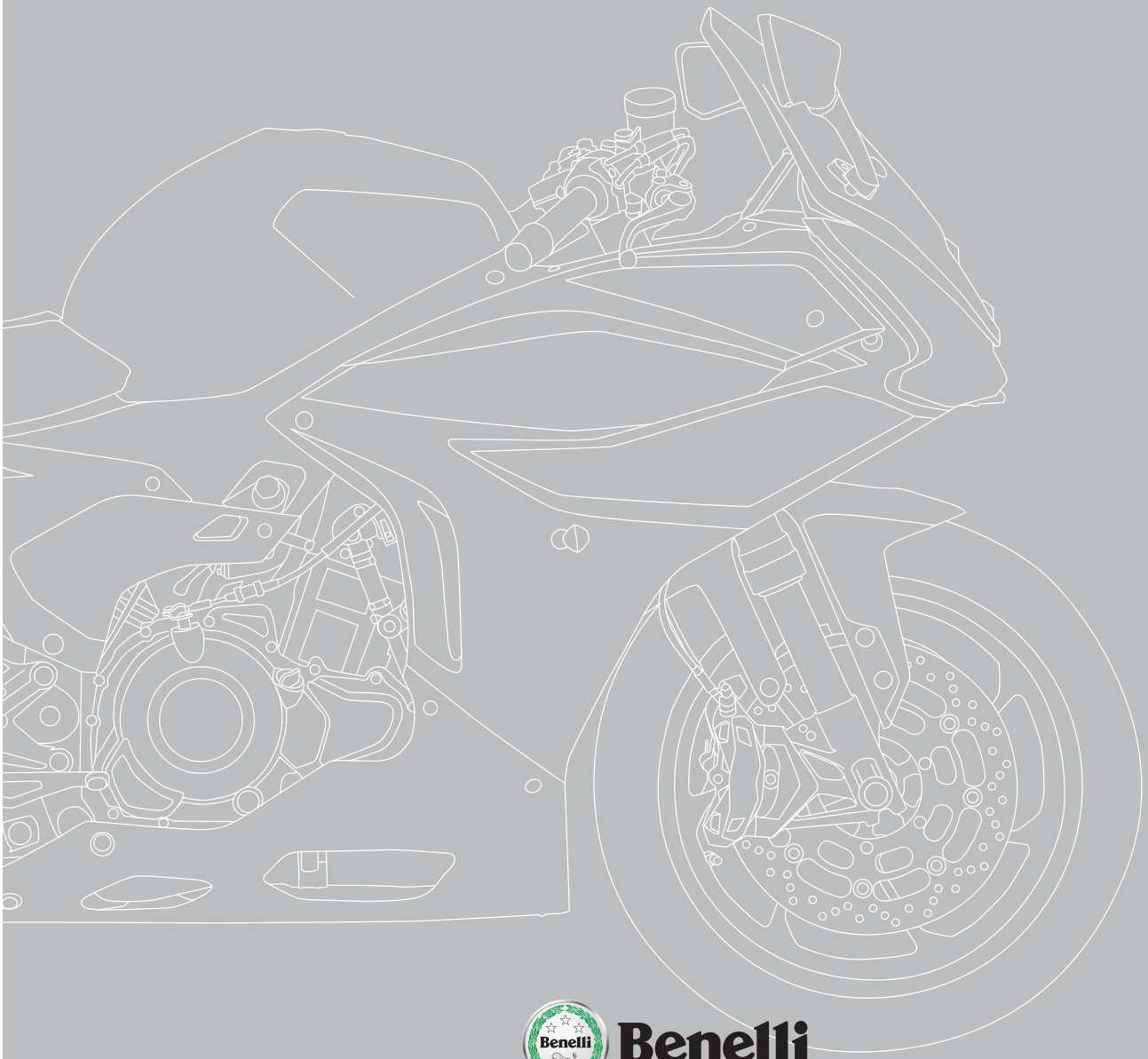
TORNADO 550

MANUALE DI OFFICINA / WORKSHOP MANUAL



Benelli

WARNING:

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 motorcycle.

NOTICE “Important notice" means that specific precautions are required to avoid causing damage to the motorcycle.

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

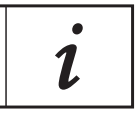
HOW TO USE THIS MANUAL

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 plants 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 "SYMBOLS" section.
4. The exploded drawings is accompanied by a table showing the position on the spare part catalogue, its description, intervention sequence, symbols used, intervention description, and any notes for the operator.
5. Interventions requiring any other information (e.g., special tools and technical data) are described in sequence.

SYMBOLS

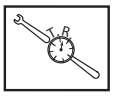
SUBJECT SYMBOLS

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

EXPLANATORY SYMBOLS

 Wear/Clearance limits

 Special tool

 Tightening torque

 Grease application



Sealant paste application

 Thread locker application

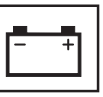
 Recommended solvent

 Brake fluid

 Lubricant

Benelli

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ENG. 	Engine	CHAP. 5
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1
GEN.
INFO

CHAPTER 1

GENERAL INFORMATION

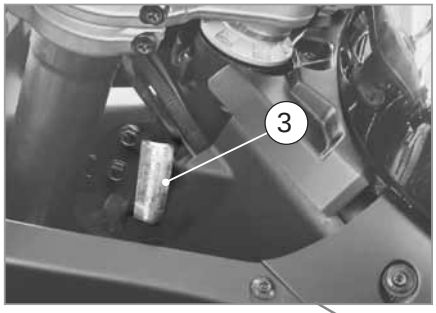
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IDENTIFICATION

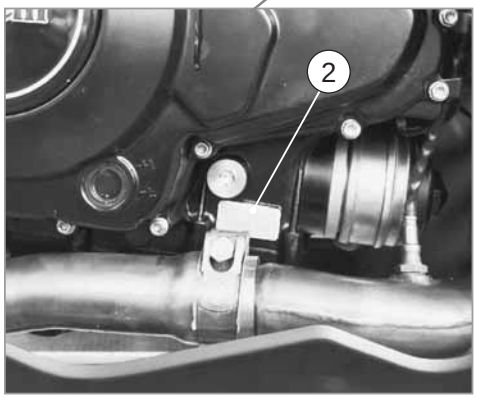
MOTORCYCLE IDENTIFICATION

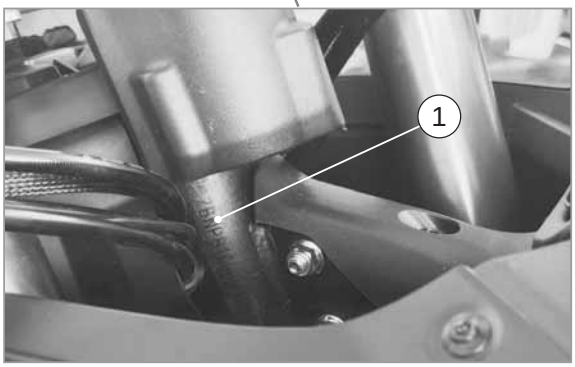
The identification data are:

1. Frame serial No. (on the steering sleeve, right side)
2. Engine serial number (on the bottom crankcase).
3. Type-approval data (on the lower crankcase, right side).



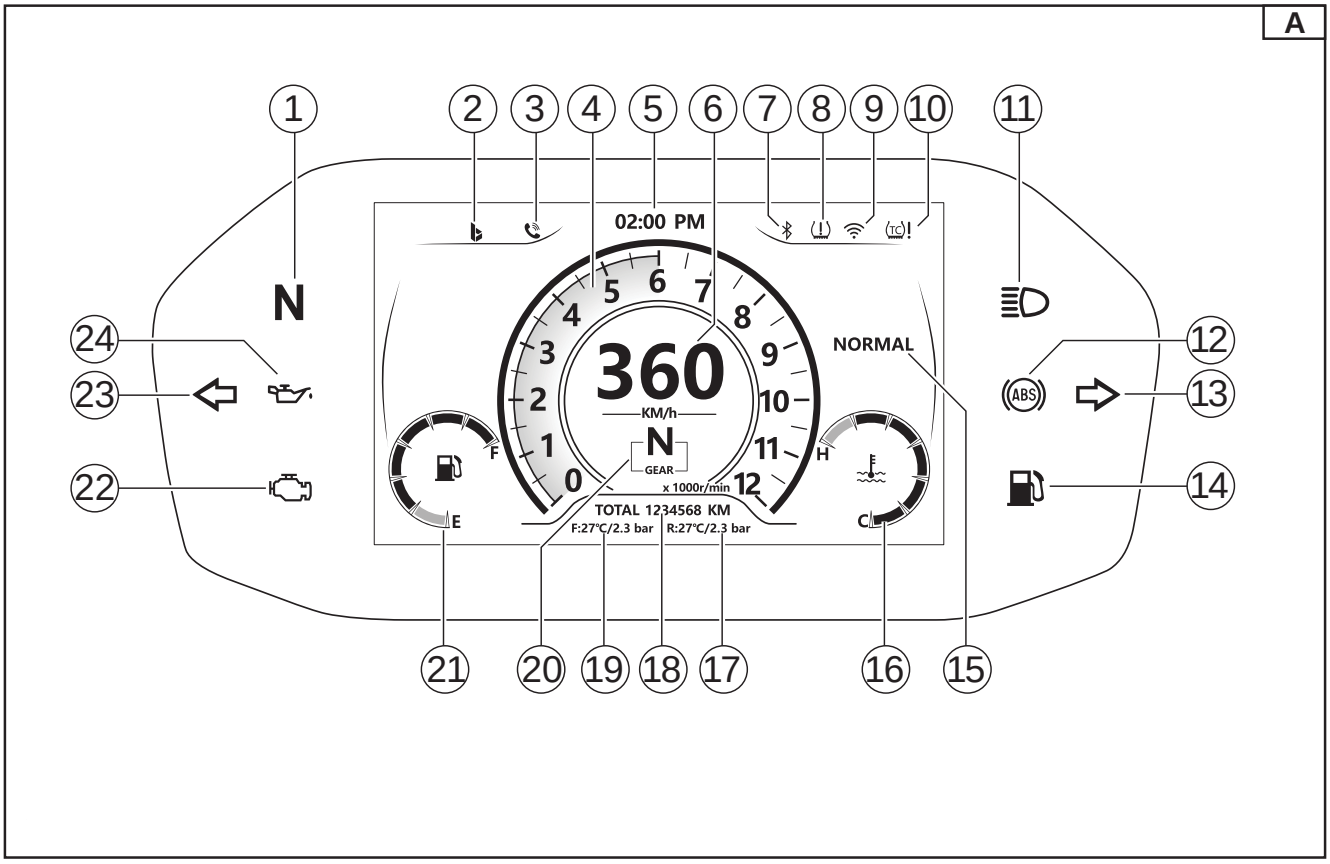






FEATURES
INSTRUMENTATION AND INDICATOR LIGHTS

A



The instruments and lights will switch on when the ignition key is turned to "ON".
After an initial check-up, the information will correspond to the overall condition of the motorcycle at that time.
The dashboard is equipped with the following instrumentation:

MULTIFUNCTION DISPLAY (FIG. A)

1. NEUTRAL GEAR INDICATOR.
It goes on when the gear is in “Neutral” position.

2. B-BOX ICON.
The function might change according to the areas or the Countries.

3. INCOMING/OUTGOING CALL.
It displays the incoming/outgoing calls after the device is connected with the phone via Bluetooth.

4. TACHOMETER
The tachometer allows the rider to monitor the engine revolution speed and to keep it within the optimal power range.

5. CLOCK
It shows the time in hours and minutes.

6. SPEEDOMETER
It displays the current speed of the vehicle.

7. BLUETHOOTH
When on, it indicates the presence of a device connected via Bluetooth.

8. TIRE MALFUNCTIONING INDICATOR
It goes on when malfunctioning of tire pressure or temperature is detected.

9. WI-FI
The function might change according to the areas or the Countries.

10. TCS INDICATOR
It goes on when the TCS (Traction Control System) is activated.

11. HIGH BEAM INDICATOR
This indicator light comes on when the high beam of the headlight is on the high beam position.

12. ABS INDICATOR
a. ABS system fault: whenever any fault is detected and saved, the ABS diagnostic light is and remains on.
b. ABS system activated: When the control panel is on, the ABS diagnostic light stays on until the motorcycle exceeds the speed by about 5 km/h. When this speed is exceeded, the ABS diagnostic light turns off.
When the control panel is on, the ABS diagnostic light stays on until the motorcycle exceeds the speed by about 5 km/h. When this speed is exceeded, the ABS diagnostic light turns off.

NOTICE

Usually, the ABS diagnostic light remains on when the instrument panel is turned on and goes off when the motorcycle exceeds the speed by about 5 km/h.

FEATURES

INSTRUMENTATION AND INDICATOR LIGHTS

If the ABS diagnostic light shows one of the following symptoms, one or more faults may have occurred in the ABS system.

- The ABS diagnostic light does not go on when the instrument panel is switched on.
- The ABS diagnostic light remains on even when the vehicle exceeds the speed by about 5 km/h.

Please note that the ABS system is not active when the light is on, but the braking system continues working as a normal system without ABS.
During this situation, a sudden braking may lock the wheels with the subsequent loss of grip and stability of the motorcycle.

13. RIGHT TURN SIGNAL LIGHT
Each indicator light will flash when its corresponding turn signal lights are flashing.

14. FUEL RESERVE INDICATOR LIGHT
It goes on when there are approx.ly 2.5 l of fuel in the tank, therefore it is necessary to refuel, when possible.

15. ENGINE POWER MODE
It displays the current mode (normal or sport one).

16. COOLANT TEMPERATURE GAUGE
It shows the coolant temperature.
The coolant temperature varies according to the climatic changes and the engine load.

17. REAR TIRE STATUS INFORMATION
It displays the temperature and the pressure of the rear tire in real time.

18. TRIP/TOTAL ODOMETER

TOTAL: It shows the total distance travelled by the vehicle.

TRIP: It indicates the total distance travelled from the last reset of the trip odometer.

19. FRONT TIRE STATUS INFORMATION
It displays the temperature and the pressure of the front tire in real time.

20. ENGAGED GEAR INDICATOR
The engaged gear indicator shows the selected gear.
This is a 6-speed gearbox model.

21. FUEL GAUGE INDICATOR
The digital fuel gauge shows the level of the fuel tank. As the fuel level drops, the lines on the gauge will become closer and closer to the "E" reserve area.
As soon as the final line starts to lash, there is an autonomy of about 2.5 litres of fuel.

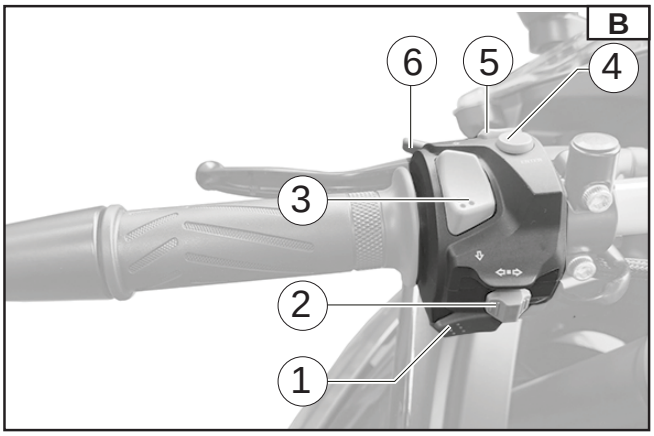
22. ENGINE TROUBLE WARNING LIGHT
This warning light comes on if a problem is detected in the engine or another control system of the vehicle. The electrical circuit of the warning light can be checked by turning the key to “ON”.The warning light should come on and then go off as soon as the engine is started. If the warning light does not come on initially when the key is turned to“ ON”, or if it remains on, connect the diagnostic system.

23. LEFT TURN SIGNAL LIGHT
Each indicator light will flash when its corresponding turn signal lights are flashing.

24. ENGINE OIL PRESSURE INDICATOR LIGHT
This indicator light switches on when the engine oil pressure is low.

FEATURES
INSTRUMENT AND CONTROL FUNCTIONS

OF LEFT HAND GRIP CONTROLS (FIG. B)



1. HORN PUSH BUTTON.

Press this switch to activate the horn.

2. TURN SIGNAL SWITCH

To signal a right-hand turn, move this switch to ⇨. To signal a left-hand turn, move this switch to ⇦. When released, the switch returns to the central position. To cancel the turn signal lights, push the switch in after it has returned to the central position.

3. MENU SCROLLING BUTTON.

Press to scroll up and down the items of the main menu on the display.

4. MENU ENTER BUTTON.

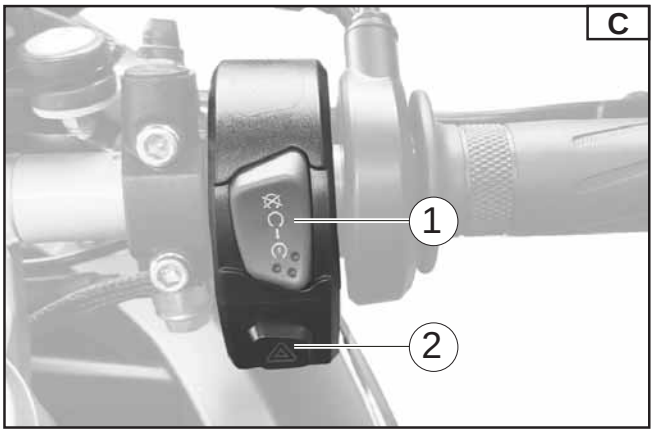
With the vehicle at standstill, access the multifunction menu by short pressing the ENTER button.

5. BACK BUTTON

Press to go back to the previous selection of the main menu.

6. BUTTON OF HIGH BEAM FLASHING / DIMMER/SWITCH

Position this switch in high position to activate the high beam. The button remains locked in this position. Press this switch downward for flashing. This function serves to alert other road users in case of possible dangerous situations.



RIGHT HAND GRIP CONTROLS (FIG. C)

1. STOP / IGNITION / ELECTRIC STARTER SWITCH ⊠ ○ ⓢ.

To crank the engine with the starter, set this switch to ○.
Set this switch to ⊠ to switch off the engine in case of emergency.
To crank the engine with the starter, set this switch to ⓢ.

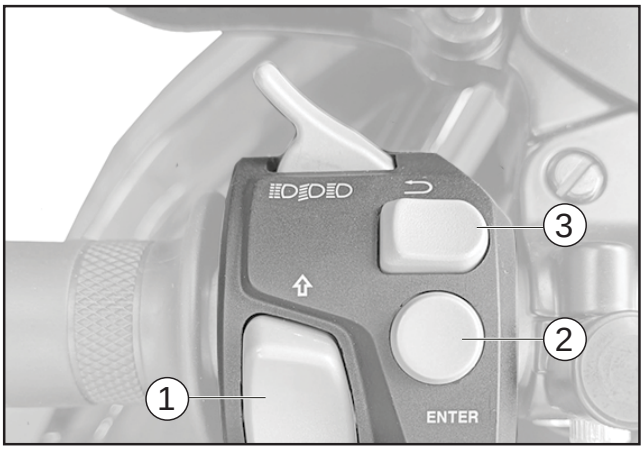
2. EMERGENCY SWITCH ⚠

With the ignition key set to ○, use this switch ⚠ to switch on the emergency lights (simultaneous flashing of all of the turn signal lights).
The emergency lights are used in case of emergency, to advise the other road users that your vehicle is about to stop in dangerous traffic areas.

FEATURES
INSTRUMENT AND CONTROL FUNCTIONS

MULTIFUNCTION DISPLAY CONTROLS

Short press “ENTER” button (2) to access the multifunction display menu.
Press “SELECT” button (1) to scroll through the items of the menu.
Press “BACK” button (3) to go back to the item of the previous menu.

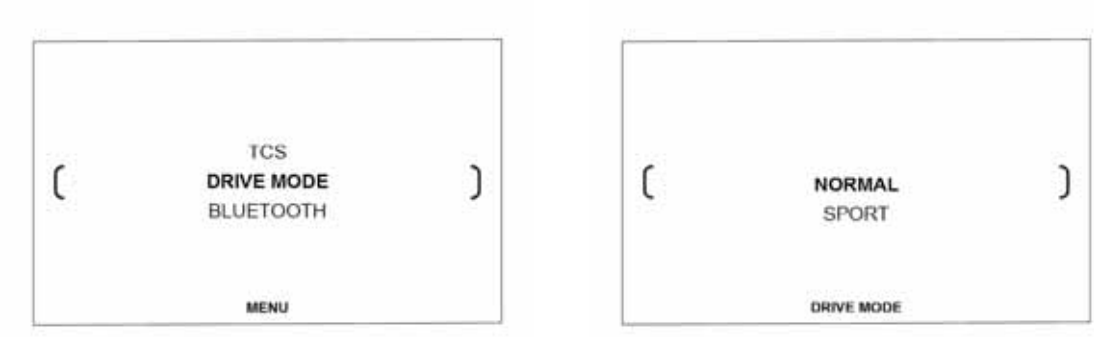


Function of the device

The following items can be set:

- DRIVE MODE
- BLUETOOTH
- TIRES
- BRIGHTNESS
- INFO
- CLOCK
- UNITS
- LANGUAGE
- TCS

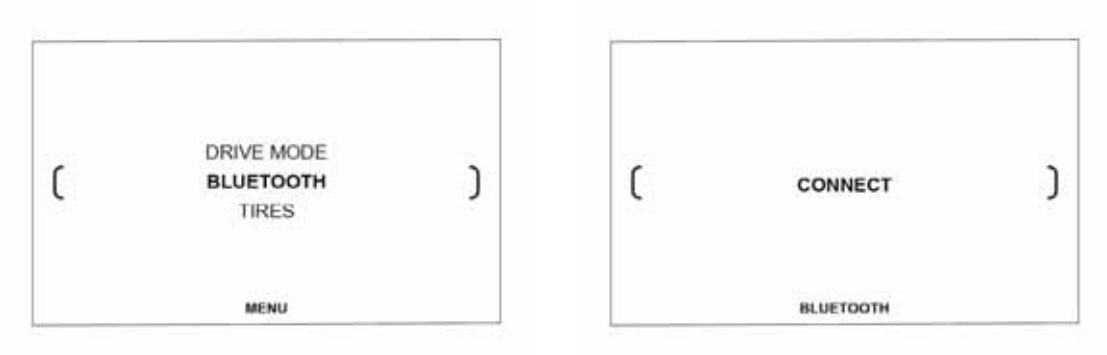
DRIVE MODE



It is possible to select between two modes: NORMAL or SPORT

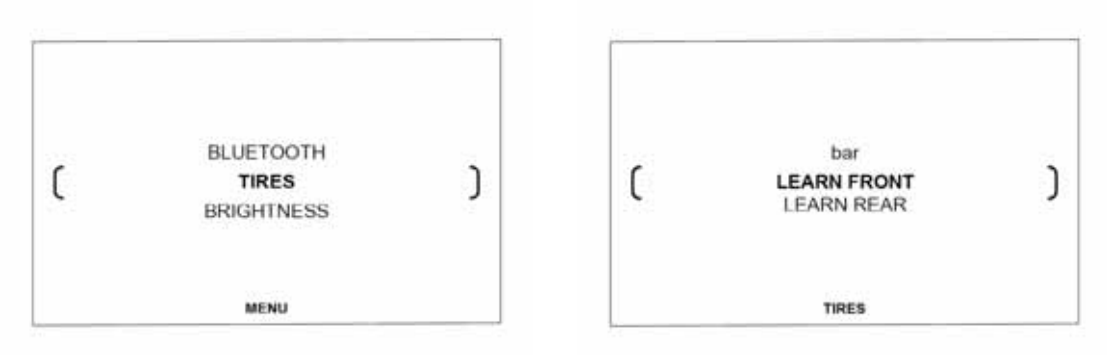
FEATURES
INSTRUMENT AND CONTROL FUNCTIONS

BLUETOOTH



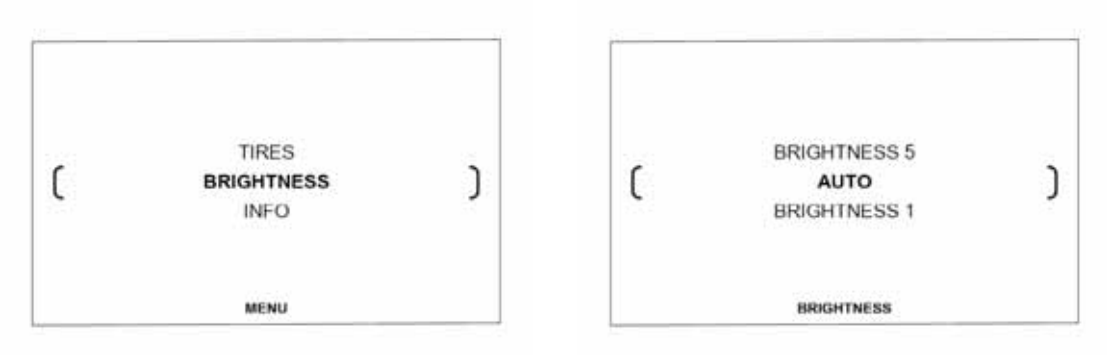
Select “CONNECT” to activate the Bluetooth; select “CLOSE” to disable the Bluetooth.

TIRES



It allows to pair the tire pressure sensors with the on-board device.

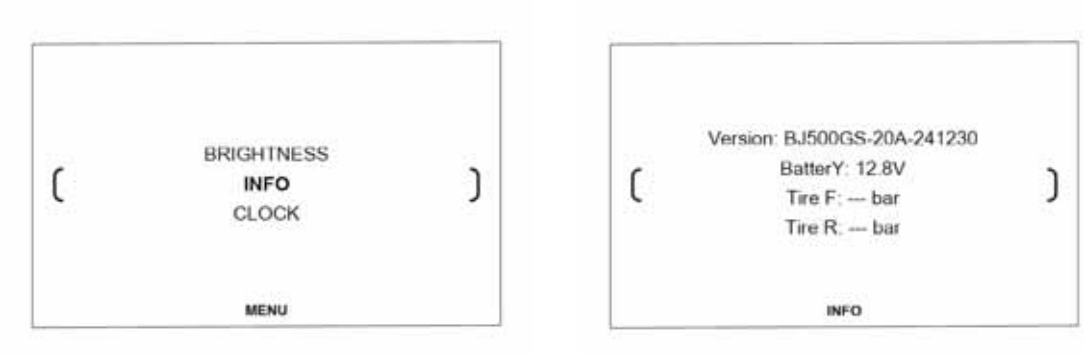
BRIGHTNESS



There are six brightness levels to choose from: BRIGHTNESS from 1 to 5 or AUTOMATIC
After having selected the “AUTOMATIC” mode, the optical sensor selects the mode automatically based on the ambient light.

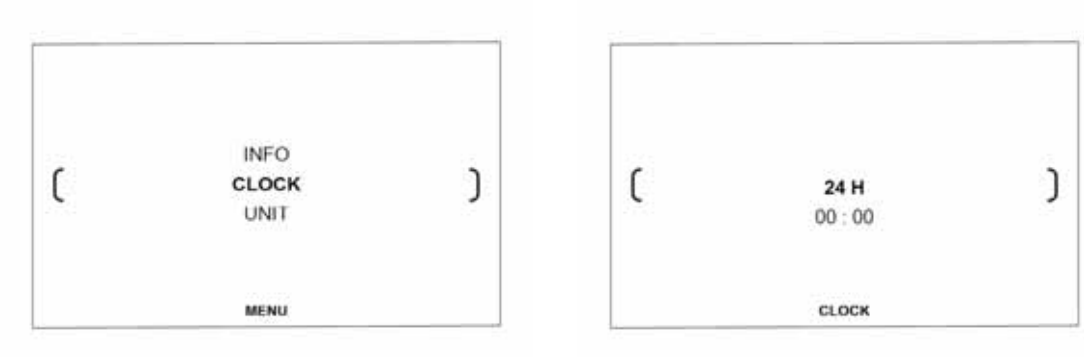
FEATURES
INSTRUMENT AND CONTROL FUNCTIONS

INFO



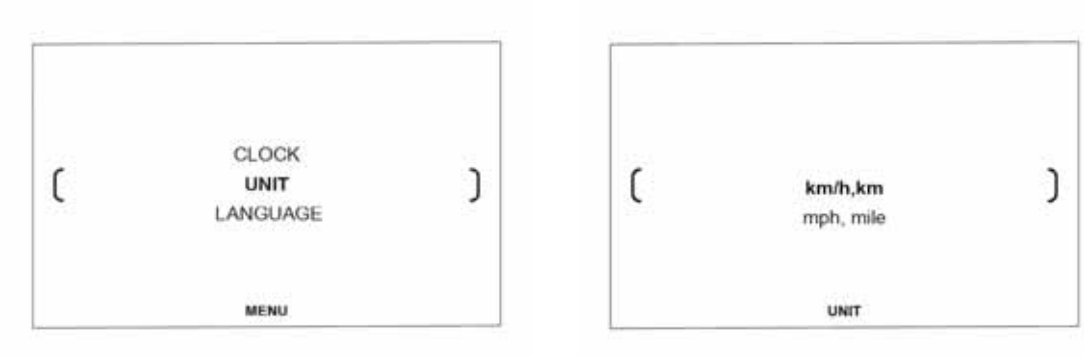
It shows the following information:
Vehicle version, battery voltage, pressure of front and rear tires, information on current faults and fault history.

CLOCK



The clock can be set on two formats: 24 or 12 hours.
Use the UP / DOWN / ENTER / BACK buttons on the left handlebar to set the time.

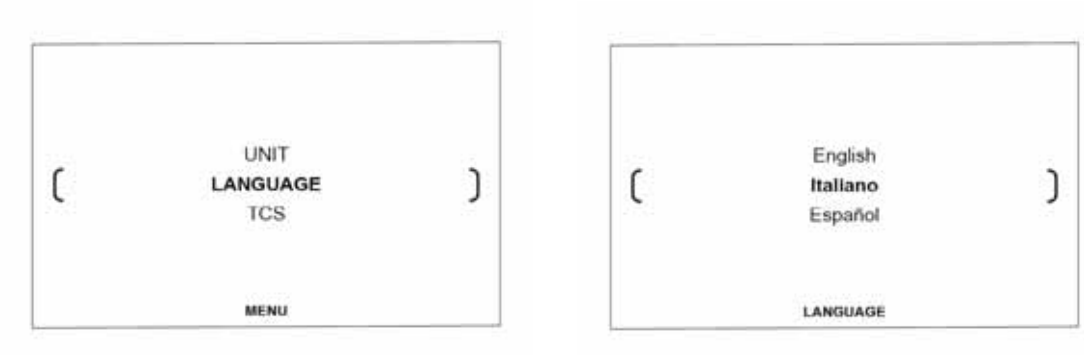
UNITS



It is possible to select between two units: metric (km/h, km) or imperial (mph, mile).
The units of the speedometer and the odometer will change automatically according to the unit selected.

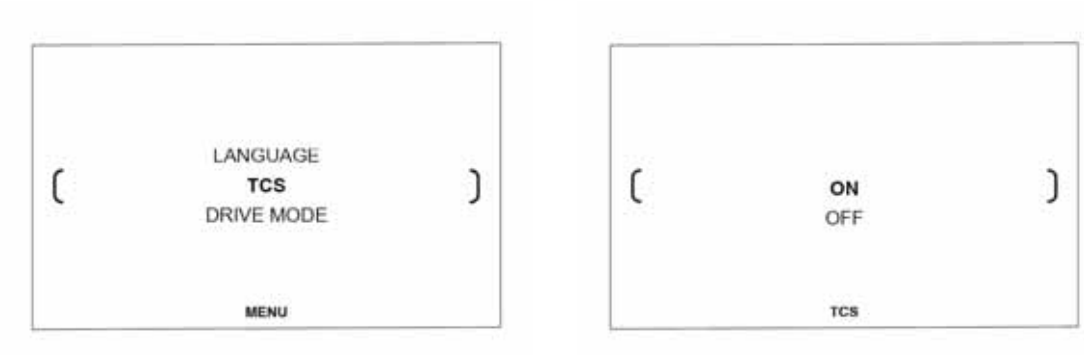
FEATURES
INSTRUMENT AND CONTROL FUNCTIONS

LANGUAGE



There are six languages available: English, Italian, Spanish, German, French, Japanese.
The functions of the device will change automatically into the selected language.

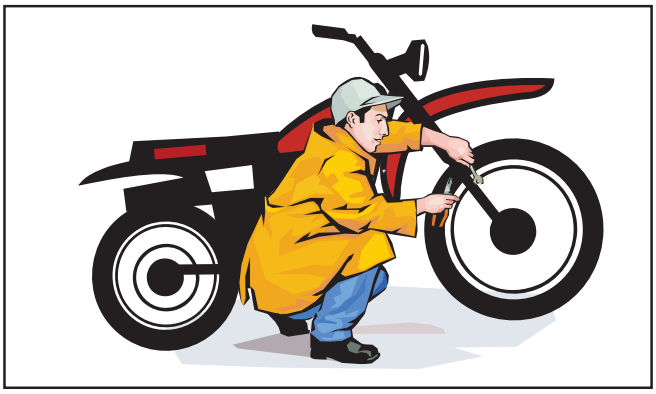
TCS



Select “ON” to activate the TCS;
select “OFF” to disable it.

IMPORTANT INFORMATION

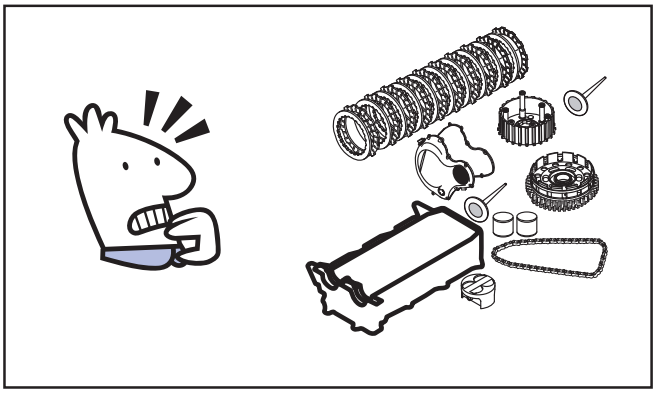
GETTING READY FOR REMOVAL AND DISASSEMBLY OPERATIONS



- Before carrying out any removal and disassembly operations, remove any dirt, mud, dust or foreign bodies.

- Use only suitable cleaning tools and products.
  See the paragraph “SPECIAL TOOLS”.

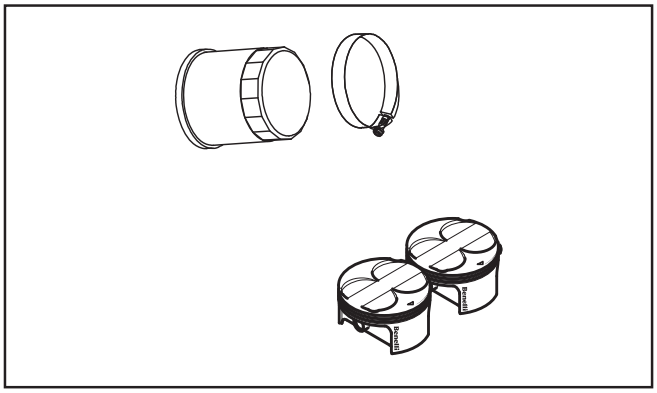
- While disassembling the vehicle, we recommend keeping coupled parts together at all times. These parts include gears, cylinders, pistons and other parts, whose surfaces will be "coupled" during the normal wear and tear of work. Coupled pieces must always be re-used or replaced in groups. During the disassembly operation, clean all parts and place them in a bowl, using the same order as for disassembly. This will make reassembly operations easier and allows for the correct installation of all parts.



- Keep all parts away from any source of heat.

SPARE PARTS

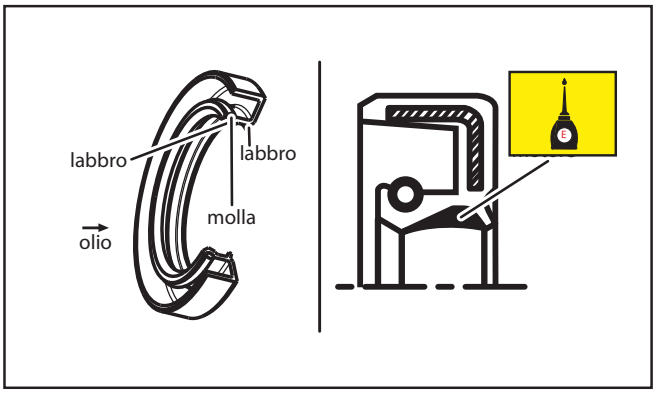
Use only Benelli original replacement parts. Use only oils and grease recommended by Benelli to lubricate parts. Other brands may look similar and operate in a similar manner, but will be of lower quality.



IMPORTANT INFORMATION

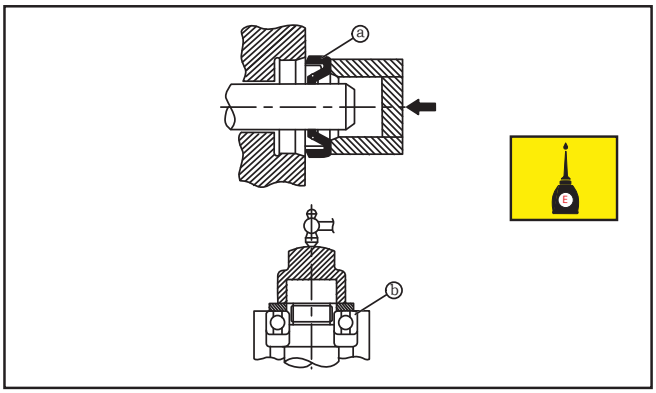
SEALS, O-RINGS, OIL SEALS, AND BEARINGS

Always replace all seals, oil seals and O-rings when carrying out repairs to the engine.
The seal surfaces, oil seal lips and O-rings must always be clean.
During installation, always oil the coupled parts and bearings, and lubricate the oil seal lips with engine oil.



Insert the bearings and oil seals so that the brand or manufacturer's number is facing outwards and visible. To install the oil seal, lubricate the lips with a fine layer of engine oil.
Always apply plenty of oil to bearings when installing them.

a. Oil seal
b. Bearing

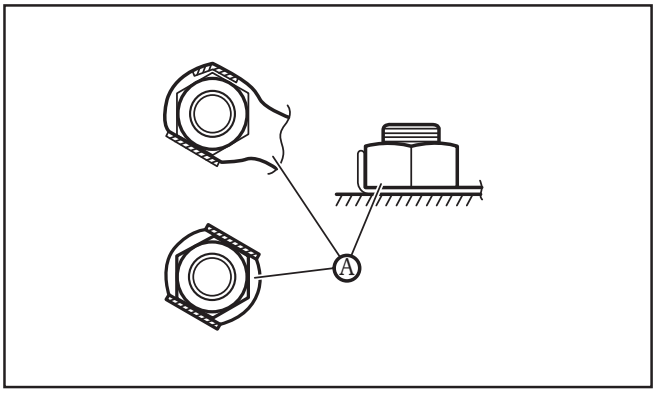


NOTICE

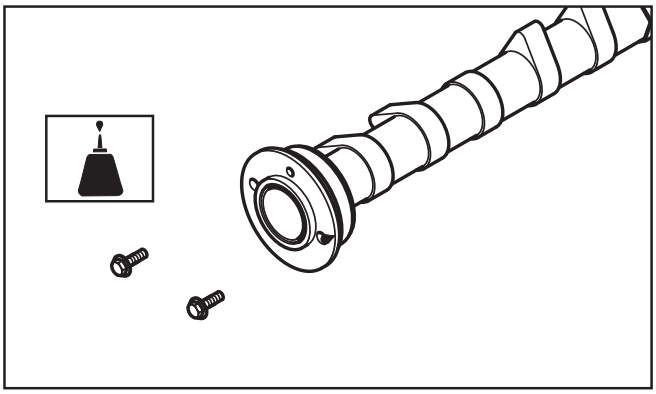
Never use compressed air to dry bearings, allowing them to turn, as this will damage the surfaces.

SAFETY WASHERS/PLATES, COTTER PINS, AND THREAD LOCKER

After removing, replace all of the safety washers "A", the safety plates and cotters.
After tightening the bolt or nut according to specification, bend the locking tabs and the ends of the cotter against the flat sides of the nut.



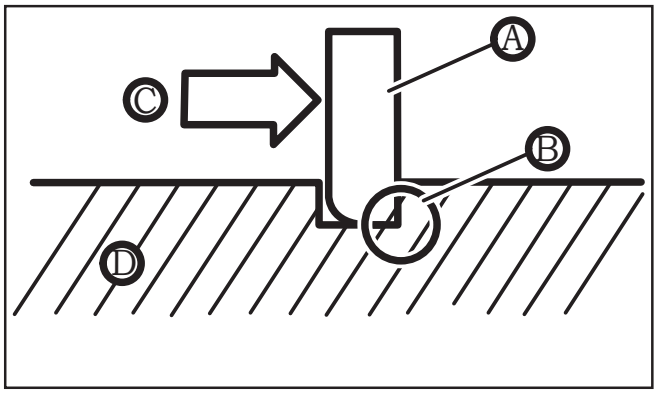
Before applying the thread locker, always degrease both parts with solvent.



IMPORTANT INFORMATION

SAFETY SNAP RINGS

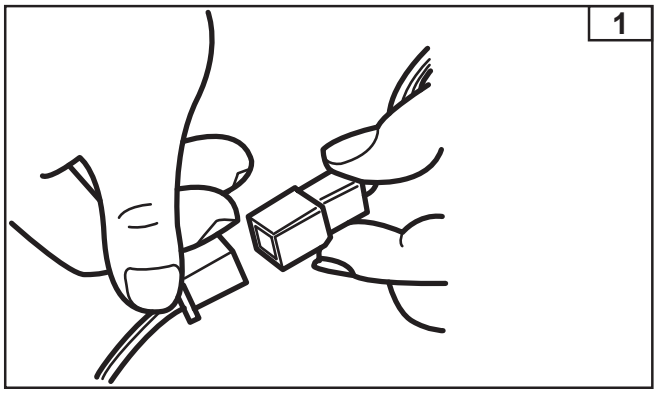
Before reassembling them, check all of the snap rings and replace any that have become damaged or are out of shape.
Always replace the snap rings on the pin after using them once.
When installing a snap ring “A”, make sure the sharp edge “B” is positioned on the other side compared to the thrust “C” that it receives.
"D" Shaft



CHECKING CONNECTIONS

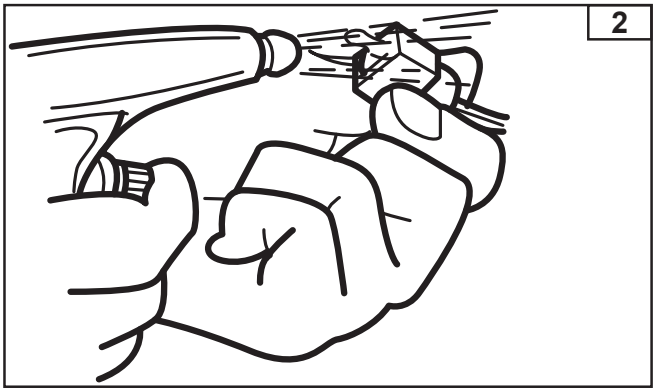
Make sure that there are no marks, rust, moisture, etc. on wiring, couplers, or connectors.

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



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

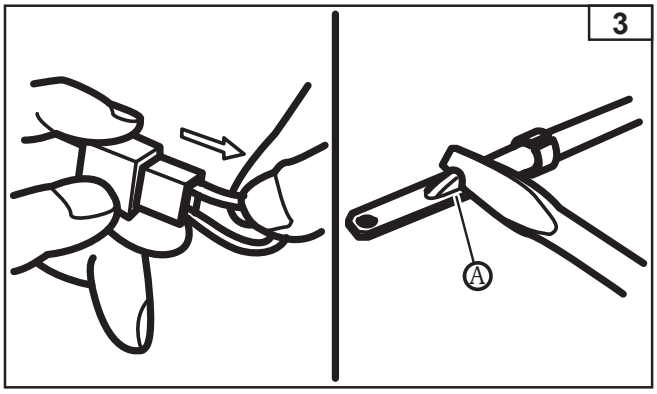
If there are traces of moisture → Use a fan to dry.
If there is any rust/marks → Connect and disconnect the parts several times.



3. Check:
- **all connections**

If there are any loose connections → Reconnect them properly.

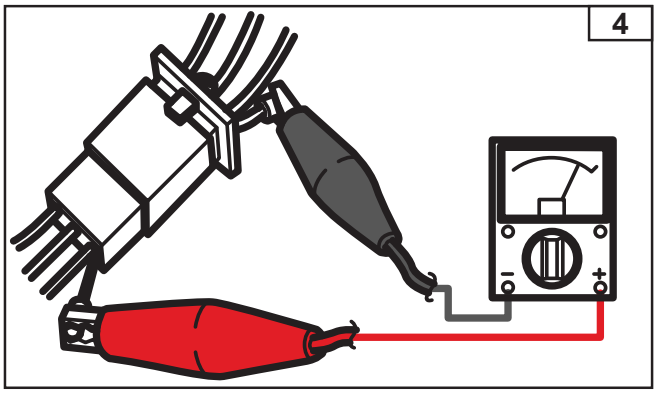
NOTE:
If the foot of the terminal “A” is bent, raise it.



IMPORTANT INFORMATION

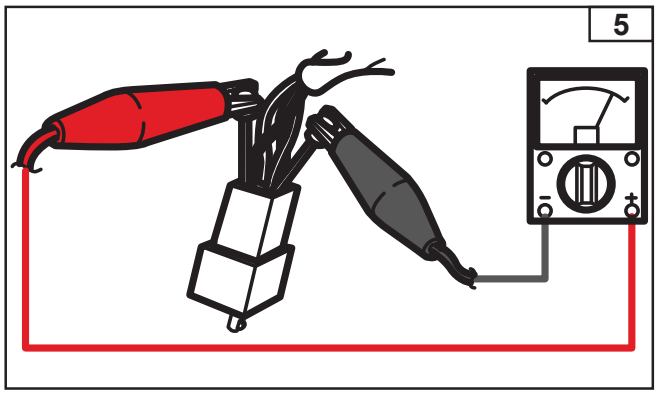
4. Connect:
- **The wire**
- **The coupler**
- **The connector**

NOTE:
Make sure all connections are installed tightly.



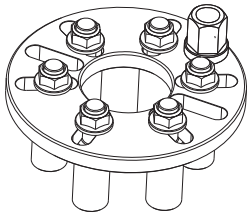
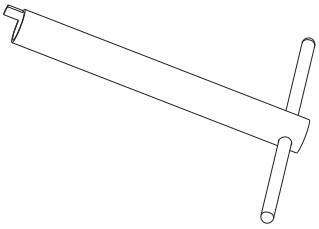
5. Check:
- **Continuity** (using a pocket tester)

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.

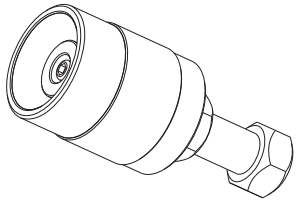
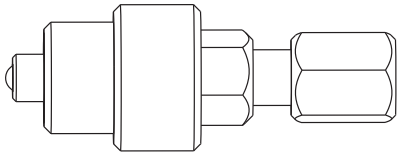
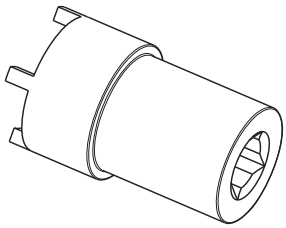
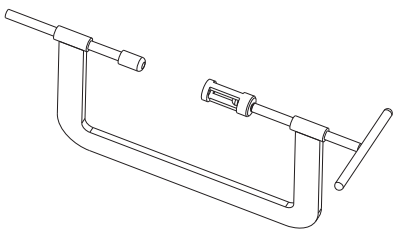


SPECIAL TOOLS

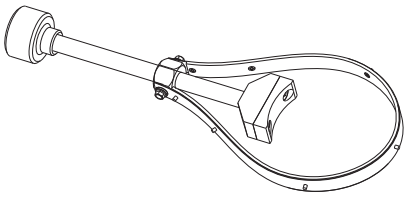
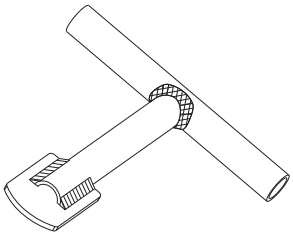
The special equipment listed here serves for the complete, thorough performance of fine tuning and assembly operations. The use of this equipment will help to prevent damage caused through using unsuitable tools or makeshift techniques. When completing an order, please check the list below to avoid any errors.

ENGINE SPECIAL TOOLS		
Tool Code	Tool Name / Function	Image
R180197025000	**Pad for valve oil seal** This serves to insert the valve oil seal in situ.	
KST03BL01057	**Clutch disassembly wrench** This serves to block the clutch drum and loosen 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 rings and for the subsequent insertion into the cylinder.	
0320097051000	**Gear selection drum assembly tool** This tool serves to assemble the gear selection drum.	

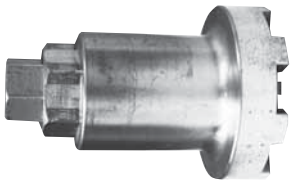
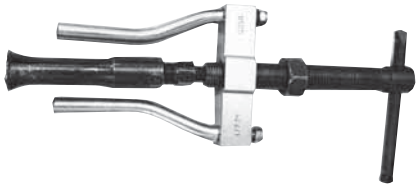
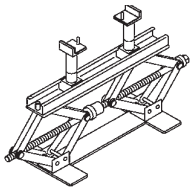
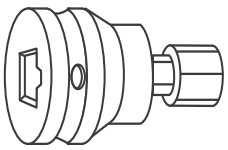
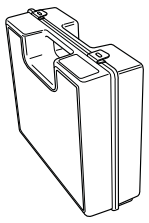
SPECIAL TOOLS

ENGINE SPECIAL TOOLS		
Tool Code	Tool Name / Function	Image
KST03BL01055	**Flywheel extractor** This tool serves to extract the flywheel from the crankshaft.	
KST03BL01054	**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.	
KST03BL01031	**Oil filter tool** This tool serves to tighten or remove the engine oil filter.	
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.	

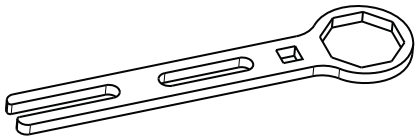
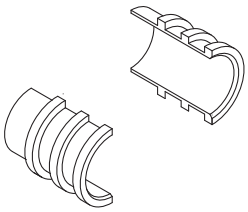
SPECIAL TOOLS

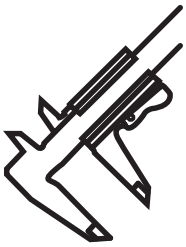
ENGINE SPECIAL TOOLS		
Tool Code	Tool Name / Function	Image
Standard tool commonly found	**Measuring tool commonly found** This tool is used to measure the inner dimensions of bores.	
Standard tool commonly found	**Measuring tool commonly found** This tool is used to measure the external dimensions of parts.	
Standard tool commonly found	**Measuring tool commonly found** This tool is used to measure thicknesses.	
0320097044000	**Key assembly tool of flywheel** This tool serves to tighten the flywheel on the crankshaft.	
0320097043000	**Flywheel cover screwdriver tool** This tool serves to unscrew the magnetic cap of the alternator cover.	

SPECIAL TOOLS

SPECIAL FRAME TOOLS		
Tool Code	Tool Name / Function	Image
R180297129000	**Steering sleeve lock ring nut tightening tool** This composed tool is used to tighten the steering sleeve lock nut.	
Standard tool commonly found	**Front wheel spindle tightening tool** This tool serves to tighten the front wheel spindle.	
Standard tool commonly found	**Rear swingarm bearing removing tool** This tool serves to extract bearings.	
Standard tool commonly found	**Jack** It allows to lift the frame and the engine.	
R300097146000	**Steering plate screw key** It allows to loosen the special key of the steering column.	
0000097277000	**Diagnostic Tool**	

SPECIAL TOOLS

SPECIAL FRAME TOOLS		
Tool Code	Tool Name / Function	Image
R00009758000	**Fork cap key tool** This tool is used to close/open the fork cap.	
Standard tool commonly found	**Spring compression key tool** This tool is used to compress the spring inside the fork.	
Standard tool commonly found	**Fork oil seal assembly tool** This tool is used to insert the oil seal into the fork.	



2 SPEC.

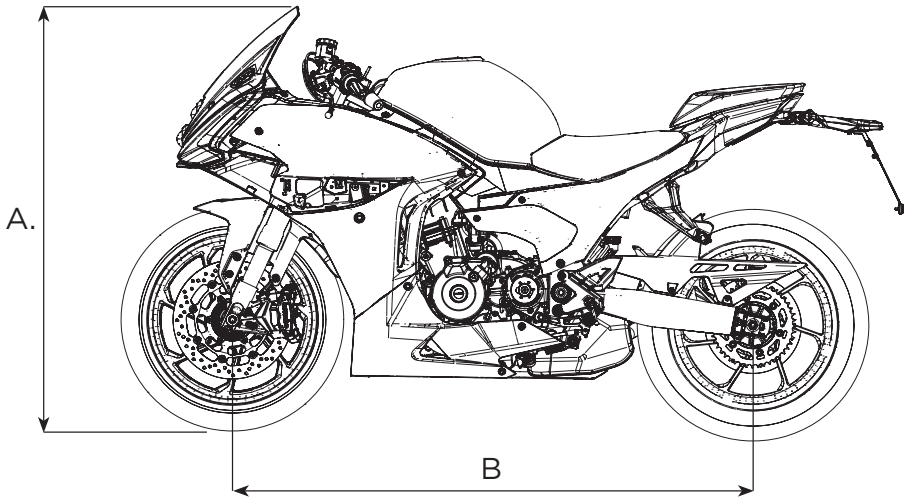
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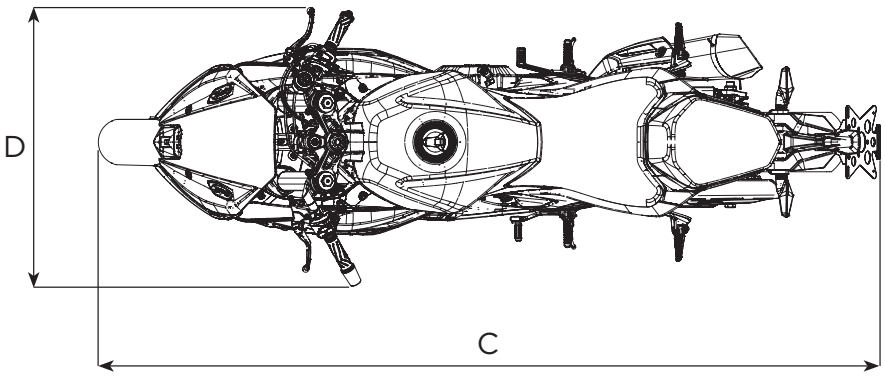
SPECIFICATIONS

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GENERAL SPECIFICATIONS

TORNADO 550	
SIZE	**STANDARD**
Total height (A)	1155 mm
Wheelbase (B)	1420 mm
Total length (C)	2090 mm
Total width (D)	770 mm
WEIGHT	**STANDARD**
Kerb weight (with full oil and fuel tank)	198 Kg
Max. technically permissible load (with rider and load)	177 Kg
(1 mm = 0.0393701 in)	

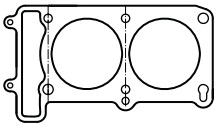
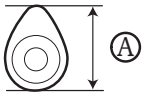
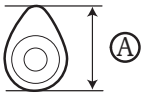
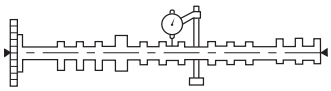




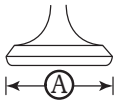
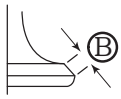
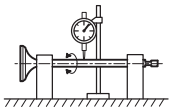
TECHNICAL DATA
ENGINE SPECIFICATIONS

TORNADO 550	
ENGINE	**STANDARD**
Type of engine	2 inline cylinders, 4 stroke, water cooling, 4 valves for each cylinder, and double overhead camshaft DOHC
Displacement:	554 cc
Number of cylinders	2
Cylinder layout	In line
Bore × stroke	70.5 x 71 mm
Compression ratio	11.5: 1
Idle speed	1400 ~ 1600
Distribution	Double overhead camshaft, chain-controlled, and 4-valves for each cylinder
Maximum net power	41.2 kW at 8250 rpm (56.01 HP)
Max. net torque	54 Nm / 5500 rpm
FUEL	**STANDARD**
Recommended fuel	Unleaded petrol (gasohol containing Ethanol no at 10% volume (E10)
ENGINE OIL	**STANDARD**
Lubrication system	Wet sump
Amount without replacement of oil filter cartridge	2.9 +/- 0.1 L
Amount with replacement of oil filter cartridge	3 +/- 0.1
Recommended oil:	API SN - SAE 10w50
OIL FILTER	**STANDARD**
Type of oil filter	Cartridge
OIL PUMP	**STANDARD**
Oil pump type	Lobe
Clearance between the inner and outer rotor tips	0.25 mm max
Clearance between outer rotor and oil pump	0.2 mm max
STARTING	**STANDARD**
Ignition system type	Electric starter
(1 mm = 0.0393701 in)	

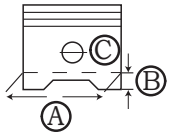
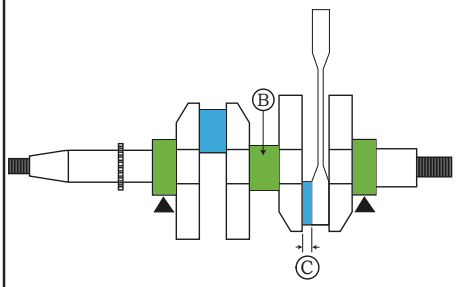
TECHNICAL DATA
ENGINE SPECIFICATIONS

SPARK PLUGS	STANDARD
Model (make) x quantity	NGK CR8E (Qty. 2)
Spark plug gap	0.7 ÷ 0.8 mm (0.275591 ÷ 0.314961 in)
CYLINDER HEAD	**STANDARD**
	Planarity check= 0.05 mm
CAMSHAFTS	**STANDARD**
Control system	Chain transmission
Camshaft diameter	Ø 23.950 mm - 24.965 mm
Clearance between camshaft and camshaft seat	0.1 max
Camshaft radial clearance	0.02 - 0.050 mm
Camshaft lobe dimensions, intake side 	Size “**A**” intake 32.50 - 32.55 mm Intake wear limit 32.475 mm
Camshaft lobe dimensions, exhaust side 	Size “**A**” exhaust 31.90 - 31.95 mm Exhaust wear limit 31.875 mm
Max camshaft eccentricity 	0.02 mm
DISTRIBUTION CHAIN	**STANDARD**
Automatic tensioning	System
(1 mm = 0.0393701 in)	

TECHNICAL DATA
ENGINE SPECIFICATIONS

VALVES, VALVE SEATS, VALVE GUIDES		STANDARD
Intake valve clearance (cold)		0.15 - 0.20 mm
Exhaust valve clearance (cold)		0.20 - 0.25 mm
VALVE SIZE		
 Head "A" diameter	Intake	Ø 26 mm
	Exhaust	Ø 22 mm
 Ground surface width "B"	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
CYLINDERS		**STANDARD**
Cylinder layout		In line
Bore x stroke:		Ø 70.5 x 71 mm
Compression ratio		11.5:1
Maximum ovalization		0.008 mm
Maximum taper		0.06 mm
(1 mm = 0.0393701 in)		

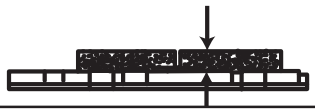
TECHNICAL DATA
ENGINE SPECIFICATIONS

PISTON		STANDARD
Clearance between piston and cylinder		0.03 ~ 0.05 mm limit 0.060mm
	Piston diameter “A”	70.5 mm
	Piston height “B”	N/A
	Pin seat diameter "C"	17.00 mm
Piston pin outside diameter		17 mm
CONNECTING RODS		**STANDARD**
Diameter of connecting rod axle		37.984 - 38.000 mm Limit 37.97mm
Bearing colour codes		A = Black B = Blue C = Brown
DRIVE SHAFT		**STANDARD**
		
Diameter “B”		37.984 - 38 mm Limit 37.97mm
Side clearance of connecting rod big end “C”		0.1 - 0.25 mm
Main bearing colour code		A = Black B = Blue C = Brown
(1 mm = 0.0393701 in)		

TECHNICAL DATA
ENGINE SPECIFICATIONS

CLUTCH	STANDARD
Clutch type	Wet clutch, multiple discs, slipper device
Clutch release method	Cable with springs
Clutch release action	Cable operation
Clutch control	Mechanical
Activation	Via cable
Control layout	Lever on the handlebar, left side
Clutch cable clearance (at the end of the clutch lever)	2 ~ 3 mm
Friction plate thickness	min 3 mm max 3.1 mm limit 2.8mm
Number of friction plates	8
Steel disc thickness	min 1.50 mm max 1.55 mm limit 1.50mm
Steel disc thickness	7
Disc pack thickness	min 34 mm - max 35 mm
Max. warping	0.05 mm
Clutch spring free length	38.50 +/- 0.2 mm
Spring quantity	3
TRANSMISSION	**STANDARD**
Transmission type	Straight-toothed gearbox
Main reduction ratio	38 / 74
Secondary reduction system	Chain, ratio 14 / 44
Transmission ratio	
1st	13 / 37
2nd	19 / 37
3rd	18 / 28
4th	24 / 32
5th	21 / 25
6th	25 / 24
GEAR CONTROL MECHANISM	**STANDARD**
Type of gear control mechanism	Sequential with desmodronic drive and prese-lector
Maximum warp on gear control rod	Straightness 0.02 - Roundness 0.005
AIR FILTER	**STANDARD**
Air filter type	PAPER
FUEL PUMP	**STANDARD**
Pump type	Electric pump
Model (manufacturer)	Q.J.
Output pressure	250 KPa
Flow rate	≥ 37 L/h
THROTTLED BODIES	**STANDARD**
Diameter	41mm
Throttle cable clearance (at the throttle hand grip flange)	2-3 mm
(1 mm = 0.0393701 in)	

TECHNICAL DATA
FRAME SPECIFICATIONS

FRAME		STANDARD
Frame type		Steel pipe frame
FRONT WHEEL		**STANDARD**
Wheel type		Aluminium alloy
Rim		17” x MT 3.50 DOT
Wheel travel		110 mm
REAR WHEEL		**STANDARD**
Wheel type		Aluminium alloy
Rim		17” x MT 4.50 DOT
Wheel travel		125 mm
FRONT TIRE		**STANDARD**
Size		Tubeless 120/70 - ZR17 - M/C
Model (Manufacturer)		N/A
Tire pressure		220kpa±10kpa
REAR TIRE		**STANDARD**
Size		Tubeless 160/60 - ZR17 - M/C
Model (Manufacturer)		N/A
Tire pressure		250kpa±10kpa
FRONT BRAKE		**STANDARD**
Brake type		Dual semi-floating disc with 4-piston caliper and ABS
Activation		With brake lever
Recommended liquid		DOT 4
	Diameter × Thickness	320 x 4.5 mm
	Minimum thickness	4mm
	Maximum deformation	0.15 mm
	Thickness of worn brake pads	Refer to the size limit on the pad
Inside diameter of pump cylinder		18 mm
Inside diameter of caliper cylinder		4 x 32 mm
REAR BRAKE		**STANDARD**
Brake type		Single disc with floating support single disc caliper and ABS
Activation		With the right pedal
Recommended liquid		DOT 4
	Diameter × Thickness	260 x 5 mm
	Minimum thickness	4.5 mm
	Maximum deformation	0.15 mm
	Thickness of worn brake pads	Refer to the size limit on the pad
Inside diameter of pump cylinder		14 mm
Inside diameter of caliper cylinder		34 mm
(1 mm = 0.0393701 in)		

TECHNICAL DATA
FRAME SPECIFICATIONS

FRONT SUSPENSION		STANDARD
Suspension type		Upside – down fork with ø 41mm stems
Wheel travel		110 mm
Spring	Free length	375± 0.5 mm
	Shim length	33 mm
	Flexibility (K1)	7.5 Nm
	Spring stroke (K1)	0~127 mm
Fork oil	Recommended oil	Bardahl XTF 10W
	Quantity for tube	365 cc
	Level (from the top of the external tube, with the external tube totally compressed and without the fork spring)	240 mm
STEERING		**STANDARD**
Steering bearings type		Ball bearing
Angle from one end of stroke to the other (left)		27.5°
Angle from one end of stroke to the other (right)		27.5°
REAR SUSPENSION		**STANDARD**
Suspension type		Swingarm with single central shock absorber adjustable in spring preload and brake in extension
Travel of rear shock absorber		45 mm
Travel of rear wheel		125 mm
Spring	Free length	170 mm
	Flexibility (K1)	K1=225 N/mm K2=260 N/mm
	Spring stroke (K1)	56 ± 1 mm
Adjustment of spring preload ring nut		20 mm ring nut from end of stroke
Rebound damping	STANDARD	- 5 clicks from fully closed
	Total	- 22 clicks from fully closed
TRANSMISSION CHAIN		**STANDARD**
Number of links		108
(1 mm = 0.0393701 in)		

TECHNICAL DATA
ELECTRICAL SPECIFICATIONS

SYSTEM VOLTAGE	STANDARD
System voltage	12 V
IGNITION COILS	**STANDARD**
Model (manufacturer)	QJ
Resistance of primary coil	0.65 ± 0.07 Ohm
Resistance of secondary coil	4 ± 0.5 kOhm
Inductance of primary coil	2.2 ± 0.3 mH
Inductance of secondary coil	8.1 H
Max. permissible current value	6 ± 0.5 A
CHARGE SYSTEM	**STANDARD**
System type	AC Magnetic
Model (manufacturer)	QJ
Windings	0.2 ± 0.1 Ohm
Rated Power	12 V at 4000 rpm
Rated Power	at 1400r/min ≥15A at 5000r/min ≤26A
Voltage adjustment	13.5 +0.5 V (3000 rpm 25 °C)
STARTING RELAY	**STANDARD**
Model (manufacturer)	QJ
Amperage	100 A
Coil resistance	4.4 Ohm at 20°C
BATTERY	**STANDARD**
Model (manufacturer)	YTZ14S NANO-GEL Super Sealed
Voltage of battery capacity	12V/ 11.2 Ah
CCA inrush current	230CCA
HEADLAMP	**STANDARD**
Type of headlamp	LED
LAMPS (WATT VOLTAGE X QTY)	**STANDARD**
Headlamps (High/Dipped beam)	LED12V 9/9W
Front position indicator light	LED 12V 2.2W
Rear position indicator light/brake light	LED 12V 0.3/2.6W
Turn signal lights	LED 12V 2.4W
License plate light	LED 12V 0.3W
Instrument panel light	Integral LED

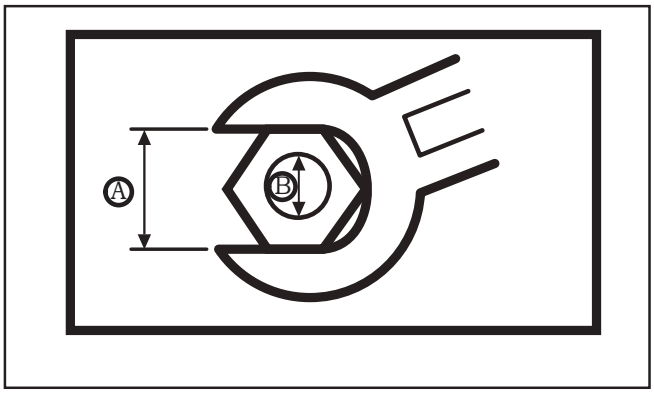
TECHNICAL DATA
ELECTRICAL SPECIFICATIONS

ELECTRONIC START-UP SYSTEM	STANDARD
Model (manufacturer)	QJ
Power output	0.7 kw
HORN	**STANDARD**
Horn type	Electromagnetic with disc resonator
Model (manufacturer)	QJ
Maximum amperage	3 A
Performance	105 - 118 dB
FLASHER RELAYS	**STANDARD**
Relay type	Electronic Flasher
Model (manufacturer)	QJ 600 45 Flasher
Flashing frequency of turn signal lights	85/min
Watt	2.4 W x 4
OIL PRESSURE SENSOR	**STANDARD**
Model (manufacturer)/Setting	0.05 ±0.015 MPa
FUSES (AMPERAGE X QTY)	**STANDARD**
Power Lock	15 A
ECU1	15 A
FBT (sensor)	15 A
FAN	10 A
FUEL PUMP	15 A
SPARE	10A / 15A / 25A
ABS 1	15 A
ABS 2	25 A
THROTTLE VALVE SENSOR	**STANDARD**
Model (manufacturer)	TGKEAIR
Output power voltage	0.5 to 4.5 V
FUEL PUMP	**STANDARD**
Max. amperage/Pressure/Flow rate	2.8 A / 2.50 kPa /≥50 L/h
Level sensor	External
Min. Max. resistance	90 Ohm +/-2 empty - 9 Ohm +/-2 full
SAFETY SWITCHES	**STANDARD**
Stand switch	QJ
Neutral switch	QJ
Drop sensor	QJ 250T - 3 (QJ)
AIRBOX AIR TEMPERATURE SENSOR	**STANDARD**
Model (manufacturer)	12160244 (PACKARD)
Resistance	181 ± 8 Ohm 100°C
THROTTLE BODY AIR PRESSURE SENSOR	**STANDARD**
MODEL (manufacturer)/Power supply voltage	F01R00E018 (HYUNDAI KEFICO) 5V

TECHNICAL DATA
ELECTRICAL SPECIFICATIONS

FLUID TEMPERATURE SENSOR	STANDARD
Model (manufacturer)	Loreada
Resistance	100°C - 178 Ohm
SPEED SENSOR	**STANDARD**
Model (manufacturer)/GAP	QJ/ 1 mm -1.5 mm
OXYGEN SENSOR	**STANDARD**
Model (manufacturer)	QJ
INJECTOR	**STANDARD**
Model (manufacturer)	QJ
RELAY ASSEMBLY	**STANDARD**
Model (manufacturer)	HFV6 (HF)
IGNITION SYSTEM	**STANDARD**
Ignition type	EZ MT 05.B
Ignition timing	26.25° ± 2° before TDC at maximum power
Signal wheel sensor (pick-up)	550 ± 50 Ohm
Model (manufacturer)	QJ
STEPPER	**STANDARD**
Model (manufacturer)	LOREADA
Stepper type	Dual-phase
RADIATOR FAN	**STANDARD**
Model (manufacturer)/Electric consumption	PANASONIC SSW7109 / 2.76 A 12 V

TECHNICAL DATA
GENERAL TIGHTENING SPECIFICATIONS



The tightness torques for parts or special assemblies are provided in each chapter of this manual.
As far as concerns assemblies with multiple fastening elements, in order to avoid the risk of warping, cross-tighten the parts in successive stages until the required torque is achieved.
Unless otherwise stated, 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

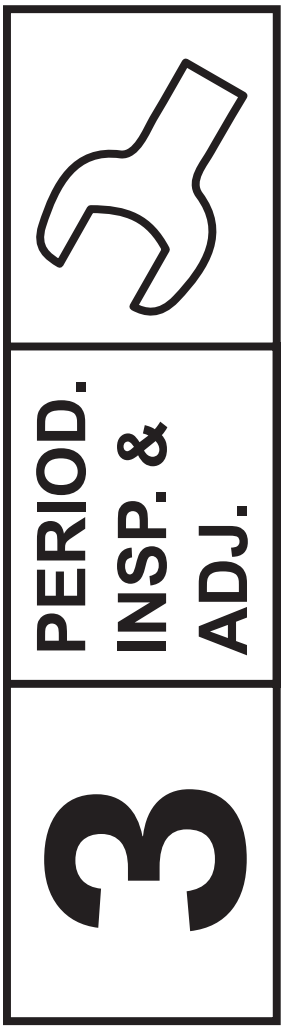
TIGHTENING TORQUES AND RELEVANT PRELOADS FOR STANDARD CONNECTIONS

The values given in the following table refer to standard tightness, i.e., for metric screws coupled with the relevant nut, or with screw nut in metal.
The bodies to be tightened must be metal or sufficiently rigid not to required the insertion of bushing or shims.
Coupling is always made with the thread slightly oiled or greased; alternatively, the type of thread locker required must be stated.
Axial preloads related to tightening torque have increased by 10% compared to the value calculated, to take into account the tolerance on the nominal torque and the variation that the friction coefficient may undergo from tightening to tightening.

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 named has a fine pitch.

Remarks


3
PERIOD.
INSP. &
ADJ.

CHAPTER 3

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Remarks

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 set to OFF.
While checking fluid levels, it is preferable to keep the motorcycle upright without using the rear stand.
Checks need to be made every year, except in cases where maintenance inspections are carried out as part of services linked to mileage.
When reaching 25.000 km (15,500 mi), repeat services, starting from the one of 7000 km (4400 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 pages contain the tables of the maintenance tasks.

NOTE:
AIR FILTER
• The air filter needs to be replaced more often when using the vehicle in particularly damp or dusty environments.

HYDRAUILC BRAKE MAINTENANCE
• Check brake fluid levels on a regular basis and top up as necessary.
• Replace brake hoses every 4 years, or before if cracked or damaged.

KEY: PERIODIC MAINTENANCE AND LUBRICATION INTERVALS	
I	Inspection and adjustment, cleaning, lubrication or replacement, as needed.
R	Replacement
T	Tighten
◙	Dealer

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

MAINTENANCE INTERVALS

NO.		Item	Check or maintenance intervals		Before Delivery	Frequency										Check Yearly
						1st		2°		3°		4°		5°		
				Km X 1,000	0	1		7		13		19		25		
				ml X 1,000	0	0.6		44		8.0		11.5		15.5		
1		Engine oil	Top up/Replacement	I		R		R		R		R		R		R
			Check	Every 500 km												
2	■	Oil filter	Replacement			R		R		R		R		R		
3	■	Air filter	Check/Replacement							R				R		
				Replace the air filter element more frequently when driving in very damp or dusty areas.												
4	■	Intake filter Oil	Check/Cleaning											I		
			Replace, if necessary.													
5	■	Fuel filter	Replacement									R				
				Every 18,000 km												
6	■	Throttle body	Check/Balancing/Clean-ing							I				I		
7	■	Valve clear-ance	Operation check Adjust clearance.											I		
8	■	Distribution chain														
				Every 48,000 km												
9	■	Distribution chain slides	Check													
			Replacement	Whenever the distribution chain tensioner is replaced												
10	■	Distribution chain tensioner	Check													
			Replacement	Whenever the distribution chain tensioner is replaced												
11	■	Spark plugs	Check/Replacement									R				
				Check the status, clean and adjust the spark plug gap.												
12	■	Distribution Chain	Check chain tension. Check whether the rear wheel is properly aligned. Clean and grease.	I		I		I		I		I		I		I
				Every 500 km and after every wash of the motorcycle or if the motorcycle has been used in the rain.												

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS
MAINTENANCE INTERVALS

NO.		Item	Check or maintenance intervals		Before Delivery	Frequency										Check Yearly
						1st		2°		3°		4°		5°		
				Km X 1,000	0	1		7		13		19		25		
				ml X 1,000	0	0.6		44		8.0		11.5		15.5		
13	■	Chain wheel	Check/Lubricate			I		I		I		I		I		I
				Replace whenever the transmission chain is replaced.												
14	■	Pinion/ Retaining washer	Check/Replacement			I		I		I		I		I		I
				Replace whenever the transmission chain is replaced.												
15	■	Fuel circuit hoses	Verify the fuel hoses are not cracked or damaged. If necessary, replace.			I		I		I		I		I		I
				Replace in any case every 4 years												
16	■	Brake fluid	Check/Top up	I		I		I		I		I		I		I
			Replacement	Replace in any case every 2 years												
17	■	Front brake/ Rear brake	Check caliper tightening. If necessary, replace pads. Make sure there are no leakages.	I		I		I		I		I		I		I
				Replace hoses every 4 years.												
19	■	Brake pads	Check/Replacement	I		I		I		I		I		I		I
				Replace if worn to the limit.												
20	■	Swingarm chain slides	Check/Replacement					I		I		I		I		I
				Replace if worn to the limit.												
21	■	Clutch control	Operation check Adjustment	I		I		I		I		I		I		I
22	■	Engine cover screws	Check/Tighten	I		T		T		T		T		T		
23	■	Control system of evapora-tive emissions (Canister)	Check for faults and leakages			I		I		I		I		I		I
				No maintenance required. In case of malfunction, replace.												
24	■	Throttle control hand grip and cable	Check operation, if necessary, adjust throttle cable clearance.	I		I		I		I		I		I		I

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

MAINTENANCE INTERVALS

NO.		Item	Check or maintenance intervals		Before Delivery	Frequency										Check Yearly
						1st		2°		3°		4°		5°		
				Km X 1,000	0	1		7		13		19		25		
				ml X 1,000	0	0.6		44		8.0		11.5		15.5		
25	■	Ring nut and sleeve and sleeve	Check/Adjustment	I		I		I		I		I		I		I
				Adjust if necessary.												
26	■	Steering bearings	Verify that the bearing is not loose or damaged.			I		I		I		I		I		
				Lubricate and replace, if necessary.												
27	■	Front/rear wheel bearings	Verify that the bearing is not loose or damaged.							I				I		
				Lubricate and replace, if necessary.												
28	■	Bearings and guide pin Swingarm	Verify that the bearing is not loose or damaged.					I		I		I		I		
				Lubricate and replace, if necessary.												
29	■	Swingarm .	Check operation, the pin tightening and make sure the clearance is not excessive. Lubricate.	I				I		I		I		I		
30	■	Fork	Check operation and make sure there are no leaks.	I		I		I		I		I		I		I
31	■	Rear Suspension	Check/Adjustment, make sure there are no leaks.	I		I		I		I		I		I		I
32	■	Wheels	Check they are not damaged.	I		I		I		I		I		I		I
				Replace, if necessary.												
33	■	Tires	Check depth, verify they are not damaged. Check inflation pressure.	I		I		I		I		I		I		I
				Replace if worn to the limit.												
34	■	Side stand	Check/Operation	I		I		I		I		I		I		I
				Lubricate and tighten if necessary.												
35	■	Ignition Side stand	Check/Operation	I		I		I		I		I		I		I
36	■	Spring drive rubber on sprocket	Check/Operation					I		I		I		I		
				Replace if worn.												

PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

MAINTENANCE INTERVALS

NO.		Item	Check or maintenance intervals		Before Delivery	Frequency										Check Yearly
				Km X 1,000	0	1st		2°		3°		4°		5°		
				ml X 1,000	0	0.6		44		8.0		11.5		15.5		
37	■	Instruments, lights, signals, and switches	Check/Operation	I		I		I		I		I		I		I
38	■	Front head-light	Check/Operation	I		I		I		I		I		I		I
			Adjustment	At every change in vehicle set-up												
39	■	Acoustic signal	Check/Operation	I		I		I		I		I		I		I
40	■	Battery	Check/Operation/Re-charge	I		I		I		I		I		I		I
				Replace, if necessary.												
41	■	Electric system	Check operation, rubbing, clearance, and free movement.	I		I		I		I		I		I		I
42	■	Ignition switch	Check/Operation	I		I		I		I		I		I		I
43	■	Electronic injection	Reading of faults memo-ry ECU/ Parameters	I		I		I		I		I		I		I
44	■	Fastening of motorcycle parts	Ensure that all nuts, bolts, and screws have been accurately fastened.	T		T		T		T		T		T		T
45	■	Parts and wires subject to movement	Check/Replacement	I		I		I		I		I		I		I
				Replace, if damaged.												
46	■	Coolant .	Check/Top up	I		I		I		I		I		R		I
			Replacement	Every 3 years when reaching the mileage.												
47	■	Cooling System	Check the coolant level and verify that there are no leaks of coolant from the vehicle.	I		I		I		I		I		I		I
48	■	Electric fans	Check/Operation	I		I		I		I		I		I		I
(1 KM=0.621 mi)																

ENGINE/AIRBOX
REMOVAL OF FILTER ELEMENT

Park the motorcycle on a level surface.

NOTICE

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

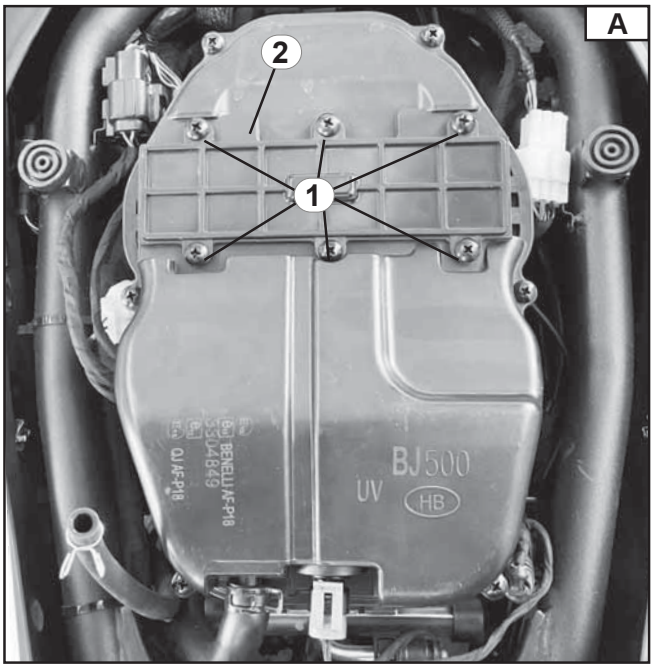
Remove:
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The 6 screws (1) Fig. A.
- The cover (2) Fig. A.

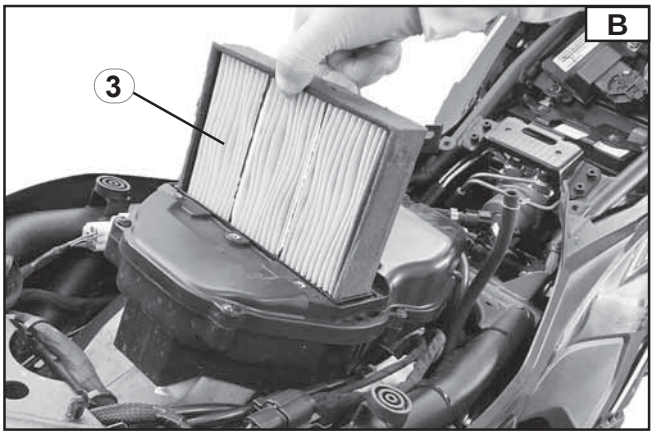
Remove:
- The filter element (3) Fig. B.

NOTICE

Replace the air filter element every 13,000 km (8,078 mi). If the vehicle is used in particularly humid climates or in very dusty areas, the air filter must be substituted more often.

Check:
If the filter element is damaged, replace.





ENGINE/AIRBOX
INSTALLATION OF FILTER ELEMENT

Installation:

- During the installation stage, follow the steps for removing the filter, as described above, only this time in reverse order.

WARNING

Never start the engine if the air filter is not mounted. Unfiltered air causes rapid wear to engine parts and might damage the engine. Furthermore, using the engine without air filter has a negative impact on the fine tuning of the throttles and this will worsen of engine performance, as well as causing engine 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.

ENGINE/THROTTLE CABLE CLEARANCE

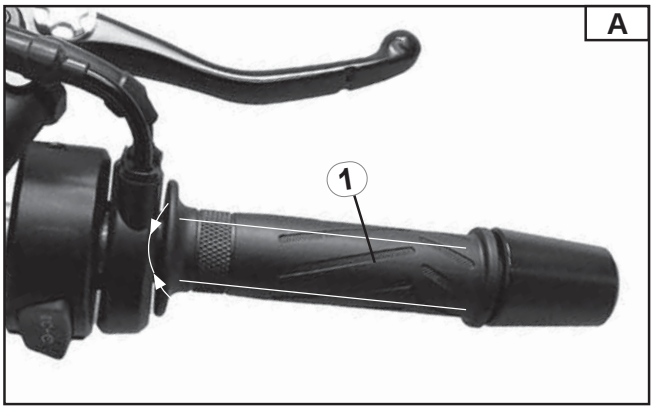
THROTTLE CABLE CLEARANCE ADJUSTMENT

Check:

- **The throttle cable clearance (1) Fig. A.**

Make sure the throttle hand 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.

Throttle cable clearance (A)	Dimensions
Throttle cable	2 - 3 mm (0.0787 - 0.1181 in)



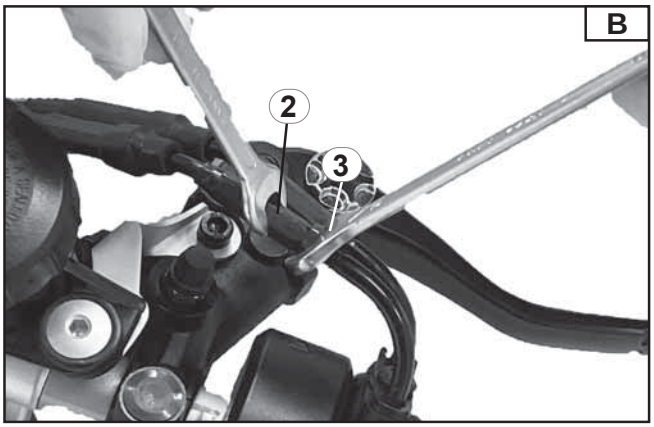
Adjust:

- Throttle cable clearance.

Handlebar side

1. Loosen the lock nut (3) Fig. B.
2. Turn the adjustment nut (2) clockwise or counter-clockwise until the throttle cable clearance meets specifications, Fig. B.

Throttle cable clearance	Clearance
Clockwise	Increases clearances
Counter-clockwise	The gap is decreased



3. Tighten the lock nut (3) Fig. B.

Make the adjustment to both throttle cables.

WARNING

After adjusting the throttle cable clearance, start the engine and turn the handlebar right and left, making sure that the minimum idle speed of the engine does not change.

ENGINE/CLUTCH CABLE

CLUTCH CABLE CLEARANCE ADJUSTMENT

Check:

- **The clutch cable clearance (1) Fig. A.**

If outside range, adjust.

Clearance distance
3 - 4 mm (0.1181 - 0.15748 in)

Adjust:

- The clutch cable clearance.

Handlebar side

1. Move the clutch cable cowling.
2. Tighten the ring nut (2) Fig. B.
3. Rotate the register (3) clockwise or counter-clockwise up to the specified clutch cable clearance Fig. B.

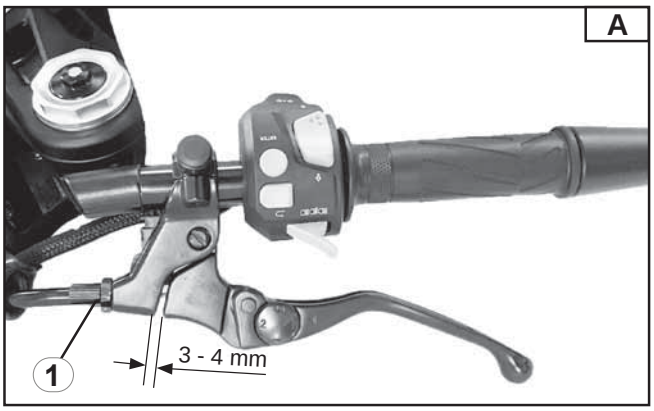
Clutch cable clearance	Clearance
Clockwise	Increases clearances
Counter-clockwise	The gap is decreased

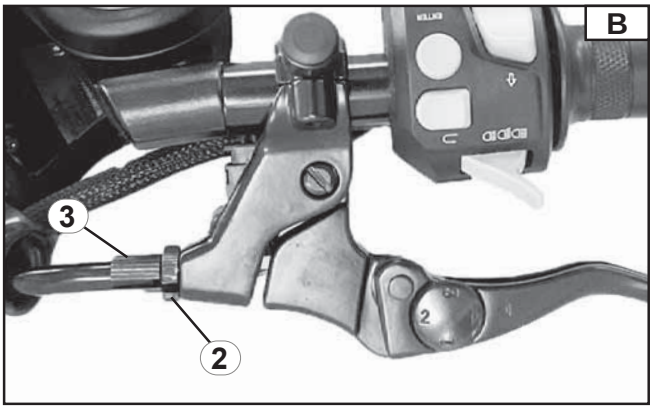
4. Tighten the ring nut (2) Fig. B.

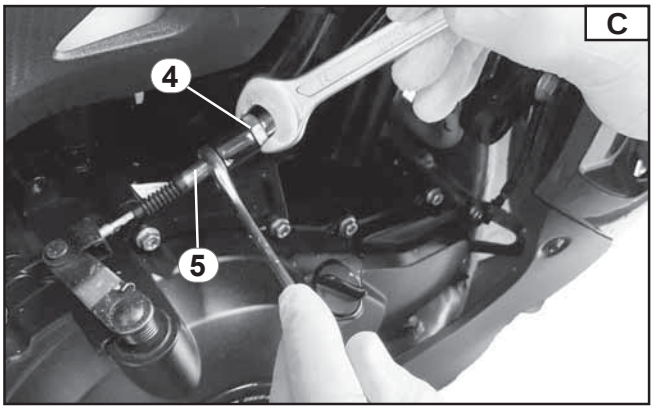
NOTE:

If it is not possible to achieve the specified clearance for the clutch cable from the handlebar side, use the adjustment nut on the engine side (5) Fig. C.

1. Prise the dust seal in the middle of the clutch cable.
2. Loosen the lock nut (4) in the middle of the clutch cable Fig. C.
3. Turn the adjustment nut (5) until the clearance is reached Fig. C.
4. Tighten the lock nut (4) in the middle of the clutch cable Fig. C.
5. Reposition the dust seal in the previous position.







ENGINE/ENGINE OIL

ENGINE OIL LEVEL CHECK

Park:
- The motorcycle on a level surface.

NOTE:
- **Place the motorcycle on a suitable stand.**
- **Make sure that the motorcycle in upright position.**

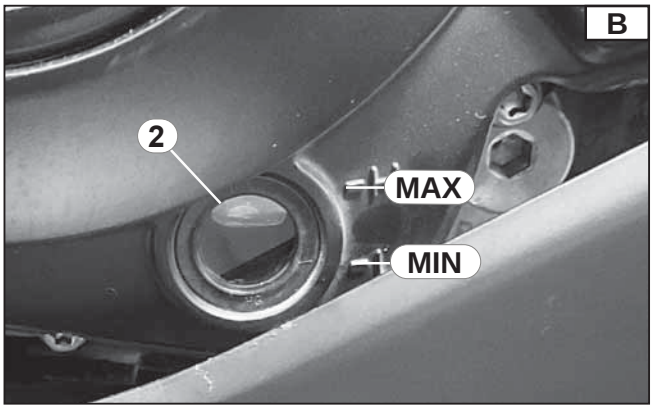
Start:
- The engine.

Leave it to warm up for a few minutes and then turn it off.

NOTICE

Do not start the engine if the oil level is below the MIN level shown on the sight glass (2) Fig. B.





Check of engine oil level:

- Wait a few minutes to allow oil to settle.
- Place the vehicle on a flat surface keeping it upright. A slight tilt to the side can lead to control errors.
- Check oil level via the sight glass (2) Fig. B.
- Unscrew the oil filler cap and add oil. Engine oil should be between the MIN and MAX level marks.
- If the engine oil is below the minimum level mark, top up sufficient recommended oil up to the correct level.

Recommended Lubricant
API SN - SAE 10w50

To top up with engine oil:
- Remove the oil filler cap (1) with the engine switched off Fig. A.
- Pour an amount of oil of the recommended type within the reference of the maximum (MAX) and the minimum (MIN) level of the sight glass (2) Fig. B.
- Screw the oil filler cap back in place (1) Fig. A.

NOTE:

The engine contains 3 +/- 0.1 l of oil (with filter replacement), 2.9 +/- 0.1 l of oil (without filter replacement).

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 engine oil properly.**

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/ENGINE OIL
CHANGE OF ENGINE OIL

Start:
- The engine.

Leave it to warm up for a few minutes and then turn it off.

Remove:
- The oil filler cap (1) Fig. A.

Position:
- A suitable container underneath the drainage for engine oil recovery.

NOTE:
Change the engine oil at 1000 Km (621 mi) first and then every 7000 km (4349 mi).

NOTICE

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

Remove:
- The magnetic cap (2) Fig. B.
- the copper gasket (3) Fig. D.

Drain:
- The engine oil from the crankcase.

NOTE:
When changing oil, change also the oil filter cartridge.

Replace:
- The gasket (3) of the magnetic cap Fig. D.

Install:
- The magnetic cap.

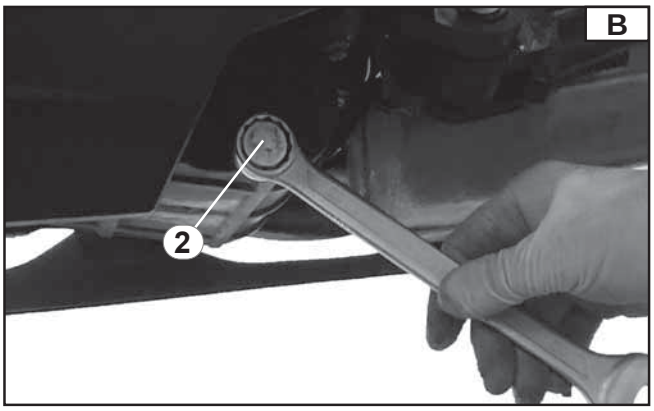
NOTE:
In case of metal traces on the magnetic cap, clean it before installation.

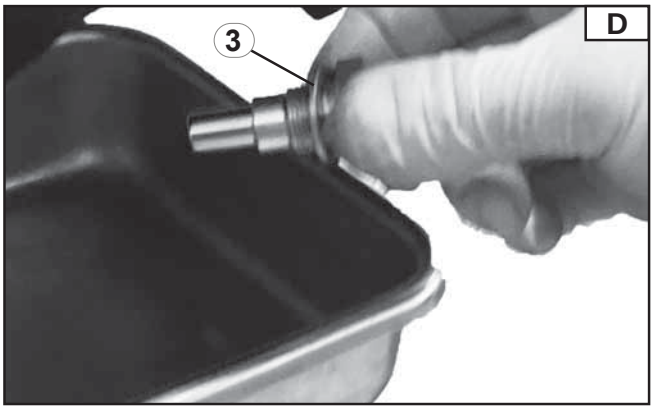
Tighten:
- The magnetic cap to the following torque:

Torque 24 N*m
Fill:
- The crankcase with the recommended engine oil with the specified amount Fig. E.

Install:
- The oil filler cap (1) Fig. A.









ENGINE/ENGINE OIL

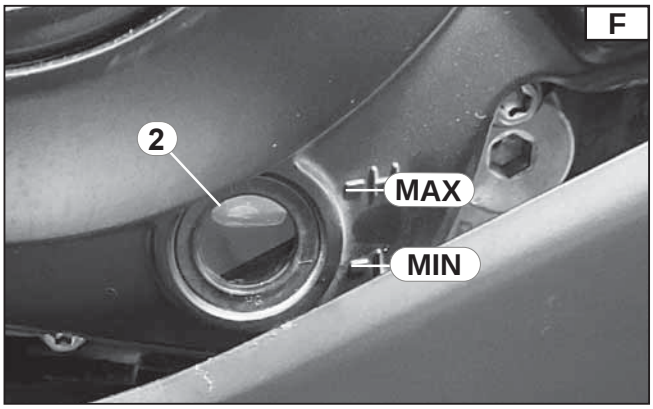
CHANGE OF ENGINE OIL

Start:

- The engine.

Leave it to warm up for a few minutes and then turn it off.

NOTE:
Wait 2-3 minutes after having switched off the engine and make sure that the level is halfway between the MIN and MAX marks on the gauge (2) Fig. F.
Top the engine oil level up, if necessary.



Recommended engine oil:
Grade: API SN - SAE
Viscosity: 10W50
Capacity: 3 ± 0.1 l of oil (with filter replacement)
Capacity: 2.9 ± 0.1 l of oil (without filter replacement)

ENGINE/ENGINE OIL

OIL FILTER REMOVAL/INSTALLATION

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

Remove:
- The conveyor, refer to **"Removal of bottom fairing, Chapter 4"**.

Removal:
1. Place a suitable container underneath the engine.
2. Use the specific tool to rotate the oil filter counter-clockwise (1) and take it out Fig. A.



Tool for oil filter removal
Code: KST03BL01031

Installation:
Proceed using the opposite order to removal.

NOTE:
Before installing a new oil filter, apply a fine layer of engine oil to the contact surfaces of the same to lubricate it Fig. B.

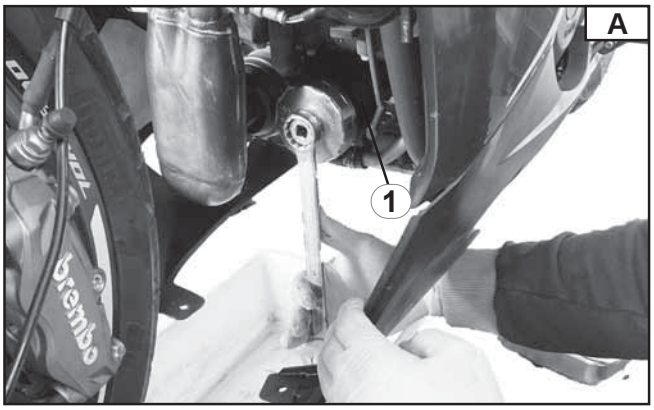
Tighten:
- The oil filter (1) Fig. A to the following torque:



Torque: 15. N*m

NOTICE

Always use original Benelli oil filters.
Non-original oil filters may differ in terms of threading (diameter and pitch) or calibration of the inner bypass valve.
The use of other types of filter may affect the filter performance, duration and reliability, which will cause possible damage to the engine or oil leaks.





ENGINE/SPARK PLUGS

REMOVAL OF SPARK PLUGS FROM VEHICLE

The following procedure applies to all spark plugs.

WARNING

Replace and check the spark plugs when the engine is cold.

Park:

- The motorcycle on a level surface.

NOTICE

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

Remove:

- The rear view mirrors, refer to **"Removal of rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The airbox, refer to **"Removal of airbox, Chapter 4"**.
- The screw (1) Fig. A.
- The bracket (2) Fig. A.

Disconnect:

- The ground cables (3) Fig. B.
- The connectors (4) of the coils Fig. B.

Take out:

- The coil (5) Fig. C.

NOTICE

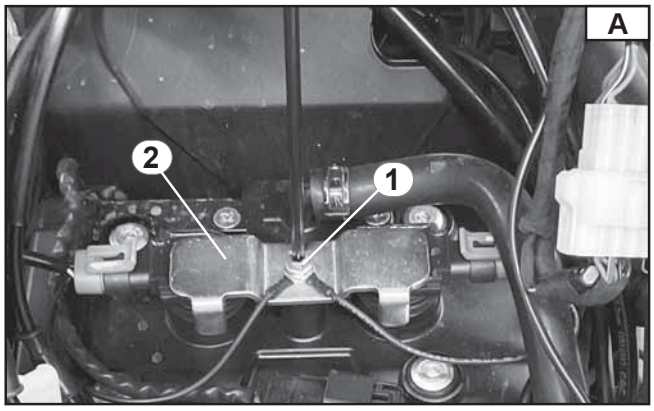
Before disassembly of spark plug, remove any dirt from the groove of the seats with a stream of compressed air to prevent it from falling into cylinders.

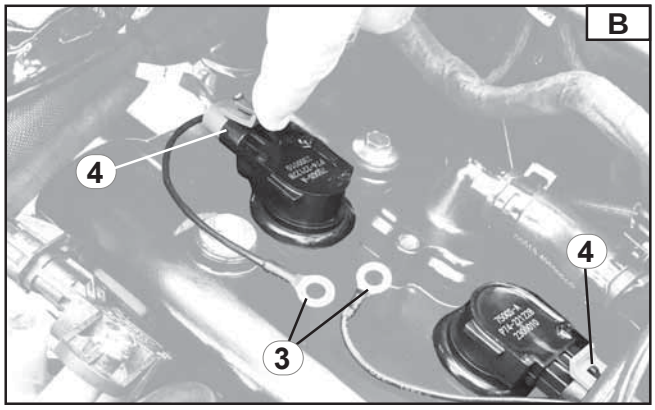
Screw off:

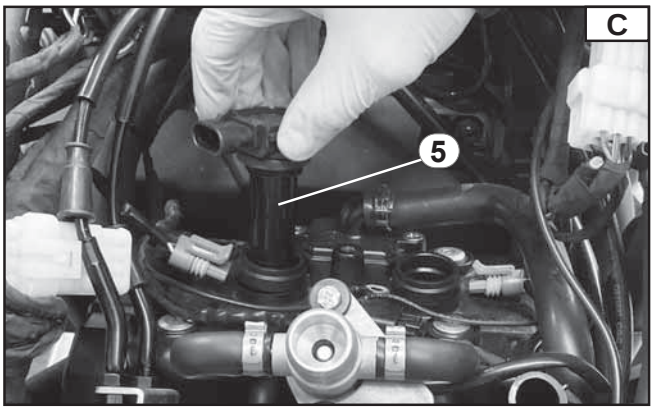
- The spark plug underneath (6) Fig. D.

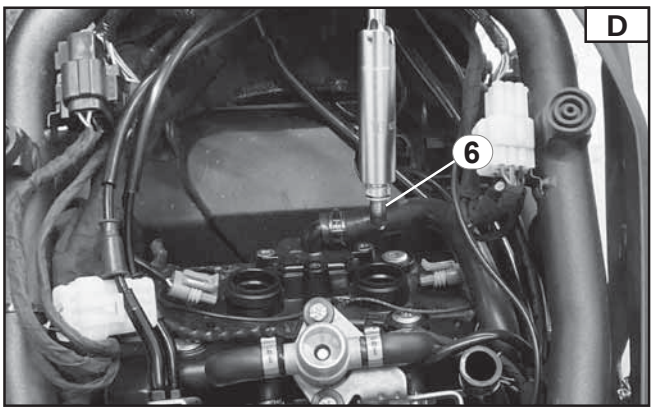
NOTE:

Use a wrench to remove the 16 mm spark plug.









ENGINE/SPARK PLUGS

SPARK PLUG CHECK

The following procedure applies to all spark plugs.

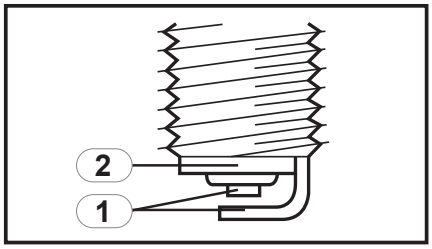
Check:
- the type of spark plug.

Check:
- electrodes (1) Fig. E.
- If there is any damage, wear or rounding,

Replace the spark plug.
- the insulating part (2) Fig. E.

Size color abnormal.
Replace the spark plug.
Generally, the colour is a light, medium brown.

E

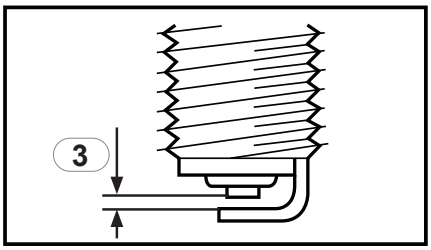


Check:
Measure the spark plug gap Fig. F with a thickness gauge.

If the spark plug gap is not correct, replace the spark plug.

Spark plug gap	(mm)
3	0.7 - 0.8 mm (0.027 - 0.031 in)

F



Spark plug type
NGK CR8E

ENGINE/SPARK PLUGS

SPARK PLUG CHECK

The following section contains a table with the typical conditions of spark plugs with the different causes of damage and any remedies.

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

ENGINE/SPARK PLUGS
SPARK PLUG INSTALLATION

NOTE:
The following procedure applies to all spark plugs.

WARNING

Lubricate the spark plug threads with copper grease.



NOTE:
Before installing it, clean the spark plug and surface in contact with the gasket.

Install:
- The spark plug on the head, tightening it by hand until you can feel it comes into contact with the base of the head. Then tighten to the correct torque.



Torque 12 N*m

Install:
- The coil (1) Fig. A.

Connect:
- The coil connector.

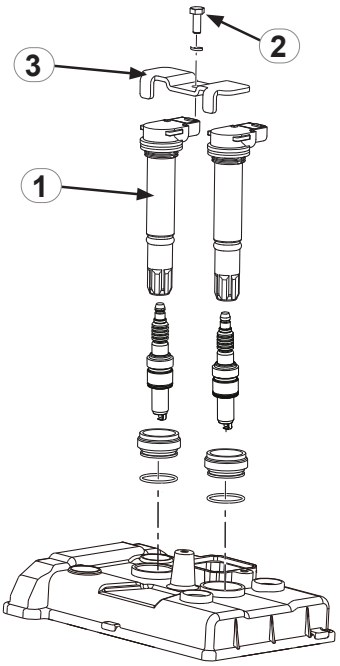
Install:
- The bracket (3) Fig. A.
- The screw (2) Fig. A together with the relevant ground cables.

Tighten to the following torque:



Torque 10 N*m

A



ENGINE/VALVE CLEARANCE CHECK

ADJUSTMENT OF THE VALVE CLEARANCE WITH ENGINE ON THE FRAME

Park:
- The motorcycle on a level surface.

NOTICE

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

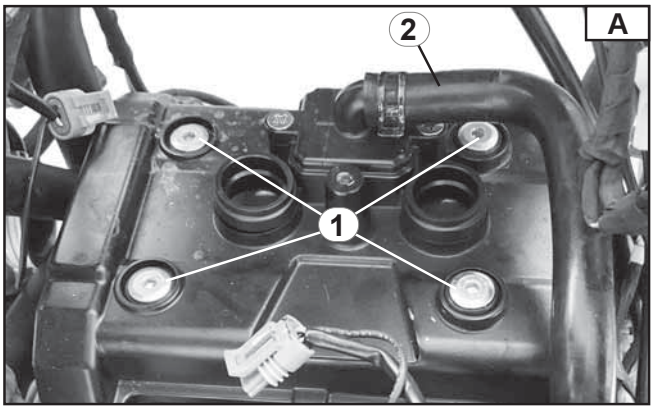
Remove:
- The rear view mirrors, refer to **"Removal of rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The airbox, refer to **"Removal of airbox, Chapter 4"**.
- The throttle body, refer to **"Removal of throttle body, Chapter 5"**.

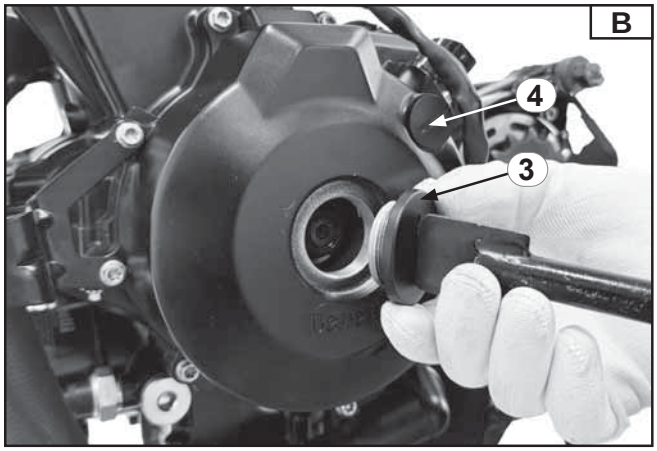
Remove:
- The 4 screws (1) Fig. A.

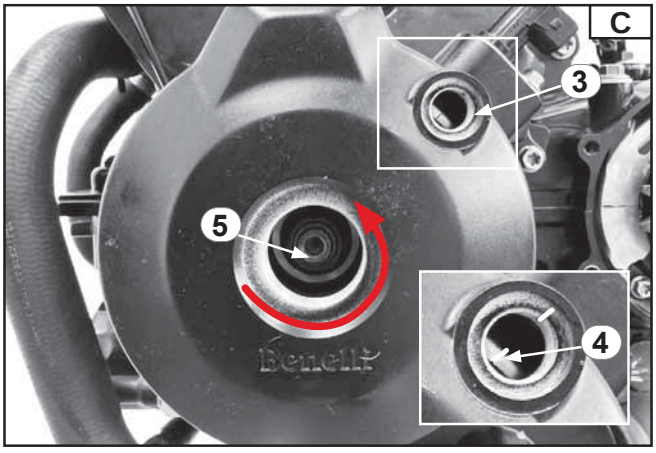
Disconnect:
- The secondary air tube (2) Fig. A.

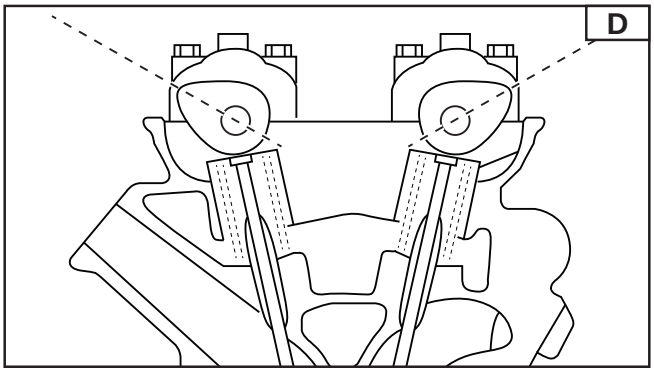
Remove:
- The crankshaft cap (3) Fig. B.
- The flywheel position inspection cap (4) Fig. B.

Check valves for piston 1 (right):
- The alignment of the reference notch (4) as on the rotor magneto flywheel, with the notch on the alternator cover, as on Fig. C, in these conditions the piston 1 (right) should be placed in the top dead centre (check with a comparator) and the intake and exhaust cams directed outwards Fig. D.
- Otherwise, rotate the crankshaft (5) by other 360 ° counter-clockwise for alignment Fig. C.







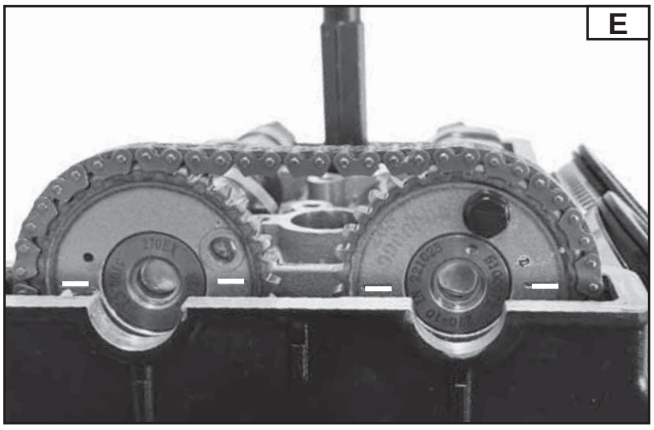


ENGINE/VALVE CLEARANCE CHECK

ADJUSTMENT OF THE VALVE CLEARANCE WITH ENGINE ON THE FRAME

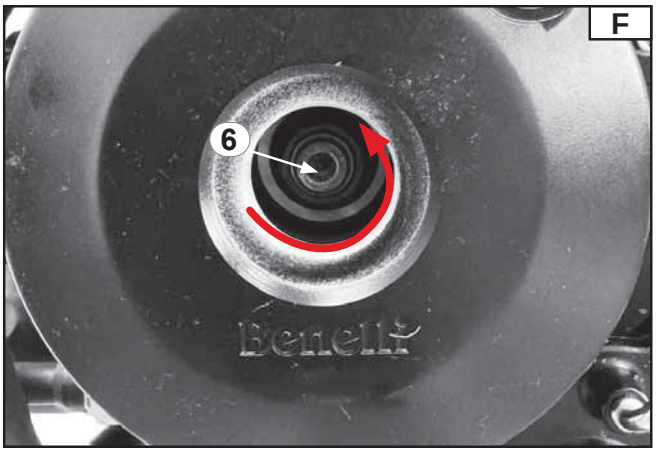
NOTE:

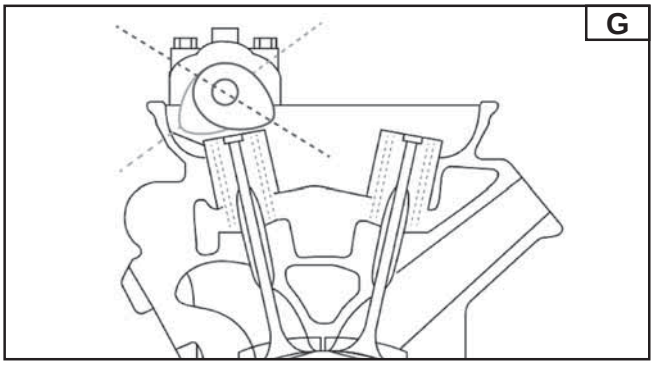
The correct position of the piston on the top dead centre can be confirmed by the alignment of the notches on the camshaft gears with the head surface Fig. E.



Check for piston 2 (left):

- After having checked the position of piston 1 (right), rotate the crankshaft (6) Fig. F counterclockwise by 450 ° (360 ° + 90 °). Iin these conditions the piston 2 (left) should be placed in the top dead centre (check with a comparator) and the intake and exhaust cams directed outwards Fig. G.
- Otherwise, repeat the alignment procedure of piston 1 (right), then of piston 2 (left).



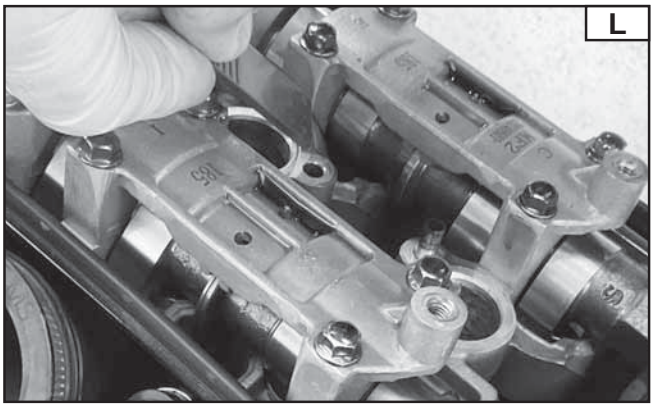


ENGINE/VALVE CLEARANCE CHECK

ADJUSTMENT OF THE VALVE CLEARANCE WITH ENGINE ON THE FRAME

Check:

- The valve clearance via thickness gauge Fig. L.



NOTE:
The valve clearance must be controlled and adjusted while the engine is cold and at ambient temperature.

NOTE:
The measurement must be taken on all cams and tappets.

Camshaft	Tappet-cam clearance
Camshaft on exhaust side	0.20 - 0.26 mm
Camshaft inlet side	0.15 - 0.21 mm
(1 mm = 0.0393701 in)	

NOTE:
In case of valve clearance correction, replace the calibrated tappets.
For replacing the tappets, refer to Chapter 5 “Engine”, Head timing, Selection table for calibrated tappets.

ENGINE/CHECK OF ONE-WAY VALVE

CLEANING OF SECONDARY AIR ONE-WAY VALVE

Park:
- The motorcycle on a level surface.

NOTICE

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

Remove:
- The rear view mirrors, refer to **"Removal of rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The airbox, refer to **"Removal of airbox, Chapter 4"**.

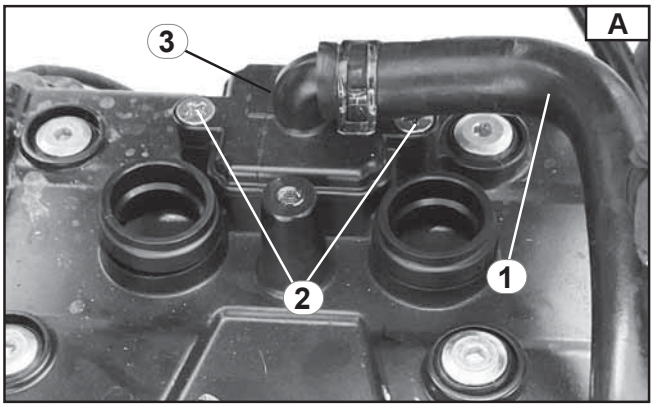
Disconnect:
- The secondary air tube (1) Fig. A.

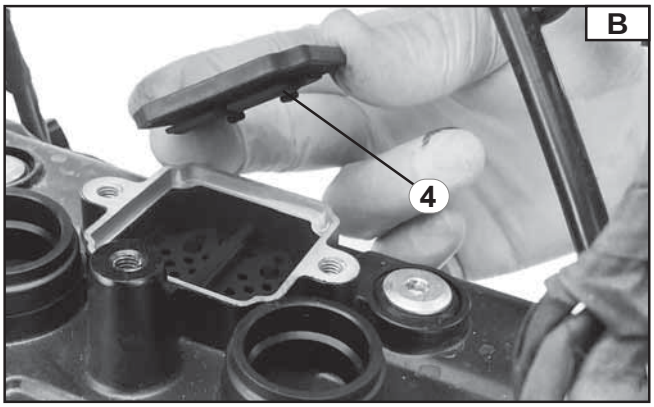
Remove:
- The 2 screws (2) Fig. A.
- The cover (3) Fig A.
- The reed valve support (4) Fig. B.

Clean:
- The valve from any carbon deposits or dirt.

Check:
- The conditions of the reed valve and replace it in case of breakage or wear.

Re-assemble:
- The valve following the removal process in the opposite order.





ENGINE/COOLING SYSTEM

CHECK OF COOLANT LEVEL

Park the motorcycle on a level surface.

NOTICE

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

NOTE:
Make sure that the motorcycle in upright position.
Inspect the level while the engine is cool.

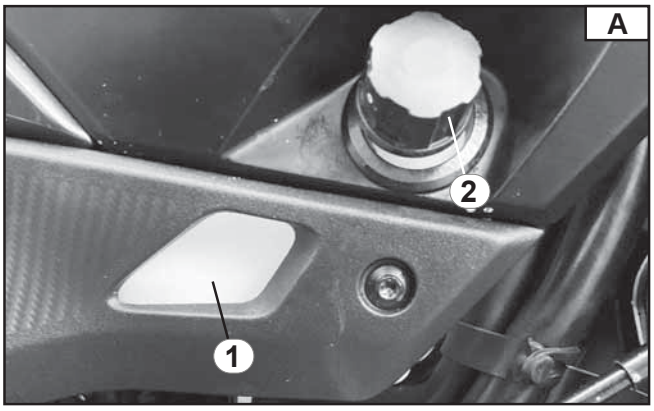
Check:
- The coolant level (1) Fig. A.

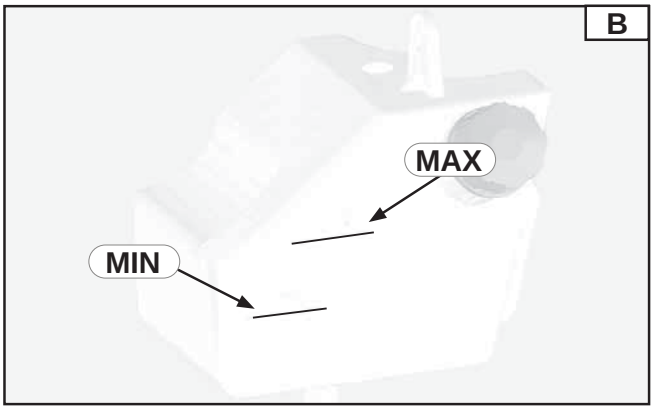
The coolant level must be within the maximum level reference (MAX) and the minimum one (MIN). If below the minimum notch, top up with the recommended coolant up to the correct level Fig. B.

Remove:
- The expansion tank cap (2) Fig. A.

Add:
- The coolant up to the level line (MAX) Fig. B.

Position:
- The expansion tank cap.





FRAME/BRAKE ADJUSTMENT

FRONT BRAKE ADJUSTMENT

Adjust:

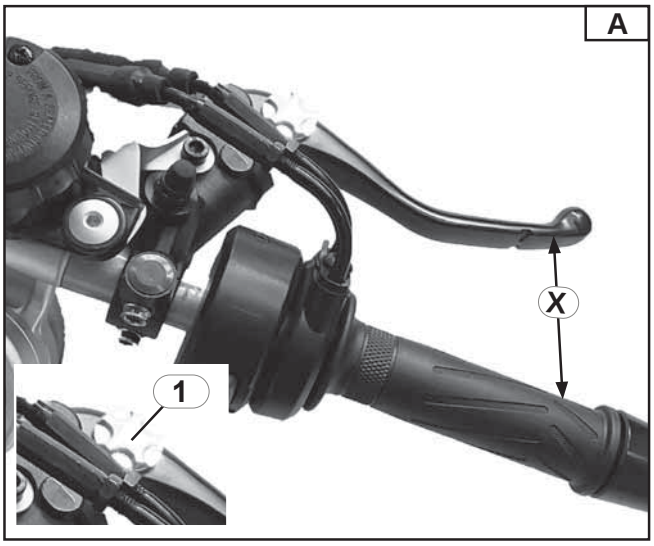
- The brake lever position Fig. A.

(Distance "x" between the throttle hand grip and the brake lever).

NOTE:

Push the brake lever forward to neutralise the spring thrust and at the same time, adjust the position turning the ring nut (1) Fig. A clockwise or counter-clockwise until the brake lever reaches the required position.

Ring nut position	Gap
Position 1	The distance is greater from the handlebar.
Position 4	The distance is shorter 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 if necessary, bleed the brake system.

NOTICE

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

FRAME/BRAKE ADJUSTMENT

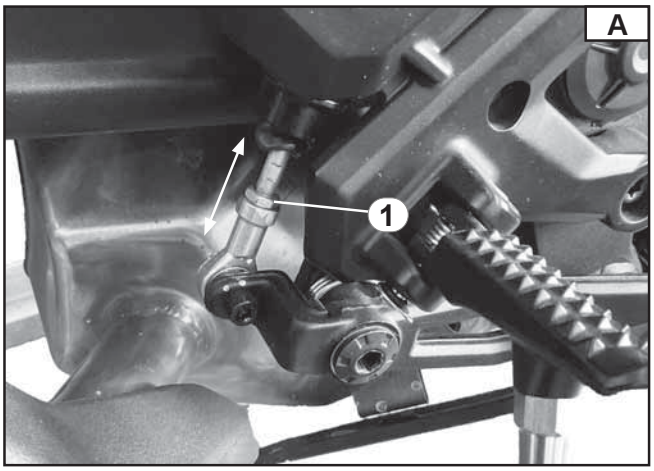
ADJUSTMENT OF THE REAR BRAKE

Screw off:
- The lock nut (1) Fig. A.

Adjust:
- Screw up o screw off the threaded pin to increase or reduce the rear brake lever clearance.

Tighten:
- The lock nut (1) Fig. A after adjustment.

NOTE:
Check the clearance on the tip ranges from 3 and 5 mm (between 0.118 in and 0.196 in).



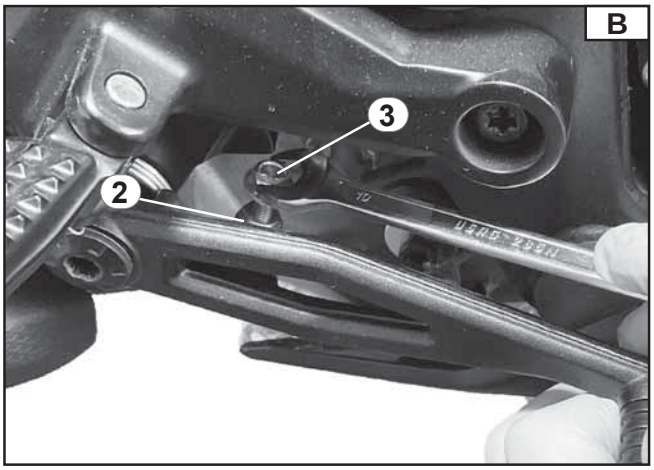
Adjust:
The stop screw of the brake pedal.

Screw off:
- The lock nut (2) of the stop screw (3) Fig. B.

Adjust:
- Tighten or loosen the stop screw (3) to obtain the correct stop.

Tighten:
- The lock nut (2) after adjustment.

NOTE:
Check the clearance on the tip ranges from 3 and 5 mm (between 0.118 in and 0.196 in). C.

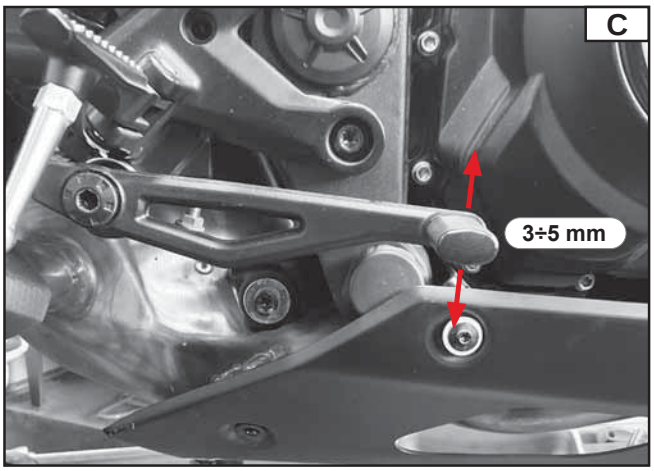


WARNING

If the brake pedal 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 if necessary, bleed the brake system.

NOTICE

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



FRAME/CHECK AND CHANGE OF BRAKE FLUID

CHANGE OF FRONT BRAKE FLUID

Park:
- The motorcycle on a level surface.

NOTE:
Place the motorbike on a stand and make sure that it is in the upright position.

Check:
- The brake fluid level.

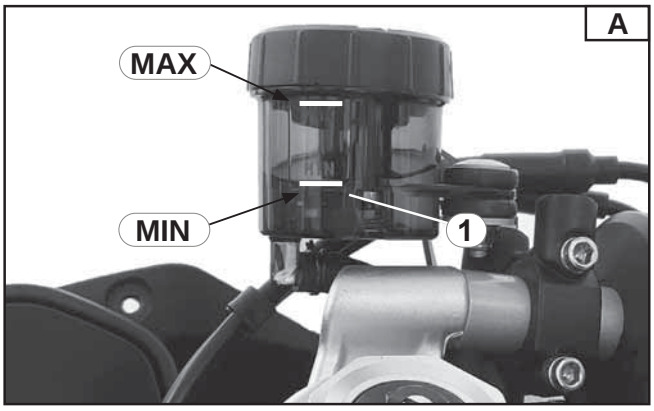
If below the minimum notch (1) Fig. If below the minimum notch "A" Fig. A, top up with the recommended brake fluid until it is at the correct level.

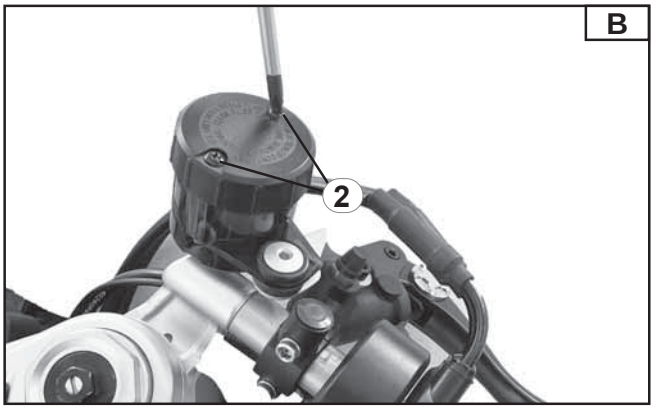
NOTE:
Before proceeding with the topping-up procedure, check the brake pads for wear.
To replace the pads, refer to the "Frame" chapter, "Front brake pad removal and installation".
Furthermore, check the brake circuit for any leakages.

Fluid topping up procedure:
- Place the motorcycle on a level surface.
- Loosen the screws (2) Fig. B.

Clean:
- The cap gasket (3) Fig. C.

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



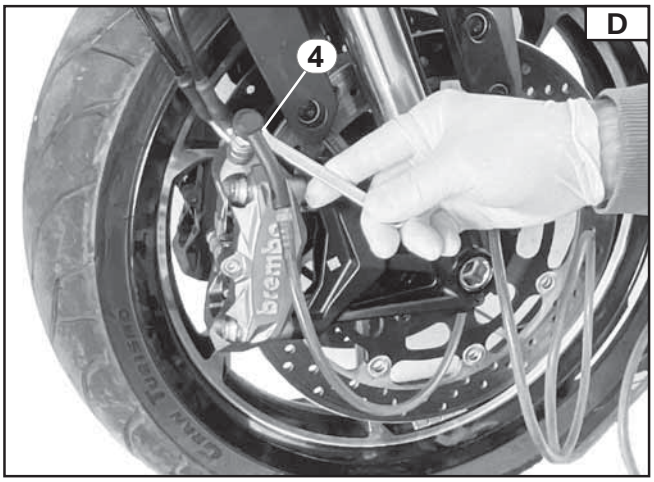


NOTICE

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 (4) Fig. D.
- Activate the device and open the drain screw.
- Regularly top the fluid up during the drain phases.
- Close the drain screw and stop the vacuum device.
- Repeat the same procedure on both calipers.
- Restore the correct level of brake fluid in the container.





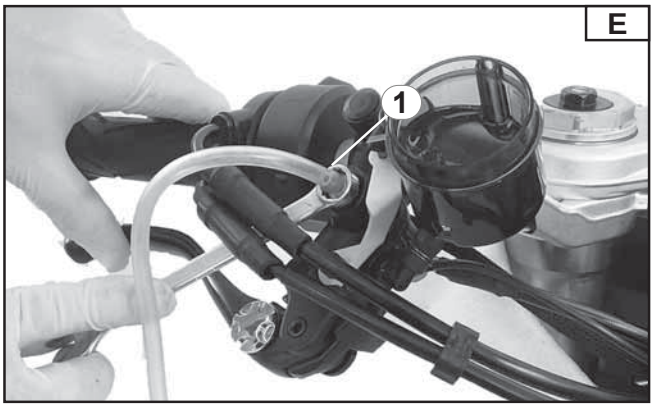
FRAME/CHECK AND CHANGE OF BRAKE FLUID

CHANGE OF FRONT BRAKE FLUID

Bleeding procedure of front brake fluid
after having drained the front brake calipers, complete the bleeding procedure on the pump.

- Prearrange soft plastic tube with suitable size on the valve (1) Fig. E.
- Press the front brake lever.
- Open the valve (1) Fig. E.
- Close the valve (1) Fig. E.
- Release the front brake lever.

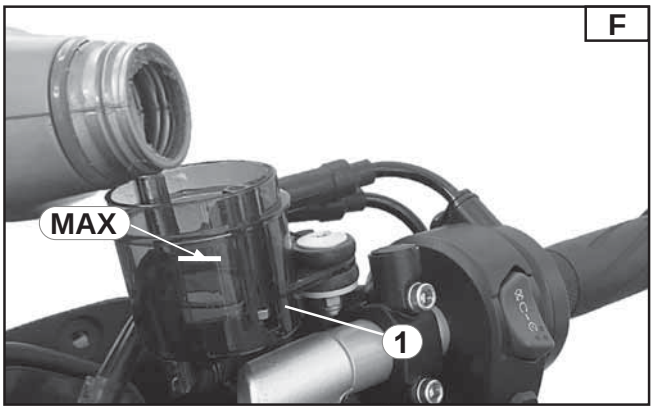
Repeat this procedure until the front brake lever is rigid when pressing.



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.

- Top up the fluid as far as the max level of the front brake tank (1) on the pump Fig. F.
- Pump the brake fluid by moving the brake lever.
- Should the brake lever be spongy to the touch, activate the bleeding function present on the ABS diagnostic system.
- After topping up, place the cap and tighten the cover.



WARNING

Only use the prescribed fluid. Other brake fluids may be the cause of deterioration to rubber gaskets, causing leaks and an improper operation 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.

	Recommended brake fluid DOT4

FRAME/CHECK AND CHANGE OF BRAKE FLUID

CHANGE OF REAR BRAKE FLUID

Park:

- The motorcycle on a level surface.

NOTE:
Place the motorcycle on a stand and make sure that it is in the upright position.

Check:

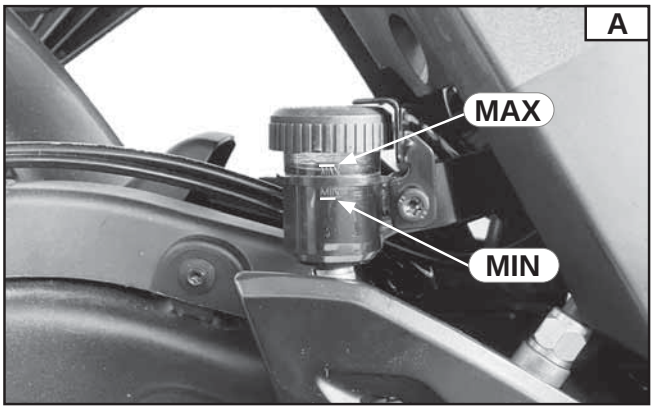
- The brake fluid level.

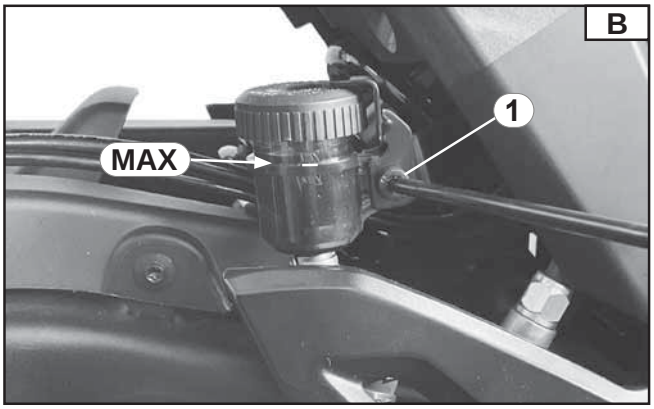
If below the minimum notch Fig. A, top up with the recommended brake fluid until it is at the correct level.

NOTE:
Before proceeding with the topping-up procedure, check the brake pads for wear.
To replace the pads, refer to the chapter "Frame", section "Removal and installation of rear pads".

Fluid topping up procedure:

- Remove the protection (1) Fig. B of the cap of the rear brake pump tank.



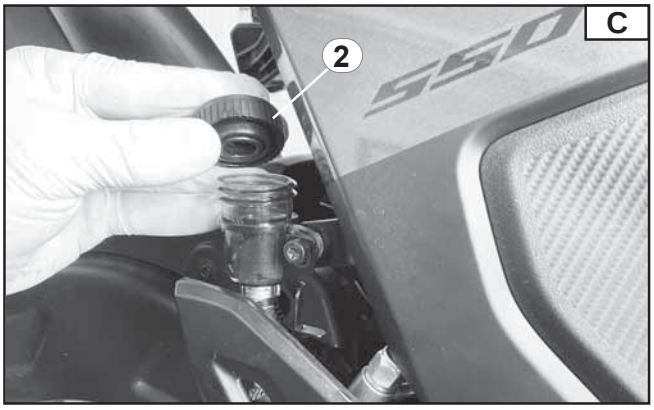


- Loosen the top cap (2) on the brake pump tank Fig. C.

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.

- Top the liquid up to the MAX level indicated on the tank Fig. B.



FRAME/CHECK AND CHANGE OF BRAKE FLUID

CHANGE OF REAR BRAKE FLUID

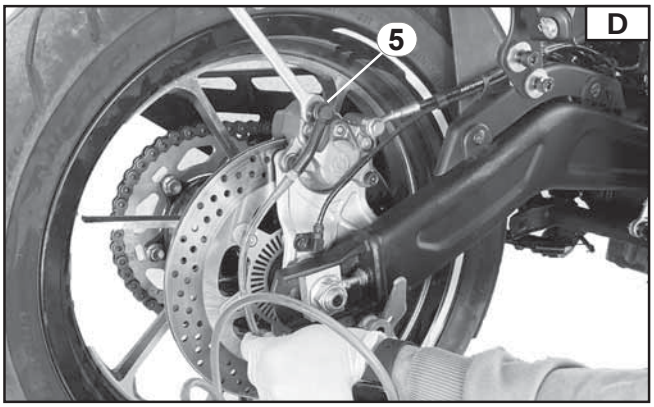
- Connect and activate the device and open the drain screw (5) Fig. D.
- Regularly top the fluid up during the drain phases.
- Close the drain screw and stop the vacuum device.
- Restore the correct level of brake fluid in the pump tank.
- Pump the brake fluid through movement of the brake pedal.
- Should the brake pedal be spongy to the touch, activate the bleeding function present on the ABS diagnostic system.
- Proceed with topping up.

Clean:

- The cap gasket (6) Fig. E.

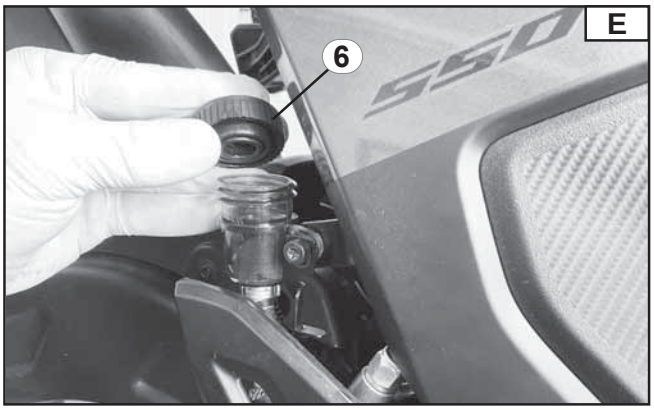
If there is any damage/wear,
Replace the gasket.

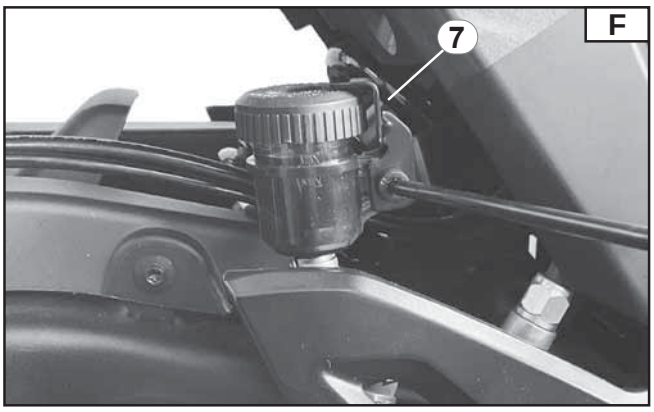
- Close the pump tank cover.
- Re-install the pump cover protection (7) Fig. F.



WARNING

Only use the prescribed fluid. Other brake fluids may be the cause of deterioration to rubber gaskets, causing leaks and an improper operation 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/ABS PIPE CHECK

CHECK FOR ANY LEAKS FROM ABS TUBES

Park:
- The motorcycle on a level surface.

NOTE:
Place the motorcycle on a stand and make sure that it is in the upright position.

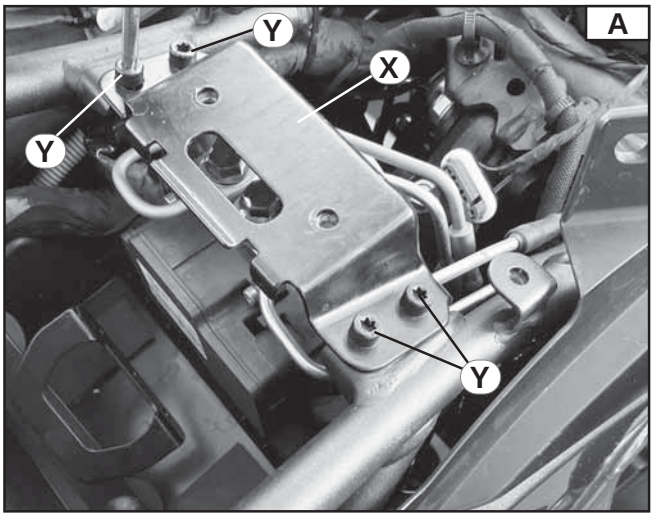
For the motorcycle models equipped with ABS, it is necessary to check for leakages in the braking system and especially in the ABS circuit.

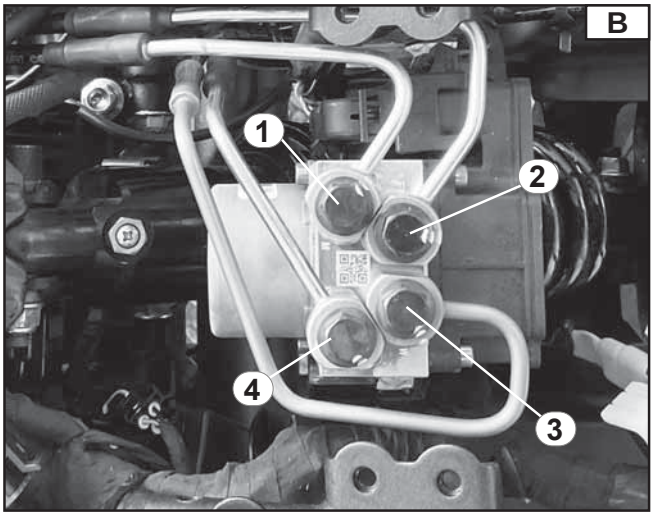
Remove:
- The rear view mirrors, refer to **"Removal of rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The airbox, refer to **"Removal of airbox, Chapter 4"**.
- The throttle body, refer to **"Removal of throttle body, Chapter 5"**.

Remove:
- The tank support bracket (X) and the relevant screws (Y) Fig. A.
- Activate the lever or the brake pedal and check for any leaks of brake fluid from the hoses and brake fittings.
- In case of leaks in any point, check or replace the broken part.

Check:
- The fitting (1) "front braking system" on the ABS control unit "FM" Fig. B.
- The fitting (2) "front brake pump" on the ABS control unit "FW" Fig. B.
- The fitting (3) "rear brake pump" on the ABS control unit "RW" Fig. B.
- The fitting (4) "rear braking system" on the ABS control unit "RM" Fig. B.

FM	Front master cylinder	of the front brake pump
FW	Front wheel	front brake caliper
RW	Rear wheel	rear brake caliper
RM	Rear master cylinder	rear brake pump





FRAME/BRAKE PAD CHECK

CHECK FRONT AND REAR BRAKE PADS FOR WEAR

The following procedure applies to all brake pads.

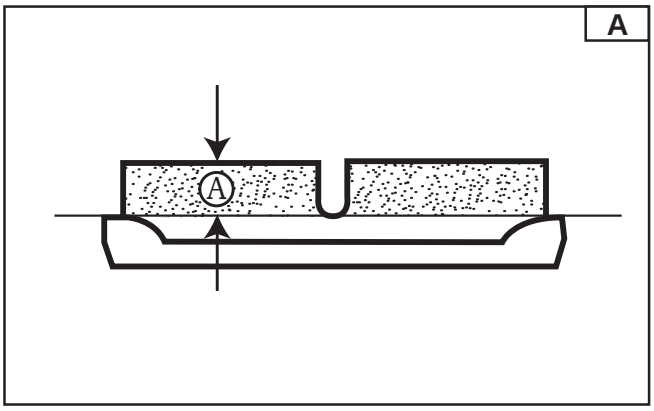
Check:

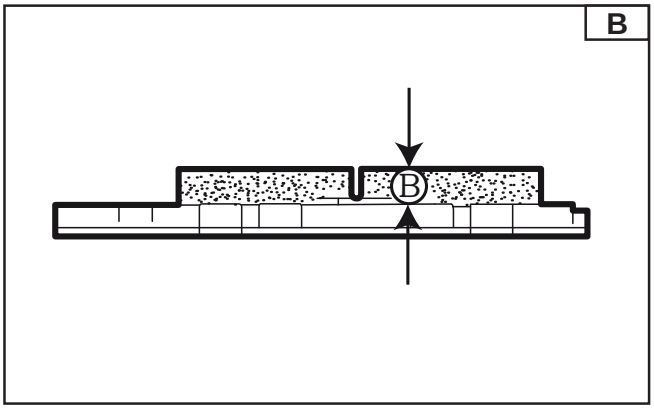
- "L": brake pads front Fig. A.
- The rear brake pads Fig. B.
- The wear limit for the front and rear brake pads.

If the wear limit has been reached, replace the brake pads.

Pads	Wear limit (A)
Front	1 mm (0.0393 in)
Rear	1 mm (0.0393 in)

NOTE:
To replace the pads, refer to "Frame, Chapter 4".





FRAME/BRAKE SYSTEM HOSE CHECK

CHECK OF HOSES

Park:
- The motorcycle on a level surface.

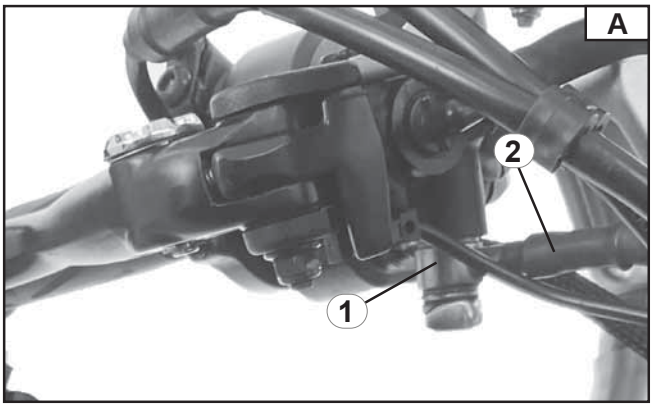
NOTE:
Place the motorcycle on a stand and make sure that it is in the upright position.

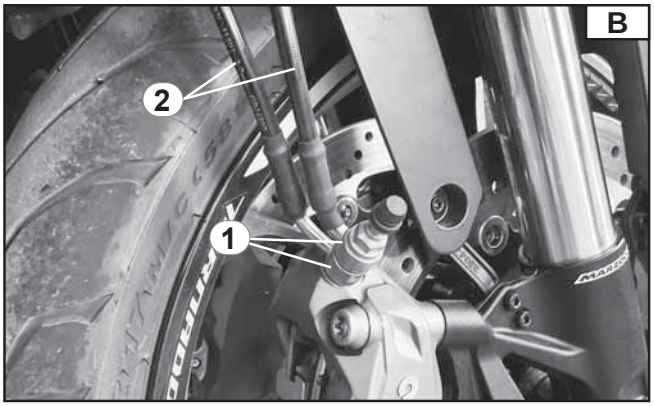
The following procedure applies to all brake hoses and brake hose clamps.

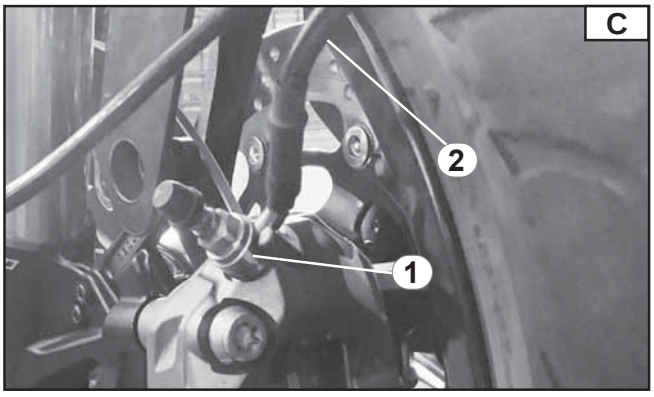
Check:
- The route of the front and rear brake hoses.

If there are any cracks/signs of wear or damage, replace.

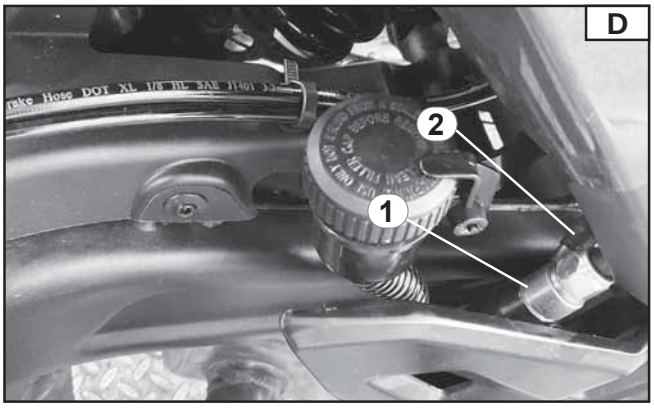
Check:
- The fitting (1) and the hose (2) of the front brake pump Fig. A.
- The fitting (1) and the hoses (2) of the front right/left brake caliper Fig. B-C.







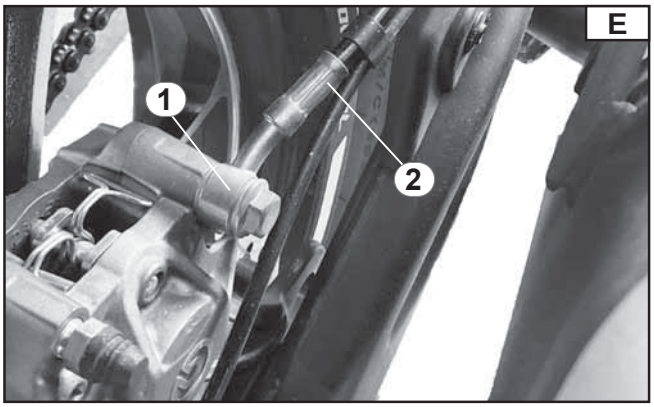
- The fitting (1) and the hose (2) of rear brake pump Fig. D.



FRAME/BRAKE SYSTEM HOSE CHECK

CHECK OF HOSES

- The fitting (1) and the hose (2) of the rear brake caliper Fig. E.



Check:
- Tightness of the fitting screws.

Tighten:
- The fitting screws to the following torque.

Torque 25. N*m.

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 TRANSMISSION CHAIN

NOTE:
Never inspect or adjust the transmission chain with the engine running.
Check the transmission chain slackness in the tautest point.

Park:
- The motorcycle on a level surface.

WARNING

Support the motorcycle correctly, so that it cannot fall over and so that the rear wheel is raised.

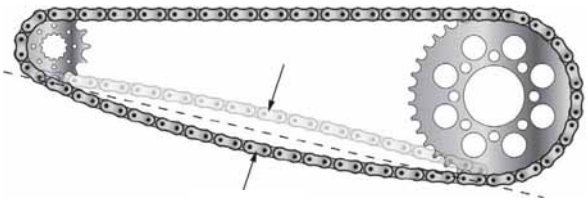
- Rotate the rear wheel several times and define the tautest position of the transmission chain.

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

Transmission chain clearance	28 - 35 mm (1.102 - 1.377 in)

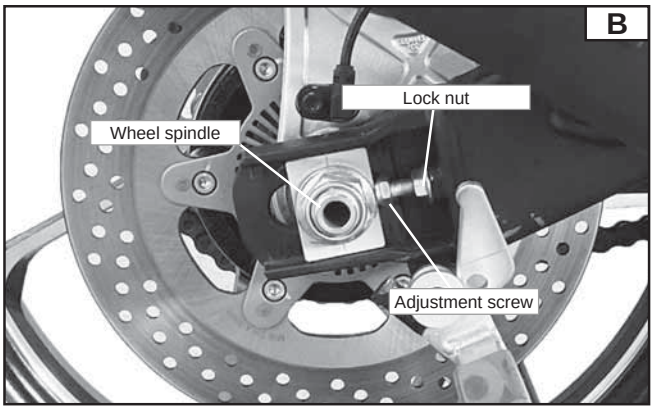
Adjust:
- The transmission chain clearance Fig. A.
- Loosen the wheel spindle nut on the right side Fig. B.

A



28-35 mm

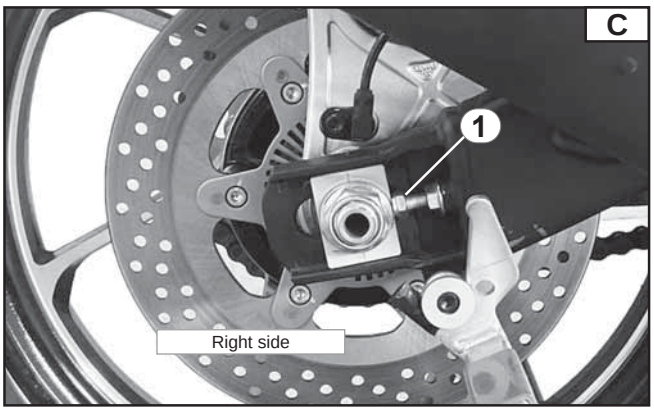
B



- To tension the transmission chain, loosen the lock nut Fig. B on both sides Fig. C - D and turn the adjustment screw counter-clockwise on both sides.
- To loosen the transmission chain, turn the adjustment screw clockwise on both sides Fig. C - D and push the rear wheel forward.
- After adjustment, tighten the lock nut on both sides (1) Fig. C - (2) Fig. D.
- Tighten the wheel spindle nut to the following torque:

Torque 80 N*m.

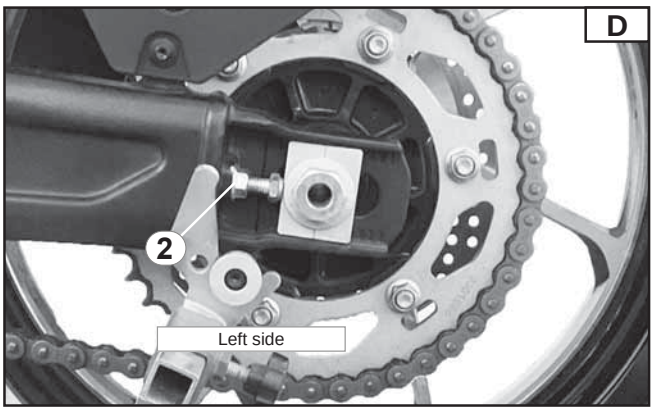
C



WARNING

If the transmission 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.

D



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 the motorcycle is used in very dusty areas.
This motorcycle is equipped 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 fine, even layer of lubricant to the whole chain, taking care not to reach the parts around it, especially the tires.

	**Recommended lubricant Specific spray for chains with O-rings.**

FRAME/TRANSMISSION CHAIN

CHECK OF CHAIN SLIDING SHOE

Check:

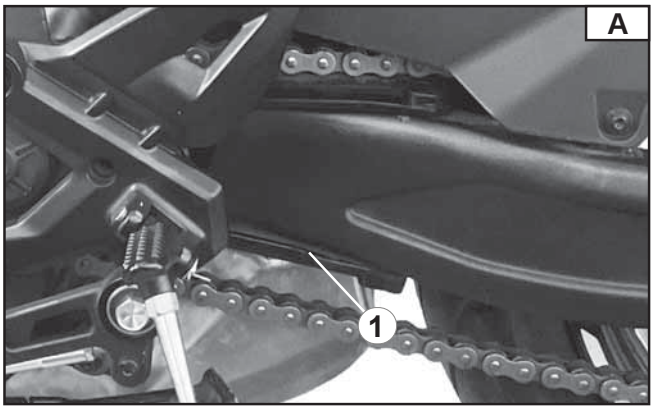
- Visually check the chain sliding shoe (1) Fig. A.

Replace:

In case of any sign of abnormal wear or damage, replace the chain sliding shoe.

See:

- Removal of the chain sliding shoe, refer to **"Removal of the chain sliding shoe, Chapter 4".**



FRAME/TRANSMISSION CHAIN

CHECK OF TRANSMISSION CHAIN WEAR

Check:
- The transmission chain.

Clean and grease, 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 kerosene from the transmission chain and leave it to dry completely.

NOTICE

This motorcycle is fitted with a transmission chain complete with small rubber O-rings (1) Fig. This motorcycle is fitted with a transmission chain complete with small rubber O-rings 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 (1) Fig. B.

In the event of damage, replace the transmission chain.
- The transmission chain rollers (2) Fig. B.

In the event of damage/wear, replace the transmission chain.
- The side plates of the transmission chain (3) Fig. B.

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

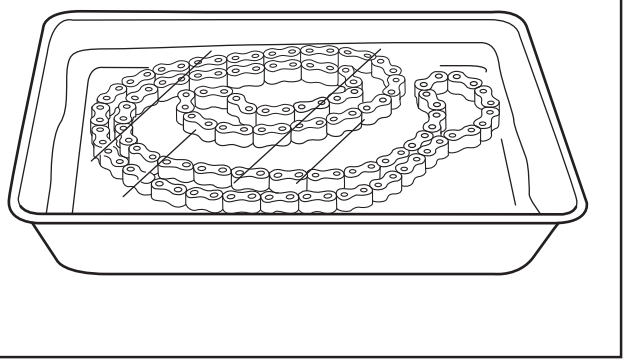
Lubricate:
- The transmission chain.

NOTE:
Use specific grease

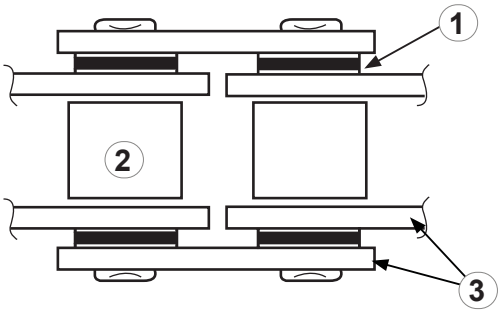
Check:
- The mobility of the chain (4) Fig. C

If the links are jammed, replace the whole assembly (transmission chain, pinion, and sprocket).

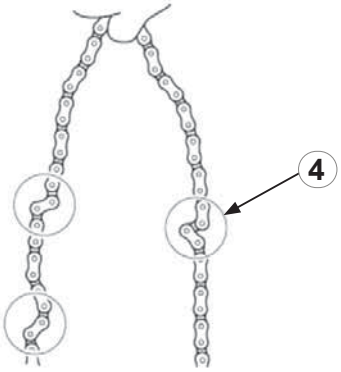
A



B



C



FRAME/TRANSMISSION CHAIN

CHECK OF TRANSMISSION CHAIN WEAR

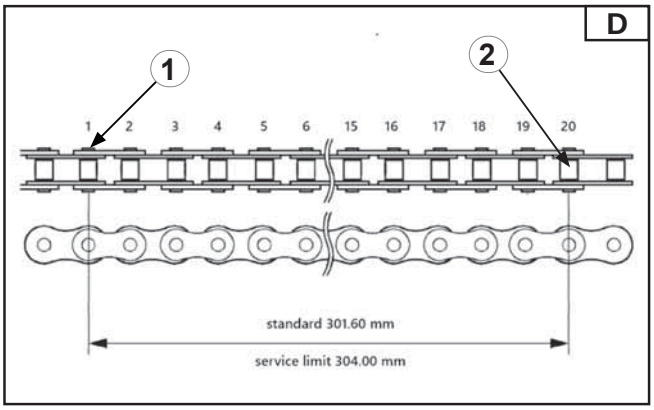
Check:

- The elongation of the transmission chain.

Tension the transmission chain applying a force of 10Kg (98 Nm) until it is fully taut.

Measure:

- Use a gauge to measure the length of 19 sections of the transmission chain corresponding to the gap between pin (1) and pin (2) Fig. D.
- If the measure exceeds the wear limit (see table), replace the whole assembly (transmission chain, pinion, and sprocket).



PIN	Elongation
1-20	301.60 mm (11.874 in) standard wear
1-20	304.00 mm (11.968 in) standard wear

FRAME/CHAIN PINION

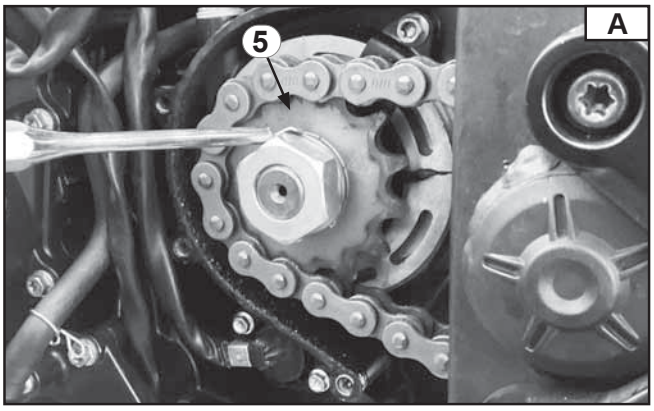
CHECK OF TRANSMISSION CHAIN PINION

Remove:

- The pinion cover, refer to **"Removal of pinion cover, Chapter 4".**

Check:

- The transmission chain pinion (5) Fig. A.

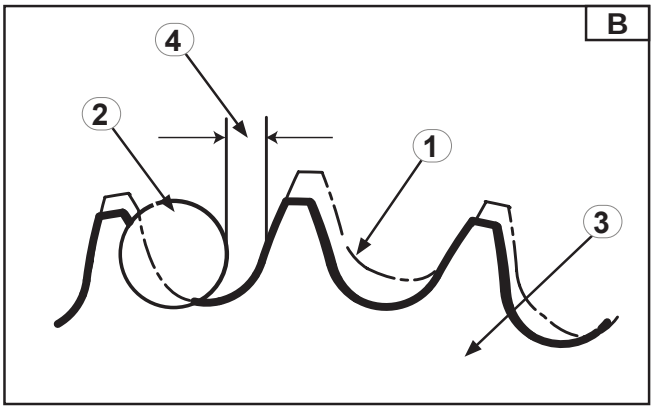


Check:

- The transmission chain pinion.

If more than 1/4 of each tooth (4) Fig. B is worn, replace the transmission chain gears all together.
If the teeth are bent, replace the whole gears of the transmission chain and the transmission chain.

NOTE:
Never install 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.



(1) Adjustment
(2) Transmission chain roller
(3) Transmission chain pinion

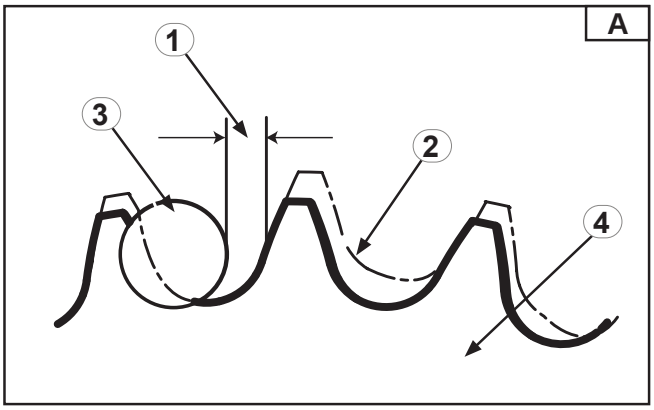
FRAME/CHAIN PINION

CHECK OF TRANSMISSION SPROCKET

Check:

- The sprocket.

If more than ¼ of each tooth is worn, replace the sprocket, the pinion, and the distribution chain.



1. 1/4 teeth.
2. Correct.
3. Transmission chain roller.
4. Sprocket.

When replacing the sprocket, refer to **"Replacement of chain wheel, Chapter 4".**

NOTE:

Never install 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:

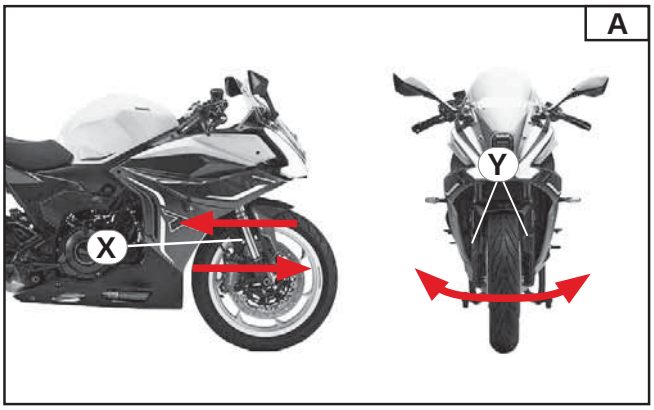
Place the motorcycle on a suitable support so that the front wheel is raised.

Check:

- The steering sleeve.

Gently oscillate the front fork, holding it by the end of the stems (X) Fig. A.
Rotate the front fork to the right/left, holding it by the end of the stems (Y) Fig. A, checking that the rotation is free and smooth.

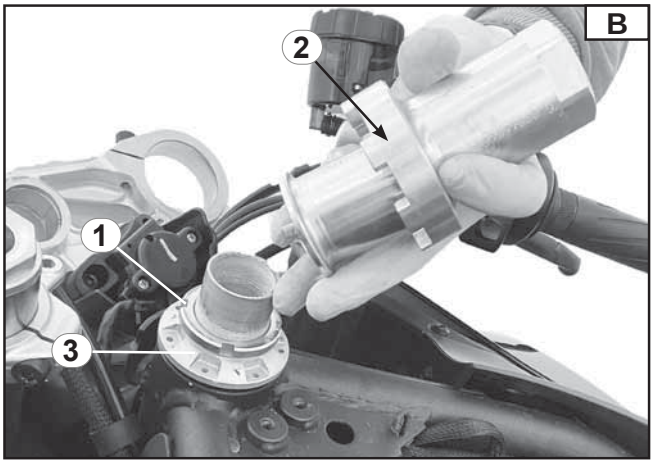
If there is any jamming/loosening, adjust the steering sleeve.



Remove:

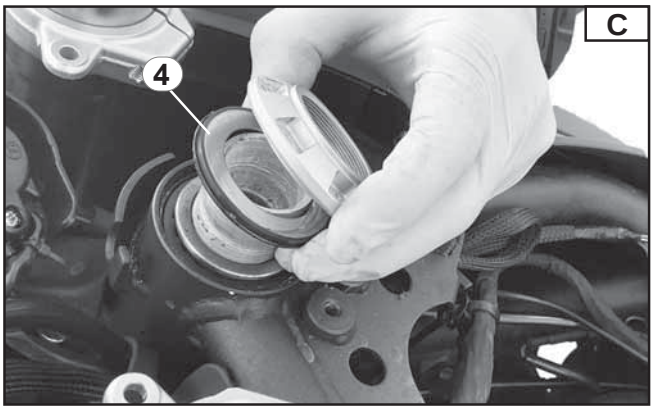
- The steering head, refer to the section **"Removal of steering head, Chapter 4".**
- The steering pin ring nut (1) Fig. B.
- The steering ring nut (3) Fig. Fig. B.

Tightening tool for steering sleeve ring nut (2) Fig. B.
Code: R180297129000



Remove:

- The dust seal (4) Fig. C.

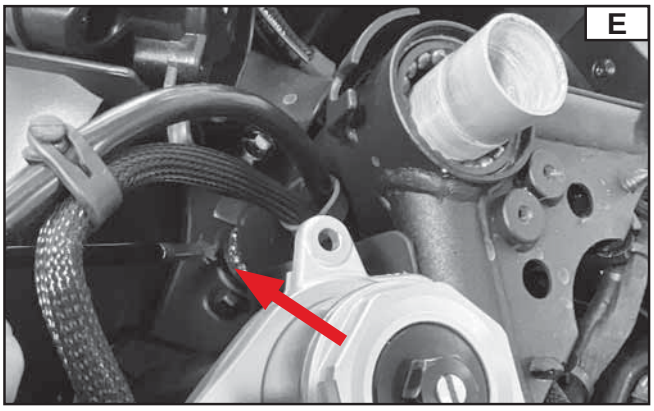


- The bearing washer (5) Fig. D.



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

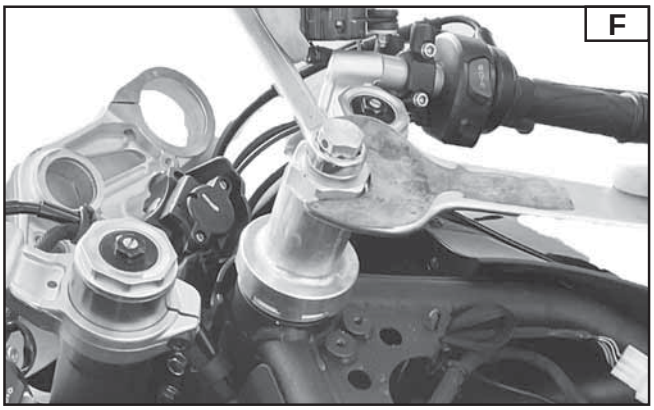
Check:
- Visually check the outer races and the balls. Replace if worn or damaged.
- Insert the balls, then apply a thin layer of grease on the outer top/bottom races Fig. D and Fig. E.



Assemble:
Once assembled, tighten the steering ring nut Fig. F to the following torque:

Steering sleeve lock ring nut tightening tool.
Code: R180297129000

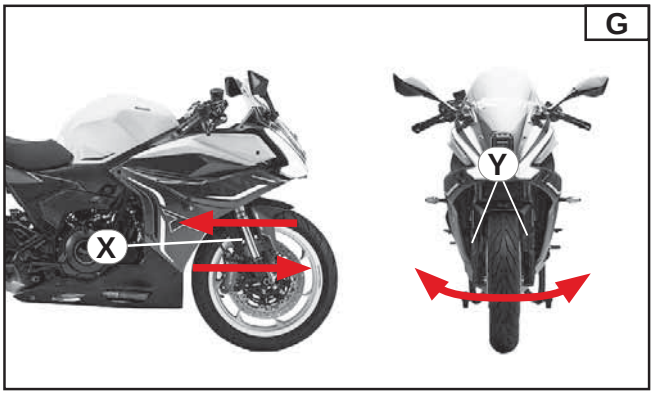
Torque: 15. N*m



Assemble:
- The steering pin ring nut Fig. F with the relevant tool, to the following torque:

Steering sleeve lock ring nut tightening tool.
Code: R180297129000

Torque 60 N*m



	Specific grease

Check:
Gently oscillate the front fork, holding it by the end of the stems (X) Fig. G.
Rotate the front fork to the right/left, holding it by the end of the stems (Y) Fig. G, checking that the rotation is free and smooth.
If there is any jamming/loosening, adjust the steering sleeve.

FRAME/FRONT FORK CHECK

FRONT FORK CHECK

Park:
- The motorcycle on a level surface.

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

Check:
- The fork sleeve (1) Fig. A.
- The fork stem (2) Fig. A.

In case of damage/scuffing, replace.

- The oil seal.

If there are any leaks, replace

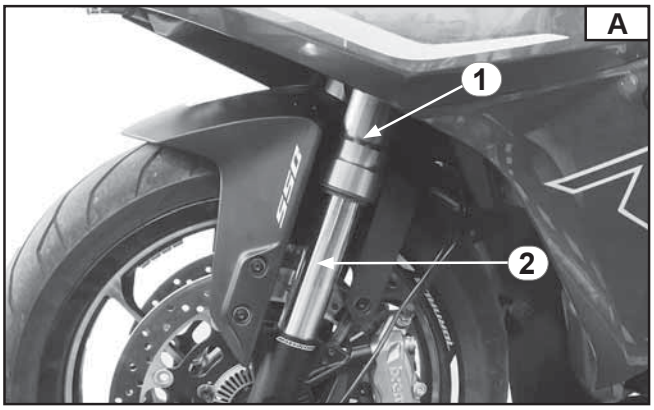
Keep:
- The motorcycle in a upright position.

Activate:
- The front brake.

Check:
- The fork operation.

Push hard on the handlebars several times and make sure that the front fork slides easily back into place.
If the movement is not smooth, adjust the fork.

NOTE:
In case of overhaul, refer to chapter "Disassembly of front fork, Chapter 4."



FRAME/REAR VIEW MIRRORS

REPLACEMENT OF REAR VIEW MIRRORS

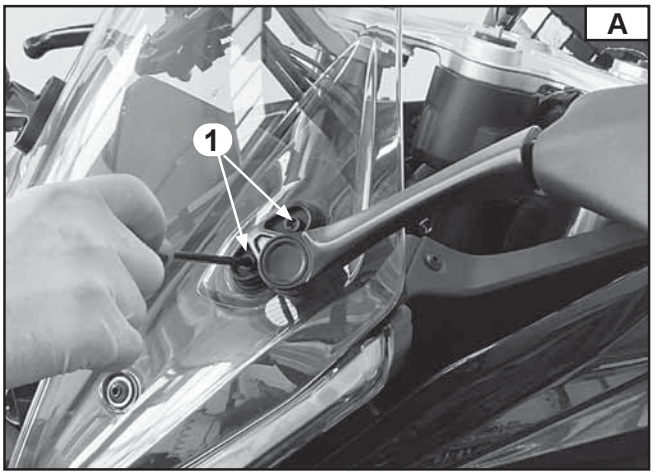
Park:
- The motorcycle on a level surface.

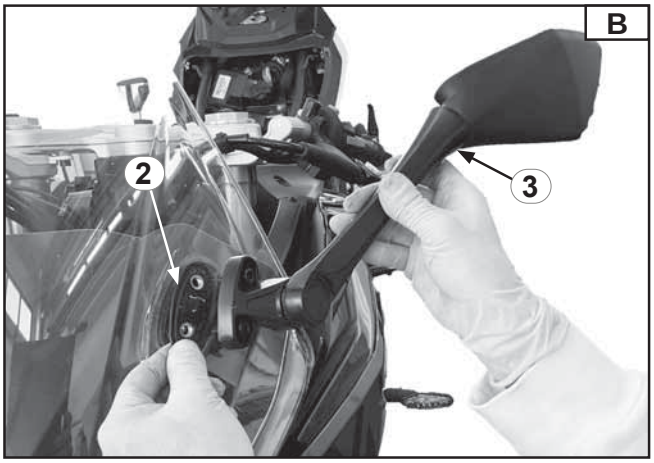
NOTE:
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The screws (1) Fig. A.
- The gasket (2) Fig. B.
- The complete mirror (3) Fig. B.

NOTE:
Carry out the following operation for the right side.

Install:
- Proceed using the opposite order to removal.





FRAME/HANDLEBAR

ADJUSTMENT OF REAR VIEW MIRRORS

The mechanical adjustment of the rear view mirrors is not intended for this king of vehicle.

FRAME/WINDSCREEN

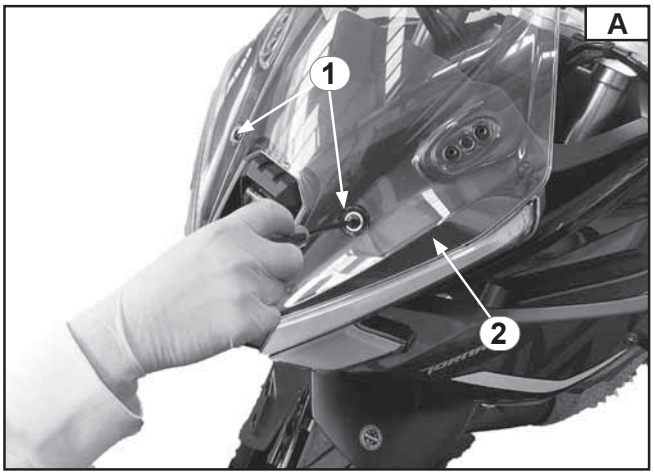
REPLACEMENT OF WINDSCREEN

Park:
- The motorcycle on a level surface.

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

Remove:
- The rear view mirrors, refer to **"Replacement of rear view mirrors, Chapter 3".**
- The screws (1) Fig. A.
- The windscreen (2) Fig. A.

Install:
- Proceed using the opposite order to removal.



FRAME/WINDSCREEN SUPPORT

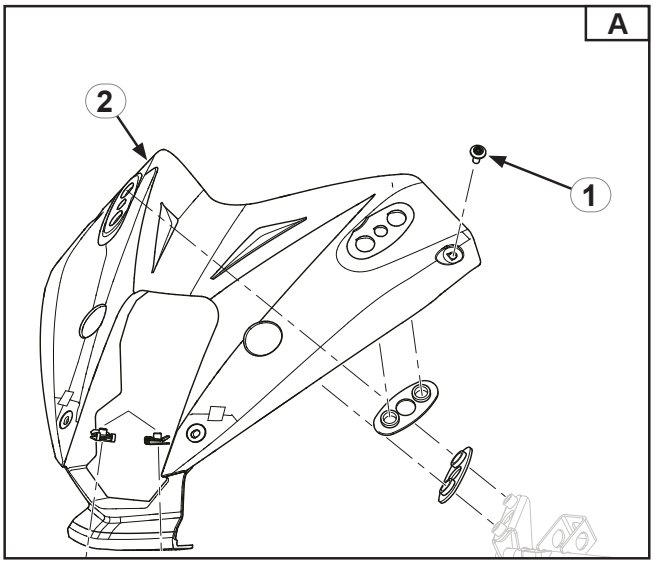
REPLACEMENT OF WINDSCREEN SUPPORT

Park:
- The motorcycle on a level surface.

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

Remove:
- The rear view mirrors, refer to **"Replacement of rear view mirrors, Chapter 3".**
- The windscreen, refer to **"Replacement of windscreen, Chapter 3".**
- The RH/LH screws (1) Fig. A.
- The windscreen support (2) Fig. A.

Install:
- Proceed using the opposite order to removal.



FRAME/REAR SHOCK ABSORBER CHECK

ADJUSTMENT OF SHOCK ABSORBER

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

Adjustment of spring preload

- Adjust the spring preload Fig. A.

The rear shock absorber is equipped with an spring preload adjusting ring nut (1).

- To **increase** the spring preload and thereby harden the suspension, turn the adjusting ring clockwise(**+**).
- To **decrease** the spring reload and therefore decrease the rigidity of the suspension, turn the adjustment ring nut counter-clockwise(**-**).

NOTICE

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

Position	Gap
Standard	20 mm ring nut (0.787 in) from end of stroke

NOTE:
The spring preload task can be carried out only when the shock absorber is extracted from the vehicle.

Adjustment of damping

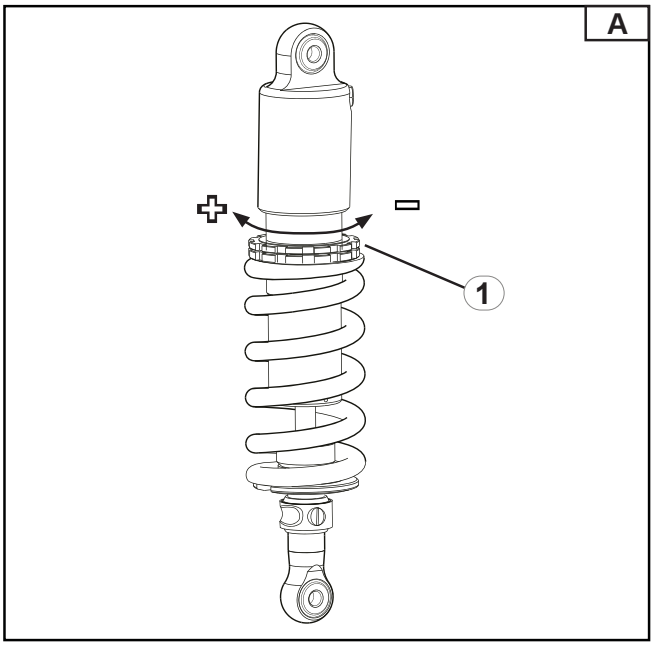
To adjust shock absorber damping, proceed as follows:

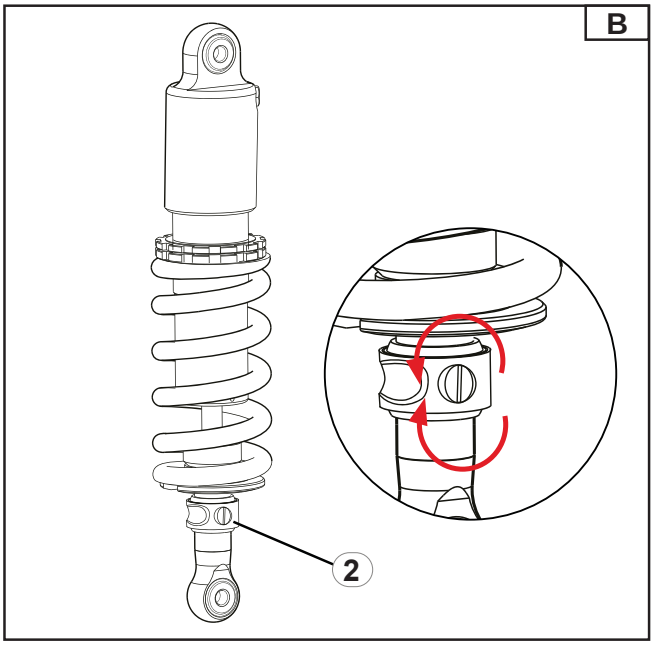
- To **increase** damping, rotate the adjustment screw (2) clockwise Fig. B.
- To **reduce** damping, rotate the adjusting screw (2) counter-clockwise Fig. B.

NOTICE

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

Position	Gap
Standard	5 clicks from fully closed (total 22 clicks)





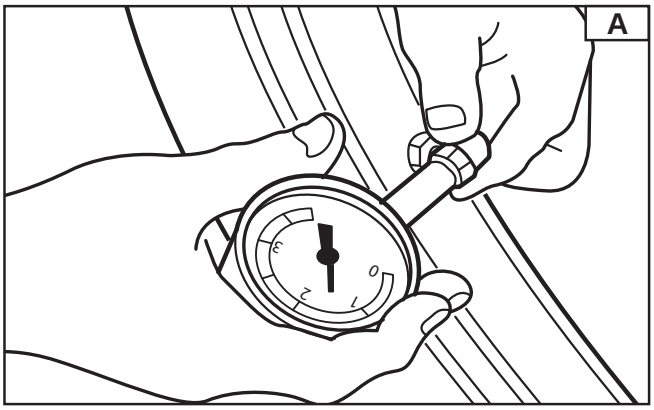
FRAME/CHECK OF FRONT/REAR TIRES

CHECK OF TIRES

The following procedure applies to both tires.

Check:

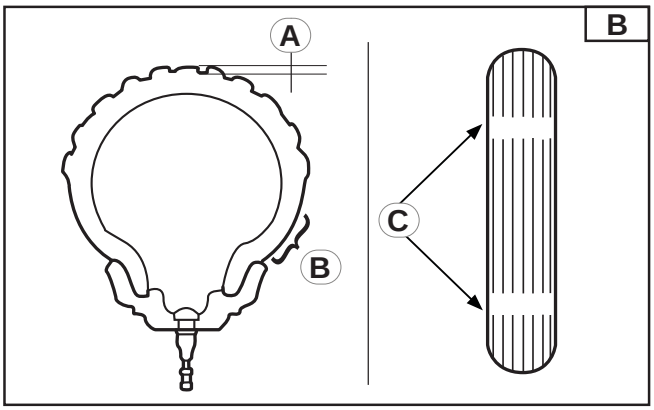
- The tire pressure. If outside specifications, adjust Fig. A.



WARNING

The tire pressure must be checked and adjusted only when the wheel temperature corresponds to the ambient temperature.
The tire 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 motorcycle may cause damages to tires, with the risk of an accident or injuries for people.
NEVER OVERLOAD THE MOTORCYCLE IN ANY CASE.

Wear limit (A) Fig. B	(1 mm)	
PRESSURE TIRES A COLD	**FRONT**	**REAR**
	220Kpa±10Kpa	250Kpa±10Kpa
	2.20 bar	2.50 bar



WARNING

It is dangerous to drive with the worn tread.
If the tread reaches the wear limit, replace the tire immediately.

Check:

- The tire surface Fig. B B.

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

A. Tread pattern depth.
B. Sidewall.
C. Wear signaller.

WARNING

If tires are new, the grip on the road is relatively weak until they are slightly used. Therefore, we recommend riding at normal speeds for the first 100 km (62.17 mi), before going at speed.

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 tire.

ELECTRICAL SYSTEM
CHECK AND CHARGE OF BATTERY

WARNING

Batteries might generate explosive gas and contain electrolyte, consisting of sulphuric acid, which is a poisonous and highly caustic substance.
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
- Immediately contact a poison centre or a doctor.

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.

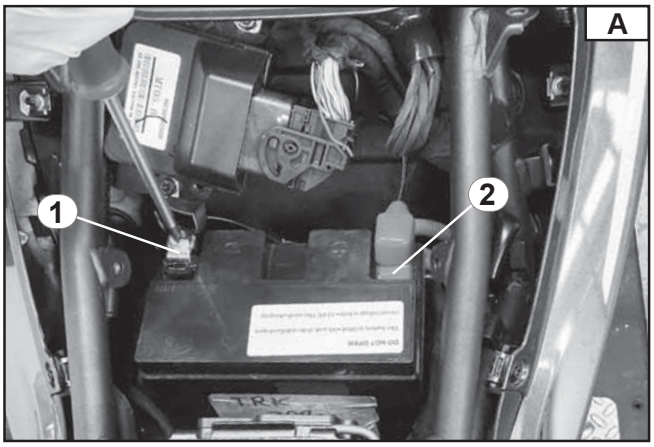
ELECTRICAL SYSTEM
CHECK AND CHARGE OF BATTERY

Remove:
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**

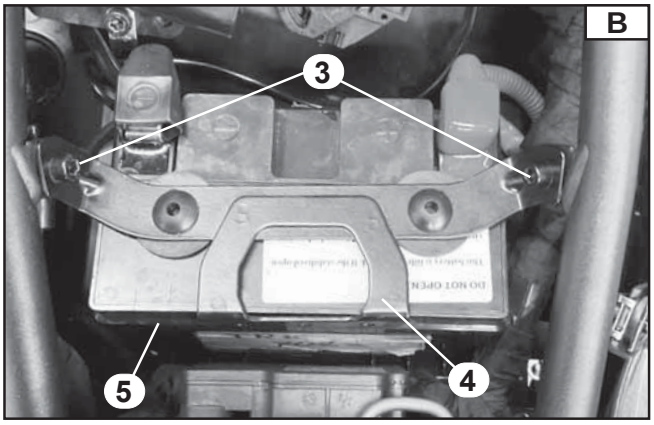
Disconnect:
- The battery cables from the terminals (1) and (2) Fig. A.

NOTICE

Disconnect the negative cable of the battery (1) first, and then the positive cable (2) Fig. A.

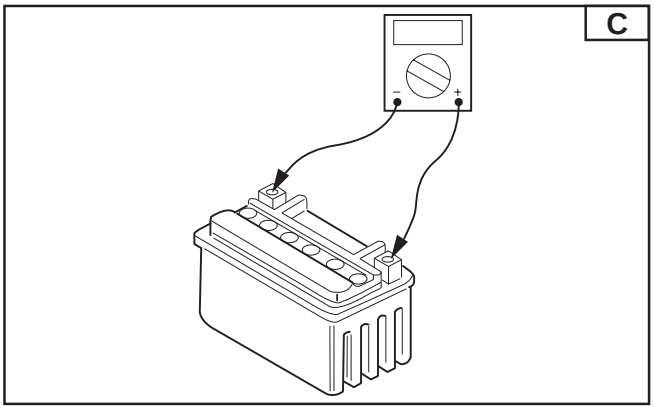


When replacing the battery:
Remove:
- The screws (3) Fig. B.
- The battery bracket (4) Fig. B.
- The battery (5) Fig. B.



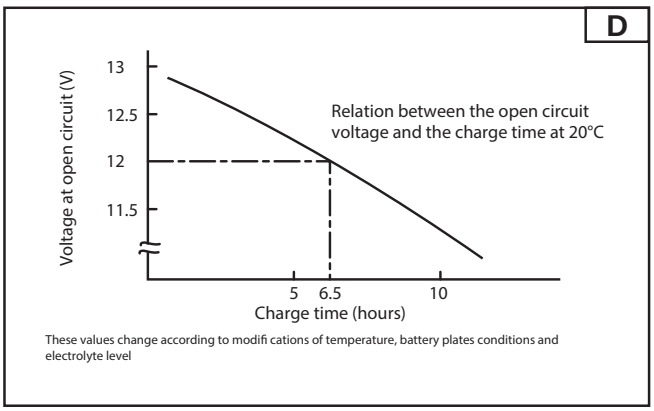
Check:
- The battery charge.

Connect a multimeter to the battery terminals Fig. C.



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



RECHARGING METHOD:
- Standard: 1.1A x 5/10 hour.
- Fast: 5.5A x 1 hour max.

ELECTRICAL SYSTEM

CHECK AND CHARGE OF BATTERY

WARNING

- **Never remove the caps that seal the battery.**
- **Use fast chargers with extreme care, as there 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 recharging current of the battery charger, be careful to prevent the battery from over-charging.

For charging the motorcycle, disconnect the battery from the vehicle. (Should it be necessary to recharge with the battery mounted on the motorcycle, 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.

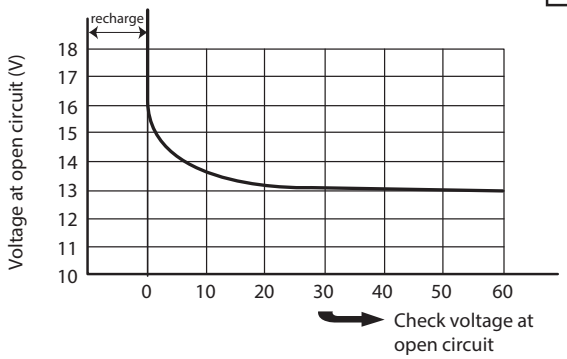
Before disconnecting the clamps from the battery charger cables from the battery terminals, remember to switch off the battery charger.

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 illustrated in Fig. E, await 30 minutes after the end of recharging, before measuring the open-circuit voltage.

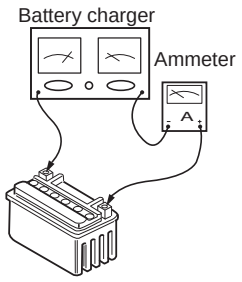
E



ELECTRICAL SYSTEM
CHECK AND CHARGE OF BATTERY

RECHARGING 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. (A lower setting will not give sufficient charge; an excessively high setting will overload the battery).**



Measure the voltage at open circuit before charging

Connect a battery charger and an ammeter to the battery and start charging

Check the current is higher than the standard value of the charge one indicated on the battery

YES

NO

By rotating a charge voltage setting roller, set the charge voltage to 20 ~ 24 V

Monitor the amps for 3 ~ 5 minutes to check if the standard charge current is reached

YES

Set the voltage so that the current is equal to standard charge level

NO

Should current not exceed the standard charge current after 5 minutes, replace the battery

Set time according to charge time suitable for the voltage in an open circuit.
Refer to instructions supplied with the battery

In case it takes more than 5 hours for charge, it is recommended to check the charge current after 5 hours.
In the event of amps changes, set again the voltage to obtain the standard charge current

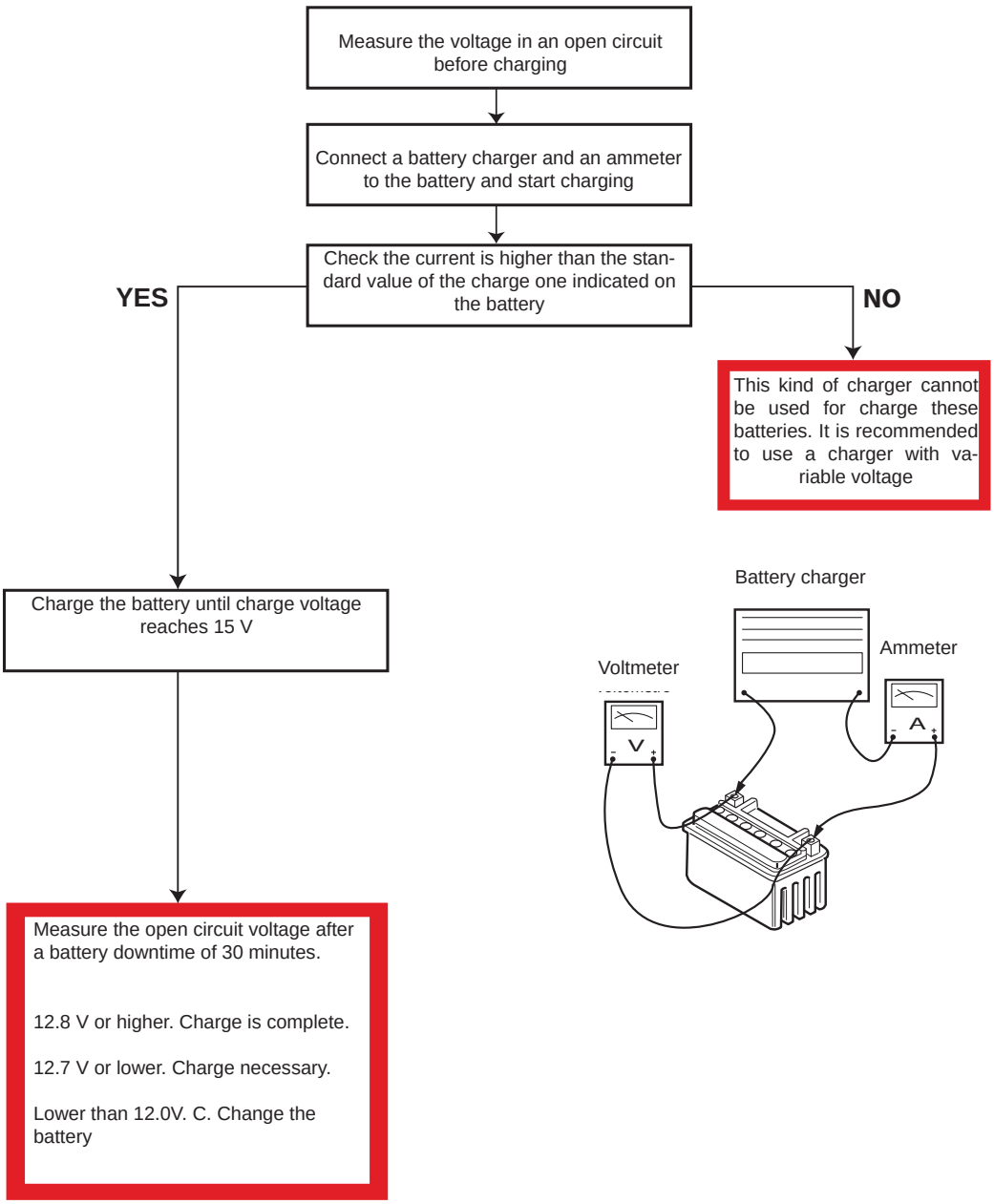
Measure the battery open circuit voltage after a downtime of 30 minutes.
12.8 V or higher > Charge is complete
12.7 V or lower >Charge necessary
Lower than 12.0V > Replace the battery

ELECTRICAL SYSTEM
CHECK AND CHARGE OF BATTERY

RECHARGING 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.**

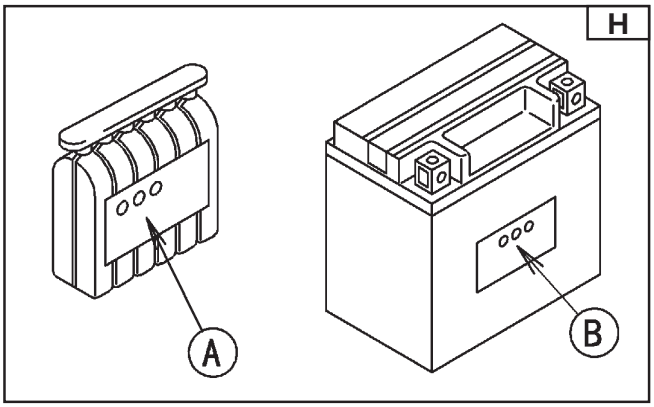
NOTE:
- **To guarantee maximum battery performance and durability, it is advisable to use an electronic battery charger able to supply charge currents or voltages based on the specific requirement of the sealed battery technology.**



ELECTRICAL SYSTEM

CHECK AND CHARGE OF BATTERY

Battery activation:
Filling Electrolyte
Make sure that the model (A) marked on the electrolyte bottle matches with the model (B) of the battery Fig. H. The denominations must be the same.
Battery model name: YTX9-BS.



WARNING

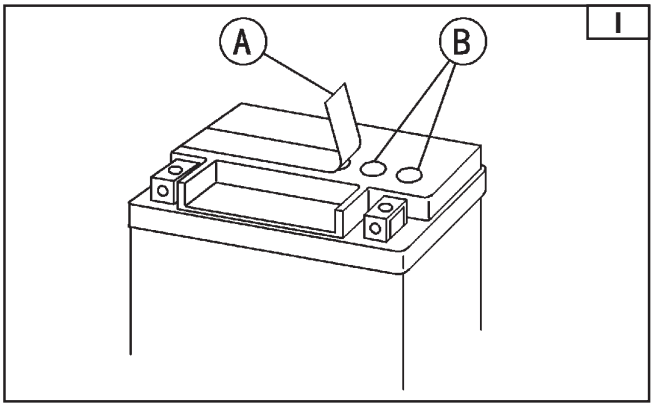
Every battery is supplied with a bottle of its own electrolyte. The use of an unsuitable container may cause the leakage with the wrong electrolyte, thus shortening the battery life and jeopardizing performance.
Use the electrolyte bottle having the same battery model name, as the volume and specific 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.

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.



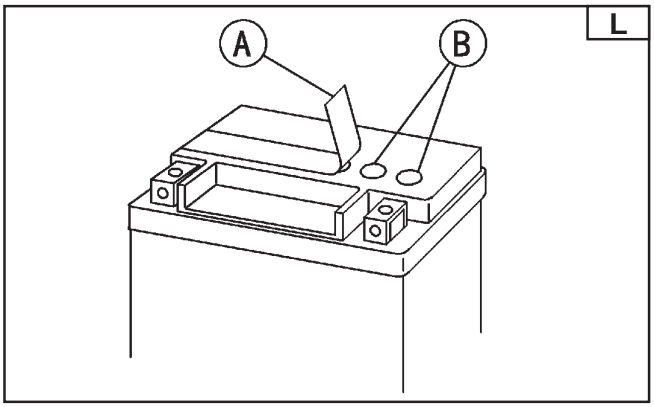
- Place the battery on a flat surface.
- Make sure the sealing film is not frayed, broken or perforated.
- Remove the sealing film (A) Fig. I.

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
CHECK AND CHARGE OF BATTERY

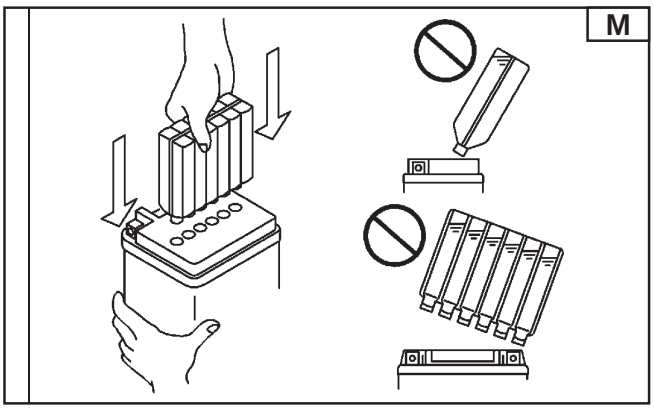
- Take the electrolyte bottle away from vinyl bag.
- Detach the sealing film (A) from the bottle and store it for seal the battery subsequently, Fig. L.

NOTE:
Do not puncture or open the sealed cells (B) of the electrolyte bottle. Do not try to divide the single cells.



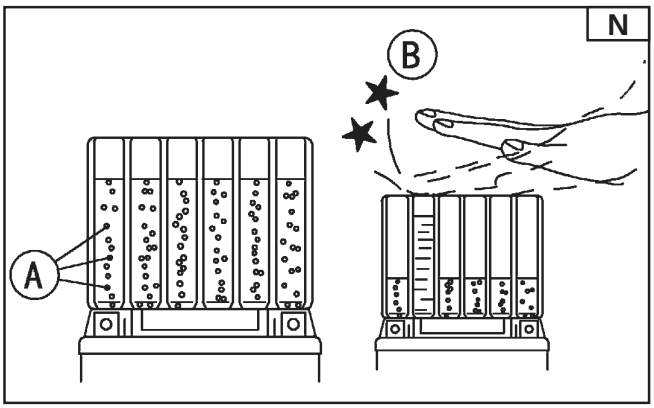
- Topple the electrolyte bottle by aligning the six sealed cells to the filling ports of battery. By keeping the bottle in horizontal position, push downwards to break the seals of the six cells. During filling, some air bubbles will go up to each cells Fig. M.

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. N.

NOTE:
Take care not to drop the battery.



- 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
CHECK AND CHARGE OF BATTERY

- Place the strip of caps (A) on the filling ports and press strongly with both hands to insert them into the battery Fig. O (without tapping) Fig. E. If correctly installed, the series of caps will be levelled with the top side of the battery.

WARNING

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

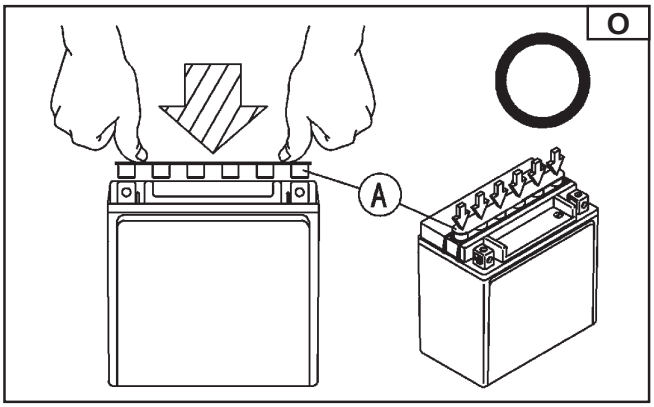
NOTE:
Charging immediately after filling may reduce the technical life of the battery.

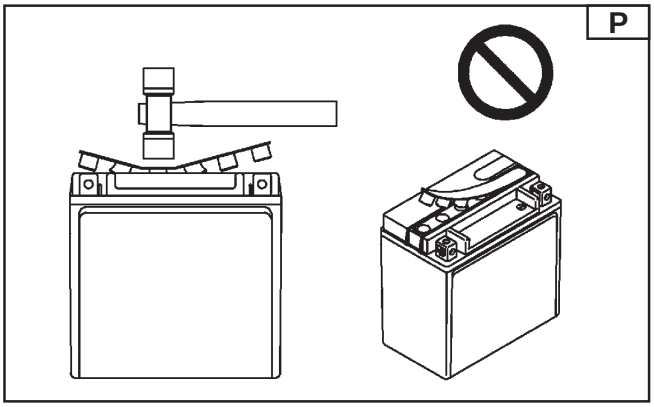
Initial Charge:
The sealed battery just supplied require initial charge.
Use a constant voltage battery charger.

Standard charge: 0.9 A × 5 – 10 hours.

- Leave the battery to settle for 30 minutes after the initial charge and then inspect the voltage using a voltmeter. (The voltage is temporarily high immediately after charge. For accurate measurement, leave the battery to rest for the time required).

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. Check the voltage again and if it is lower than12.6V, repeat the charge cycle and the charge test. If the voltage is still below 12.6V, the battery is faulty.**





ELECTRICAL SYSTEM
FUSES

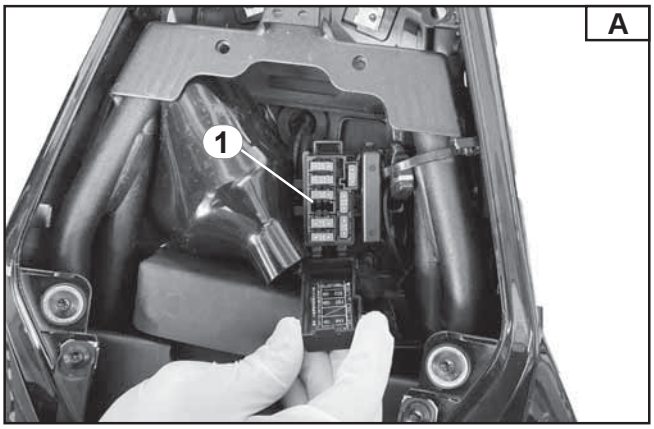
The following procedure applies to all fuses.

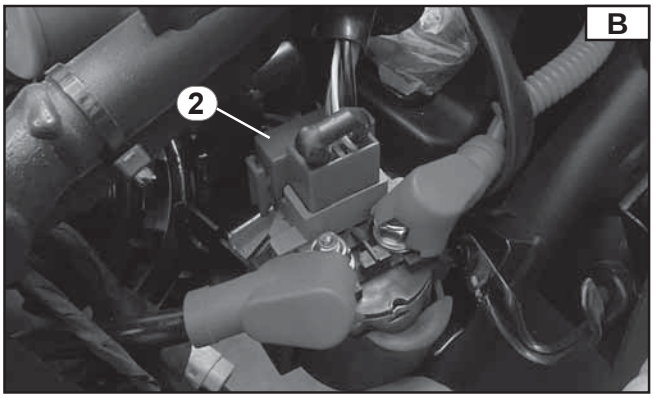
NOTICE

Set the ignition switch to "OFF".

Remove:
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**

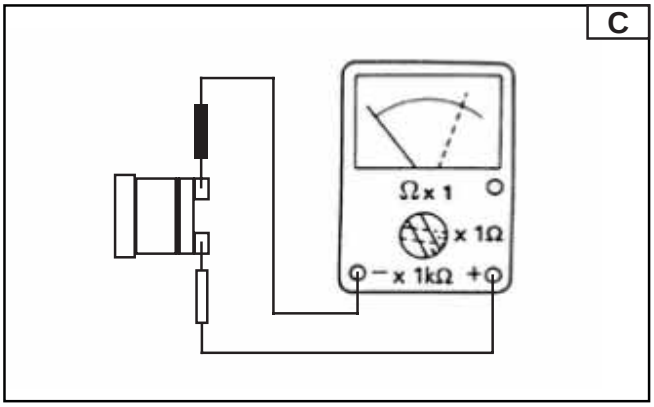
Access:
- The fuse box (1) Fig. A.





Check:
- The main fuse (2) Fig. B.

Connect a multitester to the fuse and check its continuity Fig. C.



NOTE:

Set the selector switch of the multimeter on "Ω x 1".

- If the multitester indicates "∞", replace the fuse.

Replace:
- The blown fuse.

- Position the main switch at "OFF".
- Install a new fuse with the correct amperage.
- Switch on the switches to make sure that the electrical circuit is working.
- If the fuse burns out immediately, check the power circuit.

WARNING

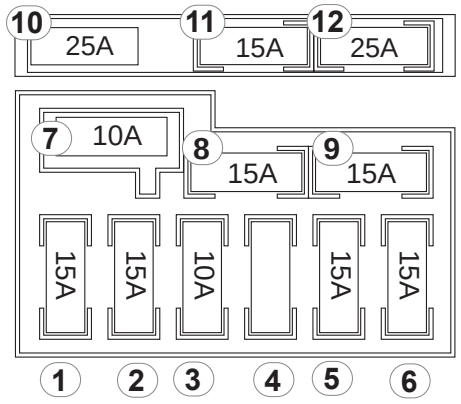
Never use fuses with a amperage different from those specified. The use of improvised techniques or fuses with different amperages could cause irreversible damage to the electrical system, or cause functioning defects of the lighting system and the ignition system and eventually cause a fire.

ELECTRICAL SYSTEM
CHECK OF FUSES

KEY OF FUSES
Refer to Fig. A.

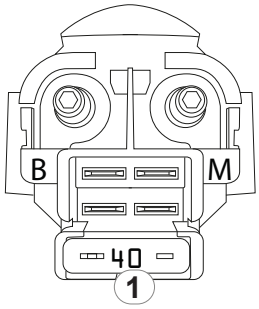
1. Ignition block fuse
2. Fuse of ECU (ECU1)
3. FBT speed sensor fuse
4. (empty)
5. Fuse of cooling fan
6. Fuse of fuel pump
7. Spare fuse
8. Spare fuse
9. Spare fuse
10. Spare fuse
11. ABS 1
12. ABS 2

A



KEY OF STARTING RELAY FUSES
Refer to Fig. B.
1. Main fuse

B



ELECTRICAL SYSTEM
ADJUSTMENT OF HEADLIGHT

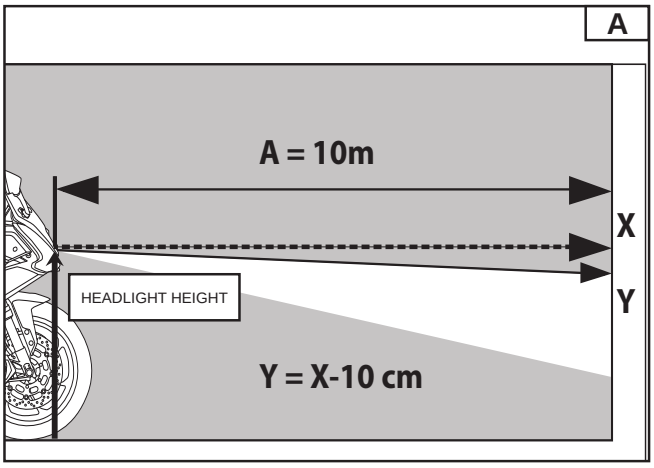
To carry out the correct adjustment of the luminous beam of the headlights:

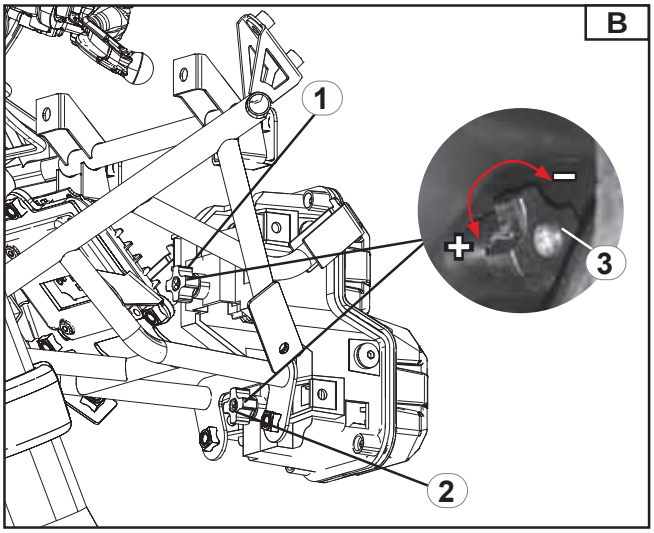
Check if the headlamp is properly oriented by positioning the vehicle at a 10 m distance (A) from a vertical wall, on which the point (X) was previously marked at the height of the light centre, while the point (Y) must be at a 10 cm lower than (X).
The light will be properly oriented when the top limit of the lit area will correspond with the reference (Y).

- If the beam does not fall within these limits, make the adjustments to set it to the correct position.

NOTICE

The presence of any passengers or baggage affect the orientation of the luminous beam, therefore it is advisable to adjust the configuration with which it is required to use the vehicle.





Adjust:
- The luminous beam of the high-beam headlamp (1) and the dipped-beam headlamp (2) via the setting screws (3) on the back of the headlamp Fig. B.
- By rotating counter-clockwise (+), the luminous beam of the headlamp is raised Fig B.
- By rotating counter-clockwise (+), the luminous beam of the headlamp is lowered Fig B.

ELECTRICAL SYSTEM

REPLACEMENT OF REAR TURN SIGNAL LIGHTS

Park the motorcycle on a level surface.

NOTICE

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

NOTICE

The vehicle has integrated LED turn signal lights built-in in the rear auxiliary lights, and in case of anomaly, it is necessary to replace the whole unit.

Remove:

- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The license plate holder, refer to **"Removal of license plate holder, Chapter 4".**
- The fairing lock, refer to **"Removal of tailpiece fairing lock, Chapter 4".**

Disconnect:

The electrical connectors of:

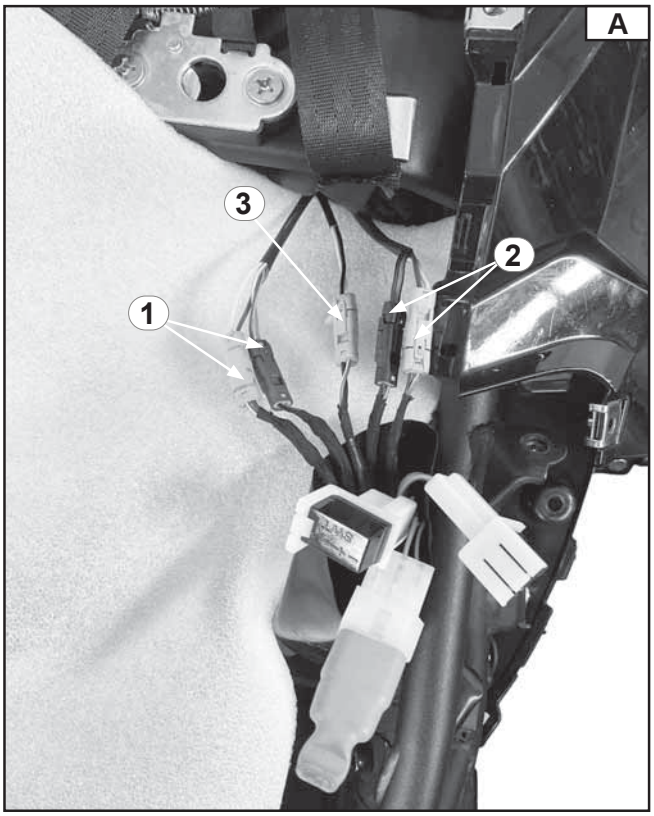
- The turn signal light, the rear auxiliary light and the right stop one (1) Fig. A.
- The turn signal light, the rear auxiliary light and the left stop one (2) Fig. A.
- The license plate light (3) Fig. A.

Install:

- Proceed using the opposite order to removal being careful to position the cables into the apposite housings inside the cover.

Connect:

- The electrical connectors.



ELECTRICAL SYSTEM

REPLACEMENT OF LICENSE PLATE LIGHT

Park the motorcycle on a level surface.

NOTICE

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

The license plate light is built-in with the indicators/auxiliary light support.

For replacing the license plate light, refer to **"Replacement of rear turn signal lights, Chapter 3"**.

ELECTRICAL SYSTEM

REPLACEMENT OF THE FRONT TURN SIGNAL LIGHTS

Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, based on the indicator to be replaced, refer to **"Removal of tank fairing, Chapter 4"**.

Disconnect:

- The left rear indicator light (1) Fig. A.

Remove:

- the locking nut (2) Fig. B.

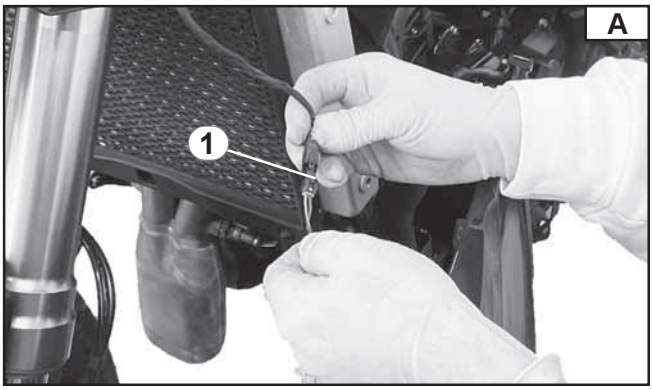
NOTE:
Carry out the following operation for the right side.

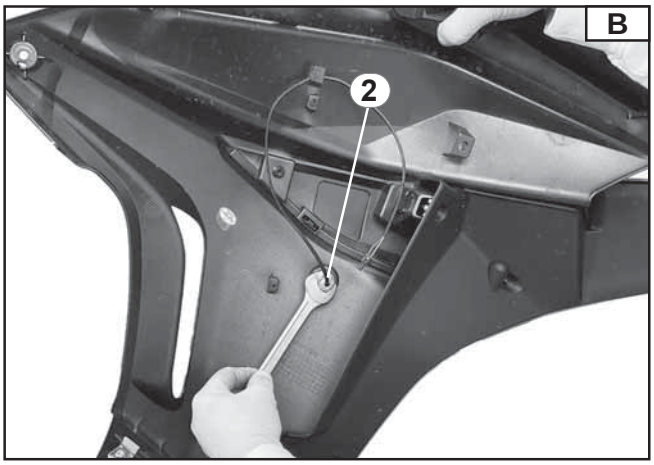
Install:

- Proceed using the opposite order to removal.

NOTICE

The vehicle has integrated-LED turn signal lights, and in case of anomaly, it is necessary to replace the whole turn signal light.





ELECTRICAL SYSTEM
REPLACEMENT OF AUXILIARY LIGHTS

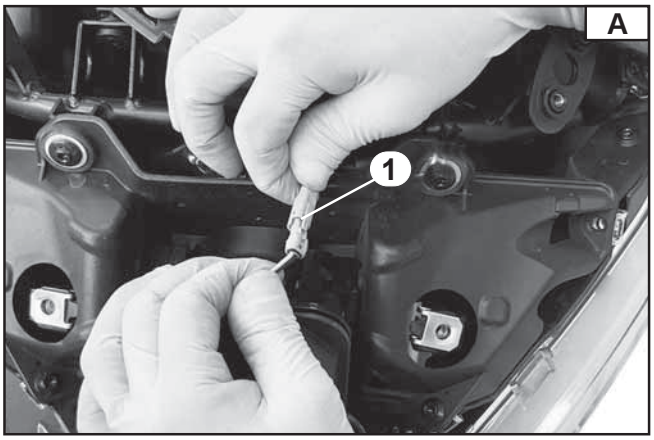
Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The rear view mirrors, refer to **"Replacement of rear view mirrors, Chapter 3".**
- The windscreen, refer to **"Replacement of windscreen, Chapter 3".**

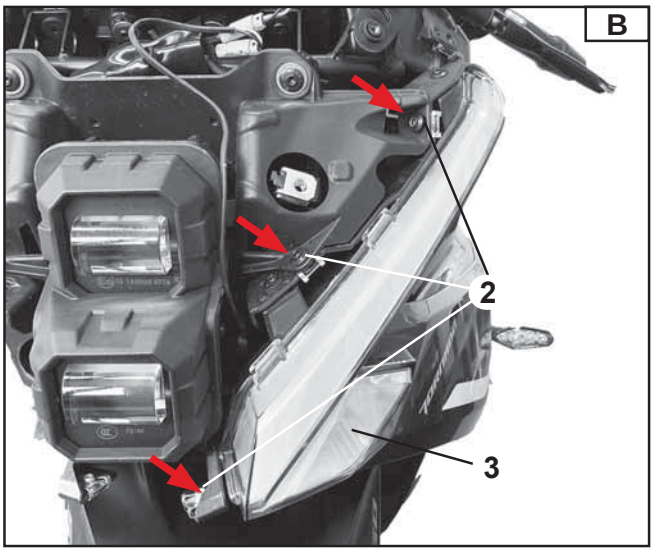
Disconnect:
- The connector (1) Fig. A.



Remove:
- The screws (2) Fig. B.
- The left auxiliary light (3) Fig. B

NOTE:
Carry out the following operation for the right side.

Install:
- Proceed using the opposite order to removal.



ELECTRICAL SYSTEM
IGNITION BLOCK REPLACEMENT

Park the motorcycle on a level surface.

NOTICE

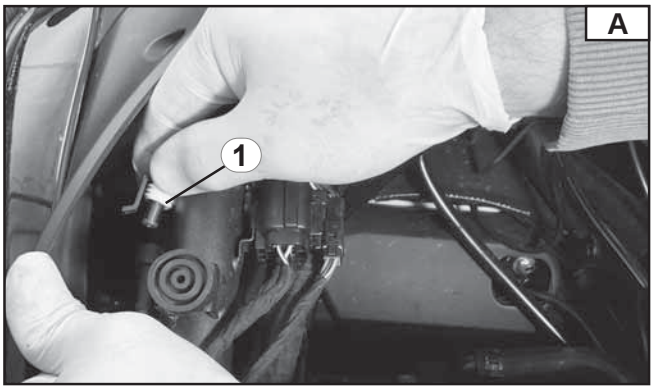
Prop the motorcycle on suitable supports so that it cannot fall.

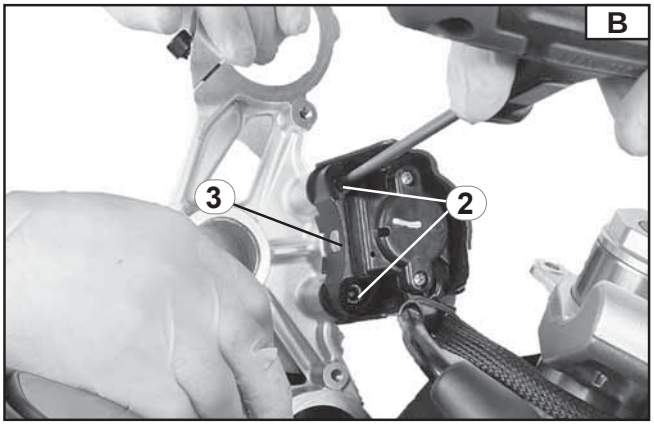
Remove:
- The rear view mirrors, refer to **"Removal of rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The steering head, refer to "**Check of steering clearance adjustment**, **Chapter 3**".
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.

Disconnect:
- The connector (1) left side of the tank Fig. A.

Remove:
- The screws (2) Fig. B.
- The ignition block (3) Fig. B.

Install:
- Proceed using the opposite order to removal.





Remarks



4 FRAME

CHAPTER 4

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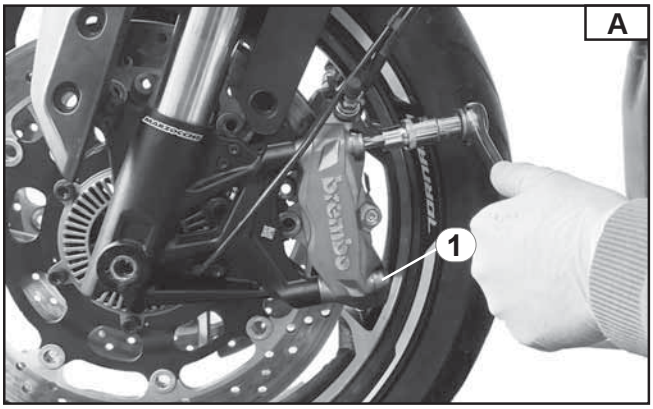
FRONT WHEEL AND BRAKE DISCS

FRONT WHEEL REMOVAL

Park:
- The motorcycle on a level surface.

NOTE:
Place the motorcycle on a suitable stand so that the front wheel is raised.

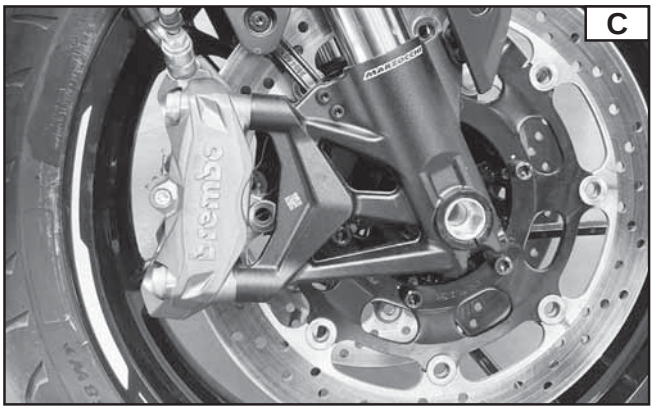
Remove:
- The left brake caliper screws (1) Fig. A.



- The screw (2) of the ABS sensor Fig. B.

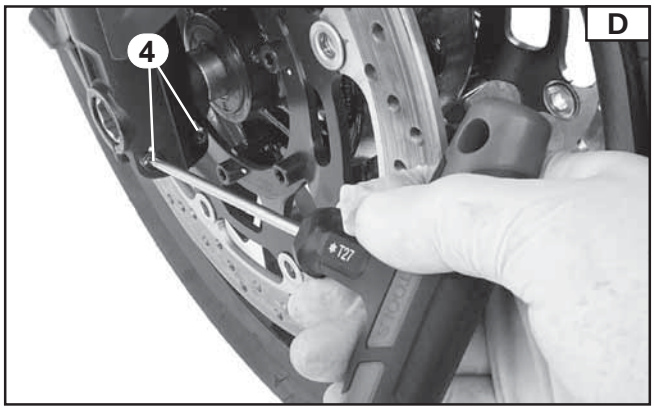


Remove:
- The right brake caliper screws (3) Fig. C.



NOTE:
Do not activate the front brake lever while removing the brake calipers.

Loosen:
- The screws (4) of the RH wheel spindle clamp Fig. D.

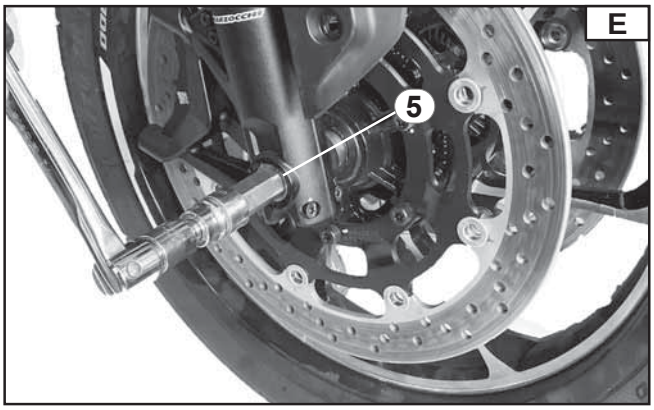


FRONT WHEEL AND BRAKE DISCS

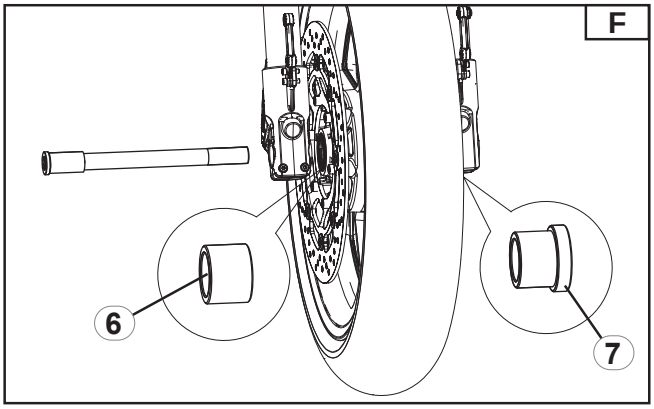
FRONT WHEEL REMOVAL

Remove:

- The front wheel spindle (5) Fig. E.



- The right inner spacer (6) Fig. F.
- The left inner spacer (7) Fig. G.
- The front wheel.



FRONT WHEEL AND BRAKE DISCS

REMOVAL/INSTALLATION OF BRAKE DISCS

Remove:

- The front wheel, refer to **"Removal of the front wheel, Chapter 4".**
- The brake calipers, refer to **"Removal of the front brake caliper, Chapter 4".**
- The screws (1) Fig. A.

NOTE:
To make removal of screws easier, use an industrial drier so as to reduce the action of the thread locker.

- The brake disc (2) Fig. A.

Install:

- The front brake disc.

Tighten:

- The screws (1) Fig. A.

Torque 28 N*m

	MEDIUM THREAD LOCKER

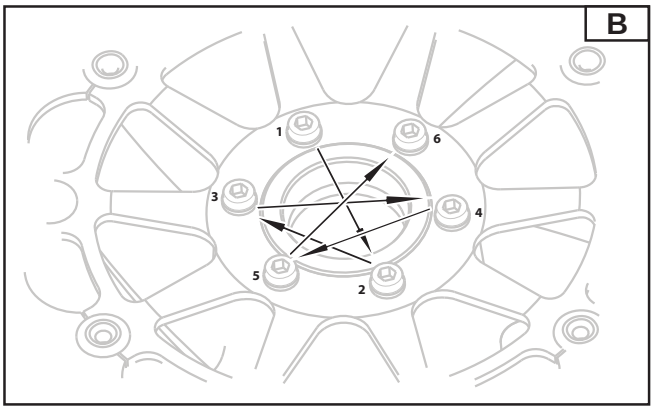
The procedure below applies to both brake discs.

NOTE:
Tighten the bolts on the brake disc in successive steps and proceeding in a crossover manner Fig. B.

A



B



FRONT WHEEL AND BRAKE DISCS

CHECK OF THE BRAKE DISCS

The procedure below applies to all brake discs.

Check:

- The brake disc.

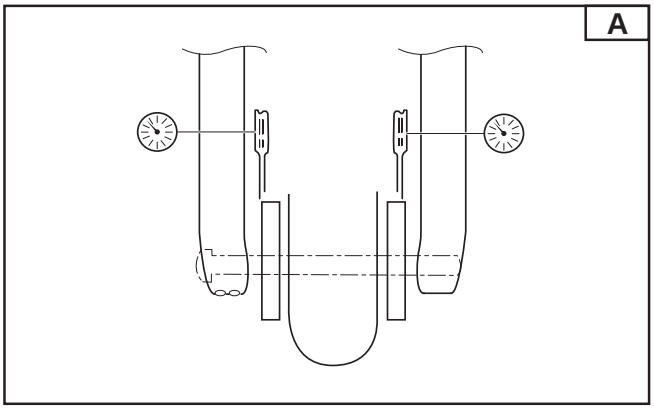
If there is any damage/abrasion, replace.

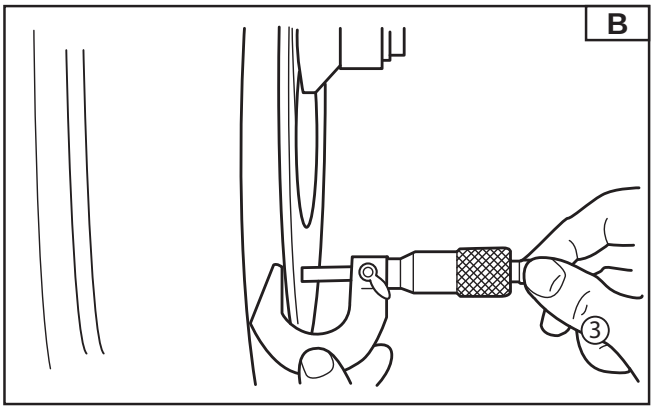
Measure:

- The deformation of the brake disc Fig. A.

Substitute the brake disc if it is outside the specification.

- Place the motorcycle on a suitable support stand so that the wheel is raised.
- To remove the brake caliper, refer to **"Removal of the front brake caliper, Chapter 4".**
- Keep the gauge perpendicular to the surface of the brake disc.
- Measure the bending, which must be between 0.1 mm and 0.15 mm (0,03-0,059 in) under the edge of the brake disc Fig. A.





Brake disc	Deformation limit
Front	0.15 mm
Rear	0.15 mm
Standard wear limit Fig. B	4.5 mm
Wear limit Fig. B	4.0 mm
(1 mm = 0.0393701 in)	

Measure:

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

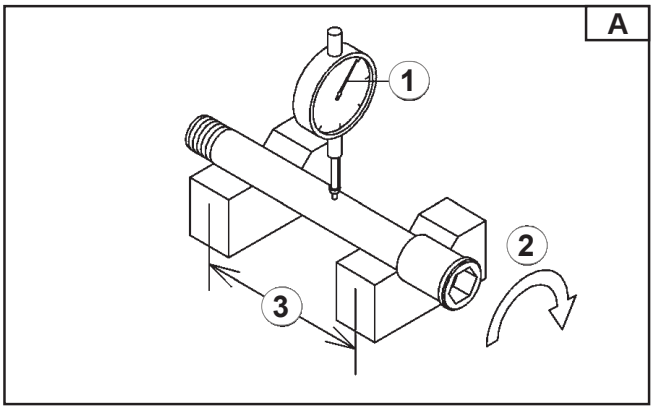
FRONT WHEEL AND BRAKE DISCS

CHECK OF WHEEL SPINDLE

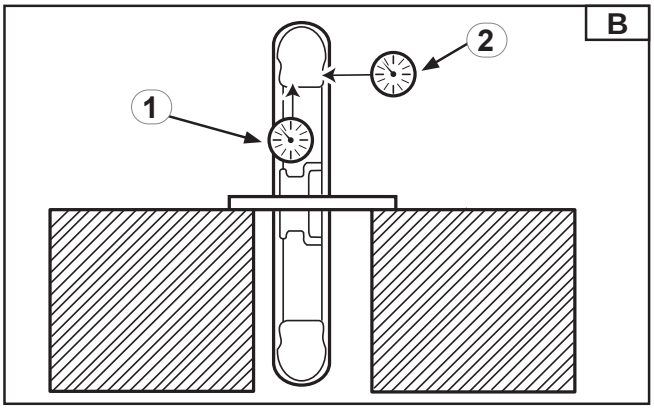
Carry out a visual check of the front/rear wheel spindle to make sure they are not damaged.
Replace the wheel spindle if it is damaged or bent.

Check:
- The wheel spindle.
- Position the wheel axle on two V-shaped blocks approx. 100 mm apart (3) and position a comparator (1) on the wheel axle at a point halfway between the blocks Fig. A.
- Rotate the wheel axle (2) to measure the lack of centring.

The difference between the top and bottom detections of the comparator represents the measurement of the misalignment. Replace the wheel spindle, if the misalignment exceeds the service limit.



Wheel spindle runout/100 mm	
STANDARD	0.1 mm or less
Service limit	0.2 mm
(1 mm = 0.0393701 in)	



NOTICE

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

Check:
- The tire.
- The front wheel.

If there is any damage or wear, replace.

Measure:
- The radial eccentricity of the wheel (1) Fig. B.
- The lateral eccentricity of the wheel (2) Fig. B.

If the specified limit is exceeded, replace.

Eccentricity	Limit
Radial (1)	2 mm
Lateral (2)	2 mm
(1 mm = 0.0393701 in)	

FRONT WHEEL AND BRAKE DISCS

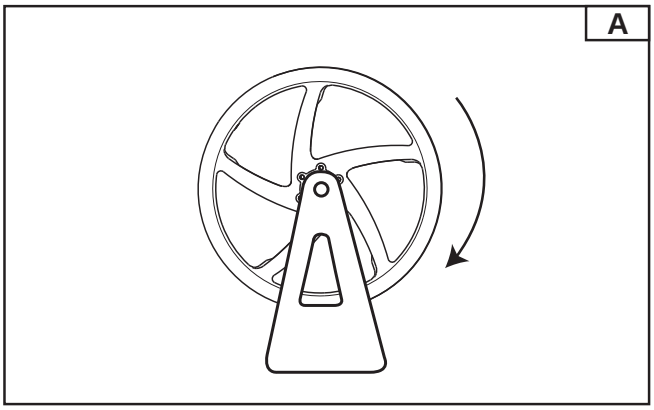
CHECK/REPLACEMENT OF WHEEL BEARINGS

Check:

- The wheel bearings Fig. A.

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

A

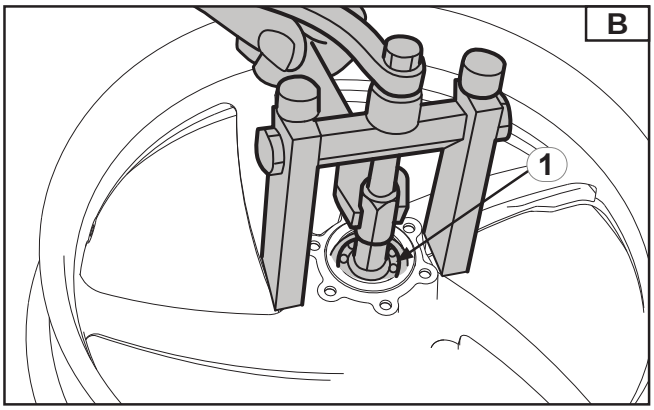


Replace:

- The wheel bearings.

Remove the wheel bearings (1) using a general bearing extractor Fig. B.
Insert the new wheel bearings, following the removal steps in reverse order.

B

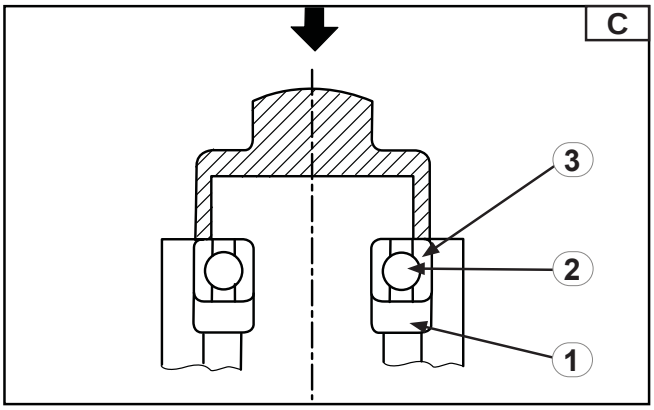


NOTICE

During bearing insertion, do not touch the inner seat (1) or the ball bearings of the wheel (2). Contact must only occur with the outer seat of bearing (3) Fig. C.

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

C



FRONT WHEEL AND BRAKE DISCS

INSTALLATION OF FRONT WHEEL

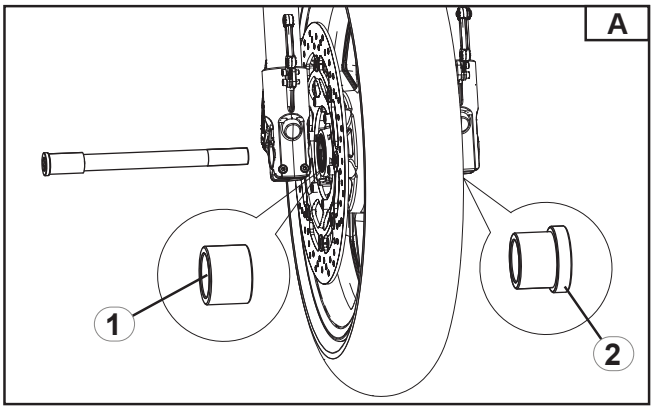
Park the motorcycle on a level surface.

NOTICE

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

Install:
Proceed using the opposite order to removal.

Insert:
- The right inner spacer (1) Fig. A.
- The left inner spacer (2) Fig. A.

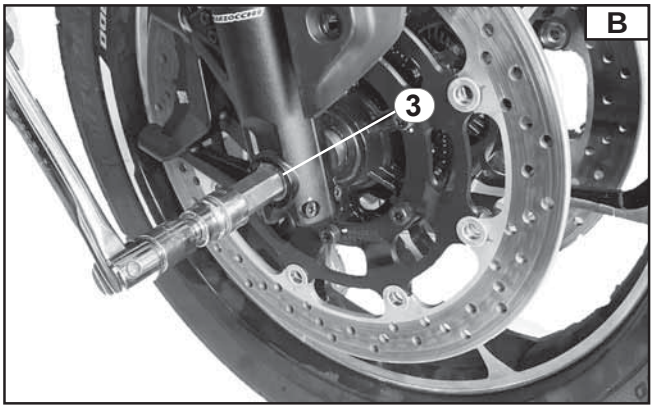


Tighten:
- The wheel spindle (3) Fig. B.

	**Recommended lubricant NGLI2 GREASE**



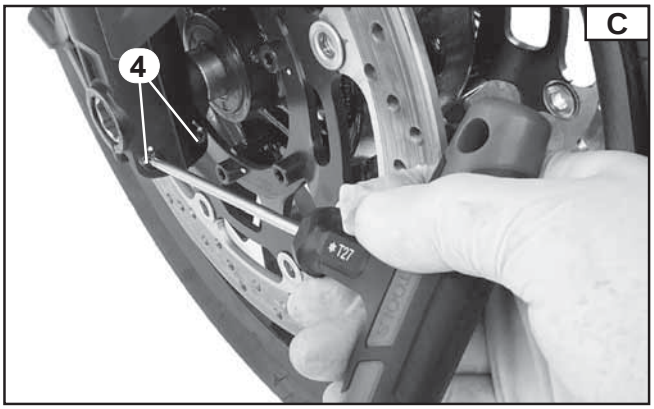
Torque 60 N*m



Tighten:
- The screws (4) of the RH wheel spindle clamp Fig. D.



Torque 10 N*m



NOTICE

Before tightening the setscrews (4) Fig. C push hard on the handlebar to check that the front fork returns to the stationary position in a smooth way.

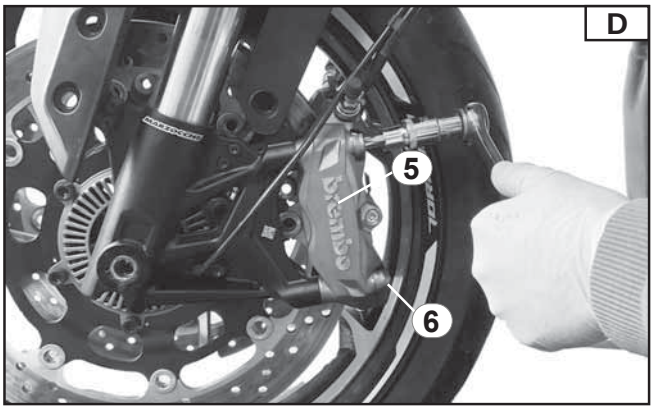
FRONT WHEEL AND BRAKE DISCS

INSTALLATION OF FRONT WHEEL

Install:
- The left brake caliper (5) Fig. D.

Tighten to the torque:
- The screws (6) Fig. D.

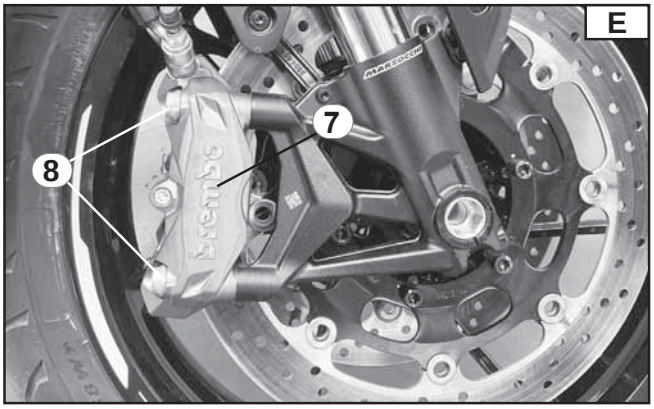
Torque 50 N*m



Install:
- The right brake caliper (7) Fig. E.

Tighten to the torque:
- The screws (8) Fig. E.

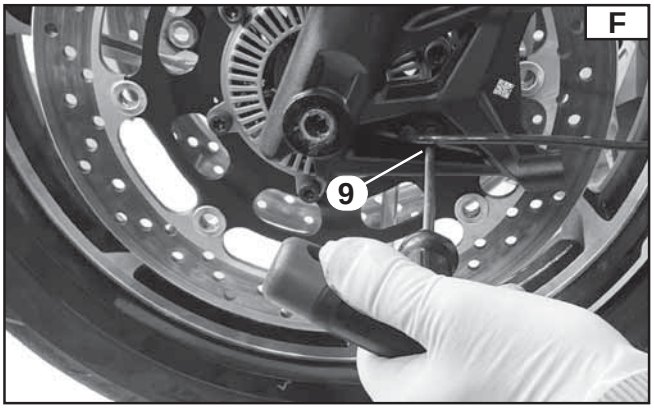
Torque 50 N*m



Install:
- The ABS sensor and screw (9) Fig. F.

Torque 10 N*m

	MEDIUM THREAD LOCKER



NOTE:
Make sure that there is enough space between the brake pads before installing the calipers to the brake discs.
Check that the path of the brake hose is correct.

REAR WHEEL AND BRAKE DISC

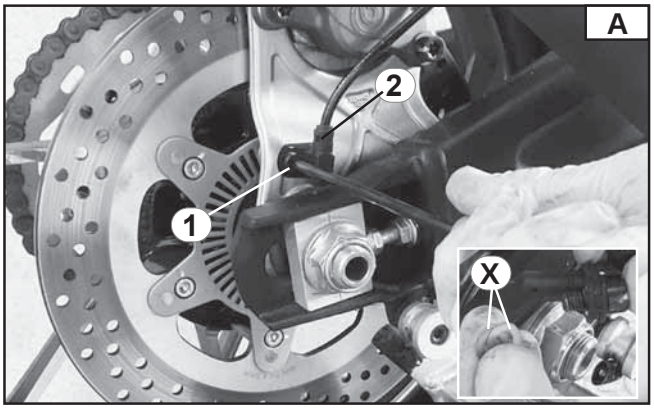
REMOVAL OF REAR WHEEL

Park:
- The motorcycle on a level surface.

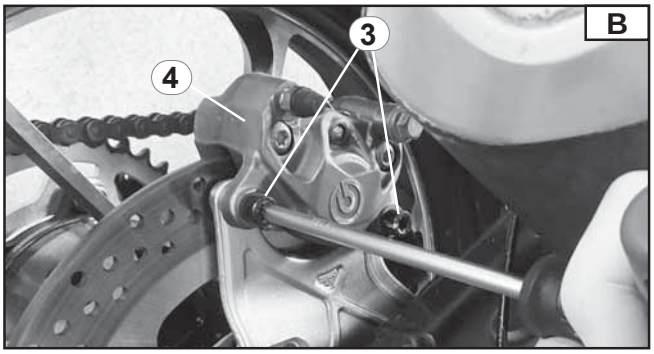
NOTE:
Place the motorcycle on a suitable stand so that the rear wheel is raised.

Remove:
- The screw (1) Fig. A.
- The ABS sensor (2) Fig. A.

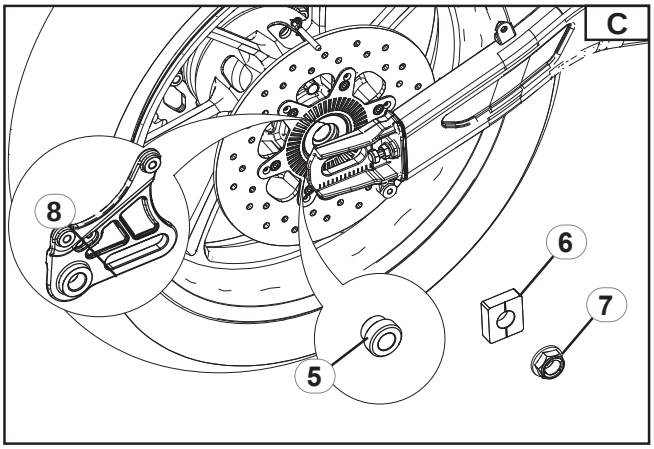
NOTE:
during removal of the sensor, pay attention to the two scraping washers (x) Fig. A



Remove:
- The screws (3) Fig. B.
- The brake caliper (4) Fig. B.



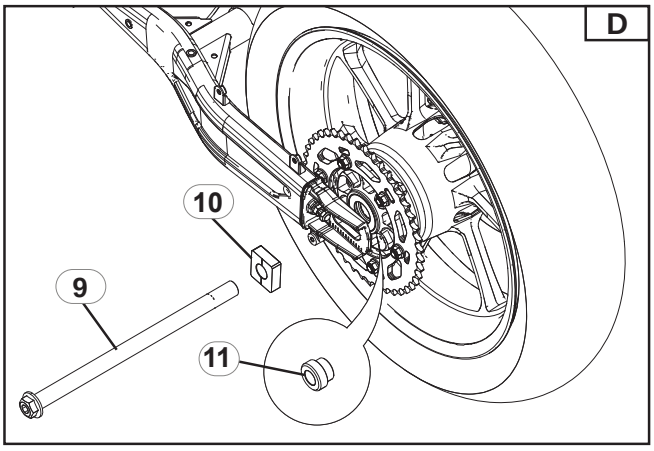
Remove:
- The nut (7) Fig. C.
- The adjuster sliding shoe (6) Fig. C.
- The pin (9) Fig. D.
- The adjuster sliding shoe (10) Fig. D.
- The rear brake caliper support plate (8) Fig. C
- The spacer (5) of the right side Fig. C



Raise:
- The chain.

NOTE:
By raising the chain, the sprocket is disengaged.

Remove:
- The spacer (11) of the left side Fig. D.
- The wheel.



REAR WHEEL AND BRAKE DISC

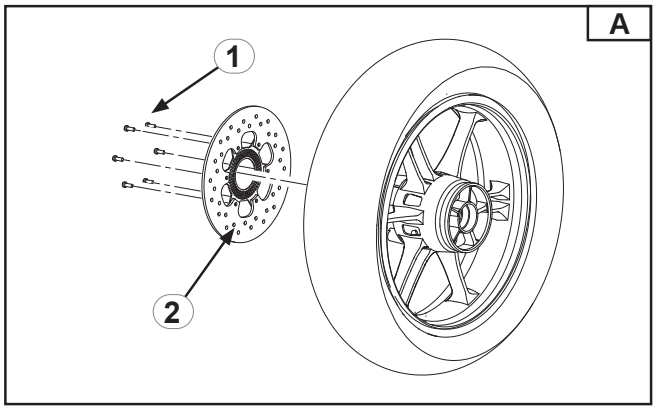
REMOVAL OF REAR BRAKE DISC AND SPROCKET

Remove:
- The rear wheel, refer to **"Removal of the rear wheel, Chapter 4".**

Remove the brake disc:
- The screws (1) Fig. A.

NOTE:
To make removal of screws easier, use an industrial drier so as to reduce the action of the thread locker.

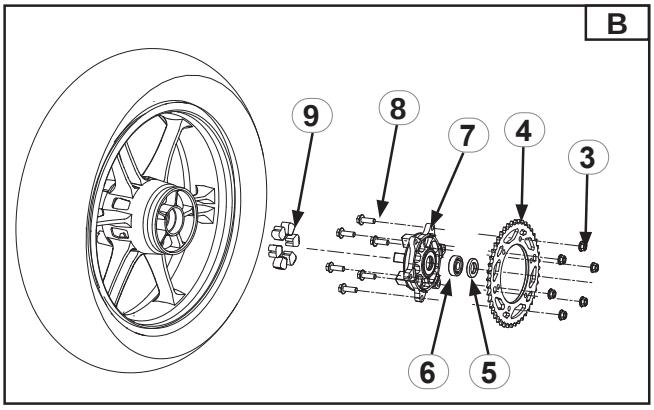
- The brake disc (2) Fig. A.



Remove:
- The nuts (3) Fig. B.
- The sprocket (4) Fig. B.
- The bearing (6) Fig. B.
- The oil seal (5) Fig. B.
- The flange (7) Fig. B.
- The screws (8) Fig. B.
- The spring drive rubbers (9) Fig. B.

Check:
- The sprocket flange (7) Fig. B.
- The spring drive rubbers (9) Fig. B.
- The bearing (6) Fig. B.
- The oil seal (5) Fig. B.

NOTE:
If there are any anomalies or traces of wear, replace the parts.



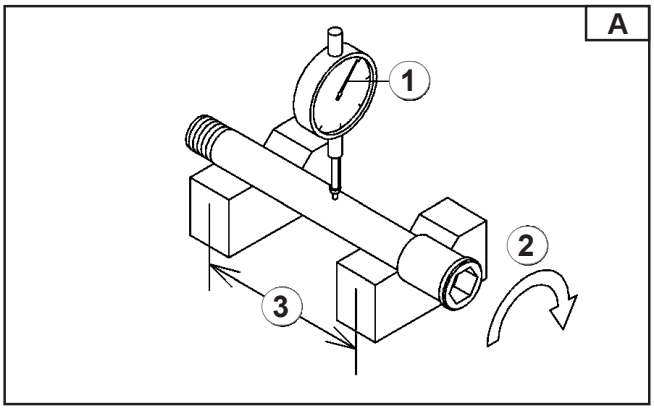
REAR WHEEL AND BRAKE DISC

CHECK OF WHEEL AXLE

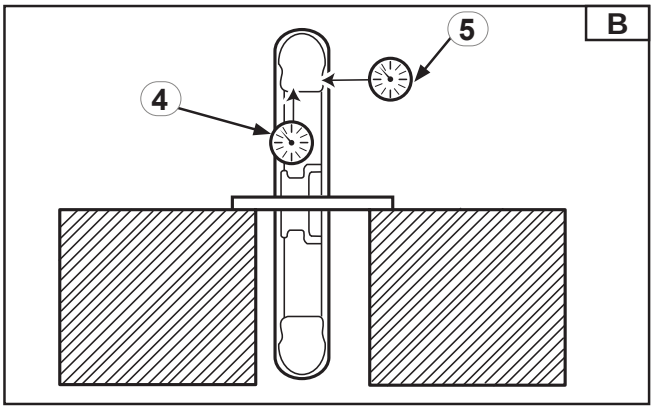
Carry out a visual check of the front/rear wheel spindle to make sure they are not damaged.
Replace the wheel spindle if it is damaged or bent.

Check:
- The wheel axle.
- Position the wheel axle on two V-shaped blocks approx. 100 mm apart (3) and position a comparator (1) on the wheel axle at a point halfway between the blocks Fig. A.
- Rotate the wheel axle (2) to measure the centring.

The difference between the top and bottom detections of the comparator represents the measurement of the misalignment.
Replace the wheel spindle, if the misalignment exceeds the service limit.



Centring of wheel spindle/100 mm (3.93 in)	
STANDARD	0.1 mm or less
Service limit	0.2 mm
(1 mm = 0.0393701 in)	



NOTICE

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

Check:
- The tire.
- The rear wheel.

If there is any damage or wear, replace.

Measure:
- The radial eccentricity of the wheel (4) Fig. B.
- The lateral eccentricity of the wheel (5) Fig. B.

If the specified limit is exceeded, replace.

Eccentricity	Limit
Radial (4)	2 mm
Lateral (5)	2 mm
(1 mm = 0.0393701 in)	

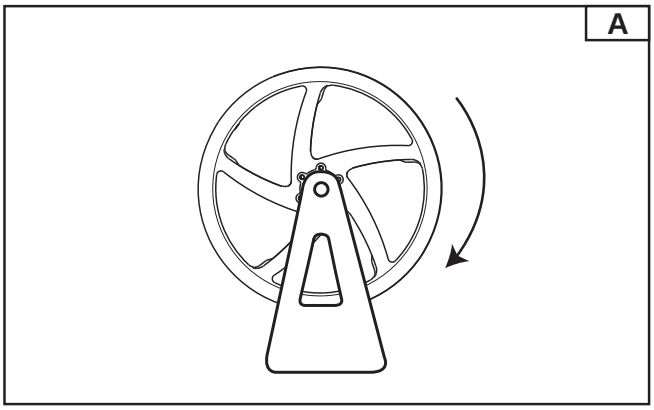
REAR WHEEL AND BRAKE DISC

CHECK/REPLACEMENT OF WHEEL BEARINGS

Check:

- The wheel bearings Fig. A.

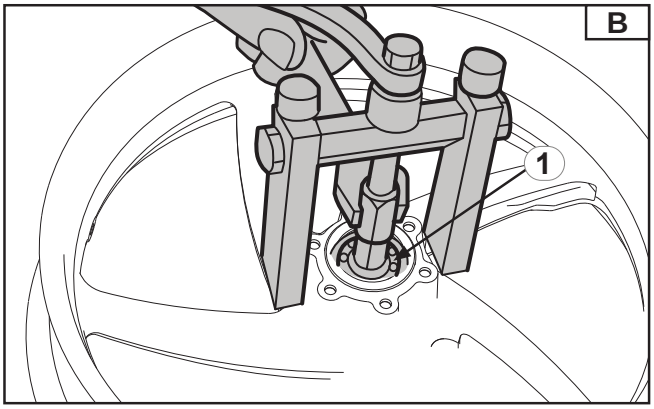
If the rear wheel turns irregularly or is loose, replace the wheel bearings.



Replace:

- The wheel bearings.

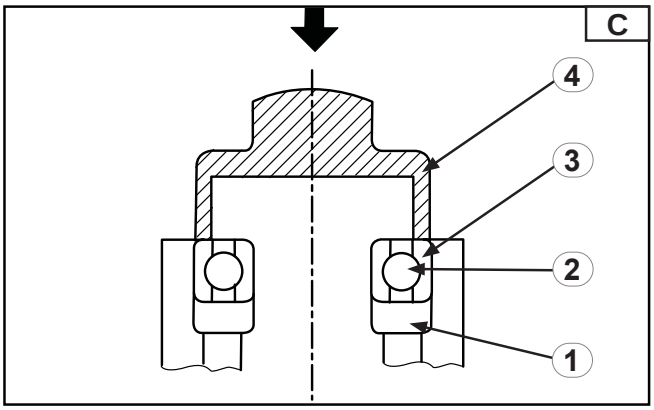
Remove the wheel bearings (1) using a general bearing extractor Fig. B.
Insert the new wheel bearings, following the removal steps in reverse order.



NOTICE

During bearing insertion, do not touch the inner seat (1) or the ball bearings of the wheel (2). Contact must only occur with the outer seat of bearing (3) Fig. C.

NOTE:
Use a wrench that adapts to the diameter of the external edge (4) of the wheel bearing Fig. C.



REAR WHEEL AND BRAKE DISC

REPLACEMENT OF SPROCKET

Replace:

- The sprocket**,** refer to section **"Removal of rear brake disc, sprocket, and signal wheel, Chapter 4".**
- Clean the sprocket flange (1) Fig. A using a clean cloth, especially surfaces that touch the sprocket.

	Solvent with high flash point.

Install:

- The new sprocket.
- The screws and the self-locking nuts (2) Fig. A and tighten to the following torque:

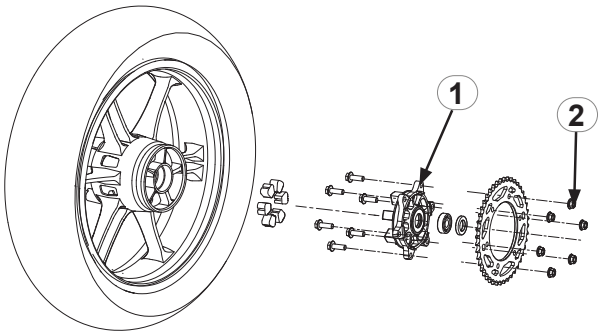


Torque 45 N*m

	**MEDIUM THREAD LOCKER**

NOTE:
Tighten the self-locking nuts in repeated steps, proceeding with a crossover sequence.

A



REAR WHEEL AND BRAKE DISC

BRAKE DISC INSTALLATION

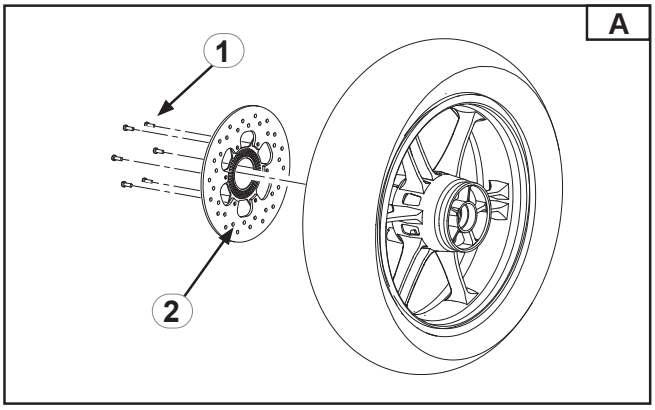
Install:

- The brake disc (2) Fig. A.
- The screws (1) Fig. A.

	MEDIUM THREAD LOCKER

Tighten to the following torque:

Torque 12 N*m



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

REAR WHEEL AND BRAKE DISC

INSTALLATION OF REAR WHEEL

Park the motorcycle on a level surface.

NOTICE

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

Inert in sequence:

- The wheel.
- The chain.
- The LH spacer (3) Fig. A
- The RH spacer (5) Fig. C.

NOTE:
Before installing the brake caliper support plate, check the condition of the two O-Rings inside the seats, as shown in Fig. B.

- Position the brake caliper support bracket (4) Fig. C.

Insert:

- The adjuster sliding shoe (6) Fig. C.
- The adjuster sliding shoe (2) Fig. A.
- The pin (1) Fig. A.
- The nut (7) Fig. C.

Lubricate and install:

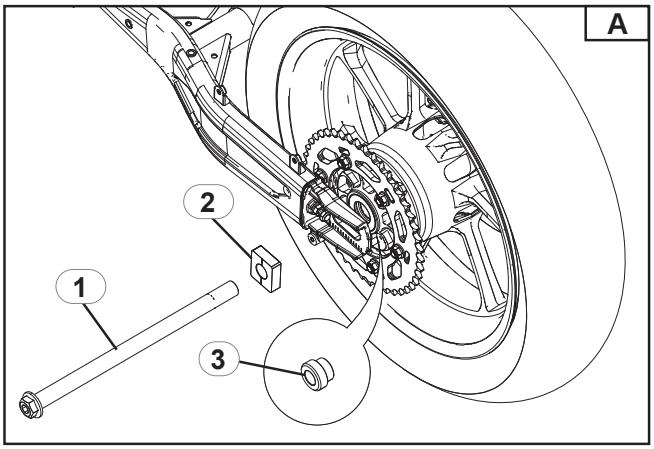
	**Recommended lubricant NGLI2 GREASE**

- Tighten to the following torque:

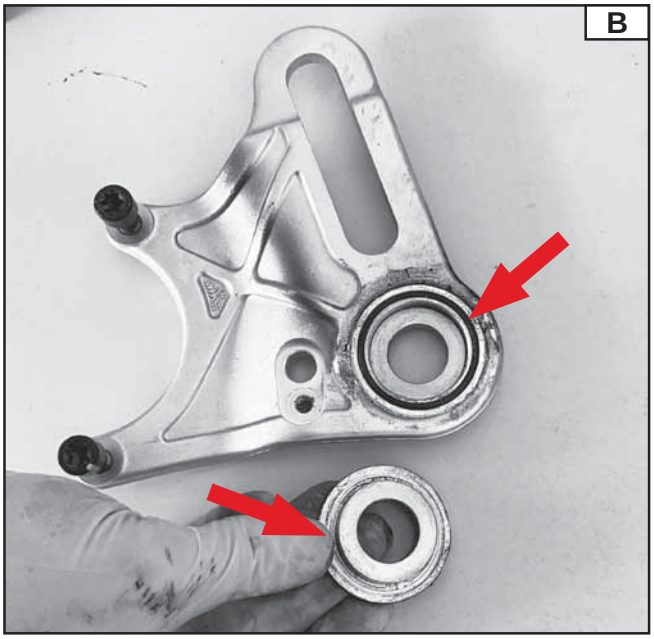


Torque 80 N*m

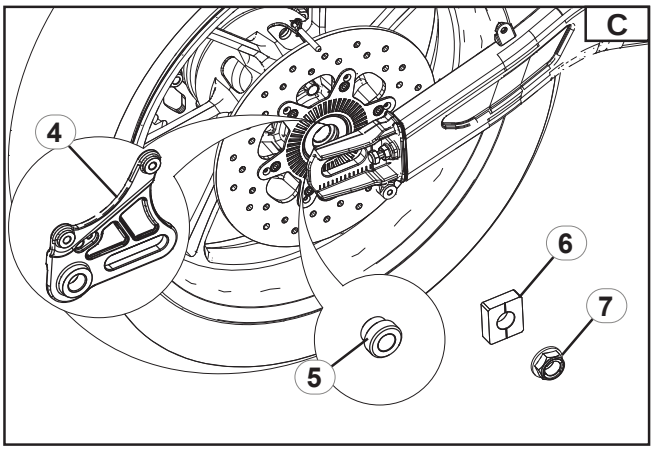
A



B



C



REAR WHEEL AND BRAKE DISC

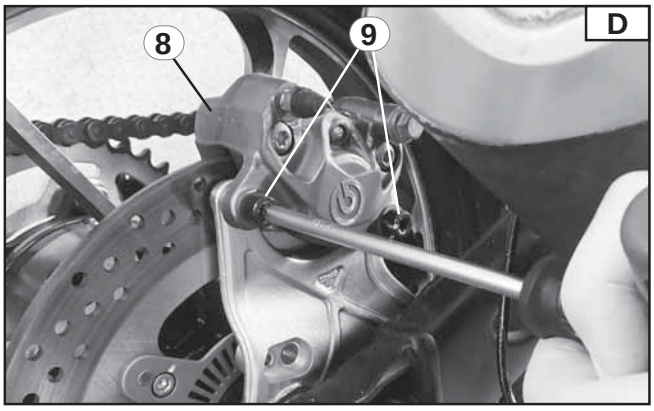
INSTALLATION OF REAR WHEEL

Install:
- The brake caliper (8) Fig. D.

Tighten:
- The screws (9) Fig. D.

Torque 22 N*m

	MEDIUM THREAD LOCKER



NOTE:
Make sure that there is enough space between the brake pad before fitting the caliper to the relevant brake disc.

NOTICE

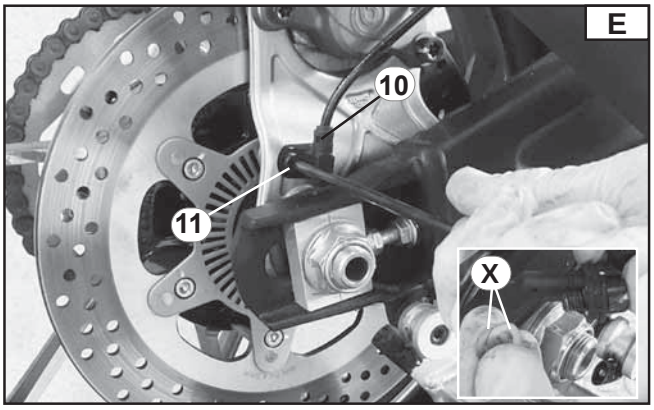
Check that the path of the brake hose is correct.

Install:
- The ABS sensor (10) Fig. E.
- The scraping washers (X) Fig. E.

Tighten:
- The screw (11) Fig. E.

	MEDIUM THREAD LOCKER

Torque 10 N*m

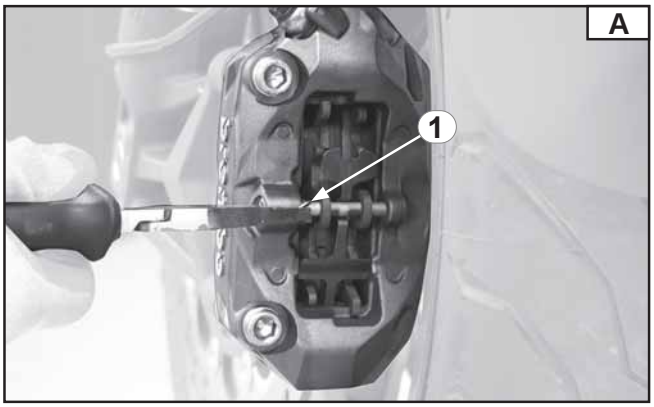


FRONT AND REAR BRAKES
REMOVAL OF FRONT BRAKE PADS

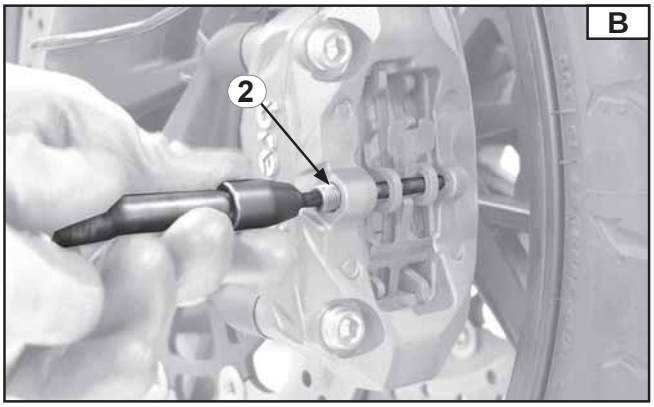
The procedure that follows is applicable to both front brake callipers.

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

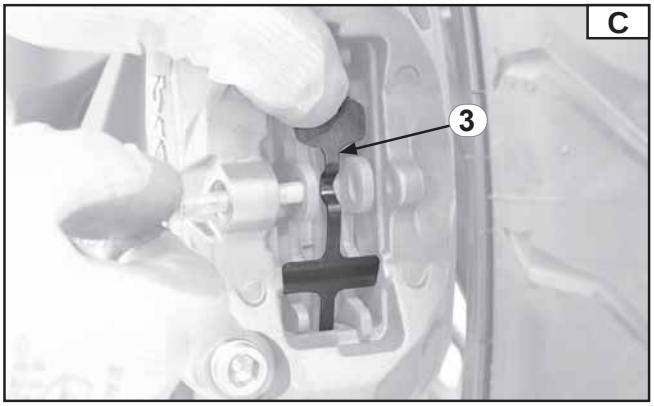
Remove:
- The pin safety spring (1) Fig. A.



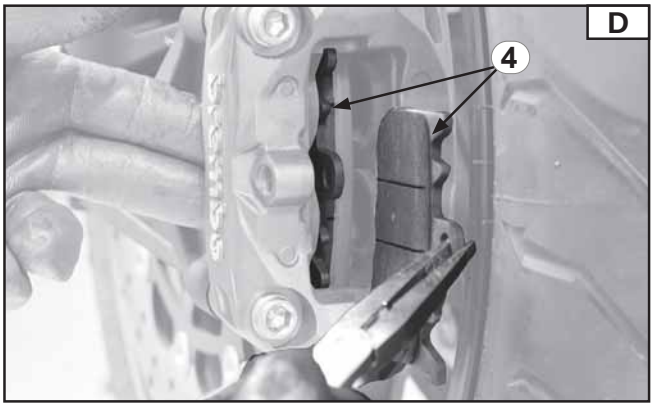
- The fixing pin (2) Fig. B.



- The pad pushing spring (3) Fig. C.



Take out:
- The brake pads (4) Fig. D.



Measure:
- The wear limit for the brake pads.

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

Pads	Wear limit
Front	1 mm

FRONT AND REAR BRAKES

INSTALLATION OF FRONT BRAKE PADS

Clean:

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

Install:

- The brake pads in reverse order of disassembly.
- The brake caliper.

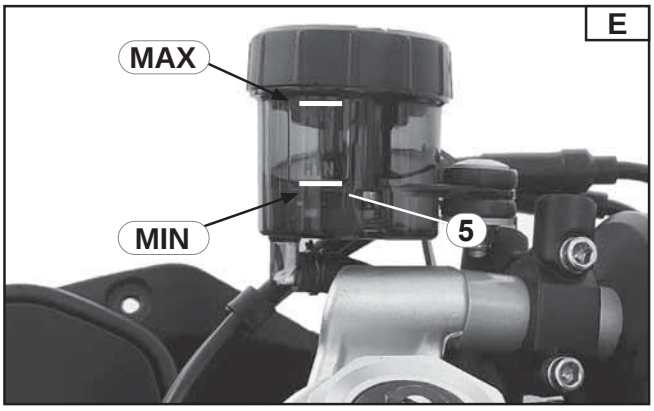
Check:

The brake fluid level (5) Fig. E.
If below the minimum notch, top up with the recommended brake fluid up to the correct level, refer to the section **"Checking and topping up the front brake fluid level, Chapter 3"**.

Check:

- Brake lever operation.

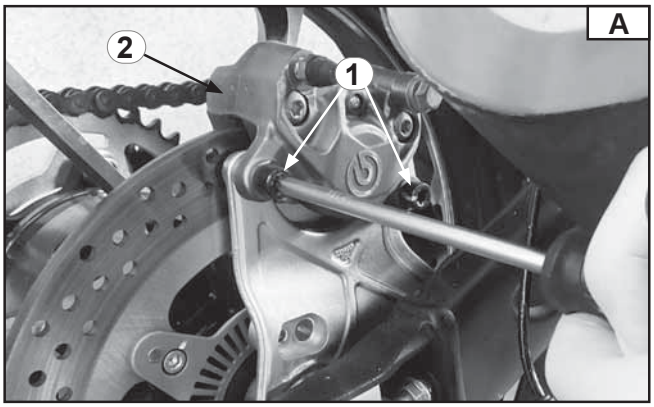
If the brake lever is soft or spongy to the touch, drain the brake circuit.



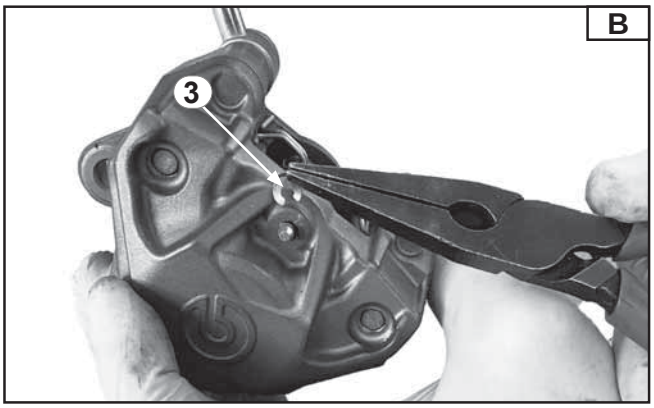
FRONT AND REAR BRAKES

REMOVAL OF REAR BRAKE PADS

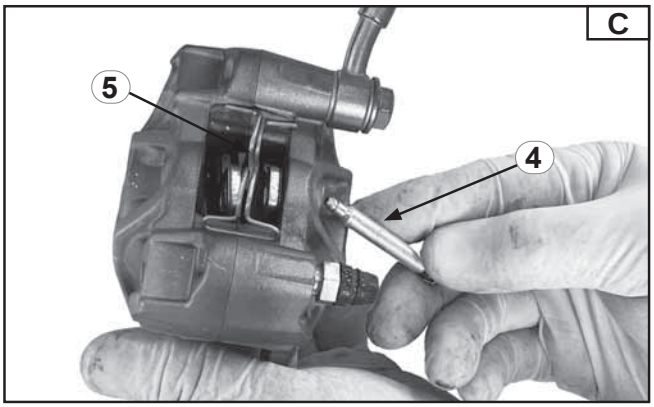
Remove:
- The brake caliper fixing screws (1) Fig. A.
- The brake caliper (2) Fig. A.



- The safety spring (3) Fig. B.



- The fixing pin (4) Fig. C.
- The pad pushing spring (5) Fig. C.



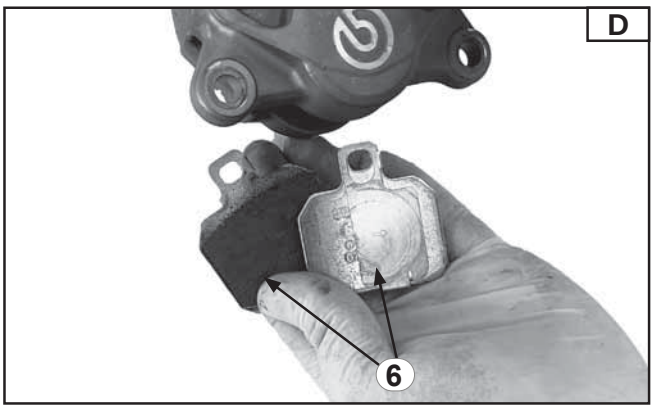
Take out:
- The brake pads (6) Fig. D.

Measure:
- The wear limit for the brake pads.

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



Pads	Wear limit
Rear	1 mm



Clean:
- Inside the caliper.
- The pistons, then dry everything.

FRONT AND REAR BRAKES

INSTALLATION OF THE REAR BRAKE PADS

Install:

- The brake pads in reverse order of disassembly.

NOTICE

Check, during installation, that the metallic plates (1) Fig. A are directed towards the wheel rotation, as shown in the figure.

Install:

- The brake caliper on the support Fig. B.

Tighten:

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

Torque 22 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

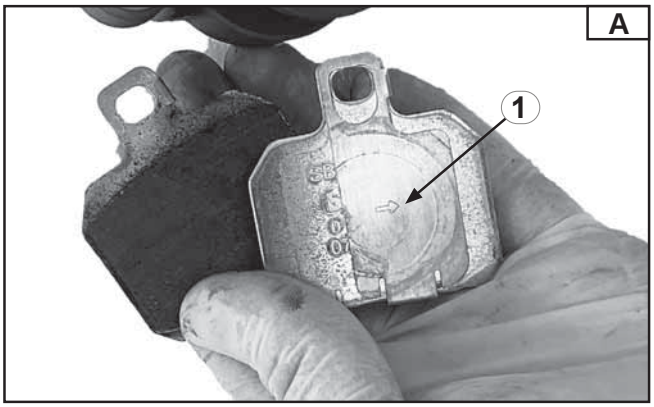
Check:

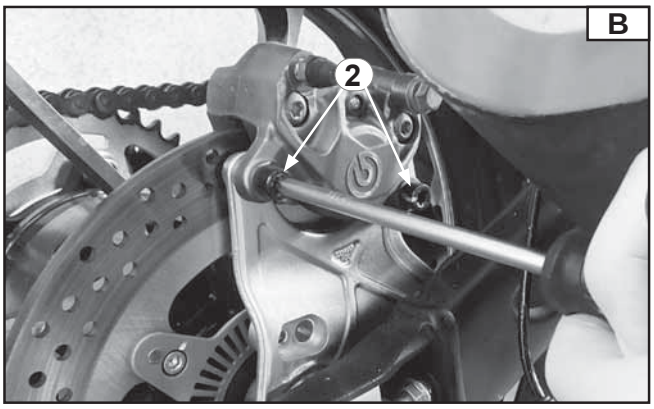
- The brake fluid level Fig. C.

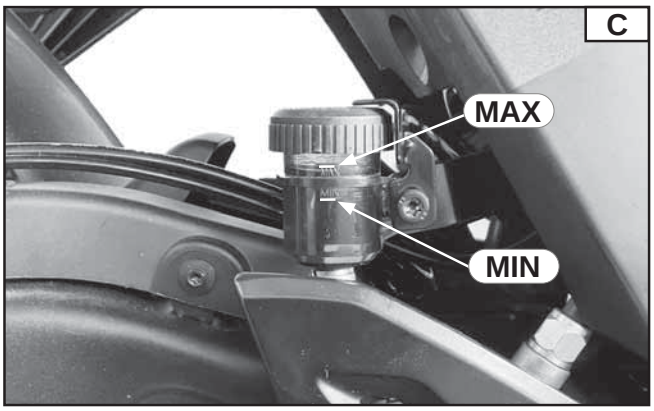
Top up with brake fluid if the level is less that the minimum level mark.

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

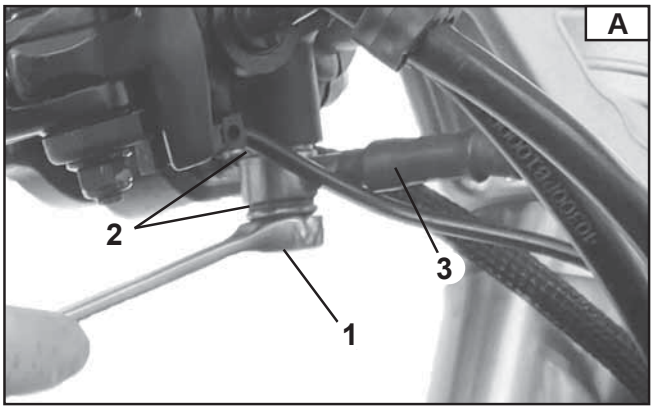
FRONT BRAKE PUMP REMOVAL

NOTE:
Drain out the brake fluid before proceeding with these operations.
Refer to the Chapter 3, Periodic maintenance, section "Checking and topping up the front brake fluid level".

NOTICE

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

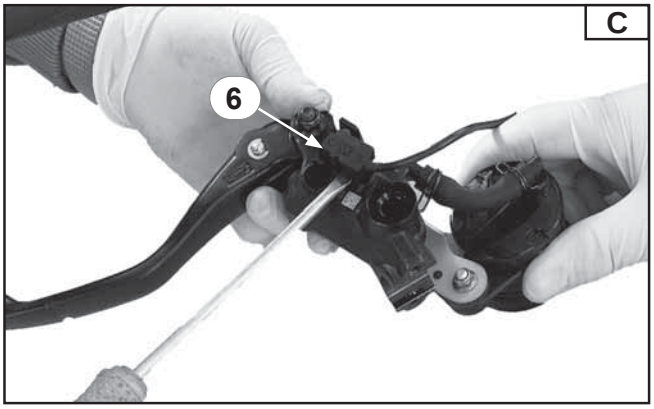
Remove:
- The special screw (1) Fig. A.
- The sealing washers (2) Fig. C. A.
- The front brake tube (3) Fig. A.



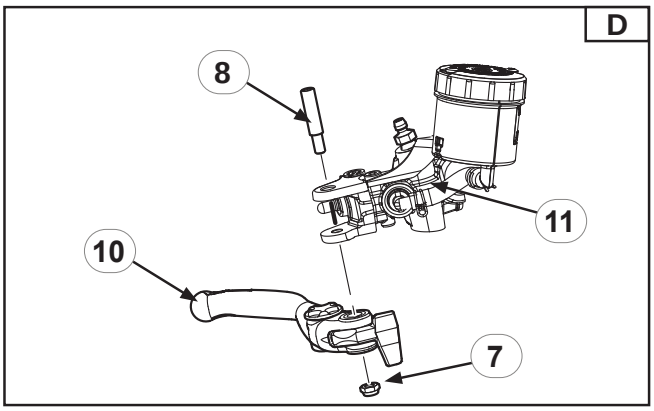
- The screws (4) Fig. B.
- The bracket (5) Fig. B.



Disconnect:
- The connector and the switch of the front brake (6) Fig. C.



Remove:
- The nut (7) Fig. D.
- The screw (8) Fig. D.
- The front brake lever (10) Fig. D.
- Remove the pump body (11) Fig. D.



NOTICE

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

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 DOT3-DOT4

Install:
- The micro-switch (X) Fig. A.

Position
- The pump body (1) Fig. B.

Install:
- The bracket (3) Fig. B.
- The screws (2) Fig. B.

Tighten to the following torque:

Torque 8 N*m

Install:
- The front brake tube to the brake pump (4) Fig. C.
- The sealing washers (5) Fig. C.
- The special screw (6) Fig. C.

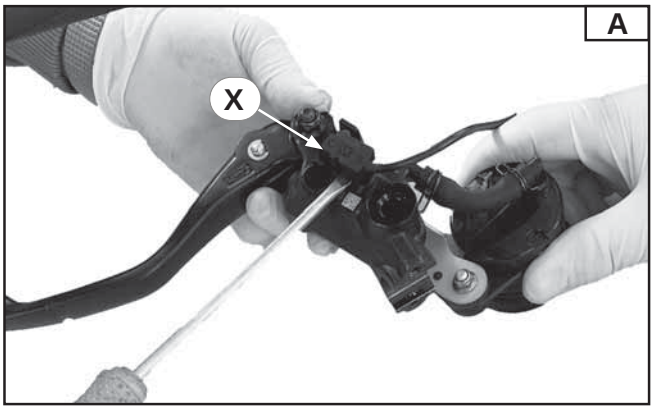
Torque 22 N*m

Position:
- The front brake lever (10) Fig. D.

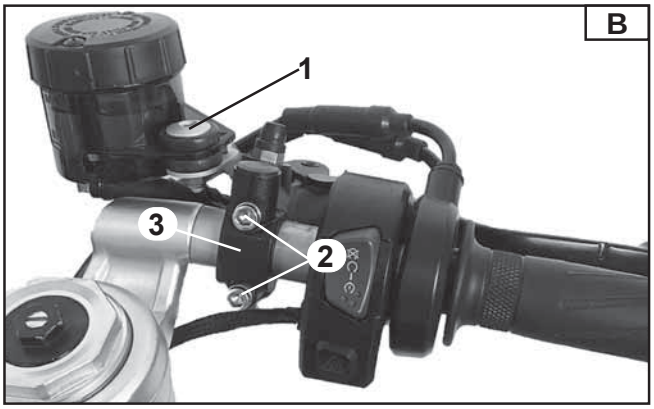
Install:
- The nut (7) Fig. D.
- The screw (8) Fig. D.

Torque 10 N*m

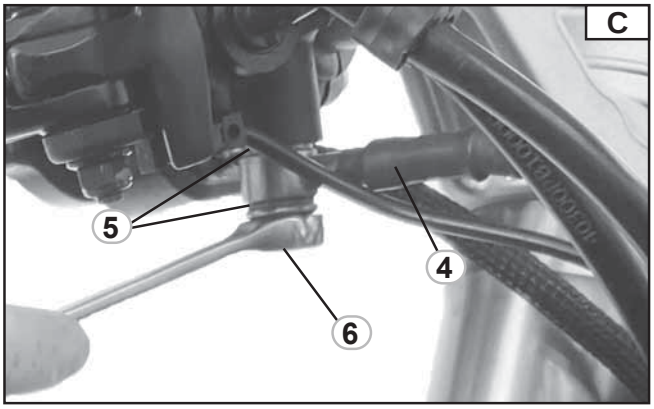
A



B



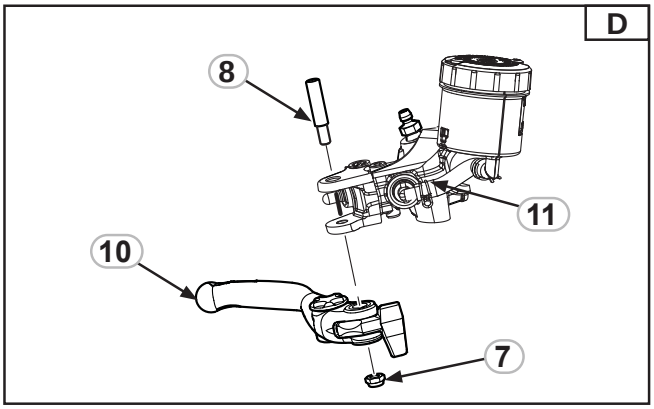
C



WARNING

To guarantee the safety of the motorcycle, it is essential for the path of the flexible brake tube to be positioned properly.
NOTE:
Once topping up operations of the brake fluid have finished, refer to Chapter 3, Periodic maintenance, section "Checking and topping up the front brake fluid level".

D

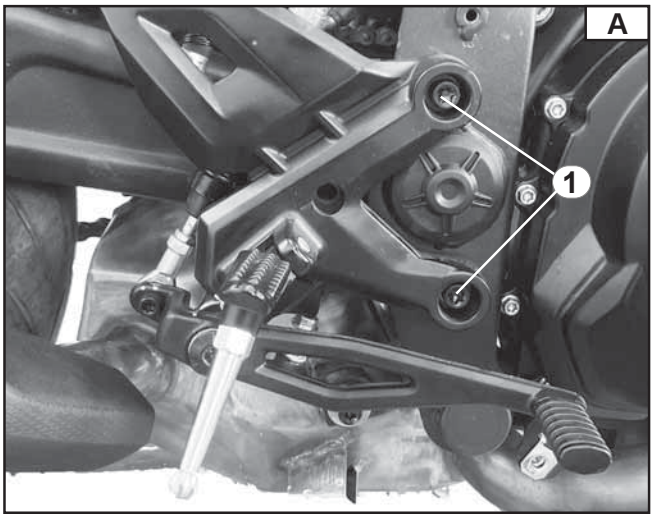


FRONT AND REAR BRAKES

REMOVAL OF THE REAR BRAKE PUMP

NOTE:
Drain out the brake fluid before proceeding with these operations.
Refer to Chapter 3, Periodic maintenance, section "Checking and topping up the rear brake fluid level".

Remove:
- The screws (1) Fig. A.

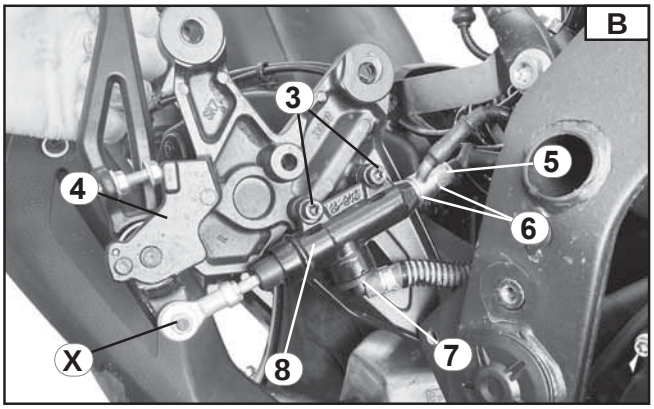


- The hydrostop (5) Fig. B.
- The sealing washers (6) Fig. B.
- The nut (X) Fig. B.

Disconnect:
- The brake reservoir hose (7) Fig. C.

Remove:
- The screws (3) Fig. B.
- The support (4) Fig. B.

Take out:
- The brake pump (8) Fig. C.



NOTICE

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

FRONT AND REAR BRAKES
REAR BRAKE PUMP INSTALLATION

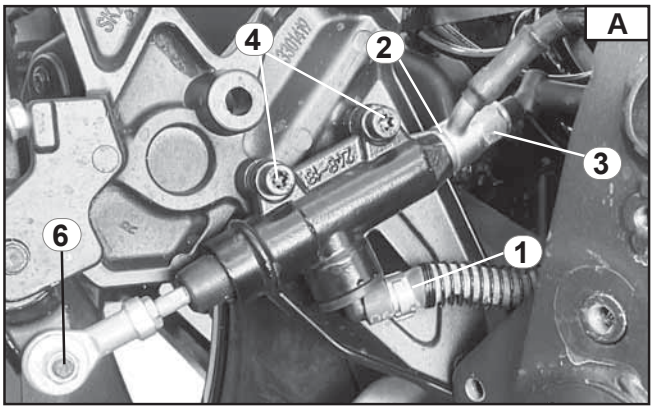
NOTICE

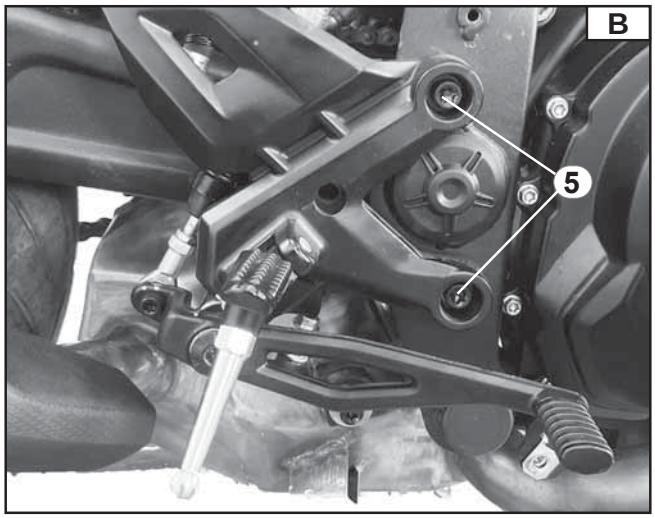
Prop the motorcycle on suitable supports so that it cannot fall.

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 DOT3-DOT4





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

Install:
- The rear brake reservoir hose to the brake pump (1) Fig. A.
- The rear brake tube with the relevant sealing washers (2) Fig. A.
- The hydrostop (3) Fig. A and tighten to the following torque:

Torque 22 N*m

Install:
- The screws (4) Fig. A.

Torque 12 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

Install:
- The screws (5) Fig. B.

Torque 28 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

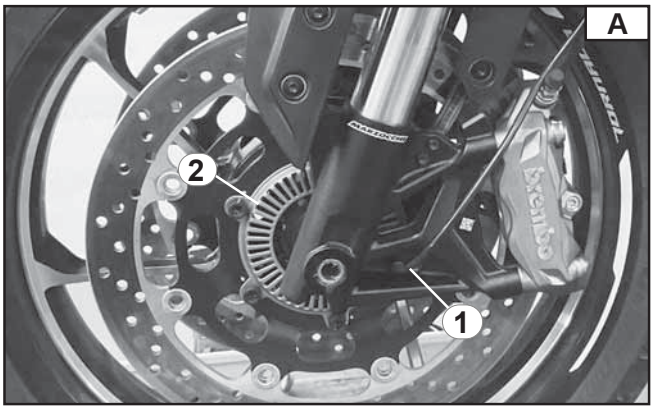
Install:
- The nut (6) Fig. A.

Torque 12 N*m

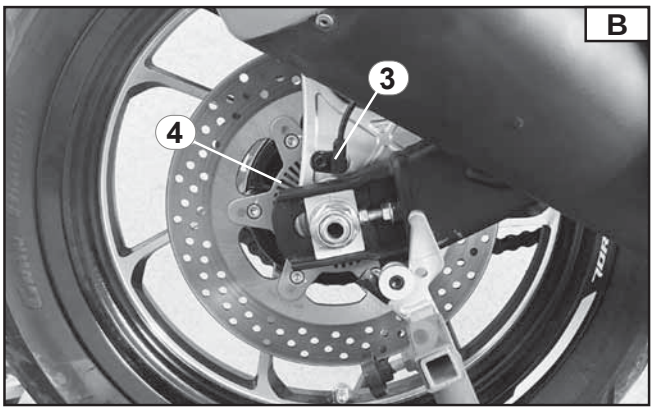
ABS ANTI-LOCK BRAKING SYSTEM
LOCATION OF THE COMPONENTS

The parts making up the anti-lock braking system are:

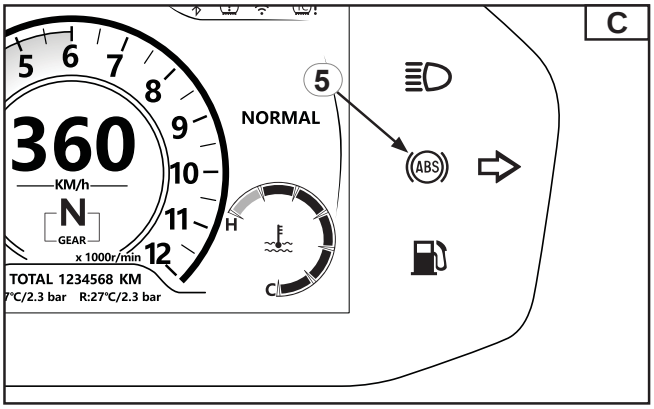
- The ABS sensor (1) of the front wheel Fig. A.
- The signal wheel (2) on the front wheel Fig. A.



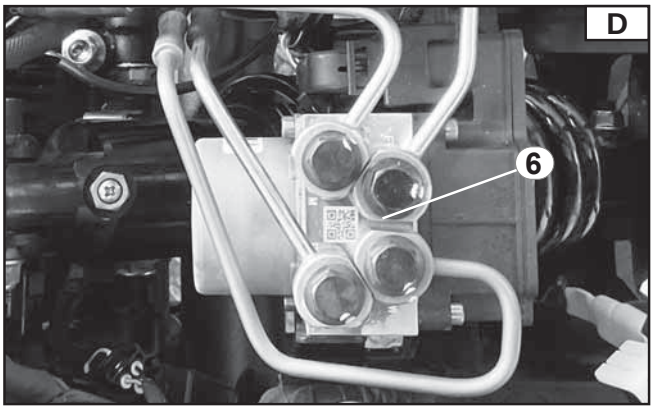
- The ABS sensor (3) of the rear wheel Fig. B.
- The signal wheel (4) on the rear wheel Fig. B.



- The ABS light (5) in the display Fig. C.

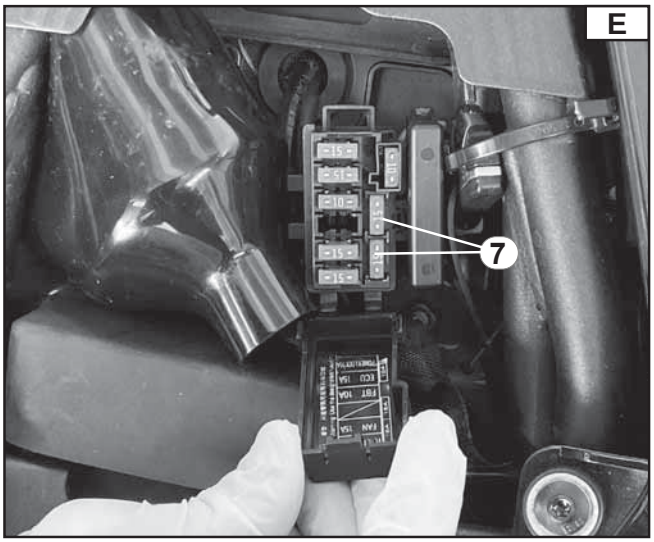


- The ABS hydraulic unit (6) Fig. D.

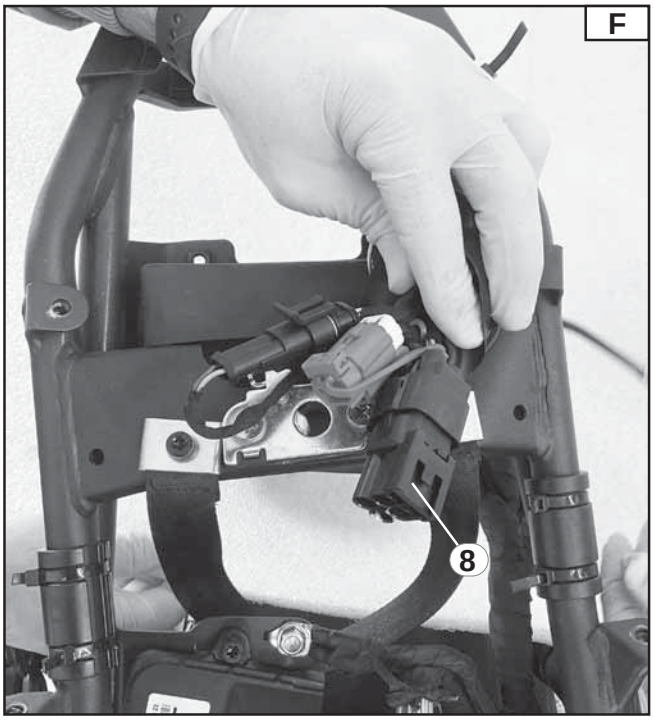


ABS ANTI-LOCK BRAKING SYSTEM
LOCATION OF THE COMPONENTS

- ABS1 and ABS2 fuse, (7) Fig. E.



- The connector of the ABS diagnostic system (8) Fig. F.



ABS ANTI-LOCK BRAKING SYSTEM
ROTATION SENSOR CHECK

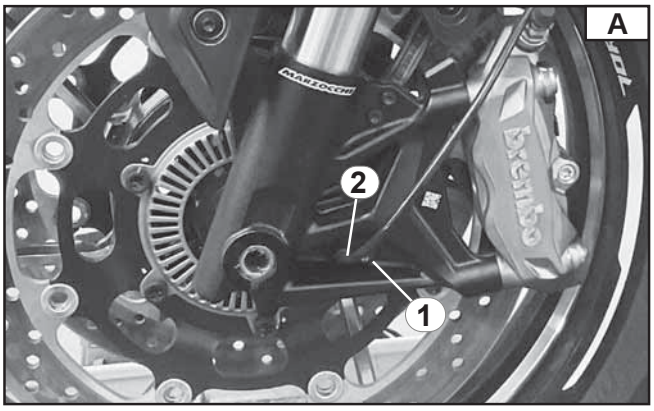
NOTICE

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

Remove:
- The screw (1) Fig. A.
- The ABS sensor (2) on the front wheel Fig. A.

Disconnect:
- The connector of the ABS sensor.

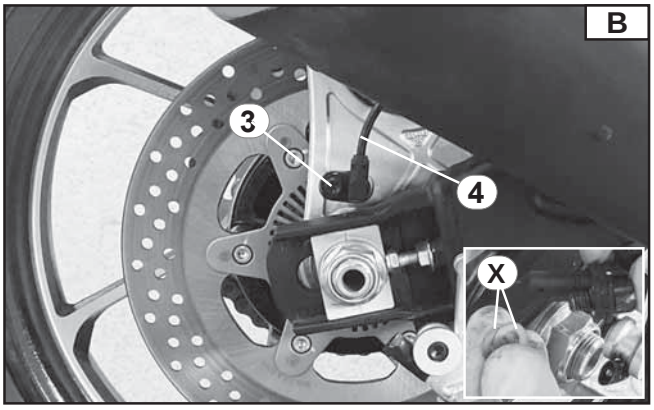
Carry out a visual check of the ABS sensor. Replace the ABS sensor if it is cracked, bent or damaged in any way. If an electrical fault in the sensors is suspected, check the electrical circuit.



Remove:
- The screw (3) Fig. B.
- The ABS sensor (4) of the rear wheel Fig. B.
- The scraping washers (X) Fig. B.

Disconnect:
- The connector of the ABS sensor.

Carry out a visual check of the ABS sensor. Replace the ABS sensor if it is cracked, bent or damaged in any way. If an electrical fault in the sensors is suspected, check the electrical circuit.



NOTE:
Place the motorcycle on a suitable stand so that the front wheel is raised.

Check:
Lift the front/rear wheel off the ground and measure the distance at various points between the sensor and the signal wheel.

Air gap	
Front	**Rear**
1.0 - 1.5 mm	1.0 - 1.5 mm
(1 mm = 0.0393701 in)	

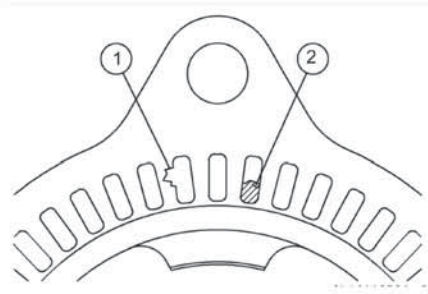
- If the distance does not come within the prescribed values, increase or reduce the gap of the sensor via apposite scraping washers, then check the hub bearing (refer to sections Removal/Installation of the front/rear wheel), the sensor, the signal wheel and the assembly conditions of the sensor.

ABS ANTI-LOCK BRAKING SYSTEM

CHECK OF FRONT WHEEL ABS SIGNAL WHEEL

Check:
Replace the signal wheel if it is deformed, damaged or with damaged teeth (1) Fig. A.
Remove any deposits of metal or other magnetic material (2). If necessary, replace the signal wheel.

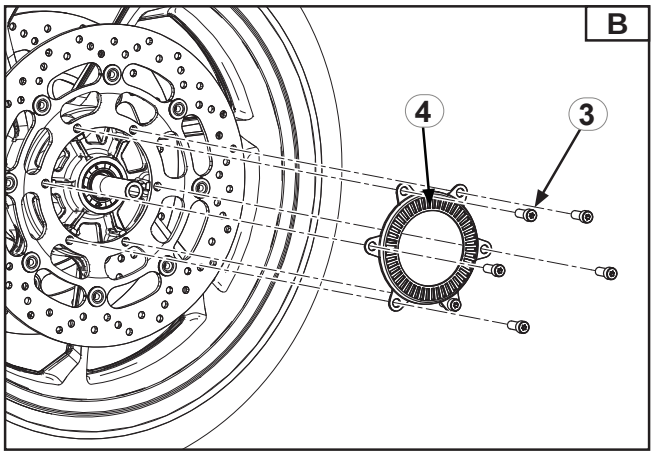
A



REPLACEMENT OF FRONT WHEEL ABS SIGNAL WHEEL

Remove:
- The front wheel, refer to **"Removal of the front wheel, Chapter 4"**.
- The screws (3) Fig. B.
- The signal wheel (4) Fig. B.

B

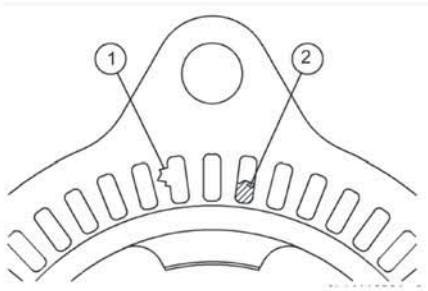


ABS ANTI-LOCK BRAKING SYSTEM

CHECK OF REAR WHEEL ABS SIGNAL WHEEL

Check:
Replace the signal wheel if it is deformed, damaged or with damaged teeth (1) Fig. A.
Remove any deposits of metal or other magnetic material (2). If necessary, replace the signal wheel.

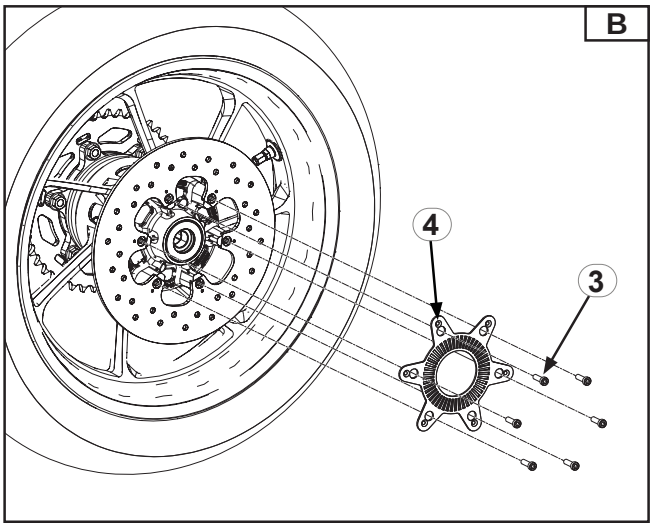
A



REPLACEMENT OF REAR WHEEL ABS SIGNAL WHEEL

Remove:
- The front wheel, refer to **"Removal of rear wheel, Chapter 4"**.
- The screws (3) Fig. B.
- The signal wheel (4) Fig. B.

B



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 ground 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 ABS hydraulic unit.
- 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 cannot detect problems of the conventional braking system (abnormal wear of the brake discs, uneven wear of the brake
- Pads and other mechanical faults). To avoid inconveniences, check that the brake circuits and tubes are positioned and connected properly, the wiring is laid out suitably and the brakes have adequate braking power.
- Check that there are no leaks of fluid and then accurately bleed the brake circuits.

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.

NOTICE

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

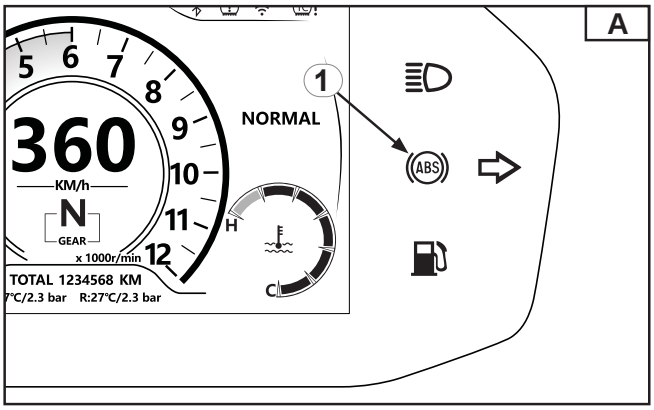
NOTICE

The use of non-recommended tires might 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 tires for this motorcycle.

ABS ANTI-LOCK BRAKING SYSTEM
PRECAUTIONS

NOTICE

The ABS yellow indicator light (LED) (1) Fig. A might come on if the tire pressure is not correct, if a not-recommended tire was mounted, if the wheel is deformed or of the ABS system has an electric fault. If the warning light comes on, solve the problem by cancelling the maintenance code.



ABS ANTI-LOCK BRAKING SYSTEM
PRECAUTIONS

NOTICE

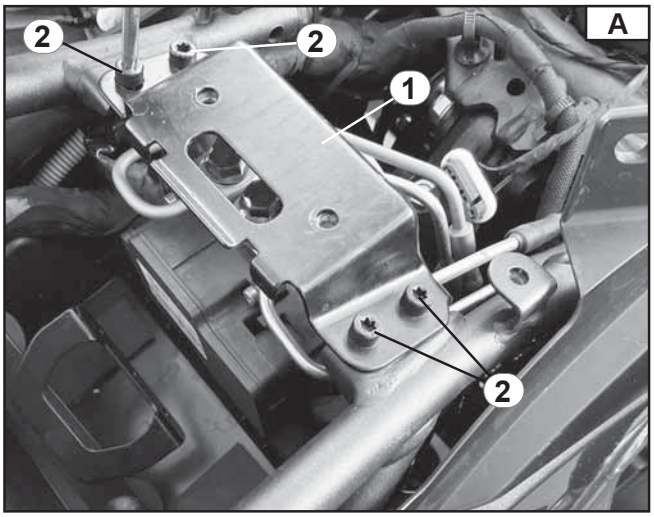
The ABS hydraulic unit Fig. A has been adjusted and set with precision by the manufacturer. Therefore, handle it with care.

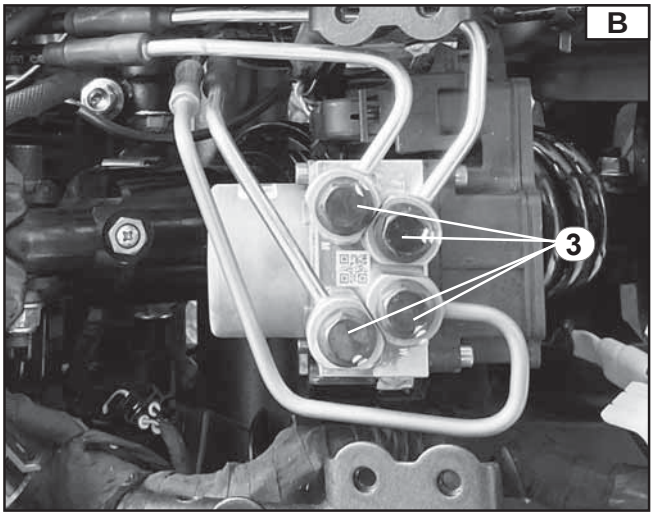
Remove:
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The tank support bracket (1) and the relevant screws (2) Fig. A.
- The special screws (3) with the relevant sealing washers Fig. B.
- The rigid tubes of the brakes onto the ABS hydraulic unit.

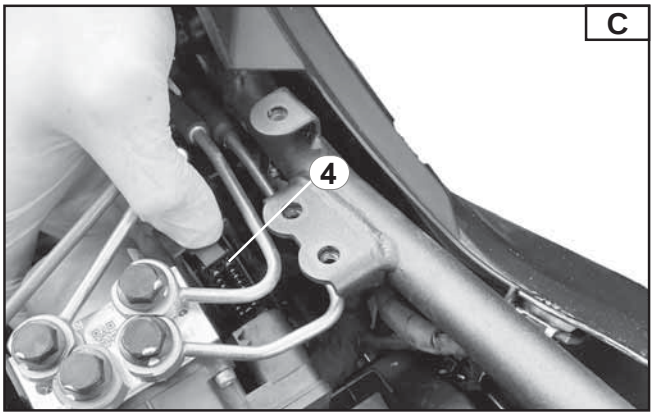
Disconnect:
- The connector of the ABS hydraulic unit (4) Fig. C.

Remove:
- The ABS hydraulic unit.

NOTE:
Be careful not to bend the brake hoses when removing the ABS hydraulic unit.







ABS ANTI-LOCK BRAKING SYSTEM
PRECAUTIONS

- Close the oil passage holes (5) of the ABS hydraulic unit with a cloth to avoid dirt from entering into the unit Fig. D.

NOTICE

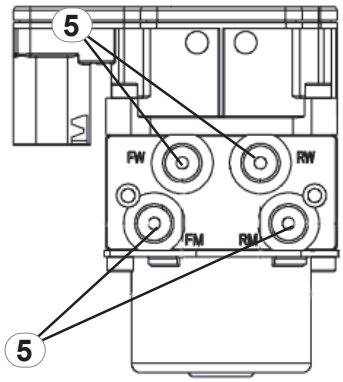
Do not allow dirt to enter into the hydraulic system when the tubes are disconnected. Brake fluid rapidly damages painted plastic surfaces; completely wash with water the concerned zones immediately.

NOTICE

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

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

D



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

Position the ABS hydraulic unit on the frame.
Install:
- The fitting (1) “front braking system” on the ABS control unit “FM” Fig. B.
- The fitting (2) “front brake pump” on the ABS control unit “FW” Fig. B.
- The fitting (3) “rear brake pump” on the ABS control unit “RW” Fig. B.
- The fitting (4) “rear braking system” on the ABS control unit “RM” Fig. B.

FM	Front master cylinder	of the front brake pump
FW	Front whell	front brake caliper
RW	Rear whell	rear brake caliper
RM	Rear master cylinder	rear brake pump

Tighten:
the connecting screws and the relevant sealing washers of the rigid tubing Fig. A to the following torque:

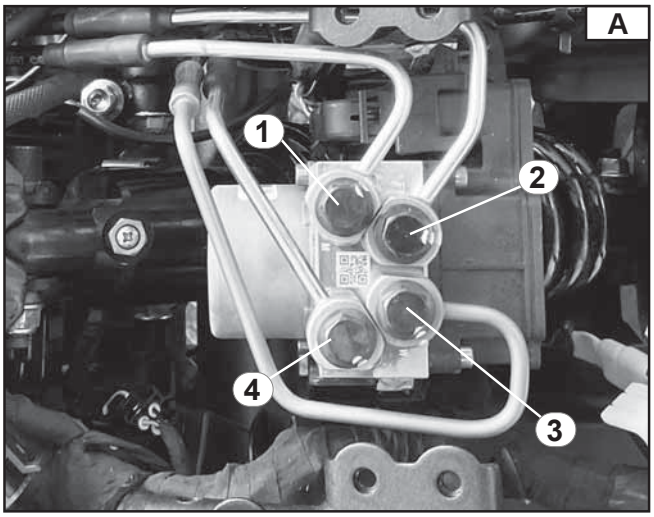


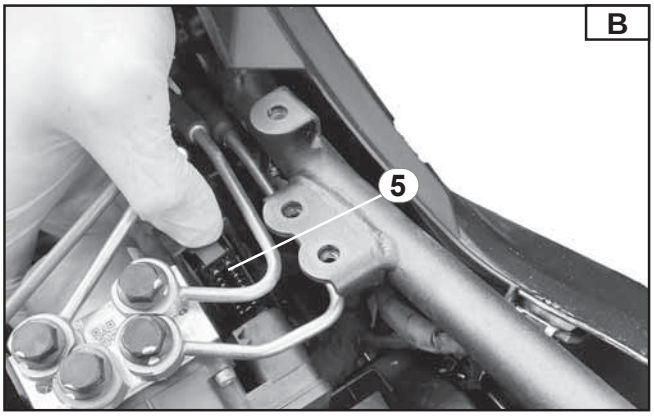
Torque 26 N*m

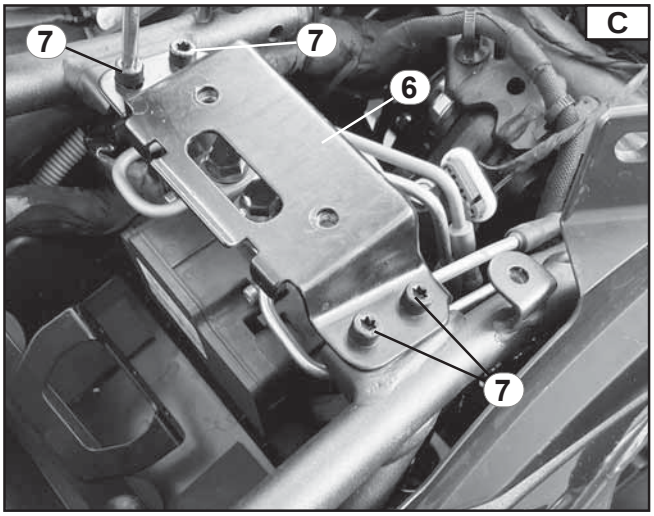
Connect:
- The connector of the ABS hydraulic unit (5) Fig. B.

Install:
- The tank support bracket (6) and the relevant screws (7) Fig. C.

Install:
- Bleed air from the brake circuit, refer to **“Check of frame/ brake fluid level check, Chapter 3”.**







ABS ANTI-LOCK BRAKING SYSTEM

REMOVAL OF THE ABS ROTATION SENSORS – FRONT/REAR WHEEL

NOTICE

The ABS sensor must be handled with care, since it is a precision component.
Do not attempt to disassemble or repair the wheel ABS sensor.

Remove:

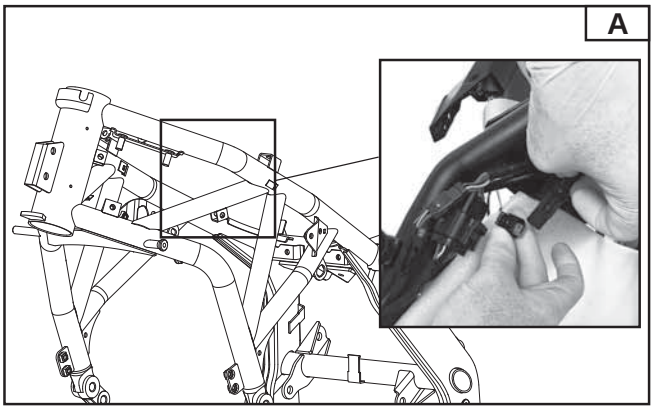
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The tailpiece fairing, refer to **"Removal of tailpiece fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The rear ABS sensor, refer to **"Check of the rotation sensor, Chapter 4".**
- The front ABS sensor, refer to **"Check of the rotation sensor, Chapter 4".**

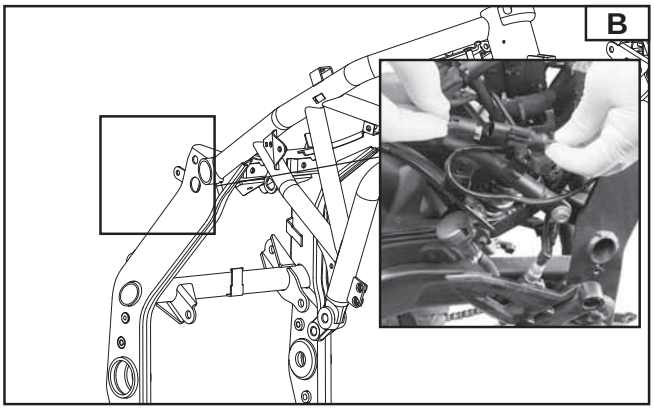
Disconnect:

- The connector of the ABS of the front wheel (1) Fig. A.
- The connector of the ABS of the rear wheel (2) Fig. B.

Install:

To install, reverse the order of the removal operation.
Place the cable correctly.





FRONT AND REAR BRAKE CALIPER

REMOVAL OF FRONT BRAKE CALIPER

The following procedure applies to both front brake callipers.

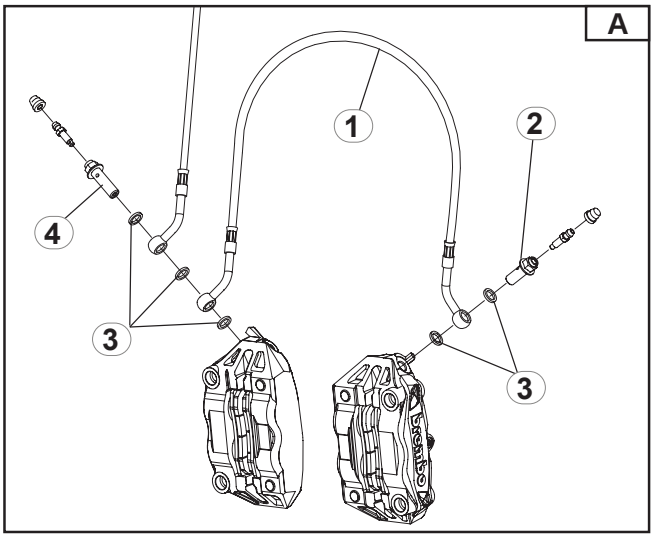
NOTE:
Before disassembling the brake caliper, discharge the brake fluid from the complete braking system, refer to the section "Frame/Check of brake fluid level, Chapter 3".

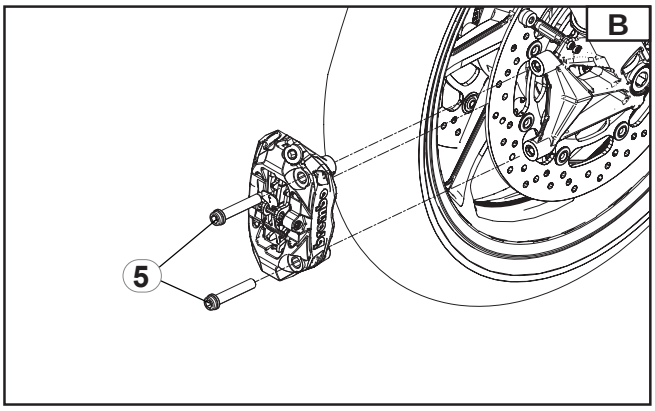
Remove:
- The special screw (2) and (4) Fig. A.
- The sealing washers (3) Fig. A.
- The front brake tube (1) Fig. A.
- The screws (5) Fig. B.
- Disconnect both calipers.

NOTE:
Insert the end of the brake hose into a container and slowly pump out and drain the residual brake fluid by activating the front brake lever.

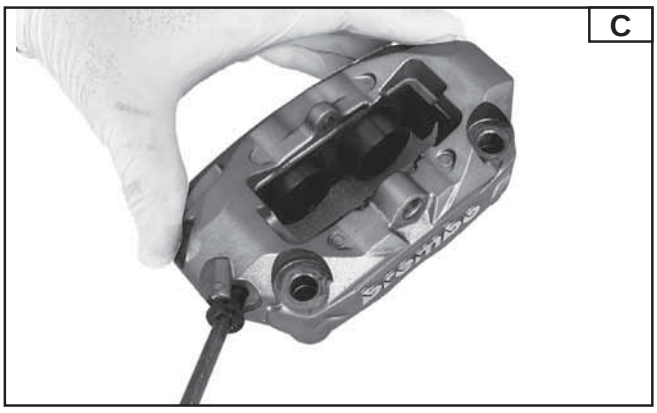
NOTICE

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





Disassemble:
- The brake caliper pistons.
- Blow compressed air into the fitting of the flexible brake hose to push the left and right pistons out from the brake caliper Fig. C.



FRONT AND REAR BRAKE CALIPER

REMOVAL OF FRONT BRAKE CALIPER

Remove:

- The pistons (6) Fig. C.
- The gaskets Fig. C (the dust seals first, then the smallest gaskets (7), the seal rings (8), and the largest gaskets).

NOTICE

Never try to prise out the caliper pistons.

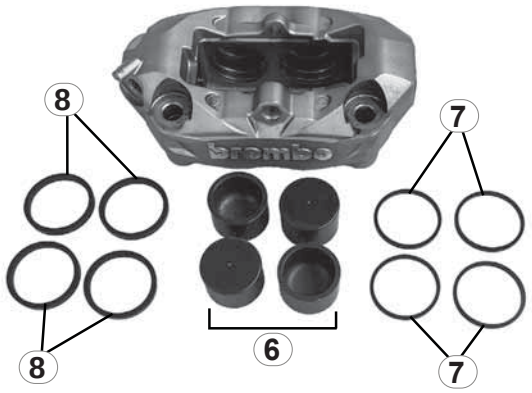
NOTE:

Clean the parts with a dry cloth and check the status of the disassembled parts.

NOTICE

In the case of lines, depressions or wear of the parts, replace the whole brake caliper.

D



FRONT AND REAR BRAKE CALIPER

INSTALLATION OF THE FRONT BRAKE CALIPER

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

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 the internal parts of the brake, as the piston gaskets might swell and warp.

	Recommended brake fluid DOT4

Install:
- The largest gaskets (1) Fig. A.
- The dust seals (2) Fig. A.
- The pistons on the brake caliper (3) Fig. B.

NOTE:
To improve insertion of the pistons, lubricate the seats with special grease for braking system.

Install:
- The brake caliper (4) Fig. C.
- The screws (5) Fig. C.

To the following torque:

Torque 50 N*m

Recommended lubricant

	Recommended lubricant NGLI2 GREASE

Install:
- The brake tube (3) Fig. D.
- The brake tube (4) Fig. D.
- The sealing washers (6) Fig. D.

Install:
- The special screws (7) and (5) Fig. D.

To the following torque:

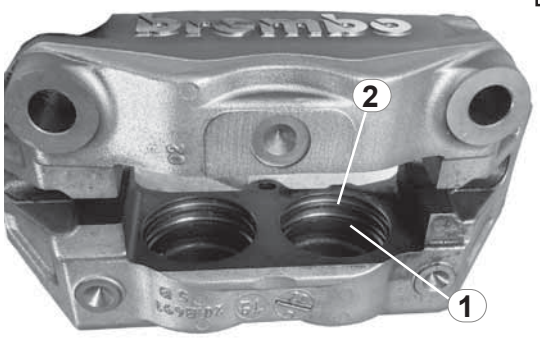
Torque 22 N*m

NOTICE

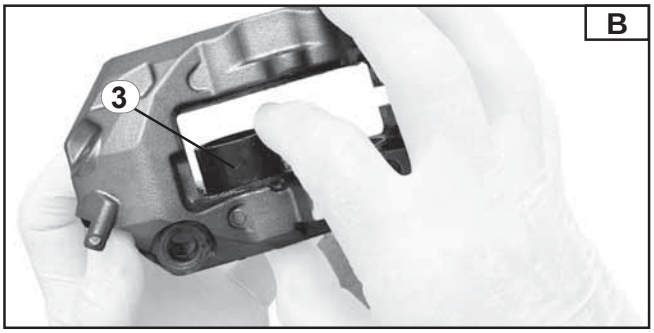
To guarantee the safety of the motorcycle, it is essential for the path of the flexible brake tube to be correct. Fill and bleed the braking system with brake fluids (refer to "Change of front brake liquid, Chapter 3).

Check:
the level of the brake fluid and top up, refer to "**Check and topping up of front brake fluid level, Chapter 3"**.

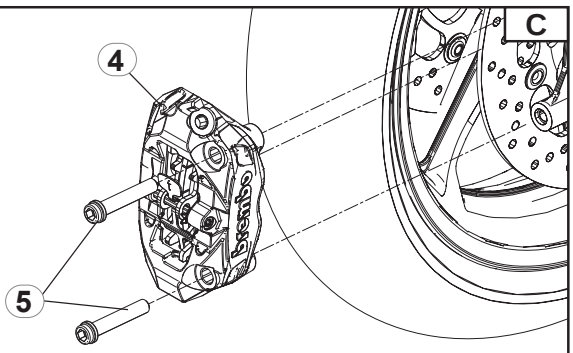
A



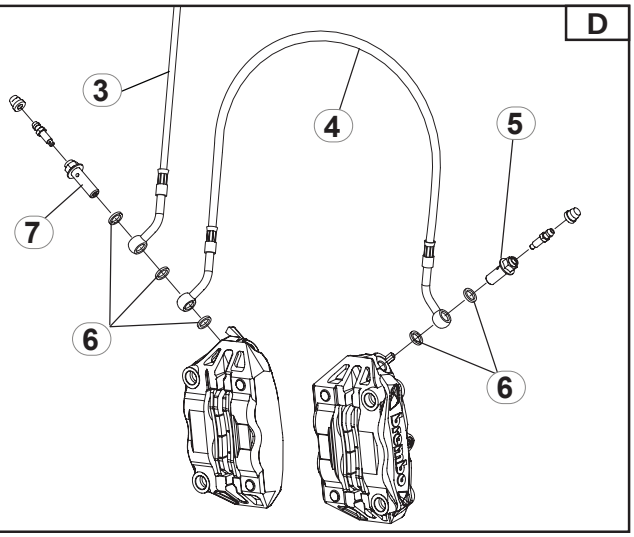
B



C



D

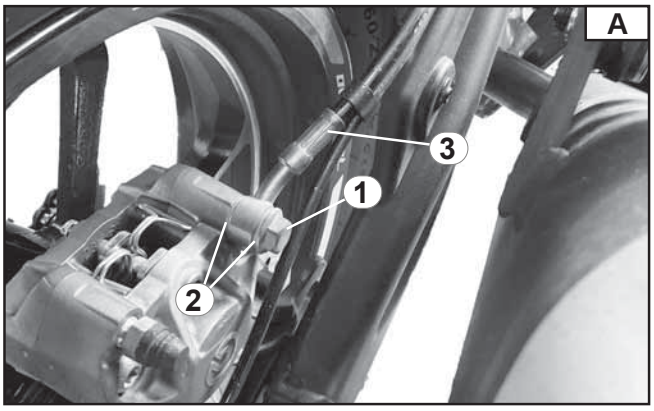


FRONT AND REAR BRAKE CALIPER

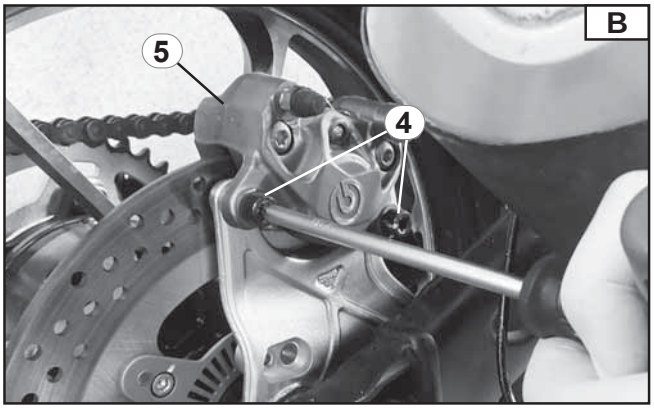
REMOVAL OF REAR BRAKE CALIPER

NOTE:
Before disassembling the brake caliper, discharge the brake fluid from the complete braking system, refer to the section "Frame/Check of brake fluid level, Chapter 3".

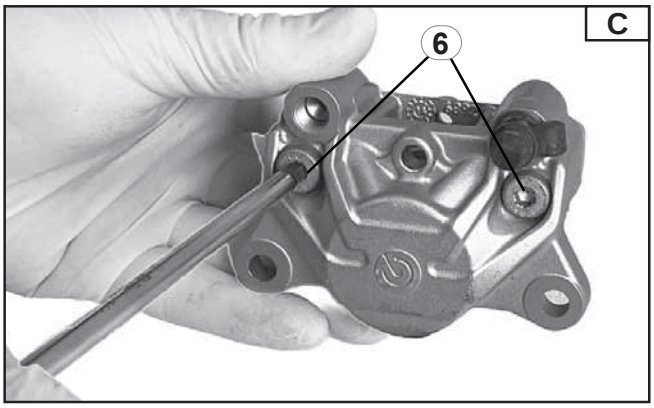
Remove:
- The brake pads, refer to "**Removal of rear brake pads, Chapter 4**".
- The special screw (1) Fig. A.
- The sealing washers (2) Fig. C. A.
- The rear brake tube (3.) Fig. A.



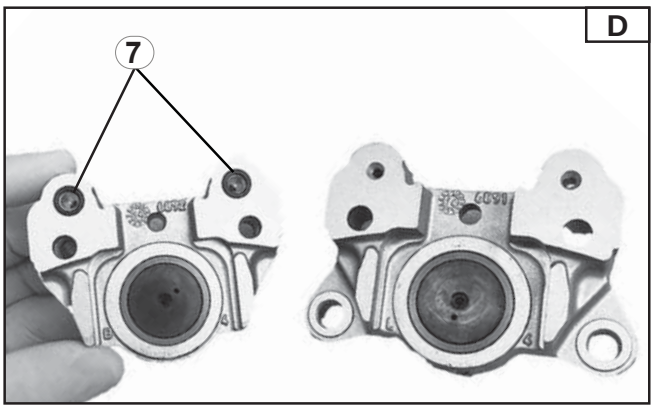
- The screws (4) Fig. B.
- The caliper (5) Fig. B.



Remove:
- The fastening screws (6) Fig. C.



- The gaskets (7) Fig. D.



FRONT AND REAR BRAKE CALIPER

REMOVAL OF REAR BRAKE CALIPER

Disassemble:

- The brake caliper piston.
- Blow compressed air into the attachment of the flexible brake hose to force the piston (8) out from the half brake caliper Fig. E.

NOTE:
Repeat the same procedure on the other half caliper.

Remove:

- The pistons (9) Fig. F.
- The gaskets Fig. F (the dust seals first, then the smallest gaskets (10), the seal rings (11), and the largest gaskets).

NOTICE

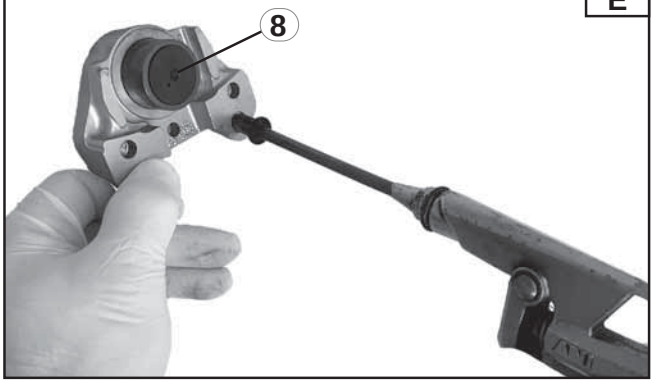
Never try to prise out the caliper pistons.

NOTE:
Clean the parts with a dry cloth and check the status of the disassembled parts.

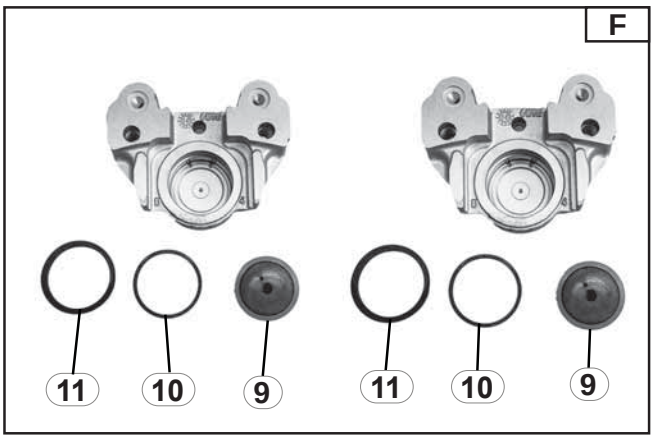
NOTICE

In the case of lines, depressions or wear of the parts, replace the whole brake caliper.

E



F



FRONT AND REAR BRAKE CALIPER

INSTALLATION OF REAR BRAKE CALIPER

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 the internal parts of the brake, as the piston gaskets might swell and warp.

	Recommended brake fluid DOT4

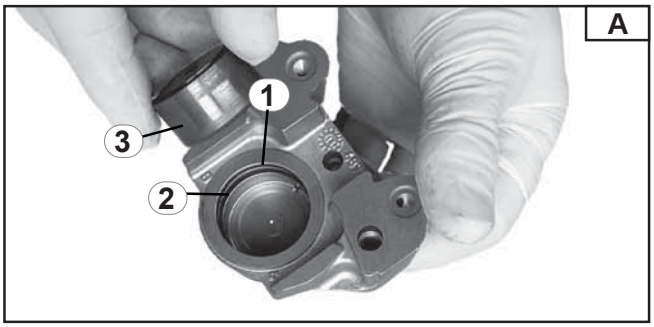
Install:

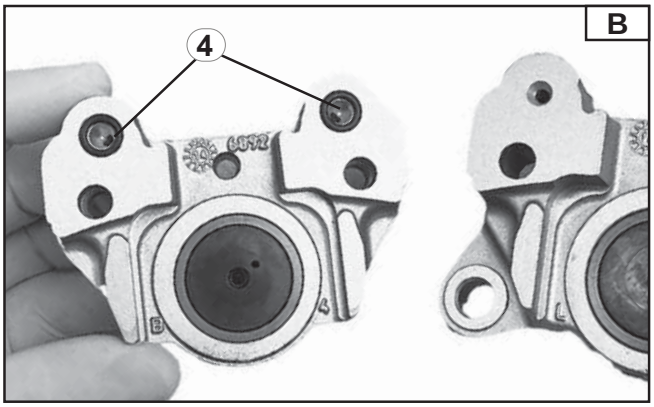
- The dust seal, smallest gaskets (1) Fig. A.
- The seal ring (2). largest gaskets Fig. A.
- The pistons on the brake caliper (3) Fig. A.

NOTE:
To improve insertion of the pistons, lubricate the seats with special grease for braking system.

- The gaskets (4) Fig. B.

NOTE:
Repeat the same procedure on the other half caliper.

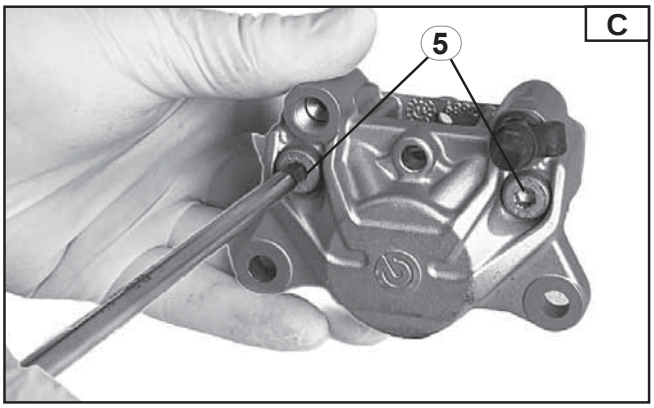




Assemble:

- The two half calipers Fig. C.
- The screws (5) Fig. C.

Torque 25. N*m

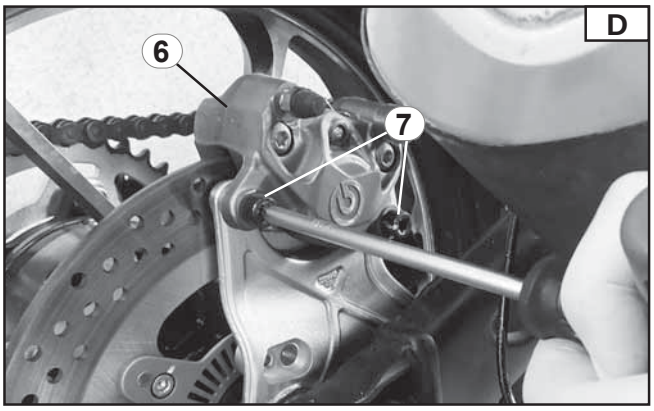


Install:

- The brake caliper (6) Fig. D.
- The screws (7) Fig. D.

To the following torque:

Torque 22 N*m



FRONT AND REAR BRAKE CALIPER

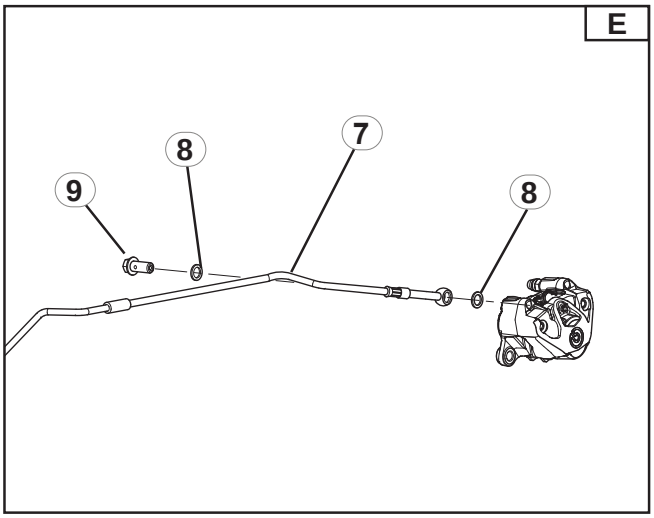
INSTALLATION OF REAR BRAKE CALIPER

Install:
- The brake tube (7) Fig. E.
- The sealing washers (8) Fig. E.
- The special screw (9) Fig. E.

Tighten twice to the previous torque set after having loosened:

Torque 22 N*m

E



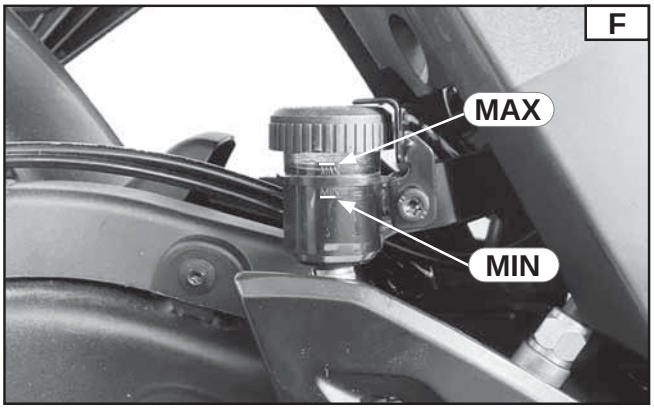
NOTICE

To guarantee the safety of the motorcycle, it is essential for the path of the flexible brake tube to be correct. Fill and bleed the braking system with brake fluids (refer to "Change of front brake liquid, Chapter 3).

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.

F



Check:
If below the minimum notch Fig. F, top up with the recommended brake fluid.

- Brake lever operation.

If the brake lever movement is soft or spongy, bleed brake system again. Refer to the section (**Change of front brake fluid, Chapter 3**).

FRONT FORK

FRONT FORK STEM REMOVAL

The following procedure is applied to both front fork stems.

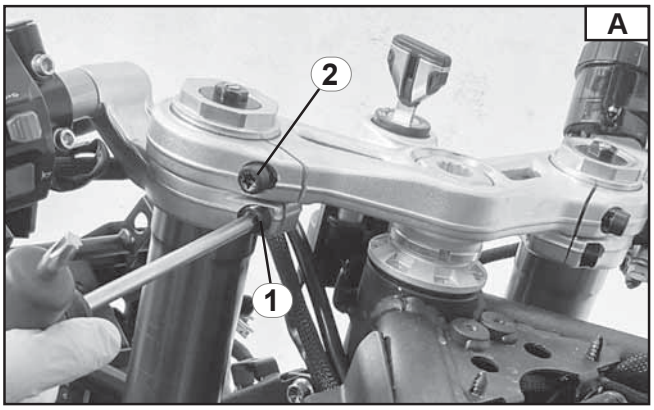
Park:
- The motorcycle on a level surface.

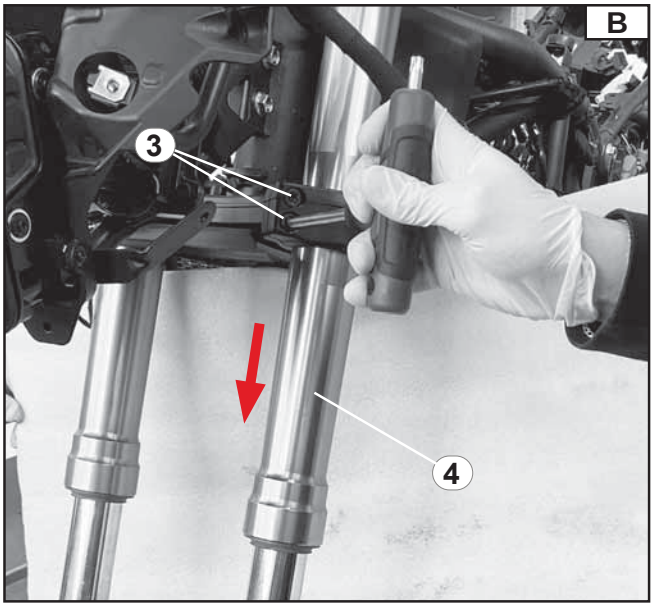
NOTE:
Place the motorcycle on a suitable support so that the front wheel is raised.

Remove:
- The front brake caliper, refer to **"Removal of the front brake caliper, Chapter 4".**
- The front wheel, refer to **"Removal of the front wheel, Chapter 4"**.
- The front mudguard, refer to **"Removal of the front mudguard, Chapter 4".**
- The screw (1) of the left clip-on handlebar Fig. A.
- The screw (2) of the steering base plate Fig. A.
- The screws (3) of the bottom steering base Fig. B.

Slide out:
- The fork stem (4) Fig. B by extracting it downwards.

NOTE:
The following procedure is applied to both 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.

Release:
- the protective cap (1) Fig. A.

Fork cap key tool
Code: R00009758000

A



NOTICE

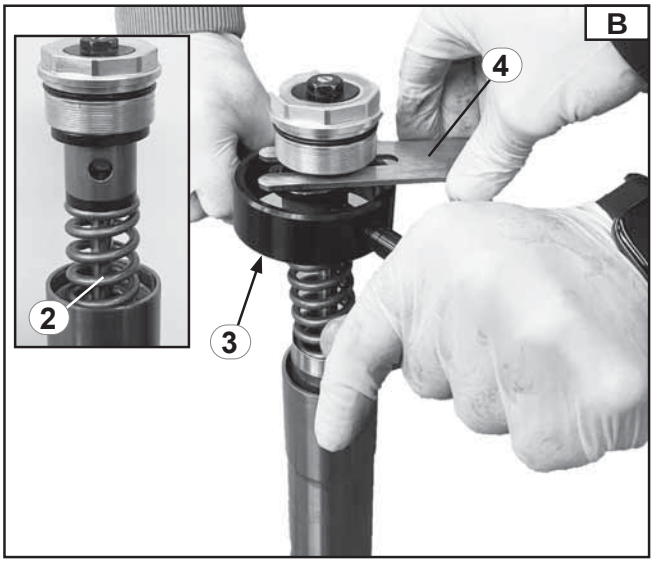
The fork spring is compressed, to proceed with this task, two operators are required.

Pushdown:
- The spring (2) via apposite compression tool (3) Fig. B.

Spring compression key tool:
Code: Generic tool

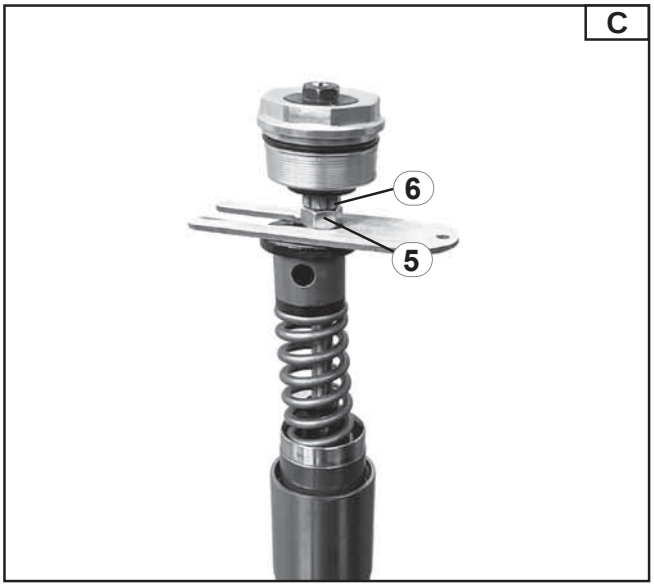
Insert:
- The fork (4) Fig. B.

B



Release:
- The protective cap, by loosening the nut (6) and the lock nut (5) Fig. C.

C

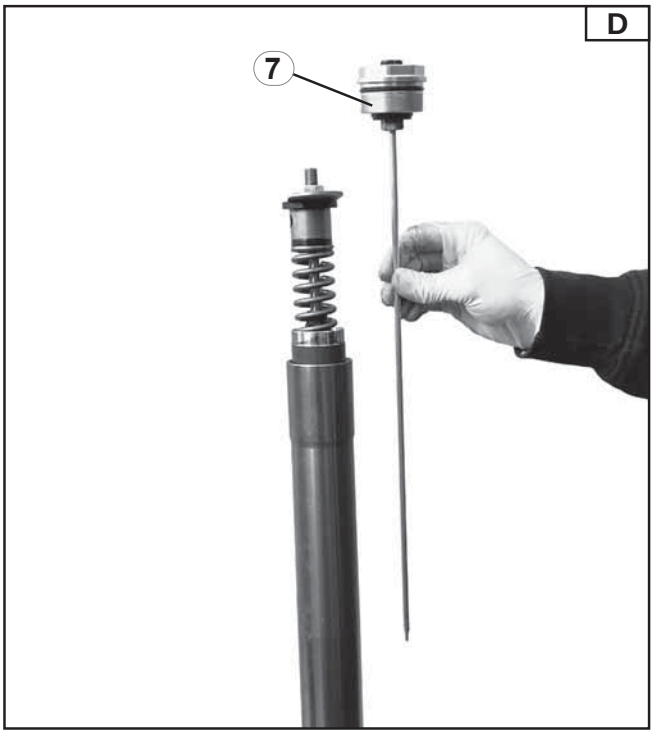


FRONT FORK

FRONT FORK STEM DISASSEMBLY

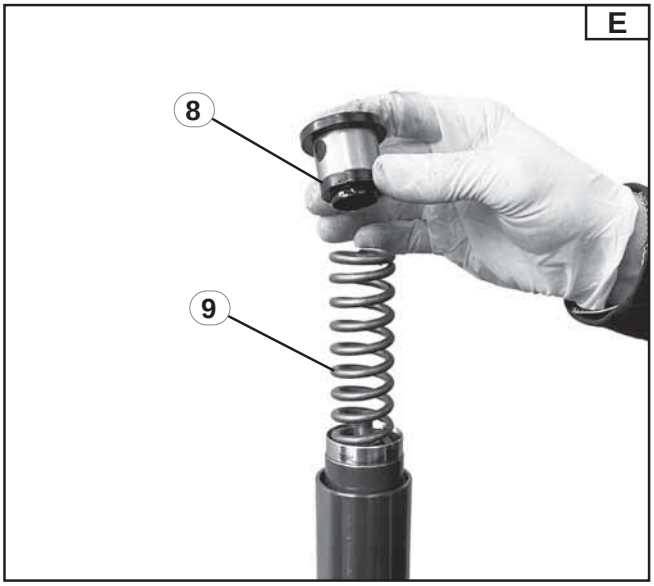
Remove:
- The protective cap (7) Fig. D.

D



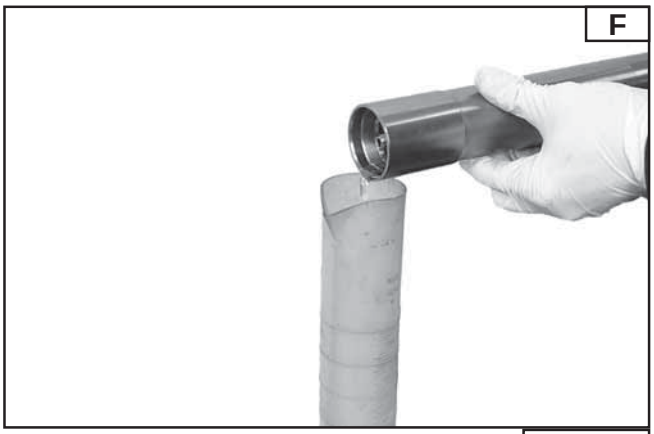
Remove:
- The complete spacer (8) Fig. E.
- The spring (9) Fig. E.

E



Remove:
- Oil inside the Insert the following into the fork sleeve Fig. F.

F



FRONT FORK

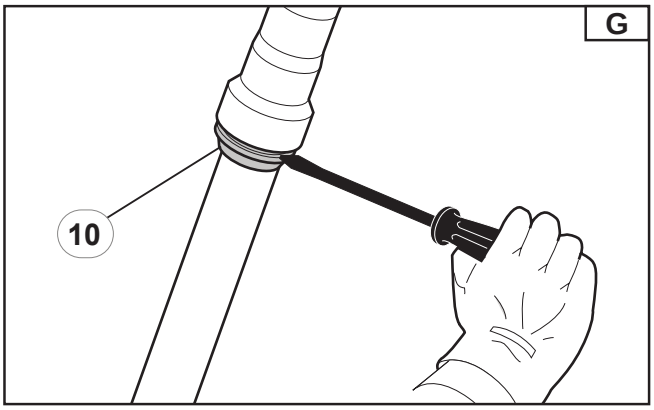
FRONT FORK STEM DISASSEMBLY

NOTICE

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

Remove:

- The dust seal (10) from the seat using a small flat-blade screwdriver Fig. G.

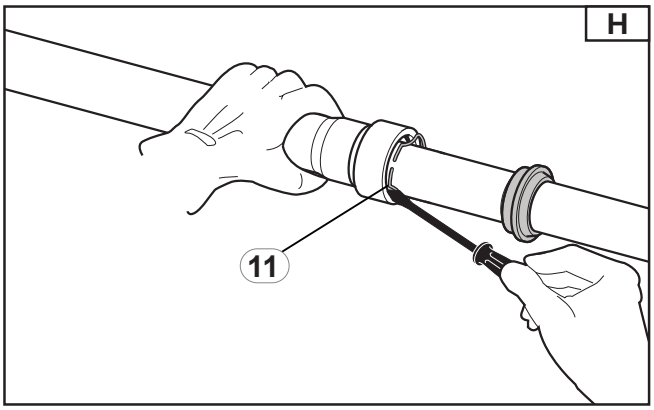


NOTICE

Pay attention not to damage or scratch the fork stem.

Remove:

- The clip of the oil seal (11) using the same screwdriver Fig. H.

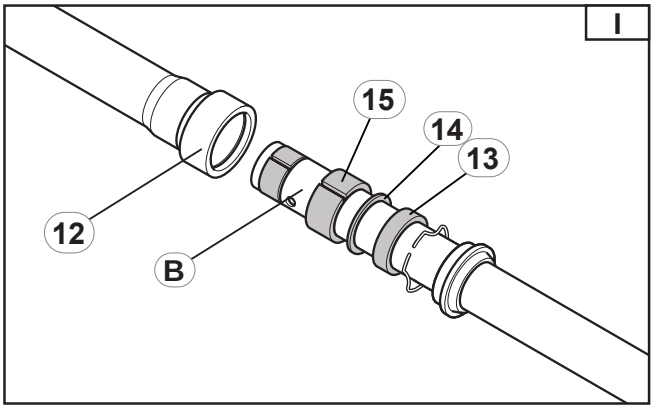


Slide out:

- The fork stem (B) from the fork sleeve (12), Fig. I.

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

- The oil seal (13) Fig. I.
- The washer (14) Fig. I.
- The bottom guide bushing (15) Fig. I.



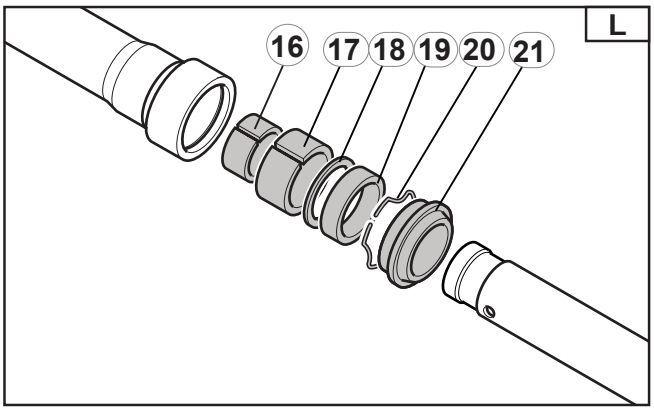
Manually remove:

- The top guide bushing (16) Fig. L.

NOTE:
If this operation becomes difficult manually, it is possible to use a flathead screwdriver in the slot in the bushing, to make it easier.

- The bottom guide bushing (17) Fig. L.
- The washer (18) Fig. L.
- The oil seal (19) Fig. L.
- The oil seal clip (20) Fig. L.
- The dust seal (21) Fig. L.

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



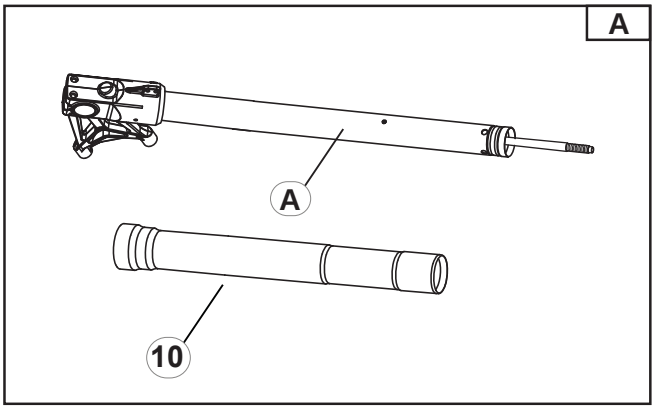
FRONT FORK

FRONT FORK STEM INSPECTION

The following procedure is applied to both front fork stems.

Check:
- The fork stem (A) Fig. A.
- The fork sleeve (10) Fig. A.

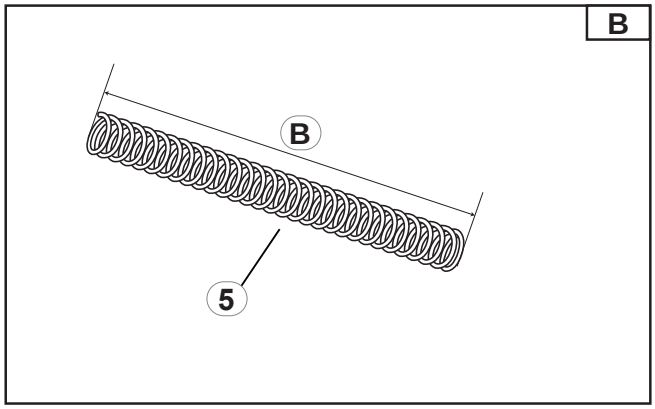
If there is any deformation/damage/wear, replace.



WARNING

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

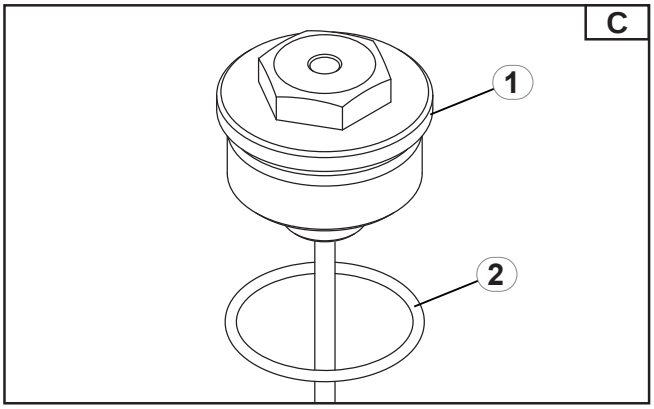
Measure:
- The full length (B) of the spring (5). If outside specifications, replace Fig. B.



Vehicle	Oil quantity	Full length of the spring
Tornado 550	365 ml x Stem	375 mm (14.76 in)

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:
- The O-Ring (2) of the cap (1) Fig. C.

If there is any damage or wear, replace.

FRONT FORK
FRONT FORK STEM ASSEMBLY

The following procedure is applied to both front fork stems.

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 bushings as this must be integral.

Apply to the end of the supporting tube:
- Adhesive tape so as to cover the seat for the top bush Fig. A.
- Sightly lubricate the oil and dust seals with grease.

Insert into the support tube Fig. B:
- The dust seal (14).
- The dust seal clip (13).
- The oil seal (12).
- The washer (11).
- The bottom guide bushing (8).

NOTICE

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

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

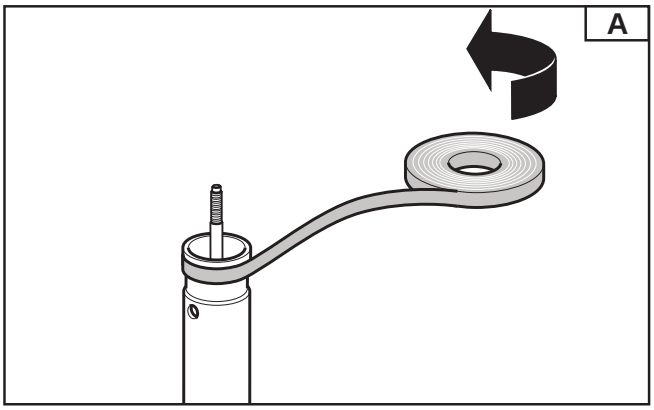
Insert:
- The top guide bushing (6) Fig. C.

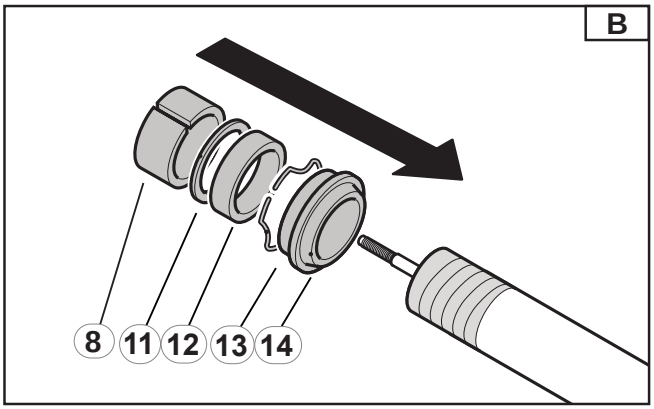
NOTE:
If this operation becomes difficult, it is possible to use a flat-head screwdriver in the slot in the bush, to make it easier.

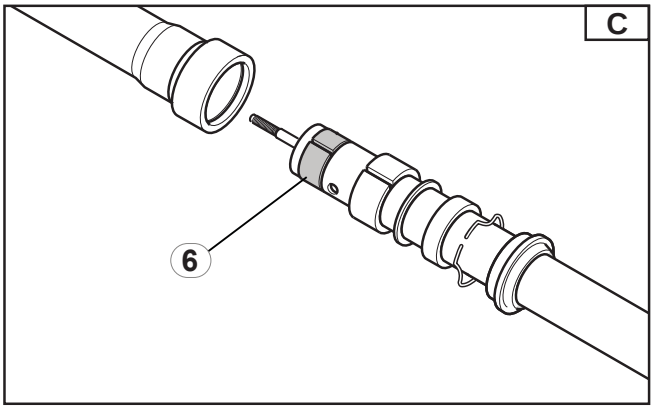
- Insert the fork stem into the sleeve very gently to make sure it does not damage the top guide bush.

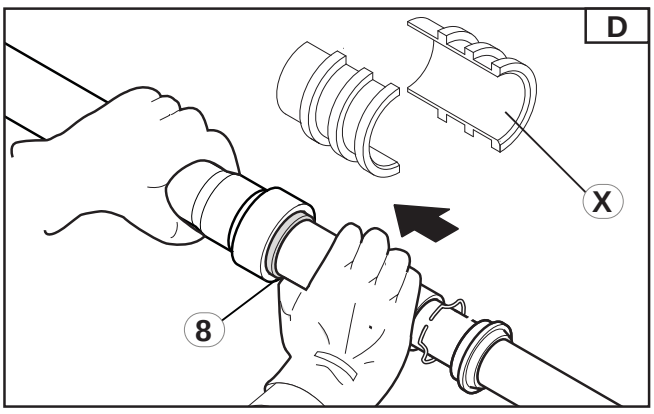
Accompany:
- The bottom guide bushing (8) as far as the sleeve comes into contact with the fork Fig. D.
- The washer (11).
- The oil seal (12).

Then, place them in seat with the aid of the fork oil seal assembly tool (X) (Ø41 mm) Fig. D.



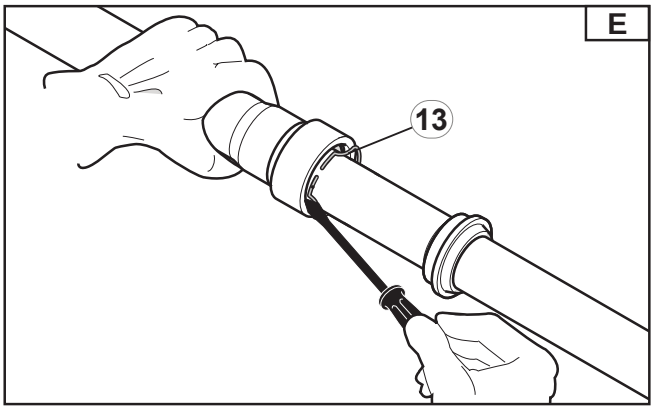




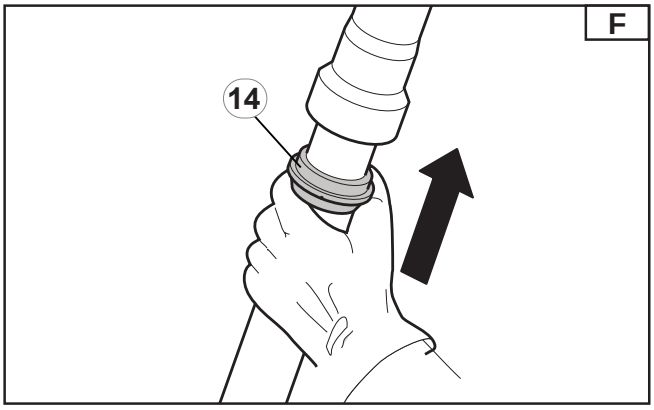


FRONT FORK
FRONT FORK STEM ASSEMBLY

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.



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 an amount of oil (see table) about 2/3 of the oil necessary according to the vehicle, then pump repeatedly to discharge air.
- Continue pouring up to the required amount.
- Lower the fork sleeve over the stem up to the stop of the dust seal on the wheel support foot.
- Await some minutes and check the oil level with the compressed fork, which must be 240 mm (9.448 in) from the top edge of the sleeve (h) Fig. I.

Vehicle	Oil quantity	Full length of the spring
Tornado 550	365 ml x Stem	375 mm (14.76 in)

Oil features
Fork oil SAE 10 W

NOTICE

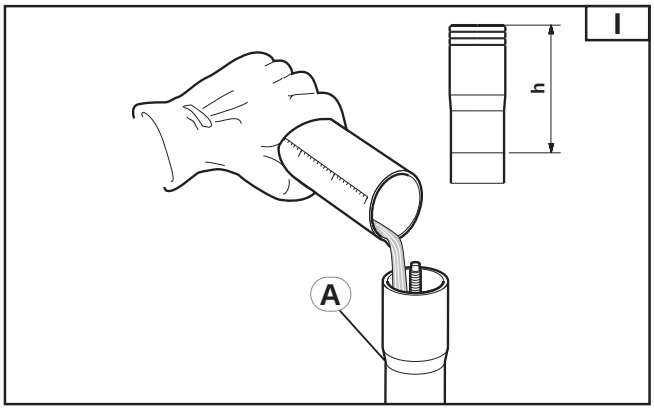
A bottom or top air volume or a different type of oil to that recommended may change the behaviour of the fork at every stage.

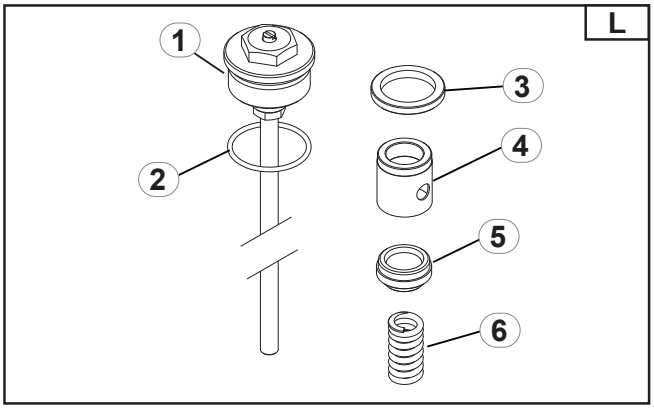
Insert into the fork sleeve:
- The cap with dipstick (1) Fig. L.
- the O-ring (2) Fig. L.
- The centring ring (3) Fig. L.
- The spacer (4) Fig. L.
- The top spring guide bushing (5). L.
- The fork spring (6) L.

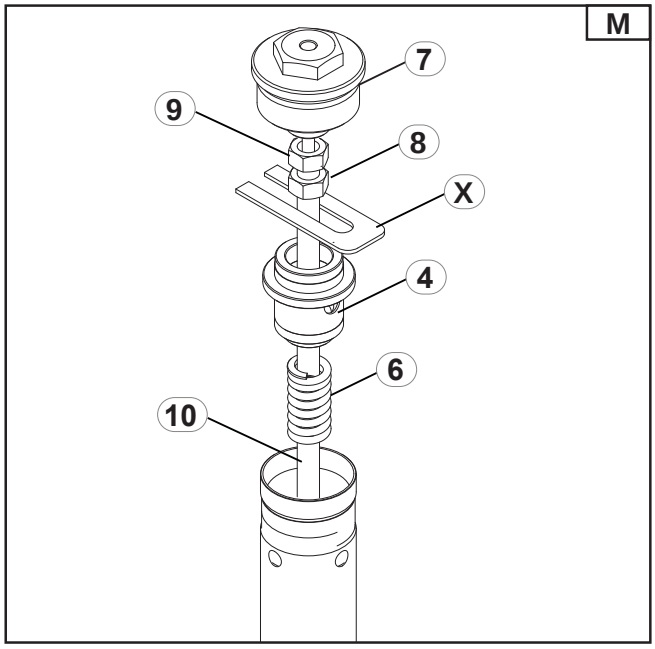
Push down:
- The spring (6) Fig. M.
- The preload spacer (4) Fig. M.
- Insert the special tool (x) between the spacer (4) and the nut (8) Fig. M.
- Screw the cap (7) on the threaded part of the stem (10)Fig. M.
- Tighten the nut (9) and the lock nut (8) to the following torque:

Torque 20 N*m

- Lift the fork sleeve over the stem.







FRONT FORK
FRONT FORK STEM ASSEMBLY

Secure:
- The fork sleeve in a clamp.

Tighten:
- The protective cap on the fork sleeve with the special tool (1) Fig. N to the following torque:

Torque 20 N*m

Fork cap key tool
Code: R00009758000



FRONT FORK

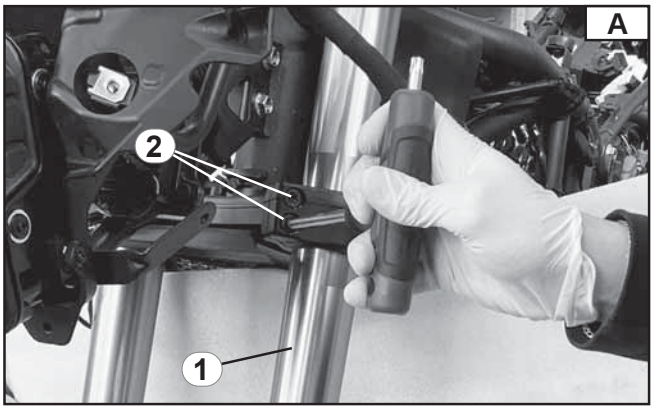
FRONT FORK STEM INSTALLATION

NOTE:
The following procedure is applied to both front fork stems.

Install:
- The front fork stems (1) Fig. A.

Insert:
- The fork sleeves by bringing it flush on the top plate, as shown by the arrow Fig. B.

Tighten provisionally:
- The setscrews (2) on the bottom steering plate Fig. A.

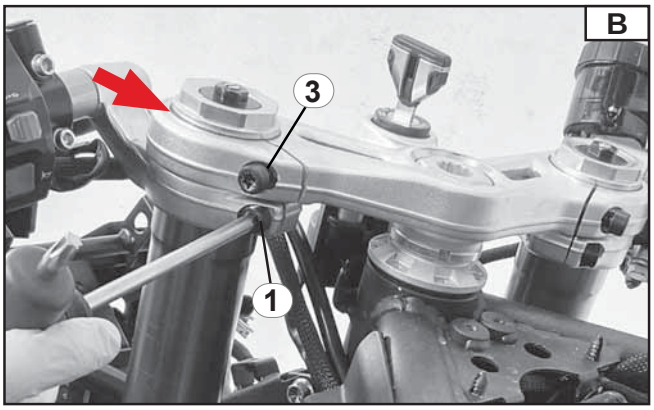


Tighten:
- The screw (1) of the clip-on handlebar Fig. B.
- The screw (3) of the steering base plate Fig. B.

Torque 22 N*m

Tighten:
- The screws (2) on the bottom steering plate Fig. A.

Torque 18. N*m



NOTICE

Check that the path of the brake hoses is correct.

HANDLEBAR

REMOVAL OF CLIP-ON HANDLEBAR AND RELEVANT PARTS

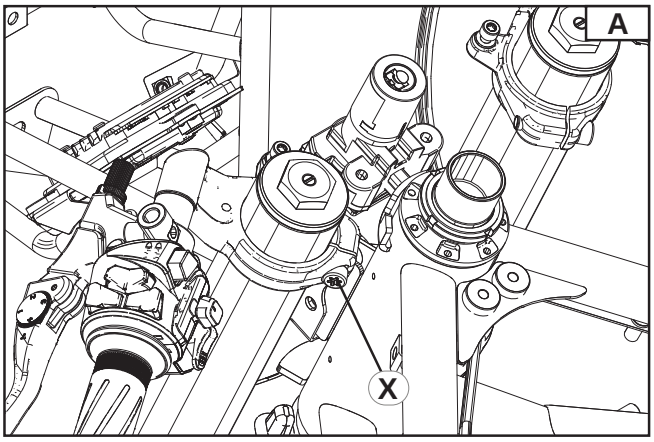
Park the motorcycle on a level surface.

NOTICE

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

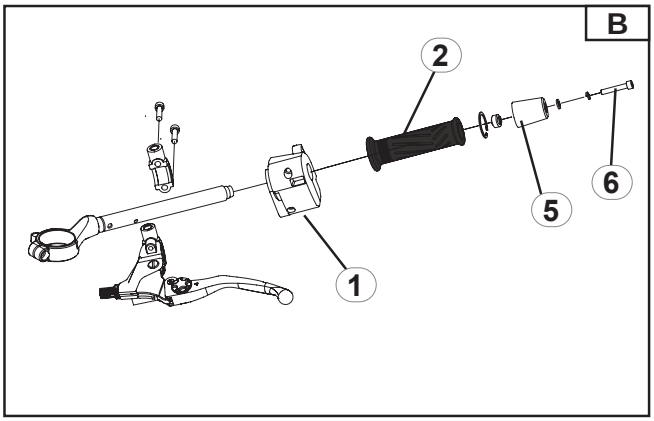
Removal:

- The steering head, refer to **"Removal of steering head, Chapter 4".**
- The fixing screw (X) Fig. A.



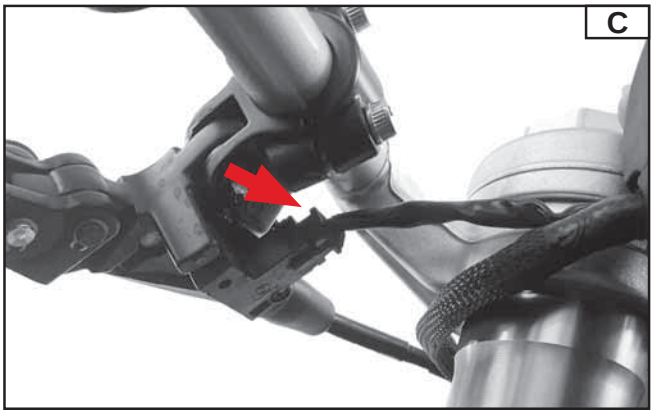
Removal of the left parts:

- The screw (6) and the relevant washers Fig. B.
- The hand grip terminal (5) Fig. B.
- The left hand grip (2) Fig. B.
- The left switch (1) Fig. B.



Disconnect:

- The clutch control connector Fig. C.



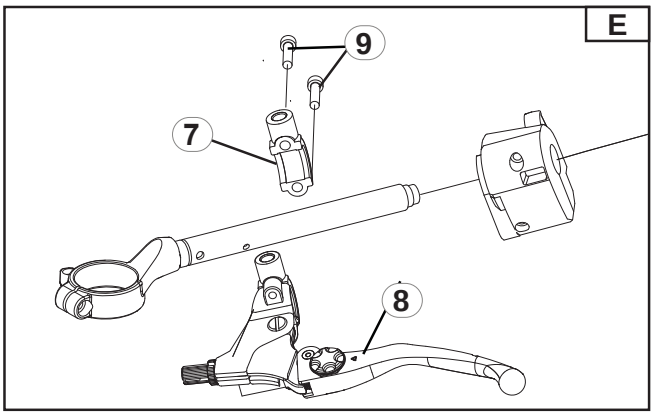
- The left switch wire Fig. D.



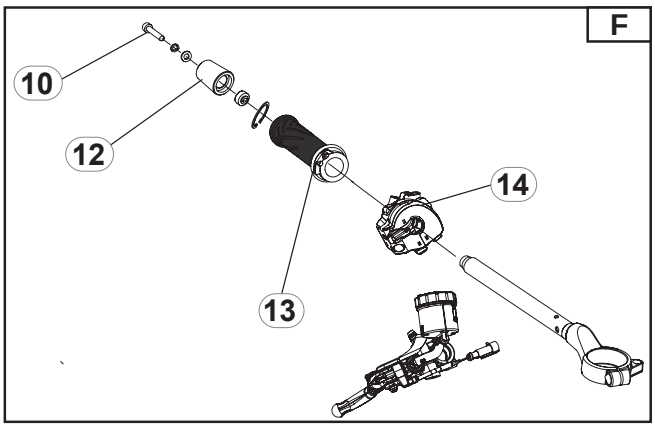
HANDLEBAR

REMOVAL OF HANDLEBAR AND ITS COMPONENTS

Remove:
- The screws (9) Fig. E.
- The clutch control bracket (7) Fig. E.
- The clutch control lever (8) Fig. E.

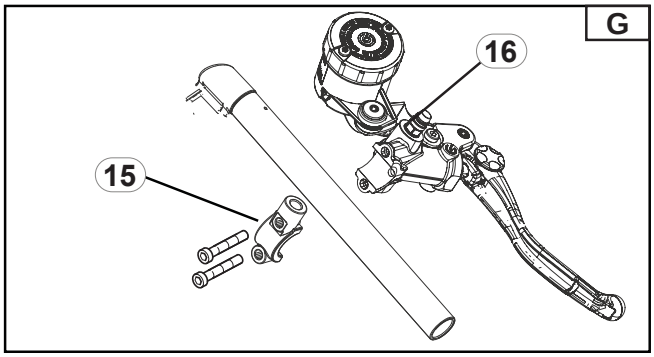


Removal of the right parts:
- The screw (10) Fig. F.
- The hand grip terminal (12) Fig. F.
- The throttle control, refer to Chapter **"Removal of throttle control, Chapter 4".**
- The right hand grip (13) Fig. F.
- The right switch (14) Fig. F.

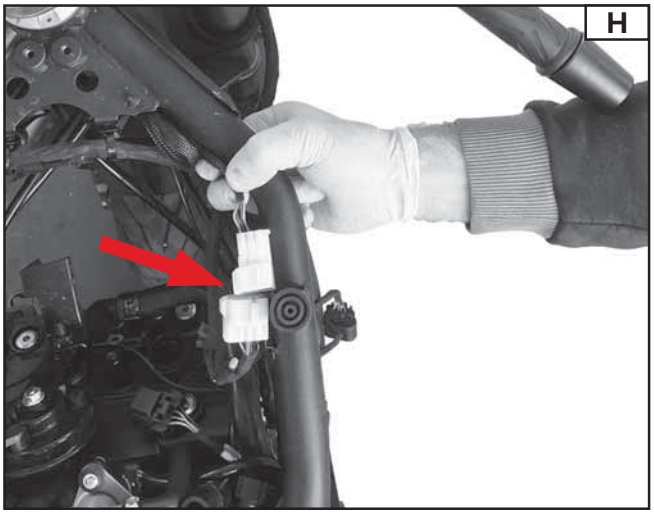


Remove:
- The brake pump support bracket (15) Fig. G.
- The brake pump (16) Fig. G.

NOTE:
Disconnect the connector of the right STOP light button.



Disconnect:
- the right switch wire Fig. H.

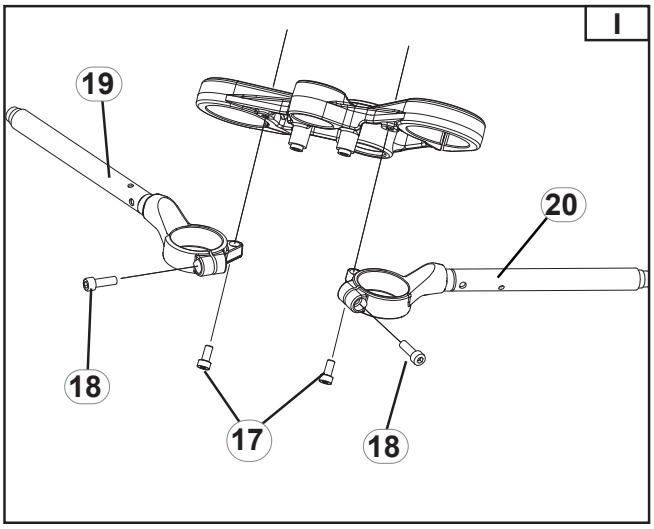


HANDLEBAR

REMOVAL OF HANDLEBAR AND ITS COMPONENTS

Remove:

- The steering head, refer to **"Removal of the steering head, Chapter 4".**
- The screws (17) Fig. I.
- The screws (18) Fig. I.
- The right clip-on handlebar (19) Fig. I.
- The left clip-on handlebar (20) Fig. I.



HANDLEBAR

INSPECTION OF CLIP-ON HANDLEBAR

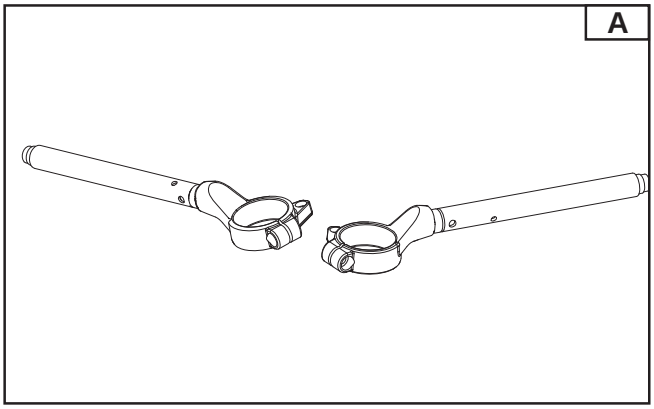
Check:

- The clip-on handlebar Fig. A.

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

WARNING

Do not try to straighten the clip-on handlebar if bent, since it will become weaker and might be dangerous.



HANDLEBAR

INSTALLATION OF CLIP-ON HANDLEBAR AND RELEVANT PARTS

NOTICE

Prop the motorcycle 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:
- The clip-on handlebar (1) Fig. A.

Tighten:
- The screw (2) Fig. A.

Tighten to the following torque:

Torque 12 N*m

Install:
- The steering plate (3), refer to **"Installation of steering plate, Chapter 4"**.

Tighten:
- The connection screws (4) of the right/left clip-on handlebar Fig. B.

Tighten to the following torque:

Torque 12 N*m

NOTE:
The following procedure applies to both clip-on handlebar.

Install:
- The front brake pump (5) Fig. C.

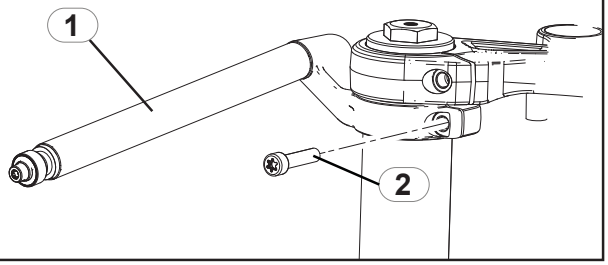
Tighten:
- The screws (6) Fig. C.

Tighten to the following torque:

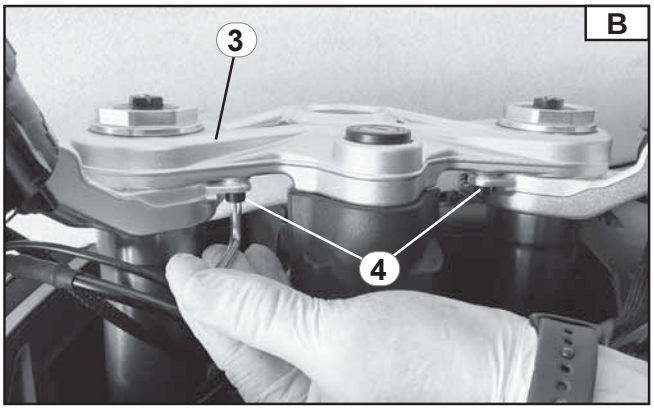
Torque 10 N*m

Install:
- The left switch Fig. D.

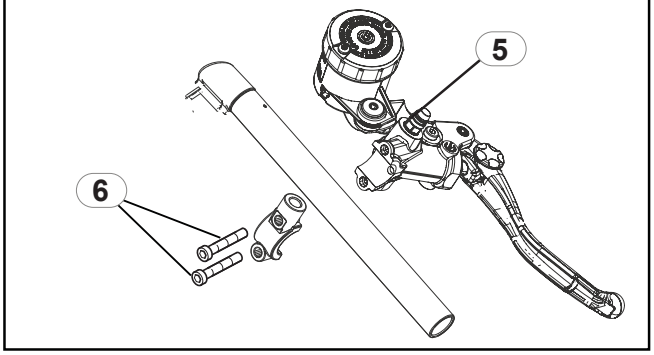
A



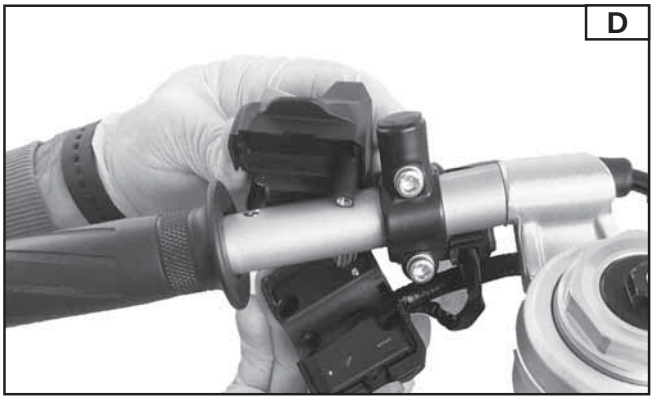
B



C



D



HANDLEBAR

INSTALLATION OF CLIP-ON HANDLEBAR AND RELEVANT PARTS

Install:

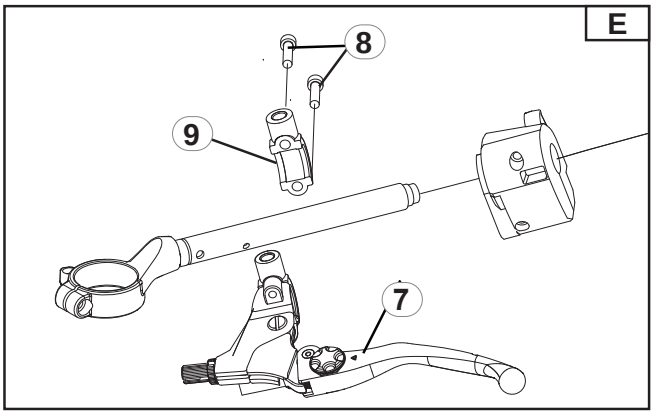
- The clutch control lever (7) Fig. E.
- The bracket (9) Fig. E.

Tighten:

- The screws (8) Fig. E.

Tighten to the following torque:

Torque 10 N*m



HANDLEBAR

REMOVAL OF THROTTLE GRIP

Park the motorcycle on a level surface.

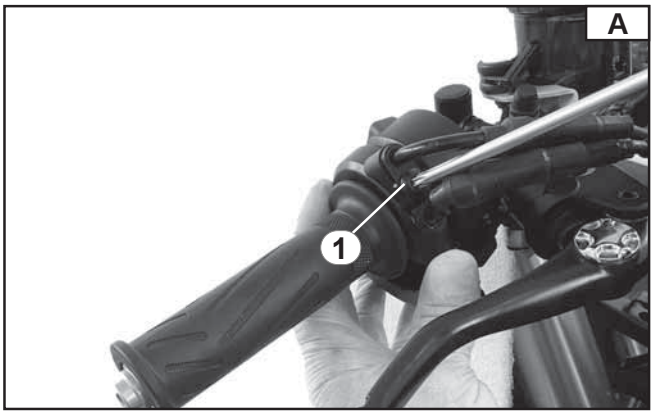
NOTICE

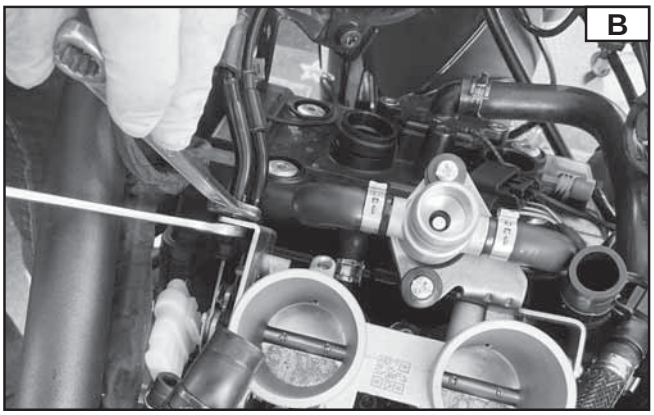
Prop the motorcycle on suitable supports so that it cannot fall.

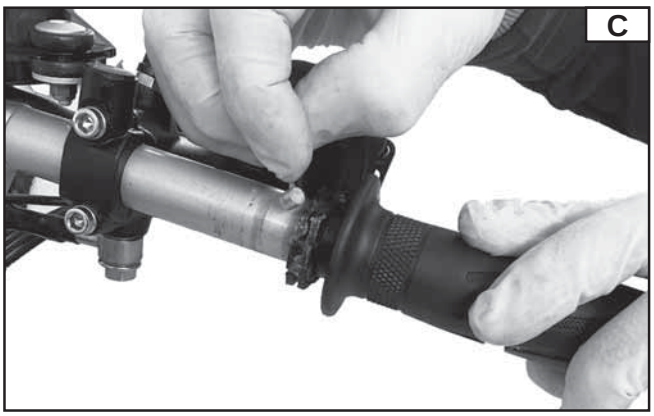
Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The air-box, refer to **"Removal of air-box, Chapter 4"**.
- The screw (1) Fig. A.

Loosen:
- The adjusting nuts and the lock nuts on the throttle body Fig. B.

Remove:
- The hand grip control cables Fig. C.







HANDLEBAR

INSTALLATION OF THROTTLE GRIP

Park the motorcycle on a level surface.

NOTICE

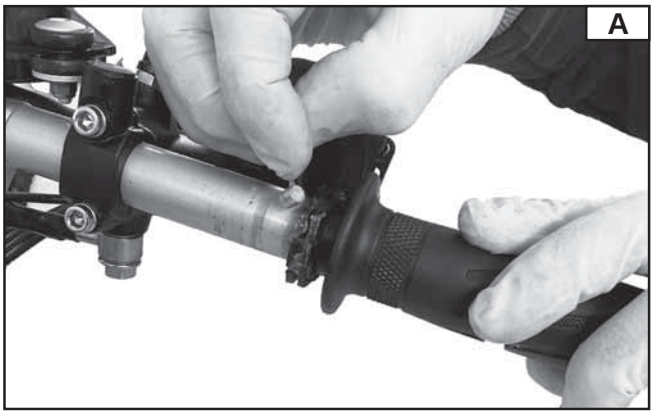
Prop the motorcycle on suitable supports so that it cannot fall.

Proceed using the opposite order to removal.

NOTE:
When inserting the hand grip, lubricate the handlebar with grease.

Recommended lubricant

	Recommended lubricant **NGLI2 GREASE**



STEERING

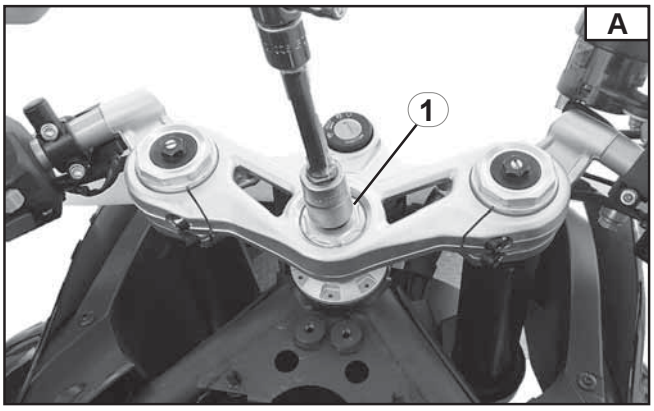
REMOVAL OF STEERING HEAD

NOTICE

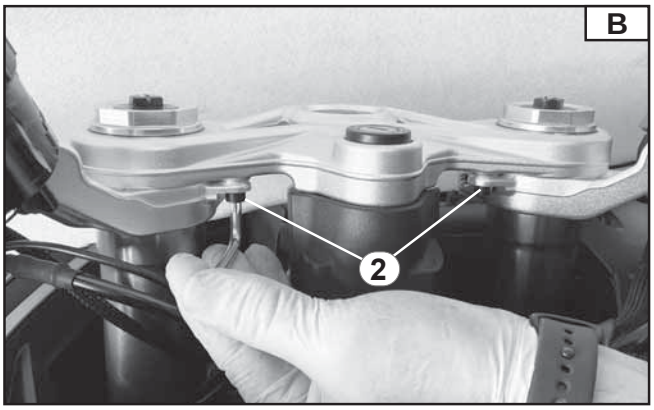
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The special screw (1) via the special tool Fig. A.

Steering sleeve disassembly tool
Code: R300097146000

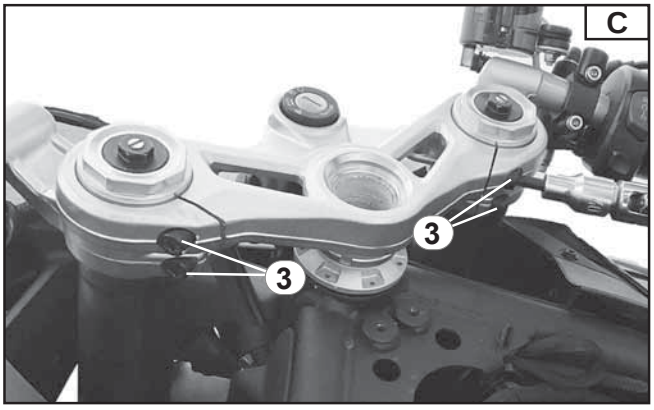


Remove:
- The connection screws (2) of the right/left clip-on handlebar Fig. B.

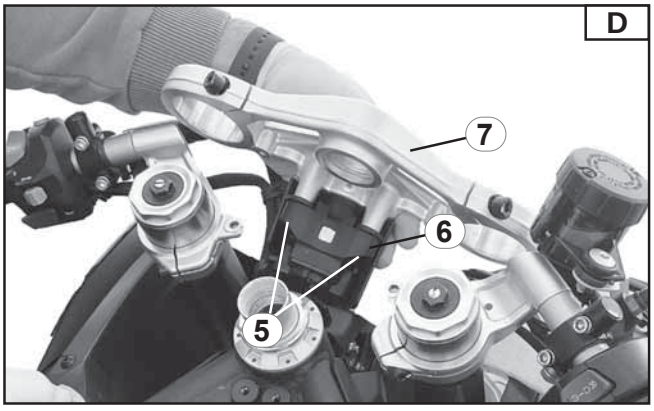


- The screws (3) Fig. C.

Disconnect:
- The ignition block connector.



Remove:
- The two screws (5) Fig. D.
- The ignition block (6) Fig. D.
- The steering head (7) Fig. D.



STEERING

STEERING HEAD INSPECTION

Wash:
- The bearings.
- The bearing races.

	Solvent with high flash point.

Check:
- The bearing races (1) Fig. A.
- The dust seal rings (2) Fig. A.

If there is any spotting/damage, replace.

Replace:
- The bearings.
- The bearing races.
- Remove the bearing races (1) from the frame tube using a long rod and a hammer (2) Fig. B.
- Detach the race of the bearing (3) from the bottom bracket using a chisel (4) and a hammer Fig. B.
- Mount a new dust seal ring and new bearing races.

NOTICE

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

NOTE:
- **Always replace the bearings and the related races as an assembly and greased when needed Fig. C.**
- **Every time the steering sleeve is removed, a new rubber gasket must be fitted.**

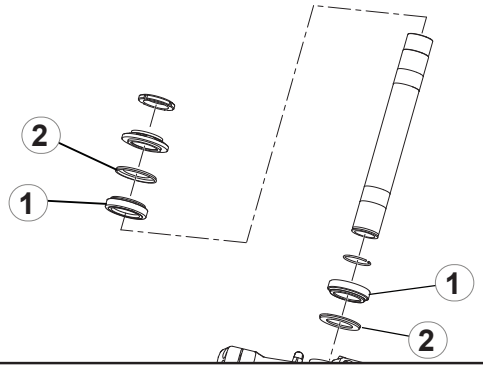
Check:
- The steering head.
- The bottom steering head base (along with the sleeve).
- If there is any warping/cracking/damage, replace.

NOTE:
If necessary:

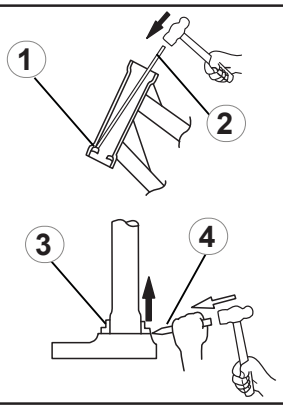
Lubricate:
- The dust seal rings Fig. C.
- The races of the bearings Fig. C.

	**Recommended lubricant NGLI2 GREASE**

A



B



C



STEERING
STEERING HEAD INSTALLATION

Park the motorcycle on a level surface.

NOTICE

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

Install:
Proceed using the opposite order to removal.
Tighten:
- The steering ring nut (1) Fig. A with the special tool at the following torque:

Torque: 15. N*m

Tool to tighten the steering sleeve lock nut.
Code: R180297129000

NOTICE

Do not overtighten the steering ring nut.

- The steering ring nut pin (2) Fig. A (with the special tool) and tighten to the following torque:

Torque 60 N*m

Install:
- The steering head (4) Fig. B.
- The side setscrews (3) of the fork stem Fig. B.

To the following torque:

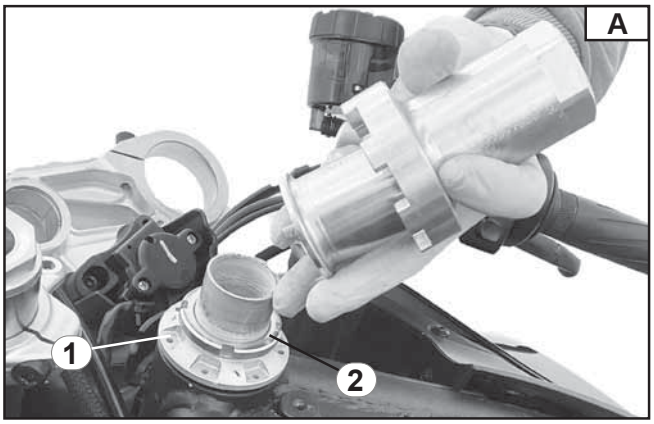
Torque 22 N*m

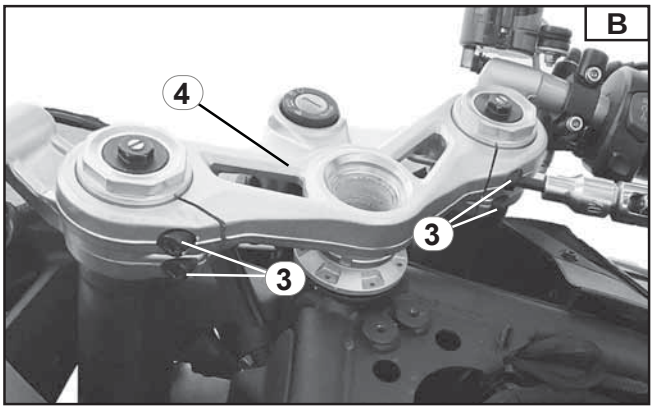
Install:
- The special screw (5) via the special tool (6) Fig. C.

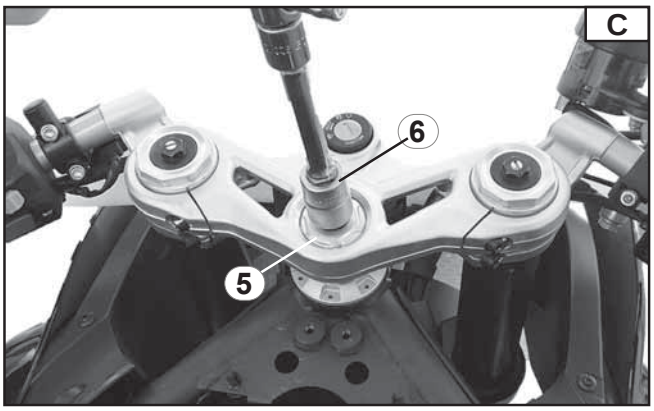
Tighten to the following torque:

Torque 60 N*m

The steering head wrench.
Code: R300097146000







STEERING

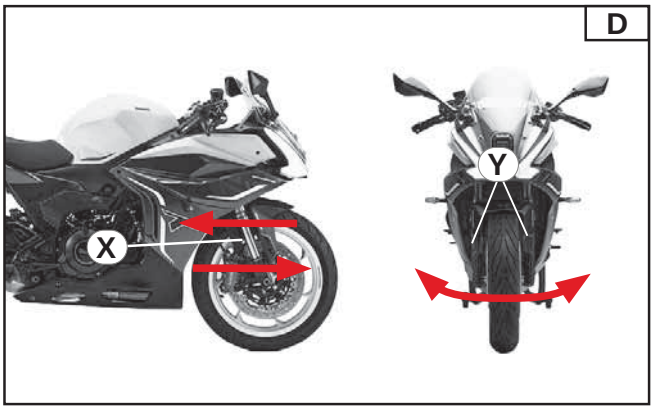
STEERING HEAD INSTALLATION

Check:

- The steering sleeve.

Gently oscillate the front fork, holding it by the end of the stems (X) Fig. D.
Rotate the front fork to the right/left, holding it by the end of the stems (Y) Fig. D, checking that the rotation is free and smooth.

If there is any jamming/loosening, inspect the steering head again.



STEERING

STEERING HEAD BASE REMOVAL

NOTICE

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

Remove:

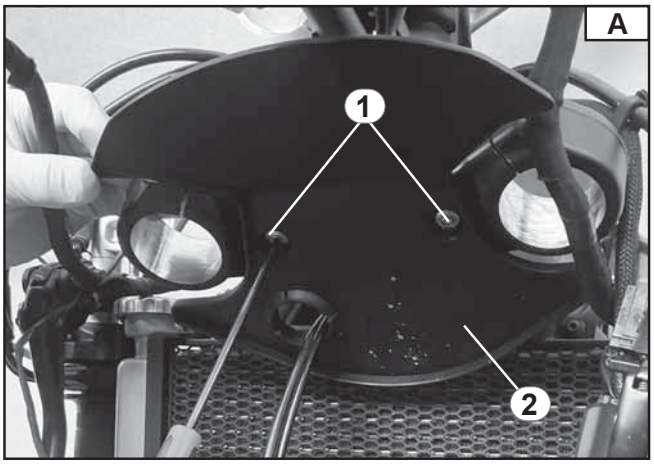
- The front fork stems, refer to chapter **"Removal of front fork stems, Chapter 4".**
- The screws (1) Fig. A.
- The protection (2) Fig. A.
- The steering head, refer to the section **"Removal of steering head, Chapter 4".**

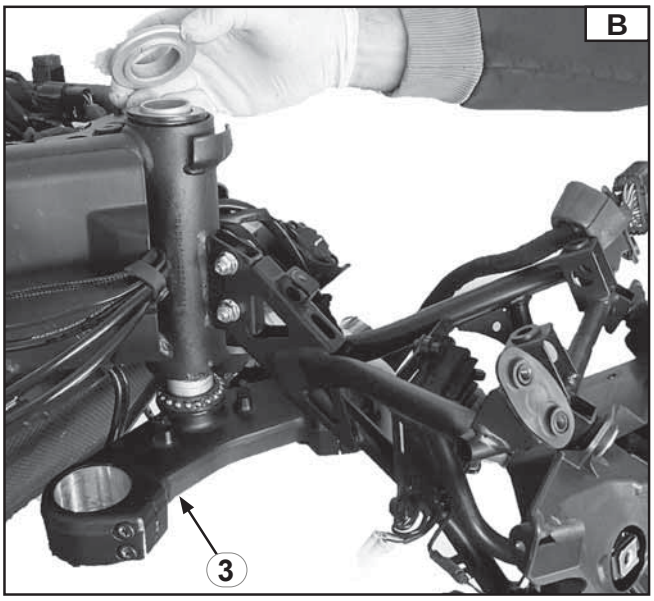
NOTE:

- **When the steering head base is disassembled, pay attention to the steel balls, since the might fall.**

Remove:

- The steering head base (3) Fig. B





STEERING

INSTALLATION OF STEERING HEAD BASE

Park the motorcycle on a level surface.

NOTICE

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

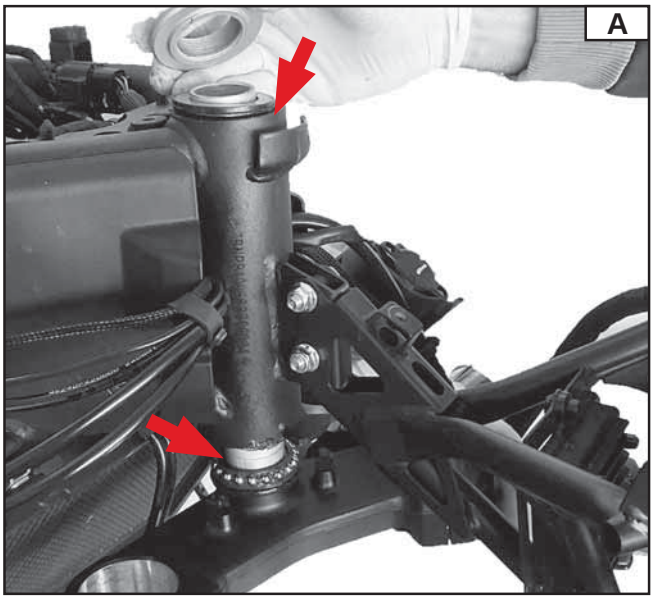
Install:

- Proceed using the opposite order to removal.

NOTE:

During re-assembly of the steering head base, grease the guides and the balls, as shown in Fig. A.

	**Recommended lubricant NGLI2 GREASE**



REAR SHOCK ABSORBER

REAR SHOCK ABSORBER REMOVAL

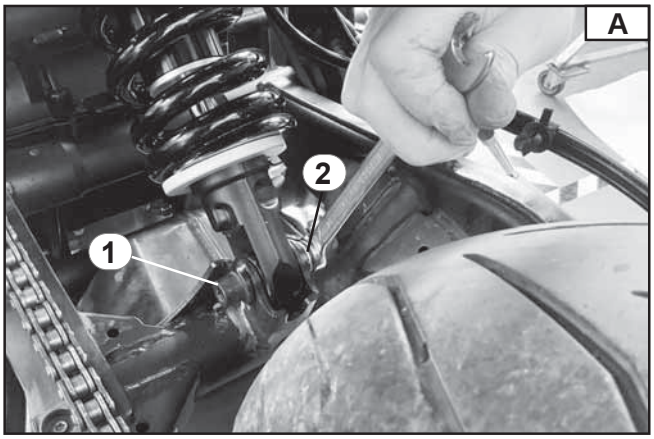
Park the motorcycle on a level surface.

NOTICE

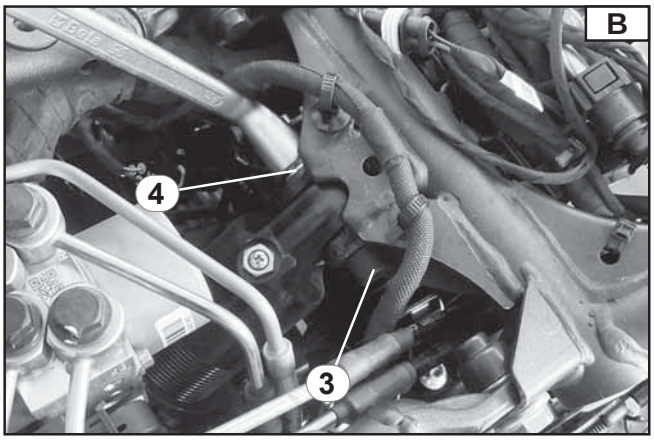
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The rear mudguard, refer to chapter **"Removal of rear mudguard, Chapter 4".**
- The nut (2) Fig. A.
- The bottom screw (1) of the whole rear shock absorber Fig. A.

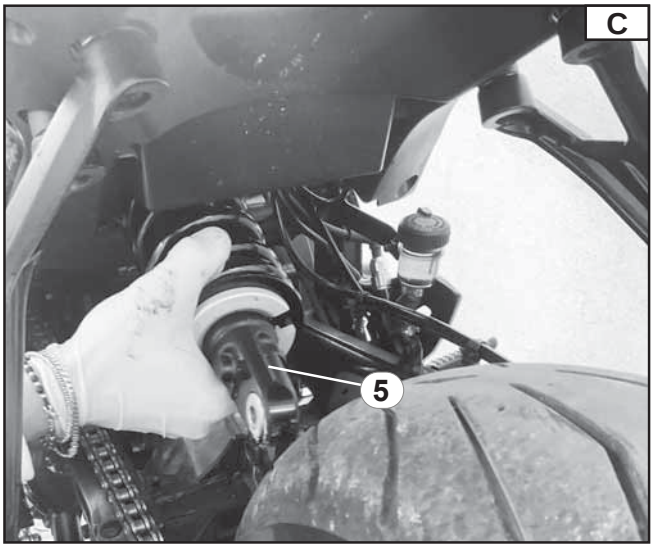


NOTE:
Place a support underneath the engine.
Prop the swingarm, then remove the rear shock absorber assembly from the attachment point on the swingarm.



Remove:

- The nut (4) Fig. B.
- The top screw (3) of the whole rear shock absorber Fig. B.
- The rear shock absorber (5), by removing it from the rear side of the vehicle, as shown in Fig. C.



REAR SHOCK ABSORBER

REAR SHOCK ABSORBER CHECK

Check:
The rear shock absorber rod.
-]If there is any warping/damage, replace the rear shock absorber assembly.

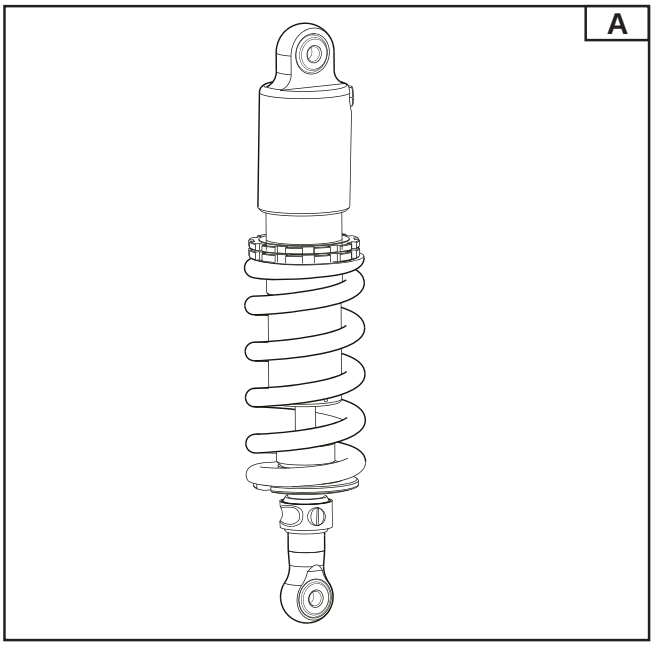
The rear shock absorber.
- If there is any oil leak, replace the rear shock absorber assembly.

The spring.
- If there is any damage/wear, replace the rear shock absorber assembly.

The bushings.
- If there is any damage or wear, replace.

The fixing screws.
- If there is any warping/damage/signs of wear, replace.

NOTE:
As regards the rear shock absorber, refer to Chapter 3 "Adjustment of shock absorber"



REAR SHOCK ABSORBER

REAR SHOCK ABSORBER INSTALLATION

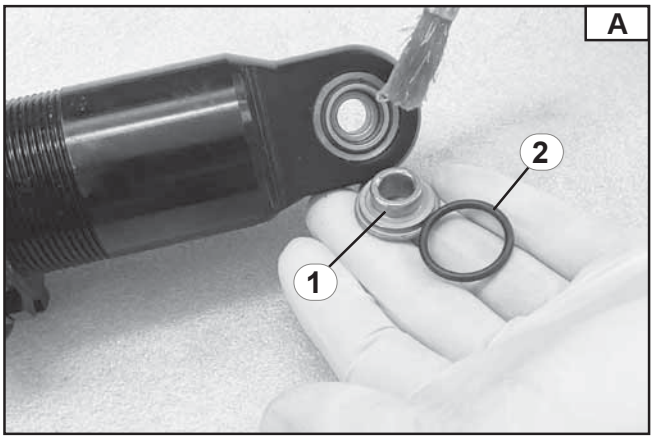
Park the motorcycle on a level surface.

NOTICE

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

NOTE:
Before installing the bottom of the shock absorber, check the bushings (1) and the related O-rings (2) Fig. A for wear from both sides of the bottom attachment point of the shock absorber.
In the event of wear, replace, otherwise lubricate with special grease.

	**Recommended lubricant NGLI2 GREASE**

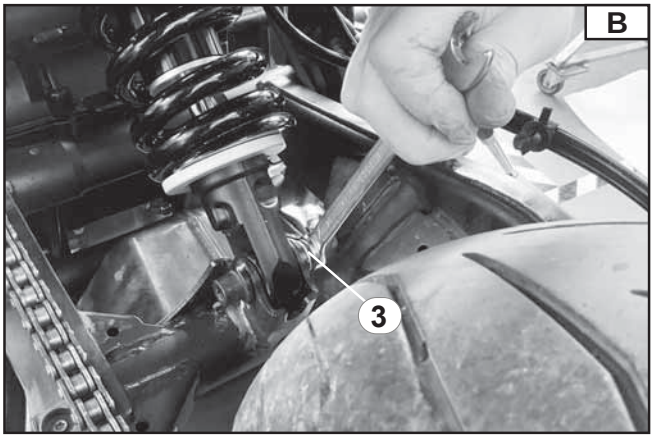


Install:
- Proceed using the opposite order to removal, considering as follows.
- The bottom part of rear shock absorber.

Tighten:
- The nut (3) Fig. B to the following torque:



Torque 55 N*m

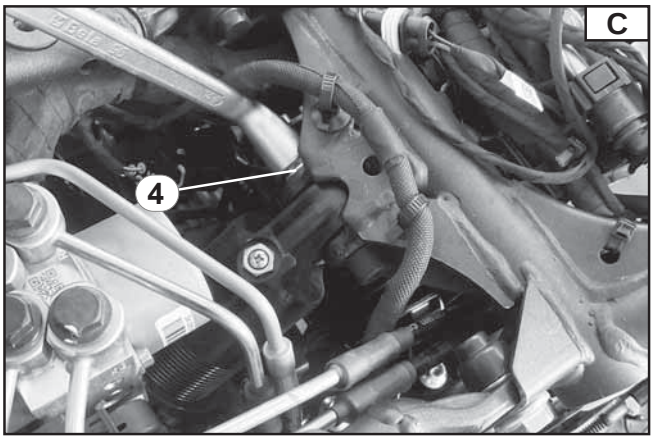


Install:
- The top part of rear shock absorber.

Tighten:
- The nut (4) Fig. C to the following torque:



Torque 55 N*m



CHAIN TRANSMISSION

REMOVAL OF TRANSMISSION CHAIN

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

Remove the parts in the indicated order.

- The chain pinion cover, refer to **"Removal of chain pinion cover, Chapter 4".**

Remove:

- The transmission chain by opening the link Fig. B via the apposite tool (1) Fig. A.

A



CHAIN TRANSMISSION

TRANSMISSION CHAIN REPLACEMENT

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

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 (1) Fig. B.
- The O-Rings (2) Fig. B.
- The clip link (3) Fig. B.

NOTICE

Insert the master link from inside the transmission chain, then insert 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.

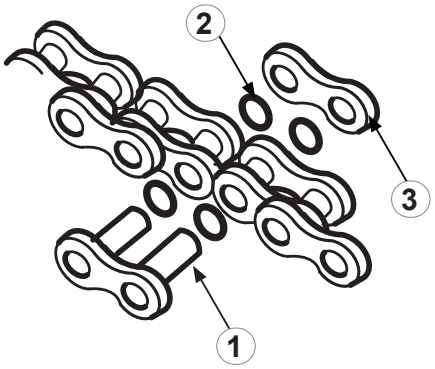
Check:
- The surface affected by the clinched master link.

This must have no apertures.
If there are apertures, replace the master link, seal rings and clip link.
As regards transmission chain control, refer to "**Check of transmission chain wear, Chapter 3**".

NOTICE

Never use a transmission chain with a clip-type master link.

B



SWINGARM

REMOVAL OF SWINGARM

Park the motorcycle on a level surface.

NOTICE

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

Remove the parts in the indicated order.

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The rear brake caliper, refer to **"Removal of rear brake caliper, Chapter 4".**
- The rear wheel, refer to **"Removal of rear wheel, Chapter 4".**
- The rear shock absorber, refer to **"Removal of rear shock absorber, Chapter 4".**
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The rear mudguard, refer to chapter **"Removal of rear mudguard, Chapter 4".**
- The RH/LH caps (1) Fig. A.
- The nut (2) Fig. B.
- The washer (3) Fig. B.

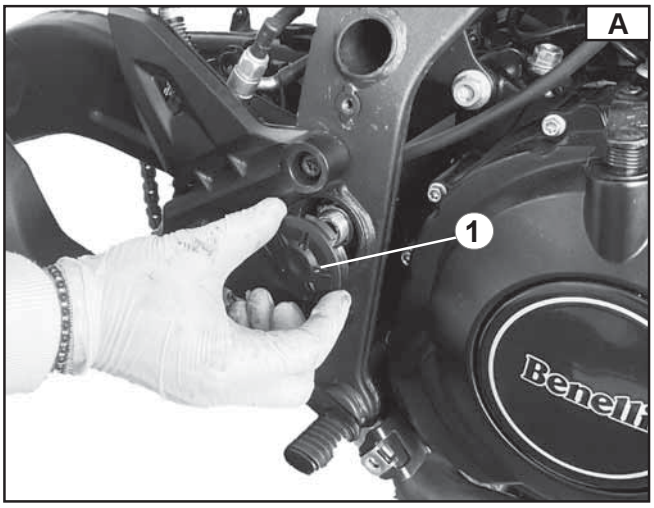
NOTE:
Position a stand (B) to support the rear swingarm.

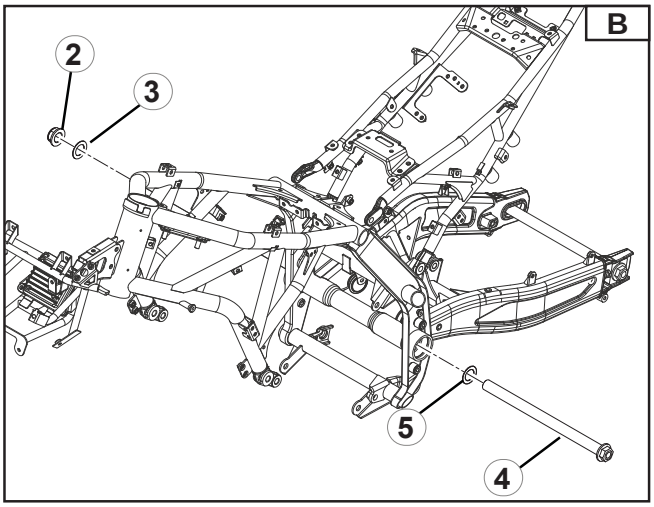
Slide out:

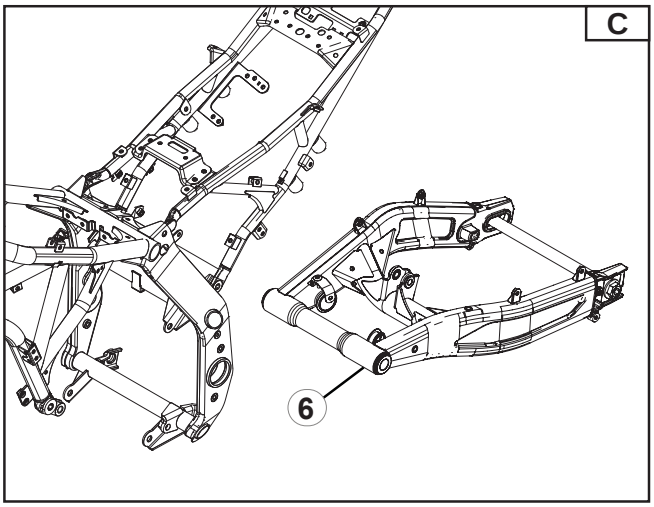
- The swingarm pin (4) Fig. B.
- The washer (5) Fig. B.

Remove:

- The swingarm (6) Fig. C.







SWINGARM

REMOVAL OF SWINGARM

Utilise the appropriate tool for the removal of the internal components of the swingarm:

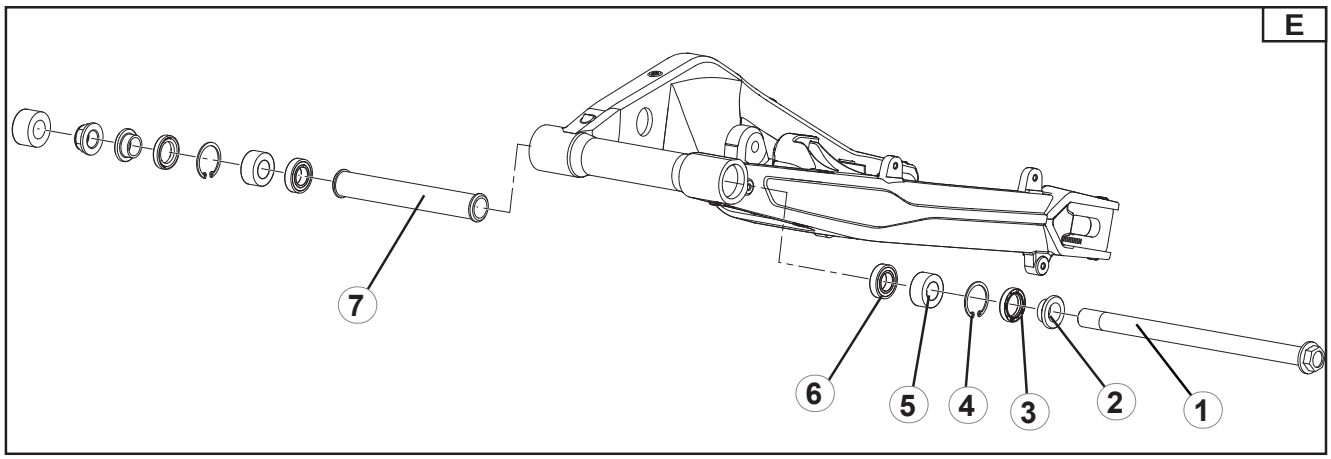


Rear swingarm bearing disassembly tool, see "Special tools for the frame, Chapter 1".

Take out:

- The bush (2) Fig. E.
- The oil seal (3) Fig. E.
- The Seeger ring (4) Fig. E.
- The bearing (5) Fig. E.
- The bearing (6) Fig. E.
- The central spacer (7) Fig. E.

Remove the other parts on the right side following the same sequence.



TRANSMISSION CHAIN AND SWINGARM

INSTALLATION OF SWINGARM

Park the motorcycle on a level surface.

NOTICE

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

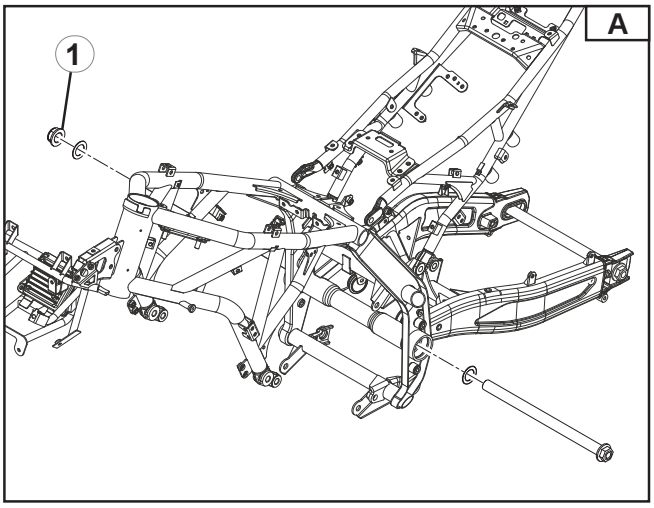
Install:
- Proceed using the opposite order to removal, considering as follows.

Lubricate:
- The internal bearings.
- The bushings.

	Recommended lubricant NGLI2 GREASE

Tighten:
- The nut (1) Fig. A to the following torque:

Torque 110 N*m



FRAME

REMOVAL OF THE REAR FRAME

Park the motorcycle on a level surface.

NOTICE

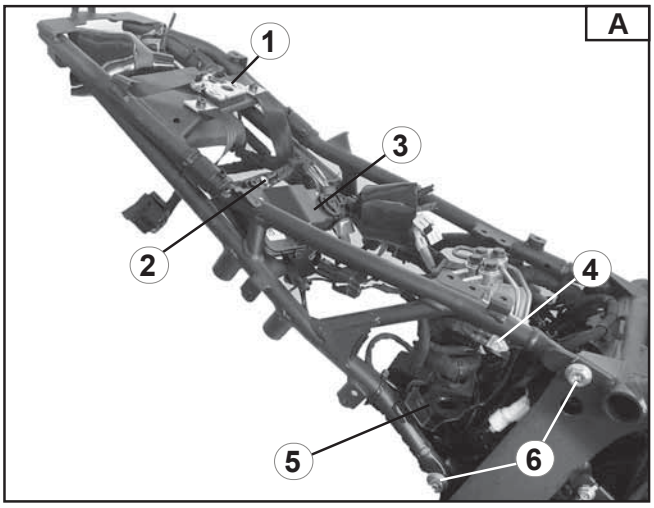
Prop the motorcycle on suitable supports so that it cannot fall.

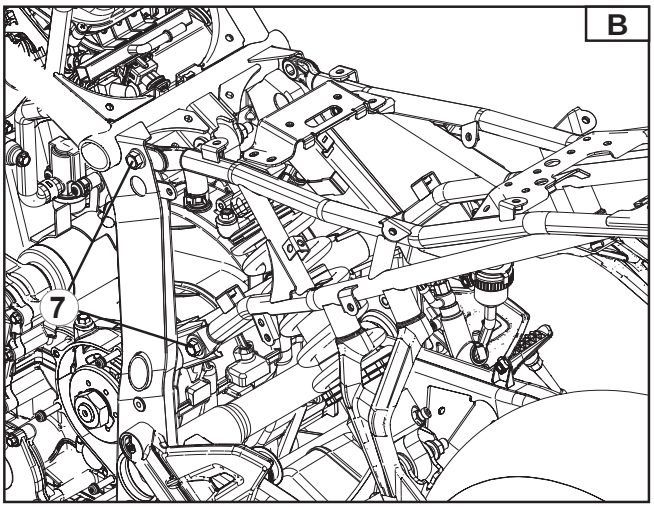
Remove:
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4".**
- The battery, refer to **"Check and charge of battery, Chapter 3"**.
- The license plate support, refer to **"Removal of license plate support, Chapter 4".**
- The rear light, refer to **"Removal of rear light, Chapter 4".**
- The bottom tail cover, refer to **"Removal of bottom tail cover, Chapter 4".**
- The exhaust system, refer to **"Removal of exhaust system, Chapter 4".**
- The tail fairing, refer to **"Removal of tail fairing, Chapter 4"**.
- The side tailpiece fairings, refer to **"Removal of side tailpiece fairings, Chapter 4"**.
- The passenger seat, refer to "**Removal of passenger seat, Chapter 4"**.
- The passenger seat opening lock, refer to **"Removal of passenger seat lock, Chapter 4"**.

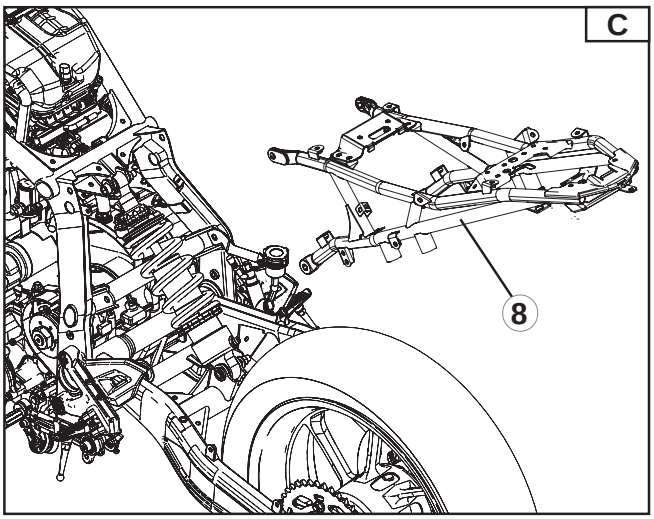
Disconnect:
- The mass (2) Fig. A.
- The mass (4) Fig. A.

Remove:
- The ECU (3) Fig. A, refer to **"Removal of ECU, Chapter 4"**.

Remove:
- The support bracket (5) Fig. A.
- The screws (6) Fig. A.
- The screws (7) Fig. B.
- The rear frame (8) Fig. C.







FRAME
REAR FRAME INSTALLATION

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

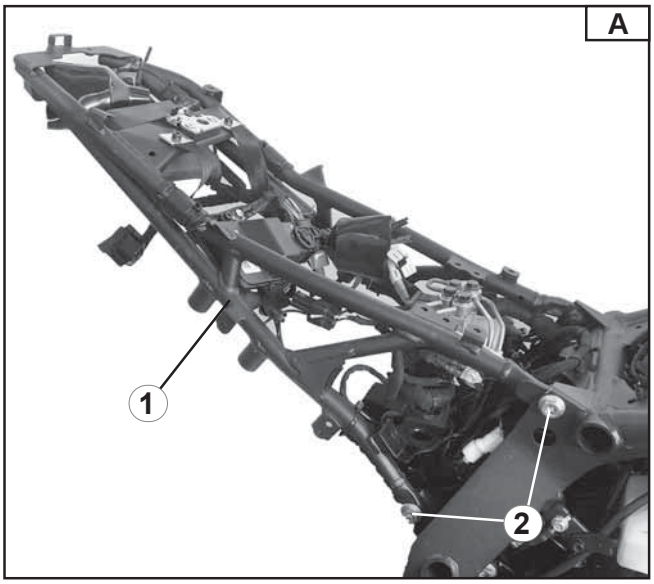
Install:
- The rear frame (1) Fig. A.

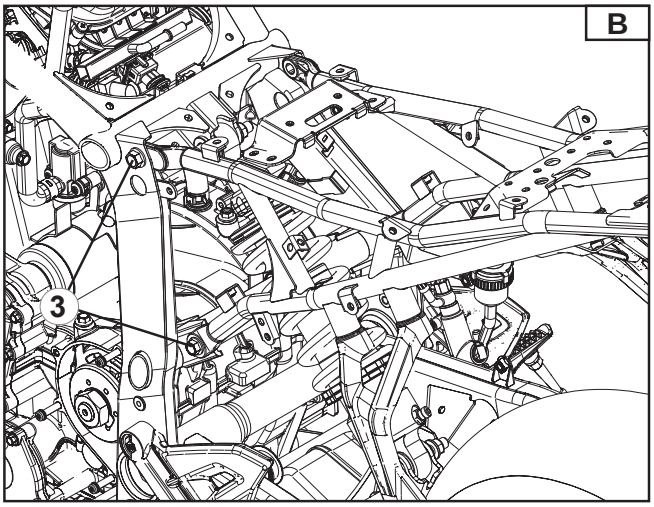
Tighten:
- The screws (2) Fig. A to the following torque:

Torque 45 N*m

Tighten:
- The screws (3) Fig. B to the following torque:

Torque 45 N*m





FRAME
REMOVAL OF FRONT FRAME

Park the motorcycle on a level surface.

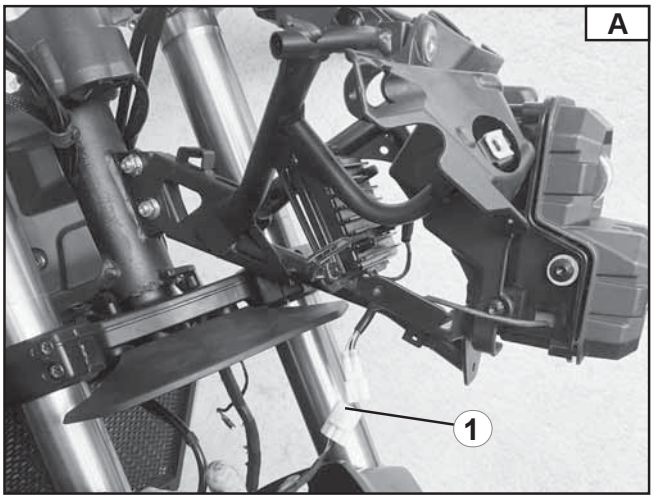
NOTICE

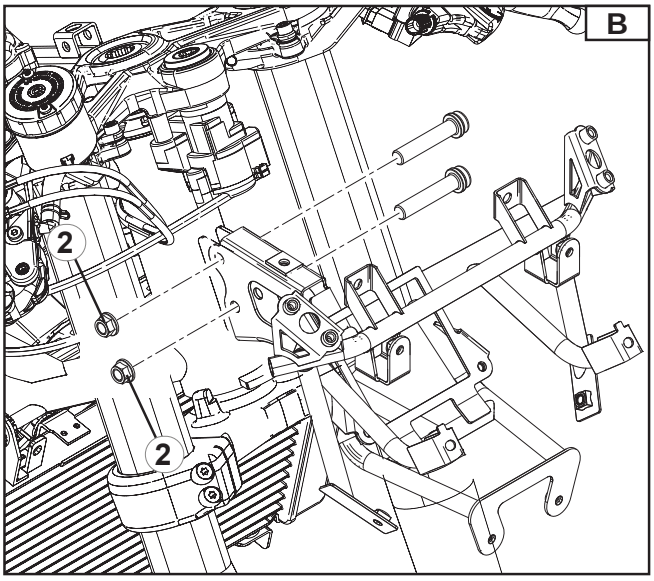
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.

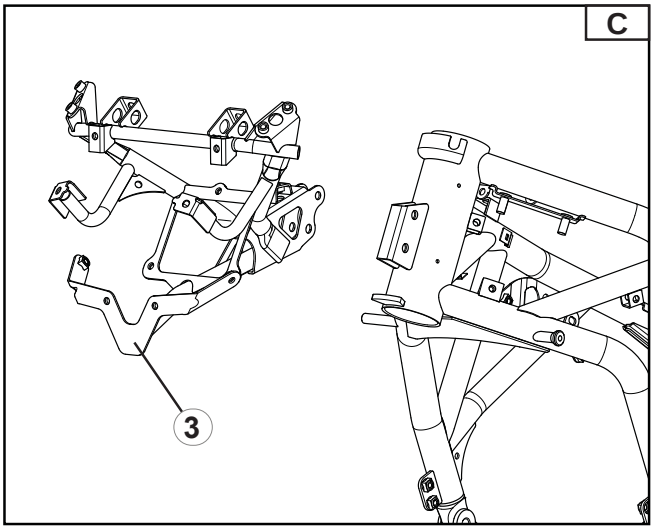
Disconnect:
- The front headlight cable (1) Fig. A.

Remove:
- The front headlights, refer to **"Removal of rear high / dipped beam headlights, Chapter 4".**
- The headlight support, refer to **"Removal of headlight support, Chapter 4"**.
- The front headlight electronics, refer to **"Removal of front headlight electronics, Chapter 4"**.
- The screws (2) Fig. B.





- The front frame (3) Fig. C.



FRAME
INSTALLATION OF FRONT FRAME

Park the motorcycle on a level surface.

NOTICE

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

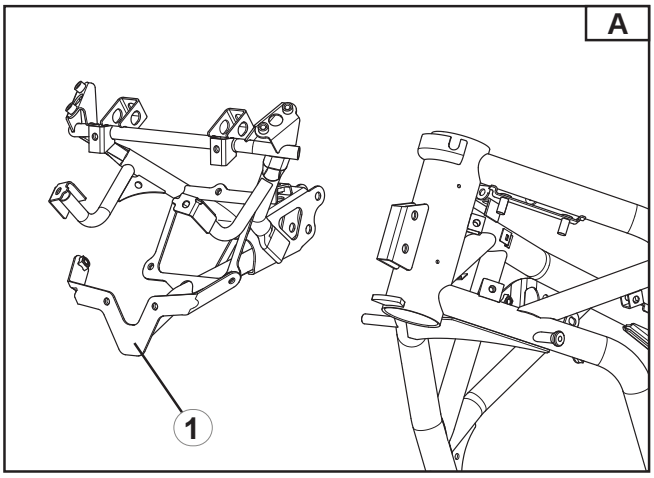
Installation:
Proceed using the opposite order to removal.

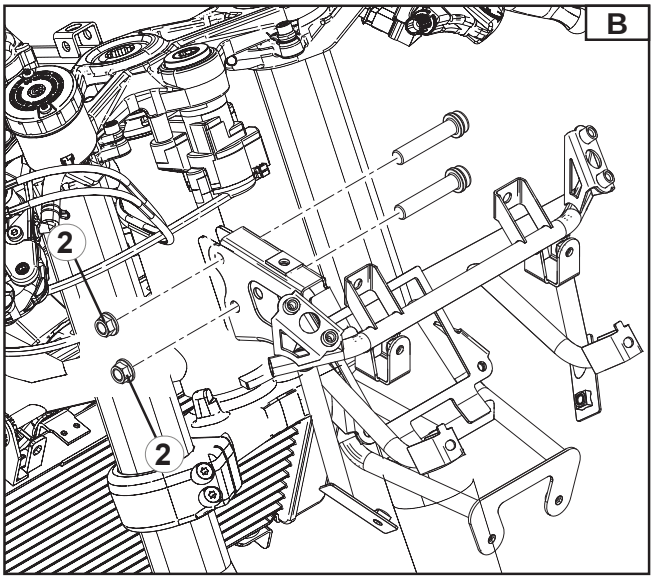
Install:
- The front frame (1) Fig. A.

Tighten:
- The fixing nuts (2) Fig. B.

To the following torque:

Torque 28 N*m





FRAME

REMOVAL OF HIGH / DIPPED BEAM HEADLIGHT

Park the motorcycle on a level surface.

NOTICE

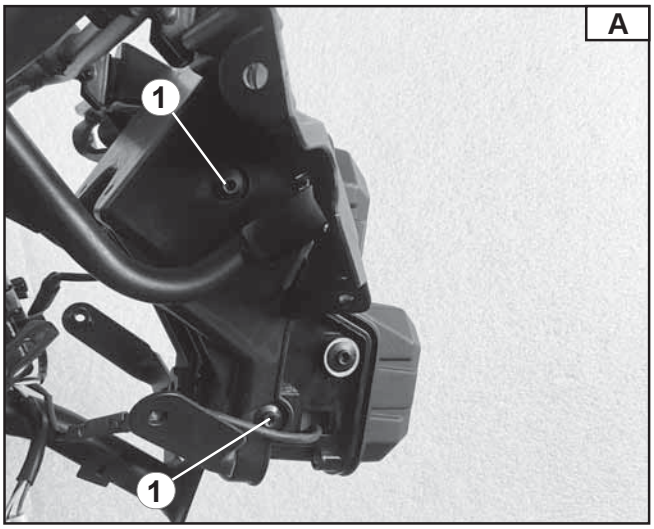
Prop the motorcycle on suitable supports so that it cannot fall.

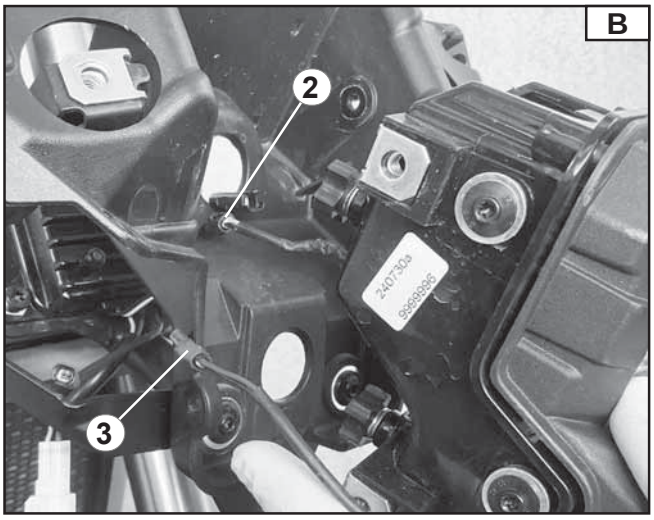
Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.
- The screws (1) Fig. A on the opposite side.

Disconnect:

- The cable (2) Fig. B.
- The cable (3) Fig. B.





FRAME

INSTALLATION OF HIGH / DIPPED BEAM HEADLIGHT

Park the motorcycle on a level surface.

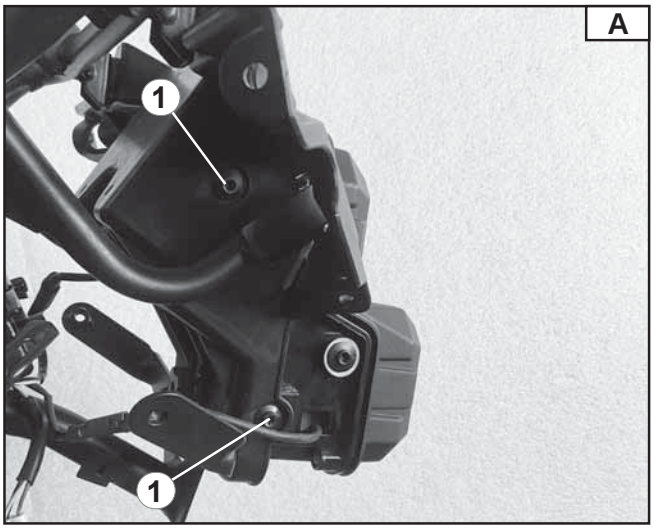
NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 12 N*m



FRAME
REMOVAL OF HEADLIGHT SUPPORT

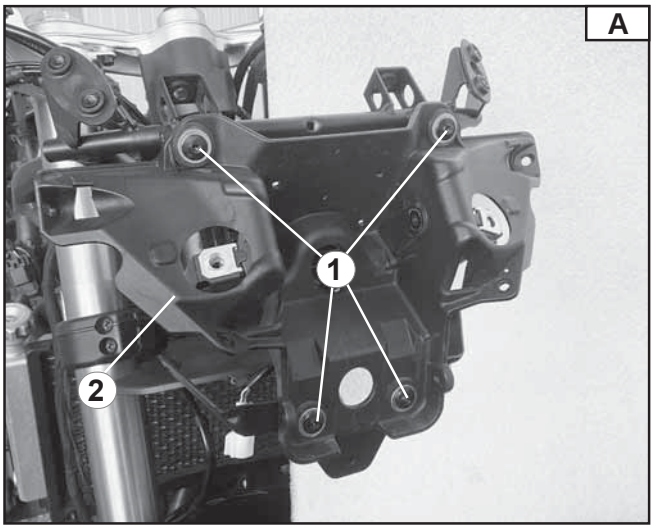
Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.
- The high / dipper beam headlights, refer to **"Removal of rear high / dipped beam headlights, Chapter 4"**.
- The screws (1) Fig. A.

Take out:
- The headlight support (2) Fig. A.



FRAME
INSTALLATION OF HEADLIGHT SUPPORT

Park the motorcycle on a level surface.

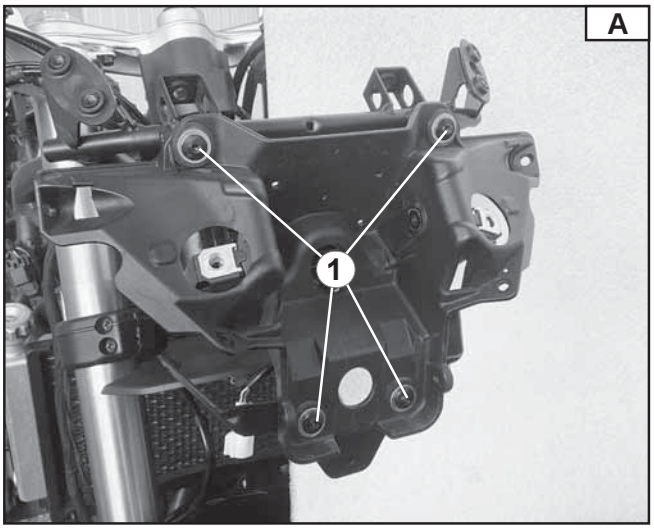
NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 12 N*m



FRAME

REMOVAL OF FRONT HEADLIGHT ELECTRONICS

Park the motorcycle on a level surface.

NOTICE

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

Remove:

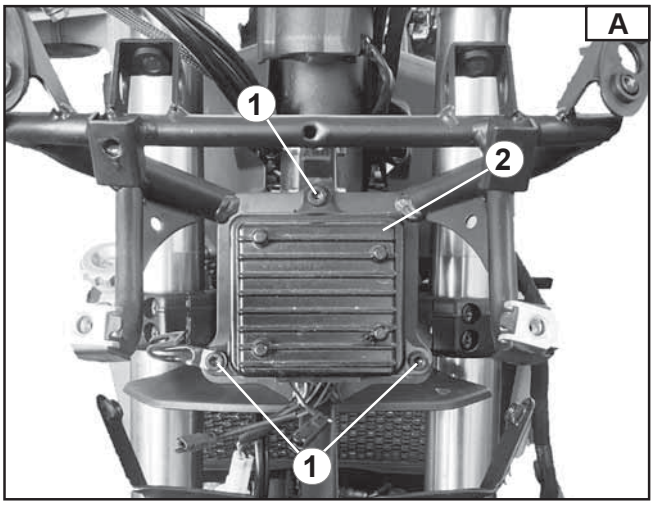
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.
- The high / dipper beam headlights, refer to **"Removal of rear high / dipped beam headlights, Chapter 4"**.
- The headlight support, refer to **"Removal of headlight support, Chapter 4"**.
- The screws (1) Fig. A.

Take out:

- The front headlight electronics (2) Fig. A.

NOTE:_____

In the event of malfunctioning of the headlight electronics, replace the complete front headlight assembly.



FRAME
INSTALLATION OF FRONT HEADLIGHT ELECTRONICS

Park the motorcycle on a level surface.

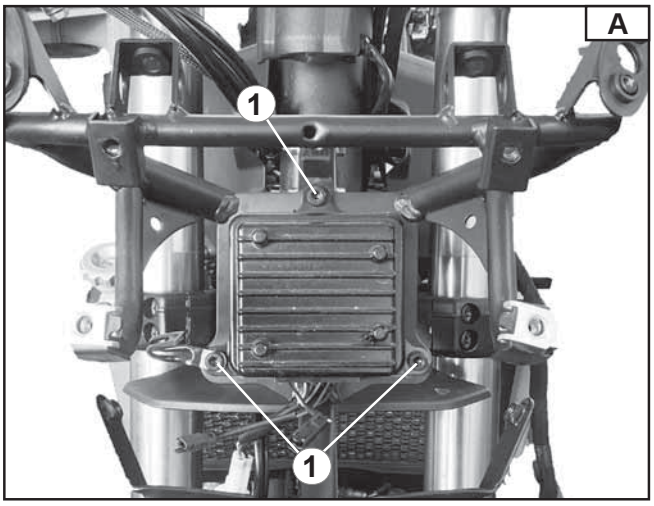
NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 12 N*m



FRAME

REMOVAL OF LICENCE PLATE SUPPORT

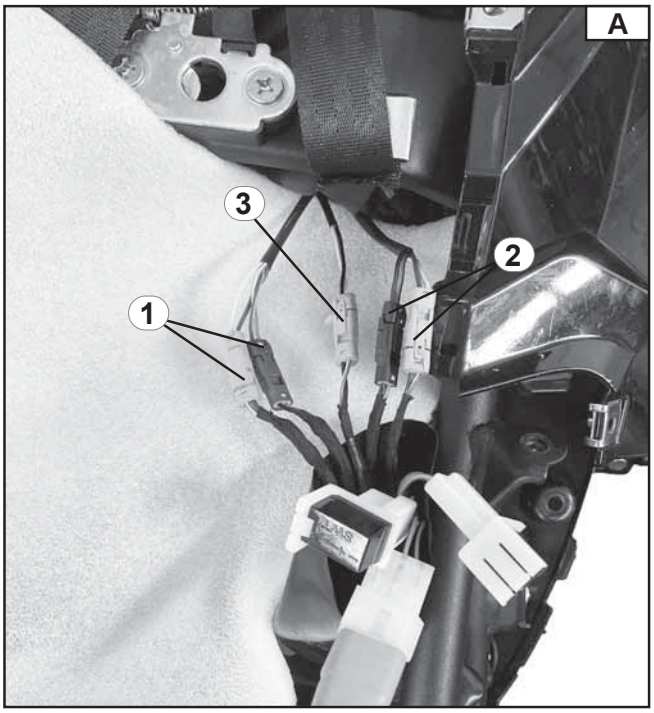
Park the motorcycle on a level surface.

NOTICE

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

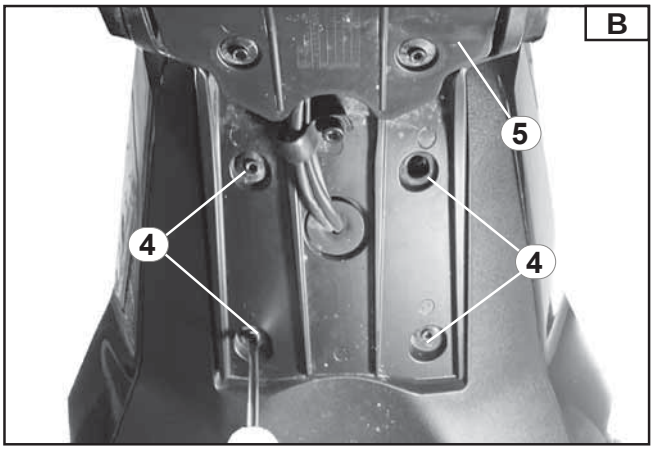
Remove:
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The fairing lock, refer to **"Removal of tailpiece fairing lock, Chapter 4".**

Disconnect:
- The indicator and the right rear position indicator light (1) Fig. A.
- The indicator and the left rear position indicator light (2) Fig. A.
- The license plate light (3) Fig. A.



Remove:
- The screws (4) Fig. B.

Take out:
- The license plate support (5) Fig. C.



FRAME
INSTALLATION OF LICENCE PLATE SUPPORT

Park the motorcycle on a level surface.

NOTICE

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

Installation:

- Proceed using the opposite order to removal.

FRAME
REMOVAL OF ECU

Park the motorcycle on a level surface.

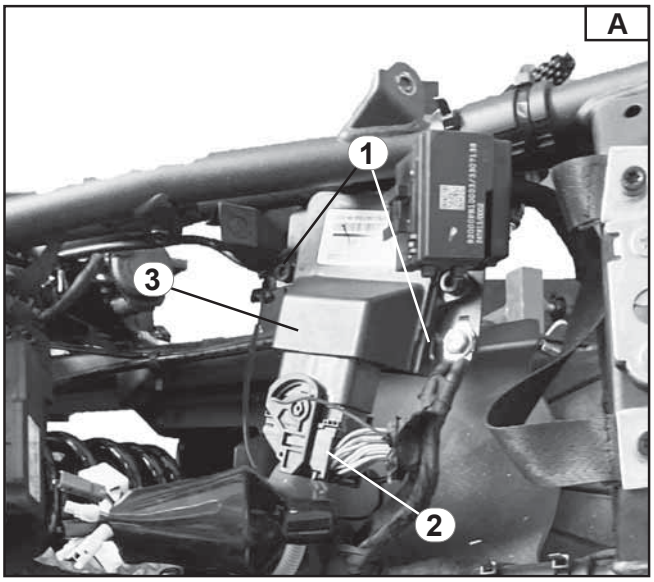
NOTICE

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

Remove:
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The screws (1) Fig. A.

Disconnect:
- The connector (2)

Remove:
- The ECU (3) Fig. A.



FRAME
INSTALLATION OF ECU

Park the motorcycle on a level surface.

NOTICE

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

Installation:

- Proceed using the opposite order to removal.

CYCLING

REMOVAL OF COMPLETE LEFT REAR FOOT PEG PLATE

Park the motorcycle on a level surface.

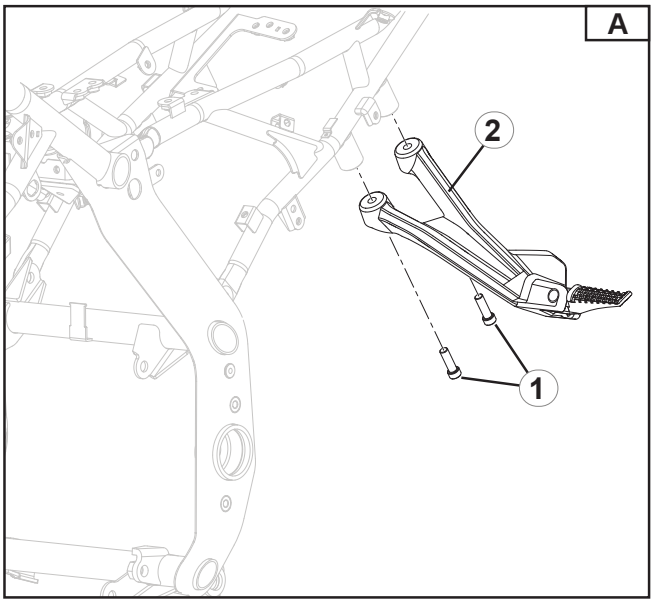
NOTICE

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

Remove:

- The screws (1) Fig. A.
- The left foot peg (2) Fig. A.

NOTE:
The kickstarter is included in the left rear foot peg plate. When replacing the kickstarter, replace the complete rear foot peg (2) Fig. A.



CYCLING

INSTALLATION OF COMPLETE LEFT REAR FOOT PEG PLATE

Park the motorcycle on a level surface.

NOTICE

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

Installation:

- Proceed using the opposite order to removal.

Tighten:

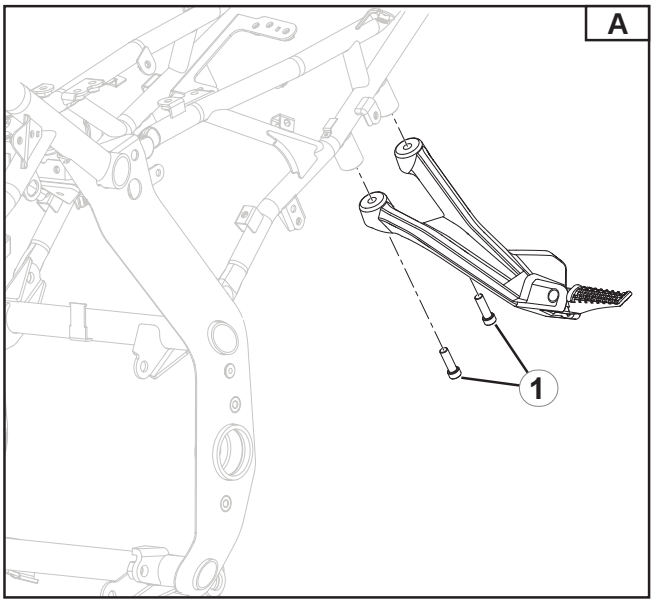
- The screws (1) Fig. A.

To the following torque:

Torque 25. N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



CYCLING

REMOVAL OF COMPLETE RIGHT REAR FOOT PEG PLATE

Park the motorcycle on a level surface.

NOTICE

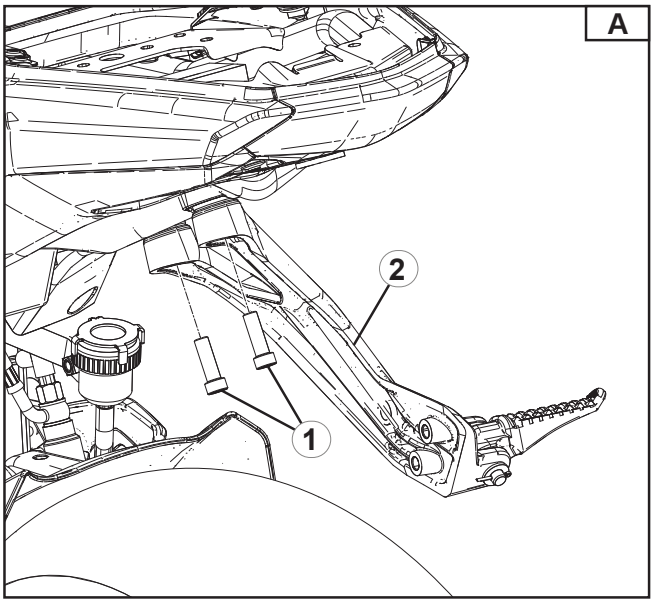
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The silencer, refer to **"Removal of exhaust system, Chapter 4"**.
- The screws (1) Fig. A.
- The right foot peg (2) Fig. A.

NOTE:

The kickstarter is included in the right rear foot peg plate. When replacing the kickstarter, replace the complete rear foot peg (2) Fig. A.



CYCLING

INSTALLATION OF COMPLETE RIGHT REAR FOOT PEG PLATE

Park the motorcycle on a level surface.

NOTICE

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

Installation:

- Proceed using the opposite order to removal.

Tighten:

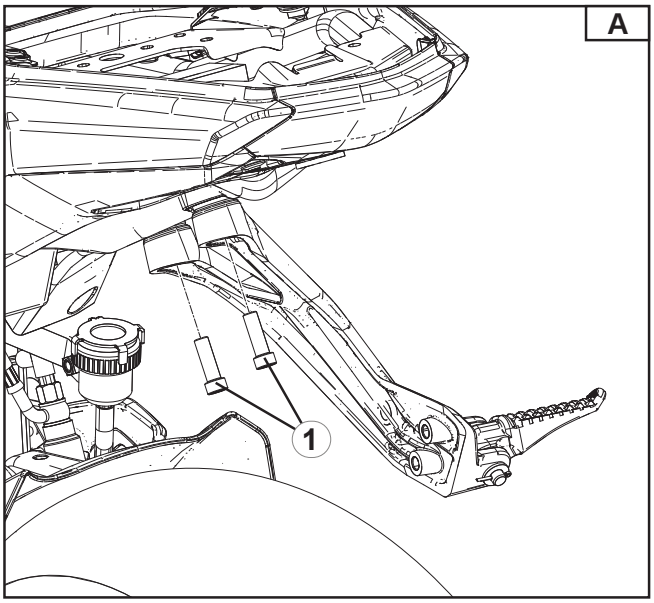
- The screws (1) Fig. A.

To the following torque:

Torque 25. N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



CYCLING

REMOVAL OF COMPLETE LEFT FRONT FOOT PEG SUPPORT

Park the motorcycle on a level surface.

NOTICE

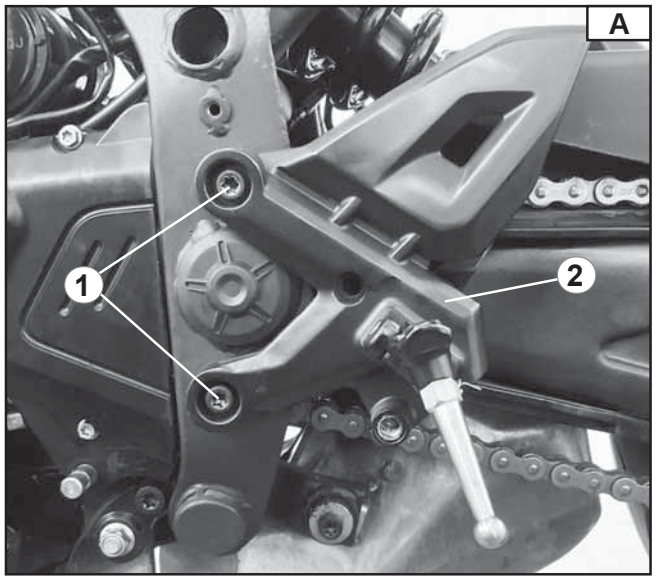
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The gearchange pedal, refer to "**Removal of the gearchange pedal, Chapter 4"**
- The screws (1) Fig. A.
- The left front foot peg support (2) Fig. A. A.

NOTE:

The kickstarter is included in the left front foot peg plate. When replacing the kickstarter, replace the complete front foot peg (2) Fig. A.



CYCLING

INSTALLATION OF COMPLETE LEFT FRONT FOOT PEG SUPPORT

Park the motorcycle on a level surface.

NOTICE

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

Installation:

- Proceed using the opposite order to removal.

Tighten:

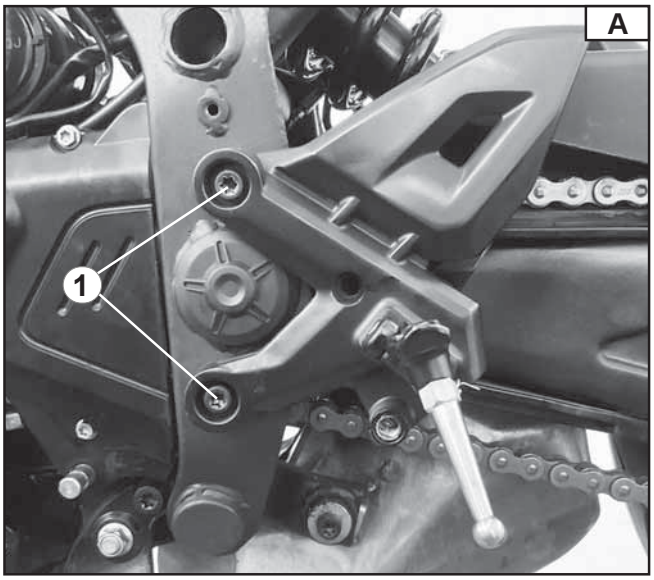
- The screws (1) Fig. A.

To the following torque:

Torque 25. N*m

Use medium Loctite thread locker to secure.

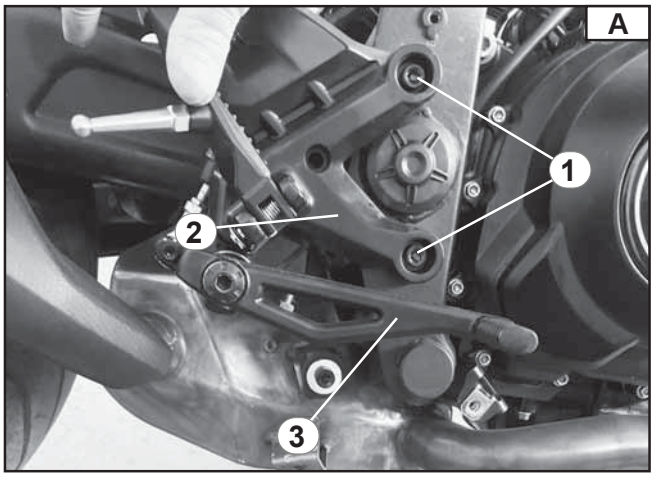
	MEDIUM THREAD LOCKER



CYCLING

REMOVAL OF COMPLETE RIGHT FRONT FOOT PEG SUPPORT

Park the motorcycle on a level surface.



NOTICE

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

Remove:

- The rear brake pedal (3) Fig. A, refer to **"Removal of rear brake pedal, Chapter 4".**
- The screws (1) Fig. A.
- The right front foot peg (2) Fig. A.
- The rear brake pump, refer to **"Removal of rear brake pump, Chapter 4"**.

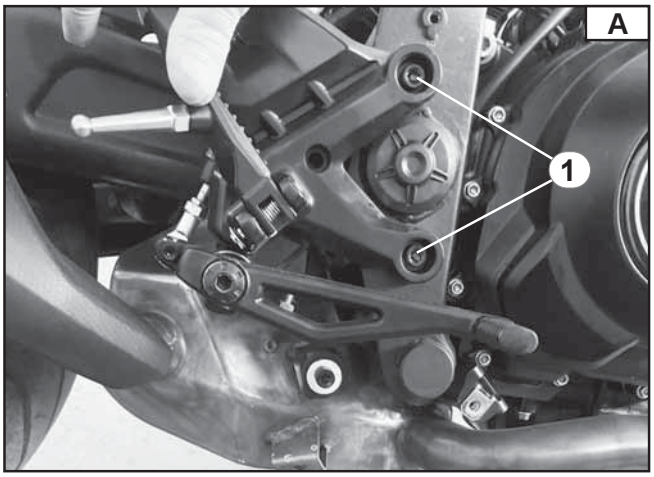
NOTE:

The kickstarter is included in the right front foot peg plate. When replacing the kickstarter, replace the complete front foot peg (2) Fig. A.

CYCLING

INSTALLATION OF COMPLETE RIGHT FRONT FOOT PEG SUPPORT

Park the motorcycle on a level surface.



NOTICE

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

Installation:

- Proceed using the opposite order to removal.

Tighten:

- The screws (1) Fig. A.

To the following torque:

Torque 25. N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

CYCLING

REMOVAL OF REAR BRAKE PEDAL

Park the motorcycle on a level surface.

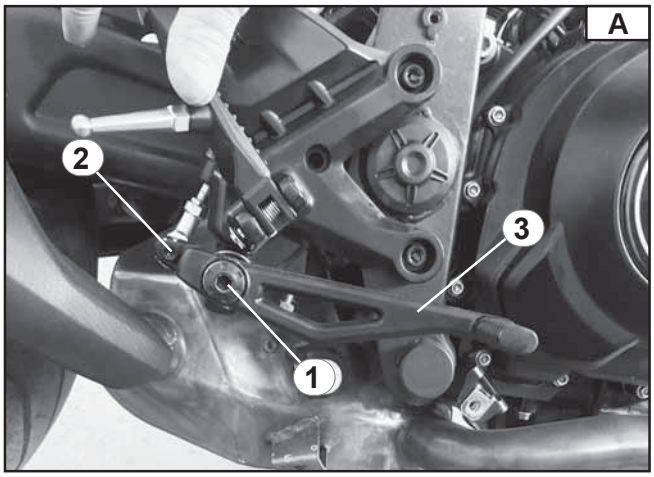
NOTICE

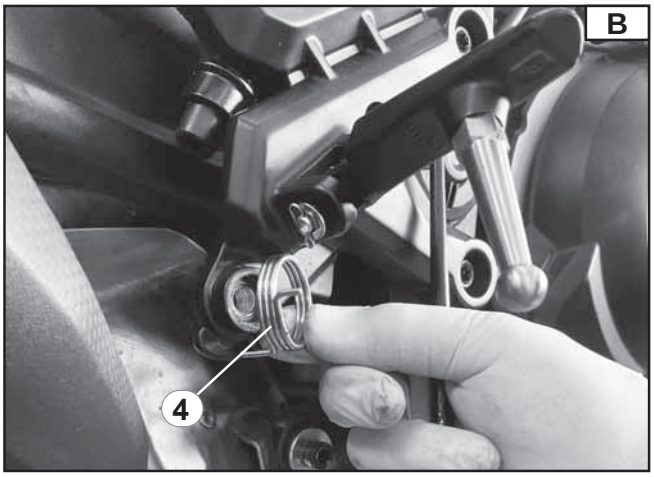
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The screw (1) Fig. A.
- The screw (2), the nut, and the relevant washer Fig. A.
- The brake pedal (3) Fig. A.

NOTE:
During disassembly, pay attention to the spring (4) Fig. B.





CYCLING
INSTALLATION OF REAR BRAKE PEDAL

Park the motorcycle on a level surface.

NOTICE

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

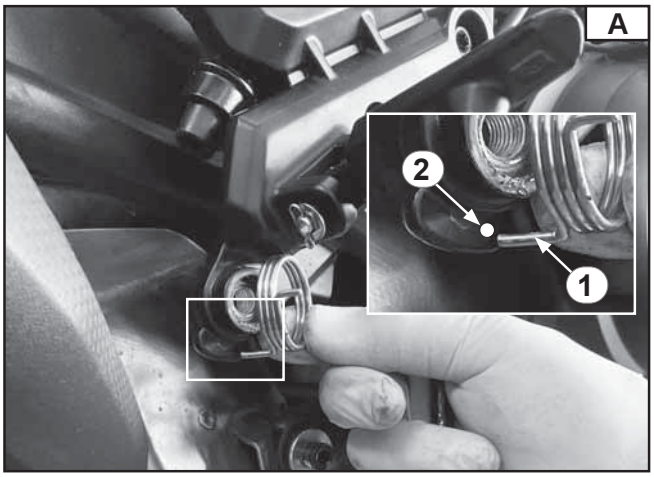
Installation:
- Proceed using the opposite order to removal.

NOTE:
During the installation stage, insert the longest part of the spring (1) into the hole (2) Fig. A.

NOTE:
Make use of grease around the unthreaded collar (3) during the assembly Fig. B.



Recommended lubricant
NGLI2 GREASE





Tighten:
- The screw (4) Fig. C.

To the following torque:

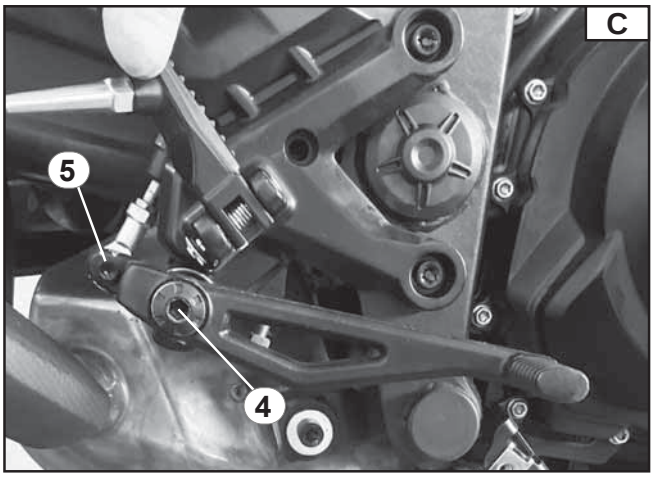


Torque 28 N*m

Use medium Loctite thread locker to secure.



MEDIUM THREAD LOCKER



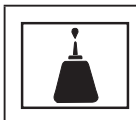
Tighten:
- The screw (5) Fig. C.

To the following torque:



Torque 12 N*m

Use medium Loctite thread locker to secure.



MEDIUM THREAD LOCKER

CYCLING

REMOVAL OF THE SIDE STAND

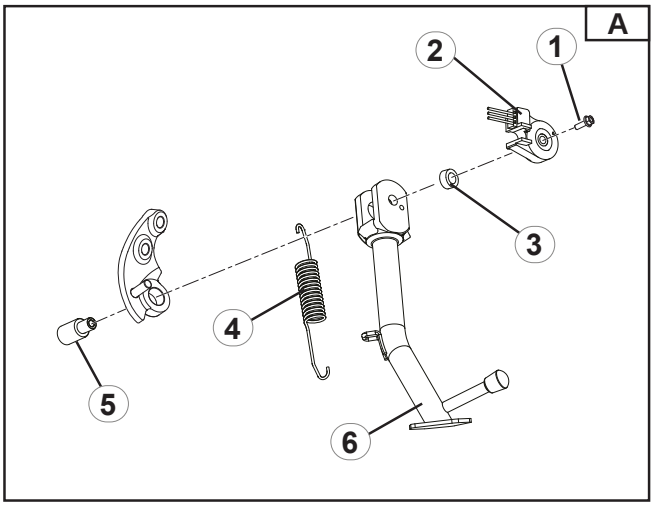
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The gearbox clamp, refer to **"Removal of gearbox pedal, Chapter 4"**.
- The special screw (1) Fig. A.
- The stand sensor (2) Fig. A., refer to **"Removal of stand sensor, Chapter 4"**.
- The bush (3) Fig. A.
- The spring (4) Fig. A.
- The special screw (5) Fig. A.
- The stand (6) Fig. A.



CYCLING
INSTALLATION OF THE SIDE STAND

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The special screw (1) Fig. A.

To the following torque:

Torque 45 N*m

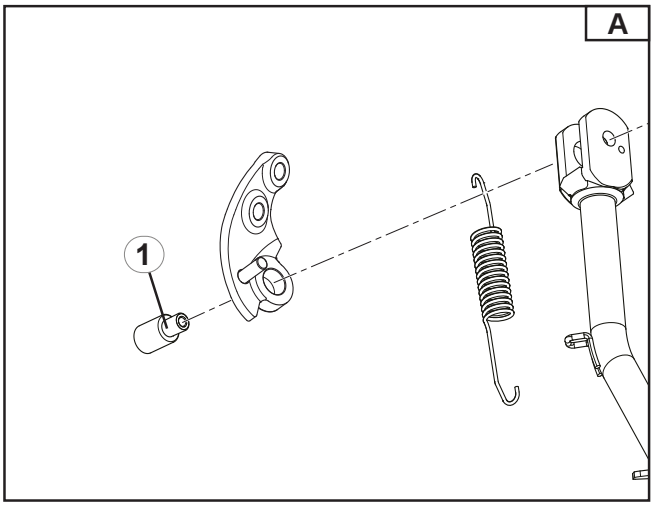
NOTE:
Make use of grease around the unthreaded collar during the assembly Fig. A.

	Recommended lubricant NGLI2 GREASE

Apply:
- The thread locker in the threaded part of the special screw (1) Fig. A.

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



CYCLING
REMOVAL OF SIDE STAND SENSOR

Park the motorcycle on a level surface.

NOTICE

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

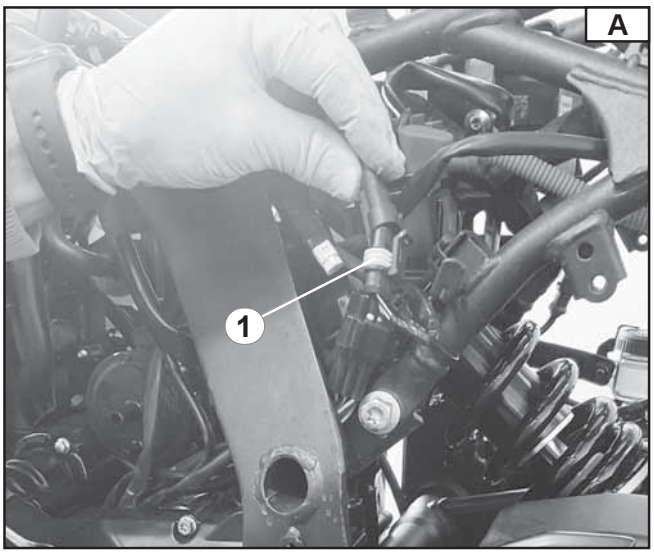
Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The tail fairing, refer to **"Removal of tail fairing, Chapter 4".**

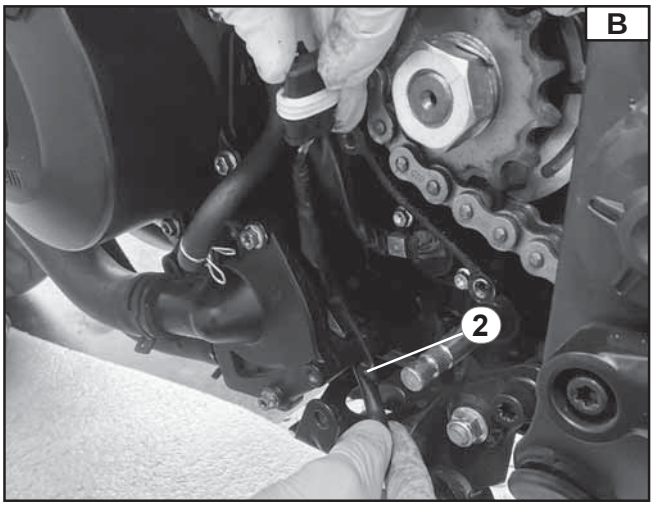
Disconnect:
- The three-pole connector (1) Fig. A.

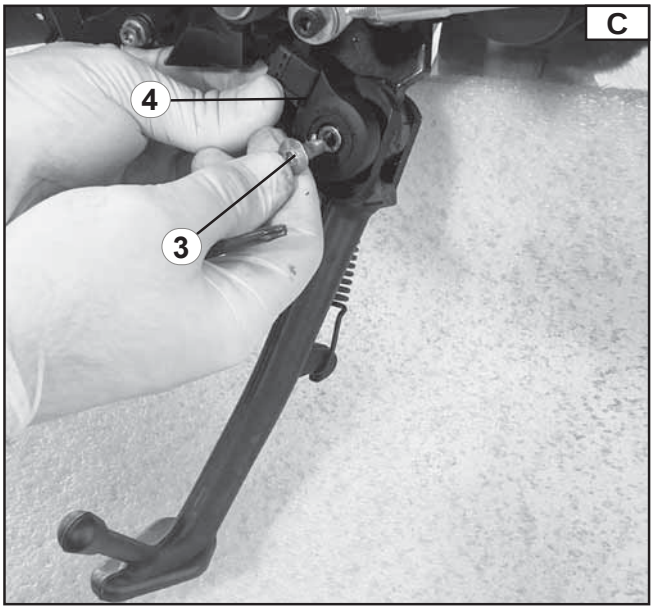
Remove:
- The gearbox clamp, refer to **"Removal of gearbox pedal, Chapter 4"**.
- The pinion covering, refer to **"Removal of chain pinion cover, Chapter 4".**
- The fixing screws of the water pump, refer to **"Removal of water pump, Chapter 6"**.

Distance:
- The water pump as required to allow passage of the cable (2) Fig. B.

Remove:
- The screw (3) Fig. C.
- The stand sensor (4) Fig. C.







CYCLING
INSTALLATION OF SIDE STAND SENSOR

Park the motorcycle on a level surface.

NOTICE

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

Installation:
- Proceed using the opposite order to removal.

NOTE:
During assembly, make sure that the tooth (1) of the sensor is properly aligned and inserted into the hole (2) Fig. A.

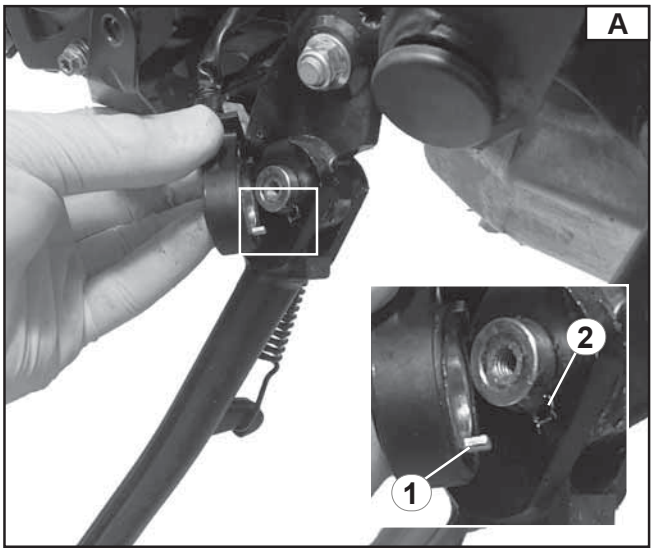
Tighten:
- The screw (3) Fig. B.

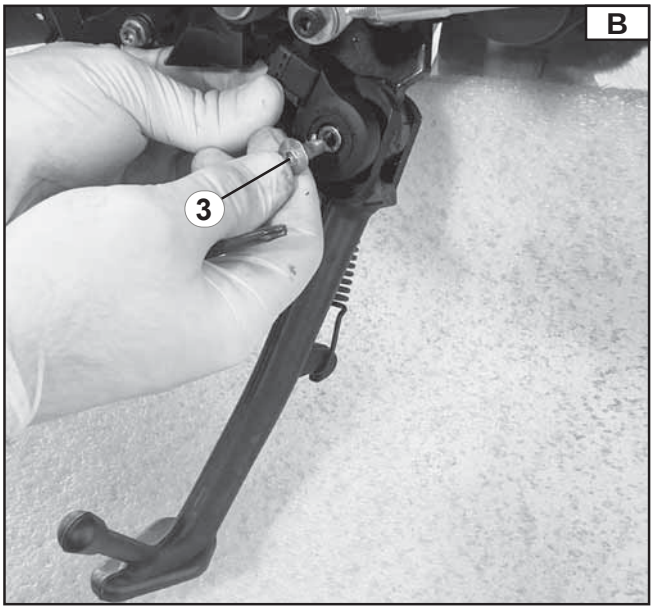
To the following torque:

Torque 12 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER





CYCLING

REMOVAL OF SIDE STAND SUPPORT

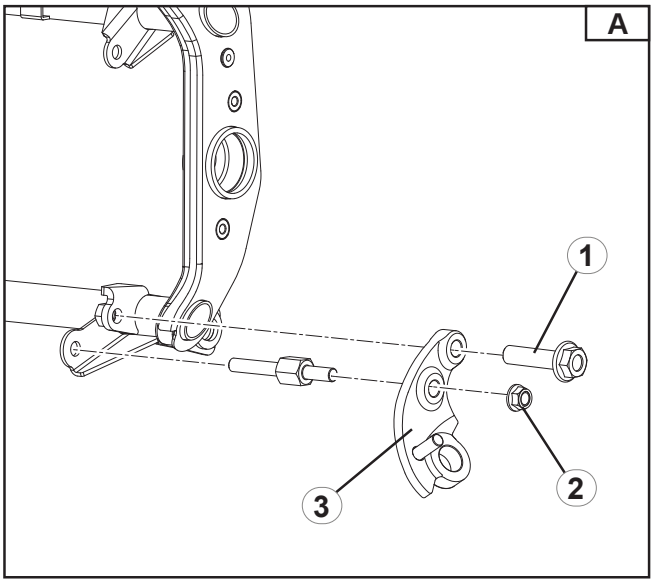
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The gearbox clamp, refer to **"Removal of gearbox pedal, Chapter 4"**.
- The side stand, refer to **"Removal of side stand, Chapter 4"**.
- The screw (1) Fig. A.
- The nut (2) Fig. A.
- The support (3) Fig. A.



CYCLING
INSTALLATION OF SIDE STAND SUPPORT

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screw (1) Fig. A.

To the following torque:

Torque 45 N*m

Use medium Loctite thread locker to secure.

	Medium thread locker

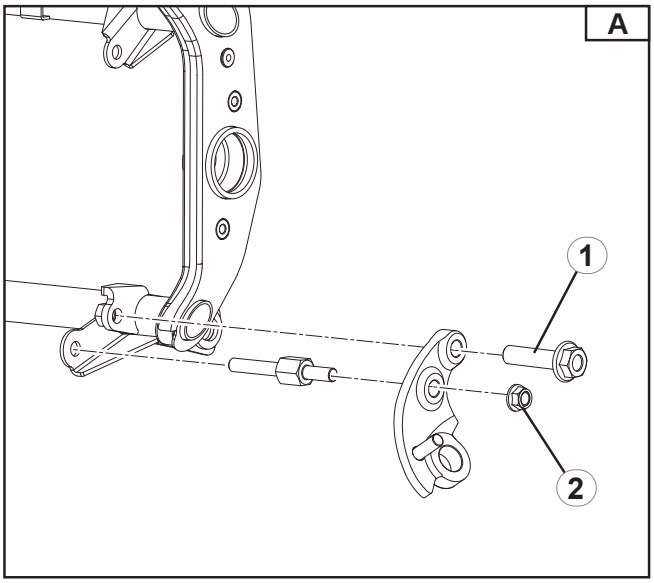
- The nut (2) Fig. A.

To the following torque:

Torque 45 N*m

Use medium Loctite thread locker to secure.

	Medium thread locker



CYCLING

REMOVAL OF GEARBOX CONTROL PEDAL

Park the motorcycle on a level surface.

NOTICE

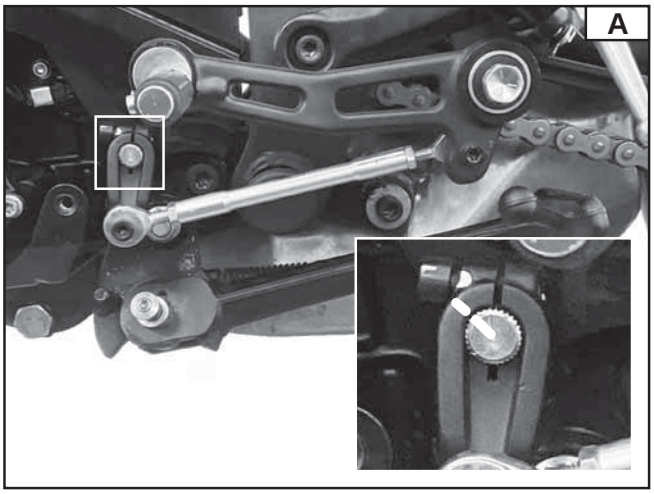
Prop the motorcycle on suitable supports so that it cannot fall.

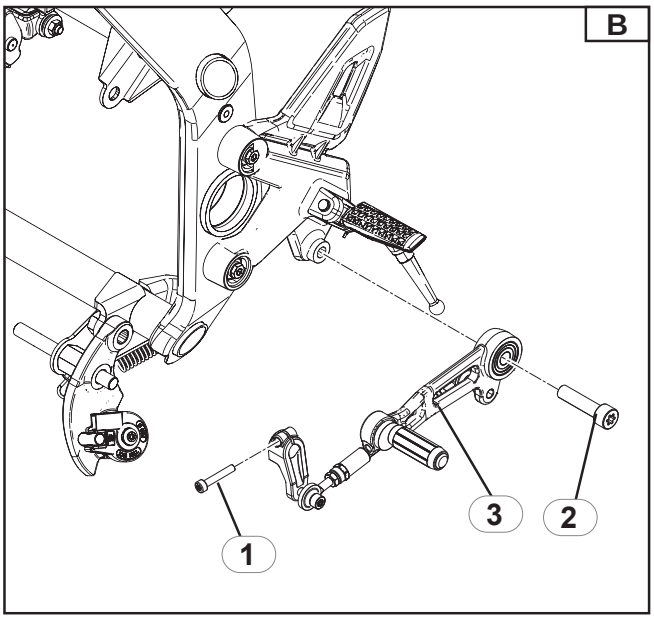
NOTE:
Make sure that the gear is in neutral position.

NOTE:
Mark the position of the gearchange control lever, as shown in Fig. A.

Remove:

- The screw (1) Fig. B.
- The screw (2) Fig. B.
- The gear control pedal (3) Fig. B.





CYCLING
INSTALLATION OF GEARBOX CONTROL PEDAL

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

NOTE:
During the assembly stage, place the gearchange control lever with the two signs aligned Fig. A.

Tighten:
- The screw (1) Fig. B.

To the following torque:

Torque 40 N*m

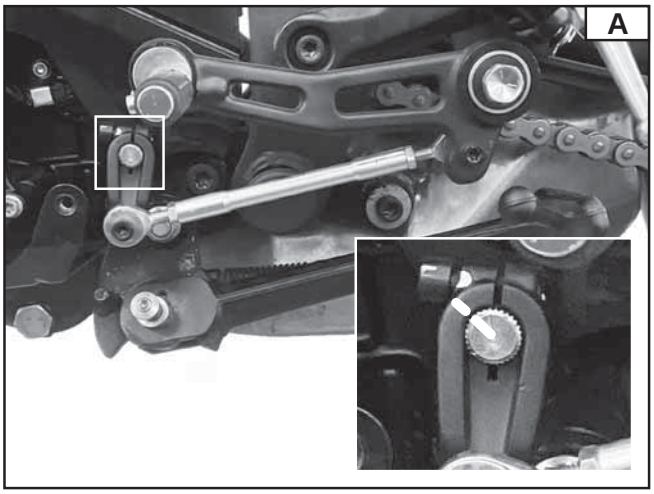
Use medium Loctite thread locker to secure.

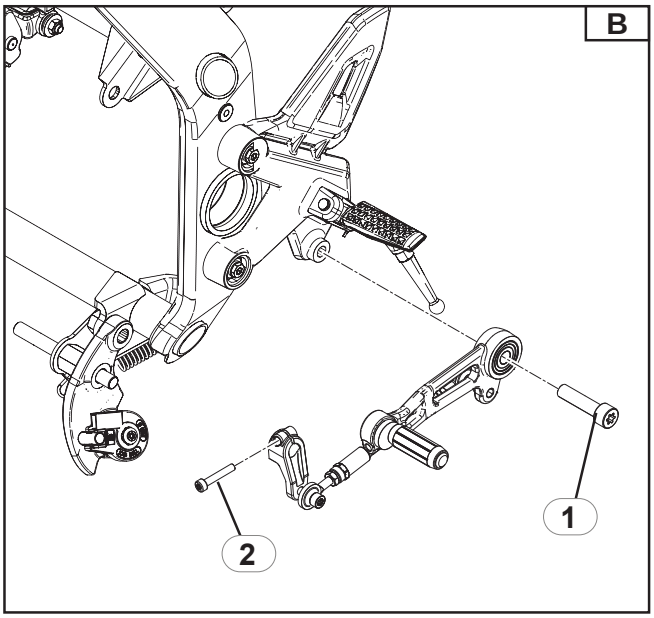
	MEDIUM THREAD LOCKER

Tighten:
- The screw (2) Fig. B.

To the following torque:

Torque 10 N*m





CYCLING

REMOVAL OF CHAIN SLIDING SHOE

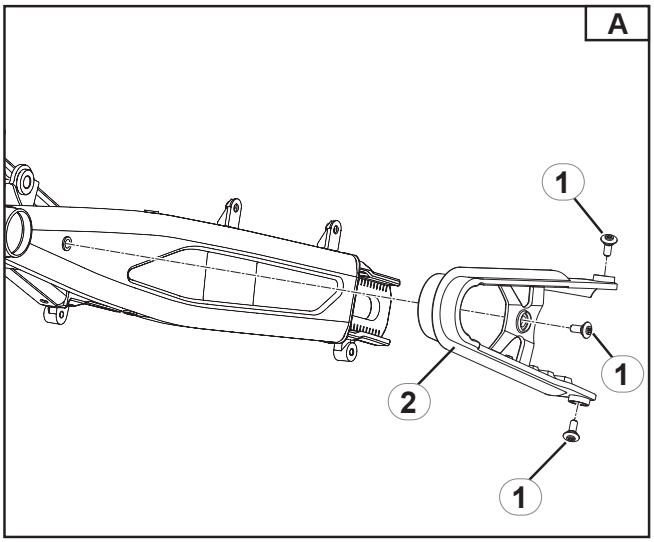
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The rear brake caliper, refer to **"Removal of rear brake caliper, Chapter 4".**
- The rear wheel, refer to **"Removal of rear wheel, Chapter 4".**
- The rear shock absorber, refer to **"Removal of rear shock absorber, Chapter 4".**
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The rear mudguard, refer to chapter **"Removal of rear mudguard, Chapter 4".**
- The left front foot peg support, see **"Removal of the left front foot peg support, Chapter 4"**.
- The pinion covering, refer to **"Removal of chain pinion cover, Chapter 4".**
- The transmission chain, refer to **"Removal of transmission chain, Chapter 4"**.
- The rear swingarm, refer to **"Removal of rear swingarm, Chapter 4"**.
- The screws (1) Fig. A.
- The chain sliding shoe (2) Fig. A.



CYCLING
INSTALLATION OF CHAIN SLIDING SHOE

Park the motorcycle on a level surface.

NOTICE

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

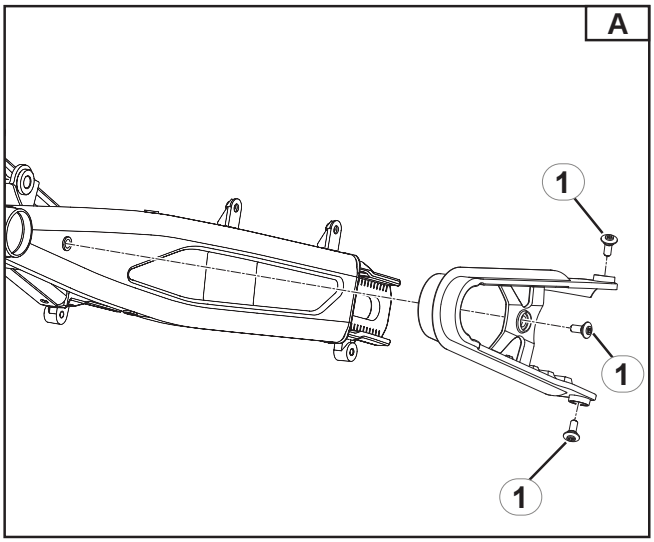
Installation:
Proceed using the opposite order to removal.
Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 8 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



CYCLING
REMOVAL OF CLUTCH CABLE

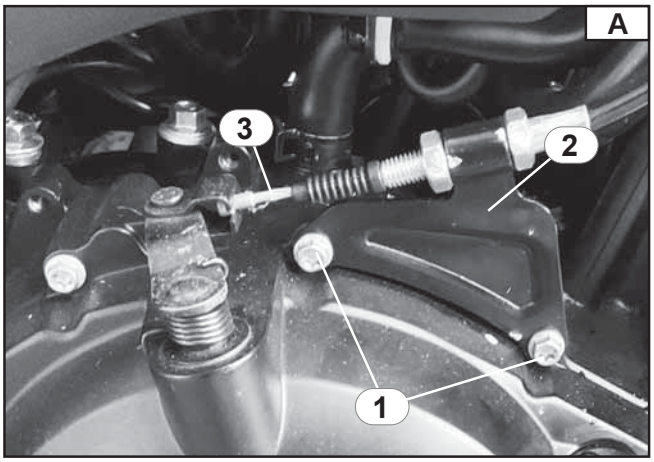
Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The screws (1) Fig. A.
- The support bracket (2) Fig. A.

Disconnect:
- The clutch cable (3) Fig. A.



CYCLING
INSTALLATION OF CLUTCH CABLE

Park the motorcycle on a level surface.

NOTICE

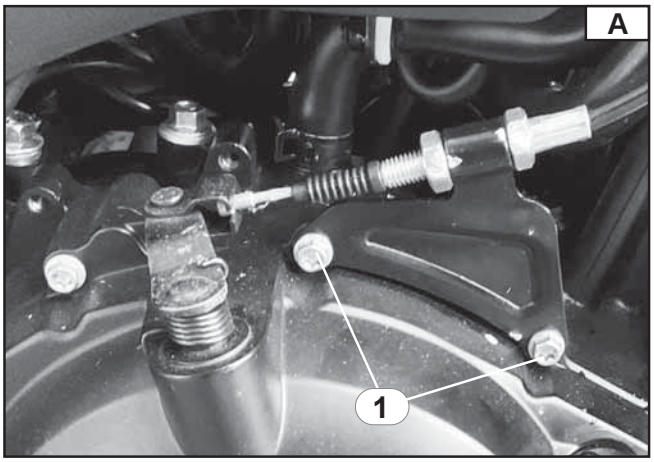
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 10 N*m



EXHAUST SYSTEM

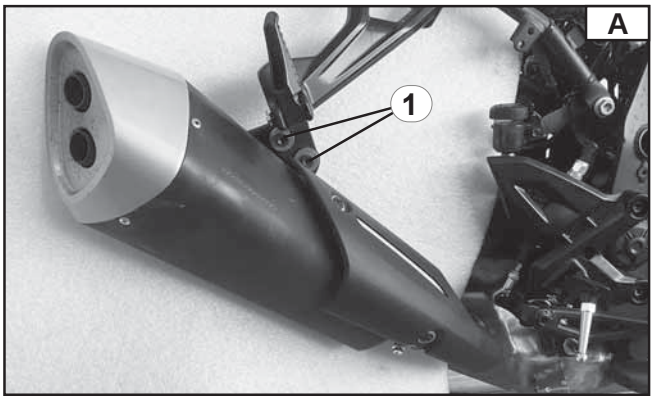
EXHAUST ASSEMBLY REMOVAL

Park the motorcycle on a level surface.

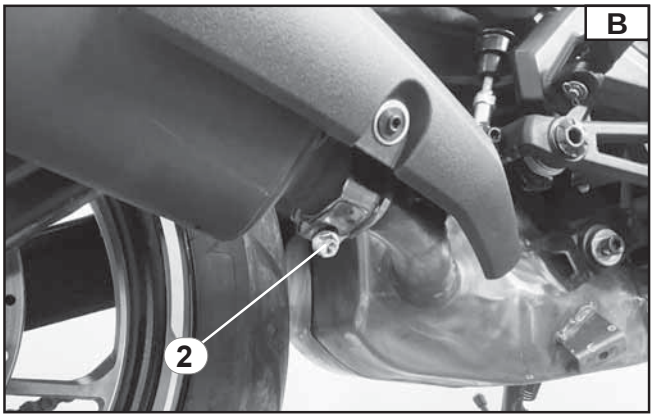
NOTICE

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

Remove:
- The screws (1) Fig. A.

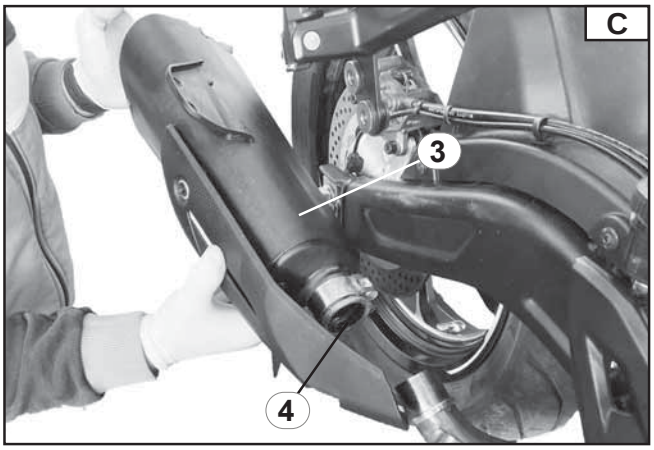


Loosen:
- The metal clamps (2) Fig. B.



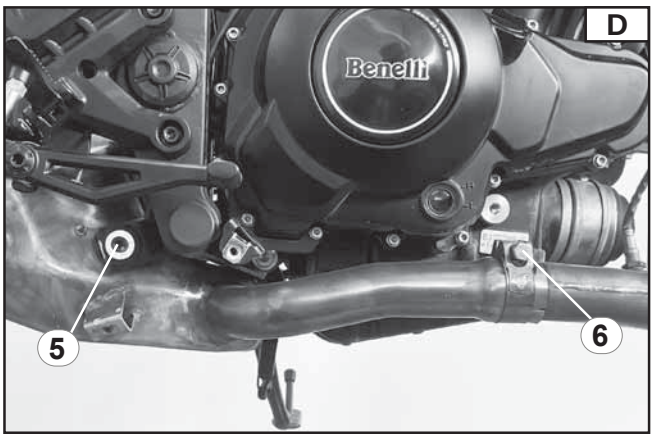
Remove:
- The silencer (3) Fig. C.

NOTE:
Replace the graphite gasket (4) Fig. C if worn.



Remove:
- The screw (5) Fig. D.

Loosen:
- The metal clamps (6) Fig. D.

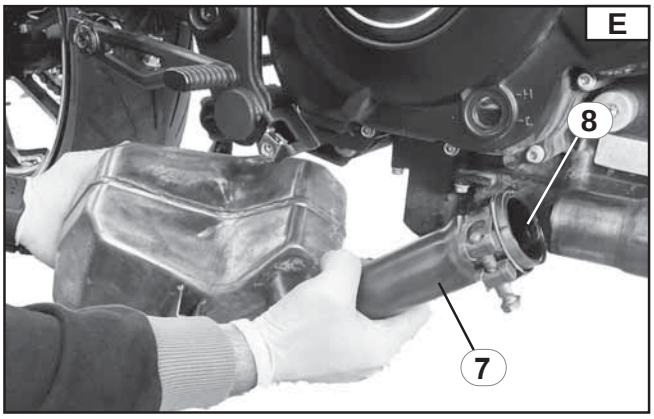


EXHAUST SYSTEM

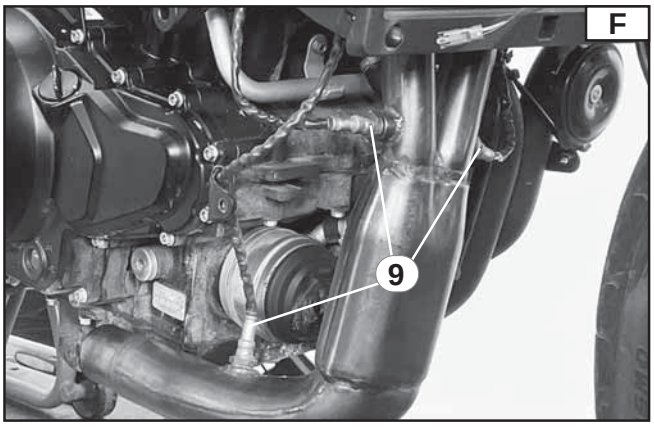
EXHAUST ASSEMBLY REMOVAL

Remove:
- The muffler (7) Fig. E.

NOTE:
Replace the graphite gasket (8) Fig. E if worn.

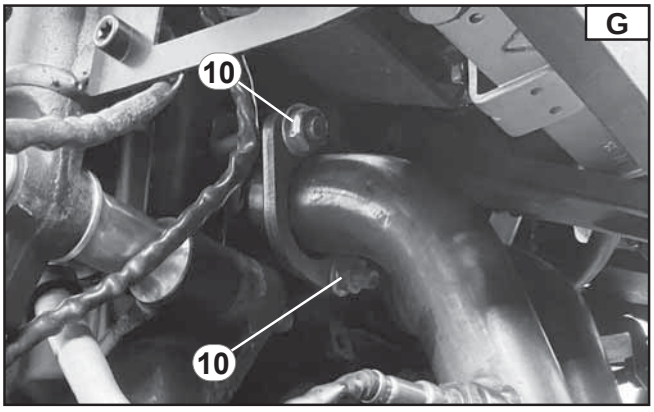


Remove:
- The oxygen sensor terminals (9) Fig. F.



- The nuts (10) Fig. G.

NOTE:
Remove the fixing nuts of the manifold of both cylinders.

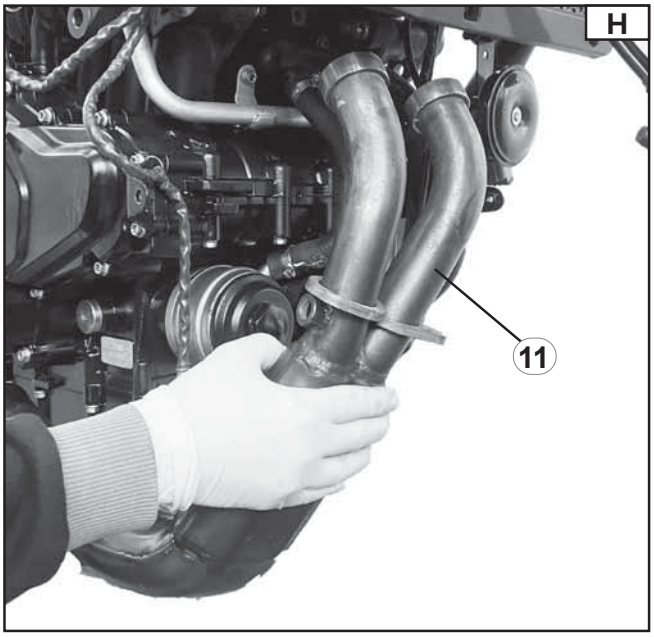


EXHAUST SYSTEM

EXHAUST ASSEMBLY REMOVAL

Remove:

- The exhaust manifold (11) Fig. H.



EXHAUST SYSTEM
EXHAUST INSTALLATION

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The nuts (1) Fig. A.

To the following torque:

Torque 22 N*m

NOTE:
During assembly stage, lubricate the nuts with copper grease.

	Recommended lubricant COPPER GREASE

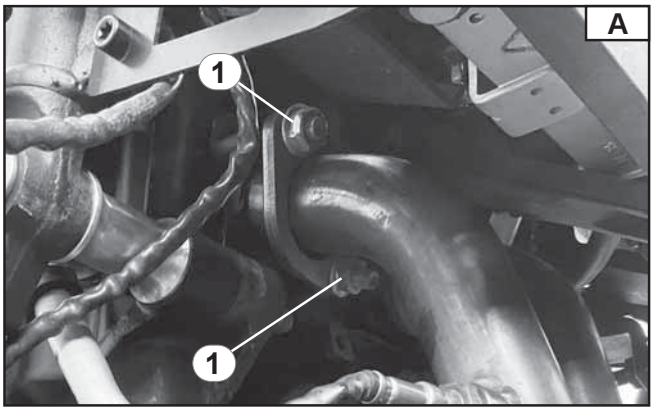
NOTE:
Remove the fixing nuts of the manifold situated on the opposite side.

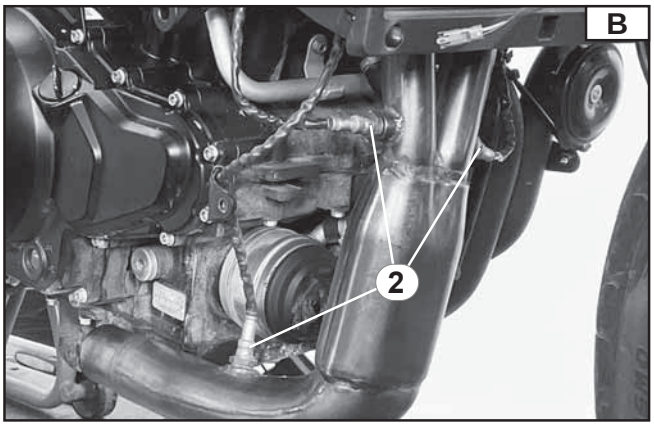
Tighten:
- The oxygen sensor terminals (2) Fig. B.

To the following torque:

Torque 22 N*m

NOTE:
During the assembly phase of the oxygen sensor is necessary to lubricate the threads with copper grease for high temperatures.





EXHAUST SYSTEM
COMPLETE REMOVAL OF OXYGEN SENSOR

Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.

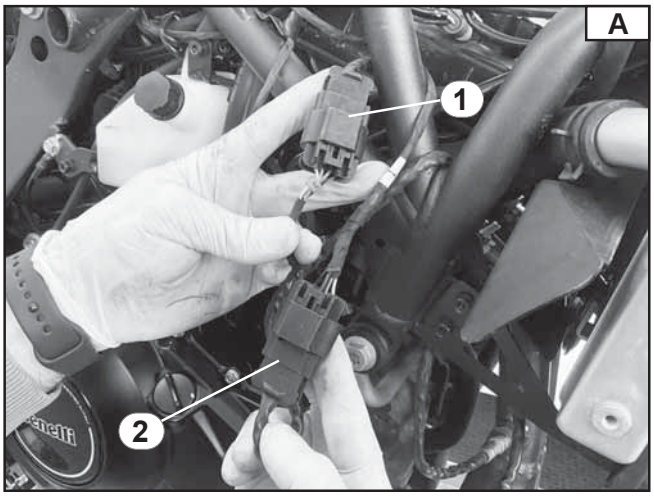
Disconnect:
- The right cylinder connector (1) Fig. A.
- The left cylinder connector (2) Fig. A.

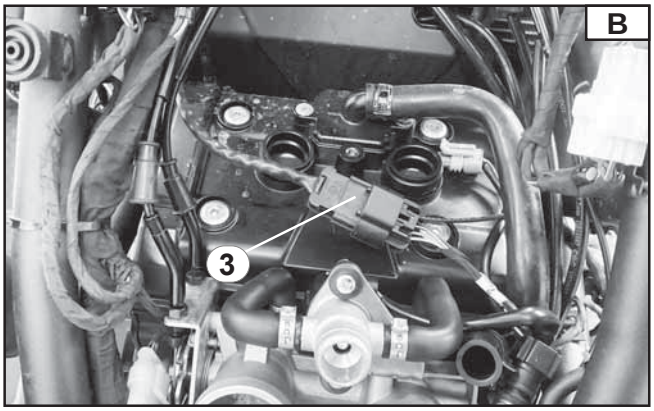
Remove:
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The air-box, refer to **"Removal of air-box, Chapter 4"**.

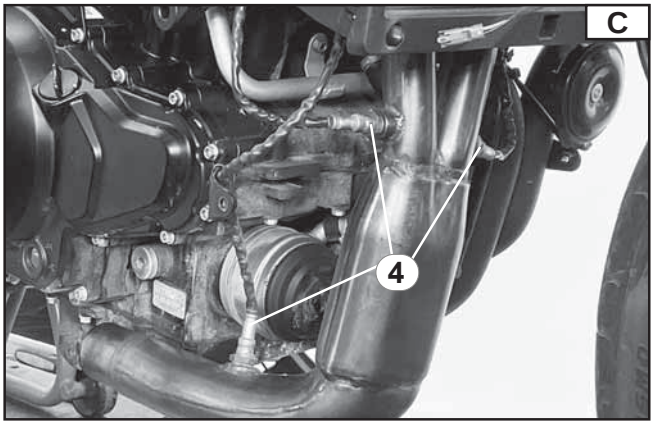
Disconnect:
- The connector (3) Fig. B.

Remove:
- The post-catalyser oxygen sensors (4) Fig. C from manifolds.

NOTE:
During disassembly of oxygen sensors, be careful not to damage the sensors.







EXHAUST SYSTEM

COMPLETE INSTALLATION OF OXYGEN SENSOR

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

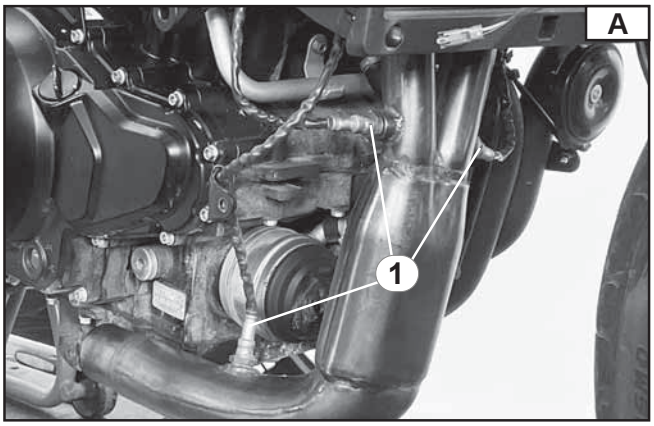
Tighten:
- The oxygen sensor terminals (1) Fig. A.

To the following torque:

Torque 22 N*m

NOTE:
During the assembly phase of the oxygen sensor is necessary to lubricate the threads with copper grease for high temperatures.

	**Recommended lubricant COPPER GREASE**



FAIRING

FRONT MUDGUARD REMOVAL

Park the motorcycle on a level surface.

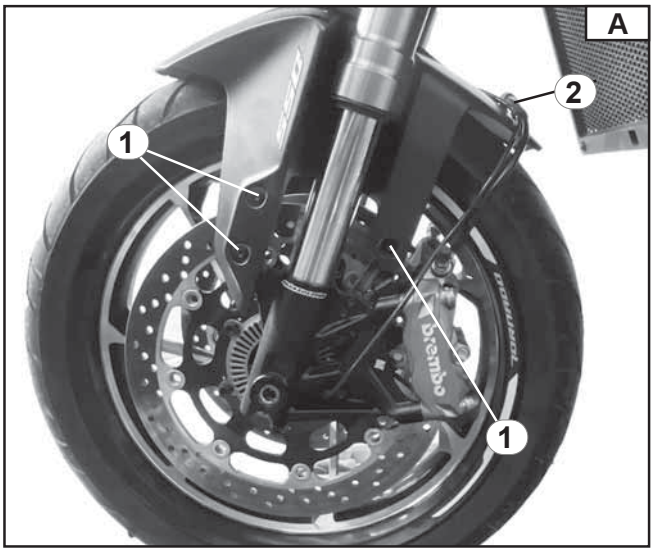
NOTICE

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

Remove:
- The screws (1) Fig. A from both sides.

Disconnect:
- The fairlead from the front brake hoses (2) Fig. A.

Remove:
- The front wheel, refer to **"Removal of the front wheel, Chapter 4"**.
- The front mudguard (3) Fig. B.





FAIRING

FRONT MUDGUARD INSTALLATION

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

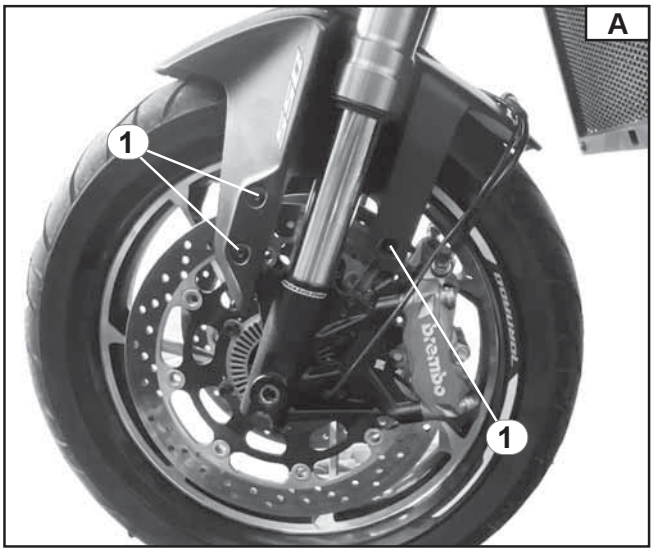
Tighten:
- The screws (1) from both sides Fig. A.

To the following torque:

Torque 10 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



FAIRING

REMOVAL OF REAR MUDGUARD AND TOP CHAIN GUARD

Park the motorcycle on a level surface.

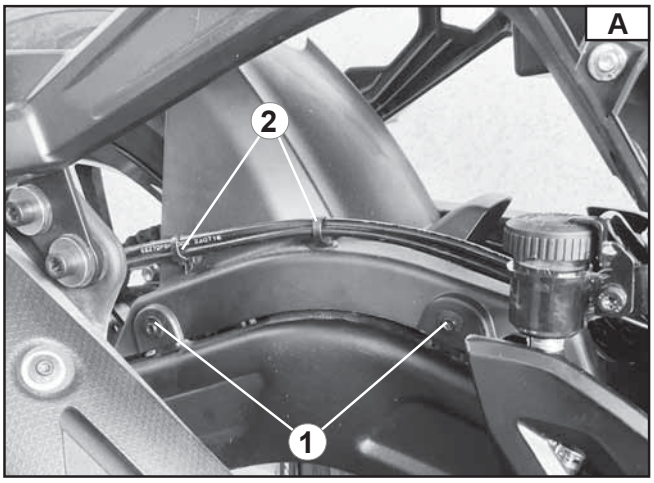
NOTICE

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

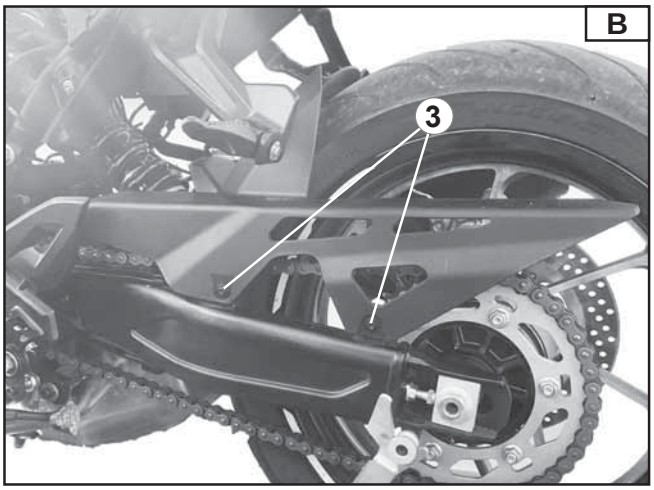
NOTE:
The rear mudguard and the top chain guard are a single part.

Remove:
- The screws (1) of the right side of the vehicle Fig. A.

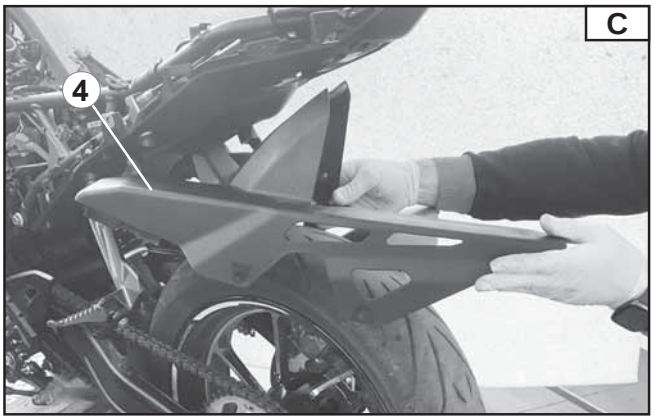
Disconnect:
- The brake hose (2) Fig. A.



Remove:
- The screws (3) on the left side of the vehicle Fig. B.



- The rear mudguard and the top chain guard (4) Fig. C.



FAIRING

INSTALLATION OF REAR MUDGUARD AND TOP CHAIN GUARD

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

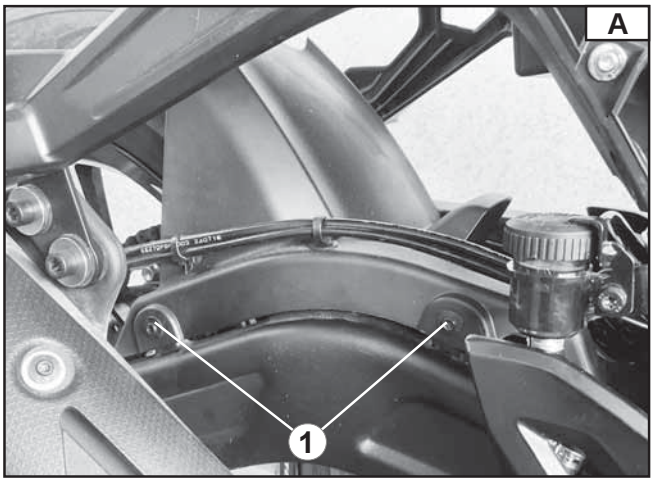
To the following torque:

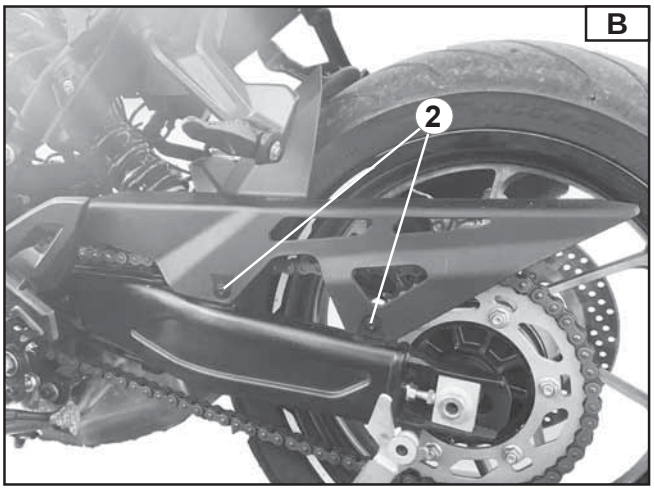
Torque 10 N*m

- The screws (2) Fig. B.

To the following torque:

Torque 10 N*m





FAIRING

REMOVAL OF PASSENGER SEAT

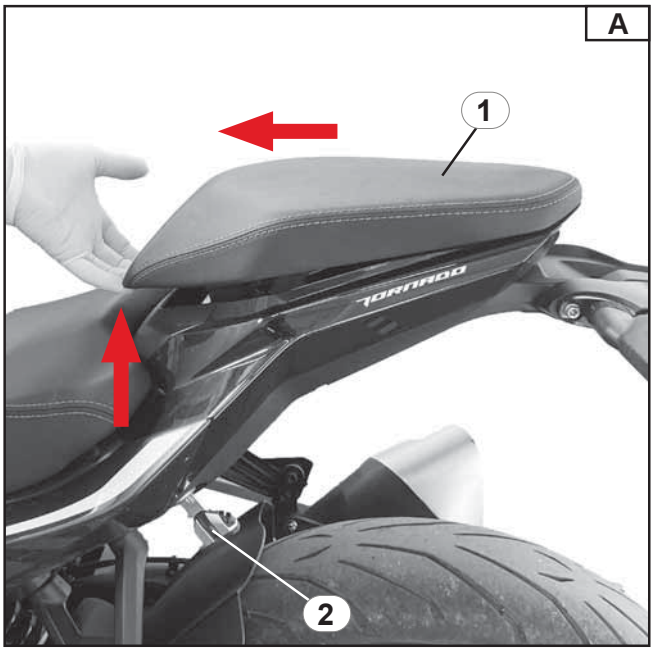
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The passenger seat (1) using the supplied spanner (2) Fig. A.



FAIRING

INSTALLATION OF PASSENGER SEAT

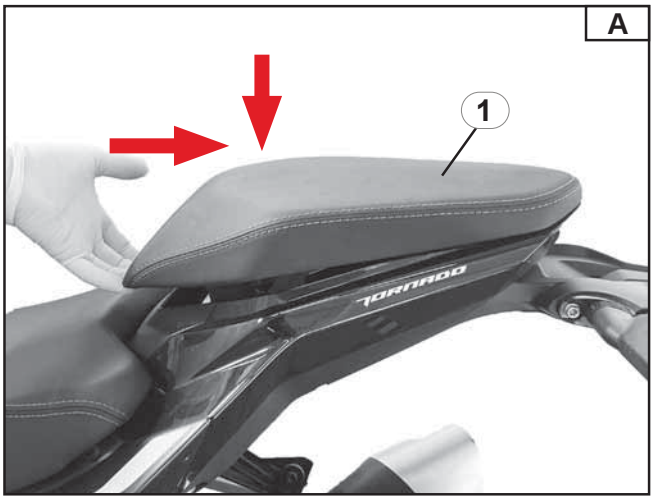
Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Insert:
- The passenger seat (1) as shown by the arrow Fig. A.
- Push down Fig. A.



FAIRING

REMOVAL OF THE RIDER SEAT

Park the motorcycle on a level surface.

NOTICE

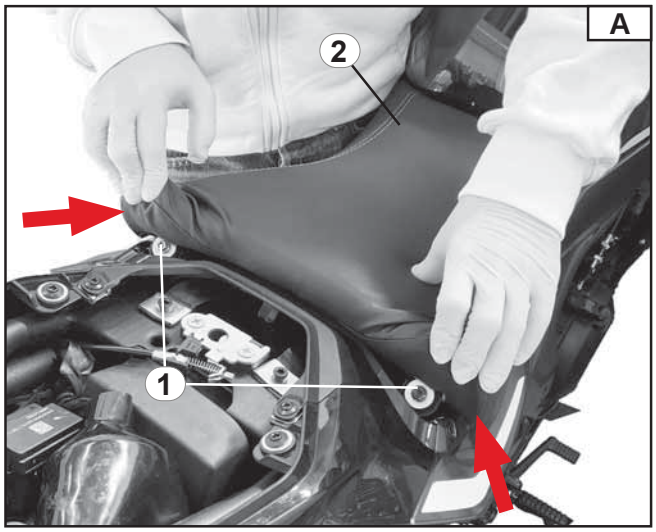
Prop the motorcycle on suitable supports so that it cannot fall.

Raise:

- The two rear end sides of the seat upwards, as shown by the arrows Fig. A.

Remove:

- The fastening screws (1) Fig. A.
- The rider seat (2) Fig. A.



FAIRING

INSTALLATION OF THE RIDER SEAT

Park the motorcycle on a level surface.

NOTICE

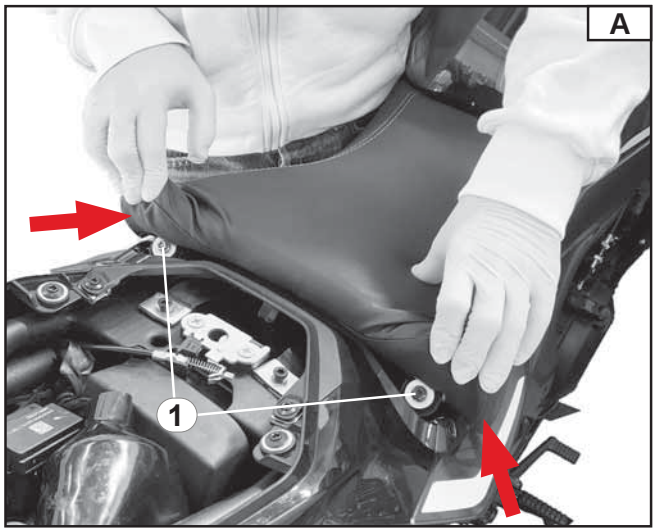
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 12 N*m



FAIRING

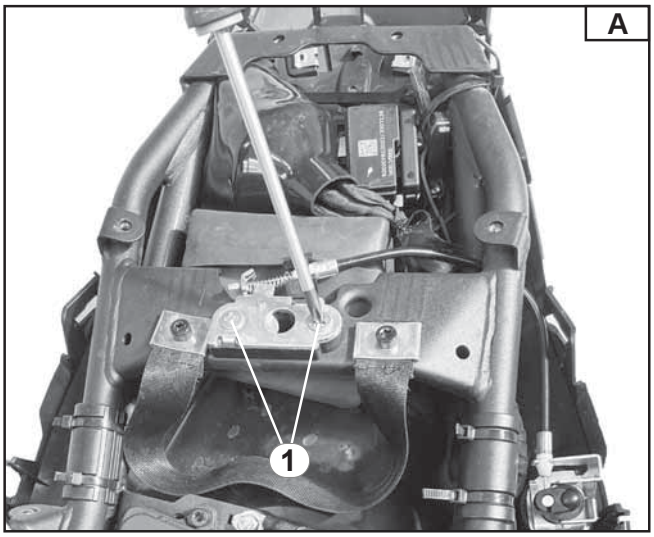
REMOVAL OF PASSENGER SEAT OPENING LOCK

Park the motorcycle on a level surface.

NOTICE

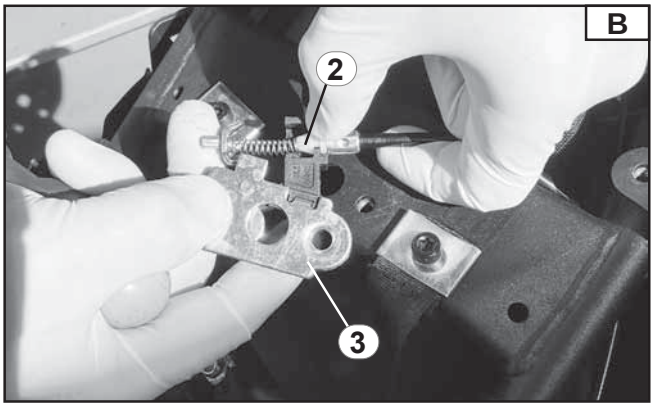
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The screws (1) Fig. A.



Disconnect:
- The lock control cable (2) Fig. B.

Remove:
- The lock (3) Fig. B.



FAIRING

INSTALLATION OF PASSENGER SEAT OPENING LEVER

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

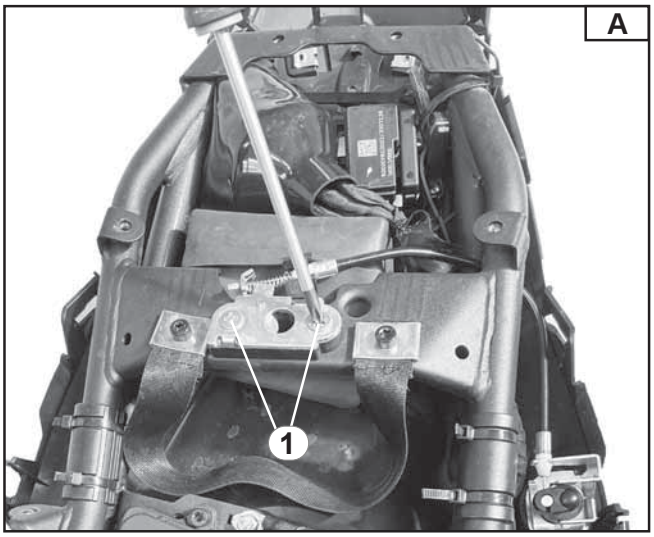
Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 12 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



FAIRING

REMOVAL OF PASSENGER SEAT OPENING BLOCK

Park the motorcycle on a level surface.

NOTICE

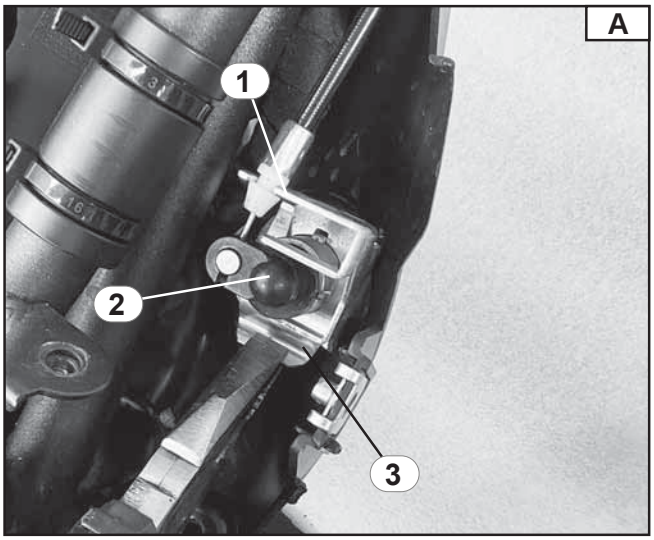
Prop the motorcycle on suitable supports so that it cannot fall.

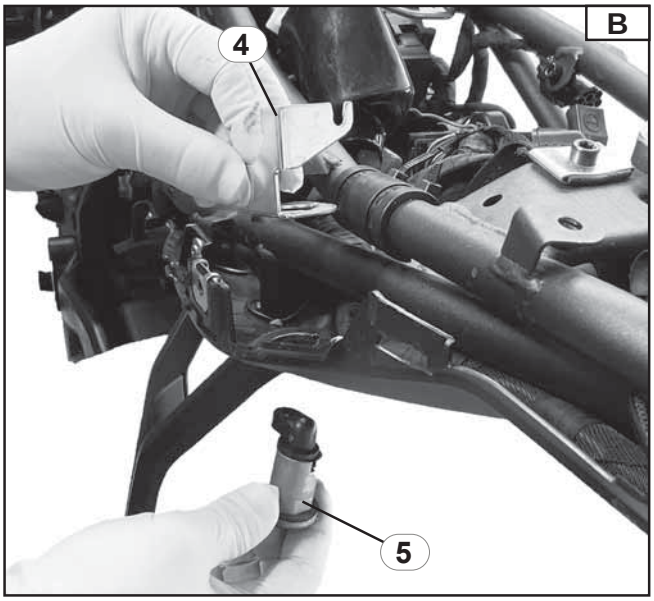
Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter 4"**.
- The windscreen, refer to **"Removal of windscreen, Chapter 4"**.
- The day lights, refer to **"Removal of day lights, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The left tail, refer to **"Removal of tail fairing, Chapter 4".**
- The left side fairing, refer to **"Removal of side tailpiece fairings, Chapter 4"**.
- The cable (1) from the block (2) Fig. A.

Take out:

- The elastic fork (3) Fig. A.
- The support plate (4) Fig. B.
- The lock block (5) Fig. B.





FAIRING

INSTALLATION OF PASSENGER SEAT OPENING BLOCK

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

FAIRING

REMOVAL OF BOTTOM FAIRING

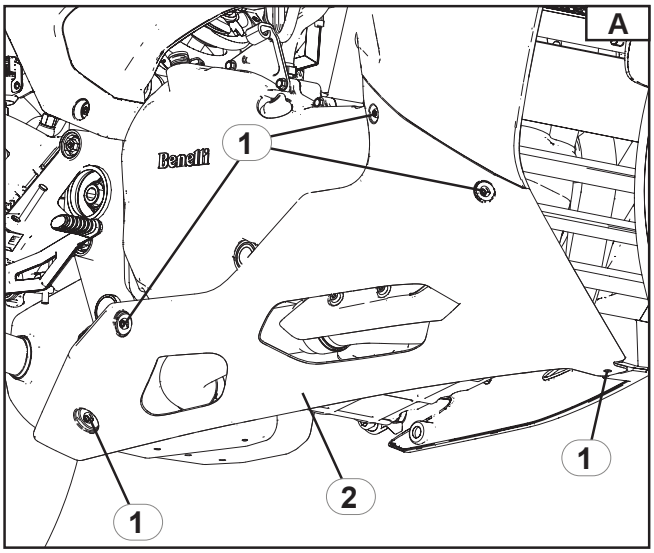
Park the motorcycle on a level surface.

NOTICE

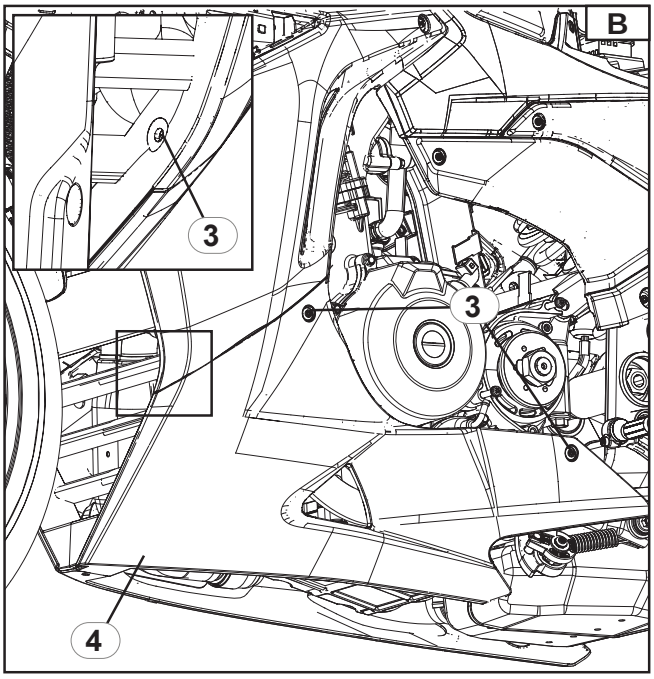
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The fastening screws (1) Fig. A.
- The right engine protection (2) Fig. A.



- The fixing screws (3) Fig. B.
- The left engine protection (4) Fig. B.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.

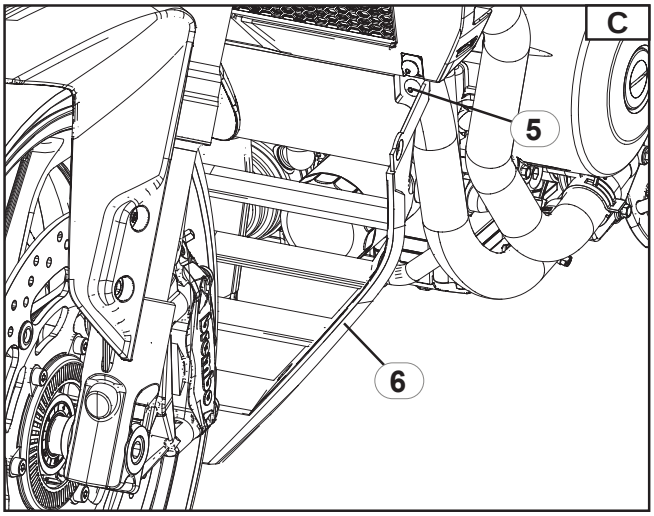


- The fixing screw (5) Fig. C.

NOTE:
Carry out the following operation for the right side.

Remove:

- The conveyor (6) Fig. C.



FAIRING

INSTALLATION OF BOTTOM FAIRING

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 12 N*m

Tighten:
- The screws (2) Fig. B.

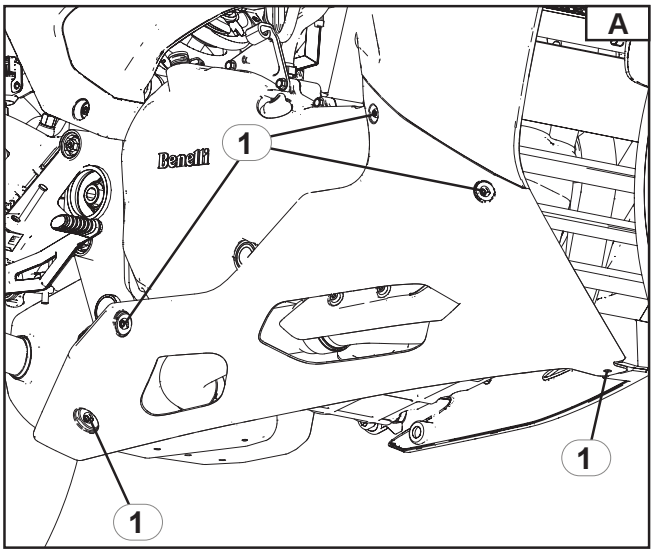
To the following torque:

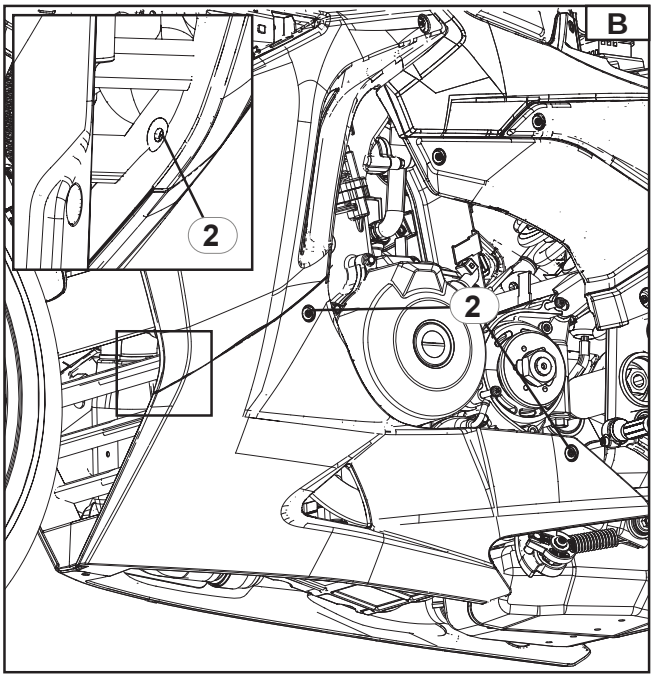
Torque 12 N*m

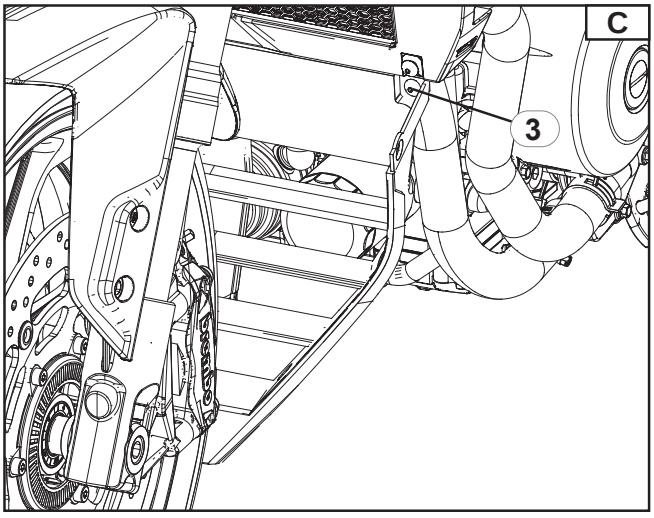
Tighten:
- The screws (3) Fig. C.

To the following torque:

Torque 12 N*m







FAIRING

REMOVAL OF TANK FAIRING

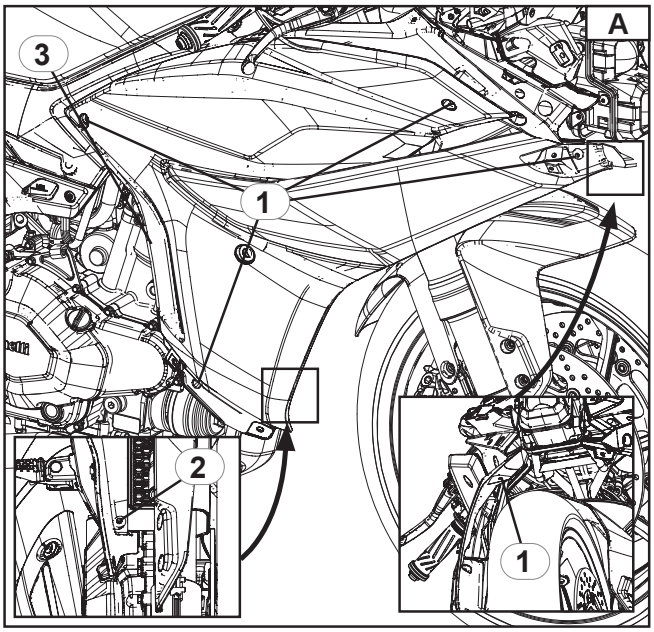
Park the motorcycle on a level surface.

NOTICE

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

Remove:

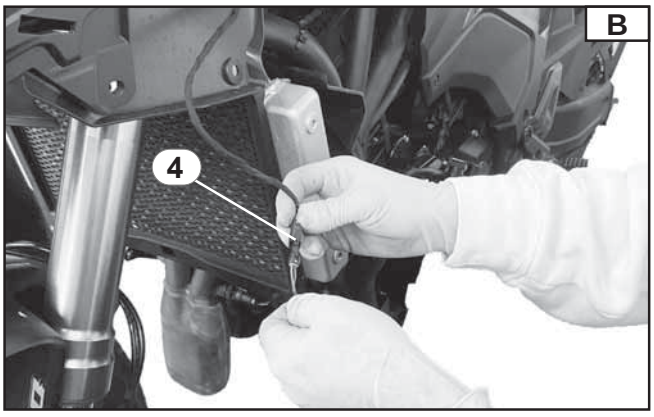
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The fastening screws (1) Fig. A.
- The expansion stud (2) Fig. A.
- The left top fairing (3) Fig. A.



Disconnect:

- The connector (4) Fig. B of the right position indicator.

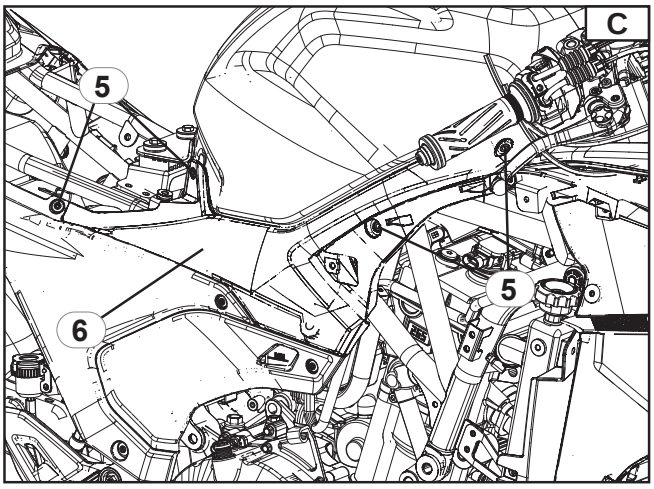
NOTE:
Carry out the following operation for the left side.



Remove:

- The left panel, refer to **"Removal of instrumentation support, Chapter 4"**.
- The fixing screws (5) Fig. C.
- The right fuel tank side (6) Fig. C.

NOTE:
Carry out the following operation for the left side.



FAIRING

INSTALLATION OF TANK FAIRING

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

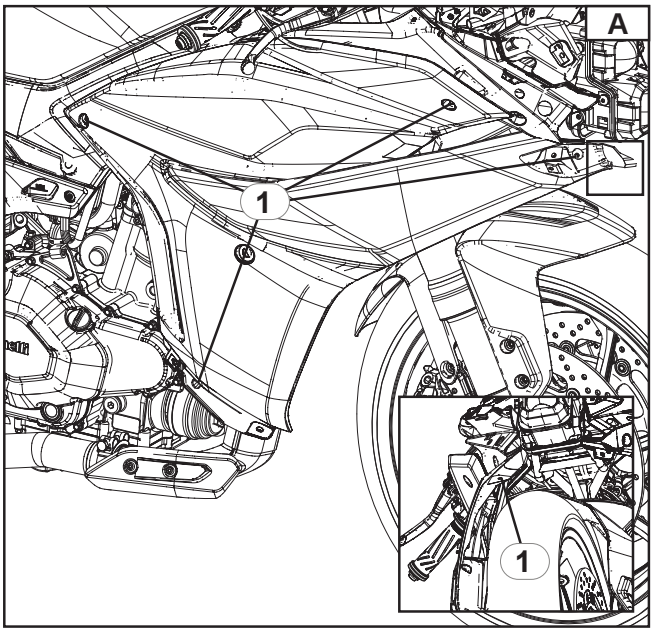
Torque 12 N*m

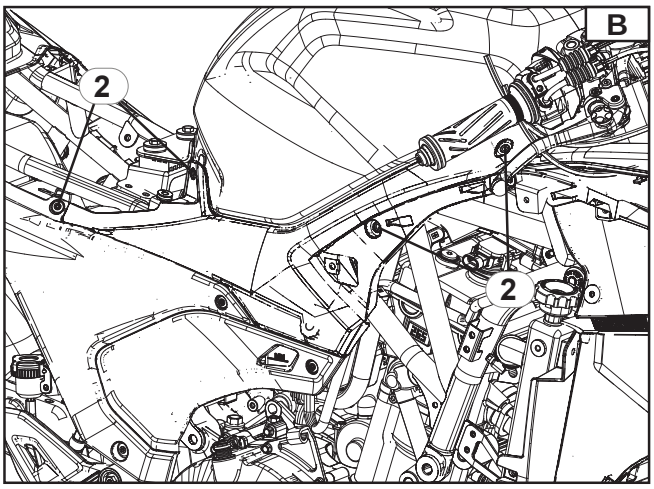
Tighten:
- The screws (2) Fig. B.

To the following torque:

Torque 12 N*m

NOTE:
Carry out the following operation for the left side.





FAIRING

REMOVAL OF INSTRUMENTATION SUPPORT

Park the motorcycle on a level surface.

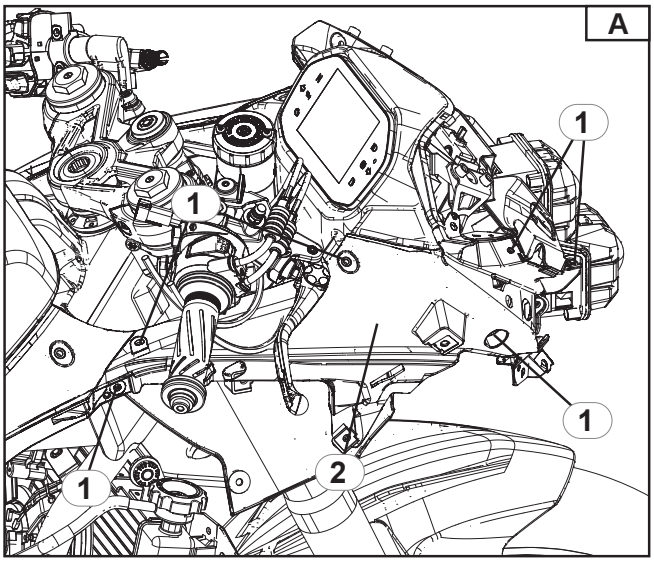
NOTICE

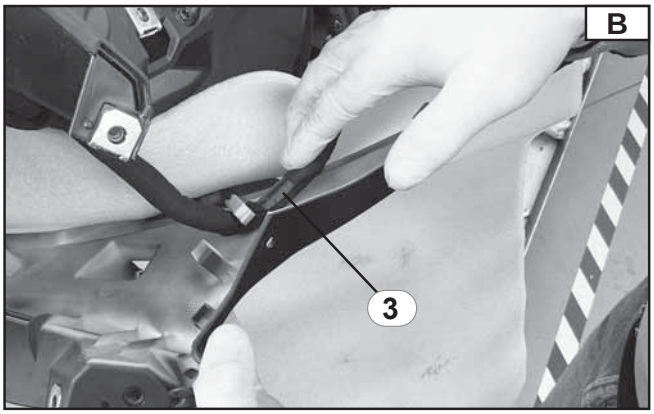
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The right tailpiece and the right panel, refer to **"Removal of tail fairing, Chapter 4"**.
- The fastening screws (1) Fig. A.
- The right panel (2) Fig. A.
- The main wiring harness (3) Fig. B from the right panel.

NOTE:
Carry out the following operation for the left side.



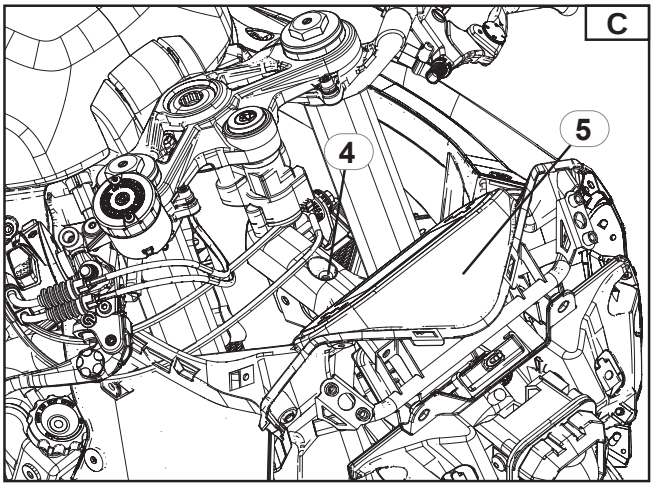


Remove:

- The fixing screw (4) Fig. C.

Raise:

- The instrumentation support (5) Fig. C.

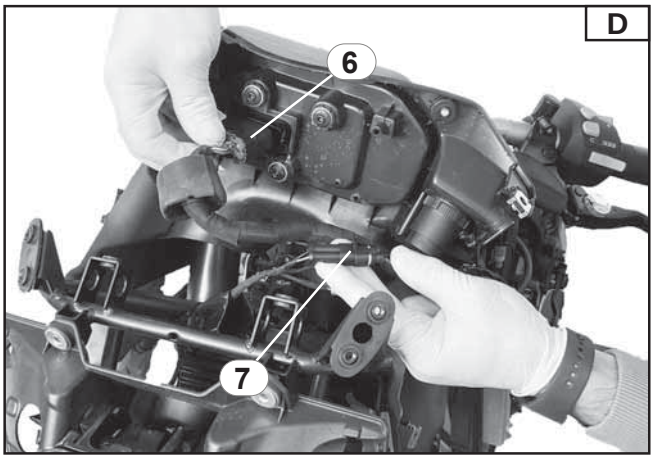


FAIRING

REMOVAL OF INSTRUMENTATION SUPPORT

Disconnect:
- The dashboard connector (6) Fig. D.
- The USB socket connector (7) Fig. D.

Remove:
- The complete instrumentation support.



FAIRING

INSTALLATION OF INSTRUMENTATION SUPPORT

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

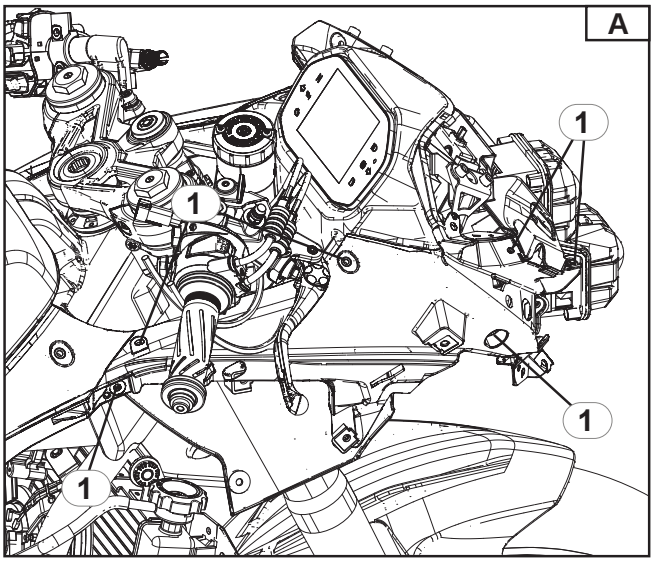
Torque 10 N*m

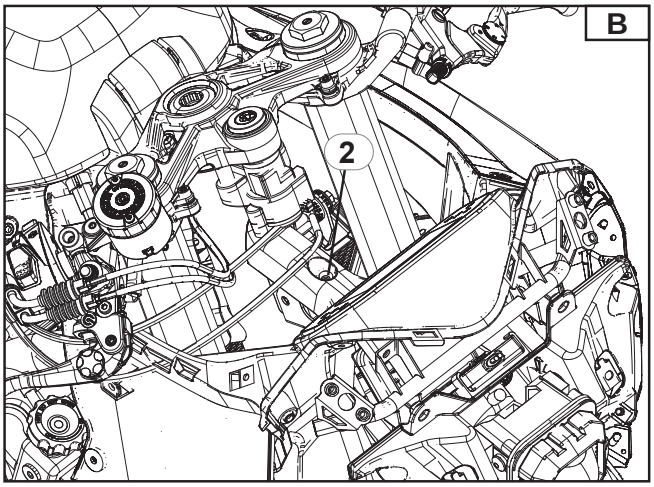
NOTE:
Carry out the following operation for the right side.

- The screw (2) Fig. B.

To the following torque:

Torque 10 N*m





FAIRING

REMOVAL OF DASHBOARD

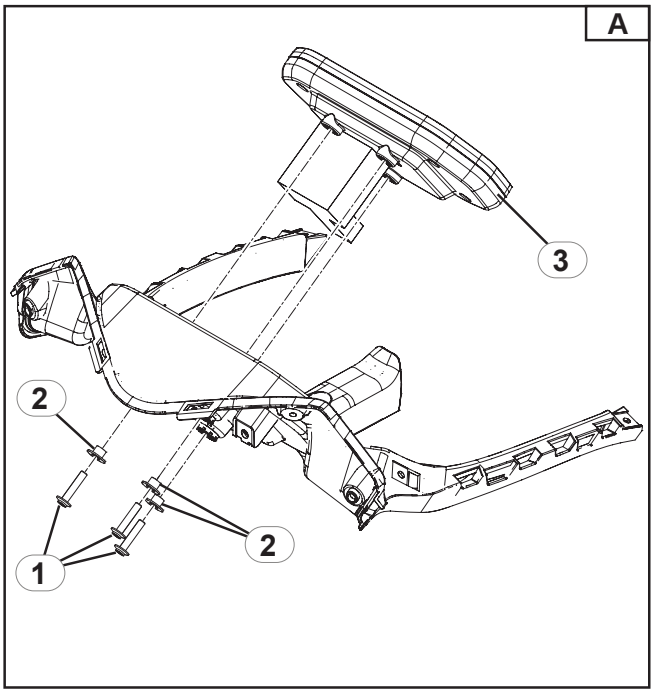
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The right tailpiece and the right panel, refer to **"Removal of tail fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.
- The screws (1) Fig. A.
- The bushes (2) Fig. A
- The dashboard (3) Fig. A.



FAIRING
INSTALLATION OF DASHBOARD

Park the motorcycle on a level surface.

NOTICE

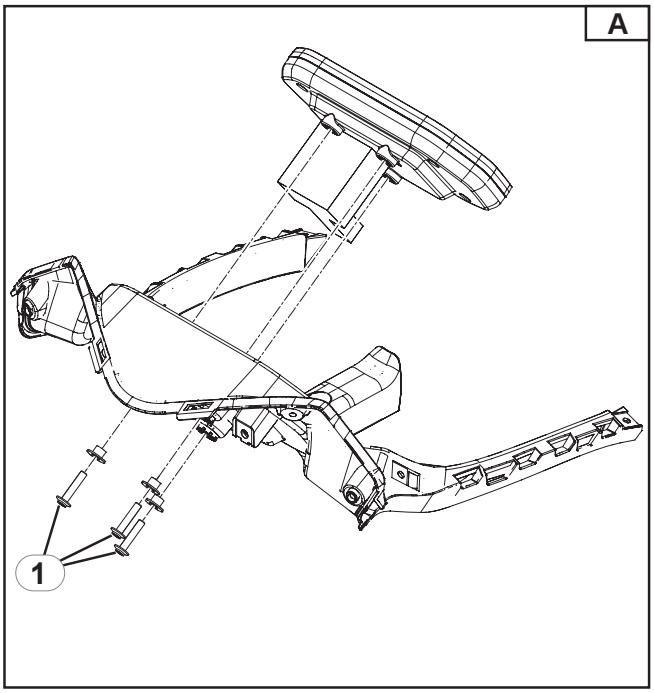
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 10 N*m



FAIRING

REMOVAL OF USB SOCKET

Park the motorcycle on a level surface.

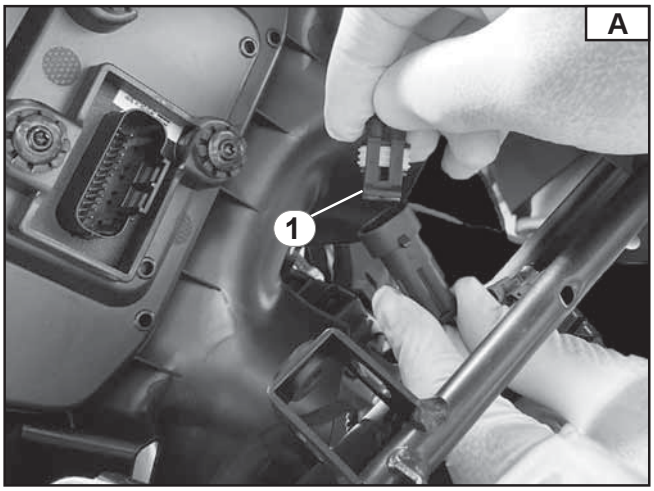
NOTICE

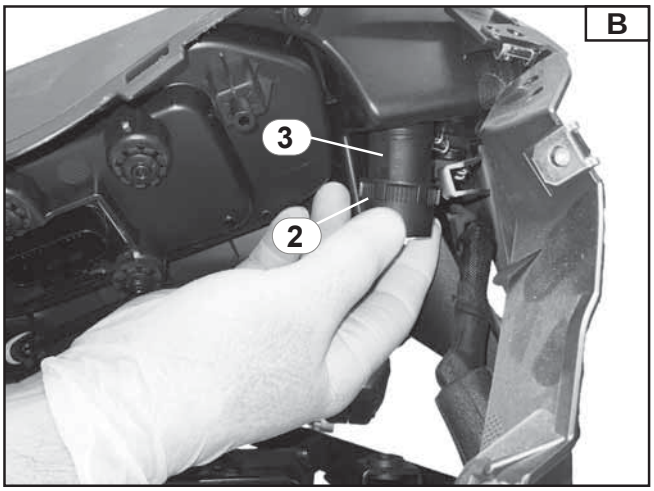
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The right tailpiece and the right panel, refer to **"Removal of tail fairing, Chapter 4"**.
- The instrumentation support, refer to **"Removal of instrumentation support, Chapter 4"**.

Disconnect:
- The two-pole connector (1) Fig. A.

Remove:
- The ring nut (2) Fig. B.
- The USB socket (3) Fig. B.





FAIRING

INSTALLATION OF USB SOCKET

Park the motorcycle on a level surface.

NOTICE

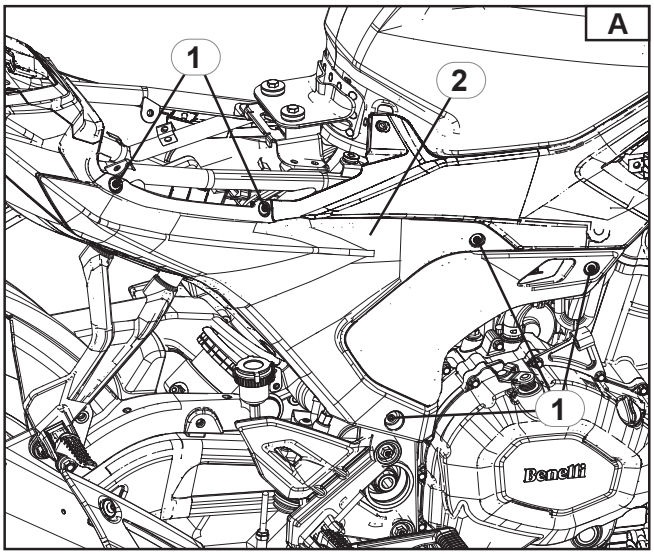
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

FAIRING

REMOVAL OF TAIL FAIRING

Park the motorcycle on a level surface.



NOTICE

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

Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fastening screws (1) Fig. A.
- The right tail (2) Fig. A.

NOTE:_____

Carry out the following operation for the left side.

FAIRING

INSTALLATION OF TAIL FAIRING

Park the motorcycle on a level surface.

NOTICE

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

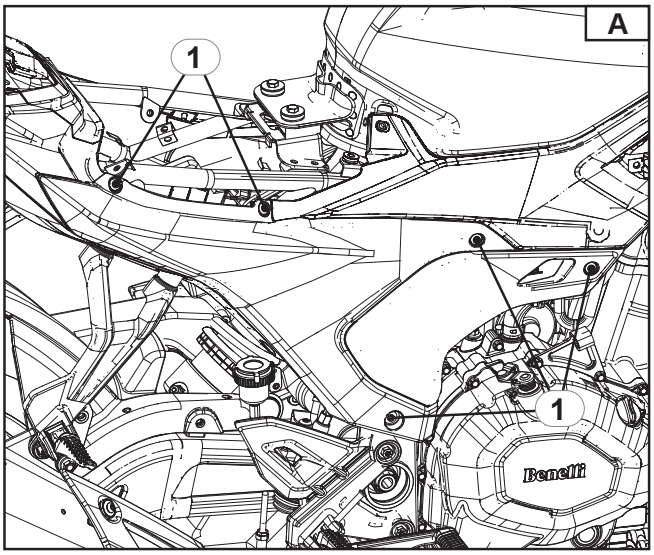
Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 10 N*m

NOTE:
Carry out the following operation for the left side.



FAIRING

REMOVAL OF SIDE TAILPIECE FAIRING

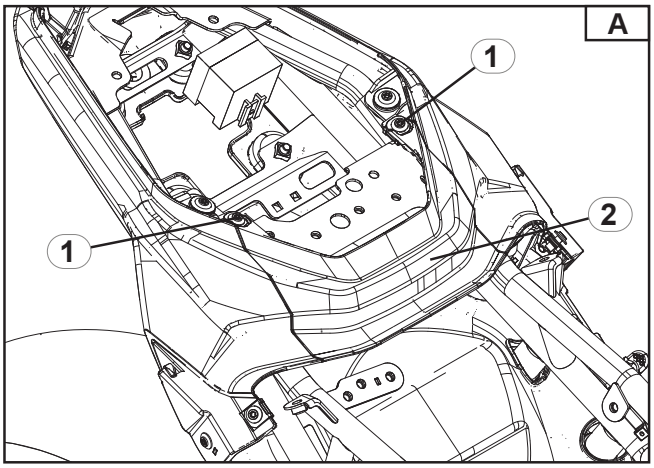
Park the motorcycle on a level surface.

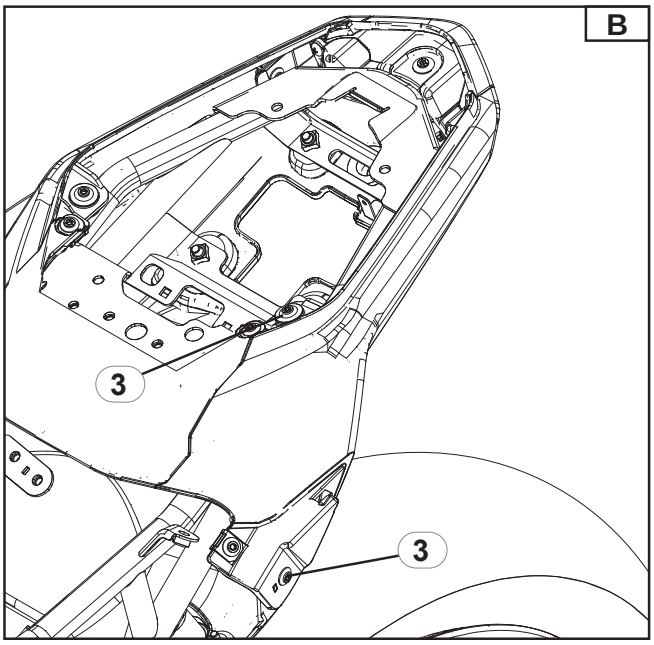
NOTICE

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

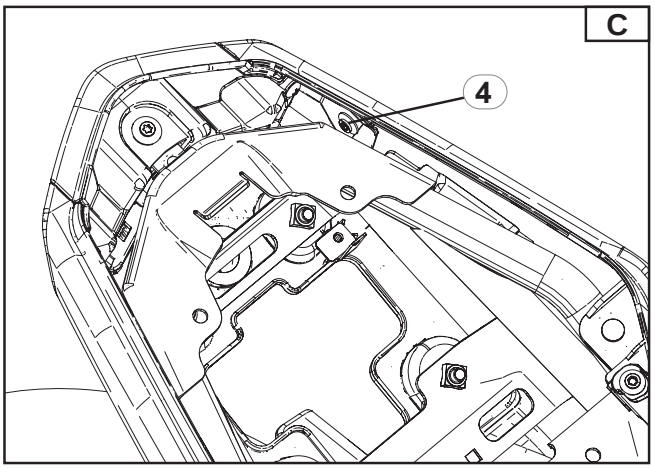
Remove:

- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The right/left tail, refer to **"Removal of tail fairing, Chapter 4"**.
- The fastening screws (1) Fig. A.
- The fairing closure (2) Fig. A.
- The fixing screws (3) Fig. B.





- The fixing screw (4) Fig. C.

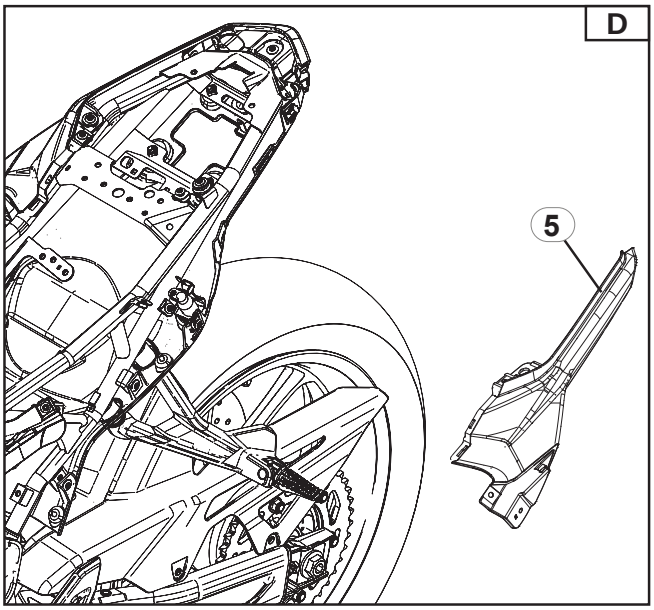


FAIRING

REMOVAL OF SIDE TAILPIECE FAIRING

- The fairing lock (5) Fig. D.

NOTE:
Carry out the following operation for the right side.



FAIRING

INSTALLATION OF SIDE TAILPIECE FAIRING

Park the motorcycle on a level surface.

NOTICE

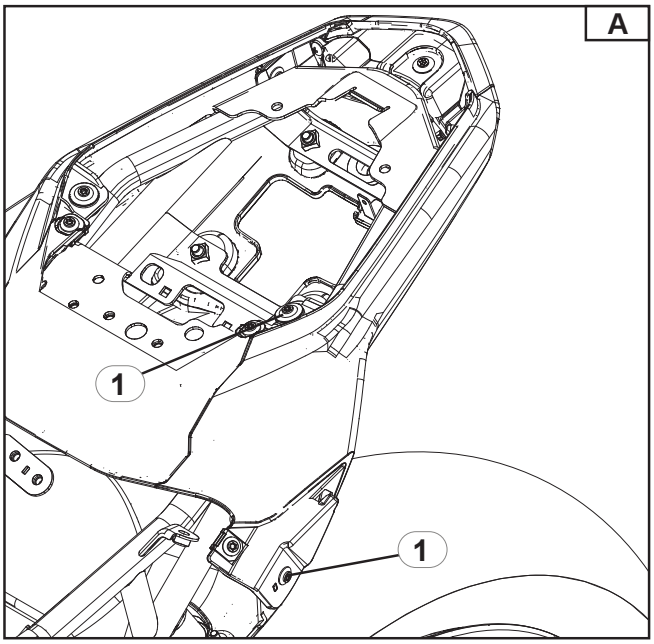
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

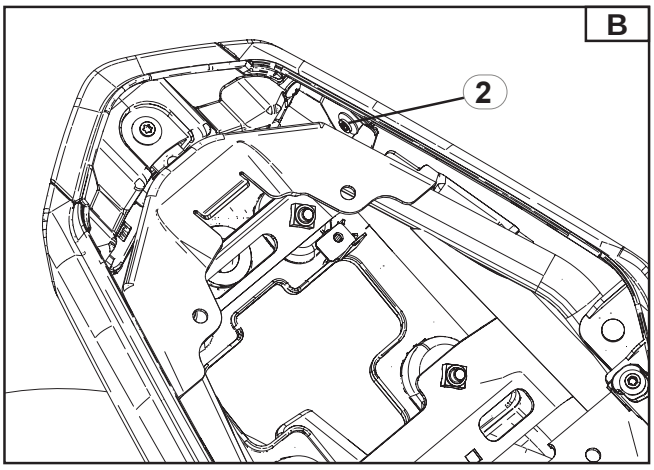
Torque 10 N*m



Tighten:
- The screw (2) Fig. B.

To the following torque:

Torque 10 N*m



NOTE:
Carry out the following operation for the right side.

FAIRING

REMOVAL OF BOTTOM TAIL COVER

Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The rear foot peg plates, refer to **"Removal of complete right/left rear foot peg plate, Chapter 4"**.
- The license plate holder, refer to **"Removal of license plate holder, Chapter 4"**.
- The right/left tail, refer to **"Removal of tail fairing, Chapter 4"**.
- The left/right side fairings, refer to **"Removal of side tail-piece fairing, Chapter 4"**.
- The cable (1) Fig. B of the passenger seat opening block.
- The fixing screws (2) Fig. A.

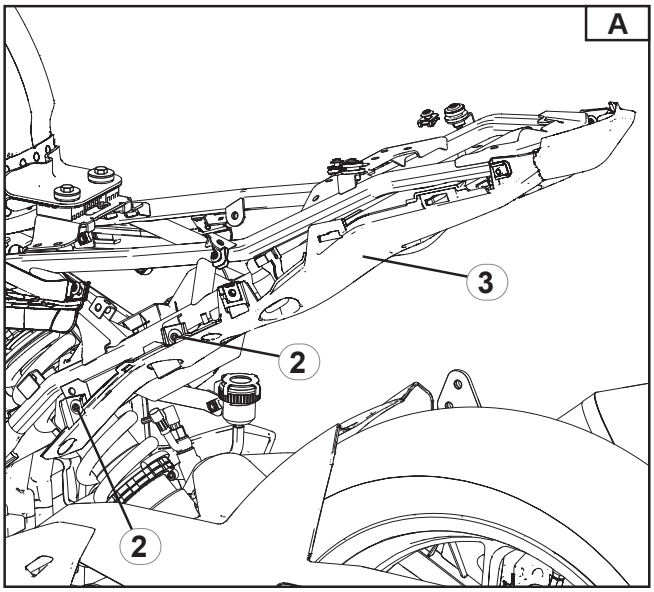
NOTE:
Remove the fixing screws on the right side of the vehicle.

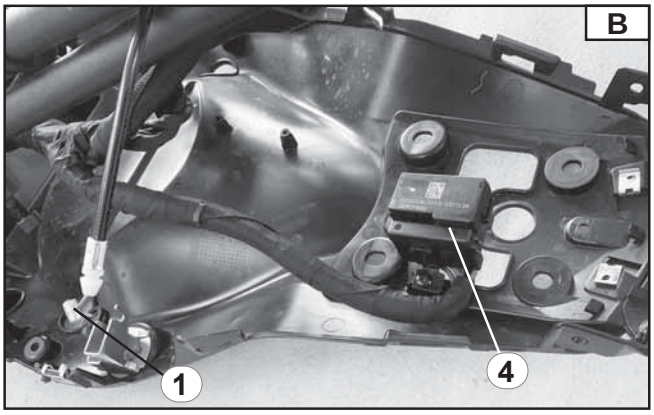
Disconnect:

- The fuse box (4) Fig. B.

Remove:

- The bottom tail covering (3) Fig. A.





FAIRING

INSTALLATION OF BOTTOM TAIL COVER

Park the motorcycle on a level surface.

NOTICE

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

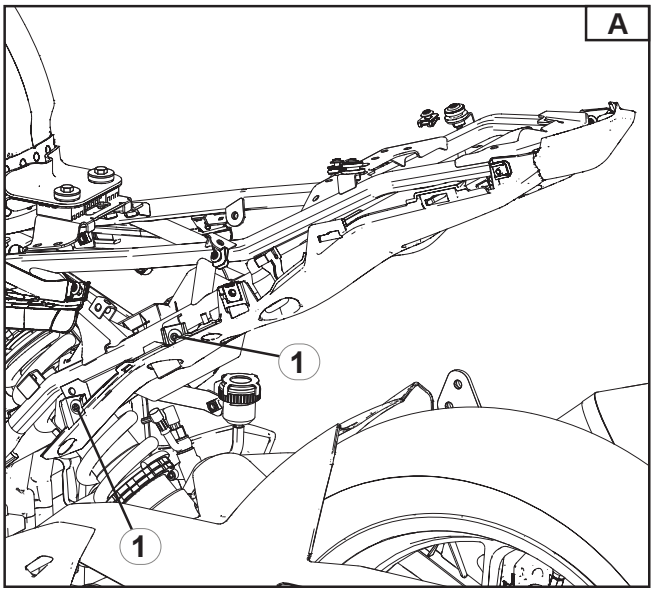
Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 10 N*m

NOTE:
Carry out the following operation for the right side.



FAIRING

REMOVAL OF THE CHAIN PINION COVER

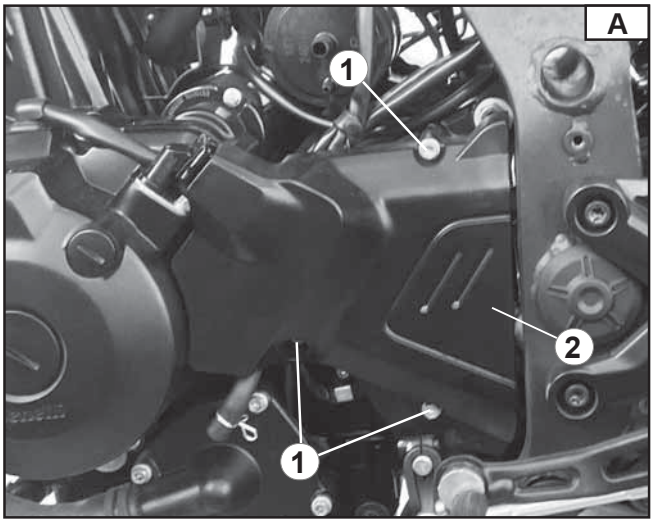
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The screws (1) Fig. A.
- The chain pinion cover (2) Fig. A.



FAIRING

INSTALLATION OF THE CHAIN PINION COVER

Park the motorcycle on a level surface.

NOTICE

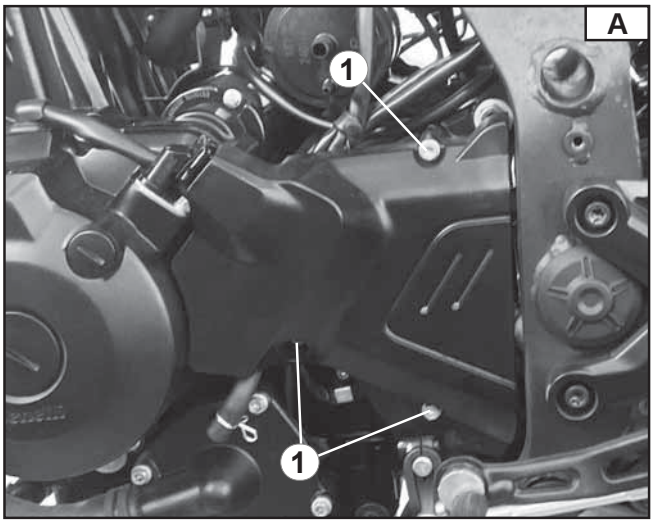
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 12 N*m



FUEL TANK

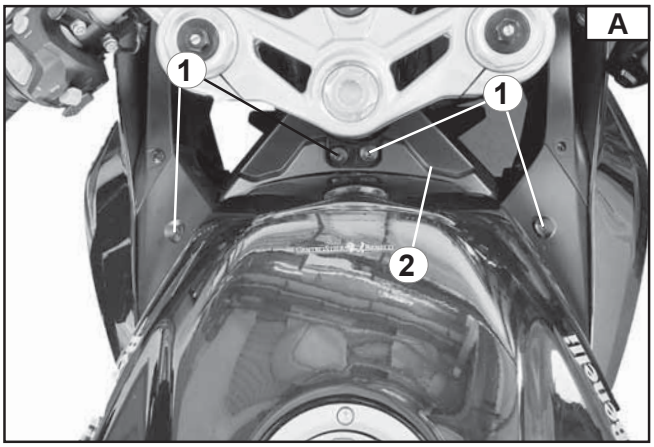
REMOVAL OF FUEL TANK

Park the motorcycle on a level surface.

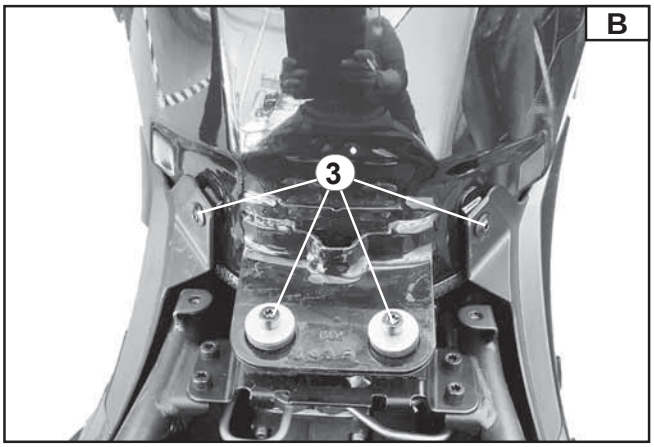
NOTICE

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

Remove:
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The screws (1) Fig. A.
- The tank front lock covering (2) Fig. A.

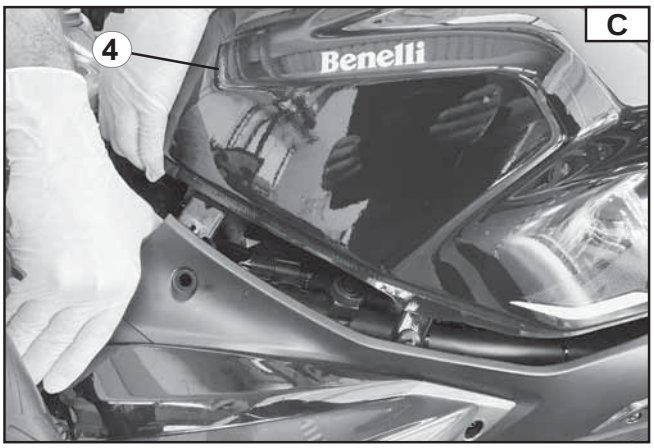


- The screws (3) Fig. B.

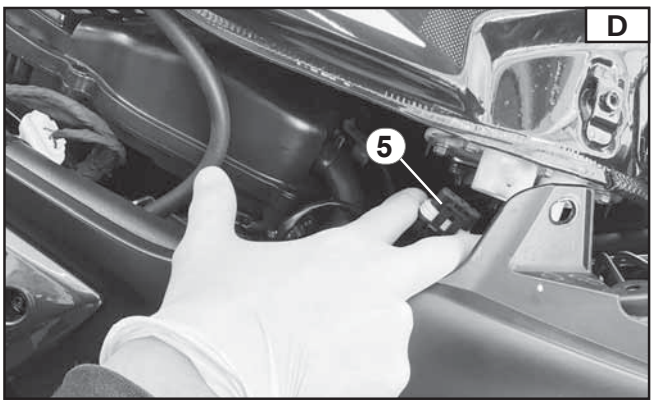


Distance:
- The right/left top fairings, as shown in Fig. C.

Raise:
- The tank fuel (4) Fig. C.



Disconnect:
- The fuel tank connector (5) Fig. D.



FUEL TANK

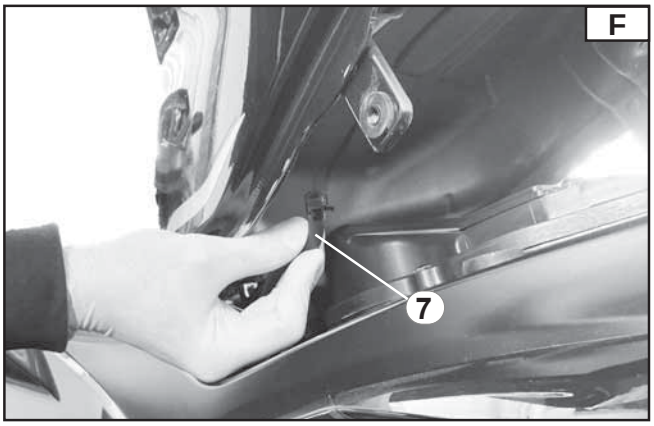
REMOVAL OF FUEL TANK

Disconnect:

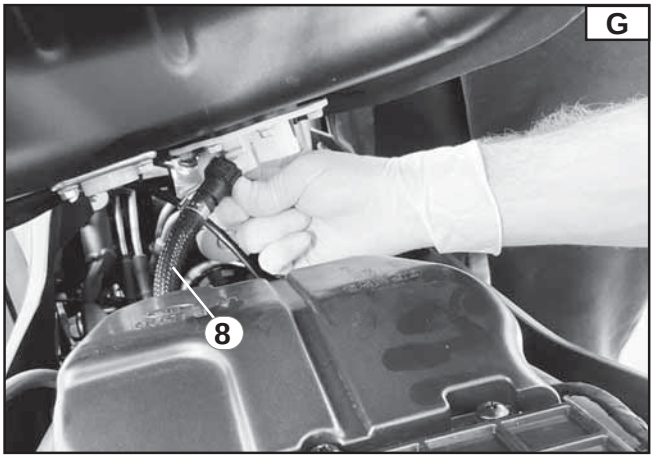
- The tank drain hose (6) Fig. E.



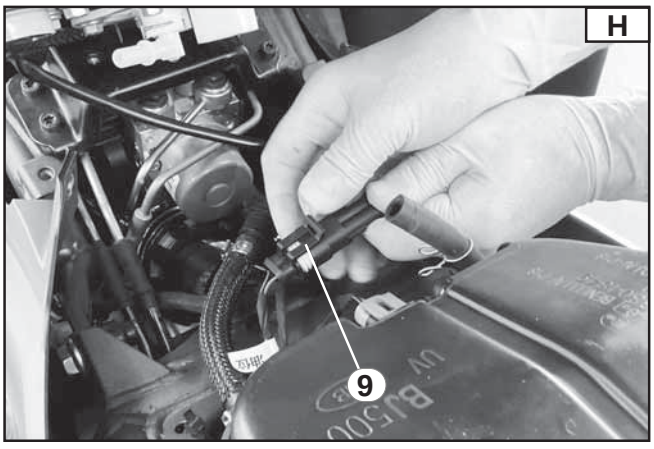
- The vapor collection tube (7) Fig. F.



- The fuel tube (8) Fig. G.



- The connector of the fuel level sensor (9) Fig. H.



Remove:

- The tank fuel (4) Fig. C.

FUEL TANK

INSTALLATION OF FUEL TANK

Park the motorcycle on a level surface.

NOTICE

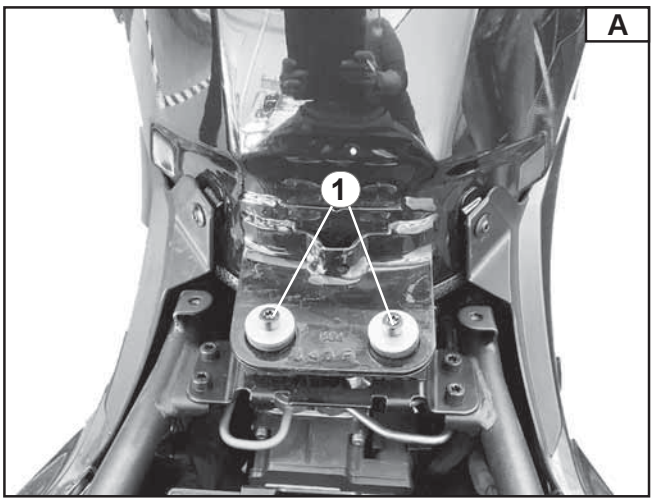
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

To the following torque:

Torque 12 N*m



FUEL TANK

REMOVAL OF FUEL TANK CAP

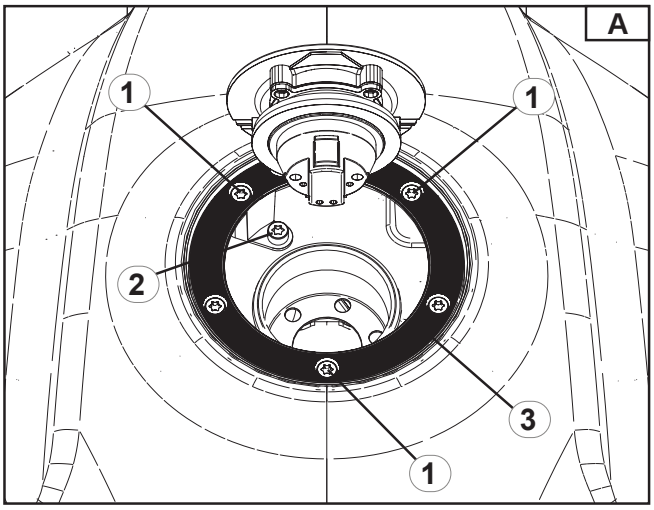
Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The fastening screws (1) Fig. A.
- The safety screw (2) Fig. A.

Take out:
- The fuel tank cap (3) Fig. A.



FUEL TANK

INSTALLATION OF FUEL TANK CAP

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A.

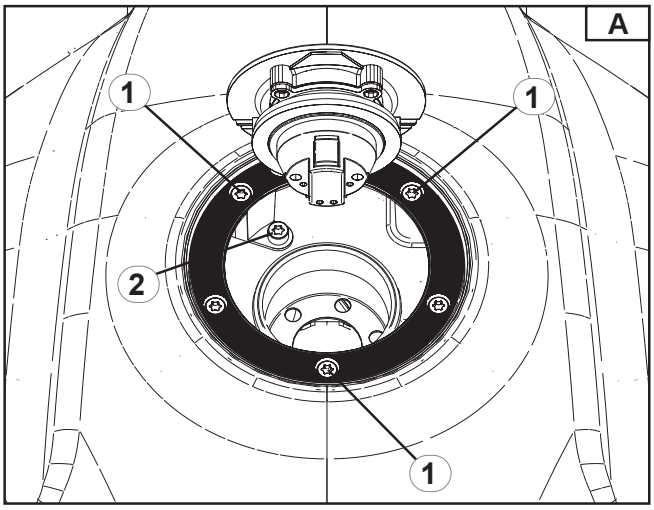
To the following torque:

Torque 10 N*m

Tighten:
- The safety screw (2) Fig. A.

To the following torque:

Torque 10 N*m



FUEL TANK

REMOVAL OF THE FUEL PUMP

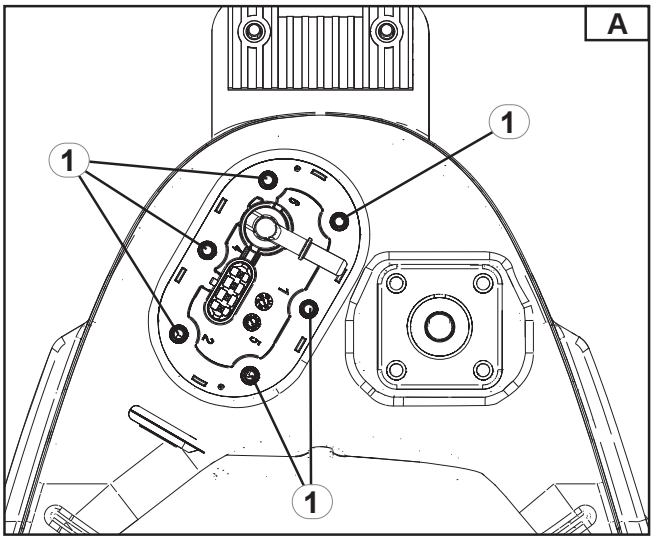
Park the motorcycle on a level surface.

NOTICE

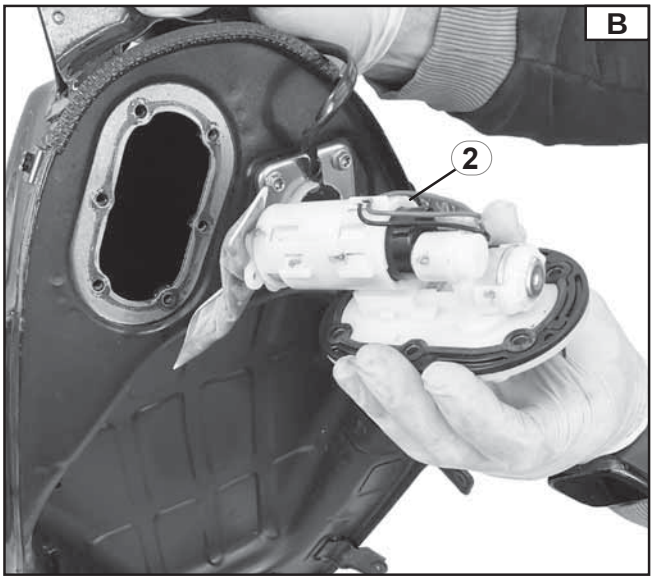
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:

- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The screws (1) Fig. A.



- The fuel pump (2) Fig. B.



FUEL TANK
INSTALLATION OF FUEL PUMP

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

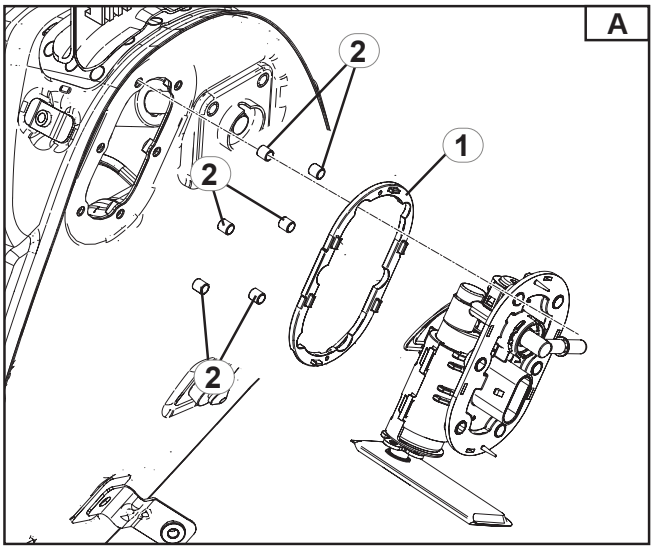
NOTE:
Before assembly, remove any dirt from the rubber gasket (1) Fig. A.

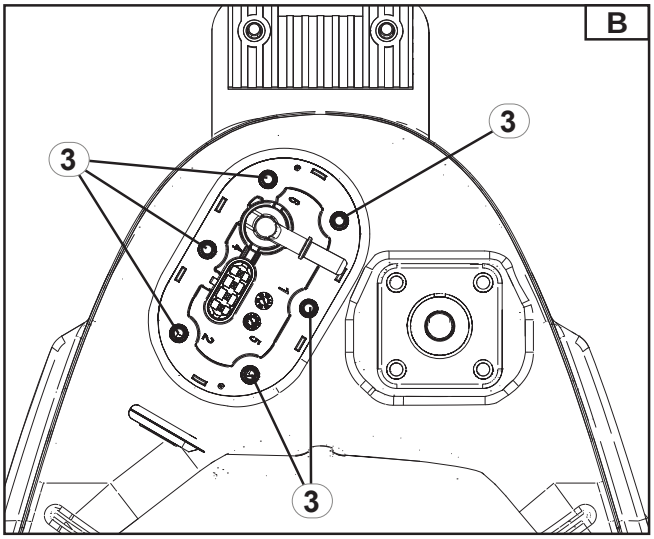
NOTE:
When assembling the pump, insert the bushes (2) into the housing holes of the screws, as shown on Fig. A.

Tighten:
- The screws (3) Fig. B.

To the following torque:

Torque 10 N*m





FUEL TANK

REMOVAL OF THE FUEL LEVEL SENSOR

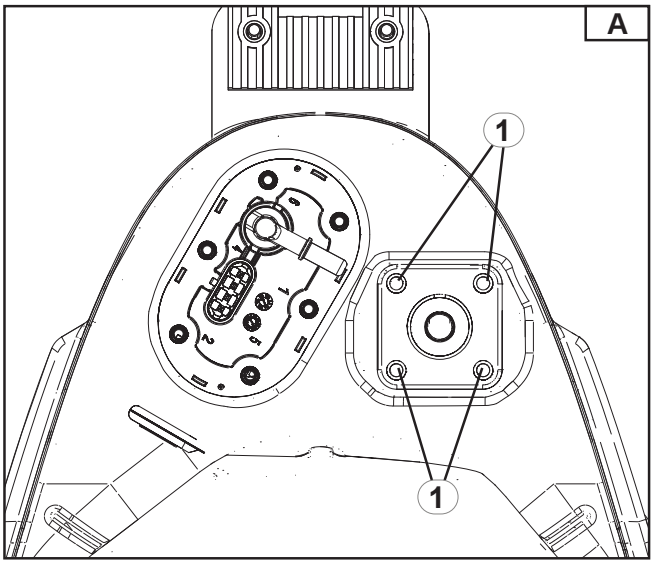
Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.
- The screws (1) Fig. A.
- The fuel level sensor (2) Fig. B.





FUEL TANK

INSTALLATION OF FUEL LEVEL SENSOR

Park the motorcycle on a level surface.

NOTICE

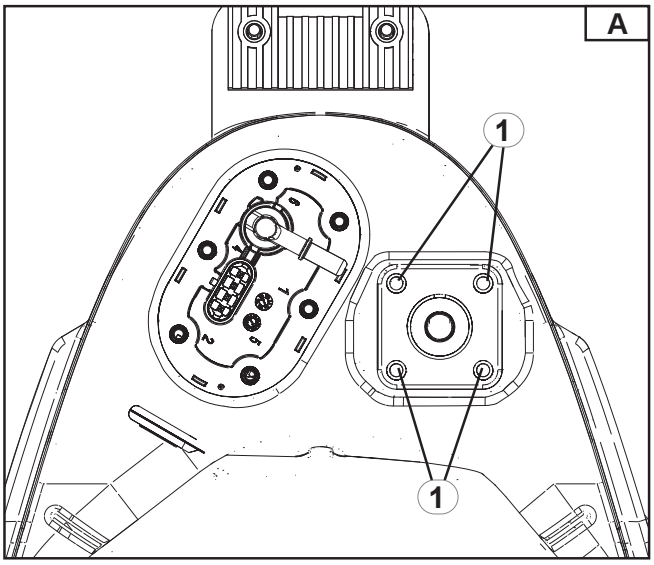
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.
NOTE:
Replace the rubber gasket, if worn.

Tighten:
- The screws (1) of the level sensor Fig. A.

To the following torque:

Torque 8 N*m



AIR FILTER

REMOVAL OF AIR-BOX

Park the motorcycle on a level surface.

NOTICE

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

Remove:

- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The rear view mirrors, refer to **"Removal rear view mirrors, Chapter** 3".
- The windscreen, refer to **"Replacement of windscreen, Chapter** 3".
- Le auxiliary lights, **refer to "Replacement of auxiliary lights, Chapter 3".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The rider seat, refer to **"Removal of rider seat, Chapter 4".**
- The bottom fairing, refer to **"Removal of bottom fairing, Chapter 4"**.
- The right/left top fairings, refer to **"Removal of tank fairing, Chapter 4"**.
- The fuel tank, refer to **"Removal of fuel tank, Chapter 4"**.

Disconnect:

- Air temperature sensor (1) Fig. A.

Disconnect:

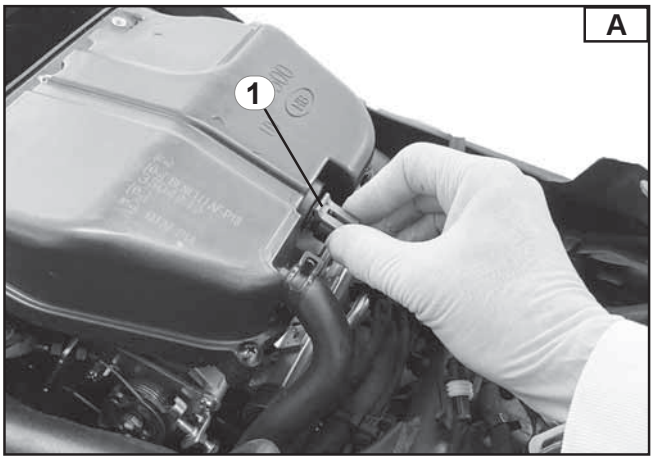
- The secondary air tube (2) Fig. B.

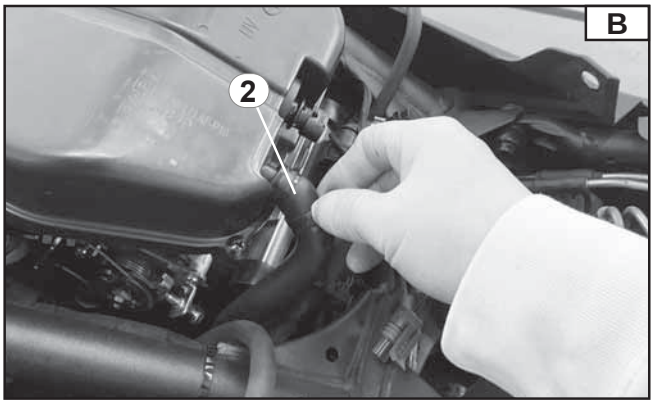
Disconnect:

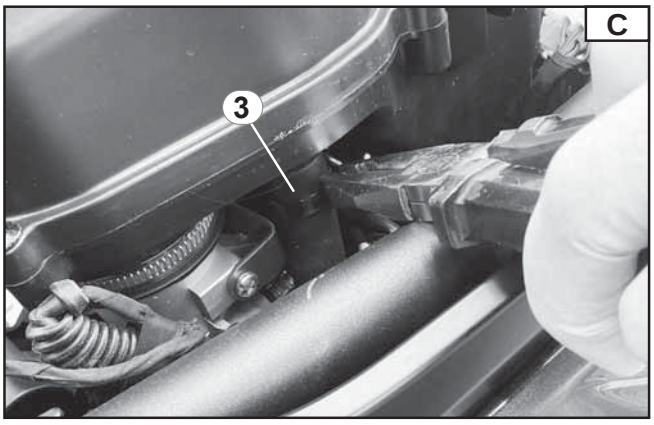
- The vapor collection tube (3) Fig. C.

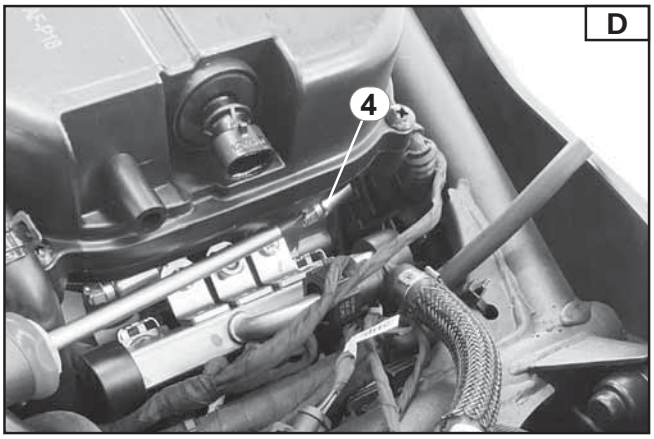
Loosen:

- The clamps (4) Fig. D of intake manifolds.







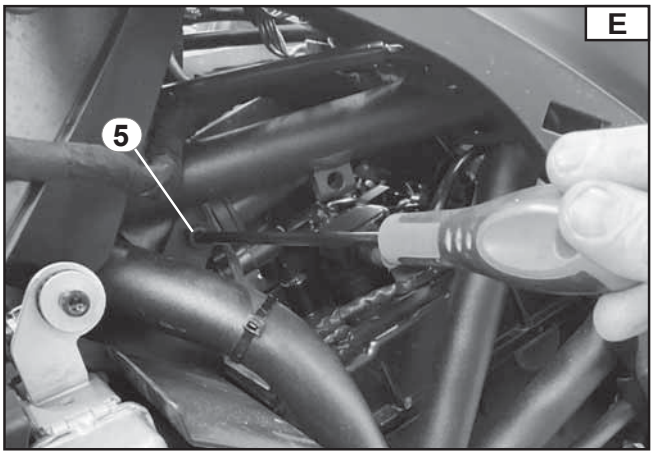


AIR FILTER

REMOVAL OF AIR-BOX

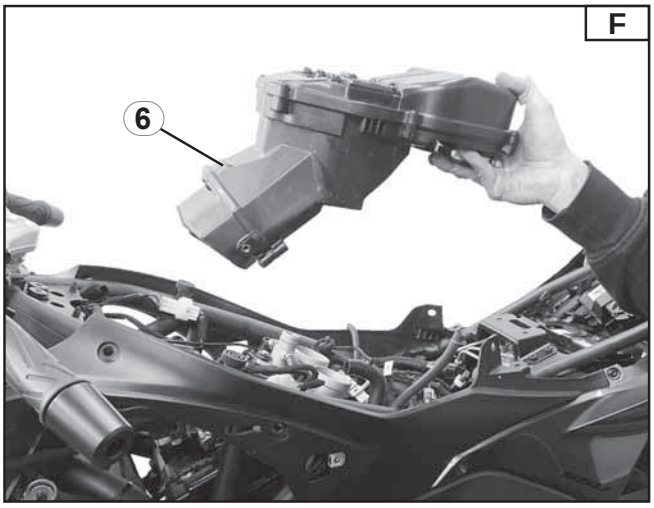
Remove:

- The fixing screw (5) Fig. E from both sides.



Take out:

- The air-box (6) Fig. F.



AIR FILTER
INSTALLATION OF AIR-BOX

Park the motorcycle on a level surface.

NOTICE

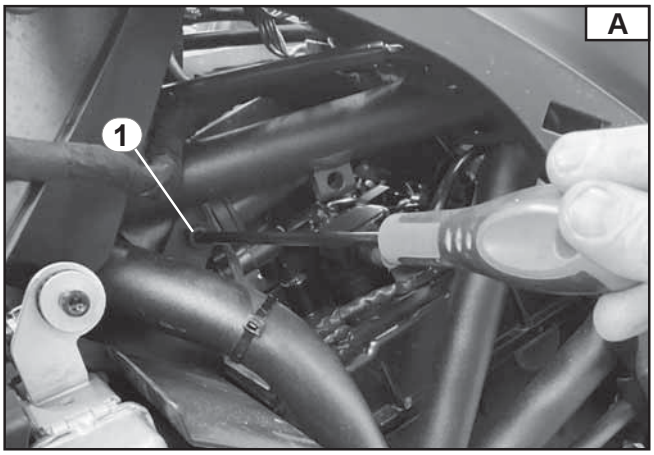
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screw (1) Fig. A.

To the following torque:

Torque 12 N*m



HORN

REMOVAL OF HORN

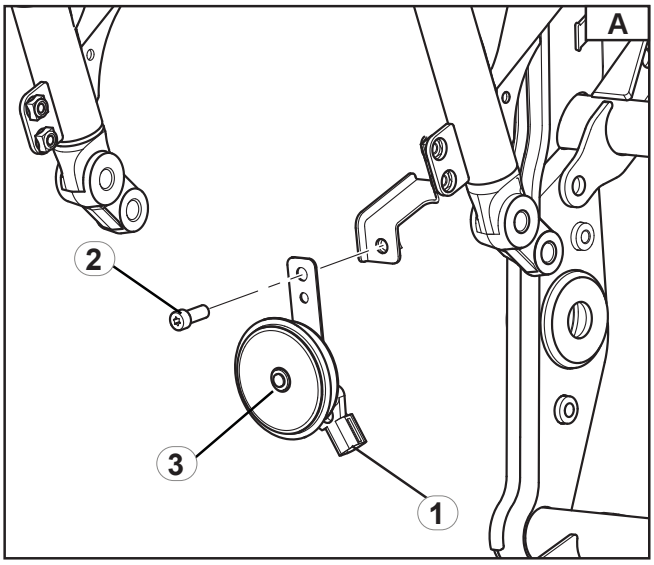
Park the motorcycle on a level surface.

NOTICE

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

Disconnect:
- The electrical connector (1) Fig. A.

Remove:
- The screw (2) Fig. A.
- The horn (3) Fig. A.



HORN

INSTALLATION OF HORN

Park the motorcycle on a level surface.

NOTICE

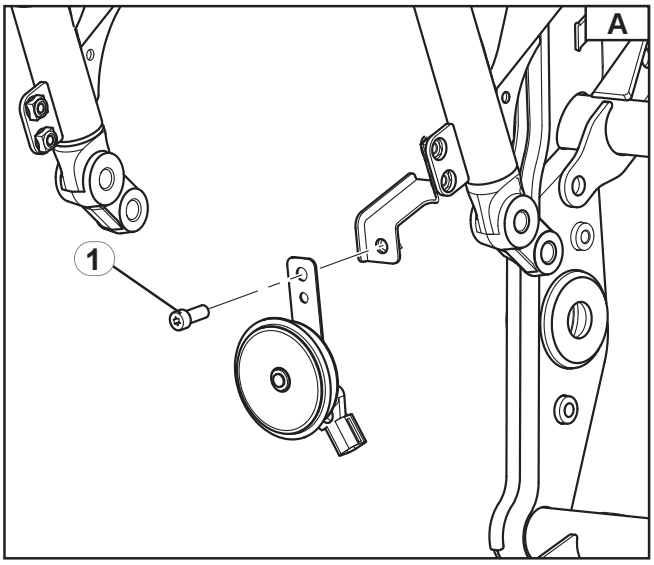
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screw (1) Fig. A.

To the following torque:

Torque 22 N*m



Remarks



5

ENG.

CHAPTER 5

ENGINE

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Remarks

ENGINE

REMOVAL OF ENGINE FROM THE FRAME

NOTICE

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

- Prop the rear side of the swingarm with a stand.

NOTICE

Make sure the front wheel is locked when moving the engine to prevent the motorcycle from falling. This could cause accidents and injuries.

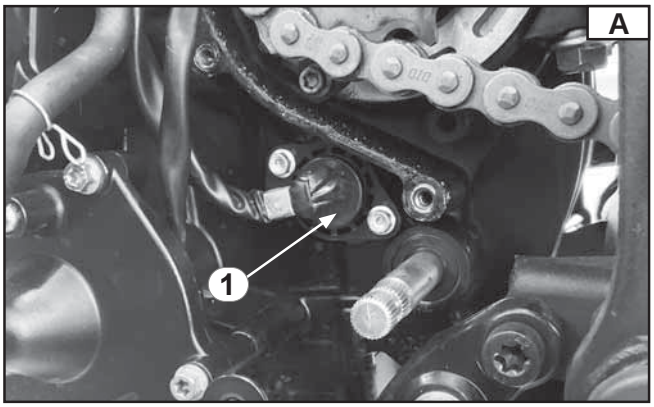
Disconnect:
- The battery, refer to **"Check and charge of battery, Chapter 3".**
- the positive and ground cables of the starter, refer to **"Removal of starter, Chapter 5".**

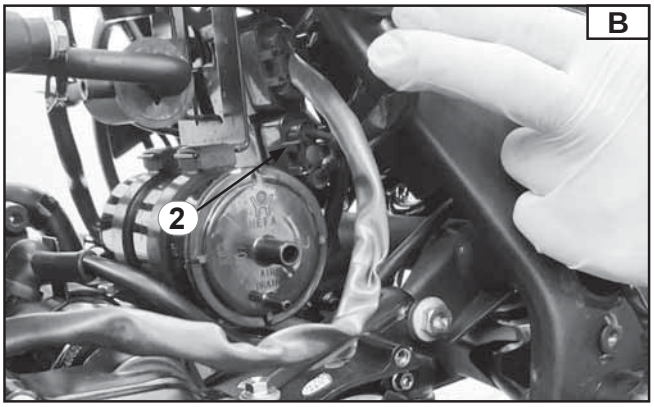
Drain:
- The engine oil, refer to **"Change of engine oil, Chapter 3".**

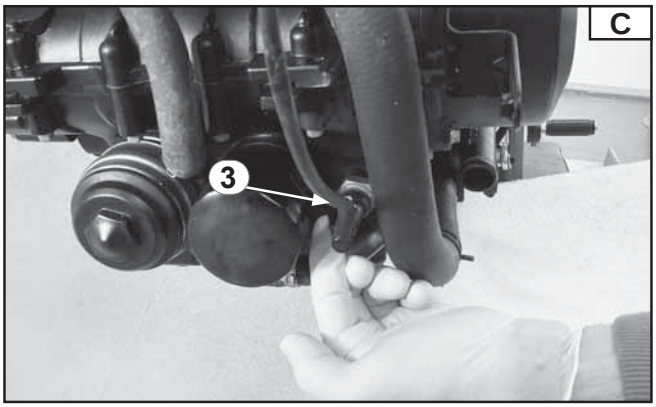
Remove:
- The seat, refer to **"Removal of rider seat, Chapter 4".**
- The passenger seat, refer to **"Removal of passenger seat, Chapter 4".**
- The fairing, refer to **"Removal of fairing, Chapter 4".**
- The tank, refer to **"Removal of fuel tank, Chapter 4".**
- The airbox, refer to **"Removal of airbox, Chapter 4".**
- The throttle body, see **"Removal of throttle body, Chapter 5".**
- The pinion cover, see **"Removal of pinion cover, Chapter 5".**
- The pinion, refer to " **Removal of driving gear, Chapter 5".**
- The exhaust system, refer to **"Removal of exhaust system, Chapter 5**".
- The cooling system, refer to " **Removal of radiator, Chapter 6**"
- The gear pedal, refer to "**Removal of gear pedal, Chapter 4**".
- The clutch cable, refer to **"Removal of clutch cable, Chapter 4"**.
- The coils, refer to **"Removal of coils and spark plugs, Chapter 5".**
- The secondary air valve, refer to **"Removal of secondary air valve, Chapter 4".**

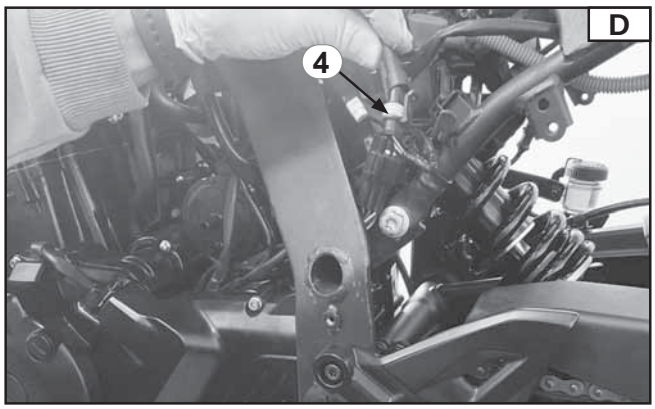
Remove:
- The gearbox position sensor (1) Fig. A.

Disconnect:
- The alternator cable of the voltage regulator (2) Fig. B.
- The engine oil pressure sensor cable (3) Fig. C.
- The three-pole cable of the stand sensor (4) Fig. D.









ENGINE

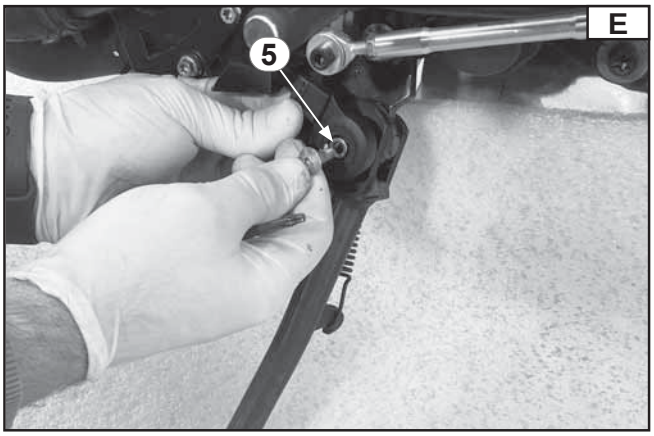
REMOVAL OF ENGINE FROM THE FRAME

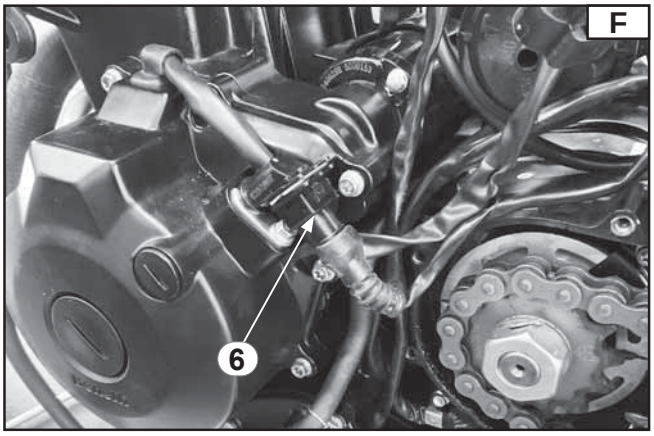
Remove:

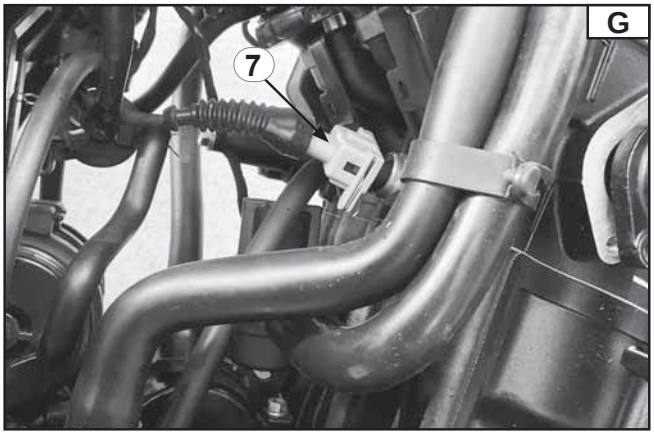
- The stand sensor (5) Fig. E, and relevant support bracket, refer to **"Removal of side stand, Chapter 4".**

Disconnect:

- The pick-up (6) Fig. F.
- the engine coolant temperature sensor (7) Fig. G.

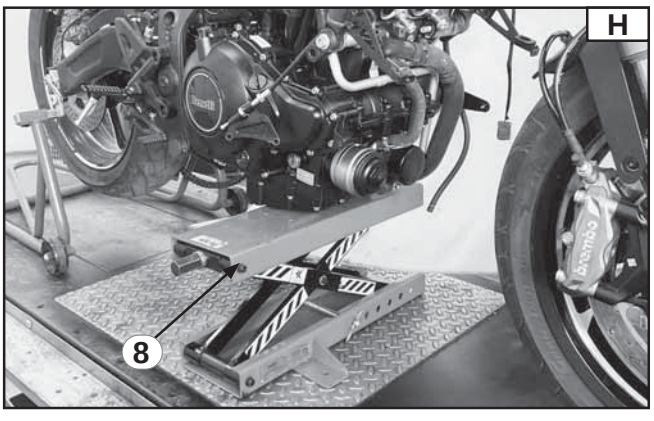






Position:

- The engine support (8) Fig. H.



ENGINE

REMOVAL OF ENGINE FROM THE FRAME

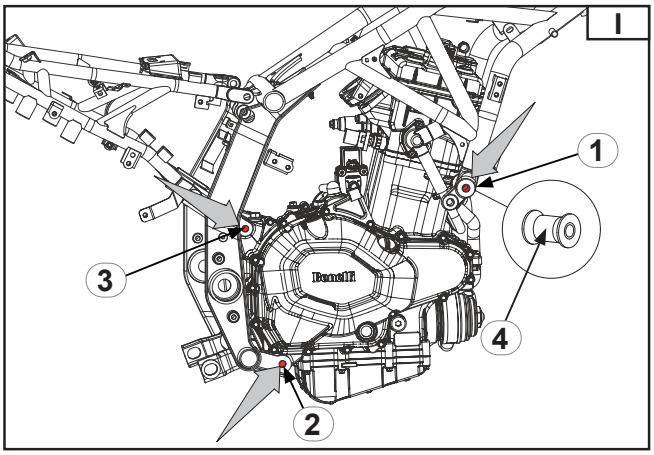
Remove:

The fixing screws and the related nuts on the right side Fig. I

- The fixing screw (1) screw (M10X130)
- The fixing screw (2) screw (M10X75)
- The fixing screw (3) screw (M10X68)

NOTE:

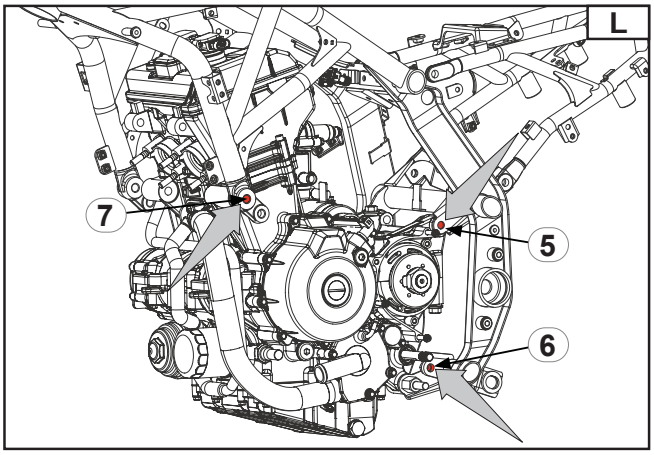
Pay attention to the spacer (4) during the removal stage of the RH top screw (1) Fig. I



Remove:

The fixing screws and the related nuts on the left side Fig. L

- The fixing screw (5) screw (M10X68)
- The special screw (6)
- The fixing screw (7) screw (M10X110)



ENGINE
INSTALLATION OF ENGINE ON THE FRAME

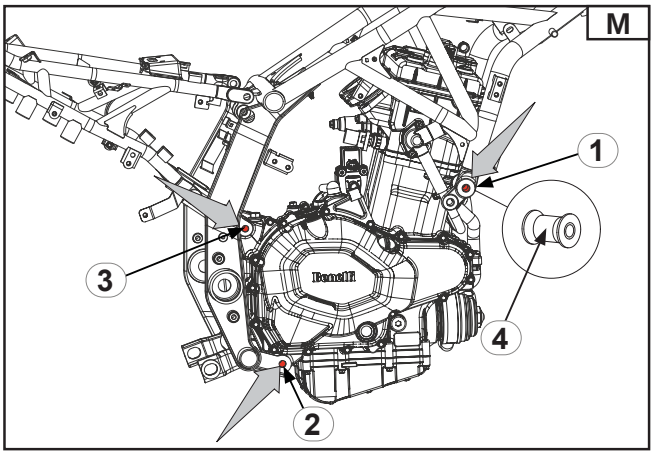
NOTICE

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

Installation:
Proceed using the opposite order to removal.

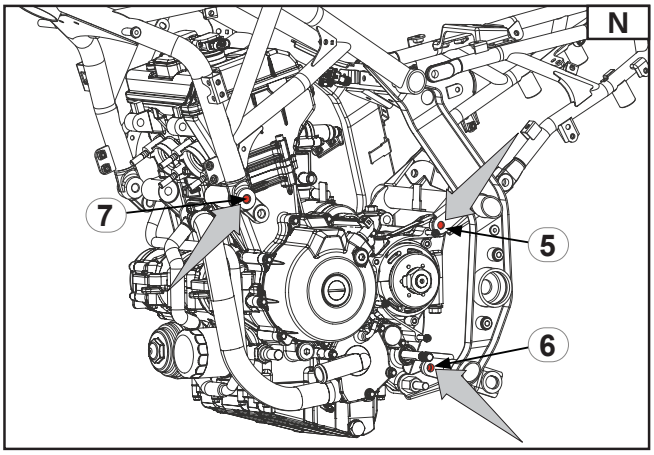
Tighten:
- The screws (1-2-3) Fig. M to the following torque:

Torque 55 N*m



- The screws (5-6-7) on the right side of the vehicle Fig. N to the following torque:

Torque 55 N*m



ENGINE
REMOVAL OF DRIVING GEAR

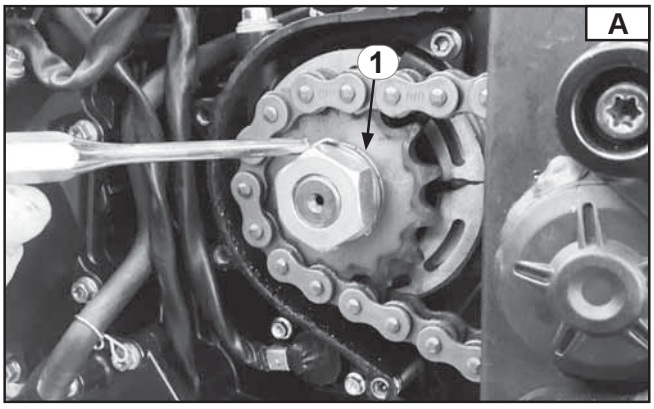
Park the motorcycle on a level surface.

NOTICE

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

Remove:
- The chain pinion cover, refer to **"Removal of chain pinion cover, Chapter 4".**

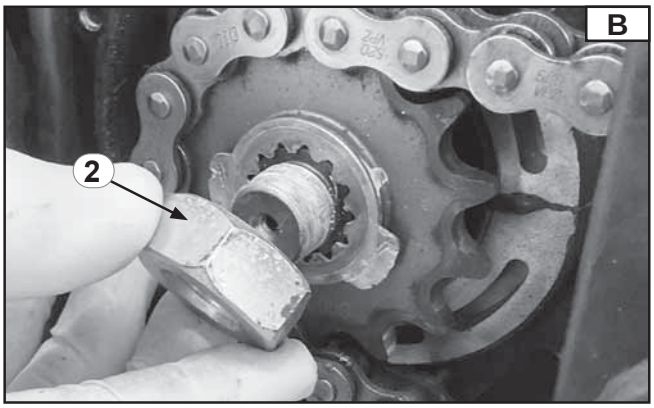
Release:
- The spring washer (1) Fig. A.



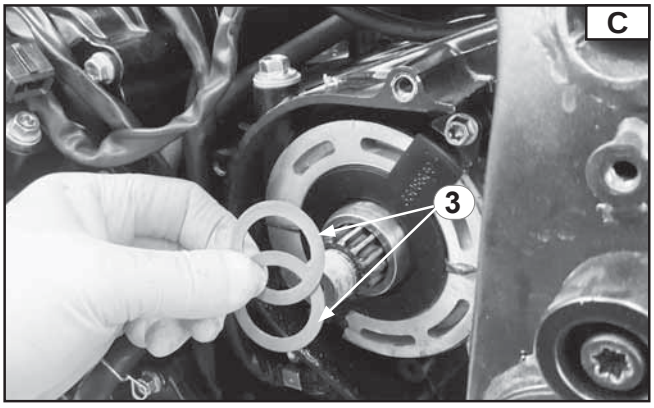
- The special nut (2) Fig. B.

NOTE:
When the driving gear loosen, lock the rear brake.

- Loosen the transmission chain clearance, refer to **"Adjustment of transmission chain clearance, Chapter 3"**.



- The pinion and the two scraping washers (3) Fig. C.



ENGINE
INSTALLATION OF DRIVING GEAR

NOTICE

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

Installation:

Proceed using the opposite order to removal.

Tighten:

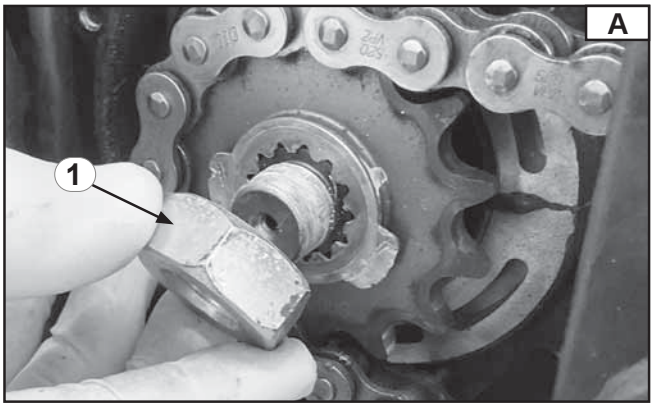
- The special nut (1) Fig. A.

To the following torque:

Torque 95. N*m

Use strong Loctite thread locker to secure.

	STRONG THREAD LOCKER



NOTICE

After tightening of the driving gear nut, fold the safety washer over the nut. If damaged, it must be replaced with a new one.

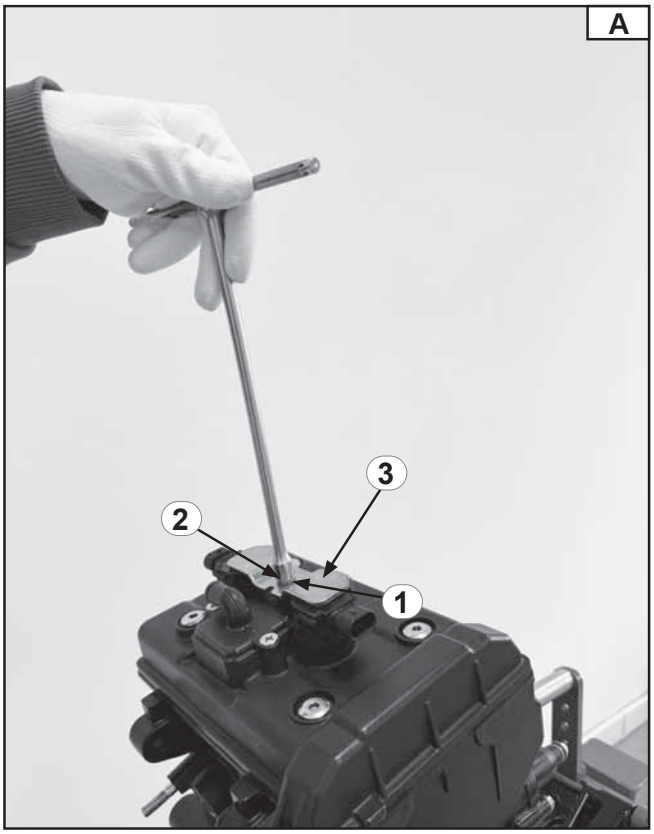
HEAD DISTRIBUTION

COILS AND SPARK PLUGS REMOVAL

NOTE:
The following procedure is applicable to both coils.

Remove:
- The screw (1) Fig. A.
- The washer (2) Fig. A.
- The bracket (3) Fig. A.

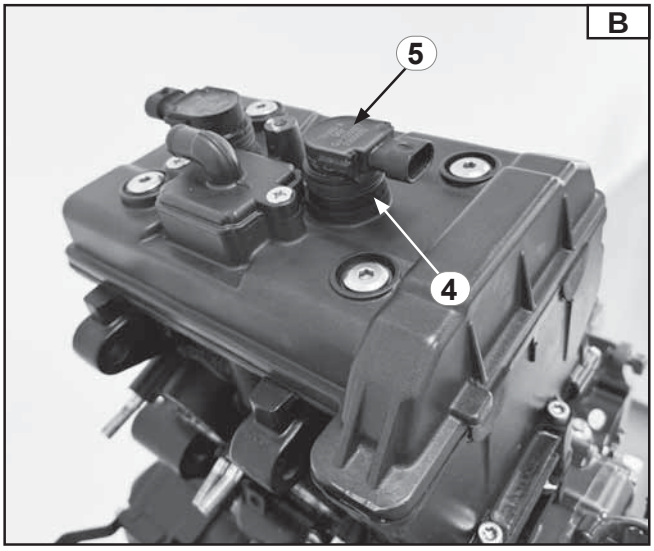
A



Remove:
- The coil (5) Fig. B.
- The rubber pad (4) Fig. B.
- The spark plug, using the special wrench.

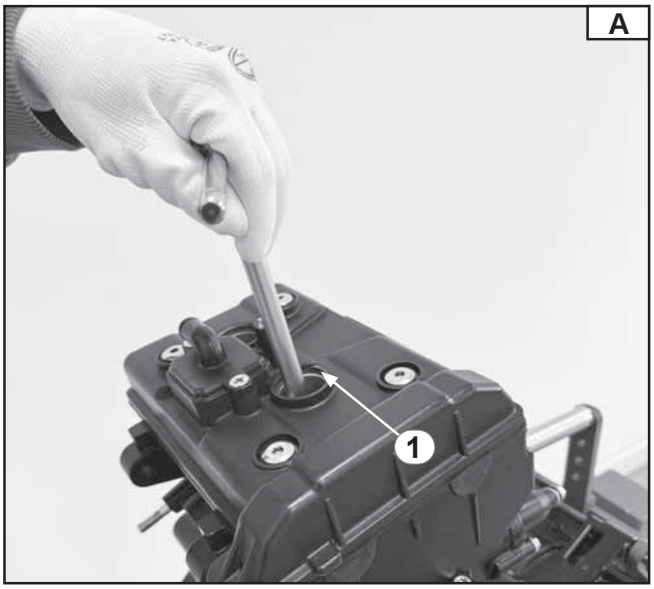
NOTE:
To check the spark plugs, refer to "Removal of spark plugs, Chapter 3".

B



HEAD DISTRIBUTION
ASSEMBLY OF COILS AND SPARK PLUGS

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



WARNING

Lubricate the spark plug threads with copper grease.

	GREASE

NOTE:
Before installing it, clean the spark plug and surface in contact with the gasket.

Install:
- The spark plug on the head, tightening it by hand until you can feel it comes into contact with the base of the head. Then tighten to the correct torque.

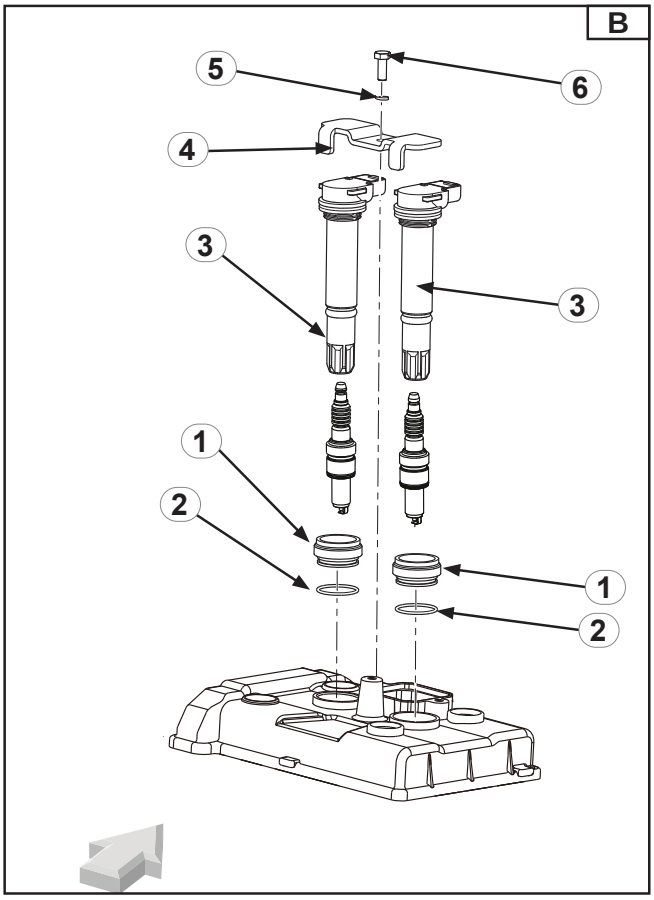
Torque 25/30 N*m

Installation:
Proceed using the opposite order to removal.

Install:
- The rubber pads (1) Fig. B.
- The O-rings (2) Fig. B.
- The coils (3) Fig. B.
- The bracket (4) Fig. B.
- The washer (5) Fig. B.
-

Tighten:
- The screw (6) Fig. B to the following torque:

Torque 10 N*m

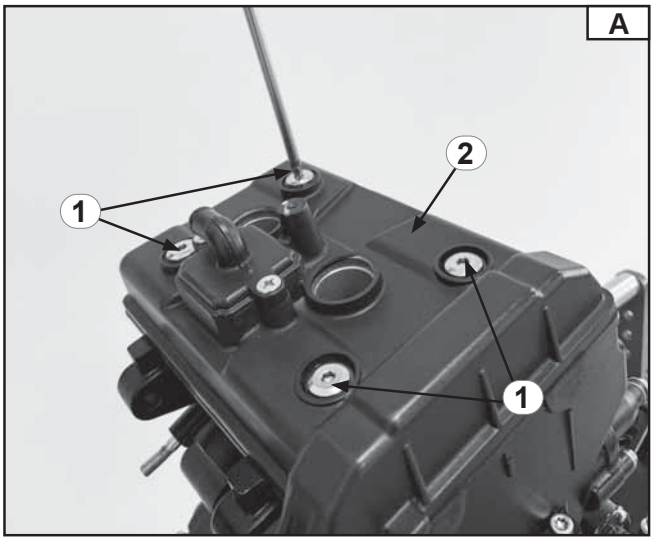


HEAD DISTRIBUTION

REMOVAL OF CAMSHAFT COVER

Remove:

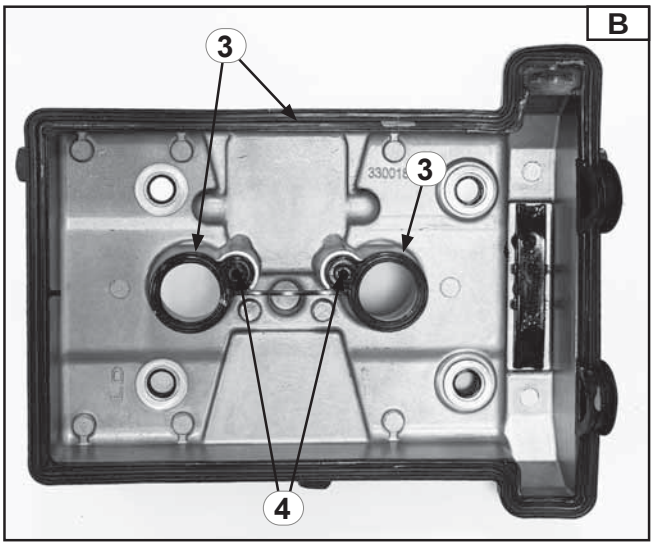
- The screws (1) Fig. A.
- The camshaft cover (2) Fig. A.



NOTE:
Take care with the gaskets on the camshaft cover (3) Fig. B during removal.

NOTE:
In the case of breakage of the camshaft cover gaskets (3), Fig. B, replace.

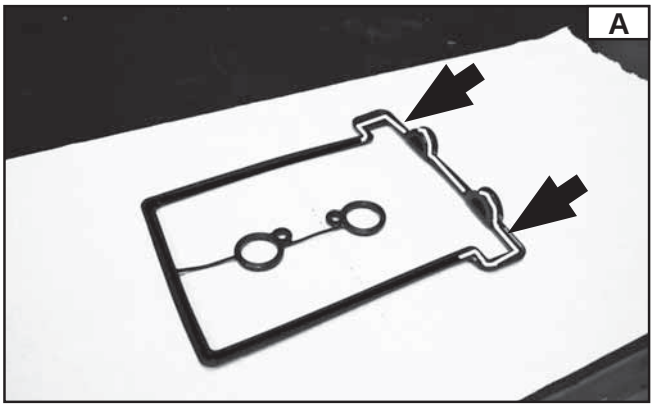
NOTE:
During the extraction of the cover, take care with the two bushings (4) of the secondary air passage system Fig. B



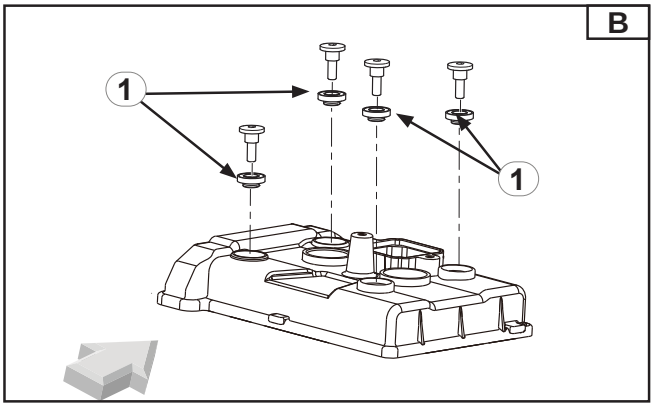
HEAD DISTRIBUTION
INSTALLATION OF CAMSHAFT COVER

Installation:
Proceed using the opposite order to removal.

NOTE:
During assembly of the cover, apply sealing paste type Three Bond 1215 on the surface, as shown in Fig. A.

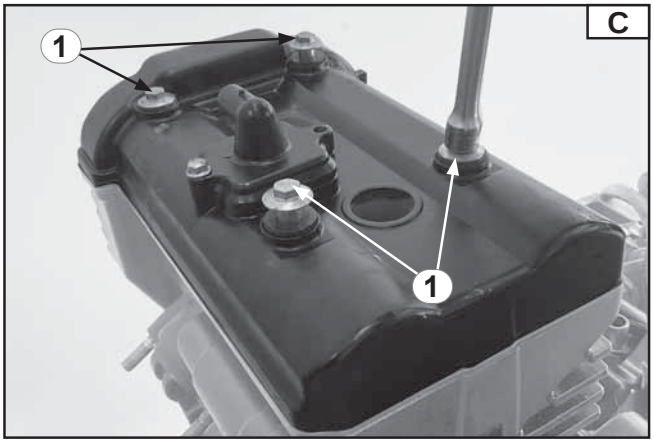


NOTE:
During assembly of the camshaft cover, it is advisable to replace the rubber pads (1) Fig. B.



Tighten:
- The screws (1) Fig. C to the following torque:

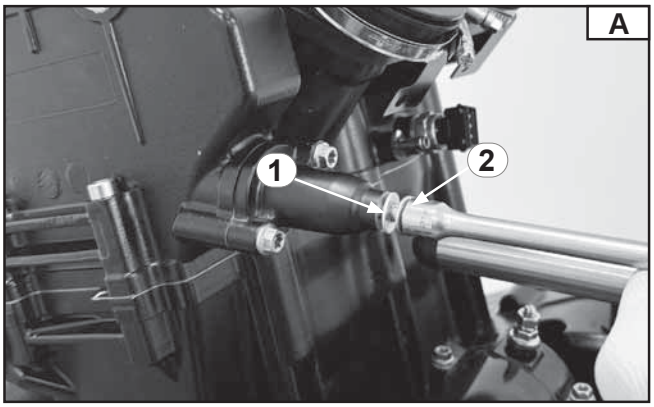
Torque 10 N*m



HEAD DISTRIBUTION

DISTRIBUTION CHAIN TENSIONER REMOVAL

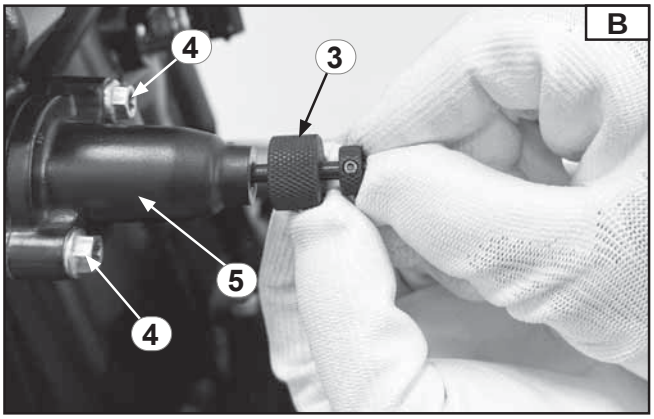
Remove:
- The screw (2) Fig. A.
- The washer (1) Fig. A.



Block:
- The chain tensioner via the apposite tool (3) Fig. B.

NOTE:
Operation to perform with the engine in TDC condition of the right cylinder 1.
Using the special tool (4) during the removal stage, keep the tensioner retracted, Fig. B

Remove:
- The screws (4) Fig. B
- The distribution chain tensioner (5) Fig. B.
- The gasket.





Chain tensioner lock tool
Code: KST03BL01050

HEAD DISTRIBUTION

ASSEMBLY OF DISTRIBUTION CHAIN TENSIONER

During the assembly stage, take care to ensure that the gasket (1) Fig. A is undamaged and unworn, otherwise replace it.

Move:
- The tensioner to the retracted position via the apposite equipment and insert it into its housing.

Chain tensioner lock tool
Code: KST03BL01050

Insert:
- The gasket (1) Fig. A.
- The tensioner (2) into its seat Fig. B.

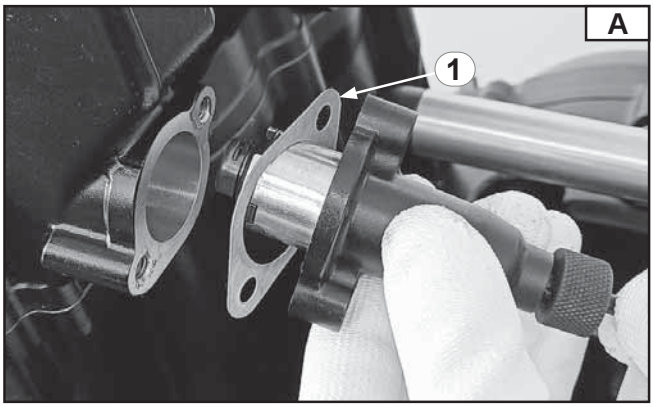
Tighten:
- The fixing screws (2) Fig. C to the following torque:

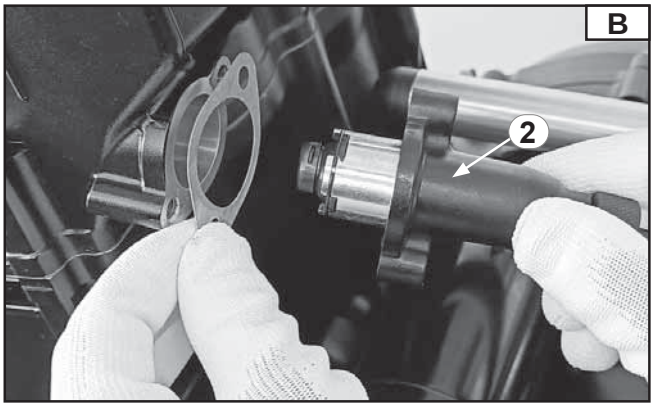
Torque 10 N*m

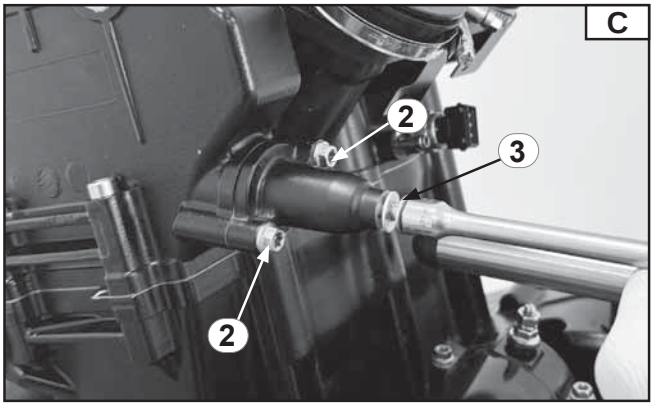
Remove:
- The chain tensioner locking tool.

Tighten:
- The screw (3) Fig. C to the following torque:

Torque 10 N*m







HEAD DISTRIBUTION

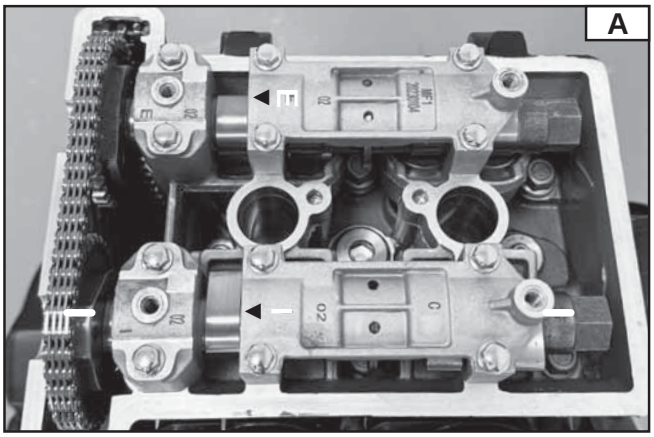
REMOVAL OF INTAKE AND EXHAUST CAMSHAFT

Remove:

- The coils and spark plugs, refer to **"Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**

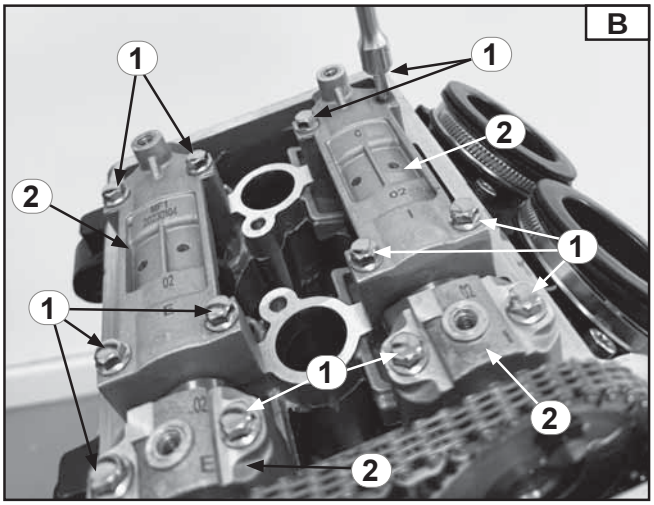
On the holders is the related application and orientation for assembly (see table below):

Code	Meaning
E	Exhaust
I	Intake
◄	Orientation of the underframes

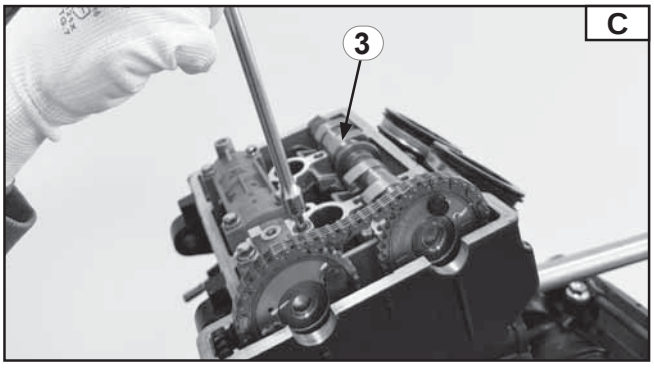


Remove:

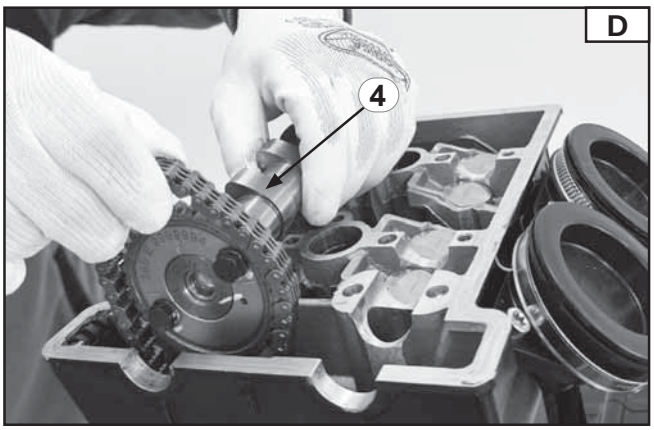
- The fastening screws (1) of the holders Fig. B.
- The holders (2) Fig. B.



- The intake camshaft (3) Fig. C.



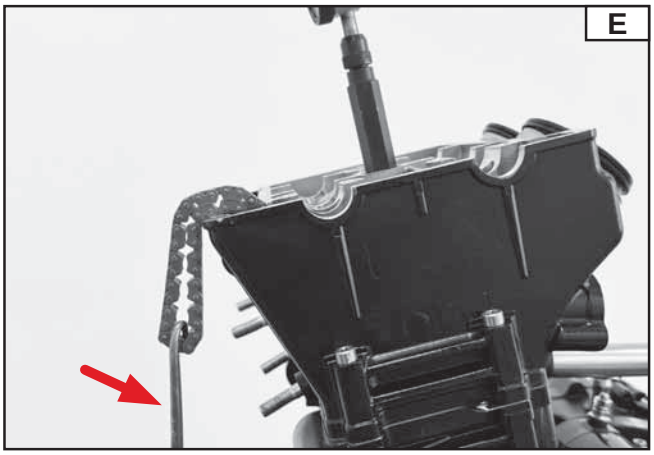
- The exhaust camshaft (4) Fig. D.



HEAD DISTRIBUTION

REMOVAL OF INTAKE AND EXHAUST CAMSHAFT

NOTE:
During the removal stage of the camshafts, duly secure the distribution chain Fig. E.



HEAD DISTRIBUTION
CAMSHAFT CHECK

Check:
- The camshaft lobes visually.

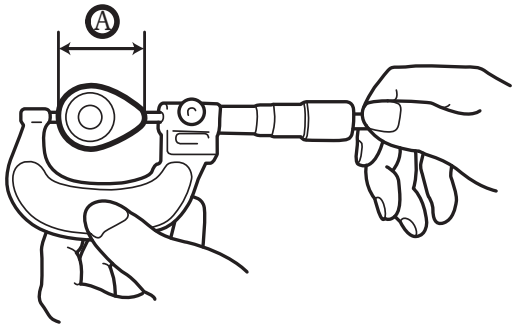
If there is any blue discolouration/pitting or lines, replace.

Measure:
- The size of the lobes Fig. A.

If the measures taken are not compliant with specifications, replace the shaft.
Specifications Table:

Camshaft	Limit (A)	Limit (A)
Camshaft on exhaust side	31.95 mm	31.90 mm
Camshaft intake side	32.55 mm	32.50 mm

A

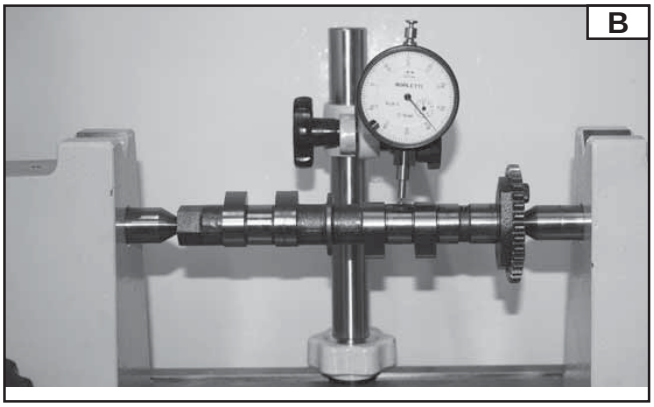


Measure:
- The eccentricity of the camshaft Fig. B.

If the measures taken are not compliant with specifications, replace the shaft.
Specifications Table:

Camshaft	Eccentricity limit
Camshaft on exhaust side	0.02 mm
Camshaft intake side	0.02 mm

B

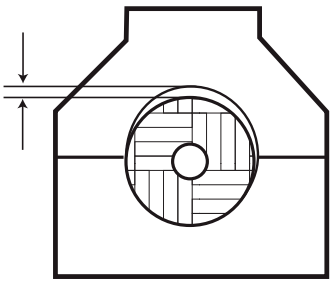


Measure:
- The clearance between camshafts bearing journals and holder Fig. C.

If the measures taken are not compliant with specifications, replace the head and holder block.
Specifications Table:

Camshaft	Clearance between bearing journal and holder
Camshaft on exhaust side	0.03 - 0.06 mm
Camshaft intake side	0.02 - 0.05 mm

C

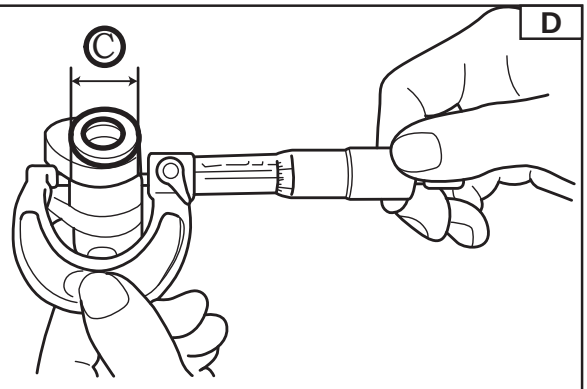


Measure:
- The diameter of the camshaft support Fig. D.

If the measurements taken are not within the specifications, proceed with shaft replacement.
Specifications Table:

Camshaft	Measurement of main bearing (C)
Camshaft on exhaust side	Ø 23 mm (-0.03 / -0.04)
Camshaft intake side	

D



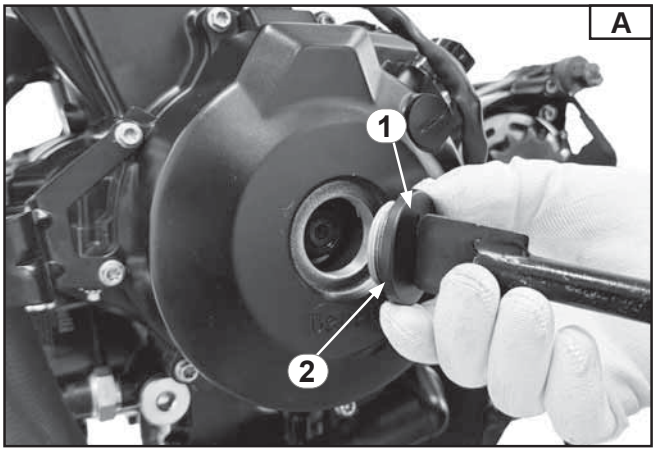
HEAD DISTRIBUTION

INSTALLATION OF INTAKE AND EXHAUST CAMSHAFT

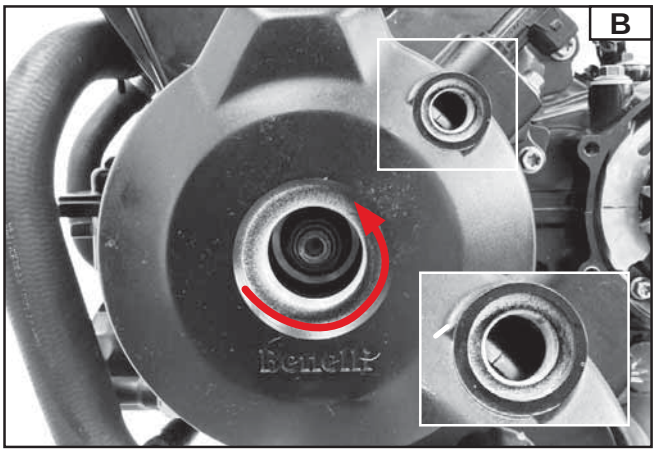
Remove:

- the inspection cap (1) from the flywheel cover via the special tool (2) Fig. A.

Flywheel cover screwdriver
Code: 0320097043000



- Rotate the crankshaft counter-clockwise to view the notch on the flywheel that can be seen from the inspection hole as shown in Fig. B.



HEAD DISTRIBUTION

INSTALLATION OF INTAKE AND EXHAUST CAMSHAFT

Insert:

- The special tool (1) into the spark plug seat of the right cylinder 1 to check the top dead centre Fig. A.

Engine phasing tool
Code: R180197022000

Once the TDC has been identified from the right cylinder 1, proceed to assemble the exhaust camshaft.

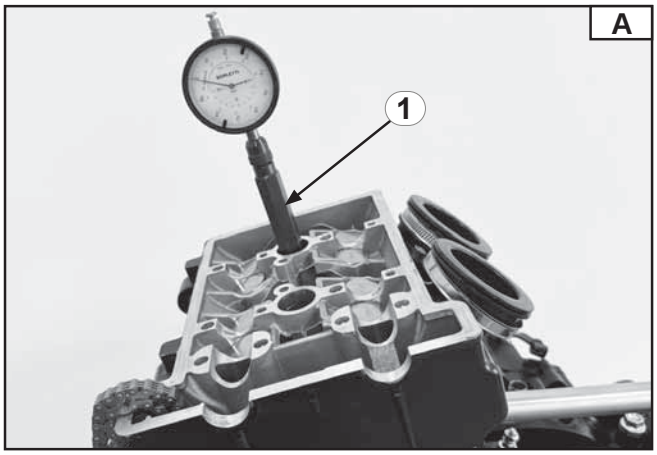
NOTE:
Release the distribution chain and, during the installation stage of the exhaust camshaft, remove the two fixing screws of the gear as shown in Fig. B.

NOTE:
During this assembly, it is important for the camshaft lobes to be placed downwards Fig. D.

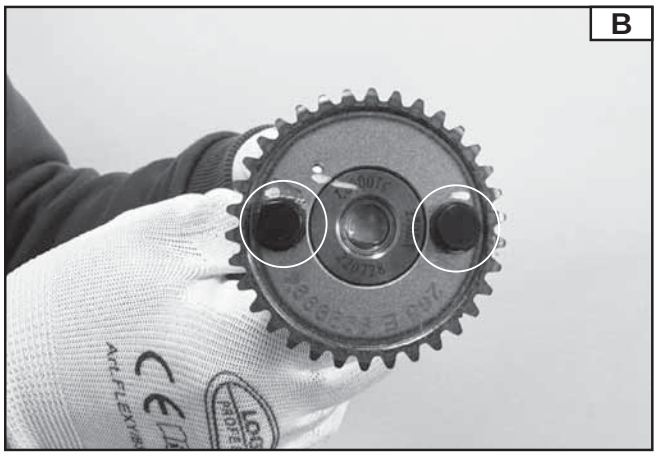
NOTE:
When assembling the holders, it is necessary to lubricate them with special grease to prevent the shafts from rotating dry during initial starting.

	**Teflon-based paste or of other lubricants, as graphite, ceramics.**

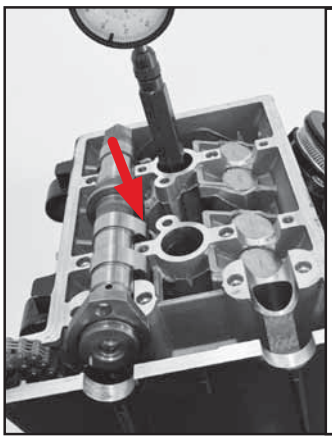
A

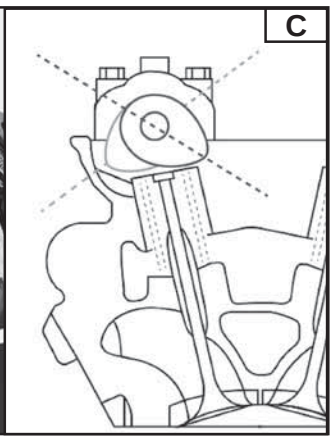


B



C



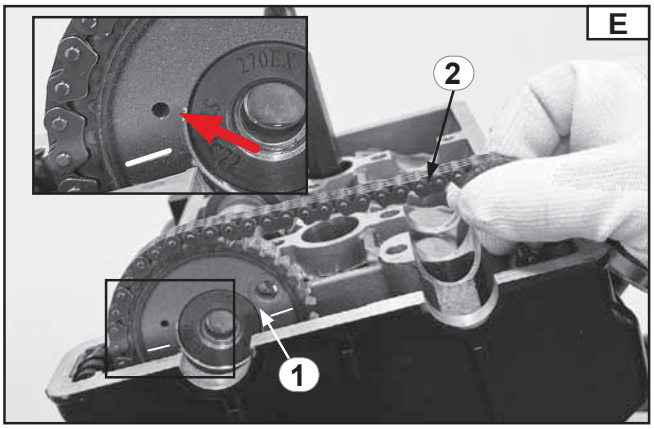


HEAD DISTRIBUTION

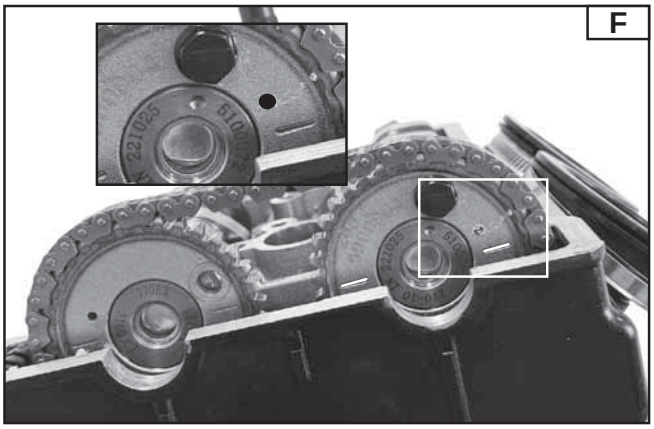
INSTALLATION OF INTAKE AND EXHAUST CAMSHAFT

Place the gear (1) and the distribution chain (2) of the exhaust camshaft on its seat without fixing it, Fig. D.

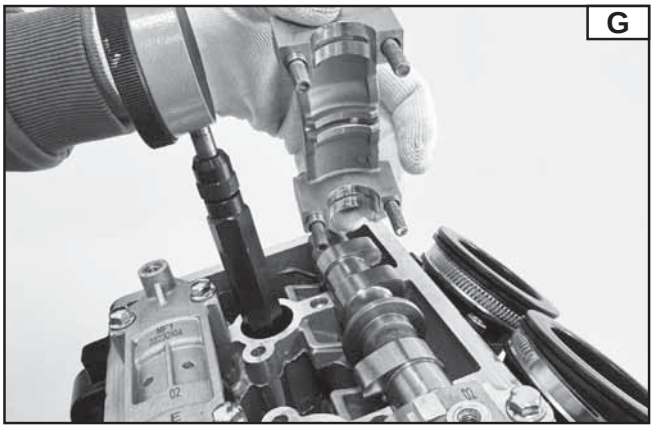
Tension the distribution chain by aligning the notches on the gear with the head surface and the hole on the gear upwards as shown in Fig. E.



Position the intake camshaft with its gear installed and align the notches on the gear with the head surface and the hole on the gear upwards as highlighted in Fig. F.



NOTE:
When assembling the holder Fig. G, it is necessary to lubricate them with special grease to prevent the shafts from rotating dry during initial starting.



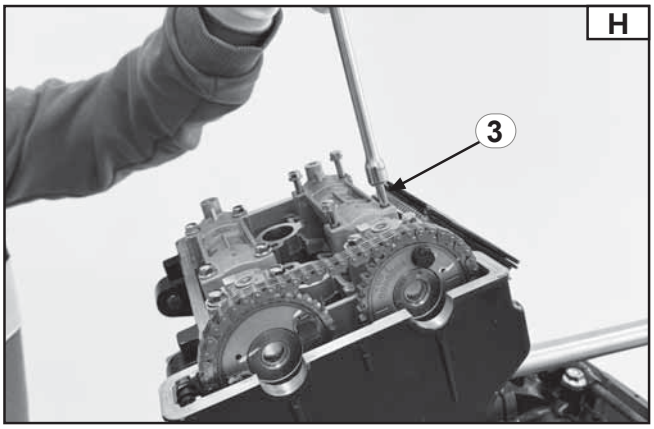
	Sintoflon Grease

Installation of holders:
Proceed using the opposite order to removal.

Tighten:
- The screws (3) Fig. H to the following torque:

Torque 10-13 N*m

NOTE:
Lubricate the screws with copper grease.



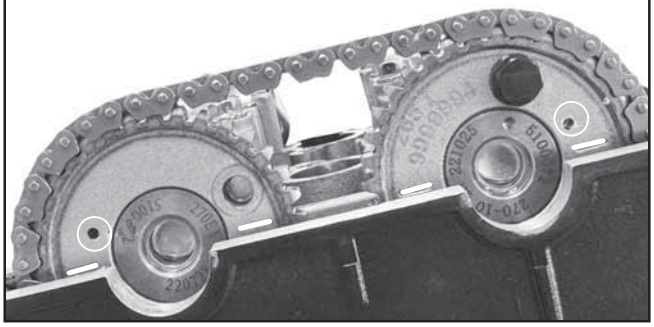
	Copper grease

Install:
- The distribution chain tensioner, refer to “**Assembly of distribution chain tensioner, Chapter 5”.**

HEAD DISTRIBUTION
INSTALLATION OF INTAKE AND EXHAUST CAMSHAFT

Check again the alignment of the notches on distribution gears with the head surface and the position of the holes of the gears, that must be oriented upwards, as shown in Fig. I.

I



Using an open wrench, rotate the exhaust camshaft clockwise until the threaded holes of the exhaust camshaft align perfectly with the corresponding holes on the distribution gear Fig. J.

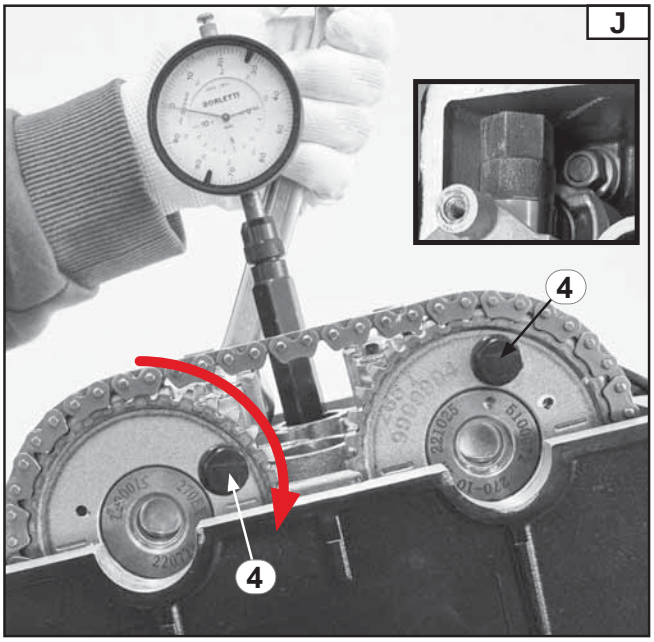
Install:
- The fixing screws (4) Fig. J.

Torque 11 N*m

Use a drop of medium Loctite thread locker only on the threading to secure:

	MEDIUM THREAD LOCKER

J

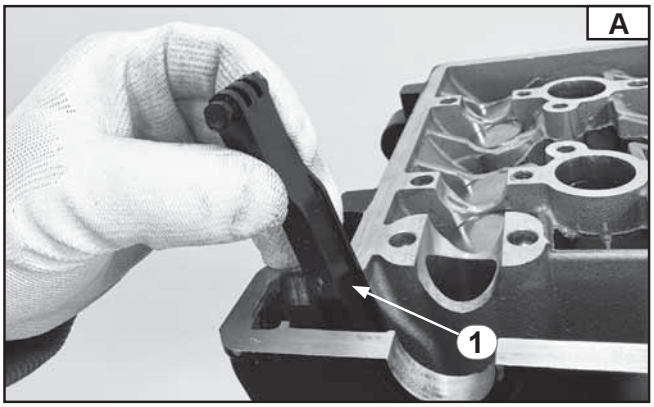


HEAD DISTRIBUTION

REMOVAL OF DISTRIBUTION CHAIN SLIDING SHOES

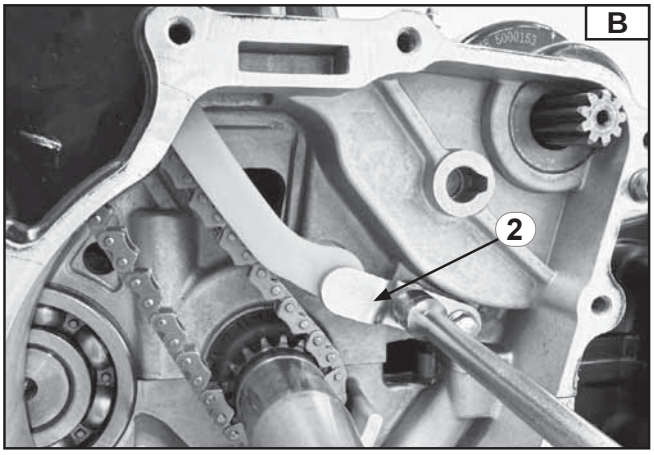
Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The intake and exhaust camshaft, refer to **"Removal of intake and exhaust camshaft, Chapter 5".**
- The flywheel**,** refer to **"Removal of flywheel, Chapter 5".**
- The starter gears, refer to "**Removal of the starter gears, Chapter 5".**

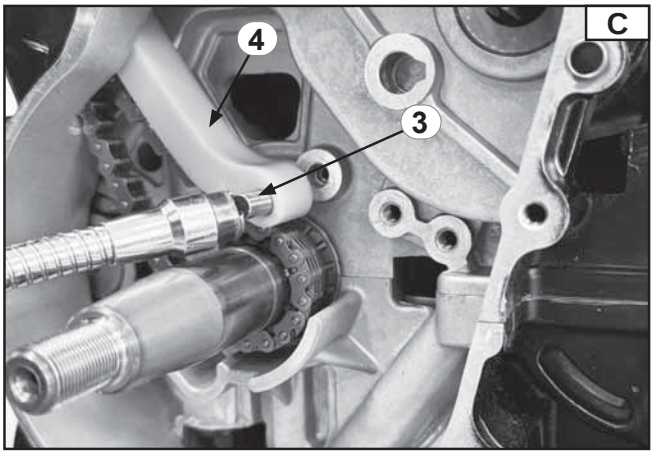


Remove:

- The fixed chain sliding shoe (1) sliding it upwards Fig. A.
- The safety plate (2) Fig. B.



- The fixing pin (3) Fig. C.
- The movable chain sliding shoe (4) Fig. C.



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

INSTALLATION OF DISTRIBUTION CHAIN SLIDING SHOES

Installation:
Proceed using the opposite order to removal.

At the end of assembly, proceed with assembly of the distribution chain tensioner, refer to **"Assembly of distribution chain tensioner, Chapter 5".**

HEAD DISTRIBUTION

REMOVAL OF DISTRIBUTION CHAIN

Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The intake and exhaust camshaft, refer to **"Removal of intake and exhaust camshaft, Chapter 5".**
- The flywheel, refer to **"Removal of flywheel, Chapter 5".**
- The starter gears, refer to **"Removal of starter gears, Chapter 5".**
- The chain sliding shoes, refer to **"Removal of chain sliding shoes, Chapter 5".**

Take out:

- The distribution chain (1) Fig. A.

DISTRIBUTION CHAIN CHECK

NOTE:
The following process can be applied to all of the toothed gears on the camshafts and all of the distribution chain guides.

Check:

- The distribution chain (2) Fig. C B.

In case of damage/lack of flexibility/locked links, replace the distribution chain and camshaft gear block.

Check:

- The elongation of the distribution chain (3) Fig. C.

Tension the distribution chain by applying a 5 kg force (49 Nm) to allow a correct slackening of the link.

Measure:

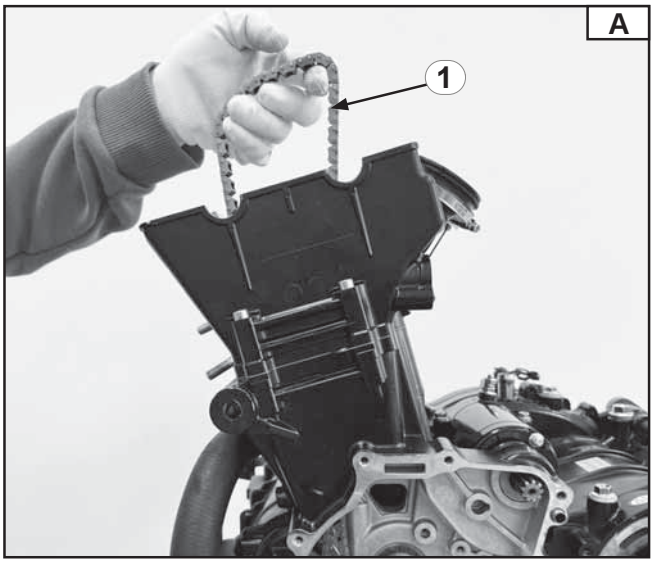
- Use a gauge to measure the length of 19 sections of the chain corresponding to the gap between 20 pins Fig. D.

If the measure exceeds the wear limit, replace the distribution chain and the camshaft gears as a whole.

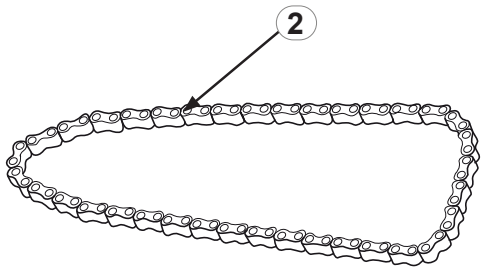
NOTE:
In any case the distribution chain needs to be replaced after 48,000 km (15,534 mi).

Pin 1 - pin 20	Standard	120.65 mm
Pin 1 - pin 20	Service limit	121.85 mm

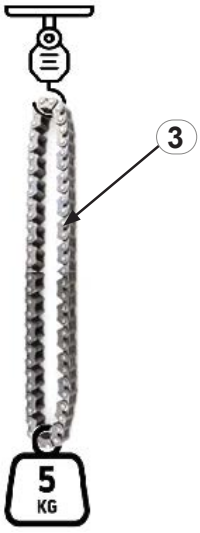
A



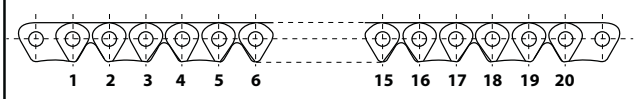
B



C



D



HEAD DISTRIBUTION
INSTALLATION OF DISTRIBUTION CHAIN

Insert:
- The distribution chain (1) onto the camshaft pinion, Fig. A.
- The fixed and movables chain tensioner sliding shoes, refer to **"Assembly of distribution chain, Chapter 5".**
- The two camshafts, making sure that both are mounted with the phasing references on the gears of the shafts parallel to the support surface of the distribution cover Fig. B.

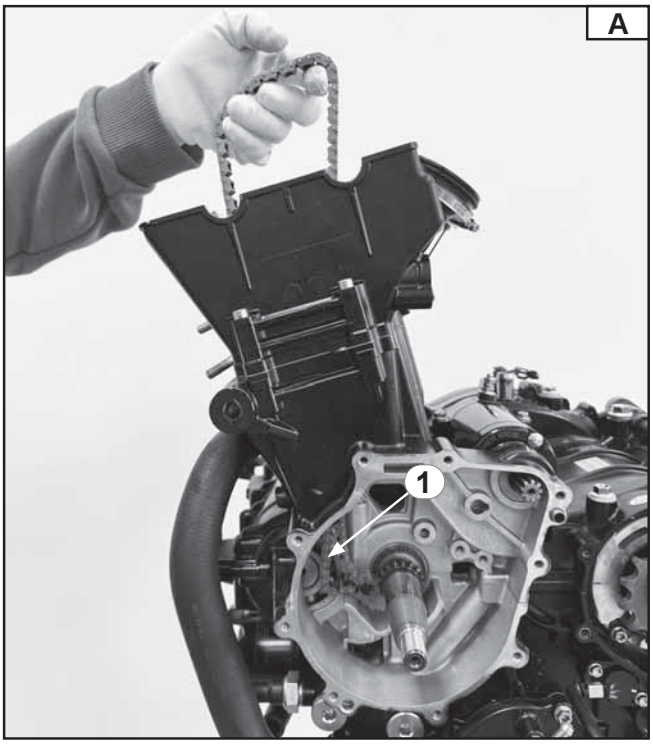
NOTE:
Assembly of the distribution chain must be always carried out by taking into account the fact that the engine must be in the TDC condition Fig. B, refer to section "Installation of intake camshaft, Chapter 5".

Engine phasing tool
Code: R180197022000

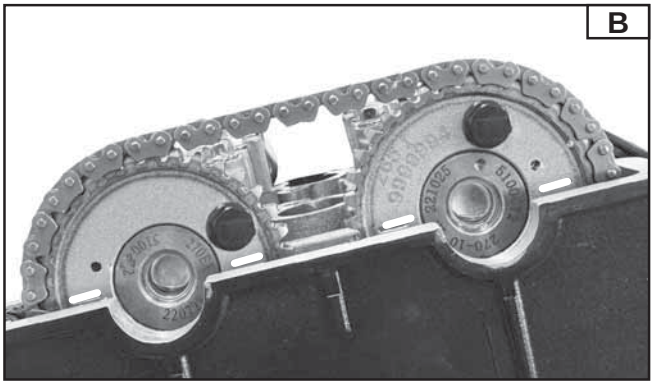
NOTE:
During this operation, it is necessary to lubricate the chain and timing gears with engine oil.

NOTE:
Every time that the chain is replaced, it is also necessary to replace the slides.

A



B



HEAD DISTRIBUTION

ADJUSTMENT OF VALVE CLEARANCE

Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**

NOTE:
Valve clearance must be checked and adjusted when the engine is cool (ambient temperature).

Check:

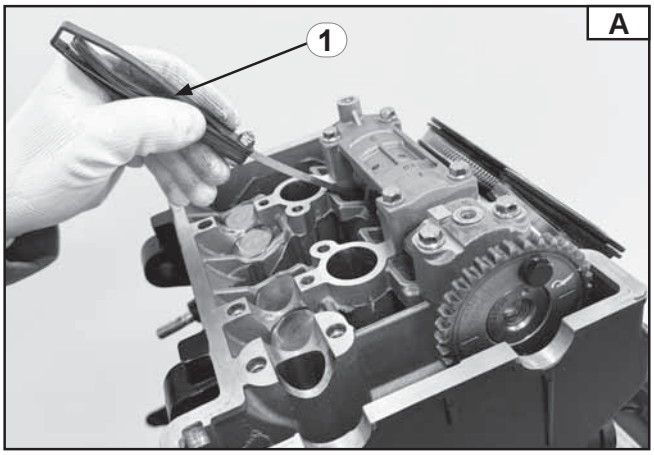
- Use a feeler gauge (1) to check the clearance between the cam and the tappet valve Fig. A.

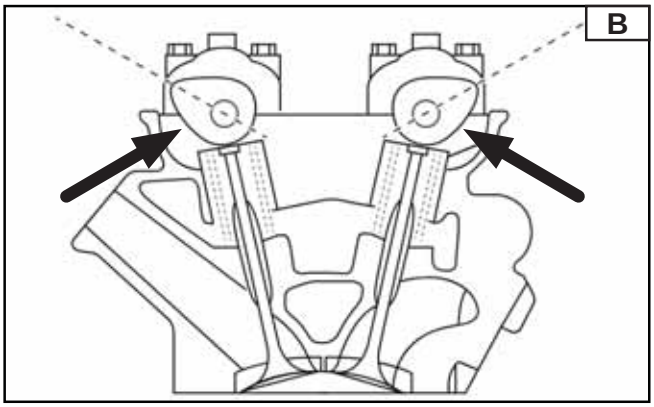
If the measurement is outside specifications, replace the calibrated tappet.

NOTE:
The measurement must be taken on all cams and tappets positioning the cams as in Fig. B.

Camshaft	Tappet-cam clearance
Camshaft on exhaust side	0.20 ~ 0.25 mm
Camshaft intake side	0.15 ~ 0.20 mm

NOTE:
In case of valve clearance correction, replace the calibrated tappet (see following table).





HEAD DISTRIBUTION

REMOVAL OF CALIBRATED TAPPET

Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**

Take out:

- The calibrated tappet (1) via magnet Fig. A.

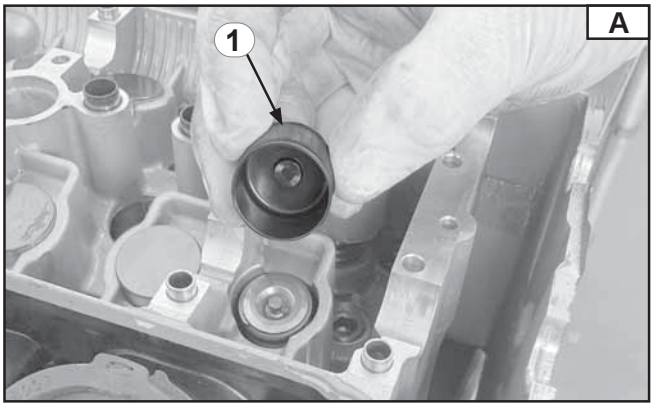
Check:

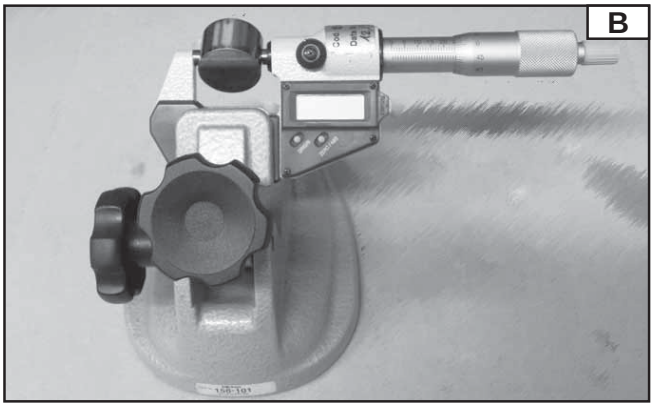
- Visually the calibrated tappet, making sure that there are no damage or lines, otherwise replace.
- Check the outside diameter of the calibrated tappet using a micrometre to exclude any deformation Fig. B.

NOTE:
During installation, lubricate the calibrated tappets.

	**Teflon-based assembly paste or other lubricants, as graphite, ceramics.**

NOTE:
At the end of the check of the parts, always check the valve clearance, refer to "Adjustment of valve clearance, Chapter 5".





HEAD DISTRIBUTION
TABLE OF TAPPET SELECTION (INTAKE SIDE)

Table for selection of the intake valve tappets

Clearance detected (mm)	Tappet installed																			
	410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446
0										410	412	414	416	418	420	422	424	426	428
0.01 ~ 0.02 mm									410	412	414	416	418	420	422	424	426	428	430
0.03 - 0.04								410	412	414	416	418	420	422	424	426	428	430	432
0.05 - 0.06							410	412	414	416	418	420	422	424	426	428	430	432	434
0.07 - 0.08						410	412	414	416	418	420	422	424	426	428	430	432	434	436
0.09 - 0.10					410	412	414	416	418	420	422	424	426	428	430	432	434	436	438
0.11 - 0.12				410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440
0.13 - 0.14			410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442
0.15 - 0.21	Correct clearance																		
0.22 - 0.23	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450
0.24 - 0.25	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452
0.26 - 0.27	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454
0.28 - 0.29	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456
0.30 - 0.31	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458
0.32 - 0.33	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460
0.34 - 0.35	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462
0.36 - 0.37	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464
0.38 - 0.39	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466
0.40 - 0.41	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468
0.42 - 0.43	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470
0.44 - 0.45	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472
0.46 - 0.47	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474
0.48 - 0.49	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476
0.50 - 0.51	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478
0.52 - 0.53	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480

(1 mm = 0.0393701 in)

Example:

- Valve clearance detected (0.30mm)
- Tappet installed (366)

Tappet to be used to obtain the correct clearance 0.15/0.21 (386)

HEAD DISTRIBUTION

TABLE OF TAPPET SELECTION (INTAKE SIDE)

Table for selection of the intake valve tappets

Clearance detected (mm)	Tappet installed																			
	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484	
0	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	
0.01 - 0.02	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	
0.03 - 0.04	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	
0.05 - 0.06	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	
0.07 - 0.08	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	
0.09 - 0.10	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	
0.11 - 0.12	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	
0.13 - 0.14	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	
0.15 - 0.21	Correct clearance																			
0.22 - 0.23	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484			
0.24 - 0.25	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484				
0.26 - 0.27	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484					
0.28 - 0.29	458	460	462	464	466	468	470	472	474	476	478	480	482	484						
0.30 - 0.31	460	462	464	466	468	470	472	474	476	478	480	482	484							
0.32 - 0.33	462	464	466	468	470	472	474	476	478	480	482	484								
0.34 - 0.35	464	466	468	470	472	474	476	478	480	482	484									
0.36 - 0.37	466	468	470	472	474	476	478	480	482	484										
0.38 - 0.39	468	470	472	474	476	478	480	482	484											
0.40 - 0.41	470	472	474	476	478	480	482	484												
0.42 - 0.43	472	474	476	478	480	482	484													
0.44 - 0.45	474	476	478	480	482	484														
0.46 - 0.47	476	478	480	482	484															
0.48 - 0.49	478	480	482	484																
0.50 - 0.51	480	482	484																	
0.52 - 0.53	482	484																		

(1 mm = 0.0393701 in)

HEAD DISTRIBUTION
TABLE OF TAPPET SELECTION (EXHAUST SIDE)

Table for selection of the exhaust valve tappets

Clearance detected (mm)	Tappet installed																		
	410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446
0												410	412	414	416	418	420	422	424
0.01 - 0.02											410	412	414	416	418	420	422	424	426
0.03 - 0.04										410	412	414	416	418	420	422	424	426	428
0.05 - 0.06									410	412	414	416	418	420	422	424	426	428	430
0.07 - 0.08								410	412	414	416	418	420	422	424	426	428	430	432
0.09 - 0.10							410	412	414	416	418	420	422	424	426	428	430	432	434
0.11 - 0.12						410	412	414	416	418	420	422	424	426	428	430	432	434	436
0.13 - 0.14					410	412	414	416	418	420	422	424	426	428	430	432	434	436	438
0.15 - 0.16				410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440
0.17 - 0.18			410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442
0.18 - 0.19		410	412	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444
0.20 - 0.26	Correct clearance																		
0.27 - 0.28	414	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450
0.29 - 0.30	416	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452
0.31 - 0.32	418	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454
0.33 - 0.34	420	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456
0.35 - 0.36	422	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458
0.37 - 0.38	424	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460
0.39 - 0.40	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462
0.41 - 0.42	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464
0.43 - 0.44	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466
0.45 - 0.46	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468
0.47 - 0.48	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470
0.49 - 0.50	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472
0.51 - 0.52	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474

(1 mm = 0.0393701 in)

Example:

- Valve clearance detected (0.11mm)
- Tappet installed (386)

Tappet to be used to obtain the correct clearance 0.25/0.31 (370)

HEAD DISTRIBUTION
TABLE OF TAPPET SELECTION (EXHAUST SIDE)

Table for selection of the exhaust valve tappets

Clearance detected (mm)	Tappet installed																		
	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484
0	426	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462
0.01 - 0.02	428	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464
0.03 - 0.04	430	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466
0.05 - 0.06	432	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468
0.07 - 0.08	434	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470
0.09 - 0.10	436	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472
0.11 - 0.12	438	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474
0.13 - 0.14	440	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476
0.15 - 0.16	442	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478
0.17 - 0.18	444	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480
0.18 - 0.19	446	448	450	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482
0.20 - 0.26	Correct clearance																		
0.27 - 0.28	452	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484		
0.29 - 0.30	454	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484			
0.31 - 0.32	456	458	460	462	464	466	468	470	472	474	476	478	480	482	484				
0.33 - 0.34	458	460	462	464	466	468	470	472	474	476	478	480	482	484					
0.35 - 0.36	460	462	464	466	468	470	472	474	476	478	480	482	484						
0.37 - 0.38	462	464	466	468	470	472	474	476	478	480	482	484							
0.39 - 0.40	464	466	468	470	472	474	476	478	480	482	484								
0.41 - 0.42	466	468	470	472	474	476	478	480	482	484									
0.43 - 0.44	468	470	472	474	476	478	480	482	484										
0.45 - 0.46	470	472	474	476	478	480	482	484											
0.47 - 0.48	472	474	476	478	480	482	484												
0.49 - 0.50	474	476	478	480	482	484													
0.51 - 0.52	476	478	480	482	484														

(1 mm = 0.0393701 in)

HEAD DISTRIBUTION

HEAD REMOVAL

Remove:

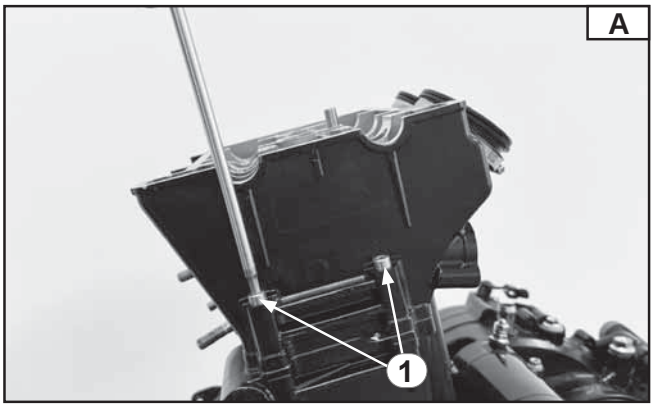
- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The intake and exhaust camshaft, refer to **"Removal of intake and exhaust camshaft, Chapter 5".**
- The chain sliding shoes, refer to **"Removal of chain sliding shoes, Chapter 5".**

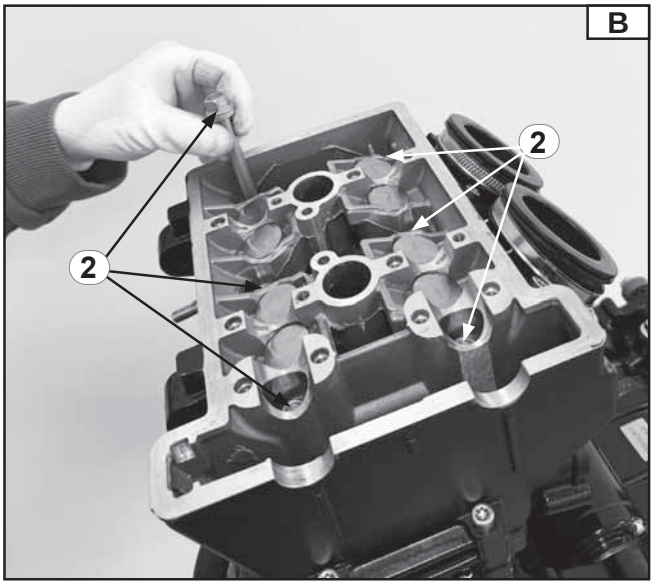
Remove:

- The screws (1) Fig. A.
- The fixing screws (2) Fig. B.

NOTE:
Loosen each screw by ½ turn and then remove all screws.

- Head gasket.





HEAD DISTRIBUTION

VALVE AND VALVE SPRING REMOVAL

Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The intake/exhaust camshaft, refer to **"Removal of intake and exhaust camshaft, Chapter 5".**
- The valve tappet, refer to **"Removal of calibrated tappets, Chapter 5".**
- The head, refer to **"Removal of head, Chapter 5".**
- The valves Fig. A.

The following process is applied to all valves.

NOTE:
Press the spring on each valve with the apposite compression tool (1) Fig. A

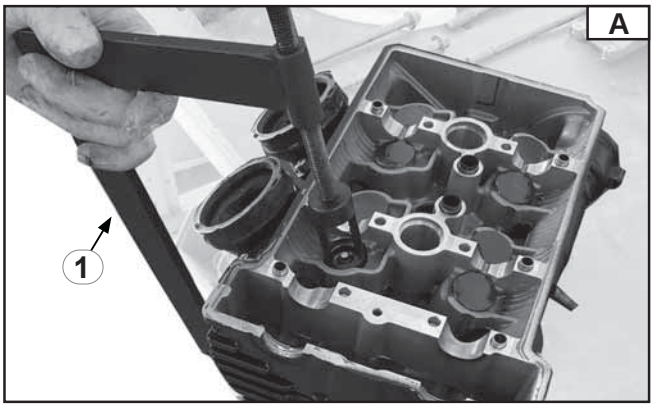


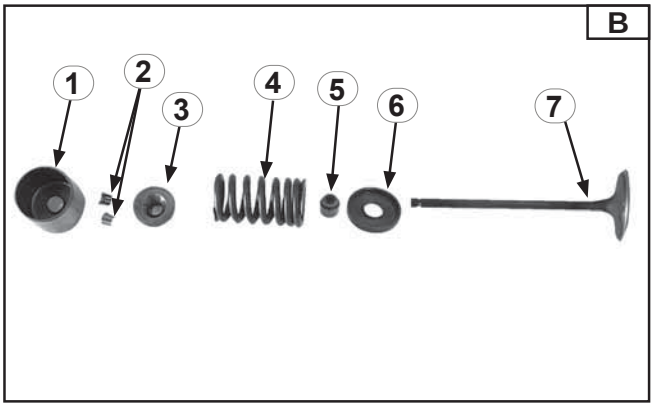
Valve spring compressor tool
Code: 0320097050000

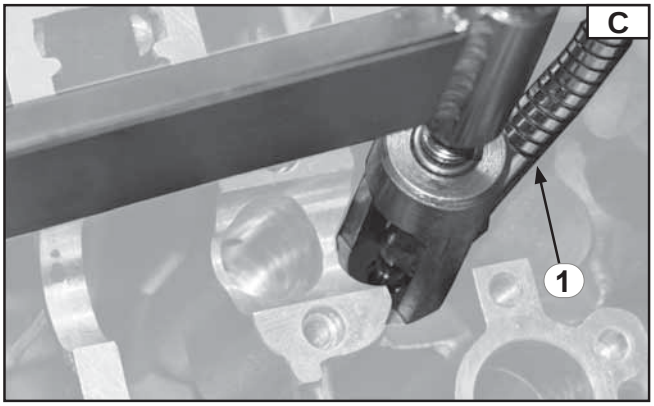
Remove:

- The calibrated tappet (1) Fig. B.
- Cotters (2) Fig. B.
- Top plate (3) Fig. B.
- The spring (4) Fig. B.
- The oil seal (5) Fig. B.
- The bottom plate (6) Fig. B.
- The valve (7) Fig. B.

NOTE:
During removal of the two cotters to lock the valve, use a magnet (1) to recover them Fig. C.







HEAD DISTRIBUTION
VALVE CHECK

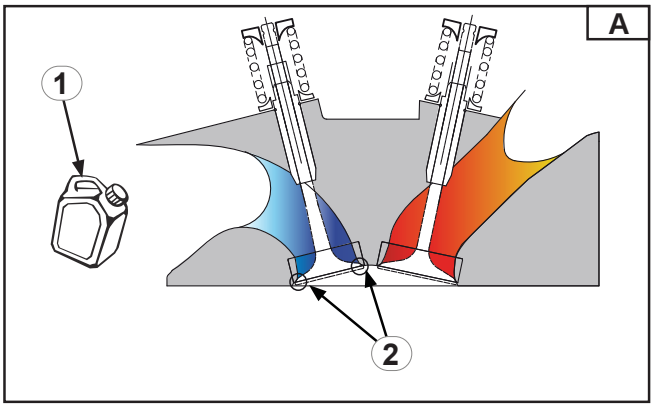
NOTE:
The following process can be applied to all of the valves and valve guides.

Check:
- The valve seals.

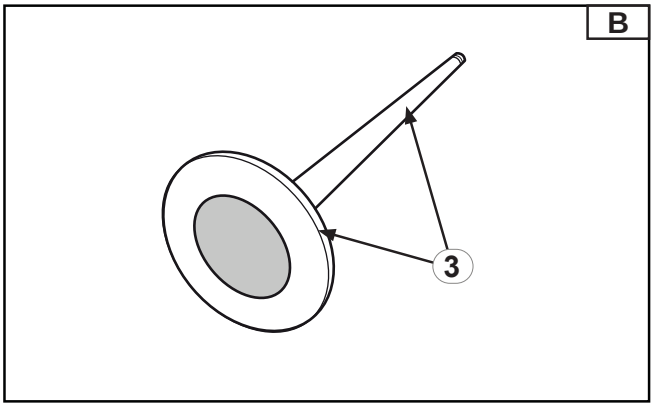
If there are leaks from the valve seats, check the contact surface, the seat and the width of the valve seat.

- Pour clean solvent (1) into the intake/exhaust pipes.
- Make sure the valves have a suitable seal.

NOTE:
There should not be any leaks from the valve seat (2) Fig. A.



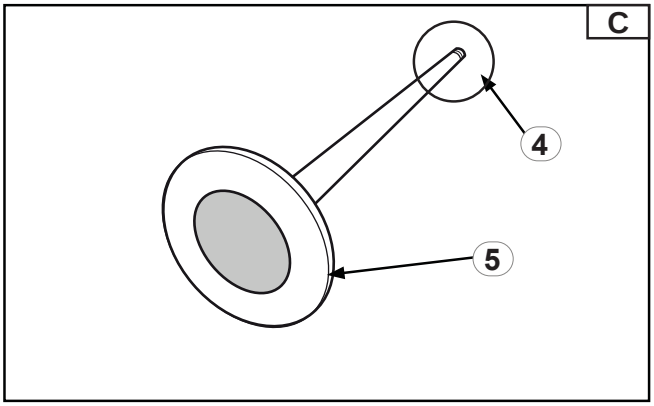
Eliminate:
- The carbon deposits (3) (from the contact surface and the valve seat) Fig. B.



Check:
- The contact surface of the valve (5) Fig. C.

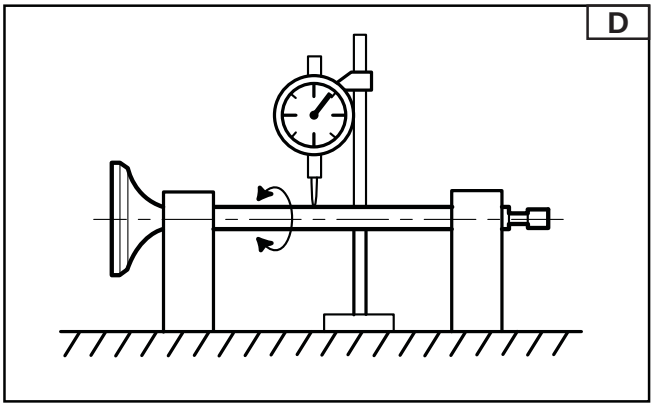
If there is any pitting/wear, grind the contact surface of the valve.
- End of the valve stem (4) Fig. C.

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. D.

If outside specifications, replace the valve.



Valve	Valve stem eccentricity
Intake	0.01 mm (0.00039 in)
Exhaust	

NOTE:
When replacing the valve, always replace the oil seal.

HEAD DISTRIBUTION
VALVE SEAT CHECK

The following procedure applies to all valves and valve seats.

Eliminate:
- The carbon deposits from the contact surface (B) and the valve seat (A) Fig. A.

Check:
- The valve seat (A) Fig. A.

If there are marks/signs of wear, grind the seats or replace the head.

Measure:
- The width of the valve seat (A) Fig. A.

If outside specifications, grind the seats or replace the head.

Valve	Width of valve seat
Intake	0.5 ~ 1.0 mm (0.019 ~ 0.039 in)
Exhaust	0.5 ~ 1.0 mm (0.019 ~ 0.039 in)

- Apply some blue colorant (Dykem) for mechanics to the contact surface of the valve (B) Fig. A.
- 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 Dykem blue pigment will have been removed.

Lap:
- The valve seat Fig. C.

NOTE:
After replacing the head or the valve, it is necessary to lap the seat and contact surface of the valve.

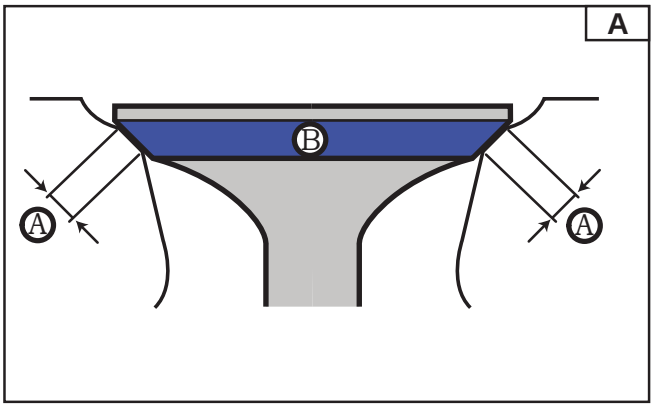
- Apply a paste for adequate lapping of the valve contact surface (C) Fig. B.

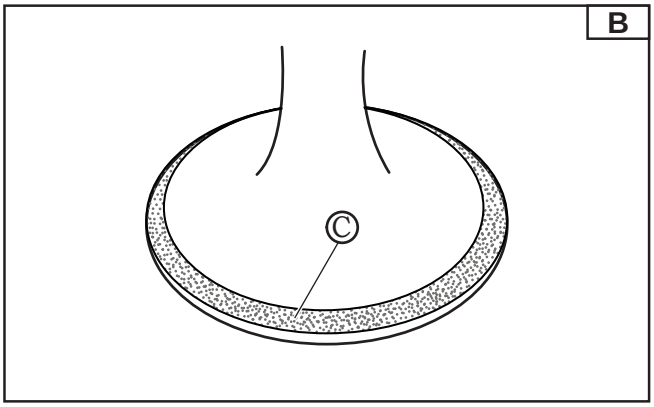
NOTICE

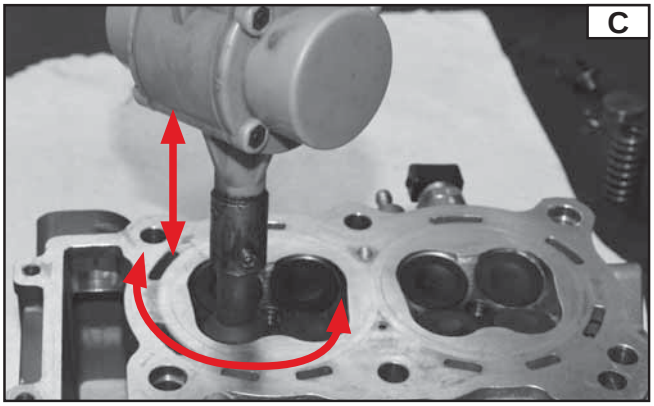
Do not allow the lapping paste to enter the area between the valve stem and the guide.

- 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 C.







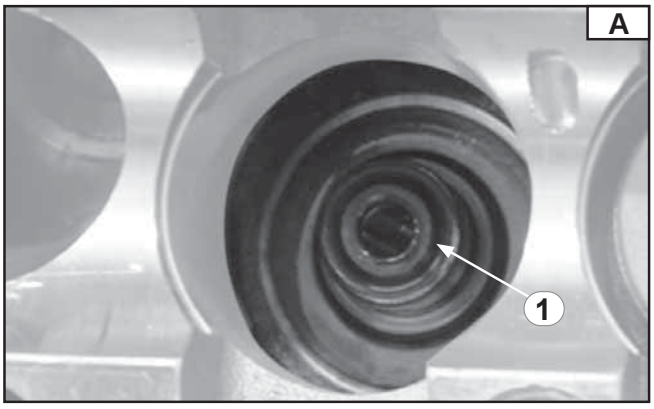
HEAD DISTRIBUTION

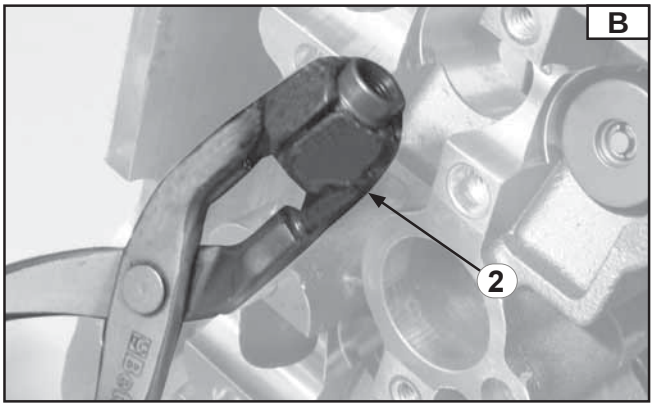
REMOVAL / INSTALLATION OF VALVE OIL SEAL

Remove:
- The valve.

Take out:
- The oil seal (1) Fig. A with the special tool (2) Fig. B.

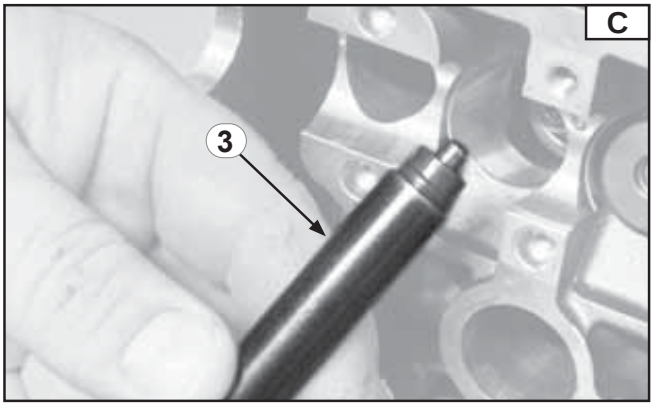
Generic tool for valve oil seal removal.





Install:
- The oil seal with the special tool (3) Fig. C.

Generic tool for valve oil seal insertion pad.



HEAD DISTRIBUTION

CHECK OF VALVE SPRINGS

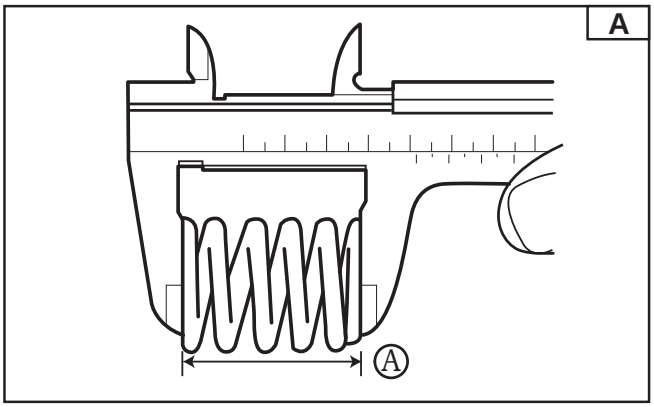
The following process is applied to all valve springs.

Measure:

- The full length of the valve spring (A) Fig. A.

Valve spring	Size (A)
Intake	38.8 mm - 37.3 mm
Exhaust	41.6 mm - 40.1 mm
(1 mm = 0.0393701 in)	

NOTE:
If not compliant with specifications, replace the valve spring.



HEAD DISTRIBUTION

INSTALLATION OF VALVES AND VALVE SPRINGS

Install into the head:

NOTE:
Lubricate the valve stem and the oil seal Fig. A2.

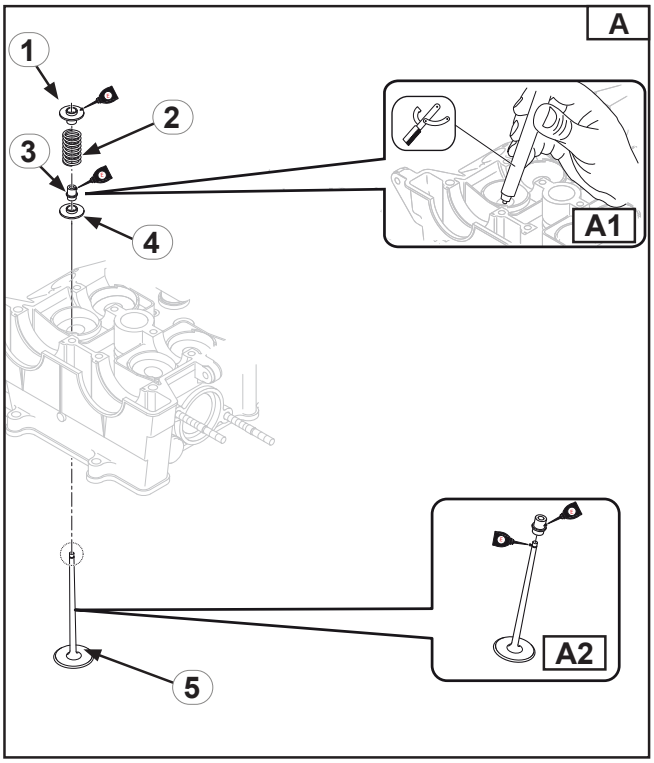
	ENGINE OIL

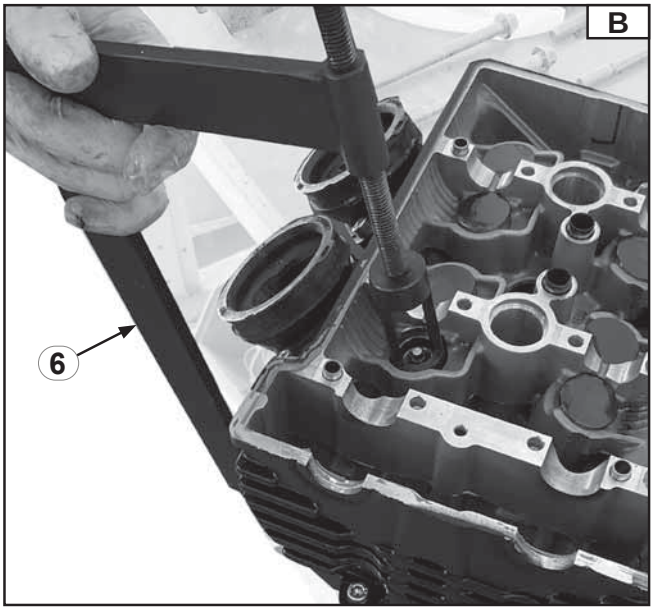
- The valve bottom spring plate (4) Fig. A.
- The valve oil seal (3) Fig. A1, refer to "**Removal / installation of the valve oil seal, Chapter 5**".
- The valve (5) Fig. A.
- The valve spring (2) Fig. A.
- The valve top spring plate (1) Fig. A.
- The cotters.

NOTE:
Make sure that every valve has been remounted in its original position.

NOTE:
Press the spring on each valve with the apposite compression tool (6) Fig. B for installation of the cotters.

Valve spring compressor tool.
Code: 0320097050000





HEAD DISTRIBUTION

INSTALLATION OF VALVES AND VALVE SPRINGS

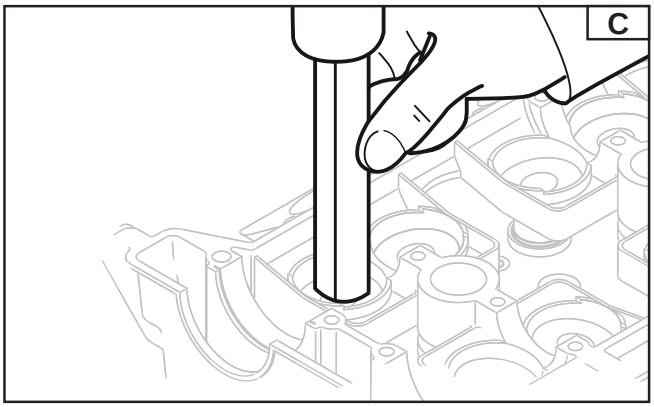
Secure:

- The cotters on the valve stems.

Gently tap on the valve tip with a soft hammer, Fig. C.

NOTICE

Hitting the valve tip with too much force could damage the valve.



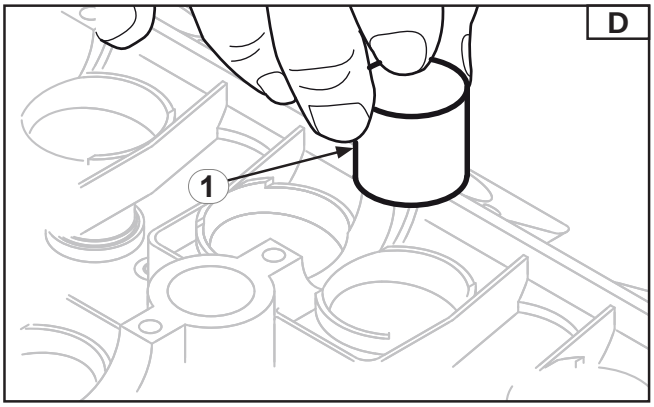
Install:

- The calibrated bucket (1) Fig. D.

NOTE:
Lubricate the tappet with MOLYKOTE with graphite.
Manually turn the tappet, which must slide smoothly.
Reassemble each calibrated tappet to its original position.

	**GRAPHITE-BASED GREASE**

The following process applies to all of the valves and relevant components.



HEAD DISTRIBUTION
CYLINDER CHECK

NOTE:
The following procedure applies to the whole cylinder group.

Remove:
- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The head, refer to **"Removal of the head, Chapter 5".**

Check:
- The cylinder wall 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:
- 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 limit.
CYLINDER bore (C) = 70.50 (+0.00, +0.01)

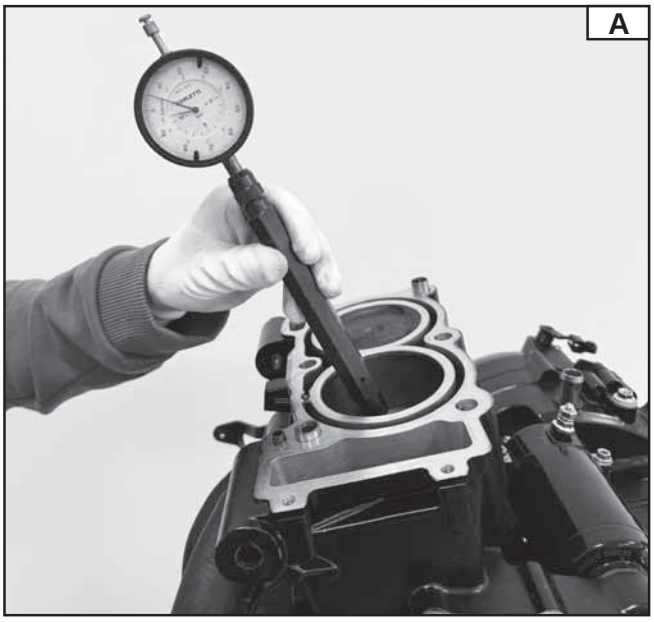
C=Max D1 or D2

Limit taper:
- Max D1 = 0.05 mm
- Max D2 = 0.05 mm
- Max D3 = 0.05 mm
- Max D4 = 0.05 mm
- Max D5 = 0.05 mm

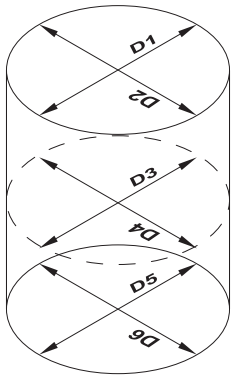
Max. opalization:
- Max D1 = 0.05 mm
- Max D2 = 0.05 mm
- Max D3 = 0.05 mm
- Max D4 = 0.05 mm
- Max D5 = 0.05 mm

Max difference between the cam and the piston:
- Max = 0.1 mm Limit 0.065 mm

A



B

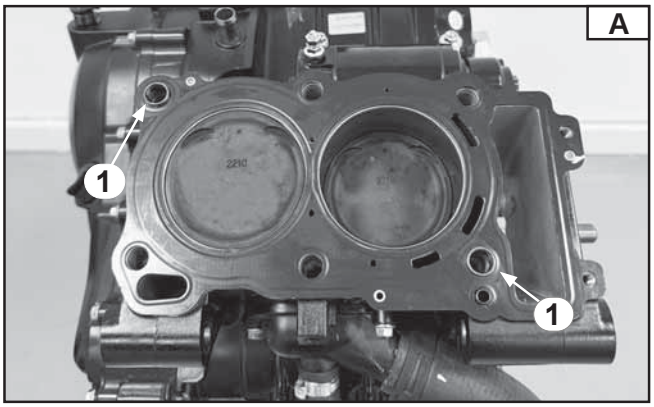


HEAD DISTRIBUTION
INSTALLATION OF HEAD

Check:
- The centring bushes (1) are in position Fig. A.

Position:
- The head.

Before assembling the head, replace the gasket.

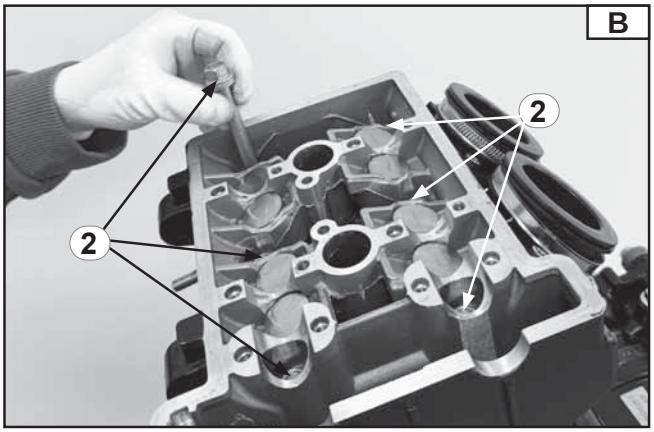


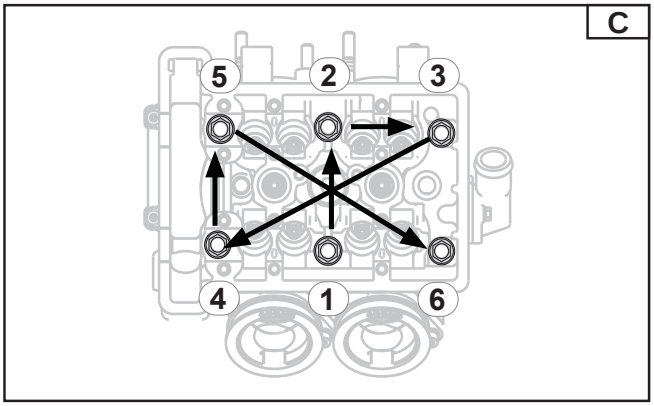
Tighten:
- The screws (2) Fig. B following the sequence stated in Fig. C in two stages:

NOTE:
During assembly of the head, lubricate the head screws with copper grease.

	COPPER GREASE

Step one:
Torque 12.5 N*m
Step two:
Torque 25 N*m
Step three:
Torque 55 N*m

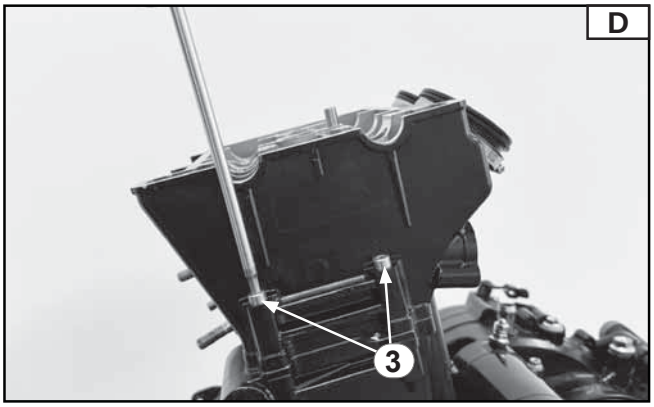




Tighten:
- The screws (3) Fig. D to the following torque:

Torque 12 N*m

NOTE:
During assembly of the head, lubricate the head screws with copper grease.



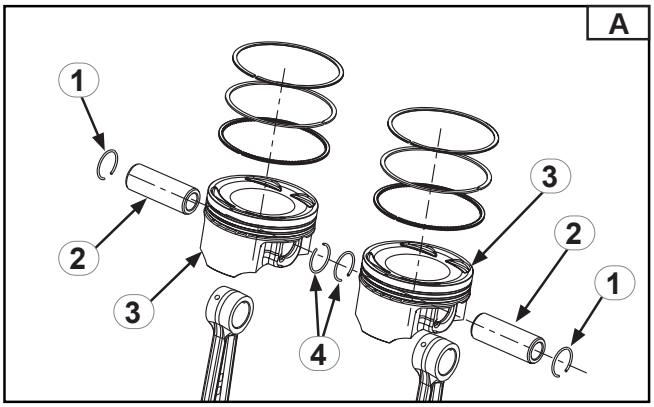
PISTONS

PISTON REMOVAL

NOTE:
The following procedure can be applied to all pistons.

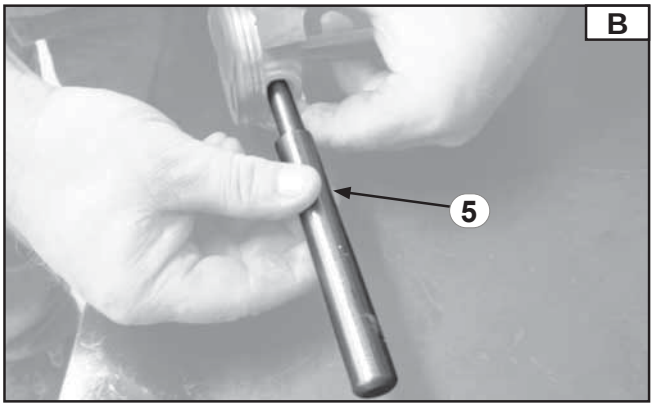
Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The head, refer to **"Removal of head, Chapter 5".**
- The top crankcase, refer to **"Removal of connecting rods, Chapter 5".**
- The outer snap ring (1) Fig. A.
- The piston pin (2) Fig. A.
- The piston (3) Fig. A.
- The inner snap ring (4) Fig. A.
-



NOTE:
To remove the piston pin, use a pad (5) Fig. B.

NOTE:
Never use hammers to remove the pins.



PISTONS

PIN CHECK:

The following procedure applies to all piston pins.

Check:

- The piston pin.

If there is blue discolouration or grooves, replace the piston pin and check the lubrication system.

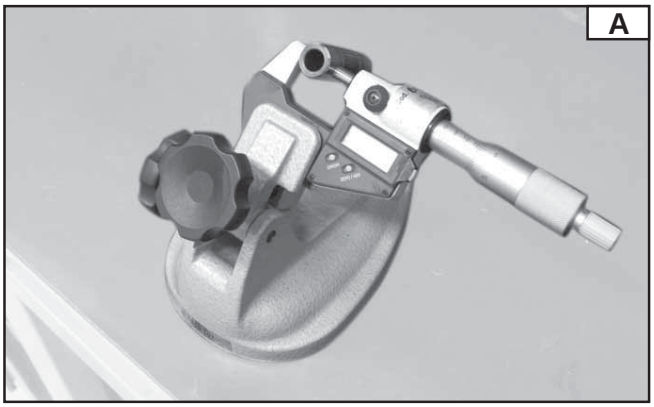
Measure:

- The outer diameter of the piston pin Fig. A via the measure tool.

If outside the specifications, replace the piston pin.

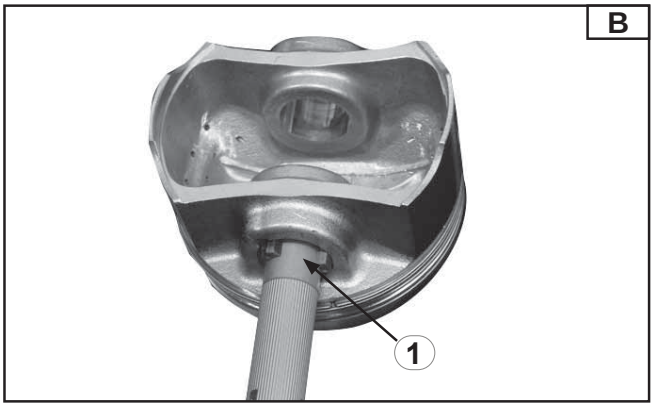
- The inner bore diameter of the piston pin (1) Fig. B.

If outside specifications, replace the piston.



Pin OD	
Standard	16.994 mm - 17.000 mm (0.669 - 0.669 in)
Limit	16.980 mm (0.668 in)

Piston ID	
Standard	17.004 mm - 17.010 mm (0.669 - 0.669 in)
Limit	17.020 mm (0.670 in)



PISTONS
PISTON RING CONTROL

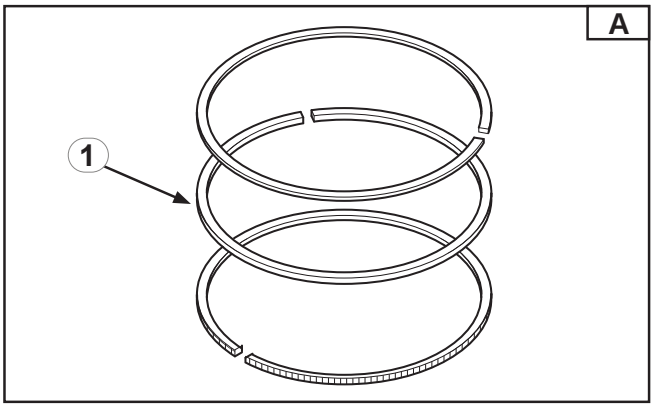
NOTE:
The following procedure can be applied to all elastic rings (1) Fig. A.

Check:
- The absence of lines and traces of forcing on each ring (1) Fig. A.

If outside specification, replace the relevant rings and pistons.

NOTE:
Before measuring side clearance between the piston rings, remove any carbon deposits from the piston rings and grooves.

A



Measure:
- The side clearance between piston rings, using a thickness gauge Fig. B.

If outside specifications, replace the cylinder and the relevant rings all together.

B

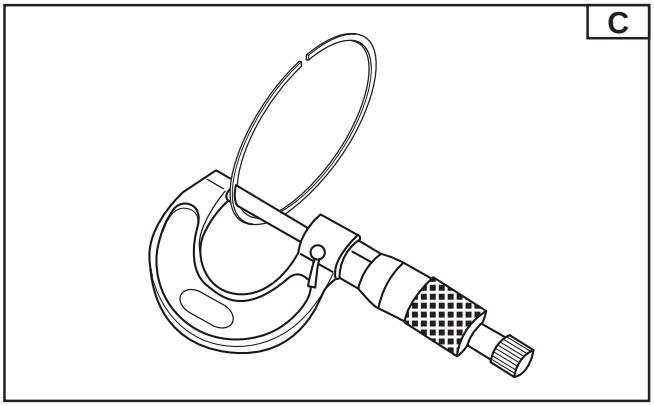


Ring	Piston ring side clearance.
Top ring	0.04 - 0.08 mm Limit 0.07
Second ring	0.05 - 0.09 mm Limit 0.07

Measure:
- The thickness of the top ring.
- The thickness of the second ring.

Refer to Fig. C.

C



Ring	Piston ring thickness
Top ring	0.8 -0.01/-0.03 mm
Second ring	0.8 -0.02/-0.04 mm

PISTONS
PISTON CHECK

NOTE:
The following procedure can be applied to both pistons.

Check:
- The wall of the piston (1) Fig. A.

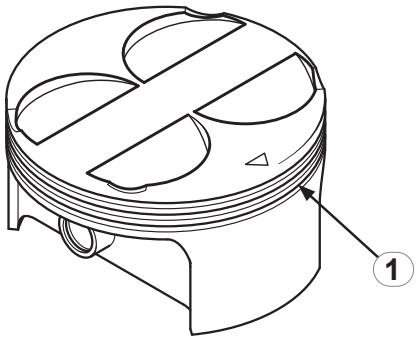
If there are any vertical lines, replace the piston all together with the relevant rings.

Measure:
- The diameter of the piston skirt (2) with a micrometre, considering a distance from the bottom edge of around 10.5 mm Fig. B.

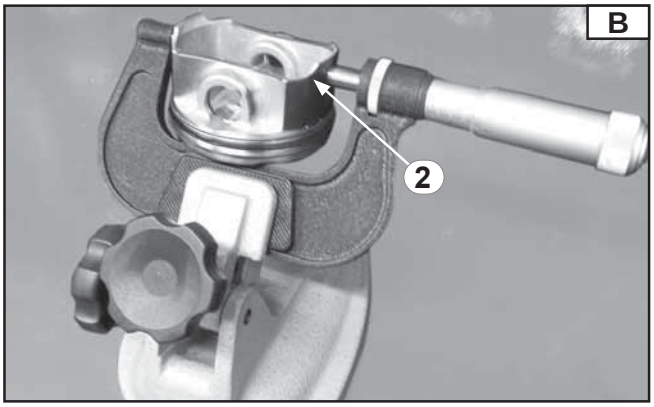
Piston skirt
Ø 70.50 (-0.025 / -0.03)

If outside specifications, replace the cylinder and the relevant rings all together.
If outside specifications:
Wrong tolerance (excessive) between the piston and the cylinder, limit max 0.100 mm.

A



B



PISTONS
PISTON ASSEMBLY

The following procedure applies to all pistons.

Install in the following order Fig. A:
- The composite “oil scraper” ring (1).
- The second ring (2).
- The top ring (3).

NOTE:
The first and second ring are marked with the letter DY on the top side and PVD Fig. A.
Remember to install the piston rings so that the letters are facing upwards Fig. B.
Lubricate the rings with engine oil during the insertion stage.

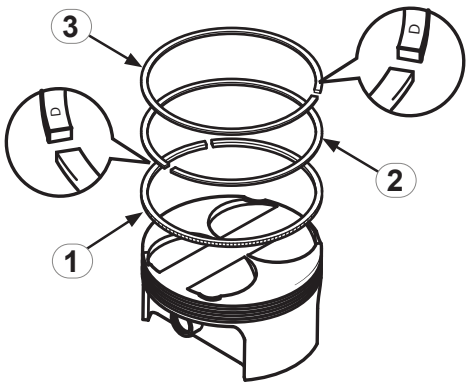
The first element to insert in the oil scraper slot is the spacer (D) Fig. C.
After positioning the shim, insert its side rings (E) Fig. B. C.

NOTE:
The shim and side rings have no top or bottom side, meaning they can be inserted in any way.

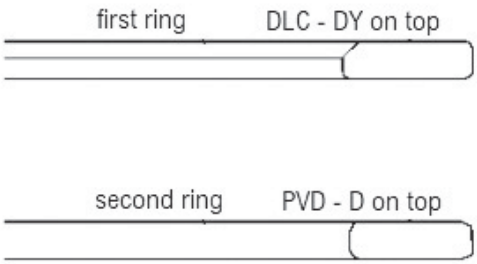
NOTICE

When installing the spacer, make sure that its ends do not overlap in the slot Fig. D.

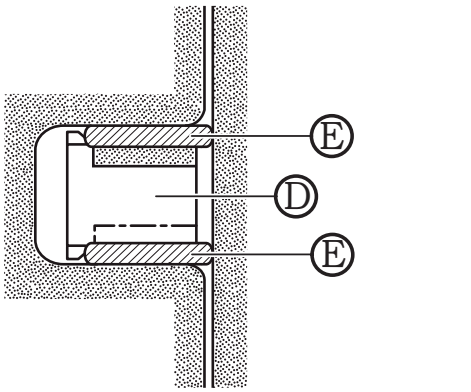
A



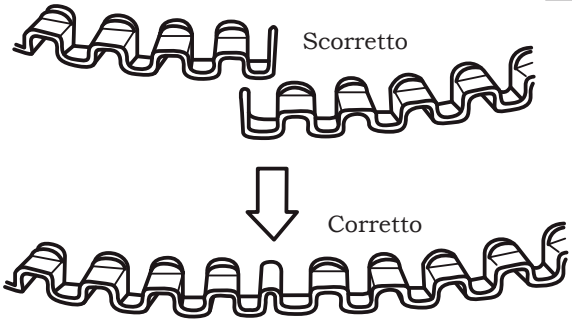
B



C



D

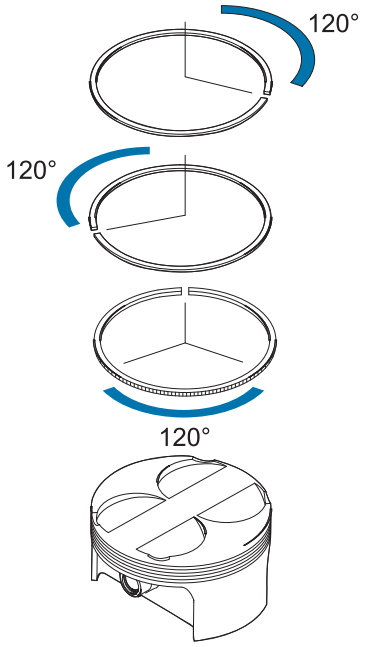


PISTONS

PISTON ASSEMBLY

NOTE:
The assembly of the rings must be made according to the position of the notches according to the order shown in Fig. E

E



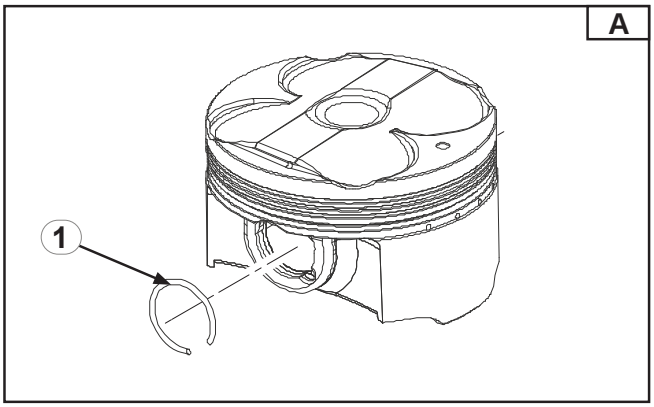
PISTONS
INSTALLATION OF PISTON

Position:
- The internal spring (1) Fig. A.

Insert:
- The piston (1) into the corresponding cylinder (2) Fig. B.

To insert the pistons into the cylinders, it is necessary to use a specific ring clamp tool to hold the rings.
Generic ring clamp tool.

A

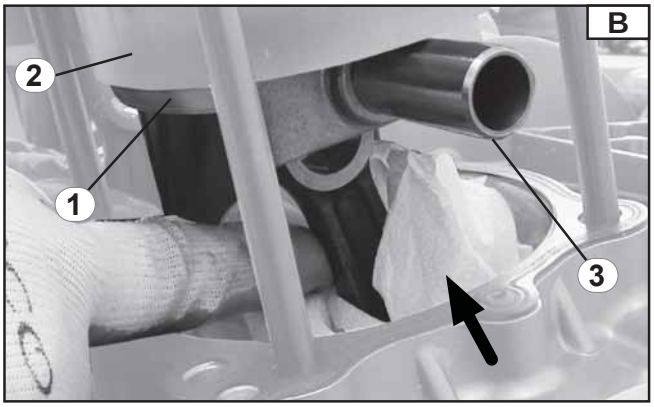


Insert:
- The pin (3) Fig. B.

NOTE:
Place some paper to avoid possible falls of parts into the engine Fig. B.

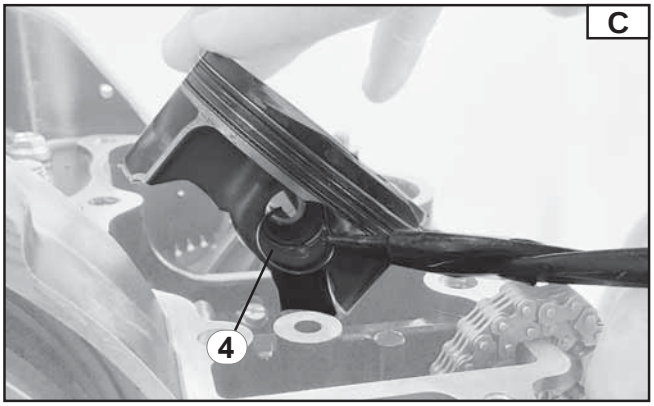
NOTE:
During this stage, lubricate parts with engine oil

B



Insert:
- The outer spring (4) Fig. C.

C

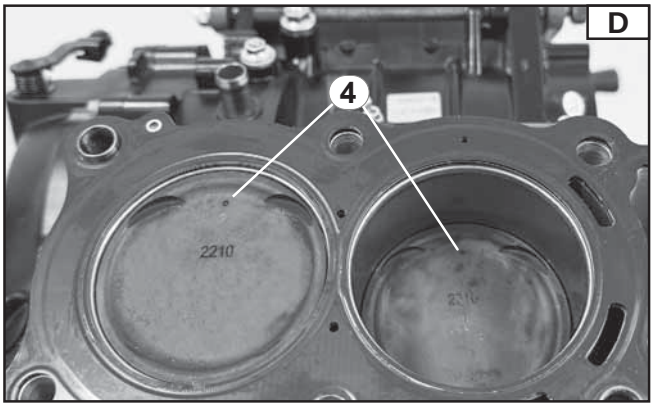


NOTICE

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 (4) Fig. D is facing in correspondence of exhaust.

NOTE:
Insert also the insertion of the second piston into the second cylinder as previously described.

D



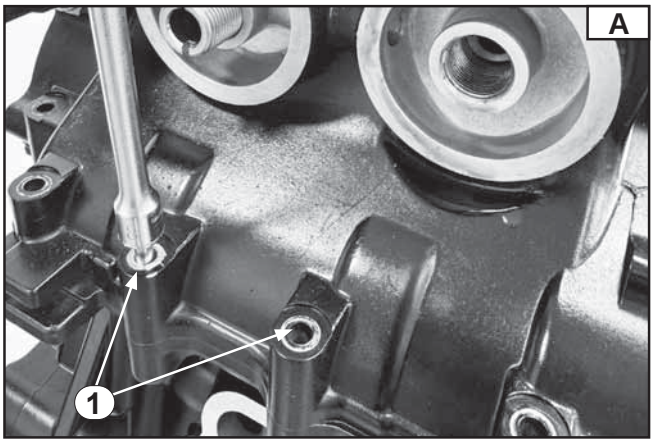
CRANKCASE

REMOVAL OF CONNECTING RODS

Remove:

- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The exhaust camshaft, refer to **"Removal of exhaust camshaft, Chapter 5".**
- The intake camshaft, refer to **"Removal of intake/exhaust camshaft, Chapter 5".**
- The head, refer to **"Removal of head, Chapter 5".**
- The flywheel, refer to **"Removal of flywheel, Chapter 5".**
- The movable chain sliding shoe, refer to **"Removal of chain sliding shoes, Chapter 5".**
- The clutch, refer to **"Removal of clutch, Chapter 5".**
- The oil sump, refer to **"Removal of oil sump, Chapter 5".**
- The oil pump, refer to **"Removal of oil pump, Chapter 5".**

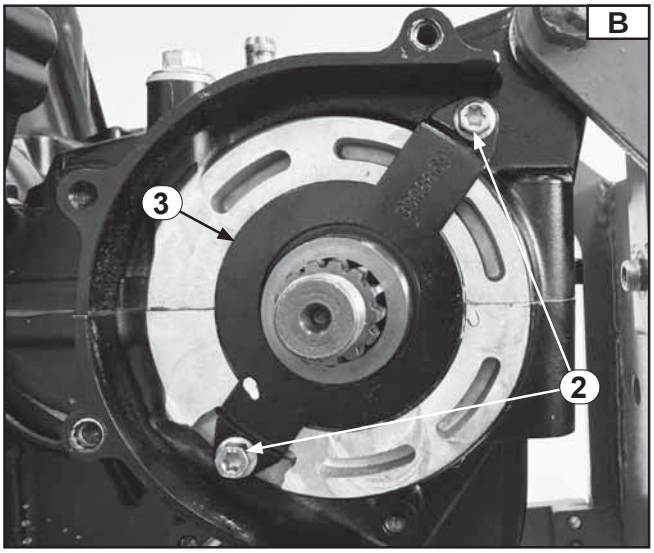
A



Remove:

- The screws (2) of the pinion oil seal retaining flange (3) Fig. B.

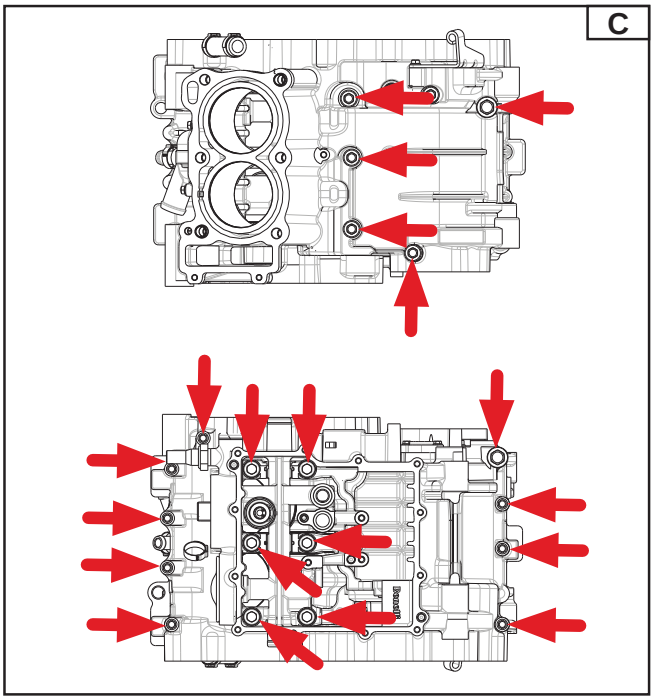
B



Remove:

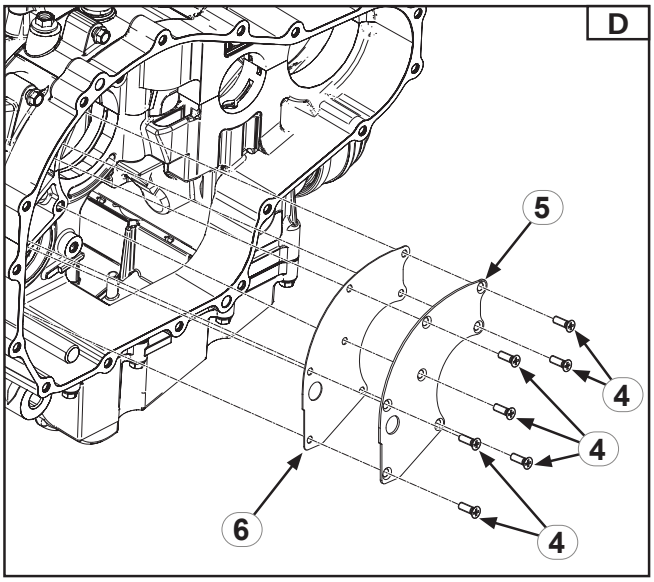
- The crankcase screws Fig. C.

C

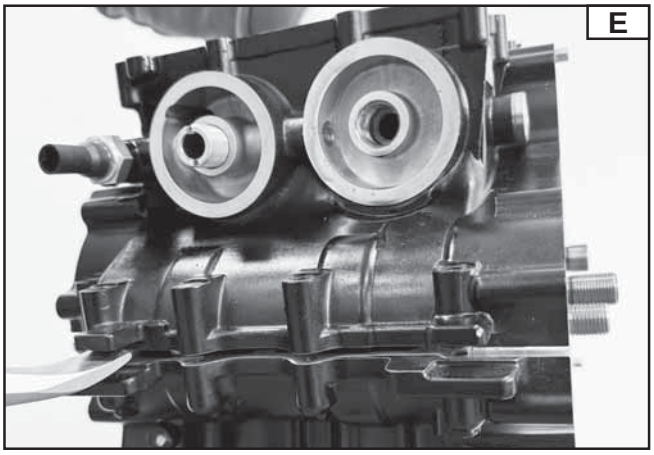


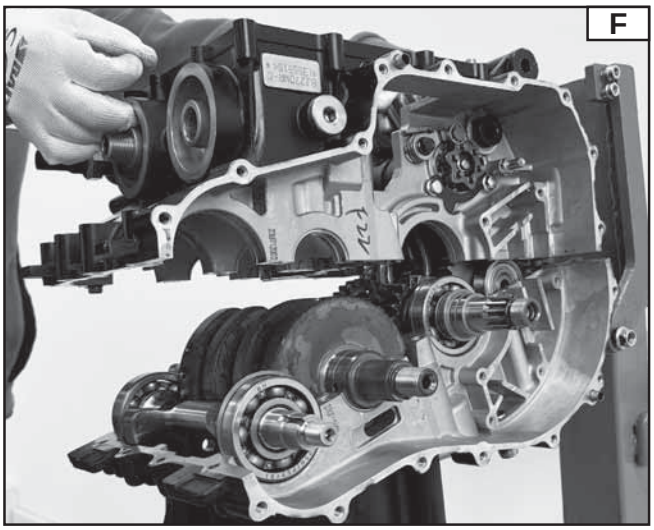
CRANKCASE
REMOVAL OF CONNECTING RODS

Remove:
- The screws (4) Fig. D.
- The plate (5) Fig. D.
- The gasket (6) Fig. D



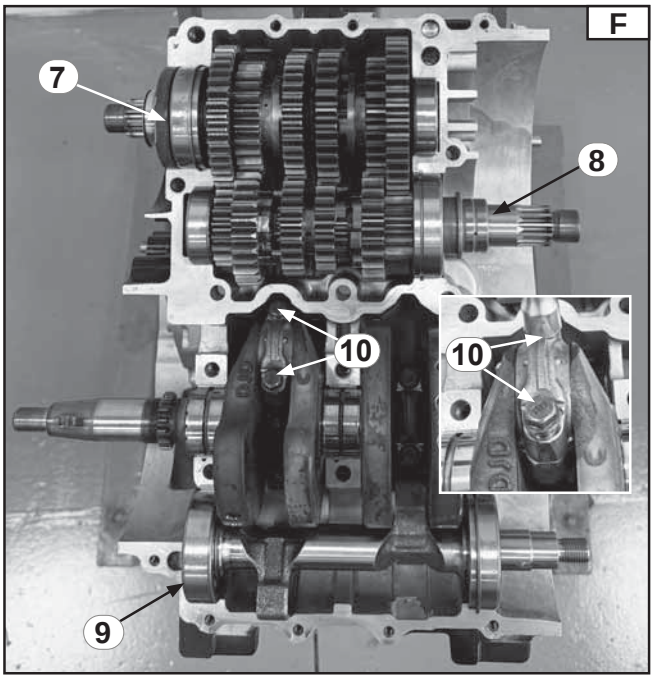
Raise:
- The top crankcase by levering as shown in Fig. E and remove Fig. F.





CRANKCASE
REMOVAL OF CONNECTING RODS

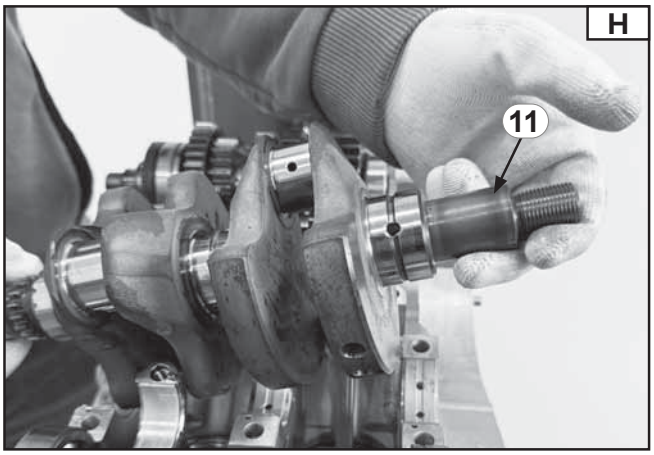
Remove:
- The gearbox output shaft (7) Fig. G.
- The main shaft (8) Fig. G.
- The balance shaft (9) Fig. G.
- The connecting rod screws (10) Fig. G.



Take out:
- The crankshaft (11) Fig. H.

Slide out:
- The connecting rods, including the pistons, from the cylinder group.

Remove:
- The pistons, refer to **"Removal of pistons, Chapter 5".**

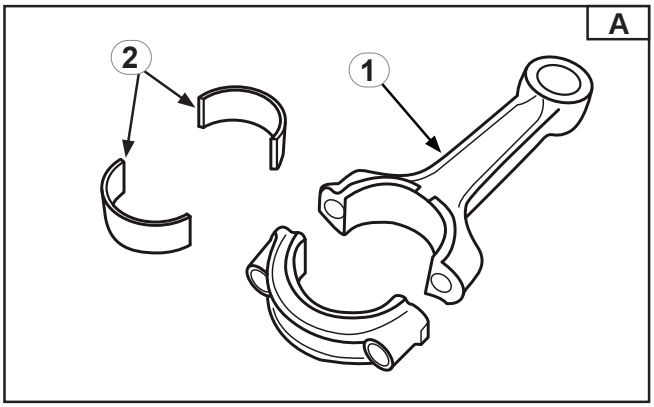


CRANKCASE

CHECK OF CONNECTING RODS AND CONNECTING ROD HALF BEARING

Check:

- For any breakages or excessive clearance on the connecting rod (1) and half bearings of the connecting rod big end (2) Fig. A.

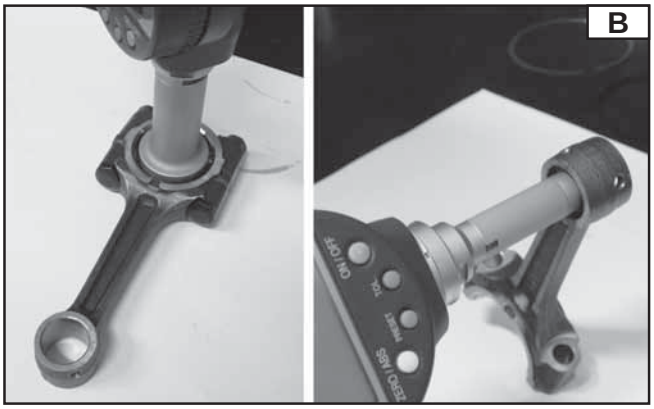


Measure:

- It is also necessary to measure the internal dimension of the connecting rod big end to check for any anomalies using the special gauge on the market Fig. B. Before measuring, assemble the connecting rod big end, tightening the screws at 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
Connecting rod big end	Ø 32.6 mm (0.0/ 0.1)
Connecting rod small end	Ø16.6mm (0.0/ 0.1)
(1 mm = 0.0393701 in)	

For selecting the bushes of the connecting rod, refer to the table below.

CRANKCASE

CONNECTING ROD AND CONNECTING ROD HALF BEARING INSTALLATION

Install:
- connecting rod big end half bearing

NOTE:
Align the projections (2) on the half bearings with the reference marks (1) in the connecting rod and the relevant cap Fig. A.

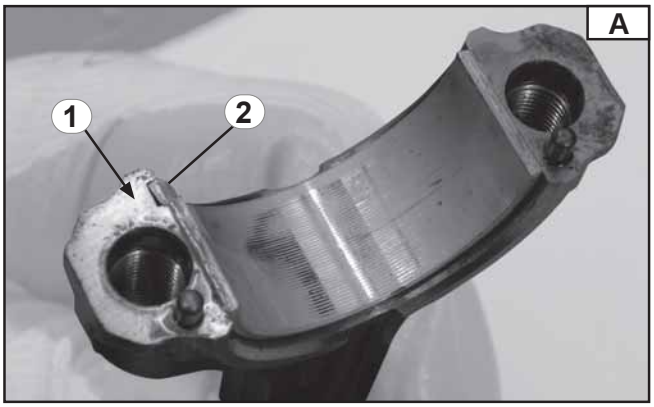
NOTE:
Do not mix up the connecting rod bushings and the connecting rods. To achieve the correct clearance between the connecting rod support and the big end half-bearing and to prevent engine damage, the connecting rod big end half bearings must be mounted in their original positions Fig. B.

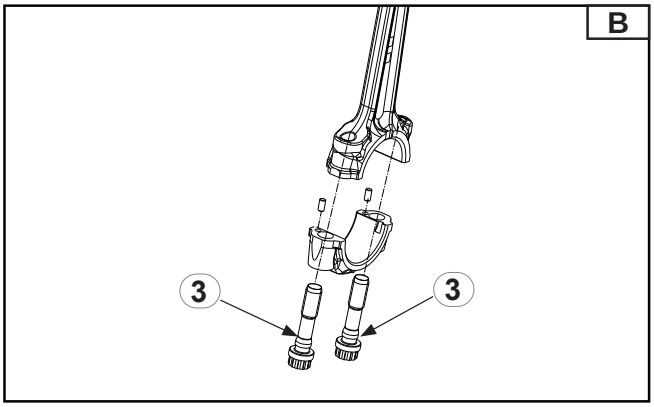
Install:
- The fixing screws (3) Fig. B and tighten to the following torque:

Step one:
Torque 12 N*m
Step two:
Torque 20 N*m
Step three:
Torque 30-33 N*m

NOTE:
Apply molybdenum disulphide oil to the threads and the surfaces of the nuts and the bolts of the connecting rod big ends.

NOTE:
Every time that the connecting rod big end is assembled, it is necessary to replace the fastening screws.





CRANKCASE

MAIN HALF BEARING AND DRIVE SHAFT INSTALLATION

Clean:

- The main half bearing (1) Fig. A.

Install:

- The main half bearings (1) in the relevant seats from the top and bottom crankcase Fig. A.

NOTE:
Align the projections of the main half bearings with the slots in the crankcase (2) Fig. A.

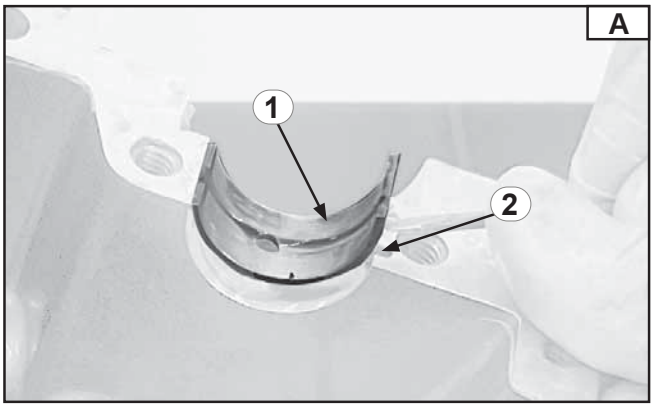
Use copper grease for assembly.

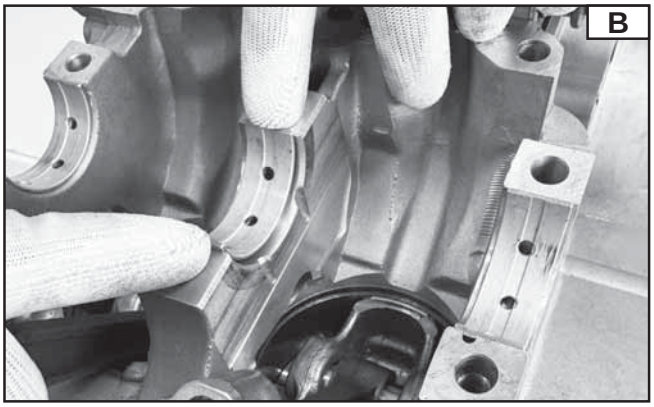
	**Teflon-based paste or other lubricants, as graphite, ceramics.**

NOTICE

Do not get the main half bearings mixed up.
To achieve the correct clearance between the connecting rod support and the main half bearings and to prevent engine damage, the half bearings must be reassembled in their original position.

NOTE:
In case of replacement of the drive shaft, it is necessary to replace the main half bearings.



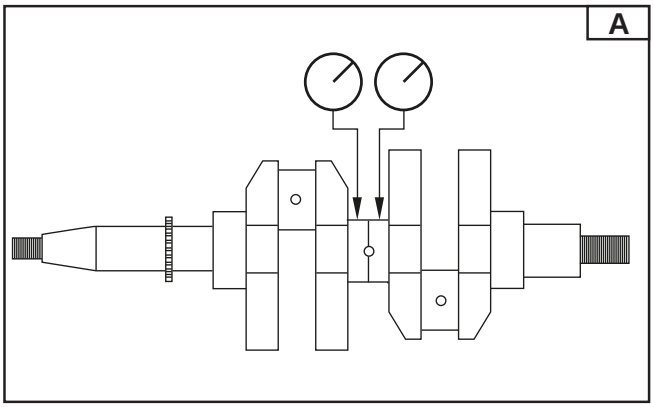


CRANKCASE
DRIVE SHAFT CHECK

Measure:
- The eccentricity of the drive shaft.

If outside specifications, replace the drive shaft.

Drive shaft eccentricity	Size
Drive shaft	A: Ø 30 (-0.005, -0.017) mm B: Ø 32 (-0.028, -0.042) mm
(1 mm = 0.0393701 in)	



NOTE:
If the eccentricity limit value is exceeded, replace the shaft.

Check:
- The main support surfaces.

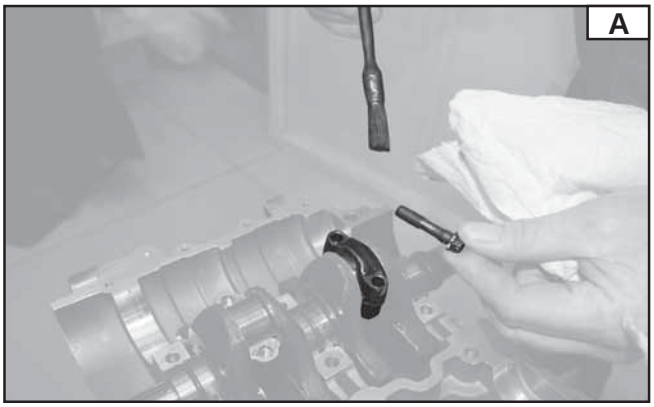
If there is any rust/lines/signs of wear, replace the drive shaft.

CRANKCASE
INSTALLATION OF CONNECTING RODS

Once the drive shaft has been inserted, proceed to assemble the big end Fig. B. A.

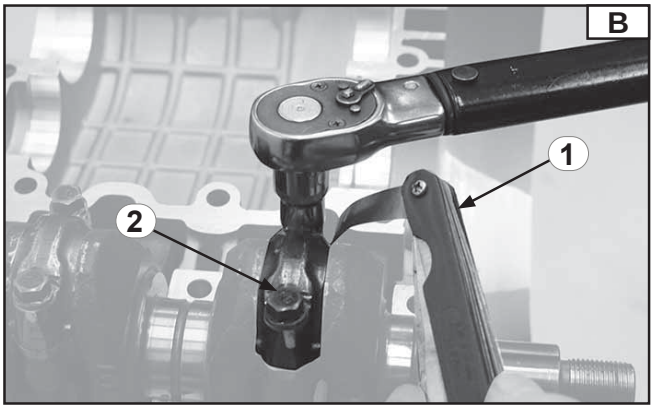
NOTE:
Lubricate the connecting rod big end pins with copper grease.

	Copper grease



Measure:
The crankshaft-connecting rod big end using a thickness gauge (1) Fig. B.

Measuring	Size
Drive shaft - Connecting rod big end	0.1 ~ 0.25 mm



NOTE:
Measure both big ends.

Tighten:
- The screws (2) Fig. B:
- Clean/wash the connecting rod big end with degreasing solvent and blow adequately with compressed air.

NOTE:
Every time that the connecting rod big end is assembled, it is necessary to replace the fastening screws.

NOTE:
Lubricate the threading and the support base of the screws before assembling the connecting rods on the crankshaft with copper grease.

	Copper grease

Step one:
Torque 12 N*m
Step two:
Torque 20 N*m
Step three:
Torque 30-33 N*m

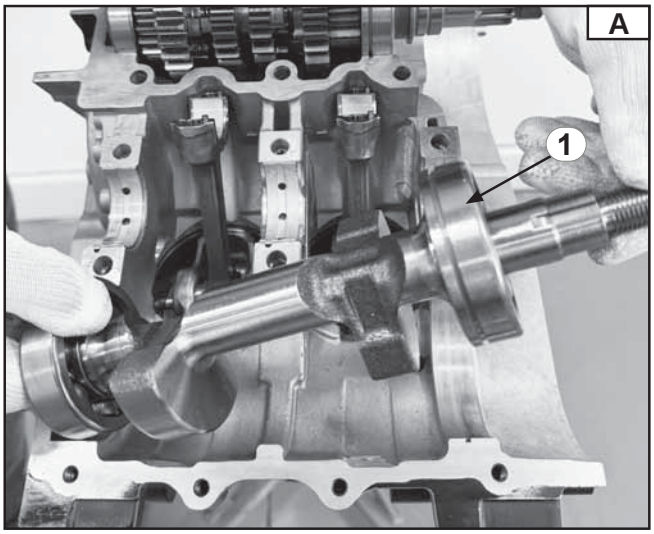
NOTE:
Always refer to stamping of the dimensional weight class indicated on the connecting rods.

CRANKCASE

REMOVAL OF THE BALANCE SHAFT

Remove:

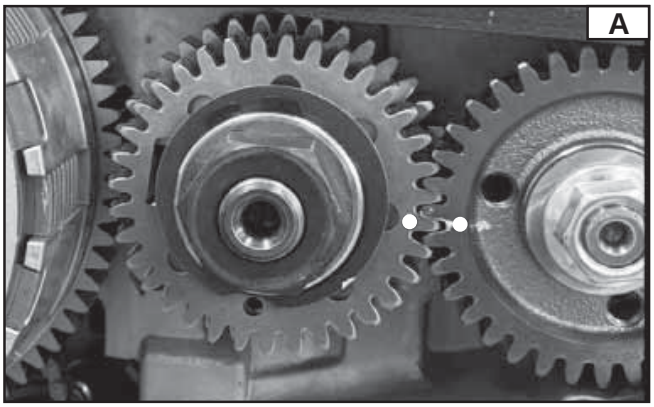
- The engine from the frame, refer to "**Removal of engine, Chapter 5**".
- The flywheel, refer to **"Removal of flywheel, Chapter 5".**
- The clutch, refer to **"Removal of clutch, Chapter 5".**
- The top and bottom engine half casing**, refer to "Removal of connecting rods".**
- The intake camshaft, refer to **"Removal of the intake and exhaust camshaft, Chapter 5".**
- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The flywheel, refer to "**Removal of flywheel, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The head, refer to **"Removal of head, Chapter 5".**
- The movable chain sliding shoe, refer to **"Removal of chain sliding shoe, Chapter 5".**
- The balance shaft (1) Fig. A.



CRANKCASE
INSTALLATION OF BALANCE SHAFT

Installation:
Proceed using the opposite order to removal.

NOTE:
Align the phasing references between the crankshaft and the balance shaft properly, as shown in Fig. A.



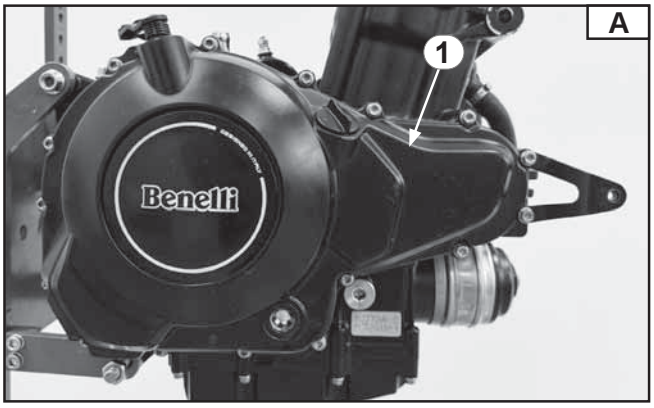
CLUTCH
REMOVAL OF CLUTCH

Park:
- The motorcycle on a level surface.

NOTICE

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

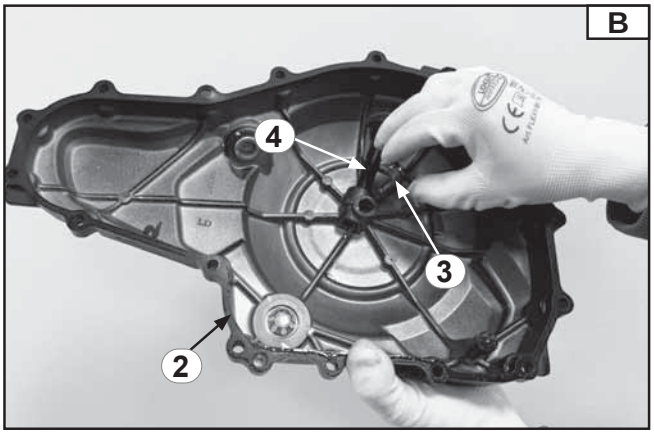
Remove:
- The engine oil, refer to **"Change of engine oil, Chapter 3".**
- The clutch cover (1) and the related fixing screws Fig. A.



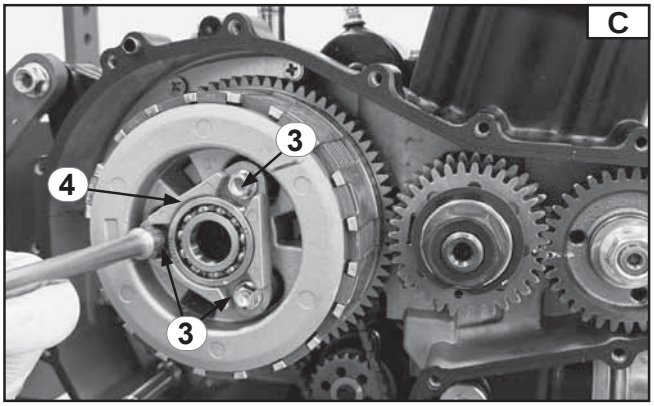
- The gasket (2) Fig. B.

NOTE:
In case of anomalies of the gasket, replace with a new one during the installation.

Remove:
- The guide bushing (3) Fig. B.
- The clutch control shaft (4) Fig. B.



- The screws (3) Fig. C.
- The support flange (4) and the related springs Fig. C.

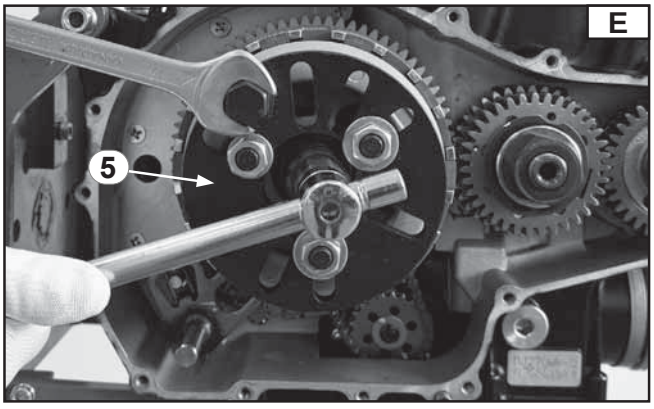


Apply:

- the clutch drum locking tool (5) Fig. E.



Clutch drum locking tool.
Code: KST03BL01057

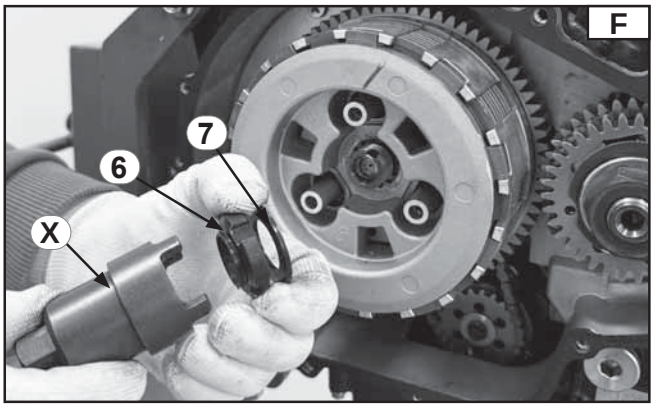


CLUTCH
REMOVAL OF CLUTCH

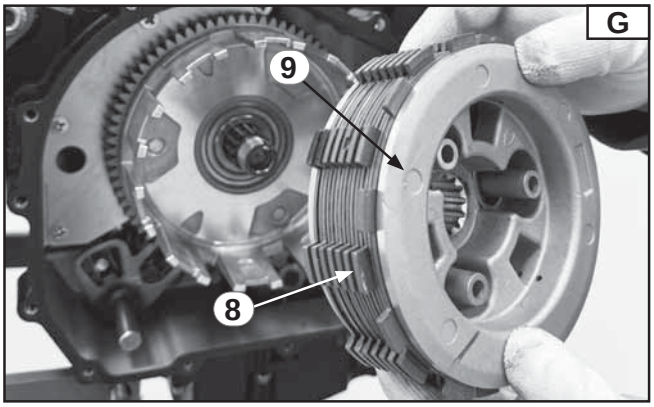
Remove:
- the ring nut (6), the washer (7) Fig. F.

NOTE:
In addition to the clutch drum locking tool, use also the disassembly/assembly tool of the clutch bell ring nut (X) Fig. F

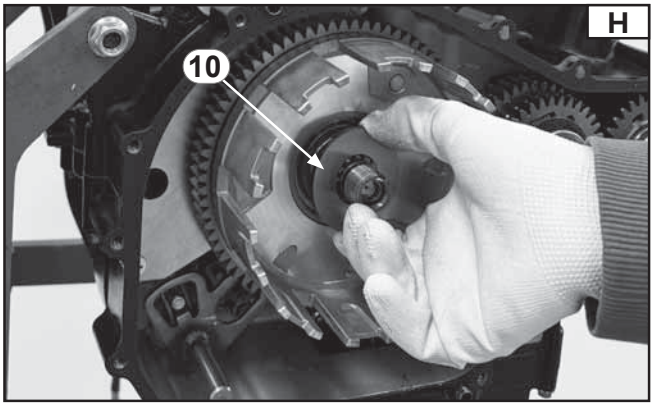
Tool to remove/assemble the clutch bell ring nut
Code: 032009705200



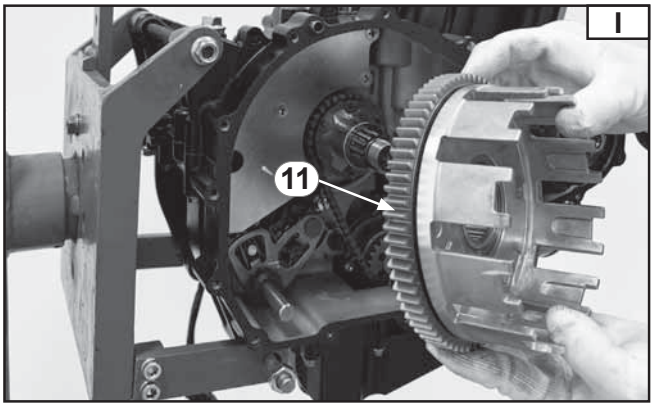
Remove:
- The disc pack (8) and the pressure plate (9) Fig. G.



- The washer (10) Fig. H.

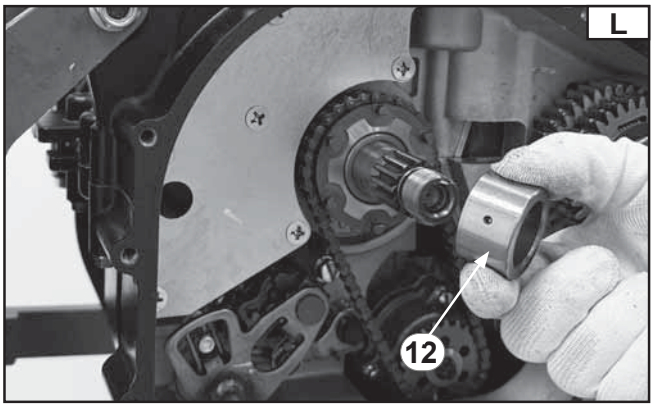


- The clutch bell (11) Fig. I.



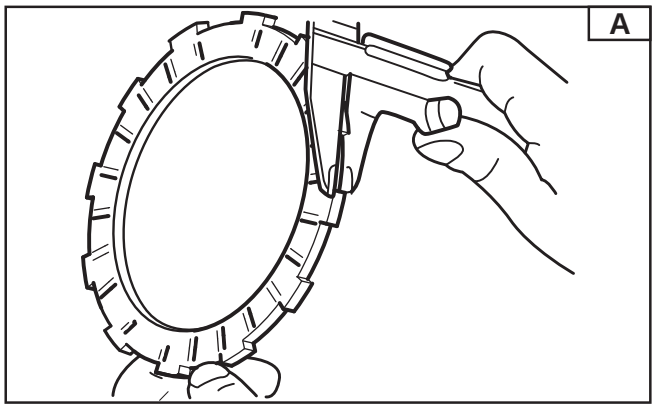
CLUTCH
REMOVAL OF CLUTCH

- The guide spacer (12) Fig. L.



CLUTCH
CHECK OF FRICTION PLATES

The following procedure applies to all friction plates.



Check:
- The friction plate.

If there is any damage/wear, replace the friction plates.

Measure:
- The thickness of the friction plates Fig. A.

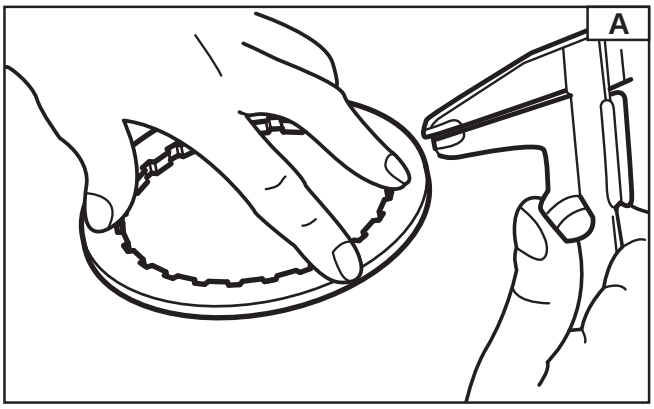
If not within specifications, replace the friction plates as a whole.

Disc	Disc number	Minimum thick-ness of new disc (mm)	Maximum thickness of new disc (mm)	Minimum thick-ness of worn disc (mm)
Friction disc rif.7	5	2.75	2.85	2.60
Friction disc rif.9	3	3.00	3.10	2.80
(1 mm = 0.0393701 in)				

NOTE:
Measure the friction plate 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. A.

If not within specifications, replace the steel discs together.

Disc	Disc number	Minimum thickness of new disc (mm)	Maximum thickness of new disc (mm)	Minimum thickness of worn disc (mm)
Single disc (steel)	6+1	1.50	1.55	1.50
Steel disc warping (mm) 0.1				
(1 mm = 0.0393701 in)				

NOTE:
Carry out the check, placing the plates on a reference surface and take the measurements using a thickness gauge.

CLUTCH

INSPECTION OF CLUTCH SPRINGS

The following process is applied to all clutch springs.

Check:

- The clutch springs.

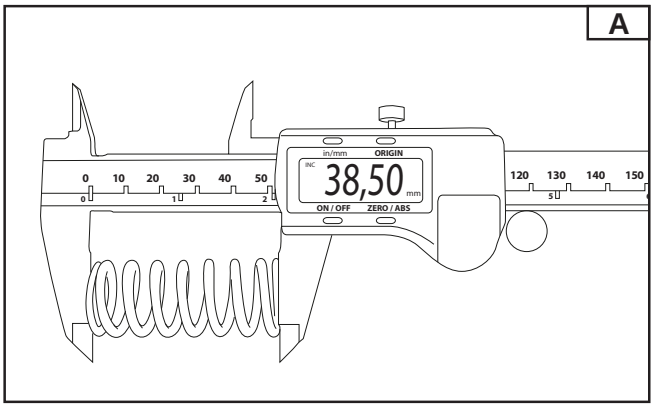
If there is any damage/wear, replace all of springs.

Measure:

- The full length of the clutch spring Fig. A.

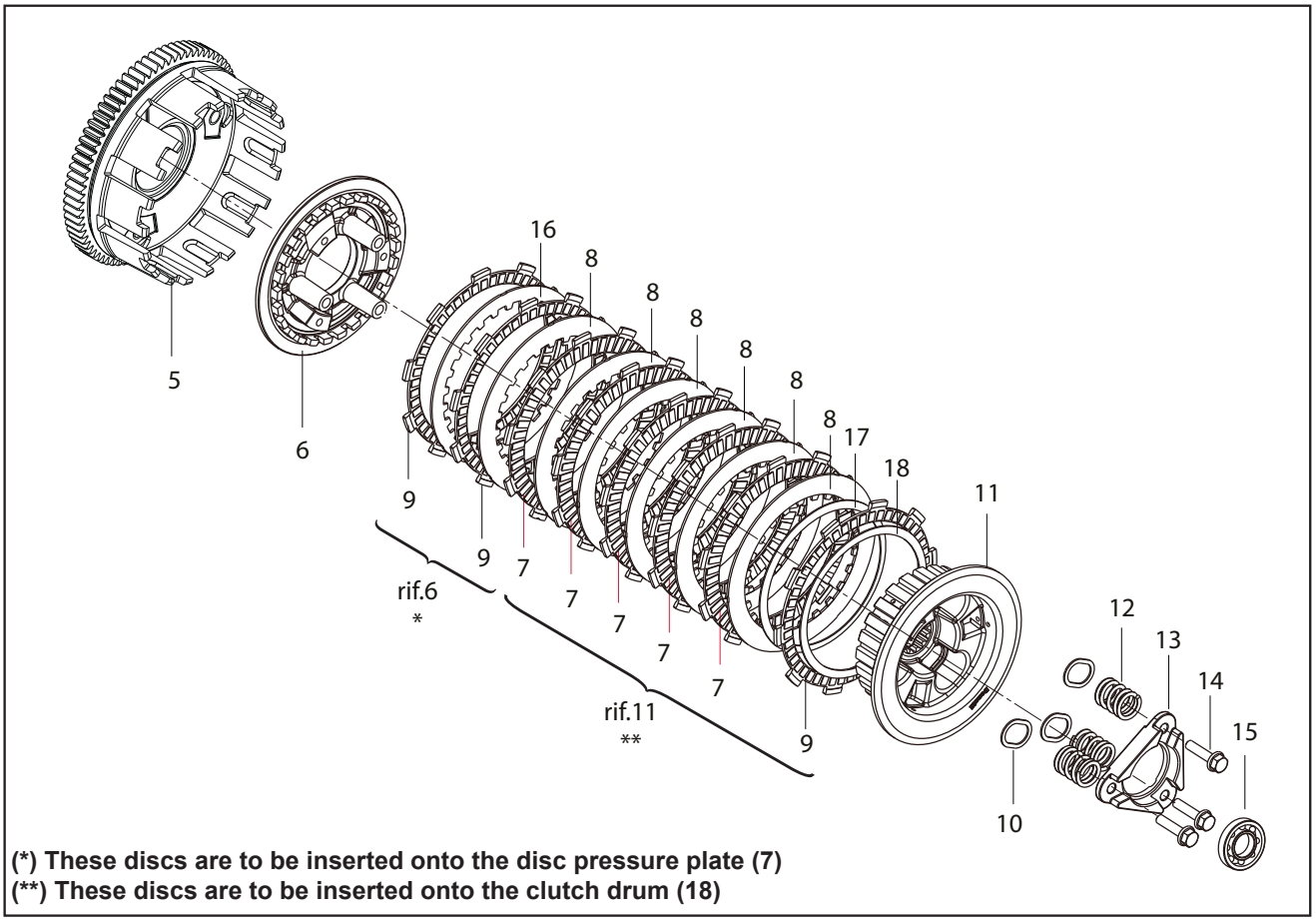
If not within specifications, replace the clutch springs together.

Spring	Free length
Clutch spring	38.50 ± 0.2 mm
(1 mm = 0.0393701 in)	

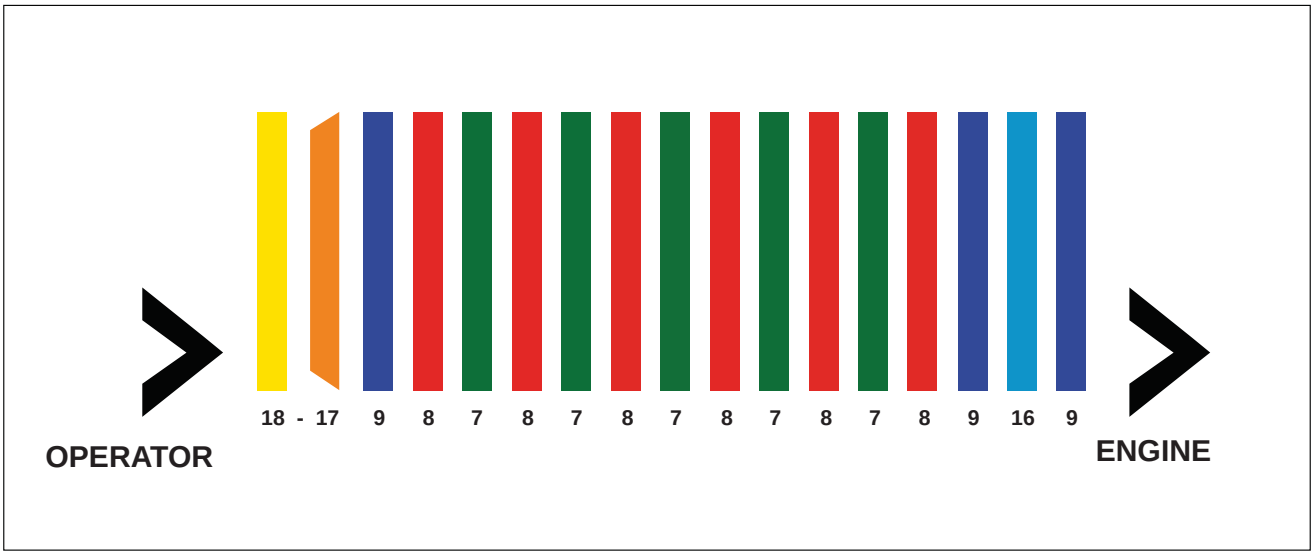


CLUTCH
DISC ASSEMBLY

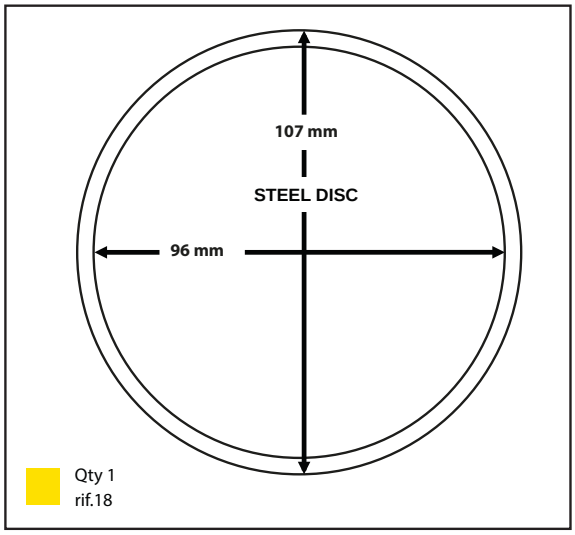
Assemble:
- The discs in the opposite order than their removal, following the diagram below.

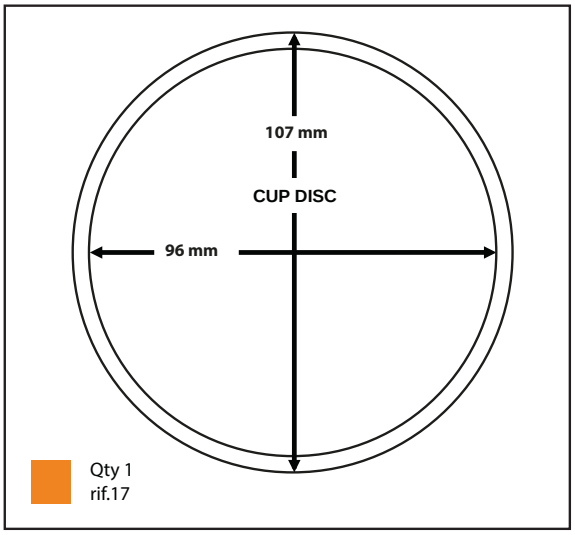


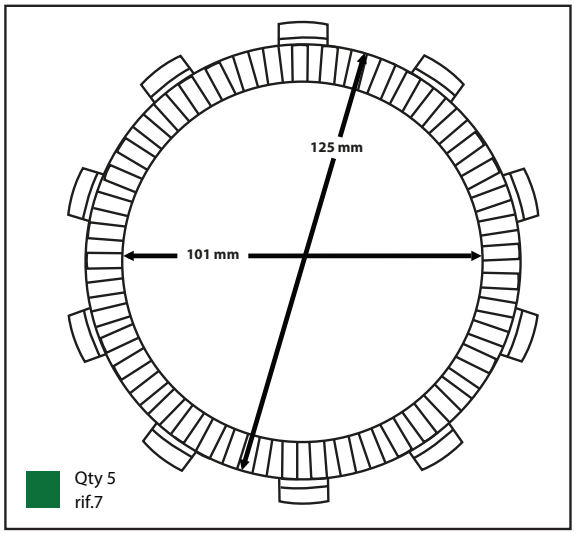
(*) These discs are to be inserted onto the disc pressure plate (7)
(**) These discs are to be inserted onto the clutch drum (18)

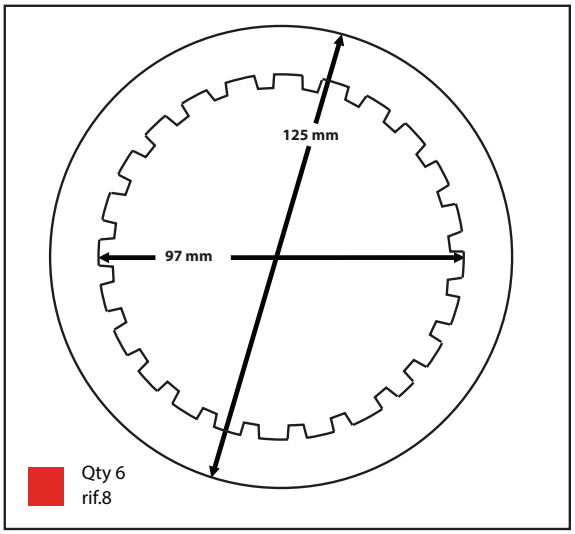


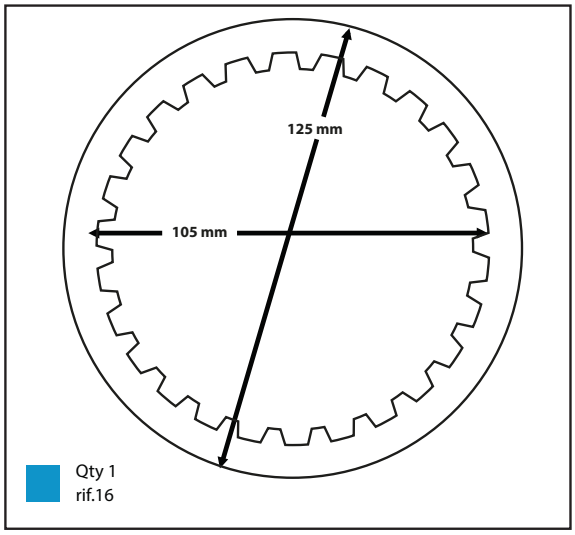
CLUTCH
DISC ASSEMBLY

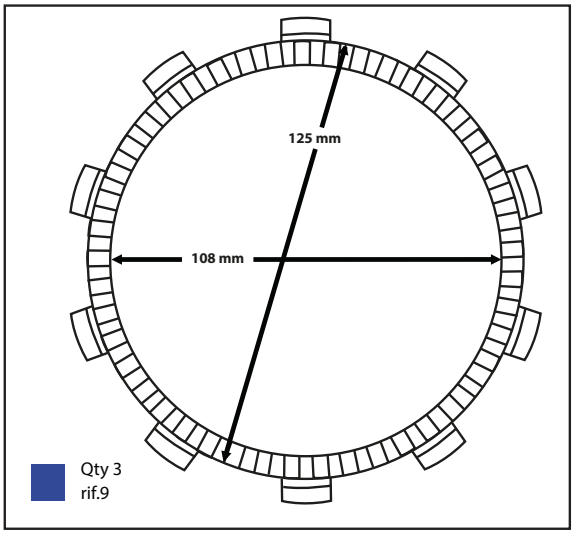












(1 mm = 0.0393701 in)

CLUTCH
INSTALLATION OF CLUTCH

Park the motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Assemble:
- The oil pump ring gear (complete with chain) (1) Fig. A.
- The guide spacer.
- The clutch bell.
- The washer.
- The friction drum complete with discs.
- The disc pressure plate.

Tighten:
- The fastening ring nut and the washer via the specific equipment Fig. A.

Tool to remove/assemble the clutch bell ring nut
Code: 032009705200

Clutch drum locking tool.
Code: KST03BL01057

Torque 105 N*m

Assemble:
- The screws (3) Fig. B.
- The support flange (4) and the related springs Fig. B.

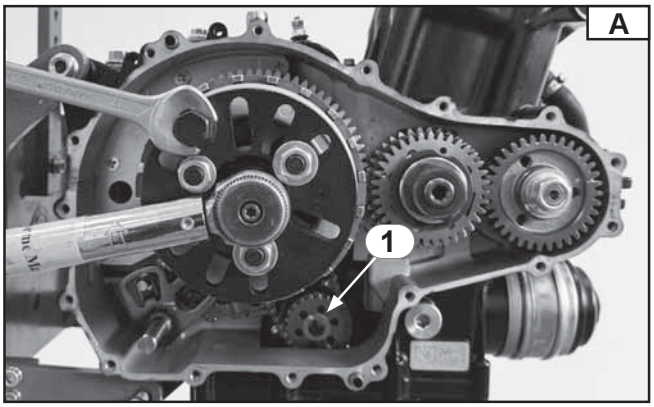
Tighten:
- The fixing screws (3) Fig. B to the following torque:

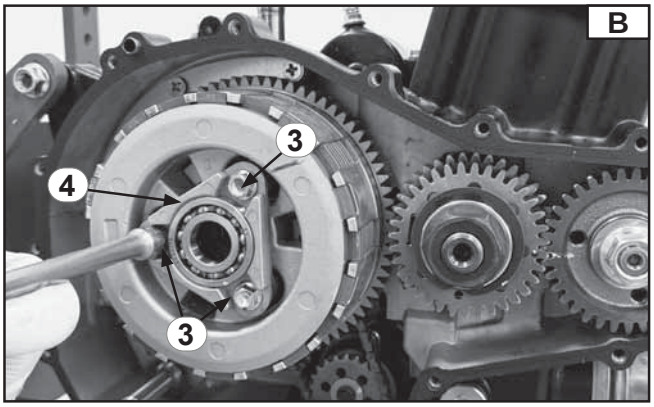
Torque 10-12 N*m

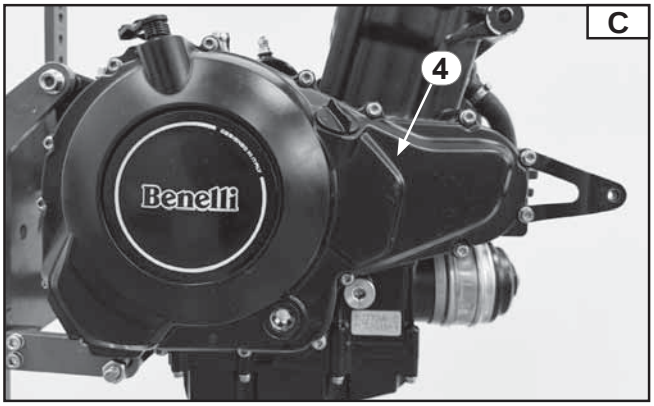
- Reposition the guide bushing and the clutch control shaft on the cover.
- Insert the gasket.
- Position the clutch cover.

Tighten:
- The clutch cover screws (4) Fig. C to the engine crankcase to the following torque:

Torque 10 N*m







LUBRICATION SYSTEM

REMOVAL OF OIL SUMP AND INTAKE FILTER

Remove:

- The complete exhaust system, refer to **"Removal of exhaust system, Chapter 4"**.

NOTE:
Before removing the oil sump, first drain out any oil in the engine, removing the magnetic cap.

Remove:

- The fastening screws (1) of the oil sump Fig. A.

Check:

- The oil sump.

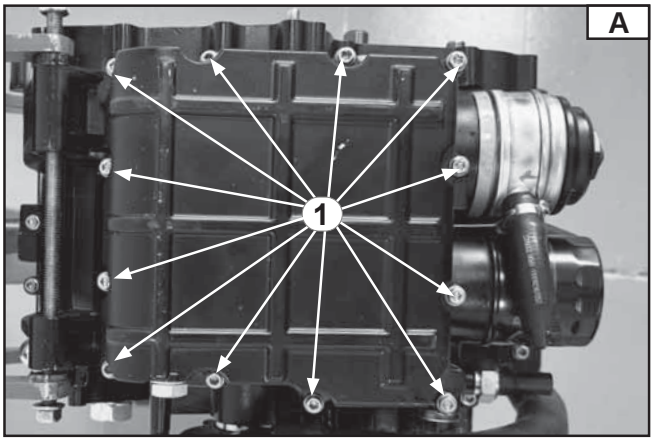
If there is any damage, replace.

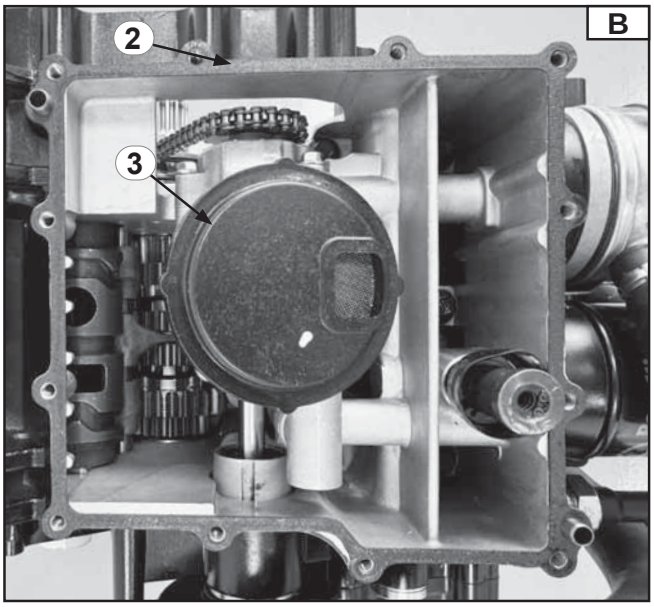
Remove:

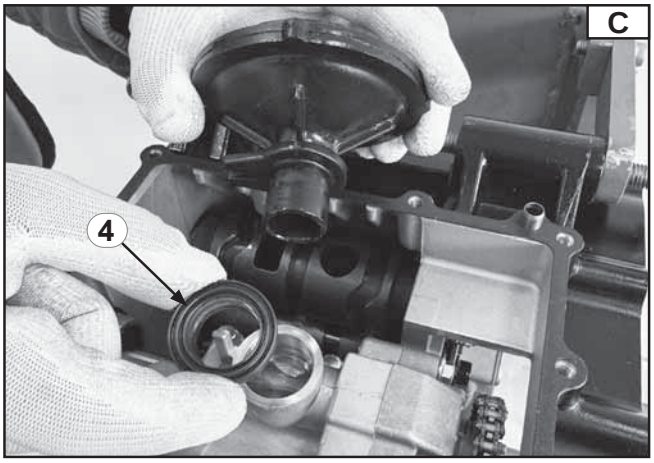
- The gasket (2) Fig. B.
- The inlet filter (3) Fig. B.
- The inlet filter fitting (4) Fig. C.

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
INSTALLATION OF OIL SUMP AND INTAKE FILTER

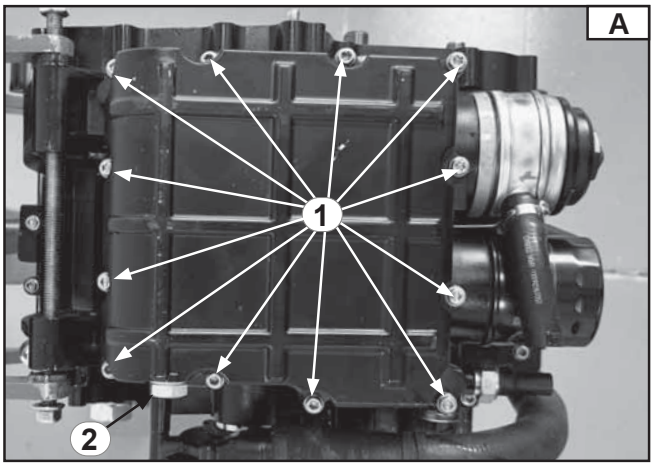
Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 10 N*m

- The magnetic cap (2) Fig. A, complete with copper washer, to the following torque:

Torque 25 N*m



NOTE:
Add engine oil once the steps have been completed.

LUBRICATION SYSTEM

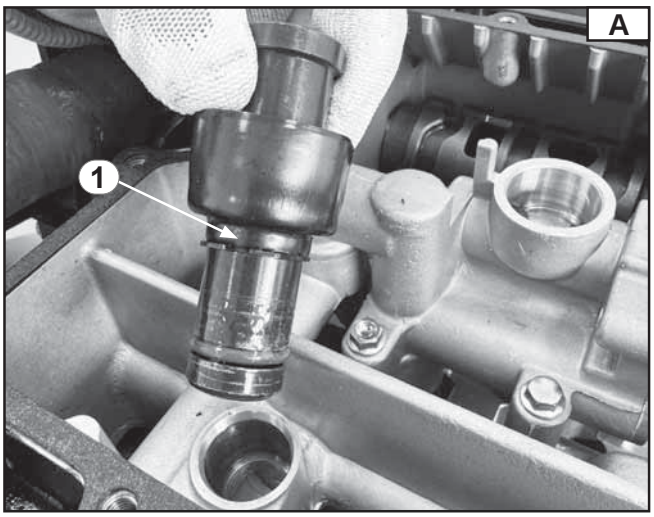
REMOVAL OF OIL OVERPRESSURE VALVE

Remove:

- The oil sump, refer to "**Removal of oil sump and intake filter, Chapter 5**".
- The overpressure valve (1) Fig. A.

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.



Check:
Before fitting the valve, make sure all the parts are free from anomalies Fig. A. B.
If there is any damage or wear, replace the faulty parts.

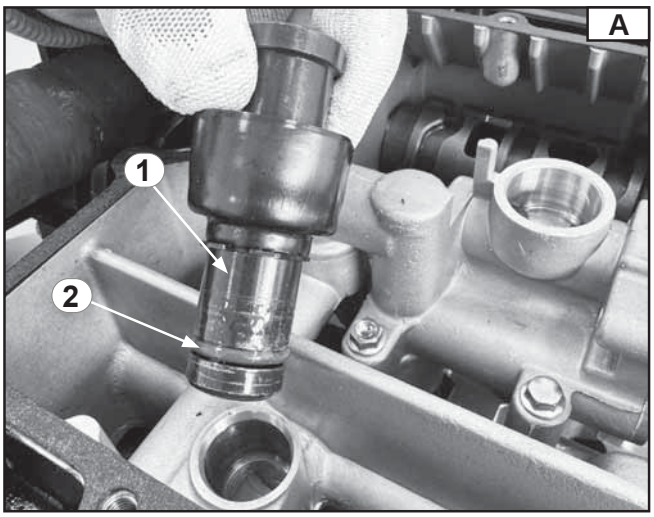


LUBRICATION SYSTEM

INSTALLATION OF OIL OVERPRESSURE VALVE

Installation:
Insert the oil overpressure valve (1) with O-Ring (2) into the bottom casing by simply engaging it Fig. A.

NOTE:
Lubricate the pressure relief valve during insertion.

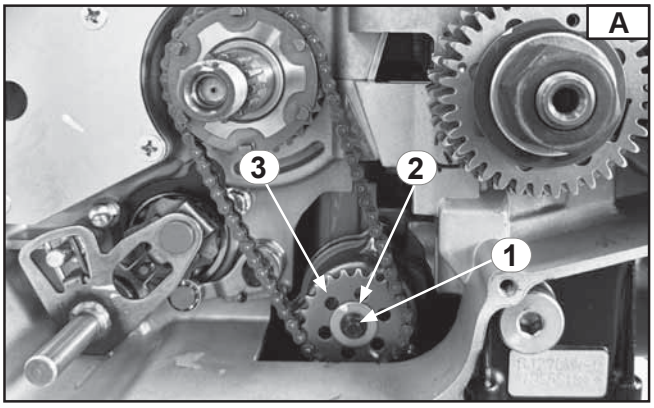


LUBRICATION SYSTEM
OIL PUMP REMOVAL

Remove:
- The clutch, refer to **"Removal of clutch, Chapter 5".**

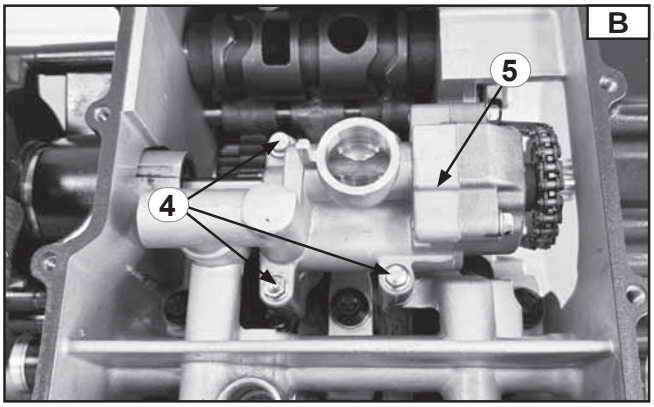
Block:
- The pump control gear (3) by means of a wrench Fig. A**.**

Remove:
- The screw (1) Fig. A.
- The washer (2) Fig. A.
- The pump ring gear (3) Fig. A.
- The oil sump, refer to **"Removal of oil sump and intake filter, Chapter 5".**

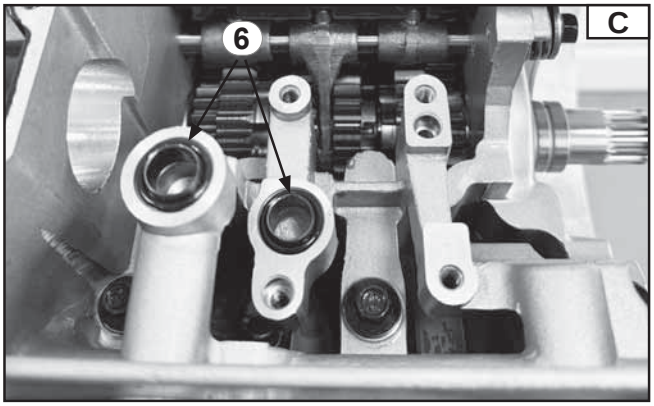


Remove:
- The screws (4) Fig. B.

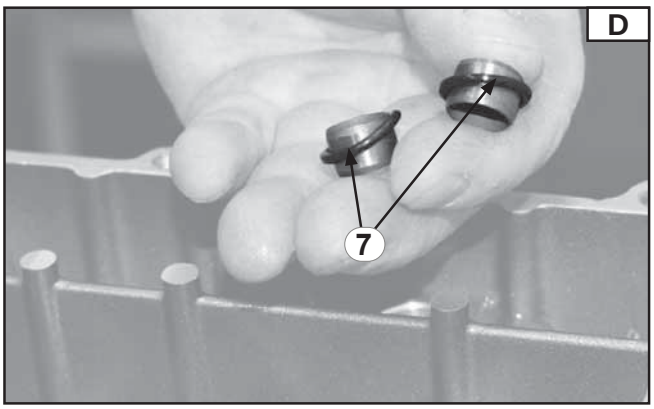
Take out:
- The pump body (5) Fig. B.



Check:
- The integrity of the two bushes (6) Fig. C.



- The two O-rings (7) Fig. D.



LUBRICATION SYSTEM
CHECK OF OIL PUMP

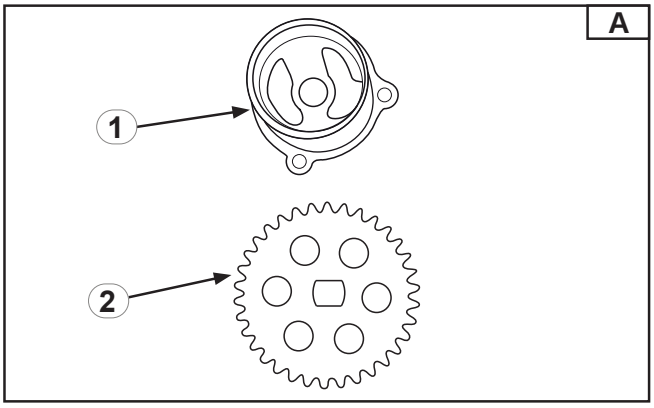
Remove:
- The screws.
- The pump cover.
- The outer rotor.
- The inner rotor.
- The roller.
- The oil pump shaft.

Check:
- The pump body (1) Fig. A.

If there are any lines/damage/wear, replace.

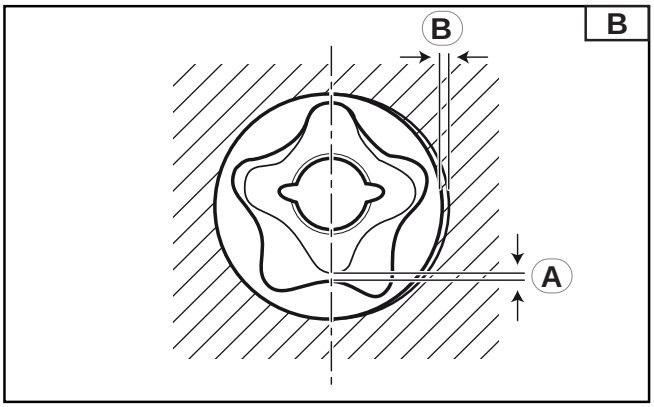
- The pump ring gear (2) Fig. A.

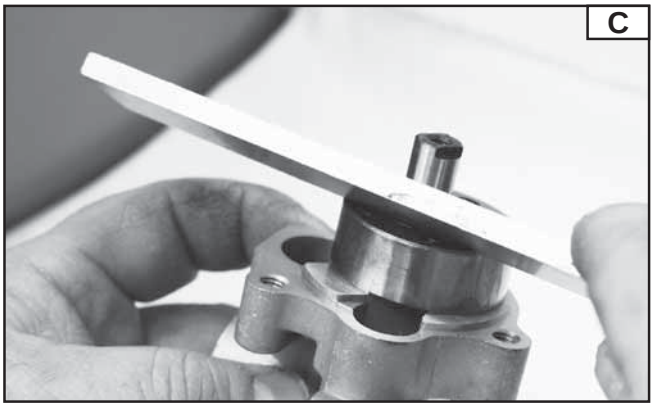
If there is any damage or wear to the gears, replace.



Measure:
- The tolerance (3) between the inner rotor and the outer rotor Fig. B.
- The tolerance (4) between the outer rotor and the oil pump housing Fig. B.
- The planarity of both rotors compared to the oil pump housing Fig. C.

Clearance	Tolerance
Inner rotor and outer rotor "**A**".	0.15 mm
Outer rotor and oil pump housing "**B**"	+0.06, +0.09 mm
(1 mm = 0.0393701 in)	

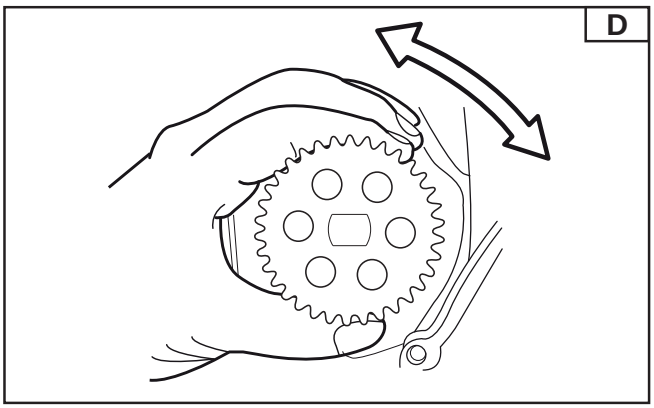




Check:
- The oil pump operation.

Turn the pump ring gear as shown in Fig. D.
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 ring gear in its seat.

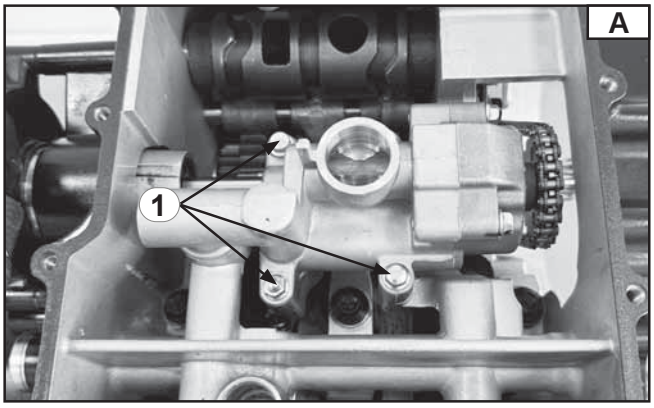


LUBRICATION SYSTEM
INSTALLATION OF OIL PUMP

Installation:
Proceed using the opposite order to removal.

Tighten:
- The assembly screws (1) Fig. A to the following torque:

Torque 12 N*m

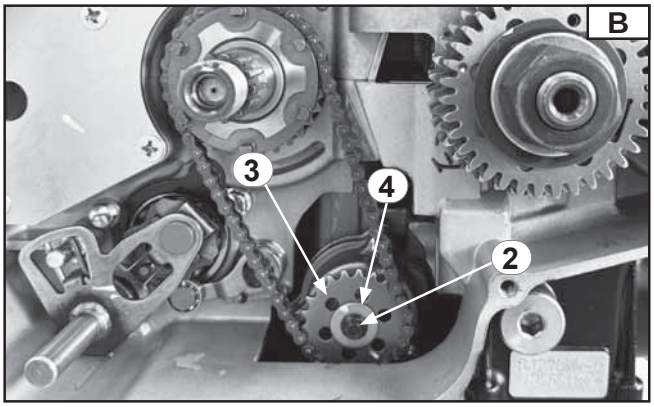


Tighten:
- The assembly screw (2) with the pump ring gear (3) and the related washer (4) Fig. B to the following torque:

Torque 7 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



NOTE:
For tightening the pump ring gear, use an apposite wrench.

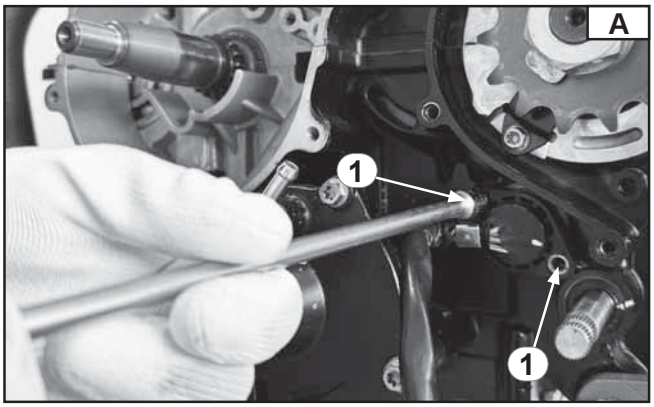
NOTE:
Add engine oil once the steps have been completed.

GEARBOX

REMOVAL OF NEUTRAL SENSOR / GEAR INDICATOR SENSOR

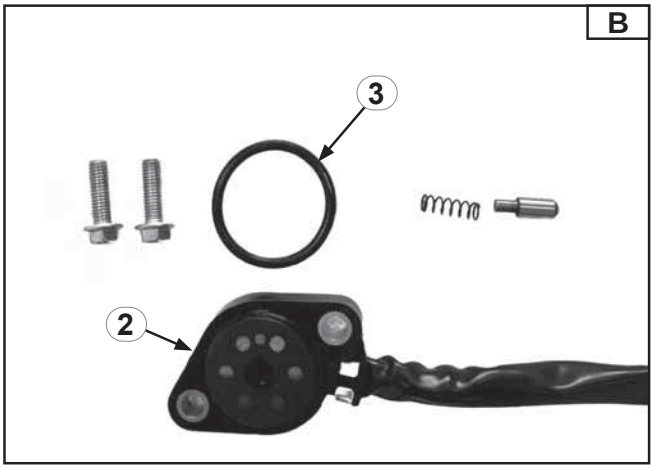
Remove:

- The screws (1) Fig. A.

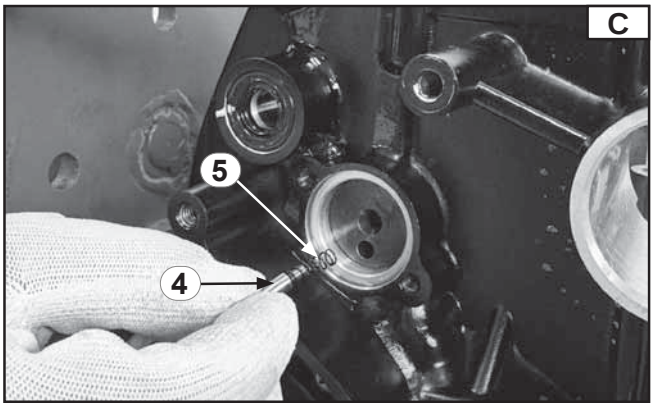


Take out:

- The neutral position/gear indicator sensor (2) Fig. B.
- The gasket (3) Fig. B.



- The pin (4) Fig. C.
- The spring (5) Fig. C.



GEARBOX

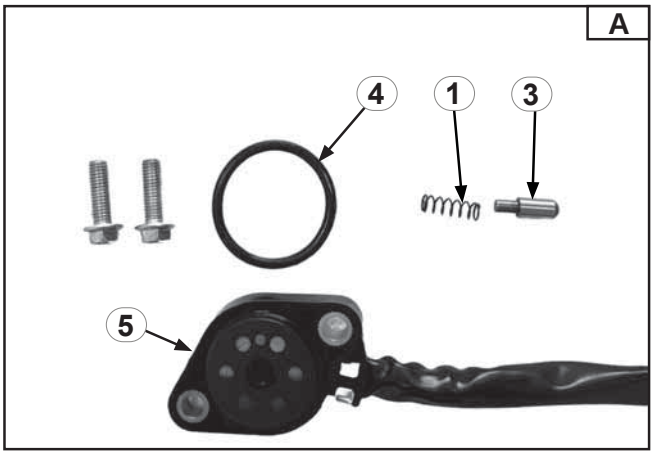
INSTALLATION OF NEUTRAL SENSOR / GEAR INDICATOR SENSOR

Install:

- The spring (1) Fig. A.
- The pin (3) Fig. A.
- The gasket (4) Fig. A.
- The neutral position/gear indicator sensor (5) Fig. A.

NOTE:
Before assembly, check the continuity of the sensor, refer to the "Gear position sensor, Chapter 7".

A



Tighten:

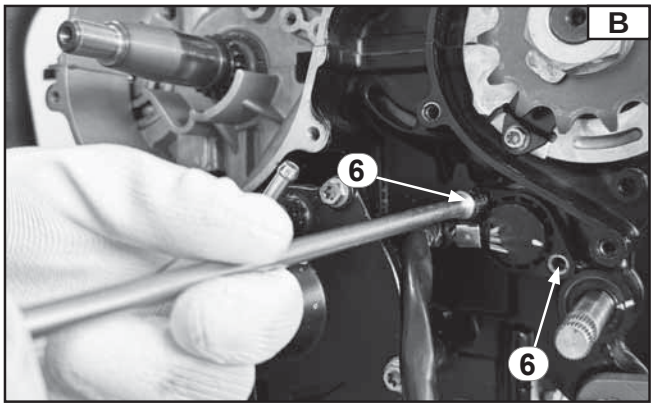
- The screws (6) of the sensor Fig. B to the following torque:

Torque 7 N*m

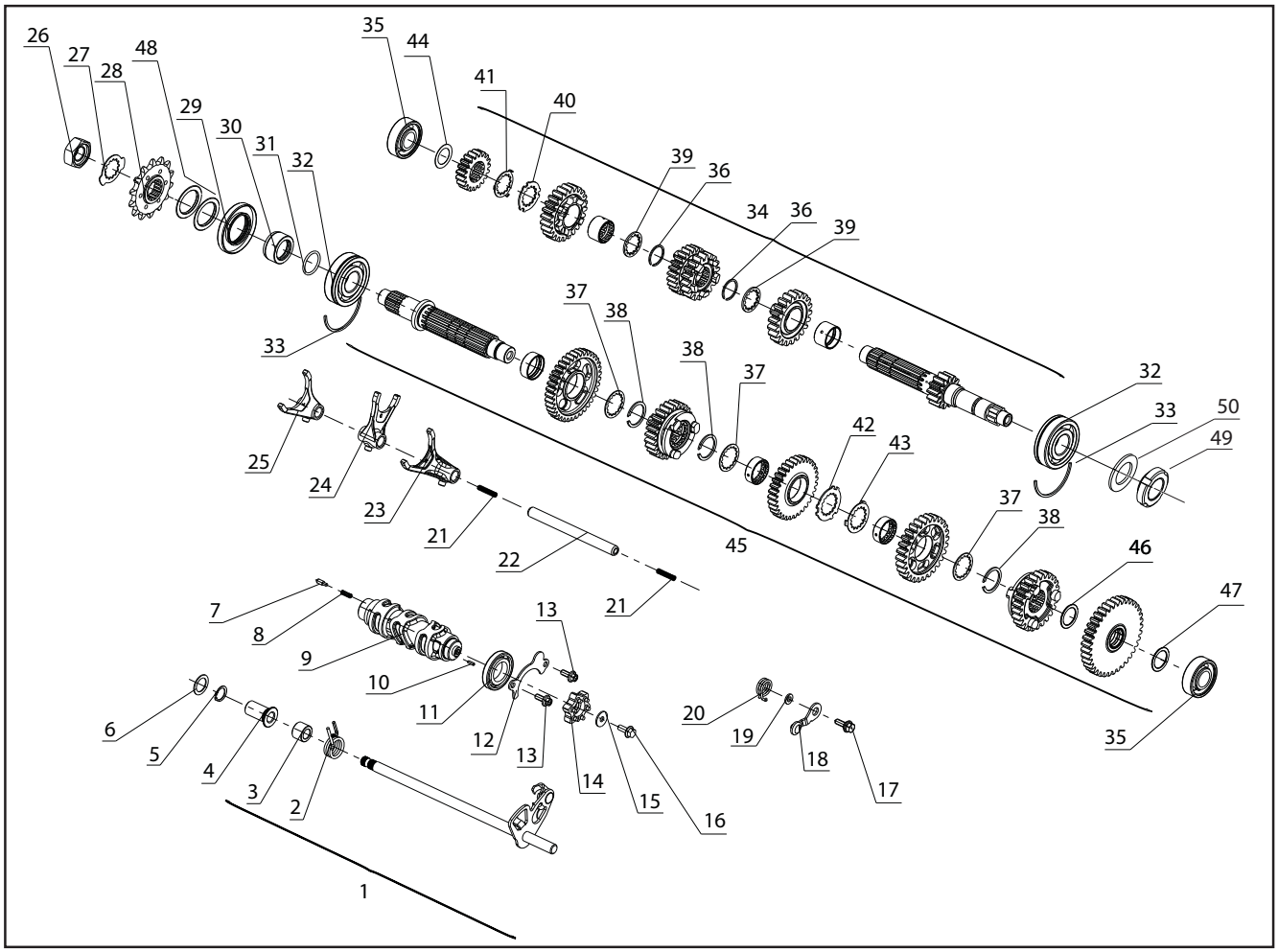
Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

B



GEARBOX



Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS DESCRIPTION	REMARKS
1	SELECTOR SHAFT					
2	STOP SPRING					
3	SHIM					
4	BUSHING					
5	SNAP RING					
6	SCRAPING					
7	PLUG					
8	SPRING					
9	DESMODROMIC					
10	PIN					
11	BEARING					
12	PLATE					
13	SCREW (M6X14)					
14	GEARBOX DRUM					
15	WASHER					
16	SCREW (M6X15)					
17	SCREW					
18	GEAR FIXING CLICK ASSEMBLY					

GEARBOX

Pos.	Description	Qty	Sq.	SYMBOLS	CONTENTS 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	TRANSMISSION PINION					
29	OIL SEAL					
30	BROACHED BUSHING					
31	O-RING					
32	BEARING					
33	BEARING RETAINER					
34	COMPLETE MAIN SHAFT					
35	BEARING					
36	SNAP RING					
37	SCRAPING					
38	SNAP RING					
39	NOTCHED WASHER					
40	NOTCHED WASHER					
41	NOTCHED WASHER					
42	NOTCHED WASHER					
43	NOTCHED WASHER					
44	GASKET					
45	COMPLETE SECONDARY SHAFT					
46	SCRAPING					
47	WASHER					
48	WASHER					
49	CROWN NUT (M20)					
50	WASHER					

GEARBOX

REMOVAL OF GEARBOX

Remove:

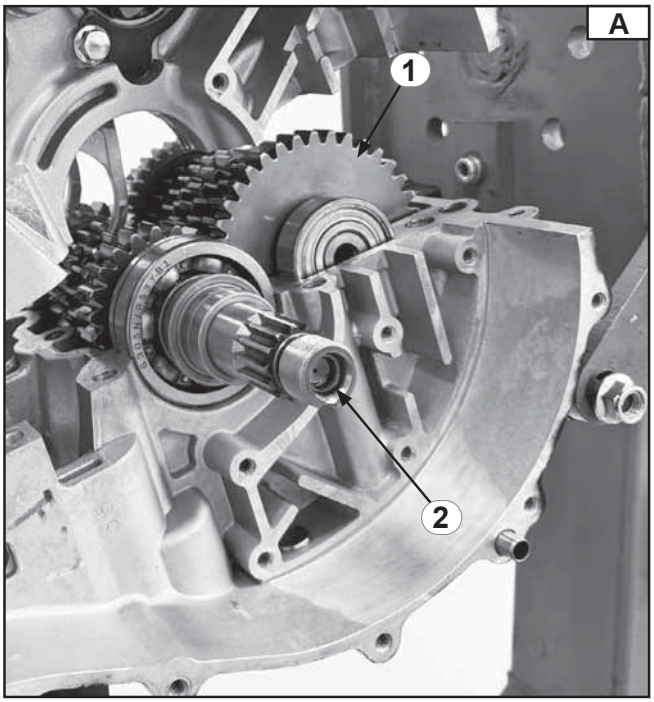
- The engine from the frame, refer to **"Removal of engine from the frame, Chapter 5**".
- The coils and spark plugs, refer to "**Removal of coils and spark plugs, Chapter 5**".
- The camshaft cover, refer to **"Removal of camshaft cover, Chapter 5".**
- The chain tensioner, refer to **"Removal of distribution chain tensioner, Chapter 5".**
- The exhaust camshaft, refer to **"Removal of exhaust camshaft, Chapter 5".**
- The intake camshaft, refer to **"Removal of intake camshaft, Chapter 5".**
- The head**,** refer to **"Removal of head, Chapter 5".**
- The flywheel**,** refer to **"Removal of flywheel, Chapter 5".**
- The movable chain sliding shoe, refer to **"Removal of mobile chain sliding shoe, Chapter 5".**
- The clutch, refer to **"Removal of clutch, Chapter 5".**
- Neutral position/gear indicator sensor, refer to **"Removal of neutral position/gear indicator sensor, Chapter 5".**
- The oil sump, refer to **"Removal of oil sump, Chapter 5".**
- The oil pump, refer to **"Removal of oil pump, Chapter 5".**

Raise:

- The bottom crankcase, refer to **"Removal of connecting rods, Chapter 5".**

Remove:

- The lay shaft (1) Fig. A.
- The main shaft (2) Fig. A.



GEARBOX
GEAR SHIFT CONTROL

The following procedure applies to all gear fork Fig. A.

Check:
- The follower of the gear control fork (1) Fig. A.
- The tooth on the gear control fork (2) Fig. A.

If there is warping/damage/lines/traces of wear, replace the gear control fork.

Measure:
- The thickness of the gear control fork, using a slide gauge.

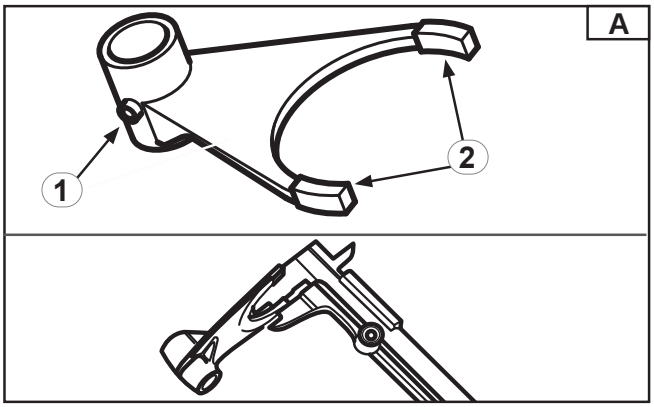
Part	Size
Gear shift control rod	5.85 ± 0.05 mm

Check:
- The guide pin of the gear control fork (3) Fig. B.

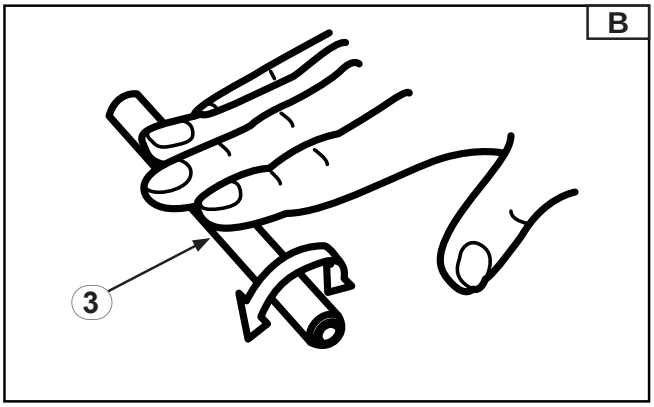
Roll the guide pin of the gear control fork on a flat surface Fig. B.
If there is any warping, replace.

NOTE:
Do not try to straighten the control fork guide if it is warped.

A



B



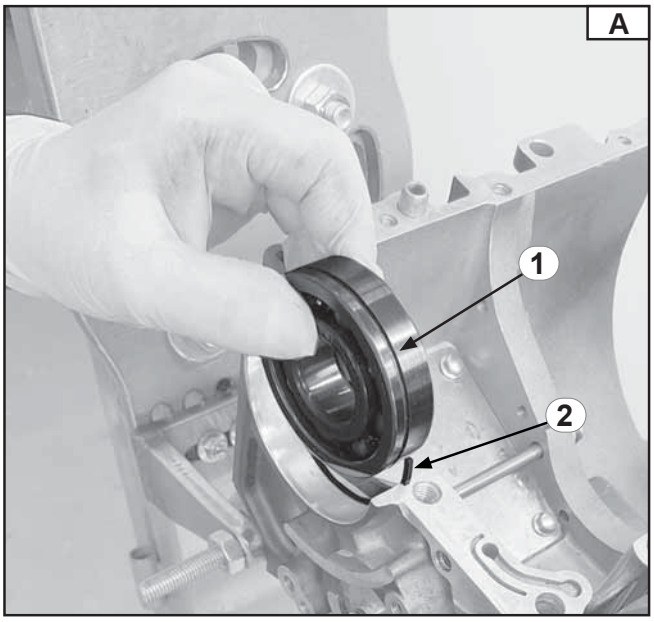
GEARBOX

REMOVAL OF MAIN SHAFT BEARING

Remove:

- The flywheel, refer to **"Removal of flywheel, Chapter 5".**
- The clutch, refer to **"Removal of clutch, Chapter 5"**.
- The bottom crankcase, refer to **"Removal of connecting rods, Chapter 5".**
- The gearbox, refer to **"Removal of gearbox, Chapter 5".**

- The bearing (1) and the guide (2) Fig. A.



GEARBOX
REMOVAL OF MAIN SHAFT BEARING

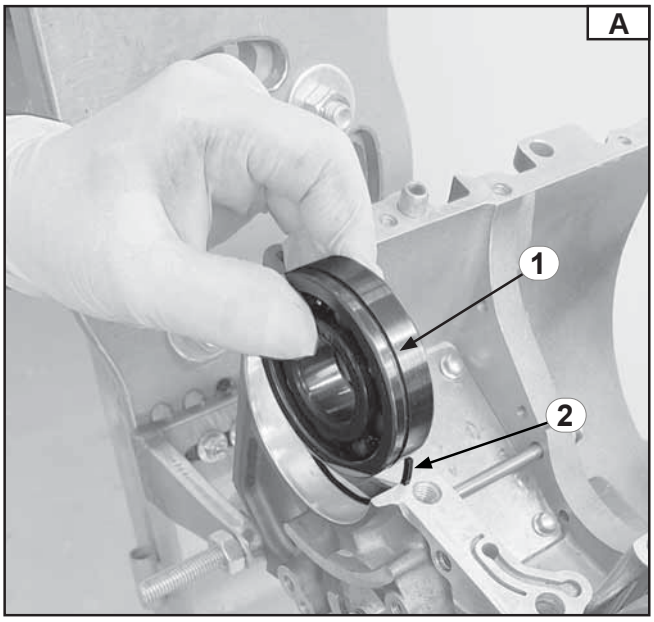
Installation:
Proceed using the opposite order to removal.

Check:
- The bearings (1) Fig. A.

If there is any damage/wear, replace.

- The integrity of the guide (2) Fig. A.

If there is any damage/wear, replace.



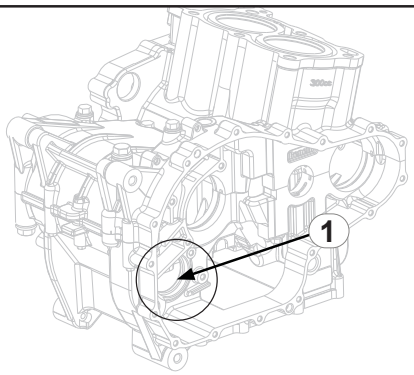
GEARBOX
INSTALLATION OF GEARBOX

Measure:
- The size of the hole (1) in the right top casing using a specific gauge Fig. A.

If outside specifications, replace the whole engine crankcase set.

Housing port desmodromic	Size: Ø 47 (0.+0.022) mm

A



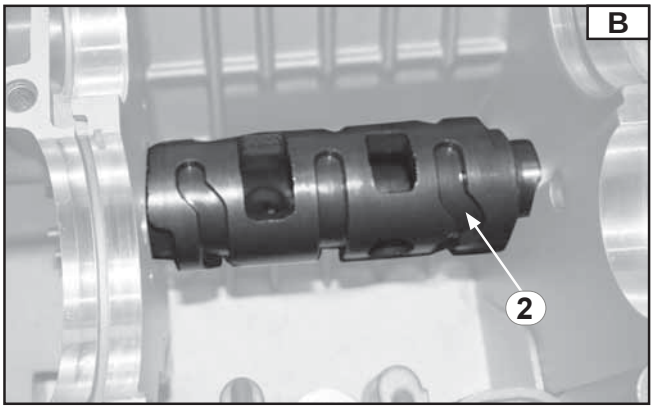
Check:
- The grooving on the desmodromic shaft (2) Fig. B.

In the presence of damage/lines/signs of wear, replace the whole desmodromic shaft.

Install:
- The bearing (3) Fig. C.

Assemble:
- The desmodromic (2) inside the casing Fig. B.

B



Assemble:
- The gear drum (6) with the special tool (7) Fig. D.
- The latch with the related spring (8) Fig. C.

Tensioner tool
Code: 0320097051000

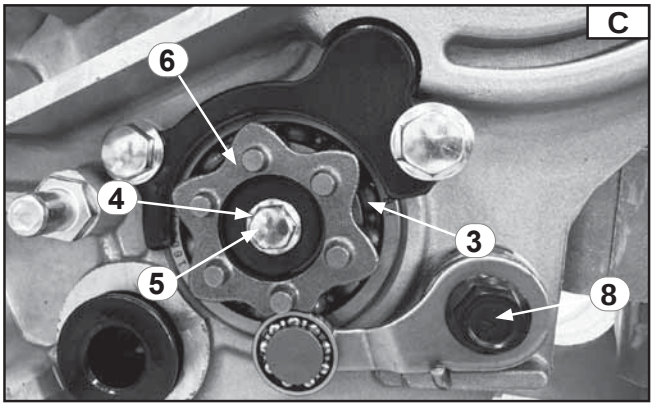
- The washer (4) Fig. C. C.
- The screw (5) Fig. C to the following torque:

Torque 12 N*m

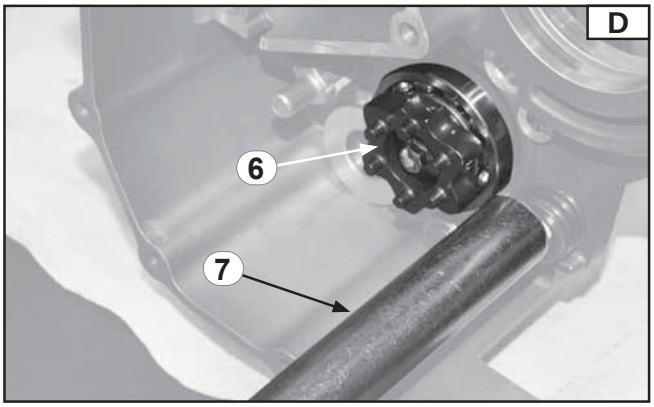
Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER

C

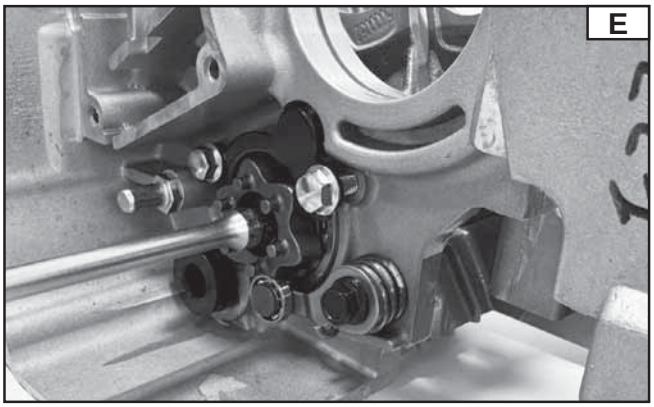


D



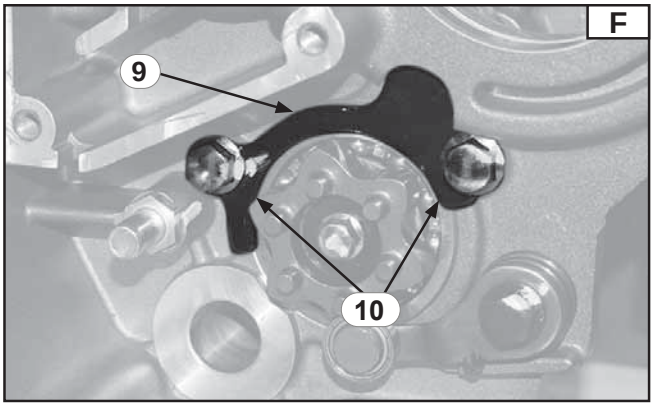
GEARBOX
INSTALLATION OF GEARBOX

NOTE:
To tighten the screw use an aluminium pad to keep the desmodromic in place Fig. E.



Assemble:
- The plate (9) Fig. F.
- The screws (10) Fig. F to the following torque:

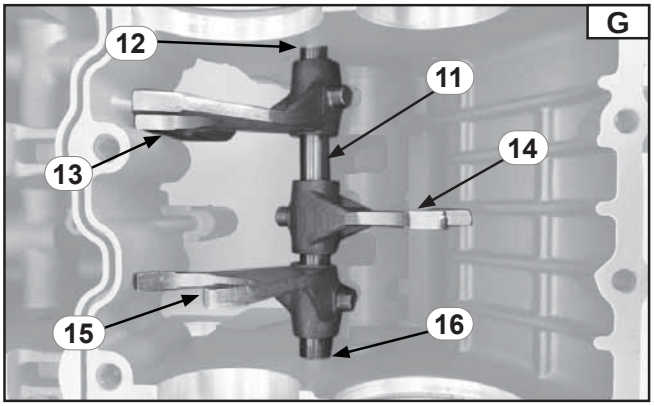
Torque 12 N*m



NOTE:
Before carrying out assembly of the main/lay shafts, check the gear control, refer to the section "Check of gear control, Chapter 5".

Assemble on the pin (11) Fig. G:
- The spring (12).
- The gear selection fork 1st/4th - 2nd/3rd (13).
- Gear selection fork 5th/6th (14).
- Gear selection fork 5th/6th (15).
- The spring (16).

Install:
- The pin (11) in the apposite housing Fig. G.

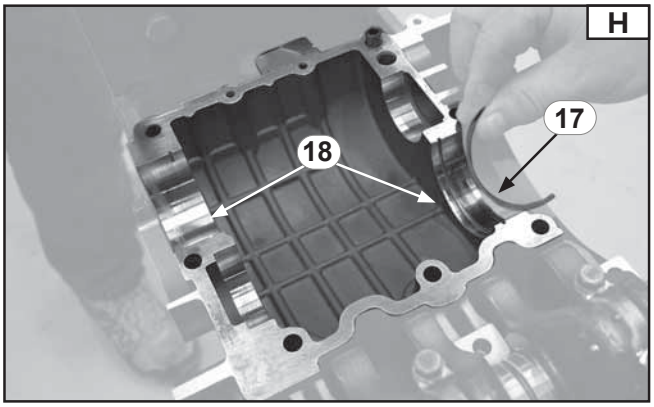


Check:
- The two bearing retainers (17) Fig. H.

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

Check:
- The seats (18) of the two bearing retainers Fig. H.

If there is any warping/damage/lines/signs of wear, replace the top cover.



GEARBOX
INSTALLATION OF GEARBOX

NOTE:
For the assembly sequence of the complete main shaft, see the spare part catalogue of the vehicle.

NOTE:
For the assembly sequence of the complete secondary shaft, see the spare part catalogue of the vehicle.

Assemble:
For the assembly sequence of the full input shaft (20), see the exploded drawing at the beginning of the chapter.

For the assembly sequence of the full output shaft (19), see the exploded drawing at the beginning of the chapter.

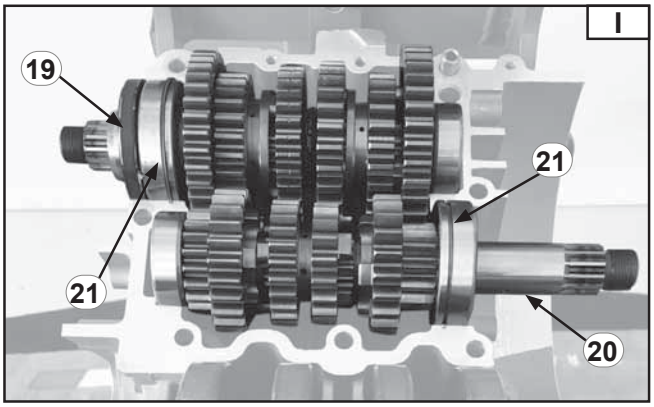
Position:
- The complete main shaft (20) Fig. I.
- The complete secondary shaft (19) Fig. I.

NOTE:
Make sure the grooves on the two bearings (21) match correctly Fig. I with the related stops.

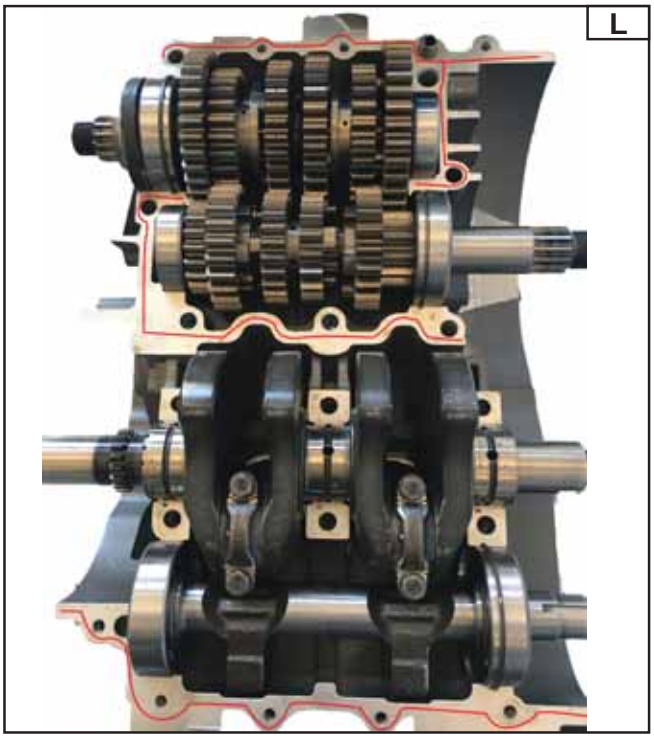
NOTE:
Before assembling the two half casings, top and bottom, it is necessary to apply sealant paste along the whole profile of the top casing, in order to achieve a good hold Fig. L.

	**PASTE THREEBOND 1207B**

I



L



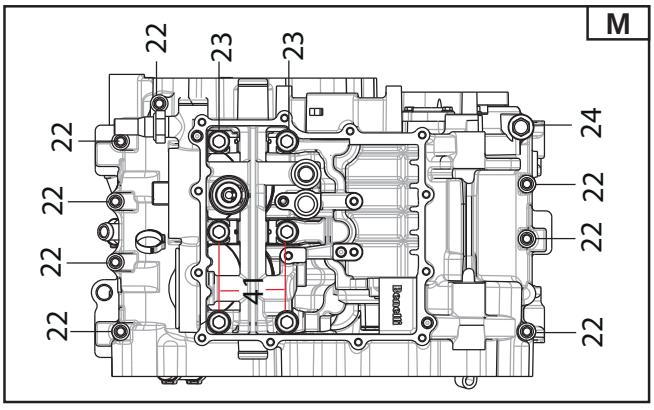
Assemble:
- The two half casings.

Tighten:
- The relevant screws Fig. M to the following torque:



- Position screws (22) (M6):
- Position screws (23) (M8):
- Position screws (24) (M10):

M



GEARBOX
INSTALLATION OF GEARBOX

Rotate:
- The complete casing by 180°.

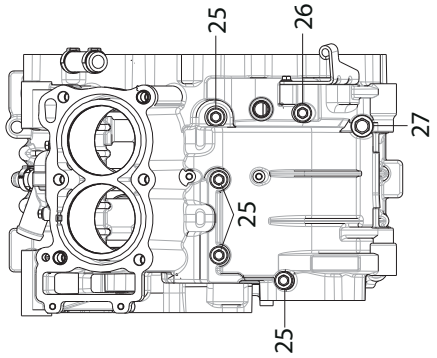
Tighten:
- The relevant screws Fig. N to the following torque:

- Position screws (25) (M8):
- Position screws (26) (M8):
- Position screws (27) (M10):

Use lubricant while tightening.

	Lubricate

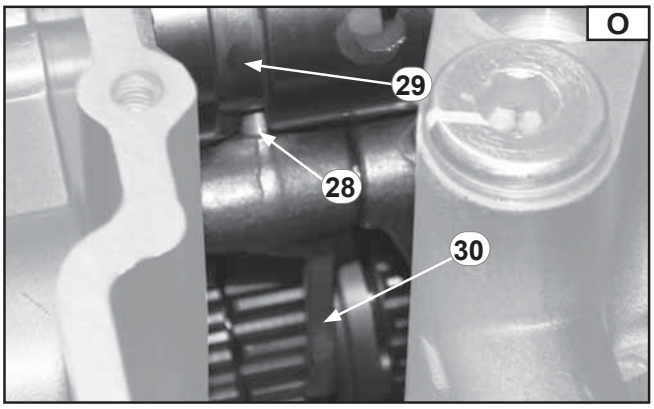
N



Casing closure tightening torque		
Sequence	**Size**	**Phases**
1	M10:	1st Phase 12 N.m 2nd Phase 24 N.m 3rd Phase 45 N.m
2	M8	1st Phase 12 N.m 2° Phase 30 N.m
3	M6	1st Phase 10 N.m 2st Phase 12 N.m

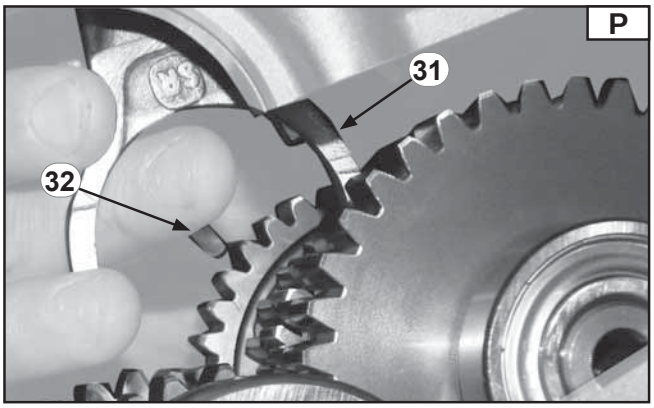
Assemble:
- The bottom casing over the top one, taking care to insert the follower (28) correctly in the segment corresponding (29) to the desmodromic shaft Fig. O.

O



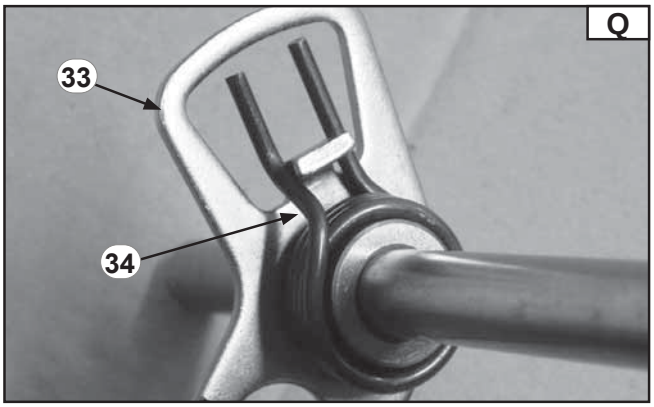
Install in the related seats:
- Gear selection fork 5th/6th (31) Fig. P.
- The gear selection fork 1st/4th - 2nd/3rd (32) Fig. P.
- Gear selection fork 5th/6th (30) Fig. O.

P

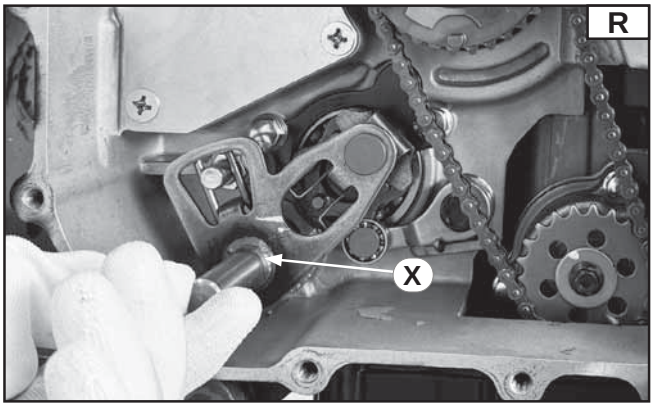


GEARBOX
INSTALLATION OF GEARBOX

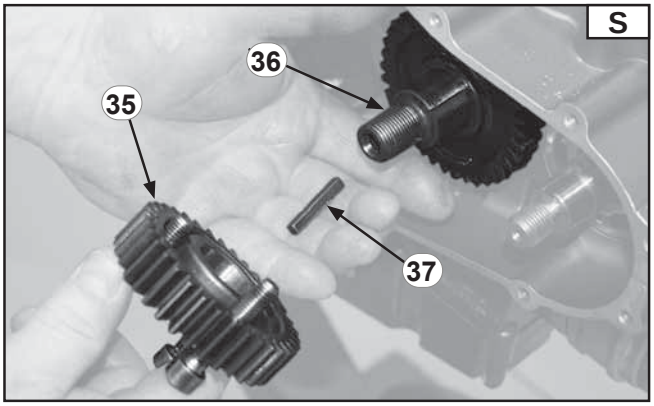
Check:
- That the end of the gear lock spring (34) is in its seat on the selector plate (33) Fig. Q.
- That in the neutral position, the clearance between the two ends of the spring and the strike pin is “0”.



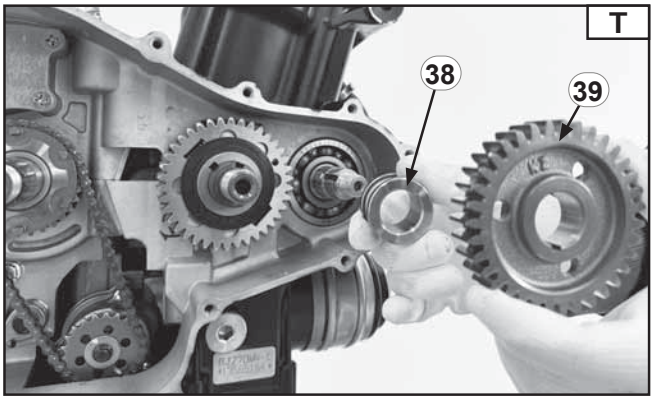
Assemble:
- The selector shaft (X) Fig. R.



Position:
- The gear (35) Fig. S
- The drive shaft gear (36), locking it into place with the spline (37) Fig. S

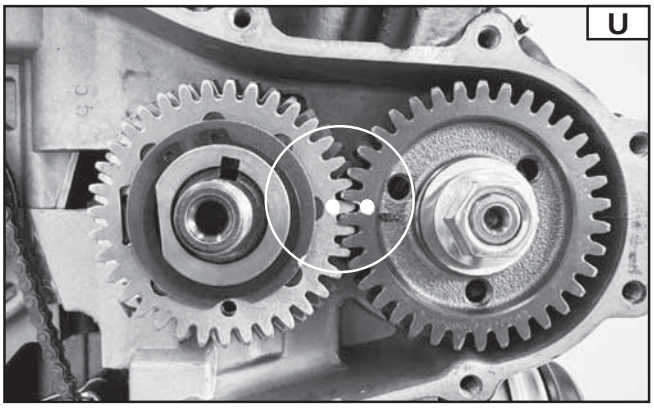


Install:
- The guide bushing (38) Fig. T.
- The balance shaft gear (39) and the relevant spline Fig. T.



GEARBOX
INSTALLATION OF GEARBOX

NOTE:
Bring the two phasing points into line between crankshaft and balance shaft Fig. U.

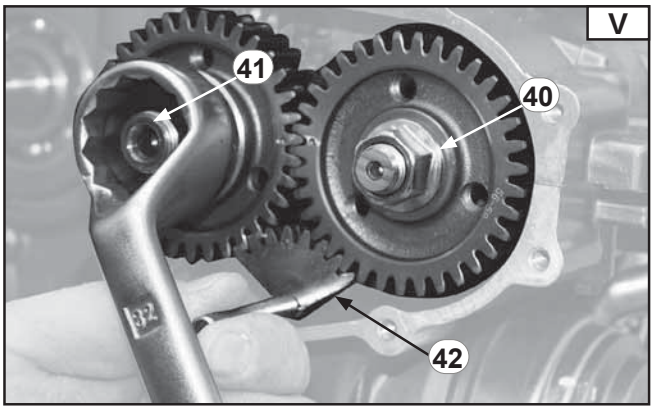


Install:
- The balance shaft gear nut (40) with the related washer Fig. V to the following torque:

Torque 90-100 N*m

- The crankshaft gear nut (41) wit the related washer Fig. V to the following torque:

Torque 115-125 N*m

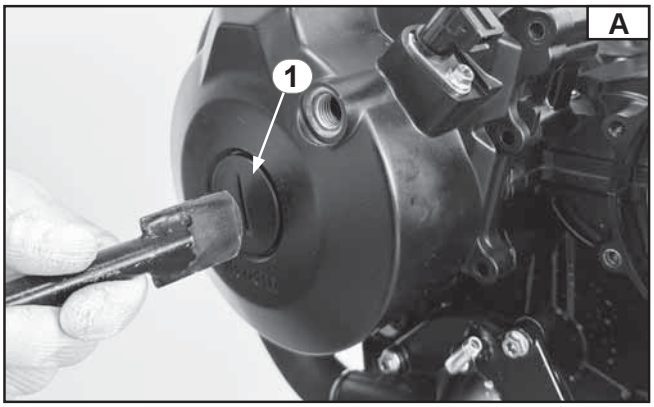


NOTE:
To keep the two crankshafts still, it is necessary to use the tool (42) in Fig. V.

Clutch bell locking toothed wrench tool
Code: 0320097053000

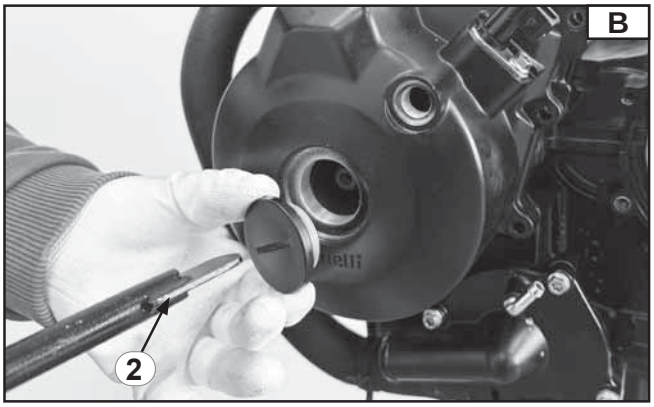
STARTING
FLYWHEEL REMOVAL

Remove:
- The cap (1) Fig. A.

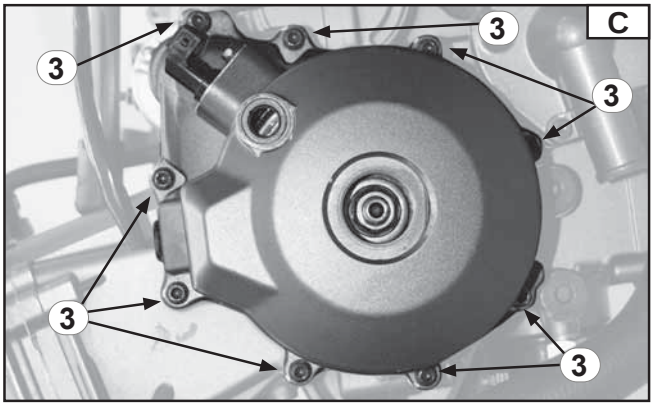


NOTE:
Use the tool (2) for this operation Fig. B.

Flywheel cover screwdriver tool
Code: 0320097043000.

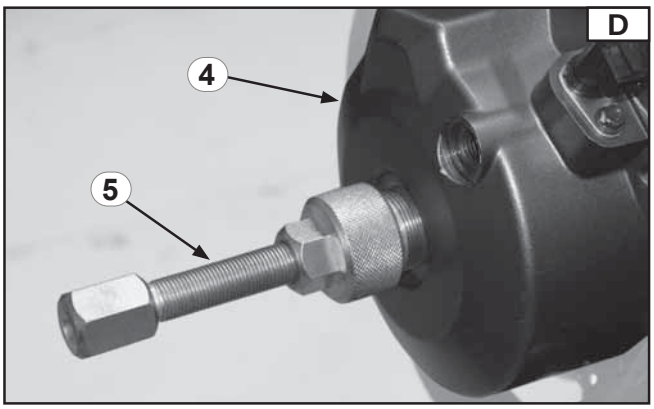


Remove:
- The screws (3) Fig. C.



Remove:
- The magneto flywheel cover (4) using the tool (5) Fig. D.

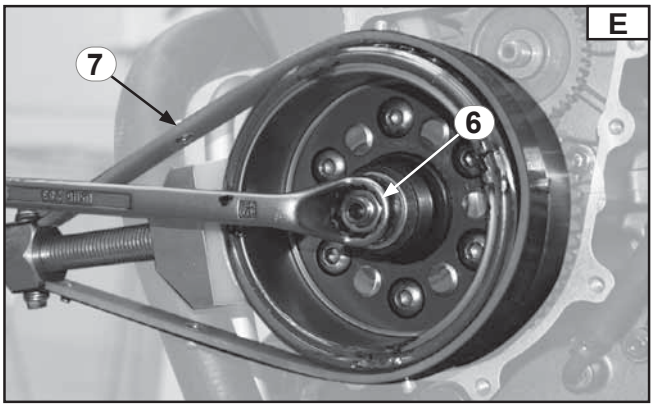
Flywheel cover extractor
Code: KST03BL01054



STARTING
FLYWHEEL REMOVAL

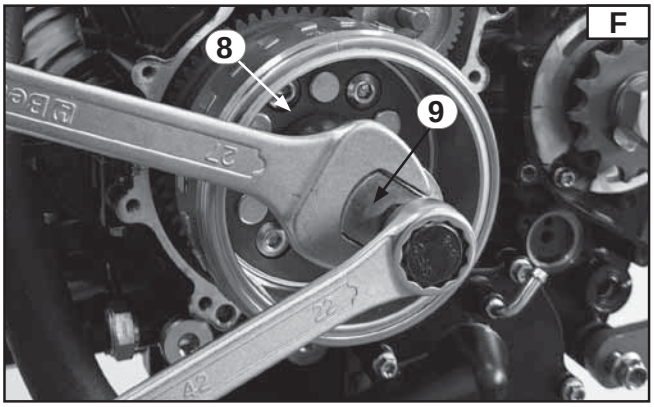
Remove:
- The nut (6) and the relevant washer using the tool (7) Fig. E.

Key assembly tool of flywheel
Code: 0320097044000



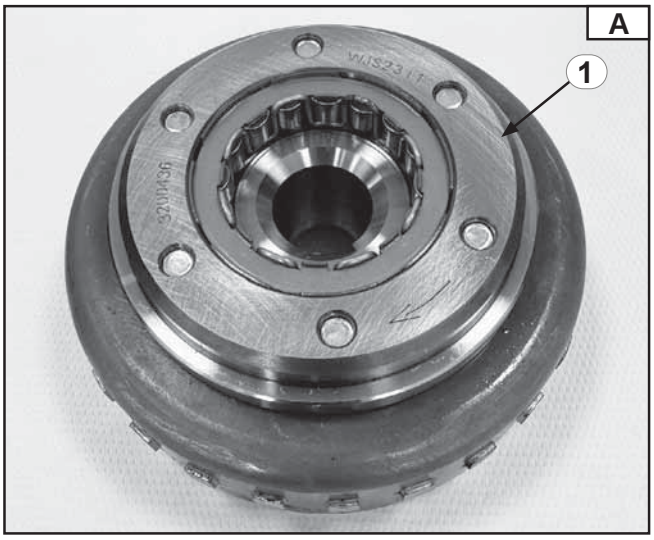
Remove:
- The rotor magneto flywheel (8) using the tool (9) Fig. F.

Flywheel extractor
Code: KST03BL01055

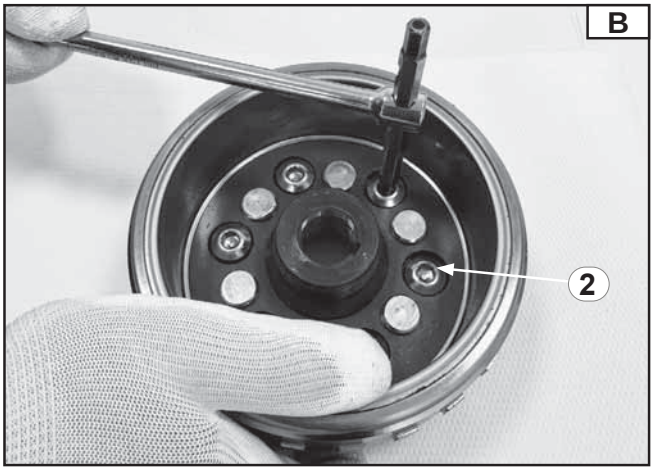


STARTING
FLYWHEEL REMOVAL

Remove:
- The one way wheel elements (1) Fig. A.



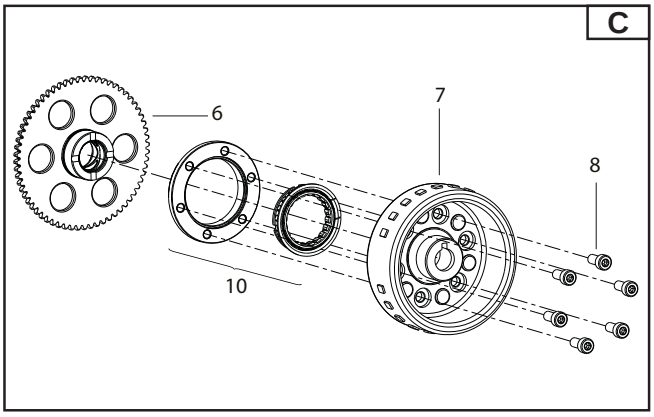
- The screws (2) Fig. B.



Check:
- The roller cage and support.

If there are any anomalies or signs of wear, replace the whole one way wheel.

The flywheel consists of the following parts:
- The starter gear (6) Fig. C.
- The rotor magneto flywheel (7) Fig. C.
- The screw (M8X16) (8) Fig. C.
- The complete freewheel (10) Fig. C.



STARTING
FLYWHEEL INSTALLATION

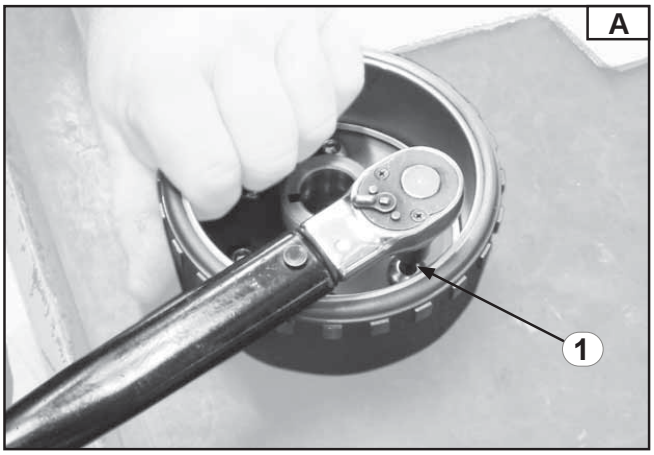
Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 25 N*m

Use medium Loctite thread locker to secure.

	MEDIUM THREAD LOCKER



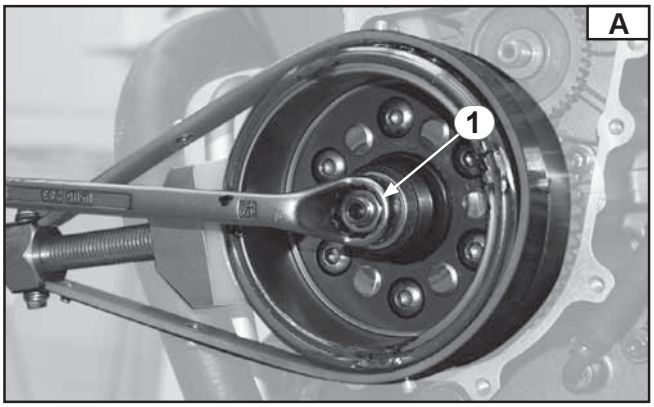
STARTING
FLYWHEEL INSTALLATION

Installation:
Proceed using the opposite order to removal.

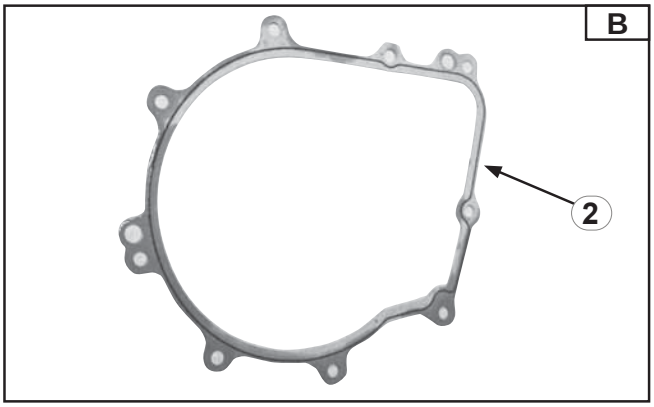
Tighten:
- The nut (1) wit the related washer Fig. A with the special tool at the following torque:

Torque 90 N*m

Flywheel assembly tool
Code: 0320097044000

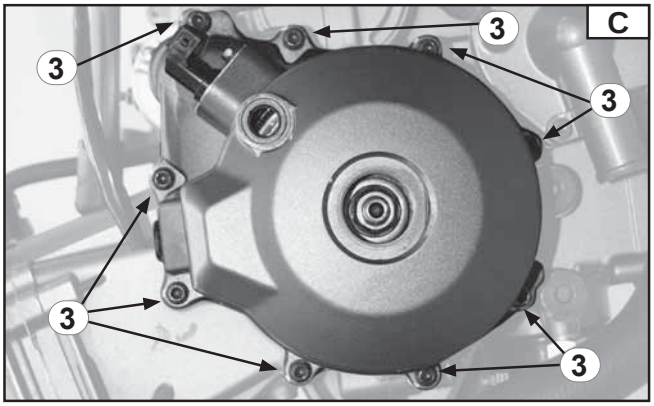


NOTE:
When closing the magnet flywheel cover, pay attention to the gasket (2) Fig. B.
If the seal is damaged, it must be replaced with a new one.



Tighten:
- The screws (3) Fig. C to the following torque:

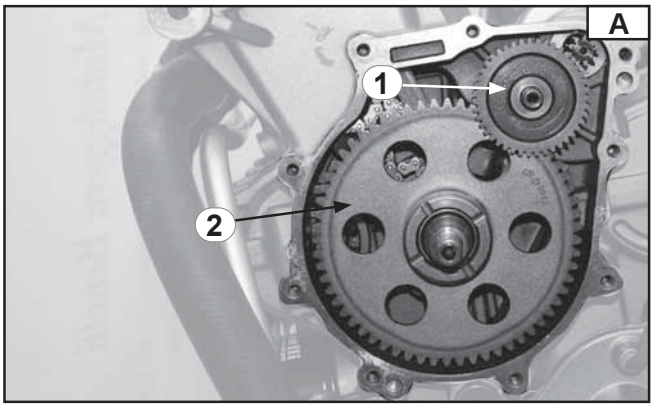
Torque 12 N*m



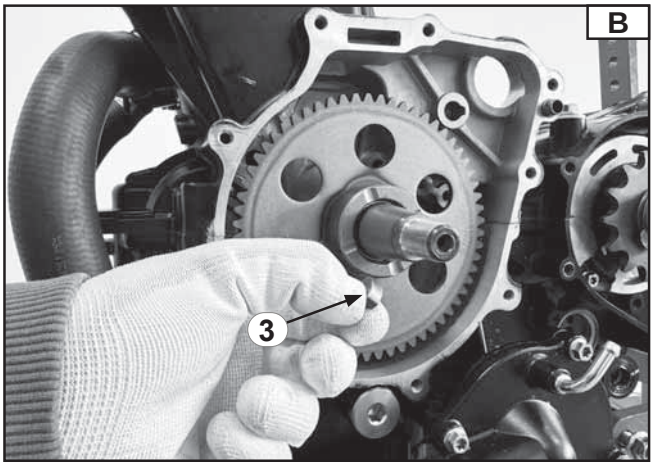
STARTING
REMOVAL OF START PINIONS

Remove:
- The flywheel**,** refer to **"Removal of flywheel, Chapter 5".**

Remove:
- The satellite starter gear (1) Fig. A.
- The one way wheel starter gear (2) Fig. A.



- The spline (3) Fig. B.



STARTING
INSTALLATION OF START PINIONS

Installation:
Proceed using the opposite order to removal.

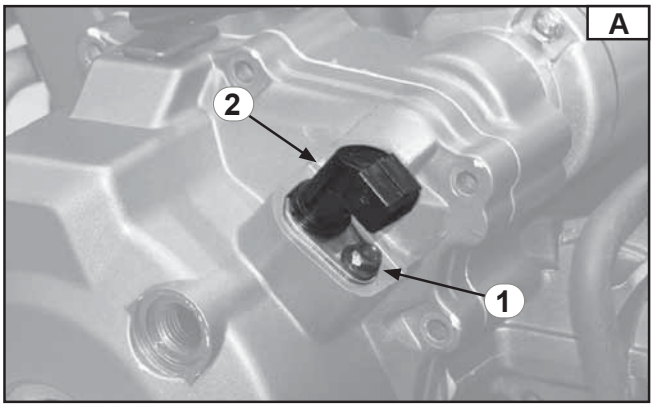
STARTING
PHASE SENSOR REMOVAL

Disconnect:
- The electric connector from the phase sensor, refer to **"Phase sensor, Chapter 7".**

Remove:
- The screw (1) Fig. A.
- The phase sensor (2) Fig. A.

Check:
- The integrity of the phase sensor.

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



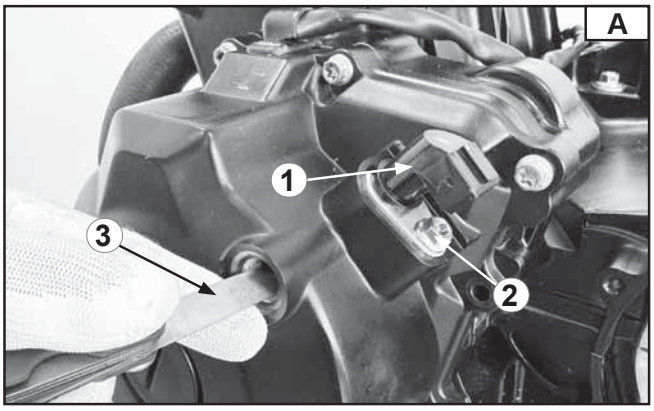
STARTING
PHASE SENSOR INSTALLATION

Assemble:
- The phase sensor (1) Fig. A.
- The fixing screw (2) Fig. A to the following torque:

Torque 12 N*m

Measure:
- The distance between the phase sensor (1) and the pick-up on the magneto flywheel by means of thickness gauge (3) Fig. A.

Gap	0.8 - 1.0 mm



STARTING
REMOVAL OF STARTER

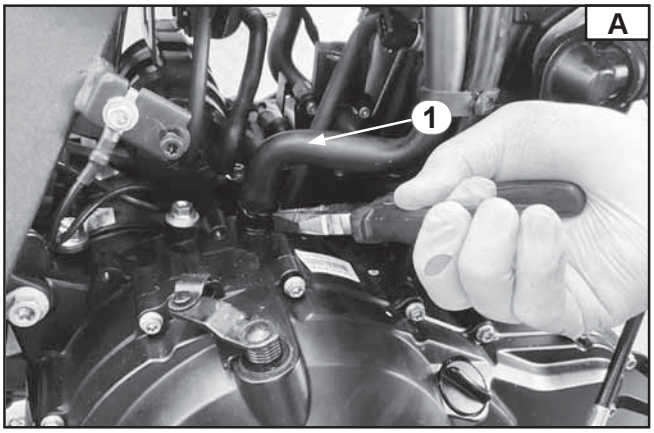
Park the motorcycle on a level surface.

NOTICE

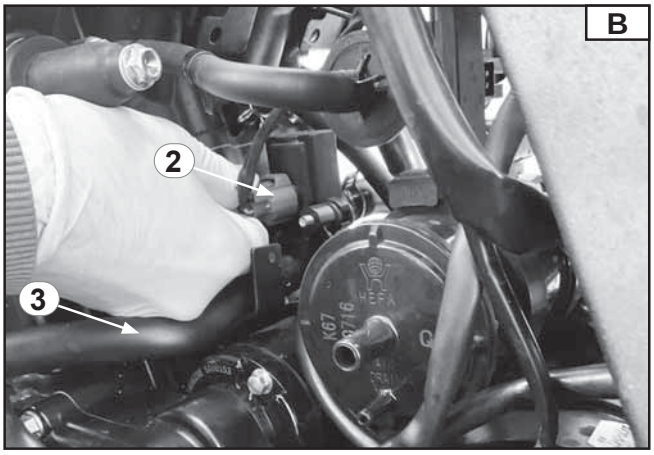
Prop the motorcycle on suitable supports so that it cannot fall.

Disconnect:
- the battery cables, refer to **"Removal of battery cables., Chapter 4".**

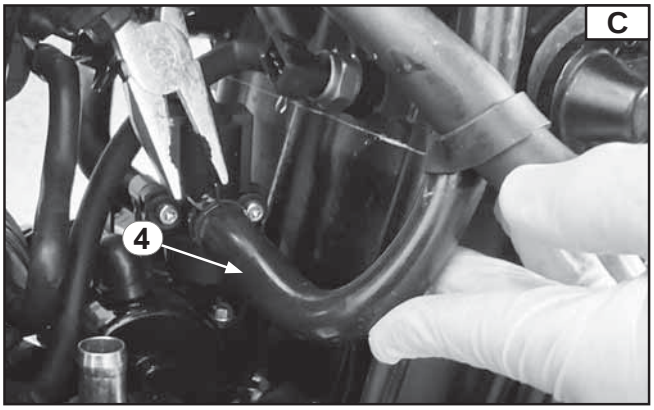
Remove:
- The side fairings, refer to **"Removal of vehicle fairings, Chapter 4".**
- The clutch cable bracket, refer to **"Removal of clutch cable bracket, Chapter 4"**.
- The oil vapor tube (1) Fig. A.



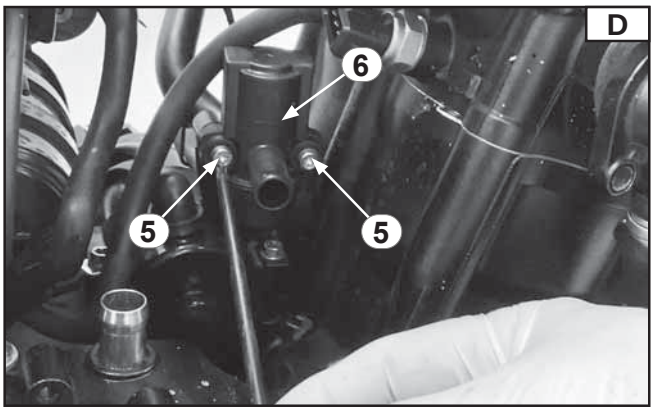
Disconnect:
- The solenoid connector (2) Fig. B.
- The solenoid tube - airbox (3) Fig. B.



Disconnect:
- The solenoid tube - one-way valve (4) Fig. C.

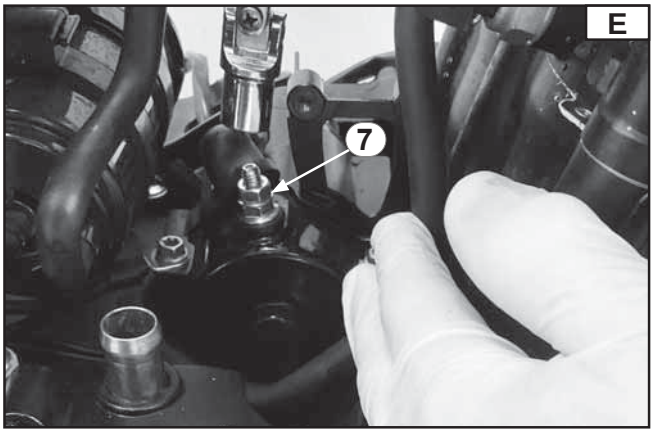


Remove:
- The screws (5) Fig. D.
- The solenoid (6) Fig. D.



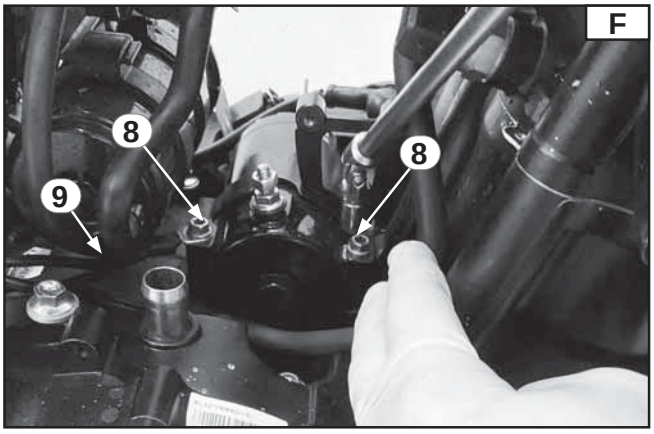
STARTING
REMOVAL OF STARTER

Disconnect:
- The positive cable (7) Fig. E

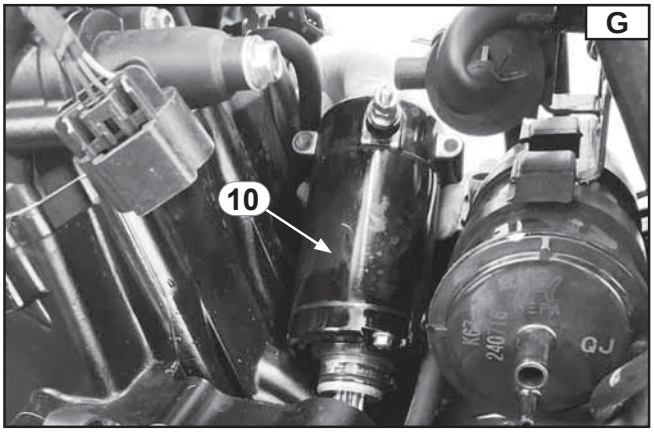


Remove:
- the fixing screws (8) Fig. F

Disconnect:
- The ground cable (9) Fig. F



Remove:
- the starter (10) Fig. G



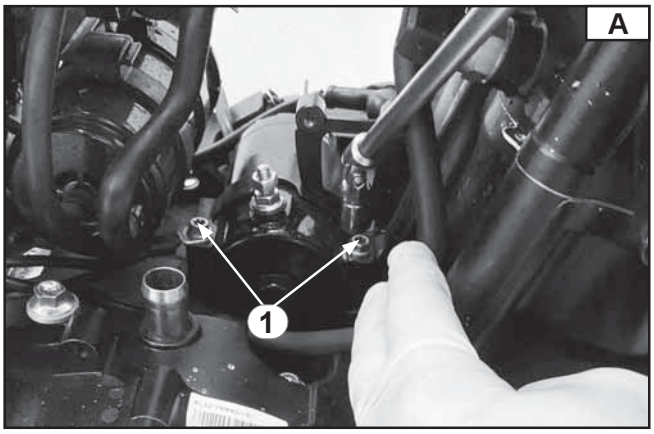
STARTING
INSTALLATION OF STARTER

Install:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 12 N*m

NOTE:
Once the starter motor is assembled, proceed with the connection of the current wire.



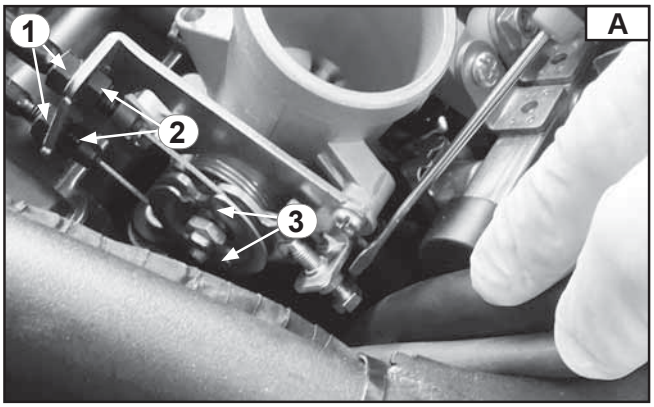
POWER SYSTEM
REMOVAL OF THROTTLE BODY

Park:
- The motorcycle on a level surface.

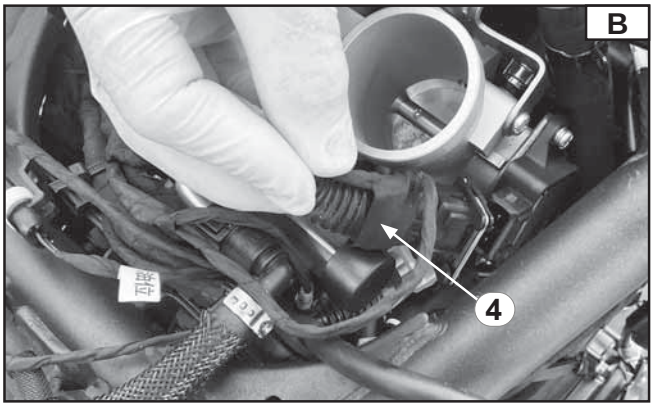
NOTICE

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

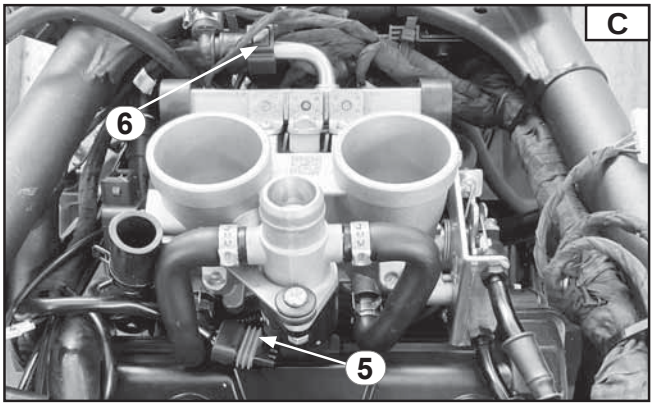
Remove:
- The seat, refer to **"Removal of rider seat, Chapter 4".**
- The tank, refer to **"Removal of tank, Chapter 4".**
- The side fairings, refer to **"Removal of vehicle fairings, Chapter 4".**
- The airbox, refer to **"Removal of airbox, Chapter 4".**



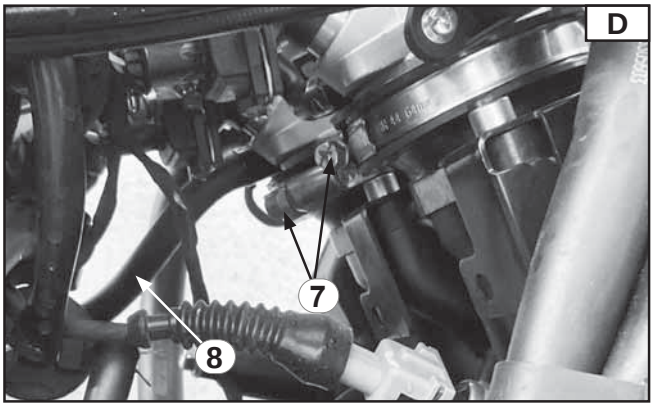
Disconnect:
- The bottom end of the throttle opening/closure cable (3) by releasing the lock nuts (1) Fig. A
- The lower nuts (2) Fig. A.



Disconnect:
- The TPS connector (4) of the throttle body Fig. B.
- The Stepper connector (5) Fig. C.
- The fuel recirculation tube (8) Fig. D.
- The fuel supply tube (6) Fig. C.

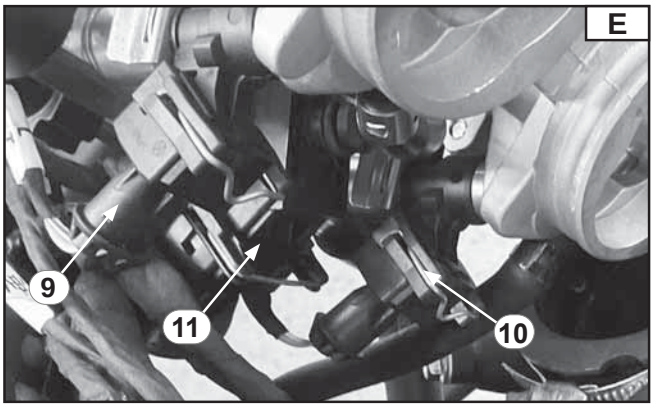


Loosen:
- The screw hose clamps (7) Fig. D.

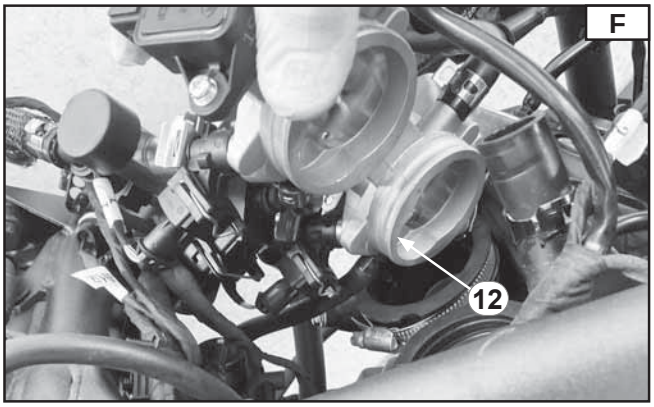


POWER SYSTEM
REMOVAL OF THROTTLE BODY

Disconnect:
- The injector connector 1 (9) Fig. E.
- The injector connector 2 (10) Fig. E.
- The MAP sensor connector (112) Fig. E.



Take out:
- The throttle body (12) Fig. F.



POWER SYSTEM
INSTALLATION OF THROTTLE BODY

Park:
- The motorcycle on a level surface.

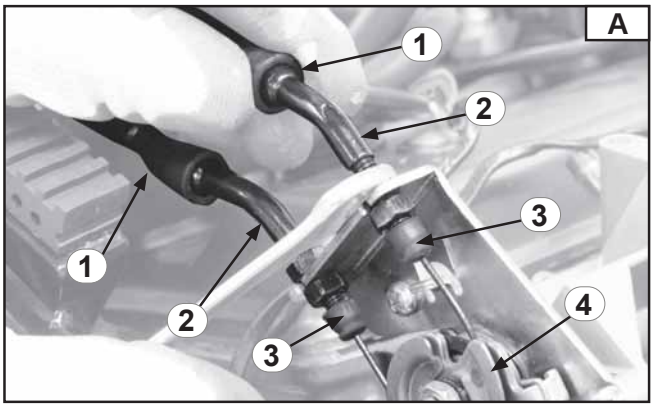
NOTICE

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

Installation:
Proceed using the opposite order to removal.

NOTICE

During assembly of the throttle cables, take care to insert the hood (1) on the control line (2) Fig. A, the rubber terminals (3), otherwise they could interfere with the throttle opening nut (4) Fig. A



POWER SYSTEM
REMOVAL OF STEPPER

Park:
- The motorcycle on a level surface.

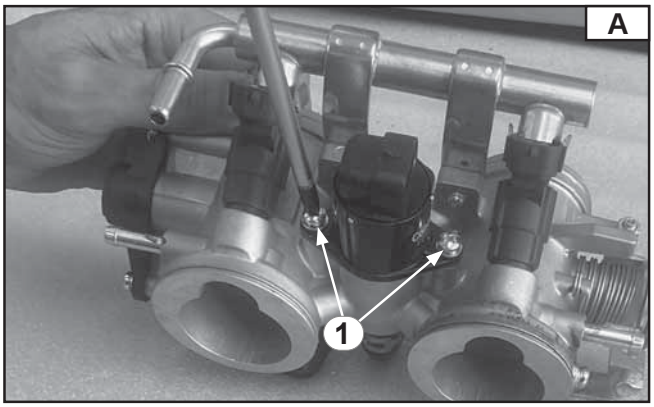
NOTICE

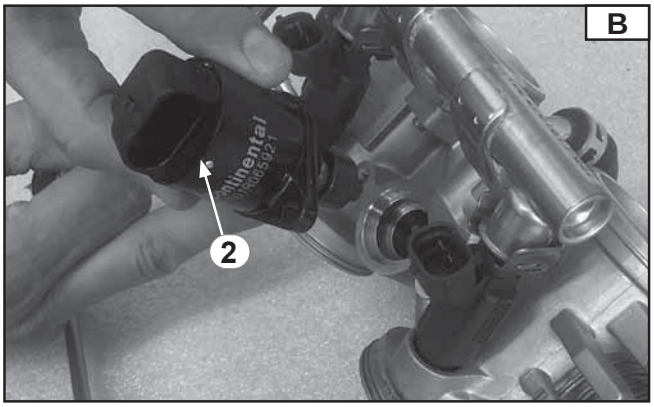
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The seat, refer to **"Removal of rider seat, Chapter 4".**
- The tank, refer to **"Removal of tank, Chapter 4"**.
- The airbox, refer to **"Removal of airbox, Chapter 4".**
- The throttle body, refer to "**Removal of throttle body, Chapter 4**".

Remove:
- The screws (1) Fig. A.

Take out:
- The stepper (2) Fig. B.





POWER SYSTEM
INSTALLATION OF STEPPER

Park:
- The motorcycle on a level surface.

NOTICE

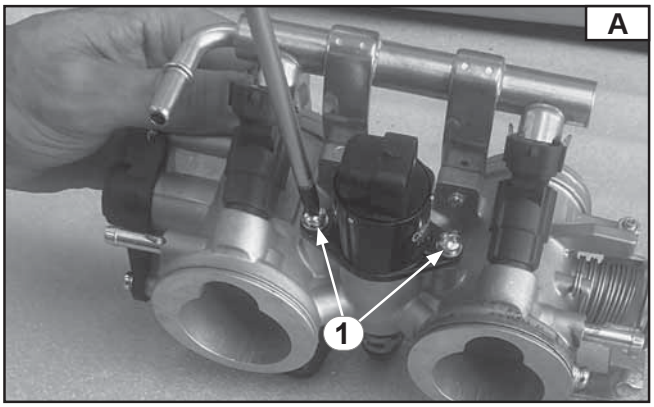
Prop the motorcycle on suitable supports so that it cannot fall.

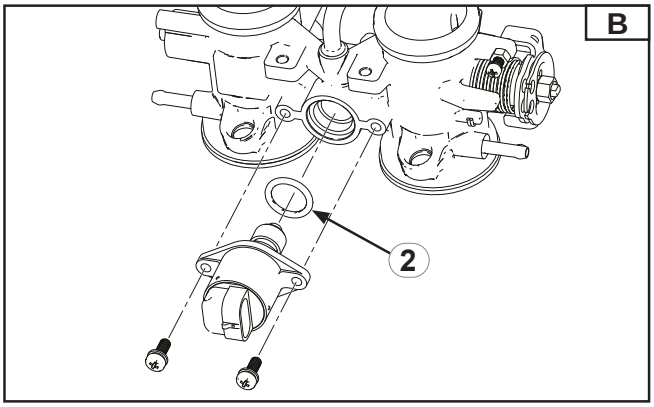
Installation:
Proceed using the opposite order to removal.

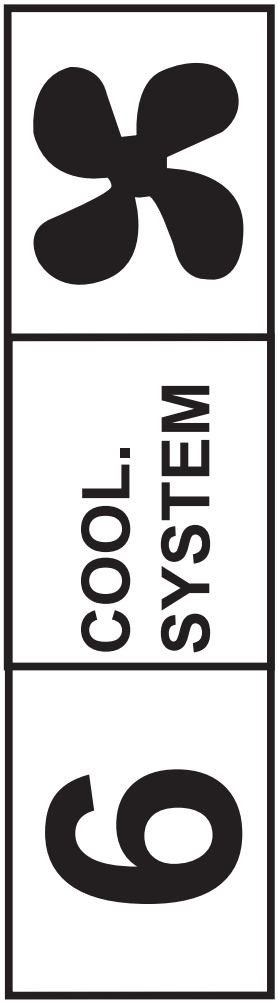
Tighten:
- The screws (1) Fig. A to the following torque:

Torque 8-10 N*m

NOTE:
During the assembly stage of the stepper, pay attention that the O-Ring (2) Fig. B is not damaged during insertion into its seat.






6
COOL.
SYSTEM

CHAPTER 6

COOLING SYSTEM

WATER PUMP 3
REMOVAL OF WATER PUMP 3
INSTALLATION OF WATER PUMP 5
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REMOVAL OF THE THERMOSTAT 6
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RADIATOR 13
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EXPANSION TANK 18
REMOVAL OF EXPANSION TANK 18
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WATER PUMP

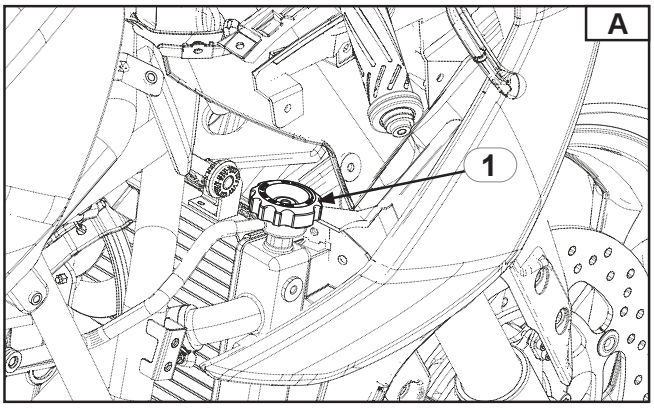
REMOVAL OF WATER PUMP

Park:
- The motorcycle on a level surface.

NOTICE

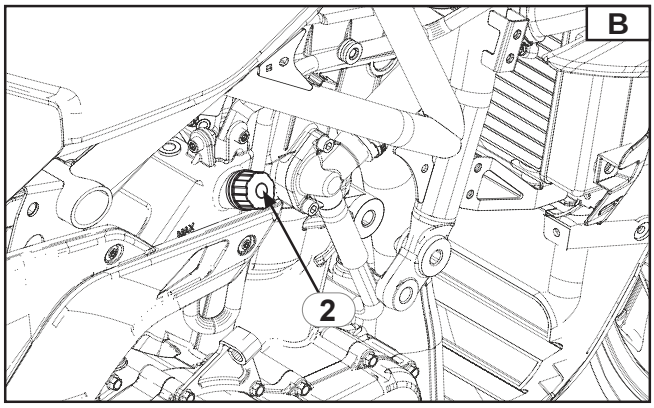
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4".**
- The radiator cap (1) Fig. A.

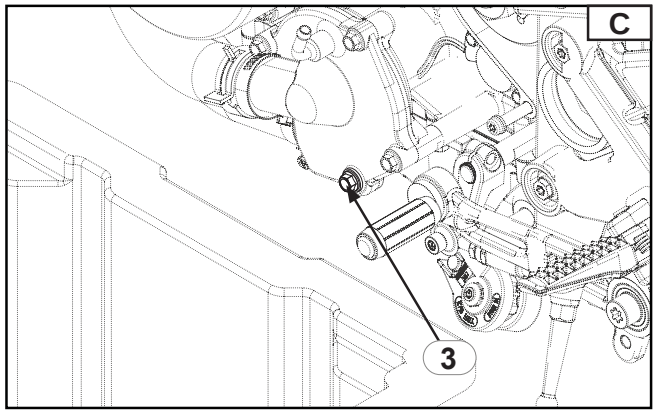


- The expansion tank cap (2) Fig. B.

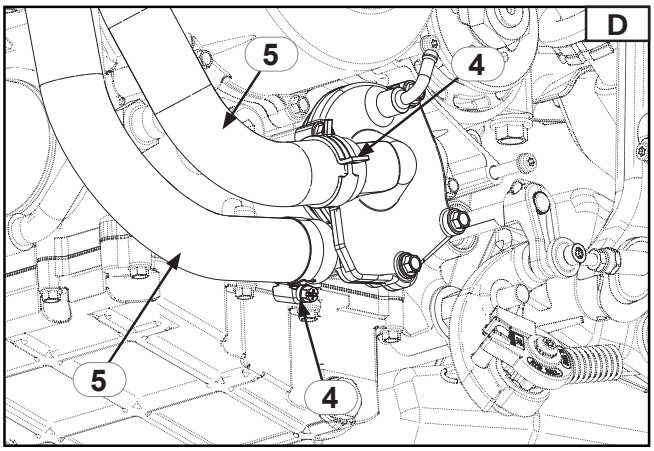
NOTE:
Place a container underneath the drain cap of the water pump Fig. C.



Remove:
- The coolant drain screw (3) Fig. C.
- The coolant.



- The metal clamps (4) Fig. D.
- The water inlet and return sleeves (5) Fig. D.

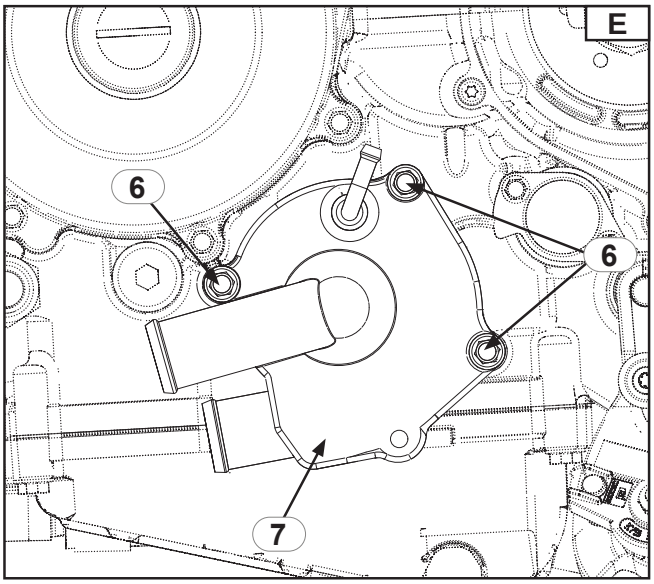


WATER PUMP

REMOVAL OF WATER PUMP

Remove:

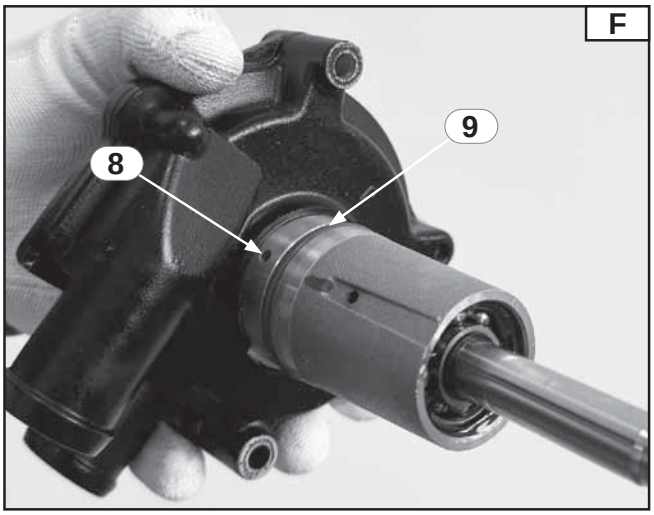
- The screws (6) Fig. E.
- Complete water pump (7) Fig. E.



NOTICE

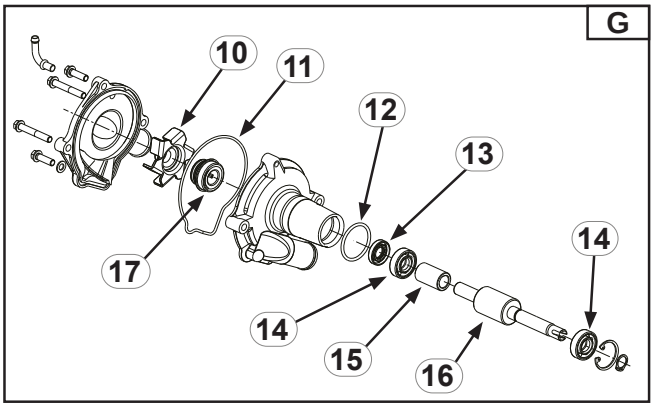
In case of faulty gaskets, it is possible to notice leaks from the hole (8) shown in Fig. F.

NOTE:
Pay attention to the "O-Ring" (9) Fig. F during removal.



Check:

- The water pump fan (10) Fig. G.
- The seal ring (11) Fig. G.
- The O-ring (12) Fig. G.
- The oil seal (13) Fig. G.
- The bearings (14) Fig. G.
- The bushing (15) Fig. G.
- The water pump shaft (16) Fig. G.
- The mechanical gasket (17) Fig. G.



WATER PUMP

INSTALLATION OF WATER PUMP

Installation:
Proceed using the opposite order to removal.

Lubricate with engine oil:
- The pump shaft.
- The bushing.
- The bearings.

NOTE:
During insertion of the mechanical seal, the latter must never come in contact with oil, grease nor be handled with bare hands. It must be degreased on support tables with trichloroethylene or equivalent degreasing agent.

NOTE:
When inserting the pump, make sure the notch (1) Fig. A on the water pump shaft is properly timed with the corresponding counter-face of the oil pump shaft.

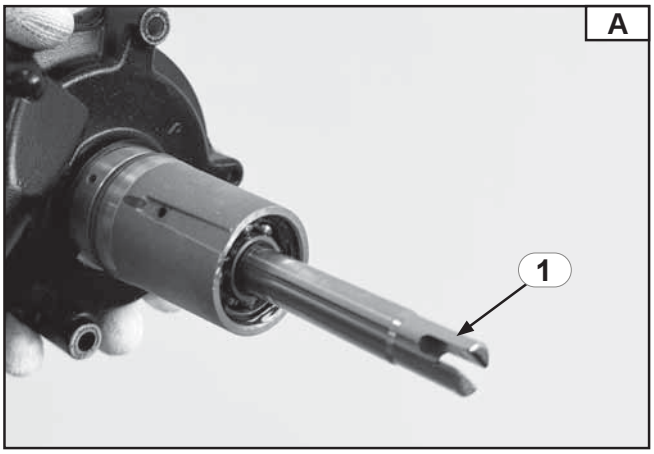
Tighten:
- The screws (2) Fig. B to the following torque:

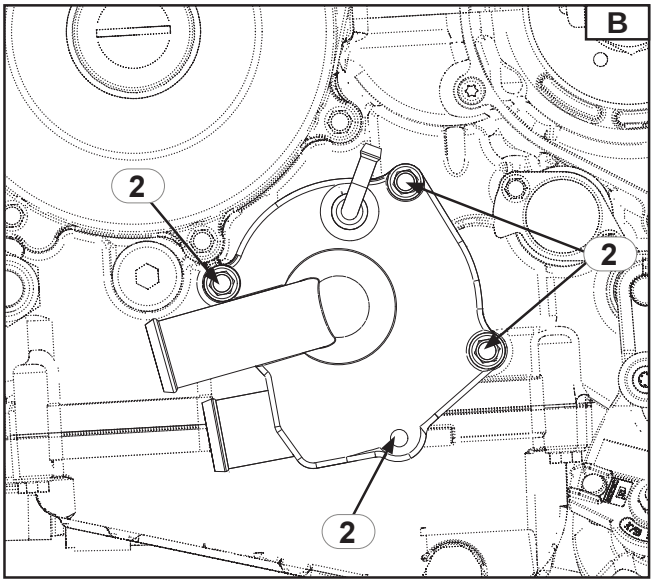
Torque 12 N*m

Use Loctite thread locker to secure.

	Loctite 243

NOTE:
Fill with coolant after completing these operations.





THERMOSTAT

REMOVAL OF THERMOSTAT

Park:
- The motorcycle on a level surface.

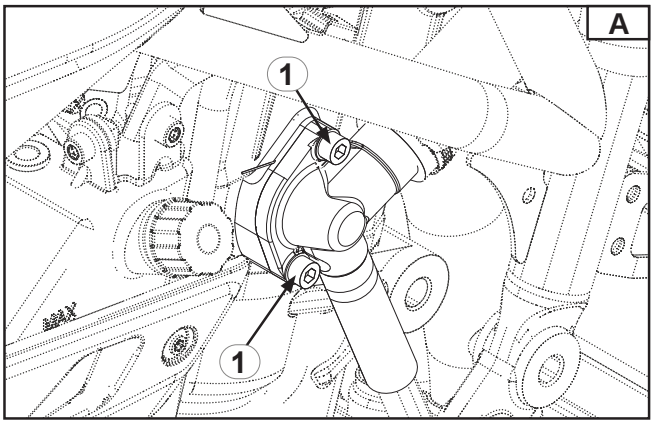
NOTICE

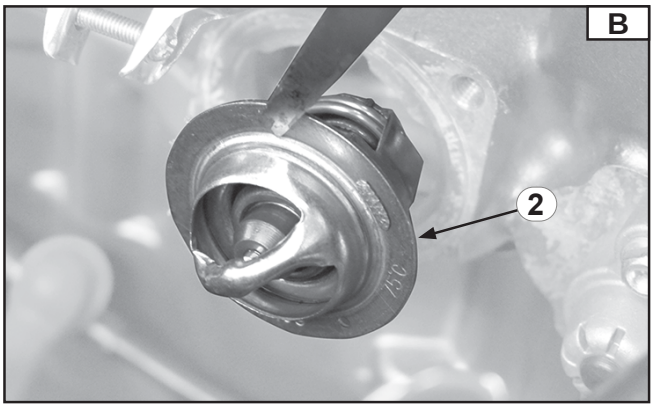
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4".**
- The coolant, refer to **"Removal of water pump, Chapter 6"**.

Remove:
- The screws (1) Fig. A.

- The thermostatic valve (2) Fig. B.

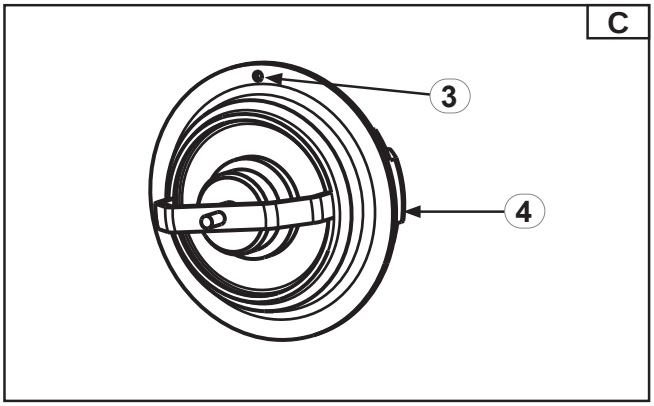




Check:
- The by-pass port (3) Fig. C.

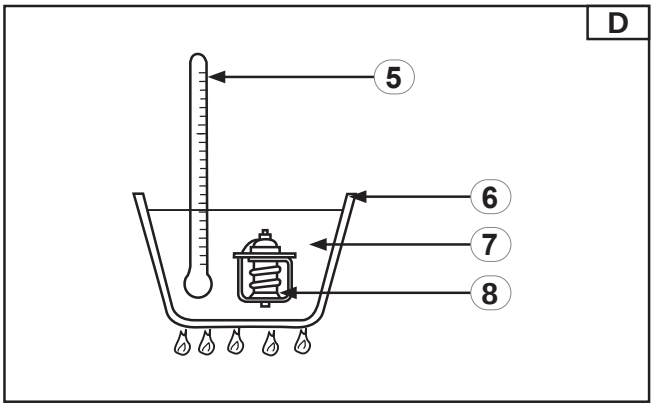
If there is any clogging, replace.
- The thermostat (4) Fig. C.

If this does not open at 82° ~ 95° C (179 °~ 203° F), replace.



Check of thermostat:
- Immerse the thermostat in a container filled with water Fig. D.
- Slowly heat the water.
- Immerse a thermometer in water.
- Mixing the water, monitor the thermostat and the temperature reading on the thermometer.
- When the temperature of 82°C (179° F) is reached, the thermostat valve starts to open up to the max opening at a temperature of 95°C (203° F). The thermostat valve will open at least to 7 mm (0.275 in).

Key Fig. D.
- Thermometer (5).
- Container (6).
- Water (7).
- Thermostat (8).



THERMOSTAT

REMOVAL OF THERMOSTAT

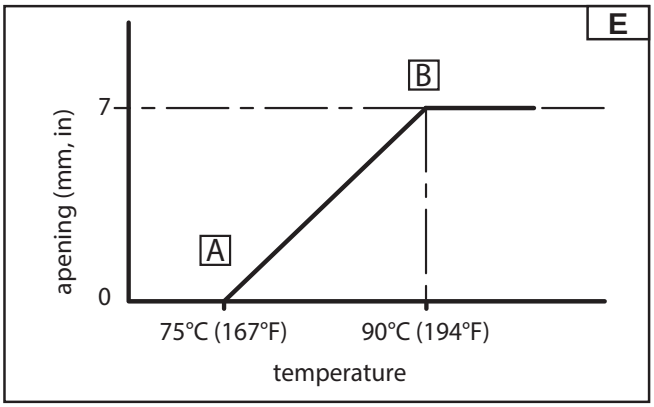
Diagram of thermostat opening / closing Fig. E.

A. Fully closed

B. Fully open.

NOTICE

If there are any doubts about the precision of the thermostat, it should be replaced. A faulty thermostat might cause overheating.



THERMOSTAT

INSTALLATION OF THERMOSTAT

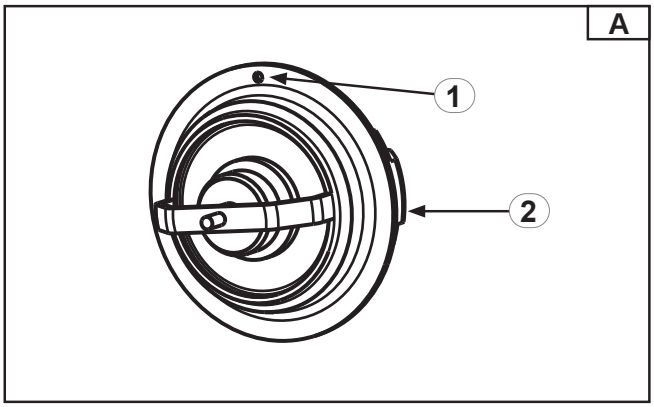
Park:
- The motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

Install:
- The thermostat (2) with the by-pass port (1) Fig. A facing upward.

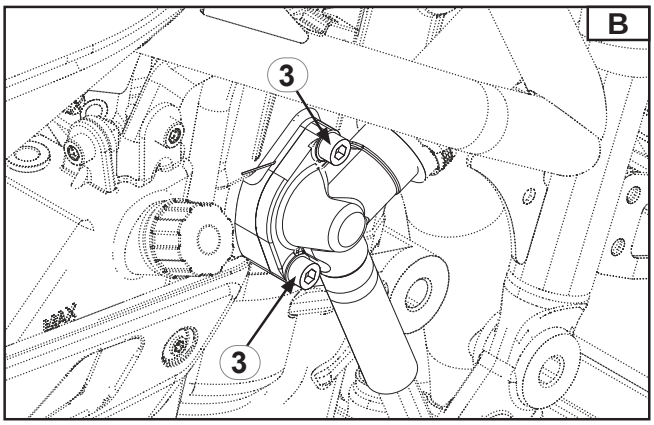


Tighten:
- The screws (3) Fig. B to the following torque:

Torque 10 N*m

Use Loctite thread locker to secure the screws.

	Loctite 242/243



NOTE:
Fill with coolant after completing these operations.

WATER MANIFOLD

REMOVAL OF WATER MANIFOLD

Park:
- The motorcycle on a level surface.

NOTICE

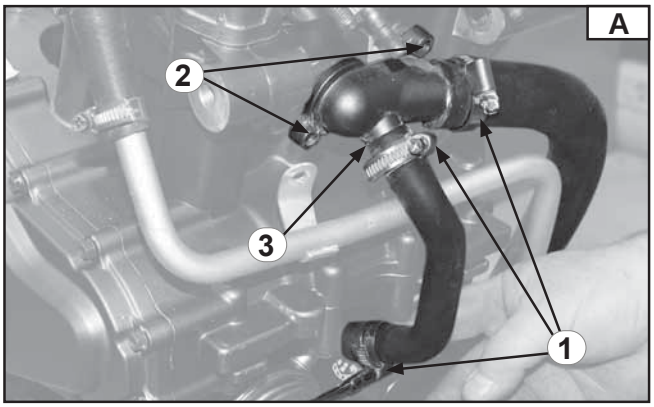
Prop the motorcycle on suitable supports so that it cannot fall.

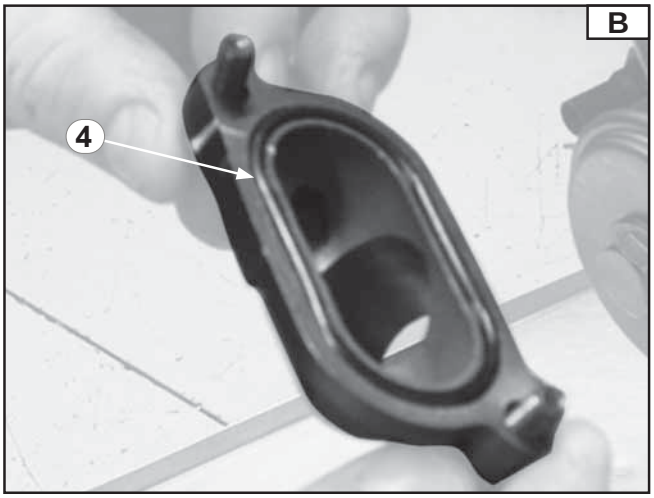
Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4".**
- The coolant, refer to **"Removal of water pump, Chapter 6"**.
- The radiator, refer to "**Removal of radiator, Chapter 6**".
- The exhaust manifolds, refer to **"Removal of exhaust assembly, Chapter 4"**.

Loosen:
- The clamps (1) Fig. A.

Remove:
- The screws (2) Fig. A.
- The water manifold (3) Fig. A.
- The gasket (4) Fig. B.

If there is any damage/breakage, replace the parts previously described.





WATER MANIFOLD

INSTALLATION OF WATER MANIFOLD

Park:
- The motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

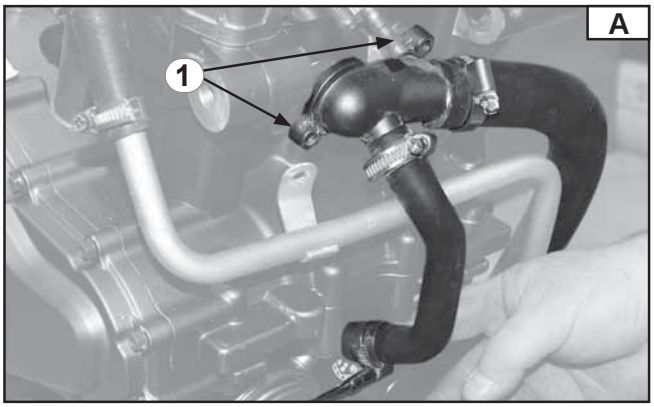
Tighten:
- The screws (1) Fig. A to the following torque:

Torque 10 N*m

Use Loctite thread locker to secure the screws.

	Loctite 243

NOTE:
Fill with coolant after completing these operations.



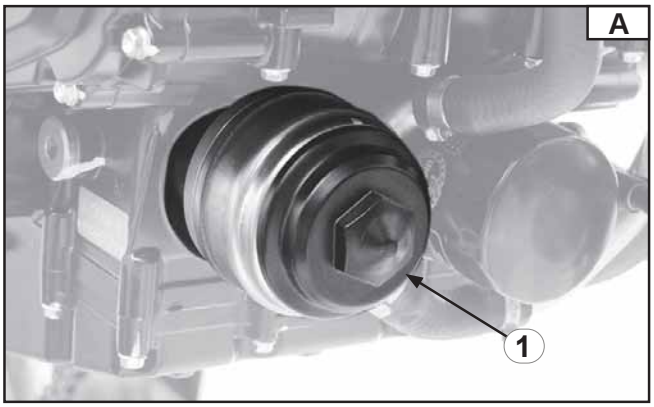
HEAT EXCHANGER
REMOVAL OF TIMING SYSTEM

Park:
- The motorcycle on a level surface.

NOTICE

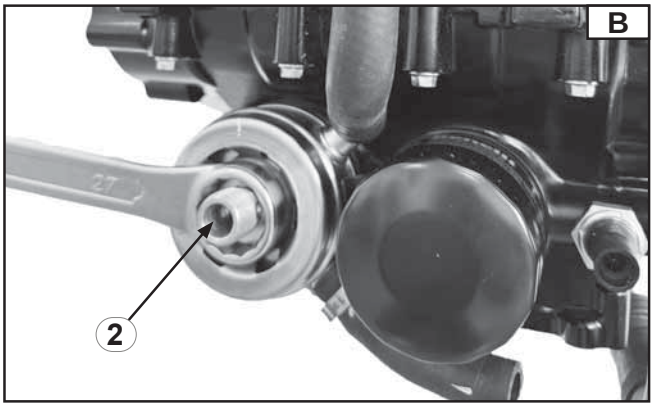
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4"**.
- The coolant, refer to **"Removal of water pump, Chapter 6"**.
- The timing system cap (1) Fig. A.



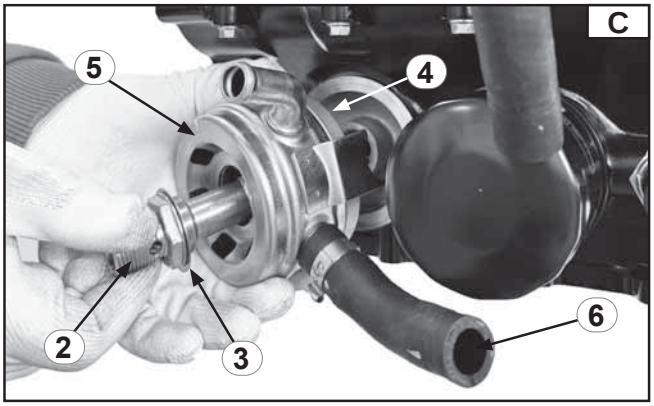
Disconnect:
- The water tubes (6) Fig. C.

Remove:
- The special screw (2) Fig. B.



NOTE:
During the extraction of the special screw (2) do not let the washer fall (3) Fig. C.

Remove:
- The timing system (5) Fig. C.
- The flange (4) Fig. C.



HEAT EXCHANGER
INSTALLATION OF TIMING SYSTEM

Park:
- The motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

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

Torque 60 N*m

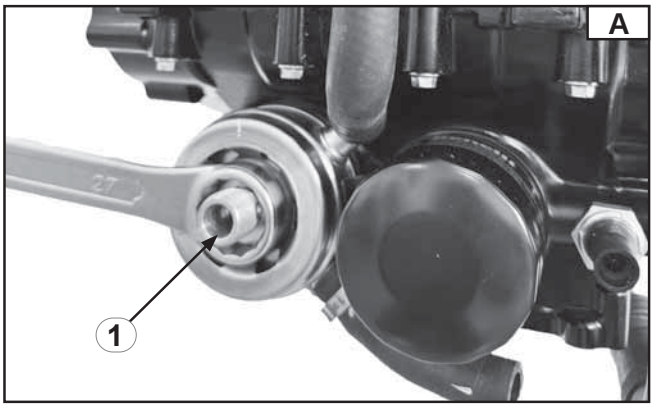
Use Loctite thread locker to secure the screws.

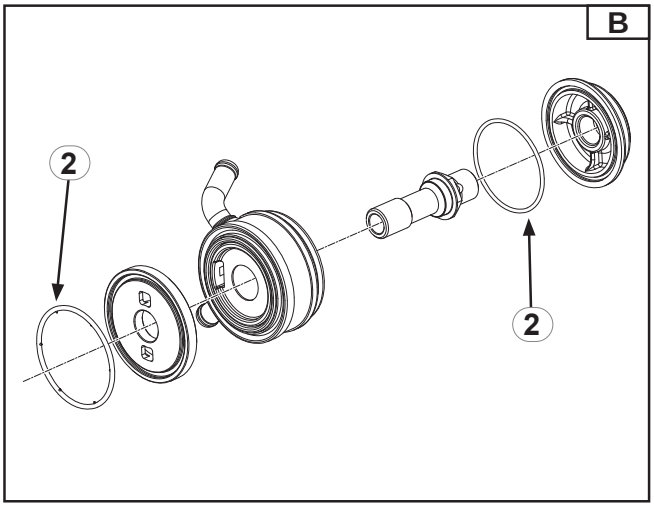
	Loctite 270

NOTE:
Fill with coolant after completing these operations.

NOTE:
During the installation, make sure the various parts of the timing system are positioned as shown in Fig. B.

NOTE:
During installation, replace the O-Ring (2) Fig. B.





RADIATOR

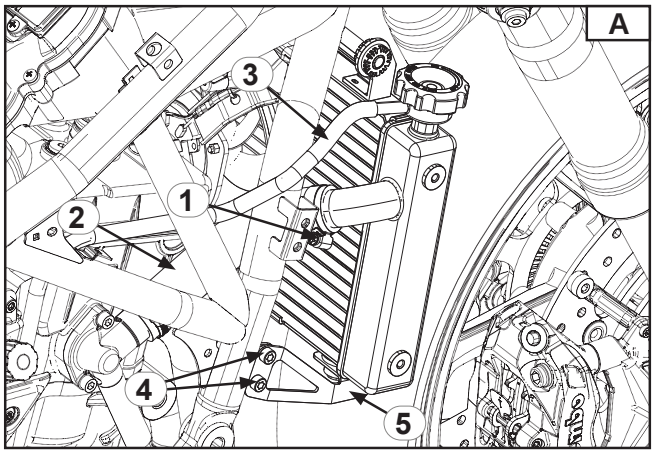
REMOVAL OF RADIATOR

Park:
- The motorcycle on a level surface.

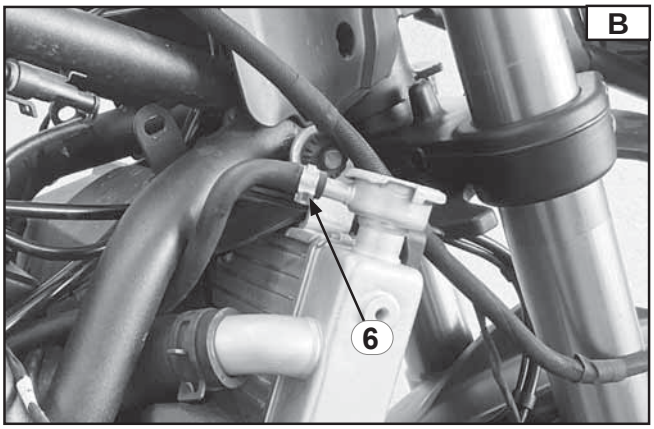
NOTICE

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

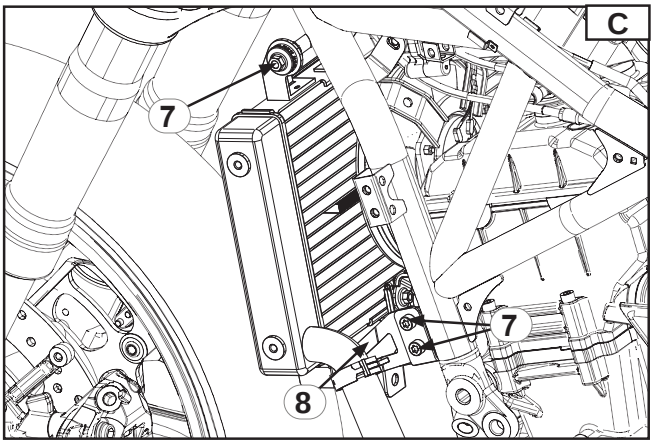
Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4"**.
- The coolant and the delivery and return sleeves, refer to **"Removal of water pump, Chapter 6"**.
- The metal clamps (1) Fig. A.
- The water tube (2) Fig. A.
- The overpressure tube (3) Fig. A.
- The screws (4) Fig. A.
- The bracket (5) Fig. A.



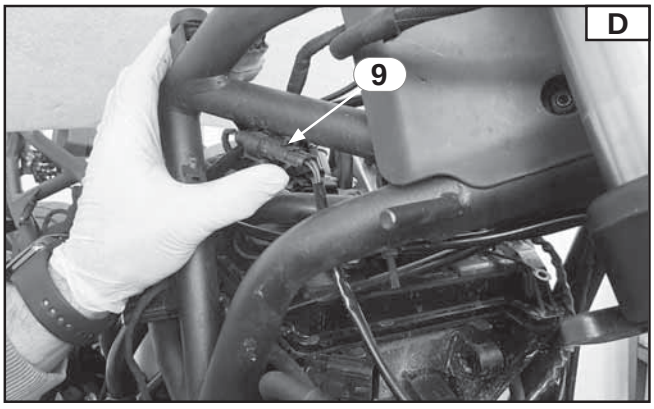
NOTE:
During the installation stage, replace the metal clamps (6) Fig. B.



Remove:
- The screws (7) Fig. C.
- The bracket (8) Fig. C.



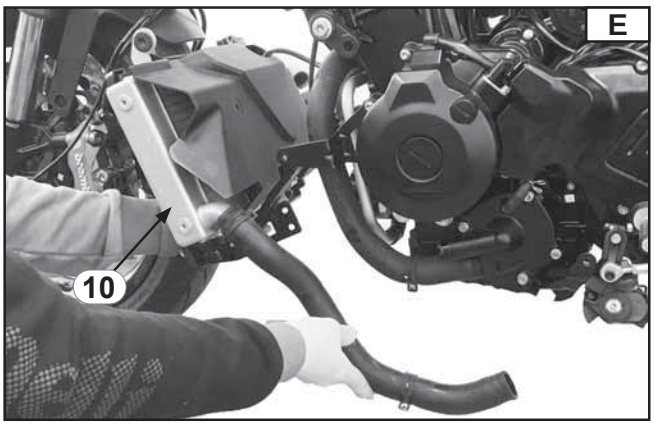
Disconnect:
- The fan connector (9) Fig. D.



RADIATOR

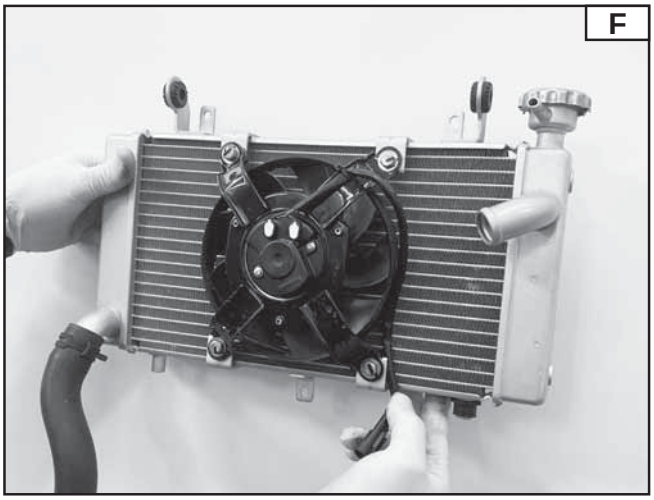
REMOVAL OF RADIATOR

Take out:
- The complete radiator (10) Fig. E.



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 tubes.

If there is any cracking/damage, replace.
- The radiator fan

In the event of damage, replace.
In case of malfunction, check and repair.

RADIATOR
INSTALLATION OF RADIATOR

Park:
- The motorcycle on a level surface.

NOTICE

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

Once each individual part has been checked, proceed to install the radiator following the removal steps in reverse order.

Tighten:
- The screws (1) Fig. A to the following torque:

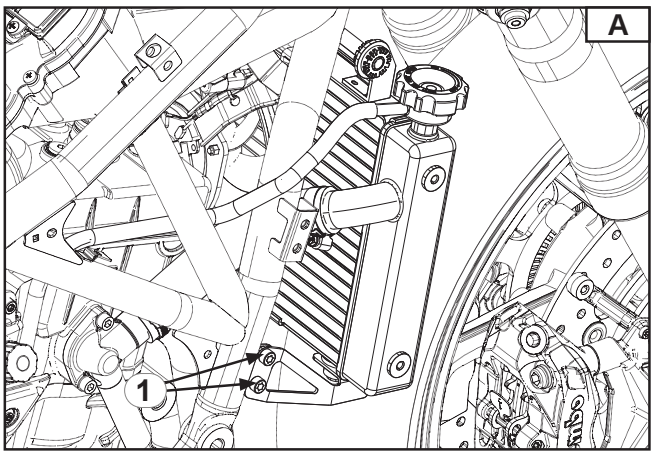
Torque 12 N*m

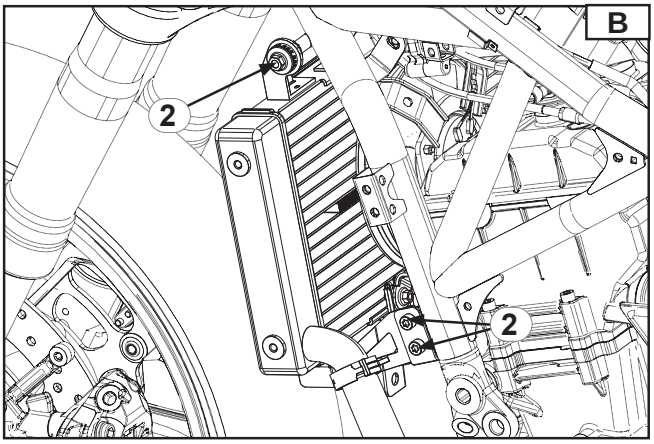
Tighten:
- The screws (2) Fig. B to the following torque:

Torque 12 N*m

NOTE:
Fill with coolant after completing these operations.

NOTE:
While filling the circuit, pinch the sleeve close to delivery of fluid to remove any air bubbles.





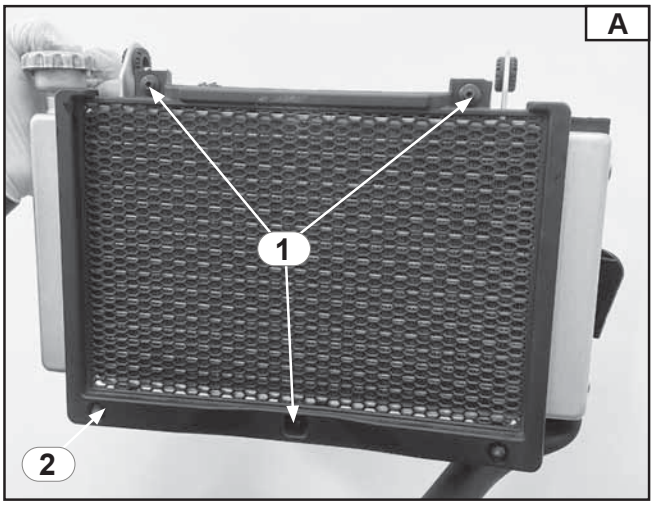
RADIATOR
REMOVAL OF ELECTRIC FAN

Park:
- The motorcycle on a level surface.

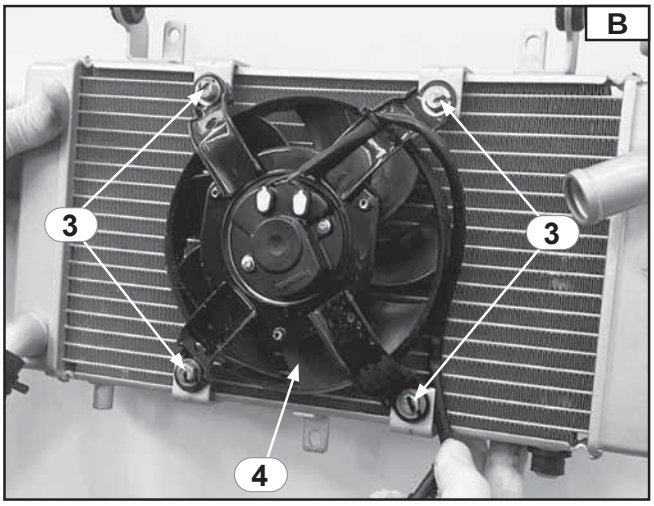
NOTICE

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

Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4"**.
- The radiator, refer to **"Removal of radiator, Chapter 4".**
- The screws (1) Fig. A.
- The radiator conveyor (2) Fig. A.



- The screws (3) Fig. B.
- The electric fan (4) Fig. A. B.



RADIATOR
INSTALLATION OF ELECTRIC FAN

Park:
- The motorcycle on a level surface.

NOTICE

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

Installation:
Proceed using the opposite order to removal.

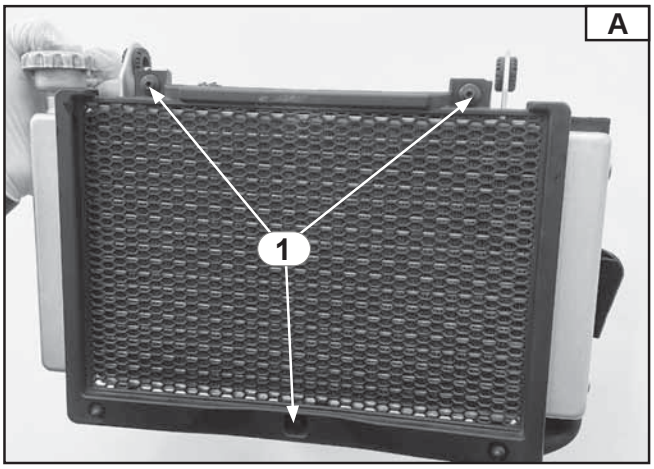
Tighten:
- The screws (1) Fig. A to the following torque:

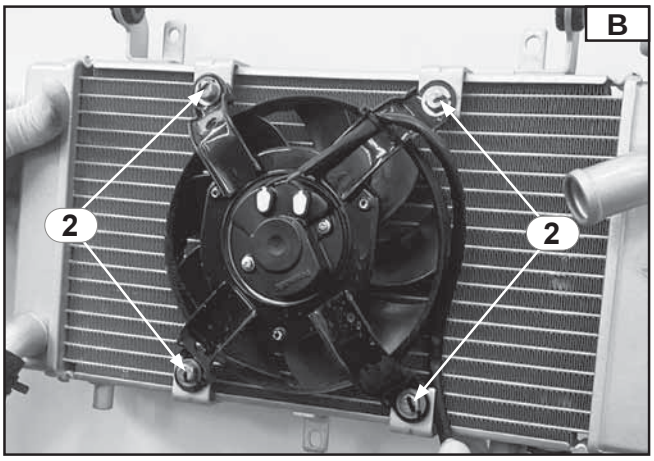
Torque 10 N*m

Tighten:
- The screws (2) Fig. B to the following torque:

Torque 10 N*m

NOTE:
Fill with coolant after completing these operations.





EXPANSION TANK

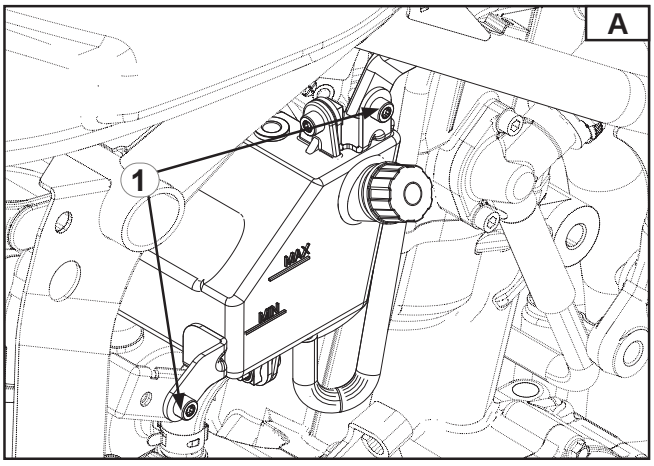
REMOVAL OF EXPANSION TANK

Park:
- The motorcycle on a level surface.

NOTICE

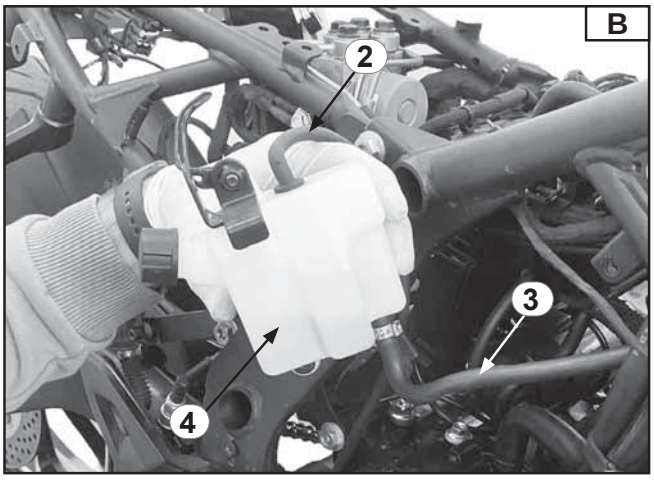
Prop the motorcycle on suitable supports so that it cannot fall.

Remove:
- The vehicle fairings, refer to **"Removal of vehicle fairings, Chapter 4"**.
- The coolant, refer to **"Removal of water pump, Chapter 6"**.
- The screws (1) Fig. A.



Remove:
- The breather hose (2) Fig. B.
- The overpressure tube (3) Fig. B.

Pull out:
- The expansion tank (4) Fig. B.



EXPANSION TANK
INSTALLATION OF EXPANSION TANK

Park:
- The motorcycle on a level surface.

NOTICE

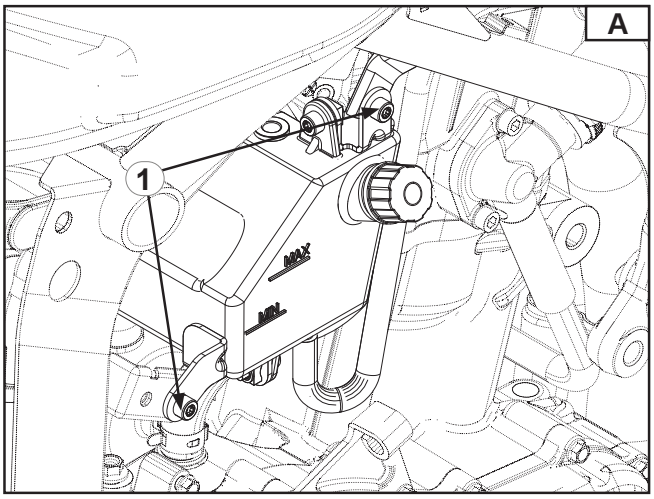
Prop the motorcycle on suitable supports so that it cannot fall.

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (1) Fig. A to the following torque:

Torque 10 N*m

NOTE:
After having installed the expansion tank, top up coolant up to the required level.




+
-
ELEC.
7

CHAPTER 7

ELECTRICAL SYSTEM

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SENSORS

DESCRIPTION OF ENGINE MANAGEMENT SYSTEM

Each model has an electronic control system for the engine, with a control including both ignition and fuel distribution.
The Electronic Control Module (ECM) uses information from the sensors around the engine, the cooling system and intake system, calculating with precision, the advance ignition time and fuel needs for all engine speeds and loads.
Furthermore, the system features hardware diagnostic functions in compliance with the provisions of the EOBD protocol.
This function makes sure that if a breakdown occurs in the system, the type of breakdown and engine data at the time of the problem are stored in the ECM memory.
The data stored can be recovered by means of an apposite service equipment available at any Benelli's Dealer.
This way, there can be exact diagnosis of the breakdown and prompt, efficient repair of the fault.

SENSORS

COOLANT TEMPERATURE SENSOR

Situated close to the cylinder head, the sensor (1) Fig. A (grey three-way connector) calculates the information of coolant temperature 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.



Check:

- The impedance via a multimeter between the terminals A and C of the connector, as shown in the figure below.

CHECKLIST

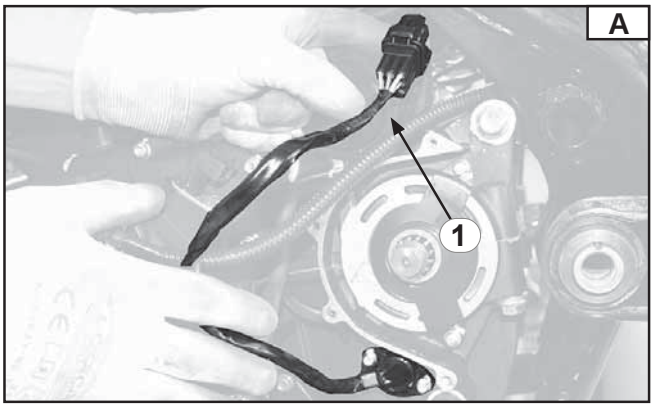
Restance (A-C)			Restance (A-C)		
Temp	Res Ω	Tolerance	Temp	Res Ω	Tolerance
-40℃	100, 865	±4. 87%	70℃	469	±2. 11%
-35℃	72, 437	±4. 64%	75℃	359	±2. 07%
-30℃	52, 594	±4. 43%	80℃	334	±2. 04%
-25℃	38, 583	±4. 21%	85℃*	283	±2. 0%
-20℃	28, 582	±4. 0%	90℃	241. 8	±2. 1%
-15℃	21, 371	±3. 8%	95℃	207. 1	±2. 21%
-10℃	16, 120	±3. 6%	100℃	178. 0	±2. 31%
-5℃	12, 261	±3. 4%	105℃	153. 6	±2. 42%
0℃	9, 399	±3. 21%	110℃	133. 1	±2. 52%
5℃	7, 263	±3. 06%	115℃	115. 7	±2. 61%
10℃	5, 658	±2. 92%	120℃	100. 9	±2. 68%
15℃	4, 441	±2. 78%	125℃	88. 3	±2. 75%
20℃	3, 511	±2. 64%	130℃	77. 5	±2. 8%
25℃*	2, 795	±2. 5%	135℃	68. 3	±2. 84%
30℃	2, 240	±2. 45%	140℃	60. 3	±2. 87%
35℃	1, 806	±2. 4%	145℃	53. 4	±2. 89%
40℃	1, 465	±2. 36%	150℃	47. 5	±2. 9%
45℃	1, 195	±2. 31%			
50℃	980	±2. 27%			
55℃	809	±2. 23%			
60℃	671	±2. 19%			
65℃	559	±2. 15%			



Resistance(B-Sensor shell)	
Temp	Resistance Ω
50℃*	205-231
70℃	93. 5-113. 1
90℃	45. 5-54. 95
110℃*	22. 86-26. 84
115℃	19. 19-22. 31
118℃	19. 35-22. 05
125℃	13. 85-16. 05

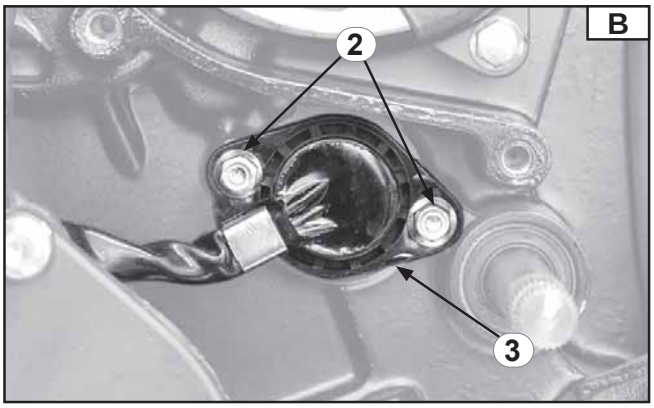
SENSORS
GEARBOX POSITION SENSOR

It is situated on the left side of the engine, close to the pinion, and detects the position of the gear.

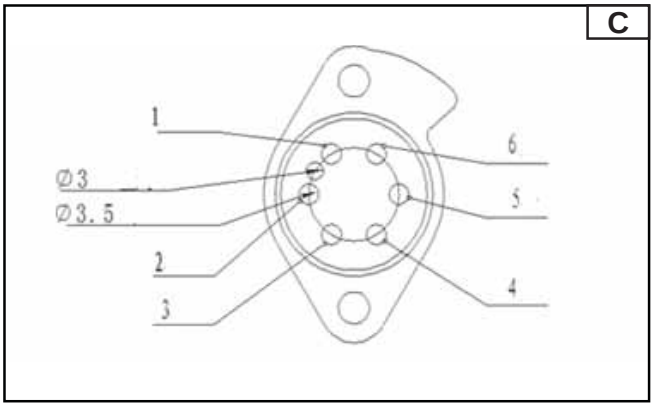


Disconnect:
- The electrical coupling (1) Fig. A.

Remove:
- The chain pinion cover, refer to **"Removal of chain pinion cover, Chapter 4".**
- The screws (2) Fig. B.
- The gear position sensor (3) from the half casing Fig. B.



Check:
- The continuity Fig. C.



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

Installation:
Proceed using the opposite order to removal.

Tighten:
- The screws (2) Fig. B to the following torque:

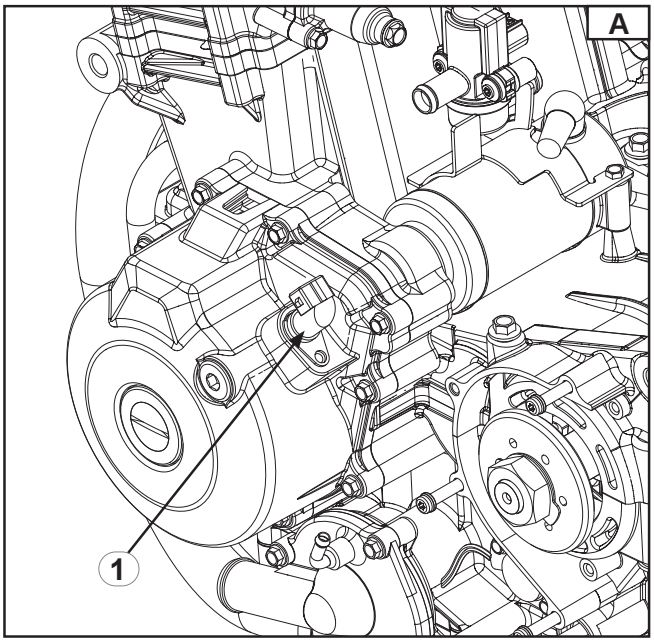
Torque 6 N*m

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

SENSORS
PHASE SENSOR

Situated close to the LH engine crankcase, the crankshaft position sensor (1) Fig. A shows the movement of a sprocket fixed to the right end of the crankshaft 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 crankshaft in relation to the point in which fuel is injected and to the requirements of fuel ignition.



Disconnect:
- The main wiring connector.

Measure:
- Resistance value:

Standard value	**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.

NOTICE

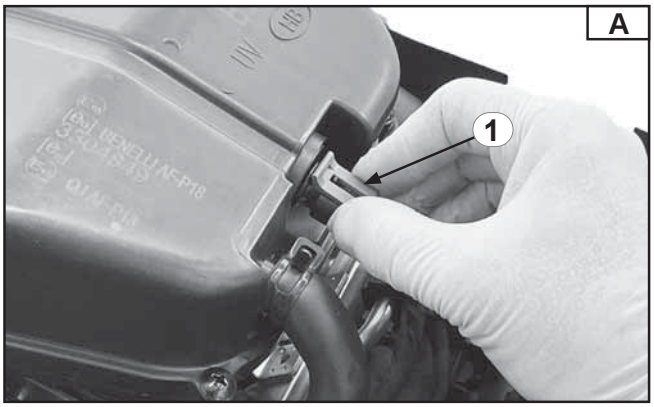
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

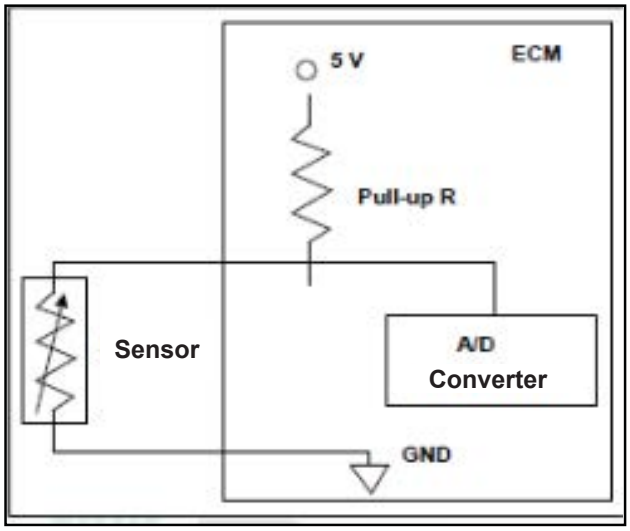
SENSORS
AIR TEMPERATURE SENSOR

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 air temperature sensor (1) 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





NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

SENSORS
OXYGEN SENSOR

Situated on the exhaust manifold (1), Fig. A.

The lambda sensor 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

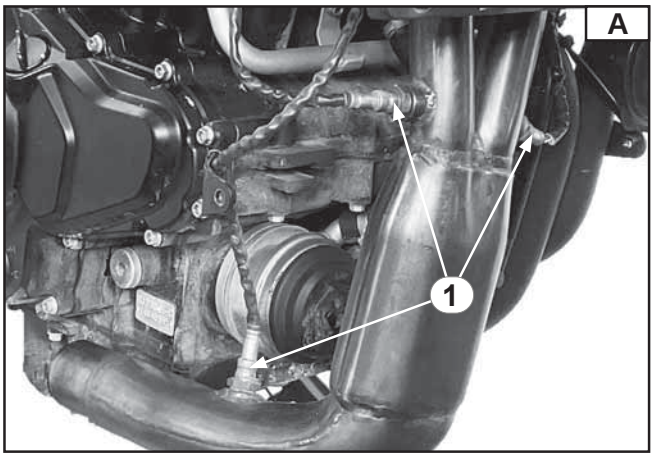
The sensor transmits an electric signal to the ECU, which controls the insertion of fuel and air into the combustion chamber Fig. B.

- Threshold value of air-fuel ratio: >750 mVcc
- Dilute threshold of air-fuel ratio: <120 mVcc
- Heating power of oxygen sensor: 7.0 W.
- 450°C exhaust gas temperature, 70% duty ratio, 10 Hz, 13.5V voltage.
- Heating power: 9.6±1.5 Ω (measured at 21°C)
- Operating temperature range: 260-850°C

NOTICE

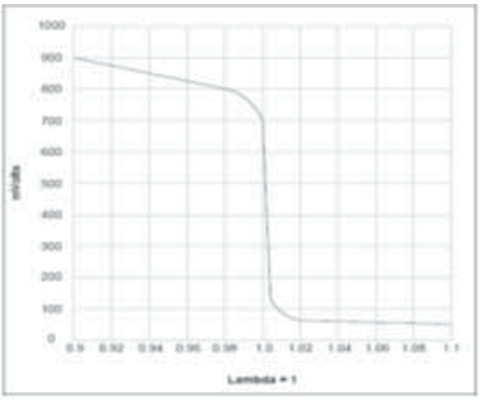
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

A



CHARACTERISTIC OPERATING CURVE

B

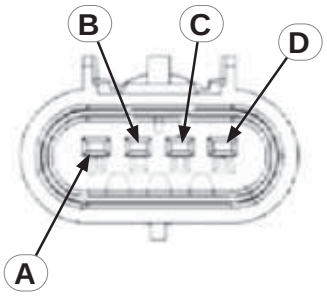


Hereunder the connector pins are listed: C.

PIN	WIRE COLOR	CONNECTION OF PIN AND CABLE
A	Purple	Positive pole (+)
B	White	Negative pole (-)
C	Black	Sensor (output)
D	Grey	Sensor (input)

CONNECTOR

C



SENSORS

OIL PRESSURE SENSOR

On the bottom half casing, it measures the pressure of the oil in the bushes (X) Fig. A.

It indicates the presence of sufficient oil pressure to the dash-board.

Disconnect:
- The electrical coupling.

Remove:
- The oil pressure sensor from the half casing.

Check:
- La continuity between the pin (1) and the ground (2) Fig. B of the sensor via an air pressure regulator with insertion on the detection hole.
- Set the air pressure regulator at 2 bar.
- Gradually lower the pressure to 0.2 - 0.3 bar.

SENSOR	PIN 1	PIN 2
≤ 3 bar	●	●
0 bar	●	●

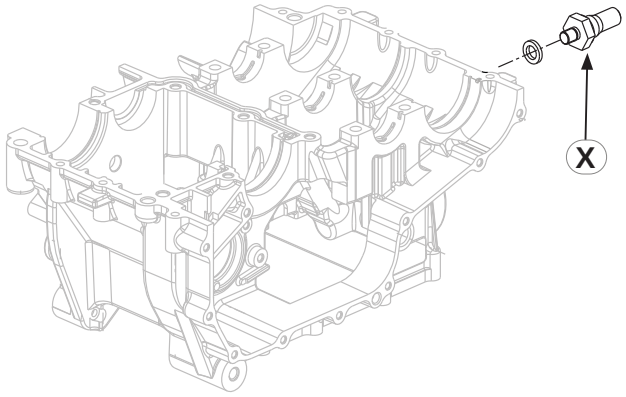
NOTE:
If there is no continuity between PIN (1) and ground (2) Fig. B, replace the part.

NOTICE

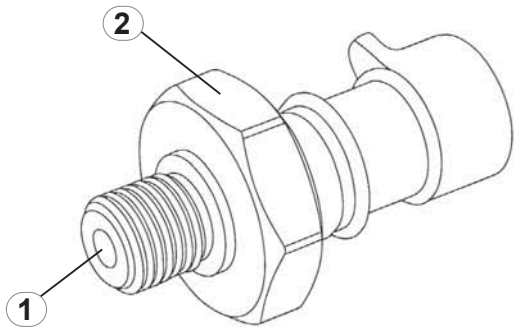
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

Oil pressure sensor connector Fig. C.

A



B



SENSORS

FRONT BRAKE MICROSWITCH

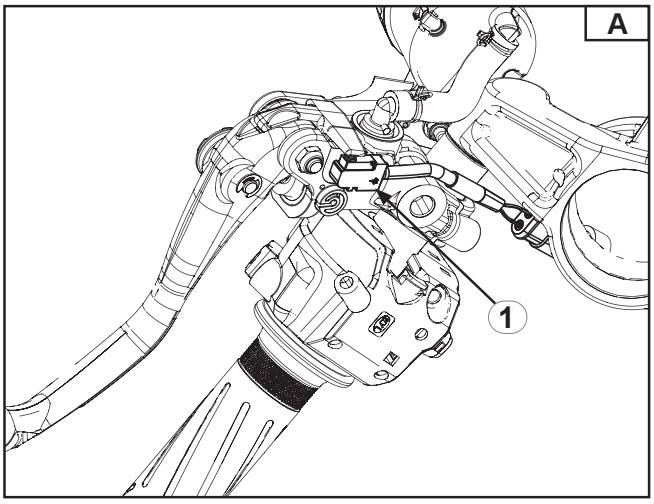
Situated on the front brake pump (1) Fig. A, it is a switch in contact with the brake lever, which serves to switch on the stop lights.

Check:

- The continuity by positioning the multitester on PIN 1 and PIN 2 and checking 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.

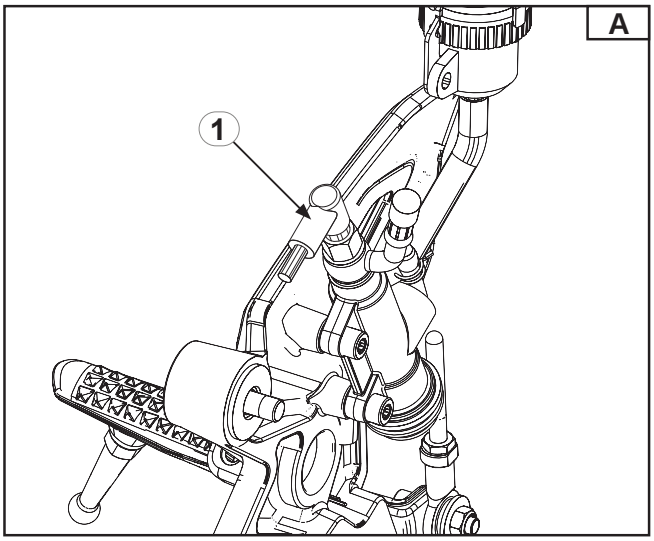


NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

SENSORS
HYDROSTOP

Situated on the rear brake pump (1) Fig. A is a switch, which reads the oil pressure exerted on the pump.
It serves to switch the stop lights on.



Check:

- The continuity by positioning the multitester on PIN 1 and PIN 2 and checking the table.

BRAKE	PIN 1	PIN 2
Operated	●	●
Released	●	●

NOTE:
When the above conditions are fulfilled, the rear brake sensor is working properly, otherwise replace the part.

NOTE:
For removal of the hydrostop, refer to the section "Removal of rear brake pump, Chapter 4".

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

SENSORS

THROTTLE BODY POSITION SENSOR (SYNC CONTACTS)

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 (4), Fig. A.
Hereunder the sensor pins are listed:

PIN 1	**Power supply: +5 Vdc**
PIN 2	**Ground: 0**
Pin 3	**Signal output: 0.5 - 4.5 Vdc**

Disconnect:
- The electrical coupling.

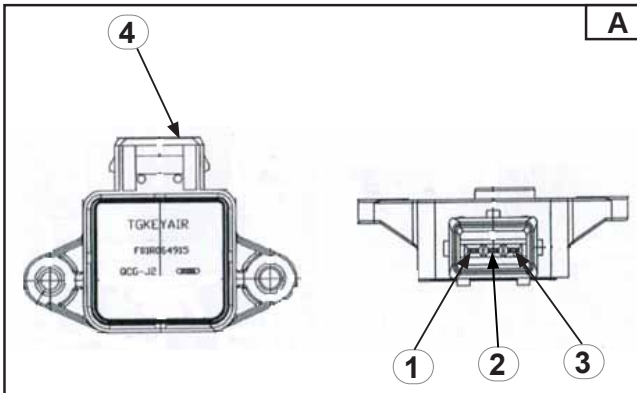
Check:
- The resistance using the multitester on symbol Ω between pin 3 and pin 2.

Throttle location	RESISTANCE
Fully closed throttle	**1,050 KΩ±20%**
Fully open throttle	**2.5 KΩ±20%**

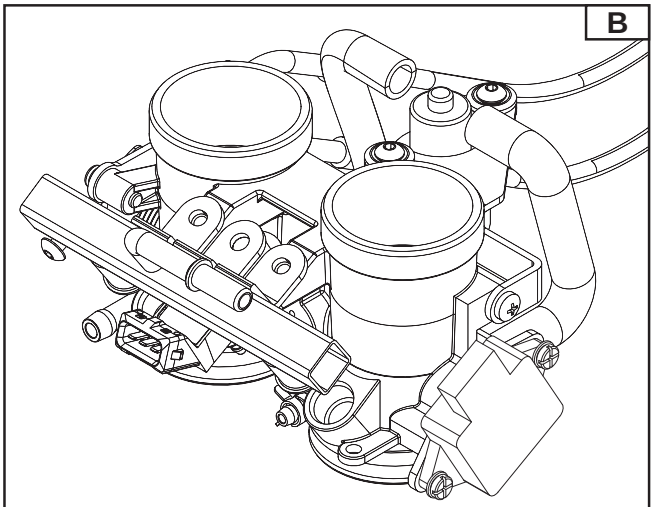
NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

A

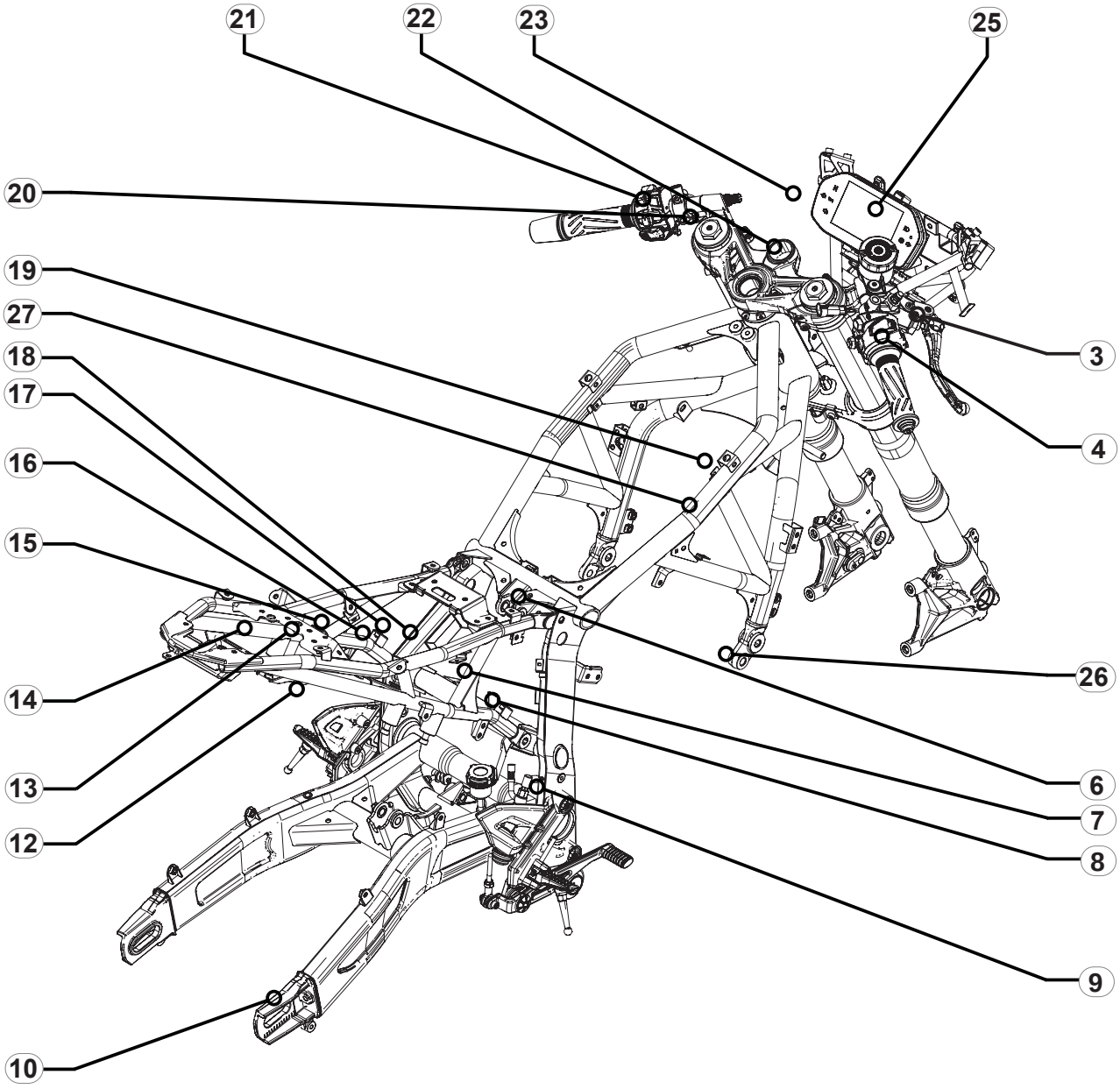


B



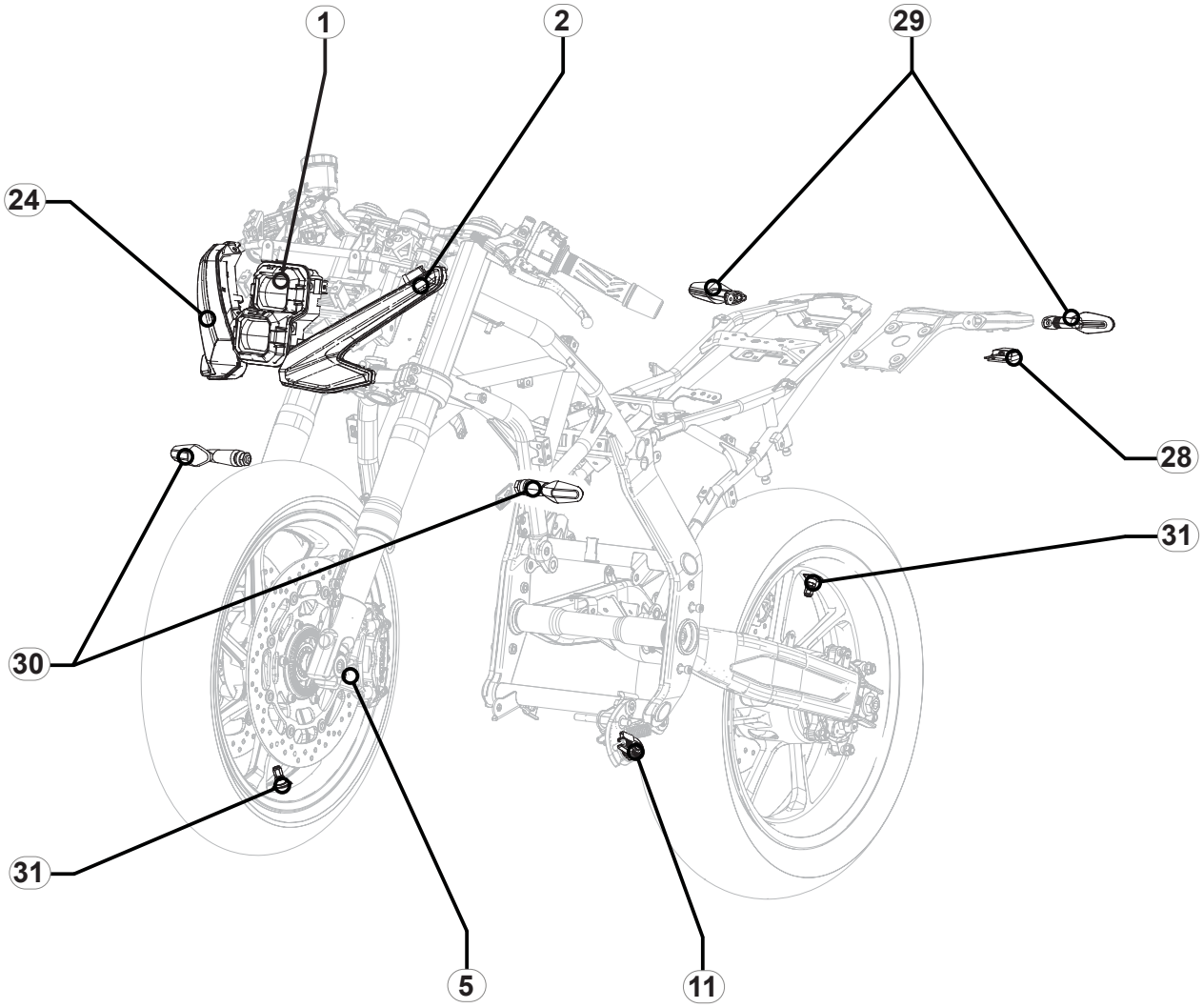
DEVICES

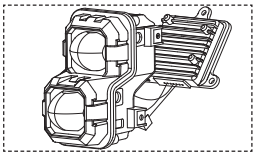
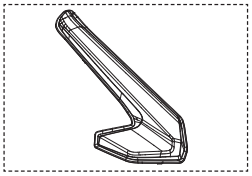
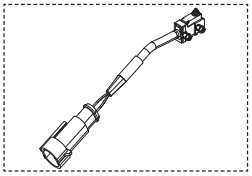
DEVICES POSITION



DEVICES

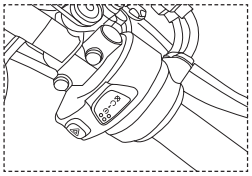
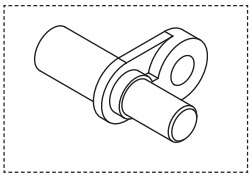
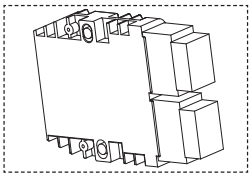
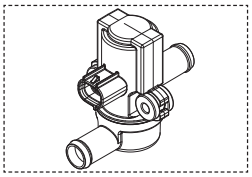
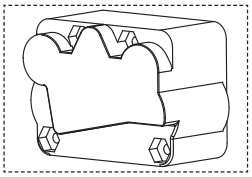
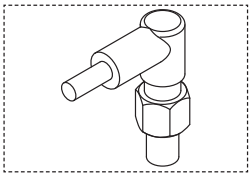
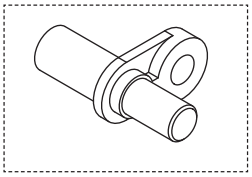
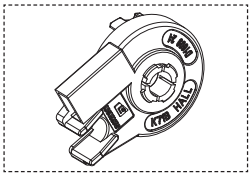
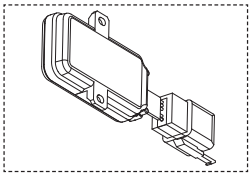
DEVICES POSITION



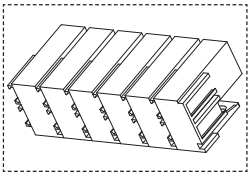
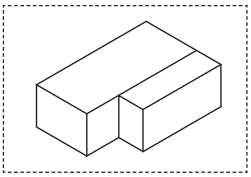
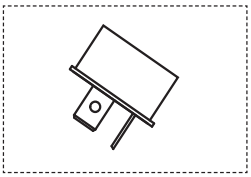
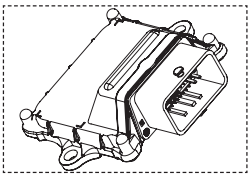
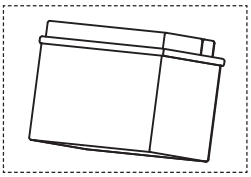
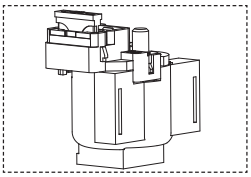
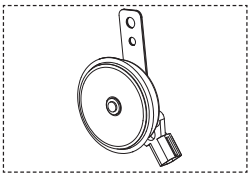
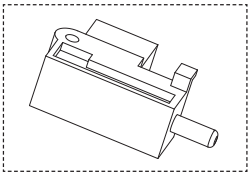
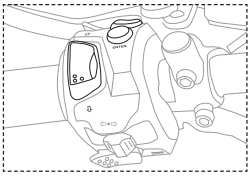
Position	Device	Image
1	FRONT HEADLIGHT	
2	RH AUXILIARY LIGHT	
3	FRONT STOP SWITCH	

DEVICES

DEVICES POSITION

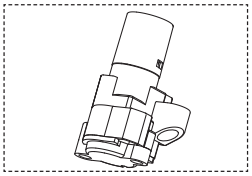
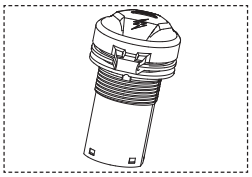
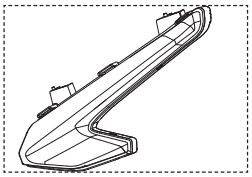
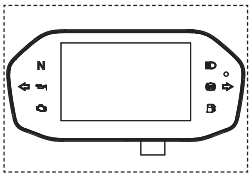
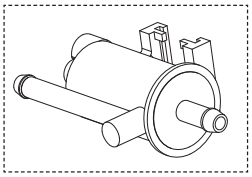
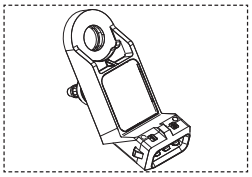
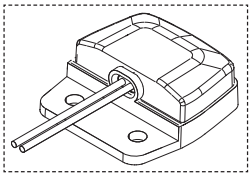
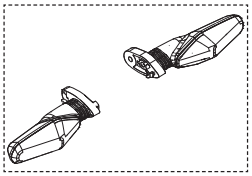
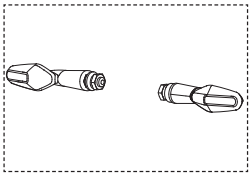
Position	Device	Image
4	RH LIGHT SWITCH	
5	FRONT ABS SENSOR	
6	VOLTAGE REGULATOR	
7	SOLENOID	
8	DROP SENSOR	
9	REAR HYDROSTOP	
10	REAR ABS SENSOR	
11	SIDE STAND SENSOR	
12	B-BOX	

DEVICES
DEVICES POSITION

Position	Device	Image
13	RELAY	
14	FUSE BOX	
15	DIODE	
16	ECU	
17	BATTERY	
18	STARTER RELAY (REMOTE CONTROL SWITCH)	
19	HORN	
20	CLUTCH SWITCH	
21	LH LIGHT SWITCH	

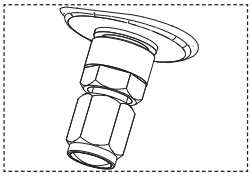
DEVICES

DEVICES POSITION

Position	Device	Image
22	IGNITION SWITCH	
23	USB SOCKET	
24	LH AUXILIARY LIGHT	
25	INSTRUMENTATION	
26	CARTRIDGE FILTER SOLENOID	
27	MAP SENSOR	
28	LICENSE PLATE LIGHT	
29	REAR TURN INDICATOR/AUXILIARY LIGHTS/STOP	
30	FRONT TURN SIGNAL LIGHTS	

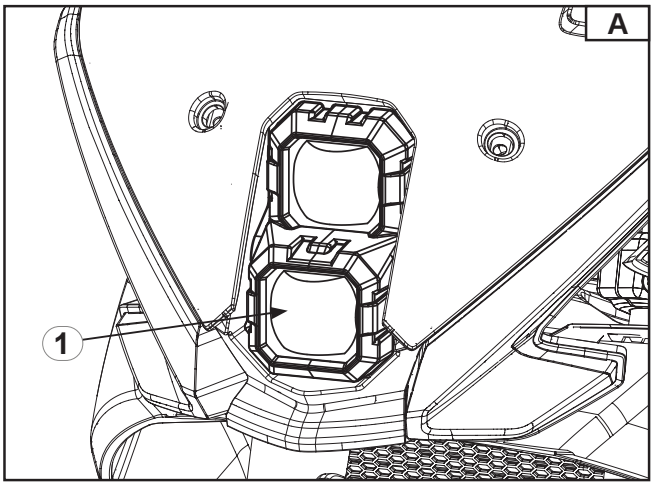
DEVICES

DEVICES POSITION

Position	Device	Image
31	TIRE PRESSURE SENSOR	

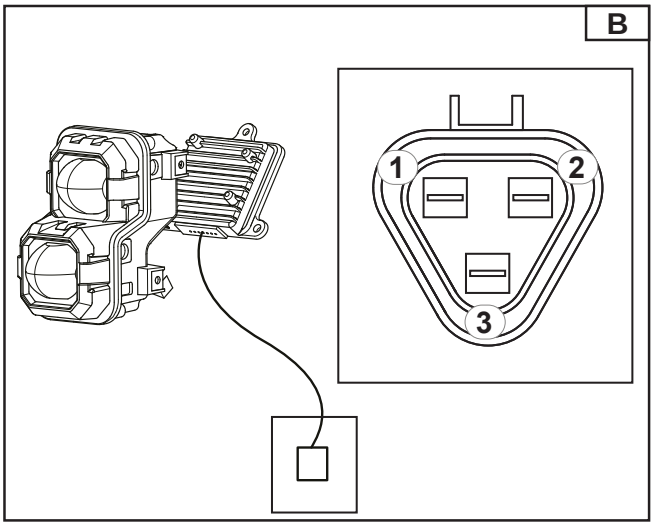
DEVICES
FRONT HEADLIGHT

The front headlight (1) Fig. A is located in the front side of the vehicle, built-in in the front fairing with the aim of ensuring lighting in conditions of poor visibility.



Hereunder the connector pins of the front headlights are listed: B:

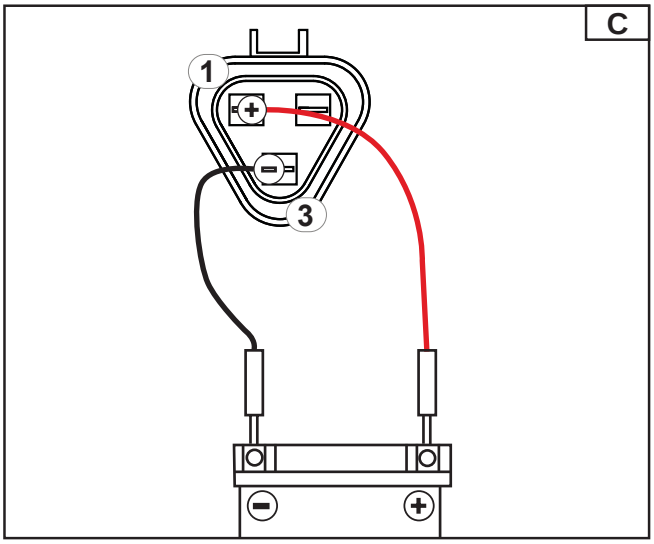
PIN 1	Dipped beam: light blue (+)
PIN 2	High beam: blue (+)
PIN 3	Ground: black (-)



Check:
- Continuity by using a battery and connecting it with the PINs as follows:

Dipped beam continuity:
Insert:
- The connector of the positive pole (+) from the battery to PIN (1) Fig. C.
- The connector of the negative pole (-) from the battery to PIN (3) Fig. C.

NOTE:
If the above procedure is carried out and the dipped beam goes on, the headlamp is working properly, otherwise replace the part.

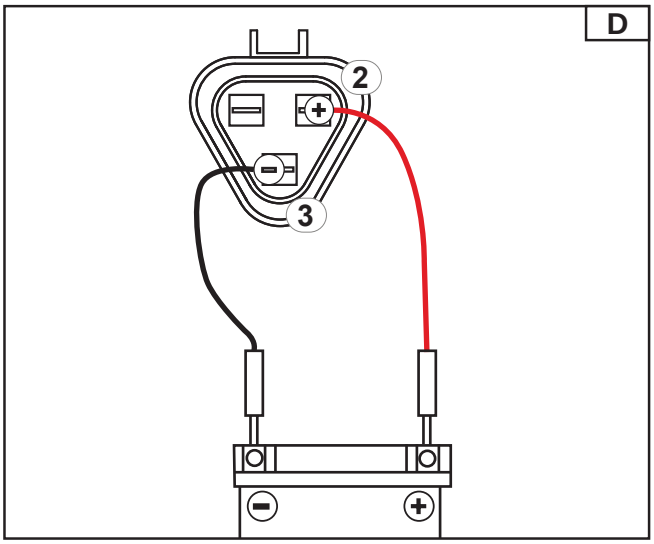


DEVICES
FRONT HEADLIGHT

High beam continuity:
Insert:

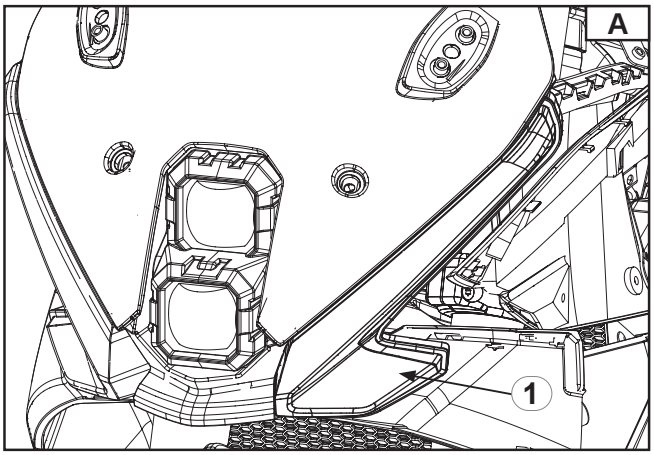
- The connector of the positive pole (+) from the battery to PIN (2) Fig. D.
- The connector of the negative pole (-) from the battery to PIN (3) Fig. D.

NOTE:
If the above procedure is carried out and the high beam goes on, the headlamp is working properly, otherwise replace the part.



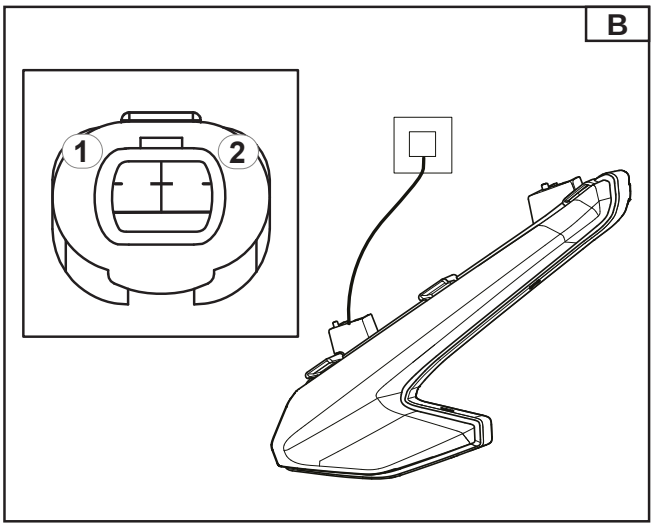
DEVICES
LH AUXILIARY LIGHT

The left auxiliary light (1) Fig. A is located in the left front side of the vehicle, built-in in the front fairing with the aim of ensuring the visibility of the vehicle.
Its activation occurs when the panel is on based on the logic defined via the vehicle electrical system.
It does not require ordinary maintenance except in case of malfunctioning of the LED module or the associated wiring.



Hereunder are the connector pins of the left auxiliary light Fig. B:

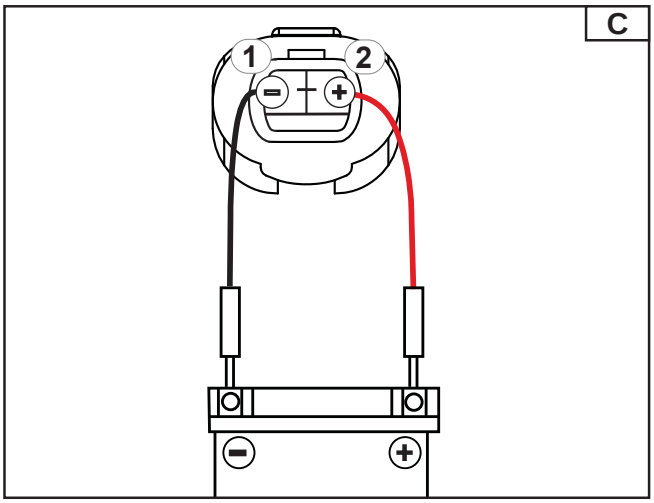
PIN 1	Ground: black (-)
PIN 2	(+) yellow



Check:
- Continuity by using a battery and connecting it with the PINs as follows:

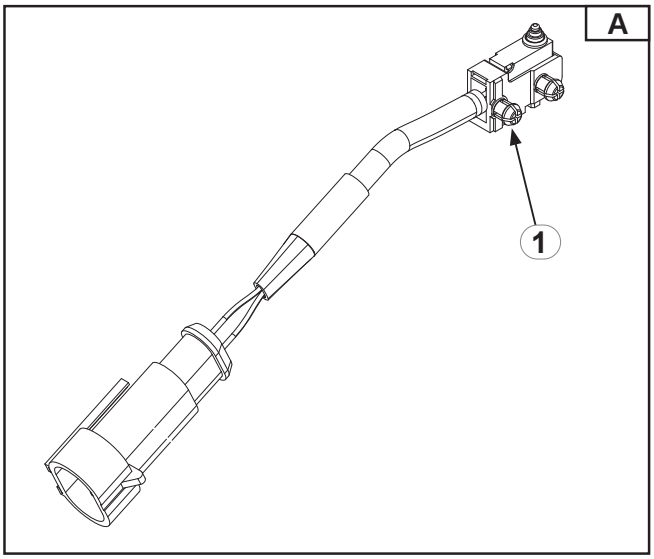
Dipped beam continuity:
Insert:
- The connector of the positive pole (+) from the battery to PIN (1) Fig. C.
- The connector of the negative pole (-) from the battery to PIN (2) Fig. C.

NOTE:
If the above procedure is carried out and the left auxiliary light goes on, the light is working properly, otherwise replace the part.



DEVICES
FRONT STOP SWITCH

It is a switch in contact with the brake lever, situated on the front brake pump, which serves to switch on the stop lights (1), Fig. A.



Check:

- Continuity

with the multitester on the symbol →|- (diode/continuity test function), 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.

NOTE:
For removal of the front brake switch, refer to "Removal of front brake pump, Chapter 4".

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

DEVICES
RIGHT LIGHT SWITCH

On the right side of the handlebar Fig. A the right electrical device consists of:

- **Stop/Ignition/Start switch (1)**

It serves to break contact to the electric device in case of emergency and start the engine.

- **Emergency switch (2)**

It serves to switch on the emergency light (hazard lights) to alert the other users to the vehicle stop.

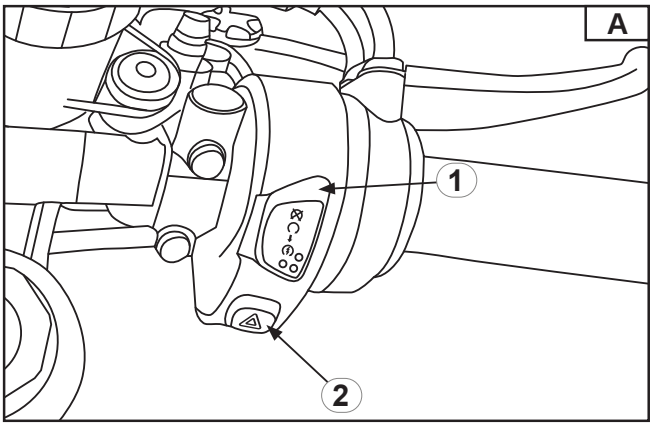
Check:
- The continuity by positioning the multitester on Stop/Ignition button located on ON.

Check:
- The continuity by positioning the multitester on the ignition button pressed on ON.

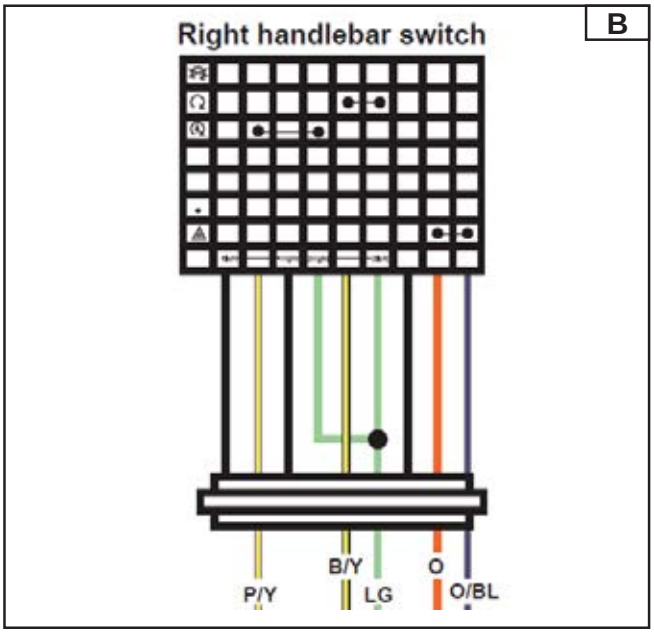
Check:
- The continuity by positioning the multitester on the emergency switch located on ON.

Check:
The table, in Fig. B via the connector coming from the main electrical system) of the right electrical device Fig. C.

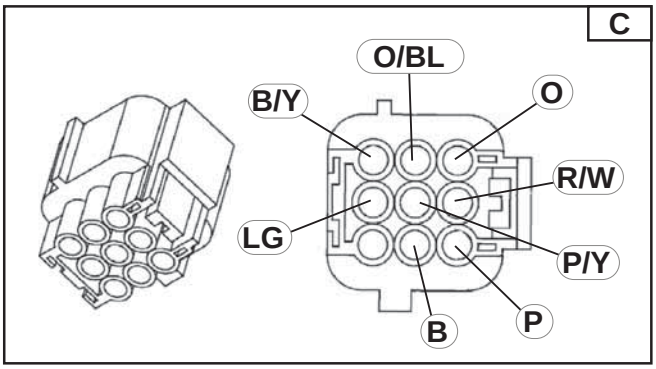
A



B

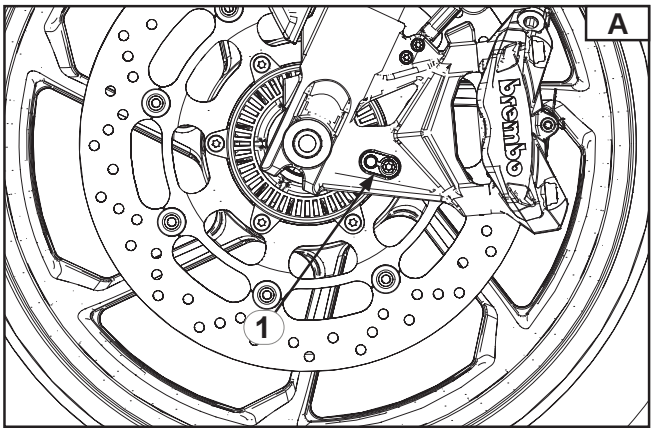


C



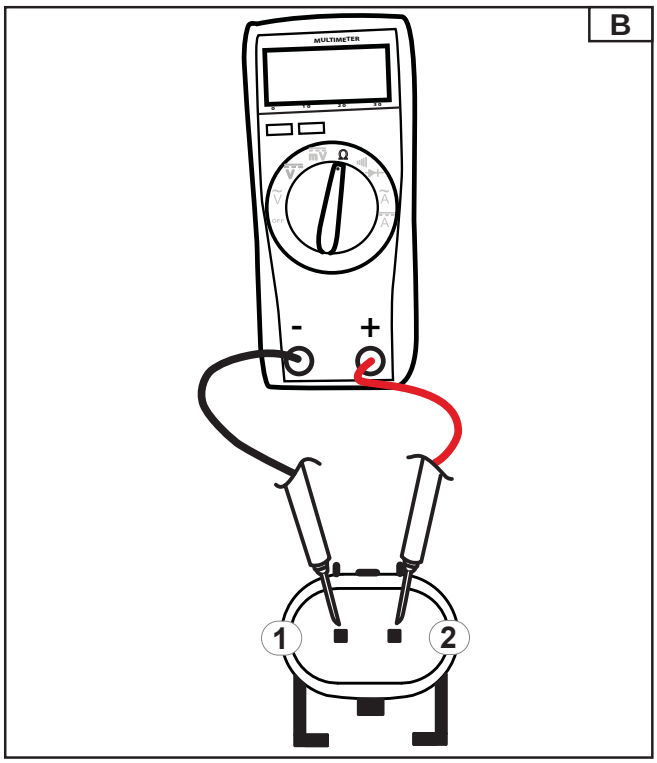
DEVICES
FRONT ABS SENSOR

The front ABS sensor is mounted on the left foot of the front fork with the purpose of constantly monitoring the rotation speed of the front wheel during braking.
In the event of sudden slowing down or wheel stop, the sensor sends signals to the ABS module.



Check:
Via the multitester on the symbol MΩ between PIN1 and PIN 2, the resistance at 20°-25°C (Fig. B).

Standard value	0.450 MΩ
Nominal value	0.450 MΩ (±10%)
Acceptable tolerance	0.405 MΩ - 0.495 MΩ



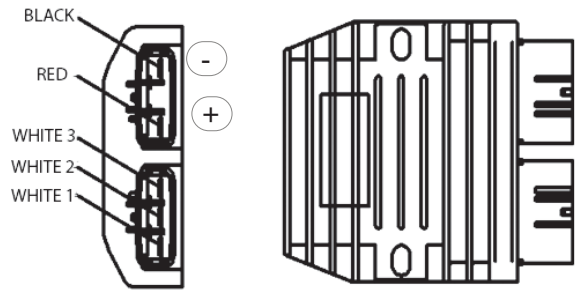
NOTE:
Before carrying out the testing measurements, make sure the conditions below are followed:
- **Disconnect the sensor.**
- **The ambient temperature must be 20°C ± 25°.**
- **The instrument must be calibrated properly.**

NOTE:
If the resistance measured is out of the specified range, it must be replaced.

DEVICES
VOLTAGE REGULATOR

Situated in the front central area, it allows balancing of electrical consumption via the battery recharge Fig. A.

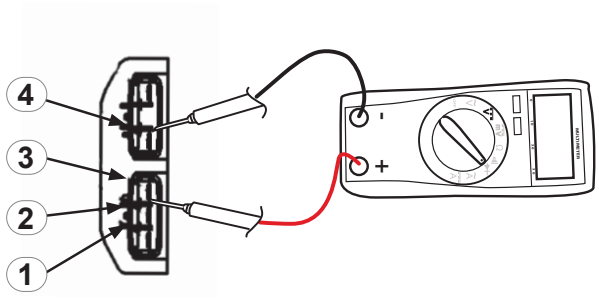
A



Multimeter selection: diode test.

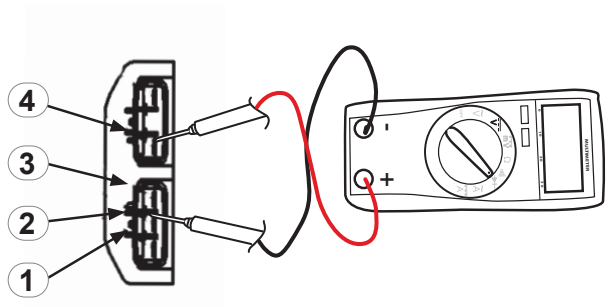
1. Connect the black probe to the red line terminal (4) of voltage regulator. Connect the red probe to the white line terminal of voltage regulator (white 1- 2 -3) Fig. B.
   If the gauge shows the value∞ on the three pins, the regulator is valid.
   The gauge shows a value (range 0.3~0.8 Ohm) on all three pins when the regulator is damaged and must be replaced.

B



2. Connect the red probe to the red line terminal (4) of voltage regulator. Connect the black probe to the white line terminal of voltage regulator (white 1 - 2 - 3) Fig. C.
   If the gauge shows the value∞ on the three pins, the regulator is valid.
   The gauge shows a value (range 0.3~0.8V) on the three pins when the regulator is damaged and must be replaced.

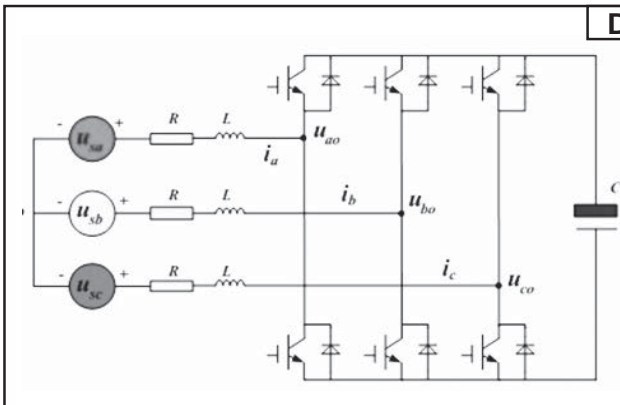
C



NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.
Fig. D shows the wiring diagram of the voltage regulator.

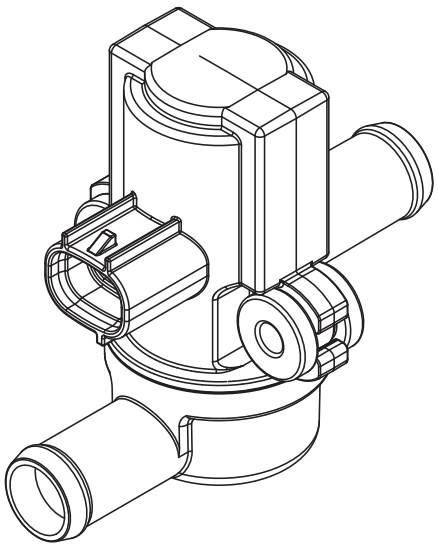
D



DEVICES
SECONDARY AIR SOLENOID

The secondary air solenoid (Fig. A) situated close to the starter serves to adjust the air flow from the filter casing to the exhaust pipes.
The device is normally open and cuts off the air flow according based on the control of the ECU.

A



Operation:
The solenoid receives a direct supply from the injection relay (yellow/white wire) and a ground signal from the unit (yellow/light green wire) via the pin 23 (Fig. B).

B

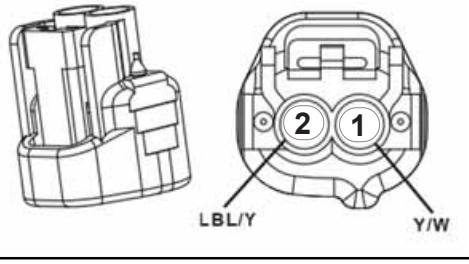


Check:
With the multitester on the symbol Ω between PIN1 and PIN2 the resistance at 20°C (Fig. C).

Pin1 – Pin2 20 Ohm +/-10%

Resistance (Ω)	PIN 1	PIN 2
20 Ohm +/-10%	●	●

C



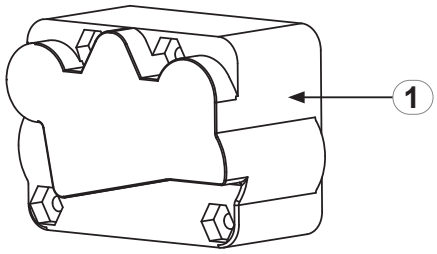
DEVICES
DROP SENSOR

Situated close to the starter, in case of falling, it cuts off the fuel supply to the injection system (1) Fig. A.

Check:
Position the drop sensor in the condition of normal use of the motorcycle (horizontal) Fig. B.

NOTE:
The test will be carried out with the electrical circuit closed, that is with the sensor connector stably connected to the electrical system. The tips will be inserted behind the connector.

A

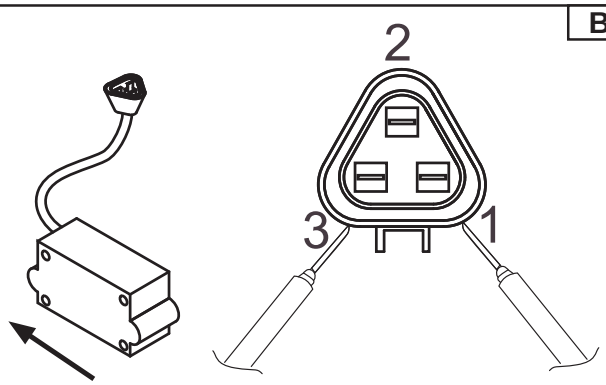


Insert:
- The red tip of the multimeter (+) into the pin 3 Fig. B.
- The black tip of the multimeter (-) into the pin 1 Fig. B.

Rotate the key of the ignition block to “ON”.

Check:
The voltage between the pin 3 and pin 1 must correspond to the battery one (12 or more Vcc).

B

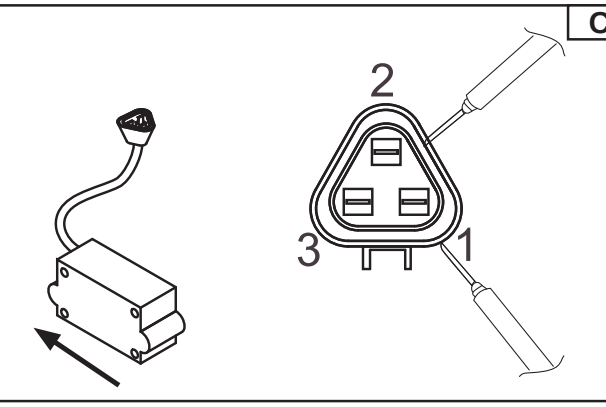


Insert:
- The red tip of the multimeter (+) into the pin 2 Fig. C.
- The black tip of the multimeter (-) into the pin 1 Fig. C.

Check:
The voltage between the pin 2 and pin 1 must correspond to the battery one (12 or more Vcc).

If the check between the pin 2 and the pin 1 is positive, place the drop sensor in vertical position Fig. D.

C



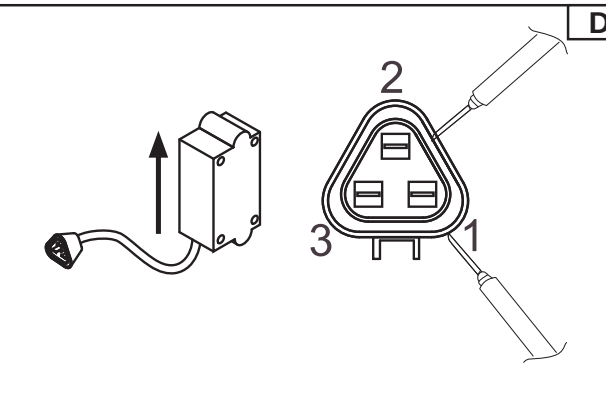
Insert:
- The red tip of the multimeter (+) into the pin 2 Fig. D.
- The black tip of the multimeter (-) into the pin 1 Fig. D.

Check:
The voltage between the pin 2 and pin 1 must be below 2 Vcc.

NOTICE

When the above conditions are fulfilled, the drop sensor is working properly, otherwise replace the part.

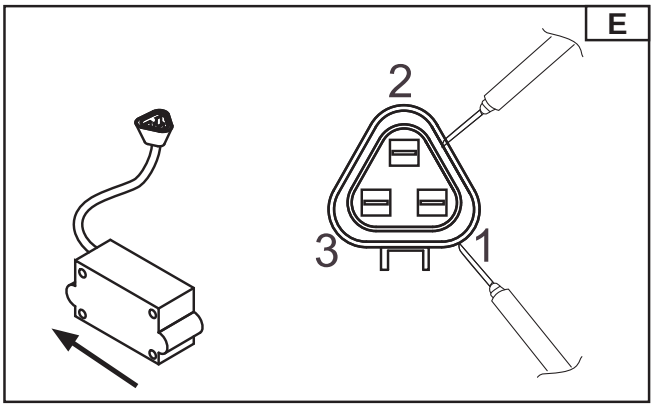
D



DEVICES
DROP SENSOR

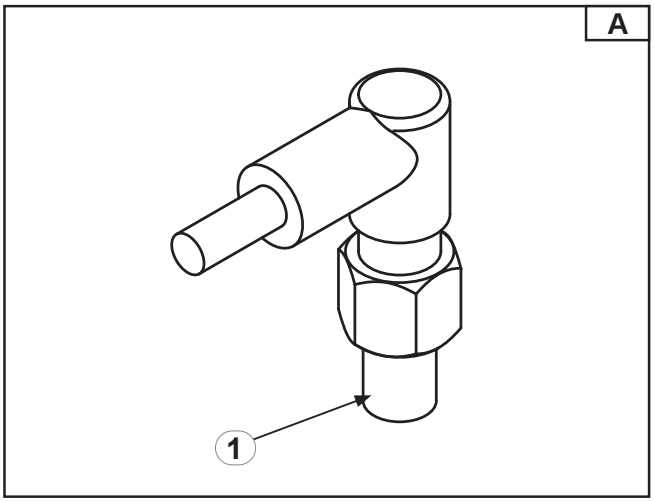
NOTE:
Every time the sensor is positioned vertically, it activates and the output voltage from pin 2 goes below 2/3 Vcc, the ECU memorizes such condition and to proceed with motor starting it is necessary to proceed as described below.

- Position the drop sensor in horizontal and install in the correct position on-board.
- Rotate the key in the ignition block to OFF.
- After few seconds, rotate the key in the ignition block to ON and check that the voltage to pins 1 and 2 is the one of the battery (12 Vcc or more). If the outcome is positive, proceed with the engine start test.



DEVICES
REAR HYDROSTOP

Situated on the rear brake pump, the hydrostop (1) Fig. A is a switch, which reads the oil pressure exerted on the pump.
It serves to switch the stop lights on.



Check:

- 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.

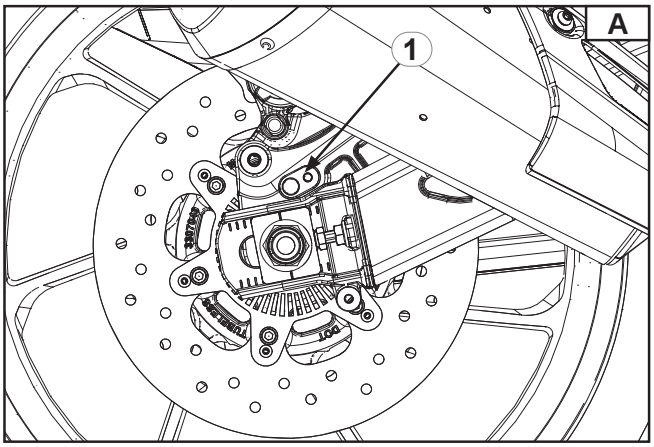
NOTE:
For removal of the hydrostop, refer to the section "Removal of rear brake pump, Chapter 4".

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

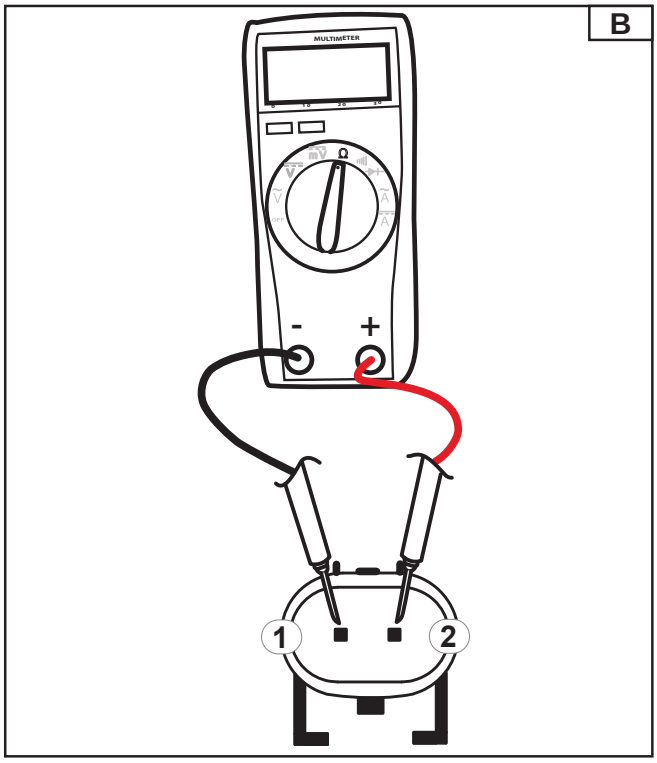
DEVICES
REAR ABS SENSOR

The front ABS sensor is mounted on the caliper tool of the rear wheel with the purpose of constantly monitoring the rotation speed of the front wheel during braking.
In the event of sudden slowing down or wheel stop, the sensor sends signals to the ABS module.



Check:
With the multitester on the symbol MΩ between PIN1 and PIN2 the resistance at 20°-25°C (Fig. B).

Standard value	0.450 MΩ
Nominal value	0.450 MΩ (±10%)
Acceptable tolerance	0.405 MΩ - 0.495 MΩ



NOTE:
Before carrying out the testing measurements, make sure the conditions below are followed:
- **Disconnect the sensor.**
- **The ambient temperature must be 20°C ± 25°.**
- **The instrument must be calibrated properly.**

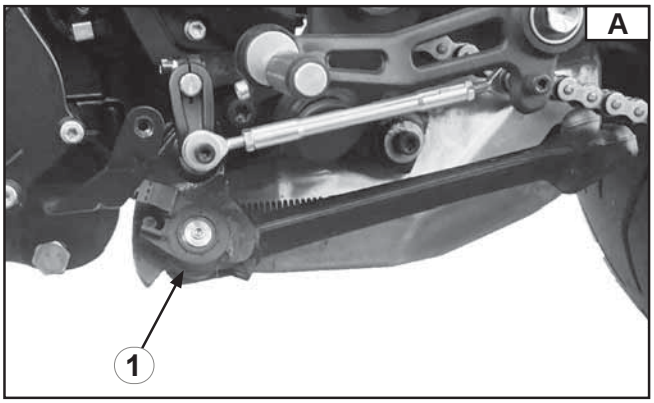
NOTE:
If the resistance measured is out of the specified range, it must be replaced.

SENSORS

SIDE STAND SENSOR

The side stand sensor (1) Fig. A is situated near the supporting plate of the side stand.

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.

CRUTCH	PIN 1	PIN 2	PIN 3
Raised	●	●	●
Lowered	●	●	●

NOTE:
When the above conditions are fulfilled, the sensor is working, otherwise replace the part.

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

DEVICES
SERVICES RELAY

Situated under the rider seat and in front of the battery, the relay group Fig. A 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.

- **The services:**

All devices “with ignition on”, as dashboard, start safety devices and lighting system, are connected to the services relay.

Check:

- The resistance using the multitester on symbol “Ω”.

Check the resistance between pin 85 and pin 86 Fig. B.

Resistance	**12 ± 2 Ω**

Use:

- The tester and, referring to the table, check on relay pins, by powering the PIN 85 and the PIN 86 respectively at the positive and negative terminals of the battery.

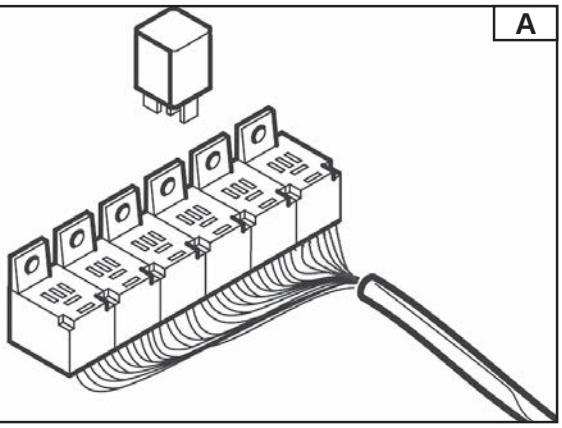
RELAY	PIN 87	PIN 30
Powered on battery	●	●
Not powered on battery	●	●

NOTE:
When the above conditions are fulfilled, the relays are operating properly, otherwise replace.

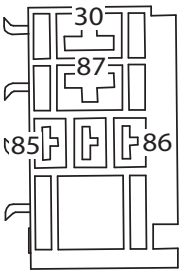
NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

A



B

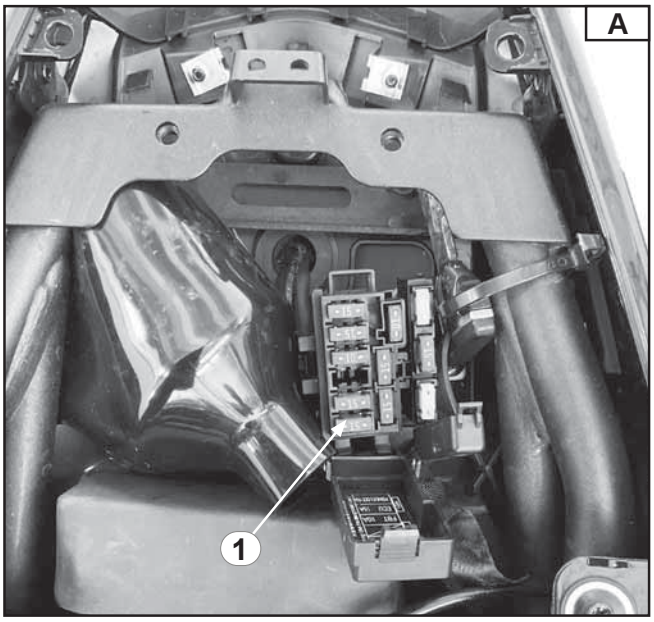


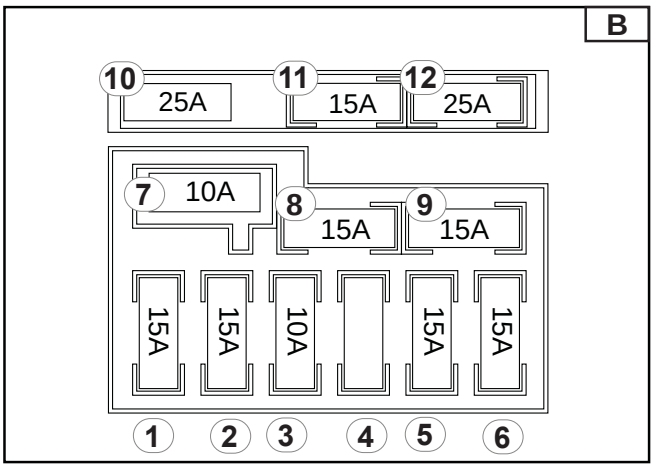
DEVICES
FUSE BOX

The fuse box (1) Fig. A is situated on the rear side of the motorcycle.
Refer to **"Fuses, Chapter 3"** to carry out checking on the fuses.

KEY: FUSES
Refer to Fig. C B.

1. Ignition block fuse
2. Fuse of ECU (ECU1)
3. FBT speed sensor fuse
4. (empty)
5. Fuse of cooling fan
6. Fuse of fuel pump
7. Spare fuse
8. Spare fuse
9. Spare fuse
10. Spare fuse
11. ABS 1
12. ABS 2





DEVICES
DIODE

Use:
- The tester and set the function “diode test”.



Connect:
- The red tip to the anode (+) (1) and the black one to the cathode (-) (2) Fig. B.

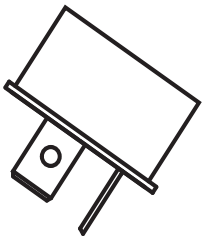
The multimeter must detect a voltage drop ranging from 0.500 V and 0.700 V (standard value: ~0.600 V for silicon diodes).

Connect:
- Invert the tips (red tip to cathode and black tip to anode - reverse bias).

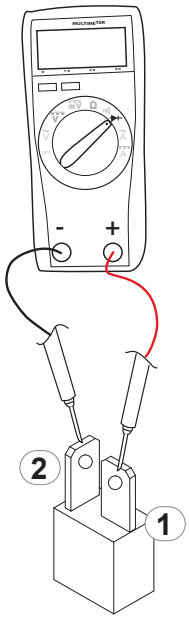
The multimeter must show “OL” or no conduction (open circuit), signalling that the diode blocks the reverse current properly.

NOTE:
If the diode conducts in both situations, it is faulty (short circuit).
If the diode does not conduct in any direction, it is interrupted (open).

A



B



DEVICES
ECU

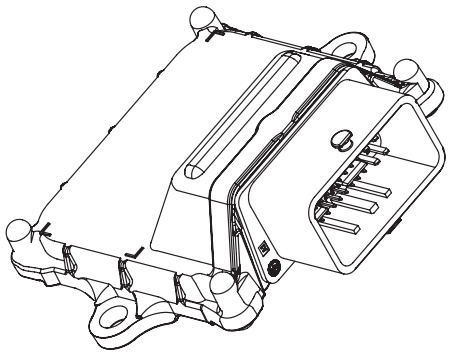
The injection unit is situated close to the rear frame Fig. A.

NOTICE

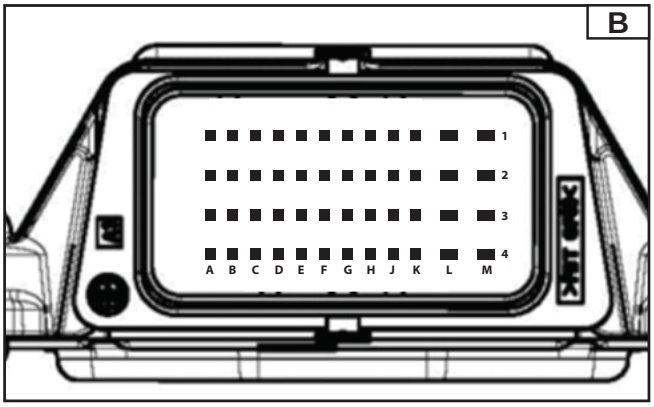
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

The position of the Pin is shown in Fig. B.

A



B



DEVICES
ECU

ERROR TABLE	
Code error	**Error description**
P0030	Oxygen Sensor Heater Control Circuit Open Bank 1 Sensor 1
P0031	Oxygen Sensor Heater Control Circuit Low Bank 1 Sensor 1
P0032	Oxygen Sensor Heater Control Circuit High Bank 1 Sensor 1
P0050	Oxygen Sensor Heater Control Circuit Open Bank 2 Sensor 1
P0051	Oxygen Sensor Heater Control Circuit Low Bank 2 Sensor 1
P0052	Oxygen Sensor Heater Control Circuit High Bank 2 Sensor 1
P0038	Oxygen Sensor Heater Control Circuit High Bank 1 Sensor 2
P0037	Oxygen Sensor Heater Control Circuit Low Bank 1 Sensor 2
P0036	Oxygen Sensor Heater Control Circuit Open Bank 1 Sensor 2
P0053	Oxygen Sensor Heater Resistance Bank 1 Sensor 1
P0059	Oxygen Sensor Heater Resistance Bank 2 Sensor 1
P0054	Oxygen Sensor Heater Resistance Bank 1 Sensor 2
P0130	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1
P0131	Oxygen Sensor Circuit Low Voltage Bank 1 Sensor 1
P0132	Oxygen Sensor Circuit High Voltage Bank 1 Sensor 1
P0134	Oxygen Sensor Circuit No Activity Detected Bank 1 Sensor 1
P0133	Oxygen Sensor Circuit Slow Response Bank 1 Sensor 1
P0150	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 2 Sensor 1
P0151	Oxygen Sensor Circuit Low Voltage Bank 2 Sensor 1
P0152	Oxygen Sensor Circuit High Voltage Bank 2 Sensor 1
P0154	Oxygen Sensor Circuit No Activity Detected Bank 2 Sensor 1
P0153	Oxygen Sensor Circuit Slow Response Bank 2 Sensor 1
P0138	Oxygen Sensor Circuit High Voltage Bank 1 Sensor 2
P0137	Oxygen Sensor Circuit Low Voltage Bank 1 Sensor 2
P0136	Oxygen Sensor Circuit No Activity Detected Bank 1 Sensor 2
P2232	Oxygen Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2
P013A	Oxygen Sensor Slow Response - Rich to Lean Bank 1 Sensor 2
P2271	Oxygen Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2
P2270	Oxygen Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2
P0420	Catalyst System Efficiency Below Threshold Bank 1
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High
P0105	Manifold Absolute Pressure/Barometric Pressure Circuit
P0106	Manifold Absolute Pressure Sensor Circuit Range/Performance
P0107	Manifold Absolute Pressure Sensor Circuit Low
P0108	Manifold Absolute Pressure Sensor Circuit High
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance Bank 1
P0112	Intake Air Temperature Sensor 1 Circuit Low Bank 1
P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1
P0114	Intake Air Temperature Sensor 1 Circuit Intermittent Bank 1
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
P0117	Engine Coolant Temperature Sensor 1 Circuit Low

DEVICES
ECU

ERROR TABLE	
Code error	**Error description**
P0118	Engine Coolant Temperature Sensor 1 Circuit High
P0119	Engine Coolant Temperature Sensor 1 Circuit Intermittent
P0201	Injector Circuit Open - Cylinder 1
P0261	Cylinder 1 Injector Circuit Low
P0262	Cylinder 1 Injector Circuit High
P0202	Injector Circuit Open - Cylinder 2
P0264	Cylinder 2Injector Circuit Low
P0265	Cylinder 2 Injector Circuit High
P0351	Ignition Coil "A" Primary Control Circuit Open
P2301	Ignition Coil “A” Primary Control Circuit High
P2300	Ignition Coil "A" Primary Control Circuit Low
P0352	Ignition Coil "B" Primary Control Circuit Open
P2304	Ignition Coil “B” Primary Control Circuit High
P2303	Ignition Coil "B" Primary Control Circuit Low
P0300	Random/Multiple Cylinder Misfire Detected
P0301	Cylinder 1 Misfire Detected
P0302	Cylinder 2 Misfire Detected
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal
P0413	Secondary Air Injection System Switching Valve “A” Circuit Open
P0414	Secondary Air Injection System Switching Valve “A” Circuit Low
P0412	Secondary Air Injection System Switching Valve “A” Circuit High
P0411	Secondary Air Injection System Incorrect Flow Detected
P0441	Evaporative Emission System Incorrect Purge Flow
P0444	Evaporative Emission System Purge Control Valve Circuit Open
P0458	Evaporative Emission System Purge Control Valve Circuit Low
P0459	Evaporative Emission System Purge Control Valve Circuit High
P0480	Electric Fan Output Stage A Open
P0691	Electric Fan Output Stage A Low
P0692	Electric Fan Output Stage A High
P0500	Vehicle Speed Sensor "A" Circuit
P0501	Vehicle Speed Sensor "A" Circuit Range/Performance
P0503	Vehicle Speed Sensor "A" Circuit Intermittent/Erratic/High
P0506	Idle Control System RPM Lower than Expected
P0507	Idle Control System RPM Higher than Expected
P0615	Starter Relay Circuit Open
P0616	Starter Relay Circuit Low
P0617	Starter Relay Circuit High
P0627	Fuel Pump “A” Control Circuit Open
P0628	Fuel Pump “A” Control Circuit Low
P0629	Fuel Pump “A” Control Circuit High
P263A	MIL Control Circuit Low
P263B	MIL Control Circuit High

DEVICES
ECU

ERROR TABLE	
Code error	**Error description**
P0650	MIL Control Circuit Open
P0560	System Voltage Malfunction
P0562	System Voltage Low Voltage
P0563	System Voltage High Voltage
P1098	DUMP Control Circuit Low
P1099	DUMP Control Circuit High
P2177	System Too Lean bank1
P2178	System Too Rich bank1
P2179	System Too Lean bank2
P2180	System Too Rich bank2
P0602	Control Modul Programming Error
P0604	Internal Contr.Module Random Access Memory (RAM) Error
P0605	Internal Contr.Module ROM Test Error
U0198	Lost Communication With Telematic Control Module
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module
U0073	Control Module Communication Bus Off
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module
P0508	Idle Air Control System Circuit Low
P0509	Idle Air Control System Circuit High
P0511	Idle Air Control System Circuit Open
P0508	Idle Air Control System Circuit Low
P0509	Idle Air Control System Circuit High
P0511	Idle Air Control System Circuit Open

DEVICES
BATTERY

NOTICE

Do not use batteries other than the indicated ones (1), Fig. A.

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 **YTZ14S.**.

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.

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

CHECKING BATTERY CURRENT LOSSES

Connect:
- The multitester between the negative terminal and the negative wire of the battery as ammeter in direct current Fig. B.

NOTICE

Since the current losses may be high in case of malfunctioning, use a high range of the multitester first to prevent damages.
Do no position the ignition switch to ON whilst measuring the current.

When the panel is off, the current losses must be ≤ Ã 2 - 2.5 mA.

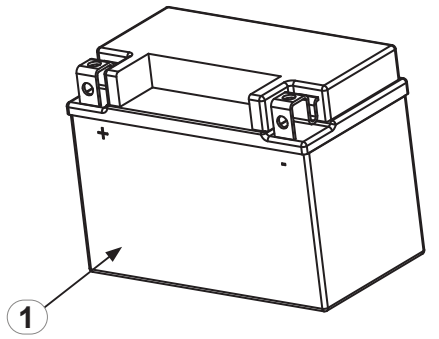
- Otherwise, find out the source of such absorption by disconnecting the connectors of each utility powered by the battery directly.

NOTE:
In the event an anti-theft device is installed, disconnect it before carrying out the modifications.

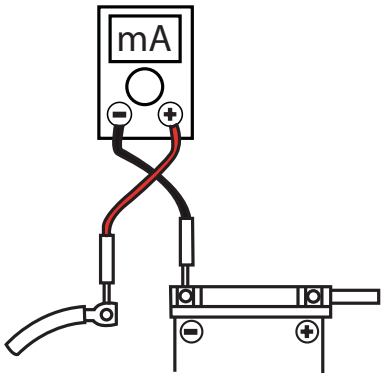
NOTICE

For vehicles equipped with B-BOX device, make sure the connector is disconnected before proceeding with measurements.

A



B

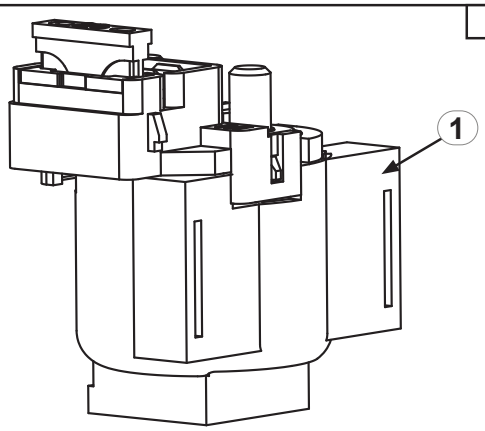


DEVICES

STARTING RELAY (REMOTE CONTROL SWITCH)

It is situated on the rear side and breaks power contact on the starter (1) Fig. A.

A



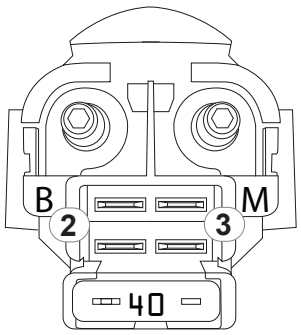
KEY OF STARTING RELAY FUSES
Refer to Fig. C B.
1. Main fuse

Apply:
- 12 volt to terminals (2) and (3) Fig. B.

Check:
- The continuity between power terminals.

If there is continuity, the ignition relay is operational.

B



WARNING

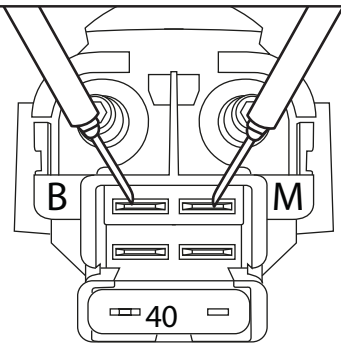
Do not apply the battery voltage to the starter relay for more than 5 seconds to prevent overheating and damages to winding.

Check:
- The winding Fig. C.

If it is “open” or “grounded” and if there is resistance.
Winding is in good condition if the resistance is:

Starting relay resistance	**3 - 6 Ω**

C



NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

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 serving as an acoustic warning device.

Connect:
- (PIN 1) and (PIN 2) Fig. A to the battery and check operation.

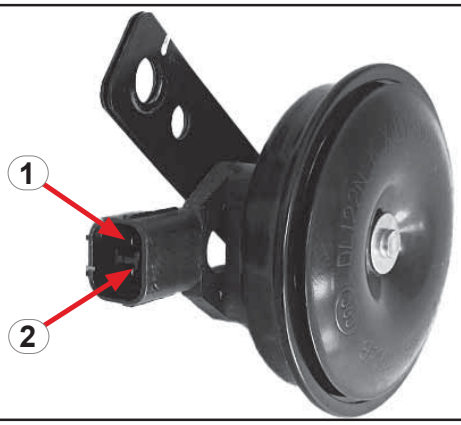
Check:
- After having connected the horn to rechargeable battery, the presence of a sound signals a normal operation.

Resistance value	**3.2 Ω**

NOTICE

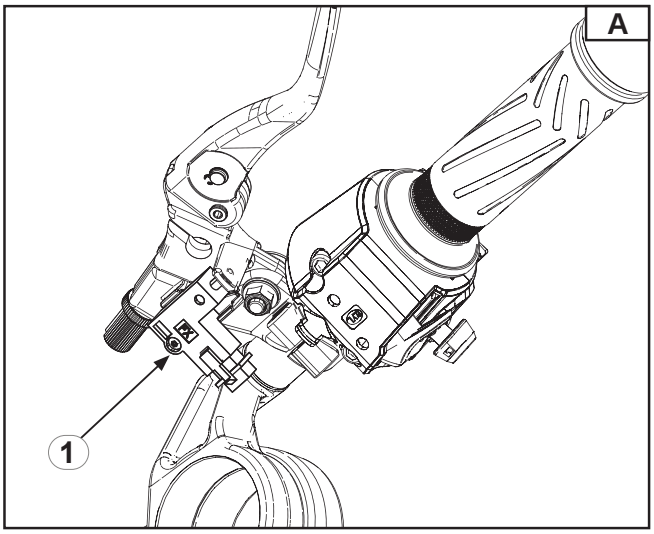
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

A



SENSORS
CLUTCH SWITCH

It is situated on the clutch lever and serves to control engine start in safety (1) Fig. A.



Disconnect:
- The clutch switch cables.

Use:
- The tester in continuity test mode (ohm), as shown in the table.

CLUTCH	PIN 1	PIN 2
Pulled	●	●
Released	●	●

NOTE:
When the above conditions are fulfilled, the front clutch sensor is working properly, otherwise replace the part.

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

DEVICES
LEFT LIGHT SWITCH

On the left side of the handlebar (Fig. A-B) the left electrical device consists of:

- **Horn button (1)**

Press to activate the horn.

- **Turn signal light control (2)**

By moving the control to the right or to the left, the relevant turn signal lights are activated. The control returns to the centre.
Press to deactivate the turn signal lights.

- **Select control (3)**

The menu items are shown on the display by moving the control.

- **Enter/select control (4)**

For information about control, refer to **"Instrumentation and indicator lights, Chapter 1".**

- **Back control (5)**

Press to scroll up and down the items of the main menu.

- **Flash/high beam switch/low beam switch button control (6)**

Position this switch in high position to activate the high beam. The button remains locked in this position.
Position this switch in intermediate position to activate the dipped beam.
Press this switch downward for flashing, as shown by the arrow Fig. B).
This function serves to alert other road users in case of possible dangerous situations.

Check horn (1):

- Continuity

With the multitester on the relevant reference terminals for the selection (high beam/low beam).

Check of turn signal lights (2):

- Continuity

With the multitester on the relevant reference terminals for the selection (LH/RH).

Check of Select control (3):

- Continuity

By positioning the multitester on the relevant terminals with the button pressed.

Check of Enter/select control (4):

- Continuity

By positioning the multitester on the relevant terminals with the button pressed.

Back control (5):

- Continuity

By positioning the multitester on the relevant terminals with the button pressed.

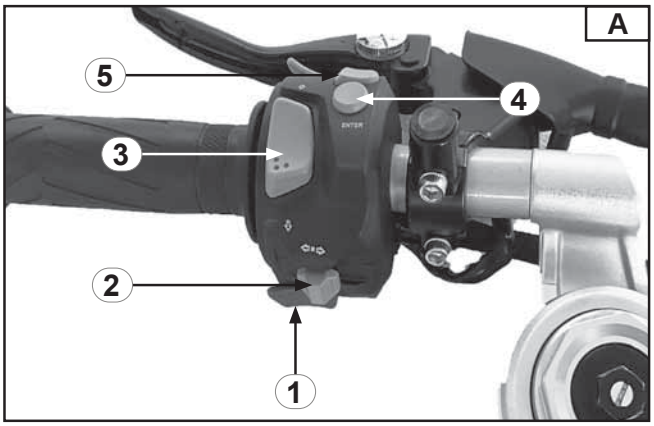
Check of flash control (6):

- Continuity

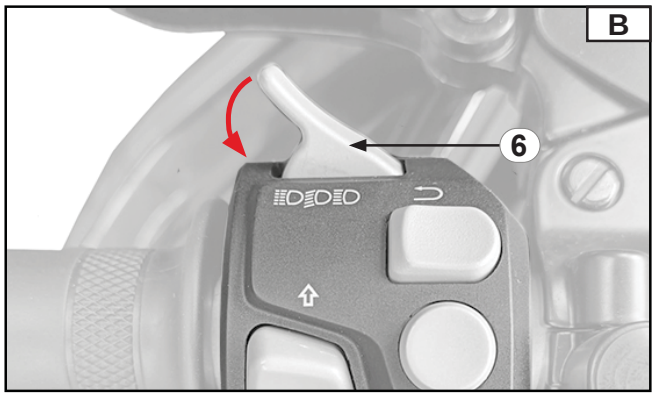
By positioning the multitester on the relevant terminals with the button pressed.

Check:
The table, in Fig. C, via the left electric device connector Fig. D.

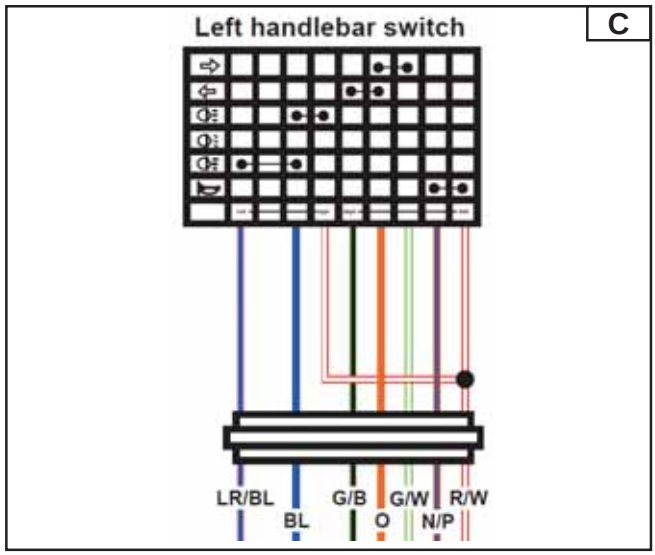
A



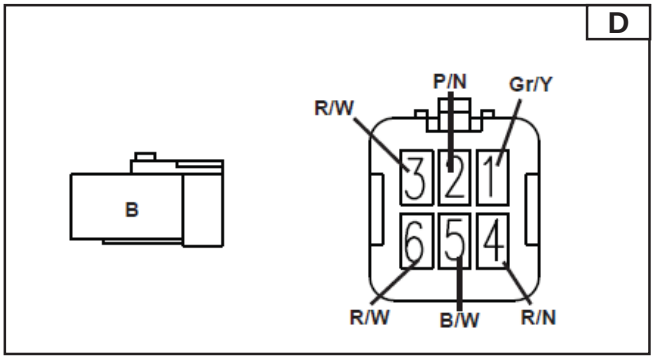
B



C



D



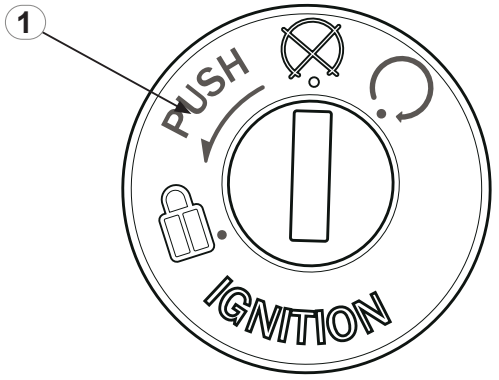
DEVICES
IGNITION SWITCH

Behind the steering sleeve is the ignition switch (1) Fig. A, which serves to:
- Provide the main contact to the electrical system
- Close the steering lock.

Check:
- The continuity using the multitester referring to the table.

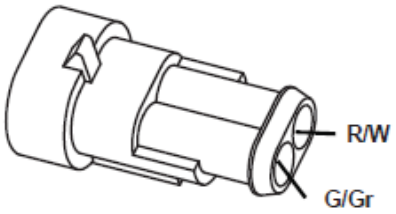
COLOR	G/GR	R/W
PIN	PIN 1	PIN 2
Key ON	●	●
Key OFF		
Lock		

A



In Fig. B is the ON switch connector.

B



If the above conditions are met, then the ignition switch is operating: if not, replace the component.

- **Key in position "ON"**

All power circuits are active, instrumentation and lights carry out auto diagnostics; the engine can be switched on.
The key cannot be removed.

- **Key in position "OFF"**

All electric circuits are deactivated, the key can be removed.

- **Key in position "LOCK"**

All power circuits are deactivated; the steering is locked.
The key can be removed.

NOTICE

On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

DEVICES
USB SOCKET

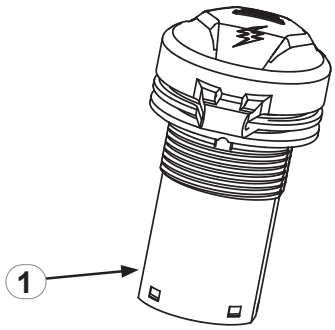
The USB socket (1) Fig. A is situated close to the multifunction display.

Supply check:
- Check the input voltage (12 DC) at the device supply connector pins

Check of USB output:
- Measure the output voltage on the USB connector using a multimeter (correct value 5 V DC).

Live test:
- Connect an electronic device (ex. smartphone) and check the stability of the output voltage and the actual current delivery.

A

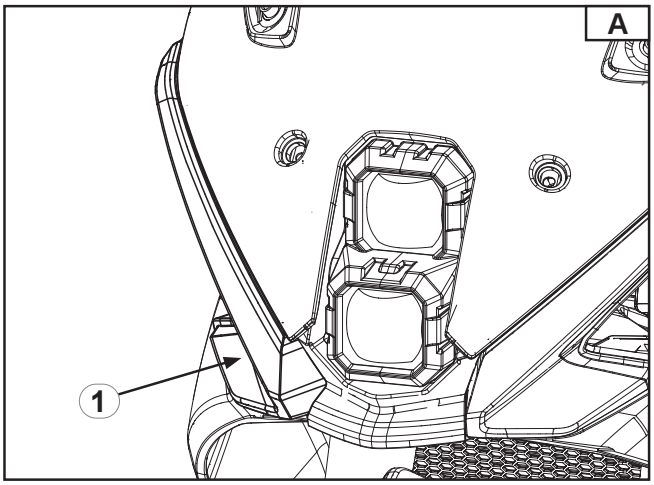


B



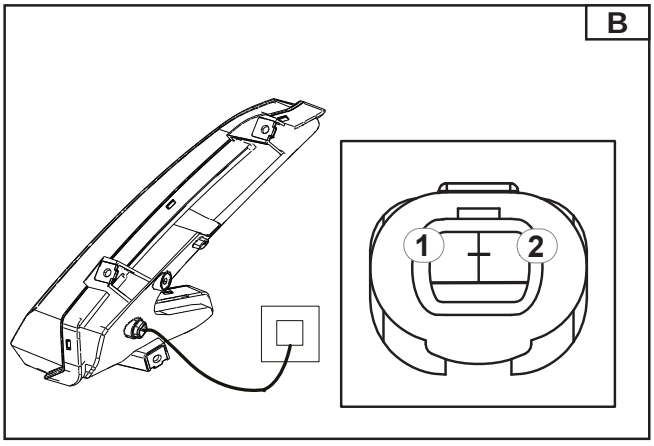
DEVICES
RH AUXILIARY LIGHT

The right auxiliary light (1) Fig. A is located in the right front side of the vehicle, built-in in the front fairing with the aim of ensuring the visibility of the vehicle.
Its activation occurs when the panel is on based on the logic defined via the vehicle electrical system.
It does not require ordinary maintenance except in case of malfunctioning of the LED module or the associated wiring.



Hereunder are the connector pins of the right auxiliary light Fig. B:

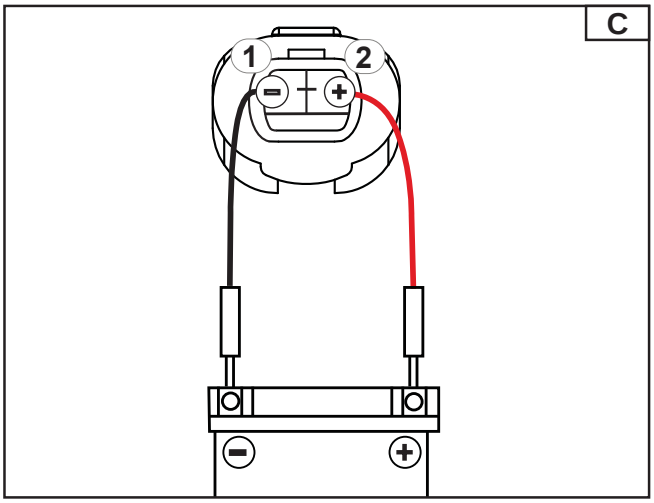
PIN 1	Ground: black (-)
PIN 2	(+) yellow



Check:
- Continuity by using a battery and connecting it with the PINs as follows:

Dipped beam continuity:
Insert:
- The connector of the positive pole (+) from the battery to PIN (1) Fig. C.
- The connector of the negative pole (-) from the battery to PIN (2) Fig. C.

NOTE:
If the above procedure is carried out and the right auxiliary light goes on, the light is working properly, otherwise replace the part.



DEVICES
INSTRUMENTATION

Situated on the instrumentation support frame, the instrumentation provides all information concerning the motorcycle operation to the driver Fig. A.
For information about instrumentation, refer to **"Instrumentation and indicator lights, Chapter 1".**

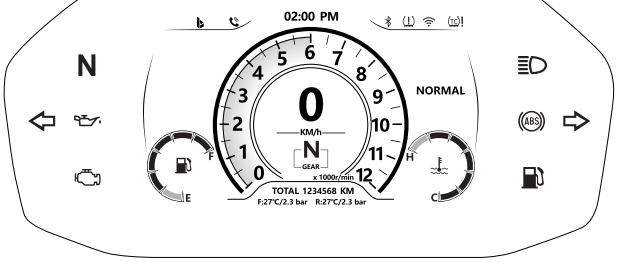
Pin-out (see table)

- The dashboard Fig, B is connected with a 26 pin male connector. Fig. C.
- The male connector pins activated for communication with the device are the ones highlighted in the following table.

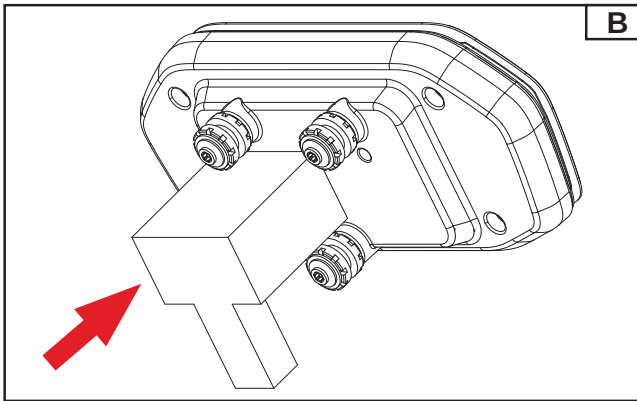
NOTICE

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In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

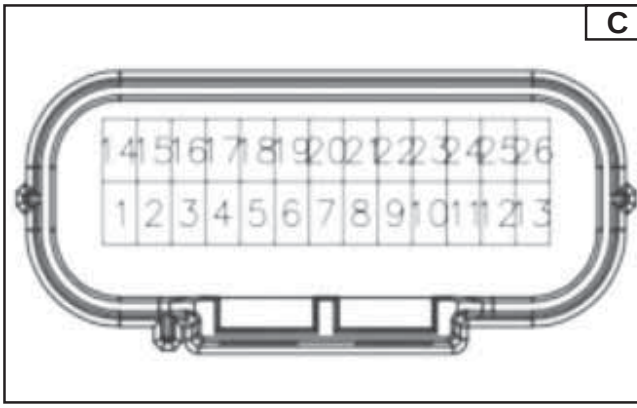
A



B



C



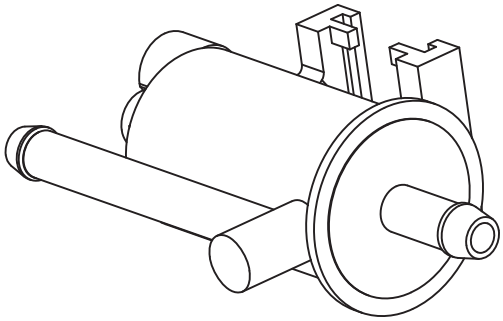
POSITION	FUNCTION	ALARM
1	N	-
2	1	-
3	2	-
4	3	-
5	4	-
6	5	-
7	6	-
8	Permanent positive	12 V
9	Switched positive	12 V
10	Ground	-
11	Fuel level	Resistive
14	Number of revolutions per minute	Pulse signal
15	Right turn signal light	12 V
16	Right turn signal light	12 V
17	High beam indicator light	12 V
18	Oil pressure	-
19	Signal ABS light	Grounding
20	Select	12 V
21	Enter	12 V
22	Data	-
23	Data	-

DEVICES
CARTRIDGE FILTER SOLENOID

The canister filter solenoid (Fig. A) is situated close to the canister filter (motorcycle central area) and serves to adjust the gas flow from the fuel tank to the air-box for recycling.

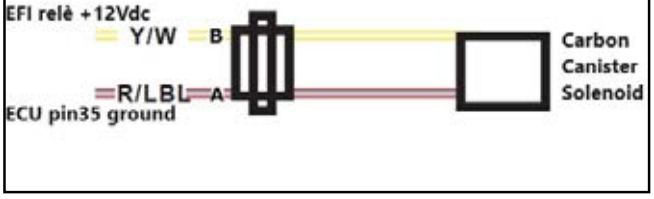
The device is normally open and cuts off the gas flow according based on the control of the ECU.

A



Operation:
The solenoid receives a direct supply from the injection relay (yellow/white wire) (Fig. B) and a signal from the unit (red/light blue wire) via the pin 35. (Fig. B)

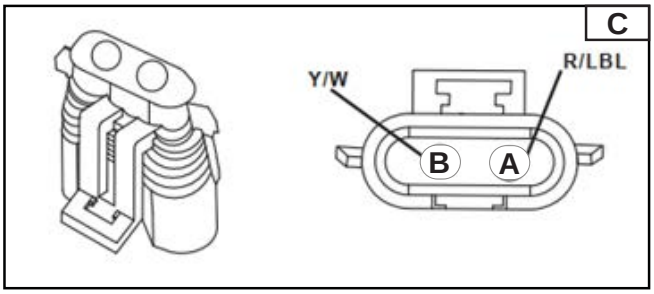
B



Check:
With the multitester on the symbol Ω between PinA and PinB the resistance at 20°C (Fig. C)

Resistance (Ω)	PIN A	PIN B
20 Ohm +/-10%	●	●

C



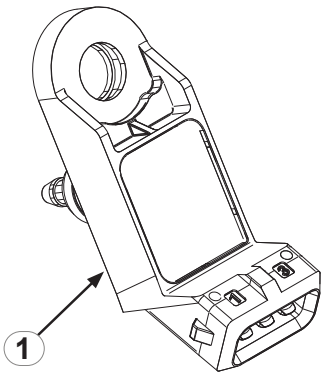
DEVICES
MAP SENSOR

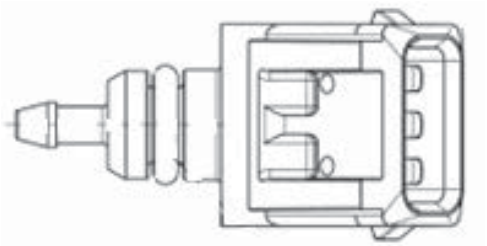
Situated close to the throttle body, the sensor (1) Fig. A serves to detect the absolute pressure on the intake manifold. It reflects the size of inlet pressure, which can be converted to air intake volume accessing the combustion chamber of the engine.

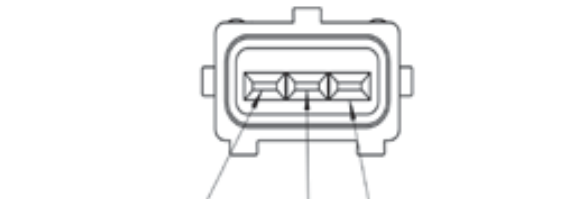
NOTICE

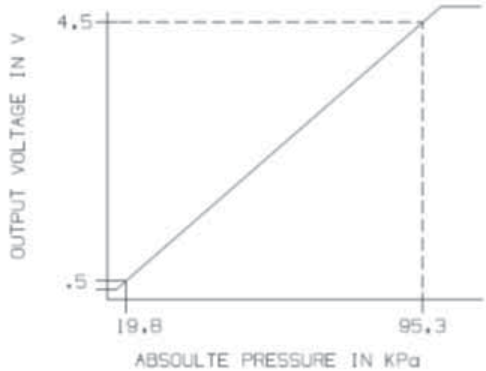
On the electric systems there could be equal connectors for different functions.
In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

A





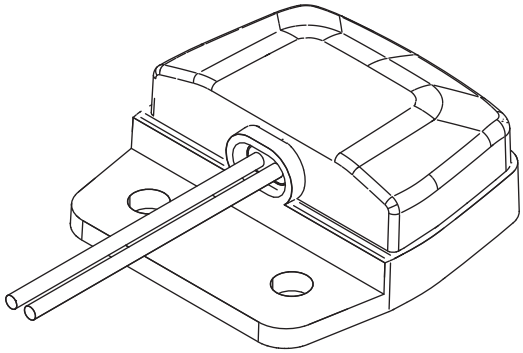




DEVICES
LICENSE PLATE LIGHT

The license plate light is situated on the rear side of the vehicle, above the license plate, to ensure the visibility of the latter in poor visibility conditions.

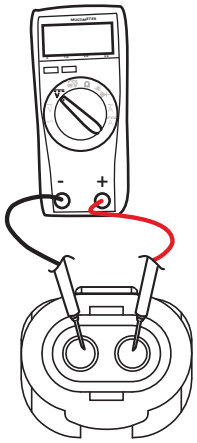
A



Check of LED license plate light

Supply check:
- Check via a multimeter Fig. B the 12 V DC voltage at the license plate light connector pins with the key turned or in the lights ON.

B

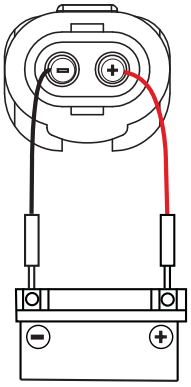


Functional test:
- Connect the license plate light directly to a 12 source to check the correct operation Fig. C.

Polarity check:
- The LEDs are polarity sensitive, make sure that the positive and negative are properly connected.

Continuity check:
- If the light does not go on, check the continuity of the wires and the conditions of the fuse related to the rear light circuit.

C

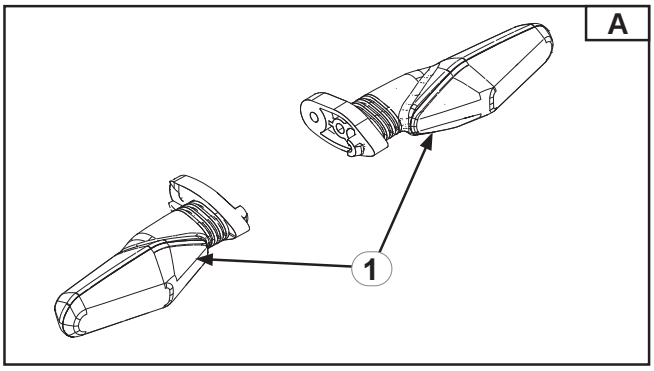


DEVICES

REAR TURN INDICATOR/AUXILIARY LIGHTS/STOP

The turn signal lights/auxiliary lights/stop (1) Fig. A, are situated on the rear side of the vehicle.
Each rear device is equipped with three independent bipolar connections, respectively dedicated to the functions of auxiliary lights, stop lights, and turn signal lights.

To carry out the functional checks, it is highly advisable to refer to the vehicle wiring diagram and precisely identify the supply lines associated to each function. The checks can be carried out via direct 12 VDC supply by applying the voltage between the positive terminal and the ground reference of the single channel in order to validate the activation of the related light circuit.

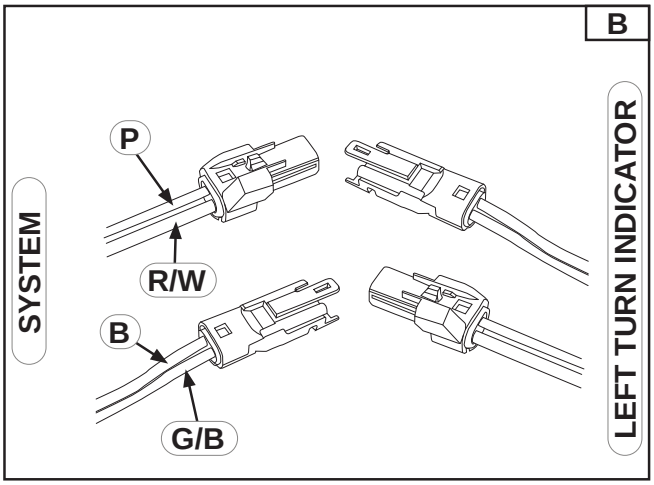


NOTICE

While carrying out the check, pay attention to the polarity and use suitable protective equipment against unexpected overcurrent and short circuit.

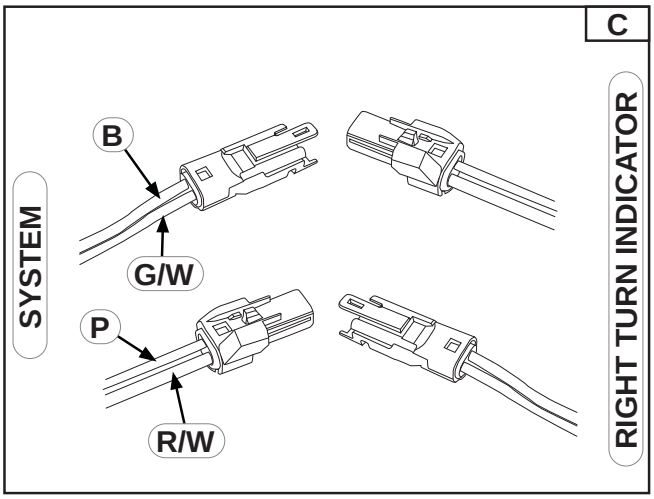
The left device connector Fig. B.

SOURCE	COLORS
SYSTEM	• P: Purple (+) • R/W: Red/White (+) • B: Black (-) • G/B: Green/Black (+)
LEFT TURN INDICATOR	-



Right device connector Fig. C.

SOURCE	COLORS
SYSTEM	• B: Black (-) • G/W: Green/White (+) • P: Purple (+) • R/W: Red/White (+)
RIGHT TURN INDICATOR	-



DEVICES
FRONT TURN SIGNAL LIGHTS

The turn signal lights (1) Fig. A, are situated on the front side of the vehicle.

For carrying out the functional checks, proceed as described below:
- Connect the black wire (B) Fig. B of the turn signal light to the negative (-) of the battery.
- Connect the wire (G/W) Fig. B or the wire (G/B) Fig. C to battery positive (+).

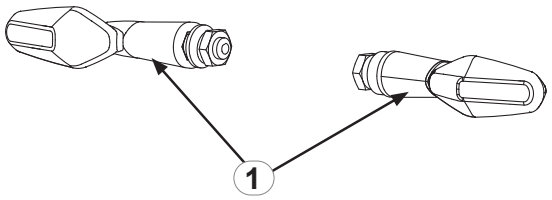
During the check, carefully observe the intensity and the stability of the light emission. A weak light (flashing or absent) can indicate one of the following anomalies:
- Faulty light element (lamp or LED).
- Oxidized or unstable electric contact
- Interruption or damaging of wiring.

NOTICE

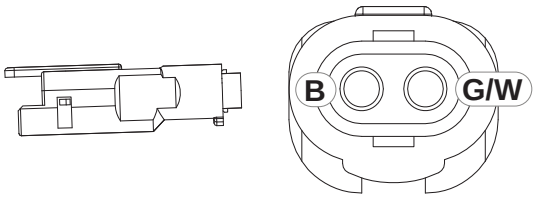
The direct power supply must be applied only for short intervals enough for functional check. It is absolutely not recommended to keep the load (ex. turn signal light) always connected to the battery without an interruption/protective system (fuses, switches, etc.) to prevent damages to the part or the circuit.

Fig. B shows the connector of the right turn signal light.
Fig. C shows the connector of the left turn signal light.

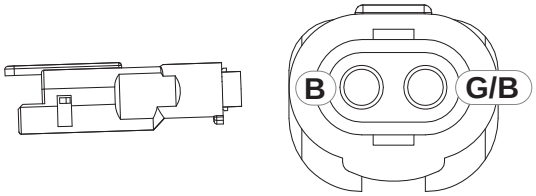
A



B



C



DEVICES
TIRE PRESSURE SENSOR

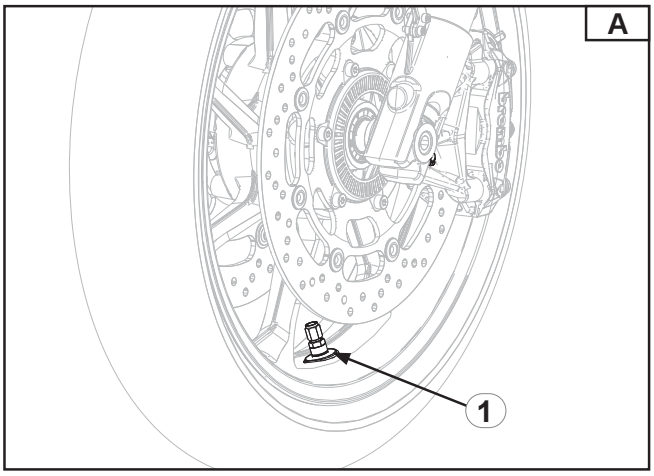
Front tire pressure sensors (1) Fig. A and rear ones (2) Fig. B are installed on the front and rear wheel rims with the function of continuously monitoring the inner pressure of the tires.

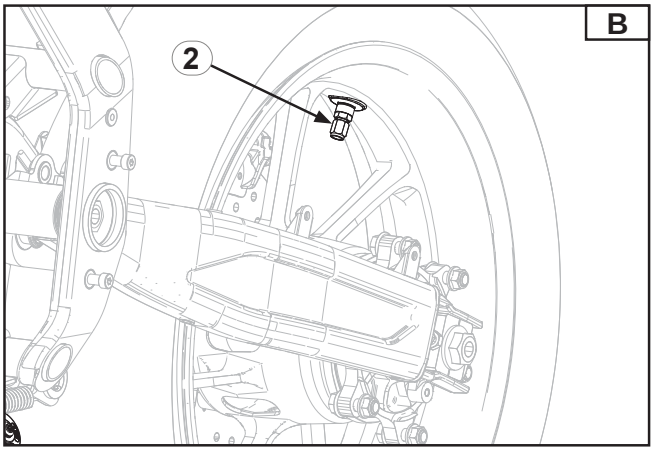
The tire pressure monitoring system (TPMS) are sealed electronic devices that cannot be serviceable and not subject to interventions of manual repairing or calibration.

In the absence of communication, inconsistent readings, erratic signalling or no detection via the on-board instrumentation, the sensor affected must be replaced.

Checking and synchronization procedure of TPMS sensor
To check any synchronization of the sensor and force a new learning via the system follow the procedure below:

- Start the vehicle panel.
- Access the “Tire pressure” menu on the on-boar display.
- Select the item “Front wheel learning” or “Rear wheel learning” based on the sensor to be verify.
- Increase or reduce the pressure of the tire in question in a quick and significant manner (via compressor or breathe valve).
- The sudden change in pressure will trigger the automatic synchronization procedure of the sensor with the control unit.





DEVICES

INDICATOR LIGHT INTERMITTENCE

It is situated underneath the passenger seat and allows to control the turn signal lights.

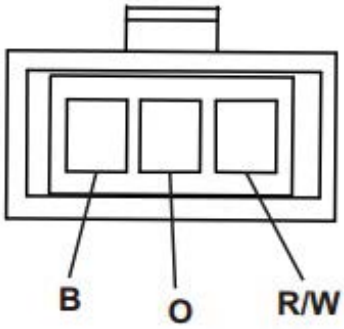
NOTICE

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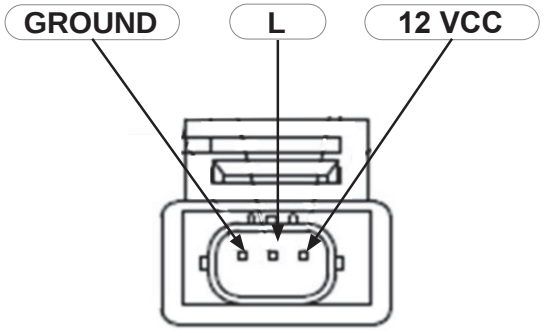
Check:
the diagram in Fig. A, via the electric device connector Fig. B.

Features:
- Type: electronic
- Power: 10Wx4.
- Operating voltage: 10.5-16V
- Flashing frequency: 85 flashes per minute
- Hazard light function

A



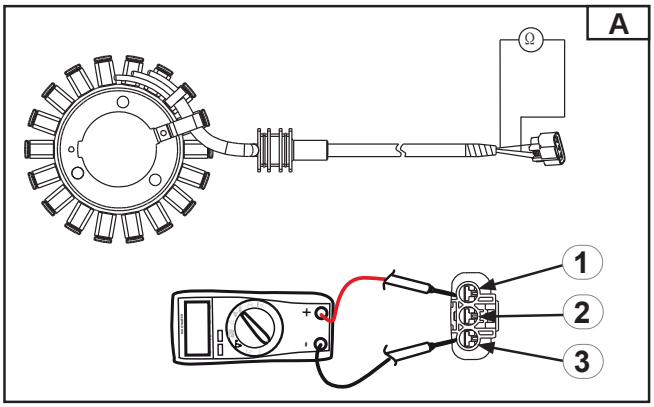
B



DEVICES
STATOR

The problems that may occur on the magneto electric generator (stator) Fig. A are of three types:

- **Short circuit**
- **Line break (wire burnt)**
- **Lack/reduction of the magnetic field.**



Turn off the ignition switch.

Disconnect:

- The connector of the 3-pole magneto electric generator.

Measure:

- The resistance value among the three terminals 1-2, 1-3, 2-3 of the generator with a multimeter.

Standard value	**0.18 Ω ± 0.01Ω at 25°C**

- If the resistance is greater than the aforementioned values, proceed with replacement. When it is far lower than the resistance, it refers to a stator short-circuit. It shall be replaced.
- 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).

Range of tester	Wiring		Steady state reading min	Readings at 5000 rpm
	Tester (+) to	Tester (-) to		
750 V AC	Wire 1	Wire 2	10 V ac +/- 20%	60 V ac +/- 20%
750 V AC	Wire 1	Wire 3	10 V ac +/- 20%	60 V ac +/- 20%
750 V AC	Wire 2	Wire 3	10 V ac +/- 20%	60 V ac +/- 20%

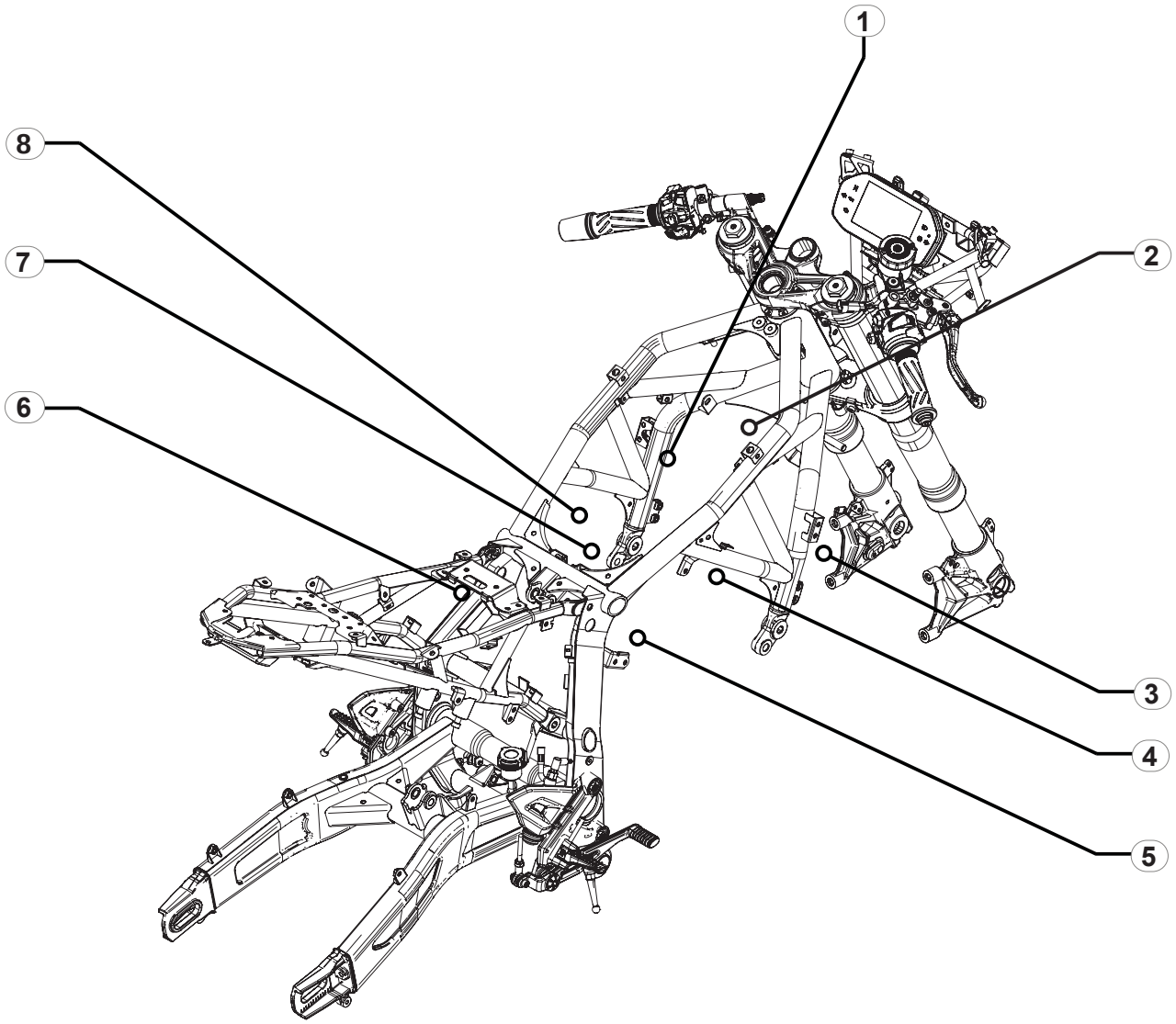
NOTE:
If the output voltage indicated is within the value of the table, the magnetoelectric generator works properly.
If the output voltage indicated is much lower than the value within the value of the table, problems occur on the generator.

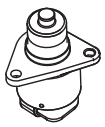
NOTICE

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In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

ACTUATORS

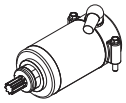
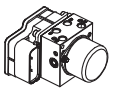
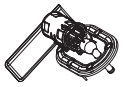
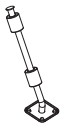
POSITION OF ACTUATORS



Position	Device	Image
1	STEPPER	
2	IGNITION COILS	
3	COOLING FAN	

ACTUATORS

POSITION OF ACTUATORS

Position	Device	Image
4	INJECTORS	
5	STARTER	
6	ABS ECU	
7	FUEL PUMP	
8	FUEL LEVEL SENSOR	

NOTICE

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In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

ACTUATORS

IDLE AIR CONTROL SYSTEM (STEPPER)

Situated on the throttle body, the system includes a valve to check the passage of air under the throttle body and equipped with a step motor (stepper).
The system controls the following parameters:

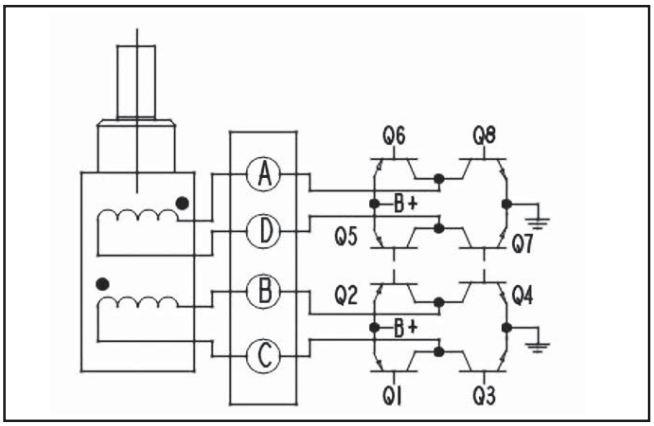
- **Idle speed.**
- **Adjustment of air/fuel ratio by working at idle speed at altitudes above sea level.**
- **Adjustment of air/fuel ratio in cold/hot setting-off.**

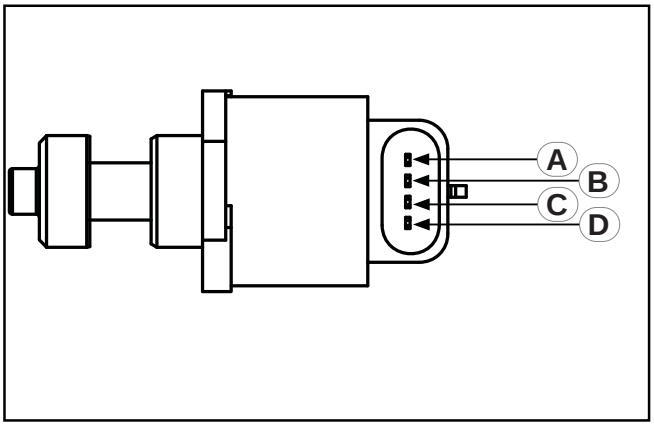
When enabled, the step motor (stepper) opens the valve by a certain amount to check the passage of air, allowing a set amount to flow down a series of hoses in the group of throttles.

Operating voltage	12 V DC
Minimum /maximum operating voltage	7.5 V DC/ 14.0V DC
Impedance per coil (27°C)	53 ± 5.3 Ω
Minimum impedance	35 Ω
Distance	0.04167 mm (0.00164 in)
Maximum travel	8.5 mm (0.334 in) (200 steps)
Resonant frequency range	20-120 pps

NOTICE

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In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.





							PINS		
	STEP	Q6-Q7	Q5-Q8	Q1-Q4	Q2-Q3	STEP	A	D	C	B
Extend	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	+	-	+	-
Retract										

Motor 4 steps drive control table

ACTUATORS
IGNITION COILS

Situated directly above the head of each spark plug (1) Fig. A, the ignition coil makes available the high voltage and ignition energy needed to produce sparks at high voltage among the spark plug electrodes.

Check:
- The measurement of the coil terminal impedance.

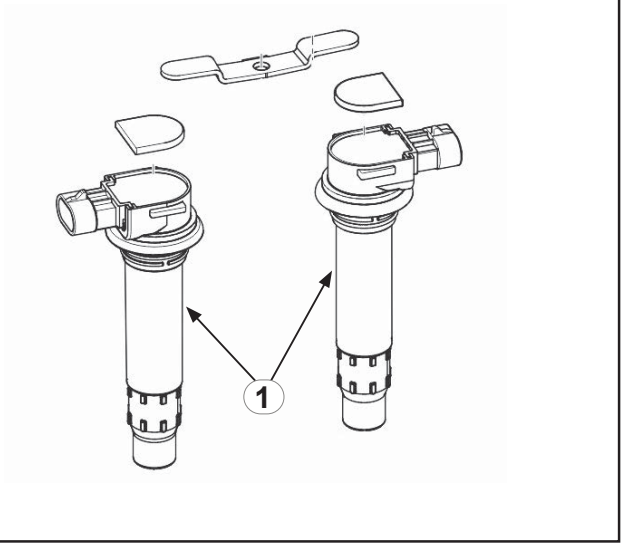
Primary coil	0.65 ± 0.07 Ω
Secondary coil	4 ± 0.5 kΩ

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.

NOTICE

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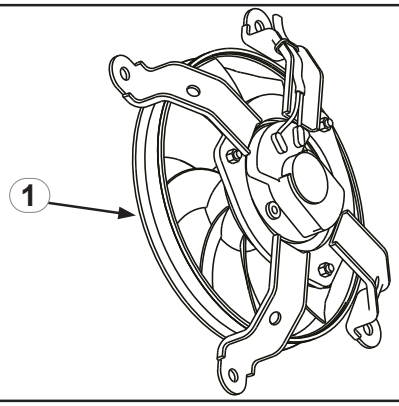
A



ACTUATORS
COOLING FAN

Situated on the radiator body, the cooling fan (1) Fig. A is powered via the FAN relay when the ECM requires it.
The activation signal is generated when the coolant reaches the temperature of 93 °C.
When the coolant temperature lowers enough (lower-tier temperature), the coolant fan is deactivated.

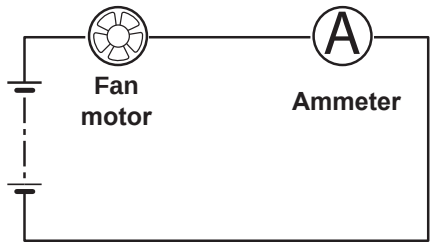
A



Check:

- The load current of the fan motor by connecting an ammeter, as shown in Fig. B.

B



The voltmeter serves to check that the battery powers the 12 volt motor.
When the fan is turning at full speed, the ammeter must not read any more than 5 amps.
If the motor is not turning, replace the fan.

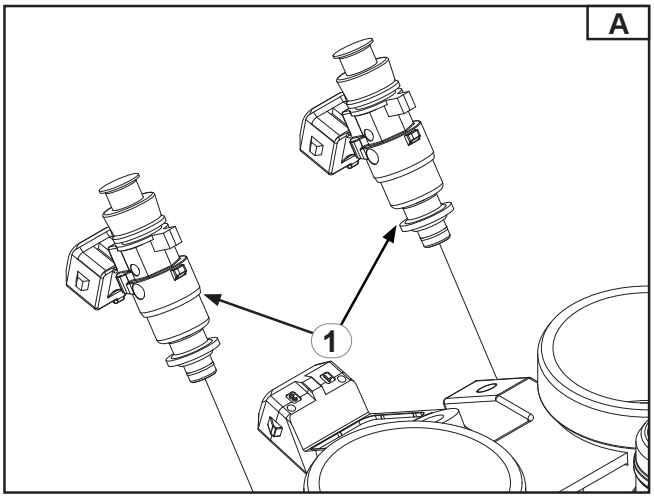
NOTE:
It is not necessary to remove the cooling fan from the radiator to carry out the above test.

NOTICE

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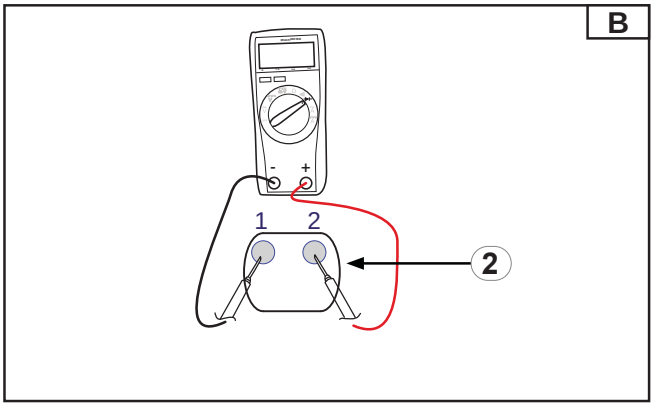
ACTUATORS
INJECTORS

They are positioned on the throttled body unit.
The engine is equipped with two 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 by the ECM based on data from the different system sensors.



Disconnect:
- The electrical coupling.

Check:
- The resistance using the multitester on symbol Ω between PIN 1 and PIN 2 (2) Fig. B.



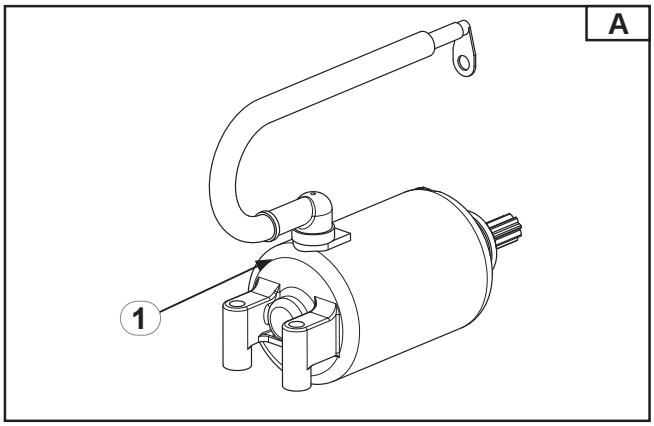
Resistance	12 ± 2 Ω

NOTICE

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ACTUATORS
STARTER

The starter motor (1) Fig. A, is a part that can be replaced totally. If the starter is damaged, replace it.



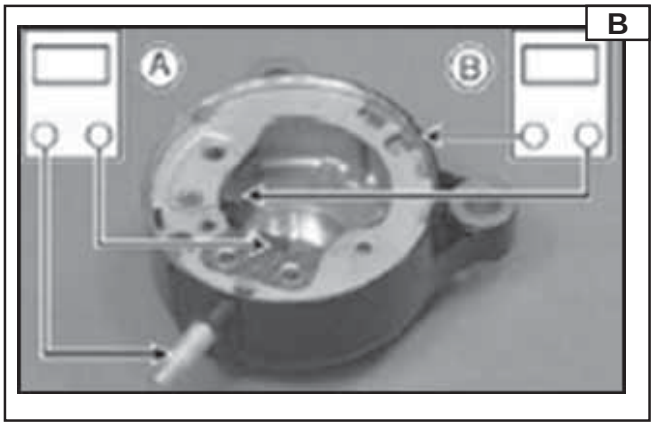
Remove:
- Release the coiled spring of brushes.
- Remove the casing framework.
- Use an ohmmeter to measure the resistance between the wire terminal and the insulated brush.

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.

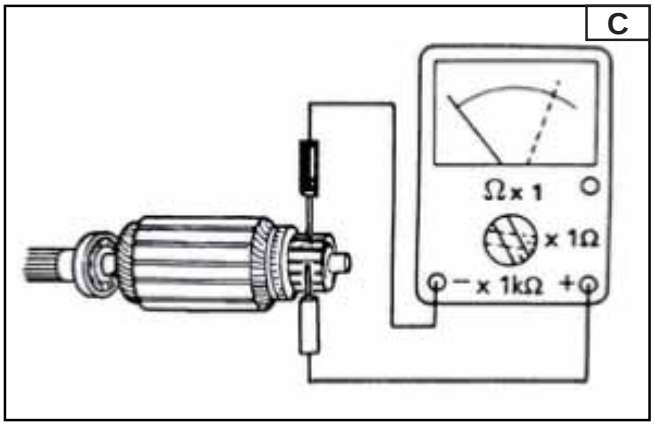
Measure:
- The brush length and replace in case of wearing exceeding the allowed limit.



Brush wear limit (length)	
Standard value	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 multitester is used for measurement.

NOTE:
Reading should be max 3 ohm.

Continuity of lower framework	
Bottom framework	**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.

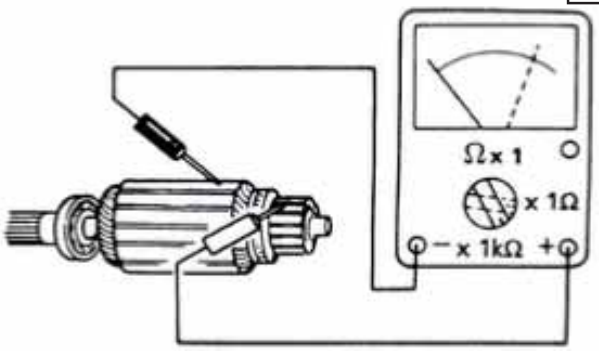
- Position the framework in a short circuit detector.
- Switch on the detector and position longitudinally a saw blade or a thickness gauge for 3 mm (1/8") above the laminates of the framework coil.
- Turn the framework by 360°.

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.

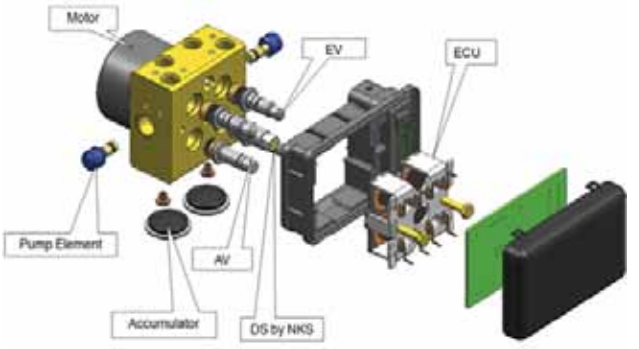
D



ACTUATORS
ECU ABS

It is situated underneath the fuel tank Fig. A.

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. This kind of shock may damage 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). 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.

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.

For the diagnostic management of the device, hereunder are the main fault codes and the necessary corrective actions.

ACTUATORS
ECU ABS

For the diagnostic management of the device, hereunder are the main fault codes and the necessary corrective actions.

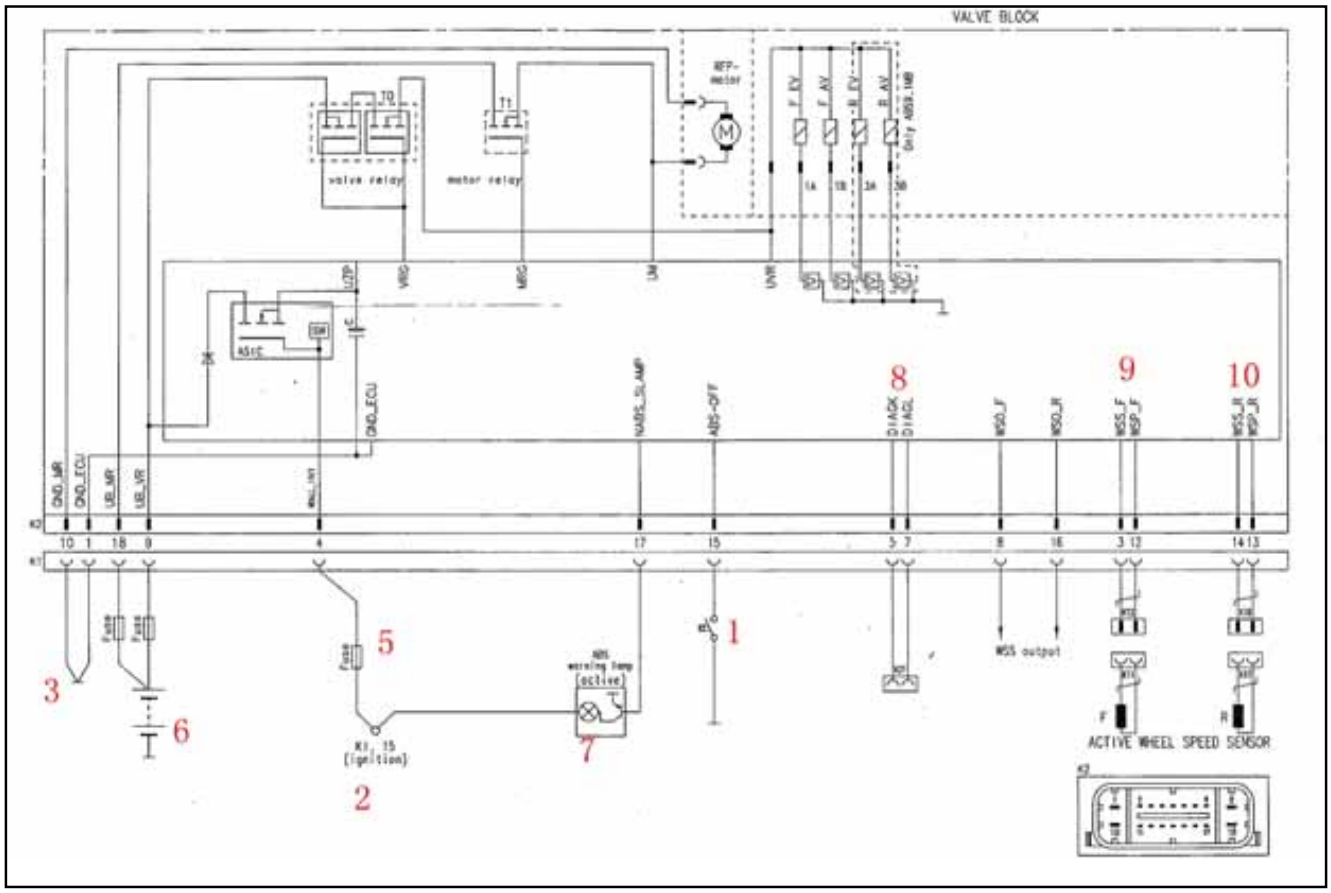
DTC (Hex) Fault codes	Solutions
5055	Replace ABS unit.
5019	
5017	
5013	
5018	
5014	
5053	Check battery voltage.
5052	
5035	Replace ABS unit.
5043	Check connection of the speed sensors using a new sensor.
5045	
5042	Check the signal wheel for deformation or faults.
5044	
5025	Check speed sensors, distance, signal wheel, and tire specifications.
5122	Replace ABS unit.
5223	

NOTICE

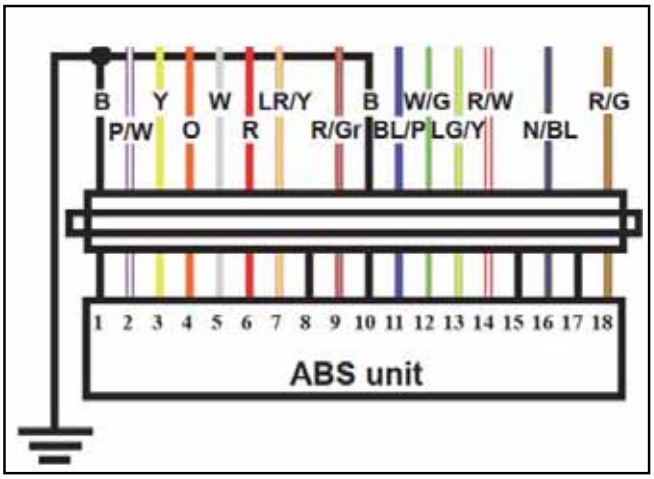
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ACTUATORS
ECU ABS

Diagram



Position	Code
1	Ground
2	TCS switch
3	FWSS supply
4	FWSS signal
5	RWSS supply
6	RWSS signal
7	ABS diag/k-line
8	-
9	VCC - ABS fuse 1
10	Ground
11	Speed
12	CAN - L
13	CAN - H
14	VCC - Key on
15	-
16	ABS warning lamp
17	-
18	VCC - ABS fuse 2



ACTUATORS
FUEL PUMP

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 bar. The ECM directly controls pump action, guaranteeing, from when the panel is switched on with a timed function, that the fuel is at the correct pressure to start the engine, with a continued operation for the successive use of the bike.

Check:
- The fuel pump (1) Fig. A.

1. Put an outlet pipe into a container to let the fuel flow out Fig. B.

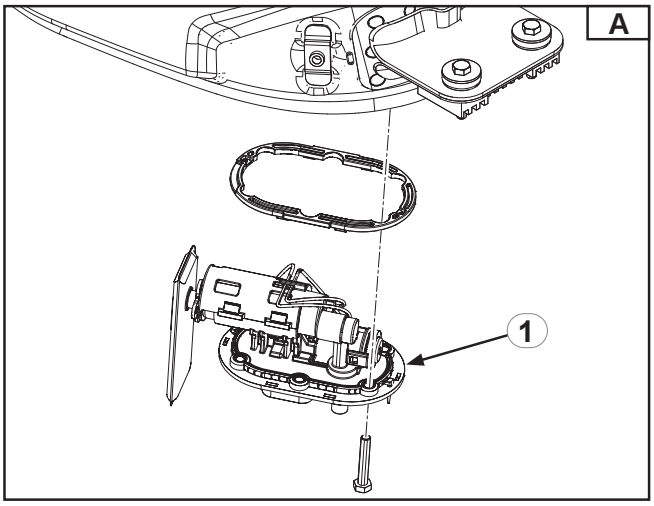
2. Connect the battery (12 V) to the fuel pump Fig. B.
- RED/BLACK positive wire +
- BLACK negative wire -

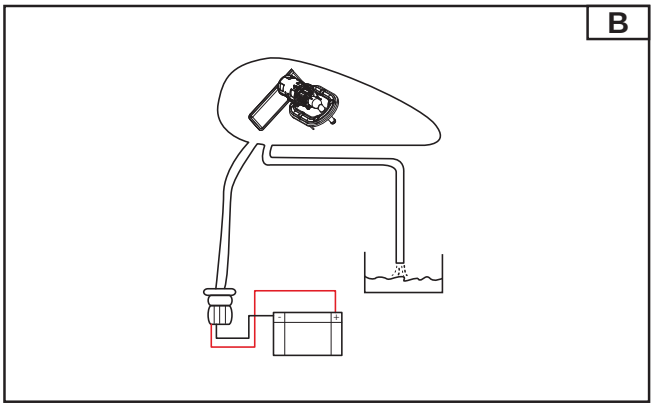
Flow rate:
≥ 0.65 litres/min.

Pressure:
3 ± 0.2 bar.

NOTICE

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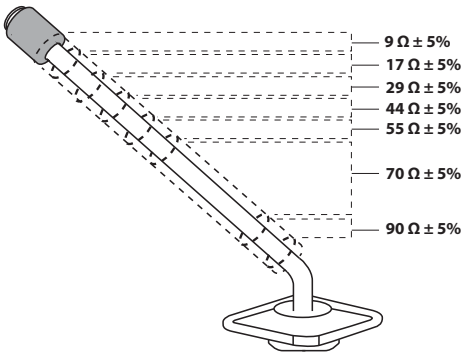




ACTUATORS
FUEL LEVEL SENSOR

Situated close to the fuel pump (1) Fig. A provides an value of variable resistance according to the present fuel level.

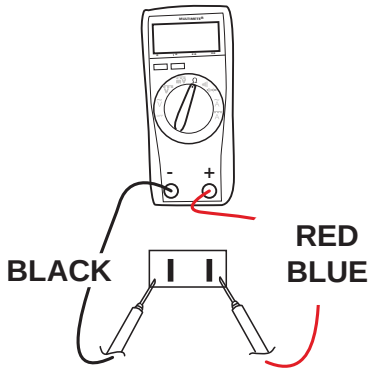
A



Check:

- The resistance based on fuel level by positioning the multitester on symbol Ω between PIN 1 - PIN 2 Fig. B.

B



NOTICE

On the electric systems there could be equal connectors for different functions.
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- Resistance of the sensor with floater in minimum position: 90 Ω +/-5 (Fig. A).
- Resistance of the sensor with floater in maximum position: 9 Ω +/-5 (Fig. A).

To check the resistance on the other levels, refer to the table below:

Liters	*Sensor impedance*	*Instrument indication*
16.5 / 15 L	10 Ω ± 5%	
15 / 13.5 L	18 ± 5%	
13.5 / 11 L	30 ± 5%	
11 / 8 L	45 ± 5%	
8 / 5 L	55 ± 5%	
5 / 2.5 L	70 ± 5%	
2.5 / 0 L	90 ± 5%	

DIAGNOSTICS

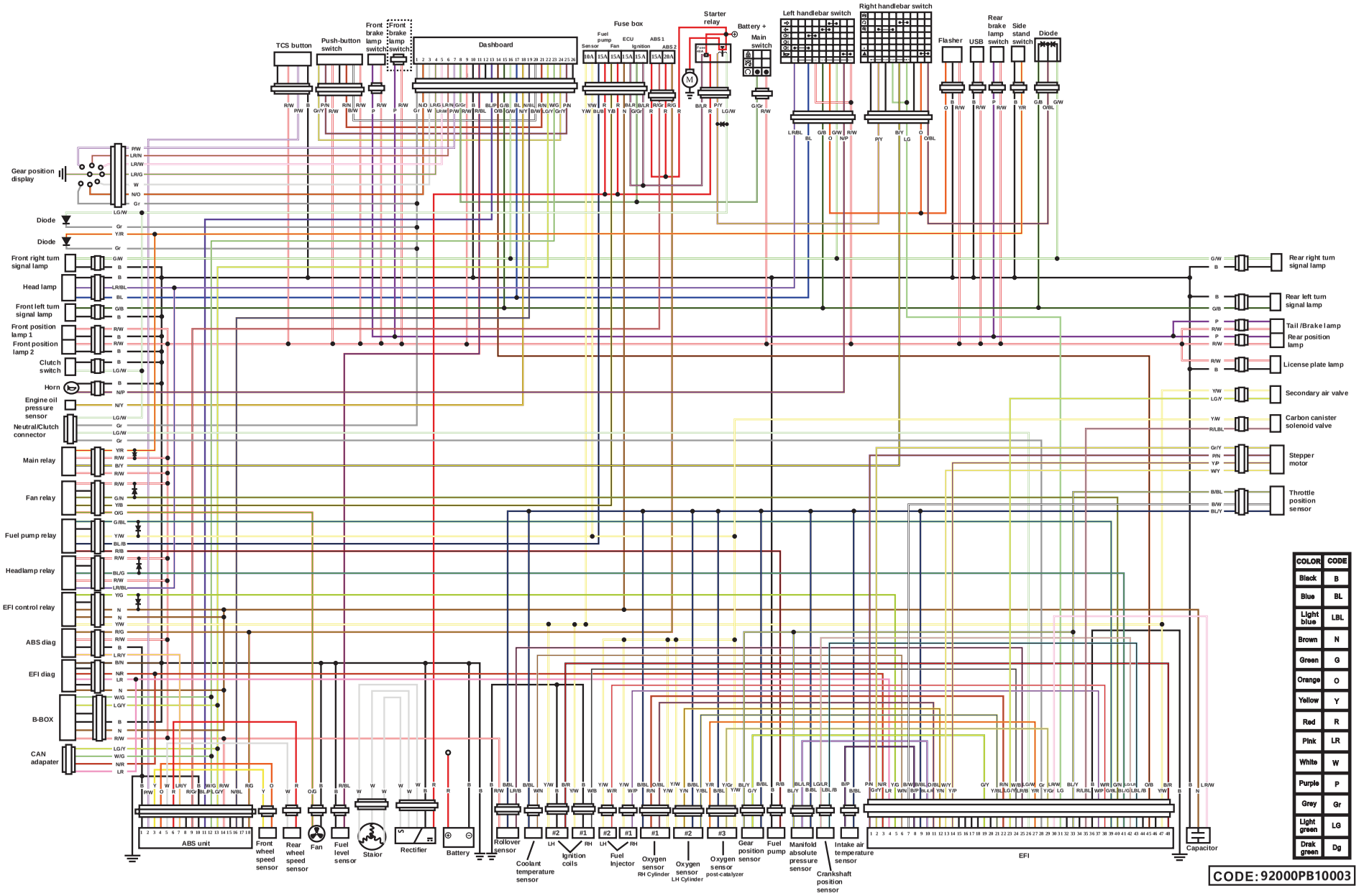
BRAKE FILLING/BLEEDING DIAGNOSTICS

Refer to the TXB-ZERO Benelli diagnostic instructions.

Remarks

ELECTRICAL SYSTEM

ELECTRICAL WIRING DIAGRAM



COLOR	CODE
Black	B
Blue	BL
Light blue	LBL
Brown	N
Green	G
Orange	O
Yellow	Y
Red	R
Pink	LR
White	W
Purple	P
Grey	Gr
Light green	LG
Drak green	Dg

CODE: 92000PB10003

ELECTRICAL SYSTEM
COLOUR KEY

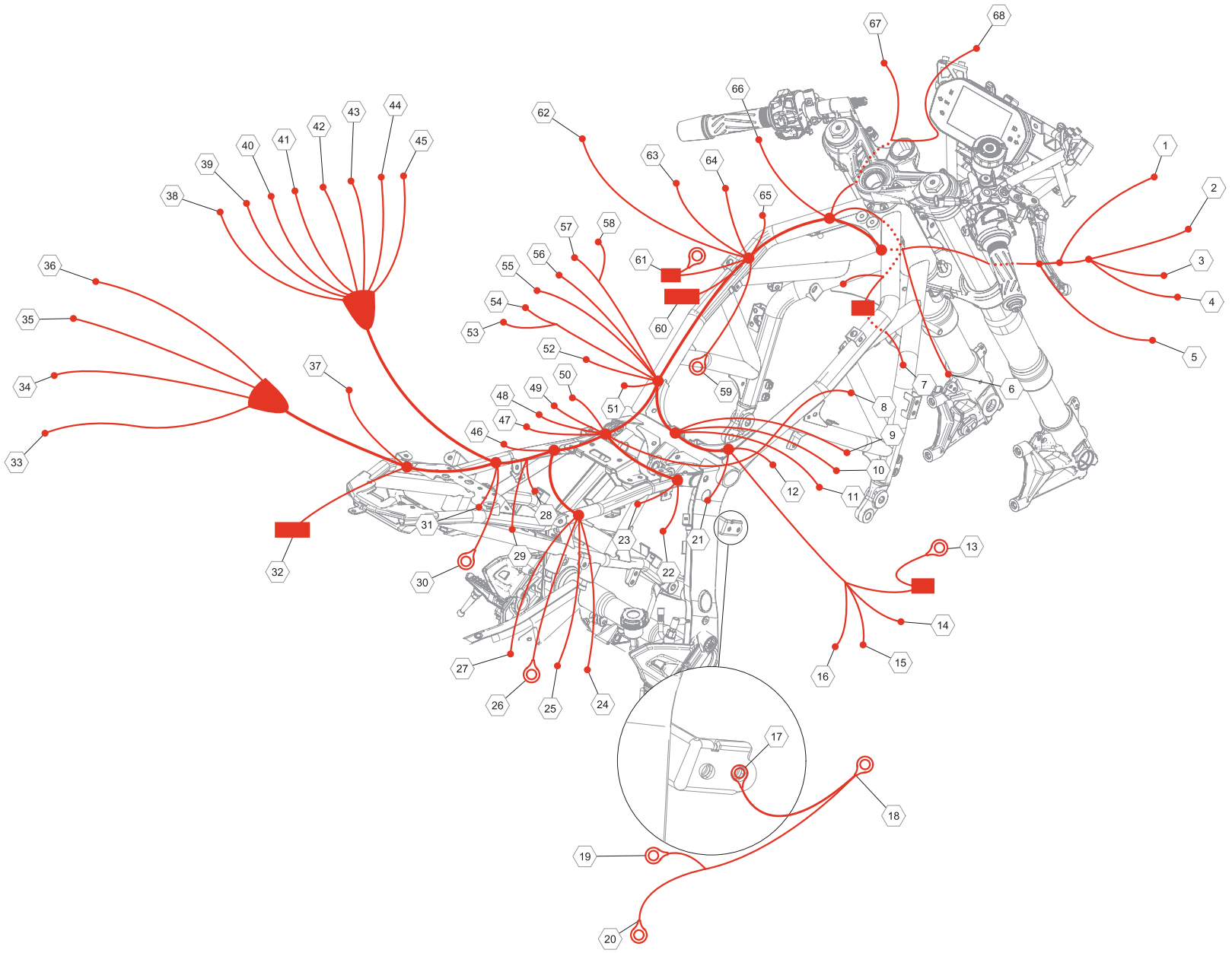
CODE	COLOR
B	Black
BL	Blue
LBL	Light blue
N	Brown
G	Green
O	Orange
Y	Yellow
R	Red
LR	Pink
W	White
P	Purple
Gr	Grey
LG	Light green
DG	Dark green

NOTICE

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In this case, the reversal is possible. Pay attention to the correct positioning during the disassembly and reassembly procedures of sensors and actuators.

ELECTRICAL SYSTEM

SERVICE ELECTRICAL DISTRIBUTOR CONNECTIONS



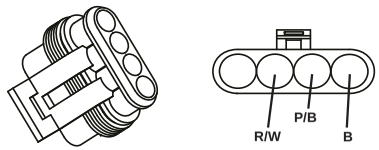
ELECTRICAL SYSTEM
SERVICE ELECTRICAL DISTRIBUTOR KEY

POS.	DESCRIPTION
1	Headlight
2	LH daylight
3	USB
4	RH daylight
5	RH turn signal light
6	Front ABS sensor
7	RH electric block
8	Oxygen sensor 3
9	Tyre pump gasoline
10	Fuel level sensor
11	IAT
12	Front stop sensor
13	RH coil
14	Oxygen sensor 2
15	Oxygen sensor 1
16	Stepper
17	Frame ground
18	Starter (-)
19	Battery (-)
20	ECU ground
21	Vapor recovery solenoid
22	Hydrostop
23	Top intermittence
24	Setup
25	Rear ABS sensor
26	Ground
27	ABS ECU
28	ECS
29	Battery (+)
30	Ground
31	ECU
32	Relay
33	Engine diagnostic socket
34	ABS diagnostic socket
35	Canbus connector
36	-
37	Fuse box
38	Turn signal light diode module
39	Neutral diode
40	Safety diode
41	Right turn indicator
42	Left turn indicator
43	Right stop
44	Left stop
45	License plate light
46	Starting relay
47	Side stand

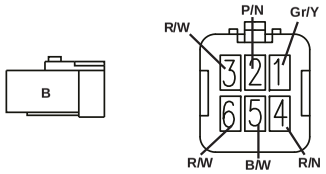
POS.	DESCRIPTION
48	Drop Sensor
49	Gear position sensor
50	B-box connector
51	Voltage regulator
52	Pick-up
53	Injector 1
54	MAP sensor
55	Injector 2
56	TPS
57	Secondary air sensor
58	Engine Temperature Sensor
59	Ground
60	Setup
61	LH coil
62	Key block
63	Oil pressure sensor
64	LH electric block
65	LH electric block
66	Loudspeaker
67	LH turn signal light
68	Dashboard

ELECTRICAL SYSTEM
CONNECTORS

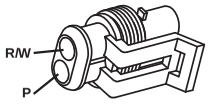
TCS button



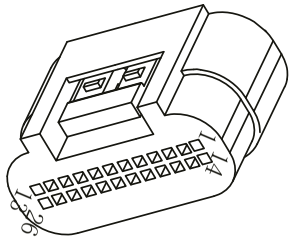
Push-button switch

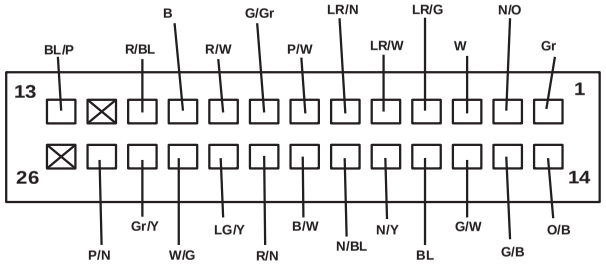


Front brake lamp switch

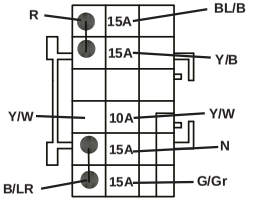


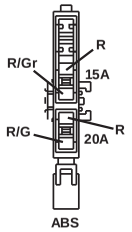
Dashboard



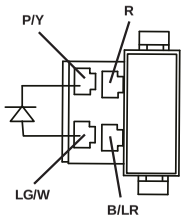


Fuse box

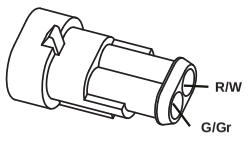




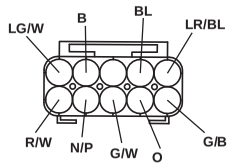
Starter relay



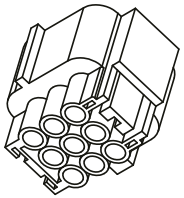
Main switch

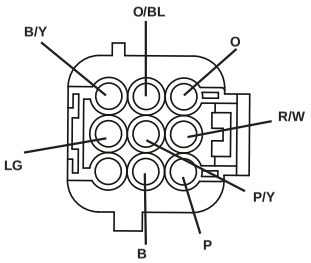


Left handlebar switch

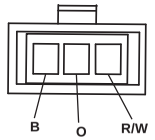


Right handlebar switch

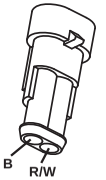




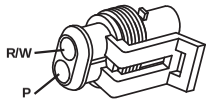
Flasher



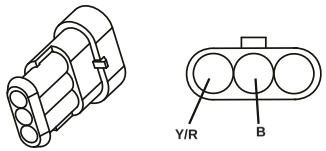
USB



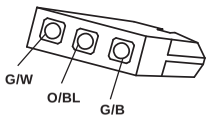
Rear brake lamp switch



Side stand switch

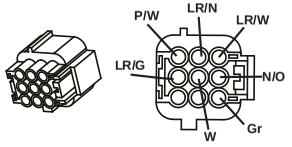


Diode

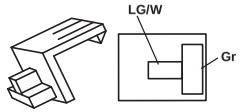


ELECTRICAL SYSTEM
CONNECTORS

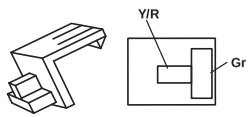
Gear position display



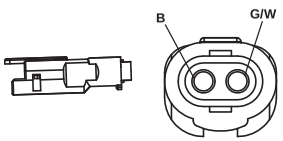
Diode



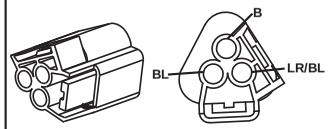
Diode



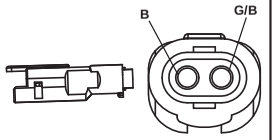
Front right turn signal lamp



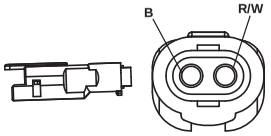
Head lamp



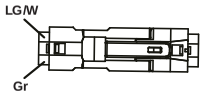
Front left turn signal lamp



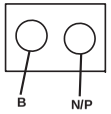
Front position lamp 1/2



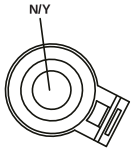
Clutch switch



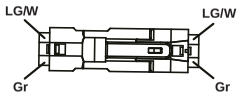
Horn



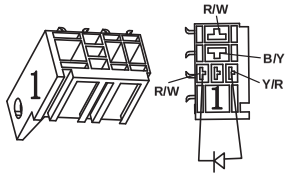
Engine oil pressure sensor



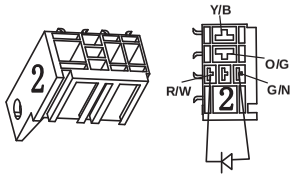
Neutral/Clutch connector



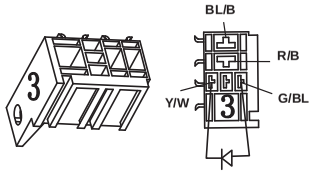
Main relay



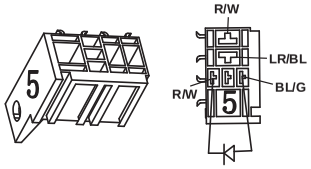
Fan relay



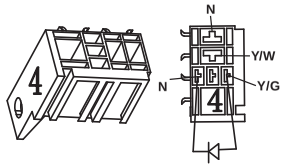
Fuel pump relay



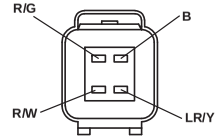
Headlamp relay



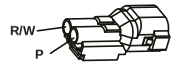
EFI control relay



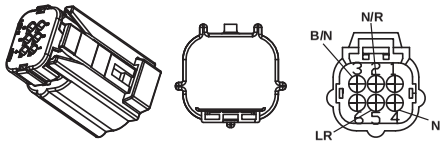
ABS diag



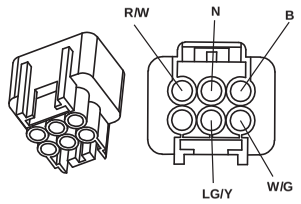
Tail /Brake lamp



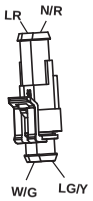
EFI diag



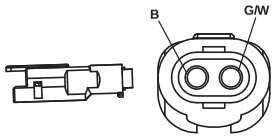
B-BOX



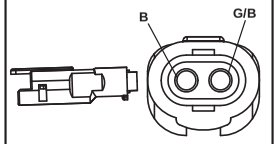
CAN adapater



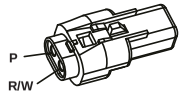
Rear right turn signal lamp



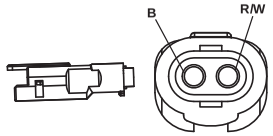
Rear left turn signal lamp



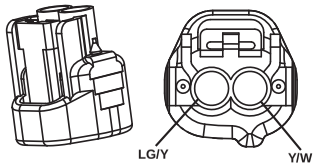
Rear position lamp



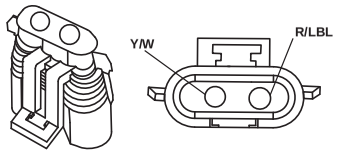
License plate lamp



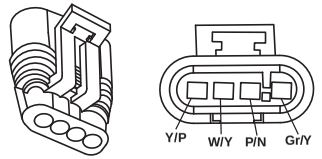
Secondary air valve



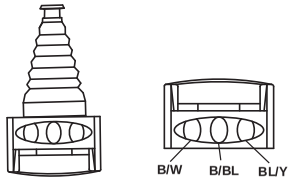
Carbon canister solenoid valve



Stepper motor

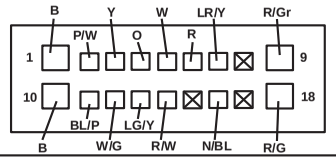


Throttle position sensor

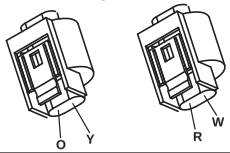


ELECTRICAL SYSTEM
CONNECTORS

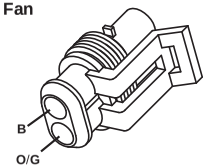
ABS unit



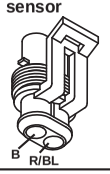
Front /Rear wheel speed sensor



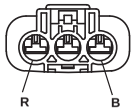
Fan



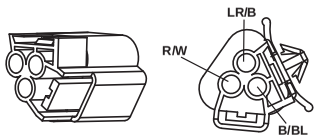
Fuel level sensor



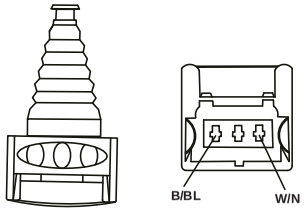
Rectifier



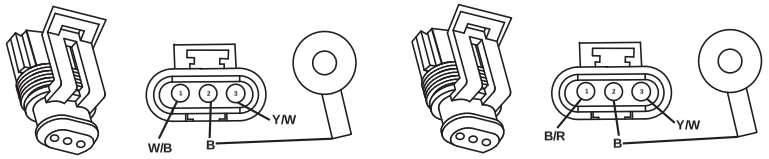
Rollover sensor



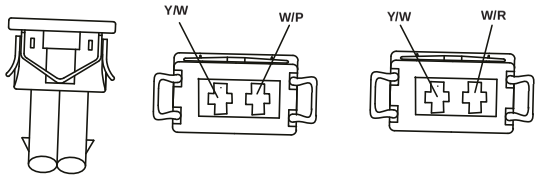
Coolant temperature sensor



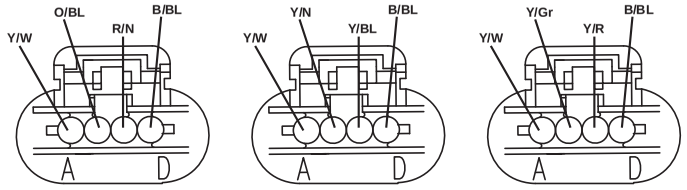
Ignition coils



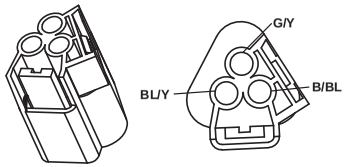
Fuel Injector



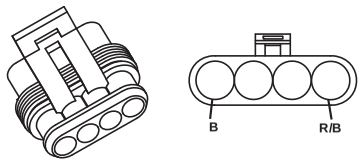
Oxygen sensor



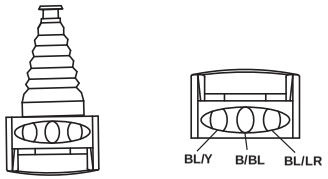
Gear position sensor



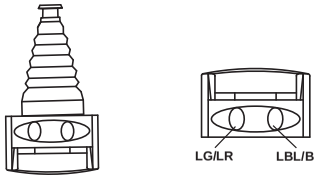
Fuel pump



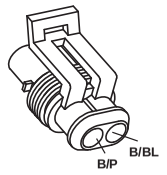
Manifold absolute pressure sensor



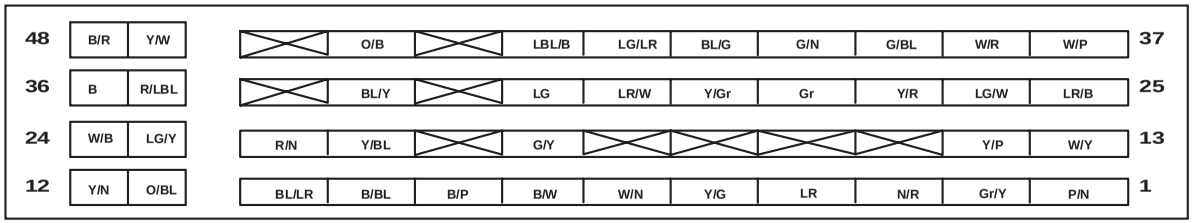
Crankshaft position sensor



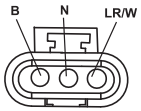
Intake air temperature sensor



EFI



Capacitor



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Benelli Q.J. s.r.l.

Strada della Fornace Vecchia, sn - 61122 Pesaro Italy
Tel. +39 0721 41871 Fax +39 0721 418722
support@benelli.com / www.benelli.com / www.benellishop.com