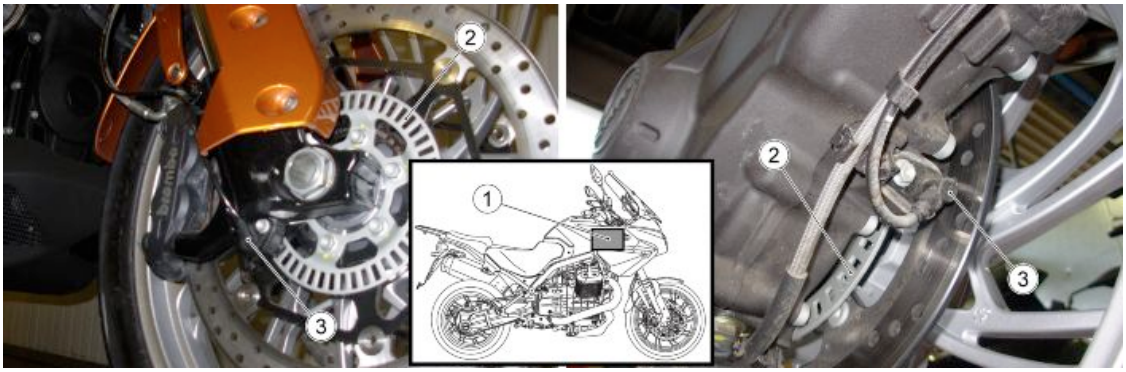
Sometimes when the brake is operated, the tyre locks with a consequent loss of grip, which makes it difficult to control the vehicle. A position sensor (3) on the tone wheel (2), forming an integral unit with the vehicle wheel, "reads" the status of the vehicle wheel spotting any possible lock.

A control unit (1) signals this out and adjusts the pressure in the braking circuit accordingly.

NOTE

WHEN THE ABS SYSTEM STARTS WORKING, A VIBRATION IS FELT ON THE BRAKE LEVER.

THE WHEEL ANTILOCK BRAKING SYSTEM DOES NOT PREVENT FALLS WHILE ON A BEND. AN EMERGENCY BRAKING WITH THE VEHICLE INCLINED, HANDLE BAR TURNED, ON UNEVEN OR SLIPPERY ROADS, OR WITH POOR GRIP CREATES LACK OF STABILITY DIFFICULT TO HANDLE. THEREFORE, RIDE CAREFULLY AND SENSIBLY AND ALWAYS BRAKE GRADUALLY. BRAKING WHILE TURNING A CORNER IS SUBJECT TO LAWS OF PHYSICS WHICH NOT EVEN ABS CAN ELIMINATE.



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

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

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Riding with an active ABS system

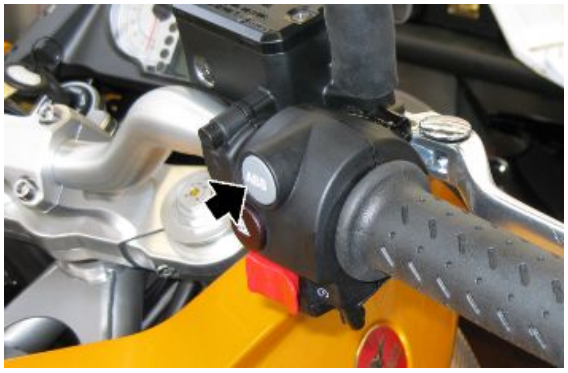
- At engine starter, the ABS warning light (5) on the instrument panel (4) flashes until the vehicle exceeds 5 km/h (3.1 mph).

If the ABS warning light remains on when the vehicle is running, it means that a fault has been detected and the ABS system has been automatically deactivated.

Riding with a deactivated ABS system

The warning light (5) turns on permanently, the system was deactivated.

ABS device deactivation



To deactivate the system, proceed as follows:

- Start the engine.
- With the vehicle at a standstill, press and hold the button. After roughly three seconds, the indicator light ABS (5) on the instrument panel (4) becomes steadily on.
- Release the button immediately.
- Now the ABS warning light (5) on the instrument panel (4) continues to be on; the ABS system is then completely deactivated.

ABS system reactivation

- With the vehicle at a standstill, press and hold the button. After roughly three seconds, the indicator light ABS (5) on the instrument panel (4) will start to flash.
- Release the button immediately.
- Once riding, the ABS system will be re-activated only after riding faster than 5 km/h (3.1 mi/h) and the ABS warning

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light (5) on the instrument panel (4) turns off.

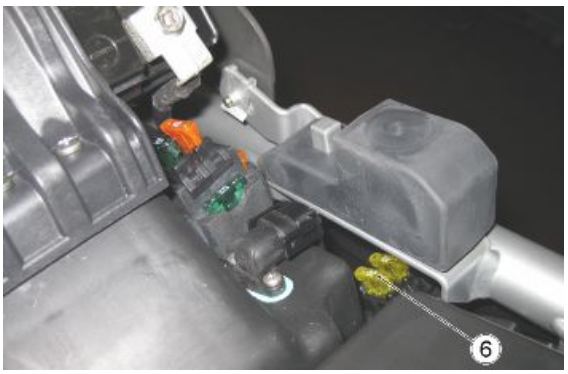
CAUTION

IF THE ABS SWITCH IS PRESSED FOR MORE THAN TEN SECONDS, THE SYSTEM DETECTS A FAILURE. TO ACTIVATE THE ABS SYSTEM AGAIN TURN THE IGNITION SWITCH TO "OFF" AND THEN TO "ON".

IN CASE OF FAILURE OR WITH ABS DISCONNECTED, THE VEHICLE OPERATES AS IF IT DID NOT HAVE THIS SYSTEM.

20 A fuse (ABS Main fuse) (6)

Protects: ABS Control unit.



Guide to diagnosis

PREMISE

Each time the key is ON, if, at least one current or stored* error is detected, the ABS warning light turns on permanently.

The ABS system is deactivated!

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

*** The diagnosis requires exceeding the 5 km/h (3.1 mph).**

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

- the ABS warning light flashes.

When the 5 km/h (3.1 mph) are exceeded:

- if errors are not detected: the ABS warning light turns off

- if at least one malfunction is detected: the ABS warning light turns on permanently.

The ABS system is deactivated!

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

The detection of malfunctions may require more or less time according to the type of failure.

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

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If during this given time one of the conditions is missing but then it comes back, the timer is reset and the system is no longer able to diagnose the error.
The ABS system is still inactive.

Example:

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

ABS FAULTS - GUIDE TO THE DIAGNOSIS

1. ABS WARNING LIGHT ON

2- CONNECT NAVIGATOR

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

3.PERFORM THESE CHECKS:

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

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

5. CONSULT THE ERRORS TABLE

6. ABS WARNING LIGHT ACTIVATION

ACTIVE?(YES, go to 7; NO, go to 8)

7. CONTACT TECHNICAL SERVICE

8. CHECK:

- A. Cable continuity between PIN 8 of the ABS control unit connector and PIN 39 of the instrument panel.
- B. Check connectors - refer to the operations described in the chapter

If the previous checks are OK, the causes might be:

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

Using Navigator for the abs

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ECU INFO screen page

This screen page shows general data regarding the control unit, for example software type, mapping, control unit programming date

INFO ECU SCREEN PAGE

Characteristic	Value/example	Unit of measurement	Notes
Vehicle manufacturing date			
Chassis number			
Software version			
Vehicle code	Stelvio / Norge		The vehicle code stored in the control unit is read.
Vehicle identification according to the status of Pin 2 and 15 of the ABS control unit connector	Stelvio / Norge		Depending on the detected connection of PIN 2 and PIN 15 of the ABS control unit connector corresponds to a different type of vehicle: see the following table

NOTE: the "X" in the table identifies the connector pin is grounded.

ABS CONNECTOR IS GROUNDED

Vehicle	PIN 2	PIN 15
Stelvio 1200 4V ABS		X
Norge 1200 4V ABS	X	

PARAMETERS screen page

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, etc.)

PARAMETERS

Characteristic	Value/example	Unit of measurement	Notes
Front wheel speed	0	km/h	With stopped wheel, 0 Km/h is displayed
Rear wheel speed	0	km/h	With stopped wheel, 0 Km/h is displayed
Battery voltage	11.9	V	

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ACTIVATION screen page

This screen page is used to delete errors in the control unit memory and to activate some systems controlled by the control unit.

ACTIVATION

Characteristic	Value/example	Unit of measurement	Notes
Front brake bleeding procedure			Useful in case of lever sponginess although the bleeding has been done as in a regular braking system
Rear brake bleeding procedure			Useful in case of lever sponginess although the bleeding has been done as in a regular braking system
ABS warning light			During the test the warning light stays on
Ambient parameter error reading (1)			The ambient parameters are 4: Number of error detections, Operation cycles from the last detection, Battery voltage, Speed.
Ambient parameter error reading (2)			Number of error detections: number of times the error has been detected by the control unit;
Ambient parameter error reading (3)			for example, if it indicates 2, it means that the error has been detected (ATT), then it has not been detected for a while (sent to the MEM) and then it has been detected again.
Ambient parameter error reading (4)			Operation cycles from the last reading: a cycle is counted if the following occurs: key ON and speed over 20 km/h.
Ambient parameter error reading (5)			If for example 5 is shown, it means that the last time the error has been measured was 5 cycles ago.
Error clearing (1)			Press "enter" to transfer errors from the memory (MEM) to the historical record (STO).
Error clearing (2)			In the next connection between Navigator and the control unit, the historical errors (STO) are no longer shown.

ERRORS screen page

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

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ERRORS

Characteristic	Value/example	Unit of measurement	Notes
Front speed sensor: 5D90 electric malfunction			Electrical fault in sensor or cable harness
Front speed sensor: 5D91 the signal works irregularly			Faulty sensor or signal interference
Front speed sensor: 5D92 the signal decreases periodically			Possible tone wheel fault due to deformations or dirt; possible alterations on the wheel bearing surface. In very rare cases, abnormal tone wheel vibrations
Front speed sensor: no signal or speed measured too low in relation to the rear wheel 5D93			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
Front speed sensor: 5D94 no acceleration after pressure reduction			Faulty sensor or missing sensor/tone wheel or excessive distance between the sensor and the tone wheel
Front speed sensor: 5D95 excessive measured speed			Faulty sensor/tone wheel, or tone wheel with wrong number of teeth or wrong tyre size
Rear speed sensor: 5DA0 electric malfunction			Electrical fault in sensor or cable harness
Rear speed sensor: 5DA1 the signal works irregularly			Faulty sensor or signal interference
Rear speed sensor: 5DA2 the signal decreases periodically			Possible tone wheel fault due to deformations or dirt; possible alterations on the wheel bearing surface. In very rare cases, abnormal tone wheel vibrations
Rear speed sensor: 5DA3 no signal or speed measured too low in relation to the front wheel			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
Rear speed sensor: 5DA4 no acceleration after pressure reduction			Faulty sensor or missing sensor/tone wheel or excessive distance between the sensor and the tone wheel
Rear speed sensor: excessive measured speed 5DA5			Faulty sensor or tone wheel with wrong number of teeth or wrong tyre size
Control unit: missing valve calibration 5DD2			Possible control unit fault
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 electric voltage - long period measurement 5DF3			Voltage too low measured for 30 seconds at PIN 18 of the ABS control unit:
Control unit 5DF5			Possible control unit fault
High electric voltage 5DF7			Excessive voltage measured at PIN 18 of the ABS control unit
Vehicle code 5E59			Inconsistency detected between memory coding (INFO ECU/Vehicle code) and what is measured at cable harness identification PIN (INFO ECU screen page, Vehicle identification line - Pins 2-15 of ABS control unit)
Control unit F000			Possible control unit fault
CAN line: D347 electric malfunction			Open circuit, short circuit in the ground lead or to battery of one or both wires of CAN line. Possible short circuit between the two cables.
CAN line: 5E11 electric malfunction			Open circuit, short circuit in the ground lead or to battery of one or both wires of CAN line. Possible short circuit between the two cables.
0xF01F control unit			Possible control unit fault
5E5A ABS switch			

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SETTINGS screen page

This screen page is used to adjust some control unit parameters.

ADJUSTMENTS

Characteristic	Value/example	Unit of measurement	Notes
Coding (1)			Used for re-coding the control unit or coding a new one.
Coding (2)			Vehicle identification is done according to the connection of PINS 2 and 15 of the ABS control unit connector and is stored in the control unit memory.
Coding (3)			The identification can be read in the INFO ECU screen page in the line: Vehicle code.

NOTE: the "X" in the table identifies the connector pin is grounded.

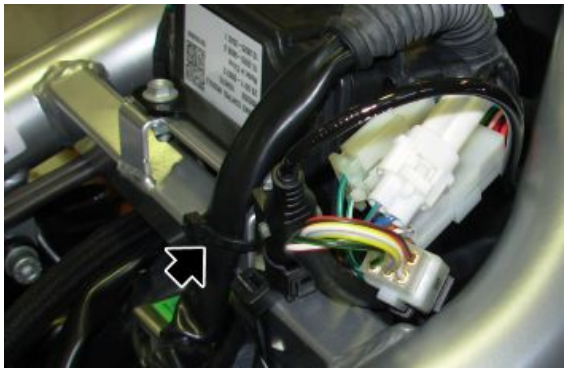
ABS CONNECTOR IS GROUNDED

Vehicle	PIN 2	PIN 15
Stelvio 1200 4V ABS		X
Norge 1200 4V ABS	X	

Abs screen pages

Modulator

- Remove the fuel tank.
- Cut the cable harness clamp.



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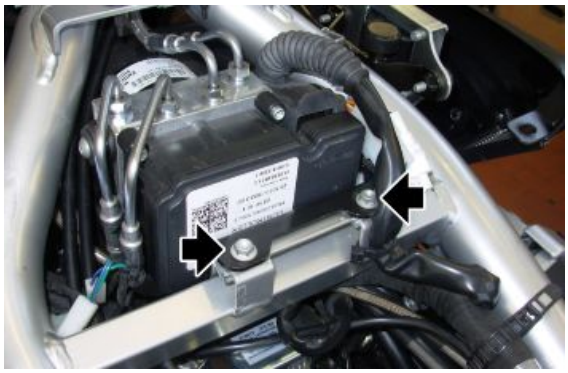
- With a felt-tip pen, mark a reference on the pipes and on the ABS control unit to avoid inverting them when refitting.
- Protect with a clean cloth the plastic materials near the ABS control unit.
- Loosen the nuts and remove the pipes.
- Cover the pipes to prevent brake fluid spilling.

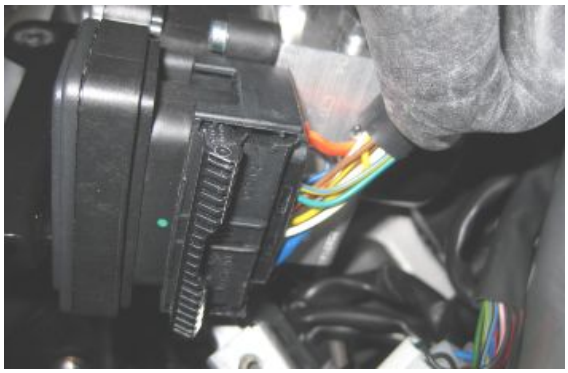
See also

Fuel tank

- Unscrew and remove the two screws.

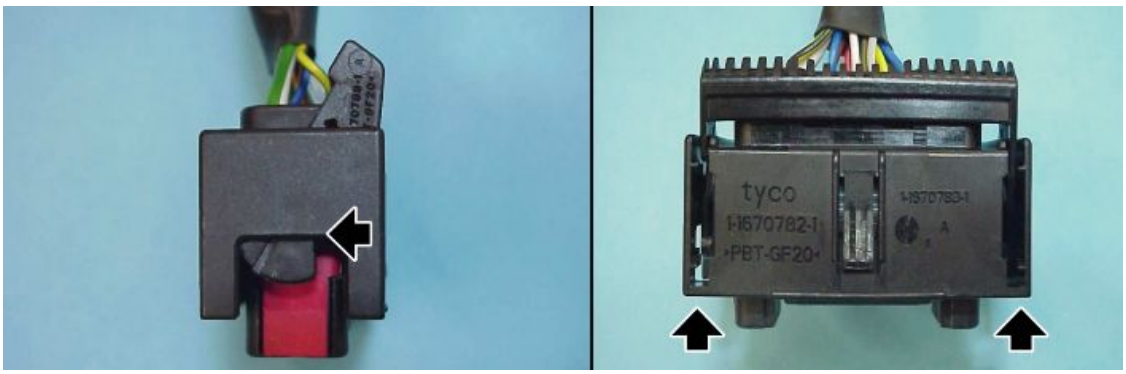


- Disconnect the ABS control unit connector.
- Remove the ABS control unit.



INSERTION PROCEDURE OF ABS CONTROL UNIT CONNECTOR

- Check the initial position of the lever that couples the connector.



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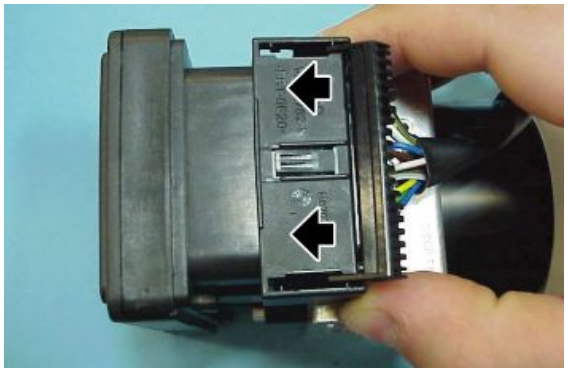
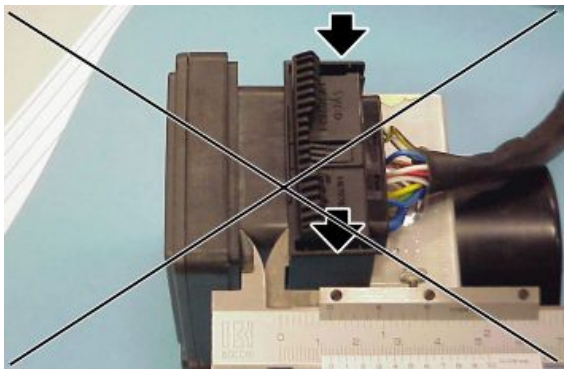
- When the connector is fully inserted, the distance between the connector and the ABS control unit must be 7.5 mm (0.29 in).



- If the initial position of the connector and the driving lever is not that shown in fig. 1, the connector will not be properly coupled and the distance measured will be greater (12 mm approx. (0.47 in)). In this case repeat the operation as described in the two previous points.

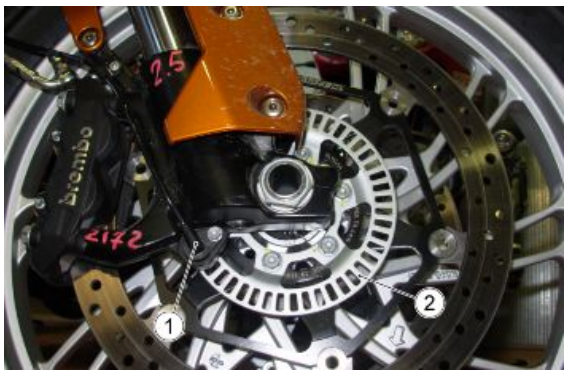
It is advisable to create a template to check the correct connector insertion.



- Fit the protection casing.

Component maintenance

The vehicle is fitted with a two-channel ABS system, i.e. it works on both the front and the rear wheel.
Check periodically and each time the wheels are refitted, the tone wheel (2) or the sensor (1) replaced, that the wheel distance is constant at each 360°. Use a thickness gauge to check the distance between sensor (1) and tone wheel (2) at three points at a 120° span. The values should be between:



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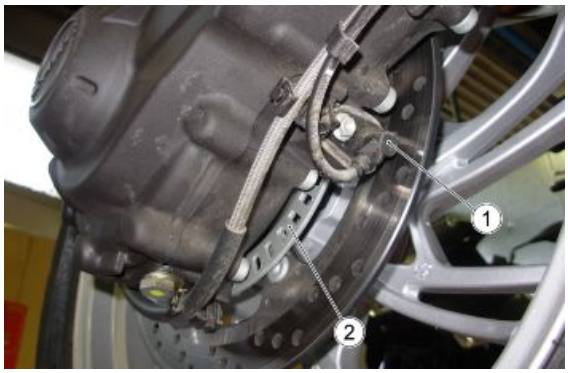
2.10 - 2.25 mm (0.083 - 0.088 in) for the front one;

1.90 - 2.30 mm (0.075 - 0.090 in) for the rear one;

CAUTION

IF A VALUE BEYOND THE TOLERANCE RANGE IS MEASURED, REPLACE THE SENSOR (1) AND/OR THE TONE WHEEL (2) AND REPEAT THE CHECKS; MAKE SURE THAT THE VALUES ARE WITHIN THE TOLERANCE LIMITS.



TONE WHEELS (2) CLEANING

It is important to check that all the tone wheels (2) are always clean. Otherwise,: gently remove any possible dirt deposits with a cloth or metal brush. Avoid using solvents, abrasives and air or water jets directly on the tone wheel (2).

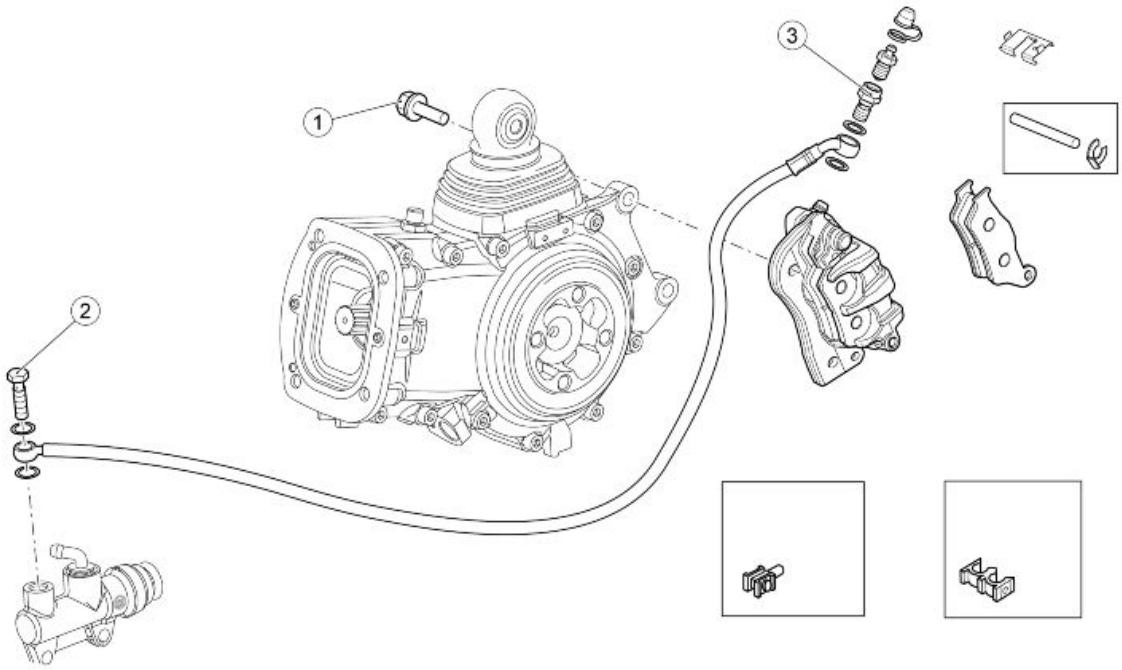
TONE WHEEL SENSOR REPLACEMENT

Disconnect the tone wheel sensor connector (1) from the main wire. Unscrew and remove the screw and remove the tone wheel sensor (1).

CAUTION

BEFORE REFITTING, MAKE SURE THAT THE FAYING SURFACES BETWEEN THE SENSOR (1) AND THE SEAT ITSELF DO NOT SHOW SIGNS OF DAMAGE AND ARE COMPLETELY CLEAN. ALWAYS CHECK THE DISTANCE BETWEEN THE SENSOR (1) AND THE TONE WHEEL (2).

Rear brake calliper



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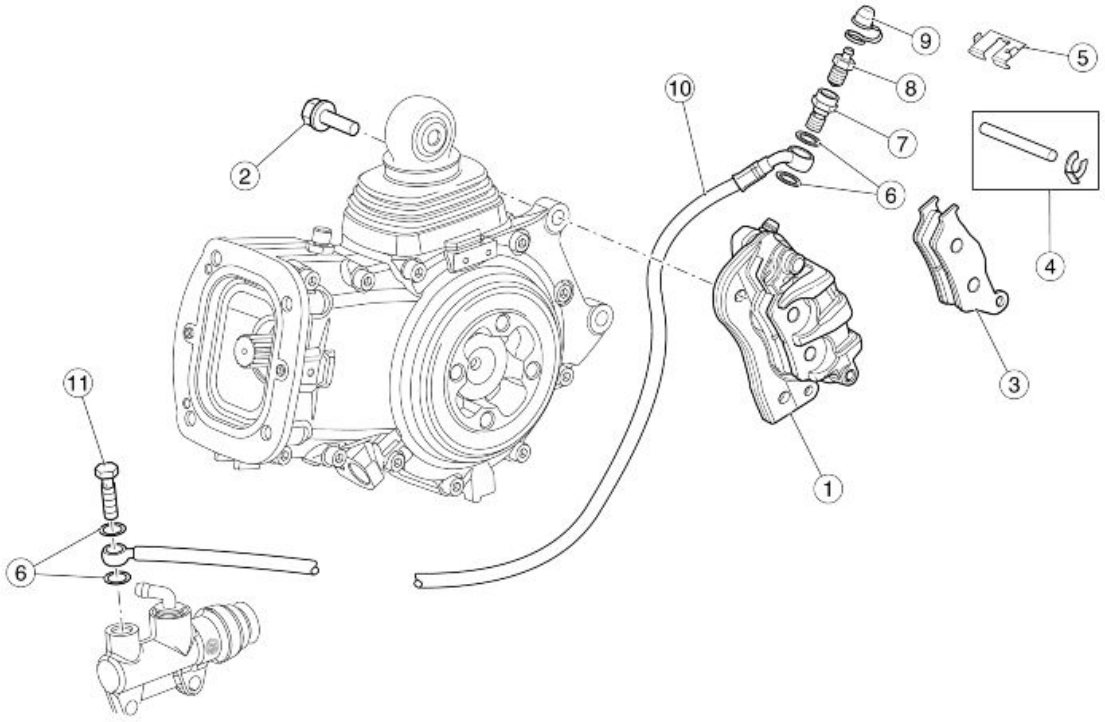
PINZA FRENO POSTERIORE

Pos.	Descrizione	Tipo	Quantità	Coppia	Note
1	Rear brake calliper fixing screw	M10	2	50 Nm (36.87 lbf ft)	-
2	Vite fissaggio tubo olio	-	1	- Nm (-.-- lbf ft)	-
3	Vite fissaggio tubo olio	-	1	- Nm (-.-- lbf ft)	-



Key:

1. Rear brake calliper
2. Screw
3. Pads
4. Pin + calliper split pin
5. Spring
6. Gasket
7. Screw
8. Air bleed
9. Air bleed cap
10. Rear brake pipe
11. Oil pipe screw

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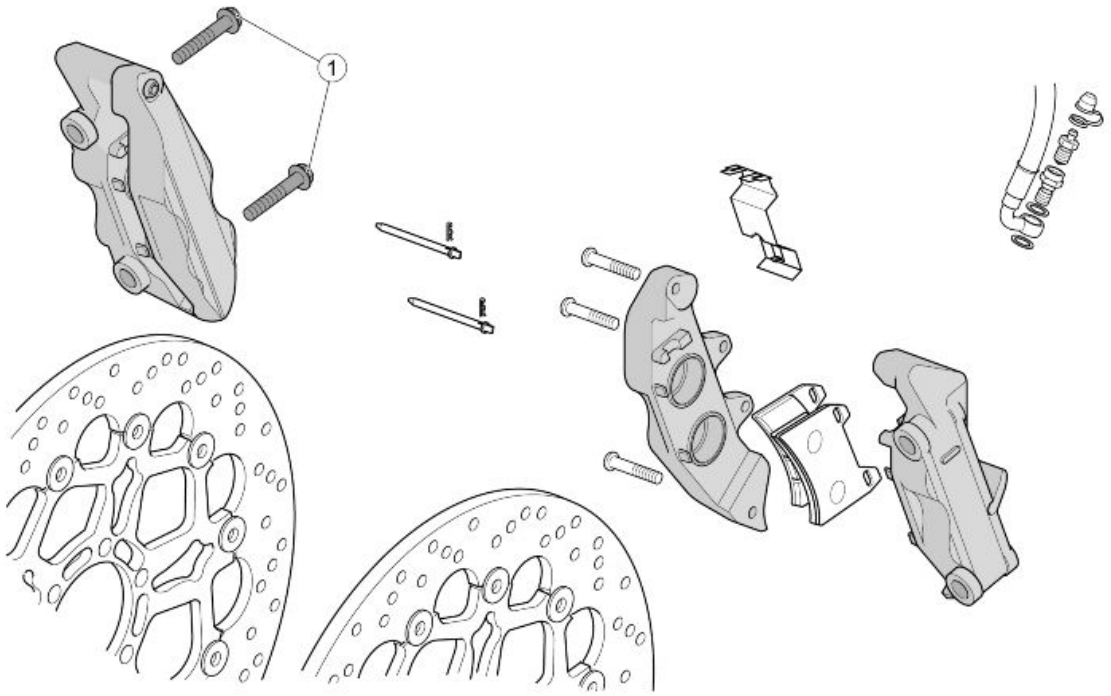
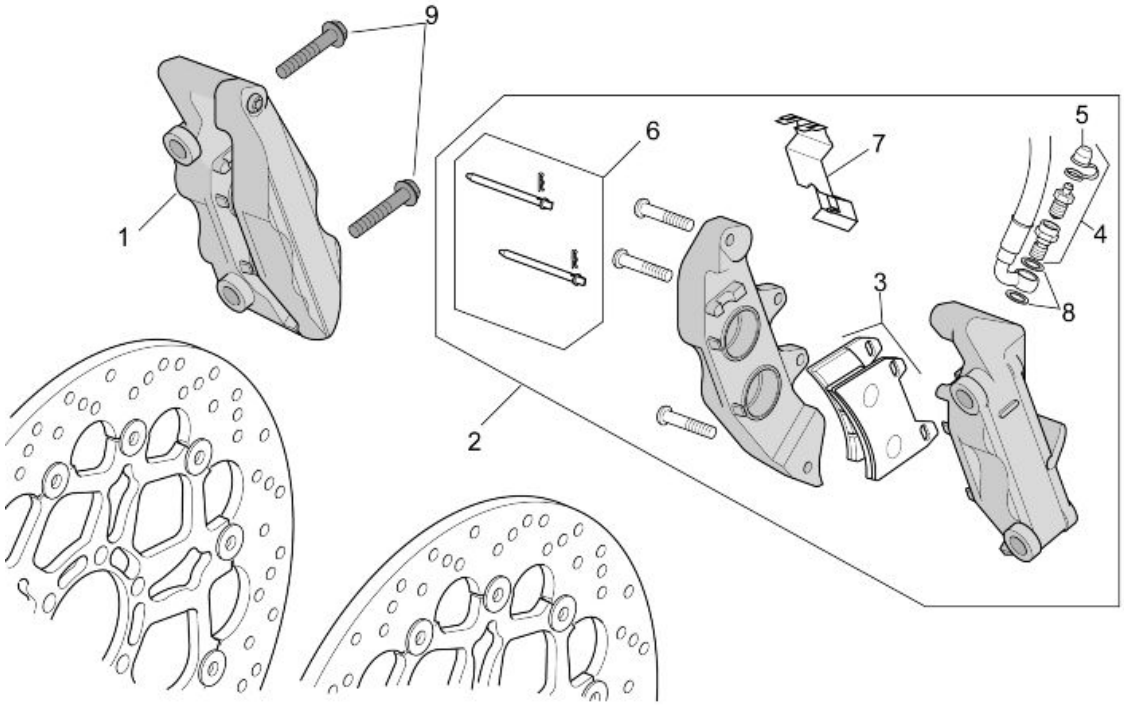
Front brake calliper



FRONT BRAKE CALLIPERS

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TE Flang. fissaggio pinze	M10x55	4	50 Nm (36.88 lbf ft)	-



Key:

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1. Front right brake calliper
2. Front left brake calliper
3. Pads
4. Air bleed
5. Air bleed cap
6. Pins + Calliper springs
7. Spring
8. Aluminium gasket
9. Screw

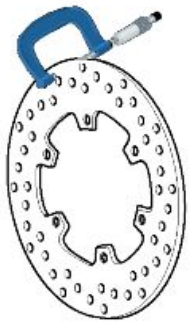
Rear brake disc

Disc Inspection

CAUTION

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

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



Disc thickness minimum value: 4.5 mm (0.18 in)

Front brake disc

Disc Inspection

CAUTION

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

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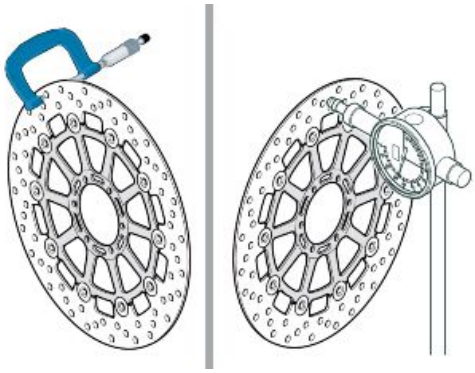
- The following operations must be carried out with the brake discs fitted on the wheel; they refer to a single disc, but are valid for both.
- Check the disc for wear by measuring the minimum thickness with a micrometer in different points. If the minimum thickness, even in a single point of the disc,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



Disc thickness minimum value: 4 mm (0.16 in)

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

Disc oscillation tolerance: 0.15 mm (0.0059 in)

Front brake pads

Removal

- Unscrew and remove the two screws.
- Slide off the brake calliper from the disc.

- Turn the pins and remove both split pins.

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- Remove both pins.

- Remove the vibration-damping plate.

- Extract one pad at a time.

CAUTION

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER OR THE CALLIPER PLUNGERS COULD GO OUT OF THEIR SEATS RESULTING IN BRAKE FLUID LEAKS.

Installing

- Insert two new pads, placing them so that the holes are aligned with the calliper holes.

CAUTION

ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.

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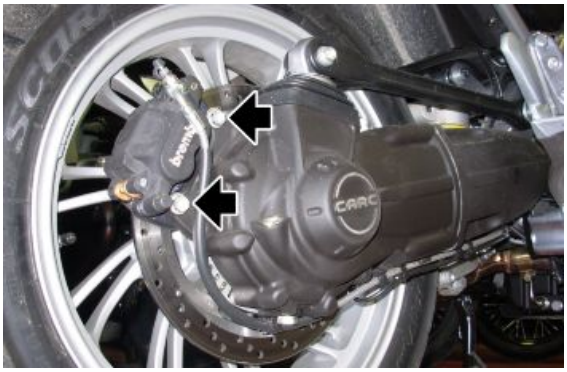
- Position the anti-vibration plate.
- Insert both pins.
- Position both split pins.
- Abut the plungers against the pads, acting on the brake pump lever several times.
- Check the brake fluid level in the reservoir.

Rear brake pads

Removal

- Undo and remove the two screws.
- Remove the brake calliper from the disc.
- Turn the pin and pull out the split pin.
- Remove the split pin.



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- Remove the pin.

- Extract one pad at a time.

CAUTION

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER OR THE CALLIPER PLUNGERS COULD GO OUT OF THEIR SEATS RESULTING IN BRAKE FLUID LEAKS.

Installing

- Insert two new pads, placing them so that the holes are aligned with the calliper holes.

CAUTION

ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.

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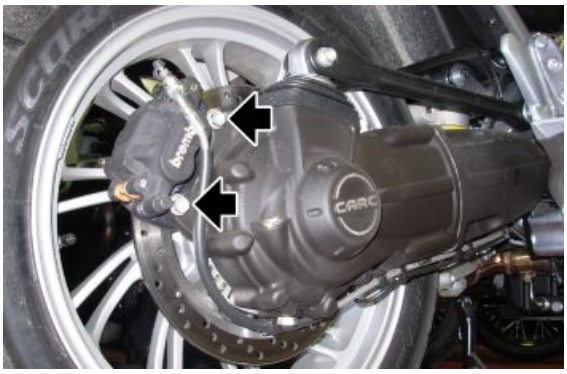
- Insert the pin.
- Position the split pin.
- Insert the brake calliper into the disc by screwing in the two screws.
- Abut the plungers against the pads, acting on the brake pump pedal several times.
- Check the brake fluid level in the reservoir.



Bleeding the braking system

VEHICLE PREPARATION

- It is important to check that there is always enough brake fluid in the reservoir.
- Using a bleed device facilitates these operations while, in the meantime, the "Brake fluid replacement" operations are performed.
- In this case, the bleed process must be accompanied by further pedal strokes and with the bleed device connected (about 5 for each wheel circuit).

BRAKE PUMP REPLACEMENT

PRELIMINARY OPERATIONS

- Replace the damaged brake pump with a new one.
- Connect the brake pipe to the new brake pump.
- Fill the reservoir with new brake fluid.

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CAUTION

PERFORM THE REGULAR BRAKING SYSTEM BLEEDING, AS DESCRIBED AT THE END OF THE CHAPTER.

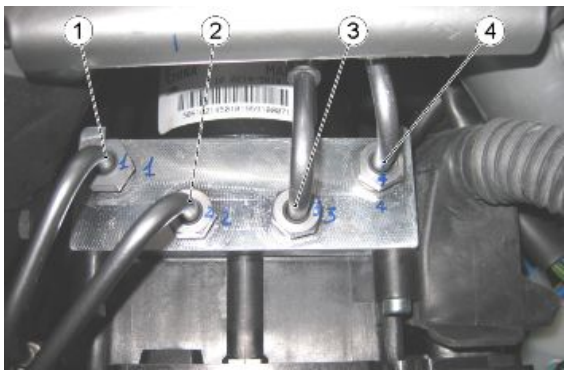
- Always fill the reservoir up to the reference "MAX" and refit the cap.
- Check the stroke and the sensitivity of both the lever and the brake pedal.
- If, after bleeding, the pedal or the lever stroke is too long, check that there are no leaks in the braking system and if everything is ok, continue bleeding operations using Navigator as described.
- Detach the bleed hoses and close the bleed screws again to the correct tightening torque.

See also

Front
Rear

REPLACE THE ABS CONTROL UNIT

VEHICLE PREPARATION



- Connect the bleed bottle to the bleed screws of the front and rear callipers and open it.
- Fully press down the lever and the brake pedal and fix them into position with the respective locking devices.
- Close the bleed screws of the front and rear callipers and remove the bleed bottle.
- Remove the damaged ABS control unit.

Note: First of all, detach the brake pipes that go from the ABS control unit to the brake pump (1-4) and immediately seal the opened unions of the ABS control unit with protective caps. Afterwards, remove pipes (2-3) that go from the ABS control unit to the brakes and also seal these unions with protective caps.

- Install the new ABS control unit, previously filled up.
- So that the brake fluid remains in the ABS control unit, first remove the pro-

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tective caps of the braking circuit unions and connect the respective pipes.

Once all the braking circuits have been connected, remove the protective caps from the braking pump unions and connect the braking pump pipes to the ABS control unit.

- Unlock the lever and the brake pedal.
- Remove the reservoir cap and fill it with new brake fluid up to the reference "MAX".

CAUTION

PERFORM THE REGULAR BRAKING SYSTEM BLEEDING, AS DESCRIBED AT THE END OF THE CHAPTER.

- Always fill the reservoir up to the reference "MAX" and refit the cap.
- Check the stroke and the sensitivity of both the lever and the brake pedal.
- If, after bleeding, the pedal or the lever stroke is too long, check that there are no leaks in the braking system and if everything is ok, continue bleeding operations using Navigator as described.
- Detach the bleed hoses and close the bleed screws again to the correct tightening torque.

See also

Front
Rear

CALLIPERS REPLACEMENT

VEHICLE PREPARATION - The operations are described for the front system, but they are also valid for both braking systems.

- Connect the bleed bottles to the bleed screw of the front calliper and open it.
- Fully press down the brake lever and fasten it into position with a locking device so as to avoid fluid flowing out from the open system.
- Close the bleed screws of the front calliper and remove the bleed bottle.
- Replace the damaged calliper with a new one.
- Unlock the brake lever.

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- Remove the reservoir cap and fill it with new brake fluid up to the reference "MAX".

CAUTION

PERFORM THE REGULAR BRAKING SYSTEM BLEEDING, AS DESCRIBED AT THE END OF THE CHAPTER.

- Always fill the reservoir up to the reference "MAX" and refit the cap.
- Check the stroke and the sensitivity of both the lever and the brake pedal.
- If, after bleeding, the pedal or the lever stroke is too long, check that there are no leaks in the braking system and if everything is ok, continue bleeding operations using Navigator as described.
- Detach the bleed hoses and close the bleed screws again to the correct tightening torque.

See also

Front
Rear

BLEEDING SYSTEM WITH NAVIGATOR

This type of bleeding has to be carried out if after all the checks the brake lever and the pedal are still spongy.

The operations described here are valid for both systems even though the description refers to the front system.

FRONT

- With Navigator properly connected, select the function "FRONT BRAKE BLEEDING PROCEDURE".
- The pump starts rotating.
- While the pump is performing a rotation cycle, operate and release the front brake lever until the message Navigator cycle completion is received.
- This procedure allows the air to turn and to accumulate.
- Once the procedure with Navigator is finished, perform the REGULAR BLEEDING to remove the air from the system completely.

CAUTION

PERFORM THE REGULAR BRAKING SYSTEM BLEEDING, AS DESCRIBED AT THE END OF THE CHAPTER.

See also

Front
Rear

Front

If there is air in the hydraulic system, it acts as a bearing, absorbing a large part of the pressure from the brake pump and minimising calliper efficiency during braking.

The presence of air is signalled by the "sponginess" of the brake control and by poor braking efficiency.

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CAUTION

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

NOTE

THE FOLLOWING OPERATIONS REFER TO ONLY ONE FRONT BRAKE CALLIPER BUT APPLY TO BOTH CALLIPERS. THE VEHICLE MUST BE ON LEVEL GROUND TO BE PURGED. WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

REGULAR AIR BLEEDING SYSTEM

- 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 bleed valve and remove the pipe.
- Top-up the reservoir until the right brake fluid level is obtained.
- Refit and block the front brake fluid reservoir cap.
- Refit the rubber protection cover.

Rear

Any air trapped in the hydraulic circuit acts as a cushion, absorbing much of the pressure applied by the brake pump and minimising the braking power of the calliper.

The presence of air is signalled by the "sponginess" of the brake control and by poor braking efficiency.

CAUTION

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

NOTE

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

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

REGULAR AIR BLEEDING SYSTEM

- 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 by a 1/4 turn to let the air escape.
- Close the bleed valve before reaching the end of travel of the brake lever, then repeat the operation until air no longer escapes.

- Screw the bleed valve and remove the pipe.
- Top-up the reservoir until the right brake fluid level is obtained.
- Refit and lock the rear brake fluid reservoir cap.
- Refit the protective rubber cap.

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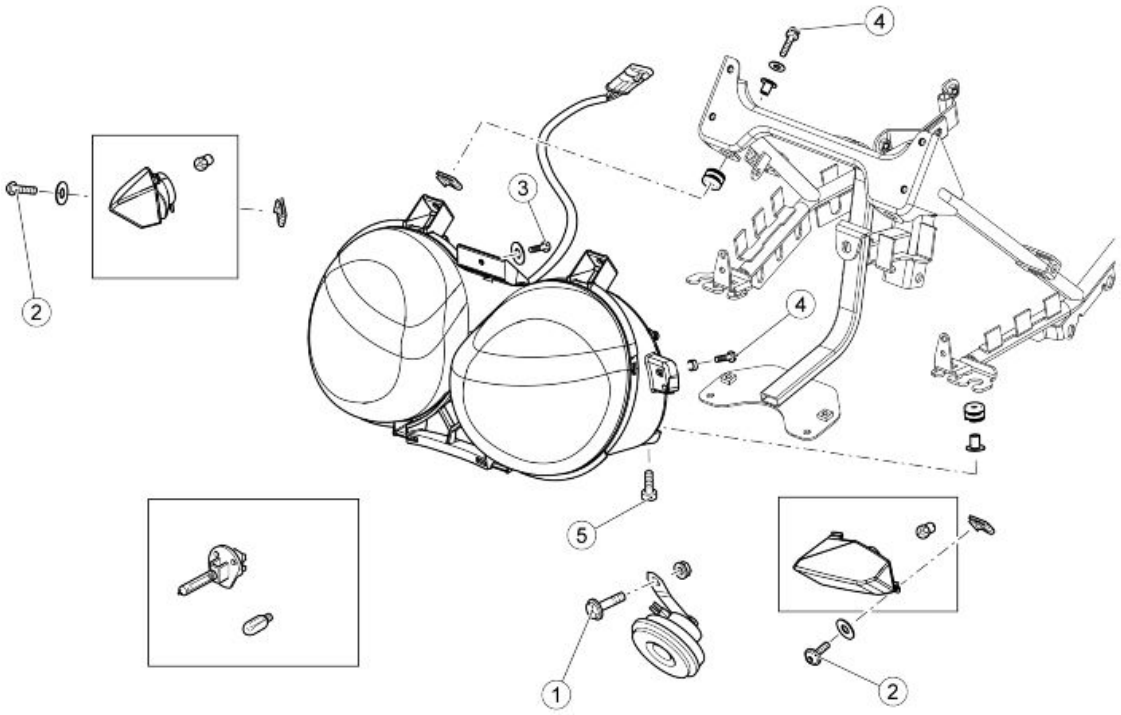
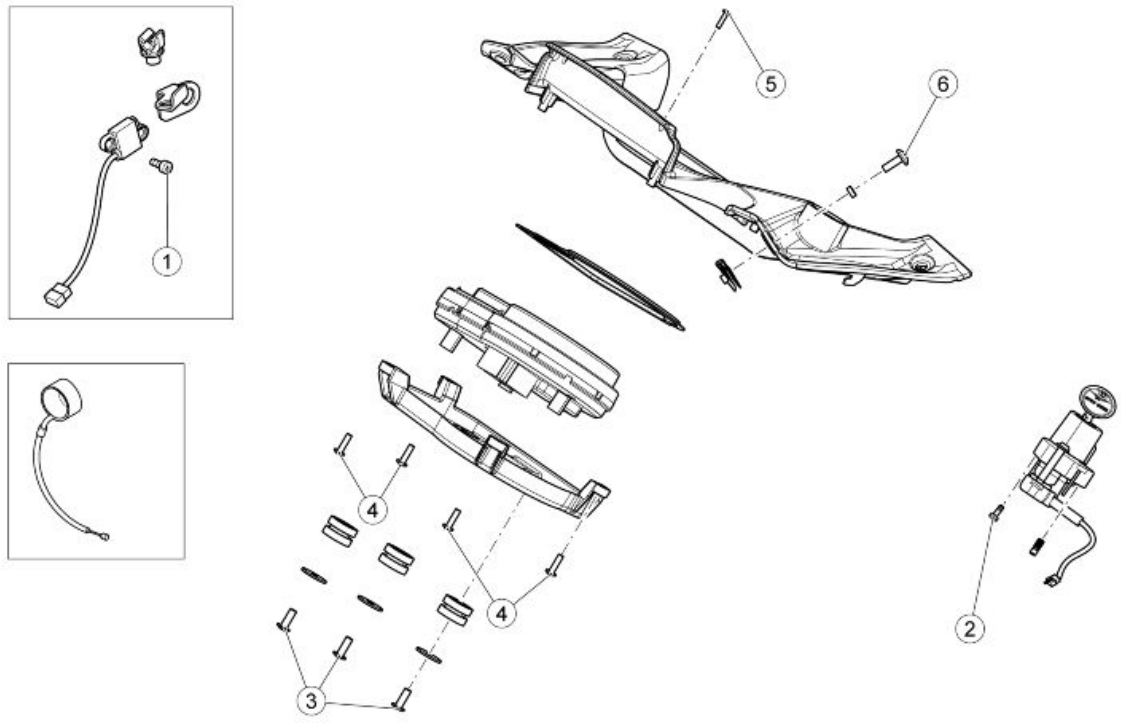


FRONT LIGHTS

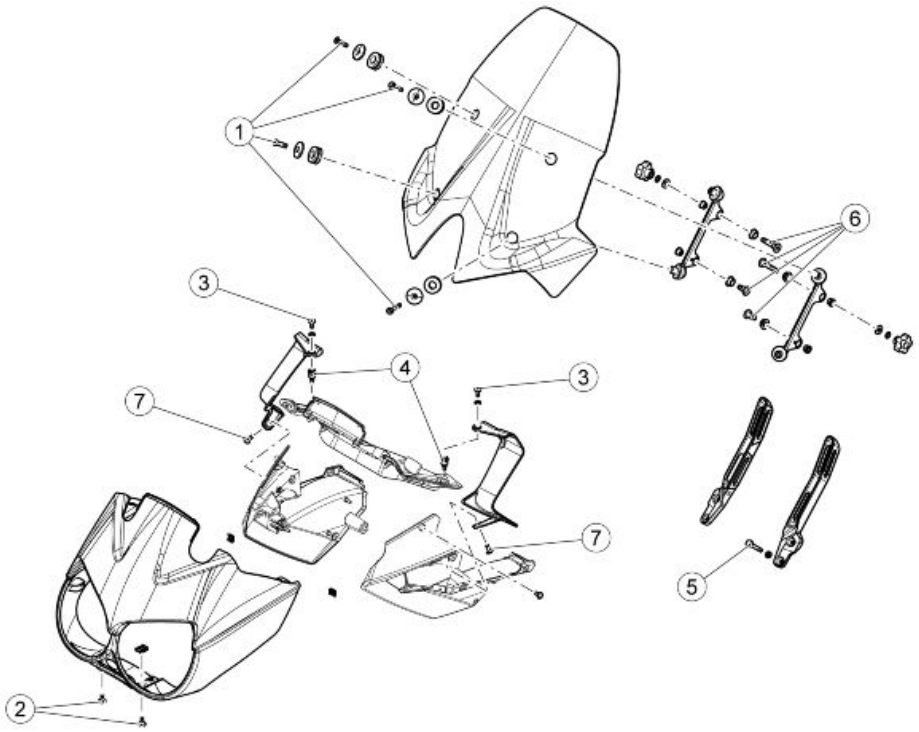
pos.	Description	Type	Quantity	Torque	Notes
1	Horn fixing screw	M6x20	1	15 Nm (11.06 lbf ft)	-
2	Viti fissaggio freccie anteriori	M4	2	3 Nm (2.21 lbf ft)	-
3	Vite fissaggio superiore fanale a carozzeria	M4	1	3 Nm (2.21 lbf ft)	-
4	Viti fissaggio fanale a carozzeria	M4x25	2	3 Nm (2.21 lbf ft)	-
5	Viti TCEI fissaggio fanale a telaietto	M5x25	5	6 Nm (4.42 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

INSTRUMENT PANEL

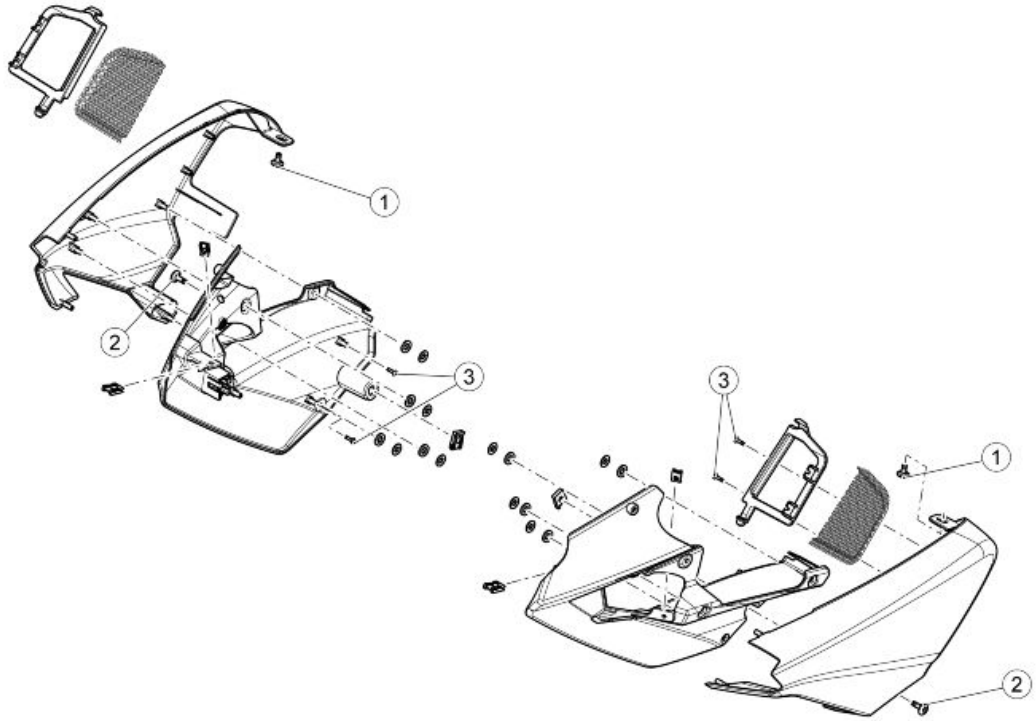
pos.	Description	Type	Quantity	Torque	Notes
1	Viti TCEI fissaggio sensore velocità anteriore	M5x16	2	6 Nm (4.42 lbf ft)	-
2	Viti TCEI fissaggio blocchetto avviamento	M8x30	1	25 Nm (18.44 lbf ft)	-
3	Viti autofil. fissaggio supporto cruscotto	5x14	3	Manual	-
4	Viti autofil. fissaggio supporto cruscotto a cornice	3.9x14	4	Manual	-
5	Viti autofil. fissaggio cornice	-	4	Manual	-
6	Viti TCE	M5	2	6 Nm (4.42 lbf ft)	-



CARROZZERIA ANTERIORE - CUPOLINO

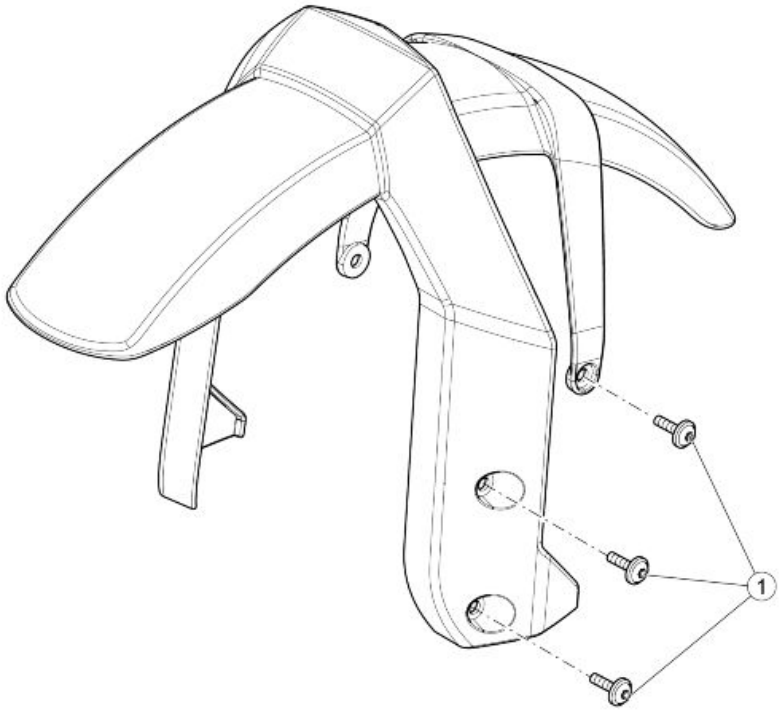
pos.	Description	Type	Quantity	Torque	Notes
1	Viti fissaggio parabrezza	M6	4	10 Nm (7.38 lbf ft)	-
2	Viti TBEI Flang. fissaggio cupolino	M5x12	4	6 Nm (4.42 lbf ft)	-
3	Viti fissaggio deflettori superiori	M5	4	6 Nm (4.42 lbf ft)	-
4	Colonnette fissaggio deflettori	M5	2	6 Nm (4.42 lbf ft)	-
5	Viti TE Flang. fissaggio staffa parabrezza	M6x16	4	10 Nm (7.38 lbf ft)	-
6	Perno filettato fissaggio supporto parabrezza	M8	2	25 Nm (18.44 lbf ft)	-
7	Viti TBEI Flang. fissaggio deflettori inferiori	M5	2	Manual	-

Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten



CARROZZERIA ANTERIORE - CONVOGLIATORI

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio convogliatori	M5x9	2	6 Nm (4.42 lbf ft)	-
2	Viti TBEI Flang. fissaggio convogliatori	M5	2	6 Nm (4.42 lbf ft)	-
3	Viti SWP Autofil. fissaggio telaietto griglie	2.9x12	4	Manual	-



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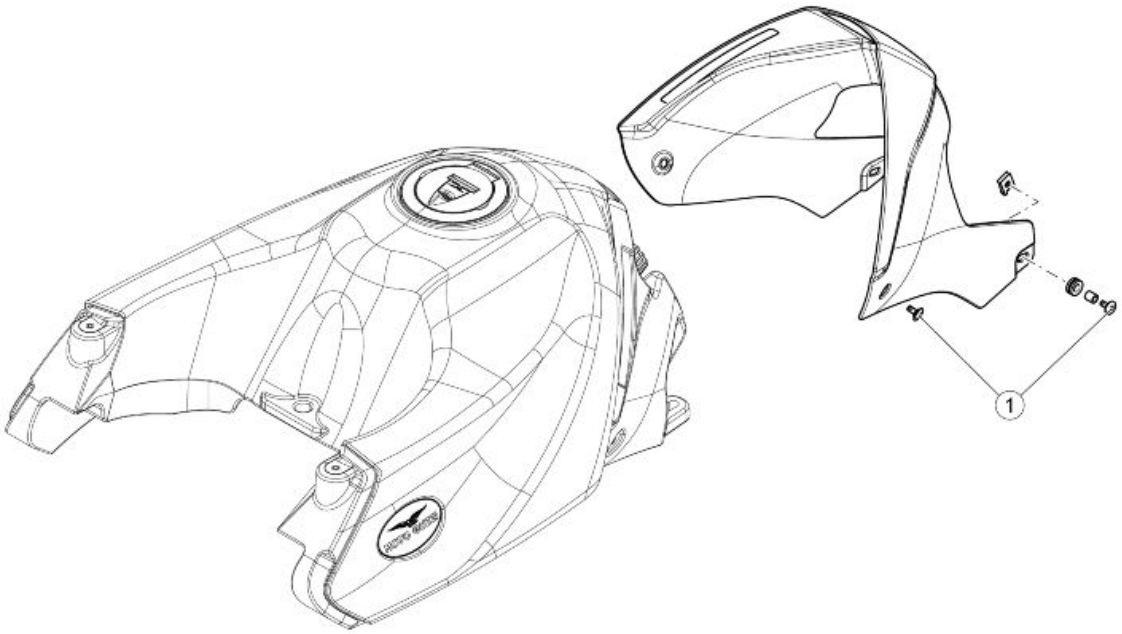
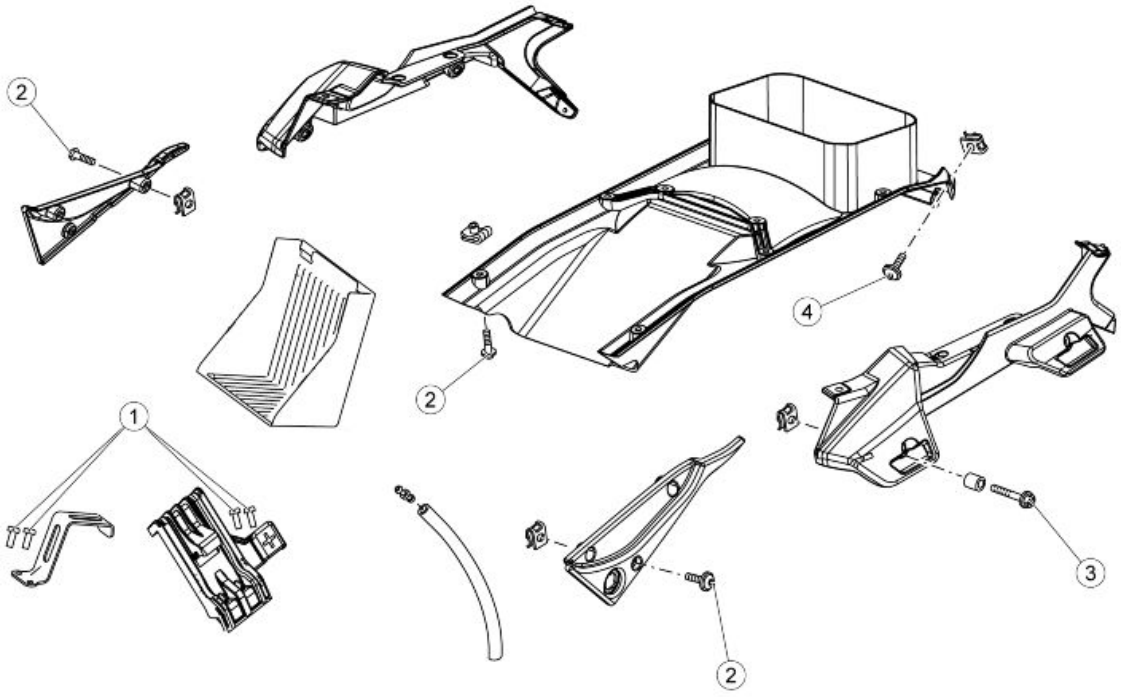
FRONT MUDGUARD

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio parafango anteriore	M5x12	6	6 Nm (4.42 lbf ft)	-



COPERTURA SERBATOIO CARBURANTE

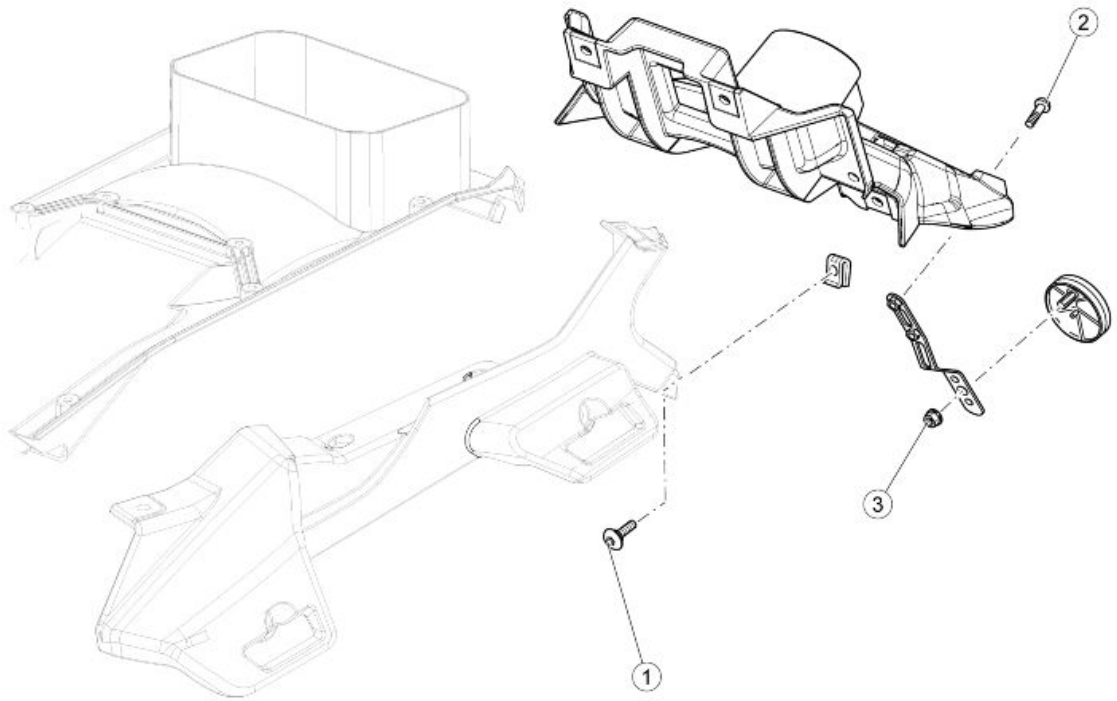
pos.	Description	Type	Quantity	Torque	Notes
1	Vite TBEI Flang. fissaggio copertura	-	4	5 Nm (3.69 lbf ft)	-



Revente Interdite - Revendita Vietata - Resaling Forbiden - Wiederverkauf Verboten

REAR BODYWORK

pos.	Description	Type	Quantity	Torque	Notes
1	Viti SWP fissaggio piastra batteria	M5x20	4	Manual	-
2	Viti TBEI Flang. fissaggio fianchetti e para-spruzzi	M5x9	10	6 Nm (4.42 lbf ft)	-
3	Viti TE Flang. fissaggio supporti valigie	M6	4	10 Nm (7.38 lbf ft)	-
4	Viti TBEI Flang. fissaggio paraspruzzi	M5x12	2	6 Nm (4.43 lbf ft)	-



LICENSE PLATE HOLDER

pos.	Description	Type	Quantity	Torque	Notes
1	Viti TBEI Flang. fissaggio portatarga	M5	2	6 Nm (4.43 lbf ft)	-
2	Viti TBEI speciali	-	2	6 Nm (4.43 lbf ft)	-
3	Dado autobloc. flang. fissaggio catadiottro	M5	1	6 Nm (4.43 lbf ft)	-

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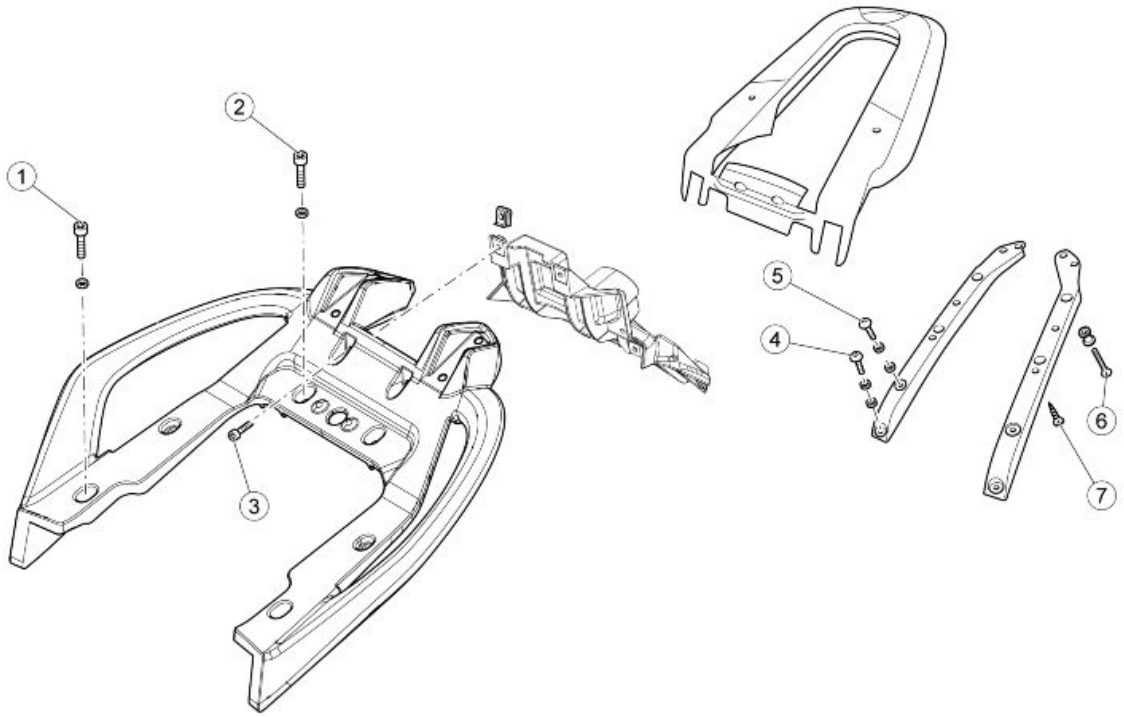
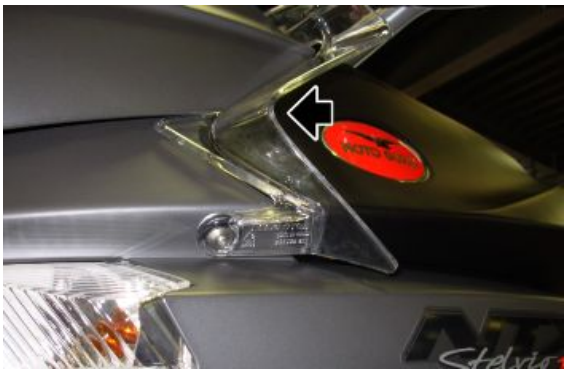


MANIGLIONE E PORTAPACCHI

pos.	Description	Type	Quantity	Torque	Notes
1	Vite TCEI fissaggio maniglione passeggero	M6x25	4	10 Nm (7.38 lbf ft)	-
2	Vite TCEI fissaggio maniglione passeggero	M8	2	25 Nm (18.44 lbf ft)	-
3	Vite fissaggio portatarga a maniglione	M5	2	6 Nm (4.42 lbf ft)	-
4	Vite TBEI fissaggio supporti portapacchi	M8x20	2	25 Nm (18.44 lbf ft)	-
5	Vite TBEI fissaggio supporti portapacchi	M8x30	2	25 Nm (18.44 lbf ft)	-
6	Vite TSPEI fissaggio coperchio portapacchi	M6x35	2	10 Nm (7.38 lbf ft)	-
7	Vite autofil. fissaggio coperchio portapacchi	5	4	Manual	-

Instrument panel

- Rimuovere i deflettori laterali trasparenti.



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- Remove the screws (1).

- Sganciare le estremità della plancia e sollevarla.

- Scollegare il connettore cruscotto (2) e il connettore della presa di corrente (3)

- Remove the instrument panel.

NOTE

FOR REFITTING, FOLLOW THE PROCEDURE IN THE REVERSE ORDER

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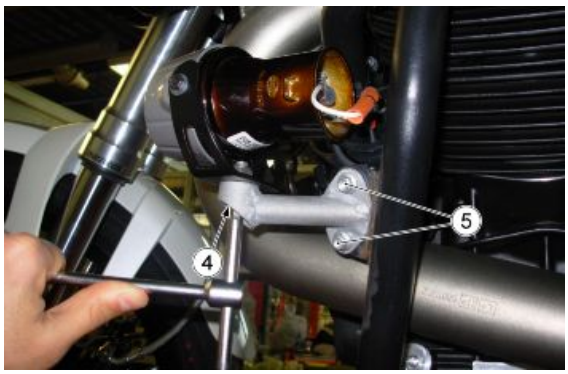
Additional lights

- Liberare i cablaggi dei fari supplementari rimuovendo le fascette (1) sul telaio e scollegare i connettori (2).

- Rimuovere le fascette (3) per liberare completamente il cablaggio dei fari supplementari.

- Svitare a rimuovere la vite (4) recuperando il dado o in alternativa è possibile rimuovere le viti (5) non compromettendo cosi l'angolo di inclinazione dei fasci luminosi.
- Ora è possibile rimuovere i fari supplementari.



NOTE

FOR REFITTING, FOLLOW THE PROCEDURE IN THE REVERSE ORDER

Headlight fairing

- Remove the windshield.
- Remove the control panel.

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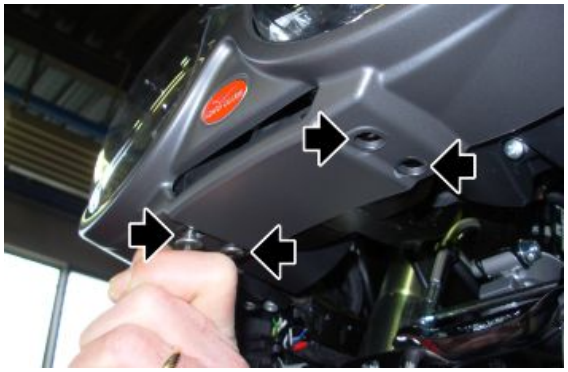
- Rimuovere le quattro viti inferiori.



- Rimuovere le due viti di fissaggio del cupolino al telaietto in corrispondenza delle freccie anteriori.

- Rimuovere le due viti di fissaggio del cupolino al telaietto in corrispondenza del cruscotto.

- Scollegare i connettori dei fari e rimuovere il cupolino.

Rider footrest plate

LEFT SIDE

- Undo and remove the upper screw and collect the washer and the nut.

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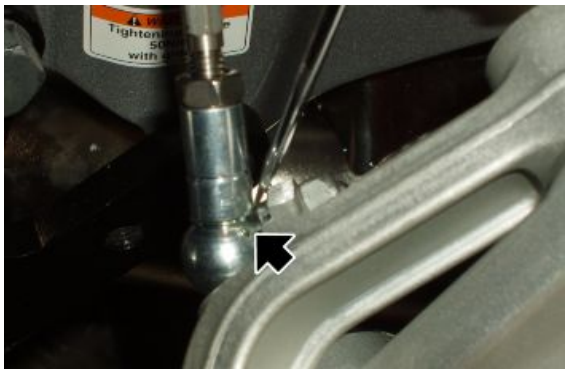
- Undo and remove the lower screw and collect the two washers and the spacer.

- Undo and remove the lower screw and collect the washer and the spacer.

- Disconnect the gearbox rod and release the spring.
- Remove the left footrest holding plate.



RIGHT SIDE

- Undo and remove the upper screw and collect the washer and the nut.

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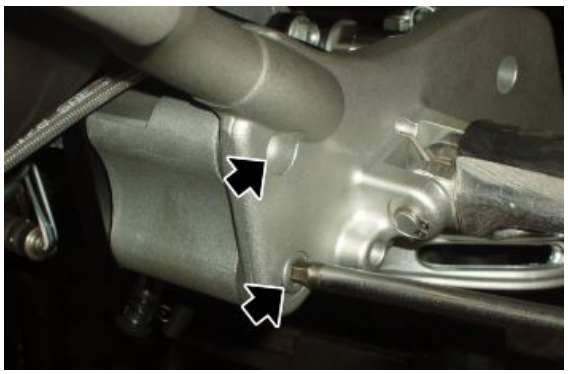
- Undo and remove the front lower screw.

- Undo and remove the three screws.
- Remove the right under seat fairing.

- Disconnect the connectors of the rear brake lever switch and the speed sensor.
- Release the cable harness from the clamps.

- Undo and remove the two rear lower screws; collect the washers and the spacer.



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- Unscrew and remove the screw.
- Detach the rear brake fluid reservoir but keep it connected to the pipe.

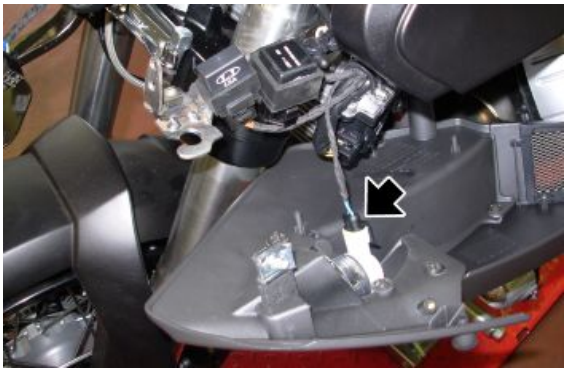
- Remove the right footrest plate, keeping the brake fluid reservoir in vertical position.

Side fairings

- Rimuovere la vite interna prestando attenzione a recuperare la relativa rondella.

- Rimuovere la vite inferiore esterna.

- Scollegare il connettore della freccia anteriore e rimuovere il fianchetto laterale.



CAUTION

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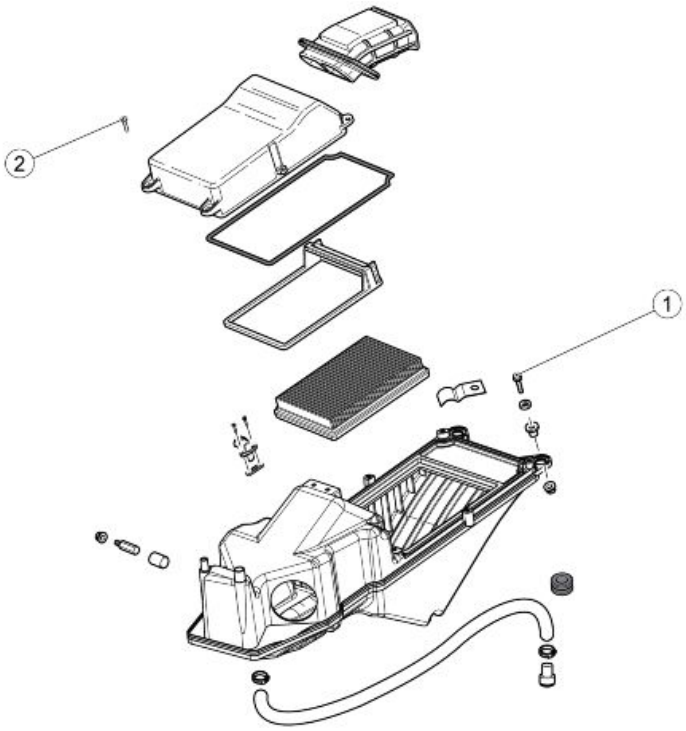
ESEGUIRE LA MEDESIMA OPERAZIONE DI SMONTAGGIO ANCHE PER IL FIANCHETTO OPPOSTO

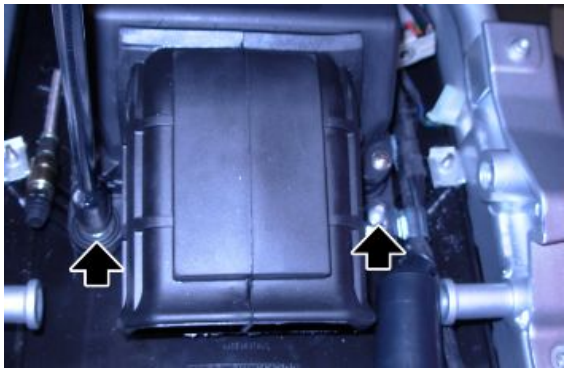
Air box



AIR FILTER

pos.	Description	Type	Quantity	Torque	Notes
1	Vite fissaggio cassa filtro aria a telaio	-	2	10 Nm (7.38 lbf ft)	-
2	Air filter box cover fastening screw	SWP 5x20	6	3 Nm (2.21 lbf ft)	-

- Remove the saddle.
- Remove the passenger grab handle.
- Undo and remove the two screws and collect the cable guide.



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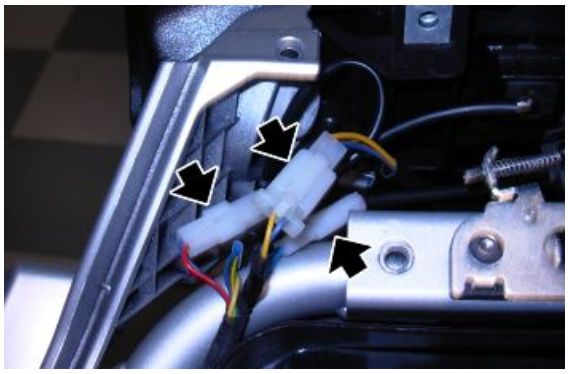
- Disconnect the air temperature sensor connector.

- Slide off and remove the main fuse box from its holder.

- Disconnect the rear light connectors



- Release the clutch bleeding pipe from the cable guide.

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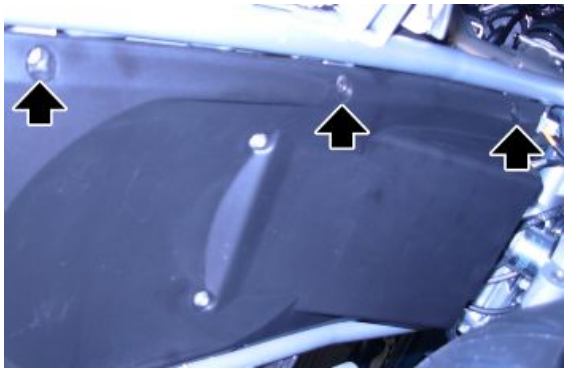
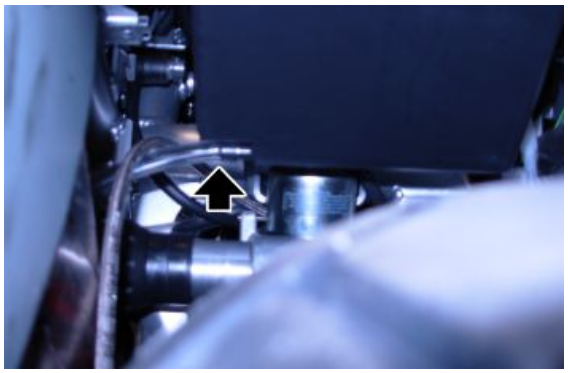
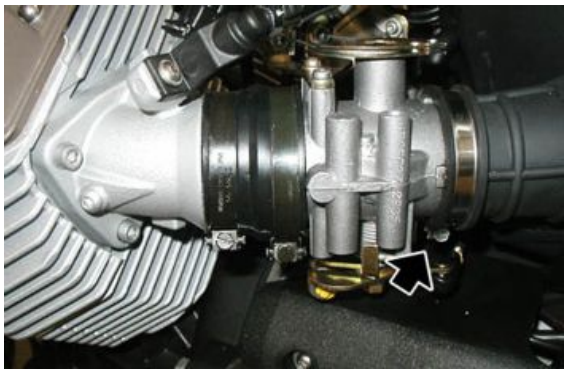
- Operating from both sides, undo and remove the three screws.
- Remove the mudflap.

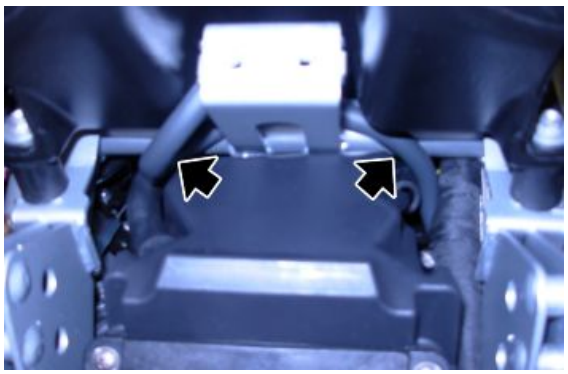


- Release from its and remove the breather pipe placed on the right side of the filter casing.
- Operating on both sides, loosen the clamp.





- Remove the two breather pipes.



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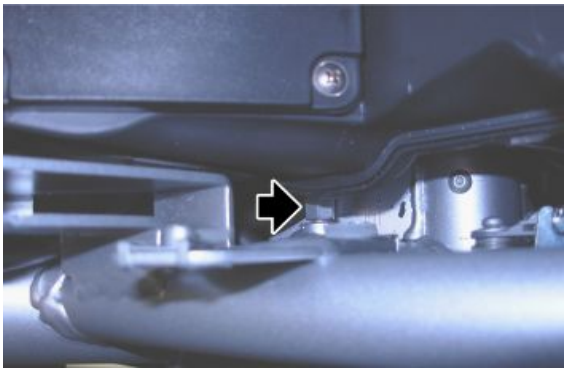
- Operating from both sides, undo and remove the stud bolt.
- Remove the filter casing.



See also

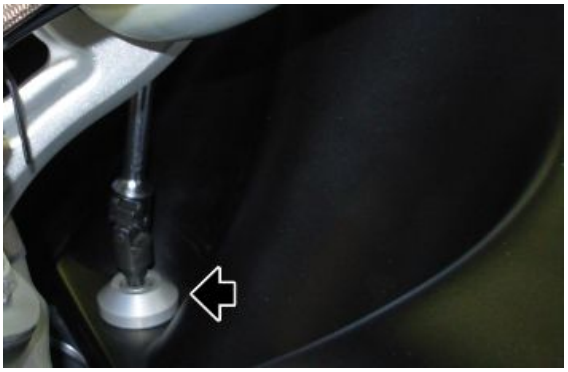
Seat

Fuel tank

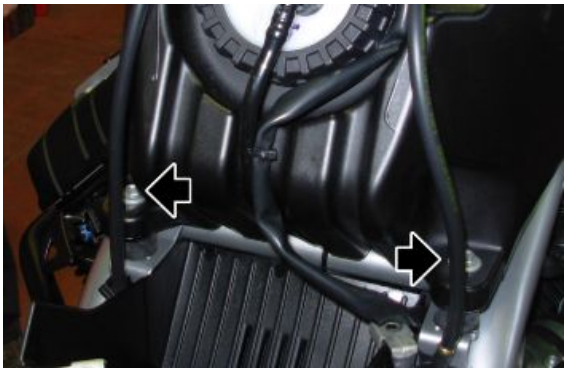
RIMOZIONE COPRI SERBATOIO CARBURANTE

- Rimuovere le viti (1) dal lato destro del motociclo.
- Rimuovere le viti (2) dal lato destro del motociclo.
- Remove the side fairings.
- Remove the control panel.

- Rimuovere la vite anteriore del serbatoio.



- Rimuovere le viti posteriori del serbatoio.



See also

Side fairings

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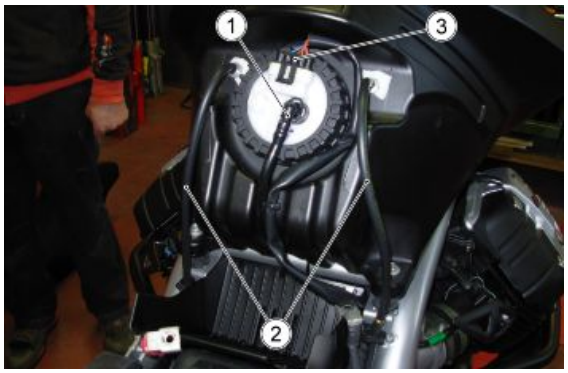
- Scollegare il tubo carburante (1)
- Scollegare i tubi sfiato (2)
- Scollegare il connettore della pompa carburante (3)



- Remove the fuel tank

NOTE

FOR REFITTING, FOLLOW THE PROCEDURE IN THE REVERSE ORDER

Adjustable windscreen

- Remove the windscreen glass.
- Working from both sides, undo and remove the windscreen top set screw and remove the knob.

- Working from both sides, unscrew and remove the lower screw.

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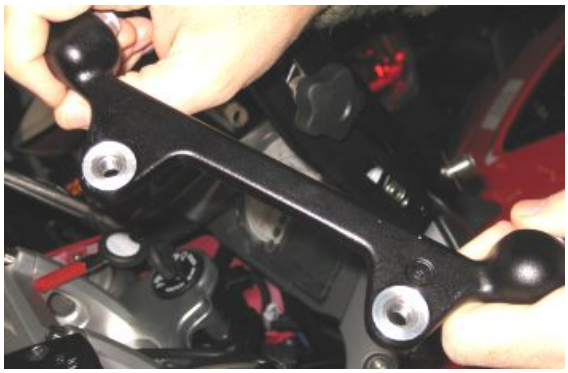
- Working from both sides, remove the windscreen support from the bracket.



- Remove the four bushings from the brackets

If replacing the bushings remember to place them with the larger diameter inside the brackets.

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Carry out the listed checks before delivering the motorcycle.

WARNING

HANDLE FUEL WITH CARE.

Aesthetic inspection

- Paintwork
- Fitting of Plastic Parts
- Scratches
- Dirt

Tightening torques inspection

- Safety fasteners:

front and rear suspension unit

front and rear brake calliper retainer unit

front and rear wheel unit

engine - chassis retainers

steering assembly

- Plastic parts fixing screws

Electrical system

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

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- Through the diagnosis tool, check that the last mapping version is present in the control unit/s and, if required, program the control unit/s again: consult the technical service website to know about available upgrades and details regarding the operation.

CAUTION

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

CAUTION

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

WARNING

THE BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING.
IN CASE OF CONTACT WITH YOUR EYES OR SKIN, WASH WITH ABUNDANT WATER FOR APPROX. 15 MIN. AND SEEK MEDICAL ATTENTION IMMEDIATELY.
IF ACCIDENTALLY SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES. VENTILATE THE AREA WHEN RECHARGING INDOORS. ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN.

CAUTION

NEVER USE FUSES WITH A CAPACITY HIGHER THAN THE RECOMMENDED CAPACITY. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE VEHICLE OR EVEN CAUSE A FIRE.

Levels check

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

Road test

- Cold start
- Instrument panel operation

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- Response to throttle control
- Stability when accelerating and braking
- Front and rear brake efficiency
- Front and rear suspension efficiency
- Abnormal noise

Static test

Static check after test drive:

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

Functional inspection

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

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES AS TYRES MAY BURST.

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

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