

## Carbon monoxide

- ⚠ The exhaust fumes contain carbon monoxide, a poisonous gas that can cause death. Therefore, for certain operations, make sure you are in an open space, or in a suitable and well-ventilated room, never in enclosed spaces. If operating in enclosed spaces, use an evacuation system for the exhaust fumes.

## Fuel

- ⚠ The fuel used is extremely flammable and can become explosive under certain conditions. Refuelling and maintenance operations must be carried out in a ventilated area and with the vehicle switched off. Do not smoke during refuelling and near fuel vapours; avoid contact with open flames, sparks and any other source that could cause ignition or explosion.
- ⚠ Do not disperse in the environment and keep away from children.

## Hot components

- ⚠ The engine and certain components become very hot and remain hot for a while even when the engine is off. Before carrying out any operation near the engine or exhaust system, wear insulating gloves or wait for their cooling.

## Used engine and gearbox oil

- ⚠ Used engine and gearbox oil is harmful to health, whether it is inhaled or swallowed. It is also irritating and can cause serious consequences if it comes into contact with the skin.
- ⚠ Spreading and dispersion into the environment is prohibited.
- ⚠ If swallowed, do not induce vomiting, but go urgently to a first aid centre, indicating the cause and how the accident occurred.
- ⚠ In case of contact with the skin, immediately wash the affected part with soap and water, repeating the operation until the affected part is free from residues.
- ⚠ In case of contact with eyes and ears, immediately rinse the affected parts with plenty of water and urgently go to a first aid center, indicating the cause and how the accident occurred.
- ⚠ In case of contact with clothing, undress and wash thoroughly with soap and water. Change the dirty cloths which must be specifically washes as soon as possible.
- ⚠ Always use gloves suitable to protect your hands during the maintenance operations.
- ⚠ Keep out of the reach of children.
- ⓘ Used engine and gearbox oil must be collected in a sealed container, and delivered to the nearest service station or at a waste oil collection centre where you will find personnel authorized to dispose of it.

## Brakes

- ⚠ Brake fluid may damage the vehicle painted, plastic or rubber surfaces. Protect these components with a clean rag when performing certain operations.
- ⚠ Always wear protective glasses and in case of accidental contact of the brake fluid with eyes, rinse immediately with plenty of clean, fresh water and consult a doctor immediately. Keep out of the reach of children.
- ⚠ Clean the brake pads in a ventilated environment, directing the compressed air jet so as not to inhale the dust produced by the wear of the friction material. Although the latter does not contain asbestos, inhaling dust is however harmful.


## Electrolyte and hydrogen gas from the battery


- ⚠ The electrolyte of the battery is toxic and caustic. In contact with skin it can cause burns, as it contains sulphuric acid. Wear gloves and protective clothing.
- ⚠ If the electrolyte liquid comes into contact with the skin, wash it thoroughly with fresh water.
- ⚠ Protect your eyes, as battery fluid can cause blindness. If it comes into contact with the eyes, wash thoroughly with water for fifteen minutes and promptly contact an eye specialist.
- ⚠ The battery emits explosive gases, it is advisable to keep away flames, sparks and any other source of heat. Provide adequate ventilation when servicing or recharging the battery.
- ⚠ Keep out of the reach of children.

 The battery fluid is corrosive. Do not pour it or spread it, especially on plastic parts.

 Provide for regular disposal.

#### Coolant


 Under certain conditions, the ethylene glycol present in the engine coolant is combustible and its flame is not visible. If ethylene glycol is ignited, its flame is not visible but it is able to cause serious burns.

 Avoid pouring engine coolant to the exhaust system or on engine parts. These parts may be hot enough to ignite the liquid which then burns without visible flames. Coolant (ethylene glycol) can cause skin irritation and is poisonous if swallowed. Keep out of the reach of children. Do not remove the radiator cap when the engine is still hot. Coolant is under pressure and may cause burns.


 Keep hands and clothes away from the cooling fan as it starts automatically.

#### Precautions and general warnings

 The clothing of the operator performing the repair operations must be adequate to avoid the risk of injury when working on moving parts (for example, too wide clothes that can get caught).

 Do not wear personal items (e.g. rings, wristwatches, etc.) while performing repairs on the vehicle, and in particular on the electrical system.

 Keep the work area tidy, to avoid that elements left on the ground interfere with the repair operations.

 Clean the floors of the working areas from oil, grease or other residual fluids, to avoid slipping.

 Perform compression or decompression operations on the springs, using only suitable tools to prevent the operations from causing damage to the operator.

 Avoid inhalation of vapours from cleaning fluids: they can be highly toxic. Make sure the work area is properly ventilated.

 Use suitable cleaning products for each operation, making sure that they are approved.

 Wear eye protection when using electrical tools such as drills, grinders or milling machines.

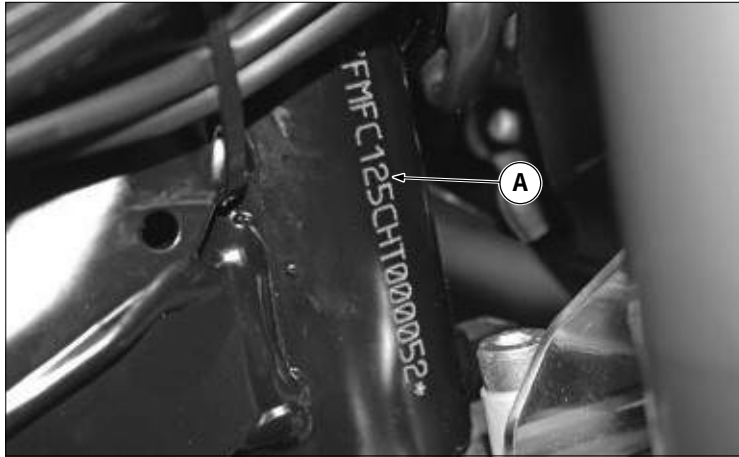
## 2.1 MAINTENANCE

- ⓘ Always use original fantic motor spare parts and lubricants recommended by the manufacturer. Non-original spare parts can damage the vehicle.
- ⚠ Use only the specific tools designed for this vehicle.
- ⓘ Always use new gaskets, seals and o-rings during assembling.
- ⓘ After disassembling, clean the components with non-flammable thinners.
- ⓘ Lubricate all the work surfaces before assembling, except the tapered fittings.
- ⚠ Use only metric measuring tools for disassembling, overhaul and assembling operations. Metric screws, nuts and pins are not interchangeable with coupling parts having english units of measurement.
- ⓘ All surfaces with gaskets, oil seals and o-rings must be cleaned with special care.
- ⓘ Carefully examine all the retaining rings before replacing the deformed ones. Use the new piston pin retaining rings after each use.
- ⓘ After assembling, check that all components have been correctly installed and are working perfectly.
- ⓘ Always use high quality equipment. Use, for lifting the vehicle, equipment expressly made and complying with national and local laws and regulations.
- ⓘ In case of interventions that involve the electrical system, check the correct installation of electrical connections, in particular the earth and battery connections

## 2.2 PREPARATION FOR INTERVENTIONS

- ⓘ Before carrying out the disassembling operations, carefully clean the elements from dirt, dust, mud and foreign bodies.
- ♻ Use appropriate tools and cleaning products.
- ⓘ When disassembling the vehicle always keep the coupled elements together, i.E. Gears, cylinders, pistons and other elements adapted to each other through normal wear. These coupled elements must always be reused together or completely replaced.
- ⚠ During the motorcycle disassembling clean all the elements and place them in containers following the disassembling order, so as to facilitate assembling operations and allow a correct installation of all components. If necessary, mark parts or positions that could be exchanged with each other during assembling.
- ⚠ Keep all items away from heat sources.
- ⓘ Keep, during the operations, the tools at hand, possibly according to a predetermined sequence and never on the vehicle or in hidden or inaccessible positions.
- ⓘ Keep the working area tidy and clean.
- ⚠ Do not lift the vehicle grasping the license plate holder frame, in order to avoid damage.



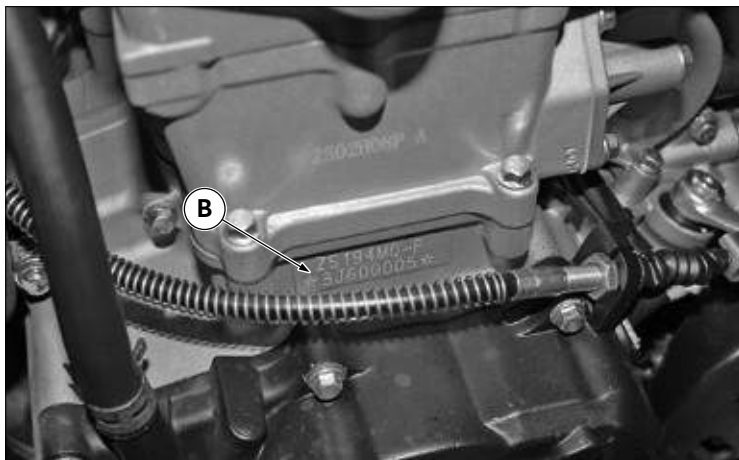


**Fantic Motor** vehicles are equipped with frame and engine identification numbers.

**i** These numbers that identify the motorcycle model must be mentioned for the request for spare parts.

**Frame number**

The frame number “A” is punched on the steering tube on the right side.





**Engine number**

The engine number “B” is punched on the left side of the engine crankcase.



We recommend using only original Fantic Motor parts for all the needs. It is recommended to use lubrication products such as greases and oils recommended by Fantic Motor.



#### **4.1 GASKETS, OIL SEALS AND O-RINGS**

-  When performing engine repairs, always use new gaskets, o-rings and oil seals. Also, clean all mating surfaces and edges of sealing rings and o-rings.
-  Prior to assembling, lubricate the coupled elements and bearings with the specified oil and apply the prescribed grease to the edges of the sealing rings.


#### **4.2 WASHERS, PLATES AND SPLIT PINS**

-  If washers, plates and split pins are disassembled, always use new elements during assembling. The locking tabs must be folded over the tops of the relative nut or bolt after they have been properly tightened.





#### **4.3 BEARINGS AND OIL SEALS**

-  Install bearings and oil seals with the manufacturing identification markings facing outwards, i.E. Towards the visible side. When installing the oil seals, apply a thin layer of lithium grease on their edges.
-  To avoid damaging the rolling surfaces, do not dry the bearings with compressed air.

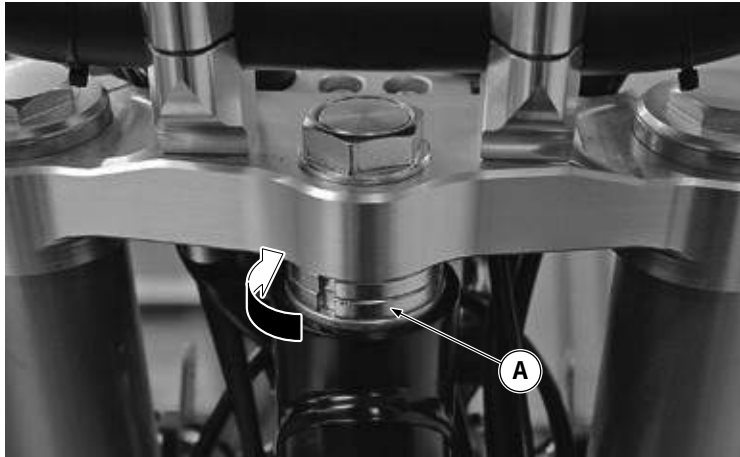
#### **4.4 RETAINING RINGS**

-  Check all the retaining rings before installing them. Always replace the retaining rings that have been removed during disassembling. Replace the deformed elastic rings. When mounting a new retaining ring, turn it so that the side with the sharp edge is on the side opposite the point where pressure is applied.

## 5.1 FRAME TIGHTENING TORQUES

Component	Screw	Tightening torque	Remarks
Fork upper plate fastening screws	M6 (8.8)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Fork bottom plate fastening screws	M6 (8.8)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Screws fastening the headlight support bracket to the lower fork plate	M8 (8.8)	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Front brake calliper fastening screws	M8 (10.9)	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Front wheel pin	M14	50 Nm (5.0 m·kgf, 37 ft·lbf)	
Rear wheel pin	M16	80 Nm (8.0 m·kgf, 59 ft·lbf)	
Right fork foot tightening screw	M8 (8.8)	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Screws fastening the riser to the fork upper plate	M10 (8.8)	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Screws fastening the U-bolts to the Riser (handlebar clamping)	M8 (8.8)	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Screws fastening the clutch control to the handlebar	M6 (10.9)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Screws fastening the brake pump to the handlebar	M6 (10.9)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Screws fastening the engine mounting plate to the chassis	M8 (8.8)	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Screws fastening the engine mounting plates to the engine	M10 (8.8)	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Screws fastening the engine head mounting plate to the engine	M12 x 1.5 (8.8)	40 Nm (4.0 m·kgf, 30 ft·lbf)	
Swingarm pivot	M16	80 Nm (8.0 m·kgf, 59 ft·lbf)	
Rear connecting rod nuts	M12	50 Nm (5.0 m·kgf, 37 ft·lbf)	
Mono-shock absorber upper fastener	M10	40 Nm (4.0 m·kgf, 30 ft·lbf)	
Mono-shock absorber lower fastener	M10	40 Nm (4.0 m·kgf, 30 ft·lbf)	
Rim fastening screws	M8 (10.9)	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Front brake disc fastening screws	M8 (8.8)	20 Nm (2.0 m·kgf, 15 ft·lbf)	
Rear brake disc fastening screws	M6 (8.8)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Kickstand screw	M10 (10.9, special)	screw: 25 Nm (2.5 m·kgf, 18 ft·lbf) locknut: 25 Nm (2.5 m·kgf, 18 ft·lbf)	
Rear brake lever screw	M10 (8.8)	40 Nm (4.0 m·kgf, 30 ft·lbf)	
Screws fastening the chassis side plates to the chassis	M8 (8.8)	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Screws fastening the rear brake pump to the chassis side plate	M6 (8.8)	10 Nm (1.0 m·kgf, 7 ft·lbf)	
Steering column fastening nut and ring nuts	<b>Follow the instructions for the appropriate tightening sequence.</b> (Refer to "Steering column tightening sequence" on page 14)		

 It is recommended using Loctite® 243 to tighten the fastening element indicated.

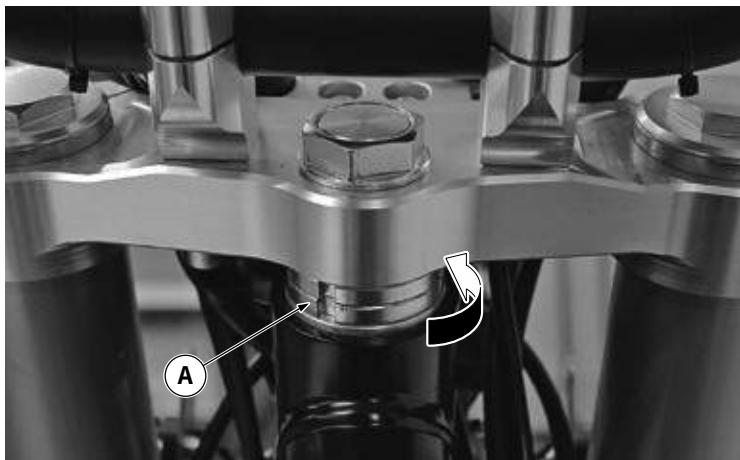


### 5.1.1 Sequences for tightening chassis parts

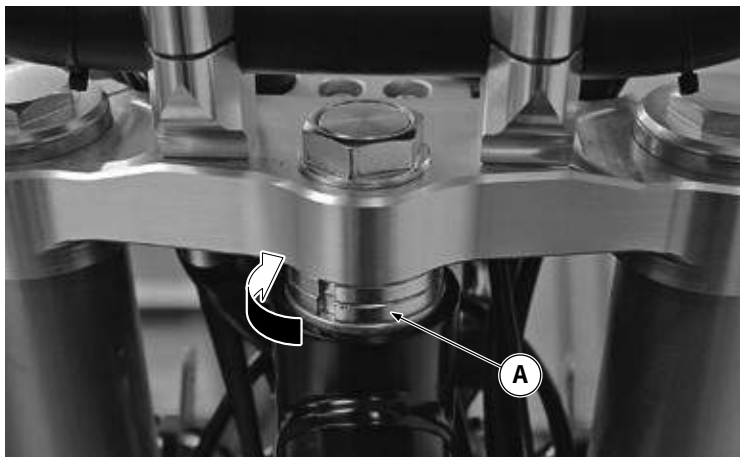
#### Steering column tightening sequence

Tighten the 1st steering column fastening ring nut "A" to the following tightening torque.


 **1st ring nut initial tightening torque: 25 Nm (2.5 m·kgf, 18 ft·lbf)**

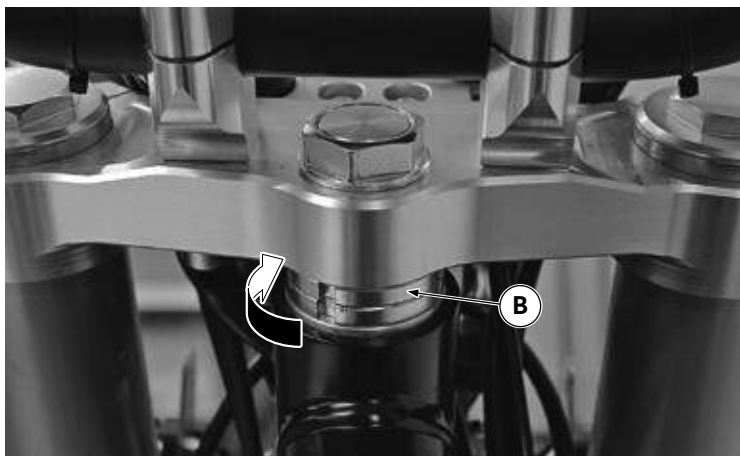


Loosen the 1st steering column fastening ring nut "A" 1/2 turn.



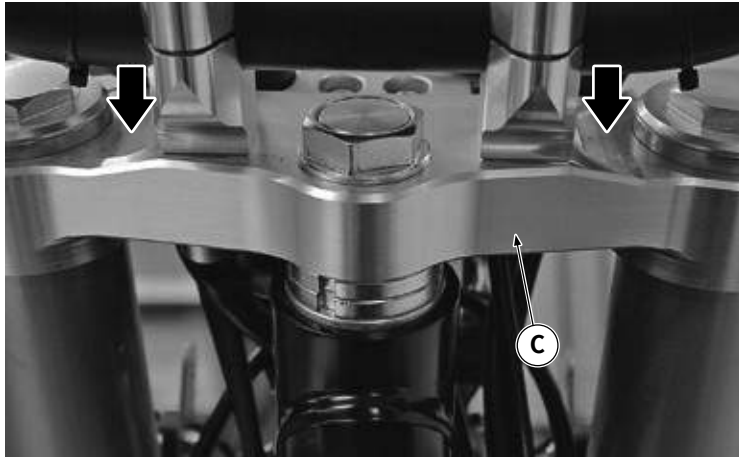
Re-tighten the 1st steering column fastening ring nut "A" to the following tightening torque:

 **1st ring nut final tightening torque: 8 Nm (0.8 m·kgf, 6 ft·lbf)**

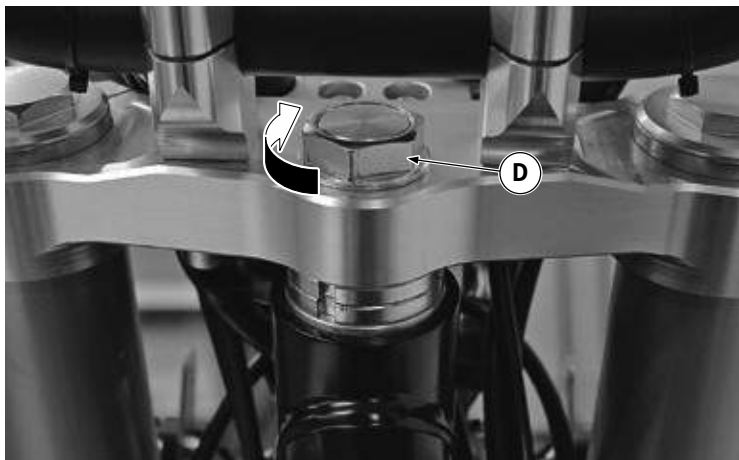


Screw the 2nd ring nut "B" fastening the steering column onto the 1st ring nut "A", preventing it from turning, at the following tightening torque:

 **2nd ring nut tightening torque: 10 Nm (1.0 m·kgf, 7 ft·lbf)**



Install the upper steering plate "C".



Tighten the upper steering column fastening nut "D" to the following tightening torque:

 **Upper nut tightening torque: 80 Nm (8.0 m·kgf, 59 ft·lbf)**

**5.2 ENGINE TIGHTENING TORQUES**

Component	Screw	Tightening torque	Remarks
Spark plug	M10	8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)	
Radiator bolt	M6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Radiator fan bolt	M6	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Coolant tank bolt	M6	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Thermostat cover fastening screws	M6 x 20	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Exhaust pipe stud screw	M8 x 40	12 ~ 18 Nm (1.2 ~ 1.8 m·kgf, 8.9 ~ 13.3 ft·lbf)	①
Secondary air intake cover bolts	M6 x 16	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	①
Temperature sensor		11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Camshaft plate fastening screw	M6 x 12	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Rocker arms shafts fastening bolts	M14 x 1	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Rocker arms shafts locking bolts	M14 x 1	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Cylinder head fastening stud screws	M10 x 152	55 ~ 60 Nm (5.5 ~ 6.0 m·kgf, 40.6 ~ 44.3 ft·lbf)	
Cylinder head fastening bolt	M6 x 40	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Camshaft sprocket fastening bolt	M6 x 10	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Pressure relief valve fastening bolt	M6 x 16	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Cylinder head cover fastening bolt	M6 x 29.7, M6 x 50.7	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Chain tensioner plate fastening bolt	M6 x 105	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	②
Engine flywheel fastening nut		85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)	②
Starter motor fastening bolts	M6 x 25	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Chain tensioner fastening bolts	M6 x 20	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	②
Chain tensioner spring fastening bolt		5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)	
Timing inspection hole cap on cylinder head cover	M8 x 12	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Primary oil strainer cap		11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Thin oil strainer cap fastening bolts	M6 x 16	9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)	
Oil pump right cover fastening bolts	M5 x 18	7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)	
Oil pump left cover fastening bolts	M5 x 12	7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)	
Starter axle fastening screw	M6 x 25	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Crankshaft locking nut	M18 x 1	115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)	②
Primary shaft locking nut	M18 x 1	85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)	②
Clutch thrust plate fastening bolts	M5 x 25	8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)	
Water pump impeller		2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)	
Small inspection cap on the right cover		4 ~ 6 Nm (0.4 ~ 0.6 m·kgf, 3.0 ~ 4.4 ft·lbf)	
Right cover decorative cover fastening bolts	M6 x 30	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Right cover bolts	M6 x 35	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Water pump cover bolts	M6 x 25, M6 x 45	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Crankshaft fastening nut	M24 x 1	115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)	②
Countershaft locking nut	M16 x 1	85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)	
Rotor fastening bolts	M5 x 30	7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)	②
Stator fastening bolts	M5 x 10	7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)	②

Component	Screw	Tightening torque	Remarks
Generator small inspection cap		24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)	
Generator large inspection cap		24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)	
Left cover bolts	M6 x 30	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	②
Intake flange bolts on cylinder head	M6 x 20	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Air intake sleeve clamps		5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)	
Rim locking nut	M16 x 1	85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)	②
Deflector fastening screws	M6 x 12	9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)	
Secondary shaft bolt		11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Starting shaft bolt	M8 x 40	18 ~ 20 Nm (1.8 ~ 2.0 m·kgf, 13.3 ~ 14.8 ft·lbf)	
Oil drain bolt	M16 x 1.5	24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)	
Engine oil nozzle		2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)	
Inspection bolt on left crankcase	M8 x 12	24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)	
Half-crankcase coupling bolts	M6 x 45, M6 x 45, M6 x 70	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	②
Gear sensor fastening bolt	M6 x 20	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Plate fastening bolt on right half-crankcase	M6 x 12	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Gear drum fastening bolt	M6 x 20	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	
Gear drum plate fastening bolt	M6 x 35	11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)	②

① For tightening the fastening element indicated, we recommend using Loctite® 243.

② For tightening the fastening element indicated, we recommend using Loctite® 263.

### 5.3 GENERIC TIGHTENING TORQUES

#### 5.3.1 General specifications of the tightening torques

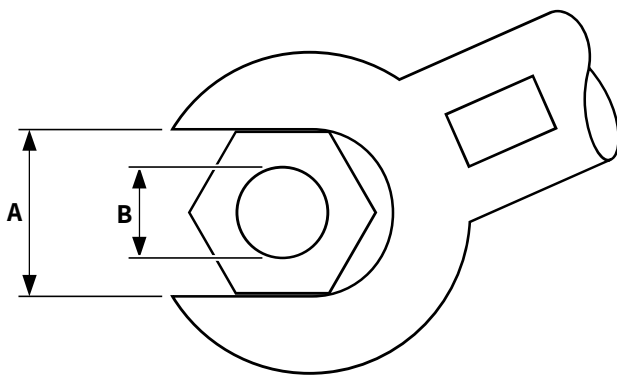
The following table contains the tightening torques of standard nuts and bolts with standard ISO thread pitch.

**(i)** The tightening torques of components or special units can be found in the relevant chapters of this manual.

**⚠** To avoid deformation, tighten the bolt or nut assemblies gradually until the specified torque is reached.

**⚠** Unless otherwise specified, the tightening torques indicated are intended with clean and dry threads.

**⚠** The components must be at room temperature.



"A" (nut)	"B" (bolt)	General tightening torques		
10 mm	6 mm	6 Nm	0.6 m·kgf	4.3 ft·lbf
12 mm	8 mm	15 Nm	1.5 m·kgf	11 ft·lbf
14 mm	10 mm	30 Nm	3.0 m·kgf	22 ft·lbf
17 mm	12 mm	55 Nm	5.5 m·kgf	40 ft·lbf
19 mm	14 mm	85 Nm	8.5 m·kgf	61 ft·lbf
22 mm	16 mm	130 Nm	13.0 m·kgf	94 ft·lbf

A. Key opening

B. External thread diameter

#### 5.3.2 Conversion table

**(i)** All the specifications in this manual follow the International System (IS) and the Metric System units.

Use the following table to convert the values expressed with units of the Metric System into values expressed with units of the English System.

Feature	Metric system unit	Multiplication factor	Unit of the English system
Tightening torque	m·kg	7.233	ft·lb
	m·kg	86.794	in·lb
	cm·kg	0.0723	ft·lb
	cm·kg	0.8679	in·lb
Counterweight	kg	2.205	lb
	g	0.03527	oz
Speed	km / h	0.6214	mph
Distance	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
Volume / Capacity	cc (cm <sup>3</sup> )	0.03527	oz (Liquid IMP = liq.)
	cc (cm <sup>3</sup> )	0.06102	cu.in
	l (litri)	0.8799	qt (Liquid IMP = liq.)
	l (litri)	0.2199	gal (Liquid IMP = liq.)
Other	kg / mm	55.997	lb / in
	kg / cm <sup>2</sup>	14.2234	psi (lb/in <sup>2</sup> )
	degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

**6.1 FRAME TECHNICAL DATA**

Technical data	Value(s)
Maximum length (Scrambler)	2166 mm (85.27 in)
Maximum length (Flat Track)	2180 mm (85.82 in)
Maximum width	820 mm (32.28 in)
Maximum height (Scrambler)	1135 mm (44.68 in)
Maximum height (Flat Track)	1154 mm (45.43 in)
Wheel base	1423 mm (56.02 in)
Weight in running order	160 kg (352.74 lb)
Weight at full load (vehicle, rider, baggage)	330 kg (727.52 lb)
Seats	2
Maximum allowable weight (rider, passenger, baggage)	177 kg (390.21 lb)
Frame	Closed double cradle frame in molybdenum chrome steel with forged aluminium elements
Swingarm	Steel swingarm with variable section
Steering angle (with extended suspensions)	24°
Steering angle (both sides)	39° ± 1°
Front suspension	Upside down swingarm ø41 Stroke 150 mm (5.90 in)
Rear suspension	Mono-shock absorber in adjustable compression and progressive linkage Stroke 56 ± 2 mm (2.20 ± 0.07 in)
Front brake	Four-piston calliper 28 mm (1.10 in) , 320 mm disk (12.59 in)
Rear brake	One-piston floating calliper 32 mm (1.25 in) , 230 mm disk (9.05 in)
Wheels (Scrambler version)	Spoke wheels with aluminium rims and tubeless tires with inner tube: front 2.50 x 19" / rear 3.50 x 17". Front/rear inflation pressure: from 1.7 bar (170 kPa ± 10) (24.66 PSI) to 1.9 bar (190 kPa ± 10) (27.55 PSI).
Wheels (Flat Track version)	Spoke wheels with aluminium rims and tubeless tires with inner tube: front 2.50 x 19" / rear 3.00 x 19". Front/rear inflation pressure: from 2.1 bar (210 kPa ± 10) (30.45 PSI) to 2.3 bar (230 kPa ± 10) (33.35 PSI).
ABS system	ABS system on two independent and disconnectable channels
Spark plug	NGK-ER9EH-6N
Battery	12 V - 8 Ah
Fuses	Main fuse 30 A Secondary fuses 2 A, 5 A (4), 7.5 A, 30 A
Generator	12 V - 300 W
Turn signals	12 V - 6 W
High/low beam light	Led
Position/brake light	Led
License plate light	Led
ABS warning light	Led
Fuel reserve indicator light	Led
Turn signal indicator light	Led
Neutral indicator light	Led
Oil pressure warning light	Led: not activated
Engine warning light	Led



Technical data	Value(s)
High beam light indicator	Led

## 6.2 ENGINE TECHNICAL DATA

Technical data	Value(s)
<b>Main</b>	
Engine type	4-stroke single cylinder
Number of cylinders	1
Total displacement	448.88 cc (27.39 cu in)
Bore/Stroke	94.5 mm/64 mm (3.72/2.51 in)
Compression ratio	10.8 / 11.5:1
Starting type	Electric
N ° of engine revolutions at idle speed	1600 (1 ± 10%) rpm
Type of cooling	Liquid
Coolant	1.5 l (0.32 UK gal, 0.39 US gal)
Clutch	Multidisc in oil bath Control on the left side of the handlebar
Lubrication system	Casing in oil bath. Pressure system regulated by trochoid pump
Engine oil	Quantity (disassembled) 1.8 l (0.4 UK gal, 0.48 US gal) Without oil filter change 1.15 l (0.25 UK gal, 0.3 US gal) With oil filter change 1.2 l (0.26 UK gal, 0.32 US gal)
Type of gearbox	6-speed mechanical Pedal control on the left side of the engine
Transmission ratios (Scrambler)	Primary drive: 64/28 = 2.286 1st gear ratio: 33/14 = 2.357 2nd gear ratio: 31/17 = 1.824 3rd gear ratio: 28/19 = 1.747 4th gear ratio: 26/22 = 1.182 5th gear ratio: 25/23 = 0.920 6th gear ratio: 21/27 = 0.778 Secondary drive: 48/13 = 3.692
Transmission ratios (Flat Track)	Primary drive: 64/28 = 2.286 1st gear ratio: 33/14 = 2.357 2nd gear ratio: 31/17 = 1.824 3rd gear ratio: 28/19 = 1.747 4th gear ratio: 26/22 = 1.182 5th gear ratio: 25/23 = 0.920 6th gear ratio: 21/27 = 0.778 Secondary drive: 52/13 = 4
Drive chain	520 Regina model 135 ZRA
Air filter	Paper
Fuel system	34 mm single-body Athena electronic injection, singlepoint single injector.
Fuel	95-98 octane super lead-free petrol
Tank capacity (including reserve)	11.5 l (2.52 UK gal, 3.03 US gal)
Capacity of the fuel reserve only	3.5 l (0.76 UK gal, 0.92 US gal)

- i Use lubricating and fluid products that meet the equivalent specifications, or higher than those prescribed. These same indications are also valid for topping up.**

Product	Characteristics	Remarks
4-stroke gear engine oil	SAE 10W30,10W40,15W40, 20W40, 20W50, API service type SG or greater, JASO standard MA	Do not use mineral oils: see table in section "13.3 Engine oil volume" on page 173.
Grease for bearings, joints, articulations and levers	Lithium grease	
Coolant	Antifreeze liquid based on ethylene glycol with organic additives	Do not dilute with water.
Fork oil	Fork oil gradation 15W	
Transmission chain lubricant	Spray grease for transmission chains	
Brake oil	Dot 4 or 5.1 brake fluid	
Cleaner for electrical contacts	Contact cleaner	
Fuel	95 or 98 octane super lead-free petrol	<div> <div>PETROL FUEL TYPE</div> <div> <div>E5</div> <div>E10</div> </div> </div>
Paste for carter and engine covers coupling	Three Bond N. 1215®	
Safety lock medium tightening	Medium threadlocker	
Safety lock strong tightening	Strong threadlocker	
Lubricant for bolts unlocking	Unlocking protective lubricant	
Anti-friction lubricant for screw tightening torques	Generic engine oil	
Lubricant for rubber oil seals and OR parts	Lithium soap grease	
Battery poles	White vaseline grease	
Vehicle wash	Low pressure water at room temperature Ecological neutral liquid soap	Avoid aggressive detergents.
External cleaning of the brake system (brake discs and seats)	Spray Disc Brake Cleaner	Do not use to clean brake pads and plastic parts.

This chapter includes all the information necessary to perform the recommended checks and adjustments. These preventive maintenance procedures, if complied with, will ensure more reliable operation and longer vehicle life and will limit the need for costly overhaul work. This information applies to both vehicles already in use and new vehicles in preparation for sale. All maintenance technicians must be familiar with the instructions contained in this chapter.

**⚠ Carry out maintenance operations more frequently if the vehicle is used in rainy, dusty areas, rough roads or in the case of fast riding.**

**⚠ Check the engine oil level every 1,000 km (600 mi).**

**⚠ It is essential to carry out the first service within the end of the first year of use of the vehicle even if the expected deadline of 1,000 km (600 mi) has not been reached.**

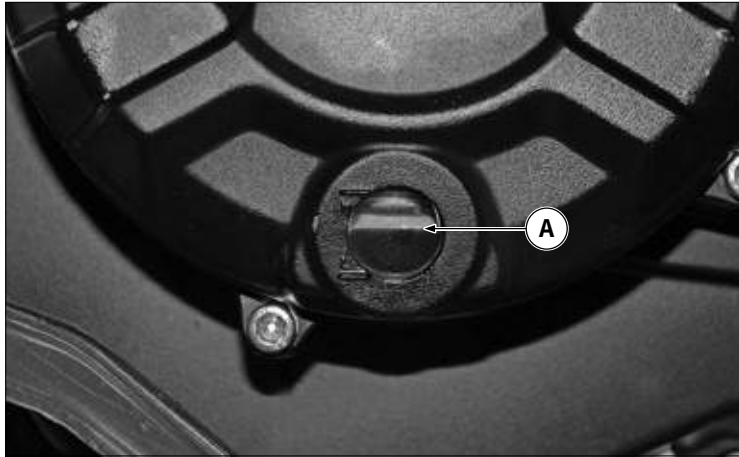
**⚠ It is essential to carry out a service within the end of the second year of use of the vehicle even if no scheduled deadline has been reached.**

**ⓘ The timely execution of the service and servicing indicated (the first one in the first year and the second one in the second year) is necessary for the correct use of the warranty.**

**ⓘ Perform the annual checks on a regular basis unless a kilometre (or mileage) interval has expired previously.**

Position	Operation	1.000 km (600 mi)	5.000 km (3.500 mi)	10.000 km (6.000 mi)	15.000 km (9.000 mi)	20.000 km (12.000 mi)
<b>Fuel circuit</b>	– Check that the fuel pipes are not cracked or damaged.		✓		✓	
<b>Spark plug</b>	– Check its status. – Clean and restore the electrode distance.	✓	✓	✓	✓	✓
	– Replace.			✓		✓
<b>Valves</b>	– Check the valve clearance. – Adjust.	✓	✓	✓	✓	✓
<b>Cylinder head</b>	– Check the tightness of the head fixing bolts cylinder.	✓				
<b>Additional fuel filter</b>	– Replace.	<b>Every 10,000 km (6,000 mi).</b>				
<b>Air filter</b>	– Clean.	✓		✓		
	– Replace.		✓		✓	
<b>Clutch</b>	– Check its operation. – Adjust.	✓	✓		✓	
<b>Front brake</b>	– Check its operation, the fluid level and absence of leakage in the vehicle.	✓	✓		✓	
	– Replace the brake pads.	<b>If worn up to the limit.</b>				
<b>Rear brake</b>	– Check its operation, the fluid level and absence of leakage in the vehicle.	✓	✓		✓	
	– Replace the brake pads.	<b>If worn up to the limit.</b>				
<b>Brake tubes</b>	– Check for cracks or damage. – Check that the installation and tightening are correct.		✓		✓	
	– Replace.	<b>Every 4 anni.</b>				
<b>Brake fluid</b>	– Replace.	<b>Every 2 anni.</b>				
<b>Wheels</b>	– Check for misalignment and damage.		✓		✓	
<b>Tires</b>	– Check the tread depth and damage.		✓		✓	
	– Replace if necessary.					
	– Check the air pressure.					
	– Correct if necessary.					
<b>Wheel bearings</b>	– Check that the bearings are not loose or damaged.		✓		✓	
<b>Swing arm</b>	– Check its operation and excessive clearance.		✓		✓	
	– Lubricate with lithium soap based grease.	<b>Every 24.000 km (14.000 mi).</b>				

Position	Operation	1.000 km (600 mi)	5.000 km (3.500 mi)	10.000 km (6.000 mi)	15.000 km (9.000 mi)	20.000 km (12.000 mi)
<b>Transmission chain</b>	<ul style="list-style-type: none"> <li>– Check the tension, alignment and conditions of the transmission chain.</li> <li>– Check the rim and pinion.</li> <li>– Check the play on the rear sprocket coupling.</li> <li>– Fully adjust and lubricate the drive chain with a specific lubricant.</li> </ul>	<b>Every 500 km (300 mi). Following heavy use</b>				
	<ul style="list-style-type: none"> <li>– Replace.</li> </ul>	<b>If the chain elongation exceeds 2%.</b>				
<b>Handlebar bearings</b>	<ul style="list-style-type: none"> <li>– Check the bearing clearance and the handlebar hardness..</li> </ul>	√	√		√	
	<ul style="list-style-type: none"> <li>– Lubricate with lithium soap based grease.</li> </ul>	<b>Every 24.000 km (14.000 mi).</b>				
<b>Fixings the frame parts</b>	<ul style="list-style-type: none"> <li>– Make sure that all nuts, bolts and screws are properly tightened.</li> </ul>	√	√	√	√	√
<b>Brake lever rotation pin</b>	<ul style="list-style-type: none"> <li>– Lubricate with silicone grease.</li> </ul>		√		√	
<b>Brake pedal rotation pin</b>	<ul style="list-style-type: none"> <li>– Lubricate with lithium soap based grease.</li> </ul>		√		√	
<b>Clutch lever rotation pin</b>	<ul style="list-style-type: none"> <li>– Lubricate with lithium soap based grease.</li> </ul>		√		√	
<b>Side kickstand</b>	<ul style="list-style-type: none"> <li>– Check its operation.</li> <li>– Lubricate with lithium soap based grease.</li> </ul>		√		√	
<b>Side kickstand switch</b>	<ul style="list-style-type: none"> <li>– Check its operation.</li> </ul>	√	√	√	√	√
<b>Fork</b>	<ul style="list-style-type: none"> <li>– Check its operation and the absence of oil leaks.</li> </ul>		√		√	
	<ul style="list-style-type: none"> <li>– Replace oil.</li> </ul>			√		√
	<ul style="list-style-type: none"> <li>– Oil seal replacement</li> </ul>	<b>Every 15.000 km (9.000 mi).</b>				
<b>Rear shock absorber</b>	<ul style="list-style-type: none"> <li>– Check its operation and the absence of oil leaks in the shock absorber.</li> </ul>		√		√	
<b>Rear suspension rotation points</b>	<ul style="list-style-type: none"> <li>– Check the transmission arm operation.</li> </ul>		√		√	
	<ul style="list-style-type: none"> <li>– Check the junction arm operation.</li> </ul>	√	√	√	√	√
	<ul style="list-style-type: none"> <li>– Lubricate the suspension rotation points.</li> </ul>	√	√	√	√	√
<b>Passenger foot pegs</b>	<ul style="list-style-type: none"> <li>– Lubricate the passenger foot pegs.</li> </ul>	√	√	√	√	√
<b>Engine oil</b>	<ul style="list-style-type: none"> <li>– Check the oil level and the absence of oil leaks in the vehicle.</li> </ul>	<b>Every 1.000 km (600 mi).</b>				
	<ul style="list-style-type: none"> <li>– Change.</li> </ul>	√	√	√	√	√
<b>Engine oil filter</b>	<ul style="list-style-type: none"> <li>– Replace.</li> </ul>	√	√	√	√	√
<b>Cooling system</b>	<ul style="list-style-type: none"> <li>– Check the coolant level and the absence of oil leaks in the vehicle.</li> </ul>		√		√	
	<ul style="list-style-type: none"> <li>– Coolant change.</li> </ul>	<b>Every 3 anni.</b>				
<b>Front brake and rear brake switches</b>	<ul style="list-style-type: none"> <li>– Check its operation.</li> </ul>	√	√		√	
<b>Moving parts and cables</b>	<ul style="list-style-type: none"> <li>– Lubricate.</li> </ul>	√	√	√	√	√
<b>Throttle control knob</b>	<ul style="list-style-type: none"> <li>– Check its operation.</li> <li>– Check the throttle knob grip clearance and adjust if necessary.</li> <li>– Lubricate the cable and the knob body.</li> </ul>		√		√	
<b>Lights, signals and switches</b>	<ul style="list-style-type: none"> <li>– Check its operation.</li> <li>– Adjust the headlight beam.</li> </ul>	√	√		√	



### 9.1 ENGINE OIL LEVEL CHECK

Place the vehicle on a level surface.

- i** Place the vehicle on a suitable support and make sure that the vehicle is upright.

Start the engine, warm it up for a few minutes, then turn it off.

Check the engine oil level by observing the inspection window "A": the engine oil level should be between the minimum level reference "MIN" and the maximum level reference "MAX".

If the level is below the minimum level reference, remove the cap "1" and top up with the recommended engine oil up to the correct level.

- i** Before checking the engine oil level, wait a few minutes until the oil has settled.



Type:

SAE 10W-30, 10W-40, 15W-40, 20W-40 o 20W-50.

Recommended engine oil grade:

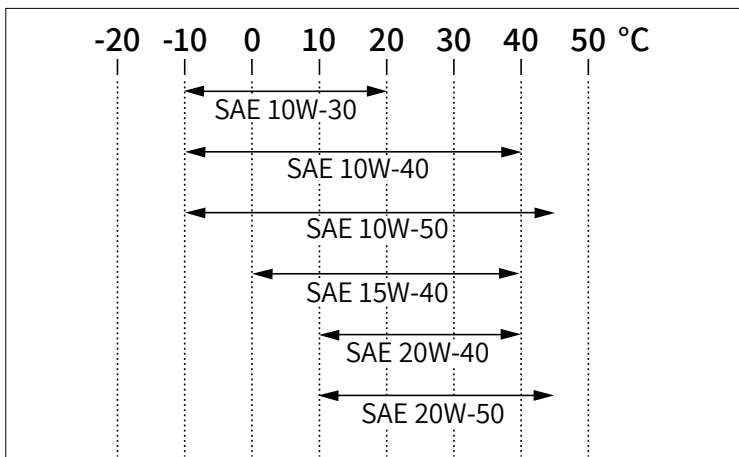
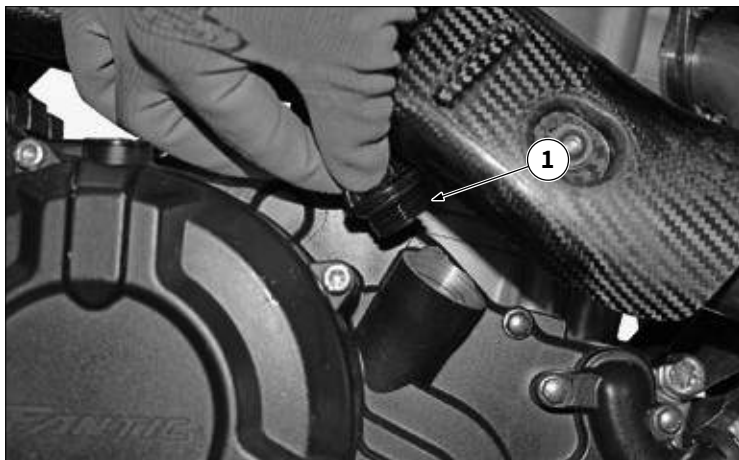
API service type SG or greater, JASO standard MA



The engine oil also lubricates the clutch; an incorrect type of oil or chemical additives can cause the clutch to slip. Therefore, do not add chemical additives or use engine oil with a "CD" grade or higher and do not use oils labelled "ENERGY CONSERVING II".



Do not allow foreign material to enter the crankcase.



Start the engine, warm it up for a few minutes, then turn it off.

Check the engine oil level again.

- i** Before checking the engine oil level, wait a few minutes until the oil has settled.



### 9.2 COOLANT LEVEL CHECK



Check the coolant level with the engine cold, off and with the vehicle resting on the side kickstand on the left.

Check that the coolant reaches and does not exceed the level shown in the figure.

If the vehicle needs topping up add distilled water, instead if it is a complete restoration of the liquid, add a mixture of water and antifreeze.



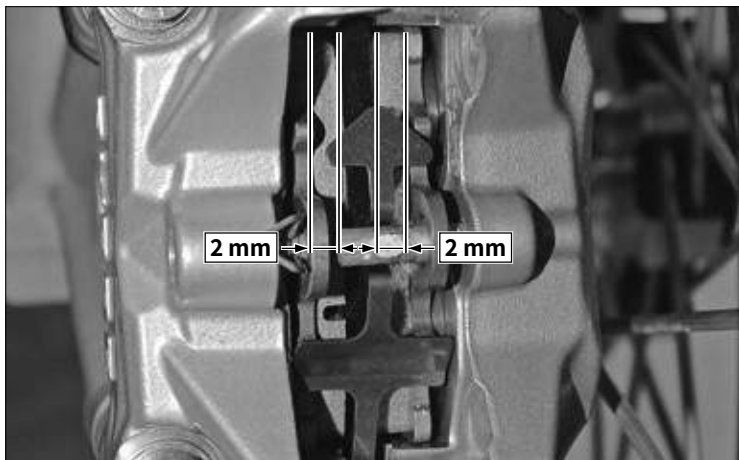
Recommended product:

Antifreeze liquid based on ethylene glycol with organic additives.

- ⚠ Press the rubber tubes several times to facilitate the release of any air bubbles.

Close the cap and start the vehicle: keep it on for at least one minute, before re-checking the level.

- ⚠ Repeat the procedure until the coolant level has settled.

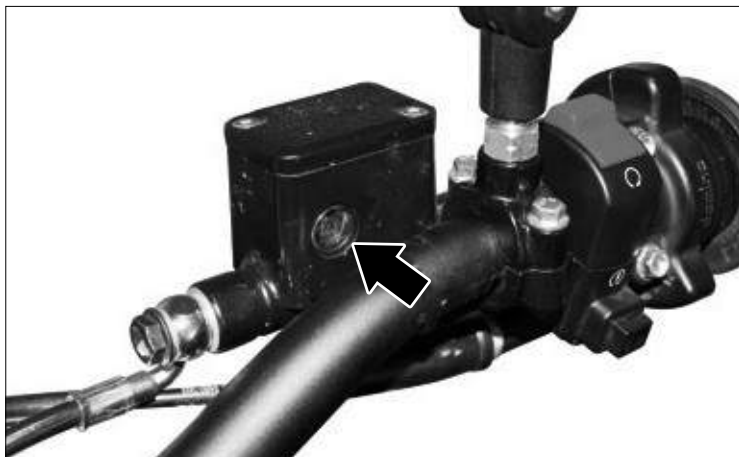


### 9.3 PADS WEAR CHECK

- ⚠ Check the wear condition of the front brake pads from the back of the calliper, where it is possible to see the ends of the pads which must have at least a 2 mm layer of lining, if the layer is lower, proceed immediately to replace them.

- ⚠ Check the wear condition of the rear brake pads from the upper part of the calliper, where it is possible to see the ends of the pads which must have at least a 2 mm layer of lining. If the layer is lower, proceed immediately to replace them.

- ⓘ Perform the check following the times indicated in the scheduled maintenance table of the use and maintenance booklet.



### 9.4 CHECK THE FRONT BRAKE MASTER CYLINDER OIL LEVEL

Check the front brake fluid level

To check the front brake fluid level, position the vehicle on the kickstand and turn the handlebar, so that the liquid contained in the brake oil reservoir is parallel to the cap. Check that the liquid is over the "MIN" mark.

- ⚠ If the liquid level does not reach at least the "MIN" mark, check the brake disc and pads wear.

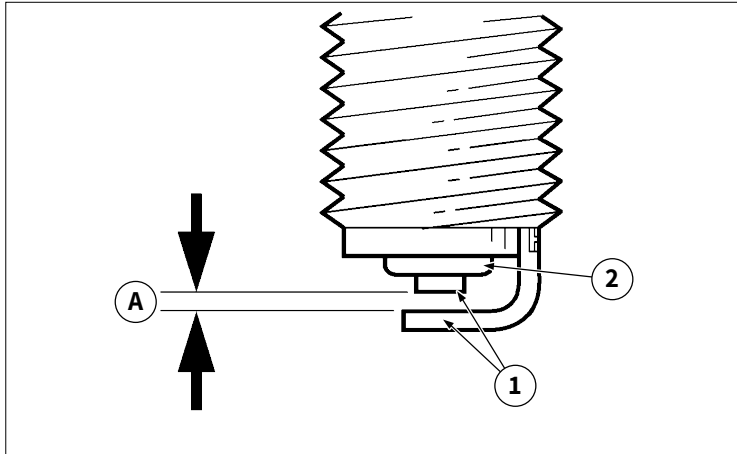


### 9.5 CHECK THE REAR BRAKE MASTER CYLINDER OIL LEVEL

Check the rear brake fluid level

To check the rear brake fluid, keep the vehicle in vertical position, so that the liquid contained in the brake oil reservoir is parallel to the cap. Check that the liquid is between the "MIN" and "MAX" marks.

- ⚠ If the liquid level does not reach at least the "MIN" mark, check the brake disc and pads wear.



### 9.6 SPARK PLUG CHECK

Disconnect the spark plug cap and remove the spark plug. Refer to "10.8.2 Spark plug removal" on page 94.

**⚠ Before removing the spark plug, remove the impurities, if any, accumulated in the sump, using compressed air, to prevent them from entering the cylinder.**

Check the type of spark plug and if it is not correct replace it with the correct model.

**♻ Spark plug:**  
- model NGK-ER9EH-6N

Check the Electrode "1": if it shows any damage or signs of wear replace the spark plug.

Check the isolator "2": if it's colour is anomalous replace the spark plug.

**i The normal colour varies between medium reddish brown and light reddish brown.**

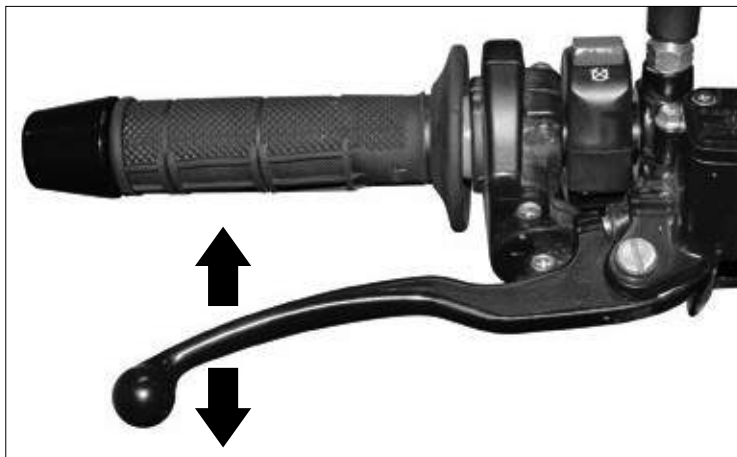
Clean the spark plug with a spark plug cleaner or a wire brush. Measure the distance between the electrodes "A" with a thickness gauge: if the distance does not comply with the specifications, restore the distance.

**✂ Distance between the electrodes: 0.7 - 0.8 mm (0.028 - 0.031 in)**

**i Before installing the spark plug, clean the surface of the gasket and of the spark plug.**

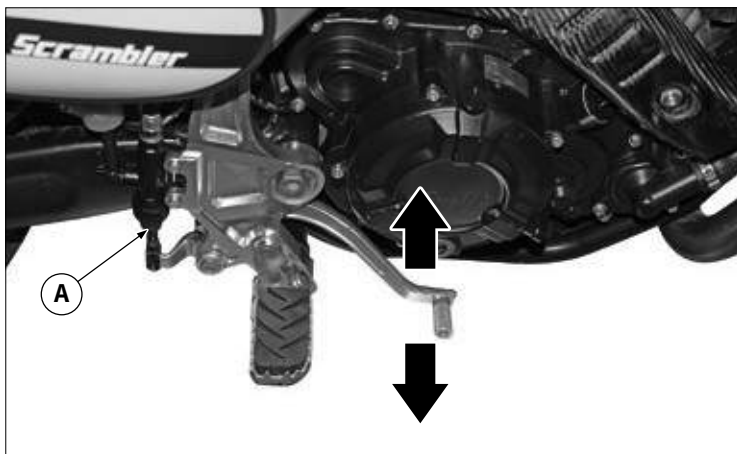
Install the spark plug and connect the spark plug cap.

**🔧 Tightening torque: Spark plug 13 Nm (1.3 m•kg, 9.4 ft•lb)**



### 9.7 FRONT BRAKE ADJUSTMENT

Check the clearance of the front brake lever; if it is excessive, top up the front brake fluid reservoir.

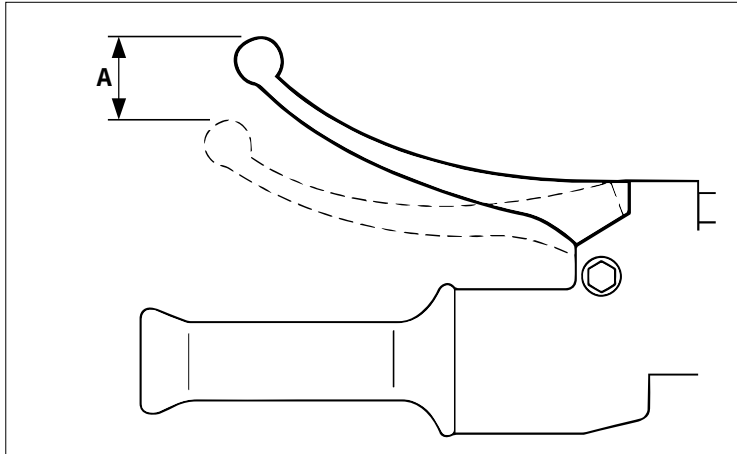


### 9.8 REAR BRAKE ADJUSTMENT

Check the clearance of the rear brake lever, if it is excessive, act on the adjuster "A".

**i If the adjustment is not enough to reduce the lever clearance, top up the rear brake fluid reservoir.**

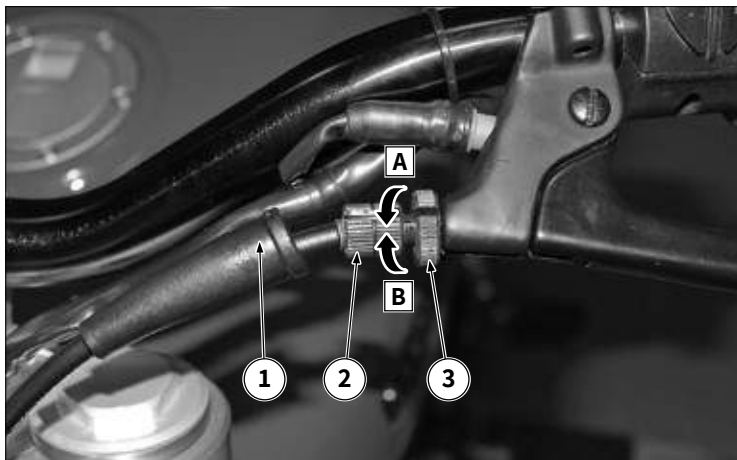
**⚠ Keep a compulsory free 1 mm clearance on the brake pedal for the master cylinder operation.**



### 9.9 CLUTCH LEVER CLEARANCE ADJUSTMENT

Check the clutch lever clearance "A" and if it does not comply with the prescribed values, proceed with the adjustment.

**Clutch lever clearance: 10.0-15.0 mm (0.39-0.59 in)**



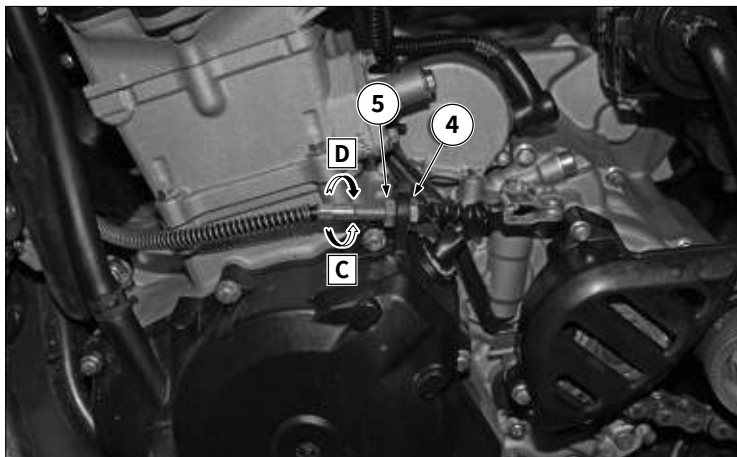
Adjust the clutch lever clearance by operating on the end of the handlebar:

- Pull back the rubber cover "1".
- Loosen the locknut "2".
- Turn the adjustment bolt "3" in direction "A" or "B" until the prescribed clutch lever clearance is obtained.

**i** Direction "A": the clutch lever clearance increases.  
Direction "B": the clutch lever clearance decreases.

- Tighten the locknut.
- Replace the rubber cover in the original position.

**i** If the specified clutch lever clearance can not be obtained at the handlebar end of the cable, use the adjusting nut on the drive end.

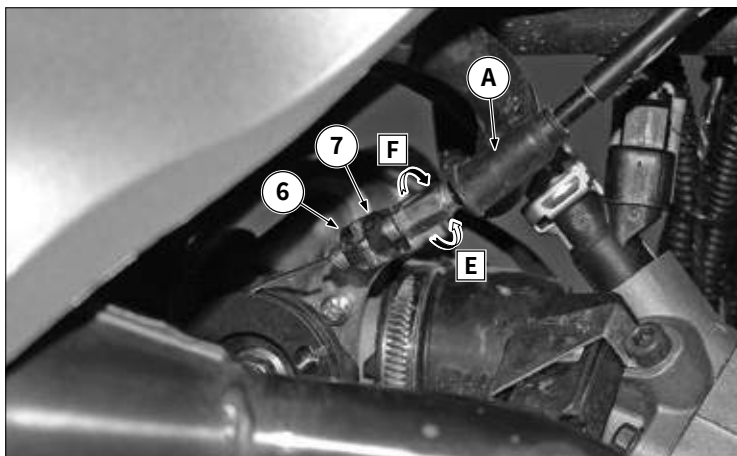


- Adjust the clutch lever clearance acting on the drive side of the cable:
- Loosen the locknut "4".
- Turn the adjustment nut "5" in direction "C" or "D" until the prescribed clutch lever clearance is obtained.

**i** Direction "C": the clutch lever clearance increases.  
Direction "D": the clutch lever clearance decreases.

Tighten the locknut.

**Tightening torque:**  
Clutch lever locknut: 8 Nm (0.8 m·kgf, 5.8 ft·lbf)



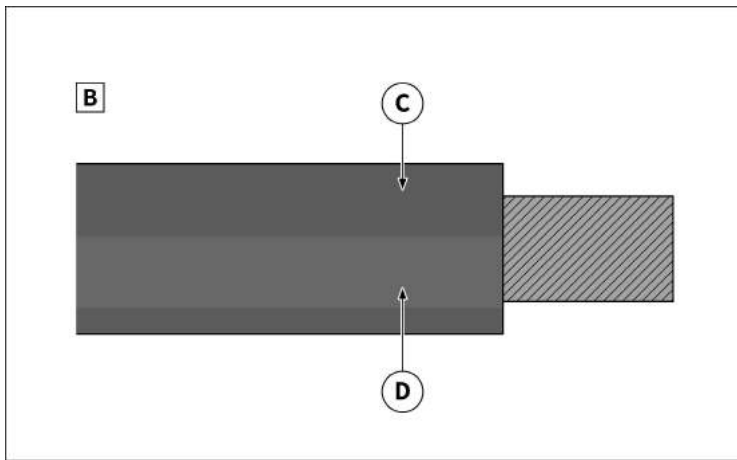
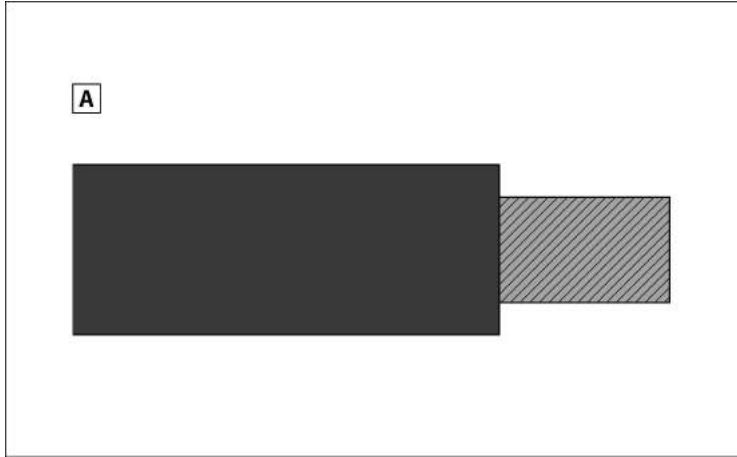
### 9.10 THROTTLE CABLE ADJUSTMENT

Working on the right side of the vehicle, lift the protection grommet "A".

- Loosen the nuts "6" and "7".
- Rotate the throttle cable in direction "E" or "F" to increase/decrease the throttle knob clearance.

Once the desired adjustment has been achieved, tighten the screws "6" and "7" and reposition the grommet.





## 10.1 ELECTRICAL SYSTEM DIAGRAM

### 10.1.1 Cables colour coding

- i** The colour of a cable can be an “A” colour or two “B” colours.

- i** The cable which has two colours is identified by the first colour code (primary “C” or colour of the sheath) followed by the second colour code (secondary “D”): the codes are separated by a dash “-”.

- i** Examples:
- case “A” : Blue = B ;
  - case “B” : Red (primary) and Green (secondary) = R-V.

The following table shows the codes used in the wiring diagram to identify the colour of the cable.

Code	Cable colour
Ar	ORANGE
Az	SKY BLUE
B	BLUE
Bi	WHITE
G	YELLOW
Gr	GREY
M	BROWN
N	BLACK
R	RED
V	GREEN
Vi	VIOLET
Ro	ROSE

**10.1.2 Key to wiring diagram colours**

The following table shows the meaning and function of the colours of the lines or wires of the electrical system diagram.

Colour	Definition	Note
RED	2 A, 5 A, 7.5 A fuses loaded.	It identifies the direct supply signals under 2 A, 5 A, or 7.5 A fuses.
BLUE	30 A fuse loads.	Identifies the direct supply signals under 30 A fuse.
GREEN	Ground.	Identifies the ground reference signals.
BLACK	Generic signal.	Identifies all other types of signals.

**10.1.3 Key to abbreviations of the wiring diagram**

The following table shows the meaning of the abbreviation labels used in the wiring diagram and the related component to which it refers.

**i** The greyed boxes identify a particular function, a particular switch or the operating status of the component.

**i** The red boxes are used to distinguish the fuses and the relays of the system.

Abbreviation	Description	Reference component
<b>F1</b>	Fuse 1	34. Fuse box
<b>F2</b>	Fuse 2	34. Fuse box
<b>F3</b>	Fuse 3	34. Fuse box
<b>F4</b>	Fuse 4	34. Fuse box
<b>F5</b>	Fuse 5	34. Fuse box
<b>F6</b>	Fuse 6	34. Fuse box
<b>F7</b>	Fuse 7	34. Fuse box
<b>FP</b>	Main Fuse	24. Starter remote control switch
<b>H1</b>	Cable from positive battery to starter remote control	24. Starter remote control switch
<b>H2</b>	Cable from starter remote control and starter motor	24. Starter remote control switch
<b>H3</b>	Cable from battery negative to engine/chassis ground	21. Engine ground point
<b>H4</b>	Rear LH turn signal resistance wiring harness	19. Left rear turn signal
<b>H5</b>	Rear RH turn signal resistance wiring harness	16. Right rear turn signal
<b>A</b>	Key status ON (on)	1. Key switch
<b>B</b>	Key status OFF (off)	1. Key switch
<b>C</b>	Steering lock function	1. Key switch
<b>D</b>	Parking function	1. Key switch
<b>E</b>	Front brake button	2. Right light stalk
<b>F</b>	RUN/OFF switch	2. Right light stalk
<b>G</b>	START button	2. Right light stalk
<b>H</b>	Horn	32. Left light stalk
<b>I</b>	Turn signal selector: – L : Left side turn signal; – N : Neutral; – R : Right side turn signal.	32. Left light stalk
<b>J</b>	Low beam / high beam	32. Left light stalk
<b>K</b>	High beam flash switch	32. Left light stalk
<b>L</b>	ABS system deactivation / malfunction indicator	32. Left light stalk
<b>M</b>	Clutch lever microswitch	32. Left light stalk
<b>N</b>	ABS system deactivation button	33. Left light stalk - secondary connector

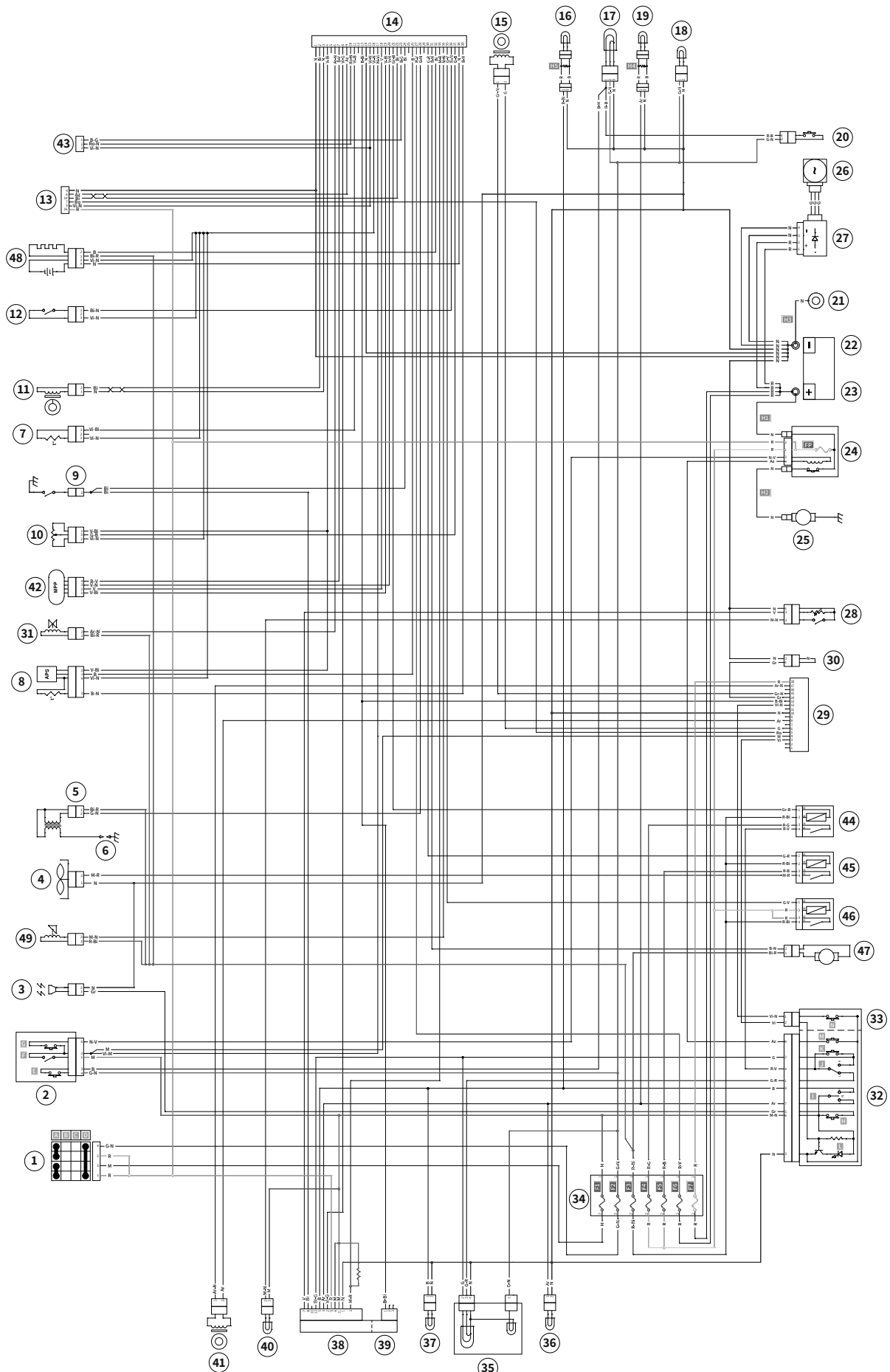
**10.1.4 Key to the wiring diagram components**

The following table lists all the components in the wiring diagram and their numbering.

Number	Description of the electrical component
1	Key switch
2	Right light stalk
3	Horn
4	Radiator fan
5	Ignition coil
6	Spark plug
7	Water temperature sensor
8	MAP sensor
9	Neutral gear switch
10	TPS sensor
11	Pick-Up
12	Side kickstand switch
13	OBD diagnosis connector
14	Engine control unit
15	Rear ABS sensor
16	Right rear turn signal
17	Tail light
18	License plate light
19	Left rear turn signal
20	Rear stop switch
21	Engine ground point
22	Battery negative terminal
23	Battery positive terminal
24	Starter remote control switch
25	Starter motor
26	Generator
27	Voltage regulator
28	Fuel level sensor
29	ABS control unit
30	ABS mode selection connector
31	Fuel injector
32	Left light stalk
33	Left light stalk - secondary connector
34	Fuse box
35	Headlight
36	Left front turn signal
37	Right front turn signal
38	Dashboard
39	Dashboard - secondary connector
40	Fuel reserve indicator light
41	Front ABS sensor
42	Stepper motor
43	CDI control unit programming connector
44	Lights remote control switch
45	Fan remote control switch

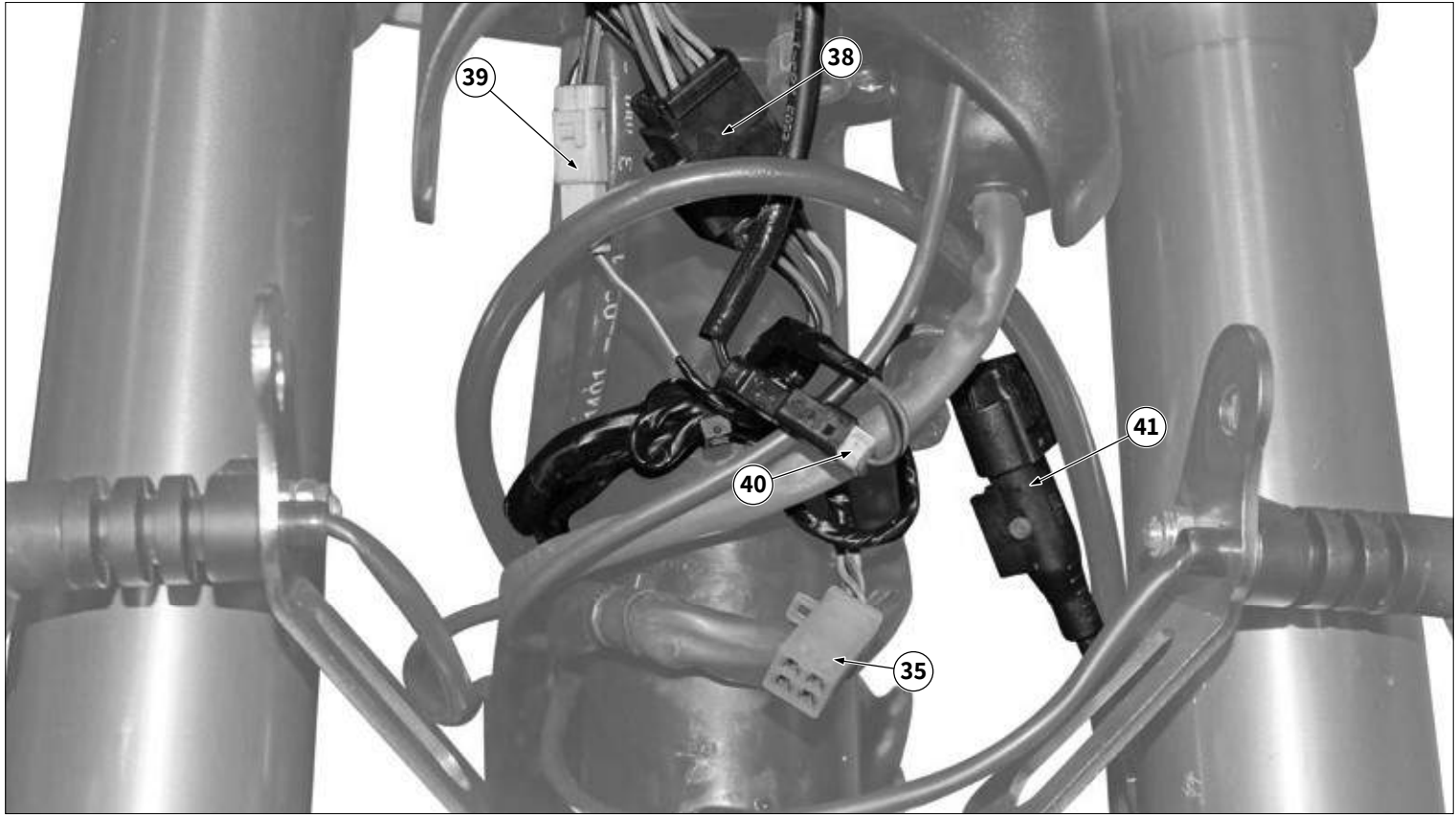
<b>Number</b>	<b>Description of the electrical component</b>
<b>46</b>	Motor sensor contactor
<b>47</b>	Fuel pump
<b>48</b>	Oxygen sensor
<b>49</b>	Canister solenoid valve

**10.1.5 Wiring diagram**



**10.2 CABLE PATH**

Main wiring path: front side, lights area and under the dashboard.

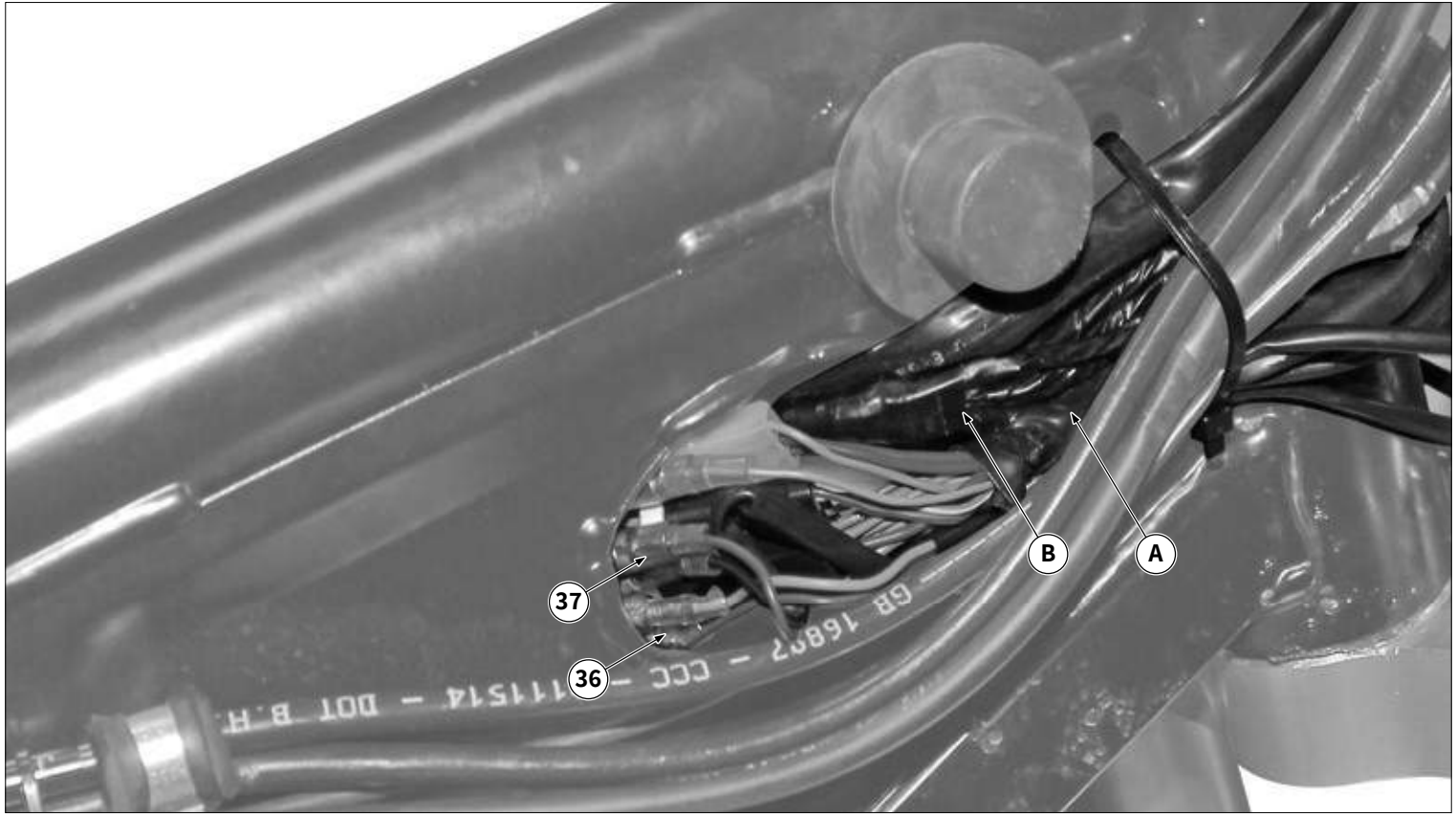


Ref.	Item	Remarks
35	Headlight	
38	Dashboard	
39	Dashboard - secondary connector	
40	Fuel reserve indicator light	
41	Front ABS sensor	

At the front, the cables of the main wiring and of the devices are collected and positioned in the space enclosed by the digital dashboard cover, with the exception of the front headlight connector “35” and the front ABS sensor “41”.

The connections of the devices on the handlebar and their wiring harness are grouped on the right side of the vehicle frame.

Main wiring path: front side, right side of the frame.

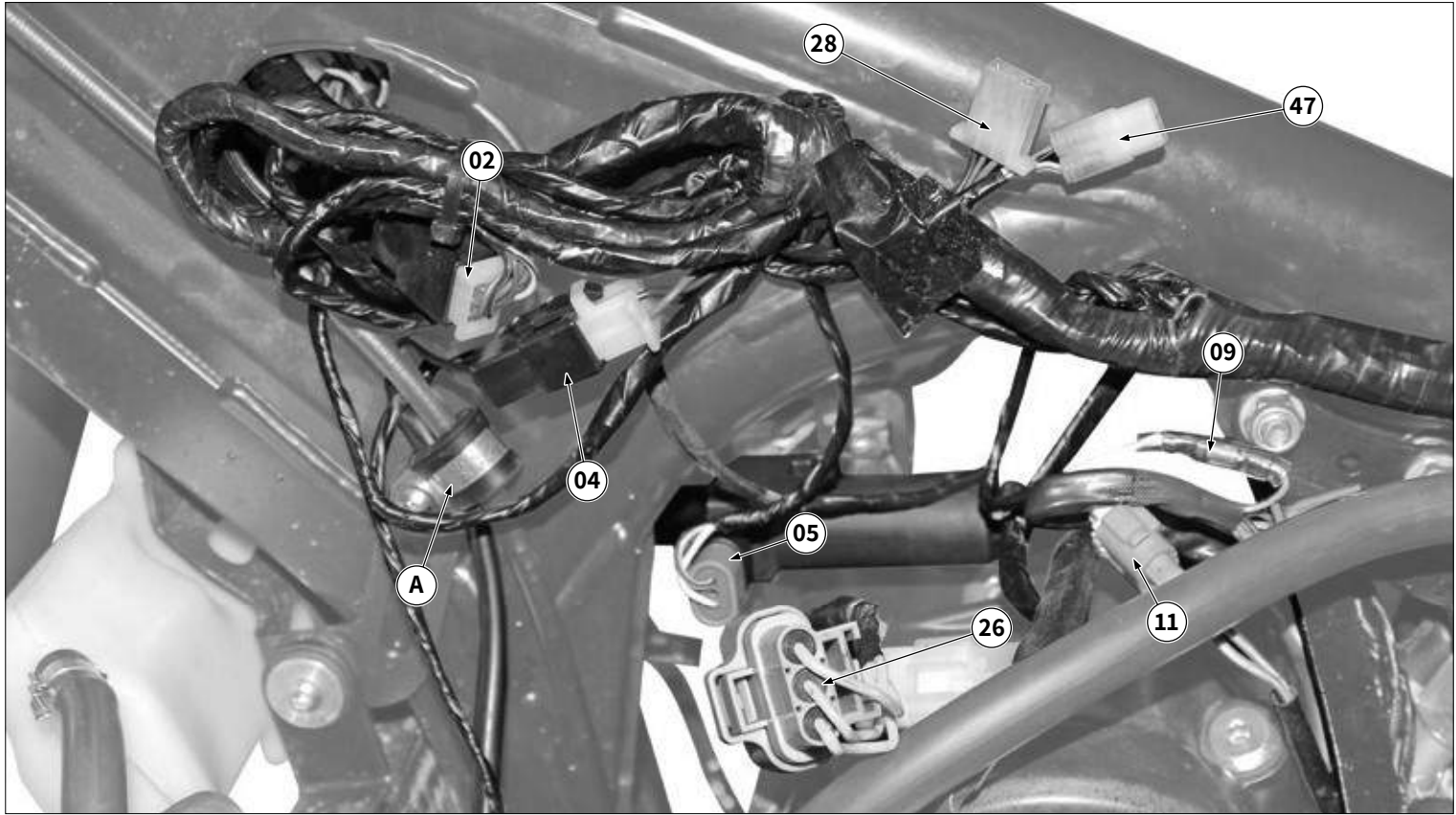


Ref.	Item	Remarks
36	Left front turn signal	
37	Right front turn signal	
A	Harness of the right light stalk component	
B	Shunt of the main wiring leading to the front part connectors	

The main wiring and the wiring harnesses of the devices installed on the handlebar must be collected together with the front brake hydraulic tubes and the throttle cables on the right side of the vehicle frame.

The main wiring continues through the passage hole on the chassis wall at the tank zone. In this point there are also the pairs of connectors for the left "36" and right "37" turn signals.

Main wiring path: front side, left frame side.



Ref.	Item	Remarks
02	Right light stalk	
04	Radiator fan	
05	Ignition coil	
09	Neutral gear switch	
11	Pick-Up	
26	Generator	
28	Fuel level sensor	
47	Fuel pump	
A	Fixing point for the main wiring on the left side of the vehicle.	Passage over the radiator.

The main wiring comes from the right side through the frame hole.

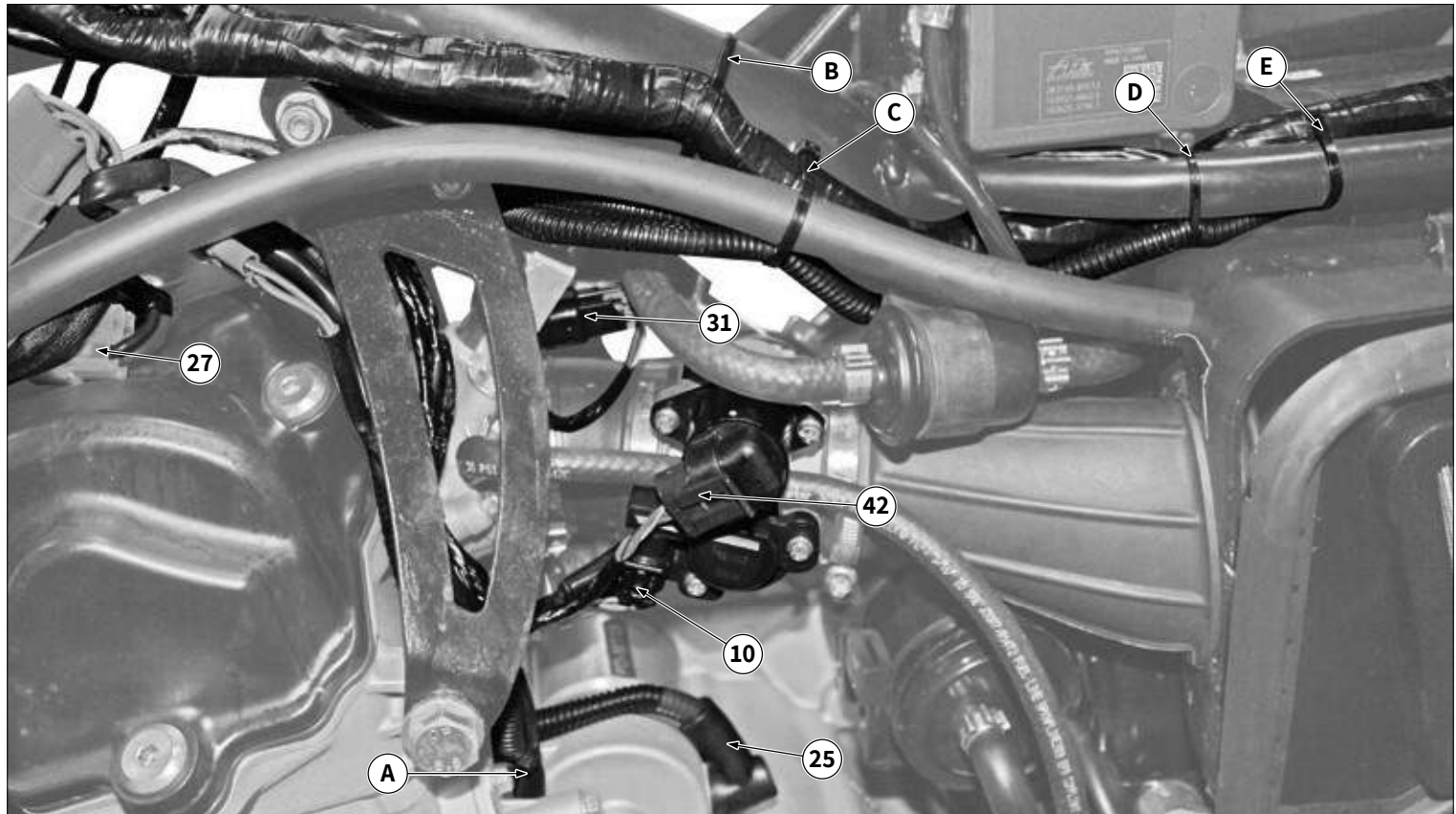
The main wiring must be attached and supported in the front part with a clamps and the connector “04” must be fastened through the bracket with sheath “A” placed on the left side of the frame to support the wiring harnesses directed to the left side of the handlebar and the branches directed towards the lower part of the motorcycle underneath the engine.

The shunts “05”, “09”, “11”, “26” and “48” run in the space between the engine head and the frame to connect the devices positioned on the right side of the vehicle.

The fuel level sensor connector “28” and the fuel pump connector “47” must be connected to the complete tank only during the tank re-assembling step.



Main wiring path: central part, lower part path and rear part path.

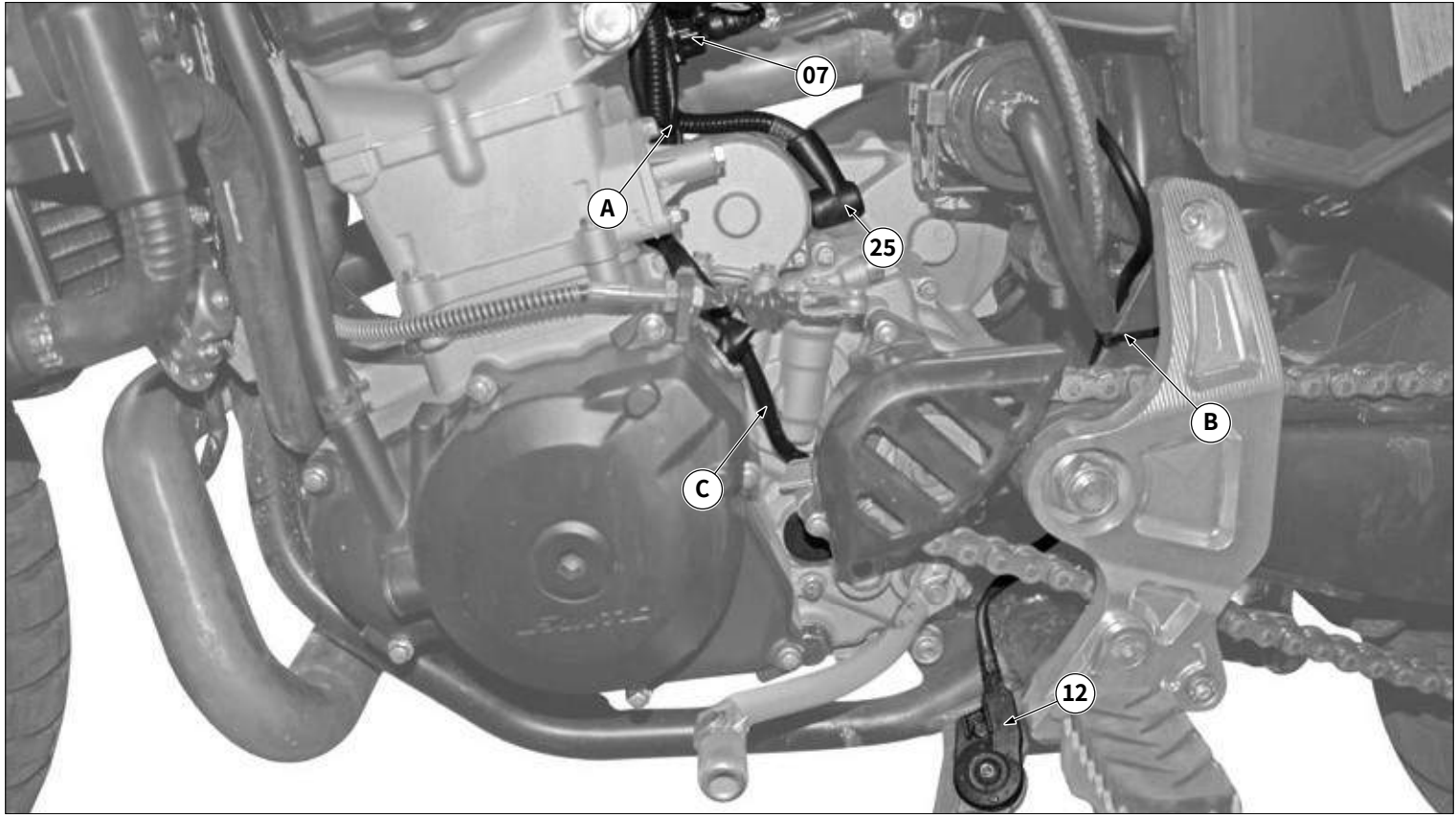


Ref.	Item	Remarks
10	TPS sensor	
25	Starter motor	
27	Voltage regulator	
31	Fuel injector	
42	Stepper motor	
A	Main wiring fastening point, central part on engine support bracket	
B	Main wiring fastening point, central part on the vehicle frame	
C	Main wiring lower part shunt	

The main wiring must be fastened, by means of clamps, in the central part of the frame in positions “B” and “C” and in the rear part in positions “D” and “E”.

The main wiring continues towards the lower part “A”: in this area the main wiring is fastened with the starter motor power wiring harness and the connecting wiring harness of the electronic injection system connectors.

Main wiring passage: lower part, stator area and passage to the compartment under the saddle.

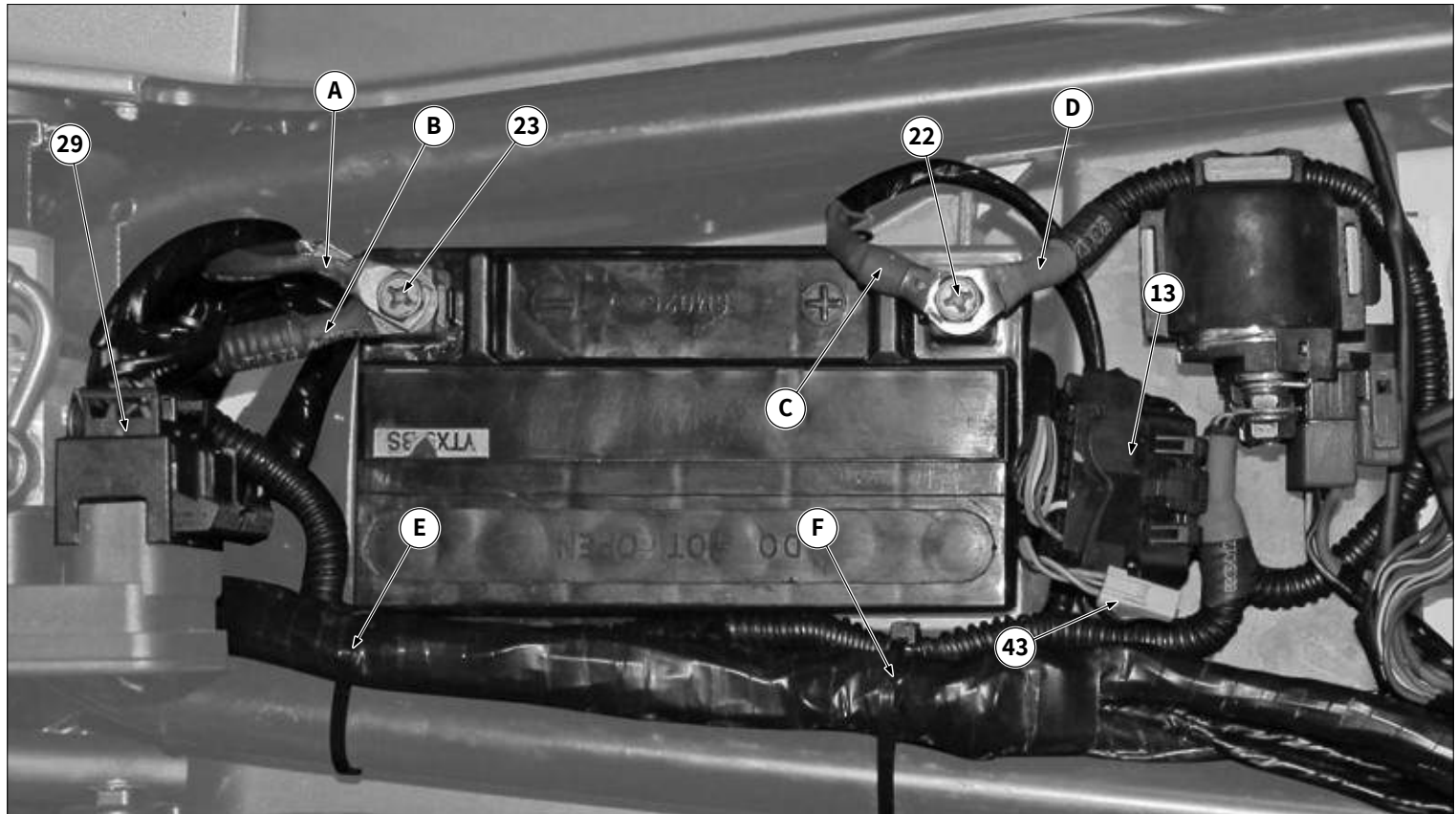


Ref.	Item	Remarks
07	Water temperature sensor	
12	Side kickstand switch	
25	Starter motor	
A	Fastening point for the main wiring and power wiring harness for the starter motor and ground on the engine.	
B	Fastening point of the lateral kickstand switch wiring harness.	
C	Neutral gear switch wiring harness passage.	

The main wiring must be collected near the starter motor “25” together with the connecting wiring harness to the neutral gear switch just below the water temperature sensor connector “07”: the switch wiring harness continues in the passage space “C” between the left side of the engine and the chain sprocket.

The connecting wiring harness of the lateral kickstand switch “12” must be fastened at the left pipe “B” of the under-seat frame.

Main wiring passage: rear part, battery area and ABS module area.



Ref.	Item	Remarks
13	OBD diagnosis connector	
22	Battery negative terminal	
23	Battery positive terminal	
29	ABS control unit	
43	Control unit programming connector C.D.I.	
A	Main wiring branch for the battery negative terminal	
B	Connection of the ground wiring harness to the battery negative terminal	
C	Branch of the main wiring for the battery positive terminal	
D	Connection of the power wiring harness of the starter remote control switch to the battery positive terminal	
E	Main wiring fastening point	
F	Main wiring fastening point	

The main wiring at the ABS module “29” runs from the central part to the under-seat compartment: in this point the main wiring is fastened to the left tube at the battery side at points “E” and “F”.

The eyelets of the main wiring branch “A” and the eyelet of the ground/chassis wiring harness “B” must be fastened to the negative terminal “23”.

The eyelets of the main wiring branch “C” and the eyelet of the power wiring harness “D” of the starter remote control switch must be fastened to the positive terminal “22”.

Main wiring passage: rear part, compartment under saddle, fuses and relay, engine control unit and rear lights.



Ref.	Item	Remarks
14	Engine control unit (CDI)	
34	Fuse box	
44	Light remote control switch	
45	Radiator fan remote control switch	
46	Engine sensors remote control switch	
A	Main wiring fastening point	
B	Main wiring fastening point	
C	Wiring harness with resistance for rear turn signals	
D	Point of passage of the connection cables to the rear lights	

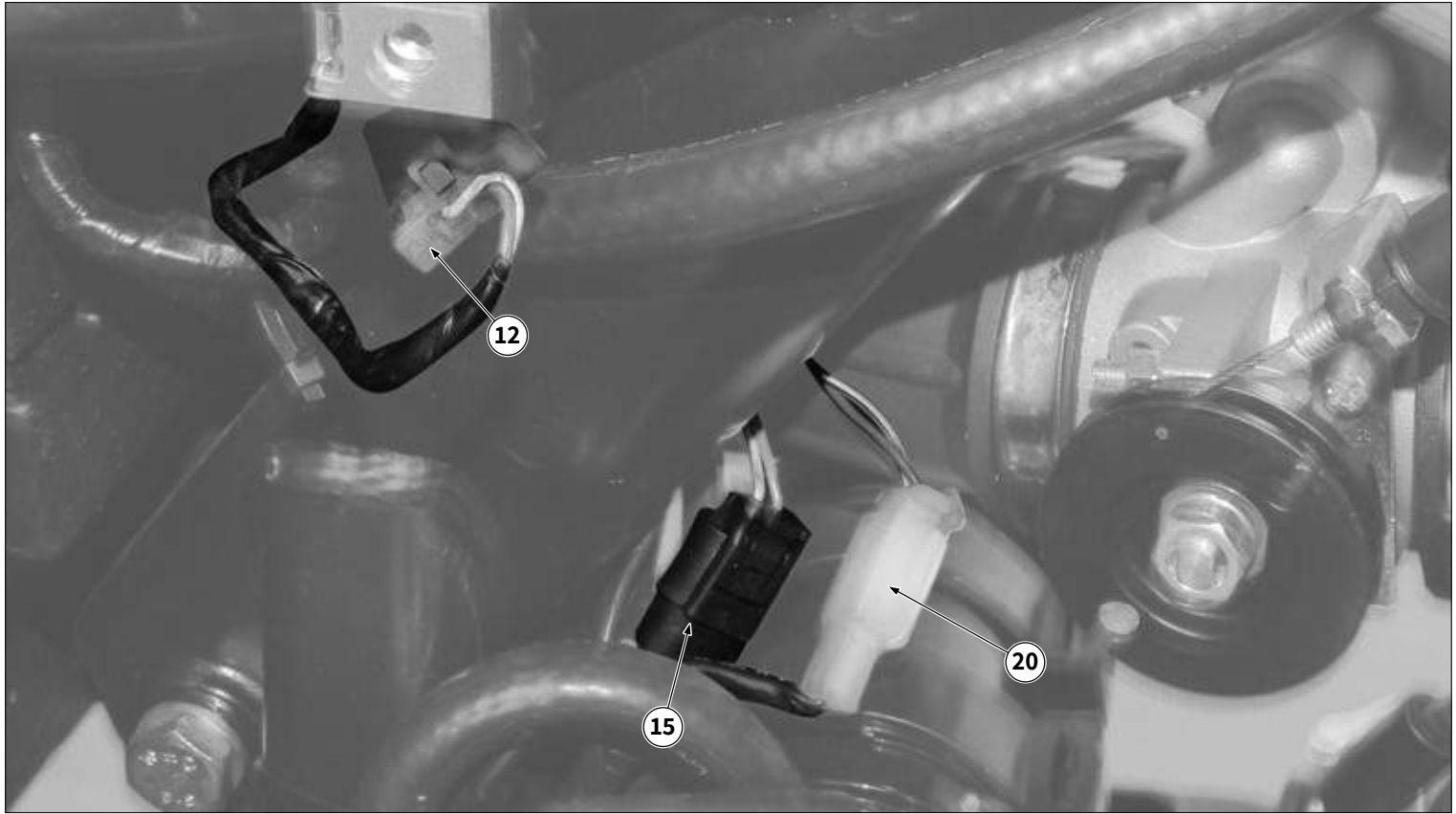
The main wiring must always be fastened on the left side of the frame in the compartment under the seat in the fastening positions “A” and “B”.

The wiring harness with resistance for the rear turn signals must be placed at the fastening point “B”, together with all the connections to the rear lights “D”.

The rear lights consist of: tail light (3 connectors), rear turn signals (1 connector each) and license plate light (2 connectors).

The rear lights wiring harness must be tied and fastened in the passage space “D”.

Main wiring passage: branches parts present in the passage space to the compartment under the saddle.



Ref.	Item	Remarks
12	Side kickstand switch	
15	ABS rear sensor	
20	Rear brake switch	

Near the throttle body air conveyor, the main wiring has three different branches to connect the kickstand “12”, which wiring harness continues on the left side of the engine, the rear ABS sensor “15” and the rear stop switch “20”, whose wiring harness continues towards the right side.

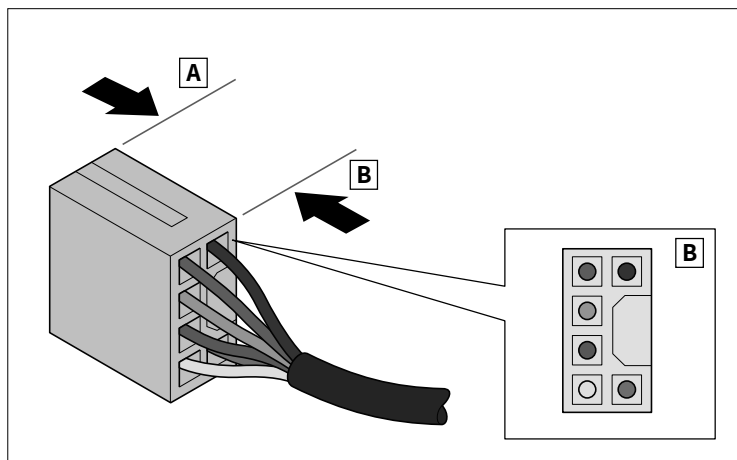
### 10.3 DEVICES AND CONNECTORS

This section concerns the devices and connectors present in the electrical system.

For each component and connector there is:

- an image that determines the location of the connector on the vehicle;
- a graphical representation of the connector;
- the specific numbering of the pins;
- the functional description of each pin (pinout table).

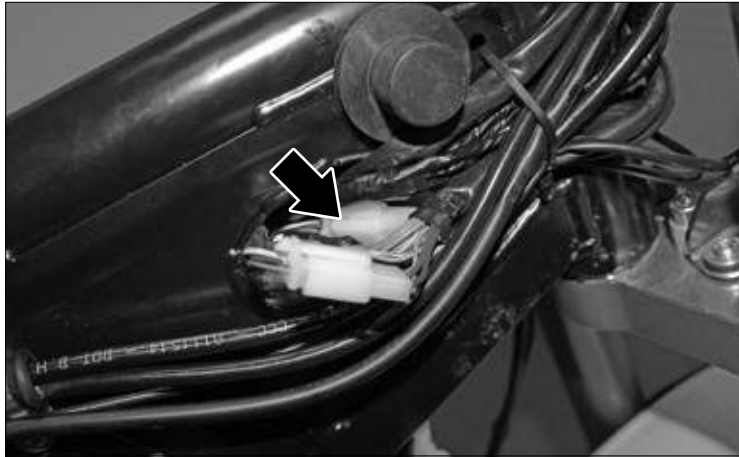
**i** An electrical device may have one or more connectors.



A. Connection side or front side view.

B. Side of cable insertion or rear side view.

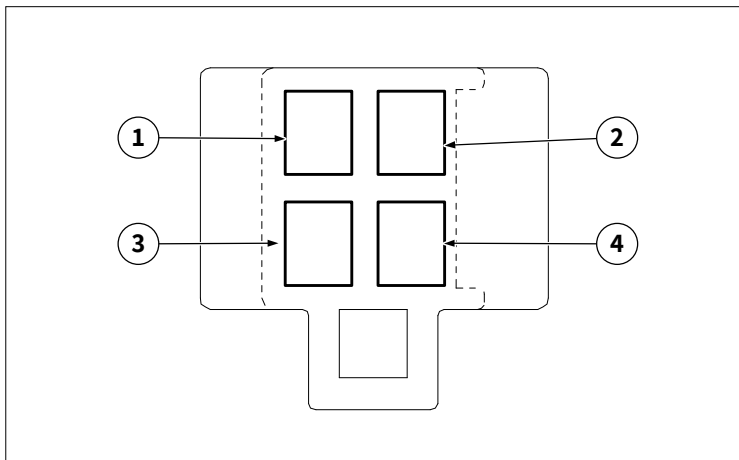
**!** All the graphic representations of the connectors have been illustrated with the arrangement of the pins observing the connector on the cable “B” insertion side or on the back side.



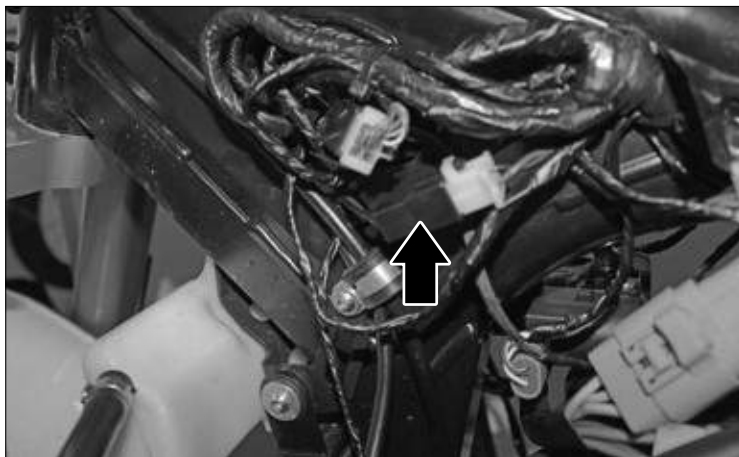
### 10.3.1 Key switch

The key switch connector is located under the fuel tank on the left side of the frame.

To access remove the tank, refer to “12.8.2 Complete tank removal” on page 128.



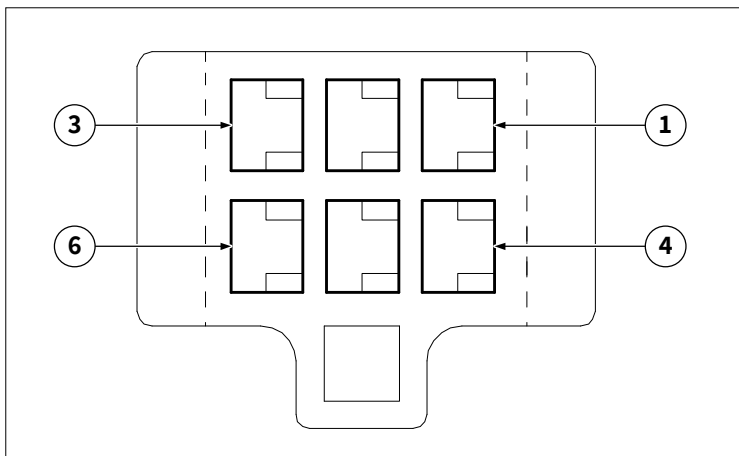
Pin	Colour	Function
1	R	Power supply from main fuse
2	R	Power supply from main fuse
3	M	Consent output signal (+) key
4	G-N	Positioning/parking lights control signal



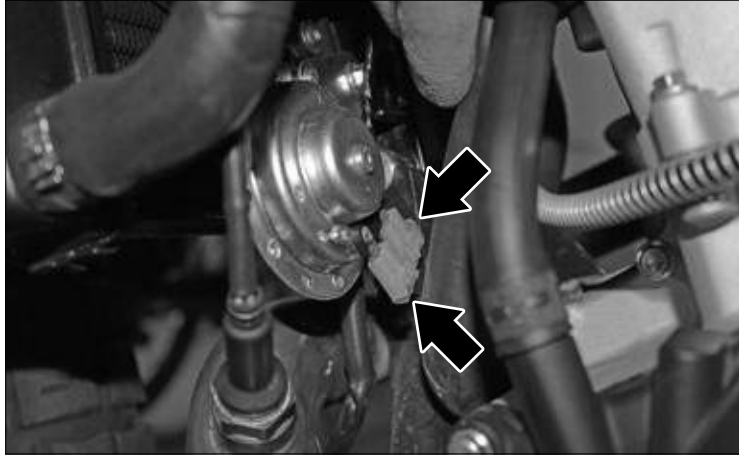
### 10.3.2 Right light stalk

The right light stalk connector is located under the fuel tank on the left side of the frame.

To access remove the tank, refer to “12.8.2 Complete tank removal” on page 128.

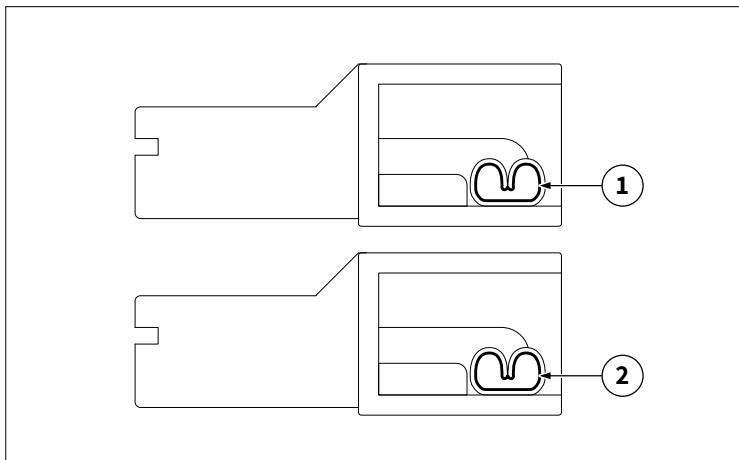


Pin	Colour	Function
1	M	Consent signal (+) from the key
2	M	RUN/OFF switch output signal to ABS control unit
2	M-Vi	RUN/OFF switch output signal to engine control unit
3	B	Output signal (-) front brake button
4	G-N	Input signal (+) front brake button
5	-	-
6	N-V	Consent signal from engine start button

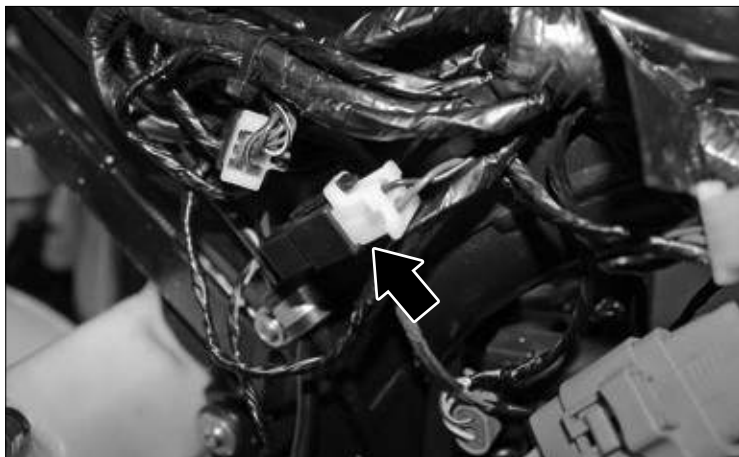


### 10.3.3 Horn

The horn and its two connectors are directly accessible: the device is positioned between the lower part of the radiator and the front part of the engine.



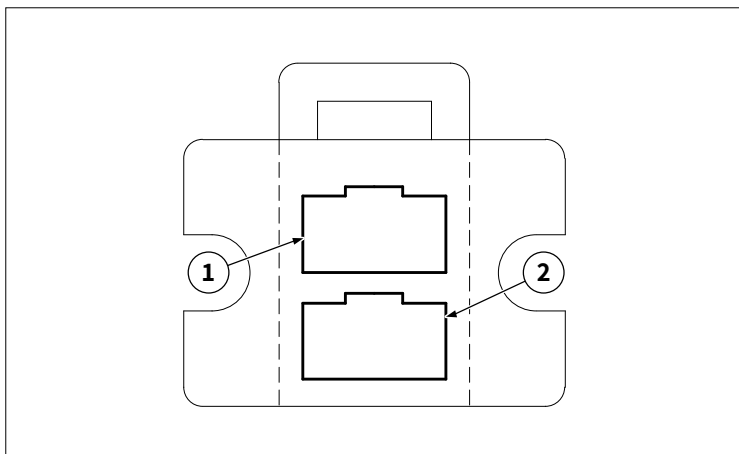
Pin	Colour	Function
1	Gr	Horn drive control
2	B	Ground



### 10.3.4 Radiator fan

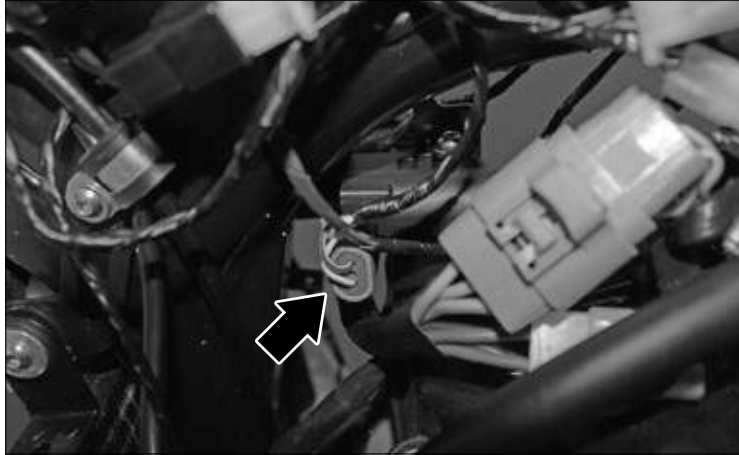
The radiator fan connector is located under the fuel tank on the left side of the frame.

To access remove the tank, refer to “12.8.2 Complete tank removal” on page 128.



Pin	Colour	Function
1	B	Ground
2	M-R	Engine cooling fan control signal



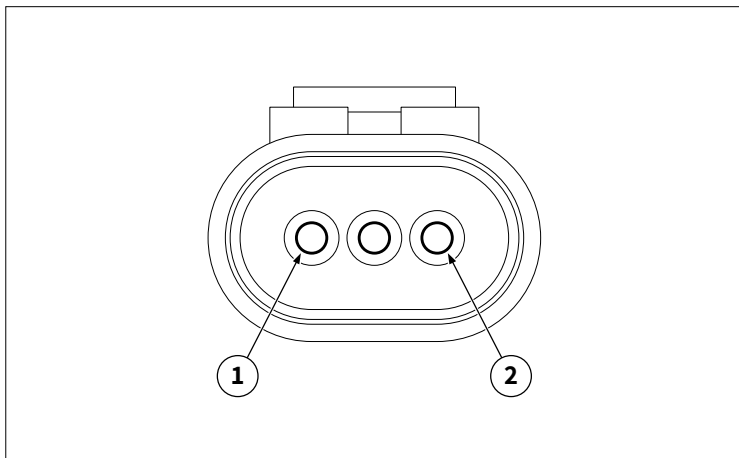


### 10.3.5 Ignition coil

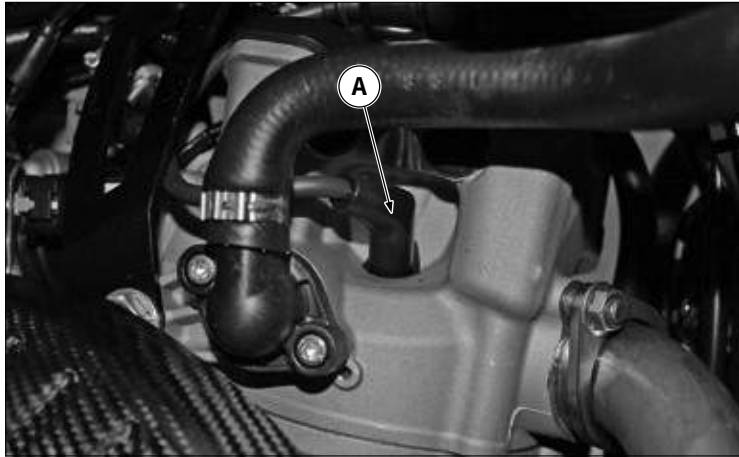
- i** The ignition coil has the task of raising the input voltage from the current generator and bringing the voltage to a level that can generate the spark in the spark plug.

This vehicle is equipped with a coil positioned near the radiator, mounted at the front of a support bracket.

- !** This coil is equipped with wiring and power supply cap to the non-separable spark plug.

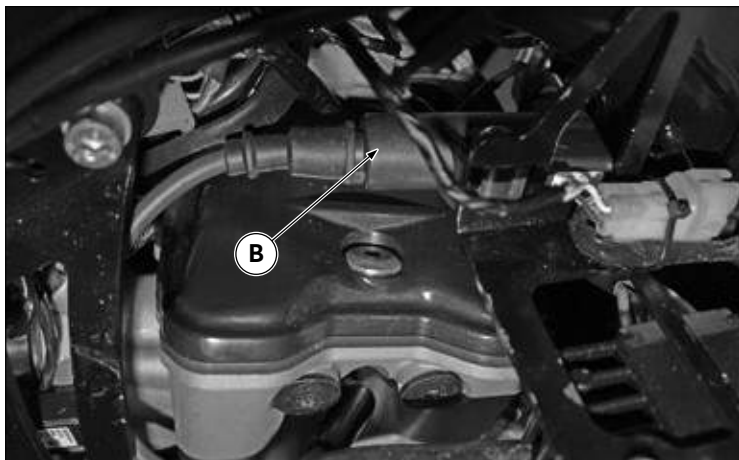


Pin	Colour	Function
1	Bi-R	Coil control signal
2	G-N	Spark plug power supply

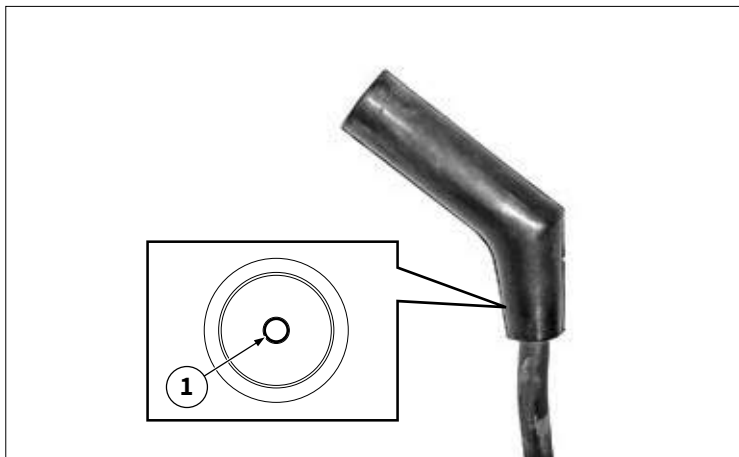


### 10.3.6 Spark plug

The spark plug connector or cap "A" is accessible directly from the right side of the vehicle under the tank.

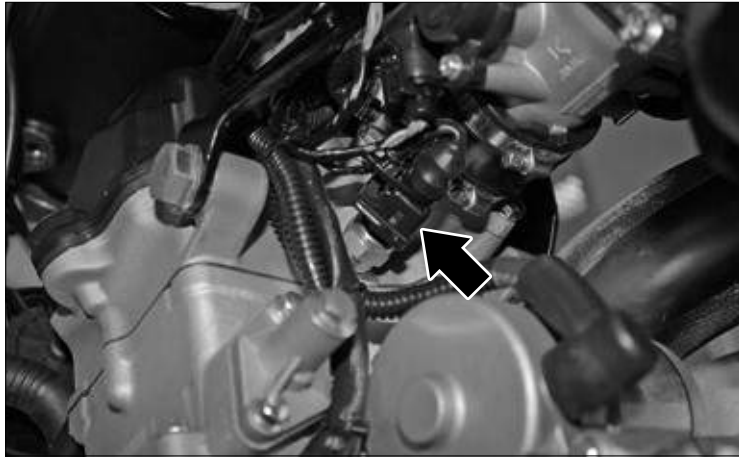


**⚠** The spark plug cable "B" can not be separated from the ignition coil.



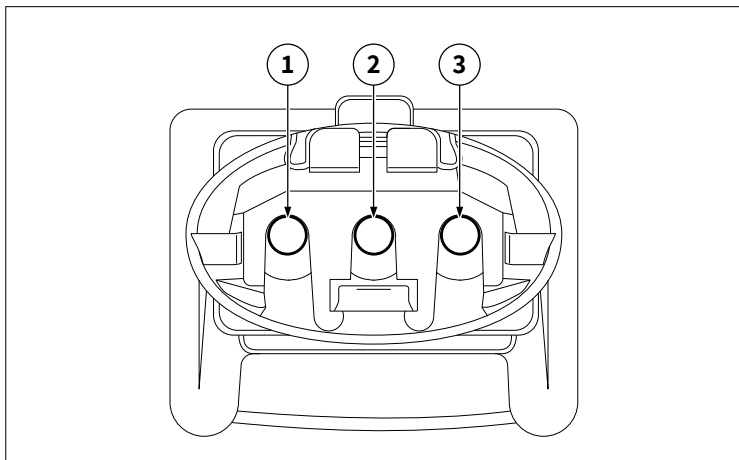
**⚠** The spark plug cap is not removable from the cable, do not attempt to disassemble it in any way.

Pin	Colour	Function
1	-	Spark plug power supply from coil

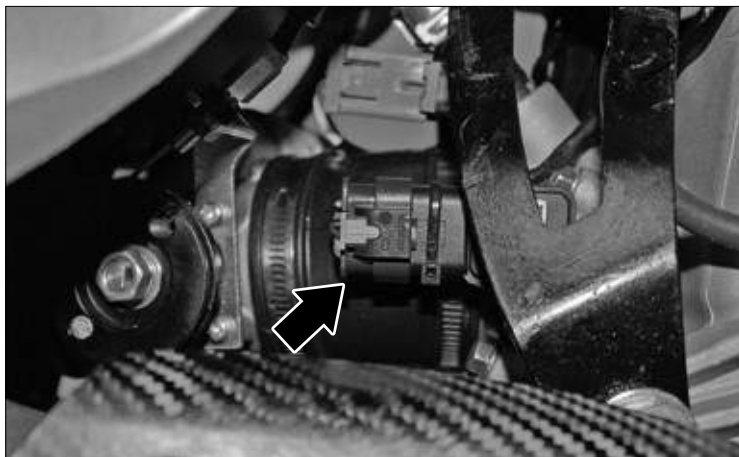


### 10.3.7 Water temperature sensor

The water temperature sensor connector is accessible directly on the right side of the vehicle near the spark plug and the thermostat.

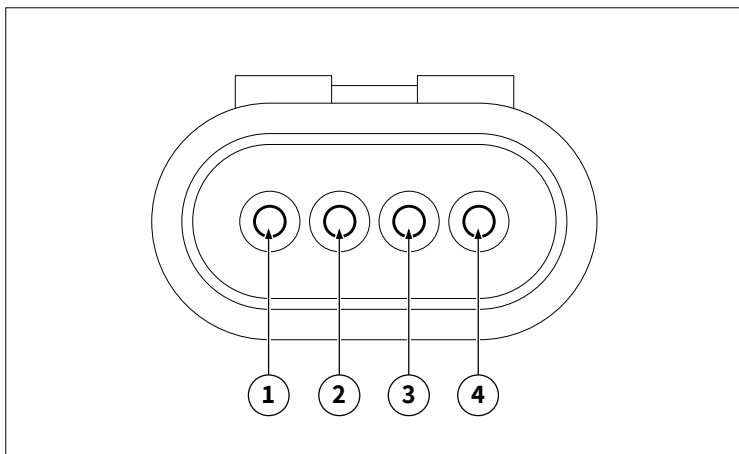


Pin	Colour	Function
1	Vi-Bi	Engine temperature output signal
2	-	-
3	Vi-N	Sensor ground

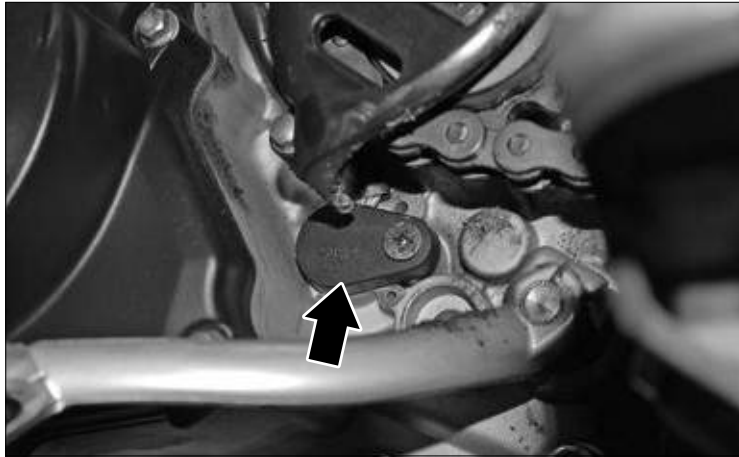


### 10.3.8 MAP sensor

The MAP sensor connector (Manifold Absolute Pressure) is directly accessible on the right side of the vehicle, under the fuel tank, fastened on the right side of the injection body.

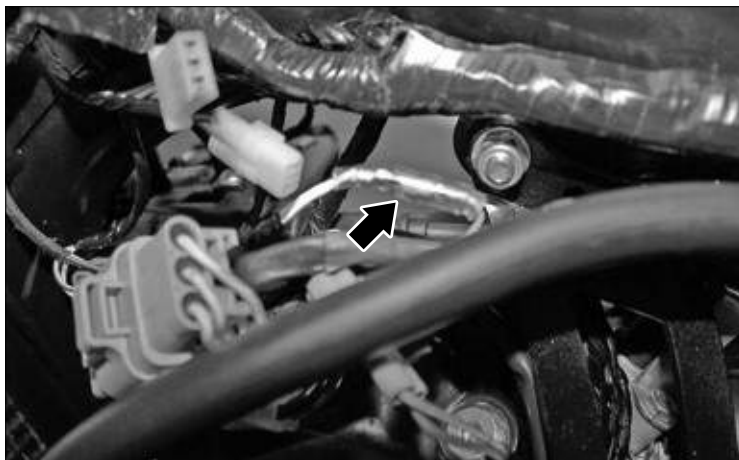


Pin	Colour	Function
1	B	Air pressure output signal
2	V-Bi	Sensor power supply from the control unit
3	B-N	Air temperature output signal
4	Vi-N	Sensor ground

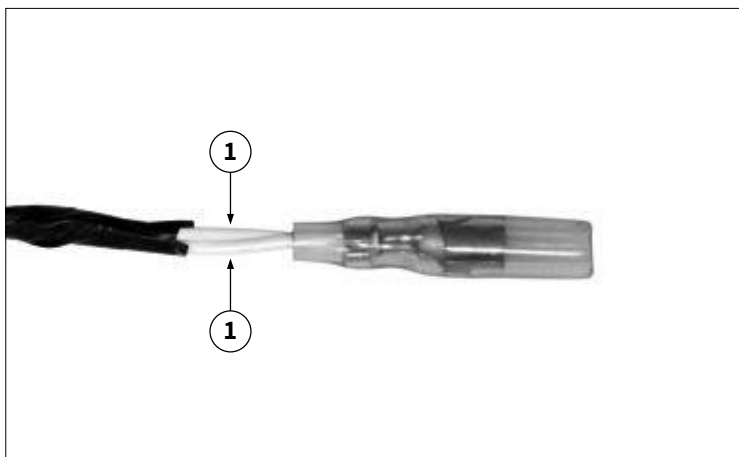


### 10.3.9 Neutral gear switch

The sensor that detects the neutral on the gearshift is positioned at the gear lever on the left side of the vehicle.

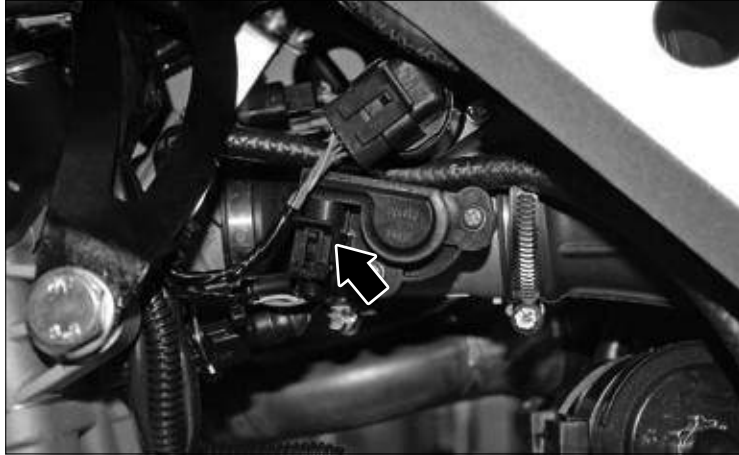


The neutral gearshift connector is positioned under the fuel tank: to access it, it is advisable to remove the tank, even only partially.



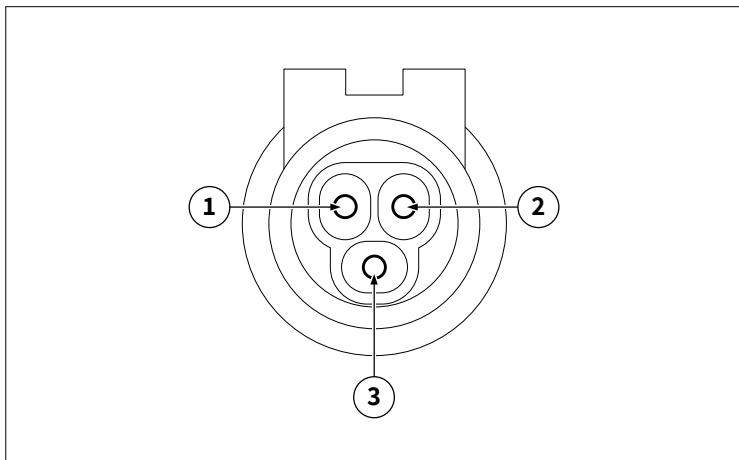
Pin	Colour	Function
1	Bi	Neutral gearshift switch signal (to engine control unit)
1	Bi	Neutral gearshift switch signal (to dashboard)

**i** It is not possible to visually identify which of the two wires (having the same colour), brings the sensor signal to the engine control unit or to the dashboard.

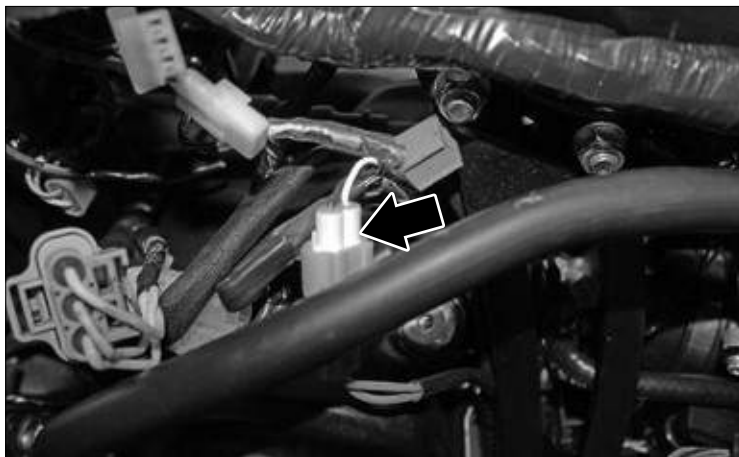


#### 10.3.10 TPS sensor

The TPS (Throttle Position Sensor) sensor connector is directly accessible: it is positioned under the fuel tank and is fastened on the left side of the injection body.

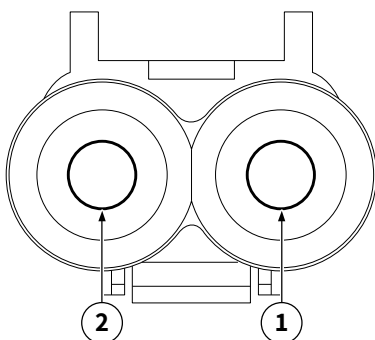


Pin	Colour	Function
1	V-Bi	Sensor power supply from the control unit
2	Vi-N	Sensor ground
3	G-B	Throttle position control signal

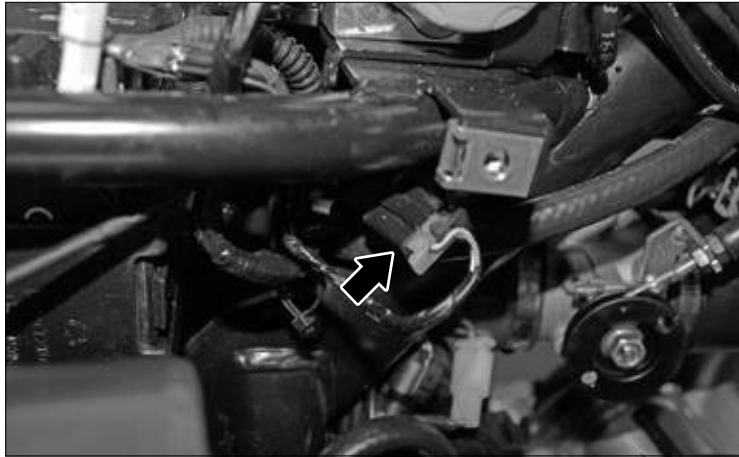


#### 10.3.11 Pick-Up

The pick-up connector is directly accessible, just below the fuel tank, near the cylinder head cover.



Pin	Colour	Function
1	N	Sensor ground
2	Bi	Pick Up Signal

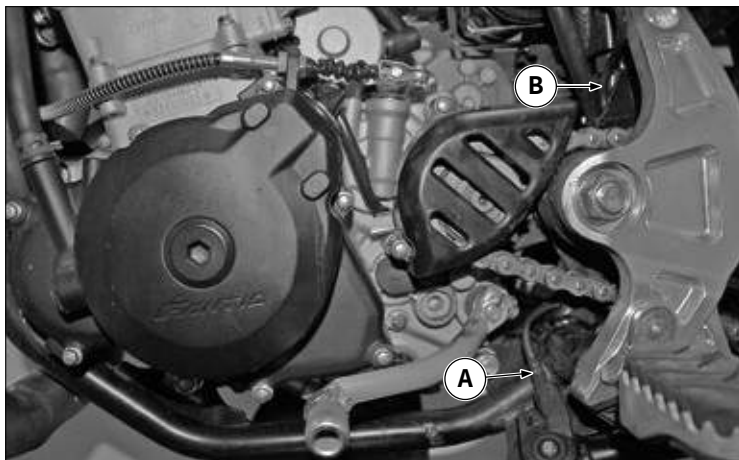


### 10.3.12 Side kickstand switch

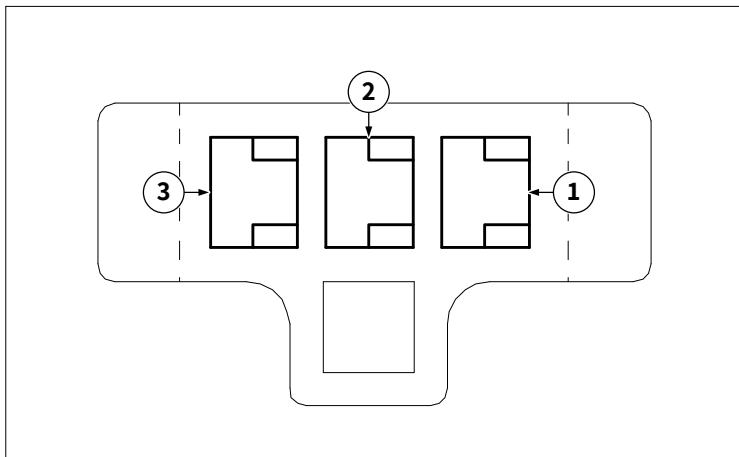
The side kickstand device is equipped with a long interconnection wiring to the vehicle.

The side kickstand connector is accessible removing:

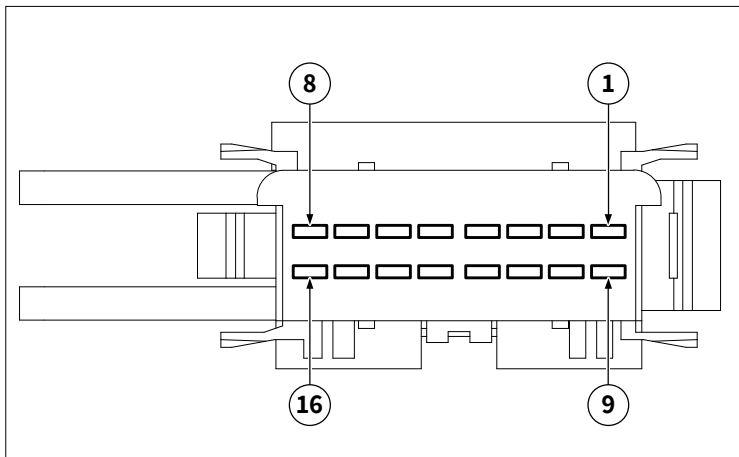
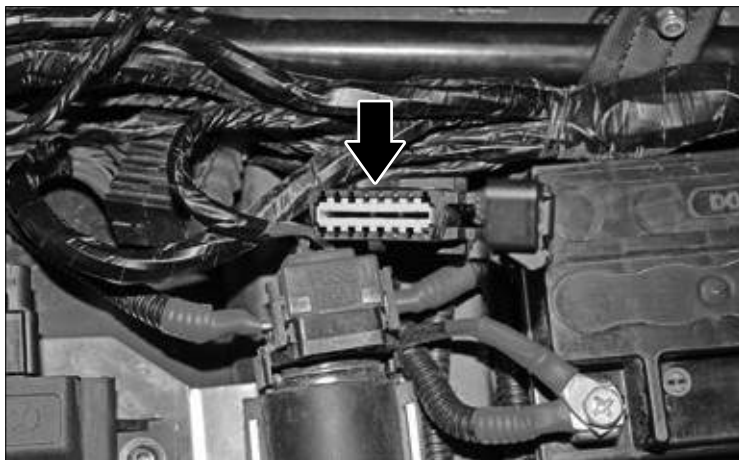
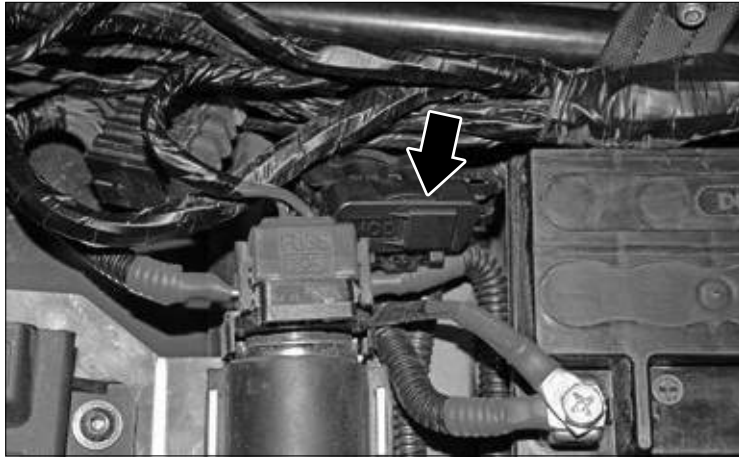
- Left lateral side panel: refer to “12.5.1 Left side panel removal” on page 126;
- Air filter: refer to “12.6 Air filter removal” on page 127;
- Air conveyor tube to the carburettor.



**!** The wiring harness of the lateral kickstand “A” passes near the left vertical pipe “B” of the vehicle chassis.



Pin	Colour	Function
1	Bi-N	Side kickstand position signal
2	-	-
3	Vi-N	Ground



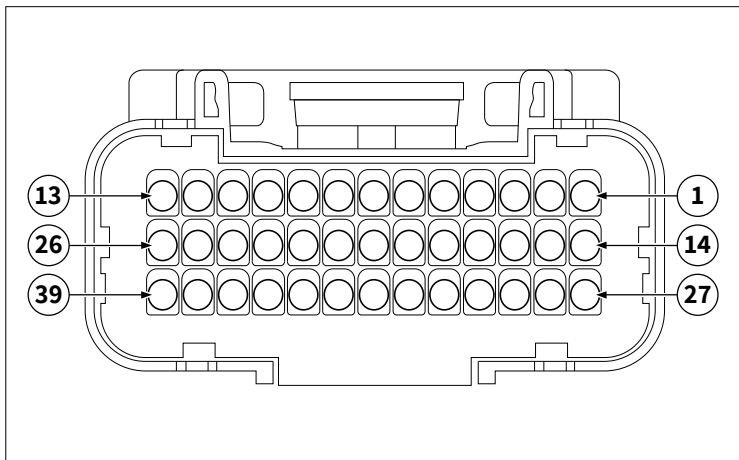
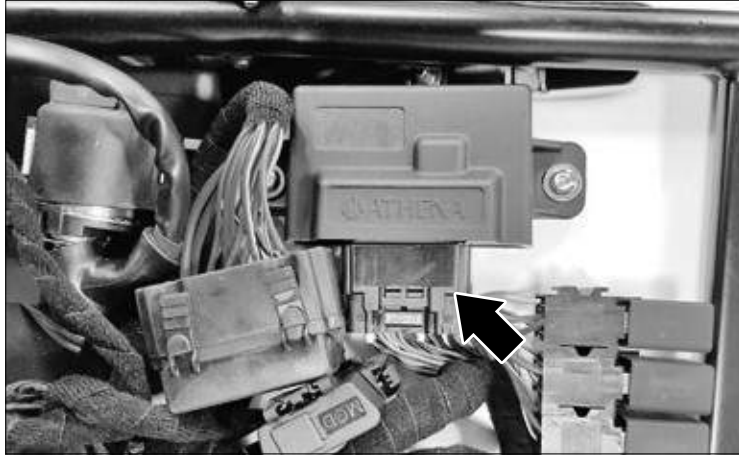
### 10.3.13 OBD diagnosis connector

- i** The On-Board Diagnostic (OBD) connector is the communication port used to connect the testers intended for self-diagnosis.

The OBD diagnostic connector is located under the seat. To access remove the seat; refer to “12.1 Seat removal” on page 122.

To connect the diagnostic tester, open the protective cover of the diagnostic socket and connect the device.

Pin	Colour	Function
1	-	-
2	-	-
3	-	-
4	N	Ground
5	Vi-N	Ground
6	Az	CAN line H
7	Ro	Diagnosis line K
8	-	-
9	-	-
10	-	-
11		
12		
13		
14	Bi	CAN Line L
15		
16	R	Diagnostic socket power supply (Vbatt)



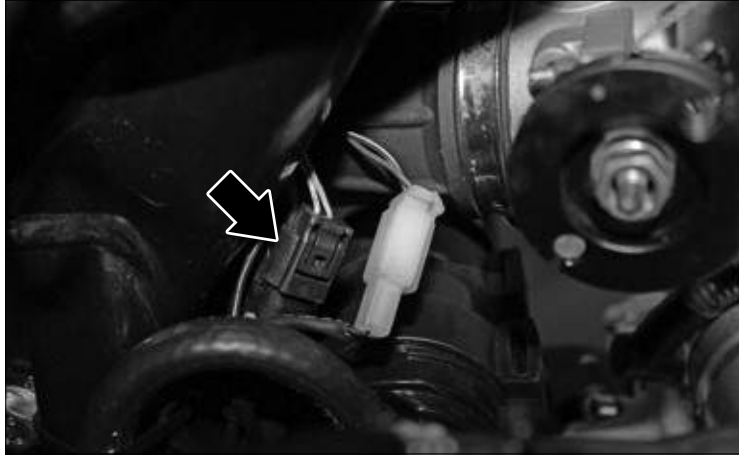
#### 10.3.14 Engine control unit

The engine control unit (electronic injection) is located under the saddle: refer to the procedure “12.1 Seat removal” on page 122” and to the procedure “10.6 Ignition module” on page 82”.

To carry out checks on the control unit wires, it is advisable to disconnect the connector from the module.

Pin	Colour	Function
1	N	Power ground
2	Bi	Pick Up input signal
3	N	Pick Up sensor ground
4	V-Bi	Sensor power supply
5	-	-
6	Ar-N	Fuel injector control signal
7	B-V	Stepper motor signal D
8	Vi-G	Engine warning signal (MIL warning light)
9	Az	CAN Line H
10	Ro-N	Reception signal (RX) RS232 communication interface
11	Vi-B	Reference ground RS232 communication interface
12	-	-
13	B-Bi	Vehicle speed output signal
14	N	Power ground
15	Vi-N	External connectors ground
16	Vi-N	Sensors ground
17	M-Vi	Key consent exit signal
18	V	Stepper motor signal B
19	V-Bi	Stepper motor signal A
20	V-N	Stepper motor signal C
21	Gr-B	Lights relay control signal (85)
22	Bi	CAN Line L
23	B-G	Transmission signal (TX) RS232 communication interface
24	Bi	Signal from neutral gearshift switch
25	-	-
26	B	Air pressure input signal
27	R-V	Injection unit direct supply from fuse 6
28	G-N	Coil control signal
29	-	-
30	G-R	Engine cooling fan control signal
31	B-N	Fuel pump control signal
32	Bi	Control signal (-) oxygen sensor heater
33	M-R	Vehicle speed output signal
34	M-N	Canister valve control signal
35	G-V	ECR consent signal
36	Bi-N	Side kickstand position signal
37	G-B	Throttle position control signal
38	N	Oxygen sensor input signal
39	B-N	Air temperature input signal

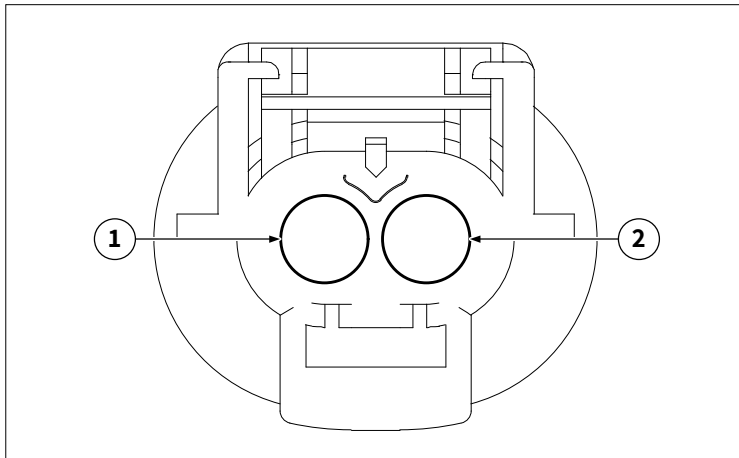




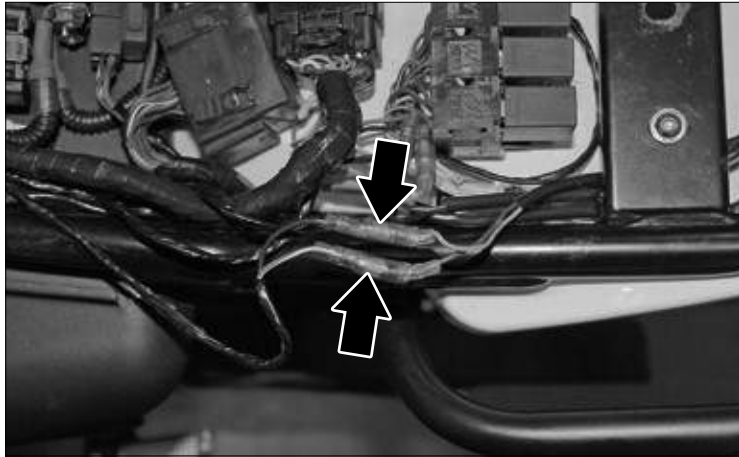
### 10.3.15 Rear ABS sensor

The rear ABS sensor connector is located in the central part of the vehicle, just above the engine block and is directly accessible.

**i** To perform instrumental tests it may be necessary to cut one or two clamps to release the connector from the frame.

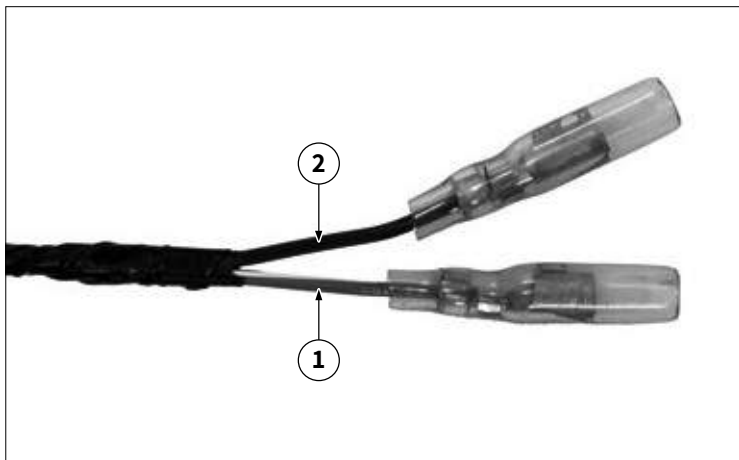


Pin	Colour	Function
1	Gr-N	Reference signal (-) rear ABS sensor
2	G	Signal (+) rear ABS sensor



### 10.3.16 Right rear turn signal

The right rear turn signal connectors are located under the seat. To access refer to “12.1 Seat removal” on page 122.

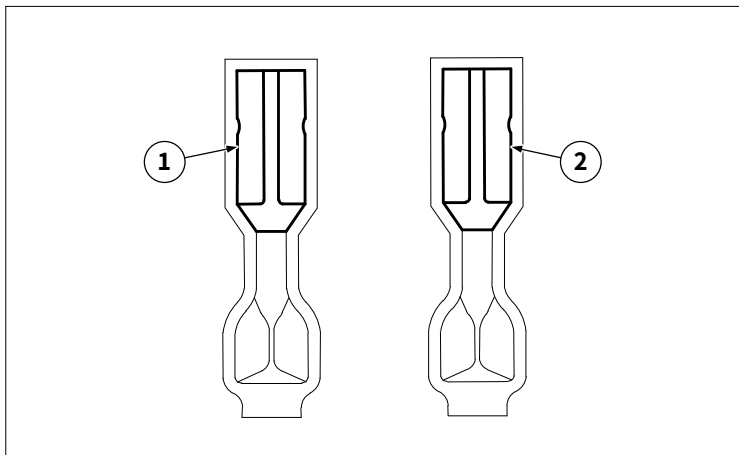


The connectors on the vehicle wiring side are identified as shown in the figure.

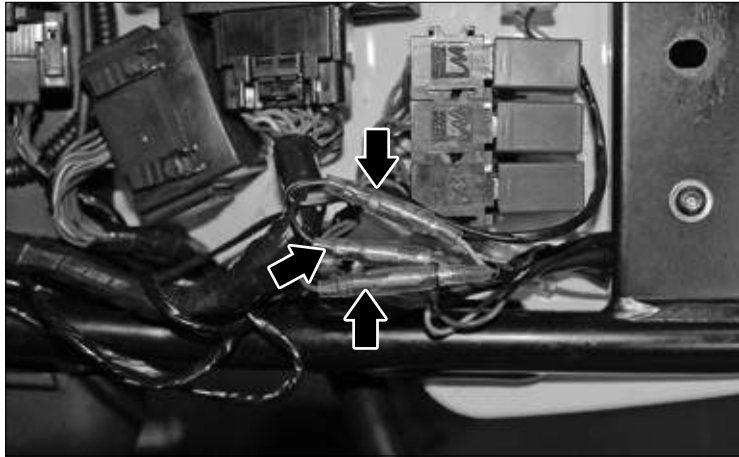
The rear right turn signal connectors are Blue and Sky Blue.

The coupling is as follows:

1. Blue (system side) to be connected to the Blue (device side);
2. Black (system side) to be connected to the Sky Blue one (device side).



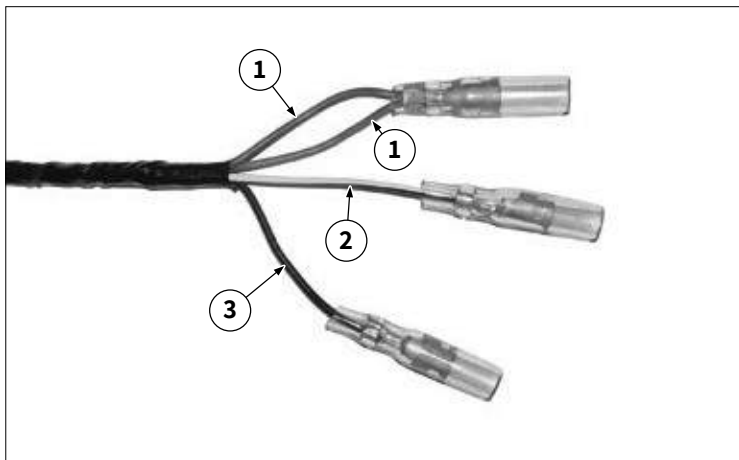
Pin	Colour	Function
1	Bi	Rear right turn signal control signal
2	N	Ground



### 10.3.17 Tail light

The tail light connections are three and are positioned under the saddle.

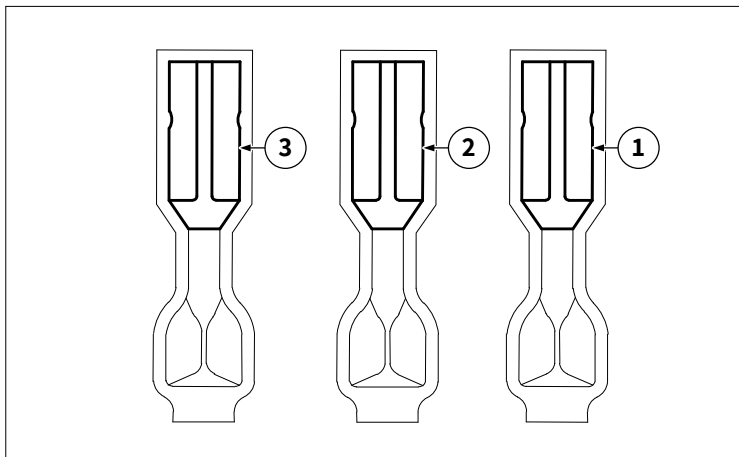
To access it, refer to “12.1 Seat removal” on page 122”.



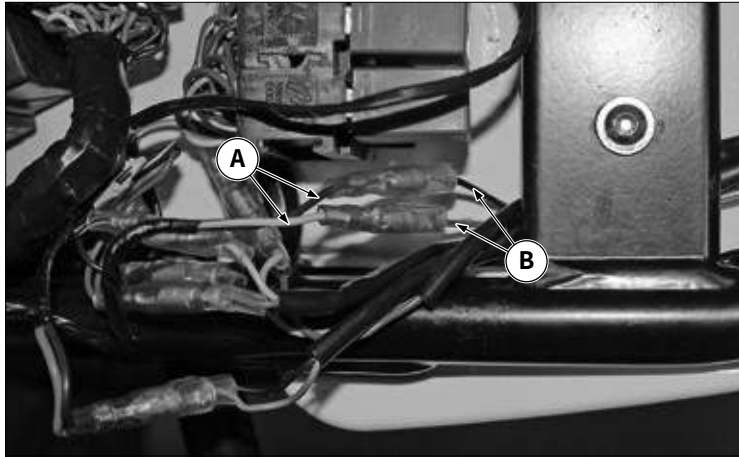
The connectors on the vehicle wiring side are identified as shown in the figure.

The coupling is as follows:

1. Red-Blue and Blue (system side) to be connected to the Red (device side);
2. Yellow-Black (system side) to be connected to the Yellow one (device side);
3. Black (system side) to be connected to Black one (Device side).



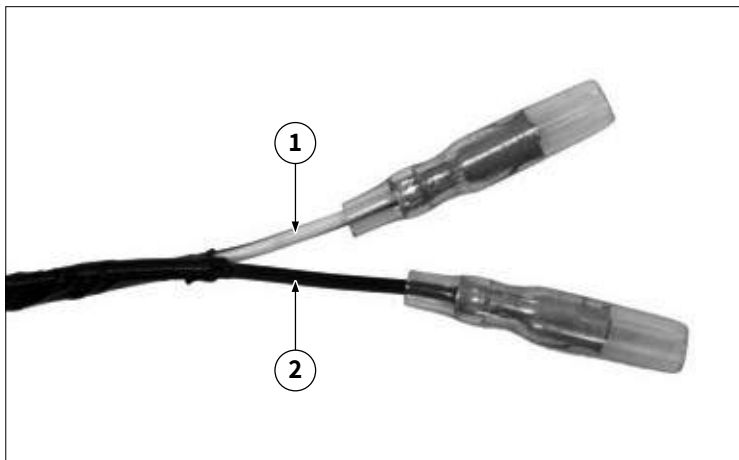
Pin	Colour	Function
1	R-B	Reference signal (-) tail light (rear brake light)
1	B	Output signal (-) front brake button (common)
2	G-N	Input signal (+) tail light (position light)
3	N	Ground



### 10.3.18 License plate light

The license plate light connectors are located under the seat. To access refer to “12.1 Seat removal” on page 122.

The connectors are two and the figure shows the connectors on the system side “A” and the connectors of the device “B”.

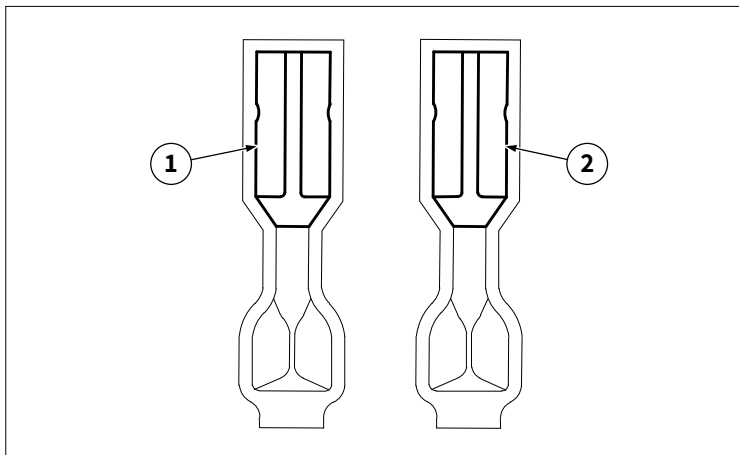


The connectors on the vehicle wiring side are identified as shown in the figure.

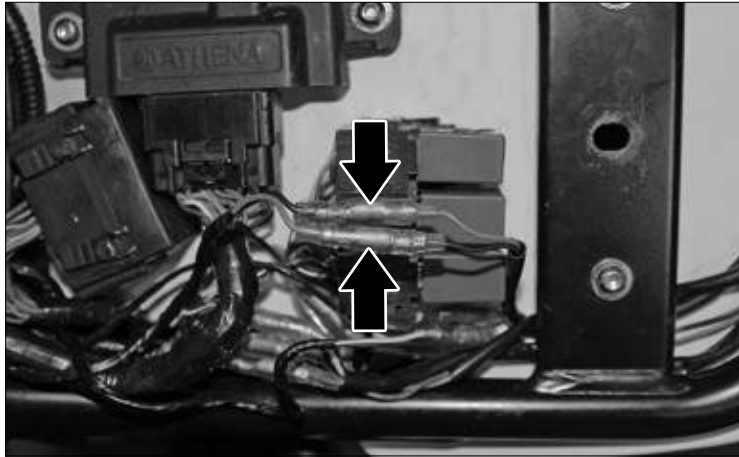
The license plate light connectors are Red and Black.

The coupling is as follows:

1. Yellow-Black (system side) to be connected to the Red one (device side);
2. Black (system side) to be connected to Black one (device side).

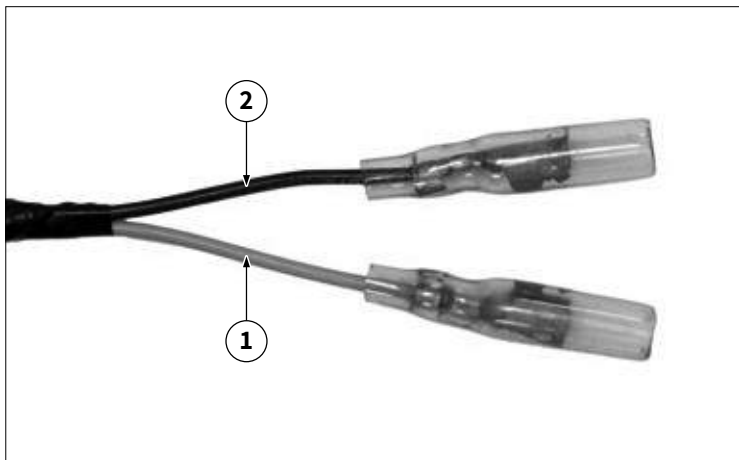


Pin	Colour	Function
1	G-N	Input signal (+) license plate light
2	N	Ground



### 10.3.19 Left rear turn signal

The left rear turn signal connectors are located under the seat. To access refer to "12.1 Seat removal" on page 122.

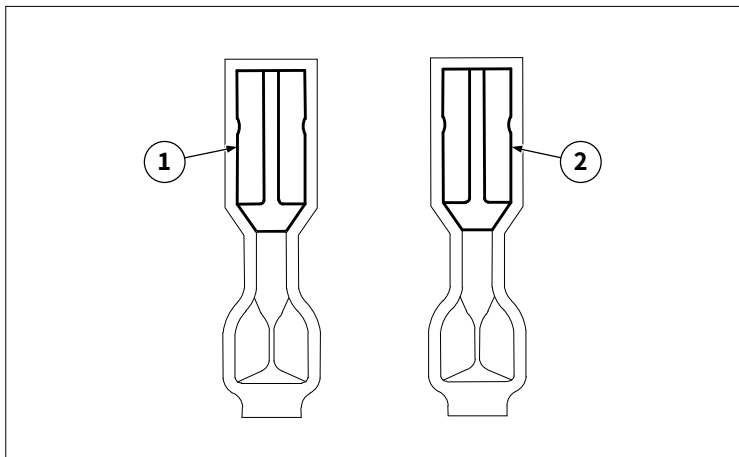


The connectors on the vehicle wiring side are identified as shown in the figure.

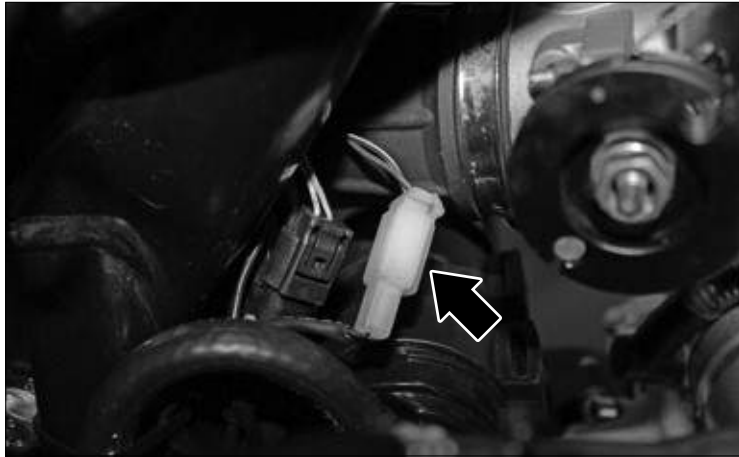
The left rear turn signal connectors are Blue and Sky Blue.

The coupling is as follows:

1. Orange (system side) to be connected to the Blue one (device side);
2. Black (system side) to be connected to Black one (device side).



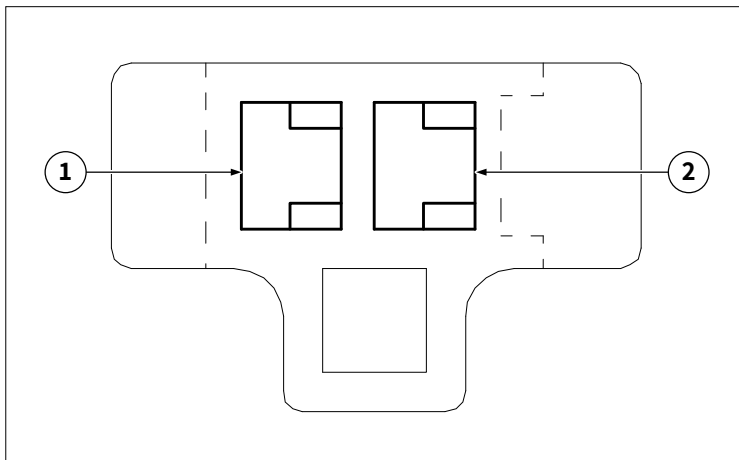
Pin	Colour	Function
1	Ar	Left rear turn signal control signal
2	N	Ground



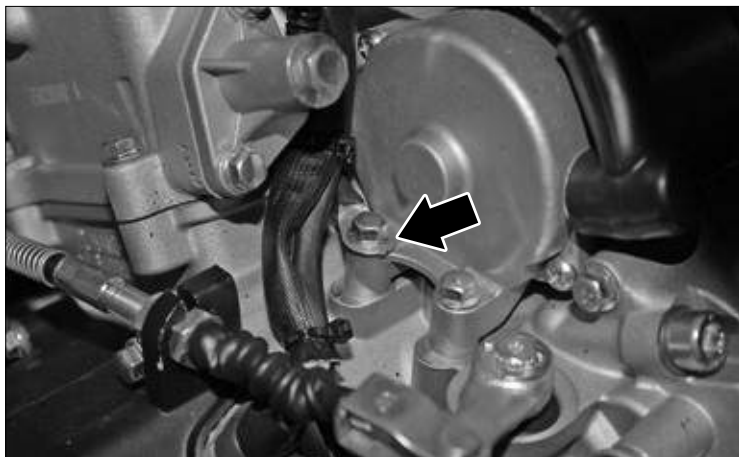
### 10.3.20 Rear brake light switch

The rear brake light sensor connector is located in the central part of the vehicle, just above the engine block and is directly accessible.

**i** To perform instrumental tests it may be necessary to cut one or two clamps to release the connector from the frame.



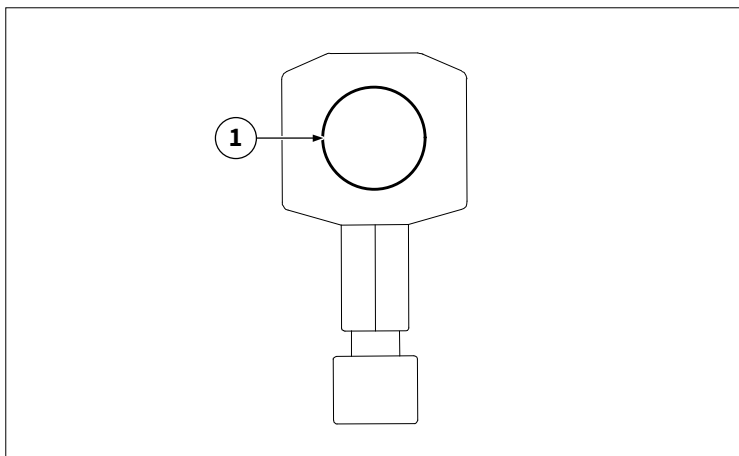
Pin	Colour	Function
1	R-B	Output signal (-) rear brake button
2	G-N	Input signal (+) rear brake button



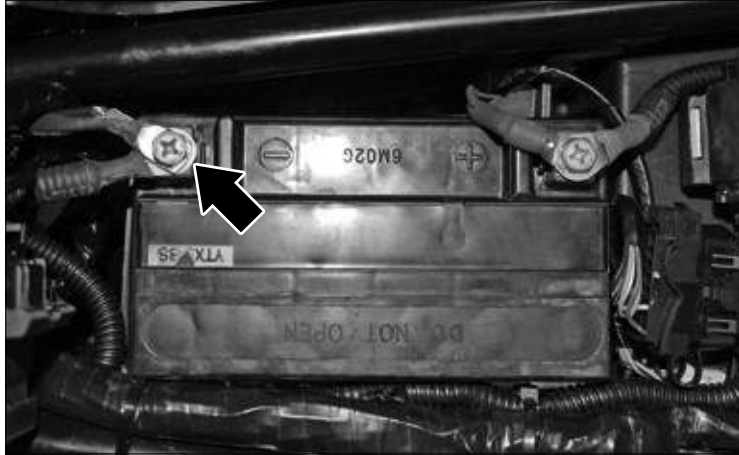
### 10.3.21 Engine ground point

The engine ground point is located on the left side of the vehicle and is directly accessible.

**i** The engine ground point is also used as a frame ground point.



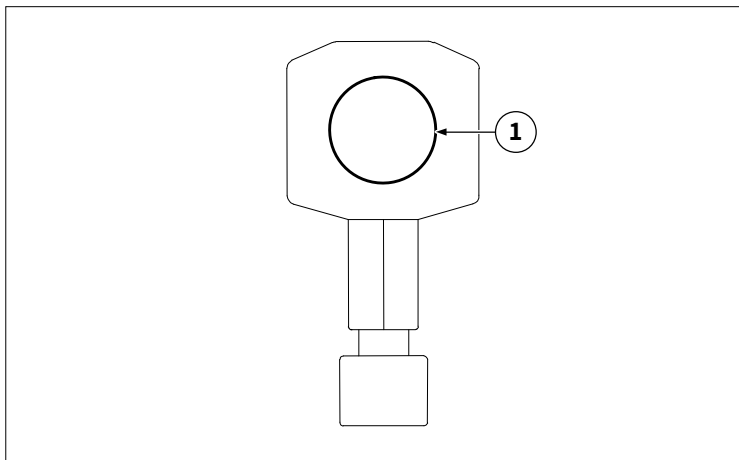
Pin	Colour	Function
1	N	Engine ground point



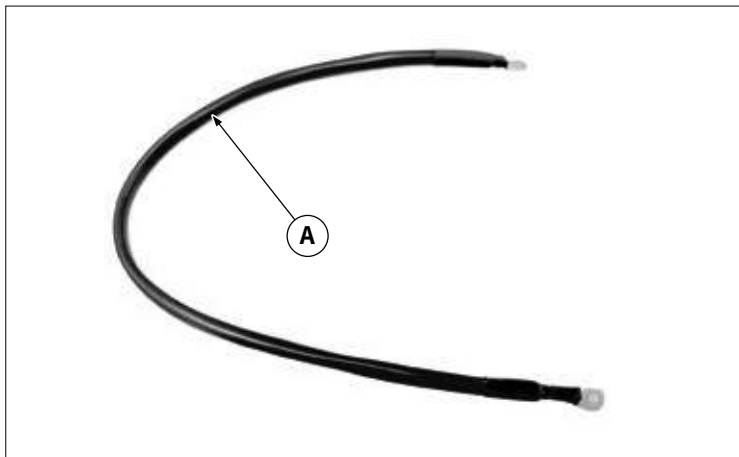
### 10.3.22 Battery negative terminal

The battery negative terminal and the battery are located under the seat. Refer to "12.1 Seat removal" on page 122.

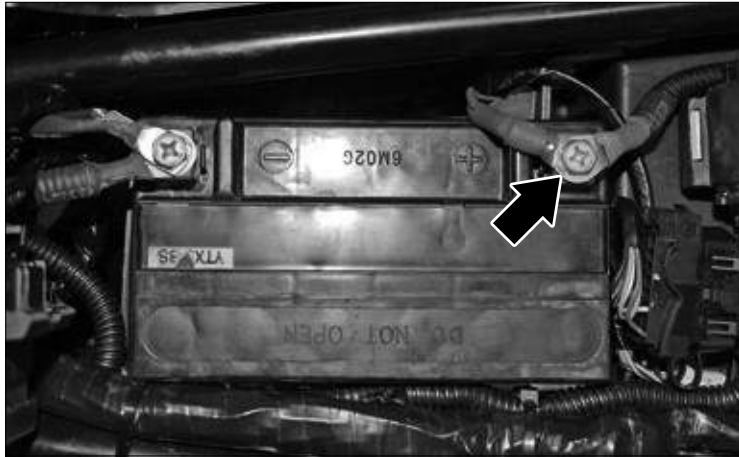
- i** The negative battery terminal is also used as a reference for the frame ground point.



Pin	Colour	Function
1	N	Engine ground point

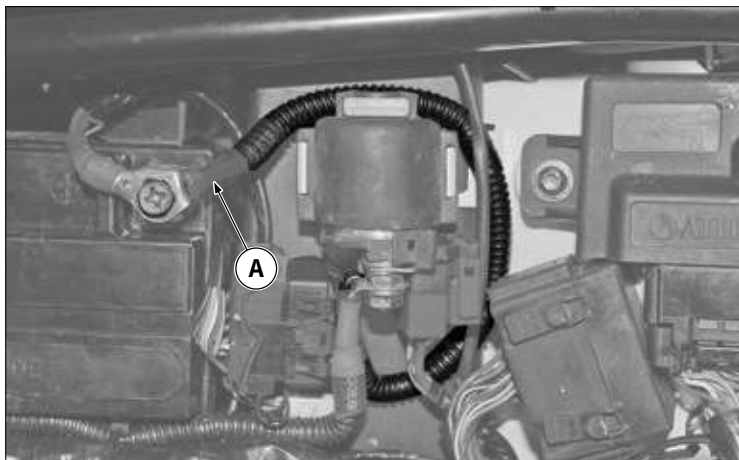


- i** The connecting wiring harness "A" is a ground wiring harness that connects the negative terminal of the battery to the ground point on the chassis.

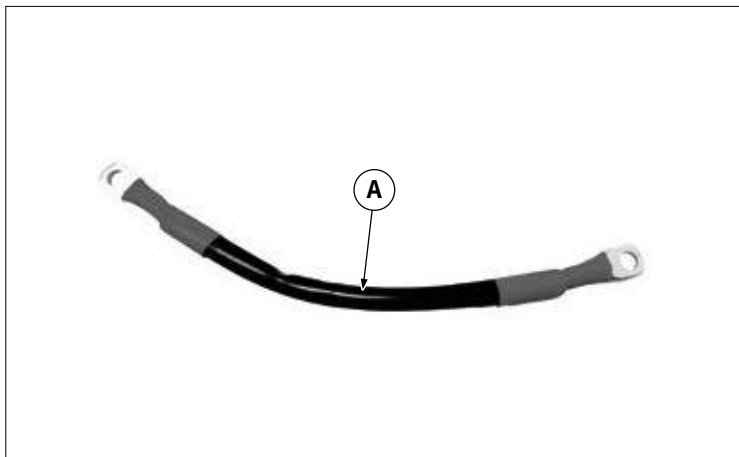


### 10.3.23 Battery positive terminal

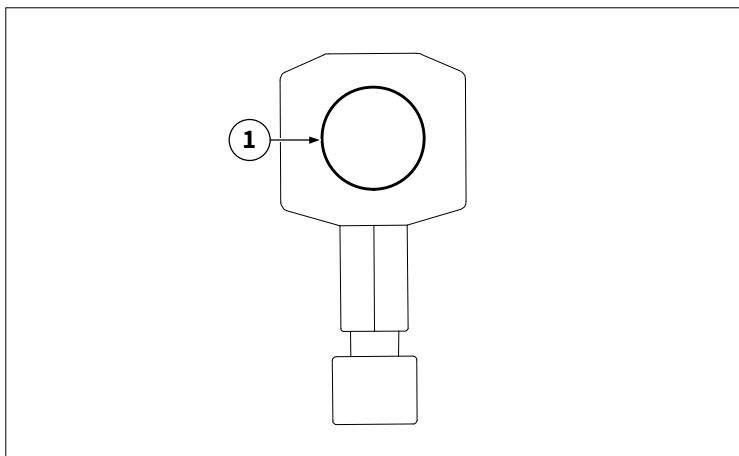
The battery positive terminal and the battery are located under the seat. Refer to "12.1 Seat removal" on page 122.



The battery positive terminal is connected to the engine starter remote control switch by means of a dedicated wiring harness "A".

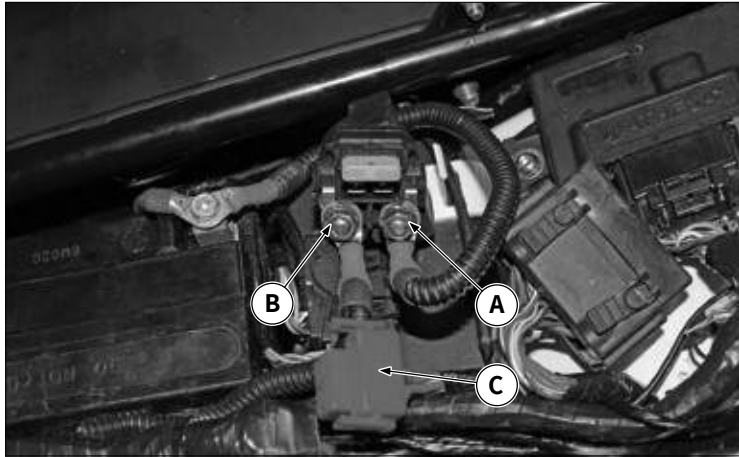


**i** The connecting wiring harness "A" is a power wiring harness to bring the charge to the starter remote switch to turn the vehicle on.



Pin	Colour	Function
1	R	Battery positive terminal



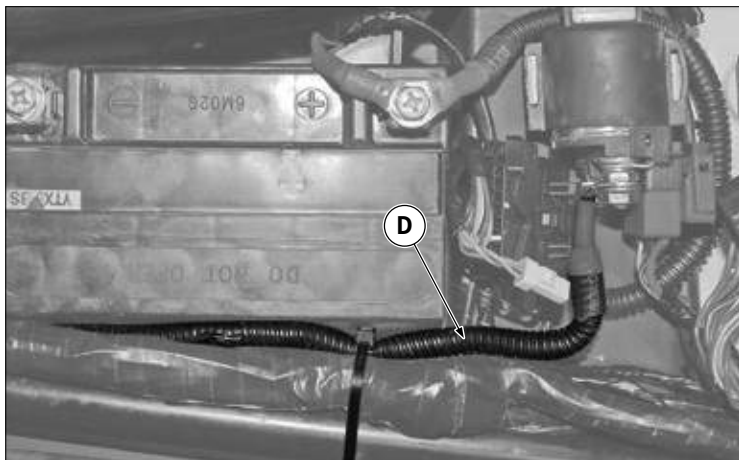


#### 10.3.24 Starter remote control switch

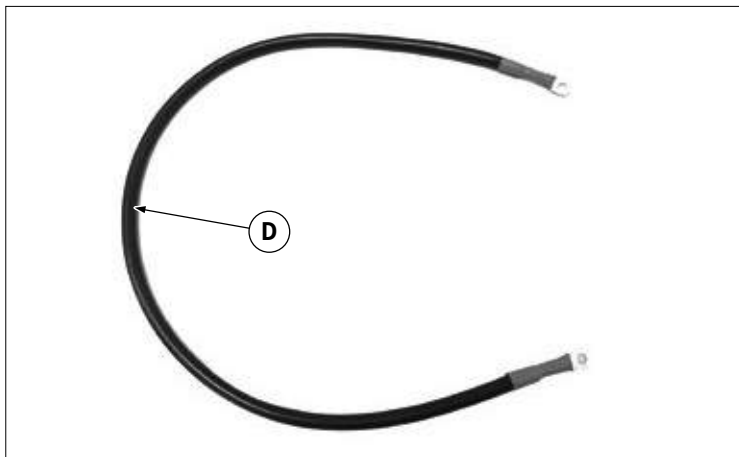
The starter remote control switch is located under the seat. Refer to "12.1 Seat removal" on page 122.

The remote control switch is equipped with three connections:

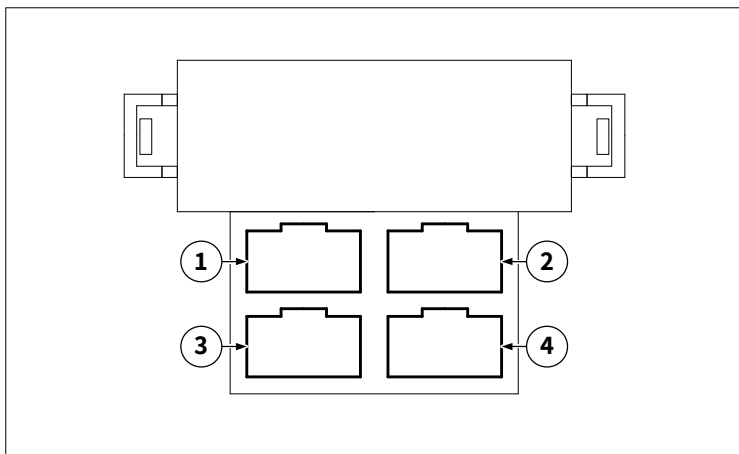
- A. Connection with nut to the charge wiring harness from the battery;
- B. Connection with nut to the charge wiring harness to the engine starter motor;
- C. Interface connector to the vehicle system.



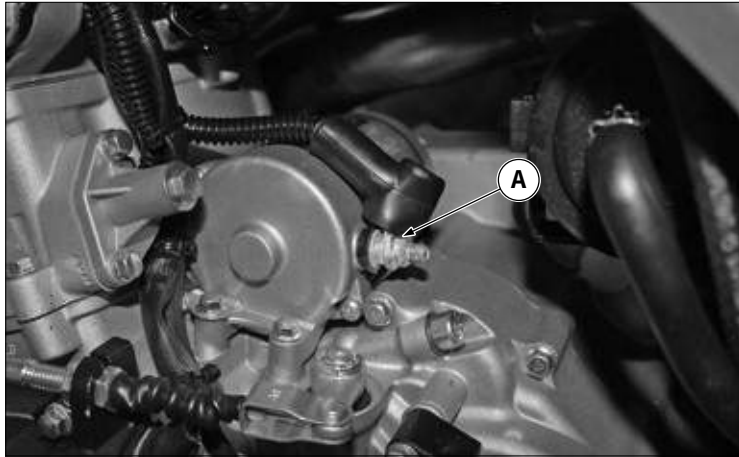
The starter remote control switch connector "B" supplies the power load to the engine starter motor by means of a specific wiring harness "D".



**i** The connecting wiring harness "D" is a power wiring harness to bring the charge to the starter motor to turn the vehicle on.



Pin	Colour	Function
1	R	Power load output from main fuse for fuses 4 and 5
2	R	Power load output from main fuse for key switch
3	N-V	Consent input (+) from left light stalk
4	Az	Consent input by engine start button

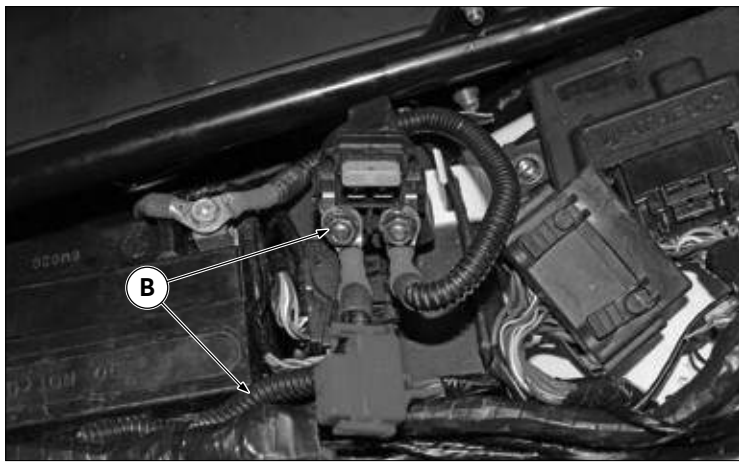


### 10.3.25 Starter motor

The engine starter motor is in a central position, located outside the engine unit at the cylinder base.

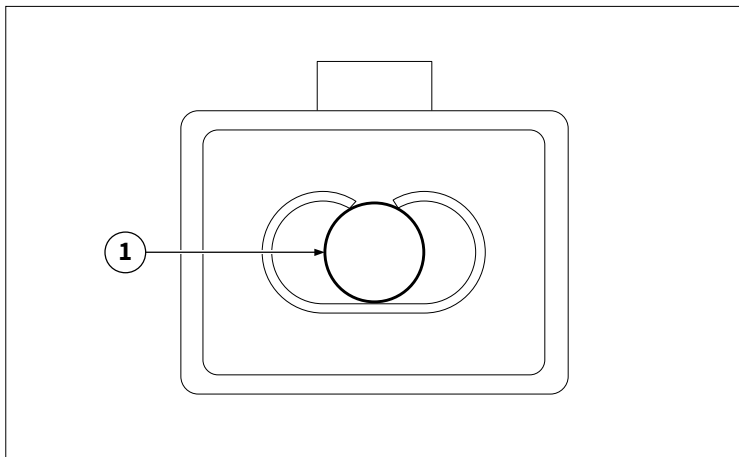
Access to the power connection “A” is direct from the right side of the vehicle.

**⚠ If access to instrumental tests is difficult, remove the exhaust silencer. Refer to “12.20.1 Silencer removal” on page 160.**

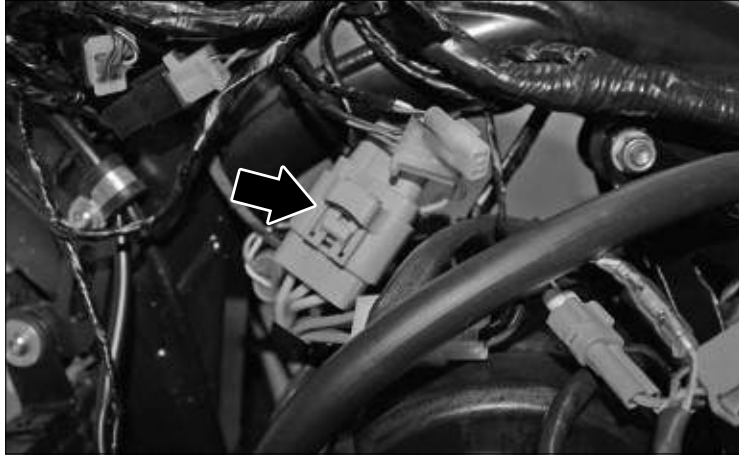


The power connection “B” of the starter motor is located under the seat. Refer to “12.1 Seat removal” on page 122.

The connection “B” connects the wiring harness connected to the engine starter remote control switch.

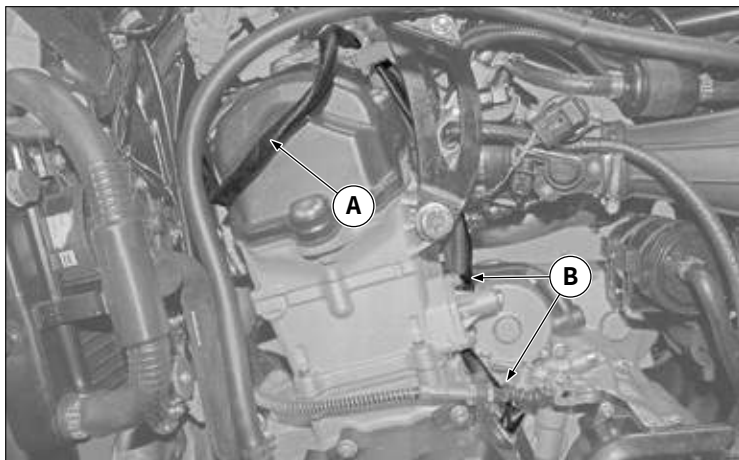


Pin	Colour	Function
1	N	Starter motor power supply input

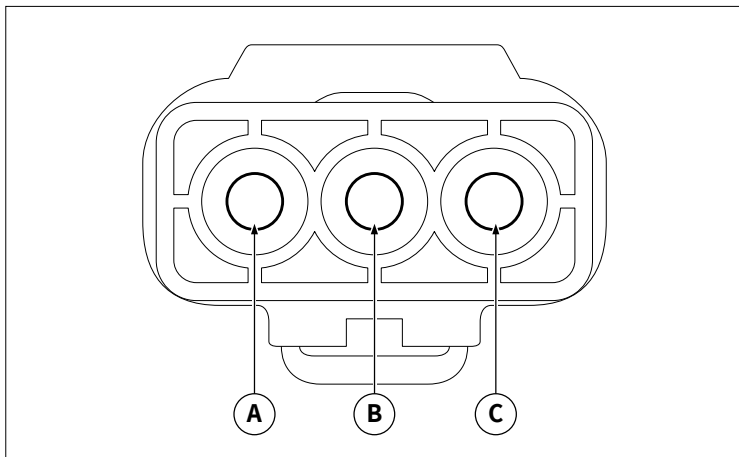


### 10.3.26 Generator

The generator connector is directly accessible: it is located under the fuel tank. If it is difficult to access it, partially remove the fuel tank.



**!** If the wiring with the generator connector is difficult to reconnect, operate on the wiring “A” removing and reinstalling the clamps “B”.



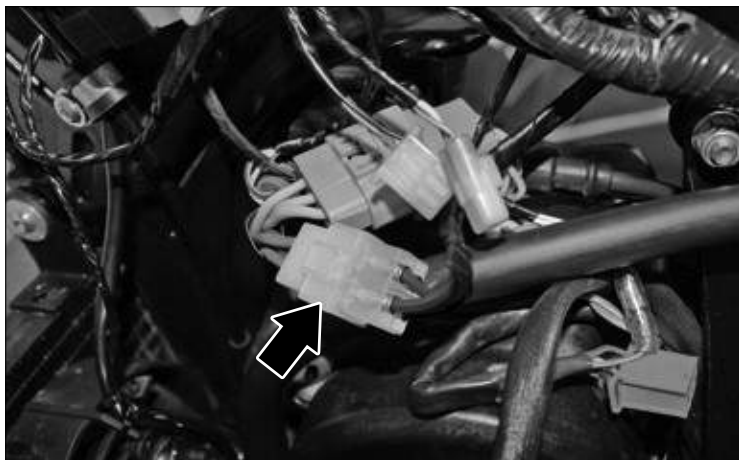
Pin	Colour	Function
A	G	Power supply from generator
B	G	Power supply from generator
C	G	Power supply from generator



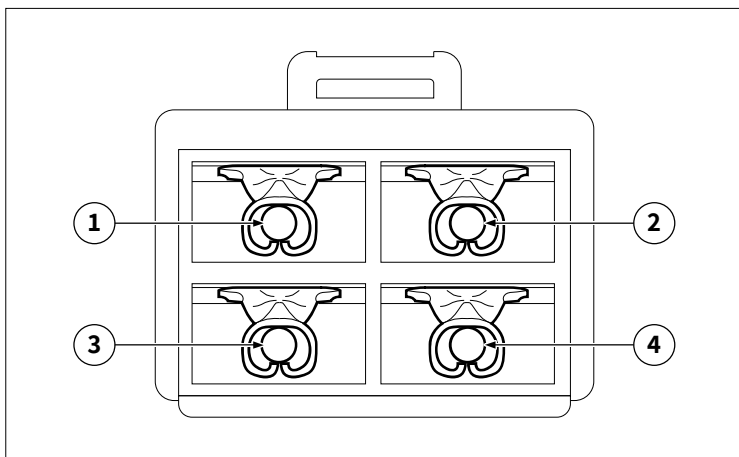
### 10.3.27 Voltage regulator

The voltage regulator is located at the engine head side on the right side of the vehicle.

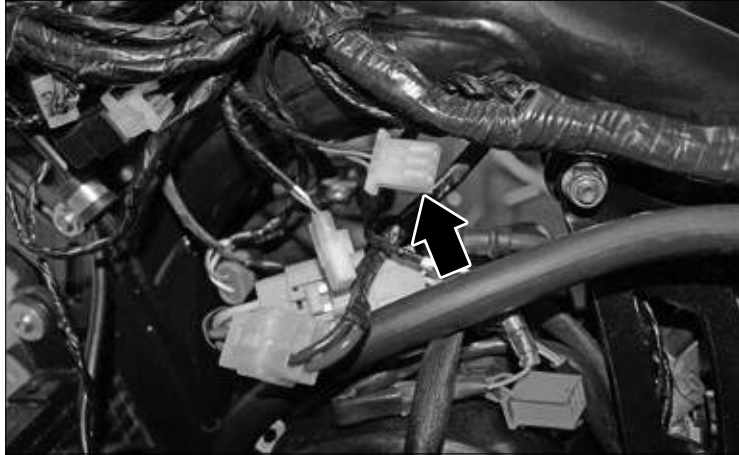
- ① The regulator (or rectifier) is a device that has the function of rectifying the current produced by the generator (or stator).
- ① It also has the function of regulating the current supplied by the alternator according to the battery voltage. The more the battery is exhausted, the greater the current supplied will be, in order to maintain the best operating conditions of the accumulator itself and vice versa.



Access to the voltage regulator connector to perform diagnostic and functional tests is easier on the left side of the vehicle.



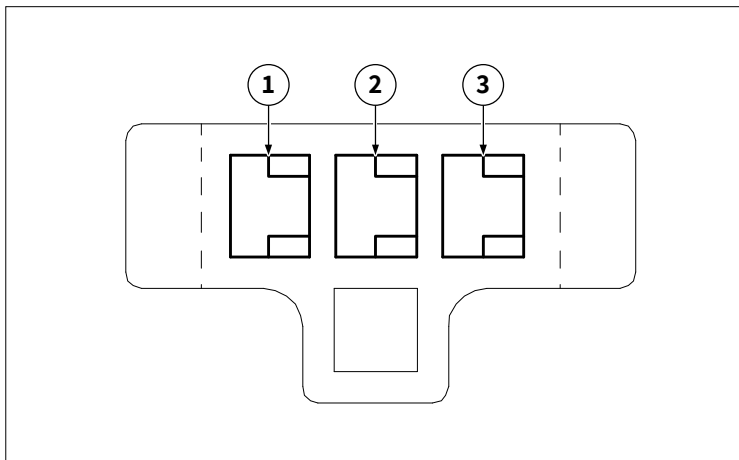
Pin	Colour	Function
1	R	Output for diode voltage regulator
2	R	Output for diode voltage regulator
3	N	Ground
4	N	Ground



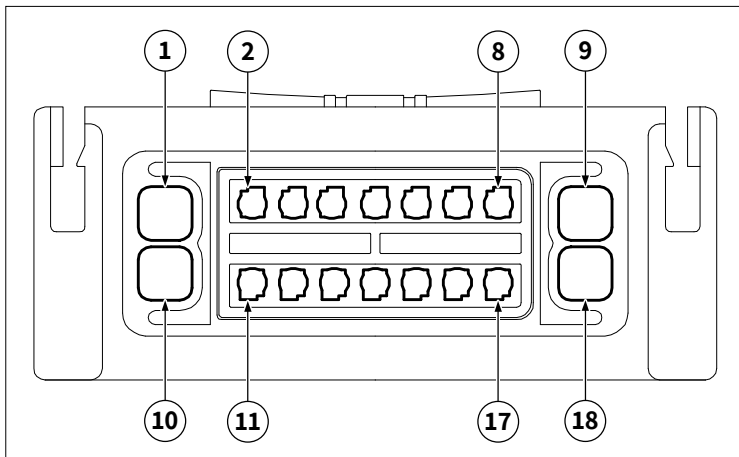
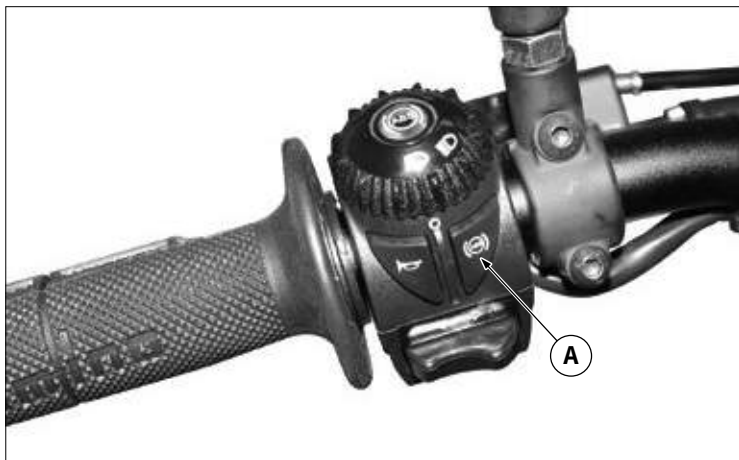
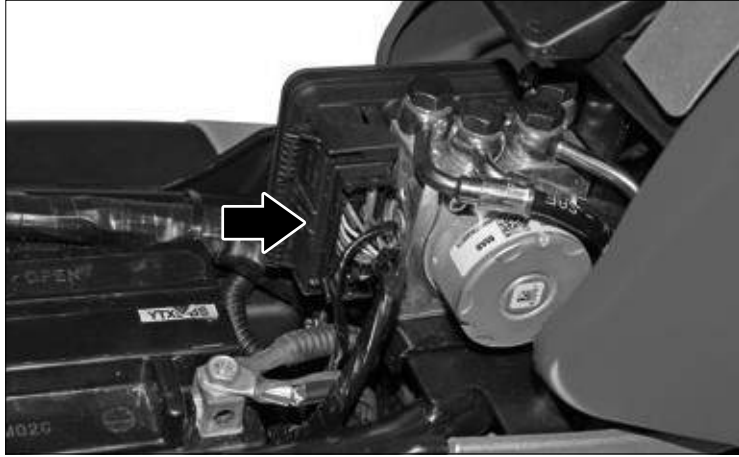
### 10.3.28 Fuel level sensor

The fuel level sensor connector is located under the fuel tank.

The level sensor connector becomes accessible at the end of the fuel tank removal operation: refer to “12.8 Fuel tank removal” on page 128.



Pin	Colour	Function
1	N	Ground
2	M-N	Output signal for fuel level warning light
3	V	Fuel level exit signal



### 10.3.29 ABS module

The connector of the ABS module is positioned under the seat; to access it, refer to "12.1 Seat removal" on page 122.

The vehicle is equipped with an ABS system that operates on both wheels. The ABS system is composed of an electro-hydraulic device which limits the pressure inside the braking system at the moment of braking.

This occurs by the detection of the tendency to block of the phonic wheels installed on the brake discs (see "12.19.7 Front ABS phonic wheel removal" on page 159) carried out by the angular speed sensors on the swingarms (see "12.19.5 Front ABS sensor removal" on page 158).

**i** When the key is turned to the "ON" position, the ABS indicator light comes on and flashes for a few seconds, then it switches off.

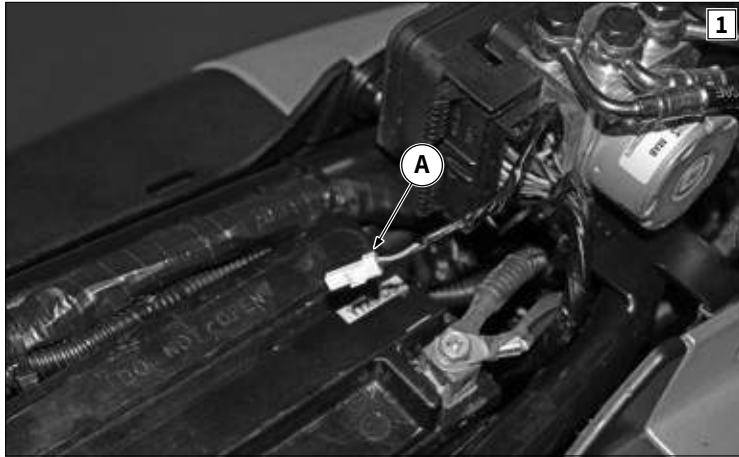
**!** In the event of a battery malfunction, the ABS system is deactivated.

**i** The ABS can be activated/deactivated by pressing, for a few seconds, the ABS button "A".

**!** In case of failure of the ABS system, the indicator light turns on, the vehicle retains the characteristics of a traditional braking system.

**!** At low speed the ABS system is not active.

Pin	Colour	Function
1	-	-
2	-	-
3	Vi	ABS warning light control signal
4	M	Key consent signal from engine control unit
5	Ro	Diagnosis line K
6	G	Signal (+) from rear ABS sensor
7	-	-
8	Ar	Signal (+) from front ABS sensor
9	-	-
10	N	Ground
11	-	-
12	Vi-N	ABS mode
13	B-Bi	Vehicle speed input signal from injection control unit
14	Gr	ABS mode selection input signal
15	Gr-N	Reference signal (-) from rear ABS sensor
16	-	-
17	Ar-N	Reference signal (-) from front ABS sensor
18	R	ABS control unit direct power supply from fuse 7

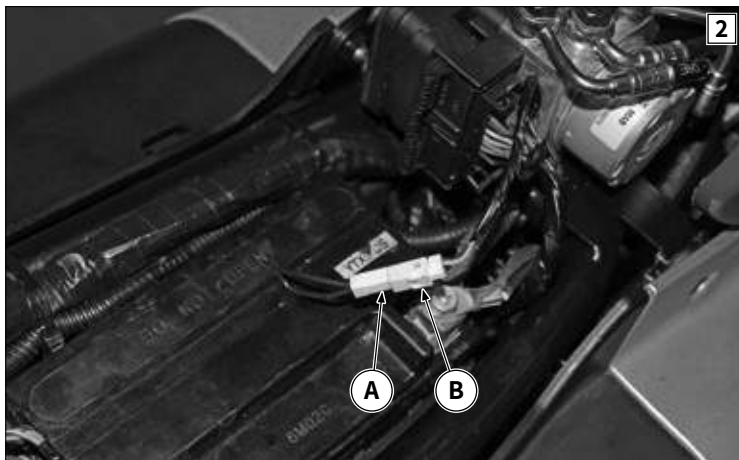


### 10.3.30 ABS mode selection connector

The ABS mode selection connector "A" is used to define the ABS system setting, depending on the vehicle model:

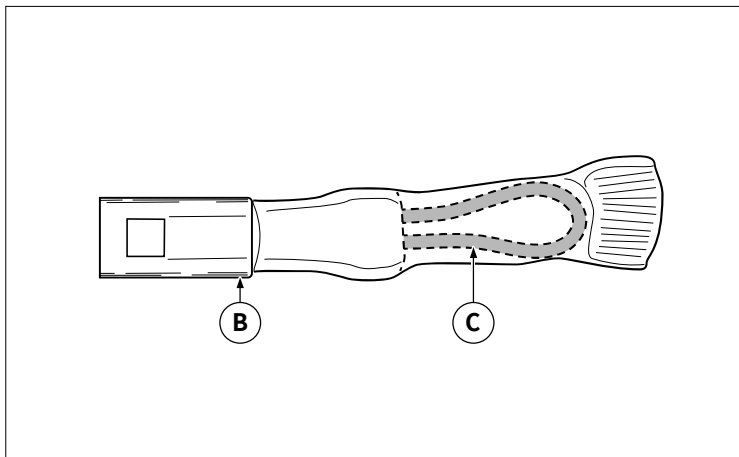
The configuration "1" is valid for the Scrambler version and there is no jumper "B".

**⚠ If the vehicle does not have a "B" jumper, do not add it or close the circuit manually.**

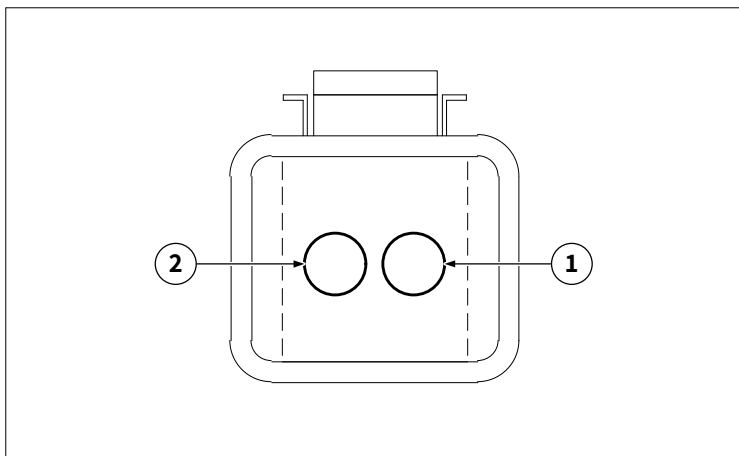


The configuration "2" is valid for the Flat Track version and requires the presence of the jumper "B".

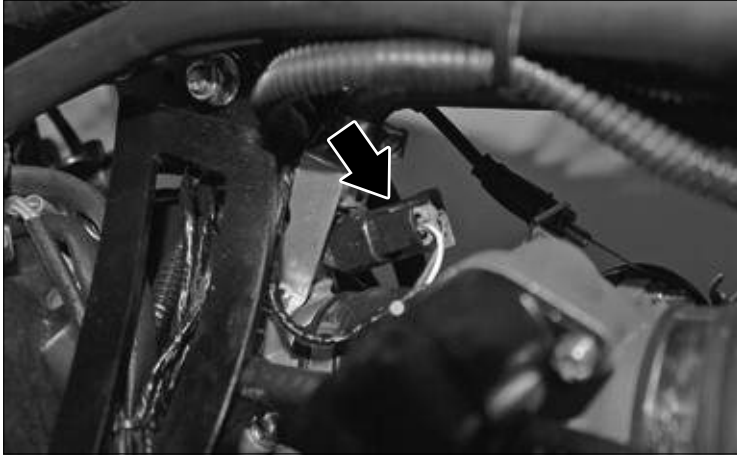
**⚠ If the vehicle has a "B" jumper, do not remove it, damage it or modify it.**



The jumper "B" consists in the presence of a wire "D": the presence of the jumper brings a positive voltage from the voltage regulator to the pin number 14 of the ABS module.

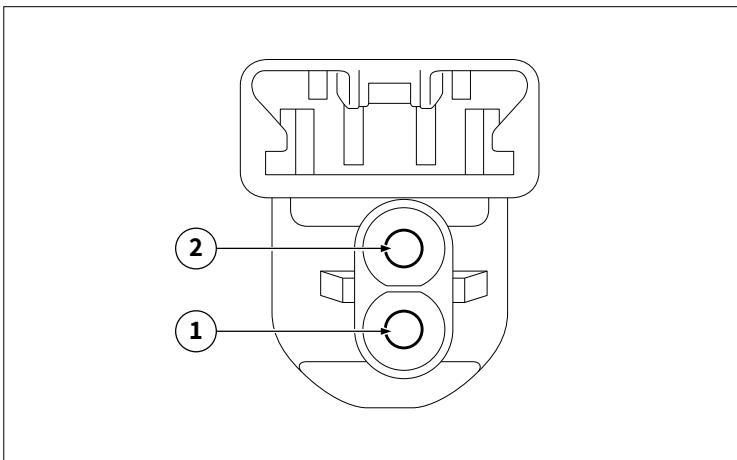


Pin	Colour	Function
1	Gr	ABS configuration input
2	N	Ground



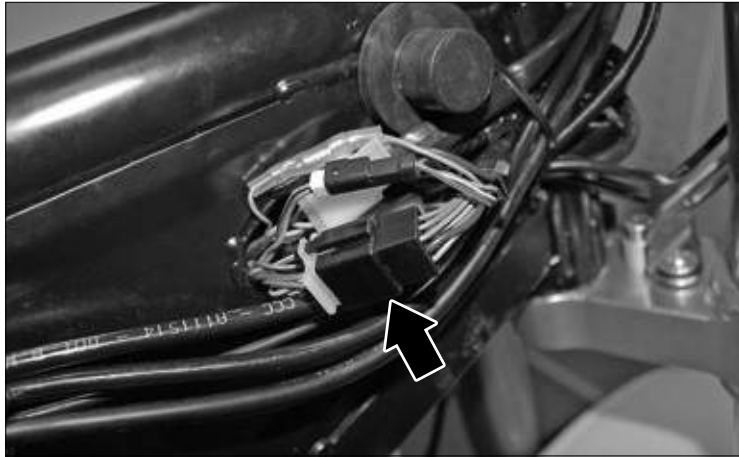
### 10.3.31 Fuel injector

The fuel injector connector is located under the tank near the cylinder head cover and is accessible by removing the tank “12.8 Fuel tank removal” on page 127



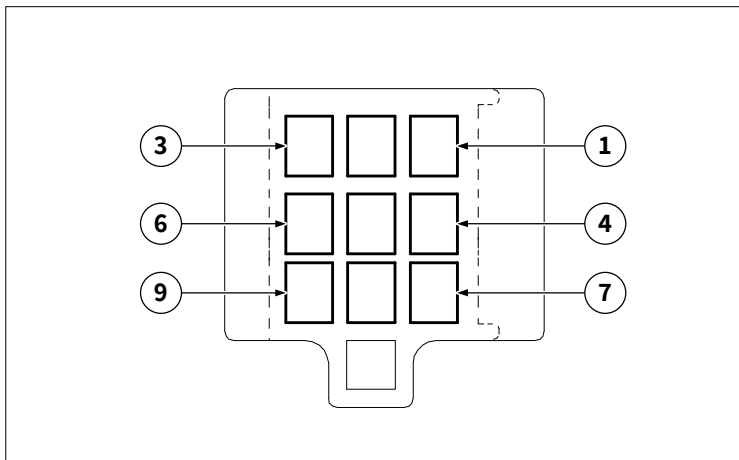
Pin	Colour	Function
1	Bi-R	Power supply with fuse 3 for fuel injector
2	Ar-N	Fuel injector control input signal



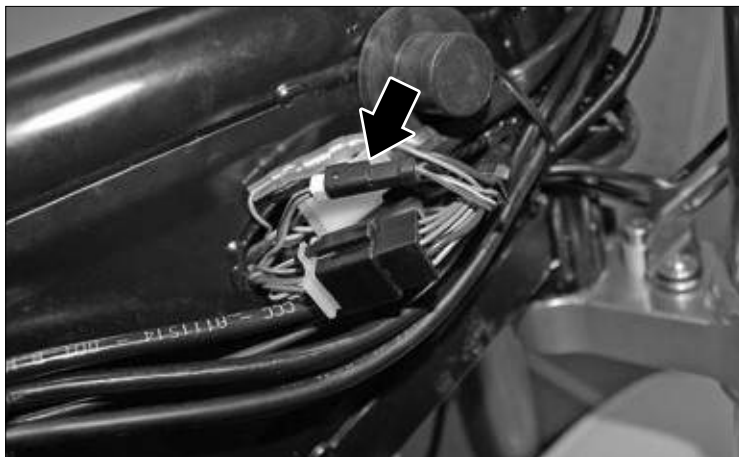


### 10.3.32 Left light stalk

The main connector (9 pin) of the left light stalk is positioned under the tank on the right side of the vehicle near the hole on the chassis for cable passage. To access it, remove the tank (refer to "12.8.2 Complete tank removal" on page 128").

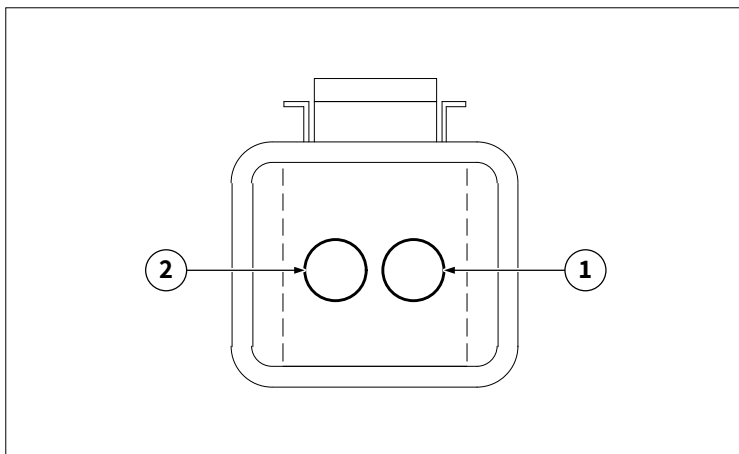


Pin	Colour	Function
1	G-R	Low beam headlight control
2	G	High beam headlight control
3	N	Ground
4	R-V	Consent signal (+) from light logic relay
5	Gr	Horn actuation control
6	M-N	Key-operated power supply from fuse 1
7	Ar	Left side direction indicator control
8	B	Right side direction indicator control
9	Az	Engine start control

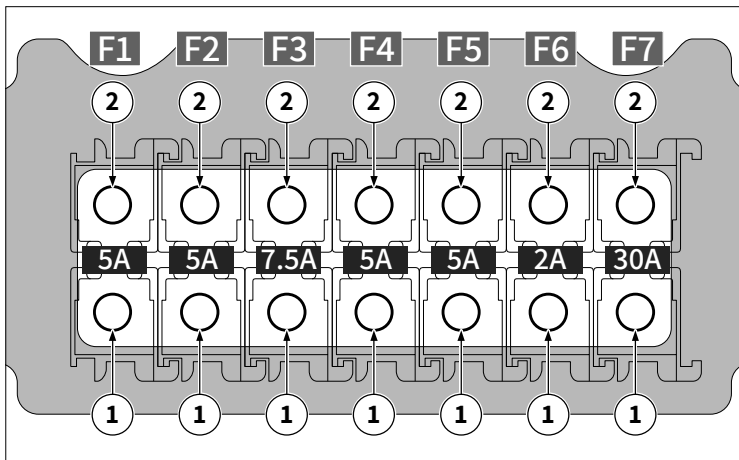
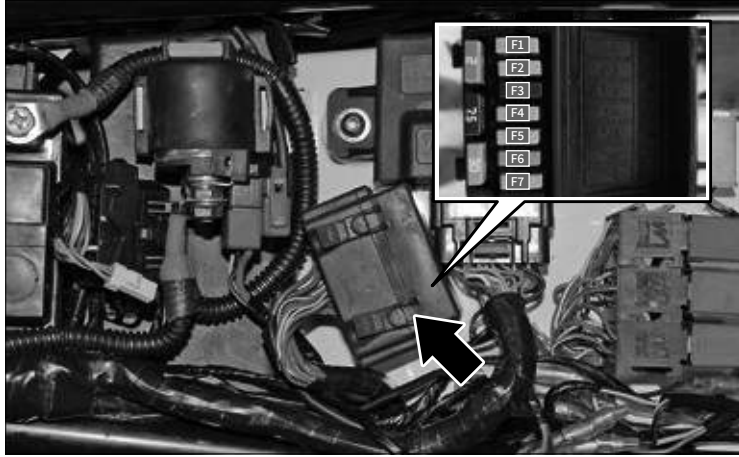


### 10.3.33 Left light stalk - secondary connector

The secondary connector (2 pin) of the left light stalk is positioned under the tank on the right side of the vehicle near the hole on the chassis for cable passage. To access it, remove the tank (refer to "12.8.2 Complete tank removal" on page 128").



Pin	Colour	Function
1	Vi-N	ABS mode
2	Vi	ABS deactivation warning light input signal



### 10.3.34 Fuse box

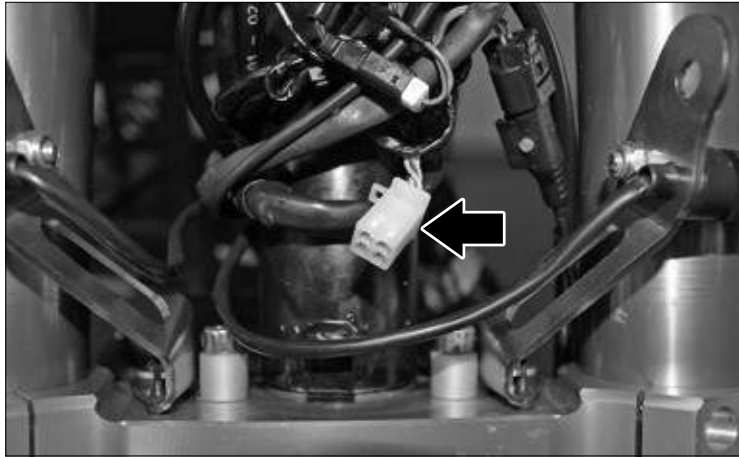
The fuse box is accessible removing the saddle (refer to “12.1 Seat removal” on page 122”).

To check the operation of the protection fuses, carry out a visual check as indicated in the procedure “10.3.42 Stepper motor” on page 75“, or perform a continuity test between the fuse pins.

Fuse/Amp.	Pin	Col.	Function
F1 (5 A)	1	M	Power supply with fuse 1 for engine control unit (key-operated), ABS control unit (key-operated), right and left light stalk, turn signals, position lights and brake light
	2	M	Key-operated power supply for fuse 1
F2 (5 A)	1	G-N	Power supply with fuse 2 for parking lights
	2	G-N	Key-operated power supply for fuse 2
F3 (7.5 A)	1	R-Bi	Power supply with fuse 3 for fuel pump, electronic injection system and OBD socket
	2	R-Bi	Power supply with main fuse for fuse 3
F4 (5 A)	1	R-G	Power supply with fuse 4 for front light and rear light
	2	R	Power supply with main fuse for fuse 4
F5 (5 A)	1	R-B	Supply with fuse 5 for engine cooling fan
	2	R	Power supply with main fuse for fuse 5
F6 (2 A)	1	R-V	Power supply with fuse 6 for engine control unit (direct power supply)
	2	R	Power supply with battery for fuse 6
F7 (30 A)	1	R	Power supply with fuse 7 for ABS control unit (direct power supply)
	2	R	Power supply with battery for fuse 7

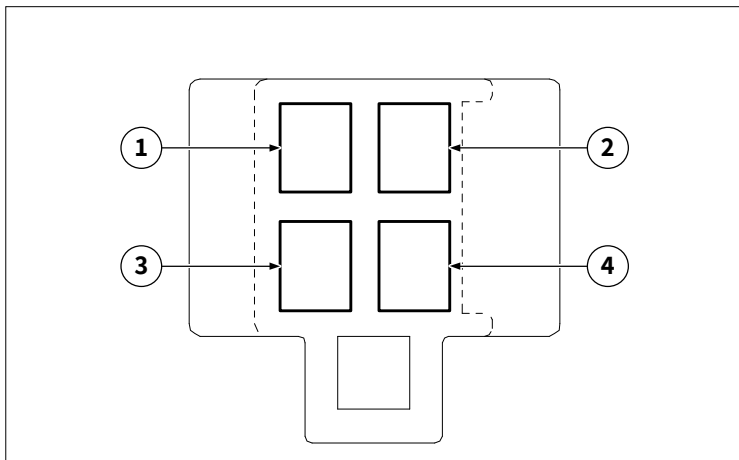
**⚠ To carry out diagnostic checks on the fuses, carefully pull the fuse box out of the recessed compartment.**

**i The fuse box is inserted in a rubber case which contains three spare fuses (2 A, 7.5 A, 30 A).**



### 10.3.35 Front headlight

The front headlight connector is located behind the lower cover of the digital dashboard. To access it, refer to “10.7 Dashboard” on page 82”.

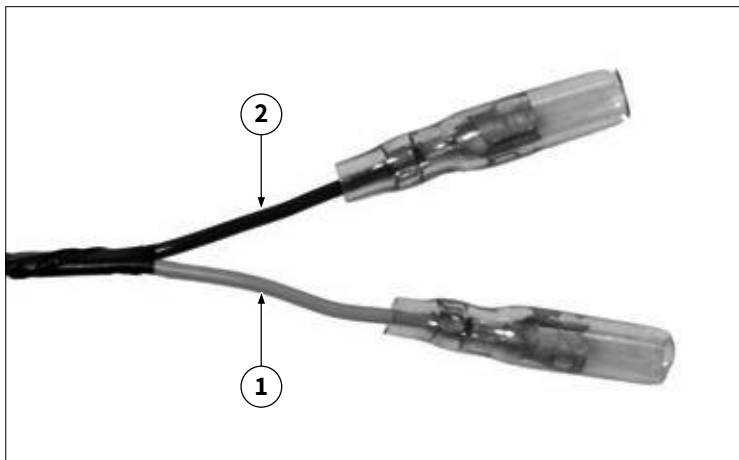


Pin	Colour	Function
1	G-N	Input signal (+) front light (position light)
2	G	High beam headlight input signal
3	G-R	Low beam headlight input signal
4	N	Ground



### 10.3.36 Left front turn signal

The left front turn signal connectors are located under the fuel tank inside the cable path slot on the front of the frame. To access remove the tank: refer to “12.8.2 Complete tank removal” on page 128.

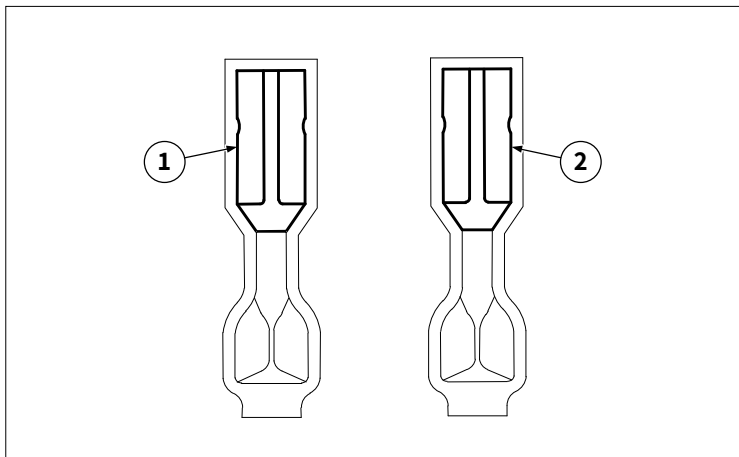


The connectors on the vehicle wiring side are identified as shown in the figure.

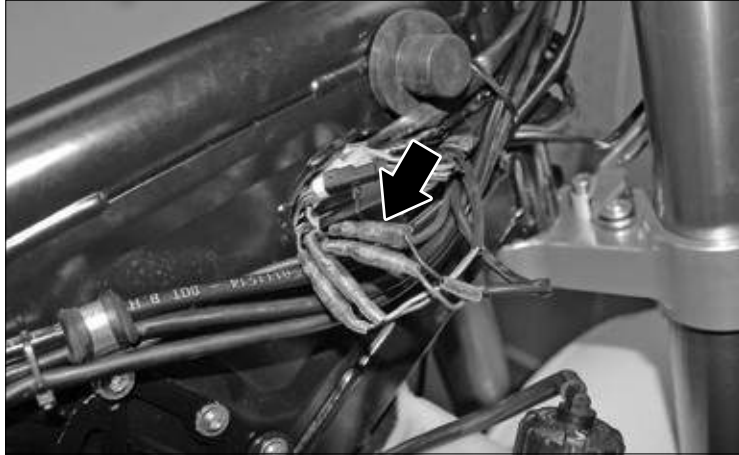
The left rear turn signal connectors are Orange (“1”) and Black (“2”).

The coupling is as follows:

1. Orange (system side) to be connected to the Blue one (device side);
2. Black (system side) to be connected to the Sky Blue one (device side).

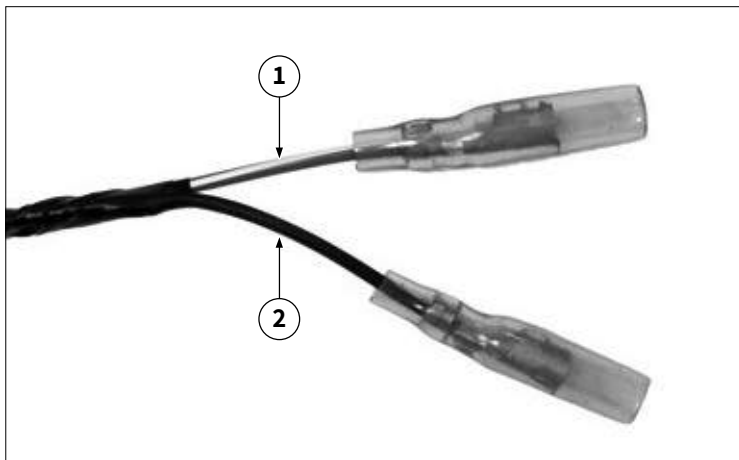


Pin	Colour	Function
1	Ar	Left front turn signal control signal
2	N	Ground



### 10.3.37 Right front turn signal

The right front turn signal connectors are located under the fuel tank inside the cable path slot on the front of the frame. To access remove the tank: refer to “12.8.2 Complete tank removal” on page 128.

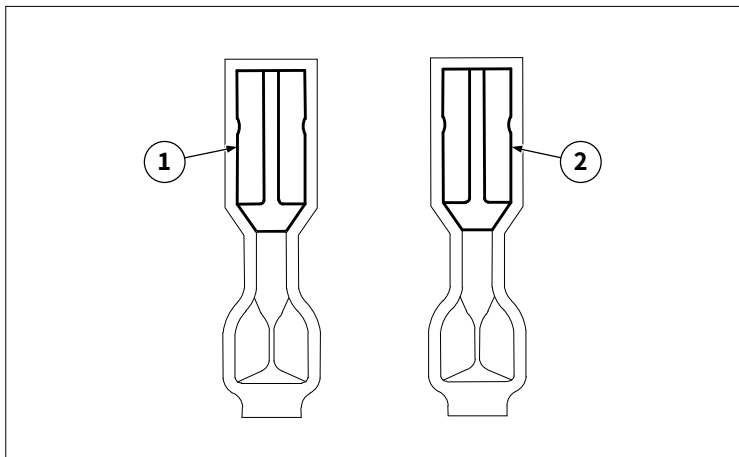


The connectors on the vehicle wiring side are identified as shown in the figure.

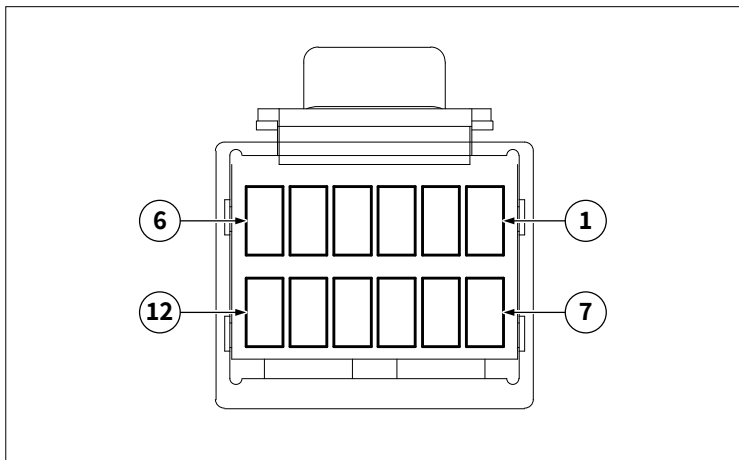
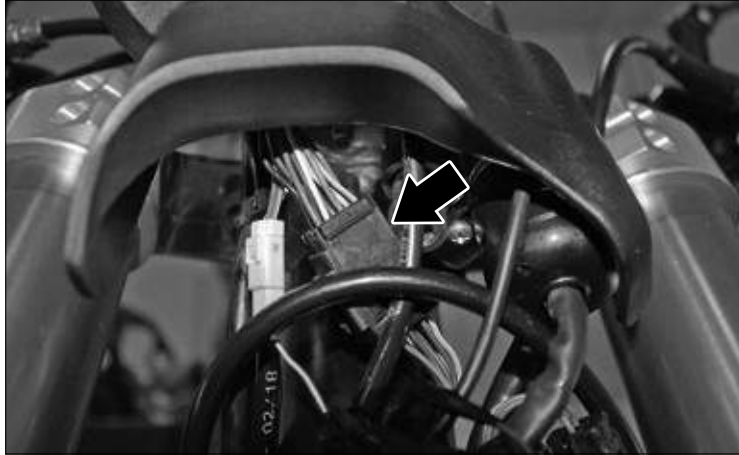
The front right turn signal connectors are Blue-White (“1”) and Black (“2”).

The coupling is as follows:

1. Blue (system side) to be connected to Black-Red (device side);
2. Black (system side) to be connected to the Blue one (Device side);



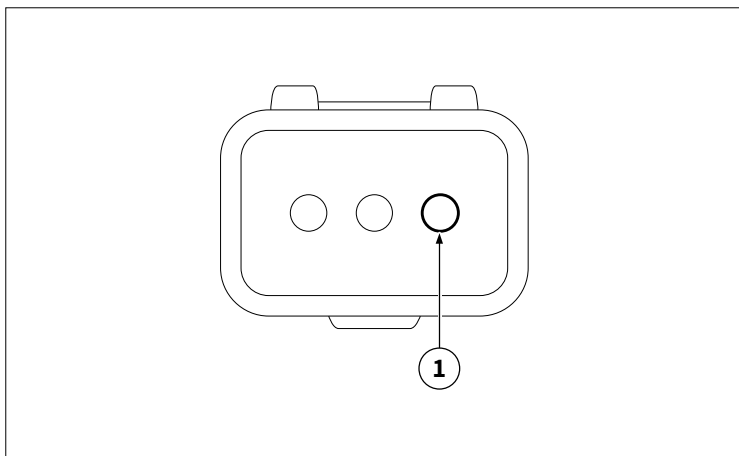
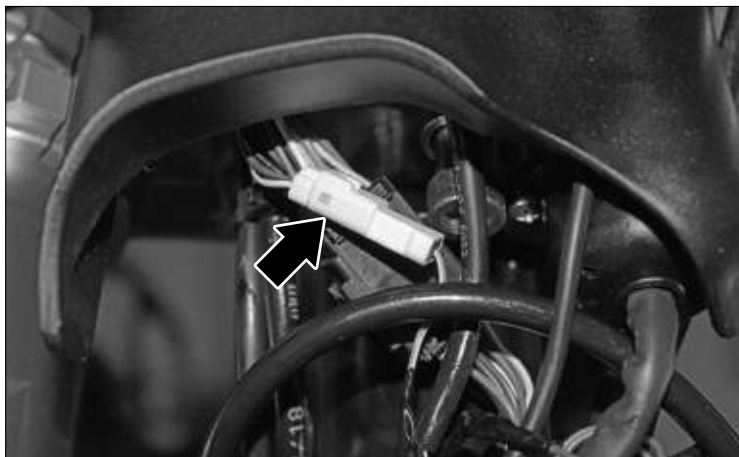
Pin	Colour	Function
1	B	Front right turn signal control signal
2	N	Ground



### 10.3.38 Dashboard

The main connector (12 pins) of the dashboard is located under the lower cover of the dashboard and the ignition lock. To access it, refer to “10.7.1 Dashboard removal” on page 82“.

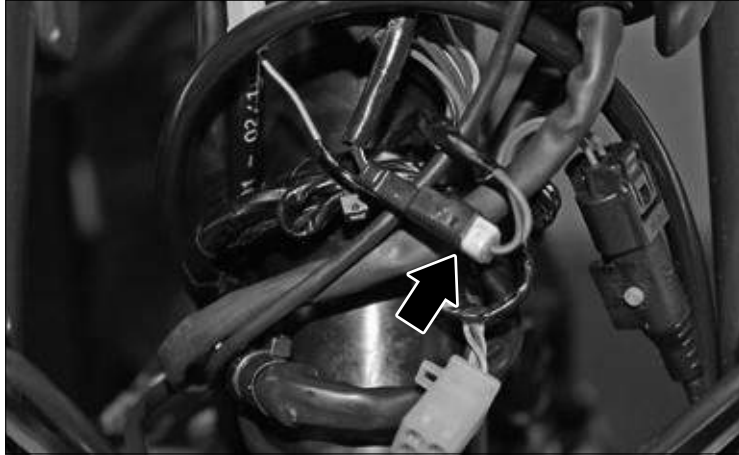
Pin	Colour	Function
1	N	Ground
2	Vi-G	Engine attention input signal (MIL warning light)
3	M-R	Vehicle speed input signal
4	Ar	Left side the turn signals warning light input signal
5	B	Right side the turn signals warning light input signal
6	M	Consent signal (+) from key
7	V	Fuel level input signal
8	Bi	Neutral gearshift switch signal
9	R	Power supply from main fuse
10	-	-
11	M	Consent signal (+) from key
12	Bi-G	High beam warning light signal



### 10.3.39 Dashboard - secondary connector

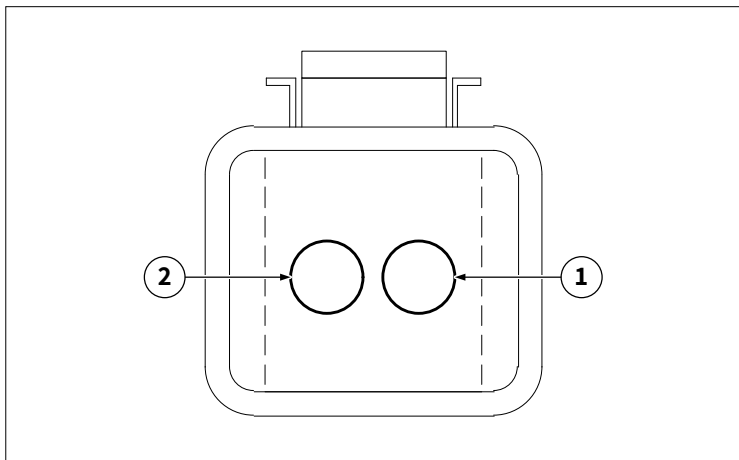
The secondary connector (3 pins) of the dashboard is located under the lower cover of the dashboard and of the ignition block. To access it, refer to “10.7.1 Dashboard removal” on page 82“.

Pin	Colour	Function
1	B-Bi	Vehicle speed input signal from injection control unit
2	-	-
3	-	-

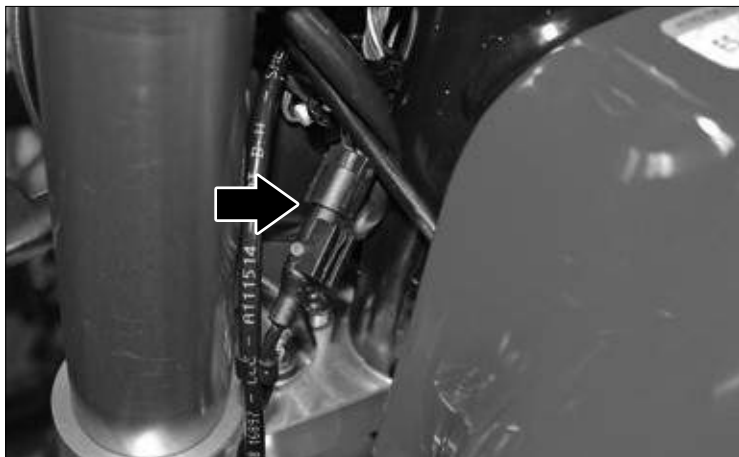


#### 10.3.40 Fuel reserve indicator light

The fuel reserve warning light connector is located under the lower cover of the dashboard and of the ignition block. To access it, refer to “10.7.1 Dashboard removal” on page 82“.

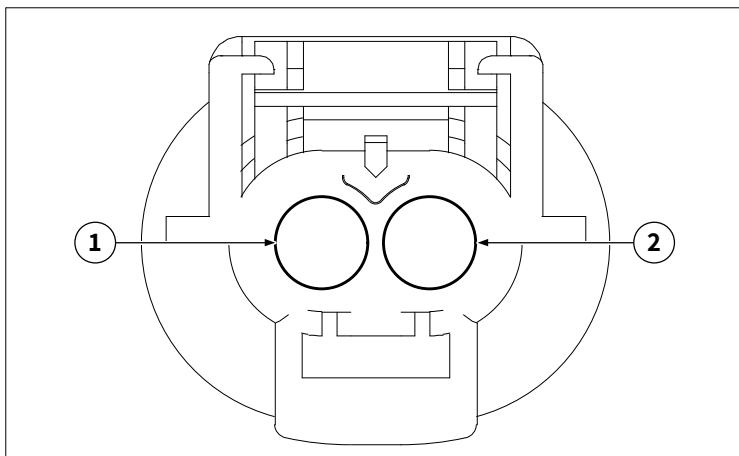


Pin	Colour	Function
1	M	Fuel reserve warning light input signal
2	M-N	Fuel reserve warning light output signal

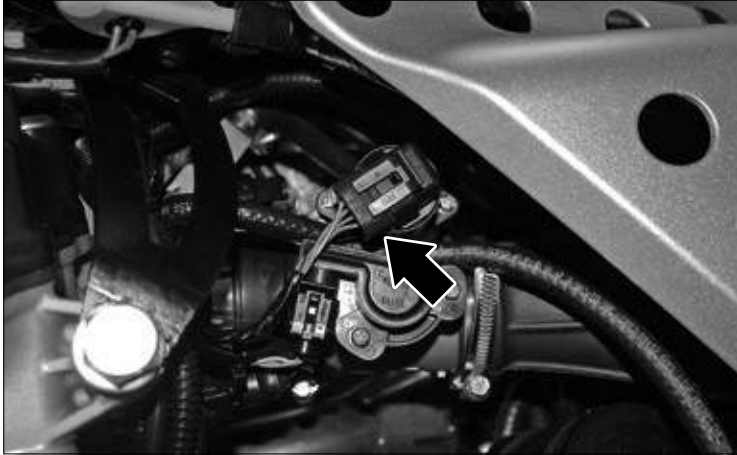


#### 10.3.41 Front ABS sensor

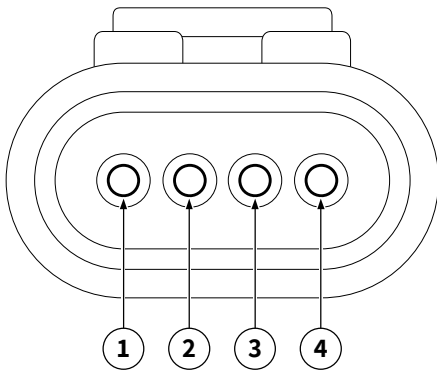
The front ABS sensor connector is located under the lower cover of the dashboard and of the ignition block. To access it, refer to “10.7.1 Dashboard removal” on page 82“.



Pin	Colour	Function
1	Ar-N	Reference signal (-) front ABS sensor
2	Ar	Signal (+) front ABS sensor

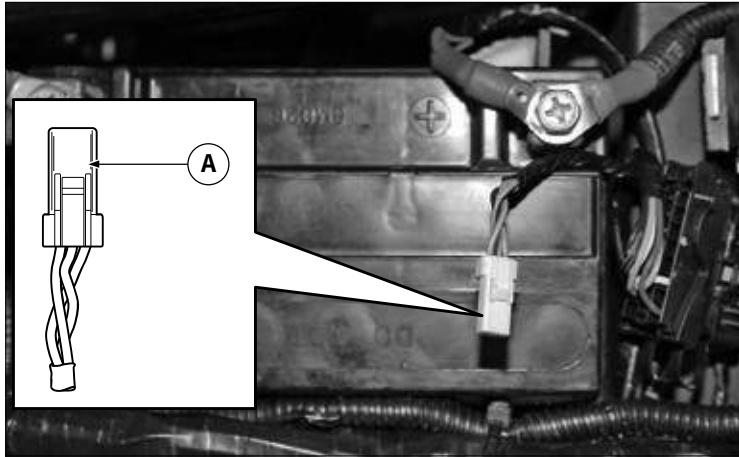
**10.3.42 Stepper motor**

The stepper motor is installed on the throttle body; the stepper motor connector is located under the tank on the left side of the vehicle and is directly accessible.



Pin	Colour	Function
1	V-Bi	Stepper motor signal A
2	V	Stepper motor signal B
3	V-N	Stepper motor signal C
4	B-V	Stepper motor signal D



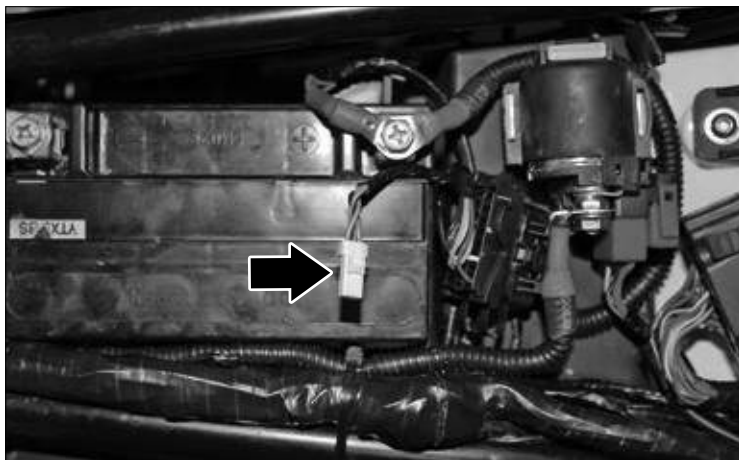


### 10.3.43 CDI control unit programming connector

This vehicle is equipped with a connector “A” for the original programming of the CDI control unit.

**i** This connector is used exclusively for programming the original mapping of the CDI control unit

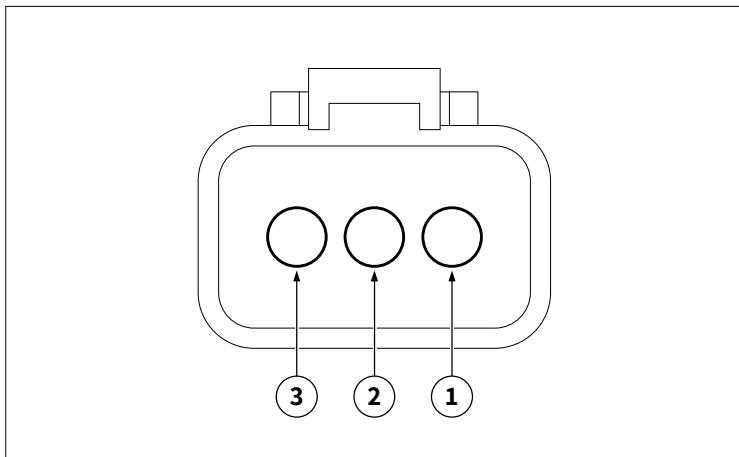
**!** Always leave the connector unconnected in any way. This communication port must never be used: it is not to be considered to carry out diagnosis or updates to the CDI control unit



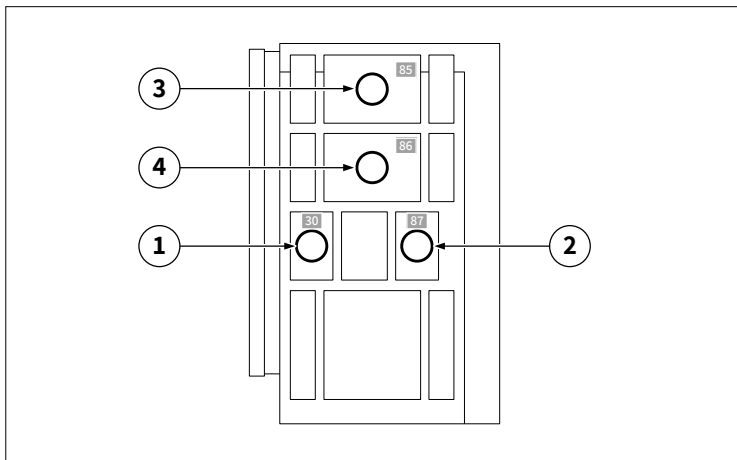
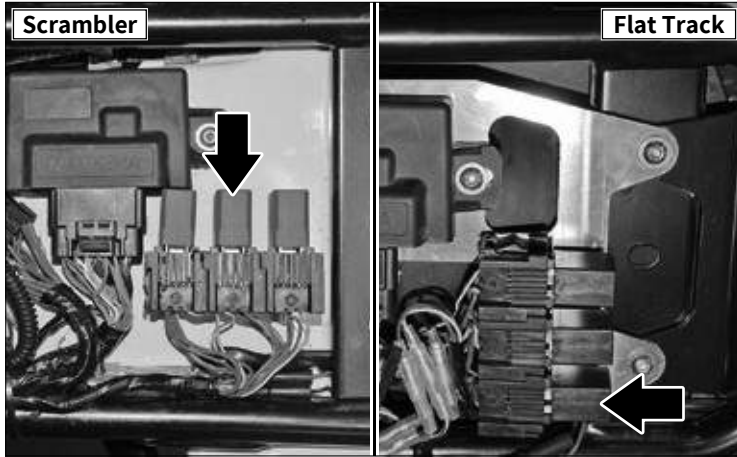
The CDI control unit programming connector is located under the saddle between the control unit and the fuse box.

To access it remove the saddle (refer to “12.1 Seat removal” on page 122”).

**i** For the diagnosis of the CDI control unit refer to the OBDII port (“10.3.13 OBD diagnosis connector” on page 50”).



Pin	Colour	Function
1	B-G	Input (TX) communication interface
2	Ro-N	Output (RX) communication interface
3	Vi-N	Communication interface reference ground



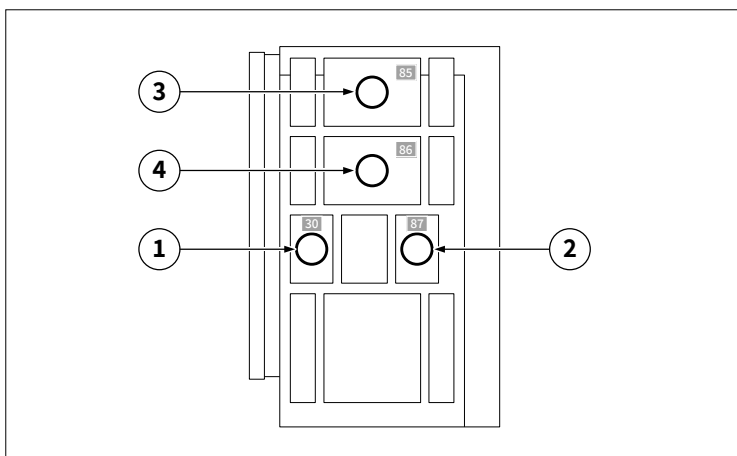
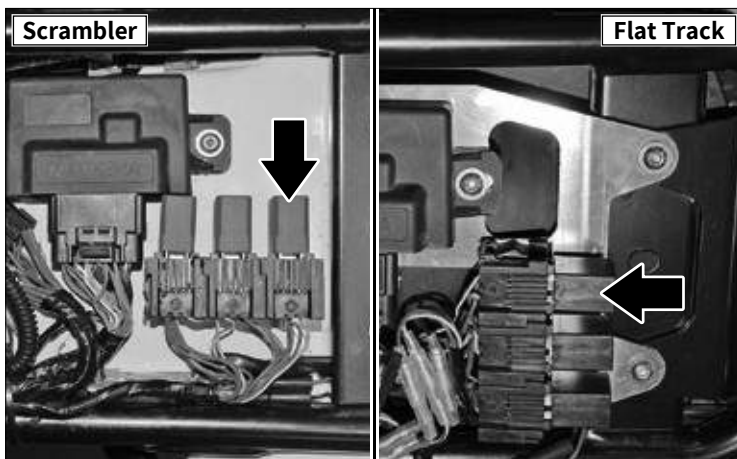
#### 10.3.44 Light remote control switch

The light remote control switch is positioned under the saddle. To access it, remove the saddle (refer to "12.1 Seat removal" on page 122").

- i** The remote control switch and its connector can be replaced individually.
- i** The type of remote control switch is: 30 A normally open.

Pin <sup>[1]</sup>	Pin <sup>[2]</sup>	Colour	Function
1	85	Gr-B	Signal for lights logic consent (85) from injection control unit
2	86	R-Bi	Light remote control switch consent input (86)
3	30	R-G	Power supply with fuse 2 for light logic (30)
4	87	R-V	Consent signal (+) light logic relay (87)

- i** The remote control switch has two pin identification modes, one sequential [1] and one functional [2].



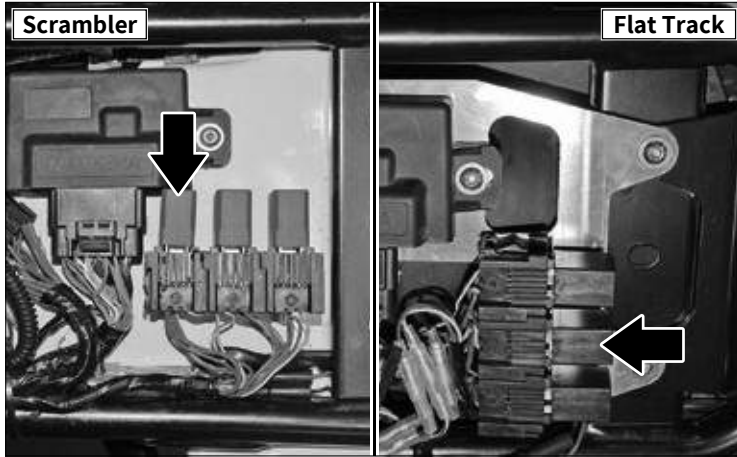
#### 10.3.45 Radiator fan remote control switch

The radiator fan remote control switch is located under the saddle. To access it, remove the saddle (refer to "12.1 Seat removal" on page 122").

- i** The remote control switch and its connector can be replaced individually.
- i** The type of remote control switch is: 30A normally open.

Pin <sup>[1]</sup>	Pin <sup>[2]</sup>	Colour	Function
1	85	G-R	Cooling fan control signal from engine control unit (85)
2	86	R-Bi	Light remote control switch consent input (86)
3	30	R-B	Supply with fuse 5 for engine cooling fan (30)
4	87	M-R	Consent signal (+) engine cooling fan (87)

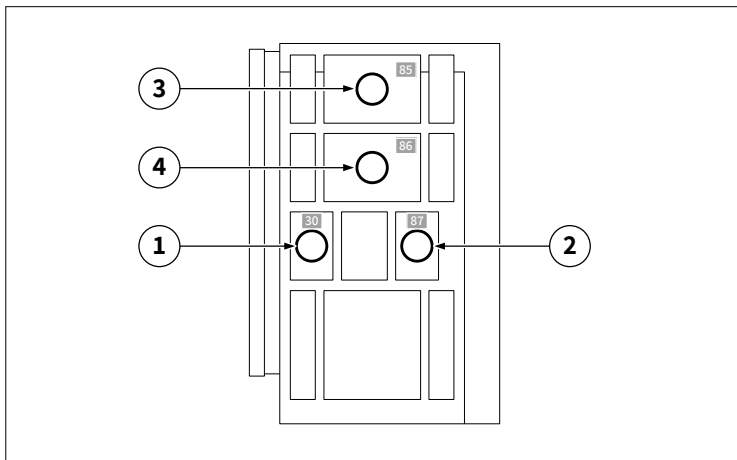
- i** The remote control switch has two pin identification modes, one sequential [1] and one functional [2].



#### 10.3.46 Motor sensor remote control switch

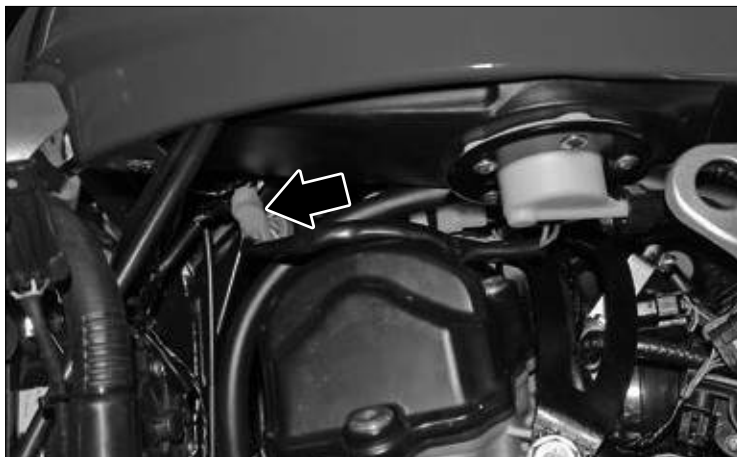
The engine sensor remote control switch is located under the saddle. To access it, remove the saddle (refer to “12.1 Seat removal” on page 122”).

- i** The remote control switch and its connector can be replaced individually.
- i** The type of remote control switch is: 30A normally open.



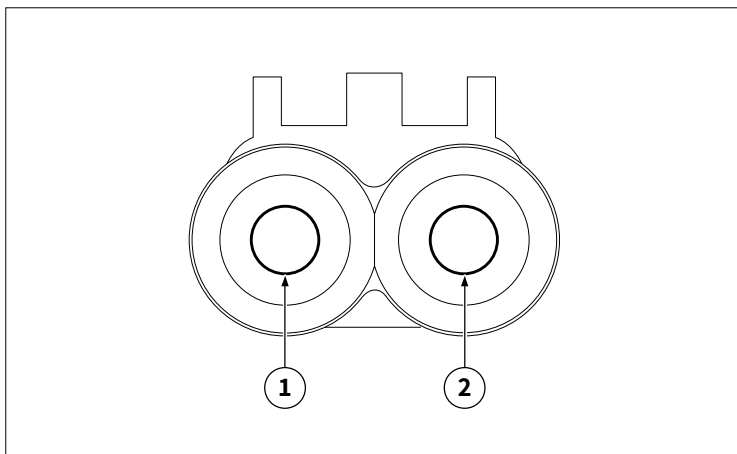
Pin <sup>[1]</sup>	Pin <sup>[2]</sup>	Colour	Function
1	85	G-V	ECR consent signal from engine control unit (85)
2	86	R	Consent signal from starter remote control switch (86)
3	30	R	Power supply input from starter remote control switch (30)
4	87	R-Bi	Output for power / lights and fan remote control consent (87)

- i** The remote control switch has two pin identification modes, one sequential [1] and one functional [2].

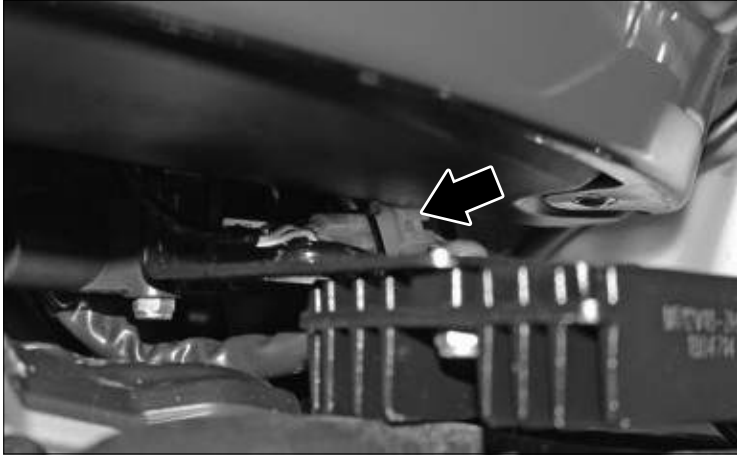


#### 10.3.47 Fuel pump

The fuel pump connector is located under the tank near the pump and just above the cylinder head cover, and is accessible directly from the left side of the vehicle.

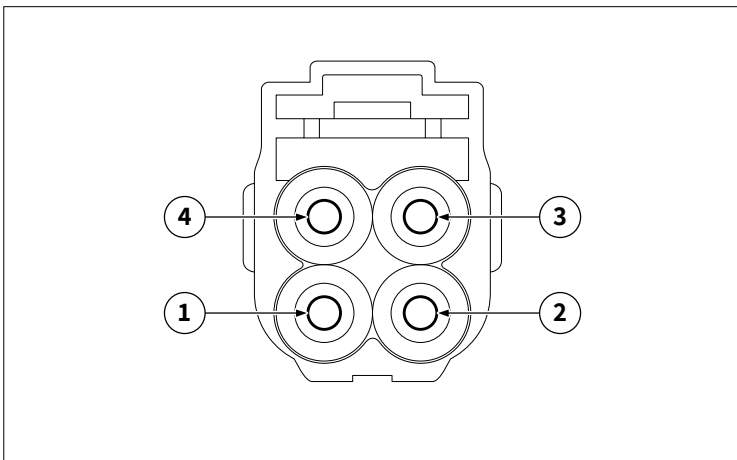


Pin	Colour	Function
1	Bi-R	Fuel pump supply fuse 3
2	B-N	Control signal (-) fuel pump from engine control unit

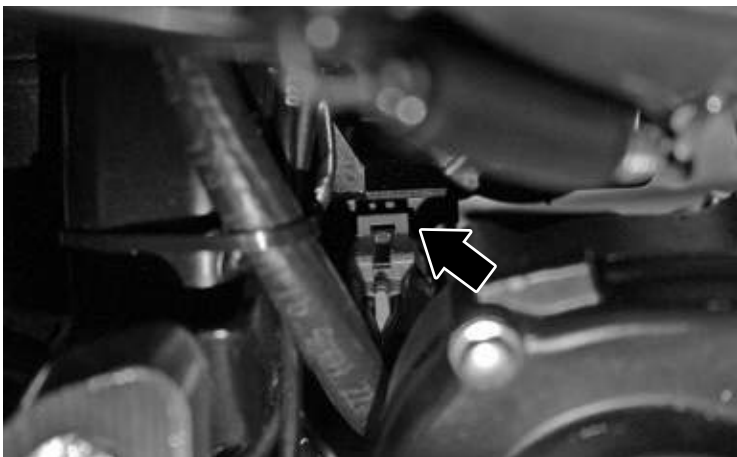


#### 10.3.48 Oxygen sensor

The Oxygen sensor connector is located under the tank just behind the cylinder head cover, and is directly accessible.

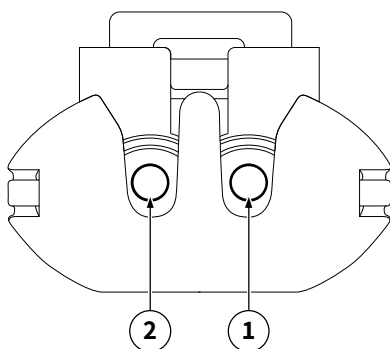


Pin	Colour	Function
1	B	Control signal (-) Oxygen sensor heater
2	Bi-R	Power supply with fuse 3 for oxygen sensor
3	Vi-N	Ground
4	N	Oxygen sensor output signal

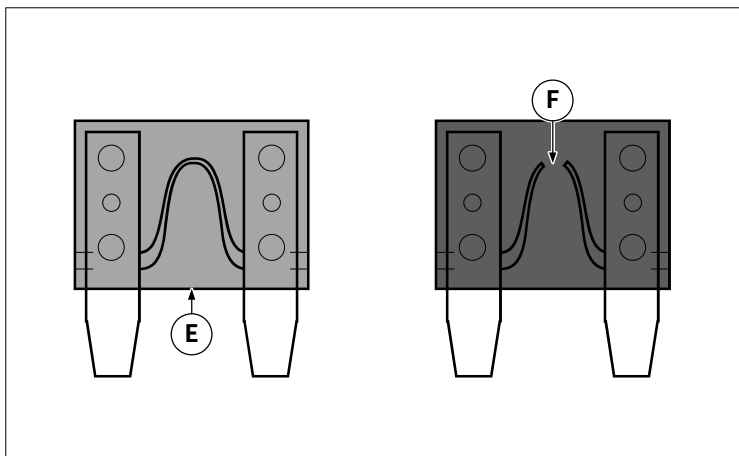
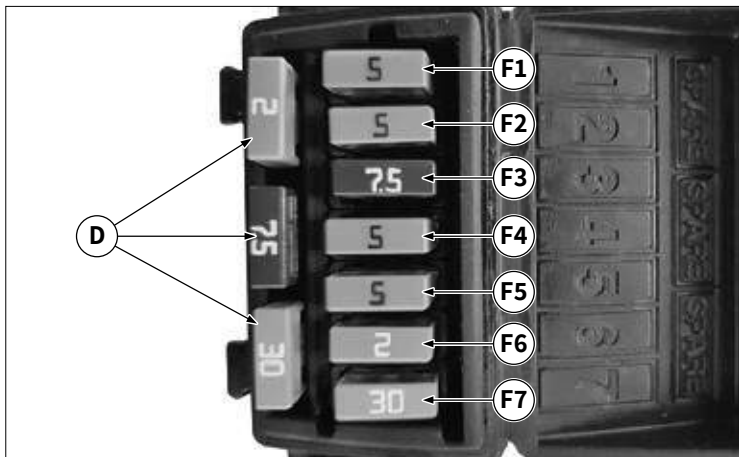
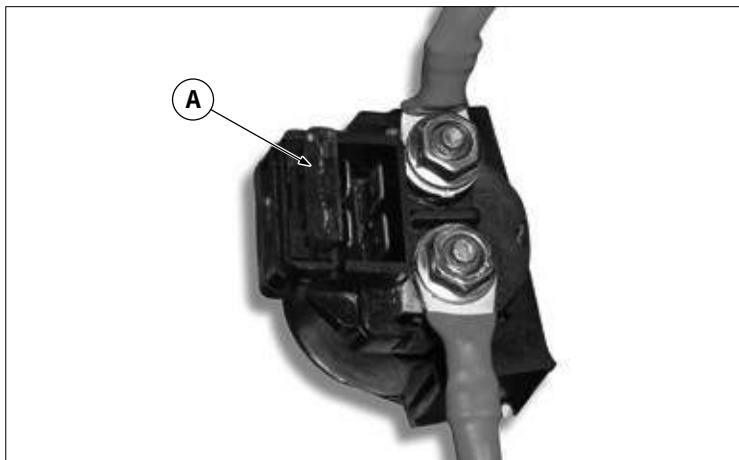
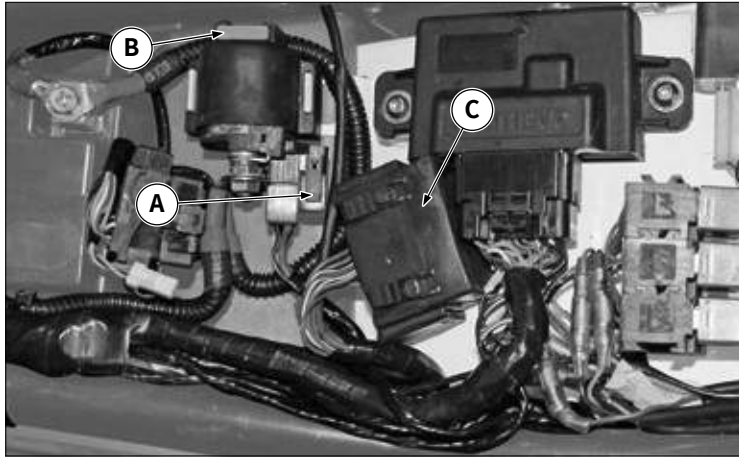


#### 10.3.49 Canister solenoid valve

The canister solenoid valve connector is located under the canister filter between the vertical uprights of the engine support and the rear part of the block: it is directly accessible from the right side of the vehicle, between the exhaust pipe and the right crankcase of the engine block.



Pin	Colour	Function
1	R-Bi	Power supply with fuse 3 for canister solenoid valve
2	M-N	Canister valve control input signal



## 10.4 FUSES AND RELAYS

To check the fuses, set the ignition switch to “OFF” to avoid the risk of a short circuit.

Remove one fuse at a time and check if the filament is broken.

Replace the fuse, if damaged, with a type of the same amperage.

### Fuses arrangement

The fuses are located under the seat: to access them remove the seat (refer to “12.1 Seat removal” on page 122).

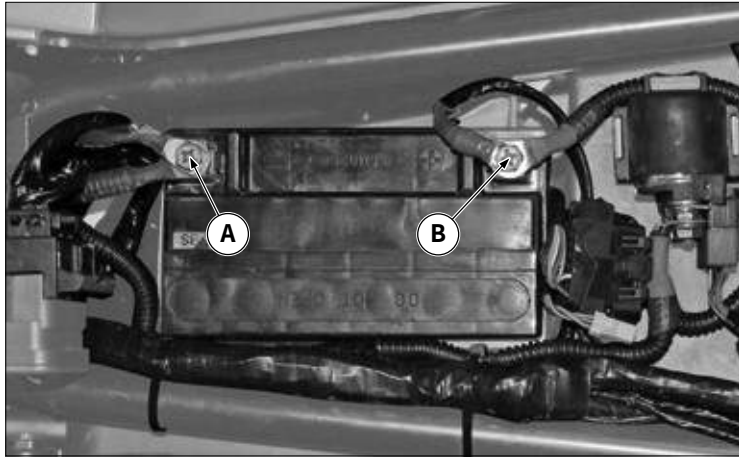
- A. Main fuse (30A)
- B. Fuse box
- C. Main spare fuse (30A)
- D. Spare fuses (2A, 7.5A, 30A)

### Fuses list

Fuse	Amp	Description
F1	5 A	Fuse for engine control unit (key-operated power supply), ABS control unit (key-operated power supply), right and left light stalk, turn signals, position lights, brake light.
F2	5 A	Parking light fuse.
F3	7.5 A	Fuel pump, electronic injection system and OBD socket fuse.
F4	5 A	Front light and rear light fuse.
F5	5 A	Cooling fan fuse.
F6	2 A	Engine control unit fuse (direct power supply).
F7	30 A	ABS control unit fuse (direct power supply).

⚠ Do not repair faulty fuses and never use a fuse of a different power rating than specified, it could cause a short circuit and consequently the risk of fire.

⚠ A blown fuse “F” can be recognized by a working fuse “E” for the blown or interrupted internal conductor filament.



## 10.5 BATTERY

### 10.5.1 Battery replacement

Remove:

– Seat.

Remove screw “A” and disconnect the negative cable.

Remove screw “B” and disconnect the positive cable.

Remove the battery.

**i** Proceed in the reverse order for reassembling.

### 10.5.2 Notes on the battery

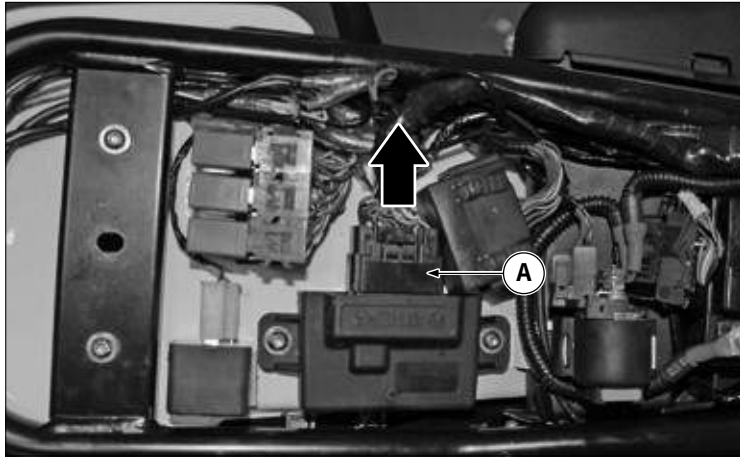
The battery supplied is sealed and the acid level can not be checked.

**i** In the event of a battery malfunction, it is recommended to replace it.

**!** Do not attempt to open or tamper with the battery.

**!** The battery fluid is corrosive. Do not pour it or spread it, especially on plastic parts.

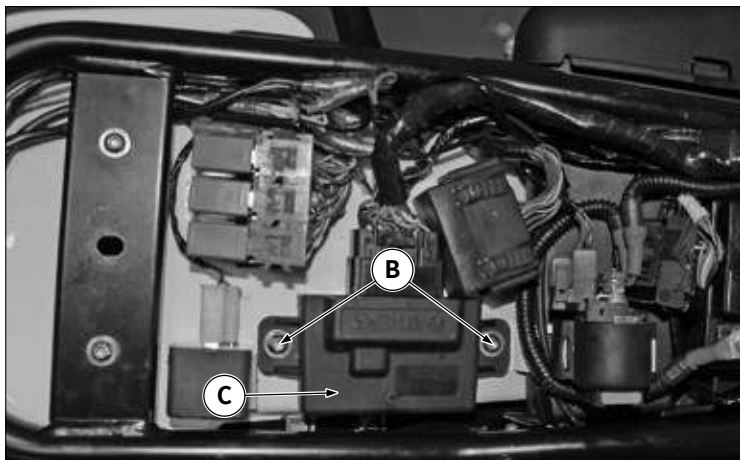
**!** Keep out of the reach of children.



## 10.6 IGNITION MODULE

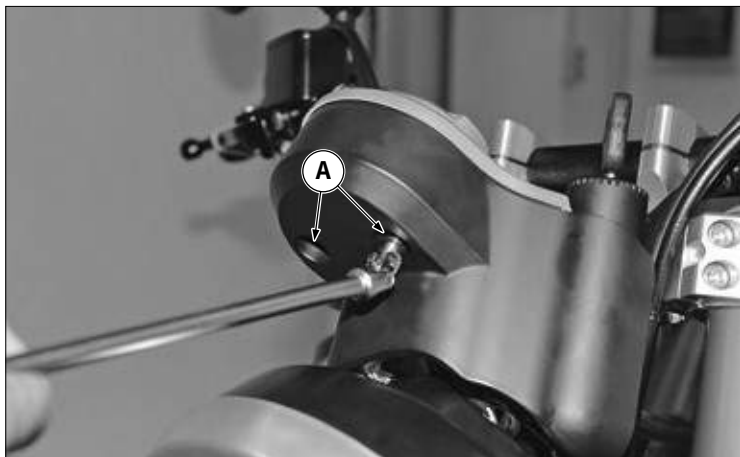
### 10.6.1 Ignition module removal

Remove the connector "A".



Remove the screws "B", then remove the module "C".

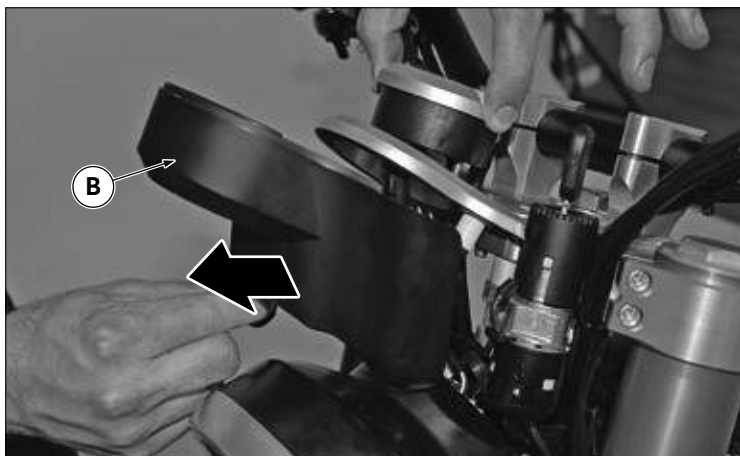
**i** Proceed in the reverse order for reassembling.



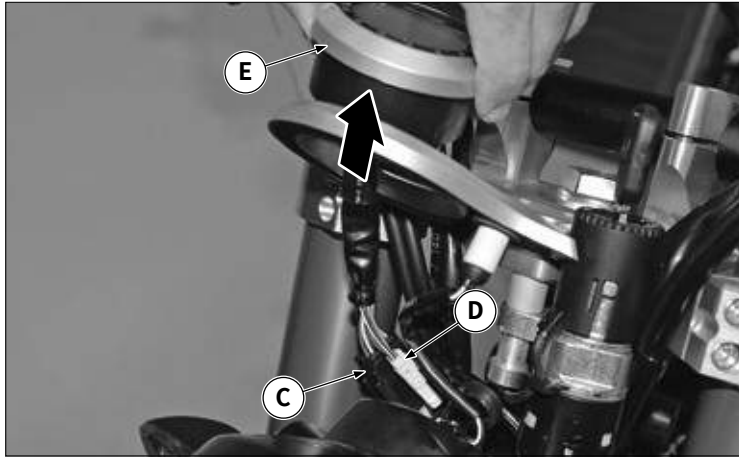
## 10.7 DASHBOARD

### 10.7.1 Dashboard removal

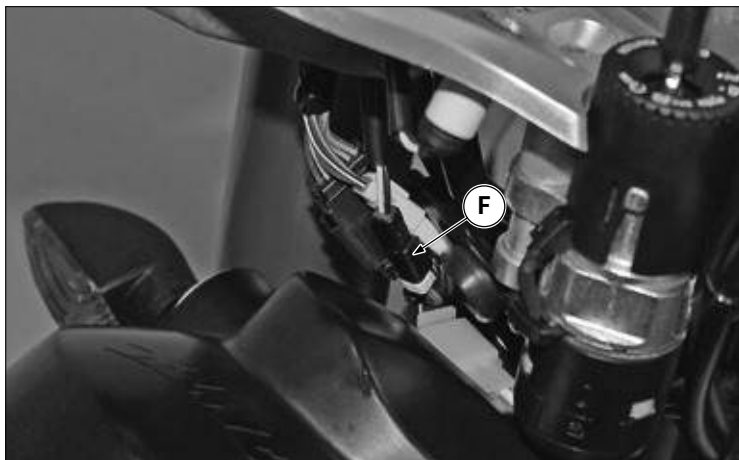
Remove the screws "A".



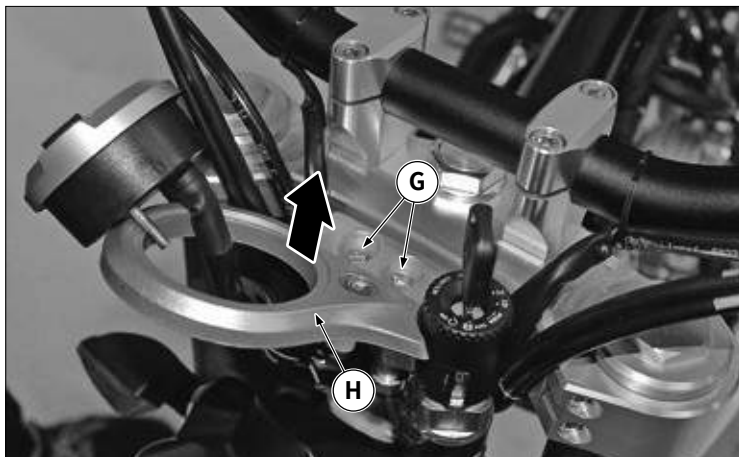
Remove the dashboard cover "B".



Disconnect the connectors “C” and “D”, then remove the speedometer “E”.



Disconnect the connector “F” of the fuel level indicator light.

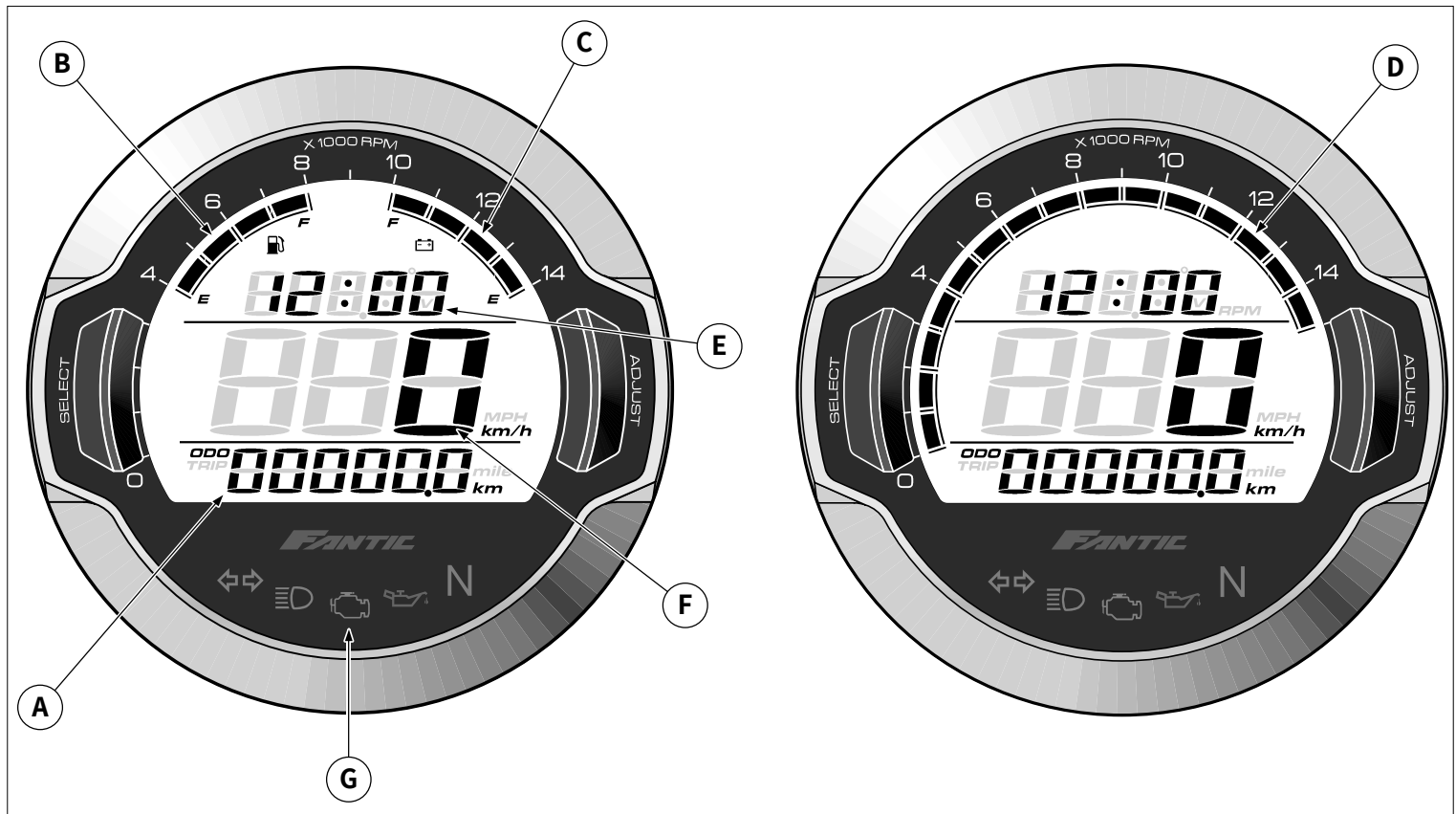


Remove the screws “G”, then remove the dashboard “H”.

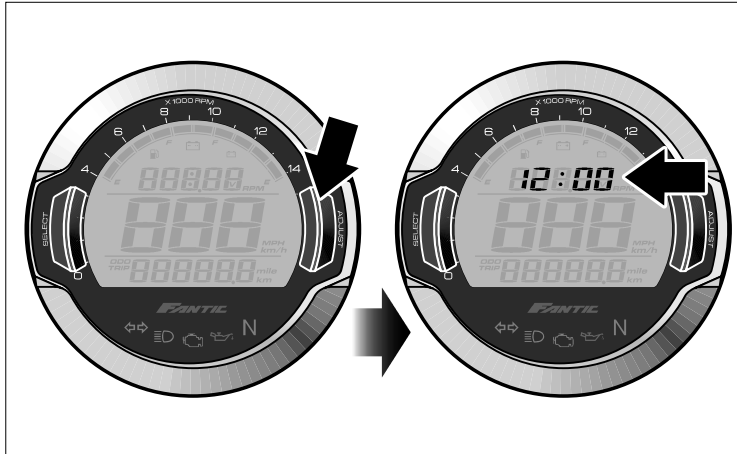
**i** Proceed in the reverse order for reassembling.



**10.7.2 Dashboard settings**



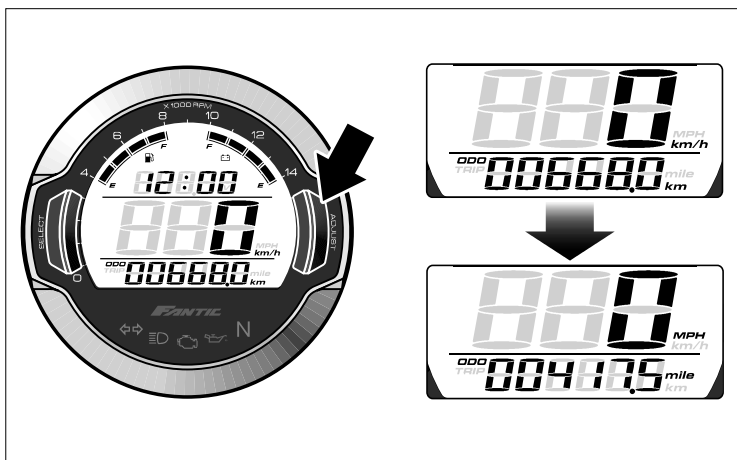
Key to Components	
A	Odometer
	Total trip distance recorder
	Partial trip distance recorder "A"
	Partial trip distance counter "B"
	Remaining Fuel/Distance
B	Fuel level
C	Digital voltmeter
D	Tachometer
E	Clock
F	Speedometer
G	Indicator light



#### Functions instructions with dashboard in stand-by

When the dashboard is off, press the adjustment button ("ADJUST") or the selection button ("SELECT") to activate the clock.

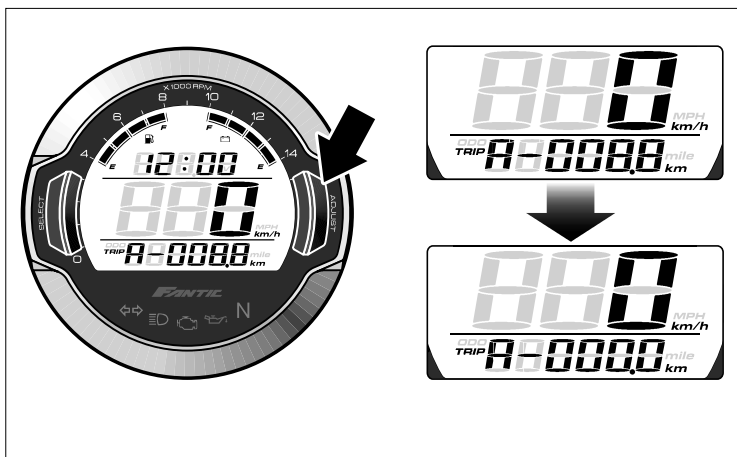
The clock will remain visible on the screen for 30 seconds after activation.



#### Adjustment button instructions ("ADJUST" button)

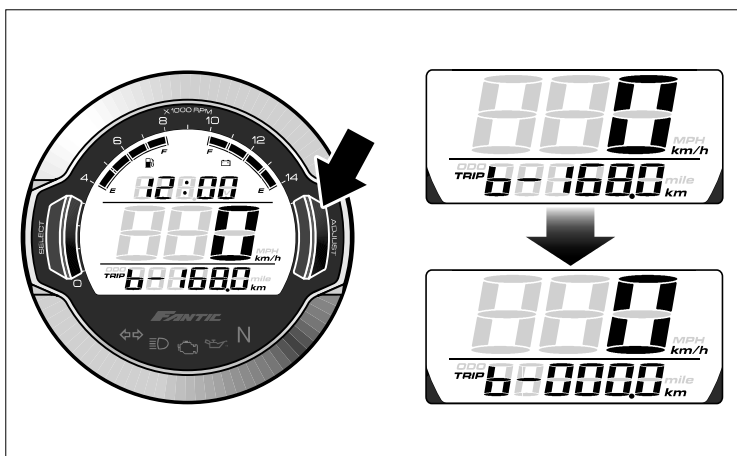
In the main screen (ODO) press once the adjustment button ("ADJUST"), to activate the partial trip distance recorder A.

Press and hold the adjustment button ("ADJUST") for three seconds to change the Odometer measurement units, from kilometres ("km") to miles ("mile"), and the speedometer measurement units, from kilometres per hour ("km/h") to miles per hour ("MPH"), and vice versa.



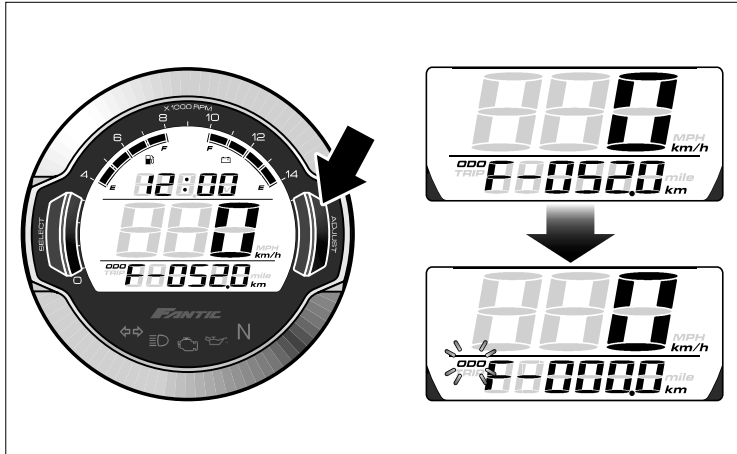
In the partial trip distance counter A screen press once the adjustment button ("ADJUST") to activate the partial trip distance counter B.

Press and hold the adjustment button ("ADJUST") for three seconds, to reset the partial trip distance counter A.



In the partial trip distance counter B screen press once the adjustment button ("ADJUST"), to activate the remaining fuel/distance screen.

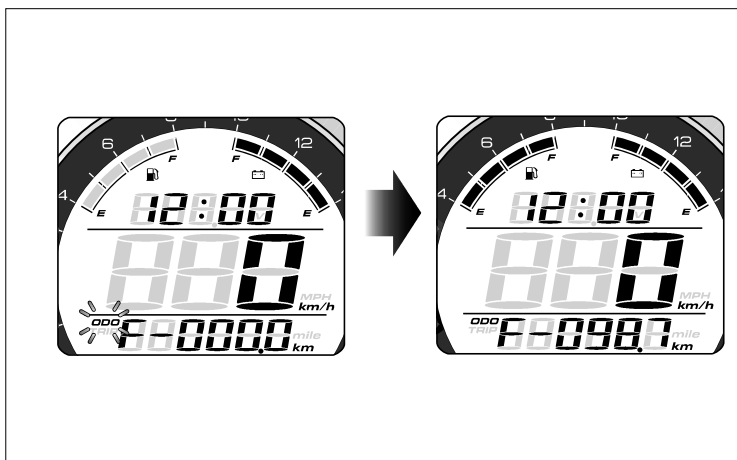
Press and hold the adjustment button ("ADJUST") for three seconds to reset the partial trip distance counter B.



In the remaining fuel/distance screen, press once the adjustment button ("ADJUST"), to reactivate the main screen (Odometer function).

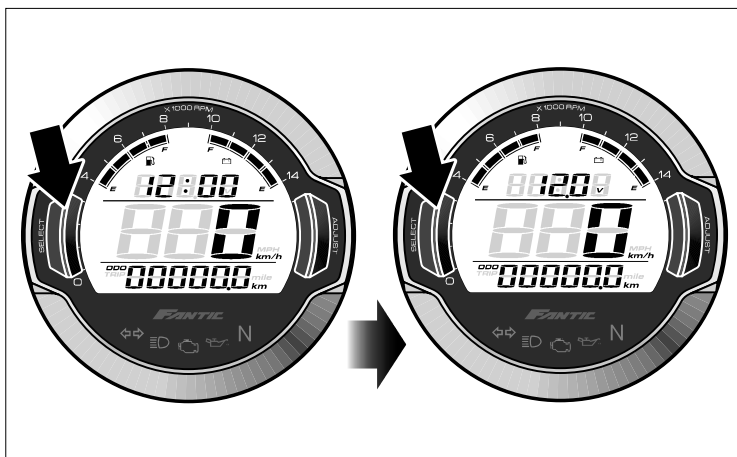
#### Remaining distance learning procedure

Fill with fuel and, in the remaining fuel/distance screen, press and hold the adjustment button ("ADJUST") for ten seconds; the symbol ODO flashes, the remaining distance is reset to 0 and the learning is restarted.



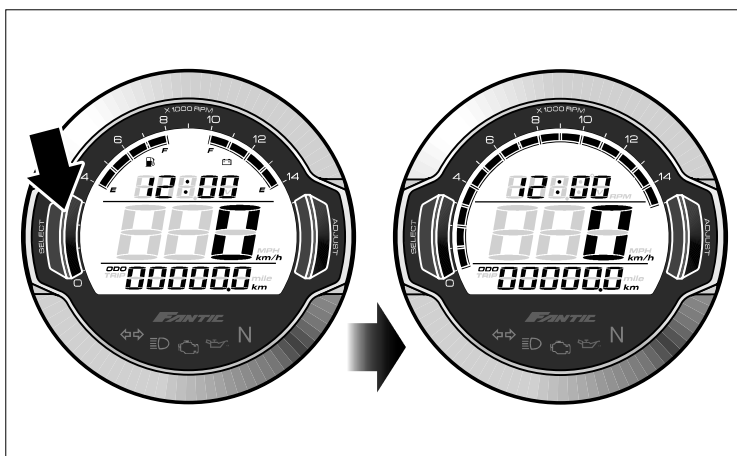
When the fuel level reaches 0, refuel. At the end of this operation, the ODO symbol stops flashing; this means that the remaining distance learning has been completed.

**⚠ The actual remaining distance indicated may be different from the calculated distance, depending on the road conditions, the vehicle conditions, the type of driving and so on. For these reasons the remaining distance is only a reference for the rider.**



#### Selection button instructions ("SELECT" button)

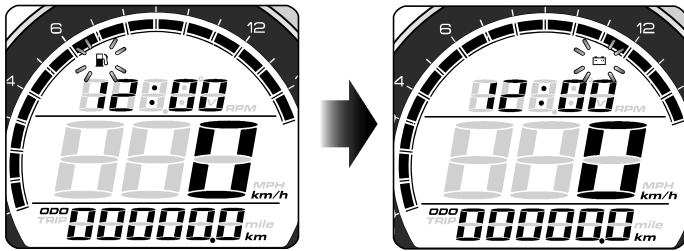
In the clock screen, press once the selection button ("SELECT") to display the battery voltage screen. In the battery voltage screen, press once the selection button ("SELECT") to activate the clock.



#### RPM (ENGINE SPEED) operating instructions

On the screen showing the remaining fuel/distance and battery voltage, press and hold the selection button ("SELECT") for three seconds to display the RPM (engine speed) screen.

In the RPM (engine speed) screen, press and hold the selection button ("SELECT") to display to the remaining fuel/distance screen and battery voltage screen.

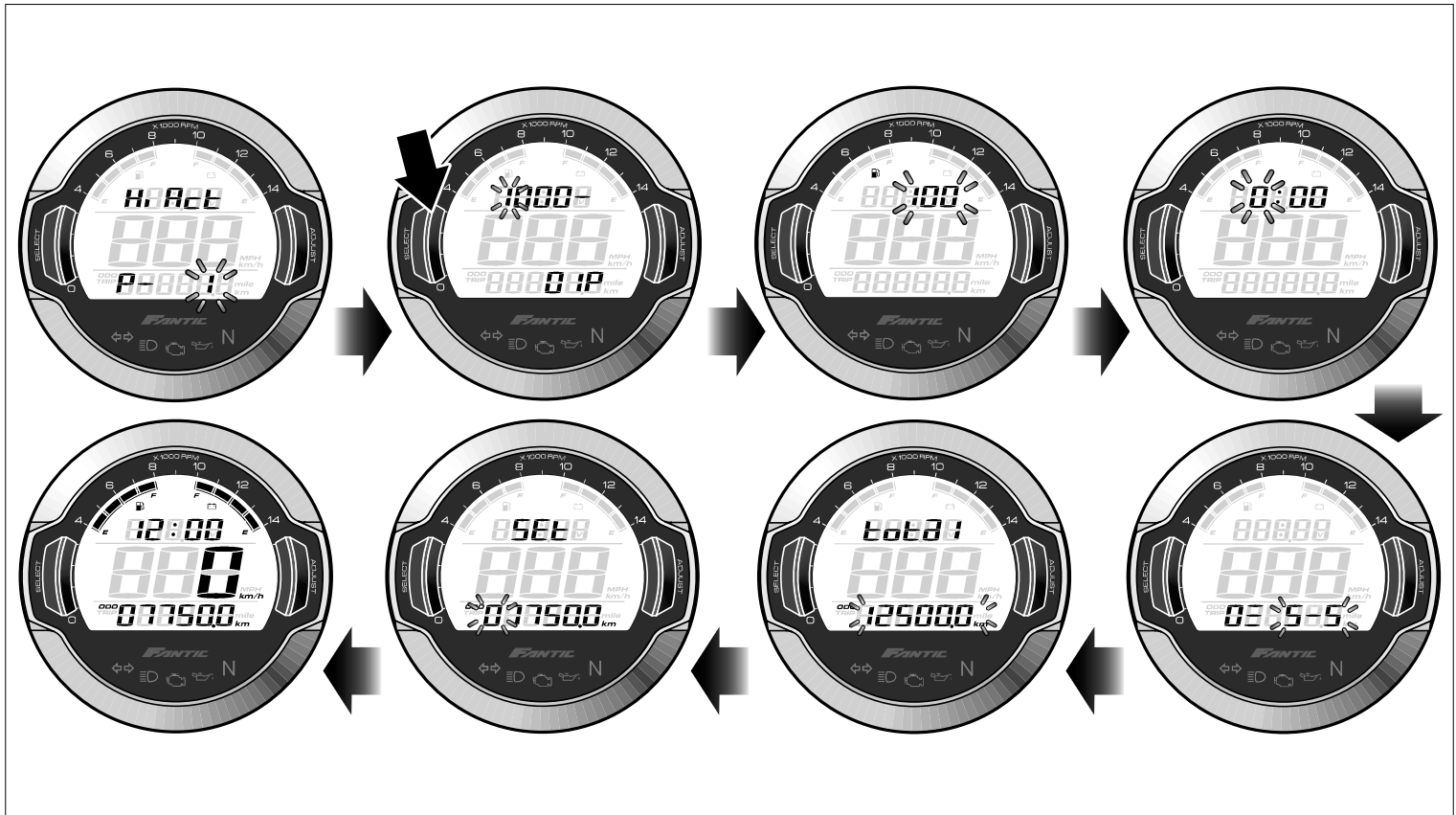


#### **RPM (ENGINE SPEED) screen**

When the remaining fuel level is at 1 the fuel symbol flashes as a warning.

When the remaining battery voltage level is at 1 the Battery symbol flashes as a warning.

**Settings screen instructions**



In the settings screen, it is possible to press the selection button (“SELECT”) to access the settings. The settings screen has the following order of options:

- input pulse setting (RPM function);
- tire circumference setting;
- fuel resistance setting;
- clock setting; dashboard backlight setting;
- total internal odometer screen setting;
- total external odometer screen setting.

**⚠ If no action is taken within 30 seconds, the dashboard automatically returns to display the main screen.**



#### Access the settings screen

On the main screen, press and hold the selection ("SELECT") and adjust ("ADJUST") buttons simultaneously for three seconds to activate the settings screen.



#### Input signal setting (RPM)

Press the adjustment button ("ADJUST") to change the setting. The setting digit flashes during the modification operations.

**Adjustment range: 0.5, 1~24.**



Press the selection button ("SELECT") until the desired input pulses value is reached.

**The standard reference value is: 1.**



Press the adjustment button ("ADJUST") to select the correct waveform.

**The RPM pulse is defined as "Hi" (positive pulse) and "Lo" (negative pulse).**

**The standard reference value is: "Lo".**

The writing that identifies the waveform setting, flashes during the modification operations.

**If the speed (RPM) is incorrect or not correctly displayed, select another setting and try again.**



⚠ Check with the engine running idle if the RPM indicator indicates a notch and if, with a slight rotation of the gas, it indicates two. In this case, the configuration adopted is correct, otherwise try again.

In the event that the standard configuration values are not successful, try the following combinations:

✂ No. of pulses / waveform:  
"1"/"Lo", "1"/"Hi", "2"/"Lo", "2"/"Hi".

After completing the settings, press one and hold the selection button ("SELECT") to display the next setting view.



### Tire circumference compensation setting

⚠ When tires of another size are installed it is necessary to reset the setting value.

Press and hold the selection button ("SELECT") until the specific value to be entered is reached.

It is possible to calculate the value to be inserted suitable for the wheels used.

- A. Circumference of the new tire.
- B. Circumference of the original tire.

The calculation to define the value to insert is the following:

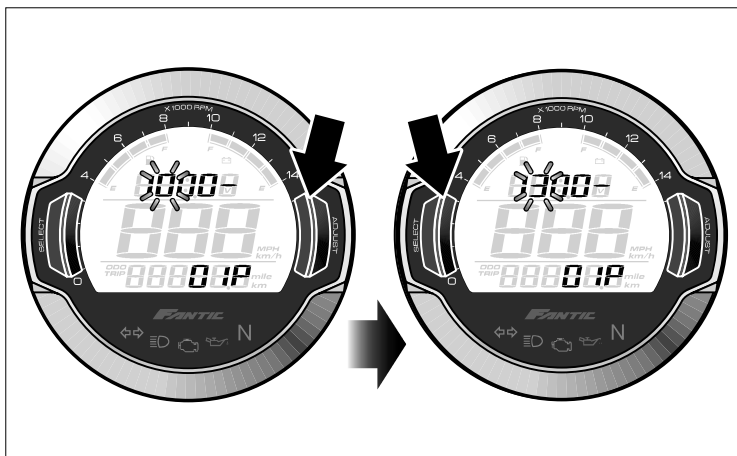
$$A \div B \cdot 100\%.$$



⚠ Setting values:  
Scrambler version: 2202 mm;  
Flat Track Version: 2250 mm.

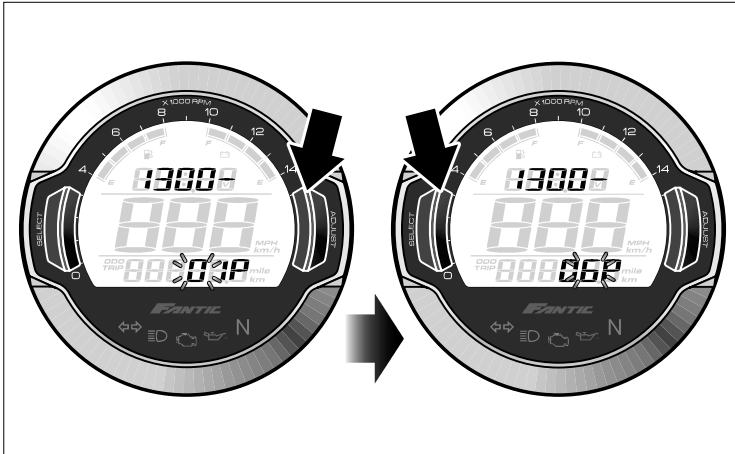
⚠ The number that identifies the setting flashes during the modification operations.

- ① Range displayed: 300~2500. Unit of measure: 1 mm.
- ① It is possible to define the valve as the starting and ending point to measure the wheel circumference with a tape measure.



Press the adjustment button ("ADJUST") to change the wheel circumference value.

At the end of the setting, press once and hold the selection button ("SELECT") to display the next setting view.



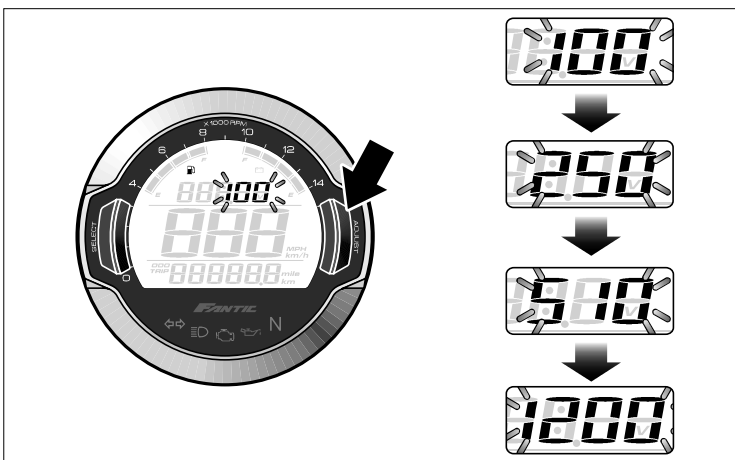
Press the adjustment button ("ADJUST") to change the setting.

**!** The number that identifies the setting flashes during the modification operations.

**i** Value range: 1~20 points.

**!** Standard value to set:  
9 pulses (points).

At the end of the setting, press once and hold the selection button ("SELECT") to display the next setting view.



### Fuel resistance setting

Press the adjustment button ("ADJUST") to select the number to be set.

**i** The resistance values which can be selected are:  
100  $\Omega$ , 250  $\Omega$ , 510  $\Omega$  and 1200  $\Omega$ .

**✂** Correct fuel resistance value: 100  $\Omega$ .



After completing the setting, press once and hold the selection button ("SELECT") to display the next setting view.

**i** When the fuel resistance value is changed, the remaining distance is reset to 0 and learning is restarted.



### Clock setting

Press and hold the selection button ("SELECT") and release it when the desired digit is displayed.

**!** During the modification, the selected digit will continue to flash.

**i** This is a clock with 24-hour format. The setting follows the order from hours to minutes.

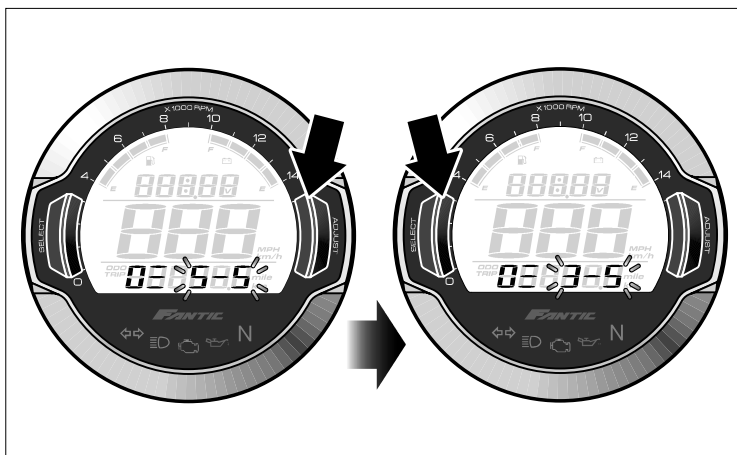




Press the adjust button ("ADJUST") to select another digit to change.



At the end of the adjustment, press once and hold the selection button ("SELECT") to display the next setting view.



#### Dashboard backlight setting

Press and hold the adjustment button ("ADJUST") and release it when the desired illumination value is selected.

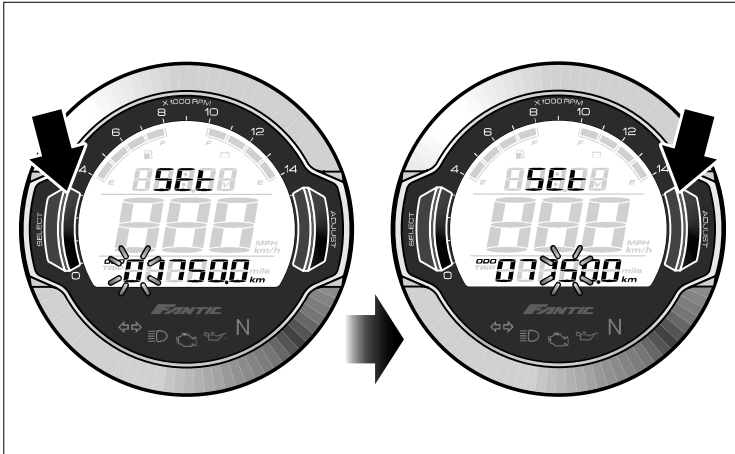
**i** Lighting values range from 1-5 (darker) to 5-5 (lighter). The brightness of the dashboard changes immediately after setting the value.

At the end of the, press once and hold the selection button ("SELECT") to confirm and to display the next setting view.



#### Internal total odometer screen setting

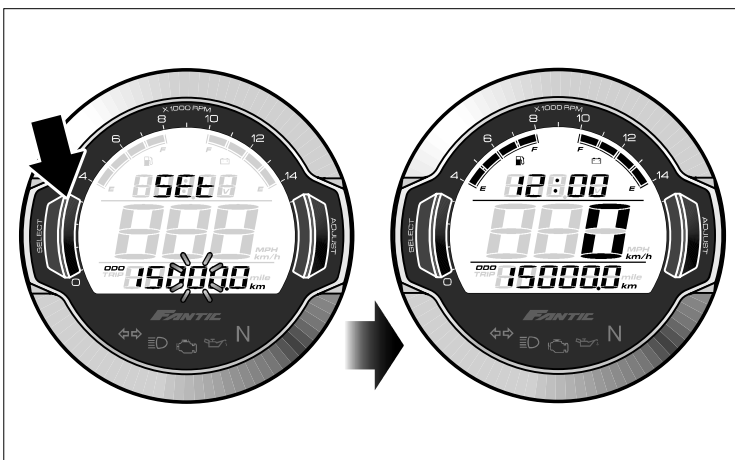
Press once and hold the selection button ("SELECT") to display the next setting view.



#### External total odometer screen setting

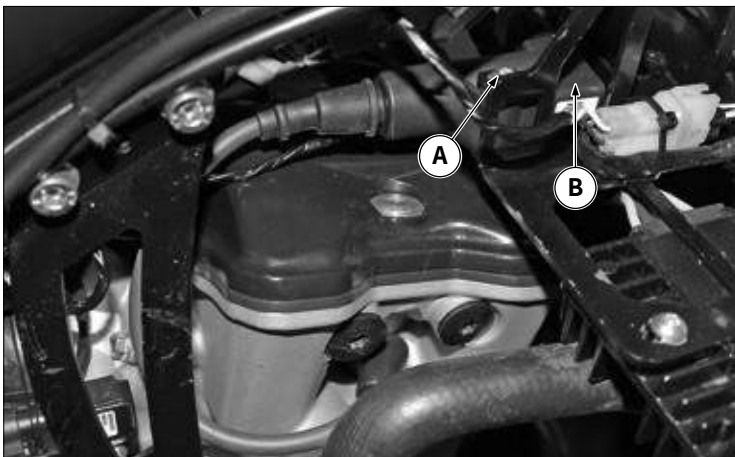
Press and hold the selection button ("SELECT") until the desired digit is displayed.

Then, press the adjust button ("ADJUST") to change the digit to be changed.



Once the desired value has been set, press once and hold the selection button ("SELECT") to confirm and return to the main screen.

Dashboard main screen after applying the customized settings.



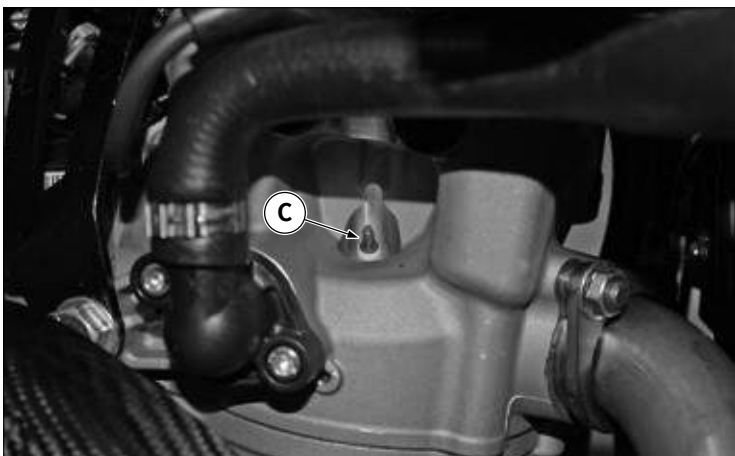
### 10.8 IGNITION

#### 10.8.1 Ignition coil removal

Disconnect the tube from the spark plug.

Remove the screws "A" and remove the coil "B".

**i** Proceed in the reverse order for reassembling.

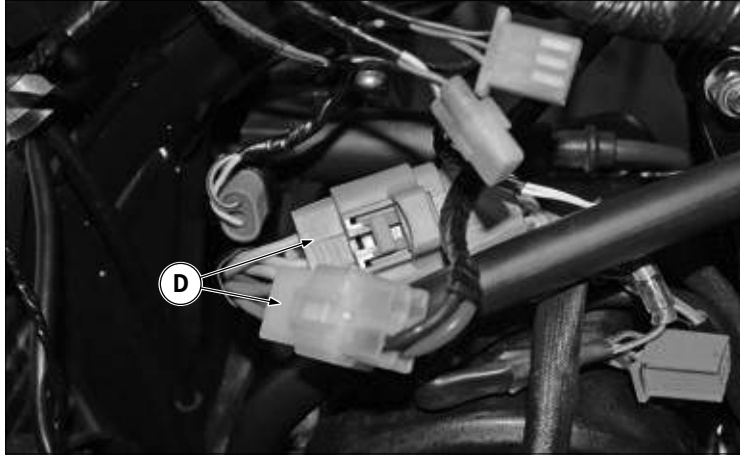


#### 10.8.2 Spark plug removal

Disconnect the tube from the spark plug.

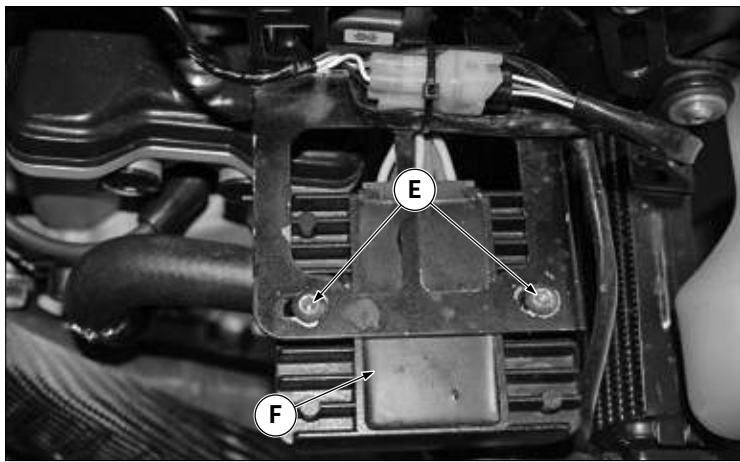
Unscrew and remove the spark plug "C".

**i** Proceed in the reverse order for reassembling.



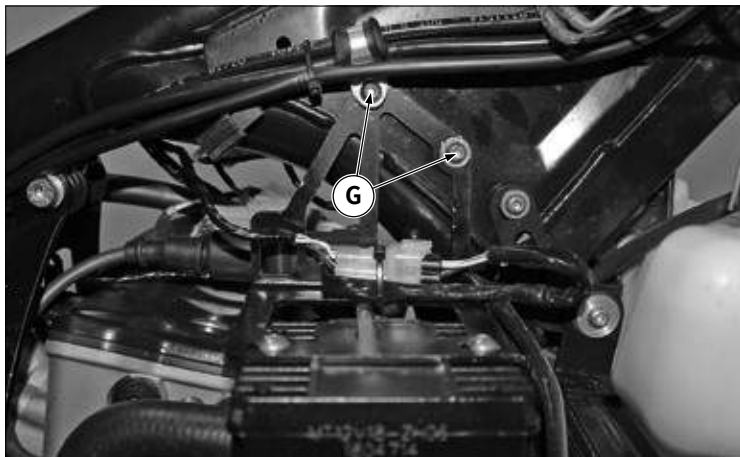
### 10.8.3 Voltage regulator removal

Disconnect the connector "D".

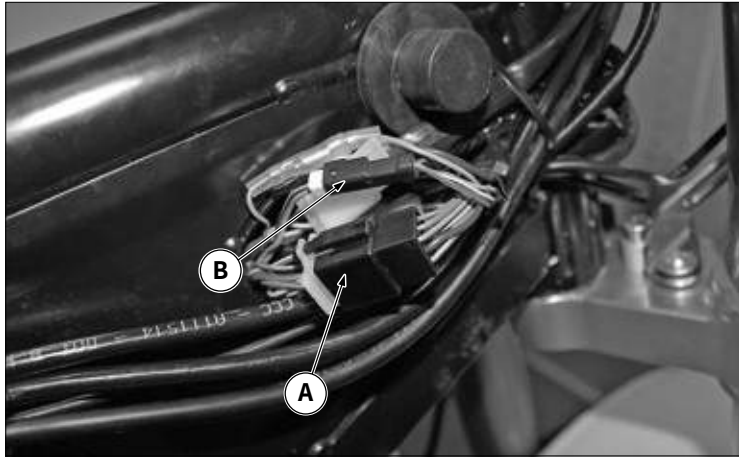


Remove the screws "E", then remove the voltage regulator "F".

**i** Proceed in the reverse order for reassembling.



Remove the screws "G", then remove the voltage regulator bracket.

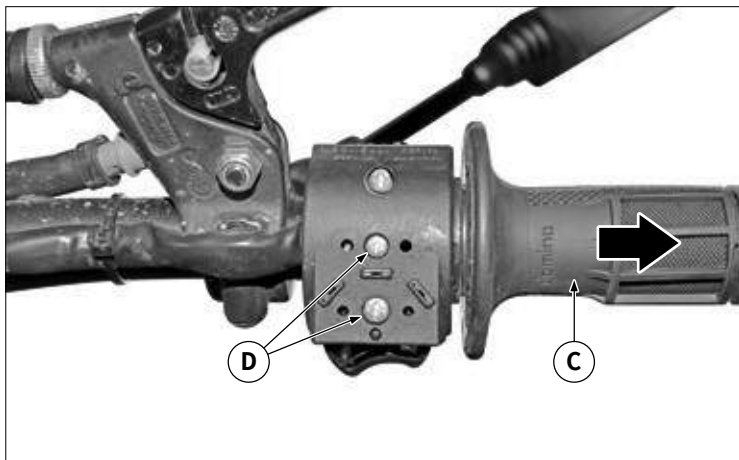


## **10.9 LIGHT STALK**

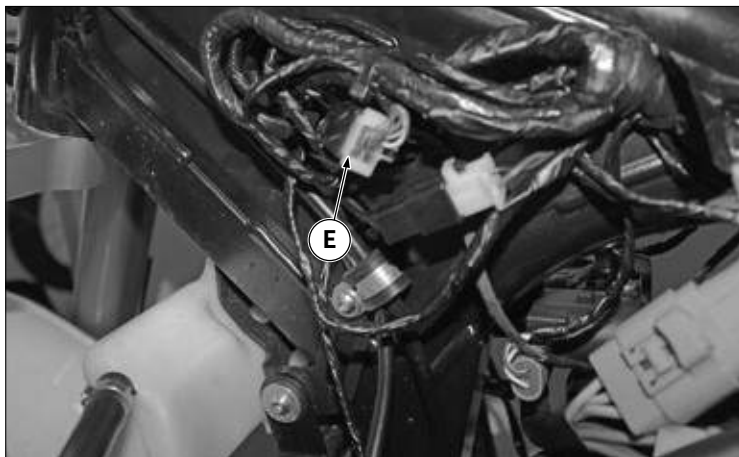
### **10.9.1 Left light stalk**

Remove:

- Tank: refer to “12.8.2 Complete tank removal” on page 128.
- Reconnect the connectors “A” and “B”.



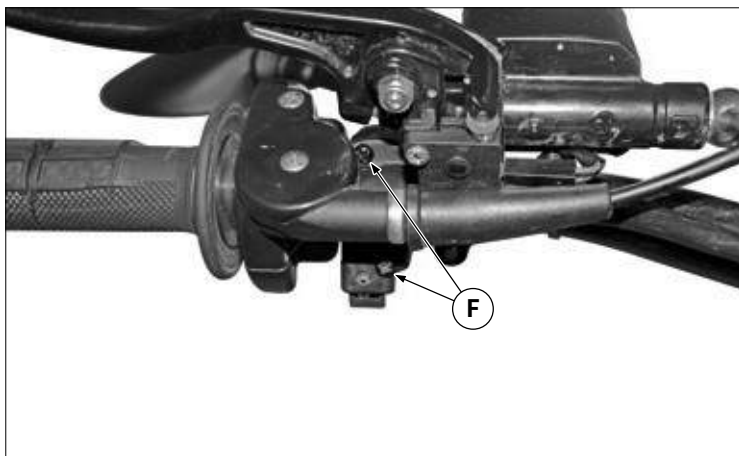
Remove the knob “C”, remove all the clamps that lock the cable of the light stalk connector then loosen the screws “D” and remove it.



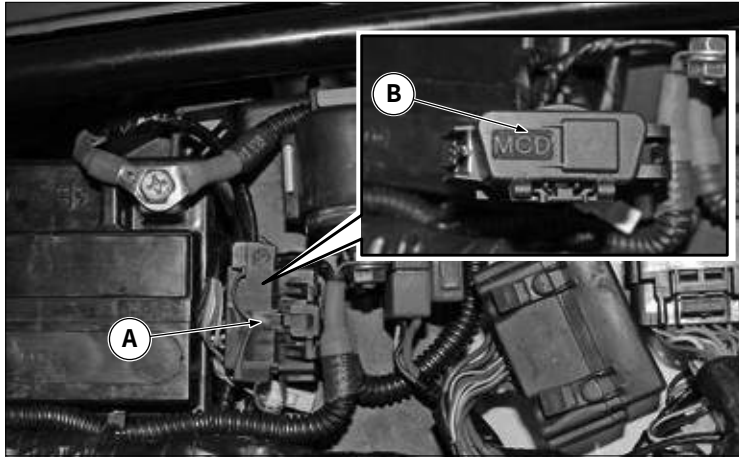
### **10.9.2 Right light stalk**

Remove:

- Tank: refer to “12.8.2 Complete tank removal” on page 128.
- Throttle control knob; refer to “12.27.1 Throttle control knob removal” on page 172.
- Disconnect the connector “E”.



Remove the cable ties that lock the cable of the light stalk connector then loosen the screws “F” and remove it.



### 11.1 INSTRUMENTS DIAGNOSIS AND CONNECTION SOCKET

To perform diagnostic tests on the vehicle, it is necessary to access the diagnostic socket and connect a recognized diagnostic tester.

The diagnostic socket A is located under the seat, in the space between the battery and the fuse box: to remove the seat, refer to "12.1 Seat removal" on page 122.

To connect the diagnostic tool, pull the OBD plug slightly out of the space in the battery compartment and open the protective cover B.

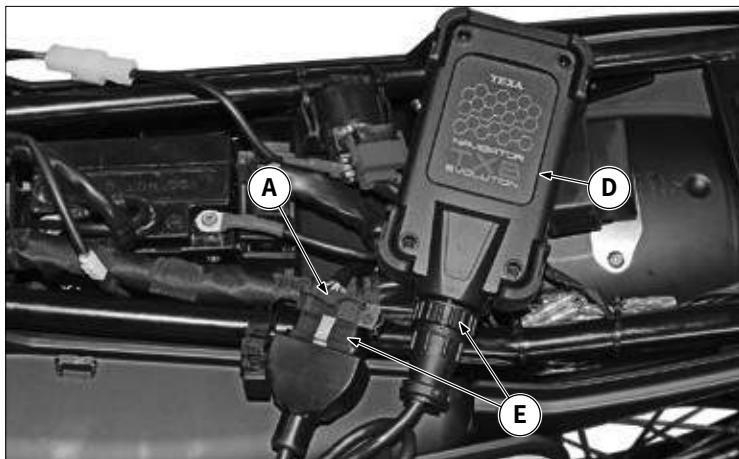


#### Option with TEXA wireless handheld computer

Connect the wireless device "C" to the diagnostic socket A.

Turn on the wireless device and turn the key to "ON".

Proceed with the diagnosis through the handheld computer.



#### Option with TEXA wired device

Connect the device "D" with the data communication wiring "E" to the diagnostic socket "A".

Turn the vehicle key to "ON".

Proceed with the diagnosis using the personal computer set up.

### 11.2 ERROR CODES

#### 11.2.1 Ignition module Error codes table

**i** The following list contains all the codes programmed in the ignition module, in addition to those available for this model of motorcycle.

ERROR CODE	ERROR
P0001	Fuel volume regulator control - circuit open
P0002	Fuel volume regulator control - circuit range/performance
P0003	Fuel volume regulator control - circuit low
P0004	Fuel volume regulator control - circuit high
P0005	Control circuit of the fuel shut-off valve interrupted
P0006	Low voltage of the fuel shut-off valve control circuit
P0007	High voltage of the fuel shut-off valve control circuit
P0008	Engine position system performance (bank 1)
P0009	Engine position system performance (bank 2)
P000A	Camshaft A position, slow response (bank 1)
P000B	Camshaft B position, slow response (bank 1)
P000C	Camshaft A position, slow response (bank 2)
P000D	Camshaft B position, slow response (bank 2)
P000E	Fuel flow regulator control, learning limit exceeded
P000F	Pressure relief valve of the supply system activated
P0016	Crankshaft position - camshaft position correlation (bank 1 sensor A)
P0017	Crankshaft position - camshaft position correlation (bank 1 sensor B)
P0018	Crankshaft position - camshaft position correlation (bank 2 sensor A)
P0019	Crankshaft position - camshaft position correlation (bank 2 sensor B)
P001A	A Camshaft profile control circuit, open (bank 1)
P001B	A Camshaft profile control circuit, low (bank 1)
P001C	A Camshaft profile control circuit, high (bank 1)
P001D	A Camshaft profile control circuit, open (bank 2)
P001E	A Camshaft profile control circuit, low (bank 2)
P001F	A Camshaft profile control circuit, high (bank 2)
P0026	Intake valve control solenoid - circuit range/performance (bank 1)
P0027	Exhaust valve control solenoid - circuit range/performance (bank 1)
P0028	Intake valve control solenoid - circuit range/performance (bank 2).
P0029	Exhaust valve control solenoid - circuit range/performance (bank 2)
P002A	B Camshaft profile control circuit, open (bank 1)
P002B	B Camshaft profile control circuit, low (bank 1)
P002C	B Camshaft profile control circuit, high (bank 1)
P002D	B Camshaft profile control circuit, open (bank 2)
P002E	B Camshaft profile control circuit, low (bank 2)
P002F	B Camshaft profile control circuit, high (bank 2)
P0030	Oxygen sensor heater circuit
P0031	Oxygen sensor heater circuit
P0032	Oxygen sensor heater circuit
P0036	Heated oxygen sensor heater for bank 1 sensor 2
P0037	Heated oxygen sensor heater control circuit (bank 1 sensor 2) low
P0038	Heated oxygen sensor heater control circuit (bank 1 sensor 2) high
P003C	Camshaft Profile Control Performance/Stuck Off - Bank 1
P003D	A Camshaft Profile Control Circuit Performance/Stuck Off - Bank 1
P003E	Camshaft Profile Control Performance/Stuck Off - Bank 2

ERROR CODE	ERROR
P003F	A Camshaft Profile Control Circuit Performance/Stuck Off - Bank 2
P0040	Oxygen sensor signals swapped - bank 1 sensor 1/bank 2 sensor 1
P0041	Oxygen sensor signals swapped - bank 1 sensor 2/bank 2 sensor 2.
P0042	Oxygen Heater Control Circuit (HO2S) Bank 1 Sensor 3
P0043	Oxygen Heater Control Circuit Low (bank 1 sensor 3)
P0044	Oxygen heater control circuit high (bank 1 sensor 3)
P0050	Oxygen Heater Control Circuit (HO2S) Bank 2 Sensor 1
P0051	Heated oxygen sensor heater control circuit (bank 2 sensor 1) low
P0052	Heated oxygen sensor heater control circuit (bank 2 sensor 1) high
P0053	Oxygen sensor heater resistance (bank 1 sensor 1)
P0054	Oxygen sensor heater resistance (bank 1 sensor 2)
P0055	Oxygen sensor heater resistance (bank 1 sensor 3)
P0056	Oxygen Sensor heater circuit (bank 2 sensor 2)
P0057	Heated oxygen sensor heater control circuit (bank 2 sensor 2) low
P0058	Heated oxygen sensor heater control circuit (bank 2 sensor 2) high
P0059	Oxygen sensor heater resistance (bank 2 sensor 1)
P005A	B Camshaft Profile Control Performance/Stuck Off - Bank 1
P005B	B Camshaft Profile Control Stuck On - Bank 1
P005C	B Camshaft Profile Control Performance/Stuck Off - Bank 2
P005D	B Camshaft Profile Control Stuck On - Bank 2
P0060	Oxygen sensor heater resistance (bank 2 sensor 2)
P0061	Oxygen sensor heater resistance (bank 1 sensor 3)
P0062	Oxygen Sensor heater circuit (bank 2 sensor 3)
P0063	Oxygen Heater Control Circuit Low (bank 2 sensor 3)
P0064	Oxygen heater control circuit high (bank 2 sensor 3)
P0068	MAP/MAF - throttle position correlation
P0069	Manifold absolute pressure - barometric pressure correlation.
P006A	Manifold absolute pressure - mass or volume air flow correlation
P006B	Manifold absolute pressure-exhaust pressure correlation
P0070	Ambient air temperature sensor circuit
P0071	Ambient air temperature
P0072	Ambient air temperature sensor (low signal)
P0073	Ambient air temperature sensor (high signal)
P0074	Ambient air temperature sensor circuit
P0075	Suction valve control solenoid valve (bank 1)
P0076	Low voltage of the suction valve control solenoid valve circuit (bank 1)
P0077	High voltage of the suction valve control solenoid valve circuit (bank 1)
P0078	Exhaust valve control solenoid valve (bank 1)
P0079	Exhaust Valve Control Solenoid Circuit Low (bank 1)
P007A	Charge Air Cooler Temperature Sensor Circuit
P007B	Charge Air Cooler Temperature Sensor Circuit Range/Performance
P007C	Charge Air Cooler Temperature Sensor Circuit Low
P007D	Charge Air Cooler Temperature Sensor Circuit High
P007E	Charge Air Cooler Temperature Sensor Circuit Intermittent/Erratic
P007F	Charge Air Cooler Temperature Sensor Bank1/Bank2 Correlation
P0080	Exhaust valve control solenoid - circuit high (Bank 1)
P0081	Suction valve control solenoid valve (bank 2)
P0082	Low voltage of the suction valve control solenoid valve circuit (bank 2)
P0083	High voltage of the suction valve control solenoid valve circuit (bank 2)

ERROR CODE	ERROR
P0084	Exhaust valve control solenoid valve (bank 2)
P0085	Exhaust valve control solenoid - circuit low (bank 2)
P0086	Exhaust valve control solenoid - circuit high (Bank 2)
P0089	Fuel pressure regulator efficiency
P008A	Low pressure fuel system pressure - Too low
P008B	Low pressure fuel system pressure - Too high
P008C	Fuel cooler pump control circuit - open
P008D	Fuel cooler pump control, circuit low
P008E	Fuel cooler pump control, circuit high
P008F	Engine Coolant Temperature/Fuel Temperature Correlation
P0090	Fuel metering solenoid valve [circuit open]
P0091	Fuel metering solenoid valve [short-circuit to ground]
P0092	Fuel metering solenoid valve [positive short-circuit]
P0093	Fuel System Leak Detected - Large Leak
P0094	Fuel System Leak Detected - Small Leak
P0095	Intake air temperature sensor 2
P0096	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE
P0097	Intake air temperature sensor 2 low input
P0098	Intake air temperature sensor 2 high input
P0099	Intake air temperature sensor 2 - circuit intermittent/irregular
P009A	Intake Air Temperature/Ambient Air Temperature Correlation
P009B	Fuel Pressure Relief Control Circuit/Open
P009C	Fuel Pressure Relief Control Circuit Low
P009D	Fuel Pressure Relief Control Circuit High
P009E	Fuel Pressure Relief Control Performance/Stuck Off
P009F	Fuel Pressure Relief Control Stuck On
P00A0	Charge Air Cooler Temperature Sensor Circuit
P00A1	Charge Air Cooler Temperature Sensor Circuit Range/Performance
P00A2	Charge Air Cooler Temperature Sensor Circuit Low
P00A3	Charge Air Cooler Temperature Sensor Circuit High
P00A4	Charge Air Cooler Temperature Sensor Circuit Intermittent/Erratic
P00A5	Intake air temperature sensor 2 circuit
P00A6	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE
P00A7	INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW
P00A8	Intake air temperature sensor 2 - circuit high
P00A9	Intake air temperature sensor 2 - circuit intermittent/irregular
P00AA	Intake air temperature sensor 1 circuit
P00AB	Intake air temperature sensor 1 - Circuit range/performance
P00AC	Intake air temperature sensor 1 - circuit low
P00AD	Intake air temperature sensor 1 - circuit high
P00AE	Intake air temperature sensor 1 - circuit intermittent
P00B1	Radiator coolant temperature sensor circuit
P00B2	Radiator coolant temperature sensor circuit out of range
P00B3	Radiator Coolant Temperature Sensor Circuit Low
P00B4	Radiator Coolant Temperature Sensor Circuit High
P00B5	Radiator Coolant Temperature Sensor Circuit Intermittent/Erratic
P00B6	Radiator Coolant Temperature/Engine Coolant Temperature Correlation
P00B7	Engine Coolant Flow Low/Performance
P00B8	Manifold absolute pressure - mass or volume air flow correlation

ERROR CODE	ERROR
P00B9	Low pressure fuel system pressure - Too low
P00BA	Low Fuel Pressure - Forced Limited Power
P00BB	Fuel Injector Insufficient Flow - Forced Limited Power - high current.
P00BC	Mass or Volume Air Flow A Circuit out of nominal range - Air flow too low
P00BD	Mass or Volume Air Flow A Circuit out of nominal range - Air flow too high
P00BE	Mass or Volume Air Flow B Circuit out of nominal range - Air flow too low
P00BF	Mass or Volume Air Flow B Circuit out of normal range - Air flow too high
P0100	Mass or Volume Air Flow Circuit
P0101	Mass or Volume Air Flow Circuit Range/Performance
P0102	Air mass metering, circuit low
P0103	Air mass or volume air metering - signal high
P0104	Mass or volume air flow, intermittent circuit
P0105	Manifold absolute pressure / Barometric pressure
P0106	Manifold absolute pressure (MAP) / Barometric pressure - range/performance problem
P0107	Manifold absolute pressure
P0108	Manifold absolute pressure
P0109	Manifold absolute pressure (MAP) / Barometric pressure intermittent circuit
P010A	Mass or Volume Air Flow B Circuit
P010B	Mass or Volume Air Flow B Circuit Range/Performance
P010C	Mass or Volume Air Flow B - circuit low.
P010D	Mass or Volume Air Flow B - circuit high.
P010E	Mass or Volume Air Flow B Circuit Intermittent/Erratic.
P010F	Mass or Volume Air Flow Sensor "A"/"B" Correlation
P0110	Intake air temperature sensor
P0111	Intake air temperature sensor 1 - Circuit range/performance
P0112	Air temperature sensor
P0113	Air temperature sensor
P0114	Intake air temperature sensor 1 - circuit intermittent
P0115	Engine coolant temperature
P0116	Engine Coolant Temperature Sensor Circuit Range/Performance problem
P0117	Engine coolant temperature
P0118	Engine coolant temperature
P0119	ECT Sensor Circuit signal Intermittent
P011A	Engine Coolant Temperature Sensor 1/2 Correlation
P011B	Engine Coolant Temperature/Intake Air Temperature Correlation
P011C	Charge Air Temperature/Intake Air Temperature Correlation - Bank 1
P011D	Charge Air Temperature/Intake Air Temperature Correlation - Bank 2
P0120	Throttle position sensor
P0121	Throttle position sensor range/performance (main/secondary)
P0122	Throttle position sensor
P0123	Throttle position sensor
P0124	Throttle position sensor circuit - intermittent signal
P0125	Insufficient coolant temperature for closed loop fuel control
P0126	Insufficient coolant temperature for stable operation
P0127	Intake air temperature too high
P0128	Coolant thermostat (coolant temperature below thermostat regulating temperature).
P0129	Barometric pressure too low
P0130	Oxygen sensor heating circuit (bank 1, sensor 1)

ERROR CODE	ERROR
P0131	Oxygen sensor
P0132	Oxygen sensor
P0133	Oxygen sensor control circuit slow response (Bank 1 Sensor 1)
P0134	Oxygen sensor
P0135	Oxygen sensor heating circuit (bank 1, sensor 1)
P0136	Oxygen sensor heating circuit (bank 1, sensor 2)
P0137	Heated oxygen sensor heater control circuit (bank 1 sensor 2) low
P0138	Heated oxygen sensor heater control circuit (bank 1 sensor 2) high
P0139	Oxygen sensor control circuit slow response (Bank 1 Sensor 2)
P013A	Oxygen sensor 2 slow response - rich to lean
P013B	Oxygen sensor 2 slow response - lean to rich
P013C	Oxygen sensor 2 slow response - rich to lean
P013D	Oxygen sensor 2 slow response - lean to rich
P013E	Oxygen sensor delayed response - rich to lean
P013F	Oxygen sensor delayed response - lean to rich
P0140	Oxygen sensor heater circuit no activity detected (bank 1 sensor 2)
P0141	Oxygen sensor heating circuit (bank 1, sensor 2)
P0142	Oxygen sensor heating circuit (bank 1, sensor 3)
P0143	Oxygen Heater Control Circuit Low (bank 1 sensor 3)
P0144	Oxygen heater control circuit high (bank 1 sensor 3)
P0145	Oxygen sensor control circuit slow response (Bank 1 Sensor 3)
P0146	Oxygen sensor heater circuit no activity detected (bank 1 sensor 3)
P0147	Oxygen sensor heating circuit (bank 1, sensor 3)
P0148	Fuel delivery error
P0149	Fuel timing error
P014A	Oxygen sensor delayed response - rich to lean
P014B	Oxygen sensor delayed response - lean to rich
P014C	Oxygen sensor 2 slow response - rich to lean
P014D	Oxygen sensor 2 slow response - lean to rich
P014E	Oxygen sensor 2 slow response - rich to lean
P014F	Oxygen sensor 2 slow response - lean to rich
P0150	Oxygen Heater Control Circuit (HO2S) Bank 2 Sensor 1
P0151	Heated oxygen sensor heater control circuit (bank 2 sensor 1) low
P0152	Heated oxygen sensor heater control circuit (bank 2 sensor 1) high
P0153	Oxygen sensor circuit slow response (bank 2 sensor 1)
P0154	Oxygen sensor heater circuit no activity detected (bank 1 sensor 2)
P0155	Oxygen sensor heating circuit (bank 2, sensor 1)
P0156	Oxygen sensor heating circuit (bank 2, sensor 2)
P0157	Heated oxygen sensor heater control circuit (bank 2 sensor 2) low
P0158	Heated oxygen sensor heater control circuit (bank 2 sensor 2) high
P0159	Oxygen sensor control circuit slow response (Bank 2 Sensor 2)
P015A	Oxygen sensor delayed response - rich to lean
P015B	Oxygen sensor delayed response - lean to rich
P015C	Oxygen sensor delayed response - rich to lean
P015D	Oxygen sensor delayed response - lean to rich
P0160	Oxygen sensor heater circuit no activity detected (bank 2 sensor 2)
P0161	Heated oxygen sensor heater control circuit (bank 2 sensor 2) high
P0162	Oxygen sensor heating circuit (bank 1, sensor 3)
P0163	Oxygen Heater Control Circuit Low (bank 2 sensor 3)

ERROR CODE	ERROR
P0164	Oxygen heater control circuit high (bank 2 sensor 3)
P0165	Oxygen sensor circuit slow response (bank 2 sensor 3)
P0166	Oxygen sensor heater circuit no activity detected (bank 2 sensor 3)
P0167	Oxygen sensor heating circuit (bank 2, sensor 3)
P0168	Fuel temperature too high
P0169	Incorrect fuel composition
P0170	Fuel trim malfunction (bank 1).
P0171	System too lean - bank 1
P0172	System too rich, Bank 1
P0173	Fuel trim malfunction (bank 2).
P0174	System Too Lean, Bank 2
P0175	System too rich, Bank 1
P0176	Fuel composition sensor
P0177	Fuel composition sensor circuit range/performance
P0178	Fuel composition sensor circuit low
P0179	Fuel composition sensor circuit high
P0180	Fuel temperature sensor A circuit
P0181	Fuel temperature sensor A circuit range/performance
P0182	Fuel temperature sensor A circuit - signal low
P0183	Fuel temperature sensor A circuit - signal high
P0184	Fuel temperature sensor A circuit intermittent
P0185	Fuel temperature sensor B circuit
P0186	Fuel temperature sensor B circuit range/performance
P0187	Fuel temperature sensor B circuit - signal low
P0188	Fuel temperature sensor B circuit - signal high
P0189	Fuel temperature sensor B circuit signal intermittent
P018A	Fuel pressure sensor "B" circuit
P018B	Fuel Pressure Sensor B Circuit, Range/Performance
P018C	Fuel Pressure Sensor B Circuit, Low
P018D	Fuel Pressure Sensor B Circuit, High
P018E	Fuel Pressure Sensor B - Circuit Intermittent/Erratic
P018F	Fuel system over pressure relief valve frequent activation
P0195	Engine oil temperature sensor circuit
P0196	Engine oil temperature sensor
P0197	Engine Oil Temperature Sensor Circuit - Low signal
P0198	Engine Oil Temperature Sensor Circuit, High Input
P0199	Engine oil temperature sensor circuit, intermittent
P0200	Injector circuit
P0201	Injectors
P0202	Injector circuit 2
P0203	Injector circuit 3
P0204	Injector circuit 4
P0205	Injector circuit 5
P0206	Injector circuit 6
P0207	Injector circuit 7
P0208	Injector circuit 8
P0209	Injector 9
P020A	Injection timing - Cylinder 1
P020B	Injection timing - Cylinder 2



ERROR CODE	ERROR
P020C	Injection timing - Cylinder 3
P020D	Injection timing - Cylinder 4
P020E	Injection timing - Cylinder 5
P020F	Injection timing - Cylinder 6
P0210	Injector 10
P0211	Injector 11
P0212	Injector 12
P0213	Cold Start Injector 1
P0214	Cold Start Injector 2
P0215	Engine Shutoff Solenoid circuit
P0216	Fuel injection timing
P0217	Engine over temperature
P0218	Transmission Over temperature
P0219	Engine overspeed condition
P0220	Throttle position sensor B
P0221	Throttle position sensor B, range/performance problem
P0222	Throttle position sensor B circuit, input low
P0223	Throttle position sensor B circuit, input high
P0224	Throttle position sensor B, circuit intermittent
P0225	Throttle position sensor C
P0226	Throttle position sensor C, range/performance problem
P0227	Throttle position sensor C circuit, input low
P0228	Throttle position sensor C circuit, input high
P0229	Throttle position sensor C circuit, intermittent
P022A	Charge Air Cooler Bypass Control A - circuit open
P022B	Charge Air Cooler Bypass Control A Circuit - low.
P022C	Charge Air Cooler Bypass Control A Circuit - high.
P022D	Charge Air Cooler Bypass Control B - circuit open.
P022E	Charge Air Cooler Bypass Control B - circuit low.
P022F	Charge Air Cooler Bypass Control B - circuit high.
P0230	Fuel pump relay circuit
P0231	Fuel pump relay control circuit - low voltage
P0232	Fuel pump relay control circuit - high voltage
P0233	Fuel pump relay - circuit intermittent
P0234	Engine supercharer condition - limit exceeded
P023A	Charge air cooler coolant pump control - circuit open
P023B	Charge air cooler coolant pump control - circuit low
P023C	Charge air cooler coolant pump control - circuit high
P023F	Fuel Pump Secondary Circuit, Open
P024A	Charge air cooler bypass control A - range/performance.
P024B	Charge air cooler bypass control A stuck
P024C	Fault in the charge air cooler bypass position sensor A circuit
P024D	Charge air cooler bypass position sensor A - circuit range/performance.
P024E	Charge air cooler bypass position sensor A - circuit low.
P024F	Charge air cooler bypass position sensor A - circuit high.
P025A	Fuel pump module control - circuit open
P025B	Fuel pump module control - circuit range/performance
P025C	Fuel pump module control - circuit low
P025D	Fuel pump module control - circuit high

ERROR CODE	ERROR
P0261	Injector control circuit 1 - low voltage
P0262	Injector 1 control circuit - high voltage
P0263	Cylinder 1 injection / balance
P0264	Injector control circuit 2 - low voltage
P0265	Injector 2 control circuit - high voltage
P0266	Cylinder 2 injection / balance
P0267	Injector control circuit 3 - low voltage
P0268	Injector 3 control circuit - high voltage
P0269	Cylinder 3 injection / balance
P0270	Injector control circuit 4 - low voltage
P0271	Injector 4 control circuit - high voltage
P0272	Cylinder 4 injection / balance
P0273	Injector control circuit 5 - low voltage
P0274	Injector 5 control circuit - high voltage
P0275	Cylinder 5 injection/balance
P0276	Injector control circuit 6 - low voltage
P0277	Injector 6 control circuit - high voltage
P0278	Cylinder 6 injection/balance
P0279	Injector control circuit 7 - low voltage
P0280	Injector 7 control circuit - high voltage
P0282	Injector control circuit 8 - low voltage
P0283	Injector 8 control circuit - high voltage
P0285	Injector control circuit 9 - low voltage
P0286	Injector 9 control circuit - high voltage
P0288	Injector control circuit 10 - low voltage
P0289	Injector 10 control circuit - high voltage
P0291	Injector control circuit 11 - low voltage
P0292	Injector 11 control circuit - high voltage
P0294	Injector control circuit 12 - low voltage
P0295	Injector 12 control circuit - high voltage
P0297	Vehicle Overspeed Condition
P0298	Engine Oil Over Temperature
P029A	Cylinder 1 balancing - Fuel trim at max limit
P029B	Cylinder 1 balancing - Fuel trim at min limit
P029C	Cylinder 1 balancing - Injector restricted
P029D	Cylinder 1 balancing - Injector leaking
P029E	Cylinder 2 balancing - Fuel trim at max limit
P029F	Cylinder 2 balancing - Fuel trim at min limit
P02A0	Cylinder 2 balancing - Injector restricted
P02A1	Cylinder 2 balancing - Injector leaking
P02A2	Cylinder 3 balancing - Fuel trim at max limit
P02A3	Cylinder 3 balancing - Fuel trim at min limit
P02A4	Cylinder 3 balancing - Injector restricted
P02A5	Cylinder 3 balancing - Injector leaking
P02A6	Cylinder 4 balancing - Fuel trim at max limit
P02A7	Cylinder 4 balancing - Fuel trim at min limit
P02A8	Cylinder 4 balancing - Injector restricted
P02A9	Cylinder 4 balancing - Injector leaking
P02AA	Cylinder 5 balancing - Fuel trim at max limit

ERROR CODE	ERROR
P02AB	Cylinder 5 balancing - Fuel trim at min limit
P02AC	Cylinder 5 balancing - Injector restricted
P02AD	Cylinder 5 balancing - Injector leaking
P02AE	Cylinder 6 balancing - Fuel trim at max limit
P02AF	Cylinder 6 balancing - Fuel trim at min limit
P02B0	Cylinder 6 balancing - Injector restricted
P02B1	Cylinder 6 balancing - Injector leaking
P02CC	Cylinder 1 fuel injector offset learning at min limit
P02CD	Cylinder 1 fuel injector offset learning at max limit
P02CE	Cylinder 2 fuel injector offset learning at min limit
P02CF	Cylinder 2 fuel injector offset learning at max limit
P02D0	Cylinder 3 fuel injector offset learning at min limit
P02D1	Cylinder 3 fuel injector offset learning at max limit
P02D2	Cylinder 4 fuel injector offset learning at min limit
P02D3	Cylinder 4 fuel injector offset learning at max limit
P02D4	Cylinder 5 fuel injector offset learning at min limit
P02D5	Cylinder 5 fuel injector offset learning at max limit
P02D6	Cylinder 6 fuel injector offset learning at min limit
P02D7	Cylinder 6 fuel injector offset learning at max limit
P02EE	Cylinder 1 injector circuit range/performance
P02EF	Cylinder 2 injector circuit range/performance
P02F0	Cylinder 3 injector circuit range/performance
P02F1	Cylinder 4 injector circuit range/performance
P02F2	Cylinder 5 injector circuit range/performance
P02F3	Cylinder 6 injector circuit range/performance
P0300	Random/multiple cylinder misfire detected
P0301	Cylinder 1 misfire detected
P0302	Cylinder 2 misfire detected
P0303	Cylinder 3 misfire detected
P0304	Cylinder 4 misfire detected
P0305	Cylinder 5 misfire detected
P0306	Cylinder 6 misfire detected
P0313	Misfire detected with low fuel
P0314	Single Cylinder Misfire (Cylinder not Specified)
P0315	Crankshaft position system - variation not learned
P0316	Engine misfire detected on startup
P0317	Rough Road Hardware Not Present
P0318	Rough road sensor A
P0319	Rough road sensor B
P0320	Crankshaft position sensor (CKP)
P0321	Crankshaft position sensor circuit range/performance
P0322	Ignition/Distributor Engine Speed Input Circuit - No Signal
P0323	Ignition/Distributor Engine Speed Input Circuit Intermittent
P0324	Knock control system error
P0325	Knock sensor bank 1
P0326	Knock Sensor 1 Circuit Range/Performance - (bank 1).
P0327	Knock Sensor Circuit bank 1 - low signal
P0328	Knock sensor 1 circuit - high input (bank 1).
P0329	Knock sensor 1 - circuit intermittent (bank 1).

ERROR CODE	ERROR
P032A	Knock sensor 3 - circuit
P032B	Knock sensor 3 circuit, range/performance
P032C	Knock sensor 3 circuit, low
P032D	Knock sensor 3 circuit, high
P032E	Knock sensor 3 circuit, intermittent
P0330	Knock sensor 2 circuit (bank 2)
P0331	Knock sensor - circuit range/performance (bank 2)
P0332	Knock sensor 2 - circuit low (Bank 2)
P0333	Knock sensor 2 - circuit high (Bank 2)
P0334	Knock sensor 2 - intermittent circuit (Bank 2)
P0335	Crankshaft position sensor
P0336	Crankshaft position sensor circuit range/performance
P0337	Crankshaft position sensor - signal too weak
P0338	Crankshaft position sensor - signal too strong
P0339	Ignition/Distributor Engine Speed Input Circuit Intermittent
P033A	Knock sensor 4 - circuit (bank 2)
P033B	Knock sensor 4 - circuit range/performance (bank 2).
P033C	Knock sensor 4 - circuit low (bank 2).
P033D	Knock sensor 4 - circuit high (bank 2).
P033E	Knock sensor 4 - circuit intermittent (bank 2).
P0340	Camshaft position sensor A signal (bank 1)
P0341	Camshaft Position Sensor A Circuit Range/Performance (Bank 1)
P0342	Camshaft Position Sensor A Circuit - low input (bank 1 or single sensor).
P0343	Camshaft position sensor A - circuit high (bank 1 or single sensor).
P0344	Camshaft position sensor A - circuit intermittente (bank 1 or single sensor).
P0345	Camshaft position sensor A signal (bank 2)
P0346	Camshaft position sensor circuit (bank 2) - range/performance
P0347	Camshaft Position Sensor A Circuit, Low Input (Bank 2)
P0348	Camshaft Position Sensor A Circuit, High Input (Bank 2)
P0349	Camshaft position sensor A - circuit intermittent (bank 2).
P0350	Ignition coil - primary/secondary circuit
P0351	Ignition coil A primary/secondary circuit malfunction
P0352	Ignition coil B primary/secondary circuit malfunction
P0353	Ignition coil C primary/secondary circuit malfunction
P0354	Ignition coil D primary/secondary circuit malfunction
P0355	Ignition coil E primary/secondary circuit malfunction
P0356	Ignition coil F primary/secondary circuit malfunction
P0357	Ignition coil G primary/secondary circuit malfunction
P0358	Ignition coil H of the primary/secondary circuit malfunction
P0359	Ignition coil I of the primary/secondary circuit
P0360	Ignition coil J of the primary/secondary circuit
P0361	Ignition coil K of the primary/secondary circuit
P0362	Ignition coil L of the primary/secondary circuit
P0363	Misfire detected - fueling disabled
P0365	Camshaft position sensor B circuit (bank 1)
P0366	Camshaft Position Sensor B Circuit Range/Performance (bank 1).
P0367	Camshaft Position Sensor B Circuit, Low Input (Bank 1)
P0368	Camshaft Position Sensor B Circuit, High Input (Bank 1)
P0369	CMP B sensor circuit signal intermittent (bank 1)

ERROR CODE	ERROR
P0370	Timing Reference High Resolution Signal A
P0371	Timing Reference High Resolution Signal A Too Many Pulses
P0372	Timing Reference High Resolution Signal A Too Few Pulses
P0373	Timing Reference High Resolution Signal A Intermittent/Erratic Pulses
P0374	Timing Reference High Resolution Signal A No Pulses
P0375	Timing Reference High Resolution Signal B
P0376	Timing Reference High Resolution Signal B Too Many Pulses
P0377	Timing Reference High Resolution Signal B Too Few Pulses
P0378	Timing Reference High Resolution Signal B Intermittent/Erratic Pulses
P0379	Timing Reference High Resolution Signal B No Pulses
P037D	Glow Plug Sense Circuit
P037E	Glow Plug Sense Circuit Low
P037F	Glow Plug Sense Circuit High
P0380	Glow plug/heater, circuit A
P0381	Glow plug/heater indicator circuit
P0382	Glow Plug/Heater, circuit B
P0383	Glow Plug Control Module Control - circuit low
P0384	Glow Plug Control Module Control - circuit high
P0385	Crankshaft Position Sensor B Circuit
P0386	Crankshaft Position Sensor B Circuit Range/Performance
P0387	Crankshaft Position Sensor B - signal too weak
P0388	Crankshaft Position Sensor B Circuit Low - signal too strong
P0389	Crankshaft Position Sensor B Circuit Intermittent
P0390	Crankshaft position (bank 2, sensor B)
P0391	Camshaft position sensor B circuit range/performance (bank 2)
P0392	Camshaft Position Sensor B Circuit Low (bank 2)
P0393	Camshaft Position Sensor B Circuit High (bank 2)
P0394	Camshaft Position Sensor B Circuit Intermittent (bank 2)
P0410	Secondary air injection system
P0411	Secondary air injection system - incorrect flow detected
P0412	Secondary Air Injection System Switching Valve A Circuit
P0413	Secondary Air Injection System Switching Valve A Circuit Open
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted
P0415	Secondary Air Injection System Switching Valve B Circuit
P0416	Secondary Air Injection System Switching Valve B Circuit Open
P0417	Secondary Air Injection System Switching Valve B Circuit Shorted
P0418	Secondary Air Injection System Control A Circuit
P0419	Secondary Air Injection System Control B Circuit
P041F	Secondary Air Injection System Switching Valve A Circuit - Low
P0420	Catalyst System Efficiency Below Threshold (bank 1)
P0421	Warm Up Catalyst Efficiency Below Threshold (bank 1)
P0422	Catalyst System Efficiency Below Threshold (bank 1)
P0423	Warm Up Catalyst Efficiency Below Threshold (bank 1)
P0424	Heated Catalyst Temperature Below Threshold (bank 1)
P0425	Catalyst Temperature Sensor (bank 1)
P0426	Catalyst Temperature Sensor Range/Performance (bank 1)
P0427	Catalyst temperature sensor (bank 1) - signal too weak
P0428	Catalyst temperature sensor (bank 1) - signal too strong
P0429	Catalyst heater control circuit (bank 1)

ERROR CODE	ERROR
P042A	Catalyst temperature sensor circuit
P042B	Catalyst temperature sensor circuit, range/performance (sensor 1)
P042C	Catalyst temperature sensor circuit, low (sensor 1)
P042D	Catalyst temperature sensor circuit, high (sensor 1)
P0430	Catalyst System Efficiency Below Threshold (bank 2)
P0431	Warm Up Catalyst Efficiency Below Threshold (bank 2)
P0432	Catalyst System Efficiency Below Threshold (bank 2)
P0433	Warm Up Catalyst Efficiency Below Threshold (bank 2)
P0434	Heated Catalyst Temperature Below Threshold (bank 2)
P0435	Catalyst Temperature Sensor (bank 2)
P0436	Catalyst Temperature Sensor Range/Performance (bank 2)
P0437	Catalyst temperature sensor (bank 2) - signal too weak
P0438	Catalyst temperature sensor (bank 2) - signal too strong
P0439	Catalyst heater control circuit (bank 2)
P043A	Catalyst temperature sensor circuit
P043B	Catalyst temperature sensor circuit, range/performance (sensor 1)
P043C	Catalyst temperature sensor (low)
P043D	Catalyst temperature sensor (high)
P043E	Evaporative Emission System Leak Detection Reference Orifice - Low Flow
P043F	Evaporative Emission System Leak Detection Reference Orifice - High Flow
P0440	Evaporative emission system
P0441	Evaporative Emission System - Incorrect Purge Flow
P0442	Evaporative Emission System - Leak Detected (small leak)
P0443	EVAP system purge fault
P0444	Evaporative emissions purge valve
P0445	Evaporative emissions purge valve [short circuit]
P0446	Evaporative emissions purge valve
P0447	Evaporative emissions purge valve [circuit open]
P0448	Evaporative emissions purge valve [short circuit]
P0449	Evaporative emissions purge valve
P044F	Switching valve circuit A secondary air injection, High
P0450	Evaporative emission pressure sensor
P0451	Evaporative emissions system - pressure sensor range/performance
P0452	Evaporative Emission System Pressure Sensor - Switch Low
P0453	Evaporative Emission System Pressure Sensor - Switch High
P0454	Evaporative Emission System Pressure Sensor/Switch - Intermittent
P0455	Evaporative Emission System Leak Detected - large leak
P0456	Evaporative Emission System - Leak Detected - very small leak
P0457	Evaporative Emission System - Leak Detected (fuel cap loose/off)
P0458	Evaporative Emission System Purge Control Valve
P0459	Evaporative Emission System Purge Control Valve
P0460	Fuel level sensor
P0461	Fuel level sensor - range/performance
P0462	Fuel Level Sensor Circuit Low Input
P0463	Fuel Level Sensor Circuit High Input
P0464	Fuel Level Sensor Circuit - Intermittent
P0465	EVAP filter purge valve malfunction
P0466	Evaporative emissions purge valve - range/performance
P0467	Evaporative emissions purge valve - signal too low

ERROR CODE	ERROR
P0468	Evaporative emissions purge valve - signal too high
P0469	Evaporative emissions purge valve - intermittent
P046A	Catalyst temperature sensor 1/2 correlation
P046B	Catalyst temperature sensor 1/2 correlation
P0470	Exhaust gas pressure sensor circuit
P0471	Exhaust gas pressure sensor - range/performance problem
P0472	Exhaust gas pressure sensor - signal too weak
P0473	Exhaust gas pressure sensor - signal too strong
P0474	Intermittent signal for exhaust gas pressure sensor
P0475	Exhaust pressure control valve
P0476	Exhaust pressure control valve - out of nominal range
P0477	Exhaust pressure control valve - signal too weak
P0478	Exhaust pressure control valve - signal too strong
P0479	Exhaust pressure control valve - erratic error
P047A	Exhaust pressure sensor B circuit
P047B	Exhaust Pressure Sensor B - Circuit Range/Performance.
P047C	Exhaust Pressure Sensor B - Circuit Low.
P047D	Exhaust Pressure Sensor B - Circuit High.
P047E	Exhaust Pressure Sensor B - Circuit Intermittent/Erratic.
P047F	Exhaust Pressure Control Valve Stuck Open
P0480	Cooling Fan 1 Control Circuit
P0481	Cooling Fan 2 Control Circuit
P0482	Cooling Fan 3 Control Circuit
P0483	Cooling fan rationality check malfunction
P0484	Cooling Fan Circuit Over Current
P0485	Fan Power/Ground Circuit
P048A	Exhaust Pressure Control Valve A Stuck Closed
P048B	Exhaust Pressure Control Valve Position Sensor/Switch Circuit
P048C	Exhaust Pressure Control Valve Position Sensor/Switch CircuitRange/Performance
P048D	Exhaust Pressure Control Valve Position Sensor/Switch Circuit, Low
P048E	Exhaust Pressure Control Valve Position Sensor/Switch Circuit, High
P048F	Exhaust Pressure Control Valve Position Sensor/Switch CircuitIntermittent/Erratic
P0491	Secondary air injection system (bank 1)
P0492	Secondary air injection system (bank 2)
P0493	Engine coolant fan motor - fan overspeed (clutch locked)
P0494	Engine coolant fan motor - fan speed low
P0495	Engine coolant fan motor - fan speed high
P0496	Evaporative Emission System High Purge Flow
P0497	Evaporative Emission System Low Purge Flow
P0498	Evaporative Emission System Vent Valve Control Circuit Low
P0499	Evaporative Emission System Vent Valve Control Circuit High
P049F	Exhaust Gas Recirculation B Flow
P04AA	Exhaust Pressure Control Valve B Position Sensor/Switch Circuit Intermittent/Erratic
P0500	Vehicle speed sensor circuit (VSS)
P0501	Vehicle Speed Sensor Range/Performance
P0502	Vehicle speed sensor - low input
P0503	Vehicle speed sensor - intermittent/erratic/high
P0504	Brake Switch A/B correlation

ERROR CODE	ERROR
P0505	Idle air stepper motor
P0506	Idle Air Control System RPM Lower Than Expected
P0507	Idle Air Control System RPM Higher Than Expected
P0508	Idle Air Control System Circuit Low
P0509	Idle air stepper motor
P050A	Cold Start Idle Air Control System - Performance
P050B	Cold Start Ignition Timing - Performance
P050C	Cold Start Engine Coolant Temperature - Performance
P050D	Cold Start Rough Idle
P050E	Cold Start Engine Exhaust Temperature Too Low
P050F	Brake Assist Vacuum Too Low
P0510	Closed Throttle Position Switch
P0511	Idle Air Control Circuit
P0512	Starter Request Circuit
P0513	Incorrect Immobilizer Key
P0514	Battery Temperature Sensor Circuit Range/Performance
P0515	Battery temperature sensor circuit
P0516	Battery temperature sensor - circuit low
P0517	Battery temperature sensor - circuit high
P0518	Idle Air Control Circuit, Intermittent
P0519	Idle Air Control System Performance
P051A	Crankcase Pressure Sensor Circuit
P051B	Crankcase Pressure Sensor Circuit Range/Performance
P051C	Crankcase Pressure Sensor Circuit Low
P051D	Crankcase Pressure Sensor Circuit High
P051E	Crankcase Pressure Sensor Circuit - Intermittent
P051F	Positive Crankcase Ventilation Filter Restriction
P0520	Engine oil pressure switch/sensor - circuit
P0521	Engine Oil Pressure Sensor/Switch Range/Performance
P0522	Engine Oil Pressure Sensor/Switch Low
P0523	Engine Oil Pressure Sensor/Switch High
P0524	Engine oil pressure too low
P0525	Cruise Control Servo Control Circuit Range/Performance
P0526	Fan Speed Sensor Circuit
P0527	Fan Speed Sensor Circuit - Range/Performance
P0528	Fan Speed Sensor Circuit No Signal
P0529	Fan Speed Sensor Circuit Intermittent
P052A	Cold Start A Camshaft Position Timing Over-Advanced - bank 1
P052B	Cold Start A Camshaft Position Timing Over-Advanced - bank 2
P052C	Cold Start A Camshaft Position Timing Over-Advanced - bank 1
P052D	Cold Start A Camshaft Position Timing Over-Advanced - bank 2
P052E	Positive Crankcase Ventilation Regulator Valve Performance
P053A	Positive Crankcase Ventilation Heater Control - Circuit Open
P053B	Positive Crankcase Ventilation Heater Control - Circuit Low
P053C	Positive Crankcase Ventilation Heater Control - Circuit High
P0540	Intake Air Heater A Circuit
P0541	Intake Air Heater A Circuit - Low.
P0542	Intake Air Heater A Circuit - high.
P0543	Intake Air Heater A Circuit Open

ERROR CODE	ERROR
P0547	Exhaust Gas Temperature Sensor Circuit (bank 2 sensor 1)
P0548	Exhaust Gas Temperature Sensor Circuit Low (bank 2 sensor 1)
P0549	Exhaust Gas Temperature Sensor Circuit High (bank 2 sensor 1)
P054A	Cold Start B Camshaft Position Timing Over-Advanced - bank 1
P054B	Cold Start B Camshaft Position Timing Over-Advanced - bank 2
P054C	Cold Start B Camshaft Position Timing Over-Advanced - bank 1
P054D	Cold Start B Camshaft Position Timing Over-Advanced - bank 1
P0550	Power steering pressure/switch circuit
P0551	Power steering pressure sensor/switch circuit range/performance
P0552	Power steering pressure sensor/switch circuit low
P0553	Power Steering Pressure Sensor/Switch Circuit High
P0554	Power Steering Pressure Sensor/Switch Circuit Intermittent
P0555	Brake Booster Pressure Sensor Circuit
P0556	Brake Booster Pressure Sensor Circuit Range/Performance
P0557	Brake Booster Pressure Sensor Circuit Low
P0558	Brake Booster Pressure Sensor Circuit High
P0559	Brake Booster Pressure Sensor Circuit Intermittent
P0560	System voltage malfunction
P0561	System voltage unstable
P0562	System Voltage Low
P0563	System Voltage High
P0564	Cruise Control Multi-Function Input A Circuit
P0565	Cruise Control "On" Signal
P0566	Cruise Control "Off" Signal
P0567	Cruise Control "Resume" Signal
P0568	Cruise Control "Set" Signal
P0569	Cruise Control "Coast" Signal
P056A	Cruise Control "Increase Distance" Signal
P056B	Cruise Control "Decrease Distance" Signal
P0570	Cruise Control "Accelerate" Signal
P0571	Brake Switch A Circuit
P0572	Brake Switch A Circuit Low
P0573	Brake Switch A Circuit High
P0574	Cruise Control System - Vehicle Speed Too High
P0575	Cruise Control Input Circuit
P0576	Cruise Control Input Circuit Low
P0577	Cruise Control Input Circuit High
P0578	Cruise Control Multi-Function Input Circuit Stuck
P0579	Cruise Control Multi-Function Input A Circuit Range/Performance
P0580	Cruise Control Multi-Function Input A Circuit Low
P0581	Cruise Control Multi-Function Input A Circuit High
P0582	Cruise Control Vacuum Control Circuit/Open
P0583	Cruise Control Vacuum Control Circuit Low
P0584	Cruise Control Vacuum Control Circuit High
P0585	Cruise Control Multi-Function Input A/B Correlation
P0586	Cruise Control Vent Control Circuit/Open
P0587	Cruise Control Vent Control Circuit Low
P0588	Cruise Control Vent Control Circuit High
P0589	Cruise Control Multi-Function Input B Circuit

ERROR CODE	ERROR
P0590	Cruise Control Multi-Function Input Circuit Stuck
P0591	Cruise Control Multi-Function Input B Circuit Range/Performance
P0592	Cruise Control Multi-Function Input B Circuit Low
P0593	Cruise Control Multi-Function Input B Circuit High
P0594	Cruise Control Servo Control Circuit/Open
P0595	Cruise Control Servo Control Circuit Low
P0596	Cruise Control Servo Control Circuit High
P0597	Thermostat Heater Control Circuit/Open
P0598	Thermostat Heater Control Circuit Low
P0599	Thermostat Heater Control Circuit High
P0600	Serial Communication Link
P0601	Internal Control Module Memory Check Sum Error
P0602	Control Module Programming Error
P0603	Internal Control Module Keep Alive Memory (KAM) Error
P0604	Internal Control Module Random Access Memory (RAM) Error
P0605	Internal Control Module Read Only Memory (ROM) Error
P0606	Control Module Processor
P0607	Control Module Performance
P0608	Control Module VSS Output A
P0609	Control Module VSS Output B
P060A	Internal Control Module Monitoring Processor Performance
P060B	Internal Control Module A/D Processing Performance
P060C	Internal control unit - main processor performance
P060E	Internal Control Module Throttle Position Performance
P060F	Internal Control Module Coolant Temperature Performance
P0610	Control Module Vehicle Options Error
P0611	Fuel Injector Control Module Performance
P0612	Fuel Injector Control Module Relay Control
P0613	TCM Processor
P0614	ECM/TCM Incompatible
P0615	PStarter Relay Circuit
P0616	Starter Relay Circuit Low
P0617	Starter Relay Circuit High
P0618	Alternative Fuel Control Module KAM Error
P0619	Alternative Fuel Control Module RAM/ROM Error
P061A	Internal Control Module Torque Performance
P061B	Internal Control Module Torque Calculation Performance
P061C	Internal Control Module Engine RPM Performance
P061D	Internal Control Module Engine Air Mass Performance
P061E	Internal Control Module Brake Signal Performance
P061F	Internal Control Module Throttle Actuator Controller Performance
P0620	Generator Control Circuit
P0621	Generator Lamp/L Terminal Circuit
P0622	Generator Field/F Terminal Circuit
P0623	Generator Lamp Control Circuit
P0624	Fuel Cap Lamp Control Circuit
P0625	Generator Field/F Terminal Circuit Low
P0626	Generator Field/F Terminal Circuit High
P0627	Fuel Pump A Control Circuit/Open

ERROR CODE	ERROR
P0628	Fuel Pump A Control Circuit Low
P0629	Fuel Pump A Control Circuit/Open
P062A	Fuel Pump A Control Circuit Range/Performance
P062B	Internal Control Module Fuel Injector Control Performance
P062C	Internal Control Module Vehicle Speed Performance
P062D	Fuel Injector Driver Circuit Performance Bank 1
P062E	Fuel Injector Driver Circuit Performance Bank 2
P062F	Internal Control Module EEPROM Error
P0630	VIN Not Programmed or Incompatible - ECM/PCM
P0631	VIN Not Programmed or Incompatible - TCM
P0632	Odometer Not Programmed or Incompatible - ECM/PCM
P0633	Immobilizer Key Not Programmed - ECM/PCM
P0635	Power Steering Control Circuit
P0636	Power Steering Control Circuit Low
P0637	Power Steering Control Circuit High
P0638	Throttle Actuator Control Range/Performance (Bank 1)
P0639	Throttle Actuator Control Range/Performance (Bank 2)
P063A	Generator Voltage Sense Circuit
P063B	Generator Voltage Sense Circuit Range/Performance
P063C	Generator Voltage Sense Circuit Low
P063D	Generator Voltage Sense Circuit High
P0640	Intake Air Heater Control Circuit
P0641	Sensor Reference Voltage A Circuit/Open
P0642	Sensor Reference Voltage A Circuit Low
P0643	Sensor Reference Voltage A Circuit High
P0648	Immobilizer Lamp Control Circuit
P0649	Speed Control Lamp Control Circuit
P064A	Fuel Pump Control Module
P064C	Glow Plug Control Module
P064D	Internal Control Module Oxygen Sensor Processor Performance Bank 1
P064E	Internal Control Module Oxygen Sensor Processor Performance Bank 2
P064F	Unauthorized Software/Calibration Detected
P0650	Malfunction Indicator Lamp (MIL) Control Circuit
P0651	Sensor Reference Voltage B Circuit/Open
P0652	Sensor Reference Voltage B Circuit Low
P0653	Sensor Reference Voltage B Circuit High
P0654	Engine RPM Output Circuit
P0655	Engine Hot Lamp Output Control Circuit
P0656	Fuel Level Output Circuit
P0657	Actuator Supply Voltage A Circuit/Open
P0658	Actuator Supply Voltage A Circuit Low
P0659	Actuator Supply Voltage A Circuit High
P065A	Generator System Performance
P065B	Generator Control Circuit Range/Performance
P065C	Generator Mechanical Performance
P065D	Reductant System Malfunction Lamp Control Circuit
P065E	Intake Manifold Tuning Valve Performance
P065F	Intake Manifold Tuning Valve Performance
P0660	Intake Manifold Tuning Valve Control Circuit/Open (Bank 1)

ERROR CODE	ERROR
P0661	Intake Manifold Tuning Valve Control Circuit Low (Bank 1)
P0662	Intake Manifold Tuning Valve Control Circuit High (Bank 1)
P0663	Intake Manifold Tuning Valve Control Circuit/Open (Bank 2)
P0664	Intake Manifold Tuning Valve Control Circuit Low (Bank 2)
P0665	Intake Manifold Tuning Valve Control Circuit High (Bank 2)
P066A	Cylinder 1 Glow Plug Control Circuit Low
P066B	Cylinder 1 Glow Plug Control Circuit High
P066C	Cylinder 2 Glow Plug Control Circuit Low
P066D	Cylinder 2 Glow Plug Control Circuit High
P066E	Cylinder 3 Glow Plug Control Circuit Low
P066F	Cylinder 3 Glow Plug Control Circuit High
P0670	Glow plug control module circuit
P0671	Cylinder 1 Glow Plug Circuit/Open
P0672	Cylinder 2 Glow Plug Circuit/Open
P0673	Cylinder 3 Glow Plug Circuit/Open
P0674	Cylinder 4 Glow Plug Circuit/Open
P0675	Cylinder 5 Glow Plug Circuit/Open
P0676	Cylinder 6 Glow Plug Circuit/Open
P067A	Cylinder 4 Glow Plug Control Circuit Low
P067B	Cylinder 4 Glow Plug Control Circuit High
P067C	Cylinder 5 Glow Plug Control Circuit Low
P067D	Cylinder 5 Glow Plug Control Circuit High
P067E	Cylinder 6 Glow Plug Control Circuit Low
P067F	Cylinder 6 Glow Plug Control Circuit High
P0683	Glow Plug Control Module to PCM Communication Circuit
P0684	Glow Plug Control Module to PCM Communication Circuit Range/Performance
P0685	ECM/PCM power relay control circuit open
P0686	ECM/PCM Power Relay Sense Circuit Low
P0687	ECM/PCM Power Relay Control Circuit High
P0688	ECM/PCM Power Relay Sense Circuit/Open
P0689	ECM/PCM Power Relay - Circuit Low
P068A	ECM/PCM Power Relay De-Energized Performance - Too Early
P068B	ECM/PCM Power Relay De-Energized Performance - Too Late
P0690	ECM/PCM Power Relay Sense Circuit High
P0691	Fan 1 Control Circuit Low
P0692	Fan 1 Control Circuit High
P0693	Fan 2 Control Circuit Low
P0694	Fan 2 Control Circuit High
P0695	Fan 3 Control Circuit Low
P0696	Fan 3 Control Circuit High
P0697	Sensor Reference Voltage C Circuit/Open
P0698	Sensor Reference Voltage C Circuit Low
P0699	Sensor Reference Voltage C Circuit High
P069E	Fuel Pump Control Module Requested MIL Illumination
P069F	Throttle Actuator Control Lamp Control Circuit
P06A3	Sensor Reference Voltage D Circuit/Open
P06A4	Sensor Reference Voltage D Circuit Low
P06A5	Sensor Reference Voltage D Circuit High
P06A6	Sensor Reference Voltage A Circuit Range/Performance

ERROR CODE	ERROR
P06A7	Sensor Reference Voltage B Circuit Range/Performance
P06A8	Sensor Reference Voltage C Circuit Range/Performance
P06A9	Sensor Reference Voltage D Circuit Range/Performance
P06AF	Torque Management System - Forced Engine Shutdown
P06B0	Sensor Power Supply A Circuit/Open
P06B1	Sensor Power Supply A Circuit Low
P06B2	Sensor Power Supply A Circuit High
P06B3	Sensor Power Supply B Circuit/Open
P06B4	Sensor Power Supply B Circuit Low
P06B5	Sensor Power Supply B Circuit High
P06B6	Internal Control Module Knock Sensor Processor 1 Performance
P06B7	Internal Control Module Knock Sensor Processor 2 Performance
P06B8	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error
P06B9	Cylinder 1 Glow Plug Circuit Range/Performance
P06BA	Cylinder 2 Glow Plug Circuit Range/Performance
P06BB	Cylinder 3 Glow Plug Circuit Range/Performance
P06BC	Cylinder 4 Glow Plug Circuit Range/Performance
P06BD	Cylinder 5 Glow Plug Circuit Range/Performance
P06BE	Cylinder 6 Glow Plug Circuit Range/Performance
P06C5	Cylinder 1 Glow Plug Incorrect
P06C6	Cylinder 2 Glow Plug Incorrect
P06C7	Cylinder 3 Glow Plug Incorrect
P06C8	Cylinder 4 Glow Plug Incorrect
P06C9	Cylinder 5 Glow Plug Incorrect
P06CA	Cylinder 6 Glow Plug Incorrect
P06D1	Internal Control Module Ignition Coil Control Performance
P0700	Transmission Control System (MIL Request)
P0701	Transmission Control System Range/Performance
P0702	Transmission Control System Electrical
P0703	Brake Switch B Circuit
P0705	Transmission Range Sensor A Circuit (PRNDL Input)
P0706	Transmission Range Sensor A Circuit Range/Performance
P0707	Transmission Range Sensor A Circuit Low
P0708	Transmission Range Sensor A Circuit High
P0709	Transmission Range Sensor A Circuit Intermittent
P0715	Input/Turbine Speed Sensor A Circuit
P0716	Input/Turbine Speed Sensor A Circuit Range/Performance
P0717	Input/Turbine Speed Sensor A Circuit No Signal
P0718	Input/Turbine Speed Sensor A Circuit Intermittent
P0719	Brake Switch B Circuit Low
P071A	Transmission Mode Switch A Circuit
P071B	Transmission Mode Switch A Circuit Low
P071C	Transmission Mode Switch A Circuit High
P071D	Transmission Mode Switch B Circuit
P071E	Transmission Mode Switch B Circuit Low
P071F	Transmission Mode Switch B Circuit High
P0720	Output Speed Sensor Circuit
P0721	Output Speed Sensor Circuit Range/Performance
P0722	Output Speed Sensor Circuit No Signal

ERROR CODE	ERROR
P0723	Output Speed Sensor Circuit Intermittent
P0724	Brake Switch B Circuit High
P0725	Engine Speed Input Circuit
P0726	Engine Speed Input Circuit Range/Performance
P0727	Engine Speed Input Circuit No Signal
P0728	Engine Speed Input Circuit Intermittent
P072A	Stuck in Neutral
P072B	Stuck In Reverse
P0730	Incorrect Gear Ratio
P0736	Reverse Incorrect Ratio
P0737	TCM Engine Speed Output Circuit
P0738	TCM Engine Speed Output Circuit Low
P0739	TCM Engine Speed Output Circuit High
P073D	Unable to Engage Neutral
P073E	Unable to Engage Reverse
P073F	Unable To Engage Gear 1
P0740	Torque Converter Clutch Circuit/Open
P0741	Torque Converter Clutch Circuit Performance/Stuck Off
P0742	Torque Converter Clutch Circuit Stuck On
P0743	TCM Engine Speed Output Circuit
P0744	Torque Converter Clutch Circuit Intermittent
P074A	Unable To Engage Gear 1
P074B	Unable To Engage Gear 3
P074C	Unable To Engage Gear 4
P074D	Unable To Engage Gear 5
P074E	Unable To Engage Gear 6
P074F	Unable To Engage Gear 7
P077A	Output Speed Sensor Circuit - Loss of Direction Signal
P077B	Output Speed Sensor Circuit - Direction Error
P0780	Shift Error
P0781	Gear shift 1-2
P0782	Gear shift 2-3
P0783	Gear shift 3-4
P0784	Gear shift 4-5
P0785	Shift Timing Solenoid A
P0786	Shift Timing Solenoid A Range/Performance
P0787	Shift Timing Solenoid A Low
P0788	Shift Timing Solenoid A High
P0789	Shift Timing Solenoid A Intermittent
P078A	Shift Timing Solenoid B
P078B	Shift Timing Solenoid B Range/Performance
P078C	Shift Timing Solenoid B Low
P078D	Shift Timing Solenoid B High
P078E	Shift Timing Solenoid B Intermittent
P0790	Normal/Performance Switch Circuit
P0791	Intermediate Shaft Speed Sensor A Circuit
P0792	Intermediate Shaft Speed Sensor A Circuit Range/Performance
P0793	Intermediate Shaft Speed Sensor A Circuit No Signal
P0794	Intermediate Shaft Speed Sensor A Circuit Intermittent

ERROR CODE	ERROR
P0800	Transfer Case Control System (MIL Request)
P0801	Reverse Inhibit Control Circuit
P0802	Transmission Control System MIL Request Circuit/Open
P0805	Clutch Position Sensor Circuit
P0806	Clutch Position Sensor Circuit Range/Performance
P0807	Clutch Position Sensor Circuit Low
P0808	Clutch Position Sensor Circuit High
P0809	Clutch Position Sensor Circuit Intermittent
P080A	Clutch Position Not Learned
P080B	Upshift/Skip Shift Solenoid Control Circuit Range/Performance
P080C	Upshift/Skip Shift Solenoid Control Circuit Low
P080D	Upshift/Skip Shift Solenoid Control Circuit High
P0810	Clutch Position Control Error
P0811	Excessive Clutch A Slippage
P0812	Reverse Input Circuit
P0813	Reverse Output Circuit
P0814	Transmission Range Display Circuit
P0815	Upshift Switch Circuit
P0816	Downshift Switch Circuit
P0817	Starter Disable Circuit/Open
P0819	Up and Down Shift Switch to Transmission Range Correlation
P081A	Starter Disable Circuit Low
P081B	Starter Disable Circuit High
P081C	Park Input Circuit
P081D	Neutral Input Circuit
P081E	Excessive Clutch B Slippage
P0826	Up and Down Shift Switch Circuit
P0827	Up and Down Shift Switch Circuit Low
P0828	Up and Down Shift Switch Circuit High
P084F	Park/Neutral Switch Output Circuit
P0850	Park/Neutral Switch Input Circuit
P0851	Park/Neutral Switch Input Circuit Low
P0852	Park/Neutral Switch Input Circuit High
P0856	Traction Control Input Signal
P0857	Traction Control Input Signal Range/Performance
P0858	Traction Control Input Signal Low
P0859	Traction Control Input Signal High
P085A	Gear Shift Control Module B Communication Circuit
P085B	Gear Shift Control Module B Communication Circuit Low
P085C	Gear Shift Control Module B Communication Circuit High
P085D	Gear Shift Control Module A Performance
P085E	Gear Shift Control Module B Performance
P0860	Gear Shift Control Module A Communication Circuit
P0861	Gear Shift Control Module A Communication Circuit Low
P0862	Gear Shift Control Module A Communication Circuit High
P0863	TCM Communication Circuit
P0864	TCM Communication Circuit Range/Performance
P0865	Transmission control module (TCM) communication circuit - low
P0866	Transmission control module (TCM) communication circuit - high

ERROR CODE	ERROR
P0880	Transmission control module power input signal
P0881	Transmission control module (TCM) power input signal - range/performance
P0882	Transmission control module (TCM) power input signal - low
P0883	Transmission control module (TCM) power input signal - high
P0884	Transmission control module (TCM) power input signal - intermittent
P0885	TCM Power Relay Control Circuit/Open
P0886	TCM Power Relay Control Circuit Low
P0887	TCM Power Relay Control Circuit High
P0888	TCM Power Relay Sense Circuit
P0889	TCM Power Relay Sense Circuit Range/Performance
P0890	TCM Power Relay Sense Circuit Low
P0891	TCM Power Relay Sense Circuit High
P0892	TCM Power Relay Sense Circuit Intermittent
P0893	Multiple Gears Engaged
P0894	Transmission Component Slipping
P0895	Shift Time Too Short
P0896	Shift Time Too Long
P0898	Transmission Control System MIL Request Circuit Low
P0899	Transmission Control System MIL Request Circuit High
P0900	Clutch Actuator Circuit/Open
P0901	Clutch Actuator Circuit Range/Performance
P0902	Clutch Actuator Circuit Low
P0903	Clutch Actuator Circuit High
P0914	Gear Shift Position Circuit
P0915	Gear Shift Position Circuit Range/Performance
P0916	Gear Shift Position Circuit Low
P0917	Gear Shift Position Circuit High
P0918	Gear Shift Position Circuit Intermittent
P0919	Gear Shift Position Control Error
P0920	Gear Shift Forward Actuator Circuit/Open
P0921	Gear Shift Forward Actuator Circuit Range/Performance
P0922	Gear shift forward actuator - circuit low
P0923	Gear shift forward actuator - circuit high
P0924	Gear Shift Reverse Actuator Circuit/Open
P0925	Gear shift reverse actuator - circuit range/performance
P0926	Gear shift reverse actuator - circuit low
P0927	Gear shift reverse actuator - circuit high
P0928	Gear shift lock solenoid/actuator control circuit, Open
P0929	Gear Shift Lock Solenoid Circuit, Range/Performance
P092A	Gear shift lock solenoid/actuator control circuit B, Open
P092B	Gear shift lock solenoid circuit B Range/Performance
P092C	Gear shift lock solenoid/actuator control circuit B, low
P092D	Gear shift lock solenoid circuit B, High
P0930	Gear Shift Lock Solenoid Circuit, Low
P0931	Gear Shift Lock Solenoid Circuit, High
P0932	Hydraulic pressure sensor circuit
P0933	Hydraulic pressure sensor, range/performance
P0934	Hydraulic pressure sensor circuit, low input
P0935	Hydraulic pressure sensor circuit, high input



ERROR CODE	ERROR
P0936	Hydraulic pressure sensor - circuit intermittent
P0937	Hydraulic oil temperature sensor circuit
P0938	Hydraulic oil temperature sensor - range/performance
P0939	Hydraulic Oil Temperature Sensor Circuit, Low Input
P0940	Hydraulic Oil Temperature Sensor Circuit, High Input
P0941	Hydraulic oil temperature sensor - circuit intermittent
P0942	Hydraulic pressure unit
P0943	Hydraulic pressure unit cycling period too short
P0944	Hydraulic pressure unit - loss of pressure
P0945	Hydraulic pump relay - circuit open
P0946	Hydraulic pump relay - range/performance
P0947	Hydraulic pump relay - circuit low
P0948	Hydraulic pump relay - circuit high
P0A00	Motor electronics coolant temperature sensor circuit
P0A01	Motor electronics coolant temperature sensor - circuit range/performance
P0A02	Motor electronics coolant temperature sensor - circuit low
P0A03	Motor electronics coolant temperature sensor - circuit high
P0A04	Motor electronics coolant temperature sensor - circuit intermittent
P0A05	Motor electronics coolant pump control circuit, open
P0A06	Motor electronics coolant pump control - circuit low
P0A07	Motor electronics coolant pump control - circuit high
P0A0A	High voltage system interlock circuit
P0A0B	High-voltage system interlock - circuit performance.
P0A0C	High-voltage system interlock - circuit low.
P0A0D	High-voltage system interlock - circuit high.
P0A0E	High-voltage system interlock - circuit intermittent.
P0A0F	Engine failed to start
P0A14	Engine mount A control circuit, open
P0A15	Engine mount control circuit - low
P0A16	Engine mount control circuit - high
P0A17	Motor torque sensor circuit
P0A18	Motor torque sensor - circuit range/performance
P0A19	Motor Torque Sensor Circuit Low
P0A1A	Generator Control Module
P0A1D	Hybrid Powertrain Control Module
P0A1E	Starter/Generator Control Module
P0A1F	Battery Energy Control Module
P0A20	Motor Torque Sensor Circuit High
P0A21	Motor Torque Sensor Circuit Intermittent
P0A22	Generator Torque Sensor Circuit
P0A23	Generator Torque Sensor Circuit Range/Performance
P0A24	Generator Torque Sensor Circuit Low
P0A25	Generator Torque Sensor Circuit High
P0A26	Generator Torque Sensor Circuit Intermittent
P0A36	Generator Temperature Sensor Circuit
P0A37	Generator Temperature Sensor Circuit Range/Performance
P0A38	Generator Temperature Sensor Circuit Low
P0A39	Generator Temperature Sensor Circuit High
P0A3A	Generator Temperature Sensor Circuit Intermittent

ERROR CODE	ERROR
P0A3B	Alternator over-temperature
P0A3E	Generator Inverter Over Temperature
P0A4B	Generator Position Sensor Circuit
P0A4C	Generator Position Sensor Circuit Range/Performance
P0A4D	Generator Position Sensor Circuit Low
P0A4E	Generator Position Sensor Circuit High
P0A4F	Generator Position Sensor Circuit Intermittent
P0A50	Generator Position Sensor Circuit Overspeed
P0A59	Generator Current Sensor Circuit
P0A5A	Generator Current Sensor Circuit Range/Performance
P0A5B	Generator Current Sensor Circuit Low
P0A5C	Generator Current Sensor Circuit High
P0A6F	Generator Phase U Current
P0A70	Generator Phase U Current Low
P0A71	Generator Phase U Current High
P0A72	Generator Phase V Current
P0A73	Generator Phase V Current Low
P0A74	Generator Phase V Current High
P0A75	Alternator - Phase W - Current
P0A76	Alternator - Phase W - Low current
P0A77	Alternator - Phase W - High current
P0A7A	Alternator inverter performance
P0A7B	Battery Energy Control Module Requested MIL Illumination
P0A7C	Motor Electronics Over Temperature
P0A80	Replace Hybrid Battery Pack
P0A92	Hybrid Generator Performance
P0A93	Inverter A Cooling System Performance
P0A95	High Voltage Fuse
P0AB6	Engine Mount B Control Circuit/Open
P0AB7	Engine Mount B Control Circuit Low
P0AB8	Engine Mount B Control Circuit High
P0AB9	Hybrid System Performance
P0AC4	Hybrid Powertrain Control Module Requested MIL Illumination
P0AFF	System Voltage Too Low for Voltage Step Down Conversion
P0B33	High Voltage Service Disconnect Circuit
P0B34	High Voltage Service Disconnect Circuit Performance
P0B35	High Voltage Service Disconnect Circuit Low
P0B36	High Voltage Service Disconnect Circuit High
P0B37	High Voltage Service Disconnect Open
P0B38	Motor Electronics Coolant Pump B Control Circuit/Open
P0B39	Motor Electronics Coolant Pump B Control Circuit Low
P0B3A	Motor Electronics Coolant Pump B Control Circuit High
P0BCC	Generator Inverter Temperature Sensor Circuit
P0BCD	Generator Inverter Temperature Sensor Circuit Range/Performance
P0BCE	Generator Inverter Temperature Sensor Circuit Low
P0BCF	Generator Inverter Temperature Sensor Circuit High
P0BD0	Generator Inverter Temperature Sensor Circuit Intermittent/Erratic
P0C2F	Internal Control Module Drive Motor/Generator - Engine Speed Sensor Performance
P0C31	Inverter B Cooling System Performance

ERROR CODE	ERROR
P0C64	Generator Position Sensor Circuit A
P0C65	Generator Position Sensor Circuit A Range/Performance
P0C66	Generator Position Sensor Circuit A Low
P0C67	Generator Position Sensor Circuit A High
P0C68	Generator Position Sensor Circuit A Intermittent/Erratic
P0C69	Generator Position Sensor Circuit B
P0C6A	Generator Position Sensor Circuit B Range/Performance
P0C6B	Generator Position Sensor Circuit B Low
P0C6C	Generator Position Sensor Circuit B High
P0C6D	Generator Position Sensor Circuit B Intermittent/Erratic
P0C73	Motor Electronics Coolant Pump A Control Performance
P0C74	Motor Electronics Coolant Pump B Control Performance
P0C7B	Generator Inverter Voltage Too High
P2002	Diesel Particulate Filter Efficiency Below Threshold Bank 1
P2003	Diesel Particulate Filter Efficiency Below Threshold Bank 2
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)
P2008	Intake Manifold Runner Control Circuit/Open (Bank 1)
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)
P200A	Intake Manifold Runner Performance, Bank 1
P200B	Intake Manifold Runner Performance, Bank 2
P200E	Catalyst temperature sensor (bank 1) - signal too strong
P200F	Catalyst temperature sensor (bank 2) - signal too strong
P2010	Intake Manifold Runner Control Circuit High (Bank 1)
P2011	Intake Manifold Runner Control Circuit/Open (Bank 2)
P2012	Intake Manifold Runner Control Circuit Low (Bank 2)
P2013	Intake Manifold Runner Control Circuit High (Bank 2)
P2014	Intake Manifold Runner Performance, Bank 1
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)
P2016	Intake Manifold Runner Control Circuit Low (Bank 1)
P2017	Intake Manifold Runner Control Circuit High (Bank 1)
P2018	Intake Manifold Runner Position Sensor/Switch Circuit Intermittent (Bank 1)
P2019	Intake Manifold Runner Performance, Bank 2
P201A	Reductant Injection Valve Circuit Range/Performance (Bank 2 Unit 1)
P2020	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 2)
P2021	Intake Manifold Runner Control Circuit Low (Bank 2)
P2022	Intake Manifold Runner Control Circuit High (Bank 2)
P2023	Intake Manifold Runner Position Sensor/Switch Circuit Intermittent (Bank 2)
P2024	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit
P2025	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Performance
P2026	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit Low Voltage
P2027	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit High Voltage
P2028	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit Intermittent
P2029	Fuel Fired Heater Disabled

ERROR CODE	ERROR
P202A	Reductant Tank Heater Control Circuit/Open
P202B	Reductant Tank Heater Control Circuit Low
P202C	Reductant Tank Heater Control Circuit High
P202D	Reductant Leakage
P202E	Reductant Injection Valve Circuit Range/Performance
P202F	Reductant/Regeneration Supply Control Circuit Range/Performance
P2030	Fuel Fired Heater Performance
P2031	Exhaust gas temperature sensor circuit, bank 1, sensor 2,
P2032	Exhaust Gas Temperature Sensor Circuit Low Bank 1 Sensor 2
P2033	Exhaust Gas Temperature Sensor Circuit High Bank 1 Sensor 2
P2034	Exhaust gas temperature sensor circuit, bank 2, sensor 2,
P2035	Exhaust Gas Temperature Sensor Circuit Low Bank 2 Sensor 2
P2036	Exhaust Gas Temperature Sensor Circuit High Bank 2 Sensor 2
P2037	Reductant Injection Air Pressure Sensor A Circuit
P2038	Reductant Injection Air Pressure Sensor A Circuit Range/Performance
P2039	Reductant Injection Air Pressure Sensor A Circuit Low
P203A	Reductant Level Sensor Circuit
P203B	Reductant Level Sensor Circuit Range/Performance
P203C	Reductant Level Sensor Circuit Low
P203D	Reductant Level Sensor Circuit High
P203E	Reductant Level Sensor Circuit Intermittent/Erratic
P203F	Reductant Level Too Low
P2040	Reductant Injection Air Pressure Sensor A Circuit High
P2041	Reductant Injection Air Pressure Sensor A Circuit Intermittent
P2042	Reductant Tank Temperature Sensor Circuit
P2043	Reductant Temperature Sensor Circuit Range/Performance
P2044	Reductant Temperature Sensor Circuit Low
P2045	Reductant Temperature Sensor Circuit High
P2046	Reductant Temperature Sensor Circuit Intermittent
P2047	Reductant Injection Valve Circuit/Open Bank 1 Unit 1
P2048	Reductant Injection Valve Circuit Low Bank 1 Unit 1
P2049	Reductant Injection Valve Circuit High Bank 1 Unit 1
P204A	Reductant Pressure Sensor Circuit
P204B	Reductant Pressure Sensor Circuit Range/Performance
P204C	Reductant Pressure Sensor Circuit Low
P204D	Reductant Pressure Sensor Circuit High
P204E	Reductant Pressure Sensor Circuit Intermittent/Erratic
P204F	Reductant System Performance Bank 1
P2050	Reductant Injection Valve Circuit/Open (Bank 2 Unit 1)
P2051	Reductant Injection Valve Circuit Low (Bank 2 Unit 1)
P2052	Reductant Injection Valve Circuit High (Bank 2 Unit 1)
P2053	Reductant Injection Valve Circuit/Open (Bank 1 Unit 2)
P2054	Reductant Injection Valve Circuit Low (Bank 1 Unit 2)
P2055	Reductant Injection Valve Circuit High (Bank 1 Unit 2)
P2056	Reductant Injection Valve Circuit/Open (Bank 2 Unit 2)
P2057	Reductant Injection Valve Circuit Low (Bank 2 Unit 2)
P2058	Reductant Injection Valve Circuit High (Bank 2 Unit 2)
P2059	Reductant Injection Air Pump Control Circuit/Open
P205A	Reductant Tank Temperature Sensor Circuit

ERROR CODE	ERROR
P205B	Reductant Temperature Sensor Circuit Range/Performance
P205C	Reductant Tank Temperature Sensor Circuit Low
P205D	Reductant Tank Temperature Sensor Circuit High
P205E	Reductant Temperature Sensor Circuit Intermittent
P205F	Reductant System Performance Bank 2
P2060	Reductant Injection Air Pump Control Circuit Low
P2061	Reductant Injection Air Pump Control Circuit High
P2062	Reductant/Regeneration Supply Control Circuit/Open
P2063	Reductant/Regeneration Supply Control Circuit Low
P2064	Reductant/Regeneration Supply Control Circuit High
P2065	Fuel Level Sensor B Circuit
P2066	Fuel Level Sensor B Performance
P2067	Fuel Level Sensor B Circuit Low
P2068	Fuel Level Sensor B Circuit High
P2069	Fuel Level Sensor B Circuit Intermittent
P206A	Reductant Quality Sensor Circuit
P206B	Reductant Quality Sensor Circuit Range/Performance
P206C	Reductant Quality Sensor Circuit Low
P206D	Reductant Quality Sensor Circuit High
P206E	Intake Manifold Runner Control Stuck Open (Bank 2)
P206F	Intake Manifold Runner Control Stuck Closed (Bank 2)
P2070	Intake Manifold Tuning (IMT) Valve Stuck Open
P2071	Intake Manifold Tuning (IMT) Valve Stuck Closed
P2074	Manifold Absolute Pressure/Mass Air Flow - Throttle Position Correlation at Higher Load
P2075	Intake Manifold Tuning (IMT) Valve Position Sensor/Switch Circuit
P2076	Intake Manifold Tuning (IMT) Valve Position Sensor/Switch Circuit - Range/Performance
P2077	Intake Manifold Tuning (IMT) Valve Position Sensor/Switch Circuit low
P2078	Intake Manifold Tuning (IMT) Valve Position Sensor/Switch Circuit High
P2079	Intake Manifold Tuning (IMT) Valve Position Sensor/Switch Circuit Intermittent
P207A	Intake Manifold Runner Performance, Bank 2
P207B	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 2)
P207C	Intake Manifold Runner Control Circuit Low (Bank 2)
P207D	Intake Manifold Runner Control Circuit High (Bank 2)
P207E	Intake Manifold Runner Position Sensor/Switch Circuit Intermittent (Bank 2)
P207F	Reductant Quality Performance
P2080	Exhaust Gas Temperature Sensor Circuit Range/Performance(bank 1 sensor 1)
P2081	Exhaust Gas Temperature Sensor Circuit Intermittent(bank 1 sensor 1)
P2082	Exhaust Gas Temperature Sensor Circuit Range/Performance (Bank 2 Sensor 1)
P2083	Exhaust Gas Temperature Sensor Circuit Intermittent (Bank 2 Sensor 1)
P2084	Exhaust Gas Temperature Sensor Circuit Range/Performance Bank 1 Sensor 2
P2085	Exhaust Gas Temperature Sensor Circuit Intermittent Bank 1 Sensor 2
P2086	Exhaust Gas Temperature Sensor Circuit Range/Performance Bank 2 Sensor 2
P2087	Exhaust Gas Temperature Sensor Circuit Intermittent Bank 2 Sensor 2
P2088	A Camshaft Position Actuator Control Circuit Low Bank 1
P2089	A Camshaft Position Actuator Control Circuit High Bank 1
P208A	Reductant Pump Control Circuit/Open

ERROR CODE	ERROR
P208B	Reductant Pump Control Range/Performance
P208C	Reductant Pump Control Circuit Low
P208D	Reductant Pump Control Circuit High
P208E	Reductant Injection Valve Stuck Closed Bank 1 Unit 1
P208F	Reductant Injection Valve Stuck Closed Bank 2 Unit 1
P2090	B Camshaft Position Actuator Control Circuit Low (Bank 1)
P2091	B Camshaft Position Actuator Control Circuit High (Bank 1)
P2092	A Camshaft Position Actuator Control Circuit Low (Bank 2)
P2093	A Camshaft Position Actuator Control Circuit High (Bank 2)
P2094	B Camshaft Position Actuator Control Circuit Low (Bank 2)
P2095	B Camshaft Position Actuator Control Circuit High (Bank 2)
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1
P2097	Post Catalyst Fuel Trim System Too Rich Bank 1
P2098	Post Catalyst Fuel Trim System Too Lean Bank 2
P2099	Post Catalyst Fuel Trim System Too Rich Bank 2
P209A	Reductant Injection Air Pressure Sensor B Circuit
P209B	Reductant Injection Air Pressure Sensor B Circuit Range/Performance
P209C	Reductant Injection Air Pressure Sensor B Circuit Low
P209D	Reductant Injection Air Pressure Sensor B Circuit High
P209E	Reductant Injection Air Pressure Sensor A/B Correlation
P209F	Reductant Tank Heater Control Circuit Performance
P20A0	Reductant Purge Control Valve Circuit /Open
P20A1	Reductant Purge Control Valve Performance
P20A2	Reductant Purge Control Valve Circuit Low
P20A3	Reductant Purge Control Valve Circuit High
P20A4	Reductant Purge Control Valve Stuck Open
P20A5	Reductant Purge Control Valve Stuck Closed
P20A6	Reductant Injection Air Pressure Control Valve Circuit/Open
P20A7	Reductant Injection Air Pressure Control Valve Performance
P20A8	Reductant Injection Air Pressure Control Valve Circuit Low
P20A9	Reductant Injection Air Pressure Control Valve Circuit High
P20AA	Reductant Injection Air Pressure Control Valve Stuck Open
P20AB	Reductant Injection Air Pressure Control Valve Stuck Closed
P20AC	Reductant Metering Unit Temperature Sensor Circuit
P20AD	Reductant Metering Unit Temperature Sensor Circuit Range/Performance
P20AE	Reductant Metering Unit Temperature Sensor Circuit Low
P20AF	Reductant Metering Unit Temperature Sensor Circuit High
P20B0	Reductant Metering Unit Temperature Sensor Circuit Intermittent/Erratic
P20B1	Reductant Heater Coolant Control Valve Circuit/Open
P20B2	Reductant Heater Coolant Control Valve Performance
P20B3	Reductant Heater Coolant Control Valve Circuit Low
P20B4	Reductant Heater Coolant Control Valve Circuit High
P20B5	Reductant Metering Unit Heater Control Circuit/Open
P20B6	Reductant Metering Unit Heater Control Circuit Performance
P20B7	Reductant Metering Unit Heater Control Circuit Low
P20B8	Reductant Metering Unit Heater Control Circuit High
P20B9	Reductant Heater A Control Circuit/Open
P20BA	Reductant Heater A Control Circuit Performance
P20BB	Reductant Heater A Control Circuit Low

ERROR CODE	ERROR
P20BC	Reductant Heater A Control Circuit High
P20BD	Reductant Heater B Control Circuit/Open
P20BE	Reductant Heater B Control Circuit Performance
P20BF	Reductant Heater B Control Circuit Low
P20C0	Reductant Heater B Control Circuit High
P20C1	Reductant Heater C Control Circuit/Open
P20C2	Reductant Heater C Control Circuit Performance
P20C3	Reductant Heater C Control Circuit Low
P20C4	Reductant Heater C Control Circuit High
P20C5	Reductant Heater D Control Circuit/Open
P20C6	Reductant Heater D Control Circuit Performance
P20C7	Reductant Heater D Control Circuit Low
P20C8	Reductant Heater D Control Circuit High
P20C9	Reductant Control Module Requested MIL Illumination
P20CA	Reductant Injection Air Pressure Leakage
P20CB	Exhaust Aftertreatment Fuel Injector A Control Circuit/Open
P20CC	Exhaust Aftertreatment Fuel Injector A Control Performance
P20CD	Exhaust Aftertreatment Fuel Injector A Control Circuit Low
P20CE	Exhaust Aftertreatment Fuel Injector A Control Circuit High
P20CF	Exhaust Aftertreatment Fuel Injector A Stuck Open
P20D0	Exhaust Aftertreatment Fuel Injector A Stuck Closed
P20D1	Exhaust Aftertreatment Fuel Injector B Control Circuit/Open
P20D3	Exhaust Aftertreatment Fuel Injector B Control Circuit Low
P20D4	Exhaust Aftertreatment Fuel Injector B Control Circuit High
P20D6	Exhaust Aftertreatment Fuel Injector B Stuck Closed
P20D7	Exhaust Aftertreatment Fuel Supply Control Circuit/Open
P20D8	Exhaust Aftertreatment Fuel Supply Control Performance
P20D9	Exhaust Aftertreatment Fuel Supply Control Circuit Low
P20DA	Exhaust Aftertreatment Fuel Supply Control Circuit High
P20DB	Exhaust Aftertreatment Fuel Supply Control Stuck Open
P20DC	Exhaust Aftertreatment Fuel Supply Control Stuck Closed
P20DD	Exhaust Aftertreatment Fuel Pressure Sensor Circuit
P20DE	Exhaust Aftertreatment Fuel Pressure Sensor Circuit Range/Performance
P20DF	Exhaust Aftertreatment Fuel Pressure Sensor Circuit Low
P20E0	Exhaust Aftertreatment Fuel Pressure Sensor Circuit High
P20E1	Exhaust Aftertreatment Fuel Pressure Sensor Circuit Intermittent/Erratic
P20E2	Exhaust Gas Temperature Sensor 1/2 Correlation Bank 1
P20E3	Exhaust Gas Temperature Sensor 1/3 Correlation Bank 1
P20E4	Exhaust Gas Temperature Sensor 2/3 Correlation Bank 1
P20E5	Reductant Injection Air Pressure Too Low
P20E6	Reductant Injection Air Pressure Too Low
P20E7	Reductant Injection Air Pressure Too High
P20E8	Reductant Pressure Too Low
P20E9	Reductant Pressure Too High
P20EA	Reductant Control Module Power Relay De-Energized Performance - Too Early
P20EB	Reductant Control Module Power Relay De-Energized Performance - Too Late
P20F4	Reductant Consumption Too Low
P20F5	Reductant Consumption Too High

ERROR CODE	ERROR
P20F6	Reductant Injection Valve Stuck Open (Bank 1 Unit 1)
P20F7	Reductant Injection Valve Stuck Open (Bank 2 Unit 1)
P2100	Throttle Actuator A Control Motor Circuit/Open
P2101	Throttle Actuator A Control Motor Circuit Range/Performance
P2102	Throttle Actuator A Control Motor Circuit Low
P2103	Throttle Actuator A Control Motor Circuit High
P2104	Throttle Actuator Control System - Forced Idle
P2105	Throttle Actuator Control System - Forced Engine Shutdown
P2106	Throttle Actuator Control System - Forced Limited Power
P2107	Throttle Actuator Control Module Processor
P2108	Throttle Actuator Control Module Performance
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance
P210A	Throttle Actuator B Control Motor Circuit
P210B	Throttle Actuator B Control Motor Circuit Range/Performance
P210C	Throttle Actuator B Control Motor Circuit Low
P210D	Throttle Actuator B Control Motor Circuit High
P210E	Throttle/Pedal Position Sensor/Switch C/F Voltage Correlation
P210F	Oxygen Sensor Signal Biased/Stuck Rich(bank 1 sensor 1)
P2110	Throttle Actuator Control System - Forced Limited RPM
P2111	Throttle Actuator Control System - Stuck Open
P2112	Throttle Actuator Control System - Stuck Closed
P2113	Throttle/Pedal Position Sensor B Minimum Stop Performance
P2114	Throttle/Pedal Position Sensor C Minimum Stop Performance
P2115	Throttle/Pedal Position Sensor D Minimum Stop Performance
P2116	Throttle/Pedal Position Sensor E Minimum Stop Performance
P2117	Throttle/Pedal Position Sensor F Minimum Stop Performance
P2118	Throttle Actuator Control Motor Current Range/Performance
P2119	Throttle Actuator A Control Motor Circuit Range/Performance
P2120	Throttle/Pedal Position Sensor/Switch D Circuit
P2121	Throttle/Pedal Position Sensor/Switch D Circuit Range/Performance
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High
P2124	Throttle/Pedal Position Sensor/Switch D Circuit Intermittent
P2125	Throttle/Pedal Position Sensor/Switch E Circuit
P2126	Throttle/Pedal Position Sensor/Switch E Circuit Range/Performance
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High
P2129	Throttle/Pedal Position Sensor/Switch E Circuit Intermittent
P212A	Throttle Position Sensor/Switch G Circuit
P212B	Throttle Position Sensor/Switch G Circuit Range/Performance
P212C	Throttle Position Sensor/Switch G Circuit Low
P212D	Throttle Position Sensor/Switch G Circuit High
P212E	Throttle Position Sensor/Switch G Circuit Intermittent
P2130	Throttle/Pedal Position Sensor/Switch F Circuit
P2132	Throttle/Pedal Position Sensor/Switch F Circuit Low
P2133	Throttle/Pedal Position Sensor/Switch F Circuit Intermittent
P2134	Throttle/Pedal Position Sensor/Switch A/B Voltage Correlation
P2135	Throttle/Pedal Position Sensor/Switch A/C Voltage Correlation
P2137	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation

ERROR CODE	ERROR
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation
P2139	Throttle/Pedal Position Sensor/Switch D/F Voltage Correlation
P213E	Fuel Injection System Fault - Forced Engine Shutdown
P213F	Fuel Pump System Fault - Forced Engine Shutdown
P2140	Throttle/Pedal Position Sensor/Switch E/F Voltage Correlation
P2146	Fuel Injector Group A Supply Voltage Circuit/Open
P2147	Fuel Injector Group A Supply Voltage Circuit Low
P2148	Fuel Injector Group A Supply Voltage Circuit High
P2149	Fuel Injector Group B Supply Voltage - Circuit Open
P214C	Long-term adaptation fuel mixing - bank 1
P214D	Long-term adaptation fuel mixing - bank 1
P2150	Fuel Injector Group B Supply Voltage Circuit Low
P2151	Fuel Injector Group B Supply Voltage Circuit High
P2152	Fuel Injector Group C Supply Voltage Circuit/Open
P2153	Fuel Injector Group C Supply Voltage Circuit Low
P2154	Fuel Injector Group C Supply Voltage Circuit High
P2155	Fuel Injector Group D Supply Voltage Circuit/Open
P2156	Fuel Injector Group D Supply Voltage Circuit Low
P2157	Fuel Injector Group D Supply Voltage Circuit High
P2158	Vehicle Speed Sensor B
P2159	Vehicle Speed Sensor B Range/Performance
P215A	Vehicle Speed - Wheel Speed Correlation
P215B	Vehicle Speed - Output Shaft Speed Correlation
P215C	Output Shaft Speed - Wheel Speed Correlation
P2160	Vehicle Speed Sensor B Circuit Low
P2161	Vehicle Speed Sensor B Intermittent/Erratic/High
P2162	Vehicle Speed Sensor A/B Correlation
P2163	Throttle/Pedal Position Sensor A Maximum Stop Performance
P2164	Throttle/Pedal Position Sensor B Maximum Stop Performance
P2165	Throttle/Pedal Position Sensor C Maximum Stop Performance
P2166	Throttle/Pedal Position Sensor D Maximum Stop Performance
P2167	Throttle/Pedal Position Sensor E Maximum Stop Performance
P2168	Throttle/Pedal Position Sensor F Maximum Stop Performance
P2169	Exhaust Pressure Regulator Vent Solenoid Control Circuit/Open
P216A	Fuel Injector Group E Supply Voltage Circuit/Open
P216B	Fuel Injector Group E Supply Voltage Circuit Low
P216C	Fuel Injector Group E Supply Voltage Circuit High
P216D	Fuel Injector Group F Supply Voltage Circuit/Open
P216E	Fuel Injector Group F Supply Voltage Circuit Low
P216F	Fuel Injector Group F Supply Voltage Circuit High
P2170	Exhaust Pressure Regulator Vent Solenoid Control Circuit Low
P2171	Exhaust Pressure Regulator Vent Solenoid Control Circuit High
P2172	Throttle Actuator Control System - Sudden High Air Flow Detected
P2173	Throttle Actuator Control System - High Air Flow Detected
P2174	Throttle Actuator Control System - Sudden Low Air Flow Detected
P2175	Throttle Actuator Control System - Low Air Flow Detected
P2176	Throttle Actuator Control System - Idle Position Not Learned
P2177	System Too Lean Off Idle Bank 1
P2178	System Too Rich Off Idle Bank 1

ERROR CODE	ERROR
P2179	System Too Lean Off Idle Bank 2
P217A	Fuel Injector Group G Supply Voltage Circuit/Open
P217B	Fuel Injector Group G Supply Voltage Circuit Low
P217C	Fuel Injector Group G Supply Voltage Circuit High
P217D	Fuel Injector Group H Supply Voltage Circuit/Open
P217E	Fuel Injector Group H Supply Voltage Circuit Low
P217F	Fuel Injector Group H Supply Voltage Circuit High
P2180	System Too Rich Off Idle Bank 2
P2181	Cooling System Performance
P2182	Engine Coolant Temperature Sensor 2 Circuit
P2183	Engine Coolant Temperature Sensor 2 Circuit Range/Performance
P2184	Engine Coolant Temperature Sensor 2 Circuit Low
P2185	Engine Coolant Temperature Sensor 2 Circuit High
P2186	Engine Coolant Temperature Sensor 2 Circuit Intermittent/Erratic
P2187	System Too Lean at Idle (Bank 1)
P2188	System Too Rich at Idle Bank 1
P2189	System Too Lean at Idle (Bank 2)
P2190	System Too Rich at Idle Bank 2
P2191	System Too Lean at Higher Load Bank 1
P2192	System Too Rich at Higher Load Bank 1
P2193	System Too Lean at Higher Load Bank 2
P2194	System Too Rich at Higher Load Bank 2
P2195	Oxygen Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 1)
P2196	Oxygen Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)
P2197	Oxygen Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 1)
P2198	Oxygen Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 1)
P2199	Intake Air Temperature Sensor 1/2 Correlation
P21AC	Long-term fuel correction under too high load (Bank 1)
P21AD	Long-term fuel correction under too lean load (Bank 1)
P21CC	Long-term fuel correction at minimum too rich (Bank 1)
P21CD	Long-term fuel correction at idle too low (Bank 1)
P21E0	Long-term fuel correction - not plausible signal (Bank 1)
P21EB	Long-term fuel correction - no signal (Bank 1)
P21EC	Long-term fuel correction - high signal (Bank 1)
P21ED	Long-term fuel correction - low signal (Bank 1)
P2226	Barometric pressure sensor circuit
P2227	Barometric pressure sensor circuit, range/performance
P2228	Barometric pressure sensor circuit, low
P2229	Barometric pressure sensor circuit, high
P222A	Barometric pressure sensor B circuit out of nominal range
P222B	Barometric pressure sensor B circuit low
P222C	Barometric pressure sensor B circuit high
P222D	Barometric pressure sensor B circuit intermittent/erratic
P222E	Barometric pressure sensor A/B correlation
P2230	Barometric pressure sensor - circuit intermittent
P2231	Heated oxygen sensor heater (HO2S) Bank 1 Sensor 1
P2232	Heated oxygen sensor heater (HO2S) Bank 1 Sensor 2
P2233	Heated oxygen sensor heater (HO2S) Bank 1 Sensor 3
P2234	Heated oxygen sensor heater (HO2S) Bank 2 Sensor 1

ERROR CODE	ERROR
P2235	Heated oxygen sensor heater (HO2S) Bank 2 Sensor 2
P2236	Heated oxygen sensor heater (HO2S) Bank 2 Sensor 3
P2237	Heated oxygen sensor current (bank 1 sensor 1)
P2238	Heated oxygen sensor current (bank 1 sensor 1)
P2239	Heated oxygen sensor current (bank 1 sensor 1)
P2240	Heated oxygen sensor current (bank 2 sensor 1)
P2241	Heated oxygen sensor current (bank 2 sensor 1)
P2242	Heated oxygen sensor current (bank 2 sensor 1)
P2243	Oxygen sensor reference voltage circuit (Bank 1 sensor 1)
P2244	Oxygen sensor reference voltage, Performance - Bank 1, Sensor 1
P2245	Oxygen sensor reference voltage circuit low - Bank 1, Sensor 1
P2246	Oxygen sensor reference voltage circuit, high - Bank 1 Sensor 1
P2247	Oxygen sensor reference voltage circuit, open - Bank 2, Sensor 1
P2248	Oxygen sensor reference voltage, Performance - Bank 2, Sensor 1
P2249	Oxygen sensor reference voltage circuit, low - Bank 2 Sensor 1
P224F	Barometric pressure sensor "B" circuit
P2250	Oxygen sensor reference voltage circuit, high - Bank 2 Sensor 1
P2251	Heated oxygen sensor current (bank 1 sensor 1)
P2252	Heated oxygen sensor current (bank 1 sensor 1)
P2253	Heated oxygen sensor current (bank 1 sensor 1)
P2254	Heated oxygen sensor current (bank 2 sensor 1)
P2255	Heated oxygen sensor current (bank 2 sensor 1)
P2256	Heated oxygen sensor current (bank 2 sensor 1)
P2257	Secondary Air Injection System Control A Circuit Low
P2258	Secondary Air Injection System Control A Circuit High
P2259	Secondary Air Injection System Control B Circuit Low
P2260	Secondary Air Injection System Control B Circuit High
P2264	Water in Fuel Sensor Circuit
P2265	Water in Fuel Sensor Circuit Range/Performance
P2266	Water in Fuel Sensor Circuit Low
P2267	Water in Fuel Sensor Circuit High
P2268	Water in Fuel Sensor Circuit Intermittent
P2269	Water in Fuel Condition
P226A	Water in Fuel Lamp Control Circuit
P2270	Oxygen Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)
P2271	Oxygen Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 2)
P2272	Oxygen Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 2)
P2273	Oxygen Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 2)
P2274	Oxygen Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 3)
P2275	Oxygen Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 3)
P2276	Oxygen Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 3)
P2277	Oxygen Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 3)
P2278	Oxygen Sensor Signals Swapped (Bank 1 Sensor 3)
P2279	Intake Air System Leak
P2283	Injector Control Pressure Sensor Circuit
P2284	Injector Control Pressure Sensor Circuit Range/Performance
P2285	Injector Control Pressure Sensor Circuit Low
P2286	Injector Control Pressure Sensor Circuit High
P2287	Injector Control Pressure Sensor Circuit Intermittent

ERROR CODE	ERROR
P2288	Injector Control Pressure Too High
P2289	Injector Control Pressure Too High - Engine Off
P228A	Fuel Pressure Regulator 1 - Forced Engine Shutdown
P228B	Fuel Pressure Regulator 2 - Forced Engine Shutdown
P228C	Fuel Pressure Regulator 1 Exceeded Control Limits - Pressure Too Low
P228D	Fuel Pressure Regulator 1 Exceeded Control Limits - Pressure Too High
P228E	Fuel Pressure Regulator 1 Exceeded Learning Limits - Too Low
P228F	Fuel Pressure Regulator 1 Exceeded Learning Limits - Too High
P2290	Injector Control Pressure Too Low
P2291	Injector Control Pressure Too Low - Engine Cranking
P2292	Injector Control Pressure Erratic
P2293	Fuel Pressure Regulator 2 Performance
P2294	Fuel Pressure Regulator 2 Control Circuit/Open
P2295	Fuel Pressure Regulator 2 Control Circuit Low
P2296	Fuel Pressure Regulator 2 Control Circuit High
P2297	Oxygen Sensor Out of Range During Deceleration (Bank 1 Sensor 2)
P2298	Oxygen Sensor Out of Range During Deceleration (Bank 2 Sensor 1)
P229A	Fuel Pressure Regulator Exceeded Control Limits - Pressure Too Low
P229B	Fuel Pressure Regulator Exceeded Control Limits - Pressure Too High
P229C	Fuel Pressure Regulator Exceeded Learning Limits - Too Low
P229D	Fuel Pressure Regulator Exceeded Learning Limits - Too High
P2300	Ignition coils
P2301	Ignition coils
P2302	Ignition Coil A Secondary Circuit
P2303	Ignition Coil B Primary Control Circuit Low
P2304	Ignition Coil B Primary Control Circuit High
P2305	Ignition Coil B Secondary Circuit
P2306	Ignition Coil C Primary Control Circuit Low
P2307	Ignition Coil C Primary Control Circuit High
P2308	Ignition Coil C Secondary Circuit
P2309	Ignition Coil D Primary Control Circuit Low
P2310	Ignition Coil D Primary Control Circuit High
P2311	Ignition Coil D Secondary Circuit
P2312	Ignition Coil E Primary Control Circuit Low
P2313	Ignition Coil E Primary Control Circuit High
P2314	Ignition Coil E Secondary Circuit
P2315	Ignition Coil F Primary Control Circuit Low
P2316	Ignition Coil F Primary Control Circuit High
P2317	Ignition Coil F Secondary Circuit
P2318	Ignition Coil G Primary Control Circuit Low
P2319	Ignition Coil G Primary Control Circuit High
P2320	Ignition Coil G Secondary Circuit
P2321	Ignition Coil H Primary Control Circuit Low
P2322	Ignition Coil H Primary Control Circuit High
P2323	Ignition Coil H Secondary Circuit
P2324	Ignition Coil I Primary Control Circuit Low
P2325	Ignition Coil I Primary Control Circuit High
P2326	Ignition Coil I Secondary Circuit
P2327	Ignition Coil J Primary Control Circuit Low

ERROR CODE	ERROR
P2328	Ignition Coil J Primary Control Circuit High
P2329	Ignition Coil J Secondary Circuit
P2330	Ignition Coil K Primary Control Circuit Low
P2331	Ignition Coil K Primary Control Circuit High
P2332	Ignition Coil K Secondary Circuit
P2333	Ignition Coil L Primary Control Circuit Low
P2334	Ignition Coil L Primary Control Circuit High
P2335	Ignition Coil L Secondary Circuit
P2336	Cylinder 1 above knock threshold
P2337	Cylinder 2 above knock threshold
P2338	Cylinder 3 above knock threshold
P2339	Cylinder 4 above knock threshold
P2340	Cylinder 5 above knock threshold
P2341	Cylinder 6 above knock threshold
P2400	Evaporative emission system leak detection pump control - circuit open
P2401	Evaporative emission system leak detection pump control - circuit low
P2402	Evaporative emission system leak detection pump control - circuit high
P2403	Evaporative emission system leak detection pump sense - circuit open
P2404	Evaporative emission system leak detection pump sense - circuit range/performance
P2405	Evaporative emission system leak detection pump sense - circuit low
P2406	Evaporative emission system leak detection pump sense - circuit high
P2407	Evaporative emission system leak detection pump sense - circuit intermittent/erratic
P2408	Fuel cap sensor / switch circuit
P2409	Fuel cap sensor / switch circuit, range/performance problem
P240A	Evaporative emission system leak detection pump heater - circuit open
P240B	Evaporative emission system leak detection pump heater - circuit low
P240C	Evaporative emission system leak detection pump heater - circuit high
P2410	Fuel cap sensor / switch circuit low
P2411	Fuel cap sensor / switch circuit high
P2412	Fuel Cap Sensor/Switch Circuit Intermittent/Erratic
P2414	Oxygen Sensor Exhaust Sample Error (Bank 1 Sensor 1)
P2415	Oxygen Sensor Exhaust Sample Error (Bank 1 Sensor 1)
P2416	Oxygen Sensor Exhaust Sample Error (Bank 2 Sensor 1)
P2417	Oxygen Sensor Exhaust Sample Error (bank 2, sensor 2)
P2418	Evaporative Emission System Switching Valve Control Circuit, Open
P2419	Evaporative Emission System Switching Valve Control - Circuit Low
P2420	Evaporative Emission System Switching Valve Control Circuit High
P2421	Evaporative emission system switching valve - performance or stuck open
P2422	Evaporative Emission System Vent Valve Stuck Closed.
P2423	HC Adsorption Catalyst Efficiency Below Threshold Bank 1
P2424	HC Adsorption Catalyst Efficiency Below Threshold Bank 2
P2428	Exhaust gas temperature too high (bank 1)
P2429	Exhaust gas temperature too high (bank 2)
P242A	Exhaust Gas Temperature Sensor Circuit Bank 1 Sensor 3
P242B	Exhaust Gas Temperature Sensor Circuit Range/Performance Bank 1 Sensor 3
P242C	Exhaust Gas Temperature Sensor Circuit Low Bank 1 Sensor 3
P242D	Exhaust Gas Temperature Sensor Circuit High Bank 1 Sensor 3
P242E	Exhaust Gas Temperature Sensor Circuit Intermittent/Erratic Bank 1 Sensor 3

ERROR CODE	ERROR
P2430	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Bank 1
P2431	Secondary air injection system air flow/pressure sensor - circuit range/performance (Bank 1)
P2432	Secondary air injection system air flow/pressure sensor - circuit low (Bank 1)
P2433	Secondary air injection system air flow/pressure sensor - circuit high (Bank 1)
P2434	Secondary air injection system air flow/pressure sensor - intermittent/erratic circuit (Bank 1)
P2435	Secondary air injection system - insufficient air flow (Bank 2)
P2436	Secondary air injection system air flow/pressure sensor - circuit range/performance (Bank 2)
P2437	Secondary air injection system air flow/pressure sensor - circuit low (Bank 2)
P2438	Secondary air injection system air flow/pressure sensor - circuit high (Bank 2)
P2439	Secondary air injection system air flow/pressure sensor - intermittent/erratic circuit (Bank 2)
P2440	Secondary air injection system switching valve - stuck open (Bank 1)
P2441	Secondary air injection system switching valve - stuck closed (Bank 1)
P2442	Secondary air injection system switching valve - stuck open (Bank 2)
P2443	Secondary air injection system switching valve - stuck closed (Bank 2)
P2444	Secondary air injection system pump - stuck on (Bank 1)
P2445	Secondary air injection system pump - stuck off (Bank 1)
P2446	Secondary air injection system pump - stuck on (Bank 2)
P2447	Secondary air injection system pump - stuck off (Bank 2)
P2450	Evaporative emission system switching valve - performance or stuck open
P2466	Exhaust gas temperature sensor circuit, bank 2, sensor 3,
P2467	Exhaust gas temperature sensor circuit range/performance - bank 2 sensor 3.
P2468	Exhaust Gas Temperature Sensor Circuit Low Bank 2 Sensor 3
P2469	Exhaust Gas Temperature Sensor Circuit High Bank 2 Sensor 3
P246A	Exhaust gas temperature sensor circuit intermittent/erratic - bank 2 sensor 3.
P246E	Exhaust gas temperature sensor circuit (bank 1, sensor 4)
P246F	Exhaust gas temperature sensor circuit out of range (bank 1 sensor 4)
P2470	Exhaust gas temperature sensor circuit low (bank 1 sensor 4)
P2471	Exhaust gas temperature sensor circuit high (bank 1 sensor 4)
P2472	Exhaust Gas Temperature Sensor Circuit Intermittent Bank 1 Sensor 4
P2473	Exhaust gas temperature sensor circuit (bank 2, sensor 4)
P2474	Exhaust gas temperature sensor circuit out of range (bank 2 sensor 4)
P2475	Exhaust gas temperature sensor circuit low (bank 2 sensor 4)
P2476	Exhaust gas temperature sensor circuit high (bank 2 sensor 4)
P2477	Exhaust Gas Temperature Sensor Circuit Intermittent Bank 2 Sensor 4
P2478	Exhaust gas temperature out of range, bank 1, sensor 1
P2479	Exhaust gas temperature, out of range (bank 1, sensor 2)
P247A	Exhaust gas temperature, out of range (bank 1, sensor 3)
P247B	Exhaust gas temperature, out of range (bank 1, sensor 4)
P247C	Exhaust gas temperature, out of range (bank 2, sensor 1)
P247D	Exhaust gas temperature, out of range (bank 2, sensor 2)
P247E	Exhaust gas temperature, out of range (bank 2, sensor 3)
P247F	Exhaust gas temperature, out of range (bank 2, sensor 4)
P2480	Exhaust gas temperature sensor circuit (bank 1, sensor 5)
P2481	Exhaust Gas Temperature Sensor Circuit Low Bank 1 Sensor 5
P2482	Exhaust Gas Temperature Sensor Circuit High Bank 1 Sensor 5

ERROR CODE	ERROR
P2483	Exhaust Gas Temperature Sensor Circuit Range/Performance Bank 1 Sensor 5
P2484	Exhaust Gas Temperature Sensor Circuit Intermittent/Erratic Bank 1 Sensor 5
P2485	Exhaust Gas Temperature Sensor Circuit/Open Bank 2 Sensor 5
P2486	Exhaust Gas Temperature Sensor Circuit Low Bank 2 Sensor 5
P2487	Exhaust Gas Temperature Sensor Circuit High Bank 2 Sensor 5
P2488	Exhaust Gas Temperature Sensor Circuit Range/Performance Bank 2 Sensor 5
P2489	Exhaust Gas Temperature Sensor Circuit Intermittent/Erratic Bank 2 Sensor 5
P2500	Generator Lamp/L-Terminal Circuit Low
P2501	Generator Lamp/L-Terminal Circuit High
P2502	Charging System Voltage
P2503	Charging System Voltage Low
P2504	Charging System Voltage High
P2505	ECM/PCM Power Input Signal
P2506	ECM/PCM Power Input Signal Range/Performance
P2507	ECM/PCM Power Input Signal Low
P2508	ECM/PCM Power Input Signal High
P2509	ECM/PCM Power Input Signal Intermittent
P250A	Engine oil level sensor circuit
P250A	Long term fuel trim - range/performance
P250B	Engine Oil Level Sensor - Circuit Range/Performance
P250C	Engine oil level sensor - circuit low
P250D	Engine oil level sensor - circuit high
P250E	Engine oil level sensor - circuit intermittent/erratic
P250F	Engine oil level too low
P2510	ECM/PCM power relay sense - circuit range/performance
P2511	ECM/PCM power relay sense - circuit intermittent
P2512	Event Data Recorder Request Circuit, Open
P2513	Engine oil level sensor - circuit low
P2514	Engine oil level sensor - circuit high
P2525	Vacuum Reservoir Pressure Sensor Circuit
P2526	Vacuum Reservoir Pressure Sensor Circuit Range/Performance
P2527	Vacuum Reservoir Pressure Sensor Circuit Low
P2528	Vacuum Reservoir Pressure Sensor Circuit High
P2529	Vacuum Reservoir Pressure Sensor Circuit Intermittent
P252A	Engine Oil Quality Sensor Circuit
P252B	Engine Oil Quality Sensor - Circuit Range/Performance
P252C	Engine oil quality sensor - circuit low
P252D	Engine oil quality sensor - circuit high
P252E	Engine oil quality sensor - circuit intermittent/erratic
P252F	Engine oil level too high
P2530	Ignition Switch Run Position Circuit
P2531	Ignition Switch Run Position Circuit Low
P2532	Ignition Switch Run Position Circuit High
P2533	Ignition Switch Run/Start Position Circuit
P2534	Ignition Switch Run/Start Position Circuit Low
P2535	Ignition Switch Run/Start Position Circuit High
P2536	Ignition Switch Accessory Position Circuit
P2537	Ignition Switch Accessory Position Circuit Low

ERROR CODE	ERROR
P2538	Ignition Switch Accessory Position Circuit High
P2539	Low Pressure Fuel System Sensor Circuit
P253F	Engine Oil Deteriorated
P2540	Low Pressure Fuel System Sensor Circuit Range/Performance
P2541	Low Pressure Fuel System Sensor Circuit Low
P2542	Low Pressure Fuel System Sensor Circuit High
P2543	Low Pressure Fuel System Sensor Circuit Intermittent
P2544	Torque Management Request Input Signal A
P2545	Torque Management Request Input Signal A Range/Performance
P2546	Torque Management Request Input Signal A Low
P2547	Torque Management Request Input Signal A High
P2548	Torque Management Request Input Signal B
P2549	Torque Management Request Input Signal B Range/Performance
P254F	Engine Hood Switch Circuit
P2550	Torque Management Request Input Signal B Low
P2551	Torque Management Request Input Signal B High
P2552	Throttle/Fuel Inhibit Circuit
P2553	Throttle/Fuel Inhibit Circuit Range/Performance
P2554	Throttle/Fuel Inhibit Circuit Low
P2555	Throttle/Fuel Inhibit Circuit High
P2556	Engine Coolant Level Sensor/Switch Circuit
P2557	Engine Coolant Level Sensor/Switch Circuit Range/Performance
P2558	Engine Coolant Level Sensor/Switch Circuit Low
P2559	Engine Coolant Level Sensor/Switch - Circuit High
P2560	Engine Coolant Level Sensor/Switch Circuit
P256A	Engine Idle Speed Selector Sensor/Switch Circuit/Open
P256B	Engine Idle Speed Selector Sensor/Switch Range/Performance
P256C	Engine Idle Speed Selector Sensor/Switch Circuit Low
P256D	Engine Idle Speed Selector Sensor/Switch Circuit High
P256E	Engine Idle Speed Selector Sensor/Switch Circuit Intermittent/Erratic
P257A	Vacuum Reservoir Control Circuit/Open
P257B	Vacuum Reservoir Control Circuit Low
P257C	Vacuum Reservoir Control Circuit High
P257D	Engine Hood Switch Circuit Range/Performance
P257E	Engine Hood Switch Circuit Low
P257F	Engine Hood Switch Circuit High
P2583	Cruise Control Front Distance Range Sensor Single Sensor or Center
P2584	Fuel Additive Control Module Requested MIL Illumination
P2585	Fuel Additive Control Module Warning Lamp Request
P258A	Vacuum Pump Control Circuit/Open
P258B	Vacuum Pump Control Range/Performance
P258C	Vacuum Pump Control Circuit Low
P258D	Vacuum Pump Control Circuit High
P258F	Torque Management Request Output Signal
P2591	Cruise Control Front Distance Range Sensor Left
P2592	Cruise Control Front Distance Range Sensor Right
P2600	Coolant Pump A Control Circuit/Open
P2601	Coolant Pump A Control Circuit Range/Performance
P2602	Coolant Pump A Control Circuit Low



ERROR CODE	ERROR
P2603	Coolant Pump A Control Circuit High
P2604	Intake Air Heater A Circuit Range/Performance
P2605	Intake Air Heater A Circuit Open
P2606	Intake Air Heater B Circuit Range/Performance
P2607	Intake Air Heater B Circuit Low
P2608	Intake Air Heater B Circuit High
P2609	Intake Air Heater System Performance
P260F	Evaporative System Monitoring Processor Performance
P2610	ECM/PCM Internal Engine Off Timer Performance
P2611	A/C Refrigerant Distribution Valve Control Circuit/Open
P2612	A/C Refrigerant Distribution Valve Control Circuit Low
P2613	A/C Refrigerant Distribution Valve Control Circuit High
P2614	Camshaft Position Signal Output Circuit/Open
P2615	Camshaft Position Signal Output Circuit Low
P2616	Camshaft Position Signal Output Circuit High
P2617	Crankshaft Position Signal Output Circuit/Open
P2618	Crankshaft Position Signal Output Circuit Low
P2619	Crankshaft Position Signal Output Circuit High
P261A	Coolant Pump B Control Circuit/Open
P261B	Coolant Pump B Control Circuit Range/Performance
P261C	Coolant Pump B Control Circuit Low
P261D	Coolant Pump B Control Circuit High
P2620	Throttle Position Output Circuit/Open
P2621	Throttle Position Output Circuit Low
P2622	Throttle Position Output Circuit High
P2623	Injector Control Pressure Regulator Circuit/Open
P2624	Injector Control Pressure Regulator Circuit Low
P2625	Injector Control Pressure Regulator Circuit High
P2626	Oxygen Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)
P2627	Oxygen Sensor Pumping Current Trim Circuit Low (Bank 1 Sensor 1)
P2628	Oxygen Sensor Pumping Current Trim Circuit High (Bank 1 Sensor 1)
P2629	Oxygen Sensor Pumping Current Trim Circuit/Open (Bank 2 Sensor 1)
P2630	Oxygen Sensor Pumping Current Trim Circuit Low (Bank 2 Sensor 1)
P2631	Oxygen Sensor Pumping Current Trim Circuit High (Bank 2 Sensor 1)
P2632	Fuel Pump B Control Circuit /Open
P2633	Fuel Pump B Control Circuit Low
P2634	Fuel Pump B Control Circuit High
P2635	Fuel Pump A Low Flow/Performance
P2636	Fuel Pump B Low Flow/Performance
P2637	Torque Management Feedback Signal A
P2638	Torque Management Feedback Signal A Range/Performance
P2639	Torque Management Feedback Signal A Low
P2640	Torque Management Feedback Signal A High
P2641	Torque Management Feedback Signal B
P2642	Torque Management Feedback Signal B - Range/Performance
P2643	Torque Management Feedback Signal B Low
P2644	Torque Management Feedback Signal B High
P2645	A Rocker Arm Actuator Control Circuit/Open Bank 1
P2646	A Rocker Arm Actuator System Performance/Stuck Off Bank 1

ERROR CODE	ERROR
P2647	A Rocker Arm Actuator System Stuck On Bank 1
P2648	A Rocker Arm Actuator Control Circuit Low Bank 1
P2649	A Rocker Arm Actuator Control Circuit High Bank 1
P264A	A Rocker Arm Actuator Position Sensor Circuit Bank 1
P264B	A Rocker Arm Actuator Position Sensor Circuit Range/Performance Bank 1
P264C	A Rocker Arm Actuator Position Sensor Circuit Low Bank 1
P264D	A Rocker Arm Actuator Position Sensor Circuit High Bank 1
P264E	A Rocker Arm Actuator Position Sensor Circuit Intermittent/Erratic Bank 1
P2650	B Rocker Arm Actuator Control Circuit/Open Bank 1
P2651	B Rocker Arm Actuator System Performance/Stuck Off Bank 1
P2652	B Rocker Arm Actuator System Stuck On Bank 1
P2653	B Rocker Arm Actuator Control Circuit Low Bank 1
P2654	B Rocker Arm Actuator Control Circuit High Bank 1
P2655	A Rocker Arm Actuator Control Circuit/Open Bank 2
P2656	A Rocker Arm Actuator System Performance/Stuck Off Bank 2
P2657	A Rocker Arm Actuator System Stuck On Bank 2
P2658	A Rocker Arm Actuator Control Circuit Low Bank 2
P2659	A Rocker Arm Actuator Control Circuit High Bank 2
P265A	B Rocker Arm Actuator Position Sensor Circuit Bank 1
P265B	B Rocker Arm Actuator Position Sensor Circuit Range/Performance Bank 1
P265C	B Rocker Arm Actuator Position Sensor Circuit Low Bank 1
P265D	B Rocker Arm Actuator Position Sensor Circuit High Bank 1
P265E	B Rocker Arm Actuator Position Sensor Circuit Intermittent/Erratic Bank 1
P2660	B Rocker Arm Actuator Control Circuit/Open Bank 2
P2661	B Rocker Arm Actuator System Performance/Stuck Off Bank 2
P2662	B Rocker Arm Actuator System Stuck On Bank 2
P2663	B Rocker Arm Actuator Control Circuit Low Bank 2
P2664	B Rocker Arm Actuator Control Circuit High Bank 2
P2665	Fuel Shutoff Valve B Control Circuit/Open
P2666	Fuel Shutoff Valve B Control Circuit Low
P2667	Fuel Shutoff Valve B Control Circuit High
P2668	Fuel Mode Indicator Lamp Control Circuit
P2669	Actuator Supply Voltage B Circuit /Open
P266A	A Rocker Arm Actuator Position Sensor Circuit Bank 2
P266B	A Rocker Arm Actuator Position Sensor Circuit Range/Performance Bank 2
P266D	A Rocker Arm Actuator Position Sensor Circuit High Bank 2
P266E	A Rocker Arm Actuator Position Sensor Circuit Intermittent/Erratic Bank 2
P2670	Actuator Supply Voltage B Circuit Low
P2671	Actuator Supply Voltage B Circuit High
P2672	Injection Pump Timing Offset
P2673	Injection Pump Timing Calibration Not Learned
P2674	Injection Pump Fuel Calibration Not Learned
P2678	Coolant Degassing Valve Control Circuit/Open
P2679	Coolant Degassing Valve Control Circuit Low
P267A	B Rocker Arm Actuator Position Sensor Circuit Bank 2
P267B	B Rocker Arm Actuator Position Sensor Circuit Range/Performance Bank 2
P267C	B Rocker Arm Actuator Position Sensor Circuit Low Bank 2
P267D	B Rocker Arm Actuator Position Sensor Circuit High Bank 2
P267E	B Rocker Arm Actuator Position Sensor Circuit Intermittent/Erratic Bank 2

ERROR CODE	ERROR
P2680	Coolant Degassing Valve Control Circuit High
P2681	Engine Coolant Bypass Valve Control Circuit/Open
P2682	Engine Coolant Bypass Valve Control Circuit Low
P2683	Engine Coolant Bypass Valve Control Circuit High
P2684	Actuator Supply Voltage C Circuit/Open
P2685	Actuator Supply Voltage C Circuit Low
P2686	Actuator Supply Voltage C Circuit High
P2687	Fuel Supply Heater Control Circuit/Open
P2688	Fuel Supply Heater Control Circuit Low
P2689	Fuel Supply Heater Control Circuit High
P268A	Fuel Injector Calibration Not Learned/Programmed
P268B	High Pressure Fuel Pump Calibration Not Learned/Programmed
P268C	Cylinder 1 Injector Data Incompatible
P268D	Cylinder 2 Injector Data Incompatible
P268E	Cylinder 3 Injector Data Incompatible
P268F	Cylinder 4 Injector Data Incompatible
P2690	Cylinder 5 Injector Data Incompatible
P2691	Cylinder 6 Injector Data Incompatible
P2696	Injector Data Incompatible
P2697	Exhaust Aftertreatment Fuel Injector A Control Circuit/Open
P2698	Exhaust Aftertreatment Fuel Injector A Control Performance
P2699	Exhaust Aftertreatment Fuel Injector A Control Circuit Low
P269A	Exhaust Aftertreatment Fuel Injector A Control Circuit High
P269B	Exhaust Aftertreatment Glow Plug Control Circuit/Open
P269C	Exhaust Aftertreatment Glow Plug Control Performance
P269D	Exhaust Aftertreatment Glow Plug Control Circuit Low
P269E	Exhaust Aftertreatment Glow Plug Control Circuit High
P269F	Exhaust Aftertreatment Glow Plug Circuit/Open
P26A0	Exhaust Aftertreatment Glow Plug Performance
P26A1	Exhaust Aftertreatment Glow Plug Circuit Low
P26A2	Exhaust Aftertreatment Glow Plug Circuit High
P2711	Unexpected Mechanical Gear Disengagement
P2712	Hydraulic Power Unit Leakage
P2745	Intermediate Shaft Speed Sensor B Circuit
P2746	Intermediate Shaft Speed Sensor B Circuit Range/Performance
P2747	Intermediate Shaft Speed Sensor B Circuit No Signal
P2748	Intermediate Shaft Speed Sensor B Circuit Intermittent
P2749	Intermediate Shaft Speed Sensor C Circuit
P2750	Intermediate Shaft Speed Sensor C Circuit Range/Performance
P2751	Intermediate Shaft Speed Sensor C Circuit No Signal
P2752	Intermediate Shaft Speed Sensor C Circuit Intermittent
P2756	Torque Converter Clutch Pressure Control Solenoid
P2757	Torque Converter Clutch Pressure Control Solenoid Control Circuit Performance/Stuck Off
P2758	Torque Converter Clutch Pressure Control Solenoid Control Circuit Stuck On
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical
P2760	Torque Converter Clutch Pressure Control Solenoid Control Circuit Intermittent
P2761	Torque Converter Clutch Pressure Control Solenoid Control Circuit/Open

ERROR CODE	ERROR
P2762	Torque Converter Clutch Pressure Control Solenoid Control Circuit Range/Performance
P2763	Torque Converter Clutch Pressure Control Solenoid Control Circuit High
P2764	Torque Converter Clutch Pressure Control Solenoid Control Circuit Low
P2765	Input/Turbine Speed Sensor B Circuit
P2766	Input/Turbine Speed Sensor B Circuit Range/Performance
P2767	Input/Turbine Speed Sensor B Circuit No Signal
P2768	Input/Turbine Speed Sensor B Circuit Intermittent
P2769	Torque Converter Clutch Circuit Low
P2770	Torque Converter Clutch Circuit High
P2783	Torque Converter Temperature Too High
P2784	Input/Turbine Speed Sensor A/B Correlation
P2785	Clutch Actuator Temperature Too High
P2786	Gear Shift Actuator Temperature Too High
P2787	Clutch Temperature Too High
P2789	Clutch A Adaptive Learning at Limit
P278A	Kick down switch circuit
P278B	Kick down switch - circuit range/performance
P278C	Kick down switch - circuit low
P278D	Kick down switch - circuit high
P278E	Kick down switch - circuit intermittent/irregular
P278F	Clutch B Adaptive Learning at Limit
P2790	Gate Select Direction Circuit
P2791	Gate Select Direction Circuit Low
P2792	Gate Select Direction Circuit High
P2793	Gear Shift Direction Circuit
P2794	Gear Shift Direction Circuit Low
P2795	Gear Shift Direction Circuit High
P279A	Transfer Case Gear High Incorrect Ratio
P279B	Transfer Case Gear Low Incorrect Ratio
P279C	Transfer Case Gear Neutral Incorrect Ratio
P2800	Transmission Range Sensor B Circuit (PRNDL Input)
P2801	Transmission Range Sensor B Circuit Range/Performance
P2802	Transmission Range Sensor B Circuit Low
P2803	Transmission Range Sensor B Circuit High
P2804	Transmission Range Sensor B Circuit Intermittent
P2805	Transmission Range Sensor A/B Correlation
P2806	Transmission Range Sensor Alignment
P280A	Transmission Range Sensor A Circuit Not Learned
P280B	Transmission Range Sensor B Circuit Not Learned
P2853	Clutch A Pressure Discharge Performance
P2854	Clutch B Pressure Discharge Performance
P2855	Clutch A Pressure Charge Performance
P2856	Clutch B Pressure Charge Performance
P2857	Clutch A Pressure Engagement Performance
P2858	Clutch B Pressure Engagement Performance
P2859	Clutch A Pressure Disengagement Performance
P285A	Clutch B Pressure Disengagement Performance
P2A00	Oxygen Sensor Circuit Range/Performance (Bank 1, Sensor 1)
P2A01	Oxygen Sensor Circuit Range/Performance (Bank 1, Sensor 2)

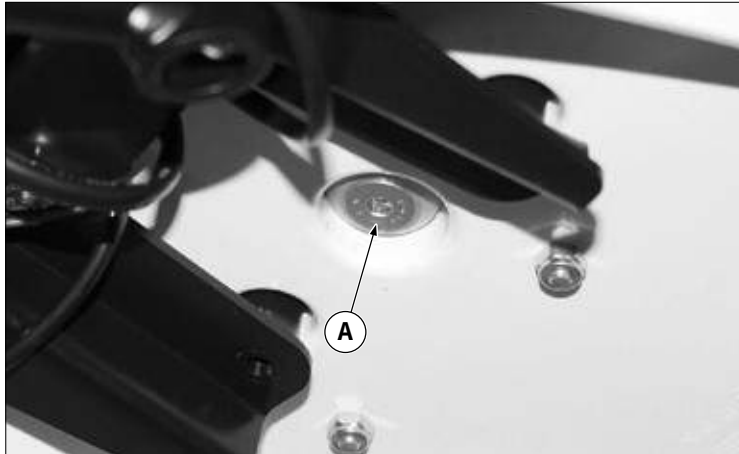
ERROR CODE	ERROR
P2A02	Oxygen Sensor Circuit Range/Performance (Bank 1, Sensor 3)
P2A03	Oxygen Sensor Circuit Range/Performance (Bank 2, Sensor 1)
P2A04	Oxygen Sensor Circuit Range/Performance (Bank 2, Sensor 2)
P2A05	Oxygen Sensor Circuit Range/Performance (Bank 1, Sensor 3)
P2A06	Oxygen Sensor Negative Voltage Bank 1 Sensor 1
P2A07	Oxygen Sensor Negative Voltage - Bank 1 Sensor 2
P2A08	Oxygen Sensor Negative Voltage - Bank 1 Sensor 3
P2A09	Oxygen Sensor Negative Voltage - Bank 2 Sensor 1
P2A10	Oxygen Sensor Negative Voltage - Bank 2 Sensor 2
P2A11	Oxygen Sensor Negative Voltage - Bank 2 Sensor 3
P3000	Manufacturer Controlled DTC, bank 1
P3100	Manufacturer Controlled
P3200	Manufacturer Controlled
P3300	Manufacturer Controlled
P3400	Cylinder deactivation system
P3401	Cylinder 1 Deactivation/Intake Valve Control Circuit/Open
P3402	Cylinder 1 Deactivation/Intake Valve Control Circuit Performance
P3403	Cylinder 1 Deactivation/Intake Valve Control Circuit Low
P3404	Cylinder 1 Deactivation/Intake Valve Control Circuit High
P3405	Cylinder 1 Exhaust Valve Control Circuit/Open
P3406	Cylinder 1 Exhaust Valve Control Circuit Performance
P3407	Cylinder 1 Exhaust Valve Control Circuit Low
P3408	Cylinder 1 Exhaust Valve Control Circuit High
P3409	Cylinder 2 Deactivation/Intake Valve Control Circuit/Open
P3410	Cylinder 2 Deactivation/Intake Valve Control Circuit Performance
P3411	Cylinder 2 Deactivation/Intake Valve Control Circuit Low
P3412	Cylinder 2 Deactivation/Intake Valve Control Circuit High
P3413	Cylinder 2 exhaust valve control - circuit open
P3414	Cylinder 2 Exhaust Valve Control Circuit Performance
P3415	Cylinder 2 exhaust valve control - circuit low
P3416	Cylinder 2 exhaust valve control - circuit high
P3417	Cylinder 3 Deactivation/Intake Valve Control Circuit/Open
P3418	Cylinder 3 Deactivation/Intake Valve Control Circuit Performance
P3419	Cylinder 3 Deactivation/Intake Valve Control Circuit Low
P3420	Cylinder 3 Deactivation/Intake Valve Control Circuit High
P3421	Cylinder 3 exhaust valve control - circuit open
P3422	Cylinder 3 Exhaust Valve Control Circuit Performance
P3423	Cylinder 3 exhaust valve control - circuit low
P3424	Cylinder 3 exhaust valve control - circuit high
P3425	Cylinder 4 Deactivation/Intake Valve Control Circuit/Open
P3426	Cylinder 4 Deactivation/Intake Valve Control Circuit Performance
P3427	Cylinder 4 Deactivation/Intake Valve Control Circuit Low
P3428	Cylinder 4 Deactivation/Intake Valve Control Circuit High
P3429	Cylinder 4 exhaust valve control - circuit open
P3430	Cylinder 4 Exhaust Valve Control Circuit Performance
P3431	Cylinder 4 exhaust valve control - circuit low
P3432	Cylinder 4 exhaust valve control - circuit high
P3433	Cylinder 5 Deactivation/Intake Valve Control Circuit/Open
P3434	Cylinder 5 Deactivation/Intake Valve Control Circuit Performance

ERROR CODE	ERROR
P3435	Cylinder 5 Deactivation/Intake Valve Control Circuit Low
P3436	Cylinder 5 Deactivation/Intake Valve Control Circuit High
P3437	Cylinder 5 exhaust valve control - circuit open
P3438	Cylinder 5 Exhaust Valve Control Circuit Performance
P3439	Cylinder 5 exhaust valve control - circuit low
P3440	Cylinder 5 exhaust valve control - circuit high
P3441	Cylinder 6 Deactivation/Intake Valve Control Circuit/Open
P3442	Cylinder 6 Deactivation/Intake Valve Control Circuit Performance
P3443	Cylinder 6 Deactivation/Intake Valve Control Circuit Low
P3444	Cylinder 6 Deactivation/Intake Valve Control Circuit High
P3445	Cylinder 6 exhaust valve control - circuit open
P3446	Cylinder 6 Exhaust Valve Control Circuit Performance
P3447	Cylinder 6 exhaust valve control - circuit low
P3448	Cylinder 6 exhaust valve control - circuit high
P3497	Cylinder deactivation system bank 2

**11.2.2 ABS module error code table**

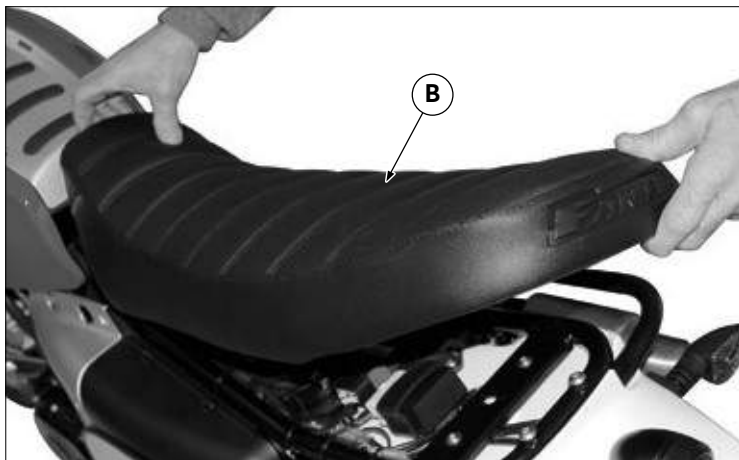
ERROR CODE	ERROR	ADDITIONAL DESCRIPTION
C1013	Rear suction valve	
C1014	Internal error: solenoid valve relay fault	
C1014	Rear exhaust valve	
C1015	Internal error: recirculation pump failure	
C1017	Front suction valve	
C1018	Front exhaust valve	
C1019	Valve relay error	
C1021	Internal error: control unit failure	
C1024	Speed comparison between front and rear wheel: excessive difference	
	Deviazione sensore di velocità ruote	
C1025	Wheel speed sensor deviation	
C1031	Rear wheel speed sensor: electrical diagnosis (circuit open or shorted to negative or shorted to positive)	
C1032	Rear wheel speed sensor: functional diagnosis (not plausible signal)	
C1033	Front wheel speed sensor: electrical diagnosis (circuit open or shorted to negative or shorted to positive)	
C1034	Front wheel speed sensor: functional diagnosis (not plausible signal)	
C1035	Pump motor	Malfunction
C1042	Front wheel speed sensor	Not plausible
C1043	Front wheel speed sensor	Short circuit to ground
C1044	Rear wheel speed sensor	Not plausible
C1045	Rear wheel speed sensor	Short circuit to ground
C1048	Internal error: rear circuit output solenoid valve fault	
C1049	Internal error: front circuit output solenoid valve fault	
C1052	Internal error: rear circuit in/out solenoid valve fault	
C1052	Supply voltage (low voltage)	
C1053	Supply voltage (high voltage)	
C1054	Internal error: front circuit input solenoid valve fault	
C1055	Control unit malfunction	
C1058	Supply voltage (low voltage)	
C1059	Supply voltage (high voltage)	
C1089	Coding error	
C1092	IMU sensor [Wrong fitting]	
C1094	IMU Sensor [Wrong Signal]	
C1331	Internal error: pressure sensor failure	
C1332	Internal error: pressure sensor failure (offset)	
C1333	Internal error: pressure sensor failure (power supply)	
C1E11	CAN line	bus off
C1E12	CAN message (ABS mode switching) absent	
C1E13	CAN bus checksum anomaly	
C1E14	Signal anomaly caused by checksum error/stall counter	
C1E15	CAN line	ABS mode switch
C1E16	CAN line	Vehicle code
C1E17	CAN bus time out combined instrument	
C1E59	Incorrect control unit coding	
C1D90	Front speed sensor	Electric malfunction

ERROR CODE	ERROR	ADDITIONAL DESCRIPTION
C1D91	Front speed sensor	The signal changes intermittently
C1D92	Front speed sensor	The signal decays periodically
C1D93	Front speed sensor	Lack of signal or speed detected too low with respect to the rear wheel
C1D94	Front speed sensor	No acceleration after pressure reduction
C1D95	Front speed sensor	Excessive speed detected
	Sensore di velocità posteriore	Malfunzionamento elettrico
C1D9A	Front wheel pressure sensor circuit	
C1DA0	Rear speed sensor	Electric malfunction
C1DA1	Rear speed sensor	The signal changes intermittently
C1DA2	Rear speed sensor	The signal decays periodically
C1DA3	Rear speed sensor	
C1DA4	Rear speed sensor	Signal not plausible
C1DAA	Rear wheel pressure sensor circuit	
C1DD3	ECU software error	
C1DF0	Recirculation pump	
C1DF1	Recirculation pump	
C1DF2	Generic hardware error inside the control unit	
C1DF4	Low electric voltage	
C1DF5	Generic hardware error inside the control unit	
C1DF7	High electric voltage	
C1E5A	ABS switch	Failuire
U1347	CAN transmission error	Timeout
U2921	CAN error: controller error	
U2922	CAN error: line fault (bus off)	
U2924	CAN error: no reception from the dashboard	
U2925	CAN error: no reception from the injection control unit	
U2926	Key + (connect to the injection control unit diagnosis)	
U2927	Key - (connect to the injection control unit diagnosis)	
U2928	IMU sensor [Signal not plausible]	
U2929	IMU sensor [Timeout]	
U3930	On board network undervoltage	
U3931	On board network overvoltage	
U3932	CAN message	Timeout
U3933	CAN message	Timeout / Wrong DLC / Checksum / Corrupt Data / Counter
U3934	CAN message	Timeout
U3935	CAN message	Signal error
U301F	Generic hardware error inside the control unit	
U30CB	PIN code check	KL 30 voltage too low



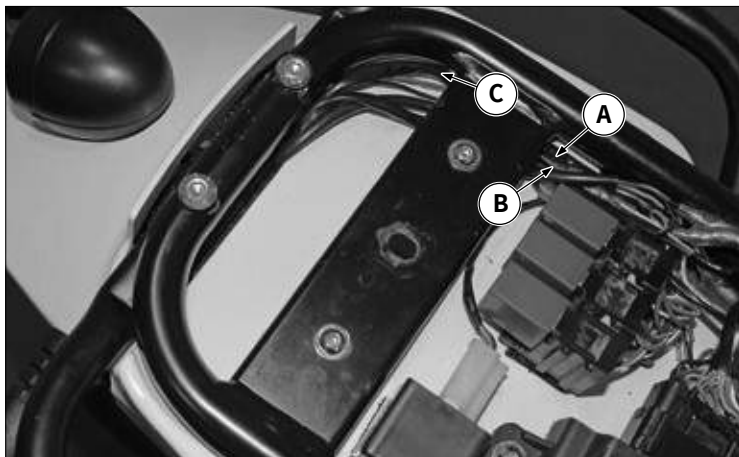
### 12.1 SEAT REMOVAL

To open the seat, unscrew and remove the screw “A”.



Lift up and remove the seat “B”.

**i** Proceed in the reverse order for reassembling.

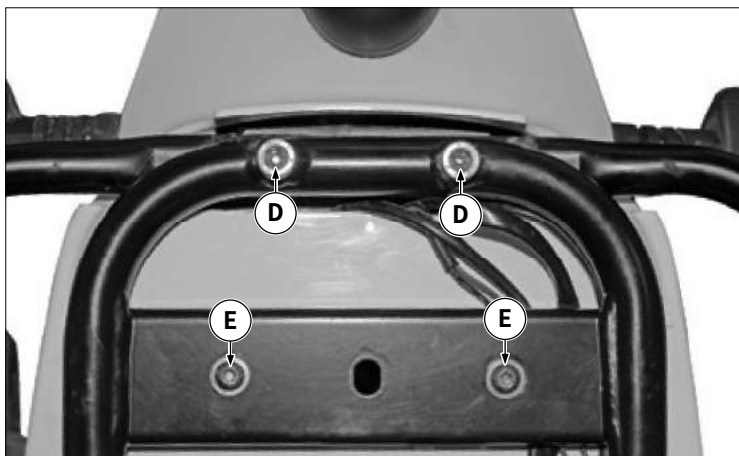


### 12.2 LICENSE PLATE HOLDER REMOVAL

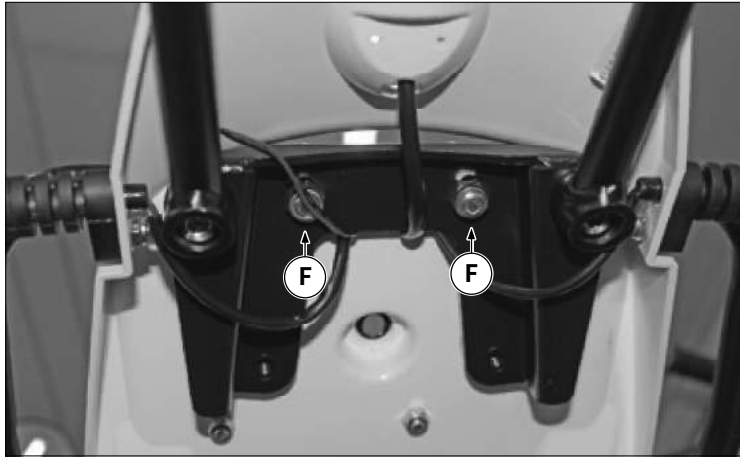
#### 12.2.1 License plate holder removal (Scrambler version)

Remove:

– Saddle, refer to “12.1 Seat removal” a pagina 121“. Disconnect the license plate light wiring black “A” red “B”, and the tail light cable “C” from the vehicle wiring.



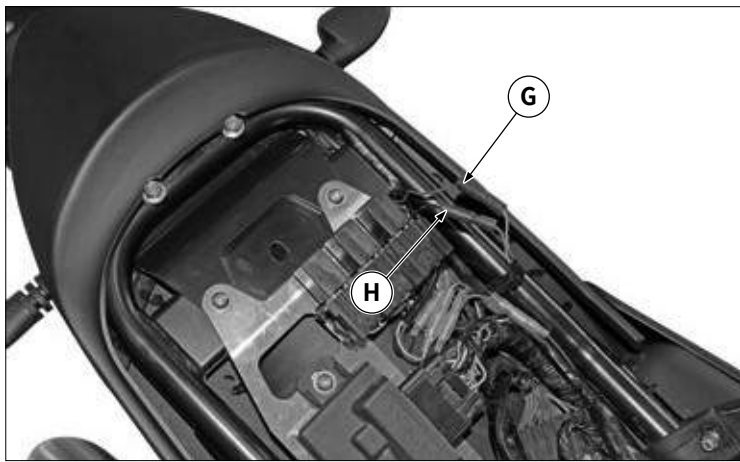
Remove the screws “D”, the screws “E”.



Remove the nuts “F”.

Remove the license plate holder, taking care not to damage the wiring of the tail light and of the turn signals.

**(i) Proceed in the reverse order for reassembling.**



### 12.2.2 License plate holder removal (Flat Track version)

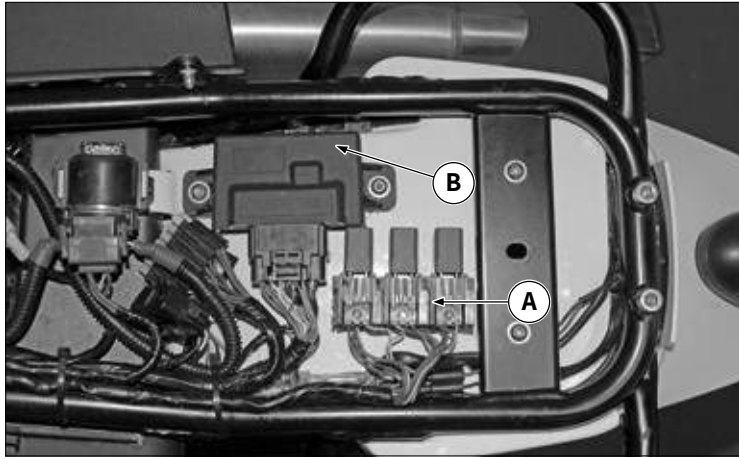
Remove:

– Saddle, refer to “12.1 Seat removal” a pagina 121“. Disconnect the red “G” black “H” license plate light wiring from the vehicle wiring.



Remove the screws “I”, then remove the license plate holder.

**(i) Proceed in the reverse order for reassembling.**



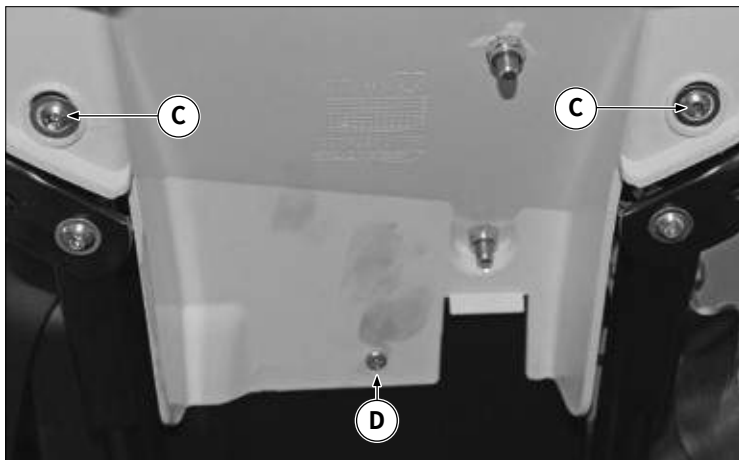
## 12.3 REAR TAIL REMOVAL

### 12.3.1 Rear tail removal (Scrambler version)

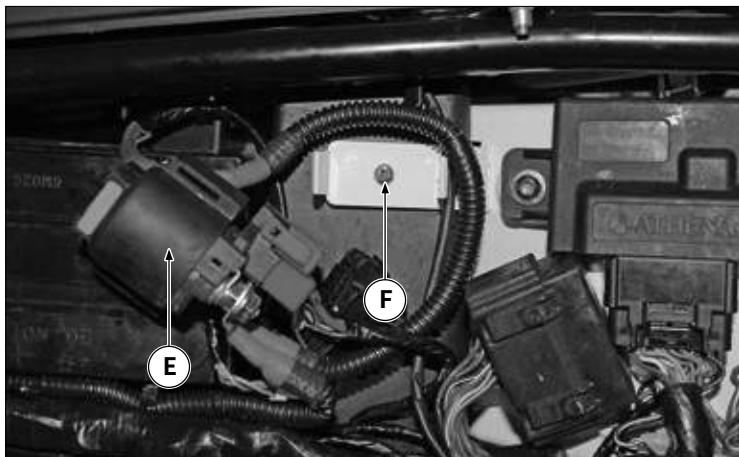
Remove:

- Saddle, refer to "12.1 Seat removal" a pagina 121";
- Scrambler version license plate holder, refer to "12.2.2 License plate holder removal (Flat Track version)" a pagina 122";
- Rear turn signals, refer to "12.23.3 Rear turn signals removal" a pagina 167";
- Scrambler tail light, refer to "12.23 Rear optical unit removal" a pagina 165".

Remove the relay box "A" and the module "B" from the tail without disconnecting the wiring.



Remove the screws "C" and the screw "D" in the lower part of the tail.

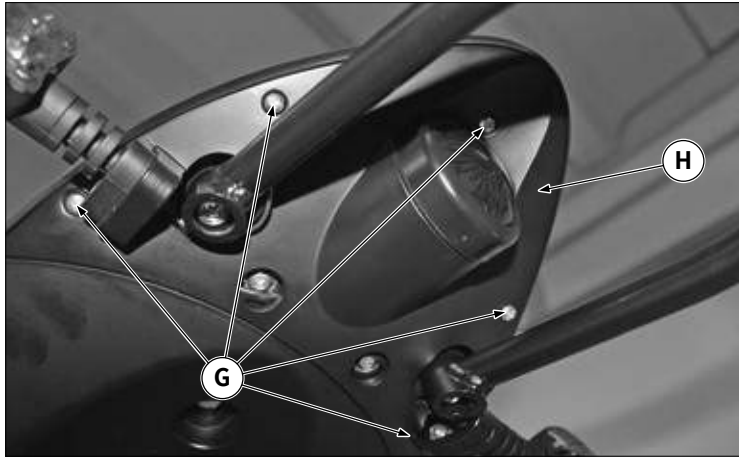


Remove the starter relay "E".

Remove the screw "F", then remove the tail from the vehicle.

**i** Proceed in the reverse order for reassembling.

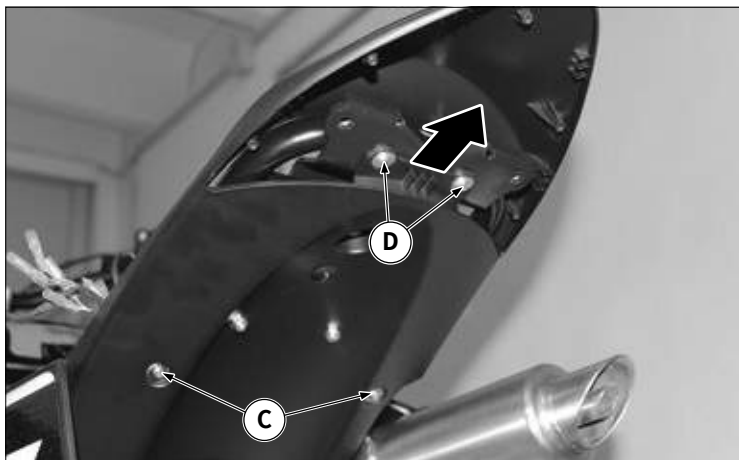


**12.3.2 Rear tail removal (Flat Track version)**

Remove:

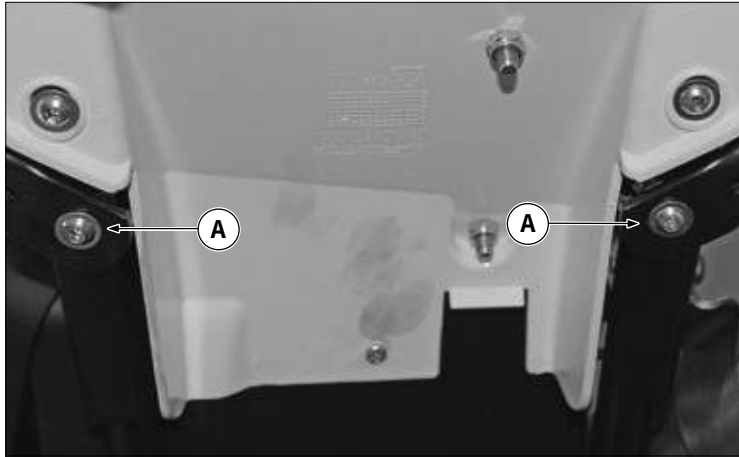
- Saddle, refer to "12.1 Seat removal" a pagina 121";
- Flat Track version license plate holder, refer to "12.2 License plate holder removal" a pagina 121";
- Rear turn signals, refer to "12.23.3 Rear turn signals removal" a pagina 167";
- Flat Track tail light, refer to "12.23 Rear optical unit removal" a pagina 165".

Remove the screws "A", then remove the lower cover "B".



Remove the screws "C" and the screws "D", then extract the rear tail.

**i** Proceed in the reverse order for reassembling.



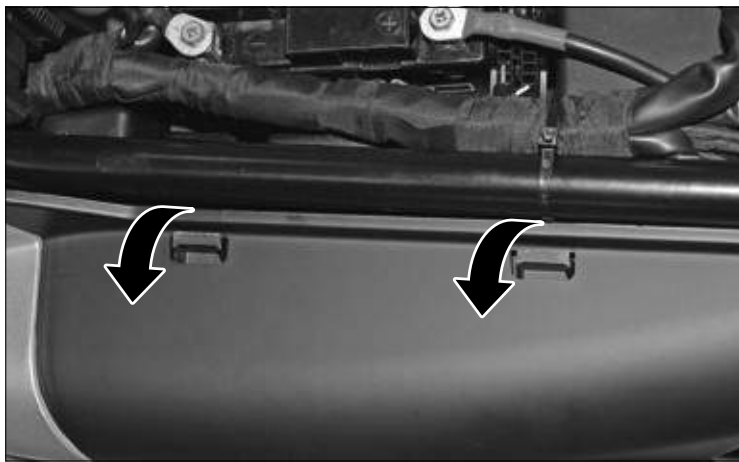
## 12.4 PASSENGER HANDLES REMOVAL

Remove:

- Saddle, refer to “12.1 Seat removal” a pagina 121“;
- License plate holder, refer to “12.2 License plate holder removal” a pagina 121“;
- Rear tail, refer to “12.3 Rear tail removal” a pagina 123“.

Remove the screws “A” and disassemble the passenger handles.

**(i) Proceed in the reverse order for reassembling.**



## 12.5 SIDE PANEL REMOVAL

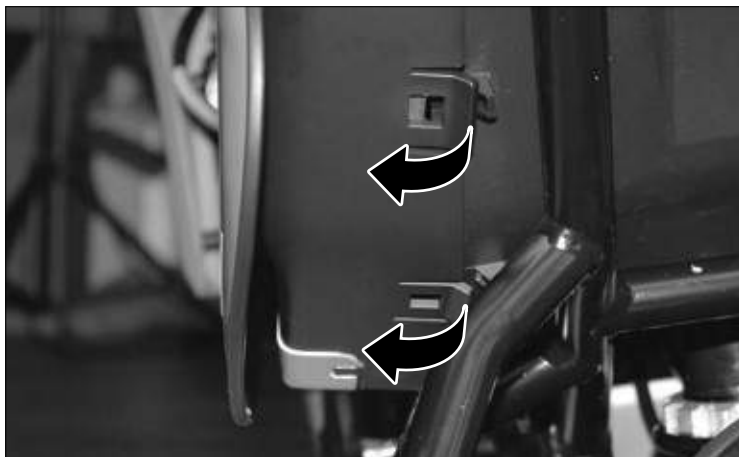
### 12.5.1 Left side panel removal

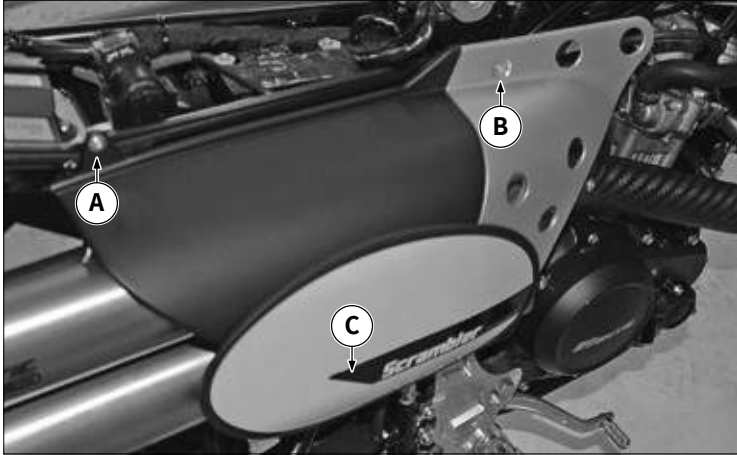
Remove:

- Saddle, refer to “12.1 Seat removal” a pagina 121“

Release the side panel from the upper and lower couplers, then remove it.

**(i) Proceed in the reverse order for reassembling.**

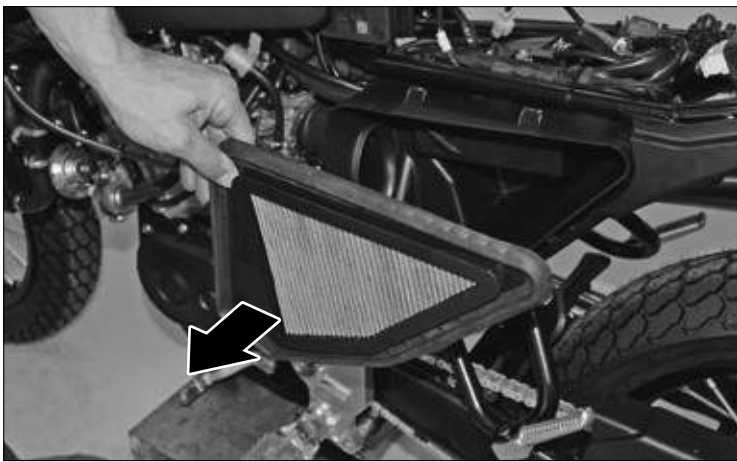


**12.5.2 Right side panel removal**

Remove:

– Saddle, refer to “12.1 Seat removal” a pagina 121“. Remove the screw “A”, the screw “B” and the screw “C”, then remove the side panel.

**i** Proceed in the reverse order for reassembling.

**12.6 AIR FILTER REMOVAL**

Remove:

– Left side panel: refer to “12.5.1 Left side panel removal” a pagina 125“.

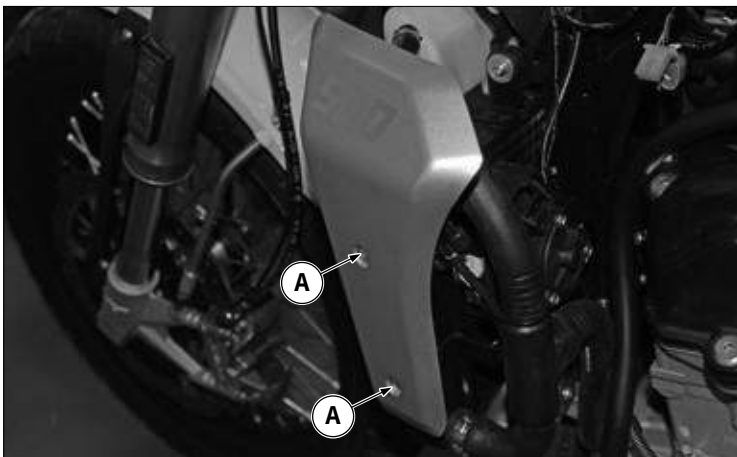
Remove the air filter.

**i** Proceed in the reverse order for reassembling.

**12.6.1 Oil filter cleaning**

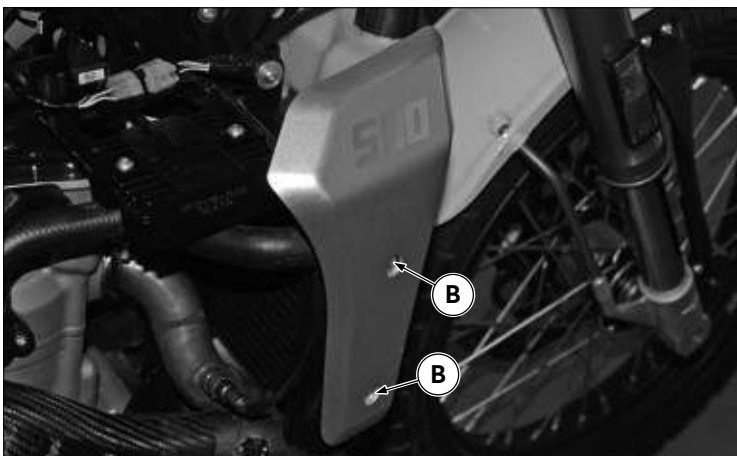
Clean the air filter with a jet of compressed air directed from the inside towards the outside of the filter.

Externally clean the air filter, the inside of the filter casing and the intake ducts with a clean cloth.

**12.7 UNDERBODY AND CONVEYORS REMOVAL****12.7.1 Left conveyor removal**

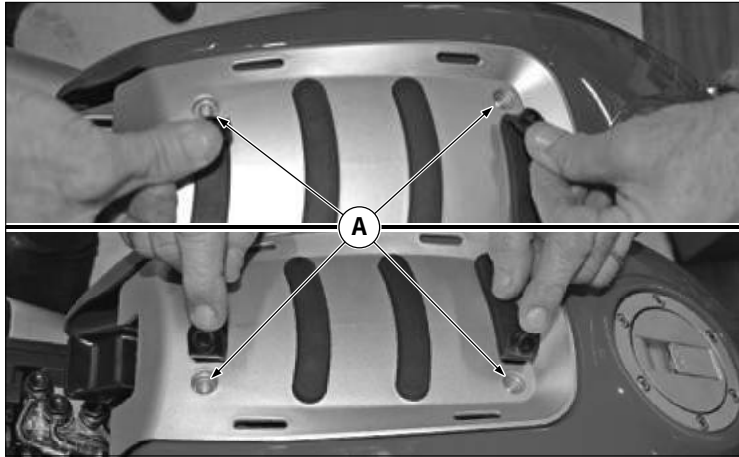
Remove the screws “A”, then remove the conveyor.

**i** Proceed in the reverse order for reassembling.

**12.7.2 Right conveyor removal**

Remove the screws “B”, then remove the conveyor.

**i** Proceed in the reverse order for reassembling.



## 12.8 FUEL TANK REMOVAL

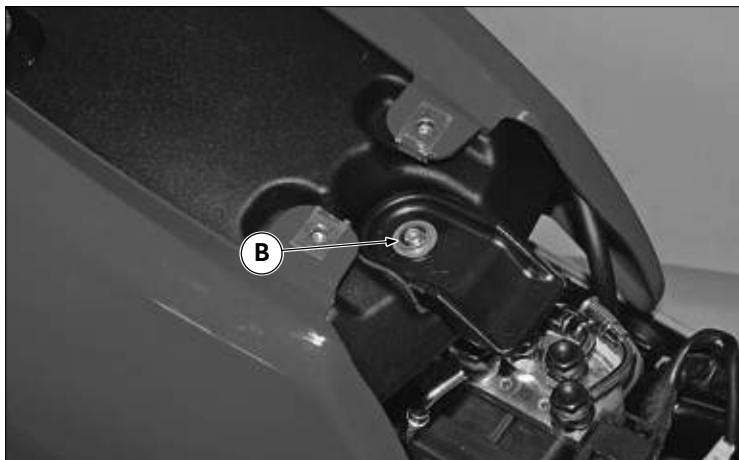
Remove:

- Left side panel.

### 12.8.1 Cover removal

Lift up the rubber guards and remove the screws "A", then remove the cover.

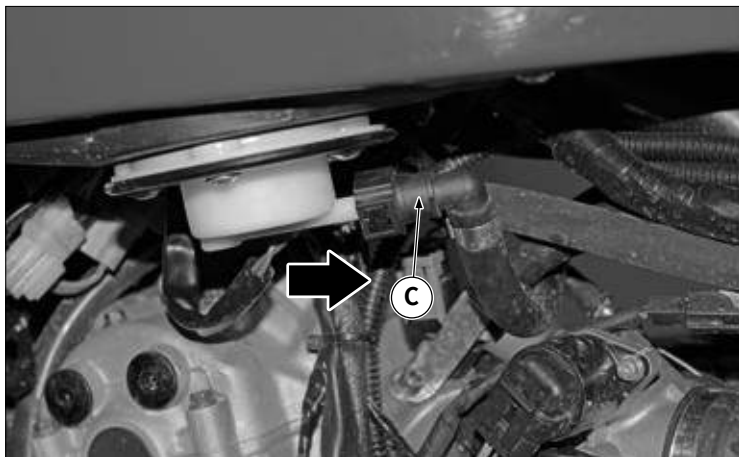
**i** Proceed in the reverse order for reassembling.



### 12.8.2 Complete tank removal

Remove:

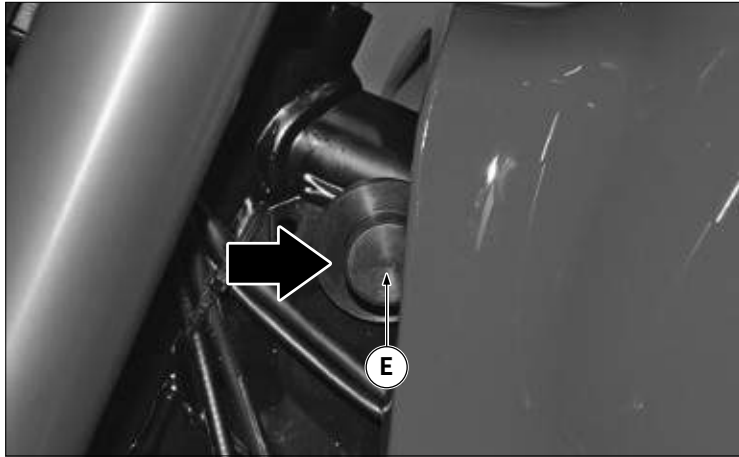
- Fuel tank cover; refer to "12.8.1 Cover removal" on page 127.
- Remove the screw "B".



Disconnect the rubber tube "C" from the fuel pump.

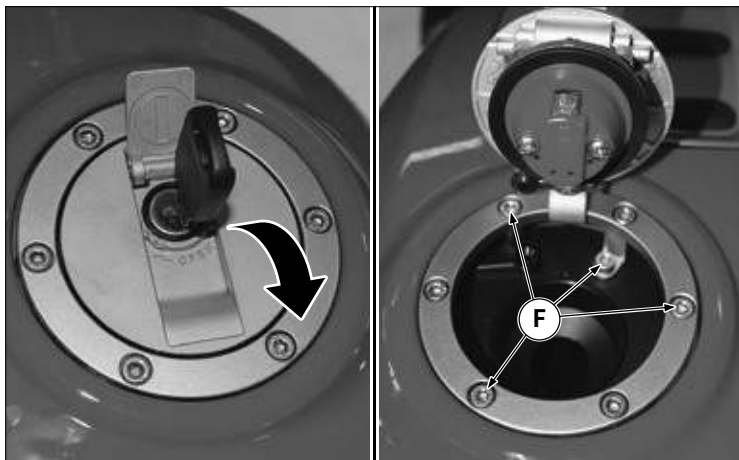


Disconnect the fuel pump connector "D" from the main wiring.



Lift the tank removing it from the front pads “E” and remove the tank.

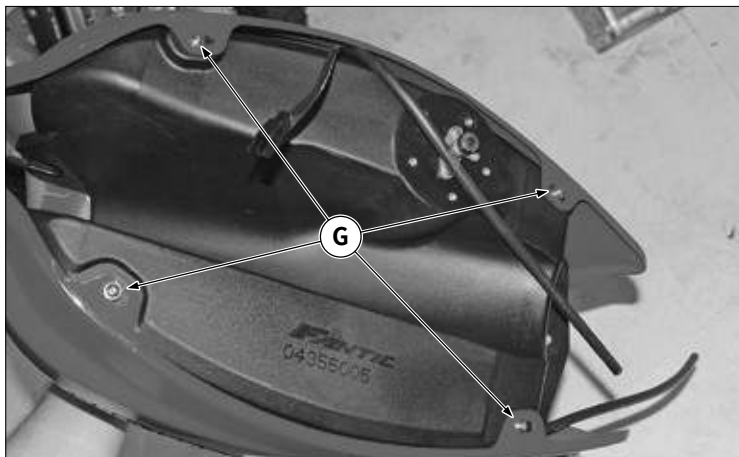
**(i) Proceed in the reverse order for reassembling.**



### 12.8.3 Fuel cap removal

Open the fuel cap with the key and remove the screws “F”, then remove the cap.

**(i) Proceed in the reverse order for reassembling.**



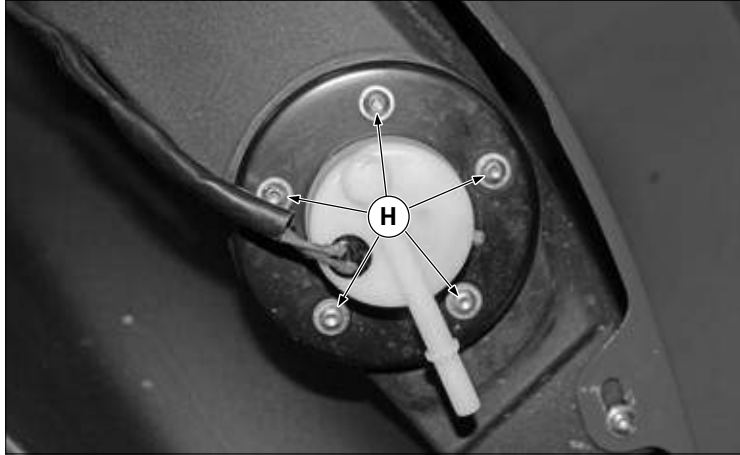
### 12.8.4 Tank cover removal

Remove:

- Tank cover, refer to “12.8.1 Cover removal” on page 127“;
- Complete fuel tank, refer to “12.8.2 Complete tank removal” on page 127“;
- Fuel cap.

Remove the screws “G” and separate the cover from the fuel tank.

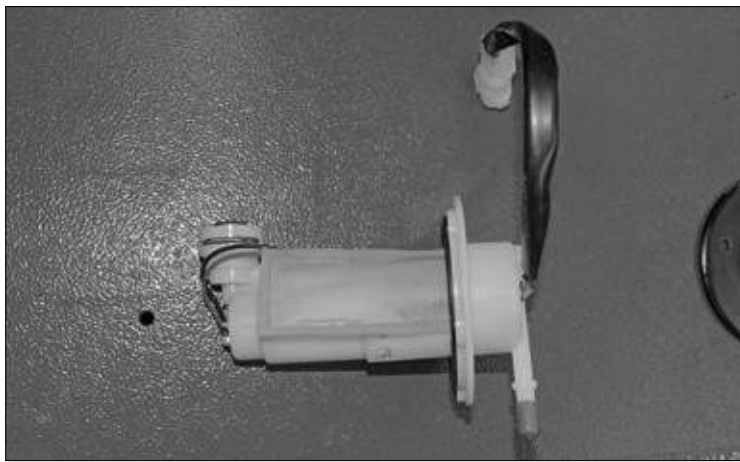
**(i) Proceed in the reverse order for reassembling.**



### **12.8.5 Fuel pump removal**

Empty the fuel tank.

Remove the screws "H", then remove the fuel pump.



① The fuel filter does not need replacing.

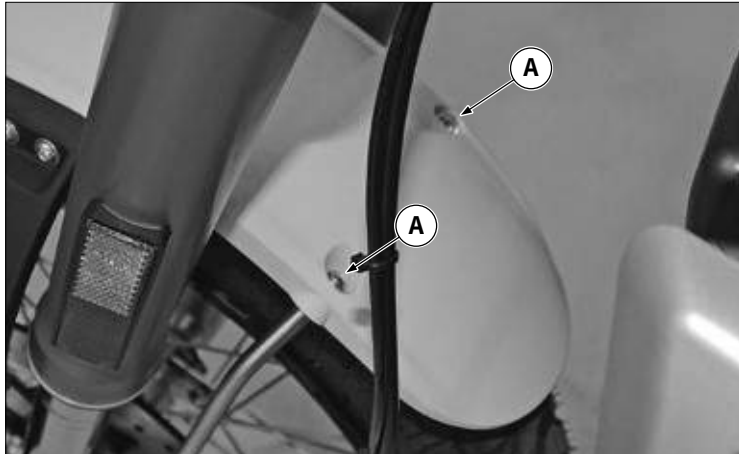
① Proceed in the reverse order for reassembling.



### **12.8.6 Fuel level indicator removal**

Remove the screws "I", then remove the fuel level indicator.

① Proceed in the reverse order for reassembling.

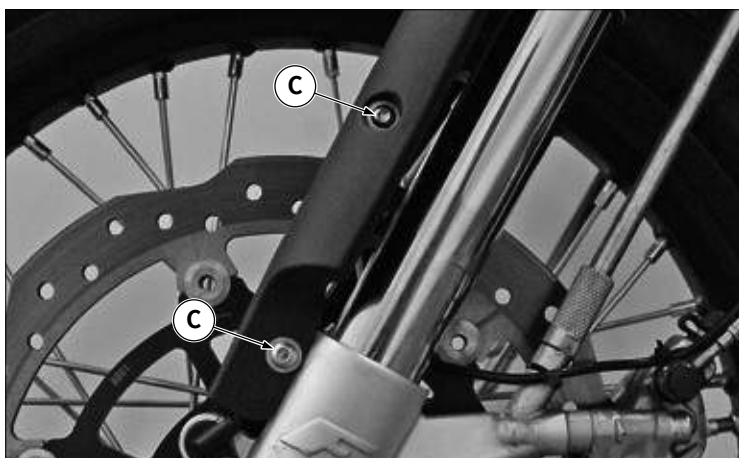
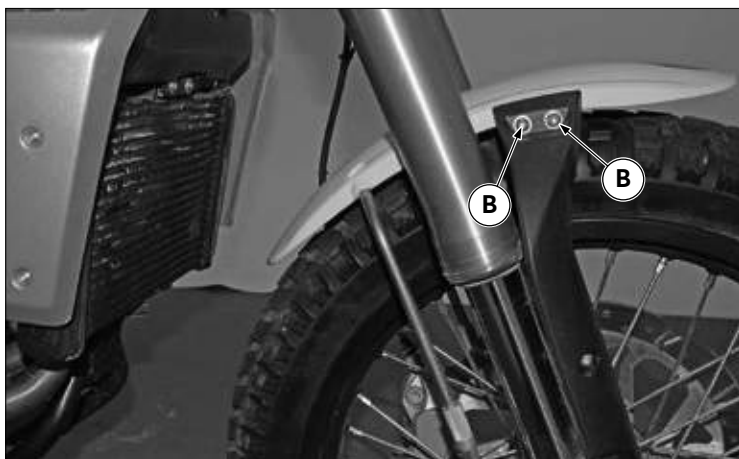
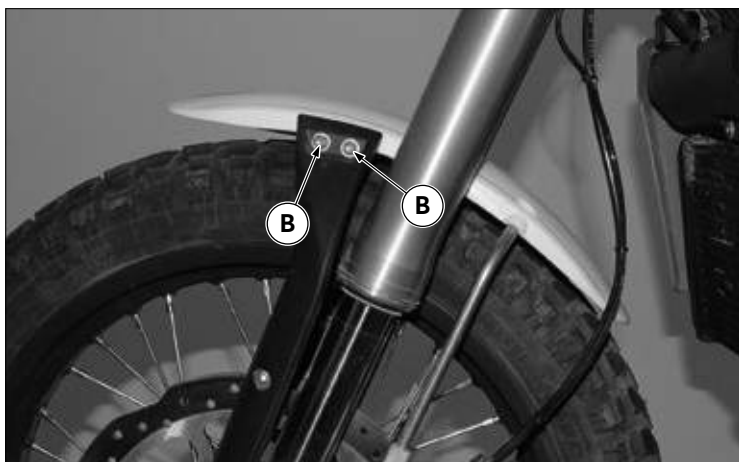


## 12.9 FRONT MUDGUARD AND FORK PROTECTORS REMOVAL

### 12.9.1 Front mudguard removal

Remove screws "A" and screws "B" to release the front mudguard.

**i** Proceed in the reverse order for reassembling.

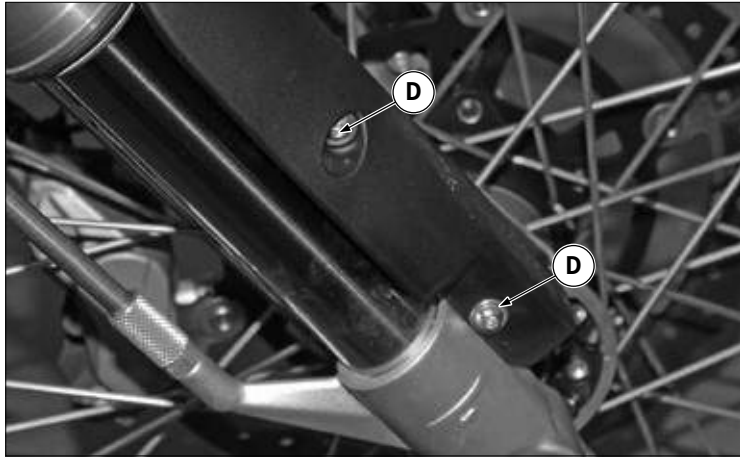


### 12.9.2 Fork protectors removal

Remove:

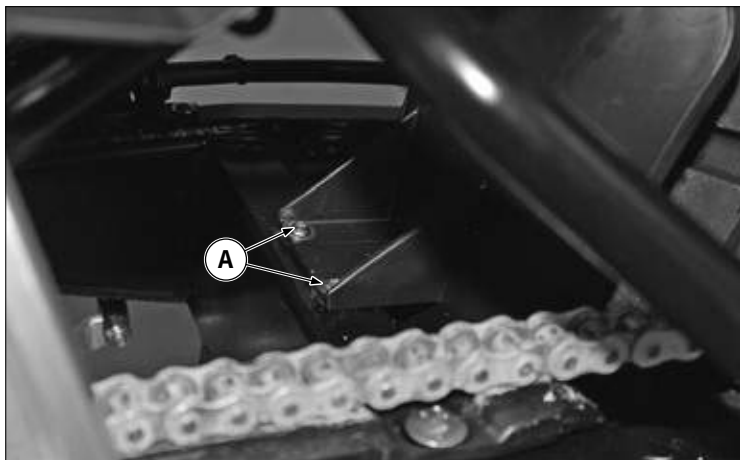
– Front mudguard, refer to "12.9.1 Front mudguard removal" on page 130"

Remove the screws "C" to release the left fork protectors.



Remove the screws “D” to release the right fork protectors.

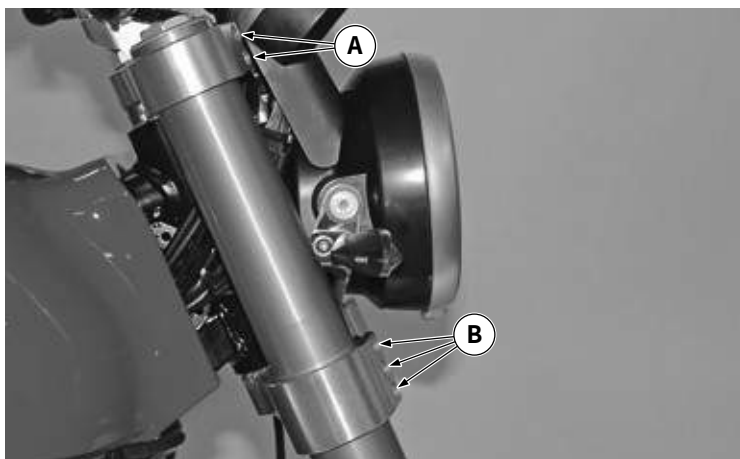
**i** Proceed in the reverse order for reassembling.



## 12.10 REAR MUDGUARD REMOVAL

Remove the screws “A” to release the rear mudguard.

**i** Proceed in the reverse order for reassembling.



## 12.11 SUSPENSIONS REMOVAL

### 12.11.1 Swingarm removal

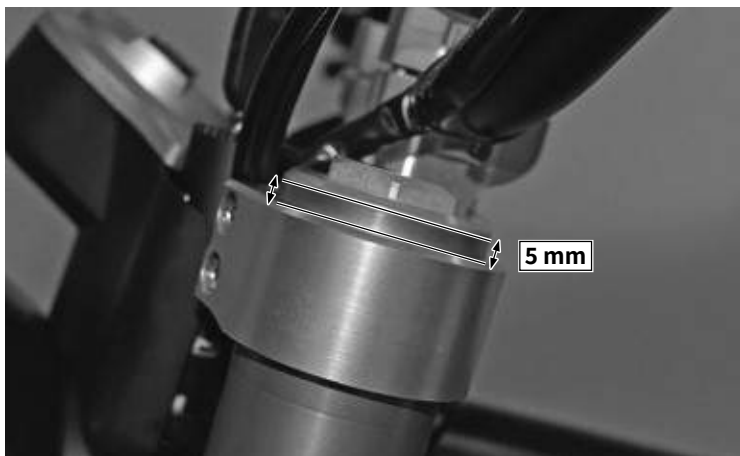
Remove:

- Front wheel, refer to “12.15.1 Front wheel removal” on page 142“;
- Front mudguard, refer to “12.9.1 Front mudguard removal” on page 130“.

Loosen the screws “A” and the screws “B” on the steering plates to remove the stem.

Repeat the operation on the opposite side.

**i** Proceed in the reverse order for reassembling.



**i** During reassembly, make sure that the golden part of the stems is at least 5 mm out from the upper edge of the steering plate.

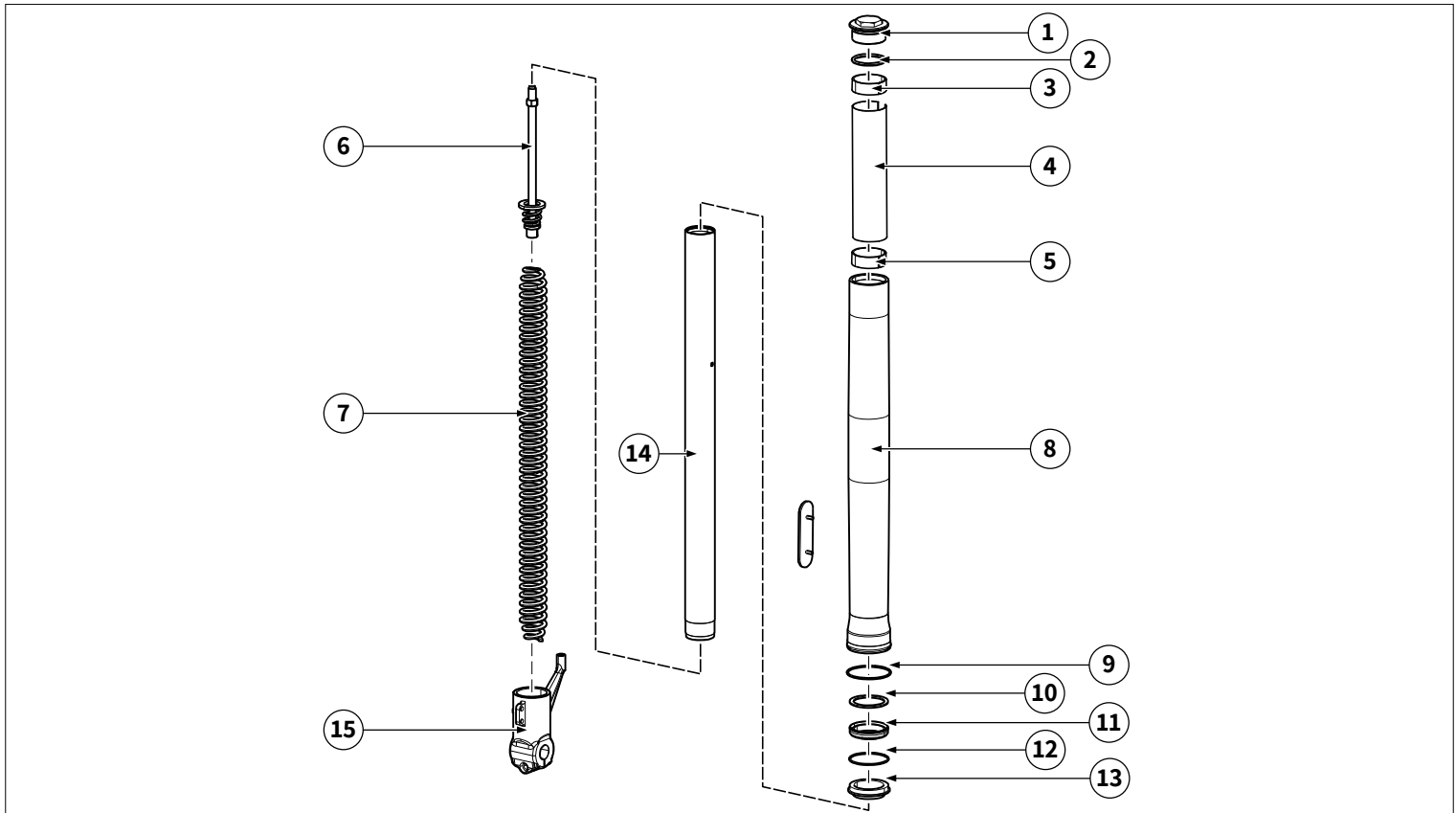
**Tightening torques:**

- Screws (A) M6 swingarm plates fastening: 22 Nm (2.2 m·kgf, 16 ft·lbf) to 25 Nm (2.5 m·kgf, 18 ft·lbf)
- Screws (B) M6 swingarm plates fastening: 12 Nm (1.2 m·kgf, 8.7 ft·lbf)



**12.11.2 Swingarm overhaul**

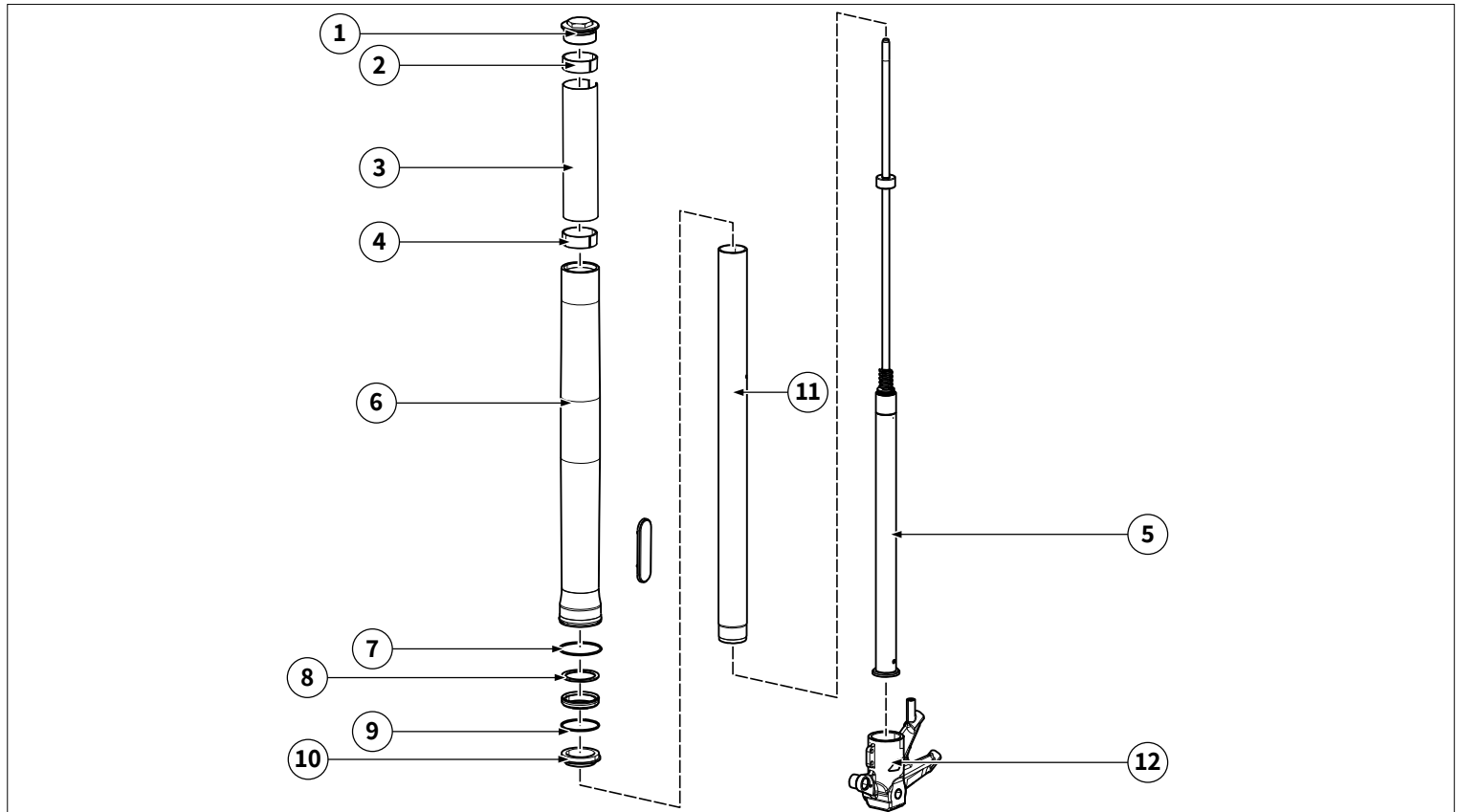
**Right suspension**



Sequence	Operation/Components to remove	Quantity	Remarks
1	Fork cap	1	
2	Seal	1	
3	Bushing	1	
4	Bushings spacer	1	
5	Bushing	1	
6	Rod	1	
7	Compression spring	1	
8	Fork cover	1	
9	Washer	1	
10	Oil seal ring	1	
11	Oil seal	1	
12	Oil seal ring	1	
13	Dust cover	1	
14	Stem	1	
15	Fork foot	1	

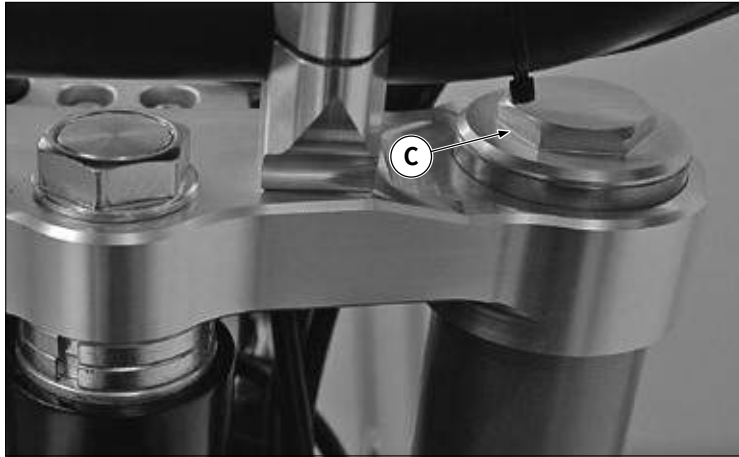
**i** For installation, reverse the removal procedure.

Left suspension



Sequence	Operation/Components to remove	Quantity	Remarks
1	Fork cap	1	
2	Bushing	1	
3	Bushings spacer	1	
4	Bushing	1	
5	Fantic hydraulic cartridge	1	
6	Fork cover	1	
7	Washer	1	
8	Oil seal	1	
9	Oil seal ring	1	
10	Dust cover	1	
11	Stem	1	
12	Fork foot	1	

**i** For installation, reverse the removal procedure.




### 12.11.3 Swingarm oil change

Remove:

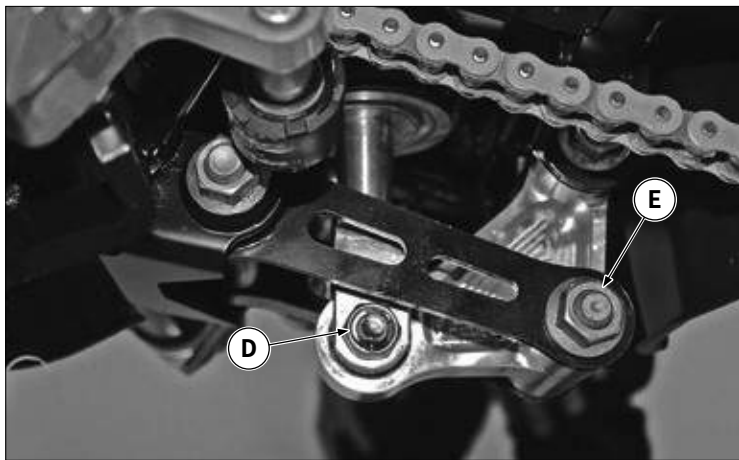
- Front wheel;
- Swingarm.

Remove the upper cap "C" of the right stem, rotate the stem and wait until the old oil is completely emptied.

Fill with new oil.

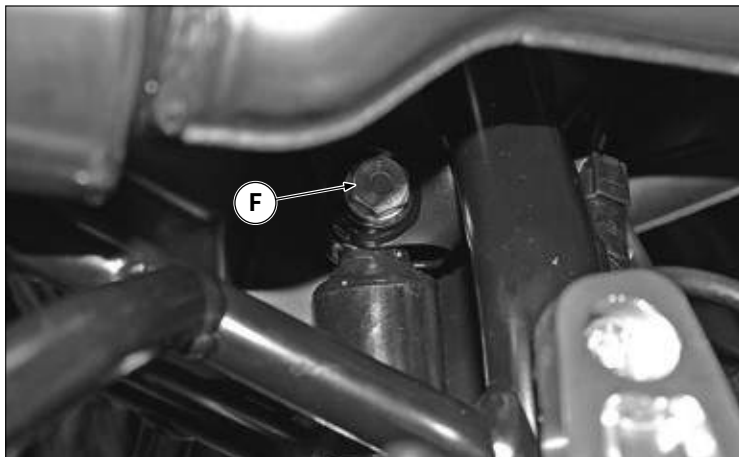
 **Quantity of oil for suspension: 430 ml.**

 **Proceed in the reverse order for reassembling.**

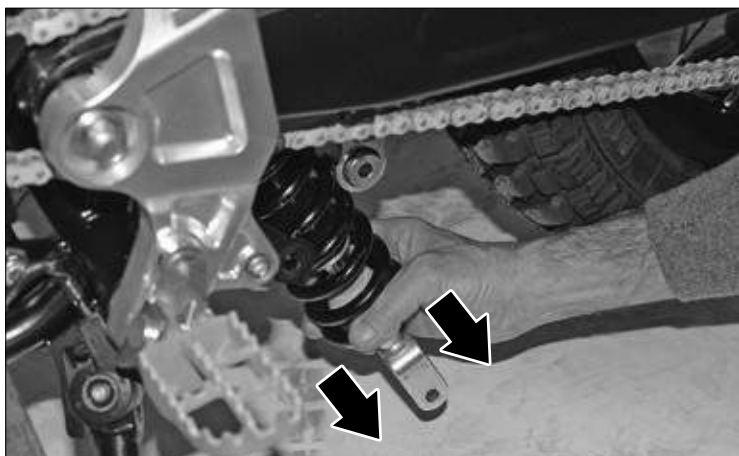


### 12.11.4 Rear shock absorber removal

Remove the screw and nut from the lower shock absorber "D" and the screw and nut from the shock absorber linkage "E".




Holding the shock absorber firmly, remove the screw and nut from the upper connection "F".



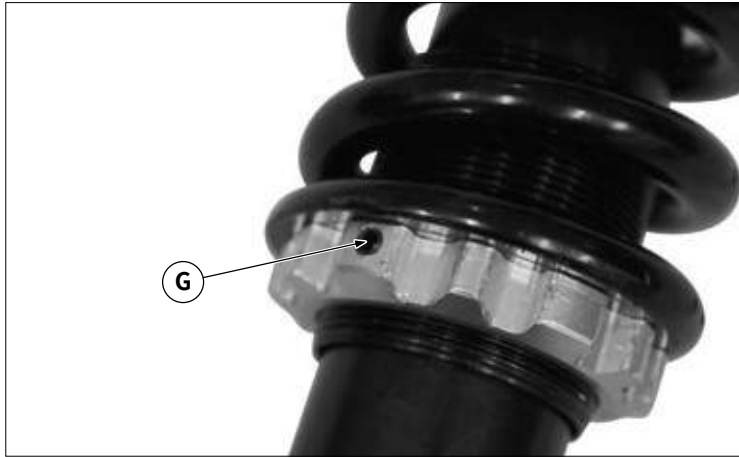
Remove the shock absorber from the bottom of the vehicle.

 **Proceed in the reverse order for reassembling.**

 **Apply threadlocker (LOCTITE ®) to the nuts M10 of the mono-shock absorber lower pin.**

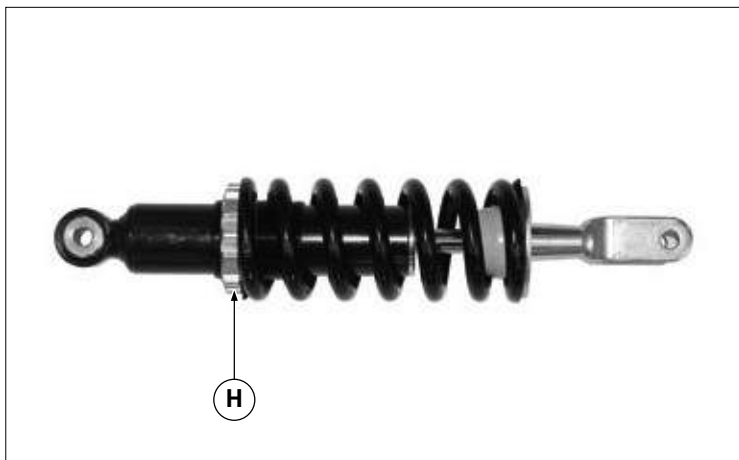
 **Tightening torques:**


- Nuts M10 of the mono-shock absorber upper pin: 40 Nm (4.0 m·kgf, 30 ft·lbf).
- Nuts M10 of the mono-shock absorber lower pin: 40 Nm (4.0 m·kgf, 30 ft·lbf).

**Shock absorber preload adjustment**


For different use needs, it is possible to customize the setting. To make changes it is recommended to wait until the engine is completely cold. Adjust the spring preload according to the conditions of use of the vehicle.

Loosen the fastening screw "G" of the ring nut.

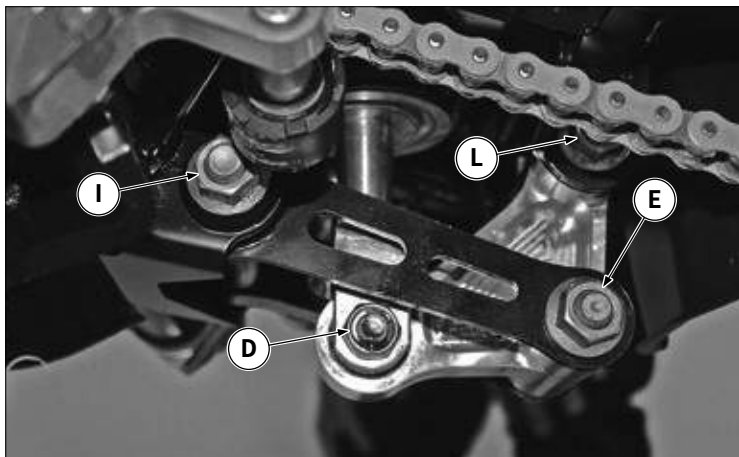


 Using a hook wrench, turn the ring nut "H" to the desired position.

Re-tighten fastening screw "G" of the ring nut.

 **Do not force the rotation of the registers beyond the limit switch (in both directions), to avoid possible damage.**

 **Proceed in the reverse order for reassembling.**

**12.11.5 Linkage removal**

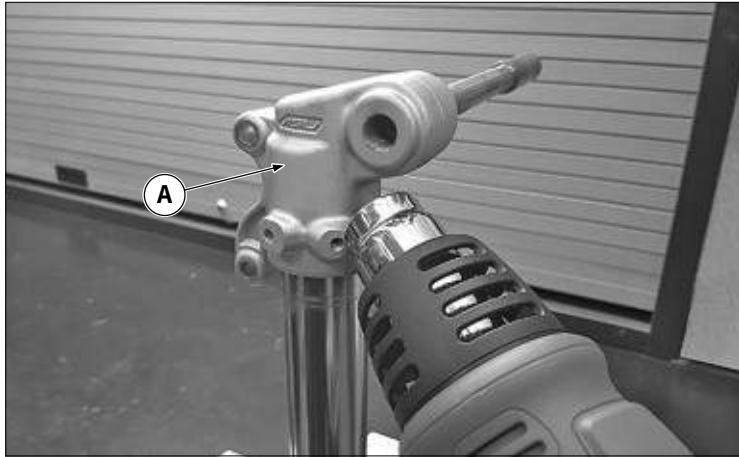
Remove the screw and nut from the lower shock absorber connection "D".

Remove the screws and nuts from the connections "I" and "L", then remove the linkages.

Remove the screw and nut from the connection "E" to separate the two components.

 **Proceed in the reverse order for reassembling.**

 **Tightening torque: Rear connecting rods nuts M12: 60 Nm (6.0 m·kgf, 43 ft·lbf)**

**12.11.6 Fork stems removal**

Remove:

– Swingarm, refer to “12.11.1 Swingarm removal” on page 131

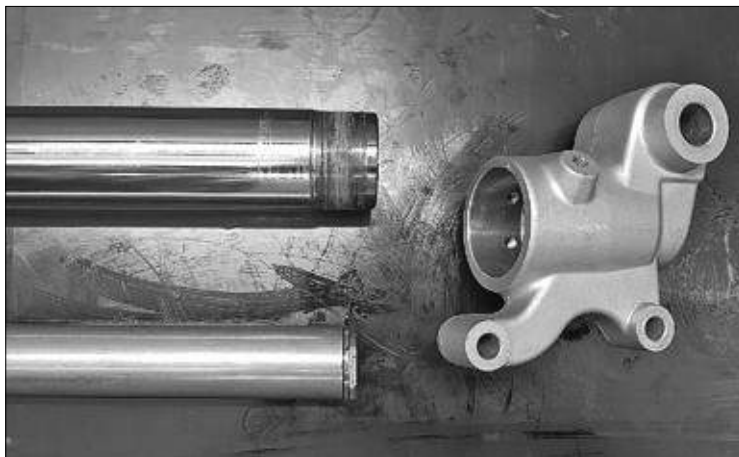
**(i) This procedure applies to both forks.**

Remove the fork oil.

Heat the fork leg “A” with a heat gun.



Unscrew and remove the leg “A”.

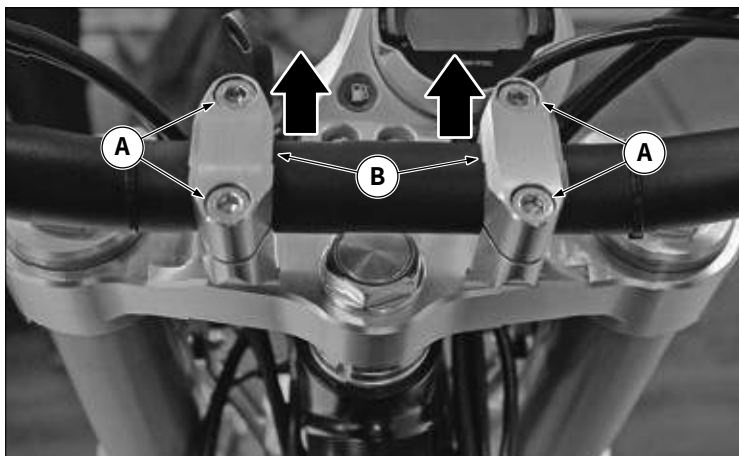


Extract the internal components of the fork from the lower part of the stem and check that each component is not damaged or deteriorated, otherwise replace them.

Perform the reassembly using medium loctite on the thread connecting the stem and the leg.

**(i) Recommended product: Loctite® 243.**

**(i) Proceed in the reverse order for reassembling.**

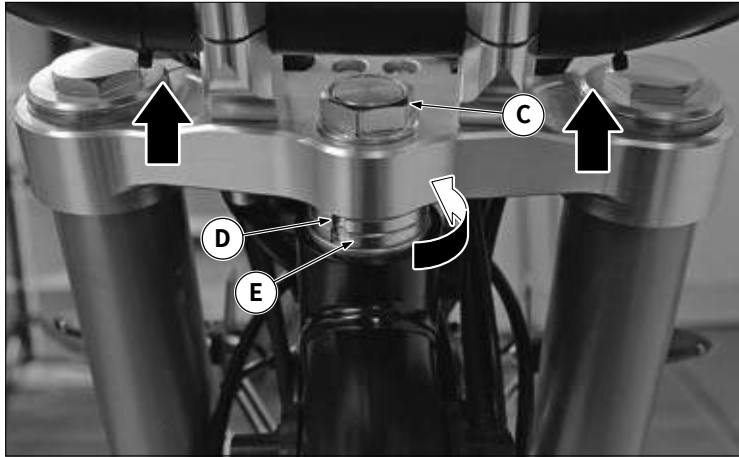
**12.12 HANDLEBAR REMOVAL****12.12.1 Handlebar removal**

Remove the screws “A”.

Remove the U-bolts “B” to remove the handlebar.

**(i) Proceed in the reverse order for reassembling.**

**(i) Tightening torque: Handlebar U-bolts screws M8: 25 Nm (2.5 m·kgf, 18 ft·lbf)**

**12.12.2 Plates removal**

Remove:

- Handlebar;
- Dashboard;
- Front mudguard
- Front wheel;
- Swingarm.

Remove the nut "C" and extract the upper steering plate.

Remove the ring nut "D" and "E" and extract the lower steering plate.

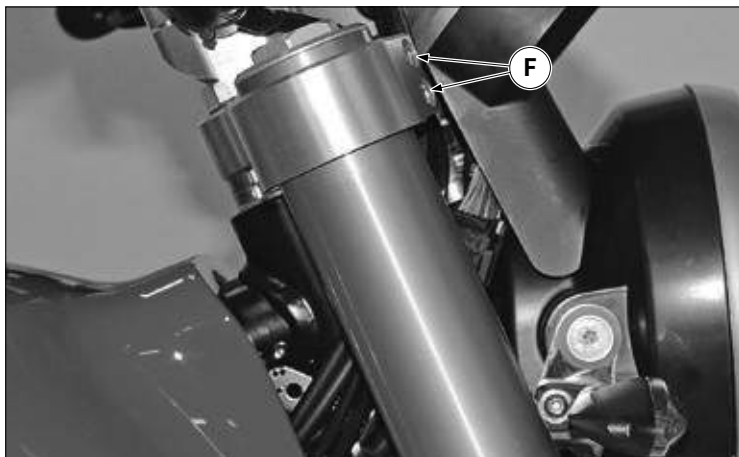
Remove the internal steering tube bearings at the same time.

**(i) Proceed in the reverse order for reassembling.**

For tightening refer to "Steering column tightening sequence" on page 14".

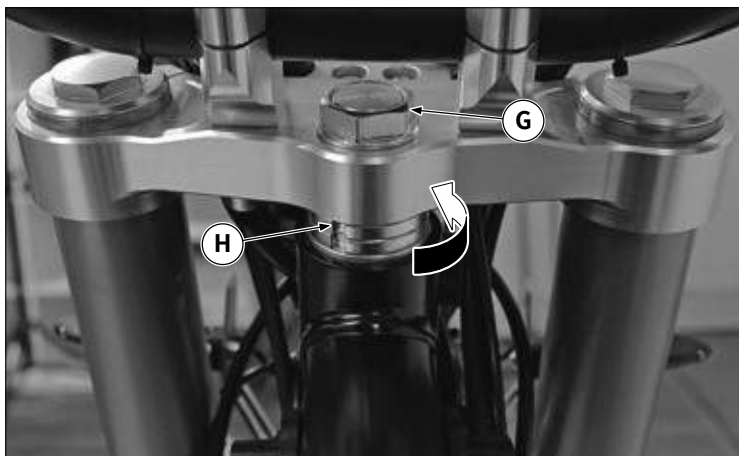
**12.12.3 Steering clearance check and adjustment**

**(i) Periodically check the clearance on the steering tube moving the swingarm back and forth as shown in the figure.**



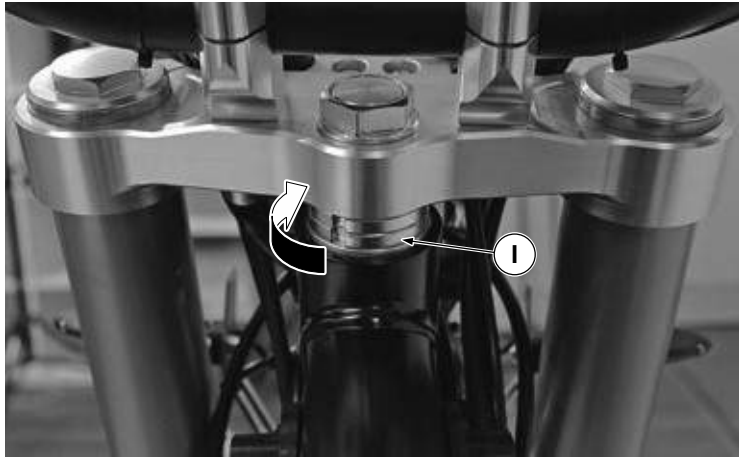
If clearance is noticed proceed to the adjustment operating as follows:

Loosen the screws "F" on both sides of the upper steering plate.



Loosen the nut "G".

Loosen the upper counter ring nut "H".



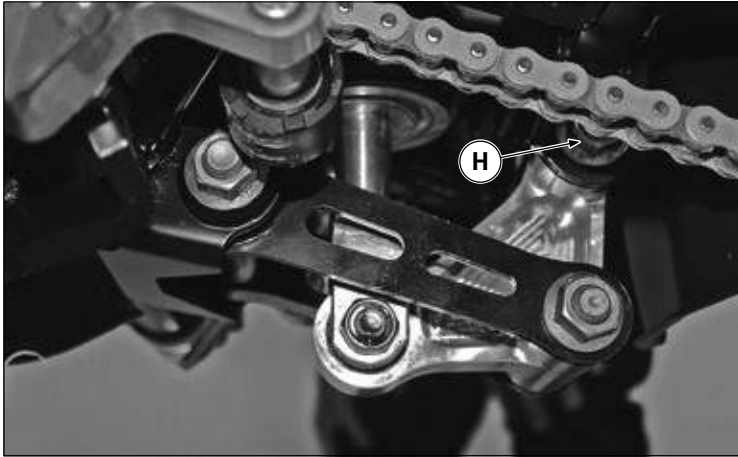
Recover the clearance operating on the ring “I”.

**⚠ A proper adjustment does not leave clearance, must not cause hardening or irregularity during the handlebar rotation.**

**⚠ Check the U-bolts assembling direction which may vary the handlebar position.**

Reassemble and tighten the steering column:

**ⓘ Follow the procedure illustrated in “Steering column tightening sequence” on page 14“.**



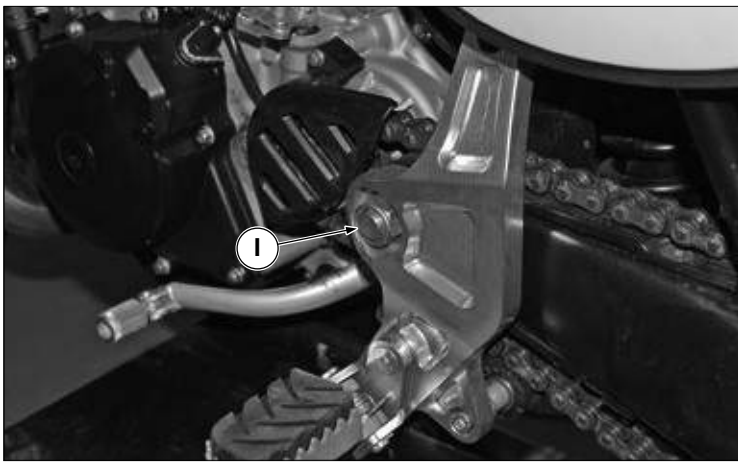
### 12.13 SWINGARM REMOVAL

- ① Position the vehicle on a central support with the rear wheel raised off the ground.

Remove:

- Rear wheel;
- Chain;
- Rear brake calliper.

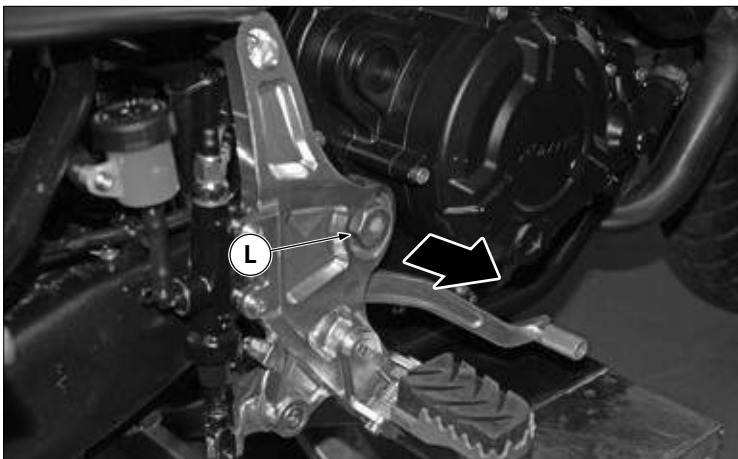
Remove the screw and the nut "H" of the lower coupling.



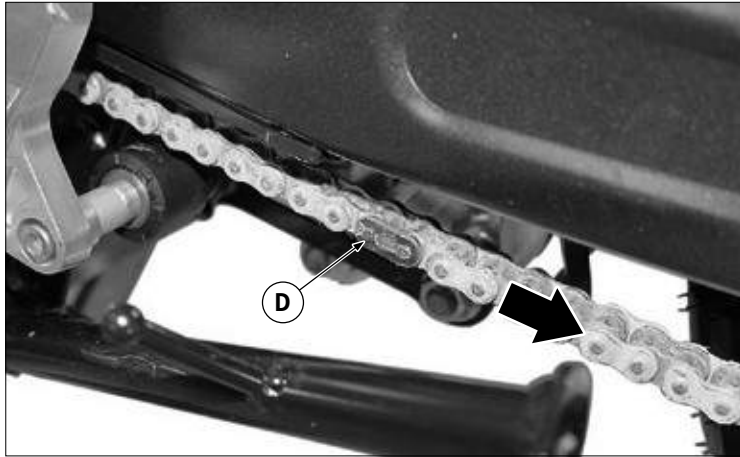
Remove the nut "I" and, holding the swingarm, remove the pin "L" from the opposite side, then remove the swingarm.

- ① Proceed in the reverse order for reassembling.

🔧 Tightening torque:  
Swingarm pin M14: 80 Nm (8.0 m·kgf, 59 ft·lbf)





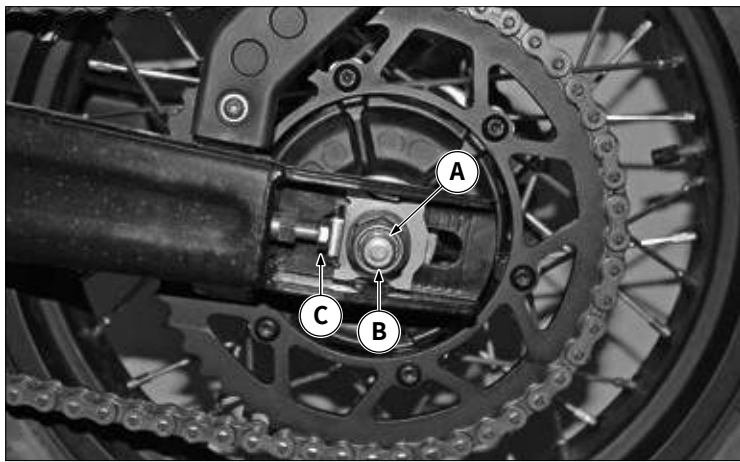


## 12.14 CHAIN REMOVAL

### 12.14.1 Chain removal

Remove the dummy mesh “D” and take out the junction mesh, then remove the chain.

**i** Proceed in the reverse order for reassembling.



### 12.14.2 Chain clearance adjustment

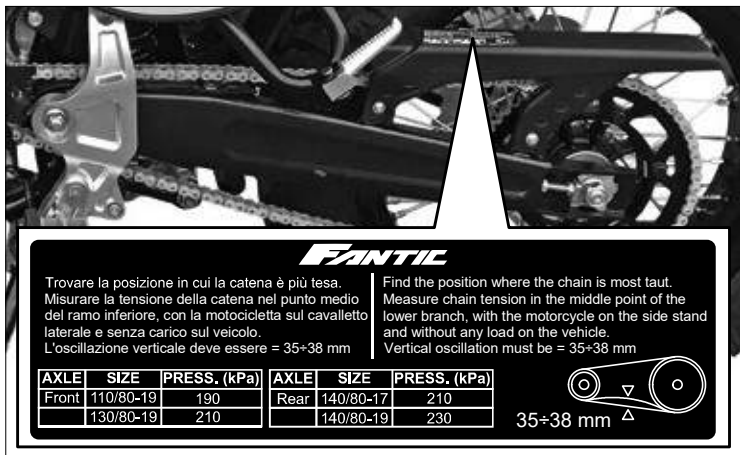
Loosen the rear wheel pin “A”.

Loosen the nut “B” and turn the screw “C” until the desired chain tension is reached.

Proceed similarly on the opposite side until the perfect alignment of the wheel is obtained, then tighten the nut “B” on both sides and the rear wheel pin “A”.

**!** Perform the chain clearance adjustment procedure with the rear suspension free of loads.

**i** Proceed in the reverse order for reassembling.

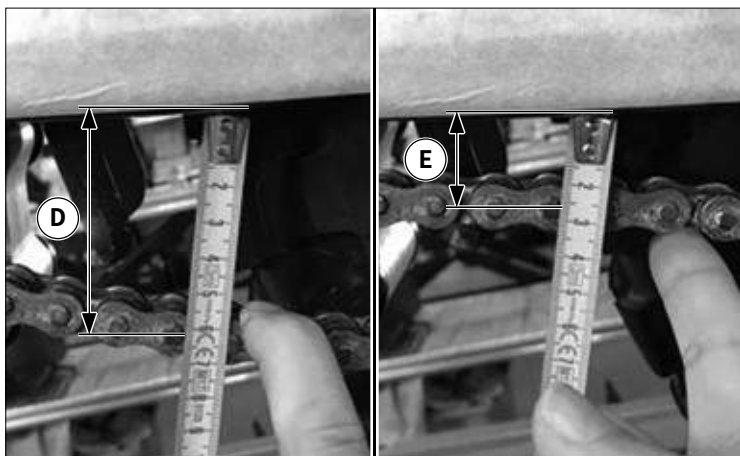


The sticker shows how to position the vehicle to measure the chain tension and the minimum and maximum clearance tolerances.

**i** It can be positioned on the chain guard, left side of the vehicle.

**!** If one of these components is damaged, the entire chain assembly (pinion, chain and rim) must be replaced.

**i** Also check the wear of the chain guide and the chain sliding shoe

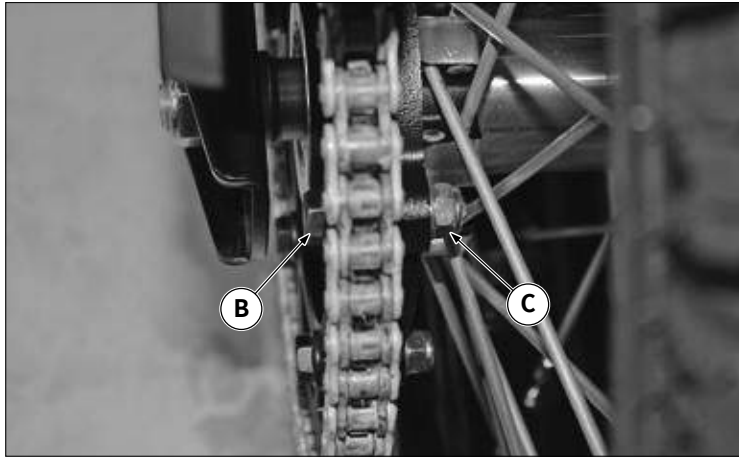


Pressing with a finger an intermediate point between the pinion and the rim, press the lower branch of the chain first downwards and then towards the other, measuring the distance from the edge of the swingarm; check that the vertical oscillation, obtained as the difference between the highest value “D” and the lowest value “E”.

**✂** Chain oscillation:  
“E” 35 mm (1,37 in) ~ “D” 38 mm (1,49 in)

Move the vehicle forward, in order to check the vertical oscillation of the chain also in other positions; the clearance must remain constant in all the phases of the wheel rotation.

**i** For a longer life of the drive chain it is advisable to periodically check its tensioning. Always keep it clean of dirt deposited and lubricate it.



### 12.14.3 Rim removal

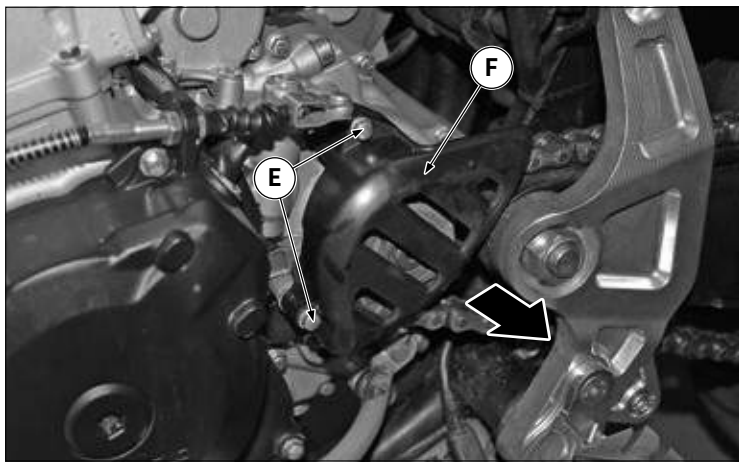
Remove:

– Rear wheel

Remove the screws “B”, the nuts “C” and remove the rim.

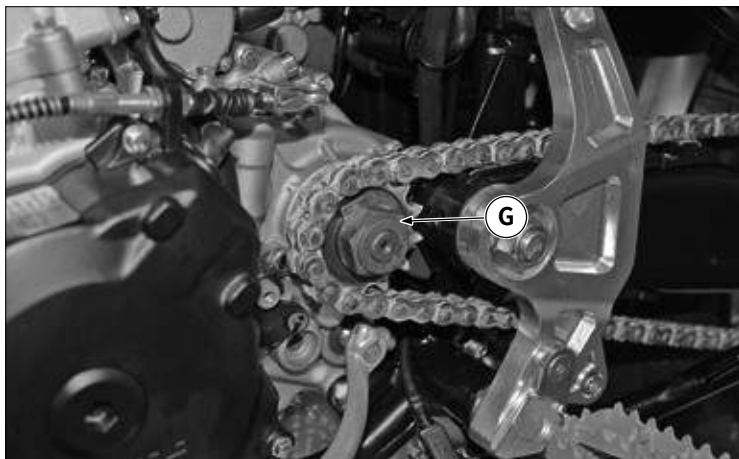
**i** Proceed in the reverse order for reassembling.

 **Tightening torque: Screws M8 for rim fastening: 25 Nm (2.5 m·kgf, 18 ft·lbf).**



### 12.14.4 Sprocket removal

Remove the screws “E” and the sprocket protection “F”.

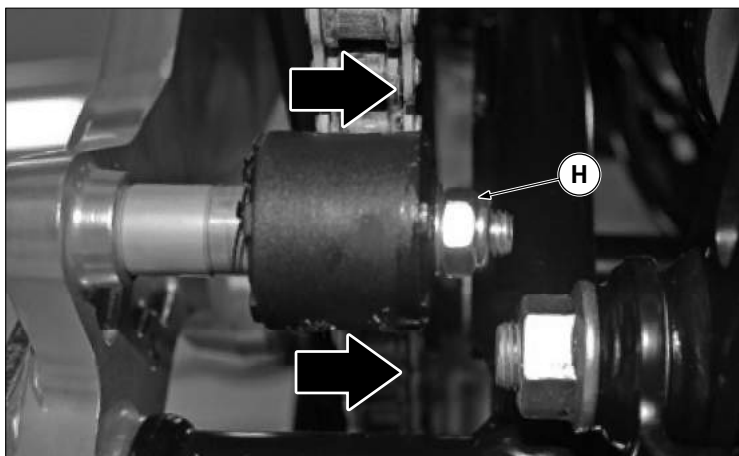


Remove the nut “G”; then take out the sprocket.

**i** Proceed in the reverse order for reassembling.

**!** Check the sprocket and rim teeth condition, if excessive wear is found, replace the rim, the sprocket and the drive chain.

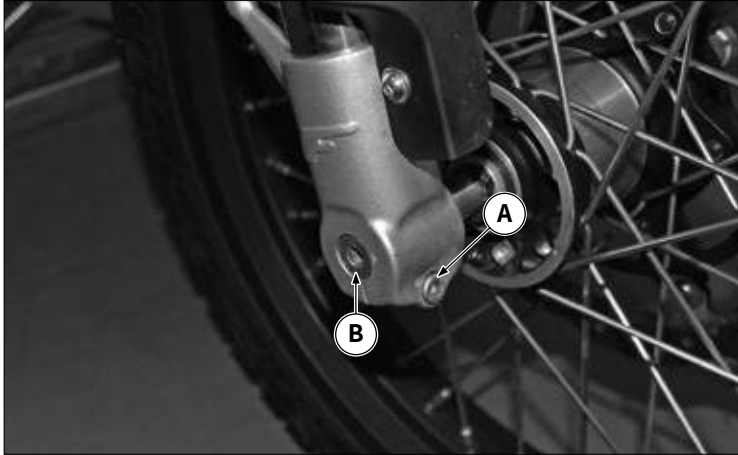
**!** To avoid early wear of the new components, replace all three together.



### 12.14.5 Chain roller removal

Remove the screw “H” then remove the chain roller.

**i** Proceed in the reverse order for reassembling.



## 12.15 WHEELS AND BRAKE DISCS REMOVAL

### 12.15.1 Front wheel removal

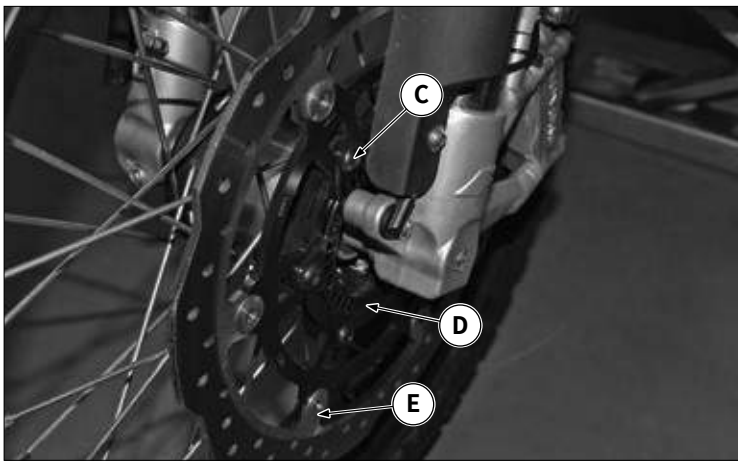
- (i)** Position the vehicle on a central support with the front wheel raised off the ground.

Remove the screw "A" and the wheel pin "B".

Remove the front wheel.

- (i)** Proceed in the reverse order for reassembling.

- Tightening torques:**
  - Front wheel pin M14: 50 Nm (5.0 m·kgf, 36 ft·lbf).
  - Swingarm foot screw M8: 25 Nm (2.5 m·kgf, 18 ft·lbf).



### 12.15.2 Front brake disc removal

Remove:

- Front wheel.

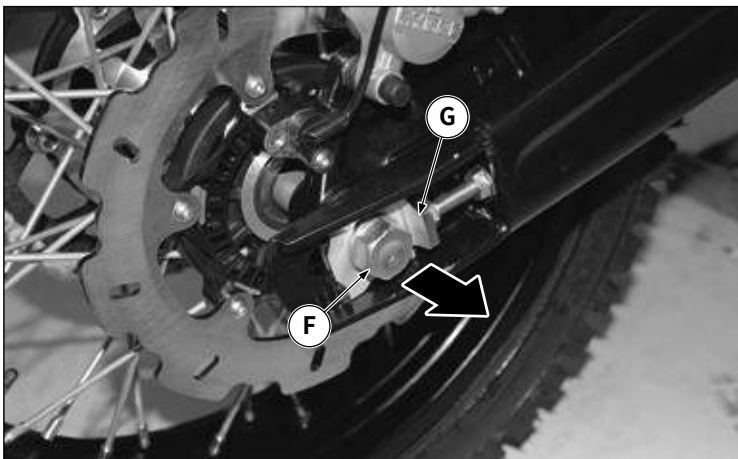
Remove the six screws "C".

Remove the phonic wheel "D" and the brake disc "E".

- (i)** Proceed in the reverse order for reassembling.

- ⚠** Apply threadlocker (LOCTITE ®) to the front brake disc M8 screws.

- Tightening torque:** Front brake disc screws M8: 25 Nm (2.5 m·kgf, 18 ft·lbf)



### 12.15.3 Rear wheel removal

- (i)** Position the vehicle on a central support with the rear wheel raised off the ground.

Remove:

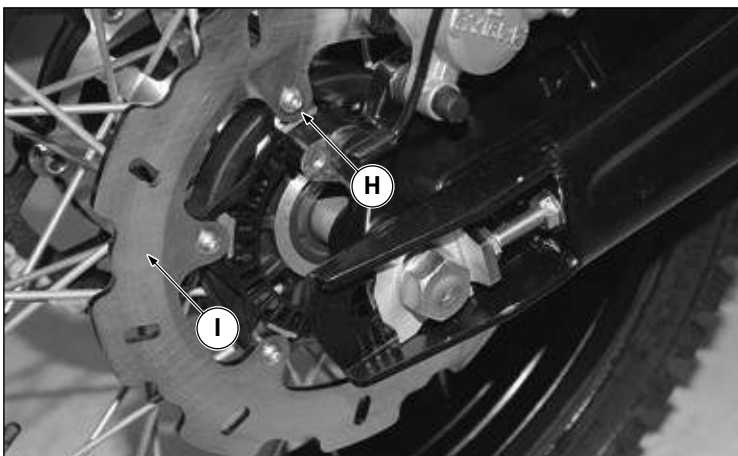
- Chain.

Supporting the rear wheel, remove the wheel pin "F" and the adjustment plates "G".

Remove the rear wheel.

- (i)** Proceed in the reverse order for reassembling.

- Tightening torque:** Rear wheel pin M17: 80 Nm (8.0 m·kgf, 59 ft·lbf).



### 12.15.4 Rear brake disc removal

Remove:

- Rear wheel.

Remove the six screws "H".

Remove the rear brake disc "I" taking care to keep the phonic wheel in place.


- (i)** Proceed in the reverse order for reassembling.

- ⚠** Apply threadlocker (LOCTITE ®) to the rear brake disc screws M6.

- Tightening torque:** Rear brake disc screws M6: 16 Nm (1.6 m·kgf, 12 ft·lbf)

**12.15.5 Wheels bearings check**

Perform this check with the bearings installed on the front wheel and/or on the rear wheel.

 **Check the integrity of all components and in particular of those indicated below.**

**Rotation check**

Manually rotate the inner ring of each bearing. The rotation must be continuous, free from impediments and/or noise.

If one or both bearings are not within the check parameters, replace both wheel bearings.

**Radial clearance and axial clearance check**

Check the radial clearance and axial clearance. Axial clearance: a minimum axial clearance is allowed. Radial clearance: none.

If one or both bearings are not within the check parameters, replace both wheel bearings.

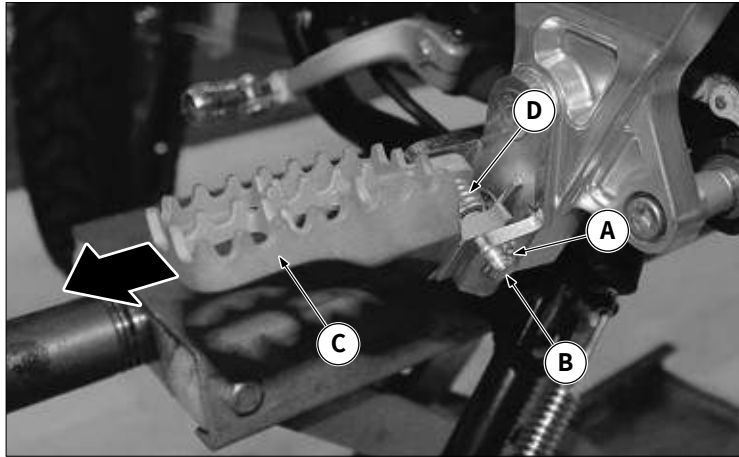
 **Always replace both wheel bearings.**

 **Always replace the bearings with bearings of the same type.**

 **Check the integrity of the gaskets; if they show damage or excessive wear, replace them.**

 **Always replace both gaskets.**

 **Always replace the gaskets with new gaskets of the same type.**



## 12.16 FOOTRESTS REMOVAL

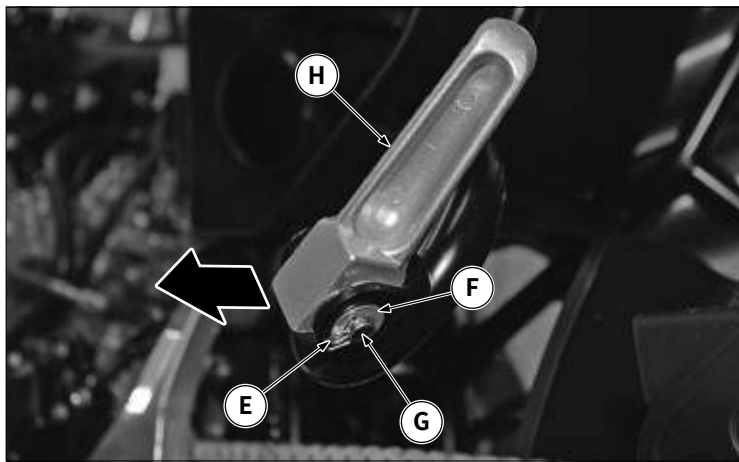
### 12.16.1 Rider footrest removal

Remove the split pin "A" and the pin "B".

Remove the footrest "C", taking care to recover the return spring "D".

Repeat the operation for the footrest on the opposite side.

**(i) Proceed in the reverse order for reassembling.**

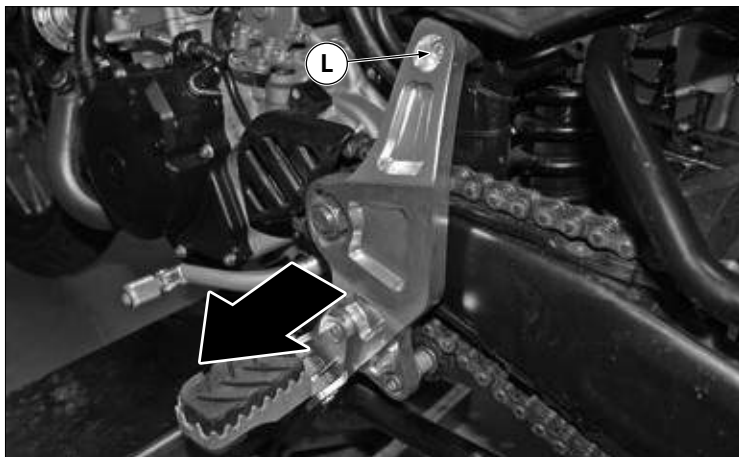


### 12.16.2 Passenger footrest removal

Remove the split pin "E", the washer "F" and the pin "G".

Remove the passenger footrest "H".

**(i) Proceed in the reverse order for reassembling.**



### 12.16.3 Frame plate for rider left pedal removal

Remove:

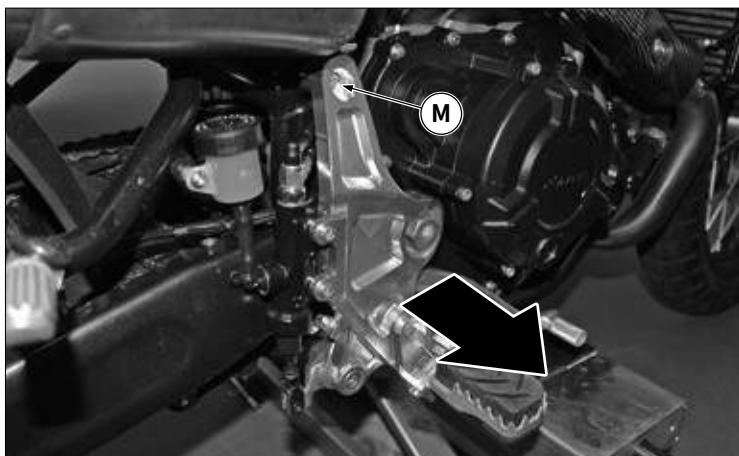
- Left rider footrest;
- Chain roller;
- Swingarm pin nut.

Remove the screw "L" then extract the left frame plate.

**(i) Proceed in the reverse order for reassembling.**

#### Tightening torques:

- Screws M8: 25 Nm (2.5 m·kgf, 18 ft·lbf).
- Screws M6: 16 Nm (1.6 m·kgf, 12 ft·lbf).



### 12.16.4 Frame plate for rider right pedal removal

Remove:

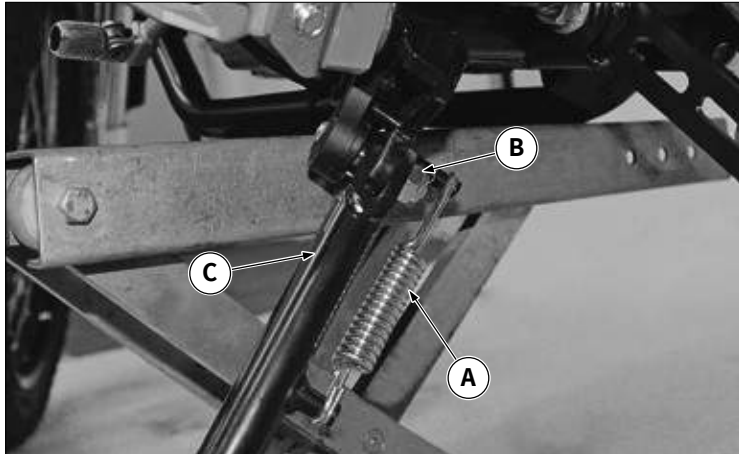
- Right rider footrest;
- Rear brake master cylinder;
- Rear brake lever;
- Swingarm pin.

Remove the screw "M" then pull out the right frame plate.

**(i) Proceed in the reverse order for reassembling.**

#### Tightening torques:

- Screws M8: 25 Nm (2.5 m·kgf, 18 ft·lbf).
- Screws M6: 16 Nm (1.6 m·kgf, 12 ft·lbf).



### 12.17 KICKSTAND REMOVAL

Remove:

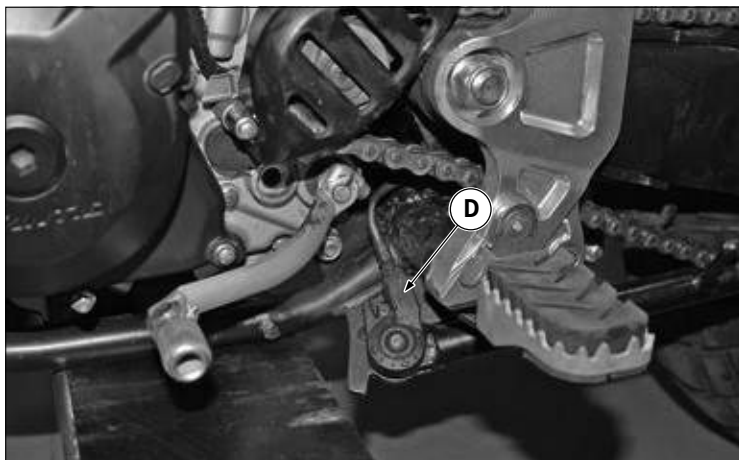
- Speed sensor.

Remove the spring “A” and the screw and fastening nut of the kick stand “B”.

Remove the kickstand.

**i** Proceed in the reverse order for reassembling.

 **Tightening torque: Kickstand screw M8: 38 Nm (3.8 m·kgf, 28 ft·lbf).**

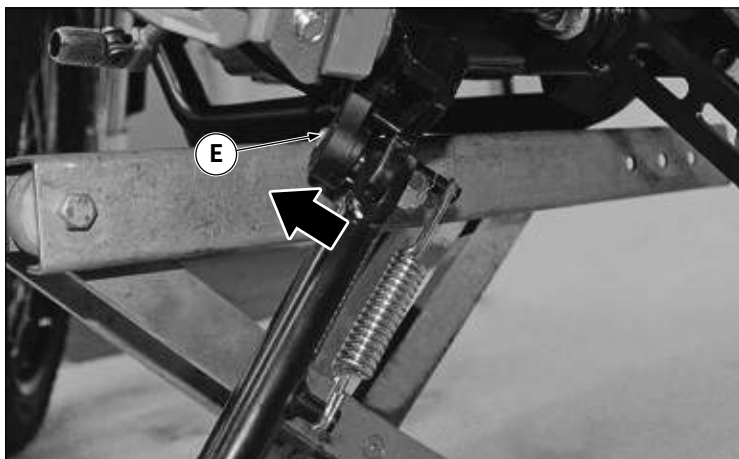


#### 12.17.1 Kickstand sensor removal

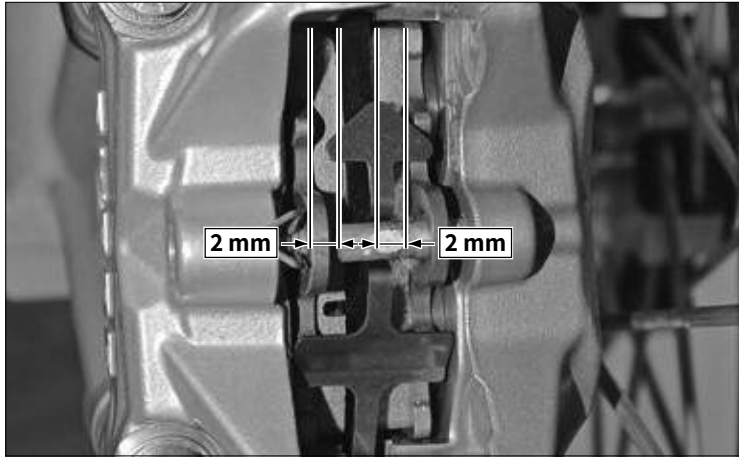
Cut the clamps that hold the kickstand sensor cable “D” locked and disconnect the connector from the main wiring.

Remove the screw “E” and extract the kickstand sensor.

**i** Proceed in the reverse order for reassembling.







### 12.18 BRAKE SYSTEM REMOVAL

**⚠** Considering the danger to the vehicle and to the rider, it is absolutely essential, after the brakes are reassembled and the braking system restored to normal conditions of use, that the hydraulic circuit is purged of air.

#### 12.18.1 Brake pads removal

##### Front brake pads

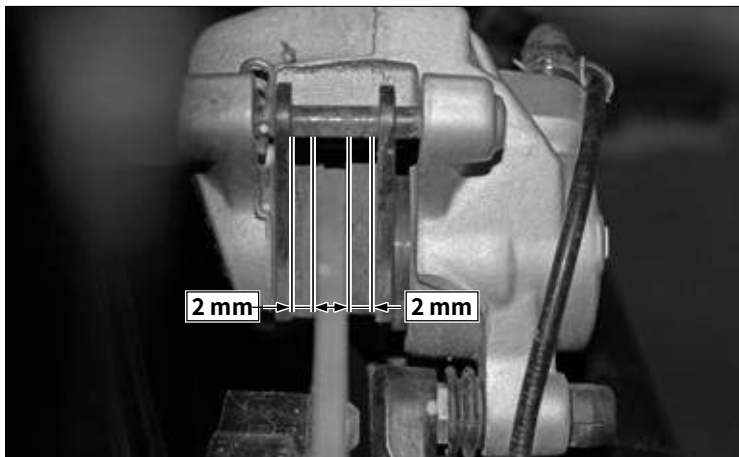
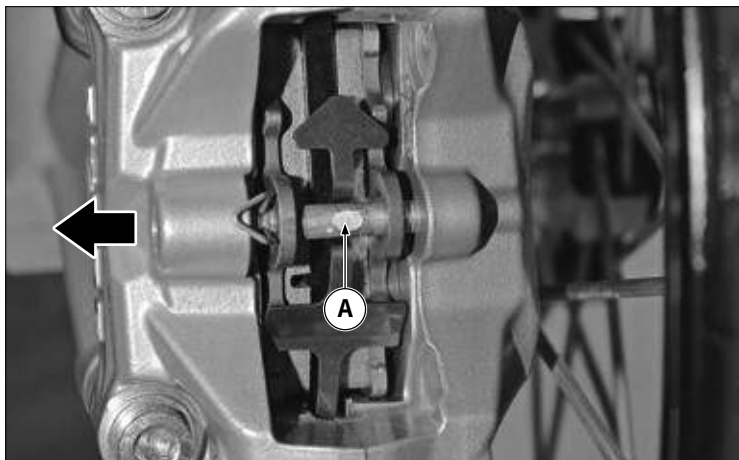
**⚠** Check the wear condition of the front brake pads from the back of the calliper, where it is possible to see the ends of the pads which must have at least a 2 mm layer of lining. If the layer is lower, proceed immediately to replace them.

**i** Perform the check following the times indicated in the scheduled maintenance table.

Remove the front brake calliper without disconnecting the brake system tube connection.

Remove the screw pin "A" and remove the pads from the front part of the calliper for replacement.

**i** Proceed in the reverse order for reassembling.



##### Rear brake pads

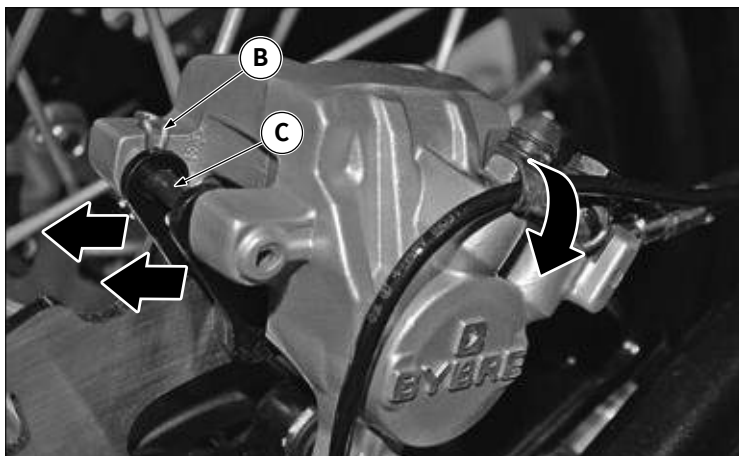
**⚠** Check the wear condition of the rear brake pads from the upper part of the calliper, where it is possible to see the ends of the pads which must have at least a 2 mm layer of lining. If the layer is lower, proceed immediately to replace them.

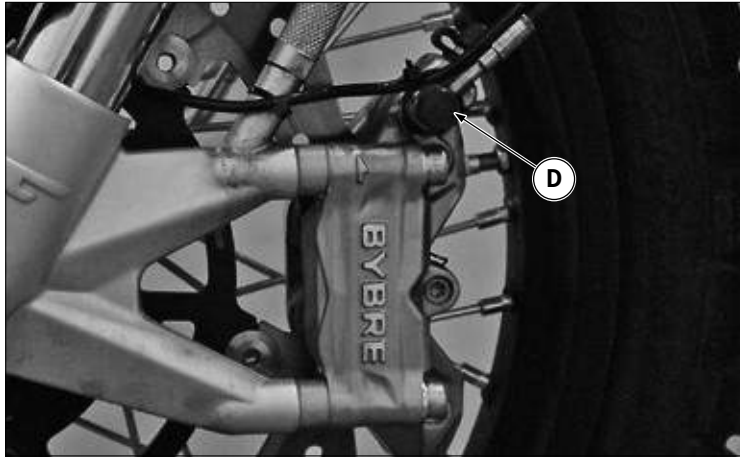
**i** Perform the check following the times indicated in the scheduled maintenance table.

Remove the rear brake calliper without disconnecting the brake system tube fitting.

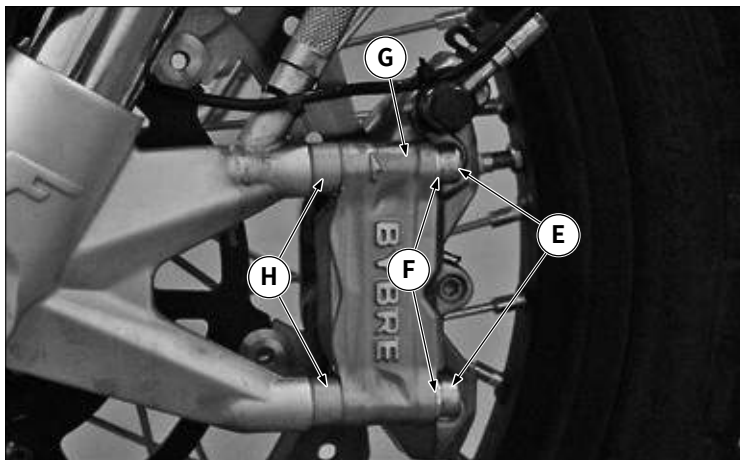
Remove the split pin "B" and remove the pin "C", then remove the pads for replacement.

**i** Proceed in the reverse order for reassembling.



**12.18.2 Front brake calliper removal**

Remove the front brake tube fitting "D", be sure to place a container for collecting the brake oil.



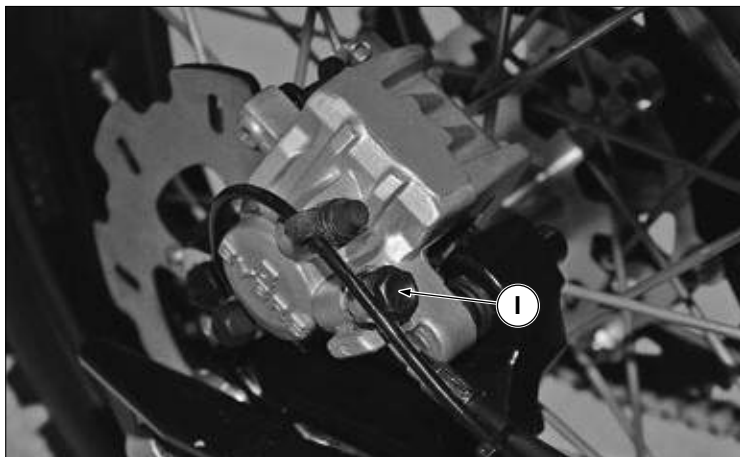
Remove the screws "E" and washers "F".

Remove the brake calliper "G" recovering the spacers "H".

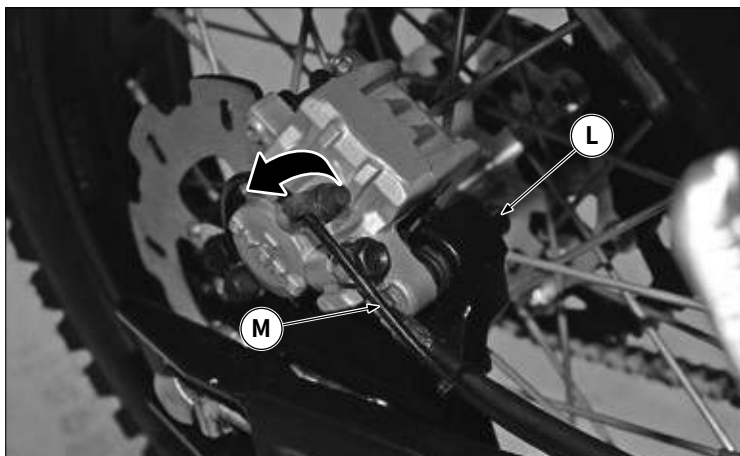
**i** Proceed in the reverse order for reassembling.

**!** Apply threadlocker (LOCTITE®) to the front calliper screws M8.

**Tightening torque: Front brake calliper screws M8: 25 Nm (2.5 m·kgf, 18 ft·lbf)**

**12.18.3 Rear brake calliper removal**

Remove the rear brake tube fitting "I", make sure to place a container for collecting the brake oil.

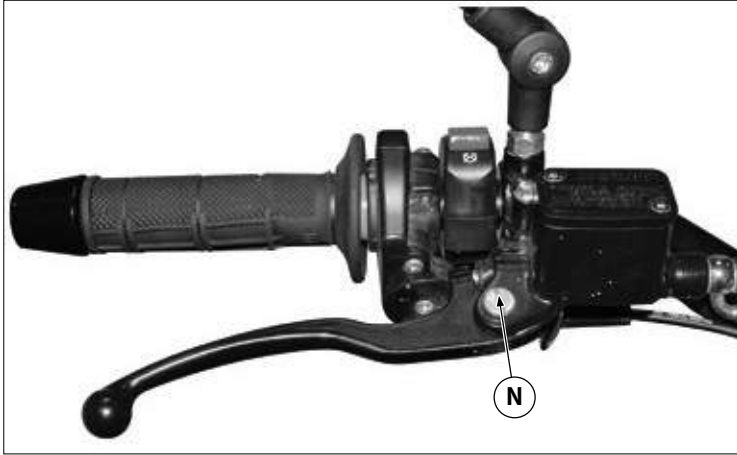


Remove the screw "L" and lift the rubber plug of the rear brake purge valve to release the ABS sensor cable "M".

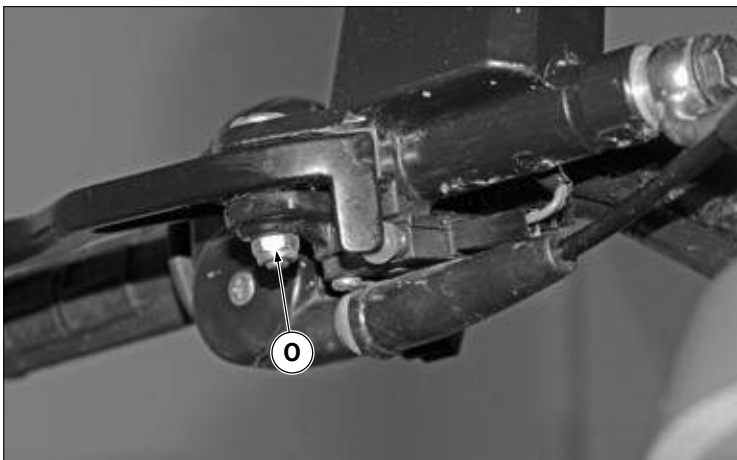
Remove the rear brake calliper.

**i** Proceed in the reverse order for reassembling.



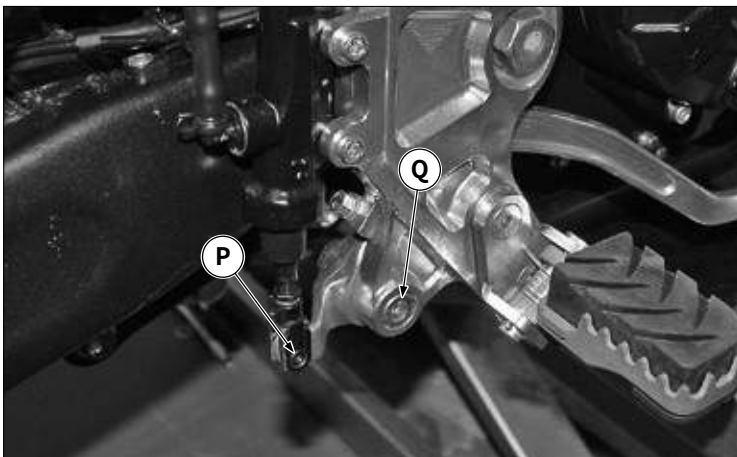
**12.18.4 Front brake lever removal**

Remove the screw "N".




Remove the screw "O", then extract the front brake lever.

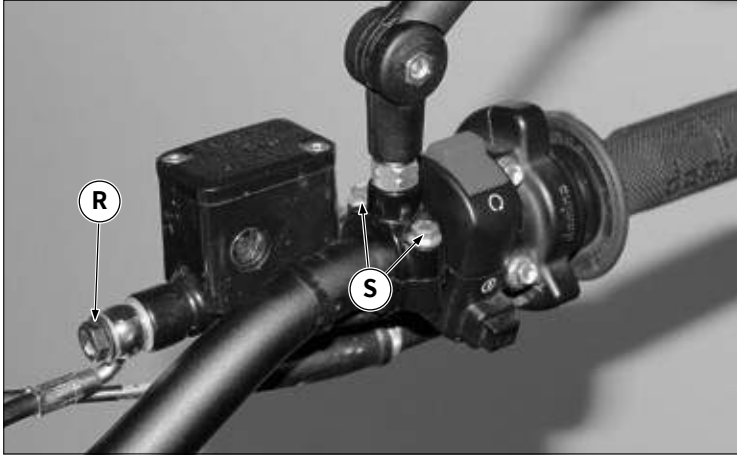
**i** Proceed in the reverse order for reassembling.

**12.18.5 Rear brake lever removal**

Remove the screw "P" and the screw "Q", then remove the rear brake lever.

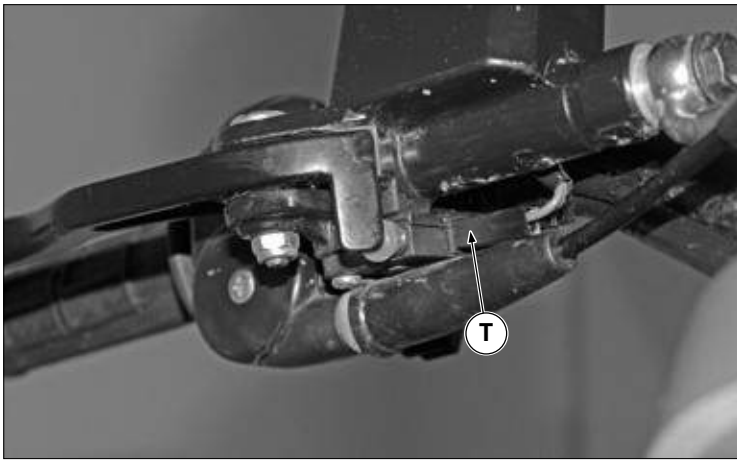
**i** Proceed in the reverse order for reassembling.

 **Tightening torque: Rear brake calliper screw M10: 50 Nm (5.0 m·kgf, 36 ft·lbf)**

**12.18.6 Front brake master cylinder removal**


Remove the rear brake tube fitting "R", make sure to place a container for collecting the brake oil.

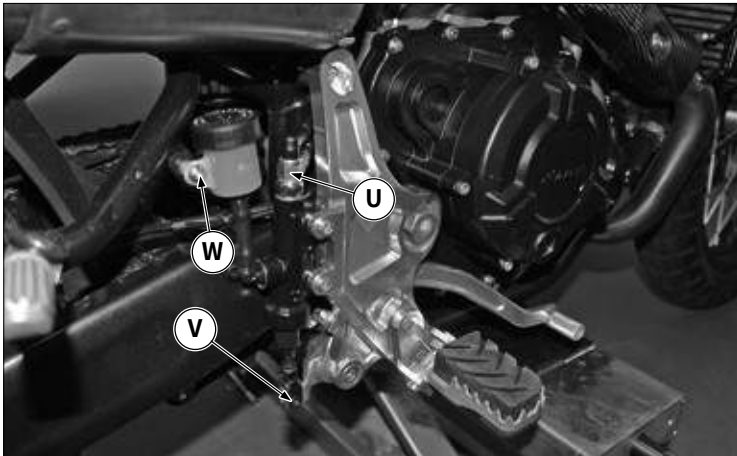
Remove the screws "S" securing the upper collar.



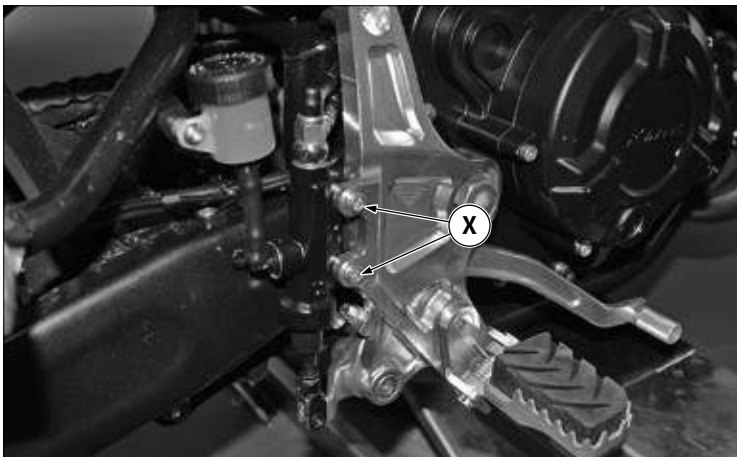
Disconnect the connector "T" of the brake light switch then remove the brake master cylinder.

**i** Proceed in the reverse order for reassembling.

 **Tightening torque: Brake master cylinder collar screws M6:**  
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

**12.18.7 Rear brake master cylinder removal**

Remove the brake system fitting "U", the rear brake lever connection "V" to the pump and the screw of the brake fluid reservoir "W".



Remove the two "X" screws, then remove the rear brake master cylinder.

**i** Proceed in the reverse order for reassembling.

### 12.18.8 Brake system draining

- i** If during the draining operation air continues to go out, examine all the fittings, if they do not show any anomaly, search for air entering from the various seals of the pump and from the calliper pistons.
- !** During the operations the vehicle must be in a vertical position.
- i** During the bleeding operation, frequently check the level to prevent the introduction of air into the system through the pump.
- i** The brake fluid is hygroscopic, i.e. It absorbs moisture from the surrounding air. If the moisture contained in the brake fluid exceeds a certain value, an inefficient braking results. It is therefore appropriate to take the liquid from sealed containers. Under normal riding and climatic conditions it is advisable to replace this liquid every two years. If the brakes are subjected to heavy stress, replace the liquid more frequently.
- !** When carrying out the operation, oil can seep between the purge screw and the seat on the calliper. Carefully dry the callipers and degrease the disc, in case there is oil on it. When the operation is complete, tighten the oil drain screw to the prescribed torque.
- !** Avoid contact of brake fluid with eyes, skin and clothing. In case of accidental contact, wash with water.
- !** The brake fluid has a high corrosive power, avoid it from coming into contact with the painted parts.
- !** If the ABS module is replaced, proceed with the braking system draining as described in section “12.19.2 ABS module removal” on page 152.

#### Front braking system

Remove the rubber protection cap from the bleed valve.

Insert a transparent plastic tube on the bleed valve of the front brake calliper and insert the other end of the tube into a collection container.

Remove the front brake oil reservoir cap.

Operate and release the front brake lever quickly and repeatedly, keeping it fully actuated.

Loosen the bleed valve 1/4 turn so that the brake fluid flows into the container, this will remove tension on the brake lever and this will make it reach the end of stroke.

Close the bleed valve before reaching the end of the stroke with the lever.

Repeat the operation until the liquid reaching the container is completely free of air bubbles.

Tighten the bleed valve and remove the tube.

Top up restoring the correct level of brake fluid in the tank.

Reposition and lock the front brake oil reservoir cap.

Reset the rubber protection cap.

- i** When draining the hydraulic system, fill the reservoir with brake fluid when necessary. Check that brake fluid is always present in the reservoir during operation.

#### Rear braking system

Remove the rubber protection cap from the bleed valve.

Insert a transparent plastic tube on the bleed valve of the rear brake calliper and insert the other end of the tube into a collection container.

Remove the rear brake oil reservoir cap.

Operate and release the rear brake lever quickly and repeatedly, keeping it fully actuated.

Loosen the bleed valve 1/4 turn so that the brake fluid flows into the container, this will remove tension on the brake lever and this will make it reach the end of stroke.

Close the bleed valve before reaching the end of the stroke with the lever.

Repeat the operation until the liquid reaching the container is completely free of air bubbles.

Tighten the bleed valve and remove the tube.

Top up restoring the correct level of brake fluid in the tank.

Reposition and lock the rear brake oil reservoir cap.

Reset the rubber protection cap.

- i** When draining the hydraulic system, fill the reservoir with brake fluid when necessary. Check that brake fluid is always present in the reservoir during operation.

#### Brake fluid replacement

- i** To change the brake fluid, operate in the same way for the front and rear parts.

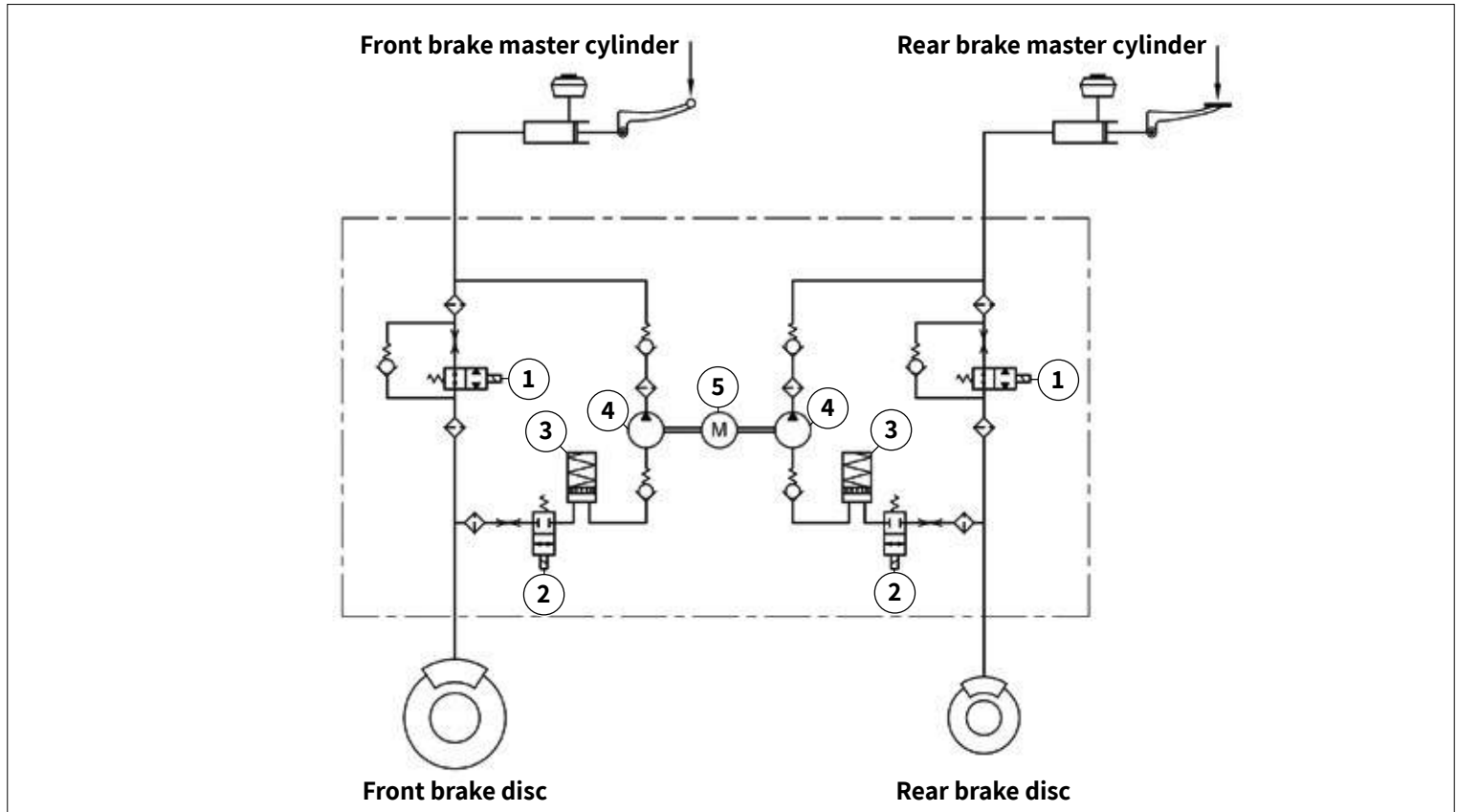
Open the brake fluid reservoir removing the cover and gasket.

Drain the system according to the drain procedure, proceeding until it reaches the level indicated in the inspection window.

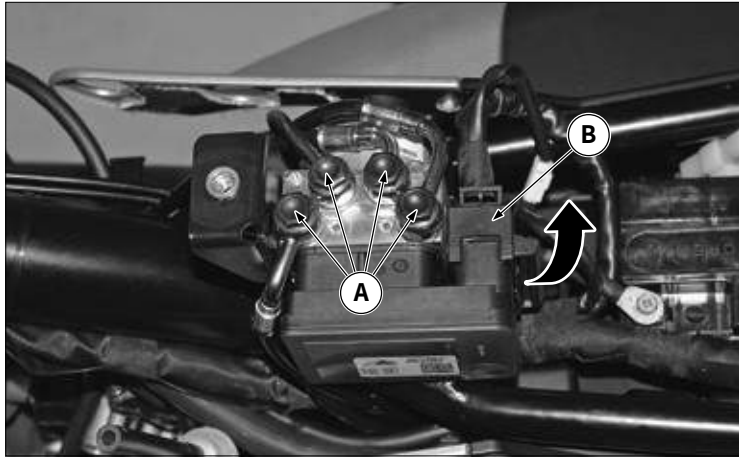
Close the brake fluid reservoir.

## 12.19 ABS SYSTEM REMOVAL

### 12.19.1 ABS system hydraulic diagram

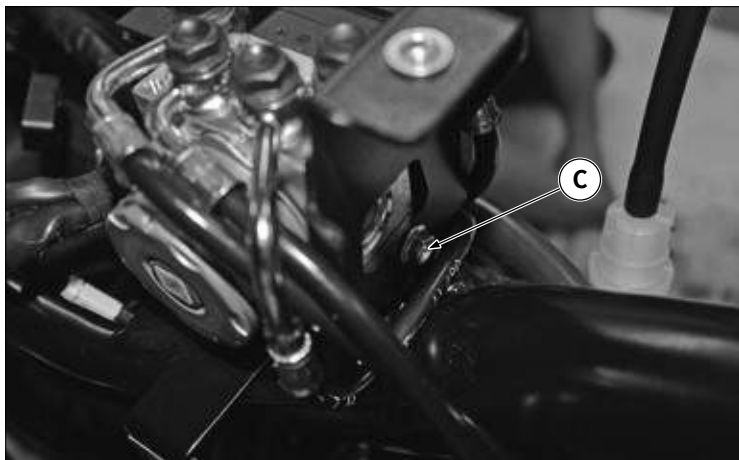


1. Inlet valve
2. Outlet valve
3. Low pressure accumulator
4. Hydraulic pump
5. Electric motor

**12.19.2 ABS module removal**

Remove the brake system tube fittings “A”, make sure to place a container for collecting the brake oil.

Disconnect the ABS module connector “B”.

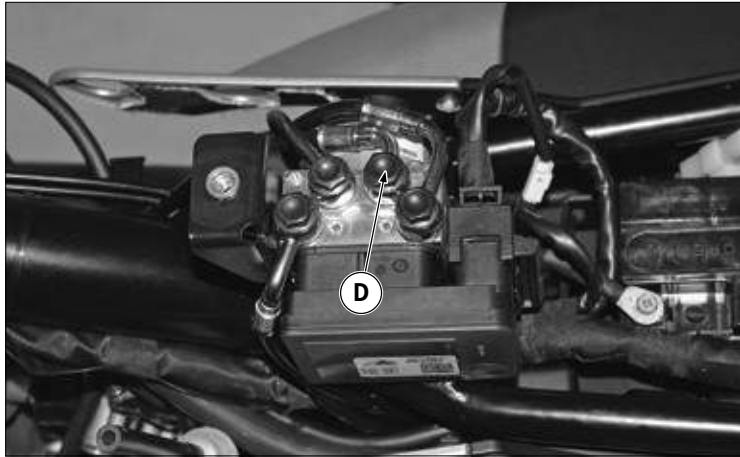


Remove the screws “C” securing the module to the frame, then remove the ABS module.

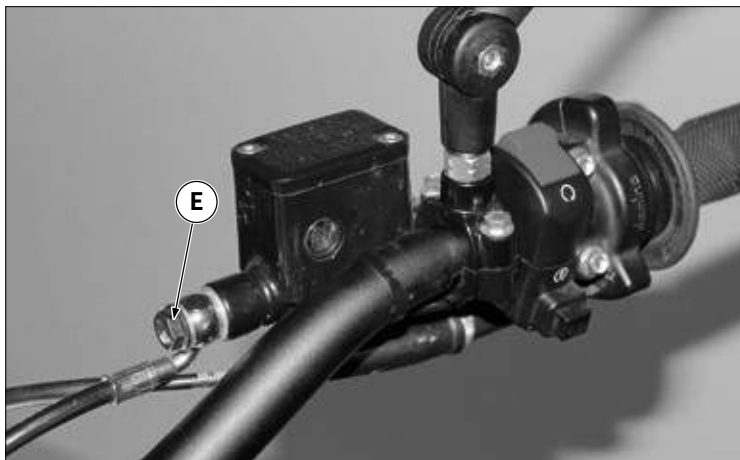
**i** Proceed in the reverse order for reassembling.

**!** Following the replacement of the ABS module, drain the system using the diagnostic system.

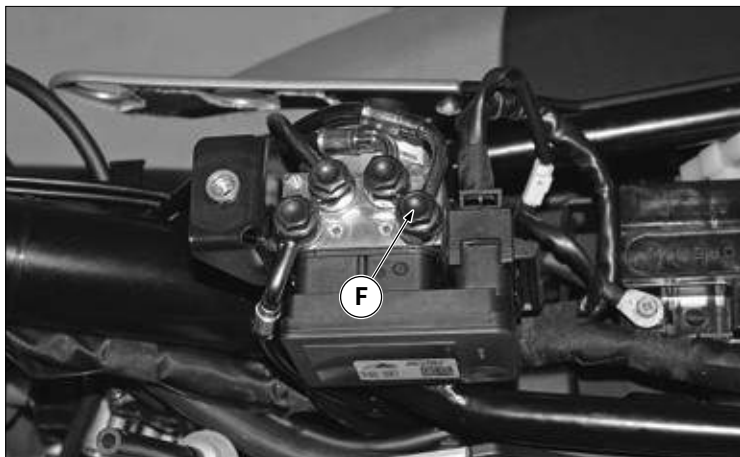


**12.19.3 Front ABS tubes removal**

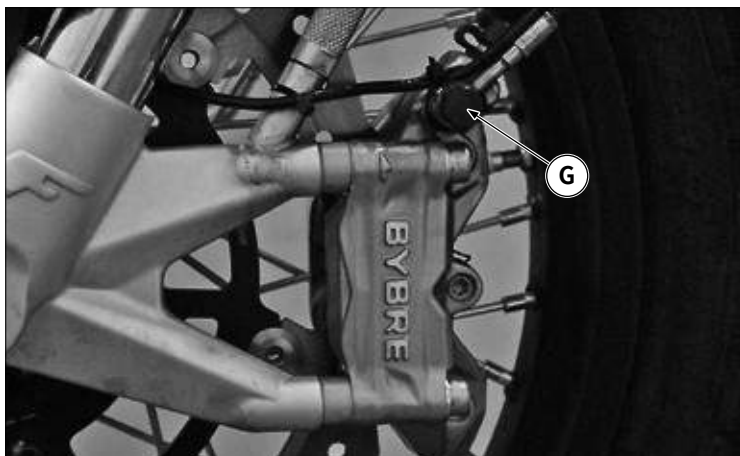
Remove the brake system tube fitting “D”, making sure to place a container for collecting the brake oil.



Remove the brake system tube fitting “E” on the front brake master cylinder and remove the tube.

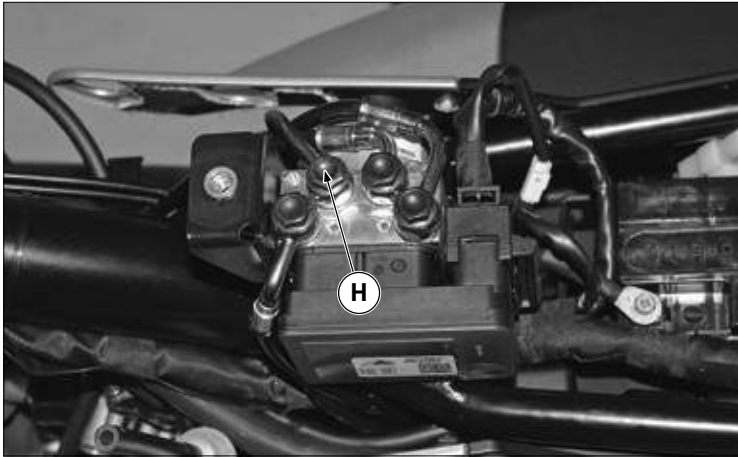


Remove the brake tube fitting “F”, making sure to place a container for collecting the brake oil.



Remove the brake system tube fitting “G” on the front brake calliper and remove the tube.

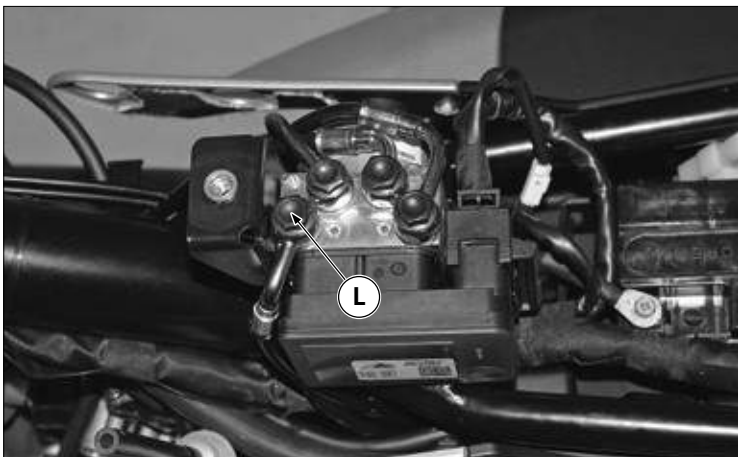
**i** Proceed in the reverse order for reassembling.

**12.19.4 Rear ABS tubes removal**

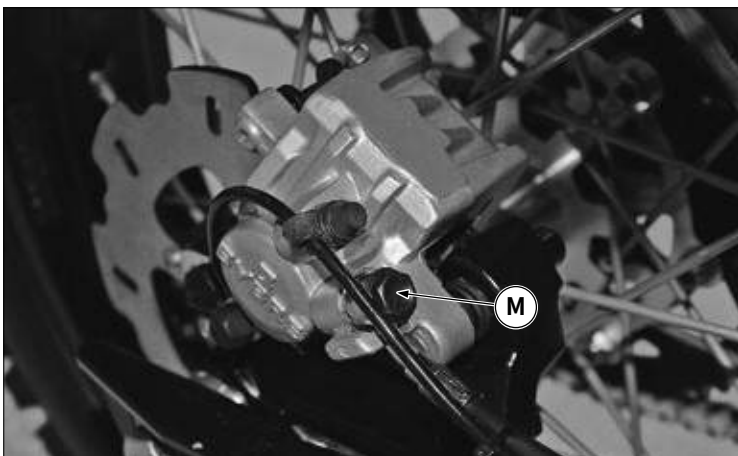
Remove the brake system tube fitting “H”, making sure to place a container for collecting the brake oil.



Remove the brake system tube fitting “I” on the rear brake master cylinder and remove the tube.



Remove the brake system tube fitting “L”, making sure to place a container for collecting the brake oil.

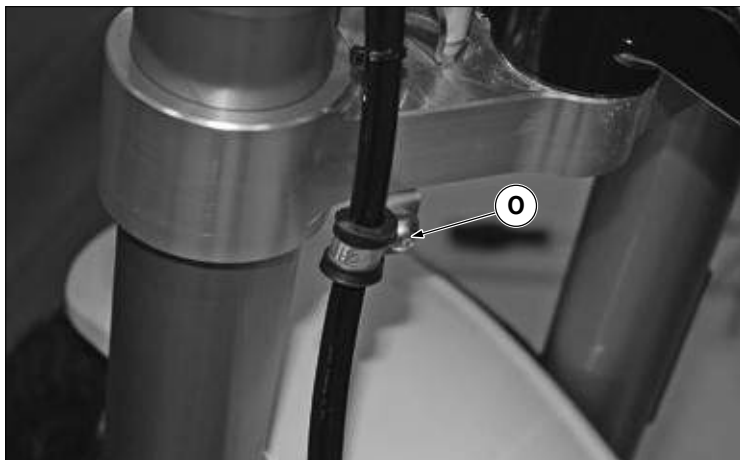


Remove the brake system tube fitting “M” on the rear brake calliper and remove the tube.

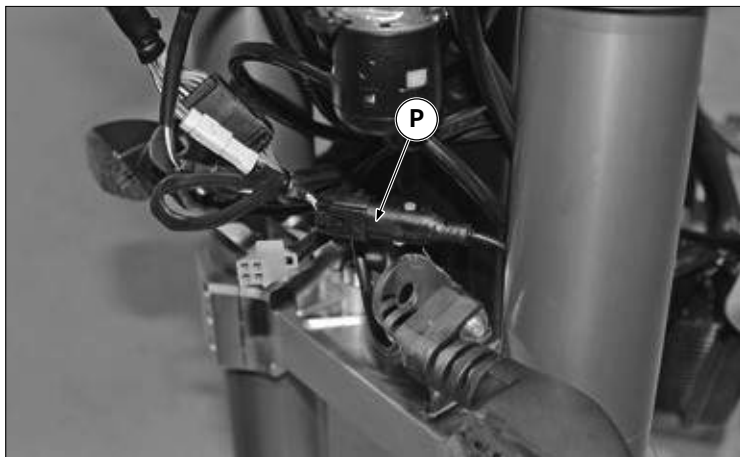
**i** Proceed in the reverse order for reassembling.

**12.19.5 Front ABS sensor removal**

Remove the screw “N” that secures the front ABS sensor.



Remove the screw “O” of the cable gland and remove the strap clamps on the cable and brake tube to release the sensor cable.

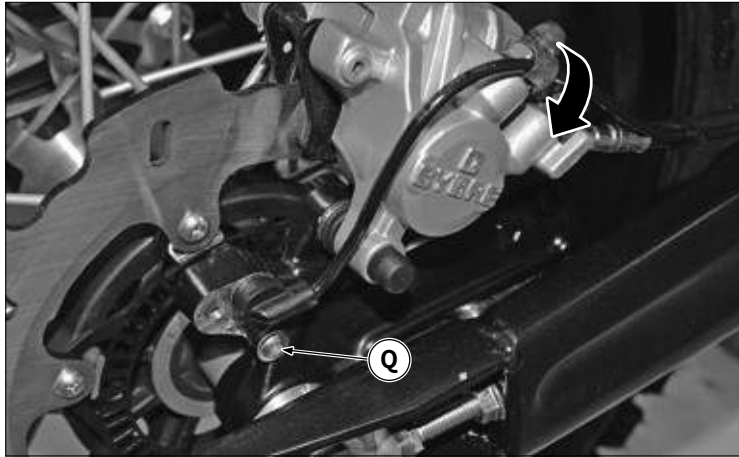


Disconnect the connector “P” and remove the ABS sensor cable.

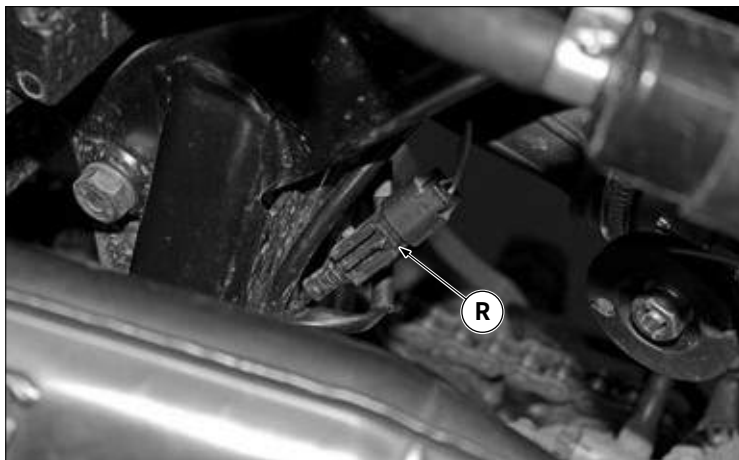
**⚠ The distance of the ABS sensor from the phonic wheel must be between a minimum of 0.3 mm and a maximum of 1.5 mm.**

**i Proceed in the reverse order for reassembling.**



**12.19.6 Rear ABS sensor removal**

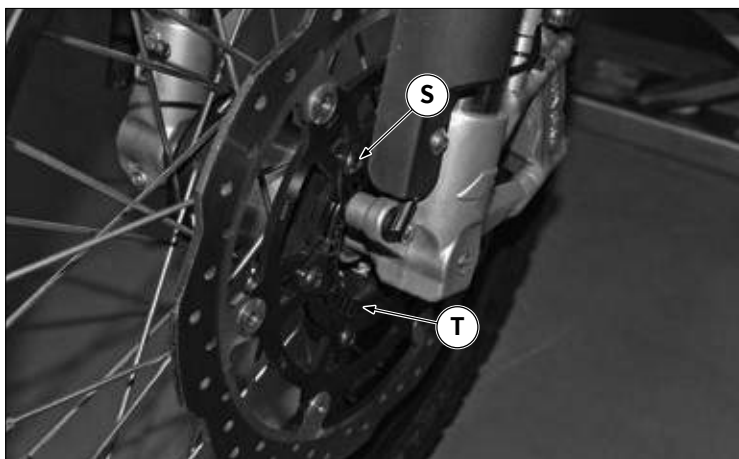
Remove the screw “Q” that secures the rear ABS sensor. Lift the purge screw cap to release the sensor cable. Remove the strap clamps on the cable and the brake tube.



Disconnect the connector “R” and remove the ABS sensor cable.

**⚠ The distance of the ABS sensor from the phonic wheel must be between a minimum of 0.3 mm and a maximum of 1.5 mm.**

**i Proceed in the reverse order for reassembling.**

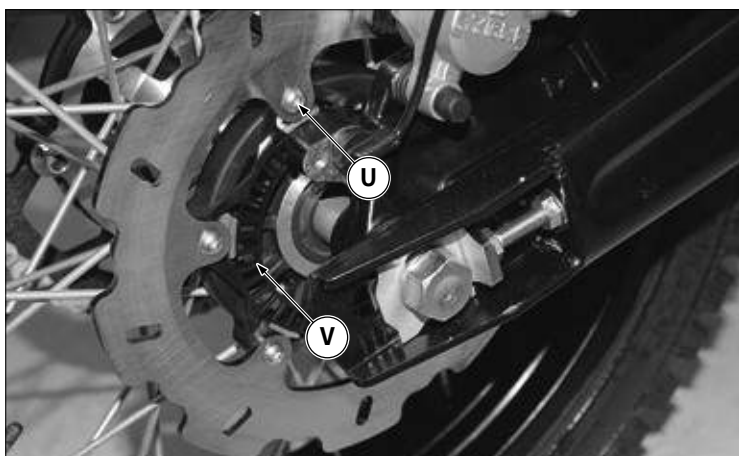
**12.19.7 Front ABS phonic wheel removal**

Remove:

– Front wheel.

Remove the six screws “S”, then remove the brake disc and the phonic wheel “T”.

**i Proceed in the reverse order for reassembling.**

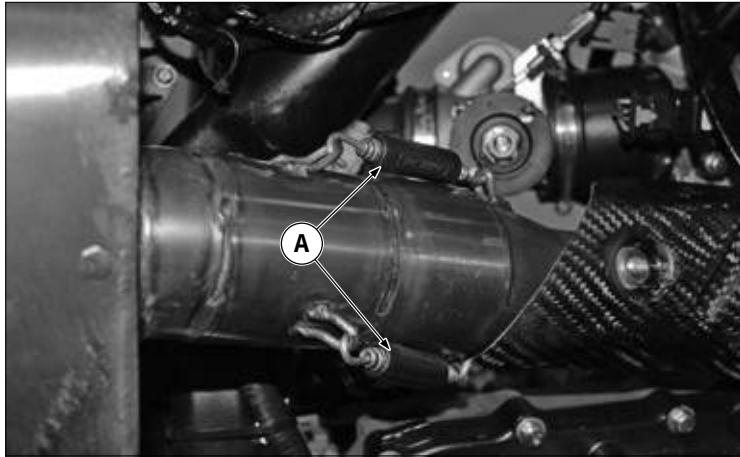
**12.19.8 Rear ABS phonic wheel removal**

Remove:

– Rear wheel.

Remove the six screws “U”, then remove the phonic wheel “V”.

**i Proceed in the reverse order for reassembling.**



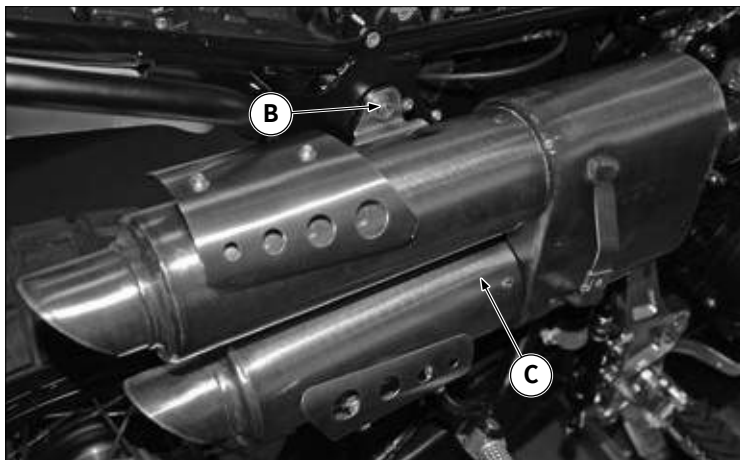
## 12.20 EXHAUST SYSTEM REMOVAL

### 12.20.1 Silencer removal

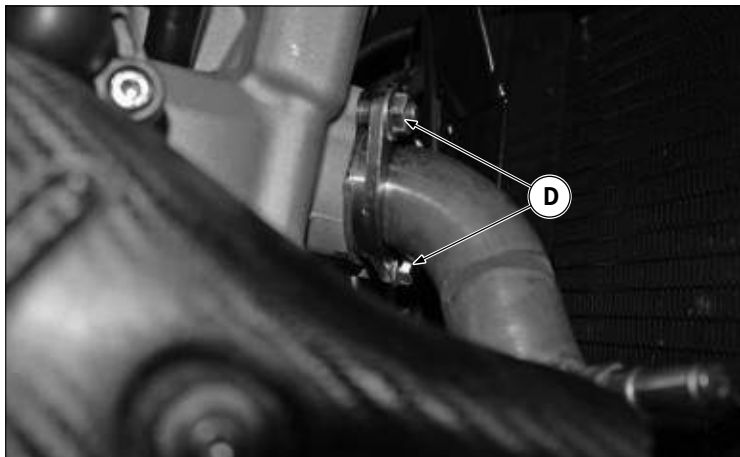
Remove:

- Seat, refer to "12.1 Seat removal" on page 121
- Right side panel.
- Oxygen sensor, refer to "12.20.2 Oxygen sensor removal" on page 158.

Remove the springs "A" that fasten the exhaust manifold to the cylinder.

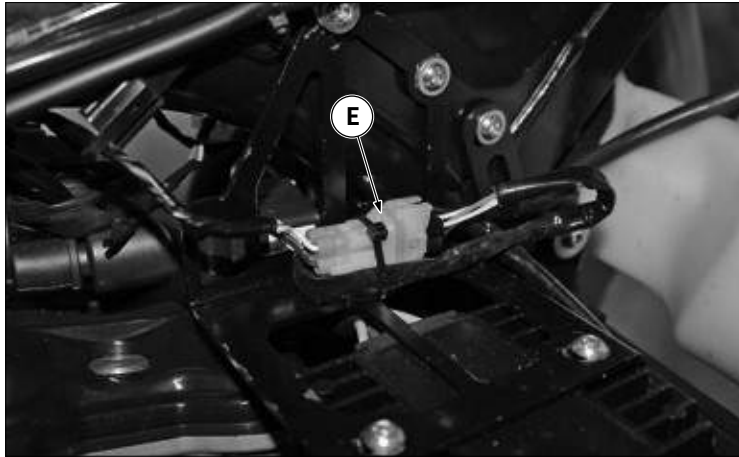


Remove the bolt "B" and the silencer "C".

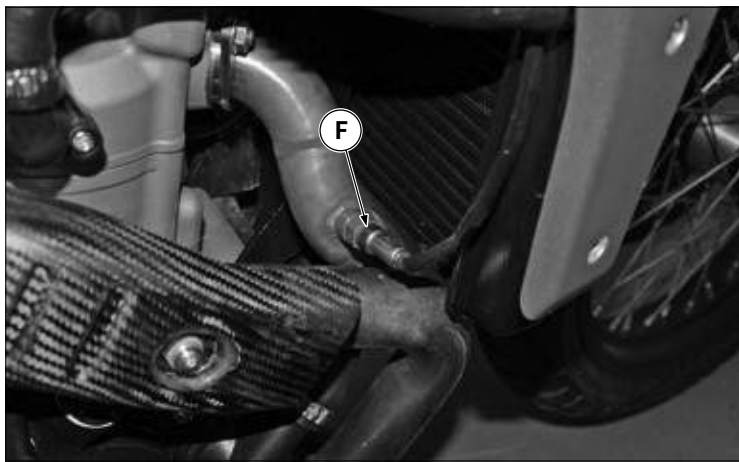


Remove the two nuts from "D", then remove the exhaust.

**i** Proceed in the reverse order for reassembling.

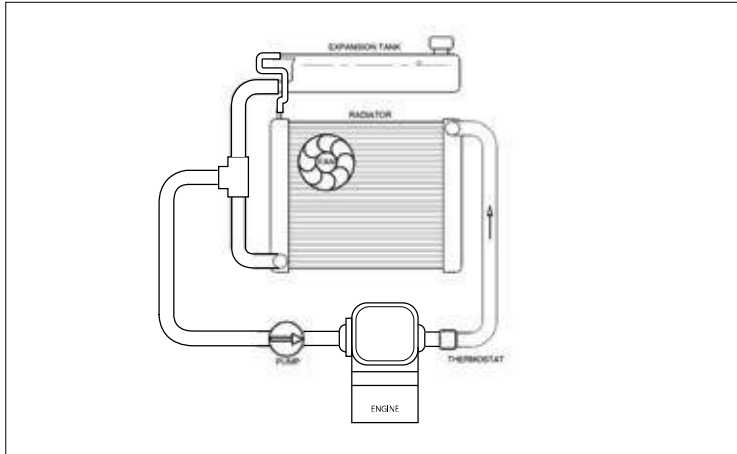
**12.20.2 Oxygen sensor removal**

Disconnect the Oxygen sensor connector “E” from the vehicle wiring.



Remove the Oxygen sensor “F” from the exhaust manifold.

**i** Proceed in the reverse order for reassembling.



## **12.21 COOLING SYSTEM REMOVAL**

### **12.21.1 Cooling system diagram**

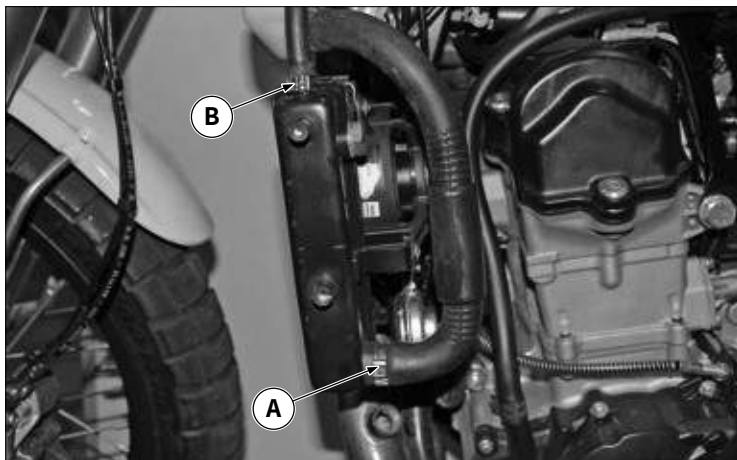
**⚠ Perform the following operations only when the engine is cold.**

### **12.21.2 Radiator removal**

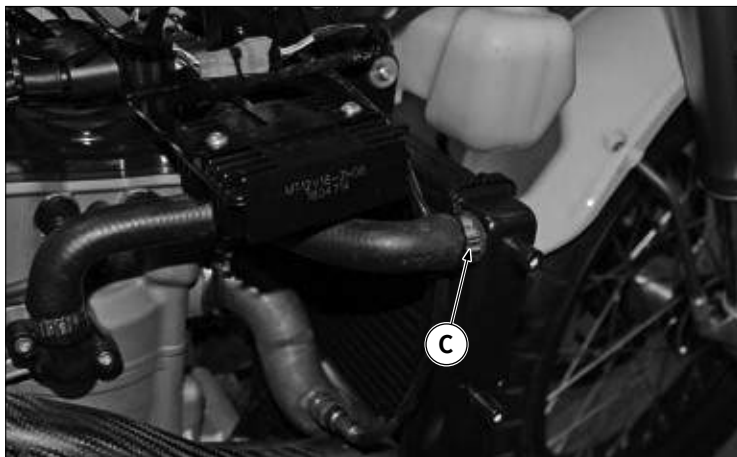
Remove:

- Conveyors;
- Radiator electric fan;
- Expansion tank.

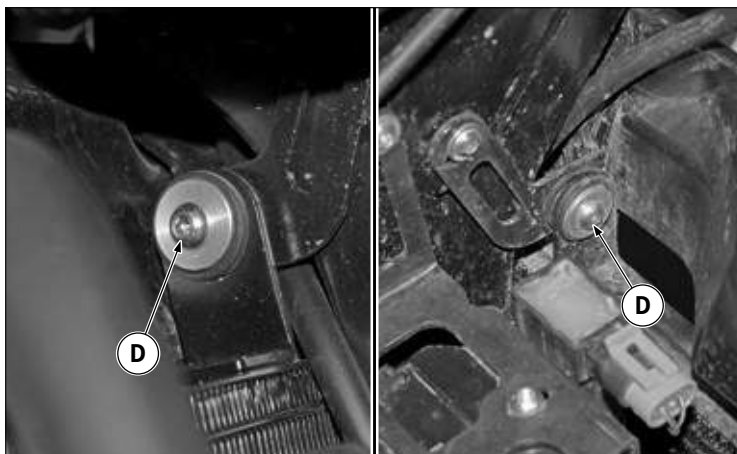
Release the tube "A" and empty the coolant from the radiator.  
Release the tube "B" from the radiator.

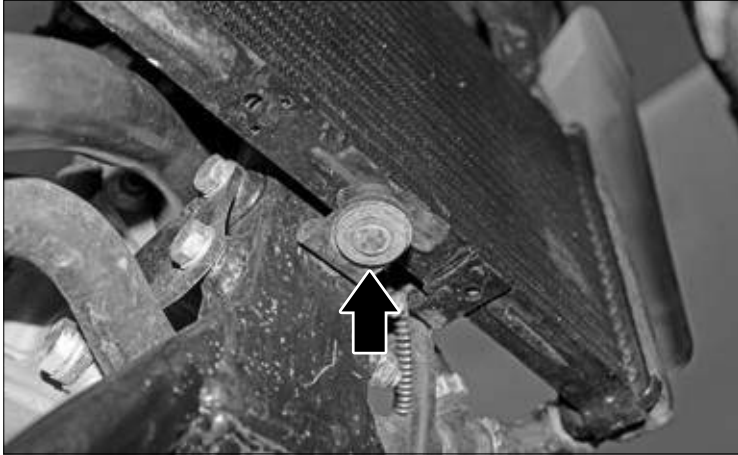


On the opposite side, release the tube "C".



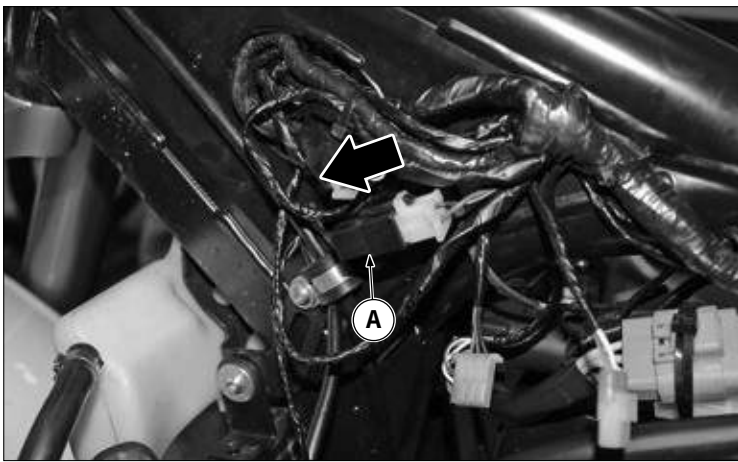
Remove the two screws "D" that fasten the radiator to the chassis.





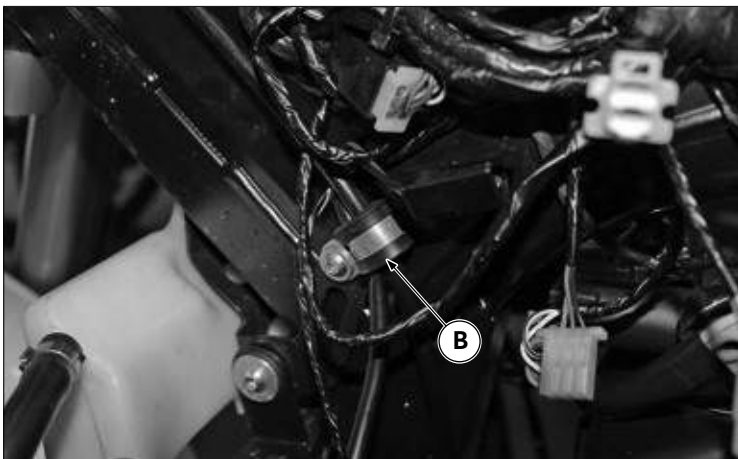
Remove the radiator pulling the lower pin out of the anti-vibration grommet.

**i** Proceed in the reverse order for reassembling.

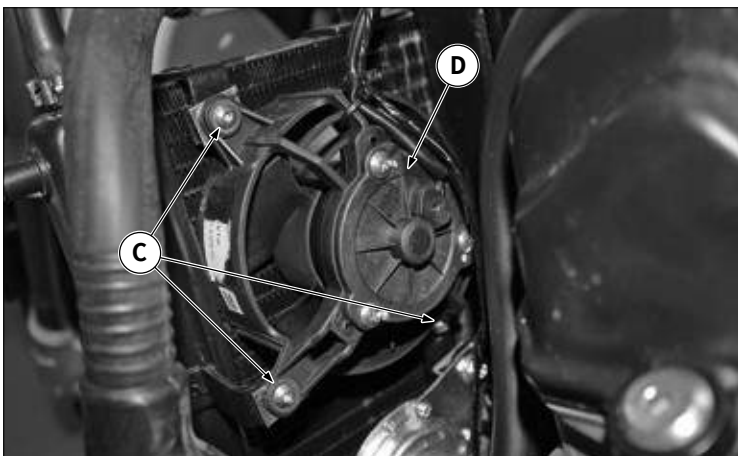


### 12.21.3 Fan removal

Disconnect the electric fan connector "A" from the main wiring.

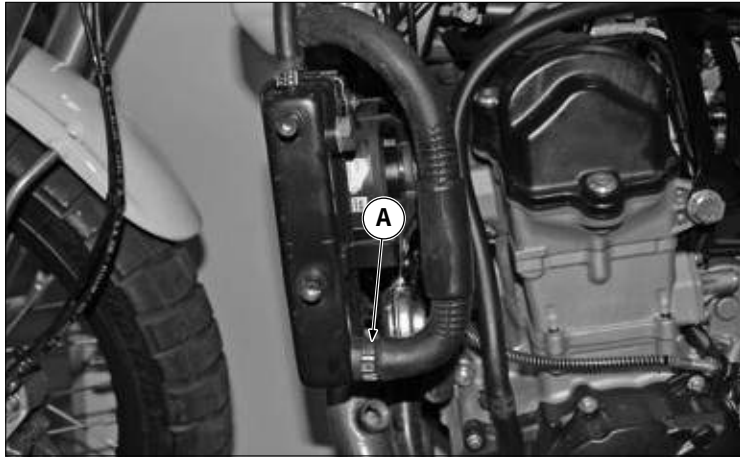


Remove the cable gland "B" to release the electric fan cable.



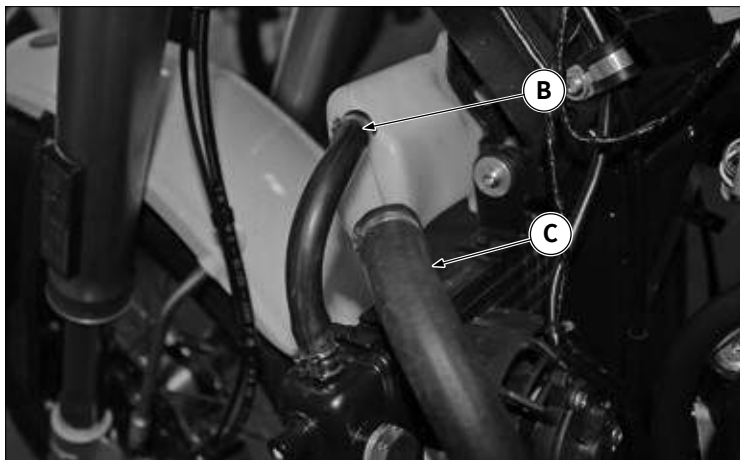
Remove the three screws "C", then remove the electric fan "D".

**i** Proceed in the reverse order for reassembling.

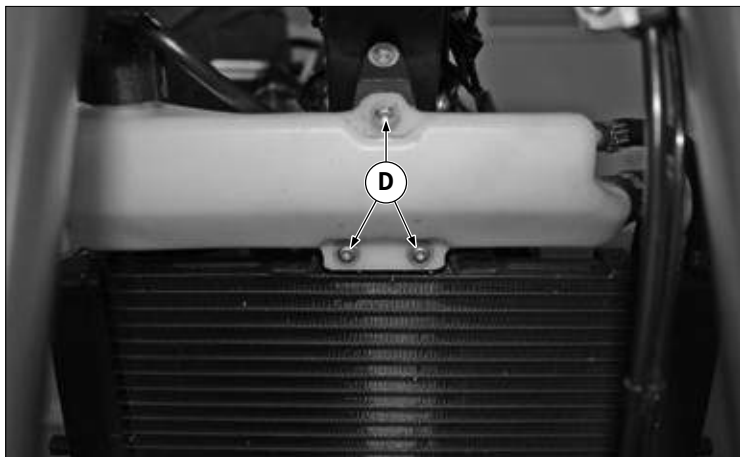
**12.21.4 Expansion tank removal**

**(i)** Place a container for collecting the coolant.

Release the tube “A” and empty the coolant from the radiator.

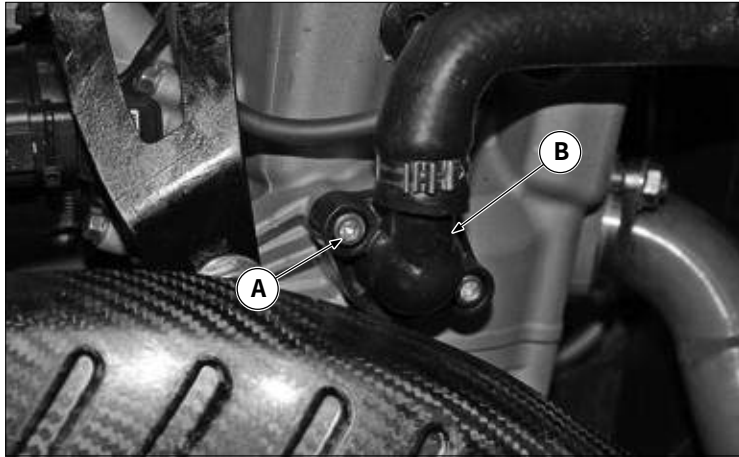


Release the tube “B” and the tube “C” from the expansion tank.



Remove the three screws “D”, then remove the tank.

**(i)** Proceed in the reverse order for reassembling.

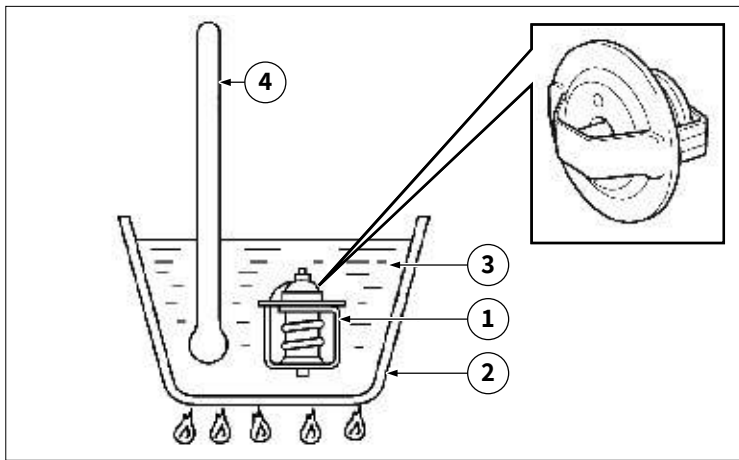


### 12.21.5 Thermostat

**i** Before removing the thermostat, it is necessary to empty the engine cooling system.

Remove the two screws "A" that fasten the fitting "B" and remove the fitting to access the thermostat.

**i** For installation, reverse the removal procedure.



### 12.21.6 Thermostat check

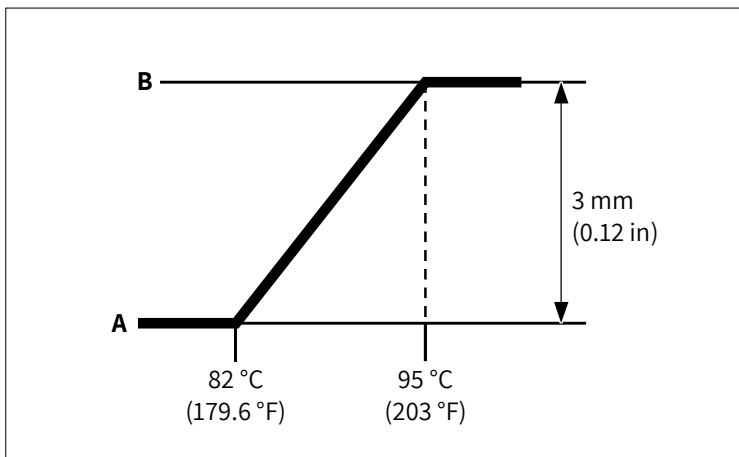
Check the operation of the thermostat: if it does not open at the temperature of 80.5-83.5 °C (176.9-182.3 °F), replace.

Proceed with the check as follows:

- Suspend the thermostat "1" in a container "2" filled with water;
- Heat the water "3" slowly;
- Dip a thermometer "4" into the water.
- Shake the water, observe the thermostat and the temperature indicated by the thermometer.

Level "A" = Fully closed

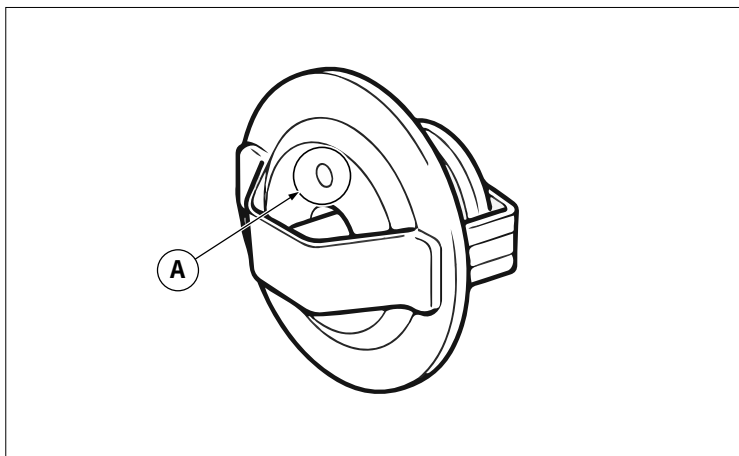
Level "B" = Fully open



**i** If you doubt the accuracy of the thermostat, replace it. The faulty thermostat can cause dangerous overheating or cooling.

Check the thermostat cover: if there are any cracks and/or damage, replace it.

Check the radiator inlet coupling: if there are any cracks and/or damage, replace it.



### 12.21.7 Thermostat installation

Install the thermostat with the vent hole "A" facing up.

Install a new copper washer and coolant temperature sensor.

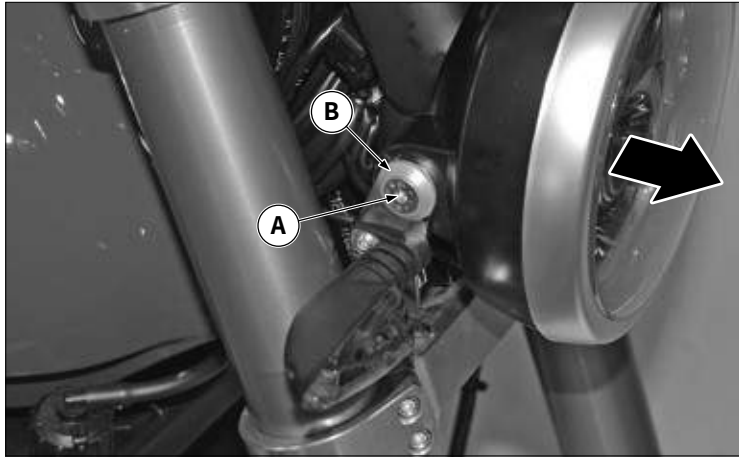
**Tightening torque:**  
**Coolant temperature sensor**  
**14 Nm (1.4 m·kgf, 10 ft·lbf)**

Pay particular attention when handling the coolant temperature sensor. Replace any piece that has fallen to the ground or has had a strong impact.

Fill the cooling system with the prescribed amount of recommended coolant.

Check the cooling system: if there are leaks, repair or replace the defective components, if any.

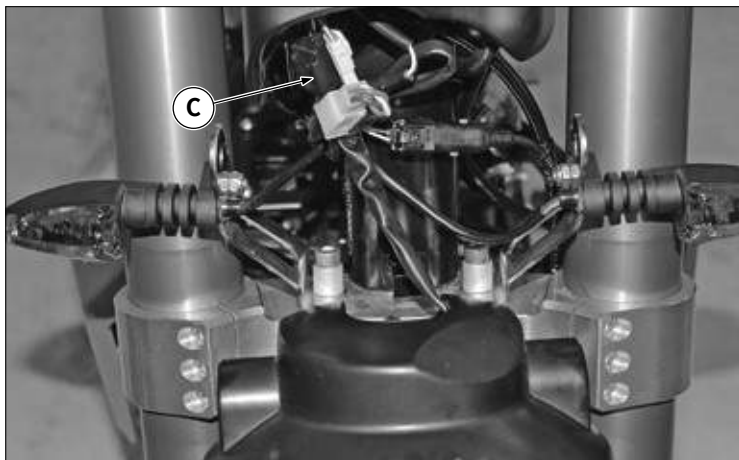
Measure the radiator cap opening pressure: if it is below the prescribed pressure, replace the radiator cap.



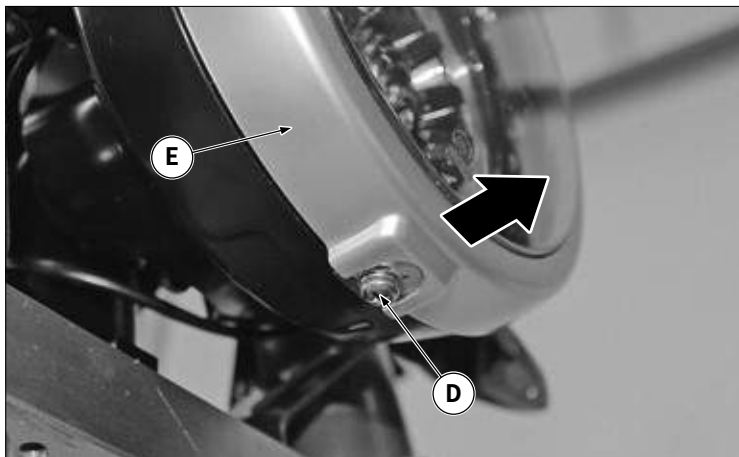
## 12.22 FRONT OPTICAL UNIT REMOVAL

### 12.22.1 Front headlight removal

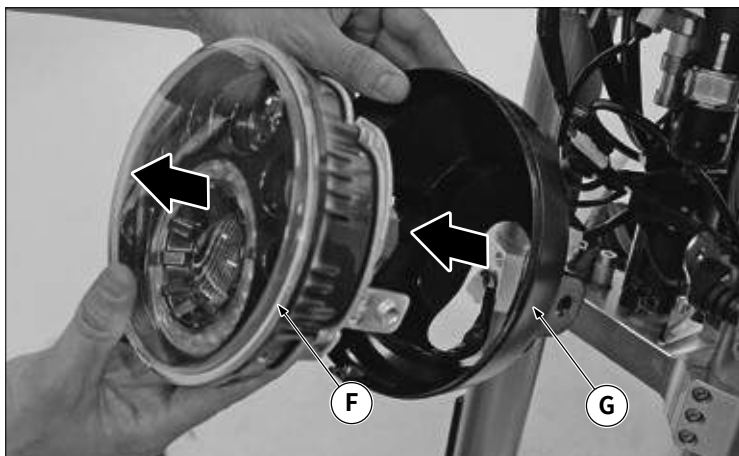
Remove the screw "A" and the spacer "B" on both sides of the headlight and remove the headlight from the brackets.



Disconnect the connector "C" of the front headlight from the vehicle wiring.



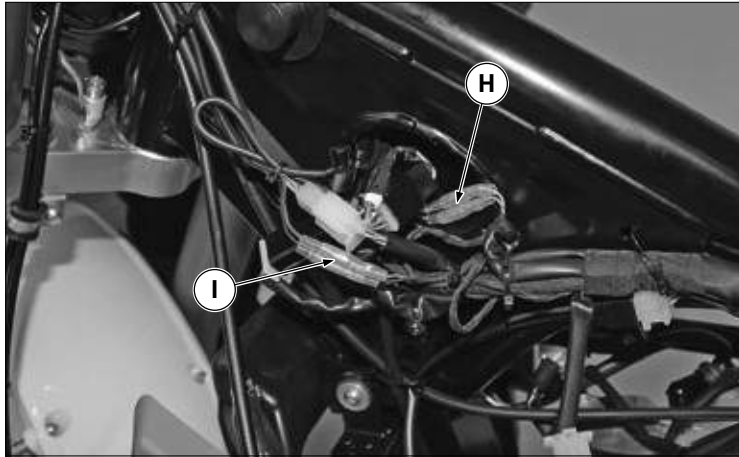
Remove screw "D" and take out the frame of the headlight "E".



Remove the optical unit "F" from the headlight cover "G".

**i** Proceed in the reverse order for reassembling.

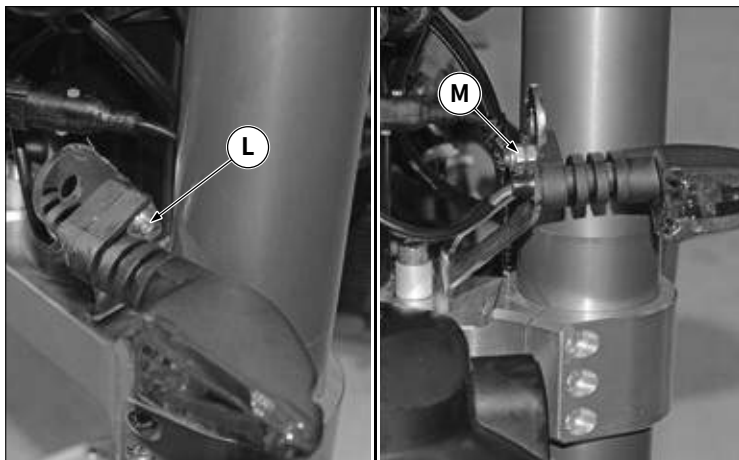


**12.22.2 Front turn signals removal**

Remove:

- Headlight;
- Tank.

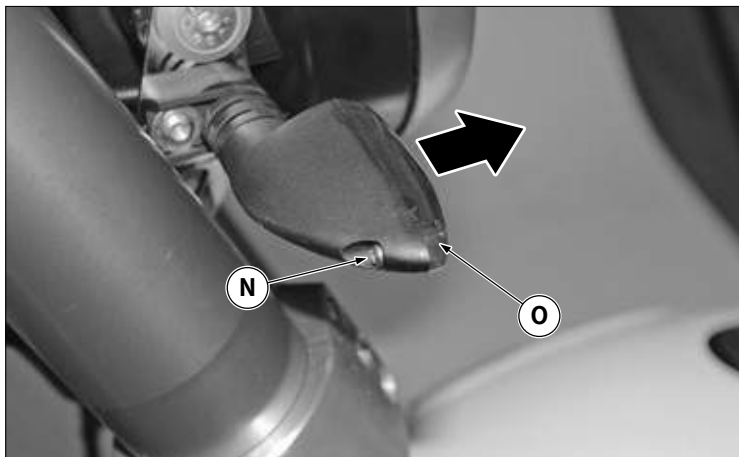
Disconnect the front left “H” and right “I” turn signal wiring.



Remove the screw and washer “L” and the self-locking nut “M”, repeat the operation on the turn signal on the opposite side.

Remove the front turn signals.

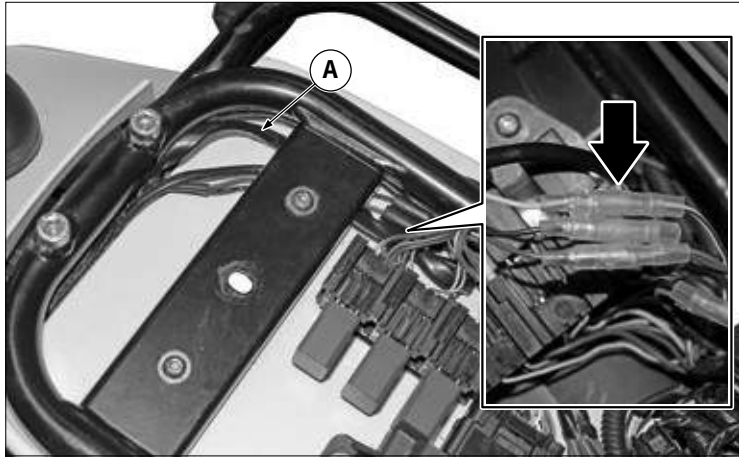
**i** Proceed in the reverse order for reassembling.

**12.22.3 Turn signal bulbs replacement**

Remove the screw “N”.

Remove the transparent cover “O” and replace the bulb with one of the same type.

**i** Proceed in the reverse order for reassembling.



## 12.23 REAR OPTICAL UNIT REMOVAL

### 12.23.1 Rear headlight removal (Scrambler version)

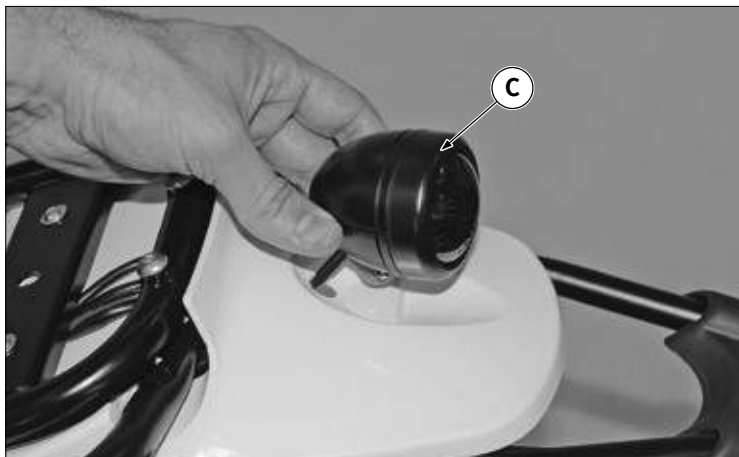
Remove:

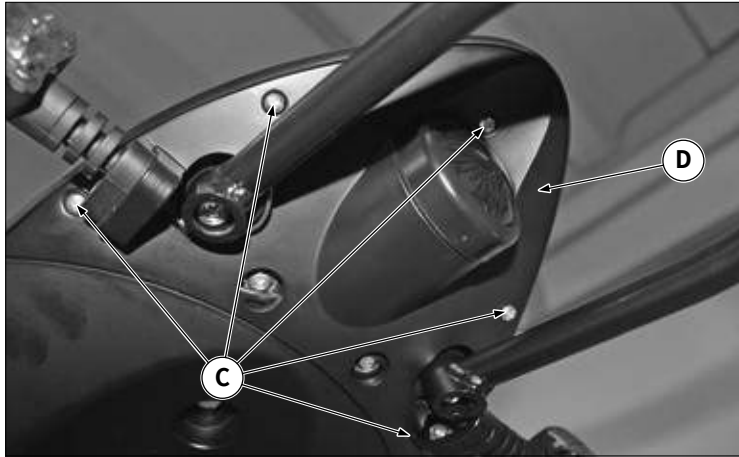
- Saddle, refer to “12.1 Seat removal” on page 121“.
- Disconnect the rear headlight wiring “A” (black, yellow and red wires) from the vehicle wiring.



Remove the fastening screws “B”, then remove the tail light “C”.

**i** Proceed in the reverse order for reassembling.

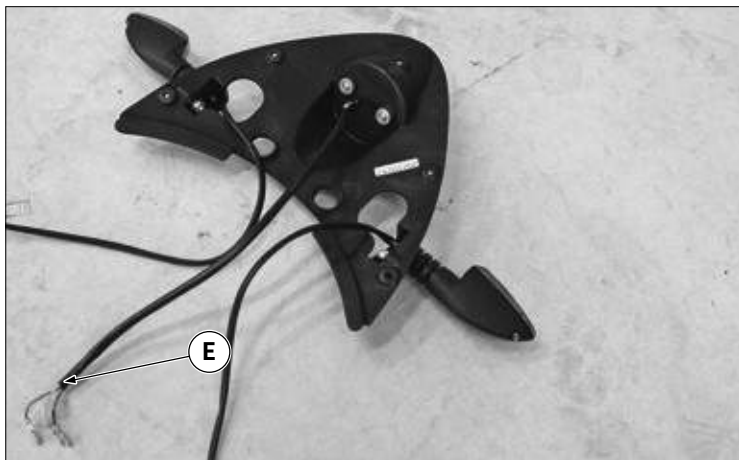


**12.23.2 Rear headlight removal (Flat Track version)**

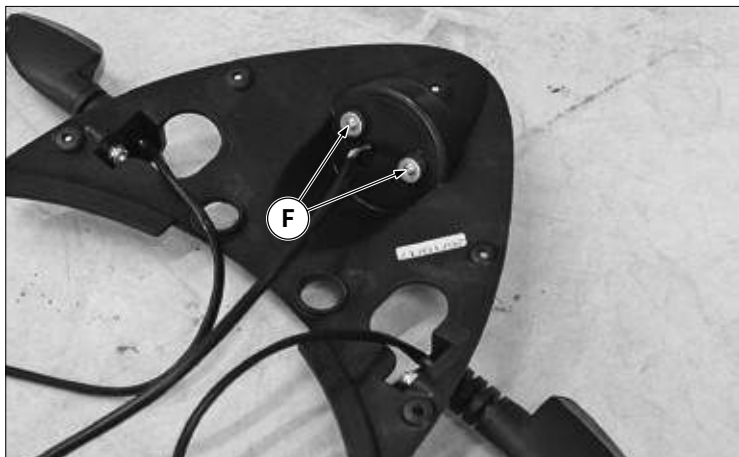
Remove:

- Saddle, refer to "12.1 Seat removal" on page 121;
- Flat Track Plate Holder.

Remove the screws "C", then remove the lower cover "D".

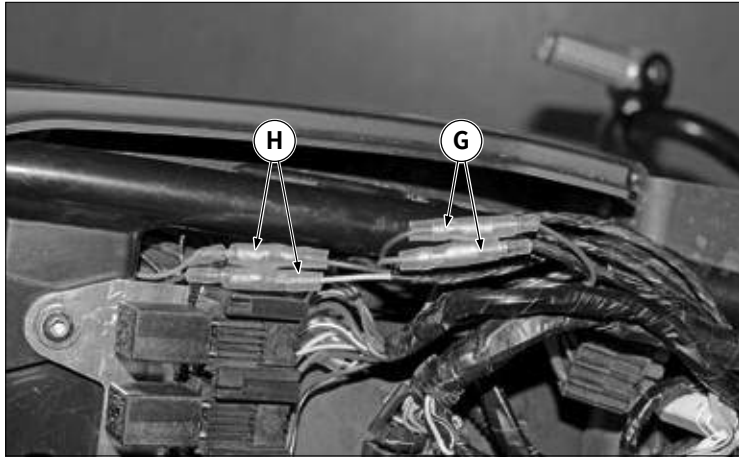


Disconnect the tail light wiring "E" (black, yellow and red wires) from the vehicle wiring.



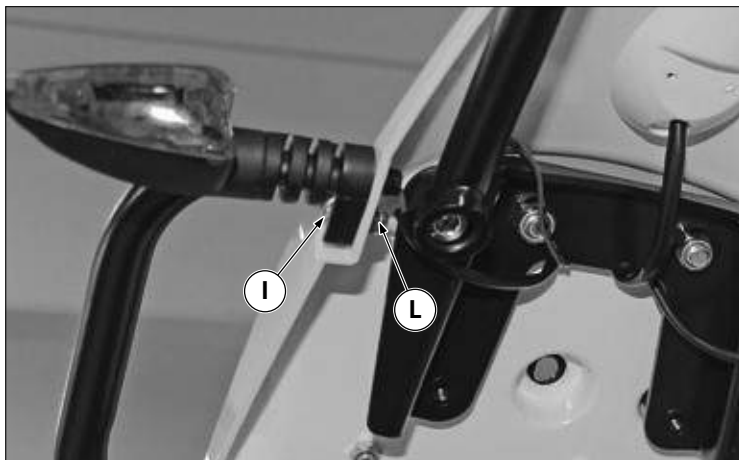
Remove the screws "F", then extract the tail light.

**i** Proceed in the reverse order for reassembling.

**12.23.3 Rear turn signals removal**

Remove:

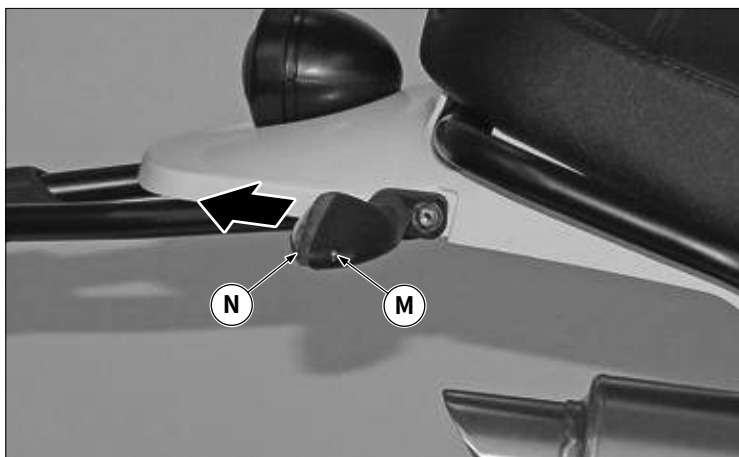
- Saddle, refer to “12.1 Seat removal” on page 121“.
- Disconnect the left turn signal wiring “G” (blue and black cables) and the right turn signal wiring “H” (blue and sky blue wires).



Remove the screw and washer “I” and the self-locking nut “L, repeat the operation on the turn signal on the opposite side.

Remove the rear turn signals.

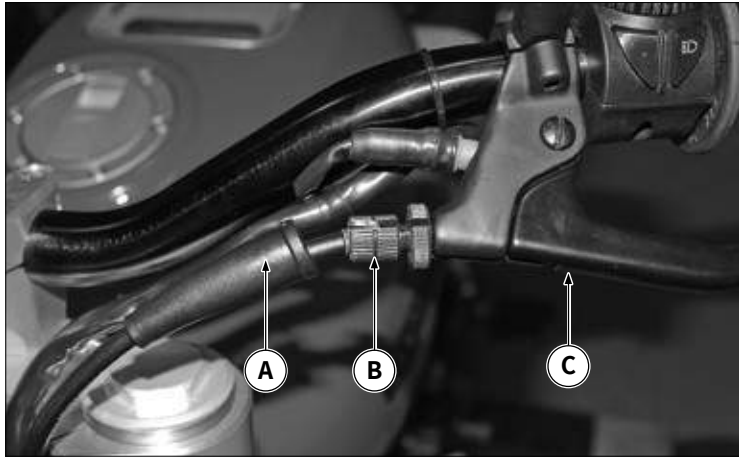
**i** Proceed in the reverse order for reassembling.

**12.23.4 Rear turn signal bulbs replacement**

Remove the screw “M”.

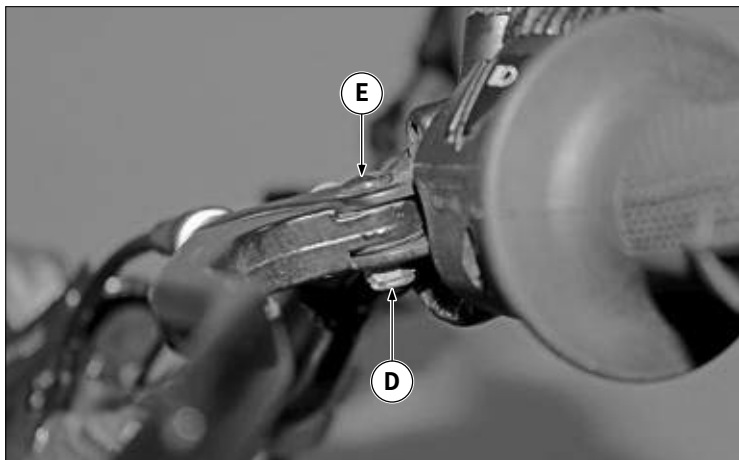
Remove the transparent cover “N” and replace the bulb with one of the same type.

**i** Proceed in the reverse order for reassembling.



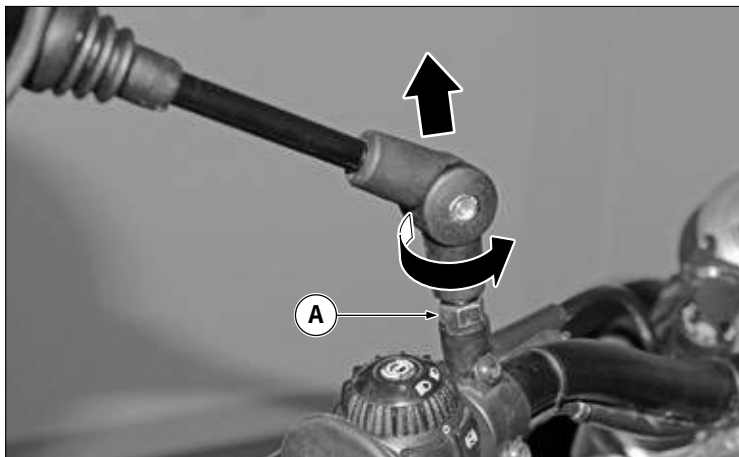
### 12.25 CLUTCH LEVER REMOVAL

Lift the cap “A” and unscrew the clutch adjuster “B” and remove the clutch cable from the clutch lever “C”.



Remove the nut “D” and the screw “E”, then remove the clutch lever.

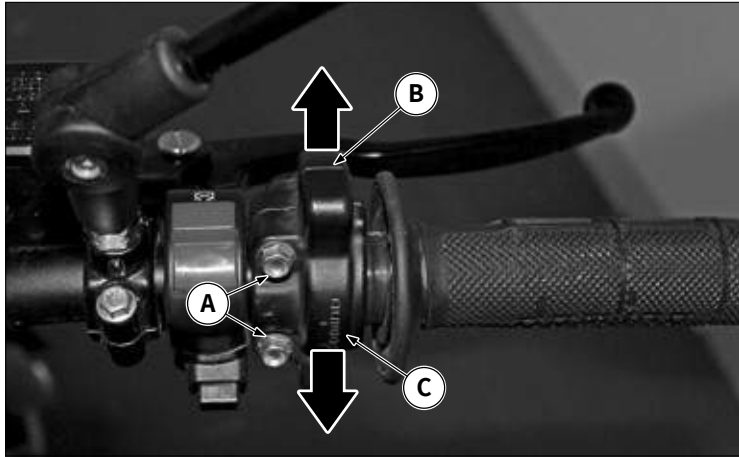
**i** Proceed in the reverse order for reassembling.



### 12.26 REAR-VIEW MIRRORS REMOVAL

Loosen the locknut “A” and unscrew the mirror rod to remove them.

**i** Proceed in the reverse order for reassembling.

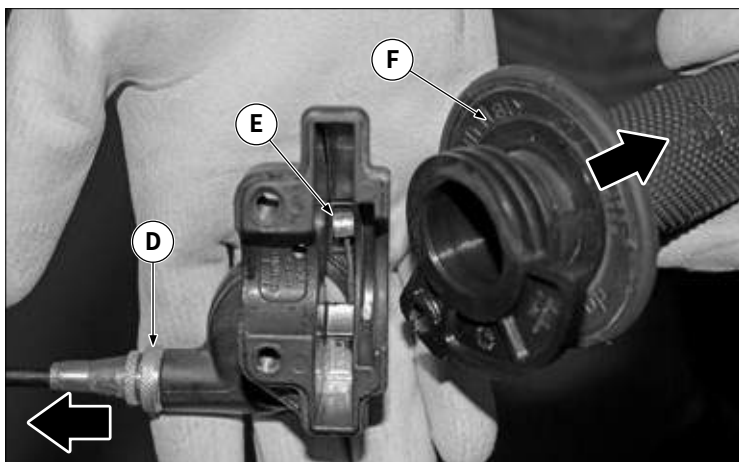


## 12.27 THROTTLE CONTROL REMOVAL

### 12.27.1 Throttle control knob removal

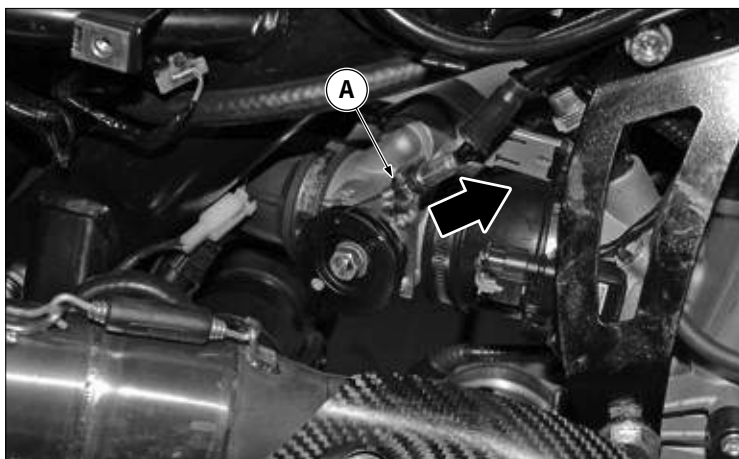
Remove the screws "A".

Remove the U-bolts "B" and "C".



Remove the adjuster "D", disconnect the cable "E" from the knob "F" and remove it.

**i** Proceed in the reverse order for reassembling.



### 12.27.2 Throttle cables removal

Remove:

– Throttle control knob.

Completely loosen the nut "A" and disconnect the throttle cable from the throttle body.

**i** Proceed in the reverse order for reassembling.

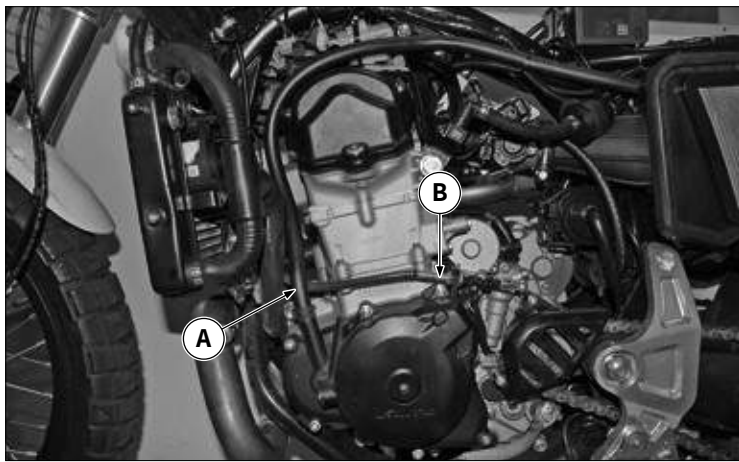
### 13.1 COMPLETE ENGINE REMOVAL

 **Position the vehicle on a central stand and support its rear weight with straps and hoist.**

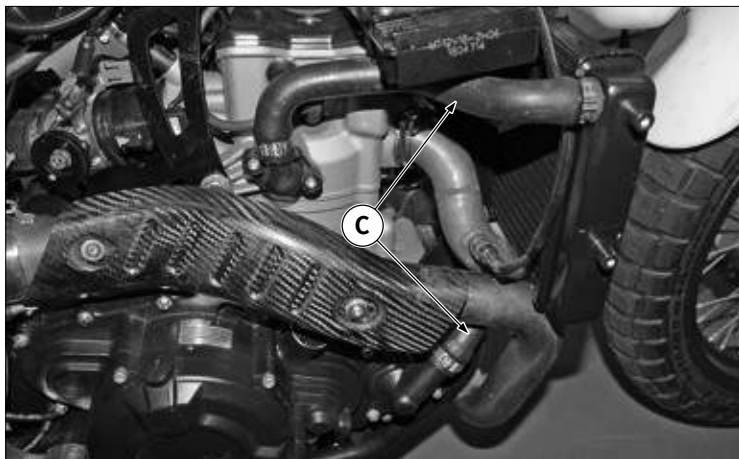
Remove:

- Saddle, refer to "12.1 Seat removal" a pagina 122“;
- Tank, refer to "12.8 Fuel tank removal" a pagina 128“;
- Exhaust system, refer to "12.20 Exhaust system removal" a pagina 160“;
- Chain, refer to "12.14 Chain removal" a pagina 143“;
- Conveyors, refer to "12.7 Underbody and conveyors removal" a pagina 127“;
- Coil and tube, refer to "10.8.1 Ignition coil removal" on page 93
- Regulator with bracket, refer to "13.1 Complete engine removal" on page 170
- Side panel, refer to "12.5 Side panel removal" a pagina 126“;
- Radiator, refer to "12.21.2 Radiator removal" a pagina 161“;
- Throttle body, refer to "13.9.2 Throttle body removal" a pagina 202“.
- Canister filter, refer to "13.10.1 Filter removal" on page 204
- Fuel injector, refer to "13.9.1 Injector removal" on page 201

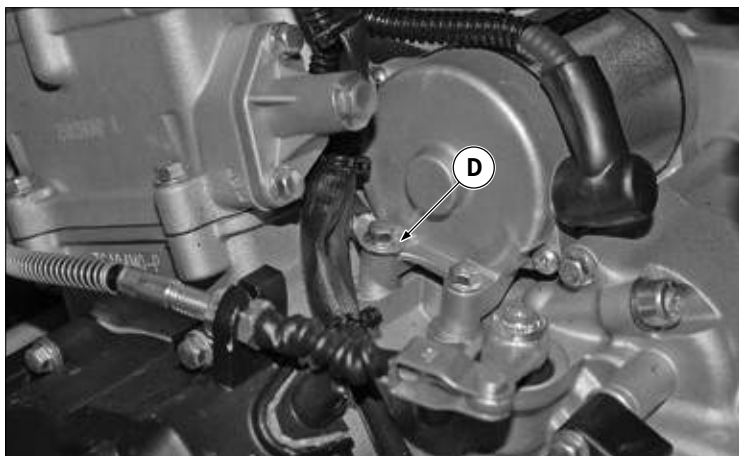
Remove the air tube "A" and the clutch cable "B".

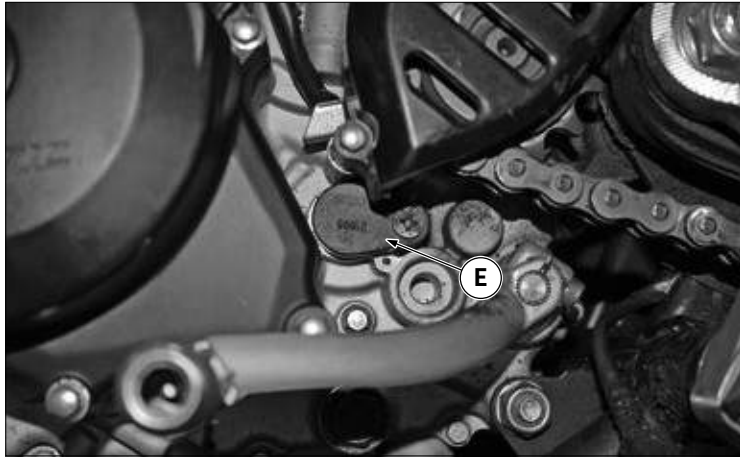


Remove the two cooling system pipes "C".

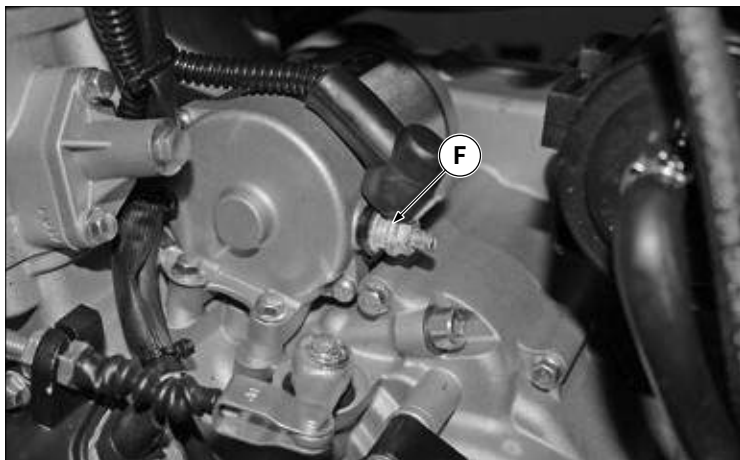


Remove the engine ground cable "D".

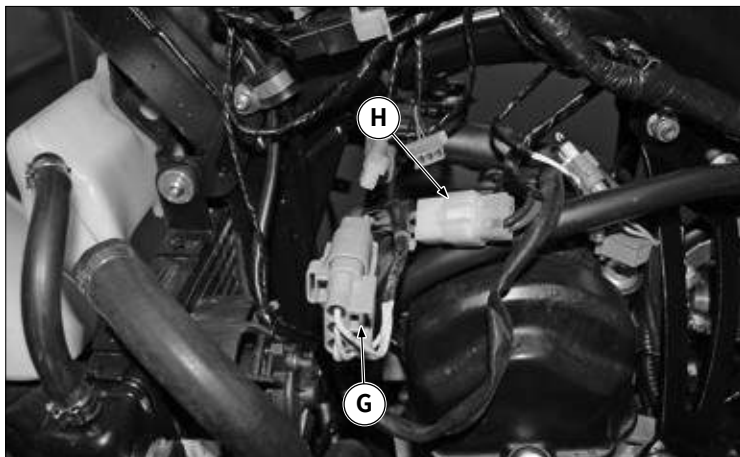




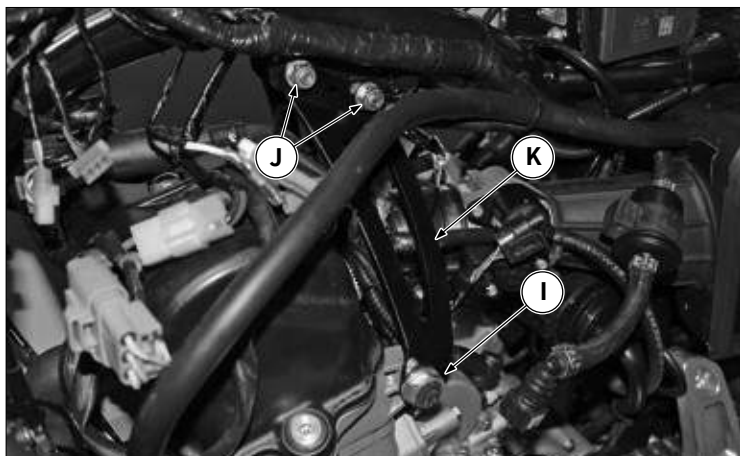
Remove the neutral sensor "E".



Remove the starter motor cable "F".

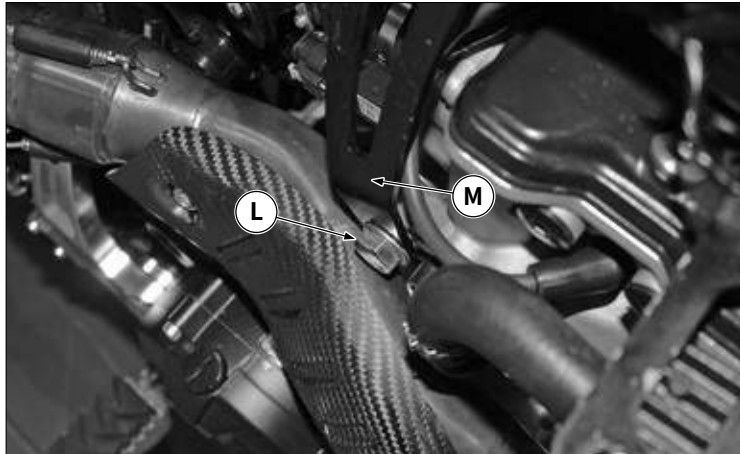


Remove the pick up "G" and alternator "H" connectors.

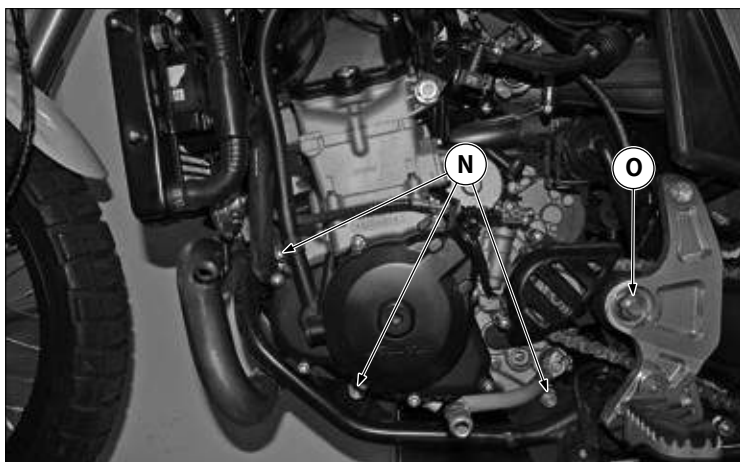


Remove the screw "I" and the connections "J", then remove the bracket "K".






Remove the screw "L" and the bracket "M".

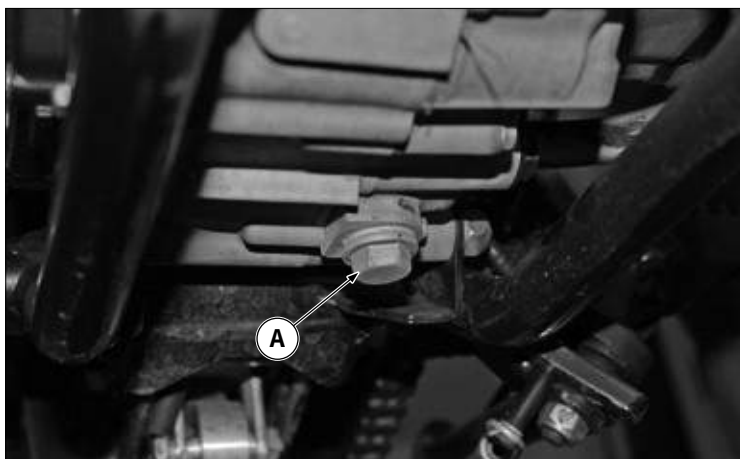


Remove the three engine connections "N" and the swingarm pivot "O".

Remove the engine from the vehicle.

-  **Tightening torques:**
- M10 screws: 50 Nm (5.0 m•kg, 36 ft•lb)
  - M8 screws: 27 Nm (2.7 m•kg, 20 ft•lb)

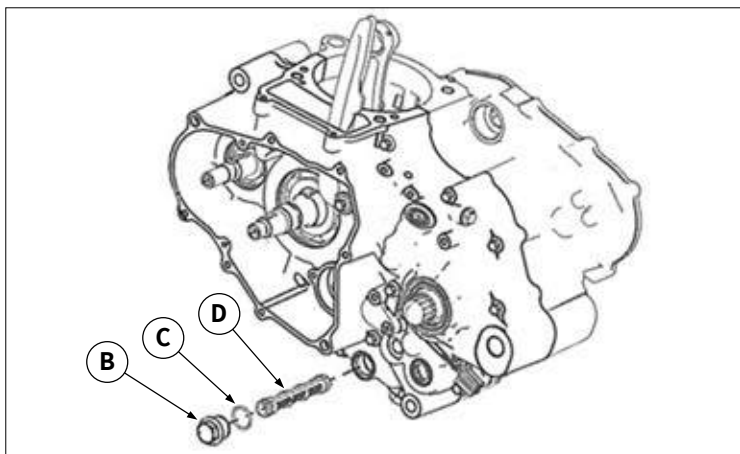
 **Proceed in the reverse order for reassembling.**



### 13.2 ENGINE OIL AND ENGINE OIL FILTERS CHANGE

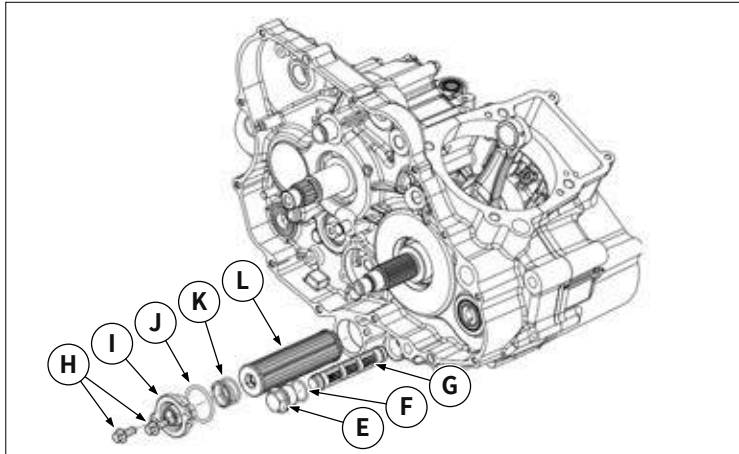
 **Place the motorcycle in vertical and upright position.**

Remove the oil drain bolt M16 "A" at the bottom of engine.



Remove the bolt M20 "B" and the gasket "C" from the primary filter on the left side of the engine, then remove the primary filter "D".

 **The primary filter is made of metal.**



Remove the bolt M20 “E” and the gasket “F” from the primary filter on the right side of the engine, then remove the primary filter “G”.

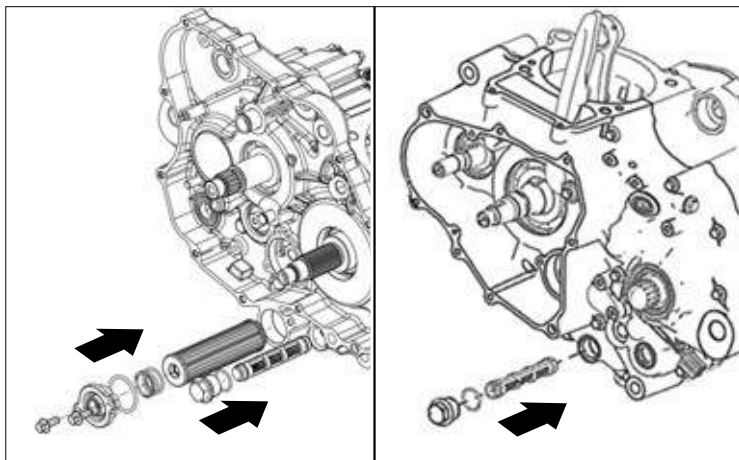
**(i) The primary filter is made of metal.**

Remove the two bolts M5 “H”, the cap “I” and the gasket “J” from the thin filter on the right side of the engine, then remove the spring “K” and the thin filter “L”.

**(i) The thin filter is made of paper.**

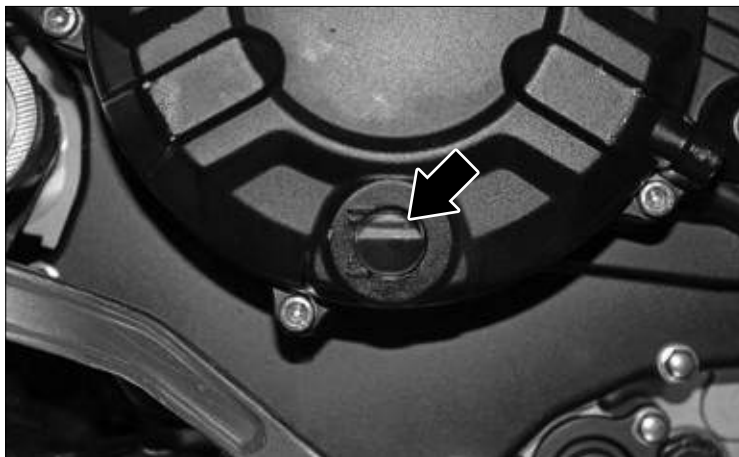
Drain the oil for 5 minutes or wait until there is no more oil.

At the same time, clean the primary filter and prepare a new thin filter.



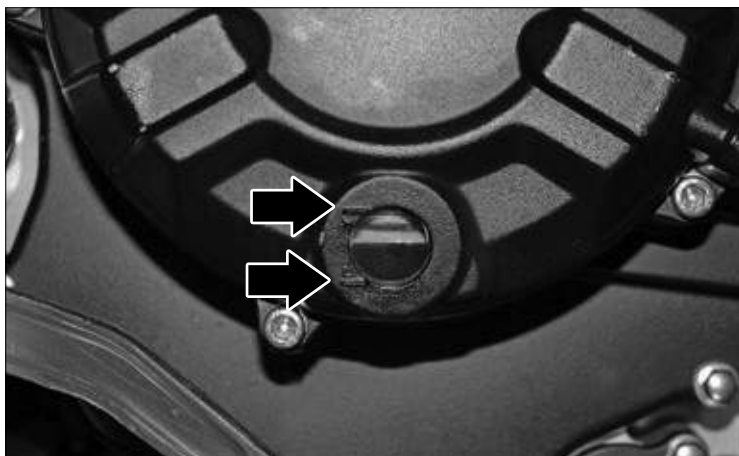
Install all components previously removed in the sequence in which they were disassembled.

**(i) Install the filter with the black plastic facing inward.**



Measure 1500-1600 ml of oil with the measuring glass and fill the motor from the filling opening with the oil contained in the glass using a funnel before closing the oil cap.

During filling, observe the oil scale on the access hole.



### **13.3 ENGINE OIL VOLUME**

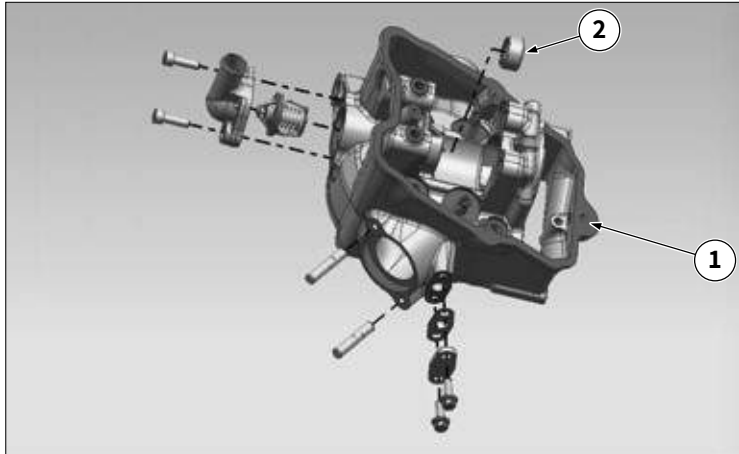
Put in neutral and start the engine letting it run for 2 minutes before stopping it.

Place the vehicle vertically.

Keep the vehicle stationary for 5 minutes.

Observe if the oil level is between H-L.

If so, it means there is sufficient engine oil.



## 13.4 CYLINDER HEAD AND VALVE

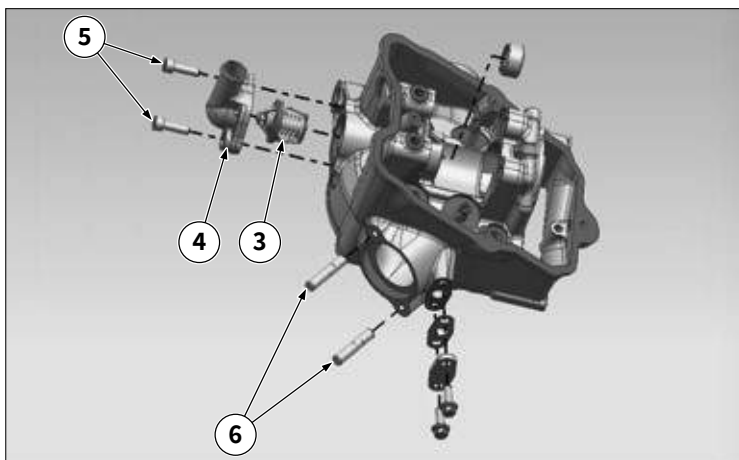
### 13.4.1 Cylinder head components assembling

Check that there are no aluminium residues or dents on the sealing surface of the head "1".

**i Use compressed air to clean the surfaces.**

Apply a small amount of oil on the surface of the needle bearing "2" and install it in the respective hole in the cylinder head using a specific tool.

**⚠ The bearing must be flush with the hole.**

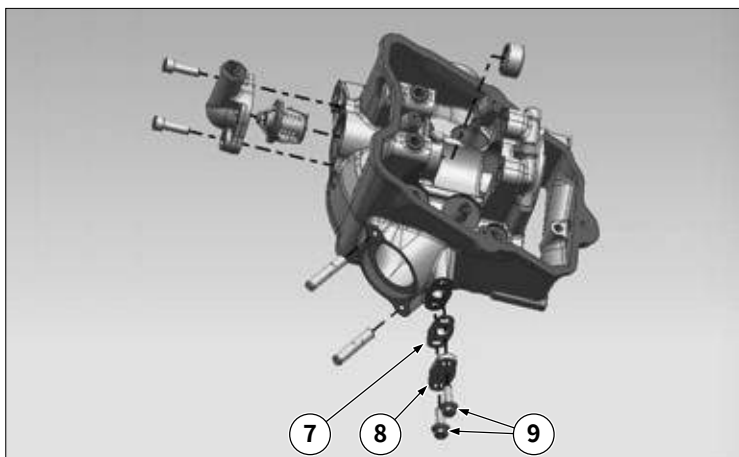


Install the thermostat "3" with the related cover "4" on the cylinder head, insert the two screws "5" M6x20 and tighten to the prescribed torque.

**Tightening torques:**  
Thermostat cover fastening screws: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

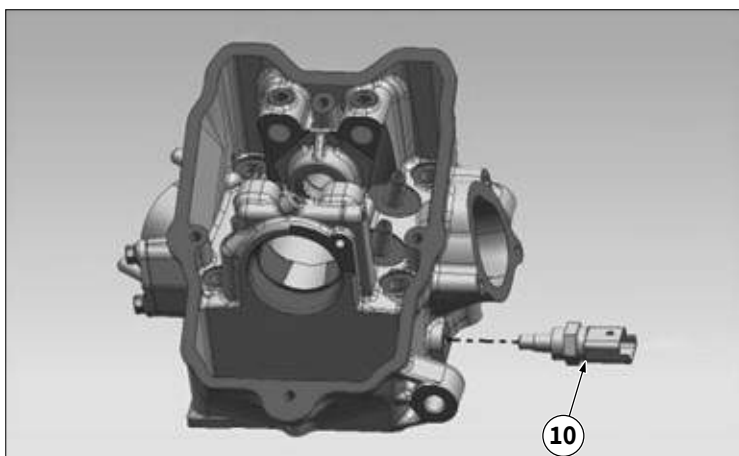
Take the two drain stud bolts "6" M8x40, apply the recommended product on the first 3 ~ 4 threads and install them in the respective seats of the cylinder head, tightening to the prescribed torque.

**Tightening torques:**  
Exhaust pipe stud bolts: 12 ~ 18 Nm (1.2 ~ 1.8 m·kgf, 8.9 ~ 13.3 ft·lbf)



Take the two bolts "9" M6x16, insert them in the secondary air intake cover "8" and in the related gasket "7", install the assembly so assembled on the exhaust manifold of the cylinder head and tighten to the prescribed torque.

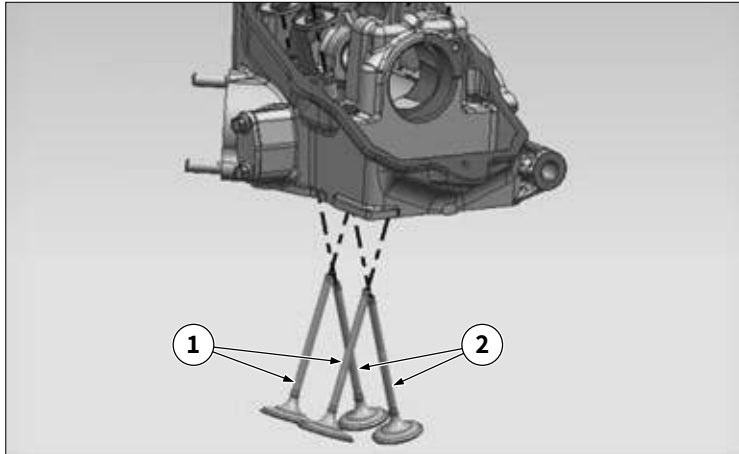
**Tightening torques:**  
Secondary air intake cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Take the temperature sensor "10" and apply a suitable quantity of recommended product on the threaded part, then install the sensor in the related seat on the cylinder head and tighten to the prescribed torque.

**♻ Recommended product: Loctite® 263 / SANVO.**

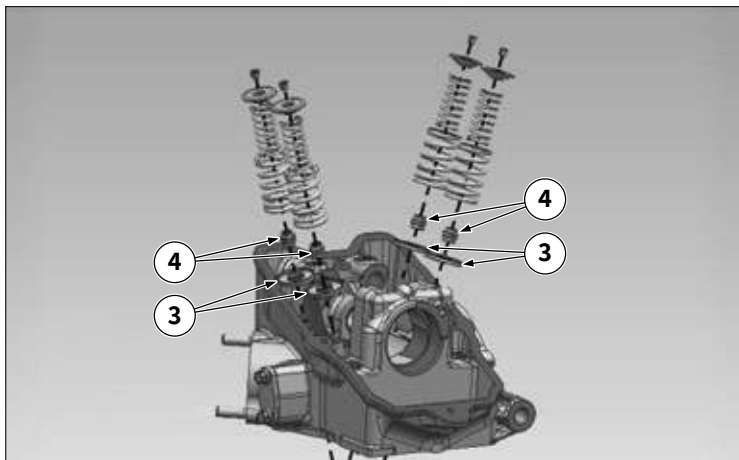
**Tightening torques:**  
Temperature sensor: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Check the cleanliness of each component.

Position the cylinder head horizontally, with the combustion chamber facing upwards.

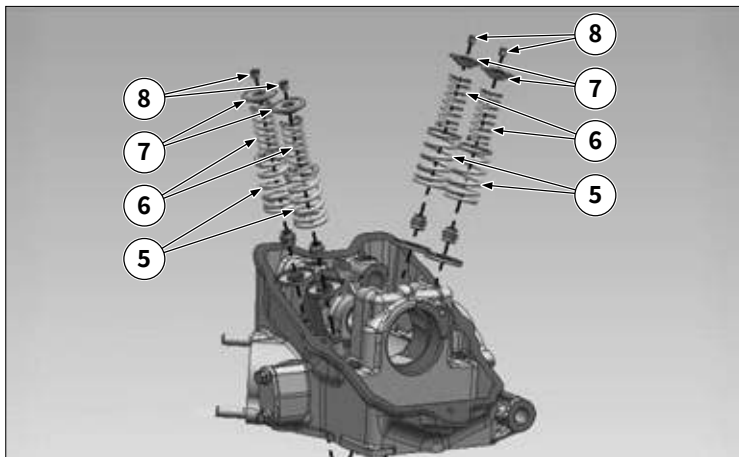
Apply an adequate quantity of oil on the stems of the intake valves "1" and drain valves "2", then install the valves in the respective seats of the cylinder head.



Turn the cylinder head horizontally, with the combustion chamber facing downwards.

Fit the four lower seats "3" of the valve springs and the four oil seal covers "4" on the valve stems.

**⚠ Apply a small amount of oil on the sealing caps.**

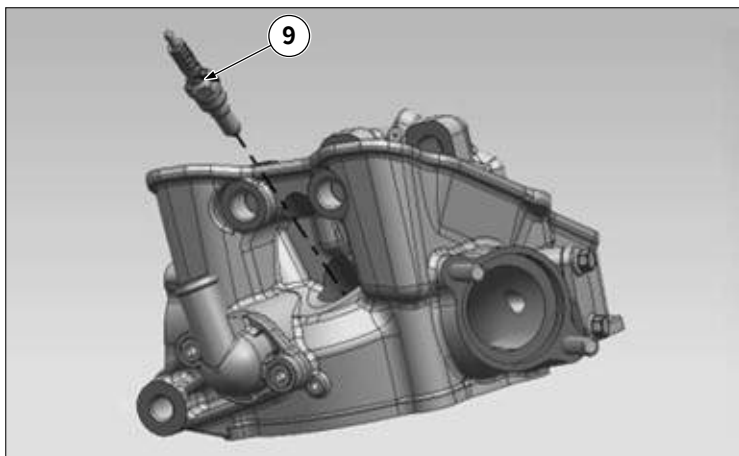


Fit the four internal springs "6", the four external springs "5" and the four upper seats "7" of the springs.

**⚠ Position the internal and external springs with the marking facing upwards.**

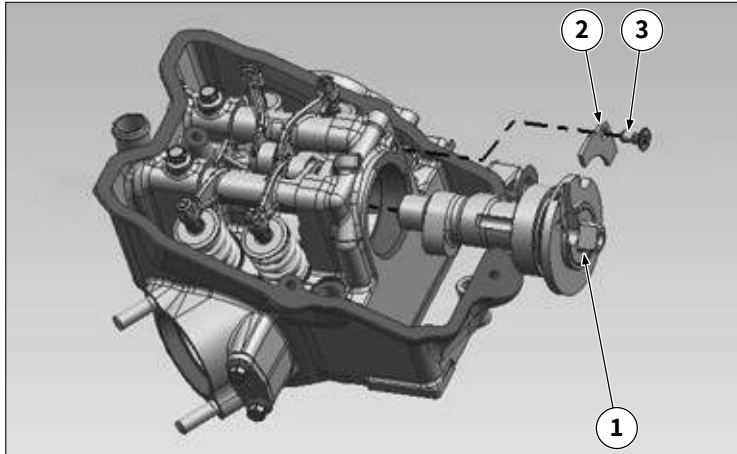
**i The internal and external springs must appear with the upper coils more separated than the lower ones.**

Install the clamps "8" for locking the valves on the upper seats, lock the clamps in the respective slots using a specific tool.



Screw the spark plug "9" into its hole for 3 ~ 4 threads by hand, then tighten to the prescribed torque.

**🔧 Tightening torques:**  
**Spark plug: 8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)**



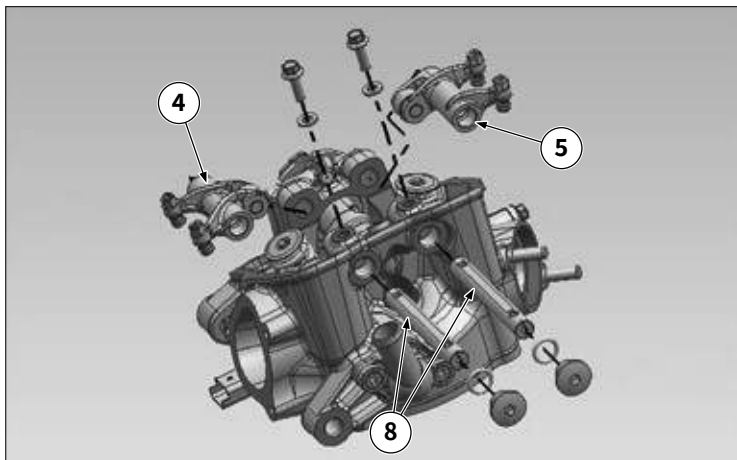
### 13.4.2 Camshaft and rocker arms components assembling

Check the cleanliness of each component.

Take the camshaft "1", apply grease to the shaft surface, then insert the camshaft into the respective hole in the head.

Fit the locking plate "2" of the camshaft, insert the screw "3" M6X12 and tighten it to the prescribed torque.

**Tightening torques:**  
Camshaft plate fastening screw: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Take the intake rocker arm "4", install it in its seat and fit the respective shaft "8".

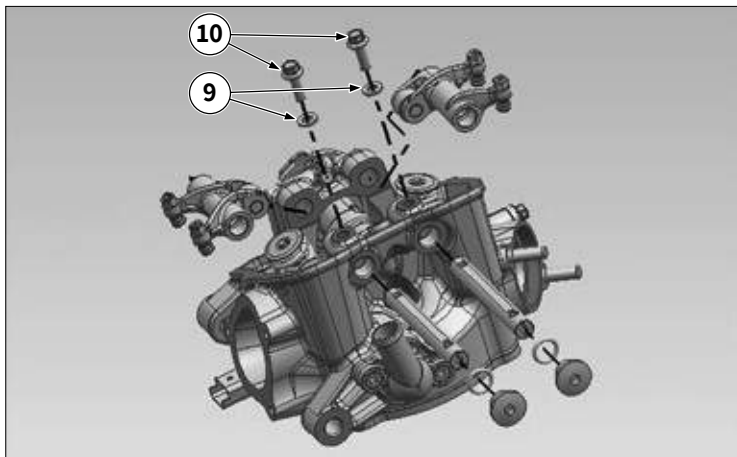
**⚠ Apply an adequate amount of oil on the surface of the shaft.**

**⚠ Insert the shaft with the flat side facing up.**

Take the exhaust rocker arm "5", install it in its seat and fit the respective shaft "8".

**⚠ Apply an adequate amount of oil on the surface of the shaft.**

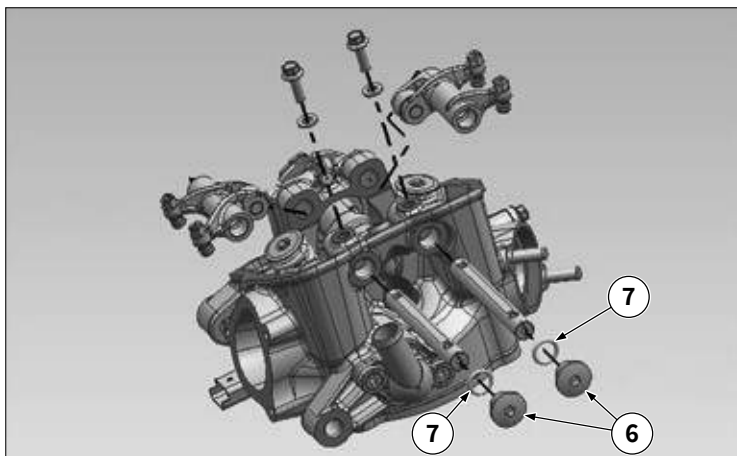
**⚠ Insert the shaft with the flat side facing up.**



Use a slotted screwdriver to rotate the shafts of the intake and exhaust rocker arms, in order to align the threaded holes of the shafts with those on the head.

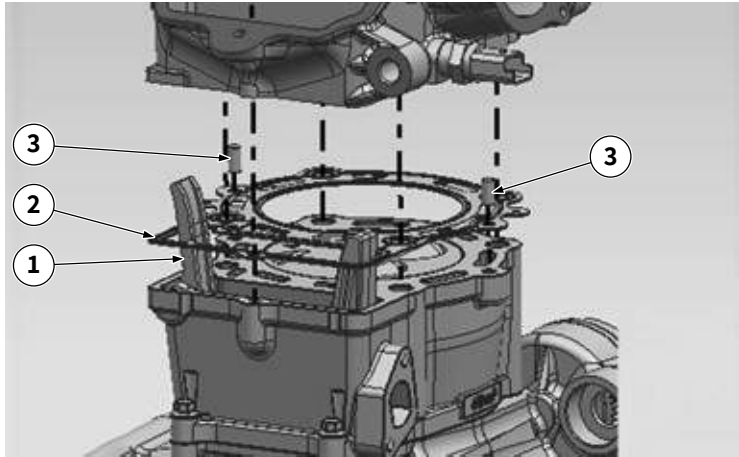
Insert the two bolts "10" M14x1 with the related washers "9" Ø6.5x1.5xØ12 in the holes just aligned and tighten to the prescribed torque.

**Tightening torques:**  
Rocker arms shafts fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Insert the two bolts "6" M14x1 locking the shafts with the related fluorine rubber O-rings "7" Ø11.8x2.6 in the respective holes in the head and tighten to the prescribed torque.

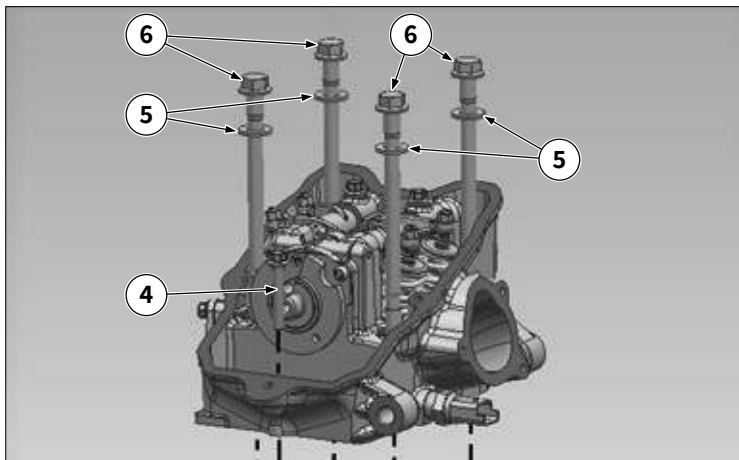
**Tightening torques:**  
Rocker arms shafts locking bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)




### 13.4.3 Cylinder head assembling

Fit the guide plate "1" of the chain, the two bushes "3" Ø6x12 and the gasket "2" of the head on the cylinder.

Install the cylinder head on the cylinder block.

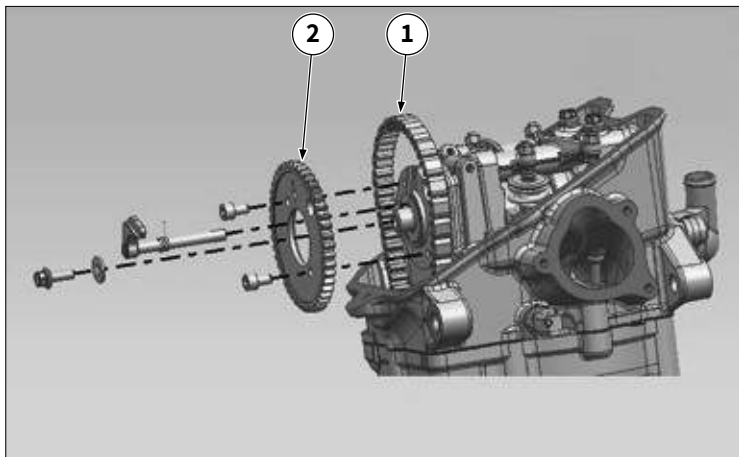


Fit the four stud bolts "6" M10x152 with the related washers "5" Ø10.5x2xØ20 in the respective holes in the head, tighten to the prescribed torque.

 **Tightening torques:**  
Cylinder head fastening stud bolts: 55 ~ 60 Nm (5.5 ~ 6.0 m·kgf, 40.6 ~ 44.3 ft·lbf)

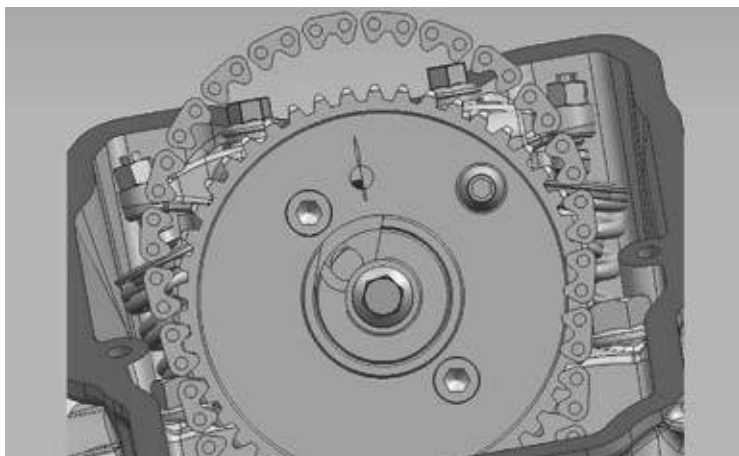
Insert the bolt "4" M6x40 into the respective hole in the head, screw in and tighten to the prescribed torque.

 **Tightening torques:**  
Cylinder head fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

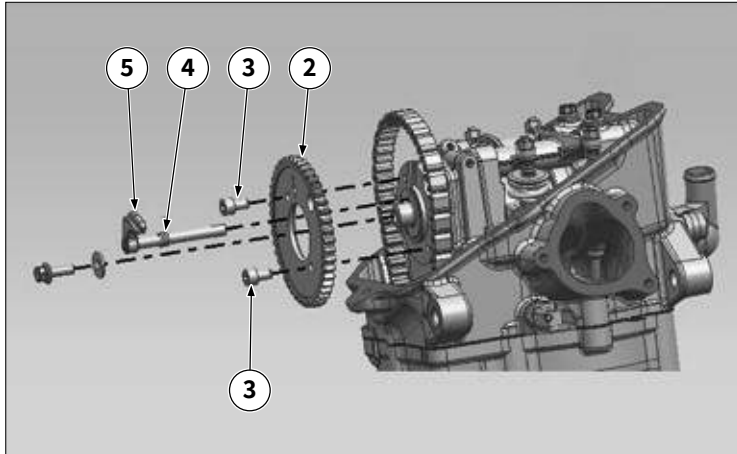


### 13.4.4 Timing pinion assembly and valve clearance adjustment

Fit chain "1" on sprocket "2".



Fit the pinion on the camshaft, aligning the pinion arrow with the marking on the head.

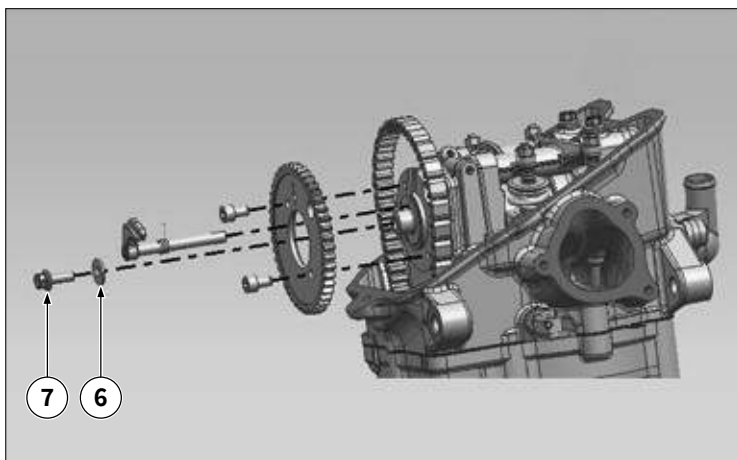


Take the two bolts “3” M6x10 and screw them onto the pinion, tightening to the prescribed torque.

**Tightening torques:**  
Camshaft pinion fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

Fit the pressure relief valve “5” with the return spring “4” on the camshaft, through the pinion “2”.

**⚠ Turn the pressure relief valve and check its normal return.**



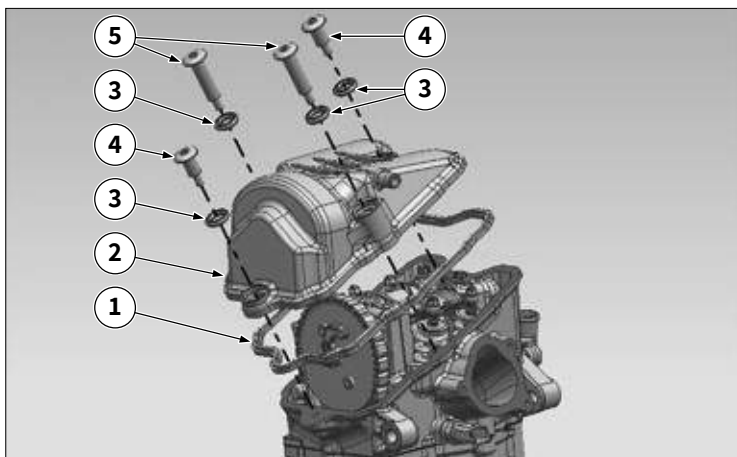
Insert the bolt “7” M6x16 with the related washer “6” Ø6.5x1.5xØ18 in the respective hole and tighten to the prescribed torque.

**Tightening torques:**  
Pressure relief valve fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

Check the correct assembly of the timing chain and adjust the intake and exhaust valve clearance.

**✂ Intake valve clearance: 0.06 ± 0.01**

**✂ Exhaust valve clearance: 0.07 ± 0.01**

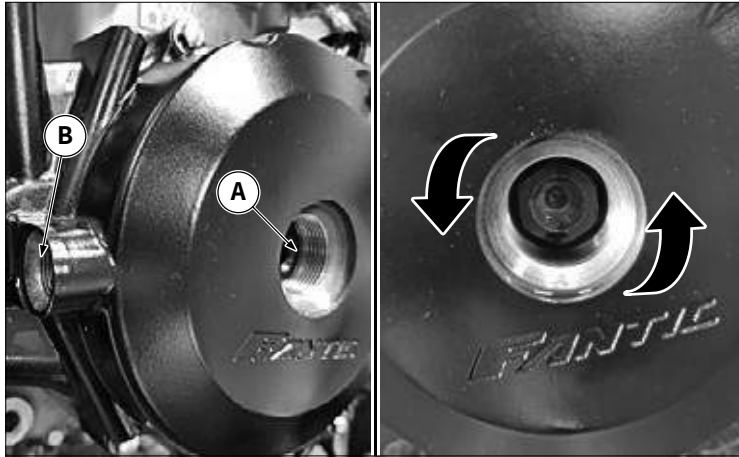


### 13.4.5 Cylinder head cover assembling

Position the gasket “1” and the four washers “3” on the head cover “2”.

Install the cover on the head and fasten it with the two bolts “4” M6x29.7 and the two bolts “5” M6x50.7, tightening to the prescribed torque.

**Tightening torques:**  
Cylinder head cover fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



#### 13.4.6 Tappet check and adjustment

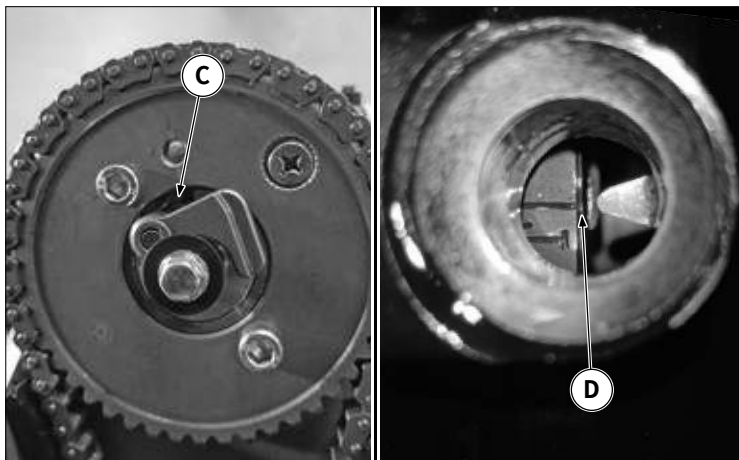
**⚠ The following procedure must be performed with cold engine.**

Remove:

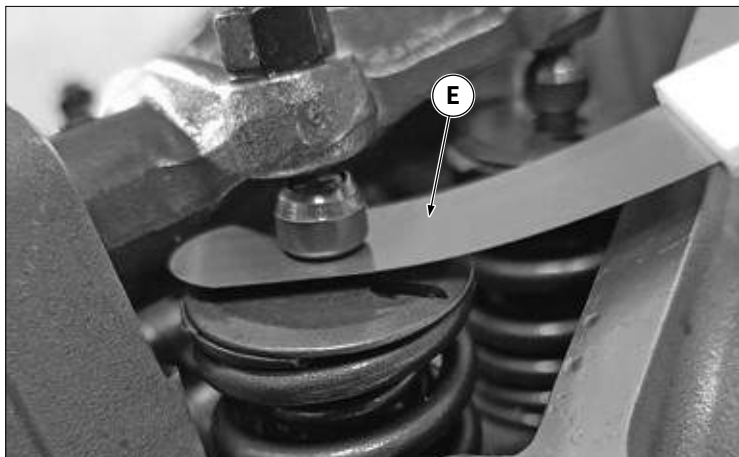
– Spark plug, refer to “10.8.2 Spark plug removal” on page 93

Remove the tappet cover.

Remove the two caps “A” and “B” on the ignition cover. Insert the special key inside the seat of the cap “A” and turn it anticlockwise.



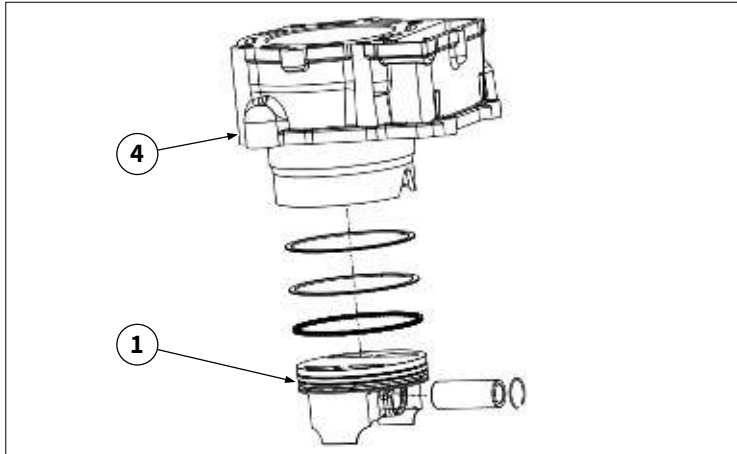
Rotate the engine until the top dead center is reached by positioning the elements “C” and “D” as shown in the figure.



Insert the thickness gauge “E” and adjust with the correct value.

**✂ Tappet adjusting shim:  
0.10 mm (0.003 in) ~ 0.15 mm (0.005 in)**





### 13.5 CYLINDER AND PISTON

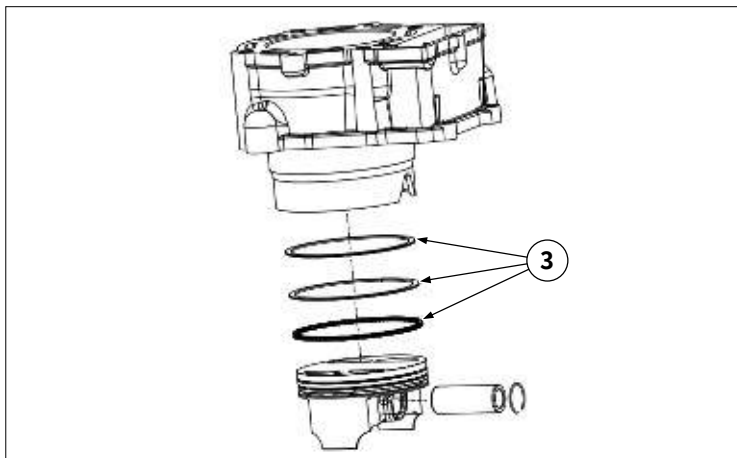
#### 13.5.1 Piston assembly components assembling

Check that there are no dents or scratches on the cylinder "4".

**⚠ The cavity from the cylinder must be well cleaned and with no dust or rust.**

The surface of piston "1" must be smooth and free of obvious scratches, dents or burrs.

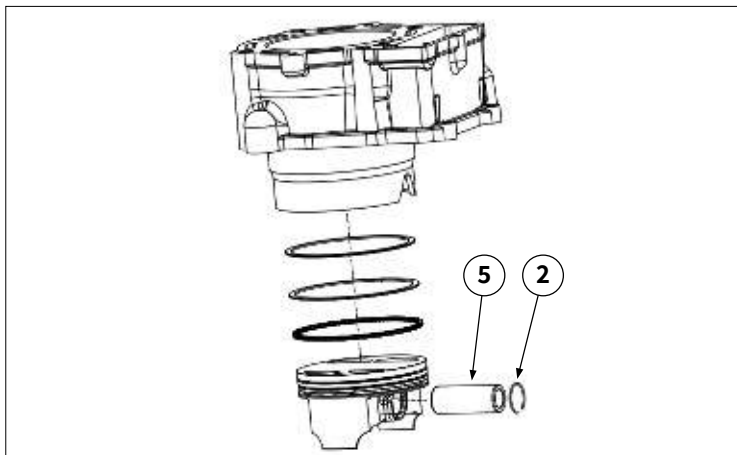
**⚠ The piston cavity must be well cleaned.**



Install the first segment, the second segment and the scraper ring "3" in the respective seats of the piston.

**⚠ The first and second segments must be installed with the identification marks facing upwards.**

**⚠ The segments must rotate freely and without jamming.**



Fit the retaining ring "2" in the groove of the piston, then insert the pin "5".

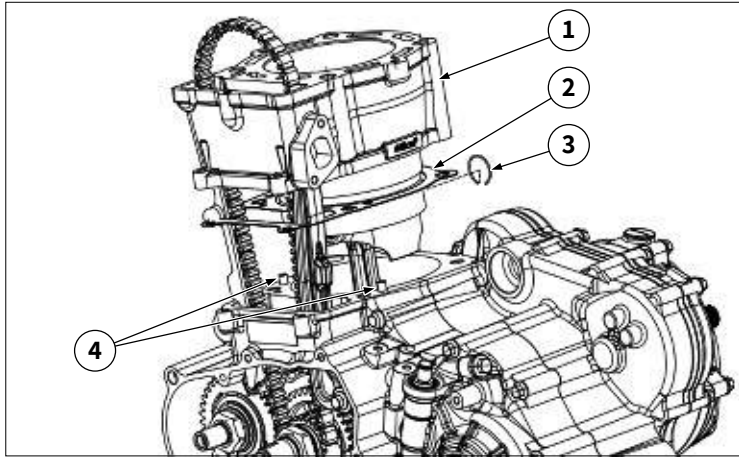
**⚠ After assembly, the retaining ring must be completely assembled in its groove.**

**⚠ The ring opening must be approximately 90° offset to the groove opening.**

Apply a small amount of oil on the piston surface, on the piston rings and on the cylinder liner.

Install the piston assembly in the cylinder.

**⚠ After assembly, the piston rings openings must be offset 180° and facing in the intake and exhaust direction.**



### 13.5.2 Piston and cylinder block installation

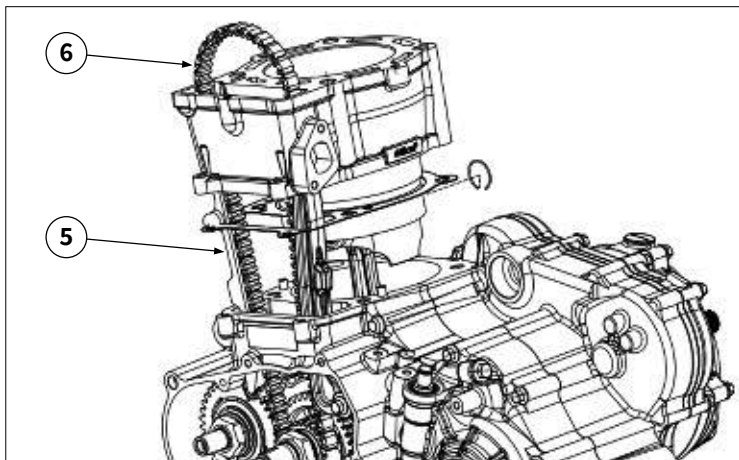
Fit the two pins "4" Ø6x12 in the respective holes of the crankcase cylinder mating surface.

Fit the cylinder gasket "2".

Install the piston and cylinder assembly "1" on the smaller end of the connecting rod, then install the piston pin and the retaining ring "3".

Finally, install the cylinder.

**⚠ The retaining ring opening and the related groove must be offset by about 90°.**



Insert the timing chain "6" on the crankshaft pinion.

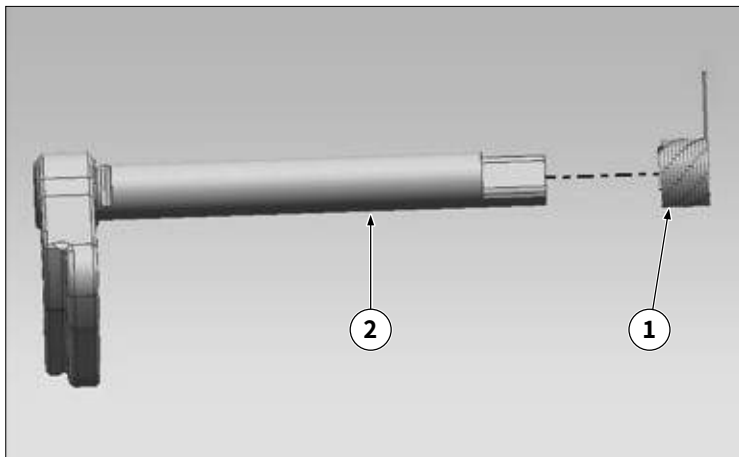
Position the guide plate "5" of the chain in the left half-crankcase half and in the respective cylinder seat.

Fit the chain tensioner plate bushing in the respective hole in the plate.

Take a bolt M6x105, apply the recommended product on the first 3 ~ 4 threads, then position and fix the chain tensioner plate tightening to the prescribed torque.

**♻ Recommended product: Loctite® 263.**

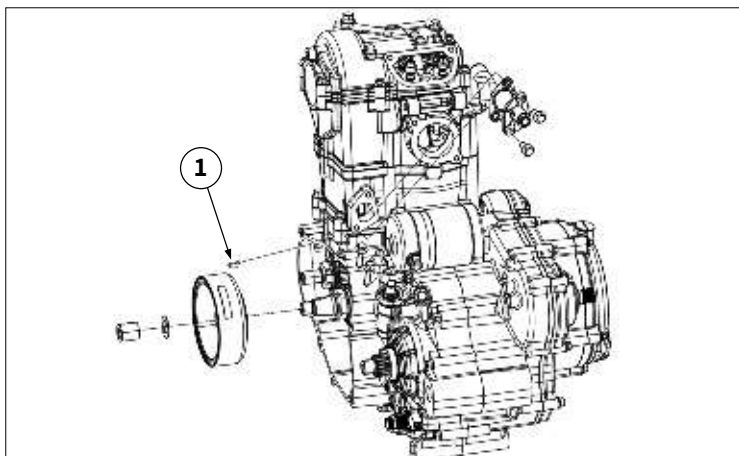
**🔧 Tightening torques:**  
Chain tensioner plate fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



### 13.5.3 Assemble the components of the pressure relief valve

Check the cleanliness of the valve assembly and the absence of impurities or burrs.

Fit the return spring "1" of the valve in the respective groove of the spindle "2".

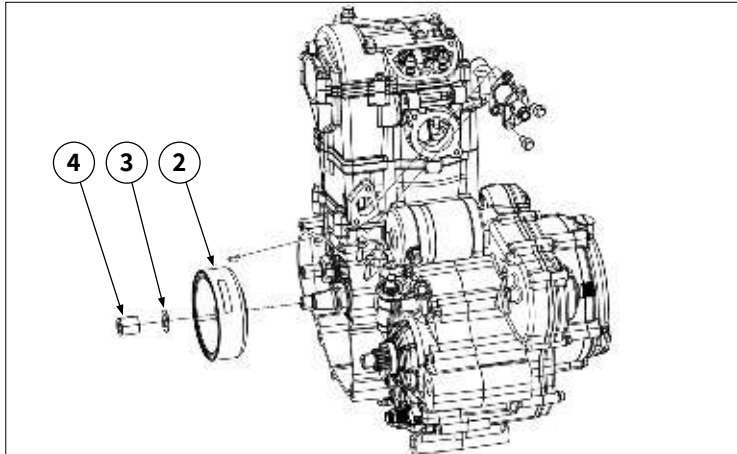


### 13.5.4 Assemble the components of the pressure relief valve

Check the cleanliness of all components.

Install a new magnetic key "1" in the groove in the crankshaft.

Clean the flywheel installing seat and the flywheel itself with a cloth and alcohol.



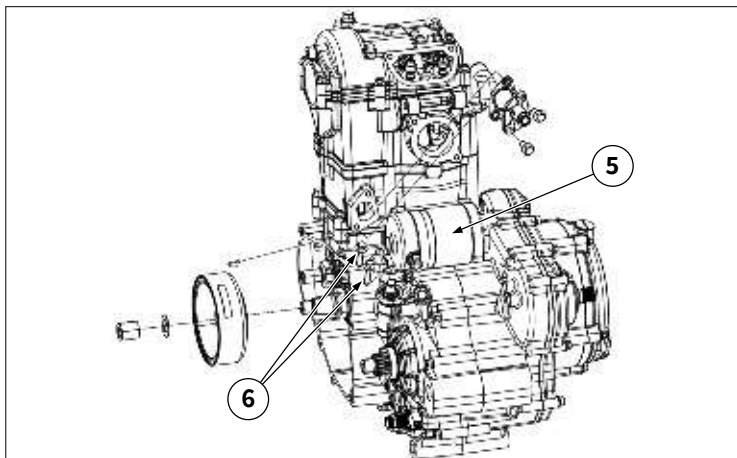
Install the flywheel “2” with the washer “3” Ø15.2x1.5xØ25 on the crankshaft, apply the recommended product on the first 3 ~ 4 threads of the flywheel closing nut “4” and screw it onto the shaft.

Tighten to the specified torque, then loosen the nut and repeat the tightening in pairs.

Then repeat the timing of the timing system.


 **Recommended product: Loctite® 263.**

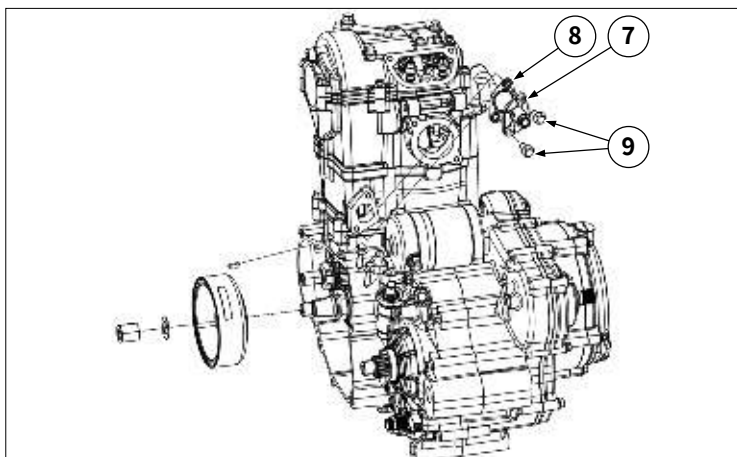
 **Tightening torques:**  
**Engine flywheel fastening nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**



Install the starter motor “5”, applying an adequate quantity of oil to the related O-ring, in the respective seat.

Secure it with the two bolts “6” M6x25 and tighten to the prescribed torque.

 **Tightening torques:**  
**Starter motor fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**




Take the tensioner “7” with the related gasket “8” and install it in the respective cylinder seat.

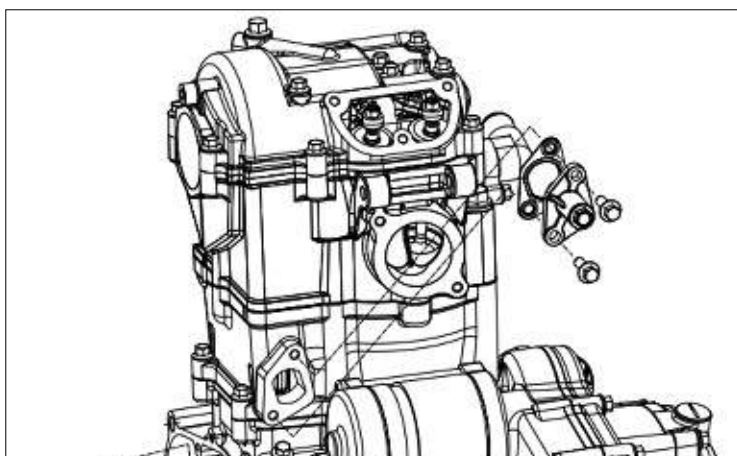
Take a bolt “9” M6x20, apply the recommended product on the first 3 ~ 4 threads and screw it into the upper hole of the tensioner.

Take a bolt “9” M6x20 and screw it into the lower hole of the tensioner.

Tighten the two bolts to the specified torque.

 **Recommended product: Loctite® 263 / SANVO.**

 **Tightening torques:**  
**Chain tensioner fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Install the tensioner spring into the tensioner.

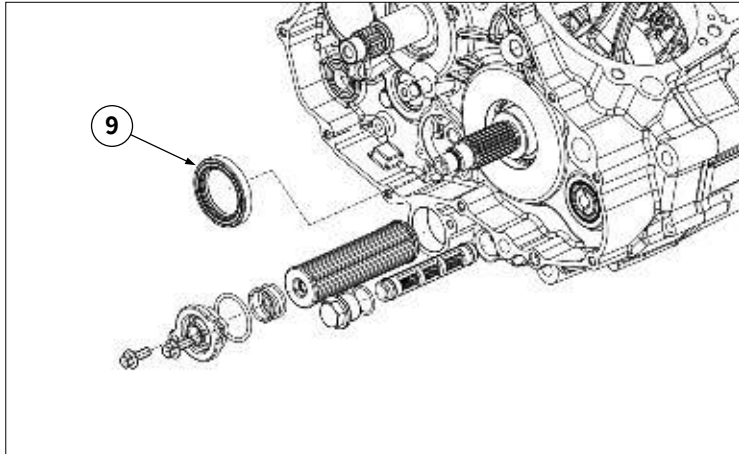
Insert the tensioner bolt with the related washer into the tensioner and tighten to the prescribed torque.

 **Tightening torques:**  
**Chain tensioner spring fastening bolt: 5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)**

Check that the timing point is visible through the positioning hole on the camshaft.

Insert a M8x12 bolt with a Ø8.5x1.2xØ15 washer in the respective hole of the head cover and tighten to the prescribed torque.

 **Tightening torques:**  
**Phasing inspection hole cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



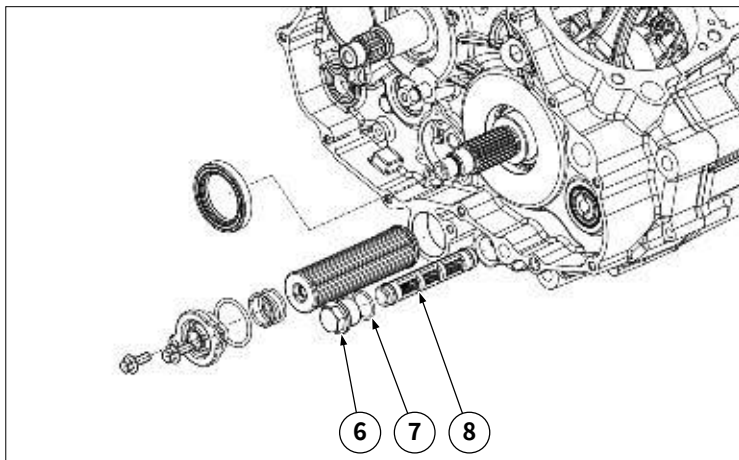
### 13.6 CLUTCH, DRIVE WHEEL, FREE WHEEL, OIL PUMP AND GEARBOX

#### 13.6.1 Thin filter and primary filter assembling

Apply a small amount of oil on the surface of the oil seal "9" Ø35xØ50x7.

Fit the oil seal in the respective hole on the crankshaft.

**⚠ The oil seal must be flush with the hole.**

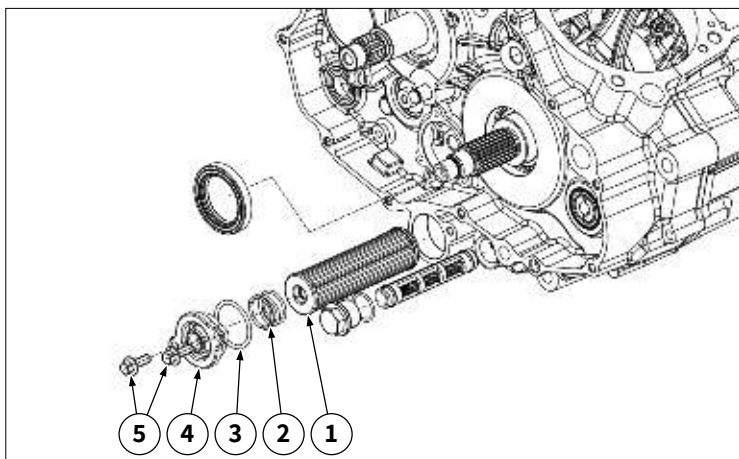


Apply a small amount of engine oil to the oil filter O-ring "8" and insert it into the appropriate hole.

Insert the O-ring "7" inside the filter cap "6".

Apply an adequate amount of Vaseline to the inside of the filter cap, install the cap and tighten to the prescribed torque.

**⚡ Tightening torques:**  
**Primary oil filter cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Assemble the thin filter "1" in the appropriate hole in the right half-crankcase.

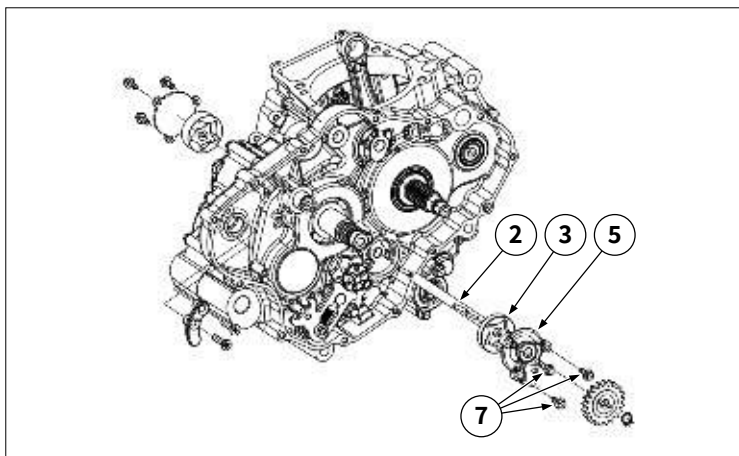
**⚠ The thin filter fitting end must face towards the left half-crankcase.**

Fit the spring "2" of the thin filter.

Insert the O-ring "3" in the respective groove of the thin filter cap "4".

Fit the cap with the two bolts "5" M6x16 and tighten to the prescribed torque.

**⚡ Tightening torques:**  
**Thin oil filter cap fastening bolts: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**



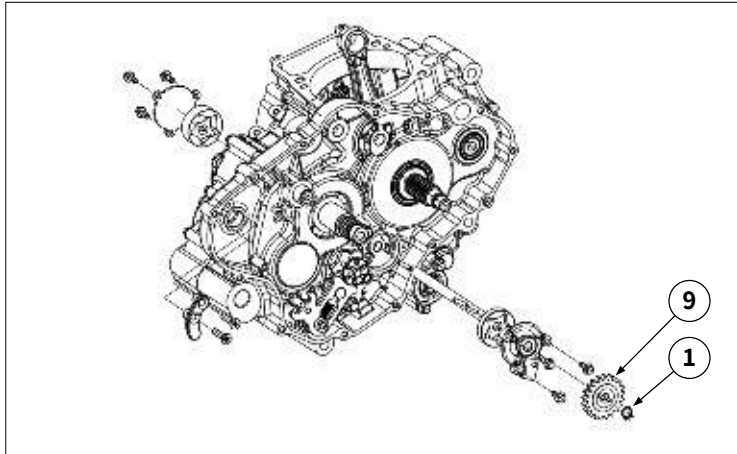
#### 13.6.2 Oil pump assembling

Fit the shaft "2" of the oil pump, with the end that is provided with the two holes facing towards the right half-crankcase, in the respective hole of the right half-crankcase.

Insert a pin in the second hole of the shaft, then install the 8 mm rotor assembly "3" in the respective hole, with the side of the identification marking facing the right half-crankcase.

Fit the right cover "5" of the oil pump with the three bolts "7" M5x18, tightening to the prescribed torque.

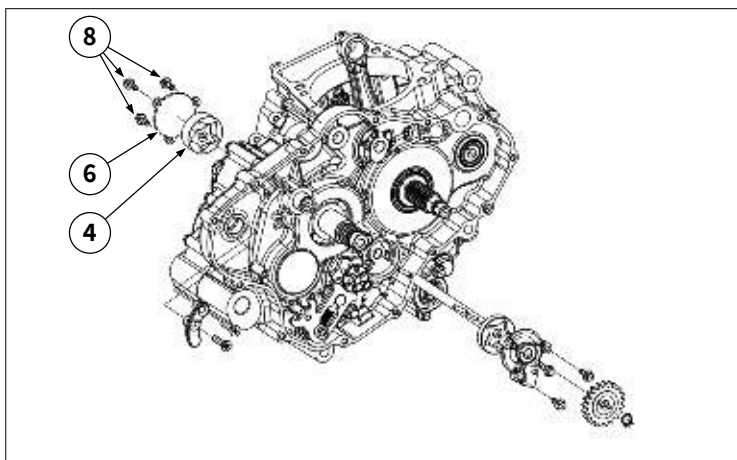
**⚡ Tightening torques:**  
**Oil pump right cover fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**



Fit a pin in the shaft of the oil pump, then install the wheel “9” on the shaft and finally the retaining ring “1”.

**⚠ Once the oil pump is assembled, lubricate with an adequate amount of oil.**

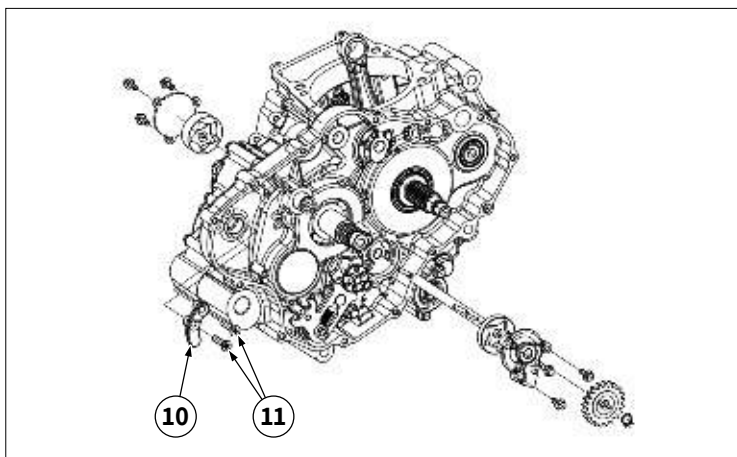
Rotate the oil pump and check its correct rotation, which must be free and without jamming.



Insert a pin into the oil pump shaft on the left side, then install the 14 mm rotor assembly “4” in the respective hole, with the side of the identification mark facing the left half-crankcase.

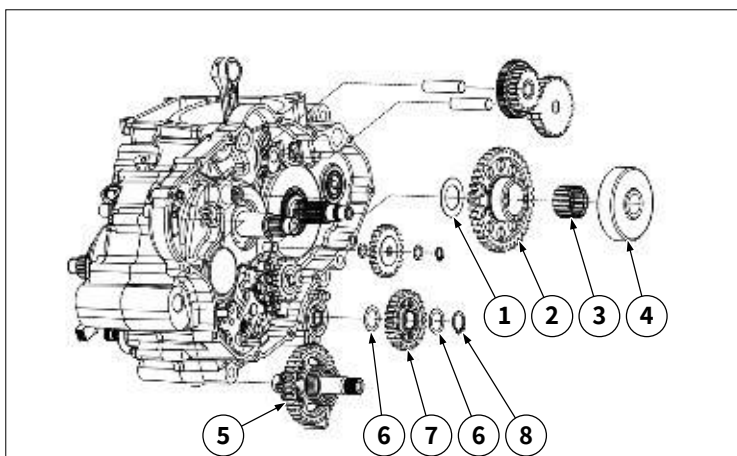
Fit the oil pump left cover “6” with the three bolts “8” M5x12, tightening to the prescribed torque.

**⚙ Tightening torques:**  
Oil pump left cover fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)



Insert the starter shaft “10” in the respective hole of the right half-crankcase and fasten it with the two bolts “11” M6x25, tightening to the prescribed torque.

**⚙ Tightening torques:**  
Starter shaft fastening screws: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



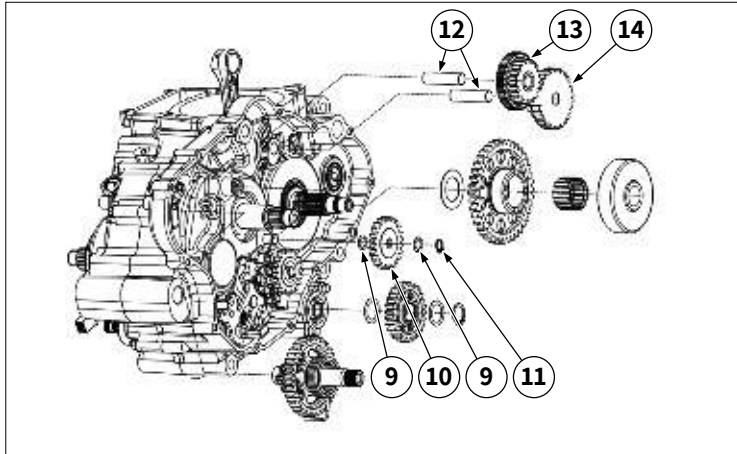
### 13.6.3 Starter system installation

Fit the starter shaft assembly “5” in the respective hole of the right half-crankcase.

Fit a washer “6” Ø18.5x0.5xØ26 and the gear “7”, then insert a second washer “6” and finally the retaining ring “8”.

Fit the washer “1” Ø25x2xØ40 on the crankshaft, then position the large gear “2”, the needle bearing “3” and the clutch housing “4”.

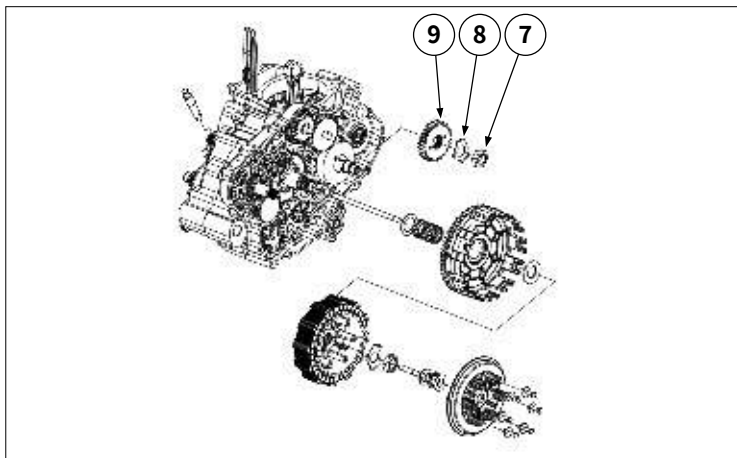
**⚠ Apply an adequate amount of oil on the needle bearing.**



Fit a washer “9” Ø10.2x0.5xØ15 and the gear “10” of the oil pump, then insert a second washer “9” and finally the retaining ring “11”.  
Rotate the retaining ring to check its correct assembly.

Apply a small amount of oil on the two shafts “12” and insert them in the respective holes of the double gears.

Fit the clutch gear “13” and the gear “14” on the respective shafts.




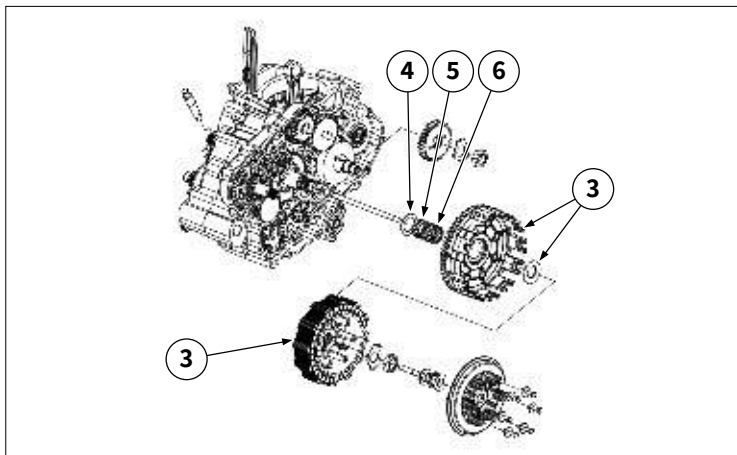
#### 13.6.4 Clutch and main transmission installation

Fit the driving gear “9” with a washer “8” on the crankshaft, then take a nut “7” M18x1 and apply the recommended product on the first 3 ~ 4 threads of the nut.

Insert the nut on the crankshaft and tighten to the prescribed torque.

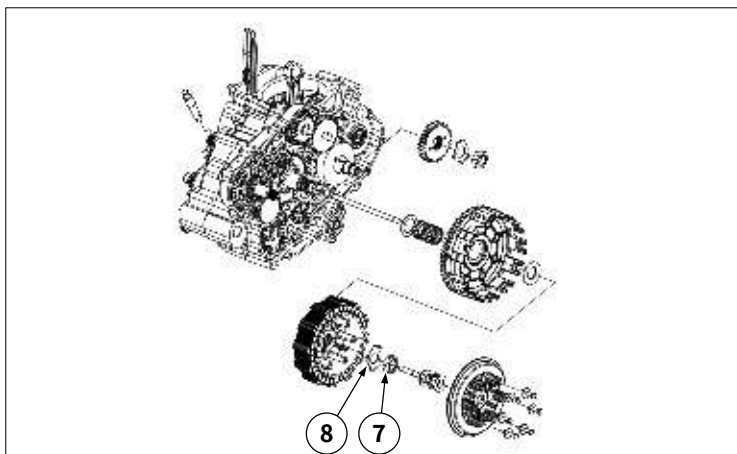
 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Crankshaft locking nut: 115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)**



Assemble in sequence the washer “4”, the needle bearings “5” (K25x29x13) and “6” (K25x29x17), the clutch housing “3”, the grooved washer and the central bushing on the primary shaft.


Insert the driving and driven discs into the central bushing.




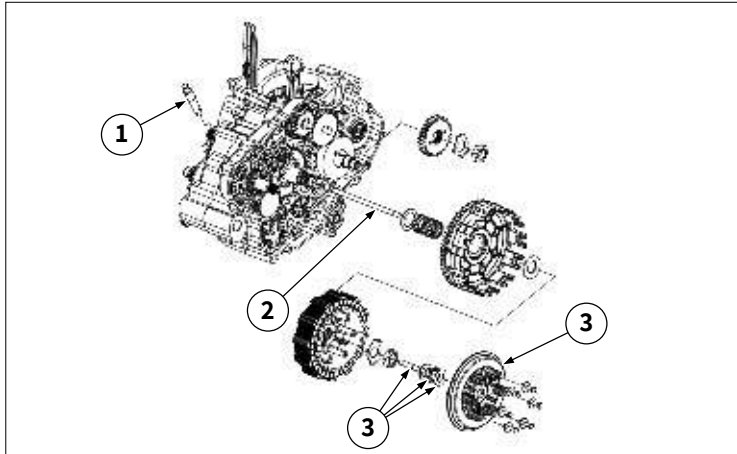
Fit a washer “8”, then take a nut “7” M18x1 and apply the recommended product on the first 3 ~ 4 threads of the nut.

Insert the nut on the primary shaft and tighten to the prescribed torque.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Primary shaft locking nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**

 **Apply an adequate amount of oil on the needle bearings.**



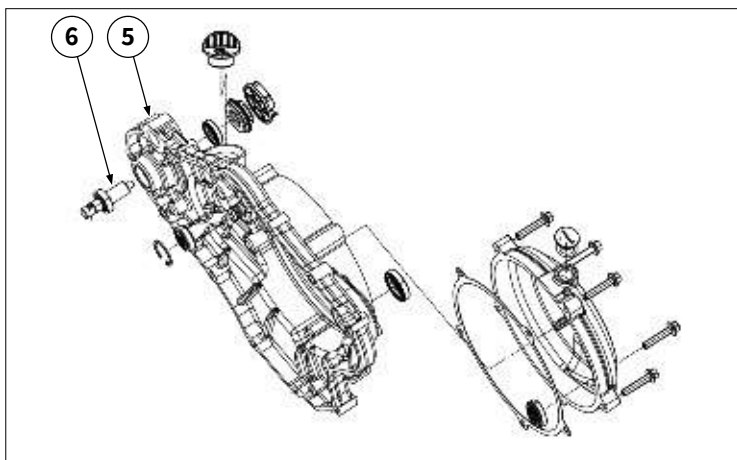
Insert the thrust pin “2” of the clutch into the hole in the primary shaft.

Take the upper clutch pin “3”, insert the bearing and the washer, then fit the upper pin in the hole of the primary shaft.

Rotate the release lever “1” of the clutch so as to have the upper pin in the lowest possible position, then fit the thrust disk, the six springs with the related washers and finally the six M5x25 bolts, tightening to the prescribed torque.

**Tightening torques:**  
Clutch thrust plate fastening bolts: 8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)

**Check that the upper pin of the clutch rotates freely.**

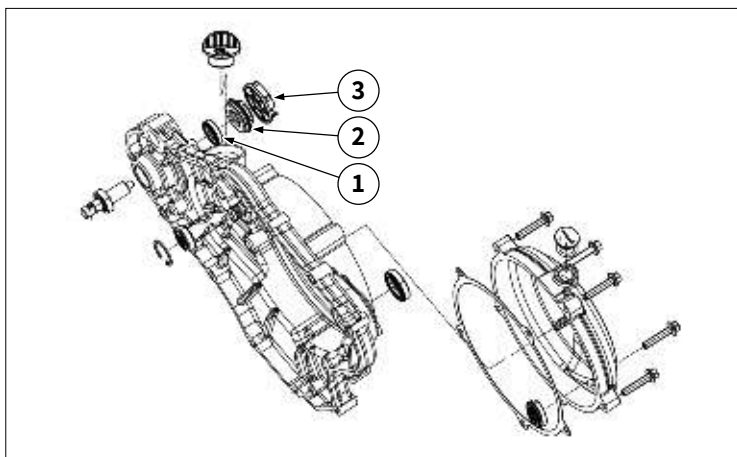


### 13.6.5 Right cover and right decorative cover components assembling

Check that the inner surface of the cover “5” is clean and free of dents.

Apply a small amount of oil into the hole in the water pump shaft bearing.

Fit the assembly “6” of the water pump shaft using a specific tool.



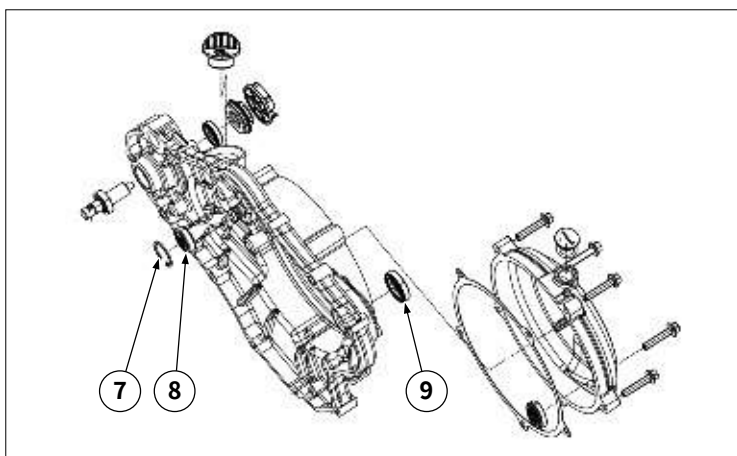
Apply a small amount of oil on the oil seal “1” and in the hole of the water pump shaft, then insert the oil seal and fit it fully down using a specific tool.

Fit the hydraulic seal assembly “2” using a specific tool.

**The end of the hydraulic seal assembly must be flush with the grooved surface of the water pump shaft.**

Install the impeller “3” of the water pump on the shaft, tightening it to the prescribed torque.

**Tightening torques:**  
Water pump impeller: 2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)



Apply a small amount of oil in the hole of the starter shaft oil seal, then insert the oil seal “9” and fit it fully down using a specific tool.

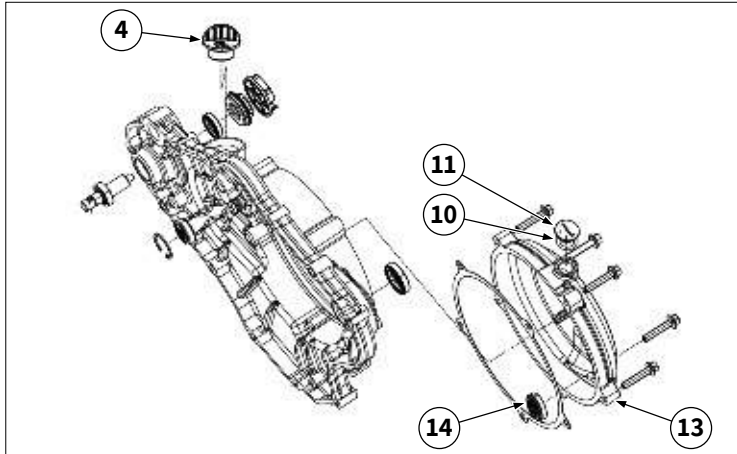
Apply a small amount of oil in the hole in the crankshaft oil seal.

Insert the oil seal “8” with the identification mark side facing outwards and fit it fully down using a specific tool.

**The oil seal end is marked as “TCV”.**

Insert the retaining ring “7” in the groove of the crankshaft hole.





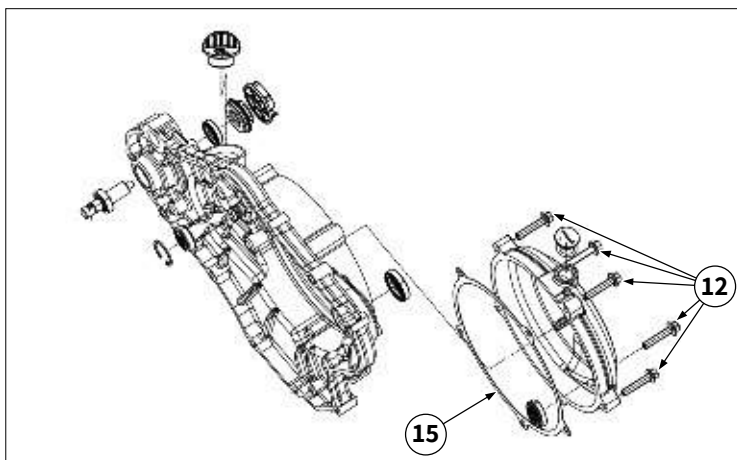
Fit the oil cap “4” in the related hole in the right cover.

Place the oil inspection window “14” in the respective hole of the decorative cover “13” and fit it fully down using a specific tool.

Apply a small amount of oil in the installation hole of the small inspection cap.

Insert the O-ring “10” in the small inspection cap “11”, then fit the cap tightening to the prescribed torque.

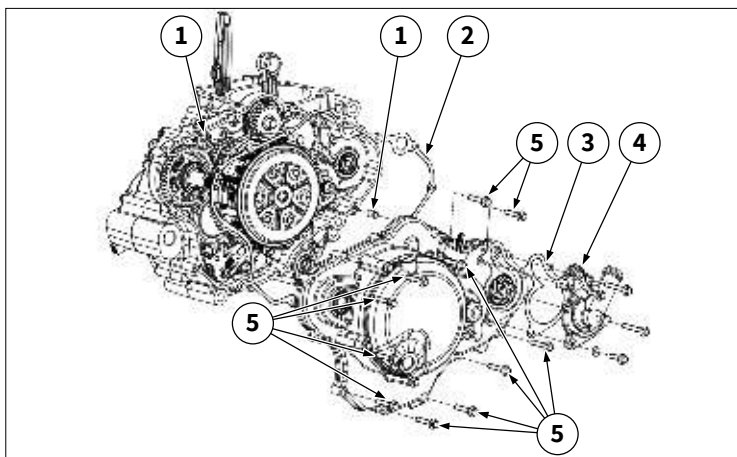
**Tightening torques:**  
**Small inspection cap on the right cover: 4 ~ 6 Nm (0.4 ~ 0.6 m·kgf, 3.0 ~ 4.4 ft·lbf)**



Fit the gasket “15” on the decorative cover.

Install the decorative cover on the right cover with the five bolts “12” M6x30, tightening to the prescribed torque.

**Tightening torques:**  
**Right cover decorative cover fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



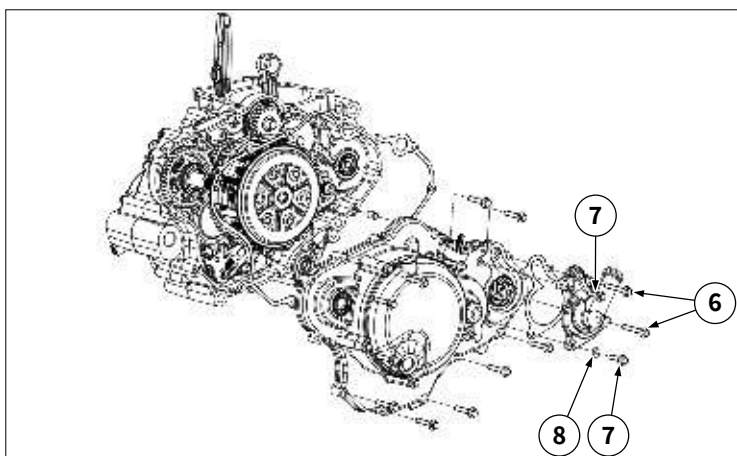
### 13.6.6 Right cover and water pump cover installation

Install the two pins “1” Ø9x13 and the gasket “2” of the right cover on the right half-crankcase, then install the right cover on the right half-crankcase.

Assemble the gasket “3” and the cover “4” of the water pump.

Insert the eleven bolts “5” M6x35 in the respective holes of the right cover and tighten to the prescribed torque.

**Tightening torques:**  
**Right cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

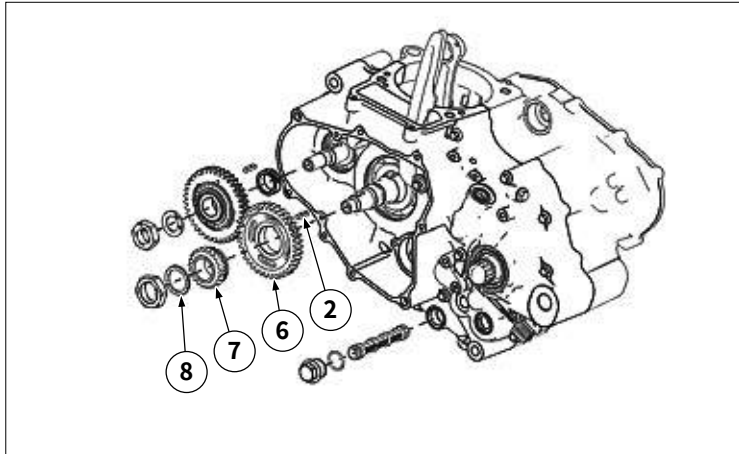


Insert a bolt “7” M6x25 with the washer “8” Ø6.5x1.5xØ12 into the drain hole of the water pump cover, tightening it to the prescribed torque.

Insert the two bolts “6” M6x45 and a bolt “7” M6x25 in the respective holes of the water pump cover, tightening to the prescribed torque.

**Tightening torques:**  
**Water pump cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

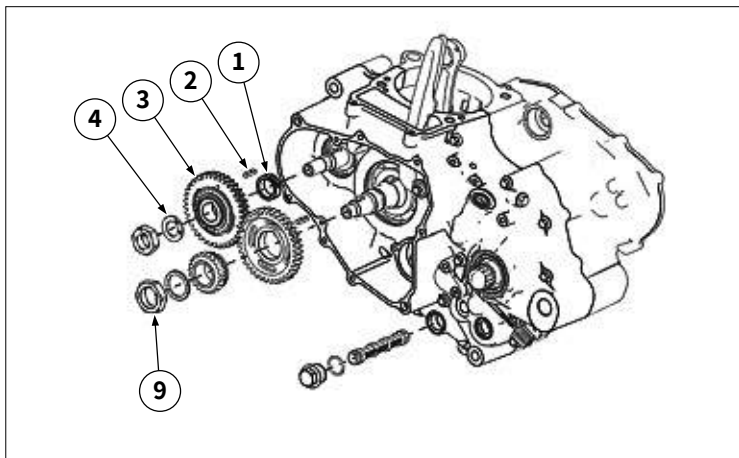




### 13.7 GENERATOR, DRIVE WHEEL AND DRIVEN WHEEL BALANCING


#### 13.7.1 Drive wheel, driven wheel and oil filter installation

Install a flat wrench "2" 4x4x16 in the respective seat on the crankshaft, fit the driving wheel "6", the gear wheel "7" and the washer "8" Ø24.2x2.5xØ32.



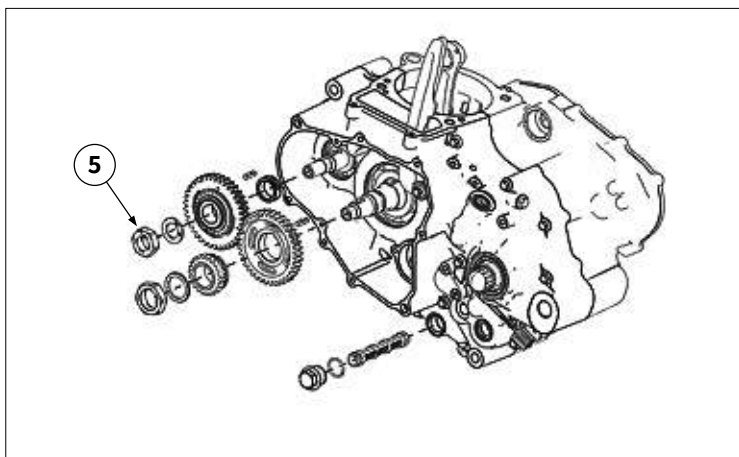
Apply the recommended product on the first 3 ~ 4 threads of the locking nut "9" M24x1, install the nut with the larger side face down, tighten to the prescribed torque and mark the nut in blue.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Crankshaft fastening nut: 115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)**

Install the bushing "1" on the countershaft, then fit a flat key "2" 4x4x16 in the respective seat on the countershaft.

Fit the driven wheel "3" with the washer "4" Ø16.5x2xØ27.




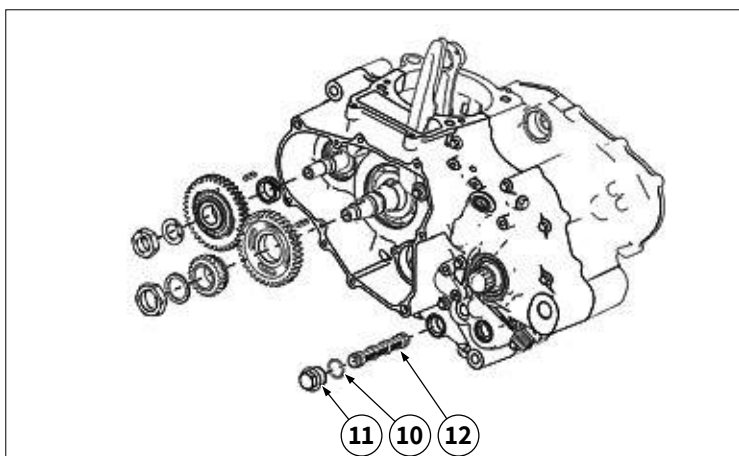
Apply the recommended product on the first 3 ~ 4 threads of the locking nut "5" M16x1, install the nut, tighten it to the prescribed torque and mark the nut in blue.

 **Align the reference markings of the driven wheel and the driving wheel.**

 **The markings must be facing upwards.**

 **Recommended product: Loctite® 263.**


 **Tightening torques:**  
**Countershaft locking nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**

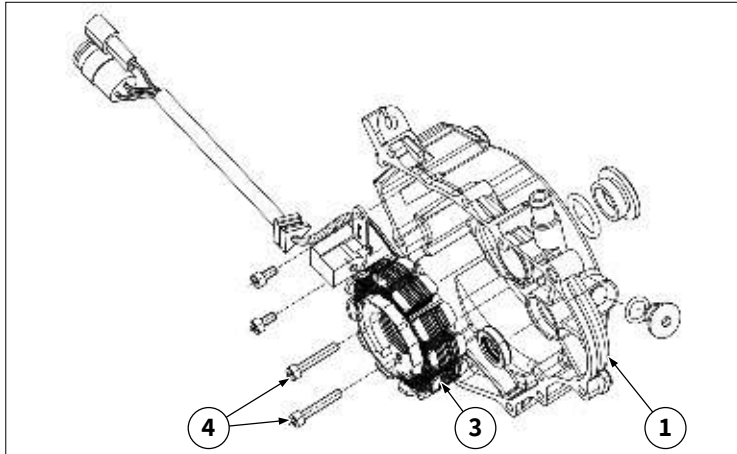


Apply a small amount of engine oil to the oil filter O-ring "12" and insert it into the appropriate hole.

Insert the O-ring "10" inside the filter cap "11".

Apply an adequate amount of Vaseline to the inside of the filter cap, install the cap and tighten to the prescribed torque.

 **Tightening torques:**  
**Primary oil filter cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



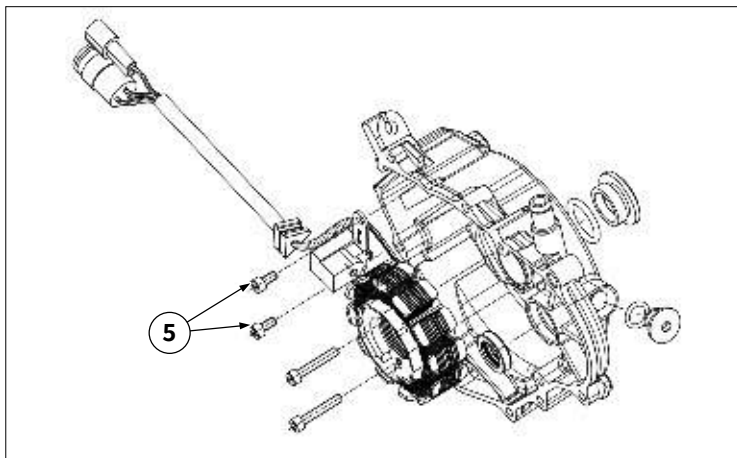
### 13.7.2 Left cover components assembling

Check that there are no aluminium residues or dents on the sealing surface of the cover "1".

Position the stator "3", apply the recommended product on the first 3 ~ 5 threads of the two bolts "4" M5x30 and insert them in the respective holes, tightening to the prescribed torque.

**Recommended product: Loctite® 263.**

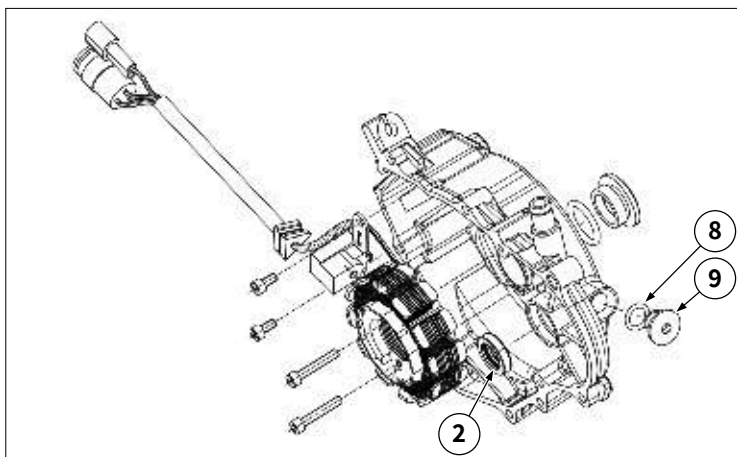
**Tightening torques:**  
**Rotor fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**



Apply the recommended product on the first 3 ~ 5 threads of the two bolts "5" M5x10 and insert them in the respective holes, tightening to the prescribed torque.

**Recommended product: Loctite® 263.**

**Tightening torques:**  
**Stator fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**

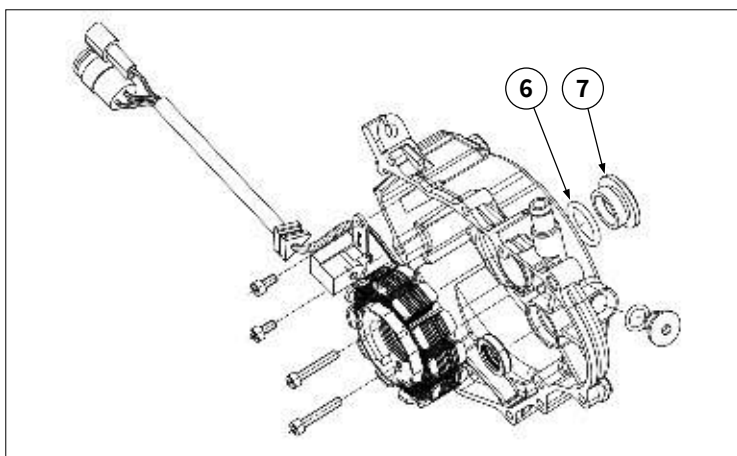


Apply a small amount of oil in the hole of the oil seal "2", then fit the oil seal using a specific tool.

**The oil seal must be flush with the hole.**

Fit the O-ring "8" on the cap "9" and screw the cap into the respective hole, tightening it to the prescribed torque.

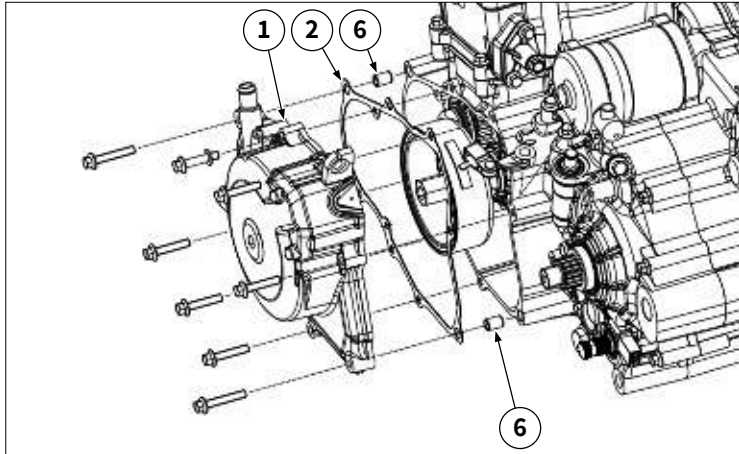
**Tightening torques:**  
**Small generator inspection cap: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)**



Fit the O-ring "6" on the large inspection cap "7" and screw the cap into the respective hole, tightening it to the prescribed torque.

**Tightening torques:**  
**Large generator inspection cap: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)**

**To check the correct assembling of the flywheel-stator assembly it is necessary to connect the stator connector to the flywheel inspection device and make sure that there is no short circuit to ground.**



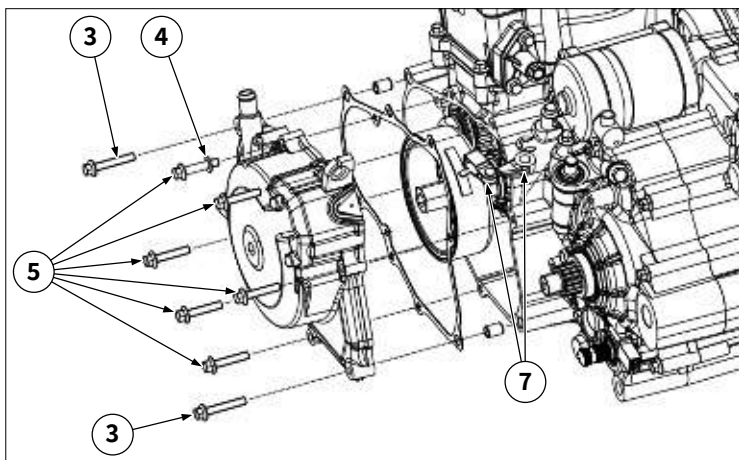
### 13.7.3 Left cover installation

Fit the two pins "6" Ø9x13 in the respective holes of the left half-crankcase half and position the gasket "2" of the left cover centering the pin holes.

Apply a suitable amount of the recommended product on the sealing surface of the flywheel, then position the cover "1" making sure that the flywheel fits into its seat on the cover.


 **Recommended product: SANVO.**

 **The recommended product must not exceed in way to compromise the aesthetic appearance.**

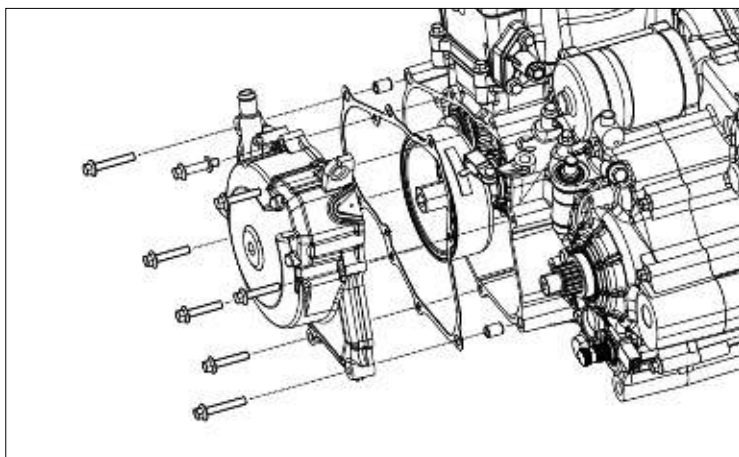


Insert the two bolts "3" M6x35 in the respective holes in the cover.

Apply a suitable amount of recommended product on the thread of one of the six bolts "5" M6x30, then insert the bolt with the washer "4" Ø6.5x1.5xØ12 in the respective hole on the cover. Insert the other five bolts "5" M6x30 and tighten all of them to the prescribed torque.


 **Tightening torques:**  
**Left cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

Install the arm "7" of the clutch release lever on the lever itself and lock it inserting the collar into the groove



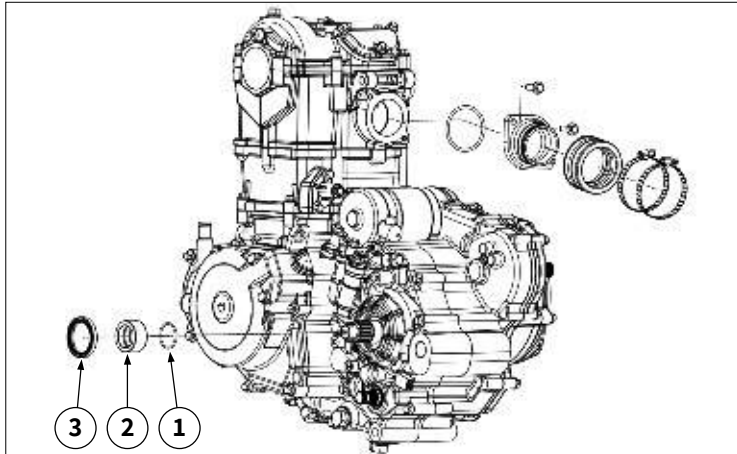
Check the clutch stroke using the specific tool.

 **Clutch stroke: 45 ± 5 mm**

 **To check the force value of the clutch release shaft, the engine must be positioned with the left cover facing upwards. Connect the clutch cable to the external clutch release lever, fasten it through the appropriate hole on the left cover, eliminate the idle stroke, pull the cable until reaching a lever rotation equal to 25° and measure the force value.**

 **Lide clutch: 310 ± 30 N**

 **FCC Clutch: 260 ± 30 N**

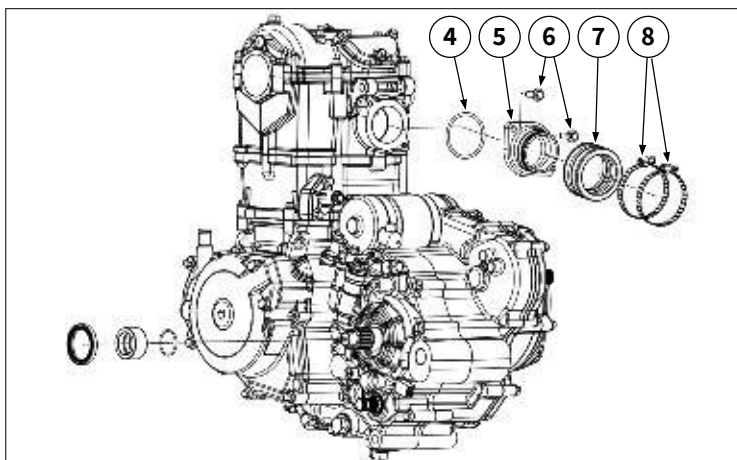


#### 13.7.4 Output shaft bushing and suction pipe installation


Insert the O-ring "1" Ø25x2 into the groove of the output shaft and apply an adequate amount of oil.

Insert the bushing "2" of the output shaft and fit it fully down.


Apply an adequate amount of oil in the hole of the output shaft oil seal, then install the oil seal "3" Ø35xØ45x6 on the output shaft using a specific tool.

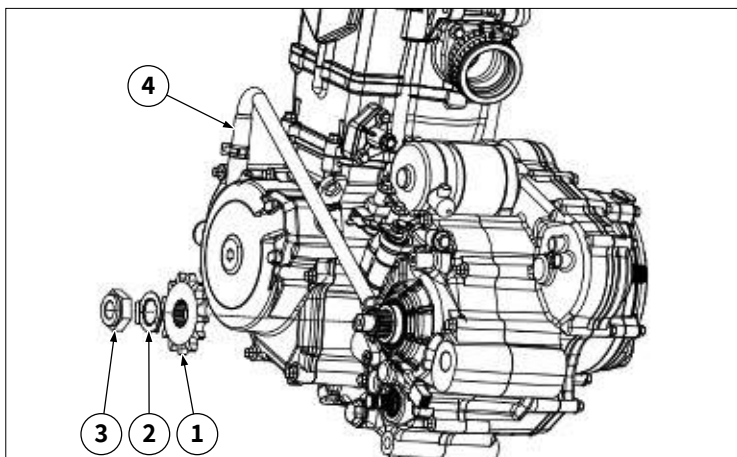


Position the O-ring "4" Ø45x3 of the intake pipe in the related groove, then install the pipe "5" and fasten it with the two bolts "6" M6x20, tightening to the prescribed torque.

 **Tightening torques:**  
**Intake flange bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

Fit one end of the sleeve "7" on the intake pipe, position the two clamps "8" and tighten the respective screws to the prescribed torque.

 **Tightening torques:**  
**Air intake sleeve clamps: 5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)**




#### 13.7.5 Installation of the rim and breather pipe

Position the rim "1" in the external groove of the wheel axle.

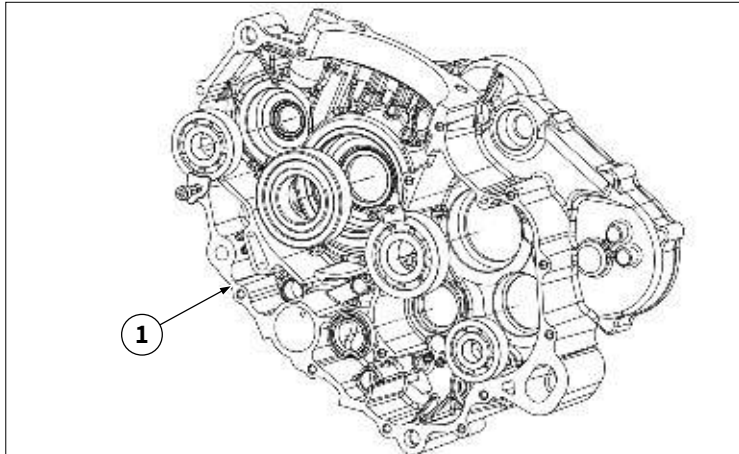
Fit the washer "2" in the internal groove.

Apply the recommended product on the first 3 ~ 4 threads of the locking nut "3" M16x1 that locks the rim, screw it onto the wheel axle and tighten to the prescribed torque.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Rim locking nu: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**

Place the vent tube "4" in the related hole and close the fastening clip.

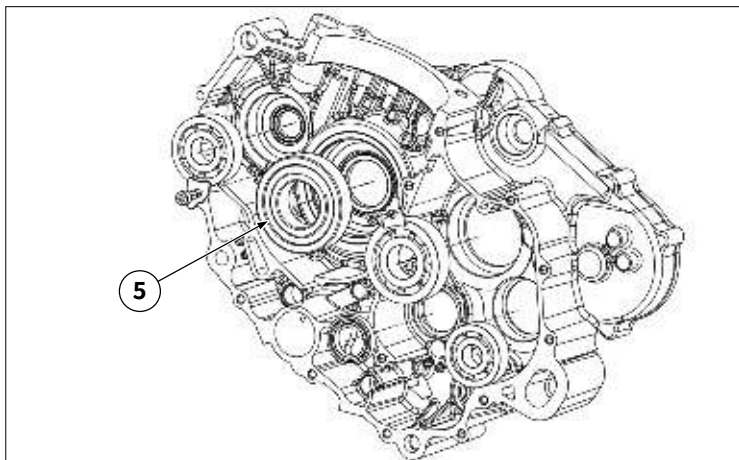


## 13.8 CRANKCASE, CRANKSHAFT, TRANSMISSION AND COMPENSATING SHAFT

### 13.8.1 Right half-crankcase components assembling

Check the cleanliness and integrity of the mating surface of the half-crankcase "1", check that there are no aluminium residues, colour variations or scratches.

Position the half-crankcase "1" with the mating surface facing upwards and apply a small amount of oil in the bearing housings.

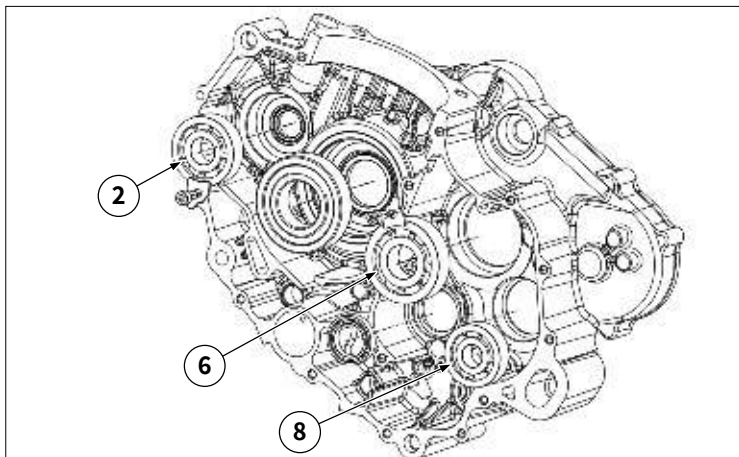


Insert the outer ring of the bearing "5" of the crankshaft\* and fit fully down using a specific tool.

Insert the inner ring and fit it fully down.

 **Bearing protrusion: 37.55 ~ 37.75 mm**

 **The inner ring and the outer ring of the bearing must match.**



Insert the bearing "2" of the countershaft (\*) and fit it fully down using a specific tool.

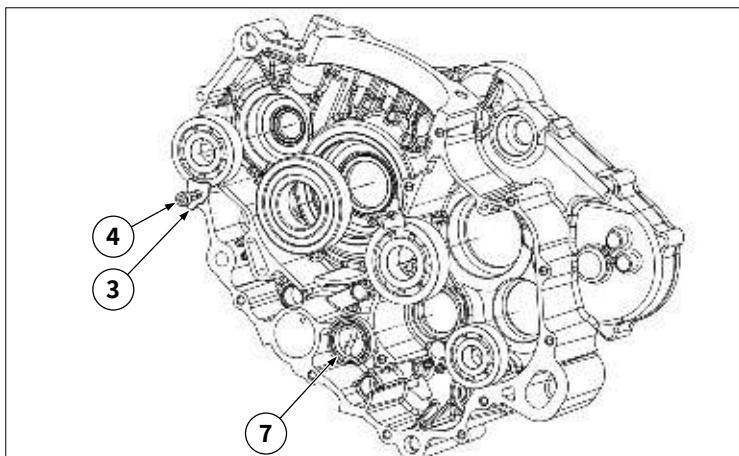
 **Bearing protrusion: 40 ~ 40.2 mm**

Insert the bearing "6" of the primary shaft (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 53.5 ~ 53.7 mm**

Insert the bearing "8" of the auxiliary shaft (\*\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 54.6 ~ 54.8 mm**



Insert the bearing "7" of the gearshift drum (\*) and fit it fully down using a specific tool.

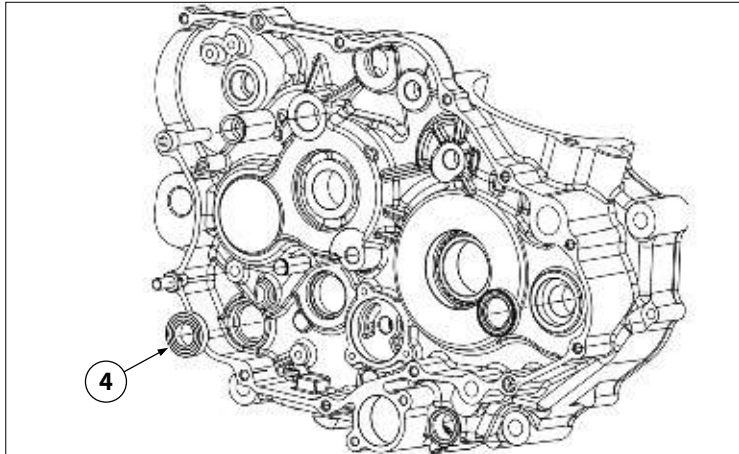
 **Bearing protrusion: 45.5 ~ 45.7 mm**

Fit the two deflectors "3" in their respective seats near the bearings of the primary shaft and of the countershaft.

Insert the two screws "4" M6x12 in the two deflectors.

Tighten to the specified torque and mark the head of the screws.

 **Tightening torques:**  
**Deflector fastening screws: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**

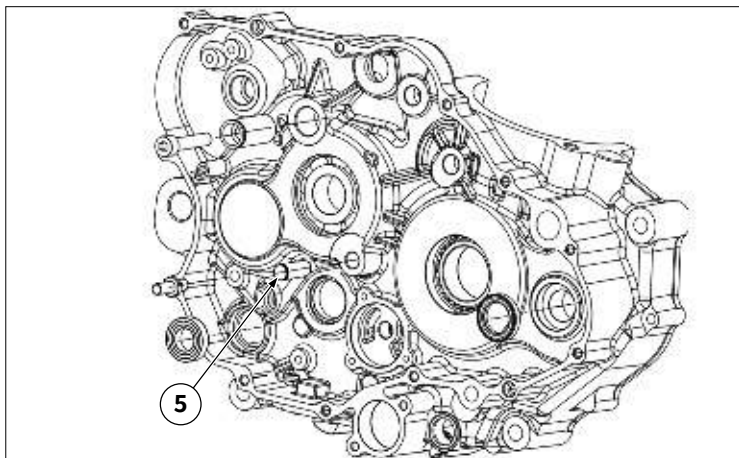


Turn the half-crankcase 180°, so as to have the mating surface facing downwards.

Apply a small amount of oil in the bearing housing and oil seal housing.

Insert the bearing “4” of the secondary shaft and fit it fully down using a specific tool.

**Bearing protrusion: 23.5 ~ 23.7 mm**



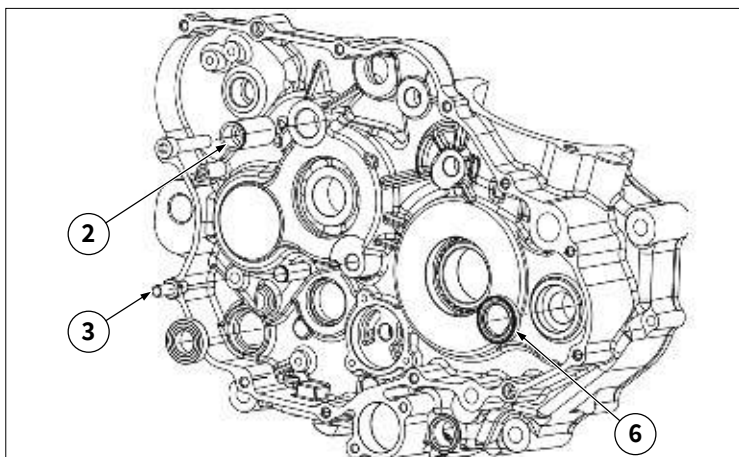
Apply a small amount of the recommended product on the oil pump shaft “5”.

Place the shaft in the hole and fit it fully down.

**Clean up spills of recommended product.**

**Recommended product: Loctite® 648.**

**Bearing protrusion: 11.2 ~ 11.5 mm**



Place the starter shaft “2” in the dedicated hole and fit it fully down.

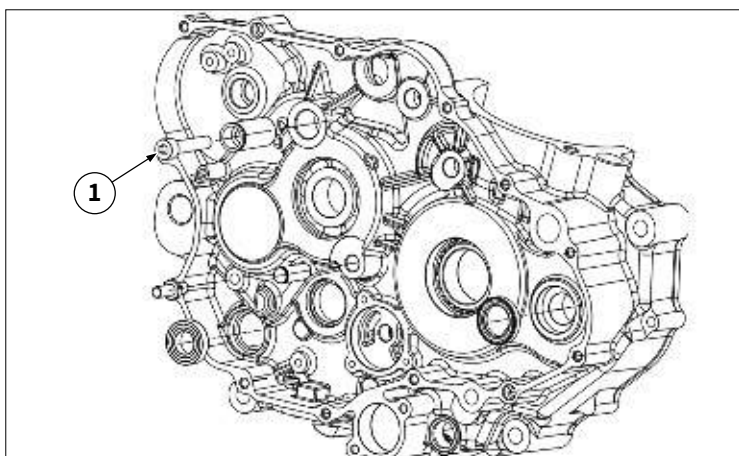
**Bearing protrusion: 15.4 ~ 15.7 mm**

Place the fluorine rubber oil seal “6” in the hole of the countershaft and fit it fully down using a specific tool.

**The oil seal must be flush with the hole.**

Insert the bolt “3” of the secondary shaft into the respective threaded hole and tighten to the prescribed torque.

**Tightening torques:**  
**Secondary shaft bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

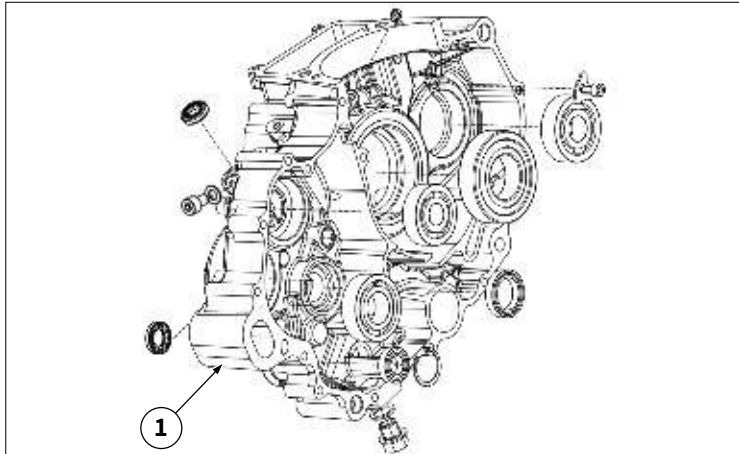


Insert the bolt “1” M8x40 into the threaded hole of the starter shaft and tighten to the prescribed torque.

**Tightening torques:**  
**Starter shaft bolt: 18 ~ 20 Nm (1.8 ~ 2.0 m·kgf, 13.3 ~ 14.8 ft·lbf)**

**(\*)**: with the identification mark facing upwards  
**(\*\*)**: with the identification mark facing downwards

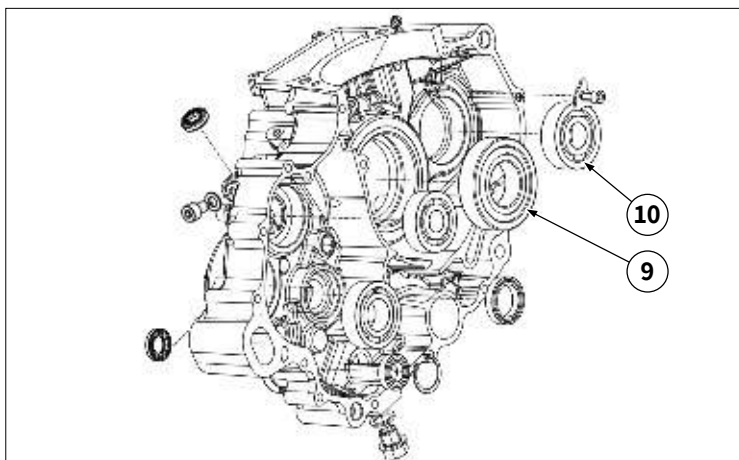




### 13.8.2 Left half-crankcase components assembling

Check the cleanliness and integrity of the mating surface of the half-crankcase "1", check that there are no aluminium residues, colour variations or scratches.

Position the half-crankcase with the mating surface facing upwards and apply a small amount of oil in the bearing housings.



Insert the outer ring of the bearing "9" of the crankshaft\* and fit fully down using a specific tool.

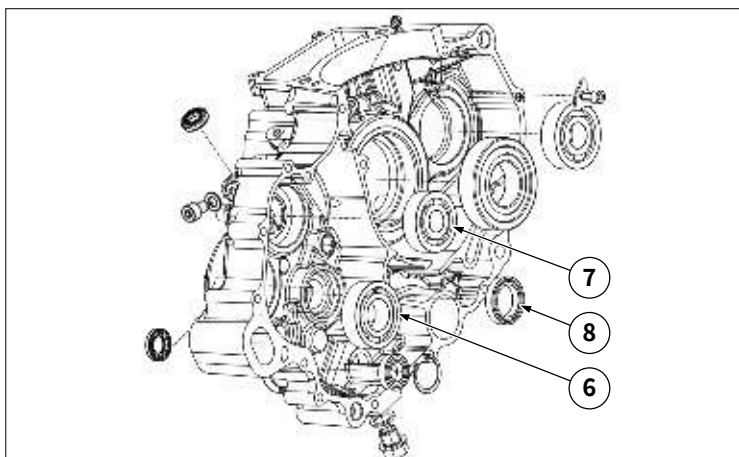
Insert the inner ring and fit it fully down.

 **Bearing protrusion: 37.55 ~ 37.75 mm**

 **The inner ring and the outer ring of the bearing must match.**

Insert the bearing "10" of the countershaft (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 40 ~ 40.2 mm**



Insert the bearing "7" of the primary shaft (\*) and fit it fully down using a specific tool.

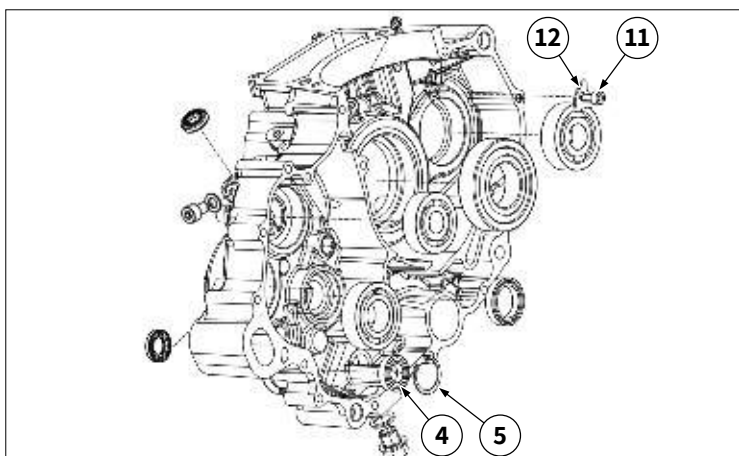
 **Bearing protrusion: 51.6 ~ 51.8 mm**

Insert the bearing "6" of the auxiliary shaft (\*\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 55.5 ~ 55.7 mm**

Insert the bearing "8" of the gearshift drum (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 42.5 ~ 42.7 mm**




Insert the bearing "4" of the secondary shaft and fit it fully down using a specific tool.

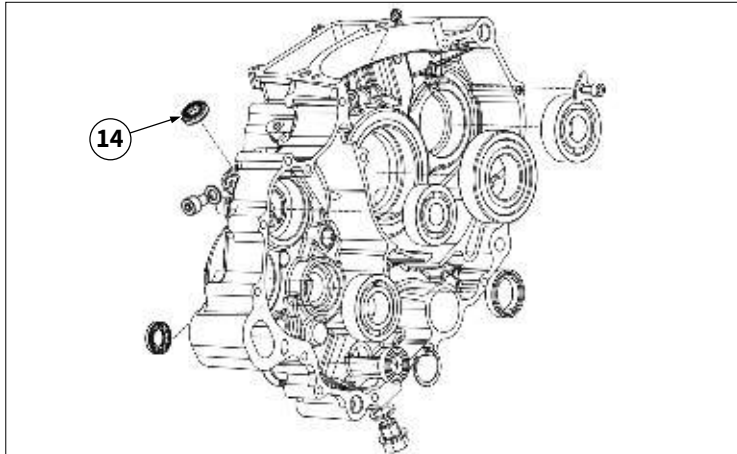
 **Bearing protrusion: 46.5 ~ 46.7 mm**

Install the deflector "12" in the respective seat near the countershaft bearing.

Insert the bolt "11" M6x12 in the deflector and tighten to the prescribed torque.

 **Tightening torques:**  
**Deflector fastening screw: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**

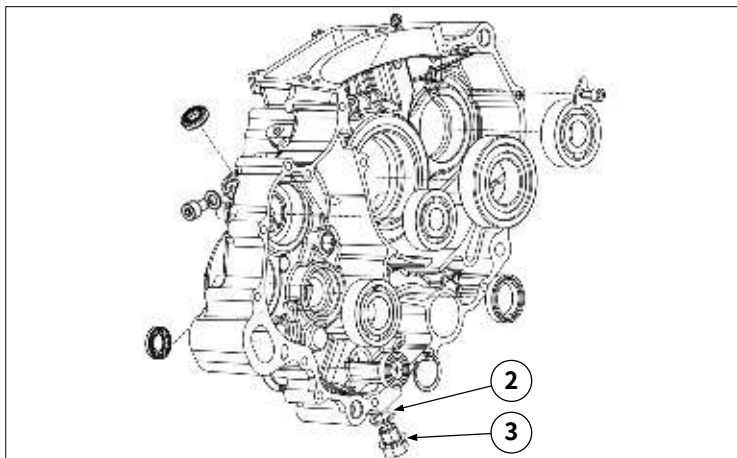
Insert the retaining ring "5" in the respective groove of the secondary shaft hole.



Position the oil seal “14” Ø14xØ22x5 in the hole of the clutch release lever and fit fully down using a specific tool.

Take the clutch release lever and insert the larger end into the respective hole with the oil seal.

**⚠ The oil seal must be flush with the hole.**



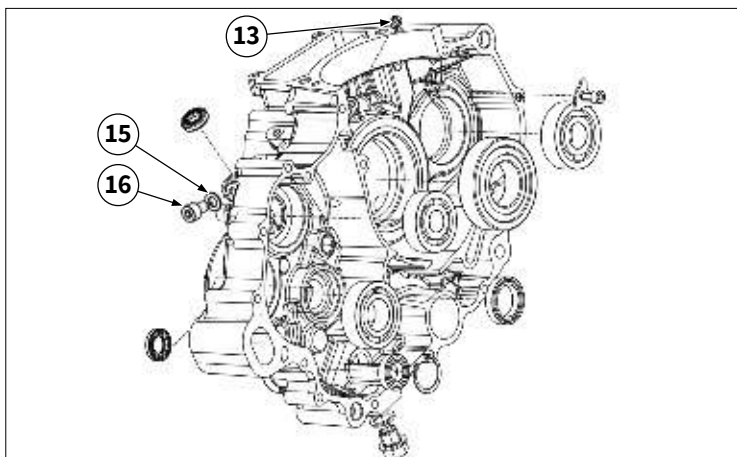
Place the gasket “2” Ø16.5x2xØ23 on the drain bolt “3” M16x1.5.

Apply the recommended product on the first 3 ~ 4 threads of the bolt, insert it in its seat and tighten it to the prescribed torque.

**♻ Recommended product: SANVO.**

**🔧 Tightening torques:**  
Oil drain bolt: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)

**⚠ The quantity of product applied must be suitable so that it leaks out after tightening.**



Insert the engine oil nozzle “13” into the respective hole and tighten to the prescribed torque.

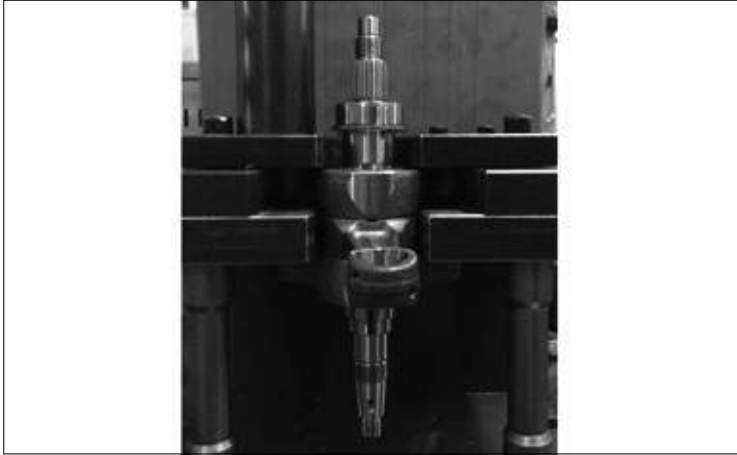
**🔧 Tightening torques:**  
Engine oil nozzle: 2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)

Insert the bolt “16” M8x12 with the gasket “15” Ø8.5x1.2xØ15 in the respective hole and tighten to the prescribed torque.

**🔧 Tightening torques:**  
Inspection bolt on left crankcase: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)

**ⓘ (\*)**: with the identification mark facing upwards  
**(\*\*)**: with the identification mark facing downwards.





### **13.8.3 Crankshaft bearing inner ring assembling**

Position the inner ring of the crankshaft bearing on the right arm of the crankshaft and fit it fully down.

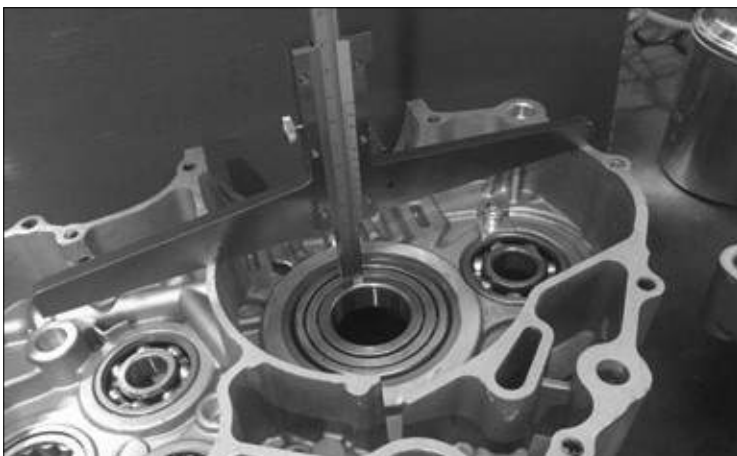
Apply a small amount of engine oil to the inner ring of the bearing.



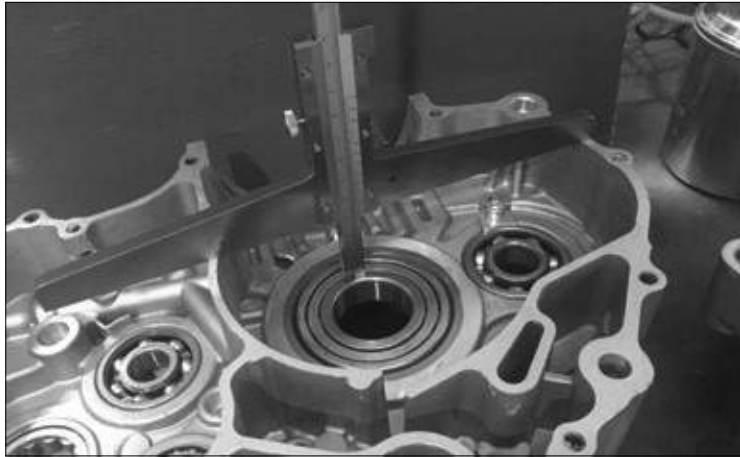
Install the crankshaft on the right half-crankcase to check that the shaft assembly is correct.



Measure the distance between the mating surface of the right half-crankcase and the end of the left crankshaft arm with a gauge for height and note down the measurement (indicated by the letter "A").



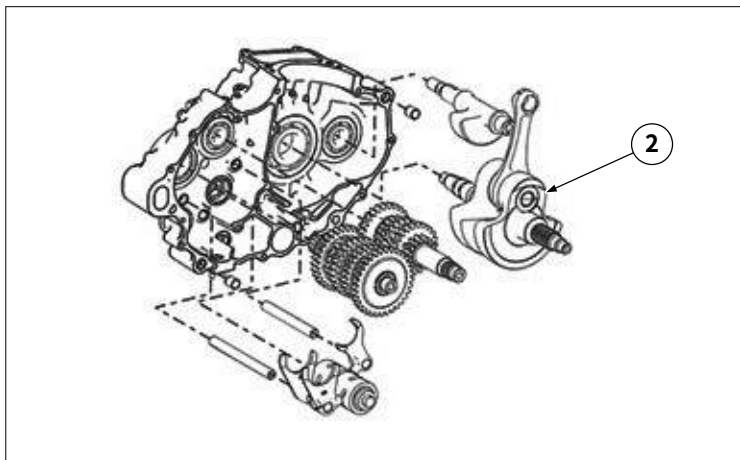
Measure the distance between the inner ring of the crankshaft bearing of the left half-crankcase and the mating surface of the left half-crankcase with a depth gauge and note down the measurement (indicated by the letter "B").



Based on the measured values “A” and “B”, obtain the crankshaft clearance from “13.8.7 Crankshaft clearance values reference table” on page <OV>.

If the clearance is less than 0.35 mm, take the inner ring of the left half-crankcase and insert it on the left arm of the crankshaft, fitting it fully down.

If the clearance is greater than 0.35 mm, fit a clearance adjustment gasket Ø35x0.2xØ50 on the left arm of the crankshaft, then take the inner ring of the left half-crankcase and insert it on the left arm of the crankshaft, fitting it fully down using a tool specific.

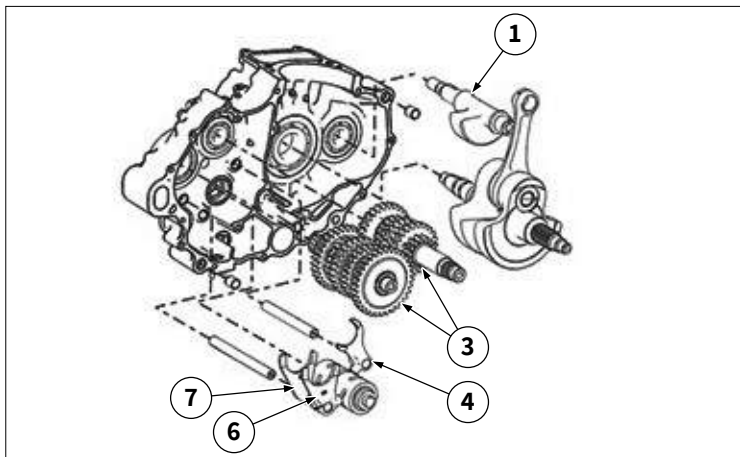


### 13.8.4 Primary shaft, auxiliary shaft and crankshaft installation

Check the cleanliness of the mating surface of the left half-crankcase, if necessary clean it with alcohol for industrial use.

Position the crankshaft “2” in the respective hole of the left half-crankcase and fit it fully down.

Inject engine oil into the hole in the right arm, blow compressed air into the hole until the oil starts to come out of the larger end of the crankshaft.



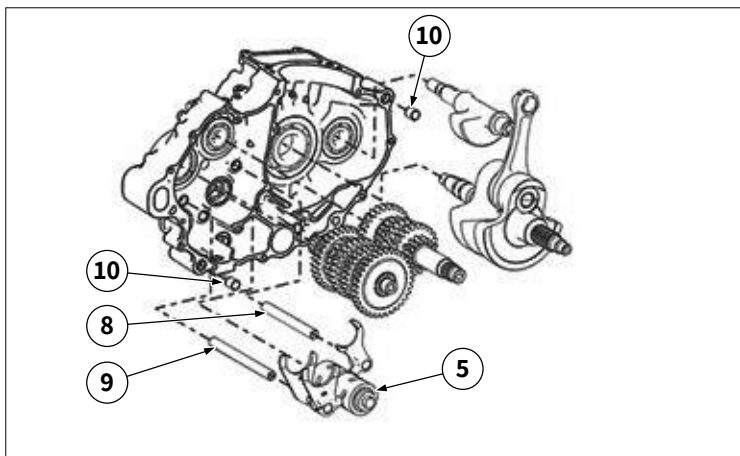
Insert the countershaft “1” in the respective hole with the left half-crankcase bearing.

Insert the primary and auxiliary shafts assembly “3” in the respective holes with bearings of the left half-crankcase.

Insert the fork of the right gearshift “6” of the auxiliary shaft into the related groove.

Insert the fork of the left gearshift “7” of the auxiliary shaft into the related groove.

Insert the fork of the gearbox “4” of the primary shaft into the related groove.



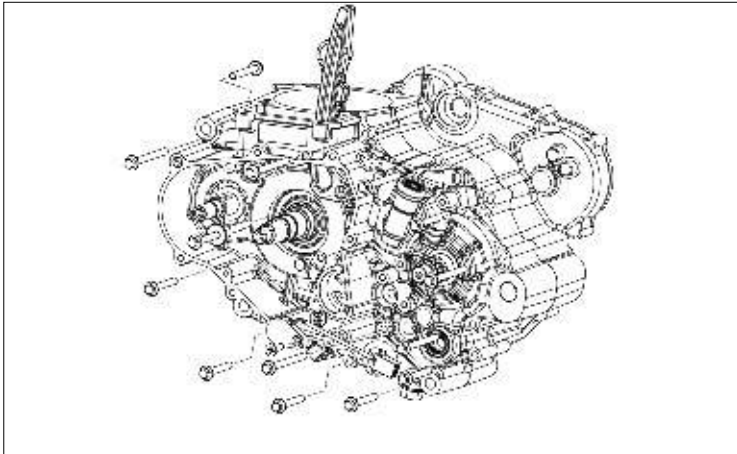
Insert the gearshift drum “5”, with the cylindrical pin facing upwards, in the respective hole of the left half-crankcase.

Insert the gearshift forks in the respective grooves of the drum.

Insert the shafts of the gearshift forks “8” and “9” in the respective holes of the left half-crankcase, passing them through the forks.

Insert the two pins “10” Ø13x14 in the respective holes of the left half-crankcase.

Rotate the primary and auxiliary shafts and verify their correct rotation, which must be free and without jamming.

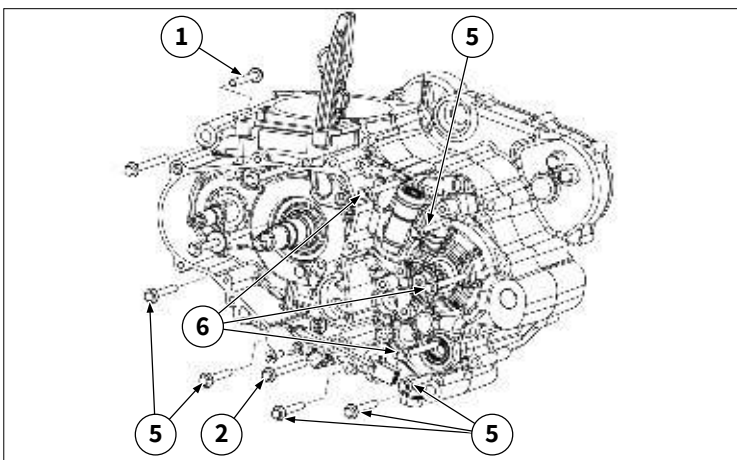


### 13.8.5 Half-crankcase coupling and gear sensor installation

Check the cleanliness of the mating surface of the right half-crankcase, if necessary clean it with alcohol for industrial use .Position the right half-crankcase with the mating surface facing upwards and align the centering pins, then apply the recommended product on the mating surface.

 **Recommended product: Tonsan 1569.**

 **The sealant must be applied evenly, without interruption.**




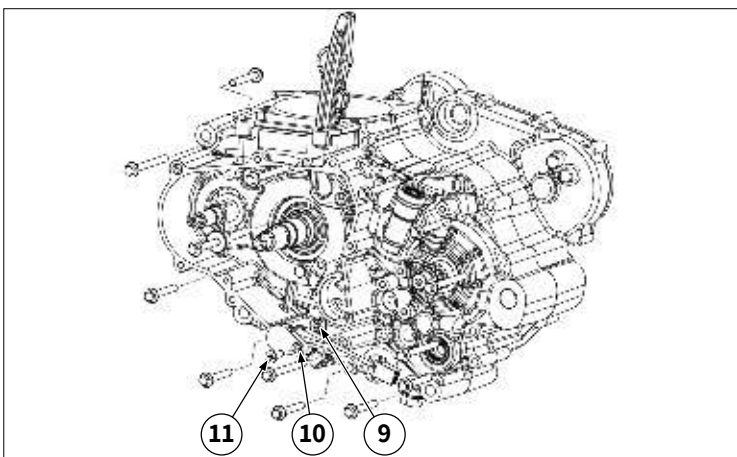
Couple the left half-crankcase half on the right half-crankcase.

Apply the recommended product on the first 3 ~ 4 threads of the six bolts "5" M6x45, the three bolts "6" M6x65, the three bolts "2" M6x70 and the bolt "1" M6x40.

Insert the bolts in the respective holes and tighten to the prescribed torque.


 **Recommended product: Loctite® 263.**

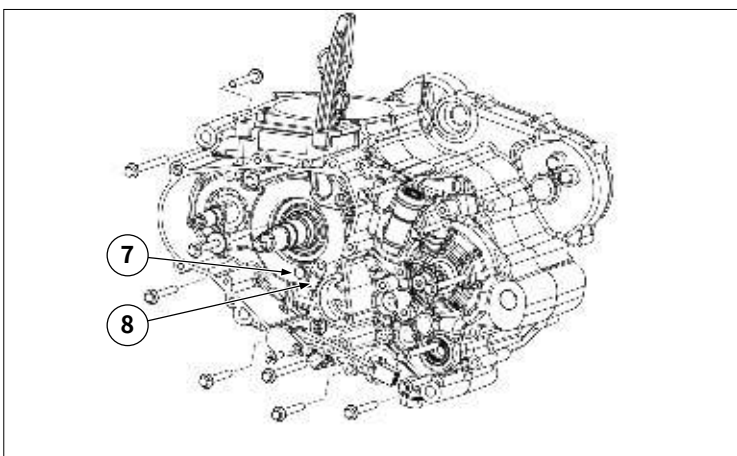
 **Tightening torques:**  
**Half-crankcase coupling bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Position the contact "9" of the gear sensor in the respective groove of the gearshift drum.


Apply a small amount of vaseline in the gear sensor installation hole, then install the sensor "10" in its respective seat on the right half-crankcase and secure it with the bolt "11" M6x20, tightening it to the prescribed torque.

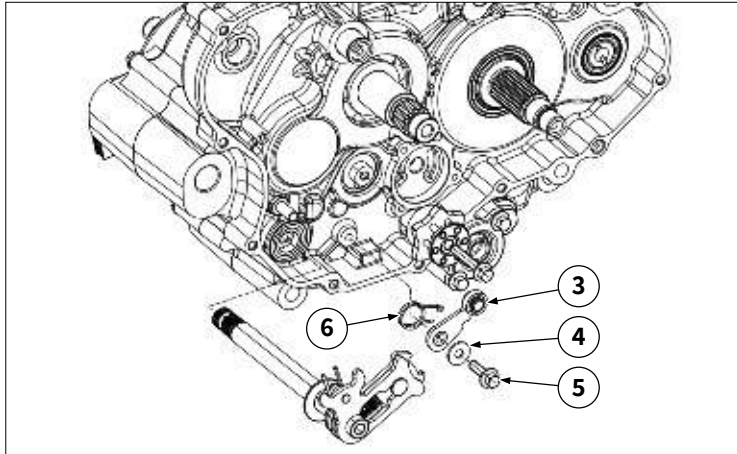
 **Tightening torques:**  
**Gear sensor fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Position the sensor wiring under the fastening plate "8".

Fasten the plate on the right half-crankcase with the bolt "7" M6x12, tightening it to the prescribed torque.

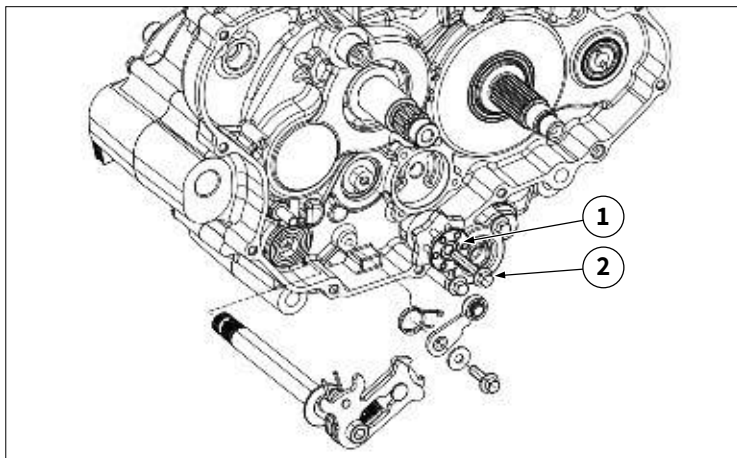
 **Tightening torques:**  
**Bolt for fastening the plate on right half-crankcase: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



### 13.8.6 Install the gearshift drum

Insert the spring "6" on the plate "3" in the appropriate seat, install the plate with the washer "4" Ø6.5x1.5xØ18 and the bolt "5" M6x20, tightening to the prescribed torque.

 **Tightening torques:**  
Gearshift drum fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



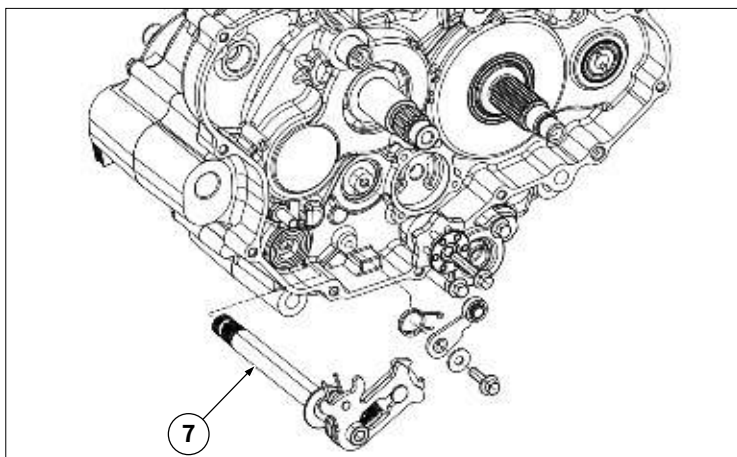
Install the plate "1" on the gearshift drum.

Apply the recommended product on the first 3 ~ 4 threads of the bolt "2" M6x35, insert it into the hole in the plate and tighten to the prescribed torque.

 **Recommended product: Loctite® 263.**

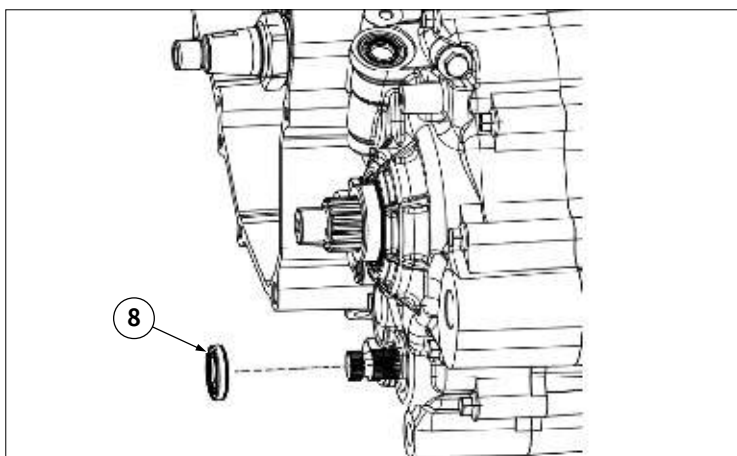
 **Align the holes in the plate with those in the gearshift drum.**

 **Tightening torques:**  
Gearshift drum plate fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Install the drive shaft "7" in the respective seat.

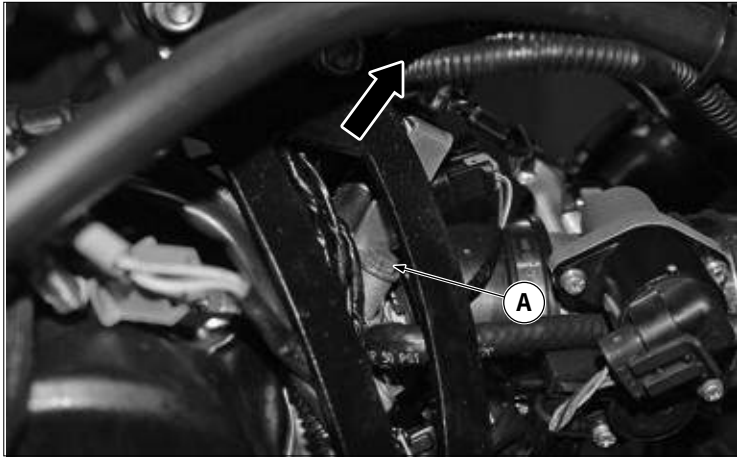
 **The return spring of the drive shaft must be hooked to the related bolt of the right half-crankcase.**



Install the oil seal "8" in fluorine rubber Ø15xØ25x5 in the respective hole of the left half-crankcase.

## 13.8.7 Crankshaft clearance values reference table

CRANKSHAFT CLEARANCE																						
		Distance between the inner ring of the crankshaft bearing of the left half-crankcase and the mating surface of the left half-crankcase (B)																				
		37.55	37.56	37.57	37.58	37.59	37.6	37.61	37.62	37.63	37.64	37.65	37.66	37.67	37.68	37.69	37.7	37.71	37.72	37.73	37.74	37.75
Distance between the mating surface of the right half-crankcase and the end of the left arm of the crankshaft (A)	37.5	0.05	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25
	37.49	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26
	37.48	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27
	37.47	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28
	37.46	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29
	37.45	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
	37.44	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31
	37.43	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32
	37.42	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33
	37.41	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34
	37.4	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35
	37.39	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36
	37.38	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37
	37.37	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38
	37.36	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39
	37.35	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
	37.34	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41
	37.33	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42
	37.32	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43
	37.31	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44
	37.3	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45
	37.29	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46
	37.28	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47
	37.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48
	37.26	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49
	37.25	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
	37.24	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51
	37.23	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52
	37.22	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53
	37.21	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	0.54
	37.2	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	0.54	0.55

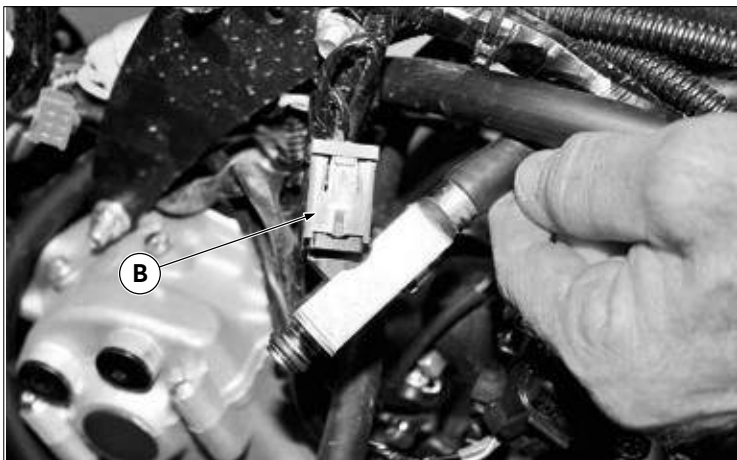


## 13.9 ELECTRONIC INJECTION REMOVAL

### 13.9.1 Injector removal

Remove:

- Tank, refer to “12.8 Fuel tank removal” on page 127.
- Remove the fastening screw “A” and disconnect the fuel injector from the flange on the engine.

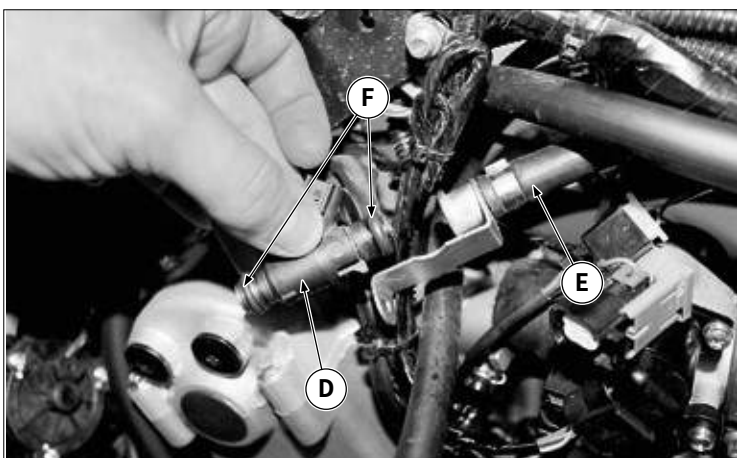


Disconnect the fuel injector connector “B”.

**⚠ There may be fuel residues inside the injector and its hose.**



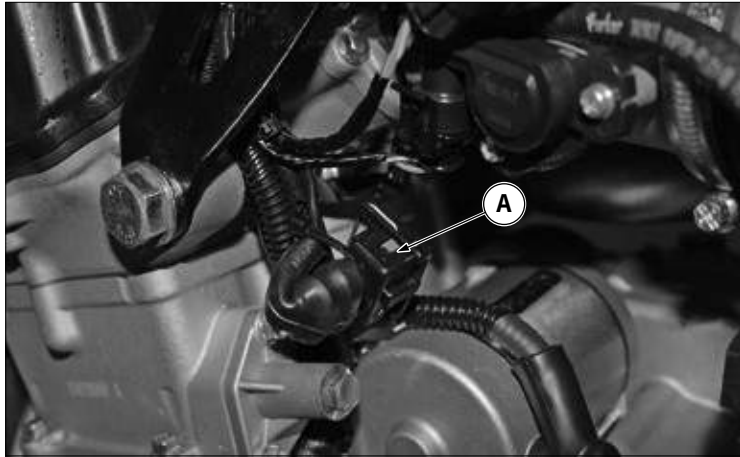
Release the retaining clip “C” from the injector.



Remove the fuel injector “D” from the fuel pipe “E”.

**i Proceed in the reverse order for reassembling.**

**⚠ Replace the O-rings . “F ”every time the fuel injector is disassembled.**

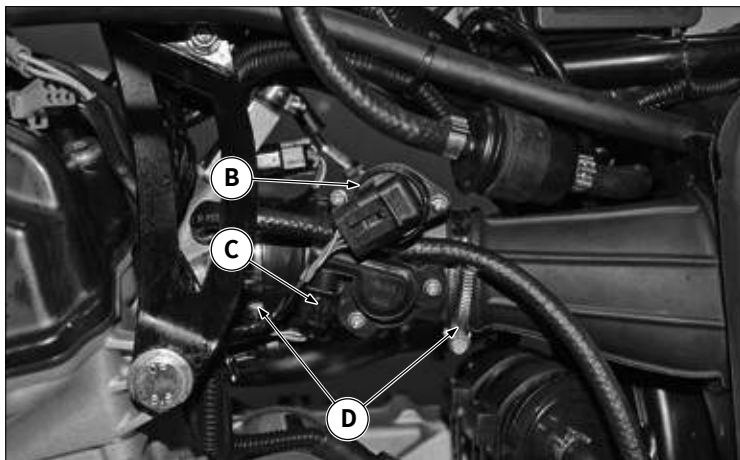


### 13.9.2 Throttle body removal

Remove:

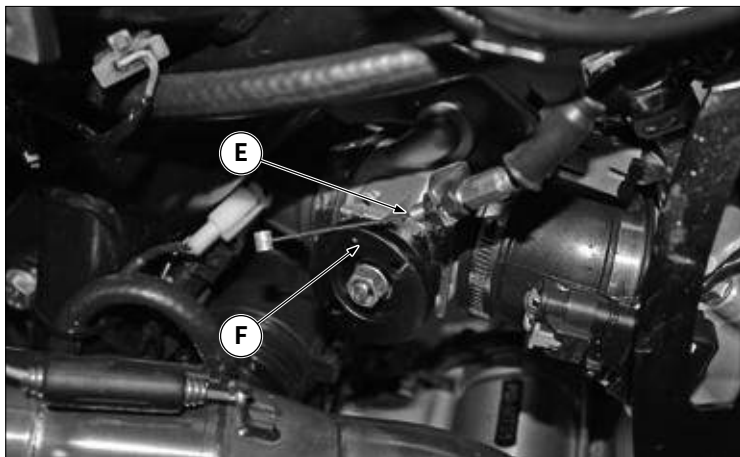
- Tank, refer to “12.8 Fuel tank removal” on page 127.

Disconnect the connector “A” of the water temperature sensor.

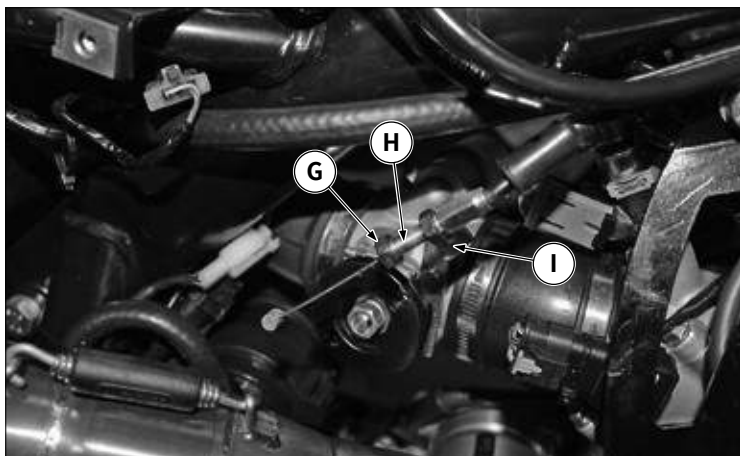


Disconnect the stepper motor connector “B” and the TPS sensor connector “C”.

Loosen the metal clamps “D”.

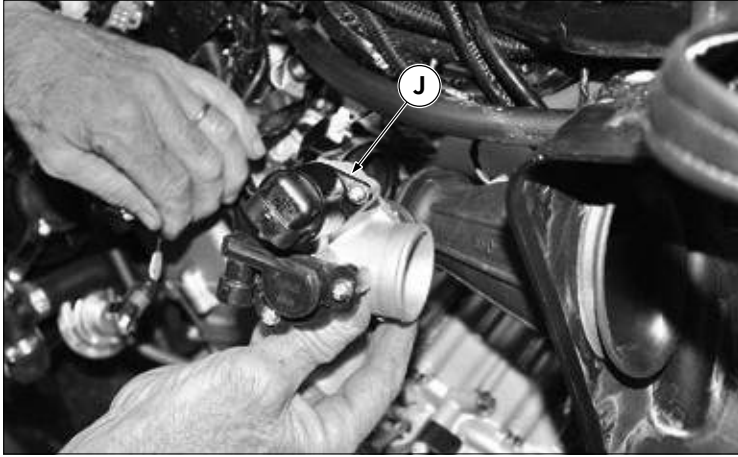


Remove the throttle cable pin “E” from the throttle body coupling “F”.



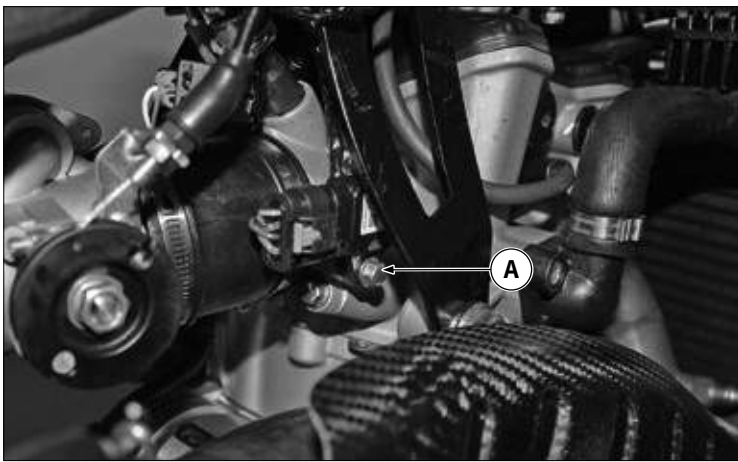
Completely unscrew the fastening nut “G” of the accelerator cable.  
Release the throttle cable “H” from the throttle body bracket “I”.





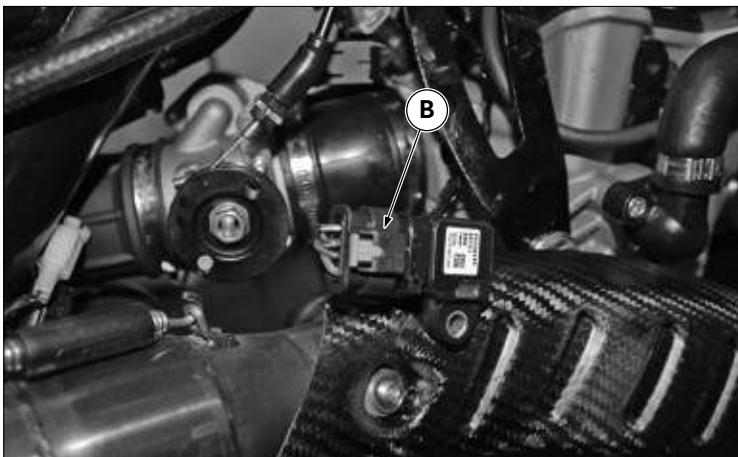
Remove the throttle body “J” from the manifolds.

**i** Proceed in the reverse order for reassembling.



### 13.9.3 MAP sensor removal

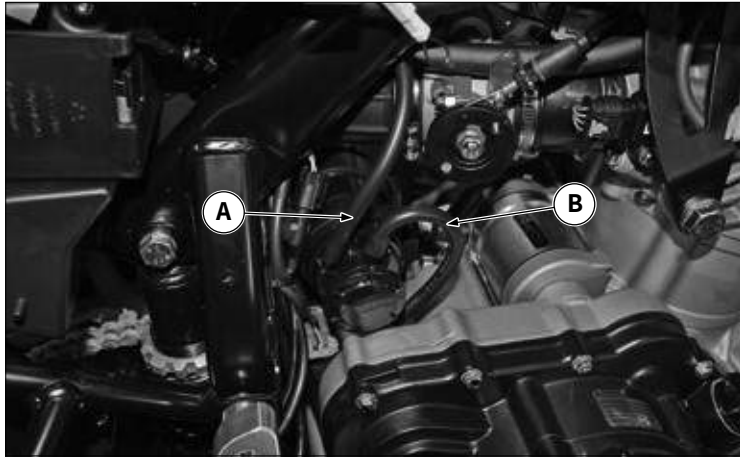
Remove the screw “A” and disconnect the MAP sensor from its seat on the engine.



Disconnect the connector “B” and the retaining bracket “C” from the MAP sensor.

**i** Proceed in the reverse order for reassembling.



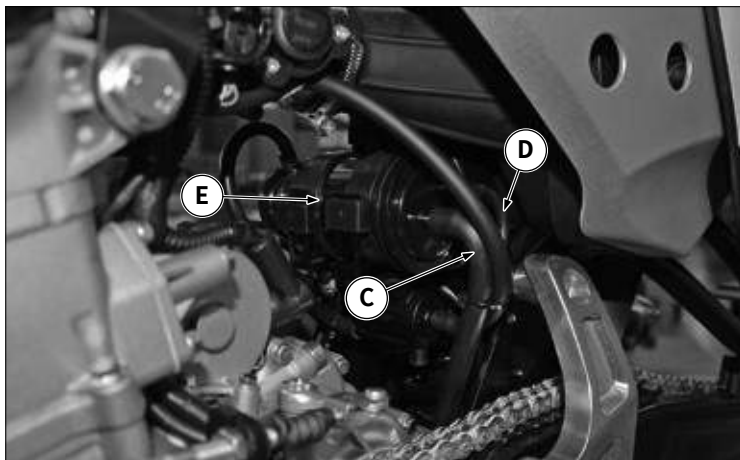


### 13.10 FILTER CANISTER REMOVAL

#### 13.10.1 Filter removal

Remove the tube "A" from the "TANK" coupling.

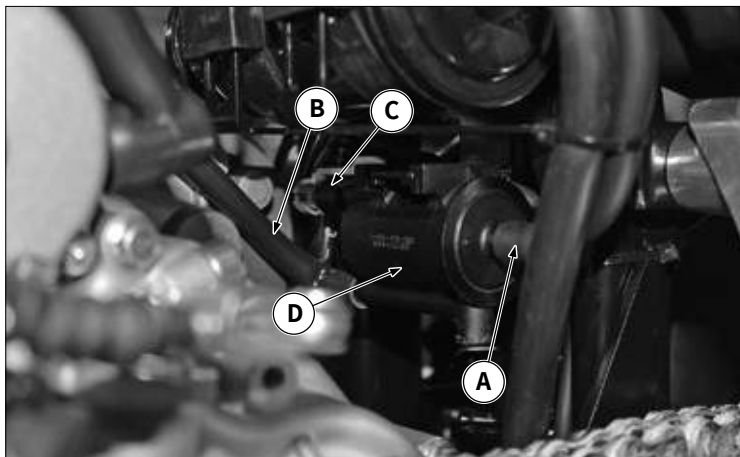
Remove the tube "B" from the "PURGE" coupling.



Remove the tube "C" from the "AIR" coupling.

Remove the tube "D" from the "DRAIN" coupling.

Lift and remove the canister filter "E".



#### 13.10.2 Solenoid valve removal

Remove the tube "A" from the "CAN" coupling.

Remove the tube "B".

Disconnect and remove the tube "C" and remove the solenoid valve "D".