



Motorcycle Art

BRUTALE



MV AGUSTA BRUTALE 990 R - 1090 RR

Motorcycle Workshop Manual

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BRUTALE

The logo features a stylized 'MV' in a bold, italicized font, followed by the word 'AGUSTA' in a similar bold, italicized font. A horizontal line with a star-like shape at its center is positioned between the 'MV' and 'AGUSTA' parts of the logo.

MVAGUSTA



Statement

This manual, to be used by the MV Agusta authorised workshops has been realised with the purpose of assisting authorised personnel in maintenance and repairs operations of the motorcycle. The knowledge of technical data herein noted, determines the complete professional training of the technician.

With purpose of making the reading of this manual immediately comprehensible, the paragraphs have been aligned with detailed illustrations that highlight the argument dealt with.

Useful advice

To prevent any problems and to reach an excellent final result, MV Agusta recommends keeping to the following guidelines:

- In the case of an eventual repair, evaluate the client's impressions who states that there is an abnormal functioning of the motorcycle and to formulate the right questions to clarify the symptoms of the problem.
- Clearly diagnose the cause of the abnormality. The basic fundamental theories can be absorbed by reading this manual that must necessarily be integrated to the personal experience and the participation of training courses that are periodically organised by MV Agusta.
- Rationally plan the repair to avoid slack periods, e.g. the collection of spare parts, the preparation of tools and equipment, etc.
- To reach the part to be repaired limiting the work to the essential operations.
With regards to this, a valid help would be to consult this manual with regards to the sequences of removal demonstrated in this manual.

Informative note

MV Agusta S.p.A. is committed to a policy of continuous improvement of their products. For this reason, there could be slight differences between that which is written here and the motorcycle on which repairs and/or maintenance are about to be carried out. MV Agusta models are exported to many countries where different norms in relation to the highway code and homologation procedures are valid. Hoping that you will comprehend these problems, MV Agusta S.p.A. reserves the right to make modifications to its products and technical documentation at any moment and without prior announcement.



Respect and defend the environment

Everything that we do has repercussions on the entire planet and its resources.

MV Agusta, wanting to protect the interest of the people, would like to make the client and the technicians of the technical assistance centres aware and to adopt modalities of use of the motorcycle and the disposal of its parts in full respect of the norms in force in terms of environmental pollution, disposal and the recycling of waste.



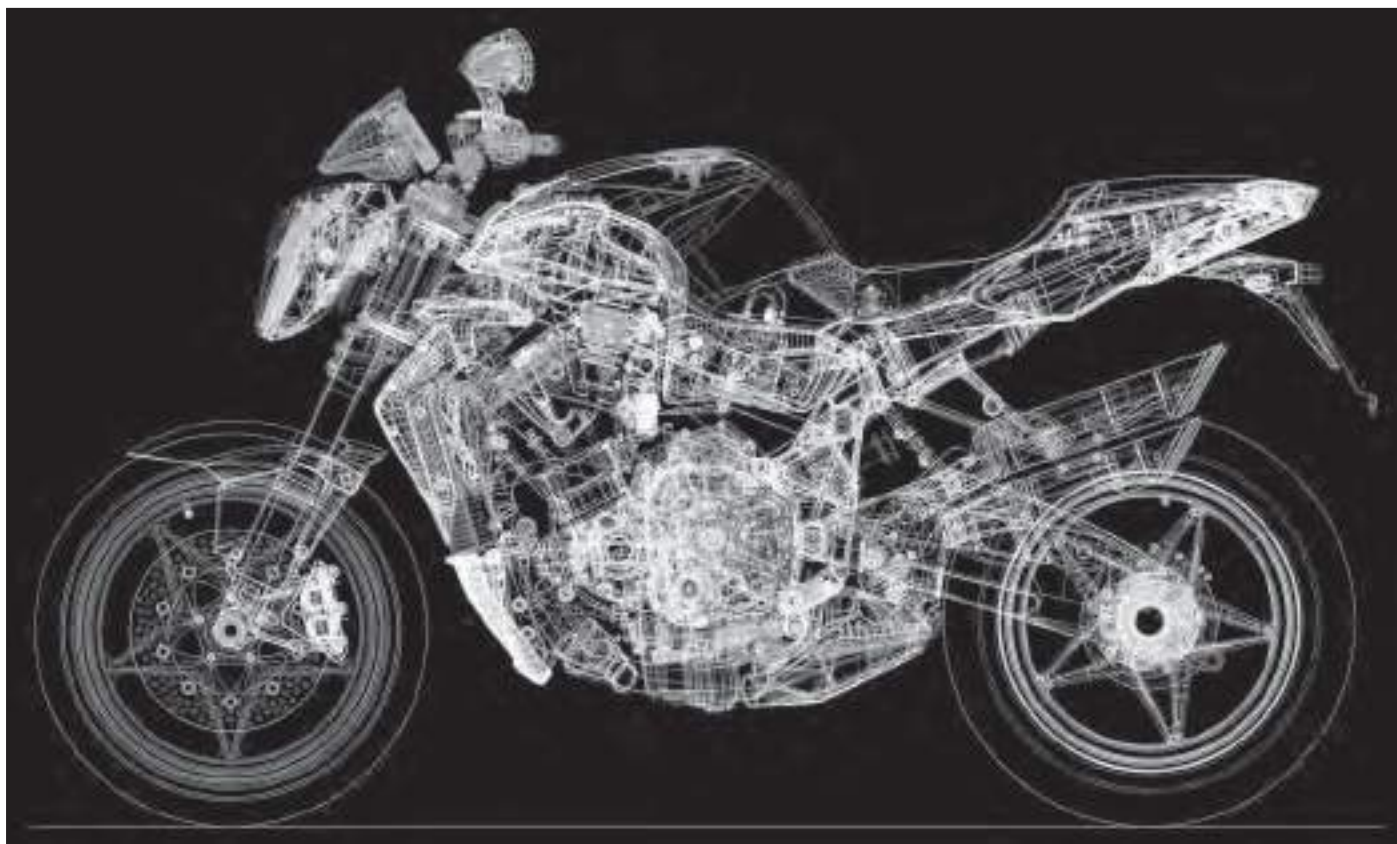
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General description

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SECTION A
Revision 0



General description

A

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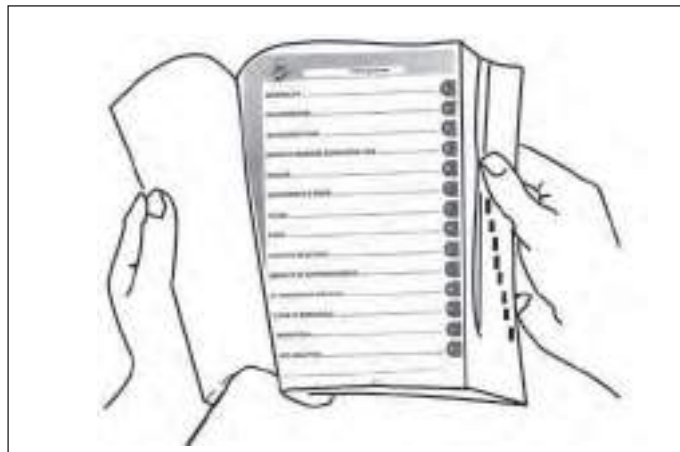
General description

HOW TO CONSULT THIS MANUAL

Order of the subjects

This manual is divided into chapters that deal with the sub-groups of the motorcycle.

To quickly find the chapter required, the pages of each chapter are marked with a reference mark aligned to the relative item in the general index..



Display of the operations

The operations of disassembly, assembly, removal and control are presented with the help of illustrations (designs and photographs).

The illustrations contain symbols that indicate the procedure, special tools and other information. See the symbols lists for their significance.

The procedures are described step after step.

EXAMPLE

Steering pin tightening

Screw in the steering pin flange ring, without tightening.

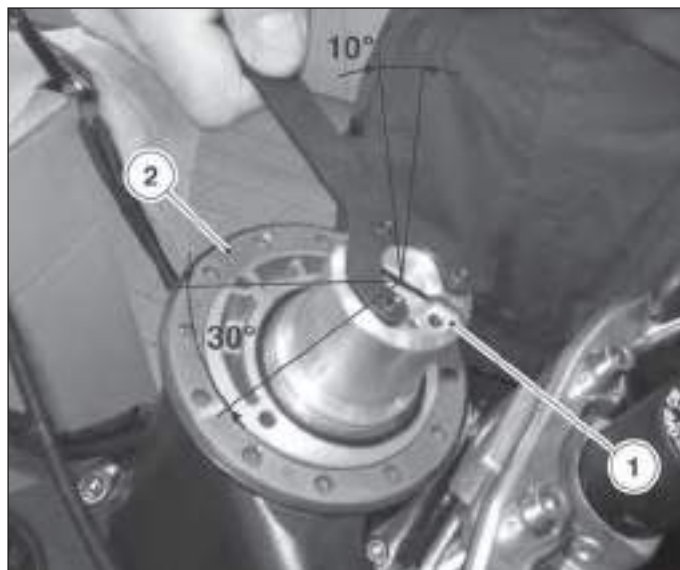
This operation must be done manually.

Check that the steering base is at the end of its travel, to the right.

Using the special tool tighten the ring (1) by rotating it 10° calculated approximately as **one third** of the movement between the two holes of the ring (2) of the steering head (see the figure).



Specific tool N. 800091645



PURPOSE OF THE MANUAL

Principally, this manual has been written for MV Agusta dealers and qualified mechanics.

It is not possible to document all the knowledge necessary for a mechanic in a manual. Those who utilise it must have a basic knowledge of mechanical concepts and the inherent procedures in the techniques of repairing motorcycles. Without this knowledge, The maintenance and repair operations can render the motorcycle unsafe for use.

Updates



















MV Agusta S.p.A. is committed to a policy of continuous updating of the models produced. The modifications and significant changes to the specifications and the procedures will be communicated to the official dealers and will appear in future editions of this manual.

All information, instructions and technical data included in this manual are based upon information on the product updated at the moment of going to print. MV Agusta S.p.A. reserves the right to carry out changes at any moment without prior notice and without incurring any obligation.



General description

A GLOSSARY AND SYMBOLS

- ▶  **ATTENTION** This signifies that the lack of or the incomplete observance of this advice can be gravely dangerous for your safety and for the safety of other persons.
- ▶  **WARNING** This signifies that the lack of observance of these instructions can bring the risk of damage to the motorcycle and the equipment.
- ▶ **N.B.** Supplies key information for the best fulfilment of the operation.
- ▶  Utilise a specific tool or equipment for the correct carrying out of the operation described.
- ▶  Tighten to the specified torque.
- ▶  Tolerance or limit of use.
- ▶  Utilise the tester.
- ▶  Use the recommended oil.
- ▶  Use the recommended grease.
- ▶  Use the recommended brake fluid
- ▶  Use the recommended suspension fluid.
- ▶  Use the recommended coolant.
- ▶  Use the recommended thread-locking fluid.
- ▶  Use the recommended sealant.
- ▶  Use the recommended sealant.
- ▶  Carry out accurate cleaning.
- ▶  Use new components.
- ▶  Substitute the component.
- ▶  Do not leave litter about.

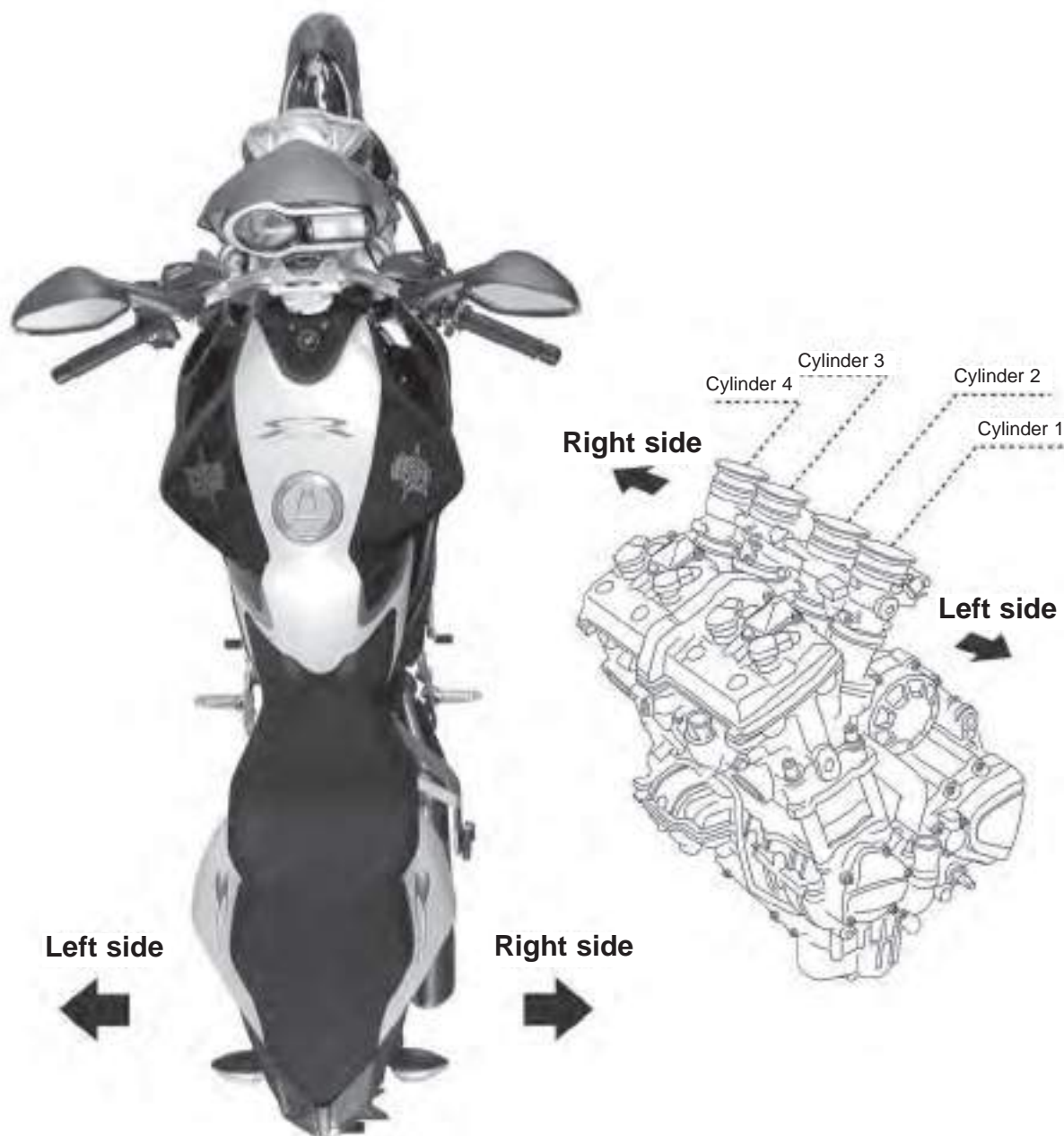


General description

RIGHT HAND AND LEFT HAND STANDARD

In order to specify the right/left convention used within the chapters of this manual, see the following motorcycle and engine scheme where all sides which refer to are reported.


A





General description

A SAFETY

 **ATTENTION** The information contained in this paragraph is fundamental so that the operations carried out on the motorcycle can be conducted with minimum risk to the mechanic.

Carbon Monoxide

- Exhaust gases contain carbon monoxide (CO) that is poisonous. Carbon monoxide can cause the loss of consciousness and death.
- If it is necessary to switch on the engine, check that the environment is well ventilated. Never switch on the engine in an enclosed environment.
- Switching on the engine can only be carried out in an enclosed environment when there are the appropriate devices for the evacuation of exhaust gases.

Petrol

- Petrol is extremely inflammable and under certain conditions can be explosive.
- Keep sources of heat, sparks and flames away from the work area.
- Always work in a well-ventilated area.
- Never use petrol as a cleaning solvent. Generally, avoid handling it unless it is absolutely necessary.
- Do not use petrol for cleaning components by using compressed air.
- Keep petrol out of reach of children.

Engine oil

- Engine oil can cause skin illnesses if in constant and long contact with the skin.
- If the skin comes into contact with engine oil, wash the parts affected as soon as possible with soap and water.
- If engine oil comes into contact with the eyes, abundantly rinse with water and consult a doctor immediately.
- If engine oil is swallowed, do not provoke vomiting to avoid the aspiration of the product into the lungs. Transport the injured person immediately to hospital.
- Used oil contains dangerous substances and poisonous for the environment. To substitute oil, it is recommended to go to an authorised MV Agusta dealer who is equipped to deal with the collection of used oil in respect of the norms in force.
- Do not dispose of used oil in the environment.
- Keep used oil out of the reach of children.

Engine coolant

- Under certain situations, the ethylene glycol contained in the engine coolant is inflammable and its flame is invisible. Ethylene glycol would cause serious burns if ignited because it is invisible.
- Avoid bringing the engine coolant into contact with hot parts. Such parts could be sufficiently hot to ignite the coolant.
- The engine coolant (ethylene glycol) can cause irritation of the skin and is poisonous if swallowed.
- If the engine coolant comes into contact with the skin, immediately remove any contaminated clothing and wash with soap and water. If it comes into contact with the eyes, abundantly rinse with clean water and immediately consult a doctor. If swallowed, do not provoke vomiting to avoid the aspiration of the product into the lungs. Administer clean water and transport the injured person immediately to hospital and show the product to the doctor.
- If exposed to high concentrations of vapour, transport the injured person to a non-poisonous atmosphere and if necessary call a doctor.
- Do not remove the radiator cap when the engine is still hot. Being under pressure, the engine coolant can be violently ejected and therefore provoke burns.
- The engine coolant contains dangerous and poisonous substances and is therefore dangerous for the environment. To substitute used engine coolant, it is advisable to go to the authorised MV Agusta dealer who is equipped to deal with the collection of used engine coolant in respect of the norms in force.
- Do not dispose of engine coolant in the environment.
- Keep engine coolant out of reach of children.



General description

A

Brake fluid

- Brake fluid is extremely corrosive.
- Avoid any contacts with the eyes, skin and the mucous membrane.
- If brake liquid comes into contact with the skin, remove all contaminated clothing and wash immediately with soap and water.
- If brake fluid comes into contact with the eyes, abundantly rinse with water and call a doctor.
- If swallowed, do not provoke vomiting to avoid aspiration of the product into the lungs. Immediately call a doctor.
- Take the injured person immediately to hospital, if he has breathed brake fluid into the lungs.
- In the case of exposure to high concentrations of vapour, move the injured person to a non-poisonous atmosphere and if necessary call a doctor.
- In the case of accidental contact, rinse abundantly with water and call a doctor.
- Keep brake fluid out of reach of children.

Thread-locking fluid

- As it is not classified as dangerous, the prolonged contact with the skin, particularly with regards to abrasions can provoke sensitiveness and dermatitis. In the case of contact with the skin, rinse abundantly with running water.
- Move the injured person into the open air and call a doctor if the injured person feels ill after having breathed in the product.
- In the case of contact with the eyes, rinse abundantly with water for at least 15 minutes.
- If the thread-locking fluid has been swallowed, drink an abundant quantity of water or milk. Do not provoke vomiting to avoid the aspiration of the product into the lungs. Immediately call a doctor.
- Keep out of reach of children.

Nitrogen - rear shock absorber

- The rear shock absorber contains nitrogen under pressure.
- Before disposing of used shock absorbers, discharge the nitrogen via the depressurising valve.
- Utilise only nitrogen to pressurise the shock absorber. The use of unstable gases can cause explosions that could cause burns.
- Do not place the shock absorber near to flames or sources of heat as this could cause explosions with consequent burns.
- Keep out of reach of children.

Battery

- The battery produces explosive gases. Keep it away from sparks, flames or cigarettes. During recharging, adequately ventilate the environment.
- The battery contains a solution of sulphuric acid (electrolyte).
- Sulphuric acid is corrosive and it destroys many materials and clothing. On contact with small quantities of water it generates a violent reaction that manifests itself by creating large quantity of heat and spurts of hot acid. Sulphuric acid attacks many metals thereby liberating hydrogen: an inflammable gas that forms an explosive mixture when mixed with air.
- Contact with sulphuric acid can cause burns. In the case of contact, remove immediately all contaminated clothing and wash the skin with abundant quantities of water. Take the injured person to hospital if necessary.
- In the case of contact with the eyes, rinse immediately with abundant water. Call a doctor and continue with the treatment until the doctor arrives.
- If the electrolyte is swallowed, rinse the mouth with water without swallowing. Take the injured person immediately to hospital and explain to the doctor there what the injured person has swallowed.
- The battery contains dangerous substances that are poisonous for the environment. It is advisable to substitute it at an MV Agusta dealer that is equipped to dispose of this product in respect of the norms in force.
- Do not dispose of used batteries in the environment.
- Keep out of reach of children.

Hot parts

- The engine and the exhaust system become very hot and maintain this temperature for some time after the engine has been switched off. Wait for these parts to cool down before handling them or working on the motorcycle near to them. Use protective gloves.



General description

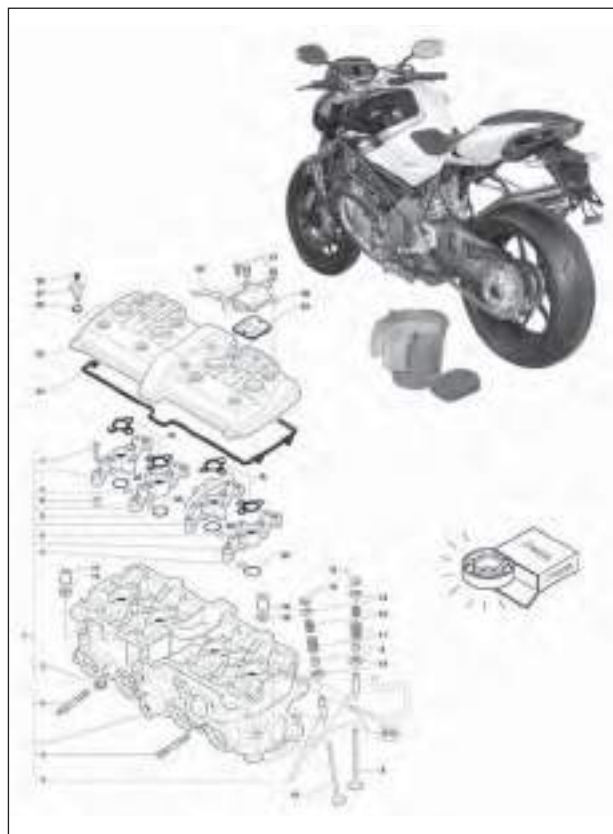
A AVVERTENZE



WARNING

The information contained in this paragraph is important so that the operations carried out on the motorcycle can be conducted without damaging the motorcycle.

- Thoroughly clean the motorcycle before disassembling it.
- During disassembly, clean all parts and place them in containers respecting exactly the order of disassembly.
- Always use the special utensils where necessary and each time where prescribed.
- Always use adhesives, sealants and lubricants where prescribed. Respect the instructions about their technical characteristics.
- Always substitute parts such as gaskets, O-rings, security washers with new parts.
- Loosening and tightening nuts or screws, always start from the bigger ones or the centre. Always comply with the torque wrench settings.
- Utilise only MV Agusta spare parts.



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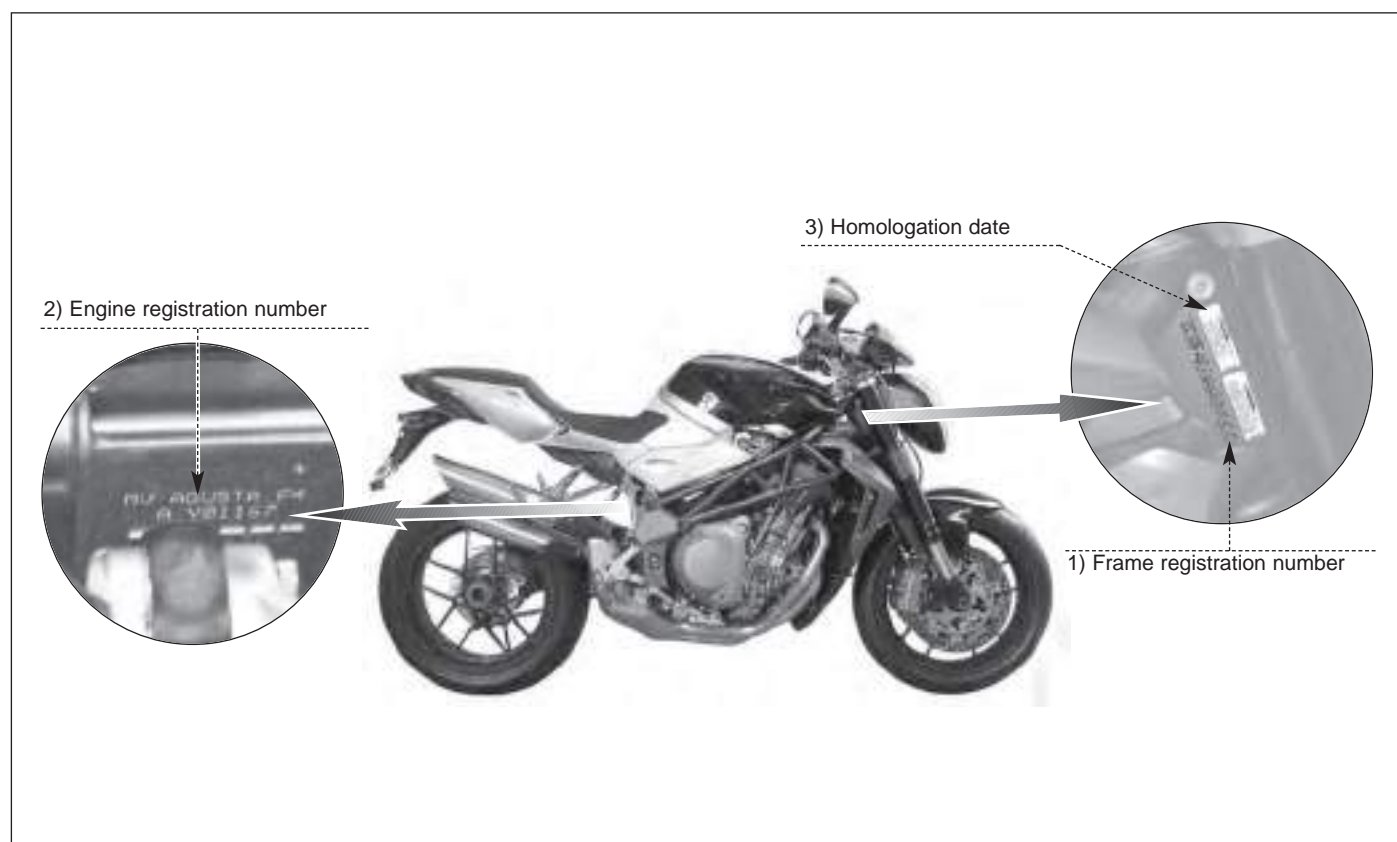
OPERATIVE TECHNICAL SPECIFICATIONS

MOTORCYCLE IDENTIFICATION

- 1) Frame registration number
- 2) Engine registration number
- 3) Homologation date

The registration number of the motorcycle is stamped on the right side of the steering head.

The engine part number is stamped on the top half casing near the fork.



Below is an example of the designation of the frame registration number:

ZCG B5 10 AA Y V 000000

Manufacturer identification ———

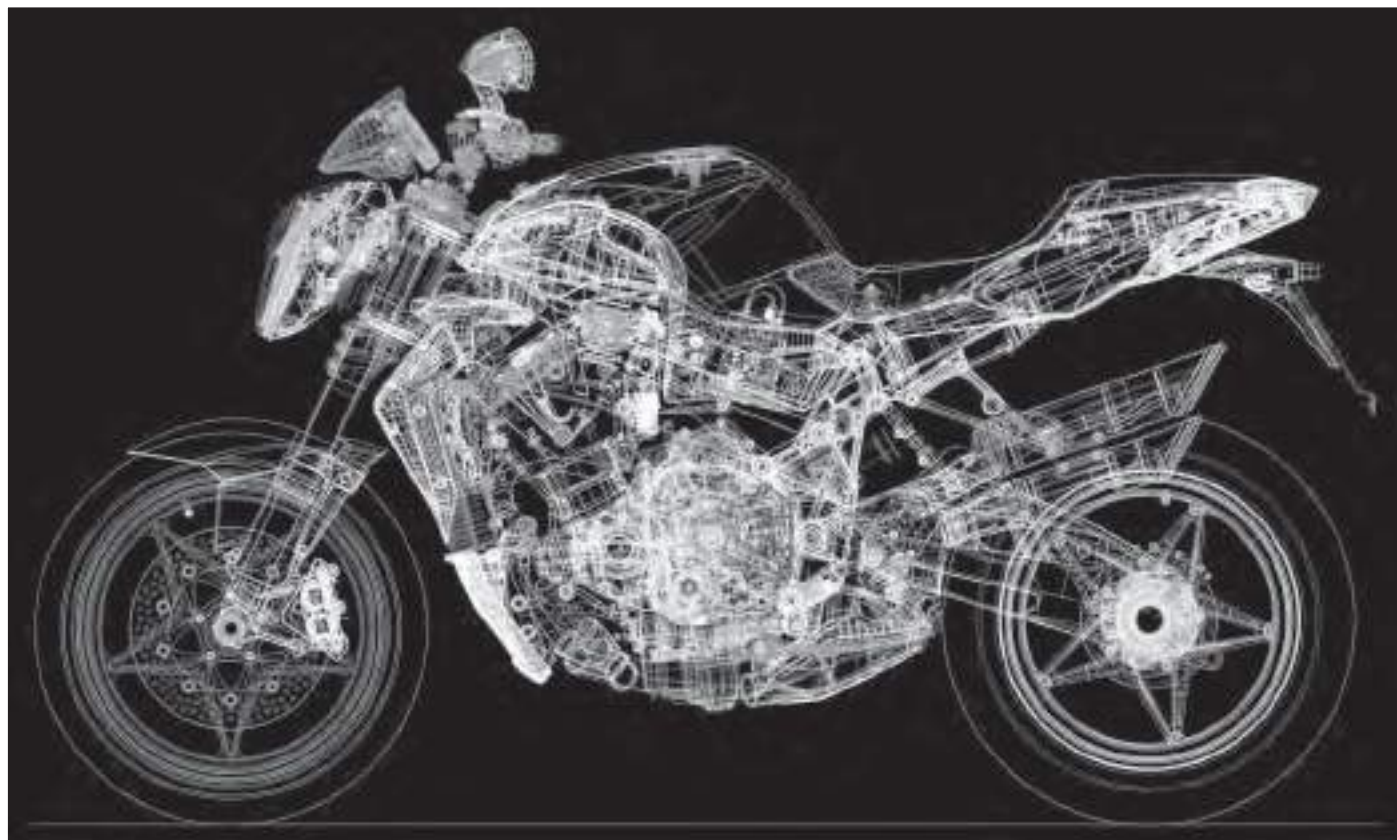
Vehicle model ———

Progressive frame number ———



General description

A



SECTION B

Revision 1



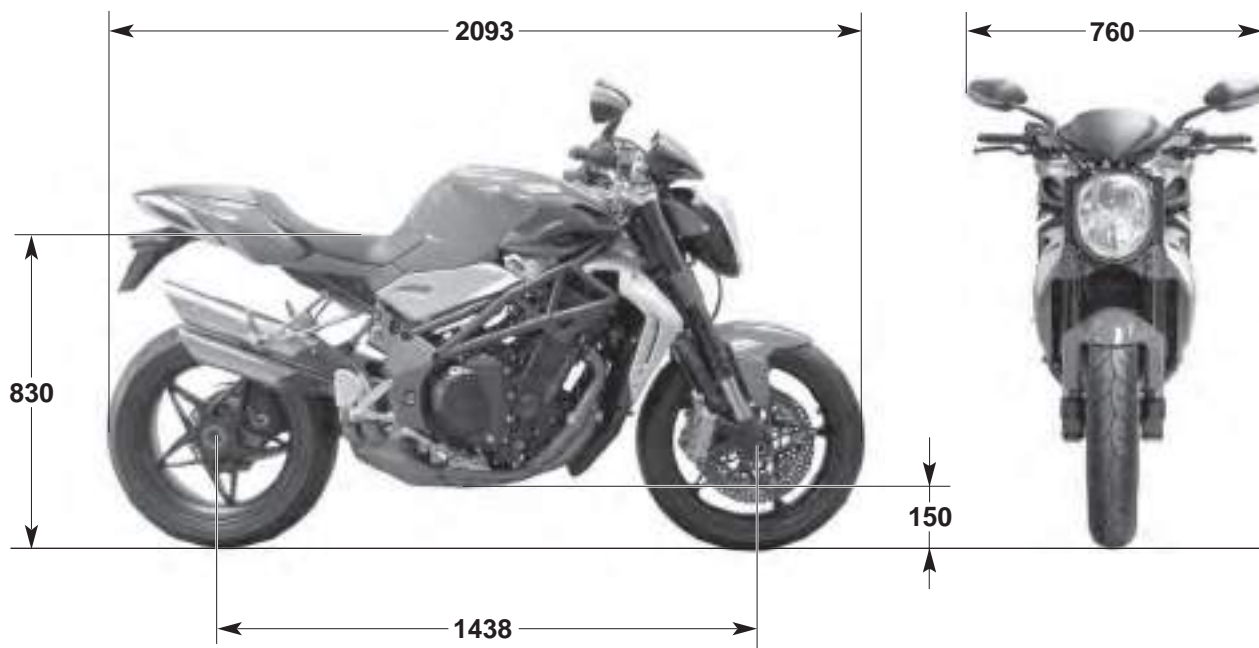
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Maintenance

TECHNICAL INFORMATION



TECHNICAL DATA

Description	BRUTALE 990 R	BRUTALE 1090 RR
CHARACTERISTICS		
Wheelbase (mm) (*)	1438	1438
Total length (mm) (*)	2093	2093
Maximum width (mm)	760	760
Seat height (mm) (*)	830	830
Ground clearance (mm) (*)	150	150
Trail (mm) (*)	103,5	103,5
Dry weight (kg)	190	190
Fuel tank capacity (lt) (**)	23	23
Fuel reserve (lt) (**)	4	4
Sump oil quantity (kg)	3,5	3,5
ENGINE		
Type	4 Stroke four cylinder, 16 valves	
Bore (mm)	76,0	79,0
Stroke (mm)	55,0	55,0
Displacement (cm ³)	998	1078
Compression ratio	13 : 1	13 : 1
Starter system	Electrical	
Cooling	Cooling with separate liquid and oil radiators	
Engine casing and covers	Die-cast	
Cylinder head and cylinders	Chill-cast	
Valves	Bi-metal / mono-metal	

* : The data declared are not binding. They are susceptible to variations due to riding conditions.

** : The data declared are not binding. They are susceptible to variations due to external temperature, engine temperature and the evaporation point of the petrol used.



Maintenance

TECHNICAL DATA

Description	BRUTALE 990 R	BRUTALE 1090 RR
TIMING		
Type	D.O.H.C. radial valves	D.O.H.C. radial valves
LUBRICATION		
Type	Wet sump	Wet sump
IGNITION – FUEL FEED SYSTEM		
Type	Magneti Marelli 5.SM starter-injection system with Mikuni throttle body Induction-discharge electronic starter, "Multipoint" phased sequential electronic injection	
Spark plugs (alternatively)	NGK CR9 EB	NGK CR9 EB
Spark gap (mm)	0.7 ÷ 0.8	0.7 ÷ 0.8
CLUTCH		
Type	Multiple-disc in oil bath	Multiple-disc in oil bath with anti-surgin device
PRIMARY TRANSMISSION		
N° teeth - engine crankshaft gear	Z = 50	Z = 50
N° teeth - clutch gear	Z = 79	Z = 79
Transmission ratio	1.58	1.58
SECONDARY TRANSMISSION		
N° teeth – pinion wheel	Z = 15	Z = 15
N° teeth – crown wheel	Z = 41	Z = 41
Transmission ratio	2.73	2.73
GEAR CHANGE		
Type	Extractable six speed, with gearing always inserted	
Gear ratios (total ratios)		
First	2.92 (12.59)	2.92 (12.59)
Second	2.12 (9.14)	2.12 (9.14)
Third	1.78 (7.68)	1.78 (7.68)
Fourth	1.50 (6.47)	1.50 (6.47)
Fifth	1.32 (5.69)	1.32 (5.69)
Sixth	1.21 (5.22)	1.21 (5.22)
FRAME		
Type	Tubular framework in wire-drawn steel tubes 25 CrMo (TIG welding)	
Swingarm fulcrum plates	Aluminium alloy	Aluminium alloy
FRONT SUSPENSION		
Type	Hydraulic telescopic forks with the stems positioned upside down, equipped with a system of external adjustment for extension, compression and spring preload	
Ø stems (mm)	50	50
Telescopic movement (mm)	125	125
REAR SUSPENSION		
	Progressive, single shock absorber with rebound damping and spring preload adjustment	Progressive, single shock absorber with adjustable rebound and compression (high/low speed) damping and spring preload
Swingarm	Aluminium alloy	Aluminium alloy
Wheel travel (mm)	120	120
FRONT BRAKE		
Type	Dual floating disc with steel braking band	
Ø discs (mm)	310	320
Disc flanges	Steel	Aluminium
Calipers (Ø pistons mm)	Radial-type, 4-piston (Ø 32)	Radial monobloc with 4 pistons (Ø 34)
REAR BRAKE		
Type	Single steel disc	Single steel disc
Ø discs (mm)	210	210
Calipers (Ø pistons mm)	4-piston (Ø 25.4)	4-piston (Ø 25.4)
FRONT WHEEL		
Material	Aluminium alloy	Aluminium alloy
Dimensions	3.50" x 17"	3.50" x 17"
REAR WHEEL		
Material	Aluminium alloy	Aluminium alloy
Dimensions	6.00" x 17"	6.00" x 17"
TYRES		
Front	120/70-ZR 17 (58 W)	120/70-ZR 17 (58 W)
Rear	190/55-ZR 17 (75 W)	190/55-ZR 17 (75 W)
Brand and type	PIRELLI - Diablo Corsa III PIRELLI - Diablo Rosso	PIRELLI - Dragon Supercorsa Pro DUNLOP - Sport Max Qualifier RR
Tyre pressures (*)		
Front	2.3 bar (33 psi)	2.3 bar (33 psi)
Rear	2.3 bar (33 psi)	2.3 bar (33 psi)

* :In the event of different make tyres being used as opposed to those advised, refer to the pressure values marked on the side of the tyre by the manufacturer.



Maintenance

TECHNICAL DATA

Description	BRUTALE 990 R	BRUTALE 1090 RR
ELECTRICAL SYSTEM		
Voltage	12 V	12 V
Front dipped beam light bulb	12 V - 55 W	12 V - 55 W
Front main beam light bulb	12 V - 55 W	12 V - 55 W
Rear parking light	12 V - 5 W	12 V - 5 W
Battery	12 V - 8.6 Ah	12 V - 8.6 Ah
Alternator	350 W at 5000 rpm	350 W at 5000 rpm
BODYWORK		
Tank	Thermo-plastic material	Thermo-plastic material
Air filter compartment conveyors	Thermo-plastic material	Thermo-plastic material
Tank side panel	Thermo-plastic material	Thermo-plastic material
Tail unit rear side panel	Thermo-plastic material	Thermo-plastic material
Tail unit	Aluminium	Aluminium
Instrumentation protection	Thermo-plastic material	Thermo-plastic material
Ignition switch cover	Thermo-plastic material	Thermo-plastic material
Front mudguard	Thermo-plastic material	Thermo-plastic material
Chain guards	Thermo-plastic material	Thermo-plastic material
Oil cooler protection	Thermo-plastic material	Thermo-plastic material
Number plate carrier	Thermo-plastic material	Thermo-plastic material
Rear-view mirrors	Thermo-plastic material	Thermo-plastic material
Exhaust pipes guard	Aluminium	Aluminium



Maintenance

PERIODICAL MAINTENANCE SCHEDULE

The following table shows the recommended intervals for the interventions of periodical maintenance. Periodical maintenance is necessary to keep the motorcycle in an optimum condition. The intervals are expressed in kilometers.



WARNING

For motorcycles used in particularly severe conditions, maintenance operations must be carried out more frequently.






We respect and defend the environment.

Everything that we do has repercussions on the whole planet and on its resources.

MV Agusta, to protect the interests of the everyone, ask clients and technical assistance operators to use the motorcycle and dispose of its used parts with respect to the norms in force in terms of environmental pollution, disposal and recycling of refuse.

Programmed maintenance schedule

Km (mi) covered		0	1000 (600)	6000 (3800)	12000 (7500)	18000 (11200)	24000 (14900)	30000 (18600)	36000 (22400)
Service		Pre-delivery	A	B	C	D	E	F	G
Description	Operation								
Engine oil	Replace		●	●	●	●	●	●	●
		At least once a year							
Engine oil filter 	Replace (Utilise only original MV Agusta oil filters)		●	●	●	●	●	●	●
		At every substitution of engine oil							
Engine coolant	Check level and top-up	●	●	●	●	●	●	●	●
	Replace	At least every two years							
Cooling system	Check for leakages	●	●	●	●	●	●	●	●
Electric fan	Check functioning	●	●	●	●	●	●	●	●
Valves 	Check / adjustment				●		●		●
Timing chain	Check				●		●		
	Replace								●
Timing chain movable shoe	Check / Substitution				●		●		
	Replace								●
		At least every substitution of the timing chain							
Timing chain tensioner	Check / Replace				●		●		●
Spark plugs	Check / Replace			●		●		●	
	Replace				●		●		●
Cooling system	Check / Replace				●		●		●
Throttle body 	Check and adjust		●	●	●	●	●	●	●
Air filter	Check / Replace			●	●	●	●	●	●
Brakes / Clutch fluid	Check level	●	●	●	●	●		●	●
	Replace						●		
		At least every two years							
Brakes and clutch	Check functioning	●	●	●	●	●	●	●	●
	Check circuit	●	●	●	●	●	●	●	●
	Cleaning of contact lever / pump piston area	●	●	●	●	●	●	●	●
Brake pads (front and rear)	Check / Replace		●	●	●	●	●	●	●
Fuel tubes	Check for defects and leakages		●	●	●	●	●	●	●
	Replace	At least every three years							
Throttle control	Check functioning	●	●	●	●	●	●	●	●
	Check/adjust play	●	●	●	●	●	●	●	●
Starter control	Check functioning	●	●	●	●	●	●	●	●



Maintenance

Programmed maintenance schedule

Km (mi) covered		0	1000 (600)	6000 (3800)	12000 (7500)	18000 (11200)	24000 (14900)	30000 (18600)	36000 (22400)
Service		Pre-delivery	A	B	C	D	E	F	G
Description	Operation								
Transmission and flexible controls	Check / Adjust	●	●	●	●	●	●	●	●
Transmission chain	Check / Adjust	●	●	●	●	●	●	●	●
	Lubricate		●	●		●		●	
	Replace				●		●		●
Front sprocket / stop washer	Check		●	●		●		●	
	Replace				●		●		●
		At least at each substitution of the transmission chain							
Rear sprocket	Check		●	●		●		●	
	Replace				●		●		●
		At least at each substitution of the transmission chain							
Rear sprocket spring drive	Check / Replace				●		●		●
Steering head flange ring	Check / Adjust		●		●		●		●
Steering bearings	Check / Adjust		●		●		●		●
	Lubricate						●		
Tyres	Check for pressure	●	●	●	●	●	●	●	●
	Check for wear		●	●	●	●	●	●	●
Wheel rims	Visual check		●	●	●	●	●	●	●
Front wheel bearings		Every tyre substitution							
	Check			●	●	●	●	●	
	Replace								●
Side stand	Check functioning	●	●	●	●	●	●	●	●
Side stand switch	Check functioning	●	●	●	●	●	●	●	●
	Cleaning of contact lever area with side stand	●	●	●	●	●	●	●	●
Rear wheel hub	Check / lubricate roller bearings and guides				●		●		
	Substitution / lubricate roller bearings and guide								●
Rear fork bearings	Check / lubricate								●
Rear fork chain guide	Check / Replace		●	●	●	●	●	●	●
Chain guide frame plate	Check / Replace		●	●	●	●	●	●	●
Rear shock absorber	Check / Adjust		●		●		●		●
Front fork oil	Substitution						●		
Battery connections	Check and clean		●	●	●	●	●	●	●
Electrical system	Check functioning	●	●	●	●	●	●	●	●
Instrument	Check functioning	●	●	●	●	●	●	●	●
Lights/visual signals	Check functioning	●	●	●	●	●	●	●	●
	Bulb replacement								
Horn	Check functioning	●	●	●	●	●	●	●	●
Front headlight	Check functioning	●	●	●	●	●	●	●	●
	Bulb replacement								
	Adjust	At every variation of the riding set-up of the motorcycle							
Ignition switch	Check functioning	●	●	●	●	●	●	●	●
Locks	Check functioning	●	●	●	●	●	●	●	●
Torque settings – nuts and bolt	Check / tightness	●	●	●	●	●	●	●	●
Tube band fasteners	Check / tightness	●	●	●	●	●	●	●	●



Maintenance

Programmed maintenance schedule

Km (mi) Covered		0	1000 (600)	6000 (3800)	12000 (7500)	18000 (11200)	24000 (14900)	30000 (18600)	36000 (22400)
Service		Pre-delivery	A	B	C	D	E	F	G
Description	Operation								
General lubrication		●	●	●	●	●	●	●	●
General check		●	●	●	●	●	●	●	●

Table of lubricants and fluids

Description	Recommended product	Specification
Engine oil	AGIP RACING 4T 10W/60 (*)	SAE 10W/60
Engine coolant	AGIP ECO - PERMANENT	Ethylene-glycol diluted with 50% distilled water
Brake and clutch fluid	AGIP BRAKE FLUID DOT4	DOT4
Chain lubrication oil	MOTUL CHAIN LUBE ROAD	—

* : To find the recommended product, MV Agusta suggests going directly to the authorised MV Agusta dealers. AGIP Racing 4T 10W/60 has been manufactured for Brutale engine. If the described oil is not available, MV Agusta suggests using completely synthetic oils with characteristics that conform or exceed the following norms:

- Conforming to API SJ
- Conforming to ACEA A3
- Conforming to JASO MA
- Grade SAE 20 W-50 o 10 W-60



N.B. The above specifications indicated are marked either on their own or together with others on the container of the lubricating oil.

MAINTENANCE AND TUNING OPERATIONS

Each operation of periodical maintenance is described in this chapter.

ENGINE OIL AND OIL FILTER

Engine oil

Substitute:→ at the first 1000 kilometers and then every 6000 kilometers

Oil filter

Substitute:→ at the first 1000 kilometers and then every 6000 kilometers (or at least every oil change)



To accede to the oil filter and the discharge and filling holes of the engine oil, it is necessary to carry out certain operations beforehand:

- Place the motorcycle on the rear stand.

N.B. The substitution of the engine oil must be done with a hot engine as opposed to the oil-check that is done with a cold engine.

Remove the oil filler plug on the right side of the motorcycle so that it facilitates the discharge of the used oil.

Remove the filler cap using the 10 mm hexagonal bar attached to a wrench.



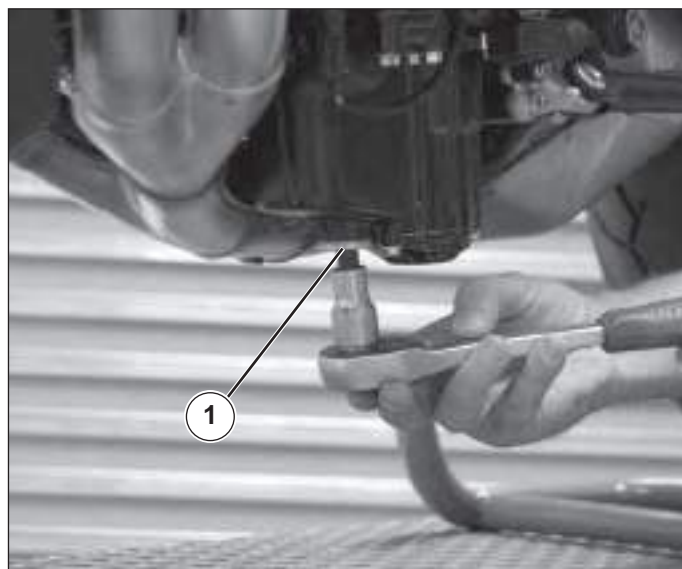
Place a container underneath the engine to collect the used oil.

Remove the oil discharge plug (1).



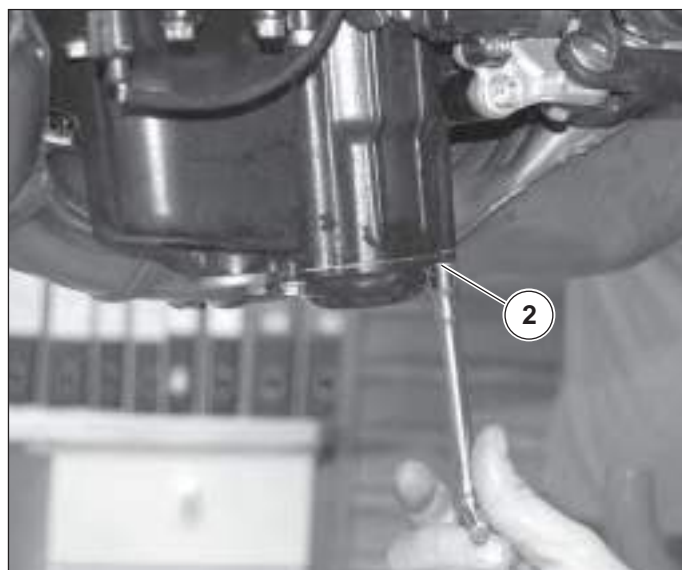
Recover the oil in an appropriate container. Do not scatter exhausted oil into the environment.

Wait until the lubrication system is completely empty of used engine oil.



Substitution of the oil filter

Remove the 4 fixing screws (2) of the oil filter cover.





Maintenance

Remove the cover and take out the oil filter.

B



Replace the oil filter and put the cover back on.



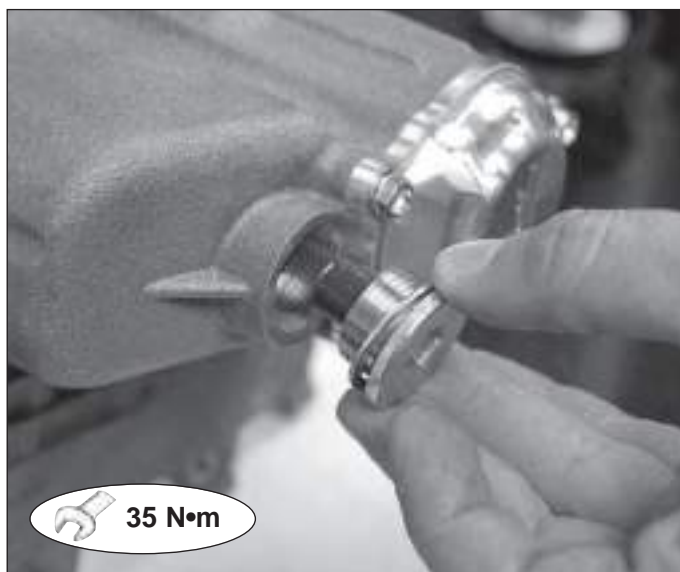
On the oil discharge plug there is a magnet to attract any metal residues that could form in the engine during rotation.

Before replacing the cap, make sure it is completely clean. Replace the sealing washer with a new one.

Screw in the oil discharge plug and tighten it to the specified torque.



Torque pressure – oil discharge plug:
35 N·m



Pour around 3 kg of engine oil (as specified in the table on page B-8) into the filling hole.

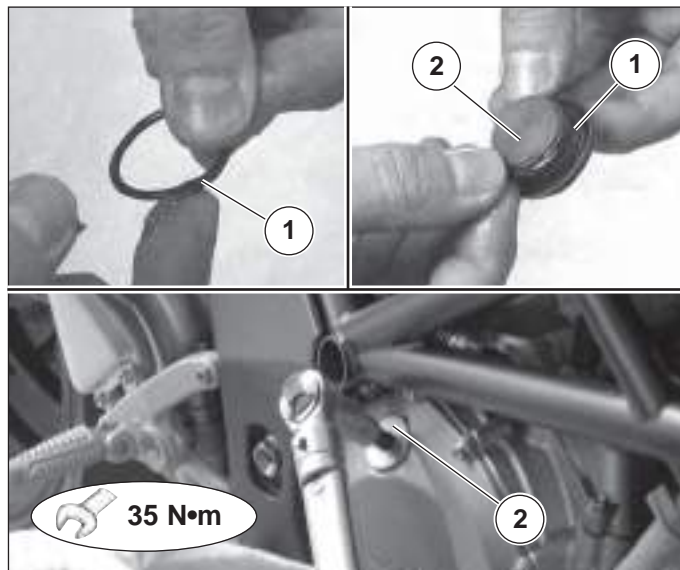
Close the filler hole using the appropriate cap.

Before replacing the filler cap, grease the O-ring (1) with silicone grease (see figure).

Tighten the cap (2) to the prescribed tightening torque.



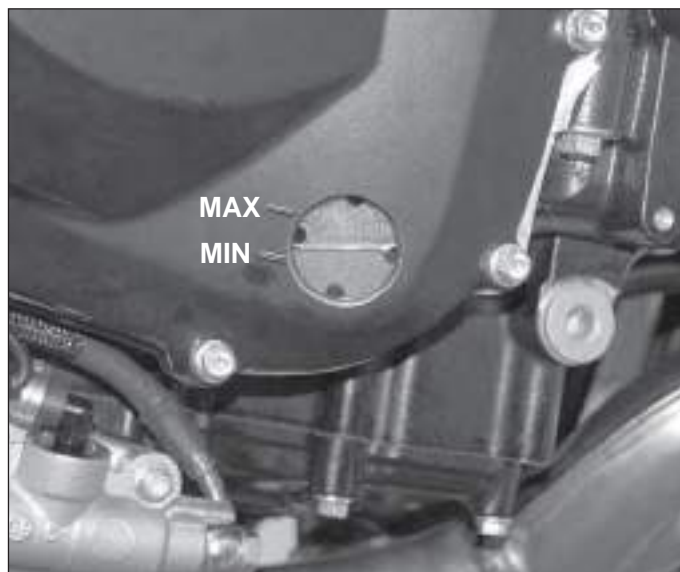
Tightening torque: 35 N·m



Switch on the engine for several minutes.
After switching off the engine, wait at least ten minutes and then check the oil level. Ensure that the motorcycle is placed on level ground and is in a vertical position. The correct level must be as close as possible to the "MAX" mark shown on the engine casing. Do not surpass this limit.
Check any oil leakages.



Avoid turning the engine over with the oil level lower than minimum. It could compromise the correct functioning of the engine. If the level after the topping-up, is over the "MAX" reference notch, correct it by emptying a little oil out of the engine.



Oil tubes

During normal maintenance procedures check the correct assembly of components and check for blow-bys or oil leaks from the engine parts.

In particular:

- Blow-bys at the base of the engine.
- Oil filter support
- Oil pump-engine cylinder head delivery tubing.



When oil leaks are identified, even small ones, externally clean the above parts. If oil leaks continue, proceed with the overhaul of components as described in the engine workshop manual (Part. Cod. 8000B3258).





ENGINE COOLANT

Check/top-up level →

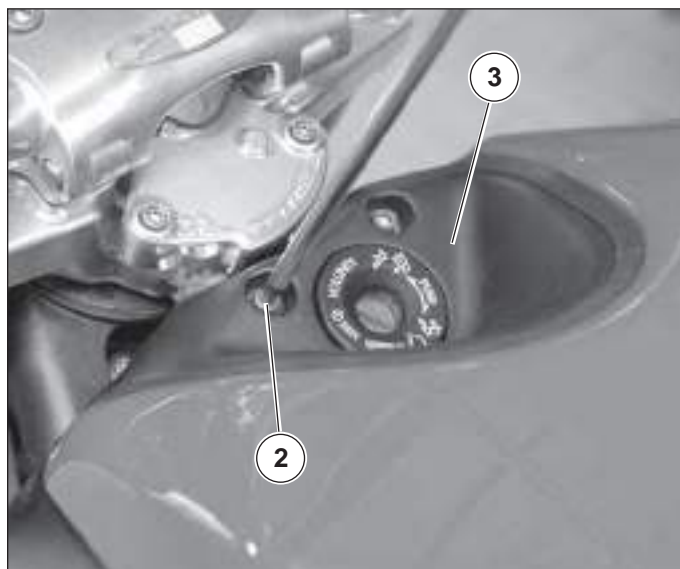
At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Keeping the motorcycle in a vertical position, check that the level of engine coolant is between the «MIN» mark found on the expansion tank (1) and the lower part of the frame tube, that you can see from the opening on the frame protection panel on the left side of the motorcycle.



If the level is under the minimum line, proceed with top-ping-up as follows:

- Remove the two fixing screws (2) of the ignition switch cover (3).
- Extract the cover.



Open the expansion tank cap (4) by using the specific tool:

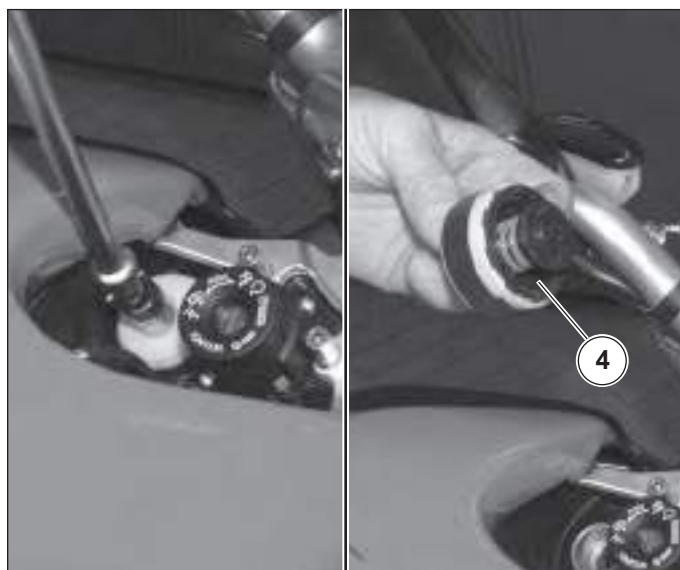


Specific tool: Part code 8000B3502



Open the expansion tank only when the engine is cold; the discharge of boiling liquid could cause burns.

If the liquid comes into contact with the skin or the eyes, rinse abundantly with water.



With the engine cold, top up the level using the filler hole of the expansion tank.

Engine coolant substitution

Substitution → Every two years

Before proceeding with the emptying of the system, perform the following operations in advance:

- Remove the ignition switch cover (see “Engine coolant level check”);
- Place a container under the engine to collect the used coolant;
- Open the expansion tank cap (see “Engine coolant level check”);
- Remove the coolant discharge screw (1) situated on the coolant pump (2), thereby letting the coolant flow out.

Wait for the engine coolant to completely flow out.

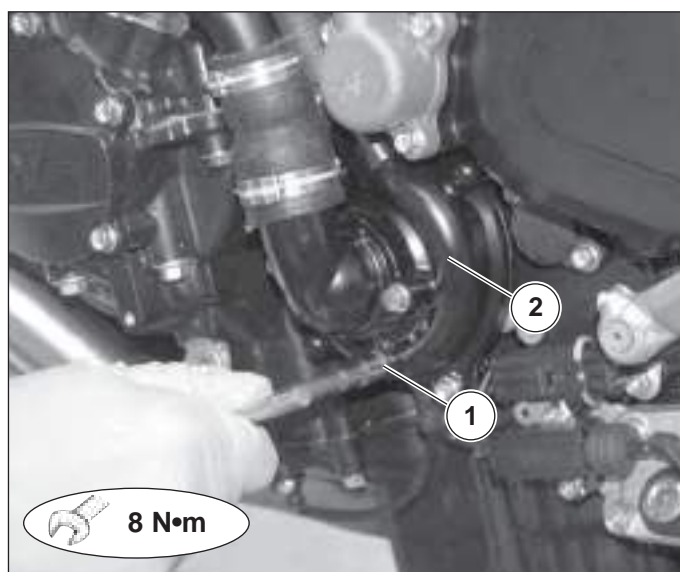


Collect the engine coolant in an appropriate container. Do not scatter the engine coolant into the environment.

Tighten the engine coolant discharge plug (1) to the specified torque, after having checked the condition of the gasket.



Torque pressure, engine coolant discharge plug: 8 N·m



Fill the cooling system with the appropriate liquid described in table (see page 8 of this chapter) until the level is between the «MIN» mark found on the expansion tank and the lower part of the frame tube (see figure on next page).

Close the cap.

Start the engine, keep it running for a few minutes, and then turn off. Wait for the engine to cool.



Carefully check for leaks, blow-bys, damaged tubing, etc. If there are leaks or damage in the cooling system, proceed with the overhaul as described in the chapter “Cooling system”.



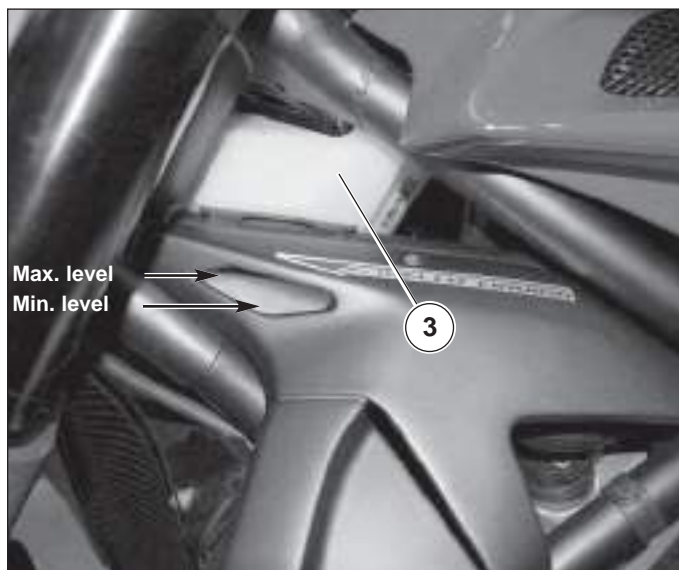


Maintenance

Check once again the level of the coolant inside the expansion tank (3).

It should be between the «MIN» mark found on the expansion tank and the lower part of the frame tube, as shown in the figure.

If the level is inferior to the «MIN» mark, top up the coolant level by pouring new coolant into the filler hole.



Complete the assembly of the motorcycle.



ELECTRIC FANS

Check → on pre-delivery and at the first 1000 kilometers and then every 6000 kilometers

To check the functioning of the electric fans, start the vehicle's engine and let it warm up.

The electric fans should come into operation when the instrument panel shows a system temperature ranging between the following values:

- 92° ÷ 94° C

If the electric cooling fans do not switch on, carry out the checks on the various components as described in chapter L "Cooling system".





VALVE MECHANISM ADJUSTMENT

Check and adjust → Every 12000 kilometers.



The valve mechanism adjustment must be performed when the engine is cold.

Remove in order the following components to carry out the measuring of the play between the camshaft and the valve cups:

- Passenger seat
- Rider seat
- Left tank side panel
- Right tank side panel
- Ignition switch cover
- Fuel tank
- Air filter compartment
- Throttle body

N.B.: For all removal operations, including the relative attention notes, please refer to the specific sections in this manual.

An analogous reference is utilised for the reassembly of the parts after the maintenance operation.



After removing the components indicated, the vehicle should look like the picture to the side.

Before proceeding with the various maintenance operations, it is advisable to thoroughly wash and clean the motorcycle.

Place the motorcycle (now without the components listed above and clean) on a workstation as indicated in the figure.

Apply adhesive paper tape to the frame tubes.

This operation will protect the paintwork from knocks, scratches and abrasions that could occur during the work activity.





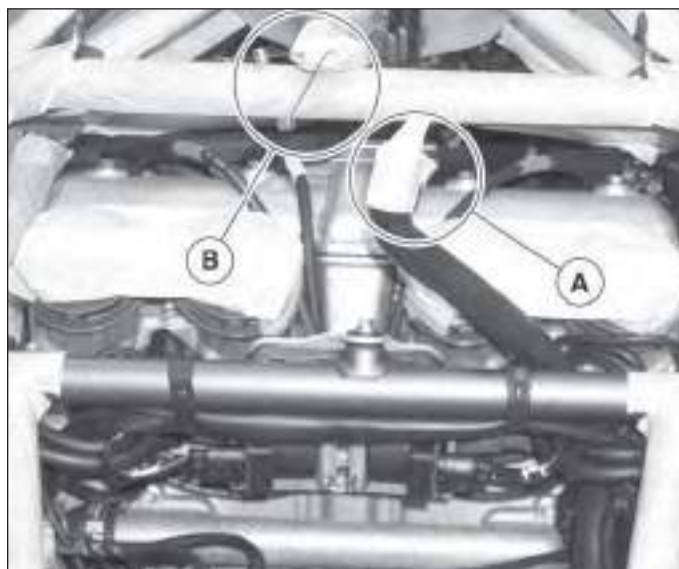
Maintenance

Ensure that all the surfaces of the frame are protected by the application of the adhesive tape.



B Apply the same adhesive tape to the air intakes of the engine.

Apply adhesive tape also on the oil breather tube (**A**) and on the terminals of the accelerator control (**B**).



Unscrew and remove the coil backing plate fixing screws (**1**).
Remove the coils from their housings.





Maintenance

Position the coils behind the tube frame so they do not get in the way of the subsequent disassembly operations.



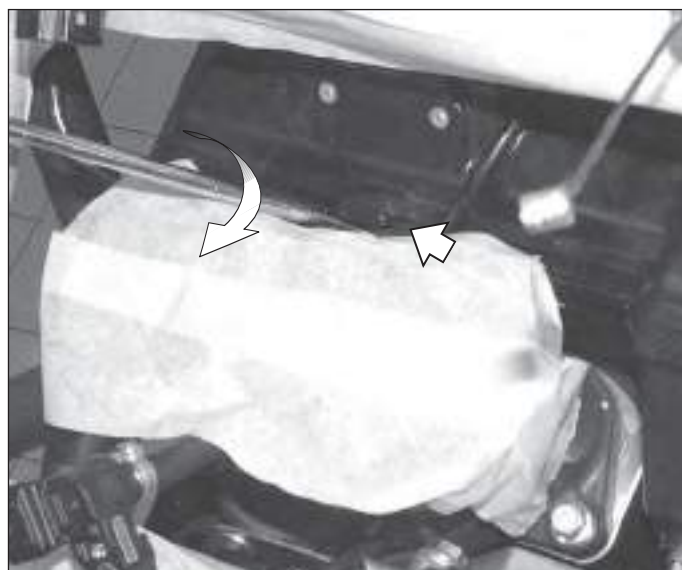
Remove the secondary air blade from the head cover, only if inspection is necessary.



Operating as shown in the figure, slightly lift up the cylinder head cover.

To carry out this operation, use only the work surfaces indicated.

Take care to not ruin or deteriorate the motorcycle parts in the proximity of the work area.





Maintenance

Remove the head cover gasket.

To facilitate this operation, it is advisable to move the rubber engine coolant filling tube situated on the left side of the motorcycle.

Complete the removal of the cylinder head cover by sliding it towards the rear part of the motorcycle.



Remove the head cover gasket.



Utilising a syringe, remove the surplus oil that is left in the various niches in proximity to the valve cups.





Maintenance

Proceed with the removal of the timing wheel cover by unscrewing the five fixing screws.

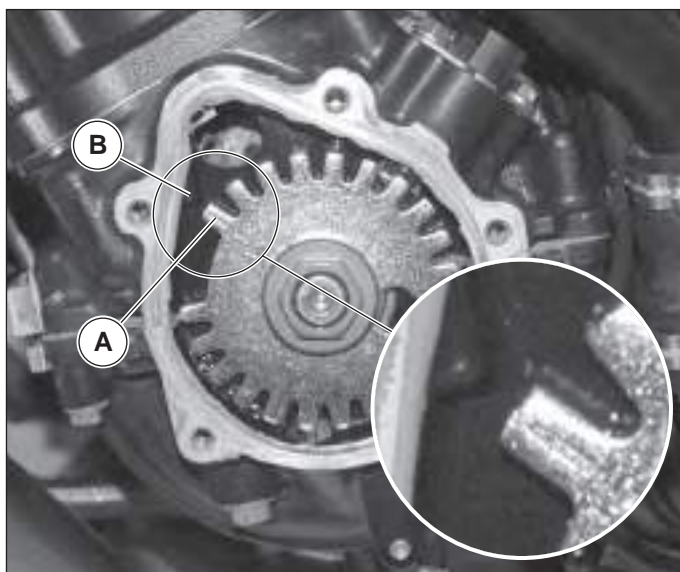


Rotate the camshaft by turning the central nut in an anti-clockwise direction to bring piston N° 1 of the engine to the Top Dead Center position (T.D.C.) when the piston is at its uppermost part of the compression stroke.



Check the timing of the engine by ensuring that the incision stamped on tooth (A) of the timing wheel is in line with the "tooth" (B) that is present on the engine casing.

The position of the timing wheel is clearly seen in the enlargement in respect of the mark on the engine casing.

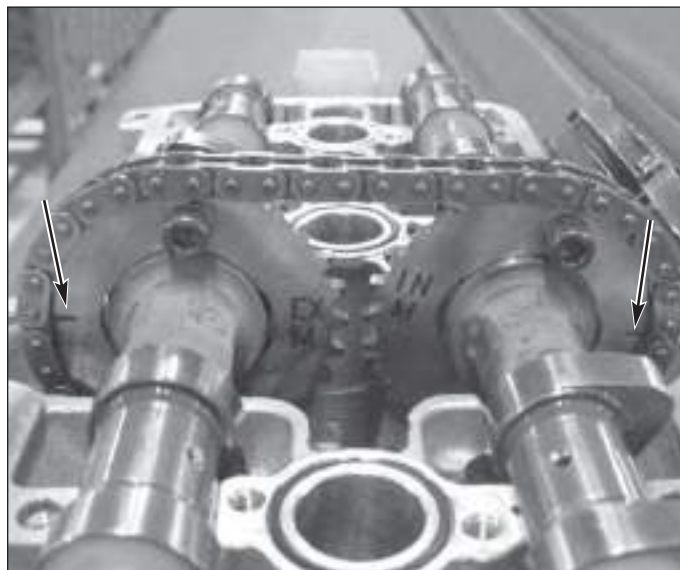




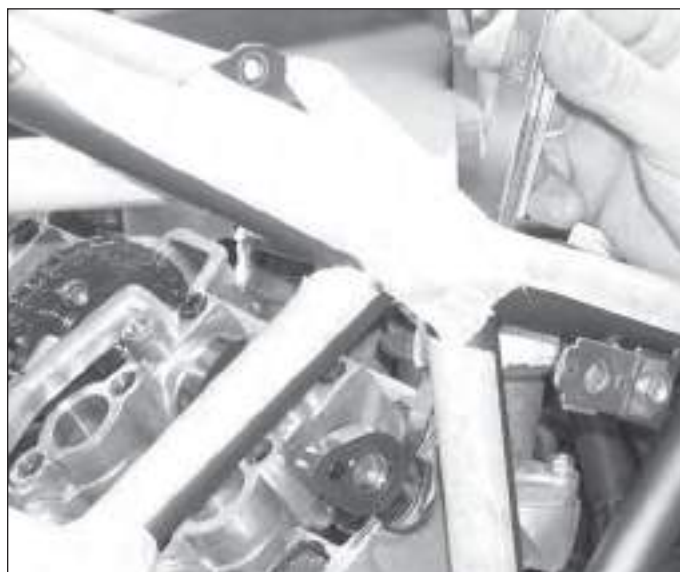
Maintenance

Also the marks present on the toothed wheels of the camshaft must be aligned together when the timing wheel is in this position.

B



Utilising a feeler gauge of the type shown in the figure, measure the play between the camshaft and the valve cups.



Continue measuring the play as illustrated in the figure.



The correct measuring of the play is a fundamental operation for the correct functioning of the engine.





Maintenance

Carry out the measuring of the play of the following valves:

Cylinders 1 and 2	intake valves	(n° 1,2,3,4)
Cylinders 1 and 3	exhaust valve	(n° 11,12,15,16)

Scrupulously, make a note of the order of the values measured in the form of a table.



B



Maintenance

For example, here is a hypothesis of a table in which are written the various values measured.

Date	Vehicle	Engine registration n°	Frame registration n°	Kilometres travelled
------	---------	------------------------	-----------------------	----------------------

Values measured before substituting the valve cups:

	CYLINDER 1		CYLINDER 2		CYLINDER 3		CYLINDER 4	
INDUCTION	Valve n° 1	Valve n° 2	Valve n° 3	Valve n° 4	Valve n° 5	Valve n° 6	Valve n° 7	Valve n° 8
Valve play								
Pad thickness								

	CYLINDER 1		CYLINDER 2		CYLINDER 3		CYLINDER 4	
EXHAUST	Valve n° 16	Valve n° 15	Valve n° 14	Valve n° 13	Valve n° 12	Valve n° 11	Valve n° 10	Valve n° 9
Valve play								
Pad thickness								

Values measured after having replaced adjusting pins:

	CYLINDER 1		CYLINDER 2		CYLINDER 3		CYLINDER 4	
INDUCTION	Valve n° 1	Valve n° 2	Valve n° 3	Valve n° 4	Valve n° 5	Valve n° 6	Valve n° 7	Valve n° 8
Valve play								
Pad thickness								

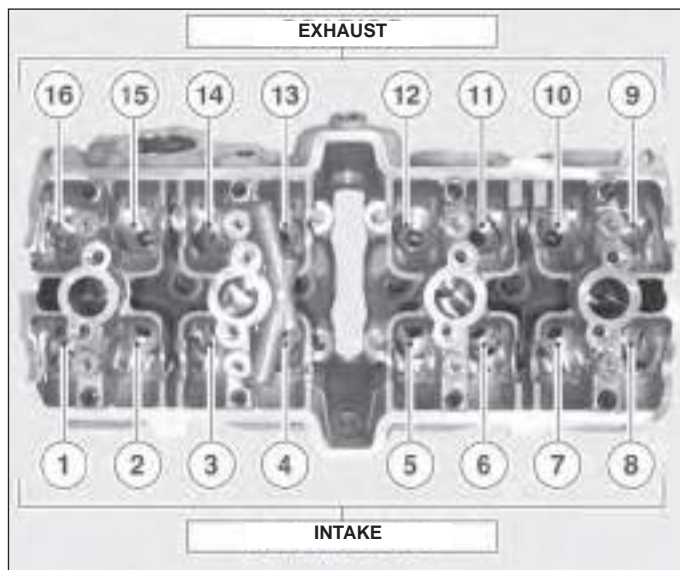
	CYLINDER 1		CYLINDER 2		CYLINDER 3		CYLINDER 4	
EXHAUST	Valve n° 16	Valve n° 15	Valve n° 14	Valve n° 13	Valve n° 12	Valve n° 11	Valve n° 10	Valve n° 9
Valve play								
Pad thickness								



Maintenance

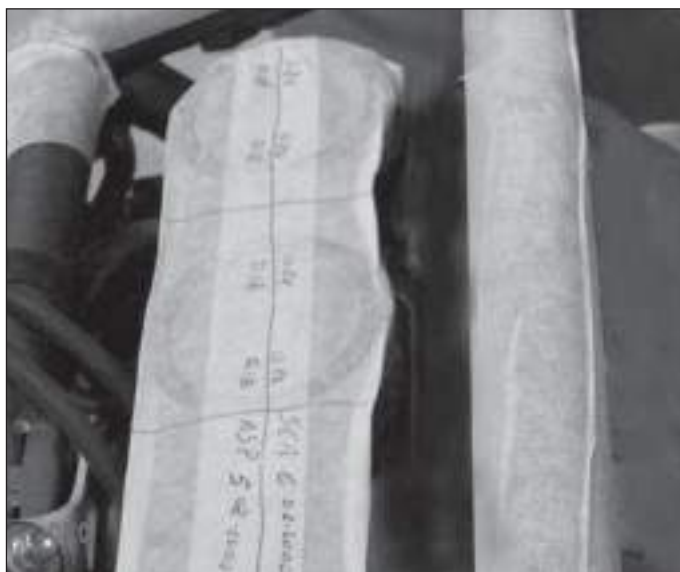
The progressive numeration of each valve is illustrated in the photograph on the right.

Note the anti-clockwise direction of the numeration.



To facilitate the operation, it is possible to note beforehand and in order the play values revealed on the strip of adhesive tape applied to the openings of the air intake conduits.

These must anyway also be written in the table previously illustrated.



Rotate the crankshaft 360° by turning the central nut.

The rotation of the crankshaft must always be done in an anti-clockwise direction.

The operation just described is completed when piston n° 4 is in the Top Dead Center position (T.D.C.) of the compression stroke.

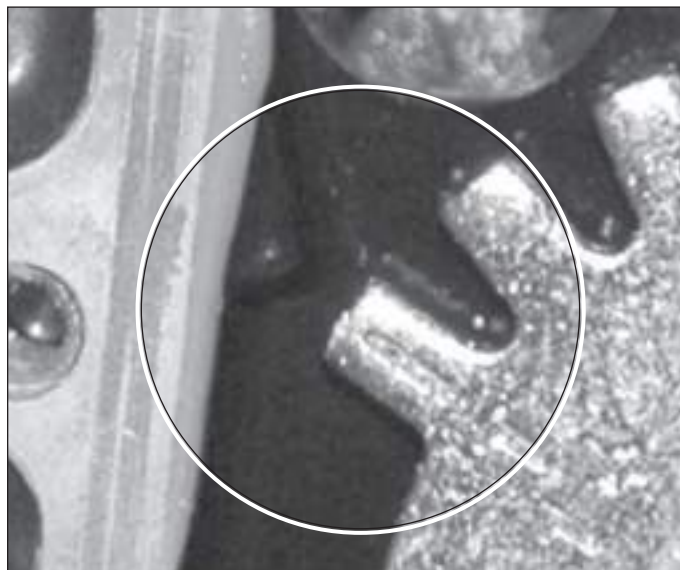




Maintenance

Check again the timing of the engine, ensuring that the incision stamped on the timing wheel is aligned with the "tooth" on the engine casing.

B



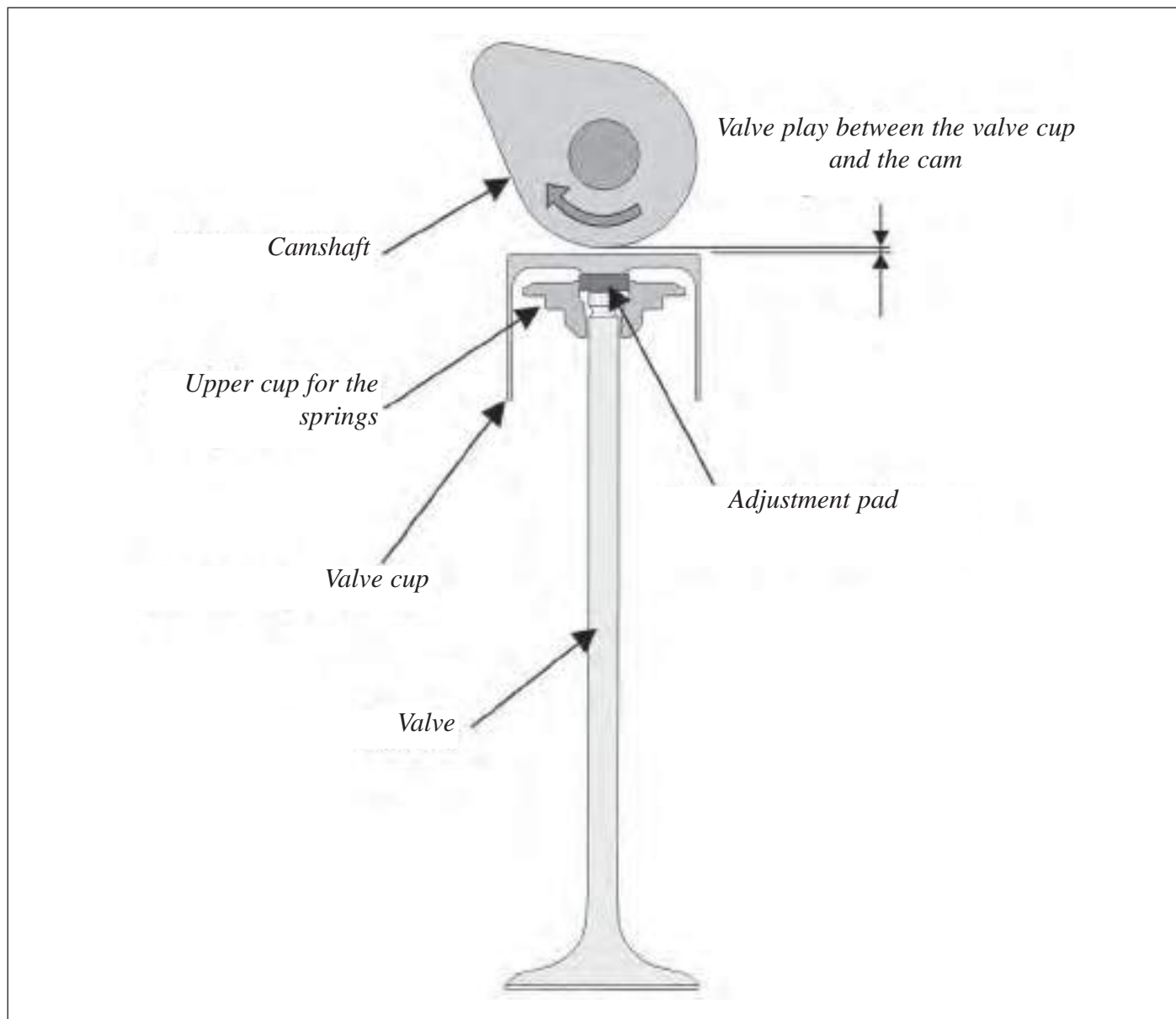
Continue with the measuring of the play of the following valves:

Cylinders 3 and 4 intake valves (n° 5,6,7,8)

Cylinders 2 and 4 exhaust valves (n° 9,10,13,14).

Make a note of the measured values ensuring that they are scrupulously written in the correct order of the previously illustrated table.





The play values measured between the valve cup and cam must be the following:

For all intake valves $0,15 \div 0,24$ mm

For all exhaust valves $0,20 \div 0,29$ mm

If different values are encountered even for one valve, substitute the camshaft/valve cup play adjustment pads as described in the engine workshop manual (Part. Cod. 8000B3258).

If the values are correct, reassemble in reverse order to disassembly, consulting the engine workshop manual (Part. Cod. 8000B3258) for the specific torque pressures and the necessary products.

Before proceed to reassemble the engine head cover, it is recommended to clean accurately the residues of dope along the seal form on the head and use a new gasket.





Maintenance

Timing chain, mobile timing chain guide and timing chain tensioner

Timing chain and mobile timing chain guide:

Check → First 1000 kilometers
Substitute → Every 36000 kilometers

Timing chain tensioner:

Check/substitute → Every 12000 kilometers

To disassemble these parts and not being a part of normal maintenance, it is necessary to proceed as described in the overhaul section of the engine workshop manual (Part. Cod. 8000B3258).

SPARK PLUGS

Check/substitute → Every 12000 kilometers
Substitute → Every 12000 kilometers

The following components must be removed to accede to the spark plugs:

- Passenger seat
- Rider seat
- Left side panel
- Right side panel
- Ignition switch cover
- Fuel tank
- Air filter compartment

Proceed to pull out 4 coils as described above. Remove the spark plugs utilising the appropriate 16 mm hexagonal spark plug spanner.

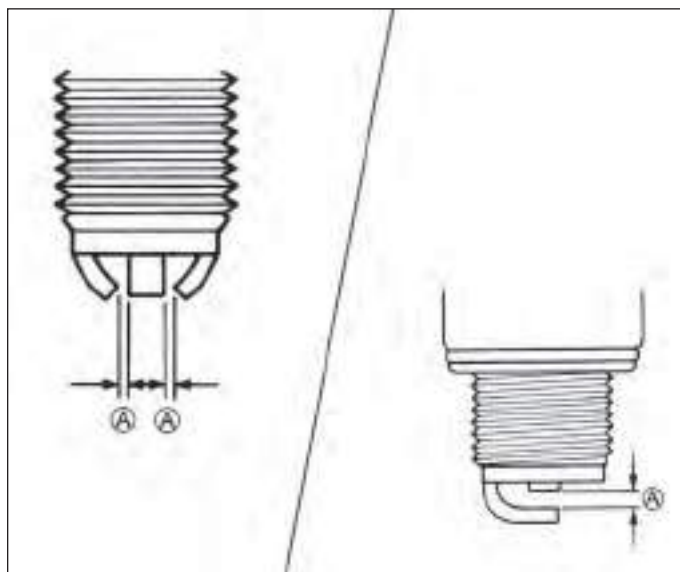
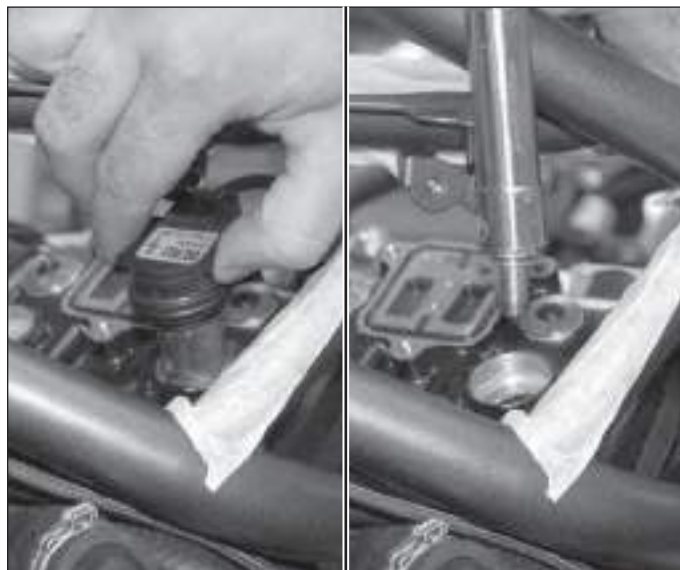
Heat Grade

Check the heat grade of the spark plugs.

Spark plug gap

Measure the gap between the electrodes of the spark plug with a feeler gauge. Adjust this gap in compliance with the values written in the table below.

Spark plugs	Electrode distance "A" (mm)
NGK CR9 EB	0.7 ÷ 0.8



Electrode condition

Check the electrodes for wear or burning. If they are extremely used or burnt, substitute the spark plugs. Also substitute the spark plugs in the case of breakage of the ceramic isolation or damage to threading.



When the spark plugs are renewed, check the thread pitch size and the length of the thread. If the threading is too short, carbon deposits will be placed on the threading of the cylinder head plughole thereby risking damage to the engine.

Manually screw the spark plugs into their seats to avoid damaging the threads of the motor head. Tighten to the prescribed tightening torque.



Spark plugs torque pressure: 12 N·m



FUEL FILTERS

Check and substitute → Every 12000 km

For the checking or substitution of the engine intake system filters (fuel filter, fuel pump filter), it is necessary to remove in sequence the following parts:

- Passenger seat
- Rider seat
- Ignition commutator cover
- Side panels
- Fuel tank

N.B.: In order to perform the above-mentioned operations, refer to the chapter C “Superstructures”.



Undo the screws and remove the lid of the tank.



Carry out the following operation.

Drain completely the fuel tank using a booster pump as shown in the figure.





Maintenance

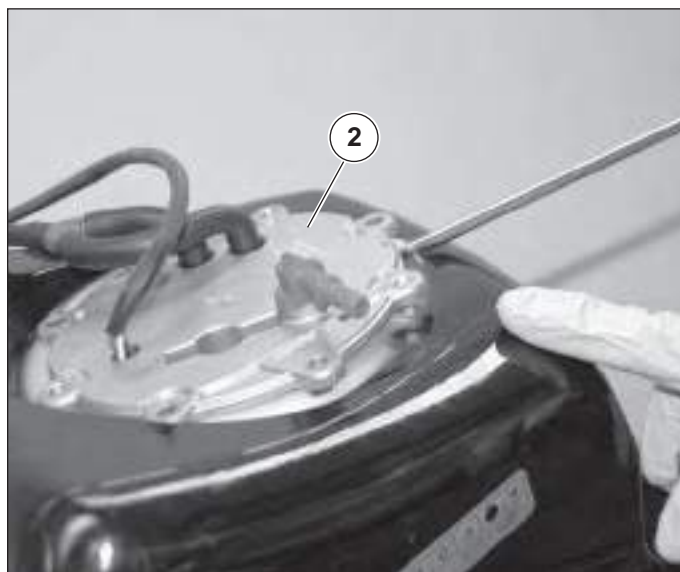
Petrol flange assembly removal

Close the tank filler cap.

Turn the tank upside down and remove the eight screws (1) fastening the flange to the tank and the three spacers.



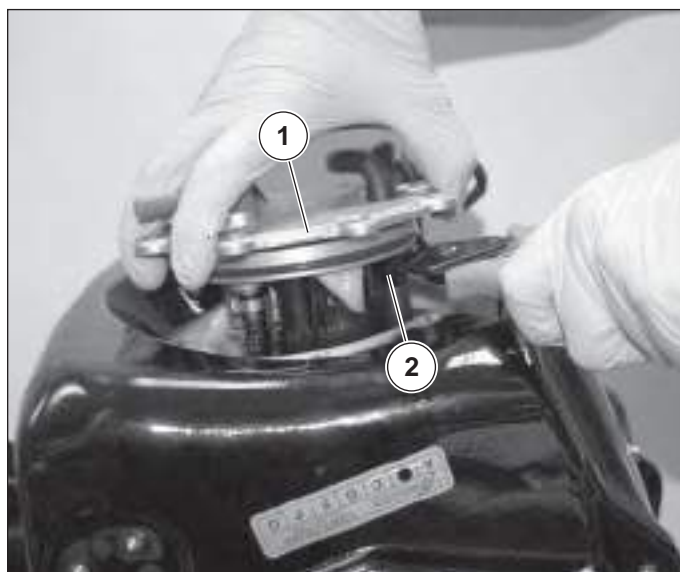
Remove the flange assembly (2) from its seat. In this operation use a flat-headed screwdriver as illustrated.



Lift up the flange (1) and disconnect the tubes (2) on both sides of the flange. Remove the two CLIC R 96105 fasteners utilising the specified pincers.



Specified pincers: CLIC R 205
Part code 800095850



Extract the complete flange assembly (1).



Disconnect the electric connectors of the fuel pump (1).



Checking and replacing the O-Ring

Check the condition of the O-Rings (1) which seal the flange (2).

Make sure that the components are perfectly intact and lubricate with silicone grease.

We recommend applying silicone grease also to the housing of the die-cast flange.

If damaged, replace with new flanges.





Maintenance

During re-assembly, if the O-Rings have been replaced, lubricate surface lightly with silicone grease.



The use of worn O-Rings can lead to a leakage of petrol from the tank with a consequent risk of fire for the vehicle.



Replacing the thermistor

If the thermistor needs to be replaced, the cable clamp must be cut.



Disconnect the connector of the thermistor cabling.

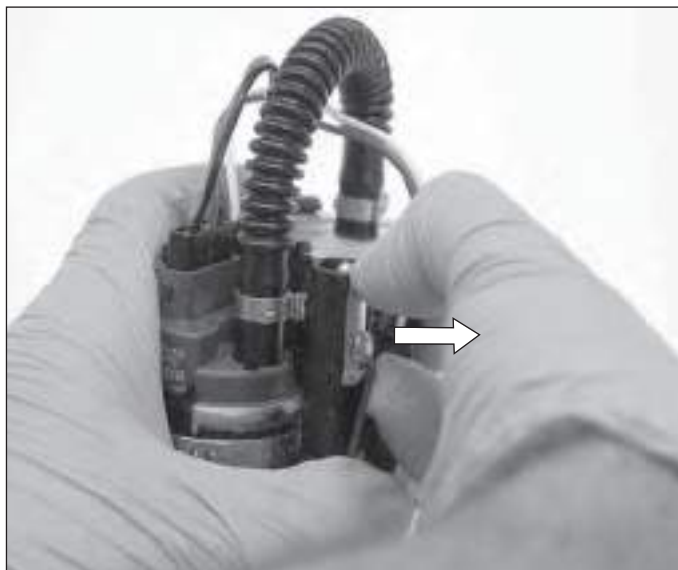




Maintenance

Take the thermistor out of its housing and replace with a new one.

Reconnect the connector and fix a new clamp (Cod. 800056783).



Replacing the filter cartridge

If the filter cartridge needs to be replaced, it is first necessary to remove the lower clamp and take the tube out of the cartridge.



Remove the upper clamp in the same way and take out the tube.





Maintenance

Remove the filter cartridge and replace with a new one.

B



Insert the upper tube in the new cartridge and fix with a clamp taken from the new kit, using the special tool.



Pneumatic pincer: Oetiker HO 3000 ME



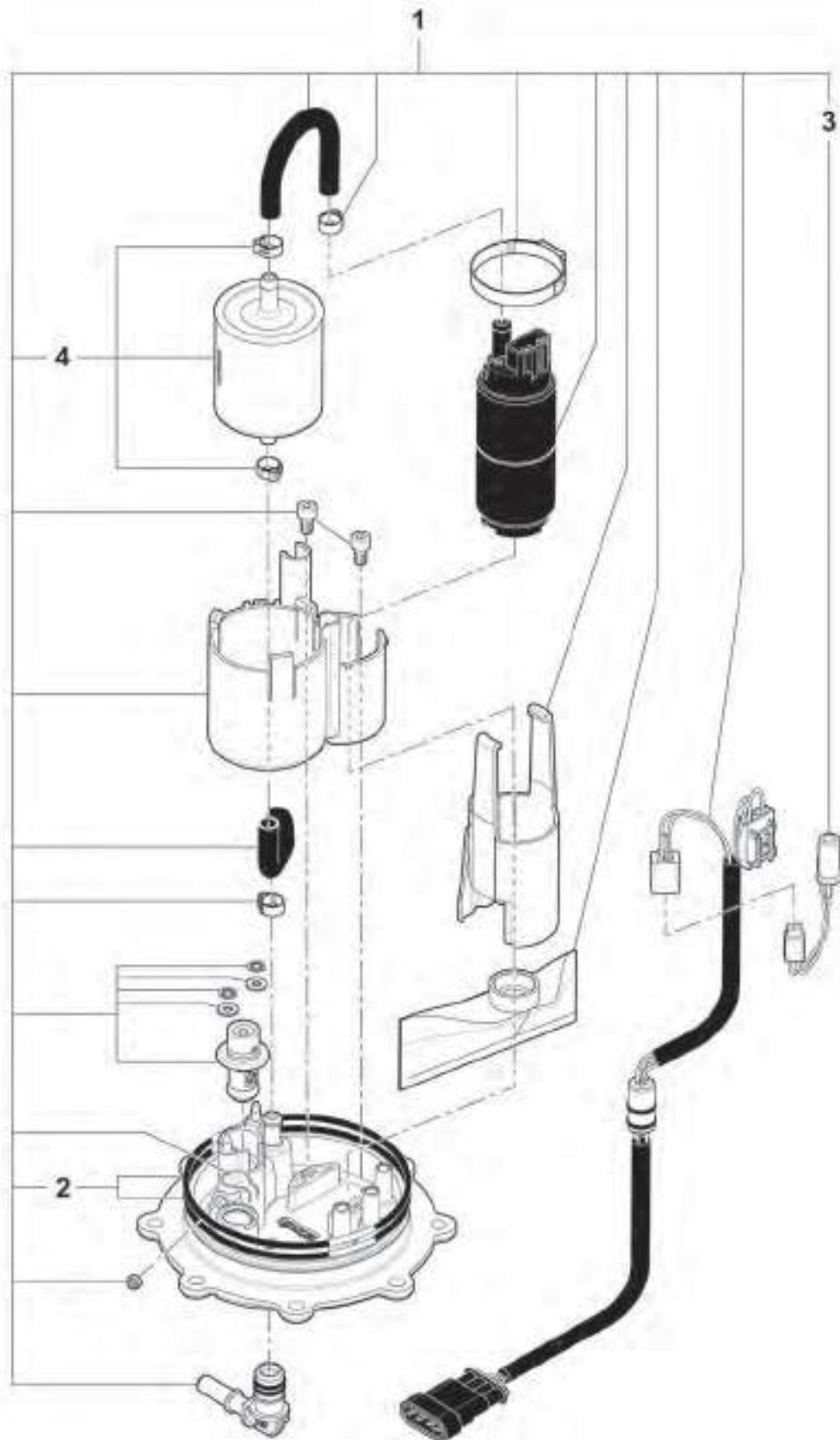
Insert the lower tube in the new cartridge and fix with a clamp taken from the new kit, using the special tool.



Pneumatic pincer: Oetiker HO 3000 ME



FUEL PUMP ASSEMBLY



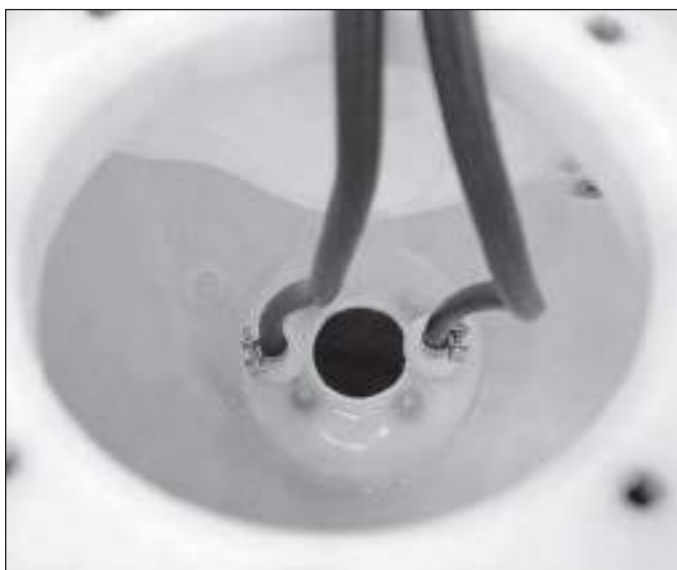


Maintenance

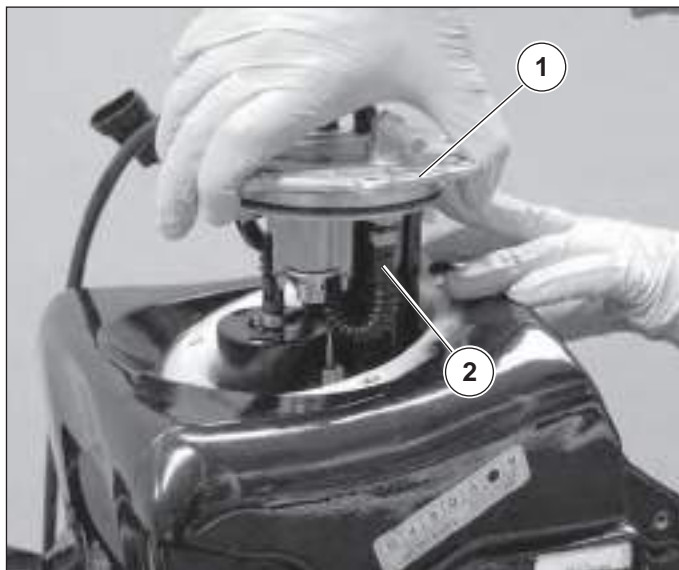
N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	► I FRAME I ►	► I ENGINE I ►
1	8000B1958	1		•	•		
1	8A00B1958	1	USA	•	•		
2	8000B4276	1		•	•		
3	8000B4277	1		•	•		
4	8000B4278	1		•	•		

Fuel flange unit assembly

Before starting the assembly of the flange to the fuel tank, check the condition of the two small overflow tubes connected to the lower part of the fuel filler cap. If these components are not in perfect condition, substitute them and position the band fasteners as shown in the figure.



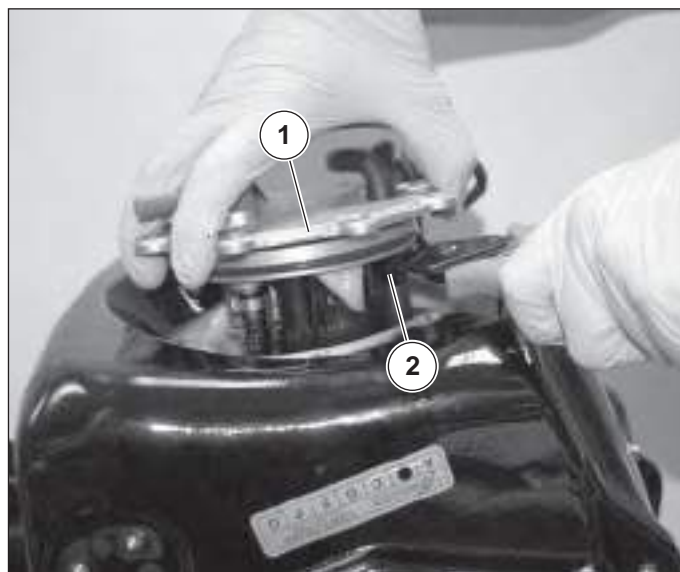
Position the flange unit (1) inside the fuel tank. Check that the two small overflow tubes (2) remain outside of the fuel tank.



Insert two CLIC R 96 105 band fasteners (1) onto the small tubes. Insert the two small rubber tubes (2) onto the appropriate spigot on the die-cast flange. Tighten the band fasteners by using the CLIC 205 pincers.



Specific pliers: CLIC R 205
Part code 800095850



Insert the flange unit into its seat on the tank. Insert the three spacers into their respective slots located on the flange. Screw and tighten the eight fixing screws.



Torque wrench of fuel pump flange fixing screws: 6 ÷ 8 N•m

Proceed with the assembly of the parts removed by following the removal operation in reverse order to that shown in chapter C "Bodywork":

- Fuel tank
- Tank side panel
- Ignition switch cover
- Rider seat
- Passenger seat





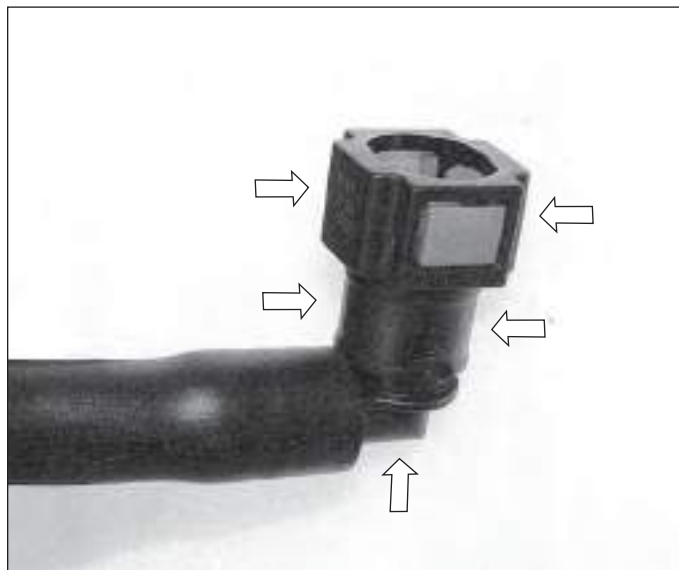
Maintenance

FUEL UNION TUBE

Check for leaks → First 1000 kilometers and then every 6000 kilometers

B

Carry out a visual check for eventual leakages from the fuel feed tubing and the unions (see figure). Substitute damaged parts if leaks or evaporation are found.



ASSEMBLY OF FUEL TUBE

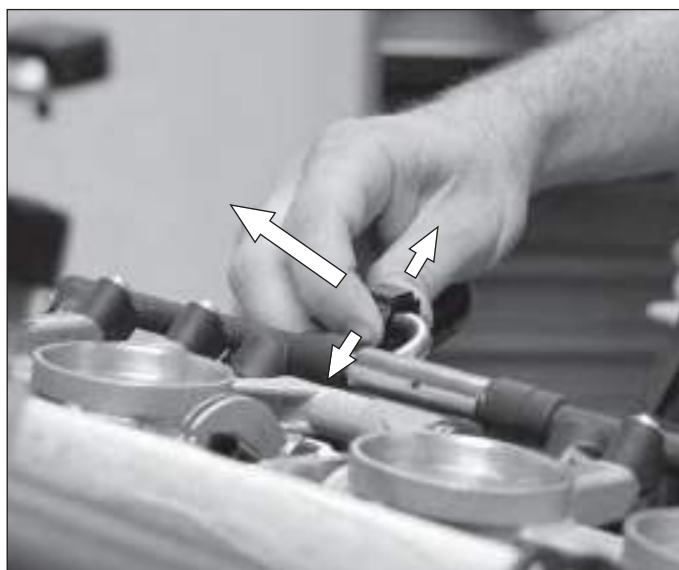
Substitute → At least every three years

The procedure to follow in the case of substitution of the feed tubing is as follows:

Remove in this order:

- Rider seat
- Tank side panel
- Ignition switch cover
- Fuel tank

Press the two stop tabs simultaneously and take out the tube.



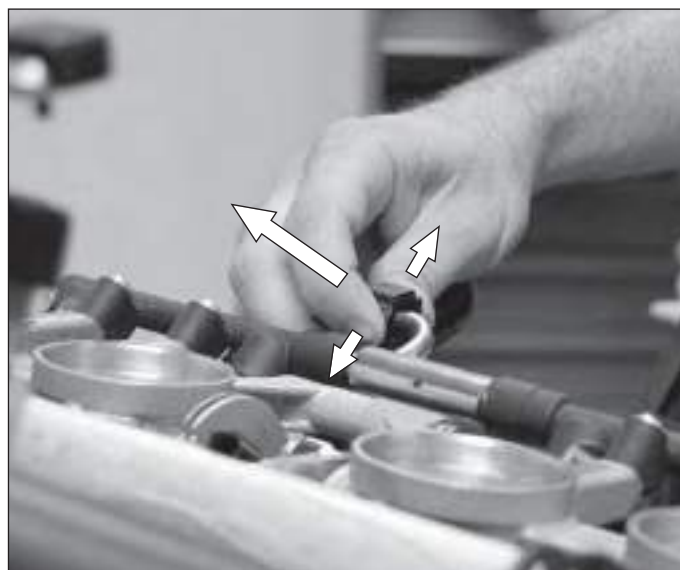


Maintenance

Insert the new fuel tube onto the union of the throttle body, until it has locked into place.



UTILISE ONLY NEW PARTS.



B



THROTTLE BODY ADJUSTMENT AND TUNING (Tickover check, CO synchronisation and check)

B Check and adjust →

First 1000 kilometers and then every 6000 kilometers

The throttle body adjusting should be performed starting the engine of the motorcycle, therefore you should use a flue gas exhauster in order to not saturate the environment with burnt gas.

The following described operations are fundamental for the correct functioning and the maximum performance of the engine.

When carrying out operations on throttle bodies, it is advisable to remove certain parts of the bodywork such as:

- Passenger seat
- Tank side panels
- Ignition switch cover
- Fuel tank

Attention: before adjusting the throttle body verify accurately:

- the absence of any cracks or damages on the pipes to check the depression;
- the absence of gas leakages from drain pipes joint;
- that the fuel pipe unions are not buckled and crushed.



The motorcycle should be fitted with an auxiliary support for the tank.



Specific tool: Part code 8000B4366





Adjustment and calibration of throttle body

After connecting the diagnostic software to the central unit, before starting the engine check the position of the throttle valve:

2.35 degrees (min. 2, max 2.7).

If it does not fall within the range, use the TPS feature to reset it, **WITHOUT TOUCHING THE MECHANIC ADJUSTING SCREW OF THE THROTTLE.**

After resetting the throttle (TPS) start the engine to warm it up.

You will see that after starting the engine the Lambda channel (mvolt), which was next to zero, will start to rise.

After starting the Lambda control (Lambda % range), the Lambda (mvolt) will range between a high of 1000 mvolt and a low of 0 mvolt (minus the diagnostic software lag). To see the range more clearly, adjust the two graphic settings.

The above behaviour means the Lambda probe is in working order.

Otherwise, if the Lambda (mvolt) shows a fixed value of about 0 mvolt or 1000 mvolt, after about thirty seconds, with the Lambda % controller fixed at -25% or +25%, the system will send out a 'Lambda probe voltage' alarm.

In this case, check the electric connection between the Lambda probe and the system or replace the Lambda probe.

Levelling of induction manifold settings

To check this, use a mercury vacuum gauge of the type shown in the figure. Then, level the vacuum inside the induction manifolds.





Maintenance

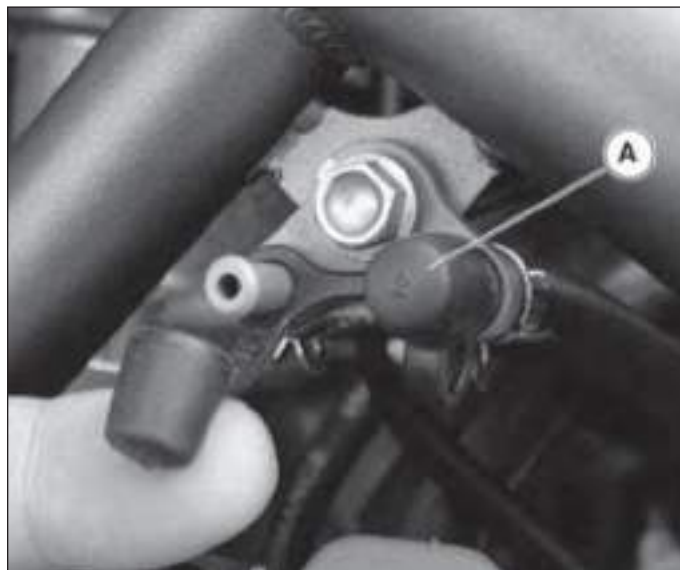
Twist off the plugs that close the vacuum tubes. The number of the cylinder to which the rubber plug is connected is written on the plug itself (**A**).

The vacuum tubes are located on the right and left side of the vehicle.

Left side: Cylinders 1 and 2

Right side: Cylinders 3 and 4

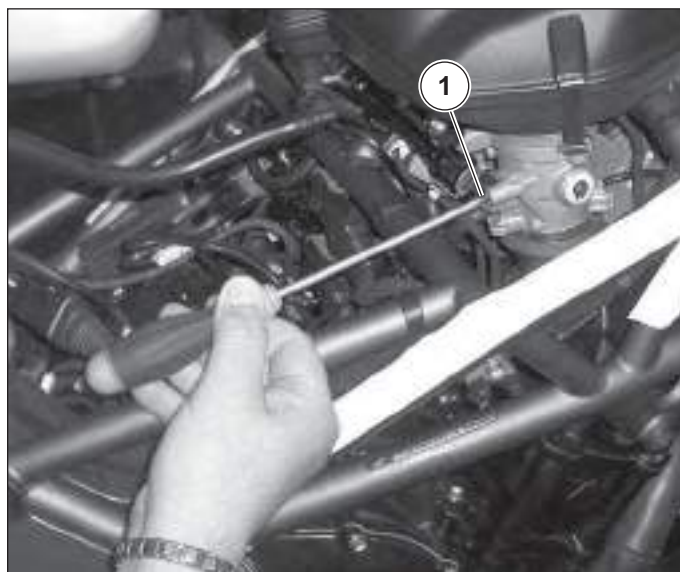
Connect the measuring device with the rubber pipes. Each pipe must match the cylinder to which it is connected.



Fit in the Starter key and start the vehicle.

All bypass adjusting screws (1) must first be opened by turning them 1.5 turns off the 'all closed' position.

We recommend starting from the cylinder with the highest mercury level.

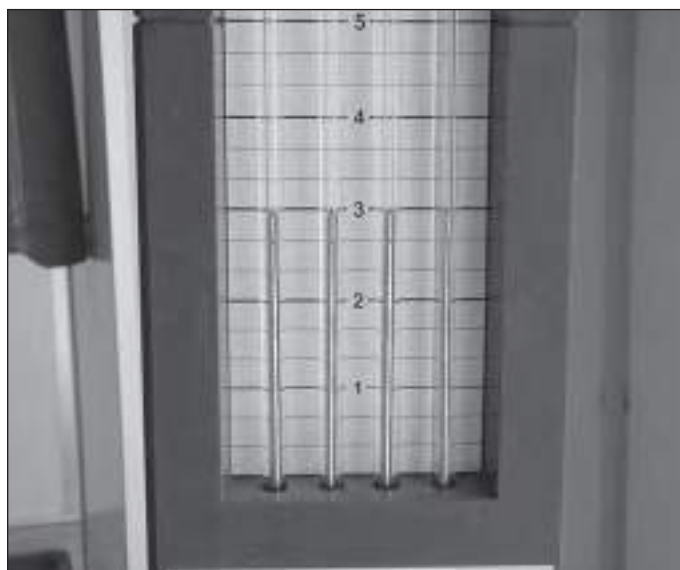


When this cylinder is taken as a reference, the by-pass screws of the other cylinders should then be tightened until the mercury levels have been aligned.

The following positions for the by-pass screws are admitted: **min. 0,5 turns - max. 3,5 turns.**

If the lower limit is exceeded, we recommend accepting a minimum position of 0.5 turns and undoing the screw of the cylinder which had been taken as an initial reference, without exceeding the upper limit.

When idling, the revs of the engine must range between **1100 revs/min and 1200 revs/min.**





Maintenance

To align the throttle body, use the diagnostic software. For the engine to work properly, adjust the throttle body so that the idling regime control works at “mid-range”.

To do this, after finding the correct alignment, proceed as follows:

If the “lead correction” channel is **NEGATIVE**, close the bypass valves to take air out, keeping it aligned until the “Lead correction” setting goes to work within a range of -6° to $+6^{\circ}$.

If the “Lead correction” channel is **POSITIVE**, open the bypass valves to add air, keeping it aligned until the “Lead correction” setting goes to work within a range of -6° to $+6^{\circ}$.

When the adjustment is over, turn off the vehicle, remove the connection pipe and replace the four protective plugs.



Adjustment of carbon oxide rate (CO)

CO ADJUSTMENT IS NOT REQUIRED.

The system can correct its (stoichiometric) carburetion through the Lambda probe control. This does not happen straightaway but depends on the Lambda probe switching speed for a water temperature of 85 to 105 °C. You will notice that, when the Lambda probe % controller work slightly **ABOVE ZERO**, ADAPTIVE GAIN setting **WILL INCREASE** and will bring the Lambda % channel back to about $0 \pm 3\%$.

You will notice that, when the Lambda probe % controller work slightly **BELOW ZERO**, ADAPTIVE GAIN setting **WILL DECREASE** and will bring the Lambda % channel back to about $0 \pm 3\%$.



AIR FILTER

Check/substitute Every 6000 kilometers

B Certain parts must be removed in sequence before accessing the air filter. See chapter C “Bodywork”:

- Passenger seat
- Rider seat
- Left tank side panel
- Right tank side panel
- Ignition switch cover
- Fuel tank
- Air filter compartment



Remove the sealing rubber gasket **(1)**.



Remove the filtering panel from the air box.



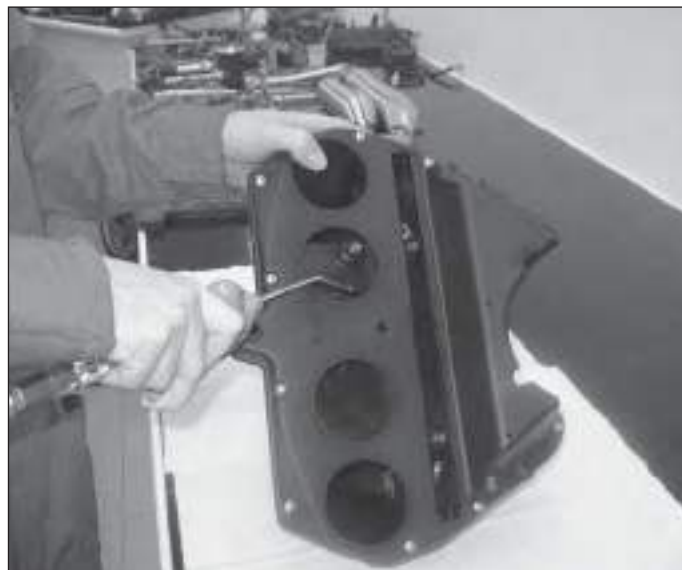


Maintenance

Check the condition of the air filter. If it is necessary to substitute it, proceed as follows:

Prepare a new air filter.

Check that the inside of the air filter compartment is clean and free from foreign bodies.



Insert the air filter complying with the correct assembly direction shown in the figure.



Complete the assembly of the filter into the air filter compartment sealing the operation opening by the rubber gasket as shown in the figure.





Maintenance

Before proceeding with the assembly of the air filter compartment onto the motorcycle, apply silicone grease to the gaskets of the air intake bell chambers.

Proceed with the assembly of the parts listed below and according to the procedure described in chapter C "Bodywork":

- Air filter compartment
- Fuel tank
- Right tank side panel
- Left tank side panel
- Ignition switch cover
- Rider seat
- Passenger seat



BRAKES AND CLUTCH

Check the levels of fluid in the systems → At pre-delivery, at first 1000 kilometers and then every 6000 kilometers

Check for leakages → At pre-delivery, at first 1000 kilometers and then every 6000 kilometers

Substitute fluid → Every 24000 kilometers or at least every two years

Commands check → At pre-delivery, at the first 1000 kilometers and then every 6000 kilometers



Check brake and clutch fluid levels

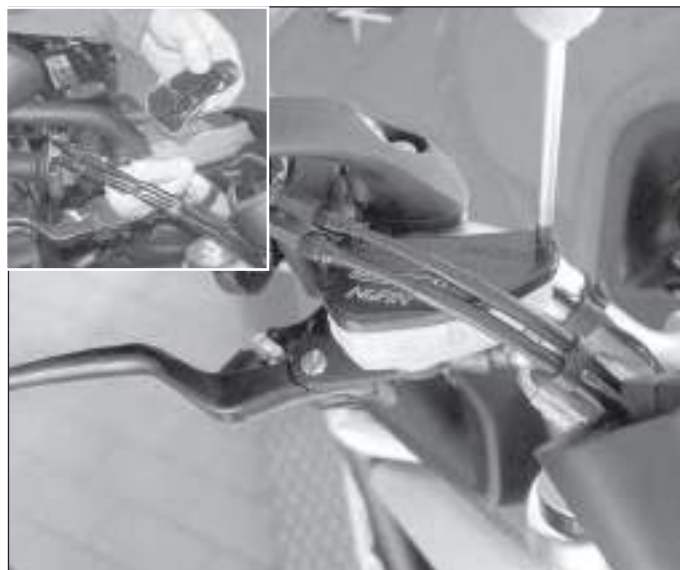
The procedure that is described as follows must be carried out for the fluid chambers of both the front and rear brakes and also the clutch fluid chamber.

Place the motorcycle in a vertical position with the handlebars straight.

Check the fluid levels in the brake and clutch fluid chambers observing the lines for the level marked on the chambers.

If the level is lower than the lower level line, check the wear of the brake pads. If the thickness of the pad linings is correct, add brake fluid complying with the specification by the manufacturer in according to the following procedure:

- Remove the 2 screws from the fluid tank cover;
- Remove the three elements of the cover.



Add brake fluid until the correct level is reached in the chamber.



Recommended brake fluid: AGIP DOT 4 or equivalent.



Do not use brake fluid that comes from old containers, has already been used or does not come from a sealed container. Do not use brake fluid that is left over from previous maintenance or stored for long periods. Utilise only the recommended brake fluids.





Maintenance

Before completing the operation, clean and wash accurately the 3 components of the chamber cover using alcohol and blow to dry them.

B

Clean the edge of the fluid chamber with a clean cloth. Close the fluid chamber with the two relative screws.



Imperfect cleaning of these parts could cause the discharge of small quantities of brake fluid during riding. Brake fluid has strong corrosive properties.



In order to access the back brake fluid tank you should remove the rider seat as described in the Chapter C "Super structures".



Likewise proceed to the front brake fluid tank.





Maintenance

Check eventual leaks and blow-bys of brake and clutch fluid on the unions and tubing.
If any breakages are seen, substitute the damaged parts as described in chapter H “Brakes”.

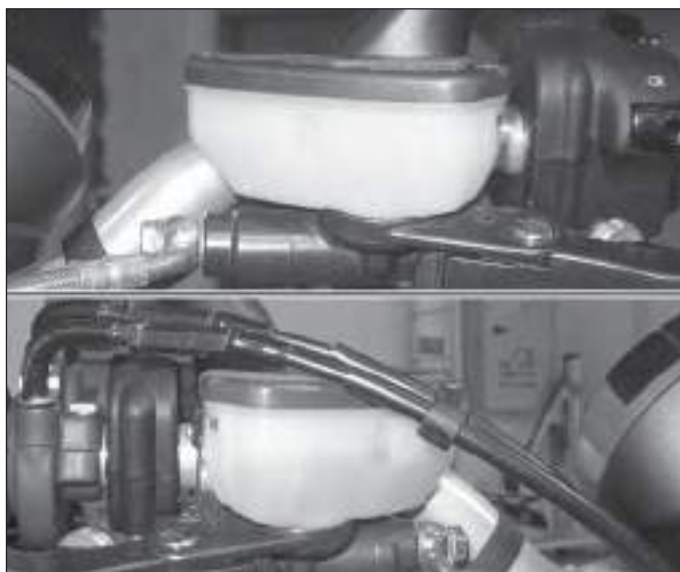


Brake fluid leakages are dangerous and immediately discolour painted surfaces. Before riding, check the tubes and joints of the brakes for damage and signs of leaks.



Substitution and bleeding of the brake/clutch fluid

The substitution of the brake/clutch fluid and the successive bleeding of the circuit are operations that require particular caution and precision. To carry out these operations, it is therefore necessary to follow the procedure described in chapter H “Brakes” of this manual.



BRAKE/CLUTCH/GEARCHANGE COMMANDS CHECK

It is possible to effectuate the adjustment of the position of the levers of the front brake, the clutch and also the gearchange lever. Such adjustments have been created to optimise the grip and the movement of the commands with regards to the needs of the motorcyclist.

The commands of the motorcycle are initially calibrated to a standard position, but can be altered as follows.

Front brake and clutch lever adjustment



Never carry out adjustments whilst riding the motorcycle.

Pull the lever to neutralise the push of the spring and at the same time, adjust the position by rotating the ring in a clockwise or anti-clockwise direction.

In a clockwise direction: The lever goes further away from the handgrip.

In an anti-clockwise direction: The lever comes closer to the handgrip.



Whenever the command levers do not function correctly or have excessive play, consult chapter H “Brakes” for the overhaul of the same.



Gearchange/rear brake lever adjustment

To carry out the adjustment of the rear brake lever and the gearchange lever, slacken the screw (1) utilising a **5 mm** Allen key.

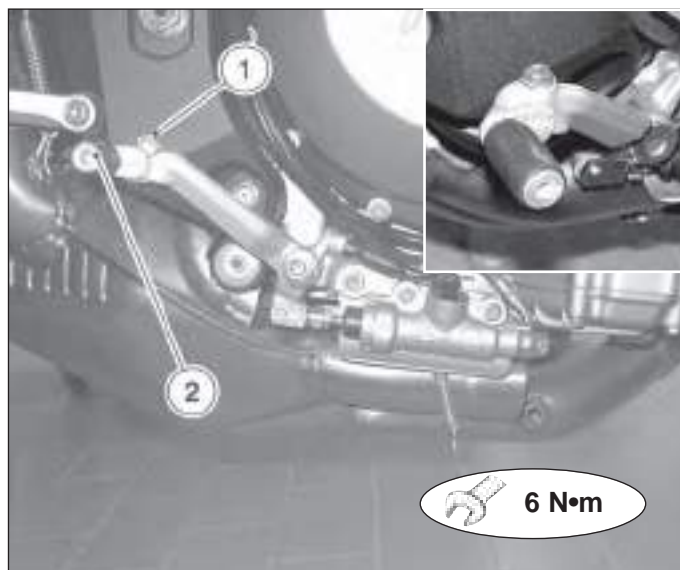
Adjust the position according to the requirements of the rider utilising the same key and on the hexagonal hole (2).

Tighten the screw (1) to the torque prescribed.



Brake lever adjustment torque pressure: 6 N·m

Operate on both the gearchange and rear brake levers in the same way.



Footrest adjustment (Brutale 1090 RR)

On some models, the footrests are adjustable. Operate as follows for the adjustment from the original position:

- Slacken (without removing) the eccentric adjustment screw (situated at the rear of the footrest support) using a **12 mm** hexagonal spanner.
- Loosen (without remove) the two fixing screws of the frame board support using a 6 mm setscrew wrench.



- Lay (without tightening) the eccentric adjustment rear screw. Effectuate the adjustment by utilising the correct size screwdriver.



Adjust both footrests to the same adjustment value.

- Tighten the two footrest fixing screws utilising a torque wrench.

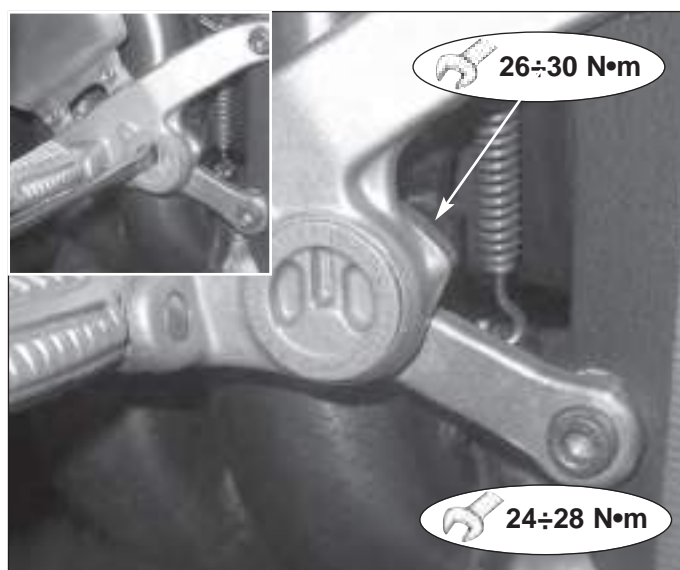


Torque pressure: 24 ÷ 28 N·m

- Tighten the rear eccentric adjustment screw.



Torque pressure: 26 ÷ 30 N·m





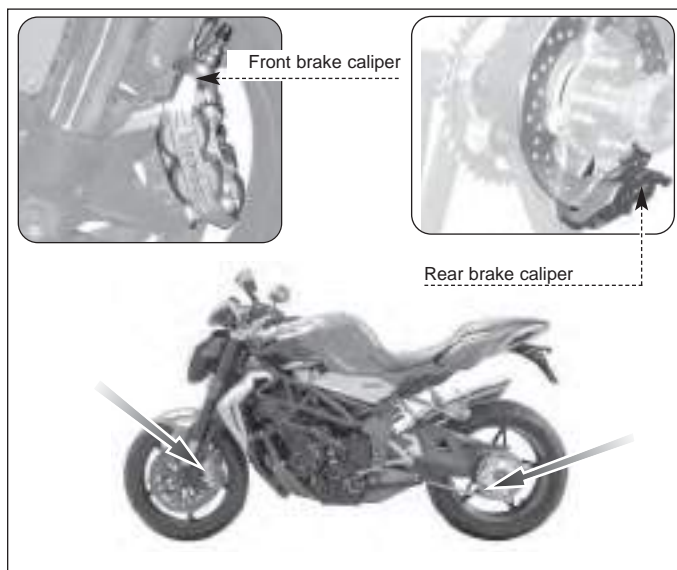
Maintenance

BRAKE PADS

Check/substitute →

At the first 1000 kilometers and then every 6000 kilometers

Check the condition and thickness of the brake pads on the calipers.

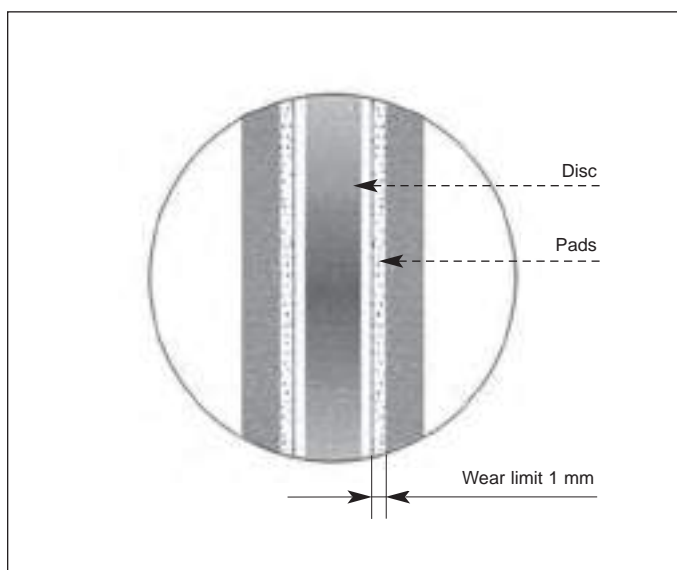


Measure the thickness of the pad linings. If the thickness of the linings is equal or less than the wear limit shown below, replace the pads as described in chapter H "Brakes".

Wear limit: 1 mm.



If the brake pads are substituted, it is necessary to effectuate a proper running-in period before reaching an optimal braking efficiency.



ACCELERATOR CONTROL

Accelerator play check →

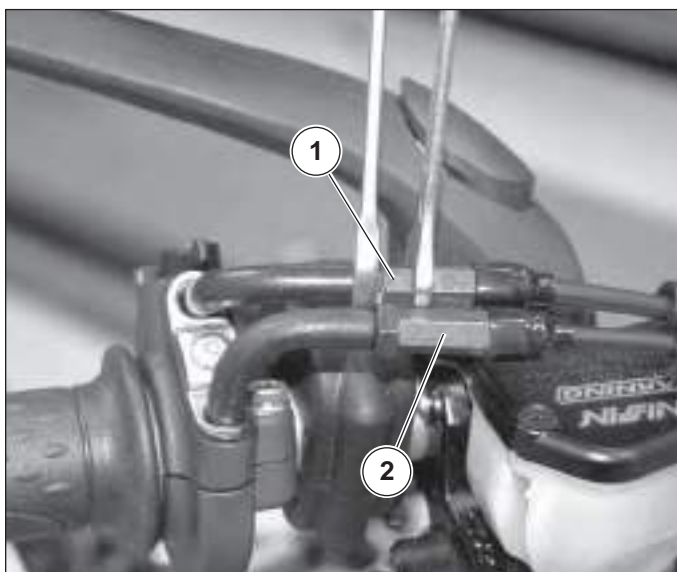
At the pre-delivery check, at the first 1000 kilometers and then every 6000 kilometers

The accelerator control should not be too tight or too slack (excessive play) in its movement. It must also be free of play and looseness when turning it.

For optimum adjustment it is necessary to work on the two upper nut adjusters (situated on the accelerator handgrip).



The lack of play on the closure of the accelerator (1) can stop the complete closing of the throttle valve and the accelerator could remain in the open position, thereby leaving the engine with a fast tickover. It is the same for the opening transmission (2).



After making adjustments, check that the throttle valves open slightly by activating the choke lever (1), as indicated in the following figure.



B



If interventions have been carried out on the throttle bodies, the transmission of the accelerator control must be analysed not only at the accelerator handgrip but also near to the throttle bodies.

It is therefore necessary to consult chapter D "Air intake injection system".



As a final control and after having reassembled all the components, switch on the engine and check that, with the choke lever activated, the tickover of the engine does not exceed **2500 r.p.m.**





Maintenance

LOCKS

Check → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Ignition/steering block switch

This switch has four operating positions.



Do not attach key rings or other objects to the ignition key that could obstruct the rotation of the steering.

The ignition switch activates and disactivates the electrical system and the steering lock. The four control positions are as follows.

“OFF” position

All electrical circuits are disactivated. The key can be pulled out.

“ON” position

All electrical circuits are activated, the instruments and warning lights carry out self-diagnosis and the engine can be switched on. The key cannot be pulled out.



Do not attempt to change the functions of the ignition switch whilst the motorcycle is being ridden. It could cause the rider to lose control of the machine.



Do not leave the key on the ON position for a long time when the engine is not running, in order to avoid damage to the electrical parts of the motorcycle.

“LOCK” position

Turn the handlebar left. Press the key down and rotate it to the “LOCK” position.

All electrical circuits are disactivated and the steering is blocked. The key can be pulled out.

“P” position

Rotate the key from the “LOCK” position to the “P” position. All electrical circuits are disactivated except for the sidelights.

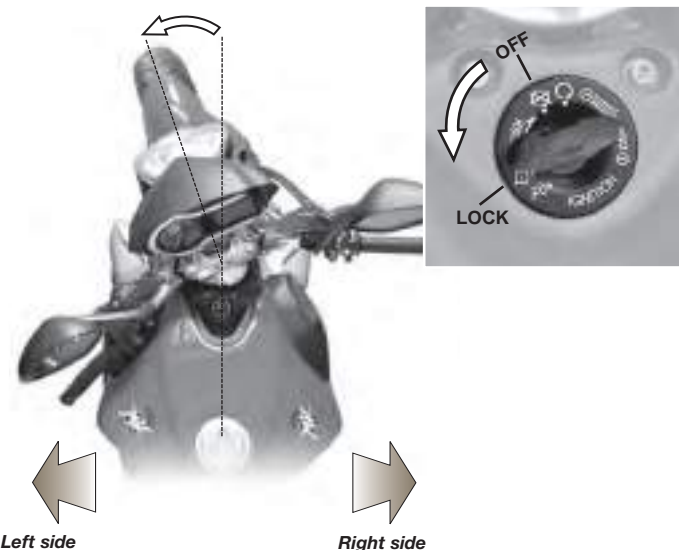
The steering is blocked.

The key can be pulled out.



Do not leave the key on the P position for a long time, in order to avoid discharging the battery of your motorcycle.

If the ignition switch unit is damaged (it does not allow the positioning of any one of the four positions), it must be substituted with a new ignition switch unit following the sequence of the disassembly as described in chapter G “FRAME”.





Fuel cap lock

Lift up the anti-dust cover.

Insert the key, rotating it in a clockwise direction and lift up the cap.

After refuelling, press the cap down and rotating the key contemporaneously to facilitate the closure. Press and hold the cap, let the key go free, bring it into a longitudinal position and pull it out.

If the fuel filler cap does not function (the cap does not close, the lock blocks, etc.) substitute it with a new one as described in chapter C "Bodywork".



Personal compartment lock

Insert the key in the lock.

Turn the key clockwise and at the same time press the driver's seat slightly.

Lift and take out the seat.



For reassembling the part refer to the following indications:

- Turn the key in the lock
- Press the rider seat
- Release the key
- Press again the passenger seat, verifying it is well fastened to the structure.



After having removed or lifted the rider seat, and in any case before using the motorcycle, ensure that the components are correctly placed and well fastened to the supporting structure of the motorcycle.



Maintenance

STEERING

Check and adjust →

At the first 1000 kilometers and then every 12000 kilometers

Check the steering components regularly according to the above-mentioned intervals.

If it is necessary to carry out adjustments, operate as described in chapter F "Suspension and wheels".

TRANSMISSION CHAIN

Check →

At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Substitute →

Every 12000 kilometers

Place the motorcycle on the rear stand.

The chain tension check should be performed with the motorcycle having a static set-up dimension equal to the following standard values (see chapter F "Suspension and wheels"):

BRUTALE 990 R - 1090 RR: 200 mm

The clearance "h" between the axis of symmetry of the chain and the chain cover should be equal to the following values as shown in the figure.

BRUTALE 990 R - 1090 RR: h = 50 mm

Manually rotate the rear wheel and effectuate this check at different points along the chain.

As the wheel is turned, the play should remain virtually the same. If, on the other hand, the play on the chain varies considerably, it means that some of the links are flattened, jammed or elongated.

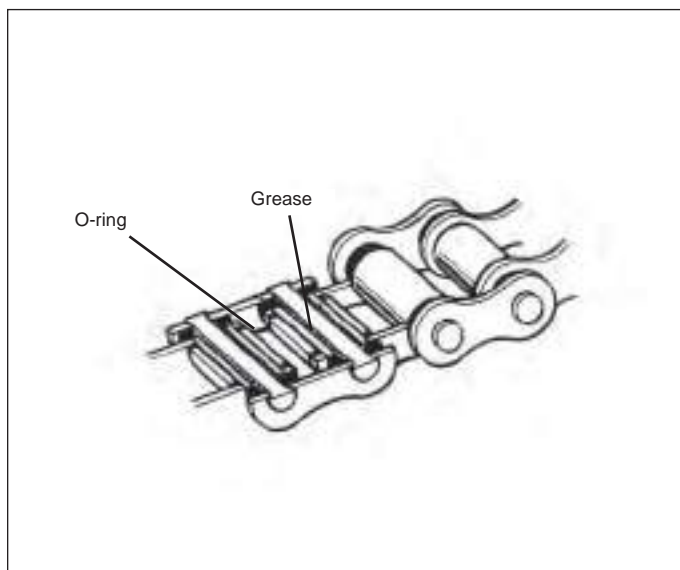
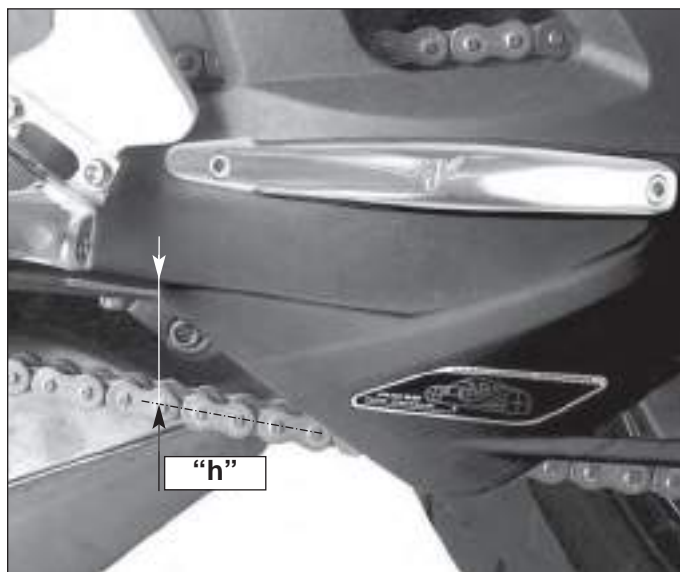
Visually check the transmission chain for the following defects:

- Slack pins
- Damaged rollers
- Dry and rusty links
- Bent or seized links
- Excessive use
- Incorrect chain adjustment
- Damaged O-rings

The chain must be substituted if any one of these defects is found.

When substituting the transmission chain, substitute also the crown and pinion wheel.

For the substitution of the chain, pinion, crown wheel and to check the wear of the chain guide, follow the sequence described in chapter F "Suspension and wheels".





Maintenance

Adjust →

At the first 1000 kilometers and then every 6000 kilometers

To adjust the chain tension, proceed as follows:
Slightly loosen the 2 screws of the back wheel hub until they can freely turn.



Using the special spanner as indicated in the figure, rotate the eccentric counterclockwise to tension the chain, or clockwise to loosen the chain, until the correct play is reached (as described previously).



Successively tighten the screws of the rear wheel hub to the torque pressure indicated as follows.

N.B. Tighten the screws to the specified torque in several steps and in an alternate pattern.

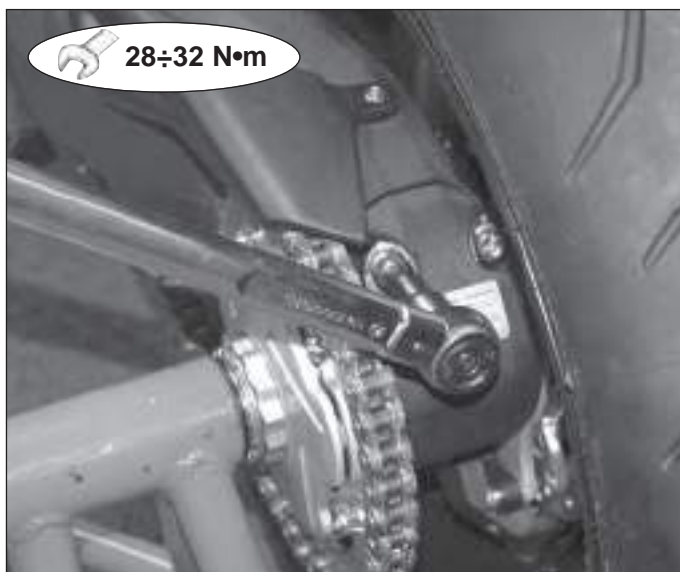


Rear hub eccentric adjuster screw torque pressure: $28 \div 32$ N·m

After tightening the screws of the rear wheel hub, recheck the chain tension so that any eventual variations can be found. If the tension of the chain is varied in respect of the adjustment before tightening the rear wheel hub, then repeat the adjustment procedure of the transmission chain.



When adjusting the tension of the chain the motorcycle set up adjustment must be carried out beforehand. See “Motorcycle set up adjustment” described in chapter F “SUSPENSIONS AND WHEELS”.





Maintenance

Chain lubrication

Lubricate → At the first 1000 kilometers and at 6000 kilometers and then at every 12000 kilometers

Clean the chain with a clean cloth and/or a jet of air.



The chain is the type with sealing rings (O-RING); in order to avoid damages you should not clean the chain using jets of steam or high pressure water, or using fuel or cleansing solvents on the market.



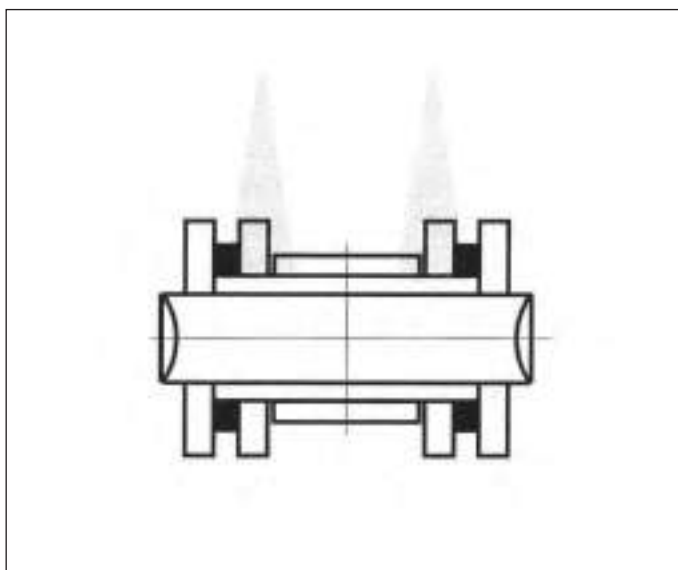
Then apply a light and even coating of lubricant on the whole chain without reaching the surrounding parts, in particular the tyres.



Use only the lubricant recommended (see page 11 in this chapter) in order to effectively protect the drive chain and avoid from splashing when the motorcycle is running.



In particular, direct the lubricant jet on the internal links, in order to lubricate the surface of the O-Rings and penetrate inside the chain roller.





Maintenance

TYRES

Check pressures → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Check wear → At the first 1000 kilometers and then every 6000 kilometers

If the tyre pressures are too high or too low, the ride is affected and tyre life duration is accentuated.

Therefore maintain the correct tyre pressures to obtain better roadholding and the maximum wear from the tyres. The cold tyre pressures are indicated in the table.



Description	BRUTALE 990 R	BRUTALE 1090 RR
Brand and type	PIRELLI - Diablo Corsa III PIRELLI - Diablo Rosso	PIRELLI - Dragon Supercorsa Pro DUNLOP - Sport Max Qualifier RR
Inflating pressure (*):		
Front	2.3 bar (33 psi)	2.3 bar (33 psi)
Rear	2.3 bar (33 psi)	2.3 bar (33 psi)

*: when using tyres that have a different brand from those recommended, refer to the tyre pressure marked by the manufacturer on the side of the tyre.

The use of the motorcycle with excessively worn tyres diminishes the roadholding and is therefore dangerous. It is highly recommended to change the tyres when the tyre tread reaches the following minimum.



Ride with extreme care during the initial kilometers after replacing the tyres.

Utilise exclusively the tyres recommended.

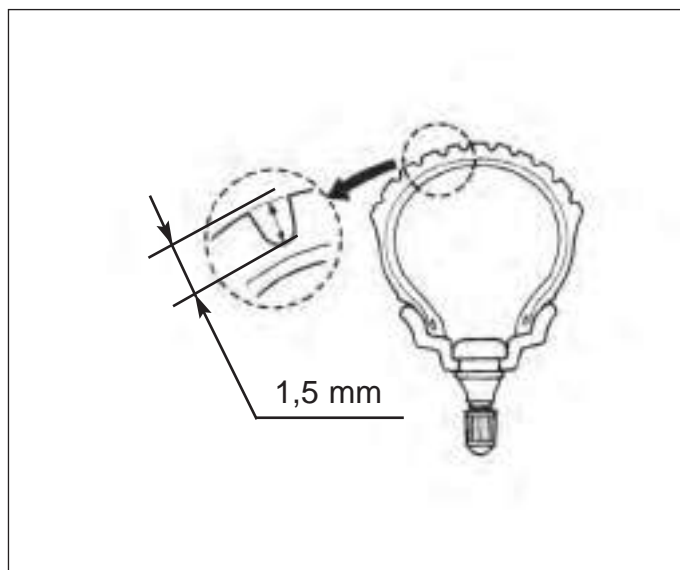
Tyre tread minimum limit = 1.5 mm.

FRONT WHEEL BEARINGS

Check → Every 6000 kilometers and at every tyre change

Substitute → Every 36000 kilometers

If excessive play of the front wheel bearings is found during checks, then substitute them as indicated in chapter F "Suspension and wheels".





WHEELS

Visual check →

At the first 1000 kilometers and then every 6000 kilometers (at least every tyre change)

After having visually checked or following even light collision damage, it is necessary to check the planarity, the eccentricity and the ovalisation of the wheel. See the control procedures described in chapter F "Suspension and wheels".



REAR WHEEL HUB

Check and lubricate bearings → Every 12000 kilometers
Substitute → Every 12000 kilometers

To check and overhaul the rear wheel hub unit, it is necessary to carry out certain preliminary operations by consulting the relative chapters.

Remove the rear wheel (see chapter F "Suspension and wheels").

Lift up the motorcycle by utilising a mechanic's lift.

Remove the Seeger ring of the fixing nut of the crown flange (see chapter F "Suspension and wheels").

Loosen the nut of the wheel pin (see chapter F "Suspension and wheels").

Remove the brake caliper (see chap. H "Brakes") and its support flange.

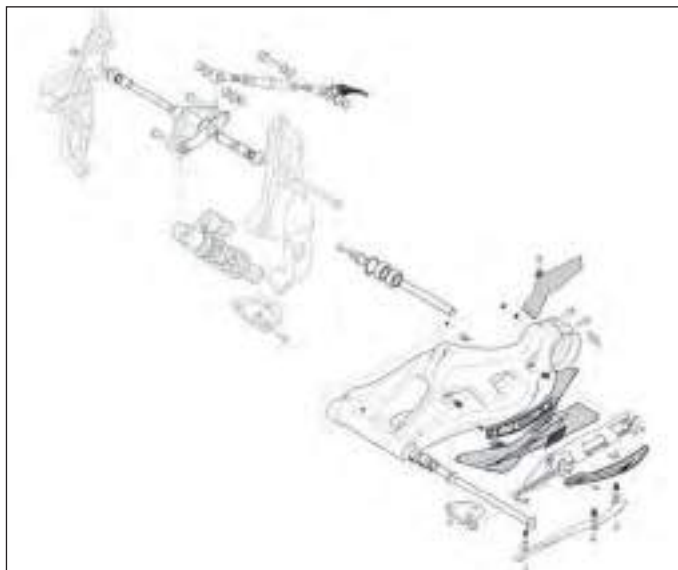
Extract the wheel pin.

Check and overhaul the rear wheel hub unit (see chapter F "Suspension and wheels").

SWINGARM BEARINGS

Check and lubricate → Every 36000 kilometers

If excessive play is found on the rear fork, due to the bearings assembled on the central pin of the fork/frame, substitute them as described in chapter F "Suspension and wheels".



REAR SHOCK ABSORBER

Check and adjust → At the first 1000 kilometers and then every 12000 kilometers

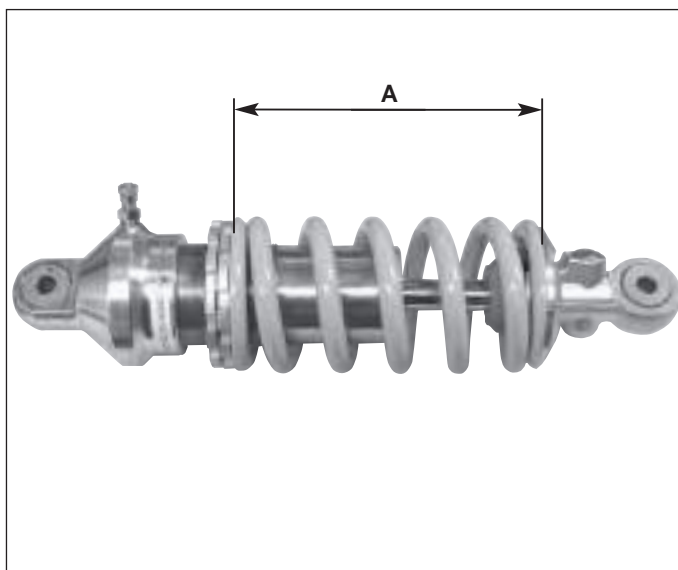
Verify the length in the seat of the back damper spring, check the absence of leakages or oil blow-by and the adjusting functionality.

Spring adjustment standard "A":

- Brutale 990 R: A = 161 mm
- Brutale 1090 RR: A = 160 mm



The shock absorber contains gas under high pressure. Do not operate the shock absorber valve. Do not attempt in any way to remove the shock absorber valve.





Maintenance

Compression and extension adjustment (rear suspension):

(See the Adjustments Table - Chapter "F – SUSPENSION AND WHEELS" - page 38).

N.B. This operation can be made with the shock absorber in position on the motorcycle. For further checks on the round joints where the rear shock absorber is attached, it is necessary to carry out the phases of removal described in chapter F "Suspension and wheels".

SIDE STAND

Functional check → At the pre-delivery, first 1000 kilometers and then every 6000 kilometers

With the side stand lowered, check that it is not possible to switch on the engine. Also check that with the engine switched on, when the side stand is lowered and a gear is engaged, the engine switches off automatically. If not, the cause could be a faulty switch mounted on the side stand. If this is the case, substitute the switch by carrying out the following procedure.

Disconnect the electrical connectors.

Remove the 2 fixing screws of the switch.

Remove the switch.

After having substituted the switch, tighten the two screws to the prescribed torque.



Torque pressure: $5 \div 7$ N·m



Apply Loctite Medium 243

Reconnect the electrical connector.

Check that the side stand is not worn.

To remove the side stand, operate as follows:

- After having removed the side stand switch, unhook the two springs;
- remove the nut placed behind the side stand joint;
- remove the screw (1).

For reassembling, perform the operations in reverse by tightening the nuts at the prescribed torque.



Torque wrench setting of side stand plate screws (2) : $25 \div 28$ N·m



Apply Loctite Medium 243

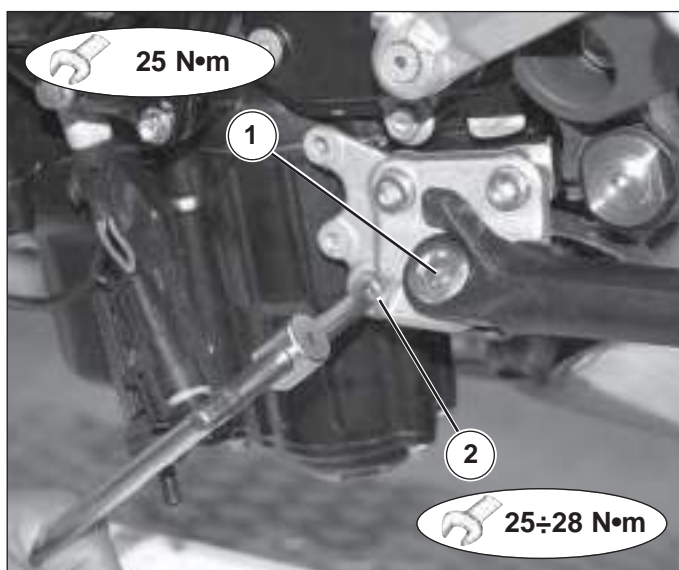
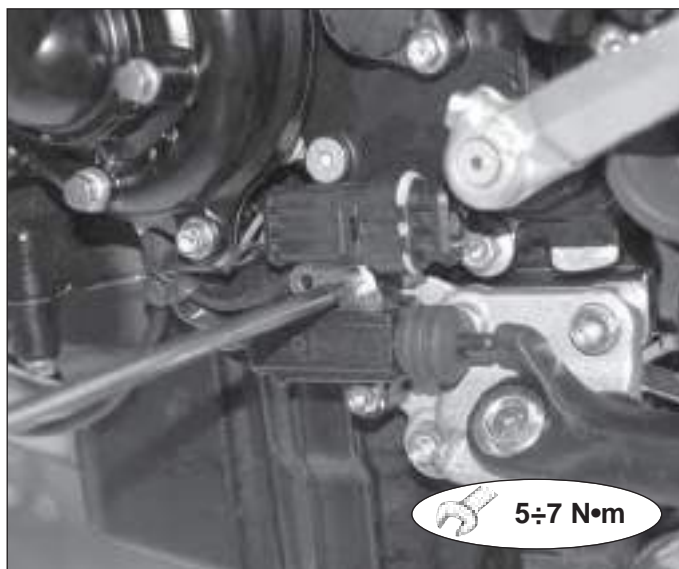
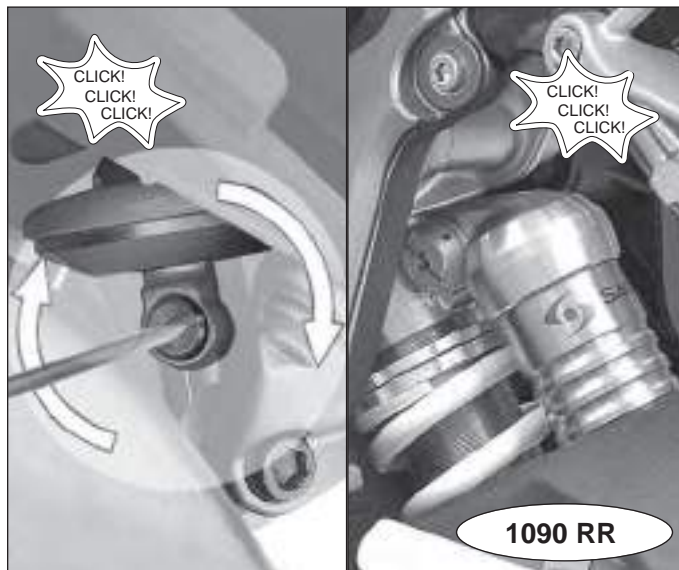


Torque wrench setting of side stand nut (1) : 25 N·m



The substitution of the springs must be carried out by using the proper tool.

Before refastening the springs, verify that the stand can freely turn (without damages or frictions).





FRONT FORK

Substitute oil → every 24000 kilometers

The front fork is vitally important for the rideability and roadholding of the motorcycle. It is therefore necessary to substitute the fork oil at the prescribed intervals.



Specified oil: **SAE 7,5**

To substitute the fork oil and to do a complete overhaul of the forks, carry out the described operations in chapter F "Suspension and wheels".



SCREWS AND NUTS

Check and tighten → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Carry out an accurate check of the tightness of the nuts and screws on the motorcycle at the intervals prescribed. Consult the table in chapter N "Torque pressures" for the correct values".

TUBE BAND FASTENERS

Check and tighten → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

Carry out a general check on all tube band fasteners for their condition and tightness.

Substitute damaged band fasteners by following the relative procedure delineated in the various sections.



ELECTRICAL SYSTEM

Check the functioning → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

B

Carry out a detailed check on the various parts of the electrical system, the contacts between components and their good functioning.

Consult chapter E "Electrical system" for these checks.

BATTERY

Check and clean connections → at the first 1000 kilometers and then every 6000 kilometers

Consult chapter E "Electrical system" for the check on the battery condition.

If it is necessary to disconnect the battery and remove it during overhauls carried out on the motorcycle, follow the procedure in the figure for the correct assembly.

Insert the battery in the proper compartment.



The first charge of the battery must be performed before assembling it on the motorcycle.



Assembly of the battery terminals

Mount the positive terminal (+) lead onto the relative pole of the battery, respecting the position indicated in figure.



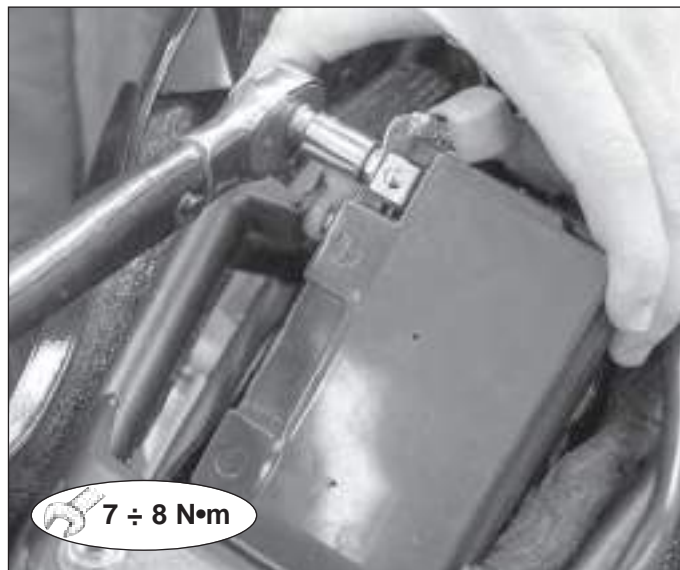


Maintenance

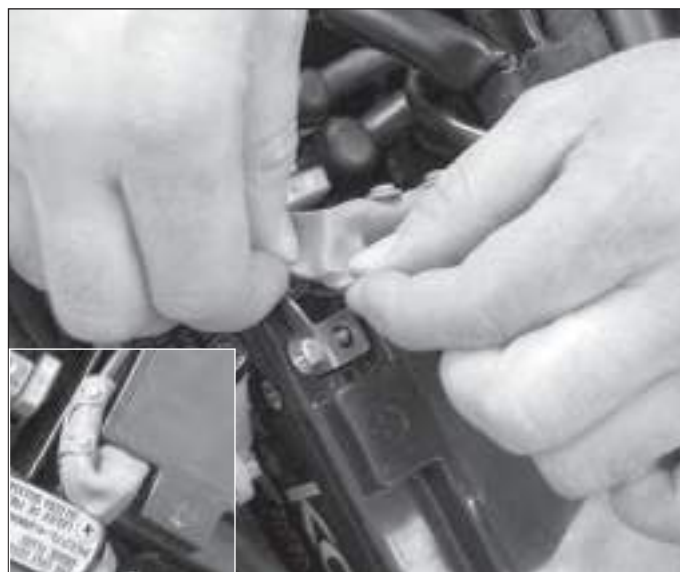
Turn the screw of the positive terminal and tighten it at the prescribed torque by using a torque wrench.



Torque wrench setting: $7 \div 8 \text{ Nm}$



When the leads are mounted, replace the **protection cover** on the positive pole (see the figure).



Mount the two negative terminal (-) leads on the relative pole of the battery following the placement shown in the figure.





Maintenance

Turn the screw of the negative terminals and tighten them complying with the prescribed torque by using a torque wrench.

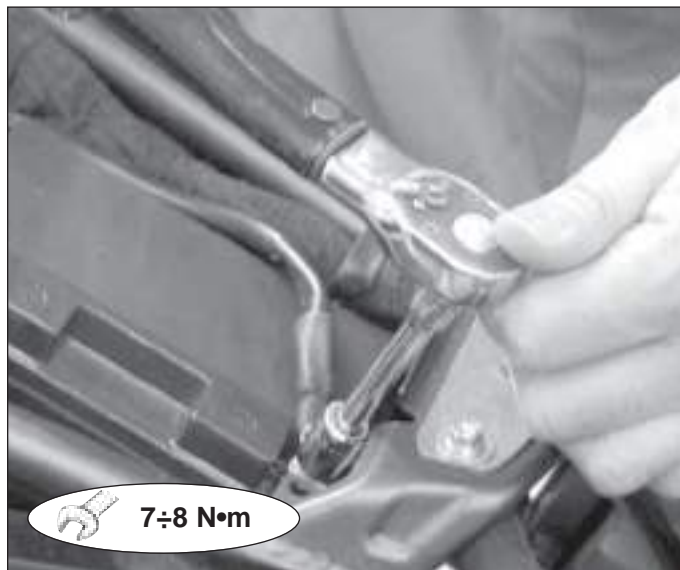
B



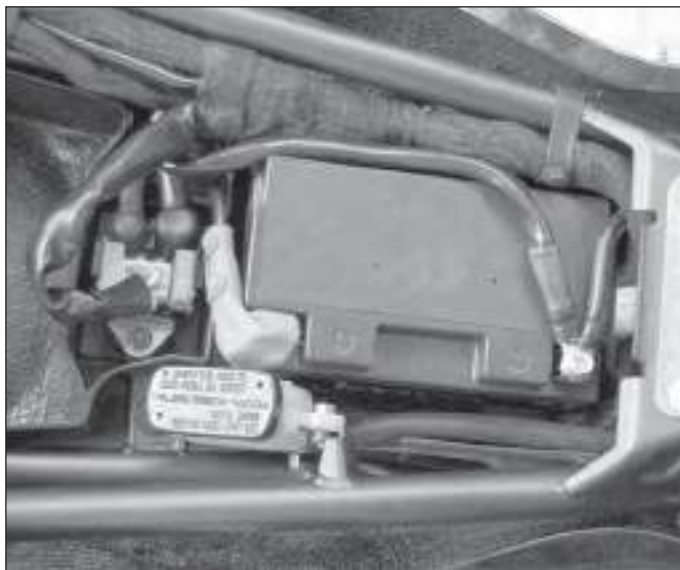
Torque wrench setting: $7 \div 8 \text{ N}\cdot\text{m}$



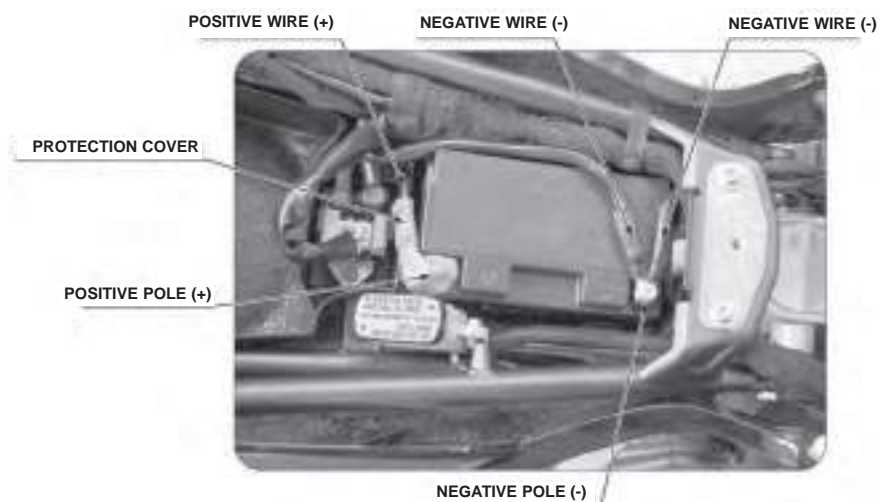
Before tightening, verify that the cables are correctly oriented.



At the end of assembly, ensure that the cable of the positive terminal is placed inside the structure of the back sub-frame (see the figure).



PLACEMENT AND ASSEMBLY OF TERMINALS (WIRE TERMINALS) ON THE BATTERY

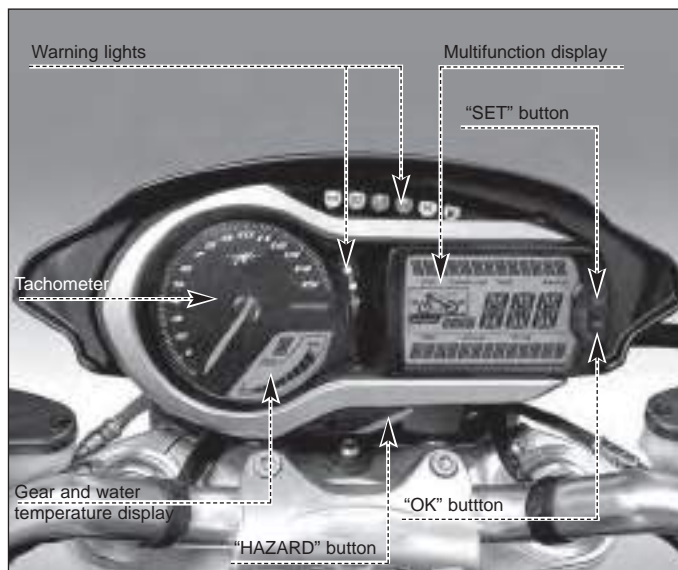


INSTRUMENTS AND WARNING LIGHTS

Check → At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

The instrumentation check must be carried out completely on all its functions as listed in the following list. If even one of the functions does not function correctly, consult chapter E “Electrical system” for complete details.

Turning the ignition key to the “ON” position activates the instruments and the warning lights. After an initial check-up (approximately seven seconds) the information received correspond to the general condition of the motorcycle at that moment.



Luminous warning indication lights

1 Main beam warning light (blue)

It lights up only when the main beam is switched on.

2 Dipped beam or sidelights warning lights (green)

It lights up when the dipped beam or sidelights positions are activated.

3 Gears in neutral warning light (green)

It lights up when the gear position is in neutral”.

4 Direction indicators warning light (green)

It lights up when the direction indicators are activated.

5 Fuel reserve warning light (orange)

It lights up when the fuel tank contains approximately four litres of fuel.



If the oil pressure warning light lights up whilst riding the motorcycle, stop immediately. Check the oil level and if necessary top up. If the warning light lights up and there is a correct level of oil in the engine, do not continue riding. Contact the nearest authorised assistance center.

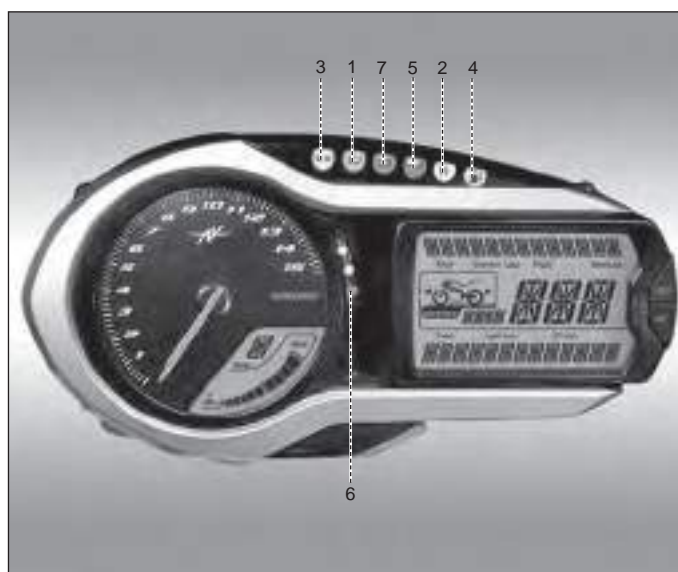
6 Engine oil pressure warning light (red)

It turns on when the engine exceeds 11600 rpm.

7 Battery charge warning light (red)

It lights up when the alternator does not supply sufficient current to recharge the battery.

If it lights up whilst riding the motorcycle, go to the nearest authorised assistance center.



Multi-function display / Gear and Water Temperature Display

9 Speedometer

The speedometer indicates the speed. The value of the scale can be written in kilometers per hour (Km/h) or miles per hour (m.p.h.). The highest value on the scale is 320 Km/h (199 m.p.h.).

10 "SET" button

If pressed, the "SET" button can select the figure of the display to effectuate adjustments.

11 "OK" button

Press it to confirm the new settings.

12 "HAZARD" button

Press it to turn on the emergency lights.

13 Total mileometer "TOTAL" Indicates the total mileage, from 0 to 99999.9 (km or mi).

Partial tripmeter 1 "TRIP 1" Indicates partial mileage, from 0 to 9999.9 (km or mi).

Partial tripmeter 2 "TRIP 2" Indicates partial mileage, from 0 to 9999.9 (km or mi).

Chronometer

It displays the time measured by the chronometer

14 "SPORT" Mode *

It puts the injection unit in Sport Mode.

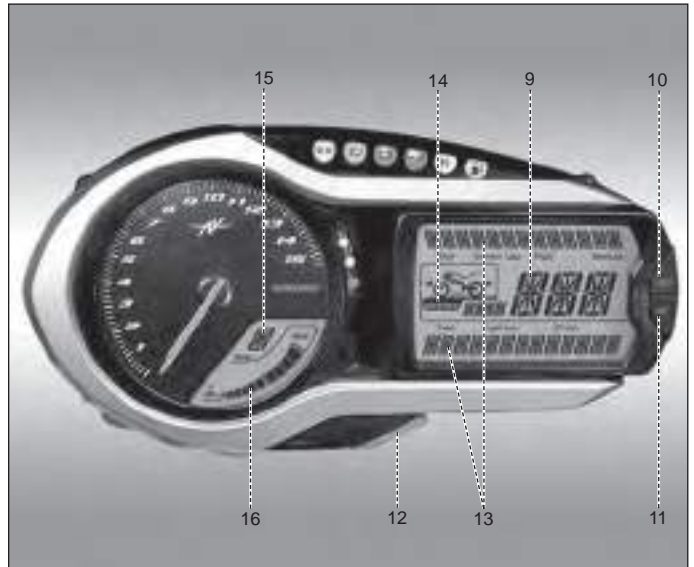
15 Gear display

It displays the currently engaged gear "N" stands for "neutral".

16 Thermometer

It displays the temperature of the coolant by turning on a variable number of segments on a graduated scale. When the temperature falls outside the normal operating range, it may display one of the following information:

- the display shows just one blinking segment; it means that the temperature is low;
- all segments are on, while the upper segment is blinking; it means that the temperature is high.



Danger - Notice: if the temperature is high, stop the motorbike and check the coolant level. If it needs to be filled up, contact a MV Agusta licensed service center. If the warning light turns on even if the level is adequate, stop driving and contact a MV Agusta licensed service center.

(*): This function is present only on certain models



Selecting and setting the display functions

Some of the main measurements of the instruments may be changed.

The available options include:

- Select an operating mode:
 - "RUN" (Odometer)
 - "CHRONO" (Chronometer)
 - "SERVICE" (Expiration of scheduled maintenance service)
 - "TC" (Traction control)
 - "IMMOBILIZER" (Antitheft device)
- Reset the trip counter:
 - Trip counter 1 "TRIP 1"
 - Trip counter 2 "TRIP 2"
- Set the measurement units for
 - Speed
 - Distance covered
- Turn on the chronometer
- Control unit mapping selection *

Selecting the display functions

The following settings may be changed on the display:

- "RUN" (Odometer)
- "CHRONO" (Chronometer)
- "SERVICE" (Expiration of scheduled maintenance service)
- "TC" (Traction control)
- "IMMOBILIZER" (Antitheft device)

To display the operating modes, press "SET" for less than four seconds. When pressed, the display shows all modes, in a sequence. Select the desired mode.



The operation must be performed while the engine is off, the gears are in neutral, the motorcycle is stationary, and with your feet on the ground. Do not set the display functions while riding.



(*): This function is present only on certain models



Maintenance

❑ “RUN” mode

In addition to the speedometer, the display shows the following functions (see §4.4.2.):

- Total odometer “TOTAL”
- Trip counter 1 “TRIP 1”
- Trip counter 2 “TRIP 2”



❑ “CHRONO” Mode

This mode turns on the Chronometer and saves the recorded information (see §4.4.4.).
The following is displayed:

- Chronometer Current lap “CURRENT LAP”
- Chronometer Fastest lap “BEST LAP”
- Chronometer Last lap “LAST LAP”
- Rev counter Total laps covered “N° LAP”



❑ “SERVICE” Mode

It shows the distance the motorbike will have to cover in order to undergo the next scheduled service.

NOTE When the next service is less than 1000 km away, such value is automatically displayed at the end of the starter page.





❑ “TC” Mode

This Mode adjusts the engine traction control level to your driving requirements (see §4.4.6.).



❑ “IMMOBILIZER” Mode

The “IMMOBILIZER” lets the engine start only if it recognises the original starter key. This is actually an anti-theft device built into the electronic circuit of the vehicle, since only authorised people are allowed to drive it.

Use the dashboard “IMMOBILIZER” only in the event of a breakdown. If for any reason the original key is not recognised by the system, you must manually enter the secret code, which is on the MV CodeCard, to let the engine start.





Maintenance

Trip reset

To reset "TRIP 1" and "TRIP 2", proceed as follows.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.

- Access "RUN" and press "SET" for more than four seconds until "RUN MENU" appears.



- Press "SET" for less than four seconds until "TRIP 1 RESET" appears.



- Press "OK" for more than four seconds; "TRIP 1" starts blinking.





Maintenance

- Now, press “OK” for less than four seconds, it will clear the display. Otherwise, press “SET” for more than four seconds to stop the reset procedure.



- Press “SET” for less than four seconds until “TRIP 2 RESET” appears.



Press “OK” for more than four seconds; “TRIP 2” starts blinking.





Maintenance

- Now, press “OK” for less than four seconds, it will clear the display. Otherwise, press “SET” for more than four seconds to stop the reset procedure.



- Press “OK” again to quit “TRIP 2 RESET” and move on to the next mode.



How to set the measurement units

The following measurement units may be changed at the same time:

- Speed
- Distance covered



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.

- Access “RUN” and press “SET” repeatedly until “UNIT CHANGE” appears.





Maintenance

- Press "OK" for over four seconds; the measurement unit of the speedometer starts blinking.



- Press "OK" to change from Km/h to Mph, or vice versa. When you change the measurement unit of the speedometer, the following quantities will change accordingly:

- Odometer (total, trip): Km → mi

Otherwise, press "SET" for over four seconds to stop resetting the measurement units.



- Press "OK" for over seconds to confirm the new measurement units.





Maintenance

Chronometer

□ Lap time recording

- Turn on the chronometer ("CHRONO" mode) to record the time taken to cover a lap.



- Press the headlight button to start recording the time. The colon that separates the minutes from the seconds and from the tenths of a second will start blinking. Now, the instrument is recording the time.



- Press the headlight button again to record the time taken to cover the 1st lap. At the same time, the instrument starts recording the time taken to cover the second lap.

The time taken to cover the first lap is saved and is displayed on "LAST LAP", until it records the time taken to cover the next lap.





Maintenance

- If using the chronometer again, every time you press the headlight button, it records a time. The instrument can record up to 100 consecutive times.

If the time taken to cover the last lap is lower than the time measured during the earlier laps, the new time is displayed on "BEST LAP".



❑ Data display

Once all times have been recorded, they may be displayed.

- Access "CHRONO" and press "SET" for over four seconds until "CHRONO MENU" appears.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.



- Press "SET" for less than four seconds until "LAPS VIEW" appears.



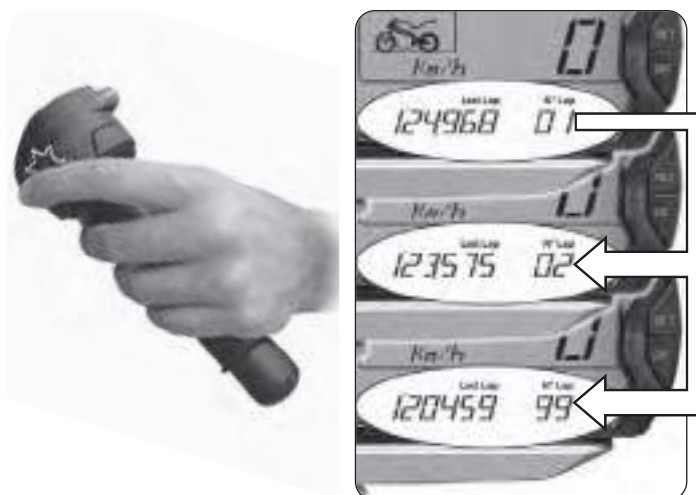


Maintenance

- Press “OK” to display the fastest lap time (“BEST LAP”) and the relevant lap number.



- Then, press the headlights button repeatedly to display all the recorded times since the 1st lap, in a sequence.
- Once all times have been displayed, press “SET” to quit “LAPS VIEW” and move on to the next mode.



❑ How to delete data

To delete the saved data, proceed as follows:

- Access “CHRONO” and press “SET” for over four seconds until “CHRONO MENU” appears.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.





Maintenance

- Press "SET" repeatedly for less than four seconds until "BEST LAP RESET" appears.



- Press "OK" for over four seconds until "BEST LAP" starts blinking.



- Now, press "OK" for less than four seconds to delete the value. Otherwise, press "SET" for over four seconds to stop the deletion procedure.





Maintenance

- Press "SET" for less than four seconds until "LAPS RESET" appears.

B



- Press "OK" for over four seconds until "LAST LAP" starts blinking.



- Now, press "OK" for less than four seconds; all the saved times are deleted. Otherwise, press "SET" for over four seconds to stop the deletion procedure.





Maintenance

- Press "OK" again to quit "LAPS RESET" and go back to Chronometer Mode.



"SERVICE" Mode

It shows the distance the motorbike will have to cover in order to undergo the next scheduled service.

Once the maintenance operations have been performed, it is possible to reset the mileage to the next scheduled service.



❑ Resetting of mileage to next service

Access to "SERVICE" mode, then press "SET" for over four seconds until "RESET KM" appears.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.





Maintenance

- Press “OK” for over four seconds; the value of the mileage will start flashing.

B



- By pressing “OK” once more, the mileage is reset to the prescribed value of the distance to be covered in order to undergo the next scheduled service.



“TC” Mode

- Press “SET” in order to access “TC” mode, then press “SET” for over four seconds until “TC LEVEL” appears. The current traction control level is the same as the one shown on the display.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.





Maintenance

- Press “OK” for less than four seconds: the traction control level rises up to the next value. Such value may range between 0 and 8.
- Press “OK” for over four seconds to confirm the selected traction control level.



“IMMOBILIZER” Mode

In the event of a breakdown, the system might fail to recognise the starter key code and prevent the engine starting. To let the engine start, enter the secret code, which is on the MV CodeCard that was handed out to you with the motorbike.

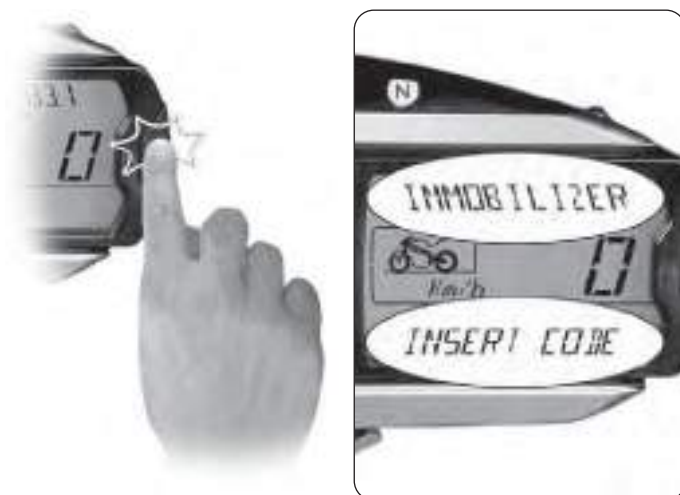
- Remove the lid from the box on the back of the MV Code Card and read the secret electronic code of the starter key (the figure shows a random code, for information only).



- Access “IMMOBILIZER” and press “SET” for over four seconds until “INSERT CODE” appears.



The display modes may be changed or set when the engine is off, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.





Maintenance

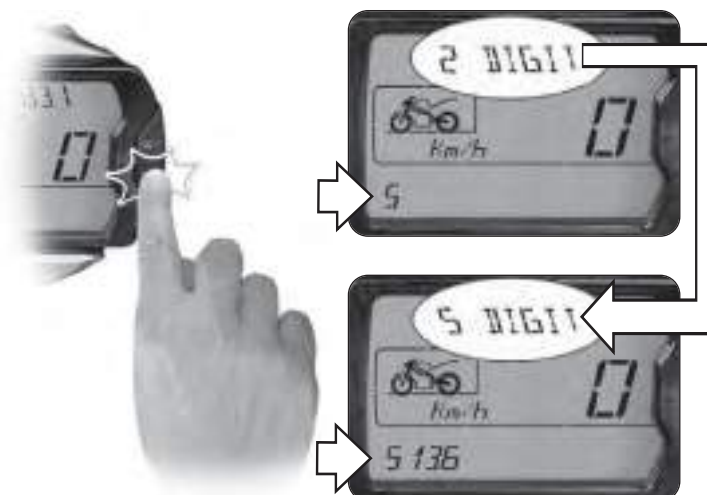
- Press "SET" for less than four seconds to set the first digit of the code.

- Press "OK" for less than four seconds to set the first digit between 0 and 9.



- Once the digit has been selected, press "OK" for over four seconds to confirm the first digit of the code. Now, you can set the second digit of the code.

- Do the same to set the other four digits of the code.



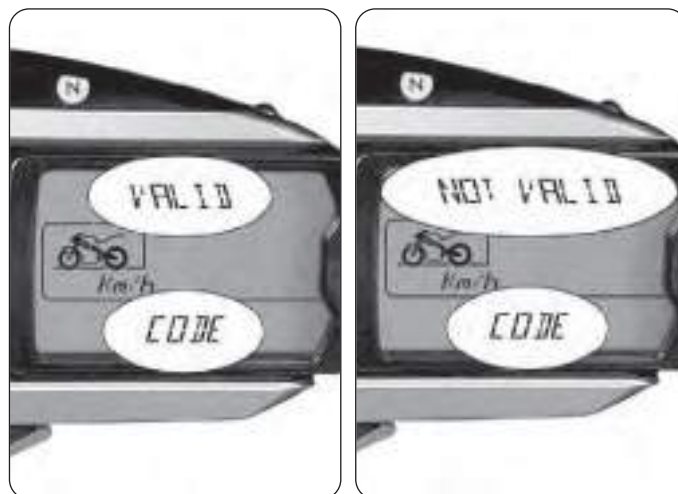
- Once the full code has been entered, "CONFIRM CODE" appears on the display. Press "OK" for over four seconds to confirm the code.





Maintenance

- If the entered code is recognised by the system, "VALID CODE" appears. The dashboard display goes back to "RUN". The engine may be started.
- If the entered code is wrong, "NOT VALID CODE" appears. The system will not let the engine start; the display goes back to "INSERT CODE". Repeat the code entry procedure from the start, taking care of setting all the right digits shown on your MV Code Card. If the problem persists, contact a MV Agusta licensed service centre.



How to select the mapping of the control unit *

In some Brutale models, you may select a special mapping of the control unit, which will enable you to achieve higher power and efficiency for a briskly driving experience.

The mapping of the control unit can be selected by pressing the start button when the engine is switched on. "SPORT" appears on the dashboard display to show the mapping has been selected.



The mapping selection may be changed or set when the engine is running, the gears are in neutral, the motorbike is stationary, and with your feet on the ground. Do not change the display while driving.

(*): This function is present only on certain models



Warning/malfunction alerts

The dashboard may highlight the presence of a fault or a malfunction during different using conditions of the motorcycle.

☐ Engine start

As you turn the ignition switch to the ON position, the instruments and the warning lights will go through the self-diagnostic cycle. If the self-diagnostic cycle detects a fault in the vehicle, the display shows the warning alert shown in the picture. In particular, this message highlights the vehicle part or device on which the fault has been detected.





Maintenance

- Press "OK" button to access to "RUN" mode.



WARNING

If a fault is detected on the vehicle when the engine is off, do not start engine.



❑ Fault during vehicle riding

- If a fault is detected during riding, the lower portion of the display shows the warning alert shown in the picture.



WARNING

If a fault is detected during riding, stop the vehicle.

- After the vehicle is stopped, the display shows the warning message highlighting the vehicle part or device on which the fault has been detected.



❑ High coolant temperature

- If a high value of the coolant temperature is detected, the display shows the warning alert shown in the picture. This message may appear during every using condition of the vehicle.



WARNING

If the coolant temperature is high, stop the motorbike and check the coolant level. If the warning alert appears even if the level is adequate, do not resume driving.



LIGHTS

Check →

At the pre-delivery, at the first 1000 kilometers and then every 6000 kilometers

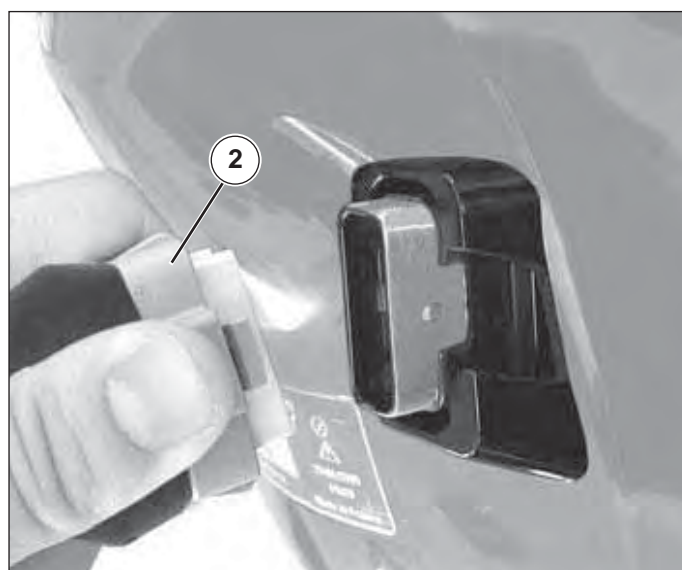
If any of the warning lights or the main lights are burnt out, replace them as follows.

Replacing the low beam bulb

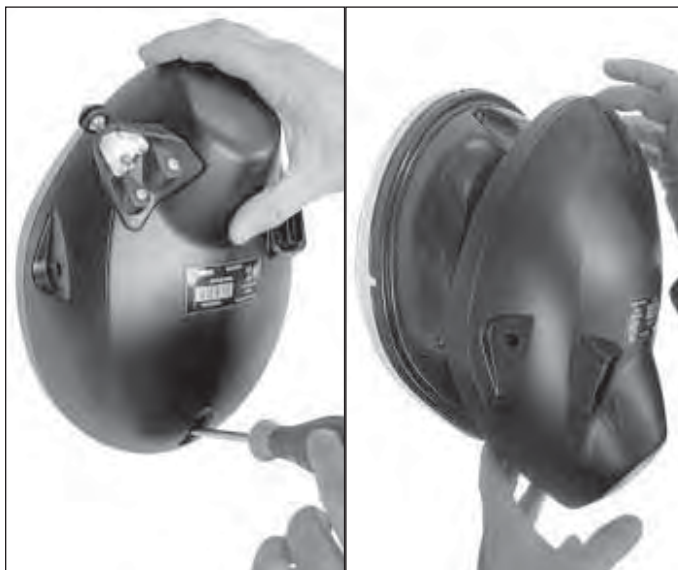
- Remove the headlight lateral fixing screws (1). Pay attention in slipping off the adjuster from its seat when the headlight is being removed from its support.



- Before removing the headlight from its support, detach the connector (2) on the rear side of the headlight.
- Lay down the headlight on a table, in order to perform the following operations.



- Remove the headlight rear screw.
- Remove the front part of the headlight from its supporting shell.



- Remove the protective headlight cover.



- Detach the low beam bulb connector.
- Release the retaining spring.
- Extract the burnt-out low beam bulb.



Do not touch the bulb glass with bare hands. If you do, clean the bulb with an oil-free solvent.

- Insert the new bulb.
- Reattach the retaining spring.
- Reattach the low beam bulb connector.
- Reposition the protective headlight cover.
- Replace the front part of the headlight on its supporting shell.
- Fasten the headlight rear screw.
- Reattach the headlight connector.
- Replace the headlight on its support and insert the two lateral fixing screws, making sure to insert the headlamp adjuster in its proper seat on the headlight.



Replacing the high beam bulb

- Remove the headlight from its support as described for the high beam.
- To take the headlight lamp out, press the connector on the side and pull it outwards.
- Detach the connector from the burnt-out bulb.



Do not touch the bulb glass with bare hands. If you do, clean the bulb with an oil-free solvent.



- Insert the connector in the new bulb.
- Fit the lamp back in and slightly press it into its housing to secure it.
- Replace the headlight on its support, following the instructions described for the high beam.



Replacing the license plate light bulb

- Remove the cable rail fixing screws.
- Pull down the cable rail and detach it from the upper surface, operating as described in the picture.





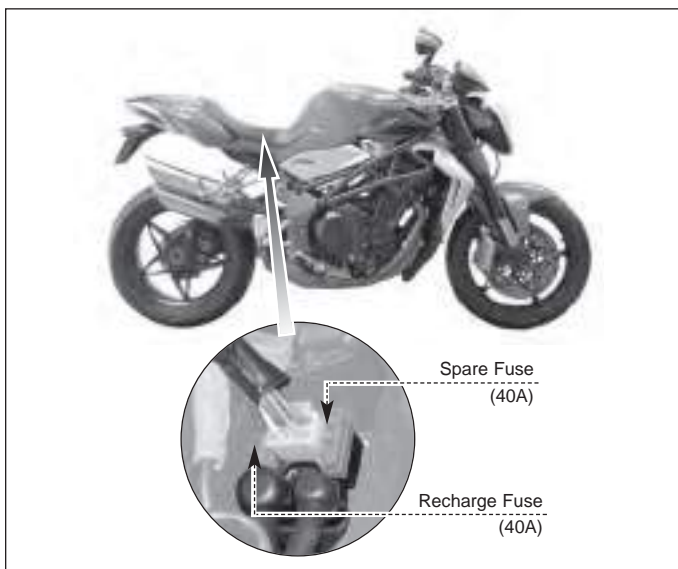
Maintenance

- Pull out the license plate light bulb holder.
- Extract the burnt-out bulb.
- Fit the new bulb.
- Replace the bulb holder.
- Push back the cable rail in touch with the upper surface.
- Replace the cable rail fixing screws.



Replacing the fuses

- The recharge fuse is located under the driver's saddle, in the position shown in the figure.



- The fuse box is under the passenger saddle. To take it, remove the driver's saddle, then unfasten the passenger saddle and take it out.



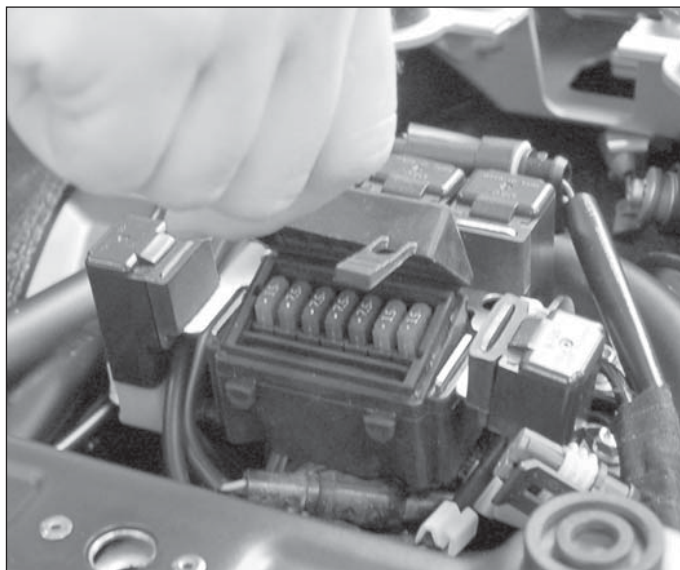


Maintenance

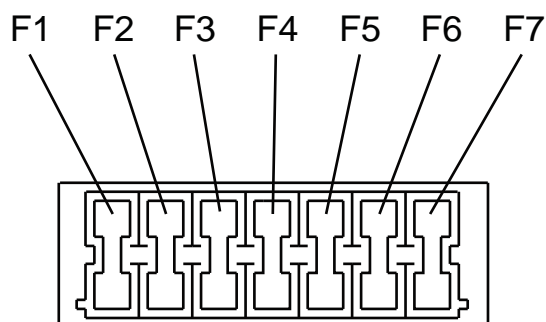
- Unfasten and lift the lid of the fuse box.



Turn the ignition switch on “OFF” before checking or replacing the fuses in order to avoid accidental short circuits with consequent risk to damage other electric components.



- To identify the position and function of the fuses, refer to the information shown on the adhesive label and in the enclosed electrical diagram. The reference letters in the figure correspond to those shown in the diagram.



- Replace the blown fuse and refit the cover. Remember that the tool bag contains three spare fuses.



Never replace a fuse with a rating other than that prescribed, in order to avoid damage to the electrical equipment of the motorcycle which could lead to a fire.





Maintenance

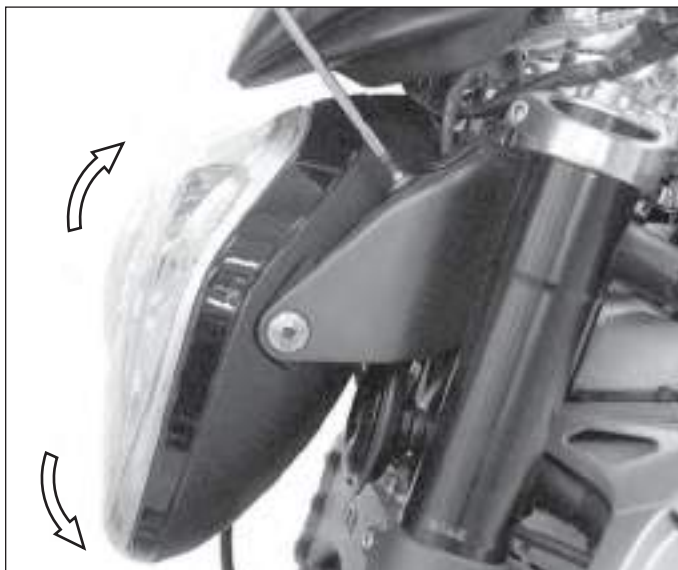
FRONT HEADLAMP

Check adjustment – At every variation of the motorcycle set-up

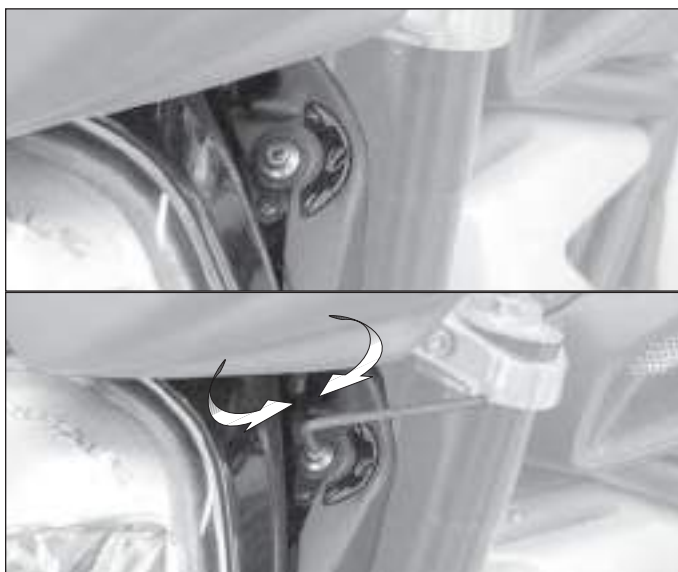
B

Each time a variation to the set-up of the motorcycle is carried out, it is good practice to carry out the adjustment of the headlamp beam.

The adjustment of the front headlight can be performed operating the screw shown in the side figure.



Clockwise: the headlight leans downwards.
Counterclockwise: the headlight leans upwards.
The inclination can be varied of $\pm 4^\circ$ with reference to the standard position.



Front headlight adjustment

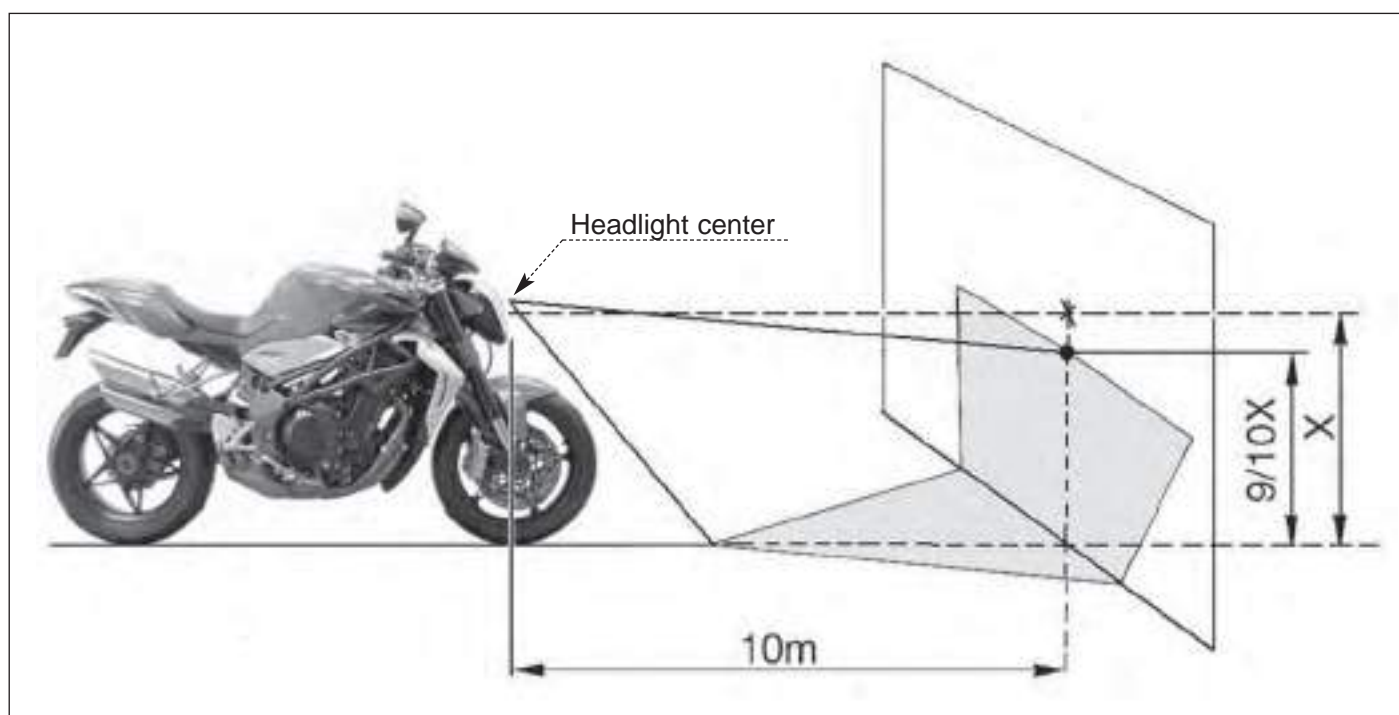
Place the motorcycle at 10 meters from a vertical wall.

Ensure that the ground is even and that the optical axis of the projector unit is perpendicular to the wall.

The motorcycle must be in a vertical position. Measure the height of the center of the beam from the ground and mark it with a cross on the wall using a piece of chalk.

Switch on the dipped beam. The upper limit between the dark zone and the lighted zone must not be more than $\frac{9}{10}$ ths of the height from the ground of the center of the beam.

B



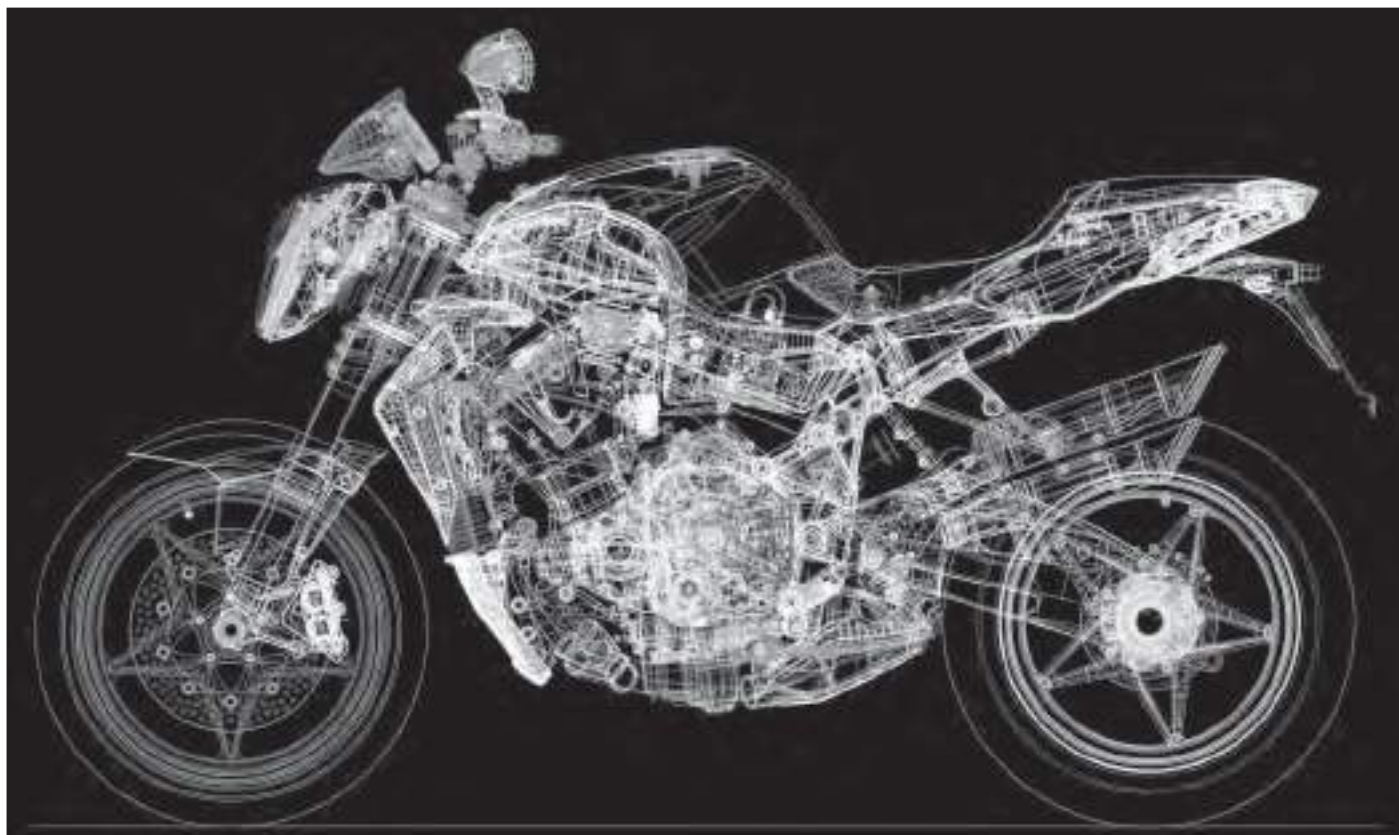


Maintenance

B



Bodywork



C

SECTION C

Revision 1



SUMMARY

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C





FRONT HEADLAMP DISASSEMBLING

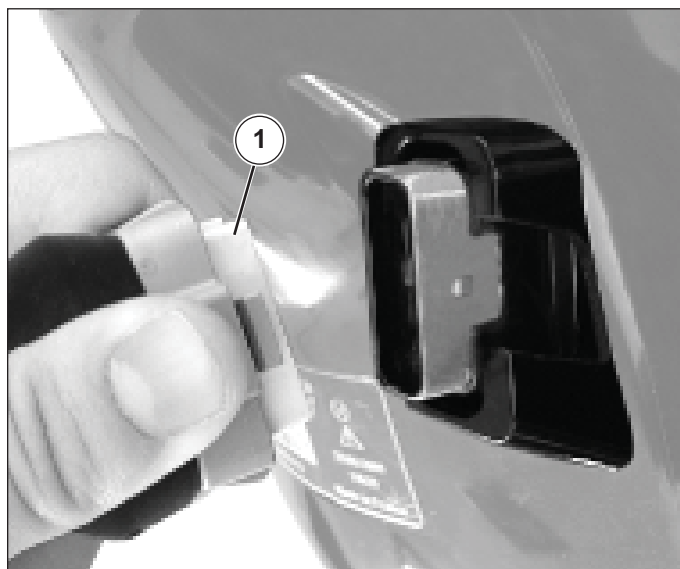
Disassemble the two fixing screws of the headlamp.



Release the headlamp from the support for the luminous beam height control.

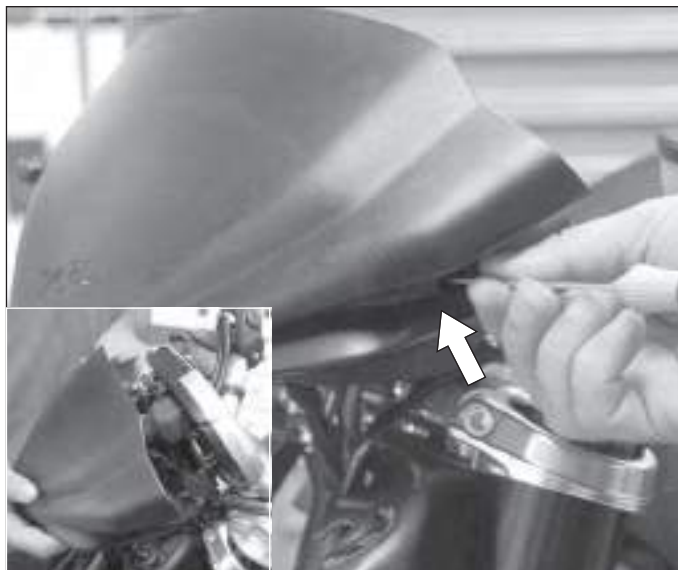


Disconnect the electric connection (1) and remove the headlamp.

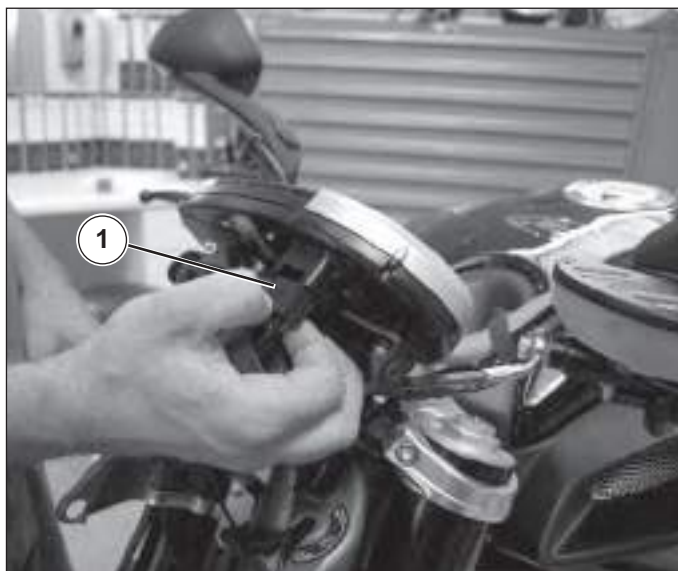


INSTRUMENTATION PANEL DISASSEMBLING

Unscrew the fixing screws and remove the instrumentation panel cover by acting in the shown direction.



Loosen the rubber cowl (1) and unhook the connector.



Unscrew the fixing screw of the instrumentation panel and withdraw it from the support.





HANDLEBAR DISASSEMBLING

Before performing this operation, you should preliminarily carry out the disassembling of the front headlight and the instrumentation panel as described in the previous pages.

Disconnect the warning horn.



Disconnect the main connectors.



Disconnect the connectors of the turn indicators.





Bodywork

If removal of the headlamp support is required, unhook the headlamp support cables.



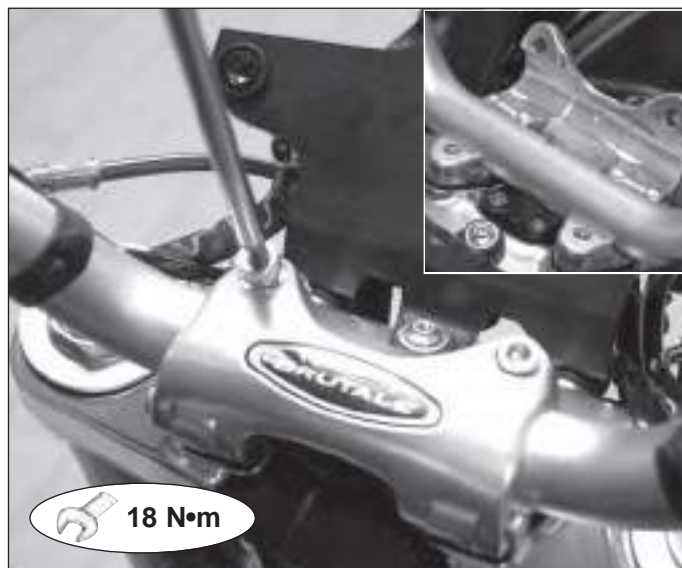
Unscrew the two fixing screws of the handlebar U bolt. Rotate the U bolt and remove the handlebar.



During the reassembly, you should pay attention to the right positioning of the U bolt in regard to the handlebar. This is made using a pin that you have to insert in the right seating of the handlebar.



Torque wrench of the U bolt handlebar fixing screws: 20 N•m



HEADLIGHT SUPPORT DISASSEMBLING

Unscrew the three fixing screws and remove the support.

For reassembling, perform the following operations:

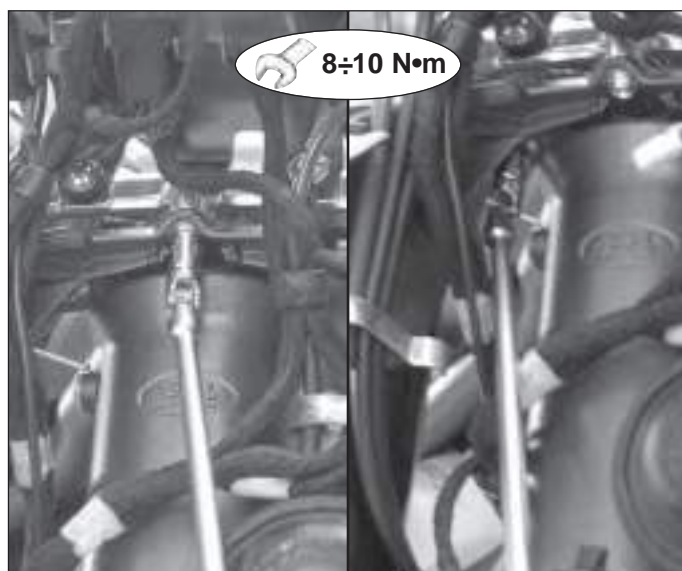
- Apply the breakthread "Loctite 243" on the threaded part of the three fixing screws.
- Position the headlight support under the steering base and insert the three fixing screws with the washers without tightening.
- Gently push the headlamp support towards the rear of the motorcycle as far as the headlamp support slots will permit.
- Tighten the fixing screws.



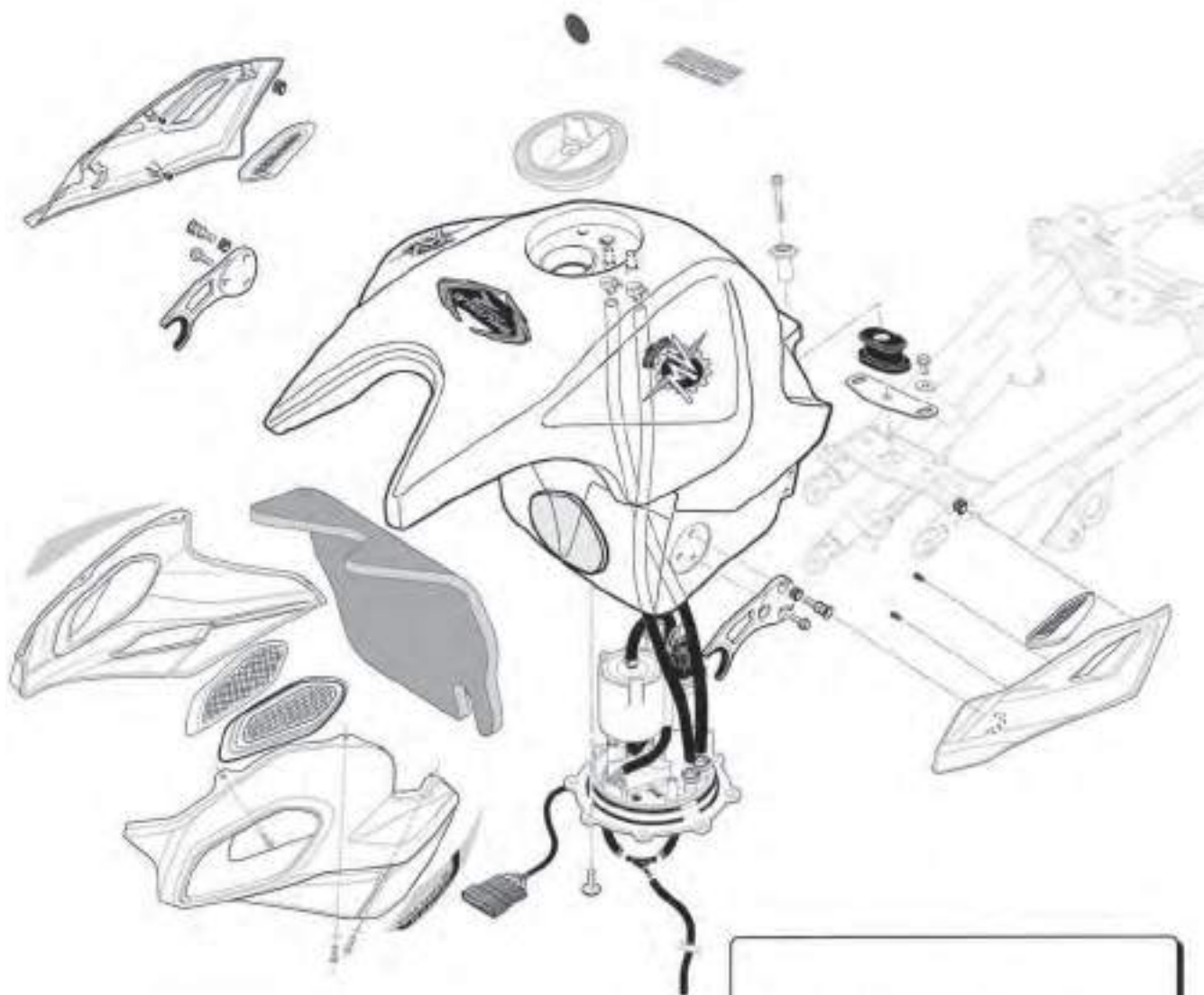
Torque wrench of the headlight support screws: 8 ÷ 10 Nm



Specific product: LOCTITE 243



FUEL TANK





Before removing the fuel tank you should preliminarily remove passenger and rider seats as described at the paragraph "Disassembling tale unit" of this chapter.

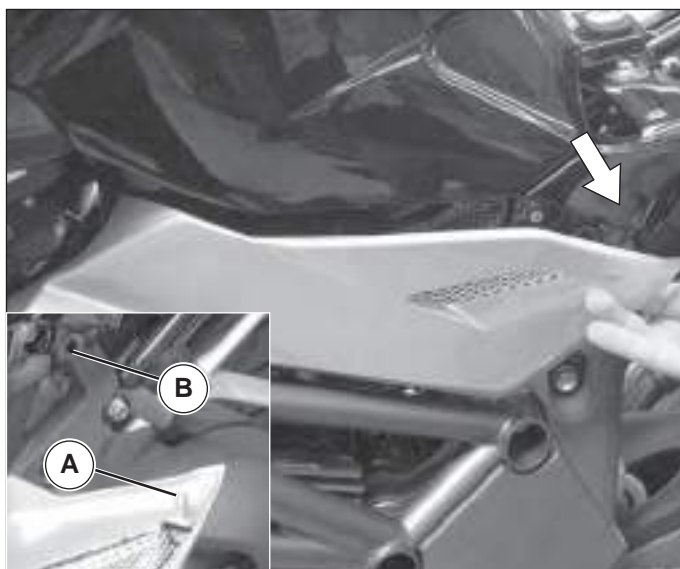


Remove the ignition commutator protection by unscrewing the two fixing screws (1).



FUEL TANK SIDE PANEL REMOVAL

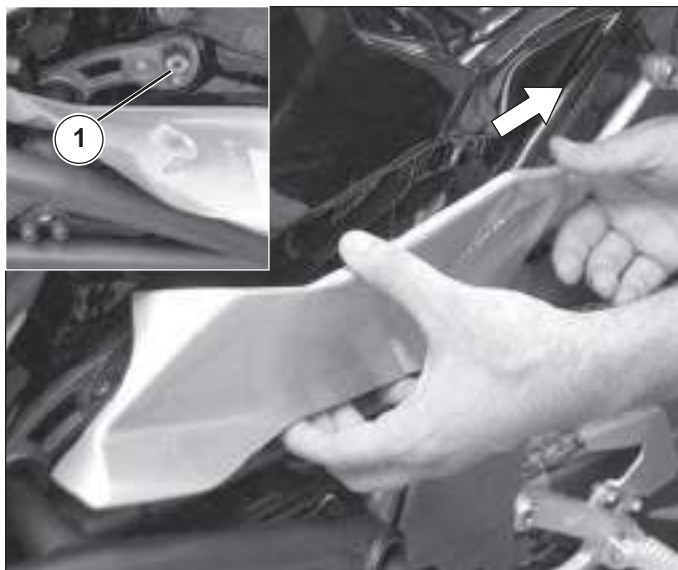
Operate on the left side of the motorcycle. Release the trailing part of the left side panel by releasing the peg (A) from its seat (B) on the rubbered support, fastened in the rear part of the tank, making it accomplish the movement shown in the figure.





Bodywork

Release definitely the side panel by moving it towards the rear part in order to release it from the special rubbered screw (1) fastened to the fuel tank.



Make the same operations in order to remove the right side panel.



FUEL TANK REMOVAL

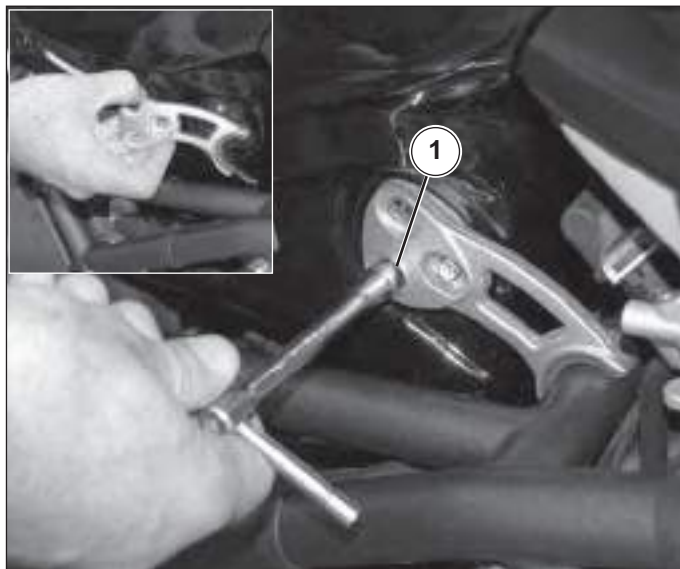
Unscrew and remove the special rear fixing screw (1) of the fuel tank to the rear sub-frame.



Operate on the right side. Unscrew and remove the special rubbered screw (1) on the tank support.



Unscrew and remove the two support fixing screws (1) of the tank support.



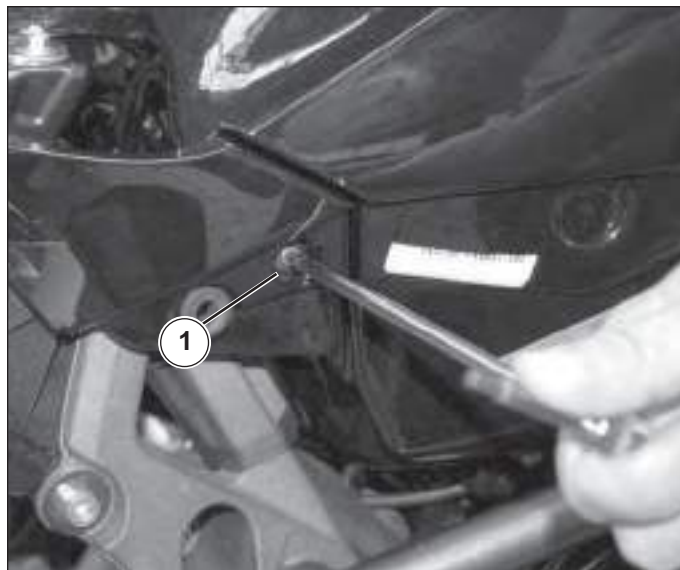
Make the same operations on the left side of the motorcycle in order to remove the tank support.





Bodywork

Remove the rear screw (1).



Lift and lean the fuel tank on a side in order to easily work on the rapid unions on the fuel pump flange.

N.B. In order to make the unions disengagement operation from the fuel pump flange easier it's recommended the presence of two operators, one that works on the tank support and the other on the rapid unions release.



Release the rapid unions (1).



Place a protective cloth below the tank as there may be some fuel spillage.



The release of the fuel tubing occurs when you press the held seat on the union as you can see in the figure.



In case of replacement of the rapid clutch terminals indicated in the figure, apply Loctite 577 on the threaded part respecting the terminal phasing when you are tightening them.



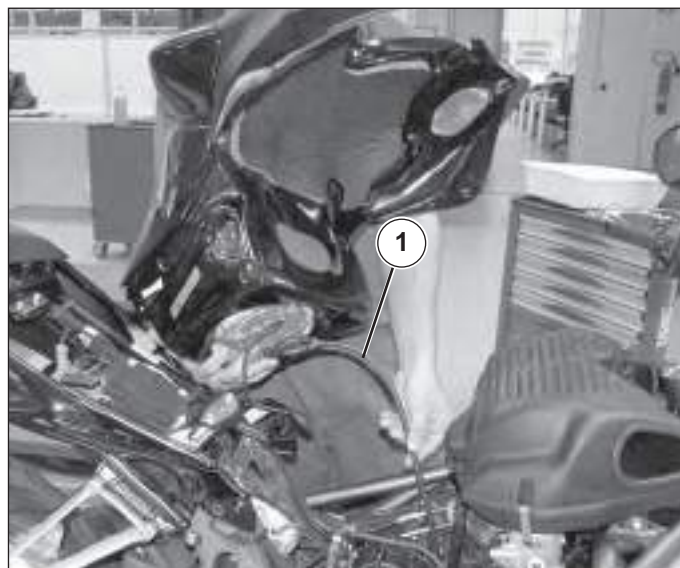


Bodywork

Disconnect the connector of the fuel flange pump (1) of the main wiring.



Withdraw the fuel breather pipe (1) connected to the three-way union.



Removing of the fuel tank plug

Insert the motorcycle key in the fuel plug lock, rotate clockwise and open the plug.





Bodywork

Unscrew and remove the four screws (1) .

During the reassembly of the fuel tank plug make the same operations in the opposite direction in regard to disassembling ones by tightening them at the described torque and apply the indicated brakethread.



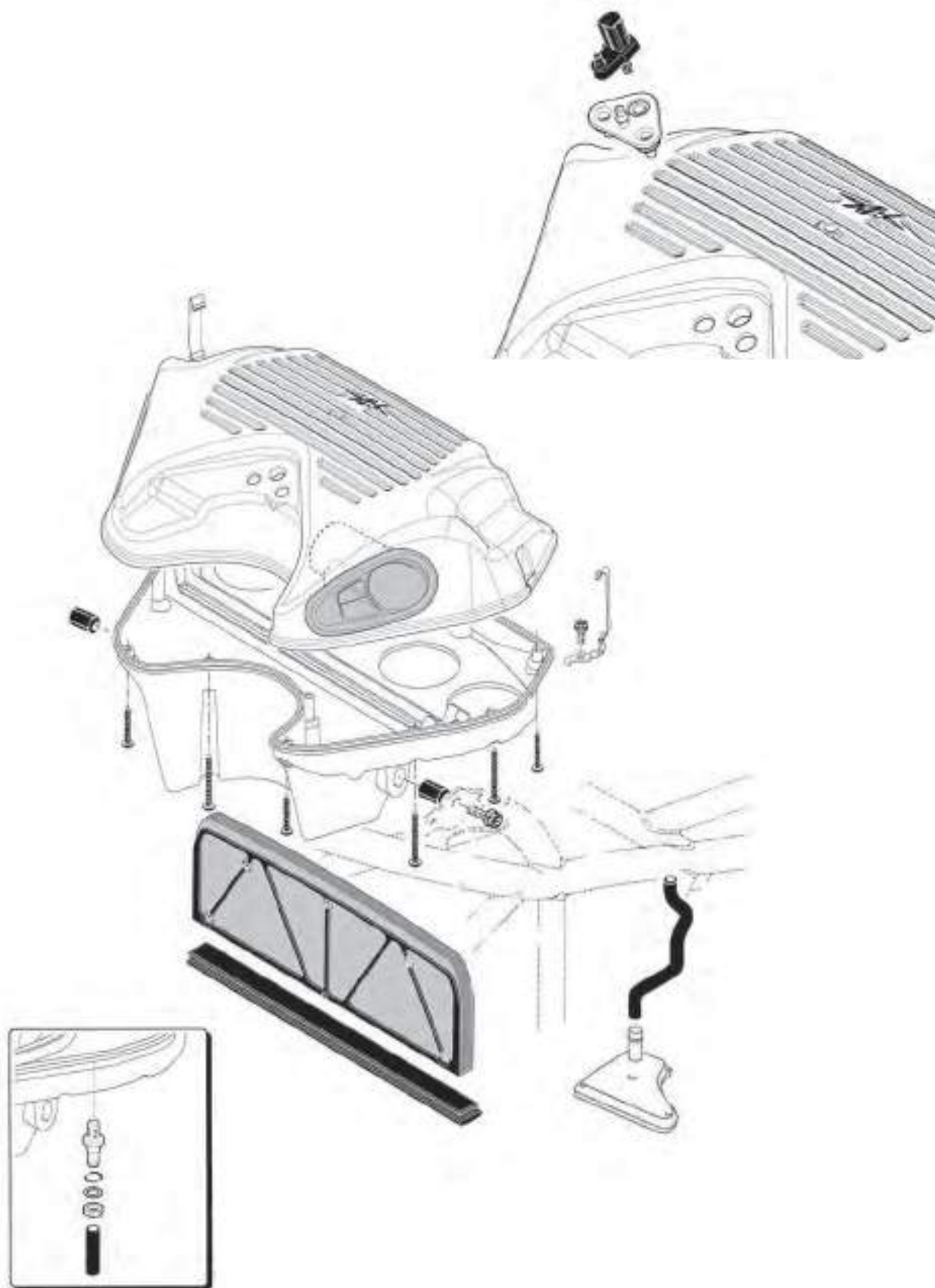
Fuel filler cap fixing screws torque pressure:
- External screws $4 \div 5 \text{ N}\cdot\text{m}$



Apply Loctite 243 and screw in lightly



AIR FILTER COMPARTMENT





AIR FILTER COMPARTMENT REMOVAL

Before removing the air filter compartment you should primarily remove the fuel tank as described in the paragraph "Tank" of this chapter.

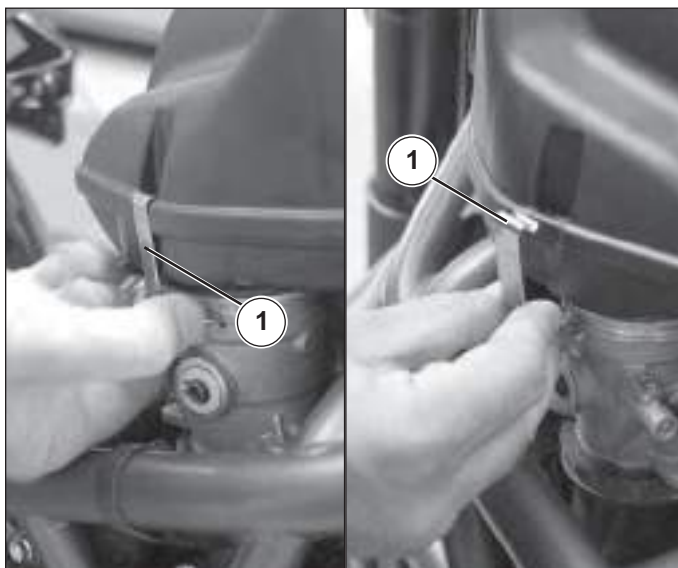


Disconnect the temperature and air pressure sensor connector (1).



AIRBOX REMOVAL

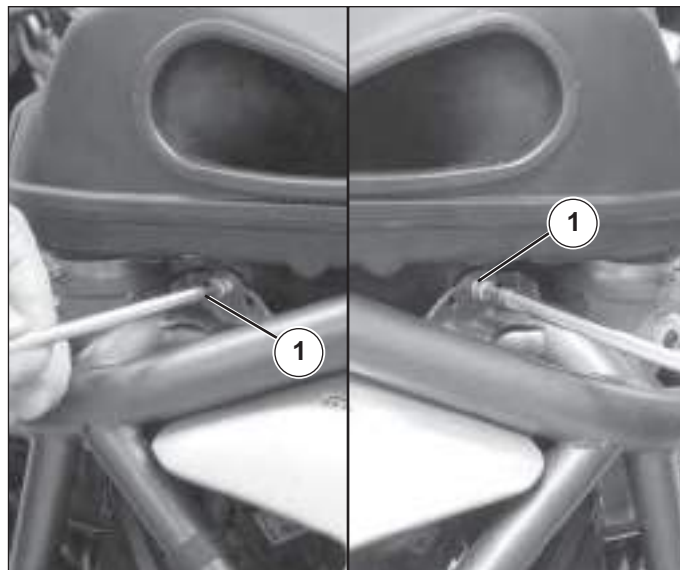
Release the fixing springs (1) of the air filter compartment box to the throttle body.



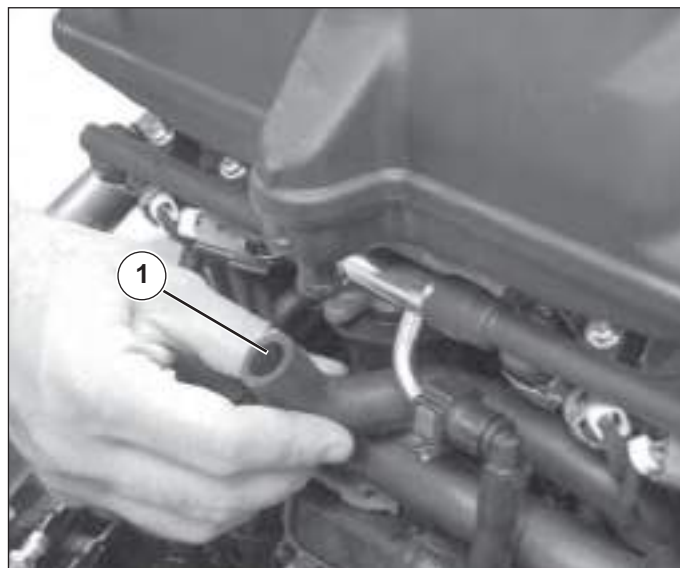


Bodywork

Unscrew and remove the two side fixing screws (1) of the air filter compartment to the frame.



Disconnect the breather piping (1) from the block.



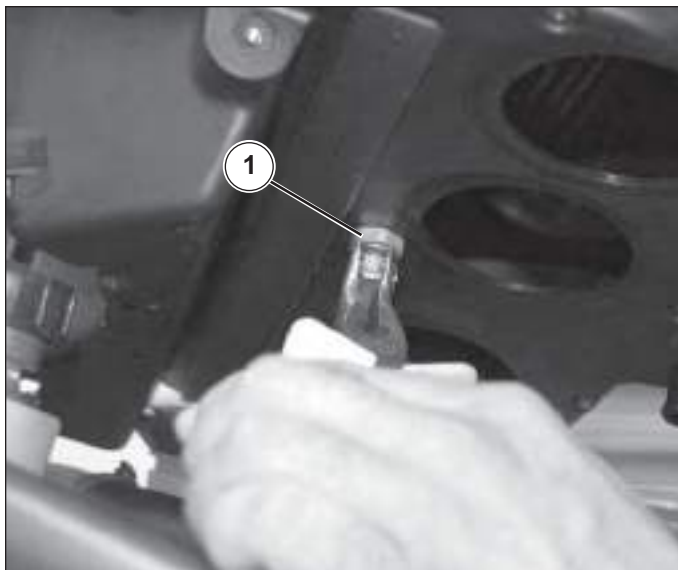
Lift the airbox.





Bodywork

Loosen the clamp (1).



Disconnect the secondary air hose from the hose air-box.



Remove the air filter compartment from the throttle body.





Bodywork

During the reassembling make the same operations of the disassembling.

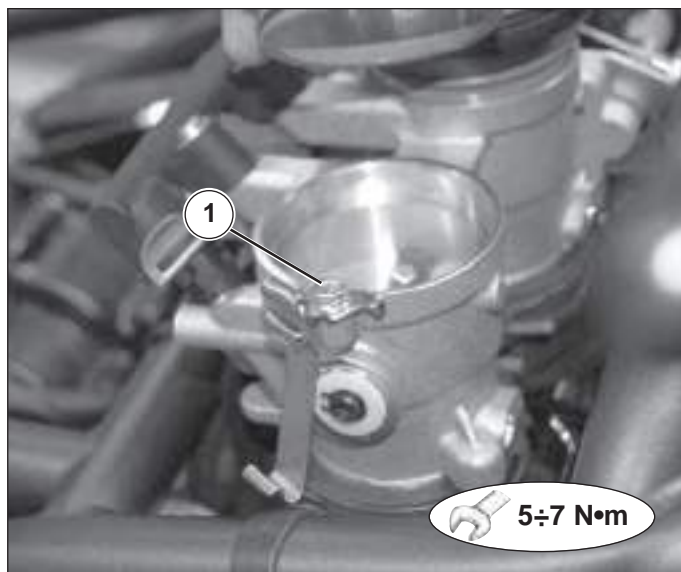
If you had to remove the fixing screws of the throttle body springs (1), during their reassembling apply the described brakethread and tighten them to the indicated torque.



Torque wrench of the fixing screws of the throttle body fly springs: $5 \div 7 \text{ N}\cdot\text{m}$

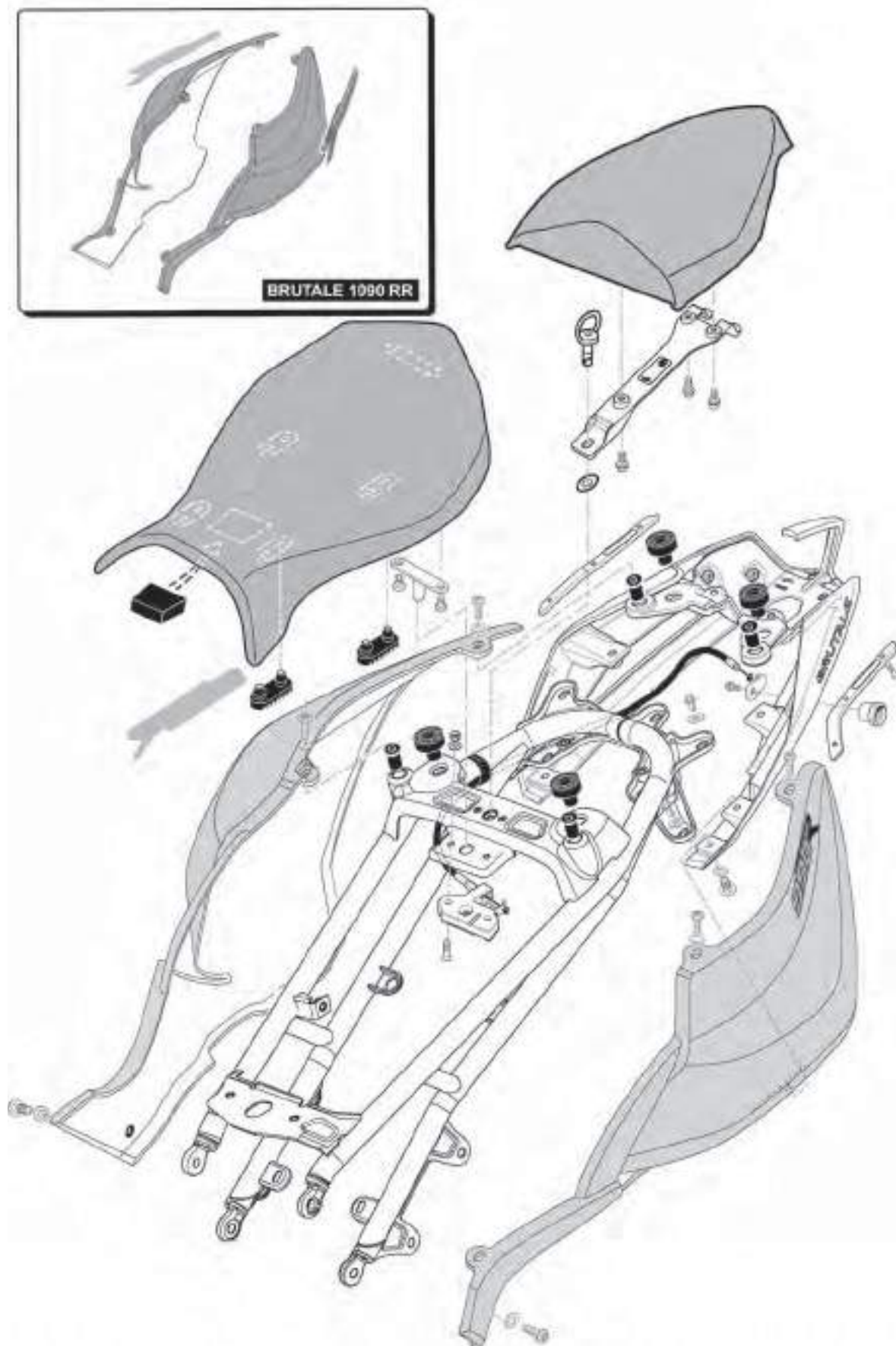


Apply Loctite 243



C

TAIL UNIT





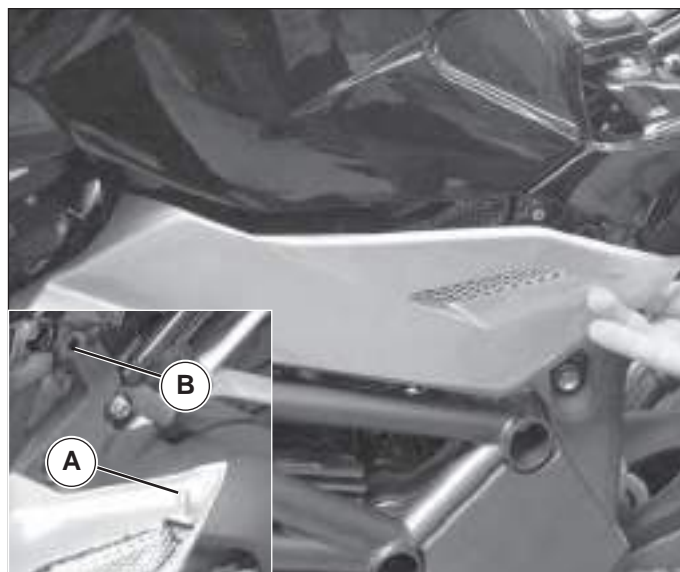
TAIL UNIT REMOVAL

PRELIMINARY OPERATION

Fuel tank side panel removal

Operate on the left side of the motorcycle.

Release the trailing part of the left side panel by releasing the peg (A) from its seat (B) on the rubbered support, fastened in the rear part of the tank, making it accomplish the movement shown in the figure.



Release definitely the side panel by moving it towards the rear part in order to release it from the special rubbered screw (1) fastened to the fuel tank.



Make the same operations in order to remove the right side panel.





Bodywork

Rider seat removal

Insert the ignition lock key in the opening seat lock on the left side of the motorcycle and rotate it clockwise. In the meantime push lightly on the rider seat. The lock will be released. Lift and remove the rider seat.



Passenger seat removal

Rotate the fixing clip of the passenger seat.



Remove the passenger seat from its seat by lifting it.





Bodywork

Removing the tail side panels.

Unscrew and remove the two upper screws fixing the tail side panels.



Unscrew and remove the lower rear screw fixing the tail side panels.



Unscrew and remove the lower front screw fixing the tail side panels.





Bodywork

Be careful to put aside the four nylon washers of the tail side panels on both sides when removing.

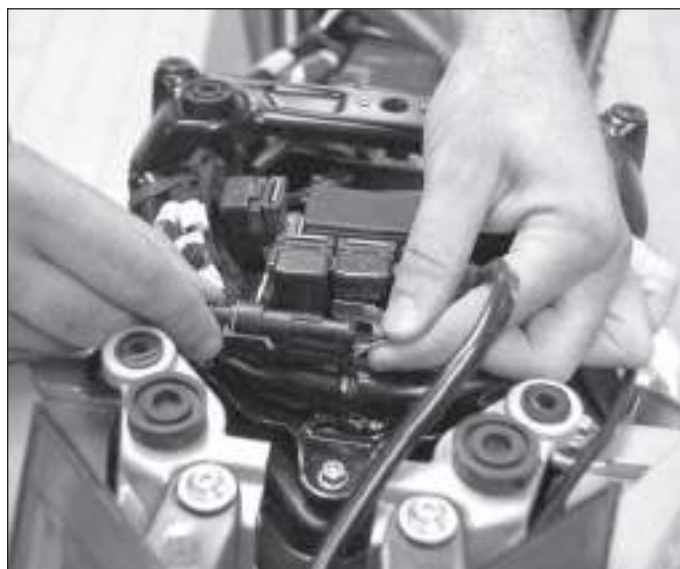


Then remove the tail side panels.



Tail unit removal

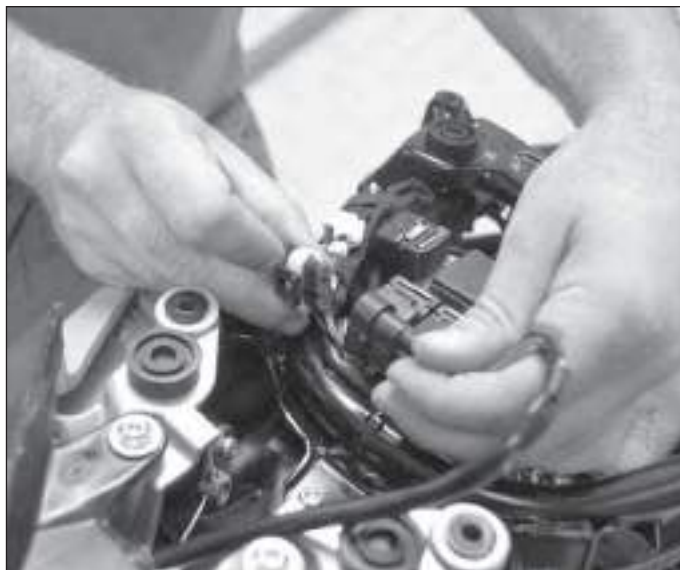
Extract the tail light connector from its seat on the frame.



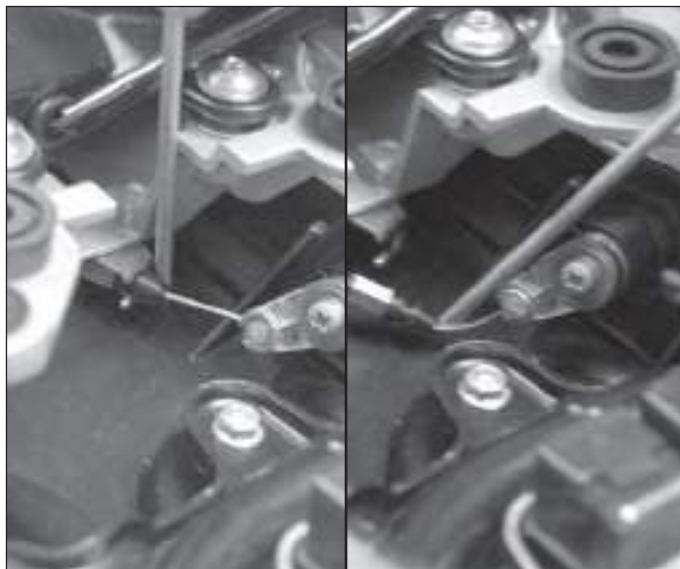


Bodywork

Release the connector.



Remove the cable of the lock transmission from its housing plate, with the aid of a screwdriver.



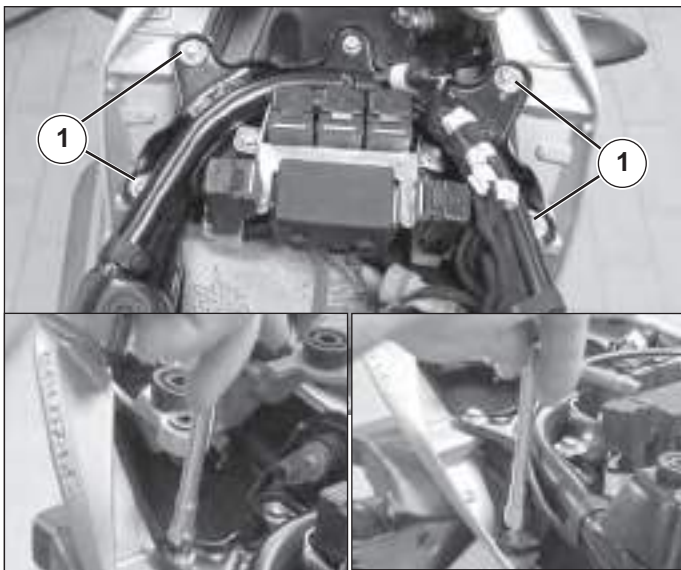
Take the cable of the lock transmission out of its housing in the thumbstick.



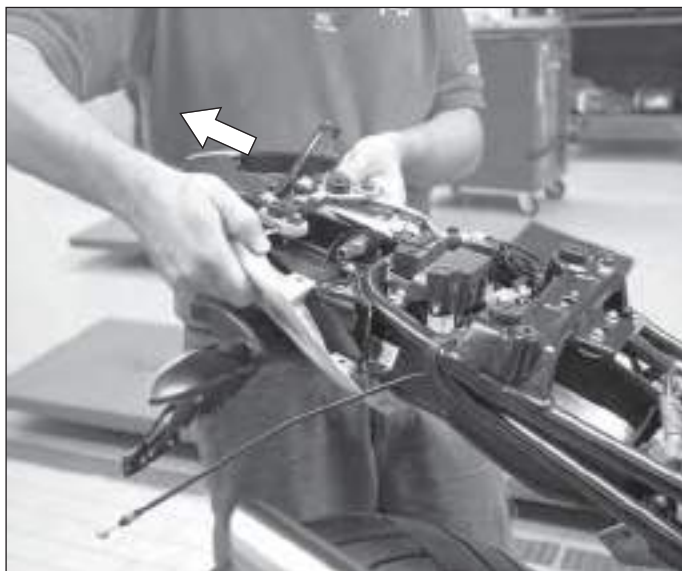


Bodywork

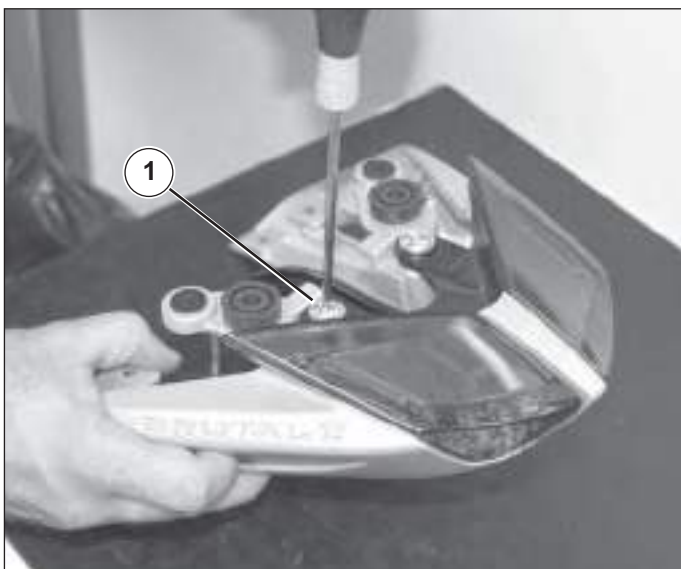
Unscrew the four fixing screws (1) of the rear part tale unit.



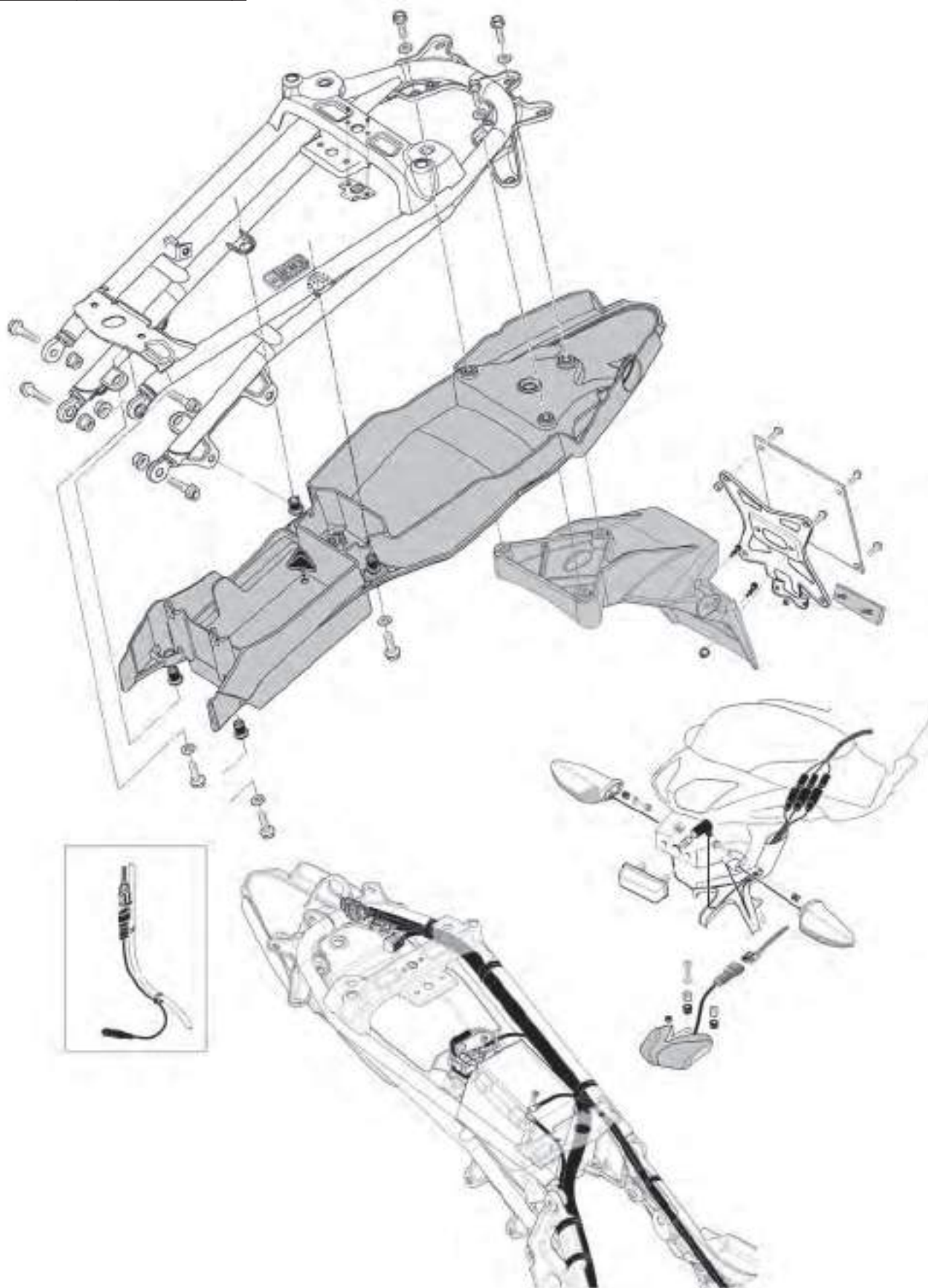
Take out towards the back and remove the tail.



Unscrew and remove the two screws (1) and release the tail light.



UNDER-TAIL ASSEMBLY

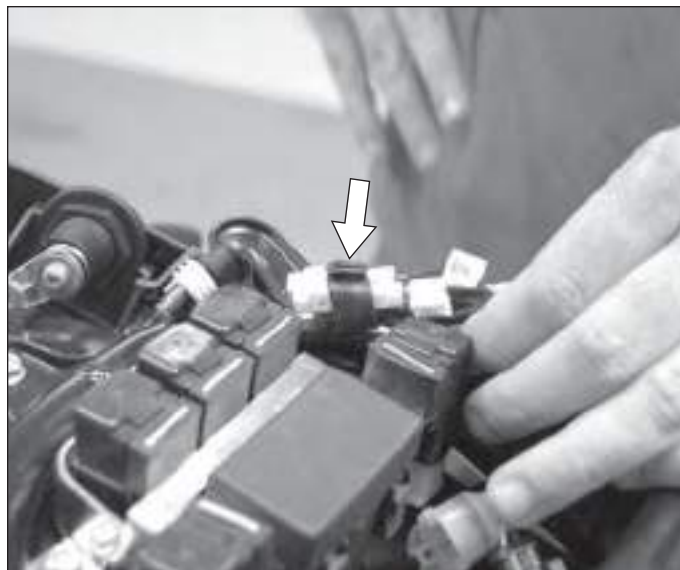




UNDER TAIL UNIT REMOVAL

Remove the passenger and rider seats, the side panels and the rear tail piece as described in the previous paragraph "Tail unit removal".

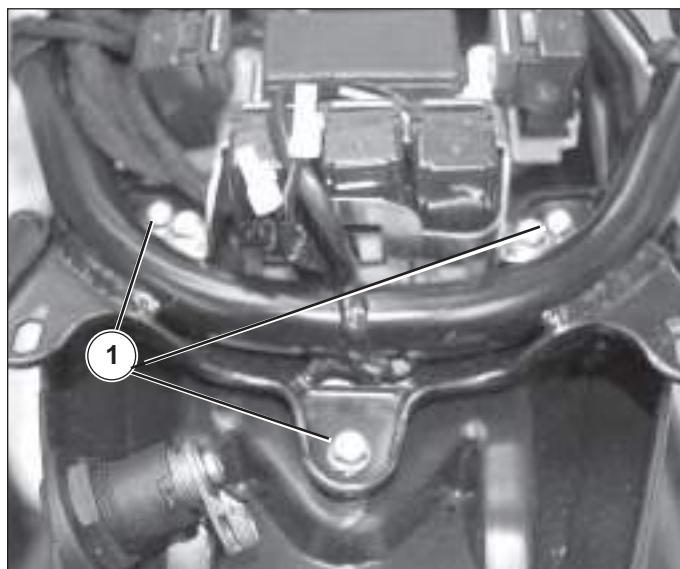
Remove the clamp.



Disconnect the connection of the direction indicator (2 connections) and of the number plate light (1 connection).



Unscrew the three fixing screws(1) of the number plate holder.



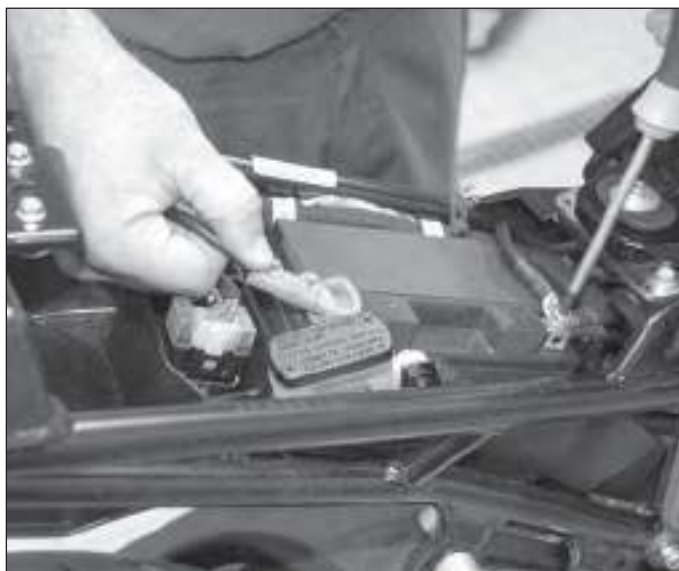
Remove completely the number plate holder.



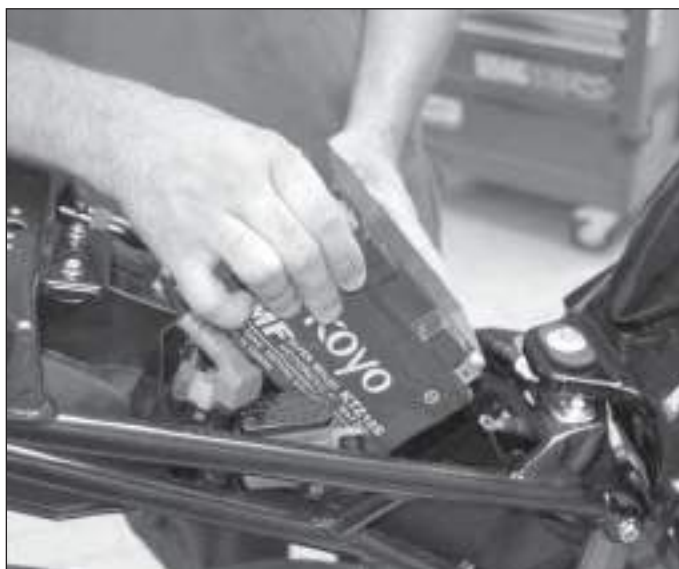
Unscrew the fixing screws of the battery connections.



Disconnect the negative pole first.



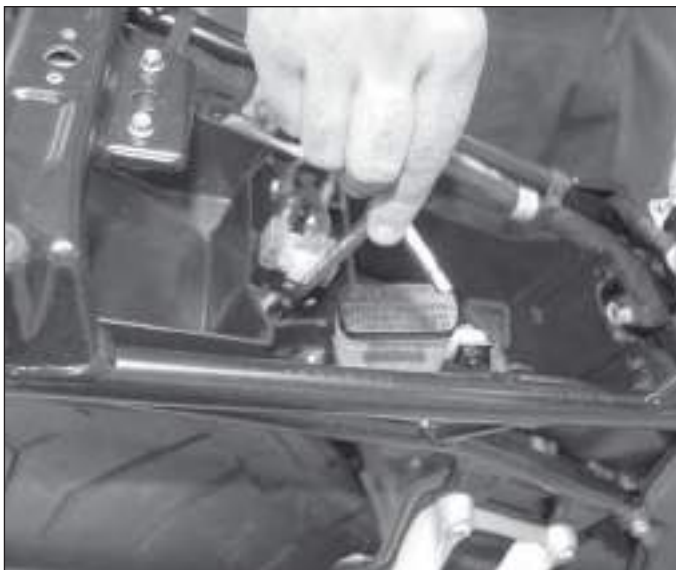
Remove the battery from its seat.



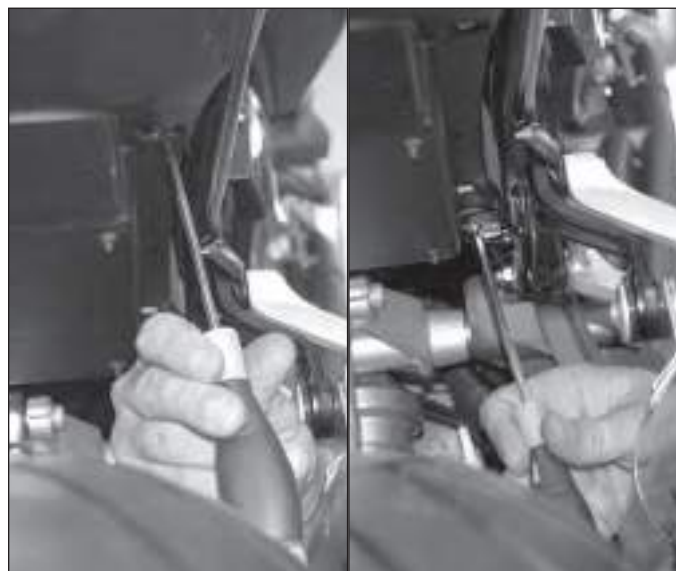


Bodywork

Remove the fixing screw of the solenoid starter.



Unscrew the four fixing screws of the under tail unit.



Remove the under tail unit.





Air intake injection system



D

SECTION D

Revision 0



SUMMARY

INJECTION-IGNITION SYSTEM	Page 3
INJECTION SYSTEM TECHNICAL CHARACTERISTICS	Page 3
INJECTION TIME INJECTION VOLUME	Page 3
INJECTION TIME COMPENSATION.....	Page 4
INJECTION ARREST CONTROL.....	Page 4
IGNITION SYSTEM.....	Page 5
D POSITIONS OF ENGINE-CONTROL SYSTEM PARTS BRUTALE 990 R - 1090 RR	Page 6
FUEL PUMP CONTROL SYSTEM	Page
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ENGINE PIC -UP.....	Page 14
TIMING WHEEL GAP	Page 14
ACTUATORS	Page 15
DIAGNOSTICS SYSTEM.....	Page 16
INJECTION SYSTEM - ELECTRICAL DIAGRAM	Page 1



Air intake injection system

INJECTION-IGNITION SYSTEM

The injection-ignition system is of the "alpha/N" type. The motor r.p.m. and the throttle position are used as main parameters to measure the amount of intake air to find the amount of fuel to be injected.

The amount of intake air for each cycle depends on the density of the air in the intake collector, the single displacement and the volumetric efficiency: this last is determined experimentally on the engine for the entire functioning range (revolutions and engine load) and it is stored in the dimensioned plans (maps) inside the internal memory of the electronic CPU.

The motor r.p.m. and the throttle angle also allow to calculate the ignition advance best suited for any functioning condition.

The other system sensors (atmospheric pressure sensor, air temperature sensor, water temperature sensor and trimmer sensor) allow to adjust the basic strategy, in specific functioning conditions.

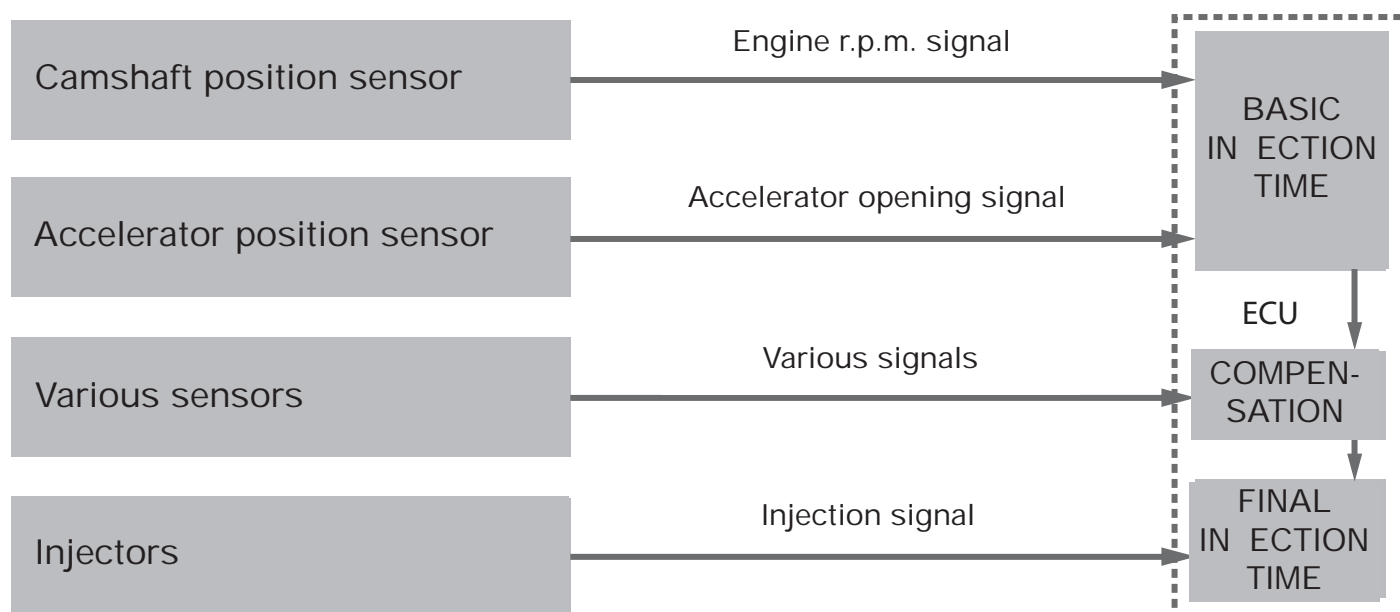
The injector control is of a sequential type, that is to say, the four injectors are controlled individually according to the intake sequence.

The ignition is of the static inductive charge type with control of coil charge time integrated into the power modules inside the CPU.

INJECTION SYSTEM TECHNICAL CHARACTERISTICS

INJECTION TIME INJECTION VOLUME

The factors for the determination of the injection time are the basic injection time that is calculated on the basis of the r.p.m. of the engine, the opening of the accelerator and various compensations that are determined according to signals coming from various sensors that reveal the condition of the engine and the riding conditions.





Air intake injection system

The various sensors allow the injection time (volume) compensations to be carried out on the basis of the following signals.

IGNITION SYSTEM

SIGNAL	DESCRIPTION
ATMOSPHERIC PRESSURE SENSOR SIGNAL	When the atmospheric pressure is low, the sensor sends a signal to the ECU to reduce the injection time (volume of the fuel injected) to compensate the lower presence of oxygen in the atmosphere.
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When the temperature of the engine coolant is low, the injection time (volume) is increased to sustain the minimum r.p.m. and to compensate the part of the fuel which condensates along the intake conduits.
AIR INTAKE TEMPERATURE SENSOR SIGNAL	When the temperature of the intake air is low, the injection time (volume) is increased to compensate the higher presence of oxygen.
BATTERY VOLTAGE SIGNAL	The battery voltage signal is supplied to the ECU for the functioning of the ECU and this voltage is revealed and utilised as a signal for the compensation of the injection time (volume). A low voltage determines a longer injection time for adjustment of the volume of the injection.
STARTER SIGNAL	When the engine is switched on, during cranking a greater volume of fuel is injected to make starting easier.
ACCELERATION/DECELERATION SIGNAL	During acceleration, the injection time of the fuel (volume) is increased in proportion to the opening of the accelerator and the r.p.m. of the engine. During deceleration, the injection of fuel is diminished in proportion to the speed of closure of the accelerator handgrip and of the engine r.p.m.

INJECTION ARREST CONTROL

SIGNAL	DESCRIPTION
R.P.M. LIMITER SIGNAL	The functioning of the fuel injectors is interrupted when the level of engine r.p.m. reaches its limit.



Air intake injection system

DESCRIPTION

This system belongs to the category of integrated systems of electronic digital ignition with static distribution and electronic petrol injection with a logic of the intermittent phased type (injection and cylinder ignition)

This ignition system consists of an engine crankshaft position sensor (pick-up), a depression sensor beneath the throttle of cylinder 1, an ECU, four ignition coils of the top plug type and four spark plugs.

The feed of the ignition coil is supplied by the battery via the power relay and is controlled by the ECU with regards to the position of the switches of the side stand and the gearchange.

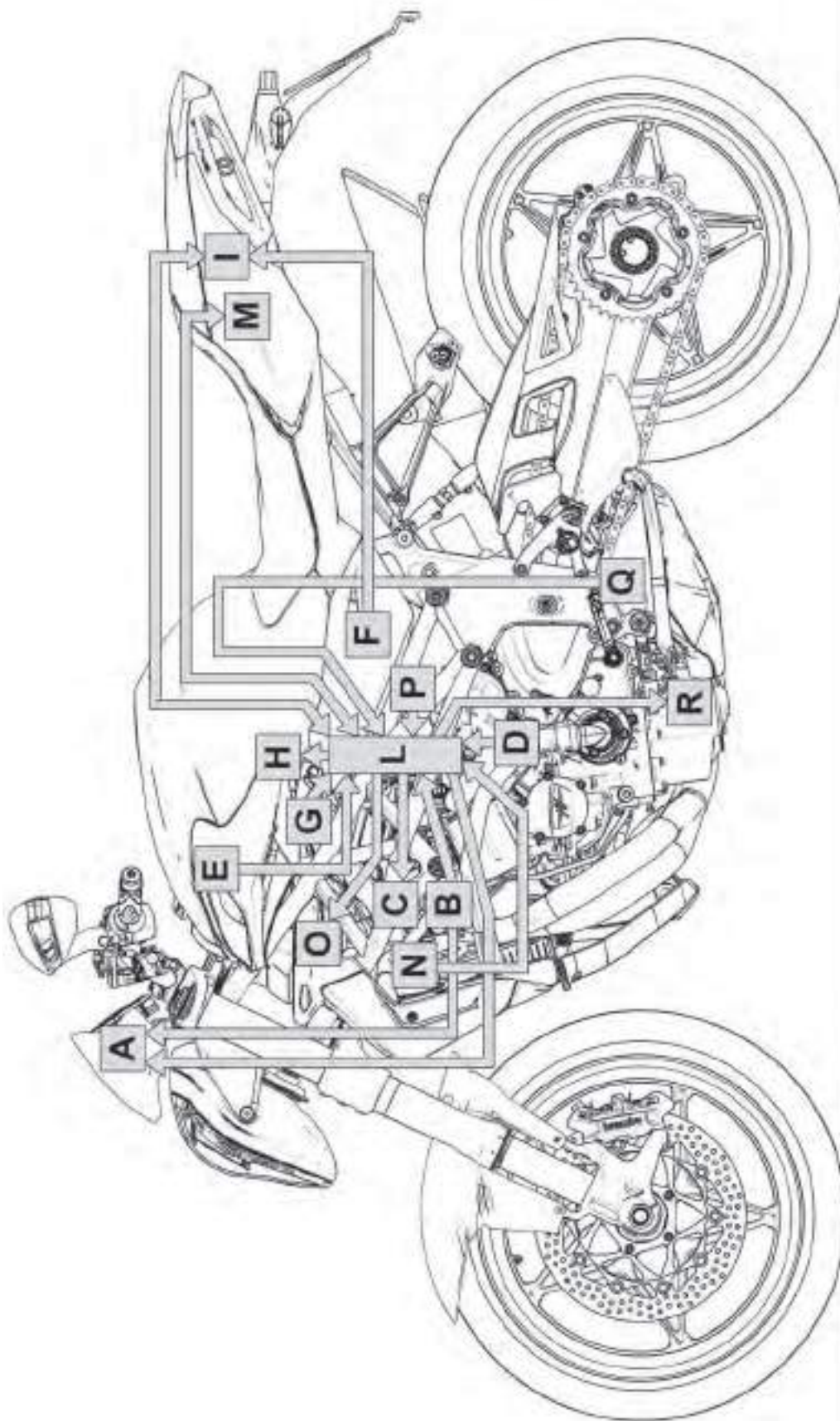
The ignition timing is precisely controlled with regards to the engine r.p.m. and the position of the accelerator. Other than this basic condition, also the temperature, intake air pressure and the temperature of the engine coolant influence the ignition timing.

N.B.

The ignition interruption circuit is incorporated in the ECU to avoid over-revving the engine. If the motor reaches 11600 r.p.m., this circuit prevents the ignition for all cylinders.

WARNING

The engine could function at more than 11600 r.p.m. without a load or when changing down even if the interruption circuit functions and therefore could damage the engine. Never spin the engine at more than 11600 r.p.m. in any conditions.



- | | | |
|--|-------------------------------|---------------------------|
| A Instrument panel | G Accelerator position sensor | O Secondary air Valve |
| B Engine coolant temperature sensor | H Fuel injectors | P Fall sensor |
| C Ignition coil | I Fuses/Relay | Q Lambda Sonde |
| D Camshaft position sensor | L Engine control unit | R Exhaust butterfly valve |
| E Intake air pressure/temperature sensor | M Starter switch | |
| F Fuel pump | N Phase sensor | |



Air intake injection system

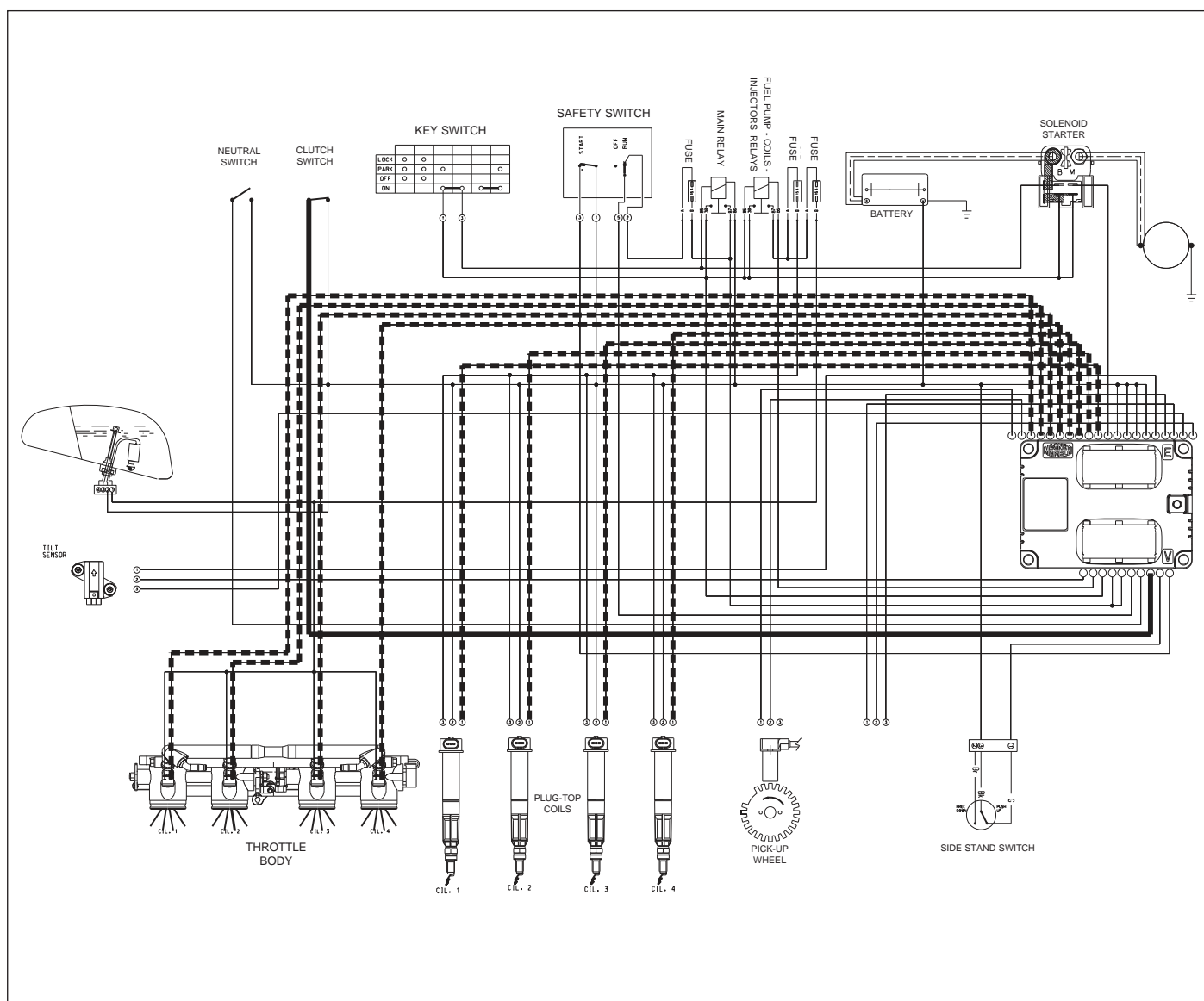
FUEL PUMP CONTROL SYSTEM

At the moment of KEYON, the system and the engine control unit are powered; once the condition of the relative inputs have been checked, it activates the injection relay, feeding the petrol pump for a pre-set time, thus allowing the power circuit to be put under pressure.

If the drive shaft is made to rotate by activating the starter either during or after this time, the engine rotation signal is sent to the ECU which allows the pump to work continuously by controlling the pump relay.

During this phase, it must be remembered that the possibility to activate the engine depends on a logic of internal safety which, in relation to the inputs of the gear sensor, the side-stand sensor and the clutch sensor, may or may not allow the starter to be activated.

When the RUN/STOP switch is in the OFF position, the control unit receives the command to interrupt the power supply to the pump relay; at the same time, it also receives the command for the injectors and the ignition coils, causing the engine to be switched off.

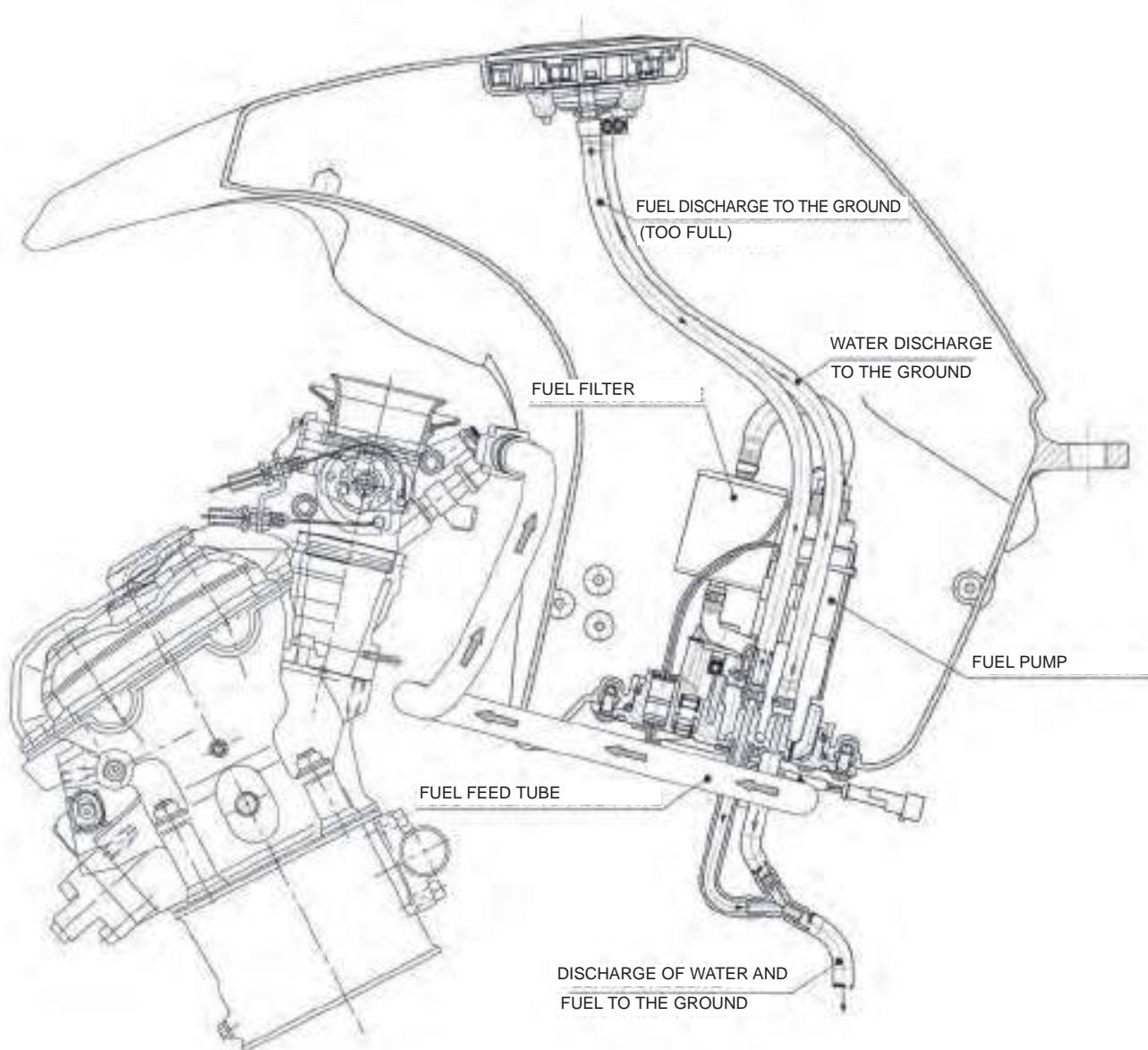




Air intake injection system

Fuel feed system

The fuel delivery system consists in the tank, the pump, the filter, delivery pipe (including fuel injectors) and pressure regulator. The fuel present in the tank is pumped into the delivery pipe at a pressure controlled by the relative regulator and maintained at a certain constant value which is higher than the depression generated by the engine. The fuel is injected into the suction conduit when the injector is opened following a law generated by the ECU.





Air intake injection system

COMPONENTS

Fuel pump

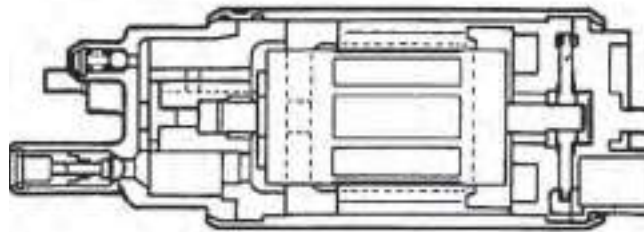
The electric fuel pump that is situated inside the fuel tank consists of an electric motor, of the rotor, impeller, control valve and pressure release valve.

The ECU controls the ON/OFF condition as described in the section FUEL PUMP CONTROL SYSTEM.

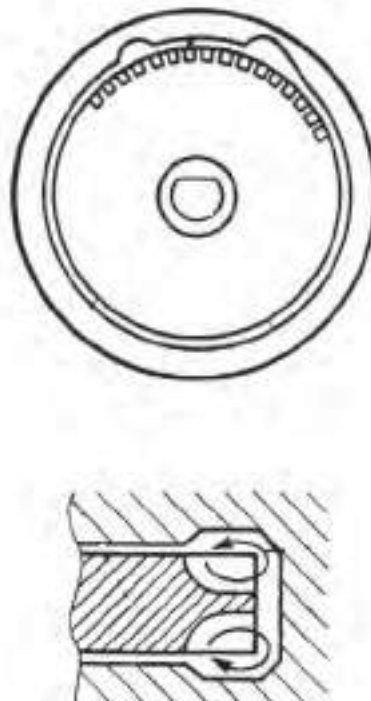
When electrical energy is supplied to the pump, the motor switches on and the impeller activates. This causes a difference in pressure on both sides of the impeller because the paddles of the impeller are grooved. The fuel is therefore sucked towards the output passage. The pump possesses a control valve to maintain a certain pressure in the fuel feed tube even when the pump is stopped and the pressure release valve opens to send fuel back to the tank when the pressure of the feed fuel increases to 4.5 - 6.5 kg/cm².

Absorbed current: 6 – 6.5A at a 13.5V voltage input

D



When the motor activates the impeller there is a difference in the pressure between the front part of the paddles and the rear part with the grooves, seen from an angular direction, because of the friction of the fluid. This process is continuous, thereby causing the increase in the fuel pressure. The pressurised fuel therefore leaves the pump chamber and is discharged towards the section of the motor and the control valve.



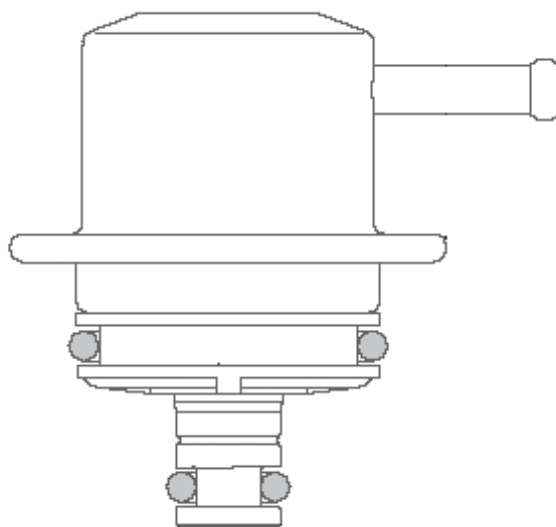


Air intake injection system

Fuel pressure regulator

The fuel pressure regulator is a diaphragm pressure release valve that consists of a diaphragm, spring and valve. It always maintains the pressure of the fuel sent to the injector at 3.0 kg/cm² (300 kPa).

When the pressure of the fuel rises above 3.0 kg/cm² (300 kPa) the excess fuel opens the valve of the regulator and therefore can return to the fuel tank.





Air intake injection system

SENSORS

Atmospheric air temperature pressure

The air intake sensor is situated on the right side of the air filter compartment and indicates both the atmospheric pressure and the air temperature.

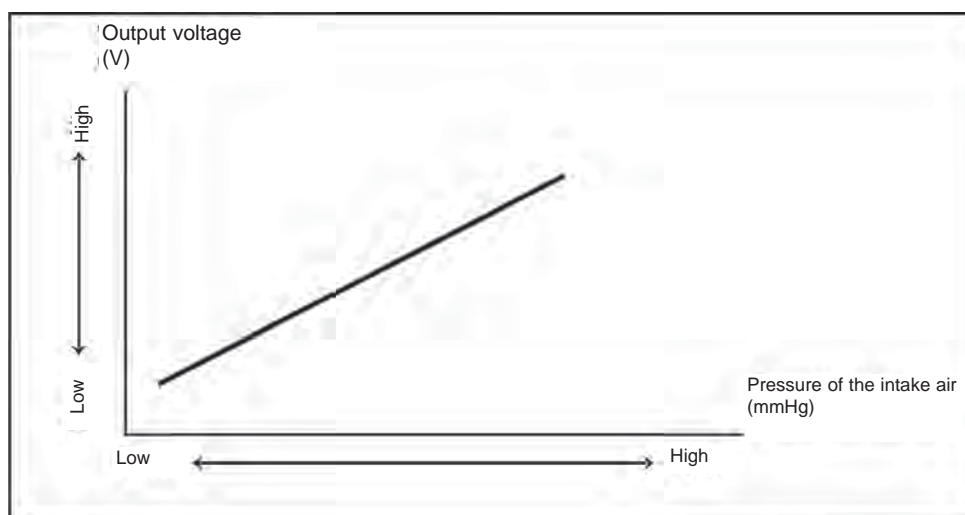


Intake air pressure sensor

The sensor reveals the pressure of the intake air and this pressure is therefore converted into voltage that is sent to the ECU.

The signal involved has a double purpose, one being that of phasing the injection and ignition of the cylinders and the second being that of adjusting the base fuel injection time (volume); this is in fact determined depending on the tension of the signal (output tension).

The voltage increases when the pressure of the intake air is high.





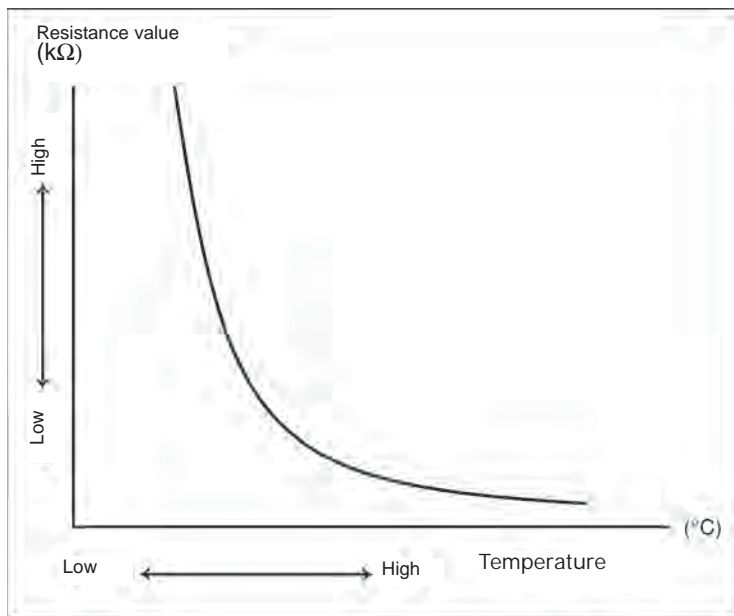
Air intake injection system

Intake air temperature sensor

The temperature of the intake air is found measuring the resistance of the Thermistor. The resistance value read is proportionate to the voltage read by the ECU.

The volume of fuel injected increases when the intake air temperature is low.

The resistance of the Thermistor increases when the air temperature is low and diminishes when the temperature is high (NTC type sensor).



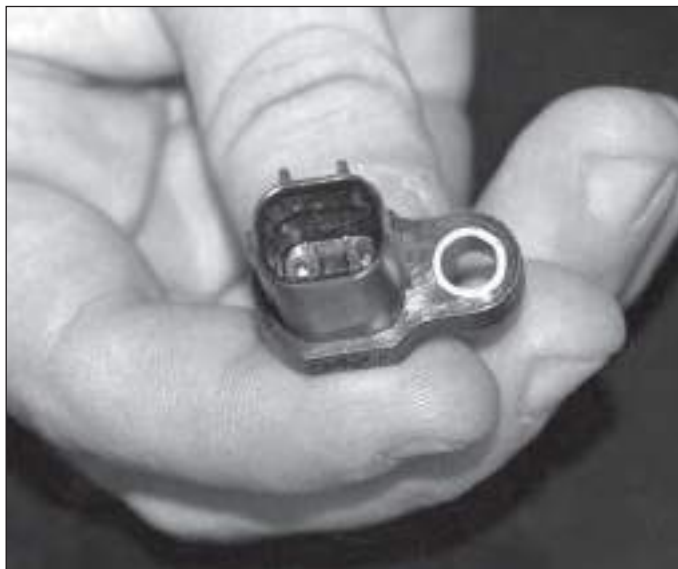
AIR TEMPERATURE → D - C

Air temperature sensor characteristics	
Temperature (°C)	Resistance (kΩ)
-10	9.5
0	6
10	3.8
20	2.5
30	1.6
40	1.1
60	0.6

AIR PRESSURE → D - A

VOLTAGE FEED TEST

→ D - B (~ 4,9 ± 0,1 volt)



Throttle body position

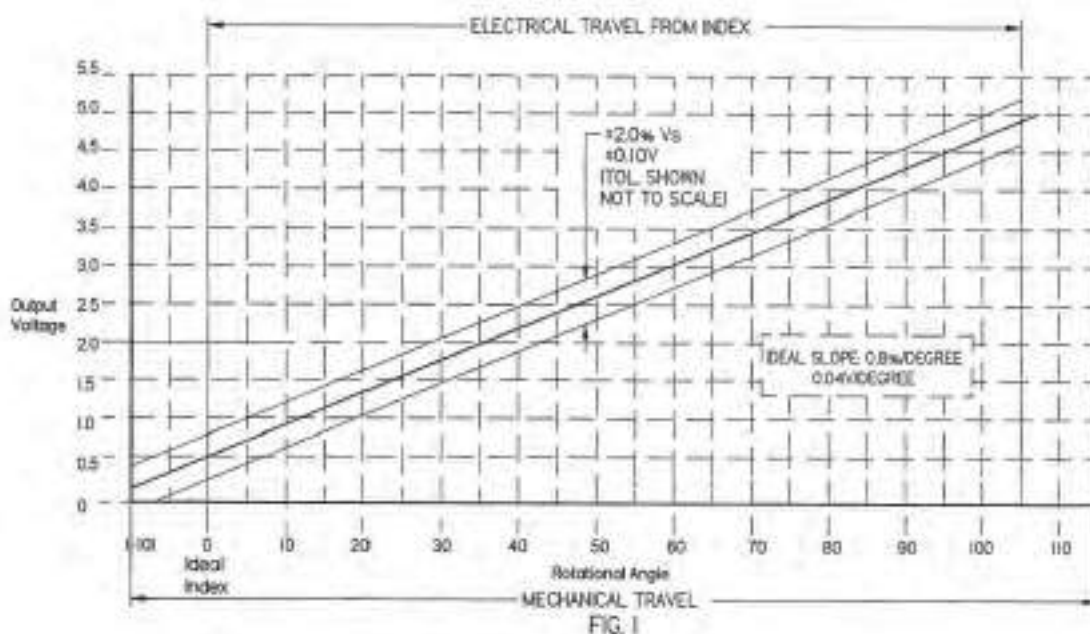
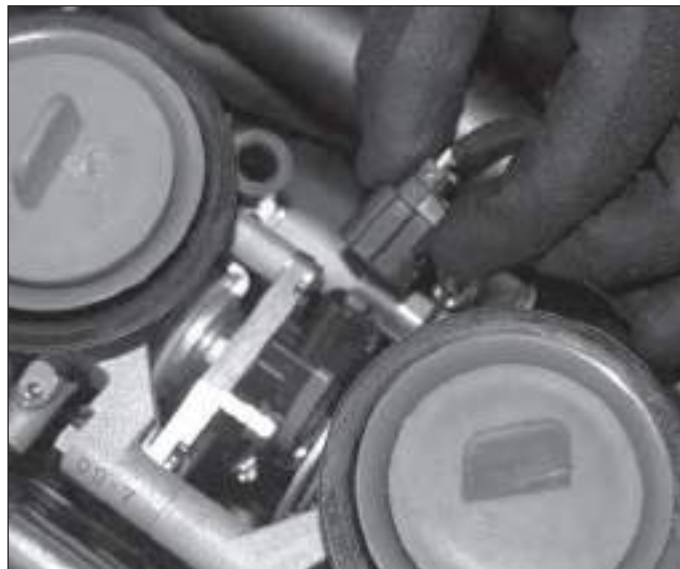
The sensor of the throttle position is located in the centre of the throttle body.

This sensor is a potentiometer with a resistance which varies according to the opening angle of the accelerator.

The sensor is supplied by the ECU at a stabilised voltage of 5V and supplies an output voltage proportionate to the throttle angle.

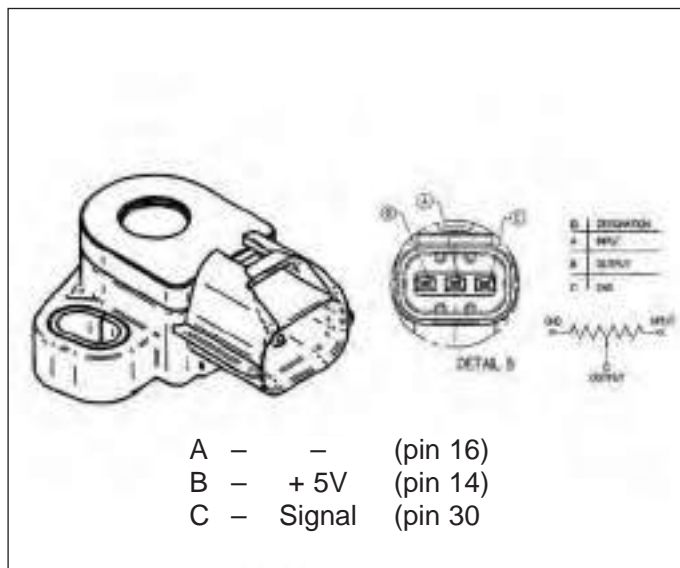
The basic injection time of the fuel (volume) is determined according to the output voltage of this sensor.

The voltage increases when the accelerator opening is increased.



RESISTANCE TEST → A - C

FEED TEST → (~ 4,9 ± 1 volt)





Air intake injection system

ENGINE PICK-UP

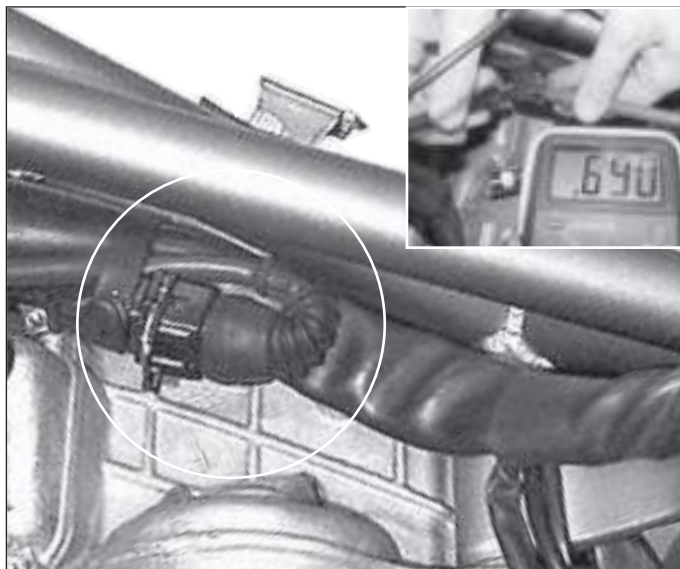
The r.p.m./TDC sensor is of an inductive type and is situated on the left side of the motorcycle.

To check this component it is necessary to identify the relative connector positioned as shown in the figure, inside the frame on the right side of the motorcycle.



After having disconnected the pick-up connector, measure the resistance between the two points identified by (+) and a (-) that are indicated on the connector.

Pick-up resistance value: $\sim 680 \div 700\Omega$

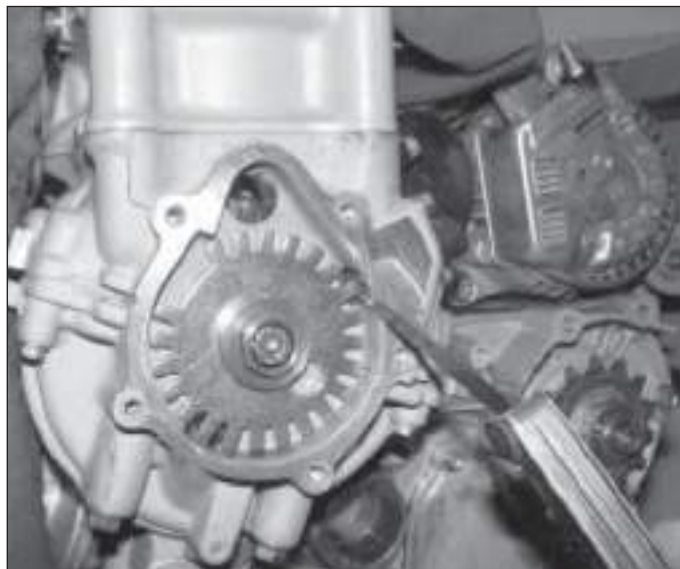


TIMING WHEEL GAP

To guarantee the correct functioning of the pick-up it is necessary to measure the gap between the pick-up and the timing wheel, that is to say the distance between the pick-up and the timing wheel by utilising a feeler gauge as shown in the figure.

GAP width: $0,6 \div 0,7 \text{ mm}$

To carry out this check it is necessary to remove the cover of the timing wheel by consulting the Workshop Engine Manual.





Air intake injection system

ACTUATORS

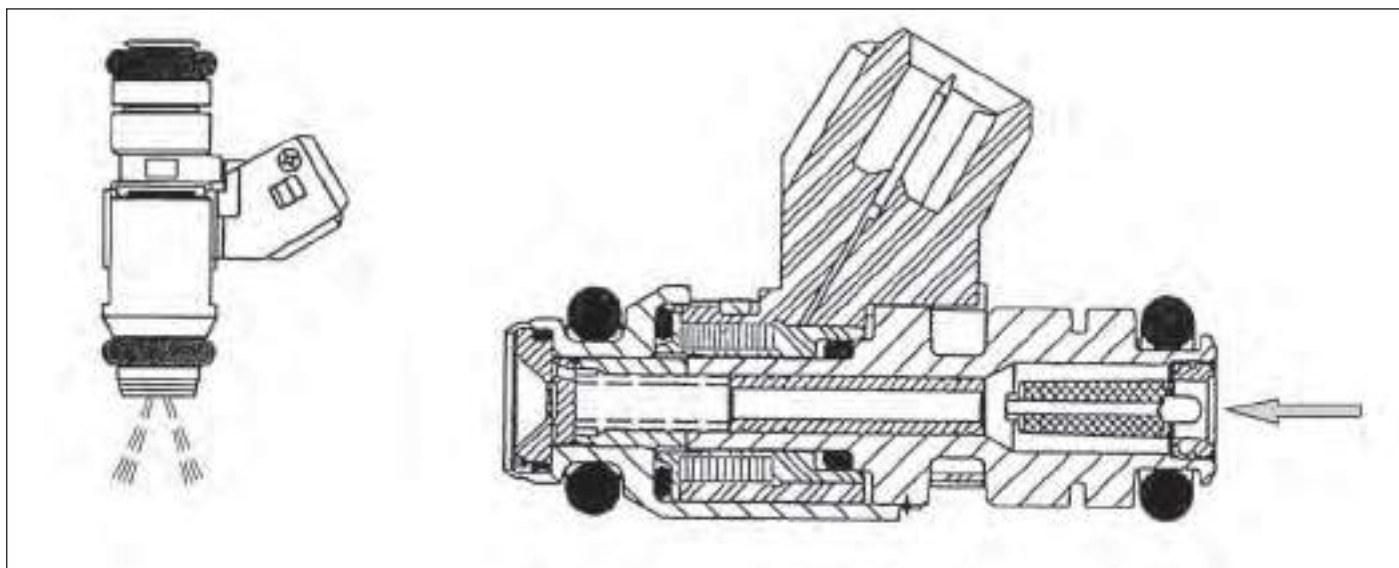
Fuel injector

The fuel injector consists of a solenoid, piston, needle valve and a filter.

The injector is a small electromagnetic injection nozzle that injects fuel into the carburettor according to the signal coming from the ECU.

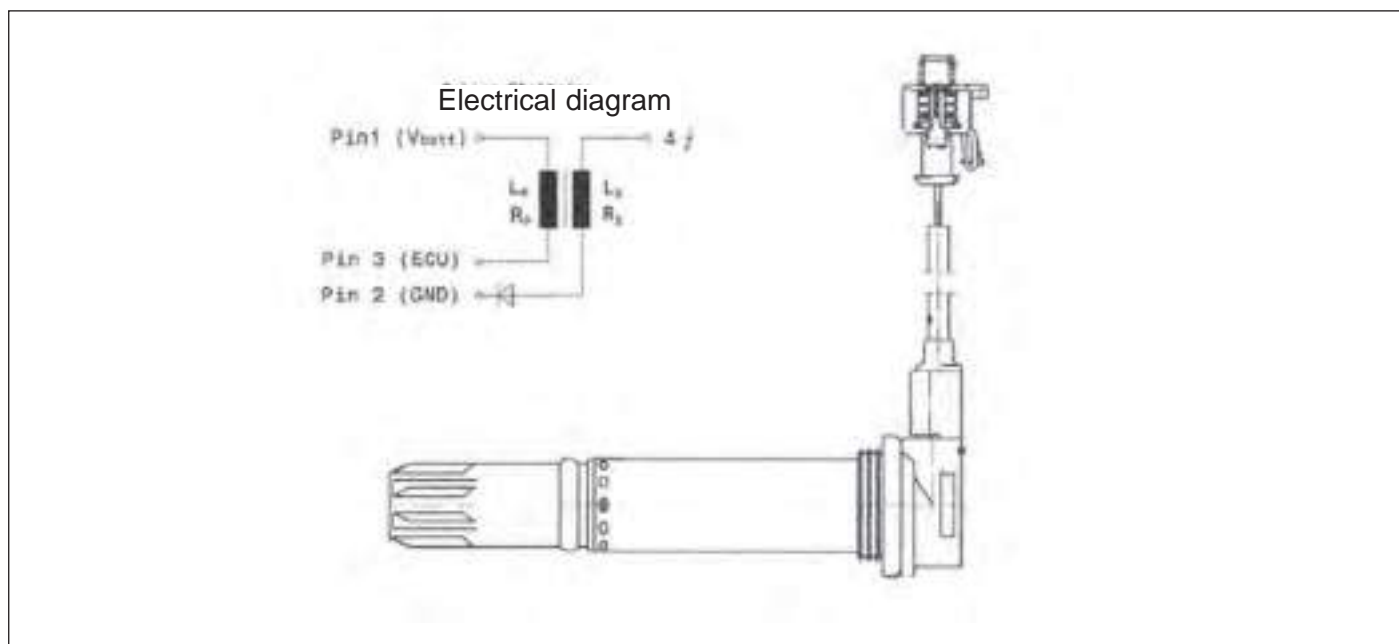
When the solenoid is agitated by the ECU, it becomes an electromagnet and attracts the piston. At the same time, the needle valve incorporated in the piston opens and the injector, under pressure of the fuel, injects the fuel in a conical dispersion. Given that the opening of the needle valve is constant, the volume of fuel injected at any one time is dependent on the time that the solenoid is agitated (injection time).

TECHNICAL DATA: Winding resistance 12 Ω



Ignition coils

The ignition coils are of the top plug type (they are assembled directly on the spark plugs. This avoids the use of the HT leads and enhance the overall system reliability).





Air intake injection system

DIAGNOSTICS SYSTEM

Ignition and injection system diagnostics

For the diagnosis of the ignition and injection system A Weber-Marelli diagnostic software is available which is capable of identifying and recording the faults present or that were present previously on the motorcycle. This software is equipped with a guide book for the use of the software itself to carry out checks on each individual component of the system.



the MDST software allows to carry out the following operations:

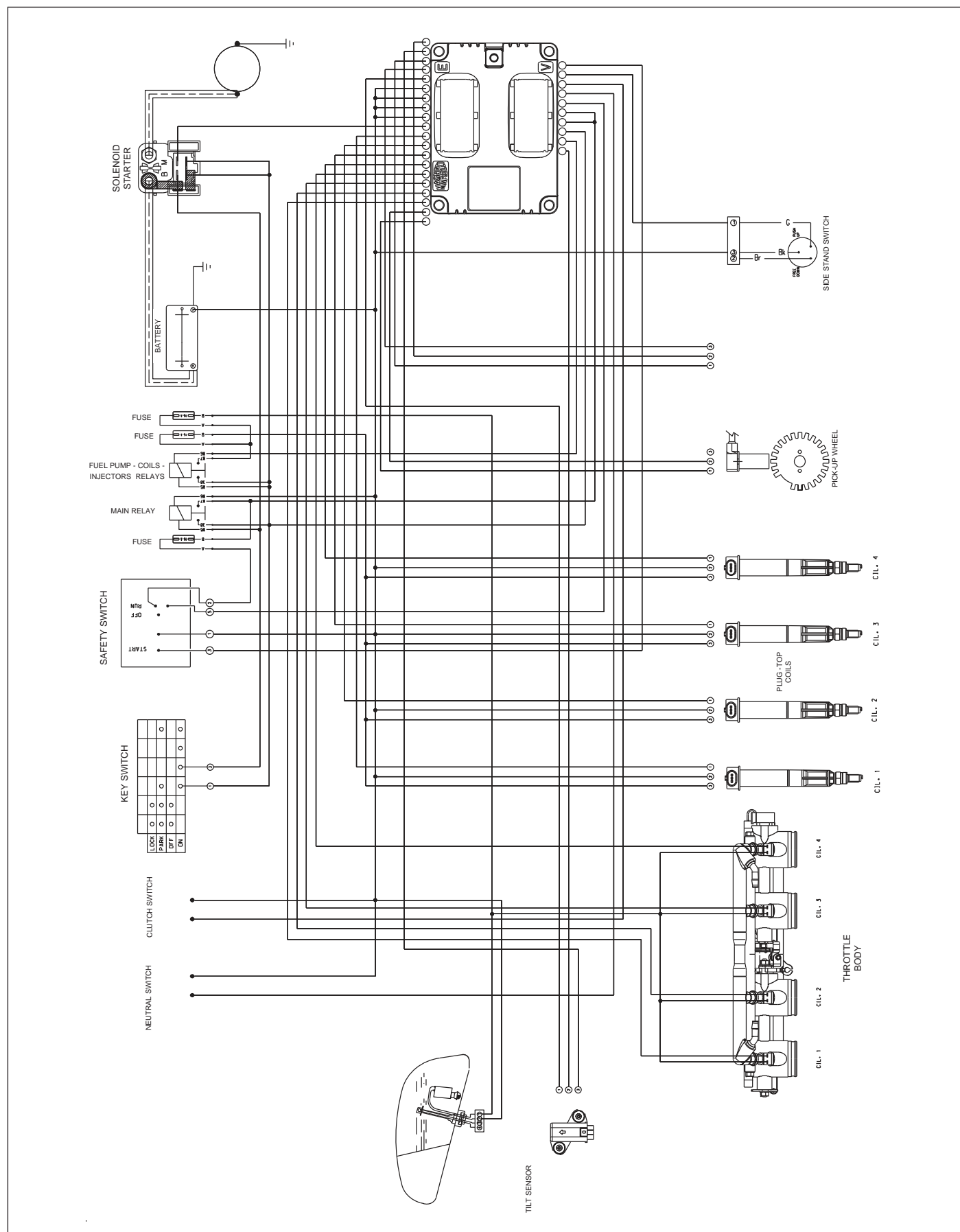
- reading of engine parameters
- reading of faults and their deletion
- active diagnosis





Air intake injection system

INJECTION SYSTEM - ELECTRICAL DIAGRAM





Air intake injection system

MV Agusta Brutale Engine control unit pinout	Connector	
	Vehicle Pin n	Engine Pin n
Input switch control panel key	12/29	
Input r.p.m. sensor (+)		9
Input r.p.m. sensor (-)		23
Input engine phase sensor		24
Input vehicle speed	49	
Input throttle potentiometer signal		44
Input feedback DCM exhaust butterfly valve		30
Input water temperature sensor signal		45
Input switch side-stand	6	
Input switch "start engine"	14	
Input clutch sensor	50	
Input overturn sensor	19	
Output direct command remote control ignition switch		2
Serial line K	10	
Output power relay control (fuel pump of coil injectors)	62	
Output coil control n°1		17
Output coil control n°2		19
Output coil control n°3		3
Output coil control n°4		1
Output injector control n°1		50
Output injector control n°2		34
Output injector control n°3		49
Output injector control n°4		33
Input air temperature sensor signal		63
Input sensor of air pressure collector/barometric		31
Input analogic sensor gear/idle	60	
Input switch "engine stop"	26	
Output relay command electric fan	55	
Output PWM command Lambda heater n° 1		32
Input Lambda sensor n°1 (+)		43
Input Lambda sensor n°1 (-)		60
Output command "Warning Lamp"	58	
Output command "secondary Air" valve		51
Output command + DCM exhaust butterfly valve		57
Output command- DCM exhaust butterfly valve		52
Output command EBS valve ("anti-jump")	45	
Output light relay command	64	
Output "Flap" suction valve command	59	
Direct power supply to control unit	16	
Mass power 1		21
Mass power 2		5
Mass power 3		22
Mass power 4		6
Output Vref 1 + 5 V. for throttle sensor	2	15
Output Vref 2 + 5 V. for throttle sensor	3	13
Analogic mass 1		7/35
Analogic mass 2	15/46	36
CAN Line H (high speed)	51	
CAN Line L (high speed)	20	



Electrical system



E

SECTION E

Revision 1

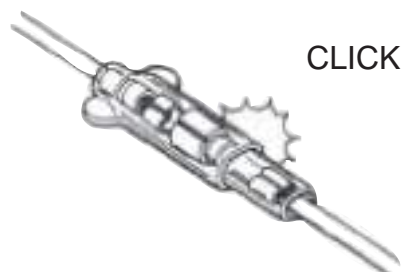


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CONNECTORS

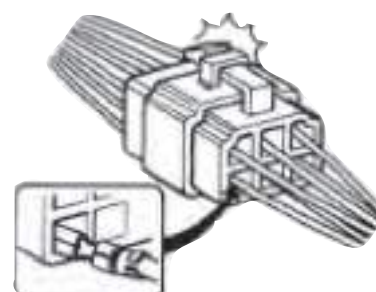
- When a connector is connected, check that it clicks into position.
- Check the connector for corrosion, dirt or a broken cover.



CLICK

COUPLINGS

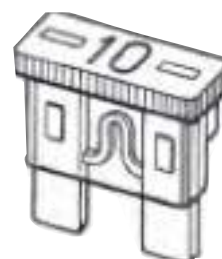
- Block couplings – ensure that the block is released before disconnecting it to push it completely home when connecting it.
- When disconnecting a coupling, ensure that the body of the coupling is gripped and do not pull it apart by the leads.
- Check that the terminals of the couplings are not slack or bent.
- Check that the terminals are not corroded or dirty.



CLICK

FUSES

- When a fuse burns out, always investigate why the fuse has burnt out. Find the cause, repair and then substitute the fuse.
- Do not utilise a fuse of a different capacity from the original one.
- Do not utilise wire or any other substitute for the fuse.





SEMICONDUCTOR PARTS

- Pay special attention to not drop parts incorporating semiconductors (ECU, instrument panel, CPU).
- When checking these components, carry out the instruction strictly. The lack of using the correct procedure can cause grave damage.

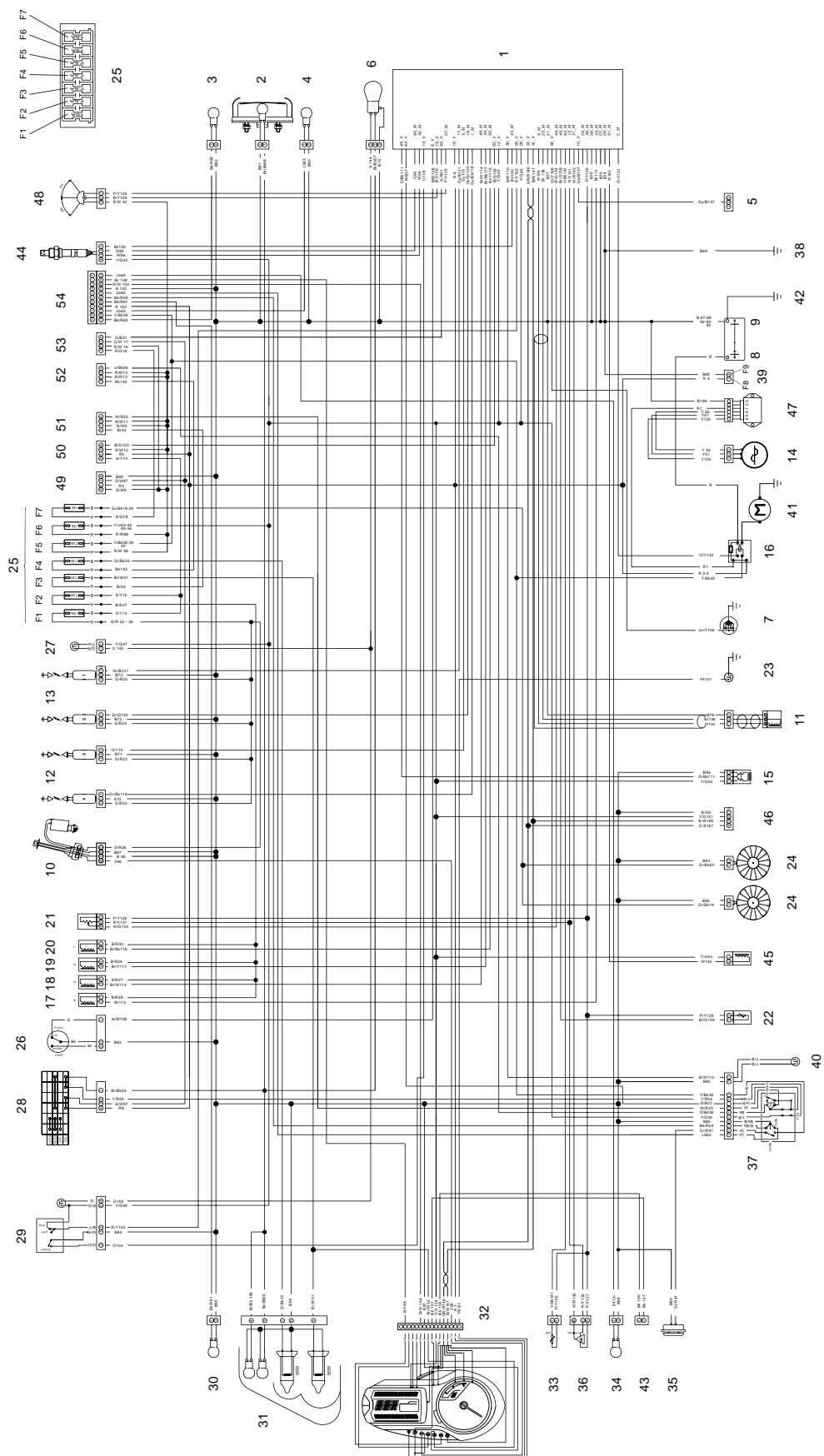
INCORRECT





Electrical system

ELECTRICAL DIAGRAM BRUTALE 990 R - 1090 RR





Electrical system

PARTS LIST

Parts list		Parts list		Parts list	
Ref.	Description	Ref.	Description	Ref.	Description
1	CPU	21	Butterfly potentiometer	38	Frame/CPU earth
2	Number plate light	22	Water temperature sensor – CPU	39	Battery recharge
3	Right indicator	23	Oil switch	40	Clutch switch
4	Left indicator	24	Electric fan	41	Starter motor
5	Diagnostic connector	25	Fuses	42	Frame earth
6	Rear stop light	26	Side stand switch	43	Immobilizer Antenna
7	Neutral switch	27	Rear stop switch	44	Sonda lambda
8-9	Battery	28	Ignition switch	45	Electrovalve
10	Fuel probe – pump	29	Safety and Front stop switch	46	Tyre pressure and temperature sensor
11	R.p.m. sensor	30	Right indicator	47	Voltage regulator
12	Coil	31	Front headlight	48	Tilt sensor
13	Coil	32	Instrument panel	49	Main relay
14	Alternator	33	Air temperature sensor	50	Injection relay
15	Speed sensor	34	Left indicator	51	High beam relay
16	Solenoid	35	Horn	52	Low beam relay
17-18	Injectors	36	Air pressure sensor	53	Relay for electric fan
19-20		37	Light switch	54	Turn signal relay
				55	Exhaust valve actuator

Wiring colour code	
Letter(s)	Colour
R	Red
Y	Yellow
B	Blue
G	Green
W	White
Bk	Black
P	Pink
V	Violet
Sb	Sky blue
Gr	Grey
O	Orange
Br	Brown

In combined colors, background and marking colors have been pointed out. E.g. : Br/Bk.

Fuses list		
Ref.	Amps (A)	Use
F1	15	Fuel pump - Coils
F2	7.5	Injectors
F3	7.5	High beam
F4	7.5	Low beam
F5	7.5	Starter relay - Turn indicators - Horn
F6	15	Rear headlight/stop light- Lambda sensor - Display - Speed sensor - Solenoid secondary air valve - Position lights - Power unit
F7	15	Electric fans
F8	40	Battery recharge
F9	40	Spare for battery recharge



Electrical system

BATTERY

The battery mounted on this motorcycle is a sealed battery therefore no maintenance is required.
The batteries recommended are the following:

- KOYO KTZ10S (pre-activated).



INITIAL BATTERY CHARGE

Proceed with charging following the method on the packet that the battery came in or as indicated in the following table.

Charging method

It is preferable to charge the battery at a constant voltage to not overcharge battery as follows:

Method	V (voltage)	C (temperature)	A (Load current)	Load time (time)
Normal	14,4	20	0,25xC	12-24
Rapid	14,4	20	1xC	6-8



BATTERY ASSEMBLY

Insert the motorcycle key into the rear lock. Turn the key clockwise while lifting the passenger seat up.





Electrical system

Insert the battery into the appropriate compartment.



The initial battery charge should be carried out before mounting it on the motorcycle.



Battery terminal assembly

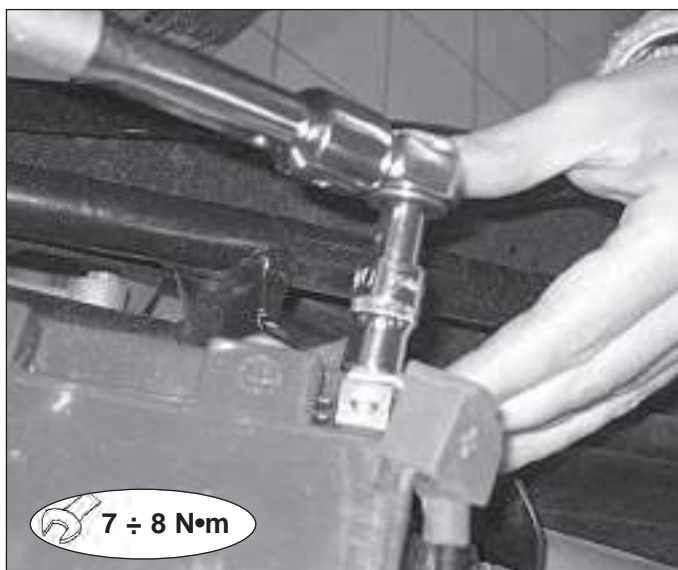
Assemble the positive (+) terminal lead on the relative battery pole, respecting the position shown in the figure.



Rotate the screw of positive terminal lead and tighten to the prescribed torque using a torque wrench.



Torque pressure: $7 \div 8 \text{ N}\cdot\text{m}$





Electrical system

When the terminals are mounted replace the **protection cover** on the positive pole (see figure).



Connect the two negative (-) terminal leads to the relative pole of the battery respecting the placing shown in the figure.



Rotate the screw of negative terminal leads and tighten to the prescribed torque, using a torque wrench.



Torque pressure: $7 \div 8 \text{ N}\cdot\text{m}$



Before tightening, make sure that the cables are oriented correctly.





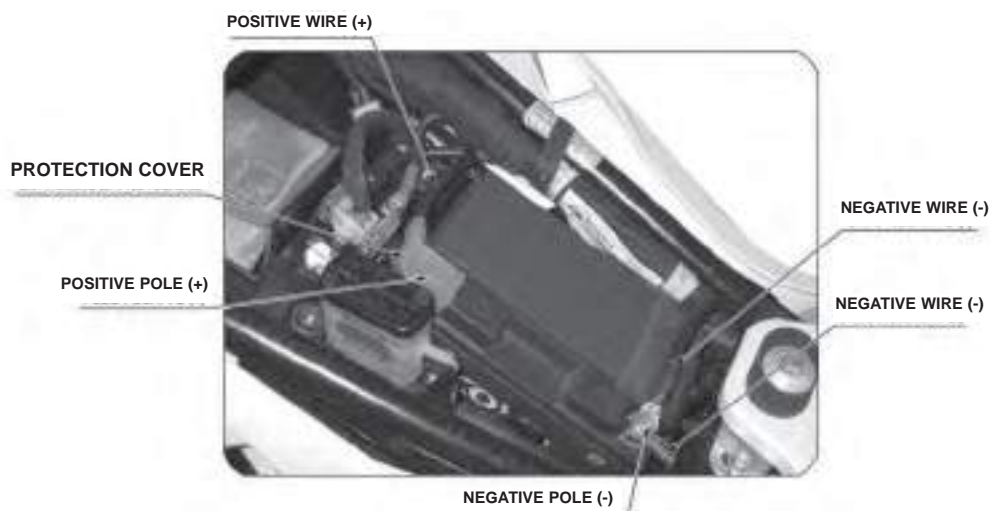
Electrical system



After the assembly operation, make sure that the positive terminal cable is positioned correctly inside the rear frame unit (see figure).



PLACEMENT AND ASSEMBLY OF TERMINALS (WIRE TERMINALS) ON THE BATTERY



CHARGING SYSTEM

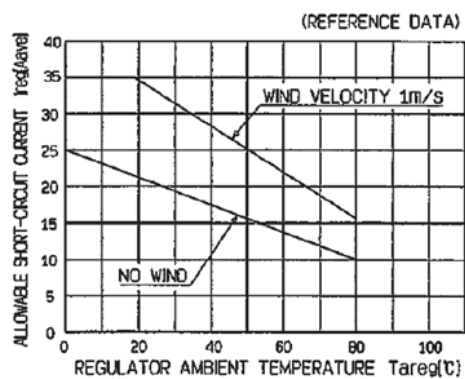
Warning function

- Disconnection of the coil
- Disconnection of the regulator
- Disconnection of terminal B (voltage at terminal S is less than 13 volts)

Any one of these abnormalities switches on the warning light on the instrument panel.

As shown in the figure, the temperature influences the characteristics of the regulator with steps of variation of the regulated voltage.

8. Tareg-Ireg CHARACTERISTIC DIAGRAM

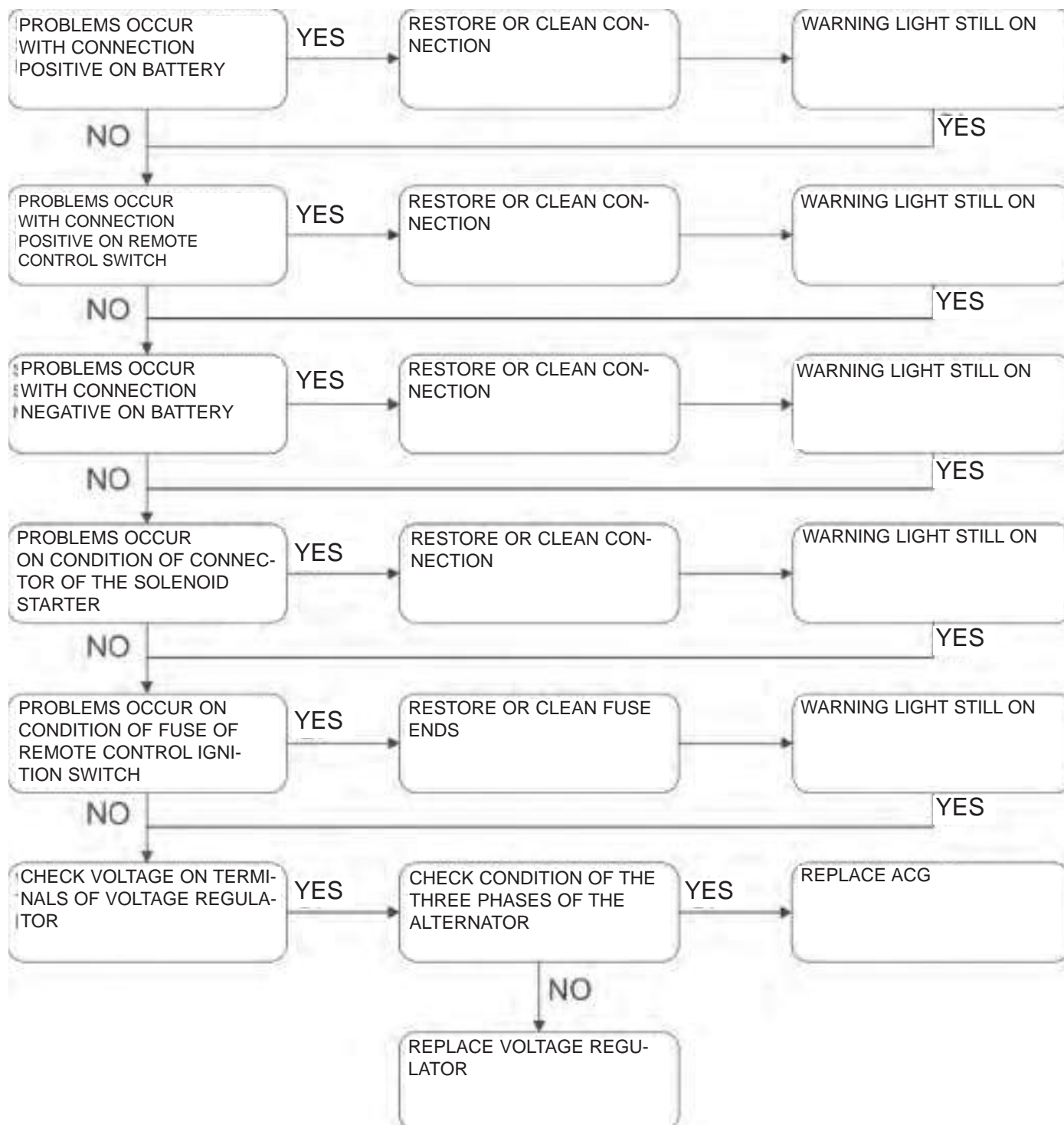


※Heat radiation depends on the model and the ambient condition. So please check the temperature with actual vehicle and the condition.



Electrical system

A list of possible problems that could occur when the warning light is switched on.





Electrical system

BATTERY EFFICIENCY CHECK

Battery current loss check

- Remove the tail unit as described in chapter C “Bodywork”.
- Turn the ignition switch to the “OFF” position.
- Disconnect the cable from the positive (+) pole of the battery.
- Connect the multi-tester between the positive (+) terminal and the positive (+) cable of the battery.

Note that any leakages lower than $2 \div 2,5\text{mA}$ may not be visualised.

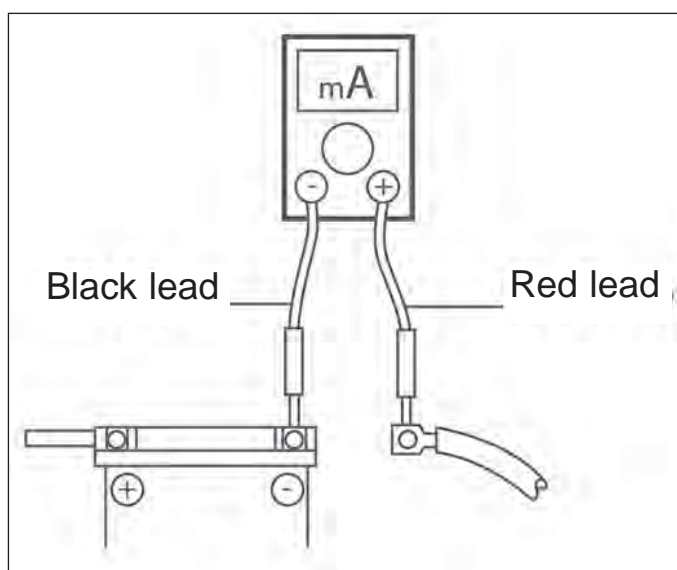
First of all when using an ampmeter, utilise a high range of the multi-tester because the current losses in the case of malfunctioning could be elevated.

Do not turn the ignition switch ON when measuring the electric.

Because of the led on the dashboard, intermittent peaks of absorption will be displayed.



If fixed losses are found over a 5 mA value, remove each part in sequence until the tester measures less than $3-3,5\text{mA}$ in order to identify the problem source.





Electrical system

Charge feed check

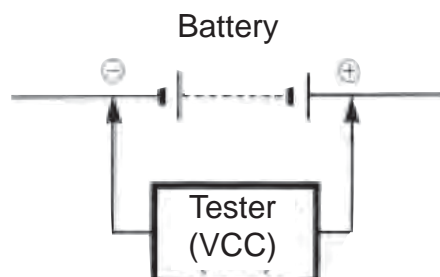
- Remove the tail unit
- Switch on the engine and run it at 2000 r.p.m. with the light switch in the "ON" position and the selector on main beam HI.



Measure the voltage between the positive (+) and negative (-) terminals of the battery with a multi-tester. If the tester indicates less than 12.6V or more than 14.5 V the cause will be found in the generator.

NOTE When carrying out this check, ensure that the battery is fully charged.

Standard recharge voltage:
12.6 - 14.5 V at 2000 r.p.m.





Electrical system

STARTER SYSTEM

The diagram below represents the starter system.

	GEAR POSITION	STAND POSITION	CLUTCH LEVER POSITION	START SWITCH DISABLED	ENGINE LOCKED OFF
1	I	I	I	NO	NO
2	I	O	I	NO	NO
3	I	I	O	NO	NO
4	I	O	O	NO	NO
5	O	O	I	NO	NO
6	O	I	I	SI	SI
7	O	I	O	SI	SI
8	O	O	O	SI	NO

GEAR	I = NEUTRAL CONDITION
	O = NOT NEUTRAL CONDITION

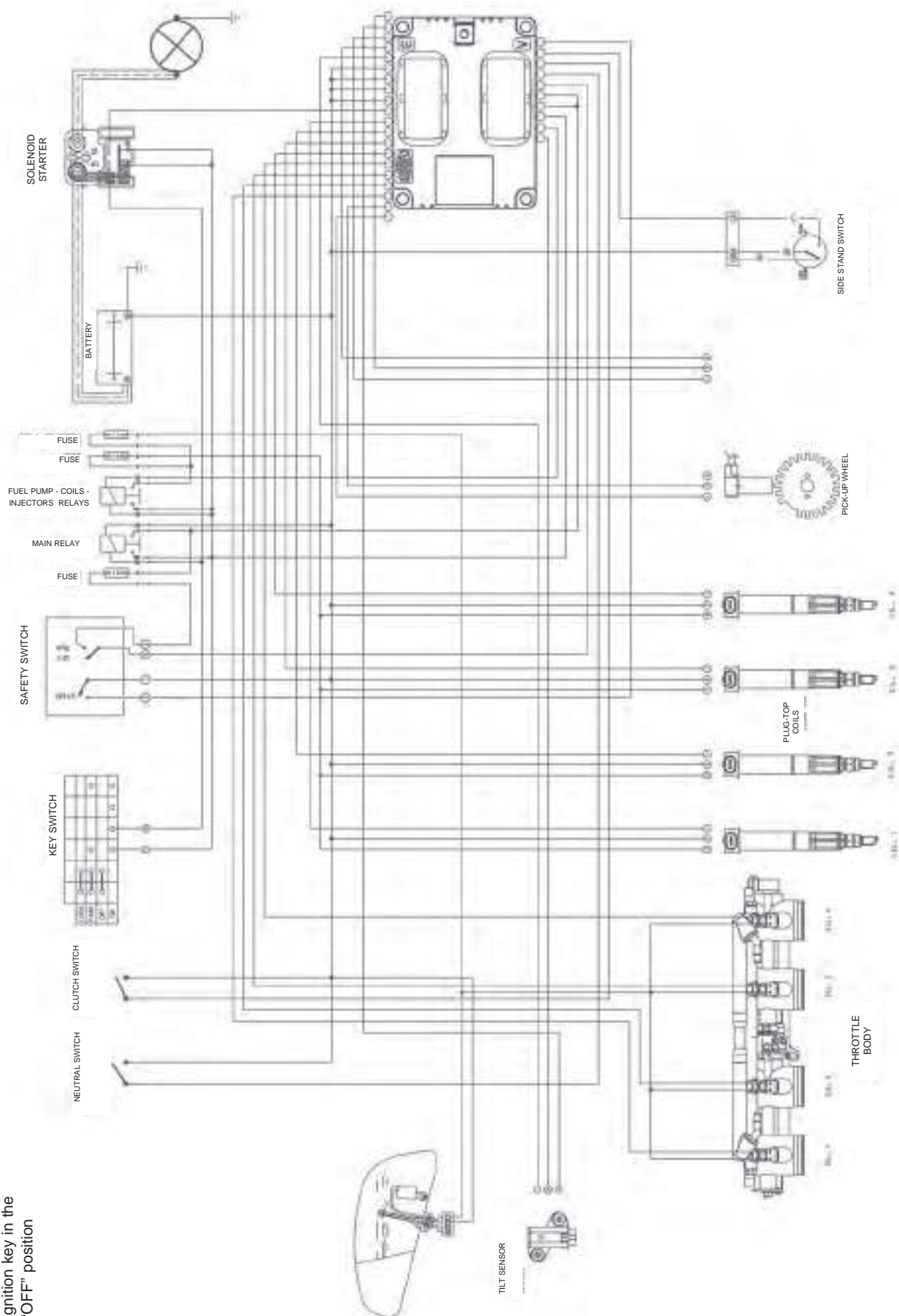
STAND	I = DOWN
	O = UP

CLUTCH LEVER	I = PULLED LEVER
	O = LEAVED LEVER

ELECTRIC START LOCKED DISABLED	START SWITCH DISABLED
-----------------------------------	-----------------------

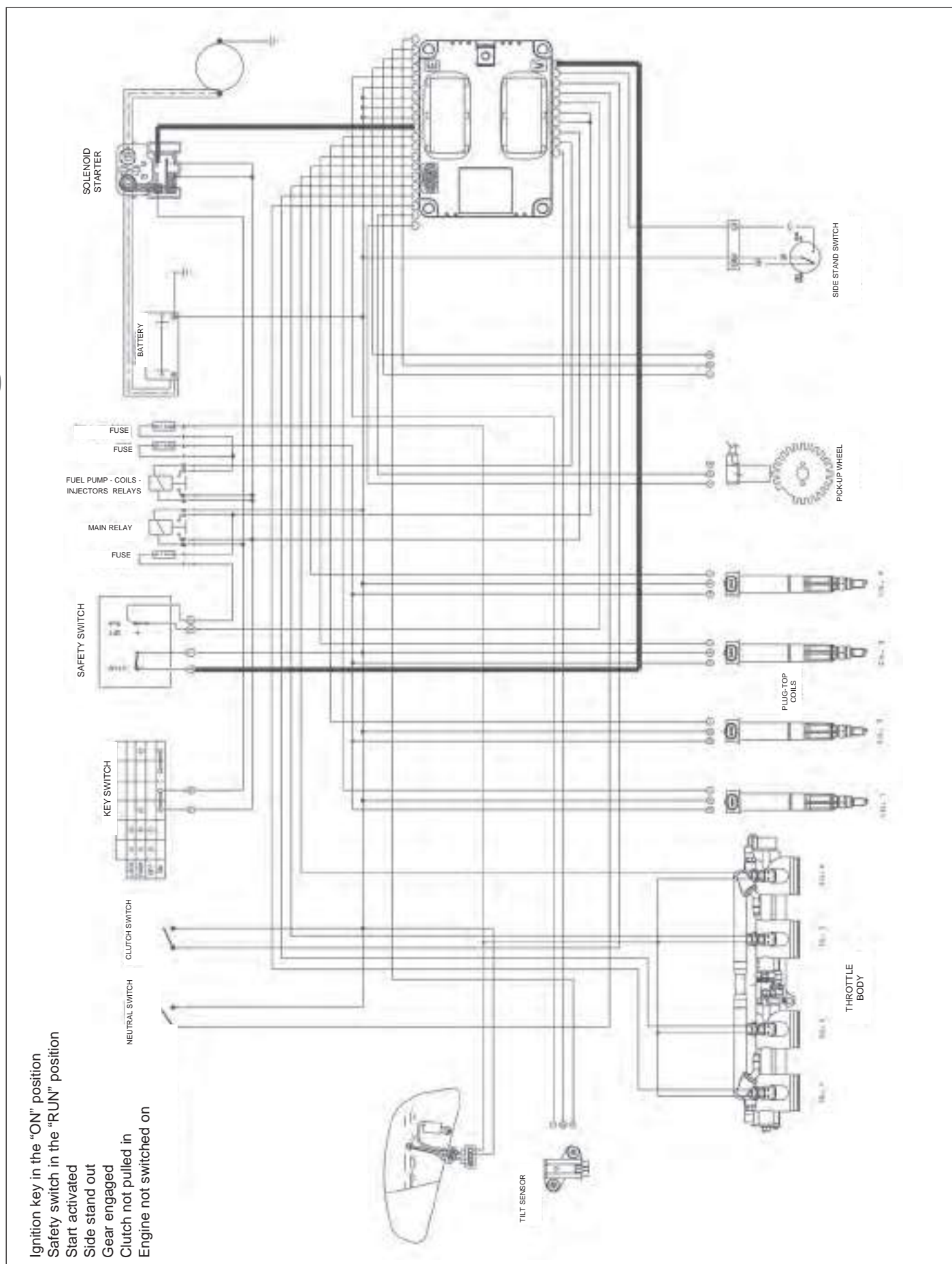
ENGINE LOCKED OFF	ENGINE FORCED OFF
-------------------	-------------------

Ignition key in the
"OFF" position

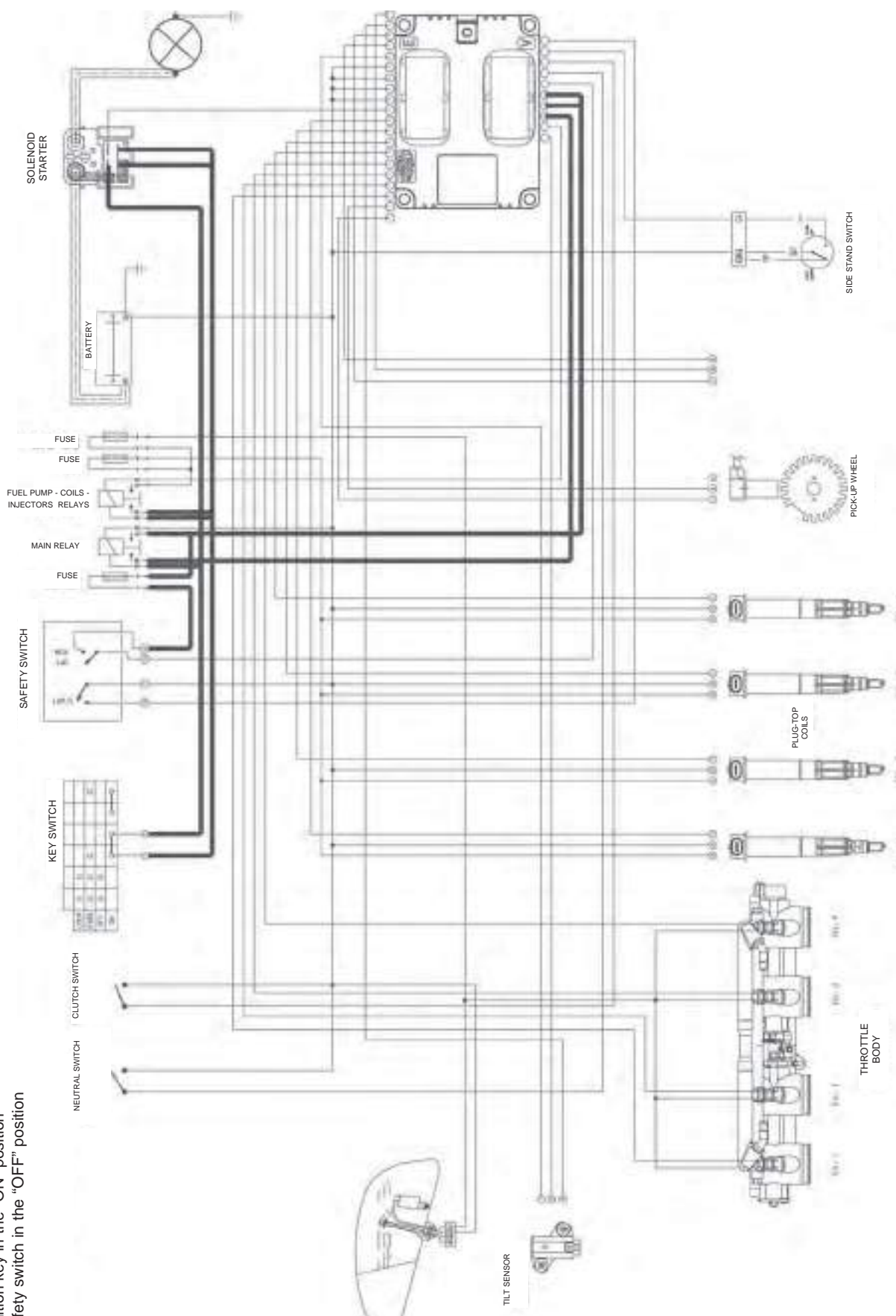




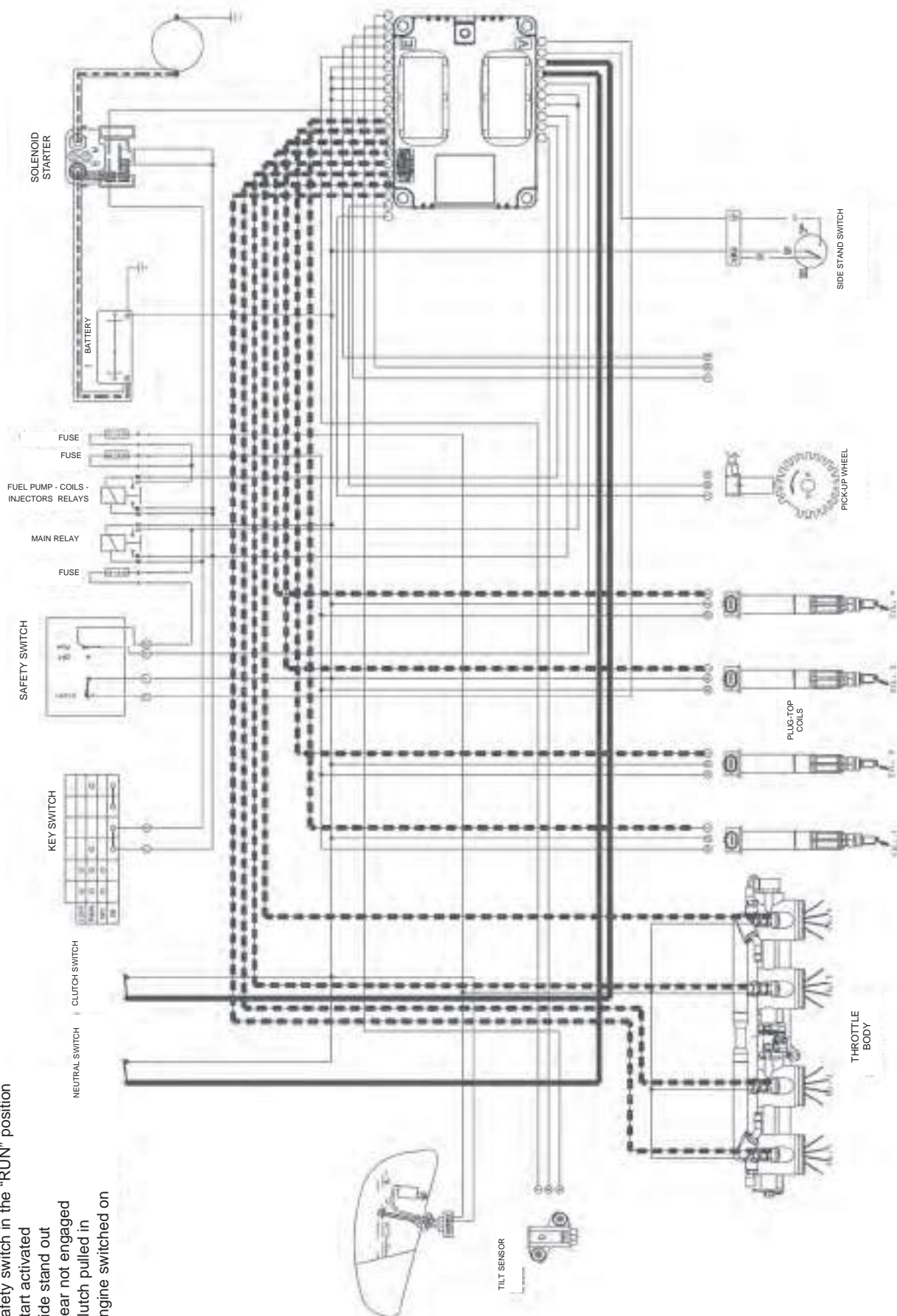
Electrical system



Ignition key in the "ON" position
Safety switch in the "OFF" position

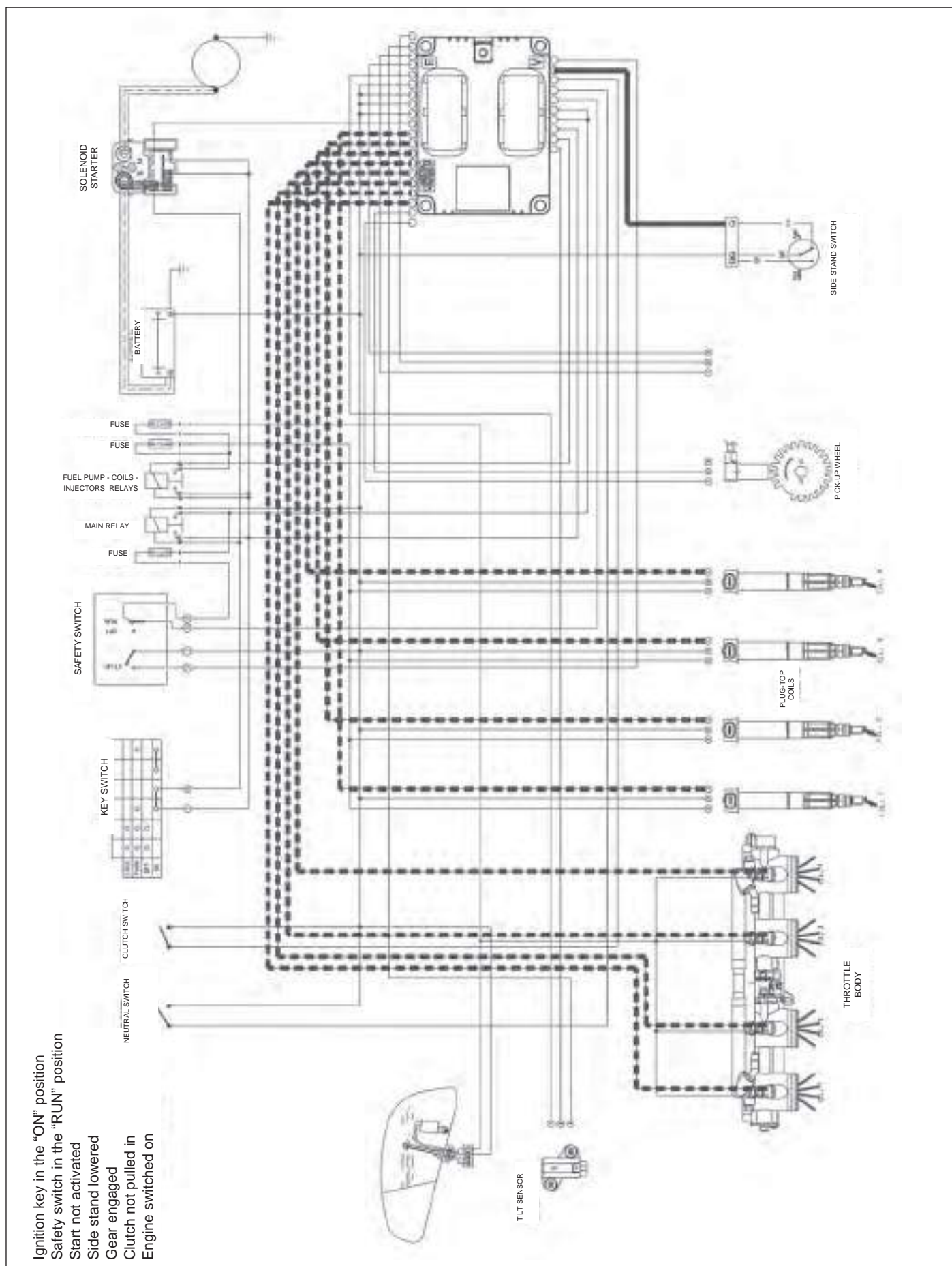


- Ignition key in the "ON" position
- Safety switch in the "RUN" position
- Start activated
- Side stand out
- Gear not engaged
- Clutch pulled in
- Engine switched on

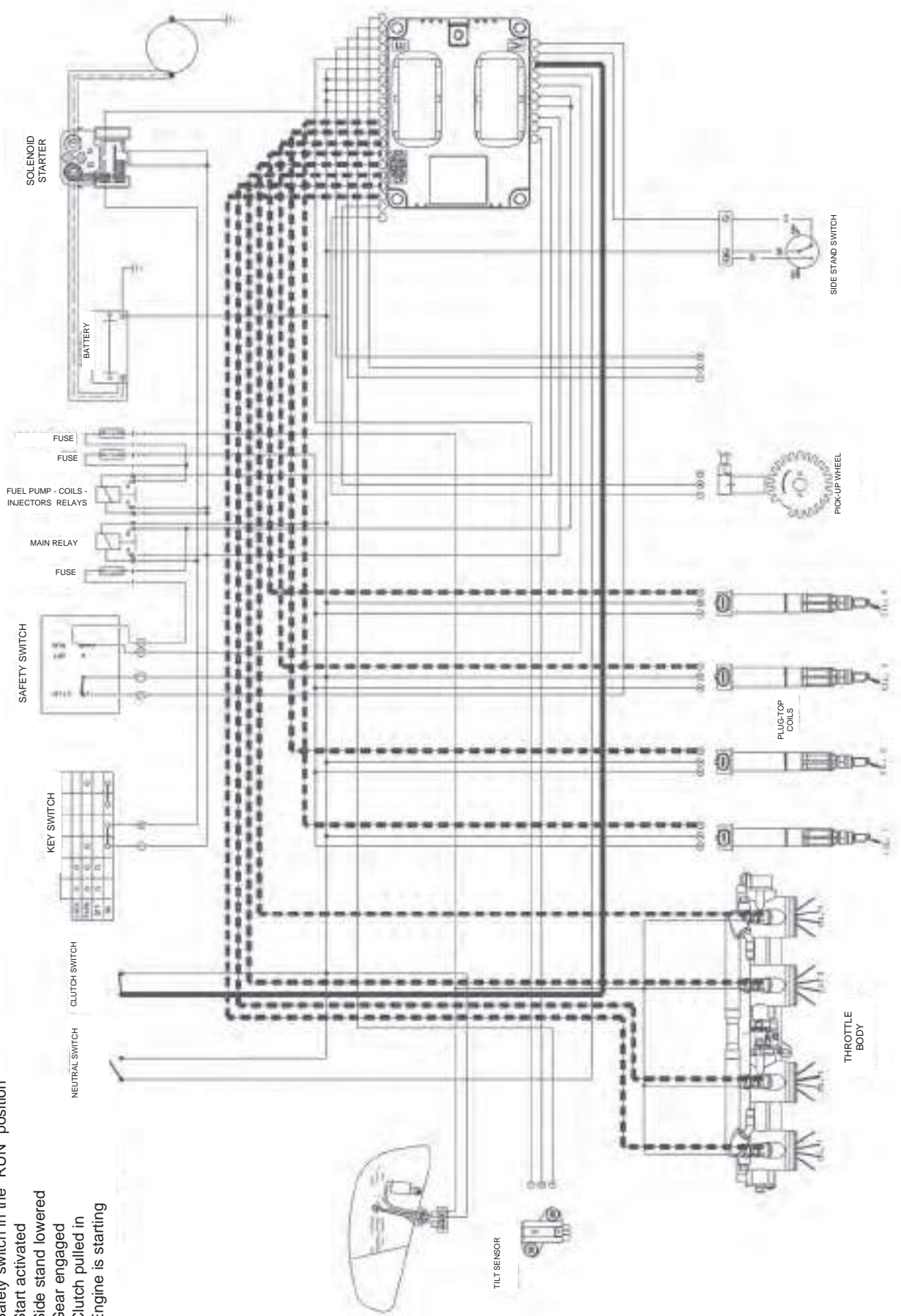




Electrical system

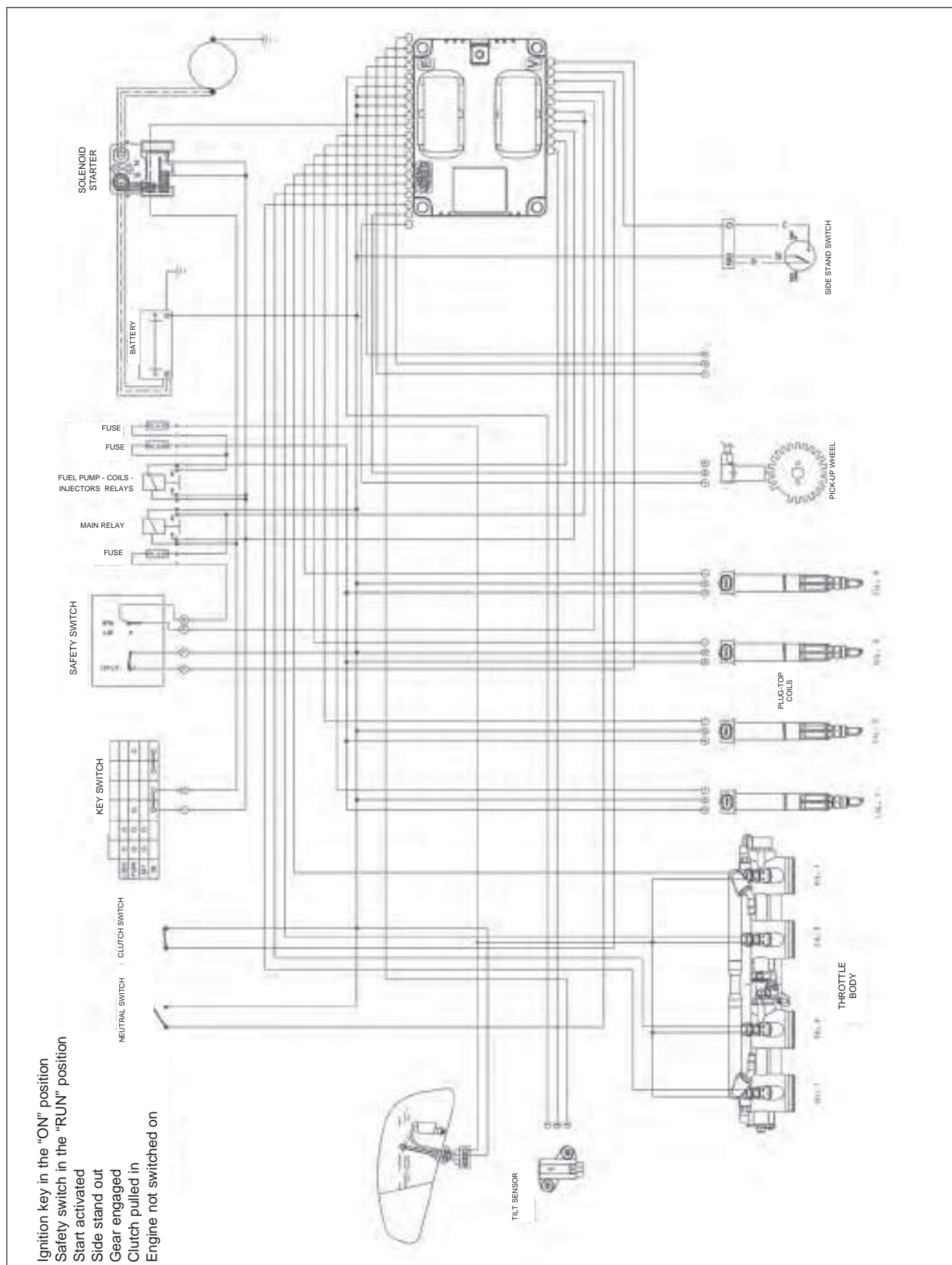


Ignition key in the "ON" position
 Safety switch in the "RUN" position
 Start activated
 Side stand lowered
 Gear engaged
 Clutch pulled in
 Engine is starting

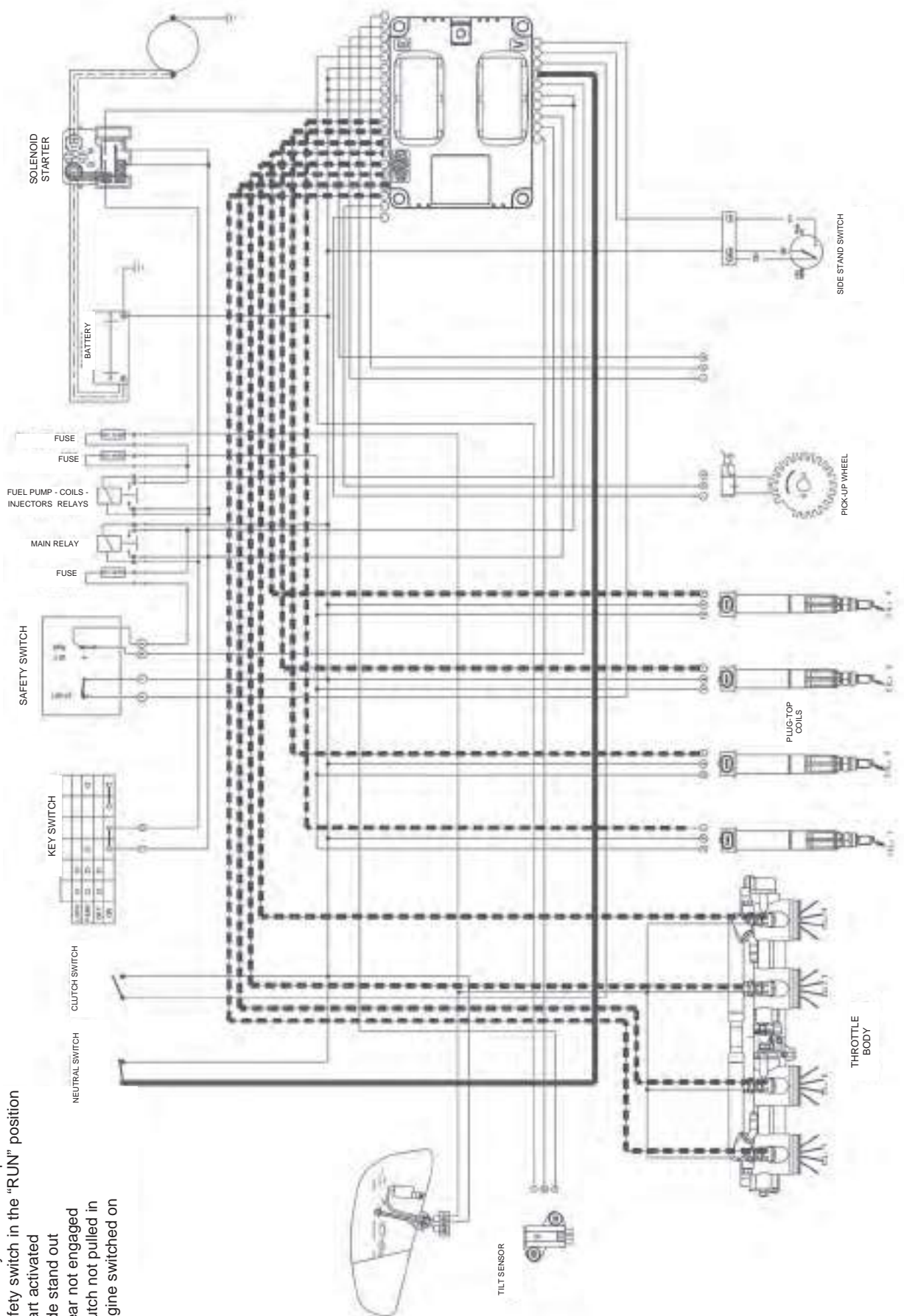




Electrical system

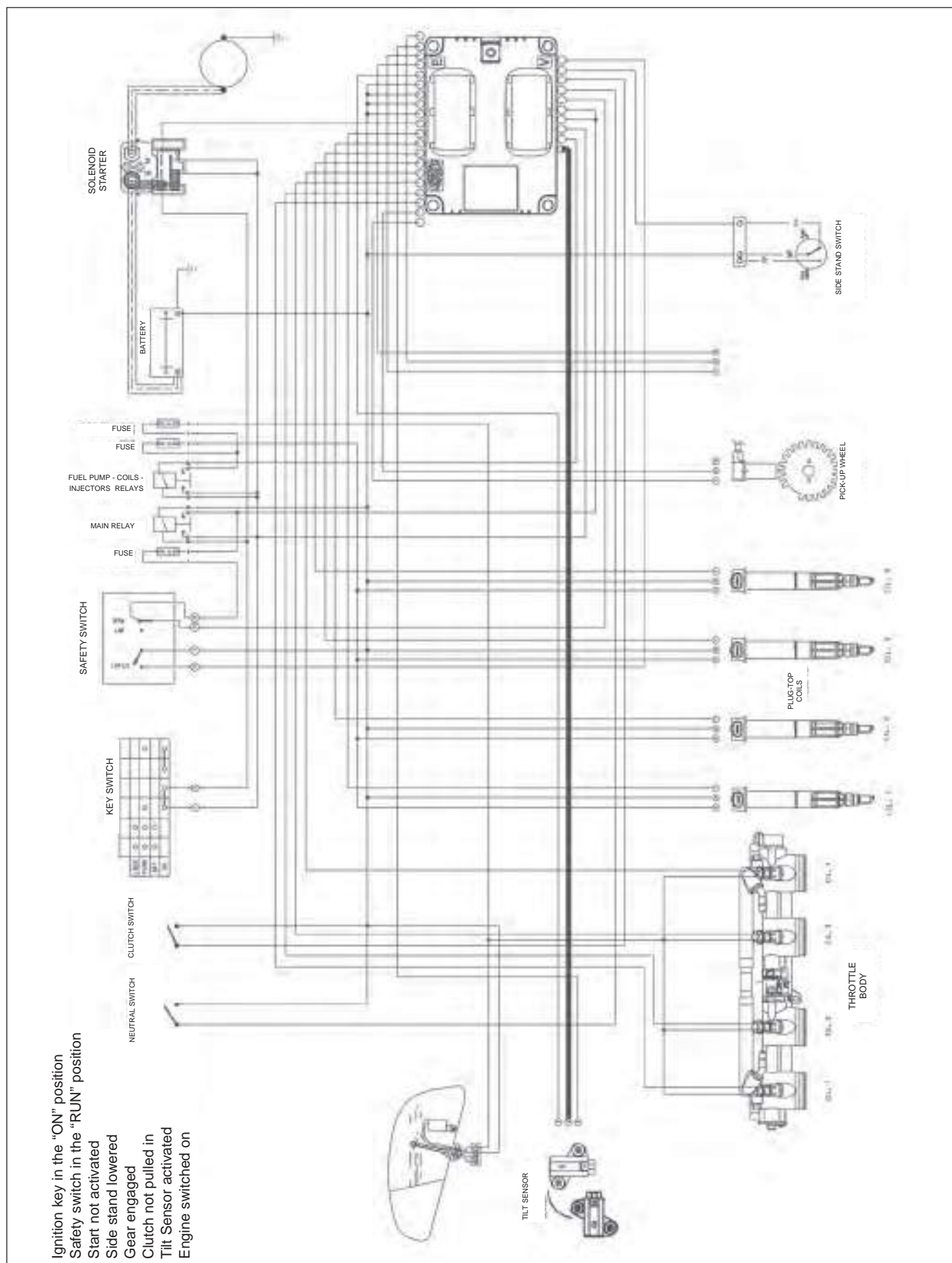


Ignition key in the "ON" position
 Safety switch in the "RUN" position
 Start activated
 Side stand out
 Gear not engaged
 Clutch not pulled in
 Engine switched on





Electrical system



FUSES

- The fuses are located beneath the passenger seat. In order to access the fuses, it is necessary to remove the rider seat and then unscrew the connection to the passenger seat and remove.



Replace the burned fuse.

To identify the position and the function of the fuses, consult the information written on the adhesive and in the electrical diagram. The reference letters indicated in the figure correspond to those shown in the diagram.



STARTER MOTOR REMOVAL

- Remove the fuel tank (see chapter C "Bodywork").
- Remove the coils from the frame support.
- Remove the connector of the actuator
- Remove the actuator without disconnecting the cables.
- Disconnect the cable of the starter.
- Remove the two fixing screws of the starter motor.
- Remove the starter motor by extracting it as indicated in the figure.



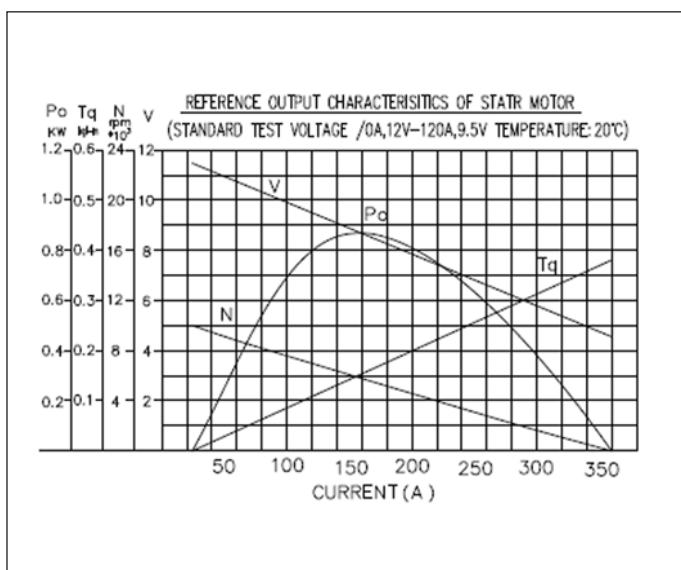
STARTER MOTOR CHECK

If a fault has been diagnosed in the starter motor, it is necessary to proceed as follows with the check:

- Connect a tester between earth and the starter motor terminal.
- Check that there is continuity between the positive pole and the engine earth. If there is no continuity, substitute the starter motor.



E



STARTER MOTOR ASSEMBLY

Assemble the starter motor in the reverse order of removal. Pay attention to the following points:

 **Substitute the O-ring with a new one to avoid oil leakage and the ingress of humidity.**

- Apply grease to the oil seal lip.
- Apply a small quantity of MOLYKOTE to the rotor shaft.
- Apply a small quantity of LOCTITE 243 to the bolts of the starter motor.

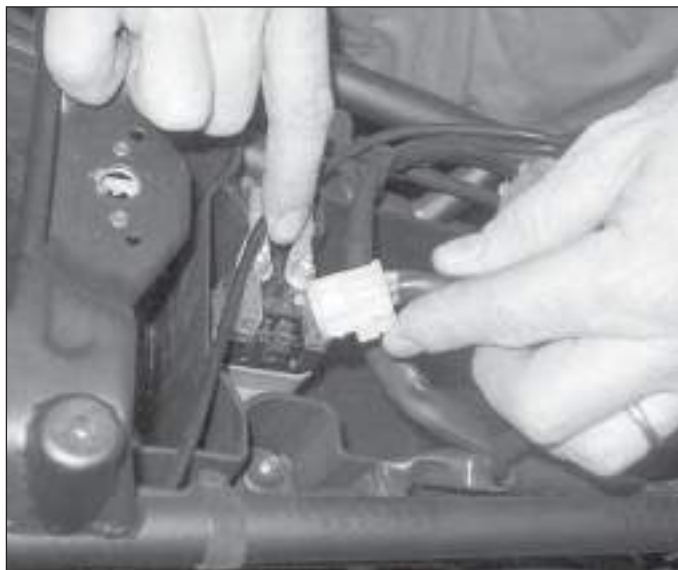




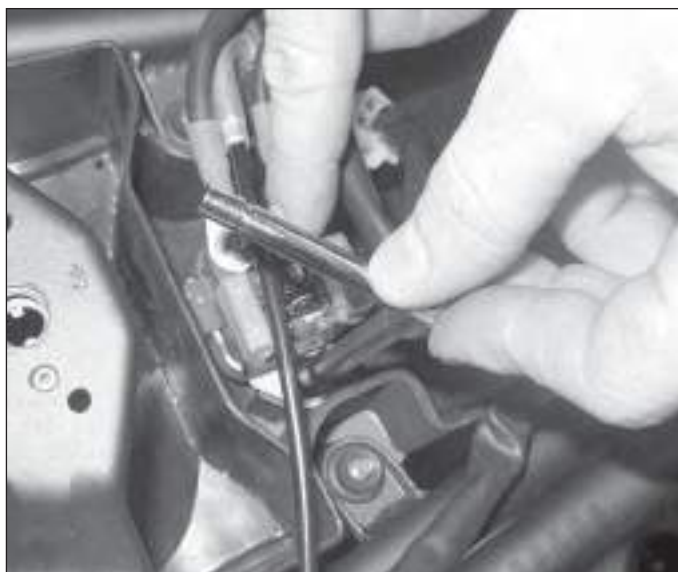
Electrical system

Starter relay check

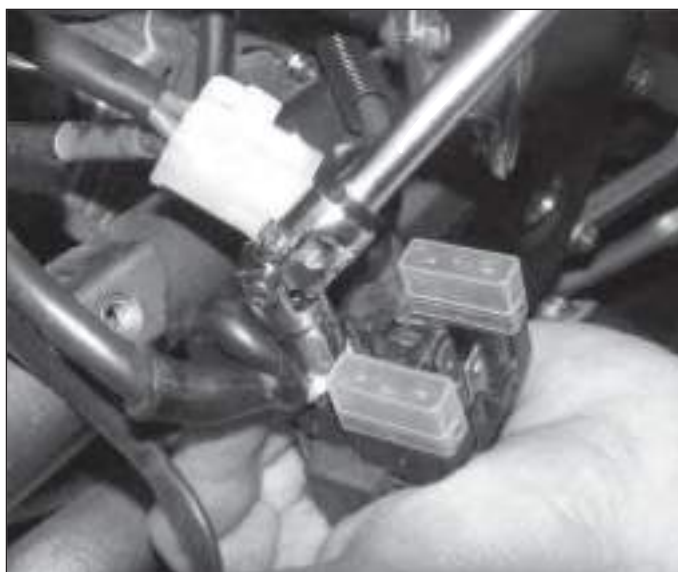
Remove the rider seat, disconnect the battery.
Unhook the connector from the starter relay.



Unscrew the fixing screw of the relay.



Disconnect the cables of the starter motor and the positive cable of the battery from the relay.





Electrical system

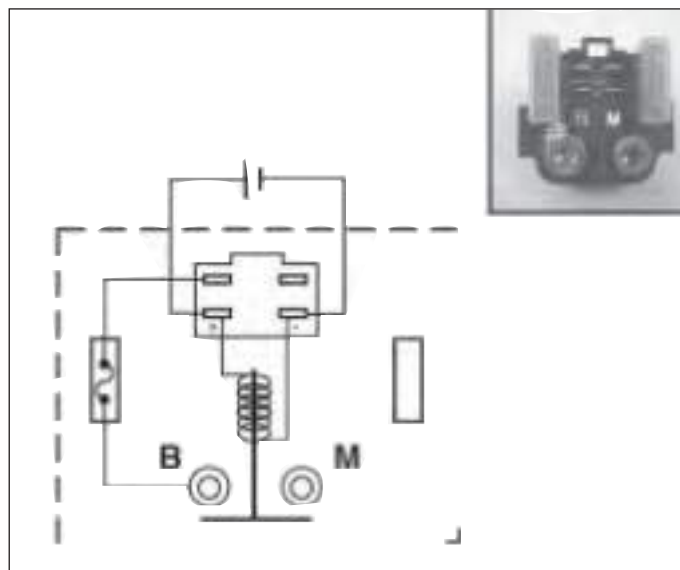
Apply 12 volts to the terminals (1) and (2) of the relay and check the continuity between terminals B-M.

Do not apply the battery voltage to the starter relay for more than five seconds to avoid overheating and therefore damaging the winding.

- Using a multi-tester, check that the winding is on open circuit or if a resistance is present. The winding is in good condition if the value of the resistance revealed is as indicated.

Starter relay resistance

Standard: 3-6 ohm



E



Electrical system

GEARCHANGE POSITION SWITCH

The connector of the gear position sensor is located on the left beneath the tank.

Disconnect the connector of the gear position switch and check the resistance value, using a multitester, in the six gears as well as the idle position, as shown in the attached table.

SCHEMA ELETTRICO ELECTRICAL SHEET			
N	Rn	OUT	
1	R1		
2	R2		
3	R3		
4	R4		
5	R5		
6	R6		

Rn	15400 ± 150.4	Ω
R1	6650 ± 66.5	Ω
R2	3660 ± 36.5	Ω
R3	2210 ± 22.1	Ω
R4	1330 ± 13.3	Ω
R5	732 ± 7.32	Ω
R6	316 ± 3.16	Ω



When the connector of the gearchange position switch is connected and disconnected, be sure to turn the ignition switch to the "OFF" position to avoid damaging the electronic parts.



SIDE STAND SWITCH

The connector for the lateral stand switch is mounted on a support under the pinion wheel transmission casing on the left side of the motorcycle.

- Disconnect the connector of the side stand switch.
Utilising a multi-tester, check the continuity as indicated in the table.

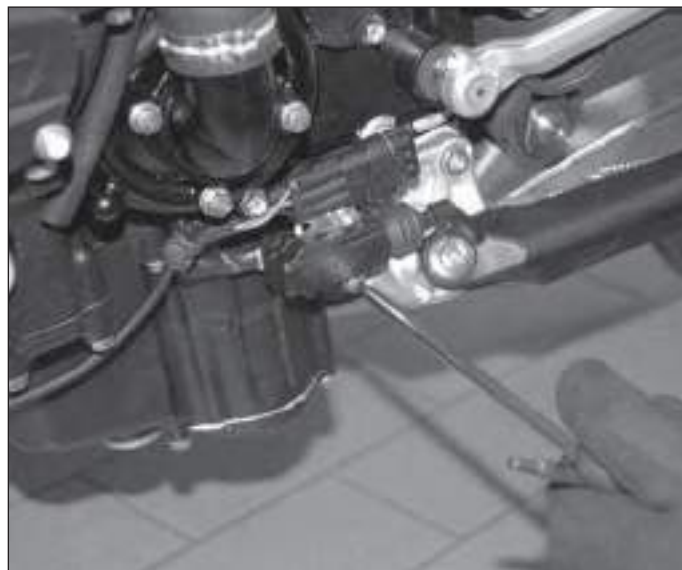
	Green	Brown	Black
ON (Raised)	○		○
OFF (Lowered)		○	○





Electrical system

If it is necessary to substitute the switch proceed by unscrewing the two fixing screws.



E

SPARK PLUGS

To accede to the ignition spark plugs, it is necessary to remove the following components:

- Passenger seat
- Rider seat
- Left side panel
- Right side panel
- Ignition switch cover
- Fuel tank
- Airbox

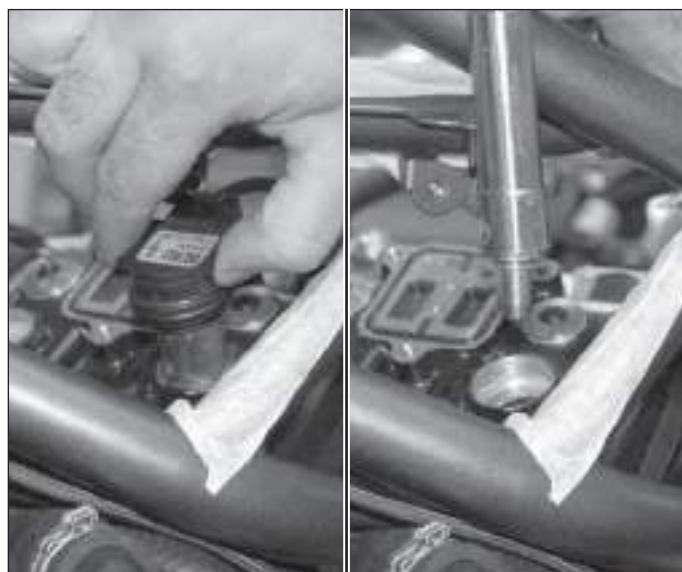
Unscrew the fixing screws of the coil plates and remove them.



Remove the coils from their seats.



When reassembling the coils, take care to connect the map connector correctly. If not connected or if connected incorrectly, it could cause damages to the coils themselves.





Electrical system

Remove the spark plugs utilising the appropriate 16mm hexagonal spark plug spanner.



Check the resistance between the electrode and the screw cap of the spark plug as shown in the figure.

Permitted resistance: $4.5 \div 5.5 \text{ K}$

Carry out the test on all the spark plugs.



RUN OFF SAFETY SWITCH

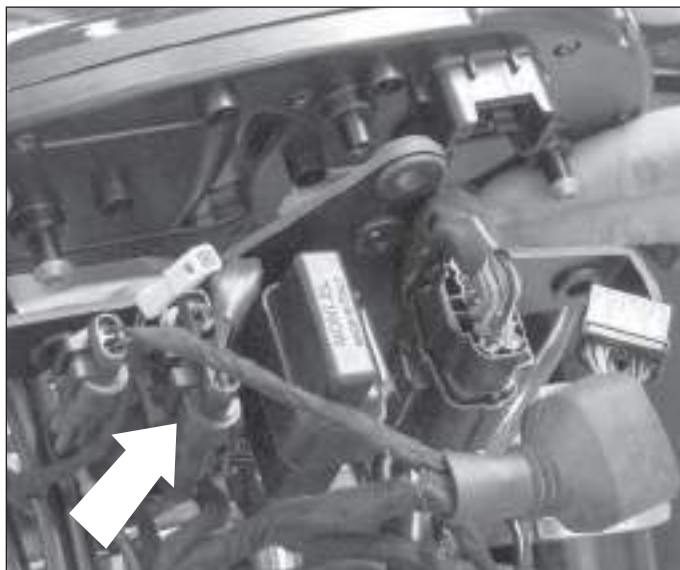
Remove the instrument panel cover unscrewing the two fixing screws on the sides.





Electrical system

Remove the relative connector to the right hand control group as indicated in the figure.



Remove the plug part of the connector.



With the switch in the "RUN" position, check the continuity between pins (2) and (5).





Electrical system

INSTRUMENTATION

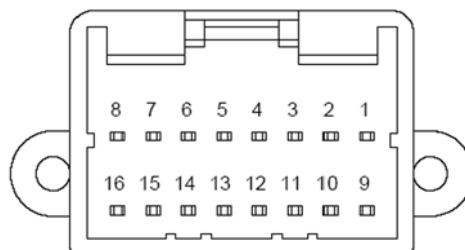
If faults are found in the instrumentation, it is necessary to check the main wiring and the various components related to the instrumentation.

To carry out the various checks, remove the instrument panel cover, then move aside the rubber cap and the connector situated behind the instrumentation.



Consult the diagram below to identify the contacts of the various components:

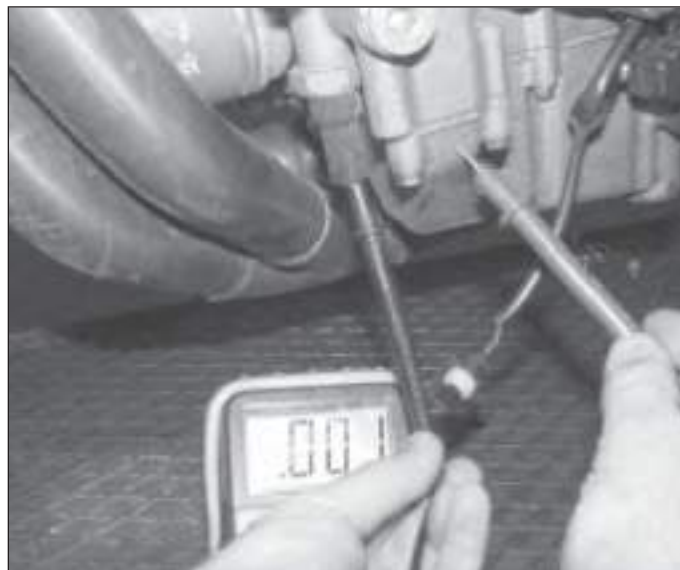
1 Supply	9 ID warning led
2 Gnd	10 Oil pressure
3 + CAN	11 Ignition key
4 - CAN	12 Serial Tx
5	13 Serial Rx
6 High beam	14 Immobilizer
7 Fuel warning led	15 Immobilizer
8 Hazard out	16



OIL PRESSURE SENSOR

With the engine switched off, it is necessary to find continuity between the terminal of the sensor and the earth of the motorcycle (as shown in the figure).

With the engine switched on, the contact must be open.



FUEL LEVEL WARNING LIGHT SWITCH CHECK

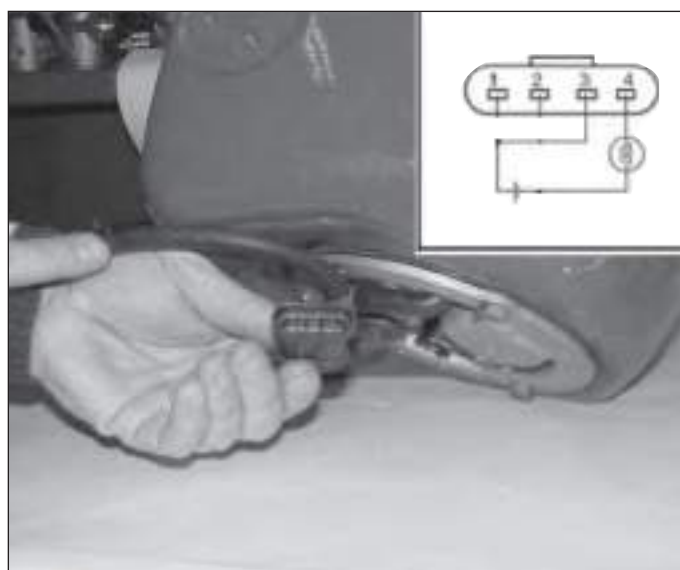
After having checked the breakdown of the fuel reserve warning light, check that there is continuity between terminal 4 of the tank flange and terminal 7 of the dashboard.

Having ascertained the good condition of the fuses in question, proceed as follows:

With the fuel tank removed from the motorcycle and empty of fuel, connect a small circuit composed of 12V battery and a light bulb of 12V – 1.7W to the connector of the fuel level indicator as shown in the diagram.

If the switch is in a good condition, the light bulb should light up after several seconds.

Pour some fuel into the fuel tank and confirm that the light bulb switches off after having poured more fuel into the tank than the maximum required for the reserve.





Electrical system

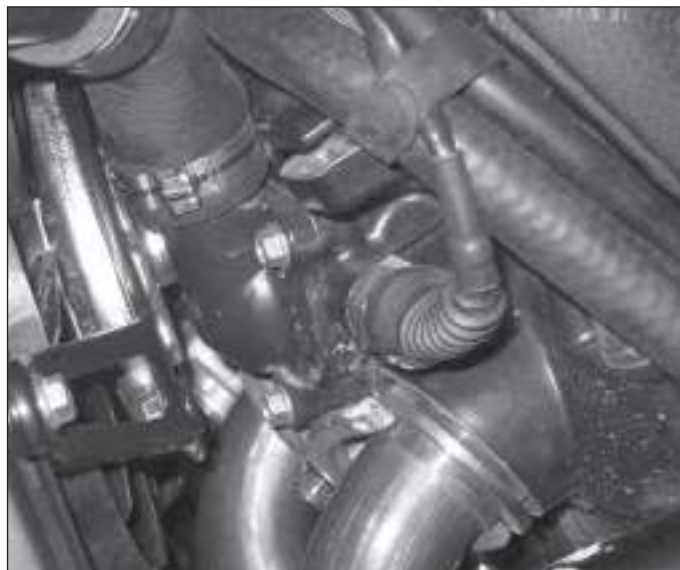
INSTRUMENT PANEL WATER SENSOR

Connect a resistance between the two connections of the connector as shown in the table. Turn the ignition key to the "ON" position.

At this point the display should indicate the Temperature relative to the resistance applied.

It is sufficient to carry out the test at 50° C and at 100° C with the respective resistances of 1,081 kOhm. and 0,204 kOhm.

TEMP. °C	RESIST. kΩ	TEMP. °C	RESIST. kΩ
- 40	100,950	+ 40	1,598
- 30	53,100	+ 50	1,150
- 20	29,121	+ 60	0,746
- 10	16,599	+ 70	0,565
0	9,750	+ 80	0,377
+ 10	5,970	+ 90	0,275
+ 20	3,747	+ 100	0,204
+ 25	3,000	+ 110	0,153
+ 30	2,547	+ 125	0,102



KEY IGNITION SWITCH

If, when the key is turned to the ON position, the dashboard check lights do not come on, check the condition of fuse 6.

If this is intact, check the condition of the fuse positioned on the remote control ignition switch.

If the fuse is intact also in this case, check the continuity of the cable between terminal 11 of the dashboard and fuse 6.



STARTER RELAY ACTIVATION

- Check that when the key is inserted, voltage is present on the terminal of the connector of the remote starter switch with a yellow-black cable.
- Check the condition of fuse n° 5.
- On the switch, with the safety switch set to RUN and the starter button pressed, check for continuity between terminal 3 of the connector and terminal 1.
- Check for continuity in the orange cable which goes from terminal 3 of the connector to terminal 14 of the connector on the power unit.
- Check that when the key is inserted and the start button is pressed, there is a flow of current between the terminal of the connector of the remote starter switch with the orange-yellow cable towards the mass.



Electrical system

- Otherwise, replace the power unit.
- Check for continuity in the orange-yellow cable between the terminal of the remote switch and terminal 2 of the motor of the power unit connector.
- If the presence of voltage and mass on both the terminals is confirmed and the remote switch does not come on, replace the remote switch.

POSITION INDICATORS

If the blinker warning lights do not work, continuity must be checked on the cable between terminal 7 of the switch connector and terminal 9 of the dashboard connector.

RPM INDICATOR

If the r.p.m. of the engine is not signalled on the instrument panel with the engine switched on, check:

- . The continuity between pin (16) of the instrument panel and pin (20) of the CPU.
- . If the cause is verified, the fault will be found in the CPU.



Electrical system

SPEED SENSOR

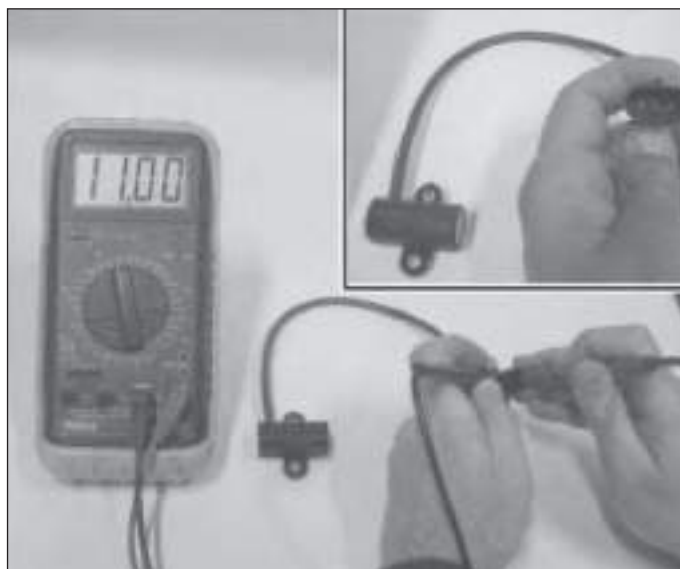
If the speed of the motorcycle is not indicated on the instrument panel, proceed as follows:

- Check the condition of the fuse 6.



If the fuse in question is in good condition, proceed with the check of the speed sensor as follows:

Keeping the sensor connected to the system and with the key in the ON position, using a tester, check that when the sensor is positioned in front of one of the nuts of the brake disk, between terminal 3 and terminal 2 of the connector, the voltage is close to zero, whilst when it is not placed in front of one of the nuts, the voltage is close to that of the battery.



COOLING FAN SYSTEM

If there is a fault in the functioning of the cooling fan, proceed with the following check:

- Check the condition of fuse 7.
- If the fuse is in good condition, check the cooling fan relay mounted on the left side of the motorcycle marked with the letter "F".



If the relay is in good condition but is not energised aboard the vehicle, disconnect the connector on the temperature sensor. Make a bridge between the two contacts as shown in the figure.

With the key in the ON position, after just a few seconds the fans should start rotating.

If this does not happen, check the continuity of the system.

If this condition is also met, the problem lies with the temperature sensor.



HORN

A fault in the horn system should be checked at various points:

- Check the condition of fuse 5 in the fuse box on the left side of the motorcycle.
- If the fuse is in good condition, disconnect the connector of the left control and check the continuity between contact 3 and 4 of the control with the horn button pressed as in the following page under "Switches".
- Check the continuity of the winding of the horn.





Electrical system

SWITCHES

Check the continuity of each switch with a tester. If there is any anomaly, substitute the respective switch unit with a new one.

START SWITCH (S)				ENGINE STOP SWITCH (S)			
	G/D	Y/R	TERS. NOM. Nom. voltage		Y/R	Gr/R	TERS. NOM. Nom. voltage
OFF							
ON	○	○	12V	○	○	○	12V
CURRENT LOAD 3 A				CURRENT LOAD ○ = 0.5 A MAX			
FUNCTIONING FORCE 5 N ± 3 N				FUNCTIONING FORCE 8 N ± 3 N			

* 2005 LIGHTING SWITCH							FLASHER SWITCH				HORN SWITCH						
		I		Z					Lb	Bk/B	R/Bk	TERZO SPINALE Third lead			G	B	TERZO SPINALE Third lead
		Y/Bk	Y/R	Y/Bk	Y/R	G/R	R/D					52 W	4 RPS/O (OFF)				
OFF								PREMUTO (OFF)					PREMUTO (ON)				60 W
ON		○	○	○	○						○	○	52 W	FORZA D'AZIONAMENTO Functioning force			
CARICO NOMINALE-Rated load							FORZA D'AZIONAMENTO-Functioning force							FORZA D'AZIONAMENTO Functioning force			
* = 8 W							12 ± 1N							7 ± 1N			
2005 = 38 W																	
☼ = 30+4 W																	
FORZA D'AZIONAMENTO-Functioning force																	
da definire																	

DIMMER SWITCH						PASSING-LAP SWITCH				
		W	R/D	Bk	CARICO NOMINALE Rated load			W	G/R	CARICO NOMINALE Rated load
H		○	○		4 W	A RPS/O (OFF)				
LO			○	○	4 W	PREMUTO (ON)		○	○	4 W
FORZA D'AZIONAMENTO Functioning force						FORZA D'AZIONAMENTO functioning force				
8 ± 1N						5 ± 1N				

FLASHER SWITCH						HORN SWITCH		
	Lb	Bk/B	R/Bk	TERS. NOM. Nom. voltage		G	B	TERS. NOM. Nom. voltage
OFF	○	○		52 W	4 RPS/O (OFF)			
ON			○	52 W	PREMUTO (ON)	○	○	52 W
FORZA D'AZIONAMENTO-Functioning force 12 ± 1N						FORZA D'AZIONAMENTO-Functioning force 7 ± 1N		
DIMMER SWITCH						PASSING-LAP SWITCH		
	W	R/D	Bk	CARICO NOMINALE-Rated load		W	G/R	CARICO NOMINALE-Rated load
OFF	○	○		4 W	4 RPS/O (OFF)			
ON			○	4 W	PREMUTO (ON)	○	○	4 W
FORZA D'AZIONAMENTO-Functioning force 8 ± 1N						FORZA D'AZIONAMENTO-Functioning force 5 ± 1N		



Suspension and wheels



F

SECTION F

Revision 1



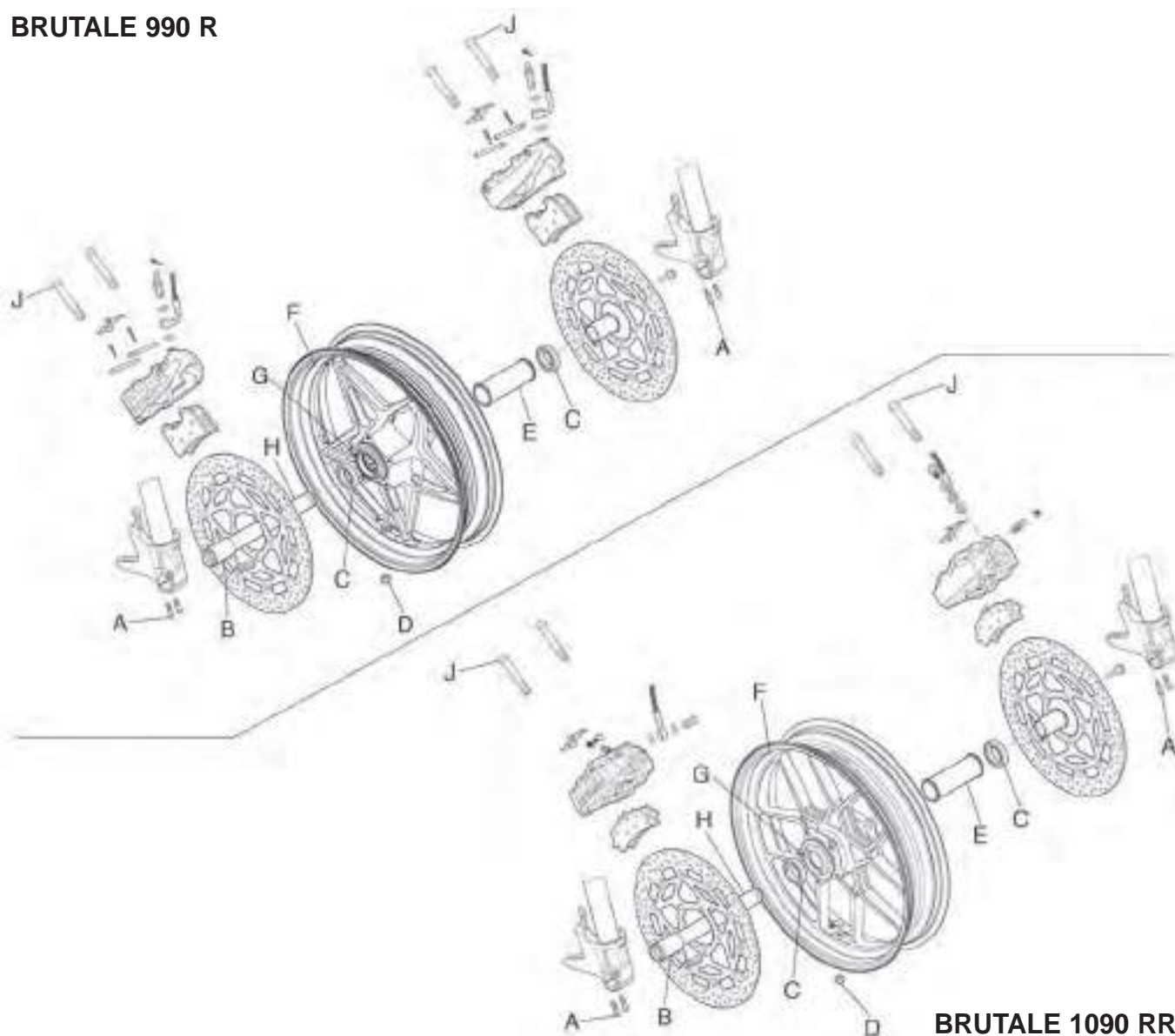
SUMMARY

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FRONT FORK	Page 13
FRONT FORK OVERHAUL	Page 14
STEERING ASSEMBLY	Page 25
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Suspension and wheels

FRONT WHEEL BRUTALE 990 R



BRUTALE 1090 RR

		A	B	C	D	E	F	G	H	J			
Torque pressure	N·m	12 ÷ 14	60 ÷ 65		5 ÷ 7					42 ÷ 46			
	Kg·m												
	ft·lb												
Operation													

Description	BRUTALE 990 R	BRUTALE 1090 RR
FRONT WHEEL		
Material	Aluminium alloy	Aluminium alloy
Dimensions	3.50" x 17"	3.50" x 17"
FRONT TYRE		
Dimensions	120/70-ZR 17 (58 W)	120/70-ZR 17 (58 W)
Brand and type	PIRELLI - Diablo Corsa III PIRELLI - Diablo Rosso	PIRELLI - Dragon Supercorsa Pro DUNLOP - Sport Max Qualifier RR
Front tyre pressure (*)	2.3 bar (33 psi)	2.3 bar (33 psi)

*: When using tyres of a brand which is different from the recommended type, refer to the tyre pressure marked by the manufacturer on the side of the tyre.

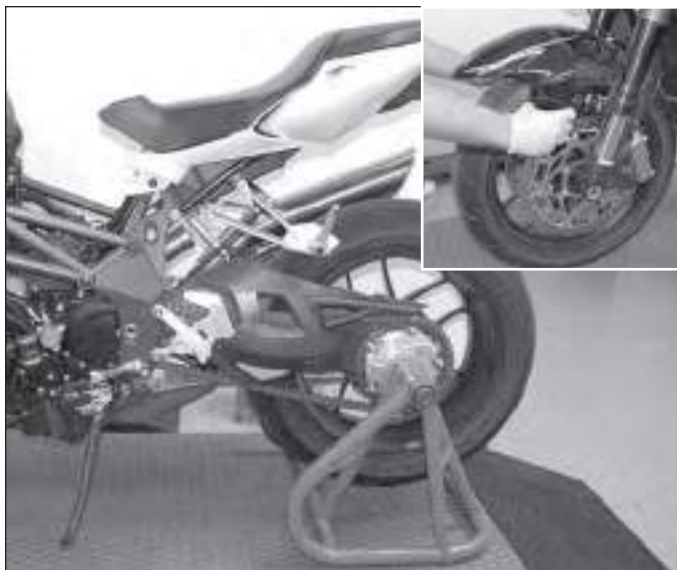


Suspension and wheels

Before proceeding with the removal and overhaul of the components relative to the front suspension, it is advisable to remove beforehand the front mudguard as described in detail in chapter H "Brakes".
Place the motorcycle on the rear stand.



Special tool: No. 800092642



F

FRONT WHEEL REMOVAL

Unscrew the two fixing screws (1) of both front calipers and remove the calipers.

N.B. To allow the wheel to be removed, turn it so as to move the inflating valve away from the calipers.

N.B. Position the removed calipers so that they do not hamper subsequent operations.



Protect the disassembled calipers with protective material thereby avoiding possible damage to the wheel rim. Hold the calipers appropriately, to not charge the brake tubes. Pay attention to not bend the brake tubes to avoid any damages.



Lift the motorcycle up at the front end.
Mount the special tool that is supplied with a pin on the lower part of the steering base as shown in the figure.
Lift the motorcycle up.



Special tools No. 800095807 and No. 800095808

N.B. To facilitate the removal of the wheel it is advisable to tape the brake tubing to the special tool.



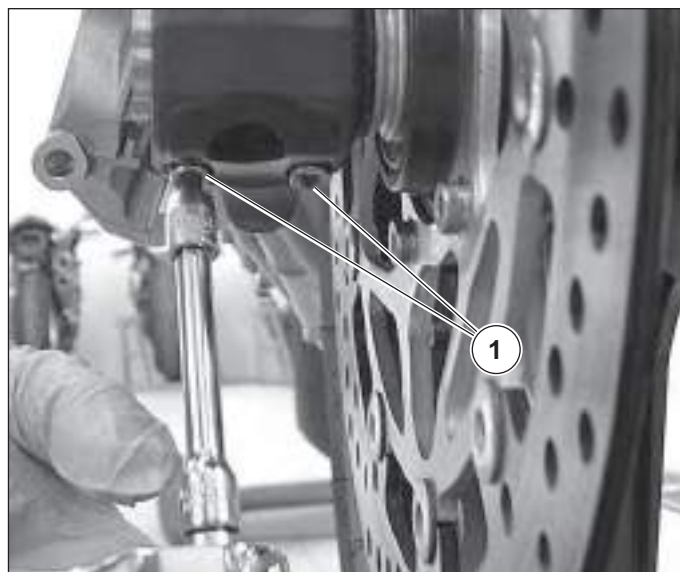


Suspension and wheels

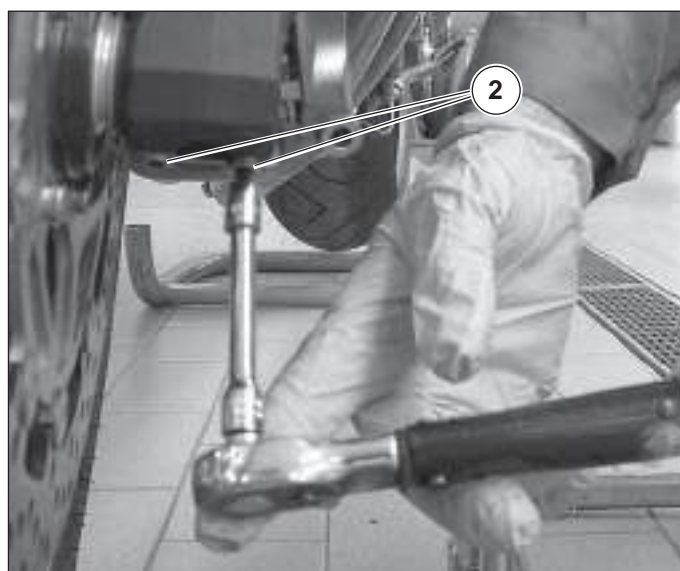
Loosen the two screws (1) on both front wheel/fork attachments.



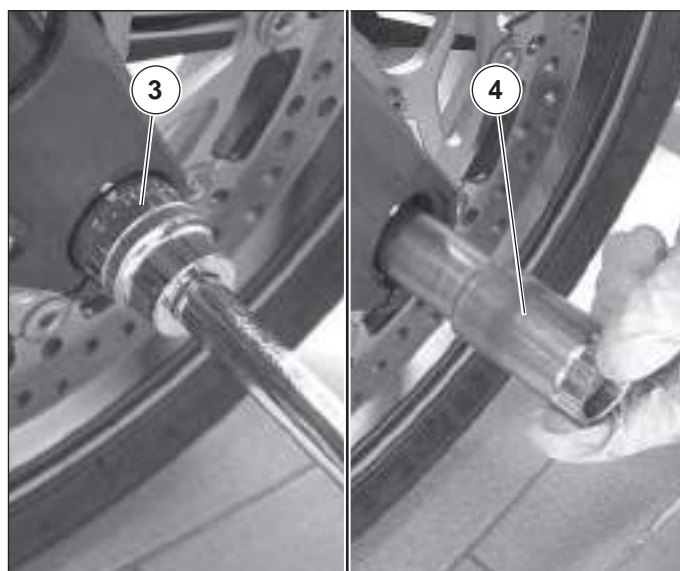
During this operation, it is necessary to support the wheel.



Loosen the two screws (2) on the fork foot on the left side of the vehicle. Leave the screws partly tightened to facilitate the removal and the subsequent refitting of the axle.



Loosen the pin (3) with the Ø 26 bushing and remove the wheel spindle (4).





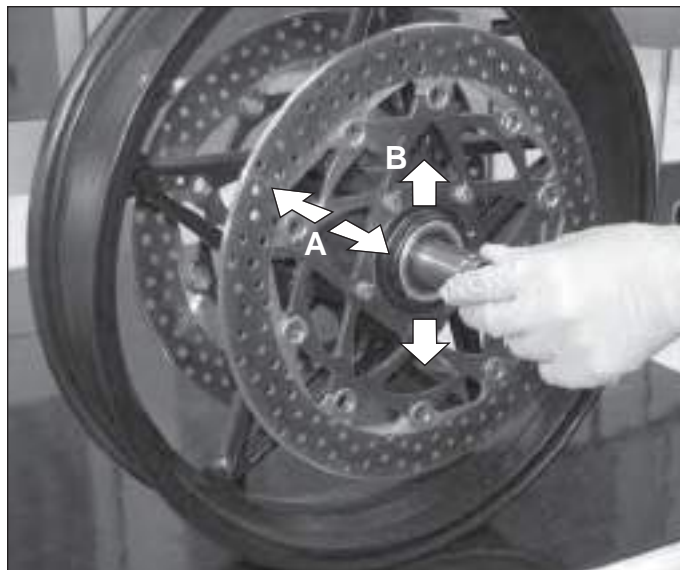
Suspension and wheels

Front wheel bearing check

Execute the following preliminary operations :

- Fit the axle on the front wheel.
- Turn in and bring the threaded bushing (Cod. 80A0A3469) into contact with the wheel spindle, tightening it by hand.

With the wheel spindle still mounted to the wheel, rotate the wheel to check that the bearings are not pitted and rotate with a smooth action. Check also for axial (**A**) and/or radial (**B**) movement. If either condition is verified, substitute the bearings.



Front wheel bearing substitution

Remove the threaded bushing, the wheel spindle and the left and right spacers from the wheel rim.

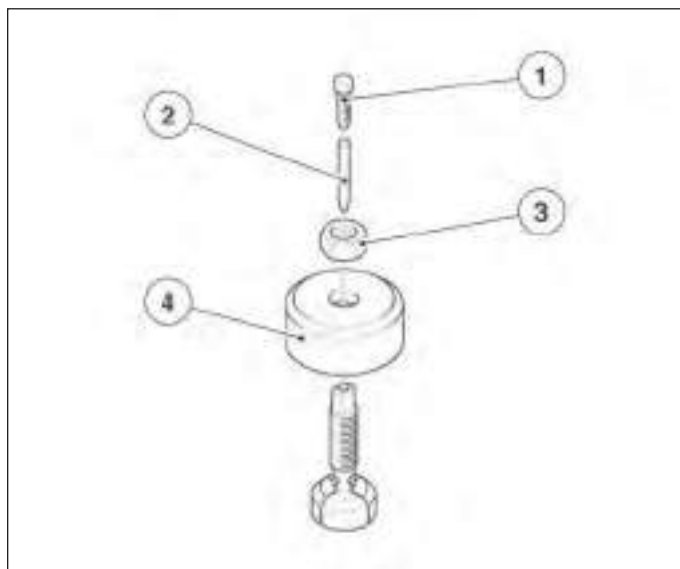
Utilise the special tool to extract the bearings. To assemble the tool, it is necessary to remove the screw (1) and extract the wheel spindle (2); remove the nut (3) and the flange (4).



Before substituting the bearings as indicated above it is advisable to remove the brake discs as indicated in chapter "Brakes" to avoid damaging them.



Special tool No. 800092862





Suspension and wheels

Introduce the extractor until the internal ring of the bearing is hooked up. Introduce the wheel spindle and screw and **manually block them**.



Mount the flange, spacer ring and nut utilising a **14 mm** spanner and a **27 mm** spanner and extract the bearing as shown in the figure.

N.B. Operate in the same way on both bearings.



Check that the ends of the aluminium spacer and the seats of the bearings on the wheels are not scored or marked.





Suspension and wheels

Reassembly – front wheel bearings

Before proceeding with the reassembly, accurately clean the bearing seats in the wheel hub.

Lubricate the outer race of both bearings with special grease.

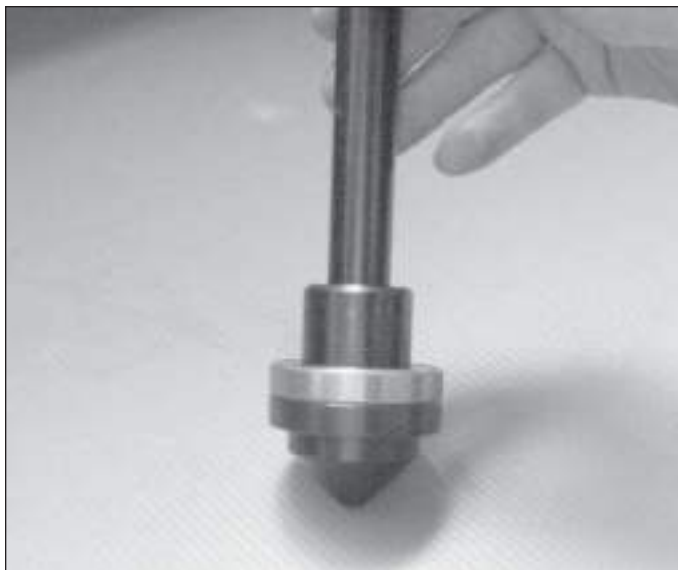
Mount a bearing onto the special tool.



Recommended product: AGIP GREASE 30



Special tool No. 800092868



F

Introduce the stem of the tool into the wheel hub as shown in the figure and insert the aluminium spacer.



Assemble the other bearing and the guide.





Suspension and wheels

Insert the guide spacer and utilising a press, squeeze down the bearings.



Proceed as illustrated in the figure.



Attention: the wheel bearings should be mounted with little interference but should the action of the press be blocked in any way, release the press.

Having completed the assembly, check that the aluminium spacer does not have axial play. Assemble the wheel spindle and carry out again the rolling check by rotating the wheel.



F

Wheel spindle check

Place the wheel spindle on two v-prisms on a flat surface.



Utilising a dial gauge, check that **the eccentricity in the central part does not exceed 0.05 mm.**





Suspension and wheels

FRONT WHEEL ASSEMBLY



If the front tyre is substituted, before assembling the wheel it is necessary to balance the wheel following the indications in page 74.

If the bearings have been replaced, refit the bearings, the inner spacer and the brake discs on the wheel using the reverse procedure to the removal.

F

Position the wheel and insert the axle (1) from the right side of the vehicle.

N.B. Ensure that the bushing on the left fork foot is in place and in contact with the foot, with the fixing screws slightly tightened in order to prevent them from coming out while inserting the axle.

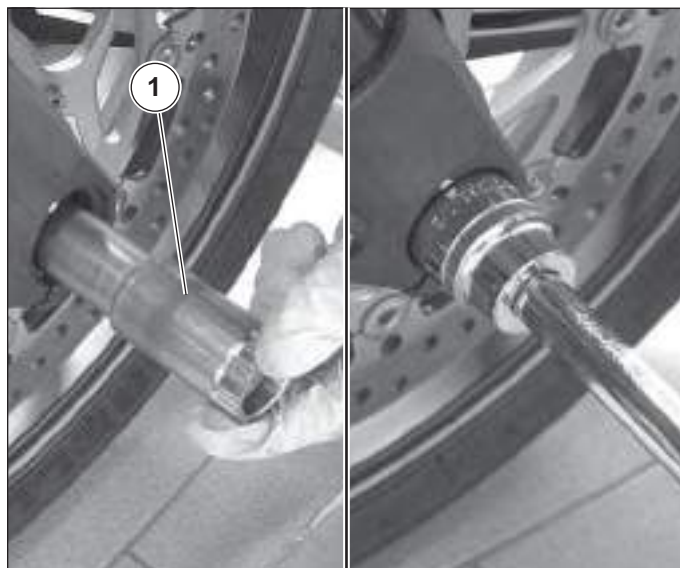
Tighten the axle to the prescribed torque.



Grease only the first threads and the cylindrical parts of the axle.



Torque pressure: 60 ÷ 65 Nm

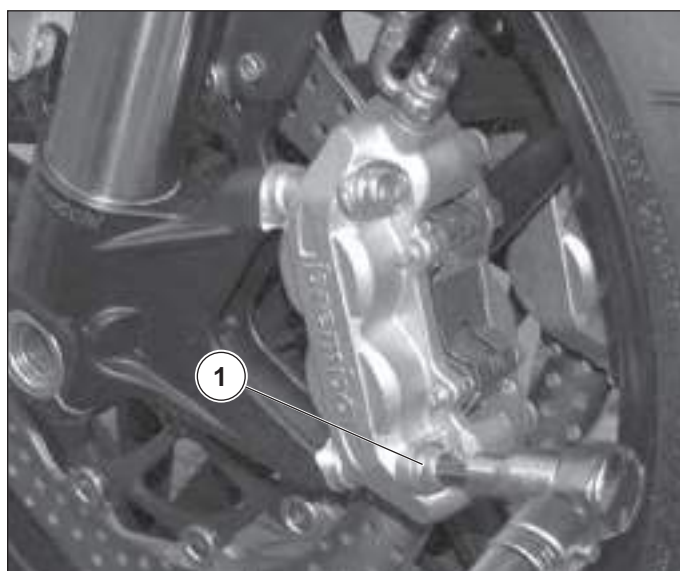


Fitting the front brake calipers

Fit the front brake calipers to the fork feet and place the fixing screws (1) without tightening.



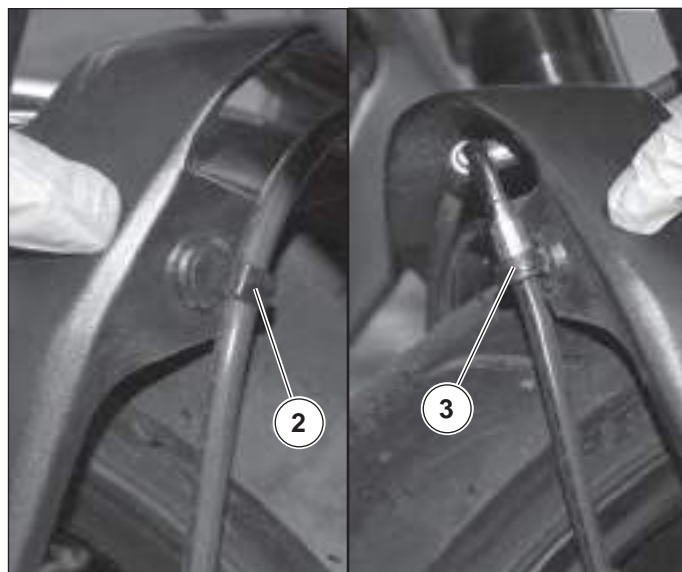
Grease only the first screw threads.





Suspension and wheels

Insert the brake lines in the clips (2) and (3) on the front mudguard.



Remove the front stand and rest the front wheel on the ground.

While pulling the front brake lever, push down on the front suspension two or three times to allow the right-hand fork rod to position itself properly.

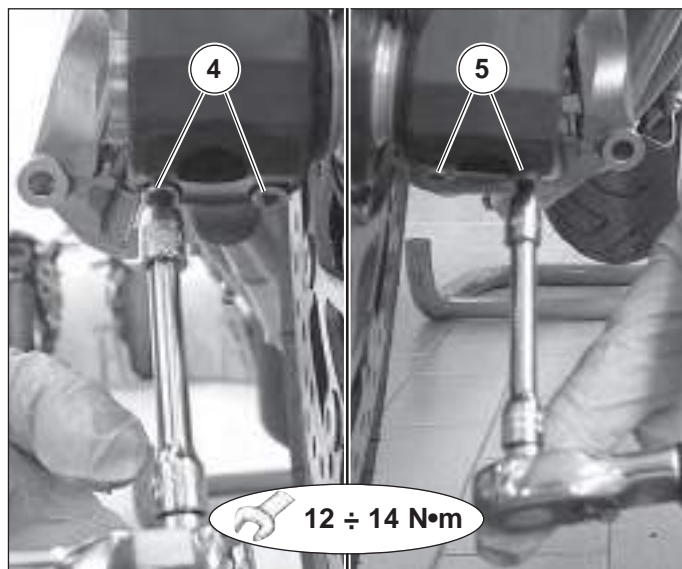


Tighten the right (4) and left (5) fork foot screws.

N.B. Tighten the screws to the specified torque in several steps and in an alternate pattern.



Torque pressure: 12 ÷ 14 Nm





Suspension and wheels

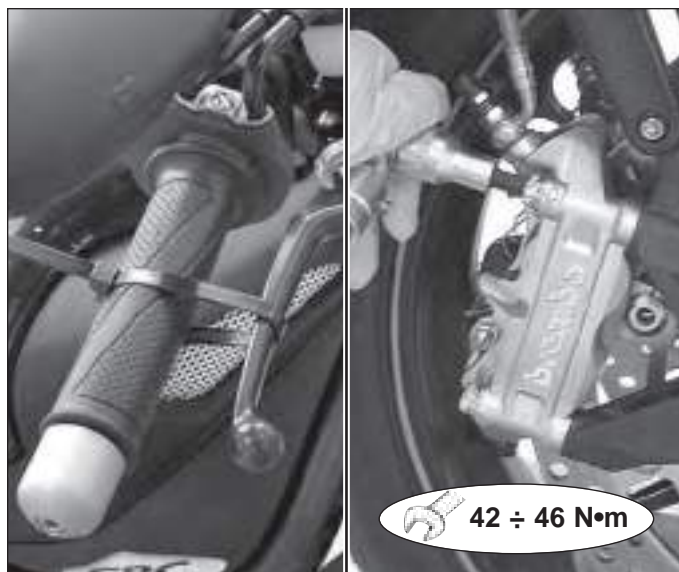
Keep the brake lever pulled back with a clamp as shown in the figure on the left.

Tighten the front brake caliper fixing screws to the prescribed torque.

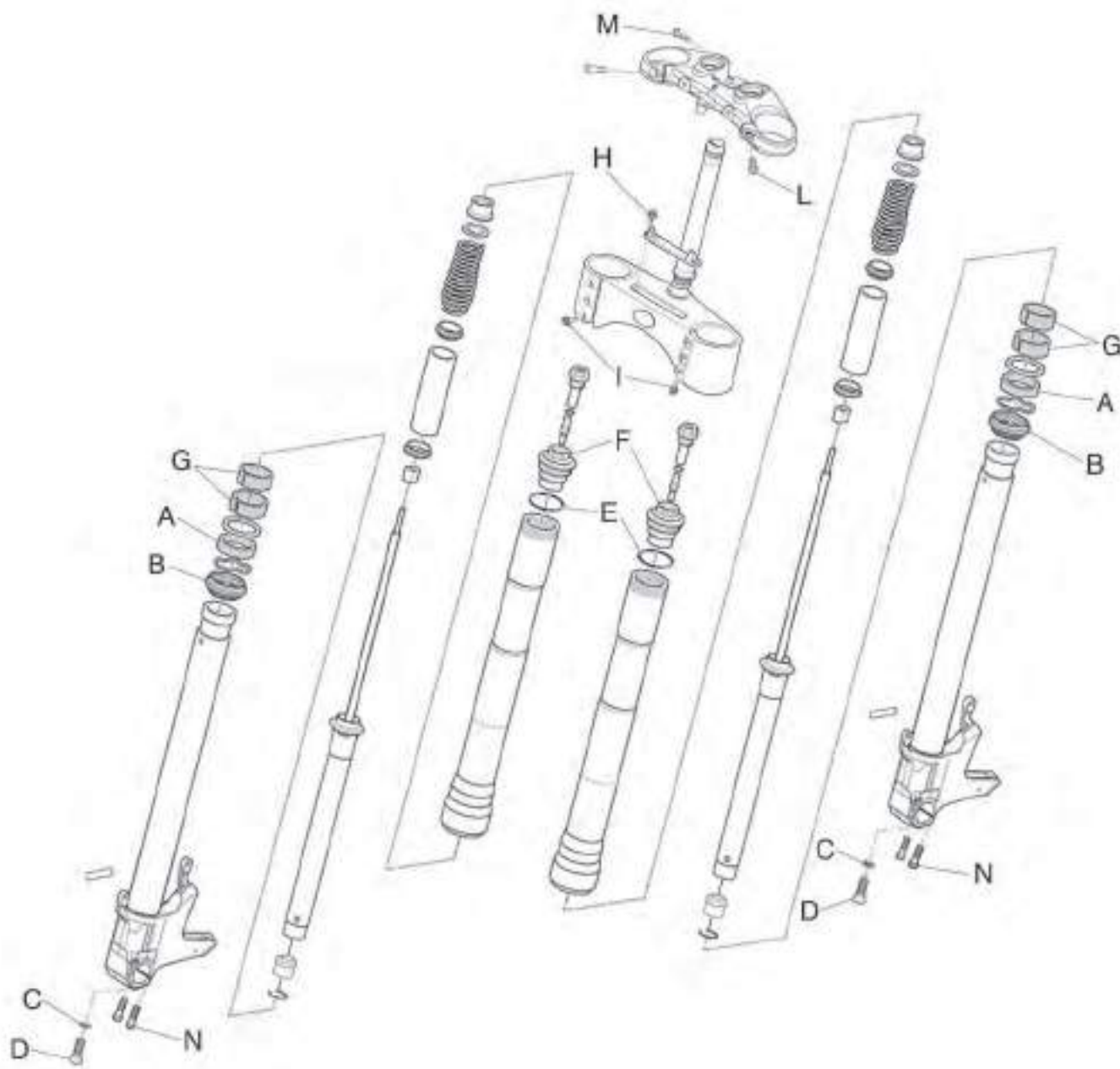


Torque pressure: $42 \div 46 \text{ Nm}$

After completing the fitting operations, disengage the front brake lever from the clamp.



FRONT FORK



		A	B	C	D	E	F	G	H	I	L	M	N
Torque pressure	N·m				40		20		8 ÷ 10	8 ÷ 9	16 ÷ 18	22 ÷ 24	12 ÷ 14
	Kg·m												
	ft·lb												
Operation													

Description	Brutale 990 R	Brutale 1090 RR
FRONT SUSPENSION		
Type	Hydraulic telescopic forks with the stems positioned upside down, equipped with a system of external adjustment for extension, compression and spring preload	
Ø stems (mm)	50	50
Telescopic movement	125	125

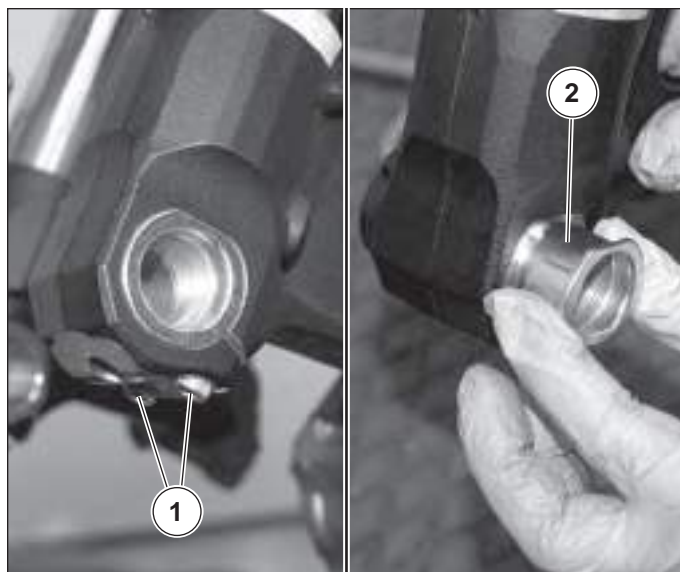


Suspension and wheels

FRONT FORK OVERHAUL

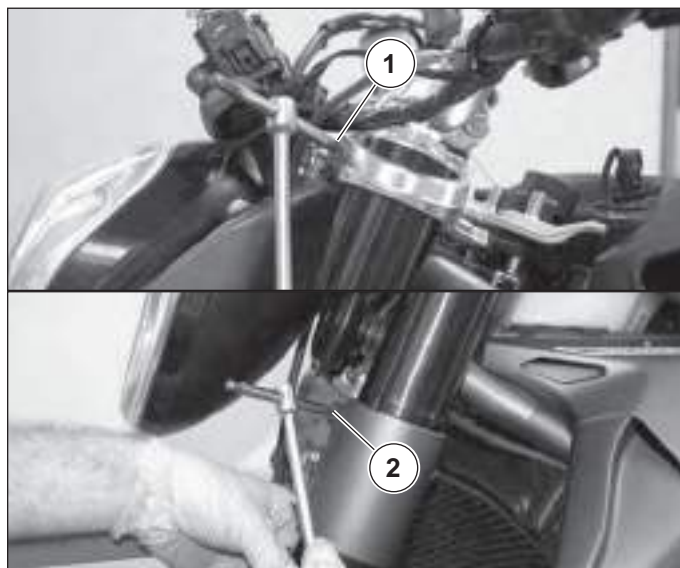
Remove the front wheel as described in the paragraph "Front wheel removal" of this Chapter.

Before continuing with the other operations, loosen the two screws (1) on the fork on the left side of the vehicle and remove the bushing (2).



Stem removal

Slacken the screw (1) of the steering head and the three screws (2) of the steering base. During this phase, support the stem. Slide out the stem, supporting it with both hands and operating with caution so as not to drop it. Proceed with the same operation for both stems.



Fork overhaul

Place the stem in a vice paying attention to protect the surfaces to not damage them.



Slacken the fork cap (1).



Completely unscrew the cap and lower the sleeve as shown in the figure. This operation must be carried out keeping the stem in a vertical position.



Unscrew the cap. Using the key, adjust the spring preload adjuster while blocking the rotation of the nut placed on the pump rod.



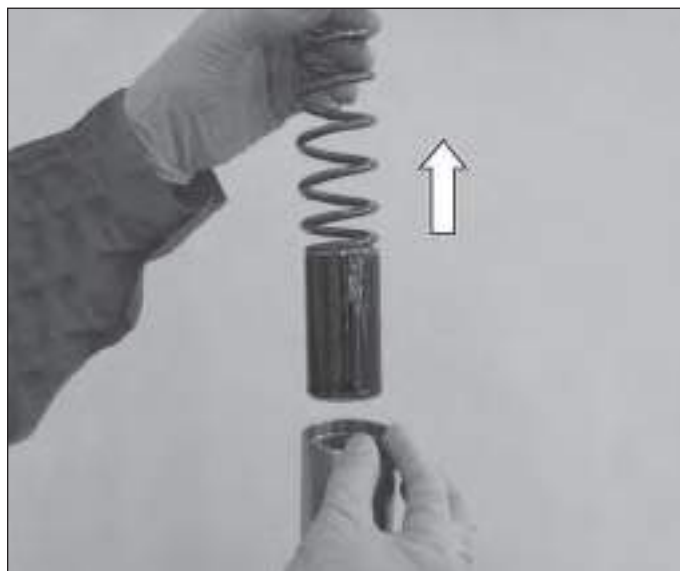


Suspension and wheels

Remove the spring-push spacer (1) and the relative spacer ring.



F Slide out the spring complete with the spacer.



Remove the internal rod for the extension adjustment.





Suspension and wheels

Turn the stem upside down and completely pour out the oil into a suitable container.



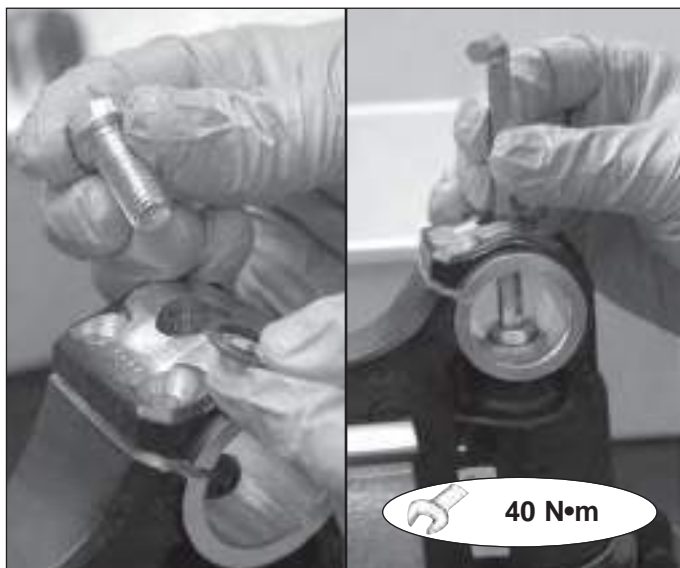
Recover the oil in an appropriate container. Do not dispose of the used oil in the environment.



Unscrew the lower central screw that fixes the pump unit. Collect the seal washer underneath.



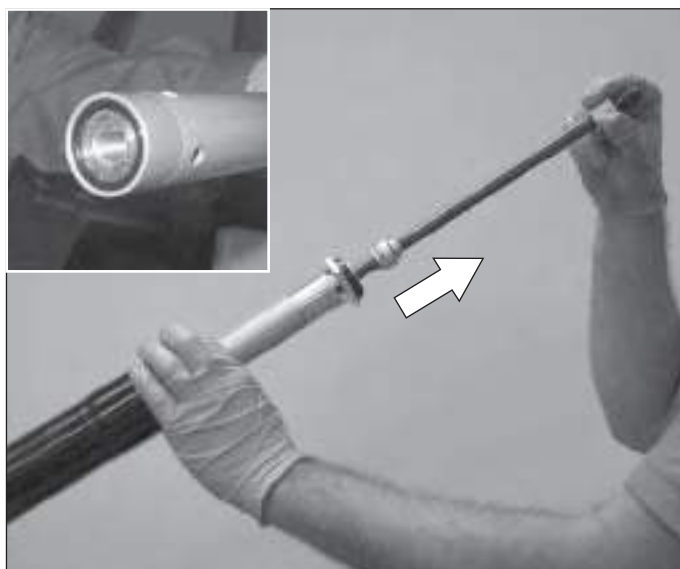
When reassembling tighten to 40 N•m.



Extract the pump unit.

Take care not to reverse the pumping elements on the fork while fitting it back in, and configure as follows:

- Brake-pressing pumping element: fit on left fork.
- Brake-releasing pumping element: fit on right fork.



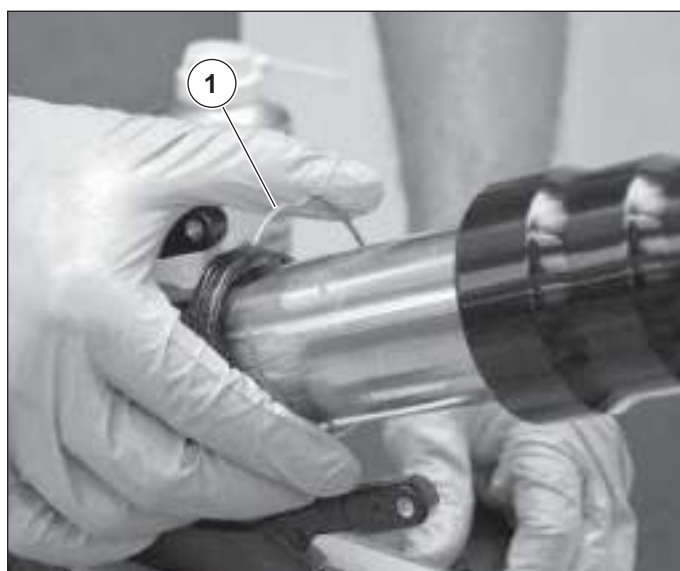


Suspension and wheels

Lower the anti-dust seal (1) taking care to not damage the seat on the sleeve.



F Remove the retaining ring (1) with a screwdriver, taking care to not scratch the stem.



Extract the sleeve from the stem by repeated blows at the end.



Fork assembly check

Check that the sleeve does not have marks on the external part that could have repercussions inside the assembly. Ensure that the inside is completely smooth, without any scratches.

If necessary, substitute with a new part.



Check for marks or scratches on all surfaces of the stem and check the condition of the chroming.

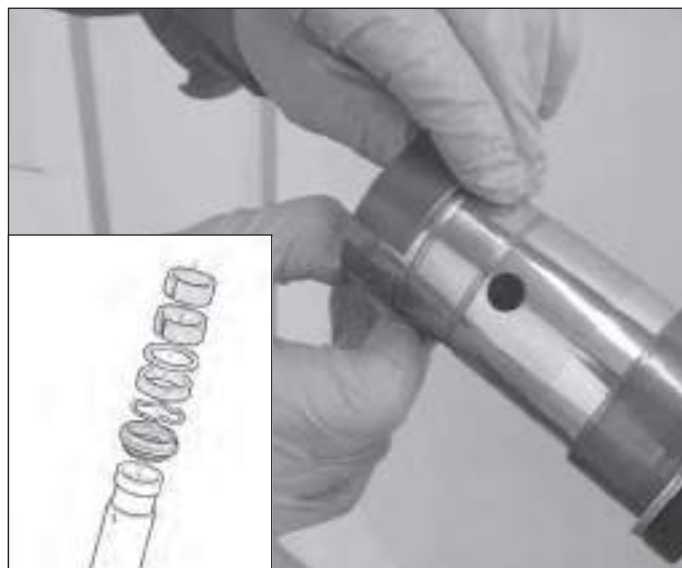


Check the spring length against the following minimum levels permitted:

260 mm.

Manually widen the upper bush and extract it.

Remove the lower bush, the washer, the oil seal and the anti-dust seal (see figure).



Oil seal and anti-dust seal assembly

After having carefully checked all components, substitute those damaged and/or deteriorated.

Grease the lips of the new anti-dust seal (1) and the new oil seal (2) with the appropriate grease.

Apply a "sleeve" of nylon to the upper part of the stem (see figure), to protect the oil seal (2) and the anti-dust seal (1) from any sharp edges on the lips of the stem during assembly.



Recommended grease: MOLYKOTE 55M





Suspension and wheels

Visually check for scratches and marks on the pump rod and check that it slides smoothly inside the pump unit without chamfering.
Substitute if necessary.

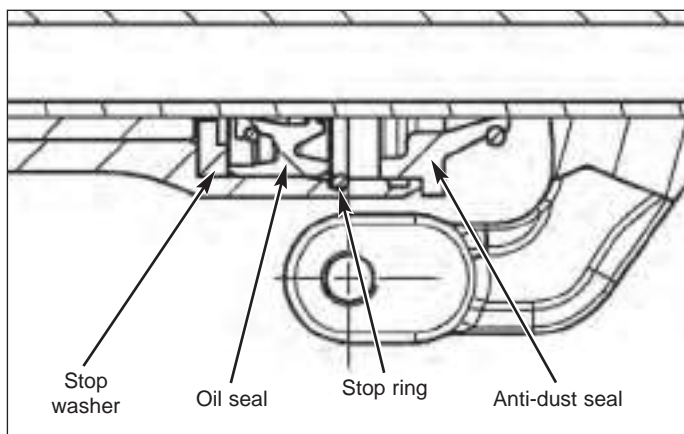


Assemble the stem into the sleeve, placing the ferrules into their seats with the respective washers. Utilise the special tool.

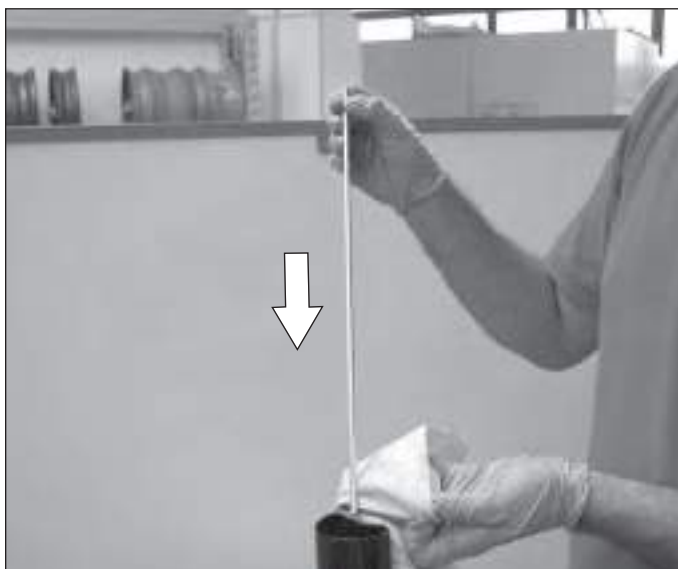
Using the same technique, assemble the oil seal and its stop ring and then manually assemble the anti-dust seal.



Special tool No. 8000A1039



Insert the internal rod.
Insert the spring spacer.





Suspension and wheels

Maintain the sleeve in a vertical position. Introduce the following amount of oil:

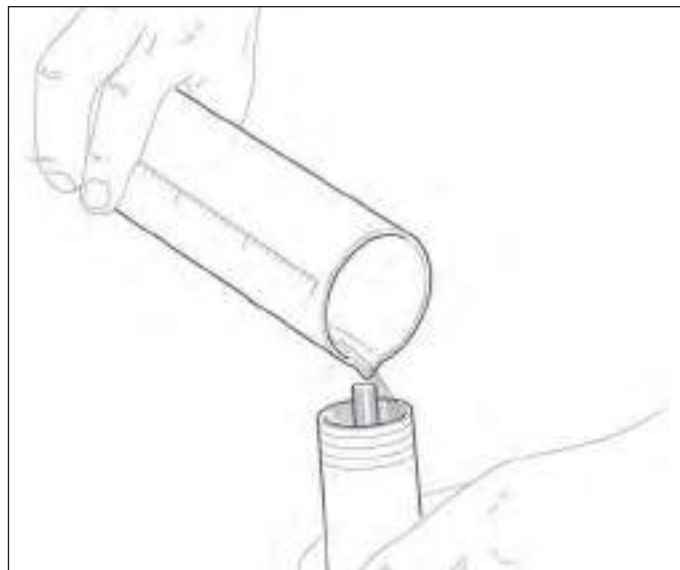
- **BRUTALE 990 R:** 685 cc
- **BRUTALE 1090 RR:** 700 cc

Press the pump rod up and down until a perfect fluidity of movement is obtained.



Recommended oil:

- **BRUTALE 990 R - 1090 RR:** SAE 7,5



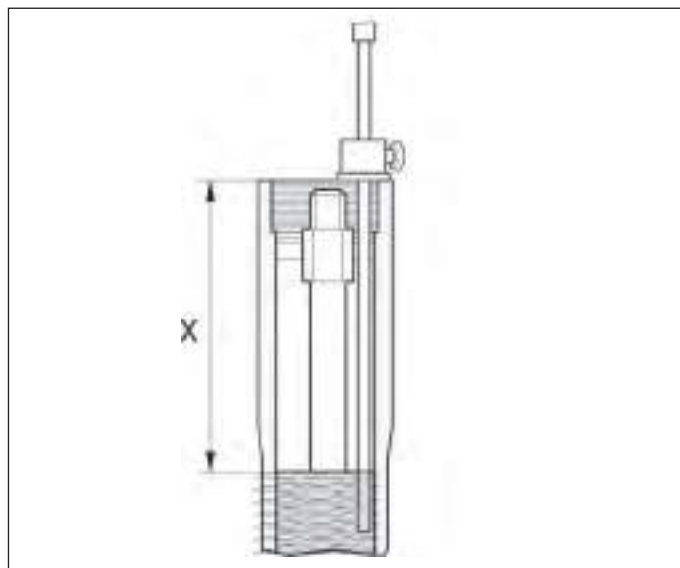
Check that the oil level is at an "X" value from the upper edge of the sleeve, including the upper edge as well.

- **BRUTALE 990 R:** X = 75 mm
- **BRUTALE 1090 RR:** X = 80 mm

N.B.: Measurement taken with the inside rod and the spacer in place.



It is important to respect the quotes indicated. Ensure that the inside rod has reached the limit stop.

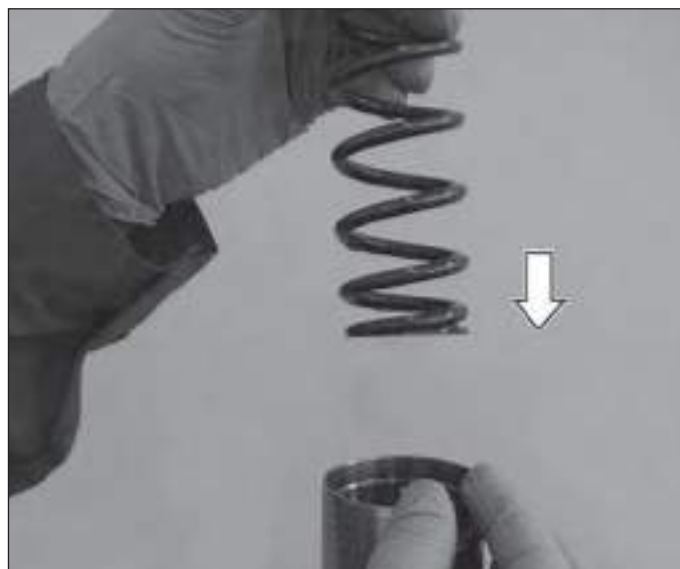


Manually screw in the locknut until it reaches the end of the thread.



The locknut has a special assembly direction. Pay attention to keep the two support bases facing upwards (see the figure below).

Introduce the spring.





Suspension and wheels

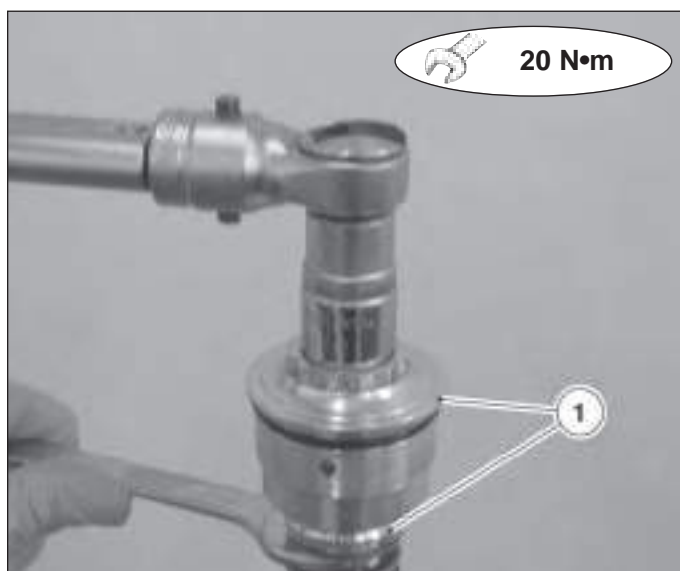
Insert the key on the pump nut (1) slightly pressing down the spring.



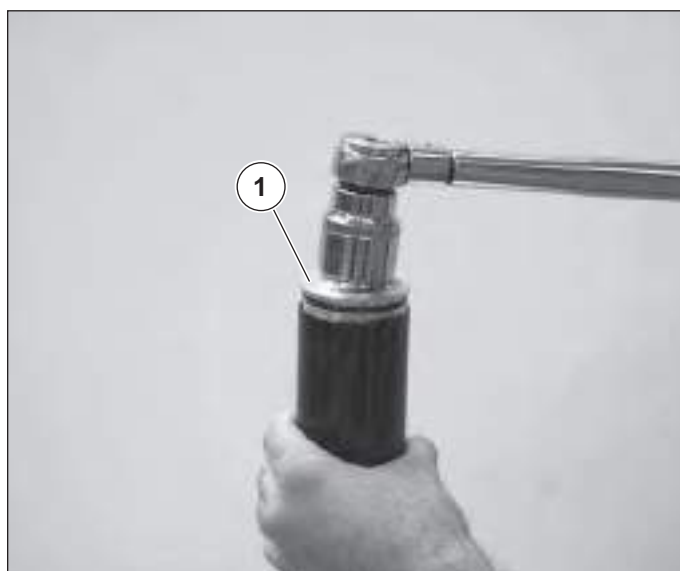
F Place the spring-push spacer (1) and the relative washer. Reassemble the complete cap with a new O-ring. Tighten the cap to the prescribed torque pressure.



Stem cap torque pressure: 20 N•m



Insert and tighten the complete lid (1) on the fork sheath.



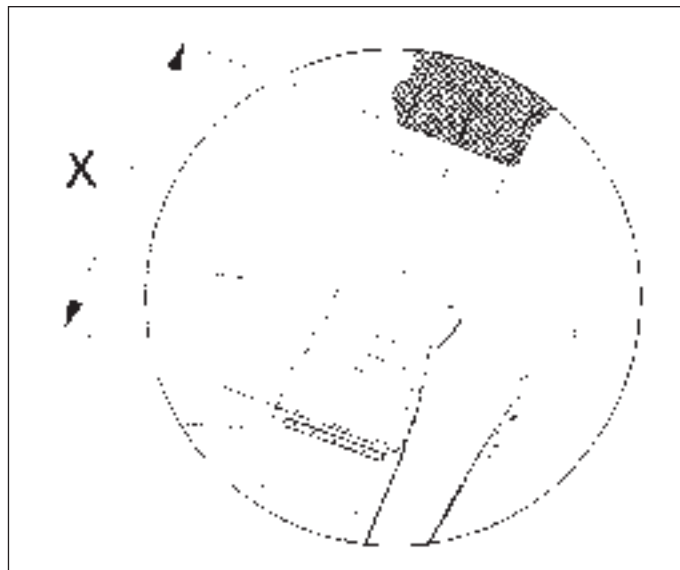


Suspension and wheels

Fork stem assembly

Assemble the left stem in its seat. To position the stem correctly, refer to the diagram in the figure on the side. Pay attention to respect the “X” assembly dimension, which is reported below:

- BRUTALE 990 R: X = 193 mm
- BRUTALE 1090 RR: X = 193 mm

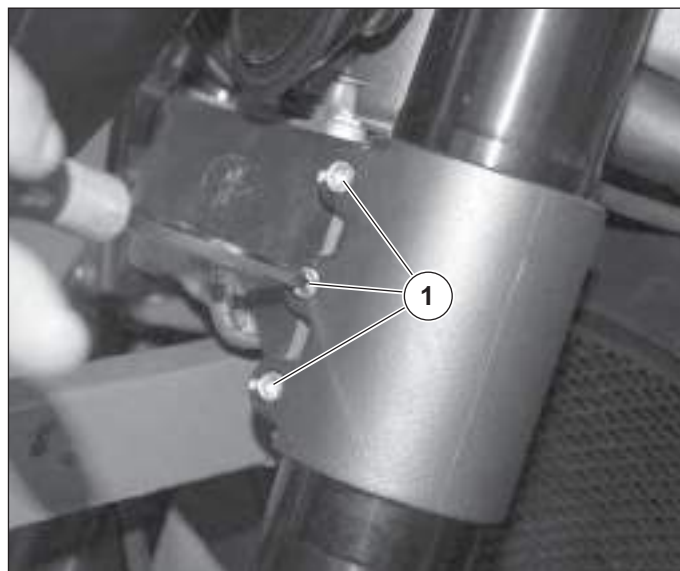


Screw in and tighten the three screws (1) at the base of the steering.



Carry out this assembly correctly. A casual or inexact assembly could compromise the stability and steering of the motorcycle.

Assemble the right stem, in the same way as described for the left stem.

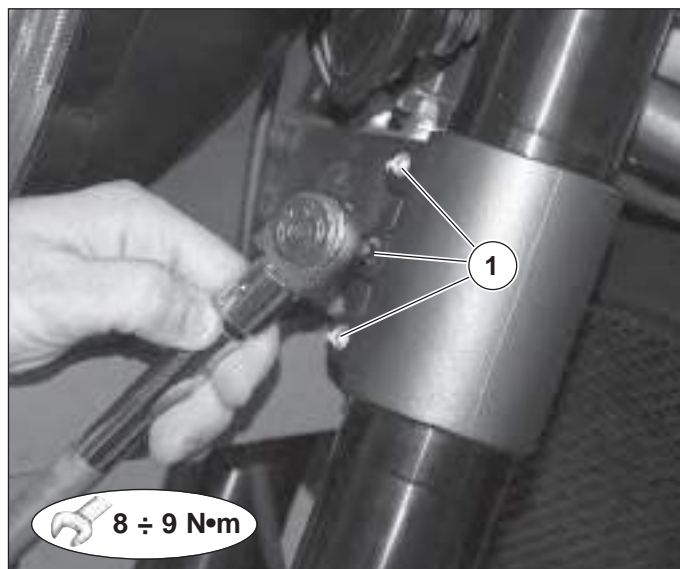


Tighten the three screws (1) at the base of the steering; perform the operation several times until the prescribed torque pressure is reached.

This operation must be carried for both stems.



Torque pressure of the screws at the base of the steering: 8 ÷ 9 N•m



8 ÷ 9 N•m




Suspension and wheels

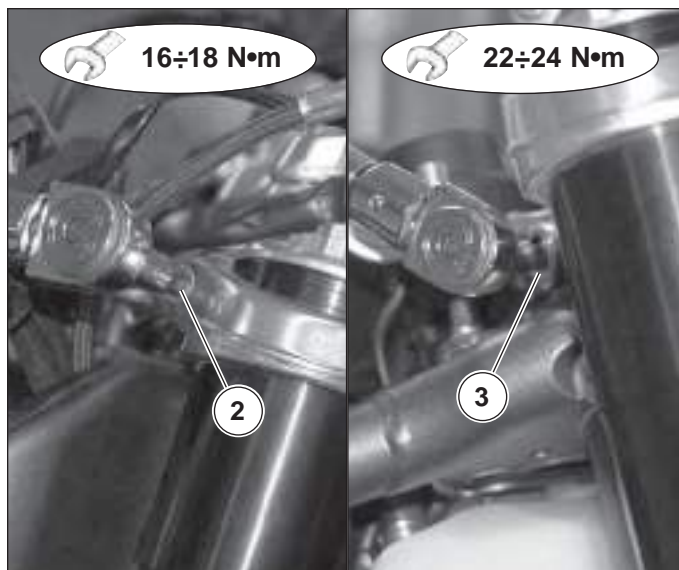
Slacken the central screw (3) of the steering head. Check that the steering stem ring nut is perfectly set against the steering head. Tighten the two screws (2) of the steering head to the prescribed torque pressure and successively tighten the central screw (3).

 **Torque pressure of the external screws (2):**
 $16 \div 18 \text{ N}\cdot\text{m}$

 **Torque pressure central screw (3):**
 $22 \div 24 \text{ N}\cdot\text{m}$

 **This check is necessary for the correct positioning of the stems even if the steering head has not been removed.**

Set up the front wheel by following the procedure shown on page 10 of this chapter.

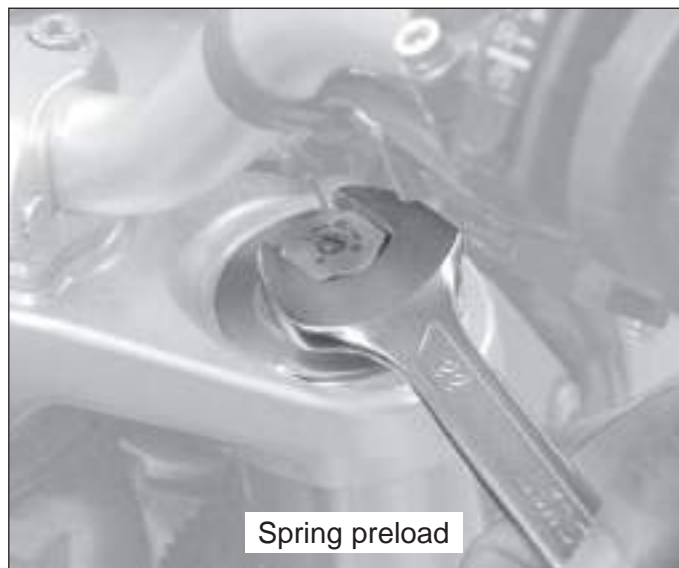


Front suspension adjustment

After having correctly reassembled the entire fork assembly, it is necessary to re-establish the adjustments shown in the table to guarantee the best set-up of the motorcycle.

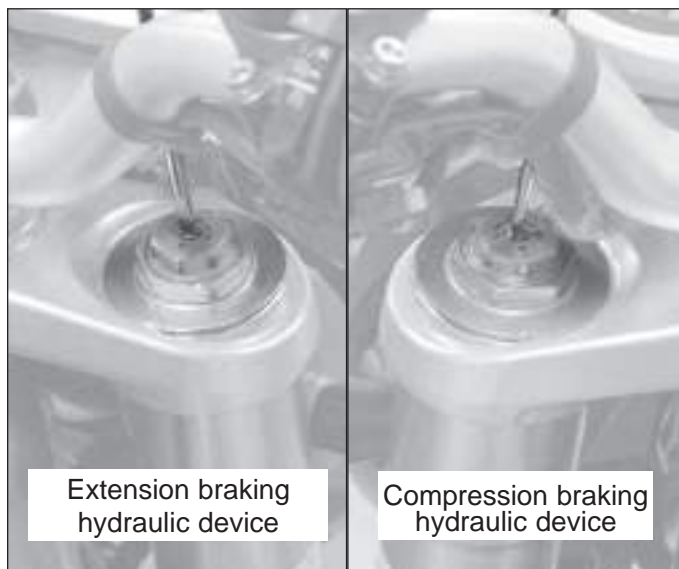
N.B. The adjustments reported in the table must be carried out from initial reference positions:

- **Spring preload:** Turn counterclockwise to end stroke.
- **Rebound damping / Compression damping (Brutale 990 R):** Turn clockwise to end stroke.
- **Rebound damping / Compression damping (Brutale 1090 RR):** Turn clockwise to end stroke, then counterclockwise until you hear the first click.

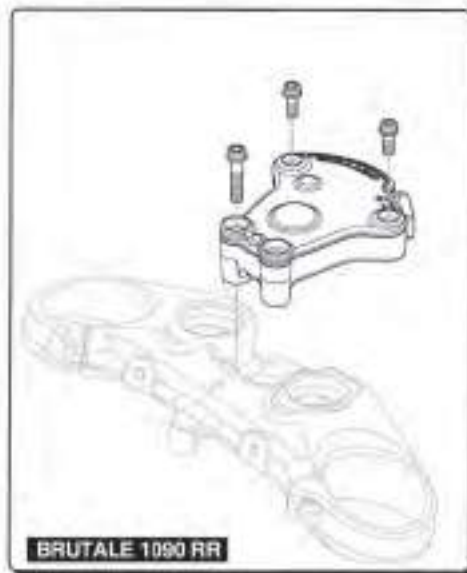
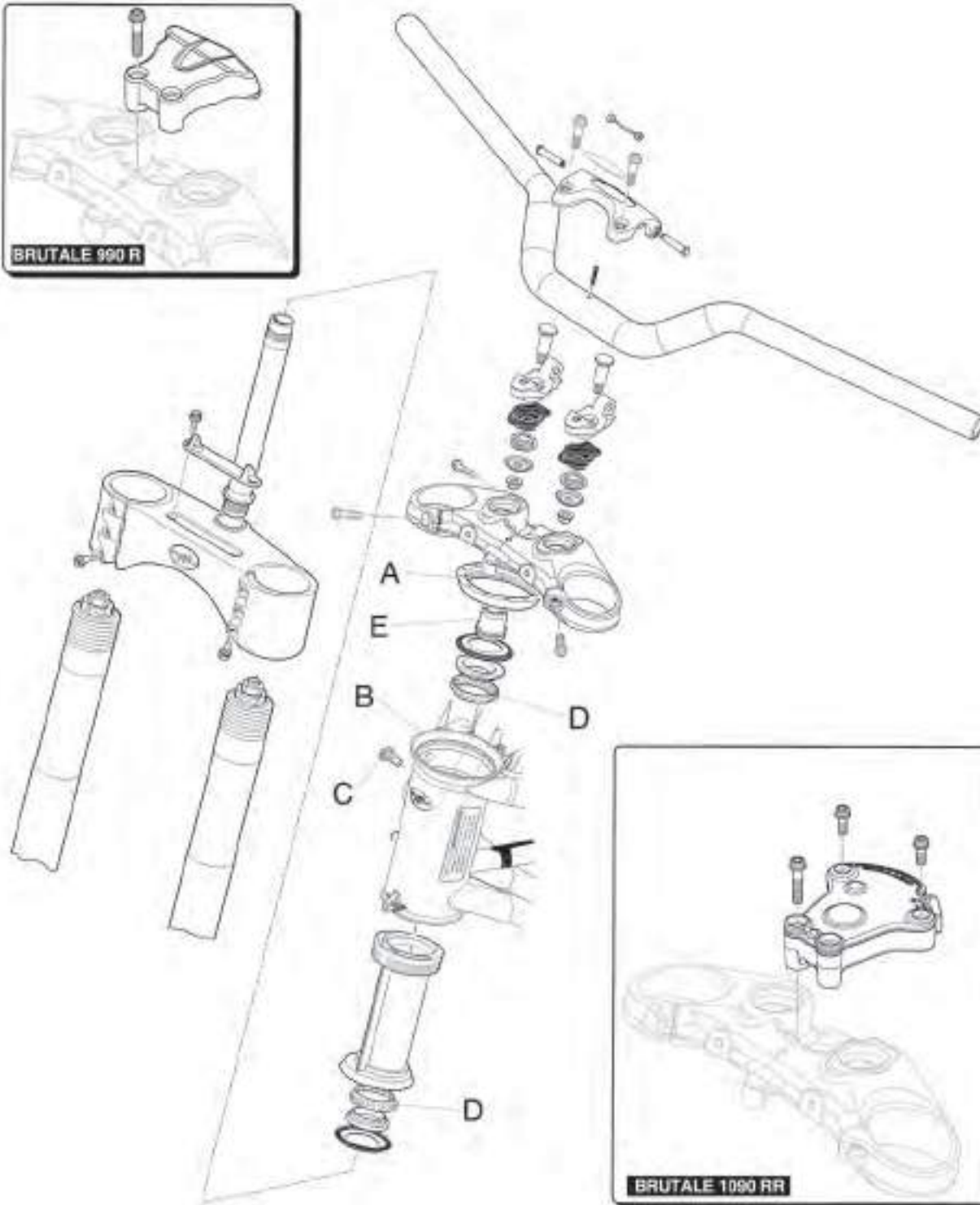


Brutale 990 R	Type of set-up	
	On road	On race track
Spring preload	1 turn	3 turns
Rebound damping	2 turns	1,5 turns
Compression damping	3 turns	2 turns

Brutale 1090 RR	Type of set-up	
	On road	On race track
Spring preload	2 turns	3 turns
Rebound damping	16 clicks	12 clicks
Compression damping	16 clicks	12 clicks



STEERING ASSEMBLY



		A	B	C	D	E			
Torque pressu- re	N·m	120 ÷ 125		18 ÷ 20		In contact + 10°			
	Kg·m								
	ft·lb								
Operation									



Suspension and wheels

STEERING ASSEMBLY OVERHAUL

To operate on the steering assembly, it is necessary to remove the fork stems as described in this chapter, in the paragraph “Front fork overhaul”.

Then remove the components according to the following order:

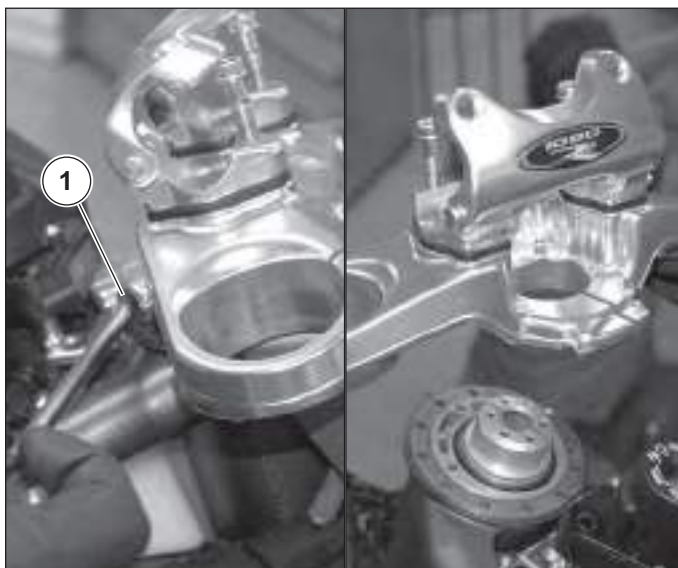
- front headlight;
- instrument panel;
- handlebars;
- headlight support;
- tank support bracket;

as described in chapter C “Bodywork”.



Steering head removal

Slacken the fixing screw (1) of the steering head and remove it from the steering pin.



Steering base removal

Utilising the special tool, slacken the screw ring of the steering pin.

Support the motorcycle sufficiently enough so that the front stand can be removed. Ensure that the brake calipers are securely placed.



Special tool No. 800091645



Remove the screw ring previously slackened and remove the steering base complete with the pin. Remove the anti-dust seal, the internal bearing ring and the ball bearing ring.



If it is necessary to replace the steering base complete with pin, you must remove the parts of the lower steering bearing according to the procedure described as follows.

Remove the internal bearing ring and the ball bearing ring from the pin of the steering base previously removed from the bike.

Place the steering base on the corresponding support plate (special tool).

 **Special tool No. 800097888**

Insert the steering pin bearing extractor (special tool) on the steering base pin.

 **Special tool No. 800097889**



Couple the two half-shells on the extractor as described in the figure.

Insert the extractor ring on the half-shells.

 **Special tool No. 800097889**



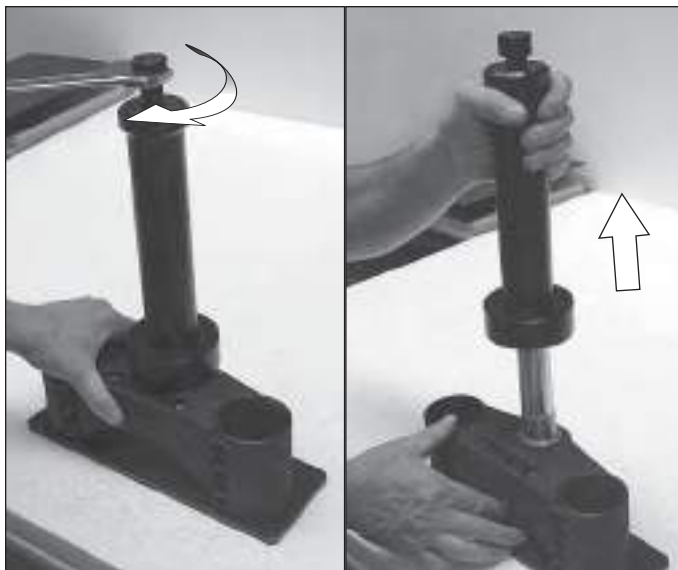


Suspension and wheels

Rotate the extractor nut by using a **27 mm** spanner key until the anti-dust seal detaches from the steering pin.

Remove the complete tool (code no. 800097889) from the steering pin and recover the anti-dust seal.

The parts removed will have to be reused in the following assembly operations of the new steering base.



F Eccentric steering head removal

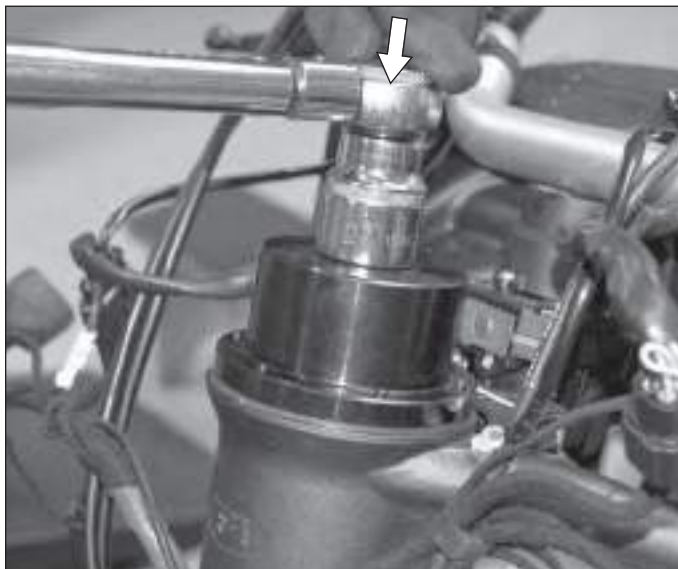
With the special tool remove the fixing screw ring of the eccentric steering head.



Special tool No. 800092857



During this operation press the tool with the palm of the hand along the axis of rotation and at the same time support the motorcycle



Disassembly of the frame head steering sleeve

Remove the adjustment screw of the frame head steering sleeve, sustaining the frame head steering sleeve at the lower part.





Suspension and wheels

Reassembly of the frame head steering sleeve

Clean the parts accurately so that a visual check can be made of the tube and the seats.

There should not be marks or lines in the bearing seats. If so, substitute the parts as necessary.

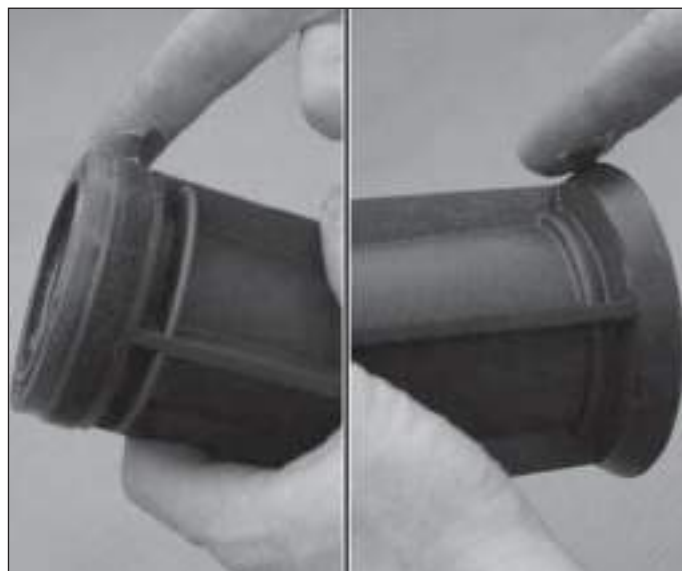


Lightly grease the contact area of the frame head steering sleeve (see figure) and the threaded part with **Agip Grease 30**.

Accurately clean the bearing seats on the frame head steering sleeve.



Recommended grease: Agip Grease 30

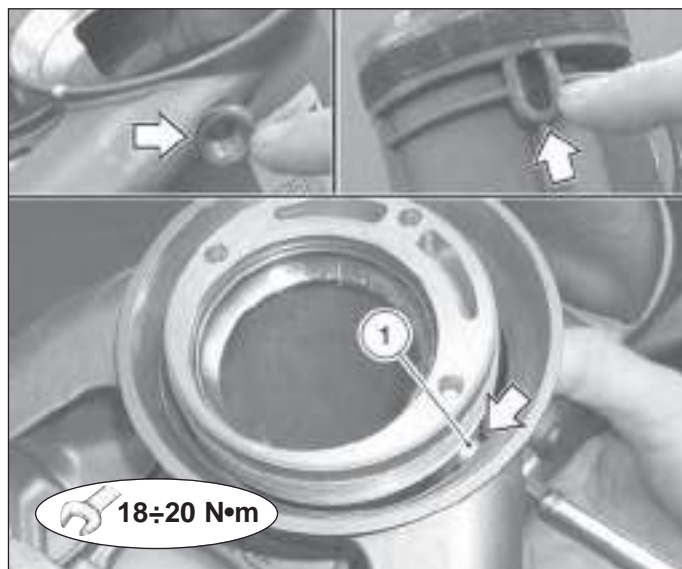


Reassemble the frame head steering sleeve aligning the slot on the frame head steering sleeve with the threaded hole on the frame head (see figure).

Align the slot to the hole and tighten the screw (1) to the prescribed tightening torque.



Tightening torque: 18 ÷ 20 N•m





Suspension and wheels

Screw ring assembly

After having accurately cleaned the screw ring and the seat of the steering head on the frame, apply the prescribed grease both on the threading and on the conical part of the screw ring, then screw it manually onto the relative seat.



Recommended grease: Agip Grease 30



F

Utilising the special tool, tighten the screw ring (1) to the prescribed torque pressure.

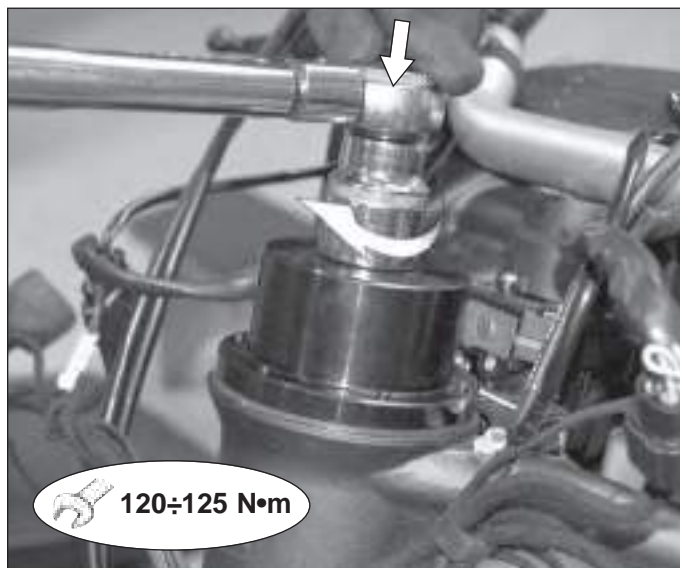


Special tool No. 800092857



Torque pressure of the frame head steering sleeve screw ring:
120 ÷ 125 N•m

During this tightening operation, press down with force along the axis of rotation of the tool (see figure).



Steering base assembly

If it is necessary to replace the steering base complete with pin, before assembling it on the bike you must carry out the following preliminary operations.

Accurately clean all previously removed parts and check the general condition.

Before reassembly, grease the internal ring of the bearing and the ball bearing ring on the steering pin with the prescribed grease.



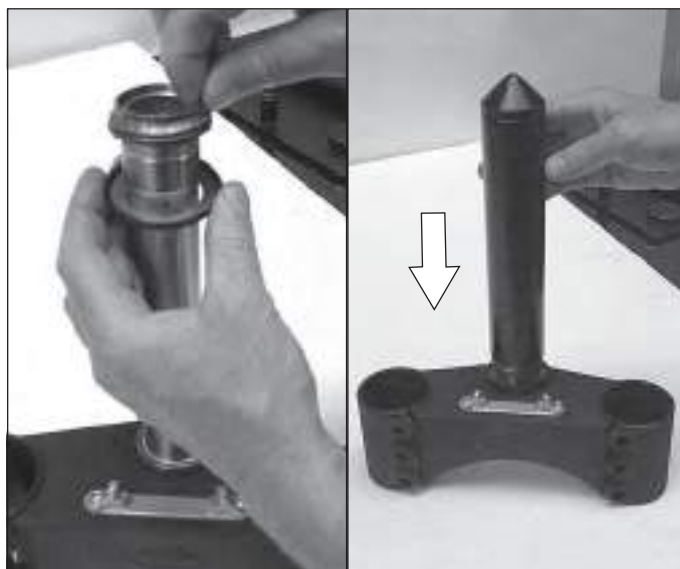
Recommended grease: Agip Grease 30

Insert the anti-dust seal, the internal bearing ring and the ball bearing ring on the new steering base.

Insert the bearing assembly tool (special tool) on the steering pin.



Special tool No. 800097890





Suspension and wheels

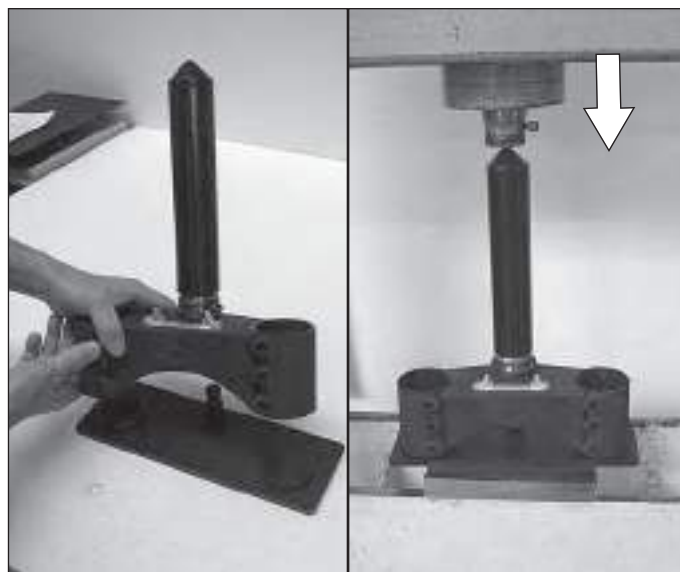
Place the steering base on the corresponding support plate (special tool).



Special tool No. 800097888

By using a press, squeeze down the lower steering bearing components on the steering pin.

Now it is possible to remove the bearing assembly tools and proceed with the assembling of the steering base on the bike.



Assemble the steering base to the eccentric steering head.

Assemble the upper ball bearing ring already greased.

Assemble the internal ring of the bearing, the anti-dust seal and the screw ring of the steering pin.



Steering pin tightening

Screw down, without tightening, the screw ring of the steering pin.

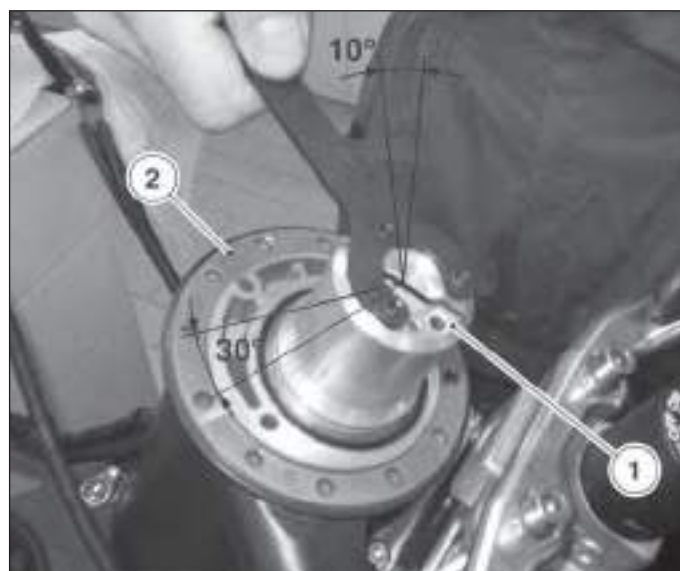
This operation must be done manually.

Ensure that the steering base is at the end of stroke, completely steered to the right.

Utilising the special tool, tighten the screw ring (1) by rotating it 10° (see figure), calculable as **one-third** distance between the two holes of the steering head screw ring (2).



Special tool N. 800091645





Suspension and wheels

Steering head assembly

Position the steering head in its seat.
Reposition the fork stems as described previously in this chapter.
Tighten the three screws of the steering head as described previously.

N.B. Check the exact position of the fork stems.



F

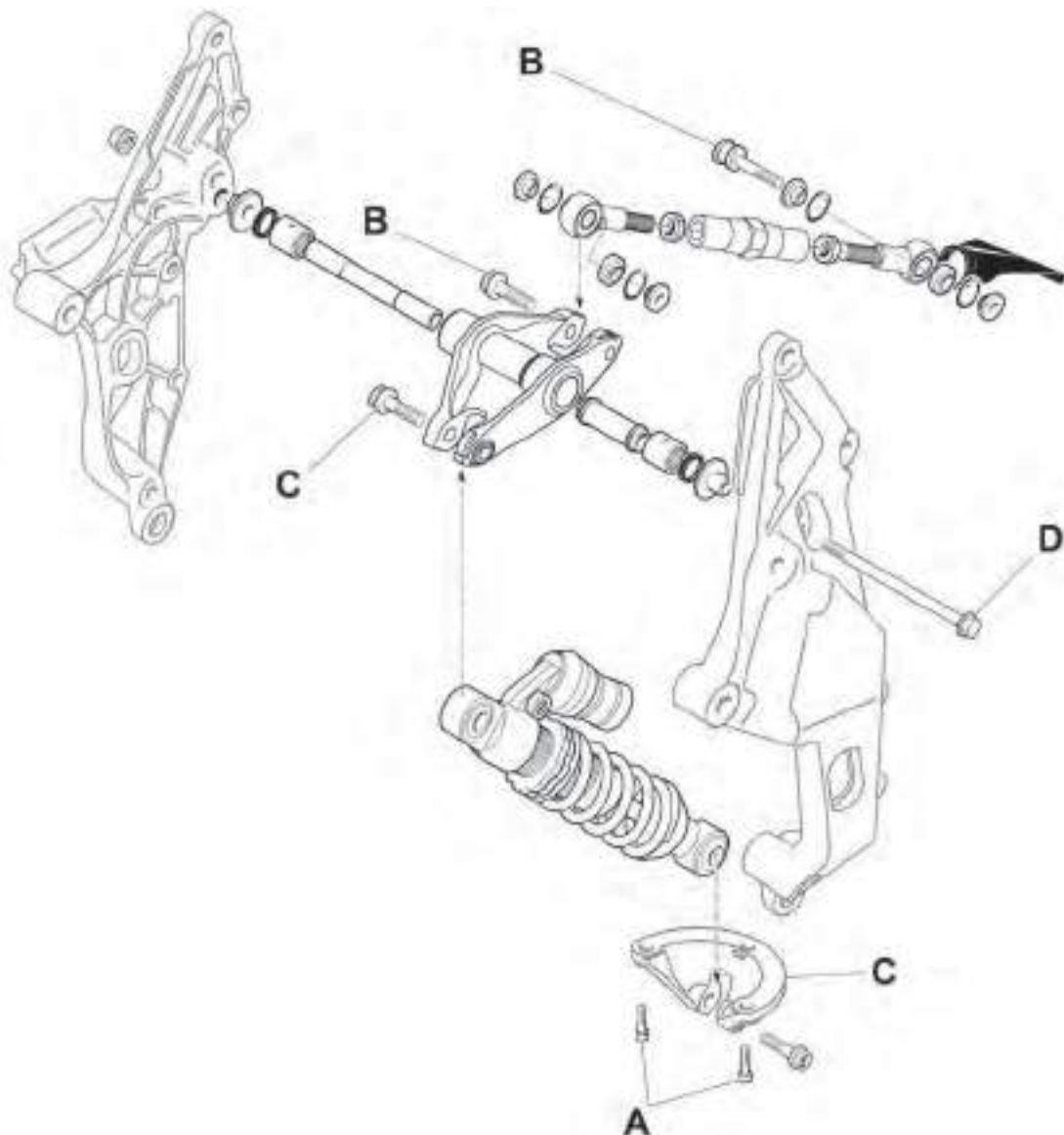
Adjusting the steering vibration damper (Brutale 1090 RR)





For a standard adjustment, turn the knob anticlockwise down to the end of the travel; in this position the vibration damper opposes the least resistance to the steering system.
The driver may gradually increase the braking effect of the steering vibration damper by turning the knob clockwise to suit the driver's style.



Steering vibration damper	On road	On race track
	0 clicks	8 clicks

REAR SUSPENSION



		A	B	C	D	E	F	G	H	I	L
Torque pressure	N·m	40 ÷ 44	40 ÷ 44	40 ÷ 44	45 ÷ 50						
	Kg·m										
	ft·lb										
Operation		 243									

Description	BRUTALE 990 R	BRUTALE 1090 RR
Type	Progressive, single shock absorber with rebound damping and spring preload adjustment	Progressive, single shock absorber with adjustable rebound and compression (high/low speed) damping and spring preload
Swingarm	Aluminium alloy	Aluminium alloy
Wheel travel (mm)	120	120

During the disassembly and check of the rear suspension assembly, it is advisable to disassemble the fuel tank, as described in chapter C "Bodywork".

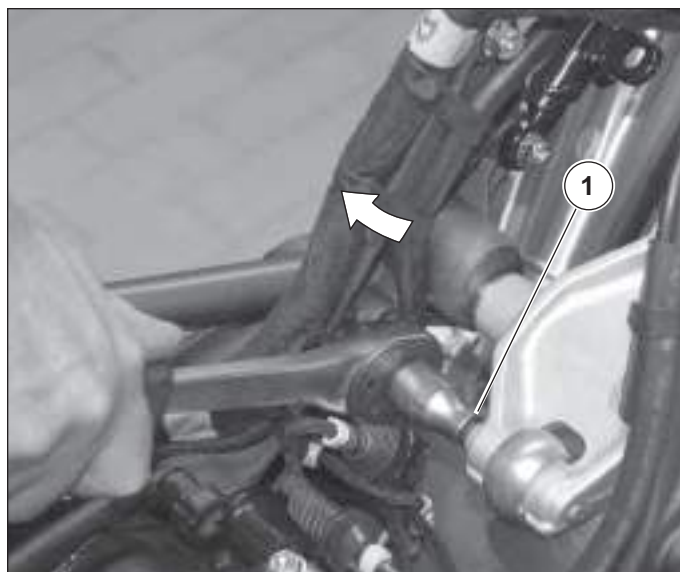
Rear shock absorber disassembly

Remove the fuel tank as described in chapter C "Bodywork".

Lift up the rear part of the motorcycle (utilising a lift and safety straps) high enough to take the load off the shock absorber.

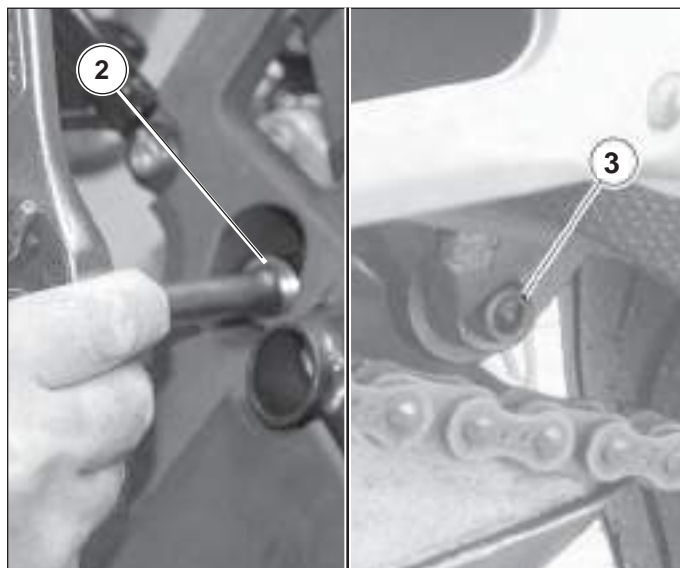
Move the electric cabling towards the upper part of the right-hand plate of the frame, as illustrated.

Slacken the upper screw of the shock absorber (1).



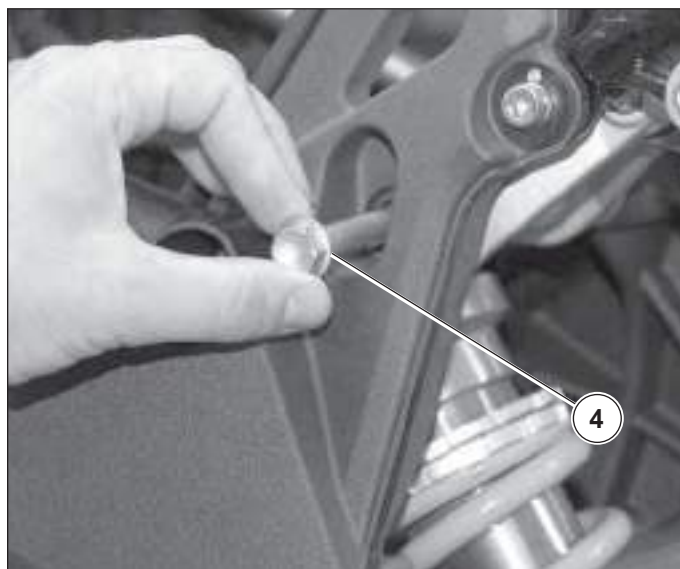
F Remove the central nut (2) of the rear wheel compensator assembly.

Slacken the lower screw of the shock absorber (3).



Raise up or lower the motorcycle utilising the lift so that the previously slackened screws are freed.

Remove the pin (4) of the compensator assembly, remove the upper screw of the shock absorber.





Suspension and wheels

Slacken the central fixing pin of the engine (5).

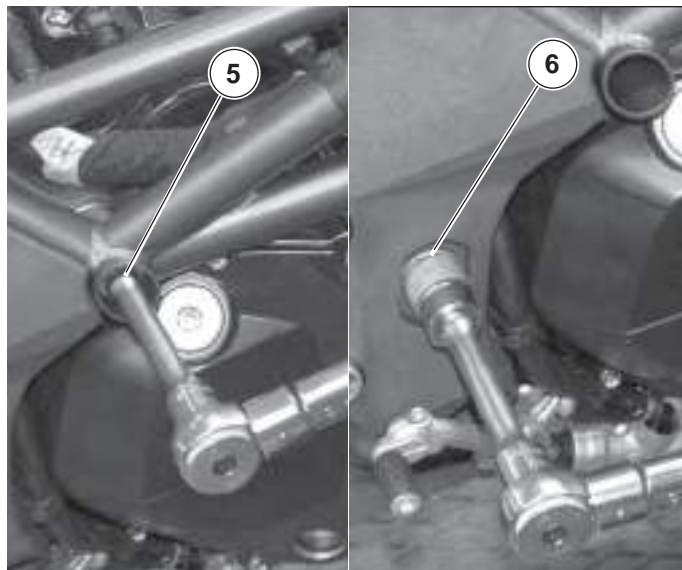
Slacken the rear fork pin (6).

These operations are necessary to free the compensator assembly.

Lift up the compensator assembly.

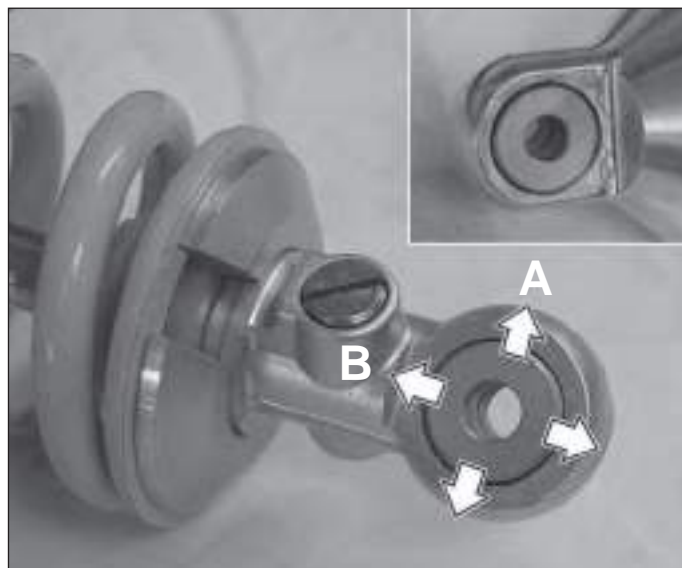
Remove the upper screw of the shock absorber that was previously slackened.

Extract the complete rear shock absorber upwards.



Rear shock absorber test

Check that the lower and upper bolt holes do not have axial (A) and radial (B) play.



Check the length of the rear shock absorber spring.

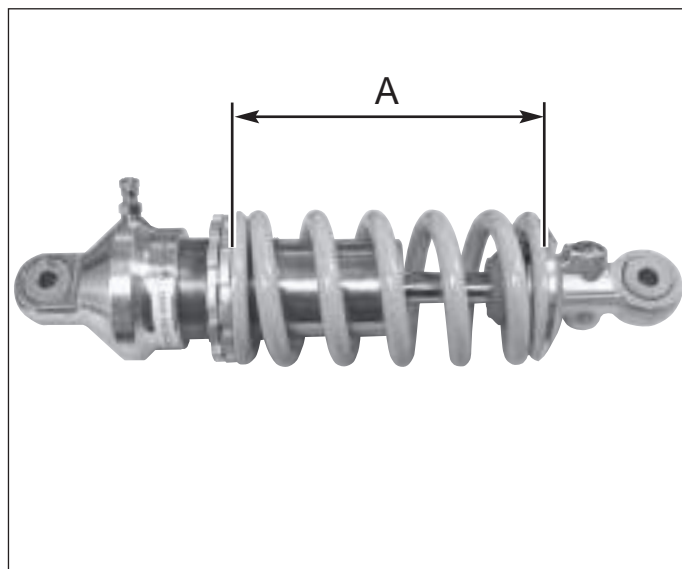
Standard spring adjustment (A):

- BRUTALE 990 R : A = 161 mm
- BRUTALE 1090 RR : A = 160 mm

Check the functioning of the adjusters.



The shock absorber contains high-pressure gas. Do not touch the valve of the shock absorber tank. Do not try to disassemble the shock absorber.





Suspension and wheels

Rear suspension adjustment

N.B. The following operations can be also carried out with the rear shock absorber assembled to the motorcycle.

Rebound damper (rear suspension)

The adjustment can be performed by operating on the screw placed on the lower side of the shock absorber, and it is obtained from the standard position.

This position is found by fully rotating the screw clockwise and then counterclockwise until you hear the first click; from this position, turn the screw counterclockwise until you reach the standard position (see table at page 37).

Rotate clockwise to increase the damping action or counterclockwise to decrease it.



F High speed compression damper (rear suspension Brutale 1090 RR)

The adjustment can be performed by operating on the ring nut placed on the upper side of the shock absorber, and it is obtained from the standard position.

This position is found by fully rotating the nut counterclockwise and then clockwise until you hear the first click; from this position, turn the nut clockwise until you reach the standard position (see table at page 37).

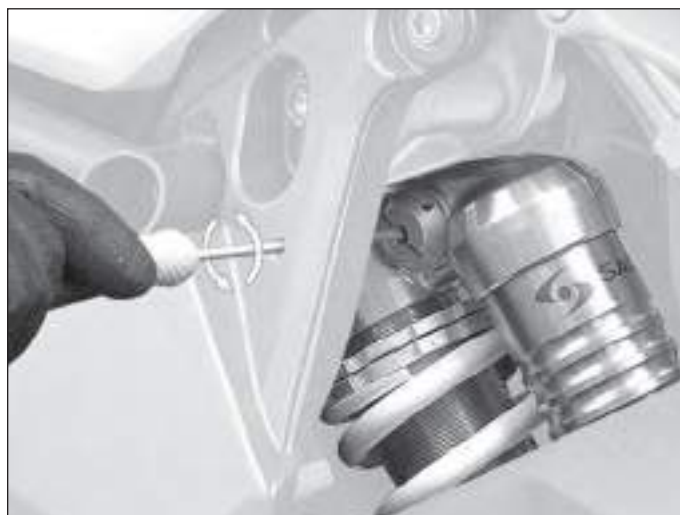
Rotate clockwise to increase the damping action or counterclockwise to decrease it.



Low speed compression damper (rear suspension Brutale 1090 RR)

The adjustment can be performed by operating on the screw placed on the upper side of the shock absorber, and it is obtained from the standard position.

This position is found by fully rotating the screw clockwise and then counterclockwise until you hear the first click; from this position, turn the screw counterclockwise until you reach the standard position (see table at page 37). Rotate clockwise to increase the damping action or counterclockwise to decrease it.





Suspension and wheels

BRUTALE 990 R	Type of set-up (<i>only rider</i>)	
	<i>On road</i>	<i>On race track</i>
Rebound damping	16 clicks	10 clicks
BRUTALE 990 R	Type of set-up (<i>with passenger</i>)	
	<i>On road</i>	<i>On race track</i>
Rebound damping	16 clicks	-

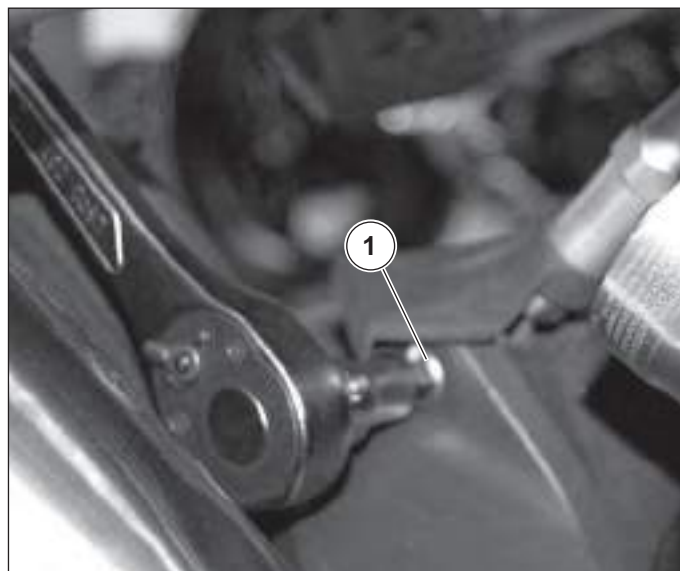
BRUTALE 1090 RR	Type of set-up (<i>only rider</i>)	
	<i>On road</i>	<i>On race track</i>
Rebound damping	24 clicks	14 clicks
Compression damping (high speed)	0 click	4 clicks
Compression damping (low speed)	22 clicks	8 clicks

BRUTALE 1090 RR	Type of set-up (<i>with passenger</i>)
	<i>On road</i>
Rebound damping	24 clicks
Compression damping (high speed)	0 click
Compression damping (low speed)	18 clicks

N.B. For use of the vehicle with a passenger, we recommend increasing the front and rear tyre pressure to 2.5 bar.

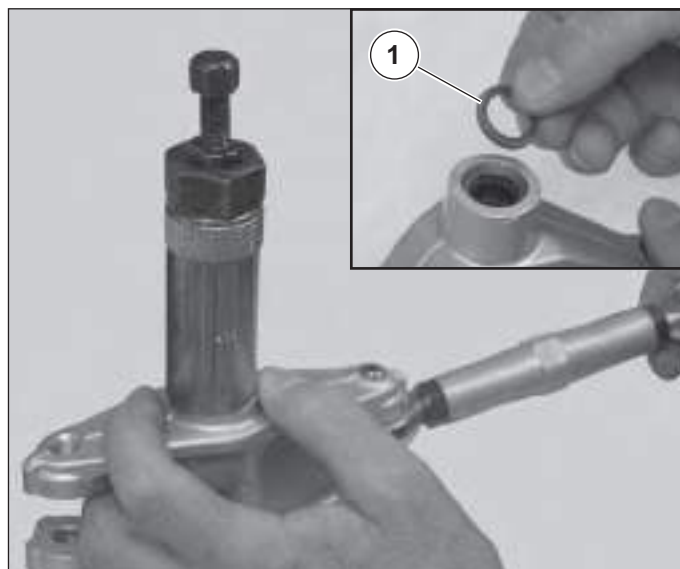
Rocker arm assembly removal

Remove the special screw (1) that fixes the rocker arm assembly of the rear suspension to the mono-arm fork. Extract the complete rocker arm assembly.



Rocker arm assembly overhaul

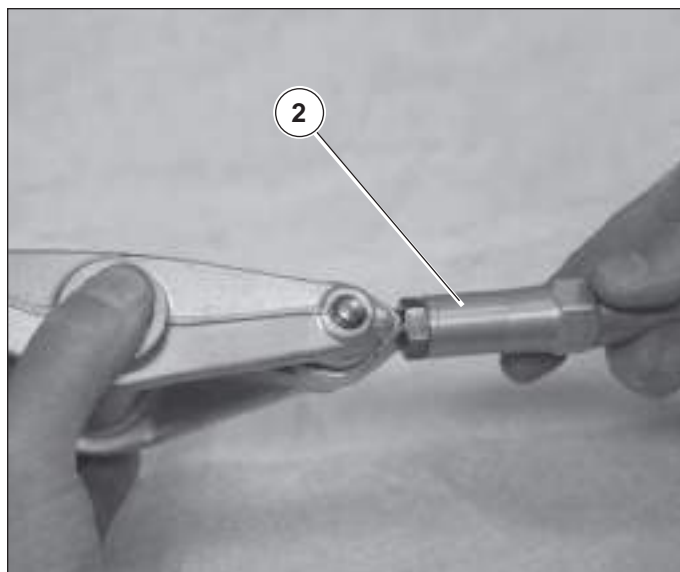
Remove the anti-dust seal (1). Check the condition of the roller bearings and if it is necessary to substitute them, utilise an extractor as shown in the figure.





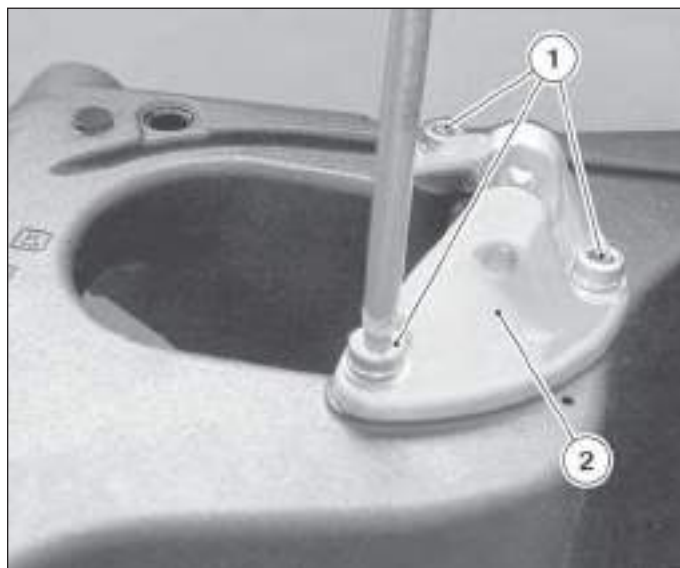
Suspension and wheels

Check for eventual axial play of the bolt holes of the connecting rod (2).
Substitute if worn.



F Rear shock absorber support plate removal

Remove the three screws (1) indicated in the figure and remove the support plate (2).



When reassembling, it is necessary to apply a special product to the three screws. Lightly screw them in. Tighten the central screw first and then the other two to the prescribed torque pressure.



Special product Loctite 243



Torque pressure: 40 ÷ 44 N•m





Suspension and wheels

Reassembly rocker arm assembly

Reassemble the rocker arm assembly after having cleaned and greased the seat of the special screw situated on the swingarm.

Screw in the screw without tightening it.



Recommended grease : Agip Grease 30



Assembly rear shock absorber

Accurately clean all parts. Grease the screws with Agip Grease 30 before reassembly.

Insert the shock absorber from above and lightly screw in the lower screw of the shock absorber.

Centralise the rocker arm assembly and replace the pin. Screw on the nut of the pin without tightening it.

Insert the shock absorber into the rocker arm assembly and lightly screw in the screw.



Lower the motorcycle to the ground, remove the lift and safety straps.

This operation is necessary to recover the play between the shock absorber/rocker arm assembly/swingarm.



Recommended grease: Agip Grease 30



Tighten up the whole assembly:

Tighten the screws of the connecting rod.

Tighten the lower and upper screw of the shock absorber.

Tighten the frame pin (1).

Tighten the swingarm pin (2).

Tighten the screw of the rocker arm assembly (3).



Apply Agip Grease 30 only to the threads of the screws.



Connecting rod torque pressure: $40 \div 44 \text{ N}\cdot\text{m}$

Shock absorber torque pressure $40 \div 44 \text{ N}\cdot\text{m}$

Rocker arm assembly torque pressure $45 \div 50 \text{ N}\cdot\text{m}$

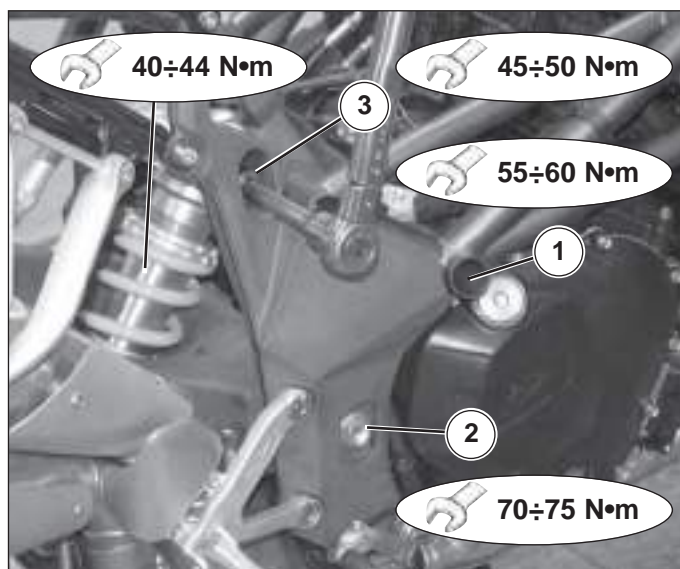
Frame pin torque pressure $55 \div 60 \text{ N}\cdot\text{m}$

Swingarm torque pressure $70 \div 75 \text{ N}\cdot\text{m}$

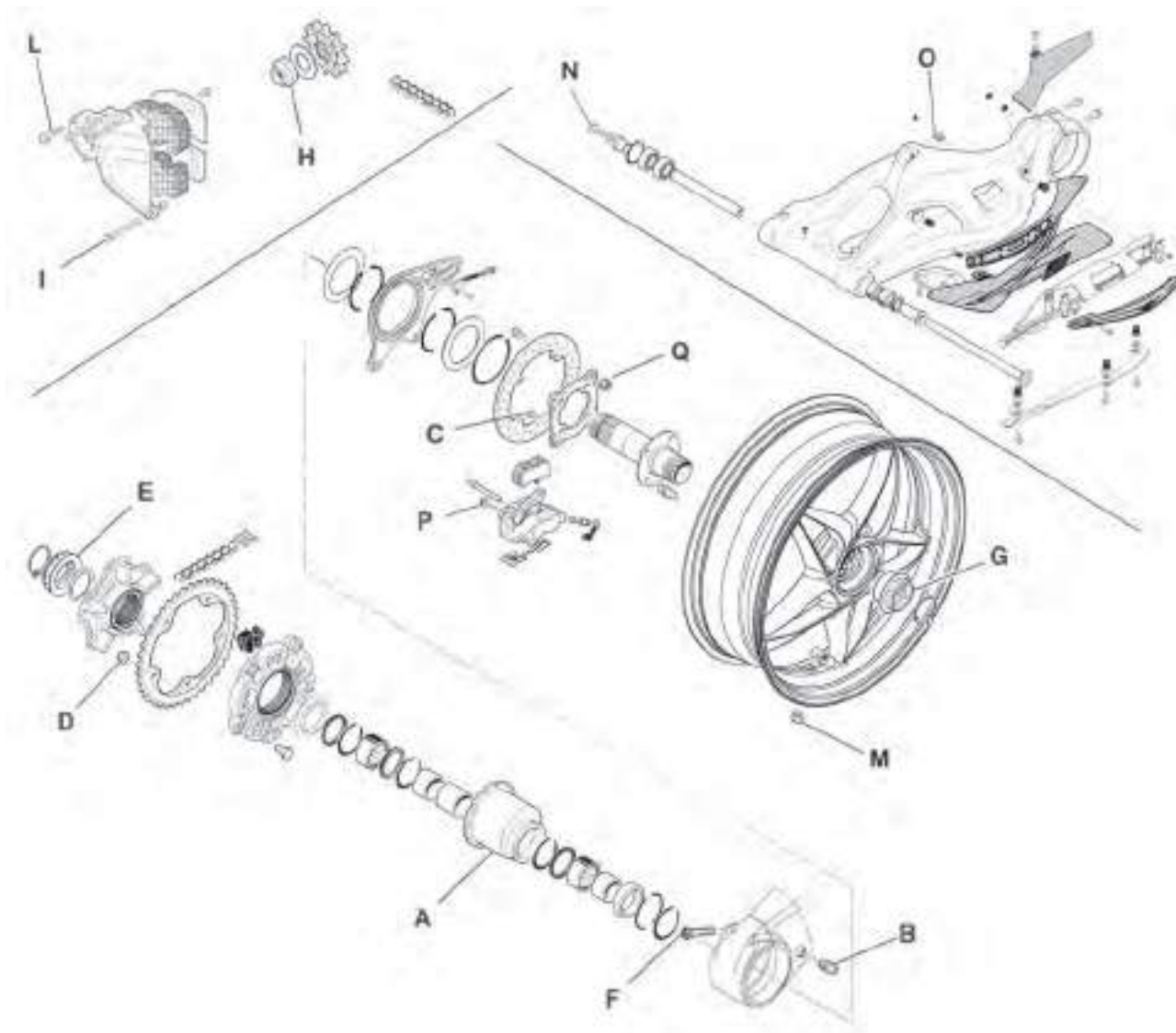


Recommended grease: Agip Grease 30

Reposition the electric cabling on the inner side of the right-hand frame plate.



REAR WHEEL HUB AND SWINGARM



		A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q
Torque pressure	N·m		30÷35	20÷22	45÷50	200÷220	28÷32	220÷240	140	25	8	5÷7	70÷75	30÷35	18	18÷20
	Kg·m															
	ft·lb															
Operation			243	270					243					243	243	270

Description	BRUTALE 990 R	BRUTALE 1090 RR
REAR WHEEL		
Material	Aluminium alloy	Aluminium alloy
Dimensions	6.00" x 17"	6.00" x 17"
REAR TYRE		
Dimensions	190/55-ZR 17 (75 W)	190/55-ZR 17 (75 W)
Rear tyre pressure (*)	2.3 bar (33 psi)	2.3 bar (33 psi)

*: In the event of different make tyres being used as opposed to those advised, refer to the pressure values marked on the side of the tyre by the manufacturer.

REAR WHEEL REMOVAL

Before checking and overhauling the rear wheel hub assembly it is necessary to carry out the following preliminary operations:

Place the motorcycle on the rear stand.



Special tool N. 800092642

Remove the retaining ring (1) of the wheel nut.

Remove the rear wheel by removing the polygonal nut, using the following tools:



- **Torque wrench**
- **55 mm polygonal spanner**

Utilising a torque wrench, slacken the rear wheel nut.



The polygonal fixing nut of the rear wheel has a left hand thread. To slacken the nut it is therefore necessary to turn the torque wrench in a clockwise direction.

Remove the rear wheel nut.

N.B.

When reassembling, tighten the rear wheel nut to the prescribed torque pressure.



Rear wheel nut torque pressure: $220 \div 240$ N•m

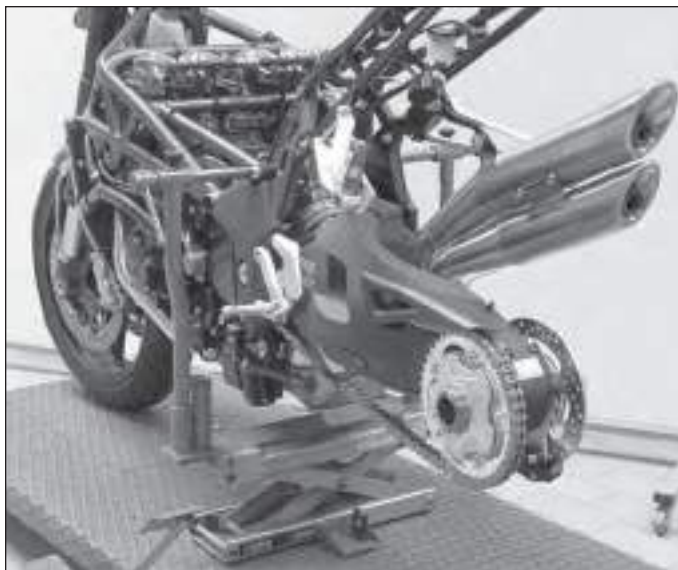
Remove the rear wheel taking care not to knock the surrounding components.





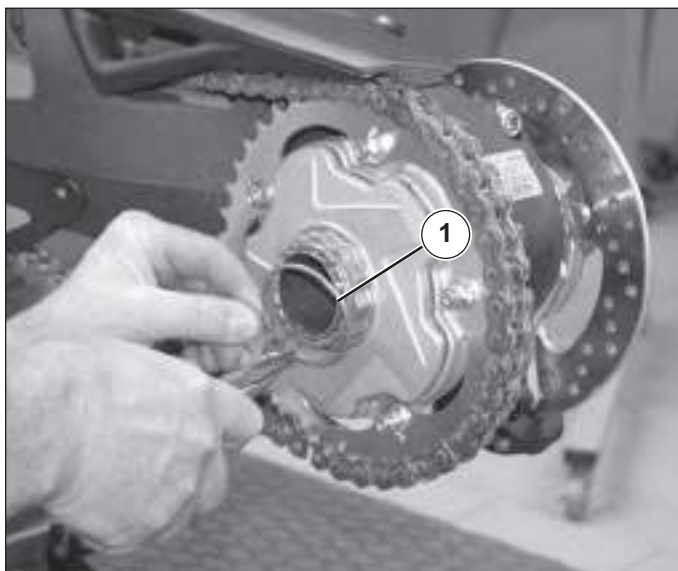
Suspension and wheels

After having carried out the rear wheel removal, support the motorcycle with a lift as shown in the figure. Remove the rear stand.




F

Remove the safety ring (1) of the crown flange-fixing nut.



Slacken the nut of the flange by rotating it in an anti-clockwise direction as shown in the figure. Utilise the following tools:

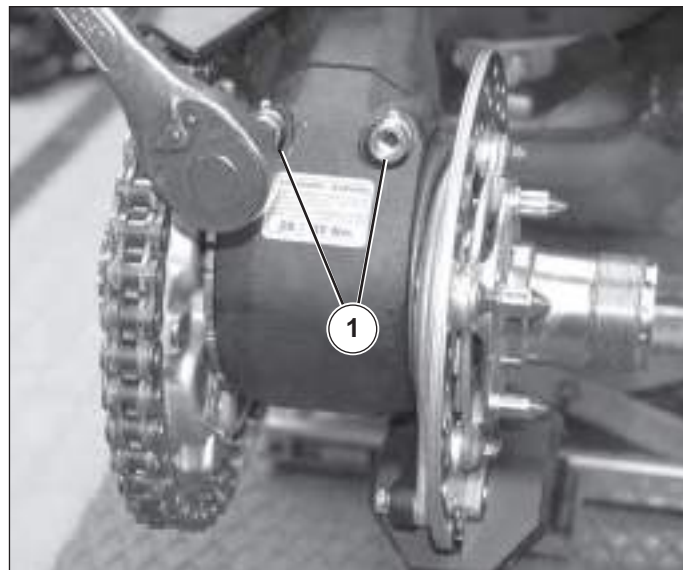
-  **Torque wrench**
- **55 mm polygonal spanner**





Suspension and wheels

Slacken the fixing screws (1) of the wheel hub.



Remove the screw complete with bushing.
Extract the chain guard by pulling it out from the back part of the wheel (see figure) so that it is freed from its position on the swingarm.



With the special spanner mounted on the extension tube, pull forward the eccentric adjuster and release the chain from the crown wheel.



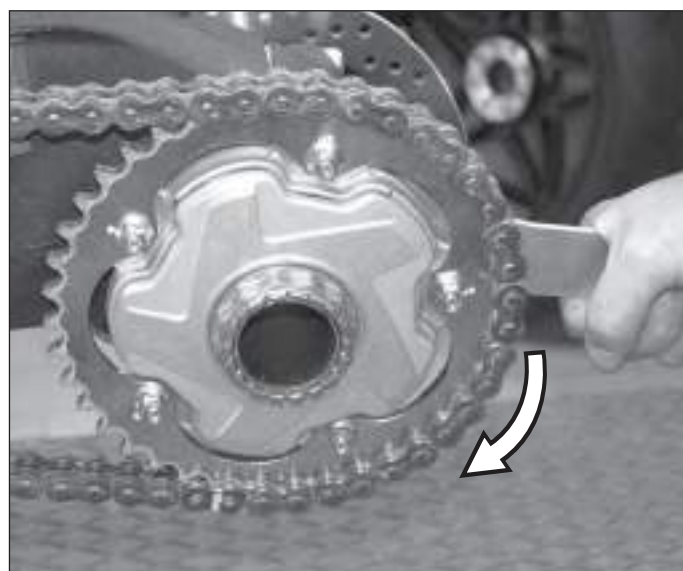
Special tool:

Eccentric adjuster spanner
Spanner extension

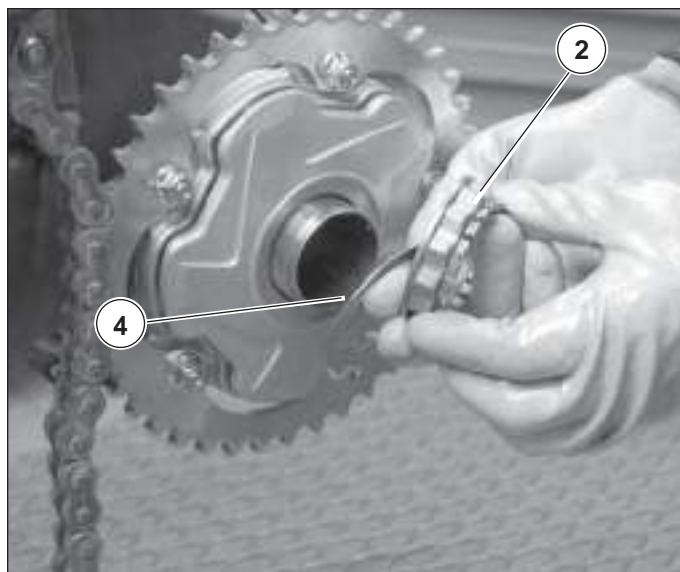
N. 800092854
N. 800092855



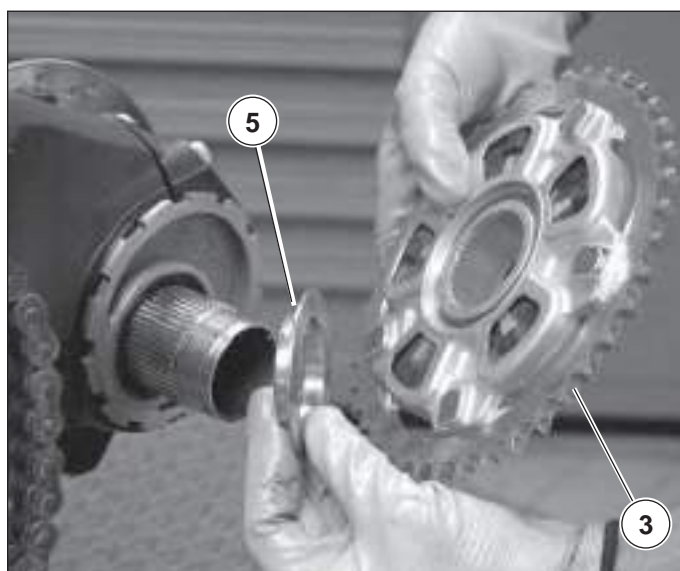
When adjusting the tension of the chain it is necessary to carry out the motorcycle set up adjustment. See “Motorcycle set up adjustment” in this chapter.



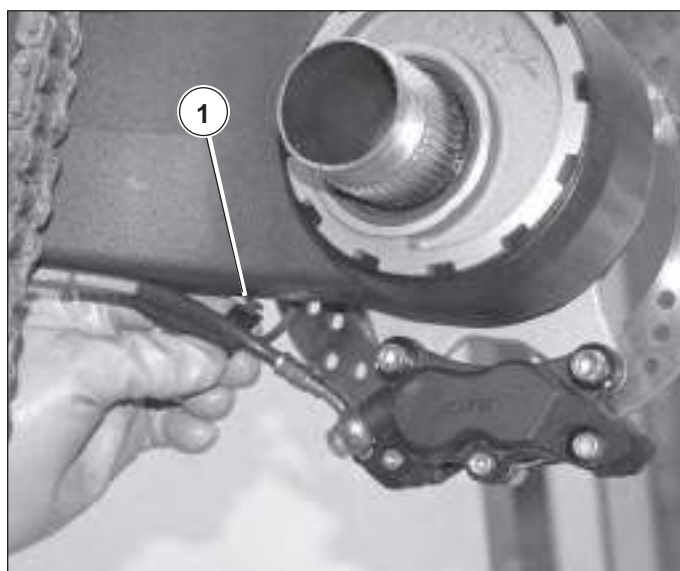
Remove the wheel spindle nut (2) previously slackened and the spacer ring (4) underneath.



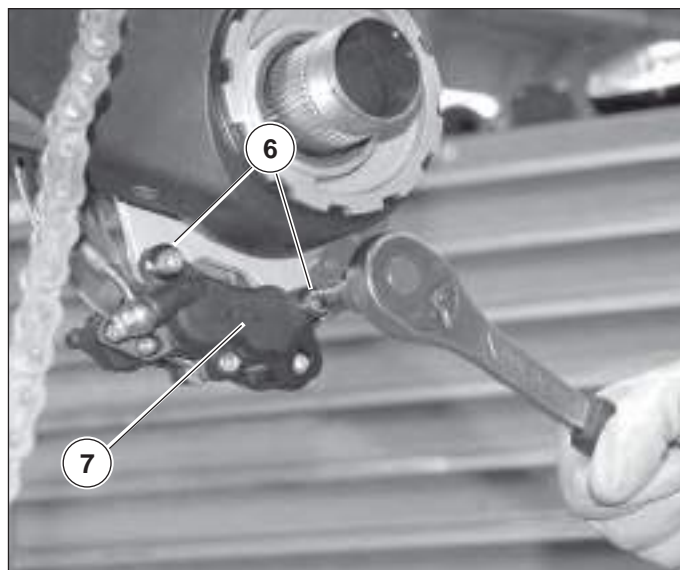
F Remove the rear sprocket unit (3) and the spacer ring (5) underneath.



Remove the rubber clamp (1) around the rear brake pipe.

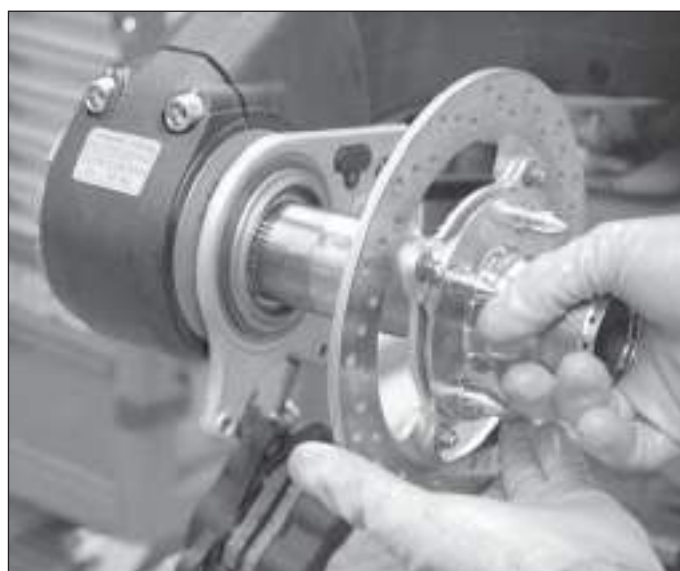


Slacken the two screws (6) and remove the brake caliper (7).



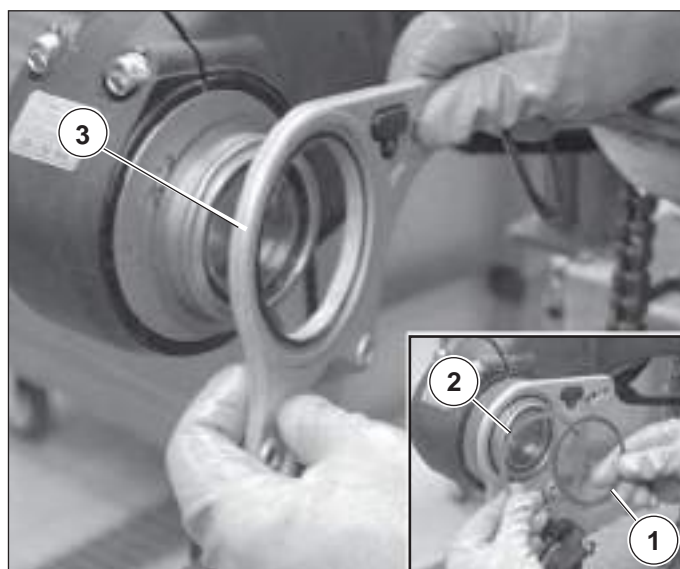
Disassembly of the wheel pin

Remove the wheel spindle complete with the brake disc, extracting it from the right side of the motorcycle as shown in the figure.



Brake caliper support flange removal

Remove the Seeger retaining ring (1), the spacer ring (2), the flange (3) and the spacer ring underneath.





Suspension and wheels

Wheel hub disassembly

Extract the wheel hub from the left side of the fork.

Carefully wash all parts.

Check the condition of the roller bearing and the ball bearing.

If there is excessive play (even only one of the bearings) or chamferings during rotation, substitute the wheel hub, complete with bearings with a new unit.



If only one bearing is worn, substitute the complete unit. Never substitute one bearing only.



F

For normal maintenance, remove the three internal spacers (wheel spindle seat), wash the roller bearing units, dry them and grease them.

Check the condition of the ball bearings.



The grease used must have the following characteristics:

- Lithium soap grease with a mineral oil base
- Consistency NLGI: 2
- Dripping point: 181° C
- Viscosity at 37.8°C: 140 cSt
- Temperature field: from -25°C to +120°C



Caliper holder pin

N.B.

Unscrew the caliper holder pin only if it is damaged.

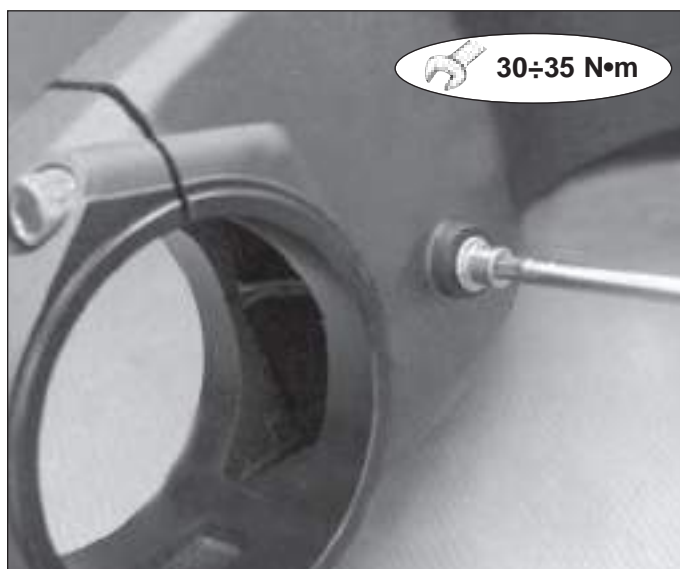
When reassembling apply the prescribed type of Loctite and tighten to the prescribed torque pressure.



Recommended thread-locking fluid: Loctite 243



**Caliper holder pin torque pressure:
30 ÷ 35 N•m**

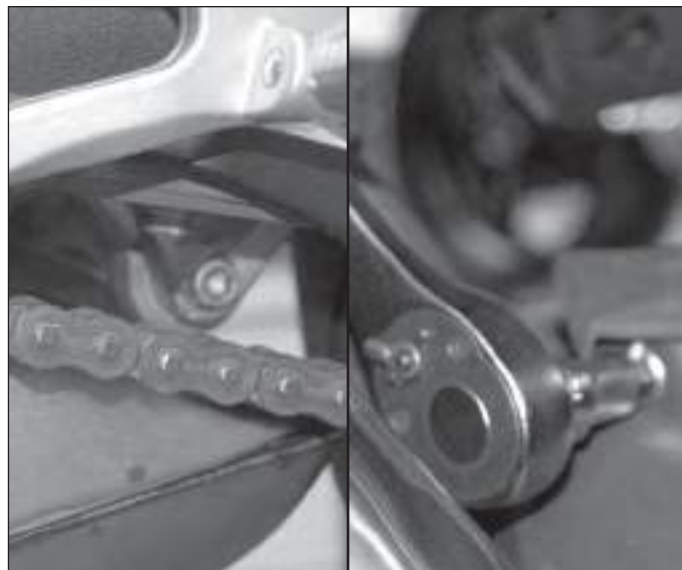




SWINGARM REMOVAL AND OVERHAUL

Before removing and overhauling the swingarm, it is necessary to execute the following preliminary operations:

- Remove the rear shock absorber and connecting rod as described in the paragraph "Disassembly rear shock absorber" and "rocker arm assembly removal" of this chapter.



Remove the protective cover of the right-hand foot rest.



F

Silencers removal

Unhook the two connecting springs between the silencers and the exhaust group.





Suspension and wheels

Unscrew the screw fixing the silencers to the support.



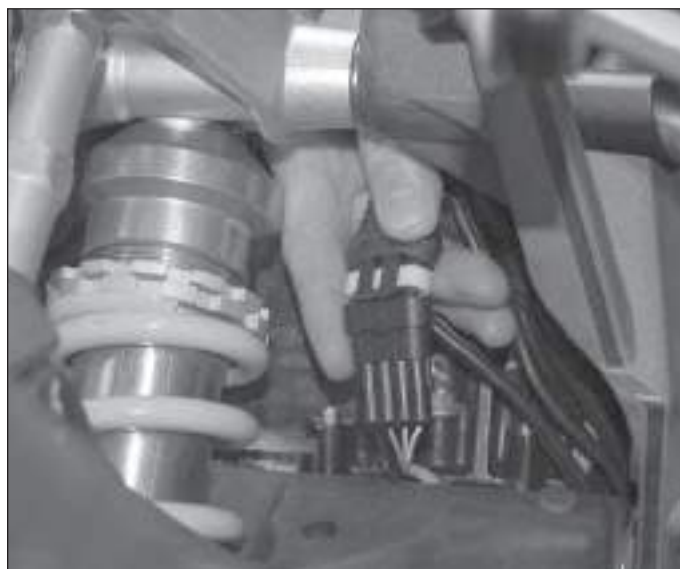
F Remove the upper silencer first, then the lower one.

Remove the other components of the rear wheel assembly as shown in the operations previously described from page 41.



Exhaust group removal

Disconnect the lambda probe connector from the main cabling and pull outwards, on the right side of the vehicle.



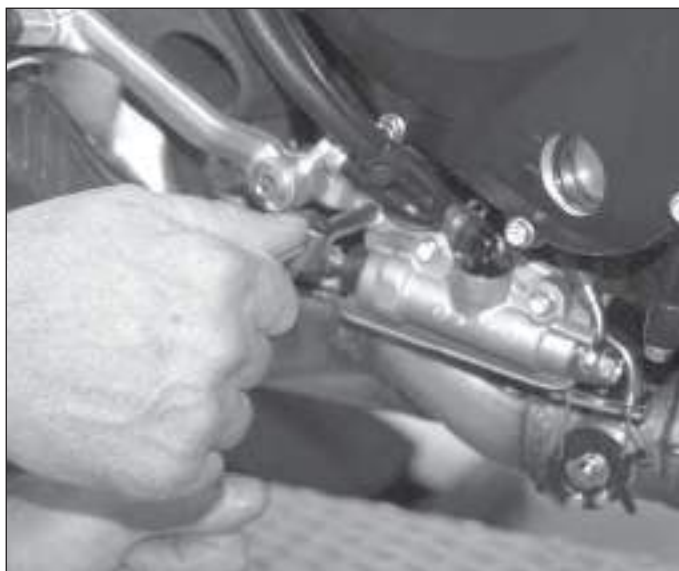


Suspension and wheels

Unscrew the lower fixing screws of the oil radiator guard, positioned at the lower base of the water radiator. Remove the oil radiator guard.

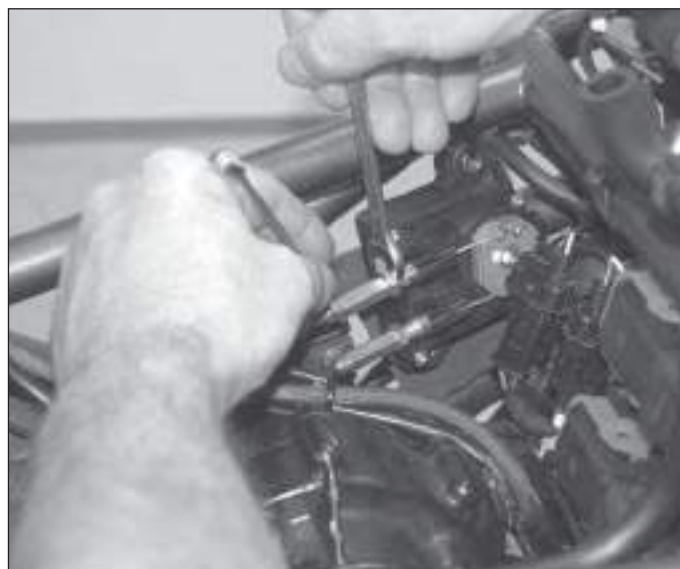


Remove the complete brake pump support.



F

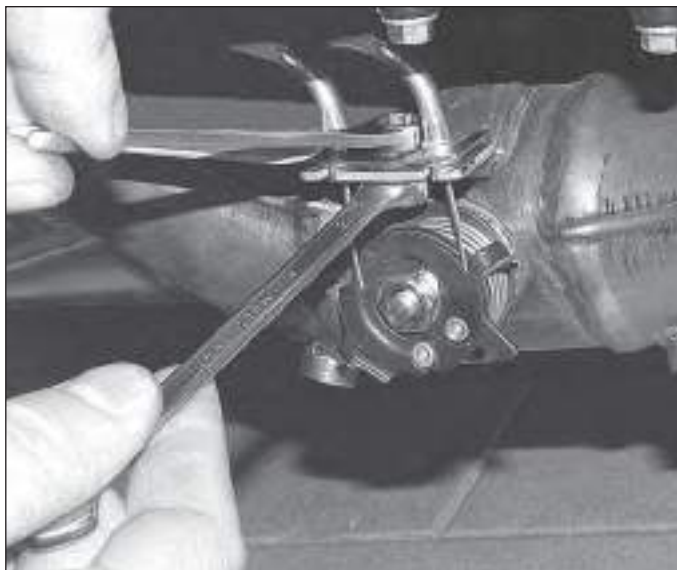
Loosen the nuts of the command cables of the exhaust valve.





Suspension and wheels

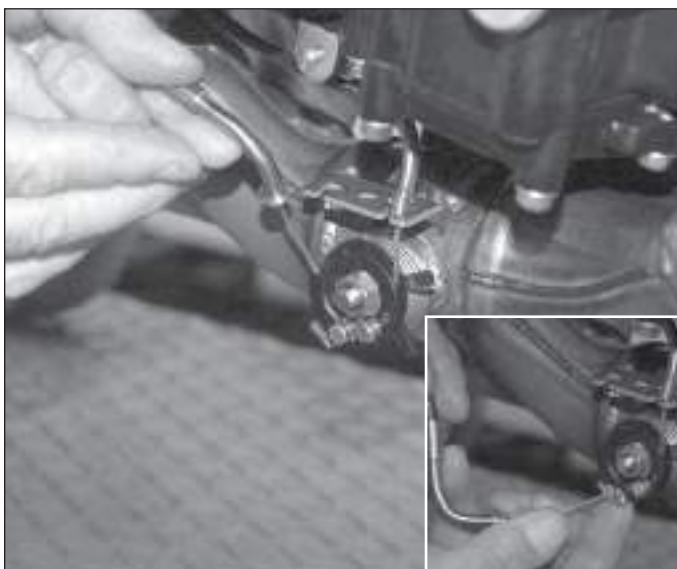
Remove the screw of the plate which holds the command cables of the exhaust valve in place.



F Extract the holding plate.



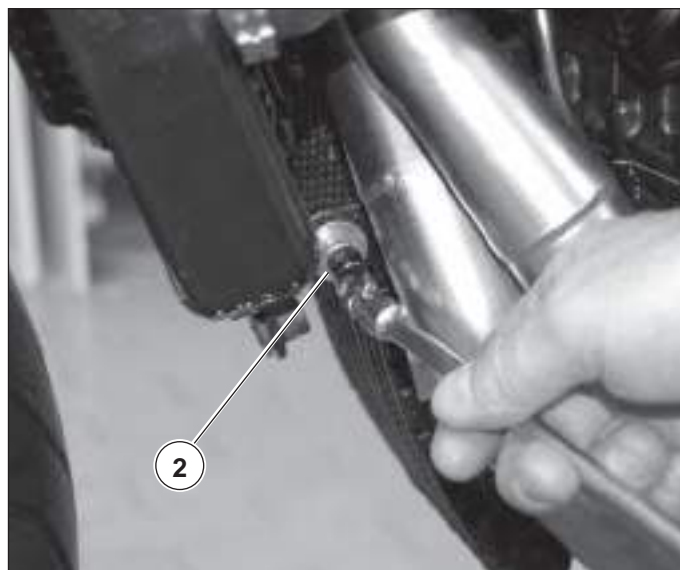
Remove the terminals of the transmission cables of the exhaust valve.





Suspension and wheels

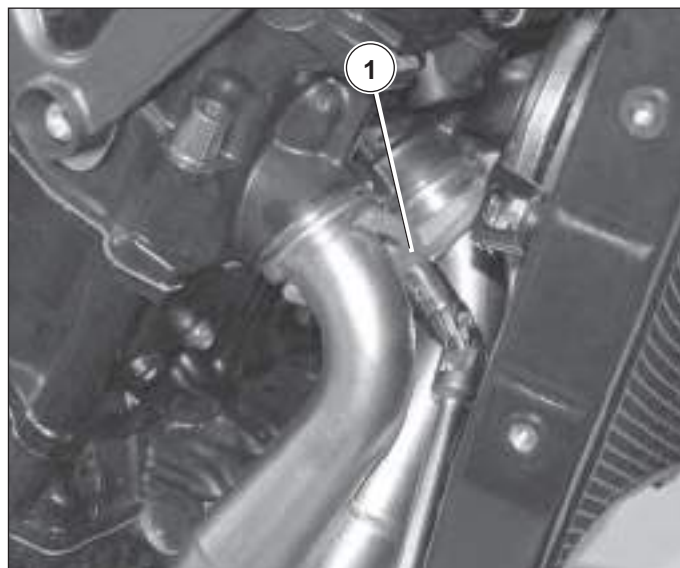
Remove the screw (2) connecting the oil radiator and the water radiator.



Move the radiators slightly towards the front of the motorcycle, then remove the flange fixing the exhaust manifolds to the cylinder unit by unscrewing the nut (1).



During this operation, take care not to touch the exhaust pipes in order to avoid burns.



Unscrew the compensatory housing fixing screws.



Special tool N. 8000B2051

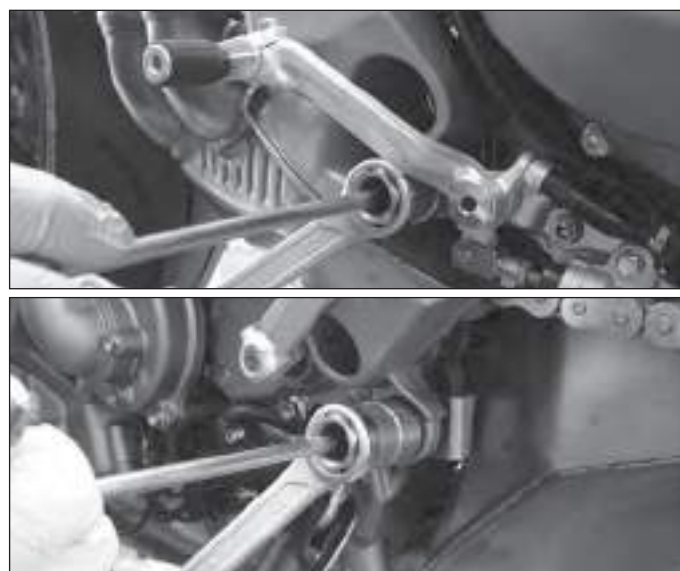
When reassembling, it is necessary to apply a special product to the three screws. Lightly screw them in. Tighten the central screw first and then the other two to the prescribed torque pressure.



**Recommended thread-locking fluid:
Loctite 243**



Torque pressure: 20 ÷ 22 N•m





Suspension and wheels

Remove the exhaust manifolds by turning slightly towards the right of the vehicle.



F Lower chain guide removal

Remove the three screws of the chain guide.
Remove the chain guide (1) complete with the two rear brake tube guide plates.



CHAIN REMOVAL

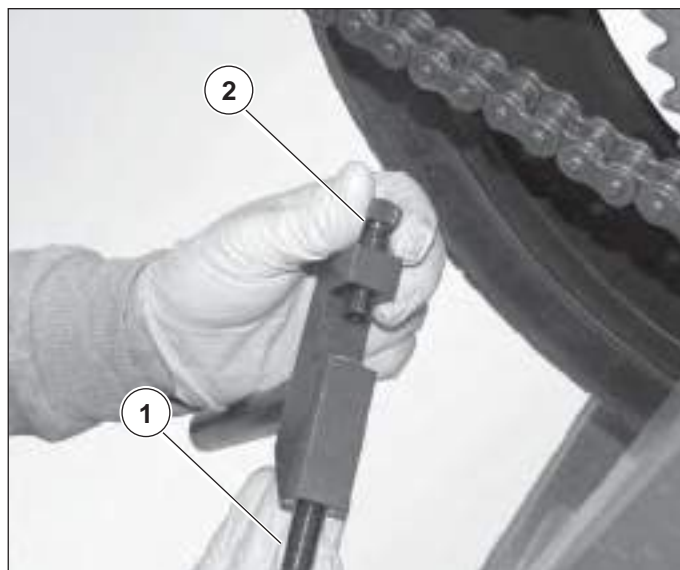
Cut the chain utilising the special tool.



Special tool N. 8000B1439

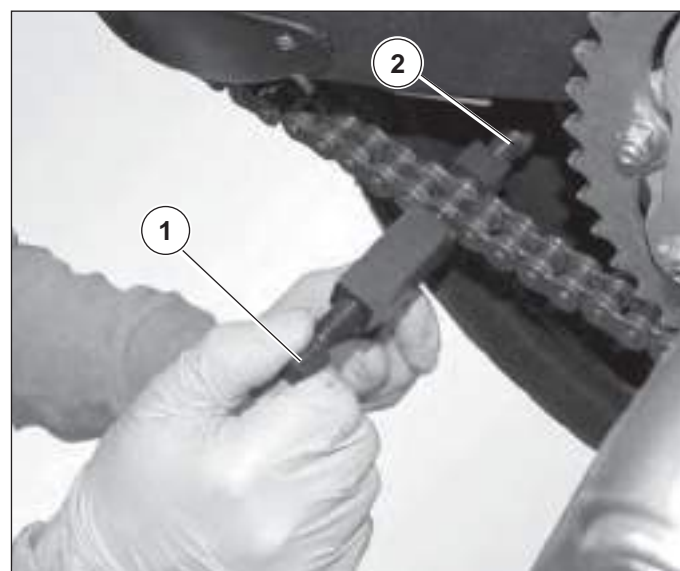
Unscrew bolt (1) so that the tip is retracted into the hex nut.

N.B. This tool could be applied in any point of the lower section of the chain.

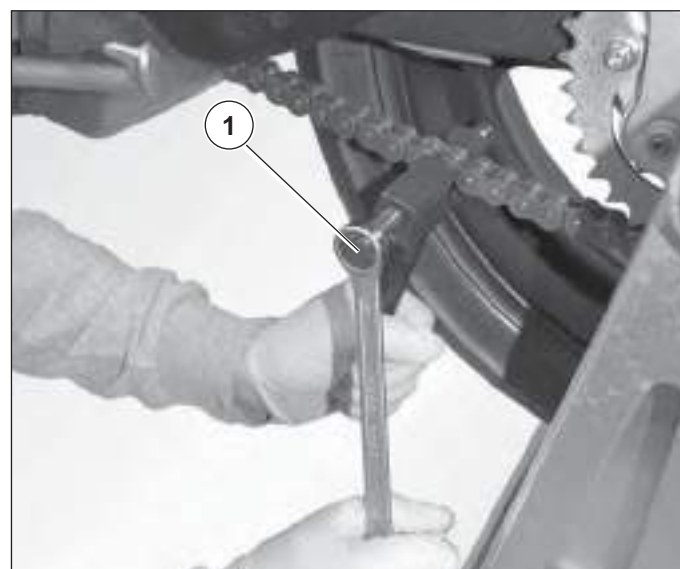


Unscrew shoulder bolt (2) until you can insert the chain into the special tool. Position the chain breaker (1) so that the ends of the chain pin can fit into the holes of the hex nut and bolt (2).

Thread with the fingers the shoulder bolt (2) to put in phase the chain with the tool.



Screw the bolt (1) until the pin is out of the chain plate on the wheel side.





Suspension and wheels

CHAIN REASSEMBLING

Pick the new connecting link from the package.

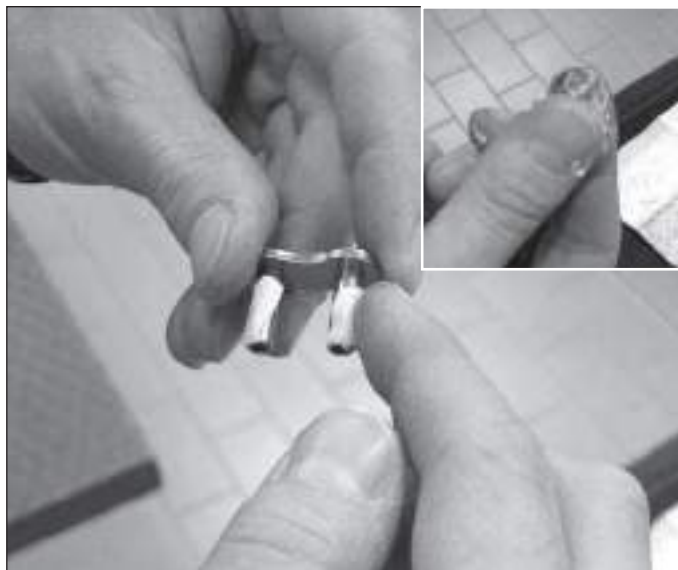


The connecting link is supplied lubricated with a special product that guarantees long life. Absolutely avoid wiping away the lubricant from the pin surfaces, as this would seriously reduce the connecting links operational life.

This is particularly important for O-Ring chains, as they cannot be re-lubricated.



Never reuse an old rivet link or old outer plate previously disassembled from the chain.



F

Check that the fork of the new connecting link fork has an O-Ring installed on each pin.

Insert the new connecting link fork from the wheel side, avoiding any contact with the pins in order not to remove the lubricant.

Place the other two O-Rings on the extended ends of the bushings.



Rotate the rear wheel so that the rivet link is positioned on the lower strand of the chain where there is more room to work.



Closing the rivet link

Closing the link utilising the special tool.



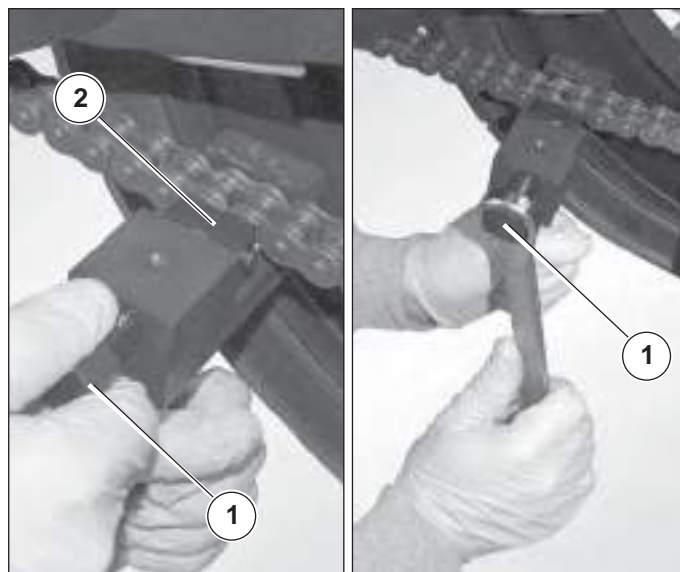
Special tool N. 8000B1456

Put the assembling tool on the chain, placing the centering pin between the chain rollers, in order to fit with the rivet link.

Thread the bolt (1) with the fingers in until the outer plate is placed on the rivet link fork pins.

With a wrench fully thread in the bolt (1) until the pin ends reach the bottom the slots in the link plate carrier (2). Avoid to force too much. This places the outer plate at the correct position on the fork.

Slowly unscrew the bolt (1) and remove the tool from the chain.



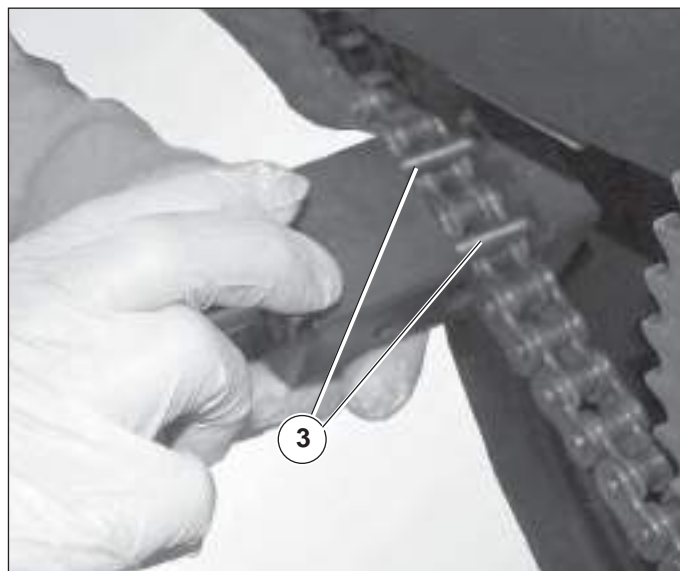
Riveting

Use the professional rivet tool.



Special tool N. 8000B1457

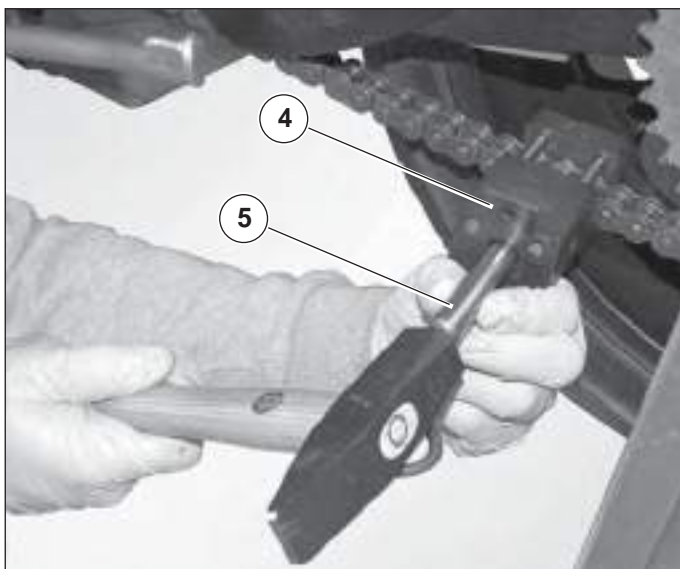
Pull the plate (4) to open the positioning rods (3), insert the chain into the tool in correspondance of the first pin to rivet and release the plate (4). The chain should be correctly inserted into the tool and kept in place by rods (3).



Slide punch (5) to contact the head of the pin to be riveted.

Using a hammer, give a sharp blow to punch (5) to deform the head of the pin.

Rotate punch (5) approx. 90° and repeat operation.

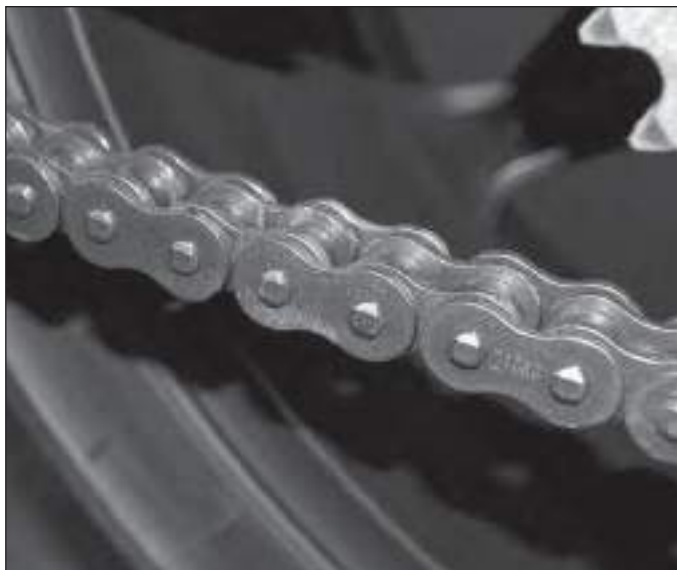




Suspension and wheels

Release the chain by retracting plate to open the positioning rods and continue the operation cycle on the second pin to be riveted.

Check for smooth flexing of the link and that the O-Rings are correctly positioned and not damaged or cut.



F

When the riveting is over, check if the diameter of the head of both pins is between the following range:

- **Pin head diameter after riveting:**
 $d = \varnothing 5.60 \div 5.80 \text{ mm}$

If the diameter is out of the specified range repeat the riveting operation.

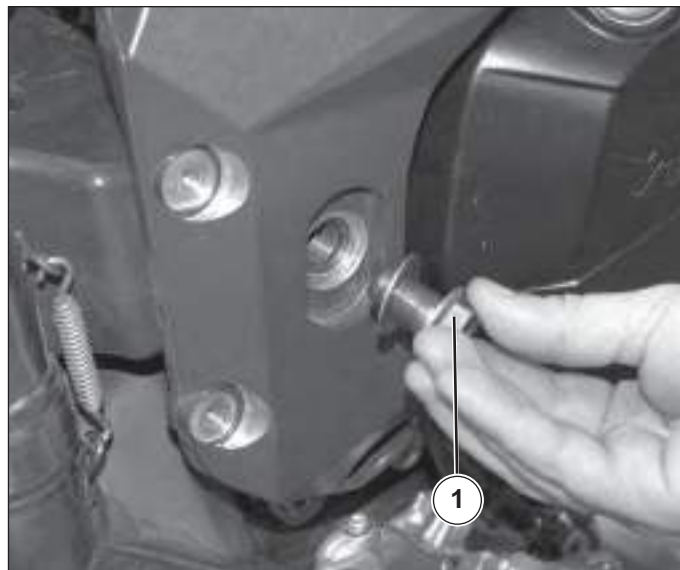


Swingarm pin removal

Remove the screw (1) on the right side of the motorcycle.

Remove the washer and push out the pin **manually**. Support the swingarm so that it does not drop to the ground.

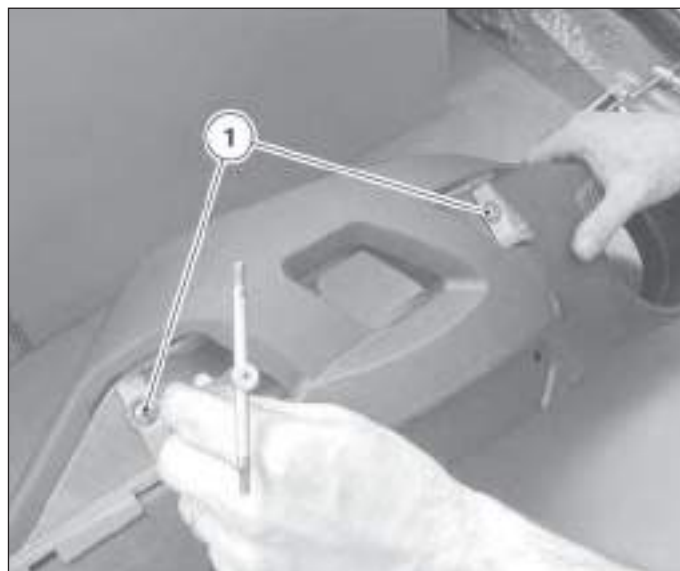
Now the swingarm can be extracted.



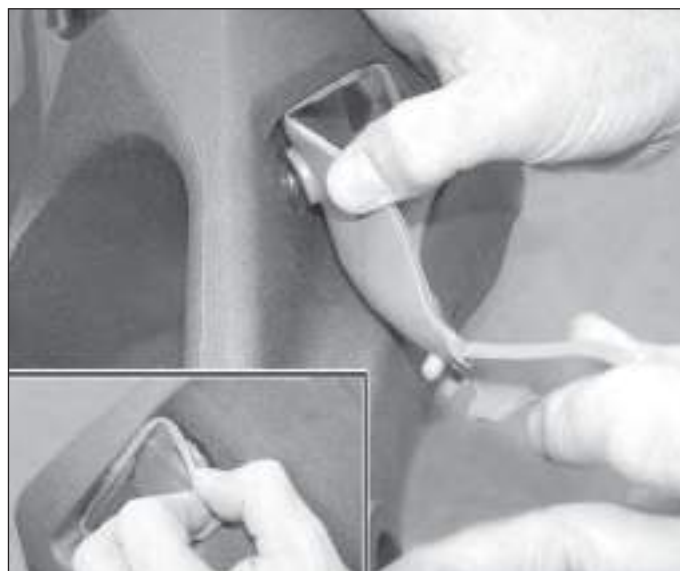
Upper chain guide removal

Remove the two screws (1) and the relative plates.

Lift up the front part of the chain guide to remove it from the swingarm (see figure).



Repeat the operation on the rear part, where the screw seat is situated in the swingarm.





Suspension and wheels

Slide out in a forward position as shown in the figure. When reassembling, proceed in the reverse order of removal ensuring the correct positioning of the front reference peg.



F Bearings overhaul

If it is necessary to substitute the bearings of the swingarm because of excessive play, operate as follows:
Remove the right and left spacer.
Remove the Seeger retaining ring on the right side of the swingarm.
Remove the anti-dust seal on the left side.
Utilising the special tool, remove the two roller bearing units.



Special tool N. 800092860 LEFT SIDE



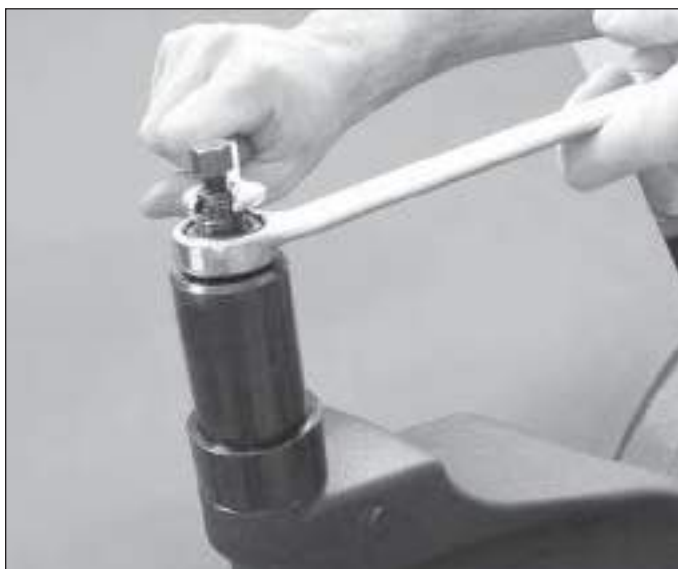
Mount the tool so that both roller bearings are removed.



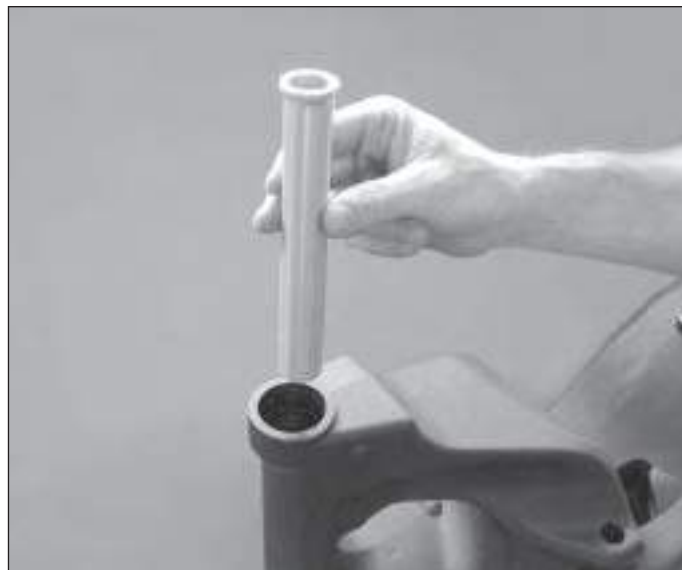
Utilising the special tool press on both ball bearings and extract them.
Operate in the same way for the bearings on the left side.



Special tool N. 800092860 RIGHT SIDE



Extract the spacer from the right side.



Check the condition of both bearing seats and the seat of the spacer.

If the spacer is in good condition, reinsert it onto the fork from the right side.

Assembly of the roller bearings and the roller bearing units

Pre-assemble the two roller bearing units on the left side and the two ball bearings on the right hand side utilising the special tool N. 800092866 as shown in the figure.



Special tool N. 800092866



Utilising a press fit the bearings and the roller bearing units (see figure).

At the end of the overhaul operations, reassemble the following components on the motorcycle:

- Swingarm
- Swingarm pin

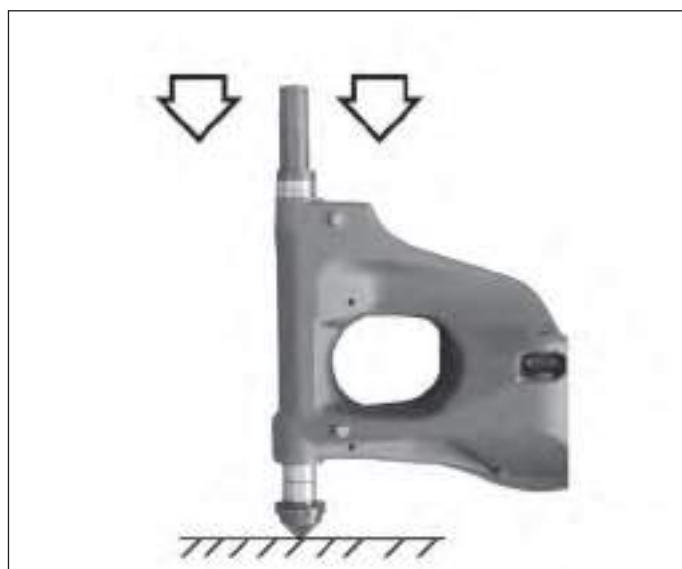
When reassembling the pin, apply special grease on the first threads of the swingarm pin screw.



Recommended grease: Agip Grease 30



**Swingarm pin screw torque pressure:
70 ÷ 75 N•m**



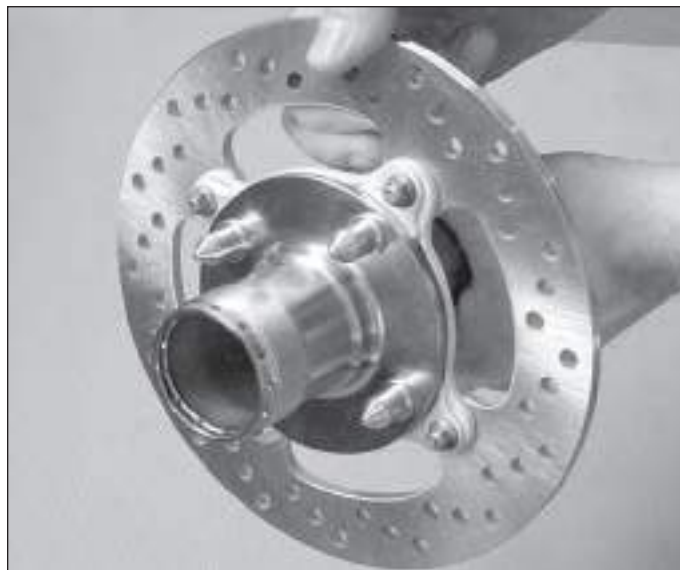


Suspension and wheels

Wheel spindle unit check

Check the condition of the wheel drive engagement splines.

If it is worn, substitute as follows.

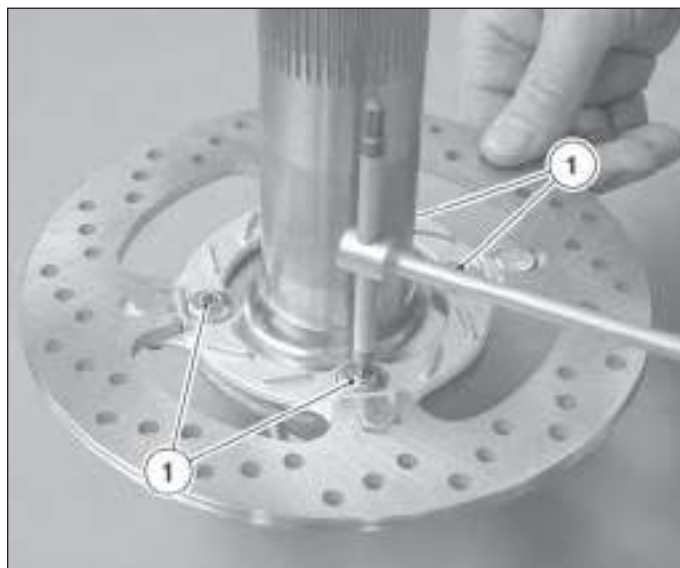


F

After heating with a heat gun, remove the four fixing screws (1) of the brake disk flange sealed with **Loctite 270**. Remove the flange.



Recommended thread-locking fluid: Loctite 270



Check the extra-smooth parts of the wheel spindle for wear (A).



Utilising a press with an adequate punch for both the removal and assembly of the pins of the wheel drive engagement.

When assembling, apply force on the crown of the peg not on the point. (see figure).

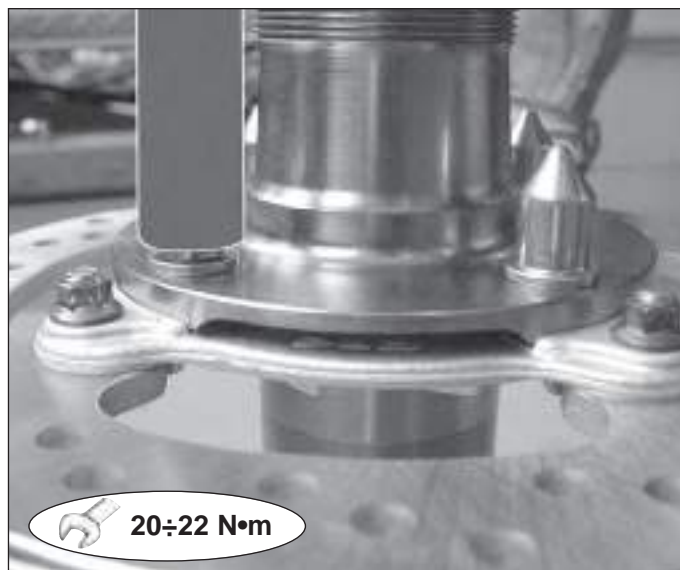
Assemble the brake disc carrier plate by tightening the screws to the prescribed torque pressure and then apply **Loctite 270**.



Recommended thread-locking fluid: Loctite 270



Brake disc carrier plate screw torque pressure: $20 \div 22 \text{ Nm}$



Crown wheel assembly check

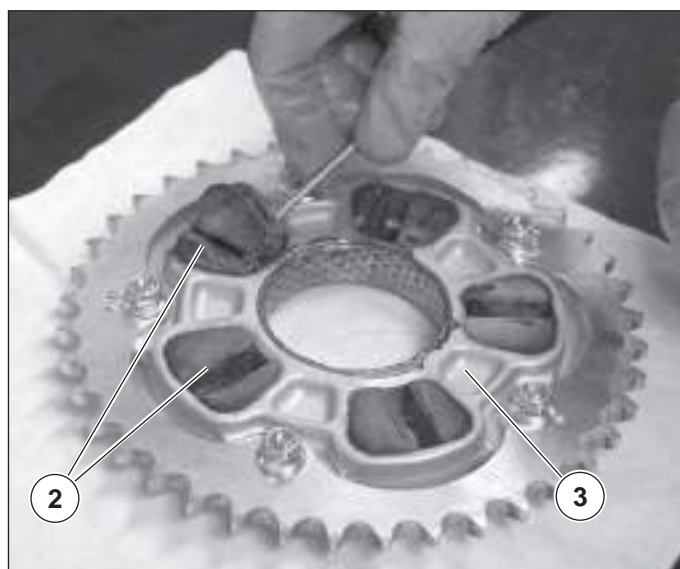
Remove the driving flange by pushing the central ring (1) outwards.



Evaluate the wear condition of the crown wheel. If it is badly worn, effectuate a substitution with a new part proceeding as described.

Extract the 5 spring drives (2) from the gear flange support (3) and assess its condition.

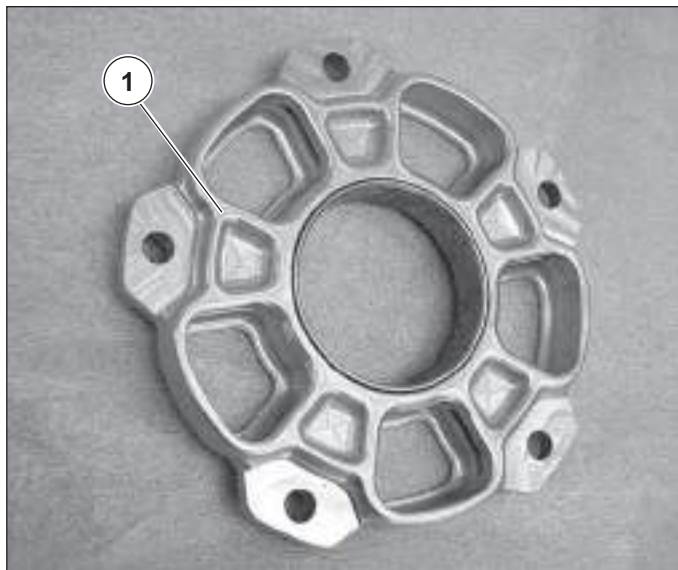
If the spring drives are worn, replace with new ones.





Suspension and wheels

Check that the coupling bushes of the gear flange support (1) and the driving flange (2) do not show any signs of excessive or uneven wear.



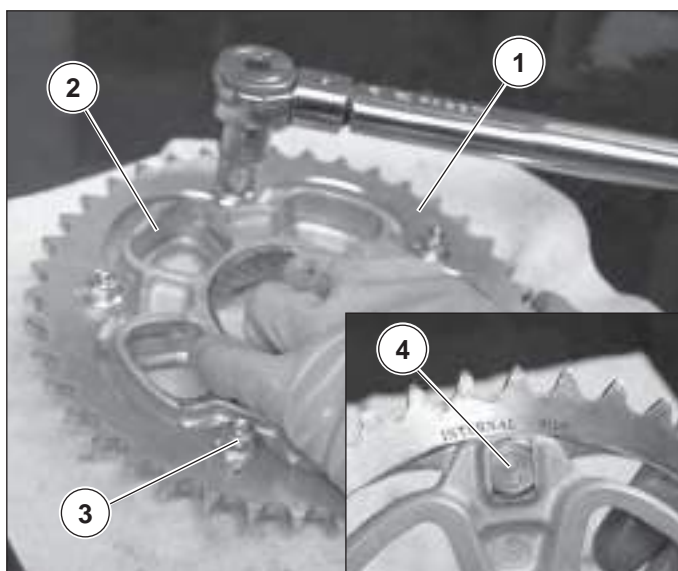
F If the bushes are excessively worn, replace the entire set of flanges.



Remove the 5 nuts (3) to free the crown (1) from the crown flange (2).

Replace the crown.

Remount the new crown on the crown flange, making sure the pins (4) enter the holes.



Check that the coupling bushes of the gear flange support (1) and the driving flange (2) do not show any signs of excessive or uneven wear.



Bushes coupling area (1):

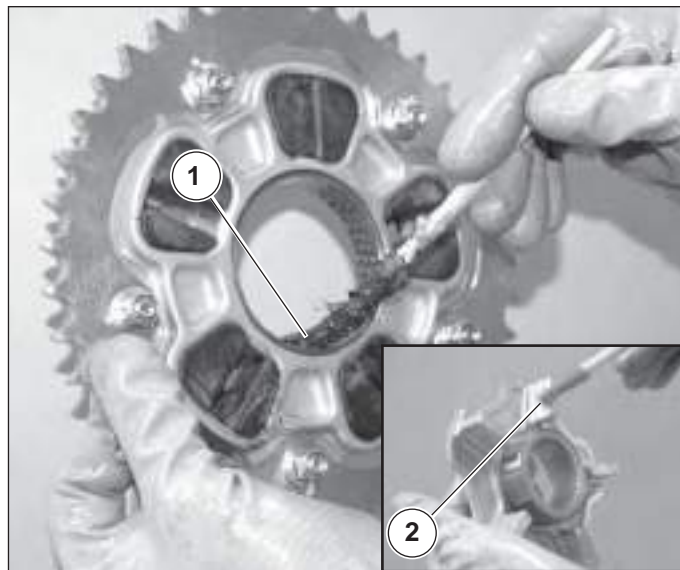
Grease AGIP GR SM

Bushes coupling area (2):

Grease AGIP GREASE 30



Do not apply grease to the threads of the pins.



Wheel hub reassembly

Lightly grease the wheel hub.

Introduce the hub to the swingarm from the left side of the motorcycle and push it in.

Screw in the two screws on the swingarm without tightening.



Recommended grease: Agip Grease 30

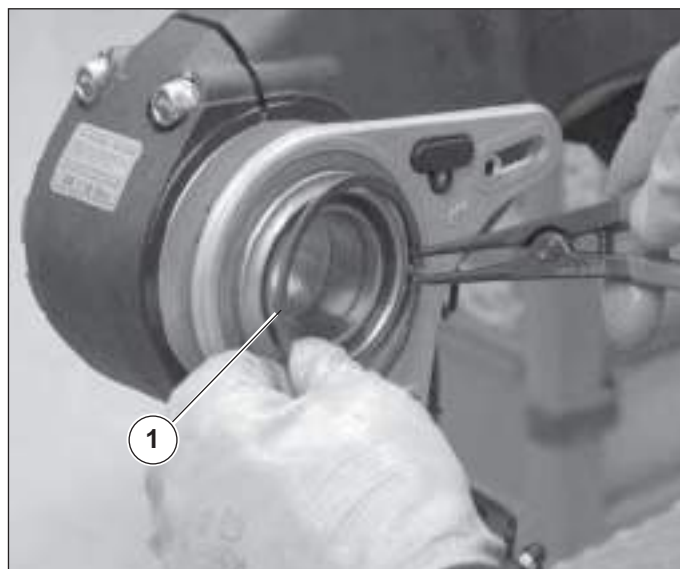


To assemble the brake caliper-carrying flange, carry out the following operations:

Grease the O-rings and insert them into their respective seats on the flange.

Assemble the rear spacer ring in contact with the hub, then the brake caliper-carrying flange (1), the second spacer ring and the Seeger retaining ring (1).

It is important to ensure that the Seeger retaining ring is inserted around the whole circumference of the seat.





Suspension and wheels

Grease the roller bearing.

Introduce the first bush, the spacer and then the second bush.



The grease used must have the following characteristics:

- Lithium soap grease with a mineral oil base
- Consistency NLGI: 2
- Dripping point: 181° C
- Viscosity at 37.8°C: 140 cSt
- Temperature field: from -25°C to +120°C



F

Reassembly rear wheel pin

Grease the wheel pin and introduce it carefully into the hub.



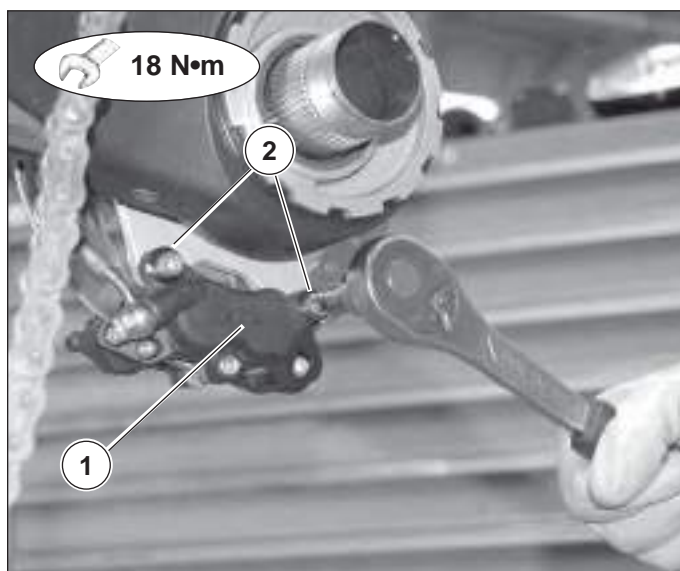
Reassemble the brake caliper (1) and tighten the fixing screws (2) at the specified torque.



Special product: Loctite 243



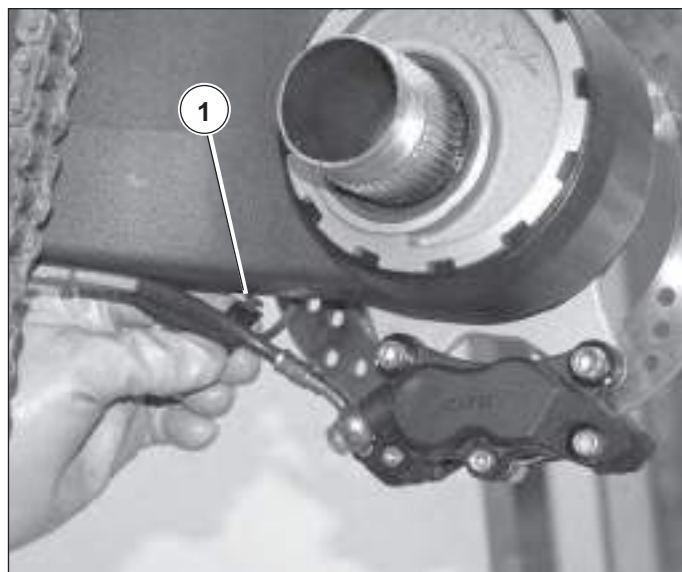
Torque pressure: 18 N•m





Suspension and wheels

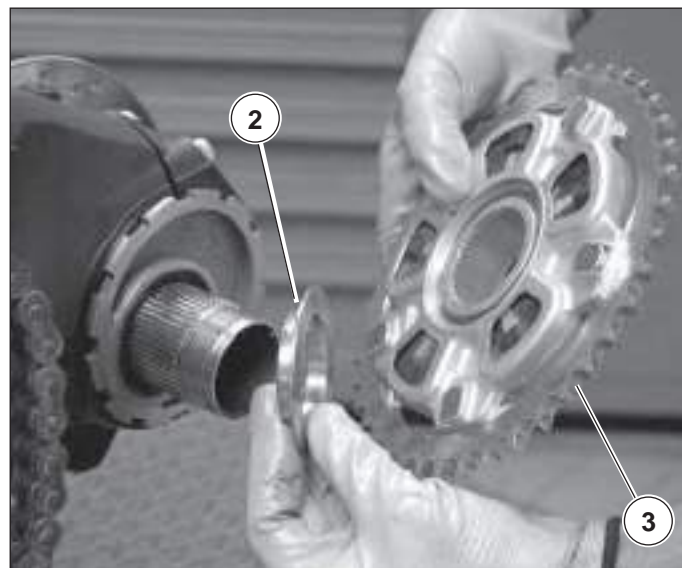
Reinsert the rubber clamp (1) around the rear brake pipe.



Insert the spacer with neck illustrated in the figure onto the wheel pin.

Insert the crown wheel assembly, the second spacer ring and the wheel pin fixing nut.

Reassemble the chain as described at pages 54÷56 of this chapter.



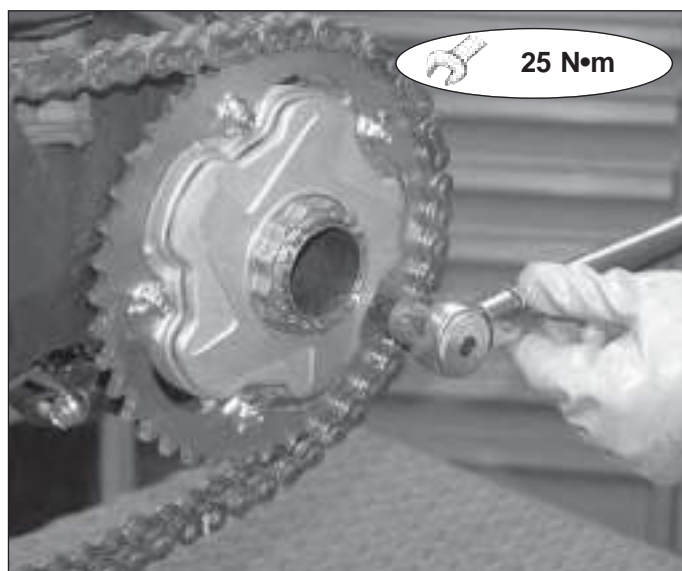
Tighten the 5 nuts to block the silentblocks as shown in the figure.



Tightening torque: 25 N·m



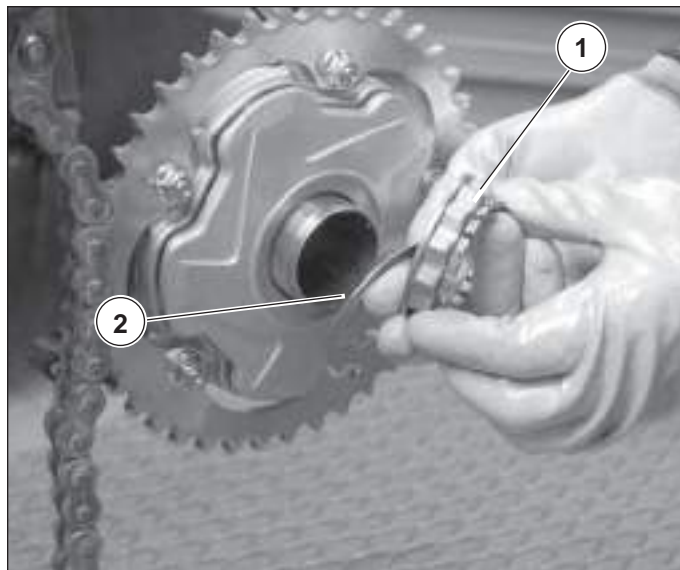
Apply grease only on the threaded part





Suspension and wheels

Reposition the nut of the flange (1) with the relative washer (2) without tightening.



F Using the special spanner, bring the eccentric back into position by rotating in an anti-clockwise direction to tighten the chain.



Special tool:

Spanner for eccentric hub

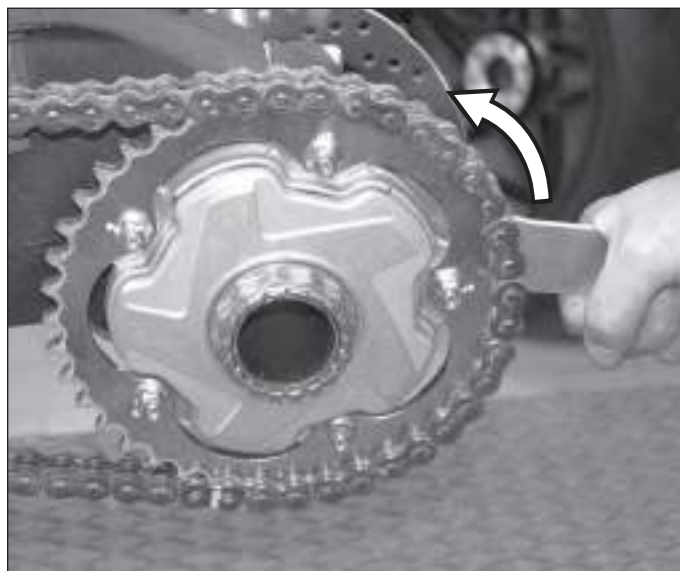
N. 800092854

Extension for spanner

N. 800092855



Whenever the chain is tightened, it is necessary to adjust the stability of the vehicle - see "Adjusting vehicle stability" in this chapter.



Tighten the wheel pin fixing nut by rotating it clockwise as shown in the figure, by using the following tools:



- **Torque wrench**

- **55 mm polygonal socket wrench**

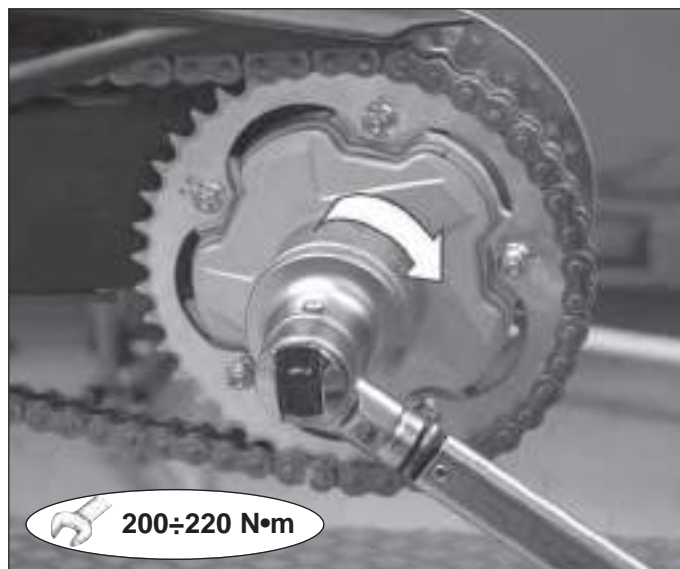


Slip flange nut coupling torque:

200-220 Nm



Apply grease only on the threaded part

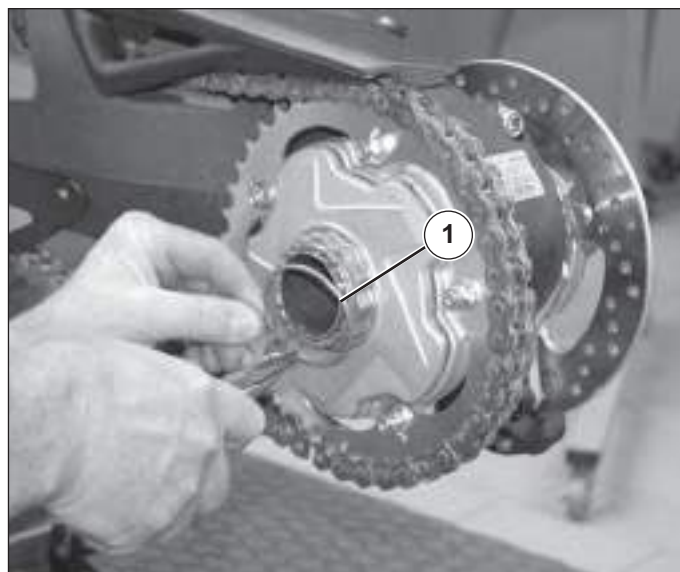




Suspension and wheels

Assemble the retaining ring (1).

Reassemble the lower chain pad, the upper chain guard and the central exhaust manifolds respectively.



Rear wheel assembly

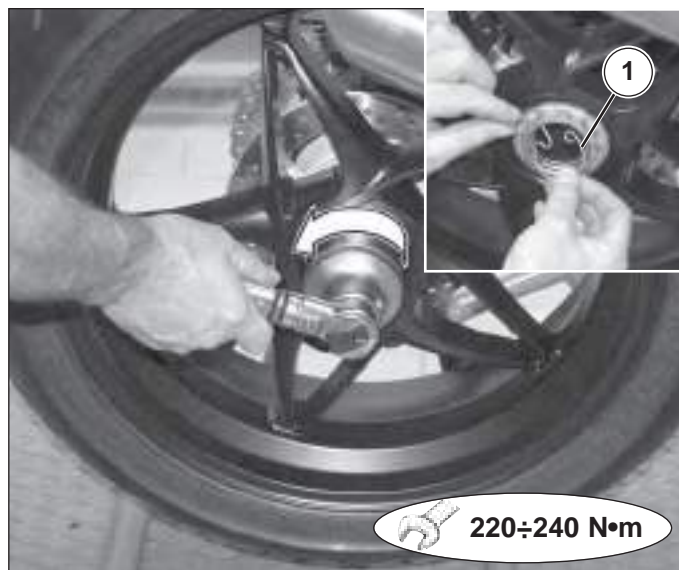
In the case of substitution of the rear tyre it will be necessary to effectuate the balancing of the wheel before assembling it. Follow the instructions described at page 74.

Insert 1st gear. Reassemble the rear wheel.
Tighten the wheel axis nut to the prescribed torque pressure.

Rear wheel RH nut torque pressure:
 $220 \div 240 \text{ N}\cdot\text{m}$

Apply grease only on the threaded part

Pay attention not to apply grease on the conical part of the nut.



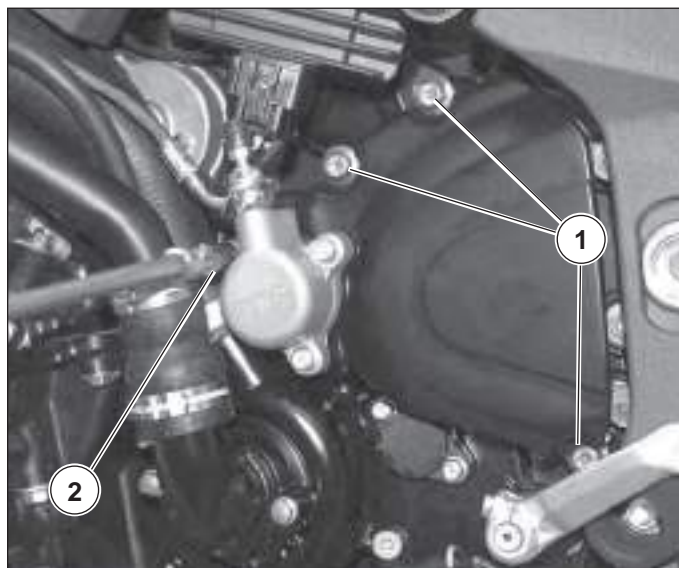
F Insert the retaining ring.

Reassemble the exhaust silencers.

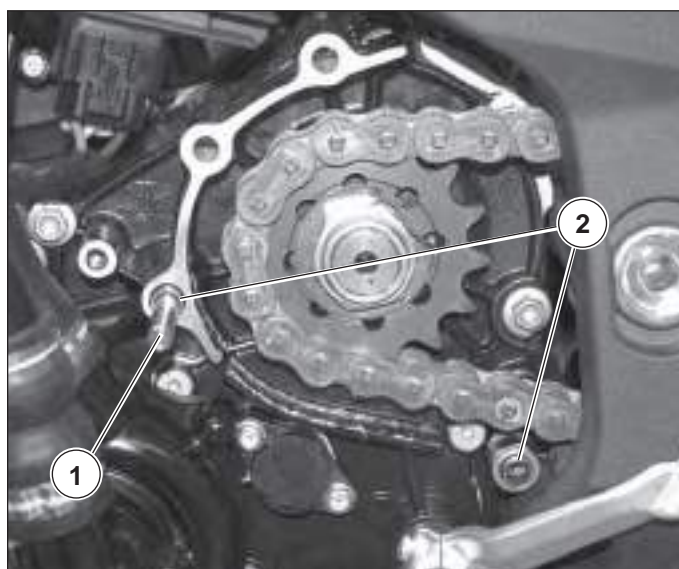
Perform the chain tension adjustment as described in the chapter B "MAINTENANCE".

Pinion wheel removal

Remove the screw (1) of the clutch control cylinder and the three screws (2) of the pinion wheel cover.



Remove the cover being careful to not extract the clutch control rod (1) (it must remain inserted in the engine) and be careful to not lose the two centralising bushes (2) indicated in the figure.





Suspension and wheels

Straighten the metal tongue with a flat-head drift and hammer.

Unscrew the pinion wheel retaining nut.



Slacken the chain (see page 43), bring it forward and slide it off the pinion wheel.

Effectuate this operation only if the pinion wheel has to be substituted.

If the pinion wheel and crown wheel assembly have to be substituted, it is advisable to operate by cutting the chain (see page 53), to facilitate the operation.



For reassembly, insert the pinion wheel with the chain already attached.

Insert a new washer on to the threaded cam shaft, tighten the nut and strongly tighten the prescribed coupling using an average-strength threadlock fluid.

Hammer the new washer down onto the two opposite faces of the hexagon.



**Chain pinion wheel nut torque pressure:
140 N•m**



**Recommended thread-locking fluid:
Loctite 243**





Suspension and wheels

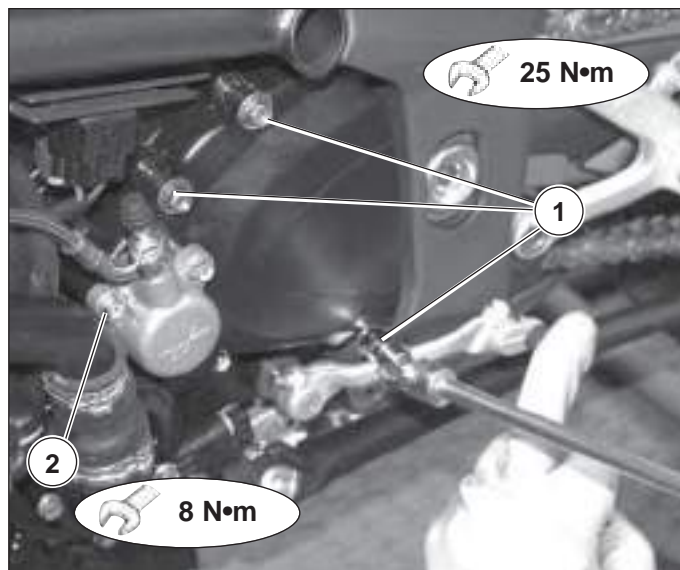
Reassemble the pinion wheel cover after having cleaned the support base.

Screw in the four screws lightly and proceed with the tightening, screwing down respectively on the three screws M8 (1) and on the screw M6 (2).



Torque pressure (M8 Screws): 25 N•m

Torque pressure (M6 Screws): 8 N•m





Suspension and wheels

MOTORCYCLE SET-UP ADJUSTMENT

Place the motorcycle on the rear stand.



Special tool N. 800092642



WARNING: The following adjustments must be performed when the fuel tank is full.

Insert the setting-up arm (A) of the rear suspension (special tool) in its appropriate seats as shown in the figure.



Special tool N. 800093347

Raise the rear part of the motorcycle by using the handle and the passenger footrest, until the full extension of the rear shock absorber is reached; contemporaneously measure the distance X_1 between the upper extremity of the rear stand and the point on the setting-up arm.

N.B. This operation must be carried out by two persons.

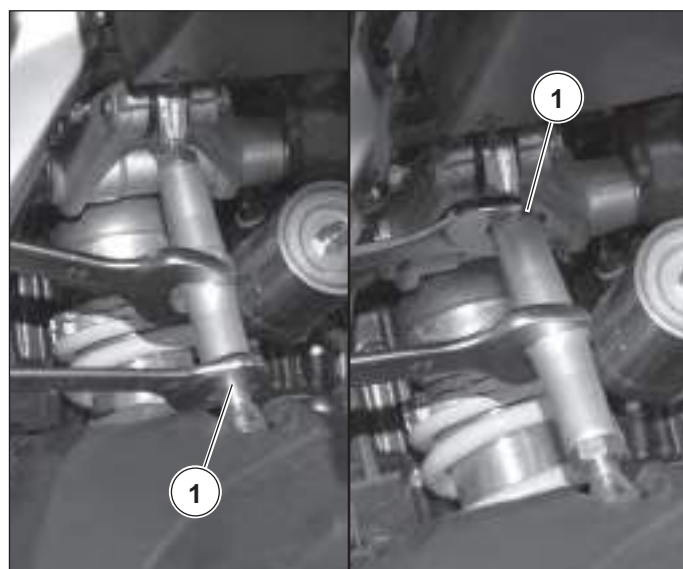
Check that the dimension X_1 is equal to:

- **BRUTALE 990 R:** $X_1 = 225 \text{ mm}$
- **BRUTALE 1090 RR:** $X_1 = 222 \text{ mm}$

If the dimension X_1 differs from the indicated value, slacken the counternuts (1) of the connecting rods of the rear suspension.



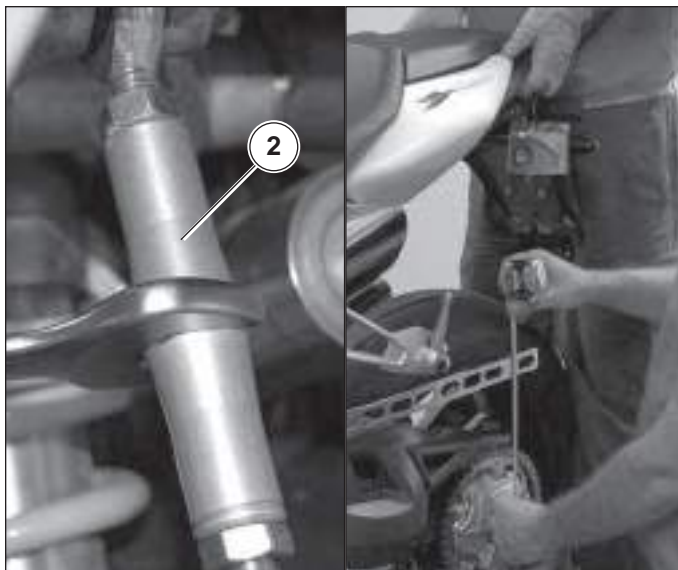
F



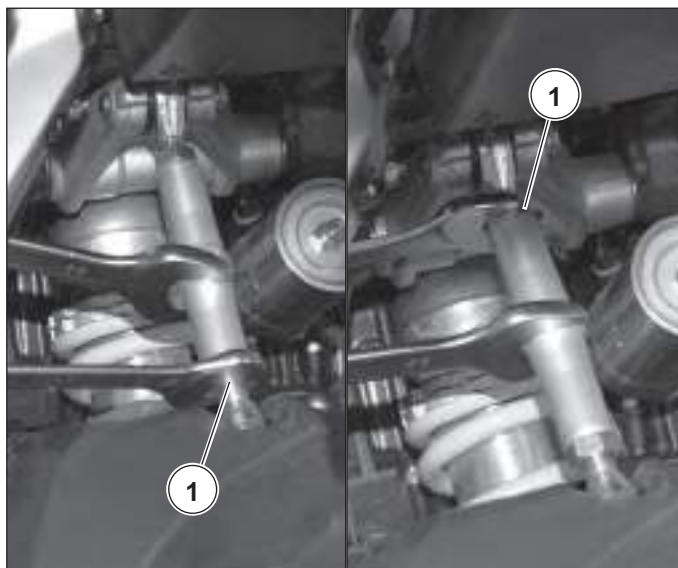


Suspension and wheels

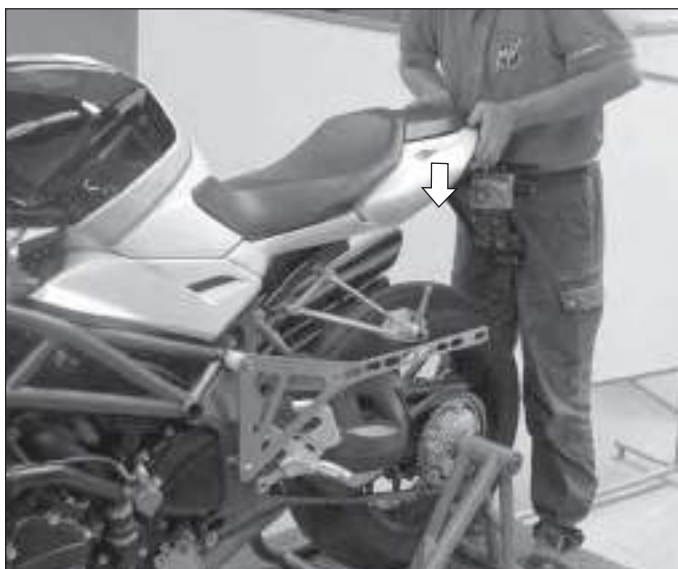
Using a ring spanner, adjust the distance between the two connecting rods by operating the adjuster bar (2) until the required X_1 level is reached.



F Manually and firmly tighten the two fixing counternuts (1) of the connecting rods until you hit the adjuster bar.



Press down on the seat so that the shock absorber is compressed and then let it go back into its resting position.





Suspension and wheels

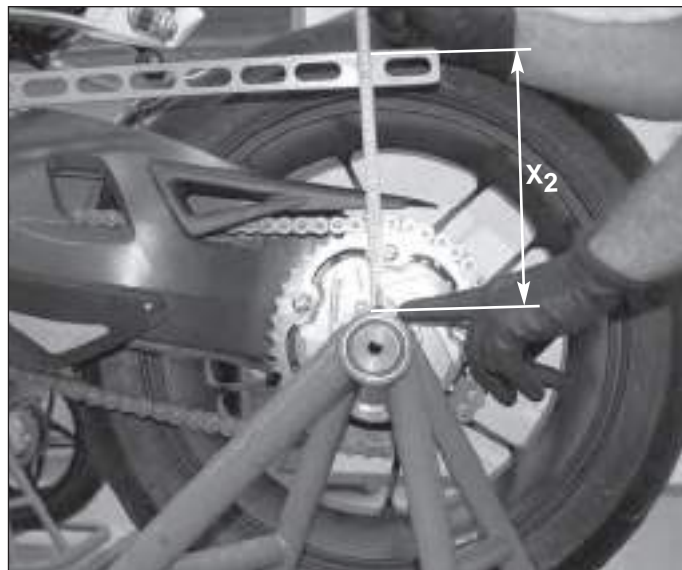
Measure the distance X_2 between the upper extremity of the rear stand tube and the point on the setting-up arm indicated by the arrow in the figure.

Calculate the static slack Δ according to this formula:

$$\Delta = X_1 - X_2$$

The value of the static slack should be equal to:

- **BRUTALE 990 R :** $\Delta = 25 \text{ mm}$
- **BRUTALE 1090 RR :** $\Delta = 22 \text{ mm}$



If the static slack value Δ is different from the indicated value, it is necessary to carry out the following adjustment on the shock absorber spring.

Slacken the upper lock ring of the rear shock absorber, rotating it in the direction indicated in the figure by utilising a **75 mm** key spanner.



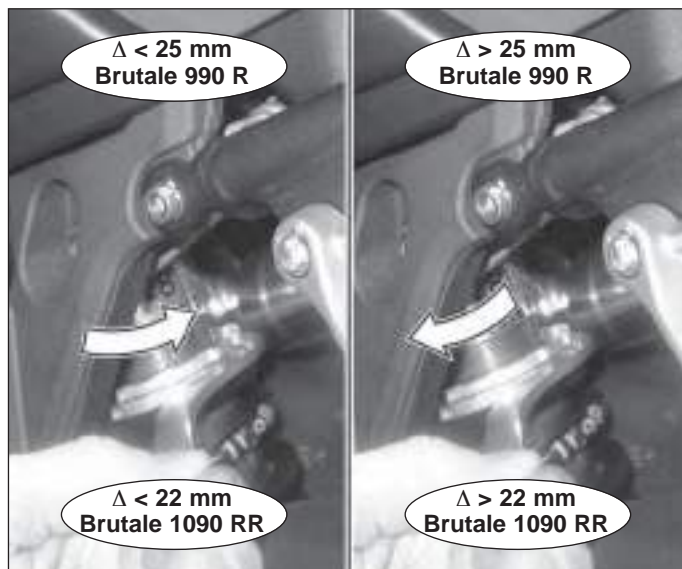
Rotate the lower lock ring as shown in the figure, either in a clockwise or anti-clockwise direction, according to the static slack Δ value calculated.

– **BRUTALE 990 R:**

- $\Delta < 25 \text{ mm}$: Rotate in an anti-clockwise direction
- $\Delta > 25 \text{ mm}$: Rotate in a clockwise direction

– **BRUTALE 1090 RR:**

- $\Delta < 22 \text{ mm}$: Rotate in an anti-clockwise direction
- $\Delta > 22 \text{ mm}$: Rotate in a clockwise direction





Suspension and wheels

At the end of the spring adjustment operation, tighten the upper lock ring as shown in the figure.



After having completed the adjustment of the motorcycle set-up, it is necessary to adjust the tension of the chain.

Check also the orientation of the front headlight and if necessary carry out the necessary adjustments. Both these operations are described in chapter B "Maintenance".

WHEEL BALANCE CHECK

If the tyres are substituted, it is necessary to effectuate the following operations balancing and checking the wheels.

Front wheel balancing

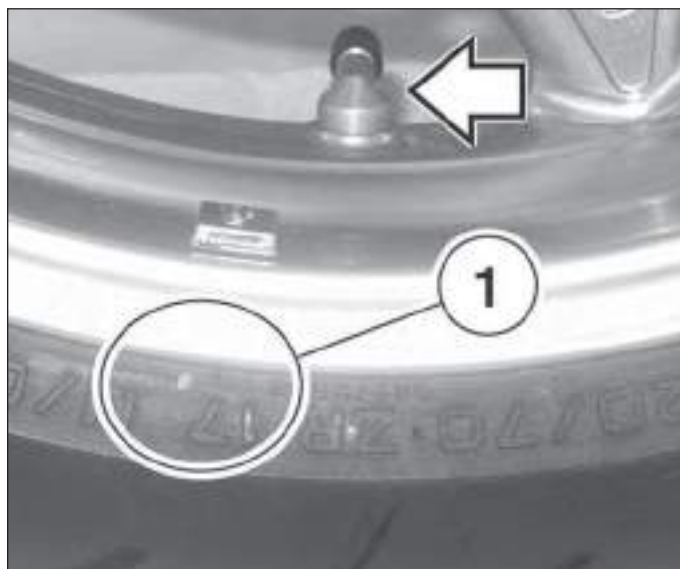
Mount the wheel onto an adequate support similar to that shown in the figure, utilising a ground pin of **35 mm** diameter. Check the wheel. Utilising a dial gauge, check the following tolerances:



Ovalization and maximum eccentricity must not exceed **0.5 mm**.
Flatness must not exceed **0.5 mm**.



When effectuating balancing on certain makes of tyres, it is necessary to refer to the yellow mark (1) present on the side of the tyre as shown in the figure. It indicates the lightest point of balancing and must be situated close to the tyre valve when the tyre is mounted onto the wheel rim.





Suspension and wheels

Rear wheel balancing

Before mounting the rear wheel on the appropriate tool, insert the balancing tool into the central hole of the wheel.



Special tool N. 800092865



Insert the polygonal nut of the balancing tool from the opposite side and screw it onto the threaded part of the tool so that the tool can be fixed to the wheel.



Mount the wheel onto an adequate support similar to that shown in the figure, utilising a ground pin of **35 mm** diameter. Check the wheel utilising a micrometer gauge and check the following tolerances:



Ovalization and maximum eccentricity must not exceed **0.5 mm**.





Suspension and wheels

Place the dial gauge as shown in the figure, and check the flatness.



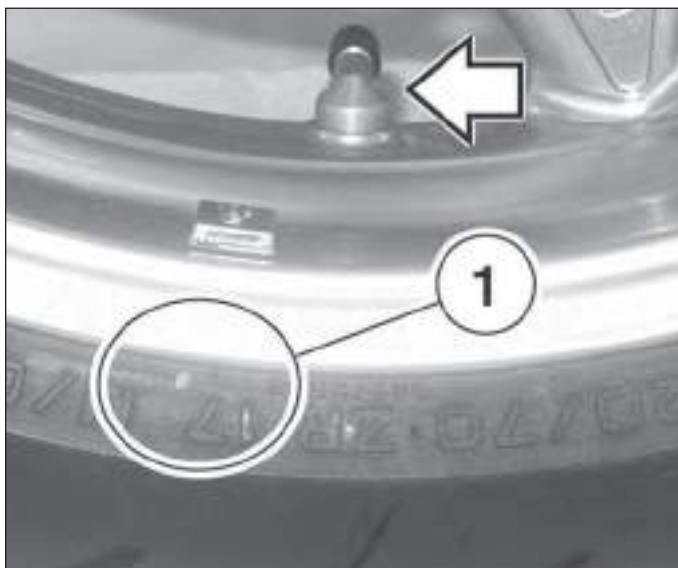
Flatness must not exceed: 0.5 mm.



F



When effectuating balancing on certain makes of tyres, it is necessary to refer to the yellow mark (1) present on the side of the tyre as shown in the figure. It indicates the lightest point of balancing and must be situated close to the tyre valve when the tyre is mounted onto the wheel rim.





Frame



G

SECTION G

Revision 1



SUMMARY

FRAME REMOVAL PRELIMINARY OPERATIONS	Page 3
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SECONDARY AIR SYSTEM DISMANTLING	Page 9
FRAME DISASSEMBLY	Page 13
FRAME CONTROL REFERENCE MEASUREMENTS	Page 16
FRAME ASSEMBLY TO THE MOTORCYCLE	Page 18
REAR SUB-FRAME REMOVAL	Page 21
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EXHAUST SYSTEM REMOVAL	Page 27
ENGINE REMOVAL	Page 31



Frame

FRAME REMOVAL PRELIMINARY OPERATIONS

Place the motorcycle on the rear stand.



Special tool: code No. 800092642



Remove the components in the following sequence:

- Tank side panels;
- Radiator protective covers;
- Passenger and rider seat;
- Fuel tank;
- Air filter compartment;
- Rear side panels;

the reassembly procedures of the components indicated are described in chapter C "Bodywork".



Utilising the specific lift equipped with the related pin, lift up the front part of the motorcycle.



Special tool:

- **Front stand code No. 800095807**
- **Pin code No. 800095808**





Frame

Remove the components in the following sequence:

- Front mudguard;
- Front brake calipers;
- Front wheel;
- Water radiator;

the procedure for removing the components indicated are described in chapter F "Suspensions and wheels", chapter H "Brakes" and chapter L "Cooling and lubricating system".

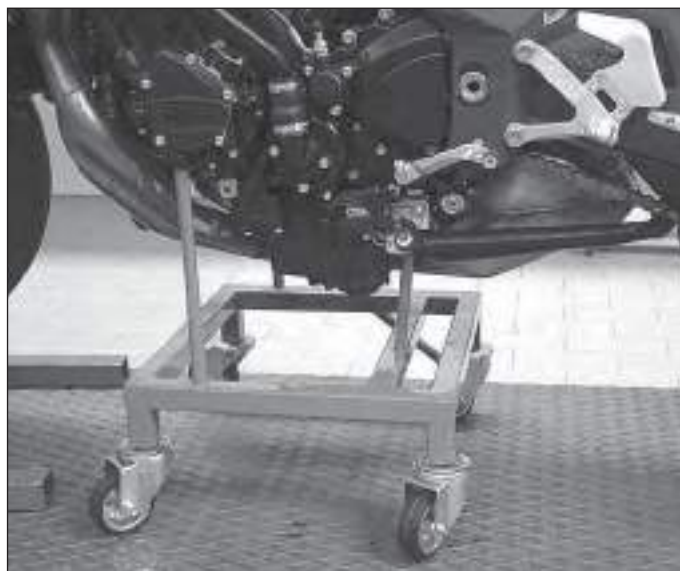


Insert the specific support tool under the engine assembly, taking care to position it as indicated in the figures.



Special tool: code No. 8000B4417

Lower the motorcycle and remove the lift no. 800095807.



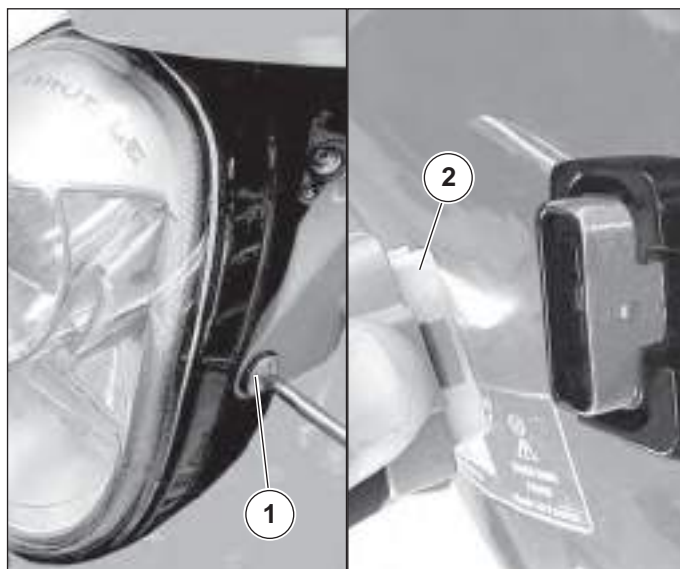
Remove the two fixing screws (1) of the front headlight on the sides.

Take care to slide the adjuster out of its seat when the headlight is removed from the support.

Before removing the front headlight, disconnect the connector (2) placed in the rear part of the headlight.

Then remove the headlight support and the instrument panel as described in chapter C "Bodywork".

Proceed removing the front brake pump and the clutch control pump as described in chapter H "Brakes".





Frame

Operating on the right side, free the wiring from the bands fixing it to the frame.



Protect the area around to the clutch control cylinder with a cloth or paper.
Remove the union and discharge the clutch fluid from the system into an appropriate container.



Remove the ignition switch and the cooling system complete with the expansion tank as described in chapter L "Cooling and lubricating system".



G



Frame

Remove the steering assembly and the relative components of the front suspension as described in chapter F "Suspensions and wheels".



THROTTLE BODY REMOVAL

Slacken the nut (1) fixing the accelerator control wiring to the support plate of the throttle body.



Remove the connector (2) of the phase sensor by undoing the screw (3).





Frame

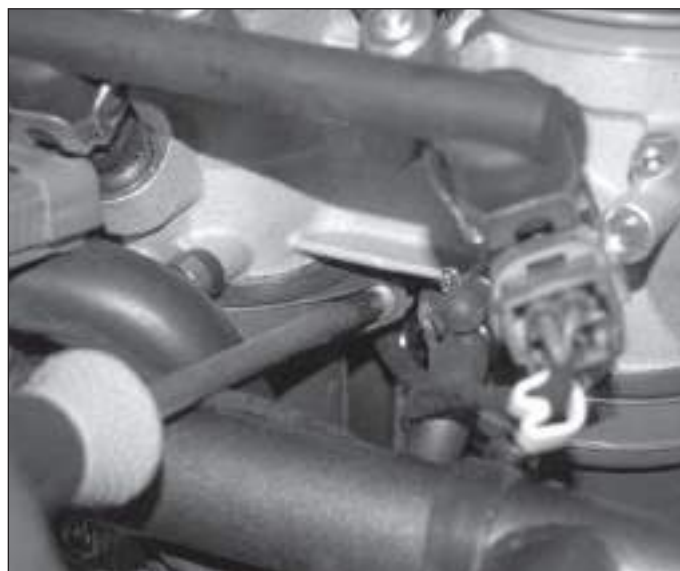
Loosen the nut (1) which clamps the accelerator command cables to the throttle body.



Fleet the accelerator control wiring and extract the pawl (A) of the opening wiring. Carry out the same operation on the pawl of the closing wiring.



Slacken the fixing clamps of the throttle body to the intake ducts of each cylinder.



G



Frame

Disconnect the connections relative to the injectors of each cylinder.



Operating alternatively on both sides of the motorcycle remove the supports of the tubing for checking the suction by unscrewing the screw (1) fixing the support to the frame.



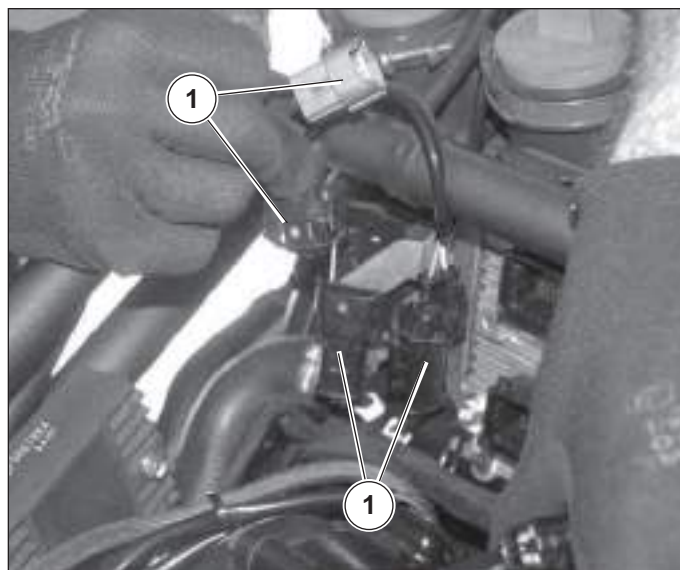
Remove the complete throttle body assembly.





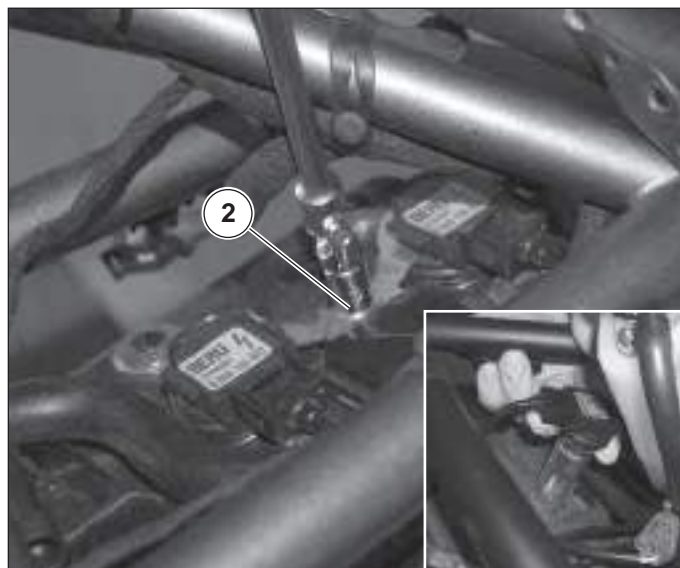
COILS DISMANTLING

Disconnect the coil connectors (1) from the control unit support.



Unscrew and remove the coil backing plate fixing screws (2).

Remove the coils from their housings.



SECONDARY AIR SYSTEM DISMANTLING

Disconnect the connector (1) from the secondary air unit.

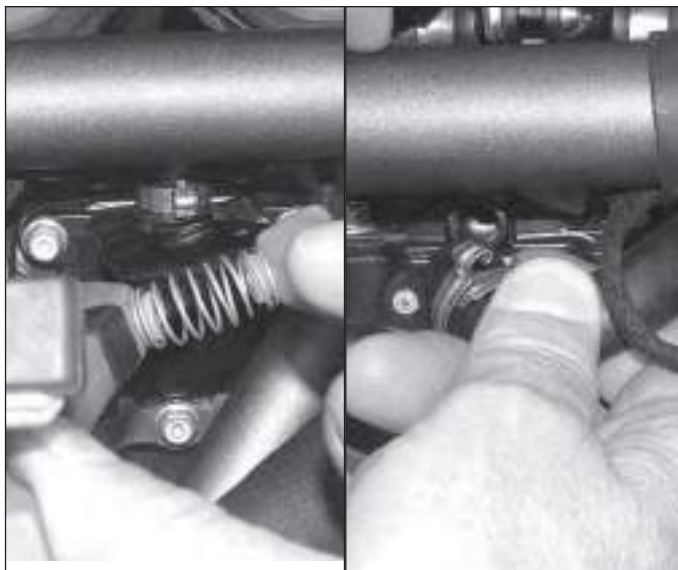




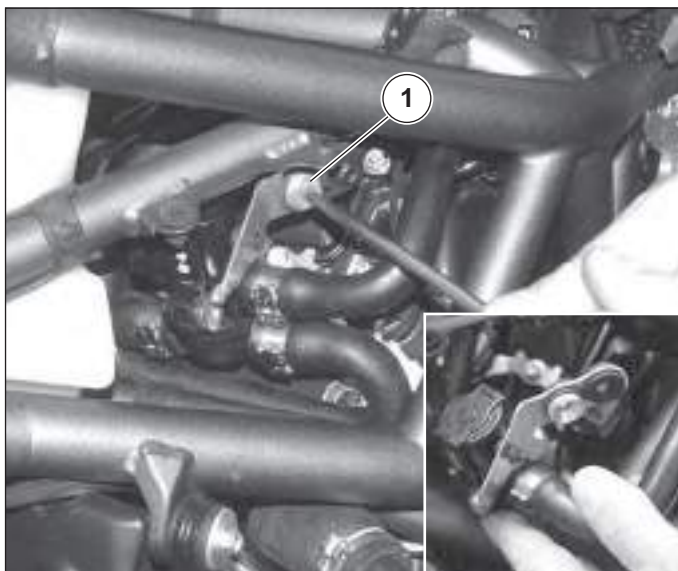
Frame

Loosen the two CLIC R 96105 clamps of the secondary air hoses connections to the cylinders using special pliers.

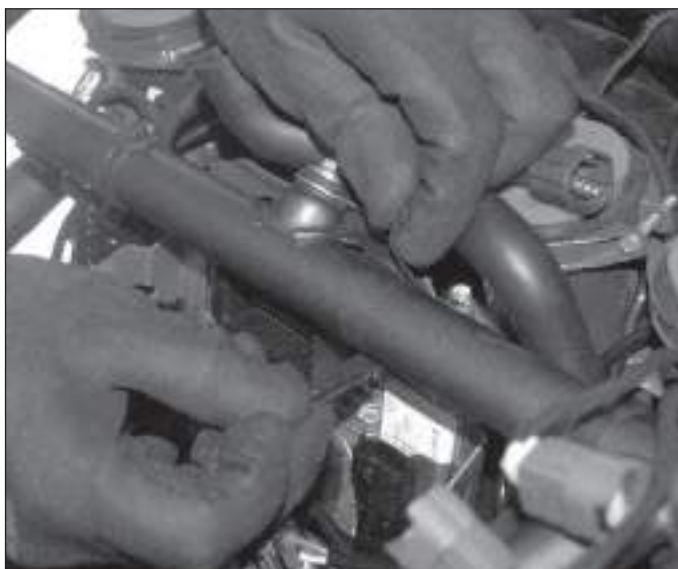
Disconnect the secondary air hoses



Unscrew the screws (1) and remove the secondary air valve with the related hoses.



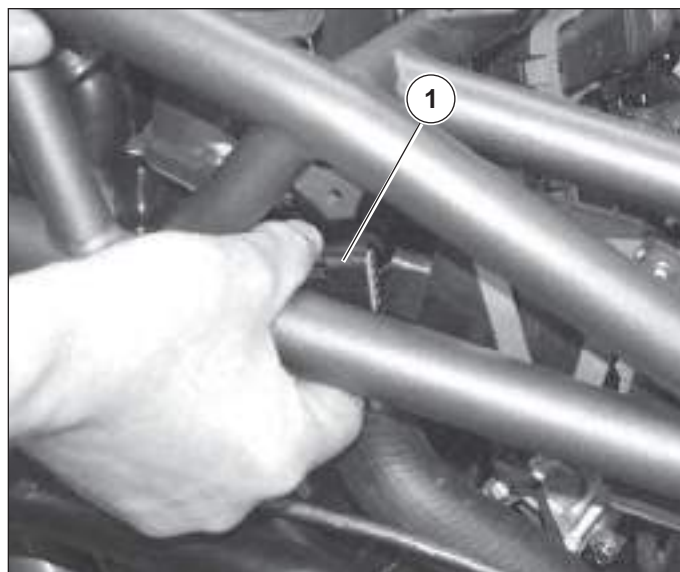
Remove the two rubber bands so to free the wiring from the frame.



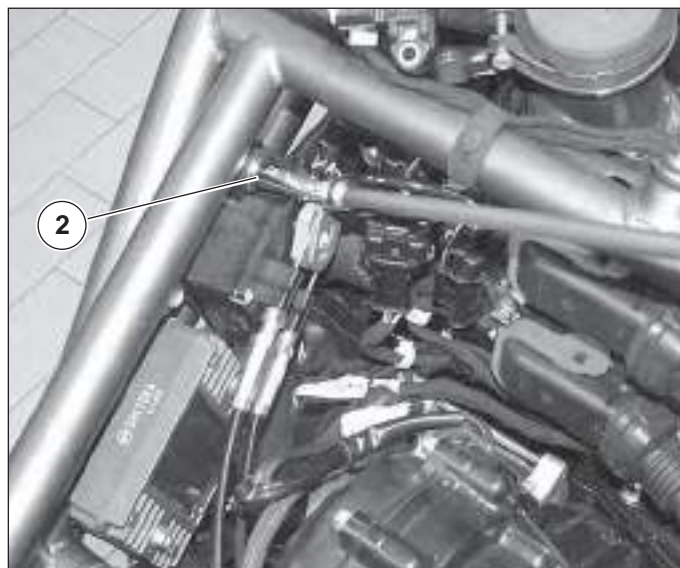


Frame

Disconnect the connector (1) from the exhaust valve actuator.



Remove the screws (2) fixing the actuator to the frame.



Lean the actuator on the engine in order not to hamper the following operations.





Frame

Disconnect the connector of the voltage regulator.



Slide out the main wiring and fold it backwards on the rear sub-frame.



Fix the main wiring to the sub-frame with an elastic band.

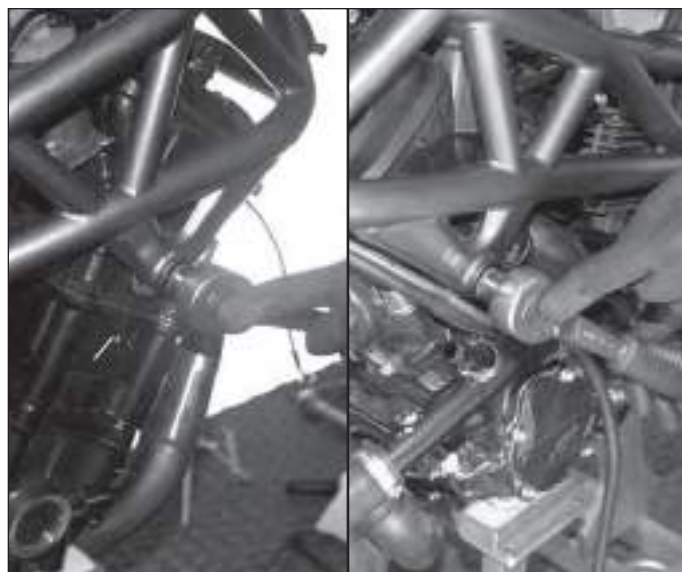




Frame

FRAME DISASSEMBLY

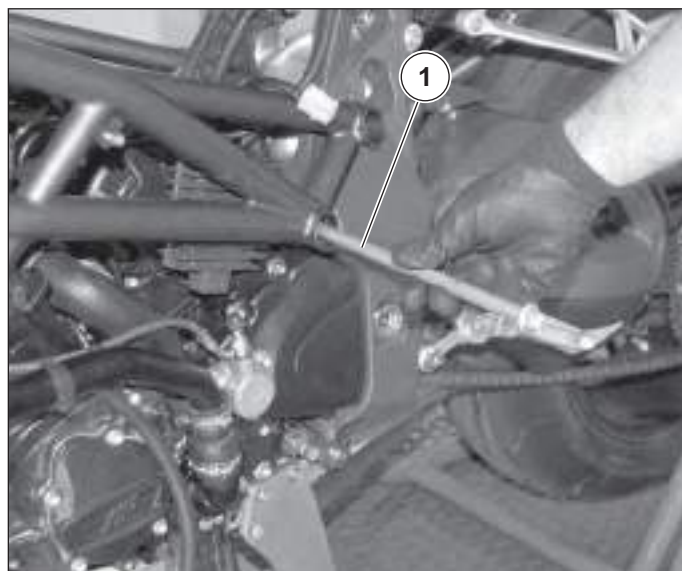
Operating in the same way on both sides of the motorcycle unscrew and remove the front screw fixing the engine cylinder head to the frame and collect the eccentric washer.



Operating on the right side unscrew and remove the rear nut fixing the engine assembly to the frame.



Operating on the left side extract the pin (1).

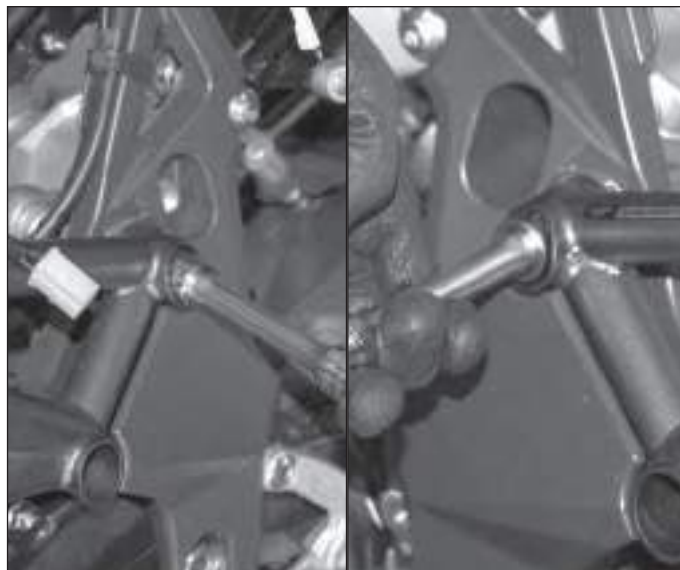


G



Frame

Remove the screws fixing the frame to the union plates from both sides.



Remove the frame rotating the steering sleeve upwards.



Frame check

Accurately clean the conical seats of the steering head housing.





Frame

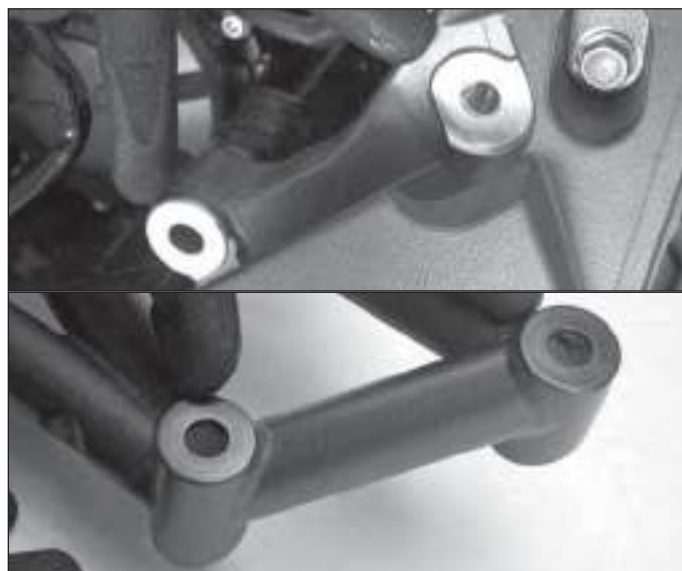
Check that there are no marks or signs on all surfaces.
Check that the area shown in the figure is not deformed (as a consequence of accident damage).



Check that there are no marks of evident breakages along the frame tubes.
If damage is found, substitute the frame.



Clean and examine the contacts between the frame and the engine and also between the frame and union plates.



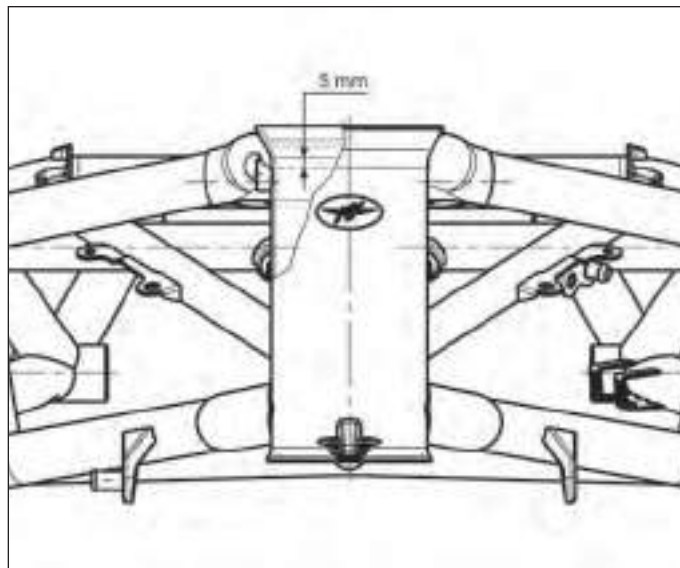


To carry out a detailed check of the frame, herewith below are the reference measurements that are of fundamental importance for the correct condition of the frame.

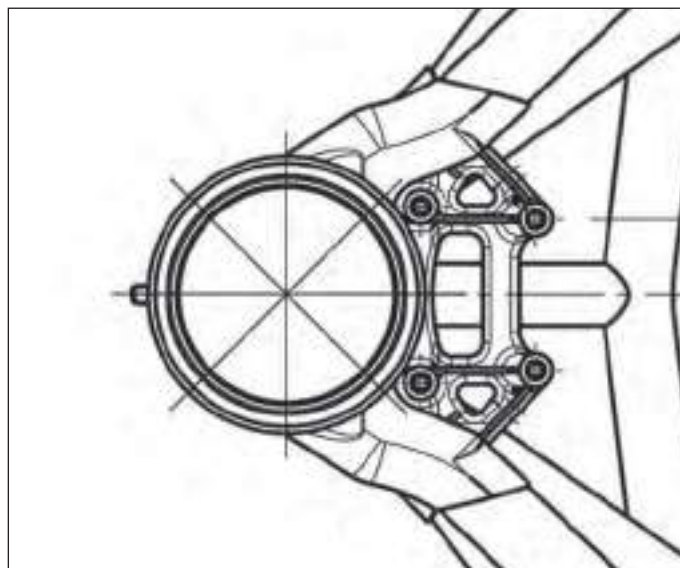


Steering head housing check

Check the diameter and eventual ovalisation of the steering head housing, **5 mm** from the lip of the beveling as shown in the figure.



Measure the ovalisation in diverse points as shown in the figure.





Frame

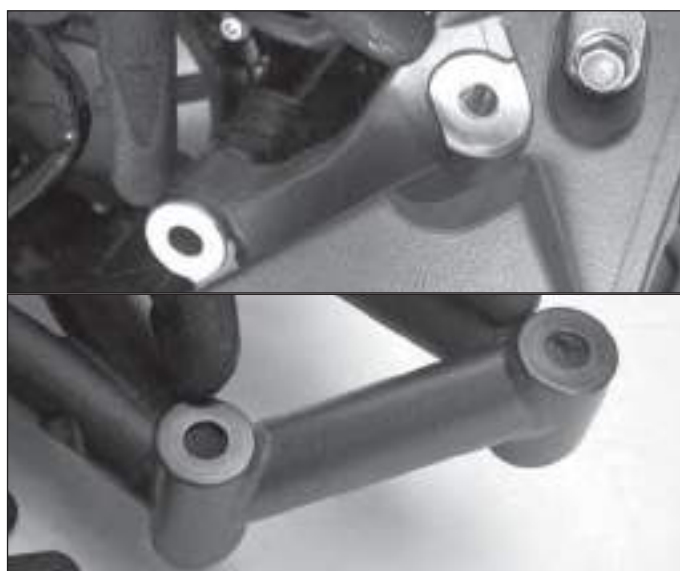
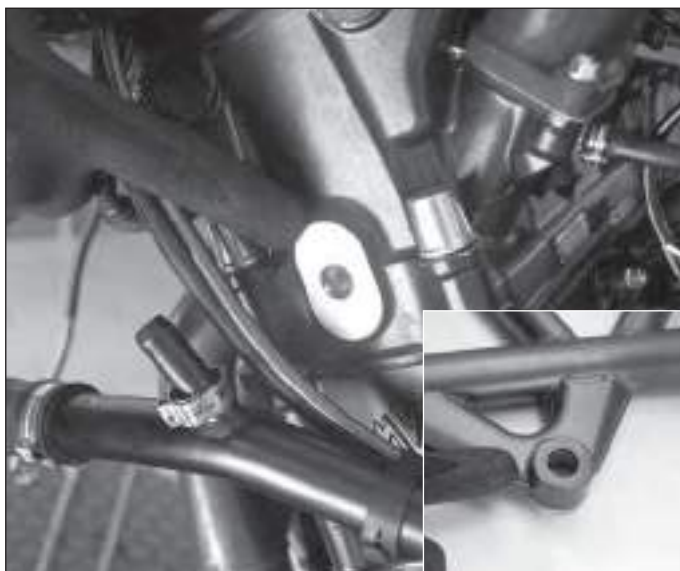
FRAME ASSEMBLY TO THE MOTORCYCLE

If it is necessary to substitute the frame, it is possible to recuperate various components from the old frame, such as the CPU support plate, anti-vibration rubbers and the rubber protection. These components can be mounted onto the new frame after having effectuated a thorough check on their condition.

For the stamping and the homologation labels of the new frame, contact the MV AGUSTA service centre.



Thoroughly clean the matching surfaces of the frame-engine cylinder head and frame-union plates.





Frame

With regards to the positioning of the cables, fasteners and various wiring consult the various tables shown in the Spare Parts Catalogue Brutale 990 R - 1090 RR (Code No. 8000B3254).

Carry out the sequence of operations of assembly in reverse order to removal for the correct assembly of the frame to the motorcycle.

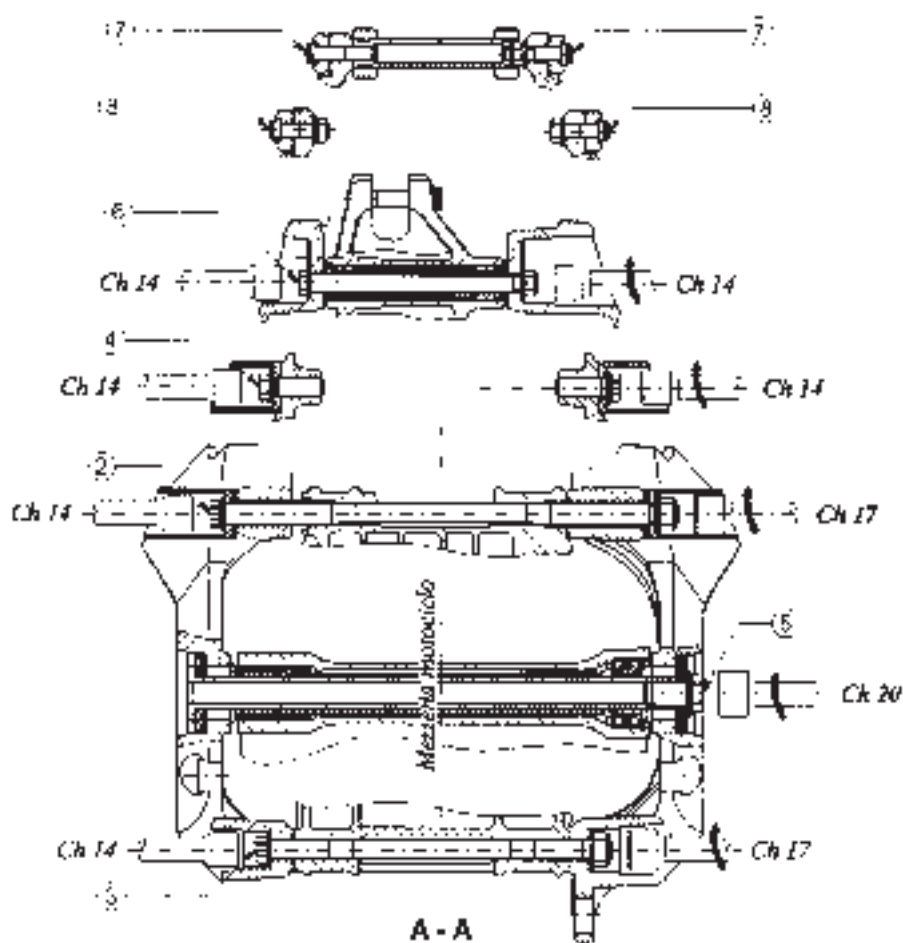
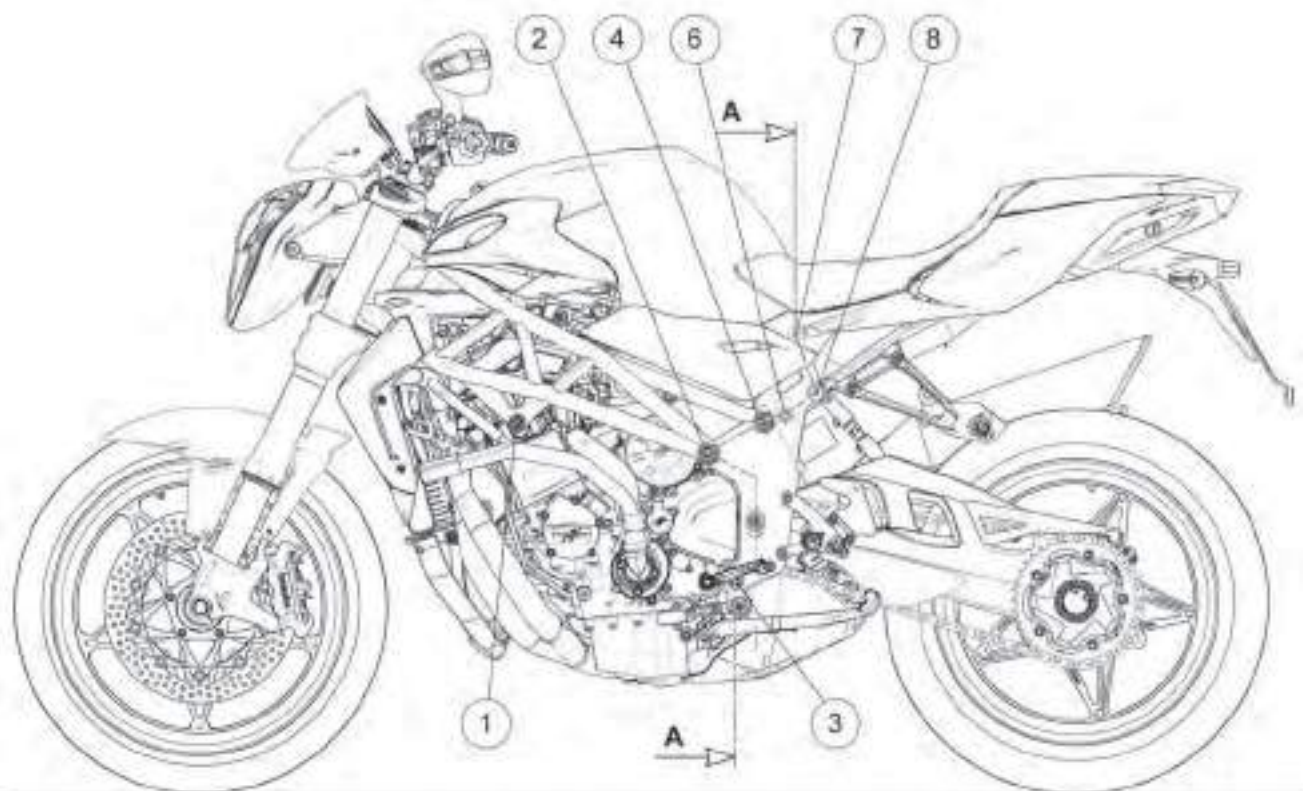
Tighten the various fixings to the torque pressure shown in the following diagram.

PART No.	DRAWING No.	DESCRIPTION	DIMENSIONS	TORQUE PRESSURE	
				N·m	Kgm
①	8000B3004	Front engine mounting screw	M12x1.25	55/60	5.5/6.0
②	8000B2757	Upper engine mounting screw	M12x1.25	55/60	5.5/6.0
③	8000B2756	Lower engine mounting screw	M12x1.25	55/60	5.5/6.0
④	8000B2750	Plate – frame screw	M12x1.25	55/60	5.5/6.0
⑤	8000B2983	Swingarm pin screw	M15x1.25	70/75	7.0/7.5
⑥	8000B2755	Rear suspension rocker arm screw	M10x1.25	45/50	4.5/5.0
⑦	8D00B2690	Upper plate-sub-frame fixing screw	M8x1.25	24/28	2.4/2.8
⑧	8C00B2690	Lower plate-sub-frame fixing screw	M8x1.25	24/28	2.4/2.8

The tightening of the engine mounting screws and the plates ① ② ③ ④ ⑤ ⑥ is carried out with the motorcycle resting on its wheels and the engine hanging from the frame.

The tightening of the rear sub-frame screws ⑦ ⑧ is carried out by letting the sub-frame drop into position by its own weight.

Utilise “AGIP GREASE 30” for the screws.





REAR SUB-FRAME REMOVAL

After having carried out the removal of all the necessary components described in the previous paragraph, perform the following operations.

Undo the screw on the negative pole of the battery, then remove the engine ground cable.

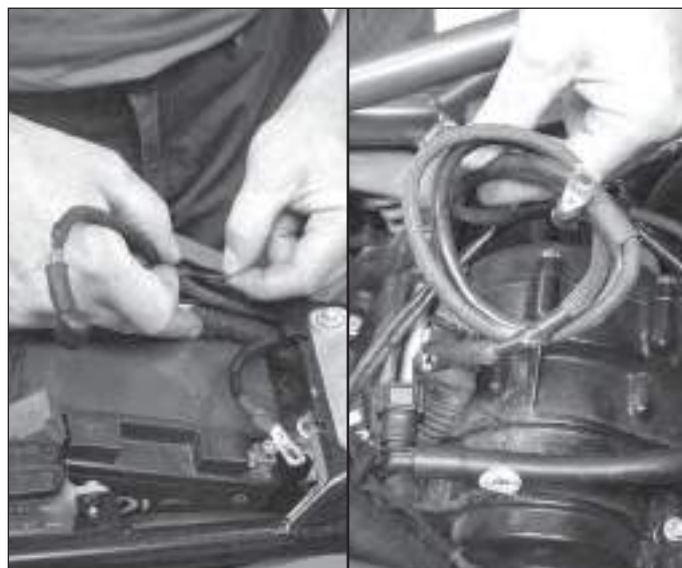
Disconnect the solenoid starter connector.

Remove the cap and the screw fixing the starter motor cable to the solenoid.



Remove the rubber clamps fixing the starter motor cable to the rear sub-frame.

Slide out the starter motor cable and lean it on the engine.



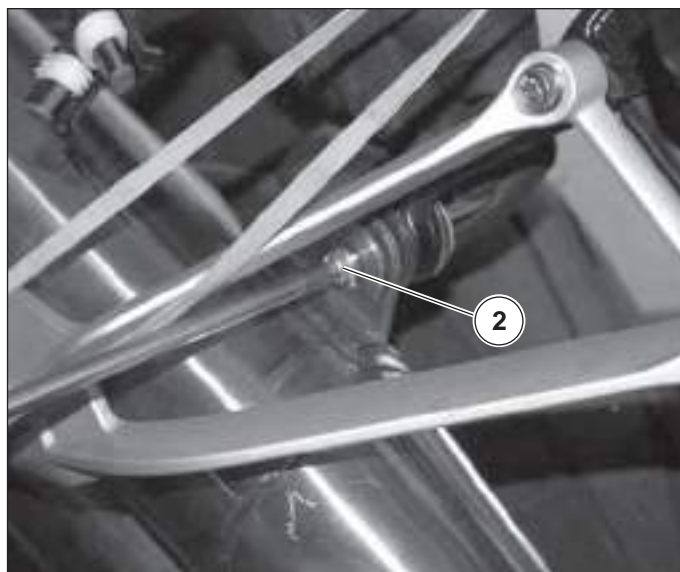
Undo the screw (1) of the oil tank of the rear brake and take it out towards the front.





Frame

Undo the screw (2) which fixes the silencers to the frame.

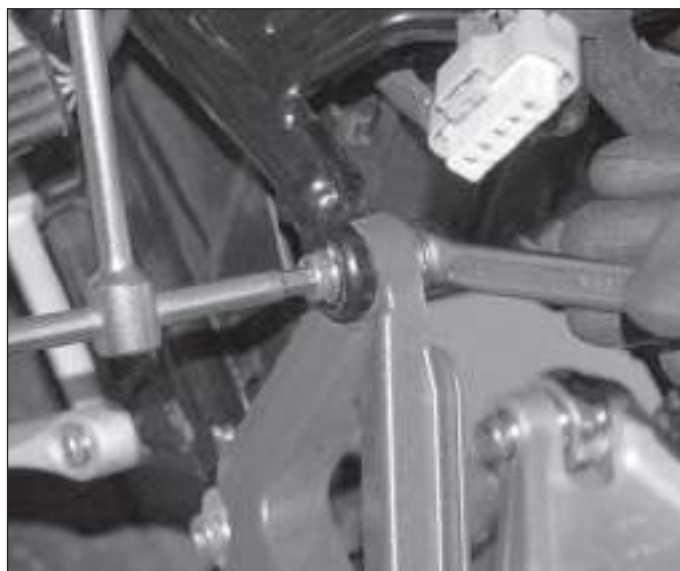


Once the wiring has been freed and collected as shown in the figure, it is possible to remove the rear sub-frame.



Unscrew and remove on both sides the two lower screws fixing the rear sub-frame to the union plates taking care to collect the nuts.

Unscrew and remove the two upper fixing screws taking care, in this case also, to support the sub-frame and collect the nuts.





Frame

At this point it is possible to remove the complete sub-frame assembly from the motorcycle.

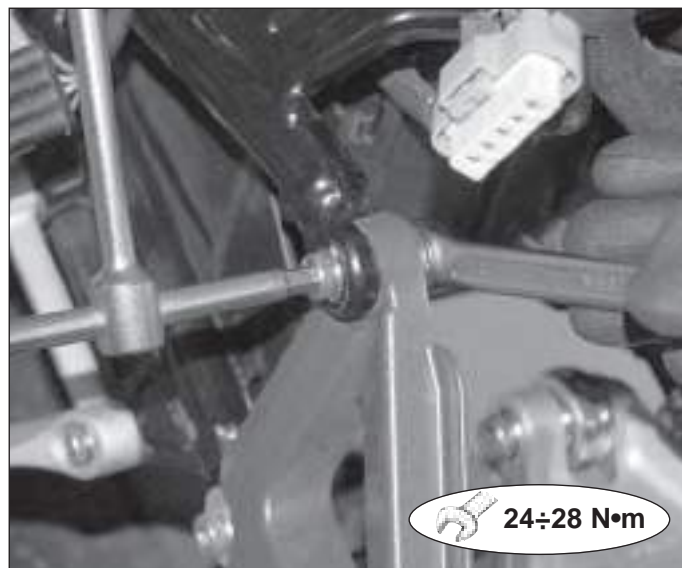


Rear frame unit assembly

Carry out the operation of reassembling the rear sub-frame on the motorcycle in the reverse order of removal, taking care to tighten the fixing screws to the prescribed torque pressure.



Rear sub-frame fixing screw torque pressure:
24÷28 N•m



ENGINE REMOVAL PRELIMINARY OPERATIONS

Side stand removal

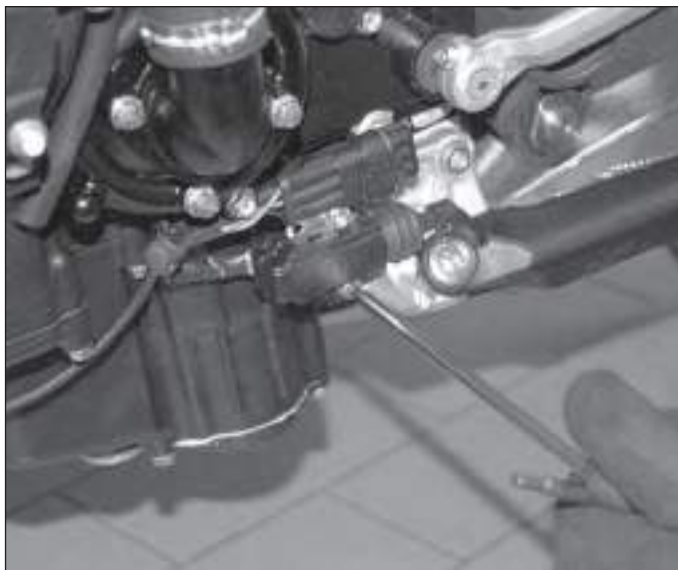
Disconnect the connector of the side stand switch from the main wiring.





Frame

Operating on the left side of the motorcycle, unscrew and remove the two fixing screws of the side stand switch.

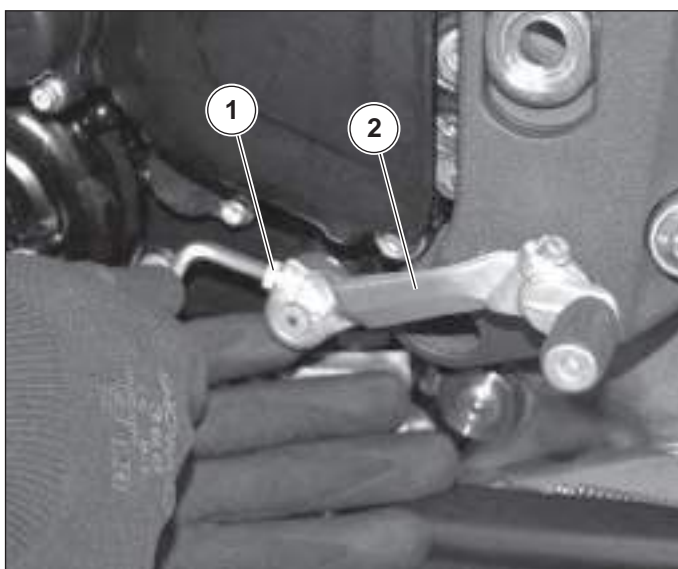


Remove the side stand assembly by unscrewing the three fixing screws.



Gearchange lever removal

Unscrew the fixing screw (1) and slide out the gear change lever (2).





Frame

Remove the rear brake pump and related protection as described in chapter H "Brakes".



Disconnect the connector of the rear brake stop light from the main wiring.



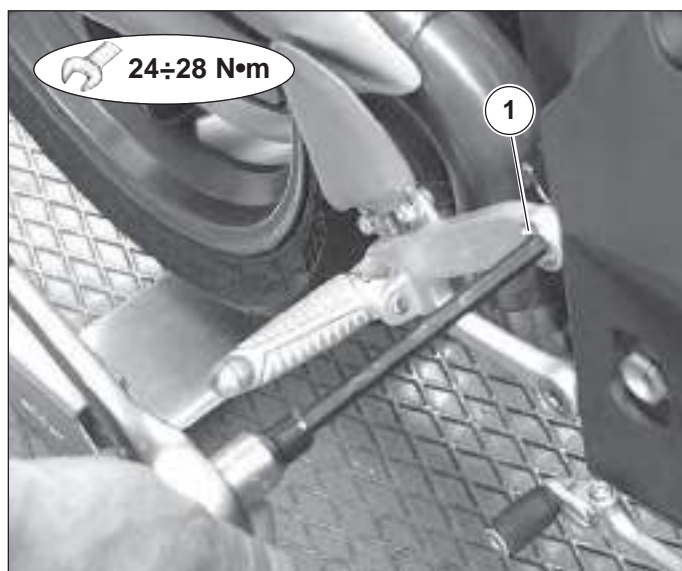
EXHAUST SILENCERS REMOVAL

Remove the rider footrests by unscrewing the two fixing (1) screws.

NOTE When reassembling tighten the footrest fixing screws to the prescribed torque pressure.



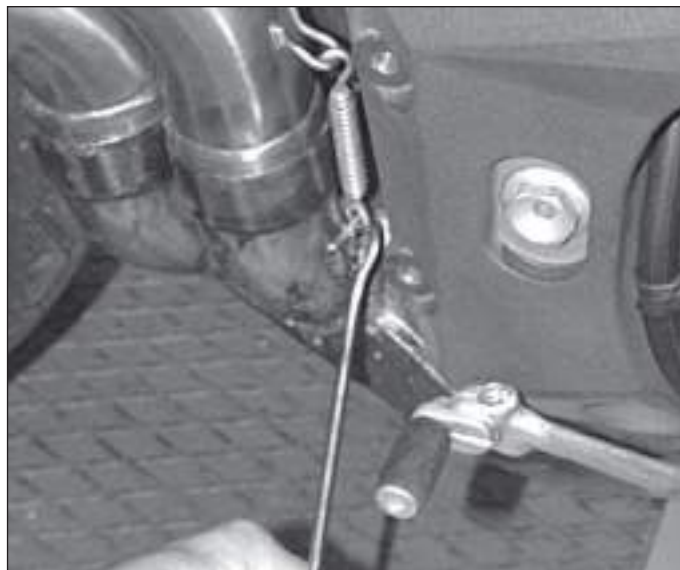
Torque pressure of the screws fixing the footrests to the plate: $24 \div 28 \text{ N}\cdot\text{m}$.





Frame

Remove the exhaust silencers retaining springs.



Remove the screw fixing the silencers to the related support bracket.



Slide out the silencers from the exhaust compensator.

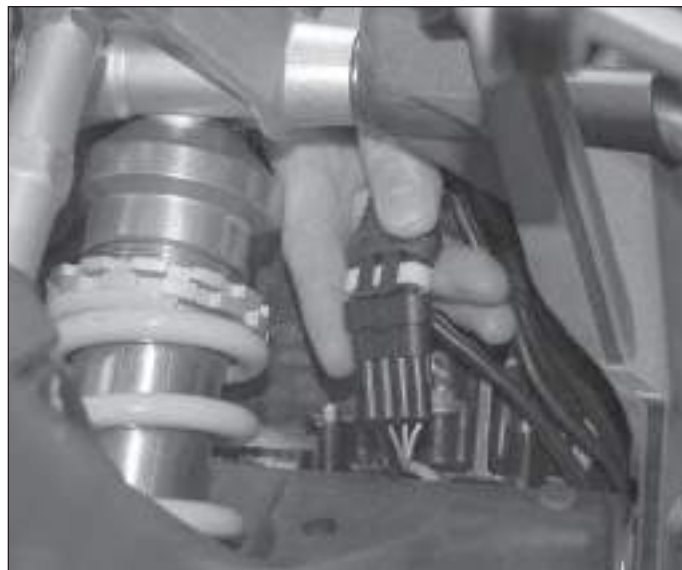




EXHAUST GROUP REMOVAL

NOTE The removal of the exhaust manifolds is not necessary in order to perform the engine disassembly. Carry out the following operations only if it is necessary to check or replace the exhaust system.

Disconnect the lambda probe connector from the main wiring and pull it outwards, on the right side of the vehicle.



Unscrew the lower fixing screws of the oil radiator guard, positioned at the lower base of the water radiator.

Remove the oil radiator guard.



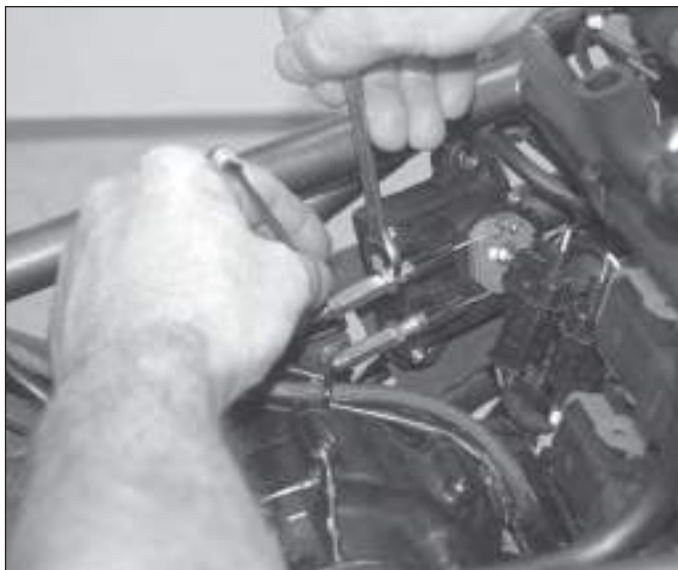
Remove the complete brake pump support.



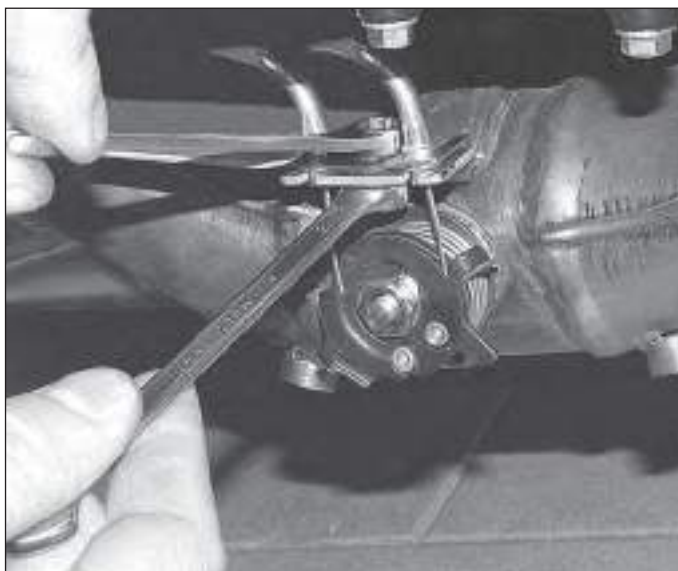


Frame

Loosen the transmission cables adjusters of the exhaust valve.



Remove the clamping screw of the plate which holds the transmission cables of the exhaust butterfly in place.



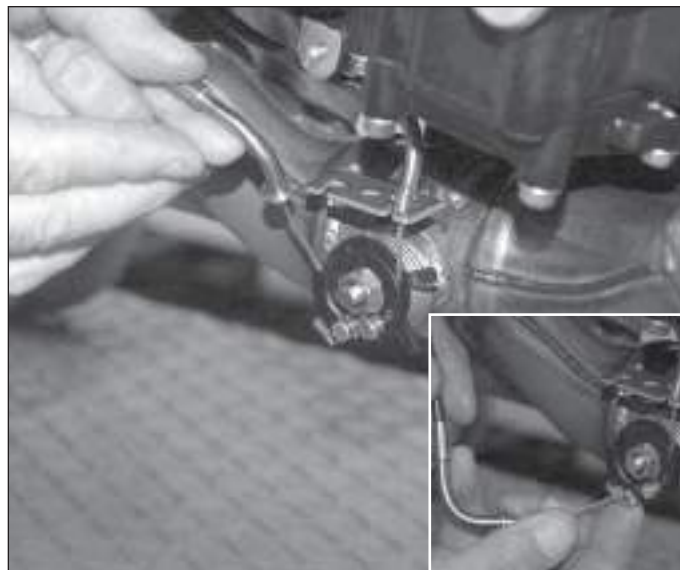
Extract the holding plate.





Frame

Remove the ends of the transmission cables of the exhaust valve.



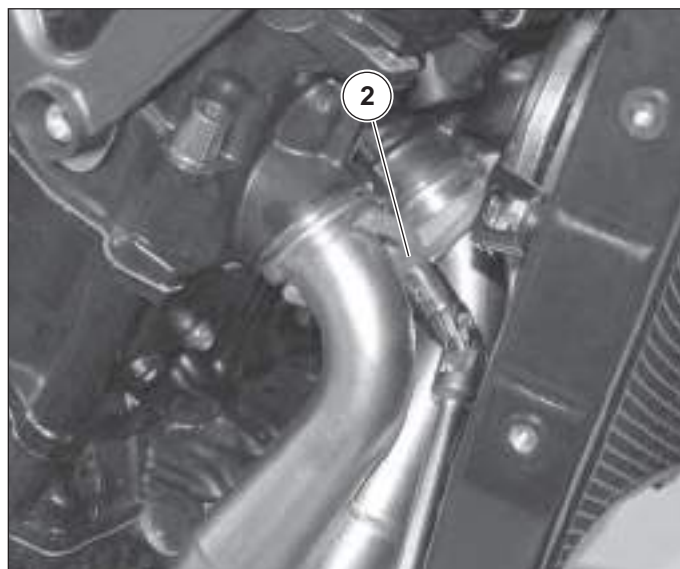
Remove the screw (1) connecting the oil radiator and the water radiator.



Move the radiators slightly towards the front of the motorcycle, then remove the flange fixing the exhaust manifolds to the cylinder unit by unscrewing the nut (2).



During this operation, take care near the exhaust pipes in order to avoid burns.





Frame

Unscrew the compensator fixing screws.



Special tool: code 8000B2051

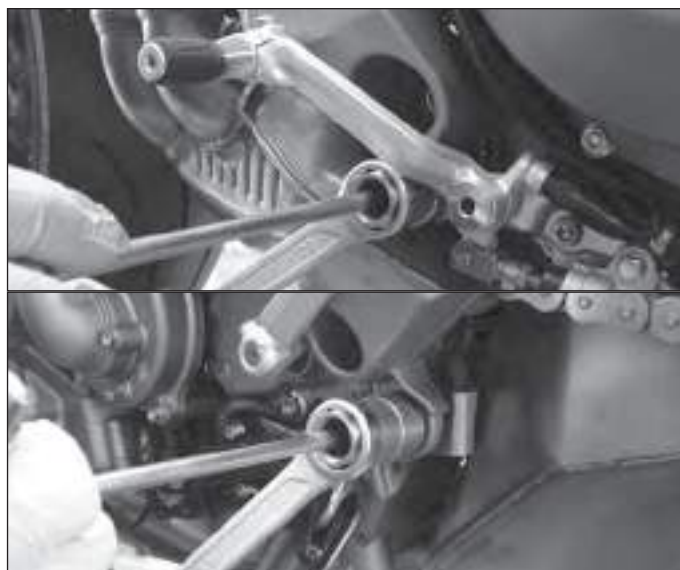
At the time of the assembly, apply the recommended thread locking adhesive to the threads of the screws and tighten them at the required torque.



Recommended thread-locking fluid: Loctite 243



Torque pressure: $20 \div 22 \text{ N}\cdot\text{m}$

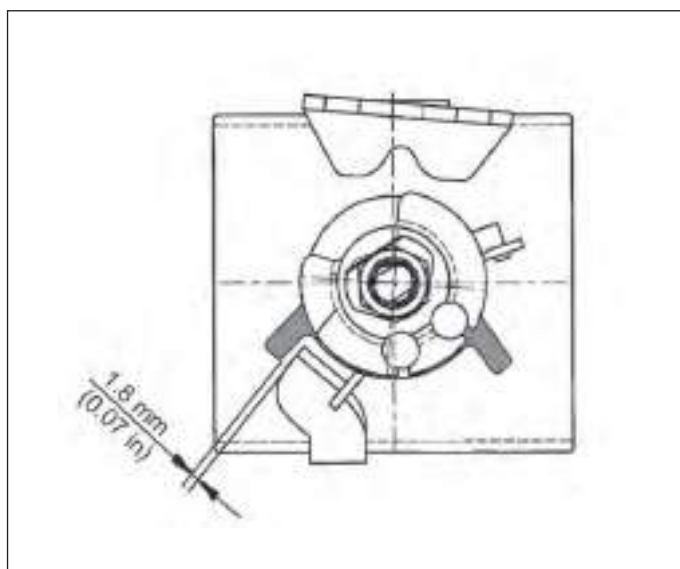


Remove the exhaust manifolds by turning slightly towards the right of the vehicle.



When reassembling the exhaust valve transmission cables, make sure to set the closing and opening transmission adjusters until you reach a clearance between reference plate and pulley stop equal to **1.8 mm** (see figure).

At this point, manually tighten the closing and opening transmission adjusters.



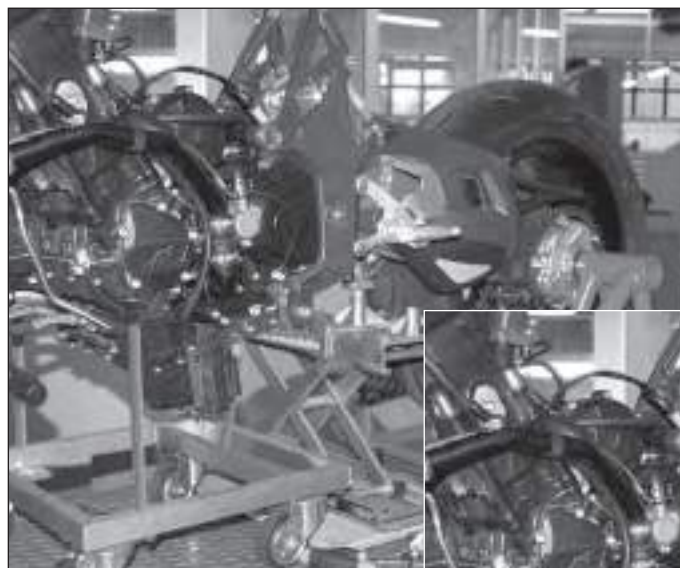


ENGINE REMOVAL

Remove the chain as described in chapter F "Suspensions and wheels".



Position an appropriate lift to support the rear suspension/swingarm assembly as shown in the figure.



Slacken the fixing screw of the swingarm pin by **1** turn.





Frame

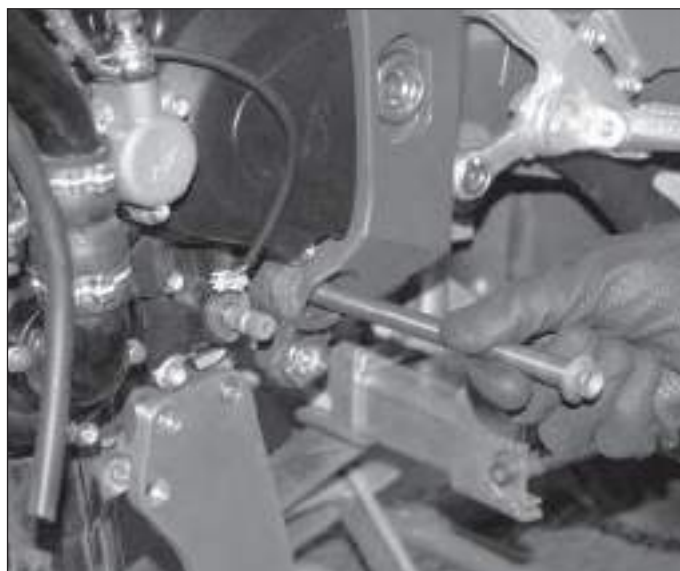
Slacken the nut on the rear suspension rocker arm pin.



Remove the lower engine support pin fixing nut.



Operating on the left side extract the engine support pin.





Frame

Extract the bush shown in the figure from the union plates of the frame from both sides, by using the specific tool.



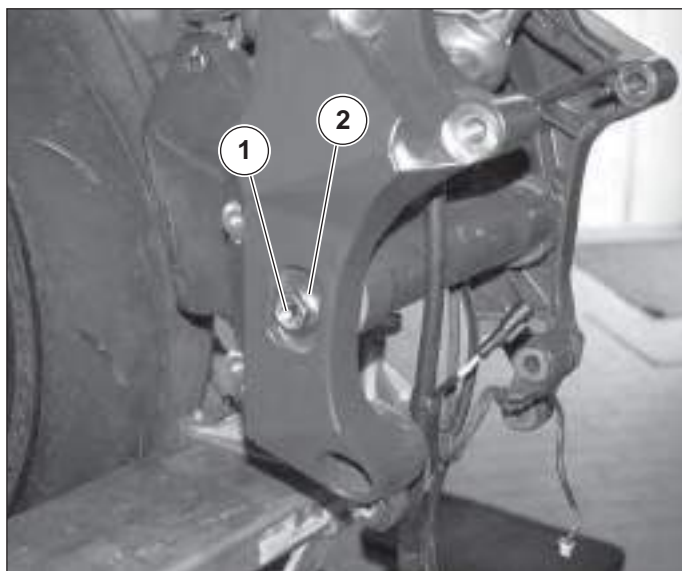
Special tool: No. 8000B4415



Remove the engine assembly from the union plates by dragging it forwards.



Operating on the right side, remove the swingarm pin fixing screw (1) taking care to collect the washer (2).





Frame

Remove the right union plate.



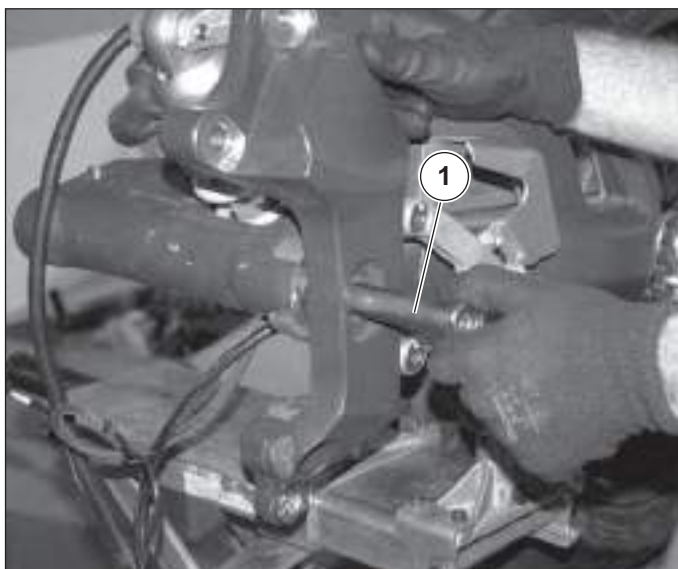
Remove the rear suspension pin fixing nut and slide out the pin from the left side.



Remove the swingarm pin (1).

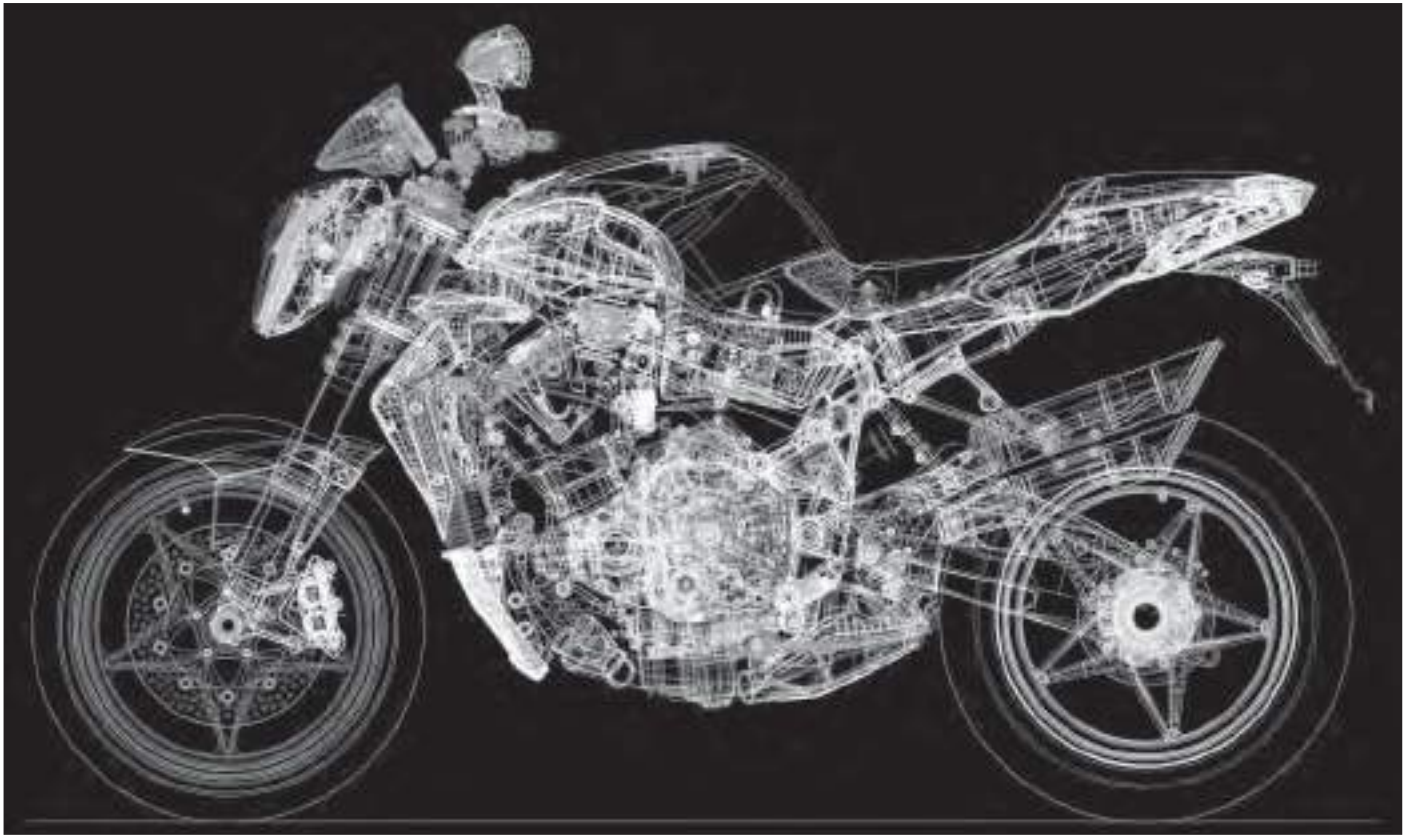
Remove the left union plate.

When reassembling proceed in the reverse order of removal, taking care to apply the prescribed grease and to tighten every fixing to the torque pressure indicated on page 19 of this chapter.





Brakes



H

SECTION H

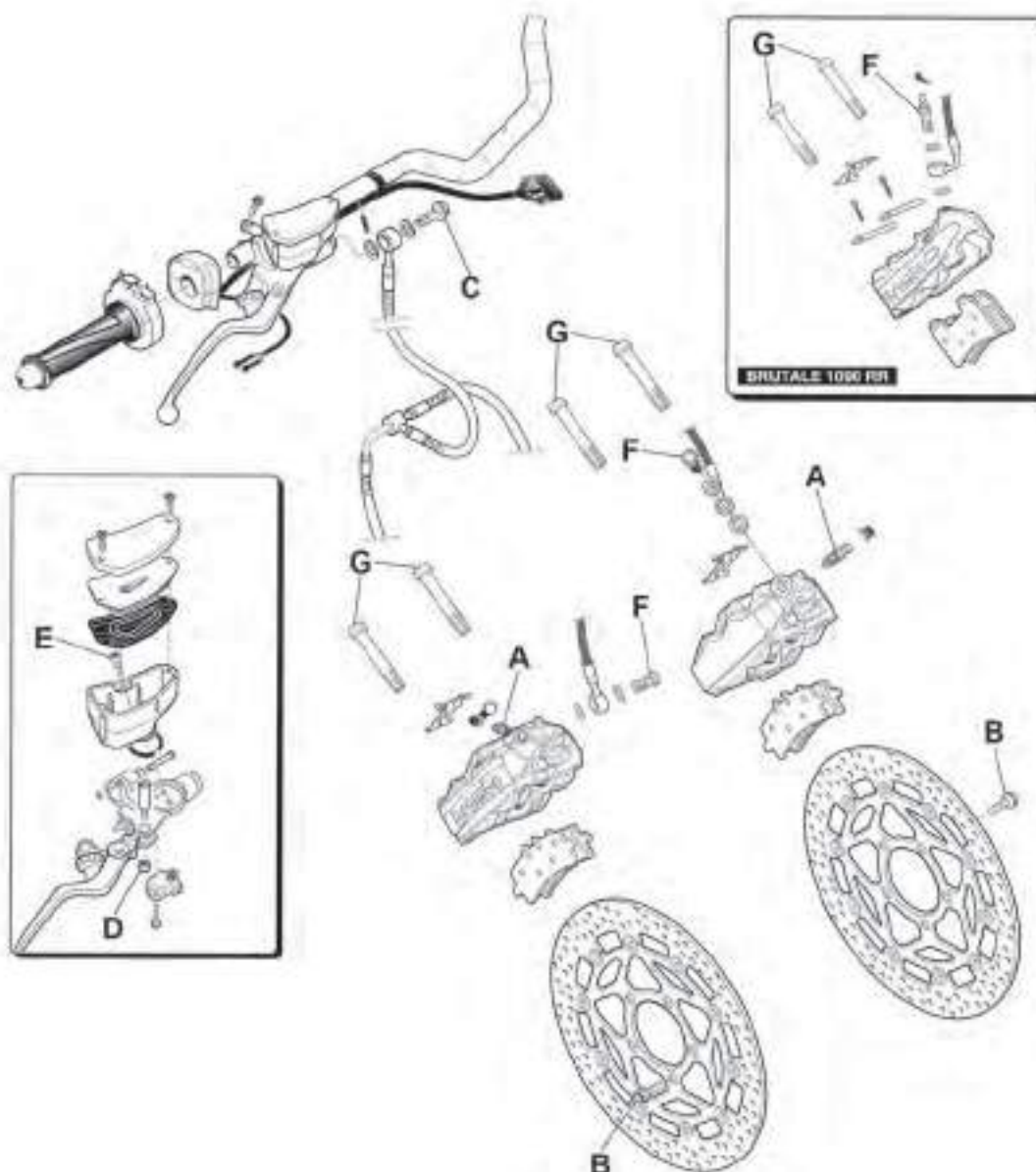
Revision 1



SUMMARY

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FRONT BRAKE SYSTEM



		A	B	C	D	E	F	G			
Torque pressure	N•m	8	23 ÷ 25	16 ÷ 18	8 ÷ 10	2	23 ÷ 26	42 ÷ 46 (990 R) 40 ÷ 42 (1090 RR)			
	Kg•m										
	ft•lb										
Operation											

Description	BRUTALE 990 R	BRUTALE 1090 RR
FRONT BRAKE		
Type	Semi-floating double disc with the braking area in steel	Semi-floating double disc with the braking area in steel
Ø disc (mm)	310	320
Disc flanges	Steel	Aluminium
Calipers (pistons mm)	Radial with 4 pistons (Ø 32)	Monobloc radial with 4 pistons (Ø 34)
Front disc thickness(mm)	4,8	5
Min. pad thickness (mm)	1	1



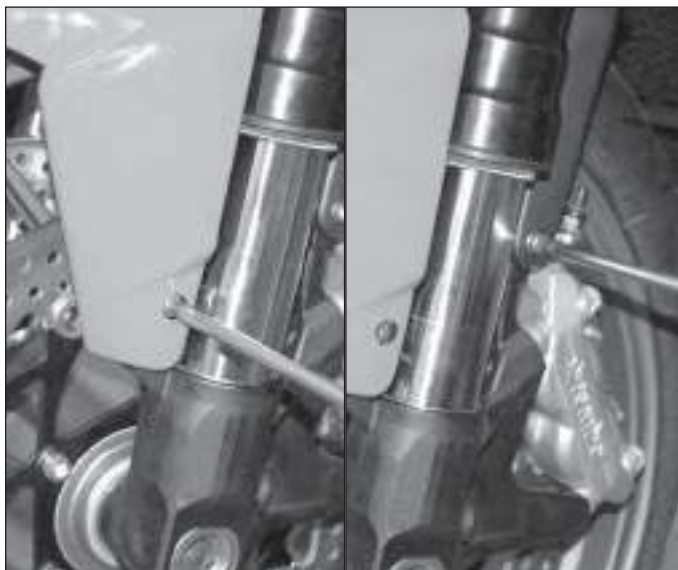
FRONT MUDGUARD REMOVAL

Remove the four screws of the rear attachment of the front mudguard as shown in the figure (the two lower screws are mounted with a bush).

Remove the front brake tubing from the clip mounted on the attachment.

Widen the attachment and slide it out of its seat.

Remove the two right and left screws with their bushes from the mudguard.



FRONT BRAKE PADS SUBSTITUTION (BRUTALE 990 R)

Using pincers, position the pin in such a way as to facilitate seeger removal.

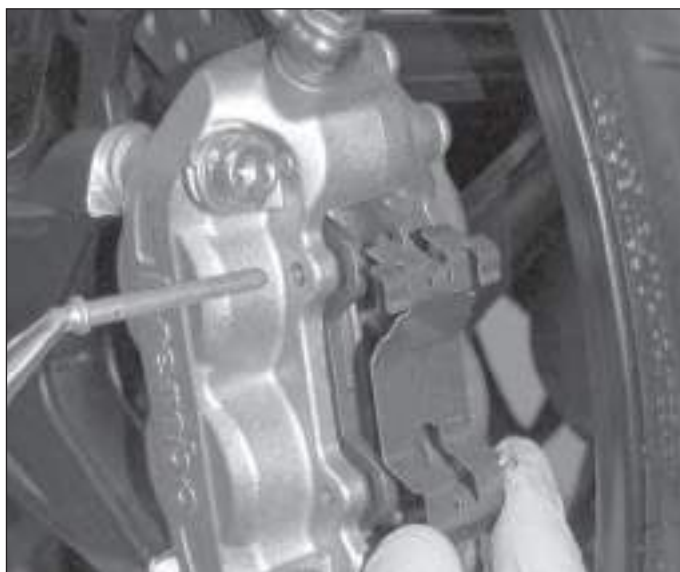


Remove the two seegers, one for each pin.



Remove the two pins and remove the pad cover.

NOTE: Re-assemble the pad cover with the stamp of the arrow turned upwards.



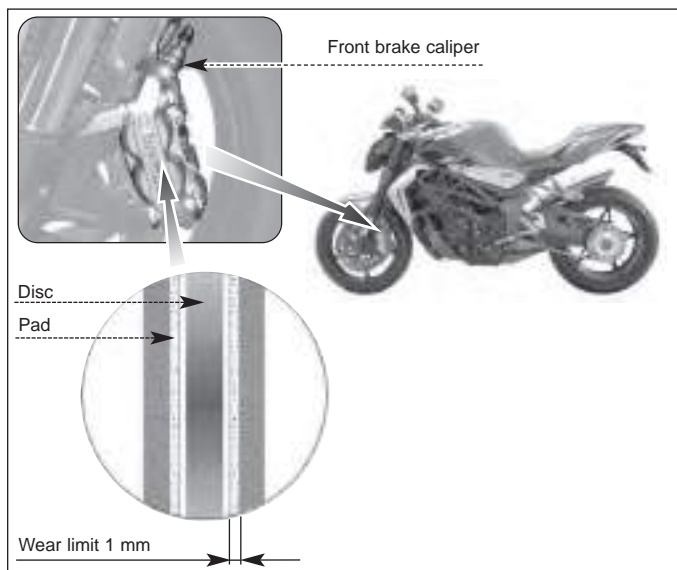
Remove the two pads from the caliper.
Repeat the same disassembling procedure for the other caliper.





Brakes

Every 6000 kilometres, check the wear of the pads. The pad thickness must not be less than **1 mm**. If the pads are excessively worn, substitute them.



For setting up front brake pads, carry out the operations described above in reverse order.



FRONT BRAKE PAD REPLACEMENT (BRUTALE 1090 RR)

To replace front brake pads, first of all, it is necessary to remove the brake callipers from the motorbike, as shown in the figure.



Loose the pads with a screwdriver.



Push one of the two pads towards the central part of the caliper.



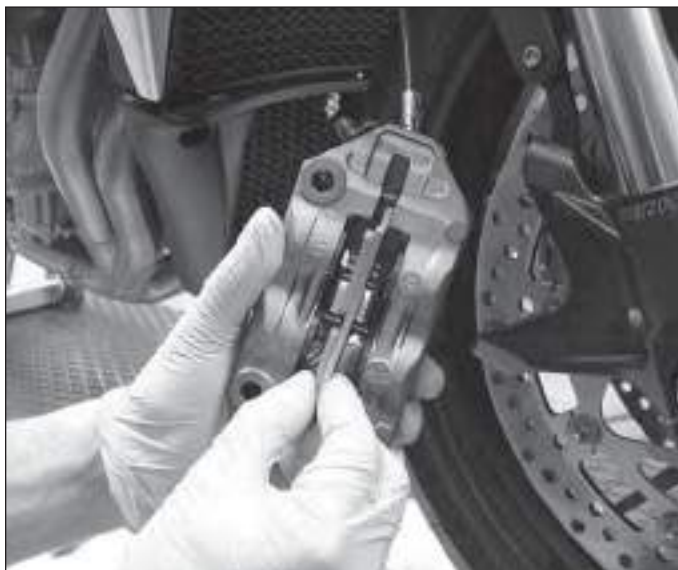
Release the pad and remove it.



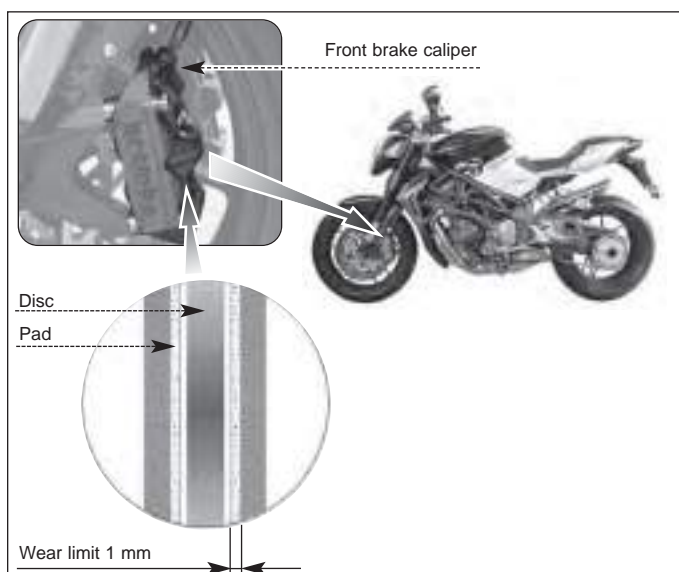


Brakes

Remove the second pad by carrying out the same operations as described above.



Every 6000 kilometres, check the wear of the pads. The pad thickness must not be less than **1 mm**. If the pads are excessively worn, substitute them.



Before setting up the pads, make sure the sheet-steel is correctly located in its seat.



Introduce the first pad by hooking it on the upper part, and inserting the lower part in the middle of the caliper.



Make sure to hold the sheet-steel in its seat during the operation.



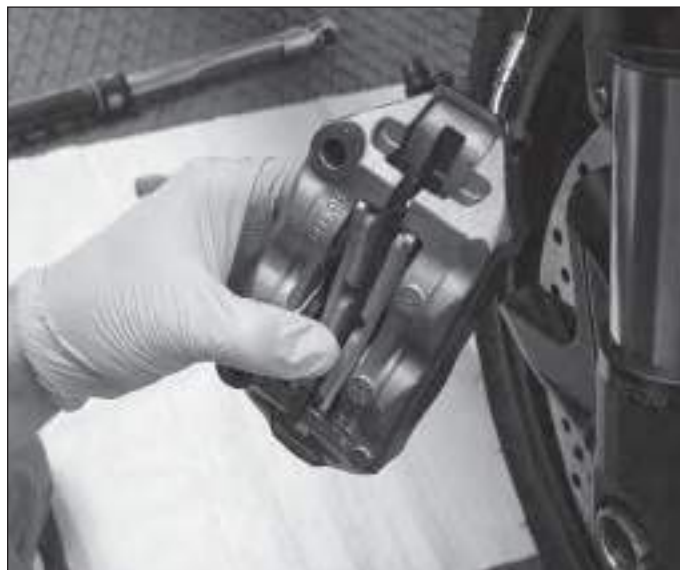
Take the pad in touch with the pistons.





Brakes

Introduce the second pad by carrying out the same operations as described above. (In this case, it is not necessary to hold the sheet-steel pressed, since it is already held in its seat by the first pad).



After inserting the newly supplied pad, assemble the front brake calipers on the motorbike and insert the relating fixing screws. Tighten the screws at the scheduled torque.



Screw tightening torque of front brake caliper screws: $40 \div 42 \text{ N} \cdot \text{m}$



SUBSTITUTION AND BLEEDING OF THE FRONT BRAKE FLUID

Place the motorcycle on a horizontal surface with the steering in a straight line.
Protect the area with a cloth.
Remove the two front brake fluid chamber cover.



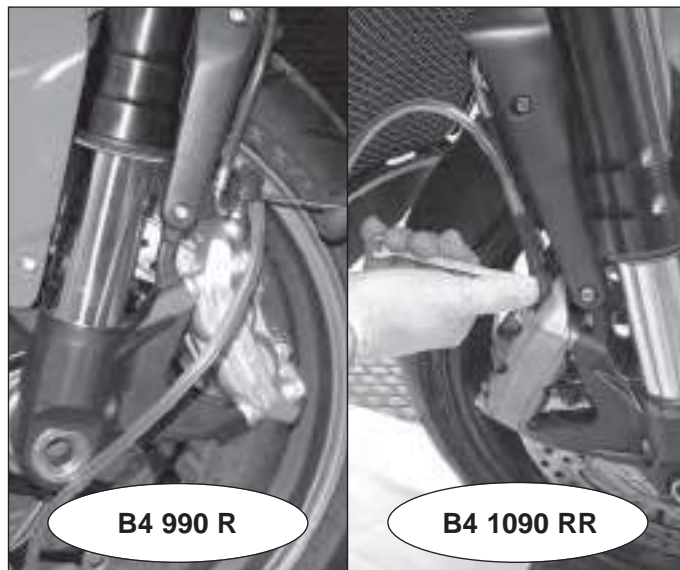
Brake fluid has a strong corrosive power. Be careful to not spill the fluid on surrounding parts.
If the fluid is spilt clean immediately with industrial alcohol and dry with compressed air.



Remove the protection cap of the bleed valve of the front right caliper.

Apply a rubber tube to the bleed valve (the valve is placed on the summit of the brake caliper).

Put the other end of the rubber tube in a suitable container.



Pull the brake lever without releasing it.
Slacken the bleed valve and empty the brake system.

Tighten again the bleeding screw.



Fill the system by pulling the brake lever 3-4 times (see figure).

Repeat the above operations until the fluid reaches the minimum level in the reservoir. Top-up with new brake fluid and continue the operation until brake fluid of a different colour comes out.

The quantity of brake fluid necessary for this operation is approximately **250 cc**.

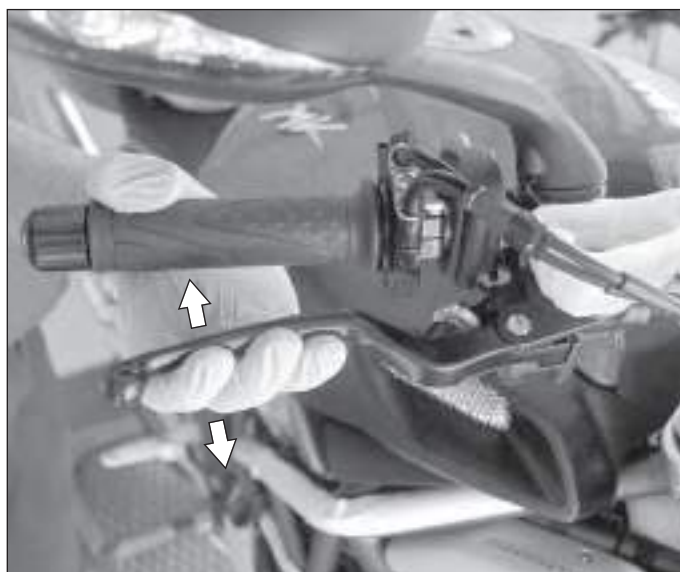
NOTA Repeat this operation on both calipers.



Recommended brake fluid :
AGIP Brake Fluid DOT 4



Utilise only the prescribed brake fluid from sealed containers. NEVER use old or used brake fluid.





Brakes

Tighten the bleed screw, remove the rubber tube, carefully clean the screw with alcohol, blow it dry and put the protective cap back on.



Bleed screw tightening torque:

- B4 990 R - 1090 RR:

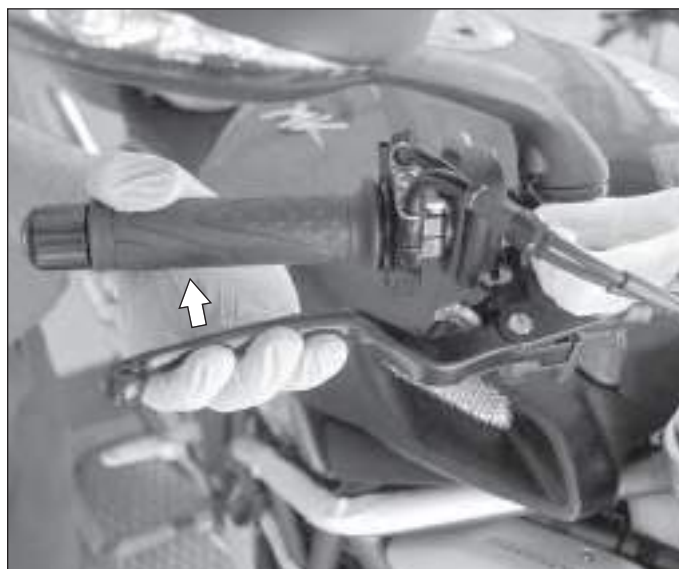
8 Nm



Slowly squeeze the brake lever to bring the pads in contact with the disc and also checking that there is no sponginess in the action of the lever. Air bubbles should not rise in the chamber.

If the bleeding has been done correctly, the movement of the lever is short and without any elastic effect.

Repeat the bleeding operation if there is still sponginess at the lever.



Pour new brake fluid into the chamber until it reaches the maximum level.



Recommended brake fluid :
AGIP Brake Fluid DOT 4



Utilise only the prescribed brake fluid from sealed containers. NEVER use old or used brake fluid.



Top-up the level of the fluid until it reaches the maximum mark.



Carefully clean around the edge of the brake fluid chamber utilising a clean cloth.



Imperfect cleaning of this component could cause the loss of small quantities of brake fluid whilst riding.



Accurately clean the three elements of the brake fluid chamber cap with alcohol and dry with compressed air





Brakes

Place the cap on the brake fluid chamber and tighten the two lateral fixing screws.

FRONT BRAKE CALIPERS SUBSTITUTION (BRUTALE 990 R - 1090 RR)

- It is advisable to remove the brake pads to facilitate the operation (only for B4 990 R).
- Slightly move the front brake lever towards the right handgrip and hold it in position with a strap to limit the outflow of brake fluid during subsequent operations.
- Taking care not to spill any remains of the brake fluid that may remain inside the brake tubing, remove the union as indicated in the figure.



Brake liquid can corrode painted surfaces. Clean immediately any spilt brake liquid using industrial alcohol and drying with compressed air.

- Remove the two caliper fixing screws (1) indicated in the figure.
- Remove the brake caliper.

NOTE The removal operation for both the right and left front calipers is identical.

- To reassemble the front brake calipers proceed in the reverse order to removal.
- Tighten the relative fixing screws to the prescribed torques.



Only grease the first threads of the brake caliper fixing screws.

- Replace the brake pads (only for 990 R).
- Refit the caliper union after replacing the sealing washers.



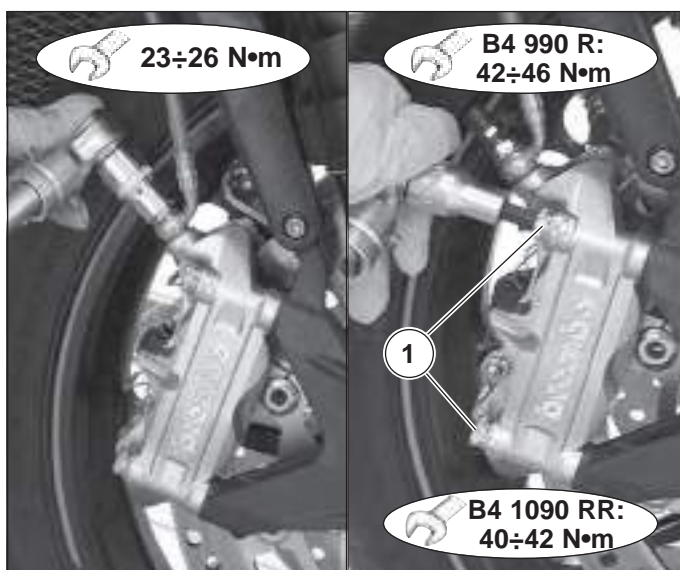
Caliper union torque pressure: 23÷26 Nm

- Fill the system with brake fluid.
- Bleed the system as described in page 10.
- Keep the brake lever pulled back with a strap and tighten the brake caliper fixing screws.



Caliper fixing screws torque pressure:

- **BRUTALE 990 R:** 42 ÷ 46 Nm
- **BRUTALE 1090 RR:** 40 ÷ 42 Nm



FRONT BRAKE PUMP REMOVAL

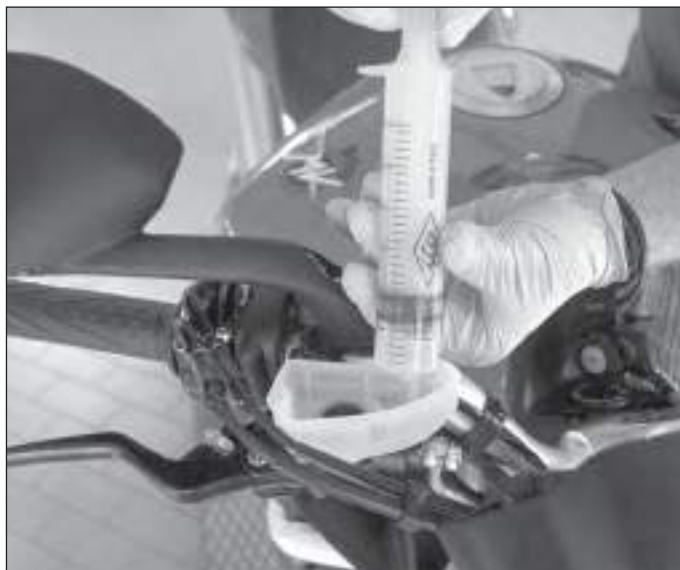
Remove the cap from the front brake fluid reservoir and drain the reservoir with a syringe.



Brake fluid is extremely corrosive. Avoid contact with the eyes, skin and nose. Wash abundantly with water and call a doctor if accidental contact occurs.



During the following operations, avoid contact with painted surfaces.



Remove the union indicated in the figure.



Remove the connectors of the electrical system.





Brakes

Remove the fixing screw that fixes the pump to the handlebar.
Open the clamp.
Push down to remove the pump from the reference pin.



To substitute the front brake switch remove the screw shown in the figure.



After having carried out the overhaul of the front brake pump assembly, carefully wash and bleed the front brake system as previously described in this chapter.



FRONT BRAKE LEVER REMOVAL

Unscrew the blocking nut.



Unscrew the pin and remove it; then remove the brake lever.



When reassembling take care to insert the lever into its seat.

Grease the pin with the specified product.

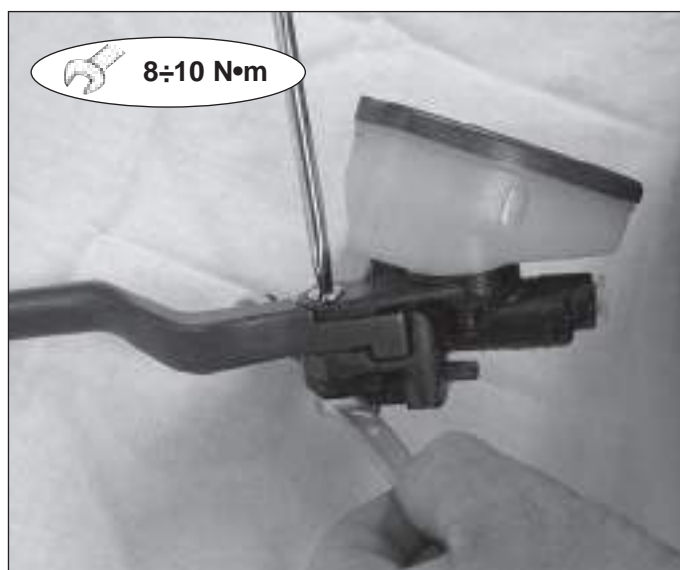


Recommended grease: Agip Grease 30

Insert the pin into the seat and screw it in until the beat is reached, then tighten the nut by using a screwdriver.



**Front brake lever nut torque pressure:
 $8 \div 10 \text{ N} \cdot \text{m}$**





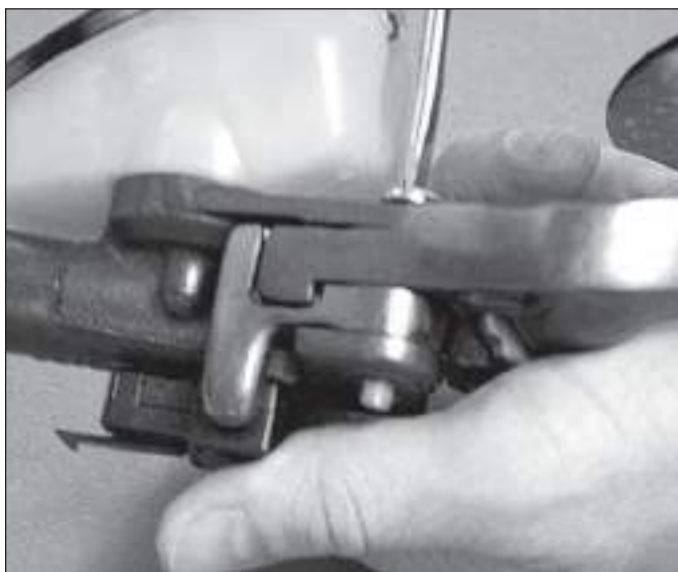
Brakes

CLUTCH LEVER REMOVAL

Remove the nut shown in the figure.



Unscrew the pin and extract it.
Remove the clutch lever.

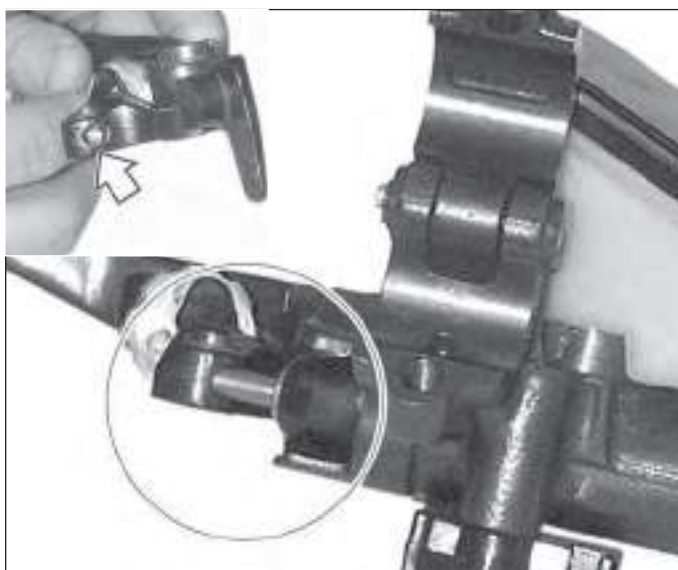


When reassembling, be careful to insert the pin of the pump piston into the seat situated on the lever (see figure).

Grease the pin with the specified product.



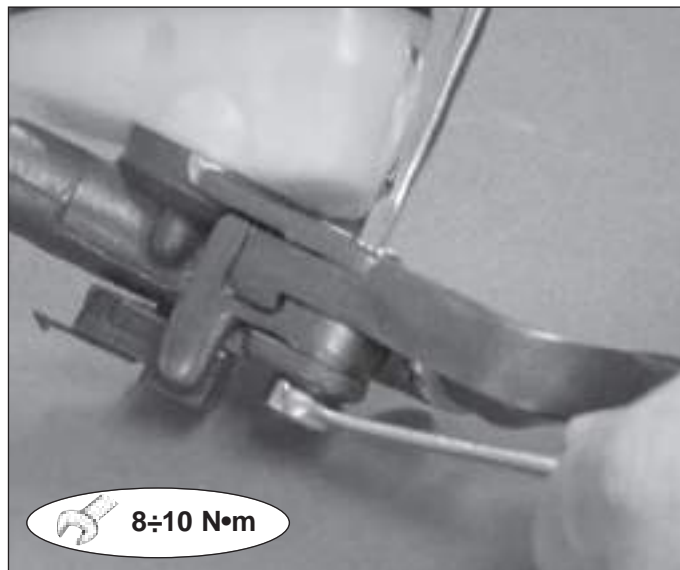
Recommended grease: Agip Grease 30



For the reassembly of the lever tighten the pin.
Keeping the pin still, tighten the nut with a screwdriver.



Clutch lever nut torque pressure:
8 ÷ 10 N • m



FRONT BRAKE DISCS

Check the thickness of the front discs utilising a micrometer gauge. Carry out the measurement at least at three points with 120 ° between them, as shown in the figure.



Utilise a micrometer gauge for this check.

- **Minimum thickness:**
- **B4 990 R:** **4,5 mm**
- **B4 1090 RR:** **4,5 mm**

This operation just be carried out on both front discs.



If the measurements are below the minimum, substitute the component with a new one.





FRONT BRAKE DISC REMOVAL

Remove the front wheel from the motorcycle (see chapter F "Suspensions and wheels").

Place the wheel in a horizontal position on a work plane and remove the five screws of each disc proceeding in a star-like mode for the removal.
Visually check the discs for lines or score marks.



Place the milled side of the brake disc flange on a level surface with the milled side face down and utilising a micrometer gauge check that the maximum oscillation of the disc reached during a rotation of 360° does not exceed **0,3 mm**.

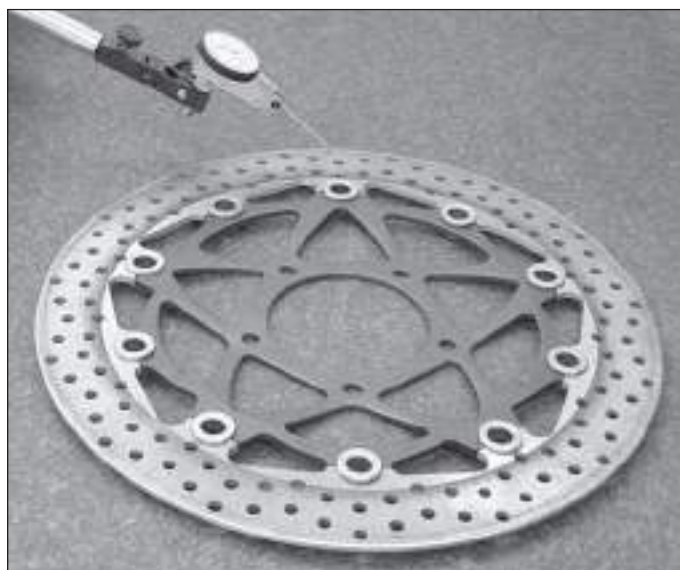


Utilise a micrometer gauge for this check.



If the oscillation is higher than 0.3 mm, substitute the disc with a new one.

This operation must be carried out on both front discs.





Brakes

Front disc assembly

Thoroughly clean the contact surfaces of the discs and the wheel.

Accurately grease all relative surfaces of the disc before reassembling.



Apply thread-locking fluid to the five fixing screws of the disc.



Recommended thread-locking fluid:
Loctite 243



Screw in the screws lightly, proceeding in a star-like mode.

Continuing in a star-like mode, tighten the screws to the prescribed torque pressures.



Front brake disc screw torque pressure:
23 ÷ 25 N•m

Be careful to reassemble the discs in the original positions (it is advisable to mark them by applying an adhesive label).

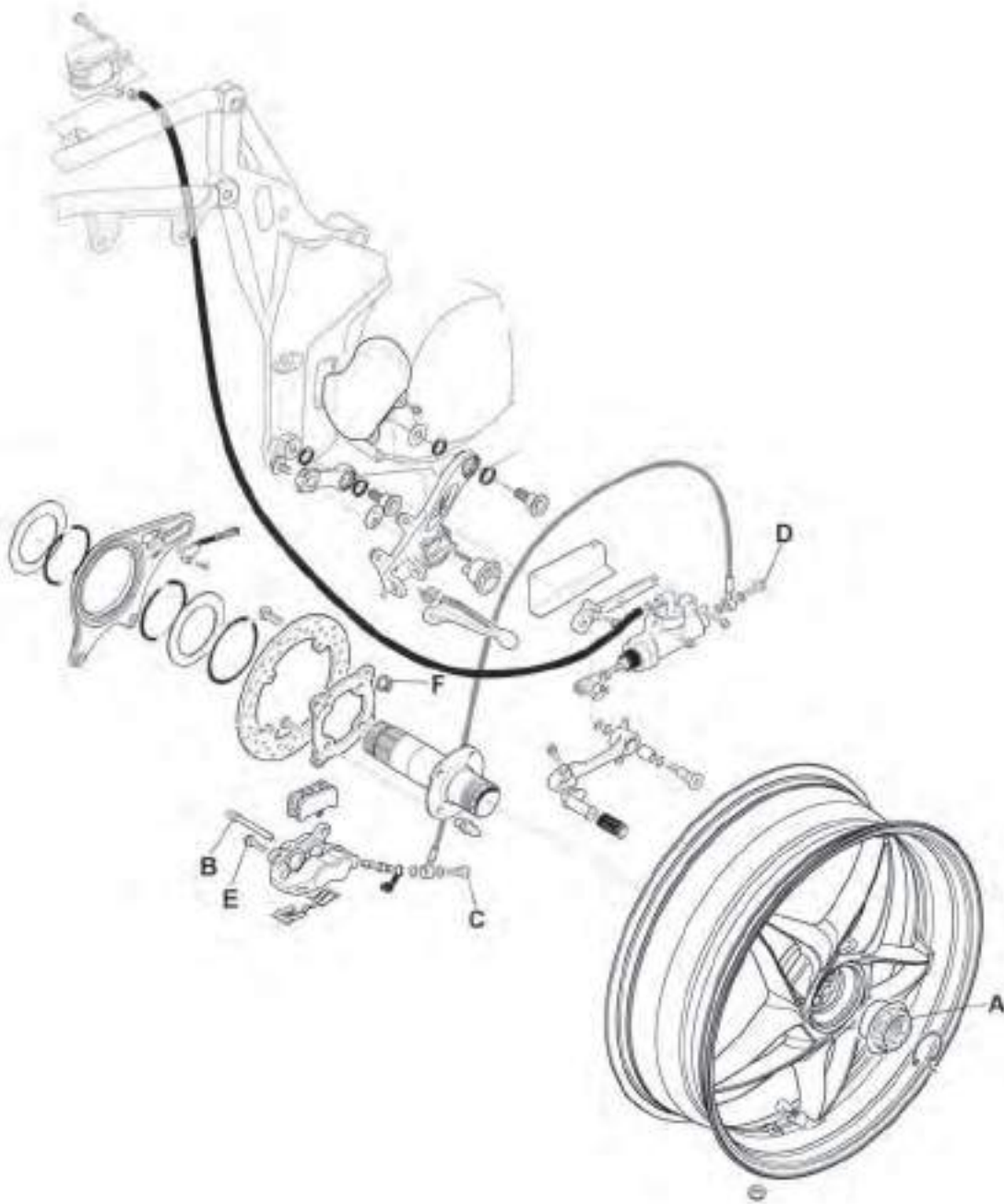









This operation is important so that a good contact between the brake discs and the relative pads.

Reassemble the wheel pin and the wheel as described in chapter F "Suspensions and wheels".



REAR BRAKE SYSTEM



		A	B	C	D	E	F				
Torque pressure 	N•m	220 ÷ 240	15 ÷ 20	16 ÷ 18	16 ÷ 18	18	18 ÷ 20				
	Kg•m										
	ft•lb										
Operation						 243	 270				

Description	BRUTALE 990 R	BRUTALE 1090 RR
REAR BRAKE		
Type	Steel disc	
Ø disc (mm)	210	210
Caliper (Ø piston mm)	4 pistons Ø 25,4	
Disc thickness (mm)	6	6
Minimum pad thickness (mm)	1	1



REAR BRAKE PADS SUBSTITUTION

Place the motorcycle on the rear stand.



Special tool N. 800092642

Remove the exhaust protection.



Remove the retaining ring (1) of the wheel nut.
Remove the rear wheel by removing the polygonal nut,
using the following tools:



Torque wrench
55 mm polygonal spanner

Utilising a torque wrench, slacken the rear wheel nut.



The rear wheel blocking nut has a left-hand thread, so to loosen the rear wheel blocking nut it must be turned clockwise.





Brakes

Remove the rear wheel nut.

NOTE When reassembling, tighten the rear wheel nut to the prescribed torque pressure.



Rear wheel nut torque pressure:
 $220 \div 240 \text{ N}\cdot\text{m}$



Grease only the threaded section.



Take care not to apply grease to the tapered section of the nut.



Remove the rear wheel taking care to not hit the silencer connecting plate.

NOTE If this operation is too difficult to carry out, remove the silencer connecting plate completely before removing the wheel.



Utilising circlip pincers as shown in the figure, widen the pads so that the pistons are pushed back into their seats.



The outward movement of the brake pads provokes the retraction of the pistons in their relative seats, with a consequent increase in the level of the brake fluid in the brake fluid chamber.



Remove the pad support pin and the relative spring.

Remove the pad by letting it drop down.

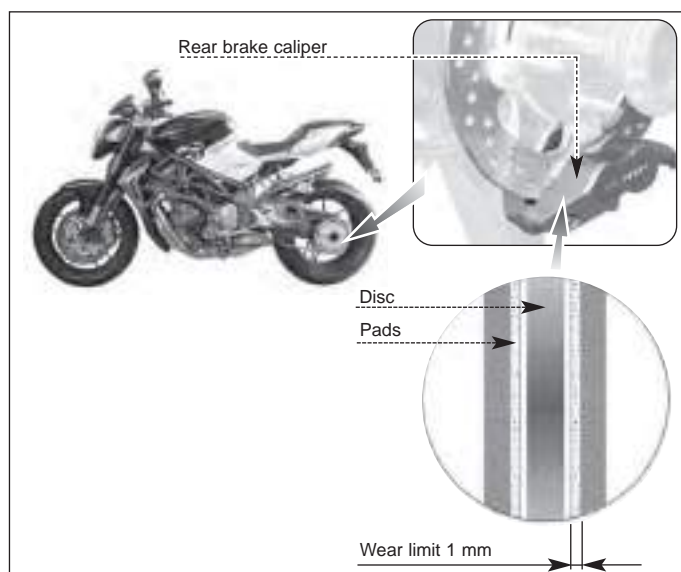


Rear brake pads

Wear/substitution check:

the first time after 1000 kilometres; then every 6000 kilometres.

Check the wear condition and the thickness of the brake pads on the calipers.



Analyse the condition of the rear brake system and its components.

Proceed with the reassembly in the reverse order of removal.



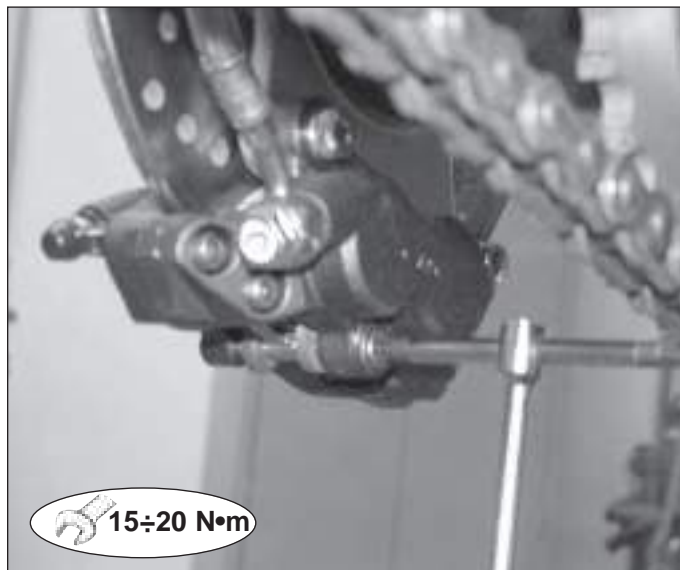


Brakes

Tighten the pin to the prescribed torque pressure.



Rear brake caliper pin torque pressure:
15 ÷ 20 N•m



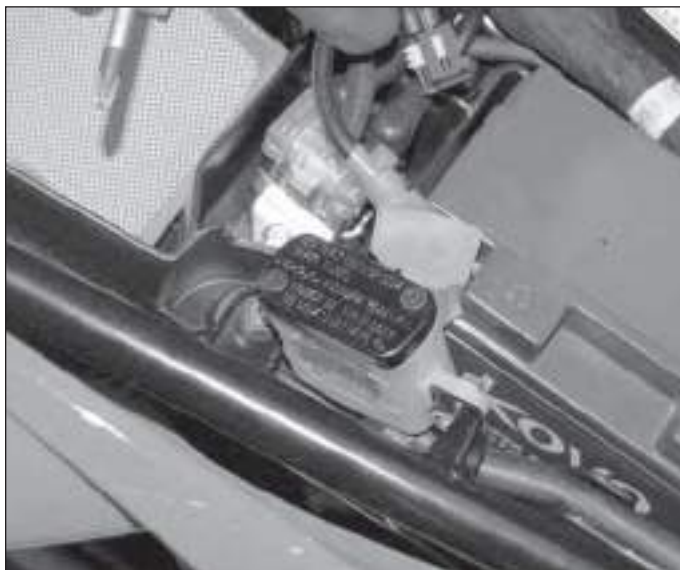
SUBSTITUTION AND BLEEDING OF THE REAR BRAKE FLUID



The operation described herewith must be carried out with the engine cold: the position of the brake fluid tank could cause grave burns.

H

To carry out this operation it is necessary to remove the rider seat, to accede to the brake fluid tank.



Open the cover of the rear brake fluid reservoir by removing the two screws.



Remove the rubber clamp fixing the rear brake fluid tube.



Remove the fixing screws of the rear brake caliper.

For reassembly, tighten the two screws to the prescribed torque pressure.



**Rear brake caliper screw torque pressure:
18 N•m**



Apply Loctite 243



Remove the rear brake caliper from the motorcycle and turn it upside down as shown in the picture.

To substitute the brake fluid, connect a rubber tube to the bleed valve, then empty the system in an appropriate container by slackening the bleed screw as shown in the figure while keeping the brake lever pushed.

Tighten the bleed screw.

Push the brake lever 3-4 times in order to fill the braking system.

Repeat the above operations until the fluid reaches the minimum level in the reservoir. Top-up with new brake fluid and continue the operation until brake fluid of a different colour comes out.

Tighten the bleed screw.





Brakes

Fill the rear brake fluid reservoir until the fluid reaches the maximum level.



Recommended brake fluid:
AGIP Brake Fluid DOT 4



Utilise exclusively the prescribed brake fluid. Use only new brake fluid from sealed containers. NEVER utilise old or used brake fluid.



Be careful to not spill the fluid from the reservoir during these operations. Brake fluid is extremely corrosive. Avoid contact with the eyes, skin and nose. Wash abundantly with water if contact is accidentally made and consult a doctor. During the successive operations, avoid spilling the fluid onto painted surfaces.

Before closing the fluid reservoir, check the condition of the components.



REAR BRAKE CALIPER SUBSTITUTION

To facilitate the operation, remove the brake pads as described previously.

Remove the crown wheel as described in chapter F "SUSPENSIONS AND WHEELS".

Empty the system of brake fluid as described in paragraph "Substitution and bleeding of the rear brake fluid".

Remove the tubing by unscrewing the union indicated in the figure.



Remove the two screws indicated in the figure.

Substitute the caliper.

For reassembly, tighten the two screws to the prescribed torque pressure.



Rear brake caliper screw torque pressure:
18 N•m



Apply Loctite 243



Assemble the union tightening to the prescribed torque.



Torque pressure: 16 ÷ 18 N•m

[NOTE] Substitute the washers with new ones.

If the brake pads have been removed, reassemble them.

Proceed with the filling and bleeding of the rear brake system (see page 26).





Brakes

Rear brake pump removal

Carry out the emptying of the brake system as previously described in paragraph "Substitution and bleeding of the rear brake fluid".

Remove the clips complete with the fixing pin of the rear brake lever and the pump control fork by rotating and successively pushing inward as shown in the figure.



Unscrew the union indicated by the arrow in the figure, thereby freeing the pump the brake tubing.



Unscrew the two fixing screws of the brake pump to its relative support.
Remove the pump.



After having carried out a check on all components and substituted those used, damaged or defective proceed with the assembly by following the procedure in reverse order of removal.

NOTE Substitute the gaskets of the pump/caliper hoses.

Tighten the fixings to the prescribed torque pressure.



Torque pressure pump union:
16÷18 N•m

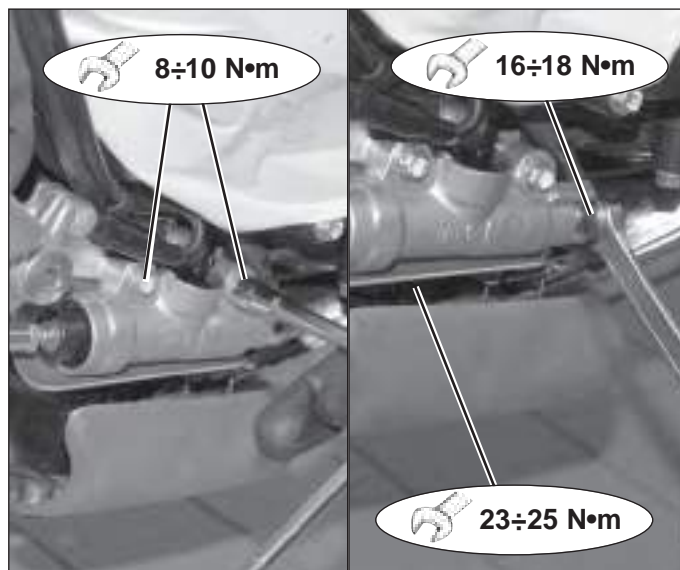


Torque pressure of the screws fixing the brake pump to the support:



Screws M6: 8÷10 N•m - Screws M8: 23÷25 N•m

Conclude the operations by filling the system with brake fluid and successively bleeding the system (see page 26).



REAR BRAKE DISC

Check the thickness of the rear brake disc. Substitute the disc if the measurements are less than the minimum value allowed. Effectuate the substitution as hereby described.

- **Minimum thickness allowed: 5.7 mm**



REAR BRAKE DISC REMOVAL

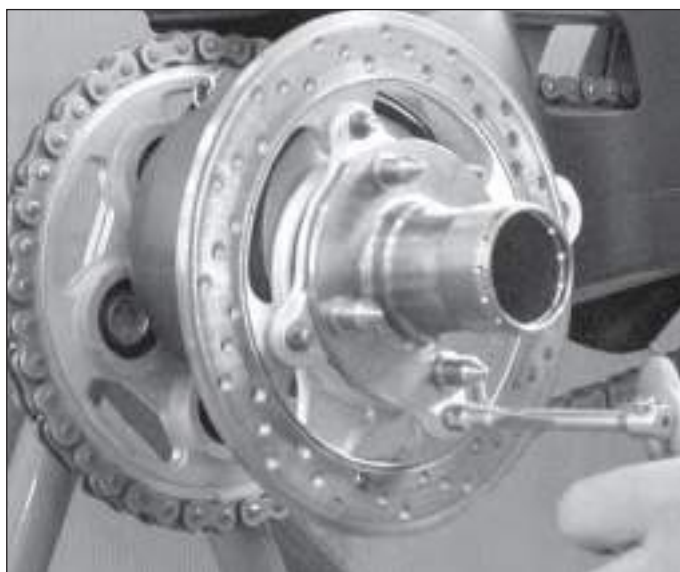
Before proceeding with the removal of the rear brake disc, it is necessary to carry out certain operations described previously in this chapter:

Remove the rear wheel.

Remove the rear brake disc from its support.

Remove the four nuts fixing the disc to the flange splined to the wheel pin.

Remove the four nuts previously freed by extracting them from the rear part of the motorcycle and rotating the disc to facilitate the removal of the nuts.





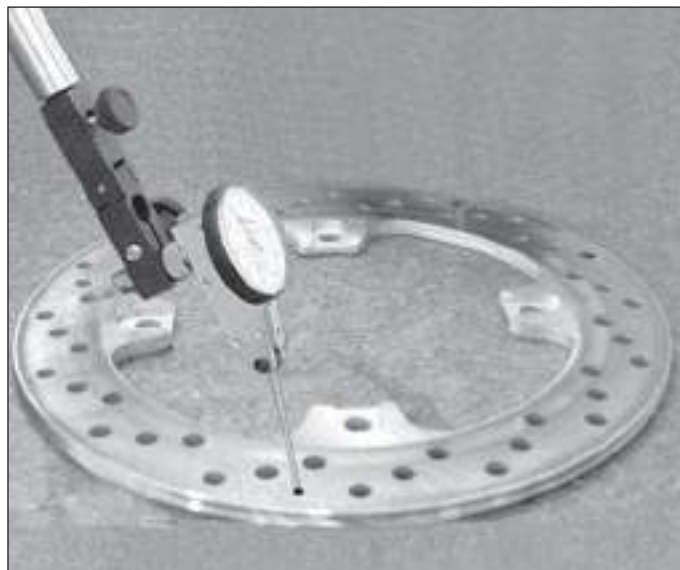
Brakes

Check the rear brake disk level using a comparator and resting the disk on a levelling table. Use the same procedure for the front brake disks.

The planarity value must not exceed **0.3 mm**.



Utilise a micrometer gauge with support to carry out this check.



Check the thickness of the rear brake disc by utilising a micrometer gauge. Carry out the measurement at least at three points with 120 ° between them.

The minimum thickness of the disc must not be less than **5.7 mm**.



Utilise a micrometer gauge for this check.



Before reassembling the rear brake disc, check the condition of the four pins and four special nuts. Proceed with tightening of the nuts.



The screws must be assembled with the nuts screwed in lightly and brought into contact with the disc surface. After this operation, tighten the four nuts in a cross-like mode.

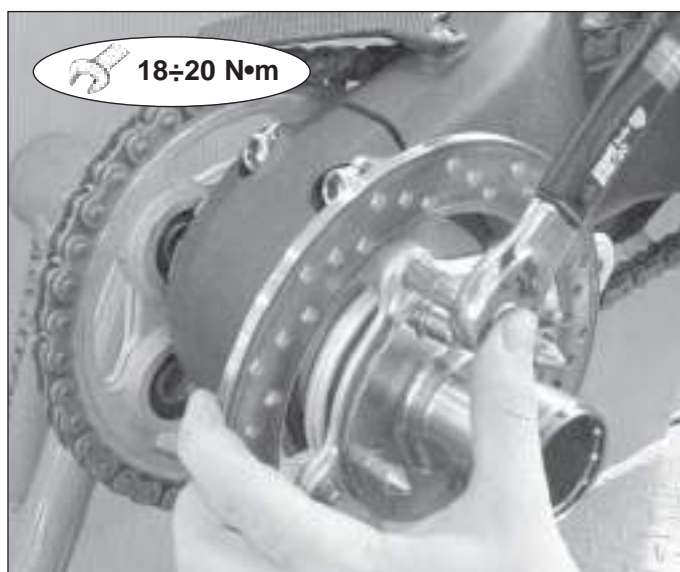


Rear brake disc nut torque pressure: 18÷20 N•m.



Apply Loctite 270

Conclude the reassembly operations of the various components by following the procedures previously described in these paragraphs in reverse order.





Cooling system and lubrication system



L

SECTION L

Revision 0



SUMMARY

COMPLETE COOLING SYSTEM ASSEMBLY AND LUBRICATION SYSTEM.....	Pag.3
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CHECKING COOLING FAN STARTER.....	Pag.14
COOLING FAN REASSEMBLY	Pag.14
REMOVING THERMOSTAT VALVE	Pag.1
REASSEMBLING THERMOSTAT VALVE.....	Pag.19
REASSEMBLING EXPANSION TANK	Pag.21
ASSEMBLING WATER RADIATOR	Pag.24
REMOVING OIL RADIATOR	Pag.30
REASSEMBLING OIL RADIATOR.....	Pag.32

This exploded view diagram illustrates the front-end assembly of a vehicle. Key components shown include the hood, headlights, grille, radiator, and engine block. The diagram uses various line styles and shading to represent different parts and their assembly relationships. A small inset box in the lower-left corner provides a detailed view of a specific mechanical connection point.

- 1) Let the engine cool down.
- 2) Remove the passenger and pilot seat, right and left side panel, ignition switch cover, fuel tank and air filter compartment as described in the chapter C "Superstructures".



Cooling system and lubrication system

COOLING SYSTEM LEAKAGE CHECK

Before removing the radiator and discharging the engine coolant, check that the cooling system does not have leakages.

Remove the expansion tank cap and connect the tester (of the type shown in the diagram) to the filler hole.



Use the special tool to unscrew the expansion tank cap.



Do not open the cap of the expansion tank when the engine is hot.

Apply a pressure of approximately 120 kPa (1.2 kg/cm²) and check that the system maintains the pressure for at least 10 seconds.

If the pressure diminishes within ten seconds means that there is a leak in the system.

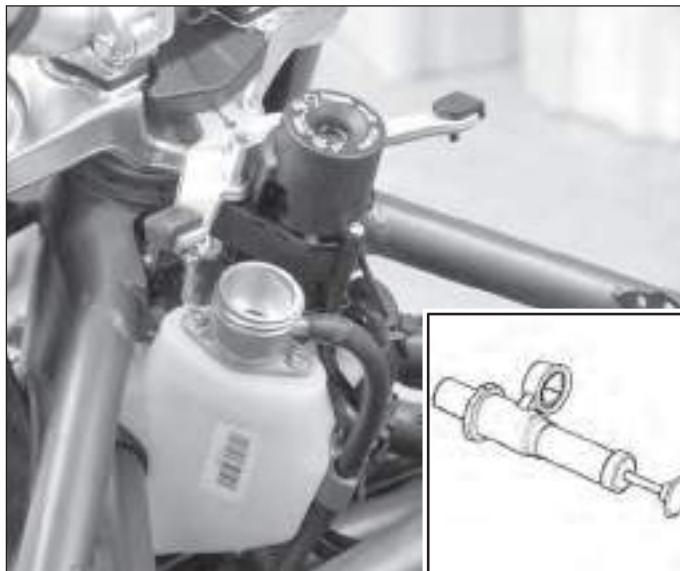
If so, check the entire system and substitute the defective/damaged parts.



When removing the tester from the filler hole wrap a cloth around the filler hole to avoid spurts of engine coolant.



Do not exceed the recommended pressure to avoid damaging the radiator.



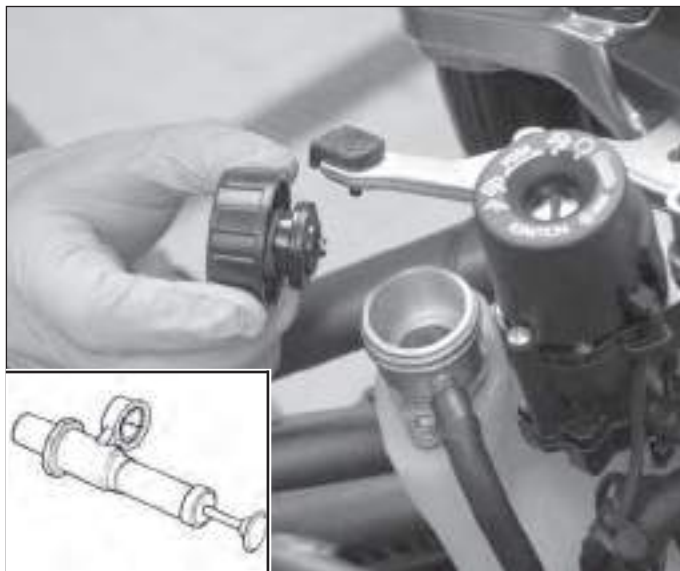
EXPANSION TANK CAP CHECK

Check the release pressure of the radiator cap by utilizing the appropriate tester as follows:

Apply the cap to the tester as indicated and slowly create a pressure by activating the tester.

Ensure that the pressure increase is stopped at 110 ± 15 kPa (1.1 ± 0.15 kg/cm²) and check that with the tester held steady, the pressure is maintained for at least ten seconds. Substitute the cap if the pressure is not maintained for ten seconds.

Radiator cap release pressure
110 ± 15 kPa 1.1 ± 0.15 kg/cm²



ENGINE COOLANT EXTRACTION

Remove the ignition commutator cover unscrewing the two fixing screws (1).

Open the cap of the expansion tank (2).



Empty the cooling system of the coolant as follows:

- Place under the engine a container to collect the discharged coolant;
- Remove the discharge screw (1) situated on the water pump (2);
- Make sure the coolant flows into the container.

Wait until all the engine coolant has dripped out of the cooling system.



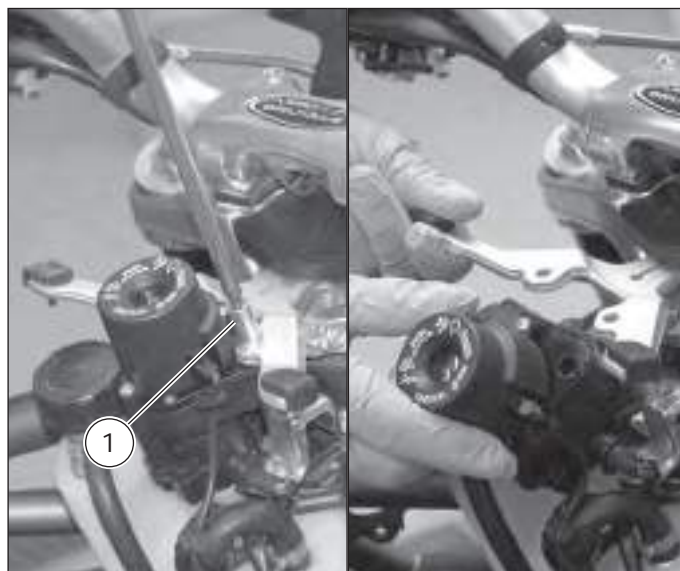
Recover the coolant in an appropriate vessel.
Do not drain liquid into the environment.



EXPANSION TAN REMOVAL

After emptying the cooling system as described in the previous paragraph, the rider's saddle, tank side panels, fuel tank and airbox must be removed prior to the expansion chamber as described in Chapter C "Superstructures".

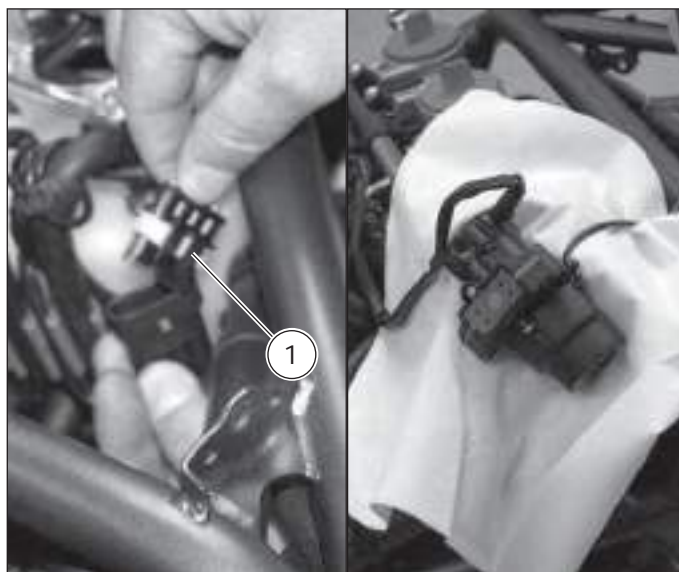
In order to remove the tank support rod, undo the two clamping screws (1), lift the rod and rotate the ignition switch and then remove the rod.





Cooling system and lubrication system

Disconnect the connector 1 of the ignition switch and place the switch on the frame, without removing it.



On the right side of the motorcycle remove the clamp (1) connecting water radiator breather pipe to the expansion tank using specific pliers CLIC R 205.



Specific tool CLIC R 205



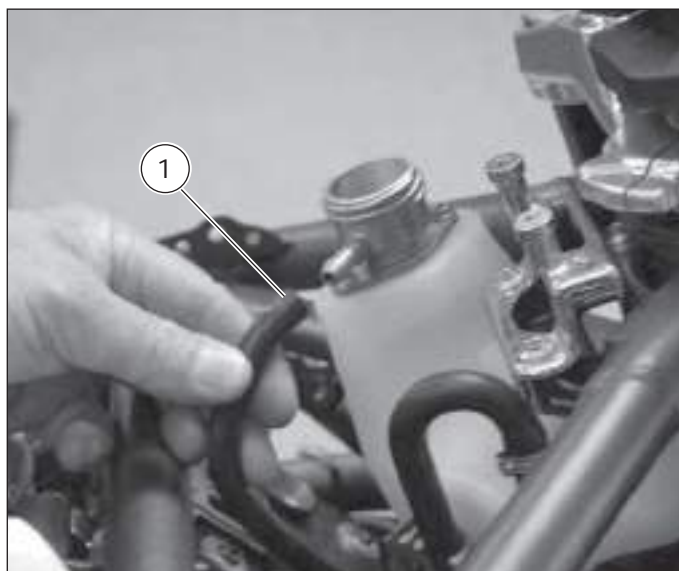
Disconnect the overflow pipe (1) from the expansion tank.

Check the diameter of the tube that has just been removed.

If the external diameter = Ø 10.5 mm and the internal diameter = Ø 6.5 mm the tube can be reused for the successive assembly.

If the dimensions of the tube are different from those indicated it must be substituted for a new one.

If so, proceed with its complete removal.





Cooling system and lubrication system

In order to extract the pipe you should release it from the fixing point shown by the arrow in the figure on the side.

Remove the ignition switch support unscrewing the four screws (1).

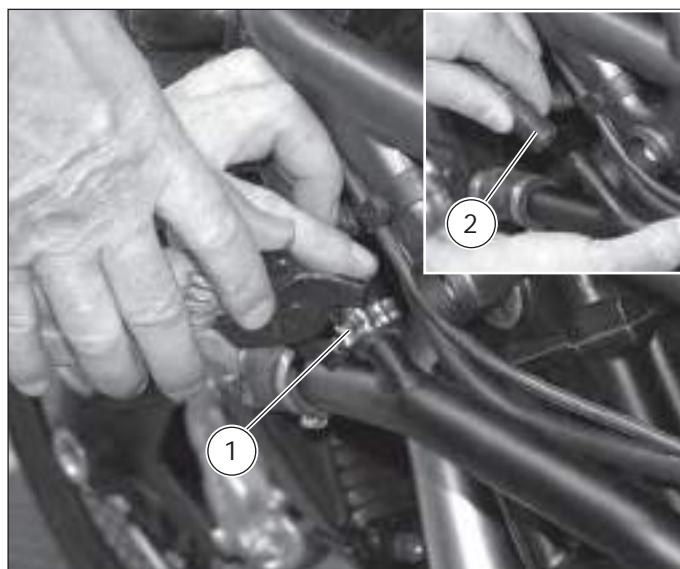


On the left side of the motorcycle remove the clamp (1) connecting the water radiator charging pipe to the expansion tank using a specific pliers CLIC R 205 and its rubber clamp placed near the fluid supply tank.

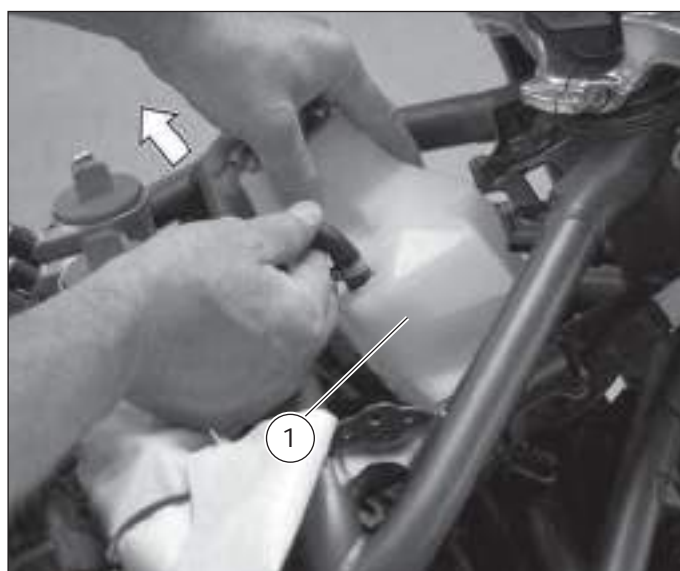


Specific tool CLIC R 205

Disconnect the water radiator charging pipe (2).



Remove the expansion tank (1) releasing it from its seat on the frame and lifting it in the rearward of the motorcycle.





Cooling system and lubrication system

DISASSEMBLING WATER RADIATOR

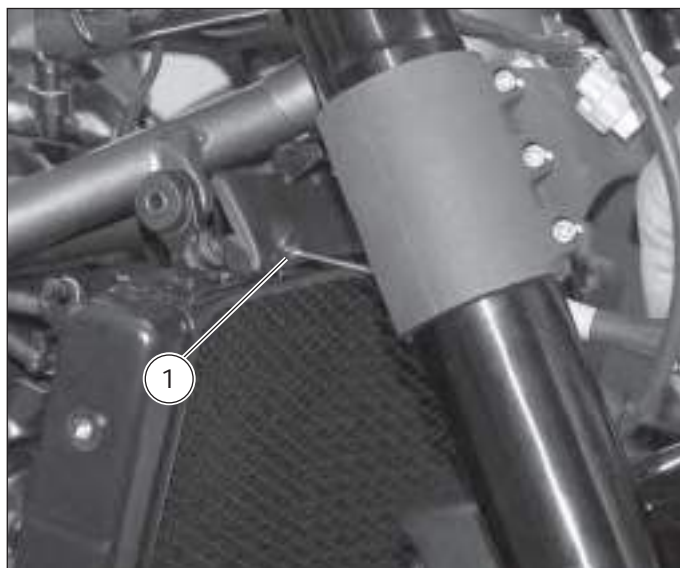
Remove the side protections (1) of the water radiator unscrewing the respective fixing screws on both sides of the radiator.



Remove the oil radiator protective guard 1 by unscrewing the two fixing screws.



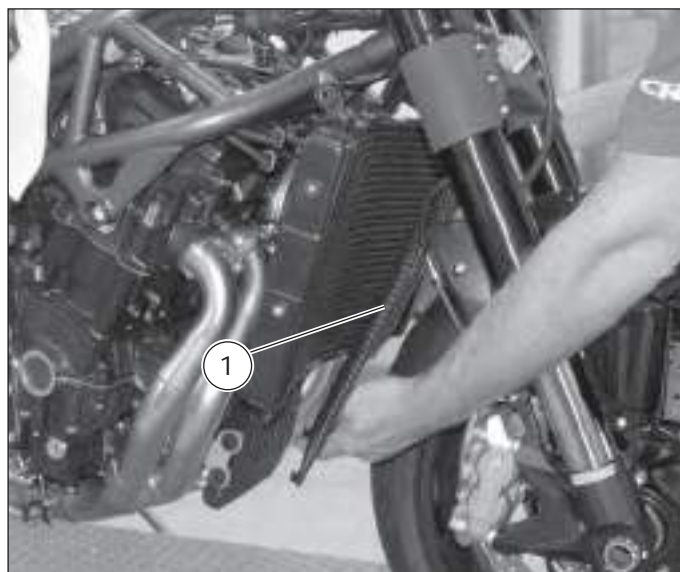
Remove the upper plastic protection (1) unscrewing the two fixing screws.



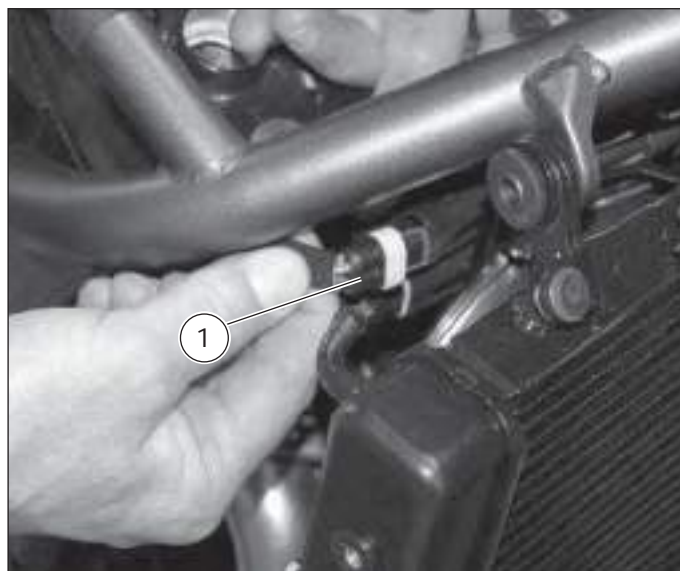


Cooling system and lubrication system

Remove the protective grid (1) taking it out from its seat.



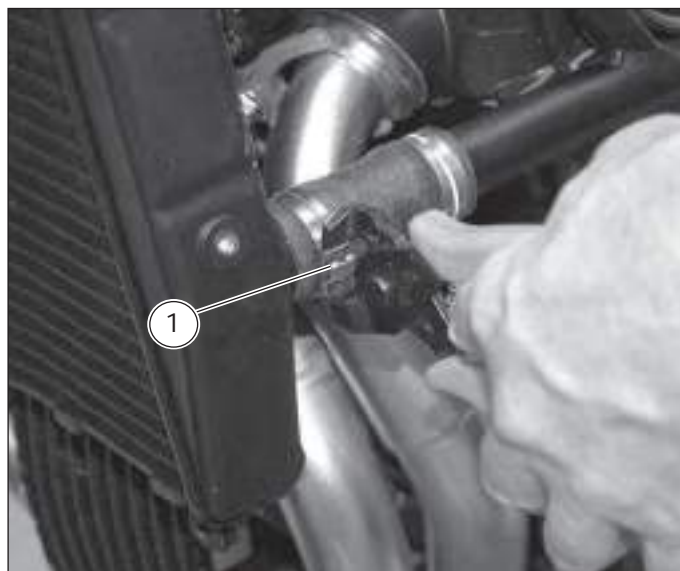
Disconnect the connector (1) of the water radiator electric fan on the right side of the motorcycle.



Remove the clamp (1) on the water suction pipe coupling from the pump to the radiator using the specific pliers CLIC R 205.



Specific tool - pliers CLIC R 205



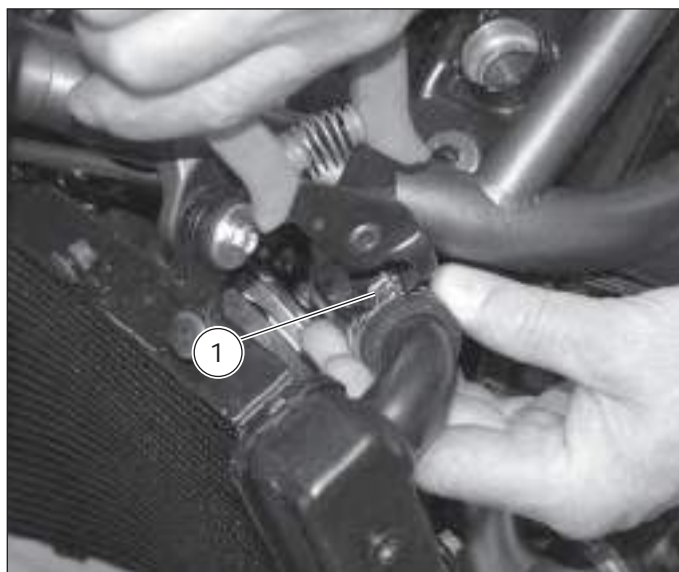


Cooling system and lubrication system

Remove the clamp (1) on the water inlet pipe coupling to the radiator from the thermostat valve using the specific pliers CLIC R 205.



Specific tool - pliers CLIC R 205



Disconnect the fixing link rod on the right side of the water radiator.



Lower the oil radiator from the left-hand side and take it out of the lower right fixing point of the water radiator.



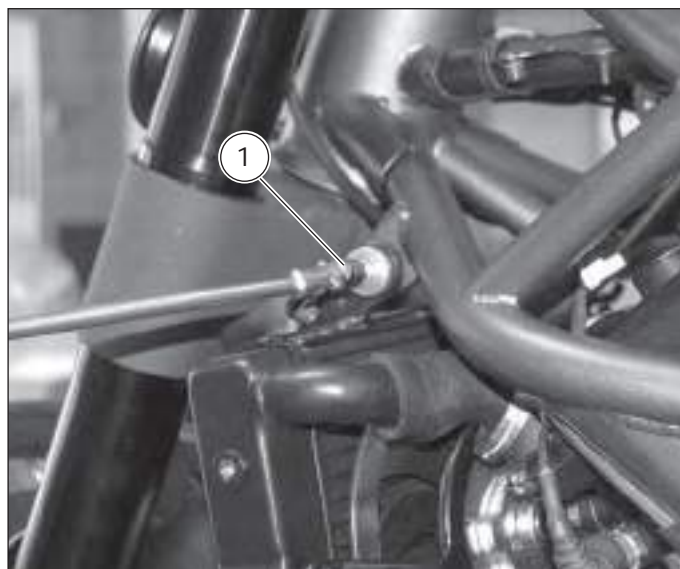


Cooling system and lubrication system

Move the radiator towards the front side of the motorcycle in order to release the water suction pipe coupling (1) from the pump to the radiator.



Remove the radiator fixing screws (1) on the left side of the motorcycle.



Release the water inlet pipe coupling to the radiator (1) to the radiator from the thermostat valve.





Cooling system and lubrication system

Remove the radiator moving it right in order to release it from the peg (A) on the frame support.



COOLING FAN DISMANTLING

Remove the rubber clamp and free the cabling from the right and left sides of the fan units.



Unhook the right fan unit cable connector from the special plate on the right fan support.





Cooling system and lubrication system

Unscrew the three screws and remove both the fan unit and support.

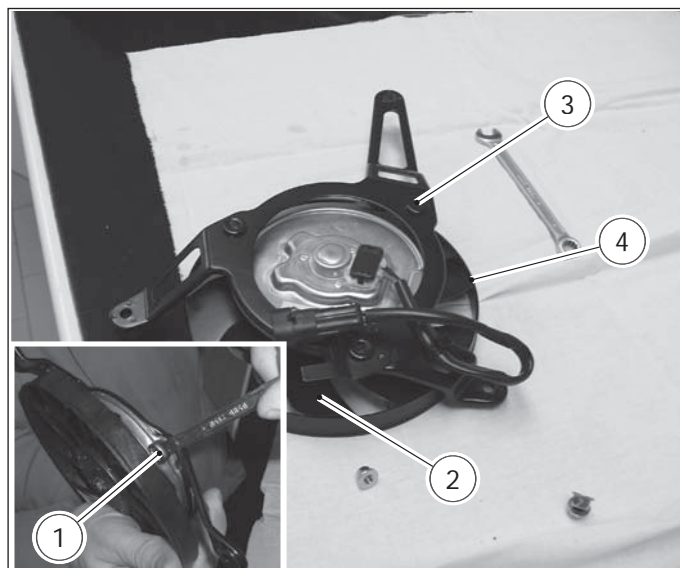


Remove the clamp connecting the cooling fan to the support.



Before replacing the fan it is important to remove the three blocking nuts (1) from the fan (2) and the guard (3) attached to the support (4).

After dismantling the right engine fan unit, proceed in the same way for the left unit.





Cooling system and lubrication system

CHECKING COOLING FAN STARTER

In order to verify the efficiency of the electric fan starter, this starter must be connected as shown in the figure by using voltmeter and amperometer.

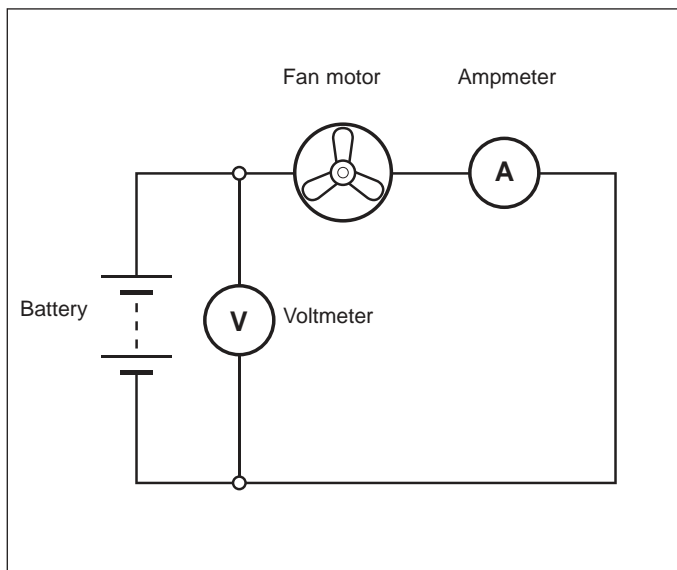
During the test the starter must be powered.

This test can be carried out on a work surface (connecting a 12V – 9Ah battery) or on board the motorcycle.

The voltmeter is to check that the battery feeds the motor at 12V. When the fan turns at maximum speed the amperometer should indicate not more than 5 ampere.

If the motor does not turn, substitute the fan motor unit with a new one.

To carry out the above-indicated test it is not necessary to remove the fan motors from the engine.




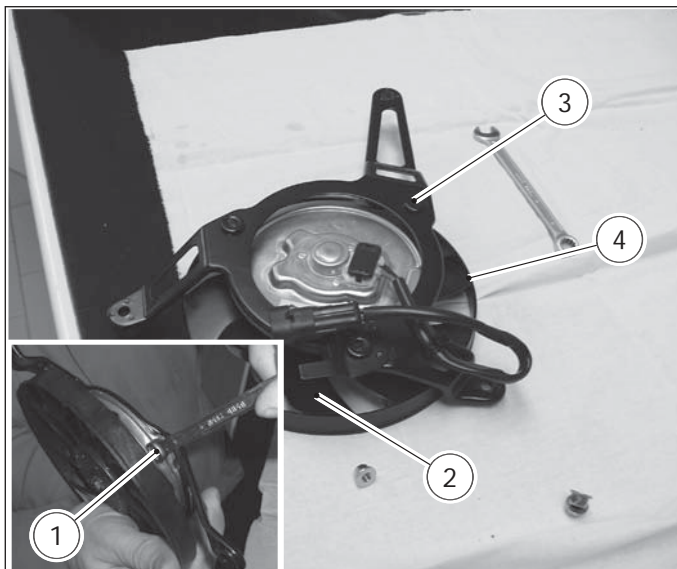
COOLING FAN REASSEMBLY

Reassemble the cooling fan unit by commencing with the left fan.

Insert the electric fan (2) on its support (4).

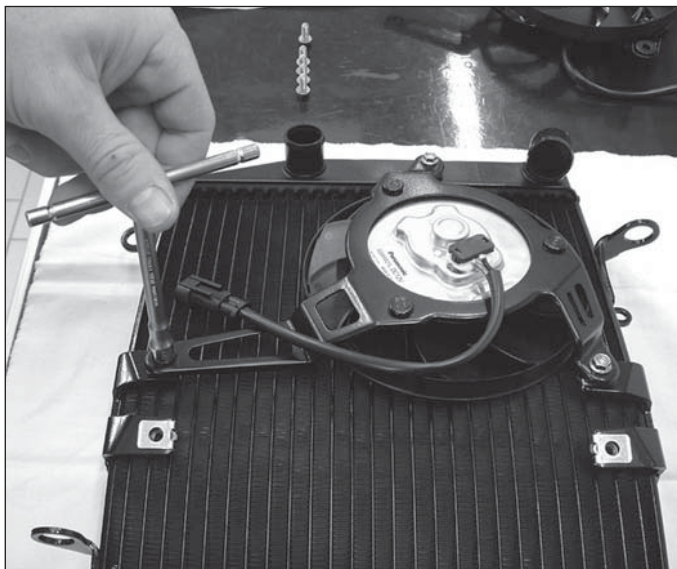
Tighten the three fixing nuts (1) putting the electric fan between support and protection (3).

 Torque wrench setting of electric fan nuts
4.5 – 6 Nm



Position the previously assembled electric cooling fan onto the radiator.

Reassemble the cooling fan unit by commencing with the left fan.





Cooling system and lubrication system

Measure the minimum span between the fan and radiator pack using a feeler gauge as illustrated in the diagram.

Perform the measurement several times in the minimum span area around the entire fan.

The minimum distance "d" must be in the following dimensional range: 1.5 d 4.5 mm.

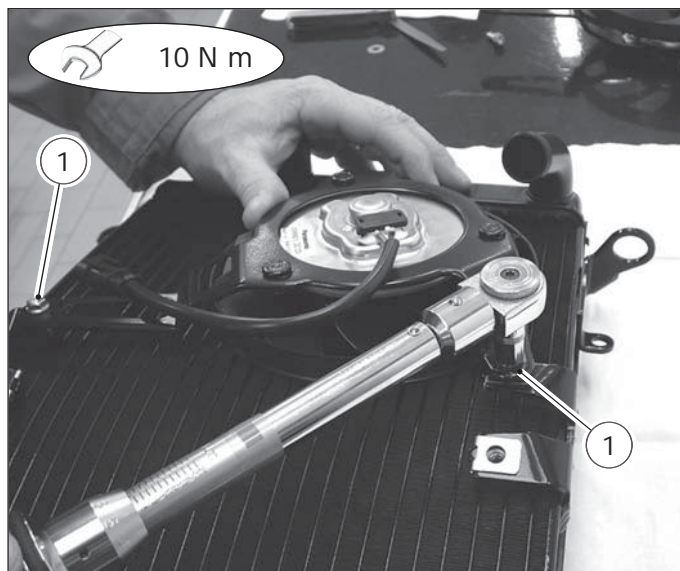


Tighten the three screws (1) to the prescribed coupling torque.

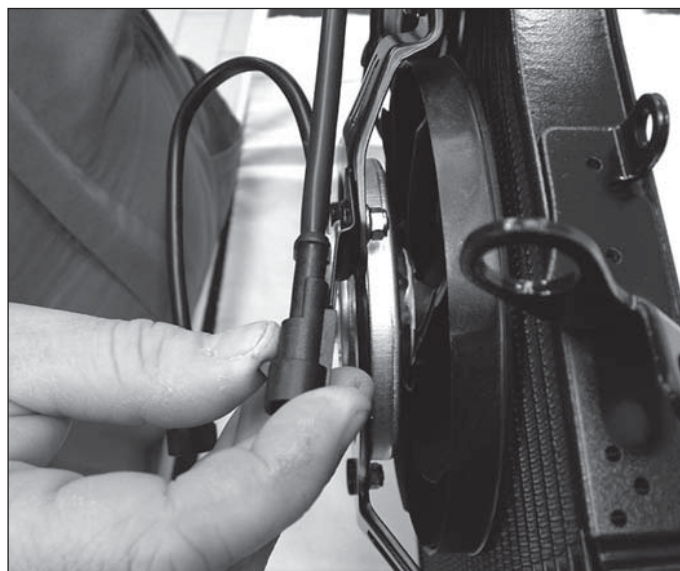


Cooling fan support screws coupling torque
-10 Nm

Proceed in a similar manner for the left cooling fan unit.



Fit the left fan unit cable connector to the special plate on the right fan support.





Cooling system and lubrication system

Fit the left fan unit cabling to the related support using a pull clamp.



Fit the right fan unit cable connector to the special plate on the right fan support.



Position the right fan unit cabling as shown in the diagram and fit to the related support using a pull clamp.





Cooling system and lubrication system

Fit the right and left fan unit cabling using rubber clamps.

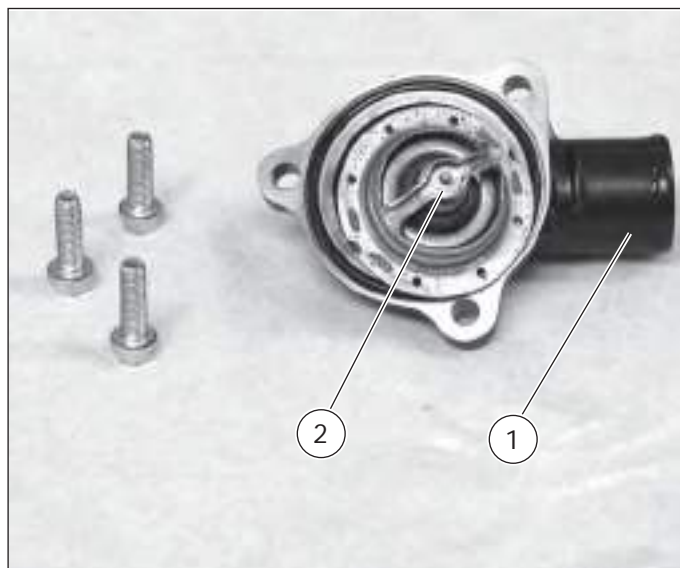


REMOVING THERMOSTAT VALVE

Remove the fixing screws (1) of the thermostat valve cover.



Remove the cover of the thermostat (1).
Remove the inside thermostat (2).





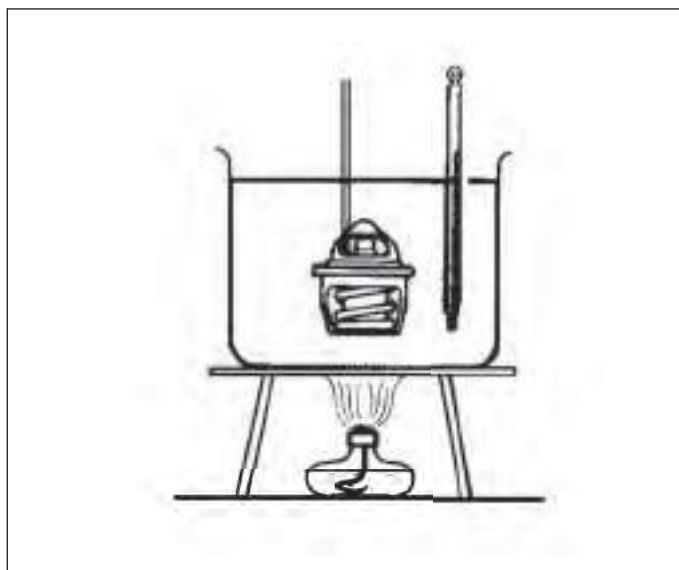
Cooling system and lubrication system

Checking thermostat valve

Check to see if the thermostat pad is damaged.

Check the functioning of the thermostat as follows:

- Suspend the thermostat by a piece of string threaded through the flange as indicated in the figure.
- Immerse the thermostat in water contained in a laboratory glass as indicated in the figure. Ensure that the thermostat is maintained in suspension. Heat the water with a heat source and observe the increase in temperature of the thermometer.
- Observe the temperature at the moment of opening of the thermostat. The temperature at which the thermostat commences to open should be between the indicated values.



Standard

Thermostat opening temperature

4.5 - 8.5 C

- Continue to heat the water to increase the temperature.
- When the temperature of the water reaches the specified value, the thermostat should be raised up by at least 7 mm.

Standard

Raising up of the thermostat

More than .0 mm at 90 C

- If the thermostat does not satisfy only one of the requisites (opening temperature and raising up of the thermostat), it must be substituted.

REASSEMBLING THERMOSTAT VALVE

Insert the O-ring (1) in its appropriate seat on the cover of the thermostat.
Check the condition of the O-ring previously utilised.



If the O-ring is not in good condition substitute it with a new one.

Apply a thin layer of silicone grease.



Recommended grease: Silicone Grease

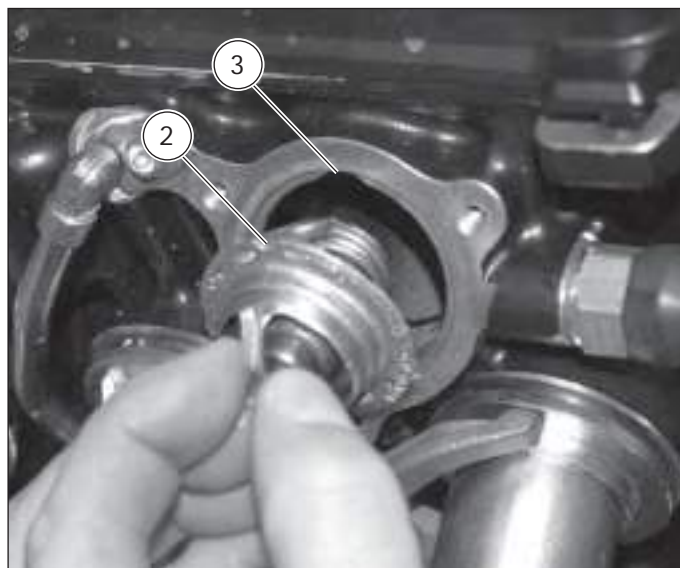


Apply grease on the outer flange of the thermostatic valve on the engine input side.



Insert the thermostat into its seat within the cover.

During the assembly of the thermostat ensure that the hole (2) on the external flange of the thermostat is aligned with the curved working (3) on the engine.



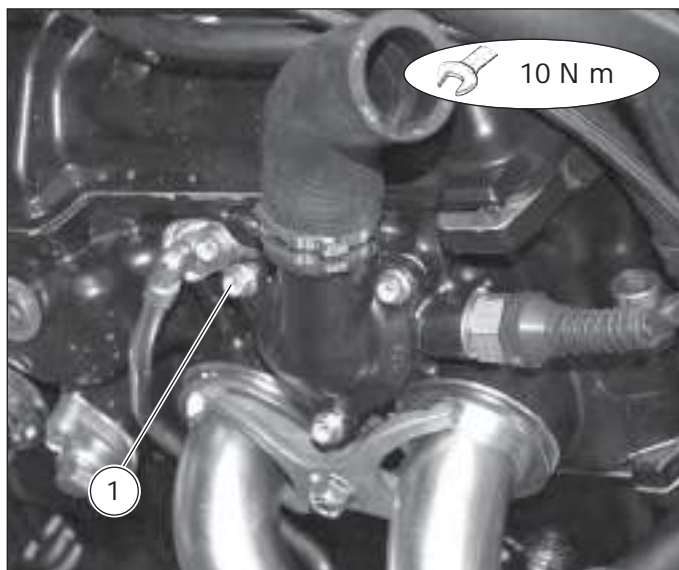


Cooling system and lubrication system

Insert the cover of the thermostat, complete with thermostat onto the engine.
Tighten the three fixing screws (1) to the prescribed torque pressure.

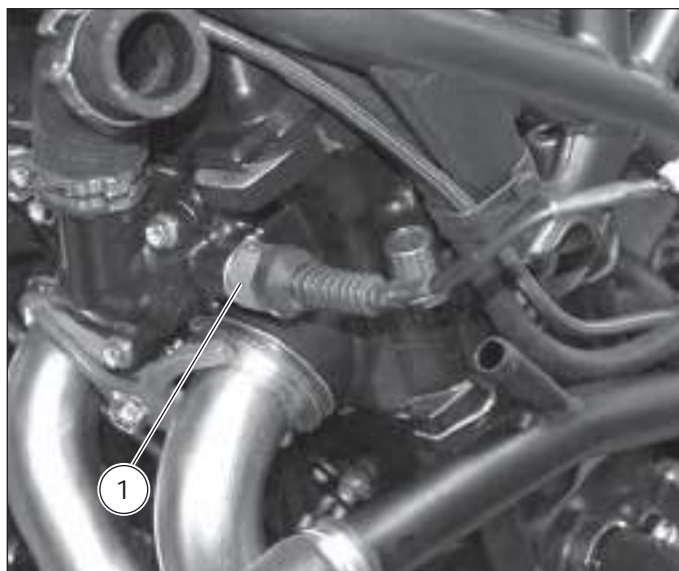


Torque pressure 10 N m

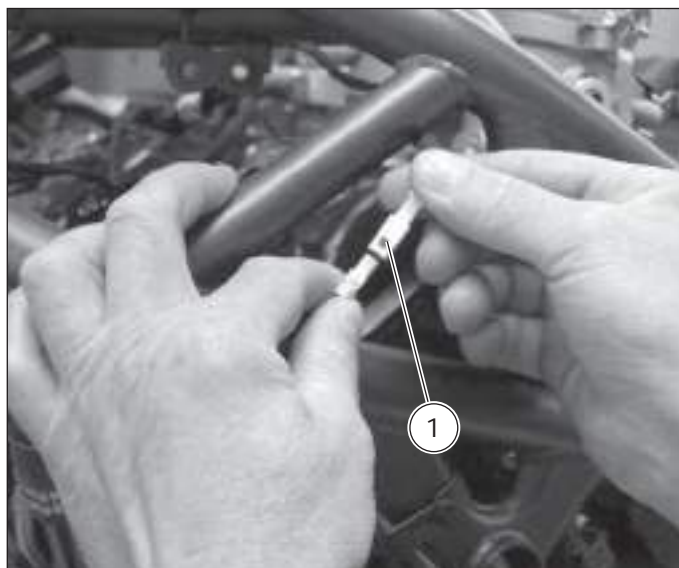


If the water temperature sensor connector was removed previously, the following action must be taken.

Tighten the sensor H₂O (1) connected to the control unit.



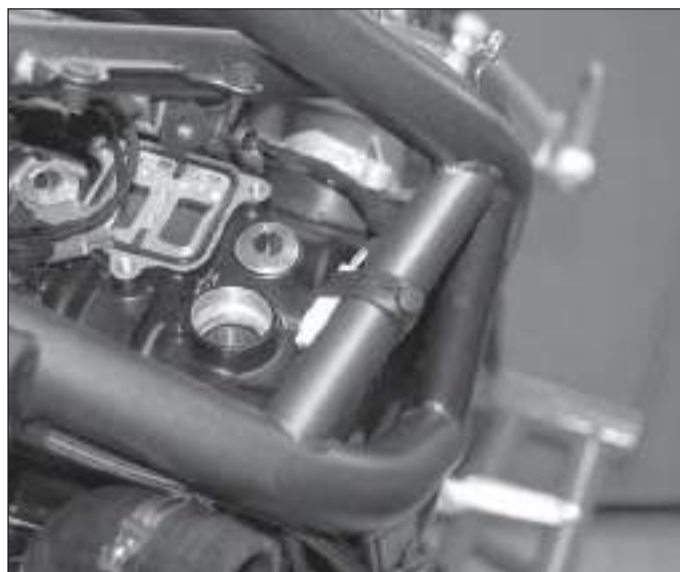
Connect the water temperature sensor electrical cable (1) to the control unit.





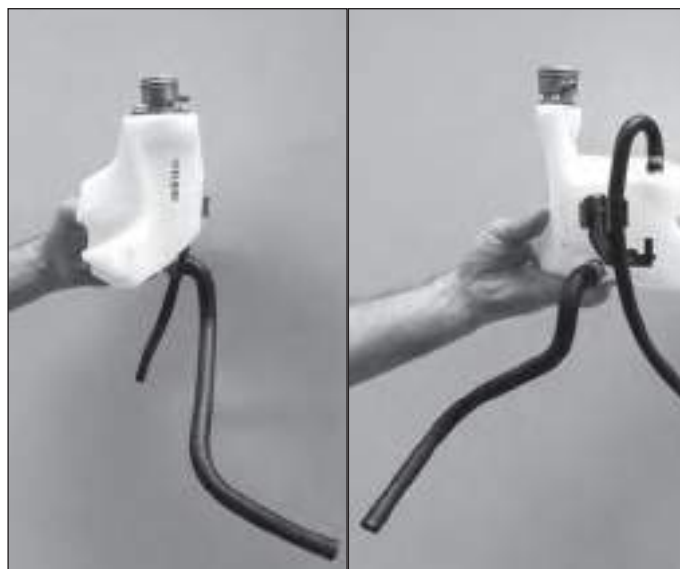
Cooling system and lubrication system

Block the water temperature sensor electrical cable with an elastic clamp as illustrated in the diagram.



REASSEMBLING THE EXPANSION TANK

Position the tube in respect of the expansion tank as indicated in the figure.



Position the expansion tank on the frame; if the operation is difficult, slightly turn the tank clockwise.






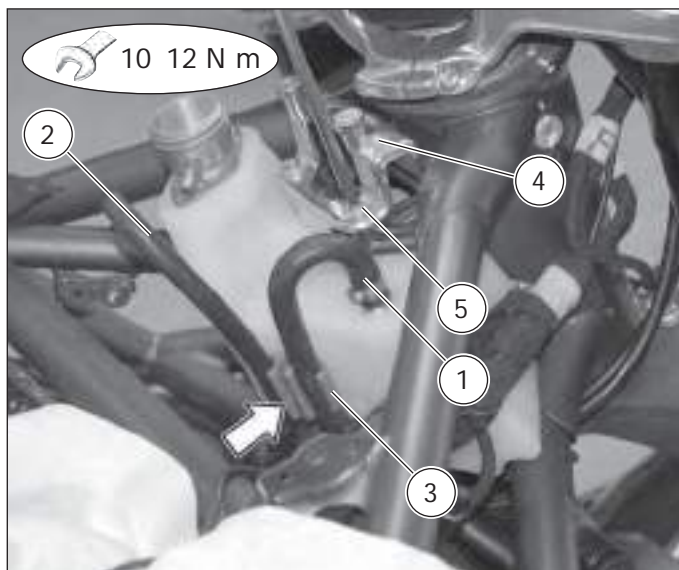
Cooling system and lubrication system

Insert the radiator water breather pipe (1) and the overflow pipe (2) inside the seats on the plastic clip (3).

Reassemble and fix the ignition switch fixing support (4) using the four screws (5).

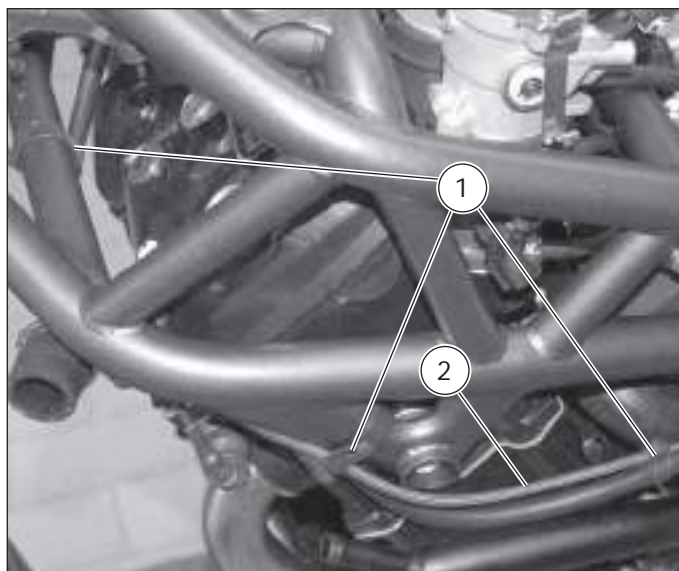
 Scre tightening torque 5 10 12 N m

 Thread-locking fluid used Loctite 243

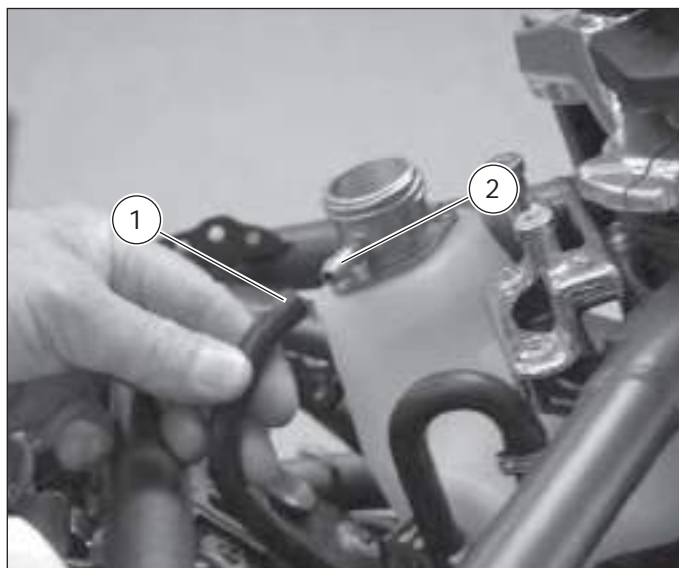


If the “overflow” tube was previously removed, reposition it and fasten with the three rubber clamps (1) as shown in the figure.

Ensure that the placement follows the figure and includes also the clutch control piping (2).



Put the overflow pipe (1) on the nozzle of the expansion tank cap (2) again, until it reaches the reference limit shown in the figure.





Cooling system and lubrication system

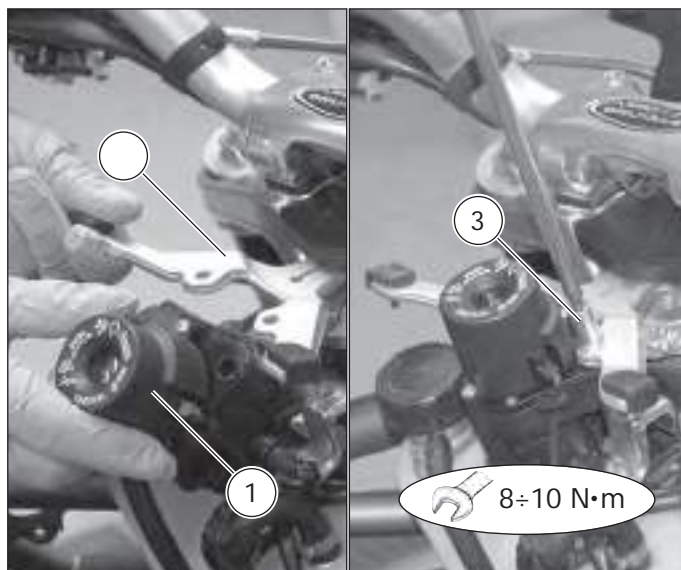
Assemble the ignition switch (1) and the tank anchoring rod (2) and fix into place with the two screws (3).



Screw tightening torque (3): $8 \div 10 \text{ N}\cdot\text{m}$



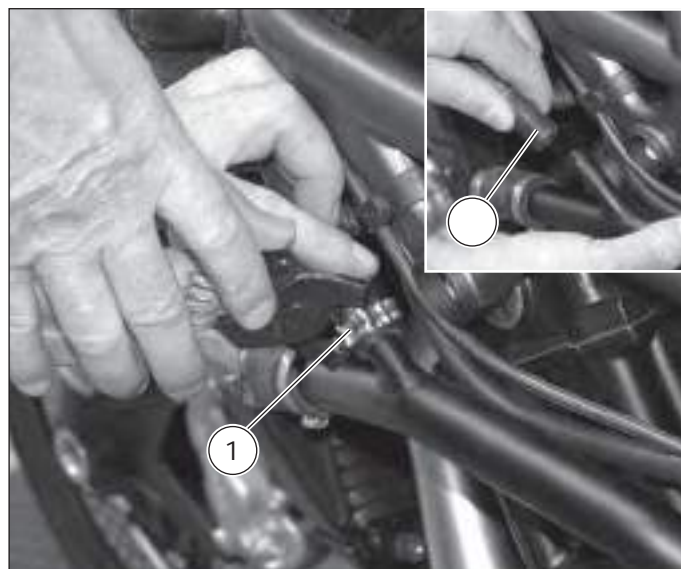
Thread-locking fluid used: Loctite 43



On the left side of the motorcycle, insert the water radiator connecting pipe () to the expansion tank. Secure it using a clamp (1) CLIC R 205 with relevant specific pliers.

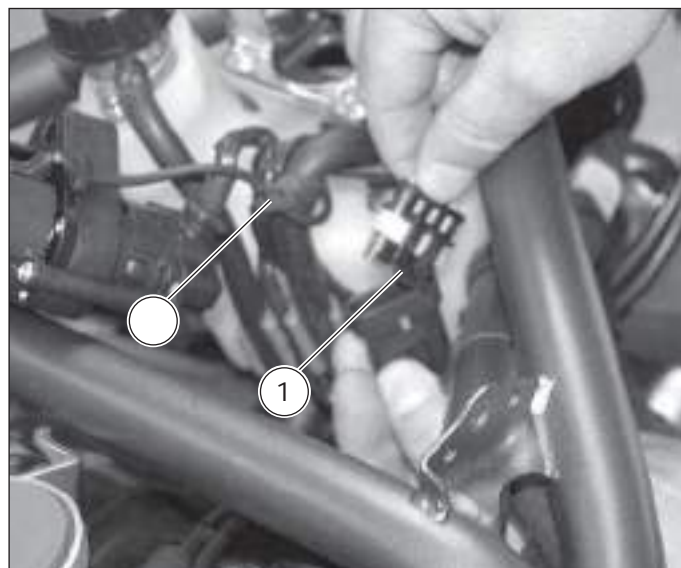


Specific tool CLIC R 05



Reconnect the connector (1) with the main wiring connection.

Secure the ignition switch wiring to the radiator breather pipe using the rubber clamp ().





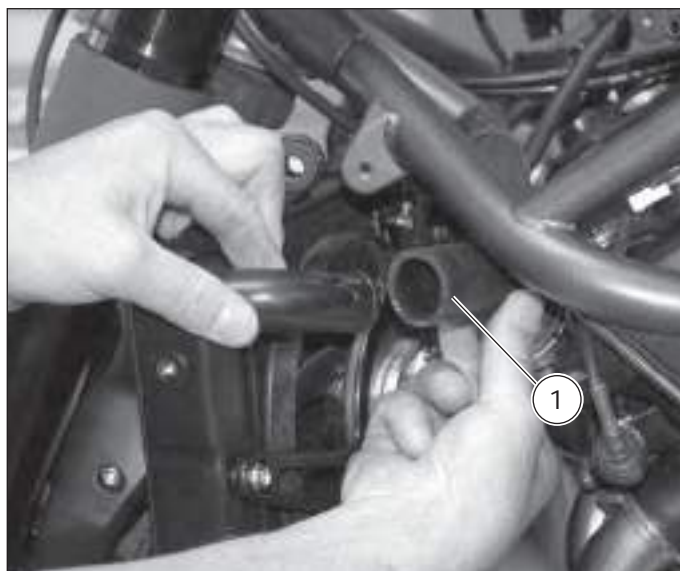
Cooling system and lubrication system

ASSEMBLING WATER RADIATOR


On the right side of the motorcycle insert the radiator right support equipped with rubber bulb in the frame peg (A).

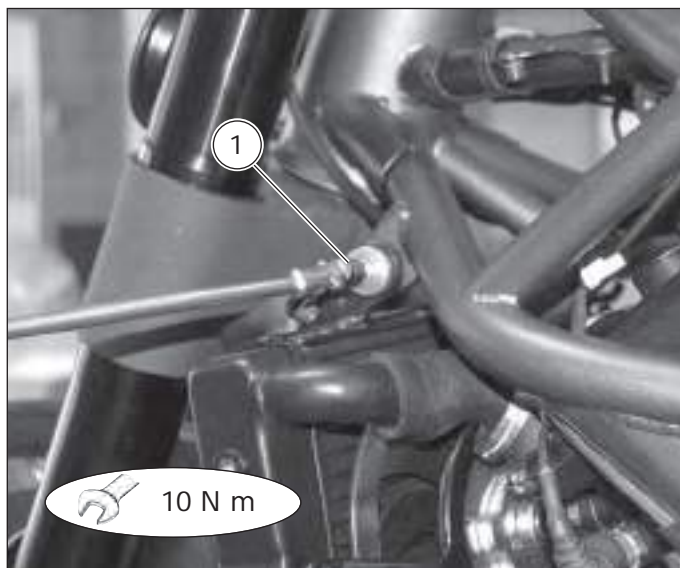


Reinsert the sleeve (1) of the water input pipe of the radiator from the thermostatic valve.



On the left side of the motorcycle insert the radiator fixing screw (1).

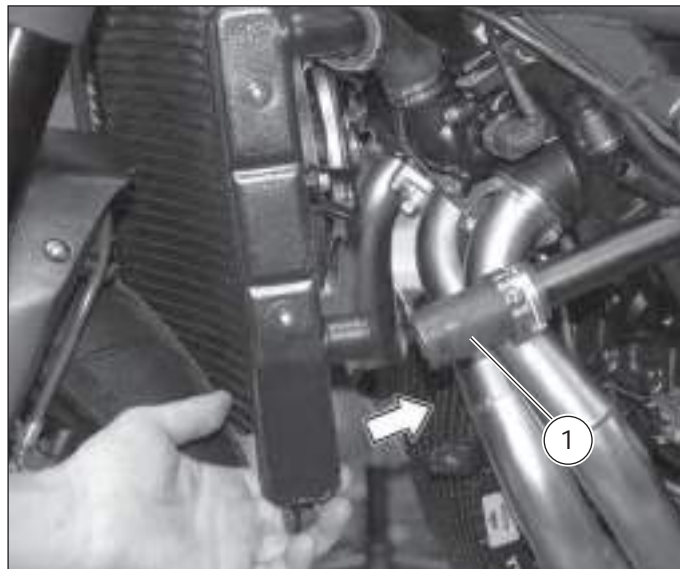
 Torque wrench setting of the radiator fixing screw 10 N m





Cooling system and lubrication system

Move the radiator towards the rear of the vehicle so that it can be inserted inside the sleeve (1) of the water suction tube of the radiator pump.



Lower the oil radiator from the left-hand side and insert into the lower right fixing point of the water radiator.



On the left side of the radiator insert the lower fixing screw.



Torque wrench setting of the radiator fixing screw 10 N m



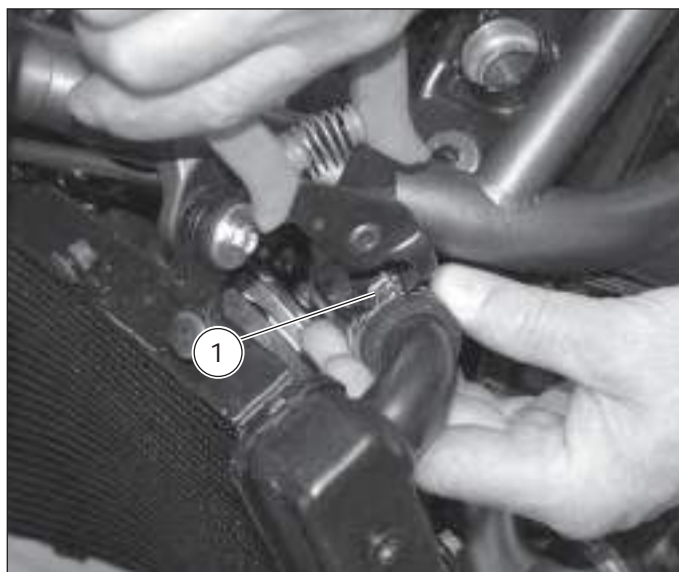


Cooling system and lubrication system

Reposition the clamp (1) on the sleeve of the water inlet pipe to the radiator from the thermostatic valve and lock into place using the special pincer CLIC R 205



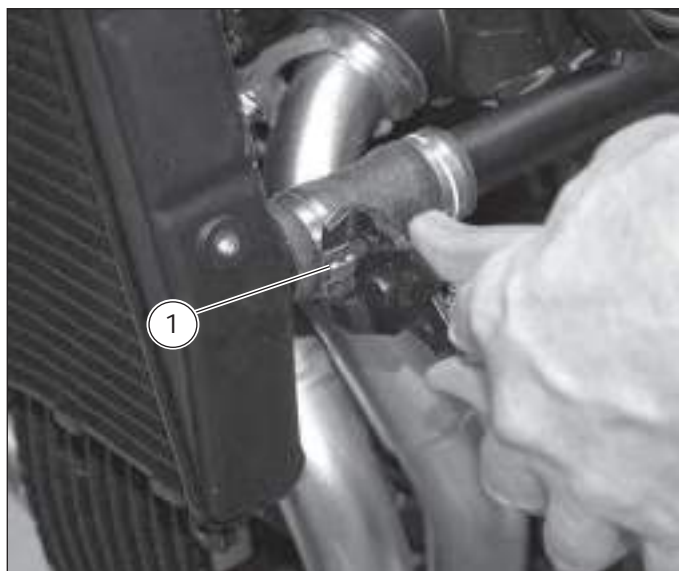
Specific tool - pliers CLIC R 205



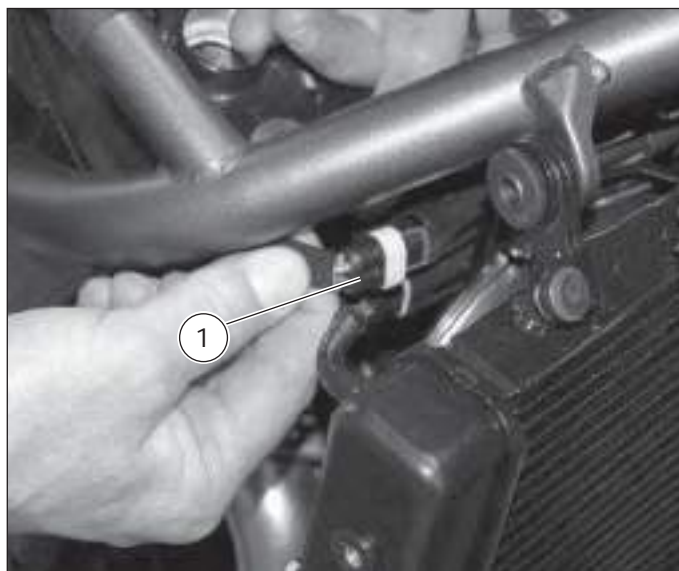
Reposition the clamp (1) on the sleeve of the water suction pipe from the water pump to the radiator and lock into place using the special pincer CLIC R 205



Specific tool - pliers CLIC R 205



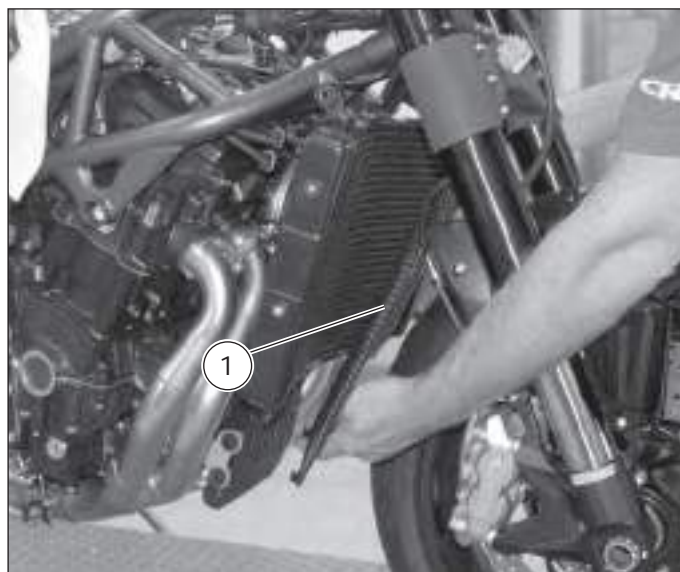
On the right side of the vehicle, connect the two cooling fan connectors (1) to the main cabling connection.



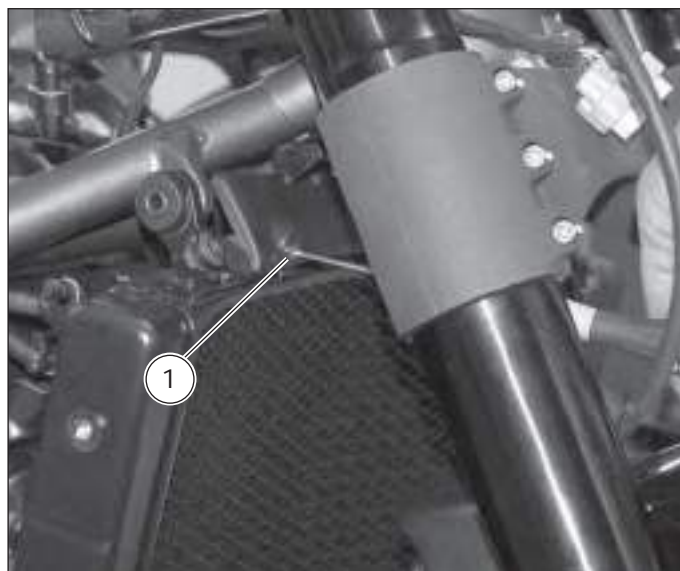


Cooling system and lubrication system

Insert the protective grid (1) in the proper seat.



Assemble the plastic upper protection (1) and secure it using the two fixing screws.



Position and tighten the oil radiator protection using the two fixing screws (1).





Cooling system and lubrication system

Position the water radiator side (1) protections securing them on both sides using the respective fixing screws.



Fill the system using the appropriate fluid.



Fill until a level slightly over the notch indicating the MIN level is reached.
Tighten the sealing cap of the expansion tank.





Cooling system and lubrication system

Reassemble the following components in order:

- Air filter compartment
- Fuel tank
- Tank side panels
- Rider's saddle



Start the engine for a few seconds. Let it cool and then re-check the level of the cooling liquid inside the expansion tank.

It must reach the line shown in the figure, keeping slightly over the MIN reference.

If the level is lower than the line shown, reset it adding new liquid from the filling cap; restart the engine until the temperature is reached and wait for the fan comes into operation at least twice. Shut off the engine and wait for the temperature falls; finally perform the definitive check of the coolant level.



Complete the motorcycle assembly.





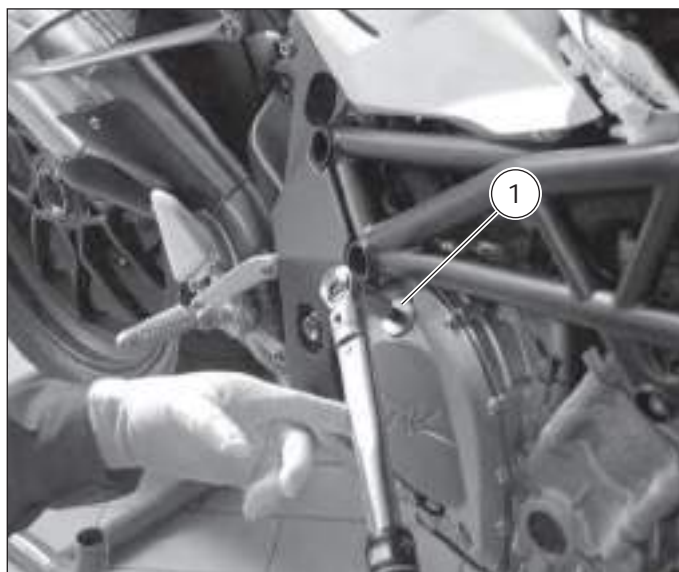
Cooling system and lubrication system

REMOVING OIL RADIATOR

Before removing the oil radiator you should completely drain the lubrication system.
Put an appropriate vessel under the engine.


Remove the filling cap (1) on the right side of the motorcycle in order to facilitate the oil spill.

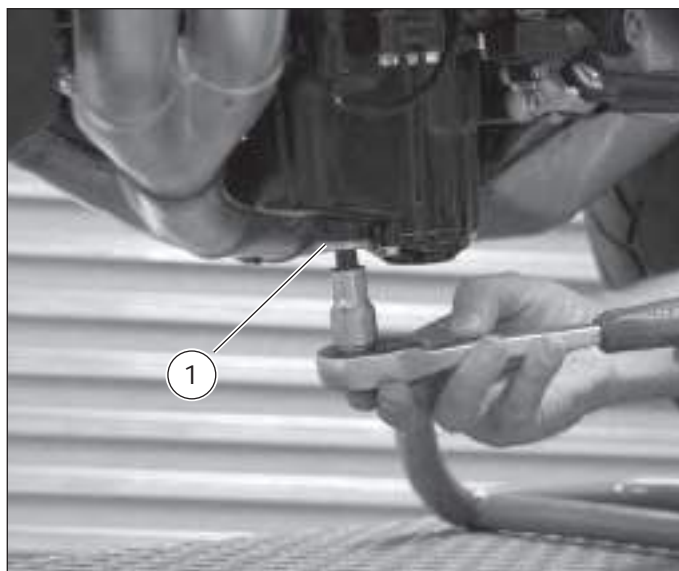
Remove the filler cap (1) using the supplied 10 mm hexagon bar attached to a wrench.



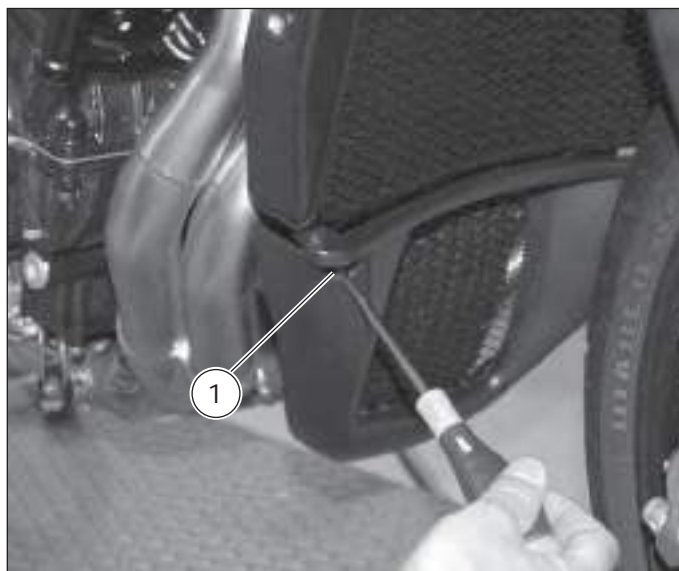
Remove the oil drain plug (1).

Wait for the complete draining of the lubrication system.

 Recover the exhausted oil in an appropriate vessel.
Do not drain liquid into the environment.



Remove the oil radiator protection unscrewing the two fixing screws(1).






Cooling system and lubrication system

Remove the engine-radiator support bracket fixing screw on the left side of the vehicle.




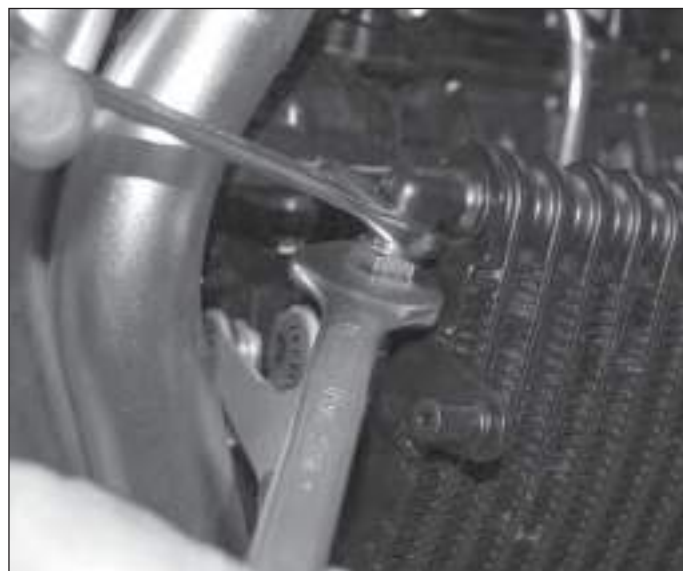
Remove the oil radiator from the clamping rod on the right-hand side.



 Only if it is necessary replacing the oil radiator perform the following operation.

Remove the oil delivery and return pipings connected with the oil radiator unscrewing the fixing nuts.
Remove the oil radiator.

 If the oil radiator should be only removed from its position instead of being replaced don't intervene either on pipings or on unions.





Cooling system and lubrication system

REASSEMBLING OIL RADIATOR



Only if it is necessary replacing the oil radiator perform the following operation.

Reposition the oil radiator and reconnect the oil delivery and return pipes which are connected to the oil radiator by tightening the nuts, after having lubricated the relative threads beforehand with motor oil.

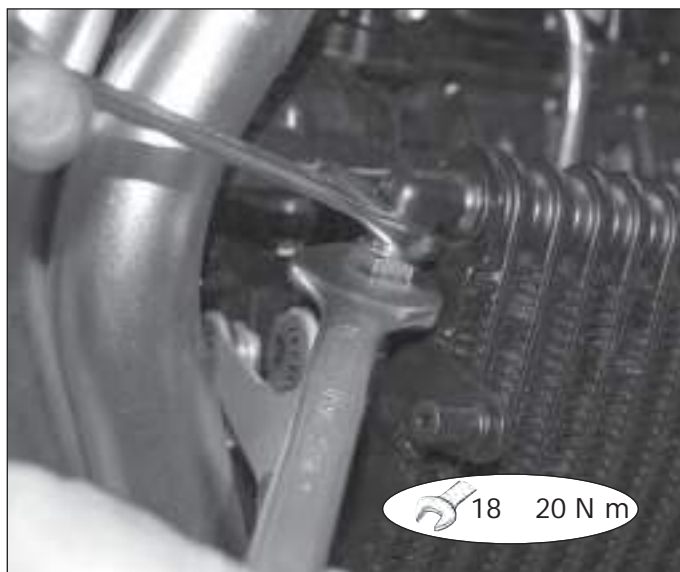


Lubricate using engine oil

Tighten the pipe fixing nuts to the radiator to the prescribed torque wrench.



Torque wrench setting 18 – 20 N m



Reinsert the oil radiator in the clamping rod on the right-hand side.



Reassemble the engine-radiator support bracket with the fixing screw on the left side of the vehicle.





Cooling system and lubrication system

Reassemble the oil radiator protection securing it by the appropriate screws (1).



Before replacing the cap, make sure it is thoroughly clean and replace the sealing ring with a new one. On the oil drain plug there is a magnet for attracting any ferrous residuals which could form in the engine during the rotation.

Reassemble the engine oil drain plug and tighten it to the specific torque wrench.



Torque wrench setting for oil drain plug
35 N m

Fill the circuit complying with the specifications described in the Chapter B "Maintenance".



Reset the correct oil level inside the engine, verifying from the appropriate port on the right side of the engine.




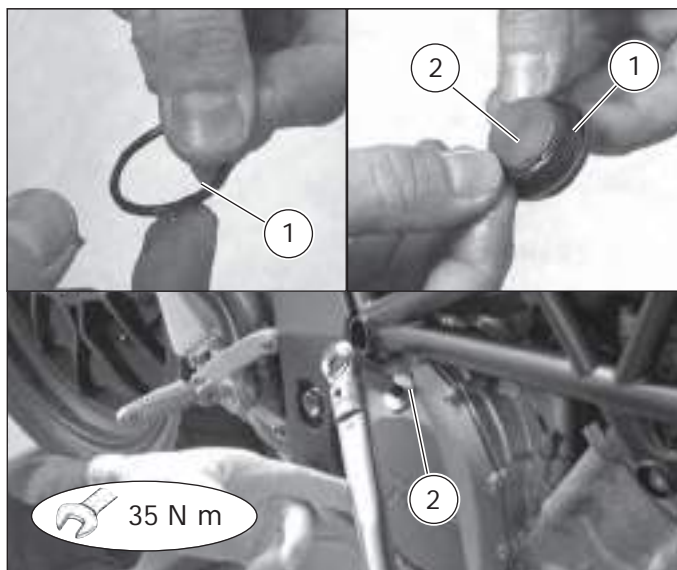


Cooling system and lubrication system

Refill to the correct level. Close the oil filler cap.
Before replacing the filler cap, grease the O-ring (1) with the silicon grease (see figure), then reposition in the proper seat.

Tighten the cap (2) to the tightening torque indicated.

 Torque wrench setting for oil drain plug
35 N m



Start the engine for some minutes.

After having shut off the engine, wait for at least 10 minutes and check the oil level. Ensure that the ground is flat and keep the motorcycle standing as much as possible.

The level must be near the “MAX” reference on the timing case as much as possible. Do not exceed this limit.

Check any oil leakages.

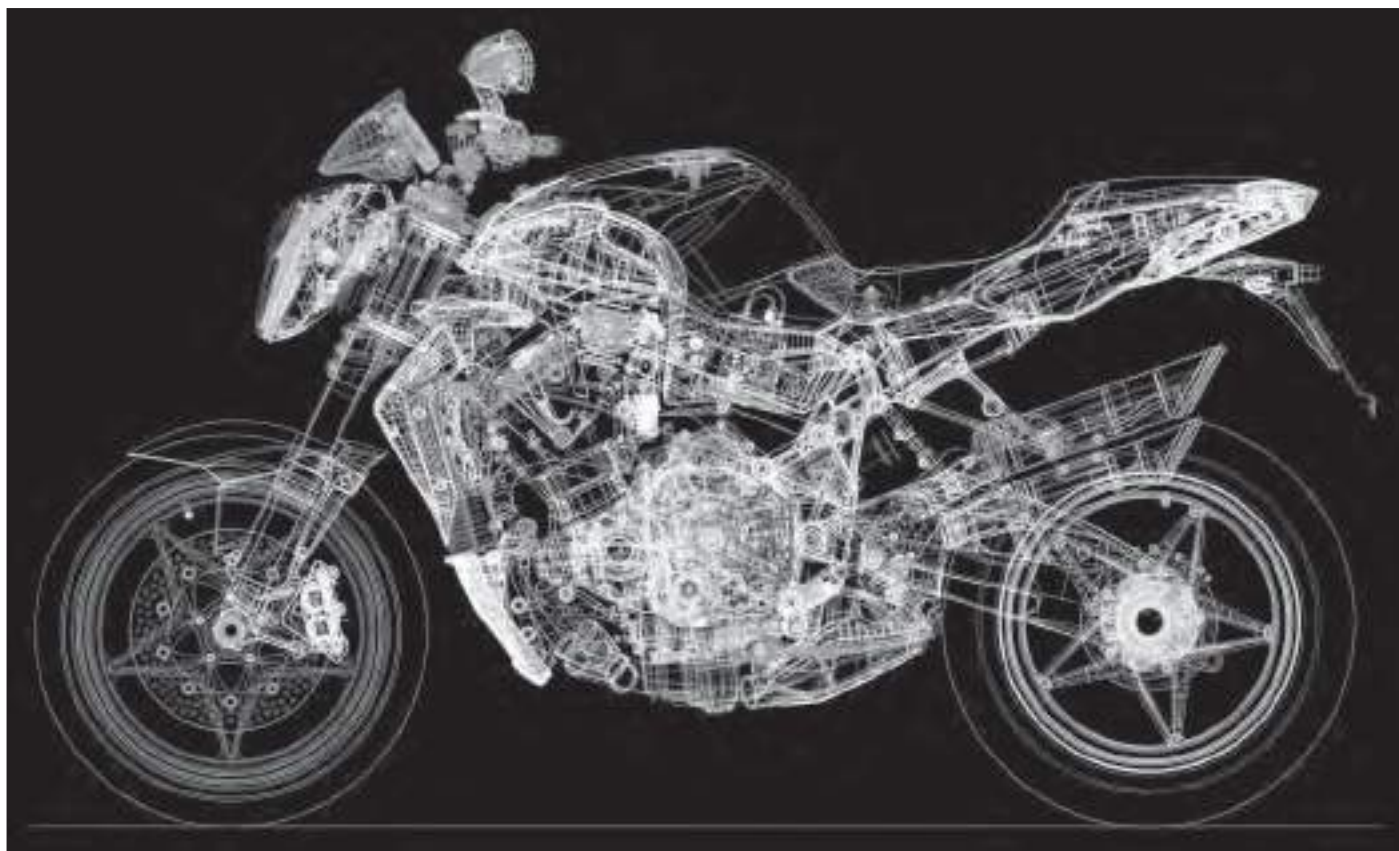


Avoid making the engine turn with the oil level lower than the minimum level this can impair the operation of the different parts of the engine.

If the oil level after the reset is upper than the MAX reference correct it by emptying the system.



Special tools



M

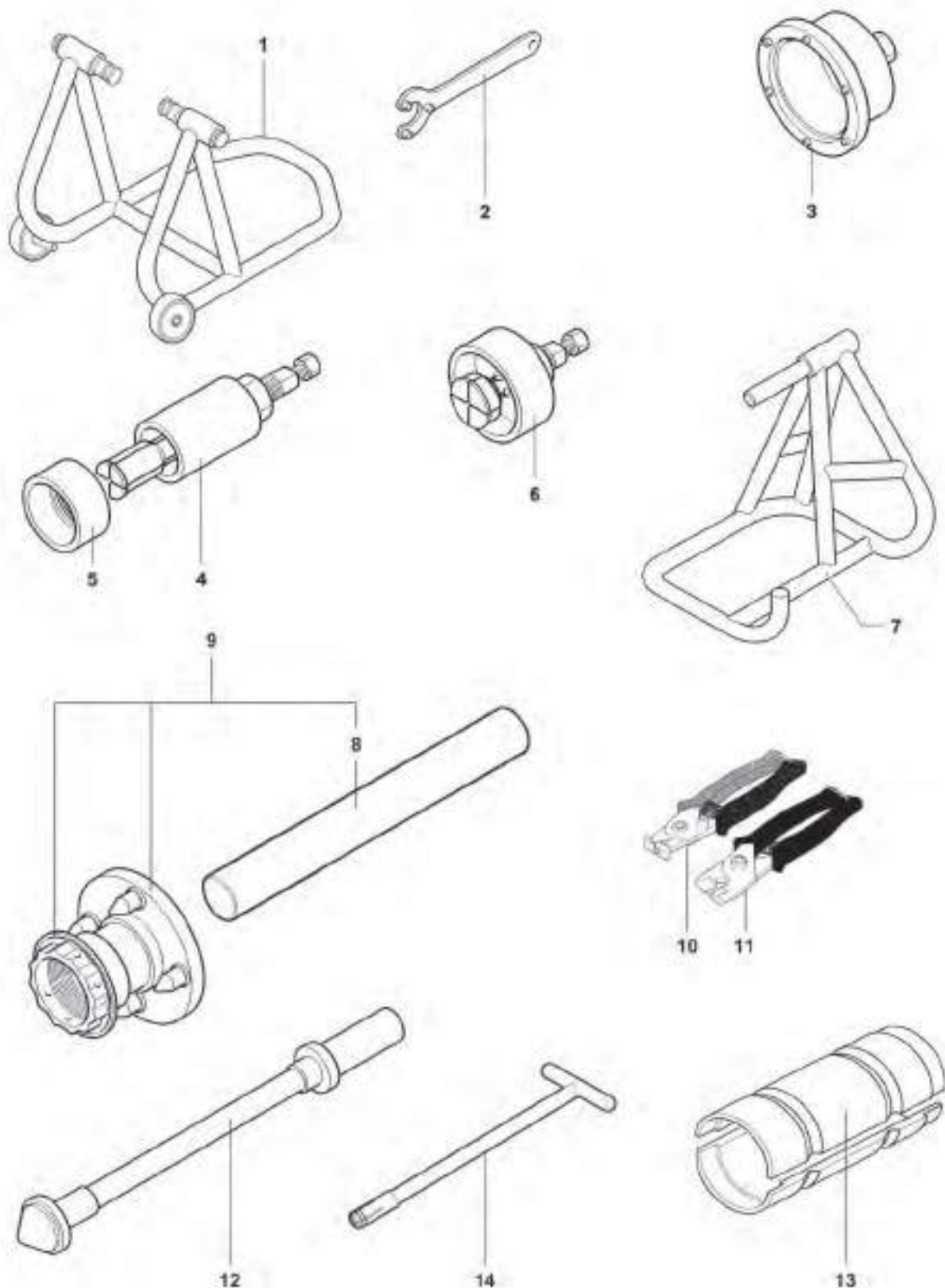
SECTION M

Revision 1

Maintenance tools

The special tools shown in the following chapter are indispensable for a correct carrying out of the described maintenance operations.

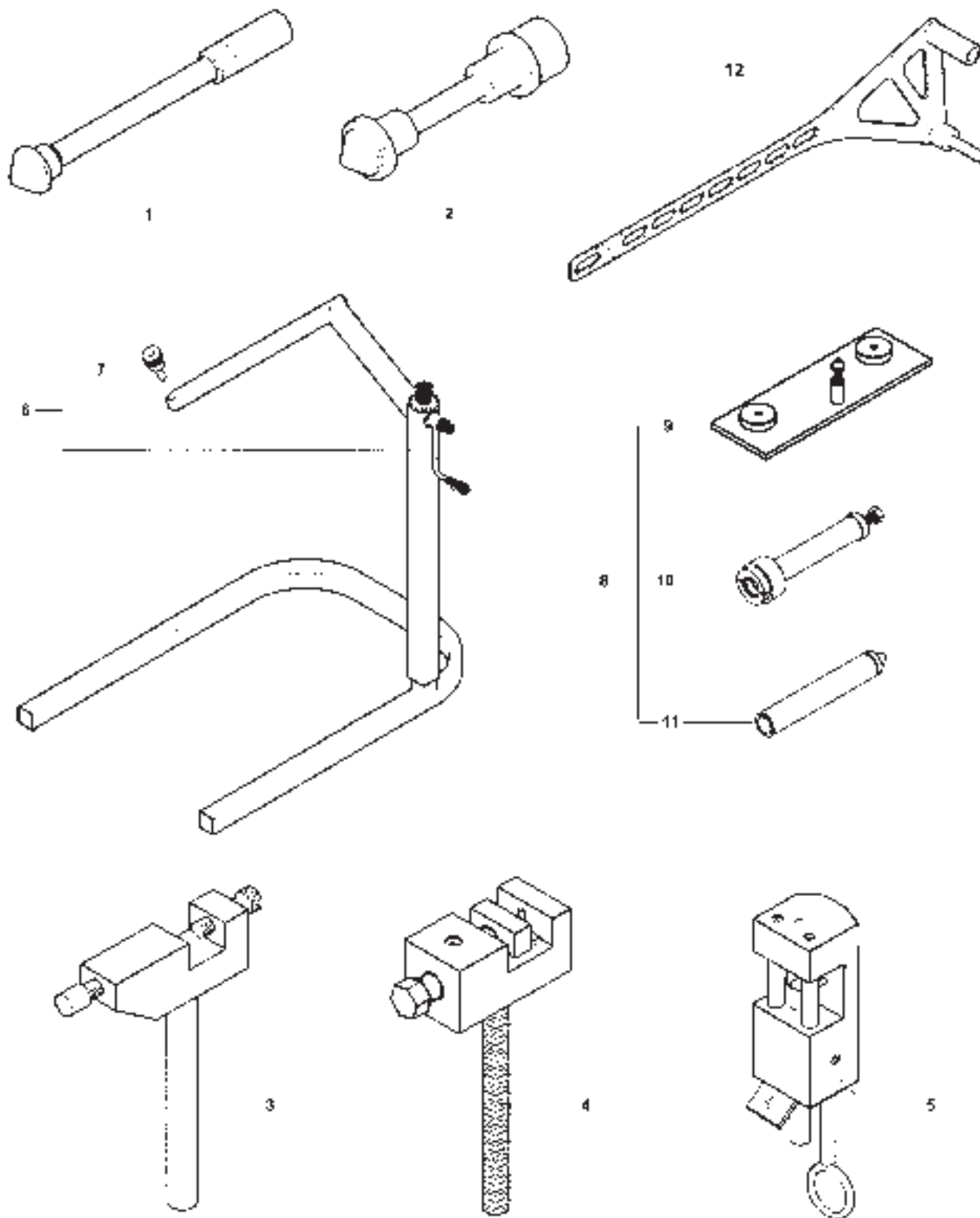
To order the special tools, refer to the spare parts catalogue.





Special tools

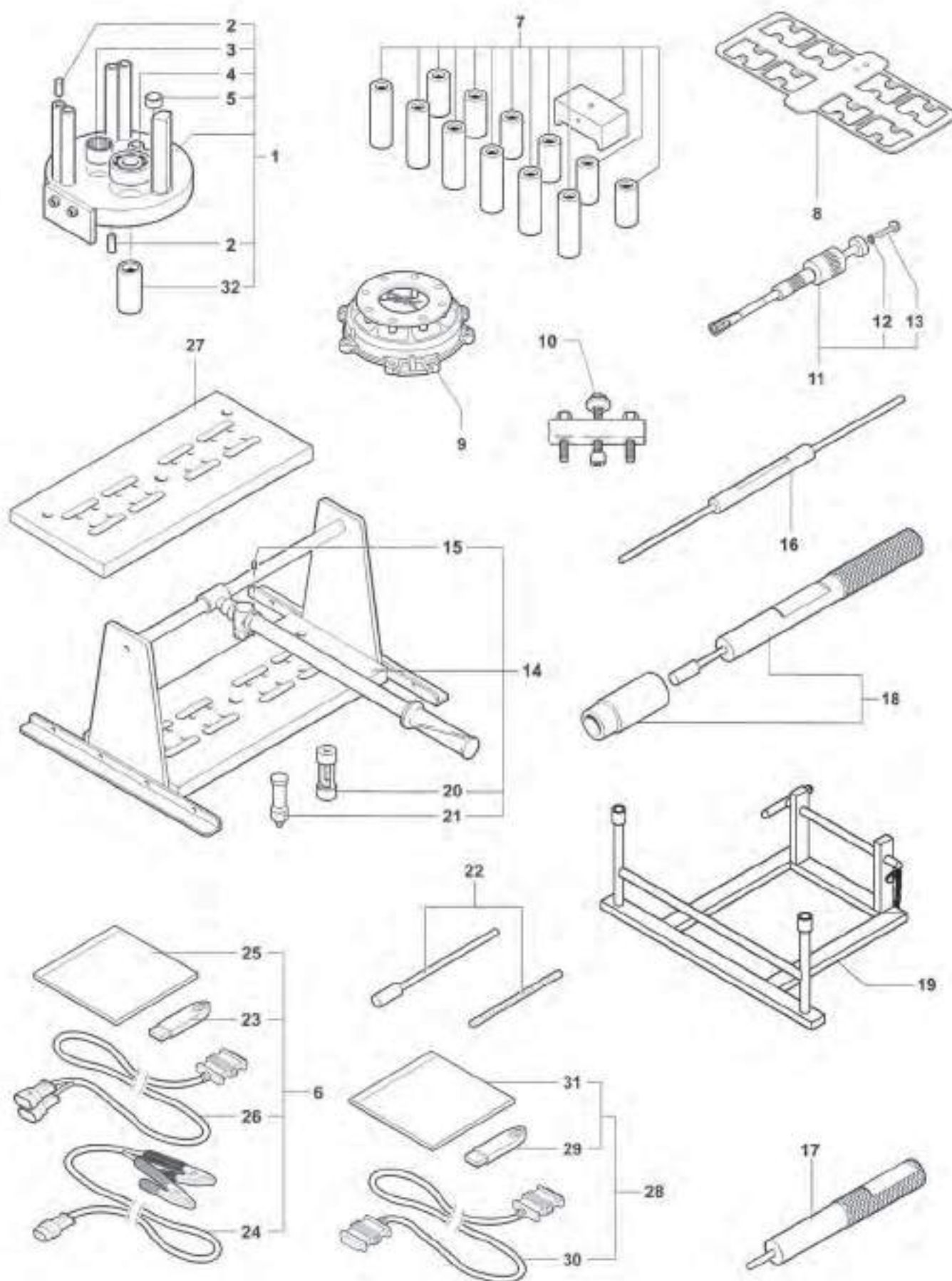
N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	Descrizione	Description	► I FRAME ►	► I ENGINE ►
1	800095830	1		•	•	Cavalletto anteriore	Front stand		
2	800091645	1		•	•	Chiave ghiera cuscinetti di sterzo	Steering bearing pin wrench		
3	800092857	1		•	•	Chiave ghiera eccentrico sterzo	Steering cam ring nut wrench		
4	800092860	1		•	•	Estrattore cuscinetti forcellone	Fork bearings puller		
5	800092861	1		•	•	Boccola estrattore cuscinetti forcellone	Fork bearing puller bushing		
6	8000B4416	1		•	•	Estrattore cuscinetti ruota anteriore	Front wheel bearings puller		
7	800092642	1		•	•	Cavalletto posteriore	Rear stand		
8	8000A1953	1		•	•	Perno per albero di centraggio	Pin for centering shaft		
9	800092865	1		•	•	Attr. bilanciamento ruota posteriore	Rear wheel balancing tool		
10	800095850	1		•	•	Pinza montaggio/ smontaggio fascette clic R	Pliers for clic R clamps assembly/ disassembly		
11	800098321	1		•	•	Pinza inclinata monta fascette clic R	Clic R clamp fitting pliers		
12	800092866	1		•	•	Attrezzo montaggio pacco forcellone	Fork pack assembly tool		
13	8000A1039	1		•	•	Attrezzo para- polvere e paraolio	Dust cover and oil splash guard tool		
14	8000B4415	1		•	•	Estrattore boccole telaio-motore- piastra	Frame-engine- plate bushes puller		





Special tools

N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	Descrizione	Description	► I FRAME ►	► I ENGINE I ►
1	800092867	1		•	•	Attrezzo montaggio pacco bilanciere	Equaliser pack tool		
2	8000B4421	1		•	•	Attrezzo cuscinetti ruota anteriore	Front wheel bearings tool		
3	8000B1439	1		•	•	Attrezzo taglio catena	Chain cutting tool		
4	8000B1456	1				Attrezzo chiusura catena	Chain joining tool		
5	8000B1457	1		•	•	Attrezzo ribaditura catena	Chain riveting tool		
6	800095807	1		•	•	Cavalletto anteriore	Front stand		
7	800095808	1		•	•	Perno cavalletto anteriore	Front stand pin		
8	800097887	1		•	•	Attrezzo cuscinetto perno di sterzo	Steering pin bearing tool		
9	800097888	1		•	•	Piastra di riscontro base di sterzo	Steering base plate		
10	800097889	1		•	•	Estrattore cuscinetto perno di sterzo	Steering pin bearing extractor		
11	800097890	1		•	•	Attrezzo montaggio cuscinetto perno di sterzo	Steering pin bearing assembly tool		
12	800093347	1		•	•	Asta settaggio sospens. posteriore	Rear suspension setting rod		





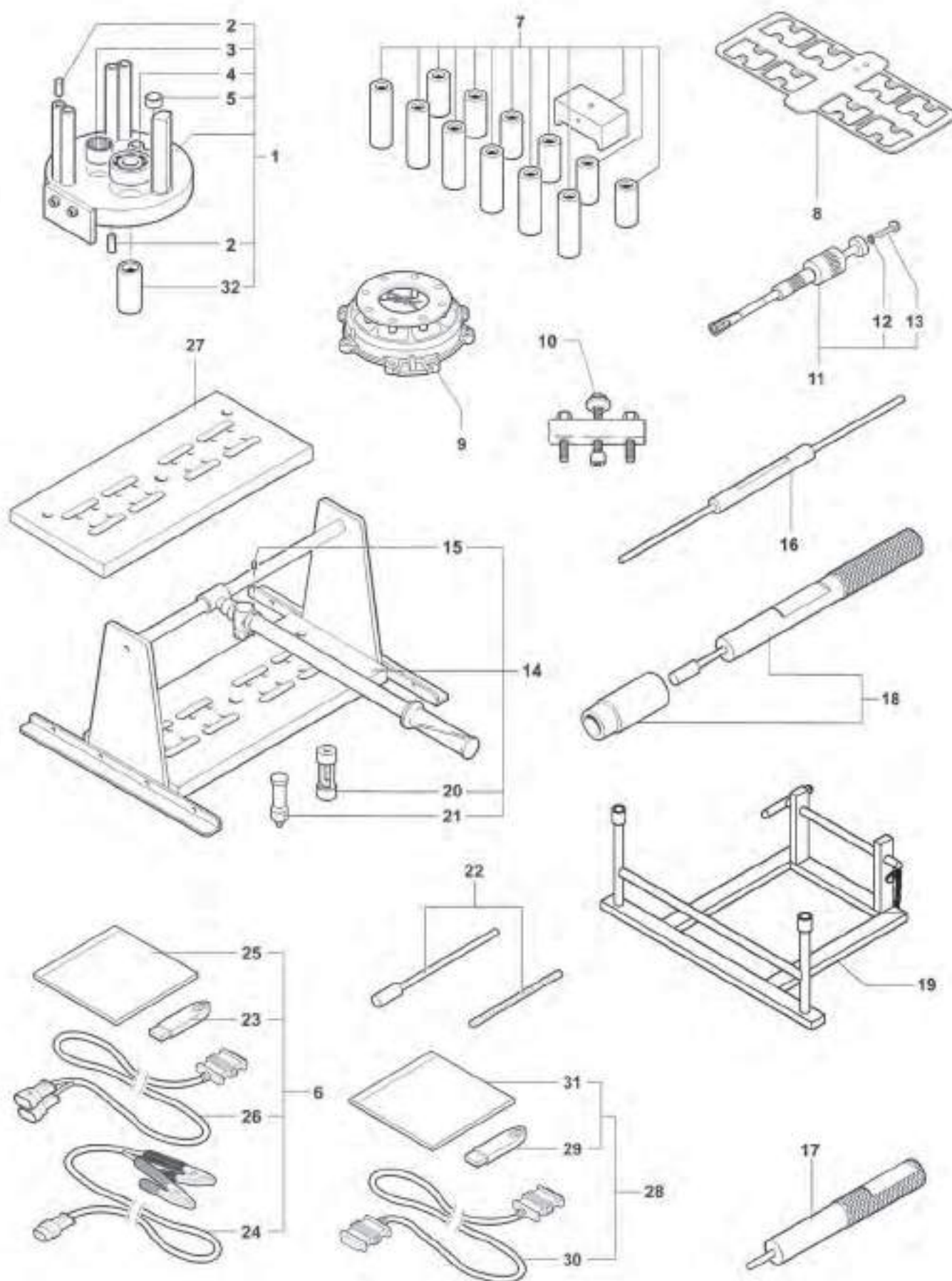
Special tools

N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	Descrizione	Description	► I FRAME ►	► I ENGINE ►
1	8A0094792	1		•	•	Attrezzo montaggio cambio	Gear change mounting tool		
2	800086119	8		•	•	Bussola di riferimento	Locating bush		
3	8000A1087	1		•	•	Cuscinetto	Bearing		
4	800098405	1		•	•	Cuscinetto	Bearing		
5	800087300	1		•	•	Cuscinetto	Bearing		
6	8A00A5394	1	①	•	•	Software diagnostica	Diagnostics software		
6	8B00A5394	1	②	•	•	Software diagnostica	Diagnostics software		
7	8000A3406	1		•	•	Attrezzo misura sporgenza pistoni	Piston projection measuring tool		
8	800094797	1		•	•	Lastra sagomata copri testa	Head cover shaped plate		
9	8000B4304	1		•	•	Attrezzo bloccaggio alternatore	Rotor locking tool		
10	8000B4305	1		•	•	Estrattore volano	Rotor puller		
11	800094798	1		•	•	Attrezzo smontaggio gommini valvola	Valve rubber caps removal tool		
12	62N115538	1		•	•	Rosetta elastica	Spring washer		
13	8C0069056	3		•	•	Vite TEF M8x30	Screw M8x30		
14	800094796	1		•	•	Attrezzo montaggio/smontaggio valvole	Valve assembly/disassembly tool		
15	800051521	2		•	•	Vite M4x6	Screw M4x6		
16	800095429	1		•	•	Tampone controllo	Gauge pad		
17	800095581	1		•	•	Punzone montaggio tenute valvola	Valve seals mounting punch		
18	8000A2385	1		•	•	Tampone montaggio guida	Guide mounting pad		
19	8000B4303	1		•	•	Supporto motore	Engine support		
20	800095179	1		•	•	Attrezzo smontaggio semiconi	Half-cones disassembling tool		
21	800095180	1		•	•	Attrezzo montaggio semiconi	Half-cones assembling tool		
22	8000A2625	1		•	•	Broccia per guida valvole	Broach for valve guide		
23	8000A7688	1		•	•	Chiave USB	USB key		
24	8000A5393	1		•	•	Cavo interfaccia	Interface cable		
25	8C0093878	1	①	•	•	CD-Rom per software diagnostica	Dagnostic software CD-Rom		
25	8D0093878	1	②	•	•	CD-Rom per software diagnostica	Dagnostic software CD-Rom		
26	8000A7689	1		•	•	Adattatore USB/Seriale	Serial/USB adapter		
27	8000A9639	1	③	•	•	Piastra di base	Base plate		
28	8000B2114	1	①	•	•	Software programmazione centralina	Power unit programming software		
28	8A00B2114	1	②	•	•	Software programmazione centralina	Power unit programming software		
29	8000B2116	1		•	•	Chiave USB	USB key		

① Versione Windows 98 - Windows 98 version - Version Windows 98 - Windows 98 Version - Versión Windows 98

② Versione Windows Vista - Windows Vista version - Version Windows Vista - Windows Vista Version - Versión Windows Vista

③ Da utilizzare con il part. N° 14 (Cod. 800094796) - To be used with part No. 14 (Code No. 800094796) - Employez avec le pièce N° 14 (Code N° 800094796) - Mit Teil nr. 14 (Kennziffer Nr. 800094796) verwendet werden - Utilizar con la pieza N° 14 (Cod. N° 800094796).





Special tools

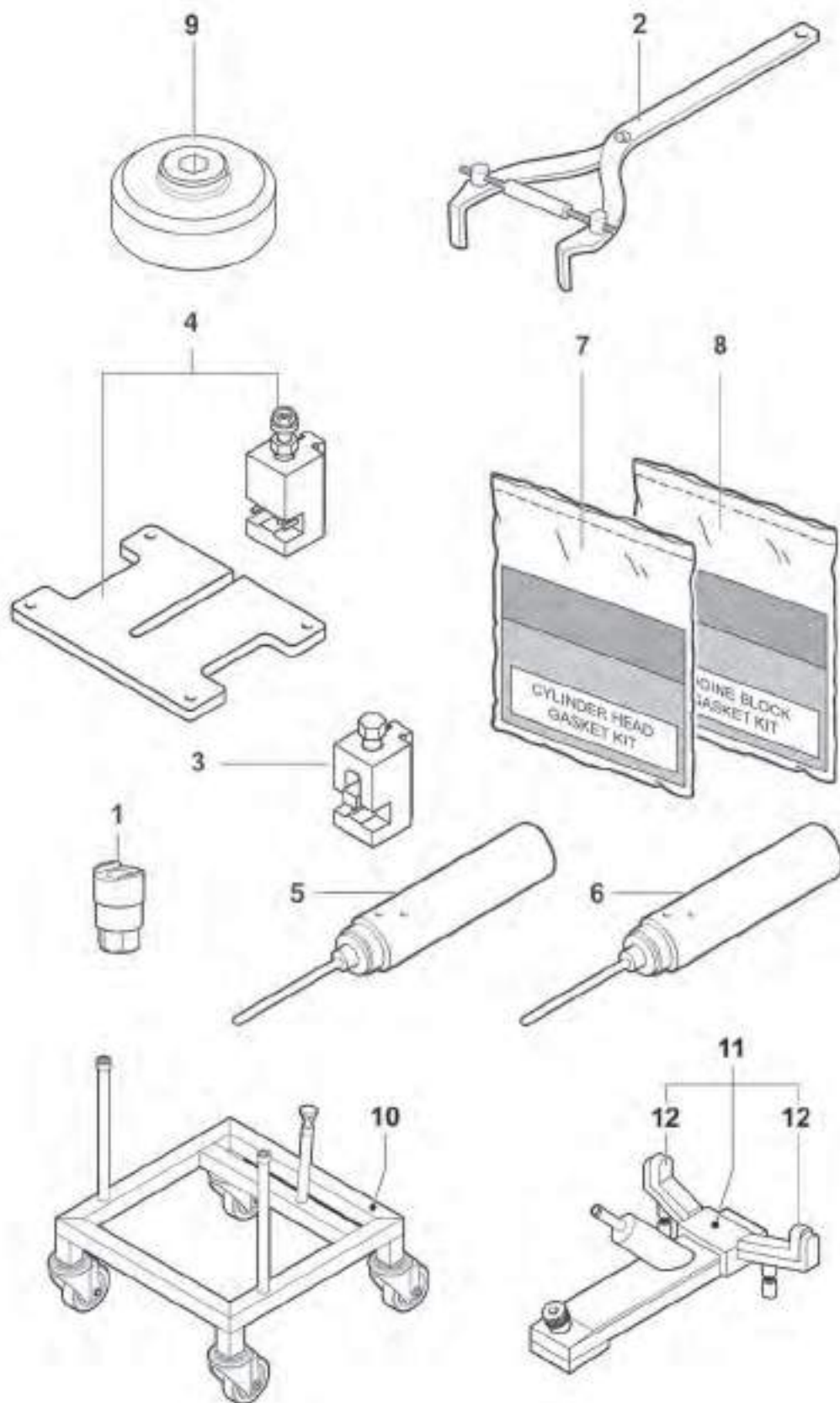
N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	Descrizione	Description	► I FRAME ►	► I ENGINE I ►
30	8000B2117	1	❶	•	•	Cavo seriale	Serial cable		
30	8A00B2117	1	❷	•	•	Cavo seriale	Serial cable		
31	8000B2118	1	❶	•	•	CD-Rom per software centralina	Power unit software CD-Rom		
31	8A00B2118	1	❷	•	•	CD-Rom per software centralina	Power unit software CD-Rom		
32	8A00B2859	1		•	•	Tubo D39-d27,2-L74,5	Pipe D39-d27,2-L74,5		

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❶ Versione Windows 98 - Windows 98 version - Version Windows 98 - Windows 98 Version - Versión Windows 98

❷ Versione Windows Vista - Windows Vista version - Version Windows Vista - Windows Vista Version - Versión Windows Vista





Special tools

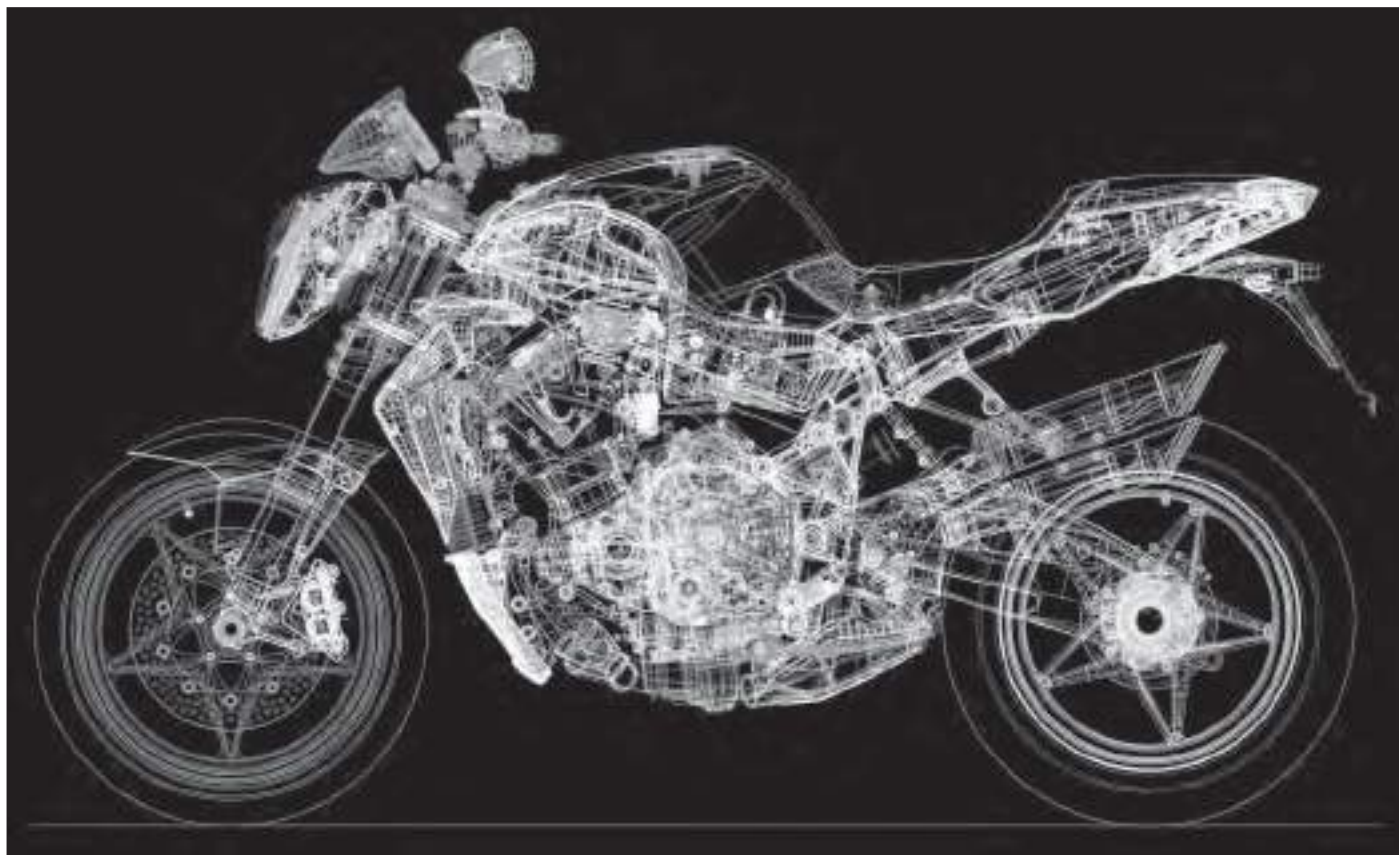
N.	Code	Q.ty	Note	Brutale 990 R	Brutale 1090 RR	Descrizione	Description	► I FRAME ►	► I ENGINE ►
1	8000B2051	1		•	•	Attrezzo fissaggio vite scarico	Exhaust screw fixing tool		
2	800079015	1		•	•	Attrezzo bloccaggio frizione	Clutch blocking tool		
3	8000A2280	1		•	•	Attrezzo chiusura catena distribuzione	Timing chain mounting tool		
4	8000A2281	1		•	•	Attrezzo apertura catena distribuzione	Timing chain cutting tool		
5	800095318	1		•	•	Tampone per sede valvola scarico	Pad for exhaust valve seat		
6	800095319	1		•	•	Tampone per sede valvola aspirazione	Pad for intake valve seat		
7	8000B4309	1		•	•	Kit guarnizioni cilindro testa	Cylinder head gasket kit		
8	8000B4310	1		•	•	Kit guarnizioni cilindro basamento	Cylinder engine block gasket kit		
9	8000B3502	1		•	•	Attrezzo per tappo serbatoio espansione	Expansion tank cap tool		
10	8000B4417	1		•	•	Supporto montaggio motore	Engine assembly support		
11	8000B4366	1		•	•	Supporto serbatoio benzina	Fuel tank support		
12	8000B4652	2		•	•	Protezione per supporto serbatoio	Guard for fuel tank support		



Special tools



Torque pressures



SECTION N

Revision 1



Torque pressures

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Torque pressures

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Torque pressures

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SECTION O

Revision 0

O



Diagnostics

DIAGNOSTICS

ELECTRICAL PARTS

CHARGING SYSTEM

Battery warning light on

Defective alternator	Substitute
Defective alternator connection	Check
Defective battery	Substitute
Recharging fuse (40A) burnt out	Substitute
Defective recharging fuse connection	Deoxidise/replace
Oxidised battery connections	Deoxidise/replace
Defective voltage regulator connection	Check
Defective voltage regulator	Substitute

SERVICES ELECTRICAL SYSTEM 12V

No function is operative

Defective ignition switch	Substitute
Recharge fuse (40A) burnt out	Substitute
Defective ignition switch connection	Deoxidise/replace
Defective general relay	Substitute
Defective general relay connection	Deoxidise/replace

STARTER SYSTEM

Starter motor does not function

Fuse 5 burnt out	Substitute
Defective fuse 5 connection	Deoxidise/replace
Defective neutral gear sensor	Substitute
Defective clutch pump switch	Substitute
Defective starter motor	Substitute
Defective starter button	Substitute
Defective electrical connection – right handlebar control unit	Deoxidise/replace
Defective ignition switch	Substitute
Defective power cable connection	Deoxidise/replace

COOLING SYSTEM

Electric fan does not function

A1 fuse burnt out	Substitute
Defective A1 fuse connection	Deoxidise/replace
Defective fan relay	Substitute
Defective temperature sensor	Substitute
Defective temperature sensor connection	Deoxidise/replace
Defective electric fan connection	Deoxidise/replace
Defective electric fan	Deoxidise/replace

LIGHTING INDICATOR SYSTEM

Front rear sidelights do not function

C3 fuse burnt out	Substitute
Defective C3 fuse connection	Deoxidise/replace
Defective ignition switch	Substitute
Defective ignition switch connection	Deoxidise/replace
Damaged headlight	Substitute
Defective light switch	Substitute
Defective light switch connection	Deoxidise/replace
Fuse 3 burnt out	Substitute
Defective fuse 3 connection	Deoxidise/replace
Burnt out bulbs	Substitute
Defective bulb connections	Deoxidise/replace
Defective light switch	Substitute
Defective light switch connection	Deoxidise/replace
Defective main beam light relay	Substitute
Defective main beam light relay connection	Deoxidise/replace
Fuse 4 burnt out	Substitute
Defective fuse 4 connection	Deoxidise/replace
Burnt out bulbs	Substitute
Defective bulb connections	Deoxidise/replace
Defective light switch	Substitute
Defective light switch connection	Deoxidise/replace
Defective main beam light relay	Substitute
Defective main beam light relay connection	Deoxidise/replace

High beam lights do not function

Low beam lights do not function



Diagnostics

Rear stop light does not function	Fuse 6 burnt out Defective fuse 6 connection Damaged tail light Defective tail light connections Defective front brake lever switch Defective front brake lever switch connection Defective rear brake lever switch Defective rear brake lever switch connection	Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace
Rear stop light remains on function	Front brake lever switch blocked Rear brake lever switch blocked	Substitute/repair Substitute/repair
Horn does not function	Fuse 5 burnt out Defective fuse 5 connection Defective horn	Substitute Deoxidise/replace Substitute
Direction indicators do not function	Fuse 5 burnt out Defective fuse 5 connection Defective intermittency Defective intermittency connection Turn indicators damaged Defective bulb connection Defective direction indicator switch Defective indicator switch connection	Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace
Direction indicator blinks with above normal frequency	Bulb of the other indicator, same side, is burnt out The connection of the other indicator is defective	Substitute Deoxidise/replace
INSTRUMENT PANEL SYSTEM		
Instrument panel does not function	Fuse 6 burnt out Defective fuse 6 connection	Substitute Deoxidise/replace
Instrument panel does not illuminate	Fuse 6 burnt out Defective fuse 6 connection Defective instrument panel connection	Substitute Deoxidise/replace Deoxidise/replace
Speedometer does not work	Defective speed sensor Defective speed sensor connection Defective instrument panel connection Defective central unit 5SM connection Defective central unit 5SM\	Substitute Deoxidise/replace Deoxidise/replace Deoxidise/replace Substitute
Water temperature indicator does not function	Defective instrument panel Defective temperature sensor Defective temperature indicator connection Defective instrument panel connection Defective central unit 5SM connection Defective central unit 5SM\	Substitute Substitute Deoxidise/replace Deoxidise/replace Deoxidise/replace Substitute
The oil warning light does not function	Defective instrument panel Defective oil pressure sensor Defective oil pressure sensor connection Defective instrument panel Defective instrument panel connection	Substitute Substitute Deoxidise/replace Substitute Deoxidise/replace
Neutral gear warning light does not function	Defective neutral gear sensor Defective neutral gear sensor connection Defective instrument panel connection Defective central unit 5SM connection Defective central unit 5SM\	Substitute Deoxidise/replace Deoxidise/replace Deoxidise/replace Substitute
Battery warning light does not function	Defective instrument panel Defective instrument panel connection Defective central unit 5SM connection Defective central unit 5SM\	Substitute Deoxidise/replace Deoxidise/replace Substitute
Side stand warning light does not function	Defective instrument panel Defective side stand switch Defective side stand switch connection Defective instrument panel connection Defective central unit 5SM connection Defective central unit 5SM\	Substitute Substitute Deoxidise/replace Deoxidise/replace Deoxidise/replace Substitute
	Defective instrument panel	Substitute



Diagnostics

Reserve fuel warning light does not function	Defective fuel level sensor Defective fuel level sensor connection Defective instrument panel connection Defective instrument panel Defective intermittency Defective intermittency connection Defective instrument panel connection Defective instrument panel Defective instrument panel connection Defective instrument panel	Substitute Deoxidise/replace Deoxidise/replace Substitute Substitute Deoxidise/replace Deoxidise/replace Substitute Deoxidise/replace Substitute
Direction indicator warning light does not function		
High beam warning light does not function		
INJECTION IGNITION IAW 5SM		
Air pressure sensor signal error	Defective sensor connection Defective sensor	Deoxidise/replace Substitute
Air temperature sensor signal error	Defective sensor connection Defective sensor	Deoxidise/replace Substitute
Throttle valve potentiometer signal error	Defective potentiometer connection Defective potentiometer	Deoxidise/replace Substitute
Engine temperature sensor signal error	Defective engine temperature sensor Defective engine temperature sensor connection	Substitute Deoxidise/replace
FUEL INJECTION SYSTEM		
Injector does not inject fuel	Fuse 2 burnt out Defective fuse 2 connection Fuse 6 burnt out Defective fuse 6 connection H8 fuse burnt out Defective H8 fuse connection Defective power relay Defective power relay connection Defective latch relay Defective latch relay connection Defective injector Defective injector connection Defective injection CPU IAW 5SM Defective side stand switch Defective safety CPU Defective engine pick-up Pick-up light/timing wheel not correct Defective fuel pump	Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Substitute Substitute Substitute Reset Substitute
IGNITION SYSTEM		
Spark plug does not function	Fuse 1 burnt out Defective fuse 1 connection Fuse 6 burnt out Defective fuse 6 connection G7 fuse burnt out Defective E5 fuse connection Defective power relay Defective power relay connection Defective latch relay Defective latch relay connection Defective coil Defective spark plug leads Defective injection CPU IAW 5SM Defective safety switch Defective spark plug Defective engine earth connection Defective side stand switch Defective safety CPU Defective engine pick-up Pick-up light/timing wheel not correct	Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Deoxidise/replace Substitute Substitute Substitute Substitute Reset Substitute Substitute Substitute Reset



Diagnostics

FRAME

STEERING

Steering is stiff

Damaged steering bearings	Substitute
Steering bearings over-tightened	Adjust
Bent steering pin	Substitute
Steering shock absorbers brake too much	Adjust
Damaged shock absorber joint	Substitute
Low tyre pressure.	Adjust

The motorcycle does not proceed in a straight line

Bent forks	Substitute
Bent frame	Substitute
Bent rear fork	Substitute
Damaged shock absorber steering joint	Substitute
Damaged steering bearings	Substitute
Bent wheel spindle	Substitute
Damaged rear fork bearings	Substitute

FRONT WHEEL

Front wheel oscillates vibrates

Bent wheel rim	Substitute
Wheel not balanced	Balance the wheel
Defective tyre	Substitute
Non-recommended tyre	Substitute
Damaged wheel bearings	Substitute
Wheel fixing screws not tightened	Tighten

Front wheel does not turn easily

Wheel spindle fixing ring not tightened	Tighten
Damaged bearings	Substitute
Bent wheel spindle	Substitute
Brake pads excessively brush against the discs /see brakes)	Check
Deformed brake discs	Substitute
Wheel spindle ring excessively tightened	Tighten to the correct torque pressure

FRONT SUSPENSION

Front suspension too spongy

Deteriorated fork oil	Substitute
Insufficient spring loading	Adjust
Insufficient hydraulic braking under compression	Adjust
Low fork oil level	Top-up
Low tyre pressure	Adjust
Damaged forks	Repair

Front suspension too rigid

Excessive spring pre-loading	Adjust
Excessive hydraulic braking under compression	Adjust
Fork oil level too high	Adjust
High tyre pressure	Adjust

REAR WHEEL

Rear wheel oscillates vibrates

Bent wheel rim	Substitute
Wheel not balanced	Balance the wheel
Defective tyre	Substitute
Non-recommended tyre	Substitute
Damaged wheel bearings	Tighten
Fixing nut not tightened	Tighten

Rear wheel does not turn easily

Suspension screws not tightened	Tighten
Damaged suspension bearings	Substitute
Damaged bearings	Substitute
Wheel hub circlip out of its seat	Check
Brake pads excessively brush against the disc	Check
Bent brake disc	Substitute
Damaged transmission chain	Substitute

REAR SUSPENSION

Rear suspension too spongy

Insufficient spring pre-loading	Adjust
Insufficient hydraulic braking under compression	Adjust
Insufficient hydraulic braking in extension	Adjust
Low tyre pressure	Adjust
Damaged shock absorber	Substitute



Diagnostics

Rear suspension too rigid

Excessive spring pre-loading
Excessive hydraulic braking under compression
Excessive hydraulic braking in extension
High tyre pressure
Damaged fork bearings
Damaged compensator suspension bearings
Damaged shock absorber joint
Damaged connecting rod suspension joints
Bent fork pin

Adjust
Adjust
Adjust
Adjust
Substitute
Substitute
Substitute
Repair
Substitute

BRAKES

Brake lever and pedal movement too spongy

Air bubbles in the braking system
Leakages in the braking system
Damaged pincer seals
Damaged pump seals
Pincer pistons do not operate smoothly
Low brake fluid level
Deformed brake discs

Bleed
Repair
Substitute
Substitute
Check
Top-up
Substitute

Brake lever and pedal movement too hard
Insufficient braking power

Bent brake lever or pedal
Discs dirty
Air bubbles in the braking system
Leakages in the braking system
Damaged pincer seals
Damaged pump seals
Pincer pistons do not operate smoothly
Low brake fluid level
Deformed brake discs
Damaged pad springs
Deformed brake discs
Pincer pistons do not operate smoothly
Brake fluid level too high
Brake pads worn past the limit

Substitute
Clean
Bleed
Repair
Substitute
Substitute
Check
Top-up
Substitute
Substitute
Check
Adjust
Substitute

EXHAUST SYSTEM

Excessive noise from the silencers

Damaged exhaust tube
Slack tube fixings
Damaged exhaust tube
Slack tube fixings

Substitute
Tighten
Substitute
Tighten

Low engine performance

COOLING SYSTEM

Engine temperature too high

Low engine coolant level
Defective cooling fan
Defective coolant expansion chamber cap
Defective fan thermal switch
Defective temperature sensor
Thermostat is blocked in the closed position
Radiator finning bent or blocked
Encrusted radiator
Damaged water pump
Defective injection/ignition system
Non-recommended fuel
Defective engine cooling system
Non-recommended thermal grade of the spark plug
Accumulation of carbon residues on the cylinder head/pistons
Thermostat blocked in the open position

Top-up
Substitute
Substitute
Substitute
Substitute
Substitute
Repair/clean
Clean
Substitute
Check
Substitute
Check
Substitute
Clean
Substitute

Engine temperature too low



Analytical index



SECTION P

Revision 1

P



Analytical index

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