

SERVICE STATION MANUAL



Pure Passion since 1911



TRK 502

code: B0000941950UK

Translation of the original instructions

WARNINGS:

This manual has been produced by Benelli Q.J. s.r.l. for the main purpose of being used by Benelli dealers and their mechanics. It is not possible to provide a mechanic with all of the information they require in a single manual. The assumption is therefore that the people using this manual for the maintenance and repair of Benelli vehicles have a basic grounding in mechanics and the procedures inherent to the repair techniques for this type of vehicle. Without this knowledge, repairs or maintenance of this type of vehicle may be inefficient or dangerous.

The policy of Benelli Q.J. s.r.l. is the continued improvement of all its models. All authorised Benelli dealers will be informed of amendments and important changes to technical details or procedures, which will be published in future editions of this manual.

NOTE:

Designs, drawings and specifications will be subject to change without prior warning.

IMPORTANT INFORMATION CONCERNING THIS MANUAL

The text in this manual contains the following important warnings.

WARNING

Failure to abide by the instructions following this symbol may lead to serious injury to or even the death of the rider, of persons in the vicinity or people intent on inspecting or repairing the motorbike.

IMPORTANT NOTICE

An important notice indicates special precautions that need to be complied with to avoid damage to the bike.

NOTE

A note provides key information to make processes easier or clearer.

HOW TO USE THIS MANUAL

This manual is a practical reference guide that is easy for mechanics to handle and use. The explanations of all of the installation, removal, disassembly, installation, repair and inspection procedures are organised into sequences of individual steps.

1. Each chapter is divided into sections. The title of the current section will be found at the top of every page.
2. To help with the identification of parts and make the different points of the various procedures clearer, the start of each section about the removal or disassembly of parts will contain exploded drawings.
3. The parts to be lubricated or replaced are marked with symbols. See the section entitled "SYMBOLS".
4. The exploded drawing is accompanied by a table with the instructions for the intervention, stating the order of operations, the name of the parts, any notes about the job, etc.
5. Interventions requiring additional information (for example, special tools and technical information) will be described in sequence.



SYMBOLS








SUBJECT SYMBOLS

GEN. INFO		<u>General Information</u>
SPEC.		<u>Specifications</u>
PERIOD. INSP. & ADJ.		<u>Checks and periodic adjustments</u>
FRAME		<u>Frame</u>
ENG.		<u>Engine</u>
COOL. SYSTEM		<u>Cooling system</u>
ELEC		<u>Electrical system</u>

INDICATION SYMBOLS

	<u>Wear/Clearance limits</u>		<u>Thread locker application</u>
	<u>Special tool</u>		<u>Recommended solvent</u>
	<u>Tightening torque</u>		<u>Brake fluid</u>
	<u>Grease application</u>		
	<u>Sealant paste application</u>		

INDEX

GEN. INFO		<u>General information</u>	CHAPTER 1
SPEC.		<u>Specifications</u>	CHAPTER 2
PERIOD. INSP. & ADJ.		<u>Checks and periodic adjustments</u>	CHAPTER 3
FRAME		<u>Frame</u>	CHAPTER 4
ENG.		<u>Engine</u>	CHAPTER 5
COOL. SYSTEM		<u>Cooling system</u>	CHAPTER 6
ELEC		<u>Electrical system</u>	CHAPTER 7

i

GEN.
INFO

1

CHAPTER 1

GENERAL INFORMATION

IDENTIFICATION3

 MOTORCYCLE IDENTIFICATION3

FEATURES4

 INSTRUMENTATION AND INDICATOR LIGHTS4

 MULTIFUNCTION DISPLAY5

IMPORTANT INFORMATION6

 GETTING READY FOR REMOVAL AND DISASSEMBLY OPERATIONS6

 SPARE PARTS6

 GASKETS, O-RING, OIL SEALS AND BEARINGS.....7

 SAFETY WASHERS/PLATES, COTTER PINS, AND THREAD SEALANT7

 SAFETY SNAP RINGS.....8

 CHECKING CONNECTIONS8

 SPECIAL ENGINE TOOLS10

SPECIAL TOOLS.....10

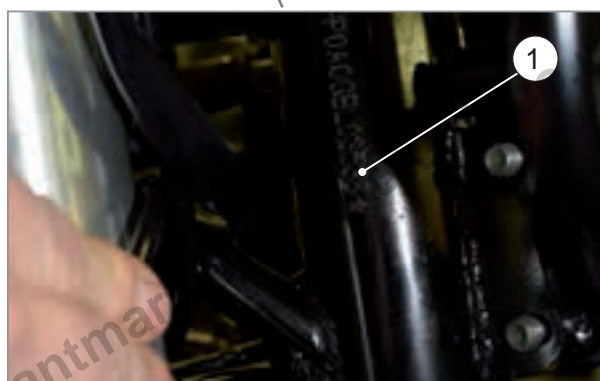
 SPECIAL FRAME TOOLS13

IDENTIFICATION

MOTORCYCLE IDENTIFICATION

Identification data are as follows:

1. Frame serial No. (on the steering sleeve)
2. Engine serial No. (on the lower crankcase)
3. Type-approval data (on the frame)



FEATURES

INSTRUMENTATION AND INDICATOR LIGHTS

The instrumentation and the lights go on by turning the ignition key to "ON" position.

After an initial check-up, the information correspond to the general conditions of the motorcycle at that time.

The dashboard is equipped with the following instruments:

1. SPEEDOMETER

It indicates the vehicle's speed in km/h or mph.

2. ADJUSTMENT BUTTON

Press the button shortly to switch over km/h and mph. The button serves to reset the "Trip" mileage.

3. SELECTION BUTTON

Press the button shortly to switch over the "Trip" function and the kilometre counter. Press the "Selection" button for some seconds to set the digital time.

Digital clock setting:

Keep pressed the switch of the menu "2" for 3 seconds to access the setting mode "TOTAL KM".

Press and hold down the button "2" for three seconds until the hour digit begins to flash.

Set the hour by pressing the button "3".

Press the button "2" to access minute setting. Set the required minutes by pressing the button "3". Press the button "2" again to exit.

4. COOLANT TEMPERATURE GAUGE

It shows the coolant temperature in °F (Fahrenheit) or C° (Celsius).

5. SELF-DIAGNOSIS LIGHT

The light warns the driver of failures of the power supply and ignition systems, by switching on the engine yellow light (LED) when their parts are faulty. Furthermore, it starts the protective function. In the event of serious problems, the control unit stops the injection/ignition function and it is necessary to contact an authorized service centre Benelli at soonest.

6. LEFT DIRECTION INDICATOR LIGHT (GREEN)

It goes on when the left direction indicator light is activated.

7. HIGH BEAM INDICATOR LIGHT (BLUE)

It goes on when the high beam light is activated.

8. NEUTRAL POSITION INDICATOR LIGHT (GREEN)

It goes on when the gear is in "Neutral" position.

9. OIL LEVEL WARNING LIGHT (RED)

It goes on when the oil pressure value is too low. The electrical circuit of the light can be checked by turning the key to "ON". Once the engine is running, the light should switch off. If the light does not switch on when the key is turned to "ON" or if it stays on, have the electrical circuit checked by an authorised Benelli centre.

10. DIGITAL CLOCK

It shows the time expressed in hours and minutes.

11. NEUTRAL GEAR INDICATOR LIGHT

It indicates the engaged gear.

12. TOTAL/PARTIAL KILOMETRE COUNTER

The total kilometre counter shows the total distance covered in kilometres,. The partial kilometre counter (TRIP) shows the distance covered after the latest reset.

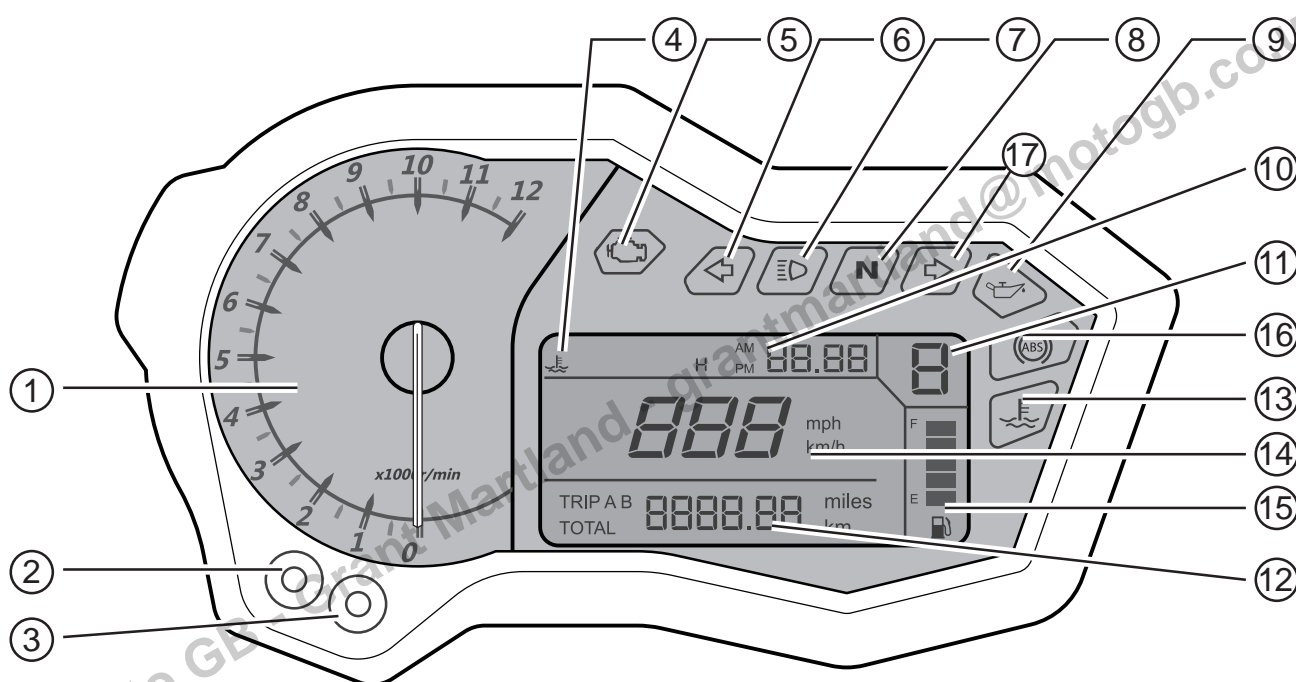
The partial kilometre counter can be used to estimate the possible distance to cover with a full tank of fuel. This information may make it possible to schedule future fuelling stops.

13. COOLANT TEMPERATURE GAUGE

The light goes on in yellow in case of engine overheating.

14. SPEEDOMETER

It indicates the vehicle speed in km/h or mph. Press the button "Selection" 3 to pass from an indication to another.



FEATURES

MULTIFUNCTION DISPLAY

15. FUEL TANK CAPACITY AND RESERVE FUEL GAUGE

The digital fuel gauge shows the capacity of the fuel tank. As the fuel level drops, the lines on the gauge will become closer and closer to the "E" reserve area.

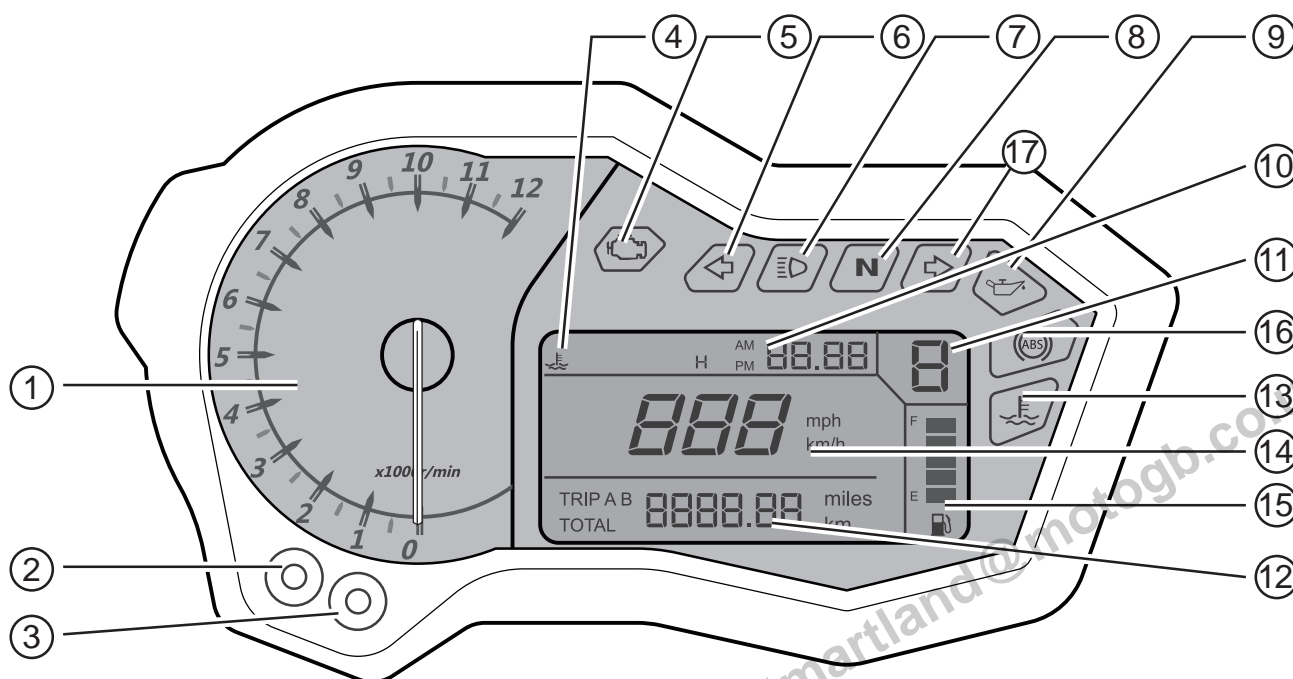
From the moment in which the last line starts flashing, the vehicle has a fuel range of about 3 litres.

16. LIGHT (ABS)

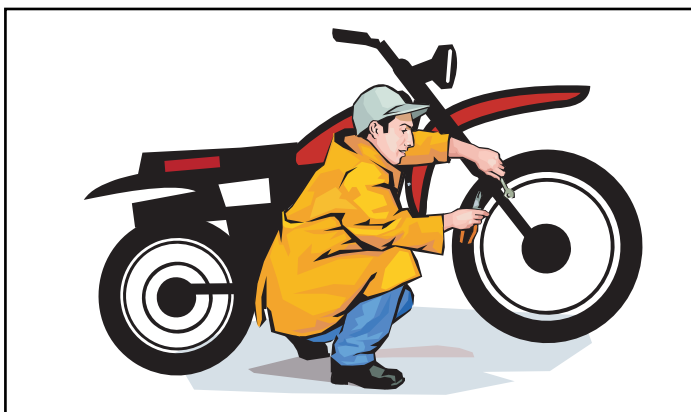
The anti-lock braking system of brakes goes on when starting to check the system and turns off if the check outcome is positive.

17. RIGHT DIRECTION INDICATOR LIGHT (GREEN)

It goes on when the left direction indicator light is activated.

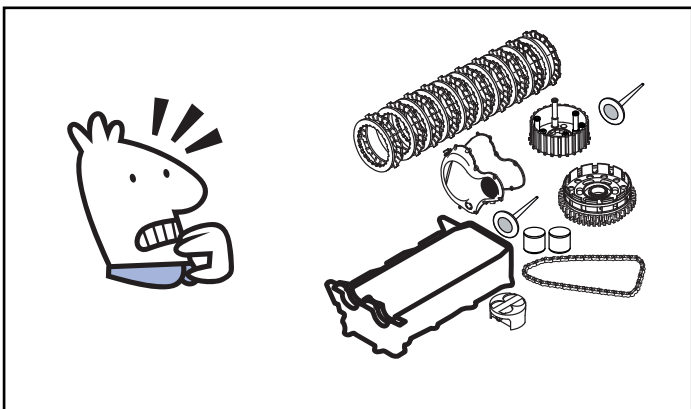


IMPORTANT INFORMATION



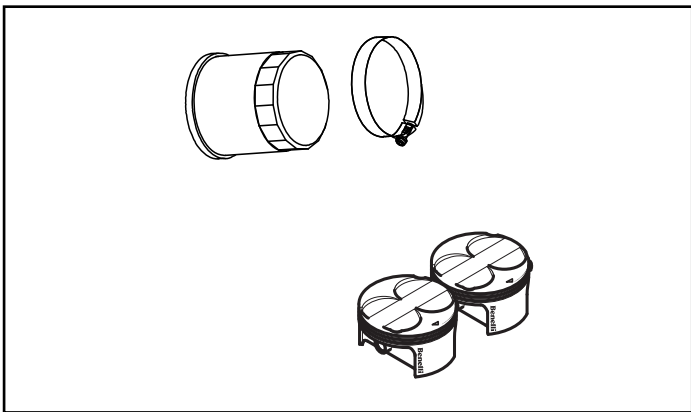
GETTING READY FOR REMOVAL AND DISASSEMBLY OPERATIONS

- Before proceeding with disassembly, remove any dirt, mud, dust, and foreign bodies.
- Only use suitable cleaning tools and agents.
See the paragraph "SPECIAL TOOLS".
- During vehicle's disassembly, it is advisable to always keep the matching parts together, among which gears, cylinders, pistons, and other parts, whose surface have been "coupled" owing to the normal operating wear. The matching parts must always be reused/replaced collectively. During the disassembly operations, clean all parts and position them in a container following the disassembly order. This will make the reassemble operations easier and allow a correct installation of all parts.
- Keep all components away from any heat source.



SPARE PARTS

Only use original Benelli spare parts. For part lubrication, use oils and greases recommended by Benelli. Other brands may be similar in appearance and function, but have a lower quality.



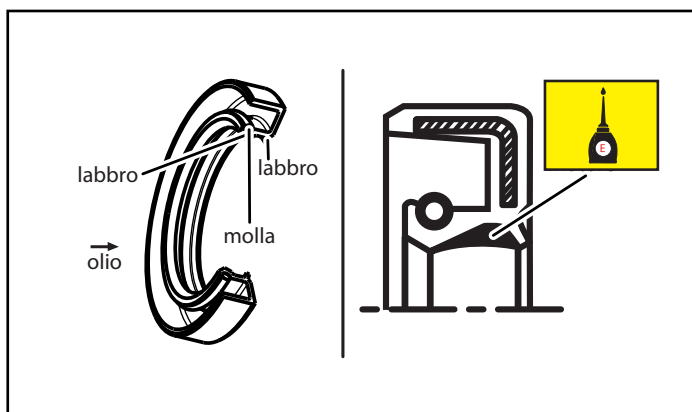
IMPORTANT INFORMATION

GASKETS, O-RING, OIL SEALS, AND BEARINGS

Always replace all gaskets, oil seals, and O-rings during the engine repairing interventions.

The surfaces of gaskets, the oil seal lips, and the O-rings must be always cleaned.

During installation, suitably oil all parts subjects to coupling and the bearings. Furthermore, lubricate the oil seal lips with engine oil.

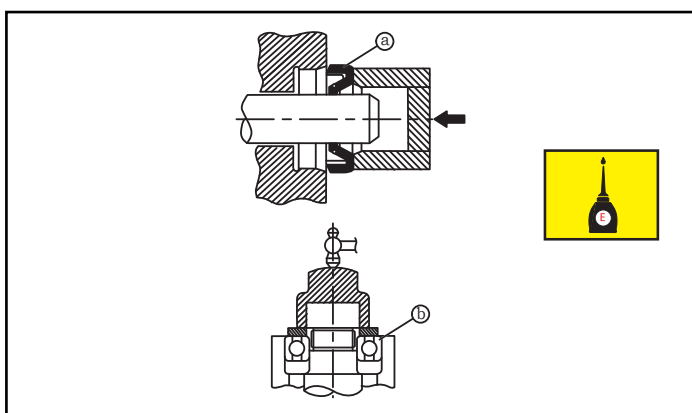


Install the bearings and the oil seals so that the brand or the manufacturer numbers facing outwards are clearly visible. To position the oil seals, lubricate the lips with a layer of engine oil. During installation of the bearings, lubricate them thoroughly.

- a. Oil seal
- b. Bearing

IMPORTANT NOTICE

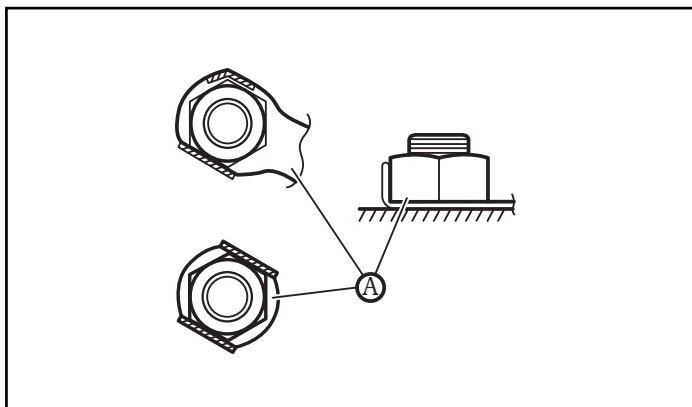
Do not use compressed air to dry the bearing whilst turning them, since the surface might be damaged.



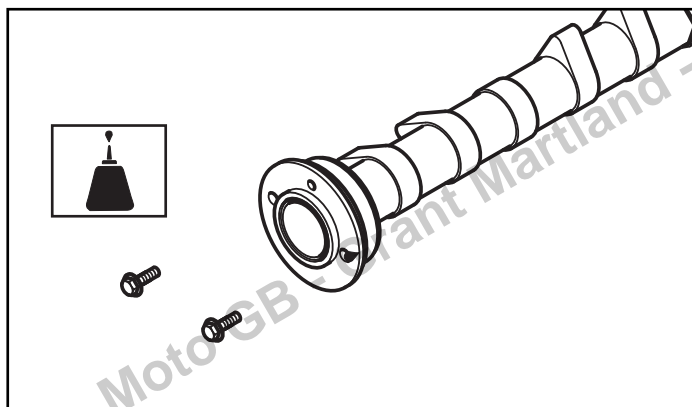
SAFETY WASHERS/PLATES, COTTER PINS, AND THREAD SEALANT

After removal, replace all safety washers "A", the safety plates, and cotter pins.

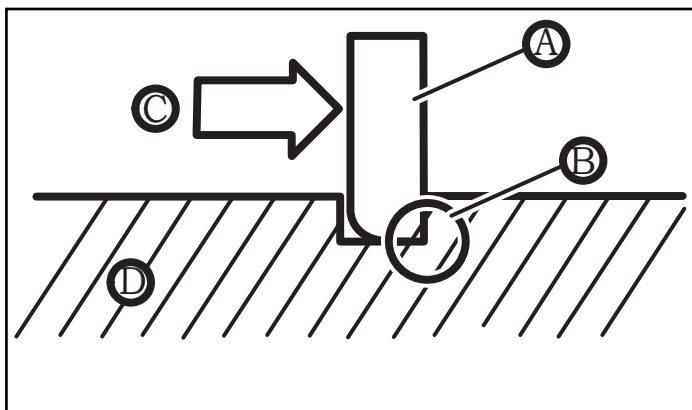
After having tightened the bolt or the nut as per specifications, bend the locking tab and the cotter pin ends against the surface of the bolt or nut.



Before applying the thread sealant, always degrease both parts with solvent.



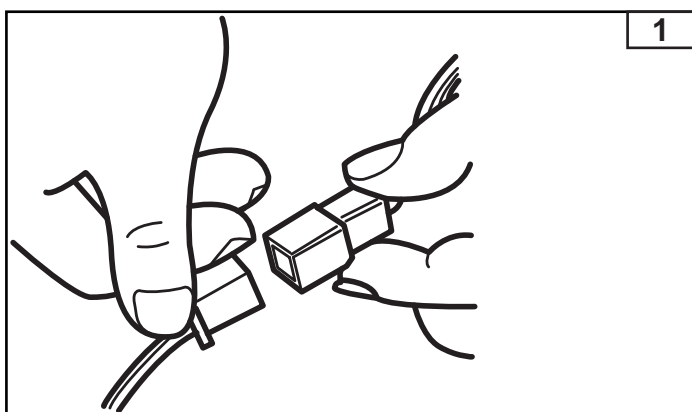
IMPORTANT INFORMATION



SAFETY SNAP RINGS

Before reassemble them, check all snap rings thoroughly and replace the damaged/deformed ones.
Always replace the snap rings of the piston pin after having used them once. When installing a snap ring "A", make sure the sharp edge "B" is positioned on the other side compared to the thrust "C" that it receives.

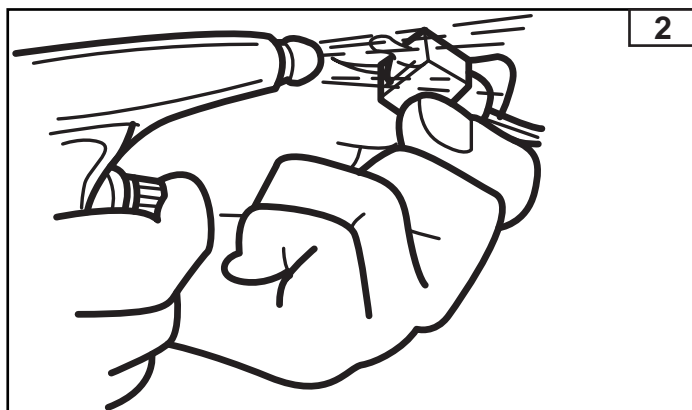
Shaft "D"



CHECKING CONNECTIONS

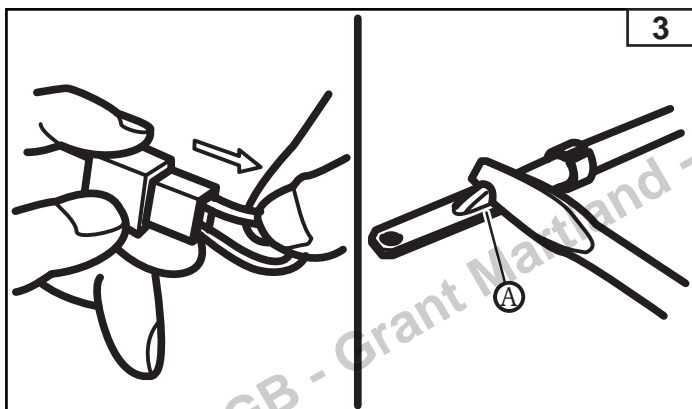
Make sure there are no stains, rust, humidity, etc. on wires, couplers, and connectors.

1. Disconnect:
 - the wire
 - the coupler
 - the connector



2. Check:
 - the wire
 - the coupler
 - the connector

In presence of humidity → Dry using a fan.
In presence of rust/stains → Connect and disconnect the parts several times.

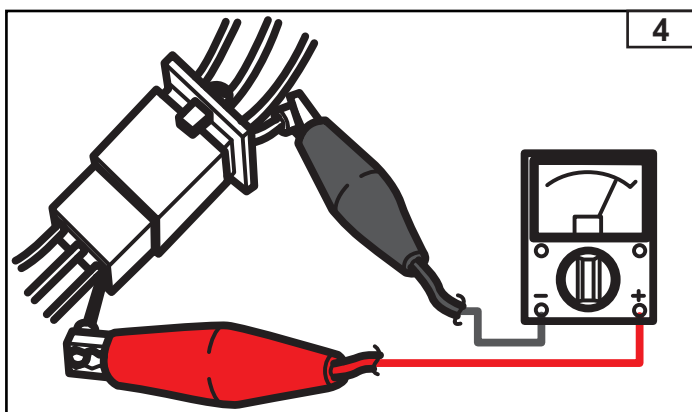


3. Check:
 - all connections

In case of loose connections → Connect them properly.

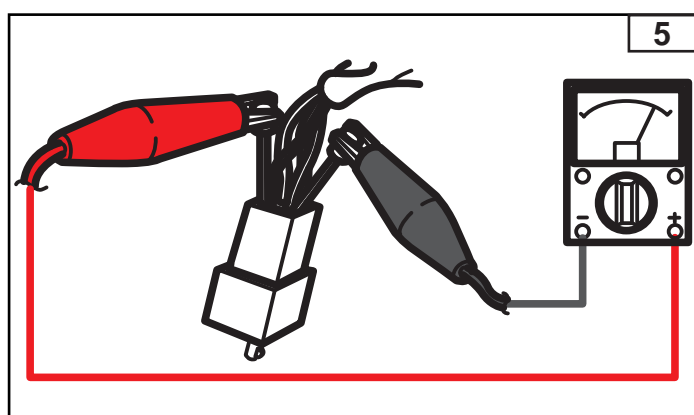
NOTE:
If the foot of the terminal "A" is bent, raise it.

IMPORTANT INFORMATION



- 4. Connect:
 - the wire
 - the coupler
 - the connector

NOTE: _____
Make sure all connections are installed tightly.


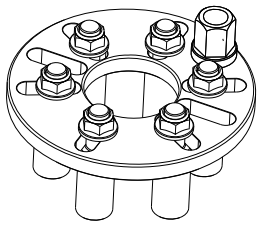



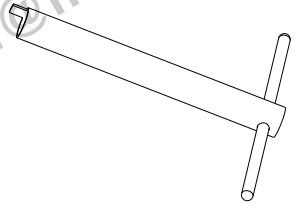
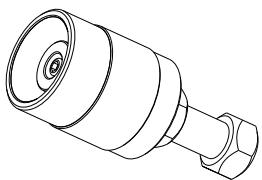


- 5. Check:
 - **continuity** (using a pocket tester)

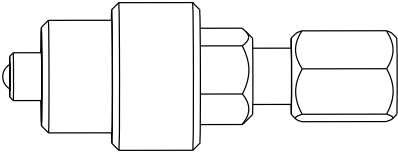


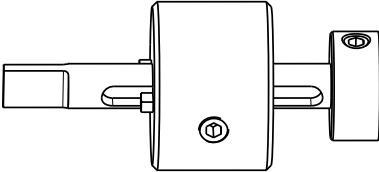
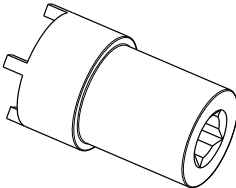
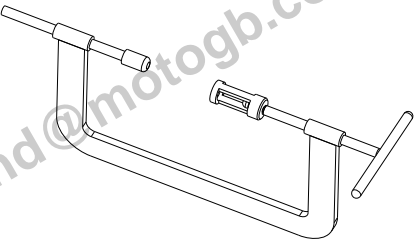

NOTE:
If there is no continuity, clean the terminals.
For checking wiring, follow the procedure of points from “1” to “3”.
As quick remedy, it is advisable to use a specific product for the contacts, which is available in the spare part shops.

SPECIAL TOOLS



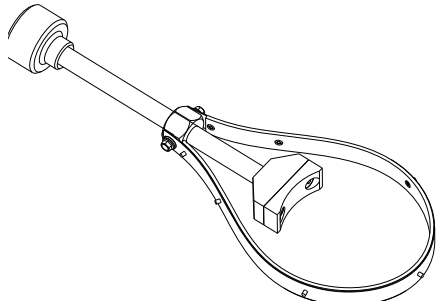
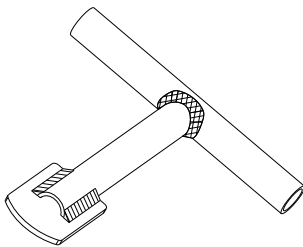
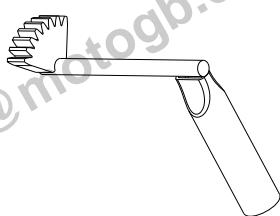
The special tools indicated herein serves for the complete and precise execution of the setting/assembly operations. Their use helps to prevent damages caused by unsuitable tools or improvised techniques. When placing an order, refer to the list below to avoid mistakes.

ENGINE SPECIAL TOOLS		
Tool Code	Tool Name-Function	Image
R180197025000	Pad for valve oil seal This tool serves to install the valve oil seal in place.	
0320097047000	Clutch disassembly wrench This tool serves to lock the clutch drum and tighten the nut.	
Standard tool commonly found	Pad for piston pin removal This tool serves to extract the piston pin.	
Standard tool commonly found	Tool for valve oil seal removal This tool serves to extract the valve oil seal.	
Standard tool commonly found	Ring clamp tool This tool serves to assemble the piston O-rings and for the subsequent insertion into the cylinder.	
0320097051000	Gear selector drum assembly tool This tool serves to assemble the gear selection drum.	
0320097045000	Flywheel extractor This tool serves to extract the flywheel from the engine shaft.	

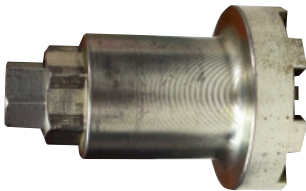



SPECIAL TOOLS

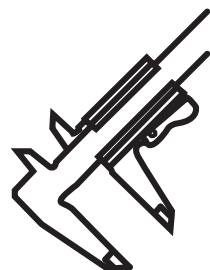
ENGINE SPECIAL TOOLS		
Tool Code	Tool Name-Function	Image
0320097045000	Flywheel cover extractor This tool serves to extract the flywheel housing cover.	
R180197022000	Engine phasing tool This tool serves to determine the position of the top dead centre.	
Standard tool commonly found	Oil filter tool This tool serves to tighten or disassemble the engine oil filter.	
0320097046001	Chain tensioner lock tool This tool serves to lock the tensioning piston during the assembly phase of the chain tensioner.	
03200097052000	Tool to remove/assemble the clutch bell ring nut This tool is used to disassemble/assemble of the notched ring nut, which clamps the clutch bell.	
0320097050000	Valve spring compressor tool This tool is used to remove the valve springs.	
Standard tool commonly found	Measuring tool commonly found This tool is used to measure the hole inner dimensions.	

SPECIAL TOOLS

ENGINE SPECIAL TOOLS		
Tool Code	Tool Name-Function	Image
Standard tool commonly found	Measuring tool commonly found This tool is used to measure the outer dimensions of parts.	
Standard tool commonly found	Measuring tool commonly found This tool is used to measure thicknesses.	
0320097044000	Flywheel assembly tool This tool serves to tighten the engine shaft flywheel.	
0320097043000	Tool to remove the magnetic cap from the alternator cover This tool serves to unscrew the magnetic cap of the alternator cover.	
03200097053000	Toothed wrench for clutch bell lock This tool is used to disassemble the clutch bell.	

SPECIAL TOOLS

SPECIAL FRAME TOOLS		
Tool Code	Tool Name-Function	Image
Standard tool commonly found	Tool to tighten the steering sleeve lock nut This composed tool is used to tighten the steering sleeve lock nut.	
Standard tool commonly found	Tool to tighten the front wheel pin This tool serves to tighten the front wheel pin.	
Standard tool commonly found	Tool to extract the rear swing arm bearings This tool serves to extract bearings.	
Standard tool commonly found	Lifting jack It allows to lift the frame and the engine.	



SPEC.

2

CHAPTER 2

SPECIFICATIONS

GENERAL SPECIFICATIONS3

TECHNICAL DATA4

ENGINE SPECIFICATIONS4

FRAME SPECIFICATIONS.....9

ELECTRICAL SPECIFICATIONS13

GENERAL TIGHTENING SPECIFICATIONS17

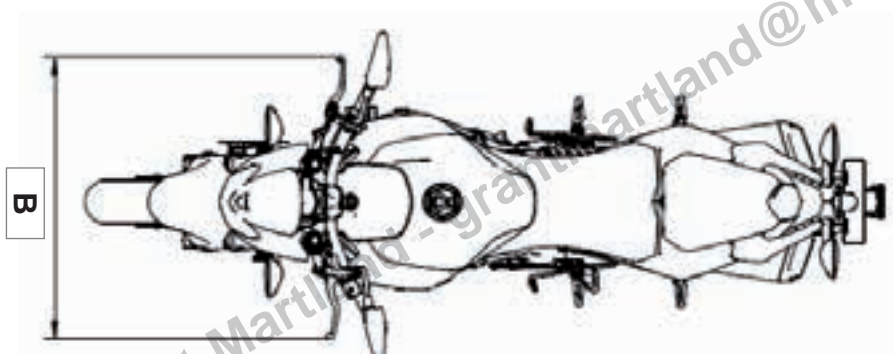
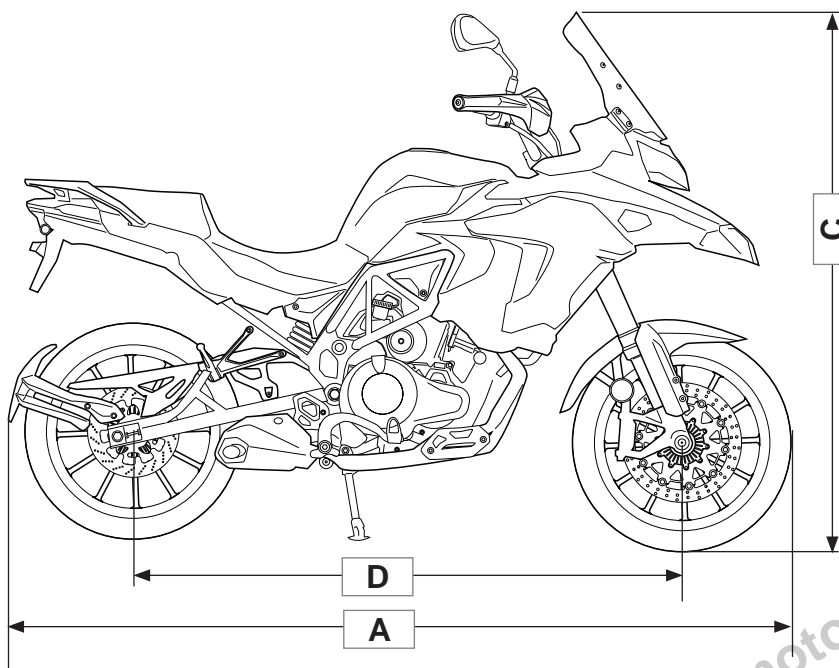
TIGHTENING TORQUES AND RELEVANT PRELOADS FOR STANDARD CONNECTIONS.....18

TIGHTENING TORQUES18



GENERAL SPECIFICATIONS

SIZE	STANDARD
Total length (A)	2200 mm
Total width (B)	915 mm
Total height (C)	1450 mm
Wheelbase (D)	1525 mm
WEIGHT	STANDARD
Kerb weight (with full oil and fuel tank)	235 kg
Empty (with no oil and empty fuel tank)	210 kg
Max. technical capacity (with rider and load)	217 kg





TECHNICAL DATA

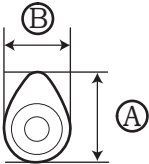
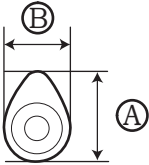

ENGINE SPECIFICATIONS

ENGINE	STANDARD
Type of engine	4 stroke, 2 cylinders in line, liquid cooling, 8 valves
Cubic capacity	499.6 cc
Number of cylinders	2
Cylinder layout	In line
Inside diameter x stroke	69x66.8 mm
Compression ratio	11.5:1
Idle speed	1400
Idle speed	1600
Distribution	Double overhead camshaft, chain-controlled, and four-valves for each cylinder
Maximum net power	28 kW/1100 rpm (38.06 hp)
Maximum net torque	52 N.m/10500 rpm
FUEL	STANDARD
Recommended fuel	premium unleaded petrol RON 95 min
ENGINE OIL	STANDARD
Forced lubrication system	with wet sump design
Total amount	3.2 l
Quantity without oil filter cartridge replacement	3 l
Quantity with oil filter cartridge replacement	3.2 l
Recommended oil	API SH 15W50 (synthetic) Jaso -MACCMC g4 10W50
OIL FILTER	STANDARD
Type of oil filter	Cartridge
OIL PUMP	STANDARD
Oil pump type	lobe
Clearance between inner rotor tip and rotor tip	0.25 mm max
Clearance between outer rotor tip and oil pump housing	0.2 mm max
STARTING	STANDARD
Starting system type	electrical



TECHNICAL DATA

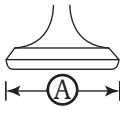
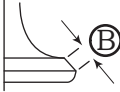
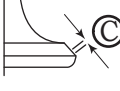
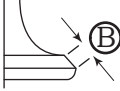
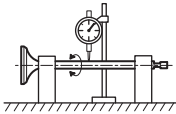
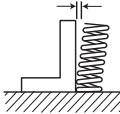
ENGINE SPECIFICATIONS

SPARK PLUGS	STANDARD
Model (manufacturer) x quantity	NGKCR8E
Distance between electrodes	0.6 ÷ 0.7 mm
CYLINDER HEAD	STANDARD
Head gasket maximum warp	0.03 mm
CAMSHAFTS	STANDARD
Control system	chain drive
Camshaft diameter	Ø 22.957-22.97 mm (Limit 22.94 mm)
Clearance between support and camshaft cap	0.03-0.064
Clearance between camshaft and camshaft seat	0.02-0.054mm
Camshaft radial clearance	0.01mm (Limit 0.02mm)
Camshaft lobe dimensions on intake side 	Size "A" = 32.2 mm Size "B" = 24,8 mm
Camshaft lobe dimensions on exhaust side 	Size "A" = 31.9 mm Size "B" = 24,92 mm
Maximum camshaft eccentricity 	0.04 mm (0.00015 in.)
FUEL	STANDARD
Recommended fuel	lead free petrol RON 93 min.
TIMING CHAIN	STANDARD
Tensioning system	Automatic



TECHNICAL DATA

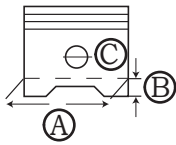
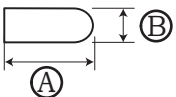
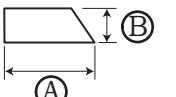
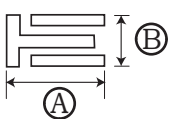
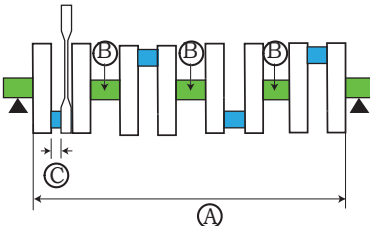
ENGINE SPECIFICATIONS

VALVES, VALVE SEATS, VALVE GUIDES		STANDARD
Intake valve clearance (cold)		0.13 ~ 0.19 mm
Exhaust valve clearance (cold)		0.19 ~ 0.25 mm
VALVE SIZE		
 Head "A" diameter	Intake	Ø 25 mm
	Exhaust	Ø 22 mm
 Contact "B" specific length	Intake	1.9 ~ 2.1 mm
	Exhaust	1.75 ~ 1.95 mm
 Seat "C" width	Intake	1 ~ 1.1 mm
	Exhaust	1 ~ 1.1 mm
 Contact surface length	Intake	1.9 ~ 2.1 mm
	Exhaust	1.75 ~ 1.95 mm
Valve stem diameter	Intake	3.965 ~ 3.98 mm
	Exhaust	3.965 ~ 3.98 mm
Clearance between valve stem and valve guide	Intake	0.05 ~ 0.075 mm
	Exhaust	0.04 ~ 0.065 mm
 Valve stem eccentricity		0.05 mm
VALVE SPRING		STANDARD
Intake/exhaust free length	Outer	38.8 mm
	Inner	41.6 mm
	Intake	1.2 mm
	Exhaust	1.2 mm
CYLINDERS		STANDARD
Cylinder layout		perpendicular line
Bore		69.00-69.01mm (limit 69.02mm)
Compression ratio		11.5:1
Max. ovalization		0.008
		0.006



TECHNICAL DATA

ENGINE SPECIFICATIONS

PISTON		STANDARD
Clearance between piston and cylinder		0.05 ~ 0.07 mm
	Piston diameter "A"	$\varnothing 65 \begin{smallmatrix} - 0.002 \\ - 0.003 \end{smallmatrix}$ mm
	Piston height "B"	25 mm
	Pin "C" seat diameter	$\varnothing 16 \begin{smallmatrix} - 0.002 \\ - 0.003 \end{smallmatrix}$ mm
Piston pin outer diameter		$\varnothing 16 \begin{smallmatrix} 0 \\ 0.008 \end{smallmatrix}$ mm
Top ring		
	Type of ring	elastic
	Size "A" X "B"	2.3 x 0.8 mm
2nd ring		
	Type of ring	elastic
	Size "A" X "B"	2.3 x 0.8 mm
Oil scraper ring		
	Size "A" X "B"	2.26 x 1.93 mm
CONNECTING RODS		STANDARD
Bearing colour code		A = Red B = Blue C = Yellow
Connecting rod code		K1 = Black K2 = Green K3 = White K4 = Brown K5 = Orange
DRIVE SHAFT		STANDARD
		
Width "A"		269.5 mm
Maximum eccentricity "B"		22.6 ± 0.01 mm
Connecting rod head side clearance "C"		0.1 - 0.25
Main bearing colour code		A = red B = blue C = yellow



TECHNICAL DATA

ENGINE SPECIFICATIONS

CLUTCH	STANDARD
Clutch type	wet clutch, multiple discs
Clutch release	cable with springs
Operation for clutch release	cable operation
Operation	with left handlebar lever
Clutch cable clearance (on end of the clutch lever)	2 ~ 3 mm
Clutch plate thickness	2.8 ± 0.05 mm - 3 (0, - 0.1) mm
Clutch plate quantity	7
Steel plate thickness	1.6 (0, -0.05) mm
Steel plate quantity	7
Plate pack thickness	11.2 mm
Maximum warp	0.05 mm
Clutch spring free length	40 ± 0.01 mm
Spring quantity	4
TRANSMISSION	STANDARD
Transmission type	straight-toothed gearbox
Main reduction ratio	44/82
Second reduction system	
Transmission ratio	Chain, ratio 14:46
1st	13-37
2nd	19-37
3rd	18-28
4th	24-32
5th	21-25
6th	24-26
GEAR SHIFT MECHANISM	STANDARD
Gear shift mechanism type	sequential with Desmodromic valve and pre-selector
Maximum deformation of shift fork guide bar	Straightness 0.02 Roundness 0.005
AIR FILTER	STANDARD
Air filter type	SPONGE
FUEL PUMP	STANDARD
Pump type	electric pump
Model (manufacturer)	Delphi
Output pressure	250 KPa
THROTTLE BODY	STANDARD
Diameter	37 mm
Accelerator cable clearance (at accelerator handle flange)	Rotating type



TECHNICAL DATA



FRAME SPECIFICATIONS

FRAME		STANDARD
Frame type		Modular trellis frame with the front module in stainless steel and the rear module in die-cast aluminium
Steering head angle		N.D.
Trail		N.D.
FRONT WHEEL		STANDARD
Wheel type		6-spoke aluminium alloy
Rim	Measure	17 M/C x MT350 DOT-D
	Material	aluminium
Wheel travel		120 mm
REAR WHEEL		STANDARD
Wheel type		6-spoke aluminium alloy
Rim	Measure	17 M/C x MT4.50 Dot -D
	Material	aluminium
Wheel travel		122 mm
FRONT TYRE		STANDARD
Tyre type		tubeless
Measure		120/70ZR17 M/C(58W)
Model (manufacturer)		N.D.
Tyre pressure (when the tyre is being cooled)		2.4 Bar.
REAR TYRE		STANDARD
REAR TYRE		tubeless
Measure		160/60ZR17 M/C (73) W
Model (manufacturer)		N.D.
Tyre pressure (when the tyre is being cooled)		2.4 Bar.



TECHNICAL DATA

FRAME SPECIFICATIONS

FRONT BRAKE		STANDARD	LIMIT
Brake type		dual-disc brake semi-floating	
Activation		use right hand	
Recommended fluid		DOT 4	
Brake discs			
	Diameter x thickness	320x 4 mm (12.5 x 0.15 in)	
	Minimum thickness		4.0mm (0.15in)
	Maximum deformation		0.1 mm (0.004in)
	Thickness of worn brake pads	4 mm (0.15 in)	
Inner diameter of pump cylinder		16 mm (0.62in)	
Inner diameter of caliper cylinder		34 e 30 mm (1.33 e 1.18in)	
REAR BRAKE		STANDARD	LIMIT
Brake type		single-disc brake	
Activation		use right foot	
Recommended fluid		DOT 4	
Brake discs			
	Diameter x thickness	260x 5 mm	
	Minimum thickness		4.5mm (0.17in)
	Maximum deformation		0.15mm (0.006in)
	Thickness of worn brake pads	4 mm	
Inner diameter of pump cylinder		12 mm (0.47in)	
Inner diameter of caliper cylinder		32 mm (1.25 in)	



TECHNICAL DATA

FRAME SPECIFICATIONS

FRONT SUSPENSION		STANDARD
Suspension type		Upside-down fork with 50 mm diameter tubes
Fork travel		150mm
Spring		
	Free Length	295mm
	Spacer length	137mm
	Flexibility (K1)	8.6 Nm
	Spring stroke (K1)	0 ~ 120mm (0 ~ 4.72in)
Fork oil		
Recommended oil		SAE 7.5 Marzocchi 19
Quantity per stem		770cc.
Level (from the top of the outer side, with the outer side completely compressed and without the fork spring)		95 mm
STEERING		STANDARD
Bearing type for steering		ball bearing
Angle from one end of stroke to the other (left)		30°
Angle from one end of stroke to the other (right)		30°



TECHNICAL DATA

FRAME SPECIFICATIONS

REAR SUSPENSION		STANDARD
Suspension type		Swing arm in aluminium alloy, gas-adjustable shock absorber in hydraulics extended and spring preloaded
Shock absorber fork travel		45 mm
Spring		
	Free Length	178+/- 1,5 mm
	Installed length	167+/- 1,5 mm
	Flexibility (K1)	16 Nm
	Spring stroke (K1)	42+/- 1 mm
Spring preload gas/air standard pressure		1200kPa (12 bar)
Spring preload adjustment positions		
	Minimum	0
	Standard	0
	Maximum	10 mm (0.39in)
Rebound damping adjustment positions		
	Minimum*	0
	Standard*	-17
	Maximum*	- 30
* from the fully retracted position		
TRANSMISSION CHAIN		STANDARD
Model (manufacturer)		N.D
Quantity of chains		N.D
Slackness of transmission chain		N.D



TECHNICAL DATA

ELECTRICAL SPECIFICATIONS

SYSTEM VOLTAGE	STANDAR D
System voltage	12 V
IGNITION COILS	STANDAR D
Model (manufacturer)	QJ
Primary coil resistance	$0,65 \pm 0,07$ Ohm
Secondary coil resistance	$4 \pm 0,5$ kOhm
Primary coil inductance	1,8 mH
Secondary coil inductance	4.7 H
Max. allowable current value	10 A
RECHARGE SYSTEM	STANDAR D
System type	Magnetic AC
Model (manufacturer)	QJ
Rated output	12.8 V a 1400 rpm 14A
Voltage regulation	$13.5 + 0.5$ V (3000 rpm 25 C°)
IGNITION RELAY	STANDAR D
Model (manufacturer)	QJ
Amperage	100 A
Coil resistance	4.4 Ohm a 20°C
BATTERY	STANDAR D
Model (manufacturer)	YTX9-BS
Voltage of battery capacity	12 V / 8 Ah
Inrush current CCA	120A
HEADLAMP	STANDAR D
Headlamp type	halogen lamp
BULBS (VOLTAGE WATT x QTY)	STANDAR D
Headlamp (High beam/low beam light)	12 V 55 W x 2
Front position indicator light	LED
Rear position indicator light/brake light	LED
Direction indicators	LED
License plate light	12 V 5 W x 1



TECHNICAL DATA

ELECTRICAL SPECIFICATIONS

Instrument board light	LED x 1
LIGHTS (VOLTAGE WATT x QTY)	STANDARD
Neutral indicator light	LED x 1
High beam light	LED x 1
Oil level alarm light	LED x 1
Indicator light	LED x 1
Faulty engine warning light	LED x 1

ELECTRIC IGNITION SYSTEM	STANDARD
Model (manufacturer)	QJ
Power output	0.7 kw
HORN	STANDARD
Horn type	low
Model (manufacturer)	QJ
Maximum amperage	3 A
Performance	105 ~ 118 db (A)
FLASHER RELAY	STANDARD
Relay type	Electronic Flasher
Model (manufacturer)	QJ 600 45 Flasher
Blinking frequency of direction indicators	80 ~ 160 cicli/min
Watt	130mA x4
OIL PRESSURE SENSOR	STANDARD
Model (manufacturer)/Calibration	0,05 ± 0,015MPa



TECHNICAL DATA

ELECTRICAL SPECIFICATIONS

FUSES (AMPERAGE x QTY)	STANDARD
Fuse CD1 (control unit)	15 A (Blue)
Headlamp fuse	15 A (Blue)
Service fuse	40 A (Red)
Radiator fan fuse	15 A (Blue)
Backup fuse	15 A (Blue) + 40 A (Red)
Fuel pump fuse	15 A (Blue)
THROTTLE VALVE SENSOR	STANDARD
Model (manufacturer)	TGKEYAIR
Resistance	2 KOhm \pm 20%
FUEL PUMP	STANDARD
Model	N.D
Max. amperage	N.D.
Level sensor	external
Min. Max. resistance	90-95 Ω (empty) - (full) 0-18 Ω
SAFETY SWITCHES	STANDARD
Stand switch	N.D
Neutral switch	QJ
Tilt	QJ 250T-3(QJ)
AIRBOX AIR TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	12160244 (PACKARD)
Resistance	181 \pm 8 Ohm 100°C
THROTTLE BODY AIR PRESSURE SENSOR	STANDARD
Model (manufacturer)/Power supply voltage	240600695(DELPHI) /5V



TECHNICAL DATA

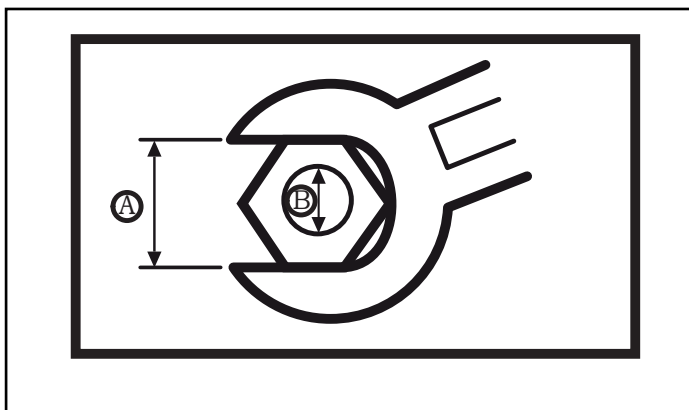
ELECTRICAL SPECIFICATIONS

LIQUID TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	WC -12A (QJ)
Resistance	100 °C 178 Ohm
VELOCITY SENSOR	STANDARD
Model (manufacturer)/distance GAP	QJ / 1.1mm - 2.2 mm
LAMBDA PROBE	STANDARD
Model (manufacturer)	OSM (Delphi)
INJECTOR	STANDARD
Model (manufacturer)	Mini (Delphi) 12±1Ω
RELAY UNIT	STANDARD
Model (manufacturer)	CM1 NAIS
IGNITION SYSTEM	STANDARD
Type of ignition system	BOSCH MSE6.0
Ignition system phasing	10° before the TDC from 900 to 1800 rpm
Phonic wheel sensor (pick-up)	550±50Ω
Model (manufacturer)	DELPHI
STEPPER	STANDARD
Model (manufacturer)	LOREADA
Model (manufacturer)	two-phase
RADIATOR FAN	STANDARD
Model (manufacturer)/Power consumption	Panasonic SSW7109/ 2,76A @ 12V



TECHNICAL DATA

GENERAL TIGHTENING SPECIFICATIONS



The tightening torques of the different special parts or assemblies are provided in each chapter of this manual.

As far as concerns assemblies with multiple fastenings, in order to prevent the risk of warping, cross tighten in successive stages, until you reach the required torque.

Unless otherwise stated, the tightness torques refer to parts with clean, dry threads.

Parts must be at ambient temperature.

“B” NUT	GENERAL TIGHTENING TORQUES	
	N.m	Kgf.m
4 mm	2.3	0.23
5 mm	4.5	0.45
6 mm	10	1.01
8 mm	25	2.54
10 mm	45	4.58
12 mm	80	8.15
14 mm	130	13.25
16 mm	200	20.39
18 mm	240	24.47



TECHNICAL DATA

TIGHTENING TORQUES

TIGHTENING TORQUES AND RELEVANT PRELOADS FOR STANDARD CONNECTIONS

The values provided in the following table refer to standard tightness, i.e. metric screws coupled with relevant nut or with lead screw in metal.

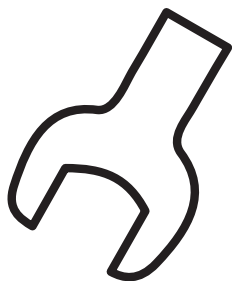
The parts to be tightened together must be in metal or sufficiently rigid not to need the insertion of bushing or shims.

Coupling must always use lightly oiled or greased threads; alternatively, the type of thread lock paste required will be indicated

Axial preloads, related to tightness torques, have been increased by 10% on the calculated value to take into account the tolerance on the nominal torque and the changes that the friction coefficient may undergo between tightening operations.

SCREW	CLASS 8.8		CLASS 10.9		CLASS 12.9	
	TIGHTENING TORQUE [Nm]	AXIAL PRELOAD [N]	TIGHTENING TORQUE [Nm]	AXIAL PRELOAD [N]	TIGHTENING TORQUE [Nm]	AXIAL PRELOAD [N]
M4 X 0.7	3	3.870	4.2	5.420	5.2	6.710
M5 X 0.8	6	6.350	7.5	7.930	9	9.520
M6 X 1	10	8.860	13	11.520	16	14.180
M8 X 1.25	22	14.900	30	20.330	40	27.100
M8 X 1 (*)	25	17.280	36	24.890	45	31.110
M10 X 1.5	45	24.680	65	35.640	80	43.870
M10 X 1.25 (*)	50	27.870	70	39.013	85	47.380
M12 X 1.75	80	37.640	110	51.750	135	63.510
M12 X 1.5 (*)	85	40.547	120	57.250	145	69.170
M12 X 1.25 (*)	90	43.550	130	62.900	150	72.580
M14 X 2	130	52.670	185	74.800	220	88.950
M14 X 1.5 (*)	150	62.900	205	85.960	245	102.780
M16 X 2	200	74.070	280	103.690	335	124.060
M16 X 1.5 (*)	225	86.140	310	118.680	360	137.820
M18 X 2.5	265	83.650	370	116.790	450	142.040
M18 X 1.5 (*)	320	104.900	450	147.520	550	180.300
M20 X 2.5	390	111.870	550	257.770	650	186.450
M20 X 1.5 (*)	440	130.620	630	187.020	750	222.650
M22 X 2.5	540	141.950	750	197.150	900	236.580
M22 X 1.5 (*)	600	162.750	850	230.560	1.000	271.240
M24 X 3	670	160.238	950	227.203	1.130	270.252
M24 X 2 (*)	750	184.566	1.050	258.392	1.250	307.610

(*) The metric screw indicated has a fine pitch.



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CHAPTER 3

PERIODIC MAINTENANCE

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS	5
MAINTENANCE INTERVALS	6
ENGINE/AIR BOX.....	9
REMOVAL/ASSEMBLY OF AIR BOX	9
ENGINE/THROTTLE CABLE CLEARANCE.....	11
ADJUSTMENT OF THROTTLE CABLE CLEARANCE	11
ADJUSTMENT OF IDLE SPEED.....	14
ENGINE/CLUTCH CABLE.....	15
ADJUSTMENT OF CLUTCH CABLE CLEARANCE	15
FRAME/HANDLEBAR	16
REAR-VIEW MIRROR ADJUSTMENT	16
ENGINE/MOTOR OIL	17
CHECKING ENGINE OIL LEVEL	17
ENGINE OIL CHANGE	18
OIL FILTER REMOVAL/INSTALLATION.....	19
ENGINE/SPARK PLUGS	20
REMOVAL OF SPARK PLUGS ON THE VEHICLE.....	20
SPARK PLUG CHECK.....	21
ASSEMBLY OF SPARK PLUGS.....	23
FRAME/BRAKE ADJUSTMENT	25
ADJUSTMENT OF THE FRONT BRAKE	25
ADJUSTMENT OF THE REAR BRAKE	26
FRAME/CHECKING BRAKE FLUID LEVEL.....	27
CHECKING THE FRONT BRAKE LIQUID LEVEL/TOPPING UP	27
CHECKING THE REAR BRAKE LIQUID LEVEL/TOPPING UP	28
FRAME/CHECKING ABS HOSES	29
CHECK FOR ANY LEAKAGES OF ABS TUBES	29
FRAME/BRAKE PAD CHECK.....	30
CHECKING WEAR OF FRONT/REAR BRAKE PADS	30
FRAME/CHECKING HOSES OF THE BRAKING SYSTEM	31
HOSE CHECK	31
FRAME/TRANSMISSION CHAIN.....	32
ADJUSTMENT OF THE TRANSMISSION CHAIN	32
LUBRICATION OF TRANSMISSION CHAIN	33
CHAIN GUIDE CHECK.....	33
CHECKING WEAR OF TRANSMISSION CHAIN.....	34
FRAME/CHECK AND ADJUSTMENT OF STEERING SLEEVE	35
CHECK/ADJUSTMENT OF STEERING CLEARANCE	35
FRAME/CHECK OF FRONT FORK	37
CHECK OF FRONT FORK	37
FRAME/CHECK OF REAR SHOCK ABSORBER	38
SHOCK ABSORBER ADJUSTMENT	38
FRAME/CHECK OF FRONT/REAR TYRES	39
TYRE CHECK.....	39

CHAPTER 3

ELECTRICAL SYSTEM40

BATTERY CHECK AND CHARGING40

FUSES49

FUSE CHECK.....50

REPLACEMENT OF THE FRONT LIGHTS.....51

REMOVAL OF THE FRONT HEADLIGHT.....52

INSTALLATION OF THE HEADLIGHT53

ADJUSTMENT OF HEADLIGHT54

SUBSTITUTION OF THE REAR LED LIGHT55

SUBSTITUTION OF THE REAR INDICATOR LIGHTS.....56

SUBSTITUTION OF THE FRONT INDICATORS57

SUBSTITUTION OF THE IGNITION BLOCK58

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PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

NOTE:
In general, maintenance needs to be carried out with the motorcycle on the rear stand, engine off and switch in “OFF” position.
While checking fluid levels, it is preferable to keep the motorcycle upright without using the rear stand.
Annual checks are to be carried out every year unless maintenance is carried out basing on the maintenance service system according to the mileage travelled.
At 40,000 km (24,854 mi), repeat maintenance services from the one at 10,000 km (6,213 mi). For interventions relating the items marked, it is advisable to contact a Benelli dealer, given that it is necessary to have specific equipment, information, and technical skills.

The following section shows all maintenance operations.

NOTE:
AIR FILTER
• Replace the air filter more frequently when the vehicle is used in particularly damp or dusty environments.

HYDRAULC BRAKE MAINTENANCE
• Check brake fluid levels on a regular basis and top up, if necessary.
• Replace the inner parts of the brake/calliper pump every two years and change the brake fluid.
• Replace the brake hoses every 4 years, or before if cracked or damaged.

KEY	
I	Checking, adjustment, cleaning, lubrication or replacement as required
R	Replacement
T	Tighten
	Dealer



PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

MAINTENANCE INTERVALS

NO.	Part	Checks or maintenance interventions	0 Km (0 mi) Pre-delivery	1000 Km (621 mi) 1ST Service	7,000 Km (3,726 mi) 2ND Service	13,000 Km (7,452 mi) 3RD Service	19,000 Km (11,178 mi) 4TH Service	25,000 Km (14,904 mi) 5TH Service	Annual inspection
1	Engine oil	Check/Level top up/ Change	I	R	R	R	R	R	R
			Check every 500 km (310 mi)						
2	Oil filter	Replacement		R	R	R	R	R	
			In any case at every engine oil change						
3	Fuel filter	Check/Replacement			I	I	R	I	
4	Air filter	Check/Replacement			R	R	R	R	
5	Coolant liquid	Check/Top up	I	I	I	I	R	I	I
		Replace	Every 2 years or 13,000 km (8,078 mi)						
6	Cooling system	Check the coolant level and make sure there are no leakages of fluid from the vehicle	I	I	I	I	I	I	I
7	Spark plugs	Check/Replacement			I	I	R	R	I
			Check the status, clean and adjust the distance between electrodes.						
8	Transmission chain	Measure chain tension. Check whether the rear wheel is properly aligned. Clean and grease.		I	I	I	I	I	I
			Every 500 km (310 mi) and after every wash or if the motorcycle was used in the rain.						
9	Chain wheel	Check/Lubricate		I	I	I	I	I	I
			Replace in any case at every chain change.						
10	Pinion/Clamping washer	Check/Replacement		I	I	I	I	I	I
			Replace in any case at every chain change.						
11	Fuel line circuit	Check for faults and leakages.			I	I	I	R	
			Replace in any case every 3 years.						
12	Brake fluid * clutch	Check/Top up	I	I	I	I	I	I	I
		Replace	Replace every 2 years.						
13	Front brake/ Rear brake	Check the fluid level and make sure there are no leakages from the vehicle.	I	I	I	I	I	I	I
14	Brake pads	Check/Replacement		I	I	I	I	I	
			Replace if worn up to limit.						
15	Swing arm chain slide	Check/Replacement		I	I	I	I	I	
			Replace if worn up to limit.						
16	Swing arm chain guide slide	Check/Replacement		I	I	I	I	I	
			Replace if worn up to limit.						
17	Throttle grip	Check operation and adjust throttle cable clearance, if necessary. Lubricate throttle grip housing and the cable.	I	I	I	I	I	I	I
18	Throttle body	Check operation/Adjust clearance		I	I	I	I	I	
19	Clutch control	Check/Adjustment	I	I	I	I	I	I	I
20	Throttle body	Check/Adjustment		I	I	I	I	I	
21	Valve clearance	Check operation/Adjust clearance						I	
			Check clearance every 22,000 km (13,670 mi)						



PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

MAINTENANCE INTERVALS

NO.	Part	Checks or maintenance interventions	0 Km (0 mi) Pre-delivery	1000 Km (621 mi) 1ST Service	7,000 Km (3,726 mi) 2ND Service	13,000 Km (7,452 mi) 3RD Service	19,000 Km (11,178 mi) 4TH Service	25,000 Km (14,904 mi) 5TH Service	Annual inspection
22	▣ Distribution chain	Check/Replacement						R	
			Every 21,000 km (13048 mi)						
23	▣ Distribution chain slides	Check/Replacement						R	
			When replacing the timing chain and every 22,000 km (13671 mi)						
24	▣ Timing chain tensioner	Check/Replacement						R	
			When replacing the timing chain and every 22,000 km (13671 mi)						
25	▣ Steering nut and sleeve	Check/Adjustment	T	T	T	T	T	T	T
26	▣ Steering bearings	Check/Replacement				T		T	
			Every 19,000 km (11,806 mi) lubricate using lithium soap grease						
27	▣ Front/rear wheel bearings	Check/Replacement				I		I	
			Every 40,000 km (24900 mi)						
28	▣ Swing arm bearings	Check/Replacement			I	I	I	R	
			Every 25,000 km (14904 mi)						
29	▣ Swing arm	Check operation and make sure the clearance is not excessive. Lubricate.			I	I	I	I	
30	▣ Front suspension	Check operation and make sure there are no leakages.		I	I	I	I	I	I
31	▣ Front suspension oil	Replacement				R	R		
32	▣ Rear suspension	Checking/adjustment, make sure there are no leakages.	I	I	I	I	I	I	
			Before each use						
33	▣ Wheels	Check they are not off-centred or damaged.				I	I	I	
			Every 18,000 km (11,184 mi)						
34	▣ Tyres	Check the depth of tread and make sure they are not damaged. Replace, if necessary. Check inflation pressure. Correct, if necessary.		I	I	I	I	I	I
			Replace if worn up to limit.						
35	▣ Side stand	Check/Operation	I	I	I	I	I	I	I
36	▣ Switch side stand	Check/Operation	I	I	I	I	I	I	I
37	▣ Equipment, lights, indicator lights, and switches	Check/Operation	I	I	I	I	I	I	I
38	▣ Headlamp	Check/Operation	I	I	I	I	I	I	
		Adjustment	At every change in vehicle set-up						
39	▣ Horn	Check/Operation	I	I	I	I	I	I	I
40	▣ Instrumentation	Check/Operation	I	I	I	I	I	I	I
41	▣ Battery connections	Check/Operation	I	I	I	I	I	I	I
42	▣ Electrical System	Check/Operation	I	I	I	I	I	I	I
43	▣ Ignition switch	Check/Operation	I	I	I	I	I	I	I



PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

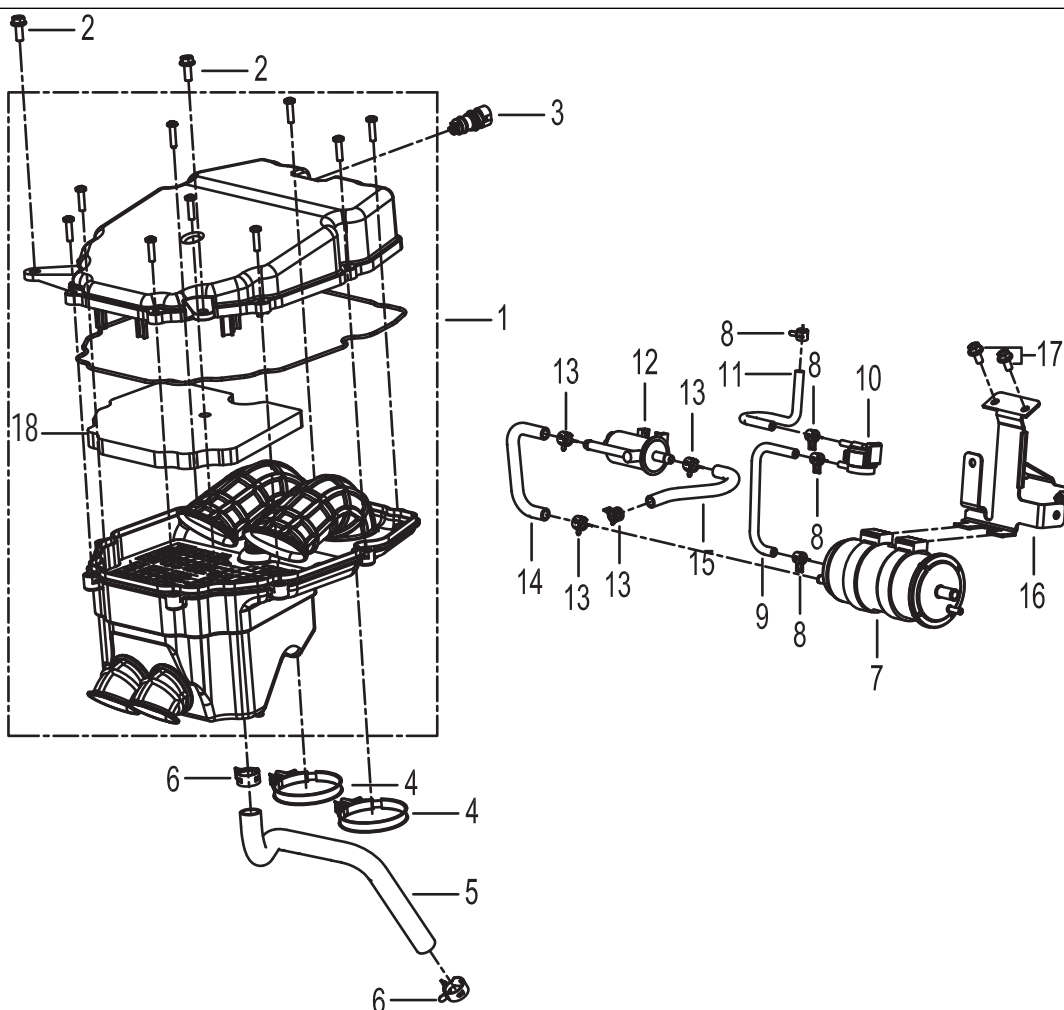
MAINTENANCE INTERVALS

NO.	Part	Checks or maintenance interventions	0 Km (0 mi) Pre-delivery	1000 Km (621 mi) 1ST Service	7,000 Km (3,726 mi) 2ND Service	13,000 Km (7,452 mi) 3RD Service	19,000 Km (11,178 mi) 4TH Service	25,000 Km (14,904 mi) 5TH Service	Annual inspec- tion
44	Electric fans	Check/Operation	I	I	I	I	I	I	I
45	Carburation / CO°	Check/Adjustment	I	I	I	I	I	I	I
46	Chassis part fixing	Ensure all nuts, bolts and screws have been accurately tightened.		T	T	T	T	T	T
47	Oil sump screws	Replacement		T	T	T	T	T	
48	Clutch cover screws	Replacement		T	T	T	T	T	
49	Catalytic converter	Check for faults and leakages.		I	I	I	I	R	
50	Cannister USA version	Check for faults and leakages.		I	I	I	I	R	
51	Brake hoses /clutch	Check for faults and leakages.	I	I	I	I	I	I	I
52	Moving parts and cables	Check/Replacement	I	I	I	I	I	I	I
53	Oil intake filter	Check/Replacement			I	I	I	I	



ENGINE/AIR BOX

REMOVAL/ASSEMBLY OF AIR BOX



Position	Description	Quantity
1	COMPLETE AIR FILTER BOX	1
2	SCREW (M6X16)	2
3	AIR TEMPERATURE SENSOR	2
4	SCREW BAND	2
5	SLEEVE	1
6	Hose holder clip	2
7	CANISTER FILTER	1
8	SPRING BAND	4
9	PIPE	1
10	CHECK VALVE	1
11	PIPE	1
12	VALVE	1
13	SPRING BAND	4
14	PIPE	1
15	PIPE	1
16	PLATE	1
17	SCREW (M6X16)	2
18	AIR FILTER	1



ENGINE/AIR BOX

REMOVAL/ASSEMBLY OF AIR BOX

Park the motorcycle on a level surface.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

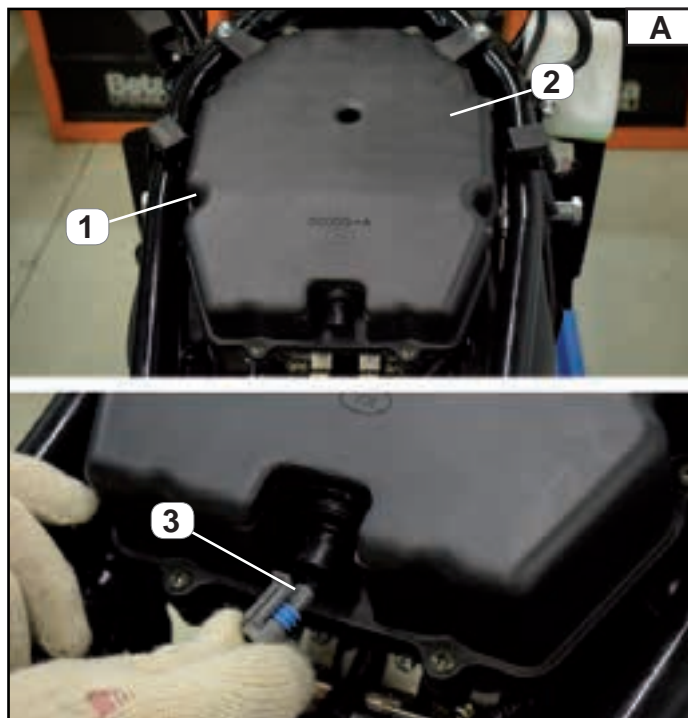
- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter “**Fuel tank removal, Chapter 4**”.
- the screws (1) Fig. A
- the cover (2) Fig. A

Disconnect:

- the connector (3) from the cover Fig. A

Remove:

- the protective mesh (4) Fig. B
- the air filter element (5) Fig. B



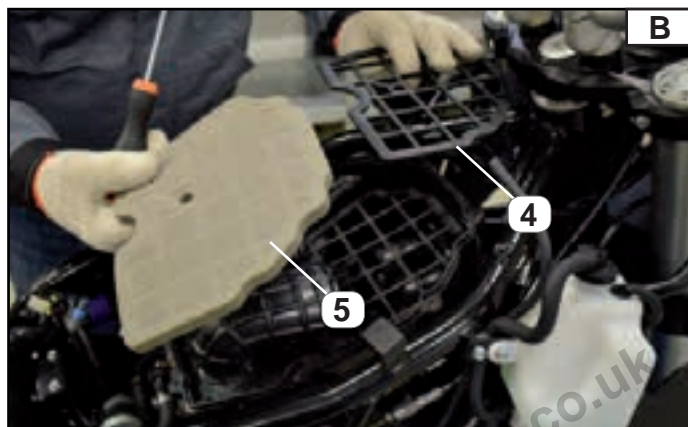
IMPORTANT NOTICE

Replace the air filter element every 12,000 km (7,456 mi). When using the vehicle in particularly humid climates or in very dusty areas, it is necessary to maintain the air filter element more frequently.

Check:

If the air filter element is faulty, replace or wash it:

1. Wash the element using specific solvents.
2. Air dry.
3. Apply a specific oil on the whole surface of the air filter element.



IMPORTANT NOTICE

Before installing the air filter element of the air box, remove the excess oil, making sure it does not drip any longer.

Install:

1. During the installation stage, proceed in the opposite direction to above described removal.

WARNING

Never start the engine without having installed the air filter element first. The unfiltered air causes a quick wear of the engine parts and might damage the engine. Furthermore, using the engine without air filter, setting of the throttle bodies is affected, causing a worsening of engine performance, as well as its overheating.

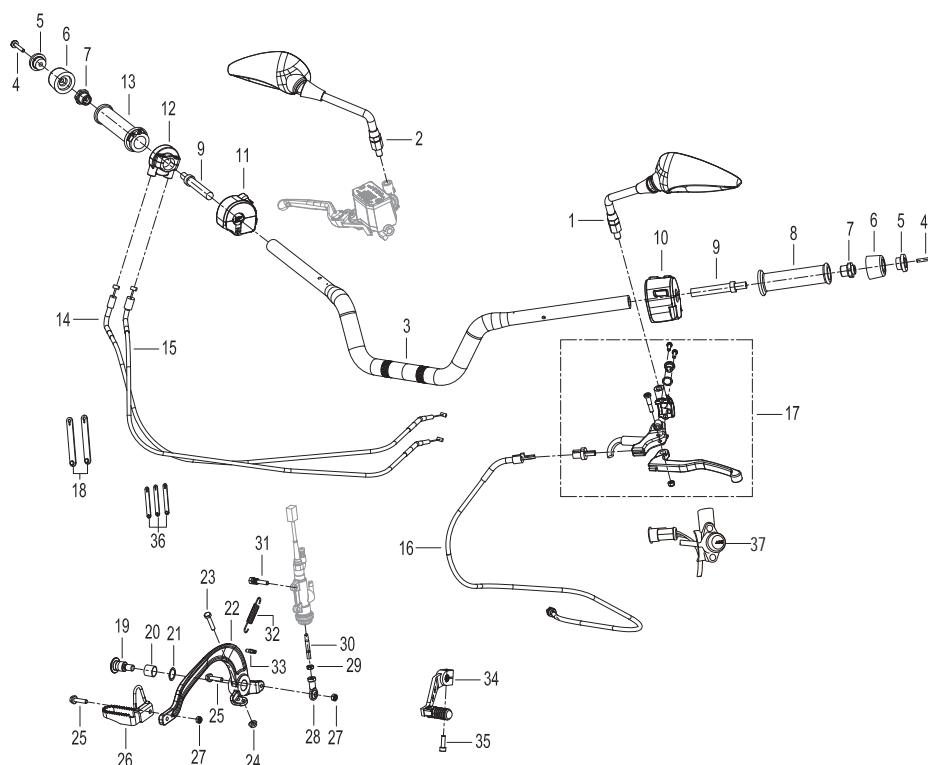
Therefore, make sure the air filter is always in good working order.

The engine life depends mainly on this part.



ENGINE/THROTTLE CABLE CLEARANCE

ADJUSTMENT OF THROTTLE CABLE CLEARANCE



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	LEFT VIEW MIRROR					
2	RIGHT VIEW MIRROR					
3	HANDLEBAR					
4	SCREW					
5	GRIP CAP					
6	GRIP END					
7	THREADED INSERT					
8	LEFT HANDGRIP					
9	THREADED INSERT					
10	LEFT LIGHT SWITCH					
11	RIGHT LIGHT SWITCH					
12	ACCELERATOR CONTROL					
13	ACCELERATOR CONTROL PIPE					
14	FUEL OPEN CABLE					
15	FUEL CLOSE CABLE					
16	CLUTCH CABLE					
17	CLUTCH CONTROL					
18	RUBBER BAND					
19	SCREW					
20	BUSHING					
21	ELASTIC WASHER					
22	BRAKE PEDAL CONTROL					
23	SCREW					
24	NUT					



ENGINE/THROTTLE CABLE CLEARANCE

ADJUSTMENT OF THROTTLE CABLE CLEARANCE

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
25	SCREW					
26	BRAKE PEDAL CONTROL					
27	NUT					
28	BALL JOINT					
29	NUT					
30	ADJUSTMENT ROD					
31	SCREW					
32	RETURN SPRING					
33	THREADED PIN					
34	GEAR PEDAL					
35	SCREW					
36	TUBE GUIDE					
37	ABS SWITCH					

ENGINE/THROTTLE CABLE CLEARANCE

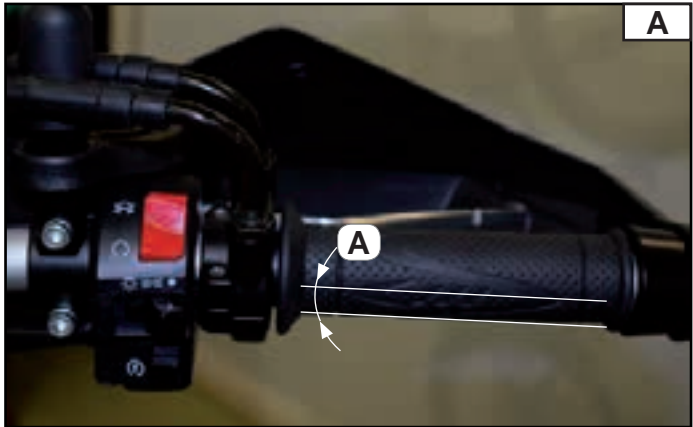
ADJUSTMENT OF THROTTLE CABLE CLEARANCE

NOTE:
 The engine idle speed should be properly adjusted before adjusting the throttle cable clearance.
 Check at 10,000 km (6,213 mi) first and then every 10,000 km (6,213 mi).

Check:

- the throttle cable clearance (A)

Make sure the throttle grip works smoothly. Furthermore, check that the max opening position and the automatic closing one can be reached in any steering position. If outside specifications, adjust. Fig. A



Throttle cable clearance (A)	Dimensions
Throttle cable	2 - 3 mm

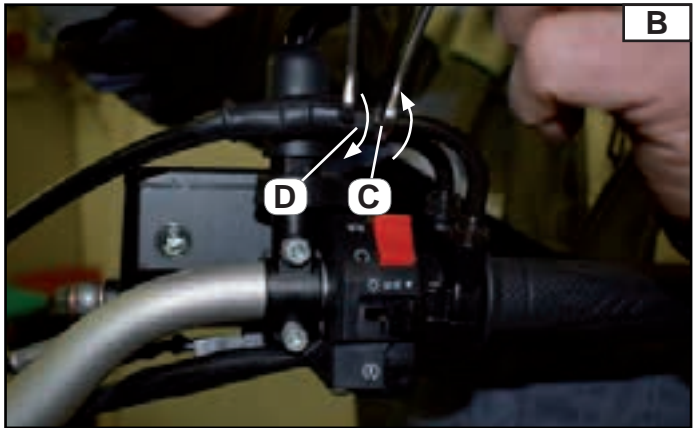
Adjust:

- the throttle cable clearance

Handlebar side

- Loosen the locknut "D".
- Rotate the adjusting nut "C" clockwise or counter-clockwise up to the specified throttle cable clearance. Fig. B

Throttle cable clearance	Clearance
Clockwise	The gap is increased
Anticlockwise	The gap is decreased



3. Tighten the lock nut "D".
 Carry out the adjustment on both accelerator controls.

WARNING

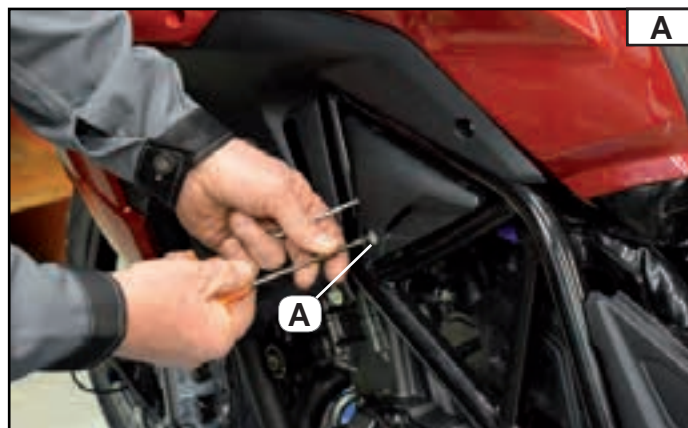
After having adjusted the throttle cable clearance, start the engine and turn the handlebar to the right and to the left, making sure the engine idle speed does not change.

ENGINE/THROTTLE CABLE CLEARANCE

ADJUSTMENT OF IDLE SPEED

Check:

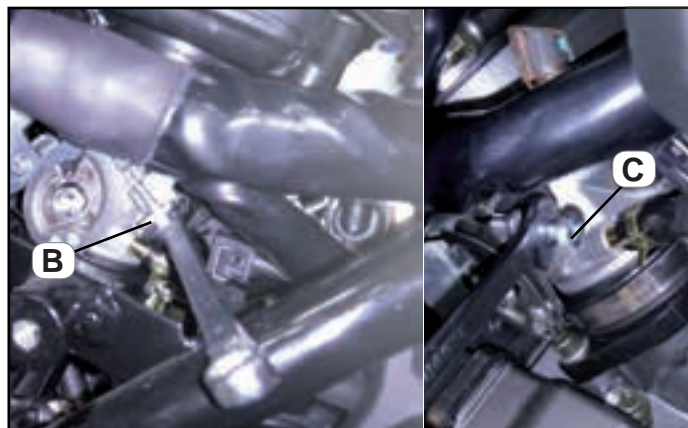
- Start the engine and warm it up.
- Extract the left, side guard by loosening the screw "A" Fig. A.
- Loosen lock nut "B" and rotate the adjusting screw "C" to obtain the correct idle speed. Fig. B
- Accelerate and decelerate a few times to make sure the idle speed is within the indicated range. Adjust again, if necessary.



Throttle cable clearance	mm
Throttle cable clearance on the accelerator grip)	3 ~ 5 mm (0.11 ~ 0.19 in)



Idle speed	rpm
STANDARD	1,400 -1,600



WARNING

If the handlebar movement leads to variations in the idle speed, the throttle cables may be adjusted or routed improperly or be damaged.

Correct these anomalies before use.

IMPORTANT NOTICE

The use of the vehicle with damaged cables or improperly adjusted/routed may jeopardize the driving safety.

ENGINE/CLUTCH CABLE

ADJUSTMENT OF CLUTCH CABLE CLEARANCE

Check:

- the clutch cable clearance (A)

If outside specifications, adjust.



Clutch cable clearance	Gap (clearance)
Clutch handle	3 - 4 mm

Adjust:

- the clutch cable clearance

Handlebar side

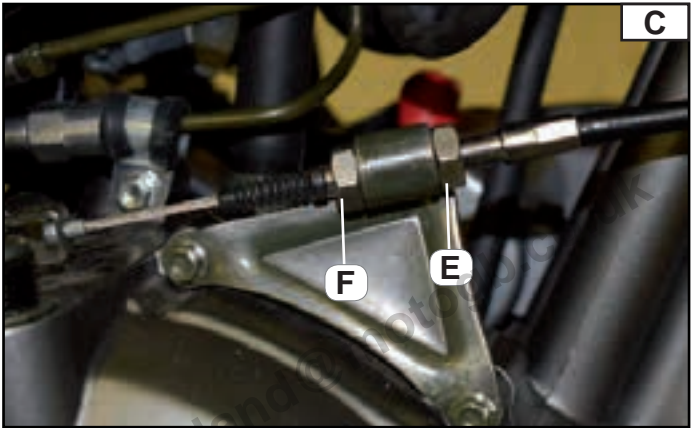
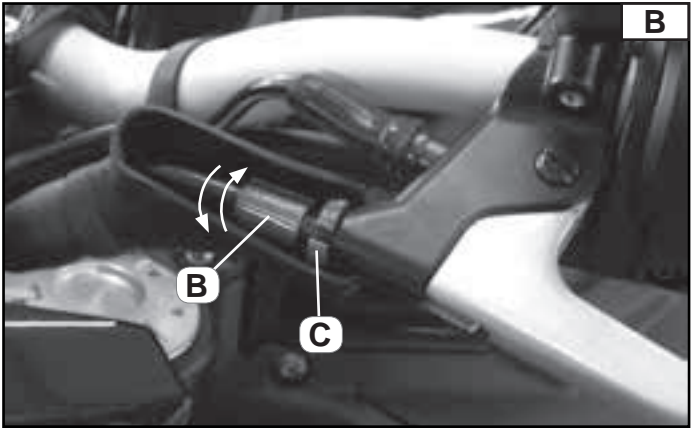
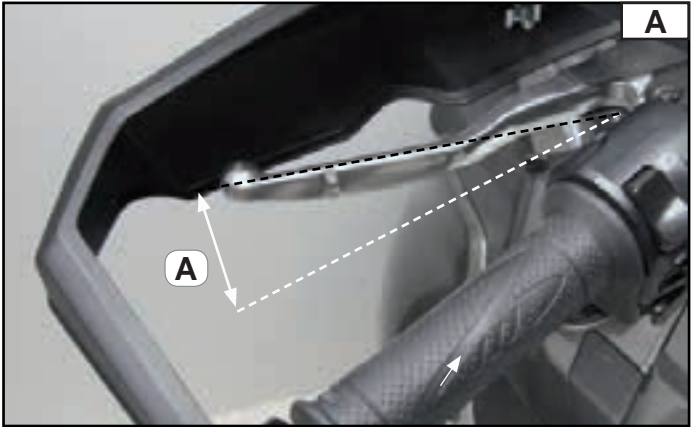
- Move the clutch cable cowling.
- Loosen the ring nut "C".
- Rotate the adjuster "C" clockwise or counter-clockwise up to the specified clutch cable clearance. Fig. B

Clutch cable clearance	Clearance
Clockwise	The gap is increased
Anticlockwise	The gap is decreased

- Tighten the ring nut "C".

NOTE:
If the specified clearance of the clutch cable cannot be obtained on the handlebar side, use the adjusting nut on the engine side "E". Fig. C

- Prise the dust seal in the middle of the clutch cable.
- Loosen the lock nut "F" in the middle of the clutch cable.
- Rotate the adjusting nut "E" to obtain the correct clearance.





FRAME/HANDLEBAR

REAR-VIEW MIRROR ADJUSTMENT

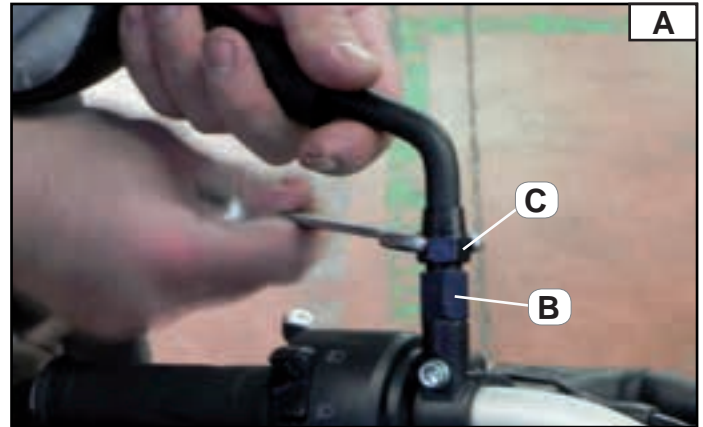
The following procedure refer to both rear-view mirrors.

Install:

1. Screw the mirror (15) on the lever body (32).
2. Move the nut "B" until it stops.
3. Adjust the mirror position by rotating it.
4. Tighten the lock nut "C".

NOTE:

Carry out the same procedure also with the right mirror.





ENGINE/MOTOR OIL

CHECKING ENGINE OIL LEVEL

Park:

- the motorcycle on a level surface.

NOTE:

- Place the motorcycle on a suitable support.
- Make sure it is in upright position.

Start:

- the engine
- allow it to warm up for some minutes and then turn it off.

IMPORTANT NOTICE

Do not start the engine if the oil level is below the MIN reference indicated on the sight glass "B".

Check:

- the engine oil level
- the engine oil level must be within the references of the minimum (MIN) and maximum (MAX) level.
If below the minimum notch, top up with the recommended engine oil up to the correct level.



Recommended oil
SAE 10 W-50 API SJ - JASO MA

Adjust:**To top up with engine oil:**

- unscrew the oil cover with the engine switched off.
- Pour an amount of oil of the recommended type within the reference of the maximum (MAX) and the minimum (MIN) level (Fig. A).

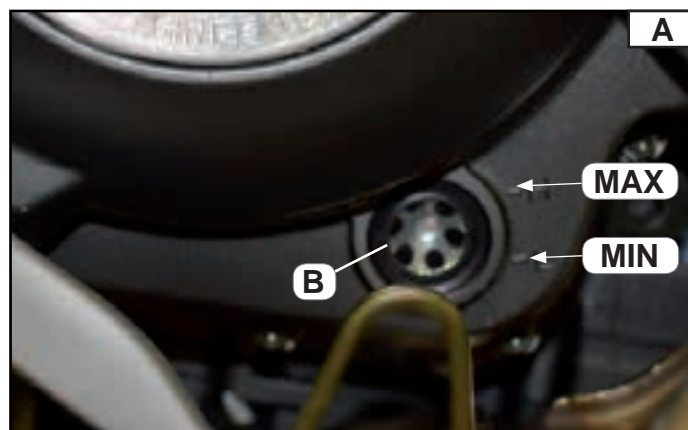
NOTE:

The engine contains approx. 3.5 l of oil.
Use oil rated API-SJ SAE 10W/50.

IMPORTANT NOTICE

Owing to the fact that the engine oil lubricates also the clutch, it may cause the clutch slipping if it is not suitable or contains additives. Therefore, it is advisable not to add chemical additives and not to use types of oil other than the one indicated in the table of the engine technical specifications.

The engine oil, whether new or waste, can be hazardous. In case of swallowing, it can be noxious for people and pets. In the event of swallowing, seek medical aid immediately; do not induce vomiting to avoid aspiration of the product into the lungs. Short contacts with the engine oil may irritate skin.



- Keep the engine oil out of reach of children and pets.
- Wear long-sleeve clothing and waterproof gloves when topping up the engine oil.
- Wash with water and soap in the event the engine oil comes into contact with skin.
- Recycle or dispose the waste oil properly.

- Turn the oil cover back to its original position.

NOTE:

To check the engine oil level again, restart the engine, warm it up for some minutes and then turn it off. Wait some minutes to allow the oil to flow downwards.



ENGINE/MOTOR OIL

ENGINE OIL CHANGE

Start:

- the engine, warm it up for some minutes and then turn it off.

Remove:

- the oil drain cap "A" Fig. A.

Position:

- a suitable container underneath the drainage for oil recovery Fig. B

NOTE:

Change the engine oil at 1000 Km (621 mi) first and then every 6000 km (3728 mi).

IMPORTANT NOTICE

Waste oil are environmentally unfriendly.
Dispose waste oil according to applicable law.

Remove:

- the magnetic cap "B" (together with the copper seal)

Drain:

- the engine oil from the crankcase.

NOTE:

Replace also the oil filter cartridge.

Replace:

- the magnetic cap seal.

Install:

- the new seal
- the magnetic cap

Tighten the magnetic cap to the following torque:



Torque 22 N*m

Fill:

- the crankcase with the recommended engine oil with the specified amount.

Install:

- the oil cap "A" Fig. A.

Start:

- the engine
- allow it to warm up for some minutes and then turn it off.

NOTE:

Always check the level is in the middle between the reference MIN and MAX of the sight glass "B" Fig. C.
Top up, if necessary.

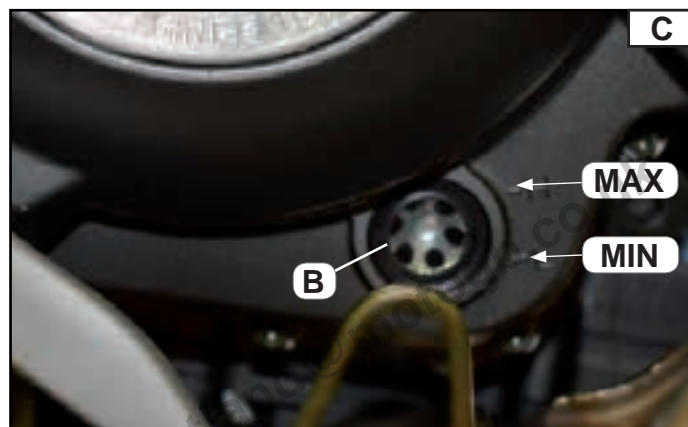
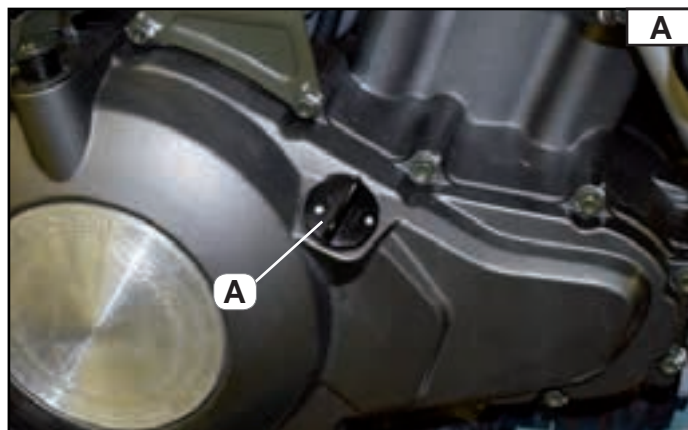
Recommended engine oil:

Rating: API SJ-JASO MA2

Viscosity: 10W50

Capacity: 3 l (without filter removal)

3.2 l (with filter removal)



D

GRADAZIONI SAE	
PER OLI MOTORE CONSIGLIATI IN RAPPORTO ALLE TEMPERATURE ESTERNE	
-35	-30 -25 -20 -15 -10 -5 0 +5 +10 +15 +20 +25 +30 +35 +40 +45 +50
SAE 10W	
SAE 20W	
SAE 30W	
SAE 40W	
SAE 10W-40	
SAE 15W-40	
SAE 15W-50	
SAE 20W-50	
SAE 20W-50 semisintetico	
SAE 30W-50 semisintetico	
SAE 40W-50 semisintetico	
SAE 50W-50 semisintetico	



ENGINE/MOTOR OIL

OIL FILTER REMOVAL/INSTALLATION

Removal:

NOTE:

Before removing the oil filter, it is necessary to drain the oil from the engine.

1. Place a suitable container underneath the engine.
2. Use the specific tool (**) to turn counter-clockwise the oil filter (2) and remove it Fig. A.



Install:

NOTE:

Before fitting a new oil filter, apply a fine layer of engine oil to the contact surfaces of the filter to lubricate it Fig. A.

1. Proceed using the opposite order to removal.
- Tighten the filter (2) to the following torque:



Torque 22 N*m

IMPORTANT NOTICE

Always use original Benelli oil filters.

Other brands of oil filters can be different in terms of thread (diameter and pitch).

The use of other types of filter may affect the filter performance and duration, which will cause possible damage to the engine or oil leaks.



ENGINE/SPARK PLUGS

REMOVAL OF SPARK PLUGS ON THE VEHICLE

The following procedure applies to all of the spark plugs.

WARNING

Replace and check the spark plugs when the engine is cold.
Park the motorcycle on a level surface.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter “**Fuel tank removal, Chapter 4**”.
- The two side guards “A” (left and right) Fig. A.
- Loosen the claps of the two rubber sleeves “B” Fig. B.
- Disconnect the breather hose “C” from the filter casing.
- Release the filter box “D”.

IMPORTANT NOTICE

Before disassembly of spark plug, remove any dirt from the groove of the seats with a stream of compressed air to prevent it from falling into cylinders.

Remove:

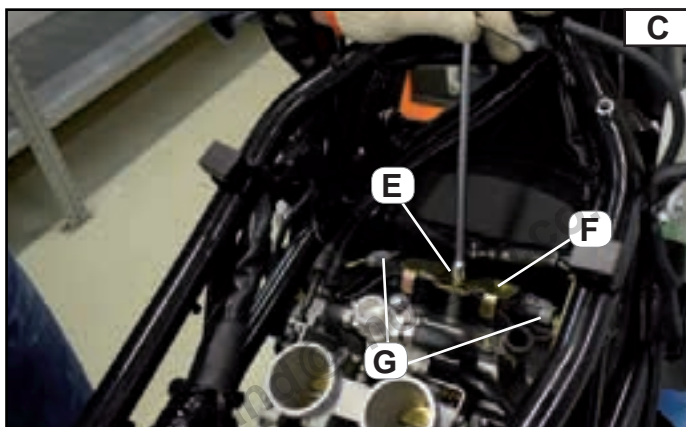
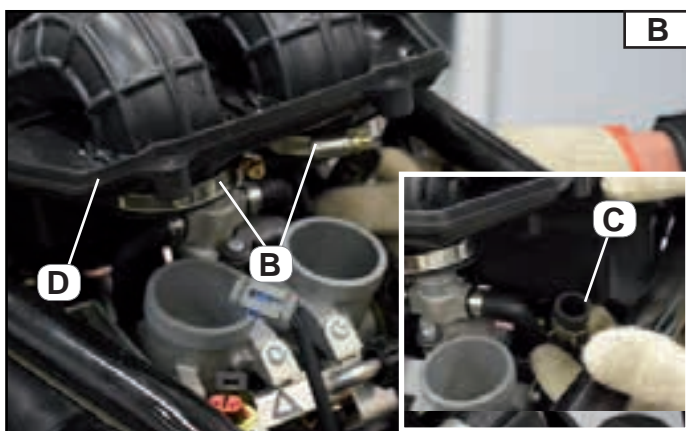
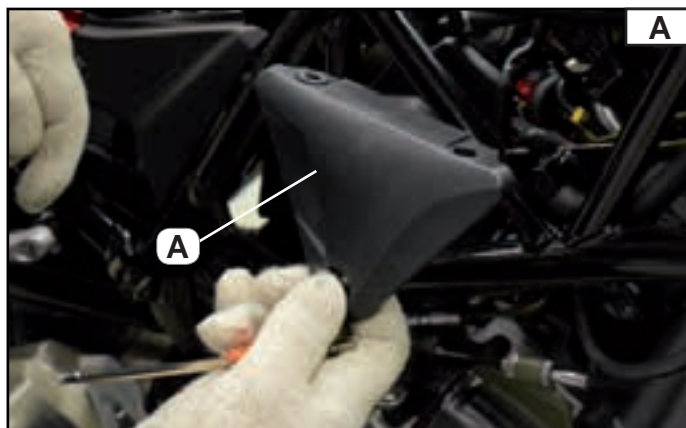
- The screw (E)
- The bracket (F)

Disconnect:

- The coil connectors (G) Fig. C
- The two rubber tips and the O-rings.

Slide out:

- The coil and the spark plug underneath Fig. D



ENGINE/SPARK PLUGS

SPARK PLUG CHECK

The following procedure applies to all of the spark plugs.

- Check:

 - the type of spark plug
- Check:

 - the electrodes (A) Fig. E
 - If there is any damage, wear or rounding, Replace the spark plug.
- the insulating part (B) Fig. E
- Abnormal colour

Replace the spark plug.

Generally, the colour is a light, medium brown.

Clean:

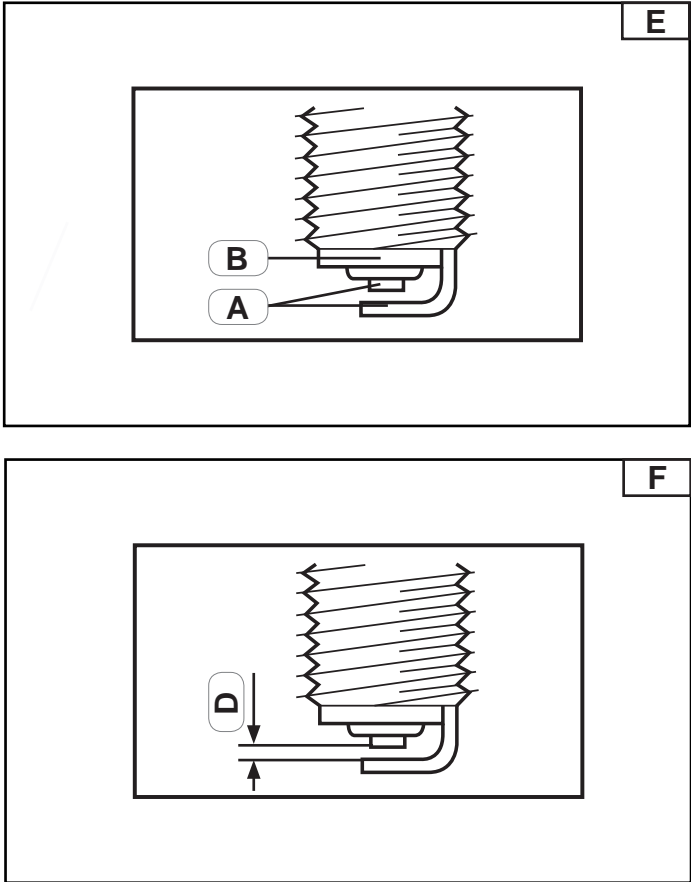
the spark plug using a cleaner for spark plugs or a metal brush.

Check:

Measure the distance between electrodes [D] using a thickness gauge.

If the distance between electrodes is not correct, replace the spark plug.

Distance between spark plug electrodes	(mm)
D	0.8-0.9





Spark plug type
NGK CR8E



ENGINE/SPARK PLUGS

SPARK PLUG CHECK

In general, the table contains the typical conditions of spark plug with the various degeneration causes and corresponding solutions.

	SOILED SPARK PLUG		OVERHEATED SPARK PLUG
Cause	Solutions	Cause	Solutions
Over rich mix of air/fuel -Wrong setting of the carburetion. Electrical system fault -Imperfect coil connection Specific riding conditions -Prolonged periods at "minimum" -Long sections at low speed Spark plug too cold	The fuel/carburettor system needs to be fine tuned Check the coil connections and relevant impedance Every so often, the bike needs to be taken to speeds of about 80 km/h Use a warmer spark plug, as per specifications	Ignition too advanced Insufficient air/fuel mix Insufficient coolant and/or lubricant Spark plug torque too low The spark plug used is too hot	Adjust advanced ignition Adjust air/fuel ratio Add coolant and/or lubricant Tighten to the correct torque Use cooler spark plugs as per specifications



ENGINE/SPARK PLUGS

ASSEMBLY OF SPARK PLUGS

The following procedure applies to all of the spark plugs Fig. D.

WARNING

Lubricate the spark plug threads with copper grease.



NOTE:

Before installing it, clean the spark plug and the surface in contact with the seal.

Install:

- the spark plug to the head, tightening it by hand until it comes into contact with the base of the head. Tighten to torque.



Torque 12 N*m

Install:

- the coil (1*)
- The rubber tips (2*) and the O-rings (3*) Fig. D

Connect:

- the coil connector

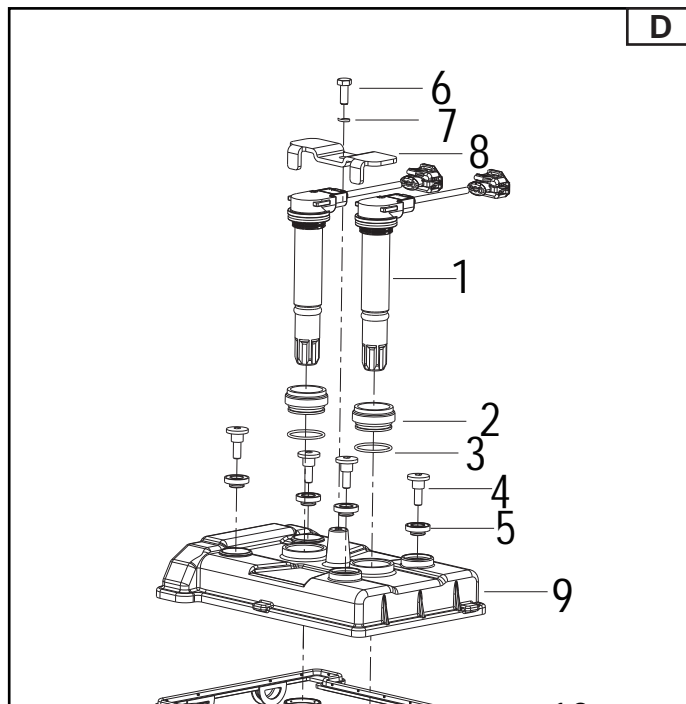
Install:

- The screw (6*)
- The bracket (8*)

Tighten the torque.



Torque 10 N*m



NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Engine", paragraph "Timing gear cover removal".



ENGINE/COOLING SYSTEM

CHECKING COOLANT LEVEL

Park the motorcycle on a level surface.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

NOTE:

Make sure it is in upright position.

Check the level when the engine is cold.

Remove:

- Rider and passenger seats, see chapter “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter “**Removal of front fairing, Chapter 4**”.

Check:

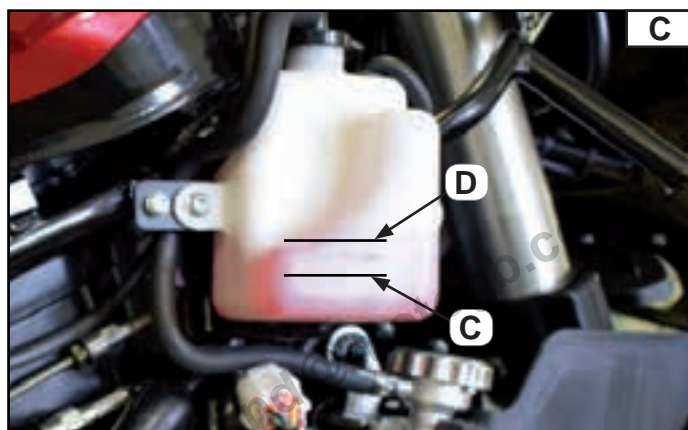
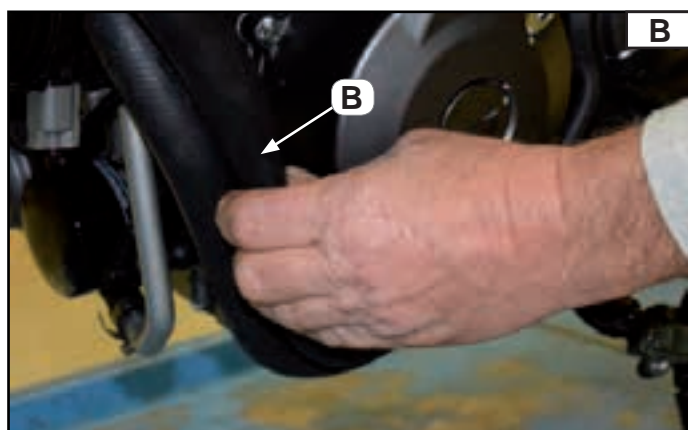
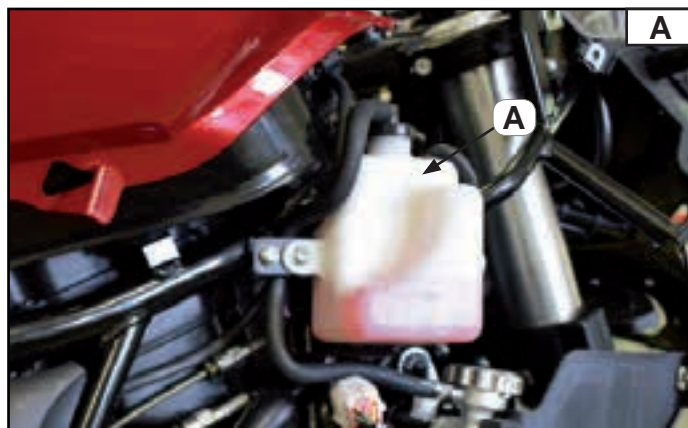
- the coolant level

The coolant level must be within the maximum level reference (MAX) and the minimum one (MIN). If below the minimum notch, top up with the recommended coolant up to the correct level. Fig. A

Remove:

- the expansion tank cap
- add coolant liquid up to the level line (MAX) Fig. C.

Press the hose “B” (from the water pump to the expansion tank) to remove any air bubbles Fig. B.





FRAME/BRAKE ADJUSTMENT

ADJUSTMENT OF THE FRONT BRAKE

Adjust:

- the brake lever position Fig. A
(distance "x" between the throttle grip and the brake lever).

NOTE:

Push the brake lever forward to neutralise the spring thrust and at the same time adjust the position, by rotating the ring nut "y" clockwise or counter-clockwise until the brake lever reaches the required position.

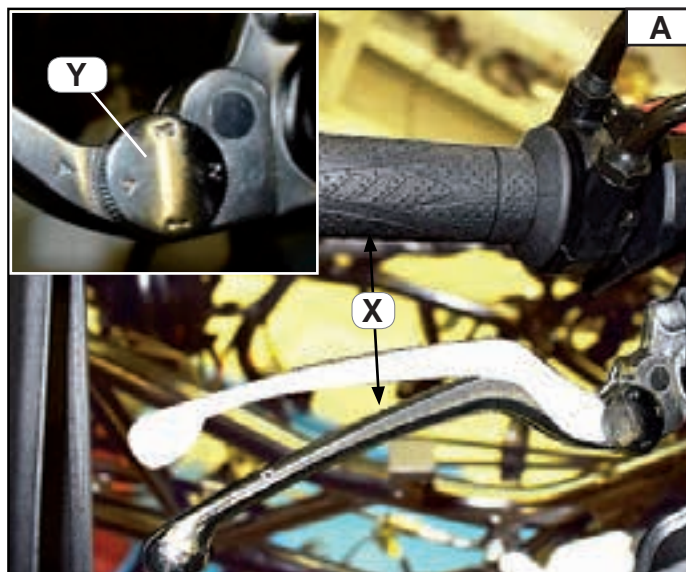
Ring nut position	Gap
Position 1	there is more gap from the handlebar
Position 4	there is less gap from the handlebar

WARNING

If the brake lever is soft or spongy to the touch, there might be air in the braking system. Before using the vehicle, it is necessary to exhaust air by bleeding the braking system. The presence of air in the braking system significantly reduces the system performance and ultimately may cause a loss of control of the motorcycle and accidents. Therefore, check and exhaust air in the braking system, if necessary.

IMPORTANT NOTICE

After adjusting position of the brake handle, make sure that there is no brake drag.





FRAME/BRAKE ADJUSTMENT

ADJUSTMENT OF THE REAR BRAKE

Adjust:

- the brake pedal position Fig. A
- Loosen the locknut "A".
- Screw off the lock nut "B".
- Screw up or screw off the threaded pin "E" to increase or reduce the rear brake control clearance Fig. A.

Tighten:

- the nut "A"
- Tighten the lock nut "B".

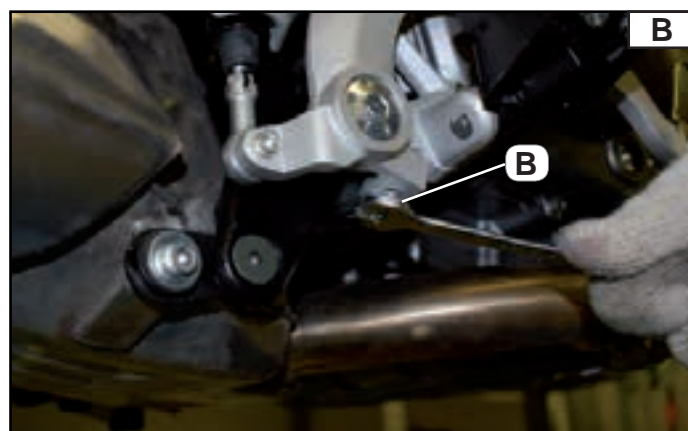
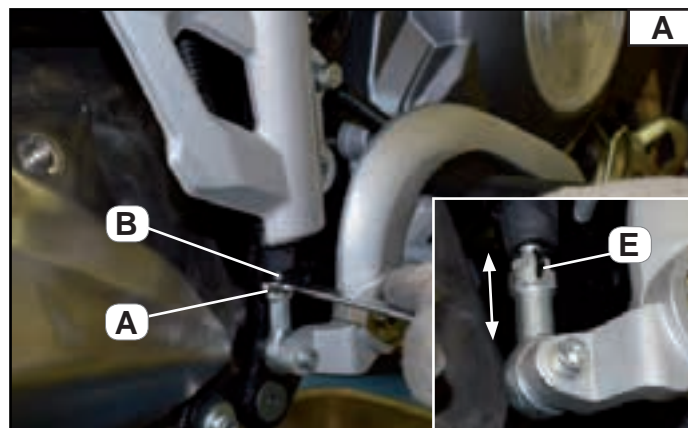
WARNING

If the brake lever is soft or spongy to the touch, there might be air in the braking system. Before using the vehicle, it is necessary to exhaust air by bleeding the braking system. The presence of air in the braking system significantly reduces the system performance and ultimately may cause a loss of control of the motorcycle and accidents.

Therefore, check and exhaust air in the braking system, if necessary.

IMPORTANT NOTICE

After adjusting position of the brake pedal, make sure that there is no brake sticking.





FRAME/CHECKING BRAKE FLUID LEVEL

CHECKING THE FRONT BRAKE LIQUID LEVEL/TOPPING UP

Park:

- The motorcycle on a level surface.

NOTE:

Place the motorcycle on a stand and make sure it is in up-right position.

Check:

- the brake fluid level

If below the minimum notch "A" Fig. A, top up with the recommended brake fluid until it is at the correct level.

Fluid topping up procedure:

- Once having positioned the motorcycle on a level surface, loosen the two fastening screws "B" of the brake pump cover Fig. A.

Check:

the cap gasket

If there is any damage/wear, replace the gasket.

IMPORTANT NOTICE

Brake fluid can damage painted surfaces and plastic parts. Therefore, wrap the absorbent paper around the pump and always clean up any brake fluid spills immediately.

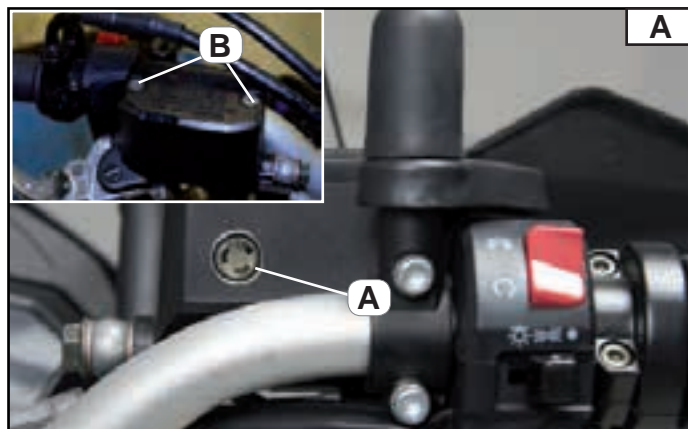
- Apply the vacuum device to the drain screw "C" Fig. B.
- Top the liquid up to the level indicated on the pump sight glass Fig. C.
- Pump the brake fluid by moving the brake lever.
- After topping up, place the cap and tighten the two fastening screws.

WARNING

Only use the prescribed fluid. Other brake fluids may cause the deterioration of the rubber seals, causing leakages and malfunctioning of the braking system.

Top up with the same type of brake fluid already in the system. Mixing different types of brake fluid may cause a noxious chemical reaction, which may affect the braking system operation.

While topping up brake fluid, take care not to let any water enter the container. Water would lower the boiling point of the brake fluid significantly, causing steam bubbles.



Fluido freni consigliato
TUTELA BRAKE FLUID
TOP 4 - DOT 4



FRAME/CHECKING BRAKE FLUID LEVEL

CHECKING THE REAR BRAKE LIQUID LEVEL/TOPPING UP

Park:

- The motorcycle on a level surface.

NOTE:

Place the motorcycle on a stand and make sure it is in up-right position.

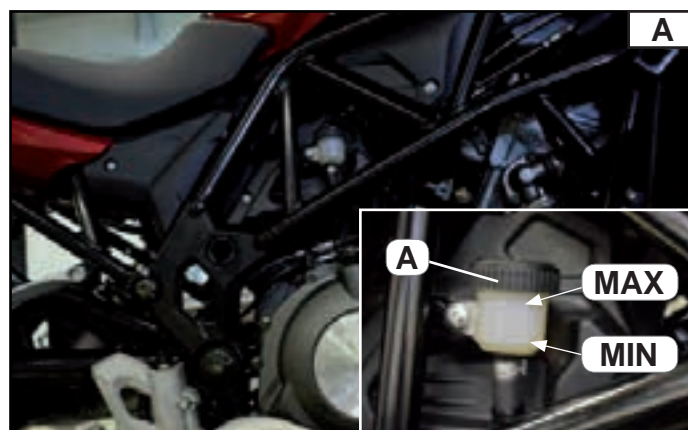
Check:

- the brake fluid level

If below the minimum notch "A" Fig. A, top up with the recommended brake fluid until it is at the correct level.

Fluid topping up procedure:

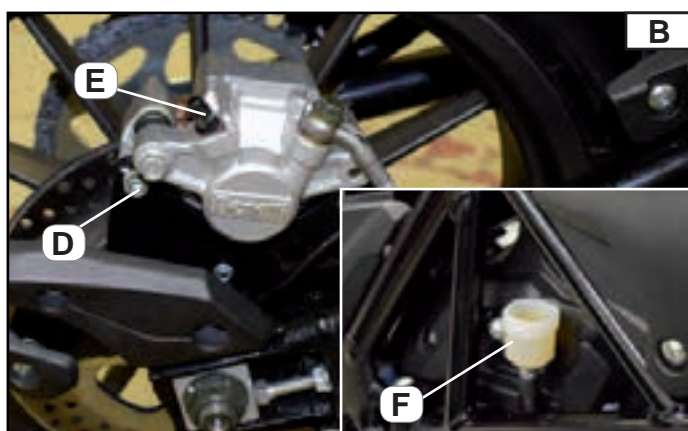
- Once having positioned the motorcycle on a level surface, loosen the top cover "A" of the brake pump Fig. A.



IMPORTANT NOTICE

Brake fluid can damage painted surfaces and plastic parts. Therefore, wrap the absorbent paper around the pump and always clean up any brake fluid spills immediately.

- Remove the fastening screw of the outer rear brake caliper and loosen the inner fastening screw "D" Fig. B in order to raise the caliper and carry out a complete exhaust, without air bubbles.
- Apply the vacuum device to the drain screw "E" and loosen the latter.
- Top the liquid up to the MAX level indicated on the graduated container "F". Pump the brake fluid by moving the brake lever.
- After topping up, lower the caliper and tighten the two fastening screws to the following torque:



Torque 22 N*m

- Close the pump cover.

WARNING

Only use the prescribed fluid. Other brake fluids may cause the deterioration of the rubber seals, causing leakages and malfunctioning of the braking system.

Top up with the same type of brake fluid already in the system. Mixing different types of brake fluid may cause a noxious chemical reaction, which may affect the braking system operation.

While topping up brake fluid, take care not to let any water enter the container. Water would lower the boiling point of the brake fluid significantly, causing steam bubbles.



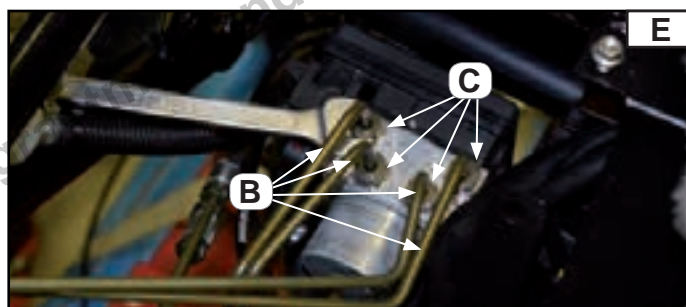
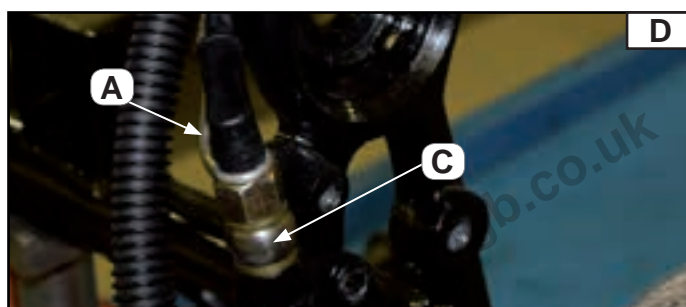
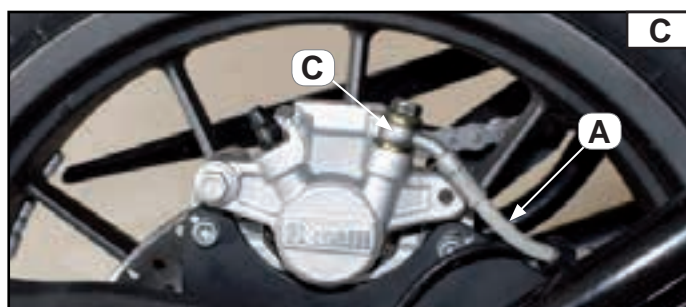
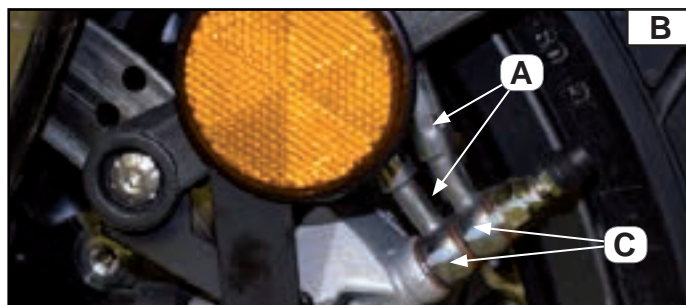
FRAME/CHECKING ABS HOSES

CHECK FOR ANY LEAKAGES OF ABS TUBES

For the motorcycle models equipped with ABS, it is necessary to check for leakages in the braking system and especially in the ABS circuit.

Remove:

- The seat (See section Seat removal).
- Disassemble the passenger's seat (see section Passenger's seat removal).
- Remove the fuel tank (see section Fuel tank removal).
- By means of the brake lever/pedal check for brake fluid leakages from the hoses "A", the tubes (models equipped with ABS) "B" and the fittings "C".
- In case of fluid leakage in any point, check or replace the faulty component.



FRAME/BRAKE PAD CHECK

CHECKING WEAR OF FRONT/REAR BRAKE PADS

The following procedure applies to brake pads.

Activate:

- the brake

Check:

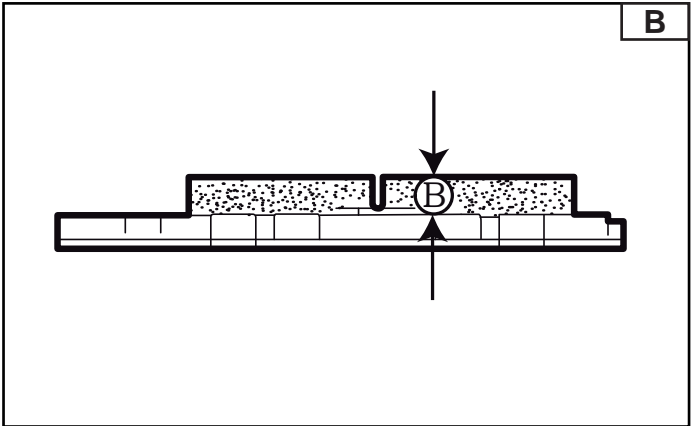
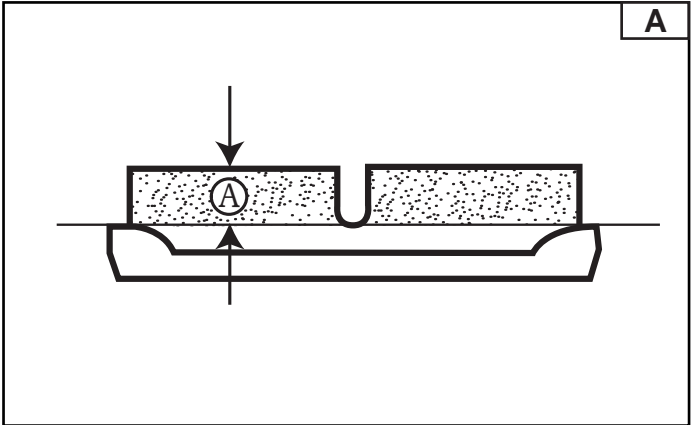
- The front brake pads Fig. A.
- The rear brake pads Fig. B.
- The wear limit for the front/rear brake pads.

If the wear reaches the limit, please replace all brake pads.



Pads	Wear limit (A)
Front	1 mm
Rear	1 mm

NOTE:
For replacing the pads, refer to the chapter “Frame”, section “Removal/installation of front brake pads”.





FRAME/CHECKING HOSES OF THE BRAKING SYSTEM

HOSE CHECK

The following procedure applies to all brake hoses and brake hose clamps.

Check:

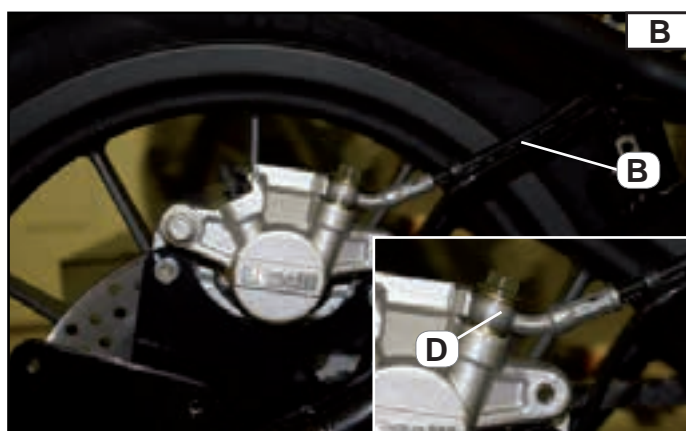
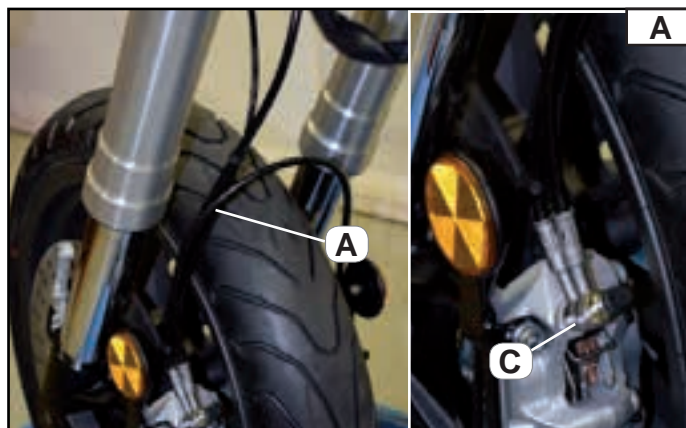
- the path of the hose of the front "A" and rear "B" brake.
- If there is any cracking/damage/wearing trace, replace.

Check:

- The hose clamp "C" of the front brake Fig. A. If loosened, tighten the clamp bolt.

Check:

- The hose clamp "D" of the rear brake Fig. B. If loosened, tighten the clamp bolt.



Torque 25 N*m

Keep:

- The motorcycle in a upright position.

Activate:

- The brake several times.

Recheck:

- The brake hose. If there is any brake fluid leakage, replace the damaged hose.

FRAME/TRANSMISSION CHAIN

ADJUSTMENT OF THE TRANSMISSION CHAIN

NOTE:
When the engine is running, do not check or adjust the transmission chain.

NOTE:
Check the transmission chain slackness in the most taut point.

WARNING

If the chain is too taut, there may be an overload of the engine or other vital parts, while , if it is too slack, it may jump out and damage the swing arm bracket or cause an accident. Therefore, it is advisable to keep the chain slackness within the specified range.

Park:

- the motorcycle on a level surface.

WARNING

Prop the motorcycle on suitable supports so that it cannot fall and the rear wheel is raised.

- Rotate the rear wheel several times and determine its tightest position.

Check:

- the slackness of transmission chain. If outside specifications, adjust Fig. A.



Transmission chain slackness	10-15 mm
------------------------------	----------

Adjust:

- slackness of transmission chain Fig. B

If the chain tension is not correct, adjust it as follows.

- Loosen the wheel axle nut on the left side of the swing arm.
- To tension the transmission chain, turn the tension adjustment bolt on each side of the swing arm (counter-clockwise).
- To loosen the transmission chain, turn the tension adjustment bolt clockwise and push the rear wheel forwards.
- After adjustment, tighten the wheel axle nut to the following torque:

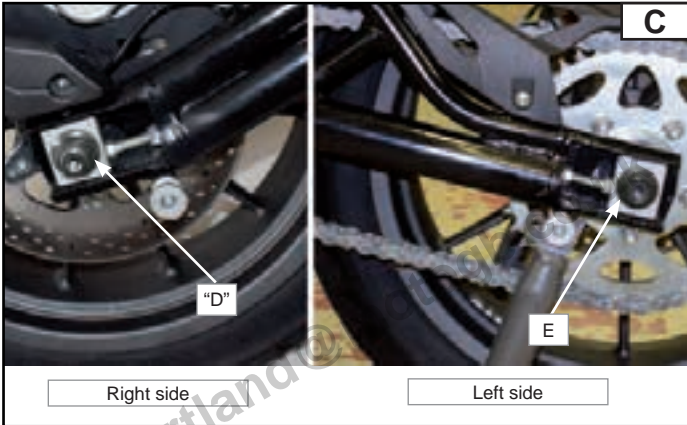
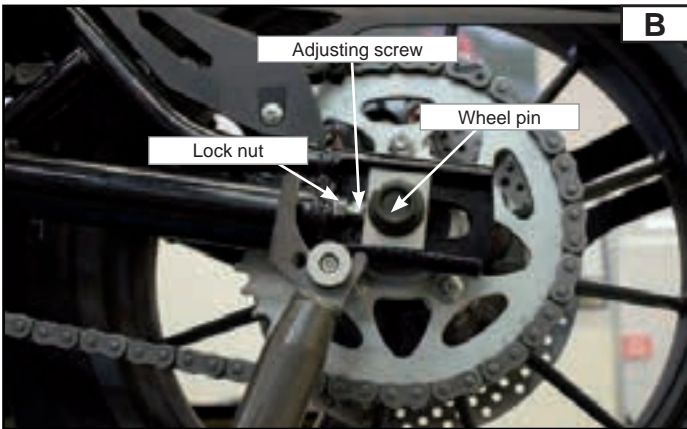
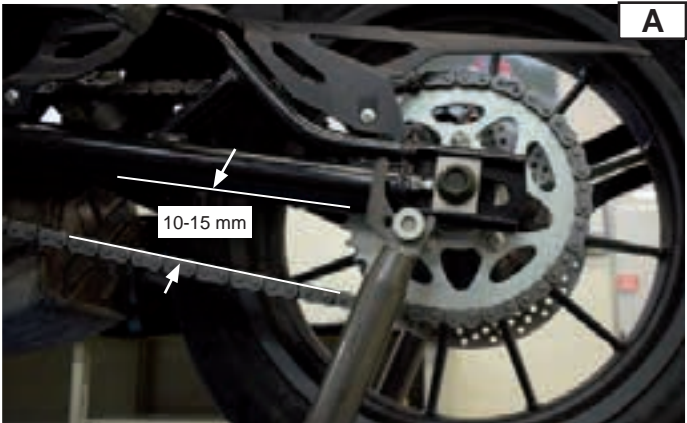


Torque 80 N*m

WARNING

If the chain is too taut, there may be an overload of the engine or other vital parts, while , if it is too slack, it may jump out and damage the suspension arm or cause an accident. Therefore, it is advisable to keep the chain slackness within the specified range.

The gap on the right side must correspond to the 8th notch on the swing arm “D”, while for the left side, to the 5th notch on the swing arm “E” Fig. C.



FRAME/TRANSMISSION CHAIN **LUBRICATION OF TRANSMISSION CHAIN**

Introduction

The transmission chain consists of several parts that interact with each other.
 The chain must be properly maintained to prevent its early wear.
 Therefore, it is advisable to maintain the transmission chain, especially if it is used in very dusty areas.
 This motorcycle is fitted with a transmission chain complete with small rubber O-rings inserted between one side plate and another.
 Do not use steam jets, high-pressure water jets, aggressive solvents or brushes with too rough bristles to prevent damaging these O-rings.
 Therefore, we recommend exclusive use of recommended products to clean the transmission chain.
 Wipe the chain and lubricate it thoroughly using engine oil or specific lubricant for chains with O-rings.
 Do not use other kinds of lubricants on the transmission chain as they might contain solvents that would damage the O-rings.

Apply:

- A thin and smooth layer of lubricant on the whole chain, being careful not to reach the surrounding parts, especially the tyres.

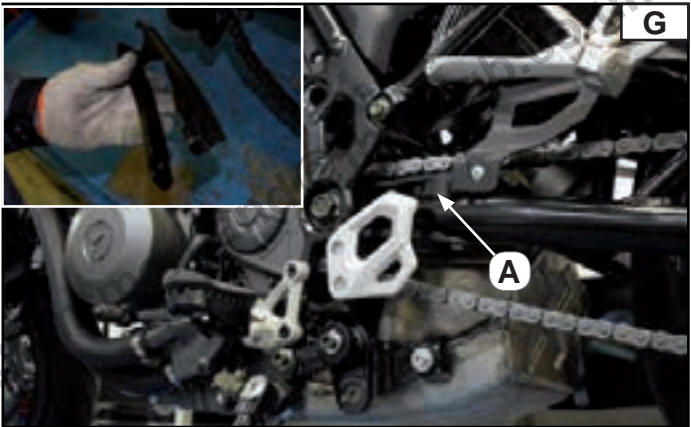
	Recommended lubricant SINTOFロン
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CHAIN GUIDE CHECK

Visually check the chain guide slide (A) Fig. F.

Replace:

The chain guide if faulty or damaged.





FRAME/TRANSMISSION CHAIN CHECKING WEAR OF TRANSMISSION CHAIN

Check:

- The transmission chain
- Rigidity. Clean and lubricate or replace.

Clean:

- The transmission chain

Clean the transmission chain with a clean rag.

Soak the transmission chain in kerosene and remove any remaining dirt.

Remove the transmission chain from the kerosene and leave it to dry completely.

IMPORTANT NOTICE

This motorbike is fitted with a transmission chain complete with small rubber O-rings (B) Fig. E, inserted between one side plate and another.

To clean the transmission chain, do not use high-pressure jets of water or air, do not use steam, petrol, aggressive solvents (such as petroleum petrol), or brushes with overly stiff bristles.

Using high-pressure items could force dirt into the cavities inside the transmission chain, while solvents could cause the O-rings to deteriorate.

The O-rings could also be damaged by the use of brushes of overly stiff bristles.

Therefore, we recommend exclusive use of white oil to clean the transmission chain.

Check:

- The O-rings (B)
- In the event of damage, replace the transmission chain.

- The transmission chain rollers (D)

In the event of damage/wear, replace the transmission chain.

- The side plates of the transmission chain (C)

In the event of damage/wear, replace the transmission chain.

If there are any cracks, replace the transmission chain and make sure that the bleeder pipe from the battery is correct and sufficiently distant from the transmission chain and below the swinging arm.

Lubricate:

- The transmission chain

NOTE:

Use specific grease

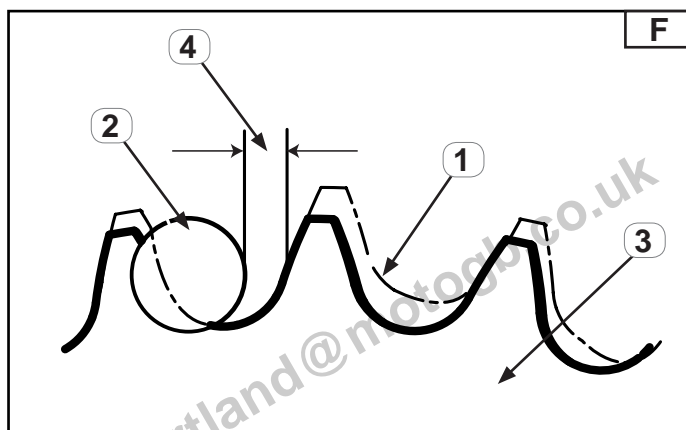
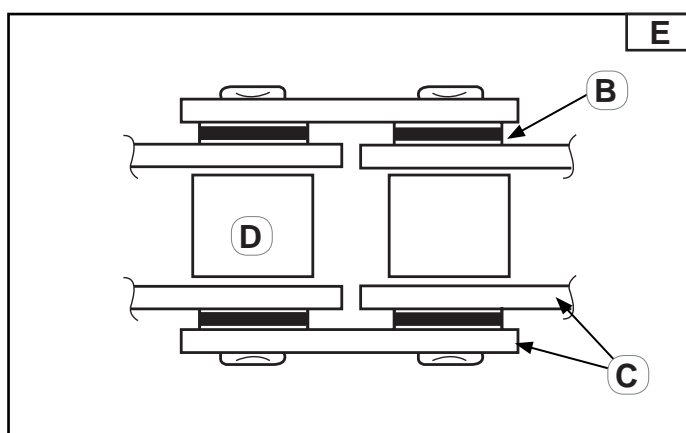
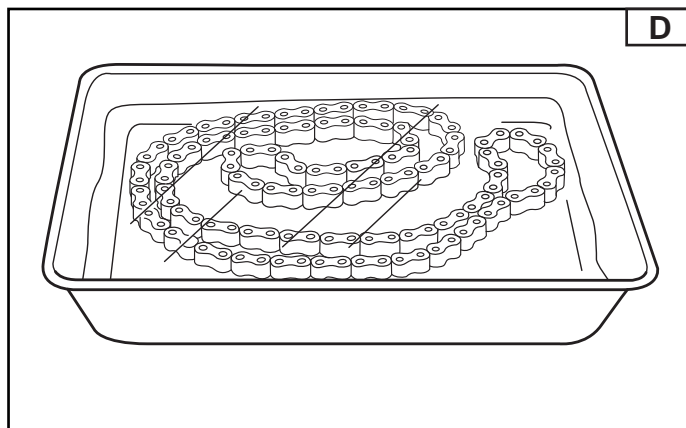
Check:

- Driving gear
- Rear toothed sprocket

If more than 1/4 of each tooth (4) is worn Fig. F, replace the transmission chain sprockets all together.

If the teeth are bent, replace the transmission chain sprockets all together.

- Correct
- Transmission chain roller
- Transmission chain sprockets



NOTE:

Never fit a new chain with worn sprockets.

Both the chain and sprockets need to be in good condition or the new chain will become quickly worn.



FRAME/CHECK AND ADJUSTMENT OF STEERING SLEEVE

CHECK/ADJUSTMENT OF STEERING CLEARANCE

Park:

- The motorcycle on a level surface.

NOTE:

Place the motorcycle on a suitable support so that the front wheel is raised.

Check:

- The steering sleeve

Gently oscillate the front fork, holding it by the ends of the tubes Fig. A.

If there is any jamming/loosening, adjust the steering sleeve.

Remove:

- Movable windscreen, see chapter "Removal of movable windscreen, Chapter 4".
- Front fairing, see chapter "Removal of front fairing, Chapter 4".
- Instrumentation plate, see chapter "Removal of the instrumentation plate, Chapter 4".

Loosen:

- The stop screws on the top steering plate "1" Fig. B.

Remove:

- the upper u-clamps (2) Fig. B
- The bolt cap of the steering head (3) Fig. B
- Slide out the plate (4) Fig. C

Adjust:

- the steering sleeve
- Remove the steering pin ring nut (5) Fig. C
- Loosen the steering ring nut (6), then tighten at the specified value using the apposite wrench "7".



(**) Tool to tighten the steering sleeve lock nut

Code:..... R180297129000



Torque 15 N*m

- Tighten the ring nut "E" with the apposite wrench to the following torque:



Torque 60 N*m

Check:

Should the steering be too hard or too soft, repeat the adjustment.

WARNING

Do not overtighten the steering ring nut.

Remove:

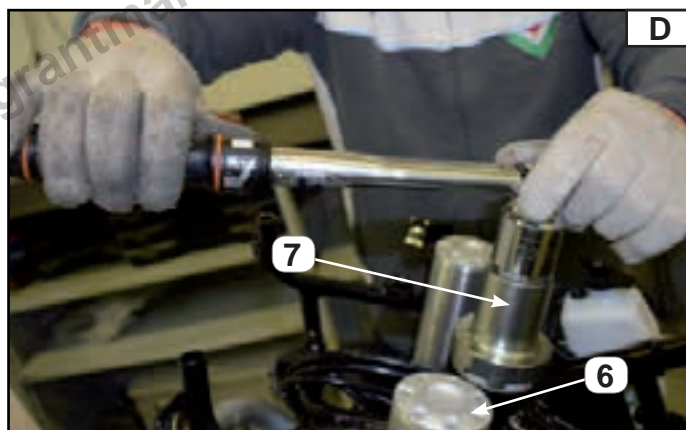
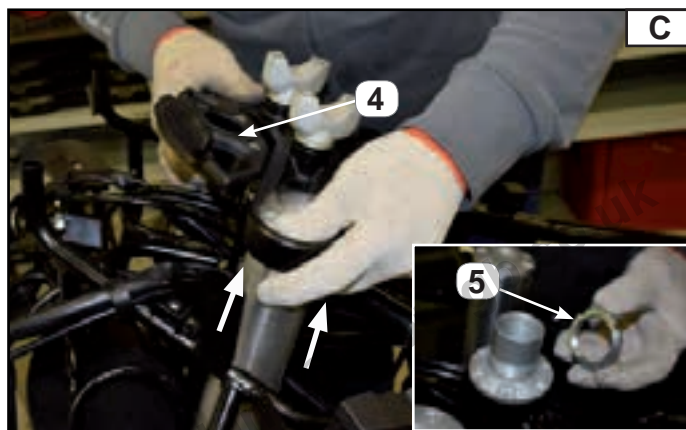
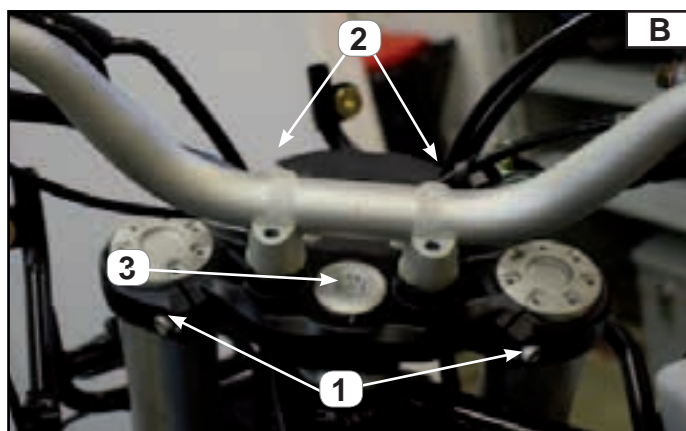
- The cap (6) with the special tool (7) Fig. D



(**) Steering head wrench

Code: R180297129000

Remove:





FRAME/CHECK AND ADJUSTMENT OF STEERING SLEEVE STEERING SLEEVE BEARING LUBRICATION

- the steering ring nut (1), then using the apposite wrench (2) remove the steering ring nut (3). Fig. A-B.



Tool to tighten the steering sleeve lock nut

Code: R180297129000

Using a solvent with a high flash point, wash the top/bottom ball bearings in the retainers, then wipe up the upper and lower outer races that are installed for interference on the frame pipe, remove the grease and dirt.

Check:

- Visually check the outer races and the balls. Replace if worn or damaged Fig. C.
- Insert the balls with some grease, then apply a thin layer of grease on the outer top/bottom races.

Assemble:

Once assembled, tighten the steering ring nut to the following torque:



Tool to tighten the steering sleeve lock nut

Code: R180297129000



Torque 60 N*m

	<p>Specific grease</p>
--	-------------------------------

Assemble:

- the steering ring nut support with the apposite tool to the following torque:

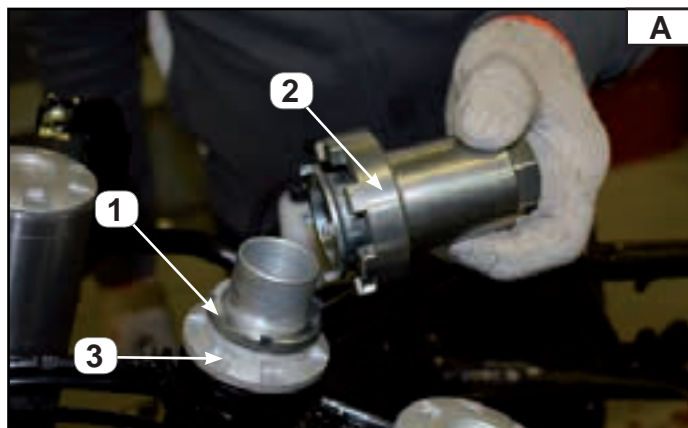


Tool to tighten the steering sleeve lock nut

Code: R180297129000



Torque 15 N*m





FRAME/CHECK OF FRONT FORK

CHECK OF FRONT FORK

Park:

- The motorcycle on a level surface.

NOTE:

Prop the motorcycle on suitable supports so that it cannot fall.

Check:

- The fork stem "A" Fig. A
 - The fork sleeve "B" Fig. A
- If there is any damage/line, replace.
- The oil seal
- If there is any leakage, replace.

Keep:

- The motorcycle in a upright position.

Activate:

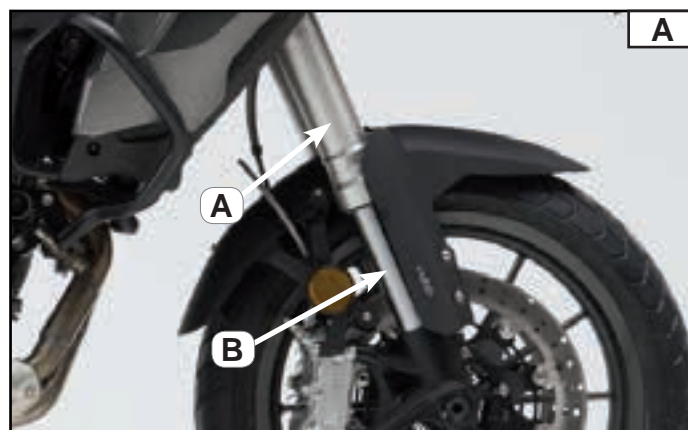
- The front brake

Check:

- The fork operation.

Push hard on the handlebar several times to check that the front fork returns to the stationary position in a smooth way.

If the movement is not smooth, replace (see chapter FRAME/CHECK AND ADJUSTMENT OF STEERING SLEEVE, section STEERING SLEEVE BEARING LUBRICATION).



FRAME/CHECK OF REAR SHOCK ABSORBER SHOCK ABSORBER ADJUSTMENT

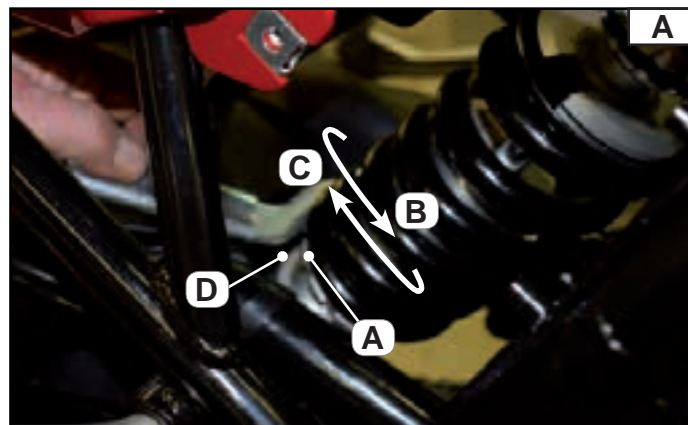
NOTE:

Prop the motorcycle on suitable supports so that it cannot fall.

Adjustment

- Adjust the spring preload Fig. A.
The rear shock absorber is equipped with an adjustment ring nut for the pre-load of spring "A" and a return ring nut "D".

- To **increase** the spring pre-load, thus making the suspension more rigid, turn the adjustment ring nut "A" to the direction (B).
- To **reduce** the spring pre-loading, thus making the suspension softer, turn the adjustment ring nut "A" to direction (C).
At the end of adjustment, tighten the return ring nut "D".



IMPORTANT NOTICE

To avoid damaging the mechanism, do not try turning over the maximum or minimum setting.

Position	Gap
MIN	0 mm
MAX	10 mm

Adjustment

- Adjustment of the hydraulic braking device in extension Fig. B.

It is possible to adjust the hydraulic braking device using the adjustment ring "E" Fig. B.

- Turn it clockwise to increase the braking action. Turn it counter-clockwise to reduce the braking action.



IMPORTANT NOTICE

To avoid damaging the mechanism, do not try turning over the maximum or minimum setting.



FRAME/CHECK OF FRONT/REAR TYRES

TYRE CHECK

The following procedure is applied to both tyres.

Check:

- The tyre pressure. If outside specifications, adjust Fig. A.

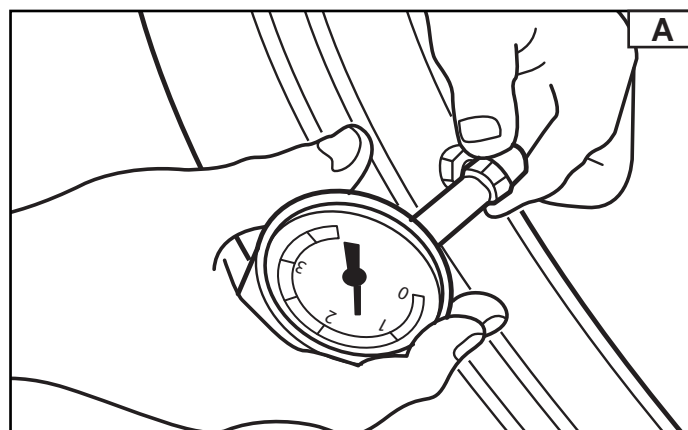
WARNING

The tyre pressure must be checked and adjusted only when the wheel temperature corresponds to the ambient temperature.

The tyre pressure and the suspension must be adjusted according to the total weight, including baggage, driver, passenger and accessories, and considering the expected driving speed.

The use of the overloaded vehicle may cause damages to tyres, with the risk of an accident or injuries for people.

NEVER OVERLOAD THE VEHICLE IN ANY CASE.



Position	Wear limit (A)	
Net weight (with oil and full fuel tank)	See general specifications	
Max. load*	See general specifications	
COLD TYRE PRESSURE	FRONT	REAR
Up to 90 kg load*	2.20 bar	2.50 bar
90 kg ~ max. load*	2.20 bar	2.50 bar

* Including baggage, driver, passenger, and accessories.

WARNING

It is dangerous to drive with the worn tread.

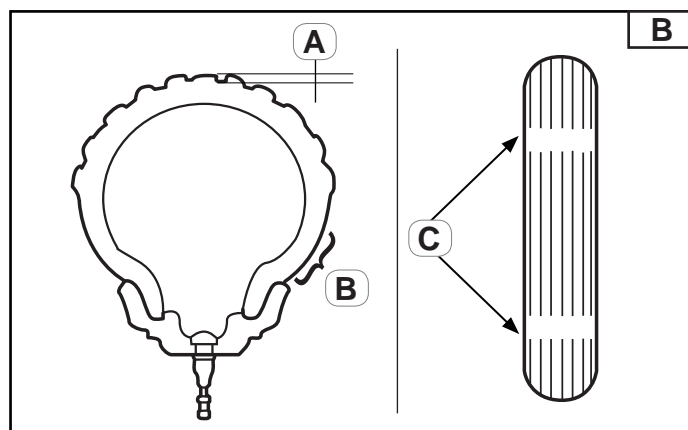
If the tread reaches the wear limit, replace the tyre immediately.

Check:

- The tyre surface Fig. B

If there is any damage or wear, replace.

- A. Depth of tread pattern
- B. Side wall
- C. Wearing warning device



WARNING

If tyres are new, the grip on the road is relatively weak until they are slightly used. Therefore, it is advisable to drive at normal speed for the first 100 km (62 mi) before driving at higher speeds.

WARNING

Most countries have their own regulations that prescribe a minimum depth of the tread. Always remain within the limits set forth.

Check and balance the wheel when replacing the tyre.

ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

WARNING

The batteries produce a nitrogen-based explosive gas and contain electrolyte, which is composed of sulfuric acid, a poisonous substance and highly caustic.

The following precautions should be always observed:

Wear protective goggles when handling a battery or while working nearby.

Recharge the batteries in a suitably ventilated area.

Battery must be far away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes, etc.).

DO NOT SMOKE during recharging or handling of the battery.

PUT BATTERIES AND ELECTROLYTE BEYOND THE REACH OF CHILDREN.

Do not allow electrolyte to come into contact with body parts to prevent severe burns or permanent injury to eyes.

FIRST AID IN THE EVENT OF CONTACT:

EXTERNAL CONTACT

- Skin: wash with water.
- Eyes: Wash with water jets for 15 minutes and seek immediate medical attention.

SWALLOWING

- Drink large quantities of water or milk, milk of magnesia, beaten egg or vegetal oil. Seek immediate medical attention.

IMPORTANT NOTICE

This battery is sealed. Do not remove the sealing caps in any case, to preserve the equilibrium between the cells and not to affect the battery performance.

The time, the amperage, and the voltage for recharging the battery differ from the standard ones. Recharge the battery as shown in the figures. If the battery is overcharged, the electrolyte level drops significantly. Therefore, during recharging, pay the utmost attention.

NOTE:

As the battery is sealed, the recharging state cannot be checked by measuring the electrolyte density.

Therefore, check battery charging by measuring the voltage on the battery terminals.

Remove:

- Rider and passenger seats, see chapter "Removal of rider and passenger seats, Chapter 4".

Disconnect:



ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

- the battery cables from the terminals Fig. B

IMPORTANT NOTICE

Disconnect the negative cable of the battery "A" first, and then the positive cable "B" Fig. B.

Detach:

- The battery
- Remove the battery rubber tip and slide out the battery "D".

Check:

- The battery charge level

Connect a pocket tester to the battery terminals Fig. C.

Check the battery level as shown in the tables of the following example Fig. D.

NOTE:

The charge status of a battery can be checked by measuring its open-circuit voltage (that is the voltage when the positive terminal is disconnected).

If the open-circuit voltage is equal to/above 12.8 V, recharging is not necessary.

EXAMPLE:

- Open-circuit voltage = 12.0 V
- Charging time = 6.5 hours
- Battery charge amount = 20 -30%

Recharge:

- The battery (see the figure with the suitable charging manner)

IMPORTANT NOTICE

Do not carry out a quick charging of the battery.

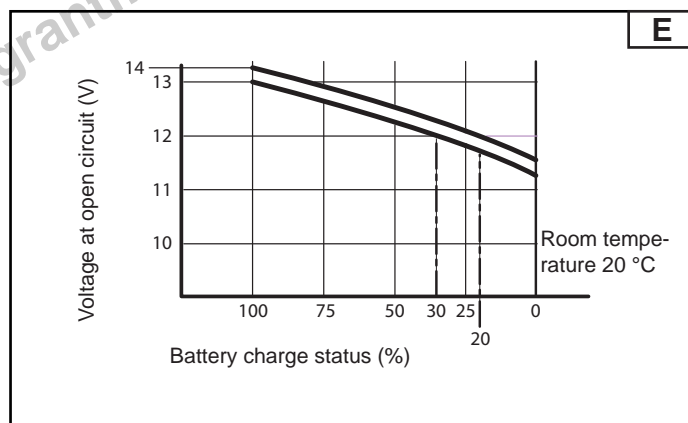
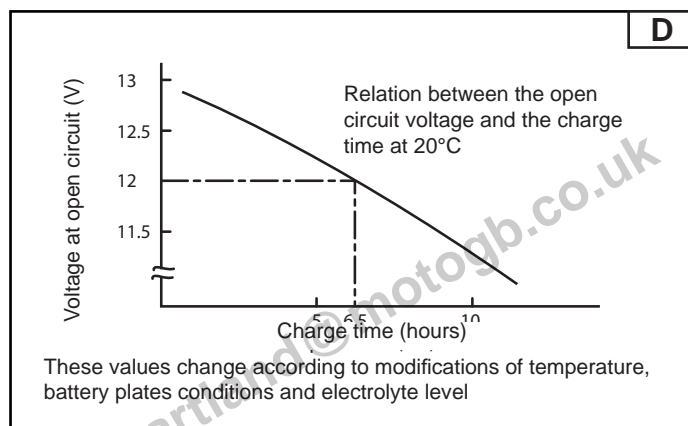
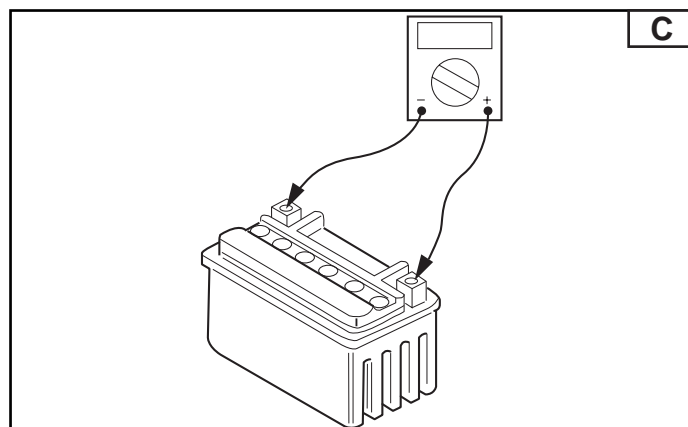
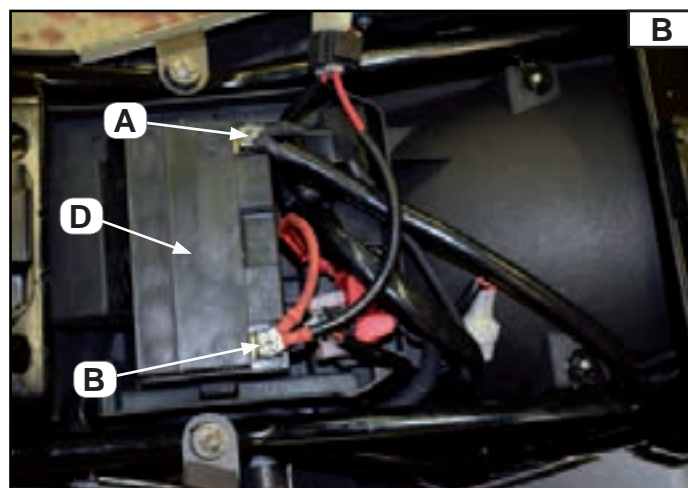
WARNING

- Never remove the caps that seal the battery.
- Do not use fast battery charger as these devices transfer a high-amperage current to the battery at high speed, therefore the battery may overheat and its parts may be damaged.

If it is not possible to adjust the charging current of the battery charger, be careful to prevent the battery overcharge.

For charging, disconnect the battery from the vehicle. (Should be necessary to recharge with the battery mounted on the vehicle, disconnect the negative cable from the battery terminal).

To reduce the risk of sparks, connect the battery charger to the power supply only after having connected the cables to the battery.





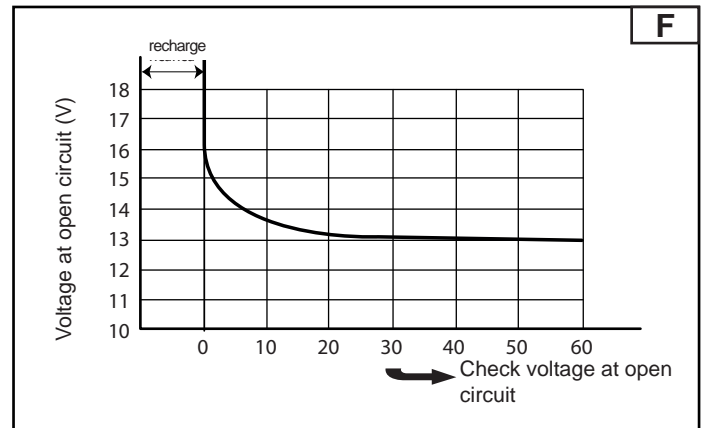
ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

Before removing the battery charger cable clamps from the terminals, turn the charger off.

Make sure the battery charger cable clamps are completely in contact with the battery terminals and are not short circuited. A corroded clamp may generate heat in the contact area and an ineffective clamp spring may cause sparks.

If the battery overheats during the charging process, disconnect the battery charger and allow it to cool down before proceeding again. The batteries that overheat may explode!! As shown in Fig. F, the open-circuit voltage of a battery stabilises 30 minutes after the charging end, before measuring the open-circuit voltage.





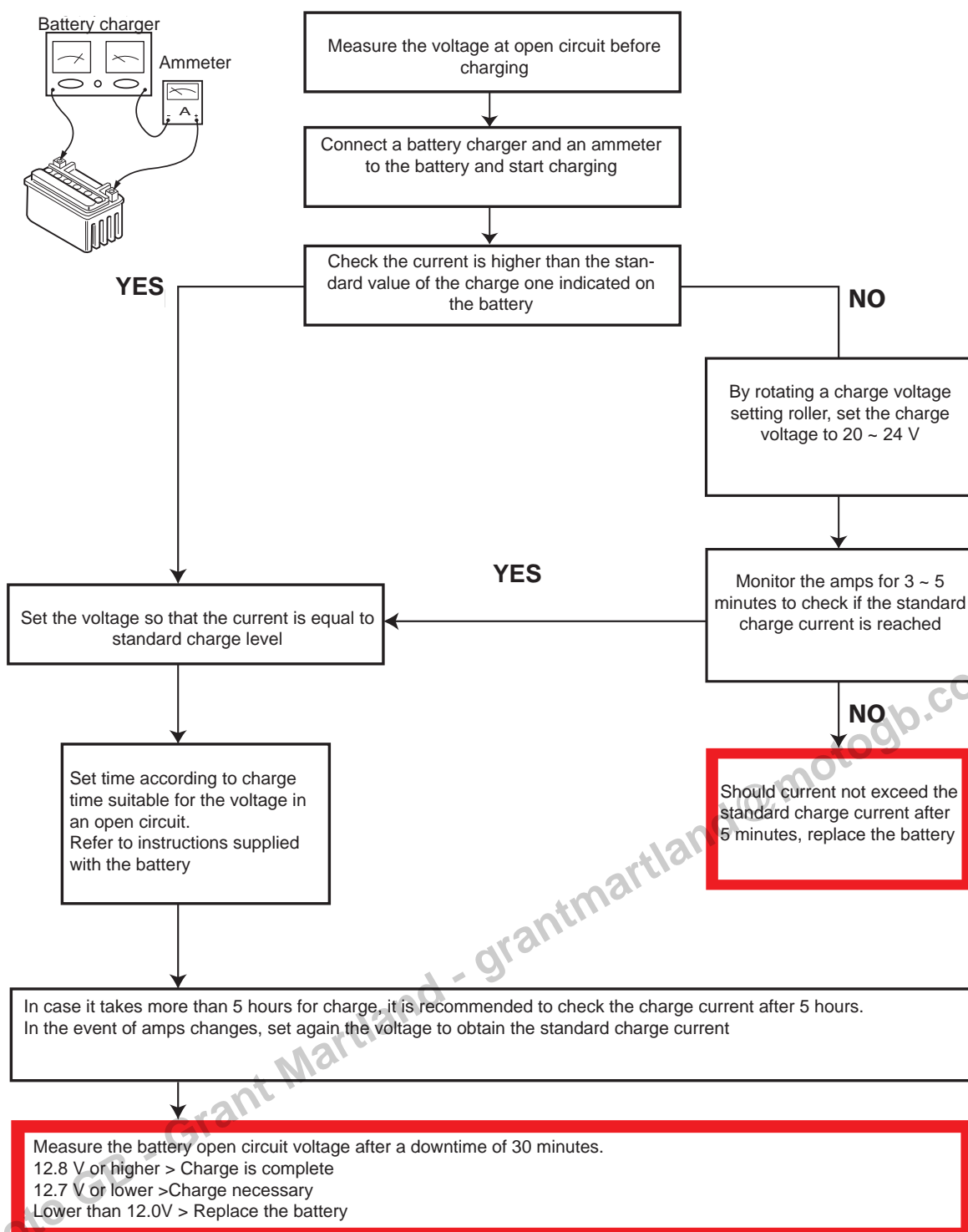
ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

CHARGING METHOD WITH A VARIABLE CURRENT (VOLTAGE) BATTERY CHARGER

NOTE:

- Measure the voltage after 30 minutes from switching off of the appliance.
- Set the charge voltage to 16 ~ 17 V. (Setting it on a lower value, the recharge would not be sufficient.
- By setting it at an overly high value, it would be overcharged).





ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

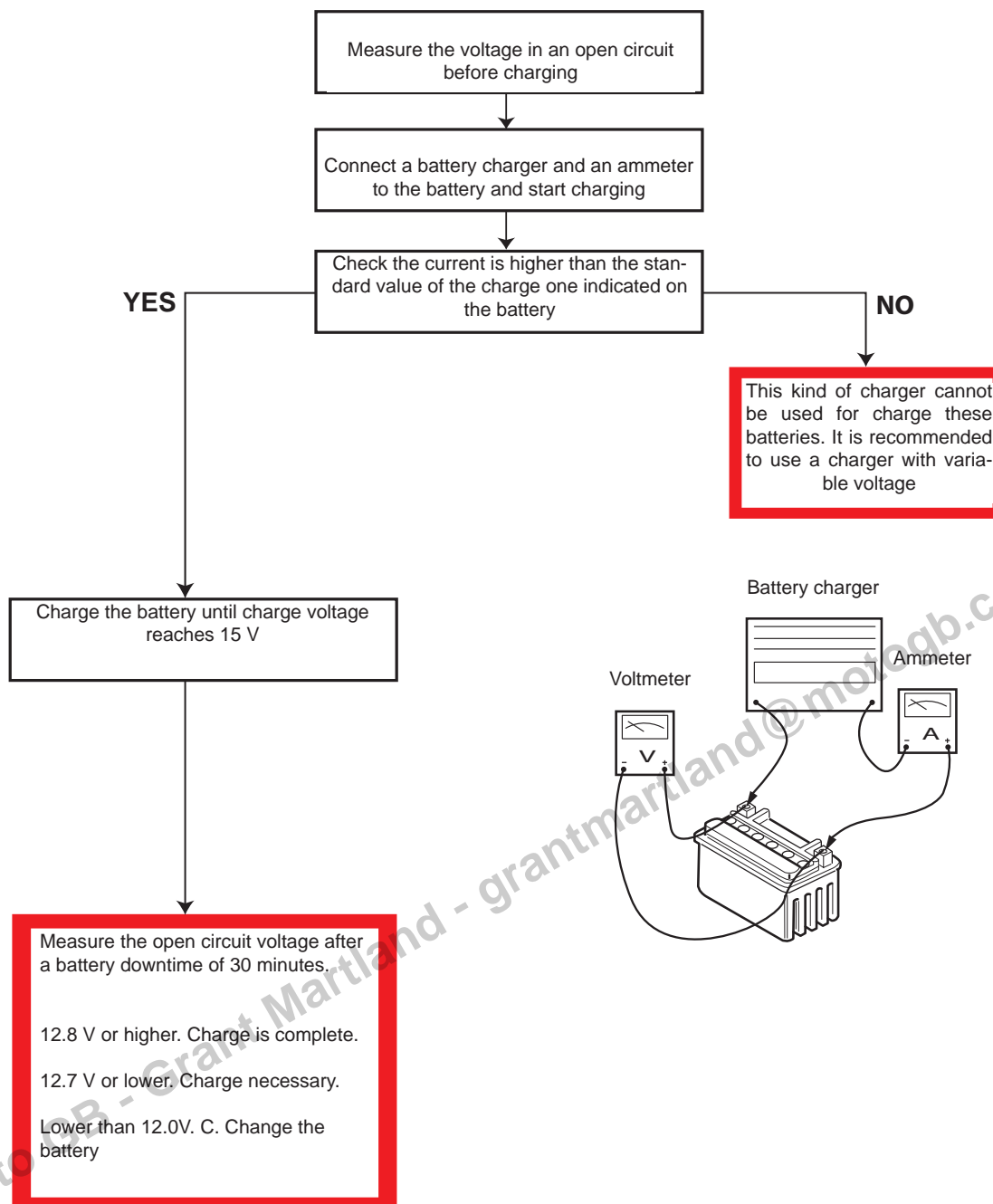
CHARGING METHOD WITH A CONSTANT VOLTAGE BATTERY CHARGER

NOTE:

- Measure the voltage after 30 minutes from switching off of the appliance.
- Set the maximum charging time to max. 20 hours.

NOTE:

- To ensure the highest performance and life of battery, it is advisable to use electronic battery chargers that can supply correct charging voltages and currents, according to the specific requirements of the sealed battery technology.





ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

Battery activation:

Filling Electrolyte

Make sure that the model [A] marked on the electrolyte bottle matches with the model [B] of the battery. The denominations must be the same.

Battery model name: YTX9-BS

WARNING

Every battery is supplied with a bottle of its own electrolyte. The use of an unsuitable container may cause the leakage with the wrong electrolyte, thus shortening the battery life and jeopardizing performance.

Use the electrolyte bottle having the same battery model name, as the volume and specific gravity of the electrolyte change according to the type of battery.

WARNING

Tear the aluminium sealing film [A] of the filling port [B] only immediately before use. Use the apposite container to be sure to insert the correct amount of electrolyte.

IMPORTANT NOTICE

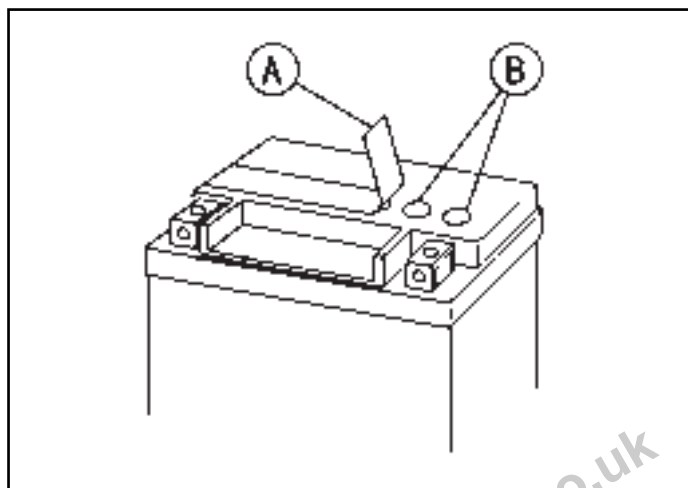
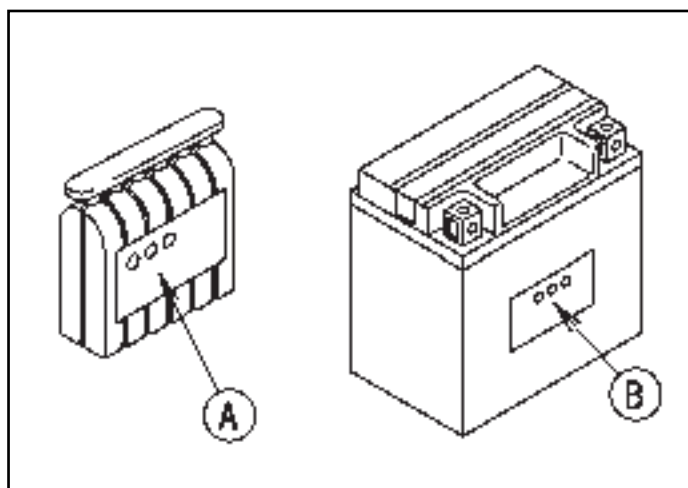
The sulfuric acid present in the battery electrolyte may cause severe burns. To prevent burns from sulfuric acid, before handling the electrolyte wear protective clothing and safety goggles.

If the electrolyte comes into contact with eyes, wash the area with plenty of water and contact a doctor in case of severe burns.

- Place the battery on a flat surface.
- Make sure the sealing film is not frayed, broken or perforated.
- Remove the sealing film.

NOTE:

The battery is vacuum sealed. If air come into the battery through the sealing film, the initial charging may require more time.





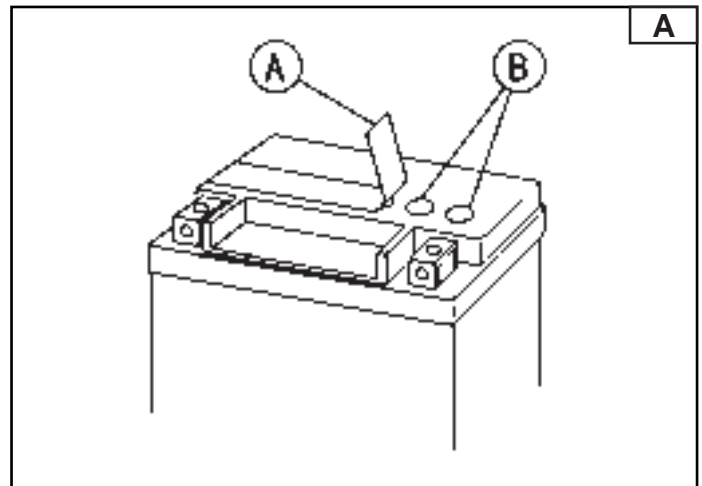
ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

- Take the electrolyte bottle away from vinyl bag.
- Detach the strip of caps [A] from the bottle and store it for seal the battery subsequently, Fig. A.

NOTE:

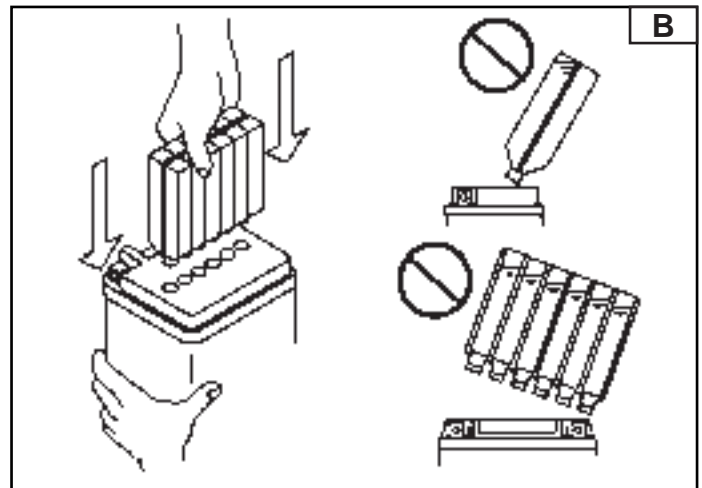
Do not puncture or open the sealed cells [B] of the electrolyte bottle. Do not try to divide the single cells.



- Topple the electrolyte bottle by aligning the six sealed cells [B] to the filling ports of battery. By keeping the bottle in horizontal position, push downwards to break the seals of the six cells. During filling, some air bubbles will go up to each cells Fig. B.

NOTE:

Do not tilt the electrolyte bottle.



- Check the electrolyte flow.
- If there are no air bubbles [A](*) that go up through the filling ports or the cells do not fill completely, tap the bottle [B] some times, Fig. C.

NOTE:

Ba careful to prevent the battery from falling.

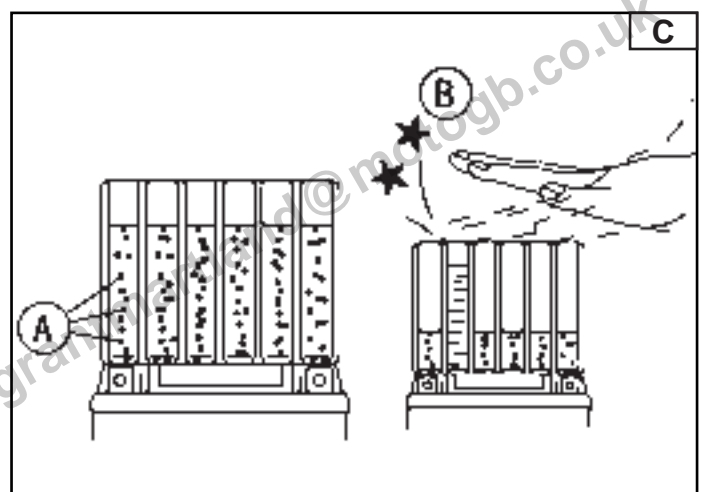
- Leave the bottle in its place. Do not remove the bottle from the battery, since it is necessary that all electrolyte passes into the battery for its proper operation.

WARNING

The removal of the bottle before it is completely empty may reduce the technical life of the battery.

Do no remove the container until it is completely empty.

- After filling, leave the battery to rest with the electrolyte bottle in its place for 20-60 minutes so that the electrolyte can permeate deeply into the plates.
- Check the bottle cells are completely empty and remove the bottle from the battery.





ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

- Place the strip of caps [A] on the filling ports and press strongly with both hands to insert them into the battery Fig. D (without tapping) Fig. E. If properly installed, the cap strip will be aligned with the battery top.

WARNING

After installation of the cap strip, do not remove the caps and do not add water/electrolyte into battery.

NOTE:

Charging immediately after filling may reduce the technical life of the battery.

Initial Charge

The sealed battery just supplied require initial charge.

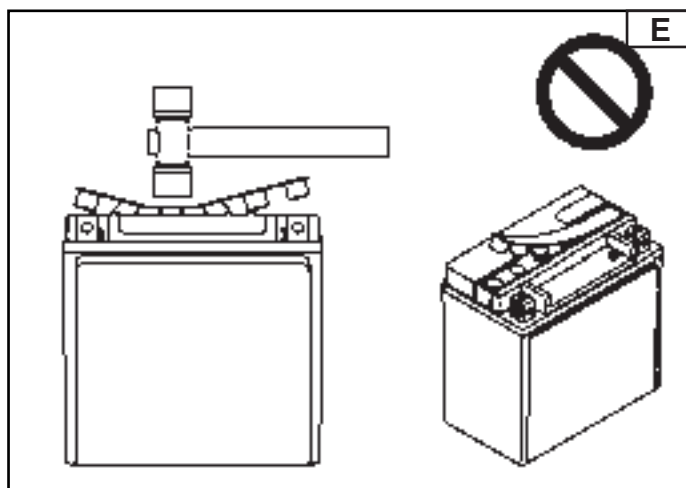
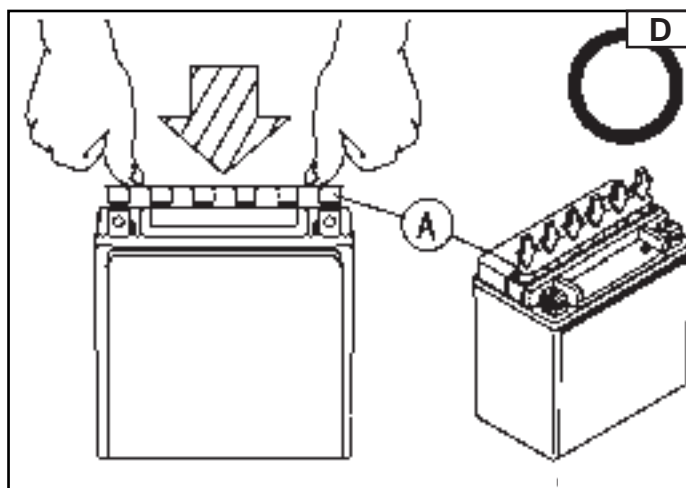
Use a constant voltage battery charger.

Standard charge: $0.9\text{ A} \times 5 - 10$ hours

- After the initial charge, let the battery stand for 30 minutes, and then check the voltage with a voltmeter. (The voltage is temporarily high immediately after charge. For a precise measurement, leave the battery to rest for the fixed period of time).

NOTE:

- The charging values change according to the storage duration, the temperature and the type of battery charger used. If the voltage does not reach at least 12.6V, repeat the charging cycle.
- In order to ensure the biggest battery life and the utmost customer's satisfaction, it is suggested to perform 15s load testing under the three times of ampere hour rate. Recheck the voltage and repeat the charging cycle and load test if the voltage is less than 12.6V. If the voltage is still below 12.6V, the battery is defective.





ELECTRICAL SYSTEM

BATTERY CHECK AND CHARGING

IMPORTANT NOTICE

Bring the start switch to the OFF position.

Install:

- The battery
- Tighten 2 screws "A" fastening the battery bracket.

Connect:

- The battery cables to the terminals.

IMPORTANT NOTICE

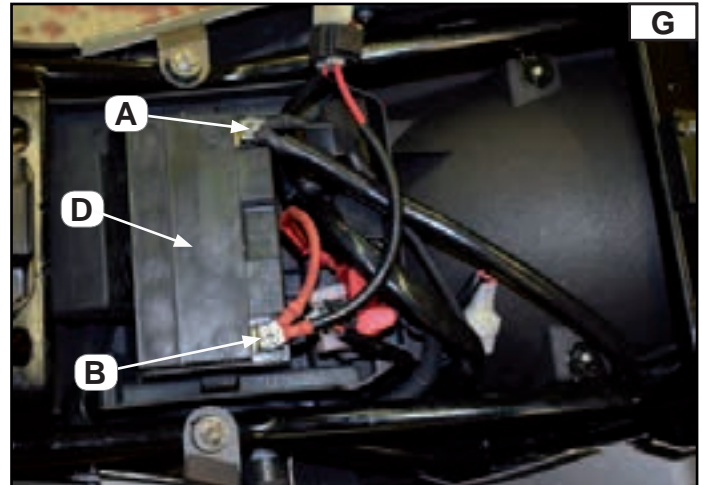
Connect the positive cable of the battery "B" first, and then the negative cable "B" Fig. G.

Check:

- The battery terminals

If it is dirty, remove the dirt using a metal brush.

In case of loose connections, connect them properly.



ELECTRICAL SYSTEM

FUSES

The following procedure applies to all fuses.

IMPORTANT NOTICE

Bring the start switch to the OFF position.

Remove:

- Rider and passenger seats, see chapter “Removal of rider and passenger seats, Chapter 4”.

Check:

- The fuse

Connect the pocket tester to the fuse and check the continuity.

NOTE:

Set the selector switch of the tester on “ Ω x 1”

- If the pocket tester indicates “ ∞ ”, replace the fuse.

Replace:

- The blown fuse.
- Position the main selector switch at “OFF”.
- Install a new fuse with the correct amperage.
- Switch on the switches to check that the electrical circuit functions.
- If the fuse blows immediately, check the electrical circuit.

WARNING

Never use fuses with aN amperage different from those specified. The use of improvised techniques or fuses with different amperages could cause irreversible damage to the electrical system, or cause functioning defects of the lighting system and the ignition system and eventually cause a fire.

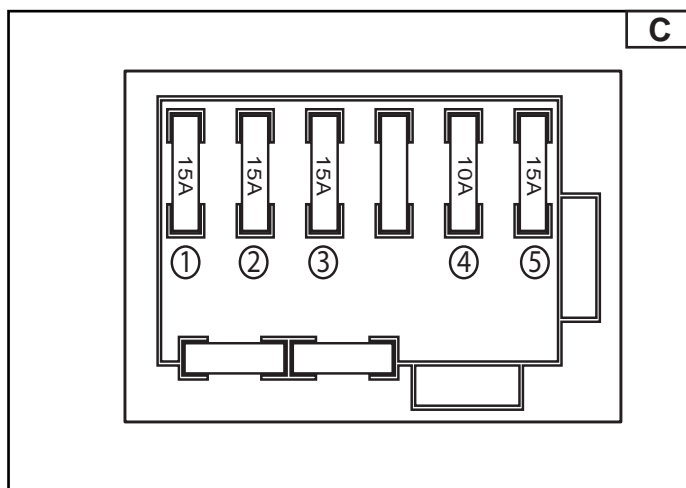
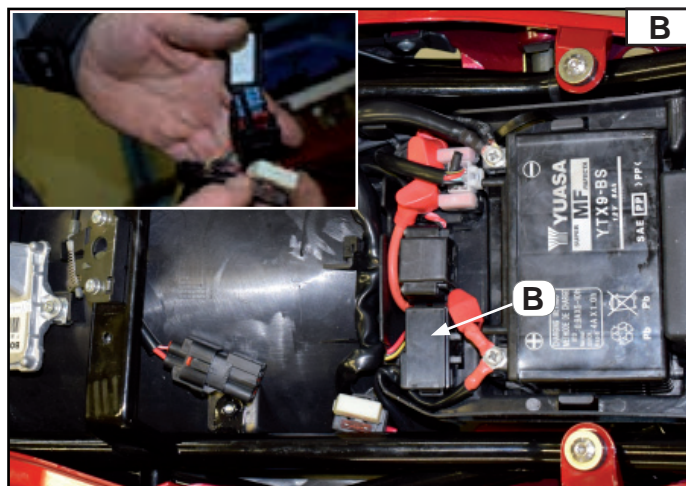
ELECTRICAL SYSTEM

FUSE CHECK

FUSE LEGEND

Refer to Fig. C

1. Petrol pump (15.00 A)
2. Fan (15.00 A)
3. ECU1 (15.00 A)
4. Services (10.00 A)
5. Lights (15.00 A)





ELECTRICAL SYSTEM

REPLACEMENT OF THE FRONT LIGHTS

The following procedure applies only to the front lights.

IMPORTANT NOTICE

Seeing that the projector lamp reaches very high temperatures, it is recommended to not touch it until it has cooled down.

Remove:

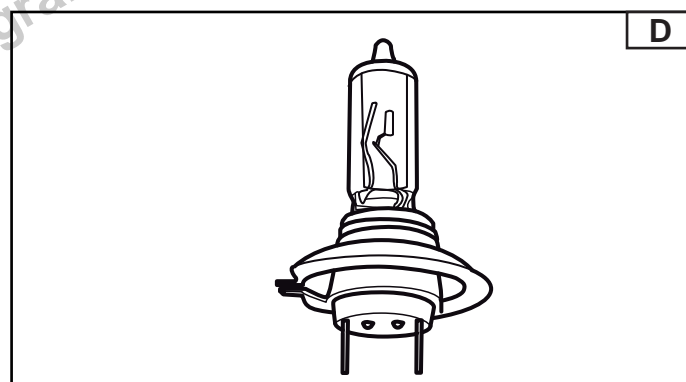
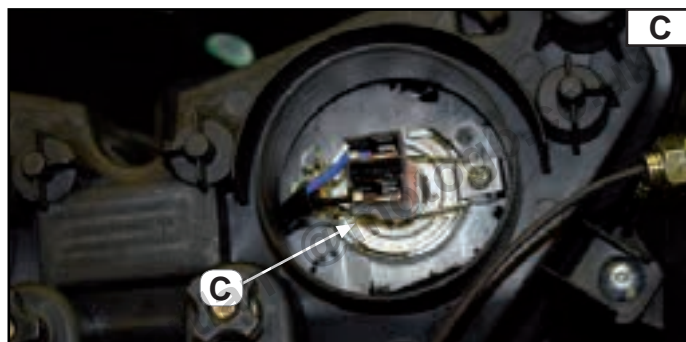
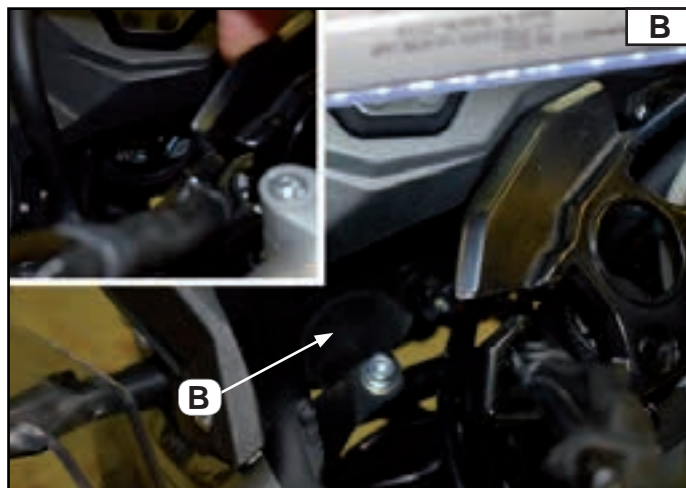
- The two fixing screws "A" of the protection of the ignition block Fig. A
- Lift the protection and gain access to the projector lamps' covers and remove them "B" Fig. B
- Disconnect the lamp from the connectors "C" Fig. C

Install:

- Insert the new lamp

Connect:

- Connect the new lamp to the connectors "C" Fig. C
- Replace the cover
- Position the protection of the ignition block and replace the two locking screws.





ELECTRICAL SYSTEM

REMOVAL OF THE FRONT HEADLIGHT

Place the motorcycle on a flat, level floor.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

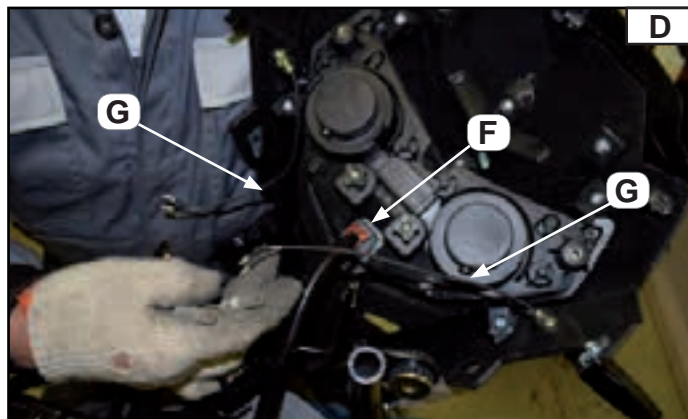
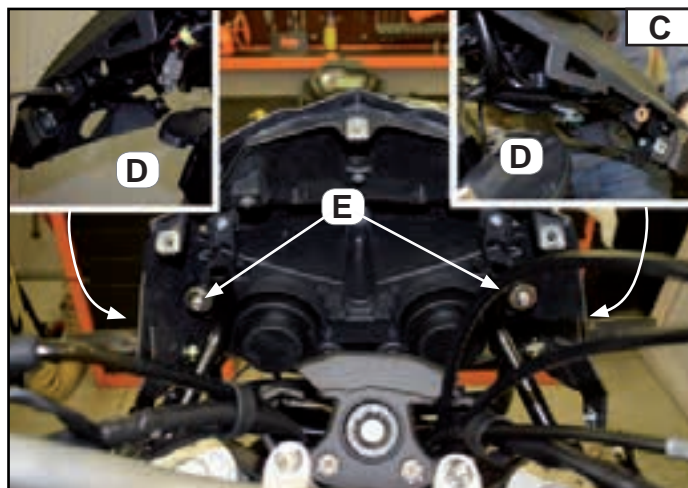
The vehicles' front headlight is a LED light. If it needs to be replaced, carry out the following procedure:

Remove:

- The mobile windscreen, refer to chapter “**Removal of mobile windscreen, Chapter 4**”.
- Front fairing, see chapter “**Removal of front fairing, Chapter 4**”.
- Instrumentation panel plate, refer to chapter “**Removal of the instrumentation panel plate, Chapter 4**”.
- side locking screws “D”
- front locking screws “E” Fig. C.

Disconnect:

- the connector of the LED headlight “F”
- the cables of the right and left front indicator lights “G”. Fig. D.





ELECTRICAL SYSTEM

INSTALLATION OF THE HEADLIGHT

Place the motorcycle on a flat, level floor.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

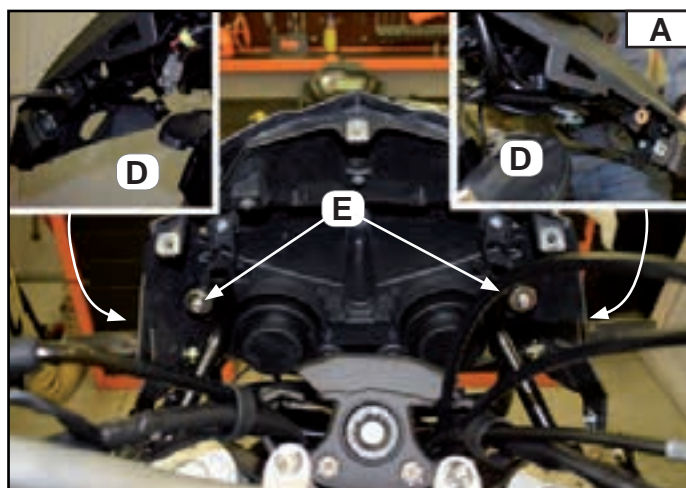
Install:

- the side locking screws "D" Fig. A.
- the front locking screws "E" Fig. A.

to the following torque:



Torque 10 N*m



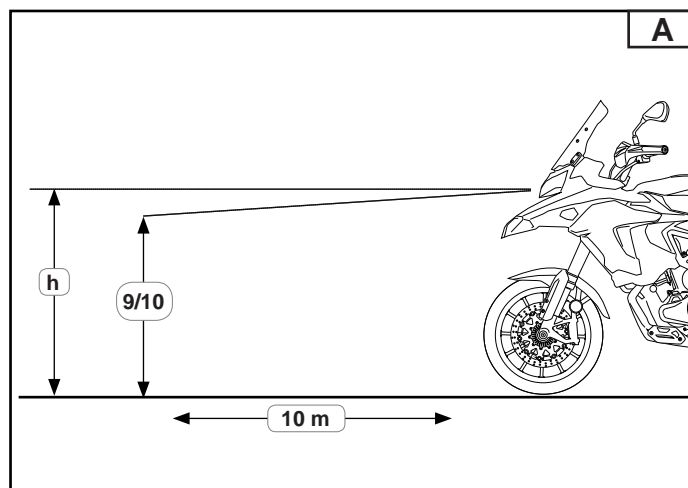


ELECTRICAL SYSTEM

ADJUSTMENT OF HEADLIGHT

To carry out the correct adjustment of the two headlights' luminous beams:

- Position the vehicle approx. 10 metres distance from a vertical wall on a perfectly flat piece of ground Fig. A
- Sit on the motorcycle in the riding position.
- Check that the upper limit of the luminous beams projected onto the vertical wall is less than approx. 1/10 in respect of horizontal axis of the headlights.
- If the luminous beam does not conform to this indication, carry out the adjustment until the luminous beams are in the correct position.

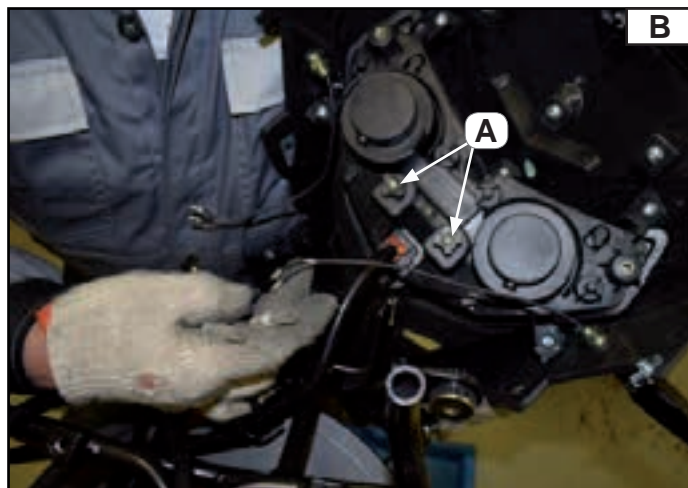


Adjust:

- The light beams of the two headlights by adjusting the register screw "A" positioned down below on the right and left side of the rear of the projector lamps Fig. B

Rotating the screw in an anticlockwise direction, the luminous beam is raised.

Rotating the screw in a clockwise direction, the luminous beam is lowered.





ELECTRICAL SYSTEM

SUBSTITUTION OF THE REAR LED LIGHT

Place the motorcycle on a flat, level floor.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

To substitute the rear LED light, refer to “Chapter 4” Fairings, paragraph “Removal of the rear light”.

ELECTRICAL SYSTEM

SUBSTITUTION OF THE REAR INDICATOR LIGHTS

Place the motorcycle on a flat, level floor.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

NOTE:

The following procedure is applicable to both rear indicators.

Remove:

- Rider and passenger seats, refer to chapter “**Removal of rider and passenger seats, Chapter 4**”.
- Rear handles, refer to chapter “**Removal of the rear handles, Chapter 4**”.
- Side fairings, refer to chapter “**Removal of the side fairings, Chapter 4**”.

Disconnect:

- the indicator cables
- Remove the nuts of the rear indicator supports (E) Fig. D
- Remove the indicators and substitute them with the new ones.

Install:

Proceed in the reverse order of removal.





ELECTRICAL SYSTEM

SUBSTITUTION OF THE FRONT INDICATORS

Place the motorcycle on a flat, level floor.

IMPORTANT NOTICE

Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- Mobile windscreen, refer to chapter “**Removal of mobile windscreen, Chapter 4**”.
- Front fairing, refer to chapter “**Removal of front fairing, Chapter 4**”.
- Lighting unit, refer to chapter “**Removal of the lighting unit, Chapter 4**”.

NOTE:

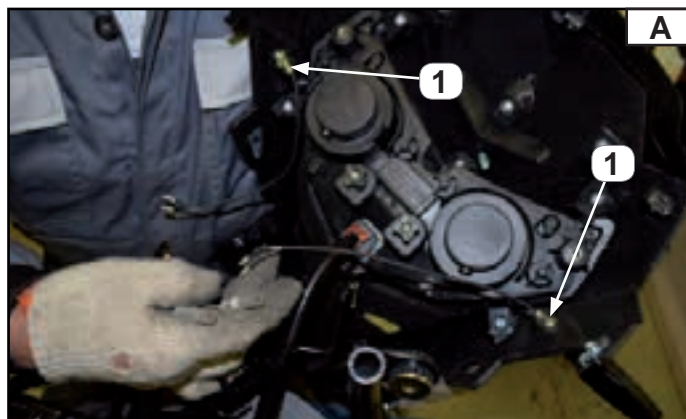
The following procedure is applicable to both front indicators

Remove:

- the support of the front indicators (1) Fig. A
- Remove the indicators.

Install:

- Proceed using the opposite order to removal.





ELECTRICAL SYSTEM

SUBSTITUTION OF THE IGNITION BLOCK

Remove:

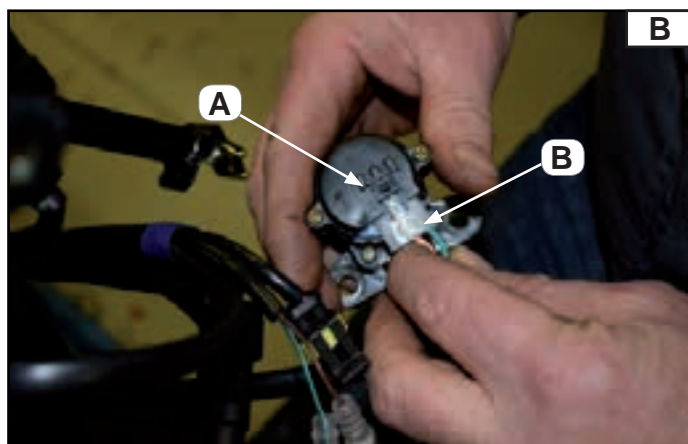
- Using a jointed hexagonal spanner, remove the ignition block "A" positioned in front of the steering head Fig. A
- Remove the ignition block and disconnect the connector "B" Fig. B

Install:

- Proceed using the opposite order to removal.

NOTE:

Each time a new ignition block is installed, it is necessary to carry out the mapping of the new block.





FRAME

4

CHAPTER 4

FRAME

FRONT WHEEL AND BRAKE DISCS.....	5
FRONT WHEEL REMOVAL.....	5
REMOVAL/INSTALLATION OF BRAKE DISCS	6
CHECK OF BRAKE DISCS	8
WHEEL AXLE CHECK.....	9
CHECK/REPLACEMENT OF WHEEL BEARINGS	10
FRONT WHEEL INSTALLATION	11
REAR WHEEL AND BRAKE DISC	12
REAR WHEEL REMOVAL	12
REMOVAL OF THE REAR DISC BRAKE, CROWN WHEEL AND PHONIC WHEEL	15
WHEEL AXLE CHECK.....	16
CHECK/REPLACEMENT OF WHEEL BEARINGS	17
SPROCKET CHECK AND REPLACEMENT	18
INSTALLATION OF THE DISC BRAKE	19
BACK TYRE INSTALLATION.....	20
FRONT AND REAR BRAKES	21
REMOVAL AND INSTALLATION OF FRONT BRAKE PADS	21
REMOVAL AND INSTALLATION OF REAR BRAKE PADS.....	22
FRONT BRAKE PUMP REMOVAL.....	23
REAR BRAKE PUMP REMOVAL	26
FRONT BRAKE PUMP INSTALLATION	28
REAR BRAKE PUMP INSTALLATION	29
ABS ANTI-LOCK BRAKING SYSTEM.....	30
LOCATION OF THE COMPONENTS	30
ROTATION SENSOR CHECK	32
CHECK OF THE PHONIC WHEEL AND ABS OF THE FRONT AND REAR WHEEL.....	33
PRECAUTIONS	34
REMOVAL OF THE ABS HYDRAULIC UNIT	36
INSTALLATION OF THE ABS HYDRAULIC UNIT.....	37
REMOVAL OF THE ABS ROTATION SENSORS – FRONT/REAR WHEEL.....	38
FRONT BRAKE CALLIPER TIGHTNESS	39
REAR BRAKE CALLIPER	40
CHECK THE FRONT AND REAR CALLIPERS.....	41
FRONT BRAKE CALLIPER INSTALLATION.....	42
REAR BRAKE CALLIPER INSTALLATION	44
FRONT FORK.....	45
FRONT FORK STEM REMOVAL	45
FRONT FORK STEM DISASSEMBLY.....	48
FRONT FORK STEM INSPECTION.....	51
FRONT FORK STEM ASSEMBLY	52
FRONT FORK STEM FITTING.....	55
HANDLEBAR.....	56
HANDLEBAR REMOVAL.....	56
HANDLEBAR INSPECTION	60
HANDLEBAR INSTALLATION.....	61
STEERING HEAD.....	62
REMOVAL OF THE TOP AND BOTTOM STEERING BASE.....	62
TOP AND BOTTOM STEERING BASE INSPECTION	64
TOP AND BOTTOM STEERING BASE FITTING	65
REAR SHOCK ABSORBER.....	66
REAR SHOCK ABSORBER REMOVAL	66
REAR SHOCK ABSORBER CHECK.....	69
REAR SHOCK ABSORBER FITTING	70



CHAPTER 4

TRANSMISSION CHAIN AND SWINGING ARM	71
TRANSMISSION CHAIN REMOVAL	71
REMOVAL OF THE SWINGING ARM	73
FRAME	74
INSTALLATION/REMOVAL OF THE FRAME PARTS	74
LEFT/RIGHT ENGINE PROTECTION INSTALLATION.....	76
REMOVAL OF THE LEFT/RIGHT ENGINE PROTECTION	77
REMOVAL OF THE FRONT FRAME/WINDSCREEN SUPPORT	78
INSTALLATION OF THE FRONT FRAME/WINDSCREEN SUPPORT	79
REMOVAL/INSTALLATION OF REAR FRAME PARTS	80
REMOVAL OF THE REAR FRAME	82
REAR FRAME FITTING	83
REMOVAL OF SIDE BAG FRAME	84
INSTALLATION OF THE SIDE BAGS SUPPORT FRAME	85
NUMBER PLATE HOLDER	86
REMOVAL OF THE NUMBER PLATE HOLDER	87
INSTALLATION OF THE NUMBER PLATE HOLDER	88
CYCLING	89
INSTALLATION OF THE STAND / FOOTRESTS.....	89
STAND/FOOTRESTS	90
REMOVAL OF THE SIDE STAND	91
INSTALLATION OF THE SIDE STAND	92
REMOVAL OF THE REAR FOOTREST SUPPORT	93
INSTALLATION OF THE REAR FOOTREST SUPPORT	94
REMOVAL OF THE RIGHT/LEFT REAR FOOTREST	95
INSTALLATION OF THE LEFT/RIGHT REAR FOOTRESTS	96
RIGHT FRONT FOOTREST REMOVAL.....	97
RIGHT FRONT FOOTREST FITTING	98
LEFT FRONT FOOTREST REMOVAL	99
LEFT FRONT FOOTREST INSTALLATION	100
REMOVAL OF THE GEAR LEVER.....	101
INSTALLATION OF THE GEARCHANGE LEVER	102
EXHAUST SYSTEM.....	103
EXHAUST ASSEMBLY	103
EXHAUST ASSEMBLY REMOVAL	104
EXHAUST INSTALLATION	106
FRONT MUD GUARD	107
FRONT MUD GUARD REMOVAL	108
REAR MUD GUARD REMOVAL.....	111
REAR MUD GUARD INSTALLATION	112
REMOVAL OF THE RIDER SEAT AND PASSENGER SEAT	115
INSTALLATION OF THE RIDER SEAT AND PASSENGER SEAT	116
FRONT FAIRING	117
REMOVAL OF THE FRONT FAIRING	118
FRONT HEADLIGHT AND WINDSCREEN	120
REMOVAL OF MOVABLE WINDSCREEN	122
INSTALLATION OF THE MOBILE HEADLIGHT FAIRING.....	123
REMOVAL OF THE HEADLIGHT UNIT	126
INSTALLATION OF THE HEADLIGHT UNIT	127
TANK COVER.....	128
REMOVAL OF THE FUEL TANK COVER	129
INSTALLATION OF THE FUEL TANK COVER	130
REMOVAL OF FUEL TANK	131
REMOVAL OF FUEL TANK	132
TANK FITTING.....	133

CHAPTER 4

TANK.....	134
TANK PARTS	134
REMOVAL OF THE TANK CAP SUPPORT	135
INSTALLATION OF THE TANK CAP SUPPORT	136
REMOVAL OF THE TANK PUMP	137
INSTALLATION OF THE TANK PUMP	138
REMOVAL OF THE TANK FUEL LEVEL SENSOR	139
INSTALLATION OF THE TANK FUEL LEVEL SENSOR	140
AIR FILTER	141
AIR FILTER PARTS	141
REMOVAL OF THE AIR FILTER	142
INSTALLATION OF THE AIR FILTER	143
INSTALLATION OF THE AIR FILTER BOX	145
SIDE FAIRINGS	146
REMOVAL OF THE SIDE FAIRINGS	147
INSTALLATION OF THE SIDE FAIRINGS	148
UPPER TAIL FAIRING	149
TAILPIECE REMOVAL	150
REMOVAL OF THE REAR PASSENGER HANDLES	152
INSTALLATION OF THE REAR HANDLES	153
REMOVAL OF THE REAR LIGHT	154
INSTALLATION OF THE REAR LIGHTS	156
CHAIN PINION COVER	157
REMOVAL OF THE CHAIN PINION COVER	158
INSTALLATION OF THE CHAIN PINION COVER	159



FRONT WHEEL AND BRAKE DISCS

FRONT WHEEL REMOVAL

Park:

- The bike on a level surface

NOTE:

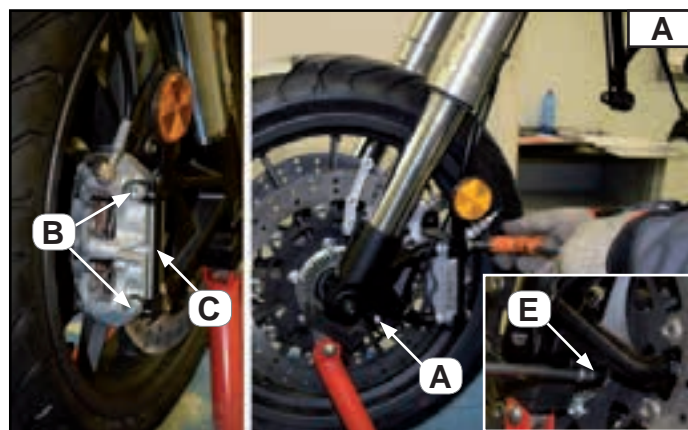
Place the bike on a suitable support so that the front wheel is raised.

Remove:

- The screw (E)
- the ABS sensor "A"
- the screws "B"
- tube guide bracket (C) Fig. A

Detach:

- the left front calliper



NOTE:

Repeat the above-mentioned procedure for the opposite front brake calliper.

NOTE:

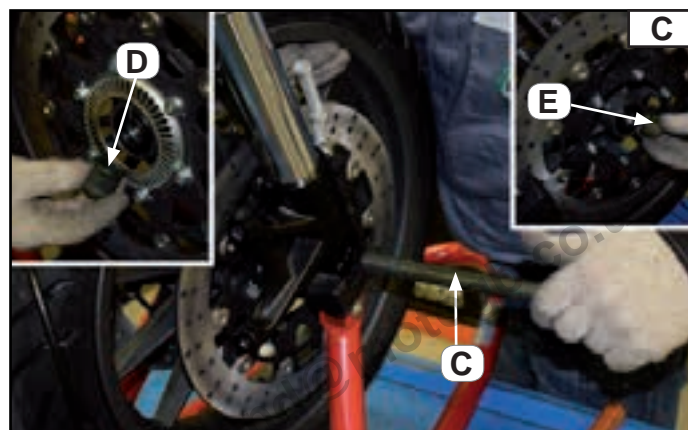
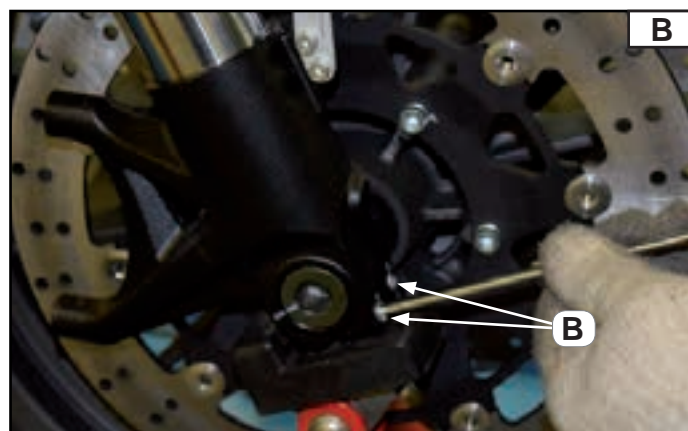
Do not pull the front brake lever while removing the callipers.

Loosen:

- the setscrews "B" Fig. B

Remove:

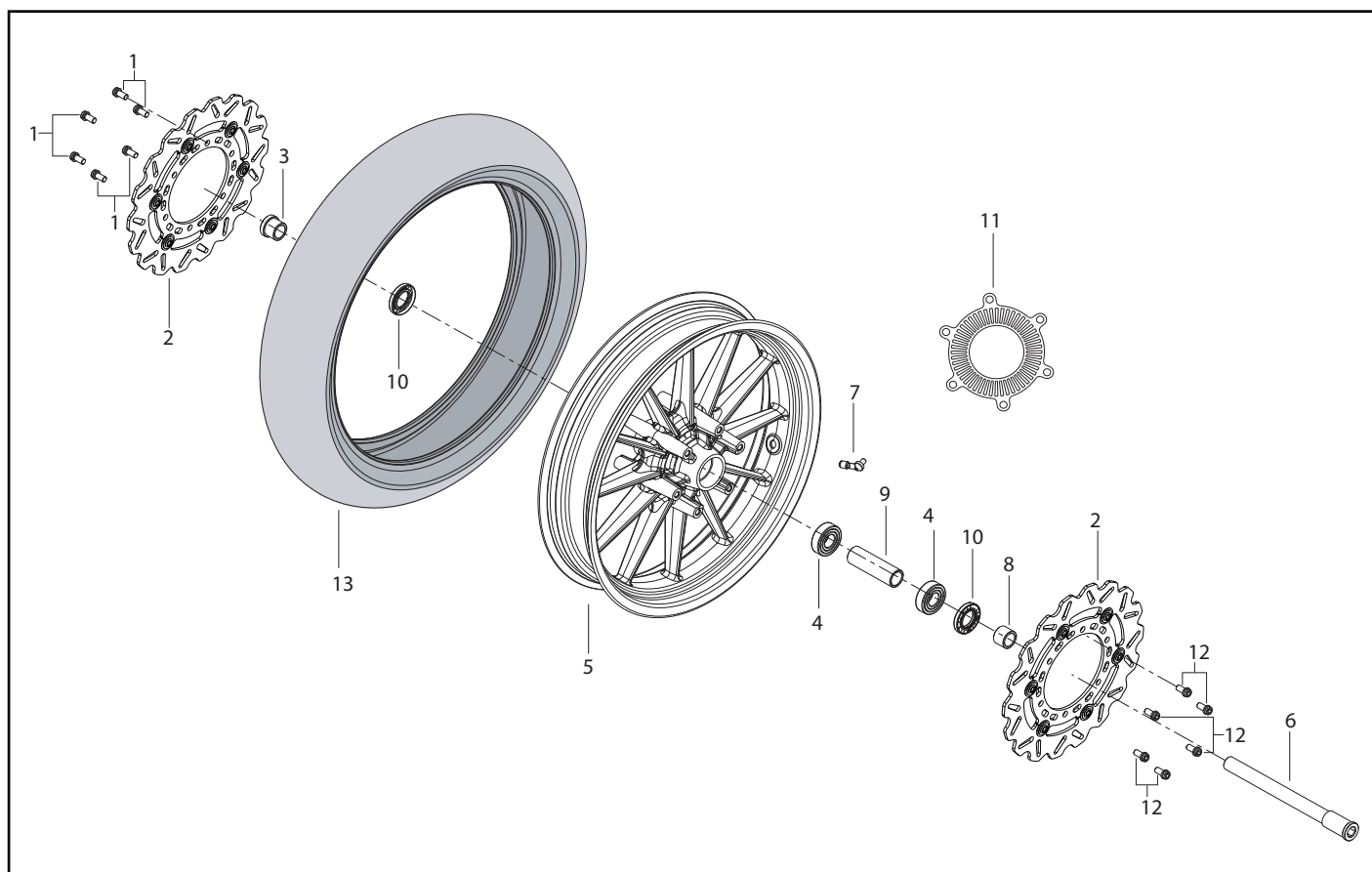
- the front wheel pin "C" Fig. C
- front wheel
- The left shim "D" Fig. C
- The spacer "E", Fig. C





FRONT WHEEL AND BRAKE DISCS

REMOVAL/INSTALLATION OF BRAKE DISCS



Pos.	Description	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SCREW				
2	FRONT BRAKE DISC				
3	LEFT SHIM				
4	BEARING				
5	FRONT WHEEL RIM (GREY)				
6	FRONT WHEEL AXLE				
7	VALVE				
8	SHIM				
9	INTERNAL SHIM				
10	OIL SEAL				
11	FRONT WHEEL ABS SENSOR				
12	SCREW				
13	FRONT TIRE				



FRONT WHEEL AND BRAKE DISCS

REMOVAL/INSTALLATION OF BRAKE DISCS

Remove:

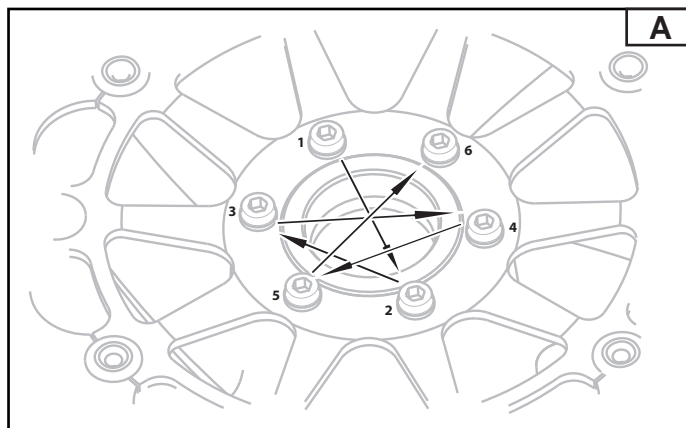
- front wheel, refer to chapter “**Removal of the front wheel**”
- brake callipers, refer to chapter “**Removal of the front brake callipers**”
- screws (12*)
- brake disc (2*)

Install:

- left front brake disc (2*)
- and screws (12*)

NOTE:

Repeat the above-mentioned procedure for the opposite front disc brake.



The procedure below applies to both brake discs.

NOTE:

Tighten the bolts of the brake disc in successive passes, operating in a criss-cross sequence - Fig. A.

- Tighten the torque:



Torque 22N*m

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.

FRONT WHEEL AND BRAKE DISCS

CHECK OF BRAKE DISCS

The procedure below applies to all **brake** discs.

Check:

- the brake disc

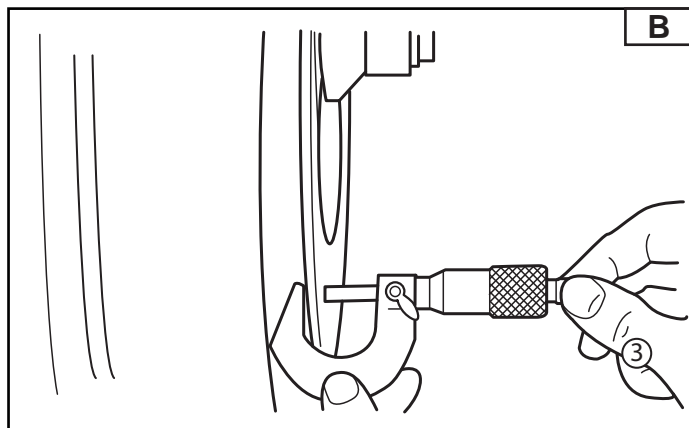
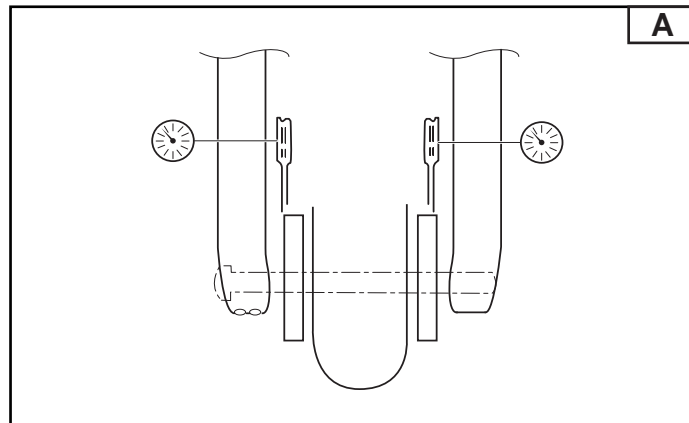
If there is any damage/abrasion, replace.

Measure:

- The deformation of the brake disc.

Substitute the brake disc if it is outside the specification.

- Place the bike on a suitable support so that the wheel is raised.
- Before measuring the bending of the front brake disc, turn the handlebar right and then left to make sure that the front wheel stops.
- To remove the disc brake, refer to chapter “**Removal of the disc brake**”.
- Keep the gauge at a right angle to the surface of the brake disc.
- Measure the bending 1.5 mm (0.05 in) under the edge of the brake disc Fig. A.



Brake disc	Deformation limit
Front	0.1 mm
Rear	0.15 mm

Measure:

- Brake disc thickness.
- Measure the thickness of the brake disc at various different points - Fig. B.
- If outside specifications, replace.



FRONT WHEEL AND BRAKE DISCS

WHEEL AXLE CHECK

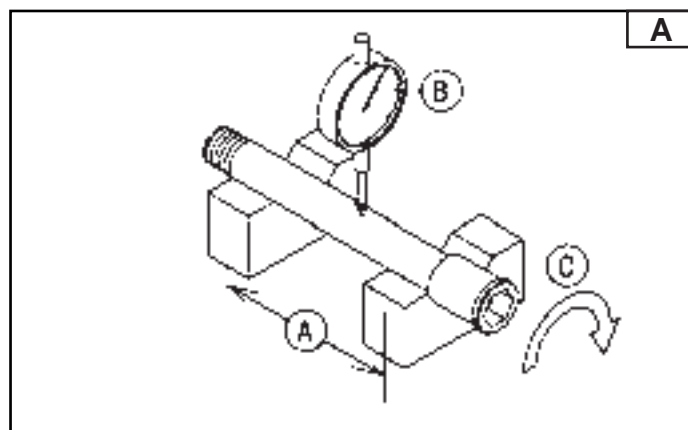
Carry out a visual check of the front wheel and rear wheel axle bolt to check for damage.

Substitute the wheel axle bolt if it is damaged or bent.

Check:

- Wheel axle.
- Position the wheel axle on two V-blocks approx. 100 mm apart (A) and position a comparator (B) on the wheel axle at a point halfway between the blocks – Fig. A.
- Rotate the wheel axle (C) to measure the lack of centring.

The difference between the upper and lower detections of the comparator represents the measurement of the misalignment. Substitute the wheel axle, if the misalignment exceeds the service limit.



Wheel shaft runout /100 mm	
STANDARD	LIT 0.1 mm or less
Service limit	LIT 0.2 mm

IMPORTANT NOTICE

**Do not try to straighten the wheel axle if it is warped.
If there is any warping, replace.**

Check:

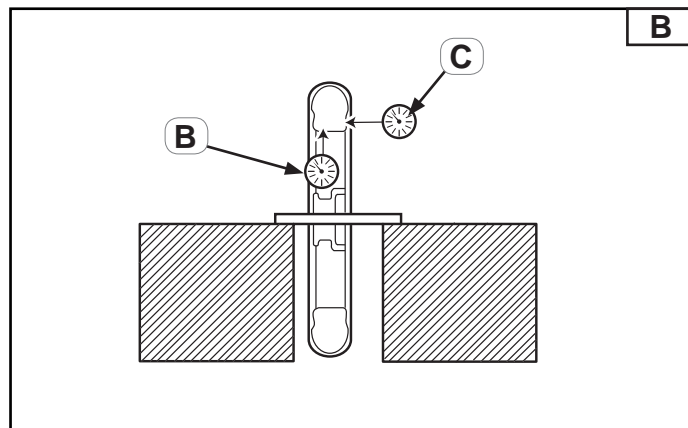
- Tyre
- Front wheel

If there is any warping, replace.

Measure:

- The radial eccentricity of the wheel "B" Fig. B.
- The side eccentricity of the wheel "C" Fig. B.

If the specified limit is exceeded, replace.



Eccentricity	Limit
Radial(B)	0.05 mm
Side(C)	0.05 mm

FRONT WHEEL AND BRAKE DISCS

CHECK/REPLACEMENT OF WHEEL BEARINGS

Check:

- Wheel bearings

If the front wheel turns irregularly or is loose, replace the wheel bearings.

Replace:

- Wheel bearings

Remove the wheel bearings "A" using a general bearing extractor Fig. B.

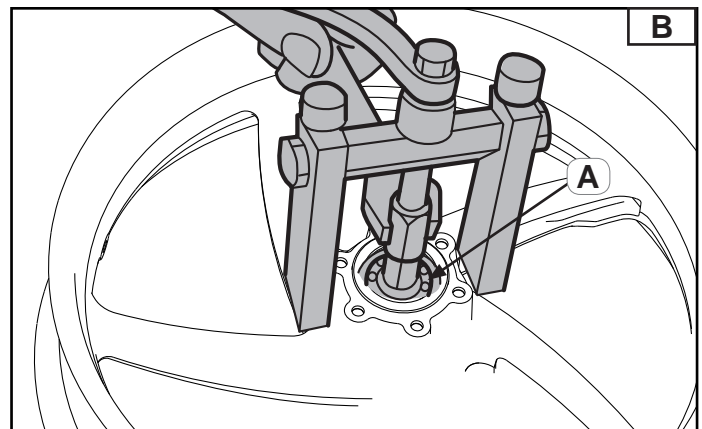
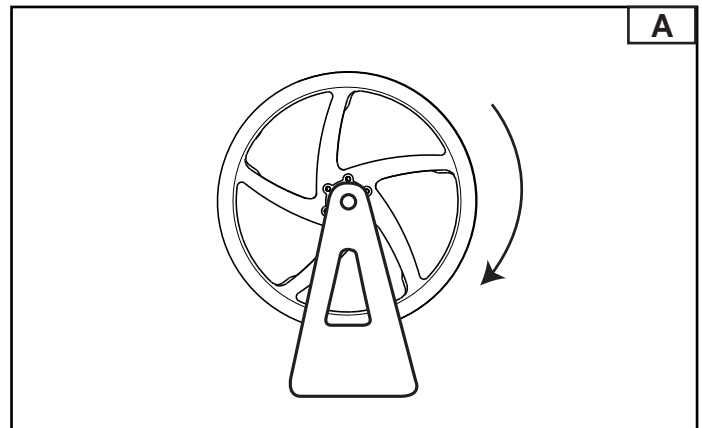
Fit the new wheel bearing, following the removal steps in reverse order.

IMPORTANT NOTICE

When inserting the bearings do not touch the internal ring (B) or the ball bearings of the wheel bearings. Contact must be made only by the external ring.

NOTE:

Use a wrench that adapts to the diameter of the external edge of the wheel bearing.





FRONT WHEEL AND BRAKE DISCS

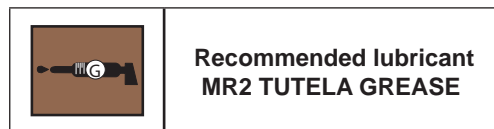
FRONT WHEEL INSTALLATION

Install:

- the wheel between the two tubes of the fork Fig. A
- the bush (8*) – left side Fig. A
- the bush (3*) – right side Fig. A

Tighten the torque:

- wheel axle (6*)



Torque 60 N*m

- Set screws "B" Fig. B



Torque 8 N*m

IMPORTANT NOTICE

Before tightening the front wheel axle bolt, push hard on the handlebars to check that the front fork returns to the stationary position in a smooth way.

Install:

- right brake calliper Fig. C
- tube guide bracket Fig. C
- screw (E) Fig. C
- ABS sensor (A) Fig. C
- screws (B) Fig. C

Tighten the torque:



Torque 50 N*m

NOTE:

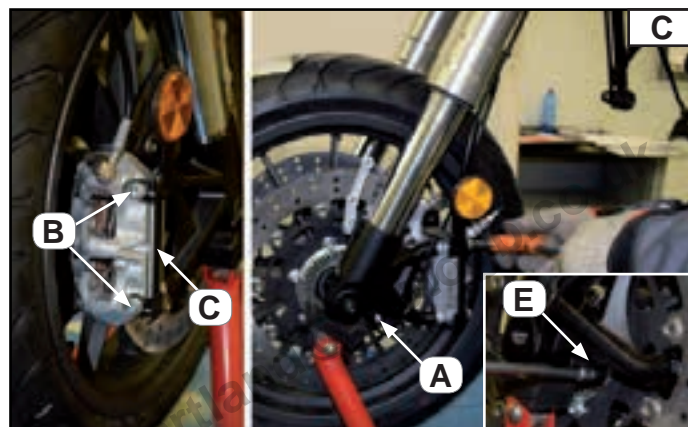
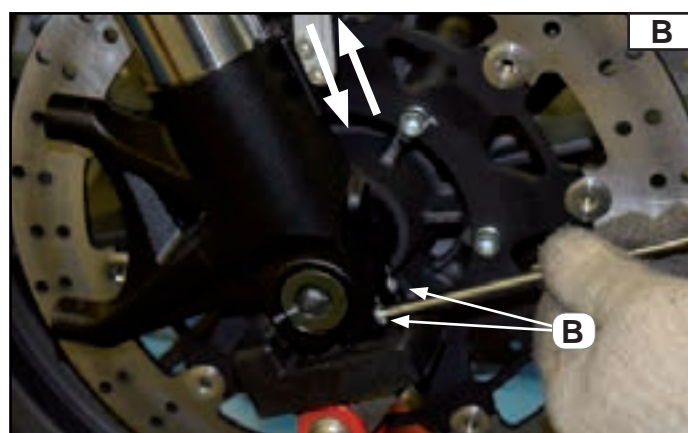
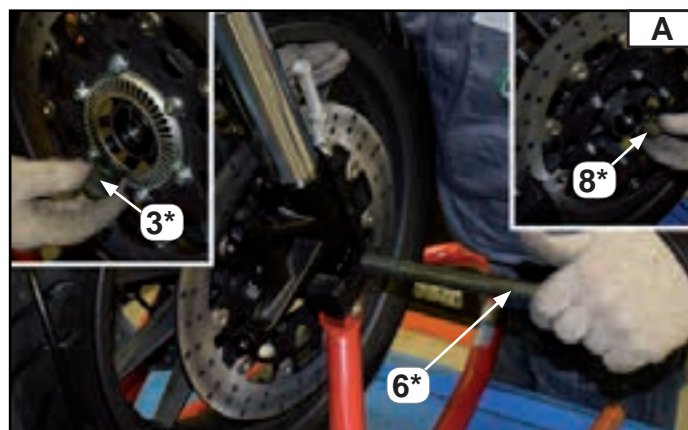
Repeat the above-mentioned procedure for the opposite brake calliper.

Ensure that there is enough space between the brake pads before fitting the callipers on the relative brake discs.

Check that the travel of the flexible brake hose is correct.

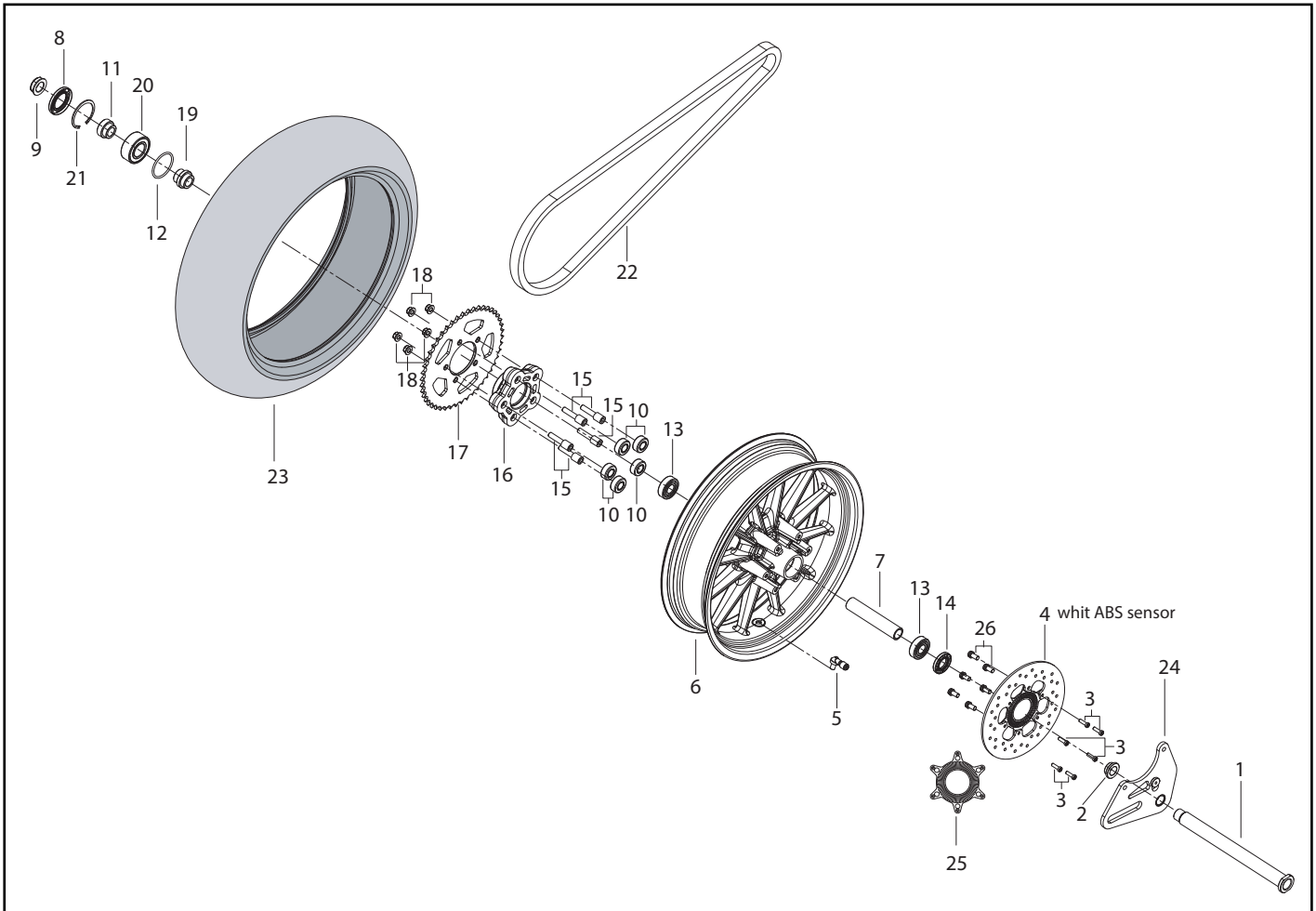
NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.



REAR WHEEL AND BRAKE DISC

REAR WHEEL REMOVAL



Pos.	Description	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	REAR WHEEL AXLE				
2	BUSHING				
3	SCREW				
4	REAR BRAKE DISC				
5	VALVE				
6	REAR WHEEL RIM (BLACK)				
7	INTERNAL SHIM				
8	DUST COVER				
9	NUT				
10	FLEXIBLE COUPLING				
11	SHIM				
12	O-RING				
13	BEARING				
14	OIL SEAL				
15	SCREW				
16	SPROCKET SUPPORT FLANGE				
17	CROWN (Z42)				
18	NUT M10				
19	SHIM				



REAR WHEEL AND BRAKE DISC

REAR WHEEL REMOVAL

Pos.	Description	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
20	BEARING				
21	ELASTIC RING				
22	TRANSMISSION CHAIN				
23	REAR TYRE (160/60-R17)				
24	CALLIPER HOLDER PLATE				
25	REAR WHEEL ABS SENSOR				
26	SCREW				

REAR WHEEL AND BRAKE DISC

REAR WHEEL REMOVAL

Park:

- The bike on a level surface

NOTE:

Place the bike on a suitable support so that the rear wheel is raised.

Remove:

- the fixing screws (A) of the brake calliper Fig. A

Detach:

- the brake calliper.

Remove:

- the screws (C) Fig. B
- the phonic wheel sensor (B) Fig. B
- The nut (21*)
- the pin (1*)
- the register slide (D) Fig. C

NOTE:

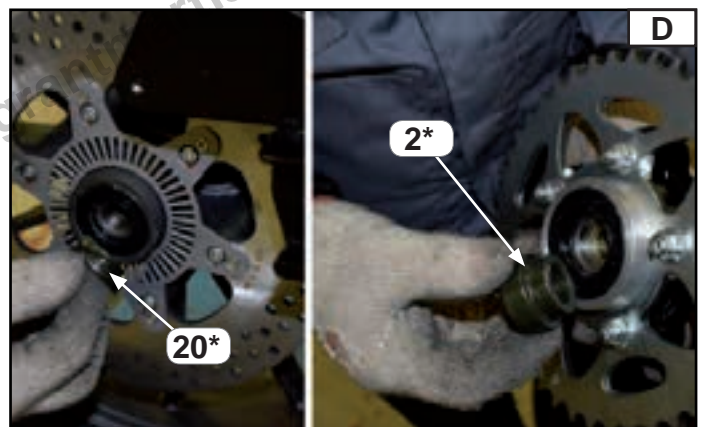
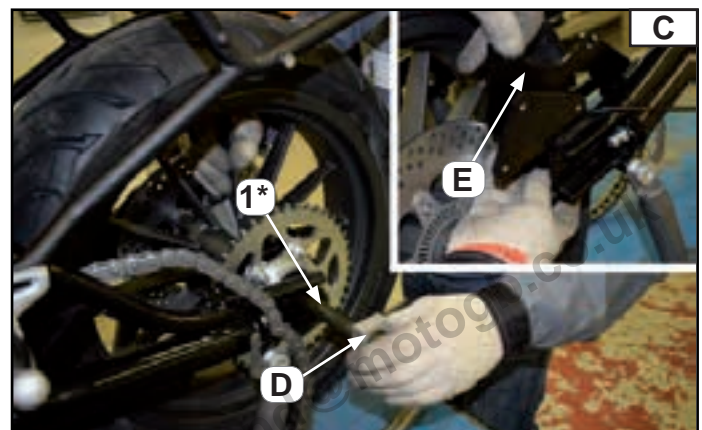
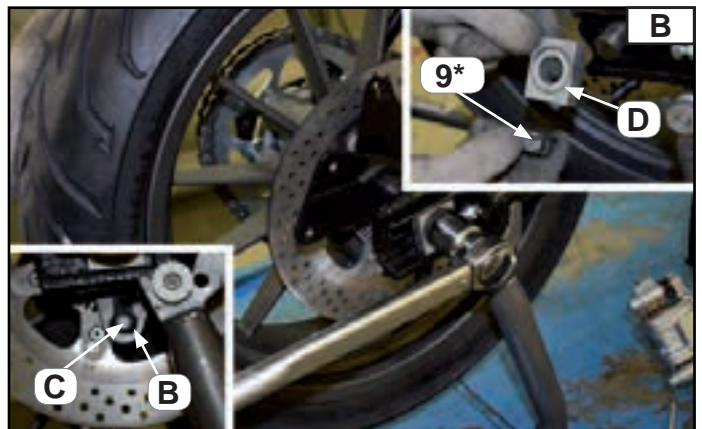
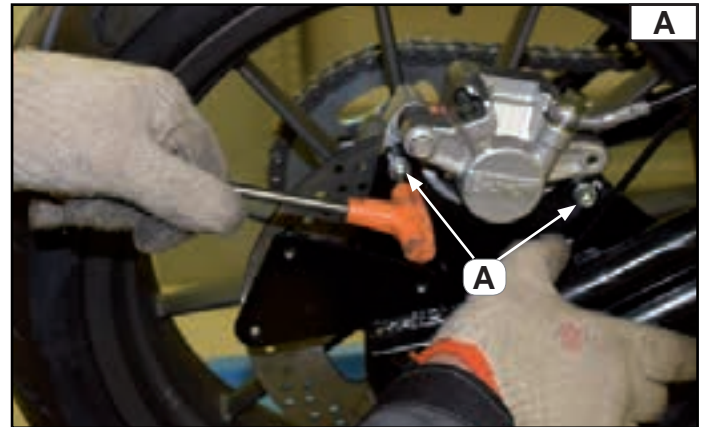
During this phase, be careful in separating the components such as the chain tensioner register on the crown wheel side and the brake disc side and brake calliper support plate "E" Fig. C.

Remove:

- The bush (20*) Fig. D
- the spacer (2*) Fig. D

NOTE:

The numbers marked (*) are a part of the "Rear wheel and brake disc" table.





REAR WHEEL AND BRAKE DISC

REMOVAL OF THE REAR DISC BRAKE, CROWN WHEEL AND PHONIC WHEEL

Remove:

- the screws (26*) Fig. A
- the brake disc (4*) Fig. A

Removal of the phonic wheel:

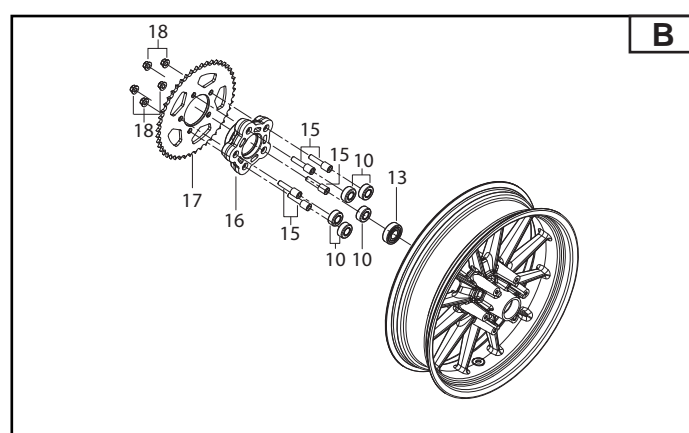
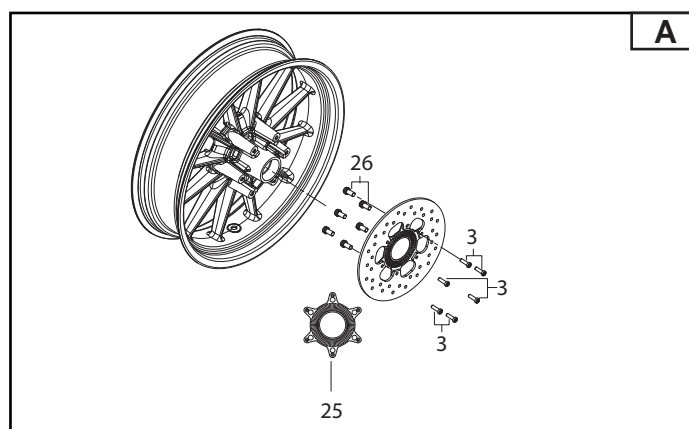
- the phonic wheel (25*) Fig. A
- loosen the screws (3*) Fig. A
- the nuts (18*)
- the crown wheel (17*)
- the flange (16*)
- the screws (15*)
- the flexible couplings (10*)

Check:

- the crown wheel holder flange (16*)
- If there is any cracking/damage, replace.
- The flexible couplings (10*)
- If there is any damage or wear, replace.

NOTE:

The numbers marked (*) are a part of the "Rear wheel and brake disc" table.



REAR WHEEL AND BRAKE DISC WHEEL AXLE CHECK

Check:

- Wheel axle.
 - Rotate the axle of wheel "A" on a flat surface Fig. A.
- If there is any warping, replace.

WARNING

Do not try to straighten the wheel axle if it is warped.

Check:

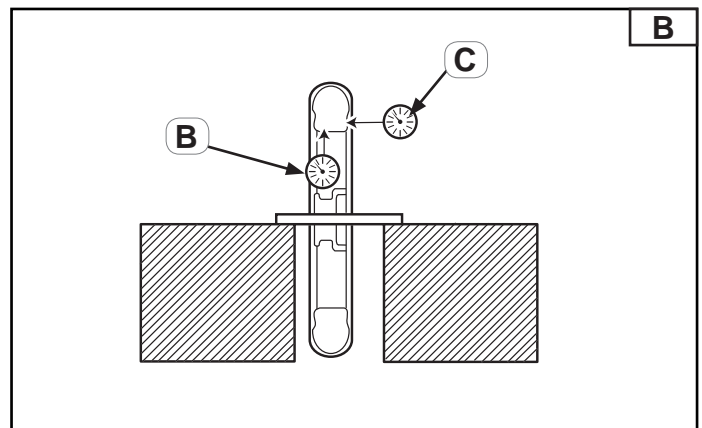
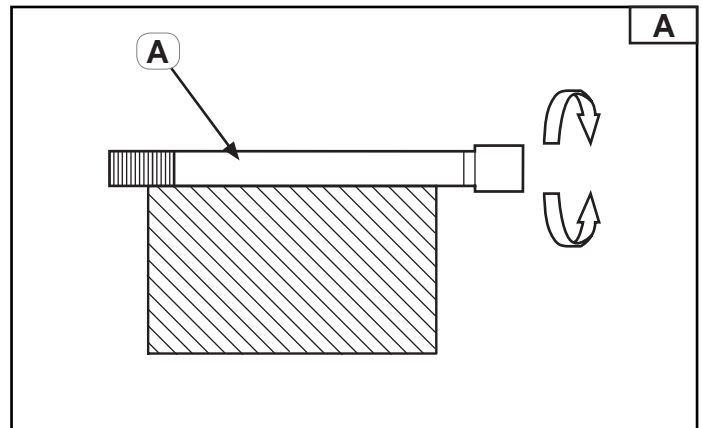
- Tyre
 - Front wheel
- If there is any warping, replace.

Measure:

- The radial eccentricity of the wheel "B" Fig. B
 - The lateral eccentricity of the wheel "C" Fig. B.
- If the specified limit is exceeded, replace.



Eccentricity	Limit
Radial(B)	0.05 mm
Side(C)	0.05 mm





REAR WHEEL AND BRAKE DISC CHECK/REPLACEMENT OF WHEEL BEARINGS

Check:

- Wheel bearings

If the front wheel turns irregularly or is loose, replace the wheel bearings.

Replace:

- Wheel bearings

Remove the bearings from the wheel "A" with a generic bearing extractor Fig. B.

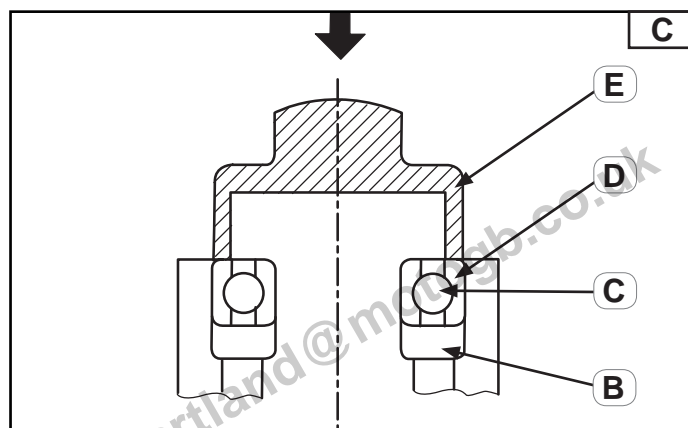
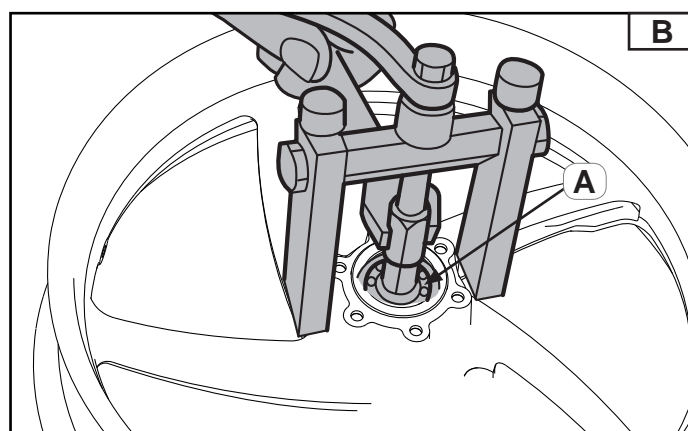
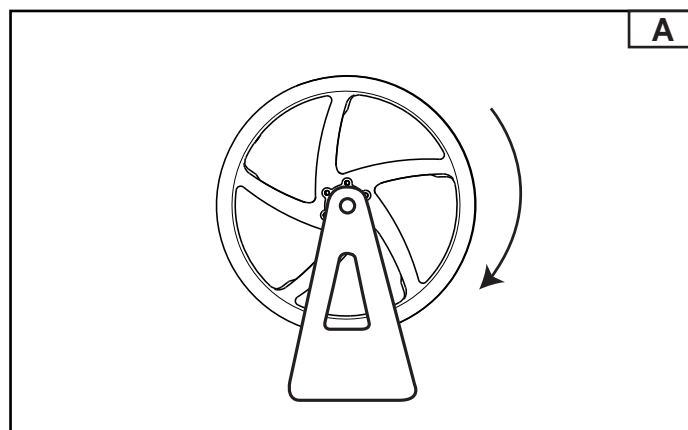
Fit the new wheel bearing, following the removal steps in reverse order.

IMPORTANT NOTICE

During the bearing insertion, do not touch the inner seat "B" or the ball bearings of the wheel "C". Contact must only occur with the outer seat of bearing "D" Fig. C.

NOTE:

Use a wrench that is adapted to the diameter of the outer edge "E" of the wheel bearing, Fig. C.



REAR WHEEL AND BRAKE DISC SPROCKET CHECK AND REPLACEMENT

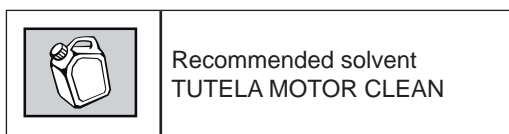
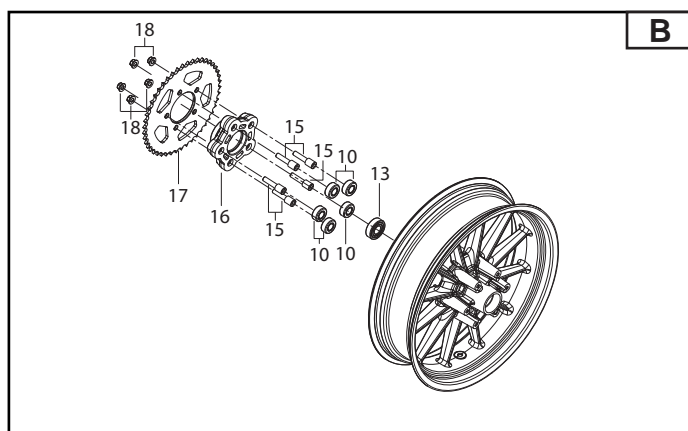
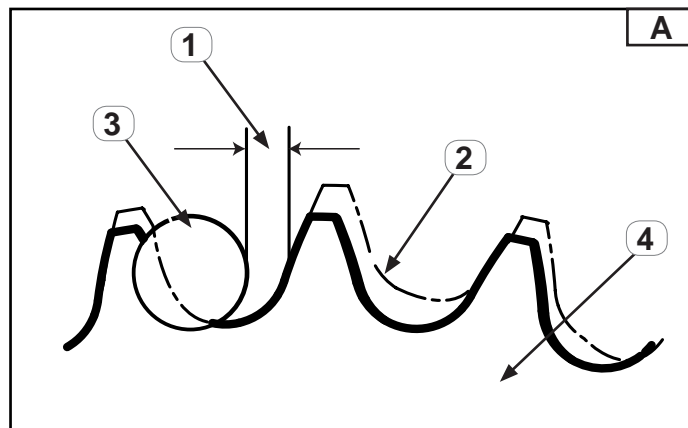
Check:

- The sprocket
- If more than 1/4 of each tooth is worn, replace the sprocket.
If the teeth are bent, replace the sprocket.

- 1/4 teeth
- Correct
- Transmission chain roller
- Chain wheel

Replace:

- the crown wheel**, refer to the "Removal of the rear brake disc, crown wheel and phonic wheel" paragraph.
- Clean the crown wheel holder flange (16*) using a clean cloth, especially surfaces that touch the crown wheel.



Install:

- the new crown wheel
- tighten the self-locking nuts (18*) to the following torque pressure:



Torque 45 N*m

NOTE:

Tighten the self-locking nuts in several stages, proceeding with a crossover sequence.

NOTE:

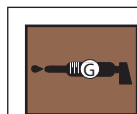
The numbers marked (*) are a part of the "Rear wheel and brake disc" table.



REAR WHEEL AND BRAKE DISC INSTALLATION OF THE DISC BRAKE

Install:

- brake disc (4*) Fig. A
- lubricate screws (26) Fig. A.



MR2 TUTELA grease

- tighten to the following torque:

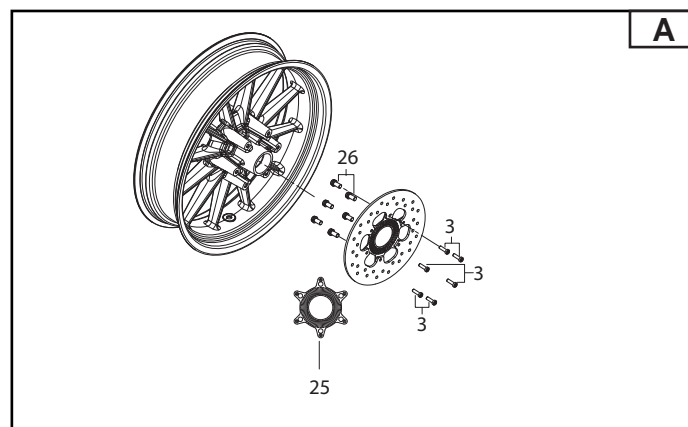


Torque 10 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE:

Tighten the self-locking nuts in several stages, proceeding with a crossover sequence.

NOTE:

The numbers marked (*) are a part of the "Rear wheel and brake disc" table.

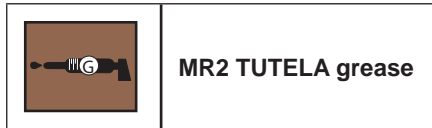
REAR WHEEL AND BRAKE DISC BACK TYRE INSTALLATION

Install:

- Position brake calliper support bracket (23*) Fig. A.
- Insert the bushes (2*) right side and (20*) left side Fig. B.
- Position the register slide (A) and (B) Fig. C.
- position the rear wheel.

Lubricate and install:

- The axle (1*)
- the nut (24*)



- tighten to the following torque pressure Fig. D:



Torque 80 N*m

Install:

- the brake calliper.
- screws
- tighten to the following torque pressure Fig. D:



Torque 80 N*m

NOTE:

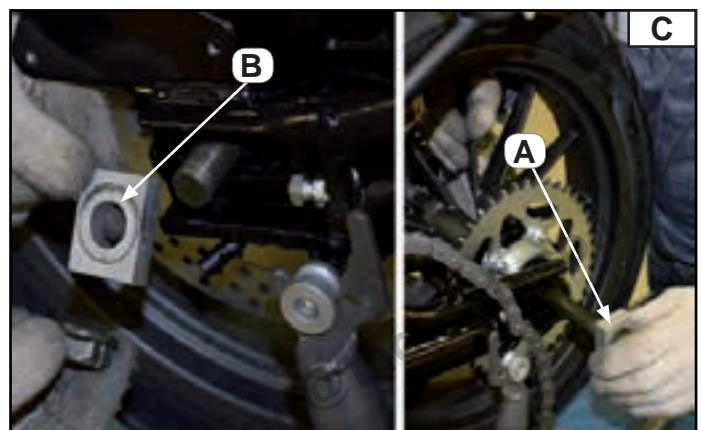
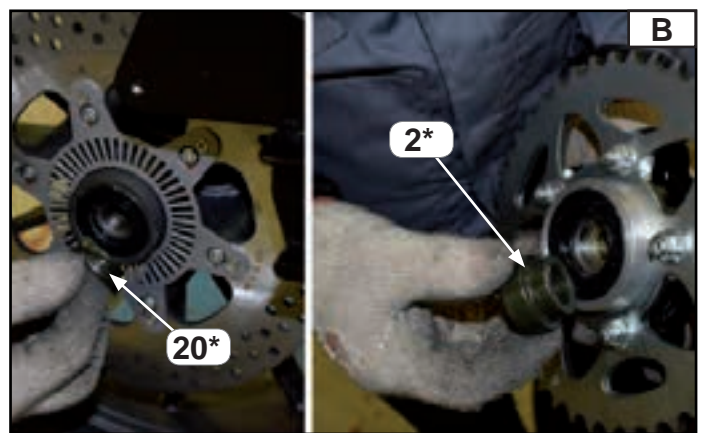
Make sure that there is enough space between the brake pads before fitting the calliper to the relevant brake discs.

IMPORTANT NOTICE

Check that the travel of the flexible brake hose is correct.

NOTE:

The numbers marked (*) are a part of the "Rear wheel and brake disc" table.





FRONT AND REAR BRAKES

REMOVAL AND INSTALLATION OF FRONT BRAKE PADS

The procedure that follows is applicable to both front brake callipers.

NOTE:

Substitute the brake pads always together to ensure a uniform pressure.

Remove:

- pin springs (B) Fig. A
- fixing pins (A) Fig. A
- Remove the brake pads (C) Fig. B.

Measure:

- The wear limit for the brake pads.
- If outside specifications, replace the brake pads as a block.



Pads	Wear limits
Front	1 mm

Clean:

- press the pistons of the calliper inside to permit the installation of the new brake pads.

Install:

- the brake pads in reverse order of disassembly.
- the brake calliper.

Check:

The brake fluid level "B" Fig. C

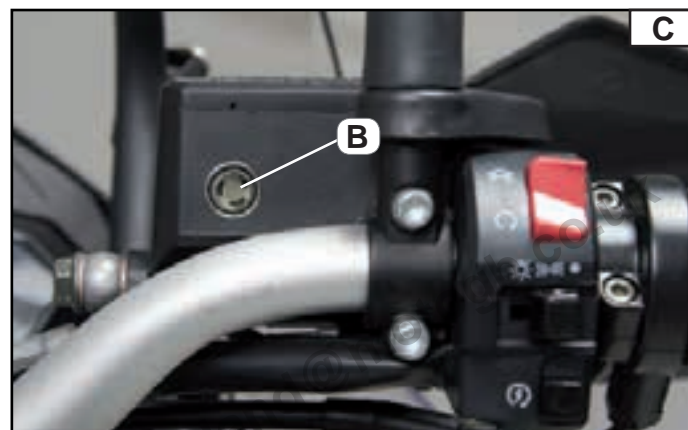
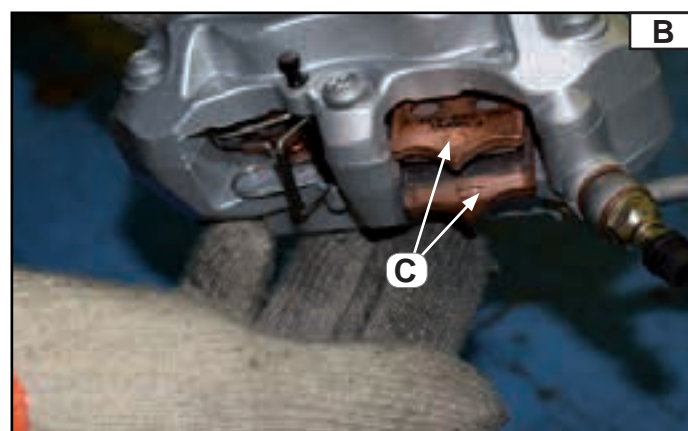
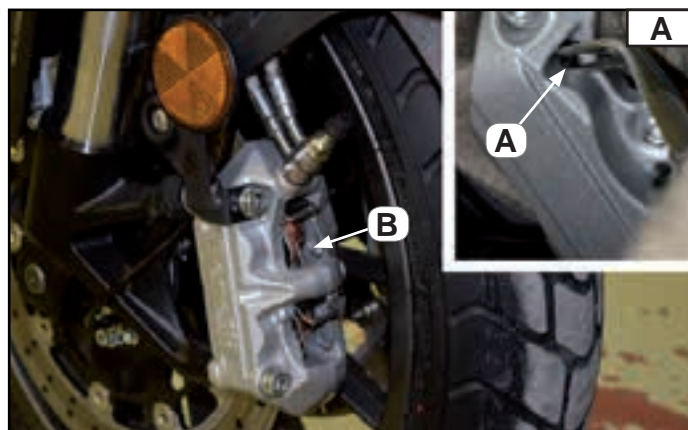
If below the minimum notch, top up with the recommended brake fluid until it is at the correct level.

Refer to **Chapter 3: Periodic maintenance**, paragraph "Checking and topping up the front brake fluid level".

Check:

- Brake lever operation.

If the brake lever is soft or spongy to the touch, bleed the brake circuit.



FRONT AND REAR BRAKES

REMOVAL AND INSTALLATION OF REAR BRAKE PADS

Remove:

- the screw "A" Fig. A.
- the calliper body "B" Fig. B.

Take out:

- The brake pads "C" Fig. B.

Measure:

- The wear limit for the brake pads.

If outside specifications, replace the brake pads as a block.



Pads	Wear limits
Rear	1 mm

Clean:

- inside the calliper
- the pistons, then dry everything.

Press:

- the pistons of the calliper inside to permit the installation of the new brake pads.

Install:

- the brake pads in reverse order of disassembly.
- screws
- the brake calliper.
- tighten to the following torque:



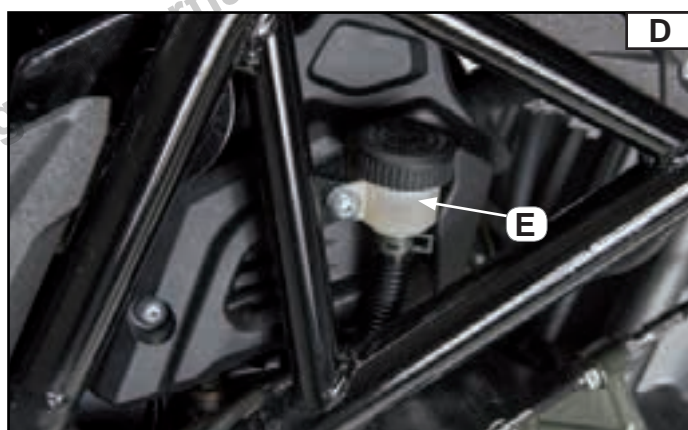
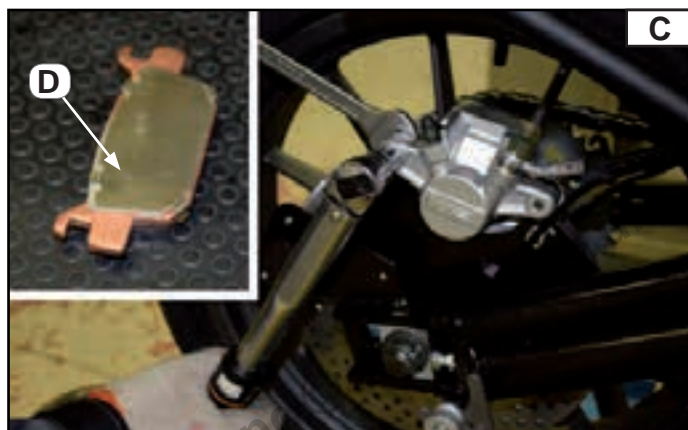
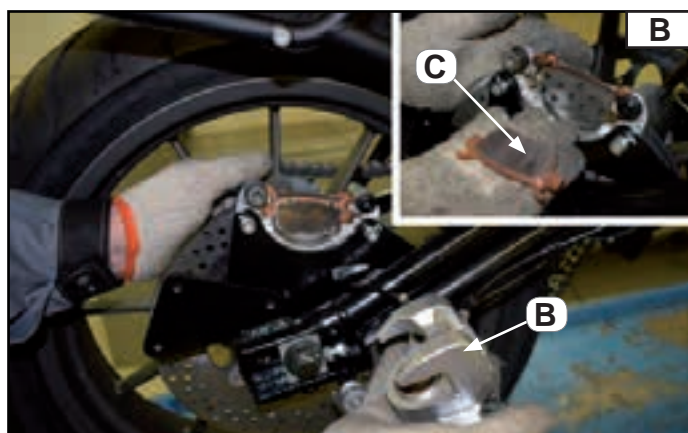
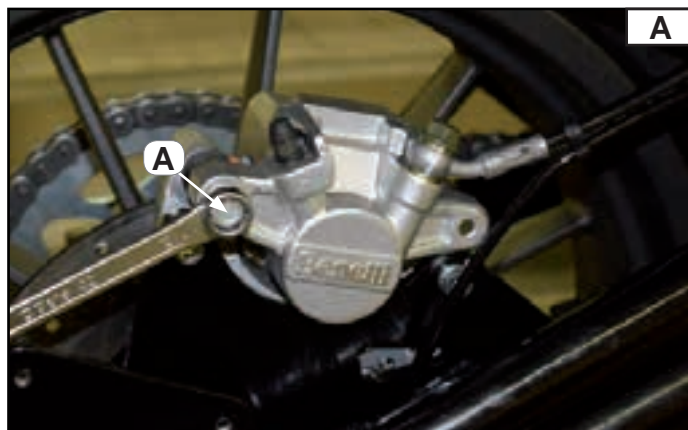
Torque 22 N*m

Check:

- The brake fluid level "E" Fig. D.
- Top up with brake fluid if the level is less than the minimum level mark.
- Brake pedal operation.

IMPORTANT NOTICE

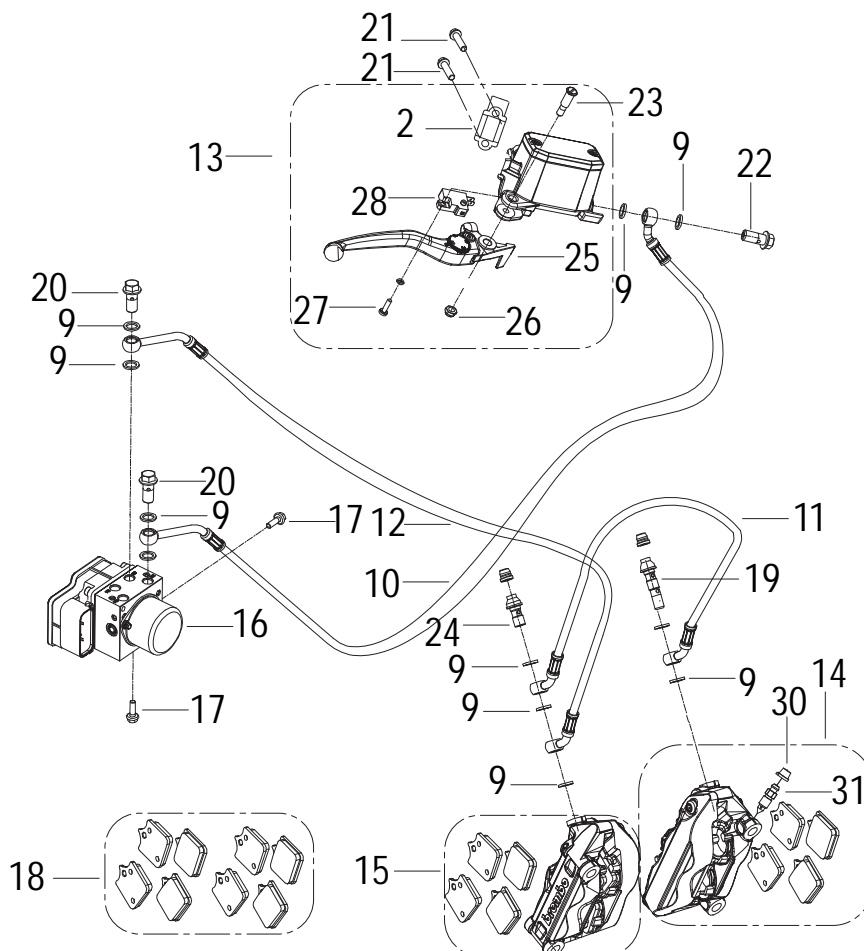
Do not utilise the motorcycle if full efficiency of the brake pedal cannot be obtained. Full efficiency is activated by operating the brake pedal several times so as to bring the pads into contact with the disc. If this operation is not carried out, the brakes will not operate the first time when the pedal is activated.





FRONT AND REAR BRAKES

FRONT BRAKE PUMP REMOVAL



Pos.	Description	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	PIPE				
2	BRACKET				
3	REAR BRAKE HOSE				
4	REAR BRAKE CALLIPER HOSE – ABS CENTRAL UNIT				
5	FRONT BRAKE PUMP				
6	REAR BRAKE CALLIPER				
7	REAR BRAKE PADS (A PAIR)				
8	REAR IDROSTOP				
9	GASKET				
10	FRONT BRAKE CALLIPER HOSE – ABS CENTRAL UNIT				
11	FRONT BRAKE HOSE				
12	FRONT BRAKE HOSE				
13	COMPLETE FRONT BRAKE PUMP				
14	LEFT FRONT CALLIPER (RADIAL)				



FRONT AND REAR BRAKES

FRONT BRAKE PUMP REMOVAL

Pos.	Description	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
15	RIGHT BRAKE CALLIPER (RADIAL)				
16	ABS CENTRAL UNIT				
17	SCREW				
18	FRONT BRAKE PADS (A PAIR)				
19	SPECIAL SCREW				
20	SPECIAL SCREW				
21	SCREW				
22	SPECIAL SCREW				
23	SPECIAL SCREW				
24	SPECIAL SCREW				
25	FRONT BRAKE LEVER				
26	SELF-LOCKING NUT				
27	SCREW				
28	MICROSWITCH				
29	ELASTIC WASHER				
30	SPRING BAND				



FRONT AND REAR BRAKES

FRONT BRAKE PUMP REMOVAL

NOTE:

Drain out the brake fluid before proceeding with these operations.

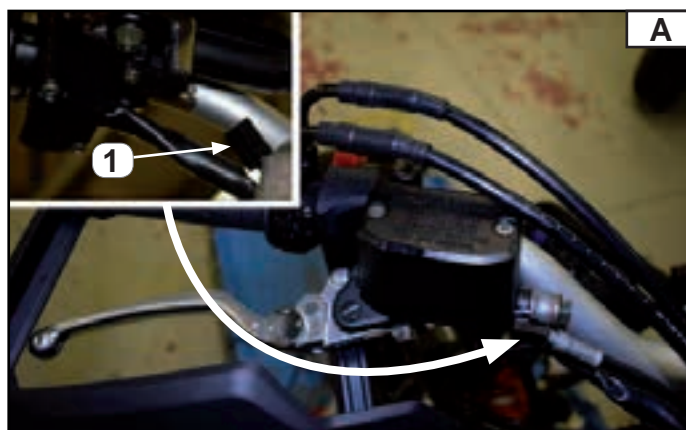
Refer to Chapter 3: Periodic maintenance, paragraph "Checking and topping up the front brake fluid level".

IMPORTANT NOTICE

When removing the pump, avoid spilling onto the surfaces of the motorcycle brake fluid that has remained in the system.

Remove:

- the special screws (22*)
- sealing washer (9*).
- Remove the front brake hose (10*).
- Detach the front brake hose (10*).
- disconnect the connector of the front brake switch (1) Fig. A.
- screw (27*)
- micro-switch (28*).
- nut (26*)
- screw (23*)
- front brake lever (25*)
- screws (21*)
- clamp (2*).
- remove the pump.

**IMPORTANT NOTICE**

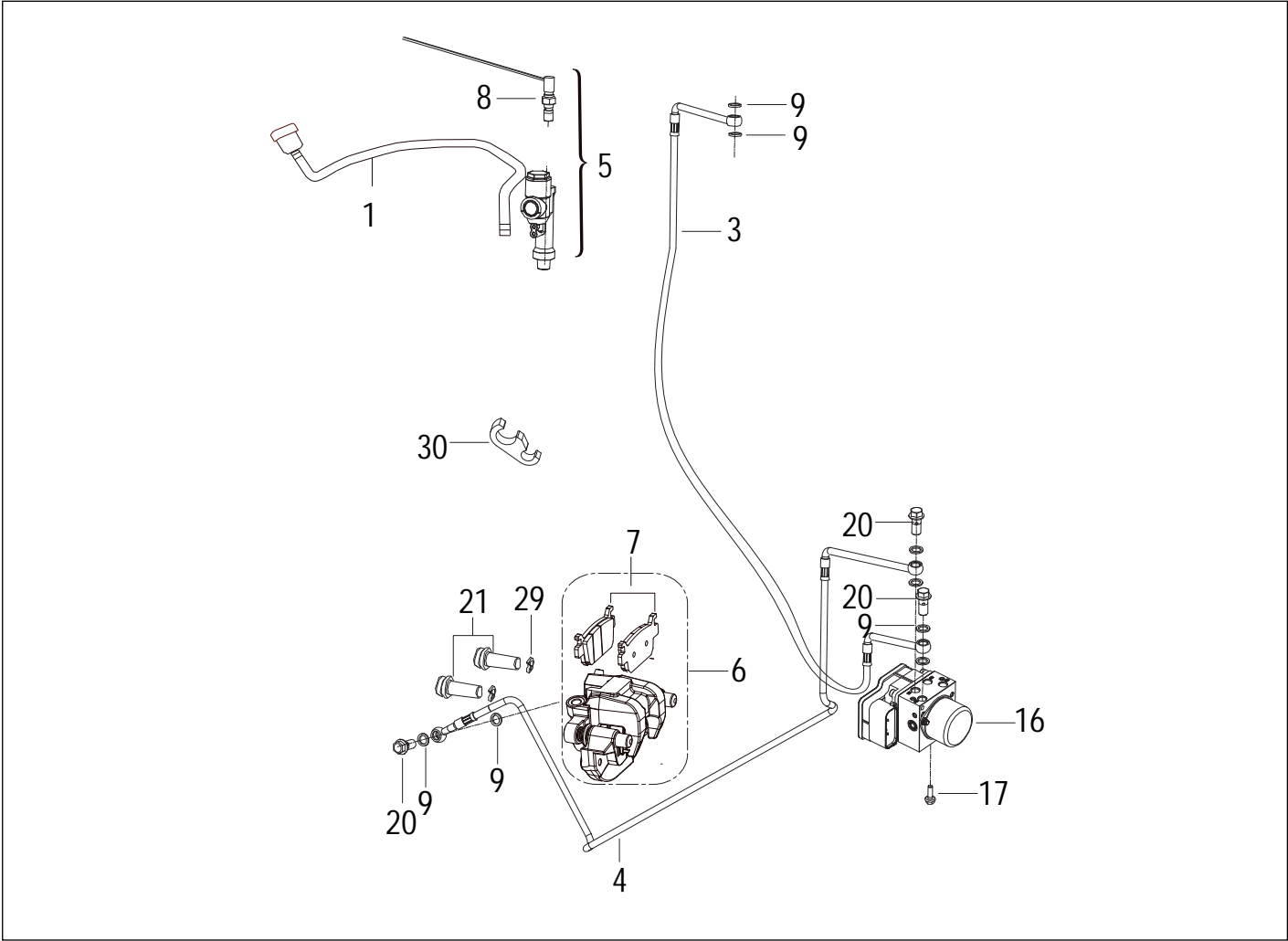
during the disassembly stage, do not allow any brake fluid remaining in the circuit to drip onto the vehicle.

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.

FRONT AND REAR BRAKES

REAR BRAKE PUMP REMOVAL



NOTE:
 The above exploded view is part of the spare parts table of the chapter “Front and rear brakes”, paragraph “Removal of the front brake pump”.



FRONT AND REAR BRAKES

REAR BRAKE PUMP REMOVAL

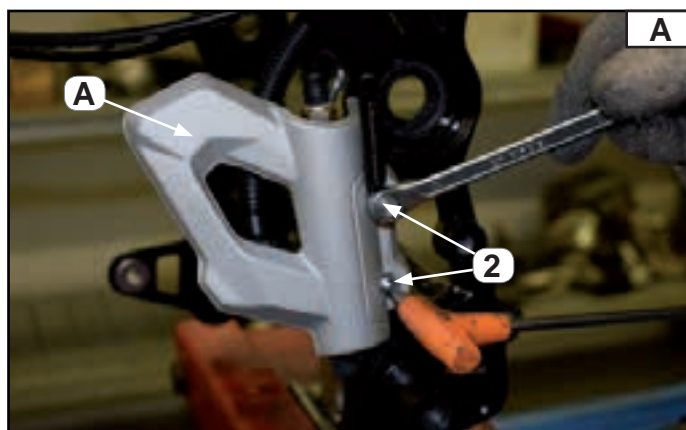
NOTE:

Drain out the brake fluid before proceeding with these operations.

Refer to Chapter 3: Periodic maintenance, paragraph "Checking and topping up the front brake fluid level".

Remove:

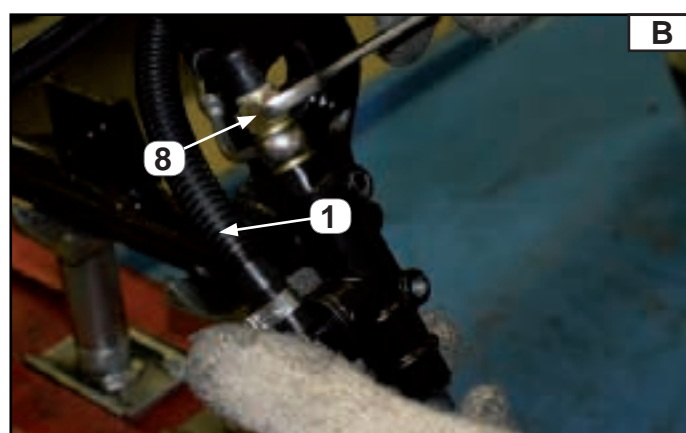
- brake pump protection (A) Fig. A
- screws (2) Fig. A.
- idrostop (8) Fig. B.
- sealing washer (9*).
- Release the main brake hose (3*).
- Release the brake reservoir hose (1*).
- Remove the brake pump (5*).

**IMPORTANT NOTICE**

During the disassembly stage, do not allow any brake fluid remaining in the circuit to drip onto the vehicle surfaces.

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.



FRONT AND REAR BRAKES

FRONT BRAKE PUMP INSTALLATION

WARNING

Before installing, clean all of the internal parts of the brake, and lubricate them with clean or new brake fluid. Never use solvents on the internal parts of the brake.



Recommended brake fluid
TUTELA BRAKE FLUID TOP4
DOT4

Install:

- position the pump body
- clamp (2*) Fig. B
- the screws (21*)

Tighten to the following torque:



Torque 8 N*m

- micro-switch (28*)
- screw (27*)

Tighten to the following torque:



Torque 1.5 N*m

- connect the connector of the front brake switch (1) Fig. A.
- Position the front brake hose to the brake pump (10*).
- sealing washer (9*).
- special screw (22*)

Tighten to the following torque:



Torque 26 N*m

- Position the front brake lever (25*) Fig. A
- screw (23*) - tighten Fig. A
- nut (26*) Fig. A

Tighten to the following torque:



Torque 7 N*m

WARNING

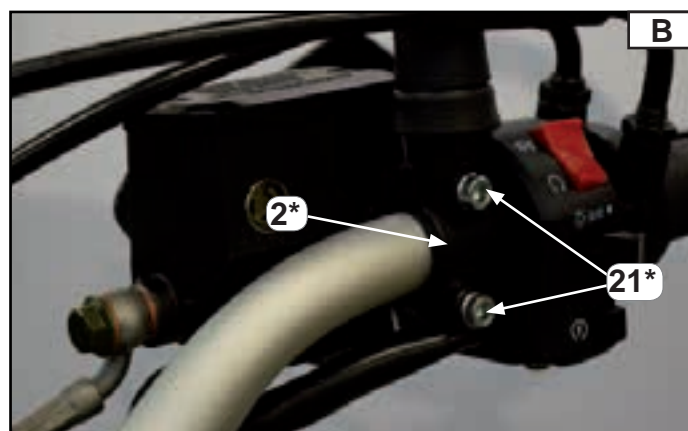
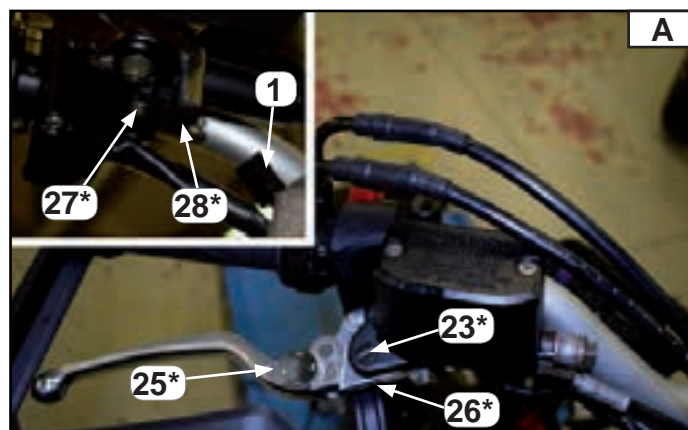
To guarantee the safety of the bike, it is essential for the path of the brake hose to be correct.

NOTE:

Once topping up operations of the brake fluid has finished, refer to Chapter 3: Periodic maintenance, paragraph "Checking and topping up the front brake fluid level".

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.





FRONT AND REAR BRAKES

REAR BRAKE PUMP INSTALLATION

Install:

- Connect the brake fluid reservoir hose (1*) to the brake pump (5) Fig. B
- Connect the main brake hose (3*).
- Position the Idrostop (8*) Fig. B and tighten to the following torque pressure:



Torque 12 N*m

- the sealing washers (9*) Fig. B.
- Position the protection and the brake pump (A) Fig. A.
- screws (10) Fig. A.

Tighten to the following torque:



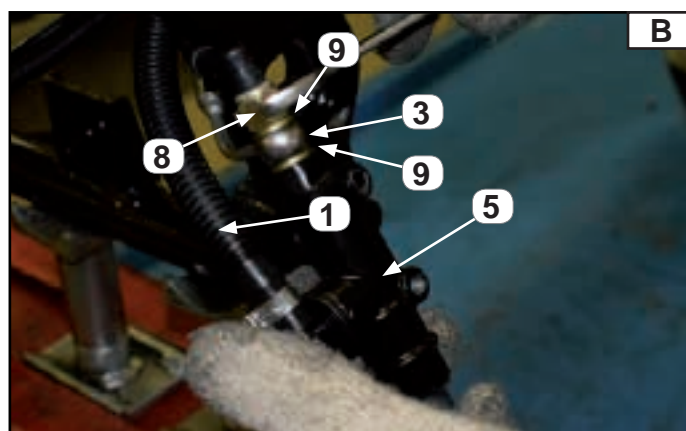
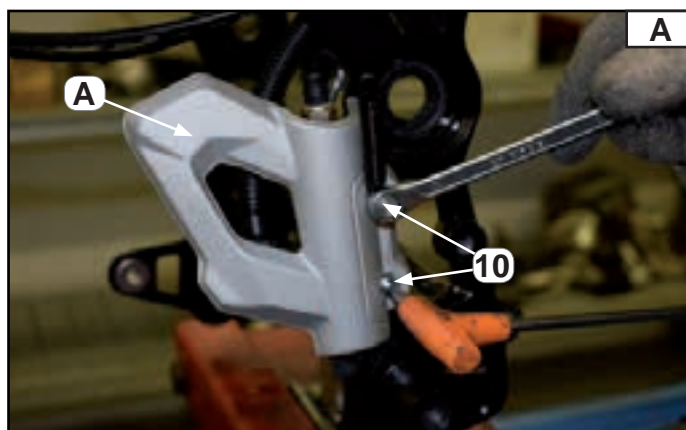
Torque 12 N*m

IMPORTANT NOTICE

When assembling the pump, avoid spilling brake fluid that has remained in the system onto the surfaces of the motorcycle.

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.

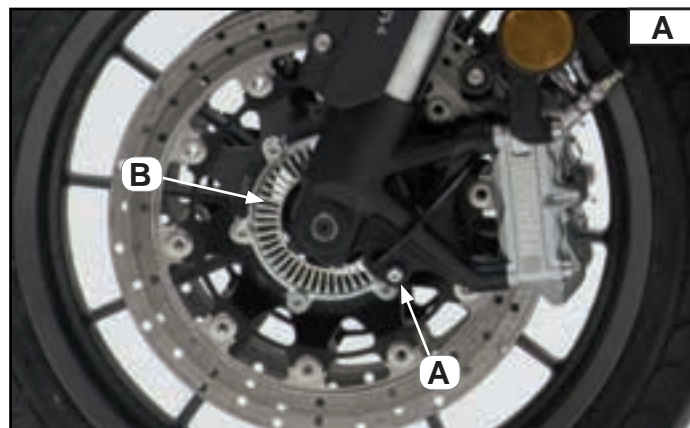


ABS ANTI-LOCK BRAKING SYSTEM

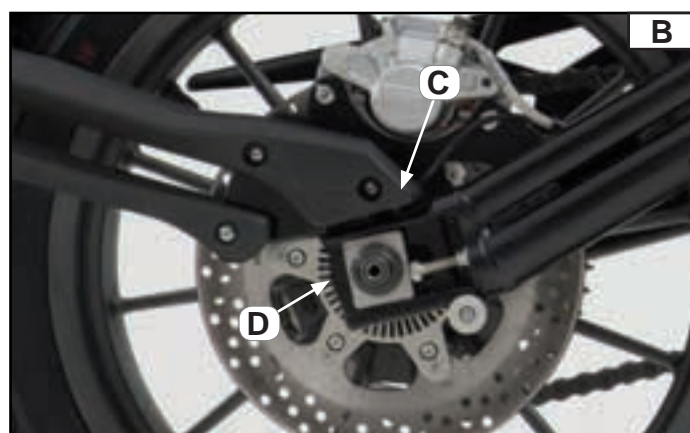
LOCATION OF THE COMPONENTS

The components that compose the anti-lock braking system are:

- phonic wheel sensor (A) – front wheel Fig. A
- phonic wheel (B) – front wheel Fig. A



- phonic wheel sensor (C) – rear wheel Fig. B
- phonic wheel (D) – rear wheel Fig. B



- ABS “yellow” warning light (E) Fig. C



- ABS hydraulic unit (F) Fig. D





ABS ANTI-LOCK BRAKING SYSTEM

POSITION OF THE COMPONENTS

- Fuse box "1" Fig. E



- Connector of the ABS diagnostic system "2" Fig. F



ABS ANTI-LOCK BRAKING SYSTEM ROTATION SENSOR CHECK

IMPORTANT NOTICE

The wheel rotation sensor must be handled with caution, must not receive knocks, e.g., with a hammer, or dropped on a hard surface. It is a precision instrument.
Do not soak the rotation sensor in water or mud
Do not attempt to repair or remove the wheel rotation sensor.

Remove:

- screw (1) Fig. A
- phonic wheel sensor (2) of the front wheel Fig. A

Disconnect:

- the connector of the phonic wheel (5) Fig. C.

Carry out a visual check of the rotation sensor of the phonic wheel. Substitute the wheel rotation sensor if it is cracked, bent or damaged in anyway. If an electrical fault in the sensors is suspected, check the electrical circuit.

Remove:

- screw (3) Fig. B
- phonic wheel sensor (4) of the rear wheel Fig. A

Disconnect:

- the connector of the phonic wheel (6) Fig. D.

Carry out a visual check of the rotation sensor of the phonic wheel. Substitute the wheel rotation sensor if it is cracked, bent or damaged in anyway. If an electrical fault in the sensors is suspected, check the electrical circuit.

NOTE:

Place the motorcycle on a suitable support so that the front wheel is raised.

Check:

Lift the front/rear wheels off the ground and measure the distance at various points between the sensor and the phonic wheel.

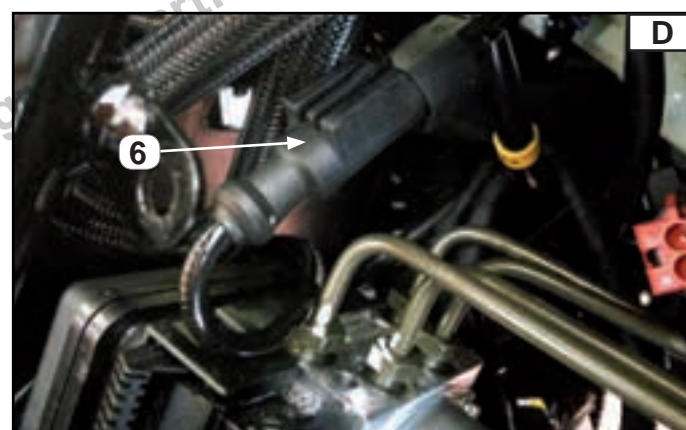
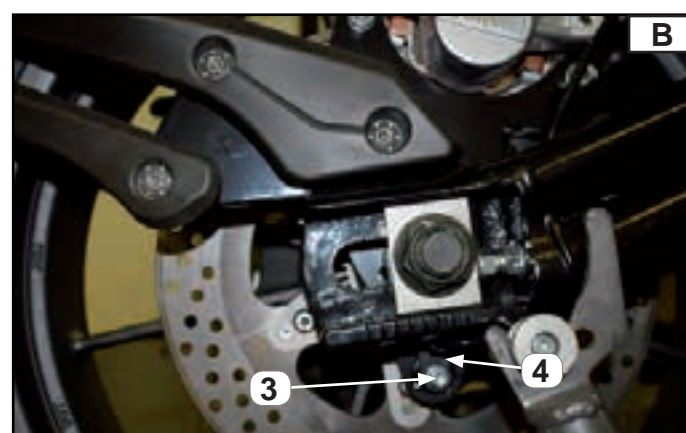


Air light	
Front	Rear
0.1 – 1.5 mm	295 mm

NOTE:

It is not possible to adjust the distance of the sensor.

- If the distance does not come within the prescribed values, check the hub bearing (refer to paragraph Removal/Installation of the front/rear wheel), the sensor, the phonic wheel and the assembly conditions of the sensor.



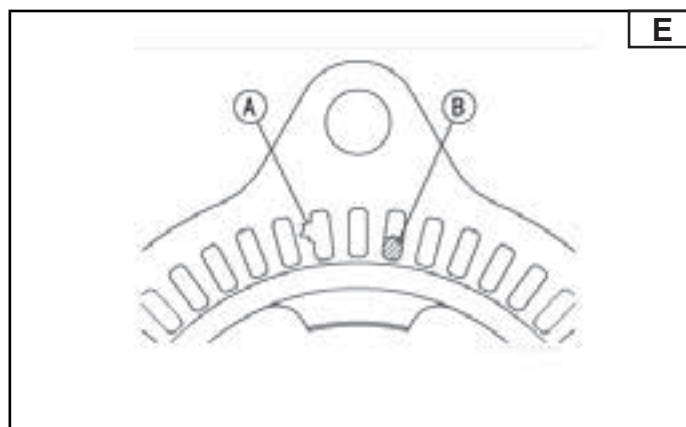


ABS ANTI-LOCK BRAKING SYSTEM

CHECK OF THE PHONIC WHEEL AND ABS OF THE FRONT AND REAR WHEEL

Check:

Carry out a visual check of the phonic wheel of the wheel.
Substitute the phonic wheel if it is deformed or damaged, such as damaged teeth. Fig. E
Remove the deposits if there are deposits of metal or magnetic material (B). If necessary, substitute the phonic wheel as follows:



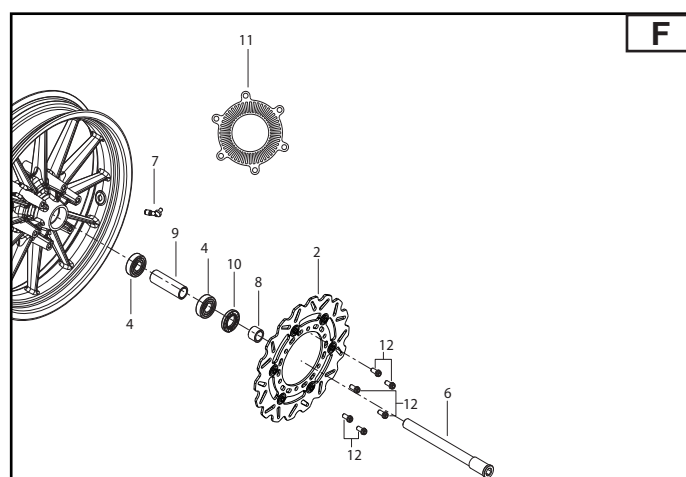
SUBSTITUTION OF THE PHONIC WHEEL, ABS OF THE FRONT AND REAR WHEEL

Remove:

- Front wheel - refer to the chapter "removal of the front wheel".
- screws (12*)
- the phonic wheel (11*) Fig. F
- Rear wheel - refer to the chapter "removal of the rear wheel".

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Front wheel and brake discs", paragraph Removal/installation of the brake discs".





ABS ANTI-LOCK BRAKING SYSTEM

PRECAUTIONS

PRECAUTIONS DURING THE MAINTENANCE OF THE ABS

A series of important precautions must be adopted during the maintenance of the ABS system.

- The ABS system has been designed to be fed by a 12V sealed battery. Do not use any other type of battery, only sealed 12V.
- Do not invert cable connections of the battery. It would damage the ABS hydraulic unit.
- To avoid damage to the ABS components, do not disconnect the battery cables or other electrical connections when the start switch is positioned at ON or when the engine is running.
- Be careful to not cause a short circuit between the cables directly connected to the positive terminal (+) of the battery and the Earth of the frame.
- Do not position the start switch at ON whilst the ABS electrical connectors are disconnected. The hydraulic unit of the ABS memorises the maintenance codes.
- Do not spray water onto the electrical components, the components of the Abs, cables, connectors or the cabling.
- If there is a transmitter/receiver installed on the motorcycle, ensure that the functioning of the ABS system is not disturbed by electromagnetic waves irradiated by the antenna.
- Position the antenna as far away as possible from the hydraulic unit of the ABS.
- Position the start switch at OFF before disconnecting the electrical connections of the ABS.
- The components of the ABS must never be hit, for example by a hammer or must not be dropped onto a hard surface. These impacts could cause damage to the components.
- The ABS components cannot be disassembled. Even if there is a fault, substitute the ABS unit, do not try to disassemble and repair the components.
- The ABS system is made up of numerous circuits, tubes and cables of the brakes.
- Furthermore, the ABS system is not capable of detecting problems of the conventional braking system (abnormal wear of the brake discs, brake pads and other mechanical faults). To avoid inconveniences, check that the brake circuits and tubes are arranged and connected correctly, the cabling is opportunely laid out and the brakes are equipped with adequate braking power.
- Check that there are no leaks of fluid and then accurately bleed the brake circuits.

IMPORTANT NOTICE

Air in the brake tubes reduces the braking power that could cause a serious accident with severe injuries and even death. If any union of the brake circuit, including the nuts of the ABS hydraulic unit joint, or the bleed valve are opened, the air entered into the system must be completely bled from the brake circuit. If the brake lever is spongy when pressed, there could be air in the tubes of the brake circuit, or the brake could be defective. In that case, do not use the vehicle and immediately repair the brake system.

IMPORTANT NOTICE

Do not use the motorcycle if there is air in the brake circuit, otherwise the ABS system could function incorrectly.

IMPORTANT NOTICE

The use of tyres that are not recommended could cause malfunctioning of the ABS system and cause an increase in the braking distance thereby causing a serious accident with severe injuries and even death. Always use the recommended standard tyres for this motorcycle.



ABS ANTI-LOCK BRAKING SYSTEM

PRECAUTIONS

IMPORTANT NOTICE

The LED yellow warning light of the ABS “E” Fig. A could come on if the tyre pressures are not correct, if tyre not recommended has been fitted, or if the wheel is deformed. If the warning light comes on, solve the problem by cancelling the maintenance code.



ABS ANTI-LOCK BRAKING SYSTEM

REMOVAL OF THE ABS HYDRAULIC UNIT

IMPORTANT NOTICE

The ABS hydraulic unit "A" has been adjusted and set with precision by the manufacturer. Therefore it must be handled very carefully, must never be hit for example by a hammer, or dropped on a hard surface. Do not soak the ABS hydraulic unit in water or mud.

- Bring the start switch to the OFF position.

Remove:

- Rider and passenger seats, see chapter "Removal of the rider and passenger seat, Chapter 4".
- Side fairings, see chapter "Removal of the side fairings, Chapter 4".
- For the fuel tank, refer to chapter "Removal of the fuel tank, Chapter 4".
- Discharge the brake fluid from the front and rear brake circuit utilising the bleed valve and pumping the brake lever and the brake pedal.
- Do not forget to place a cloth underneath the ABS hydraulic unit.
- The nuts of the rigid tubing (B). Fig. B
- the screws (D) Fig. C

Disconnect:

- The connector of the ABS hydraulic unit "C" Fig. B by rotating the lever as indicated in the figure.

Remove:

- Remove the ABS hydraulic unit

NOTE:

Be careful to not bend the brake hose when removing it.
ABS hydraulic unit

- Close the oil passage holes (A) of the ABS hydraulic unit (B) with a cloth to avoid dirt from entering into the unit Fig. D.

IMPORTANT NOTICE

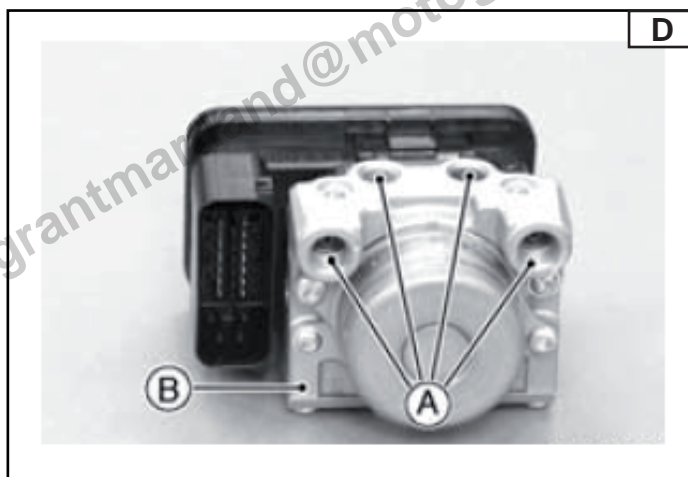
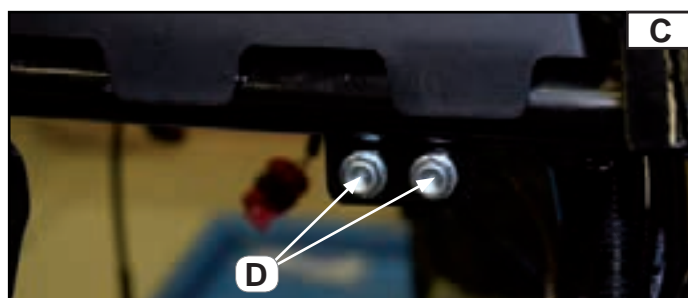
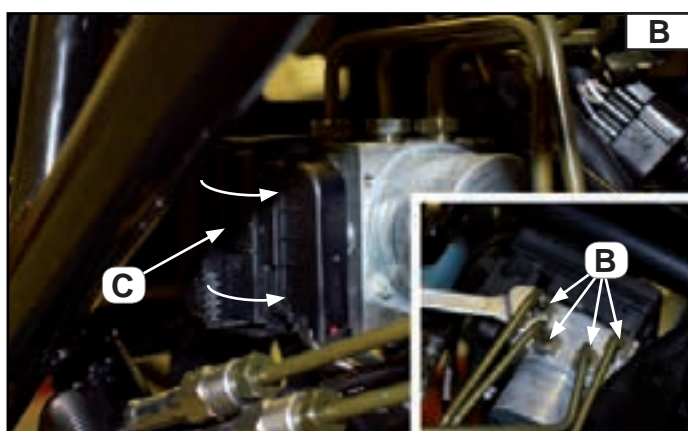
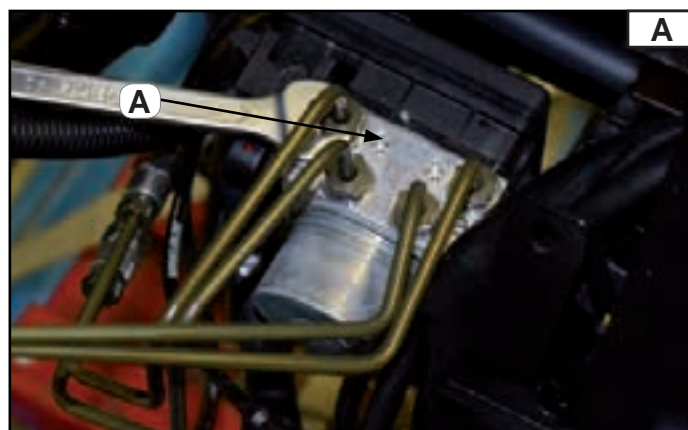
Do not allow dirt to enter into the hydraulic system when the tubes are disconnected. Brake fluid rapidly damages painted plastic surfaces; completely wash the concerned zones immediately.

IMPORTANT NOTICE

The ABS hydraulic unit has been adjusted and set with precision by the manufacturer.
Do not attempt to repair or remove the ABS hydraulic unit.

Check:

- Carry out a visual check of the ABS hydraulic unit.
- Substitute the ABS hydraulic unit if any component is cracked or damaged in any way.

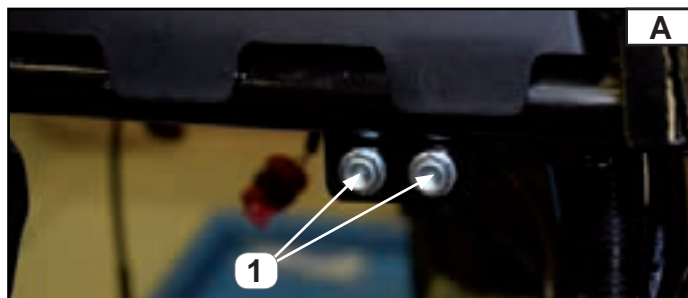




ABS ANTI-LOCK BRAKING SYSTEM INSTALLATION OF THE ABS HYDRAULIC UNIT

Install:

- Position the ABS hydraulic unit on the frame.
- Install the rigid tubes of the brakes onto the ABS hydraulic unit and manually screw in the flare nuts without tightening.
- front brake calliper hose (G) Fig. B
- front brake pump hose (D) Fig. B
- rear brake calliper hose (E) Fig. B
- rear brake pump hose (F) Fig. B
- the screws (1) Fig. A to the following torque:



Torque 10 N*m

- Tighten the union nuts of the rigid tubing Fig. B to the following torque pressure:



Torque 18 N*m

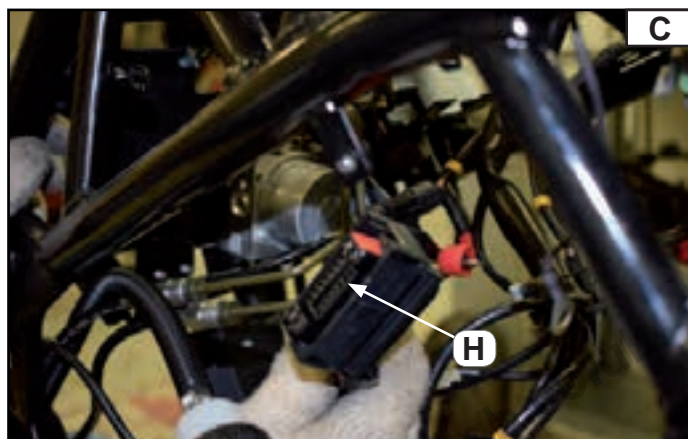
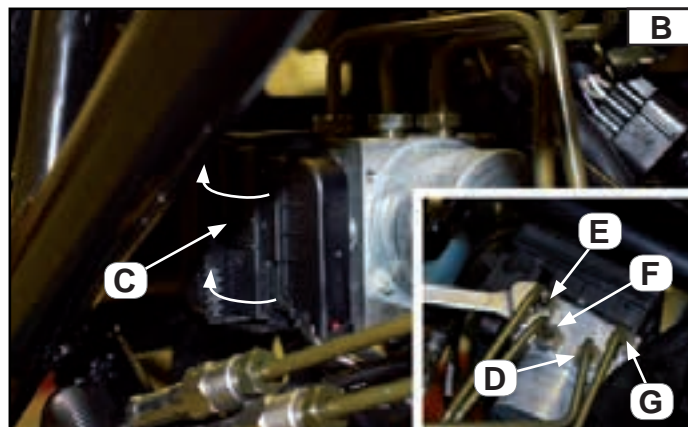
Connect:

- The connector of the ABS hydraulic unit (H) Fig. C

Install:

To install, reverse the order of the removal operation.

- Bleed the air from the brake circuit, refer to chapter “**Frame/ brake fluid level check, Chapter 3**”.



ABS ANTI-LOCK BRAKING SYSTEM

REMOVAL OF THE ABS ROTATION SENSORS – FRONT/REAR WHEEL

IMPORTANT NOTICE

The wheel rotation sensor must be handled with caution, must not receive knocks, e.g., with a hammer, or dropped on a hard surface. It is a precision instrument.

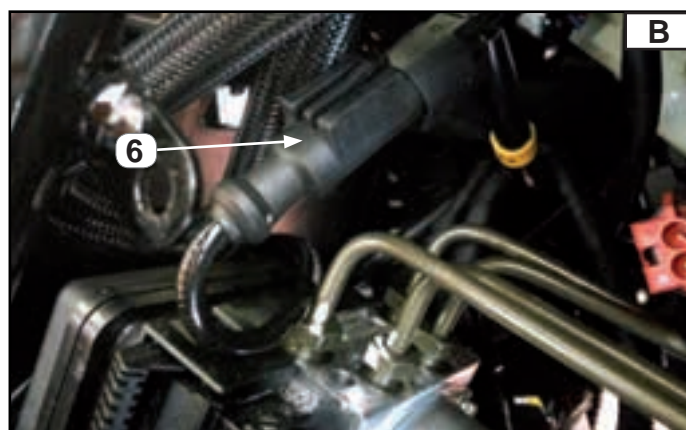
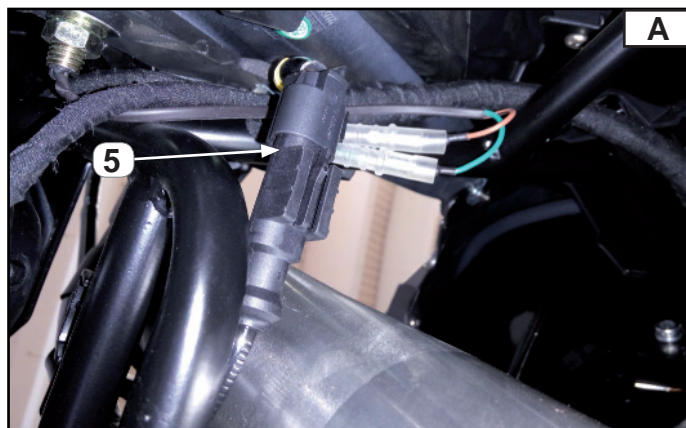
Do not soak the wheel rotation sensor in water or mud Do not attempt to repair or remove the wheel rotation sensor.

Remove:

- Rider and passenger seats, see chapter “Removal of the rider and passenger seat, Chapter 4”.
- Side fairings, see chapter “Removal of the side fairings, Chapter 4”.
- For the fuel tank, refer to chapter “Removal of the fuel tank, Chapter 4”.
- For the front wheel rotation sensor refer to chapter “ABS anti-lock braking system, paragraph rotation sensor check”.
- Disconnect the connector of the front wheel rotation sensor (5) Fig. A
- Remove the cable (6) of the sensor from the fixing terminal Fig. B.

Install:

For installation, reverse the order of the removal operation.
Replace the cable correctly.





FRONT AND REAR BRAKES

FRONT BRAKE CALLIPER TIGHTNESS

The following procedure is applied to both brake callipers.

NOTE:

Before disassembling the brake calliper, discharge the brake fluid from the complete braking system: refer to "Frame/ brake fluid level check, Chapter 3".

Remove:

- the special screw (24*) and (19*) Fig. A
- the sealing washers (9*) Fig. A
- the front brake hose (12) Fig. A
- the screws (A) Fig. B
- Remove both callipers.

NOTE:

Insert the end of the brake hose into a container and slowly pump out and drain the brake fluid.

IMPORTANT NOTICE

Brake fluid rapidly damages painted plastic surfaces; completely wash the concerned zones immediately.

Detach:

- the pistons (1) Fig. C
- the seals (2) Fig. C

Secure:

- the pistons of the brake callipers with a block of wood Fig. D
- Blow compressed air into the attachment of the flexible brake hose to push the left pistons outwards from the brake calliper.

IMPORTANT NOTICE

Never try to prise out the calliper pistons.

NOTE:

Repeat the above-mentioned procedure to force the pistons out from the opposite brake calliper.

Check:

The ring seal of the damaged brake calliper.

The ring seal (piston seal) (2) Fig. C that are found inside the piston to maintain the play between the pads and the disc.

If the seal is in bad condition, it can cause excessive wear of the pads or sticking of the brake, with a consequent increase of the temperature of the discs or the brake fluid.

Replace:

- the seals (2) Fig. C

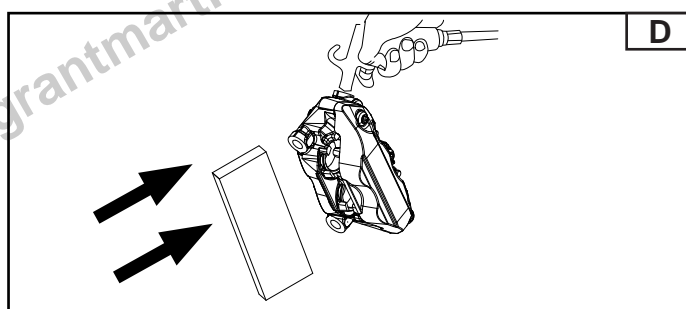
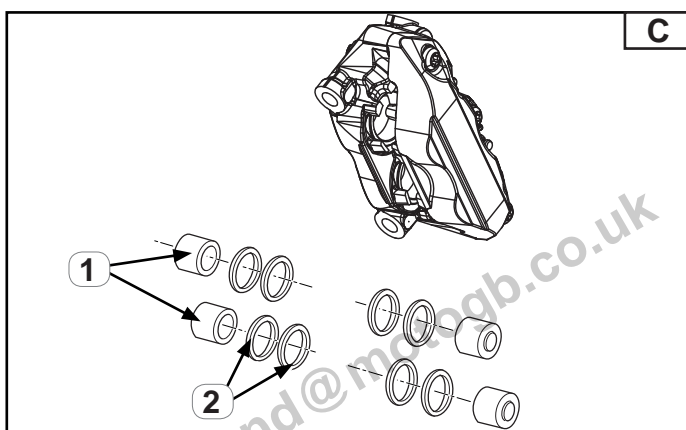
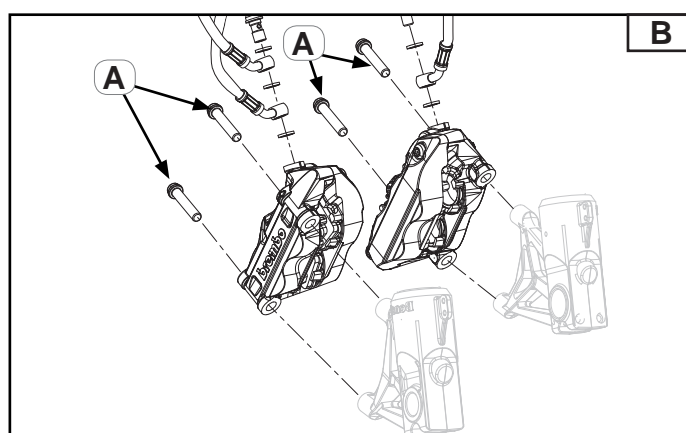
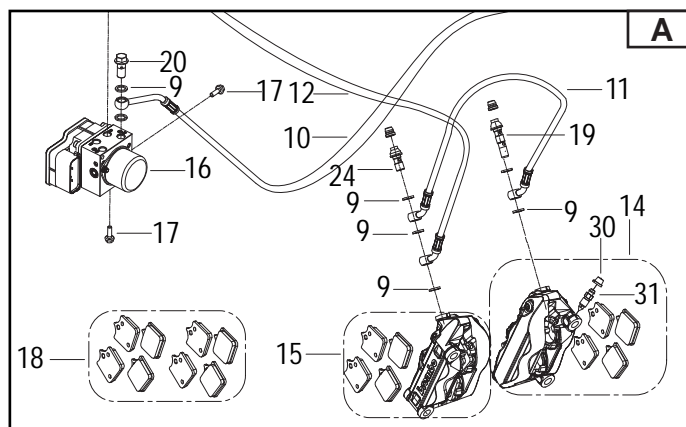
Substitute the seal if it shows signs of the following:

- Brake fluid leak around the brake pads.
- Brakes overheating.
- Notable difference of wear between the internal and external brake pads.
- If the seal and piston are stuck to each other.

Substitute the seals when substituting the brake pads.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Front and rear brakes", paragraph "Removal of the front brake pump".



FRONT AND REAR BRAKES

REAR BRAKE CALLIPER

NOTE:

Before disassembling the brake calliper, discharge the brake fluid from the complete braking system: refer to "Frame/ brake fluid level check, Chapter 3".

Remove:

- the screw (20*) Fig. A
- the sealing washers (9*) Fig. A
- the front brake hose (4) Fig. A
- the screws (A) Fig. B

Remove the calliper

NOTE:

Insert the end of the brake hose into a container and slowly pump out and drain the brake fluid.

Detach:

- the pistons (B) Fig. B
- the seals (C) Fig. B
- (first the oil seals – the smallest seals, then the O-rings – the largest seals)
- Fix the pistons of the brake calliper with a block of wood Fig. C
- Blow compressed air into the attachment of the flexible brake hose to force the pistons from the brake calliper.
- The sliding pins (3) and (4) Fig. E
- ear protectors against dust (1) and (2) Fig. D

IMPORTANT NOTICE

Never try to prise out the calliper pistons.

Replace:

- the seals (C) Fig. B
- Substitute the seal if it shows signs of the following:
 - Brake fluid leak around the brake pads.
 - Brakes overheating.
 - Notable difference of wear between the internal and external brake pads.
 - If the seal and piston are stuck to each other.

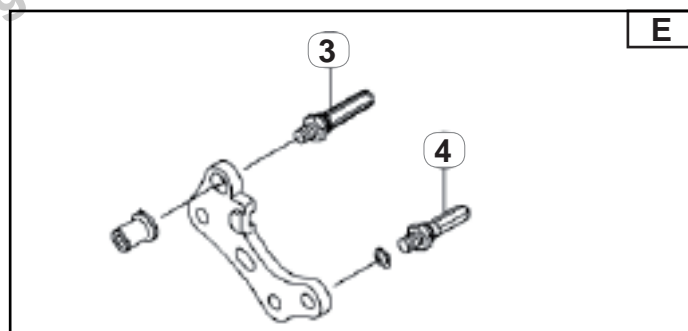
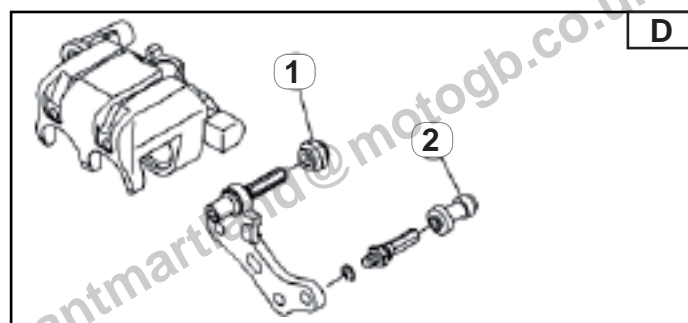
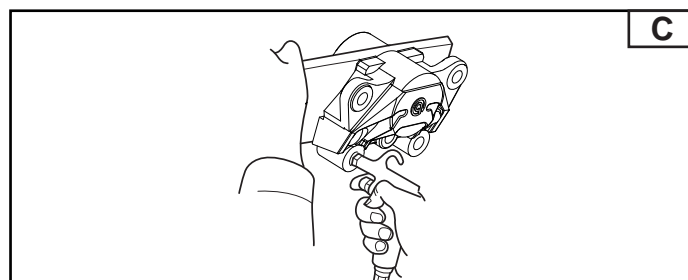
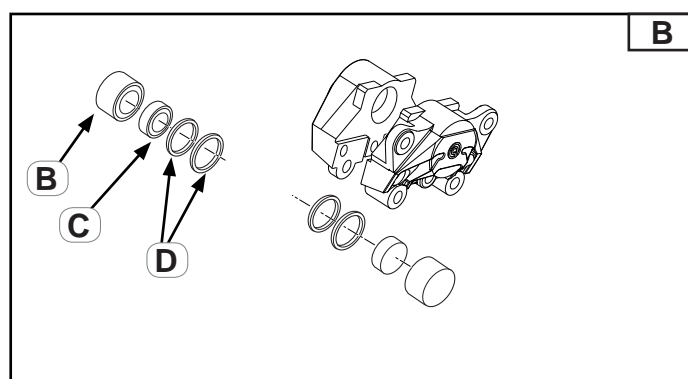
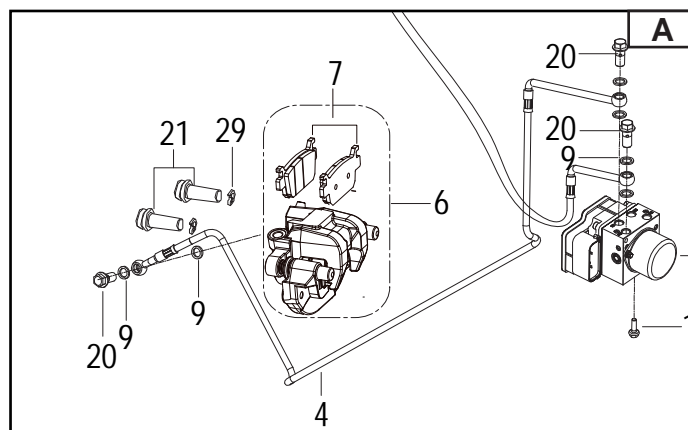
Substitute the seals when substituting the brake pads.

IMPORTANT NOTICE

When the repair has finished, the brake lever and pedal must be pressed several times so that the pads come into contact with the brake discs so that the braking distance is shortened and therefore avoiding an accident with serious injuries or death. Do not utilise the motorcycle if full efficiency of the brake pedal cannot be obtained. Full efficiency is activated by operating the brake pedal several times so as to bring the pads into contact with the disc.

NOTE:

The numbers marked (*) are a part of the table at the beginning of the chapter.





FRONT AND REAR BRAKES

CHECK THE FRONT AND REAR CALLIPERS

Check:

- the pistons (1) of the brake callipers Fig. A

Substitute the brake calliper pistons if there are signs of rust/scoring/traces of wear.

- The cylinders of the brake callipers.

If there are any lines/signs of wear, replace the whole brake calliper.

- The bodies of the brake callipers.

If there are any cracks/damage, replace the whole brake calliper.

- Brake fluid delivery passages (brake calliper body).

In the event of obstruction, clean with a jet of compressed air.

- The seals (2) and (3) Fig. A

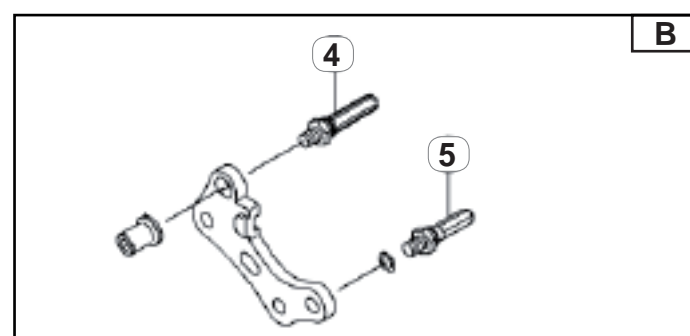
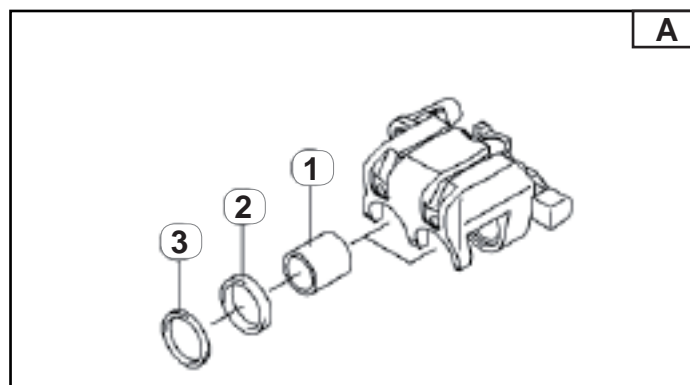
If there is any rust/lines/signs of wear, replace the brake calliper insulation.

- The sliding pins (4) and (5) the rear calliper Fig. B

If there are any lines/signs of wear, replace the whole brake calliper.

- The rear brake calliper bracket and the couplings on the front fork.

If there are any rust spots/signs of wear, replace.



IMPORTANT NOTICE

Every time the brake calliper is removed, replace the piston gaskets.

FRONT AND REAR BRAKES

FRONT BRAKE CALLIPER INSTALLATION

NOTE:

The procedure mentioned below is applicable to both callipers of the front brake.

IMPORTANT NOTICE

Before installing, clean all of the internal parts of the brake, and lubricate them with clean or new brake fluid.

Never use solvents on internal components of the brake, inasmuch that the seals of the pistons would tend to swell and deform.

Every time the brake calliper is removed, replace the piston gaskets.

	<p>Recommended brake fluid TUTELA BRAKE FLUID TOP4 DOT4</p>
---	---

Install:

- the largest seals of the pistons (E) Fig. A
- the smallest seals of the pistons (F) Fig. A
- The pistons on the brake calliper (B) Fig. A


Install:

- The brake calliper (1) Fig. B
 - the screws (2) Fig. B.
- to the following torque:



Torque 50 N*m

Recommended lubricant

	<p>MR2 TUTELA grease</p>
---	--------------------------

Install:

- The brake hose (10) Fig. C
 - the sealing washers (9*) Fig. B.
 - the special screws (20*) Fig. B
- to the following torque:



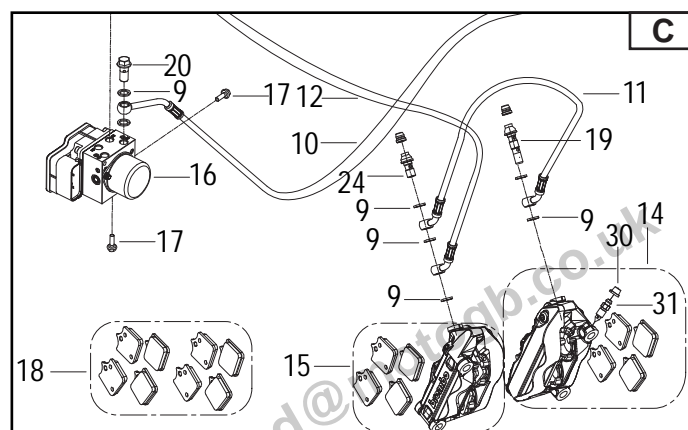
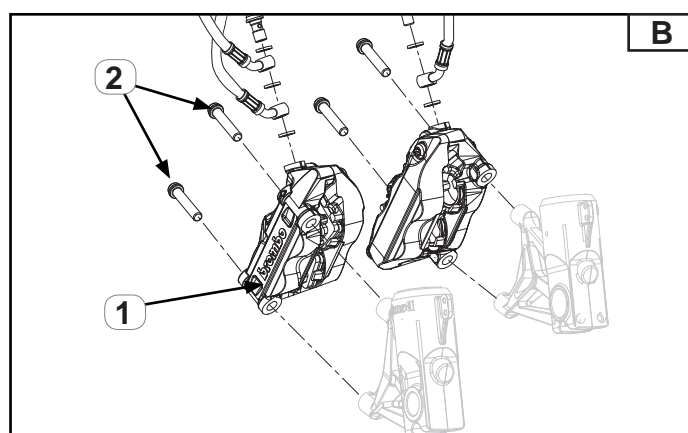
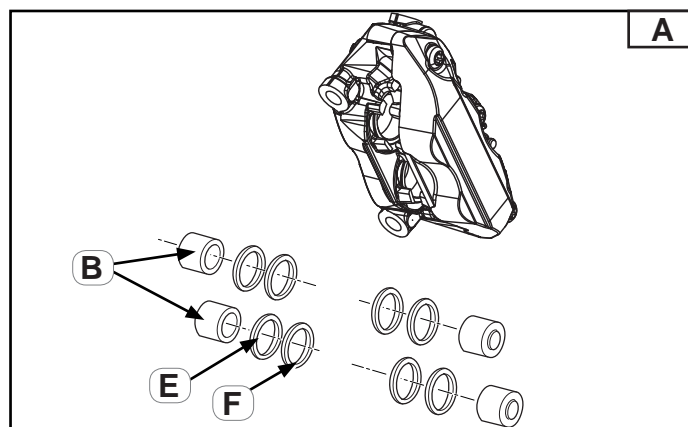
Torque 18 N*m

IMPORTANT NOTICE

To guarantee the safety of the bike, it is essential for the path of the brake hose to be correct.

Check:

the level of the brake fluid and top up (refer to Chapter 3 **Frame/ Brake fluid level check**, paragraph **Front brake fluid level check/top up**)





FRONT AND REAR BRAKES

REAR BRAKE CALLIPER INSTALLATION

IMPORTANT NOTICE

Before installing, clean all of the internal parts of the brake, and lubricate them with clean or new brake fluid. Never use solvents on internal components of the brake, inasmuch that the seals of the pistons would tend to swell and deform. Every time the brake calliper is removed, replace the piston gaskets.



Recommended brake fluid
TUTELA BRAKE FLUID TOP4
DOT4

Install:

- the largest seals of the pistons (D) Fig. A
- the smallest seals of the pistons (C) Fig. A
- The pistons on the brake calliper (B) Fig. A

Install:

- The brake calliper (6*) Fig. B
- the screws (21*) Fig. B

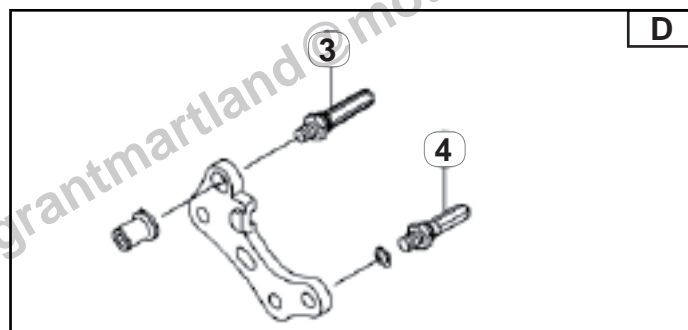
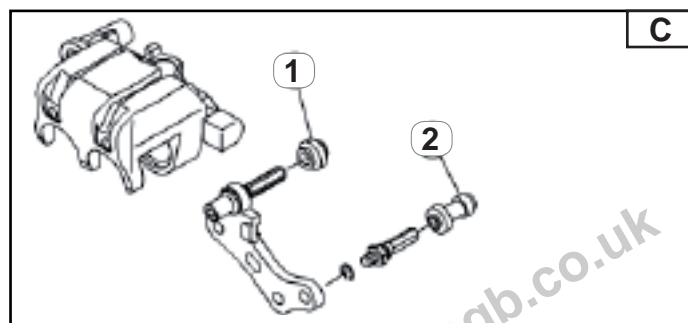
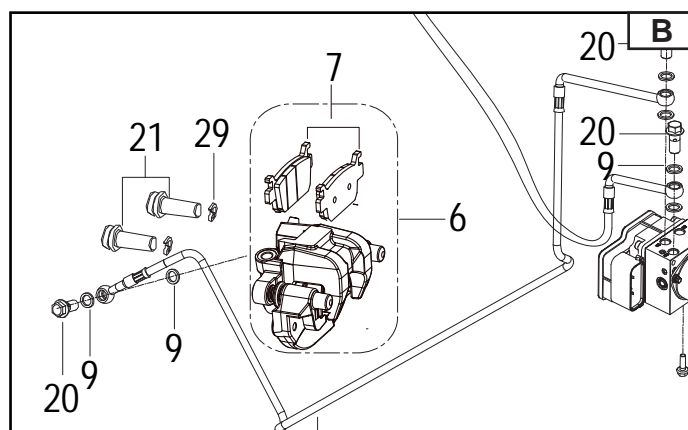
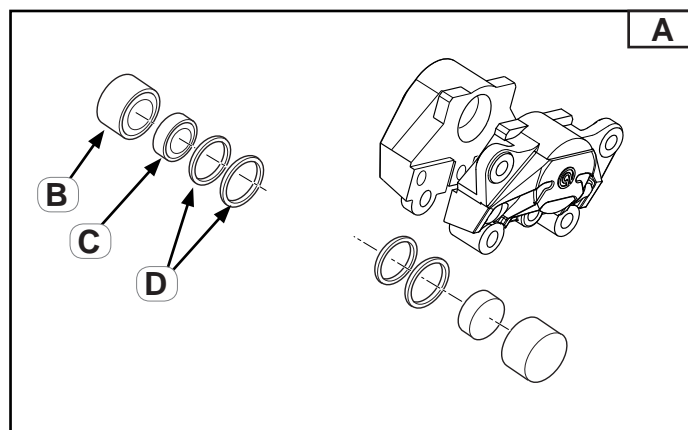
to the following torque:



Torque 22 N*m

Install:

- The sliding pins (3) and (4) Fig. D
- ear protectors against dust (1) and (2) Fig. C



FRONT AND REAR BRAKES

REAR BRAKE CALLIPER INSTALLATION

Install:

- The brake hose (4) Fig. E
- the sealing washers (9*) Fig. E
- the special screw (20*) Fig. E

Tighten to the previous set torque pressure twice after having been slackened:



Torque 15 N*m

Check:

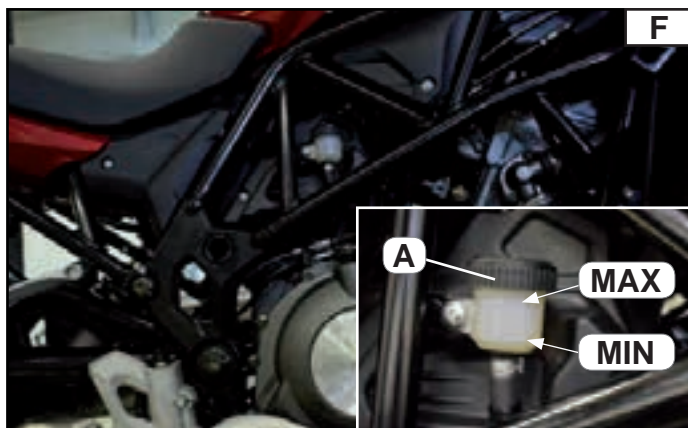
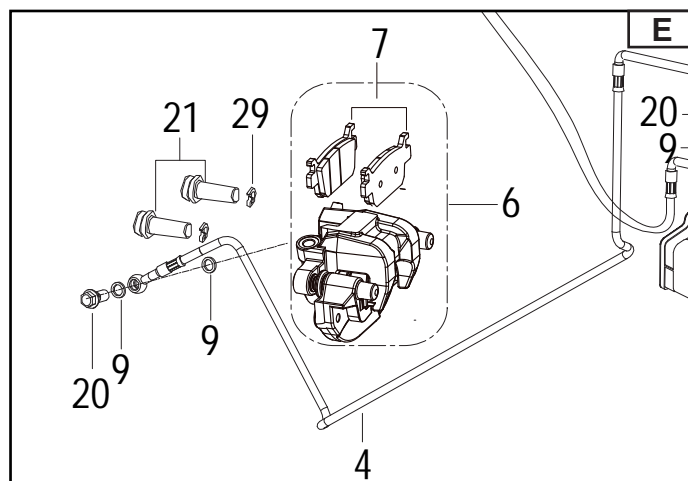
the level of the brake fluid (A) Fig. F and top up (refer to Chapter 3 **Frame/check brake fluid level**, paragraph **Check rear brake fluid level/top up**)

IMPORTANT NOTICE

Only use the prescribed fluid. The use of other types of brake fluid may cause damage to the rubber seals, leading to leaks and to a drop in brake performance. Top up with the same type of brake fluid in the system. The brake fluid must never be mixed with fluids of other brands, since this could cause a dangerous chemical reaction, with a drop in brake performance as a result.

While topping up brake fluid, take care not to let any water enter the container.

Water would considerably reduce the boiling point of the fluid and may lead to the formation of vapour bubbles.



Check:

If below the minimum notch, top up with the recommended brake fluid.

- Brake lever operation.

If the brake lever movement is spongy, bleed brake system.

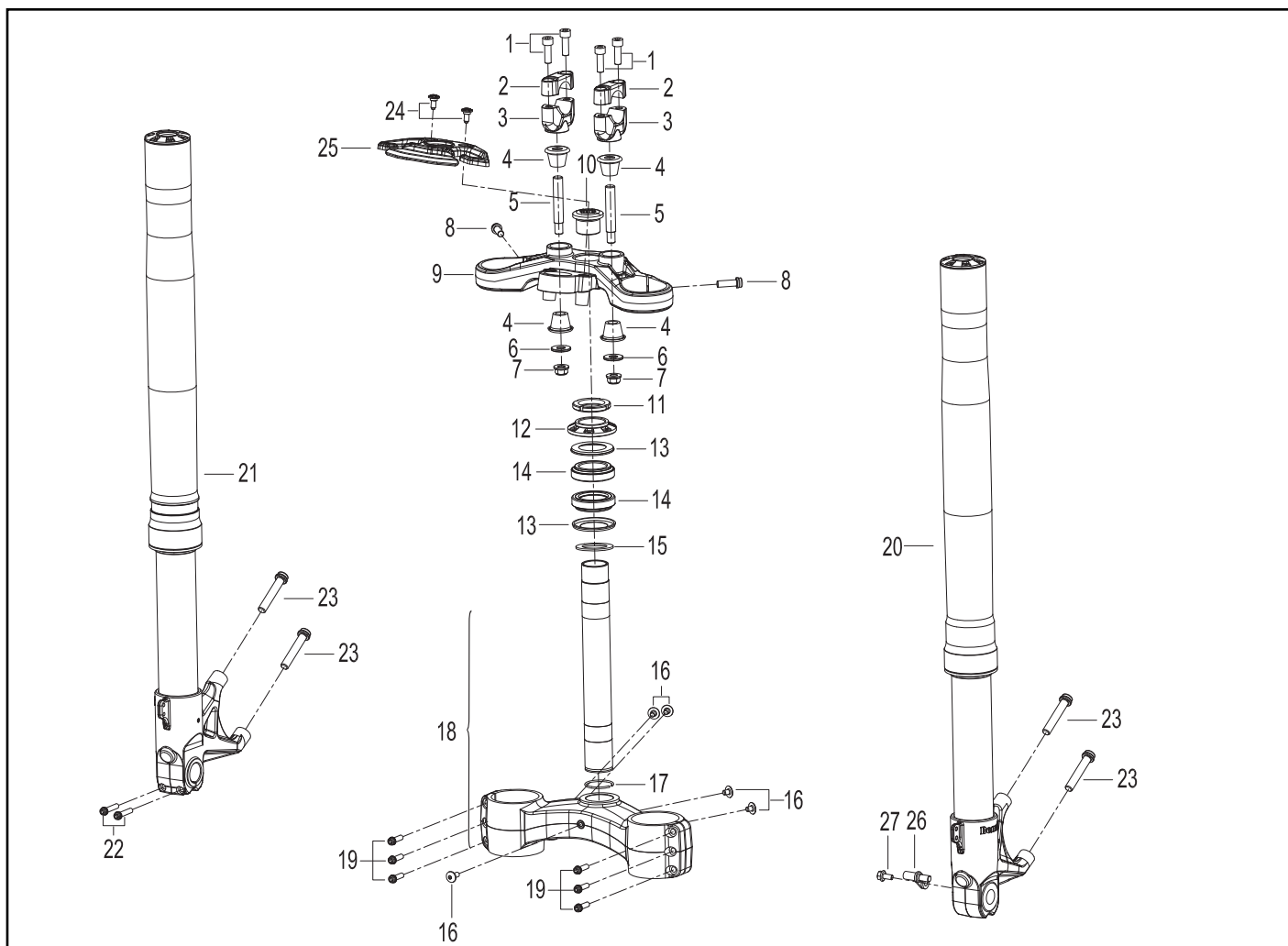
Refer to Chapter 3 **Frame/Brake fluid level check**, paragraph

Rear brake fluid level check/top up)



FRONT FORK

FRONT FORK STEM REMOVAL



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SCREW					
2	UPPER U-CLAMP					
3	LOWER U-CLAMP					
4	BUSHING					
5	HANDLEBAR FIXING PIN					
6	WASHER					
7	NUT					
8	SCREW					
9	STEERING HEAD					
10	SPECIAL SCREW					
11	STEERING PIN RING NUT					
12	STEERING RING NUT					
13	DUST SEAL					
14	BEARING					
15	WASHER					



FRONT FORK

FRONT FORK STEM REMOVAL

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
16	SCREW					
17	SEEGER RING					
18	STEERING BASE					
19	SCREW					
20	LEFT RADIAL STEM ASSEMBLY					
21	RIGHT RADIAL STEM ASSEMBLY					
22	SCREW					
23	SCREW					
24	SCREW					
25	COVER					
26	ABS SPEED SENSOR – REAR WHEEL					
27	SCREW					



FRONT FORK

FRONT FORK STEM REMOVAL

The following procedure is applied to both front fork stems.

Park:

- The bike on a level surface

NOTE:

Place the bike on a suitable support so that the front wheel is raised.

Remove:

- The front brake calliper (see procedure).
- Front wheel (see procedure)
- Front mudguard (see procedure)

Loosen:

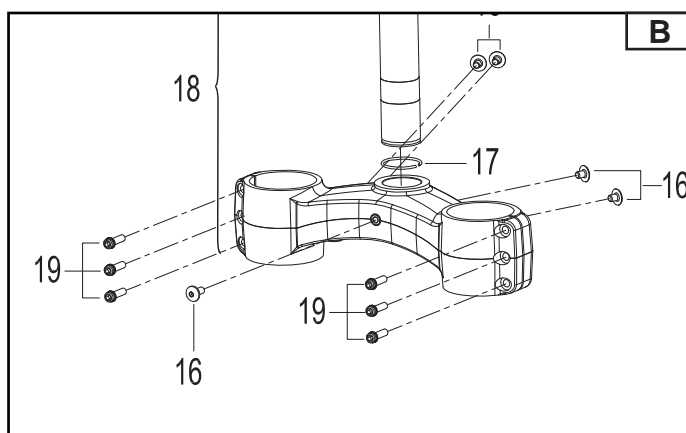
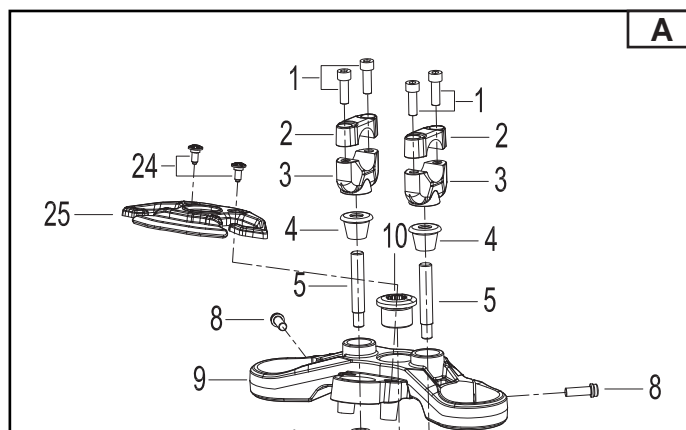
- the screws (8*) Fig. A
- the screws (19*) Fig. B

IMPORTANT NOTICE

Before loosening the setscrews on the top and bottom brackets, fit a support for the front fork stem.

NOTE:

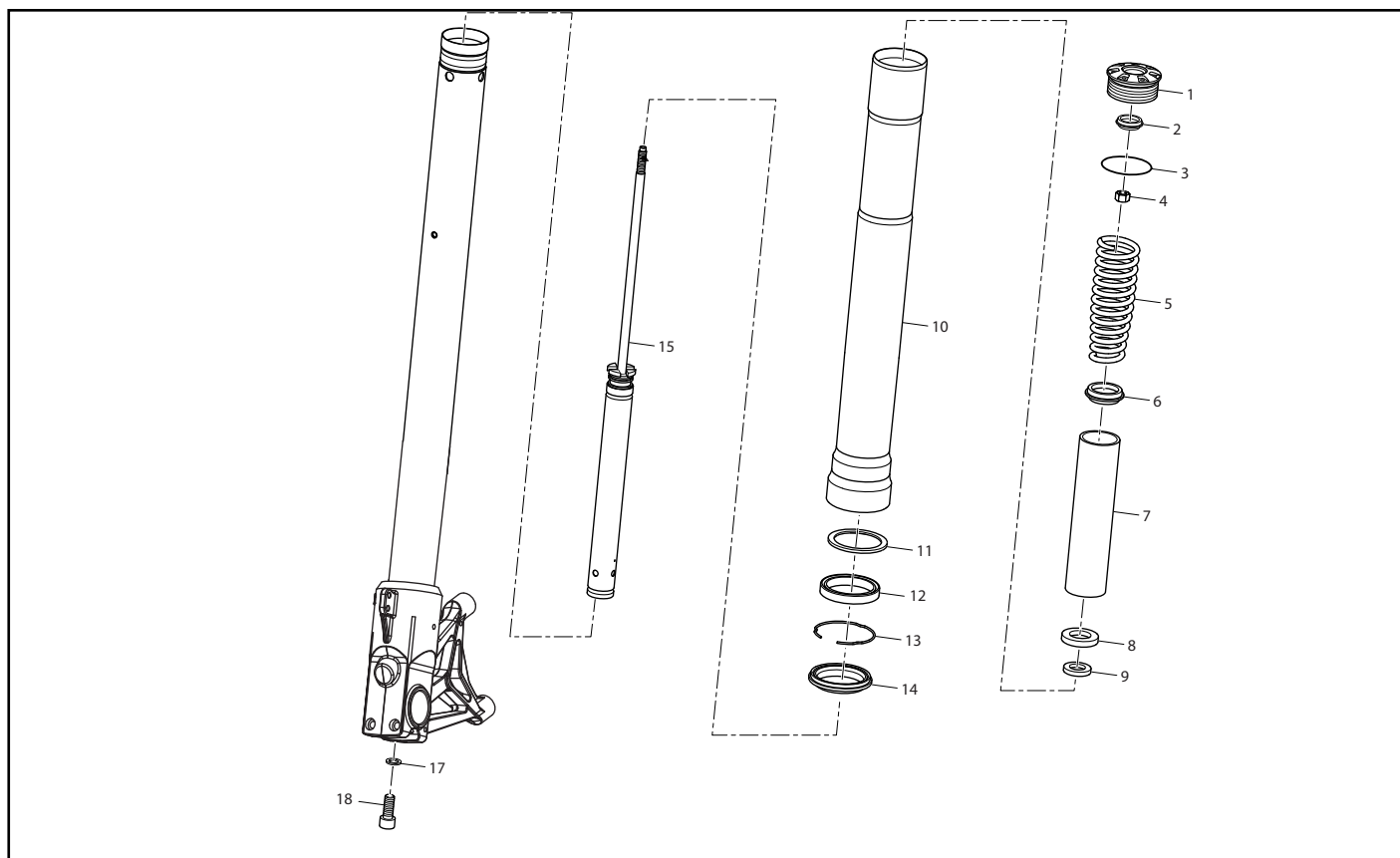
The numbers marked (*) are a part of the spare parts table of the chapter "Front fork", paragraph "Removal of the front fork stems".





FRONT FORK

FRONT FORK STEM DISASSEMBLY



Disassemble the pieces in the order listed.

NOTE:

The following procedure is applied to both front fork stems.

Secure:

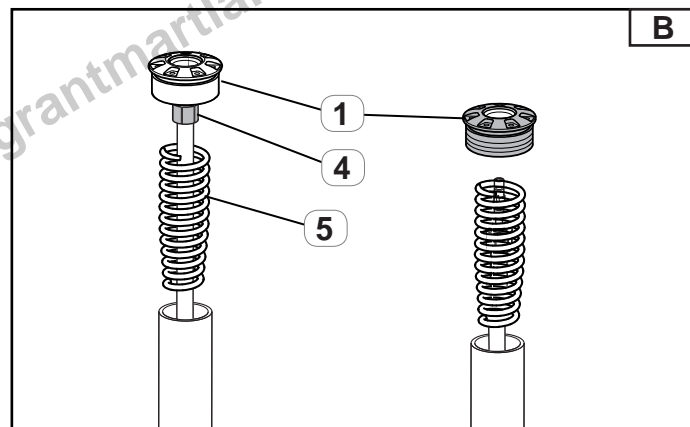
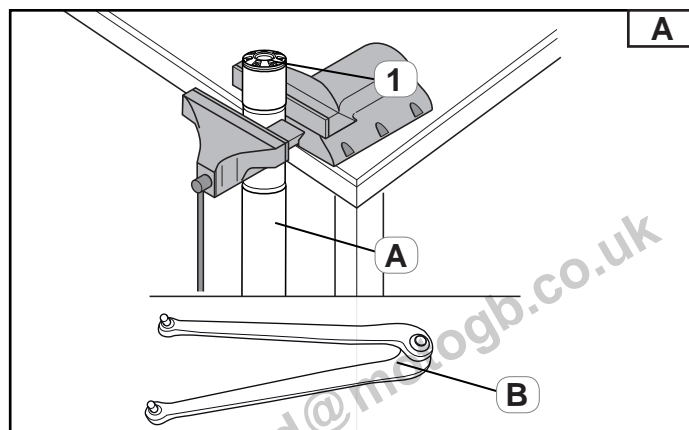
- The fork sleeve (10) in a clamp Fig. A
- Completely unscrew the cap assembly (1) from the support tube, using a 4 mm pin and hook wrench(B).
- Lower the fork sleeve (10).

IMPORTANT NOTICE

The fork spring is compressed.

Push down:

- The spring (5) Fig. B
- The preload shim so as to be able to insert a 17 mm wrench in the nut (4).
- Hold the cap assembly (1) in place with a 4 mm pin and hook wrench and use a 17 mm wrench to loosen the nut (4).
- Unscrew and remove the top cap assembly(1).





FRONT FORK

FRONT FORK STEM DISASSEMBLY

Slide out from inside the sleeve Fig. C:

- The tip (2)
- The spring (5)
- The bush (6)
- Shim (7)
- The lower bush (8)
- The tip (9).

Release:

- The rod from the clamp
- Turn the rod towards a suitably sized container so as to allow the oil it contains to flow out Fig. D.

NOTE:

To help drain the rod, it is necessary to pump a few times by pushing the pump rod forwards and backwards (15) Fig. D.

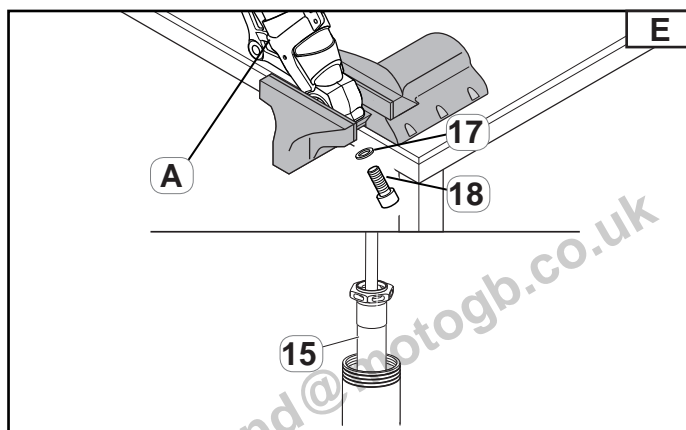
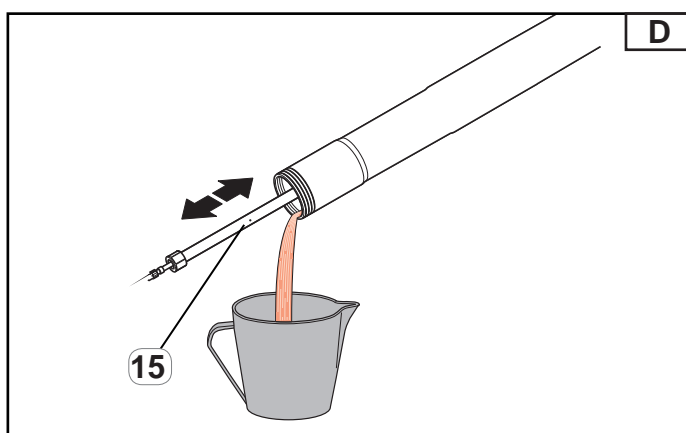
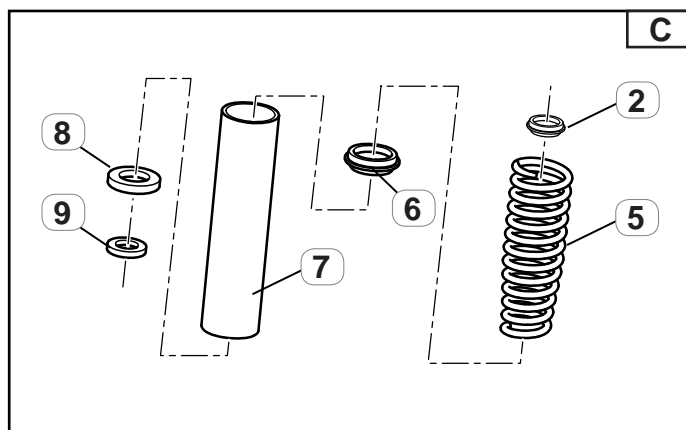
IMPORTANT NOTICE

This operation is only necessary after draining the oil from inside the rod.

- Lock the wheel shoe (A) in a clamp Fig. E.

Remove:

- The screw (18) fastening the pump unit (15)
- The washer (17)
- The pump unit (15)



FRONT FORK

FRONT FORK STEM DISASSEMBLY

IMPORTANT NOTICE

This operation is only necessary after completely draining the oil from inside the sleeve.

Remove:

- The dust seal (14) from the seat using a small flat-blade screwdriver Fig. F

Remove:

- The clip of the oil seal (13) using the small flat-blade screwdriver Fig. G.

Slide out:

- The fork stem (B) from the fork sleeve (10), Fig. H.

NOTE:

To separate these two elements, it is necessary to pull them apart with a little force.

- Oil seal (12)
- Retaining ring (11)
- The bottom guide bushing (8)

Manually remove:

- The top guide bushing (6)

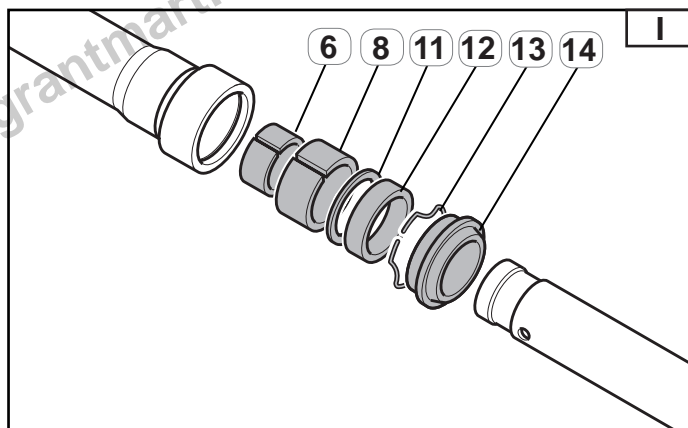
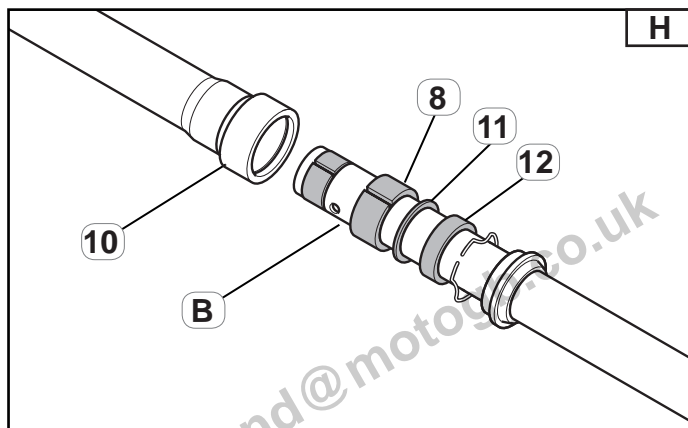
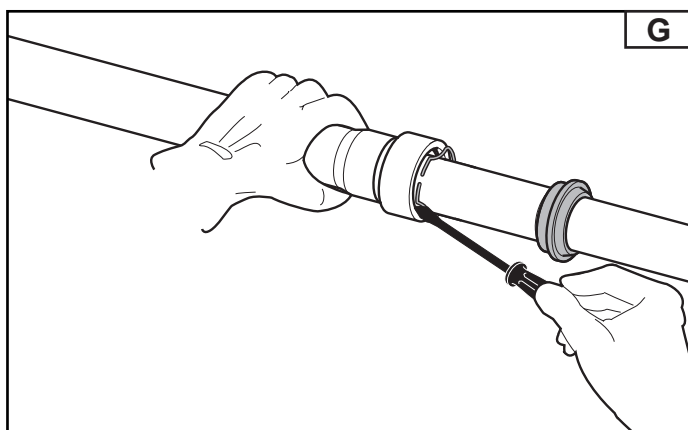
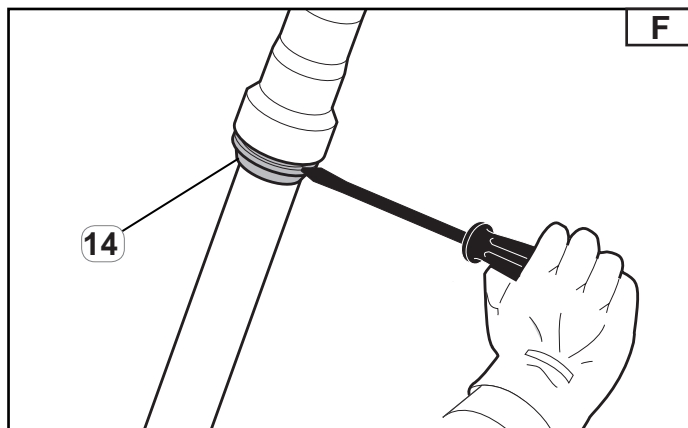
NOTE:

If this operation becomes difficult, it is possible to use a flat-head screwdriver in the slot in the bushing, to make it easier.

- The bottom guide bushing (8)
- Retaining ring (11)
- Oil seal (12)
- Dust seal clip (13)
- Dust seal (14)

NOTE:

Once the oil and dust seals have been removed, they may not be re-used.





FRONT FORK

FRONT FORK STEM INSPECTION

The following procedure is applied to both front fork stems.

Check:

- Fork stem "A" Fig. A
- The fork sleeve (10).

If there is any deformation/damage/wear, replace.

WARNING

Do not try to straighten the inner fork if bent, since it will become weaker with time and could be dangerous.

Measure:

- The full length (B) of the spring (5). If outside specifications, replace.



Detail	The full length of the spring.
Spring	295 mm

Check:

- Damper shaft (15) Fig. C

If there is any damage or wear, replace.

If there are any obstructions, free all oil passages with compressed air.

IMPORTANT NOTICE

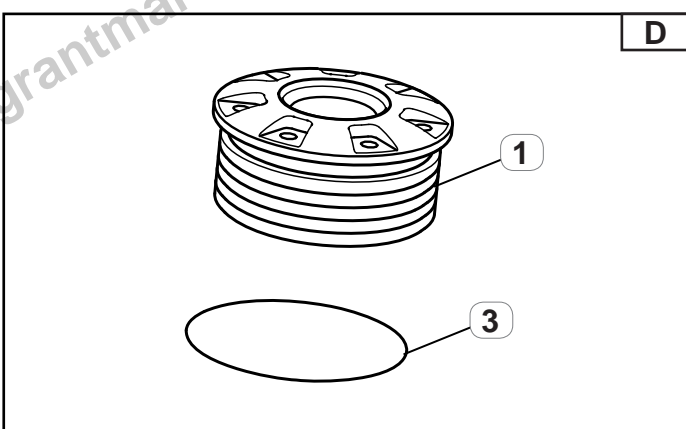
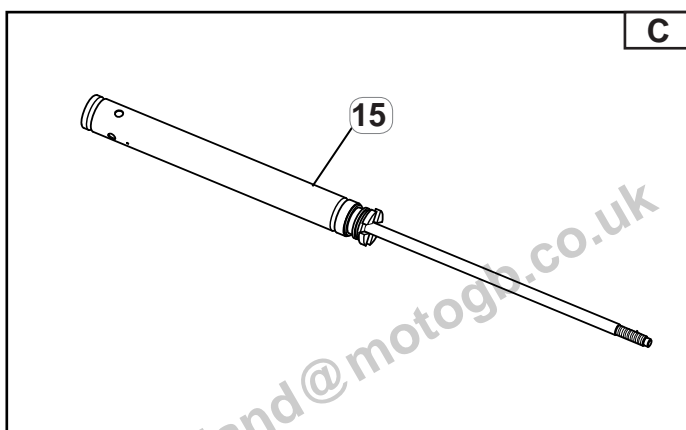
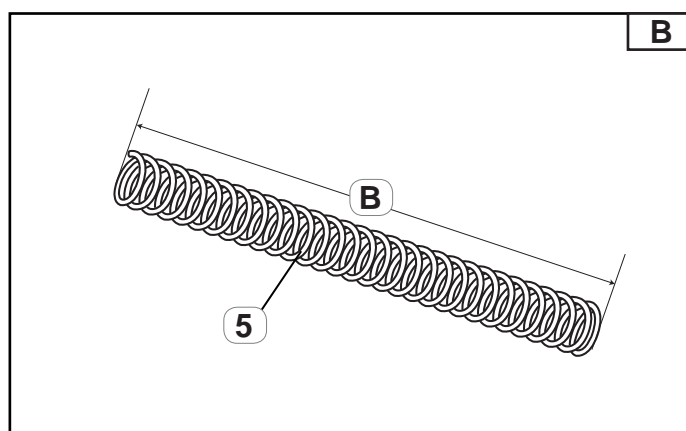
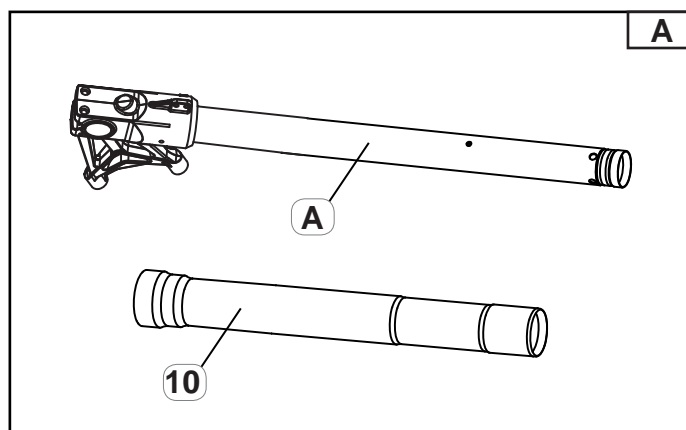
The pump unit contains elements that are very sensitive to foreign bodies.

While disassembling and refitting the front fork stem, never let foreign bodies enter the front fork.

Check:

- O-Ring (3) of the cap (1) Fig. D

If there is any damage or wear, replace.



FRONT FORK

FRONT FORK STEM ASSEMBLY

The following procedure is applied to both front fork stems.

IMPORTANT NOTICE

The oil and dust seals must not be reused after removal. Before refitting, check the condition of bushings and guides; check the guide bushings; if they are lined or scratch, replace them. Check the Teflon coating on the guide bushes as this must be integral.

Apply adhesive tape to the end of the supporting tube

- So as to cover the seat for the bushing.
- Slightly lubricate the oil and dust filters with grease.

Insert the dust seal Fig. B:

- Dust seal (14)
- Dust seal clip (13)
- Oil seal (12)
- Retaining ring (11)
- The bottom guide bushing (8)

IMPORTANT NOTICE

Take note of the direction in which the oil filter is facing (12) as it needs to be inserted with the hollow part facing the retaining ring (11).

- Remove the adhesive tape applied at the end of the fork stem, together with any traces of adhesive remaining.

Insert:

- The upper guide bush (6) Fig. C using the appropriate tool "X" Fig. C:



(**) Tool for stem guide bush insertion

NOTE:

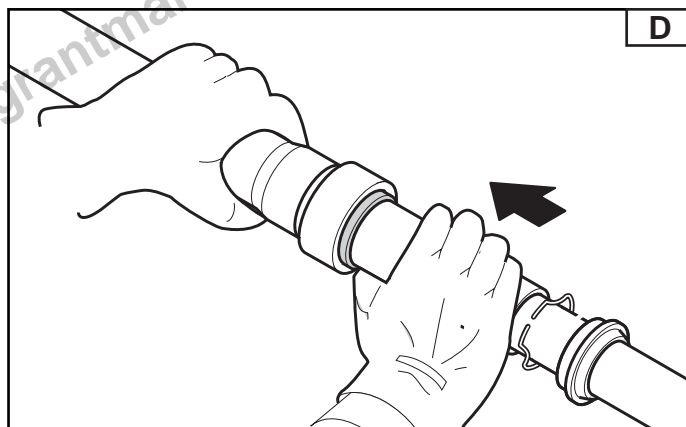
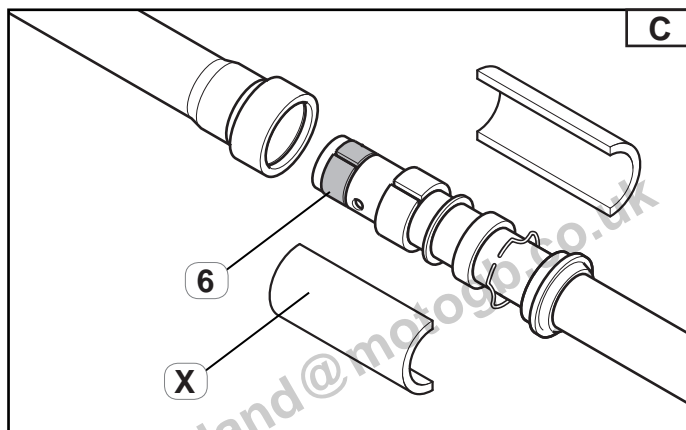
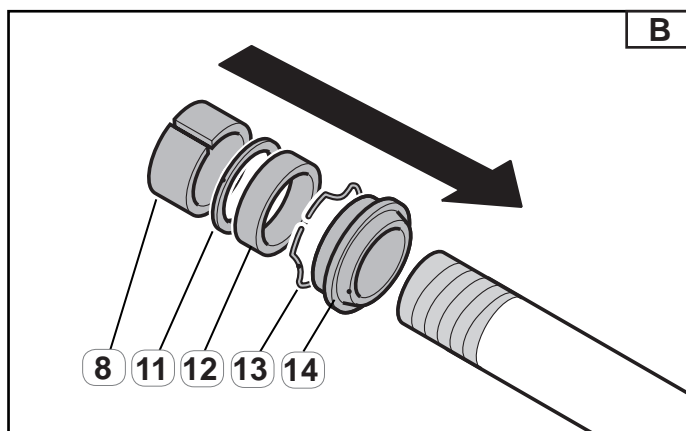
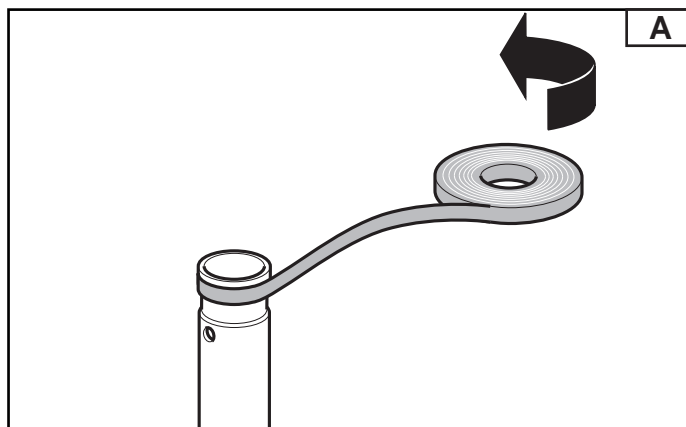
If this operation becomes difficult, it is possible to use a flat-head screwdriver in the slot in the bushing, to make it easier.

- Insert the fork stem into the sleeve, very gently to make sure it does not damage the top guide bushing.

Accompany:

- The bottom guide bushing (8) as far as sleeve contact with the fork Fig. D
- Retaining ring (11)
- Oil seal (12)

Then place them in the seat.





FRONT FORK

FRONT FORK STEM ASSEMBLY

Assemble:

- The clip on the oil seal (13) using a small flathead screwdriver, making sure that it is perfectly inserted into the special raceway and taking care not to scratch the fork stem Fig. E.

Then place the following in the seat:

- The dust seal (14) by pressing down manually Fig. F.

Insert:

- The assembled pump unit (15) into the fork sleeve (10) Fig. G.
- Fit the fork in a clamp by the wheel foot Fig. H.
- Lower the fork sleeve over the stem.

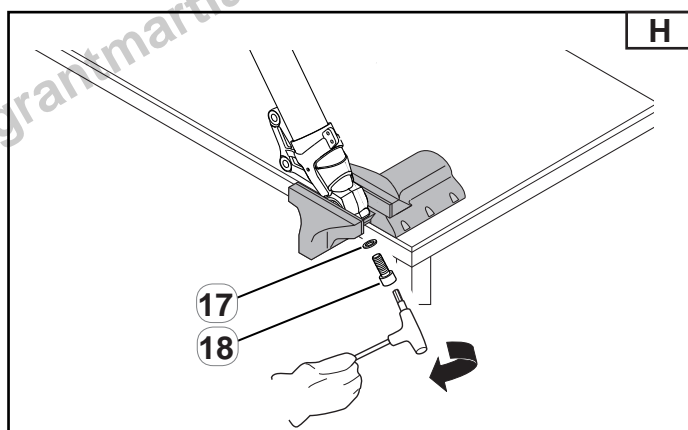
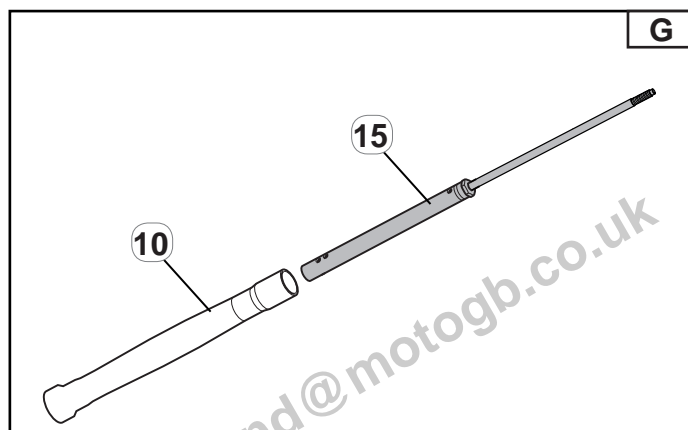
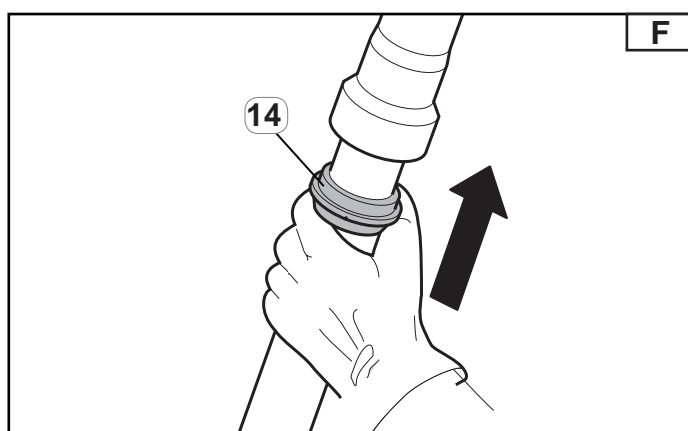
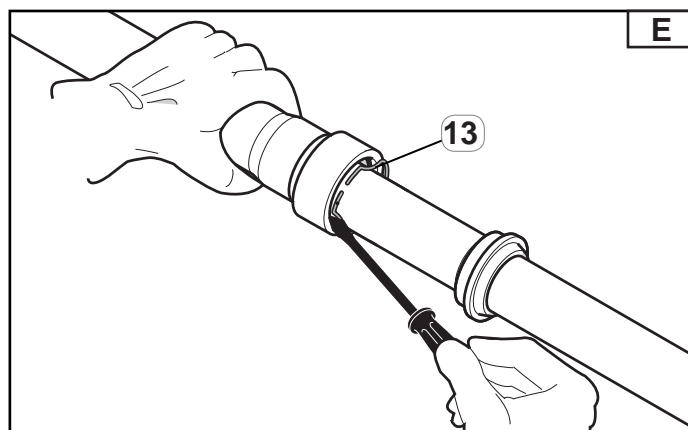
Insert:

- The washer (17)
- The screw (18) fastening the pump unit.

Use an 8 mm Allen key to tighten to the following torque:



Torque 50 N*m



FRONT FORK

FRONT FORK STEM ASSEMBLY

- Lift the fork sleeve completely Fig. I
- Using a graduated measuring container, prepare the correct amount of oil to be poured into the stem Fig. I.
- Pour about 2/3 of the oil into the fork sleeve (A), then pump the fork to eliminate any air.
- Continue pouring up to the required amount.
- Lower the fork sleeve over the stem as far as the dust seal stop on the wheel foot.
- Wait a few minutes and check the air volume then top up if necessary.

IMPORTANT NOTICE

A lower or higher air volume or a different type of oil to that recommended may change the behaviour of the fork at every stage.

Insert the following into the fork sleeve:

- Spring tip (2)
- Fork spring (5)
- Top spring guide bushing (6)
- Shim (7)
- Bottom spring guide bushing (8)
- Spring tip (9)

IMPORTANT NOTICE

**In the same direction as spring insertion.
The narrowest section must be facing upwards.**

Screw the following fully:

- Closing cap (1) Fig. M

Push down:

- The spring (5) Fig. N
- The preload shim
- Insert a 17 mm wrench in the nut (4).
- Hold the cap in place with a 4 mm pin and hook wrench and use a 17 mm wrench to tighten the nut.
- Tighten to the following torque:



Torque 20 N*m

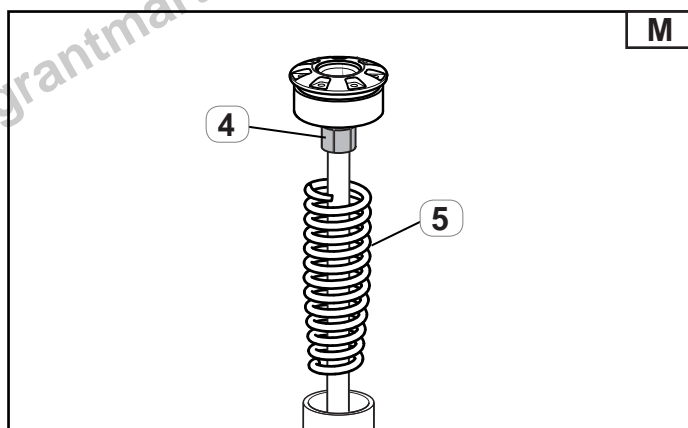
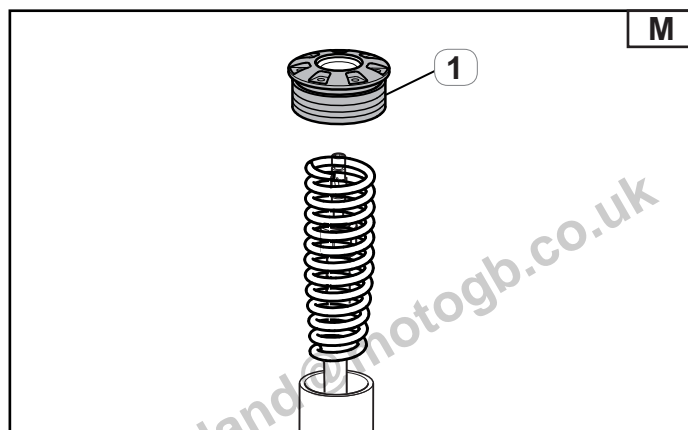
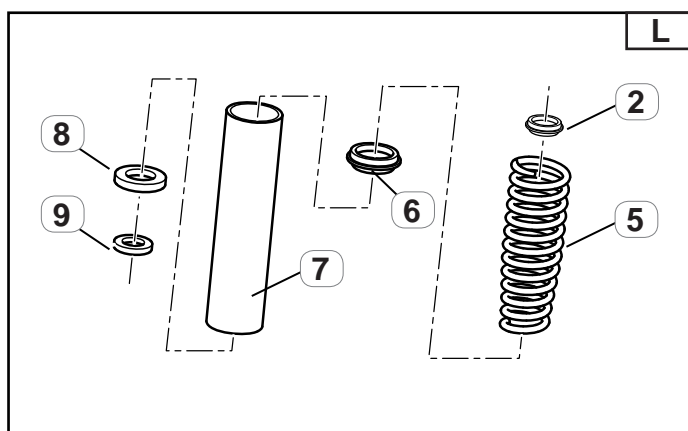
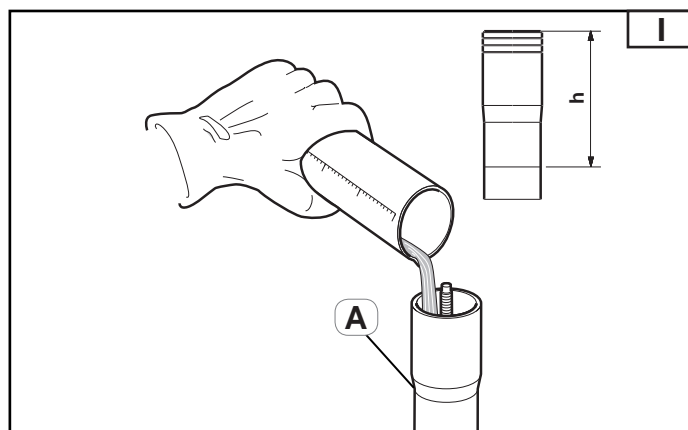
- Lift the fork sleeve over the stem.

Secure:

- The fork sleeve in a clamp
- Hold the cap in place with a 4 mm pin and hook wrench and tighten to the following torque:



Torque 20 N*m





FRONT FORK

FRONT FORK STEM FITTING

The following procedure is applied to both front fork stems.

Install:

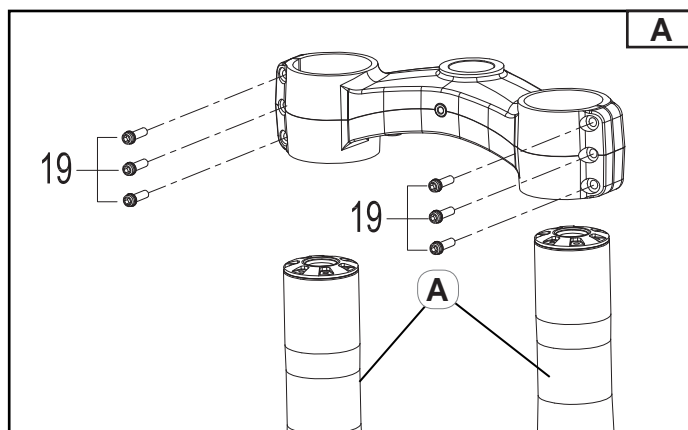
- The stems of the front fork (A) Fig. A.

tighten provisionally:

- The stop screws (19*) of the lower steering plate Fig. A.

NOTE:

Check the assembly quota "x" Fig. B that must be taken considering the lower part of the steering base (18*) and the final part of the steering stem (with the exclusion of the thickness of the dust seal)



Tighten:

- The stop screws of the lower steering plate (19*) to the following torque pressure:



Torque 8 N*m

NOTE:

Tighten in three steps.

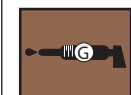
Tighten:

- The stop screws (8*) of the upper steering plate (9*) Fig. C to the following torque pressure:

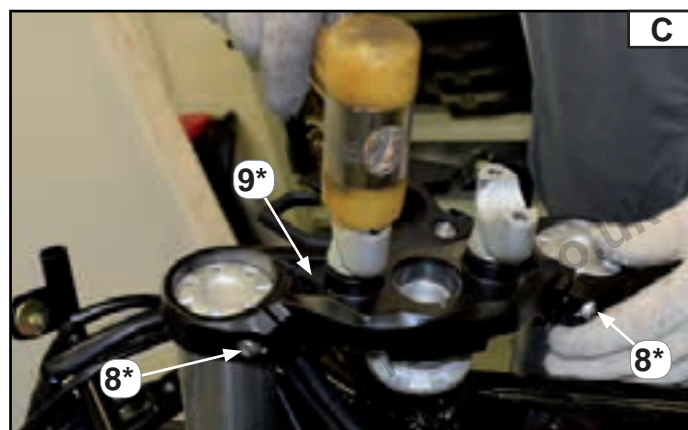
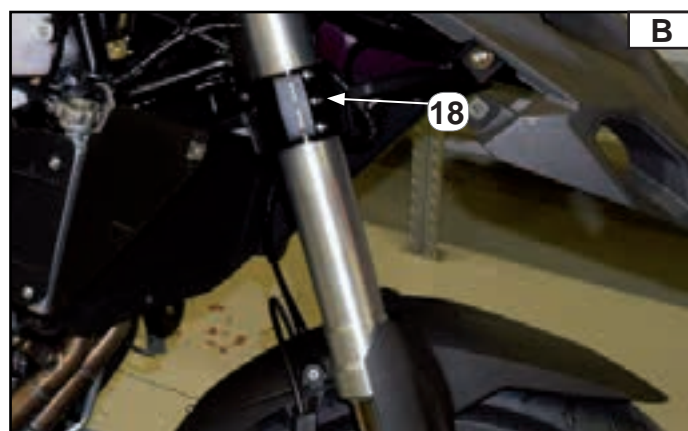


Torque 22 N*m

recommended lubricant



MR2 TUTELA grease



IMPORTANT NOTICE

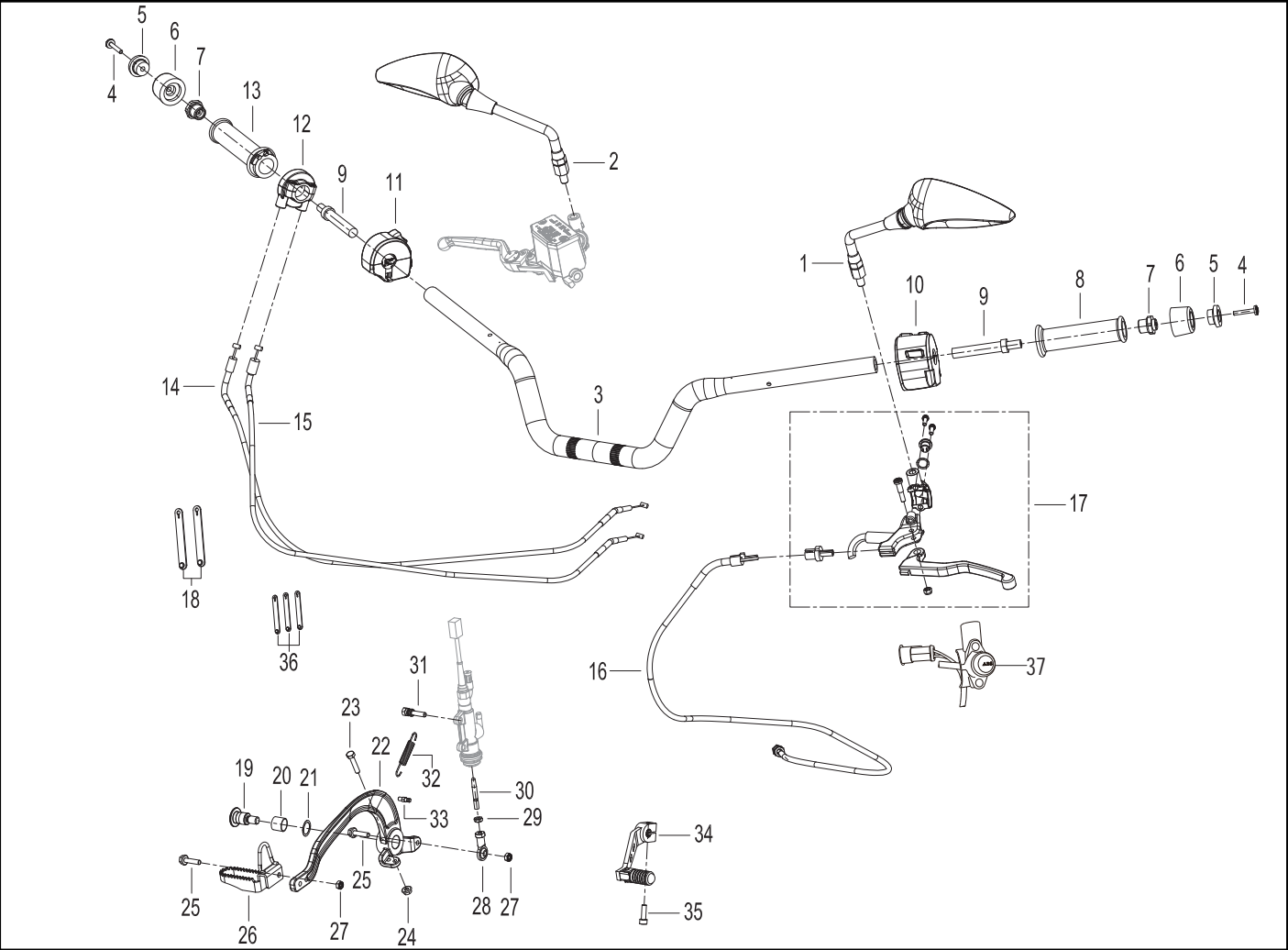
Check that the path of the brake hoses is correct.

NOTE:

The numbers marked (*) are a part of the spare parts table chapter "Front fork", paragraph "Removal of the front fork stems".

HANDLEBAR

HANDLEBAR REMOVAL



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	REAR VIEW MIRROR (LEFT)					
2	REAR VIEW MIRROR (RIGHT)					
3	HANDLEBAR					
4	SCREW					
5	GRIP CAP					
6	GRIP END					
7	THREADED INSERT					
8	LEFT HANDGRIP					
9	THREADED INSERT					
10	LEFT LIGHT COMMUTATOR SWITCH					
11	RIGHT LIGHT COMMUTATOR SWITCH					
12	ACCELERATOR CONTROL					
13	ACCELERATOR CONTROL HOSE					
14	FUEL OPEN CABLE					
15	FUEL CLOSE CABLE					



HANDLEBAR

HANDLEBAR REMOVAL

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
16	CLUTCH CABLE					
17	CLUTCH CONTROL					
18	RUBBER CLIP					
19	SCREW					
20	BUSHING					
21	ELASTIC WASHER					
22	BRAKE PEDAL					
23	SCREW					
24	NUT					
25	SCREW					
26	BRAKE PEDAL					
27	NUT					
28	BALL JOINT					
29	NUT					
30	REGISTER ROD					
31	SCREW					
32	RETURN SPRING					
33	THREADED PIN					
34	GEAR PEDAL					
35	SCREW					
36	TUBE GUIDE					
37	ABS SWITCH					

HANDLEBAR

HANDLEBAR REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

NOTE:

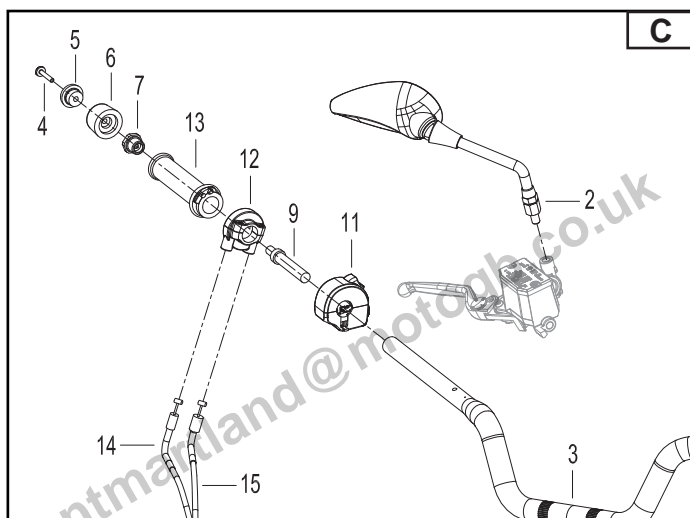
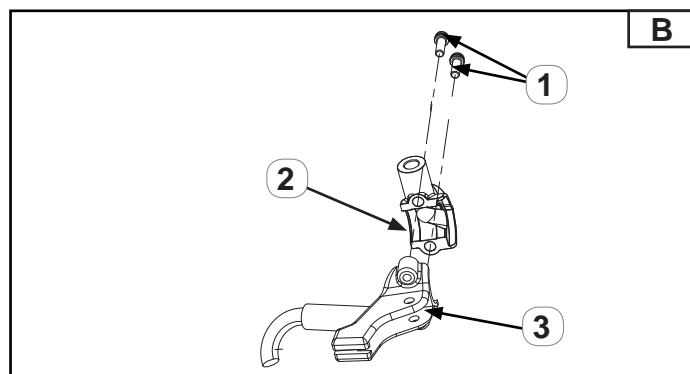
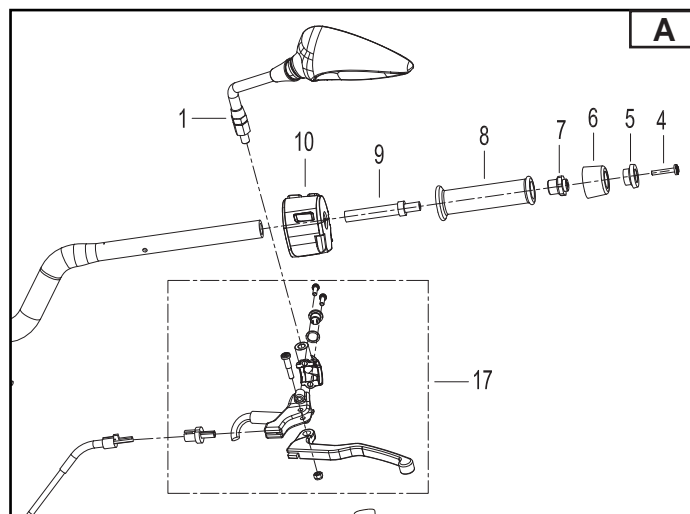
Direct a jet of compressed air between the left of the handlebar and the relevant grip, so that it can be slid off the handlebar gradually.

Remove:

- right rear-view mirror (2*) and left rear-view mirror (1*)
- screws (4*) Fig. A
- cap (5*) Fig. A
- handgrip terminal (6*) Fig. A
- threaded insert (7*) Fig. A
- threaded insert (9*) Fig. A
- left handgrip (8*) Fig. A
- screws (B) left commutator switch (C) Fig. B
- left commutator switch (10*) Fig. A
- screws (1) clutch control Fig. B
- U-clamp (2) clutch control (3) Fig. B
- clutch control (17*)

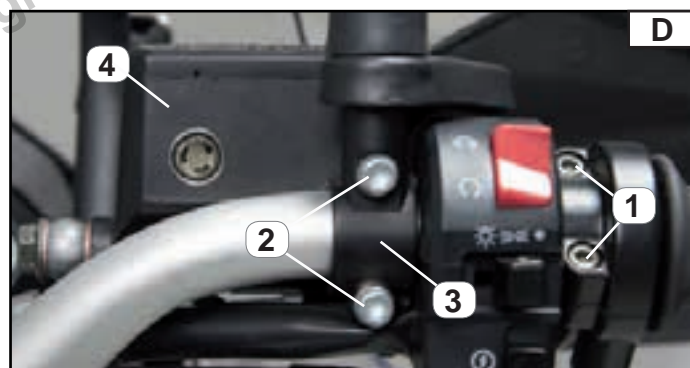
NOTE:

Disconnect the connector of the LEFT STOP light switch



Remove:

- right commutator switch screws
- Right commutator switch (11*)
- screws (1) Fig. D accelerator control (12*)
- accelerator control (12*)
- Accelerator handgrip (13*)
- Fuel open cable (14*)
- Fuel close cable (15*)
- the screws (2) Fig. D brake pump
- U-clamp (3) brake pump (4) Fig. D.



Remove:



HANDLEBAR

HANDLEBAR REMOVAL

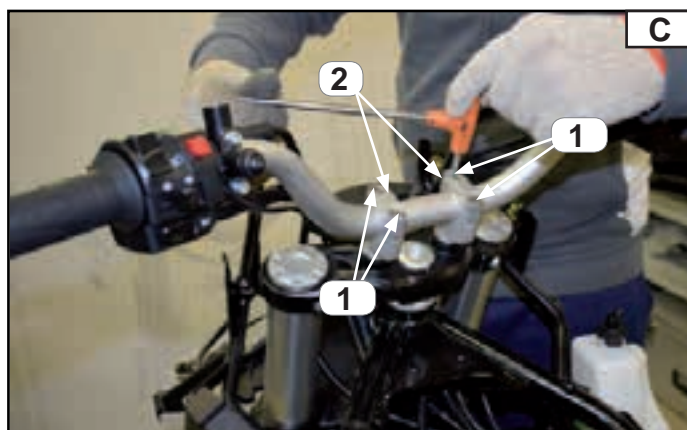
- screws (1) handlebar u-clamp (2) Fig. C

Detach:

- the handlebar (3*)

NOTE:

The numbers marked (*) are a part of the spare parts table chapter "Handlebar".



HANDLEBAR

HANDLEBAR INSPECTION

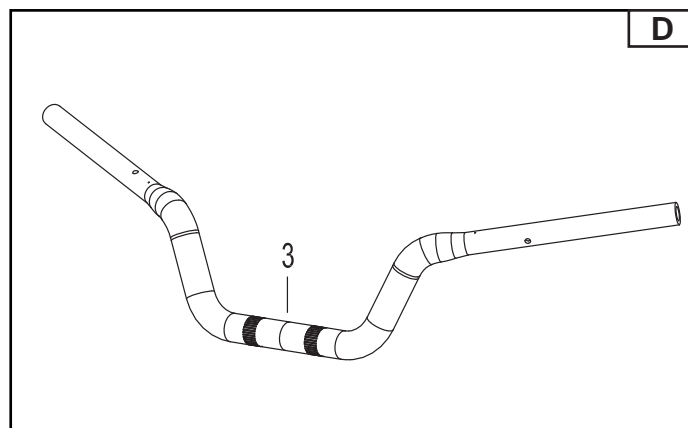
Check:

- Handlebar (3) Fig. D

If there is any warping/cracking/damage, replace.

WARNING

Do not try to straighten the handlebar if bent, since it will become weaker and could be dangerous.





HANDLEBAR

HANDLEBAR INSTALLATION

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Proceed to install, following the steps for removal in reverse order, but taking care to observe the instructions below:

Install:

- Right commutator switch (11*)

NOTE:

Align the projections (A) of the switch with the hole (B) on the right side of the handlebar.

- Front brake pump; tighten to the following torque pressure:



Torque 8 N*m

NOTE:

Install the brake pump clevis with "UP" facing upwards Fig. F, tighten the upper screw first then the lower screw.

- Accelerator handgrip (13*)
- accelerator control (12*)
- fuel open cable (14*)
- fuel close cable (15*)
- clutch control (17*), tighten to the following torque:



Torque 8 N*m

- left selector switch (10*)
- left handgrip (8*)
- handgrip terminal (6*)
- right rear-view mirror (2*) and left rear-view mirror (1*)

Position the handlebar:

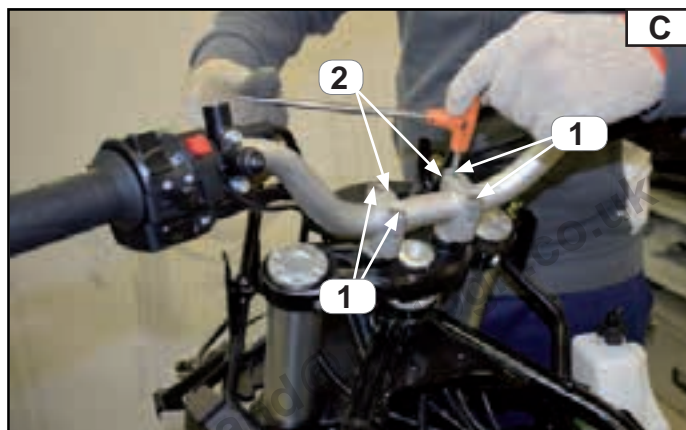
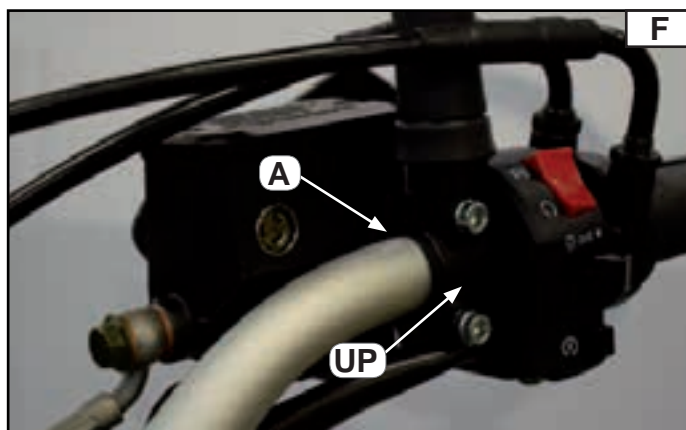
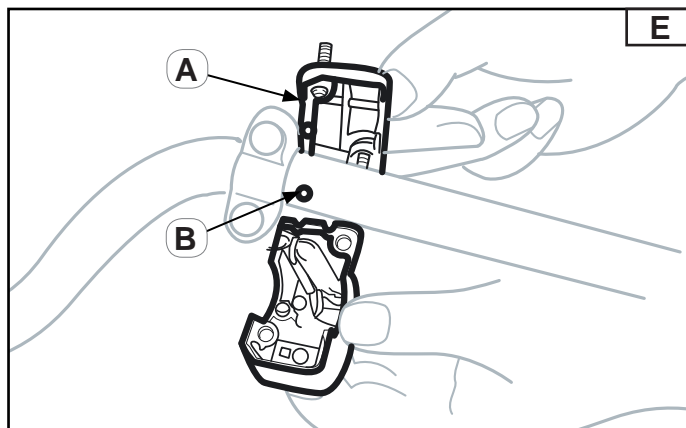
- handlebar (3*)
- U-clamp (2) of the handlebar (3*)
- screws (1), tighten to the following torque:



Torque 22 N*m

NOTE:

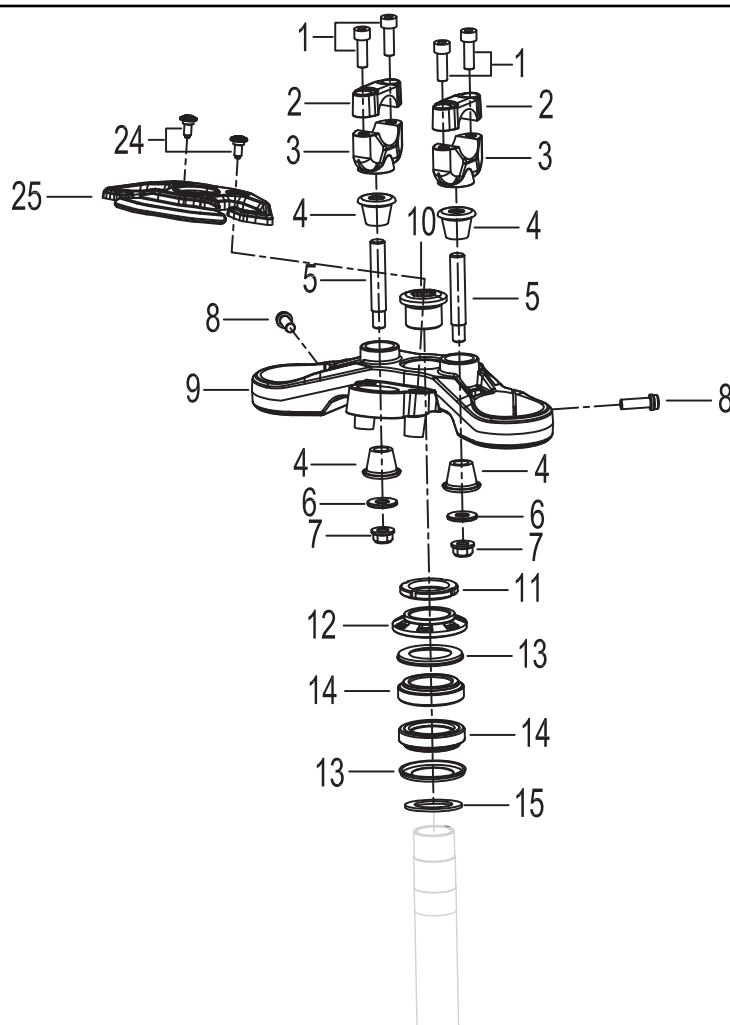
The numbers marked (*) are a part of the spare parts table chapter "Handlebar".





STEERING HEAD

REMOVAL OF THE TOP AND BOTTOM STEERING BASE

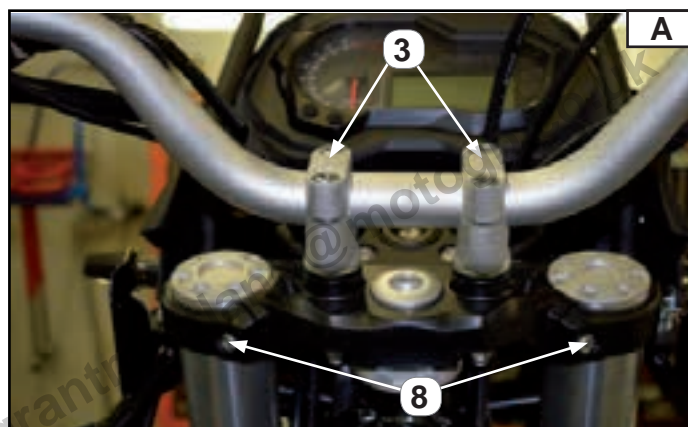


IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove the parts in the indicated order.

- **Removal of the mobile and fixed head light fairing** (Refer to paragraph)
- **Removal of the front wheel** (Refer to paragraph)
- **Removal of the front fork stems** (Refer to paragraph)
- **Removal of the mudguard** (Refer to paragraph)
- **Removal of the handlebar** (Refer to paragraph)
- The screws (8*) Fig. A
- the two upper u-clamps (3*)





STEERING HEAD

REMOVAL OF THE TOP AND BOTTOM STEERING BASE

Remove:

- The cap (10) using the special tool (A) Fig. B



(**) steering head wrench

Code: R300097146000

Pull out the upper steering base.

Loosen:

- the steering pin ring nut (B)
- the steering ring nut (C) using the steering lock nut spanner (D)

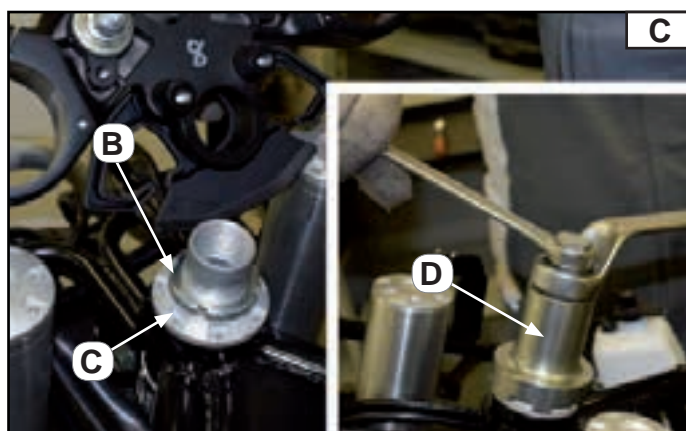
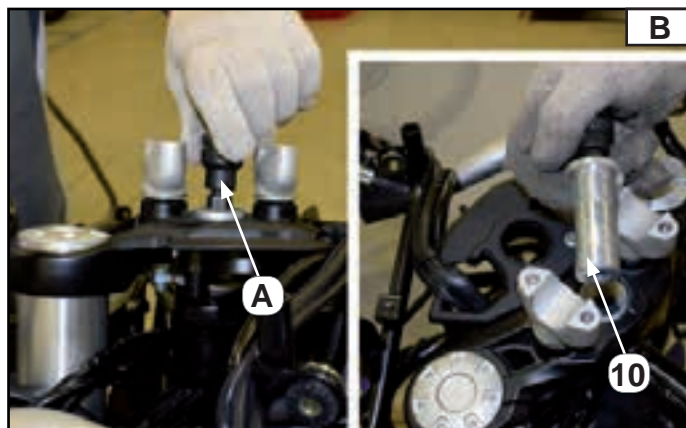


(**) Tool to tighten the steering sleeve lock nut

Code: R180297129000

WARNING

Firmly support the bottom steering base, so that it cannot fall.



STEERING HEAD

TOP AND BOTTOM STEERING BASE INSPECTION

Wash:

- The bearings
- The bearing tracks



RECOMMENDED SOLVENT
TUTELA MOTOR CLEAN

Check:

- The bearings (14) Fig. A
 - Dust seal rings (13) Fig. A
- If there is any spotting/damage, replace.

Replace:

- The bearings
- The bearing tracks
- Remove the outer races of the ball bearings (A) from the steering tube utilising a long rod and a hammer (B) Fig. B.
- Remove the outer race of the ball bearing (C) from the lower bracket using a chisel (D) and a hammer Fig. B.
- Fit a new rubber gasket and new bearing tracks.

IMPORTANT NOTICE

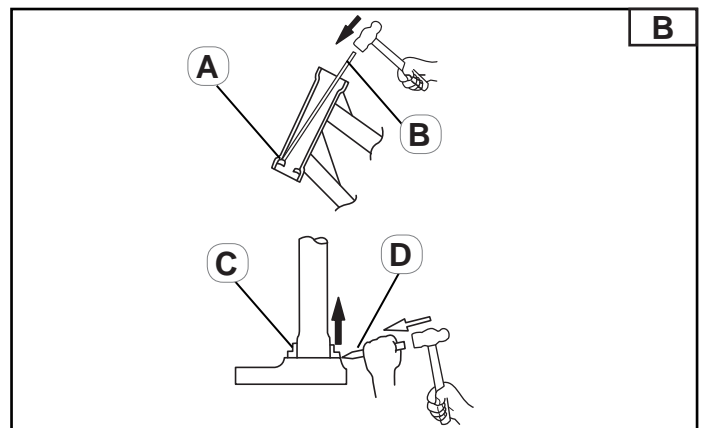
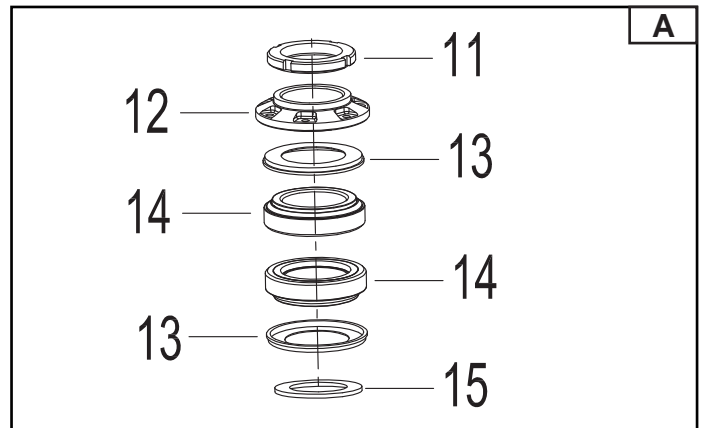
If the bearing track is not correctly fitted, this could damage the steering head tube.

NOTE:

- The ball bearings and the relative races must always be substituted together and greased as necessary Fig. C.
- Every time the steering sleeve is removed, a new rubber gasket must be fitted.

Check:

- The top steering base.
 - The bottom steering base (along with the sleeve).
- If there is any warping/cracking/damage, replace.





STEERING HEAD

TOP AND BOTTOM STEERING BASE FITTING

Lubricate:

- The bearings Fig. A.
- The dust seal rings Fig. A.
- The races of the bearings Fig. A.



RECOMMENDED LUBRICANT
MR2 TUTELA GREASE

Install:

- The steering ring nut (2) Fig. C using the special tool to the following torque:



Torque 16 N*m



(**) Tool to tighten the steering sleeve lock nut
Code: R180297129000

IMPORTANT NOTICE

Do not overtighten the steering ring nut.

- the steering ring nut (1) Fig. C
- Position the upper steering base (9*) Fig. B
- the cap (4*) Fig. B (using the special tool) and tighten to the following torque pressure:



Torque 60 N*m

- the set screws (3*) Fig. B to the following torque pressure:

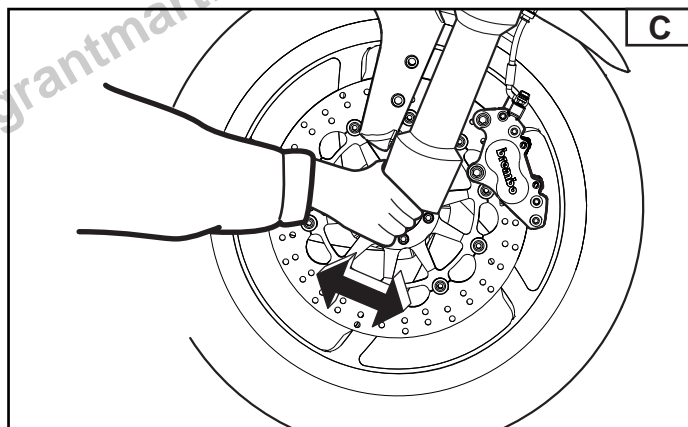
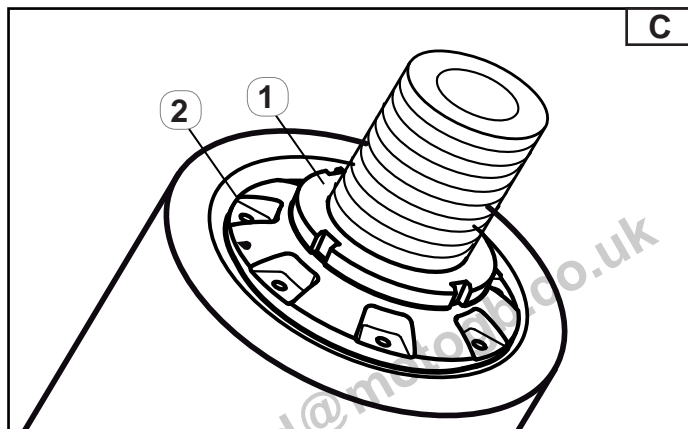
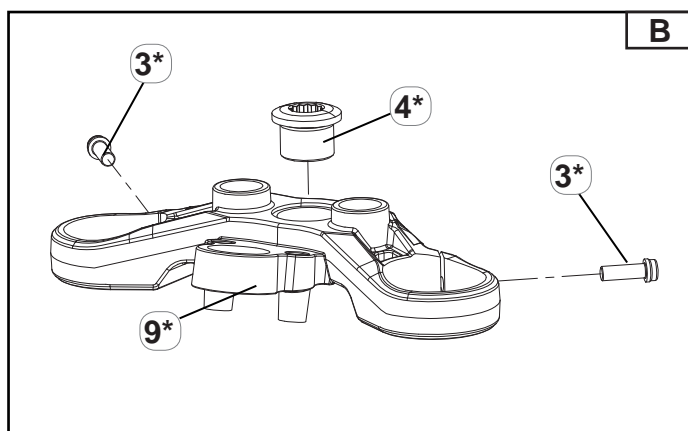


Torque 22 N*m

Check:

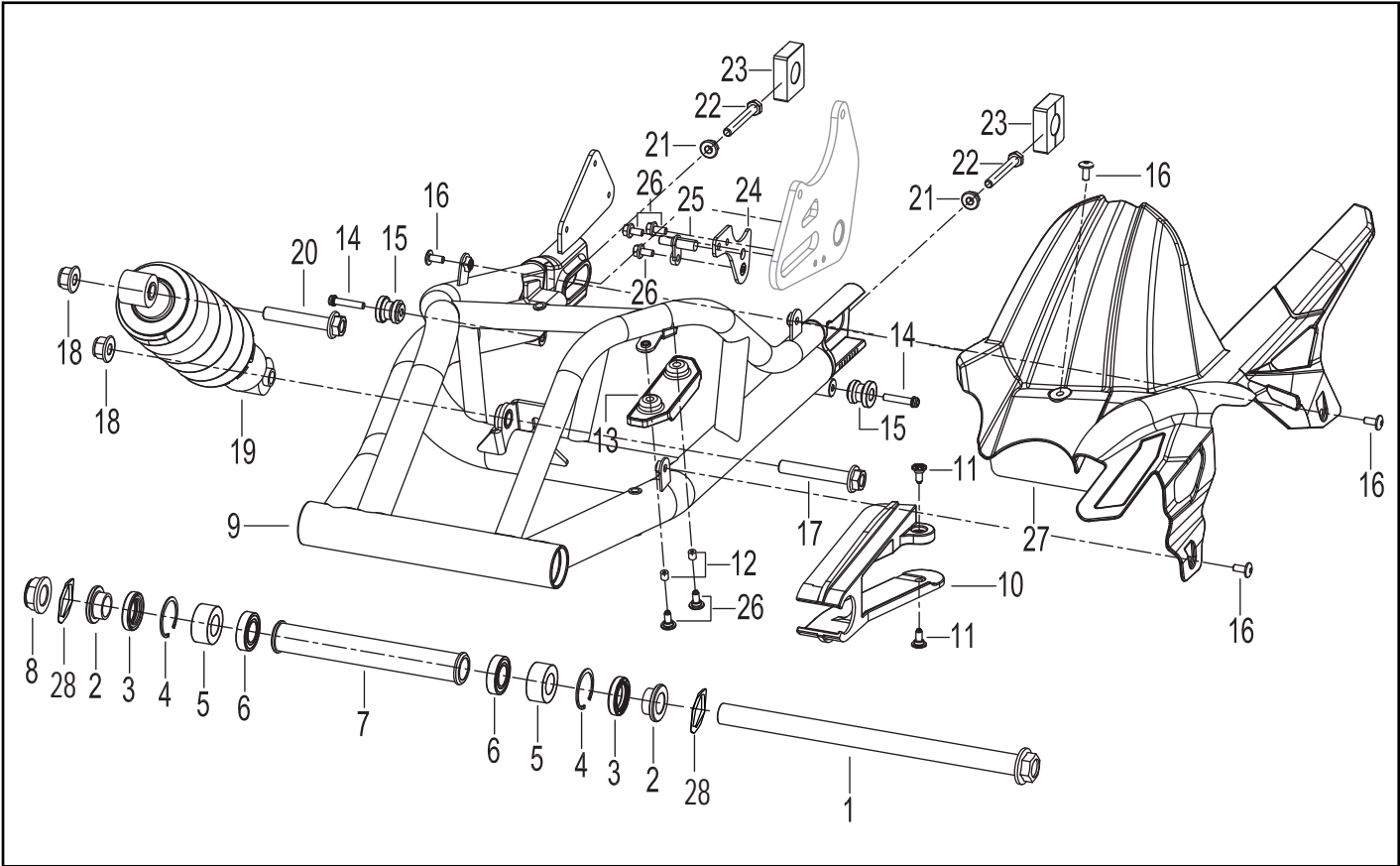
- The steering sleeve Fig. C.

Gently oscillate the front fork, holding it by the ends of the tubes.
If there is any jamming/loosening, adjust the steering sleeve.



REAR SHOCK ABSORBER

REAR SHOCK ABSORBER REMOVAL



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SWINGING ARM PIN					
2	BUSHING					
3	OIL SEAL					
4	SEEGER RING					
5	BEARING					
6	BEARING					
7	INTERNAL SHIM					
8	NUT					
9	SWINGING ARM					
10	CHAIN SLIDE					
11	SCREW					
12	SHIM					
13	VIBRATION DAMPING RUBBER					
14	SCREW					
15	GUIDE BUSHING					
16	SCREW					
17	SCREW					
18	NUT					
19	REAR SHOCK ABSORBER					



REAR SHOCK ABSORBER

REAR SHOCK ABSORBER REMOVAL

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
20	SCREW					
21	NUT					
22	SCREW					
23	CHAIN TENSIONER SLIDE					
24	PLATE					
25	ABS PHONIC WHEEL SENSOR – REAR WHEEL					
26	SCREW					
27	CHAIN COVER					
28	WASHER					

REAR SHOCK ABSORBER

REAR SHOCK ABSORBER REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter “Removal of the rider and passenger seat, Chapter 4”.
- Side fairings, see chapter “Removal of the side fairings, Chapter 4”.

IMPORTANT NOTICE

This rear shock absorber and the gas cylinder contain a highly compressed gas (nitrogen).

Before handling the rear shock absorber and the gas cylinder, carefully read the following information and ensure that you understand it.

The manufacturer cannot be held responsible for any damage to property or personal injuries deriving from the improper use of the rear shock absorber and the gas cylinder.

- Do not tamper with the rear shock absorber or the gas cylinder or try to open them.

- Do not expose the shock absorber or gas cylinder to open flames or other sources of extreme heat.

Elevated overheating could cause an explosion due to the excessive pressure of the gas.

- Do not deform or damage the rear shock absorber or the gas cylinder in anyway. If the rear shock absorber, gas cylinder or both are damaged, the damping performance will be prejudiced.

Remove:

- the screws (A) Fig. A
- The upper panels (B) on both sides, Fig. A
- the lower screw (17*) of the rear shock absorber unit Fig. B
- the relative nut (18*)

NOTE:

To remove the lower fixing screws of the rear shock absorber unit, hold the swinging arm to stop it from falling.

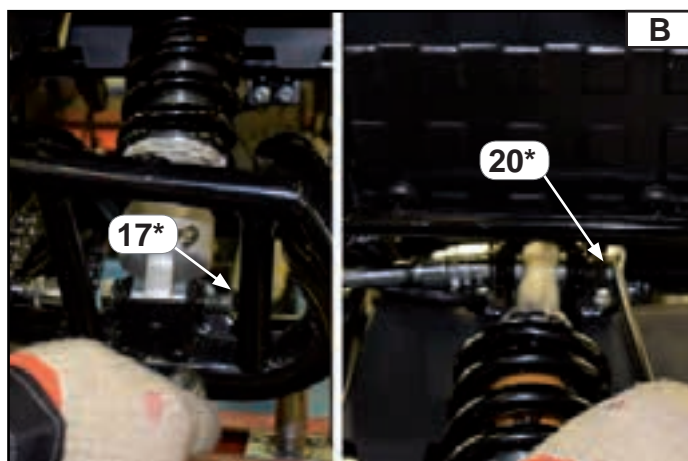
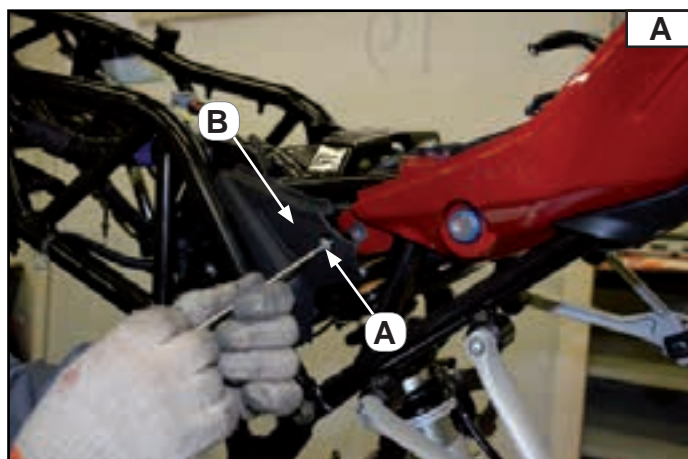
- the upper screw (20*) of the rear shock absorber unit Fig. B
- the relative nut (18*)

NOTE:

Lift the swinging arm, then remove the rear shock absorber unit from the attachment point on the swinging arm.

NOTE:

The numbers marked (*) are a part of the spare parts table chapter “Rear swinging arm”, paragraph “Removal of the rear shock absorber”.





REAR SHOCK ABSORBER

REAR SHOCK ABSORBER CHECK

Check:

- Rear shock absorber rod

]If there is any warping/damage, replace the rear shock absorber assembly.

- Rear shock absorber

]If there is any gas/oil leak, replace the rear shock absorber assembly.

- Spring

]If there is any damage/wear, replace the rear shock absorber assembly.

- Bushing

If there is any damage or wear, replace.

- Dust seal

If there is any damage or wear, replace.

- Screws

If there is any warping/damage/signs of wear, replace.





REAR SHOCK ABSORBER

REAR SHOCK ABSORBER FITTING

Lubricate:

- the spacers of the shock absorber unit
- the xing screws



RECOMMENDED LUBRICANT
MR2 TUTELA GREASE

Clean:

- the nuts of the rear shock absorber unit
- the screws of the rear shock absorber unit



RECOMMENDED SOLVENT
TUTELA MOTOR CLEAN

Install:

- the rear shock absorber unit

NOTE:

**Lift the swinging arm to install the rear shock absorber unit.
Insert the lower screw (17*) of the rear shock absorber unit.**

Tighten:

- the lower nut (18*) of the rear shock absorber unit Fig. D to the following torque pressure



Torque 80 N*m

Install:

- the upper screw (20*) of the rear shock absorber unit.

Tighten:

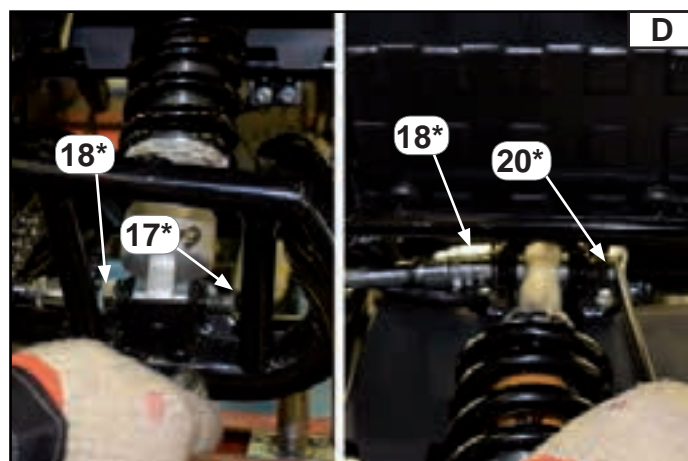
- the upper nut (18) of the rear shock absorber unit to the following torque:



Torque 80 N*m

NOTE:

The numbers marked (*) are a part of the spare parts table chapter "Rear fork", paragraph "Removal of the rear shock absorber".





TRANSMISSION CHAIN AND SWINGING ARM

TRANSMISSION CHAIN REMOVAL

NOTE:

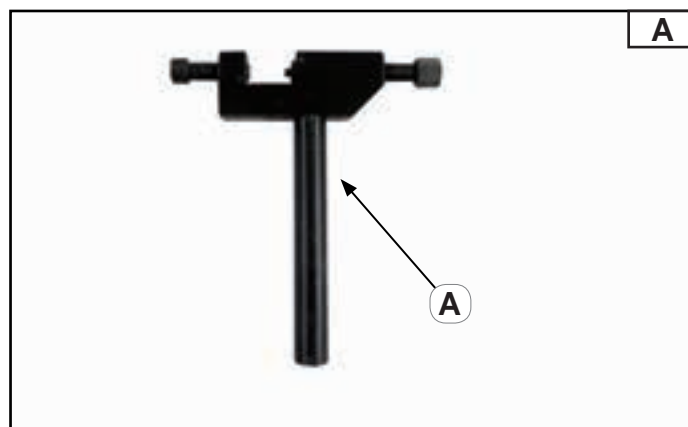
Prop the bike on suitable supports so that it cannot fall.

Remove the parts in the indicated order.

- Chain pinion cover, refer to chapter “Removal of the chain pinion cover, Chapter 4”.

Detach:

- The transmission chain (with a suitable tool for transmission chains (A) Fig. A, or with the dedicated tool according to the transmission chain manufacturer's specifications.



TRANSMISSION CHAIN AND SWINGING ARM

TRANSMISSION CHAIN REPLACEMENT

Loosen:

- The transmission chain

This chain uses a transmission chain with master link with safety clip link.

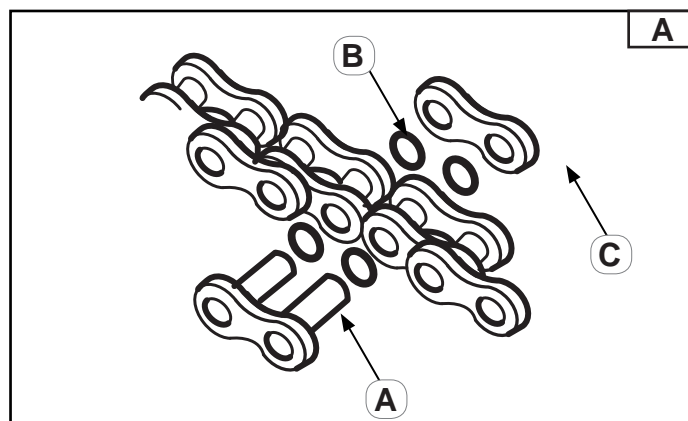
- Use the special tool, according to the chain manufacturer's specifications and the type of use required.

NOTE:

Follow the instructions of the manufacturer when using the special tool.

IMPORTANT NOTICE

Never reutilise the old transmission chain, the master link, the clip link of the master link and the O-rings.



Insert:

- The master link (A) Fig. A
- The O-Rings (B) Fig. A
- The clip link (C) Fig. A

IMPORTANT NOTICE

Insert the master link from inside the transmission chain, then fit the clip link with the ID mark facing out.

- Mount and fix the set of tools for the transmission chain.
- Ensure that the pins of the master link are mounted correctly.
- Rivet the master link pins laterally.
- Ensure that the pins are tapped correctly.

Check:

- The surface affected by the clinched master link.

This must have no apertures.

If there are apertures, replace the master link, seal rings and clip link.

IMPORTANT NOTICE

Never use a transmission chain with a clip master link.



TRANSMISSION CHAIN AND SWINGING ARM

REMOVAL OF THE SWINGING ARM

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove the parts in the indicated order.

- Rear mudguard, refer to chapter "Removal of the rear mudguard, Chapter 4".
- Rear shock absorber, refer to chapter "Removal of the rear shock absorber, Chapter 4".
- Rear brake calliper, refer to chapter "Removal of the rear brake calliper, Chapter 4".
- Rear wheel, refer to chapter "Removal of the rear wheel, chapter 4".

Remove:

- The complete swinging arm (9*)
- The swinging arm pin (1*)

NOTE:

Position a stand (B) to support the rear swinging arm (9*) Fig. A.

Remove:

- the rear brake tube ties (C) Fig. B
- the rear brake support
- the screw (17*) Fig. B
- the swinging arm pivot (1*) Fig. C.

IMPORTANT NOTICE

During the removal stage, the swinging arm bushes (2*) and the spacers (5*) could fall to the ground Fig. D.

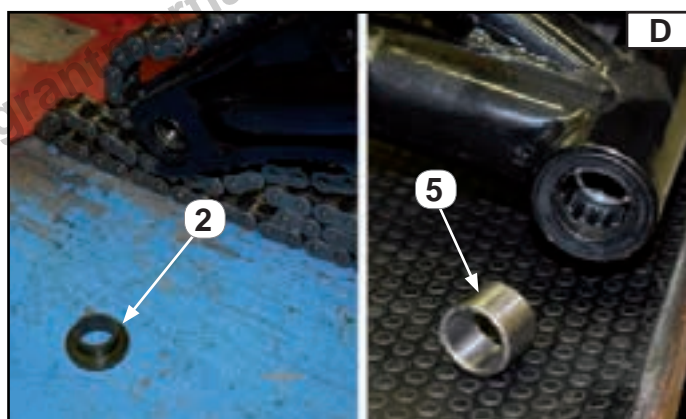
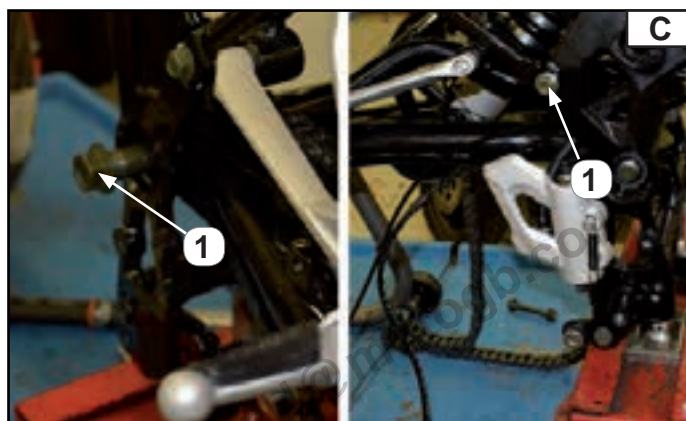
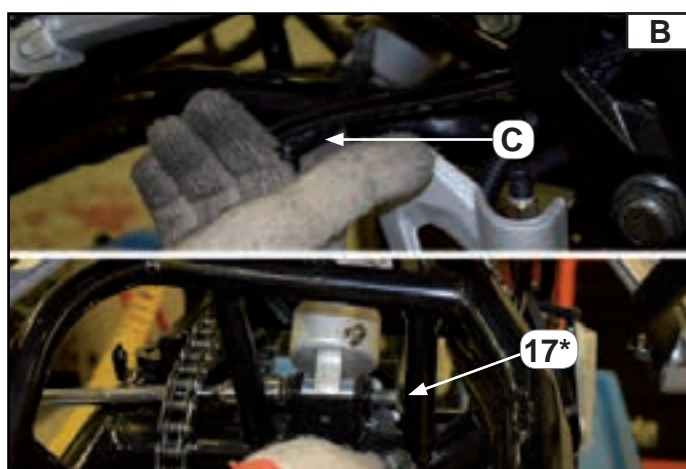
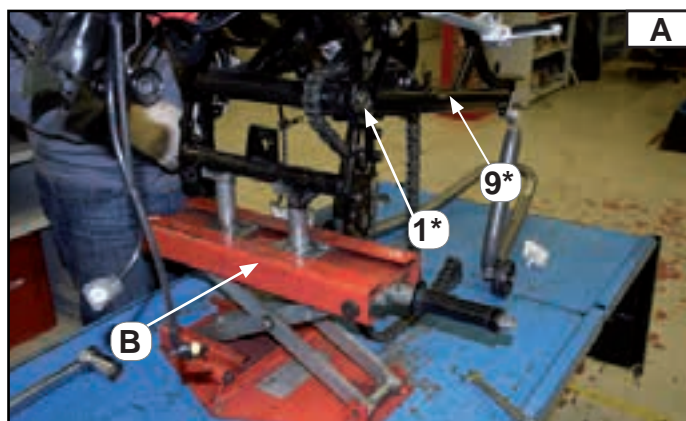
Utilise the appropriate tool for the removal of the internal components of the swinging arm:



(**) Tool for removing the rear swinging arm bearing
Refer to Chapter 1 "Special tools for the frame"

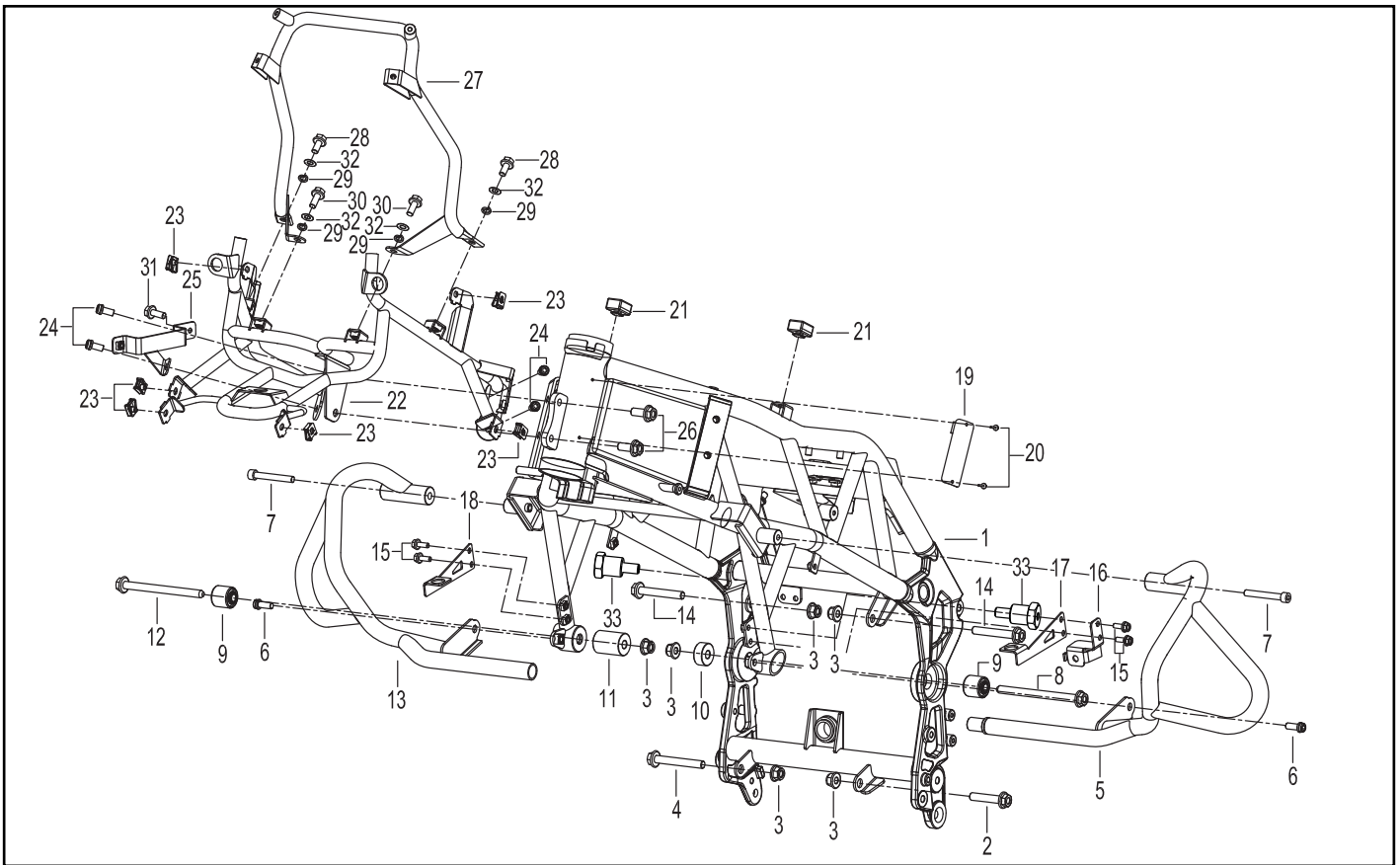
NOTE:

The numbers marked (*) are a part of the spare parts table chapter "Rear fork", paragraph "Removal of the rear shock absorber".



FRAME

INSTALLATION/REMOVAL OF THE FRAME PARTS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	FRAME					
2	SCREW					
3	NUT					
4	SCREW					
5	LEFT ENGINE PROTECTION					
6	SCREW					
7	SCREW					
8	SCREW					
9	RUBBER BUSHING					
10	SHIM					
11	SHIM					
12	SCREW					
13	RIGHT ENGINE PROTECTION					
14	SCREW					
15	SCREW					
16	PLATE					
17	LEFT RADIATOR BRACKET					
18	RIGHT RADIATOR BRACKET					
19	HOMOLOGATION PLATE					



FRAME

INSTALLATION/REMOVAL OF THE FRAME PARTS

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
20	RIVET					
21	PAD					
22	FRONT FRAME					
23	METRIC RAPID FIXING CLIP					
24	SCREW					
25	BRACKET					
26	SCREW					
27	HEADLIGHT FAIRING SUPPORT					
28	SCREW					
29	ELASTIC WASHER					
30	SCREW					
31	SCREW					
32	WASHER					
33	SCREW					

FRAME

LEFT/RIGHT ENGINE PROTECTION INSTALLATION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

- The left engine protection (5*) to the following torque pressure:



Torque (M10 screw) 45 N*m

- The screws (7*) and (6*) to the main frame Fig. A to the following torque pressure:



Torque (M6 screw) 10 N*m

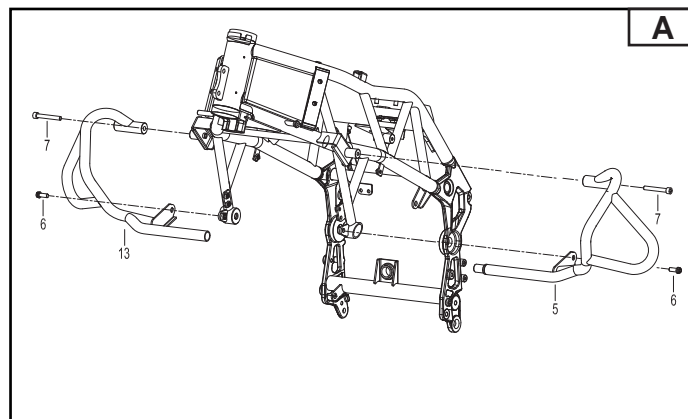
- the right engine protection (13*)
- the screws (7*) and (6*) to the main frame Fig. A to the following torque pressure:



Torque (M8 screw) 22 N*m

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Frame", paragraph "Installation of frame parts".





FRAME

REMOVAL OF THE LEFT/RIGHT ENGINE PROTECTION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

Proceed using the opposite order to removal.

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FRAME

REMOVAL OF THE FRONT FRAME/WINDSCREEN SUPPORT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

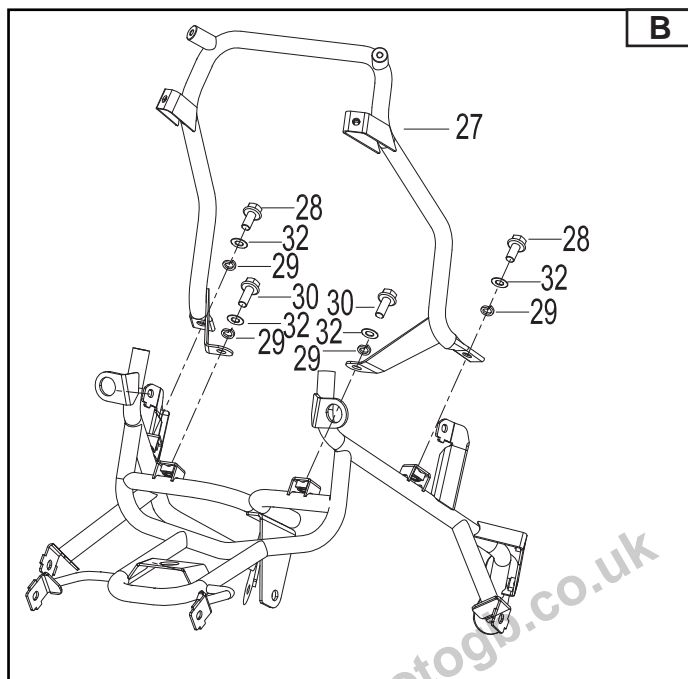
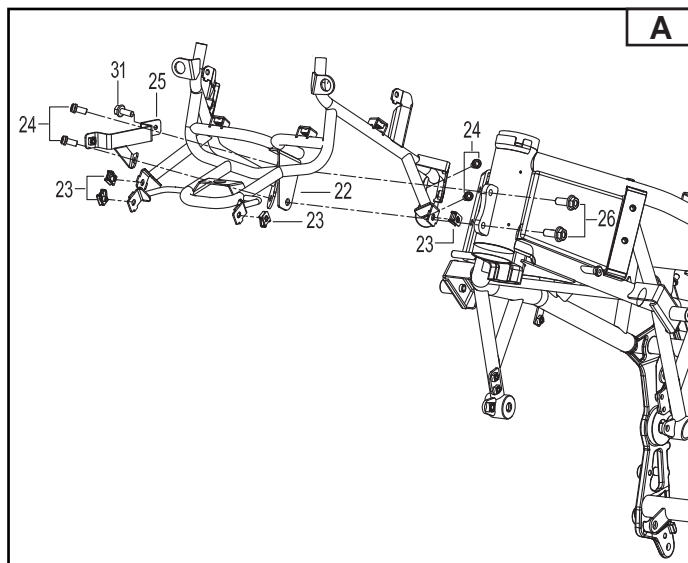
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- the screws (26*) Fig. A
- the front frame (22*) Fig. A

Remove:

- the screws (28*) B
- the screws (30*) Fig. B
- the windscreen support (27*) Fig. B.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Frame”, paragraph “Installation of frame parts”.





FRAME

INSTALLATION OF THE FRONT FRAME/WINDSCREEN SUPPORT

Park the bike on a level surface.

IMPORTANT NOTICE

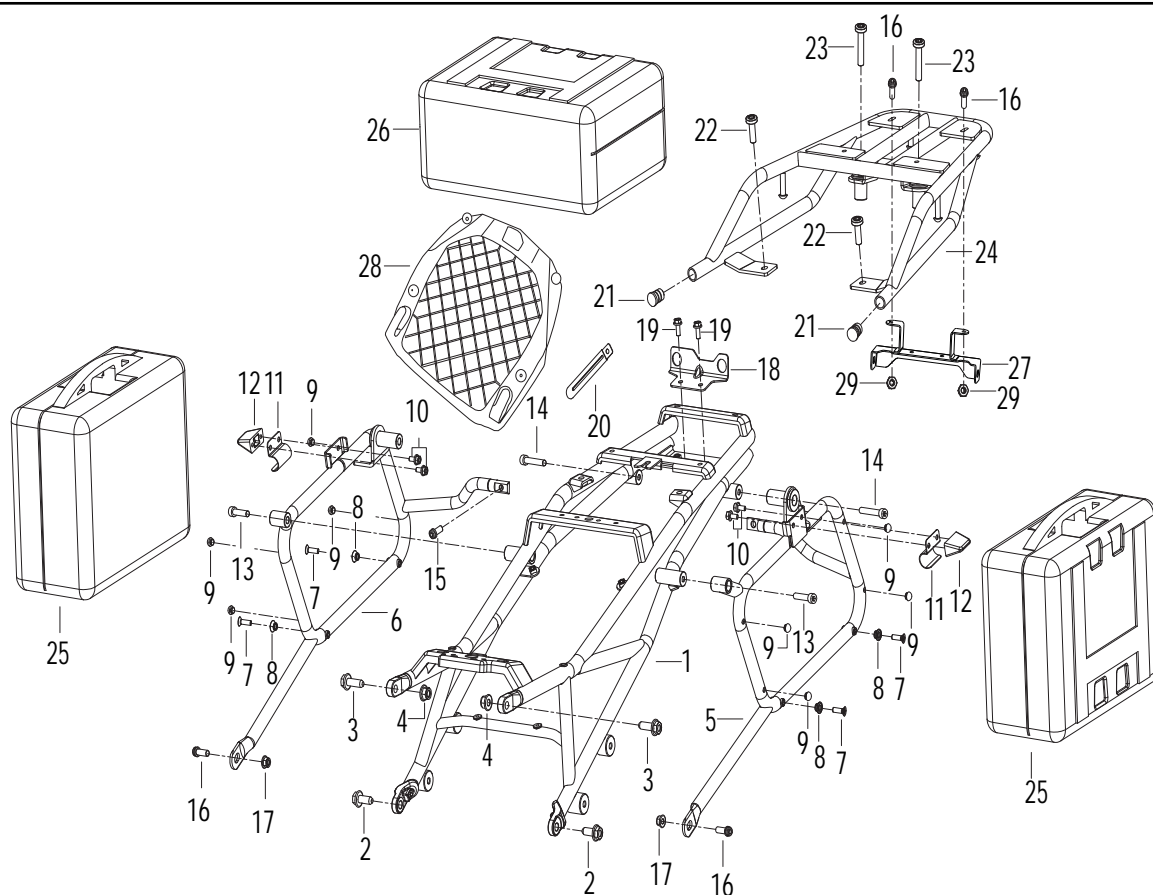
Prop the bike on suitable supports so that it cannot fall.

Install:

proceed using the opposite order to removal.

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REMOVAL/INSTALLATION OF REAR FRAME PARTS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	REAR FRAME					
2	SCREW					
3	SCREW					
4	NUT					
5	LEFT BAG SUPPORT FRAME					
6	RIGHT BAG SUPPORT FRAME					
7	SCREW					
8	BUSHING					
9	RUBBER TIP					
10	SCREW					
11	PLATE					
12	CASE RELEASE					
13	SCREW					
14	SCREW					
15	SCREW					
16	SCREW					
17	NUT					
18	PLATE					



FRAME

REMOVAL/INSTALLATION OF REAR FRAME PARTS

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
19	SCREW					
20	ELASTIC CLIP					
21	PIN					
22	SCREW					
23	SCREW					
24	REAR TOP BOX RACK					
25	TWO REAR SIDE BAGS					
26	REAR TOP BOX					
27	BRACKET					
28	REAR TOP BOX SUPPORT PLATE					
29	NUT					

FRAME

REMOVAL OF THE REAR FRAME

Park the bike on a level surface.

IMPORTANT NOTICE

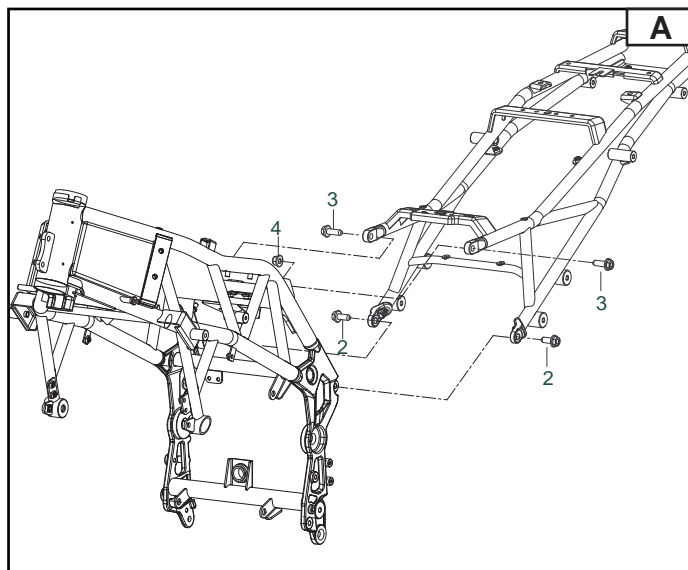
Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rear footrests, refer to chapter “Removal of the rear footrests’ support, chapter 4”.
- Rider and passenger seats, refer to chapter “Removal of the rider and passenger seat, Chapter 4”.
- Rear handles, refer to chapter “Removal of the rear handles, Chapter 4”.
- Side fairings, refer to chapter “Removal of the side fairings, Chapter 4”.
- the screws (3*) Fig. A
- the nuts (4*) Fig. A.
- the screws (2*)
- the rear frame (1*) Fig. A

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Frame”, paragraph “Installation of the rear frame”.





FRAME

REAR FRAME FITTING

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Install:

- the rear frame (1*) Fig. A.
- the screws (2*) Fig. A to the following torque:

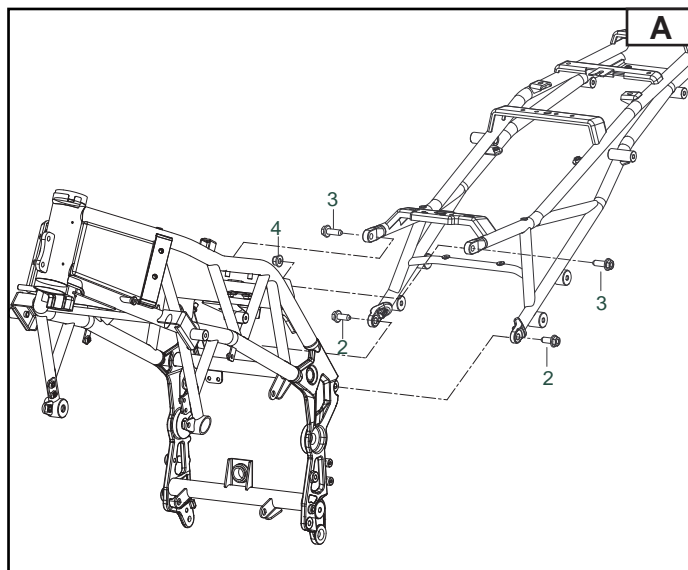


Torque 25 N*m

- the screws (3*) Fig. A to the following torque



Torque 25 N*m



FRAME

REMOVAL OF SIDE BAG FRAME

Park the bike on a level surface.

IMPORTANT NOTICE

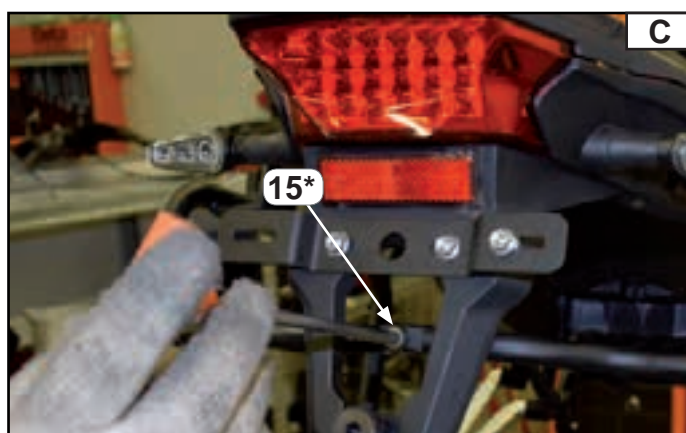
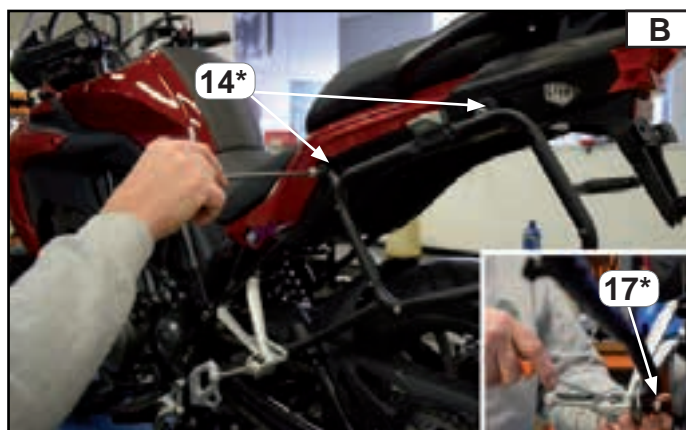
Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (14*) Fig. A
- the nut (17*) Fig. A
- the screw (15*) Fig. A

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Frame", paragraph "Installation of the rear frame". A.





FRAME

INSTALLATION OF THE SIDE BAGS SUPPORT FRAME

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

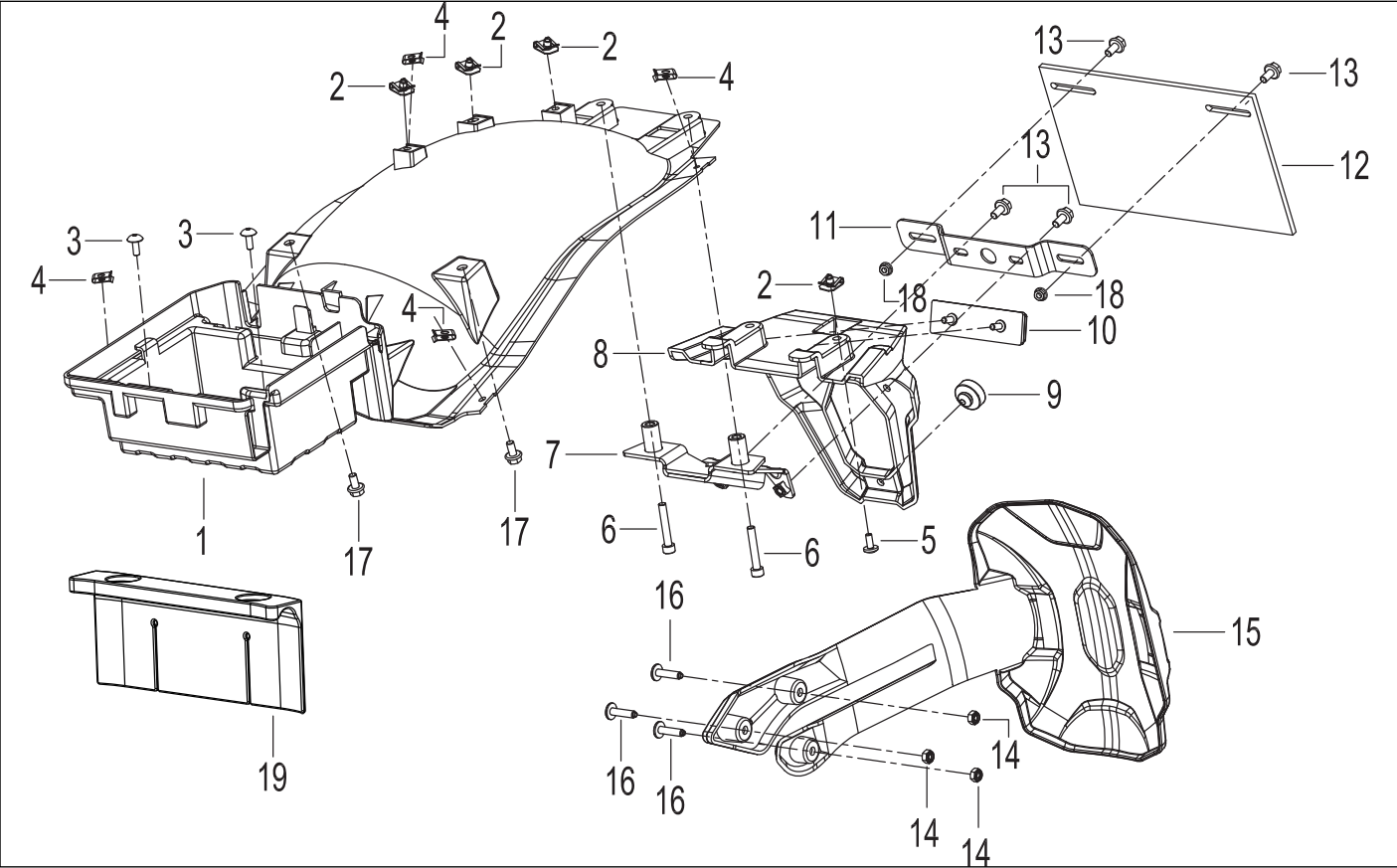
Install:

Proceed using the opposite order to removal.

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FRAME

NUMBER PLATE HOLDER



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	UPPER FAIRING					
2	METRIC RAPID FIXING CLIP					
3	SCREW					
4	SNAP-ON CLIP					
5	SCREW					
6	SCREW					
7	PLATE					
8	LICENCE PLATE HOLDER SUPPORT					
9	VIBRATION DAMPING RUBBER					
10	REFLECTOR					
11	REFLECTOR BRACKET					
12	NUMBER PLATE HOLDER					
13	SCREW					
14	NUT					
15	REAR MUD GUARD					
16	SCREW					
17	SCREW					
18	NUT					
19	COVER					



FRAME

REMOVAL OF THE NUMBER PLATE HOLDER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (6*) Fig. A
- The complete number plate holder support (8*) Fig. A

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Frame", paragraph "Number plate holder".





FRAME

INSTALLATION OF THE NUMBER PLATE HOLDER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

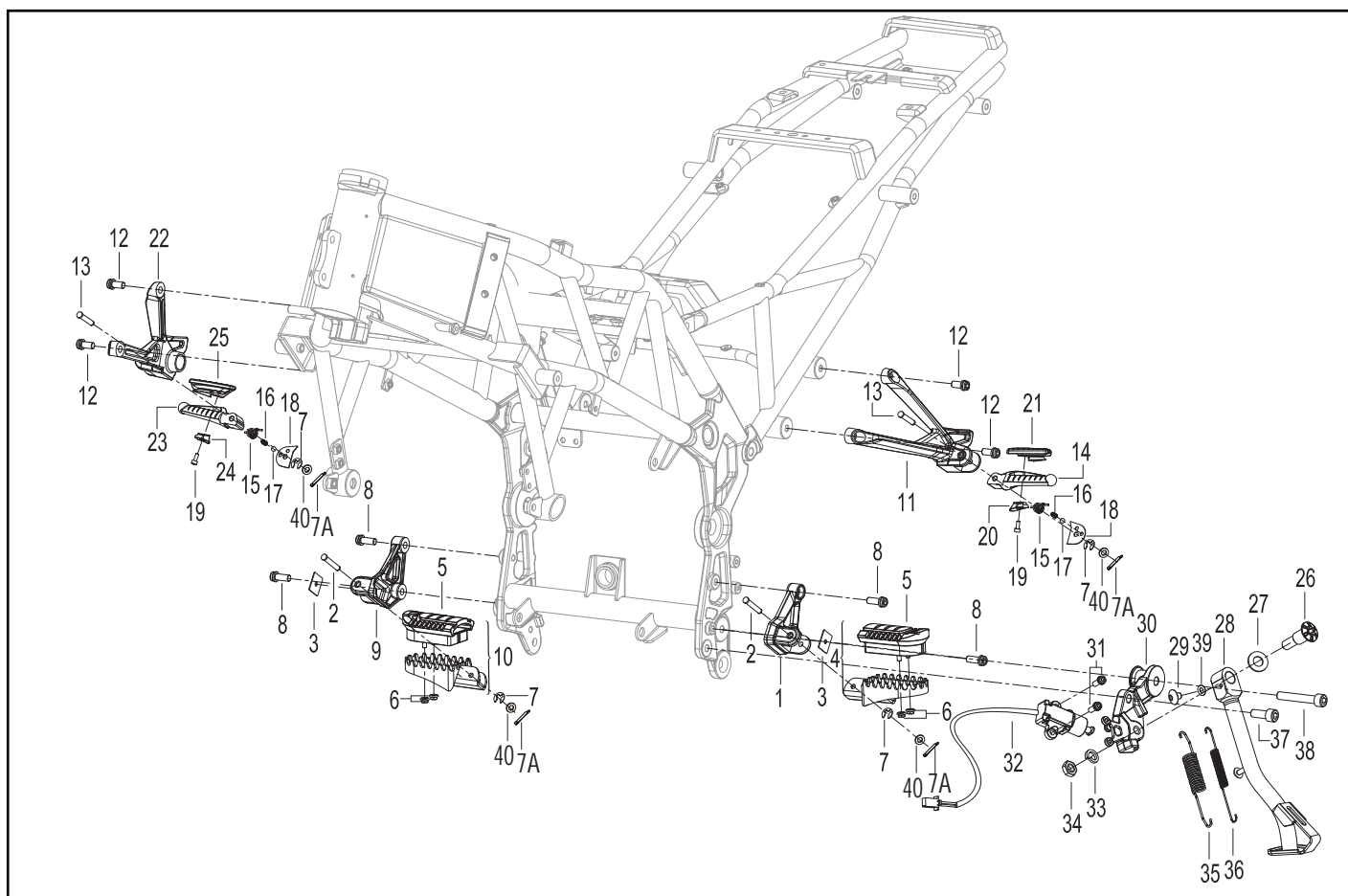
Install:

Proceed using the opposite order to removal.



CYCLING

INSTALLATION OF THE STAND / FOOTRESTS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	LEFT FRONT FOOTREST SUPPORT					
2	PIN					
2	PIN					
3	PLATE					
4	LEFT FRONT FOOTREST					
5	ANTI-SLIP RUBBER					
6	NUT					
7	ELASTIC RING					
7A.	COTTER PIN					
8	SCREW					
9	RIGHT FRONT FOOTREST SUPPORT					
10	RIGHT FRONT FOOTREST					
11	LEFT REAR FOOTREST SUPPORT					
12	SCREW					
13	PIN					
14	PEDANA POSTERIORE SINISTRA					
15	SPRING					



CYCLING

STAND/FOOTRESTS

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
16	SPRING					
17	BALL					
18	PLATE					
19	SCREW					
20	LH FOOTREST RUBBER STOP					
21	LEFT RUBBER FOOTREST COVER					
22	RIGHT REAR FOOTREST SUPPORT					
23	RIGHT REAR FOOTREST					
24	RH FOOTREST RUBBER STOP					
25	RIGHT RUBBER FOOTREST COVER					
26	SPECIAL SCREW					
27	WASHER					
28	SIDE STAND					
29	SCREW					
30	SIDE STAND SUPPORT PLATE					
31	SCREW					
32	SIDE STAND SWITCH					
33	BELLEVILLE WASHER					
34	NUT					
35	EXTERNAL SCREW					
36	INTERNAL SPRING					
37	SCREW					
38	SCREW					
39	WASHER					
40	WASHER					



CYCLING

REMOVAL OF THE SIDE STAND

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Disconnect:

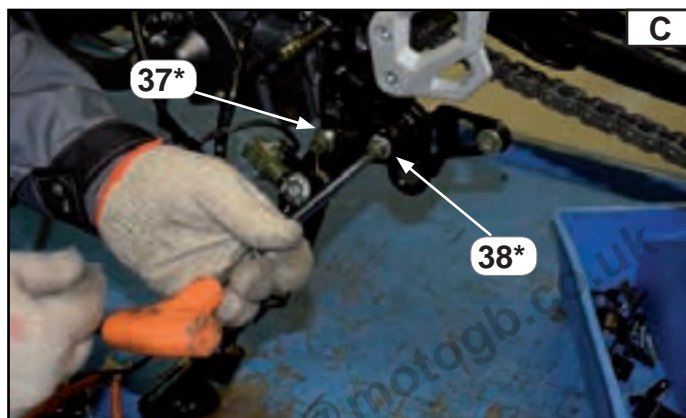
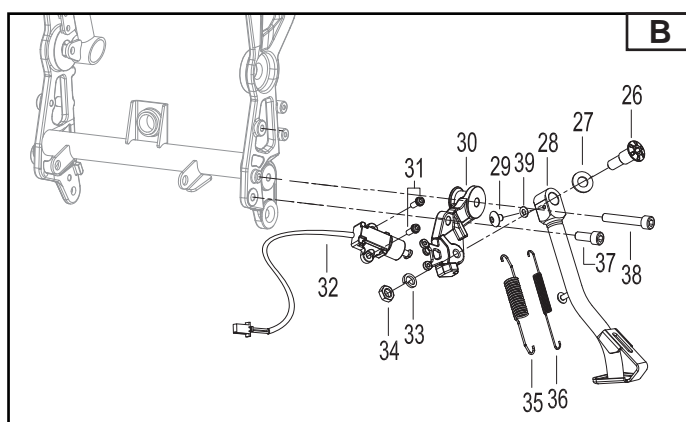
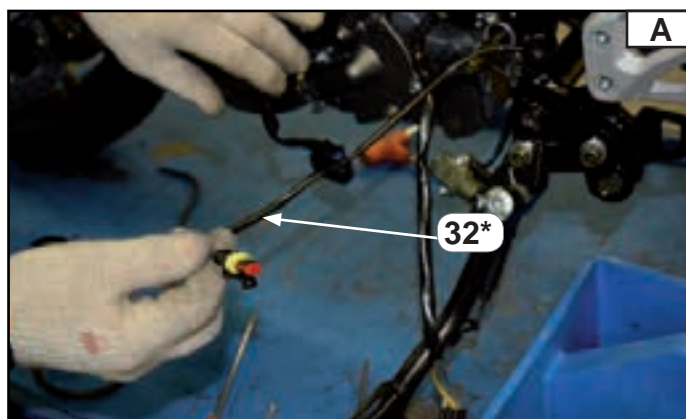
- the connector of the side stand sensor (32*) Fig. A

Remove:

- the internal spring (36*) Fig. B
- the external spring (35*) Fig. B
- the screws (37*) Fig. B-C
- the screw (38*) Fig. B-C
- The stand support plate (30*) Fig. B-C

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Stand/footrests".





CYCLING

INSTALLATION OF THE SIDE STAND

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screw (37*) Fig. B-C
 - the screw (38*) Fig. B-C
- to the following torque:



Torque 45 N*m

Utilise Loctite



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Stand/footrests".



CYCLING

REMOVAL OF THE REAR FOOTREST SUPPORT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (12*) Fig. A
- The right rear footrest support (22*) Fig. A
- The left rear footrest support (11*) Fig. A

NOTE:

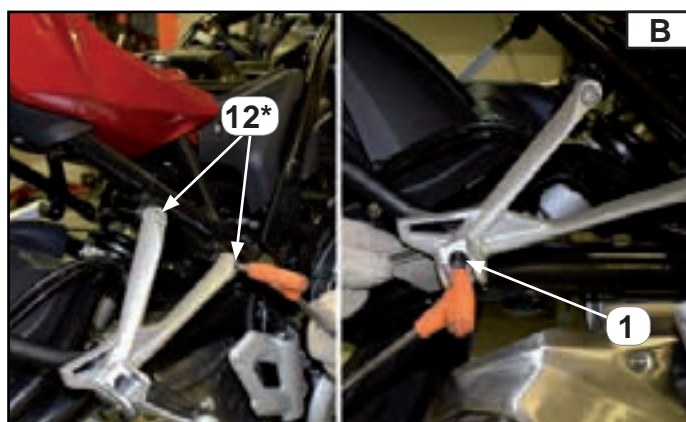
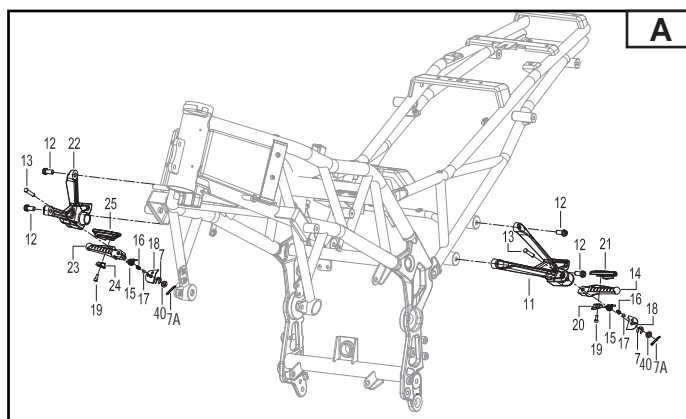
If the motorcycle is equipped with a side bag frame:

Remove:

- the screw (1) Fig. B

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Stand/footrests".





CYCLING

INSTALLATION OF THE REAR FOOTREST SUPPORT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (12*) Fig. B
- to the following torque:

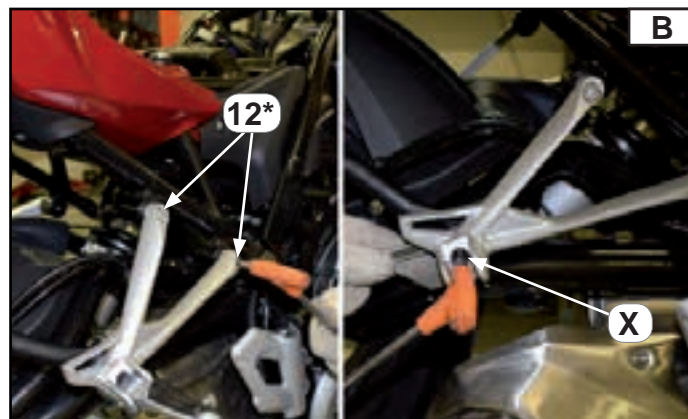


Torque 25 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE:

If the motorcycle is equipped with a side bag frame:

Tighten:

- the screw (X) Fig. B to the following torque pressure:



Torque 25 N*m

Use Loctite thread locker to secure.



Loctite 243

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Stand/footrests".



CYCLING

REMOVAL OF THE RIGHT/LEFT REAR FOOTREST

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

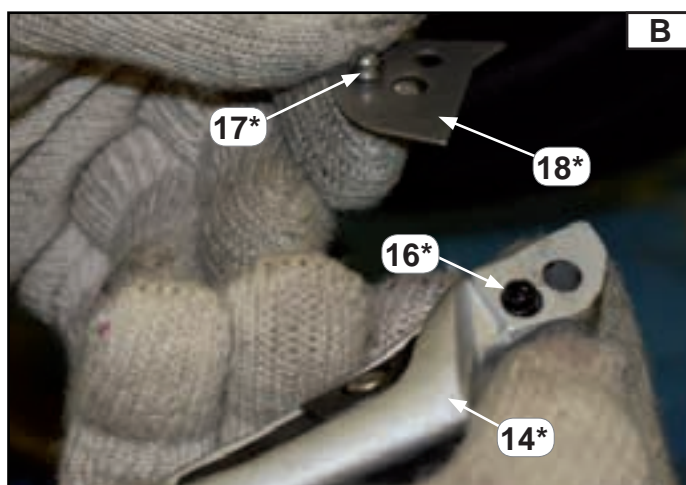
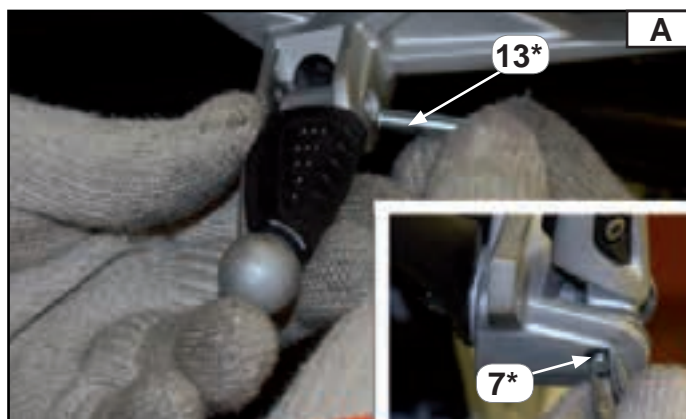
- the O-ring (7*) Fig. A
- the pin (13*) Fig. A
- the footrest (14*) Fig. B
- the plate (18*) Fig. B
- the ball (17*) Fig. B
- the spring (16*) Fig. B

NOTE:

Carry out the following operation for the left rear footrest (23*).

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Stand/footrests".





CYCLING

INSTALLATION OF THE LEFT/RIGHT REAR FOOTRESTS

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.



CYCLING

RIGHT FRONT FOOTREST REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- The spring (1) Fig. A
- the screw (2) Fig. A
- the ball joint (3) Fig. A
- the special screw (4) Fig. B
- the brake pedal (5) Fig. B

NOTE:

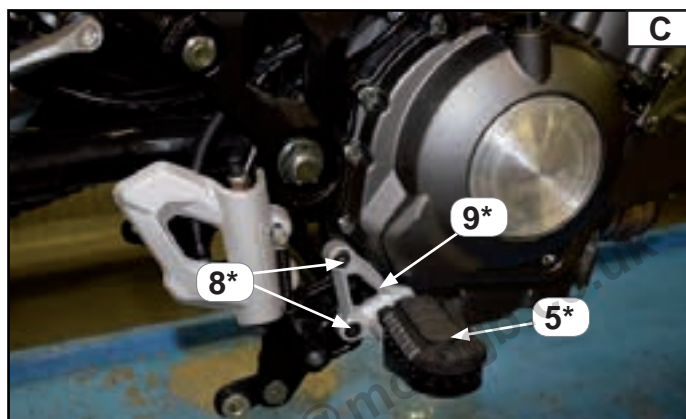
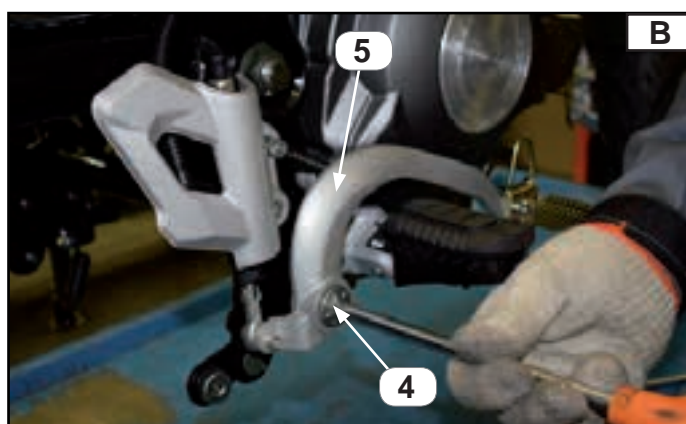
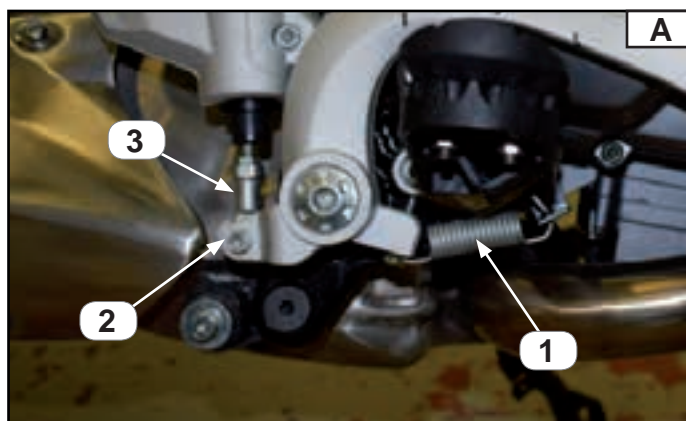
Substitute the rubber cover of the right footrest (5*) if it is worn.

Remove:

- the two screws (8*)
- the right front footrest holder plate (9*) Fig. C

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Installation of the stand/foot-rests".



CYCLING

RIGHT FRONT FOOTREST FITTING

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (8*) Fig. A
- to the following torque:



Torque 25 N*m

Use Loctite thread locker to secure.



Loctite 243

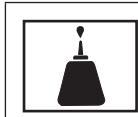
Tighten:

- the screws (4) Fig. B.
- to the following torque:



Torque 25 N*m

Use Loctite thread locker to secure.



Loctite 243

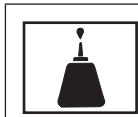
Tighten:

- the screw (2) and the related fastening nut Fig. C
- to the following torque:

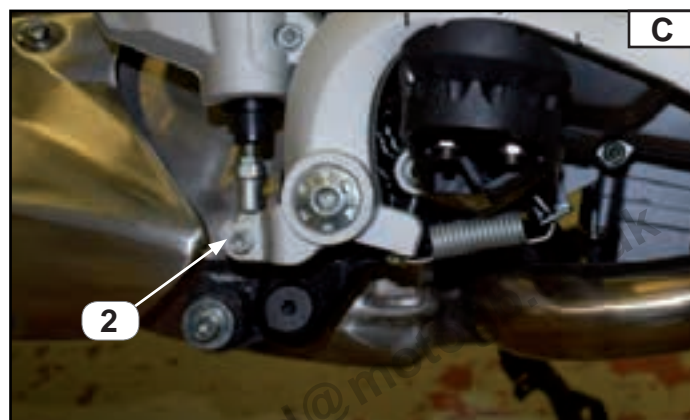
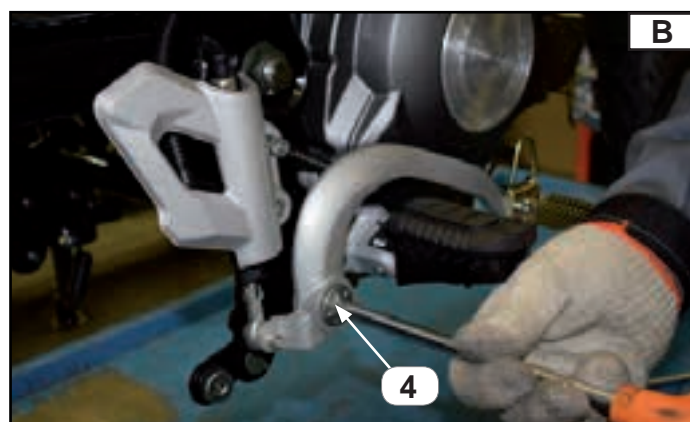
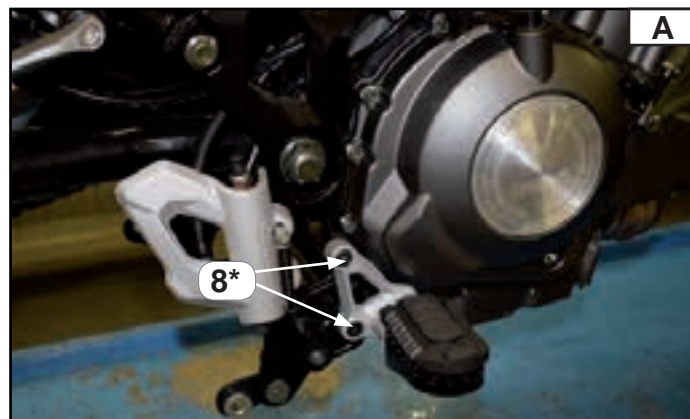


Torque 12 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Installation of the stand/foot-rests".



CYCLING

LEFT FRONT FOOTREST REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

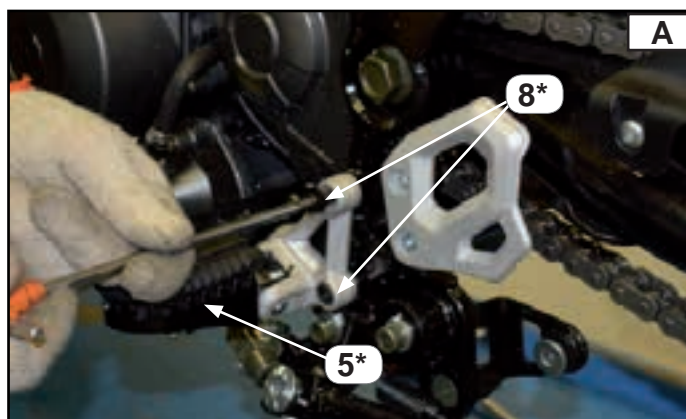
- the screws (8*) Fig. A
- the left front footrest holder plate (1*) Fig. A

NOTE:

Substitute the left anti-slip rubber cover (5*) if it is worn.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Installation of the stand/foot-rests".



CYCLING

LEFT FRONT FOOTREST INSTALLATION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (8*) Fig. A to the following torque:

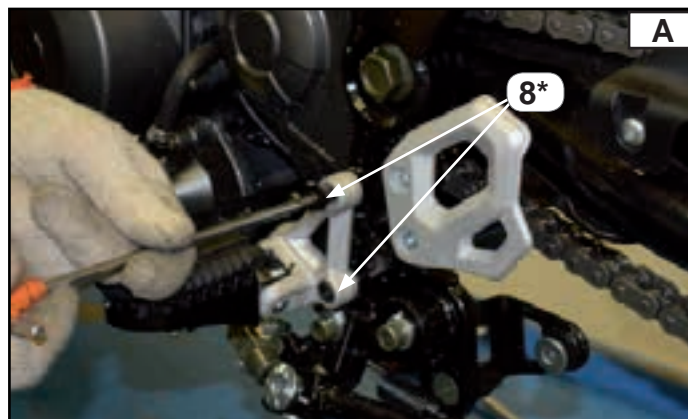


Torque 25 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE:

Before installing the left front footrest, ensure that the gearchange lever has been installed.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Cycling" paragraph "Installation of the stand/foot-rests".



CYCLING

REMOVAL OF THE GEAR LEVER

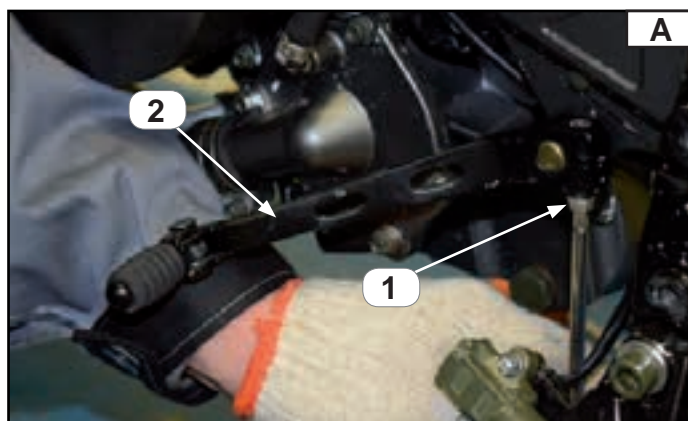
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- The left front footrest, refer to chapter “**Removal of the left front footrest, Chapter 4**”.
- the screw (1) Fig. A
- the lever (2) Fig. A



CYCLING

INSTALLATION OF THE GEARCHANGE LEVER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

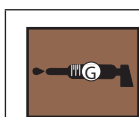
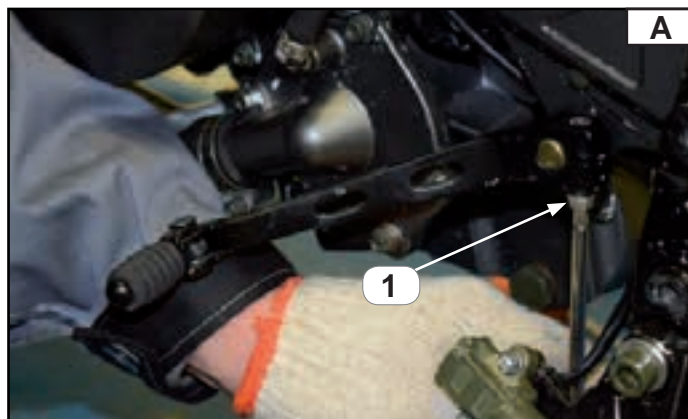
- the screw (1) Fig. A
- to the following torque:



Torque 10 N*m

NOTE:

Make use of grease during the assembly.

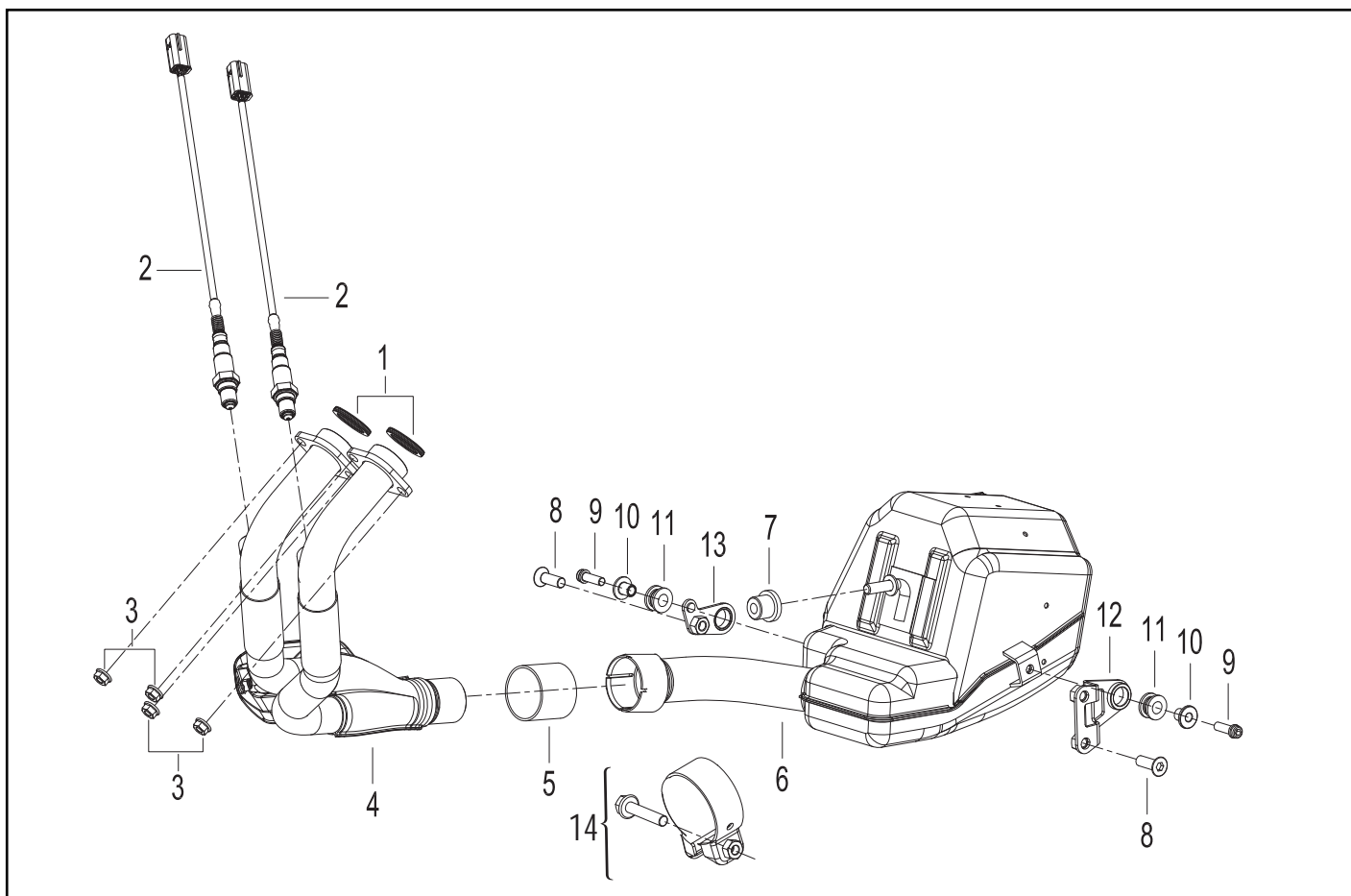


**Recommended lubricant
MR2 TUTELA GREASE**



EXHAUST SYSTEM

EXHAUST ASSEMBLY



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	EXHAUST GASKET					
2	LAMBDA PROBE					
3	NUT					
4	EXHAUST MANIFOLD					
5	GRAPHITE GASKET					
6	SILENCER					
7	RUBBER TIP					
8	SCREW					
9	SCREW					
10	BUSHING					
11	RUBBER TIP					
12	LEFT FLANGE					
13	RIGHT FLANGE					
14	SCREW CLIP					

EXHAUST SYSTEM

EXHAUST ASSEMBLY REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

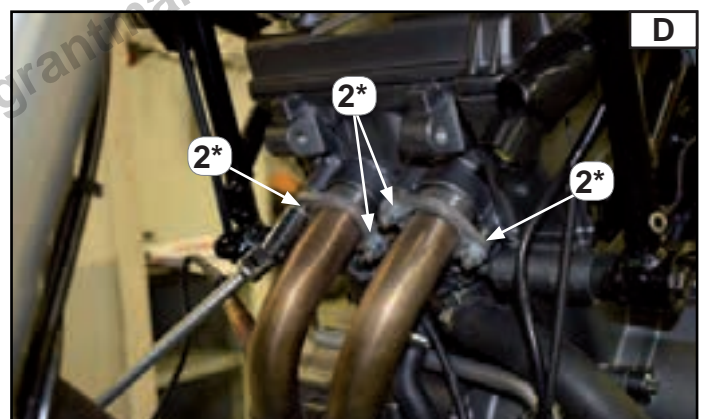
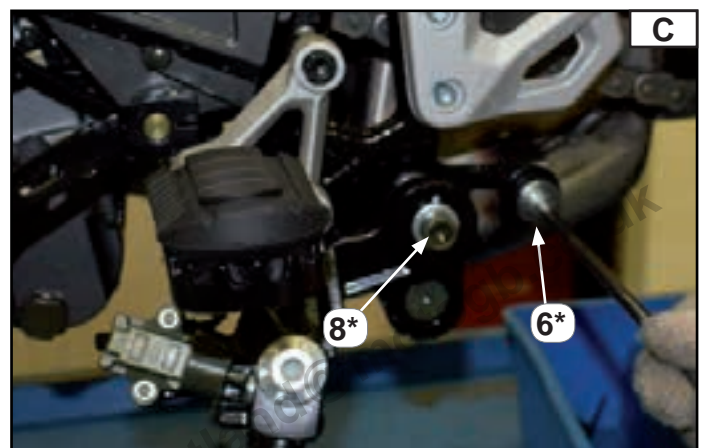
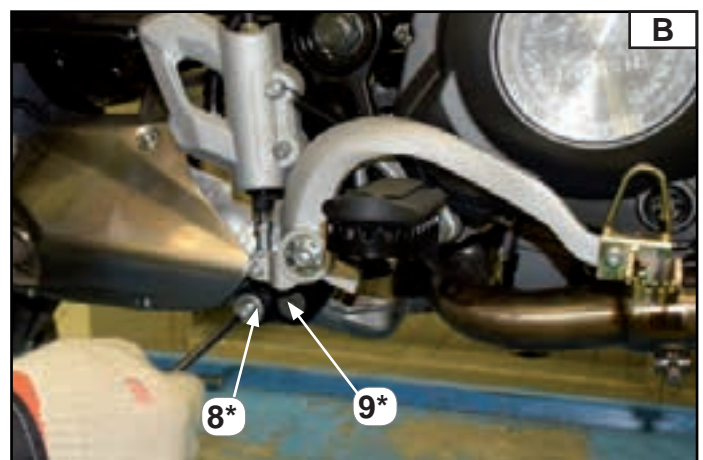
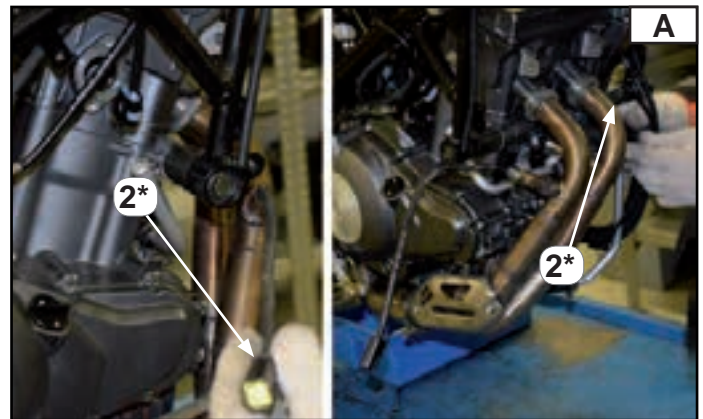
Prop the bike on suitable supports so that it cannot fall.

Disconnect:

- the Lambda sensor (2*) Fig. A.

Remove:

- the screws (8*) Fig. B.
- the screws (9*) Fig. B
- the screw (9*) Fig. C
- the screw (6*) Fig. C
- the nuts (2*) of the corresponding studs Fig. D





EXHAUST SYSTEM

EXHAUST ASSEMBLY REMOVAL

Disconnect:

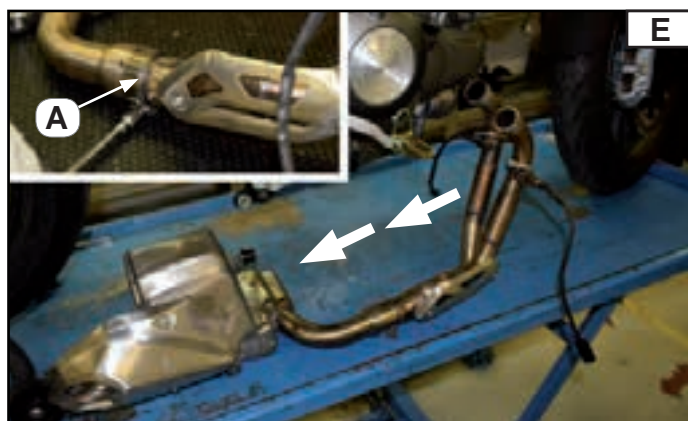
- the exhaust system, removing it from inside to outside Fig. E

NOTE:

To make extraction easier, it is advisable to loosen the silencer joint band (A) to the exhaust manifold Fig. E

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Exhaust system", paragraph "exhaust system".



EXHAUST SYSTEM

EXHAUST INSTALLATION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

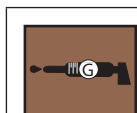
- the nuts (2*) Fig. A to the following torque:



Torque 22 N*m

NOTE:

Lubricate the nuts with copper grease during the assembly phase.



TUTELA grease

- the screws (8*) Fig. B-C to the following torque:



Torque 12 N*m

- the screws (9*) Fig. B to the following torque:



- Torque 12 N*m**

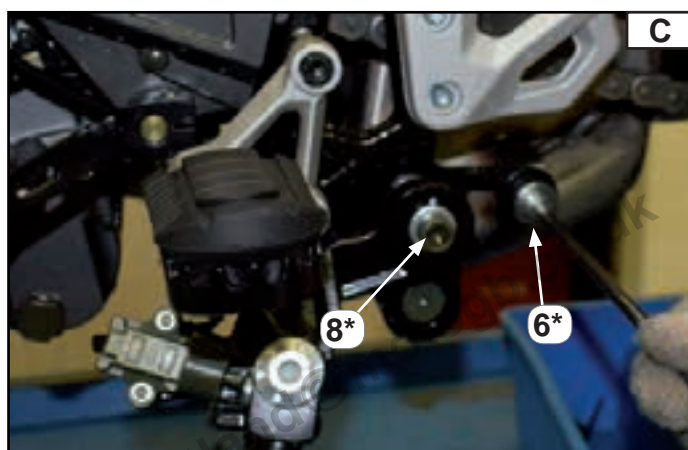
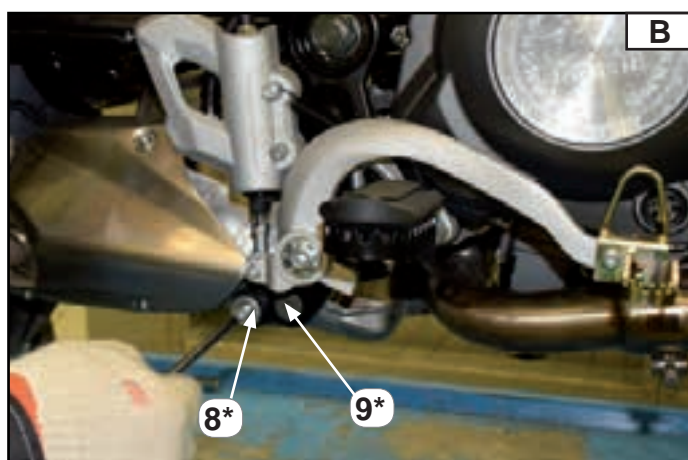
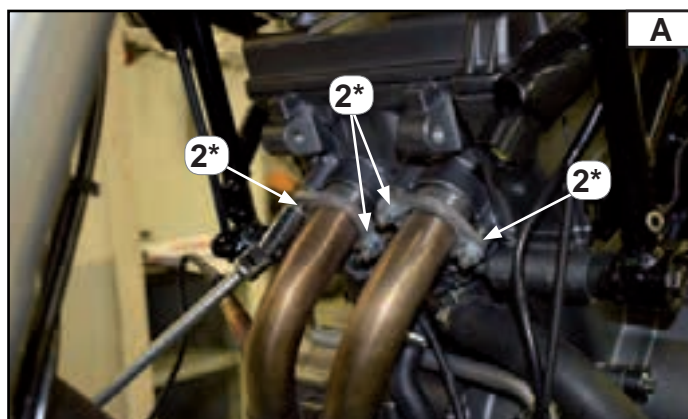
- the screw (6*) Fig. C to the following torque:



- Torque 12 N*m**

NOTE:

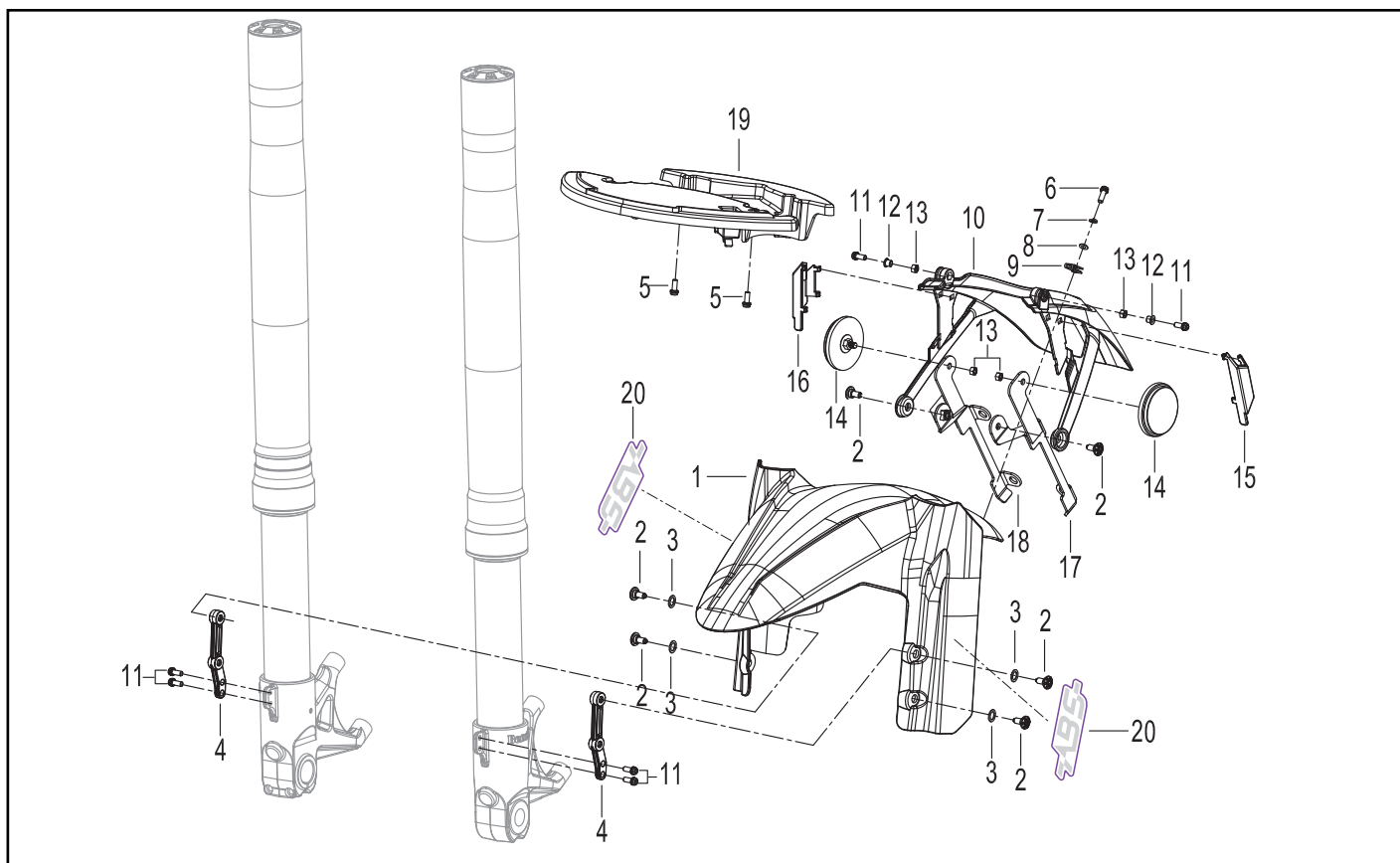
The numbers marked (*) are a part of the spare parts table, chapter "Exhaust system", paragraph "exhaust system".





FAIRING

FRONT MUD GUARD



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	FRONT MUD GUARD					
2	SCREW					
3	NYLON WASHER					
4	MUDGUARD SUPPORT PLATE					
5	SCREW					
6	SCREW					
7	ELASTIC WASHER					
8	WASHER					
9	SNAP-ON CLIP					
10	LOWER MUD GUARD					
11	SCREW					
12	"T" BUSHING					
13	NUT					
14	REFLECTOR					
15	LEFT RUBBER PROTECTION					
16	RIGHT RUBBER PROTECTION					
17	LEFT BRACKET					
18	RIGHT BRACKET					
19	INTERNAL SHIELD					
20	ABS STICKER					

FAIRING

FRONT MUD GUARD REMOVAL

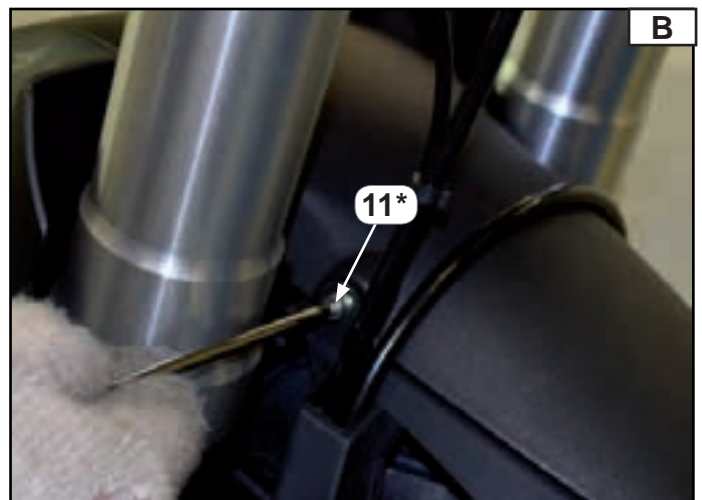
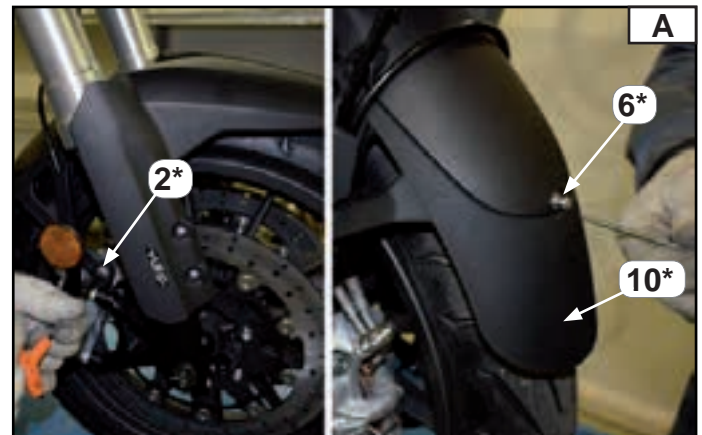
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

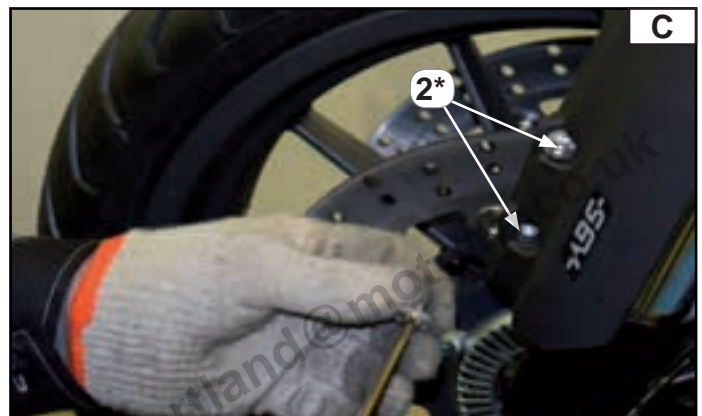
Remove:

- the screw (6*) Fig. A
- the screw (2*) from both sides Fig. A
- the screw (11*) from both sides Fig. B
- the lower mud guard (10*) Fig. A



Remove:

- the screws (2*) from both sides Fig. C
- The front mud guard (1*) Fig. D





FAIRING

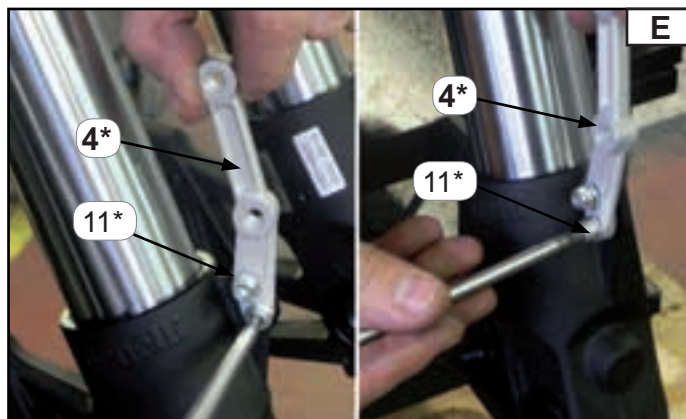
FRONT MUD GUARD REMOVAL

Remove:

- the screws (11*) Fig. E
- the mud guard support plates (4*) Fig. E

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Fairing", paragraph "Front mud guard".





FAIRING

FRONT MUD GUARD INSTALLATION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.



FAIRING

REAR MUD GUARD REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

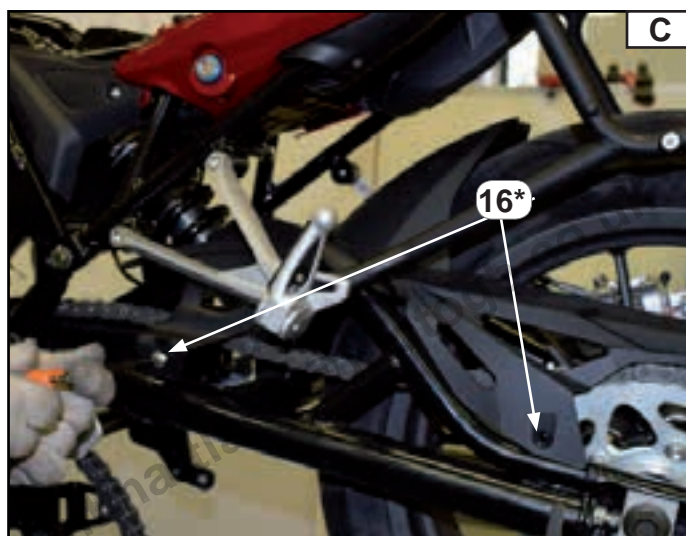
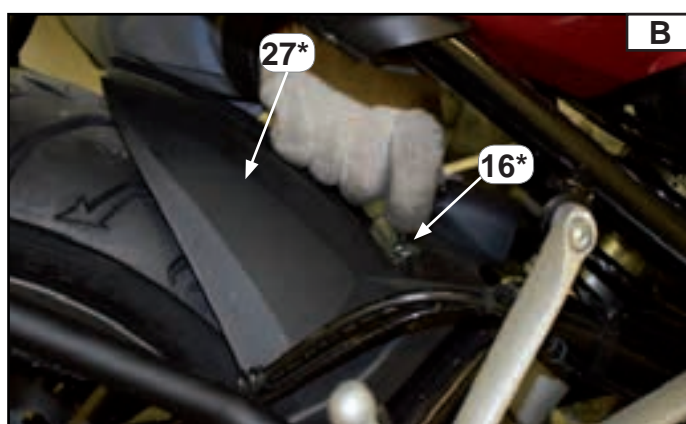
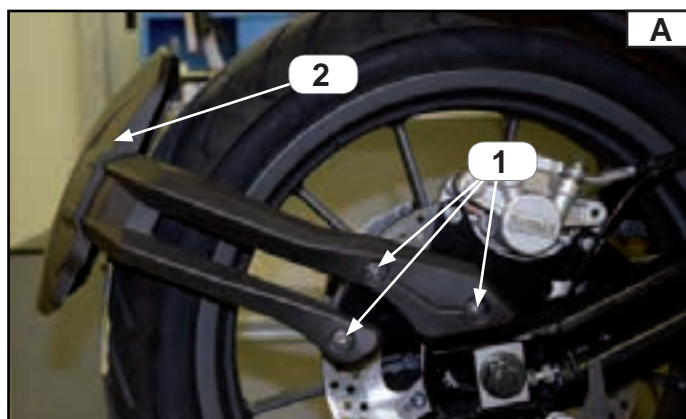
Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (1) Fig. A
- The flap guard (2) Fig. A
- the screws (16*) Fig. B-C
- The rear mudguard (27*) Fig. B

NOTE:

The numbers marked (*) are shown in the replacement parts table in the "Rear shock absorber" chapter, "Rear shock absorber removal" section.



FAIRING

REAR MUD GUARD INSTALLATION

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

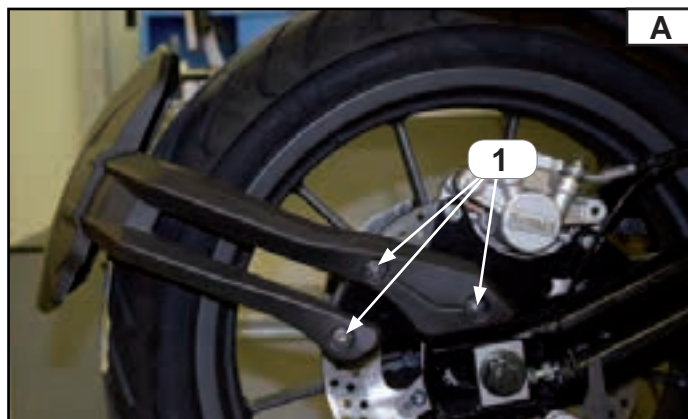
Proceed using the opposite order to removal.

Tighten:

- the screws (8*) Fig. A
to the following torque:



Torque 10 N*m





FAIRING

REMOVAL OF THE UPPER CHAIN GUARD

Park the bike on a level surface.

IMPORTANT NOTICE

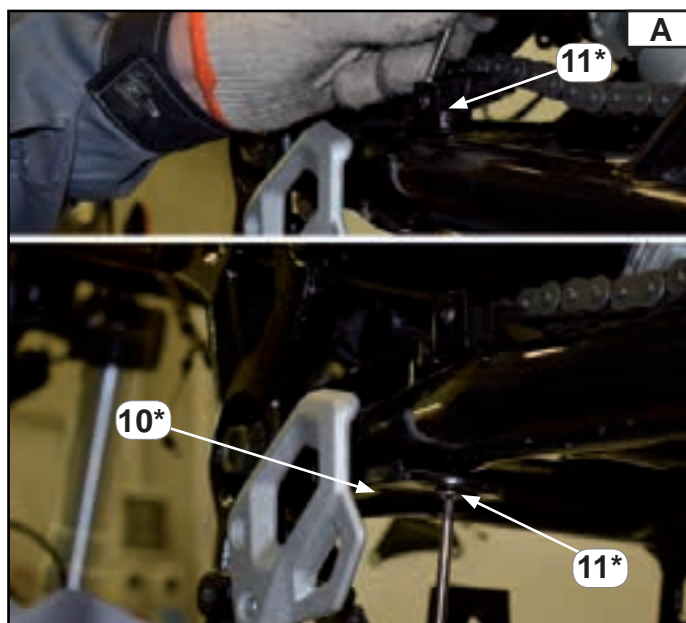
Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (11*) Fig. A
- The chain guard (10*) Fig. A

NOTE:

The numbers marked (*) are shown in the replacement parts table in the "Rear shock absorber" chapter, "Rear shock absorber removal" section.





FAIRING

INSTALLATION OF THE UPPER CHAIN GUARD

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (11*) Fig. A
- to the following torque:

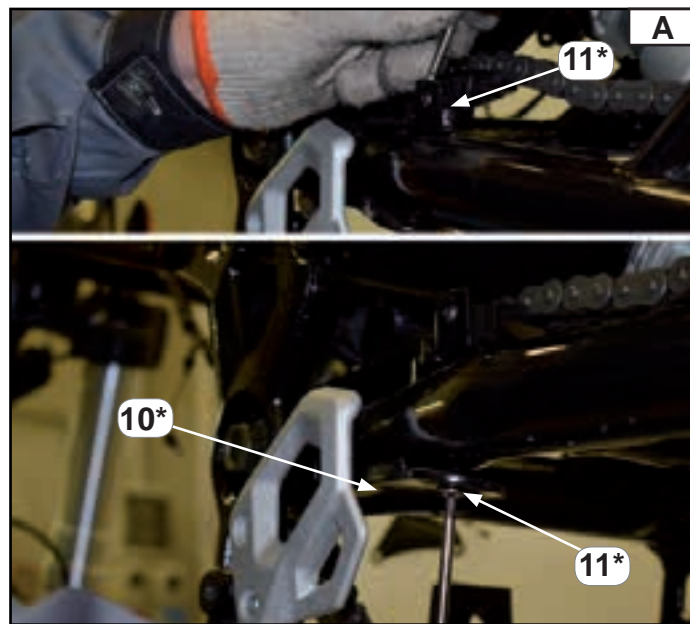


Torque 10 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE:

The numbers marked (*) are shown in the replacement parts table in the "Rear shock absorber" chapter, "Rear shock absorber removal" section.



FAIRING

REMOVAL OF THE RIDER SEAT AND PASSENGER SEAT

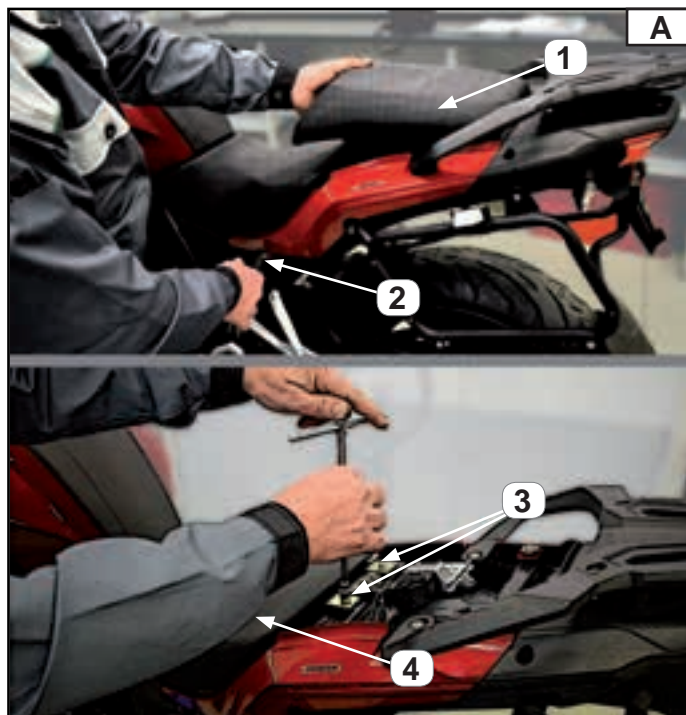
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- the passenger seat (1) using the supplied spanner (2) Fig. A.
- the screws (3) Fig. A.
- the rider seat (4) Fig. A.



FAIRING

INSTALLATION OF THE RIDER SEAT AND PASSENGER SEAT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

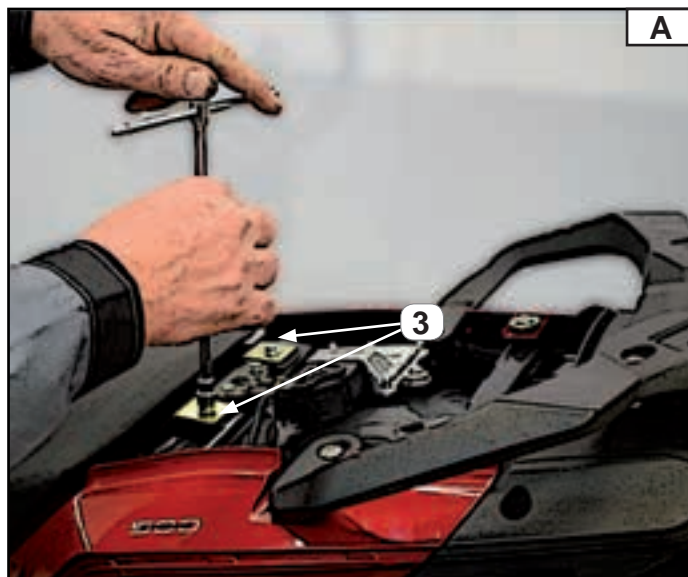
Proceed using the opposite order to removal.

Tighten:

- the screws (3) Fig. A
- to the following torque:



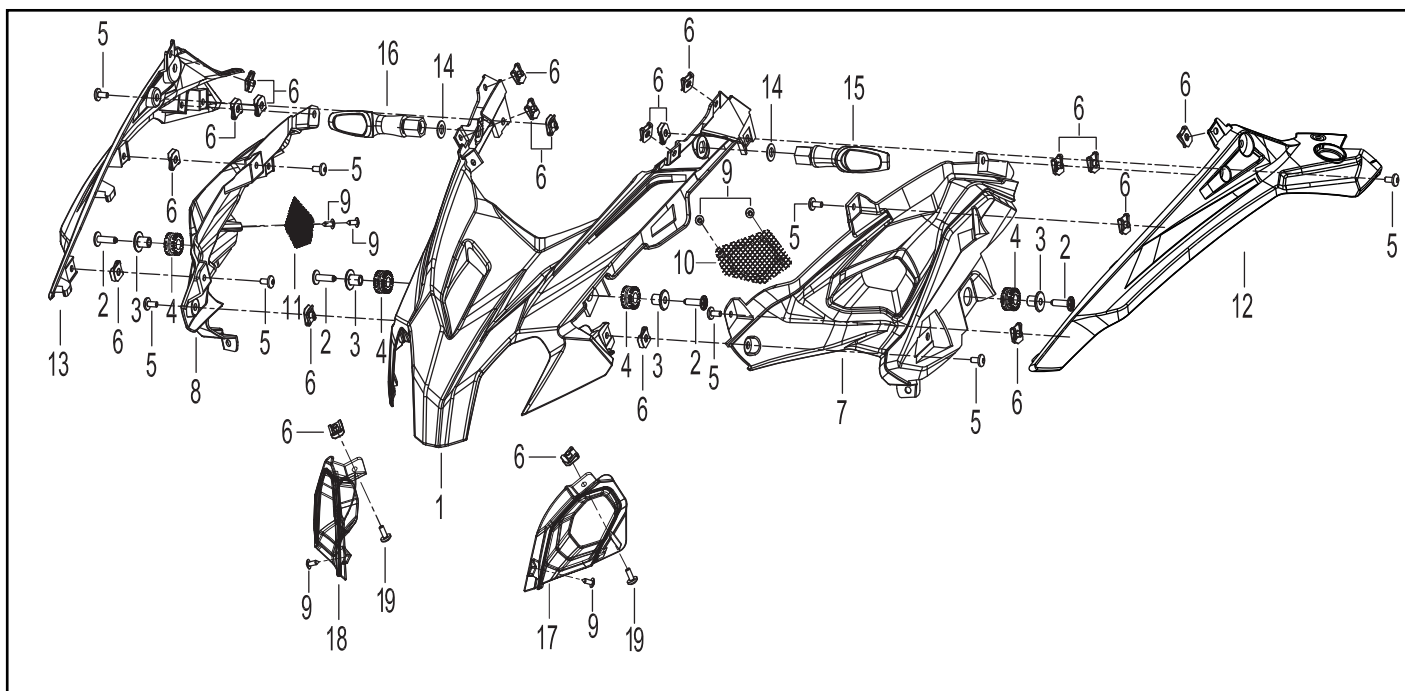
Torque 10 N*m





FAIRING

FRONT FAIRING



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	FRONT FAIRING					
2	SCREW					
3	TOP BUSHING					
4	RUBBER TIP					
5	SCREW					
6	METRIC RAPID FIXING CLIP					
7	LEFT AIR DUCT					
8	RIGHT AIR DUCT					
9	SCREW					
10	LEFT RETINA					
11	RIGHT RETINA					
12	LEFT SIDE (WHITE)					
13	RIGHT SIDE (WHITE)					
14	WASHER					
15	DIRECTION INDICATOR (FRONT LEFT)					
16	DIRECTION INDICATOR (FRONT RIGHT)					
17	LEFT AIR INTAKE					
18	RIGHT AIR INTAKE					
19	SCREW					

FAIRING

REMOVAL OF THE FRONT FAIRING

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

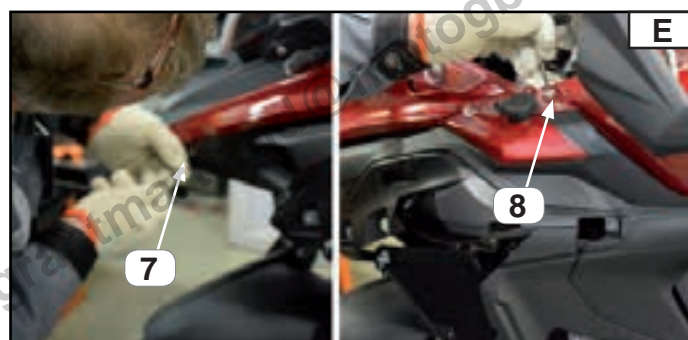
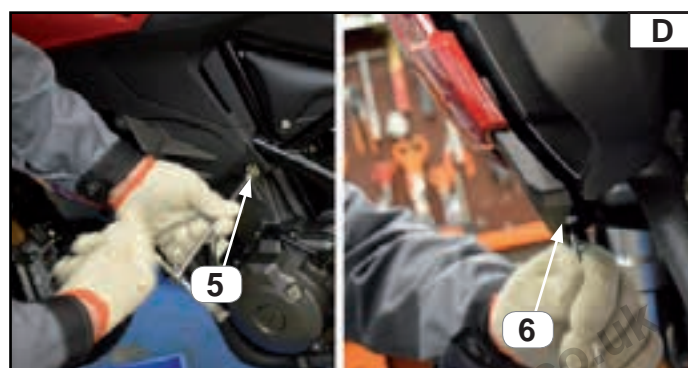
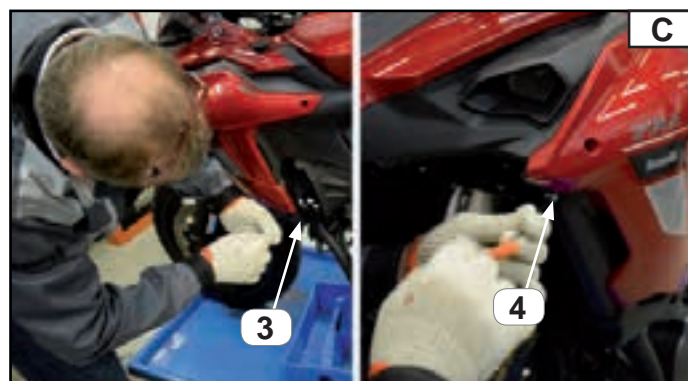
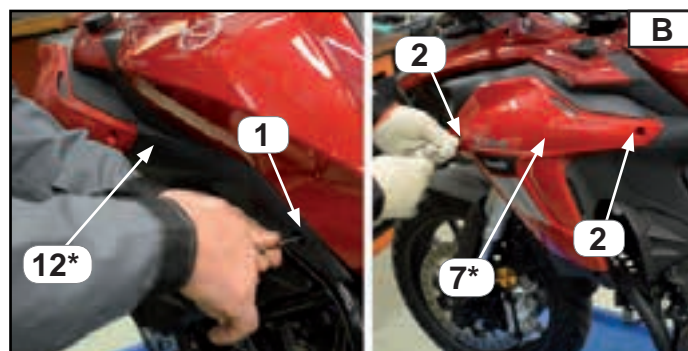
Remove:

- Rider and passenger seats, refer to chapter “Removal of the rider and passenger seat, Chapter 4”.
- the screws (1) Fig. B.
- the left side (12*) Fig. B.
- the screws (2) Fig. B.
- the screws (3) - (4) Fig. C.
- the screws (5) - (6) Fig. D.
- the left air duct (7*) Fig. B.

NOTE:

Carry out the same procedure for the right side (13*) and the right air duct (8*).

- the screws (7) - (8) Fig. E.
- the front fairing (1*) Fig. E.



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Fairings”, paragraph “Front fairing”.



FAIRING

INSTALLATION OF THE FRONT FAIRING

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

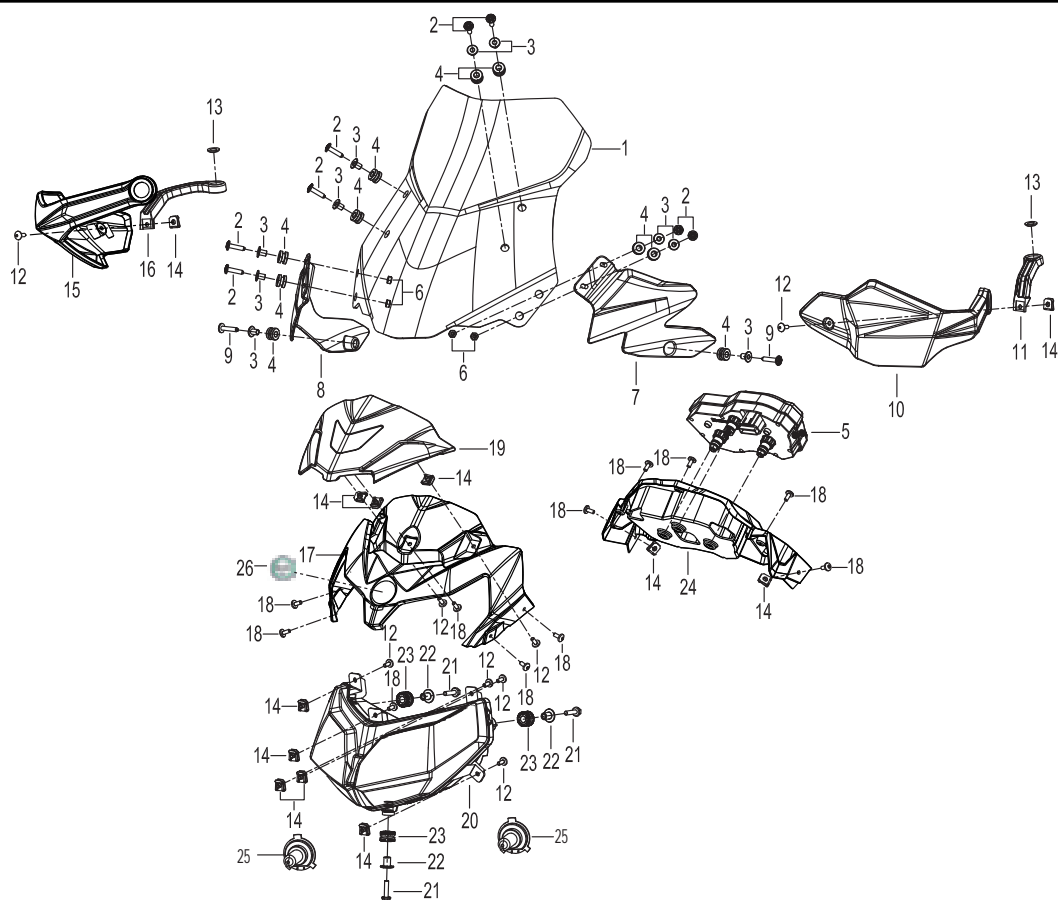
Proceed using the opposite order to removal.

COPY - Moto GB - Grant Martland - grantmartland@motogb.co.uk



FAIRING

FRONT HEADLIGHT AND WINDSCREEN



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	HEADLIGHT FAIRING					
2	SCREW					
3	SHIM					
4	VIBRATION DAMPING PAD					
5	COMPLETE INSTRUMENT					
6	NUT					
7	LEFT HEADLIGHT FAIRING					
8	RIGHT HEADLIGHT FAIRING					
9	SPECIAL SCREW					
10	LEFT HAND GUARD					
11	LEFT SUPPORT BRACKET					
12	SCREW					
13	BUSHING					
14	METRIC RAPID FIXING CLIP					
15	RIGHT HAND GUARD					
16	RIGHT SUPPORT BRACKET					
17	FIXED HEADLIGHT FAIRING					
18	SCREW					
19	WINDSCREEN					
20	HEADLAMP					

**FAIRING****FRONT HEADLIGHT AND WINDSCREEN**

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
21	SCREW					
22	TOP BUSHING					
23	RUBBER TIP					
24	INSTRUMENTATION PLATE					
25	LAMP					
26	ADHESIVE					

FAIRING

REMOVAL OF MOVABLE WINDSCREEN

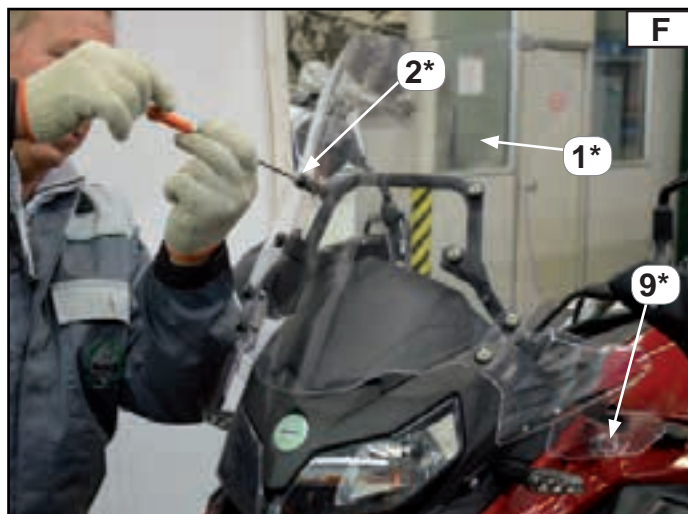
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- the screws (9*)
- the screws (2*)
- The movable windscreen (1*) together with the left/right headlight fairing





FAIRING

INSTALLATION OF THE MOBILE HEADLIGHT FAIRING

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

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FAIRING

REMOVAL OF THE INSTRUMENTATION PLATE

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- the screws (12*) Fig. A

Disconnect:

- the instrument board wiring (B) Fig. B

Remove:

the instrument board (24*) Fig. B.



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Fairings”, paragraph “Front headlight and windscreen”.



FAIRING

INSTALLATION OF THE INSTRUMENTATION PLATE

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

FAIRING

REMOVAL OF THE HEADLIGHT UNIT

Park the bike on a level surface.

IMPORTANT NOTICE

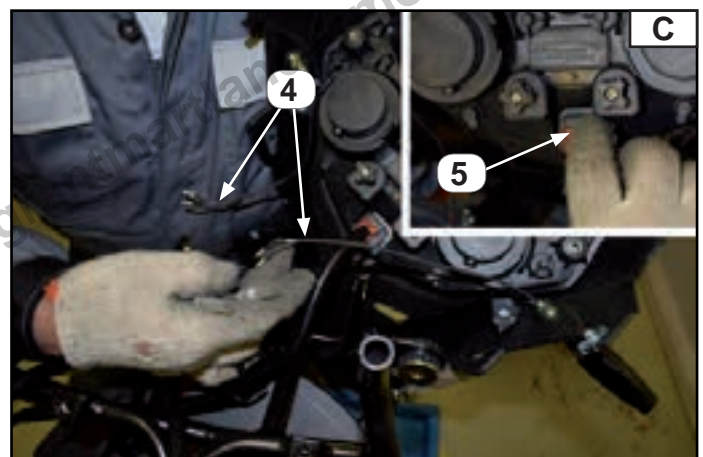
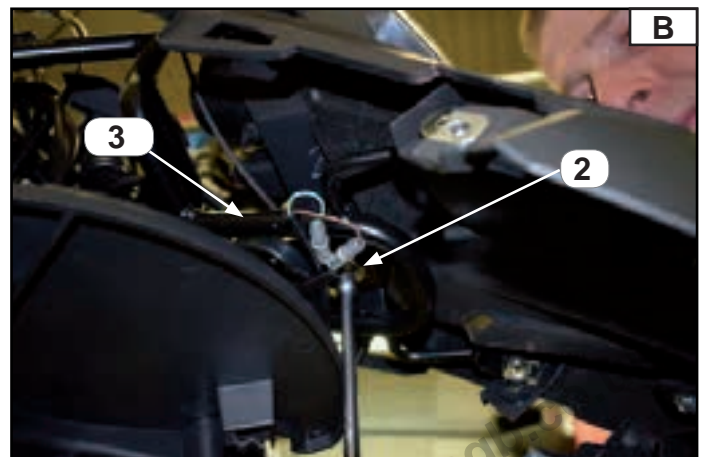
Prop the bike on suitable supports so that it cannot fall.

Remove:

- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- the screws (1) Fig. A
- the screw (2) underneath the small front frame (3) Fig. B

Disconnect:

- the cables of the left and right front indicators (4) Fig. C
- the connector (5), from the instrument panel as indicated in Fig. C.





FAIRING

INSTALLATION OF THE HEADLIGHT UNIT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

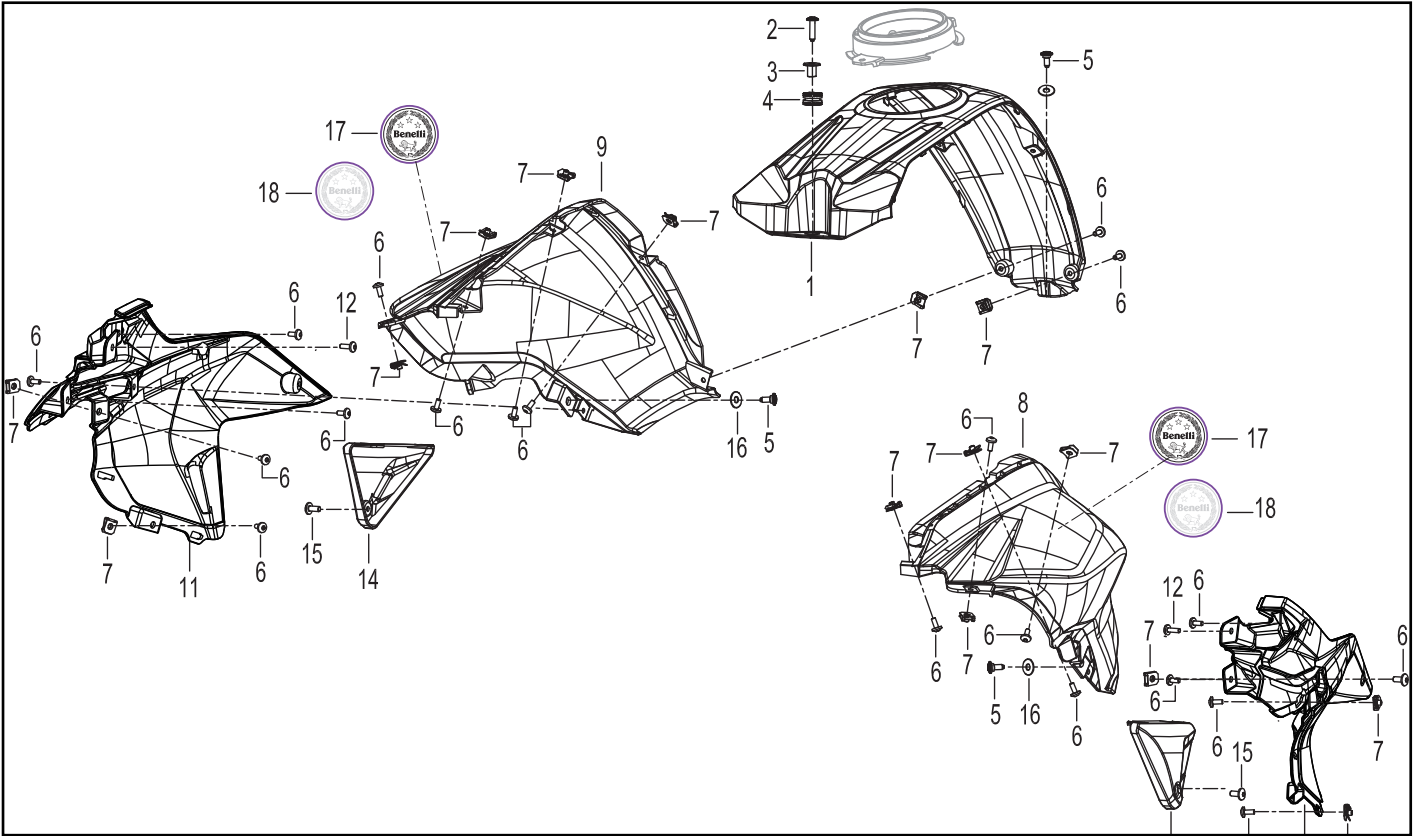
Install:

Proceed using the opposite order to removal.

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FAIRING

TANK COVER



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	FUEL TANK CAP					
2	SCREW					
3	TOP BUSHING					
4	RUBBER TIP					
5	SCREW					
6	SCREW					
7	METRIC RAPID FIXING CLIP					
8	LEFT FUEL TANK CAP					
9	RIGHT FUEL TANK CAP					
10	LEFT PANEL					
11	RIGHT PANEL					
12	SCREW					
13	LEFT COVER					
14	RIGHT COVER					
15	SCREW					
16	NYLON WASHER					
17	STICKER (BENELLI BLACK)					
18	STICKER (BENELLI WHITE)					
19	WINDSCREEN					
20	HEADLAMP					



FAIRING

REMOVAL OF THE FUEL TANK COVER

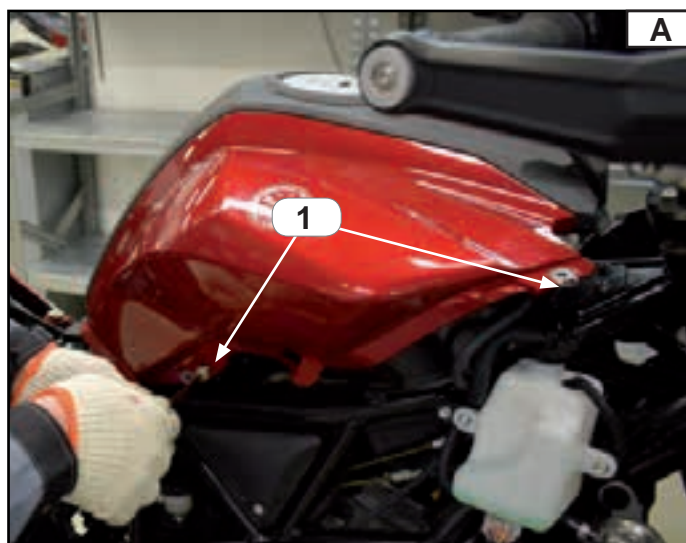
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- the screws (1) Fig. A-B.
- the tank cap (2) Fig. C.





FAIRING

INSTALLATION OF THE FUEL TANK COVER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.



FAIRING

REMOVAL OF FUEL TANK

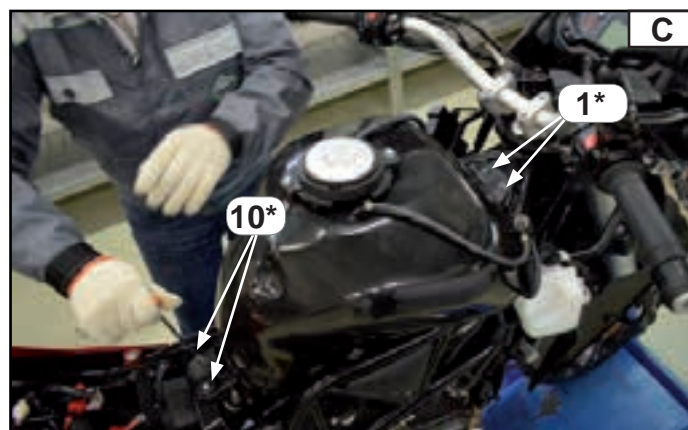
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- The fixing screws of the tank (10*) and (1*) to the frame Fig. C

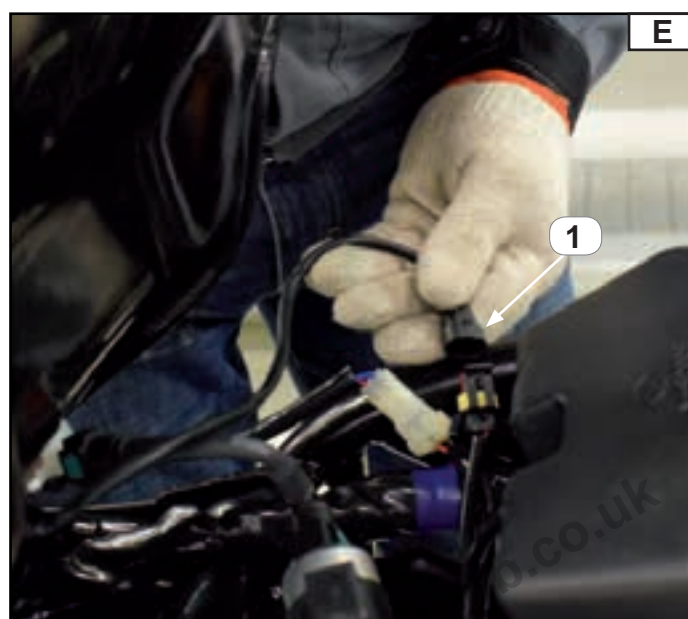


FAIRING

REMOVAL OF FUEL TANK

Disconnect:

- the tube of the non-return valve (10*) Fig. D.
- the connector of the level sensor (1) Fig. E.



Disconnect:

- The tubing of the valve (12*) of the fuel pump.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Tank", paragraph "Tank parts".





FAIRING

TANK FITTING

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (10*) Fig. A
- to the following torque:

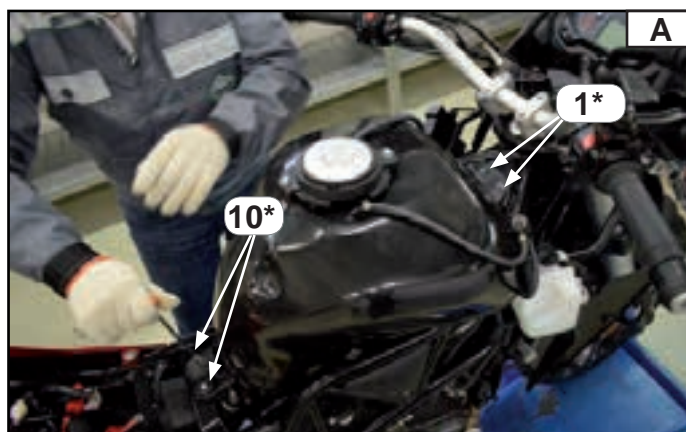


Torque 10 N*m

- the screws (1*) Fig. A
- to the following torque:



Torque 10 N*m



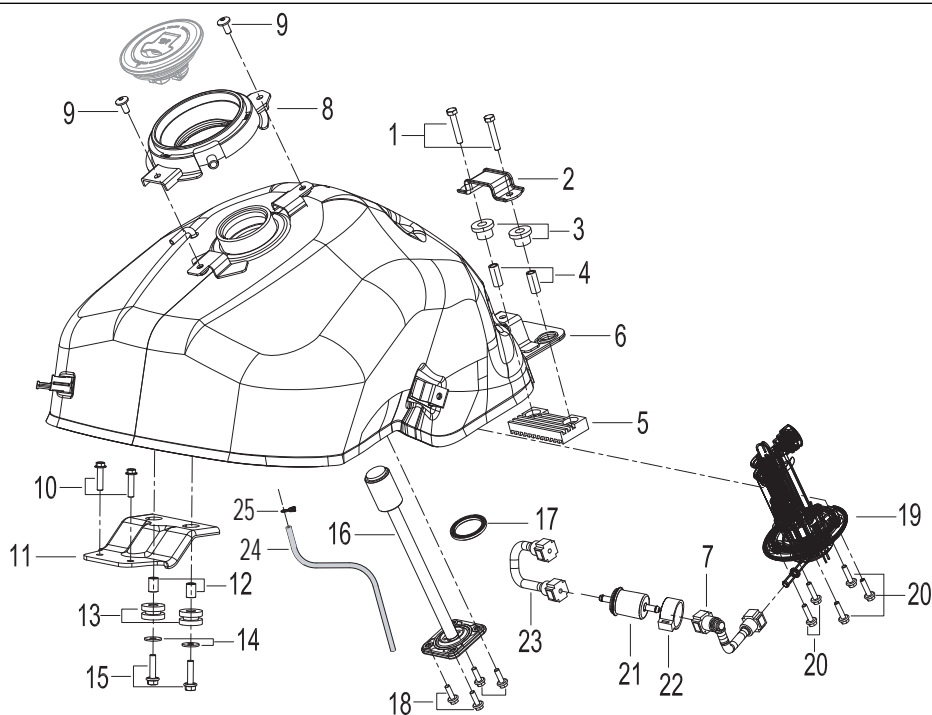
NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Tank", paragraph "Tank parts".



TANK

TANK PARTS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SCREW					
2	PLATE					
3	BUSHING					
4	BUSHING					
5	VIBRATION DAMPING RUBBER					
6	FUEL TANK					
7	FUEL TUBE/HOSE					
8	CENTRAL FAIRING CLOSURE					
9	SCREW					
10	SCREW					
11	PLATE					
12	BUSHING					
13	RUBBER TIP					
14	WASHER					
15	SCREW					
16	FUEL TANK LEVEL PROBE					
17	O-RING					
18	SCREW					
19	FUEL PUMP					
20	SCREW					
21	FUEL FILTER					
22	FILTER SUPPORT					
23	FUEL TUBE/HOSE					
24	PIPE					
25	SPRING					



TANK

REMOVAL OF THE TANK CAP SUPPORT

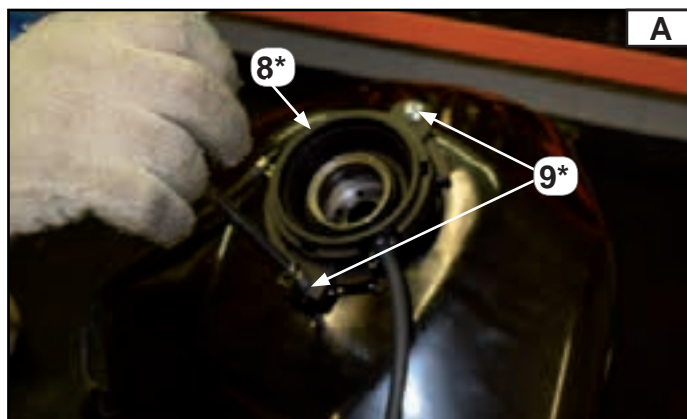
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- the fixing screws (9*) Fig. A
- the central fairing closure (8*) Fig. A



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Tank”, paragraph “Tank parts”.



TANK

INSTALLATION OF THE TANK CAP SUPPORT

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.



TANK

REMOVAL OF THE TANK PUMP

Park the bike on a level surface.

IMPORTANT NOTICE

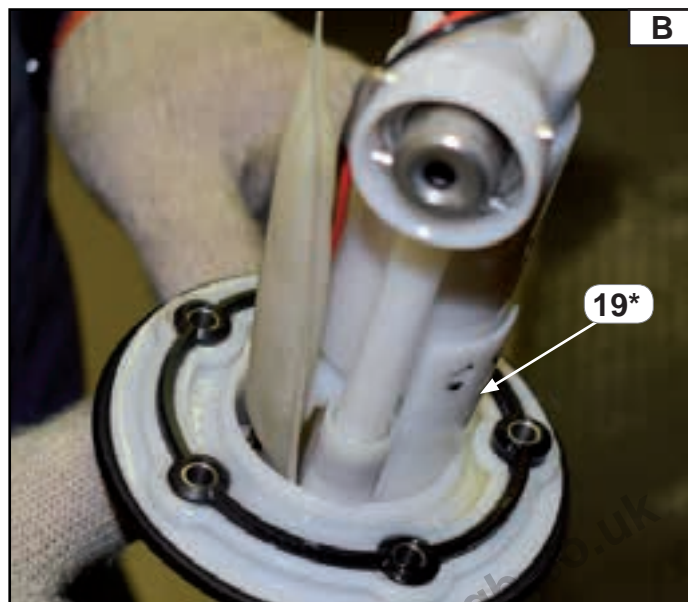
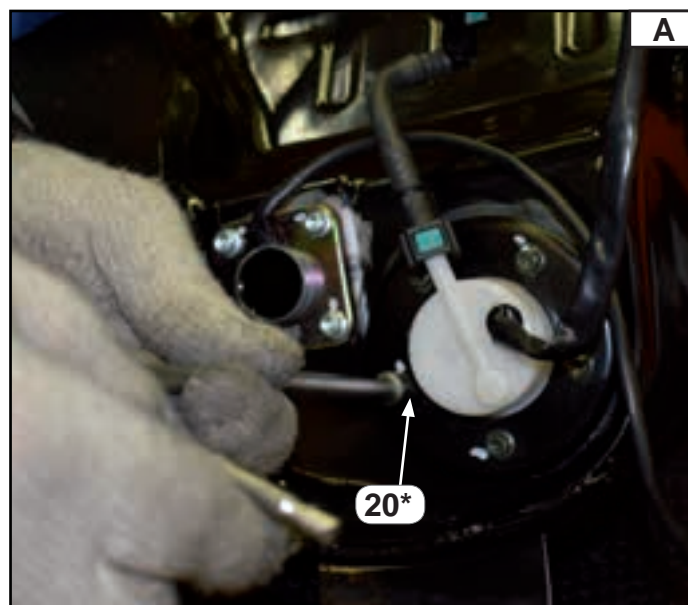
Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter entitled “**Fuel tank removal, Chapter 4**”.
- the screws (20*) Fig. A
- the petrol pump (19*) Fig. B

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Tank”, paragraph “Tank parts”.



TANK

INSTALLATION OF THE TANK PUMP

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (20*) Fig. A
- to the following torque:

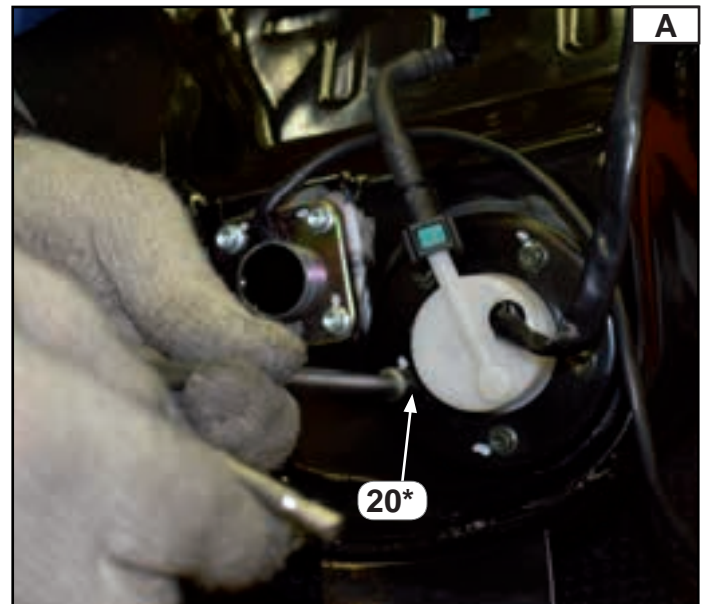


Torque 10 N*m

Use Loctite thread locker to secure.



Loctite 243

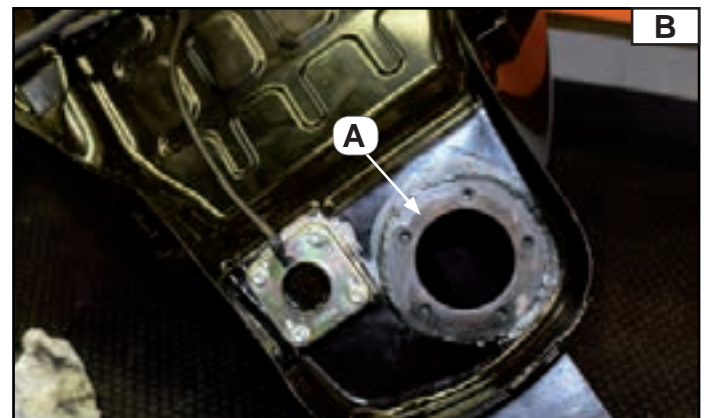


NOTE:

At the moment of reassembly of the pump, grease must be smeared around the base of the pump housing (A) and the pump must be inserted into the housing in reverse order of removal Fig. B.



**Recommended lubricant
MR2 TUTELA GREASE**



NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Tank", paragraph "Tank parts".



TANK

REMOVAL OF THE TANK FUEL LEVEL SENSOR

Park the bike on a level surface.

IMPORTANT NOTICE

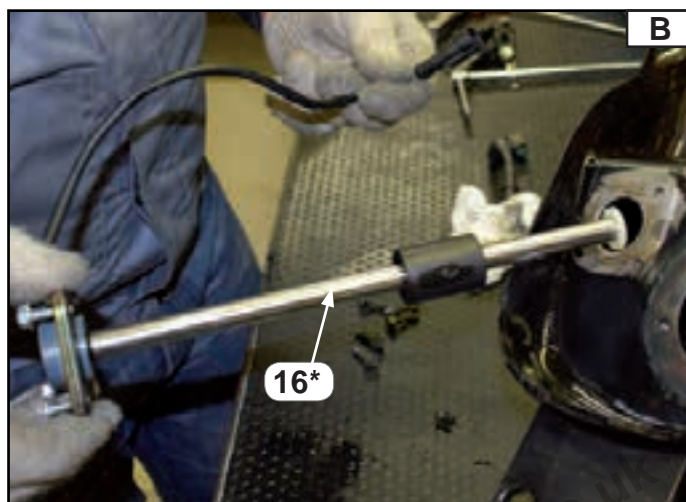
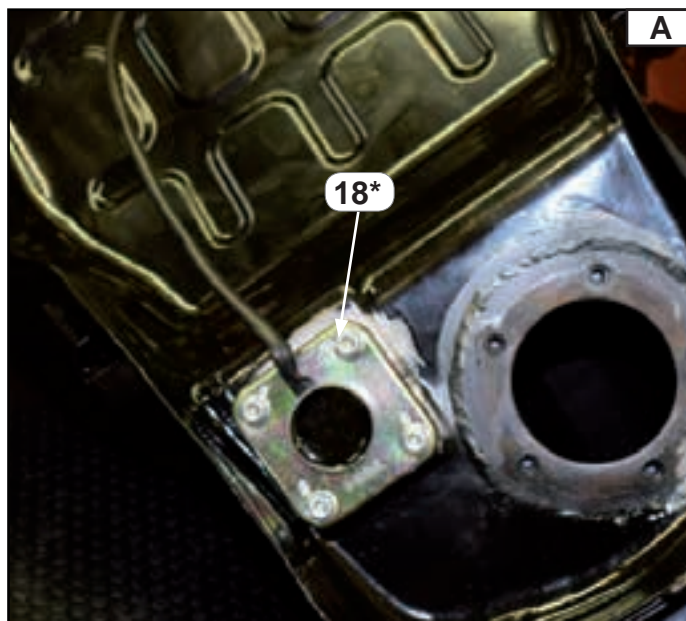
Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter entitled “**Fuel tank removal, Chapter 4**”.
- the fastening screws (18*) Fig. A
- the fuel level sensor (16*) Fig. B

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Tank”, paragraph “Tank parts”.



TANK

INSTALLATION OF THE TANK FUEL LEVEL SENSOR

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

Tighten:

- the screws (18*) Fig. A
to the following torque:

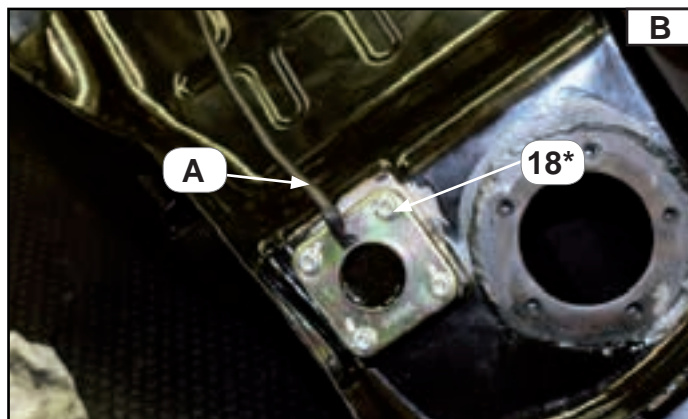


Torque 10 N*m

Use Loctite thread locker to secure.



Loctite 243



NOTE: _____

At the moment of reassembly, insert the sensor with the connecting lead (A) pointing upwards Fig. B

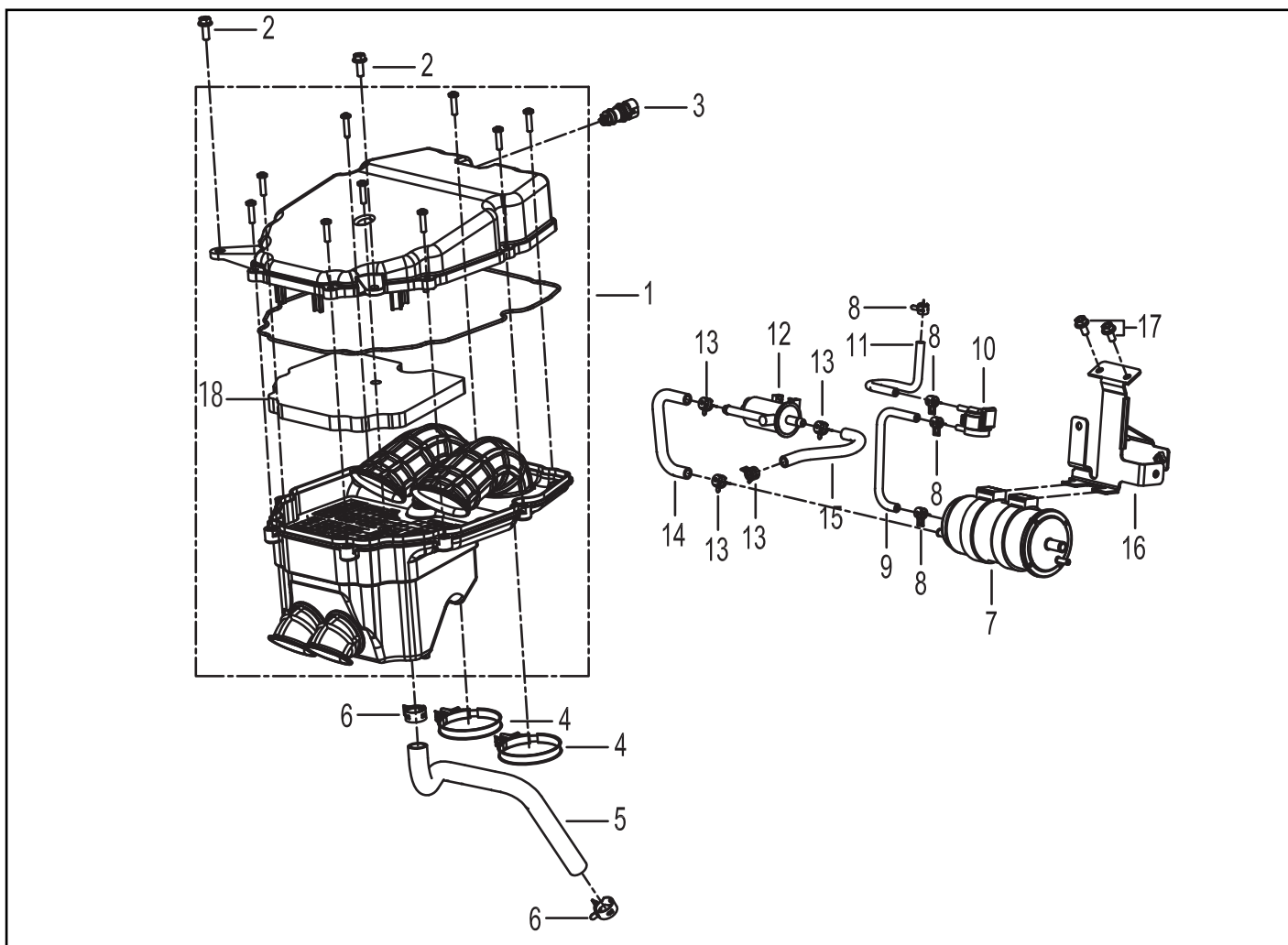
NOTE: _____

The numbers marked (*) are a part of the spare parts table, chapter "Tank", paragraph "Tank parts".



AIR FILTER

AIR FILTER PARTS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	COMPLETE AIR FILTER BOX					
2	SCREW					
3	AIR TEMPERATURE SENSOR					
4	SCREW CLIP					
5	SLEEVE					
6	HOSE HOLDER CLIP					
7	CARTRIDGE FILTER					
8	SPRING BAND					
9	PIPE					
10	NON-RETURN VALVE					
11	PIPE					
12	VALVE					
13	SPRING BAND					
14	PIPE					
15	PIPE					
16	PLATE					
17	SCREW					
18	AIR FILTER					

AIR FILTER

REMOVAL OF THE AIR FILTER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter entitled “**Fuel tank removal, Chapter 4**”.
- the screws (1) Fig. A
- the cover (2) Fig. A

Disconnect:

- the connector (3) from the cover Fig. A

Remove:

- the protection mesh (4) Fig. B
- the filter element (5) Fig. B

NOTE:

Substitute the air filter element every 12,000 km. If the vehicle is used in particularly humid climates or in very dusty areas, the air filter must be substituted more often.

Check:

Substitute the air filter element if it is damaged. If it is not damaged wash it:

- Wash the filter element with specific solvents produced for that use.
- Leave it to dry in the open air.
- Apply a specific oil over all surfaces of the filter element.

NOTE:

Before installing the filter element into the air box, remove any excess oil and making sure that there are no more drips of oil.

IMPORTANT NOTICE

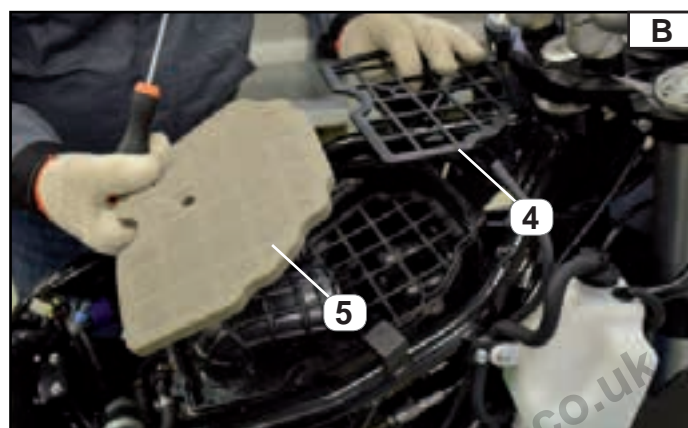
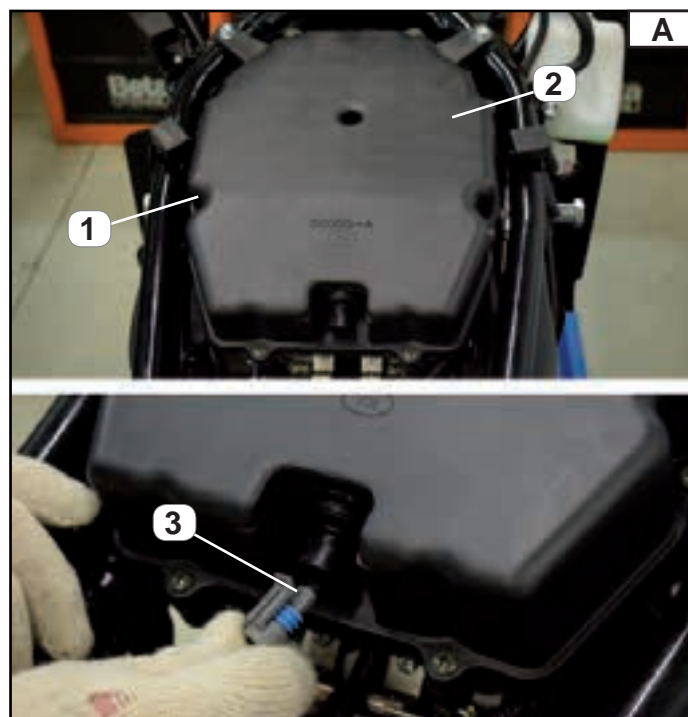
Never switch on the engine if the air filter is not installed. The unfiltered air causes a quick wear of the engine parts and might damage the engine. Furthermore, using the engine without air filter, setting of the throttle bodies is affected, causing a worsening of engine performance, as well as its overheating.

Therefore ensure that the air filter is always in a good condition.

The long life durability of the engine greatly depends on this component.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Air filter”, paragraph “Air filter parts”.





AIR FILTER

INSTALLATION OF THE AIR FILTER

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

Proceed using the opposite order to removal.

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AIR FILTER

REMOVAL OF THE AIR FILTER BOX

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Movable windscreen, see chapter entitled “**Removal of movable windscreen, Chapter 4**”.
- Front fairing, see chapter entitled “**Removal of front fairing, Chapter 4**”.
- Tank fairing, see chapter entitled “**Removal of tank fairing, Chapter 4**”.
- Tank, see chapter entitled “**Fuel tank removal, Chapter 4**”.
- the screws (1) Fig. D
- the two side covers - right and left - (2) Fig. D

Loosen:

- the two screw clips (4*) Fig. E.

Disconnect:

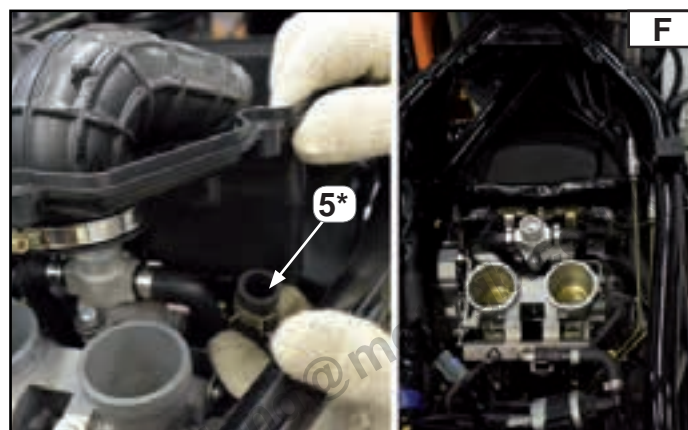
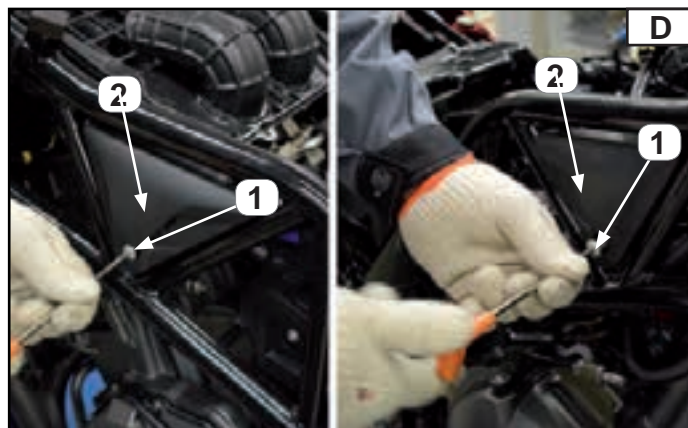
- the manifold (5*) Fig. F

Remove:

- the filter box, Fig. F

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Air filter”, paragraph “Air filter parts”.





AIR FILTER

INSTALLATION OF THE AIR FILTER BOX

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

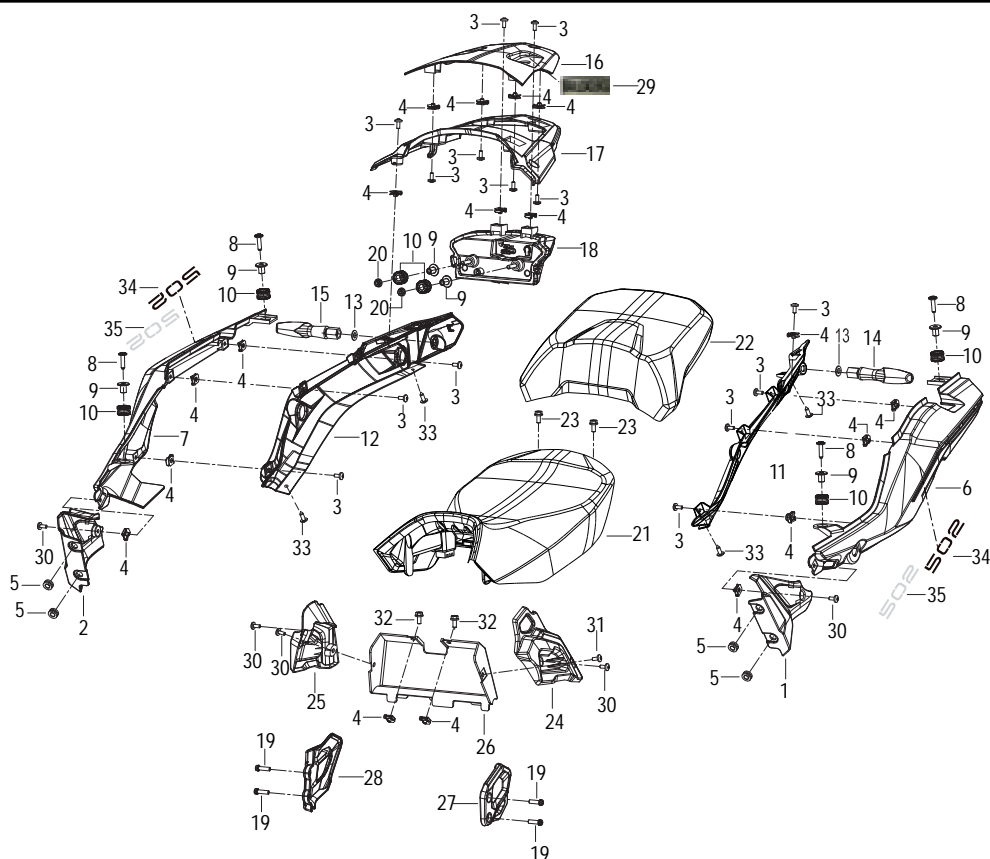
Proceed using the opposite order to removal.

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FAIRING

SIDE FAIRINGS



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	LEFT PANEL					
2	FAIRING CLOSURE					
3	SCREW					
4	METRIC RAPID FIXING CLIP					
5	VIBRATION DAMPING RUBBER					
6	LEFT TAIL FAIRING (WHITE)					
7	RIGHT TAIL FAIRING (WHITE)					
9	TOP BUSHING					
10	RUBBER TIP					
11	LEFT LOWER SIDE					
12	RIGHT LOWER SIDE					
13	WASHER					
14	LEFT REAR DIRECTION INDICATORS					
15	RIGHT REAR DIRECTION INDICATORS					
16	REAR CENTRAL FAIRING					
17	CENTRAL COVER					
18	REAR LIGHT					
19	SCREW					
20	NUT					
21	SEAT					
22	PASSENGER SEAT					



FAIRING

REMOVAL OF THE SIDE FAIRINGS

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

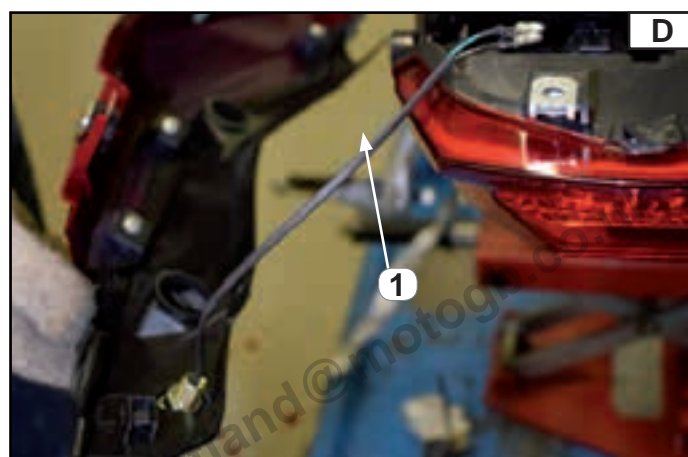
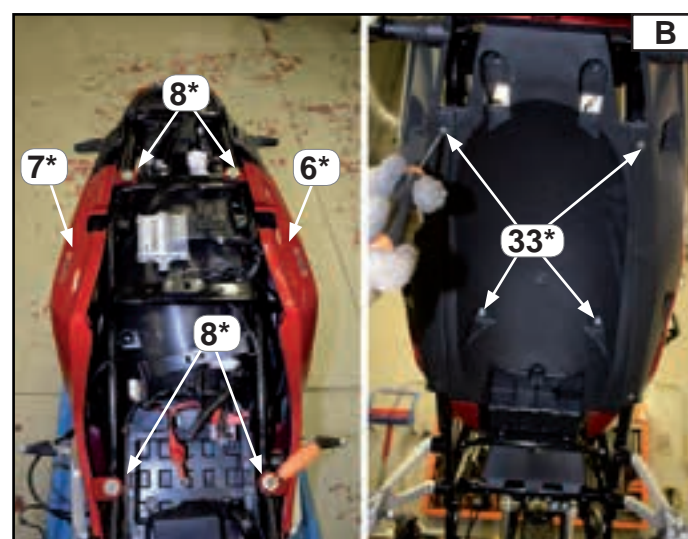
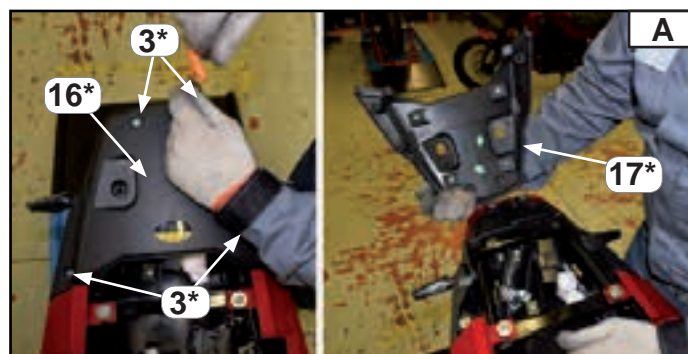
- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Rear handles, refer to chapter “**Removal of the rear handles, Chapter 4**”.
- the fastening screws (3*) Fig. A
- the rear central fairing (16*) Fig. A
- the central cover (17*) Fig. A
- the upper fixing screws (8*) Fig. B
- the lower fixing screws (33*) Fig. B
- the left tail fairing (6*) Fig. B
- the right tail fairing (7*) Fig. B

Disconnect:

- the left/right indicator leads of the tail fairing (1) Fig. D

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter “Fairings”, paragraph “Side fairings”.





FAIRING

INSTALLATION OF THE SIDE FAIRINGS

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

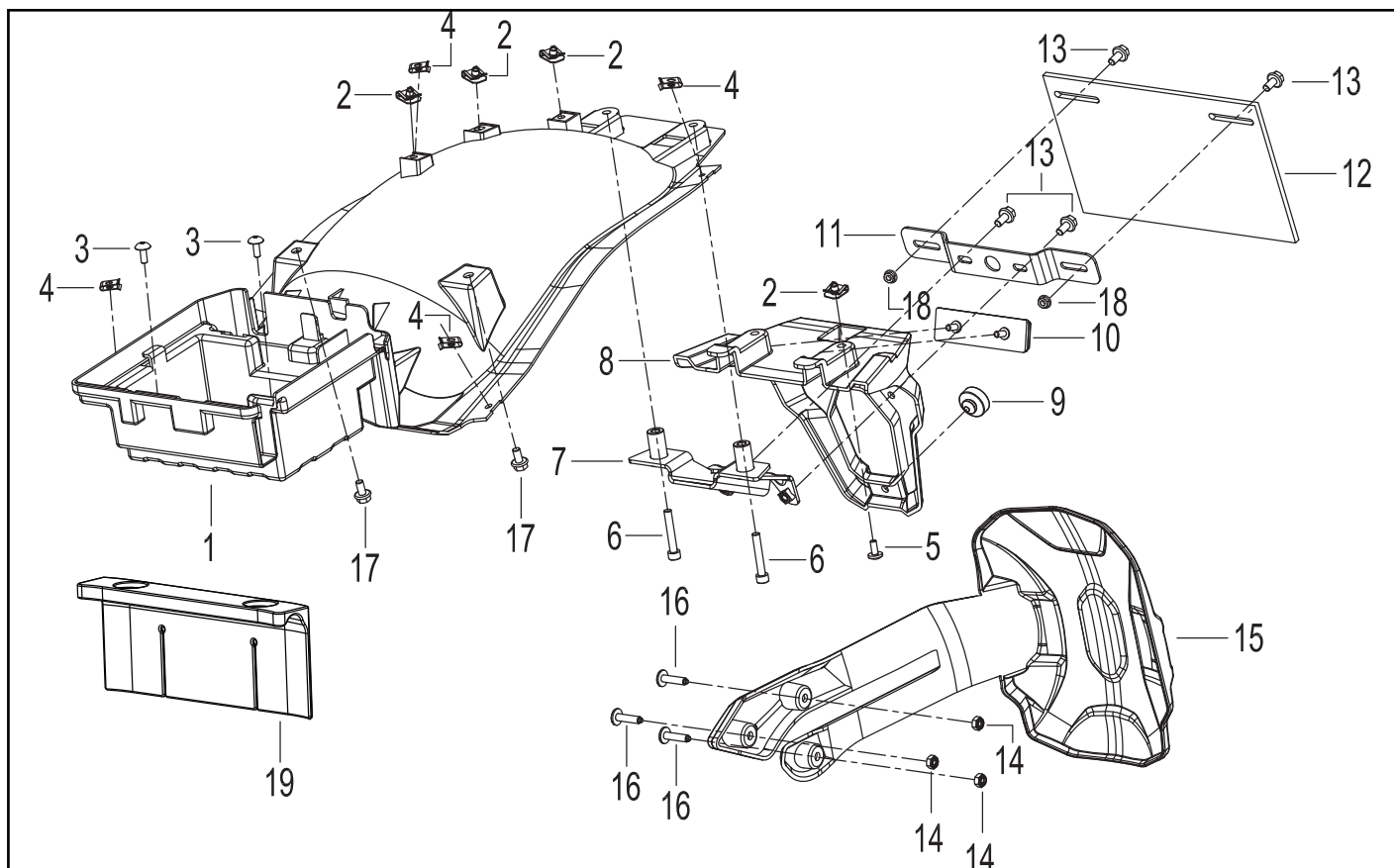
Install:

Proceed using the opposite order to removal.



FAIRING

UPPER TAIL FAIRING



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	UPPER FAIRING					
2	METRIC RAPID FIXING CLIP					
3	SCREW					
4	SNAP-ON CLIP					
5	SCREW					
6	SCREW					
7	PLATE					
8	LICENCE PLATE HOLDER SUPPORT					
9	VIBRATION DAMPING RUBBER					
10	REFLECTOR					
11	REFLECTOR BRACKET					
12	NUMBER PLATE HOLDER					
13	SCREW					
14	NUT					
15	REAR MUD GUARD					
16	SCREW					
17	SCREW					
18	NUT					
19	COVER					

FAIRING

TAILPIECE REMOVAL

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

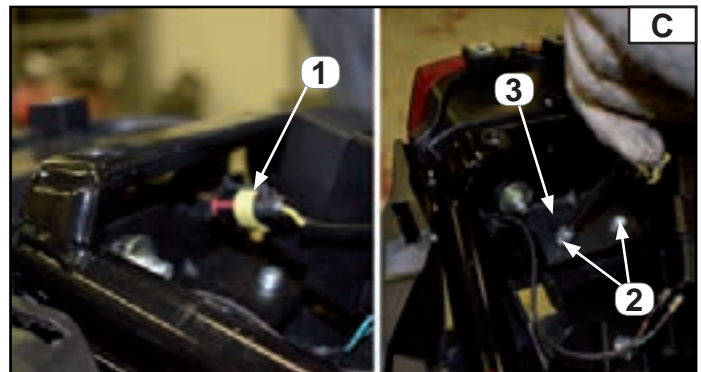
- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Rear handles, refer to chapter “**Removal of the rear handles, Chapter 4**”.
- Side fairings, refer to chapter “**Removal of the side fairings, Chapter 4**”.

Disconnect:

- the rear light connector (1) Fig. C

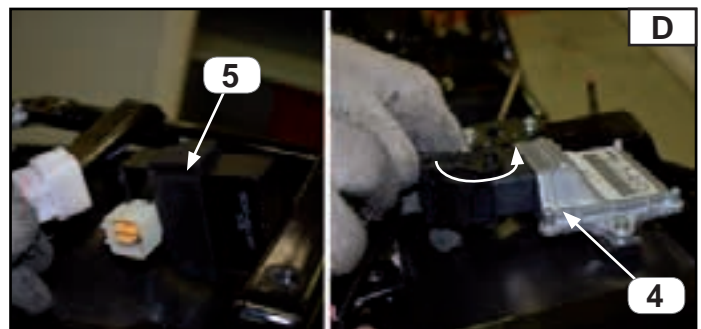
Remove:

- the screws (2) Fig. C
- the headlight support bracket (3) Fig. C



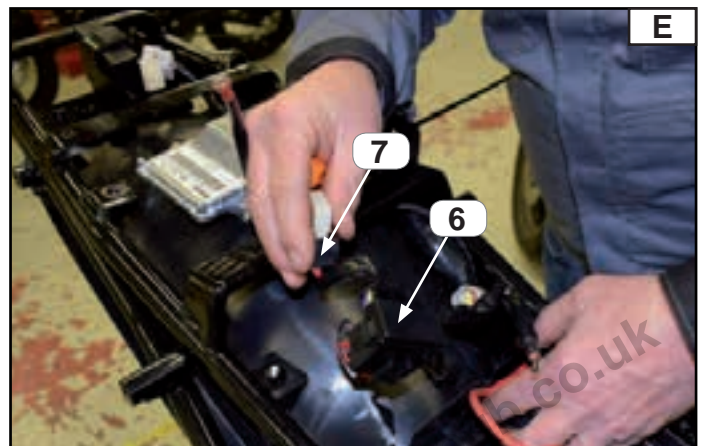
Disconnect:

- the central light unit (5) Fig. D.
- the injection central unit (4) Fig. D.



Disconnect:

- the fuse box (6) Fig. E.
- the starter relays (7) Fig. E
- the relay box (8) Fig. F

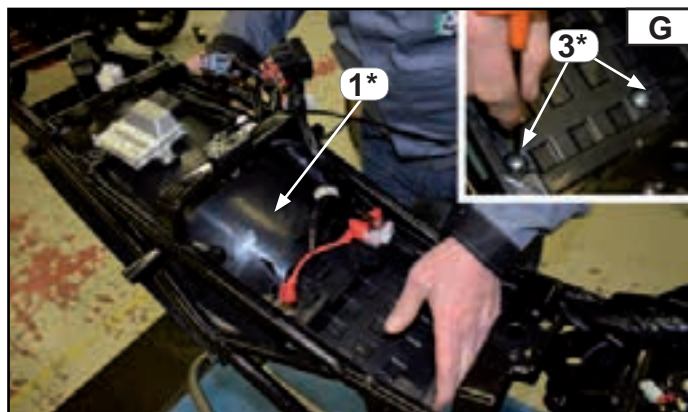




FAIRING TAILPIECE REMOVAL

Remove:

- the fixing screws (3*)
- the upper fairing (1*) Fig. G



Remove:

- the fixing screws (17*) Fig. H
- the upper fairing (1*) Fig. I

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Fairings", paragraph "Upper fairings / tail fairing".



FAIRING

REMOVAL OF THE REAR PASSENGER HANDLES

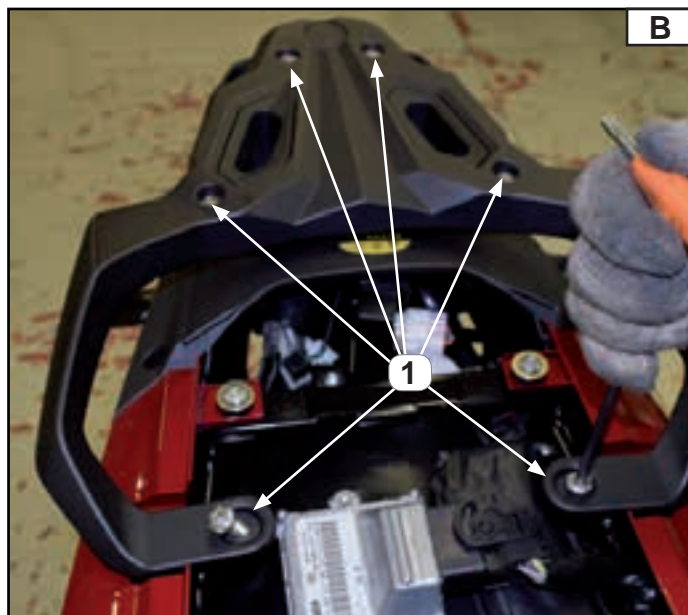
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- the screws (1) Fig. A
- the rear handles (2) Fig. B





FAIRING

INSTALLATION OF THE REAR HANDLES

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Install:

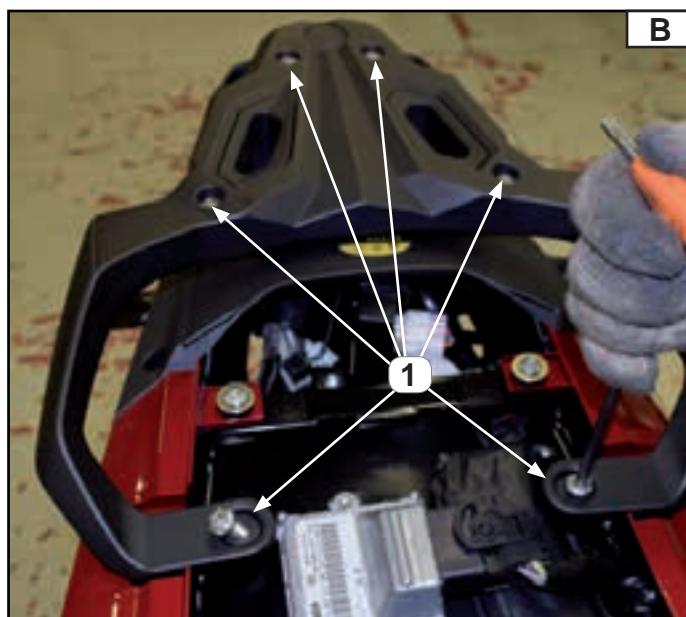
Proceed using the opposite order to removal.

Tighten:

- the screws (1) Fig. A to the following torque:



Torque 10 N*m



FAIRING

REMOVAL OF THE REAR LIGHT

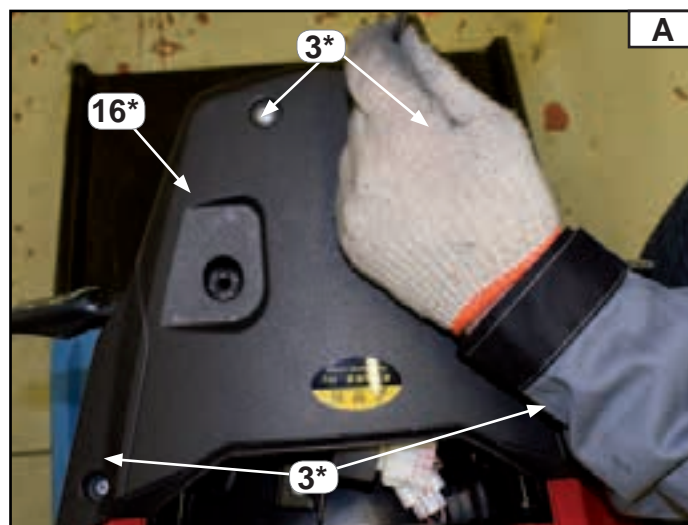
Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Rear handles, refer to chapter “**Removal of the rear handles, Chapter 4**”.
- the fixing screws (3*) Fig. A
- the rear central fairing (16*) Fig. A
- the central cover (17*) Fig. B



Disconnect:

- the rear light connector (1) Fig. C

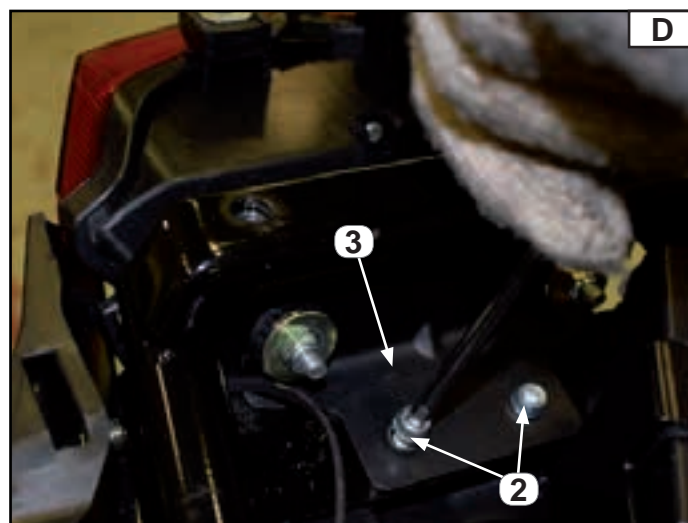




FAIRING

REMOVAL OF THE REAR LIGHT

- the screws (2) Fig. D
- the headlight support bracket (3) Fig. C

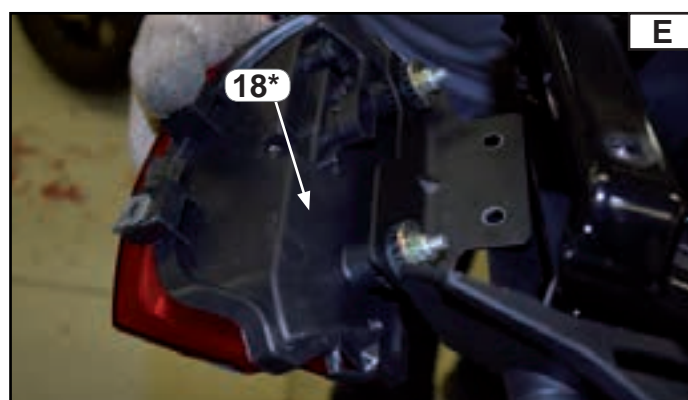


Remove:

- the rear light (18*) Fig. E.

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Fairings", paragraph "Side fairings".





FAIRING

INSTALLATION OF THE REAR LIGHTS

Park the bike on a level surface.

IMPORTANT NOTICE

Prop the bike on suitable supports so that it cannot fall.

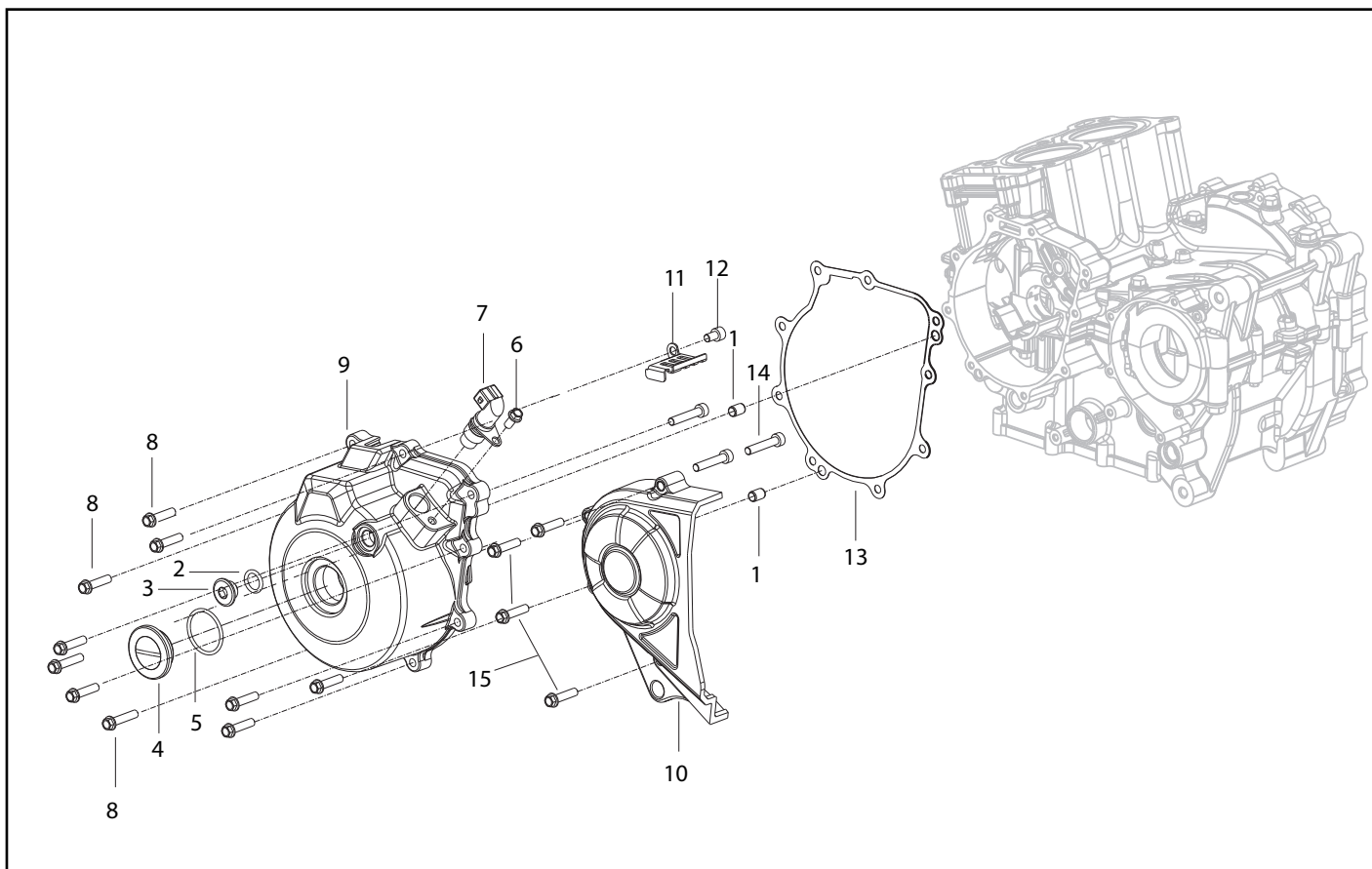
Install:

Proceed using the opposite order to removal.



FAIRING

CHAIN PINION COVER



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	BUSHING					
2	O-RING					
3	THREADED CAP					
4	MAGNETIC CAP					
5	O-RING					
6	SCREW					
7	PHASE SENSOR					
8	SCREW					
9	ALTERNATOR COVER					
10	PINION COVER					
11	PLATE					
12	SCREW					
13	FLY-WHEEL COVER GASKET					
14	SCREW					
15	SCREW					

FAIRING

REMOVAL OF THE CHAIN PINION COVER

Remove:

- the screws (15*) Fig. A.
- The pinion cover (10*) Fig. A

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Fairings", paragraph "Removal of the chain pinion cover".





FAIRING

INSTALLATION OF THE CHAIN PINION COVER

Install:

- The pinion cover (10*) Fig. A.
- the screws (15*)

Tighten to the following torque:



Torque 8 N*m

NOTE:

The numbers marked (*) are a part of the spare parts table, chapter "Fairings", paragraph "Removal of the chain pinion cover".





ENG.

5



CHAPTER 5

ENGINE

HEAD DISTRIBUTION.....	4
COILS AND SPARK PLUGS REMOVAL	5
COILS AND SPARK PLUGS ASSEMBLY	6
TIMING GEAR COVER ASSEMBLY	8
DISTRIBUTION CHAIN TENSIONER REMOVAL	9
TIMING CHAIN TENSIONER ASSEMBLY	10
INTAKE AND EXHAUST CAMSHAFT REMOVAL	11
CAMSHAFT CHECK.....	12
EXHAUST CAMSHAFT INSTALLATION	13
INTAKE CAMSHAFT ASSEMBLY.....	14
TIMING CHAIN SLIDE REMOVAL.....	15
TIMING CHAIN SLIDE ASSEMBLY	16
TIMING CHAIN REMOVAL.....	17
DISTRIBUTION CHAIN INSTALLATION	18
VALVE CLEARANCE ADJUSTMENT	19
CAMSHAFT AND VALVE PAD REMOVAL	20
CAMSHAFT AND VALVE PAD REMOVAL	21
CAMSHAFT AND VALVE PAD REMOVAL	22
HEAD REMOVAL.....	23
VALVE FLAP AND SPRING REMOVAL.....	24
CHECK OF VALVES AND GUIDES.....	25
VALVE SEAT CHECK	27
VALVE OIL SEAL REMOVAL- INSTALLATION	28
VALVE SPRING TEST	29
VALVE AND VALVE SPRING INSTALLATION.....	30
CYLINDER CHECK	31
HEAD INSTALLATION.....	32
PISTONS.....	33
PISTON REMOVAL	35
PISTON PIN CHECK	36
PISTON RINGS CHECK.....	37
PISTON CHECK	38
PISTON ASSEMBLY	39
PISTON INSTALLATION.....	40
REMOVAL OF CONNECTING RODS	41
CRANKCASE.....	41
CHECK OF CONNECTING ROD AND CONNECTING ROD BEARING SHELLS.....	43
INSTALLATION OF CONNECTING ROD AND CONNECTING ROD BEARING SHELLS	44
MAIN BEARING SHELL AND DRIVE SHAFT INSTALLATION	46
DRIVE SHAFT CHECK.....	49
DRIVE SHAFT INSTALLATION	50
CLUTCH.....	51
CLUTCH AND DISC REMOVAL	52
FRICTION DISC CHECK.....	54
STEEL DISC CHECK	55
DISC ASSEMBLY	55
CLUTCH ASSEMBLY	56
LUBRICATION SYSTEM	57
OIL SUMP AND INTAKE FILTER REMOVAL	58
OIL SUMP AND INTAKE FILTER INSTALLATION.....	59
PRESSURE-RELIEF VALVE INSTALLATION	60
PRESSURE-RELIEF VALVE REMOVAL	61
OIL PUMP REMOVAL.....	62
OIL PUMP ASSEMBLY	64
NEUTRAL POSITION/GEAR INDICATOR SENSOR REMOVAL.....	65

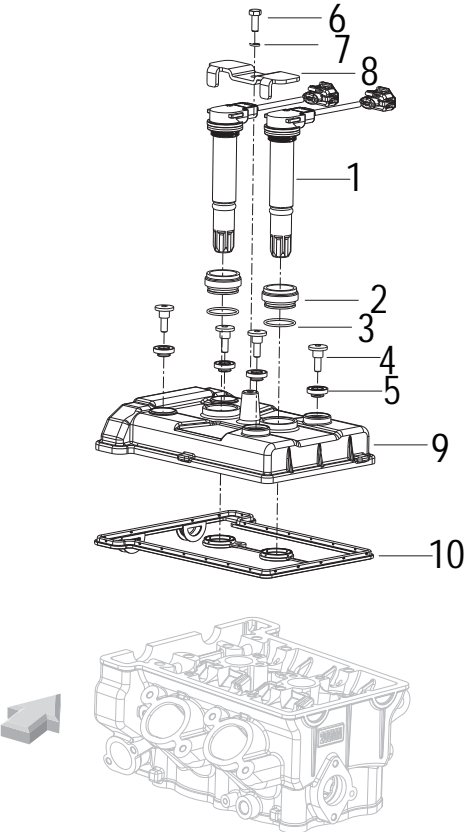


CHAPTER 5

GEAR BOX	65
NEUTRAL POSITION/GEAR INDICATOR SENSOR ASSEMBLY	66
GEAR BOX ASSEMBLY	70
GEAR SHIFT CONTROL	72
STARTER	76
STARTING	76
STARTER REMOVAL	77
STARTER INSTALLATION	78
FLYWHEEL REMOVAL	79
FLYWHEEL INSTALLATION	82
STARTER GEAR REMOVAL	83
STARTER GEAR ASSEMBLY	84
PHASE SENSOR	85
PHASE SENSOR REMOVAL	86
PHASE SENSOR INSTALLATION	87
POWER SYSTEM	88
THROTTLE BODY	88
THROTTLE VALVE REMOVAL	90
THROTTLE VALVE INSTALLATION	91

HEAD DISTRIBUTION

DISTRIBUTION COVER REMOVAL



1	COIL					
2	RUBBER TIP					
3	O-RING					
4	SCREW					
5	BUSHING					
6	SCREW					
7	SPECIAL WASHER					
8	BRACKET					
9	TIMING GEAR COVER					
10	TIMING GEAR COVER GASKET					



HEAD DISTRIBUTION

COILS AND SPARK PLUGS REMOVAL

Remove:

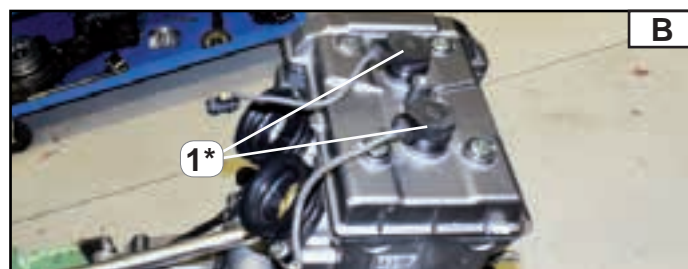
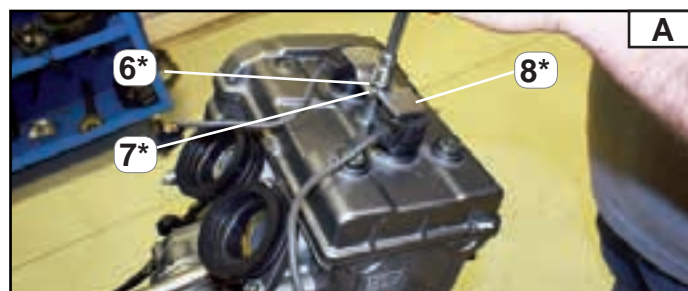
- the screw (6*) Fig. A
- washer (7*) Fig. A
- bracket (8*) Fig. A
- the coils (1*) Fig. B
- the spark plugs, using a special wrench.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Engine", section entitled "Timing gear cover removal".

NOTE:

To check the spark plugs, see the chapter entitled "Routine maintenance, "spark plug removal" section.





HEAD DISTRIBUTION

COILS AND SPARK PLUGS ASSEMBLY

The procedure applies to all of the spark plugs Fig.C.

WARNING

Lubricate the spark plug threads with copper grease.



Grease

NOTE:

Before installing it, clean the spark plug and surface in contact with the seal.

Install:

- the spark plug to the head, tightening it by hand until it comes into contact with the base of the head. Tighten to torque.



Torque 12 N*m

Install:

- The rubber tips (2*)
- the OR seals (3*) Fig. D
- the coils (1*) Fig.
- the screws (6*)
- the washers (7*)
- the brackets (8*) Fig.

Tighten to torque.



Torque 10 N*m

NOTE:

Numbers marked (*) are part of the spare parts tables in Chapter 5 "Engine", section entitled "Timing gear cover removal".





HEAD DISTRIBUTION

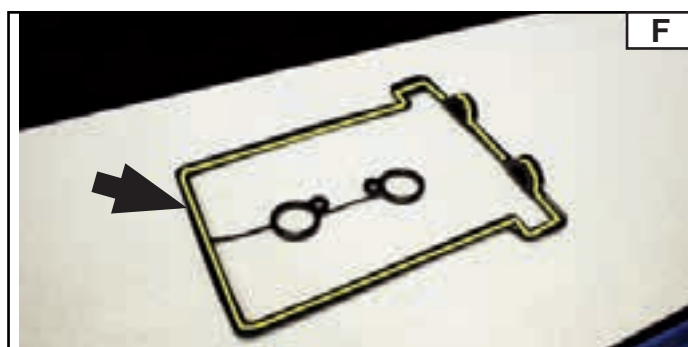
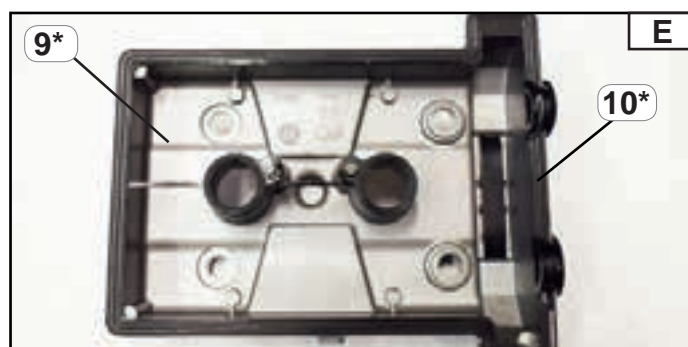
TIMING GEAR COVER REMOVAL

Take care with the seal on the timing gear cover (10*) Fig. E. during removal.

NOTE:
In case of seal breakage on the timing gear cover (10), replace.

During the assembly of the cover, install sealing paste on the surface as shown in Fig. F

NOTE:
Numbers marked (*) are part of the spare parts tables in Chapter 5 "Engine", section entitled "Timing gear cover removal".





HEAD DISTRIBUTION

TIMING GEAR COVER ASSEMBLY

Assemble:

Proceed in the opposite direction to removal.

NOTE:

During the assembly stage of the timing gear cover, replacement of the rubber tips (5*) is recommended.

Tighten:

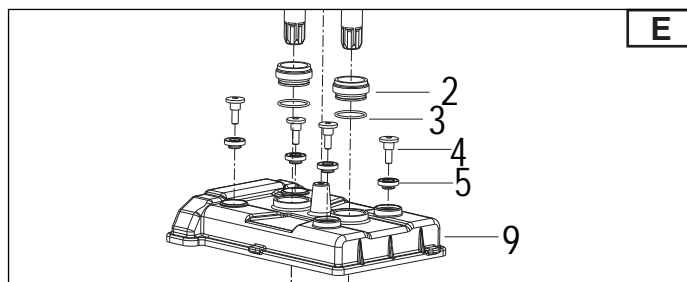
Tighten the screws (4*) to the following torque:



Torque 12 N*m

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Engine", section entitled "Timing gear cover removal".





HEAD DISTRIBUTION

DISTRIBUTION CHAIN TENSIONER REMOVAL

Remove:

1. the screws (C)
2. the screw (B)
3. the washer
4. the seal

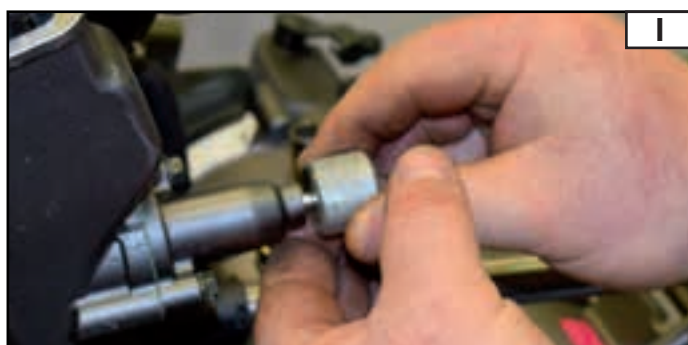
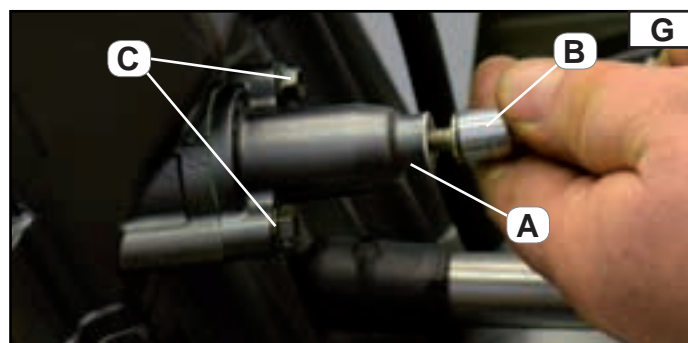
NOTE:

Operation to perform with the engine in TDC.

Using the special tool during the removal stage, keep the tensioner retracted, Fig. I., then remove the two screws "C" Fig. G.



(*) Tool: Chain tensioner lock tool
Code: 0320097046001





HEAD DISTRIBUTION

TIMING CHAIN TENSIONER ASSEMBLY

During the assembly stage, take care to ensure that the seal (D) Fig. H is undamaged and unworn. Replace if necessary.

Move:

The tensioner to the retracted position and insert it into its housing using the special tool (*)



(*) **Tool: Chain tensioner lock tool**
Code: 0320097046001

Insert the tensioner into the seat and housing.

Tighten:

- The fastening screws (C) Fig. I to the following torque:

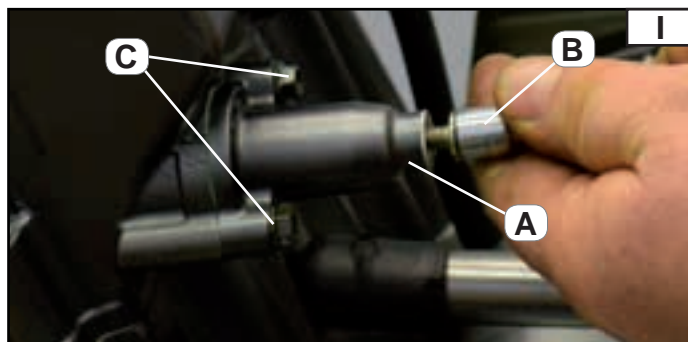
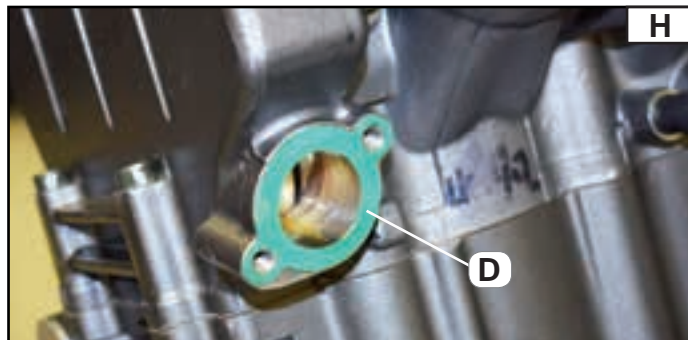


Torque 10 N*m

- The screws (B) to the following torque:



Torque 8 N*m





HEAD DISTRIBUTION

INTAKE AND EXHAUST CAMSHAFT REMOVAL

Remove:

- **Coils and Spark plugs**, see the section entitled "Coil and spark plug removal".
- **Head timing gear**, see section entitled "Head timing gear cover removal".

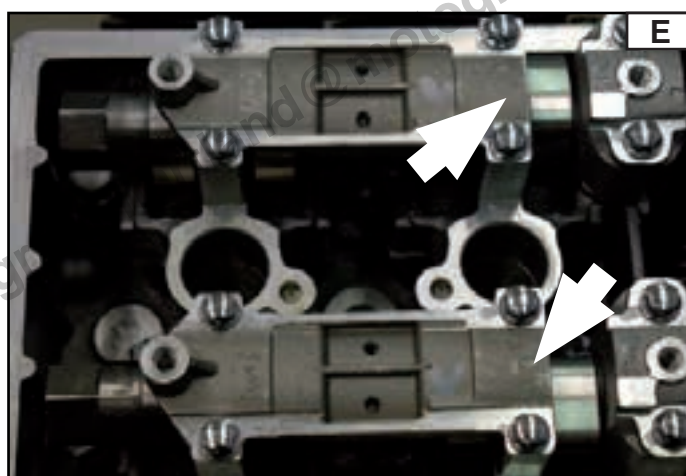
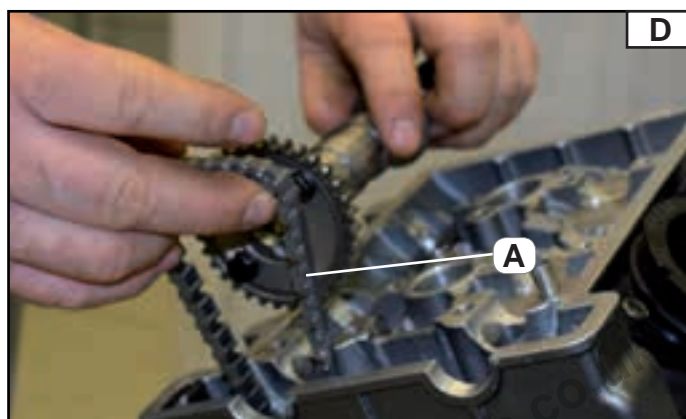
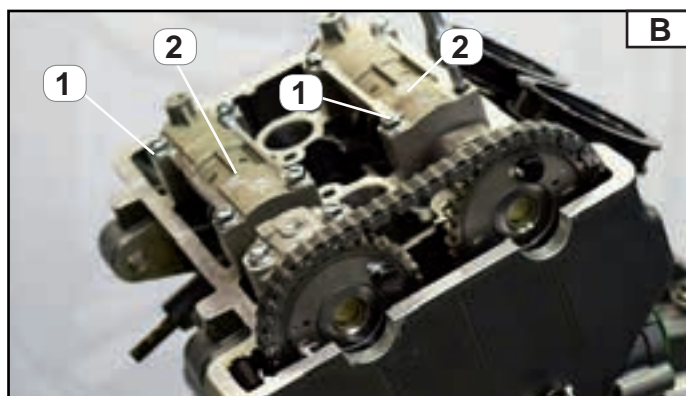
NOTE:

During the removal stage, use a marker pen to mark the position of the holders since, when reinstalling, they need to be in their original positions, Fig. E.

The "arrows" pressed into the holders show the direction in which they need to be installed towards the timing gear.

Remove:

- the fastening screws of the holders (1) Fig. B
- The holders (2)
- the intake camshaft Fig. C
- the exhaust camshaft (A) Fig. D





HEAD DISTRIBUTION

CAMSHAFT CHECK

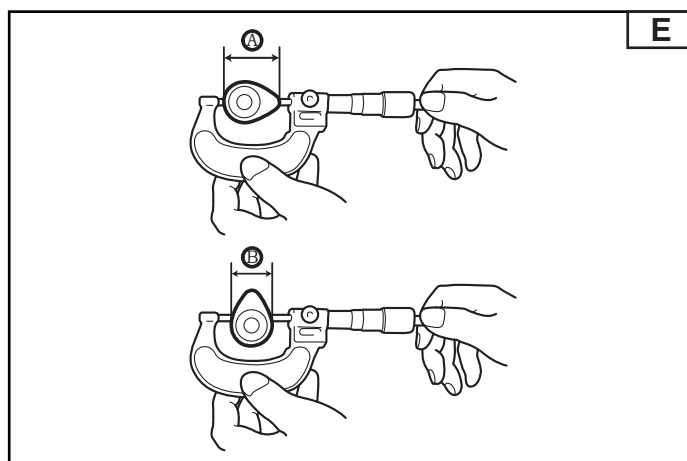
Make a visual check of the camshaft lobes and if there is any blue discolouration/pitting or lines, replace.

- Measure the size of the lobes.**

If the measures taken (Fig. E) are not compliant with specifications, replace the shaft.

Specifications Table

Camshaft	Limit (a)	Limit (b)
Camshaft exhaust side	31.9 mm	24.82 mm
Camshaft intake side	32.2 mm	24.85 mm



- Measure the eccentricity of the camshaft**

If the measures taken (Fig. F) are not compliant with specifications, replace the shaft.

Specifications Table

Camshaft	Eccentricity limit
Camshaft exhaust side	0.05 mm
Camshaft intake side	0.05 mm

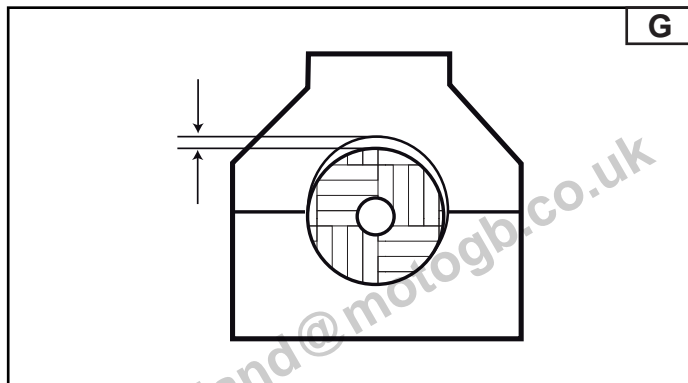


- Measurement of clearance between camshaft main bearing bolts and holder**

If the measures taken (Fig.G) are not compliant with specifications, replace the head gear and holder block.

Specifications Table

Camshaft	Clearance between bearing journals and camshaft
Camshaft outlet side	0.012 mm
Camshaft intake side	0.012 mm

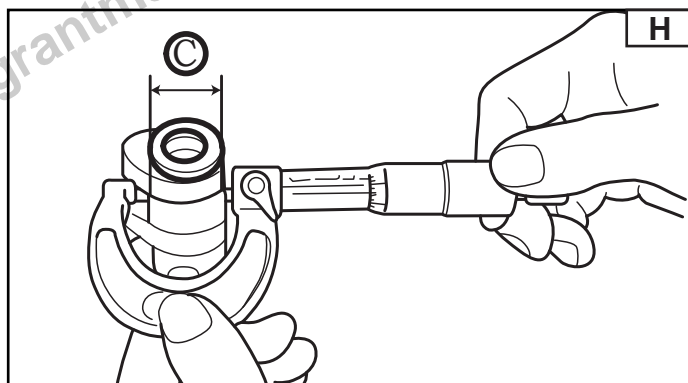


- Measure the diameter of the camshaft support**

If the measurements taken (Fig.H) are not within the specifications, proceed with shaft replacement.

Specifications Table

Camshaft	Measurement of main bearings (C)
Camshaft exhaust side	Ø 23 mm (-0.03/-0.043)
Camshaft intake side	





HEAD DISTRIBUTION

EXHAUST CAMSHAFT INSTALLATION

Insert:

Install the special tool (*) into the spark plug seat to check the top dead centre Fig. A.

(*) Tool: Engine phasing tool

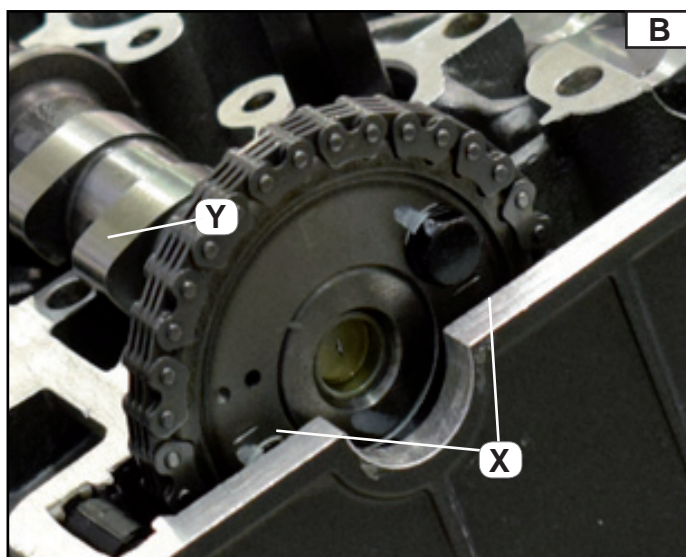
Code:R180197022000

Once the TDC has been identified, proceed to assemble the camshaft, exhaust side.



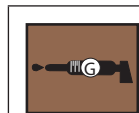
NOTE:

During this assembly, it is important for the lobes of the cylinder shaft 1 (Y) to be positioned outwards Fig. B. and the two reference notches "X" of the distribution gear are aligned as in Fig. B.



NOTE:

When assembling the holders, it is necessary to lubricate them with special grease to prevent the shafts from rotating dry during initial starting.



Sintoflon Grease

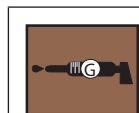
When installing the holders, proceed in the opposite direction to removal, tightening the screws to the following torque:



Torque 13 N*m

NOTE:

lubricate the screws with copper grease.



Copper grease

NOTE:

Check the correct alignment of the exhaust camshaft using the special tool (*).

(*) Tool: Engine phasing tool

Code:R180197022000



HEAD DISTRIBUTION

INTAKE CAMSHAFT ASSEMBLY

Install the relevant tool (*) into the spark plug seat to check the top dead centre Fig. A.

(*) Tool: Engine phasing tool

Code: R180197022000

Once the TDC has been identified, proceed to assemble the camshaft, exhaust side.

NOTE:

During installation, it is important for the lobes of cylinder 1 shaft are positioned outwards, and the two reference notches "X" of the two timing gears are aligned as in Fig. B.

NOTE:

When assembling the holders, it is necessary to lubricate them with special grease to prevent the shafts from rotating dry during initial starting.



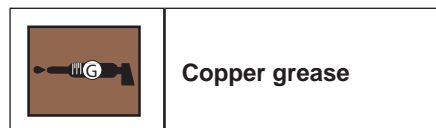
When assembling the holders, proceed in the opposite direction to removal, tightening the screws to the following torque:



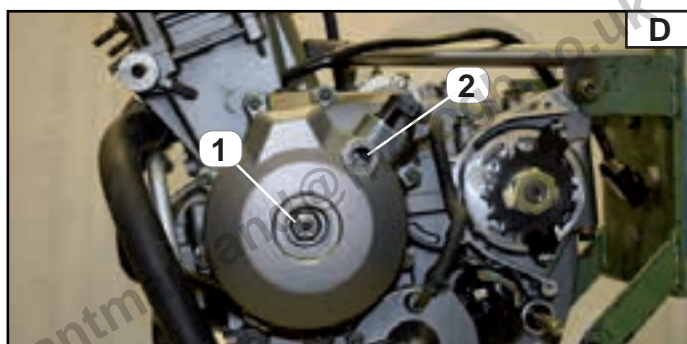
Torque 10-13 N*m

NOTE:

Lubricate the screws with copper grease.



Turn the camshaft clockwise, using the fastening nut to the flywheel, moving the TDC so it lines up with the reference markings "X" on the head surface Fig. B and the reference mark on the magnet flywheel (2) Fig. D.



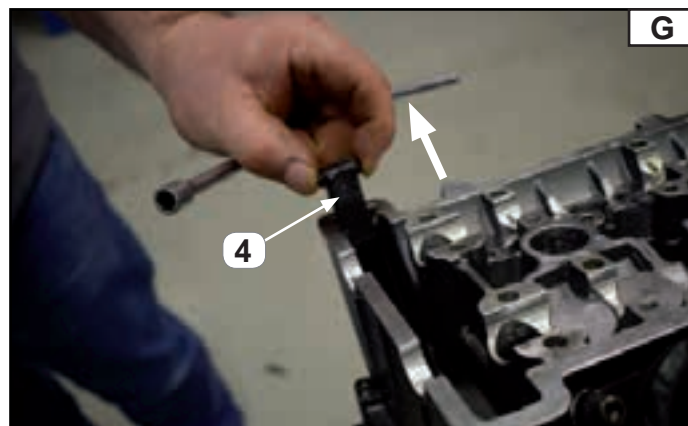


HEAD DISTRIBUTION

TIMING CHAIN SLIDE REMOVAL

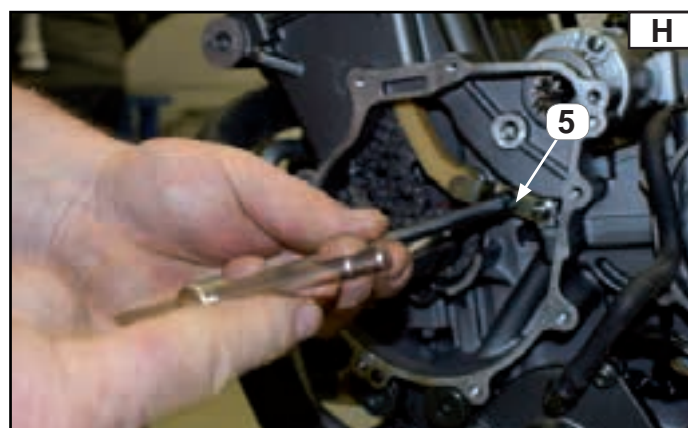
Remove:

- Coils and Spark plugs, see the section entitled “Coil and spark plug removal”.
- 1. Head timing gear, see section entitled “Head timing gear cover removal”.
- 2. Chain tensioner, see chapter entitled “Chain tensioner removal”.
- 3. Exhaust camshaft, see chapter entitled “Exhaust camshaft removal”.
- 4. Intake camshaft, see chapter entitled “Intake camshaft removal”.
- 5. Flywheel, see chapter entitled “Flywheel removal”.
- 6. Starter gear assembly, see chapter entitled “Starter gear assembly removal”.



Remove:

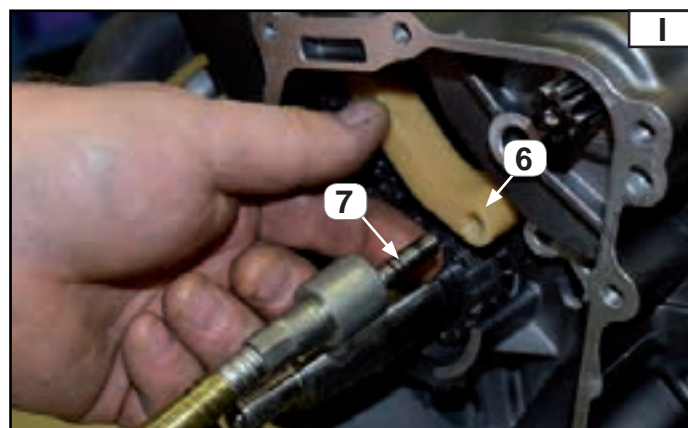
- the fixed chain slide (4) sliding it towards the other
- the safety plate (5) Fig. H
- the mobile chain slide (6) Fig. I
- the fixing pin (7) Fig. I



CHECK OF THE TIMING CHAIN SLIDES

Check:

- the contact surface of the fixed slide.
 - The contact surface of the mobile slide.
- If there is any damage or wear, replace the faulty parts.





HEAD DISTRIBUTION

TIMING CHAIN SLIDE ASSEMBLY

To assemble the chain slides, follow the removal process in the opposite order.

NOTE: Operation to perform with the engine in TDC.

At the end of assembly, proceed to load the timing chain tensioner. See chapter “**Timing chain tensioner installing**”.



HEAD DISTRIBUTION

TIMING CHAIN REMOVAL

Remove:

1. Coils and Spark plugs, see the section entitled **“Coil and spark plug removal”**.
 2. Head timing gear cover, see the chapter entitled **“Head timing gear cover removal”**.
 3. Chain tensioner, see chapter entitled **“Chain tensioner removal”**.
 4. Exhaust camshaft, see chapter entitled **“Exhaust camshaft removal”**.
 5. Intake camshaft, see chapter entitled **“Intake camshaft removal”**.
 6. Flywheel, see chapter entitled **“Flywheel removal”**.
 7. Starter gear removal, see chapter entitled **“Starter gear assembly removal”**.
 8. Chain slides, see chapter entitled **“Chain slide removal”**.
- Once the parts listed above have been removed, proceed to take out the same Fig. I



TIMING CHAIN CHECK

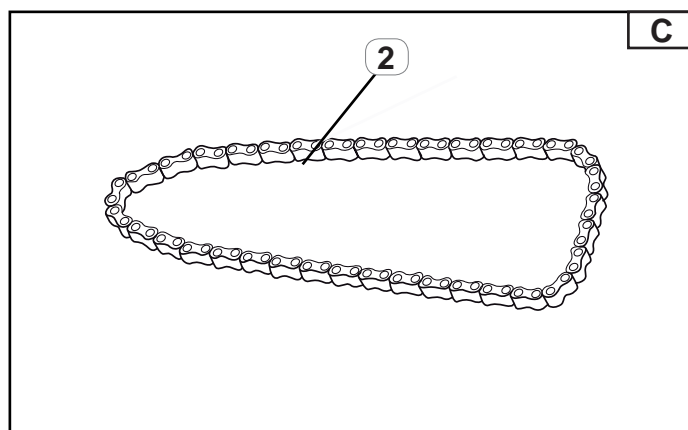
The following process applies to all of the toothed wheels on the camshafts and all of the timing chain guides.

Check:

- timing chain (2) Fig. C
- In case of damage/lack of flexibility/locked links, replace the timing chain and camshaft gear block.

NOTE:

In any case the timing chain needs to be replaced after 20,000 km.





HEAD DISTRIBUTION

DISTRIBUTION CHAIN INSTALLATION

Insert:

- the timing chain (1) in to the camshaft pinion, as in Fig. A
- Insert the fixed and mobile chain tensioner slides, see chapter "**Timing chain assembly**".
- The two camshafts, making sure that both are installed with the phasing references "aligned" with the floor" as in Fig. B.

NOTE:

Assembly of the timing chain must always take into account the fact that the motor must be in the TDC condition Fig. B, see chapter entitled "installation of intake camshaft."

(*) Engine tuning tool

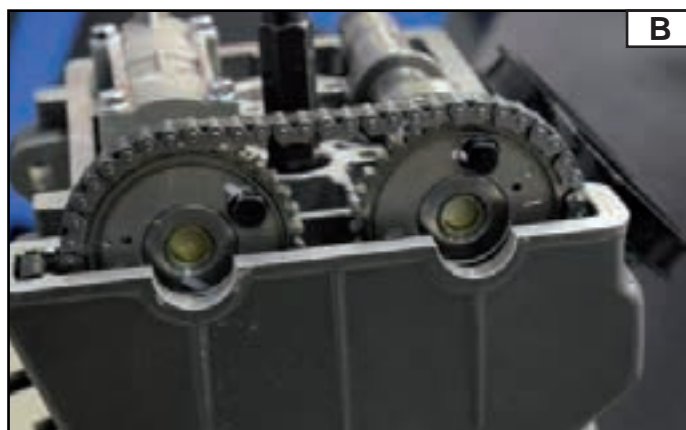
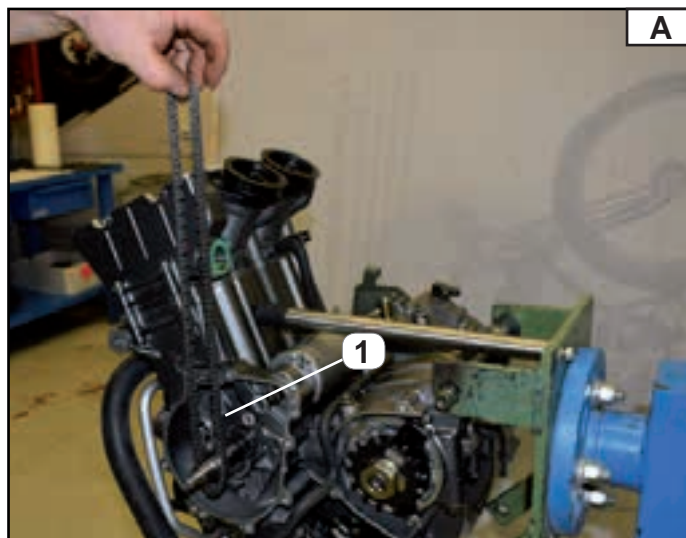
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NOTE:

During this operation, it is necessary to lubricate the chain and timing gears with engine oil.

NOTE:

Every time that the chain is replaced, it is also necessary to replace the slides.





HEAD DISTRIBUTION

VALVE CLEARANCE ADJUSTMENT

Remove:

1. Coils and Spark plugs, see the section entitled “Coil and spark plug removal”.
2. Head timing gear cover, see chapter entitled “Head timing gear cover removal”

NOTE:

Valve clearance must be checked and adjusted when the engine is cool (ambient temperature).

Check:

Use a feeler gauge to check the clearance between the cam and the valve tappets, as shown in Fig. A.

If the measurement is outside specifications, replace the calibrated pad.

**NOTE:**

The measurement must be taken on all cams and tappets.

Camshaft	Tappet-cam clearance
Camshaft exhaust side	0.19 ~ 0.25 mm
Camshaft intake side	0.13 ~ 0.19 mm

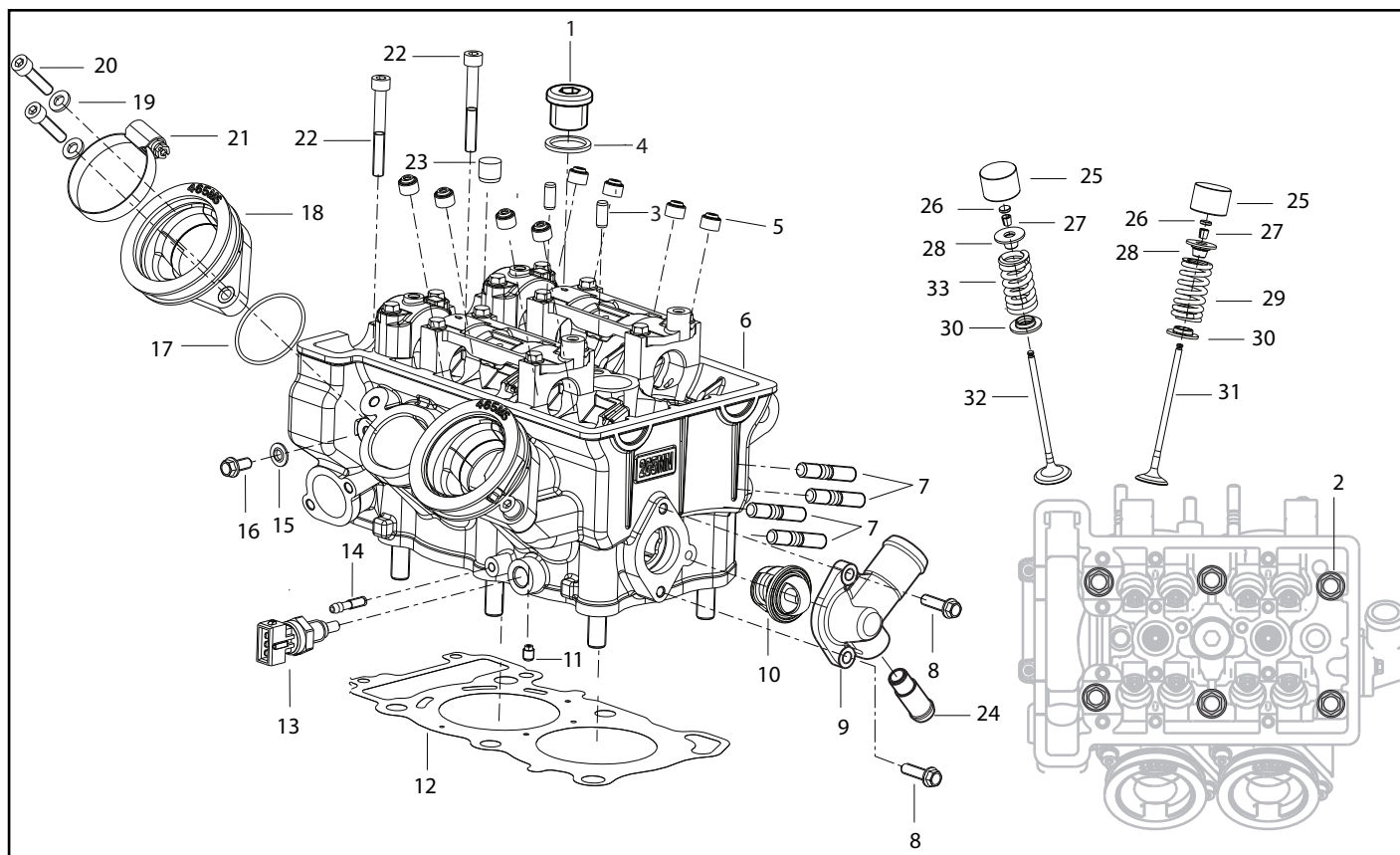
NOTE:

In case of valve clearance correction, replace the calibrated pads (see the following table).



HEAD DISTRIBUTION

CAMSHAFT AND VALVE PAD REMOVAL



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	BUSHING (M20)					
2	SCREW					
3	BUSHING					
4	WASHER					
5	VALVE RUBBER TIP					
6	CYLINDER HEAD					
7	STUD BOLT					
8	SCREW					
9	THERMOSTAT CUP					
10	THERMOSTAT					
11	GRUB SCREW					
12	HEAD GASKET					
13	WATER TEMPERATURE SENSOR					
14	COUPLING					
15	RETAINING WASHER					
16	SCREW					
17	O-RING					
18	SUCTION PIPE					
19	WASHER					
20	SCREW					
21	SCREW CLIP					
22	SCREW					
23	CAP					



HEAD DISTRIBUTION

CAMSHAFT AND VALVE PAD REMOVAL

Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
24	PLUG					
25	TAPPET VALVE					
26	VALVE PAD					
27	VALVE RUBBER TIP					
28	TOP SHIELDED BULB					
29	EXTERNAL VALVE SPRING					
30	BOTTOM SHIELDED BULB					
31	EXHAUST VALVE					
32	INTAKE VALVE					
33	INTERNAL VALVE SPRING					



HEAD DISTRIBUTION

CAMSHAFT AND VALVE PAD REMOVAL

Remove:

1. Coils and Spark plugs, see the section entitled “Coil and spark plug removal”.
2. Head timing gear cover, see the chapter entitled “Head timing gear cover removal”.

To remove the intake and exhaust valve lifter, proceed as follows:

- Use a magnet to take out the tappet valve lifter (1) and then the calibrated pad (5) Fig. A.
- Make a visual check of the tappet valve lifter, ensuring that there is no damage or lines, and if not, replace.
- Check the outside diameter using a micrometer to exclude any deformation Fig. B.

NOTE:

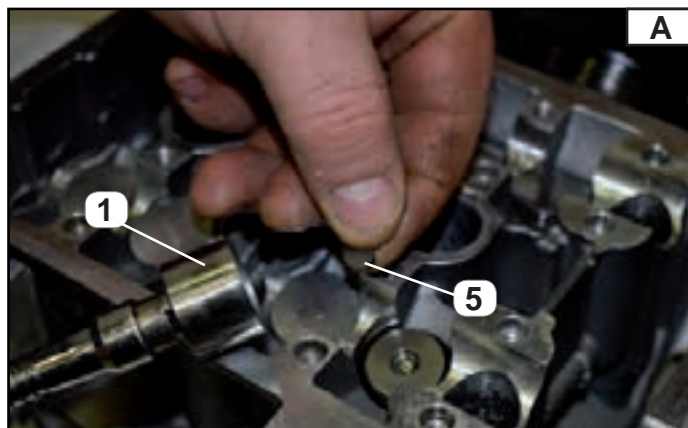
During installation, lubricate the tappet valve lifter, using:



Sintoflon Grease

NOTE:

At the end of the check of the parts, check the valve clearance, as in the chapter entitled “Valve clearance removal”.





HEAD DISTRIBUTION

HEAD REMOVAL

Remove:

1. Coils and Spark plugs, see the section entitled “**Coil and spark plug removal**”.
2. Head timing gear cover, see the chapter entitled “**Head timing gear cover removal**”.
3. Chain tensioner, see chapter entitled “**Chain tensioner removal**”.
4. Exhaust camshaft, see chapter entitled “**Intake and exhaust camshaft removal**”.
5. Chain slides, see chapter entitled “**Chain slide removal**”.

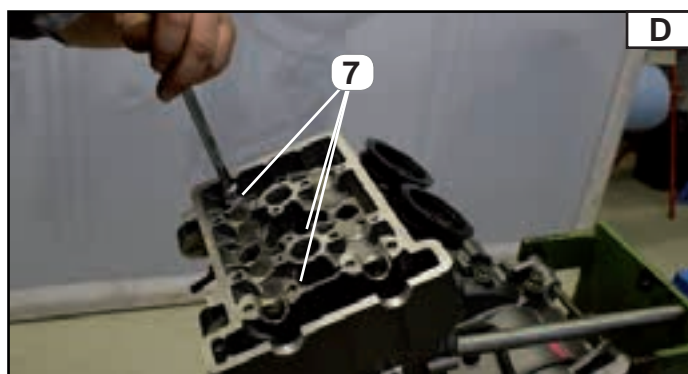
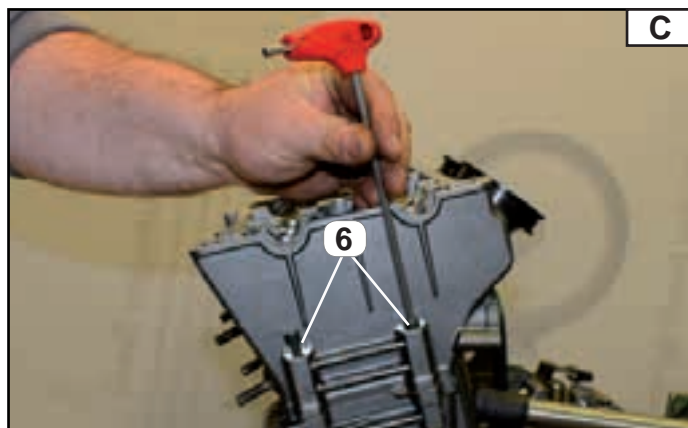
Remove:

- the screws (6) Fig. C
- the fastening screws (7) Fig. D.

NOTE:

**Loosen each screw by 1/2 turn.
then remove all screws.**

- Head gasket.





HEAD DISTRIBUTION

VALVE FLAP AND SPRING REMOVAL

Remove:

1. Coils and Spark plugs, see the section entitled “Coil and spark plug removal”.
2. Head timing gear cover, see the chapter entitled “Head timing gear cover removal”.
3. Chain tensioner, see chapter entitled “Chain tensioner removal”.
4. Exhaust camshaft, see chapter entitled “Exhaust camshaft removal”.
5. Intake camshaft, see chapter entitled “Intake camshaft removal”.

Use the special tool to remove the valves Fig. A.

(**) Valve removal tool

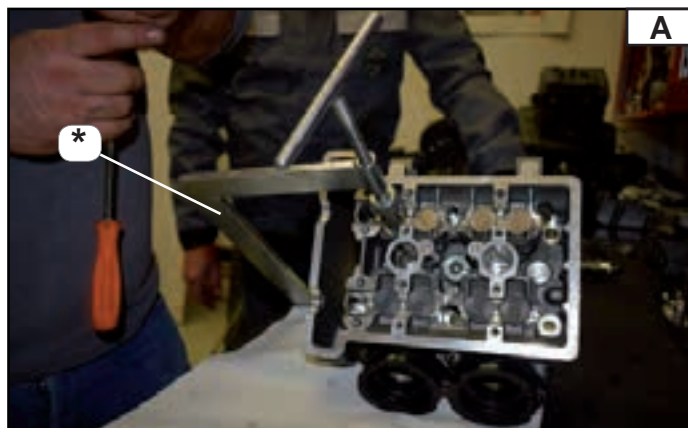
Code:0320097050000

Remove:

- Tappet valve.
- Pad.
- Cotteners.
- Top door.
- Spring.
- Bottom plate.
- Oil seal.

NOTE:

During removal of the two cotteners to lock the valve, use a magnet (1) to recover them Fig. B.





HEAD DISTRIBUTION

CHECK OF VALVES AND GUIDES

The following process applies to all of the valves and valve guides.

Check:

- the valve seals.

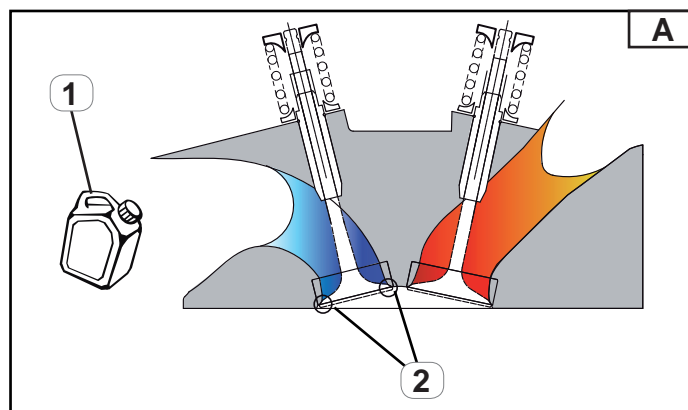
If there are leaks from the valve seats, check the contact surface, the seat and the width of the valve seat.

See the section

- Pour clean solvent (1) into the intake doors.
- Make sure the valves have a suitable seal.

NOTE:

There should not be any leaks from the valve seat (2) Fig. A.



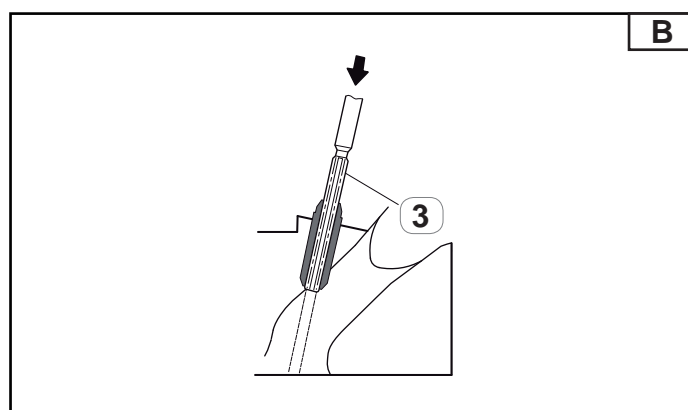
Replace:

- the valve guide.

NOTE:

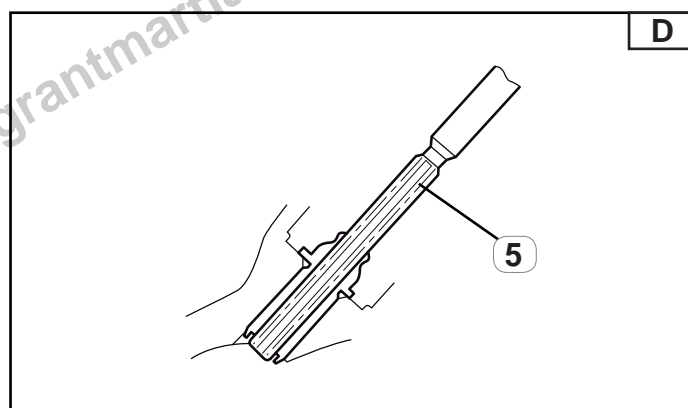
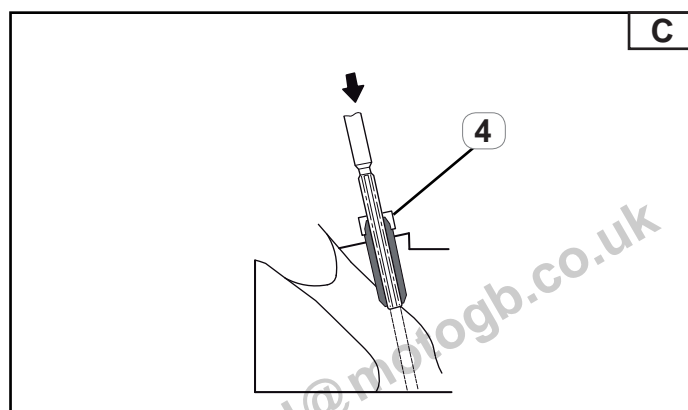
To make valve guide removal and installation operations easier and to maintain correct assembly, heat the head in an oven, taking it to 100° C (212° F).

- Remove the valve guide with a special extractor (3) Fig. B.
- Install the new valve guide with the special installer (4) and extractor (3) Fig. C.
- After installing the valve guide, bore it with a reamer (5) to create the correct clearance between the valve guide and stem.



NOTE:

After reinstalling the valve guide, pass over the seat.



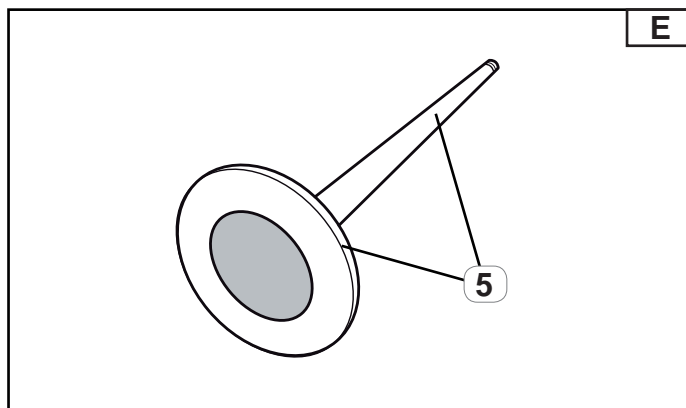


HEAD DISTRIBUTION

CHECK OF VALVES AND GUIDES

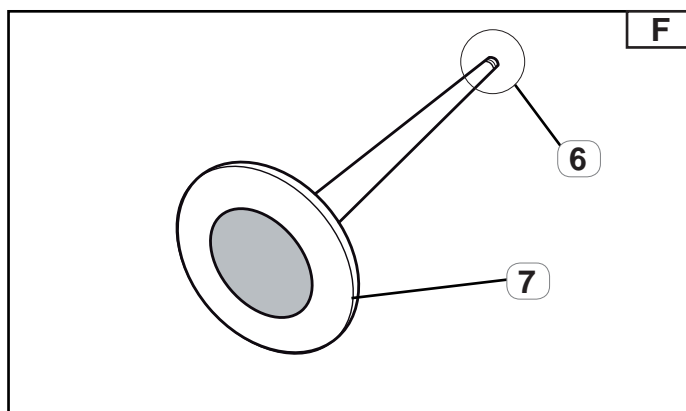
Eliminate:

- The carbon deposits (5) (from the contact surface and valve seat) Fig. E.



Check:

- the contact surface of the valve (7) Fig. F
- If there is any pitting/wear, grind the contact surface of the valve.
- end of the valve stem (6) Fig. F
- If there is a shape or a diameter of the mushroom that is larger than the body of the valve stem, replace the valve.



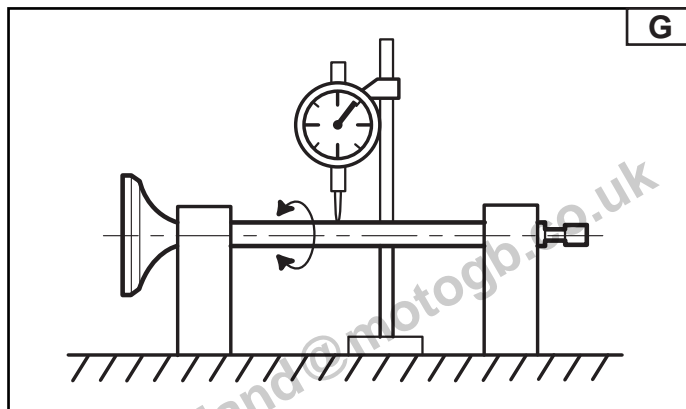
Measure:

- the eccentricity of the valve stem Fig. G.
- If not compliant with specifications, replace the valve.

NOTE:

If installing a new valve, always replace the relevant guide
If the valve is removed or installed, always replace the oil seal.

Valve	Valve stem eccentricity
Intake	0.01 mm
Exhaust	





HEAD DISTRIBUTION

VALVE SEAT CHECK

The following process is applied to all valves and valve seats
Fig. H

Eliminate:

- carbon deposits
(from the contact surfaces and valve seat (A))

Check:

- the valve seat (A)
- If there are marks/signs of wear, replace the head.

Measure:

- the width of the valve seat (A)
- If outside specifications, replace the head.

Valve	Width of the valve seat (A)
Intake	1 ~ 1.1 mm
Exhaust	0.9 ~ 1.1 mm

- Apply some blue colorant (Dykem) for mechanics to the contact surface of the valve (B).
- Install the valve in the head.
- Push the valve into the guide and against its seat to leave a well-defined mark.
- Measure the valve seat width

NOTE:

Where the valve seat and valve face are in contact with one another, the Prussian blue liquid will have been removed.

Lap:

- the valve contact surfaces
- the valve seat Fig. L

NOTE:

After replacing the head or the valve and the relevant guide, it is necessary to lap the seat and contact surfaces of the valve.

- Apply a paste for rough lapping of the valve contact surfaces (C) Fig. I

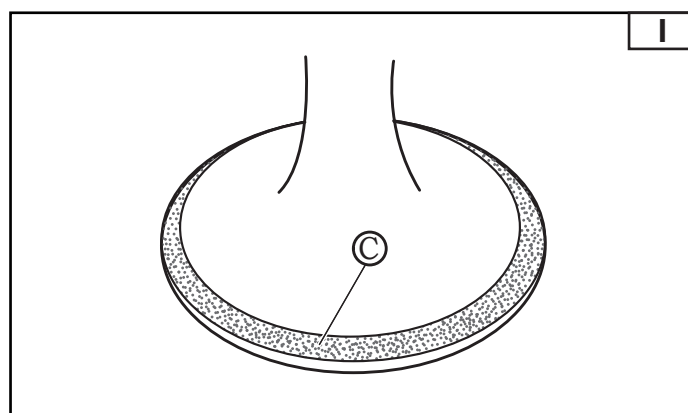
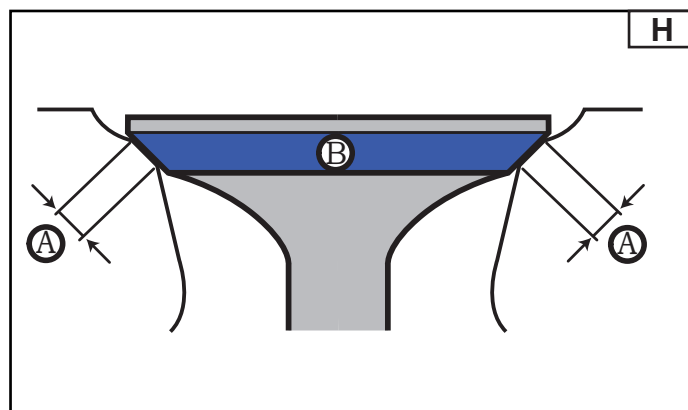
IMPORTANT NOTICE

Do not allow the lapping paste to enter the area between the valve stem and the guide.

- Apply molybdenum disulphide oil to the valve stem.
- Install the valve in the head.
- Turn the valve until the contact surface and the seat have been polished evenly, then remove all the lapping paste.

NOTE:

To get the best results from lapping, gently tap on the valve seat while turning it forwards and back manually Fig. L





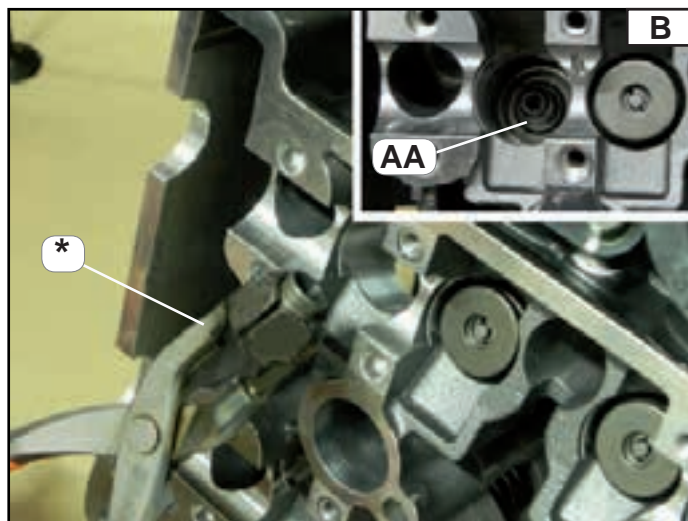
HEAD DISTRIBUTION

VALVE OIL SEAL REMOVAL- INSTALLATION

Remove:

Once the valve has been removed, using the special tool (*) to take out the oil seal (AA) Fig. B.

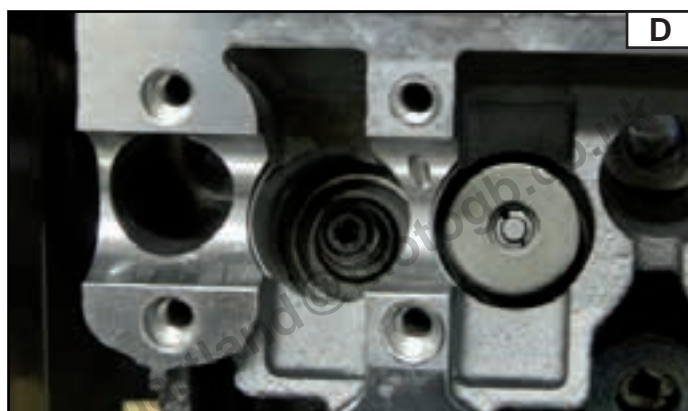
(*) Tool for valve oil seal removal

**Install:**

Proceed to install the oil seal (AA) Fig. D using the special tool ** Fig. C.

(**) Valve oil seal insertion pad (**)

Code:R180197025000





HEAD DISTRIBUTION

VALVE SPRING TEST

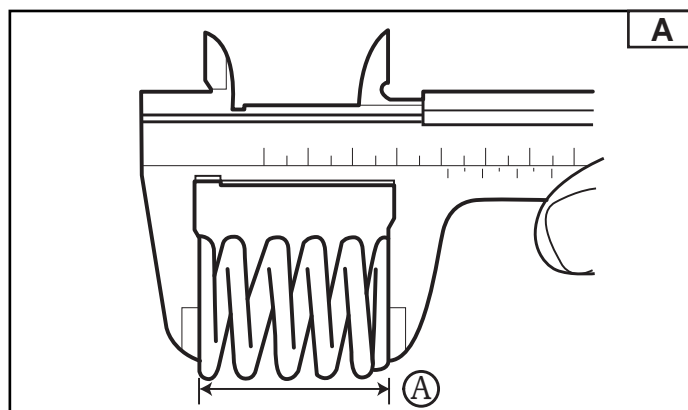
The following process is applied to all valve springs.

Measure:

- the free length of the valve springs (A) Fig. A.
- If not compliant with specifications, replace the valve spring.

Valve spring	Dimension (A)
Intake	38.8 mm - 37.3 mm
Exhaust	41.6 mm - 40.1 mm

NOTE: _____
If outside specification, replace.





HEAD DISTRIBUTION

VALVE AND VALVE SPRING INSTALLATION

Install the head:

NOTE:

Lubricate the valve stem and oil seal.



Engine oil

- Valve bottom spring plate (4),
- valve oil seal (3) Fig. A1 see section entitled "Valve oil seal installation/removal".
- valve (5)
- valve spring (2)
- Valve top spring plate (1),
- cotters.

NOTE:

Deburr the end of the valve stem with an oiling stone (A2).

NOTE:

Make sure that every valve has been reinstalled in its original position.

NOTE:

Reinstall the valve cotter pin, pressing the spring on each valve with the special compression tool (*) Fig. B

(*) Valve spring compressor tool

Code: 0320097050000

Secure:

- the cotters on the valve stems.
- Gently tap on the valve tip with a soft hammer, Fig. C.

IMPORTANT NOTICE

Hitting the valve tip with too much force could damage the valve.

Install:

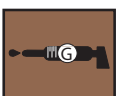
- the calibrated pad (1)
- the tappet valve (2)

NOTE:

Lubricate the tappet valve with copper grease (MOLYKOTE HSC PLUS).

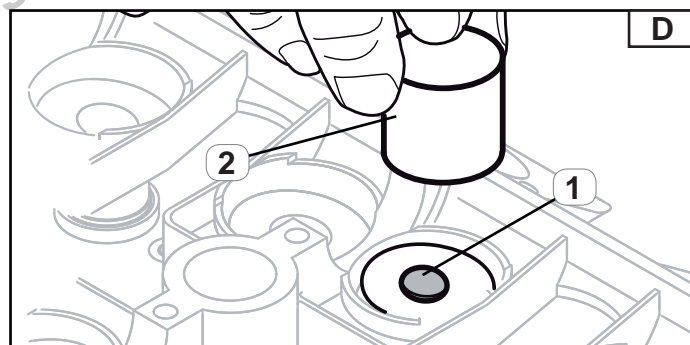
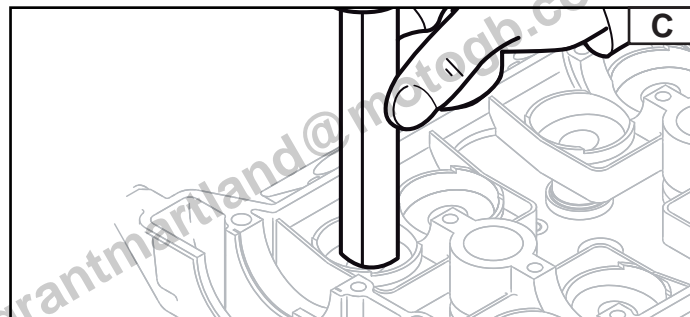
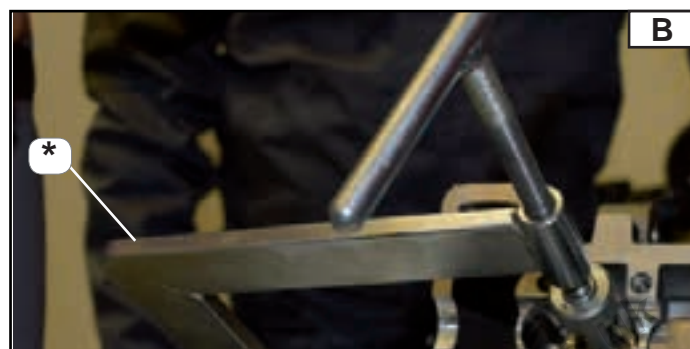
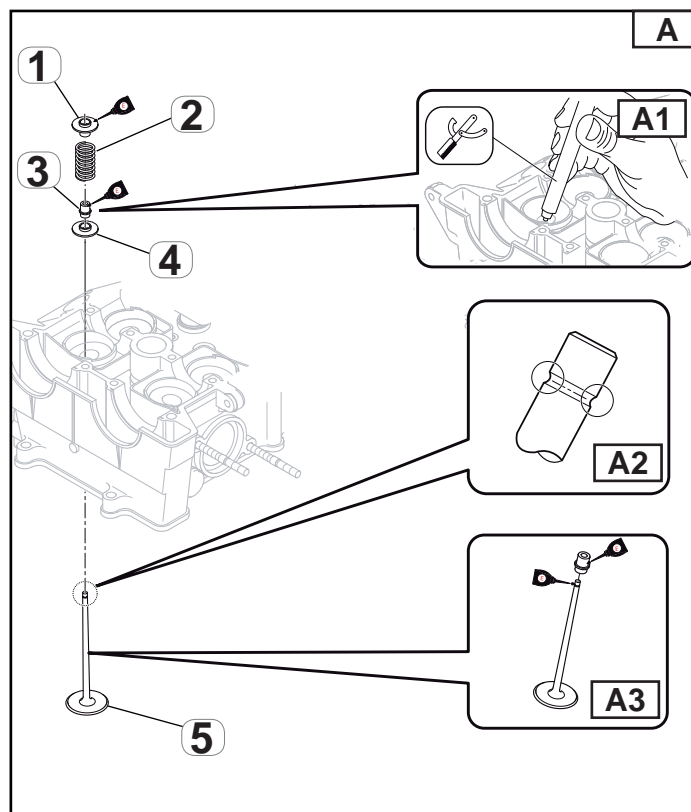
Manually turn the tappet valve, which must be able to slide smoothly.

Reinstall each tappet valve and pad to its original position.



Copper grease

The following process applies to all of the valves and relevant components.





HEAD DISTRIBUTION CYLINDER CHECK

Remove:

1. Coils and Spark plugs, see the section entitled “Coil and spark plug removal”.
2. Head timing gear cover, see chapter entitled “Head timing gear cover removal”
3. Head see chapter entitled “Head removal”

The following procedure applies the whole cylinder group.

Check:

- the cylinder walls with a special tool Fig. A.

If there are any vertical lines, replace the cylinder and the piston all together and the relevant clips.



Measure:

- The cylinder bore Fig. B

Make different measurements at different distances of 10-43-90 mm from the head coupling surface.

The highest value is considered when calculating wear limits.

CYLINDER bore (C) = 69 (+0.01 , +0.02)

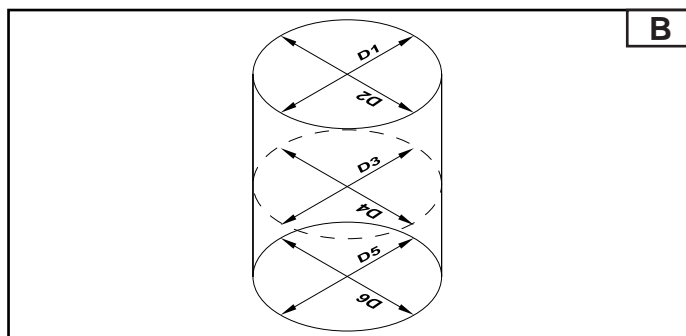
$C = \text{Max } D1 \text{ or } D2 \text{ } 65^{+0.002}_{-0.003} \text{ mm}$

Limit conicity:

- Max D1= 0.5 mm
- Max D2= 0.5 mm
- Max D3= 0.5 mm
- Max D4= 0.5 mm
- Max D5= 0.5 mm

Limit eccentricity:

- Max D1= 0.5 mm
- Max D2= 0.5 mm
- Max D3= 0.5 mm
- Max D4= 0.5 mm
- Max D5= 0.5 mm

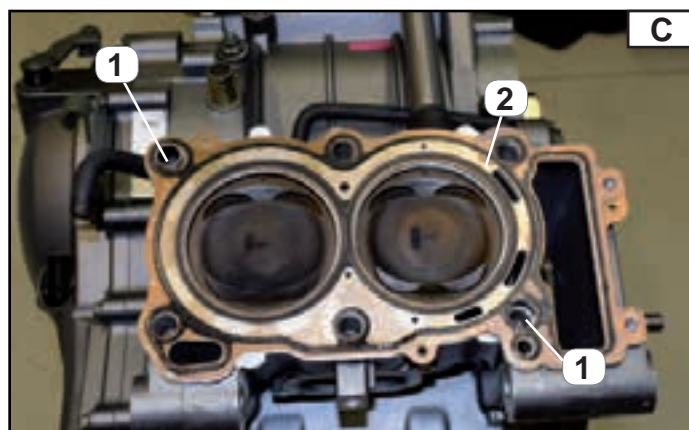




HEAD DISTRIBUTION

HEAD INSTALLATION

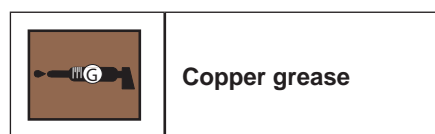
Before assembling the head, replace the seals (2).
Make sure that the alignment dowels (1) are in position Fig. C.



- Position the head and tighten the screws (3), following the sequence stated in Fig. D.
- Then the screws (4) Fig.

NOTE:

During assembly of the head. lubricate the head screws with copper grease.



Tighten:

- the screws (8) Fig. D to torque in three steps:



Step one:

Torque 12.5 N*m

Step two:

Torque 25 N*m

Step three:

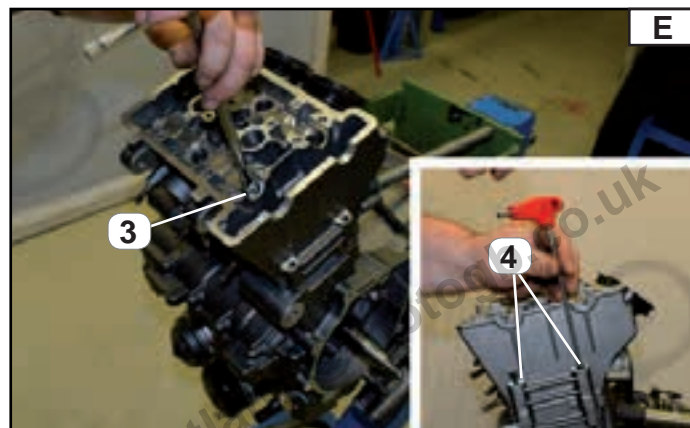
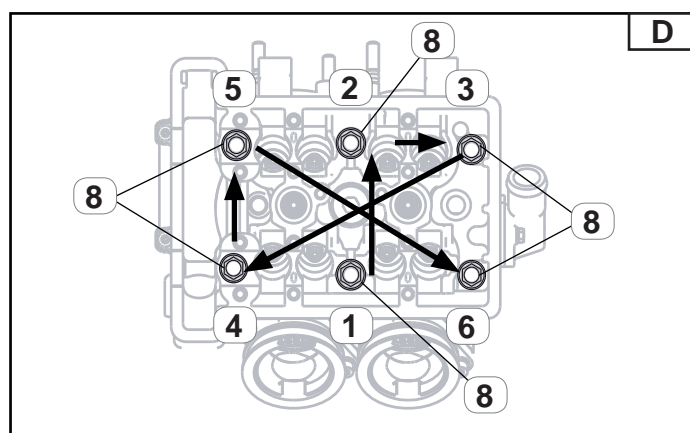
Torque 55 N*m

Tighten:

- the screws (4) Fig. E to torque.



Torque 12 N*m



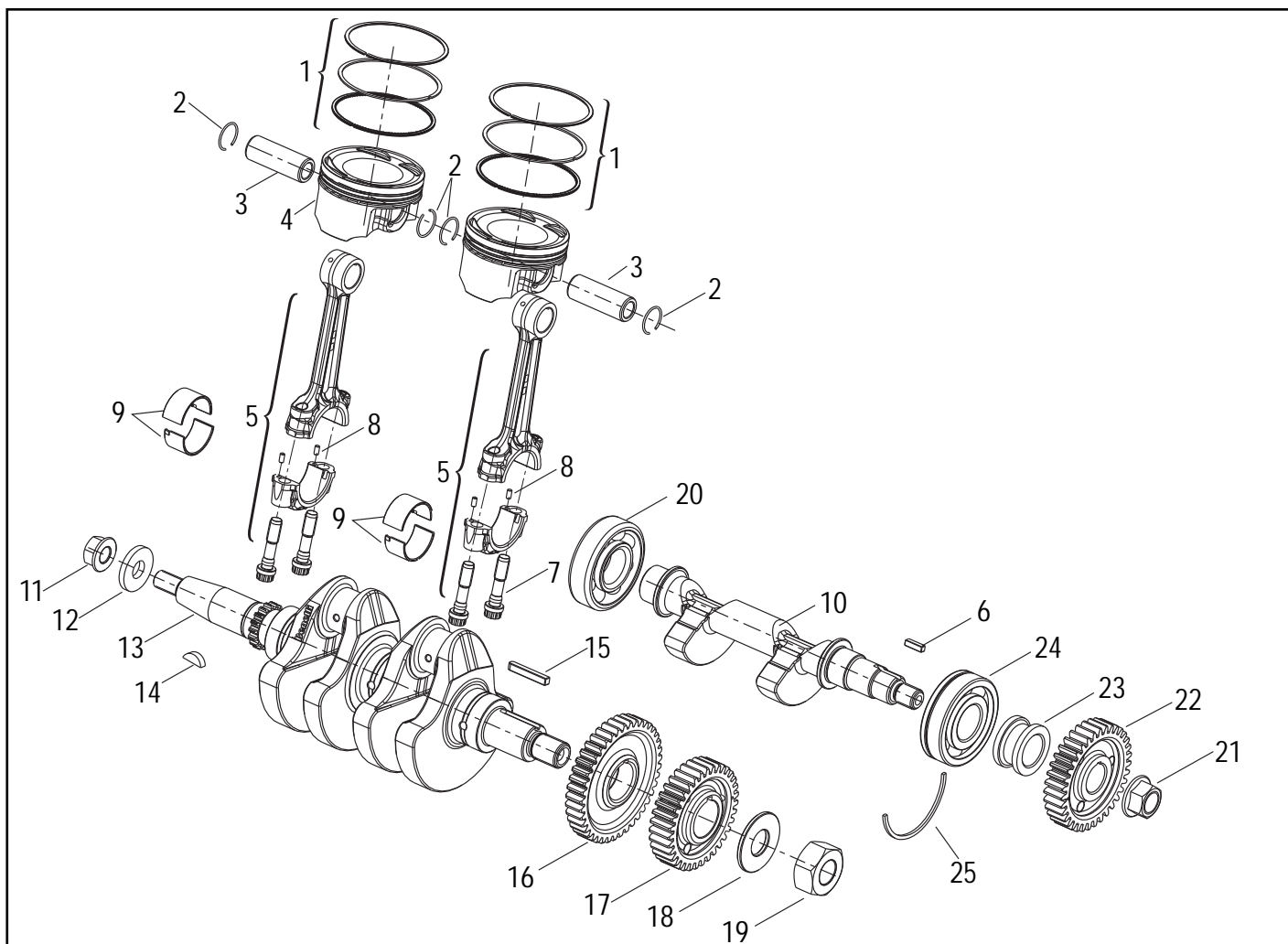
To assemble the head, tighten the fastening screws (3) Fig. E, after the screws (4) Fig.

NOTE:

During assembly of the head. lubricate the head screws with copper grease.



PISTONS



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	PISTON SEGMENT SERIES					
2	PIN RETAINING RING					
3	PISTON PIN					
4	PISTON					
5	COMPLETE CONNECTION ROD					
6	PLUG					
7	SCREW					
8	GUIDE BUSHING					
9	CONNECTING ROD MAIN BEARING SHELL					
10	COUNTERSHAFT					
11	NUT					
12	WASHER					
13	FULL DRIVE SHAFT					
14	SPLINE					
15	PLUG					
16	GEAR					
17	DRIVE SHAFT GEAR					



PISTONS

Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
18	WASHER					
19	NUT					
20	BEARING					
21	NUT					
22	COUNTERSHAFT GEAR					
23	GUIDE BUSHING					
24	BEARING					
25	BEARING RETAINER					



PISTONS

PISTON REMOVAL

The following removal process applies to all pistons.

Remove:

1. Coils and Spark plugs, see the section entitled **“Coil and spark plug removal”**.
2. Head timing gear cover, see the chapter entitled **“Head timing gear cover removal”**.
3. Head see chapter entitled **“Head removal”**.
4. Top base, see chapter entitled **“Connecting rod removal”**.

Remove:

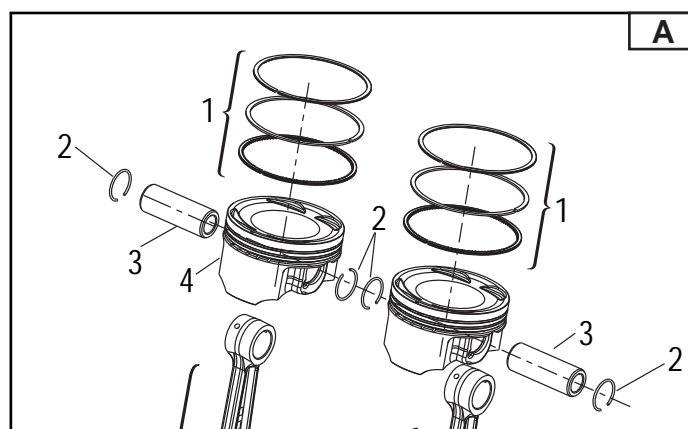
- the outer elastic ring (2) Fig. A
- the piston pin (3) Fig. A
- The piston (4) Fig. A
- the inner elastic ring (2) Fig. A

NOTE:

To remove the piston pin, use a “pad*” Fig. B.

NOTE:

Never use hammers to remove the pins.





PISTONS

PISTON PIN CHECK

The following procedure applies to all piston pins.

Check:

- piston pin

If there is blue discolouration or grooves, replace the piston pin and check the lubrication system.

Measure:

- the outer diameter of the piston pin Fig. B.

If not compliant with specifications, replace the pin using the measuring tool (A).

Measure:

- the inner diameter of the piston pin bore Fig. C.

If outside specifications, replace the piston.



Internal bore (A)	Size
Pin bore	Ø17 mm +0.0/+0.006



PISTONS

PISTON RINGS CHECK

The following procedure is applied to all elastic clips (1).

Check:

- the absence of lines and traces of forcing on each clip Fig. A.

If outside specification, replace the relevant clips and pistons.

NOTE:

Before measuring side clearance between the piston clips, remove any carbon deposits from the piston clips and grooves.

Measure:

- the side clearance between piston clips, using a thickness gauge Fig. B.

If outside specifications, replace the piston and the relevant clips all together.

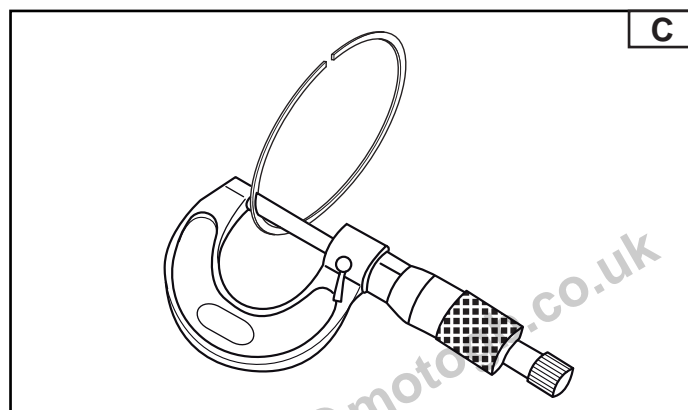
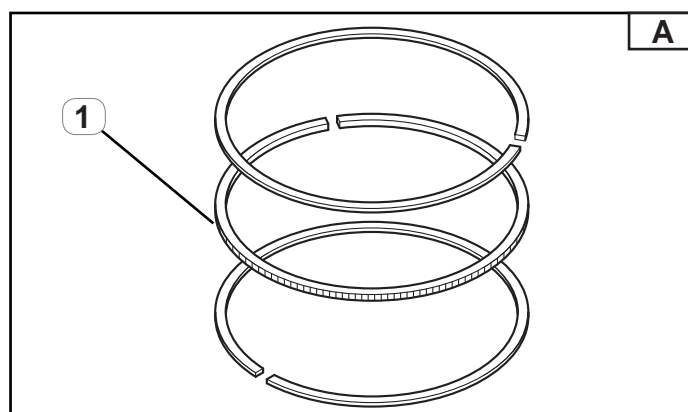
Clip	Piston clip side clearance.
Top clips	0.04-0.08 mm
Clips	0.05-0.09 mm

Measure:

- The thickness of the top clip.
- The thickness of the second clip.

See Fig. C.

Clip	Piston clip thickness
Top clips	0.8 -0.01/-0.03 mm
Clips	0.8 -0.02/-0.04 mm





PISTONS

PISTON CHECK

The following procedure applies to both pistons.

Check:

- The sides of the piston (B) Fig. D.
- If there are any vertical lines, replace the piston all together with the relevant clips.

Measure:

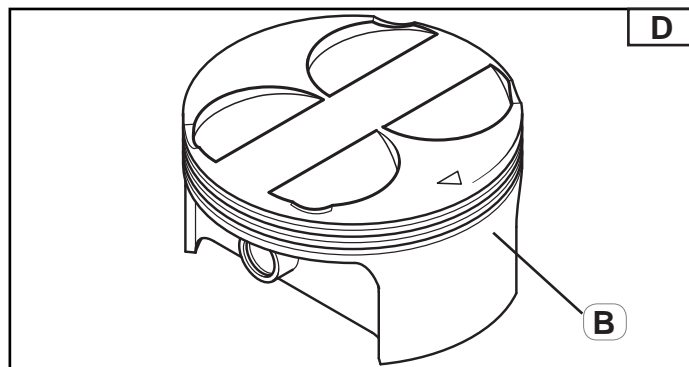
- The diameter of the piston skirt (B) with a micrometer, considering a distance from the bottom edge of around 10.5 mm Fig. E.

CLASS	Piston skirt
A	$\varnothing 69(-0.025/ -0.03)$
B	$\varnothing 69(-0.02/ -0.025)$

If outside specifications, replace the cylinder and the relevant clips all together.

IMPORTANT NOTICE

The piston is marked by a letter stating its class. The cylinder-piston coupling must be made between the same classes.





PISTONS

PISTON ASSEMBLY

The following procedure applies to all pistons.

Install:

in the following order:

1. oil scraper clip
2. second clip
3. top clip

See Fig. A

NOTE:

The first and second ring are marked with the letter D on the top side and PVD Fig. A.

Remember to install the piston clips so that the letters are facing upwards.

Lubricate the clips with engine oil during the insertion stage.

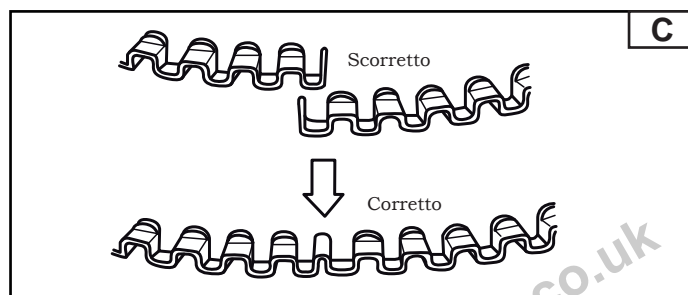
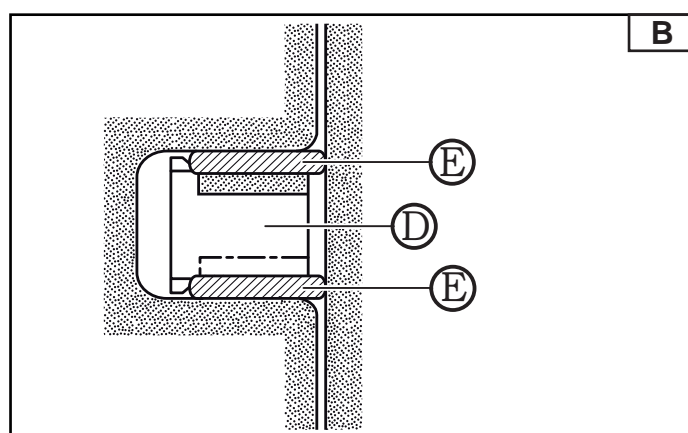
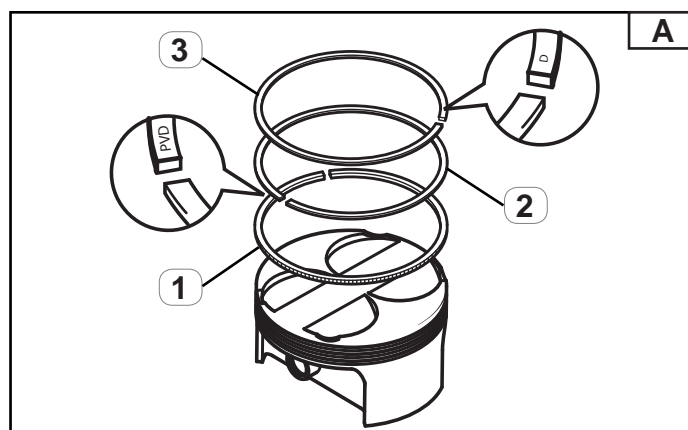
The first element to insert in the oil scraper slot is the shim (D). After positioning the shim, insert its side rings (E) Fig. B.

NOTE:

The shim and side rings have no top or bottom side, meaning they can be inserted in any way.

IMPORTANT NOTICE

When installing the shim (D), make sure that its ends do not overlap the slot Fig. C.





PISTONS

PISTON INSTALLATION

NOTE:

To install the pistons (1), first insert the inner rings (2), then the pins (4) and finally the outer rings (3) Fig. C

To insert the pistons inside the cylinders, it is necessary to use a specific piston clamp to hold the clips.

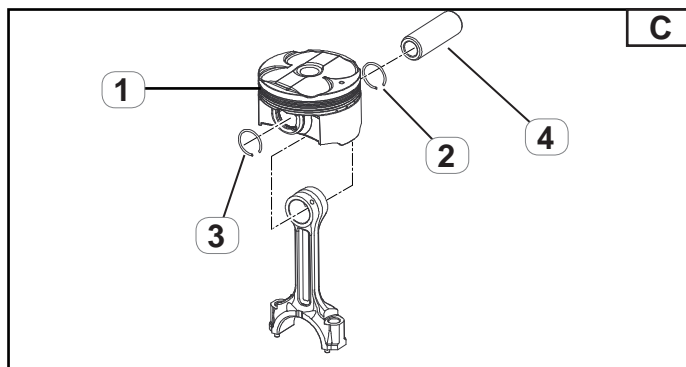
General piston clamp.

NOTE:

During this stage, lubricate parts with engine oil

IMPORTANT NOTICE

The pistons must be inserted in the sequence in which they were removed. Do not change the assembly order and above all, make sure that the mark on the piston Fig. D is facing the intake side.



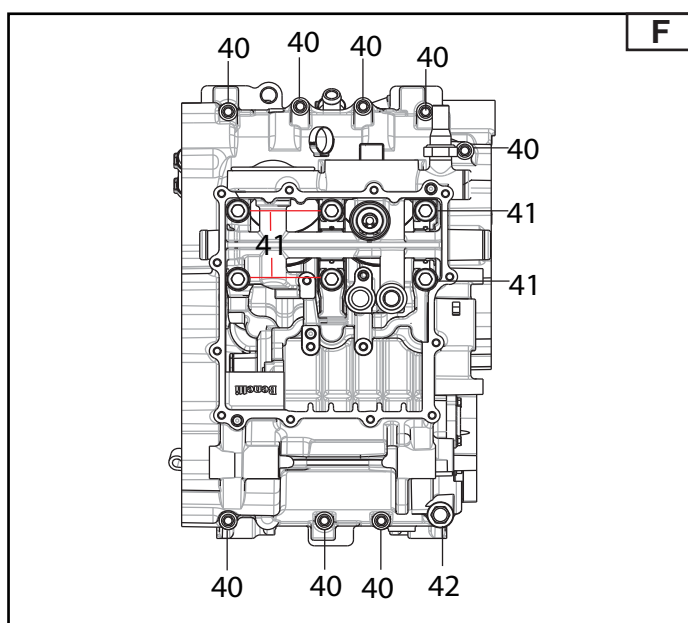
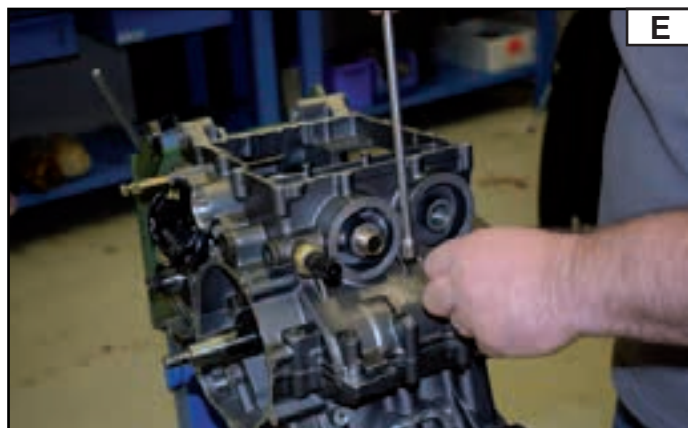


CRANKCASE

REMOVAL OF CONNECTING RODS

Remove:

1. Coils and Spark plugs, see the section entitled “**Coil and spark plug removal**”.
2. Head timing gear cover, see the chapter entitled “**Head timing gear cover removal**”.
3. Chain tensioner, see chapter entitled “**Chain tensioner removal**”.
4. Exhaust camshaft, see chapter entitled “**Exhaust camshaft removal**”.
5. Intake camshaft, see chapter entitled “**Intake camshaft removal**”.
6. Head see chapter entitled “**Head removal**”.
7. flywheel, see chapter entitled “**Flywheel removal**”.
8. Mobile chain slides, see chapter entitled “**Mobile chain slides removal**”.
9. Clutch, see chapter entitled “**Clutch removal**”.
10. Oil sump, see chapter entitled “**Oil sump removal**”.
11. Oil pump, see chapter entitled “**Oil pump removal**”.

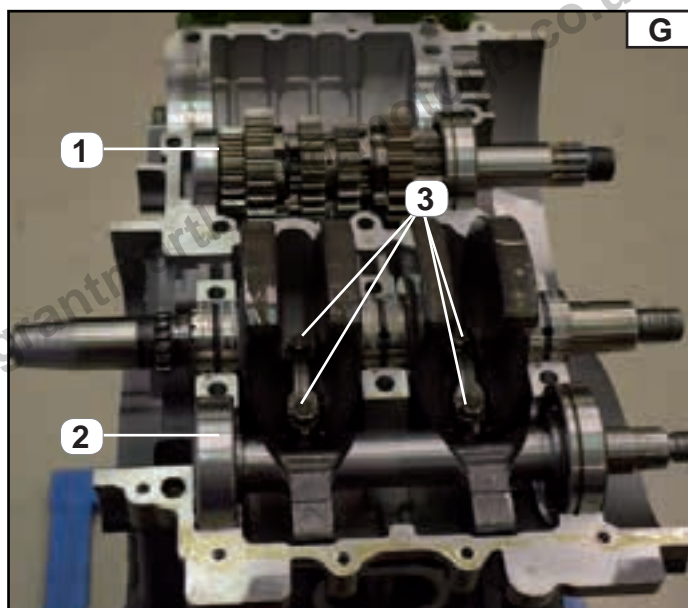


Remove:

- Base screws Fig. F
- raise the top base.

Remove:

- the gearbox output shaft (1) Fig. G
- the gearbox intake shaft
- the counter shaft (2) Fig. G
- the connecting rod screws (3) Fig. G



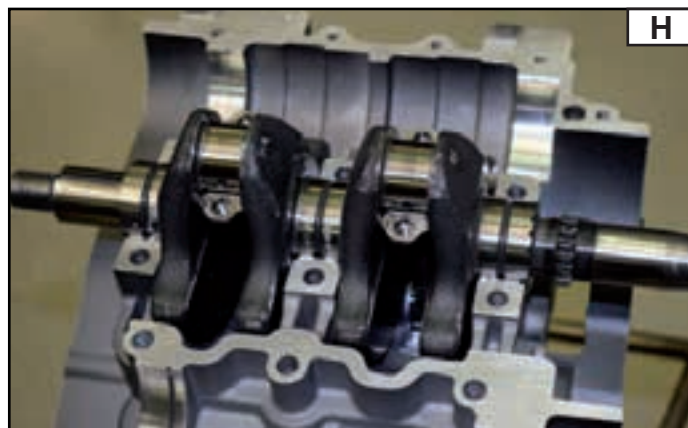


CRANKCASE

REMOVAL OF CONNECTING RODS

Remove:

- Take out the drive shaft, and slide out the connecting rod, including the pistons, from the cylinder group.
- Remove the pistons, see the chapter entitled “**PISTON REMOVAL**”.





CRANKCASE

CHECK OF CONNECTING ROD AND CONNECTING ROD BEARING SHELLS

Check:

- Any breakages or excessive clearance on the connecting rod (5) and the big end bearing shells (8) Fig. A.

If replacing the connecting rod, check the class of origin marked on the head.

Measure:

- It is also necessary to measure the inner dimensions of the big end and check for any anomalies with the relevant tool, commercially available Fig. B. Before measuring, assemble the big end, tightening the fastening screws to the following torque:

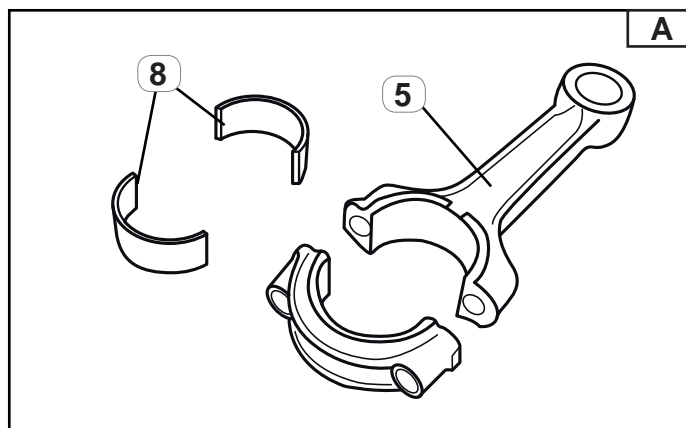


Torque 25 N*m

- It is also necessary to measure the dimensions of the small end and check for any anomalies with the relevant tool, commercially available Fig. B.

Item	Reference size
Steering head	Ø 32.6 mm (0.0/ 0.1)
Small end	Ø 16.6 mm (0.0/ 0.1)

Before installing the bushings (8) of the big end, measure them with a specific micrometer, see Fig. C.





CRANKCASE

INSTALLATION OF CONNECTING ROD AND CONNECTING ROD BEARING SHELLS

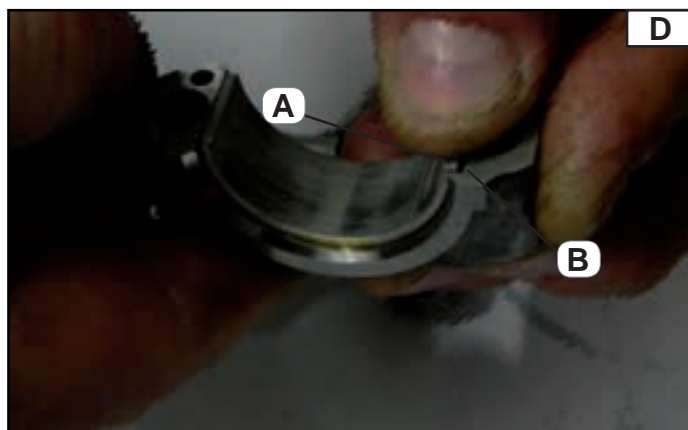
Install:

- The connecting rod bearing shells:

Install the top and bottom bearing shells and bottom bearing of the big end and connecting rod cap.

NOTE:

Align the projections "A" on the bearing shells of the big end with the slots "B" in the connecting rod and cap. D.





CRANKCASE

INSTALLATION OF CONNECTING ROD AND CONNECTING ROD BEARING SHELLS

NOTE:

Do not mix up the connecting rod bushings and the connecting rods. To achieve the correct clearance between the connecting rod support and the big end main bearing shells and to prevent engine damage, the big end bearing shells must be installed in their original positions Fig. E

According to the bushing type, make the envisaged couplings, see table:

CONNECTING ROD MAIN BEARING SHELL		
STD	COLOUR	THICKNESS
A	Green	1.503~1.506 mm
B	Blue	1.506~1.509 mm
C	Yellow	1.500~1.503 mm
Ø std seat A green		Ø 33mm (+0.008/0)
Ø std seat B blue		Ø 33 mm (+0.008/+0.016)
Ø std seat C yellow		Ø 33 mm (-0.034/-0.041)

According to the class, shown on the side of the connecting rod Fig. F combine the different types according to the table below:

SELECTION TABLE				
			Connecting rod internal Ø	
			1	2
			33.000 ~ 33.008 mm	33.008 ~ 33.016 mm
Crank pin external Ø	A	Ø 30 ^{-0.034} / _{-0.041}	A (yellow) ^{+0.003} / _{-0.003}	B (green) ^{-0.006} / _{-0.003}
	B	Ø 30 ^{-0.041} / _{-0.048}	B (green) ^{-0.006} / _{-0.003}	C (brown) ^{-0.009} / _{-0.006}

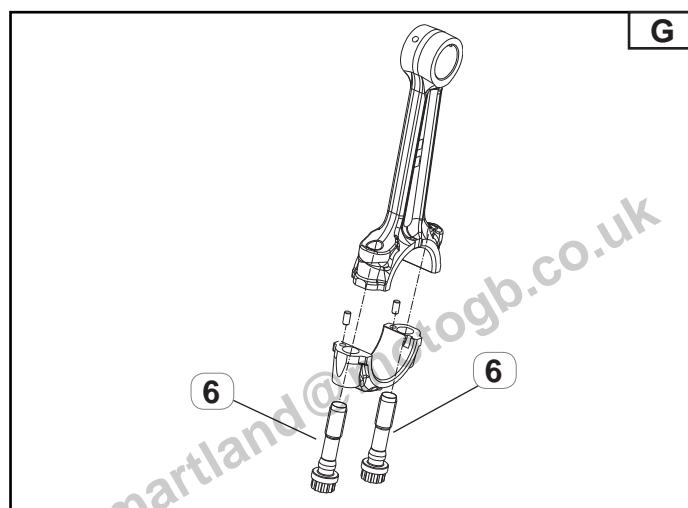
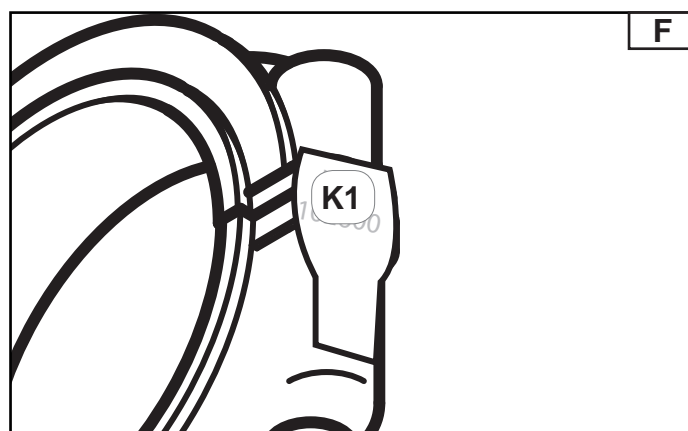
After all of these checks, install the fastening screws (6) Fig. G and tighten to the following torque:



Torque 25 N*m

NOTE:

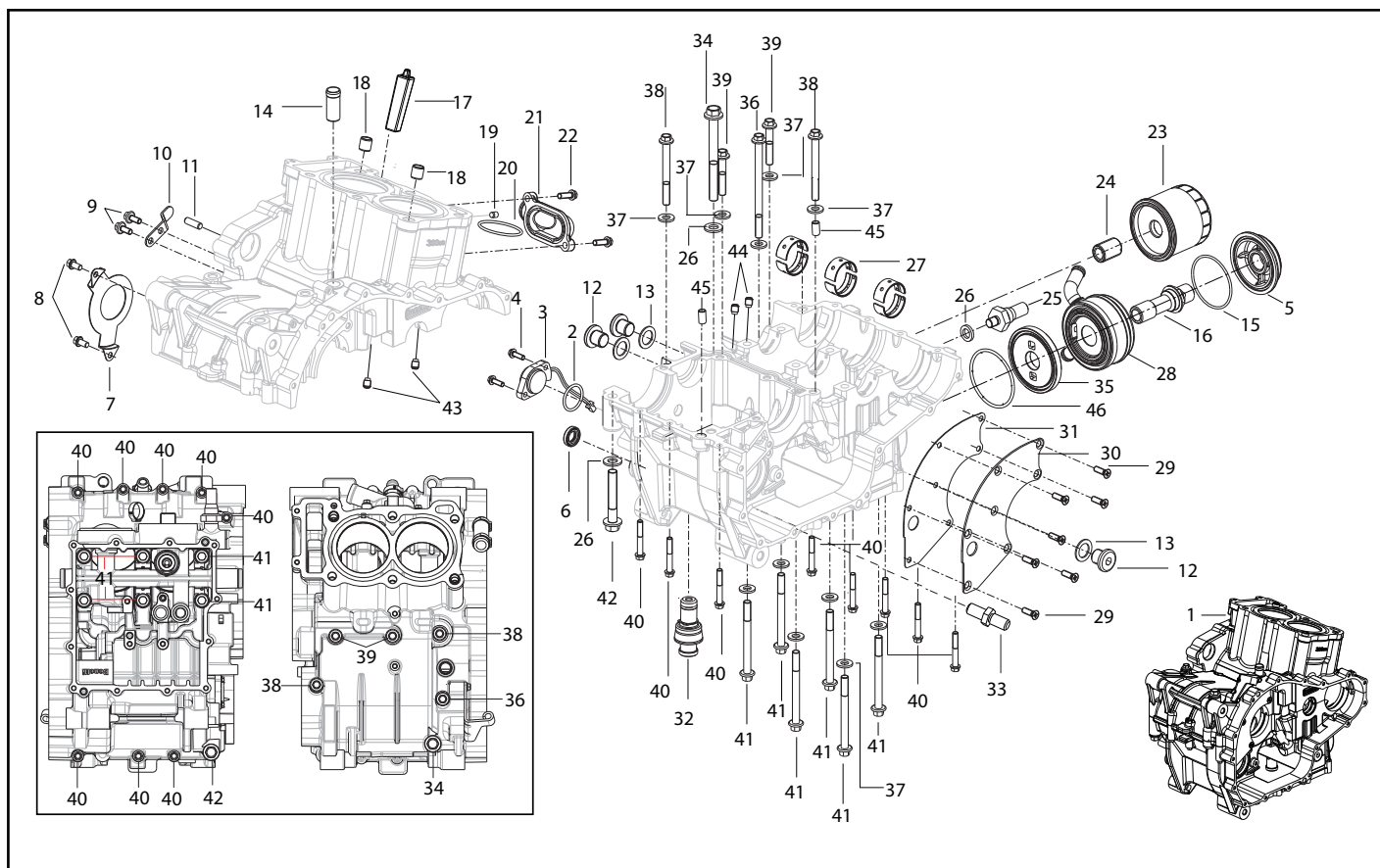
Every time that the big end is installed, it is necessary to replace the fastening screws.





CRANKCASE

MAIN BEARING SHELL AND DRIVE SHAFT INSTALLATION



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	ENGINE CASING					
2	O-RING					
3	IDLE SENSOR					
4	SCREW					
5	CAP					
6	OIL SEAL					
7	PLATE					
8	SCREW					
9	SCREW					
10	PLATE					
11	PLUG					
12	SPECIAL SCREW					
13	RETAINING WASHER					
14	COUPLING					
15	O-RING					
16	SPECIAL SCREW					
17	RUBBER TIP					
18	CENTERING BUSHING					
19	BUSHING					
20	O-RING					
21	WATER FITTING					
22	SCREW					



CRANKCASE

MAIN BEARING SHELL AND DRIVE SHAFT INSTALLATION

Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
23	OIL FILTER					
24	JOINT					
25	OIL PRESSURE SENSOR					
26	WASHER					
27	BEARING					
27	BEARING					
27	BEARING					
27	BEARING					
28	DISTRIBUTOR					
29	SCREW					
30	FLANGE					
31	GASKET					
32	OIL PRESSURE VALVE					
33	SPECIAL SCREW					
34	SCREW					
35	JOINT					
36	SCREW					
37	WASHER					
38	SCREW					
39	SCREW					
40	SCREW					
41	SCREW					
42	SCREW					
43	GRUB SCREW					
44	INSERT					
45	CENTERING BUSHING					
46	O-RING					



CRANKCASE

MAIN BEARING SHELL AND DRIVE SHAFT INSTALLATION

Install:

- clean the main bearing shells (6)
- connecting rod main bearing shells:
- install the connecting rod main bearing shells in the relevant seats in the top and bottom base.

NOTE:

Align the projections of the main bearing shells with the slots in the top base Fig. A.
Use copper grease for assembly.



Sintoflon Grease

IMPORTANT NOTICE

Do not get the main bearing shells mixed up.
To achieve the correct clearance between the connecting rod support and the bearing shells and to prevent engine damage, the bearing shells must be installed in their original positions.

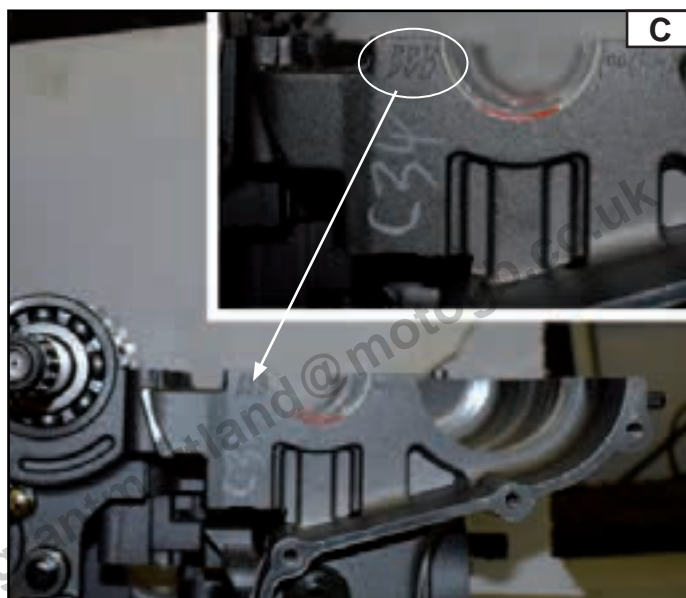
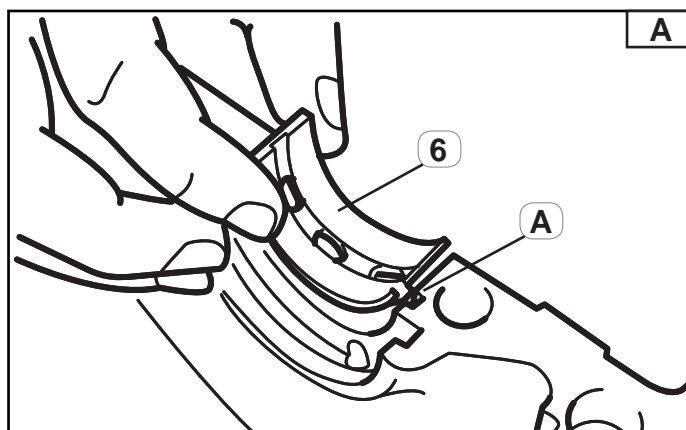
- The crankshaft bearing shells are in different sizes, marked with different letters and colours, as shown in the table.

MAIN BEARING SHELLS		
STD	COLOUR	THICKNESS
A	Green	1.5(0/0 + 0.003) mm
B	Blue	1.5(0/0 + 0.006) mm
C	Yellow	1.5(0/0 + 0.009) mm
Ø std seat A green		Ø 41(0.007+0.14)
Ø std seat B blue		Ø 41(0+0.007)
Ø std seat C yellow		Ø 41(0.014+0.021)
Ø std seat only		A Ø 41(0/+0.007) B Ø 41(0.007+0.014) C Ø 41(0.014+0.021)

- The support bearing layout is shown on the bottom casing, as illustrated in Fig. C.

NOTE:

In case of replacement of the drive shaft, it is necessary to replace the connecting rod main bearing shells.





CRANKCASE

DRIVE SHAFT CHECK

Measure:

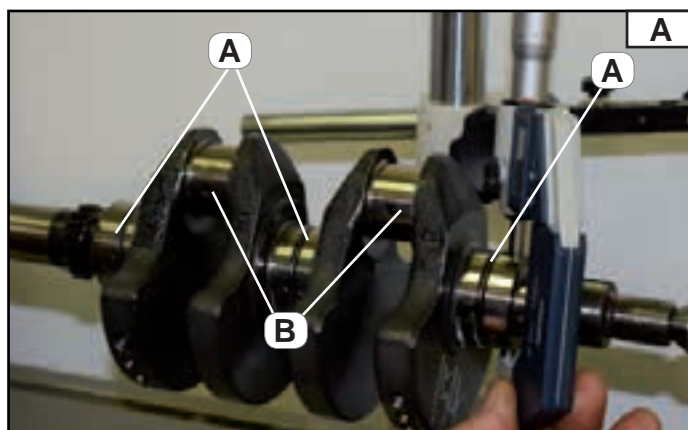
- the eccentricity of the camshaft

If outside specifications, replace the drive shaft.

Drive shaft eccentricity	Size
Drive shaft	A: $\varnothing 30$ (-0.005, -0.017) mm B: $\varnothing 32$ (-0.028, -0.042) mm

Check:

- The surfaces of the shaft supports (A) Fig. A.
 - The surfaces of the connecting rod supports (A) Fig. A.
- If there is any rust/lines/signs of wear, replace the drive shaft.



CRANKCASE

DRIVE SHAFT INSTALLATION

Once the drive shaft has been inserted, proceed to assemble the big end Fig. B.

Tighten the nuts to the following torque:



Torque 25 N*m

NOTE:
Lubricate the big end pins with copper grease

Measure:
Once the big end has been assembled, use a thickness gauge to measure the drive shaft-big end collar Fig. C.

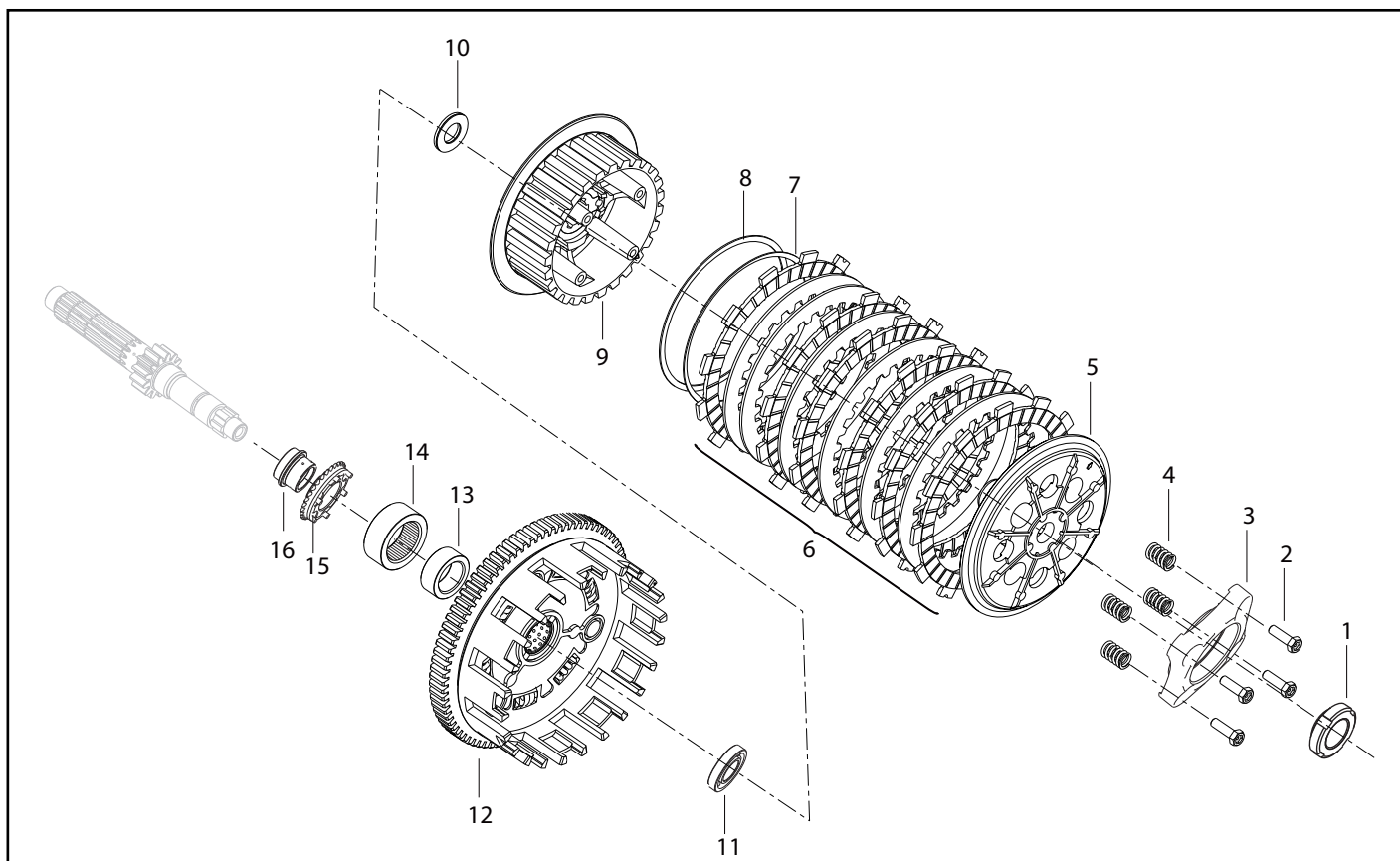
Measuring	Size
Drive shaft - steering head	0.1~0.25 mm

NOTE:
Measure both big ends.





CLUTCH



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	RING NUT					
2	SCREW					
3	FLANGE					
4	SPRING					
5	PUSHER DISC PLATE					
6	CLUTCH DISCS					
7	BELLEVILLE WASHER					
8	RING					
9	CLUTCH DRUM					
10	WASHER					
11	BEARING					
12	CLUTCH BELL					
13	GUIDE BUSHING					
14	ROLLER BEARING					
15	PINION					
16	SHIM					



CLUTCH

CLUTCH AND DISC REMOVAL

Remove:

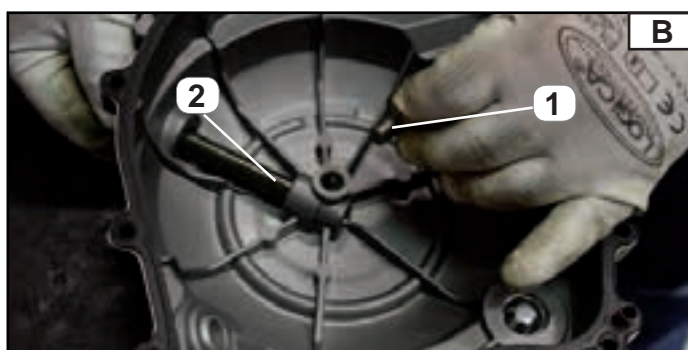
- the clutch cover screws Fig. A.
- clutch cover
- the gasket.

NOTE:

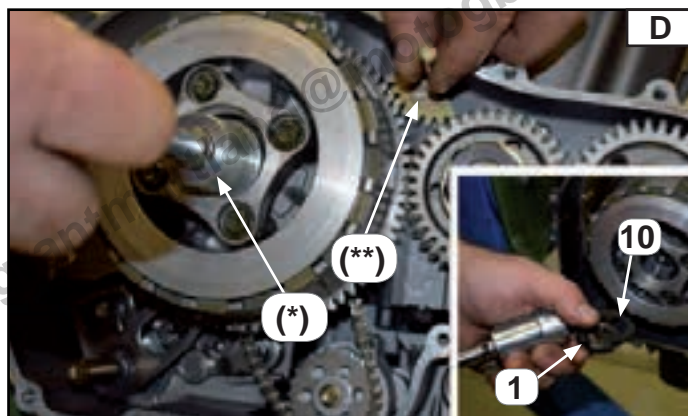
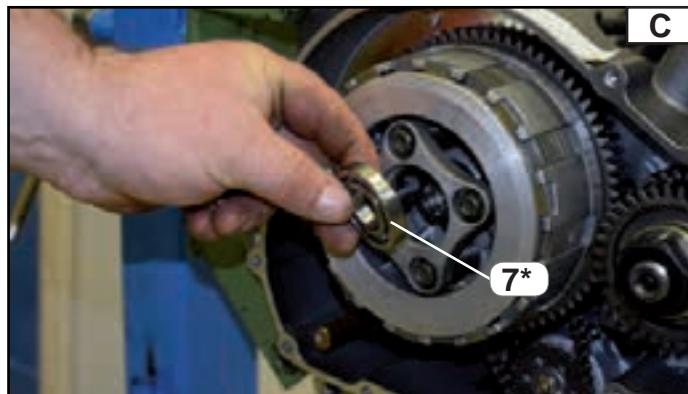
In case of gasket anomalies, install a new gasket.

Remove:

- the guide bushing (1) Fig. B
- clutch control shaft (2) Fig. B



- Remove the bearing (11*) Fig. C.
- Remove the fastening nut (1*) and ring (10*) as shown in the figure, Fig. D.



(*)Tool for clutch bell nut removal/assembly
Code:03200097052000



(**)Toothed wrench for clutch bell lock
Code:03200097053000

NOTE:

Part numbers marked (*) are part of the spare parts table in Chapter 5 "Clutch".



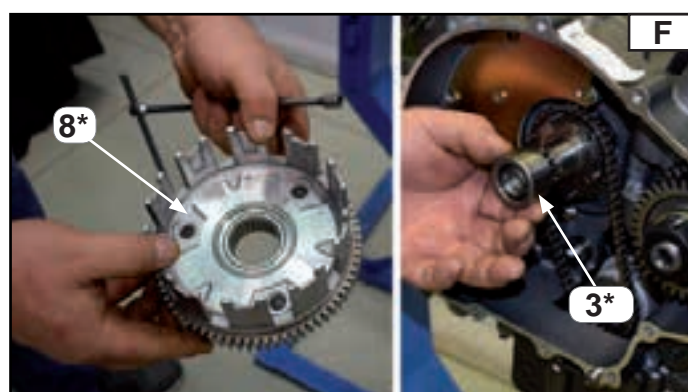
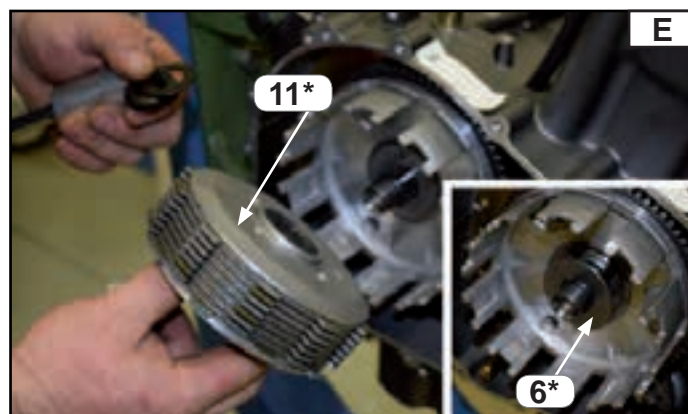
CLUTCH

CLUTCH AND DISC REMOVAL

Take out the disc pack (6*), washer and clutch drum (9*) and the guide shim (13*).

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Clutch".





CLUTCH

FRICTION DISC CHECK

The following procedure applies to all friction discs.

Check:

- Friction disc

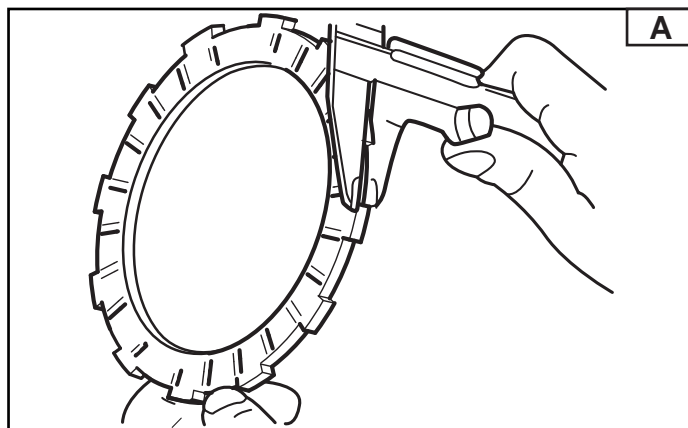
If there is any damage/wear, replace the friction discs.

Measure:

- The thickness of the friction disc Fig. A.

If not within specifications, replace the friction discs together.

Disc	Size
Friction disc	Thickness 2.7(± 0.05) mm



NOTE:

Measure the friction disc in four points.



CLUTCH

STEEL DISC CHECK

The following procedure applies to all steel discs.

Check:

- The steel disc.

If there is any damage/wear, replace the steel discs all together.

Measure:

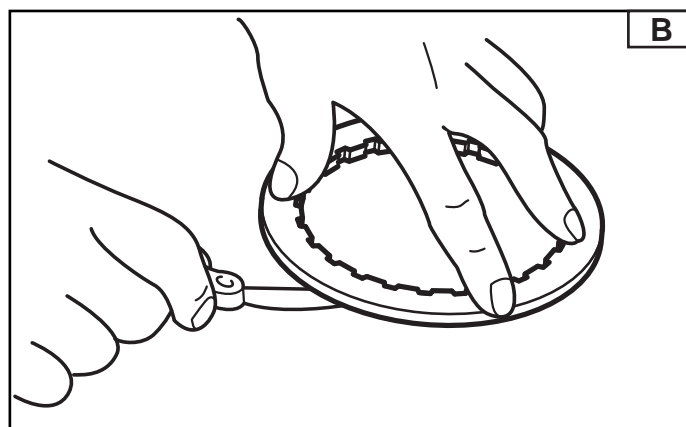
- The warping of the steel discs Fig. B.

If not within specifications, replace the steel discs together.

Disc	Twist limit
Disc	0.1 (0,-0.05) mm

NOTE:

Carry out the check, placing the disc on a reference surface and take the measurements using a thickness gauge.

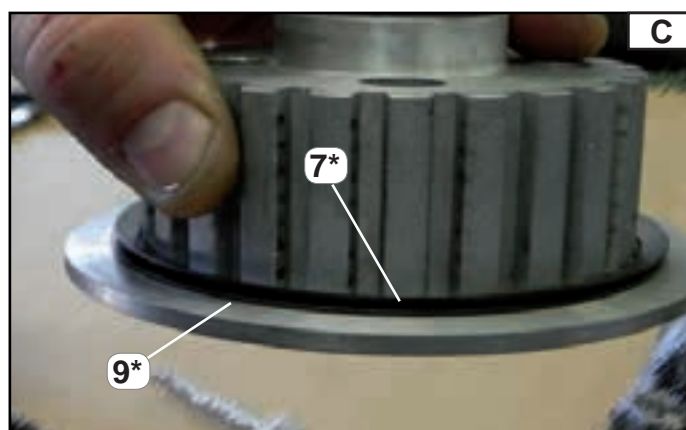


DISC ASSEMBLY

Assemble the discs in the opposite order to their removal, starting with the ring (8*) and then the belleville washer (7*) on the clutch drum (9*)

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Clutch".





CLUTCH

CLUTCH ASSEMBLY

Assemble:

- oil pump pinion (complete with chain) (A)
- guide shim (4*)
- clutch bell (8*)
- washer (6*)
- clutch drum complete with discs (8*)
- disc pusher plate (11*)
- using a specific tool (**) assemble the fastening ring nut (18) and washer (6) as shown in the figure Fig. D.
- clutch spring (12*)
- flange (18*)
- fastening screws (13*) to the following torque:



Torque 105 N*m



(**)Tool to remove/install the clutch bell ring nut

Code:03200097052000



(**)Toothed wrench to lock the clutch bell

Code:03200097053000

NOTE:

Use a punch driver to rebate the fastening ring nut Fig. E.

- insert the bearing (7*)
- reinstall the guide bushing and the clutch control shaft (2) on the cover
- insert the gasket
- place the clutch cover, inserting and tightening the cover fastening screws to the engine casing.



Torque 12 N*m

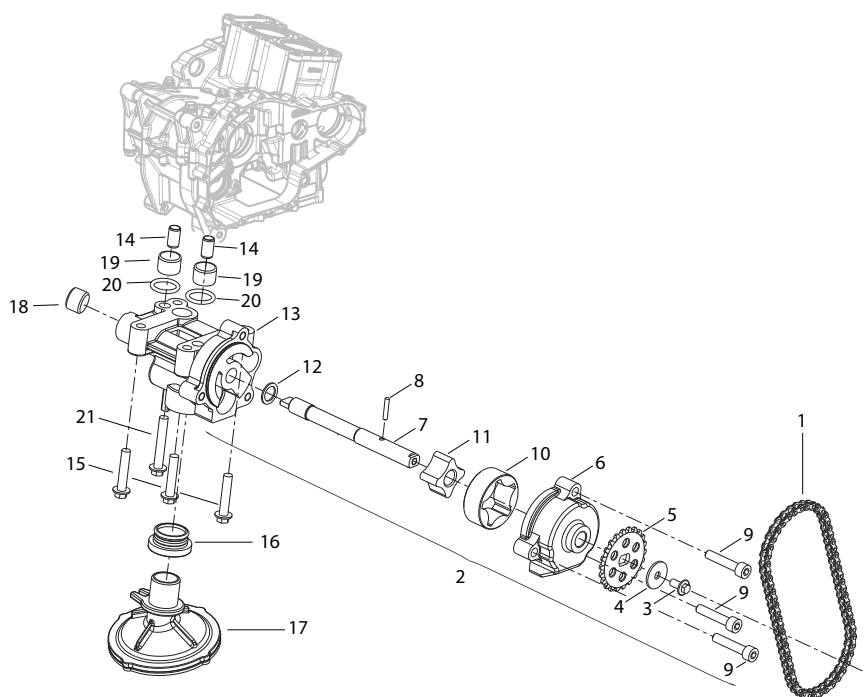
NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Clutch".





LUBRICATION SYSTEM



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	OIL PUMP CHAIN					
2	COMPLETE OIL PUMP					
3	SCREW					
4	WASHER					
5	OIL PUMP PINION					
6	OIL PUMP COVER					
7	OIL PUMP SHAFT					
8	ROLLER					
9	SCREW					
10	OUTER ROTOR					
11	INNER ROTOR					
12	WASHER					
13	OIL PUMP					
14	BUSHING					
15	SCREW					
16	INTAKE FILTER FITTING					
17	INTAKE FILTER					
18	THREADED CAP					
19	PLUG					
20	O-RING					
21	SCREW					



LUBRICATION SYSTEM

OIL SUMP AND INTAKE FILTER REMOVAL

Remove:

1. Coils and Spark plugs, see the section entitled **“Coil and spark plug removal”**.
2. Head timing gear cover, see the chapter entitled **“Head timing gear cover removal”**.
3. Chain tensioner, see chapter entitled **“Chain tensioner removal”**.
4. Exhaust camshaft, see chapter entitled **“Exhaust camshaft removal”**.
5. Intake camshaft, see chapter entitled **“Intake camshaft removal”**.
6. Head see chapter entitled **“Head removal”**.
7. flywheel, see chapter entitled **“Flywheel removal”**.
8. Mobile chain slides, see chapter entitled **“Mobile chain slides removal”**.
9. Clutch, see chapter entitled **“Clutch removal”**.

NOTE:

Before removing the oil sump, first drain out any oil in the engine, removing the magnetic cap.

Remove:

- the oil sump fastening screws (E) Fig. A.

Check:

- the oil sump.

If there is any damage replace.

Remove:

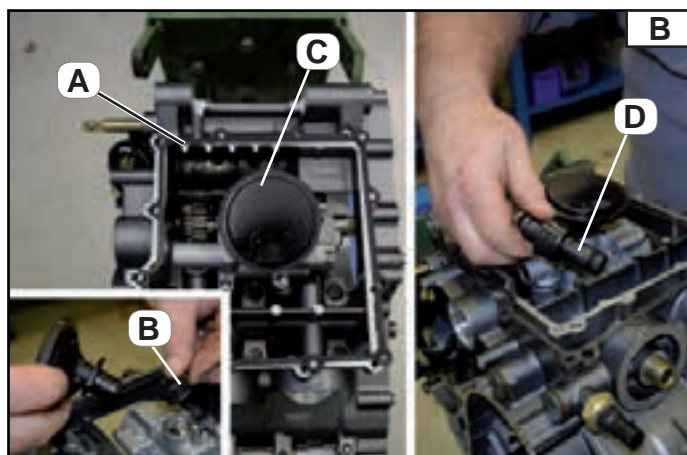
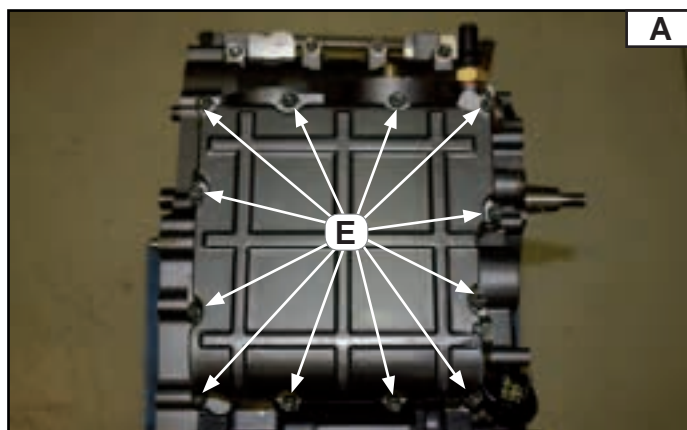
- The seal (A) Fig. B.
- The intake filter fitting (B) Fig. B.
- The intake filter (C) Fig. B.
- The pressure relief valve (D) Fig. B.

NOTE:

If there is any damage to the above parts, replace.

NOTE:

If there is any sediment or residue, clean the filtering area carefully with solvent.





LUBRICATION SYSTEM

OIL SUMP AND INTAKE FILTER INSTALLATION

Install:

Proceed using the opposite order to removal.

- Tighten the screws fastening the oil sump (E) to the following torque:



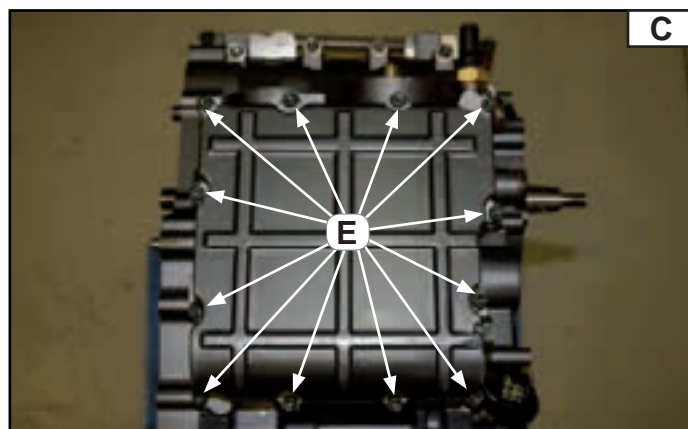
Torque 0.6 N*m

Tighten:

- the magnetic cap, complete with copper washer, to the following torque:



Torque 25 N*m

**NOTE:**

Add engine oil once these steps have been completed.



LUBRICATION SYSTEM

PRESSURE-RELIEF VALVE INSTALLATION

Remove:

- Oil sump, see section entitled “Oil sump and intake filter removal”.

Check:

Before installing the valve, make sure all the parts are free from anomalies Fig. A.

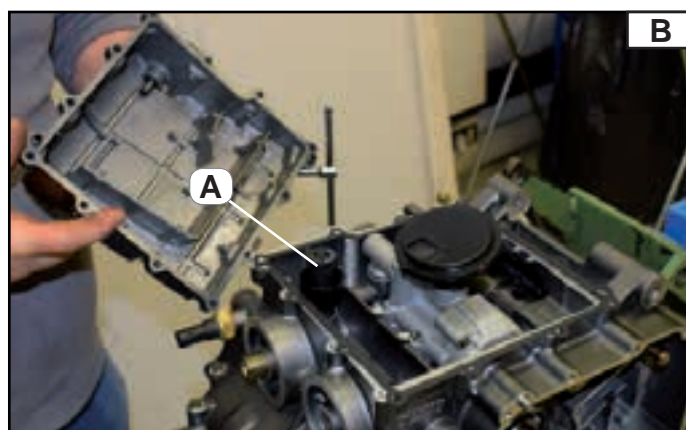
If there is any damage or wear, replace the faulty parts.

Installation:

Install the pressure relief valve (A) with O-ring inside the bottom casing, by slotting it in Fig. B

NOTE:

Lubricate the pressure relief valve during insertion.



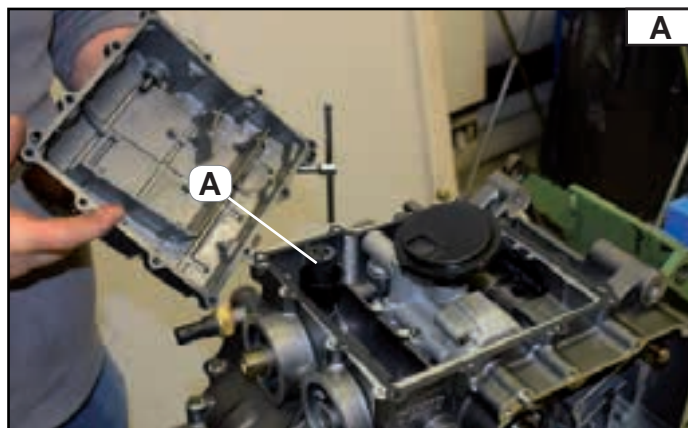


LUBRICATION SYSTEM

PRESSURE-RELIEF VALVE REMOVAL

Remove:

- Oil sump, see section entitled "**Oil sump and intake filter removal**".
- The pressure relief valve (A):



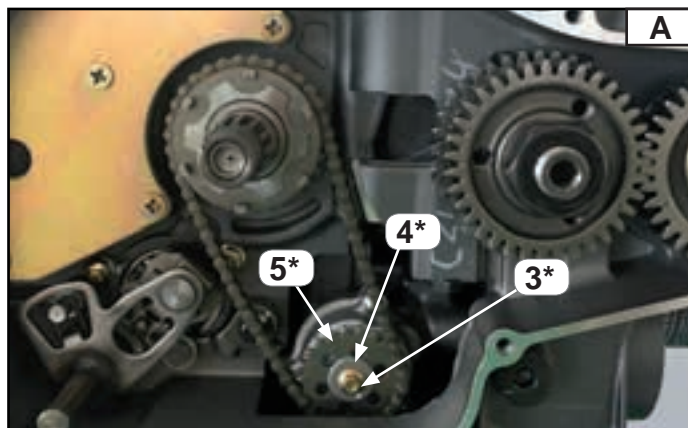


LUBRICATION SYSTEM

OIL PUMP REMOVAL

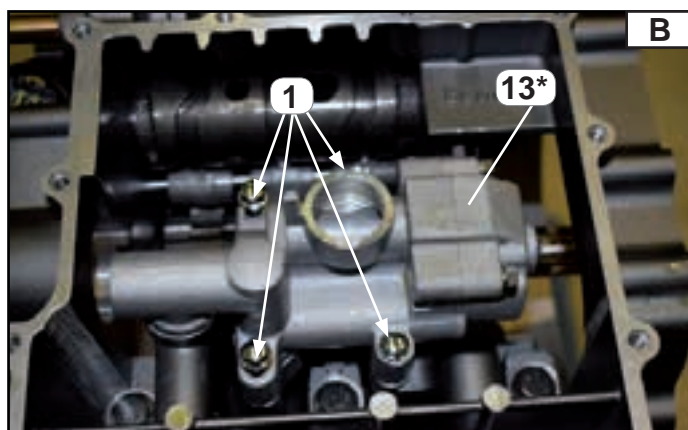
Remove:

1. Clutch, see chapter entitled “Clutch removal”.
 - Use a wrench to block the pump control gear (5*)
 - unscrew the screw (3*)
 - take out the washer (4*) Fig. A.
 - take out the pump pinion (5*)
2. Oil sump, see chapter entitled “Oil sump removal”.



Remove:

- the screws (1) Fig. B.
- slide out the pump body (13*) Fig. B.

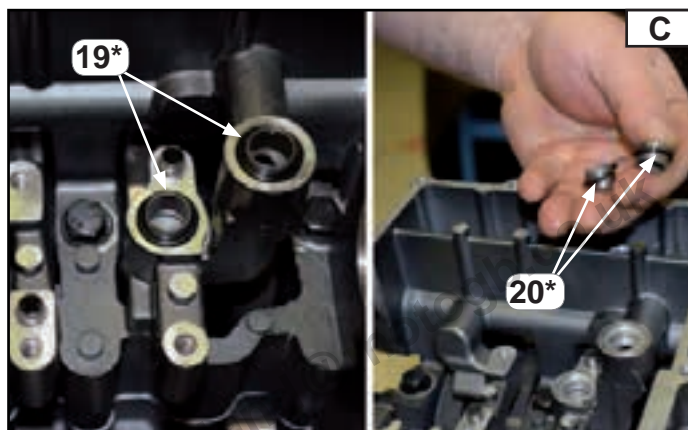


Check:

- the integrity of the two pins (19*)
- the two O-rings (20*) Fig. C.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 “Lubrication circuit”.





LUBRICATION SYSTEM

OIL PUMP REMOVAL

Remove:

- the screws (9*)
- the pump cover (6*)
- outer rotor (10*)
- inner rotor (11*)
- roller (8*)
- oil pump shaft (7*)

Check:

- the pump body (13*) Fig. D

If there are any lines/damage/wear, replace.

- The pump pinion (5*)

If there is any damage or wear to the gears, replace.

Measure:

- the tolerance between the inner rotor (11*) and the outer rotor (10*) "C". Fig. E and Fig. C (A)
- the tolerance between the outer rotor (11*) and the oil pump housing (6*) "E". Fig. E and Fig. C (B)
- the flatness of both rotors compare to the oil pump housing (6*) "C" Fig. C.

Clearance	Tolerance
between the inner rotor and the outer rotor "A".	0.15 mm
between the outer rotor and the oil pump housing "B"	+0.06, +0.09 mm

Check:

- oil pump operation.

Turn the pump pinion (5*) as shown in Fig. F

If the movement is not smooth, check the inner/outer rotor seat.

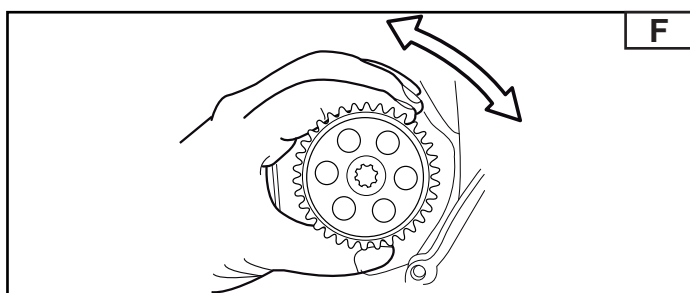
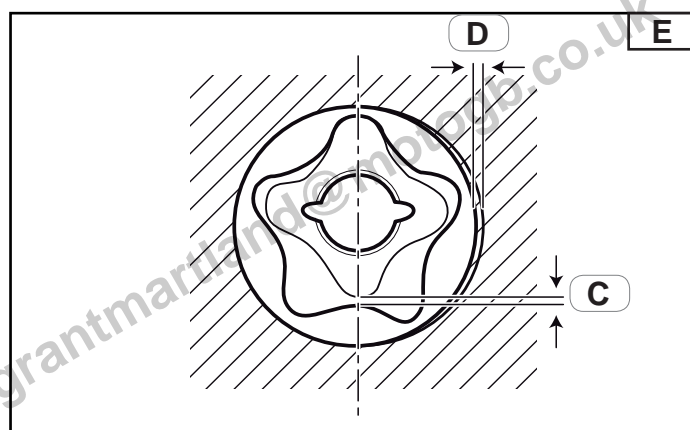
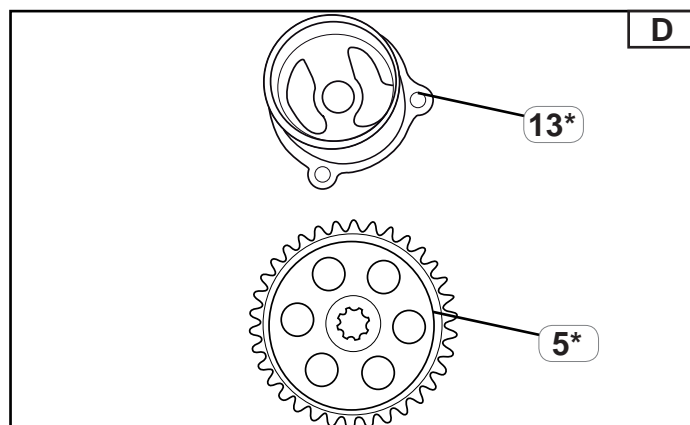
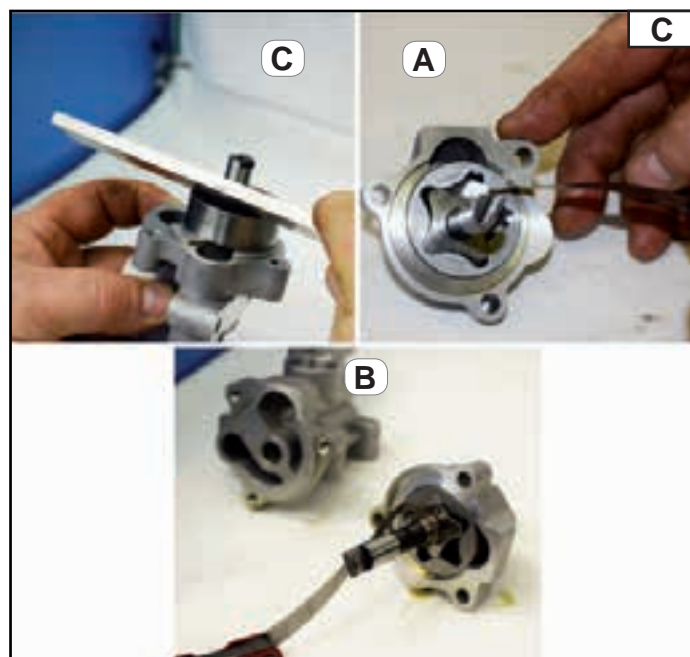
If there are any lines/damage, replace the faulty part/s.

NOTE:

This check is carried out after securing the oil pump in the engine body and inserting the pump pinion (5*) in its seat.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Lubrication circuit".





LUBRICATION SYSTEM

OIL PUMP ASSEMBLY

Install:

Proceed using the opposite order to removal.

Tighten the assembly screws (1) to the following torque:



Torque 12 N*m

Tighten the assembly screws (3*) with the pump pinion (5*) to the following torque:



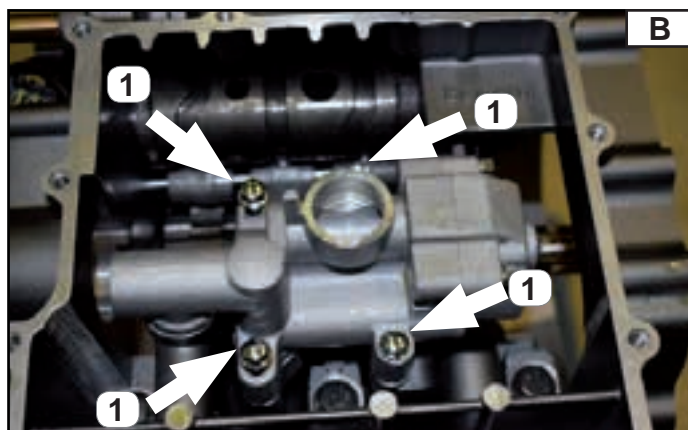
Torque 7 N*m

NOTE:

Add engine oil once these steps have been completed.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Lubrication circuit".





GEAR BOX

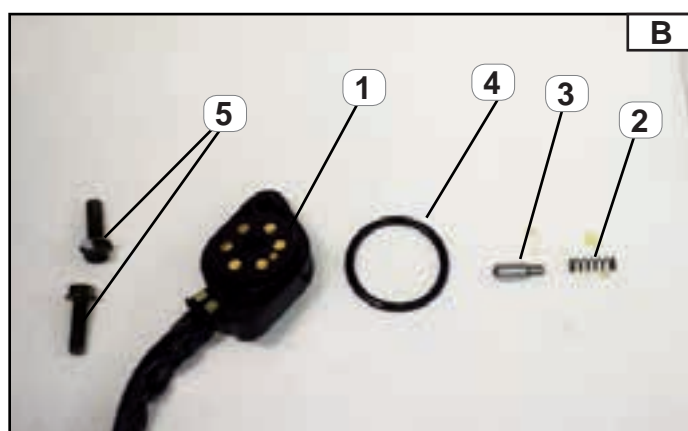
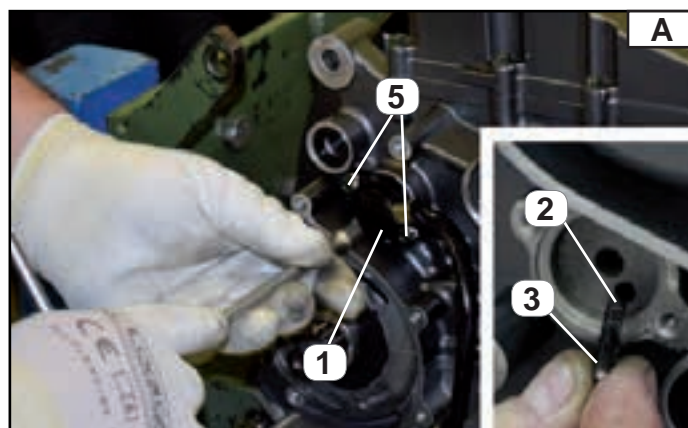
NEUTRAL POSITION/GEAR INDICATOR SENSOR REMOVAL

Remove:

- the screws (5)

Take out:

- the pin (3) Fig. A.
- the spring (2) Fig. A.
- the neutral position/gear indicator sensor (1) Fig. A.
- the gasket (4) Fig. B.





GEAR BOX

NEUTRAL POSITION/GEAR INDICATOR SENSOR ASSEMBLY

Assemble:

- insert the spring (2) Fig. A
- the pin (3) Fig. A
- the gasket (4) Fig. B
- the neutral position/gear indicator sensor (1).

NOTE:

Before assembly, check the continuity of the sensor (see the chapter entitled "Electrical system")

Tighten the two screws (5) of the sensor to the following torque:

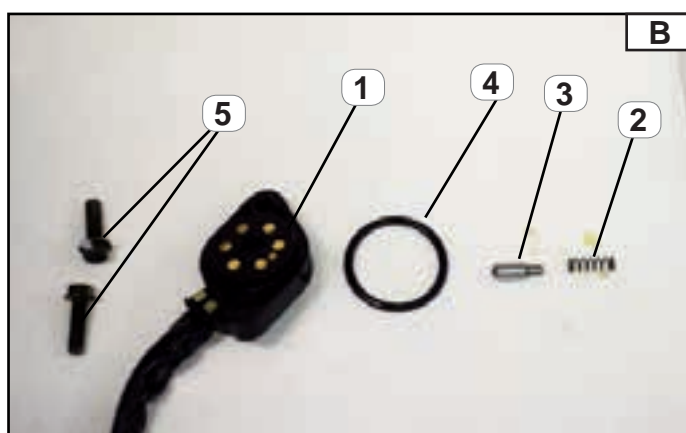
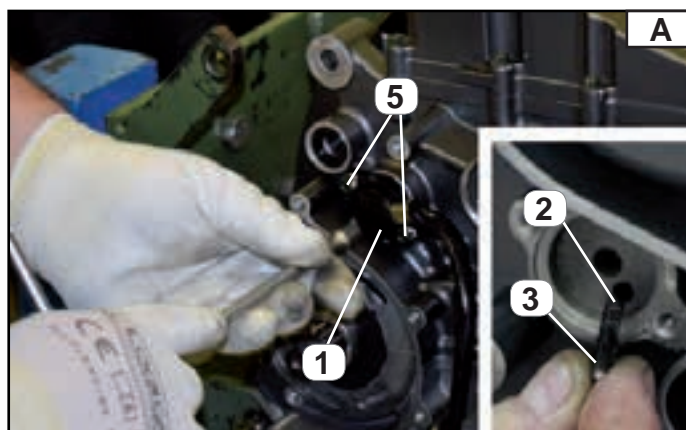


Torque 0.6 N*m

Use Loctite

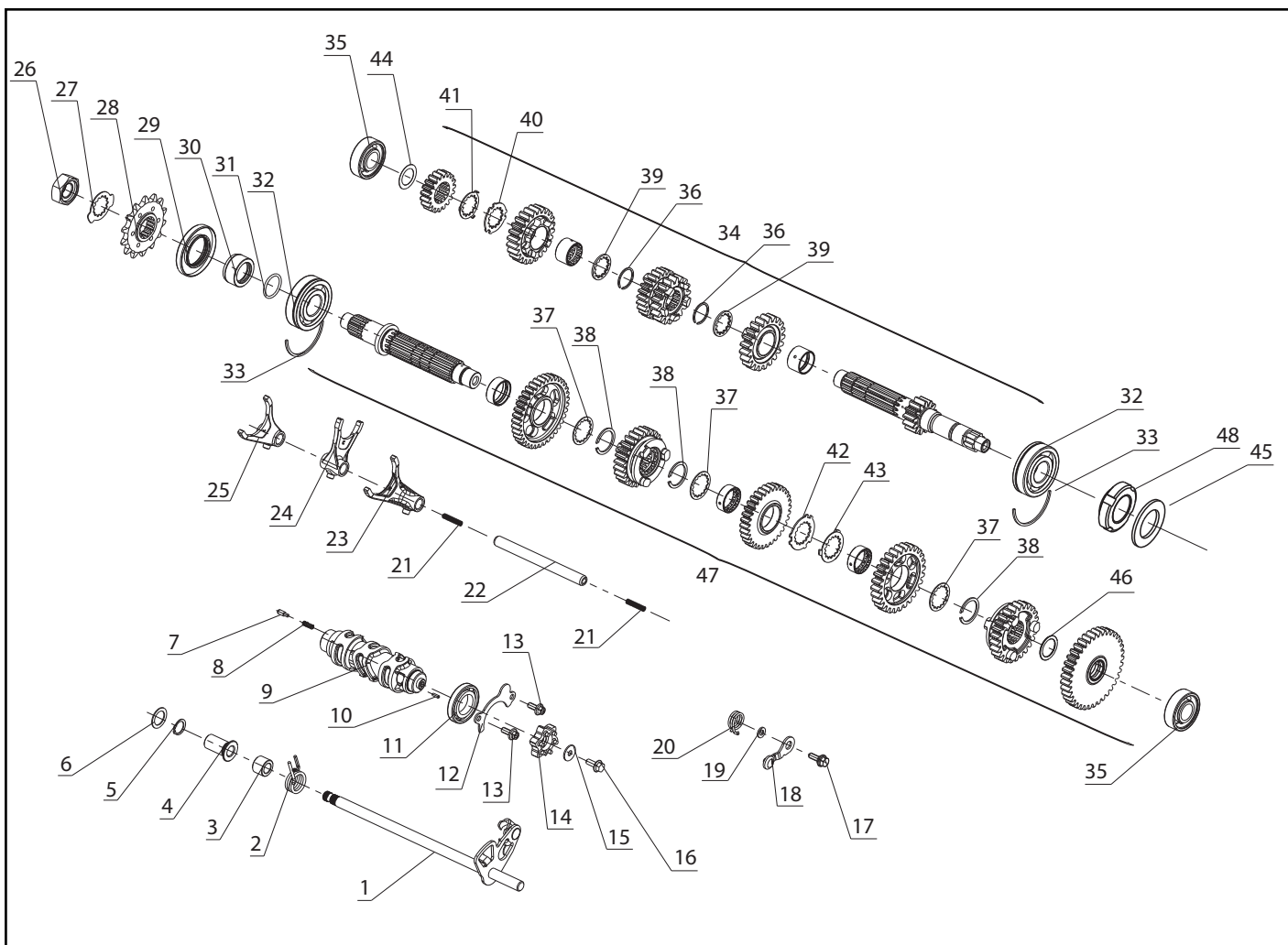


Loctite 243





GEAR BOX



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	SELECTOR SHAFT					
2	STOP SPRING					
3	SHIM					
4	BUSHING					
5	SEEGER RING					
6	SCRAPING					
7	PLUG					
8	SPRING					
9	DESMODROMIC					
10	PIN					
11	BEARING					
12	PLATE					
13	SCREW					
14	GEAR DRUM					
15	WASHER					
16	SCREW					
17	SCREW					
18	GEAR FIXING CLICK ASSEMBLY					



GEAR BOX

Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
19	WASHER					
20	HAIRSPRING					
21	SPRING					
22	PIN					
23	GEAR SELECTION FORK 5TH/6TH					
24	GEAR SELECTION FORK 5TH/6TH					
25	GEAR SELECTION FORK 1ST/4TH - 2ND/3RD					
26	NUT (M18)					
27	WASHER					
28	PINION					
29	OIL SEAL					
30	BROACHED BUSHING					
31	O-RING					
32	BEARING					
33	BEARING RETAINER					
34	COMPLETE MAIN SHAFT					
35	BEARING					
36	ELASTIC RING					
37	SCRAPING					
38	ELASTIC RING					
39	NOTCHED WASHER					
40	NOTCHED WASHER					
41	NOTCHED WASHER					
42	NOTCHED WASHER					
43	NOTCHED WASHER					
44	GASKET					
45	WASHER					
46	SCRAPING					
47	COMPLETE SECONDARY SHAFT					
48	SLOTTED NUT (M20)					



GEAR BOX

GEAR BOX DISASSEMBLY

Remove:

1. Coils and Spark plugs, see the section entitled **“Coil and spark plug removal”**.
2. Head timing gear cover, see the chapter entitled **“Head timing gear cover removal”**.
3. Chain tensioner, see chapter entitled **“Chain tensioner removal”**.
4. Exhaust camshaft, see chapter entitled **“Exhaust camshaft removal”**.
5. Intake camshaft, see chapter entitled **“Intake camshaft removal”**.
6. Head see chapter entitled **“Head removal”**.
7. flywheel, see chapter entitled **“Flywheel removal”**.
8. Mobile chain slides, see chapter entitled **“Mobile chain slides removal”**.
9. Clutch, see chapter entitled **“Clutch removal”**.
10. Neutral position/gear indicator sensor, see chapter entitled **“Neutral position/gear indicator sensor removal”**.
11. Oil sump, see chapter entitled **“Oil sump removal”**.
12. Oil pump, see chapter entitled **“Oil pump removal”**.

Remove:

- Base screws Fig. E
- raise the lower base. F

Remove:

- the gearbox output shaft (1) Fig. F
- the gearbox intake shaft (2) Fig. F





GEAR BOX

GEAR BOX ASSEMBLY

Measure:

Use a specific gauge to check the size of the hole (1) in the top right casing Fig. A.

Housing port
desmodronic

size: $\varnothing 47$ (0,+0.022) mm

If outside specifications, replace the bottom casing.

Check:

- The grooving on the desmodromic shaft (9) Fig. B.
- In the presence of damage/lines/signs of wear, replace the whole desmodromic shaft.

Assemble:

- the desmodromic (9*) inside the casing
- install the bearing (11*) Fig. B



Torque 12 N*

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Gears".

Assemble:

- the gear drum (14*) using the special tool (**)



(**) Gear selector drum assembly tool

Code:0320097051000

- washer (15*)
- screw (16*) Fig. C to the following torque:



Torque 12 N*m

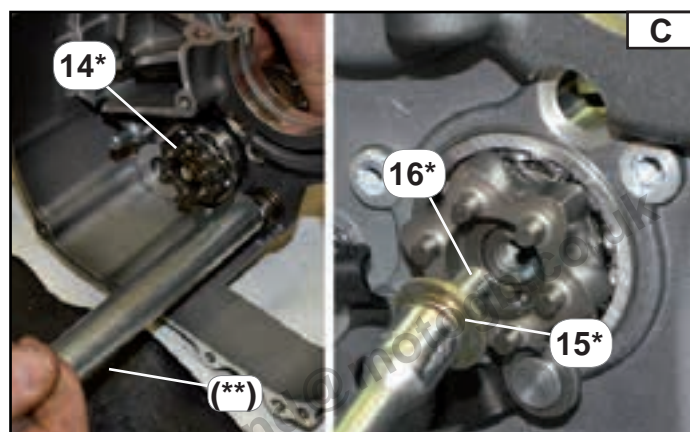
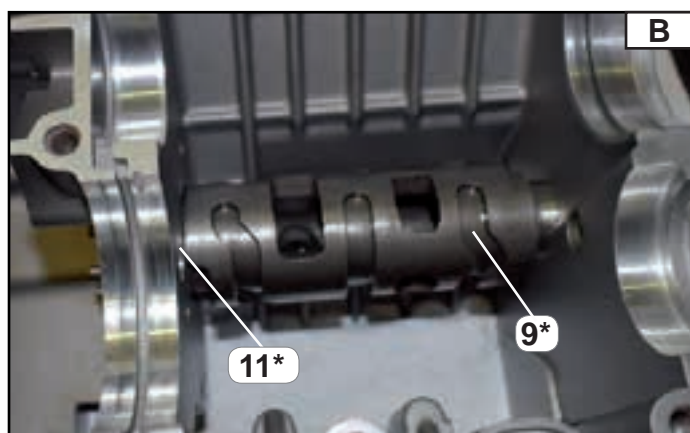
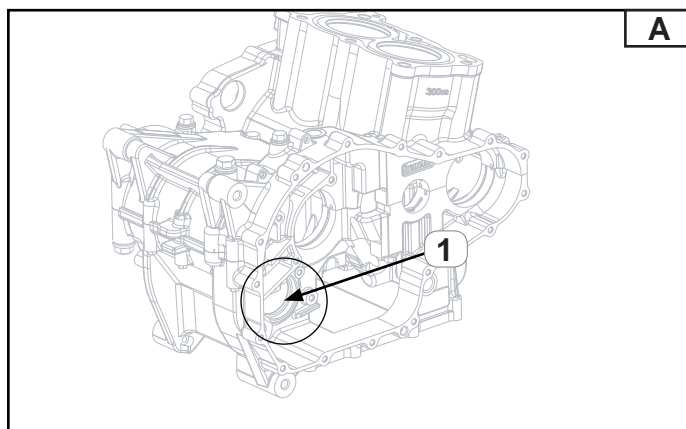
Use Loctite



Loctite 243

NOTE:

To tighten the screw (16*), use an aluminium pad (1) to keep the desmodromic in place Fig. D.





GEAR BOX

GEAR BOX ASSEMBLY

Assemble:

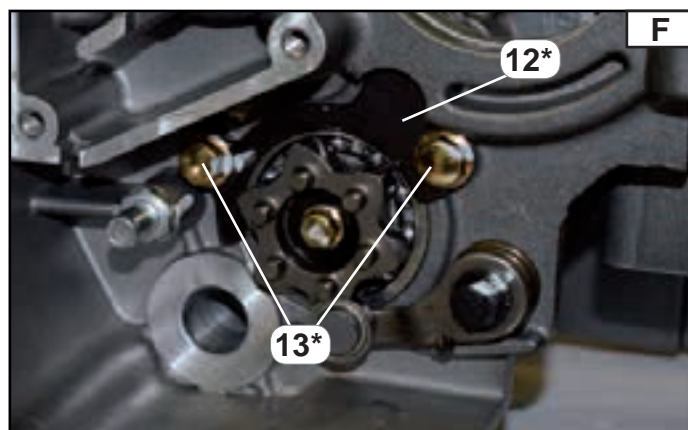
- the plate (12*)
- the 2 screws (13*) Fig. F to the following torque:



Torque 12 N*m

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Gears".





GEAR BOX

GEAR SHIFT CONTROL

Measure:

The following procedure is applied to all gear shift control rods (1). G.

Check:

- the follower of the gear shift control rod cam (A)
- The tooth of the gear shift control rod (B)

If there is warping/damage/lines/traces of wear, replace the gear shift control rod .

Measure:

- the thickness of the gear shift control rod, using a slide gauge.

Part	Size
Gear shift control rod	5.85 ± 0.05 mm

Check:

- The guide pin of the gear shift control rod (23*)

Roll the guide pin of the gear shift control rod on a flat surface

Fig. H

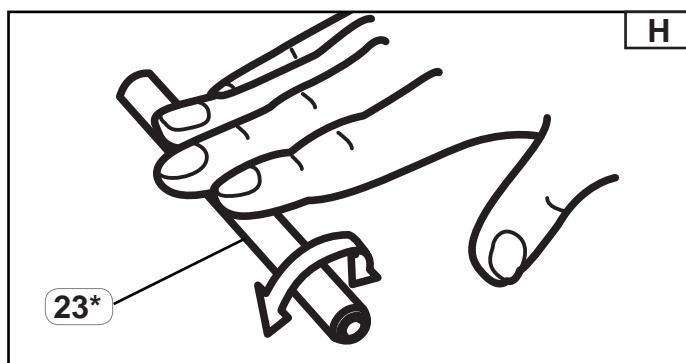
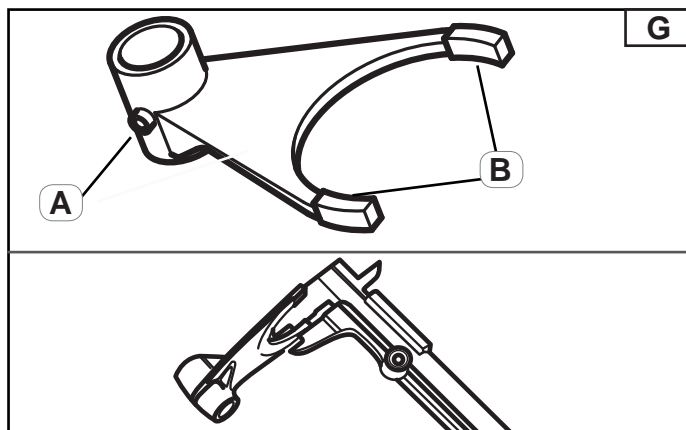
If there is any warping, replace.

NOTE:

Do not try to straighten the control rod guide if it is warped.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Gears".





GEAR BOX

GEAR BOX ASSEMBLY

Assemble:

1. spring (21*).
2. gear selection fork 5th/6th (25*).
3. gear selection fork 5th/6th (24*).
4. gear selection fork 1st/4th - 2nd/3rd (23*).
5. spring

NOTE:

see the sequence in Fig. I

Check:

- the two bearing stops (33) Fig. L
- If there is any warping/damage/lines/signs of wear, replace.

Check:

- The seats for the two bearing stops (33) Fig. L
- If there is any warping/damage/lines/signs of wear, replace.

Assemble:

For the assembly sequence of the full input shaft (47), see the exploded drawing at the start of the chapter.

For the assembly sequence of the full output shaft (34), see the exploded drawing at the start of the chapter.

Position

- the full input shaft (47)
- the full input shaft (34)

NOTE:

Make sure the grooves on the two bearings (32) and (33) match correctly.

NOTE:

Before assembling the two half casings, top and bottom, it is necessary to apply sealant paste along the whole profile of the top casing, in order to achieve a good hold.



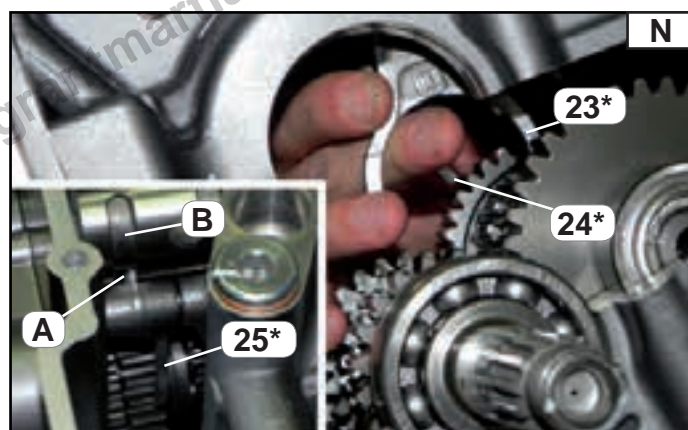
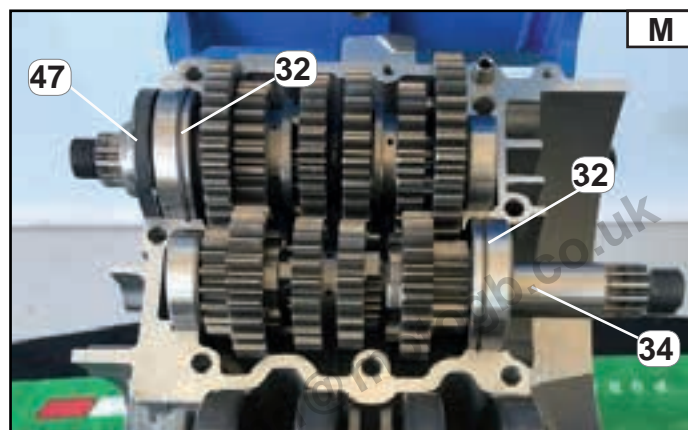
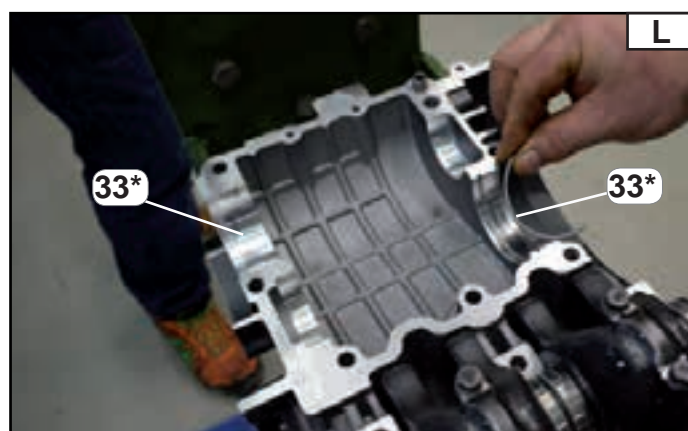
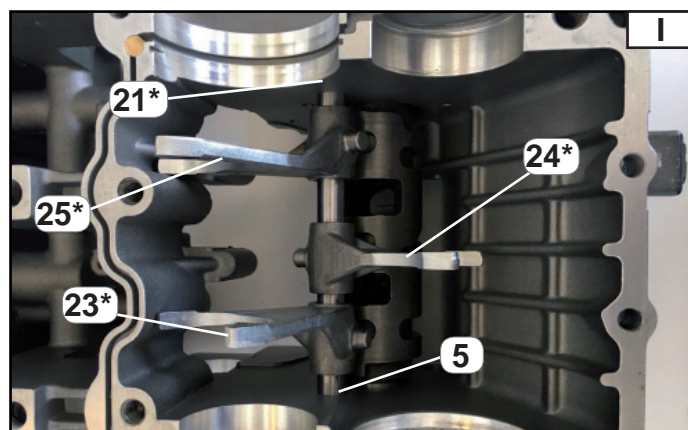
PASTE THREEBOND

Assemble:

Install the bottom casing over the top, taking care to insert the follower (A) correctly in the segment corresponding to the desmodronic shaft and the forks (23*-24*-25*) in their respective seats Fig. N.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Gears".





GEAR BOX

GEAR BOX ASSEMBLY

Check:

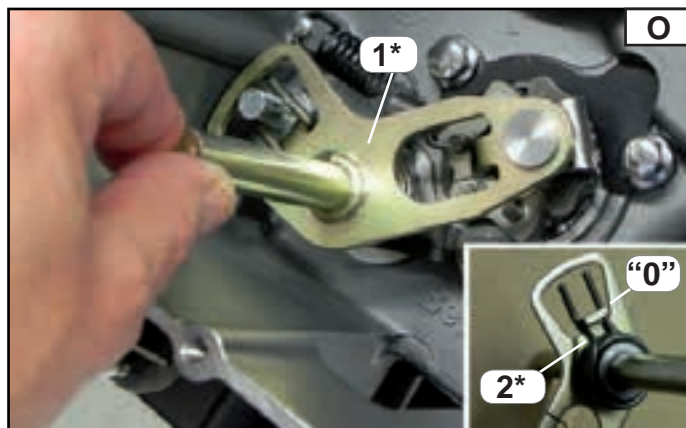
that the end of the gear lock spring (2*) is in its seat on the selector (*1) plate.

Check:

that in the neutral position, the clearance between the two ends of the spring and the strike pin is "0" Fig. O

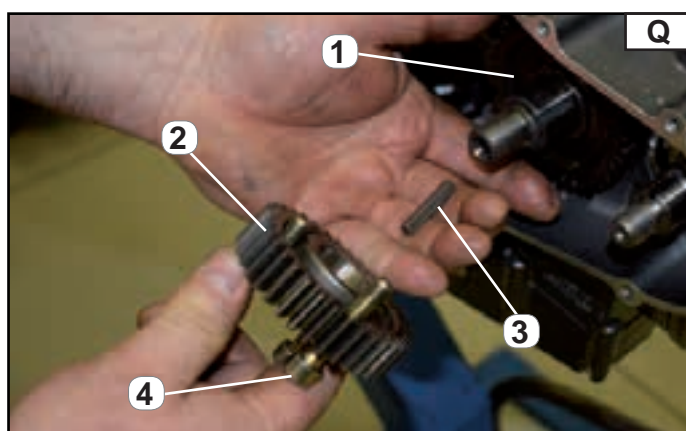
Assemble:

- the gear shaft as in Fig. O



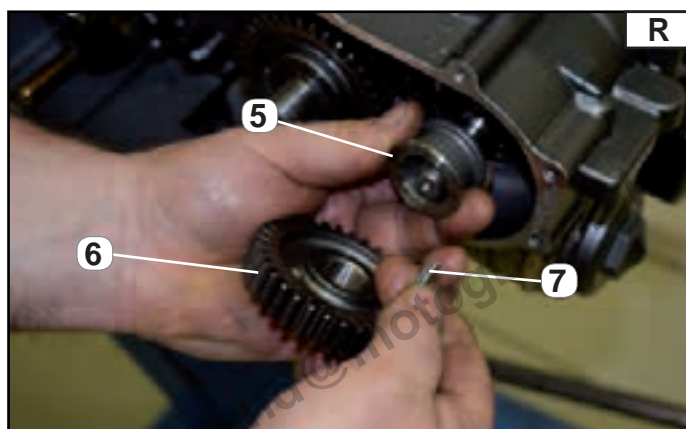
Position

- the gear (2)
- the drive shaft gear (1), locking it into place with the spline (3) Fig. Q



Install:

- the guide bushing (5)
- the counter shaft gear (6)
- the spline (7) Fig. R



NOTE:

Bring the two shaft phasing points into line and check the drive shaft Fig. S





GEAR BOX

GEAR BOX ASSEMBLY

Install:

- washer
- the counter shaft gear nut (6)



Torque 90-100 N*m

Install:

- washer
- drive shaft gear nut (2)



Torque 115-125 N*m

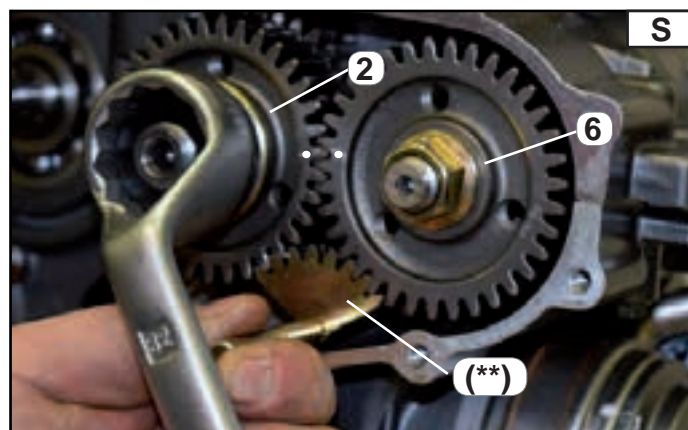


NOTE:

To keep the two drive shafts still, it is necessary to use the tool (**) in Fig. S

(**) Gear wrench

Code: 03200097053000



Assemble:

after assembling the two half casings, tighten the screws Fig. Q to the following torque:



Position screws (40): (M6)

Position screws (41): (M8)

Position screws (42): (M10)

Rotate the complete casing through 180° and tighten the screws Fig. R to the following torque:

Position screws (38): (M8)

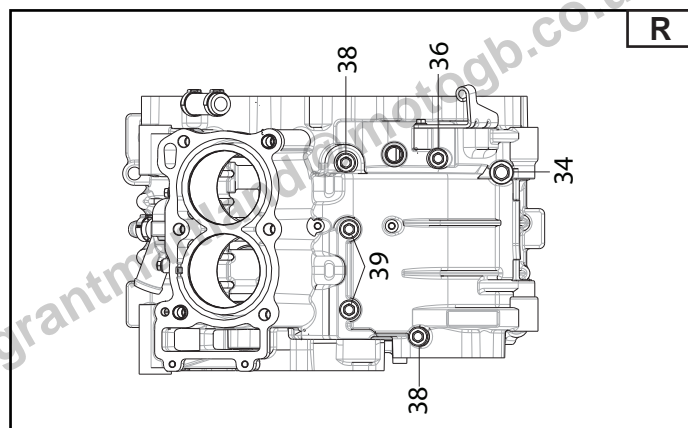
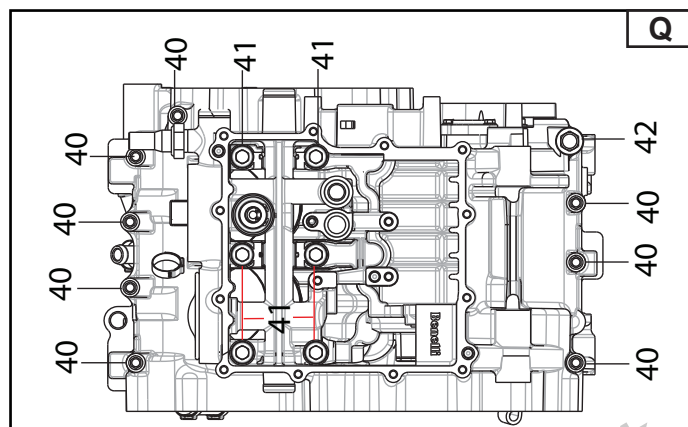
Position screws (36): (M8)

Position screws (34): (M10)

Use Loctite while tightening



Strong Loctite

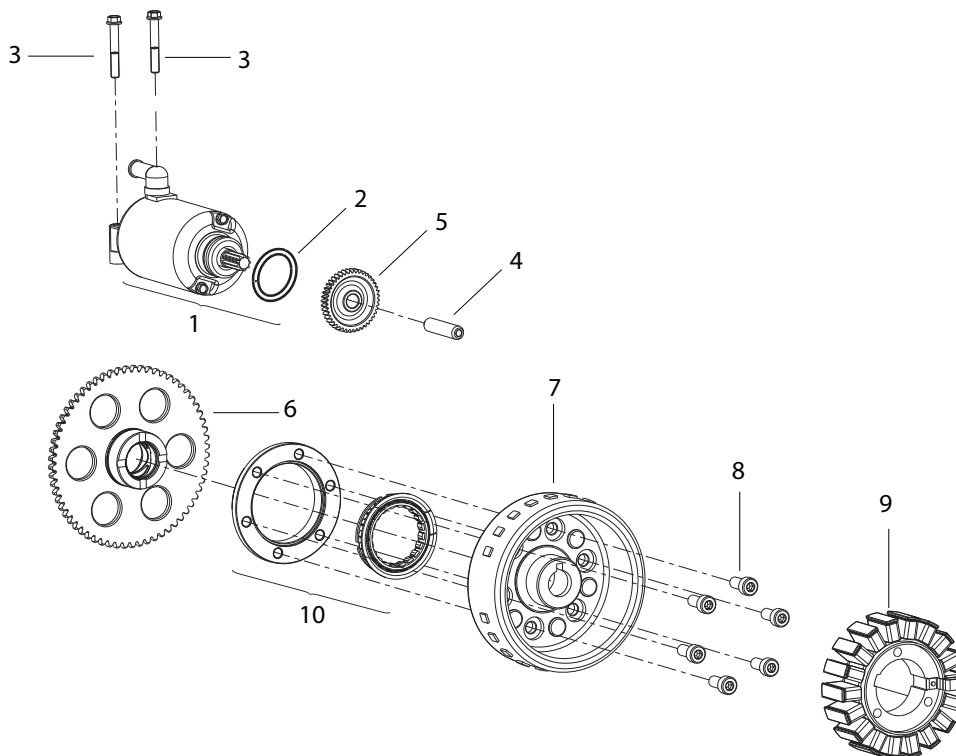


Casing closure tightness torque

Sequence	Size	Phases
1	M10:	1°Phase 12 N.m 2°Phase 24 N.m 3°Phase 45 N.m
2	M8:	1°Phase 12 N.m 2°Phase 30 N.m
3	M6:	1°Phase 10 N.m 2°Phase 12 N.m



STARTING STARTER



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	STARTER MOTOR					
2	O-RING					
3	SCREW					
4	IGNITION SHAFT					
5	DOUBLE GEAR					
6	START GEAR					
7	FLYWHEEL ROTOR					
8	SCREW					
9	MAGNET FLYWHEEL					
10	COMPLETE FREEWHEEL					



STARTING

STARTER REMOVAL

Remove:

1. the screws (3*) Fig. A
2. the starter motor (1*) from the clutch Fig. B.

Check:

- starter motor operation.

NOTE:

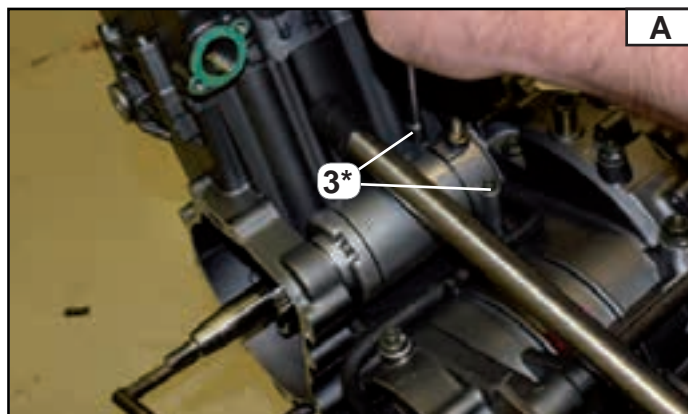
If the starter motor turns with force, replace the part.

- The O-ring gasket.

If there is any damage/spotting/traces of wear, replace the O-ring gasket.

NOTE:

Lubricate the O-ring and take care not to damage it.





STARTING

STARTER INSTALLATION

Install:

Proceed using the opposite order to removal.

Assemble:

- the screws (3*) Fig. A to the following torque:

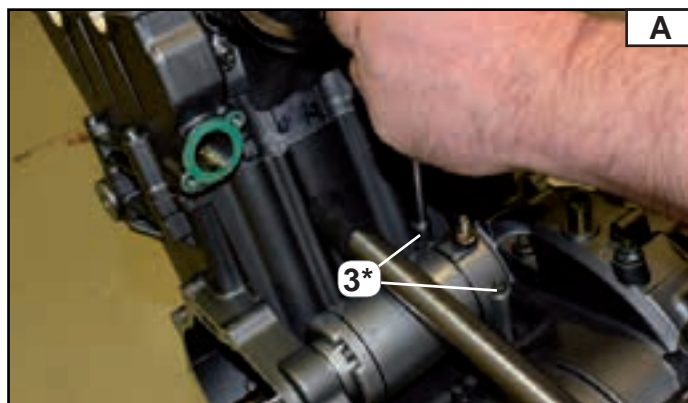


Torque 12 N*m

Use Loctite thread sealant to secure.



Loctite 243

**NOTE:**

Once the starter motor is assembled, proceed with the current wire connection.

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Starting".



STARTING

FLYWHEEL REMOVAL

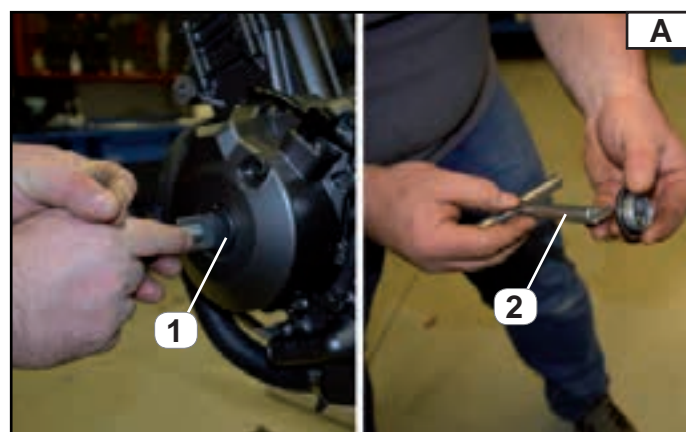
Remove:

- the cap (1).

Use the tool (2*) for this operation Fig. A

(*) Tool to remove the magnetic cap from the alternator cover

Code: 0320097043000.

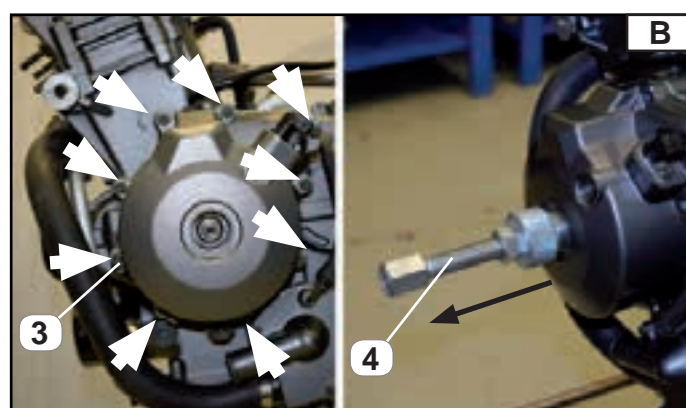


Remove:

- the screws (3) Fig. B
 - take out the magnet flywheel cover Fig. B.
- Use the tool (4*) for this operation Fig. B

(*) Flywheel cover extractor

Code: 0320097042000



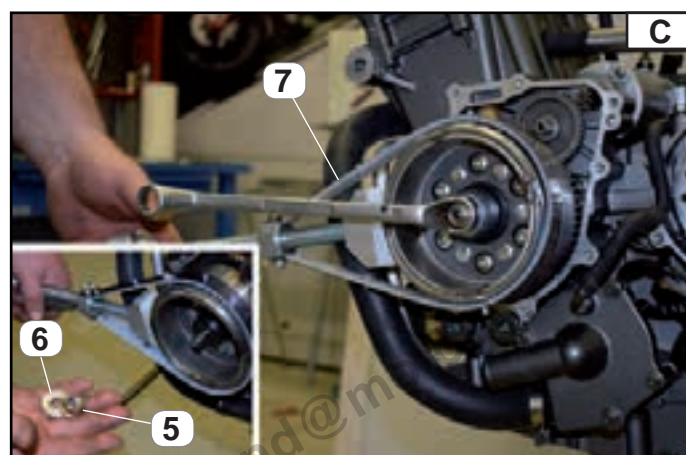
Remove:

- the nut (5) Fig. C.
- the washer (6) Fig. C.

Use the tool (7) for this operation Fig. C

(*) Tool to Tighten/Loosen the flywheel

Code:0320097044000



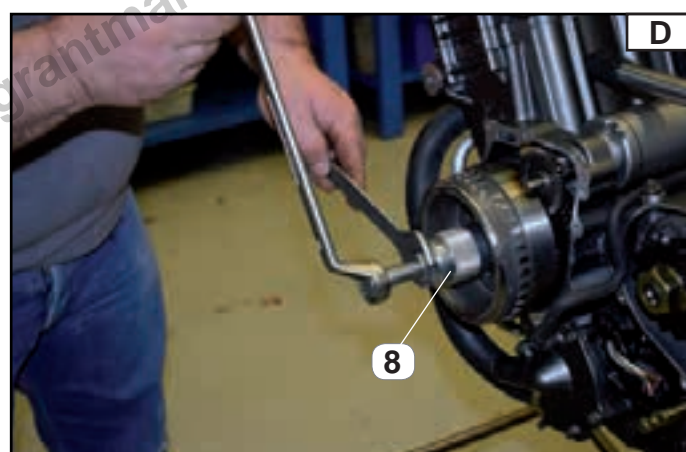
Remove:

- The flywheel rotor magnet (8).

Use the tool* (8) for this operation Fig. D

(*) Flywheel cover extractor

Code:0320097045000





STARTING

FREEWHEEL REMOVAL

Remove:

the assembled freewheel elements (6*) Fig. D.

- the 6 screws (8*).

Check:

- the roller cage and support.

If there are any anomalies or signs of wear, replace the whole freewheel (6*).

NOTE:

Numbers marked (*) are part of the spare parts table in Chapter 5 "Starting".





STARTING

FREEWHEEL INSTALLATION

Installation:

Proceed in the opposite order to removal.

Assemble:

- the screws (8*) Fig. A to the following torque.

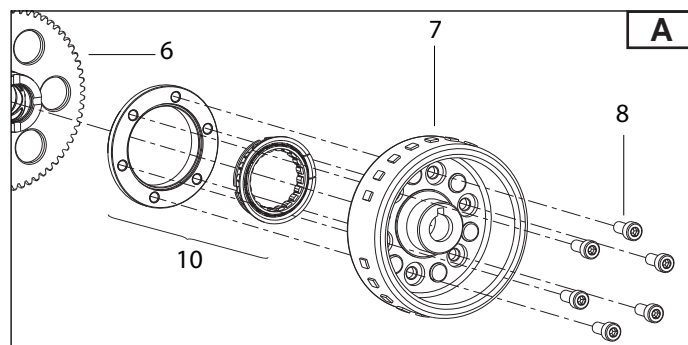


Torque 35 N*m

Use Loctite thread sealant to secure.



Loctite 243





STARTING FLYWHEEL INSTALLATION

Installation:

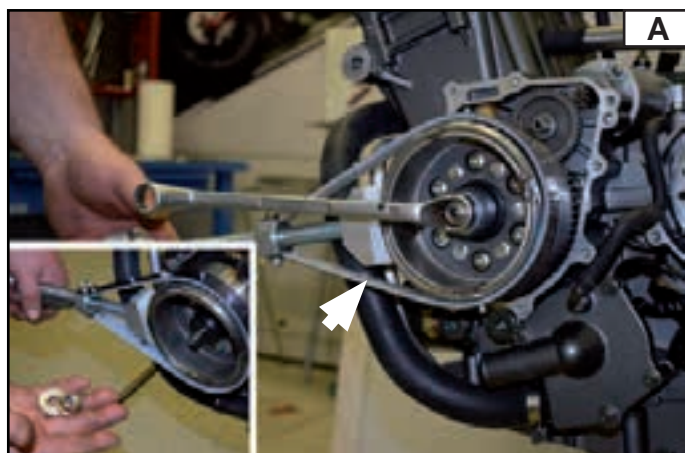
proceed in the opposite order to removal.

Assemble:

- the nut (5) Fig. A
 - the washer (6) Fig. A.
- Tighten the nut (5) to the following torque.



Torque 90 N*m



Assemble:

- the flywheel magnet cover
- gasket (7)

NOTE:

When closing the magnet flywheel cover Fig. B pay attention to the gasket.

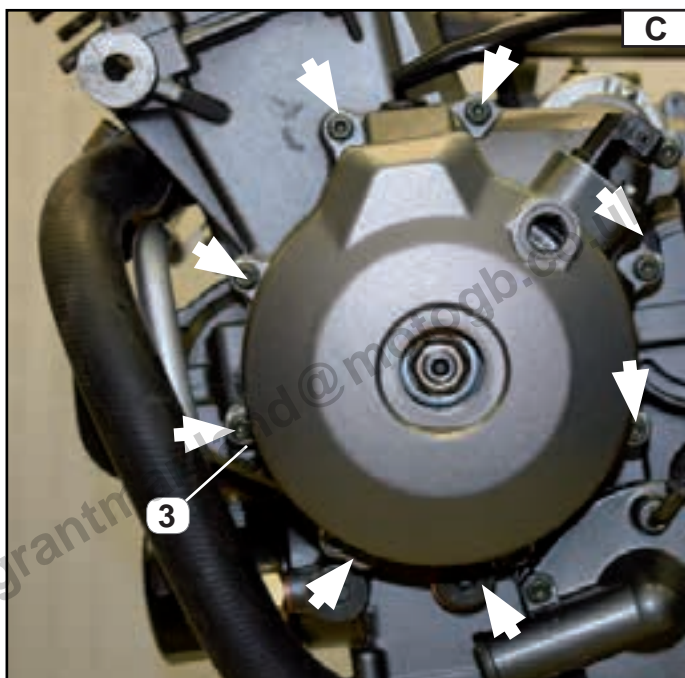
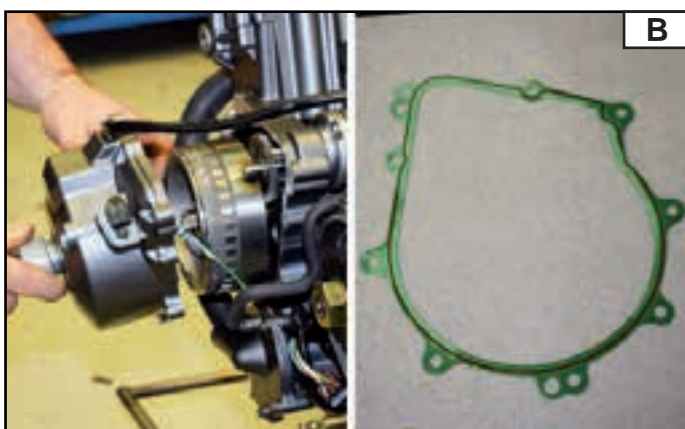
If the gasket is damaged, it must be replaced with a new one.

Assemble:

- the screws (3) Fig. C
- to the following torque:



Torque 12 N*m





STARTING

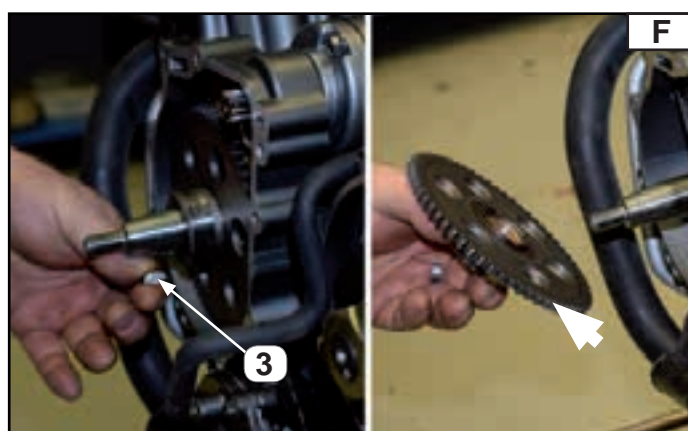
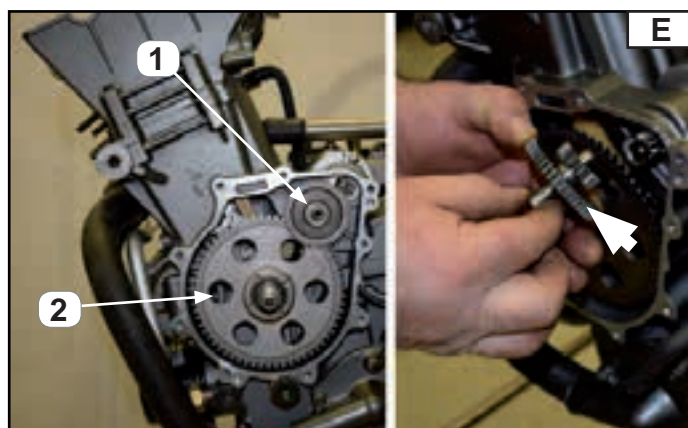
STARTER GEAR REMOVAL

Remove:

1. Flywheel, see chapter entitled “Flywheel removal”.

Remove:

- the satellite starter gear (1) Fig. E
- the freewheel starter gear (2) Fig. F
- the spline (3) Fig. F





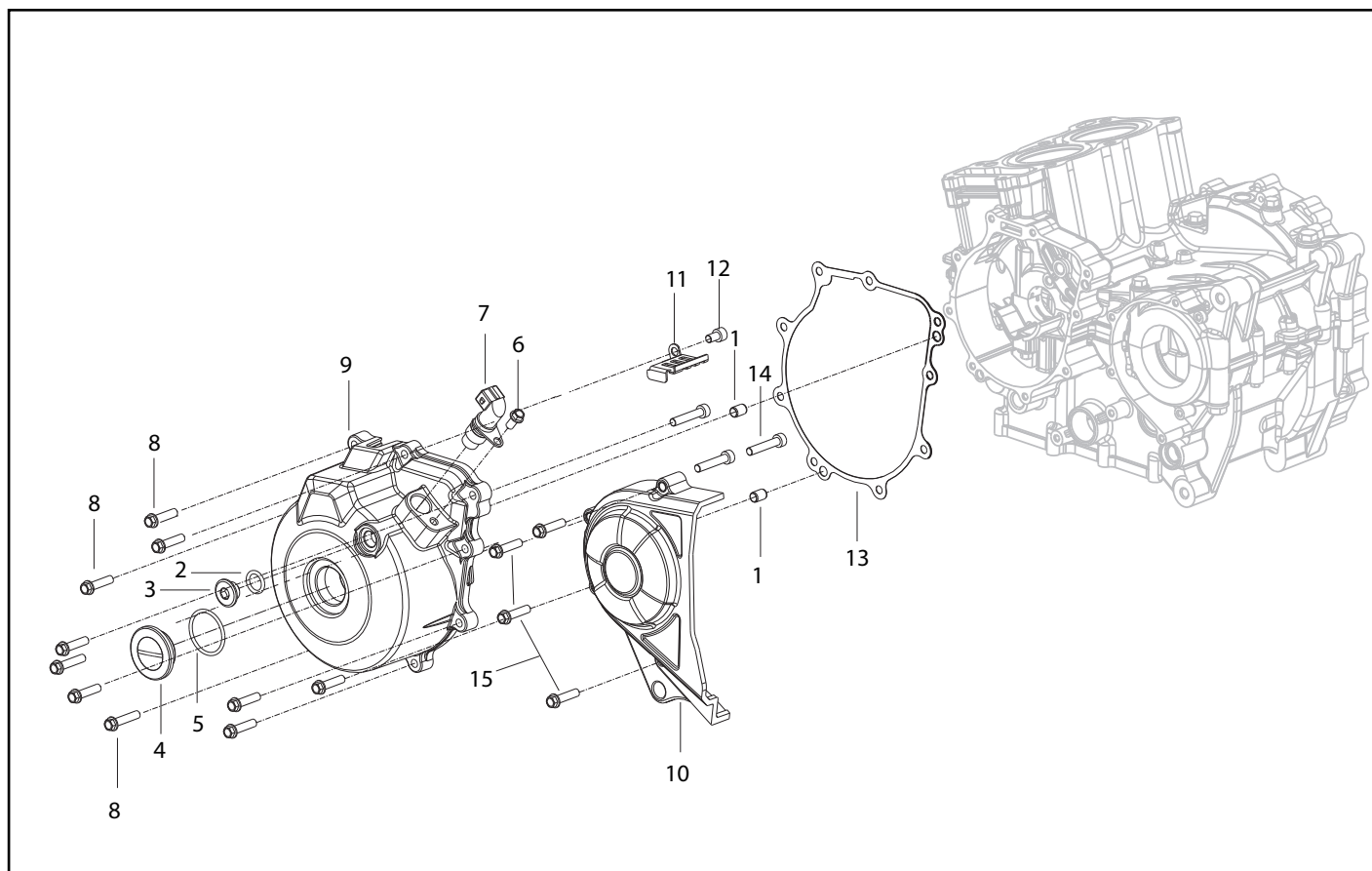
STARTING

STARTER GEAR ASSEMBLY

To assemble the chain slides, follow the removal process in the opposite order.



STARTING PHASE SENSOR



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	BUSHING					
2	O-RING					
3	THREADED CAP					
4	MAGNETIC CAP					
5	O-RING					
6	SCREW					
7	PHASE SENSOR					
8	SCREW					
9	ALTERNATOR COVER					
10	PINION COVER					
11	PLATE					
12	SCREW					
13	THE FLYWHEEL COVER GASKET					
14	SCREW					
15	SCREW					



STARTING

PHASE SENSOR REMOVAL

Disconnect:

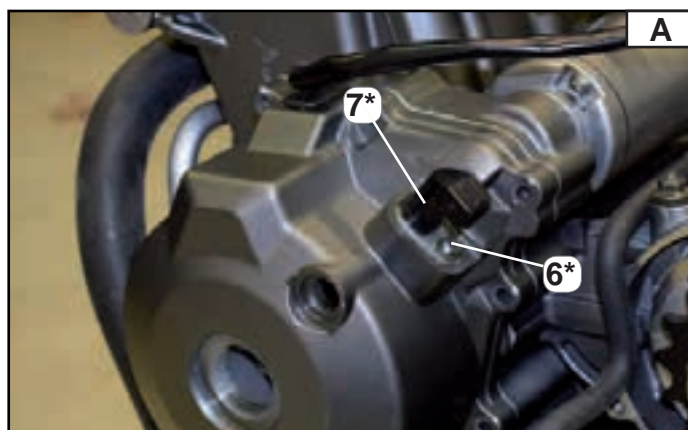
- The connector for the phase sensor (7*):

Remove:

- the screw (6*) Fig. A
- the phase sensor (7*) Fig. A

Check:

the integrity of the phase sensor.





STARTING

PHASE SENSOR INSTALLATION

Assemble:

- the phase sensor (7*)
- the fastening screws (6*) to the following torque: B:



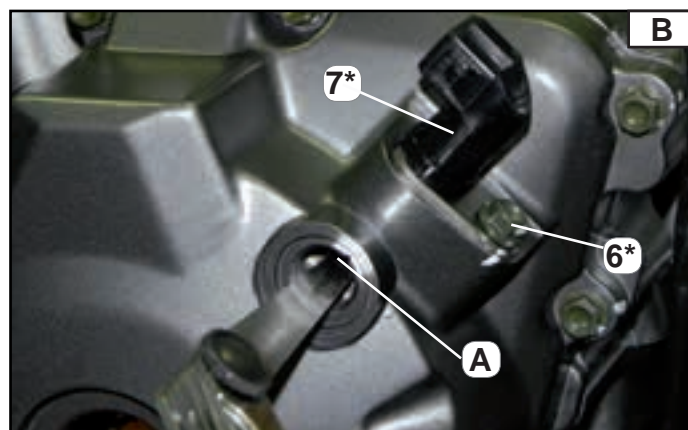
Torque 12 N*m

Measure:

- the distance (A) between the phase sensor (7*) and the pick-up on the flywheel magnet Fig. B.

NOTE:

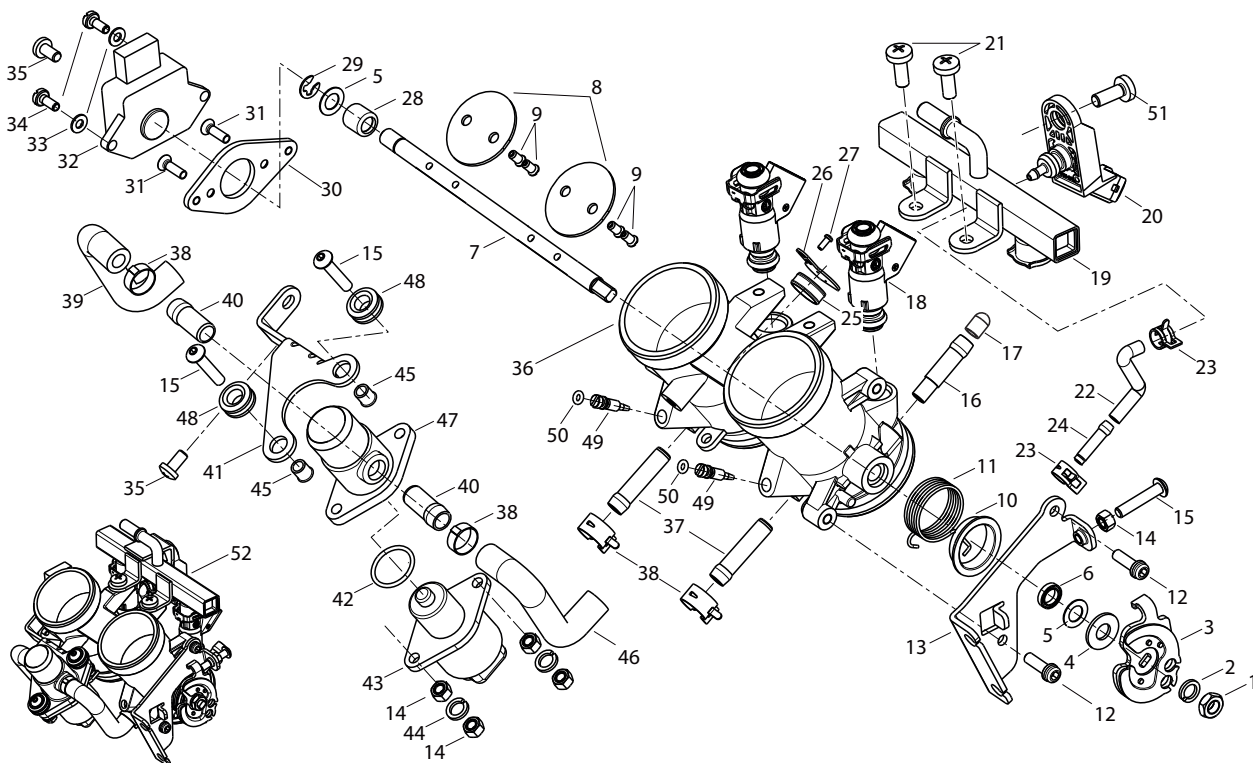
Use a thickness gauge to take this measurement





POWER SYSTEM

THROTTLE BODY



Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
1	NUT					
2	SCRAPING					
3	FLANGE					
4	WASHER					
5	WASHER					
6	OIL SEAL					
7	SHAFT					
8	THROTTLE VALVE FLANGE					
9	SCREW					
10	BUSHING					
11	SPRING					
12	SCREW					
13	BRACKET					
14	STEERING RING NUT					
15	SCREW					
16	INSERT					
17	CAP					
18	INJECTOR					
19	BRACKET					
20	MAP SENSOR					
21	SCREW					
22	PIPE					
23	PIPE GLAND CLIP					
24	INSERT					



POWER SYSTEM

Pos.	Description	Qty.	SQ.	SYMBOLS	INTERVENTION DESCRIPTION	REMARKS
25	SEALING RING					
26	PLATE					
27	SCREW					
28	ROLLER BEARING					
29	SEGER					
30	PLATE					
31	SCREW					
32	POTENTIOMETER					
33	WASHER					
34	SCREW					
35	SCREW					
36	THROTTLE VALVE					
37	PIPE					
38	CLIP					
39	PIPE					
40	PIPE					
41	SPECIAL PLATE					
42	O-RING					
43	STEPPER MOTOR					
44	SPECIAL WASHER					
45	BUSHING					
46	PIPE					
47	DISTRIBUTOR					
48	VIBRATION DAMPING RUBBER					
49	SCREW					
50	O-RING					
51	SCREW					
52	THROTTLE VALVE					



POWER SYSTEM

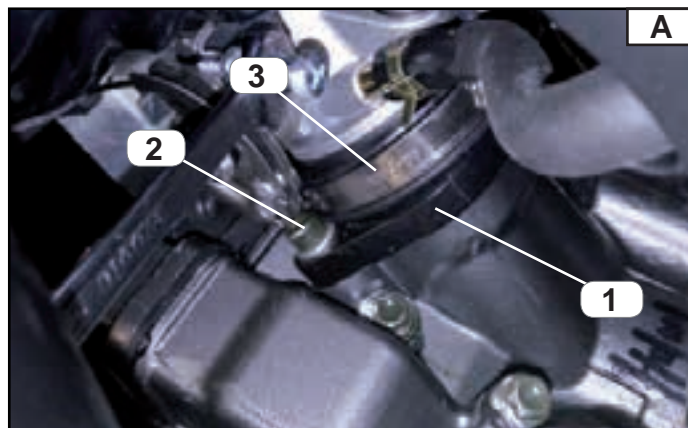
THROTTLE VALVE REMOVAL

Remove:

- Rider and passenger seats, see chapter entitled “**Removal of rider and passenger seats, Chapter 4**”.
- Fuel tank, see chapter entitled “**Fuel tank removal , Chapter 4**”.
- Air filter, see chapter entitled “**Air filter removal, Chapter 4**”.

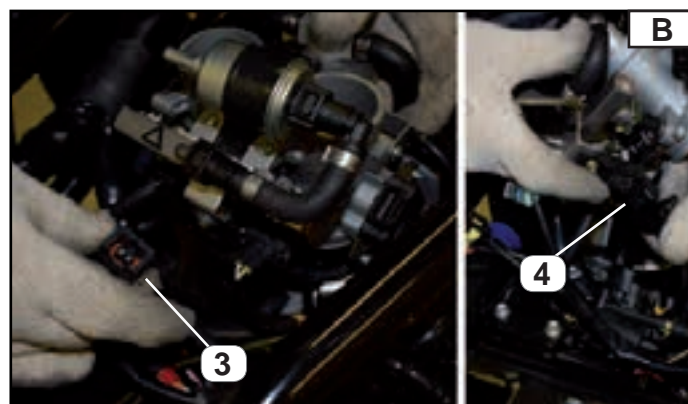
Remove:

- the 2 intake pipes (1) Fig. A.
- the gaskets
- the screws (2) Fig. A
- loosen the screw clips (3) Fig. A.

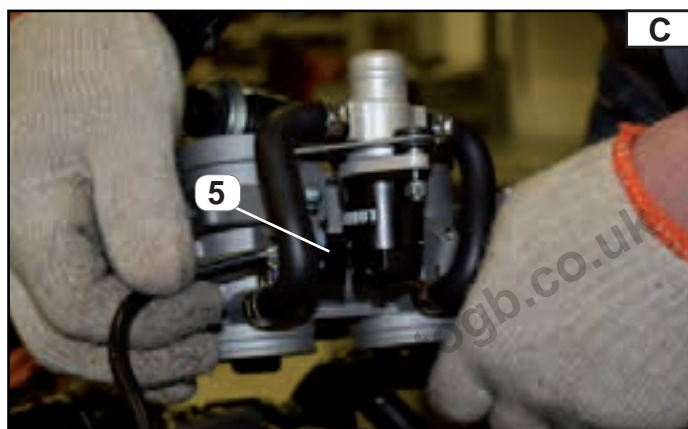


Disconnect:

- the injector connections (3)
- the connections of the pressure sensor (4) from the electric backbone to the throttle valve assembly, Fig. B

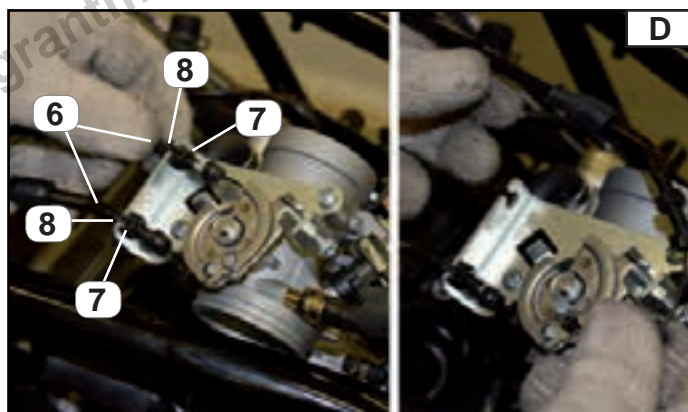


- the connection (5) of the distributor, Fig. C



Disconnect:

- the bottom ends of the accelerator cable (6) before loosening the cable nut supports (7)
- the bottom nuts (8) Fig. D
- take out the throttle valve.





POWER SYSTEM

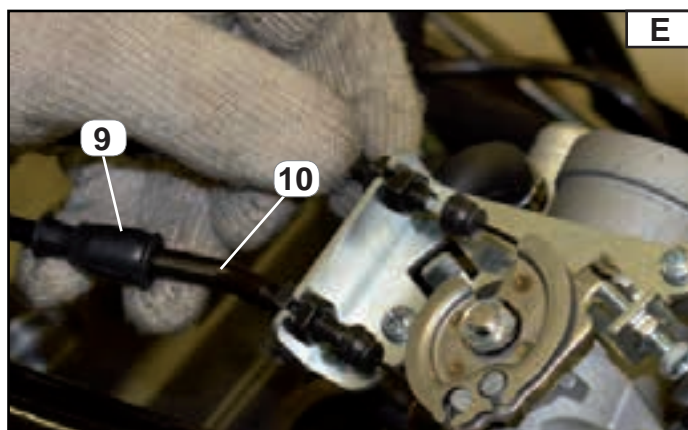
THROTTLE VALVE INSTALLATION

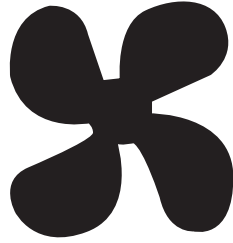
Installation:

Proceed using the opposite order to removal.

IMPORTANT NOTICE

During assembly of the accelerator cables, take care to insert the hood (9) on the control line (10) Fig. E.





COOL.
SYSTEM

6

CHAPTER 6

COOLING SYSTEM

WATER PUMP3

 WATER PUMP REMOVAL.....4

 WATER PUMP INSTALLATION5

THERMOSTAT6

 THERMOSTAT REMOVAL.....6

 THERMOSTAT INSTALLATION.....7

WATER MANIFOLD8

 WATER MANIFOLD REMOVAL.....8

 WATER MANIFOLD INSTALLATION.....9

HEAT EXCHANGER10

 HEAT EXCHANGER REMOVAL.....10

 HEAT EXCHANGER INSTALLATION11

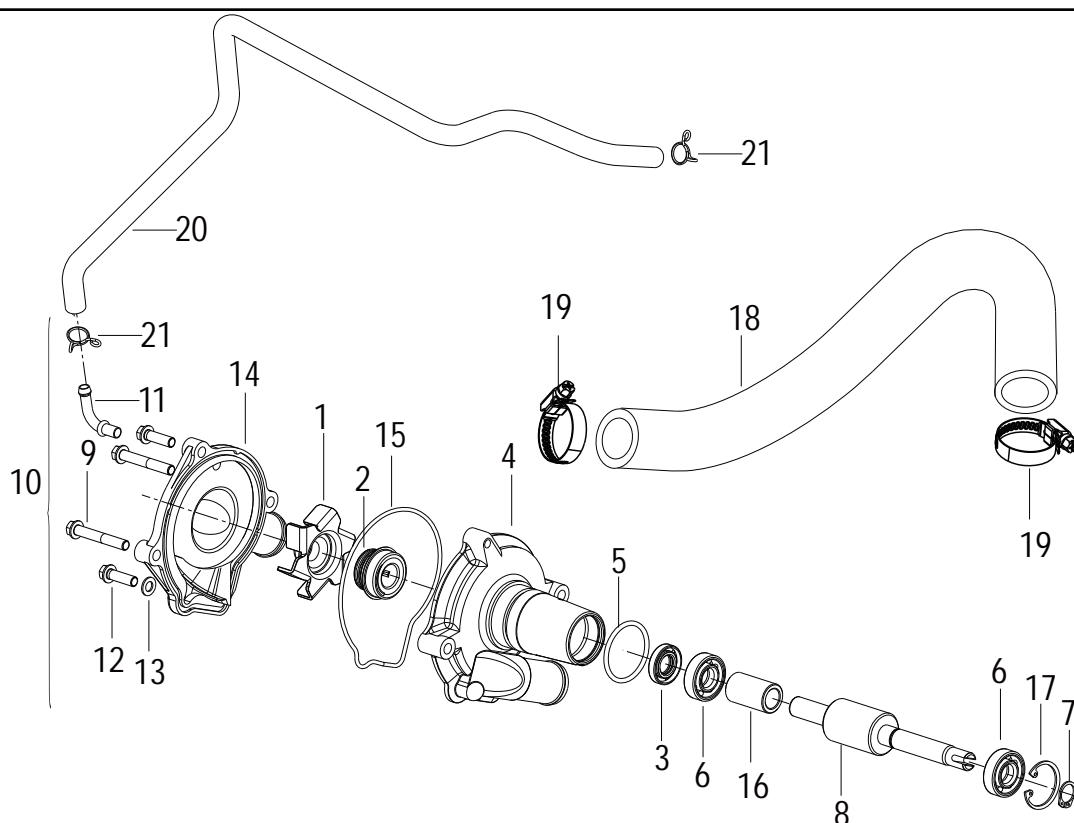
RADIATOR12

 DISASSEMBLE THE RADIATOR13

 RADIATOR INSTALLATION.....15



WATER PUMP



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	WATER PUMP IMPELLER					
2	SEALING RING					
3	OIL SEAL					
4	WATER PUMP COVER					
5	O-RING					
6	BEARING					
7	SEEGER RING					
8	WATER PUMP SHAFT					
9	SCREW					
10	COMPLETE WATER PUMP					
11	L-SHAPED JOINT					
12	SCREW					
13	WASHER					
14	WATER PUMP BODY					
15	SCREW					
16	BUSHING					
17	SEEGER RING					
18	SLEEVE					
19	SCREW CLIP					
20	PIPE					
21	SPRING					



WATER PUMP

WATER PUMP REMOVAL

Remove:

- **Gear lever**, see the section entitled "Gear lever installation" in Chapter 4
- the bands (19*) Fig. A
- the water inlet manifold (2) Fig. A
- the water return manifold (3) Fig. A
- the screws (9*) Fig. A

NOTE:

Drain out all coolant by taking out the screw (12*) before proceeding with removal operations, as shown in Fig. A.

- Take out all parts following the sequence shown in the exploded drawing, then check the entirety of each single part. If any of the parts should show signs of wear, replace.

IMPORTANT NOTICE

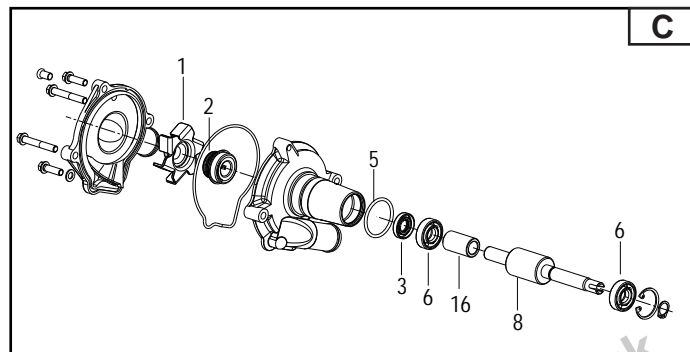
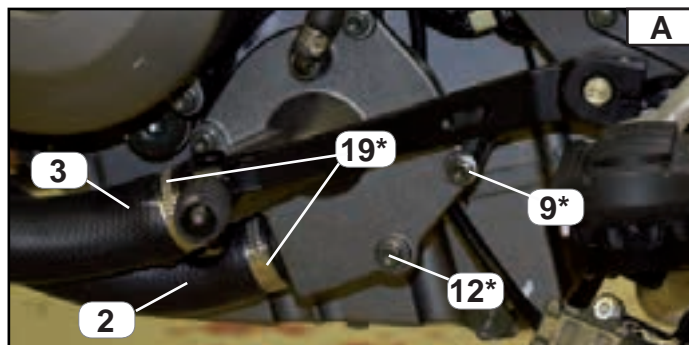
In case of faulty seals (2*), it is possible to notice leaks from the howl shown in Fig. B

NOTE:

Numbers marked (*) are part of the spare parts table in the Chapter entitled "Cooling Circuit", in the "radiator removal" section.

Check:

- Water pump impeller (1*) Fig. C
- sealing ring (2*) Fig. C
- O-ring (5*) Fig. C
- oil seal (3*) Fig. C
- bearing (6*) Fig. C
- bushing (16*) Fig. C
- water pump shaft (8*) Fig. C





WATER PUMP

WATER PUMP INSTALLATION

Install:

Proceed to assemble the pump, lubricating it with engine oil:

- the pump shaft (8*)
- the bushing (16*)
- the bearings (6*)

NOTE:

When inserting the pump, take care to ensure that the groove on the water pump shaft (8*) is facing in the direction shown in Fig. A.

**Install:**

- the screws (9) and tighten to the following torque:



Torque 12 N*m

Use Loctite thread locker to secure.



Loctite 242

THERMOSTAT

THERMOSTAT REMOVAL

Remove:

- **Right-side bodywork**, see the section in Chapter 4 entitled "front bodywork".
- screws (3) Fig. A
- thermostat (4) Fig. B

NOTE:

Drain out the coolant before proceeding with these operations.

Check:

- The by-pass port (A)
- If clogged, replace.

- Thermostat (4)

If this does not open at 75° ~ 90° C (167~ 194° F), replace, Fig. B.

Thermostat check

1. Immerse the thermostat in a container filled with water Fig. D.
2. Slowly heat the water.
3. Immerse a thermometer in the water.
4. Mix the water again, keeping an eye on the thermostat and on the temperature shown on the thermometer.
5. When the water reaches a temperature of 75°C, the thermostat valve will start to open, reaching a temperature of 90°C. The thermostat valve reaches an opening of 7 mm.

Key to Fig. D:

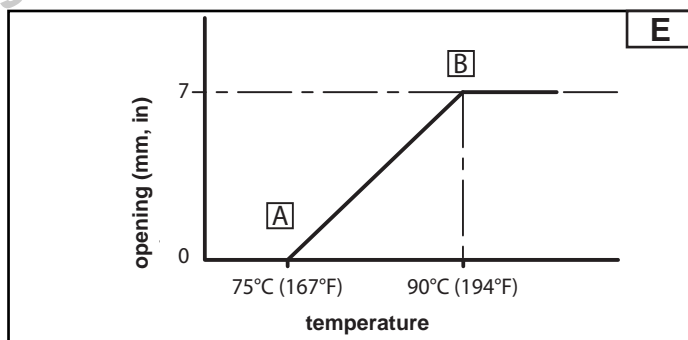
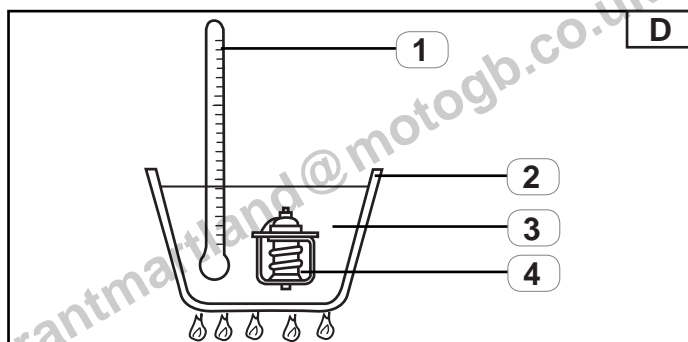
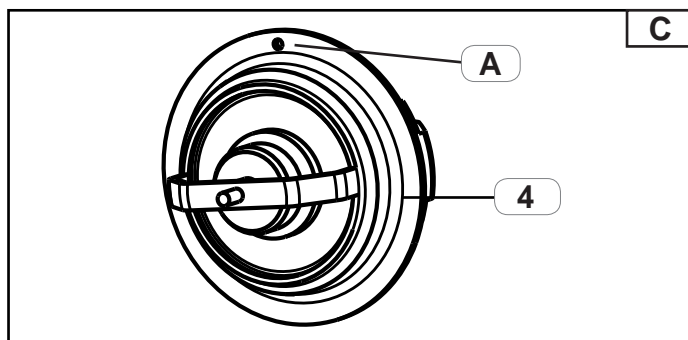
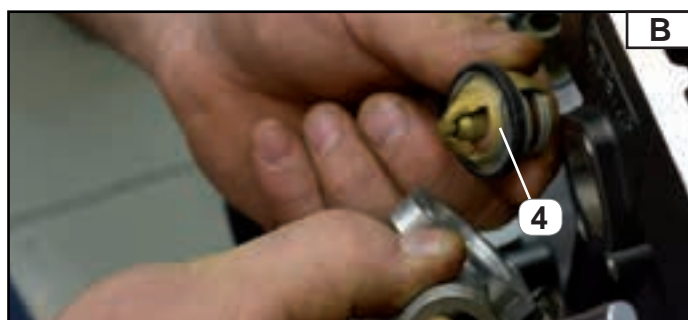
1. Thermometer
2. Container
3. Water
4. Thermostat

Thermostat opening/closure chart Fig. E

- A. Fully closed
B. Fully open

IMPORTANT NOTICE

If there are any doubts about the precision of the thermostat, it should be replaced. A faulty thermostat can cause notable over-heating or overcooling.





THERMOSTAT

THERMOSTAT INSTALLATION

Install:

- Install the thermostat so that the bypass port (A) is facing upwards.
- the screws (3) and tighten to the following torque:

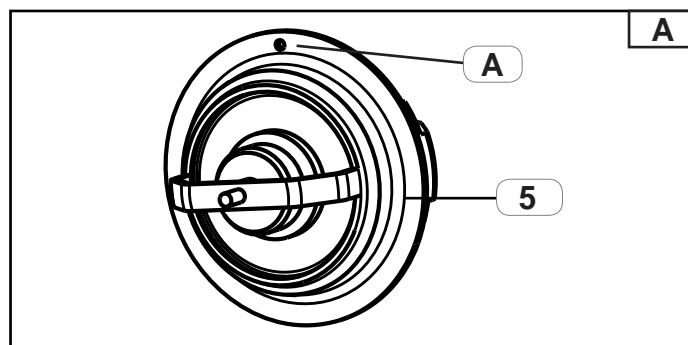


Torque 12 N*m

Use Loctite thread locker to secure the screws.



Loctite 242

**NOTE:**

Fill with coolant after completing these operations.



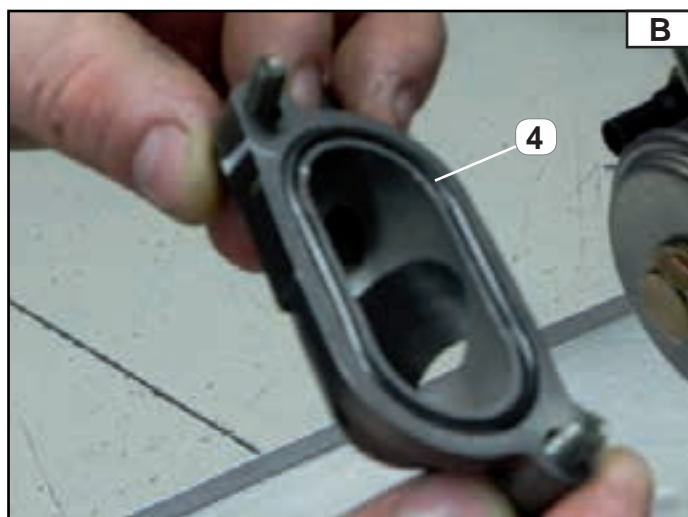
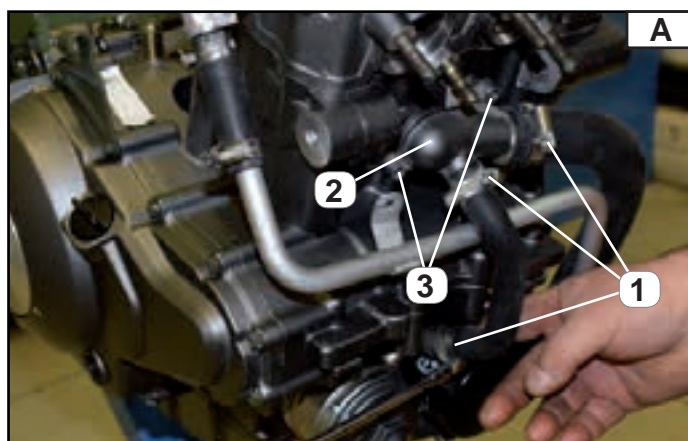
WATER MANIFOLD

WATER MANIFOLD REMOVAL

Remove:

- Coolant
- **Manifolds drain**, see the section entitled "Exhaust assembly removal" in Chapter 4.
- the bands (1) Fig. A
- the screws (3) Fig. A
- the water manifold (2) Fig. A
- the seal (4) Fig. B

If there is any damage/breakage, replace the above parts.





WATER MANIFOLD

WATER MANIFOLD INSTALLATION

Install:

Carry out the removal steps in reverse order

- the screws (3) and tighten to the following torque:

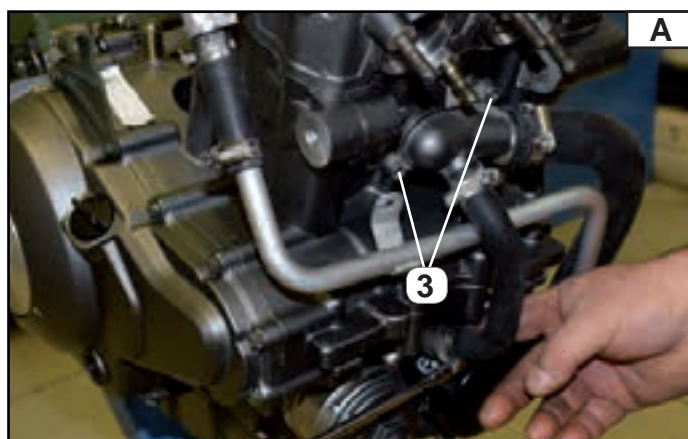


Torque 12 N*m

Use Loctite thread locker to secure the screws.



Loctite 242

**NOTE:**

Fill with coolant after completing these operations.

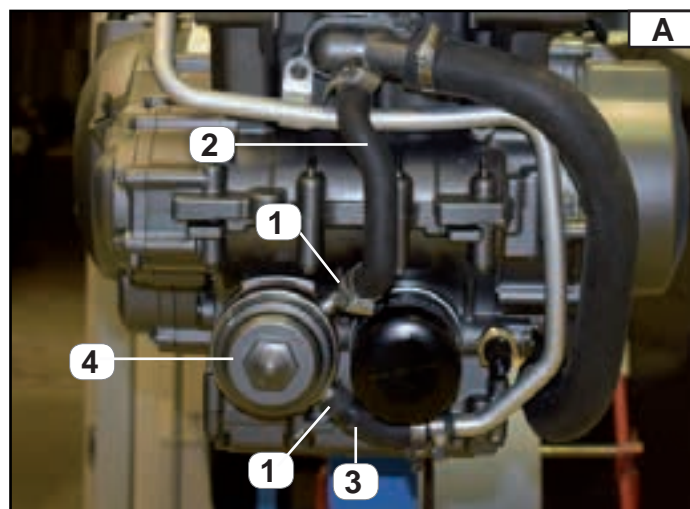


HEAT EXCHANGER

HEAT EXCHANGER REMOVAL

Remove:

- Coolant
- **Manifolds drain**, see the section entitled "Exhaust assembly removal" in Chapter 4.
- the bands (1) Fig. A
- the hose (2) Fig. A
- the hose (3) Fig. A
- the distributor cap (4) Fig. A-B
- the seal (6) Fig. B

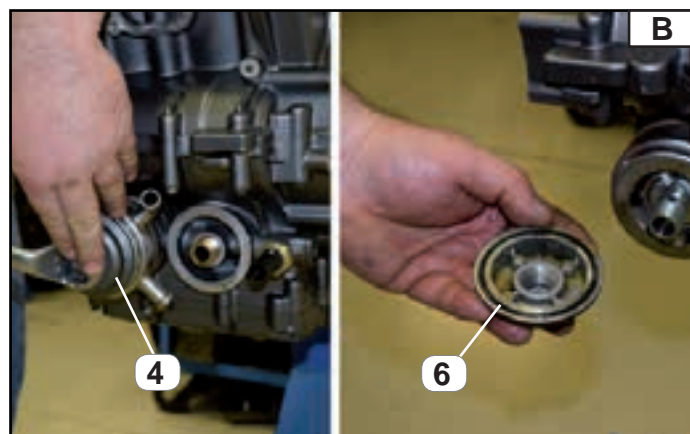


Check:

- (visually) for any build up or breaks on the distributor cap
- the seal (6) Fig. B

NOTE:

If any of the parts should show signs of damage/breakage, replace.

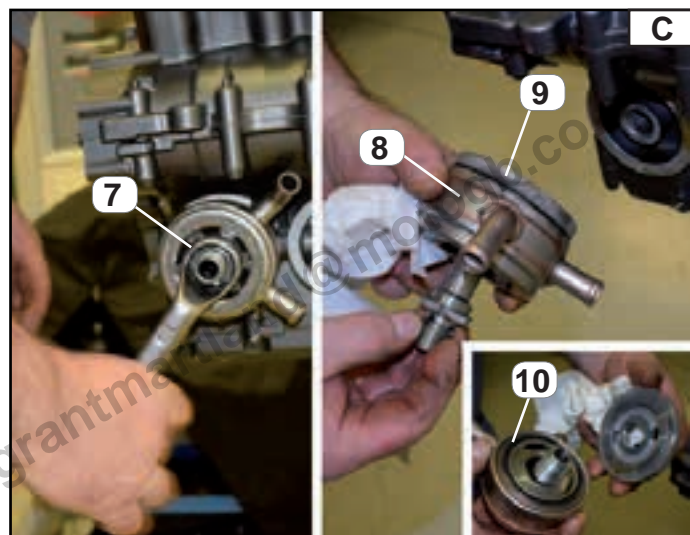


Remove:

- the special screw (7) Fig. C
- the distributor (8) Fig. C
- the fitting (9) Fig. C
- the seal (10) Fig. C

NOTE:

If any of the parts should show signs of damage/breakage, replace.





HEAT EXCHANGER

HEAT EXCHANGER INSTALLATION

Install:

Proceed to install the distributor following the removal steps in reverse order.

- the special screw (7) to the following torque:



Torque 60 N*m

- the distributor cap to the following torque:



Torque 25 N*m

NOTE:

If not worn, re-use the previously removed bands; otherwise, fit new ones.

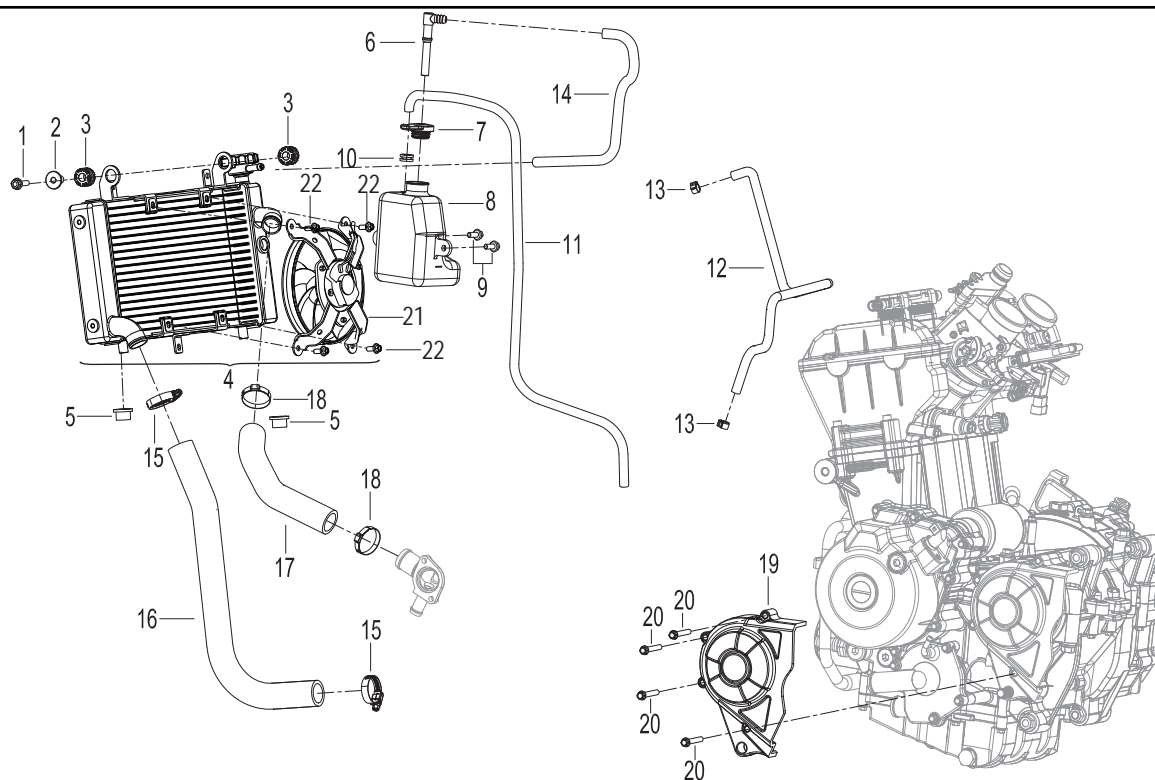
NOTE:

Fill with coolant after completing these operations.





RADIATOR



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SCREW					
2	BUSHING					
3	RUBBER TIP					
4	WATER RADIATOR					
5	BUSHING					
6	INTAKE HOSE					
7	WATER TANK CAP					
8	WATER TANK					
9	SCREW					
10	VIBRATION DAMPING RUBBER					
11	PIPE					
12	PIPE					
13	CLIP					
14	PIPE					
15	SCREW CLIP					
16	SLEEVE					
17	SLEEVE					
18	CLIP					
19	PINION COVER					
20	SCREW					
21	ELECTRIC FAN					



RADIATOR

DISASSEMBLE THE RADIATOR

Remove:

- **Side bodywork**, see the section in Chapter 4 entitled "front bodywork".

NOTE:

Drain out all coolant by taking out the screw (12*) before proceeding with removal operations, as shown in Fig. A.

- the bands (19*) Fig. A
- water inlet manifold (2) Fig. A
- water return manifold (3) Fig. A
- screws (9*) Fig. A

NOTE:

To make it easier to drain out coolant, it is necessary to open the radiator cap at the same time.

Remove:

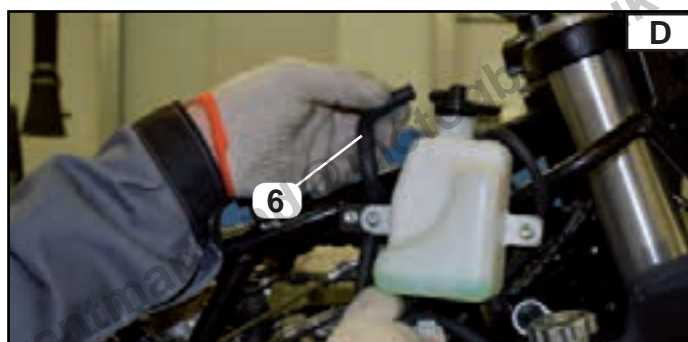
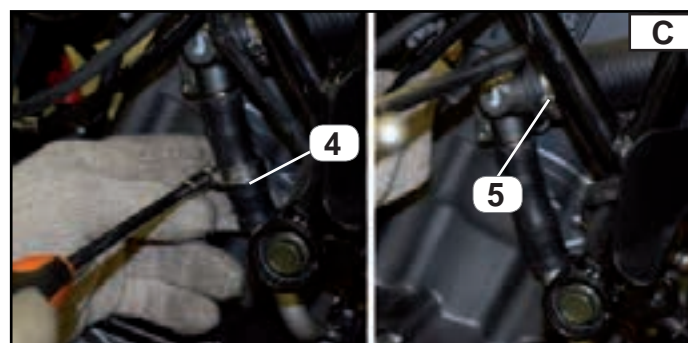
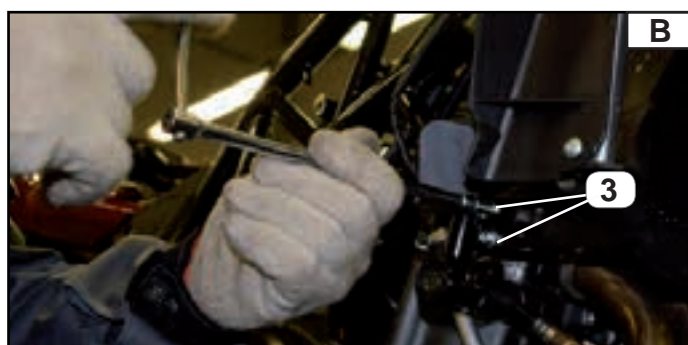
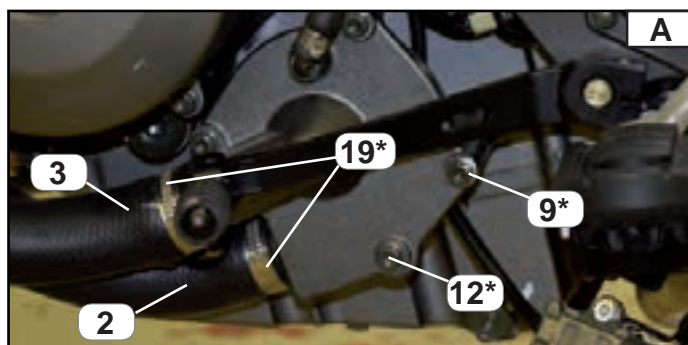
- the screws (3) fastening the radiator bracket to the frame. Fig. B
- the fastening screws on the opposite side.

- the fastening bands (4) and (5) Fig. C.

Disconnect

- the recirculation hose of the expansion tank (6) from the coolant expansion tank Fig. D

- The cooling fan connector (7) Fig. E





RADIATOR

DISASSEMBLE THE RADIATOR

Check:

- the radiator fins.

If clogged, clean.

Use a jet of compressed air on the back of the radiator.

NOTE:

Straighten any bent fins using a fine flathead screwdriver

Check:

- the radiator hoses.
- the radiator pipes.

If there is any cracking/damage, replace.

- the radiator fan

If there is any damage, replace.

In case of malfunction, check and repair.





RADIATOR

RADIATOR INSTALLATION

Install:

Once each individual part has been checked, proceed to install the radiator following the removal steps in reverse order.

- the screws to fasten the radiator to the bracket on the frame, tightening to the following torque:



Torque 10 N*m

- The bands must always be replaced once they have been opened.
- Once the parts have been assembled, connect the wiring to the radiator bulb and fan and proceed to fill the circuit, Fig. F

**NOTE:**

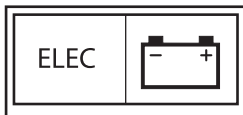
While filling, pinch the manifold close to the fluid inlet manifold in order to eliminate any air bubbles, Fig. F.





ELECTRICAL SYSTEM

SENSORS	3
DESCRIPTION OF THE ENGINE MANAGEMENT SYSTEM	3
COOLANT TEMPERATURE SENSOR	4
GEAR POSITION SENSOR	5
PHASE SENSOR	6
AIR TEMPERATURE SENSOR	7
SIDE STAND SWITCH	8
LAMBDA PROBE	9
OIL PRESSURE SENSOR	10
FRONT BRAKE MICROSWITCH	11
IDROSTOP	12
CLUTCH SWITCH	13
MAP SENSOR (MANIFOLD ABSOLUTE PRESSURE)	14
POSITION SENSOR OF THE THROTTLE BODY UNIT (POTENTIOMETER)	15
DEVICES	16
DEVICES POSITION	16
RIGHT ELECTRIC DEVICE	17
STARTING RELAY (REMOTE CONTROL SWITCH)	18
HORN	19
INSTRUMENTATION DASHBOARD	20
MASTER SWITCH	21
VOLTAGE REGULATOR	22
LEFT ELECTRIC DEVICE	23
CONVERTER OF CAN BUS SIGNALS	24
INJECTION ECU	25
INJECTION ECU CONNECTIONS	27
INDICATOR LIGHT INTERMITTENCE	28
ABS BUTTON	29
SERVICES RELAY	30
STATOR	31
ACTUATORS	32
POSITION OF ACTUATORS	32
IDLE AIR CONTROL SYSTEM (STEPPER)	33
INJECTORS	34
IGNITION COILS	35
COOLING FAN	36
FUEL PUMP	37
FUEL LEVEL SENSOR	38
STARTER	39
STARTER	40
ABS ECU	41
BATTERY	44
VEHICLE BATTERY	44
BATTERY EFFICIENCY CONTROL	45
DIAGNOSTICS	46
VEHICLE DIAGNOSTICS	46
ELECTRICAL SYSTEM	47
WIRING DIAGRAM OF TRK502 ELECTRICAL SYSTEM	47
COLOUR KEY	48



SENSORS

DESCRIPTION OF THE ENGINE MANAGEMENT SYSTEM

Each model is equipped with an electronic system of engine management featuring a control, which includes both starting and distribution of fuel.

The electronic control module (ECM) gets information from the sensors around the engine, the cooling/intake systems and calculate precisely the ignition advance and the need of fuel for all engine speeds/loads.

Furthermore, the system features hardware diagnostic functions in compliance with the provisions of the US State of California for on-board diagnostics.

In the event of a system failure, this function ensures that the type of fault and the engine data at the time of fault are stored in the ECM memory.

The stored data can be recovered by means of an apposite service equipment available at any Benelli's Dealer (see Texa instruction manual),

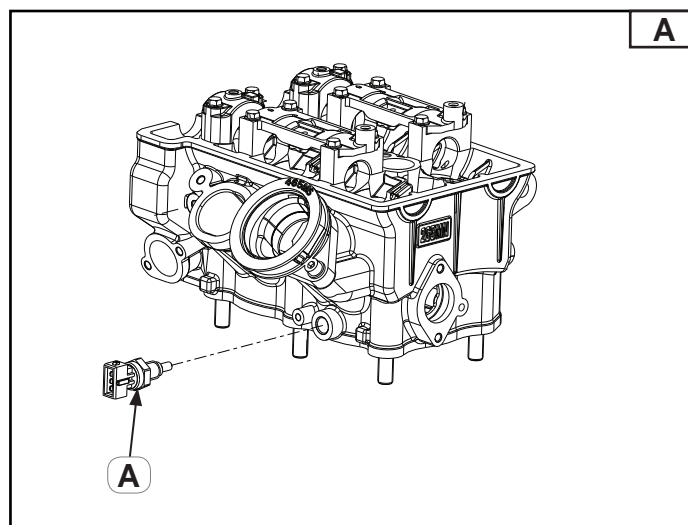
thus allowing a precise fault diagnostic and the immediate solving of the defect.



SENSORS

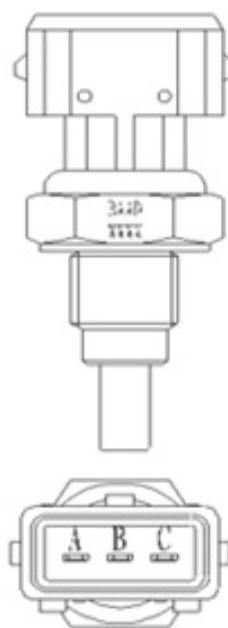
COOLANT TEMPERATURE SENSOR

It is situated close to the cylinder head (A), Fig. A, and calculates the information of temperature and coolant received from the ECM that are used to optimize the supply to all engine temperatures and to calculate the supply requirements in the heat and cold setting off.



CHECKLIST

Resistance (A-C)			Resistance (A-C)		
Temp	Res Ω	Tolerance	Temp	Res Ω	Tolerance
-40°C	100,865	$\pm 4.87\%$	70°C	469	$\pm 2.11\%$
-35°C	72,437	$\pm 4.64\%$	75°C	359	$\pm 2.07\%$
-30°C	52,594	$\pm 4.43\%$	80°C	334	$\pm 2.04\%$
-25°C	38,583	$\pm 4.21\%$	85°C*	283	$\pm 2.0\%$
-20°C	28,582	$\pm 4.0\%$	90°C	241.8	$\pm 2.1\%$
-15°C	21,371	$\pm 3.8\%$	95°C	207.1	$\pm 2.21\%$
-10°C	16,120	$\pm 3.6\%$	100°C	178.0	$\pm 2.31\%$
-5°C	12,261	$\pm 3.4\%$	105°C	153.6	$\pm 2.42\%$
0°C	9,399	$\pm 3.21\%$	110°C	133.1	$\pm 2.52\%$
5°C	7,263	$\pm 3.06\%$	115°C	115.7	$\pm 2.61\%$
10°C	5,658	$\pm 2.92\%$	120°C	100.9	$\pm 2.68\%$
15°C	4,441	$\pm 2.78\%$	125°C	88.3	$\pm 2.75\%$
20°C	3,511	$\pm 2.64\%$	130°C	77.5	$\pm 2.8\%$
25°C*	2,795	$\pm 2.5\%$	135°C	68.3	$\pm 2.84\%$
30°C	2,240	$\pm 2.45\%$	140°C	60.3	$\pm 2.87\%$
35°C	1,806	$\pm 2.4\%$	145°C	53.4	$\pm 2.89\%$
40°C	1,465	$\pm 2.36\%$	150°C	47.5	$\pm 2.9\%$
45°C	1,195	$\pm 2.31\%$			
50°C	980	$\pm 2.27\%$			
55°C	809	$\pm 2.23\%$			
60°C	671	$\pm 2.19\%$			
65°C	559	$\pm 2.15\%$			



Resistance(B-Sensor shell)	
Temp	Resistance Ω
50°C*	205-231
70°C	93.5-113.1
90°C	45.5-54.95
110°C*	22.86-26.84
115°C	19.19-22.31
118°C	19.35-22.05
125°C	13.85-16.05

SENSORS

GEAR POSITION SENSOR

It is situated on the left side of the engine, close to the pinion, and detects the position of the gear.

Disconnect:

- The electrical coupling.

Remove:

- The gear position sensor from the half casing.

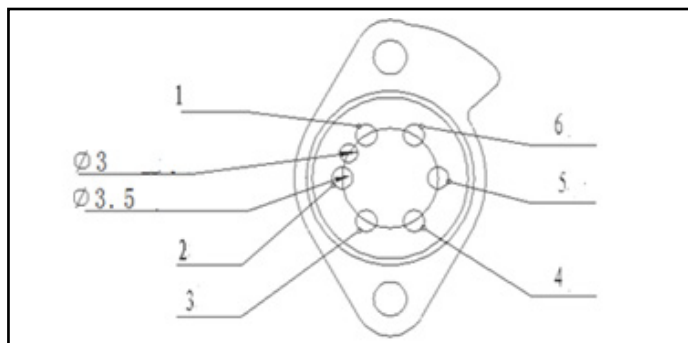
Check:

- The continuity.

Ø 3: Neutral

Ø 3.5: Grey for Neutral

1. brown/yellow first gear
2. green/black second gear
3. green/blue third gear
4. yellow/blue fourth gear
5. brown/red fifth gear
6. yellow/red sixth gear





SENSORS

PHASE SENSOR

It is situated close to the left engine casing (1), Fig. A.

The position sensor of the crankshaft shows the movement of a sprocket fixed to the right end of the drive shaft by reading a particular wheel consisting of 28 equidistant teeth near to a triple length space.

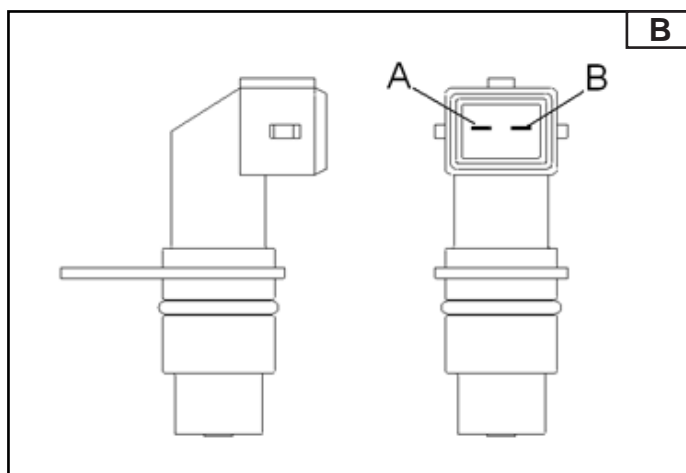
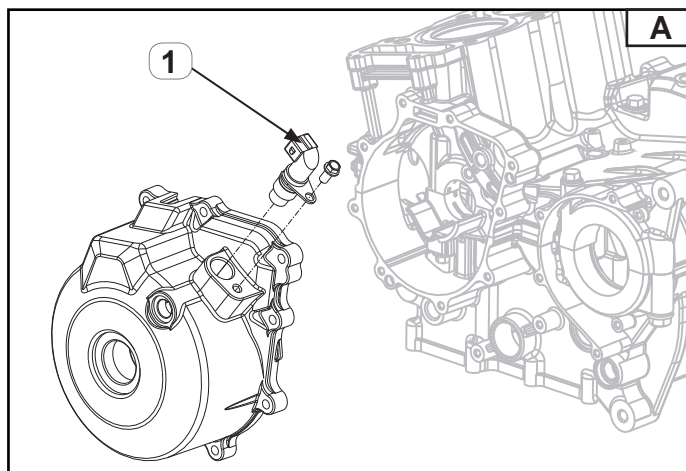
The interpretation of such reading is used by the ECM to fix the position of the drive shaft in relation to the point in which fuel is injected and to the requirements of fuel ignition.

Disconnect:

- The main wiring connector.

Measure:

- The resistance value at points A and B of engine (Fig. B).



Standard	550± 50 Ω (20°C)
NOTE: If the measured resistance is lower than the stipulated value, the inner coil might be an open circuit or short-circuited, therefore it is necessary to replace it.	

NOTE:

If the measured resistance is lower than the stipulated value, the inner coil might be an open circuit or short-circuited, therefore it is necessary to replace it.



SENSORS

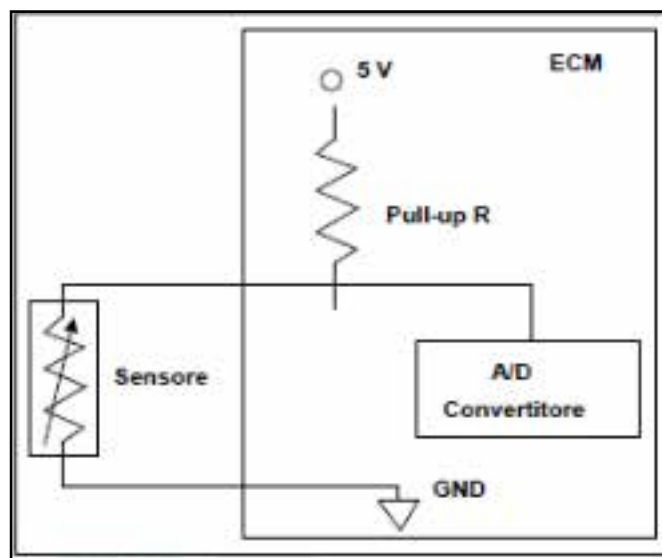
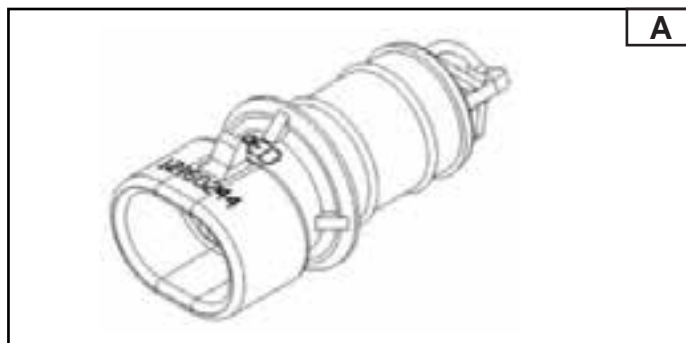
AIR TEMPERATURE SENSOR

Working principle of intake air temperature sensor

Within the sensor temperature range, the resistance varies according to the various temperature. It is distinguished by the negative temperature coefficient resistor. It is a part that can not be maintained.

Appearance of intake air temperature sensor (see Fig. A):

Measured temperature (°C)	Resistance value (Ω)
0	9.399
5	7.263
10	5.658
15	4.441
20	3.511
25	2.795
30	2.240





SENSORS

SIDE STAND SWITCH

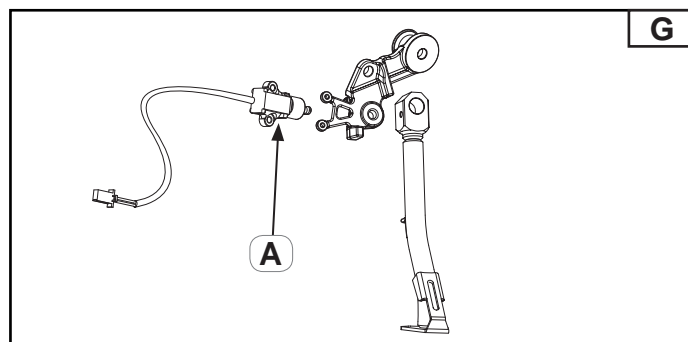
It is situated near the supporting plate of the side stand (A), Fig. G.

If the gear is engaged and the stand is open, and therefore the circuit is open, the ECU prevents starting or shuts off the engine (if rotating).

Check:

- The continuity using the multitester.

STAND	PIN 1	PIN 2
Raised		
Lowered		



NOTE:

When the above conditions are fulfilled, the sensor is working, otherwise replace the part.



SENSORS

LAMBDA PROBE

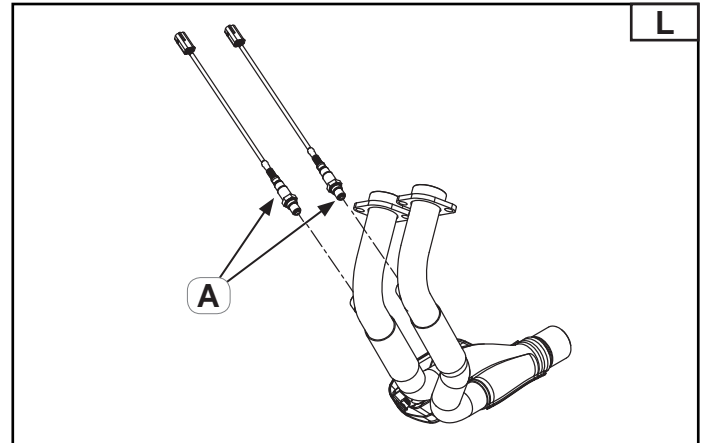
They are situated on the exhaust manifold (A), Fig. L.

The lambda probe serves to detect the oxygen concentration in the exhaust gases. More precisely, the lambda value indicates the air/petrol ratio, in which:

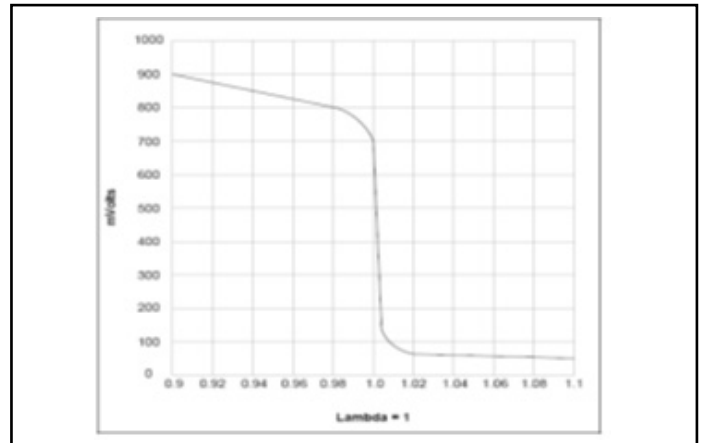
- Value 1, when combustion is stoichiometric
- <1 , in case of fuel excess
- <1 , in case of air excess

The probe transmits the electric signal to the ECU, which controls the insertion of fuel and air into the combustion chamber.

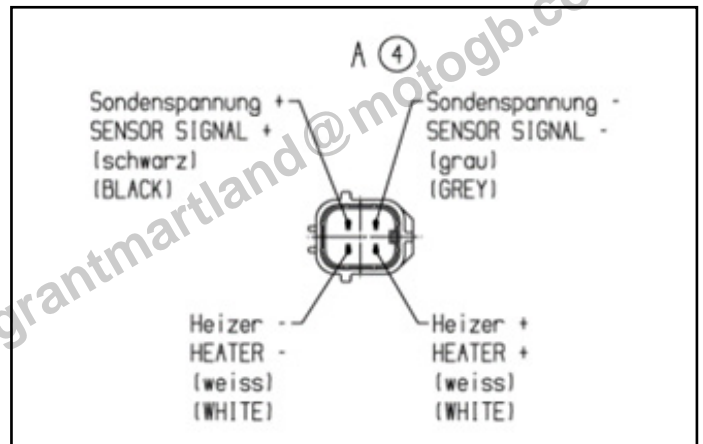
- Threshold value of air-fuel ratio: >750 mVcc
- Dilute threshold of air-fuel ratio: >120 mVcc
- Heating power of lambda probe: 7.0 W
- 450°C exhausted gas temperature, 70% duty ratio, 10Hz, 13.5V voltage.
- Heating power: $9.6 \pm 1.5\Omega$ (measured at 21°C)
- Operating temperature range: $260\text{--}850^{\circ}\text{C}$



CHARACTERISTIC OPERATING CURVE



COUPLER





SENSORS

OIL PRESSURE SENSOR

It is situated on the lower half casing and measures oil pressure in the bushing gallery (A), Fig. M.

It indicates the presence of sufficient oil pressure to the dashboard.

Disconnect:

- The electrical coupling.

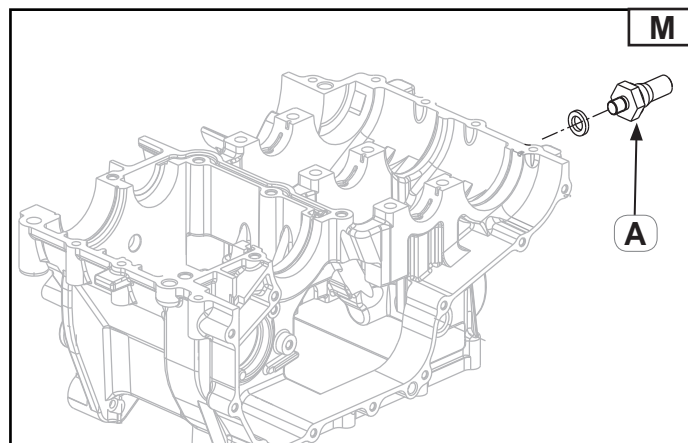
Remove:

- The oil pressure sensor

from the half casing.

Check:

- The continuity between the PIN1 and the sensor ground by means of an air pressure regulator with insertion on the detection hole.
- Set the air pressure regulator at 2 bar.
- Reduce pressure gradually to reach 0.2 - 0.3 bar.



Continuity between PIN1 and ground	0.2 - 0.3 bar
------------------------------------	---------------

NOTE:

If there is no continuity between PIN1 and engine ground, replace the part.

SENSORS





FRONT BRAKE MICROSWITCH

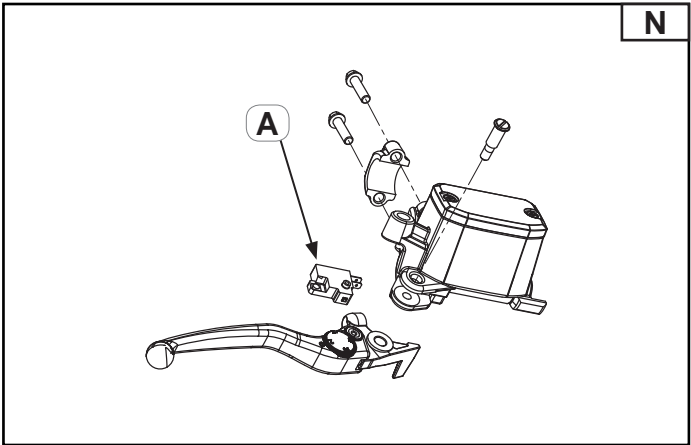
It is a switch in contact with the brake lever, situated on the front brake pump, which serves to switch on the stop lights (A), Fig. N.

Check:

- The continuity

by positioning the multitester on the symbol $\rightarrow|$ - (function diode/continuity test) to check operation, as shown in the table.

SENSOR	PIN 1	PIN 2
Brake lever Pulled		
Brake lever Released		



NOTE:

When the above conditions are fulfilled, the front brake sensor is working properly, otherwise replace the part.



SENSORS

IDROSTOP

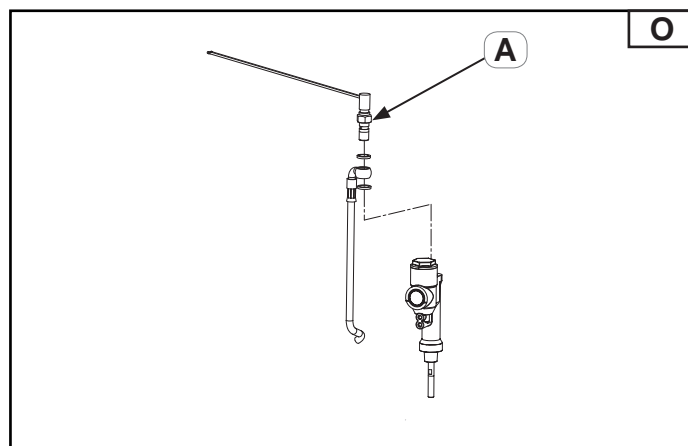
It is a switch situated on the rear brake pump, which reads the oil pressure exerted on the pump.

It serves to switch the stop lights on (A), Fig. O.

Check:

- The continuity by positioning the multitester on PIN 1 and PIN 2 and checking the table.

BRAKE	PIN 1	PIN 2
Pulled	●	●
Released	●	●



NOTE:

When the above conditions are fulfilled, the front brake sensor is working properly, otherwise replace the part.

SENSORS

CLUTCH SWITCH

It is situated on the clutch lever and serves to prevent the engine from starting before the lever is completely pulled (A) Fig. P.

Disconnect:

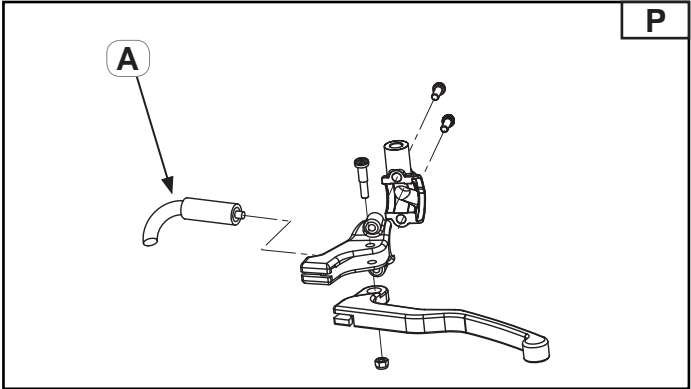
- The clutch switch cables.

Use:

- The tester and check the clutch switch pins referring to the table.

CLUTCH	PIN 1	PIN 2
Pulled	<div><div></div><div></div></div>	<div><div></div><div></div></div>
Released	<div><div></div><div></div></div>	<div><div></div><div></div></div>

NOTE:
When the above conditions are fulfilled, the front brake sensor is working properly, otherwise replace the part.

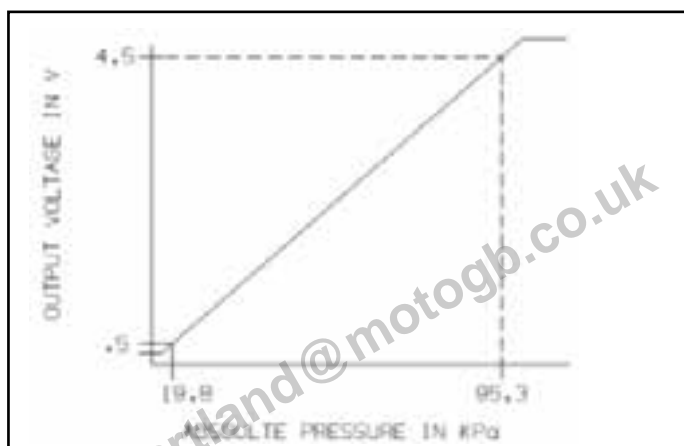
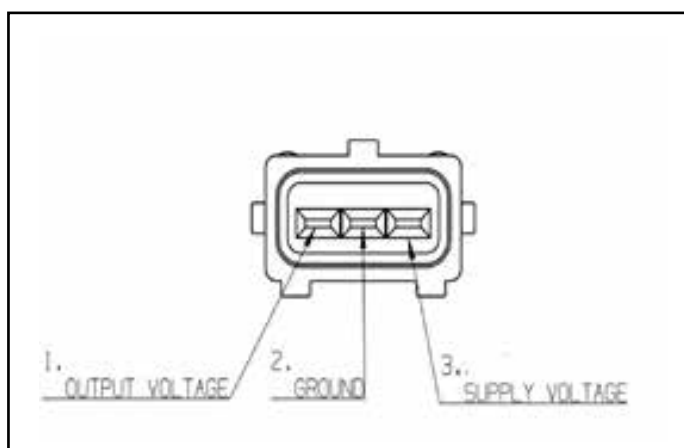
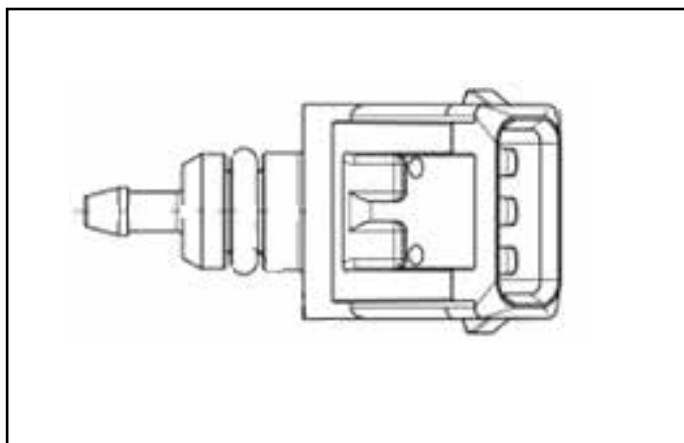




SENSORS

MAP SENSOR (MANIFOLD ABSOLUTE PRESSURE)

It is situated close to the throttle body and serves to detect the absolute pressure on the intake manifold. It reflects the size of inlet pressure, which can be converted to air intake volume accessing the combustion chamber of the engine.



SENSORS

POSITION SENSOR OF THE THROTTLE BODY UNIT (POTENTIOMETER)

It is situated on the right end of the shaft of the throttle body unit.

The position sensor of the throttle body unit (potentiometer), controlled and supplied directly by the ECM, gives out a signal, which identifies the throttle opening position used by the ECM to determine fuel dosage and ignition advance (A), Fig. Q.

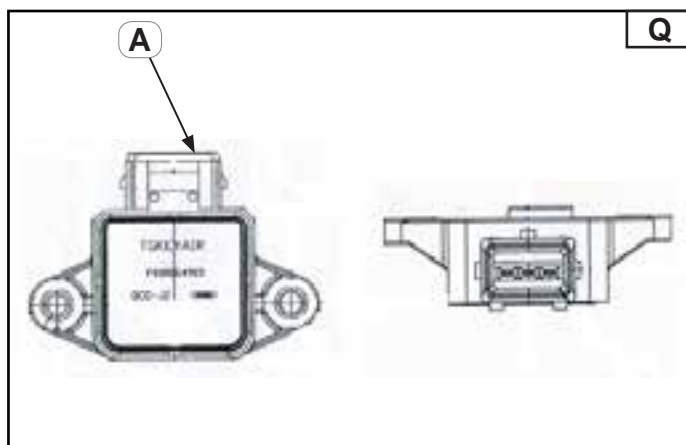
Disconnect:

- The electrical coupling.

Check:

- The resistance using the multitester on symbol Ω between pin 1 and pin 2.

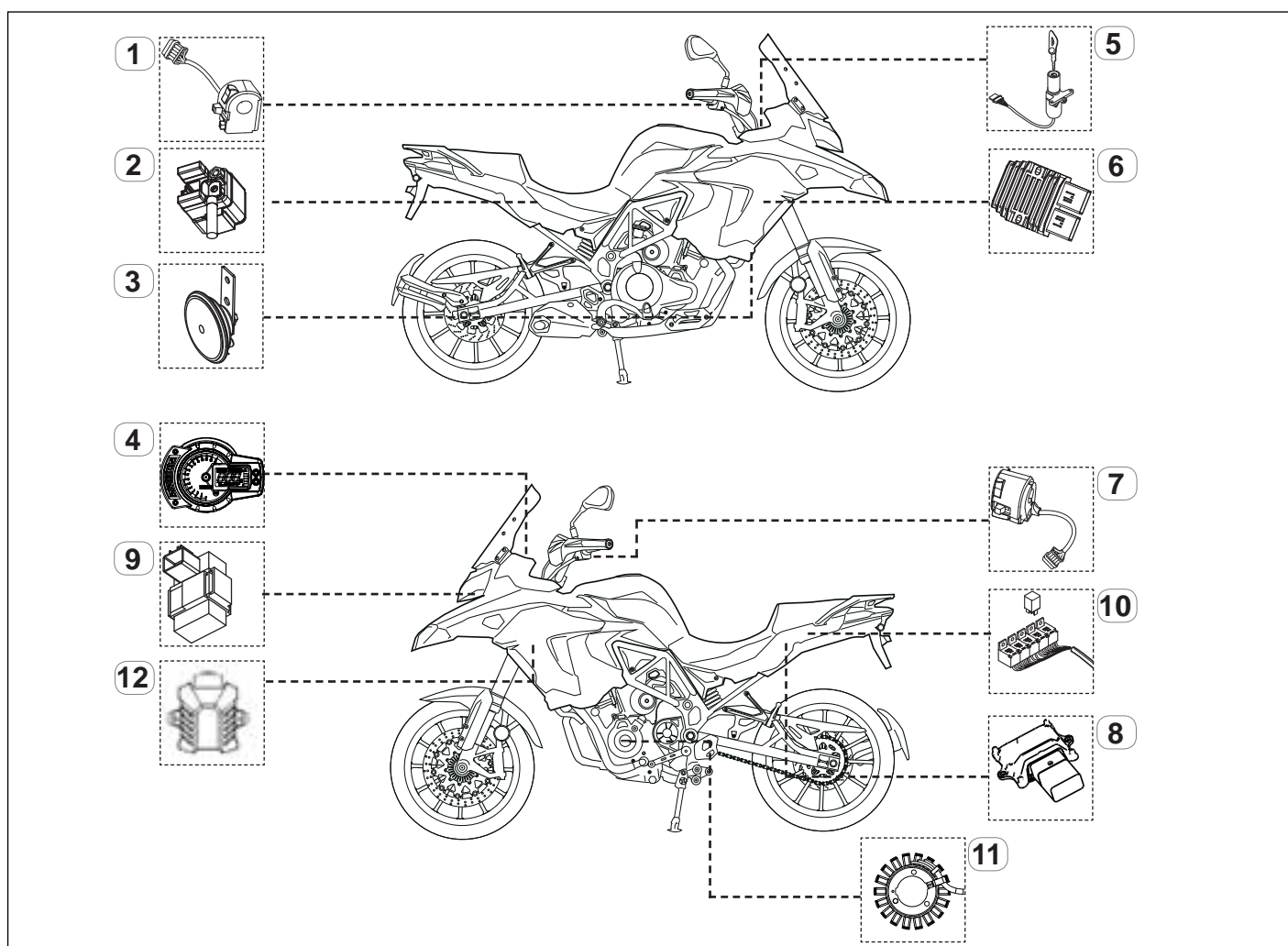
TOTAL RESISTANCE	2K $\Omega \pm 20\%$
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DEVICES

DEVICES POSITION



Position	Device
1	RIGHT ELECTRIC DEVICE
2	STARTING RELAY
3	HORN
4	INSTRUMENTATION
5	IGNITION SWITCH
6	REGULATOR
7	LEFT ELECTRIC DEVICE
8	INJECTION ECU
9	LIGHT CONTROL RELAY
10	SERVICES RELAY
11	STATOR
12	CONVERTER OF CAN BUS SIGNALS

DEVICES

RIGHT ELECTRIC DEVICE

It is situated on the right side of the handlebar Fig. 1. The right electric device consists of:

- **RUN/OFF button (A)**
it serves to break contact to the electric device in case of emergency.
- **Ignition button (C)**
it serves to start the engine.
- **Hazard lights switch (B)**
it serves to activate the hazard lights in case of emergency.

Check:

- The continuity
by positioning the multitester on RUN/OFF button located on ON.

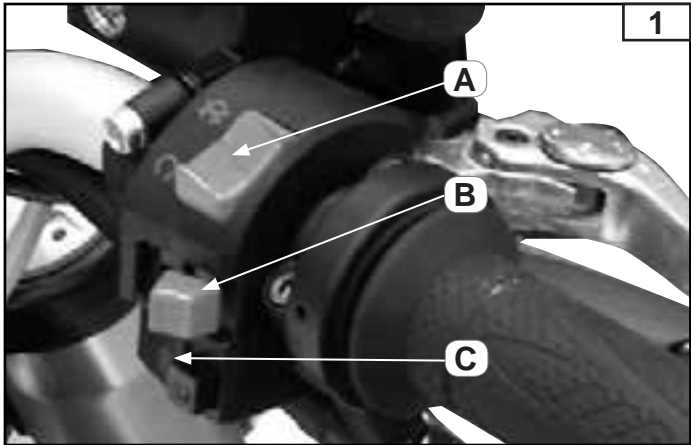
Check:











- The continuity
by positioning the multitester on the ignition button pressed on ON.

Check:

- The continuity
by positioning the multitester on the hazard lights switch located on ON.

Refer to the table.



	AR/BL	AR/GR	N	R	MR/GR	VE/GL
						
						
						
						
	1L		1R	2R		2L



DEVICES

STARTING RELAY (REMOTE CONTROL SWITCH)

It is situated close to the fuse block and breaks power contact on the starter (1) Fig. A.

Apply:

- 12 volt to terminals (2) and (3) Fig. B

Check:

- The continuity between power terminals.
- In presence of continuity, the starter relay works properly.

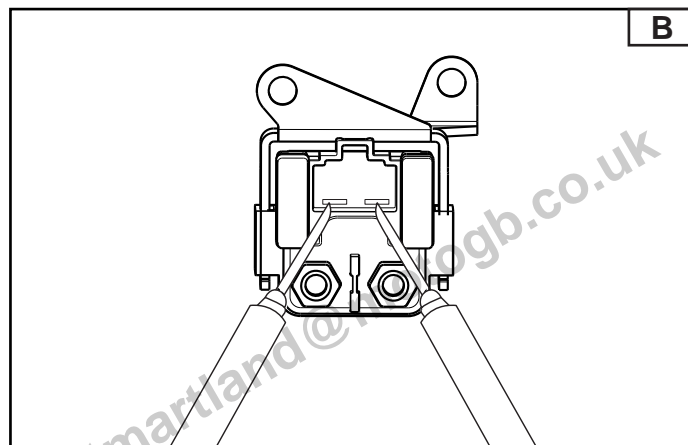
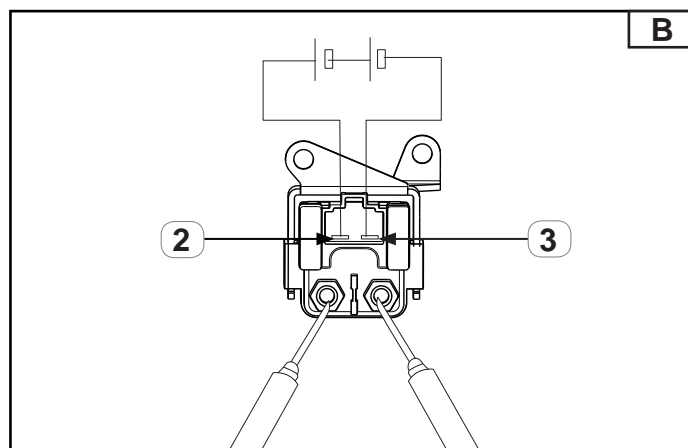
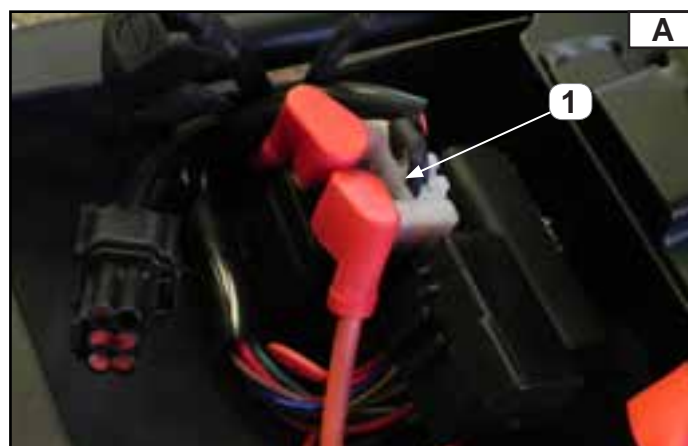
WARNING

Do not apply the battery voltage to the starter relay for more than 5 seconds to prevent overheating and damages to winding.

Check:

- If the winding Fig. B.
- is "open" or "grounded" and if there is resistance.
The winding is in good working order if the resistance is:

Starting relay resistance	3 - 6 Ω
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DEVICES

HORN

It is situated on the left side of the frame close to the radiator (1)
Fig. A.

The horn is an electromechanical device, which serves as an acoustic warning device.

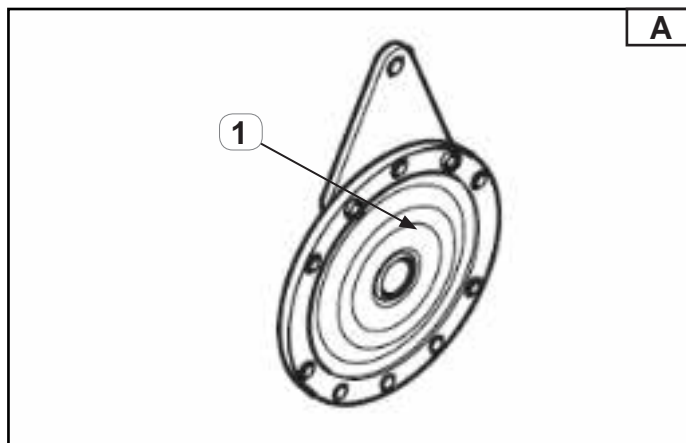
Connect:

- PIN1 and PIN2 to the battery and check.

Check:

- After the external horn being connected to rechargeable battery, if there is any sound, it refers to normal operation.

Resistance value:	3.2 Ω
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DEVICES

INSTRUMENTATION DASHBOARD

It is situated on the headlight instrumentation support frame.

The instrumentation provides all information concerning the motorcycle operation to the driver:

INDICATOR LIGHTS:

- high beam light
- left indicator light
- right indicator light
- neutral position indicator light
- injection fault indicator light
- ABS light
- oil pressure warning light

COOLANT TEMPERATURE GAUGE

- It indicates the coolant temperature.

TACHOMETER

- It indicates the number of revolutions per minute of the engine.

SPEED

- It indicates the vehicle speed in km or miles.

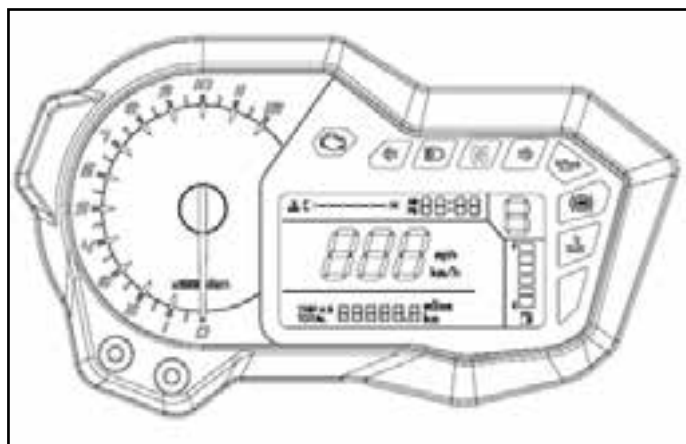
TRIP

- It indicates the distance travelled from the reset.

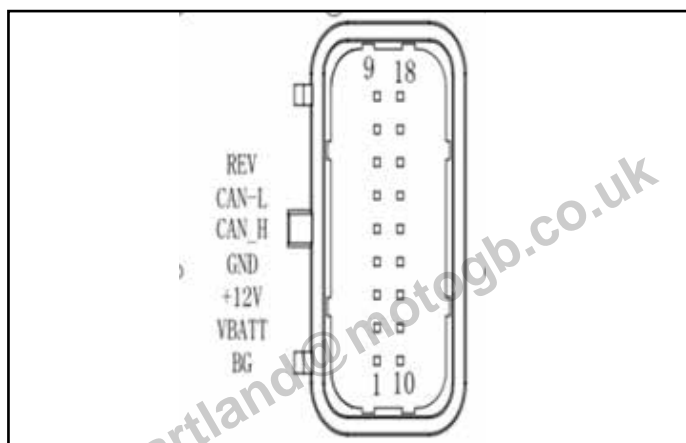
TOTAL

- It indicates the total distance travelled.

Pin-out (see table)



NO.	Function	Symbol	Color
1	Back light		Pointer RED Dial WHITE
2	Battery power		12 V
3	Ignition switch		
4	Power GND		
5	CAN high		
6	CAN low		
7	RPM Signal		
8			
9			



DEVICES

MASTER SWITCH

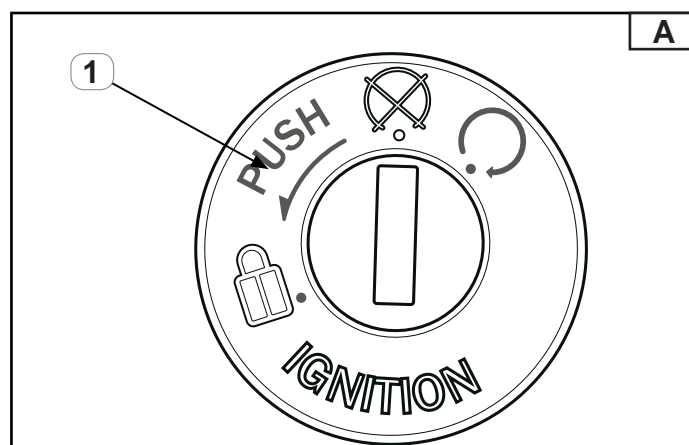
The ignition switch (1), Fig. A, is positioned behind the steering sleeve and serves to:

- Provide the main contact to the electrical system
- Close the steering block.
- Keep the parking lights on for all conditions required.

Check:

- The continuity using the multimeter and referring to the table.

COLOUR	V/G	R/B
PIN	PIN 1	PIN 2
Key ON	● ————— ●	
Key OFF		
Lock		



When the above conditions are fulfilled, the ignition switch is working properly, otherwise replace the part.

• Key in position “ON”

All electric circuits are activated, the instrumentation and the lights carry out the self-diagnostics. The engine can be started. The key cannot be removed.

• Key in position “OFF”

All electric circuits are deactivated, the key can be removed.

• Key in position “LOCK”

All electric circuits are deactivated and the steering is locked. The key can be removed.

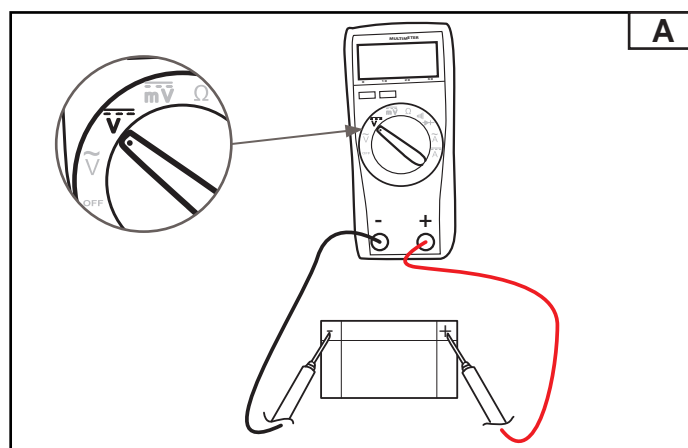
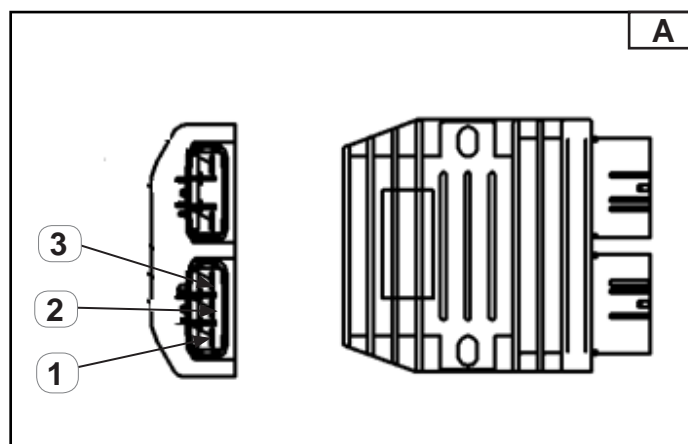


DEVICES

VOLTAGE REGULATOR

It is situated on the left side of the vehicle close to the water radiator and allows balancing of electrical consumption via the battery recharge (A), Fig. 6.

1. Multimeter selection: diode test.
2. Connect the black probe to the red line terminal of voltage regulator. Connect the red probe to the white line terminal of voltage regulator (white 1, white 2 and white 3). The pointer shows a certain value (value range 0.1~0.5V) indicating the need of replacing the regulator.
3. Connect the red probe to the red line terminal of voltage regulator port. Connect the black probe to the white line terminal of voltage regulator (white 1, white 2 and white 3). The pointer shows a certain value (value range 0.3~0.8V) indicating the need of replacing the regulator.

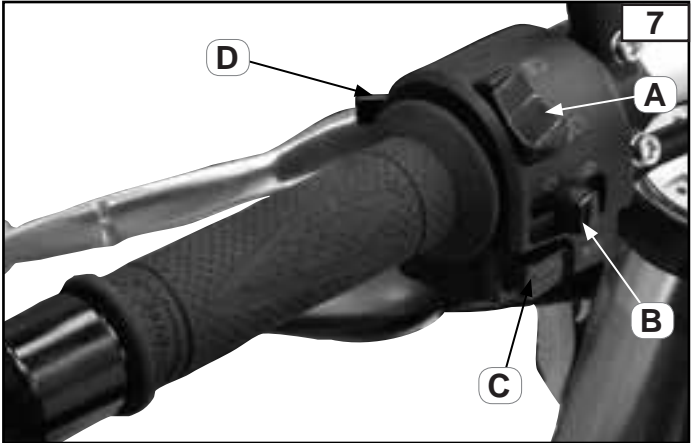


DEVICES

LEFT ELECTRIC DEVICE

It is situated on the left side of the handlebar Fig. 7. The left electric device consists of:

- **Light switch control (A)**
for switching-over the high/low beam.
- **Indicator lights control (B)**
by moving the control to the right or to the left, the relevant indicator lights are activated.
The returns to the centre. Press to deactivate the indicator lights.
- **Horn switch button (C)**
press to activate the horn.
- **High beam flash button (D)**
It is used to signal the presence in conditions of poor visibility.



Check:

- The continuity using the multitester positioned on the relevant terminals with the button pressed.

Check:

- The continuity
by positioning the multitester on the relevant terminals with the button pressed.

Check:

- The continuity
using the multitester positioned on the relevant terminals according to selection (left/right).

Check:

- The continuity
using the multitester positioned on the relevant terminals according to selection (how/low beam).

Refer to the table.

WIRE COLOURING	Red/Yel	Light Blue	Blue	Red/Whi	Gre/Bla	Oran	Gre/Whi	Red/Wh	Bro
Right indicator light						●	●		
Left indicator light					●	●			
High beam			●	●					
Low Beam	●	●							
High beam flash button	●		●						
Horn								●	●

When the above conditions are fulfilled, the horn, the light switching control, the high beam flash button are operating properly, otherwise replace the parts.

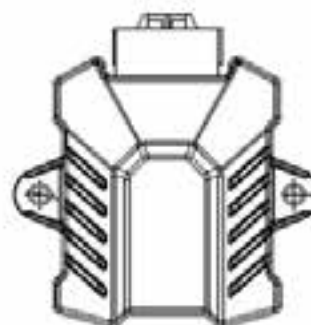


DEVICES

CONVERTER OF CAN BUS SIGNALS

It is situated on the left, front side of the vehicle and serves to collect and convert the digital/analogue signals into CAN-BUS for the instrument panel (Fig. A).

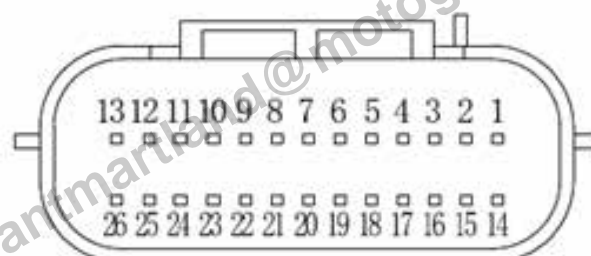
A



B

5th gear	14	1	6th gear
3rd gear	15	2	4th gear
1st gear	16	3	2nd gear
VCC	17	4	Neutral gear
GND	18	5	ABS-R Line
ECU-R line	19	6	CANL
Fuel level	20	7	CANH
Speed (ABS)	21	8	
MIL (ABS)	22	9	MIL (ECU)
Right turn	23	10	Left turn
Oil pressure (-)	24	11	High beam (+)
	25	12	
	26	13	

C

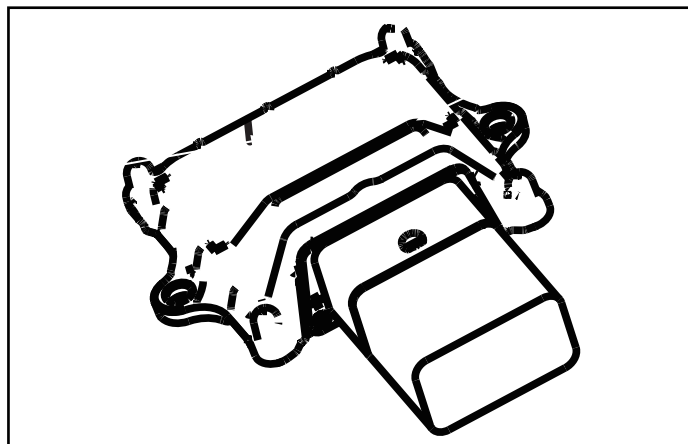




DEVICES

INJECTION ECU

Check the various utilities, situated close to the passenger's under-seat, according to the diagram below.
Hereunder is a table indicating the meaning corresponding to the error code detected.



ERROR TABLE	
Code error	Error description
48	1st lambda heater cylinder - open/short circ.
49	1st lambda heater cylinder - ground open/short circ.
50	1st lambda heater cylinder - positive open/short circ.
83	1st resistance lambda heater coil cylinder - abnormal value
54	2nd lambda heater cylinder - open/short circ.
55	2nd lambda heater cylinder - ground open/short circ.
56	2nd lambda heater cylinder - positive open/short circ.
89	2nd resistance lambda heater coil cylinder - abnormal value
261	MAP sensor - abnormal response (no variation)
262	MAP sensor - abnormal response (out of range values)
263	MAP sensor - abnormal circuit grounded
264	MAP sensor - abnormal circuit on positive
274	Air temperature sensor - output voltage too low
275	Air temperature sensor - output voltage too high
278	ECT (Engine coolant temperature) - abnormal response (out of range)
279	ECT (Engine coolant temperature) - abnormal response (too low voltage)
280	ECT (Engine coolant temperature) - abnormal response (too high voltage)
290	TPS - abnormal response (too low voltage)
291	TPS - abnormal response (too high voltage)
304	1st lambda sensor cylinder - abnormal value (out of range)
305	1st lambda sensor cylinder - abnormal value (too low voltage)
306	1st lambda sensor cylinder - abnormal value (too high voltage)
308	1st lambda sensor cylinder - open circuit
310	2nd lambda sensor cylinder - abnormal value (out of range)
311	2nd lambda sensor cylinder - abnormal value (too low voltage)
312	2nd lambda sensor cylinder - abnormal value (too high voltage)
320	2nd lambda sensor cylinder - open circuit
513	1st injector - open circuit
609	1st injector - short circuit to ground
610	1st injector - positive short circuit



DEVICES

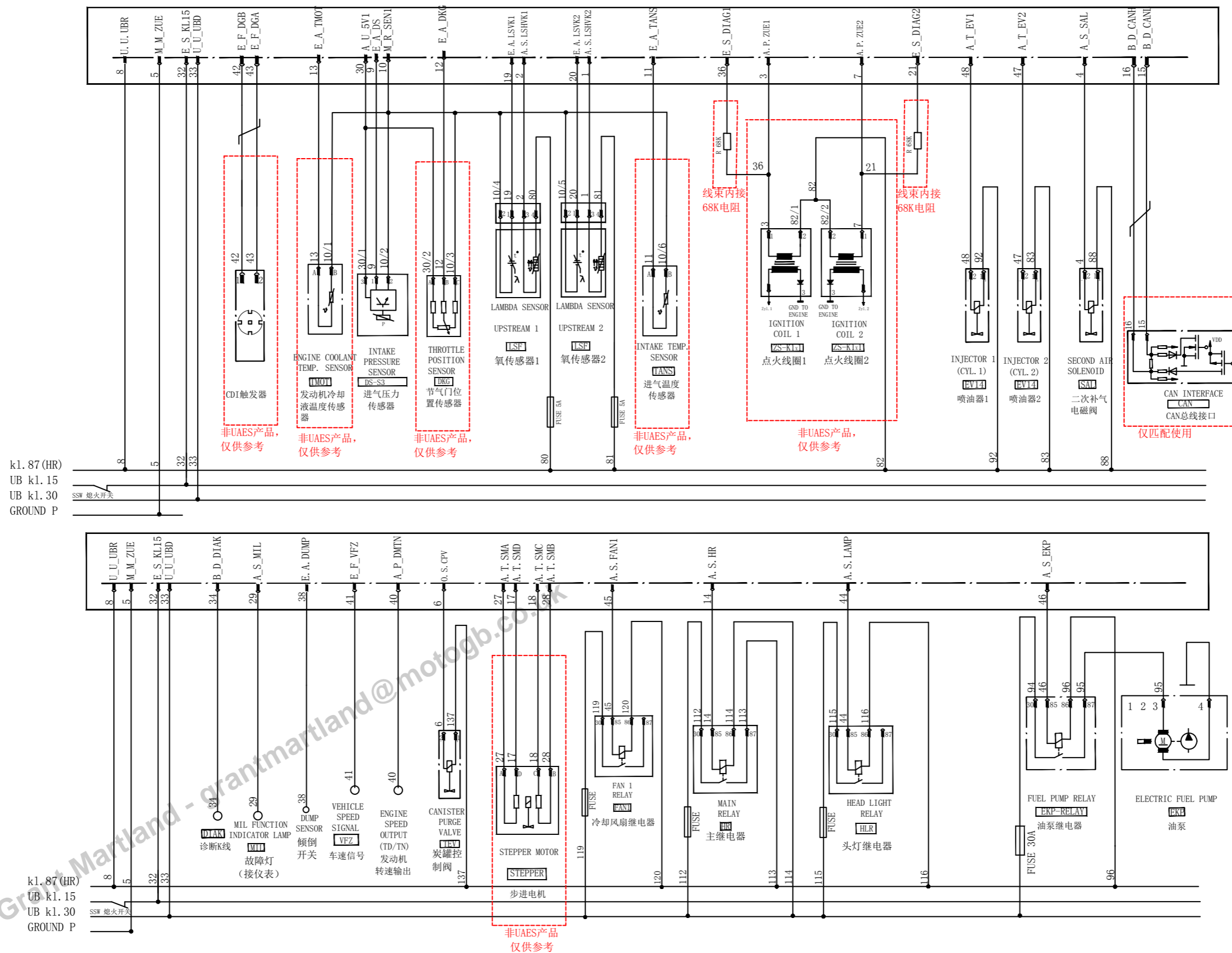
INJECTION ECU

ERROR TABLE	
Code error	Error description
514	2nd injector - open circuit
612	2nd injector - short circuit to ground
613	2nd injector - positive short circuit
801	Drive shaft position sensor - failure (out of range)
802	Drive shaft position sensor - failure (open circuit)
1092	Vapour exhaust checking valve - open circuit
1112	Vapour exhaust checking valve - too low circuit voltage
1113	Vapour exhaust checking valve - too high circuit voltage
1281	Speed sensor - failure (out of range)
1286	High minimum speed target compared to the limit of air control system
1287	Low minimum speed target compared to the limit of air control system
1288	IAC (idle air control) - short circuit to ground
1289	IAC (idle air control) - positive short circuit
1297	IAC (idle air control) - open circuit
1376	Abnormal system voltage response (out of range)
1378	Too low system voltage
1379	Too high system voltage
1538	ECU map - coding error
1575	Fuel pump relay check - open circuit
1576	Fuel pump relay check - short circuit to ground
1577	Fuel pump relay check - positive short circuit
1616	Lamp circuit error - MIL indication
8567	Too high CLL value
8558	Too low CLL value
4375	Canister purge valve - positive short circuit
4374	Too high engine temperature
4375	Canister purge valve - short circuit to ground
4376	Canister purge valve - open circuit
1393	Brake switch - failure
4406	K line - open circuit



DEVICES

INJECTION ECU CONNECTIONS

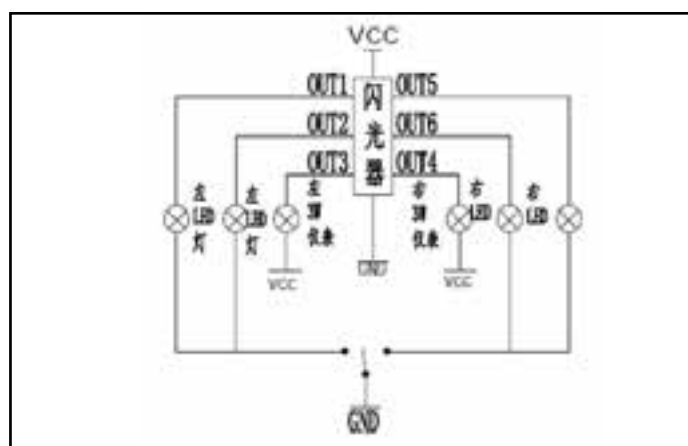
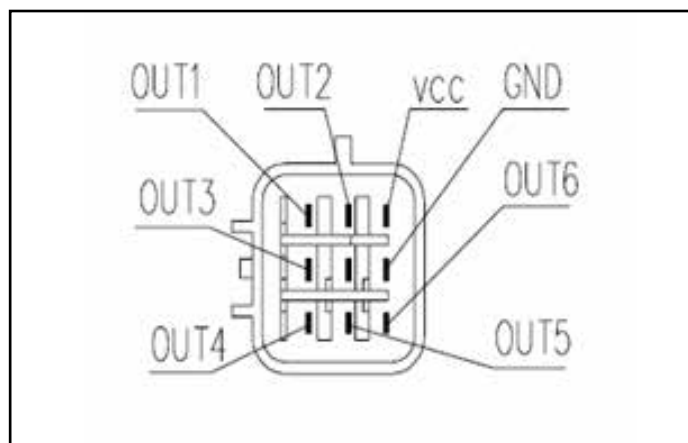




DEVICES

INDICATOR LIGHT INTERMITTENCE

It is situated inside the storage compartment, underneath the vehicle seat, and allows to control the indicator flashers.



DEVICES

ABS BUTTON

It is situated on the left side of the control handlebar (3), Fig. A, and allows to manage the insertion/release of ABS control.

Disconnect:

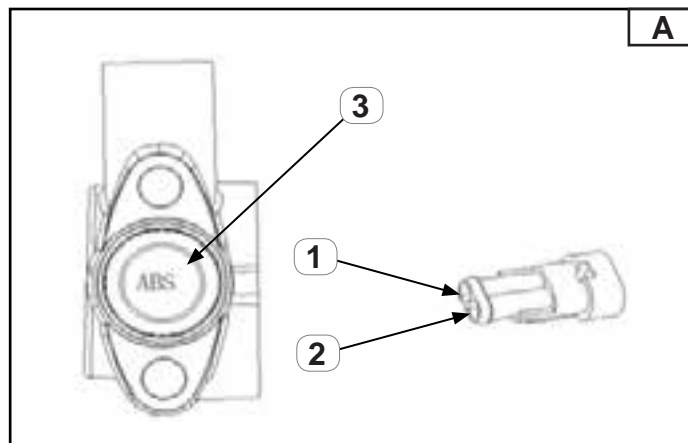
- The electrical coupling.

Check:

- The resistance using the multitester on symbol Ω between pin 1 and pin 2.

Resistance:

- 0Ω





DEVICES

SERVICES RELAY

It is situated inside the storage compartment, underneath the vehicle seat (Fig. A). The relay assembly is managed by the ECM to control each load at best, such as:

- **The lighting system**

The ECM ensures that the lights turn on in certain conditions.

- **The fuel pump**

The fuel pump is activated only when the starter lets the engine rotate.

- **The electric fans**

- **The injection**

The ECM controls the injection relay pull-in according to the relevant conditions, as ignition, shutdown, and use of the vehicle, thus allowing a stable supply to ECM, which can carry out any correct procedure of storage and setting of the parameters in the standstill phase, by continuing its self-powering for some seconds after the instrument panel shutdown.

- **Services**

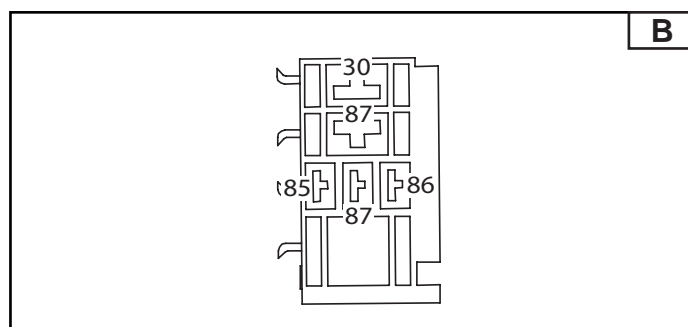
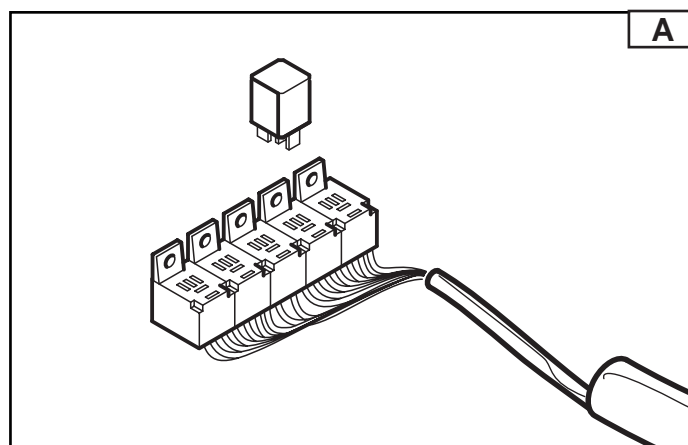
All devices "with ignition on", as dashboard, various safety devices and lighting system, are connected to the services relay.

Check:

- The resistance using the multitester on symbol "Ω" between pin 85 and pin 86 (Fig. B).



Resistance

 $12 \pm 2 \Omega$ 

Use:

- The tester and, referring to the table, check on relay pins, by powering the PIN 85 and the PIN 86 to the battery.

RELAY	PIN 87	PIN 30	PIN 87A
Powered on battery	●	●	
Not powered on battery	●		●

NOTE:

When the above conditions are fulfilled, the relays are operating properly, otherwise replace the parts.

DEVICES

STATOR

There are three types of failures of magnetoelectric generator (stator):

- **Short circuit**
- **Line break (wire burnt)**
- **Rotor Magnetic Disappear.**

Short circuit or open circuit of coil wires that cause low output or even no output.
Disappearing of rotor magnetism will lead to low output, which may be caused by AC electric generator or striving. Or it may be because of aging.

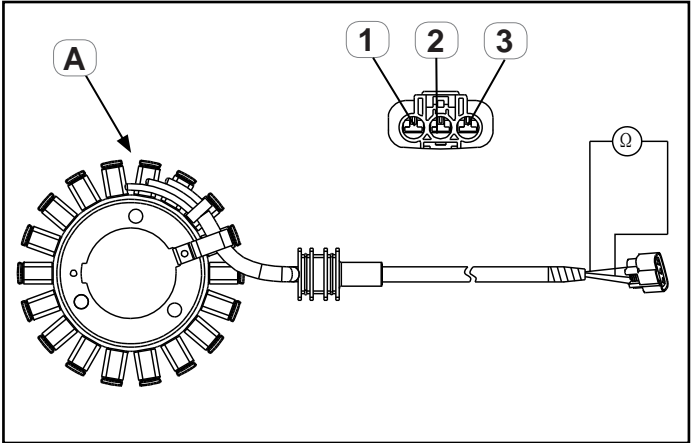
Close the ignition switch

Disconnect:

- The connector of the 3-pole magnetoelectric generator.

Measure:

- The resistance value among the three black terminals of the magnetoelectric generator with a multimeter.



Standard	0.18 Ω ± 0.01Ω to 25°C
----------	------------------------

- If the resistance is greater than the aforementioned values, or it is not possible to measure (infinite value) one of the two wires using the multimeter, it shall be replaced. When it is far lower than the resistance, it refers to stator short-circuit. It shall be replaced.
- Measure the resistance between every single black wire and frame grounding with a multimeter in the highest resistance range.
- Use tester coil to check whether the engine is through. If yes, it refers to short-circuit of coil and engine and the charge coil shall be checked.
- If the resistance of stator coil is normal, but the voltage check detects a failure of the magnetoelectric generator, the rotor magnets might have become loose. At this moment, replace the rotor.

Start up the engine:

- Run the revolutions per minute (rpm) according to Table 1.
- Record the voltage readings (three measurement values in total).

Table 1 Output voltage of magnetoelectric generator

Range of tester	Wiring		Readings at 5000 rpm
	Tester (+) to	Tester (-) to	
750 V AC	Black wire	Another black wire	55 V or higher

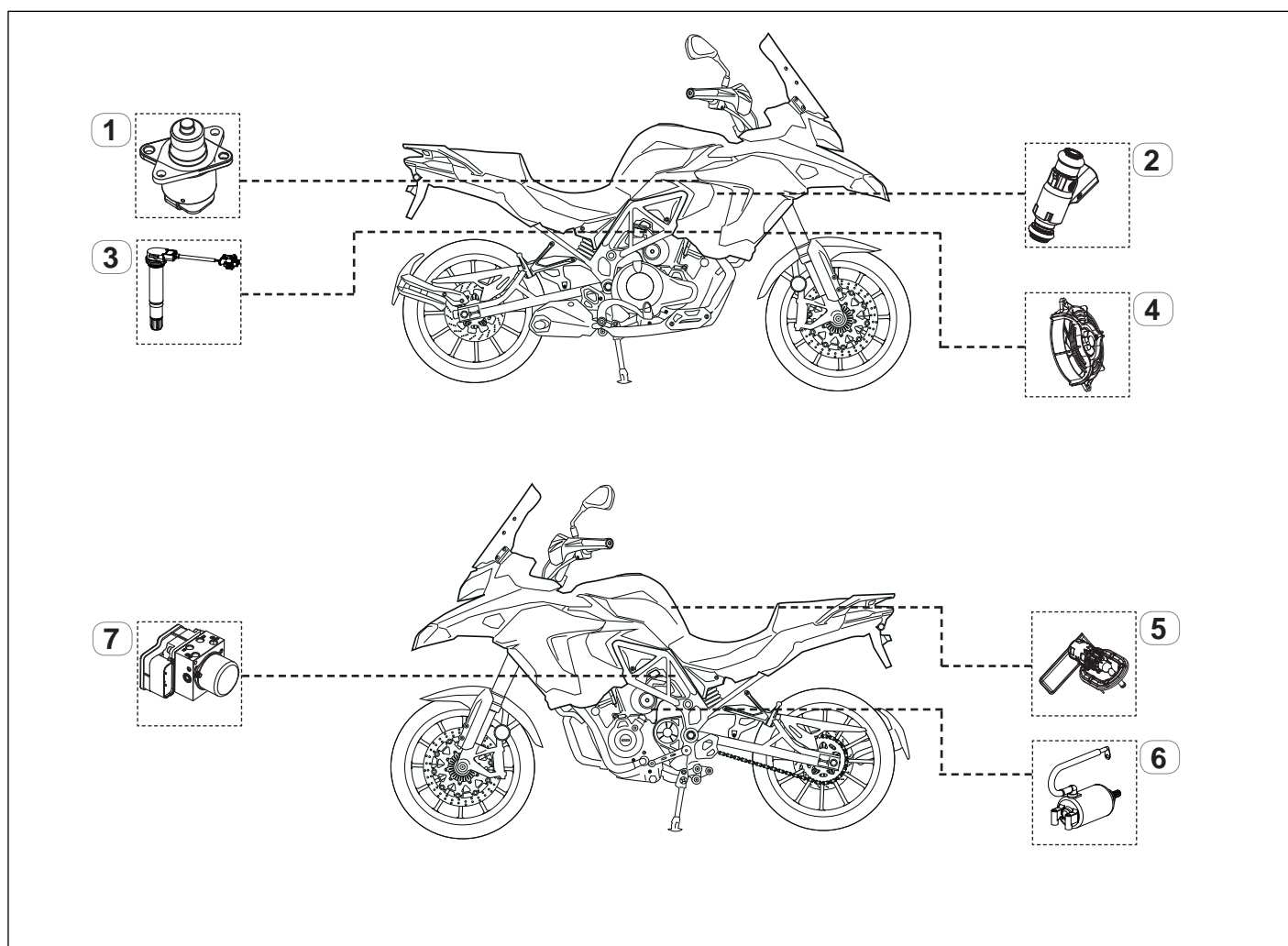
NOTE:

If the output voltage indicated is within the value of the table, the magnetoelectric generator works properly.
If the output voltage indicated is much lower than the value within the value of the table, problems occur on the generator.



ACTUATORS

POSITION OF ACTUATORS



Position	Device
1	STEPPER
2	INJECTORS
3	IGNITION COILS
4	COOLING FAN
5	FUEL PUMP
6	STARTER
7	ABS ECU

ACTUATORS

IDLE AIR CONTROL SYSTEM (STEPPER)

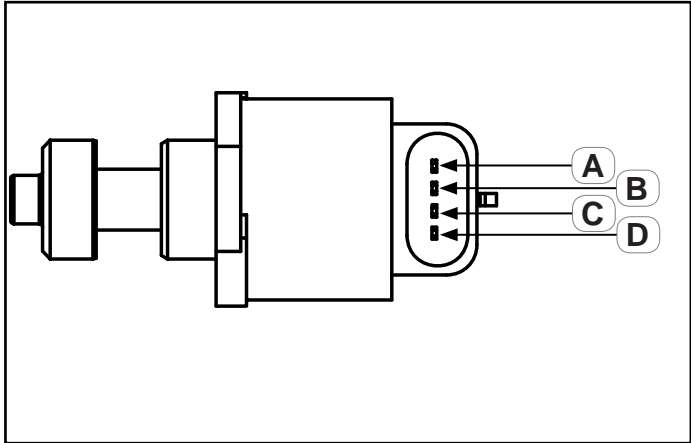
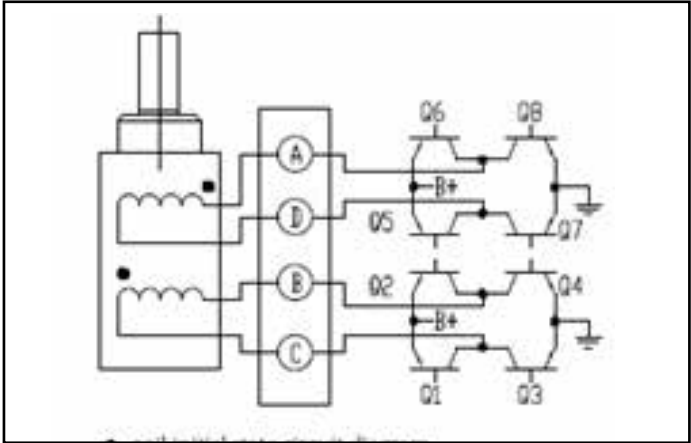
The system is situated inside the air filter case, contains a valve for checking air flow underneath the throttled body throttles and is equipped with a stepper motor.

The system controls the following parameters:

- **Idle speed**
- **Air supply in case of engine overspeed**
- **Adjustment of air/fuel ratio by working at idle speed at altitudes above sea level.**
- **Adjustment of air/fuel ratio in cold/hot setting-off.**

When the stepper motor is activated, it opens the valve that controls the air flow and allows a certain air flow to run off along a series of hoses in the throttled body unit.

Operating voltage	12V DC
Minimum /maximum operating voltage	14V DC/ 7.5V DC
Impedance per coil (27°C)	53±5.3Ω
Minimum impedance	35 Ω
Distance	0.04167 mm
Maximum travel	8.5 mm (204 steps)
Resonant frequency range	70-120 pps



						PINS			
STEP	Q6-Q7	Q5-Q8	Q1-Q4	Q2-Q3	STEP	A	B	C	D
1	ON	OFF	ON	OFF	1	+	-	+	-
2	ON	OFF	OFF	ON	2	+	-	-	+
3	OFF	ON	OFF	ON	3	-	+	+	-
4	OFF	ON	ON	OFF	4	-	+	-	+
1	ON	OFF	ON	OFF	1	+	-	+	-

Motor 4 steps drive control



ACTUATORS

INJECTORS

They are positioned on the throttle body unit.
The engine is equipped with three four-jet injectors (1), Fig. A.
The amount of jet of the injectors is constant, but the duration of time during which each injector remains open is variable.
The duration of each injection is calculated via ECM according to the data received from the various system sensors.

Disconnect:

- The electrical coupling.

Check:

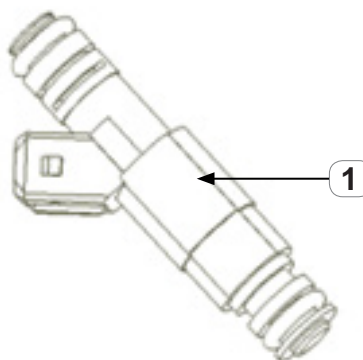
- The resistance using the multimeter on symbol Ω between PIN1 and PIN2 (2), Fig. B.



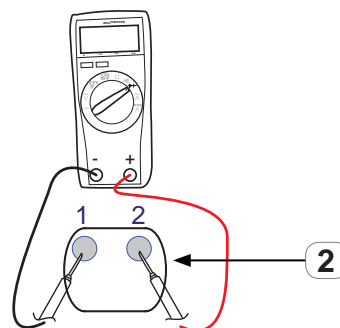
Resistance

 $12 \pm 2 \Omega$

A



B



ACTUATORS

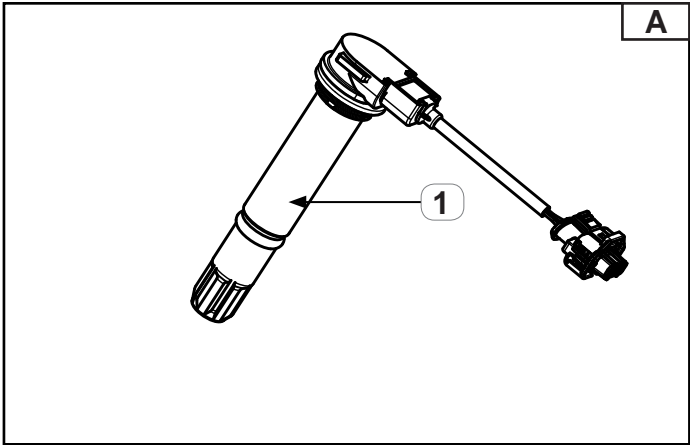
IGNITION COILS

The ignition coil is situated directly on the head of each spark plug (1), Fig. A, and provides high voltage and ignition energy necessary to produce high-voltage sparks between the electrodes of the spark plug.

- Check:**
- The measurement of the coil terminal impedance.

Primary coil	0.65±0.07Ω
Secondary coil	4±0.5 kΩ

The optimal condition is achieved when the resistance value is within the standard value.
Resistance value "∞" indicates coil wire disconnection", therefore it is necessary to replace the ignition coil.





ACTUATORS

COOLING FAN

It is situated on the radiator body (1) Fig. A. The ECM enables and disables the cooling fan according to a signal received by the coolant temperature sensor.

When the coolant temperature reaches the upper-tier temperature, the cooling fans are activated via command.

When the coolant temperature lowers enough (lower-tier temperature), the coolant fans are activated via command by the ECM.

Check:

- The load current of the fan motor by connecting an ammeter, as shown in Fig. B.

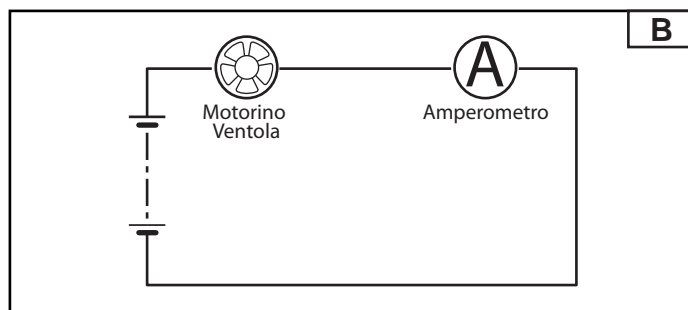
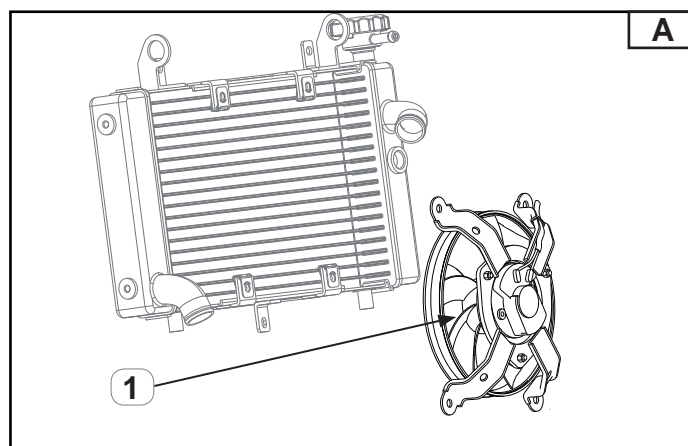
The voltmeter serves to check that the battery powers the 12 volt motor.

When the fan rotates at the highest speed, the ammeter must show no more than 5 Amps.

If the motor does not rotate, replace the motor unit of the fan.

NOTE:

It is not necessary to remove the cooling fan from the radiator to carry out the above test.





ACTUATORS

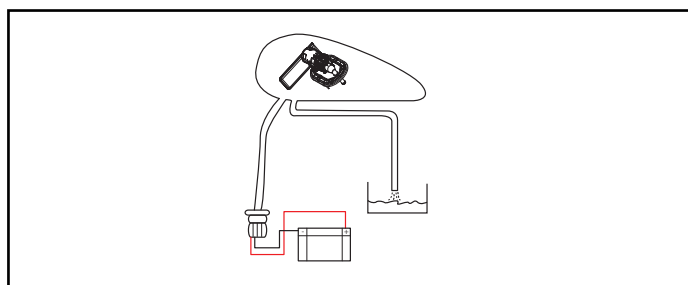
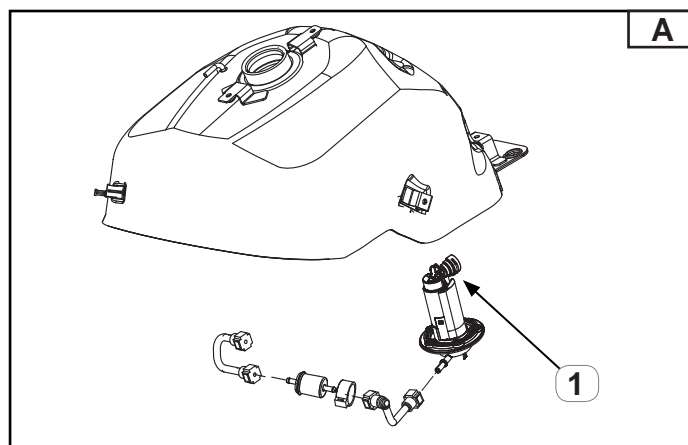
FUEL PUMP

The electric pump is situated in the fuel tank (1), Fig. A, and provides fuel in the supply circuit via a pressure regulator at a constant pressure of 3.5 bar.

The ECM controls the pump operation directly, by ensuring the correct fuel pressure necessary for starting the engine from the first activation of the instrument panel via a timed function, and a continuous operation for the normal use of the vehicle.

Check:

- The fuel pump.
1. Put an outlet pipe into a container to let the fuel flow out (Fig. A).
 2. Connect the battery (12 V) to the fuel pump.
 - RED/BLACK positive wire +
 - BLACK negative wire -





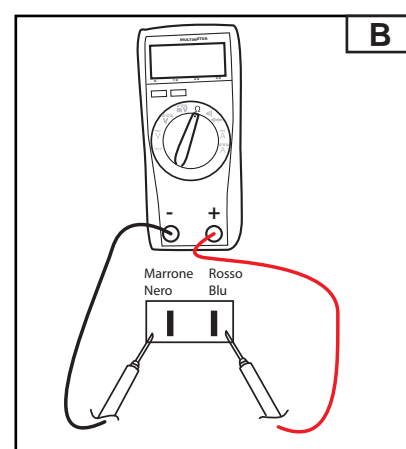
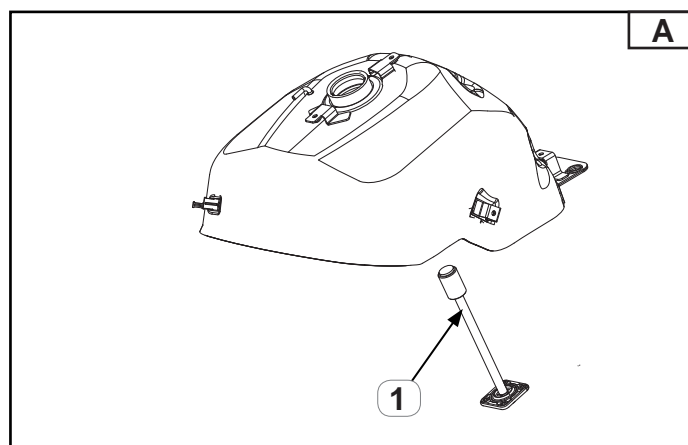
ACTUATORS

FUEL LEVEL SENSOR

It is situated close to the fuel pump (1), Fig. A, and provides an outlet value of variable resistance according to the fuel level.

Check:

- The resistance depending on fuel level (Fig. B) by positioning the multitester on symbol Ω between the PIN1 - PIN2.



Indicated level	6	5	4	3	2	1	0
Resistive value Ω	0-18	19-24	25-36	37-52	53-69	70-89	90-95
Tank fuel (Lt)	20	15.3	12.7	10	7.7	5.1	2.7
Extension (mm)	262	228 \pm 3	207 \pm 3	186 \pm 3	165 \pm 3	144 \pm 3	112 \pm 3



ACTUATORS

STARTER

The starter (1), Fig. A, is a part that can be replaced totally. If the starter is damaged, replace it.

Remove:

- Release the coiled spring of brushes.
- Remove the casing framework.
- Use an ohmmeter to measure the resistance between the wire terminal and the insulated brush.

Reading should be max 0.3 ohm.

Measure the resistance between the wire terminal and the brush holder.

- Make sure the brush does not come in contact with the casing.
- Reading should be infinite (no reading).
-

Remove:

- The brush holding plate and the brushes.

Measure:

- The brush length and replace in case of wearing exceeding the allowed limit.

Brush wear limit (length)	
Standard	10 mm
Service Limit	5.0 mm

Check:

- The switch surface for wearing or discoloration.
- The framework test.

Make sure the insulating washer of the terminal bolt is inserted properly into its housing and the tab on the brush holding plate engages the housing notch of the plate.

- Remove the magnet housing by keeping the framework and the brush holder united.

FRAMEWORK TEST

Check:

- The switch surface.
- Replace if overly worn or damaged.

Measure:

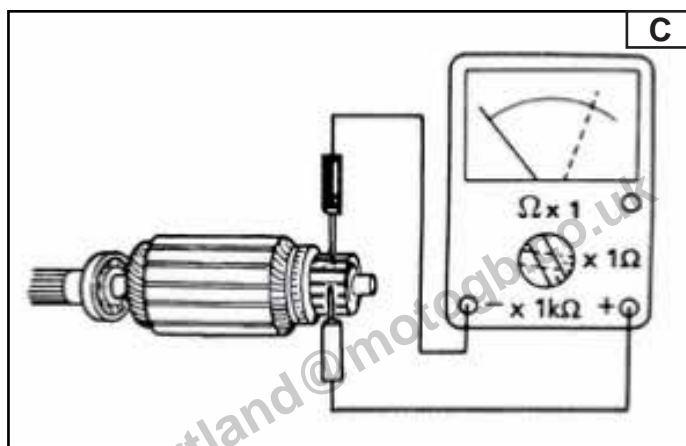
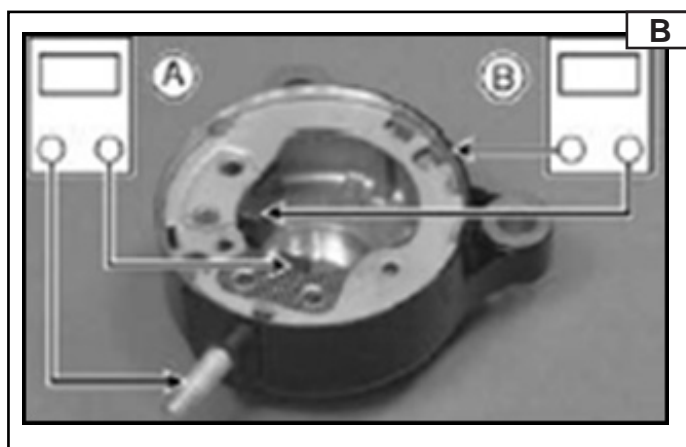
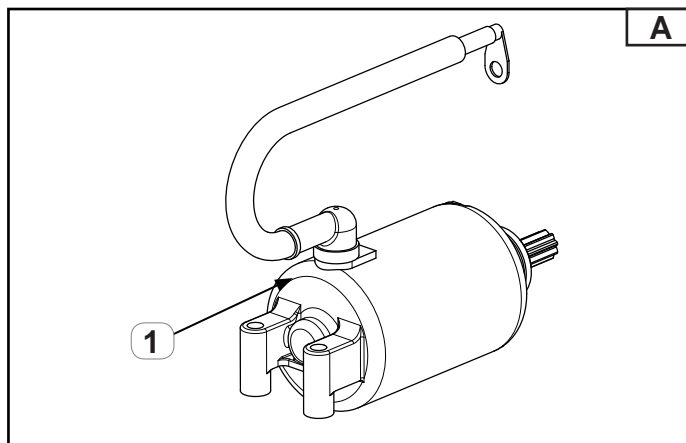
- The resistance between each segment of the switch (Fig. C).

A digital multimeter is used for measurement.

NOTE:

Reading should be max 3 ohm.

Continuity of lower framework	
coil resistance	3 Ω at 20°C (68°F)





ACTUATORS

STARTER

Measure:

- The resistance between each segment of the switch and the framework shaft (Fig. D). Reading should be infinite (no continuity).

Insulation check	
Ω infinite	20°C (68°F)

Check:

- The switch segments for discoloration.

NOTE:

The presence of discoloured segments in pairs refers to short circuits of coils that require the replacement of the starter.

- Position the framework in a short circuit detector.
- Switch on the detector and position longitudinally a saw blade or a thickness gauge for 3 mm (1/8") above the laminates of the framework coil.
- Turn the framework by 360°.

NOTE:

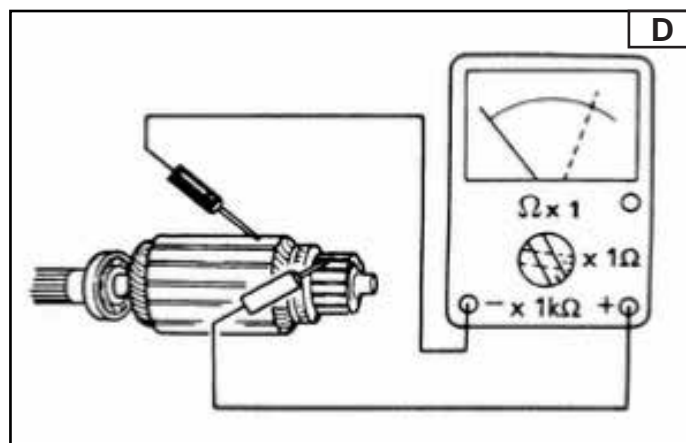
If the saw blade is attracted towards a pole of the framework, the latter has a short circuit and must be replaced.

Check:

- The permanent magnets in the starter housing.

NOTE:

Make sure they are not cracked or far away from the housing.



ACTUATORS

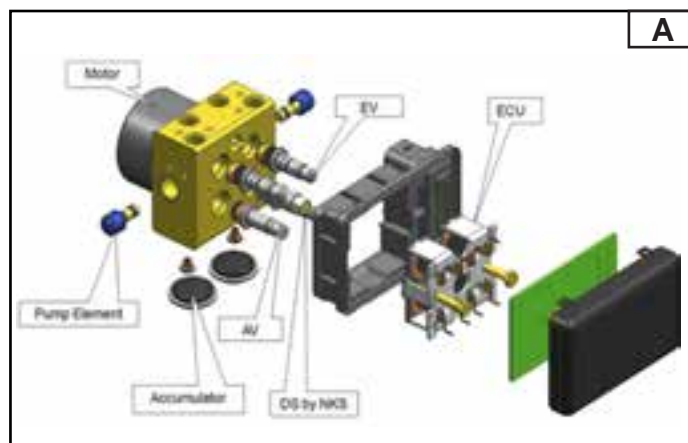
ABS ECU

It is situated underneath the fuel tank Fig. A.

Precautions

There are several precautions to follow concerning the ABS system.

- The power supply of the ABS system must be equipped with a 12 V sealed battery. Do not use other types of batteries.
- Do not reverse the battery connections to prevent damages to the ABS hydraulic control.
- Do not disconnect the battery wire or other electric parts when the main switch is on or the engine is operating to prevent damages to the ABS parts.
- Do not short circuit the positive electrode of the battery (+) on the frame.
- Do not activate the main switch when the ABS electric parts are disconnected. The ABS control unit stores the diagnostic fault code.
- Do not spray water on electric parts, ABS parts, connectors, wires, and conductors.
- Make sure the motorcycle transceiver does not interfere with the ABS system. Keep antennas as far away from ABS ECU as possible.
- Switch the master switch before disconnecting the ABS electrical parts.
- Never strike the ABS parts with a hammer or leave them fall on hard surfaces to prevent damages to the ABS parts.
- Do not disassemble or try to repair the ABS parts, even in case of malfunctioning of the ABS.
- The ABS system cannot detect malfunctioning of the conventional braking system (burnt/worn discs, worn pads or other mechanical failures). To avoid problems, keep checked the hoses and the wiring for a correct layout. For the standard braking performance, check for any brake fluid leaks. Make sure the system is properly drained.



WARNING

If the linking parts of the brake hoses are removed, including the connecting screws of the ABS hydraulic system or the air bleed screws, bleed air in the circuit carefully.

IMPORTANT NOTICE

Do not ride the vehicle if the system is not drained properly as the presence of air may jeopardize the efficiency of the ABS and the brakes.



ACTUATORS

ABS ECU

Please refer to the features on the Texa diagnostic device for managing the diagnostics. Hereunder are the main fault codes and the necessary corrective actions.

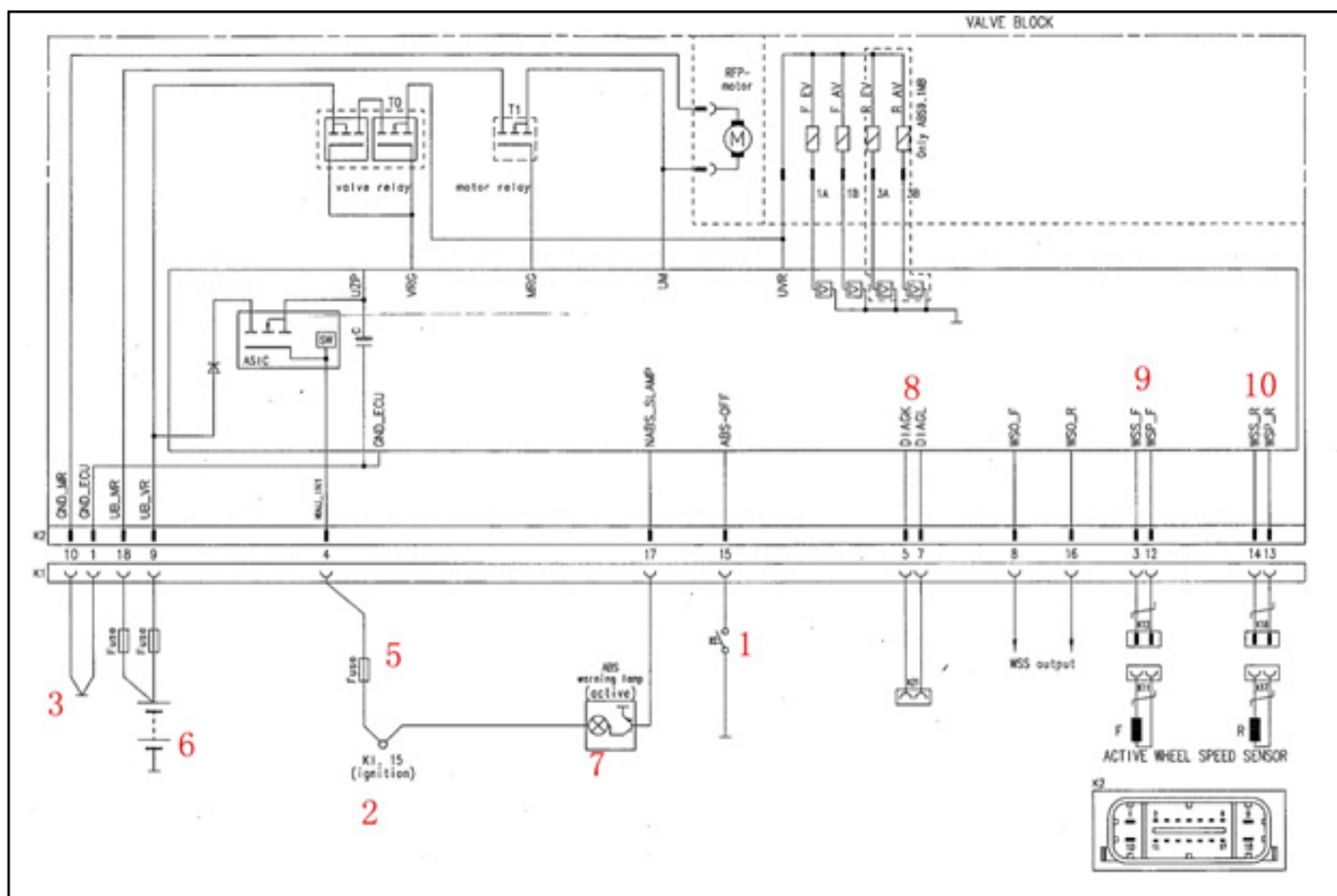
DTC (Hex) Fault codes	Solutions
5055	Replace ABS unit
5019	
5017	
5013	
5018	
5014	
5053	Check battery voltage
5052	
5035	Replace ABS unit
5043	Check connection of the speed sensors using a new sensor
5045	
5042	Check phonic wheel for deformation or faults
5044	
5025	Check speed sensors, distance, phonic wheel, and tyre specifications
5122	Replace ABS unit
5223	



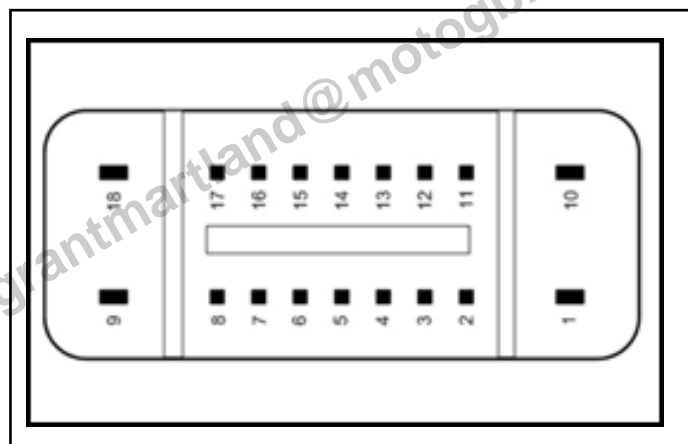
ACTUATORS

ABS ECU

Diagram



Position	Code
1	GND_ECU
2	CAN1P
3	WSS_F
4	WASU_IN1
5	DIAGK
6	BLS - input_PD -SW2H_NO
7	DIAGL
8	WSO_F
9	UB_VR
10	GND_MR
11	CAN1M
12	WSP_F
13	WSP_R
14	WSS_R
15	ABS_OFF -input_PU - SW2L_NO
16	WSO_R
17	NABS_SLAMP
18	UB_MR





BATTERY

VEHICLE BATTERY

IMPORTANT NOTICE

Do not use batteries other than the indicated ones (A), Fig. 1.

The MF battery (maintenance-free) mounted on this vehicle does not require maintenance operations, as electrolyte level control and topping up of distilled water.

Please note that the charging system of the MF battery differs from the one of a standard one.

Therefore, do not replace the MF battery with a standard one. The recommended battery is 12V-9Ah.

IMPORTANT NOTICE

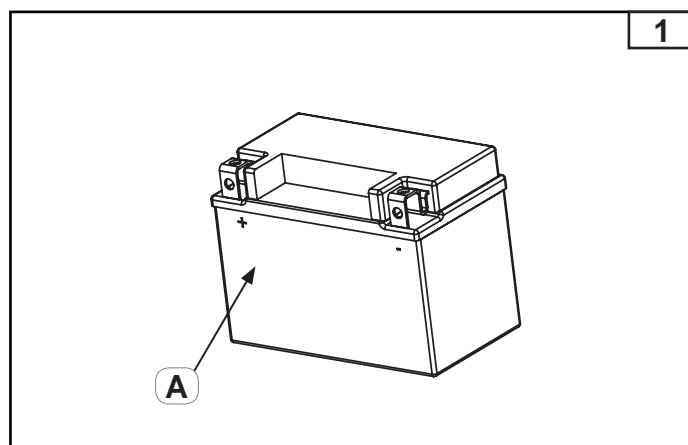
Hydrogen is not produced during the normal recharge of the battery, but it can be produced when the battery is recharged excessively.

Please keep flames away from battery during recharge.

In case of corroded terminals, remove the battery, pour warm water on it and clean using a metal brush.

At the end of connection, grease slightly.

Mount a cap on the positive terminal.



BATTERY

BATTERY EFFICIENCY CONTROL

CHECKING BATTERY CURRENT LOSSES

Connect:

- The multimeter between the negative terminal and the negative wire of the battery as ammeter in direct current (B) Fig. 2.

IMPORTANT NOTICE

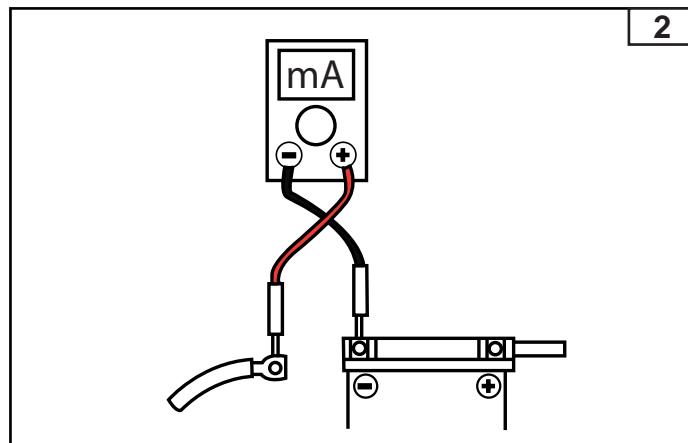
Since the current losses may be high in case of malfunctioning, use a high range of the multimeter first to prevent damages. Do not position the ignition switch to ON whilst measuring the current.

When the panel is off, the current losses must be $\approx 2\text{--}2.5\text{ mA}$.

- Otherwise, find out the source of such absorption by disconnecting the connectors of each utility powered by the battery directly.

NOTE:

In the event an anti-theft device is installed, disconnect it before carrying out the modifications.





DIAGNOSTICS

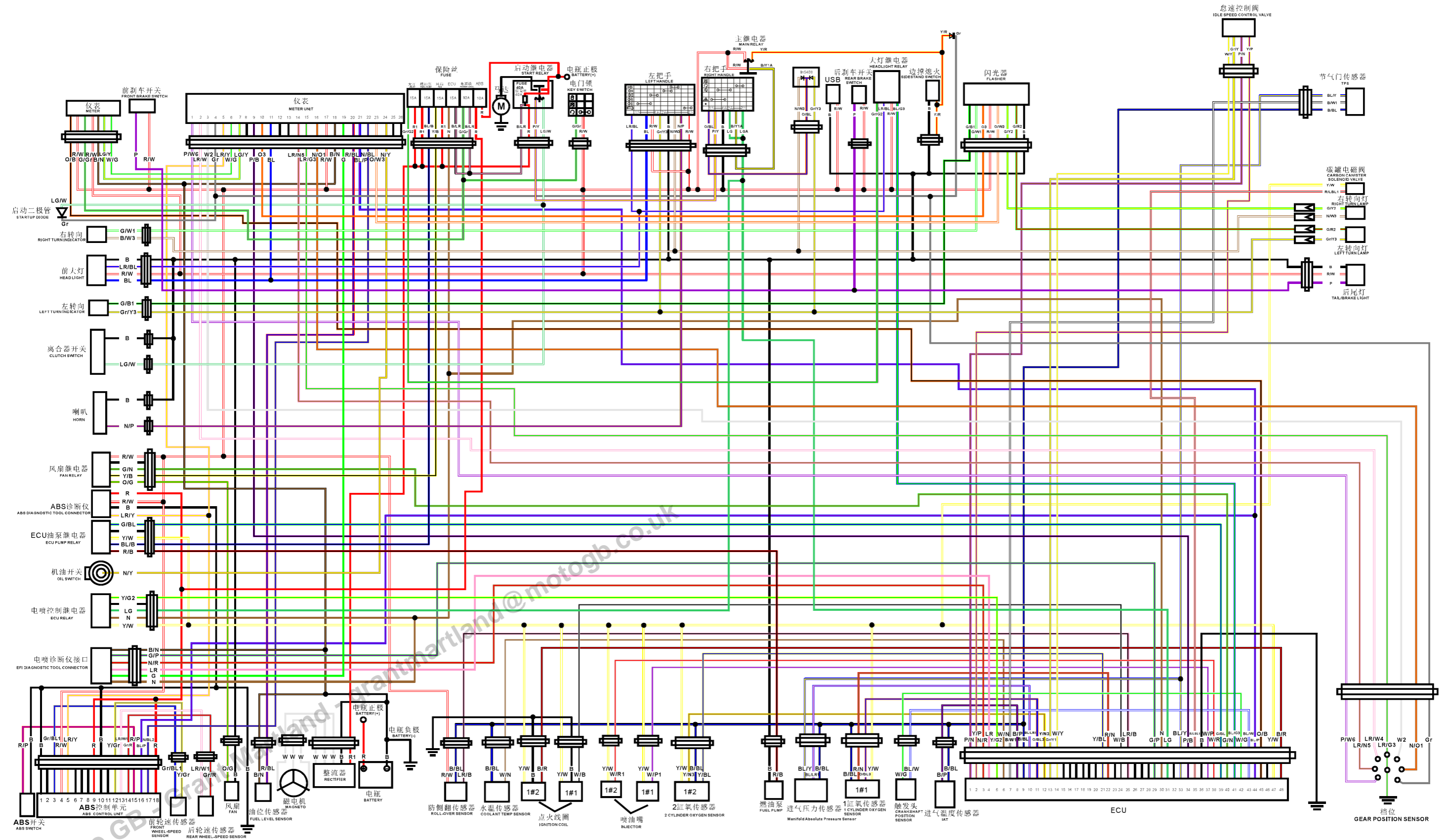
VEHICLE DIAGNOSTICS

Refer to the Texa diagnostic instructions.

COPY - Moto GB - Grant Martland - grantmartland@motogb.co.uk



ELECTRICAL SYSTEM
WIRING DIAGRAM OF TRK502 ELECTRICAL SYSTEM





ELECTRICAL SYSTEM COLOUR KEY

CODE	COLOUR
B	Black
BL	Blue
GR	Green
W	White
Y	Yellow
O	Orange
R	Red
Dg	Dark grey
P	Purple
N	Brown
G	Grey
LR	Pink



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SERVICE STATION MANUAL

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