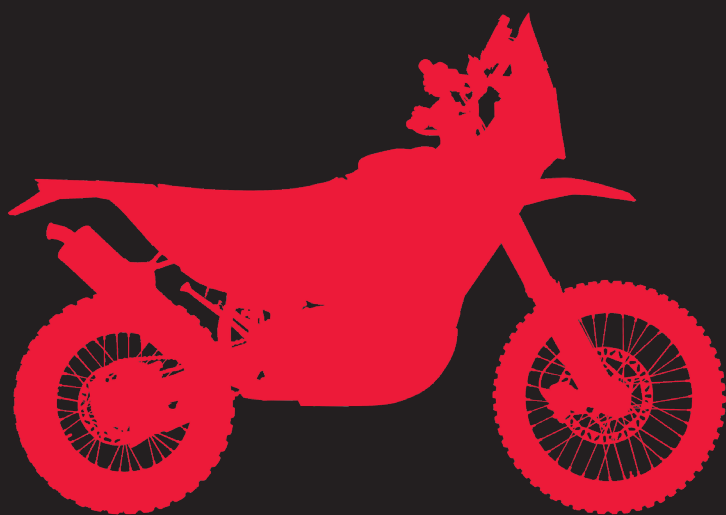


USER MANUAL



XEF
RALLY



READ THIS MANUALE CAREFULLY BEFORE OPERATING THIS VEHICLE

EN

FANTIC

FANTIC WANTS TO THANK YOU
for choosing one of its products.

We recommend that you read this manual before driving your vehicle. It contains information, advice and warnings on the vehicle maintenance and use. The instructions in this manual have been prepared to give you a simple and clear guide for use. We are sure that taking it into consideration you will gain confidence with your new vehicle, which you can use for a long time and with full satisfaction.

MANUFACTURER DATA AND EDITION

FANTIC MOTOR S.P.A.
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Introduction

This manual was prepared by **Fantic Motor** for use by **Fantic Motor** dealers and their specialized personnel. It is assumed that those who use this documentation for repair and maintenance of **Fantic Motor** vehicles have a basic knowledge of the principles and mechanical procedures regarding vehicle repair techniques. In the absence of these notions, repair or maintenance may be inadequate or dangerous.

Fantic Motor is constantly committed in improving its production. Any significant modifications and changes introduced with regard to vehicle characteristics and repair procedures will be brought to the attention of all **Fantic Motor** dealers and will be published in future editions of the manual.

ⓘ Fantic Motor reserves the right to modify and make changes, at any time and without notice, to the models described, specifications and design data, guaranteeing the essential characteristics described and illustrated in this manual.

⚠ Operators have the obligation to read the manual and to scrupulously follow the instructions given. The manufacturer is not responsible for damages caused to people and/or things and is not responsible for damages to the product, if the instructions given in this manual are not observed.

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1.1 WARNINGS

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.

1.2 SYMBOLS USED IN THE MANUAL

Within this manual there will be technical warnings and annotations preceded by the following symbols according to the reference topic:

-  **Warning regarding the procedure described and the specific safety rules: indicates procedures that must be followed to prevent damage to the vehicle or possible injuries to vehicle repairers.**
-  **Information note on the procedure described and on the characteristics of the vehicle: it provides useful information to make the procedure easier and clearer.**
-  **Tightening torque: note showing one or more tightening torques values referred to the procedure described.**
-  **Measurement data: note showing the values of one or more measurements to be complied with or verified for the procedure described.**
-  **Equipment: note that informs the user of the need to use particular tools for the procedure described.**
-  **Consumable: note that illustrates the names, types and/or quantities of consumables (such as oil, fuel, sealants, additives, etc.) to be used for the procedure described.**

All left or right indications refer to the direction of travel of the motorcycle.

This manual contains images illustrating some disassembling sequences, using the following symbols to identify the characteristics of the type of intervention.

-  **Apply and/or lubricate using engine oil.**
-  **Apply and/or lubricate using gear oil.**
-  **Apply and/or lubricate using molybdenum disulphide oil.**
-  **Apply and/or lubricate using brake fluid.**
-  **Apply a product that is not specified or specified separately.**
-  **Apply wheel bearing grease.**
-  **Apply lithium soap based grease.**
-  **Apply molybdenum disulphide grease.**
-  **Apply and/or lubricate using silicone grease.**
-  **Apply a threadlocker (LOCTITE®).**
-  **Replace with a new component.**

1.3 BEHAVIOUR AND DRIVING

Some safety tips are given below to avoid damage to people and/or things and to use your vehicle with an easier and safer drive.

Vehicle use

To use the vehicle it is necessary to meet all the law requirements.

It is advisable, in order to acquire a good knowledge of the vehicle, to use the vehicle in areas without traffic or unpopulated stretches of road.

It is advisable to always respect the highway code while driving, to avoid sudden or dangerous manoeuvres keeping both hands on the handlebar and always keeping your feet on the appropriate footrests. Pay close attention while riding.

 **Do not ride the vehicle while drunk, under the influence of drugs, after taking certain medicines or in a state of physical fatigue and drowsiness. Failure to comply with these rules is considered extremely dangerous and could cause serious damage to property and/or people.**

Evaluate and keep in consideration the conditions of the road surface, visibility and weather. In a situation not suitable for safe driving, reduce the speed and drive carefully.

The braking effect in wet roads without ever having applied the brakes is initially less; under these conditions it is advised to periodically operate the brakes.

In case the vehicle is used on roads dirty with sand, mud, snow mixed with salt, we recommend checking and if necessary cleaning the brake discs with special non-aggressive detergents, so as to prevent the formation of abrasive agglomerates inside the holes and an early wear of the brake pads.

The getting on and off from the vehicle must be in complete freedom of movement and without impediments.

Go up and down only from the left side of the vehicle and with the kickstand down to prevent unbalancing or loss of balance, causing falls or overturns.

 **The rider is always the first to go on and the last to go down as he/she has to govern the stability of the vehicle.**

Getting on

The passenger must make the movements to get on with the utmost caution, avoiding to unbalance the rider and the vehicle.

Place your feet on the ground and hold the vehicle in running position.

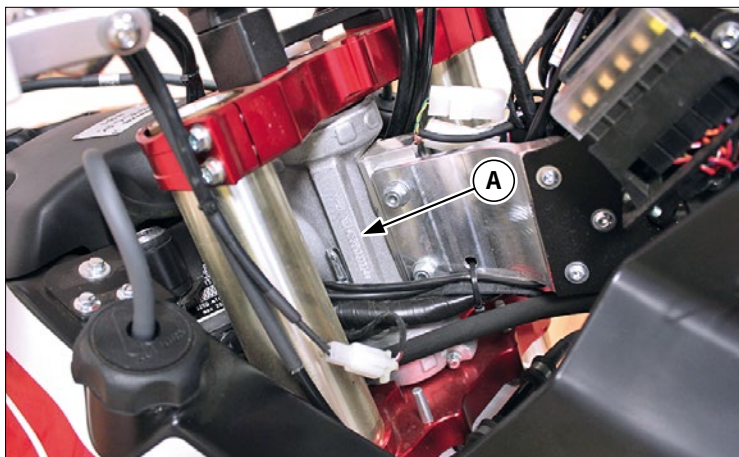
Getting off

Stop the vehicle in an area suitable for stopping or parking, ensuring that the ground is stable and free of obstacles. Fully extend the kickstand using the left foot.

Tilt the vehicle making the kickstand touch the ground. Get off the vehicle and turn the handlebar completely to the left.

 **Make sure that the vehicle is stationary and stable.**

 **Do not lift the vehicle grasping the license plate holder frame, in order to avoid damage. Qui di seguito vengono elencati alcuni consigli sulla sicurezza al fine di evitare danni a persone e/o cose e per utilizzare il proprio veicolo con una guida più tranquilla e sicura.**

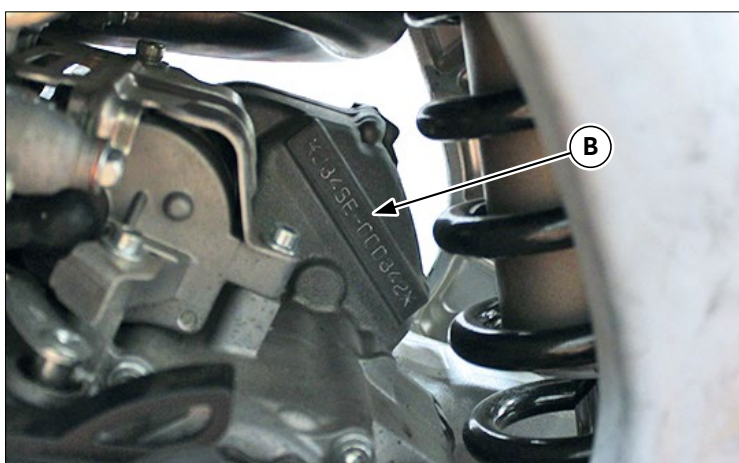


Fantic Motor vehicles are equipped with frame and engine identification numbers.

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

1.4 FRAME NUMBER

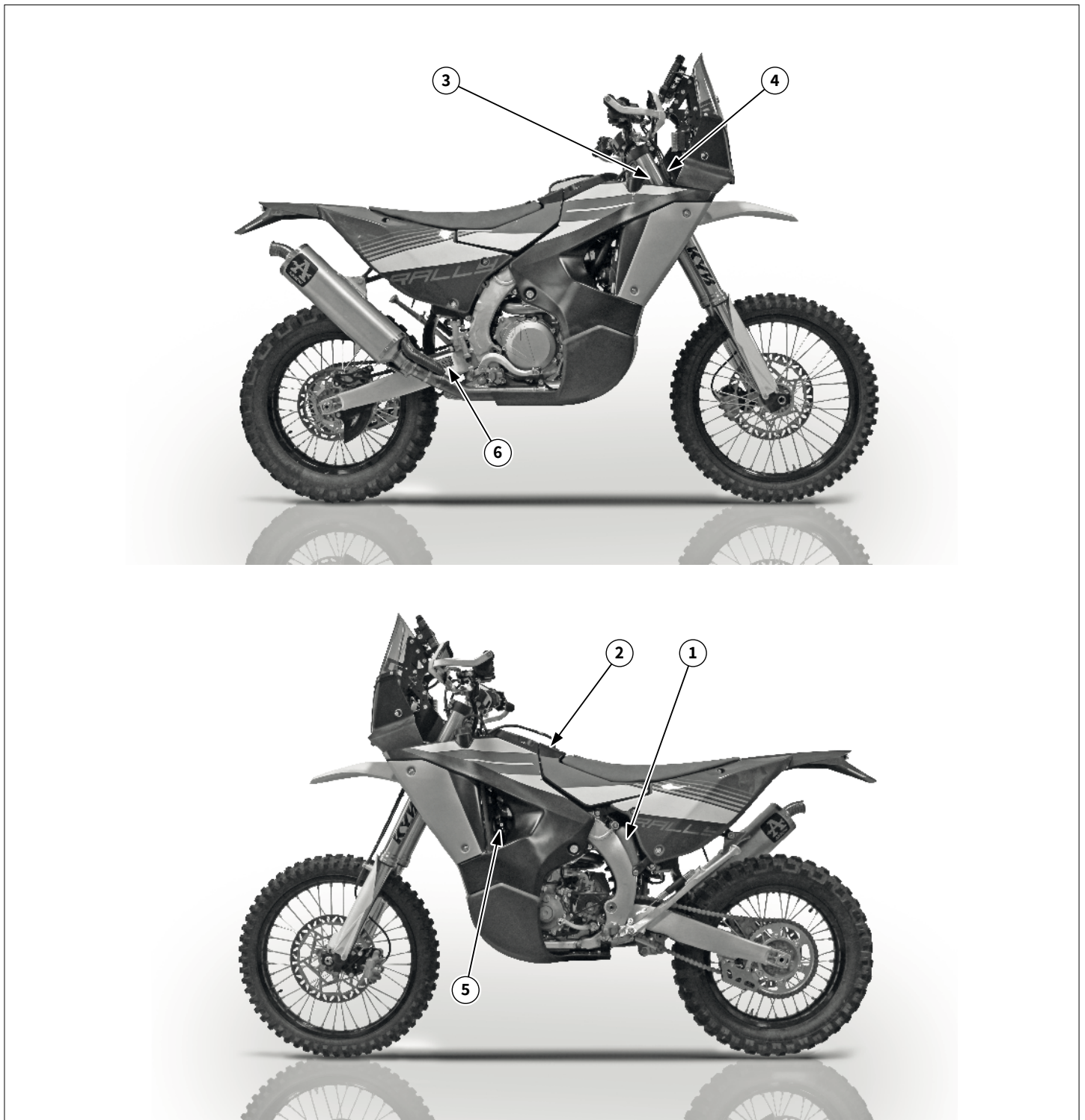
The frame number “A” is punched on the steering tube on the right side.



1.5 ENGINE NUMBER

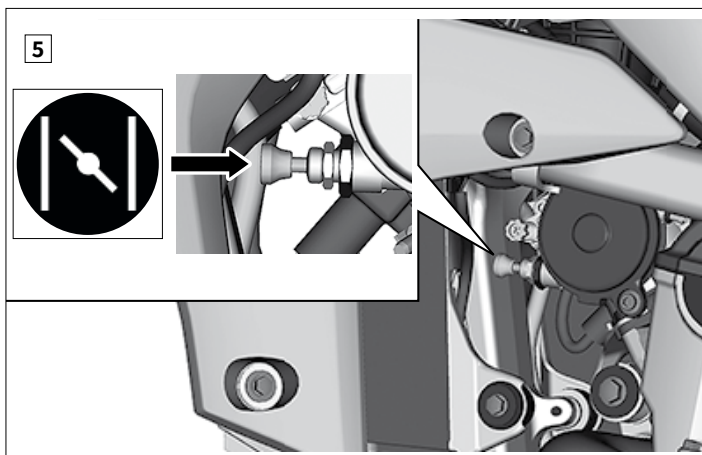
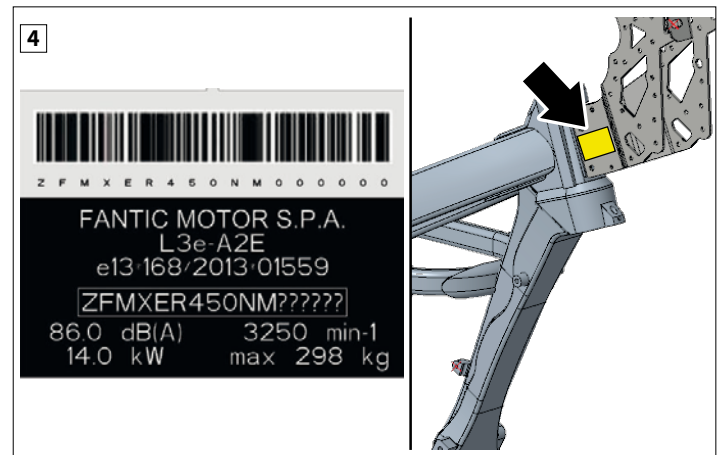
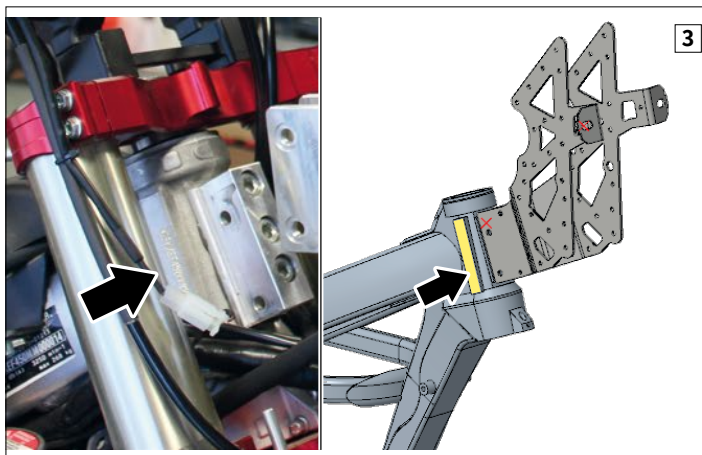
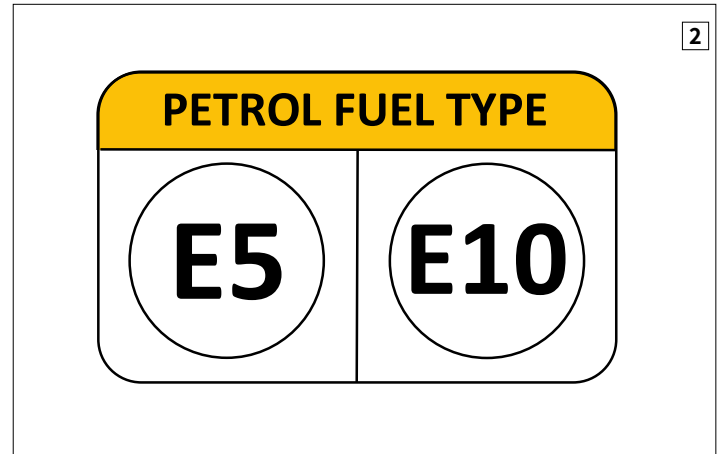
The engine number “B” is punched on the left side of the engine crankcase.

1.6 LOCATION OF IMPORTANT LABELS



1. Pressurised gas hazard label
2. Usable petrol quality label
3. Chassis number punching
4. Vehicle data label

5. "Choke" symbol
6. Tyre pressure label

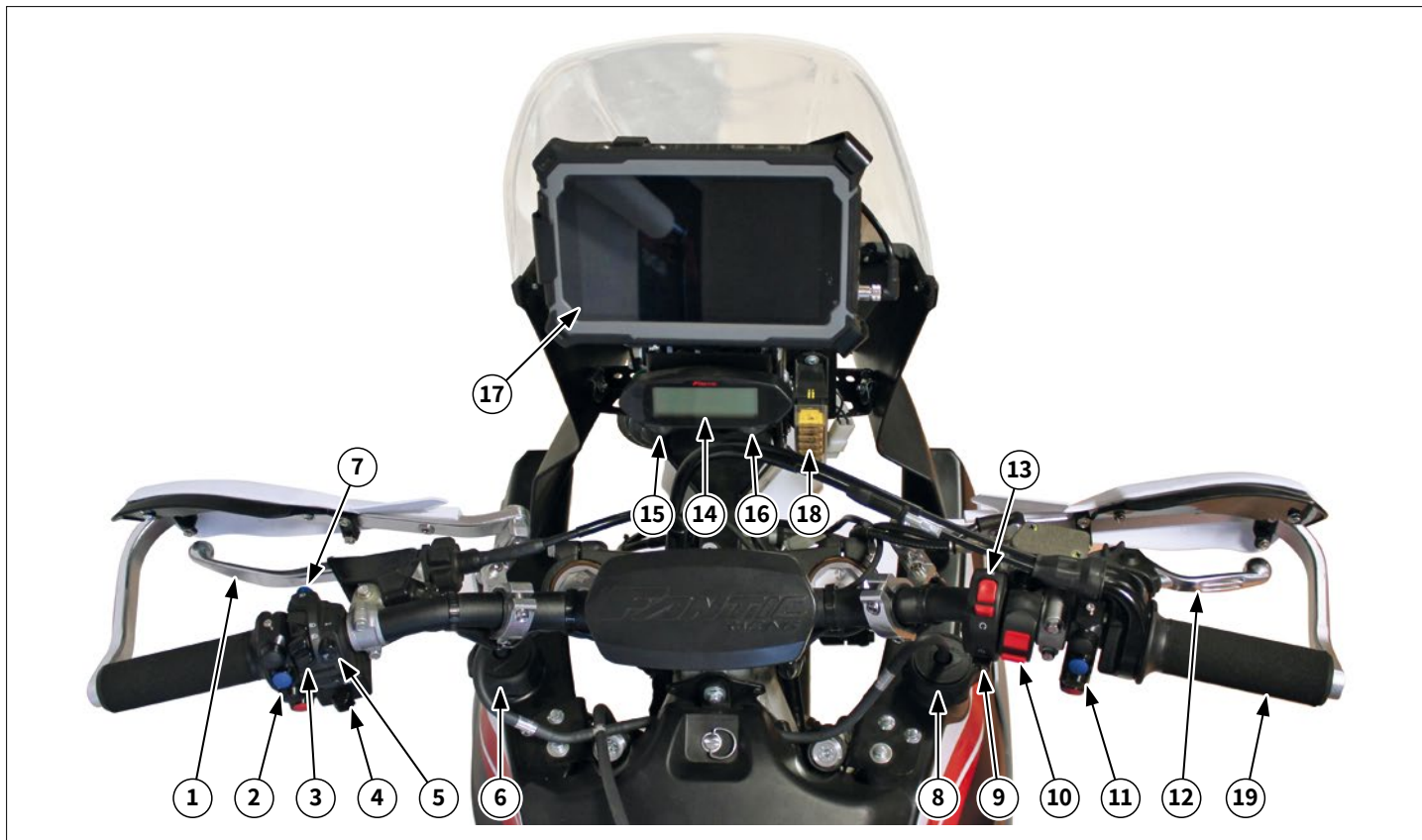


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FANTIC		PRESSURE [kPa]	
AXLE	SIZE	ON-ROAD USE	OFF-ROAD USE
Front	90/90-21	200	100
Rear	140/80-18	220	100

1.7 VEHICLE COMPONENT LOCATION

Handlebar components



Ref.	Component
1	Clutch lever
2	Left tablet control panel
3	High beam / low beam light selector switch
4	Turn signals warning light switch
5	Horn button
6	Left fuel filler cap
7	High beam flasher button
8	Right fuel filler cap
9	Starter switch
10	Central/side fuel tank selector
11	Right tablet control panel
12	Front brake lever
13	Engine stop switch
14	Dashboard
15	"SELECT" button
16	"ADJUST" button
17	Multifunction tablet
18	Auxiliary fuse box
19	Accelerator knob

Right and left side components


Ref.	Component
20	Rear brake pedal
21	Radiator
22	Headlight
23	Right fuel tank
24	Central fuel tank cap
25	Central fuel tank
26	Front fork
27	Horn

Ref.	Component
28	Cold start starter
29	Oil filler cap
30	Oil level sight glass
31	Gear pedal
32	Transmission chain
33	Left fuel tank
34	Rear taillight light

1.8 TECHNICAL DATA

Technical Data

Dato tecnico	Valore/i
Overall length	2310 mm (90.9 in)
Overall width:	
Without handguards	800 mm (31.5 in)
With handguards	885 mm (34.8 in)
Overall height	1270 mm (50.0 in)
Seat height	930 mm (36.6 in)
Wheelbase	1465 mm (57.6 in)
Minimum ground clearance	310 mm (12.20 in)
Weight in running order	136 kg (299.8 lb)
Weight at full load	206 kg (454.1 lb)
Maximum allowable height	268 kg (590.8 lb)
Engine type	Liquid cooled, 4-stroke, gasoline
Cylinder arrangement	Single cylinder
Displacement	450 cm ³
Bore × stroke	97.0 x 60.8 mm (3.82 x 2.39 in)
Compression ratio:	13.0 : 1
Valve train	DOHC
Starting system	Electric starter
Lubrication system	Wet sump
Transmission oil:	
Recommended type	10W-40, 10W-50, 15W-40, 20W-40, 20W-50 API service SG type or higher, JASO standard Ma
Periodic oil change	0.63 L (0.67 US qt, 0.55 Imp.qt)
With oil filter removal	0.65 L (0.69 US qt, 0.57 Imp.qt)
Total amount	0.90 L (0.95 US qt, 0.79 Imp.qt)
Oil filter:	
Oil filter type	Cartridge
Cooling system:	
Coolant quantity (including all routes)	1.03 L (1.09 US qt, 0.91 Imp.qt)
Radiator cap valve opening pressure	107.9–137.3 kPa (1.08–1.37 kgf/cm ² , 15.6–19.9 psi))
Air filter oil	Air Filter Special Oil
Brake oil	Synthetic Brake Fluid DOT 4
Air filter	Wet element
Fuel:	
Type	Premium unleaded gasoline only (E10 accettable)
Tank capacity	7.9 L (1.70 Imp gal, 2.10 US gal)
Reserve amount (XEF 450 version)	2.0 L (0.44 Imp gal, 0.53 US gal)
Fuel pump:	
Pump type	Electrical
Maximum consumption amperage	2.4 A
Fuel injector (resistance)	12.0 Ω
Throttle body	B7R1
Spark plug:	
Type/Manufacturer	NGK/LMAR8G
Gap	0.7–0.8 mm (0.028–0.031 in)
Clutch type	Wet, multiple-disc
Primary reduction system	Gear

Dato tecnico	Valore/i
Primary reduction ratio	2.609 (60/23)
Final drive	Chain
Secondary reduction ratio	3.692 (48/13)
Transmission type	Constant mesh, 5-speed
Operation	Left foot operation
Gear ratio:	
1a	2.417 (29/12)
2a	1.733 (26/15)
3a	1.313 (21/16)
4a	1.050 (21/20)
5a	0.840 (21/25)
Seats	1
Frame	Perimeter
Caster angle	27.2°
Trail	116 mm (4.6 in)
Wheels (original equipment):	
Front	90/90-21
Rear	140/80-18
Front inflation pressure (road use)	2 bar (200 kPa - 29 PSI)
Rear inflation pressure (road use)	2,2 bar (220 kPa - 32 PSI)
Front/rear inflation pressure ("Racing" use)	1 bar (100 kPa - 15 PSI)
Wheels (alternative sizes):	
Front	80/100-21
Rear	130/90-18, 120/90-18
Front inflation pressure (road use)	2 bar (200 kPa - 29 PSI)
Rear inflation pressure (road use)	2,2 bar (220 kPa - 32 PSI)
Front/rear inflation pressure ("Racing" use)	1 bar (100 kPa - 15 PSI)
Brake:	
Front brake type	Hydraulic single disc brake
Operation	Right hand operation
Rear brake type	Hydraulic single disc brake
Operation	Right foot operation
Suspension:	
Front suspension	Telescopic fork
Rear suspension	Swingarm (link suspension)
Shock absorber:	
Front shock absorber	Coil spring/hydraulic damper
Rear shock absorber	Coil spring/gas-hydraulic damper
Wheel travel:	
Front wheel travel	310 mm (12.2 in)
Rear wheel travel	310 mm (12.2 in)
Ignition system	TCI
Turn signals (XEF 450 version only)	12 V - 6 W
High/low beam light (XEF 450 version only)	Led
Position/brake light (XEF 450 version only)	Led
License plate light (XEF 450 version only)	Led
Fuses:	
Battery fuse	15.0 A
Electrical wiring fuse (XEF 450 version only)	5.0 A

1.9 TIGHTENING TORQUES

Engine tightening torques

i “◇” = marked portion shall be checked for torque tightening after break-in or before each race.

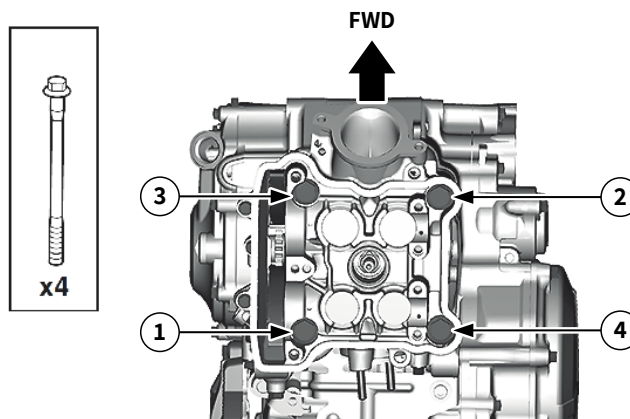
Item	Thread size	Quantity	Tightening torque	Remarks
Camshaft cap bolt	M6	8	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Spark plug	M10	1	13 Nm (1.3 kgf·m, 9.6 lb·ft)	
Cylinder head stud bolt (exhaust pipe)	M6	2	7 Nm (0.7 kgf·m, 5.2 lb·ft)	
Oil passage plug (cylinder head)	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Cylinder head bolt	M9	4	See tip i at page 21.	
Cylinder head nut	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Cylinder head cover bolt	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Cylinder bolt	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Oil pressure check bolt	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Balancer weight plate screw	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Balancer weight gear nut	M14	1	50 Nm (5.0 kgf·m, 37 lb·ft)	
Balancer nut	M10	1	38 Nm (3.8 kgf·m, 28 lb·ft)	
Timing chain guide stopper plate (exhaust side)	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Timing chain tensioner cap bolt	M6	1	6 Nm (0.6 kgf·m, 4.4 lb·ft)	
Timing chain tensioner bolt	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Coolant drain bolt	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Radiator hose clamp screw	M6	8	1.5 Nm (0.15 kgf·m, 1.1 lb·ft)	
Radiator bolt	M6	4	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Radiator pipe joint bolt	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Radiator fan bolt	M6	3	8 Nm (0.8 kgf·m, 5.9 lb·ft)	
Water pump housing cover bolt	M6	4	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Water pump impeller	M8	1	14 Nm (1.4 kgf·m, 10 lb·ft)	
Oil pump bolt	M5	2	5 Nm (0.5 kgf·m, 3.7 lb·ft)	
Oil pump cover screw	M4	1	2.0 Nm (0.20 kgf·m, 1.5 lb·ft)	
Oil strainer bolt	M6	1	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Throttle cable cover bolt	M5	1	3.5 Nm (0.35 kgf·m, 2.6 lb·ft)	
Throttle body joint bolt	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Throttle body joint clamp screw	M5	1	3.0 Nm (0.30 kgf·m, 2.2 lb·ft)	
Air filter case joint clamp screw	M5	1	3.0 Nm (0.30 kgf·m, 2.2 lb·ft)	
Air filter case bolt	M6	3	7 Nm (0.7 kgf·m, 5.2 lb·ft)	
Clutch cable locknut (clutch cable adjuster)	M6	1	4.3 Nm (0.43 kgf·m, 3.2 lb·ft)	
Clutch cable locknut (engine side)	M8	1	7 Nm (0.7 kgf·m, 5.2 lb·ft)	
Exhaust pipe nut	M6	2	10 Nm (1.0 kgf·m, 7.4 lb·ft)	
Exhaust pipe protector screw	M5	2	5 Nm (0.5 kgf·m, 3.7 lb·ft)	
Exhaust pipe bracket bolt	M8	1	20 Nm (2.0 kgf·m, 15 lb·ft)	
Silencer bolt (front)	M8	1	20 Nm (2.0 kgf·m, 15 lb·ft)	
Silencer bolt (rear)	M8	1	20 Nm (2.0 kgf·m, 15 lb·ft)	
Exhaust pipe clamp bolt	M5	2	12 Nm (1.2 kgf·m, 8.9 lb·ft)	
Silencer support bracket bolt	M8	2	20 Nm (2.0 kgf·m, 15 lb·ft)	
Oil nozzle bolt	M5	1	5 Nm (0.5 kgf·m, 3.7 lb·ft)	

Item	Thread size	Quantity	Tightening torque	Remarks
Engine oil drain bolt	M10	1	20 Nm (2.0 kgf•m, 15 lb•ft)	
Crankcase bolt	M6	12	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Clutch cable holder bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Crankshaft end accessing screw	M36	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Timing mark accessing screw	M14	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	
Drive sprocket cover bolt	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Crankcase bearing cover plate screw	M8	4	22 Nm (2.2 kgf•m, 16 lb•ft)	
Bearing plate cover bolt (left side of the drive axle)	M6	2	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Plate bolt	M6	4	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Clutch cover bolt	M6	6	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Crankcase cover bolt (left)	M6	7	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Crankcase cover bolt (right)	M6	9	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Oil filter element cover bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Starter clutch screw	M6	8	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Primary drive gear nut	M16	1	105 Nm (10.5 kgf•m, 77 lb•ft)	
Clutch spring bolt	M6	6	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Clutch boss nut	M20	1	95 Nm (9.5 kgf•m, 70 lb•ft)	Stake.
Drive sprocket nut	M18	1	75 Nm (7.5 kgf•m, 55 lb•ft)	Use a lock washer.
Segment	M8	1	30 Nm (3.0 kgf•m, 22 lb•ft)	
Shift guide bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Stopper lever bolt	M6	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Shift pedal bolt	M6	1	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Generator rotor nut	M12	1	65 Nm (6.5 kgf•m, 48 lb•ft)	
Stator coil screw	M5	3	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Stator coil assembly lead holder bolt	M5	1	8 Nm (0.8 kgf•m, 5.9 lb•ft)	
Coolant temperature sensor	M10	1	14 Nm (1.4 kgf•m, 10 lb•ft)	
Gear position switch bolt	M5	2	3.5 Nm (0.35 kgf•m, 2.6 lb•ft)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
ECU bolt	M5	2	3.8 Nm (0.38 kgf•m, 2.8 lb•ft)	
Ignition coil bolt	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Starter motor bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Nut (holder)	M6	1	8 Nm (0.8 kgf•m, 5.9 lb•ft)	
Throttle position sensor screw	M5	1	3.5 Nm (0.35 kgf•m, 2.6 lb•ft)	
Intake air pressure sensor screw	M6	1	3.5 Nm (0.35 kgf•m, 2.6 lb•ft)	

Tip ❶: Cylinder head bolt (XEF 450 version)

- First, tighten the cylinder head bolts to 40 N·m (4.0 kgf·m, 30 lb·ft) in the proper tightening sequence and remove them.
- Retighten the cylinder head bolts to 23 N·m (2.3 kgf·m, 17 lb·ft) in the proper tightening sequence.
- Tighten all bolts to reach the specified angle (90°) in a diagonal sequence.
- Then tighten the cylinder head bolts further to reach the specified angle (60°) in the proper tightening sequence.

 **The first and second time, be sure to apply molybdenum disulfide grease to the bolt threads and seats as well as to both sides of the washers.**



Chassis tightening torques

i “◊” = marked portion shall be checked for torque tightening after break-in or before each race.

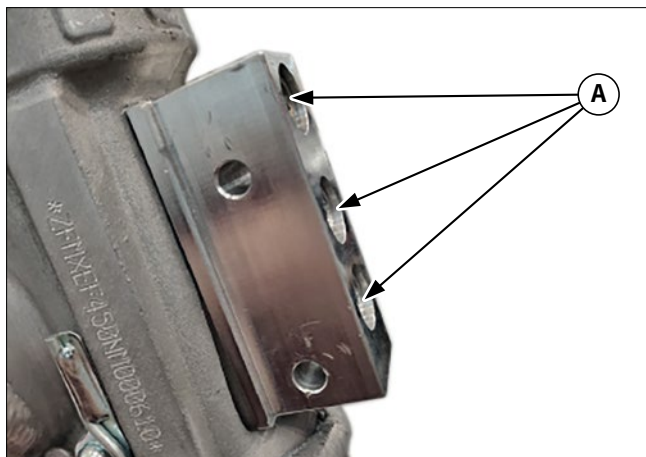
Item	Thread size	Quantity	Tightening torque	Remarks
Upper bracket pinch bolt	◊ M8	4	21 Nm (2.1 kgf•m, 15 lb•ft)	
Lower bracket pinch bolt	◊ M8	4	21 Nm (2.1 kgf•m, 15 lb•ft)	
Steering stem nut	◊ M24	1	145 Nm (14.5 kgf•m, 107 lb•ft)	
Upper handlebar holder bolt	◊ M8	4	28 Nm (2.8 kgf•m, 21 lb•ft)	
Lower handlebar holder nut	◊ M10	2	40 Nm (4.0 kgf•m, 30 lb•ft)	
Engine stop switch screw	M3	1	0.5 Nm (0.05 kgf•m, 0.37 lb•ft)	
Start switch	M3	1	0.5 Nm (0.05 kgf•m, 0.37 lb•ft)	
Mode switch (Except for Canada)	M3	1	1.3 Nm (0.13 kgf•m, 0.95 lb•ft)	
Lower ring nut	◊ M28	1	See tip ② at page 24.	
Damper assembly (front fork)	M51	2	30 Nm (3.0 kgf•m, 22 lb•ft)	
Inner tube and Adjuster	M22	2	55 Nm (5.5 kgf•m, 41 lb•ft)	
Base valve (front fork)	M42	2	28 Nm (2.8 kgf•m, 21 lb•ft)	
Adjuster (damper assembly)	M12	2	29 Nm (2.9 kgf•m, 21 lb•ft)	
Bleed screw (front fork)	M5	2	1.3 Nm (0.13 kgf•m, 0.95 lb•ft)	
Front fork protector bolt	◊ M6	6	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Speed sensor bolt	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Plate bolt	◊ M5	2	3.8 Nm (0.38 kgf•m, 2.8 lb•ft)	
Throttle grip cap screw	M5	2	3.8 Nm (0.38 kgf•m, 2.8 lb•ft)	
Clutch lever holder bolt	M5	2	3.8 Nm (0.38 kgf•m, 2.8 lb•ft)	
Clutch lever nut	M6	1	4.0 Nm (0.40 kgf•m, 3.0 lb•ft)	
Front brake master cylinder holder bolt	◊ M6	2	9 Nm (0.9 kgf•m, 6.6 lb•ft)	
Front brake master cylinder reservoir cap screw	M4	2	1.5 Nm (0.15 kgf•m, 1.1 lb•ft)	
Front brake lever pivot bolt	M6	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	
Front brake lever pivot nut	M6	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	
Locknut (front brake lever position)	M6	1	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Front brake hose union bolt	◊ M10	2	30 Nm (3.0 kgf•m, 22 lb•ft)	
Front brake caliper bolt	◊ M8	2	28 Nm (2.8 kgf•m, 21 lb•ft)	
Front brake pad pin	M10	1	17 Nm (1.7 kgf•m, 13 lb•ft)	
Front brake pad pin plug	M10	1	2.5 Nm (0.25 kgf•m, 1.8 lb•ft)	
Front brake caliper bleed screw	◊ M8	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	
Front wheel axle nut	◊ M18	1	115 Nm (11.5 kgf•m, 85 lb•ft)	
Front wheel axle pinch bolt	◊ M8	4	21 Nm (2.1 kgf•m, 15 lb•ft)	
Front brake disc bolt	◊ M6	6	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Rear brake disc bolt	◊ M6	6	12 Nm (1.2 kgf•m, 8.9 lb•ft)	
Footrest bracket bolt	M10	4	55 Nm (5.5 kgf•m, 41 lb•ft)	
Sidestand bolt	M10	1	35 Nm (3.5 kgf•m, 26 lb•ft)	
Rear brake pedal bolt	◊ M8	1	26 Nm (2.6 kgf•m, 19 lb•ft)	
Rear brake pedal adjusting locknut	M6	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	
Rear brake master cylinder bolt	◊ M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Rear brake master cylinder reservoir cap bolt	M4	2	1.5 Nm (0.15 kgf•m, 1.1 lb•ft)	
Rear brake hose union bolt	◊ M10	2	30 Nm (3.0 kgf•m, 22 lb•ft)	
Rear brake caliper bleed screw	◊ M8	1	6 Nm (0.6 kgf•m, 4.4 lb•ft)	

Item	Thread size	Quantity	Tightening torque	Remarks
Rear brake pad pin	M10	1	17 Nm (1.7 kgf•m, 13 lb•ft)	
Rear brake pad pin plug	M10	1	2.5 Nm (0.25 kgf•m, 1.8 lb•ft)	
Rear wheel axle nut	❖ M20	1	125 Nm (12.5 kgf•m, 92 lb•ft)	
Drive chain puller locknut	M8	2	21 Nm (2.1 kgf•m, 15 lb•ft)	
Rear wheel sprocket nut	❖ M8	6	50 Nm (5.0 kgf•m, 37 lb•ft)	
Nipple (spoke)	❖ —	72	2.5 Nm (0.25 kgf•m, 1.8 lb•ft)	
Bolt (rear brake disc cover)	❖ M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Rear brake caliper protector bolt	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Engine mounting bolt (upper side)	❖ M10	2	45 Nm (4.5 kgf•m, 33 lb•ft)	
Engine mounting bolt (front side)	❖ M10	1	55 Nm (5.5 kgf•m, 41 lb•ft)	
Engine mounting bolt (lower side)	❖ M10	1	53 Nm (5.3 kgf•m, 39 lb•ft)	
Engine bracket bolt (upper side)	❖ M8	4	34 Nm (3.4 kgf•m, 25 lb•ft)	
Engine bracket bolt (front side)	❖ M8	4	34 Nm (3.4 kgf•m, 25 lb•ft)	
Rear frame bolt	❖ M8	4	38 Nm (3.8 kgf•m, 28 lb•ft)	
Engine guard bolt	❖ M6	3	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Pivot shaft nut	❖ M16	1	85 Nm (8.5 kgf•m, 63 lb•ft)	
Rear shock absorber assembly upper nut	❖ M10	1	56 Nm (5.6 kgf•m, 41 lb•ft)	
Rear shock absorber assembly lower nut	❖ M10	1	53 Nm (5.3 kgf•m, 39 lb•ft)	
Locknut (rear shock absorber lock- nut)	M60	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Relay arm nut (swingarm side)	❖ M14	1	70 Nm (7.0 kgf•m, 52 lb•ft)	
Connecting arm nut (relay arm side)	❖ M14	1	80 Nm (8.0 kgf•m, 59 lb•ft)	
Connecting arm nut (frame side)	❖ M14	1	80 Nm (8.0 kgf•m, 59 lb•ft)	
Brake hose holder screw	❖ M5	4	3.5 Nm (0.35 kgf•m, 2.6 lb•ft)	
Drive chain tensioner bolt (upper side)	M8	1	16 Nm (1.6 kgf•m, 12 lb•ft)	
Drive chain tensioner bolt (lower side)	M8	1	16 Nm (1.6 kgf•m, 12 lb•ft)	
Bolt (drive chain support)	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Drive chain support nut	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Drive chain guide bolt	M5	3	4.0 Nm (0.40 kgf•m, 3.0 lb•ft)	
Bolt (rear frame cover) (left)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Screw (fuel inlet pipe)	M5	2	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Seat set bracket screw	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Seat bolt	❖ M8	2	22 Nm (2.2 kgf•m, 16 lb•ft)	
Side cover bolt (left)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side cover bolt (right)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Air scoop bolt (frame)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Front fender bolt	❖ M6	4	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Rear fender bolt (front side)	❖ M6	4	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Rear fender bolt (rear side)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Headlight body and headlight stay bolt	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Multi-function meter nut	M5	2	3.8 Nm (0.38 kgf•m, 2.8 lb•ft)	
Screw (mud flap)	❖ M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Frame ground bolt (negative battery lead)	M5	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Battery top support retaining bolt	❖ M8	4	21 Nm (2.1 kgf•m, 15 lb•ft)	
Side kickstand stroke adjustment screw	M5	1	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Side kickstand base screw	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Fastening nut for instrument support block	❖ M8	3	35 Nm (3.5 kgf•m, 25.8 lb•ft)	See tip ❸ at page 25.

Item	Thread size	Quantity	Tightening torque	Remarks
Upper tank central support screw	M6	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Steering damper pivot bracket bolt	M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Engine guard support central screw	◇ M6	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Engine guard support foot screw	M6	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Engine guard support lower bolt	◇ M8	4	20 Nm (2.0 kgf•m, 15 lb•ft)	
Engine guard support front screw	◇ M8	2	15 Nm (1.5 kgf•m, 11 lb•ft)	
Radiator guard screw	◇ M6	4	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Radiator guard support bracket bolt	◇ M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Radiator guard inner bracket screw	◇ M5	1	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Central tank support screw	◇ M6	2	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Central tank fuel pump screw	◇ M5	4	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Central tank fuel reserve probe	–	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Central tank closing screw	◇ M10	1	10 Nm (1.0 kgf•m, 7.4 lb•ft)	
Side tank upper bracket screw (left)	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank upper bracket bolt (left)	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank lower bracket screw (left)	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank fuel pump screw (left)	◇ M5	4	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Side tank fuel reserve probe	–	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank fuel pipe screw (left)	◇ M10	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank upper bracket screw (right)	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank upper bracket bolt (right)	M6	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank lower bracket screw (right)	M6	2	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Side tank fuel pump screw (right)	◇ M5	4	5 Nm (0.5 kgf•m, 3.7 lb•ft)	
Side tank fuel line screw (right)	◇ M10	1	7 Nm (0.7 kgf•m, 5.2 lb•ft)	
Front brake calliper spacer pin	–	1	24 Nm (2.4 kgf•m, 17 lb•ft)	

Tip ②: Lower ring nut (XEF 250 / XEF 450 versions)

- First, tighten the lower ring nut approximately 38 Nm (3.8 kgf•m, 28 lb•ft) by using the steering nut wrench, then loosen the lower ring nut one turn.
- Retighten the lower ring nut 7 Nm (0.7 kgf•m, 5.2 lb•ft).



Note ③ : Fastening nut for instrument support block

⚠ It is advisable to periodically check the tightening of bolts "A" of the instrument support block and if necessary, reset it to the prescribed torque.

⚠ When checking the tightening of the instrument support block, special care should be taken not to exceed the prescribed torque.

🔧 Fastening nut for instrument support block :
35 Nm (3.5 kgf·m, 25.8 lb·ft)

Electrical tightening torques (all versions)

Item	Thread size	Quantity	Tightening torque	Remarks
Stator	M5	3	10 Nm (1.0 m·kg, 7.4 ft·lb)	
Rotor	M12	1	65 Nm (6.5 m·kg, 48 ft·lb)	
Ignition coil	M6	2	7 Nm (0.7 m·kg, 7.2 ft·lb)	

1.10 MAINTENANCE LIMITS

Engine

Elemento	Standard	Limite
Cylinder head: Warp limit	–	0.05 mm (0.0020 in)
Cylinder: Bore size	97.000–97.010 mm (3.8189–3.8193 in)	97.060 mm (3.8213 in)
Camshaft: Camshaft cap inside diameter Camshaft journal diameter Camshaft-journal-to-camshaft-cap clearance Camshaft lobe dimensions: Lobe height (Intake) Lobe height (Exhaust) Camshaft runout limit	22.000–22.021 mm (0.8861–0.8670 in) 21.959–21.972 mm (0.8645–0.8650 in) 0.028–0.062 mm (0.0011–0.0024 in) – – –	– – – 38.030 mm (1.4972 in) 34.170 mm (1.3453 in) 0.030 mm (0.0012 in)
Valve, valve seat, valve guide: Valve clearance (cold): Intake Exhaust Valve dimensions: Valve seat contact width (intake) Valve seat contact width (exhaust) Valve stem diameter (intake) Valve stem diameter (exhaust) Valve guide inside diameter (intake) Valve guide inside diameter (exhaust) Valve-stem-to-valve-guide clearance (intake) Valve-stem-to-valve-guide clearance (exhaust) Valve stem runout	0.10–0.17 mm (0.0039–0.0067 in) 0.15–0.22 mm (0.0059–0.0087 in) – – – – 5.500–5.512 mm (0.2165–0.2170 in) 5.500–5.512 mm (0.2165–0.2170 in) – – – – –	– – 1.5 mm (0.06 in) 1.5 mm (0.06 in) 5.445 mm (0.2144 in) 5.435 mm (0.2140 in) – – 0.080 mm (0.0032 in) 0.100 mm (0.0039 in) 0.020 mm (0.0008 in)
Valve spring: Free length (intake) Free length (exhaust)	– –	36.65 mm (1.44 in) 35.55 mm (1.40 in)
Piston: Piston-to-cylinder clearance Diameter Measuring point (from piston skirt bottom)	0.010–0.045 mm (0.0004–0.0018 in) 96.955–96.970 mm (3.8171–3.8177 in) 9.0 mm (0.35 in)	– – –
Piston pin: Piston pin bore inside diameter Piston pin outside diameter Piston-pin-to-piston-pin-bore clearance	– – 0.004–0.024 mm (0.0002–0.0009 in)	18.045 mm (0.7104 in) 17.981 mm (0.7079 in) –
Piston ring (top ring): End gap (installed) Ring side clearance (installed)	– 0.015–0.065 mm (0.0006–0.0026 in)	0.55 mm (0.0217 in) 0.120 mm (0.0047 in)
Piston ring (second piston ring): End gap (installed) Ring side clearance (installed)	– 0.020–0.060 mm (0.0008–0.0024 in)	0.85 mm (0.0335 in) 0.100 mm (0.0039 in)
Crankshaft: Crank assembly width Runout limit	61.93–62.00 mm (2.438–2.441 in) –	– 0.030 mm (0.0012 in)

Elemento	Standard	Limite
Clutch:		
Clutch lever free play	7.0–12.0 mm (0.28–0.47 in)	–
Friction plate 1 thickness	2.92–3.08 mm (0.115–0.121 in)	2.82 mm (0.111 in)
Plate quantity	6 pezzi	–
Friction plate 2 thickness	2.92–3.08 mm (0.115–0.121 in)	2.82 mm (0.111 in)
Plate quantity	2 pezzi	–
Clutch plate thickness	1.50–1.70 mm (0.059–0.067 in)	–
Plate quantity	7 pezzi	–
Warpage limit	–	0.10 mm (0.004 in)
Clutch spring free length	48.00 mm (1.89 in)	45.60 mm (1.80 in)
Push rod bending limit	–	0.10 mm (0.004 in)
Trasmission:		
Main axle deflection limit	–	0.08 mm (0.0032 in)
Drive axle deflection limit	–	0.08 mm (0.0032 in)
Shifter:		
Shifting type	Cam drum and guide bar	–
Guide bar bending limit	–	0.050 mm (0.0020 in)
Kickstarter type:		
Kick clip friction force	Kick and mesh P=7.80–11.80 N (0.80–1.20 kg, 1.75–2.65 lb)	– –
Air filter oil grade (oiled filter)	Foam air filter oil or other quality foam air filter oil	–
Idling condition:		
Engine idling speed	1900–2100 giri/min.	
Exhaust gas sampling point	Sampling port on the exhaust pipe	
Coolant temperature	70–90°C (158–194°F)	
Fuel line pressure (at idle)	300–390 kPa (3.0–3.9 kgf/cm ² , 43.5–56.6 psi)	
CO%	2.0–6.0 %	
Intake vacuum	35.8 kPa (269 mmHg, 10.6 inHg)	
Throttle grip free play	3.0–6.0 mm (0.12–0.24 in)	
Cooling:		
Radiator cap valve opening pressure	107.9–137.3 kPa (1.08–1.37 kgf/cm ² , 15.6–19.9 psi)	–
Radiator capacity (including the whole circuit)	1.03 L (1.09 US qt, 0.91 Imp.qt)	–

Chassis

Item	Standard	Limit
Steering system: Steering bearing type	Taper roller bearing	–
Front suspension: Front fork travel Fork spring free length Optional spring Oil capacity Oil grade Inner tube bending limit	310.0 mm (12.2 in) – Yes 491.0 cm ³ (16.60 US oz, 17.32 Imp.oz) Suspension Oil S1 –	– 492.0 mm (19.37 in) – – – 0.2 mm (0.01 in)
Rebound damping: Adjusting system Unit for adjustment Adjustment value from the start position (Soft) Adjustment value from the start position (STD) Adjustment value from the start position (Hard)	Mechanical adjustable type Click 20 8 0	– – – –
Damping in compression: Adjusting system Unit for adjustment Adjustment value from the start position (Soft) Adjustment value from the start position (STD) Adjustment value from the start position (Hard)	Mechanical adjustable type Click 20 12 0	– – –
Rear suspension: Spring preload: Adjusting system Adjustment value (Soft) Adjustment value (STD) Adjustment value (Hard)	Mechanical adjustable type 1.5 mm (0.06 in) 10.0 mm (0.39 in) 18.0 mm (0.71 in)	– – –
Rebound damping: Adjusting system Unit for adjustment Adjustment value from the start position (Soft) Adjustment value from the start position (STD) Adjustment value from the start position (Hard)	Mechanical adjustable type Click 30 8 0	– – –

Item	Standard	Limit
Compression damping: Adjusting system Fast compression damping: Unit for adjustment Adjustment value from the start position (Soft) Adjustment value from the start position (STD) Adjustment value from the start position (Hard)	Mechanical adjustable type Turn 2 1 0	– – –
Slow compression damping: Unit for adjustment Adjustment value from the start position (Soft) Adjustment value from the start position (STD) Adjustment value from the start position (Hard)	Click 20 10 0	– – –
Swingarm: Swingarm end free play limit (radial) Swingarm end free play limit (axial)	– –	1.0 mm (0.04 in) 0.2–0.9 mm (0.01–0.04 in)
Wheel: Front wheel type Rear wheel type Front rim size/material Rear rim size/material Rim runout limit: Radial Lateral Front wheel axle bending limit Rear wheel axle bending limit	Spoke wheel Spoke wheel 21 × 1.60/Aluminium 18 × 2.15/Aluminium – – – –	– – – – 2.0 mm (0.08 in) 2.0 mm (0.08 in) 0.50 mm (0.02 in) 0.50 mm (0.02 in)
Drive chain: Measurement Type Number of links Chain slack Chain length (15 links)	520 Type without seal 114 50.0–60.0 mm (1.97–2.36 in) –	– – – – 239.3 mm (9.42 in)
Front brake: Front brake lever free play Disc outside diameter × thickness Brake disc thickness limit Brake disc runout limit (as measured on wheel) Master cylinder inside diameter Caliper cylinder inside diameter (Left) Specified brake fluid	0.0 mm (0.00 in) 300.0 × 4.0 mm (11.81 in × 0.15 in) 2.5 mm (0.10 in) 0.15 mm (0.0059) 9.52 mm (0.37 in) 25.40 mm, 25.40 mm (1.00 in, 1.00 in) DOT 4	– – – 1.0 mm (0.04 in) – –

Item	Standard	Limit
Rear brake:		
Brake pedal position	5.0 mm (0.20 in)	–
Disc outside diameter × thickness	245.0 × 4.0 mm (9.64 in × 0.16 in)	–
Brake disc thickness limit	3.5 mm (0.14 in)	–
Brake disc runout limit (as measured on wheel)	0.15 mm (0.0059)	1.0 mm (0.04 in)
Master cylinder inside diameter	11.0 mm (0.43 in)	–
Caliper cylinder inside diameter	25.40 mm (1.00 in)	–
Specified brake fluid	DOT 4	

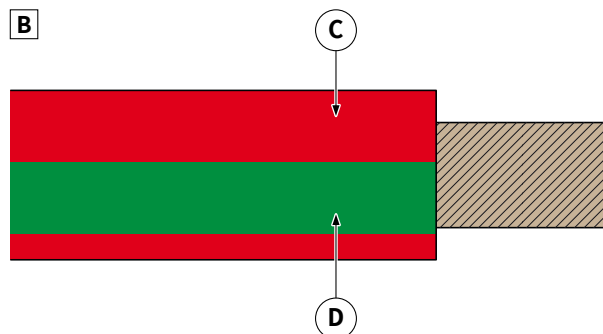
Electrical

Item	Standard	Limit
Tensione impianto	12 V	–
Ignition system:		
Ignition system	TCI	–
Ignition timing (B.T.D.C.)	8.0–12.0° /2000 r/min.	–
Ignition coil:		
Primary coil resistance	2.16–2.64 Ω	–
Secondary coil resistance	8.64–12.96 Ω	–
Spark plug cap:		
Resistance	7.50–12.50 kΩ	–
Lean angle sensor:		
Operating angle	45 °	–
Charging system:		
Charging system	AC magneto	–
Standard output	14.0 V, 10.0 A at 5000 r/min.	–
Stator coil resistance	0.368–0.552 Ω	–
Rectifier / regulator:		
Regulator type	Single-phase	–
Regulated voltage (DC)	14.0–14.8 V	–
Battery:		
Voltage, capacity	12 V, 3.0 Ah (10 HR)	–
Indicator light:		
Fuel level warning light	LED	–
Engine trouble warning light	LED	–
Starter motor:		
Brush overall length	11.0 mm (0.43 in)	5.5 mm (0.22 in)
Brush spring force	4.80–7.20 N (489–734 gf, 17.28–25.92 oz)	–
Mica undercut (depth)	–	2.40 mm (0.09 in)
Fuel injection sensor:		
Crankshaft position sensor resistance	228–342 Ω	–
Intake air temperature sensor resistance	5400–6600 Ω a 0°C (5400–6600 Ω a 32°F)	–
Intake air temperature sensor resistance	289–391 Ω a 80°C (289–391 Ω a 176°F)	–
Coolant temperature sensor resistance	2513–2777 Ω a 20°C (2513–2777 Ω a 68°F)	–
Coolant temperature sensor resistance	210–221 Ω a 100°C (210–221 Ω a 212°F)	–

A



B



1.11 ELECTRICAL SYSTEM DIAGRAM

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 = L ;
• case “B” : Red (primary) and Green (secondary) = RV.

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

Code	Cables color
A	SKY BLUE
B	WHITE
C	ORANGE
D	DARK BLUE
G	YELLOW
H	GREY
L	BLUE
M	BROWN
N	BLACK
R	RED
S	PINK
V	GREEN
Z	PURPLE

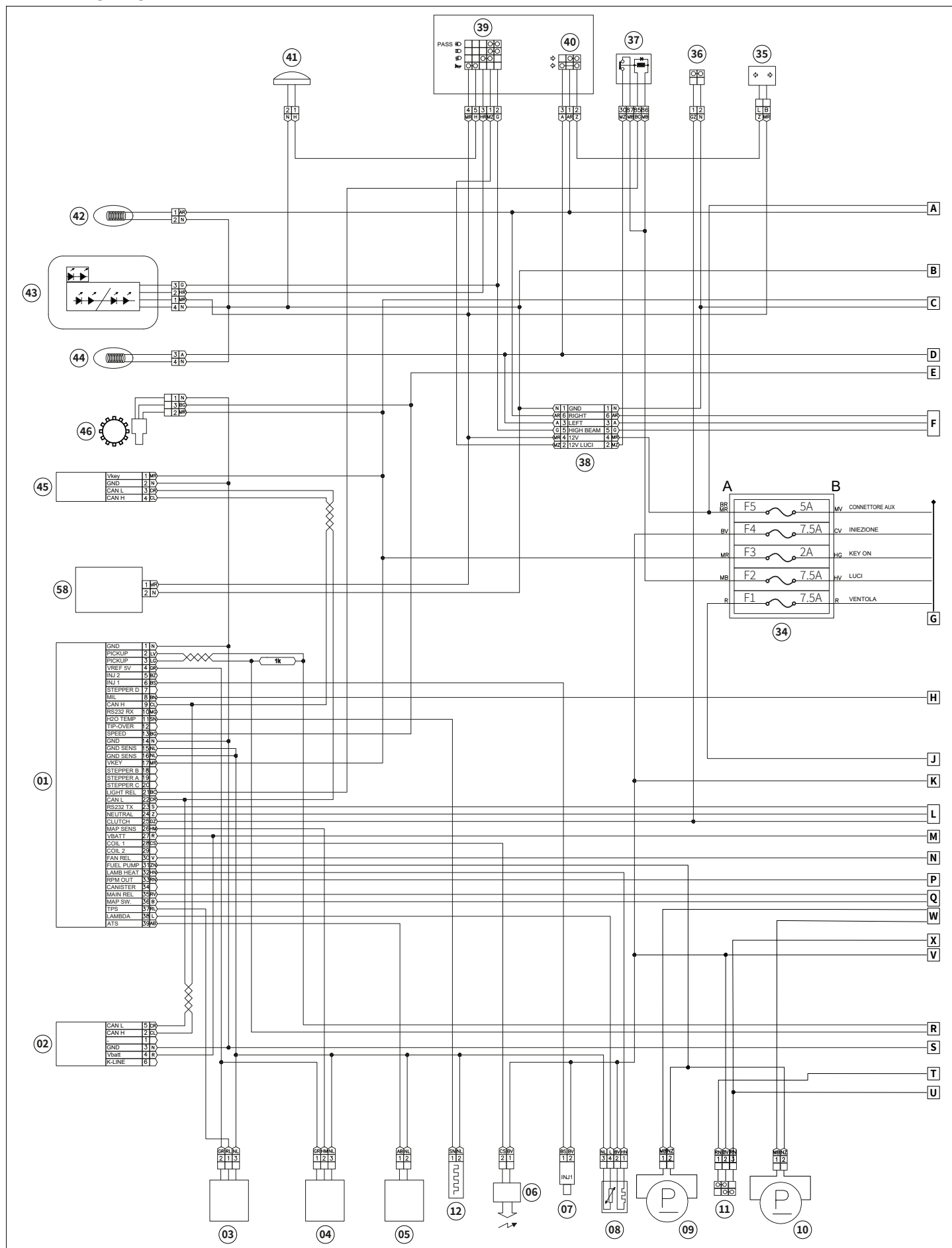
Main wiring diagram component legend

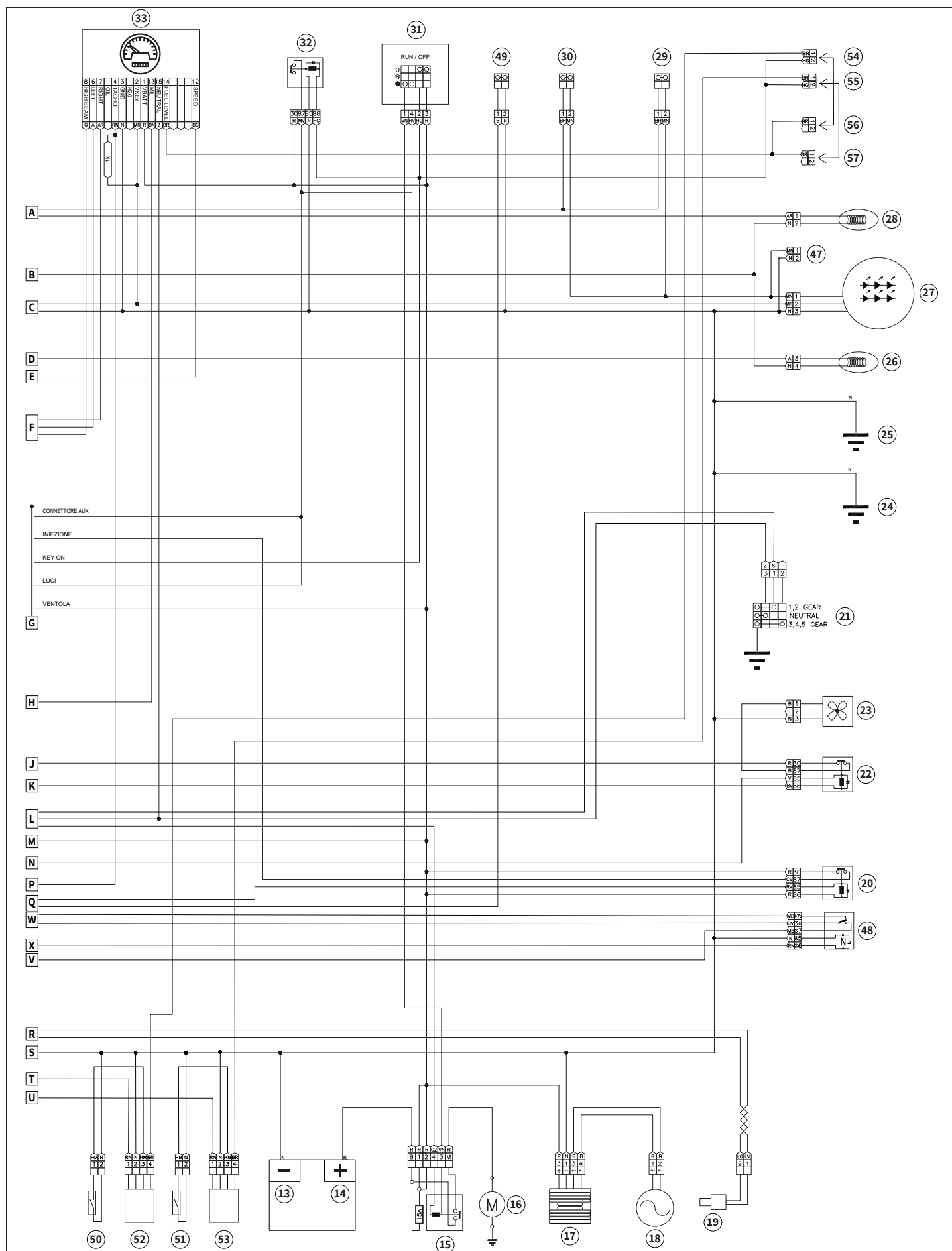
The following table lists all the components in the main electrical system diagram and their numbering.

Number	Description of the electrical component
1	Engine control unit (CDI)
2	OBD diagnosis connector
3	TPS sensor
4	MAP sensor
5	ATS sensor
6	Ignition coil
7	Fuel injector 1
8	Oxygen sensor
9	Front tank fuel pump
10	Rear tank fuel pump
11	Fuel pump selection switch
12	Water temperature sensor
13	Negative battery pole
14	Positive battery pole
15	Starter remote control switch
16	Starter motor
17	Voltage regulator
18	Magnet flywheel
19	Pick-Up
20	Engine control remote control switch
21	Gear sensor
22	Fan remote control switch
23	Radiator fan
24	Engine ground point
25	Frame ground point
26	Rear left turn signal
27	Tail light
28	Rear right turn signal
29	Rear brake light switch
30	Front brake light switch
31	Right light stalk
32	Main control switch
33	Dashboard
34	Fuse box
35	Intermittent light
36	Gearshift position switch
37	Lights remote control switch
38	Handlebar devices wiring harness interconnection
39	Left light stalk
40	Left light stalk - secondary connector
41	Horn
42	Front right turn signal
43	Front headlight
44	Front left turn signal
45	Wi-Fi interface

Number	Description of the electrical component
46	Speed sensor
47	Race light
48	Rear fuel pump control switch
49	Engine map selector
50	Front fuel tank reserve probe
51	Rear fuel tank reserve probe
52	Front fuel tank reserve interface
53	Rear fuel tank reserve interface
54	Front fuel tank reserve warning light
55	Rear fuel tank reserve warning light
56	Front fuel tank level dashboard warning light
57	Rear fuel tank level dashboard warning light
58	Terrain command - Bluetooth control

Main wiring diagram



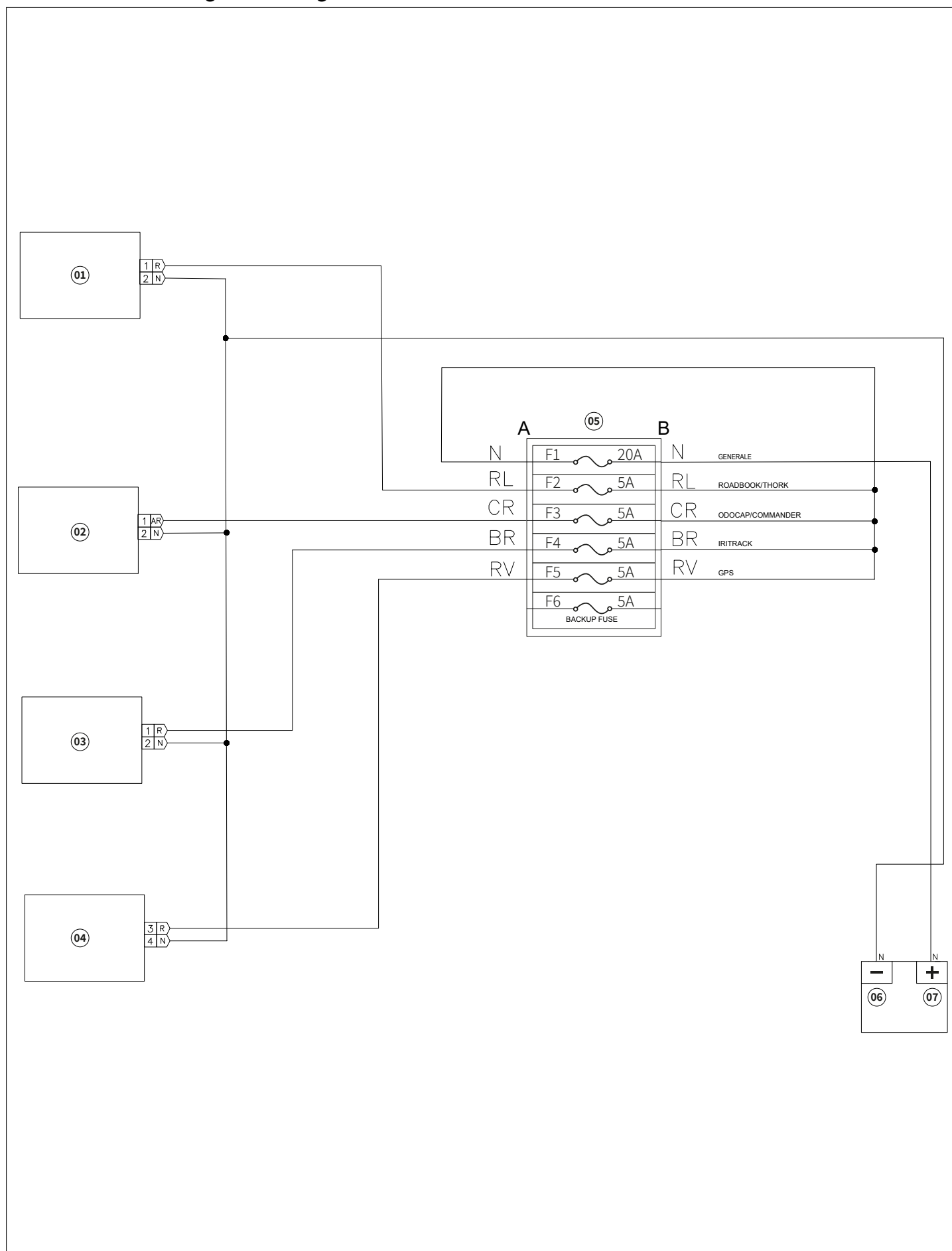


Service wiring harness components legend

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

Numero	Descrizione del componente elettrico
01	Roadbook tablet
02	OdoCap
03	IRITrack
04	GPS
05	Fuse box on front frame
06	Negative battery pole
07	Positive battery pole

Standard services wiring harness diagram

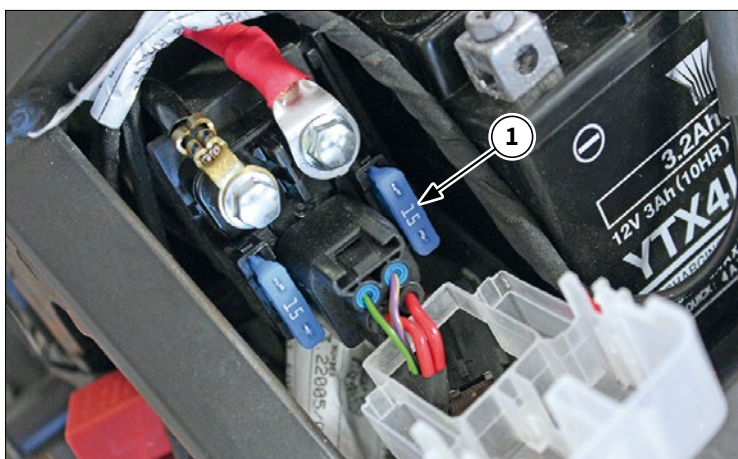




1.12 LAMPS

⚠ The front and rear lights are LED type, therefore they do not require maintenance.

The front and rear turn indicators are equipped with 12V - 6W halogen lamps.



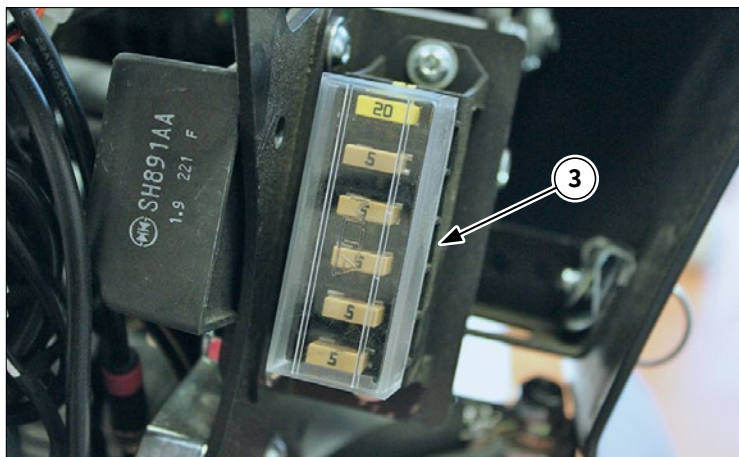
1.13 FUSES

The battery fuse "1" is accessible by removing the seat and the protective cover of the starter remote control switch.

⚡ Battery fuse: 15 A



The main fuse box "2" is accessible by removing the seat.

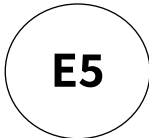
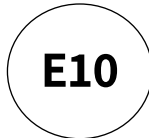
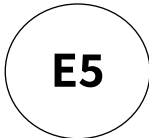
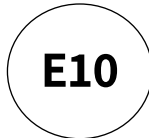
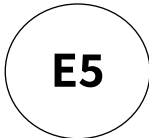
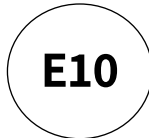


The auxiliary fuse box “3” is accessible directly, next to the dashboard.

1

1.14 RECOMMENDED LUBRICANTS AND LIQUIDS

⚠ 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				
2-stroke gear engine oil	10W-40, 10W-50, 15W-40, 20W-50 API service SG type or higher, JASO standard Ma	Do not use mineral oils.				
Grease for bearings, joints, articulations and linkage	Lithium grease					
Coolant	Antifreeze liquid based on ethylene glycol with organic additives	Do not dilute with water.				
Fork oil	Fork oil gradation 7,5W or equivalent					
Transmission chain lubricant	Spray grease for transmission chains					
Brake oil	Synthetic Brake Fluid DOT 4					
Olio per filtro aria	Air Filter Special Oil					
Cleaner for electrical contacts	Contact cleaner					
Fuel	95 or 98 octane super lead-free petrol	<table><tr><th colspan="2">PETROL FUEL TYPE</th></tr><tr><td></td><td></td></tr></table>	PETROL FUEL TYPE			
PETROL FUEL TYPE						
						
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	Unblocking protective lubricant					
Anti-friction lubricant for screw tightening torques	Generic engine oil					
Oil seals and O-rings lubricant for rubber parts	Lithium soap grease					
Battery terminals	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.				

1.15 MAINTENANCE INTERVALS

⚠ From 7000 km (4200 mi) or 9 months, repeat the maintenance intervals starting from 3000 km (1800 mi) or 3 months.

ⓘ Items marked with an asterisk (*) should be performed by a FANTIC dealer as they require special tools, data and technical skills.

Periodic maintenance chart for the emission control system

No.		Item	Checks and maintenance jobs	Initial / 1000 km (600 mi) or 1 month	3000 km (1800 mi) or 3 months	5000 km (3000 mi) or 6 months
1	*	Fuel line	– Check fuel hoses for cracks or damage. – Replace if necessary.	√	√	√
2		Spark plug	– Check condition. – Adjust gap and clean.	√	√	√
3	*	Valve clearance	– Check and adjust valve clearance when engine is cold.	√		√
4	*	Air filter element	– Clean with solvent and apply quality foam air filter oil. – Replace if necessary.	√	√	√
5	*	Breather system	– Check ventilation hose for cracks or damage and drain any deposits. – Replace (only for XEF 250).	√	√	√
6	*	Fuel injection	– Adjust engine idling speed.	√	√	√
7		Exhaust system	– Check for leakage. – Tighten if necessary. – Replace gasket(s) if necessary.	√	√	√
8		Engine oil	– Change (warm engine before draining).	√	√	√
9		Engine oil filter element	– Replace.	√	√	√
10		Engine oil strainer	– Clean.	√	√	√

General maintenance and lubrication chart

No.		Item	Checks and maintenance jobs	Initial / 1000 km (600 mi) or 1 month	3000 km (1800 mi) or 3 months	5000 km (3000 mi) or 6 months
1		Clutch	– Check operation. – Adjust or replace cable.	√	√	√
2	*	Cooling system	– Check hoses for cracks or damage. – Replace if necessary. – Replace with ethylene glycol anti-freeze coolant.	√	√	√
3	*	Spark arrester	– Clean.			√
4	*	Front brake	– Check operation, fluid level, and for fluid leakage. – Replace brake pads if necessary. – Replace brake fluid every 1 year.	√	√	√
5	*	Rear brake	– Check operation, fluid level, and for fluid leakage. – Replace brake pads if necessary. – Replace brake fluid every 1 year.	√	√	√
6	*	Brake hoses	– Check for cracks or damage and replace if necessary.		√	√
7	*	Wheels	– Check runout, spoke tightness and for damage. – Tighten spokes if necessary.	Every 30 hours		

No.		Item	Checks and maintenance jobs	Initial / 1000 km (600 mi) or 1 month	3000 km (1800 mi) or 3 months	5000 km (3000 mi) or 6 months
8	*	Tires	– Check tread depth and for damage. – Replace if necessary. – Check air pressure. – Correct if necessary.	√	√	√
9	*	Wheel bearings	– Check bearings for smooth operation. – Replace if necessary.	√	√	√
10	*	Swingarm pivot bearings	– Check bearing assemblies for looseness. – Moderately repack with lithium-soap-based grease.	√	√	√
11		Drive chain	– Check chain slack/alignment and condition. – Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.	Every ride		
12	*	Steering bearings	– Check bearing assemblies for looseness. – Moderately repack with lithium-soap-based grease every 1200 mi (2000 km) or 12 months (whichever comes first).	√	√	√
13		Brake and clutch lever pivot shafts	– Apply lithium-soap-based grease (all-purpose grease) or silicone grease lightly.	Every 30 hours		
14		Brake pedal pivot shafts	– Apply lithium-soap-based grease (all-purpose grease) lightly.	Every 30 hours		
15		Sidestand pivot	– Check operation. – Apply lithium-soap-based grease (all-purpose grease) lightly.	√	√	√
16	*	Front fork	– Check operation and for oil leakage. – Replace if necessary.		√	√
17	*	Shock absorber assembly	– Check operation and for oil leakage. – Replace if necessary.		√	√
18	*	Rear suspension link pivots	– Apply molybdenum disulfide grease lightly.		√	√
19	*	Control cables	– Apply chain and cable lube or engine oil 10W-30 thoroughly.	√	√	√
20	*	Throttle grip housing and cable	– Check operation and free play. – Adjust the throttle cable free play if necessary. – Lubricate the throttle grip housing and cable.	√	√	√
21	*	Chassis fasteners	– Check all chassis fitting and fasteners. – Correct if necessary.	√	√	√
22		Battery	– Check terminal for looseness and corrosion.		√	√

⚠ The air filter needs more frequent service if you are riding in unusually wet or dusty areas.

⚠ **Hydraulic brake service:**
After disassembling the brake master cylinders and calipers, always change the fluid. Regularly check the brake fluid levels and fill the reservoirs as required.
Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
Replace the brake hoses every four years and if cracked or damaged.

Maintenance intervals for competition use

⚠ The following schedule is intended as a general guide to maintenance and lubrication. Bear in mind that such factors as weather, terrain, geographical location, and individual usage will alter the required maintenance and lubrication intervals. If you are in doubt as to what intervals to follow in maintaining and lubricating your machine, consult your FANTIC dealer.

⚠ Periodic inspection is essential in making full use of the machine performance. The service life of the parts varies substantially according to the environment in which the machine runs (e.g., rain, dirt, etc.). Therefore, earlier inspection is required by reference to the list below.

ⓘ Items marked with an asterisk (*) should be performed by a FANTIC dealer as they require special tools, data and technical skills.

ⓘ At every service, involving components bordering consumable parts (seals, oil seals, O-rings, etc.), their replacement is required.

No.	Item	Routine	After break-in	Every 15 hours	Every 30 hours	Every 60 hours	As required
1	*	Valve	- Check valve clearances.	√	√		
			- Check valve seats & valve faces for wear.		√		
			- Replace.				√
2	*	Valve Spring	- Check the free length.		√		
			- Replace.				√
3	*	Valve lifter	- Check for scratches & wear.		√		
			- Replace.				√
4	*	Camshaft	- Inspect the camshaft surface.		√		
			- Inspect the decompressor system.				
			- Replace.				√
5	*	Timing chain	- Check for damage and sticking.				√
			- Replace.			√	√
6	*	Timing chain tensioner	- Replace.			√	√
7	*	Camshaft sprocket	- Check for wear on the teeth and for damage.		√		
			- Replace.				√
8	*	Piston	- Inspect crack.				√
			- Inspect carbon deposits & eliminate them.				√
			- Replace the piston, piston pin, piston pin clip, and piston ring all as a set.			√	√
9	*	Piston ring	- Check the end gap of the piston ring.				√
			- Replace the piston, piston pin, piston pin clip, and piston ring all as a set.			√	√
10	*	Piston pin	- Inspect.				√
			- Replace the piston, piston pin, piston pin clip, and piston ring all as a set.			√	√

No.	Item	Routine	After break-in	Every 15 hours	Every 30 hours	Every 60 hours	As required
11	*	Cylinder head	- Check the coolant passages for corrosion.			√	
			- Inspect carbon deposits and eliminate them.				
			- Check for warpage, and replace the gasket.				
12	*	Cylinder	- Inspect score marks.			√	
			- Inspect wear.			√	
			- Replace.				√
13		Engine oil	- Check the engine oil amount.	√	√		
			- Replace.	√	√		
14		Oil filter element	- Replace.	√	√		
15	*	Oil strainer	- Clean.	√	√		
16	*	Clutch	- Inspect housing, friction plate, clutch plate and spring.		√		
			- Replace.				√
17	*	Transmission	- Inspect.				√
			- Replace bearings.				√
18	*	Shift fork, shift cam, guide bar	- Inspect wear.				√
19	*	Nut (generator rotor)	- Check the tightening torques.	√		√	
20	*	Crankshaft	- Replace.			√	
21		Air filter	- Clean and lubricate.	√	√		
			- Replace.				√
22		Spark plug	- Clean the electrodes and the terminals wear.	√	√		
			- Replace.				√

2.1 PRE-OPERATION INSPECTION AND MAINTENANCE

Before riding for break-in operation, practice or a race, make sure the machine is in good operating condition.

Before using this machine, check the following points.

Item	Routine	Page
Coolant	Check that coolant is filled up to the radiator cap. Check the cooling system for leakage.	page 68
Fuel	Check that a fresh mixture of oil and gasoline is filled in the fuel tank. Check the fuel line for leakage.	page 45
Engine oil	Check that the oil level is correct. Check the crankcase for leakage.	page 66
Gear shifter and clutch	Check that gears can be shifted correctly in order and that the clutch operates smoothly.	page 57
Throttle grip/Housing	Check that the throttle grip operation and free play are correctly adjusted. Lubricate the throttle grip and housing, if necessary.	page 58
Brakes	Check the play of front brake and effect of front and rear brake.	page 89
Drive chain	Check drive chain slack and alignment. Check that the drive chain is lubricated properly.	page 92
Wheels	Check for excessive wear and tire pressure. Check for loose spokes and have no excessive play.	page 92
Steering	Check that the handlebar can be turned smoothly and have no excessive play.	page 87
Front forks and rear shock absorber	Check that they operate smoothly and there is no oil leakage.	page 88–
Cables (wires)	Check that the clutch and throttle cables move smoothly. Check that they are not caught when the handlebars are turned or when the front forks travel up and down.	–
Muffler	Check that the muffler is tightly mounted and has no cracks.	–
Rear wheel sprocket	Check that the rear wheel sprocket tightening bolt is not loose.	page 92
Lubrication	Check for smooth operation. Lubricate if necessary.	–
Bolts and nuts	Check the chassis and engine for loose bolts and nuts.	–
Settings	Is the machine set suitably for the condition of the racing course and weather or by taking into account the results of test runs before racing? Are inspection and maintenance completely done?	page 56

2.2 RUNNING IN

Running-in is important to allow the assembled rotating parts and sliding surfaces to combine with each other, as well as to allow the driver to become familiar with the vehicle:

- Warm up the engine and drive for about 20 minutes with a throttle valve opened by 1/2 or less;
- Stop and check: fixings, possible leakage of liquids and/or other problems;
- Then drive for another 40 minutes with a throttle valve opened by 3/4 or less;
- Stop again and check thoroughly: fixings, possible leakage of liquids and/or other problems. In-depth checks and adjustments are particularly necessary for cable paths, brake clearance, chain tensioning, spokes loosening and fixing points of the various vehicle components.

Repeat the procedures described each time they are replaced: piston, piston rings, valves, cylinder, crankshaft bearings. Piston, piston rings and valves: run in for 30 minutes with a throttle valve opening of 1/2 or less. Cylinder, crankshaft and bearings: run in one hour with a throttle valve opening of 1/2 or less

This vehicle is equipped with an automatic engine stop system, which stops it if it is left idle for 7 minutes. If the engine stops, press the starter switch to restart it.

After the first 3 hours or 15 litres of fuel, change the engine oil and replace the engine oil filter.



2.3 REFUELLING

The vehicle is equipped with three separate tanks (central, left side, and right side), each of which has its own filler cap. To refuel one of them, slide out the vent tube and remove cap “1” (unscrew it counterclockwise) for the left side tank, cap “2” for the central tank, and/or cap “3” for the right side tank.

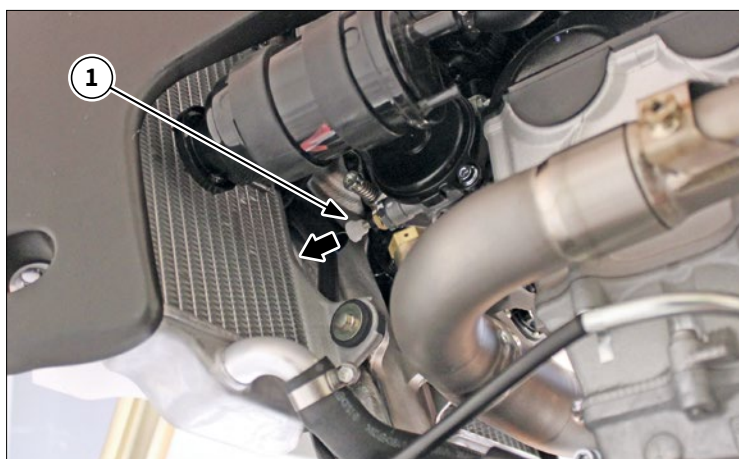
⚠ Do not smoke or use naked flames when refuelling. Avoid using electrical devices or any source that can trigger sparks or ignition. Failure to comply with these rules could result in a danger of fire or explosion, causing serious damage to property and/or persons.

⚠ Do not add additives or other substances to the fuel during refuelling.

⚠ Avoid fuel leakage during refuelling. If you use a funnel, make sure that it is perfectly clean.

⚠ It is recommended to use the type of fuel indicated in the technical specifications of this manual. Do not use different fuels, they could damage the fuel system and compromise the operation of the engine.

⚠ Make sure that tank caps “1”, “2” and “3” are closed tightly.



2.4 STARTING THE ENGINE

Starting a cold engine

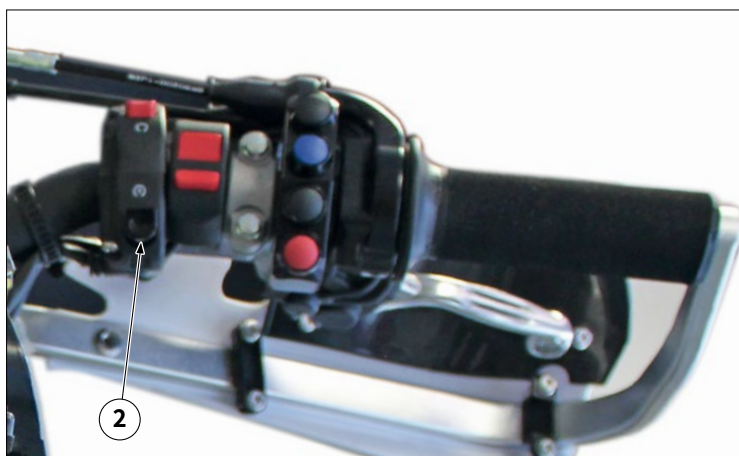
1. Shift the transmission into neutral.
2. Open the starter knob “1” (AIR VALVE) completely.
3. With the throttle valve fully closed, start the engine by pressing the start button “2”.
4. Run the engine at idle or slightly higher until it warms up: this usually takes about one or two minutes.
5. The engine is warmed up when it responds normally to the throttle with the starter knob (CHOKE) turned off.

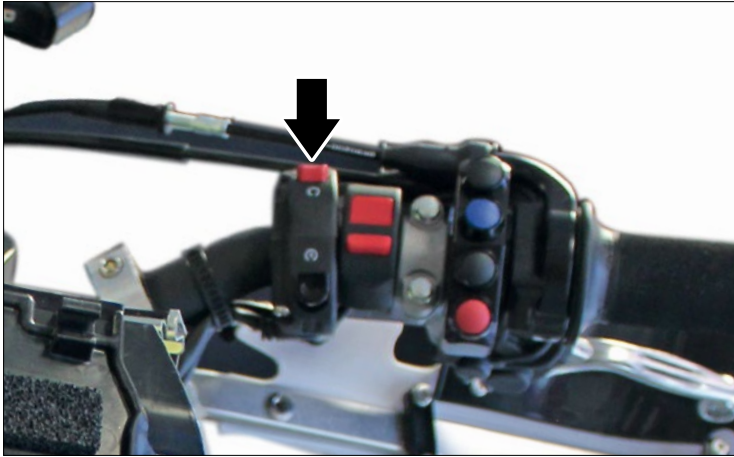
⚠ Do not warm up the engine for extended periods of time.

Starting a warm engine

DO NOT operate the starter knob (AIR VALVE). Open the throttle valve slightly and start the engine by pressing the start button.

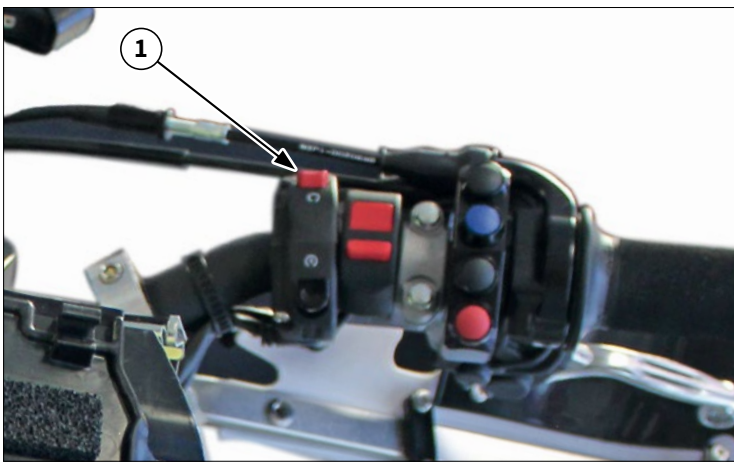
Open the throttle valve slightly and start the engine by pressing the start button “2”.





2.5 STOP THE ENGINE

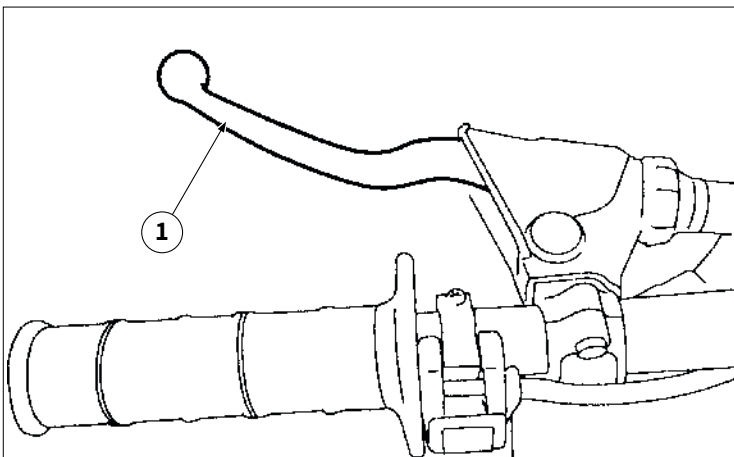
With the throttle valve completely closed, press the “ENGINE STOP” button on the right handlebar.



2.6 MAIN COMPONENTS

Engine stop switch

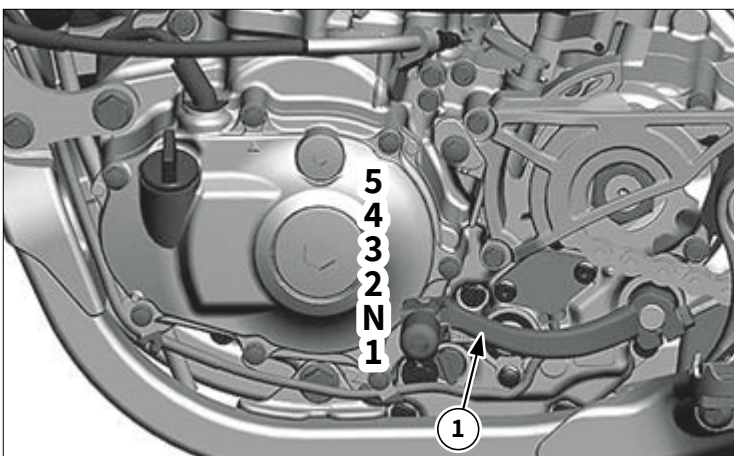
The engine stop switch “1” is located on the right handlebar. Press the engine stop switch until the engine stops.



Clutch lever

The clutch lever “1” is located on the left handlebar; it disengages or engages the clutch. Pull the clutch lever to the handlebar to disengage the clutch, and release the lever to engage the clutch.

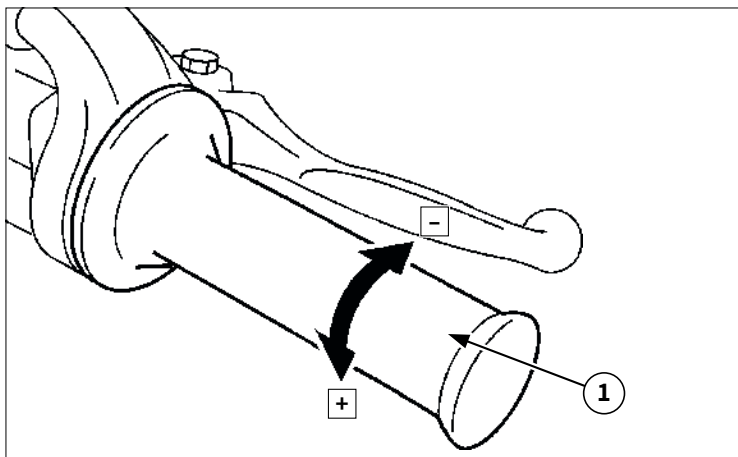
The lever should be pulled rapidly and released slowly for smooth starts.



Shift pedal

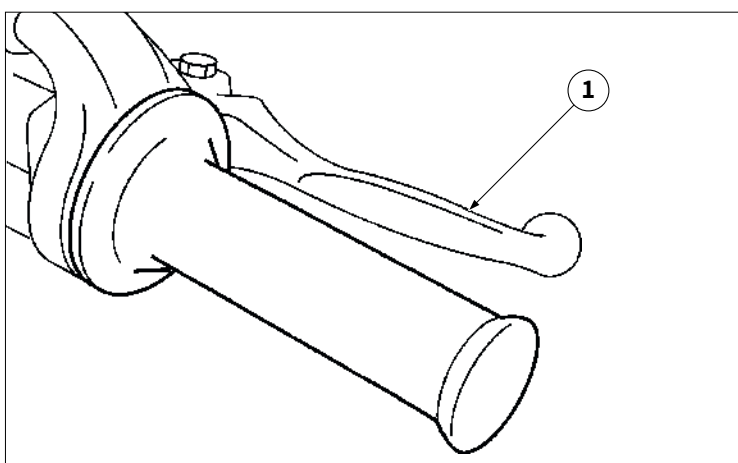
i The gear ratios in the 5-speed gearbox are perfectly spaced.

The gears can be shifted by using the shift pedal “1” on the left side of the engine.

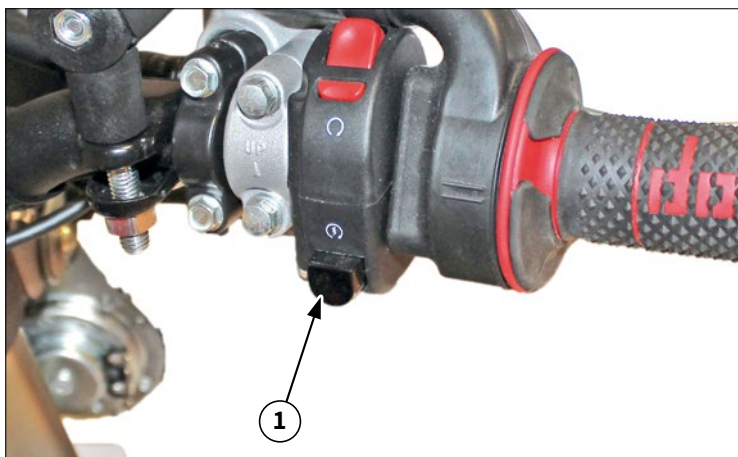
**Throttle grip**

The throttle grip "1" is located on the right handlebar; it accelerates or decelerates the engine. For acceleration, turn the grip toward you; for deceleration, turn it away from you.

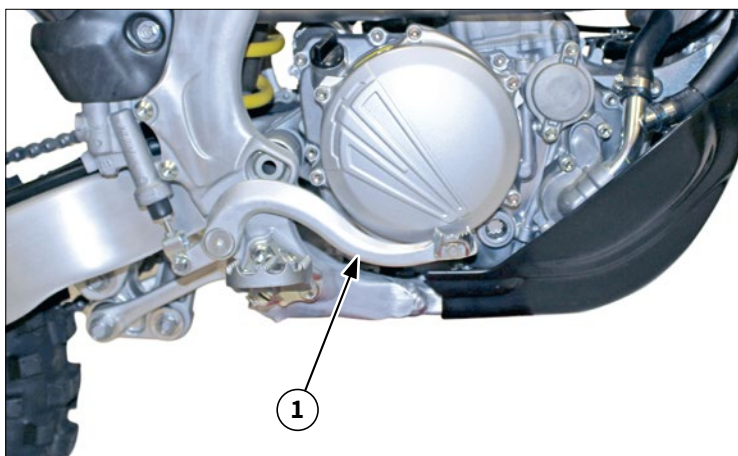
- i** "+" : accelerate
"-" : decelerate

**Front brake lever**

The front brake lever "1" is located on the right handlebar. Pull it toward the handlebar to activate the front brake.

**Start button**

The start button "1" is positioned on the right handlebar. Press this button to start the engine using the starter motor.

**Rear brake pedal**

The rear brake pedal "1" is located on the right side of the machine. Press down on the brake pedal to activate the rear brake.

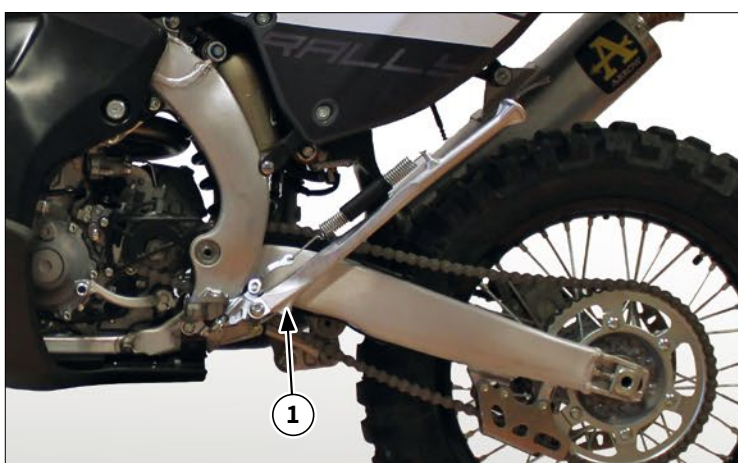


Start knob (air valve)

Starting a cold engine requires more air input, which is provided by the starter knob "1".

Pushing in the knob activates the starter, which increases the opening of the throttle valve. When the engine has warmed up, pull it out to close the circuit.

⚠ When operating the starter knob, be careful not to burn yourself with the exhaust pipe.



Sidestand

This sidestand "1" is used to support only the machine when standing or transporting it.

⚠ Never apply additional force to the sidestand.

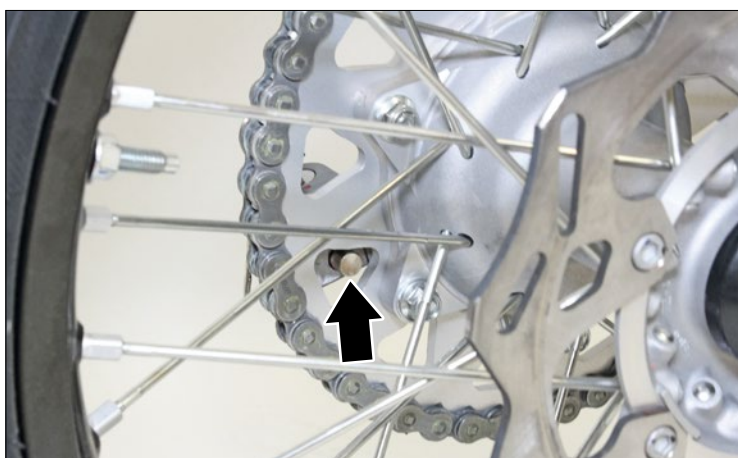
⚠ Hold up the sidestand before starting out.



Locking device

This device "1", operated by the vehicle keys, allows the rotation of the rim so it can be mechanically locked.

i It is recommended to use the device if the vehicle is left parked unattended.



2.7 DASHBOARD

Basic functions

Maximum speed record

- Display range : 0 ~ 360 km/h (0 ~ 225 mile)

Maximum RPM record

- Display range : 0 ~ 15,000 RPM

Speedometer

- Display range : 0 ~ 360 km/h (0 ~ 225 mile)

Indication light

- Neutral (green light)
- Right indication light (green light)
- Water temperature (red light)
- Motor oil (red light) *
- Engine (yellow light)
- Fuel (yellow light) *
- Left indication light (green light)
- High beam light (blue light)

* : Attention! The warning lights on this vehicle are not active.

Average speed record

- Recording range : 0 ~ 360 km/h (0 ~ 225 MPH)

Tachometer

- Display range : 0 ~ 10,000 RPM · 0 ~ 12,000 RPM · 0 ~ 15,000 RPM

Fuel Level

- Setting range : 100Ω · 250Ω · 270Ω · 510Ω · 1200Ω · SWITCH · USER

Low fuel warning

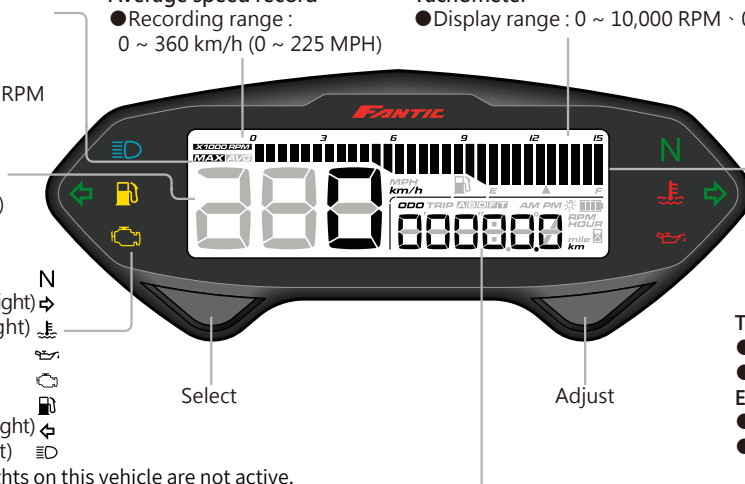
- Setting range : 10 ~ 50%, when lower than (including) setting value, fuel level symbol will blink.

Total engine operating time

- Display range : 0~99,999.9 hours
- Display unit : 0.1 hour

Engine operating time A,B

- Display range : 0~9,999.9 hours
- Display unit : 0.1 hour



Odometer

- Display range : 0 ~ 99999.9 km (mile), return to zero upon exceed.
- Display unit : 0.1 km (mile)

Trip meter A · B

- Display range : 0 ~ 999.9 km (mile), return to zero upon exceed.
- Display unit : 0.1 km (mile)

Tachometer

- Display range : 0 ~ 15,000 RPM
- Display unit : 10 RPM

Voltmeter

- Display range : DC 8.0 V ~ 16.0 V

Motor oil maintenance millage

- Display range : Metric Unit :500 (~ 8,000 km, user adjustable) ~ -999 km, automatic decrease according to the increase of total mileage.
- Display range : Imperial Unit :300 (~ 5,000 km, user adjustable) ~ -999 km, automatic decrease according to the increase of total mileage.
- Display unit : 1 km (mile)

Internal ODO

- Display range : 0 ~ 99,999.9 km (mile), user unadjustable.
- Display range : 0.1 km (mile)

External ODO

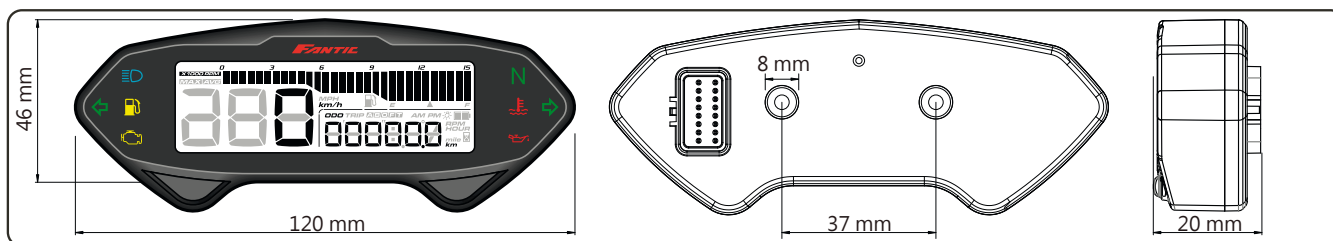
- Setting range : 0 ~ 99,999 km (mile)
- Setting unit : 1 km (mile)

Function, setting instructions

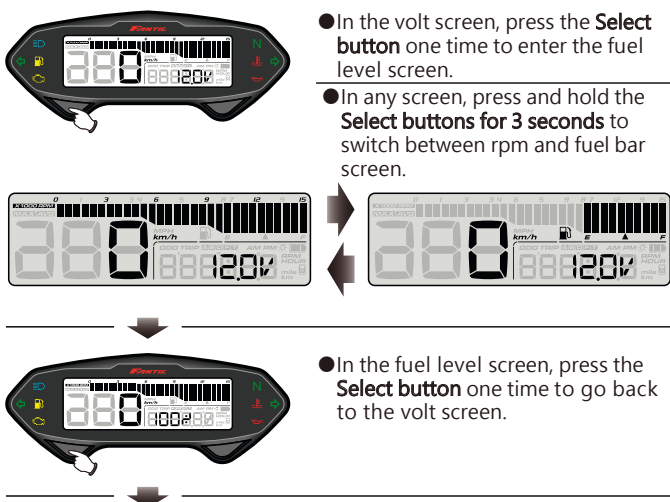
● Speedometer	Display range : 0 ~ 360 km/h (0 ~ 225 MPH) Will blink when exceed range. Display unit : 1 km (mile)	● Total hour meter	Display range : 0 ~ 99 ,999.9 hour Display unit : 0.1 hour
○ Display internal	<0.5 second	○ Hour meter A · B	Display range : 0 ~ 9 ,999.9 hour Display unit : 0.1 hour
○ Odometer	Display range : 0 ~ 99,999.9 km (mile), return to zero upon exceed. Display unit : 0.1km (mile)	● Fuel level	Setting range : 100Ω · 250Ω · 270Ω · 510Ω · 1200Ω · SWITCH · USER
○ Trip meter A · B	Display range : 0 ~ 999.9 km (mile), return to zero upon exceed. Display unit : 0.1km (mile)	○ Staged fuel gauge	Setting range : 10 stage display Warning range : Fuel level warning stage below (including) setting value, fuel level symbol will blink.
● Motor oil maintenance millage	Display range : Metric Unit :500 (~ 8,000 km, user adjustable) ~ -999 km, automatic decrease according to the increase of total mileage. Display range : Imperial Unit :300 (~ 5,000 km, user adjustable) ~ -999 km, automatic decrease according to the increase of total mileage. Display unit : 1 km (mile)	○ Digital fuel gauge	Setting range : 0 ~ 100 % Setting unit : 10 %
○ Maximum speed record	Display range : 0 ~ 360 km (0 ~ 225 mile) Display unit : 1 km (mile)	○ Low fuel warning	Setting range : 10 ~ 50 %, when lower than (including) setting value, fuel level symbol will blink. Setting unit : 10%
○ Average speed record	Recording range : 0 ~ 360km/h (0 ~ 225 MPH)	● Volt meter	Display range : DC8.0 V ~ 16.0 V Display unit : 0.1V
○ Tire circumference	Setting range : 300 ~ 2,500 mm Setting unit : 1 mm	● Internal ODO	Display range : 0~99999.9 km (mile), user unadjustable Display unit : 0.1 km (mile)
○ Sensitive point	Setting range : 1 ~ 20 points Setting range : 1 point	● External ODO	Setting range : 0~99999 km (mile) Setting unit : 1km (mile)
● Tachometer	Display range : 0 ~ 15,000 RPM Display unit : 10 RPM	● Backlight color	Display range : white
○ Display internal	<0.5 second	● Effective voltage	DC 12 V
○ Stage tachometer	Display range : 0 ~ 10,000 RPM · 0 ~ 12,000 RPM · 0 ~ 15000 RPM Display unit : 0 ~ 10,000 RPM (333 RPM each stage) 0 ~ 12,000 RPM (400 RPM each stage) 0 ~ 15,000 RPM (500 RPM each stage)	● Effective temperature range	-10 ~ +60 °C
○ MAX RPM record	Display range : 0 ~ 15,000 RPM Display unit : 10 RPM	● Meter standard	JIS D 0203 (S2)
○ The RPM input signal number setting	Setting range : P-0.5,P-1~P-25	● Meter size	120 x 46 x 20 mm
○ The RPM input pulse Setting range	Setting range : lo-Act, Hi-Act	● Meter weight	Around 240 g
		● Indicator light	Neutral (green light) N Right indication light (green light) → Water temperature (red light) ̶ Motor oil (red light) ̶ High beam light (blue light) ̶ Left indication light (green light) ← Fuel (yellow light) ̶ Engine (yellow light) ̶

NOTE Any design and specification changes will not be notify.

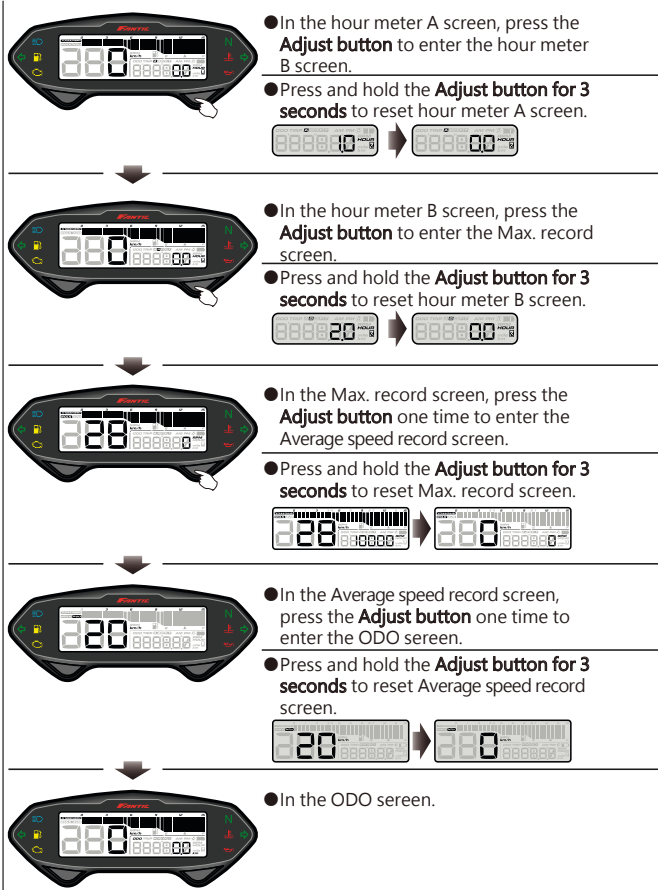
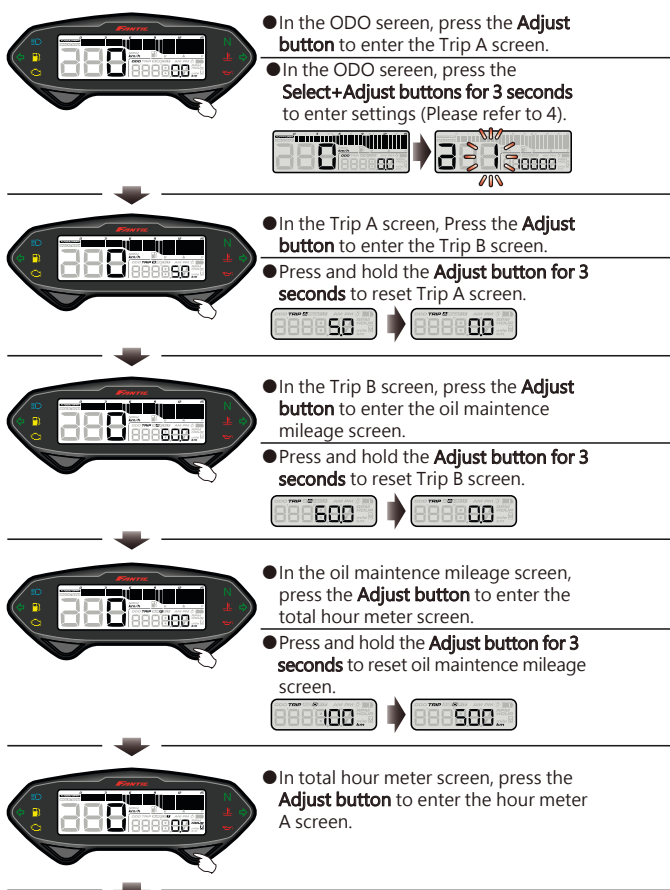
Meter size



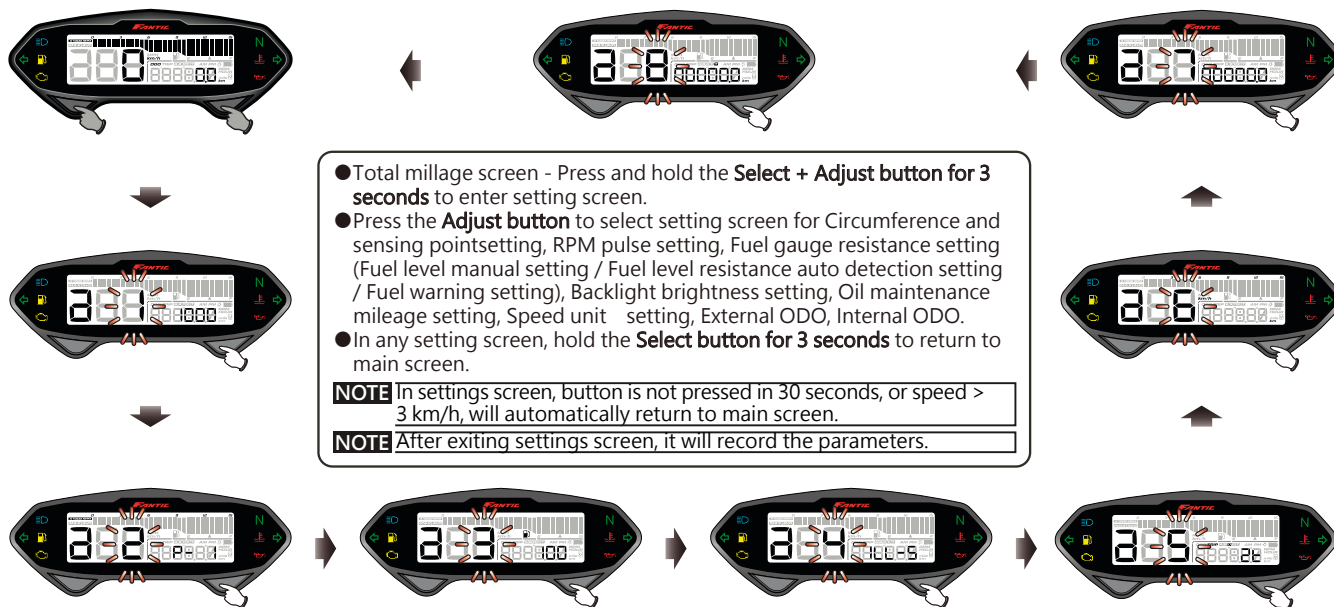
Select button function instruction



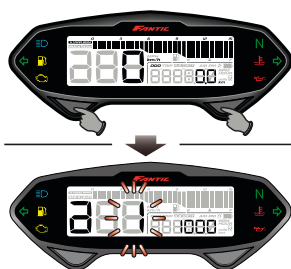
Adjust button function instruction



The settings screen description



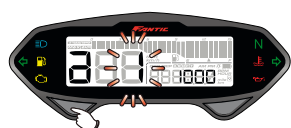
Enter settings and function index menu



- Press and hold the **Select + Adjust** button for **3 seconds** to enter setting screen.

- Function index
 1. Circumference and sensing point setting
 2. RPM pulse setting
 3. Fuel gauge resistance setting
 4. Backlight brightness setting
 5. Oil maintenance mileage setting
 6. Speed unit setting
 7. External ODO
 8. Internal ODO

Circumference and sensing point setting

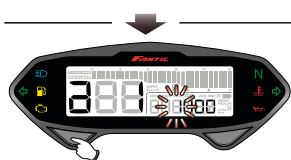


- Press the **Select** button to enter the circumference and sensing point setting screen.

CAUTION!

- Please measure the tire circumference (The tire you will install the sensor on) and make sure the number of magnet sensor point (You could install the magnet into the disc screw or the sprocket screw.)
- The speed displayed on the meter will be affected by the setting, please make sure the setting number is correct before you make the setting.

⚠ Please reset this setting value when you change a different size tire.



- Example : If the tire circumference is 1,300 mm.

- Press the **Select** button to choose the setting number.
- Ex. Now the tire circumference is setting from 1,000 mm.

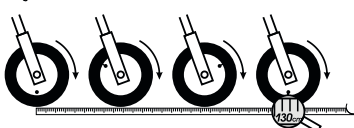
⚠ Now the digit in thousands setting number is flashing!

NOTE Setting range : 300 ~ 2,500 mm
Setting unit : 1 mm

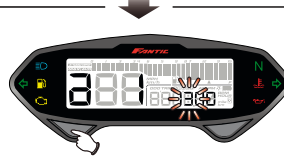
P.S.



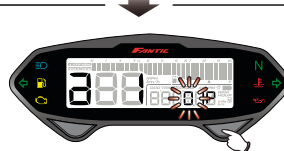
- You could define the valve as the starting point and the terminal point to measure the wheel circumference with a measuring tape.



- Press the **Adjust** button to choose the setting number.



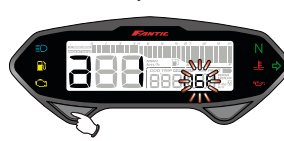
- Press the **Select** button to enter the sensor point setting.
- Ex. The circumference setting is changed from 1,000 mm to 1,300 mm.



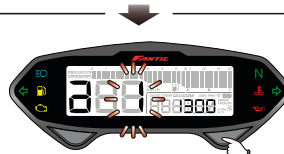
- Example : If the sensor point is setting 6P.
- Press the **Adjust** button to choose the setting number.
- Ex. Now the sensor point is setting from 1P.

⚠ Now the setting value is flashing!

NOTE Sensitive point : 1 ~ 20

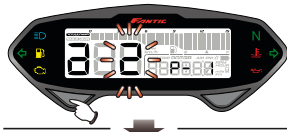


- Press the **Select** button to go back to the circumference and sensing point setting screen.
- Ex. Now the sensor point is setting from 1P to 6P.



- Press the **Adjust** button to enter next operation setting.

RPM pulse setting



- Press the **Select** button to enter the RPM pulse setting screen.



- EX. You want to connect the RPM signal wire to the pick up signal and there are 13 flywheel signals per turn.
- Press the **Adjust** button to choose the setting number.

⚠ Currently setting value will blink.

NOTE Setting range: 0.5 ~ 1 ~ 25

⚠ **CAUTION!** Most of the 4-cycle bikes with one single piston are igniting every 360 degree once, so the setting should be the same as the bike with 2-cycle and one piston engine.

The setting value	The corresponding stroke and pistons number	The corresponding RPM signal number per ignition
0.5	4C-1P	2 RPM signals per 1 ignition.
1	2C-1P 4C-2P	1 RPM signal per 1 ignition.
2	2C-2P 4C-4P	1 RPM signal per 2 ignition.
3	2C-3P 4C-6P	1 RPM signal per 3 ignition.
4	2C-4P 4C-8P	1 RPM signal per 4 ignition.
5	4C-10P	1 RPM signal per 5 ignition.
6	2C-6P 4C-12P	1 RPM signal per 6 ignition.



- Press the **Select** button to enter waveform setting screen.
- EX. Setting engine ignition angle from P-1 to P-13.



- Example : To set waveform to high waveform (Hi-Act).
- Press the **Adjust** button to choose the setting number.

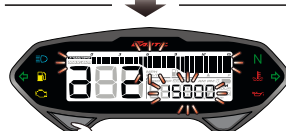
NOTE During RPM signal detection, if there is any bad sensing or interference, please select another RPM sensing waveform.

⚠ Currently setting value will blink.

NOTE Setting range : Hi-Act ~ Lo-Act



- Press the **Select** button to enter rpm stage setting screen.
- EX. Setting from high wave (Hi-Act) to low wave (Lo-Act).



- Example : To set rpm stage value as 10,000 RPM.
- Press the **Select** button to choose the setting number.

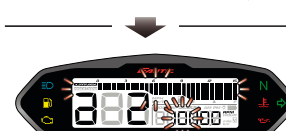
- EX. Current rpm stage value is 15,000 RPM.

⚠ Currently setting value will blink.

NOTE Setting range : 10,000 ~ 12,000 ~ 15,000 RPM



- Press the **Adjust** button to choose the setting number.



- Press the **Select** button to return to rpm stage setting screen.
- EX. Setting rpm stage value form 15,000 RPM to 10,000 RPM.



- Press the **Adjust** button to enter next operation setting.

Inactive functions

⚠ **CAUTION!**

Fuel gauge resistance setting
Fuel level manual setting
Fuel level resistance auto detection setting
Fuel warning setting

All Functions related to the fuel are disabled in this vehicle

Fuel level Setting range : SWITCH
SW

Backlight brightness setting



- Press the **Select** button to enter the backlight brightness setting screen.



- Example : You want to set the brightness at 60 % (3).
- Press the **Adjust** button to choose the setting number.

⚠ Currently setting value will blink.

NOTE Setting range : 1 (Darkest) ~ 5 (Brightest), 5 different levels available. Setting unit : 20% per level. The backlight brightness will change immediately after you set the value.



- Press the **Select** button to go back to the backlight brightness setting screen.
- EX. The backlight brightness setting is changed from 5 (100%) to 3 (60%).



- Press the **Adjust** button to enter next operation setting.

Oil maintenance mileage setting



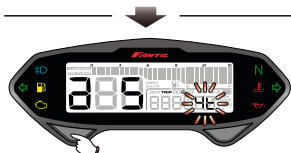
- Press the **Select** button to enter the oil maintenance mileage setting screen.



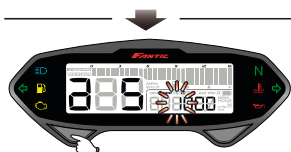
- **Example :** To set motor oil millage value as 4T.
- Press the **Adjust** button to choose the setting number.
- EX. Current motor oil millage is 2T.

⚠ Currently setting value will blink.

NOTE Setting range : 2T / 4T



- Press the **Select** button to enter 4T motor oil millage setting main screen.
- EX. Setting motor oil millage value from 2T to 4T.



- **Example :** To set motor oil millage parameter as 1,500.
- Press the **Select** button to choose the setting number.
- EX. Current motor oil millage parameter is 1,000.

⚠ Currently setting value will blink.

NOTE

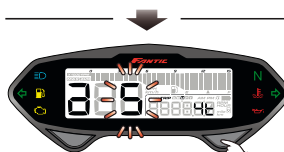
- 2-stroke motor oil millage is indicated by external signal warning (motor oil indicator will lit).
- 4-stroke motor oil millage is internally set by the chronograph.



- Press the **Adjust** button to choose the setting number.



- Press the **Select** button to go back oil maintenance mileage setting screen.
- EX. Setting motor oil millage parameter from 1,000 to 1,500.



- Press the **Adjust** button to enter next operation setting.

Speed unit setting



- Press the **Select** button to enter the speed unit setting screen.



- Press the **Adjust** button to choose the setting number.

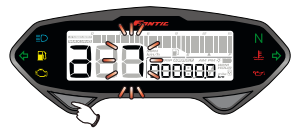


- Press the **Select** button to go back speed unit setting screen.
- EX. The speed unit setting is changed km/h - km to MPH - mlie.

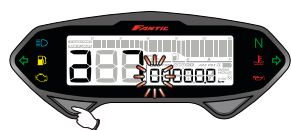


- Press the **Adjust** button to enter next operation setting.

External ODO



- Press the **Select** button to enter the external ODO setting screen.



- **Example :** To set external total millage value to 12,500 km.
- Press the **Select** button to choose the setting number.

⚠ Currently setting value will blink.

NOTE Setting range :
0 ~ 99,999 km (mile)



- Press the **Adjust** button to choose the setting number.

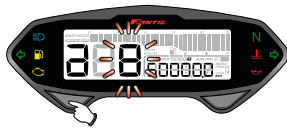


- Press the **Select** button to the external ODO setting screen.
- EX. The external ODO is changed 0 to 12,500 km.



- Press the **Adjust** button to enter next operation setting.

Internal ODO



- Example : Current internal ODO is 50,000 km.
- Press the **Select** button three seconds to go back to ODO screen.

⚠ User unable to adjust and clear internal ODO.

NOTE Setting range : 99999.9 km (mlie).



- The main screen.

Trouble shooting

The following situation do not indicate malfunction of the meter. Please check the following before taking it in for repair.

Trouble	Check item	Trouble	Check item
The meter doesn't work when the power is on.	● The power doesn't supply to the meter. → Please make sure the wiring is connected. → The wiring and fuse are not broken. → The battery is broken or the battery is too old to supply enough power (DC 8 V) to make the meter work.	Tachometer does not appear or appear incorrectly.	● Please check the RPM sensor wiring is connected correctly. ● Please check the spark plug is R type or not. If not, please replace the spark plug with the R type spark plug. ● Please check your setting. → Please refer to the manual 4-2 RPM pulse setting.
The meter shows wrong information. Speed does not appear or appear incorrectly.	● Check the voltage of your battery, and make sure the voltage is over DC 8 V. ● Make sure the speed sensor is connected properly. → Please check if speed sensor is connected and working properly. Also check whether the cable of speed sensor has broken or lose or not. ● Check the tire-size setting. → Refer to the manual 4-1 circumference and sensing point setting.	The odometer and trip meter is not accumulated or accumulated wrong data.	● It is possible that the permanent power wire is not connected well. → Please check the red positive wire is connect well or not.
The odometer and trip meter are not accumulated or accumulated the wrong data.	● It is possible that the permanent power wire is not connected properly. → Check if the red positive wire is connect properly.	Fuel gauge does not appear or appear incorrectly.	● Check your fuel tank. ● Check the wiring harness. → Is the wire connected properly. ● Check the tire-size setting. → Refer to the manual 4-3 fuel gauge resistance setting.

* If the problem is not resolved after following the steps shown above, please contact your local distributor for assistance.

Dashboard setting values

Dashboard setting	Version	Standard value
Wheel circumference	–	2210
Sensitive point	–	P16
RPM pulse	–	HI-ACT
Fuel reserve	–	SWITCH
RPM number of pulses setting	–	P01

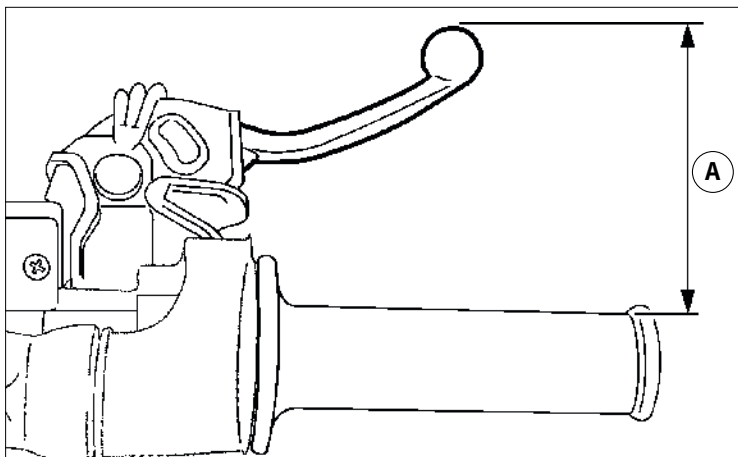
2.8 OTHER ELECTRONIC DEVICES

The standard XEF 450 Rally vehicle contains other integrated electronic devices.

i To access specific instructions for each of them, it is recommended to visit the relevant websites.

List of available devices:

- Carpe Iter Pad version 4 { <https://carpe-iter.com/carpe-iter-pad/> }
- Carpe Iter Terrain Command { <https://carpe-iter.com/support/rally-command-getting-started/> }



3.1 BRAKES

Front brake adjustment

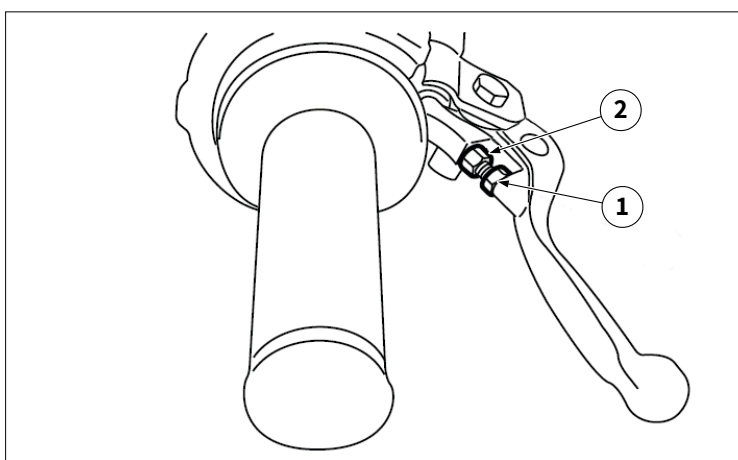
Check brake lever position "A". If it is different from the standard value, adjust it.



Brake lever position "A":

Standard position: 100 mm (3.94 in)

Adjustment point: 86-105 mm (3.39-4.13 in)



Adjust the brake lever position as described below:

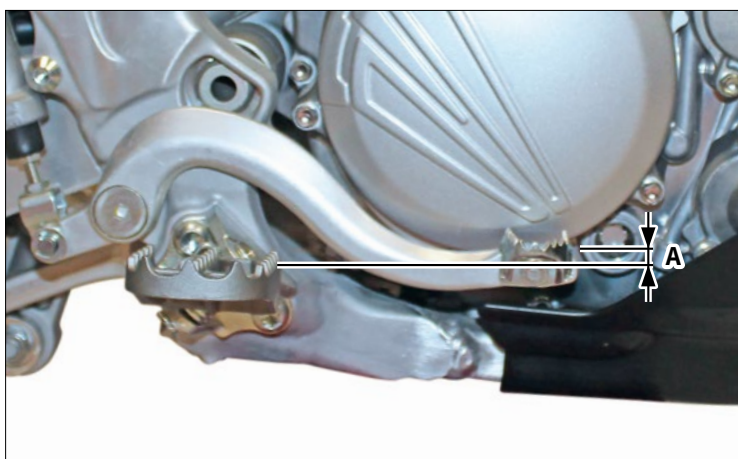
- Remove the brake lever cover;
- Loosen the locknut "1";
- Turn the adjusting bolt "2" until the lever position "A" is within specified position;
- Tighten the locknut "1";
- Reinstall the brake lever cover.



Be sure to tighten the locknut, as it will cause poor brake performance.



Locknut: 5 Nm (0.5 m•kg, 3.6 ft•lb)

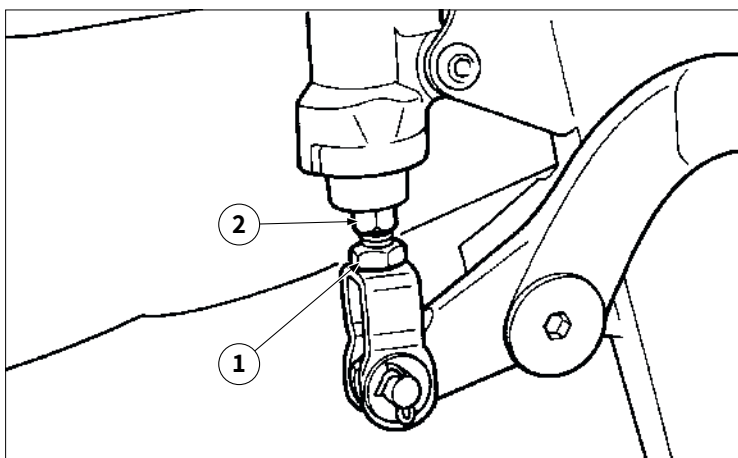


Rear brake adjustment

Check the height of brake pedal "A". If it is different from the standard value, adjust it.

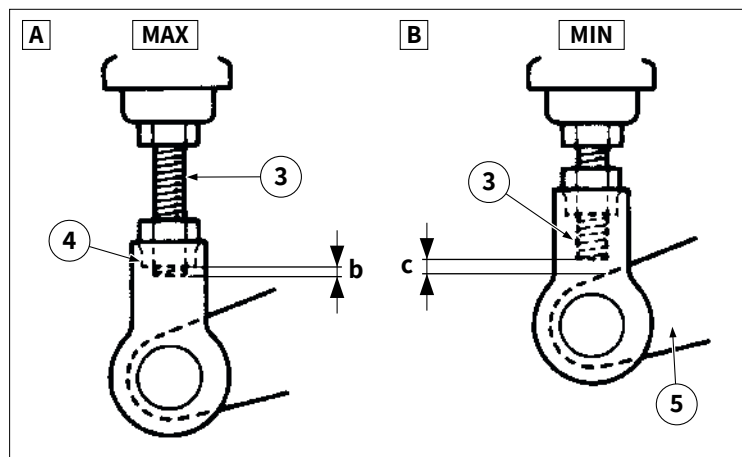


Brake pedal height "A": 5.0 mm (0.20 in)

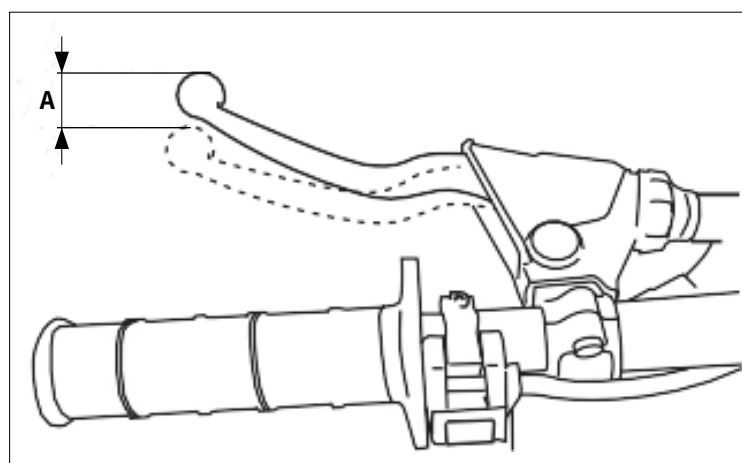


Adjust the brake pedal height as described below:

- Loosen the locknut "1";
- Turn the adjusting nut "2" until the pedal height "A" is within specified height;
- Tighten the locknut.



- ⚠ • Adjust the pedal height between the maximum “A” and the minimum “B” as shown. (In this adjustment, the bolt “3” end “b” should protrude out of the threaded portion “4” but not be less than 2 mm (0.08 in) “c” away from the brake pedal “5”).
- After the pedal height adjustment, make sure that the rear brake does not drag.

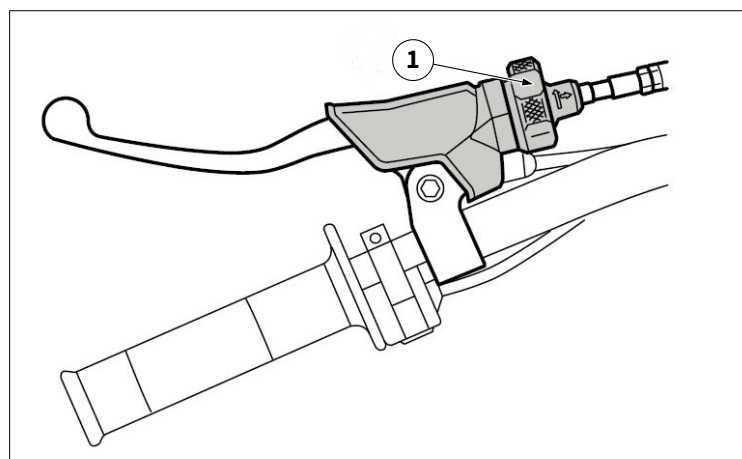


3.2 CLUTCH

Adjusting the clutch lever clearance

Check the clutch lever clearance “A”. If it is different from the standard value, adjust it.

- 🔧 Clutch lever clearance “A”:
7.0–12.0 mm (0.28–0.47 in)



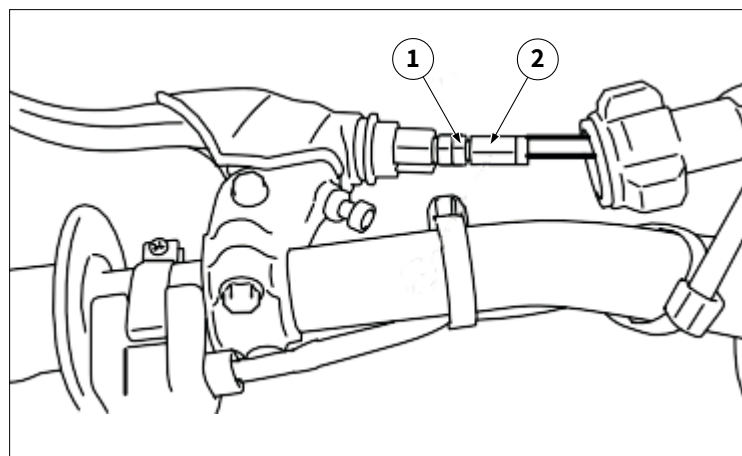
Adjust the clutch lever clearance as described below:

Handlebar side

- Turn the adjuster “1” until the specified clutch lever free play is obtained.

- ⓘ Turning clockwise increases the clearance, turning counter-clockwise decreases it.

- ⚠ If the clutch lever free play cannot be obtained on the handlebar side, use the adjuster on the clutch cable side.

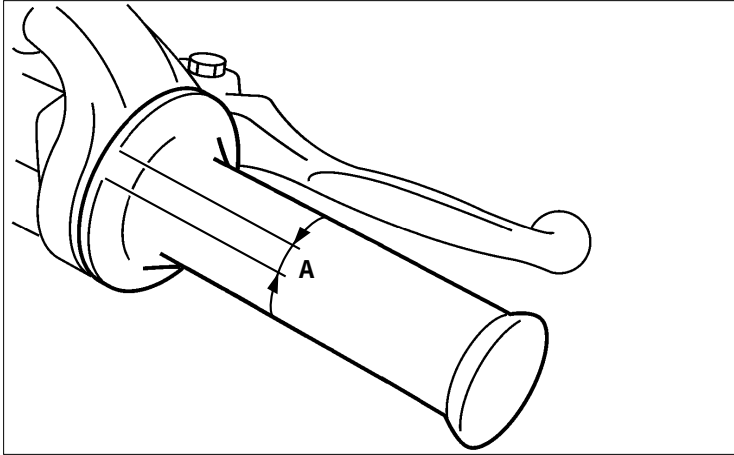


Clutch cable side

- Slide the clutch cable cover;
- Loosen the locknut “1”;
- Turn the adjuster “2” until the specified clutch lever free play is obtained;
- Tighten the locknut;

- 🔧 Locknut: 4.3 Nm (0.43 m•kg, 3.2 ft•lb)

- Return the clutch cable cover to its original position.



3.3 THROTTLE CONTROL

Adjusting the throttle grip clearance

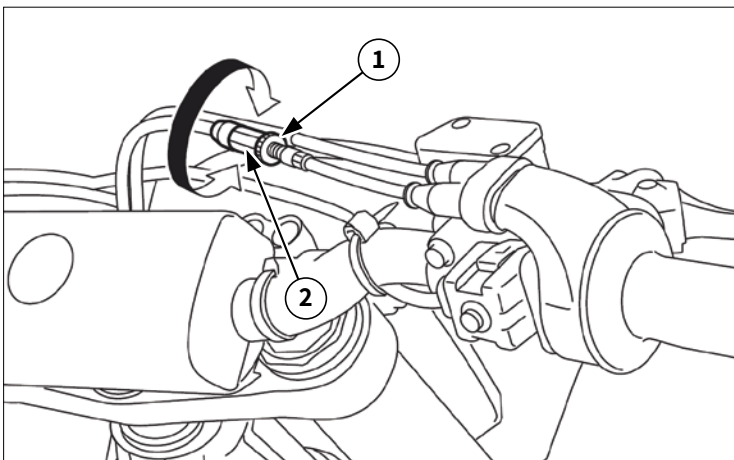
Check the throttle control knob clearance "A".

If it is different from the standard value, adjust it.

Throttle grip clearance "A":
3.0–6.0 mm (0.12–0.24 in)

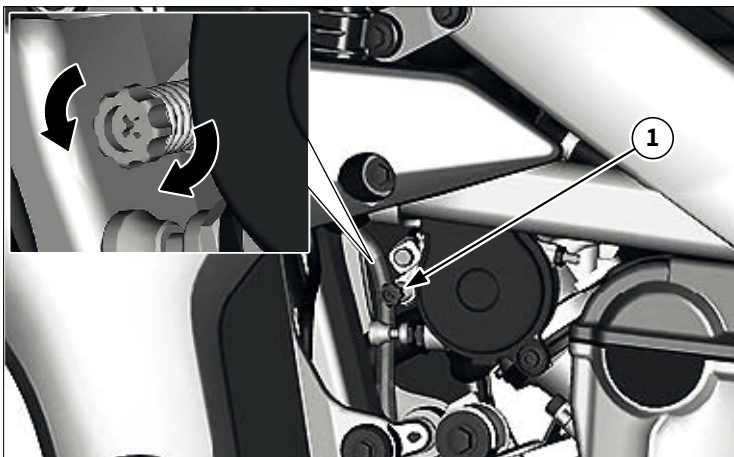
Adjust the throttle control knob clearance as described below:

- Loosen the locknut "1";
- Turn the adjuster "2" until the specified free play is obtained;
- Tighten the locknut.



Prior to adjusting throttle grip free play, the engine idling speed should be adjusted.

Prior to adjusting throttle grip free play, the engine idling speed should be adjusted. After adjusting the throttle grip free play, turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.



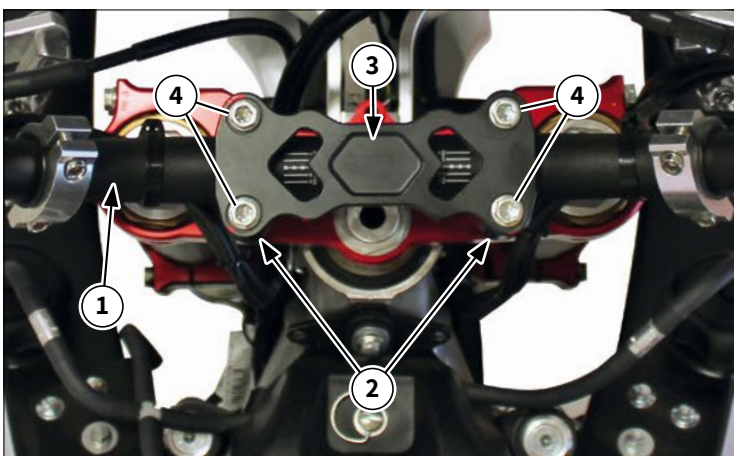
3.4 ADJUSTING THE ENGINE IDLING SPEED

- Start the engine and warm it up well;
- Install a digital tachometer on the spark plug cable;
- Adjust the idle speed by turning the adjustment screw "1" until it reaches a value that meets the specifications;

By screwing it in, the idle speed increases, by unscrewing it in, the idle speed decreases.

- Once the speed has been adjusted, remove the digital tachometer from the vehicle.

Idle speed: 1900–2100 rpm

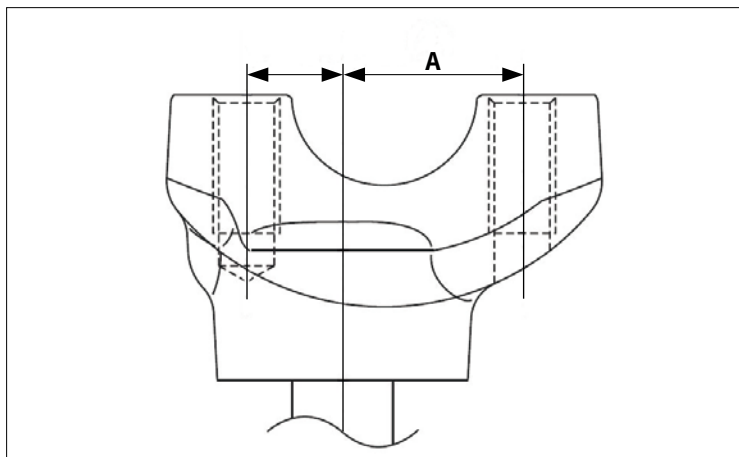


3.5 HANDLEBAR ADJUSTMENT

Handlebar installation and adjustment

Install handlebar "1" on lower supports "2";

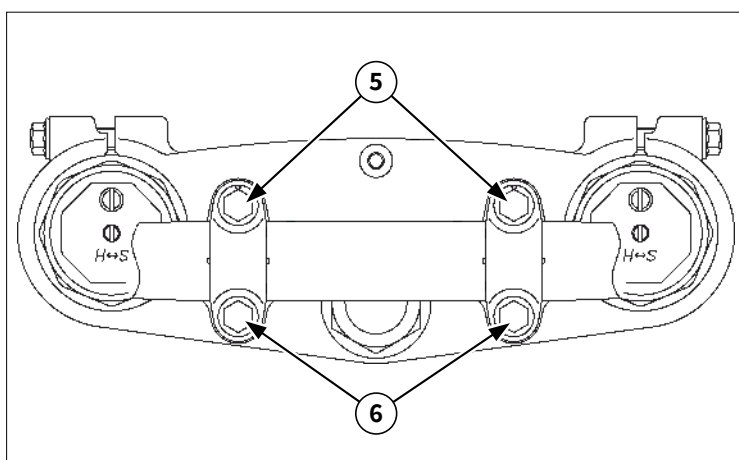
Install upper support "3" and fastening bolts "4", without tightening them permanently.



⚠ Install the lower handlebar mounts so that the side with the longest distance “a” faces forward.

i By installing the lower mounts in the opposite direction, the amount of front-rear offset of the handlebar position can be changed.

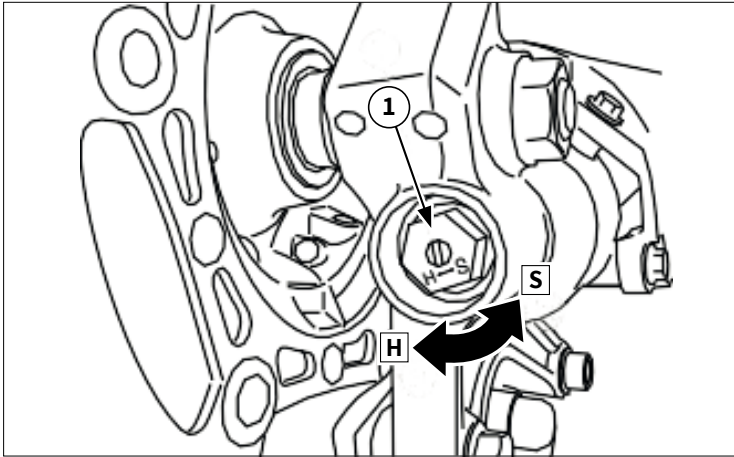
🔧 Lower handlebar support nut:
40 Nm (4.0 m•kg, 30 ft•lb)



First tighten the bolts on the front side “5” of the upper handlebar holder, and then tighten the bolts “6” on the rear side.

⚠ Always install the upper handlebar mounts with the punching facing the front and the side reference notch towards the centre nut of the steering plate.

🔧 Upper handlebar support bolt:
28 Nm (2.8 m•kg, 20 ft•lb)



3.7 FORK ADJUSTMENT

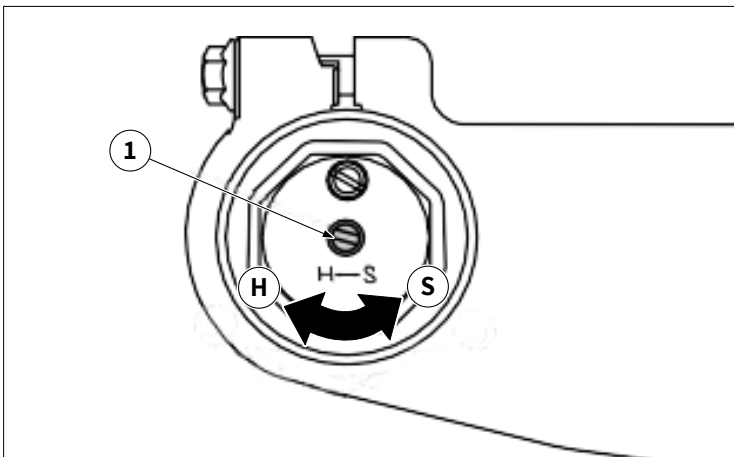
Rebound damping adjustment (return)

- To adjust the rebound damping force of the fork, turn the adjustment device "1". The device has a range of action of 20 clicks;
- To increase the rebound damping force (slower return) rotate the device clockwise, following the letter "H";
- To decrease the rebound damping force (faster return) rotate the device counter-clockwise, following the letter "S".

 **Standard adjustment:**
From all closed, open by 8 clicks by turning to "S".

 **Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**

 **Always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.**



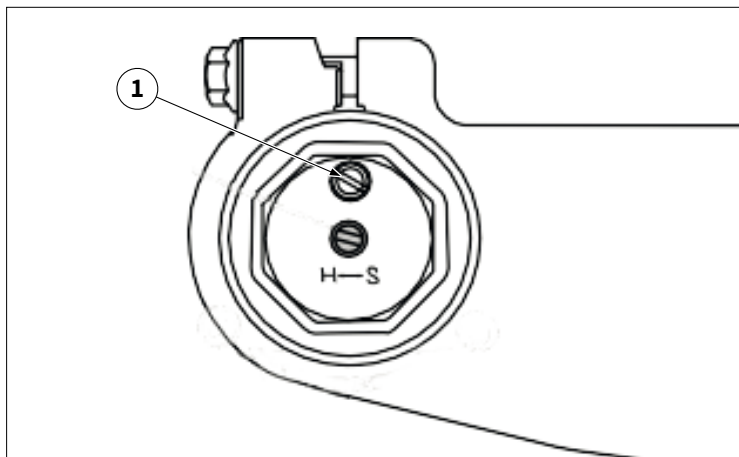
Compression damping adjustment

- To adjust the compression damping force of the fork, turn the adjustment device "1". The device has a range of action of 20 clicks;
- To increase the compression damping force (harder thrust) rotate the device clockwise, following the letter "H";
- To decrease the compression damping force (softer thrust) rotate the device counter-clockwise, following the letter "S".

 **Standard adjustment:**
From all closed, open by 12 clicks by turning to "S".

 **Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.**

 **Always adjust each front fork to the same setting. Uneven adjustment can cause poor handling and loss of stability.**

**Relieving the front fork internal pressure**

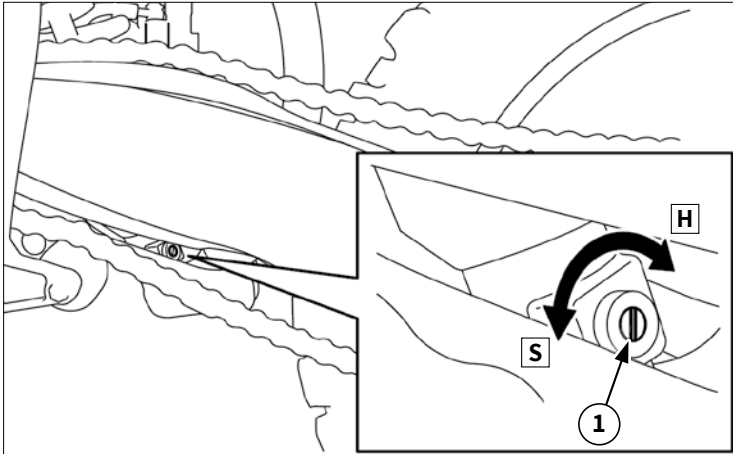
i If the front fork initial movement feels stiff during a run, relieve the front fork internal pressure.

- Elevate the front wheel by placing a suitable stand under the engine;
- Remove the air bleed screw “1” and release the internal pressure from the front fork;
- Reinstall air purge screw “1”.

 **Air bleed screw: 1.3 Nm (0.13 m•kg, 0.95 ft•lb)**

i To improve the front fork performance, and adapt it to different road conditions, driving style and rider's weight, Fantic features springs with different load coefficients which can be purchased from authorized dealers.

Load factor	Part number
4.1 N/mm	07154005
4.2 N/mm	07155005
4.3 N/mm	07156005
4.4 N/mm	07157005
4.5 N/mm	07148005
4.6 N/mm	07015005
4.7 N/mm	07149005
4.8 N/mm	07150005
4.9 N/mm	07151005
5.0 N/mm	07152005
5.1 N/mm	07153005



3.8 REAR SHOCK ABSORBER ADJUSTMENT

Rebound damping adjustment (return)

- To adjust the rebound damping force of the rear shock absorber, turn the adjustment device "1". The device has a range of action of 30 clicks;
- To increase the rebound damping force (slower return) rotate the device clockwise, following the letter "H";
- To decrease the rebound damping force (faster return) rotate the device counter-clockwise, following the letter "S".

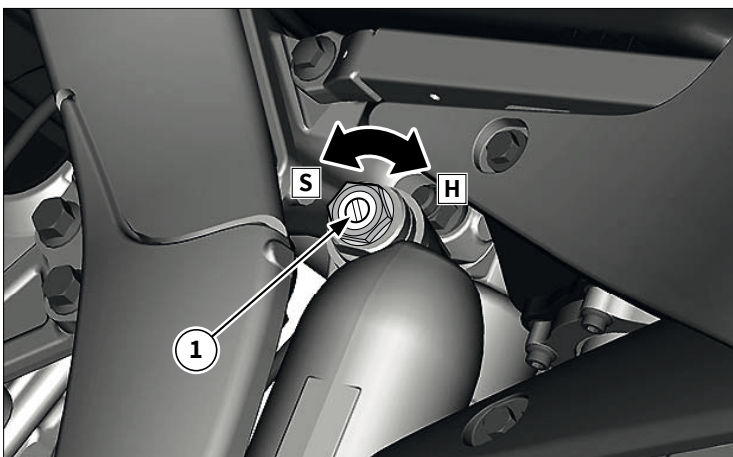


Standard adjustment:

From all closed, open by 8 clicks by turning to "S".



Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.



Compression damping adjustment (low speed)

- To adjust the compression damping force at low speed, turn the adjustment device "1". The device has a range of action of 20 clicks;
- To increase the compression damping force (harder thrust) rotate the device clockwise, following the letter "H";
- To decrease the compression damping force (softer thrust) rotate the device counter-clockwise, following the letter "S".

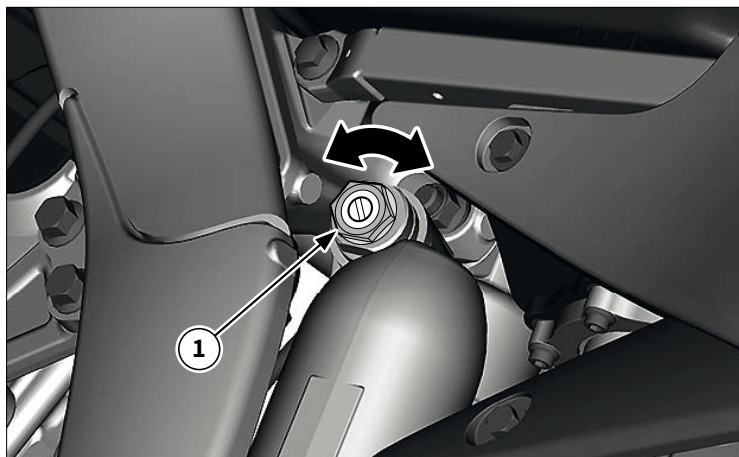


Standard adjustment:

From all closed, open by 10 clicks by turning to "S".



Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.

**Compression damping adjustment (high speed)**

- To adjust the compression damping force at high speed, turn the adjustment device "1". The device has a range of action of 2 turns, from fully closed, rotating counter-clockwise;
- To increase the compression damping force (harder thrust) rotate the device clockwise;
- To decrease the compression damping force (softer thrust) rotate the device counter-clockwise.

**Standard adjustment:**

When fully closed, unscrew the adjuster by 1 turn.



Do not force the adjuster past the minimum or maximum extent of adjustment. The adjuster may be damaged.

**3.9 SETTING THE SAG****Rear shock absorber sinking adjustment (SAG)**

- Place a stand or block under the engine to put the rear wheel above the floor, and measure the length "A" between the rear wheel axle center and the rear fender holding bolt;



- Remove the kickstand or retainer from the engine and, WITHOUT the driver on the vehicle, measure the sinking "B" between the centre of the rear wheel axle and the rear mudguard locking bolt.



Standard value: 15-40mm



- With the vehicle on the ground, hold it and get the driver on board, making sure he/she is wearing all the protective clothing available. Then measure the sinking "C" between the centre of the rear wheel axle and the rear mudguard locking bolt.

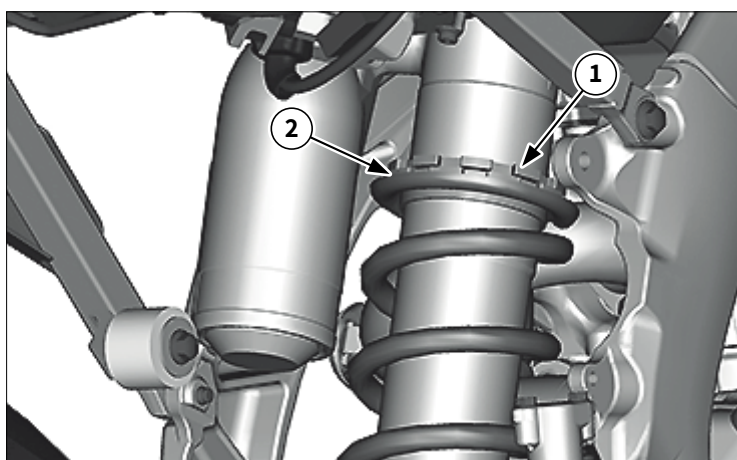
✂ Standard value: 90-100mm

- If the measured value is not included within the standard range, adjust it by loosening locknut "1". Now turn the ring nut "2" of the spring, screwing it in to give more preload (less thrust) and unscrewing it to give less preload (more thrust);
- Repeat the measurement and adjustment operations until the standard value is reached. Once reached, tighten the locknut "1".

⚠ In order to access the rear shock absorber adjustment ring nut, the central reservoir must be removed.

i Before adjusting, make sure to remove all mud and dirt around the ring nut and lock nut.

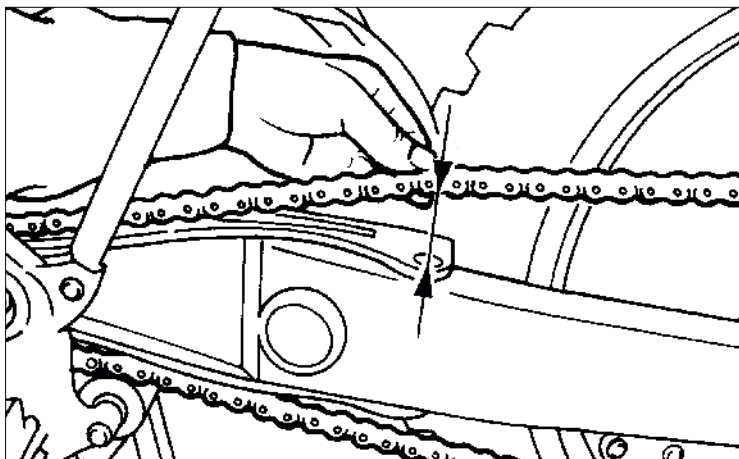
i If the vehicle is new and has run-in, the same spring length set may vary due to initial spring fatigue. Therefore be sure to perform a new evaluation.



i In case it is not possible to reach the standard value through ring nut adjustment, replace the shock absorber spring with a spring having a different load coefficient. If the ring nut is in the highest position (lower preload) but the sag value is lower than the standard value, choose a spring with a lower coefficient. Conversely, if the spring is in the lowest position but the sag value is higher than the standard value, choose a spring with a higher coefficient.

i To improve the rear shock absorber performance, and adapt it to different road conditions, riding style and rider's weight, Fantic features springs with different load coefficients that can be purchased from authorized dealers.

Load factor	Part number
48 N/mm	07147005
50 N/mm	07146005
52 N/mm	07141005
54 N/mm	07142005
56 N/mm	07143005
58 N/mm	07144005
60 N/mm	07145005



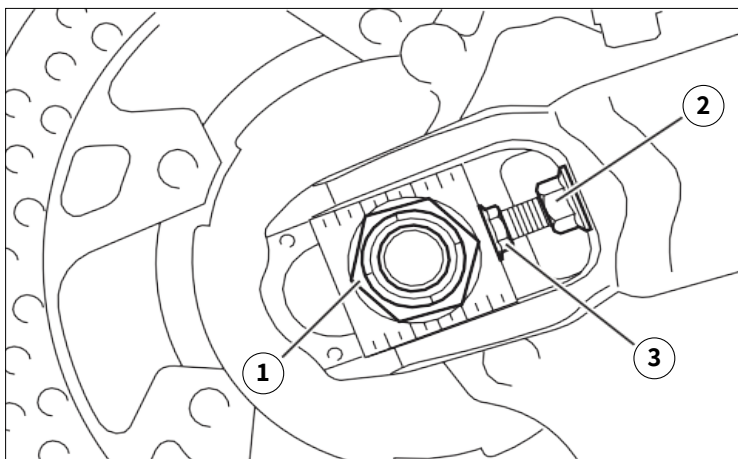
3.10 CHAIN TENSION

⚠ If the drive chain is too tight, it will overload the engine and other vital parts, and if it is too loose it may jump and damage the swingarm or cause an accident. Therefore it is recommended to keep the chain tension within the specified limits.

Chain tension check

- Place a kickstand or stand under the engine to raise the rear wheel off the floor;
- Place the gearshift in neutral;
- Lift the drive chain off the swingarm, close to the chain guide fixing bolt;
- Measure the tension between the guide and the bottom of the chain, as shown in the figure;

🔧 **Transmission chain tension:**
50.0 - 60.0mm (1.97 - 2.36 in)



Chain tension adjustment

- Place a kickstand or a stand under the engine to raise the rear wheel off the floor;
- Place the gearshift in neutral;
- Loosen the wheel axle nut "1";
- Loosen the locknut "2" on both sides;
- Turn the adjusting bolt "3", on both sides, until the specified chain tension is achieved;

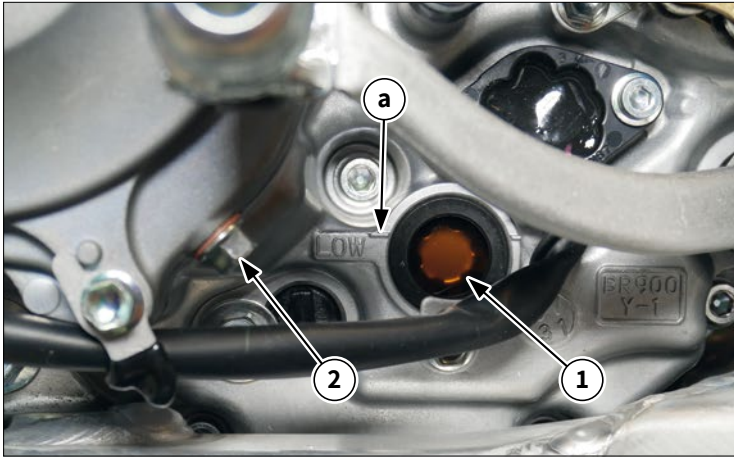
ⓘ **To maintain the correct alignment of the rear wheel, carry out the adjustment by acting evenly on both adjusters.**

- Once the correct tension is achieved, tighten the rear wheel axle nut to the specified torque;
- Tighten the locknuts of the drive chain adjusters.

ⓘ **While tightening the wheel axle nut, push the wheel forward to ensure that there is no clearance between the adjusters and the wheel axle plates.**

🔧 **Rear wheel axle nut:**
125 Nm (12.5 m•kg, 92 ft•lb)

🔧 **Chain adjusters locknut:**
21 Nm (2.1 m•kg, 15 ft•lb)

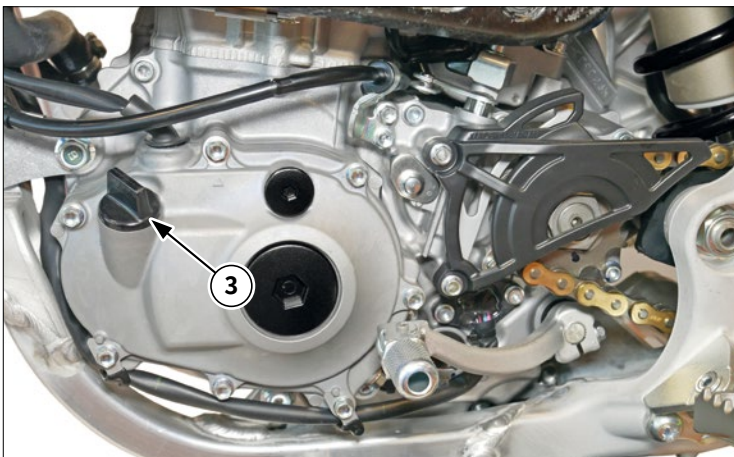


4.1 ENGINE OIL

Engine oil level check

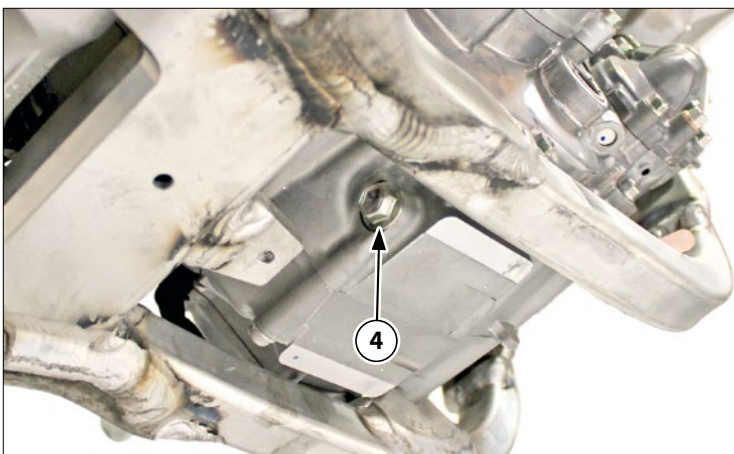
- Place the vehicle on a flat surface, in a vertical position by placing a suitable stand under the engine;
- Start the engine and warm it up for 1-2 minutes, then stop it and wait 1 minute for the engine oil to settle.
- Check through the inspection port “1” that the engine oil level is above the min. level reference mark “a”. Remove the inspection plug “2” and ensure that no oil is leaking. If it is below the reference “A”, add the engine oil indicated in the “RECOMMENDED PRODUCTS TABLE” section; in the event of leakage from the inspection hole, drain it until the correct level is reached.

⚠ Engine oil also lubricates the clutch, so wrong types of oil or additives can cause the clutch to slip. Use only types of oil that meet the specifications and do not add additives.



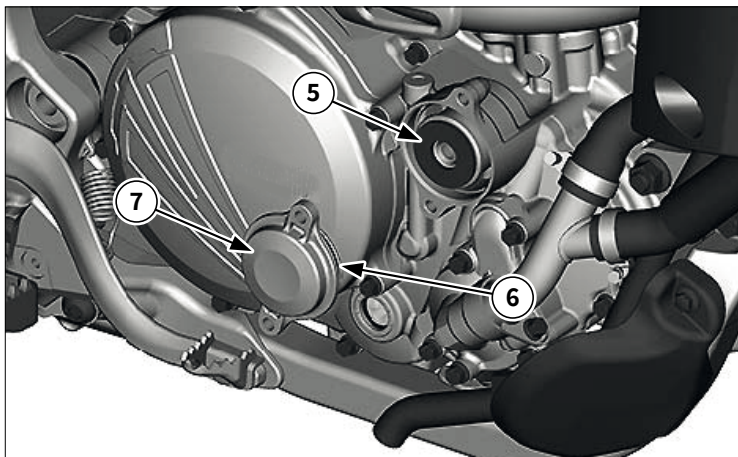
Engine oil change and engine oil filter replacement

- Remove the motor guard “1” (if fitted);
- Place the vehicle on a flat surface, in a vertical position by placing a suitable stand under the engine;
- Place a container under the engine;
- Start the engine, warm it up for several minutes then stop it and wait five minutes;
- Remove the filler cap “2”;



- Drain the engine oil by removing the drain bolt “3”;
- Once all the engine oil in the crankcases has drained, replace the copper gasket with a new one and install the drain bolt “4”.

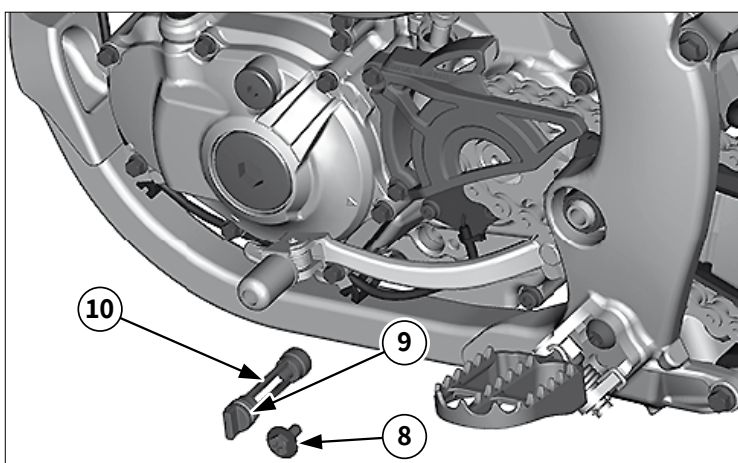
🔧 Drain bolt: 20 Nm (2.0 m•kg 15 ft•lb)



If necessary, replace the oil filter:

- Remove cover “7” and oil filter cartridge “5”;
- Install a new oil filter cartridge “5” and a new O-Ring “6”;
- Then refit the cover “7”.

Cover bolt: 10 Nm (1.0 m•kg 7.4 ft•lb)

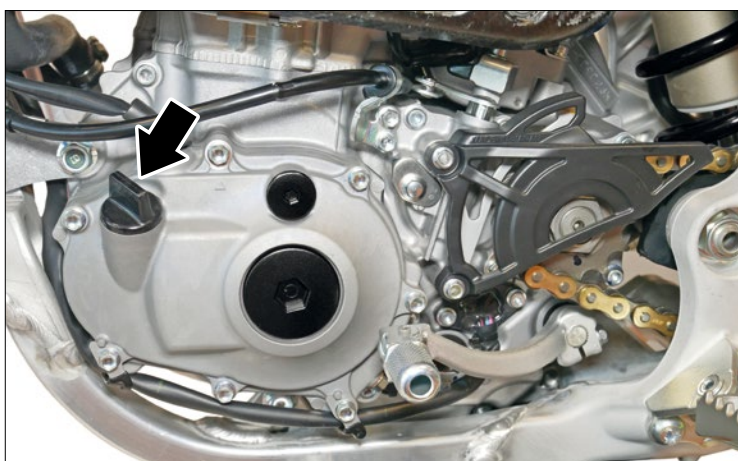


- Check the secondary oil filter “10” removing screw “8”.
- Remove the secondary oil filter “10”.

Clean it with Kerosene if it is clogged with dirt, replace if damaged.

- Replace the O-Ring “9” with a new one then replace the secondary oil filter “10”.

Oil filter bolt: 10 Nm (1.0 m•kg 7.4 ft•lb)



Engine oil filling

- Pour the engine oil through the oil filler cap hole until the correct level is reached, then install the filler cap.

Engine oil quantity:

Oil change: 0.63 L (0.67 US qt, 0.55 Imp.qt)

Oil change and filter cartridge replacement:
0.65 L (0.69 US qt, 0.57 Imp.qt)

Filling after crankcase assembly:
0.90L (0.95 US qt, 0.79 Imp.qt)

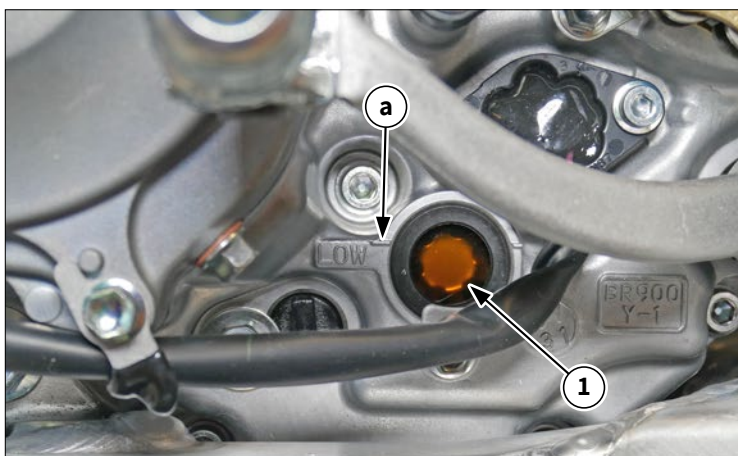
- Start the engine, keeping it at idle, and check the engine oil pressure;

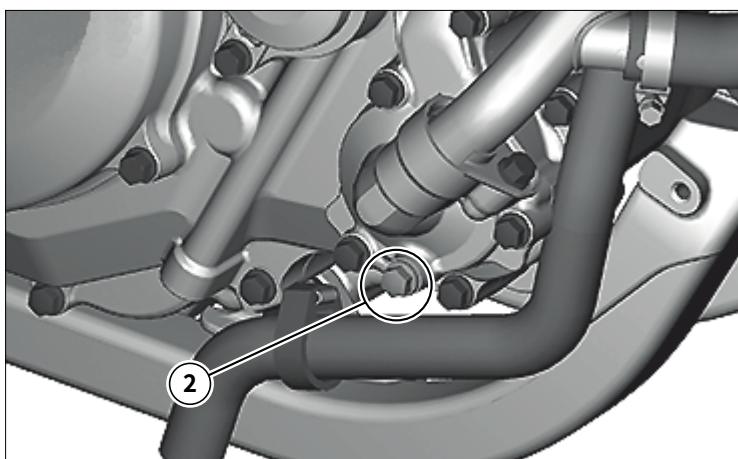
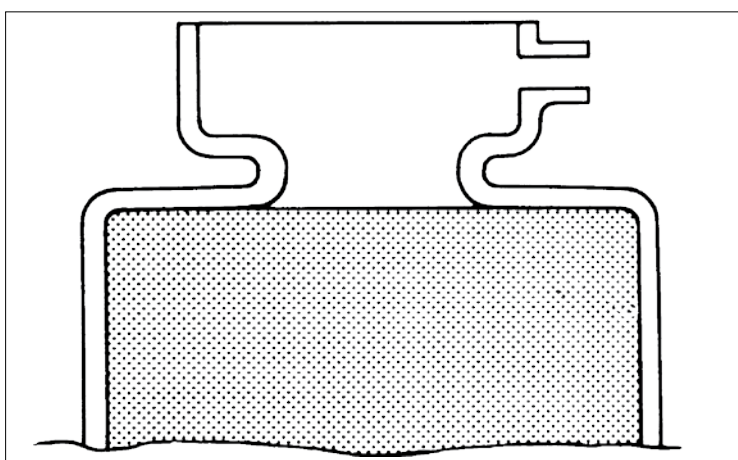
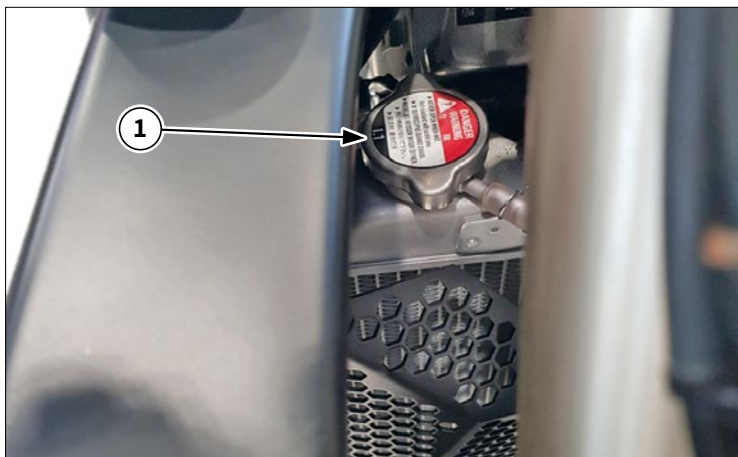
Always keep the engine at idle speed only during the check.

- Check through sight glass “1” that the engine oil is flowing and that the level is decreasing while the engine is running,

If the engine oil level does not drop after the engine has been started, switch off the engine immediately to avoid seizure.

- If, when the engine is running, the engine oil level does not drop to the “a” level reference mark, check that there are no leaks in the lubrication circuit and that the oil passages and engine oil pump are not damaged.
- Check the oil pressure again;
- Check that the engine oil level is correct and, if present, reinstall the engine guard.





4.2 COOLANT

Checking the coolant level

⚠ Do not remove the radiator cap “1”, drain bolt and hoses when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, place a thick towel over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

⚠ Hard water or salt water is harmful to the engine parts. You may use distilled water, if you can't get soft water.

- Place the machine on a level place, and hold it in an upright position;
- Remove the radiator cap “1” and check the coolant level. Add coolant if the coolant level is low.

Coolant replacement

⚠ Do not remove the radiator cap “1”, drain bolt and hoses when the engine and radiator are hot. Scalding hot fluid and steam may be blown out under pressure, which could cause serious injury. When the engine has cooled, place a thick towel over the radiator cap, slowly rotate the cap counterclockwise to the detent. This procedure allows any residual pressure to escape. When the hissing sound has stopped, press down on the cap while turning counterclockwise and remove it.

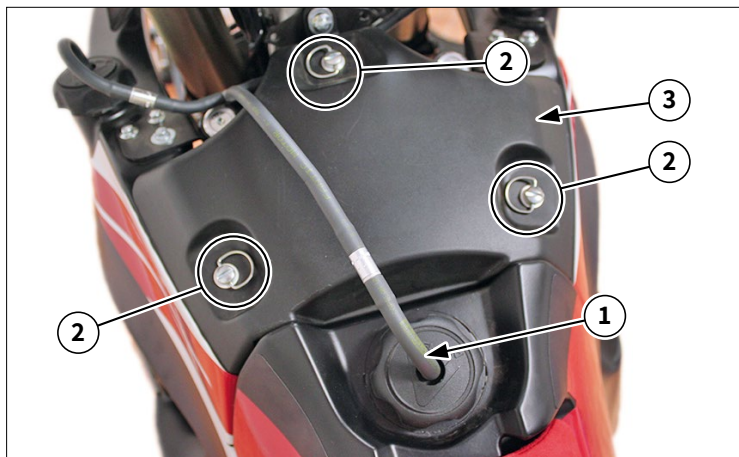
- Remove the engine guard.
- Place the vehicle on a flat surface, in a vertical position by placing a suitable stand under the engine.
- Remove the radiator cover “1” and the coolant drain plug “2”, then drain the coolant completely by collecting it in the container under the engine;
- Install a new washer on the drain plug “1” and install it in its housing;
- Fill the engine and the radiator with “ETHYLENE GLYCOL WITH ANTICORROSIVE FOR ALUMINIUM ENGINES”, up to the level previously indicated.

🔧 Coolant quantity:
1,03 L (1.09 US qt, 0.91 Imp.qt)

⚠ Do not add additives or other substances and use the products recommended in the “RECOMMENDED PRODUCTS TABLE” section.

⚠ Do not mix more than one type of ethylene glycol antifreeze containing corrosion inhibitors for aluminum engine.

⚠ Do not use water containing impurities or oil.

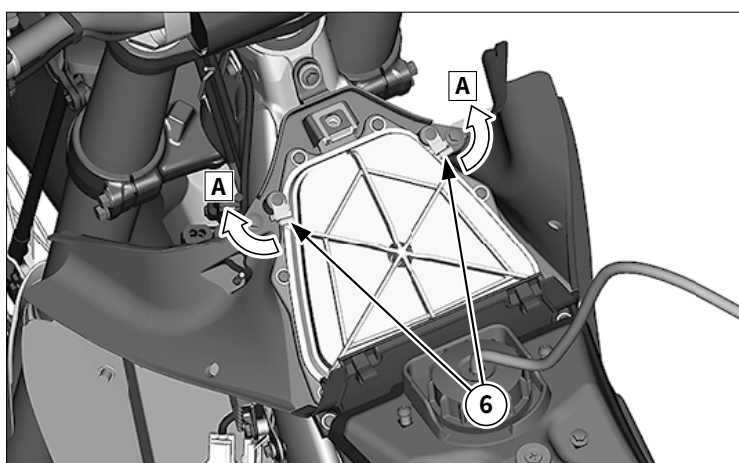


4.3 AIR FILTER

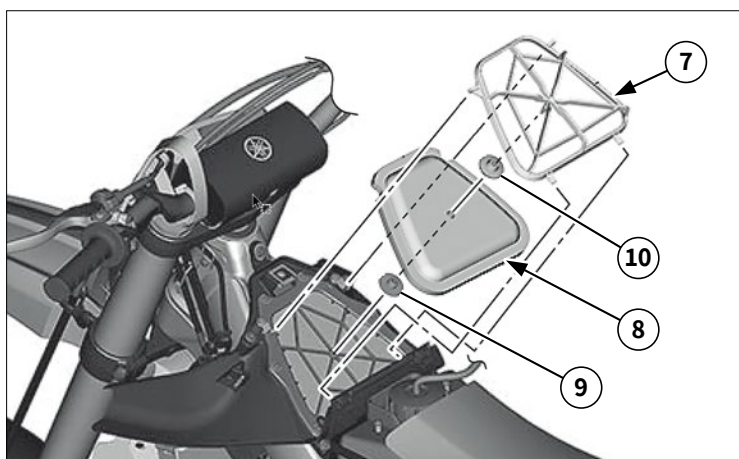
i Proper air filter maintenance is the biggest key to preventing premature engine wear and damage.

! Never run the engine without the air filter element in place; this would allow dirt and dust to enter the engine and cause rapid wear and possible engine damage.

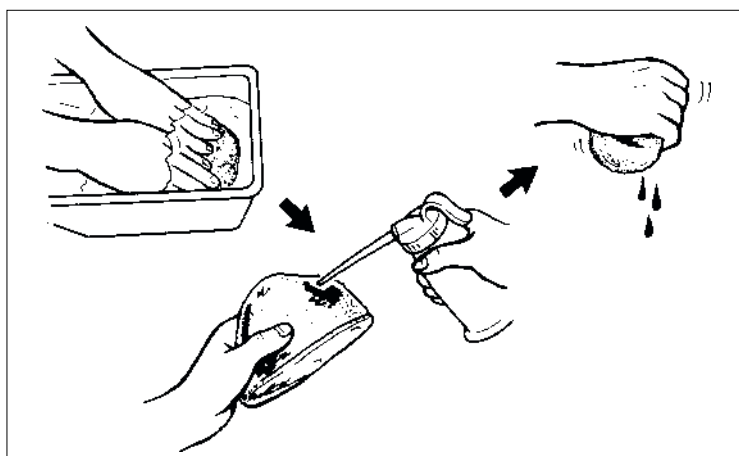
- Remove the vent tube "1" from the cap;
- Loosen the quick fastener screw "3" and remove the air filter case cover "2";



- Turn the plates "6" in direction "A".

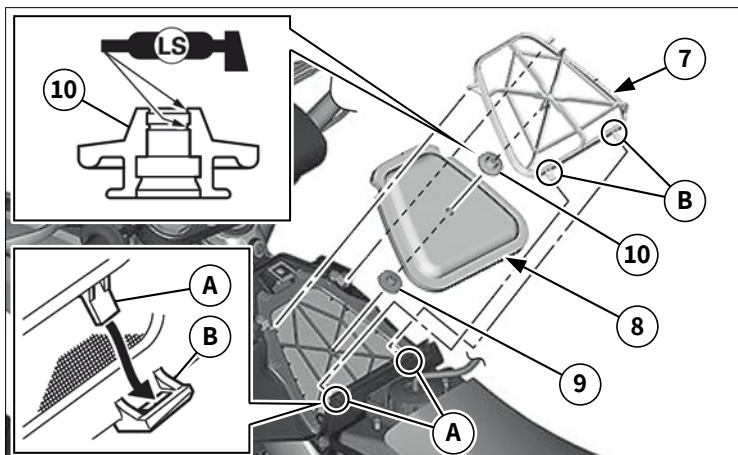


- Remove the air filter guide "7";
- Remove the filtering element "8" from the air filter guide;
- Remove the guide "9" from the filtering element;
- Remove the gasket "10" from the filtering element.



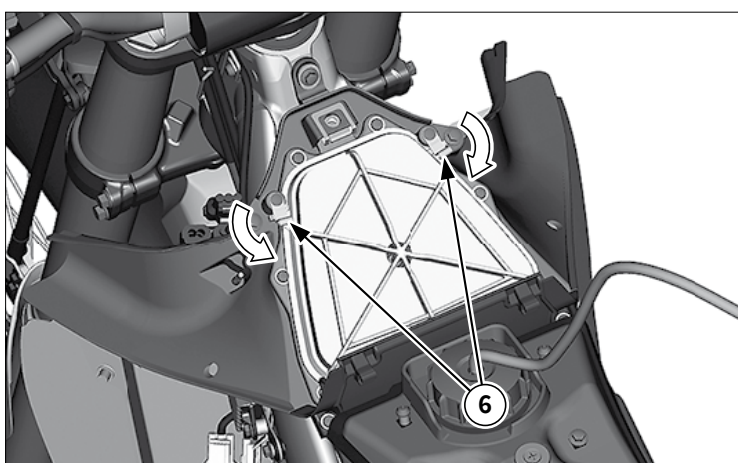
- Check that the filtering element is not damaged, if it is, replace it;
- Clean the filtering element with a dedicated solvent, after cleaning remove the solvent by squeezing the filtering element and blowing it with compressed air;
- Apply air filter oil to the filtering element, squeeze it to remove excess oil.

! The cartridge must be damp, but not wet.

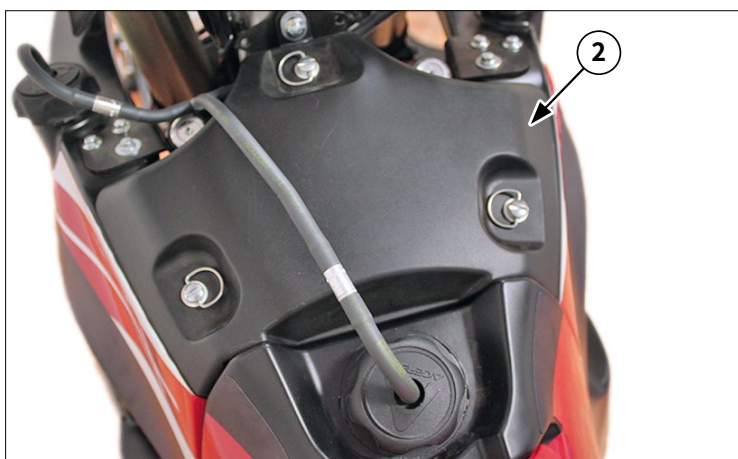


- Install gasket "7" on the filtering element;
- Install guide "8" on the filtering element;
- Install filtering element "9" on guide "10";
- Then install the guide/air filter assembly on the vehicle.

i Make sure that the two projections "A" at the rear side of the vehicle on the air filter guide are securely fitted into the two slots "B" in the air filter case.



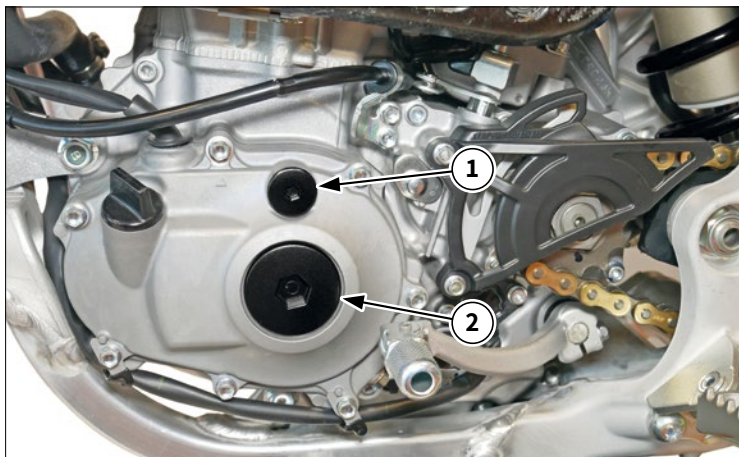
- Turn the plates "6" to the original position.



- Install the filter casing cover "2";
- Reinstall the quick releases to secure the cover.

! Also make sure that the two ribs, located on the right and left side of the cover, are correctly aligned with the protrusions on the intake ducts of the filter casing.

- Install the initial part of the seat.

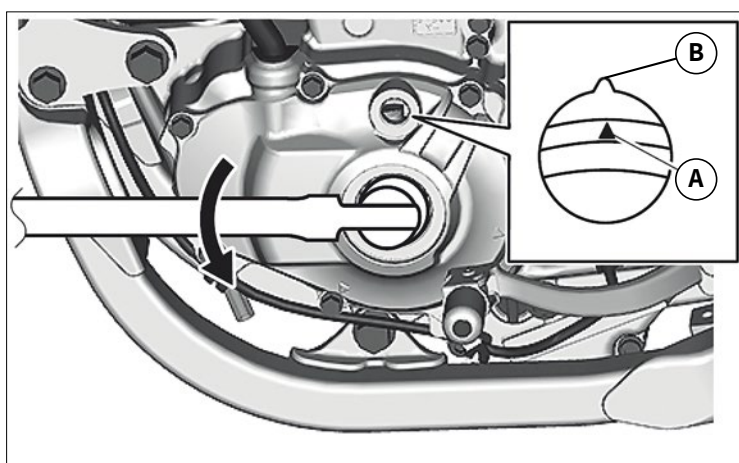


4.4 CAMSHAFTS

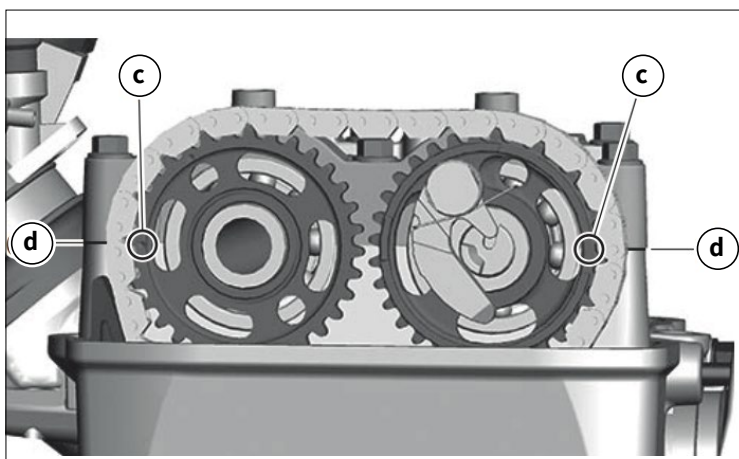
Removal

Remove:

- Seat, air filter casing, left and right fuel tanks;
- Remove the spark plug and valve cover;
- Remove timing reference cap "1" and crankshaft access cap "2".

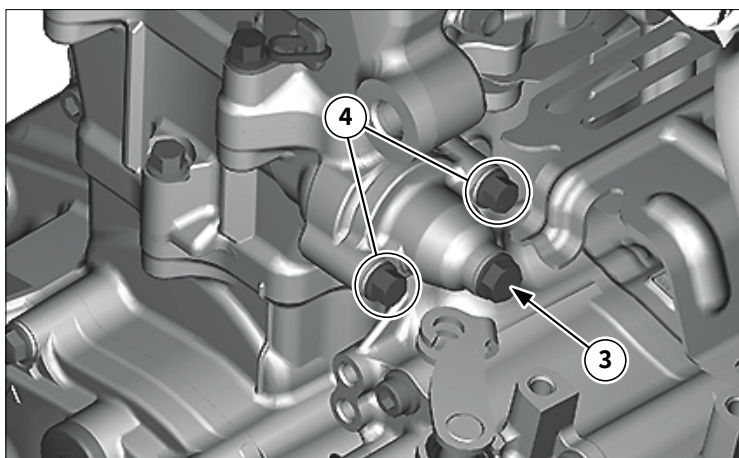


- Turn the crankshaft counter-clockwise with a spanner, using the appropriate access hole on the crankcase cover;
- Align the top dead centre notch (TDC) "A" on the flywheel with the reference "B" on the left crankcase cover.

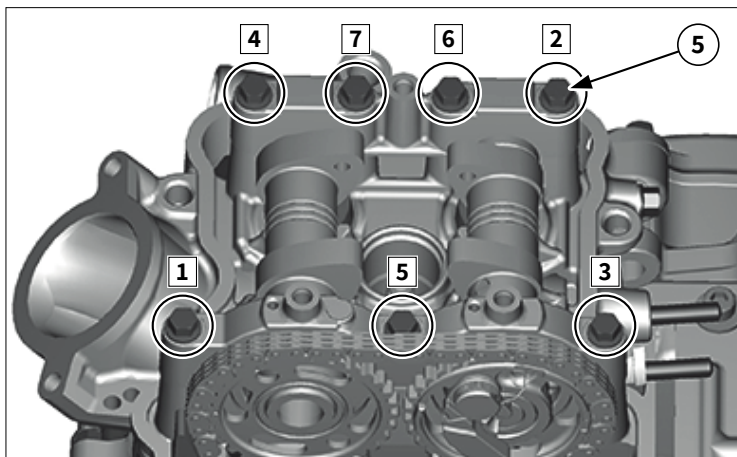


- Align the notches "c" of the exhaust and intake camshaft with the plane "d" of the camshaft supports.

⚠ Align the crankshaft and camshaft references simultaneously. It is possible to be in a situation where the crankshaft is aligned with the references, while the camshafts are not. In this case it is necessary to make the crankshaft move one more complete revolution.

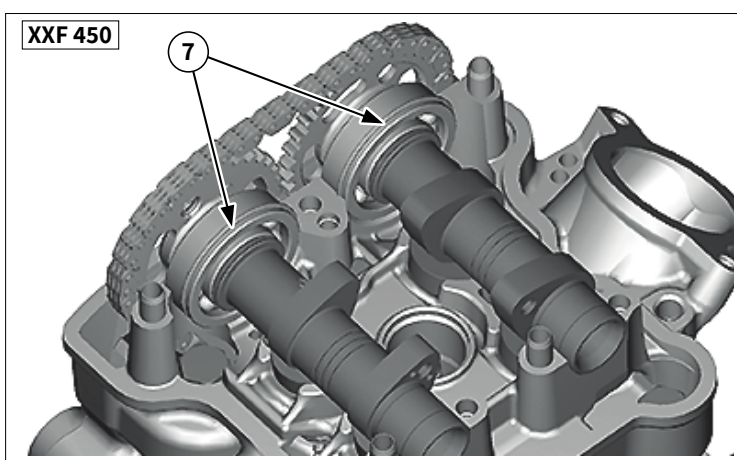


- Remove the timing chain tensioner cap "3";
- Remove the timing chain tensioner fixing screws "4", then remove the timing chain tensioner from the vehicle.

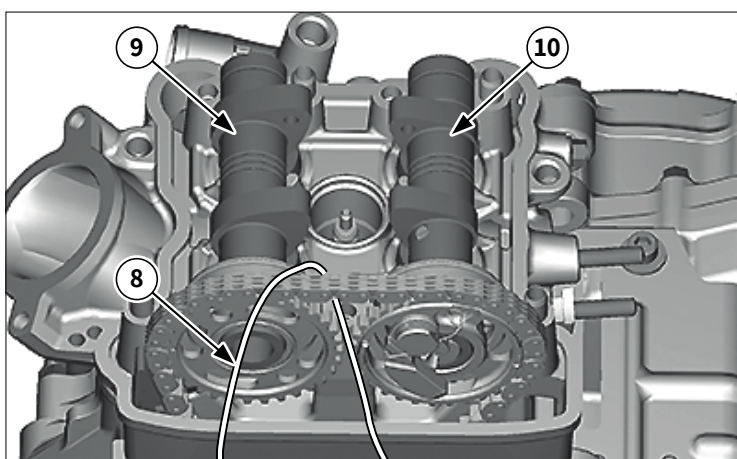


- Remove bolts "5" of the camshaft supports following a crossed pattern, starting from the outside to the inside;
- Remove the camshaft supports "6" from the head.

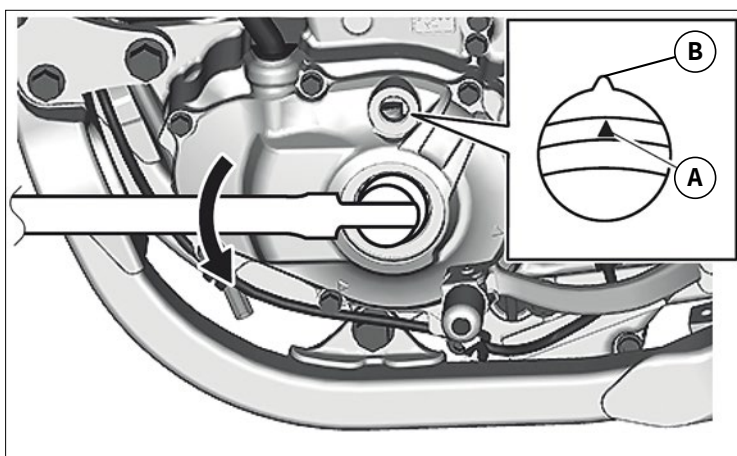
⚠ The camshaft cap bolts must be removed evenly to prevent damage to the cylinder head, camshafts or camshaft caps.



- Recover the guides "7" of the camshaft bearings, taking care not to drop them inside the engine.

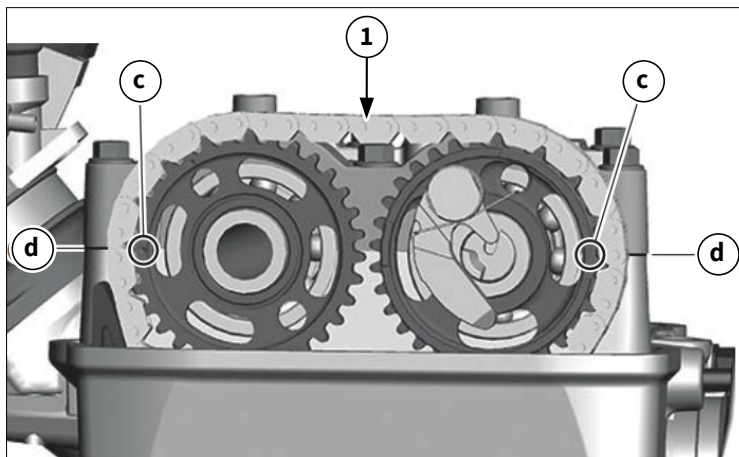


- Connect a metal wire "8" to the timing chain to prevent it from falling inside the engine, then pull it off the camshaft sprockets and tie it to the frame using the metal wire;
- Remove camshafts "9" and "10" from the head.

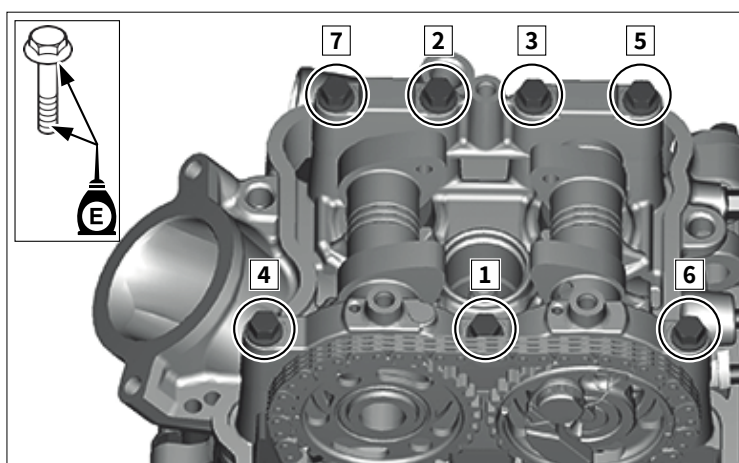


Installation

- Check that the top dead centre notch (TDC) "A" on the flywheel is aligned with the reference "B" on the left crankcase cover. If not, align it by turning the crankshaft counter-clockwise.



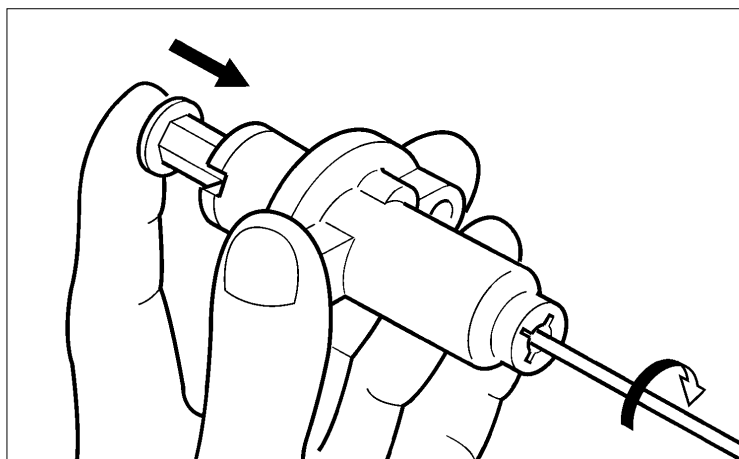
- Install the intake and exhaust camshafts in the head.
- Install the timing chain "1" on the sprockets of both camshafts. Make sure that notches "c" of the exhaust and intake camshafts are aligned with plane "d" of the camshaft supports.



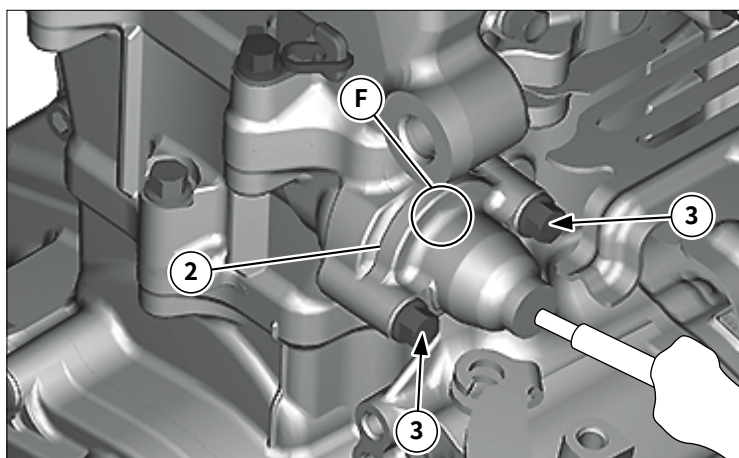
- Apply molybdenum disulphide grease to the sliding surfaces of the camshafts;
- Apply the engine oil on the decompression system.
- Install the camshaft bearing guides and camshaft supports;
- Apply engine oil to the threads and contact surfaces of the camshaft support bolts, install them and tighten them to the specified torque. Perform the tightening operation in two/three steps, following the diagram shown in the figure.

⚠ The bolts of the camshaft supports must be tightened evenly to prevent damage to the camshaft head or camshaft supports.

**🔧 Camshaft support bolt:
10 Nm (1.0 m•kg 7.4 ft•lb)**

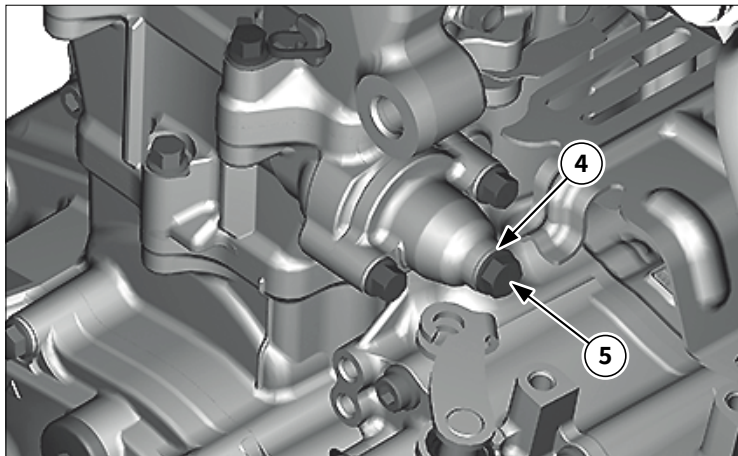


- Install the timing chain tensioner, operating as described below;
- Press the tensioner rod with your fingers at the same time, using a flat, thin-blade screwdriver, turn the rod clockwise until it is in the fully closed position.



- Install a new gasket "2" in the housing on the cylinder;
- Keeping the rod completely closed, install the tensioner on the cylinder making sure that the UP reference "F" is facing upwards, then tighten the fastening bolts "3".

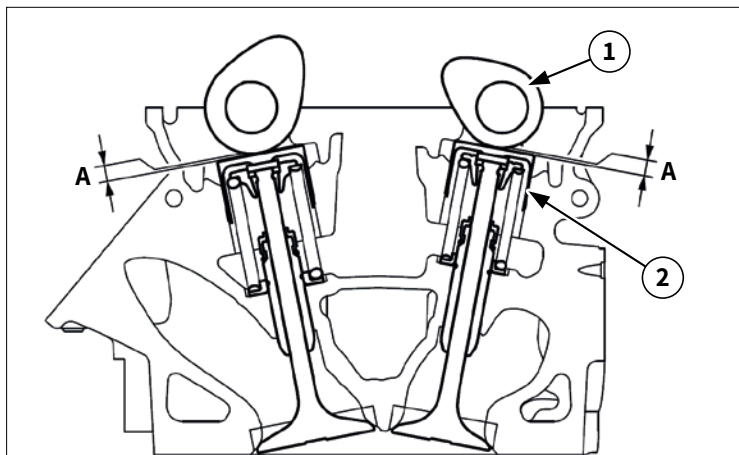
**🔧 Timing chain tensioner bolt:
10 Nm (1.0 m•kg 7.4 ft•lb)**



- Release the screwdriver and check that the tensioner rod comes out smoothly and easily;
- Install the gasket “4” and the timing chain tensioner cap “5”.

 **Timing chain tensioner cap:**
6 Nm (0.6 m•kg 4.4 ft•lb)

- Rotate the crankshaft counter-clockwise for several turns, checking that the movement is smooth and free of interference;
- Check that the crankshaft and camshaft references are correctly aligned with the references on the left crankcase cover and cylinder head;
- Refit the spark plug and valve cover.
- Reassemble: Fuel tank, air filter casing, right and left conveyors, seat.



4.5 VALVE CLEARANCE

⚠ Make sure that the valve clearance is controlled and/or adjusted when the engine is cold (ambient temperature).

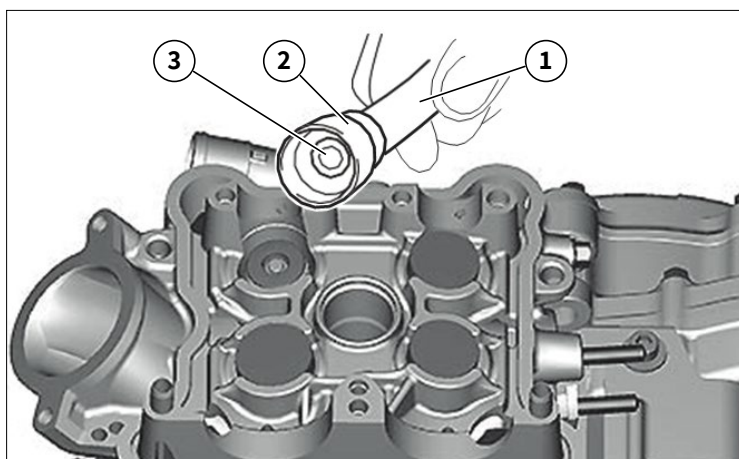
⚠ While the valve clearance is checked and/or adjusted, ensure that the piston remains at the top dead centre (TDC).

Check

- Remove: Seat, left and right conveyors, air filter casing, fuel tank;
- Remove spark plug and valve cover;
- Perform the engine timing operation (refer to section "4.4 Camshafts" on page 71);
- Measure the valve clearance "A" between the camshaft lobes "1" and the valve lifters "2", using a thickness gauge "3".
- If the clearance value of one or more valves is not within the standard values, proceed with the adjustment.

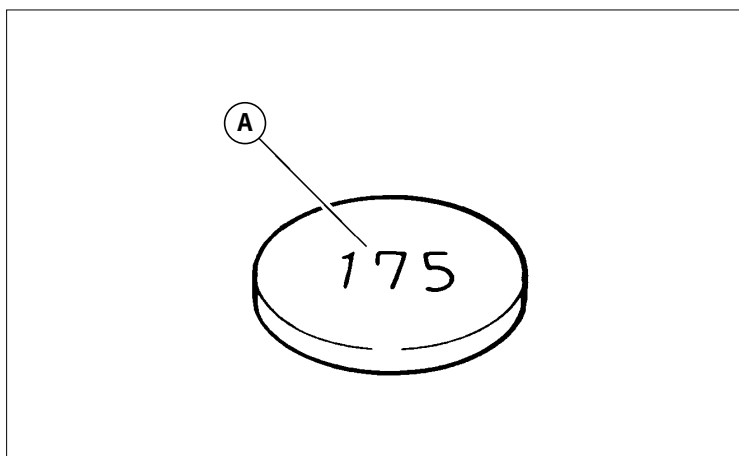
✂ Intake valve clearance:
0.10 - 0.17mm (0.0039 - 0.0067 in)

✂ Exhaust valve clearance:
0.15 - 0.22mm (0.0059 - 0.0087 in)



Adjustment

- Check that the crankshaft and camshaft references are correctly aligned with the references on the left crankcase cover and cylinder head;
- Remove the camshafts (refer to section "4.4 Camshafts" on page 71);
- Remove the valve lift "2" and the adjustment plate "3", relative to the valve to be adjusted, using a magnet "1".



- Check the thickness of the adjustment plate by checking the value "A" on the upper wall of the plate. If the value "A" cannot be read, measure the thickness of the plate with a micrometer.
- Choose the thickness of the new plate to be installed according to the following formula:

$$A = (B - C) + D$$

- A. New plate thickness;
- B. Valve clearance detected;
- C. Valve clearance specified;
- D. Old plate thickness.

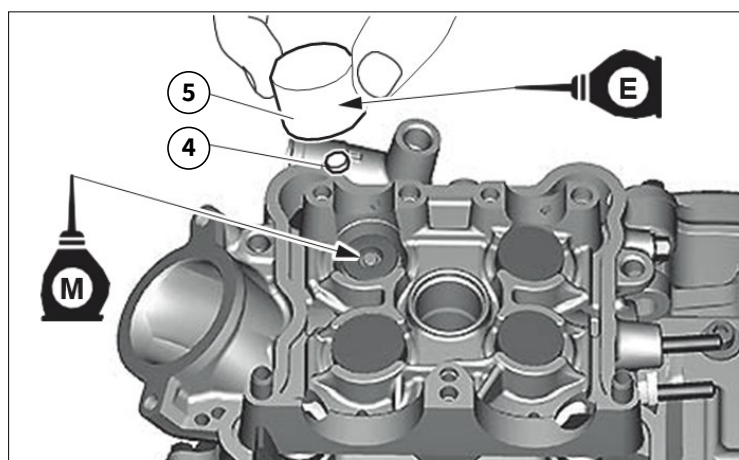
Last digit of pad number	Rounded value
0	0
1	0
2	0
4	5
5	5
6	5
8	10
9	10

i There are 25 types of adjusting pads, ranging from 1.20 mm (0.0472 in) to 2.40 mm (0.0945 in), in increments of 0.05 mm (0.0020 in).

i For the value of the originally installed plates, convert the last digit of the value according to the following table.

Example:

Plate number = 148 / Rounded value = 150



– Install the new adjustment plates “4” and valve lifters “5” on the relevant valves.

! DO NOT force plates and/or valve lifters into their housings during installation.

i Apply molybdenum disulphide grease on the end of the valve stems and related plates.

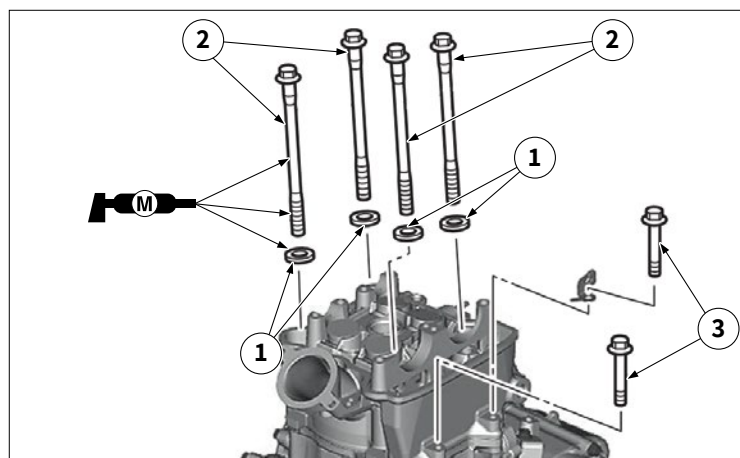
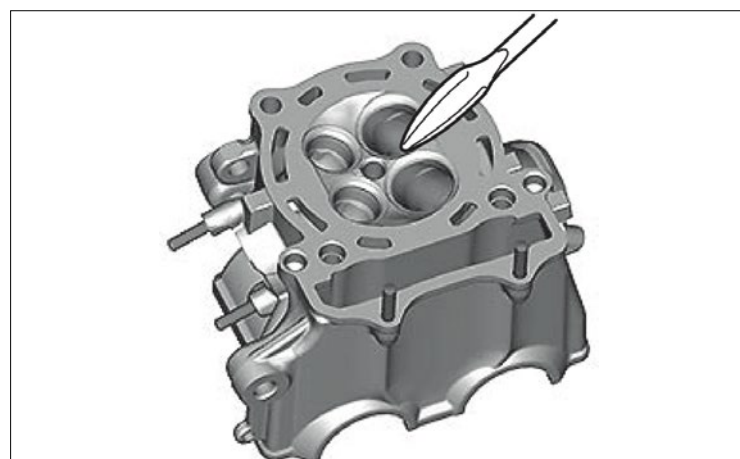
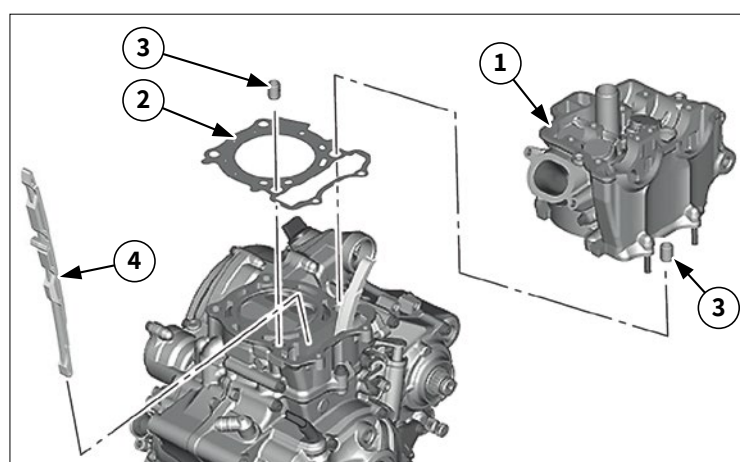
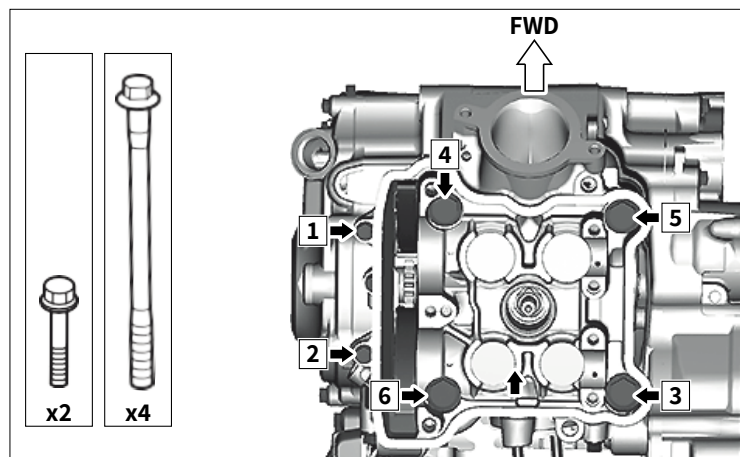
i Install the plates with the values facing upwards.

i Apply engine oil to the valve lifters and check that they move freely when rotated.

– Install the camshafts (refer to section “4.4 Camshafts” on page 71);

– Reassemble the spark plug and valve cover;

– Reassemble: Fuel tank, air filter casing, right and left conveyors, seat.



4.6 CYLINDER HEAD

Removal

- Remove: Seat, left and right conveyors, air filter casing, fuel tank;
- Remove the spark plug and valve cover;
- Remove the camshafts (refer to chapter "4.4 Camshafts" on page 71);
- Remove the nuts and bolts securing the head to the cylinder;

i Loosen the bolts $\frac{1}{2}$ turn at a time, following the sequence shown in the figure.

- Remove the bolts after having completely loosened each one.

M6 x 35 mm (1.38 in): "1", "2",
M10 x 149 mm (5.87 in): "3", "4", "5", "6"

- Remove head "1" from the cylinder, gasket "2", centering pins "3" and timing chain guide "4";

Check

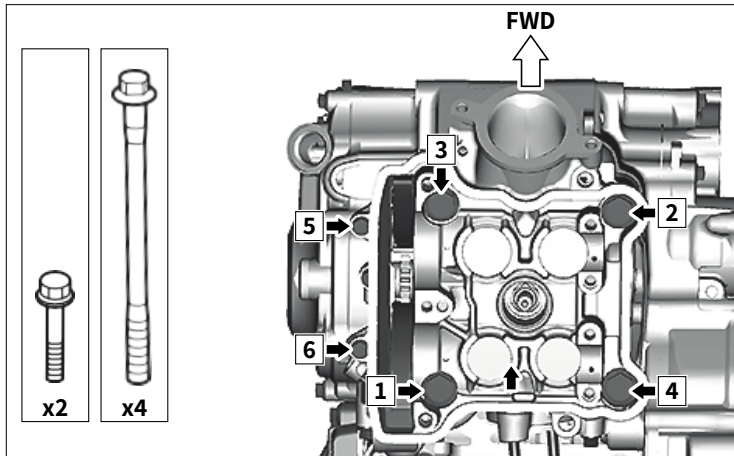
- Remove carbon deposits using a rounded scraper;
- !** Take care to avoid damaging the spark plug threads. Do not use a sharp instrument. Avoid scratching the aluminum.
- Check the head for damage and/or cracks, if any, replace the head;
- Check the water circuit, if there is encrustation and/or rust replace the head;
- Measure the deformation of the head, if it does not conform to specifications, level the head.

✂ Maximum permissible deformation:
0.05 MM (0.0020 in)

i If it is necessary to replace the head, the valves must also be replaced.

Installation

- Wash the threads and contact surfaces of bolts, washers, head/cylinder contact surface and crankcase threads;
- Install the gasket, centering pins, timing chain guide and head;
- Apply molybdenum disulphide grease to the threads and contact surfaces of the bolts and washers;
- Install washers "1", bolts "2" and nuts "3".

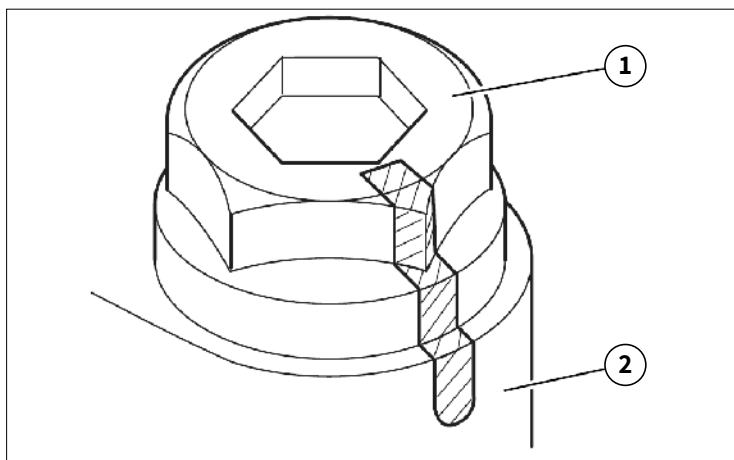


The head bolts tightening must be completed in four steps, as described below:

1st Phase

- Tighten the head bolts to the specified torque by performing the operation in two/three steps, following the diagram shown in the figure.

Head bolts "1" - "4":
30 Nm (3.0 m•kg, 22 ft•lb)

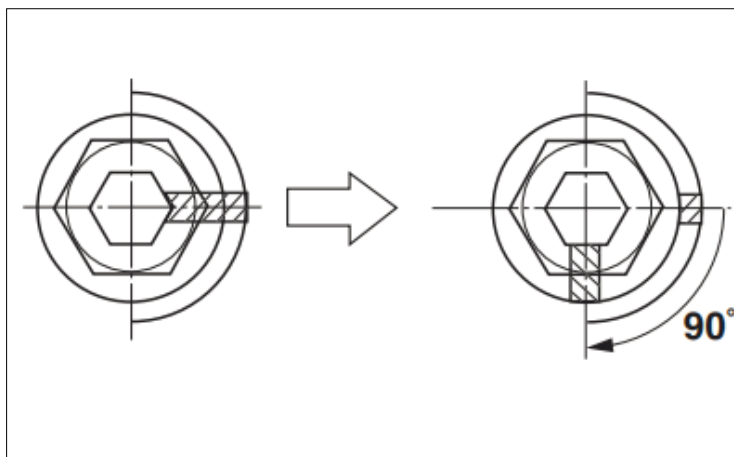


2nd Phase

- Remove bolt "1";
- Apply molybdenum disulphide grease again to the thread and contact surface of the bolt and washer;
- Tighten the bolt to the specified torque;

Head bolts "1":
23 Nm (2.3 m•kg, 17 ft•lb)

- Using a marker pen, mark a reference between bolt "1" and head "2";

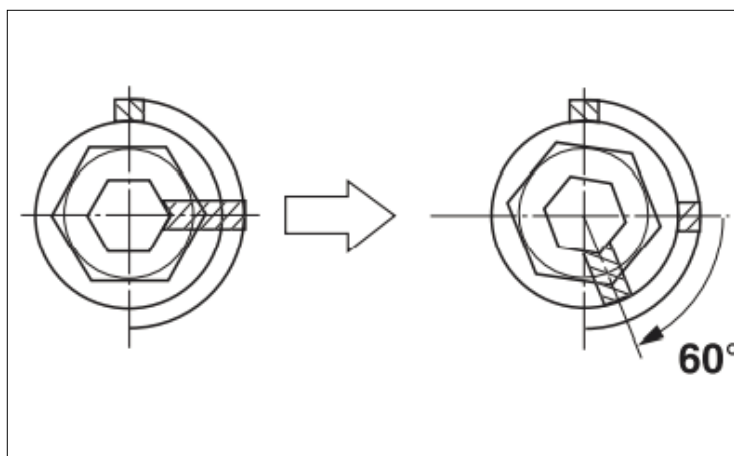


- Tighten the bolt by turning it 90° in relation to the initial reference;

Head bolt "1":
Specified angle = 90°

- Repeat steps 2 operations for bolts "2", "3", "4";

(i) Perform the 2nd Phase operations one bolt at a time. Remove the bolts in the order used for tightening, then tighten them according to the new tightening torque.



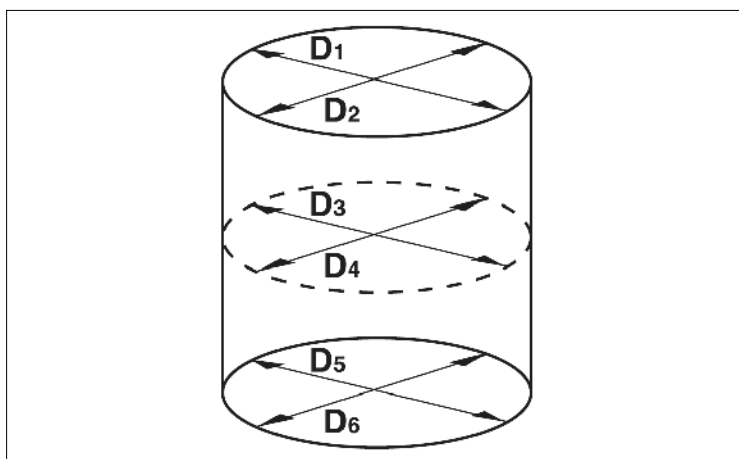
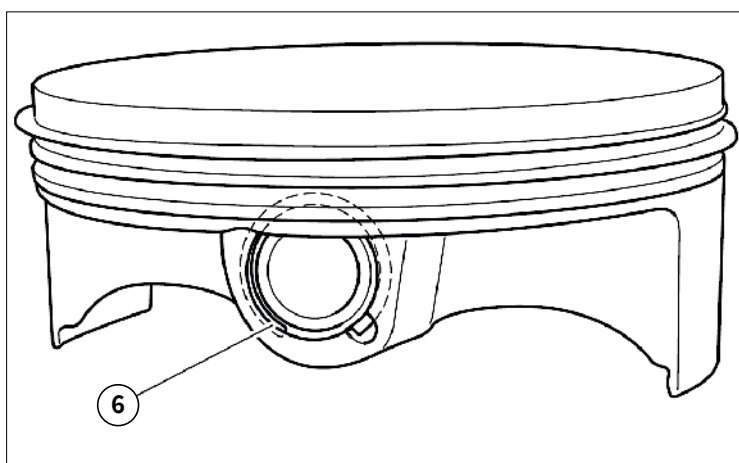
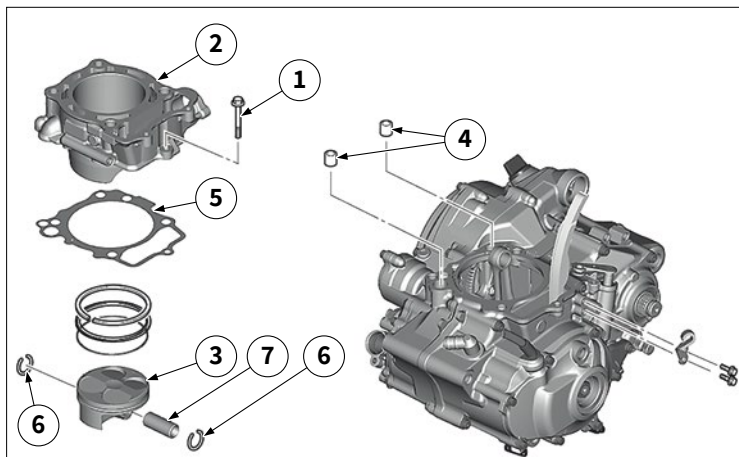
3rd Phase

- Mark a second reference between the bolt and the head, then tighten each bolt by a further 60° following the tightening order of the 1st Phase;

Head bolts "1" - "4":
Specified angle = 60°

- Tighten bolts "5" and "6" to the specified torque.

Bolts "5" - "6":
10 Nm (1.0 m•kg, 7.4 ft•lb)



4.7 CYLINDER AND PISTON

Removal

- Remove the head (refer to section “4.6 Cylinder head” on page 77);
- Remove cylinder bolts “1” on the timing chain side, then remove cylinder “2” from piston “3” and remove it from the vehicle. Retrieve the centring bushings “4” and remove the gasket “5”.
- Remove seeger “6”, pin “7” and piston “3” from the connecting rod.

i Before removing the seeger, cover the crankcase with a clean cloth to prevent it from falling into it.

! Do not use a hammer to pull out the pin, in case the operation is difficult to use a special puller.

Cylinder check

- Remove carbon deposits using a rounded scraper;
- !** Do not use a sharp instrument. Avoid scratching the aluminum.
- Check the internal surface of the cylinder, if damaged, grind or replace;

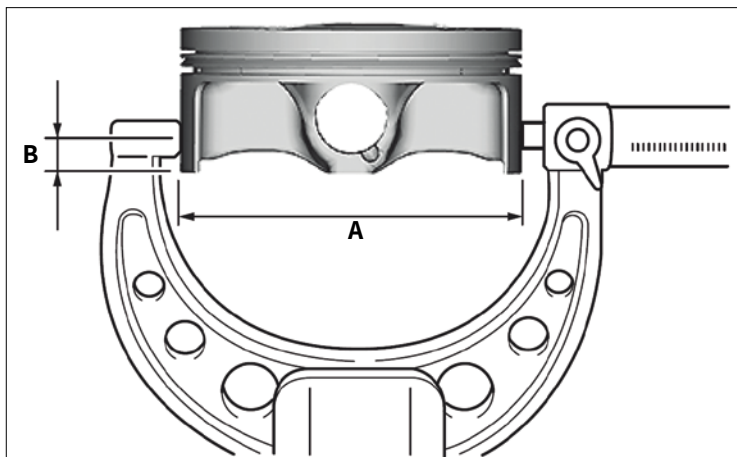
- Measure the cylinder bore in parallel (D1, D3, D5) to and at right angles to the crankshaft (D2, D4, D6).
- Then, find the average of the measurements.



Bore:

Standard = 97.000 – 97.010mm (3.8189 – 3.8193 in)
Wear limit = 97.060mm (3.8213 in)

i If the bore does not comply with the specifications, re-measure or replace the cylinder, piston and piston rings all together.



Piston check

- Measure the outside diameter of piston "A" in measuring position "B" using the micrometer.

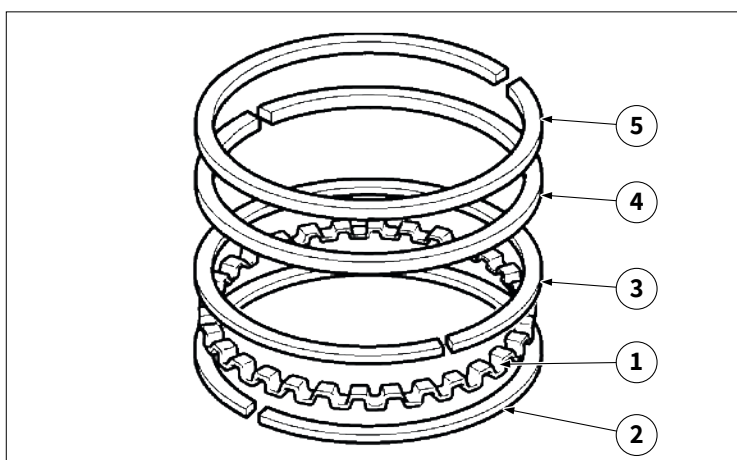
Piston diameter:
96.955 – 96.970mm (3.8171 – 3.8177 in)

Measuring point "B" (from the lower side of the piston skirt):
9.0mm (0.35 in)

i If the diameter does not comply with the specifications, replace the cylinder, piston and segments all together.

- Finally, calculate the clearance between cylinder and piston:
Clearance = Cylinder "C" bore - Piston diameter

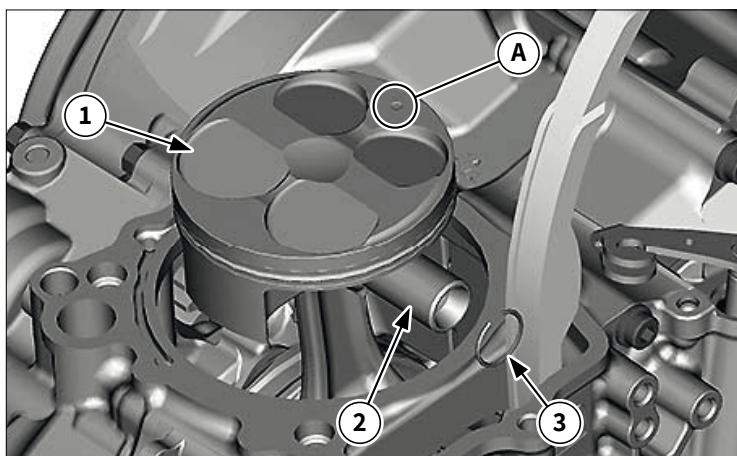
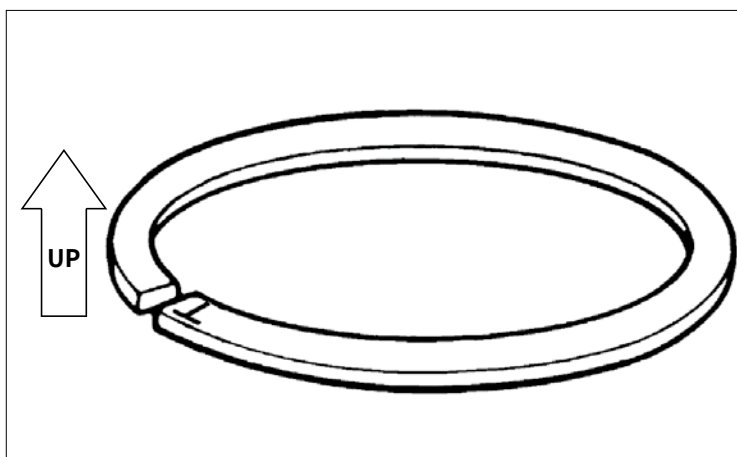
Clearance between piston and cylinder:
0.010 – 0.045mm (0.0004 – 0.0018 in)



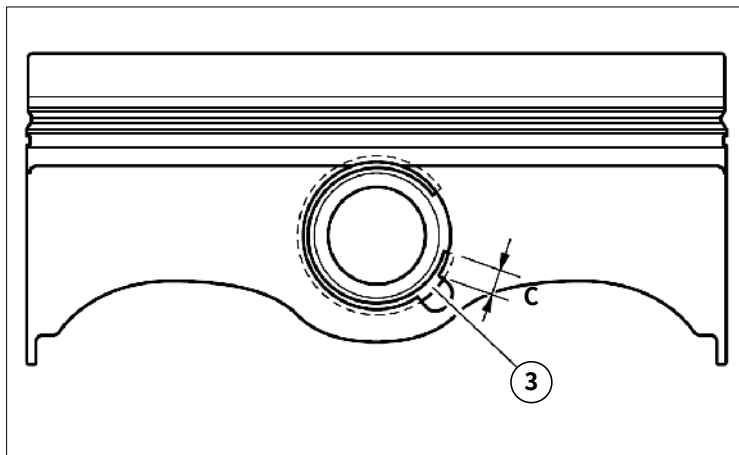
Installation

- Install in the lower piston housing: scraper ringband expander "1", lower scraper ring band light "2", scraper ring band light "3";
- Install segment "4" in the upper (XXF250 / XEF 250) or intermediate (XXF 450 / XEF 450) piston seat;
- Install segment "5" in the upper seat (XXF 450 / XEF 450 ONLY) of the piston;

i Make sure to install the segment(s) so that the reference, or manufacturer's numbers, are facing upwards.



- Lubricate piston "1" and pin "2" then install them on the connecting rod. Make sure that the piston reference "A" is facing the exhaust (rear side of the vehicle).



- Install seeger "3" in the relative housings on the piston;
- i** Make sure that the end of the seeger "C" is not near the notches in the piston.
- Install the centering pins, gasket and cylinder previously lubricated with engine oil;
- Install the cylinder bolt on the timing chain side;
-  **Cylinder bolt: 10 Nm (1.0 m•kg, 7.4 ft•lb)**
- i** While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and its slider (exhaust side) through the timing chain housing.



4.8 SOUNDPROOFING

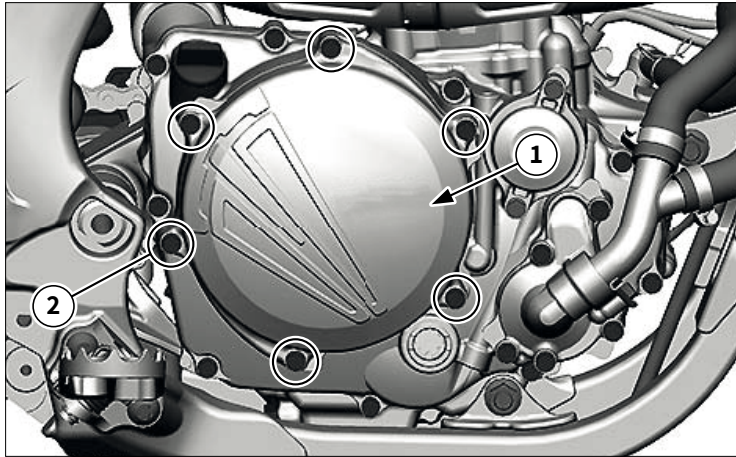
- Remove the fixing rivets (no. 6) of the bottom cover, then remove the cover from the silencer;



- Remove the end cap from the silencer and remove the soundproofing cartridge inside it;

- Insert a new cartridge, then replace the end cap on the silencer;
- Refit the cover and secure the cover/end cap/silencer assembly with new breakstem rivets.

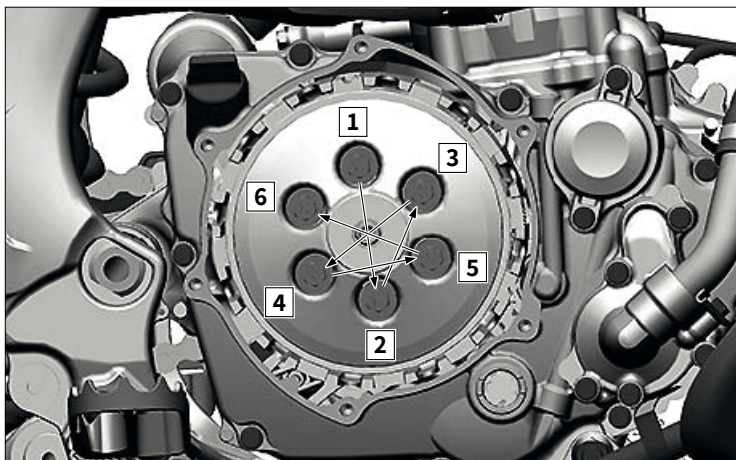
- i** A correct and regular maintenance of the soundproofing element guarantees the best performance of the vehicle and allows it to be driven on the road and/or in approved circuits.



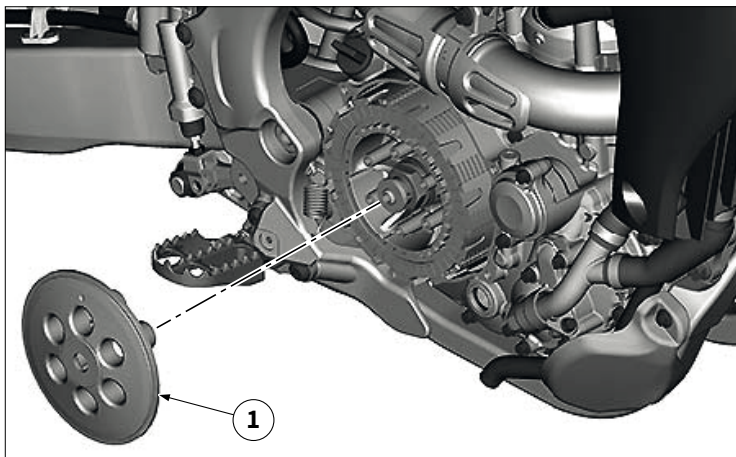
4.9 CLUTCH

Clutch removal

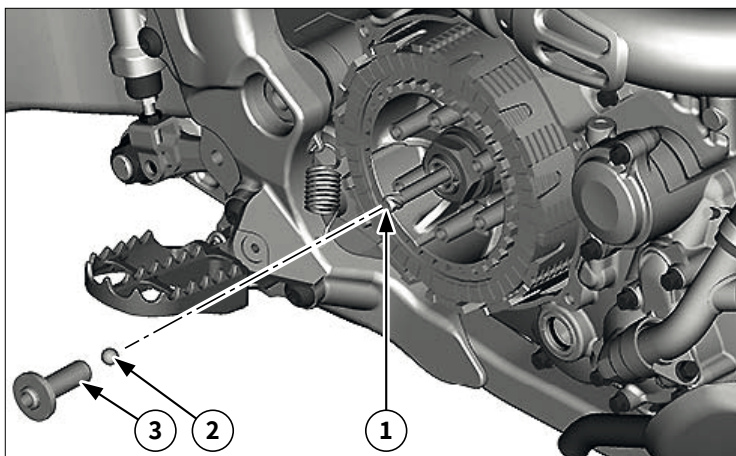
- Remove the clutch crankcase bolts “2” following a cross pattern, then remove the crankcase “1”;



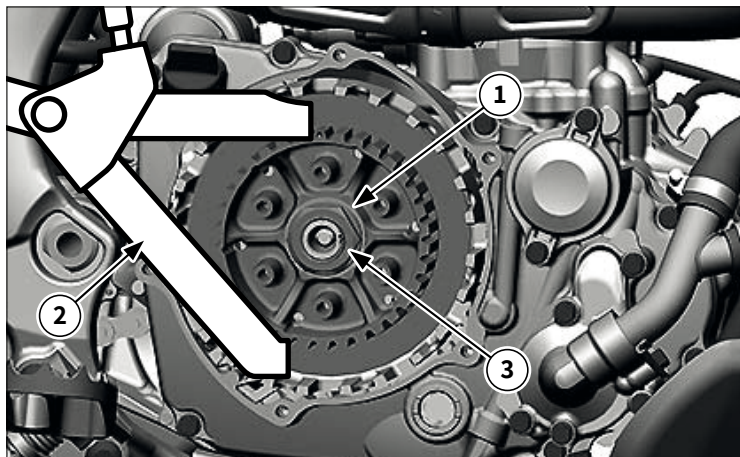
- Remove the clutch bolts and springs following a cross pattern;



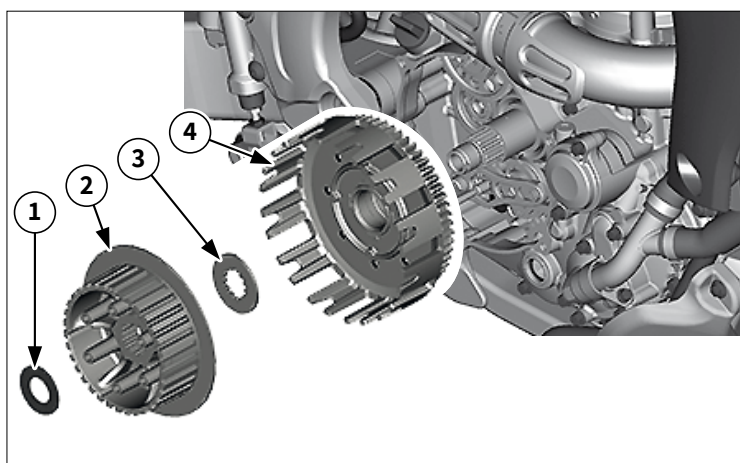
- Remove the pressure plate “1”;



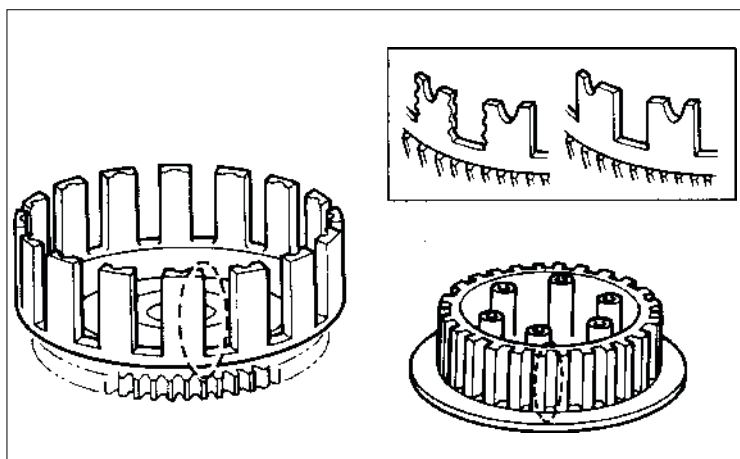
- Remove the thrust bearing “1”, the ball “2” and the thrust rod “3”;
- Remove the plates from the clutch;



- Bend the tab of the clutch hub nut lock washer (XXF 450 / XEF 450 ONLY);
- Lock the clutch hub "1" with the universal locking tool "2" and unscrew the nut "3";

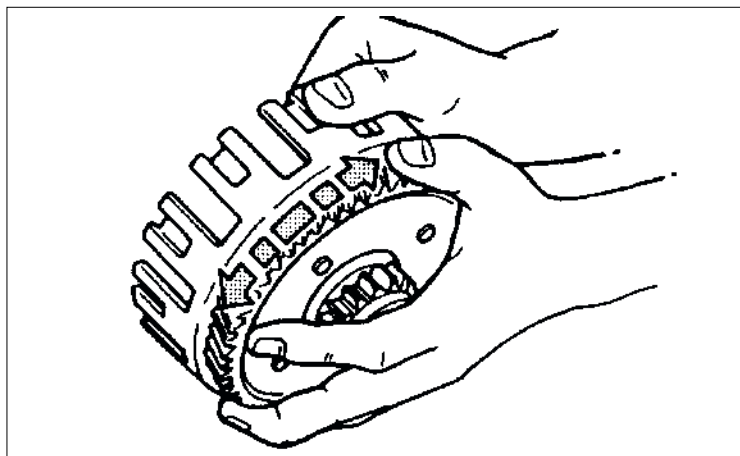


- Remove the lock washer "1", the hub "2", the spacer "3" and the clutch housing "4".

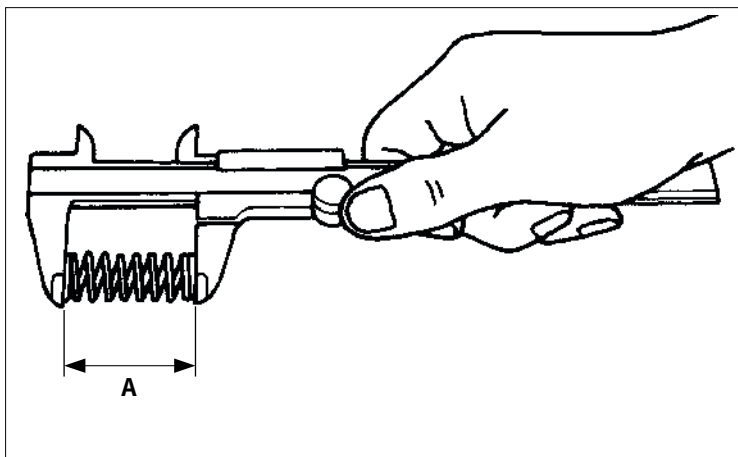


Check the clutch elements

- Check the clutch housing and clutch hub for wear/cracks/damage, replace them;

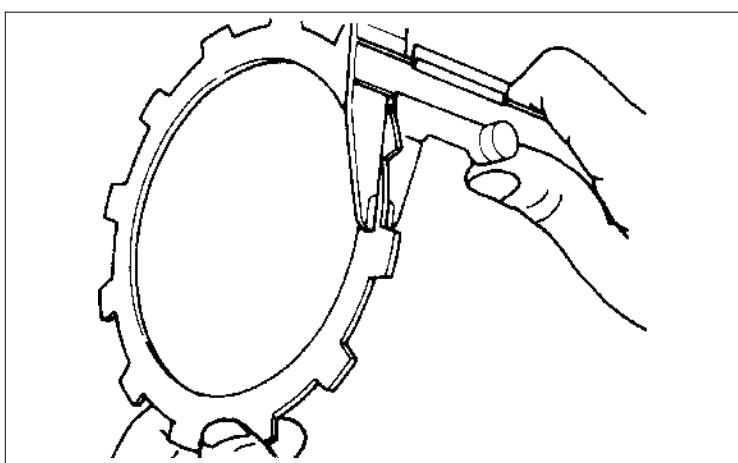


- Check the driven gear of the primary transmission for circumferential clearance and/or damage to the teeth. If it has one or both defects, replace it;



- Measure the free length "A" of the clutch springs. If not in accordance with specifications, replace the springs all together;

Clutch spring free length:
48.00 mm (1.89 in)
Minimum limit: 45.60 mm (1.80 in)



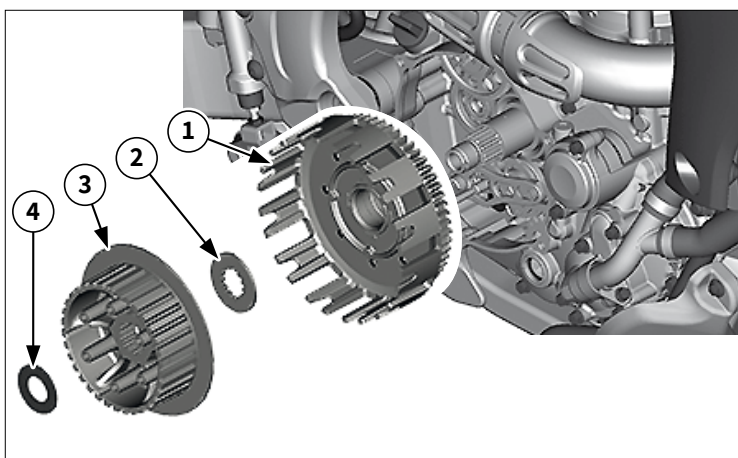
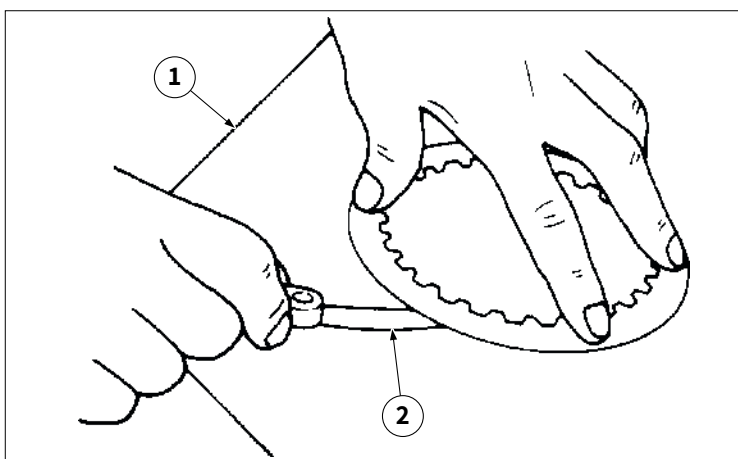
- Measure the thickness of friction discs 1 and 2. If not in accordance with specifications, replace the disc;

Friction disc 1 thickness:
2.92-3.08mm (0.115-0.121 in)
Minimum limit: 2.82 mm (0.111 in)

Friction disc 2 thickness:
2.92-3.08mm (0.115-0.121 in)
Minimum limit: 2.82 mm (0.111 in)

- Measure the distortion and thickness of the clutch disc, using a reference plane "1" and a thickness gauge "2";
- If not in accordance with specifications, replace the disc.

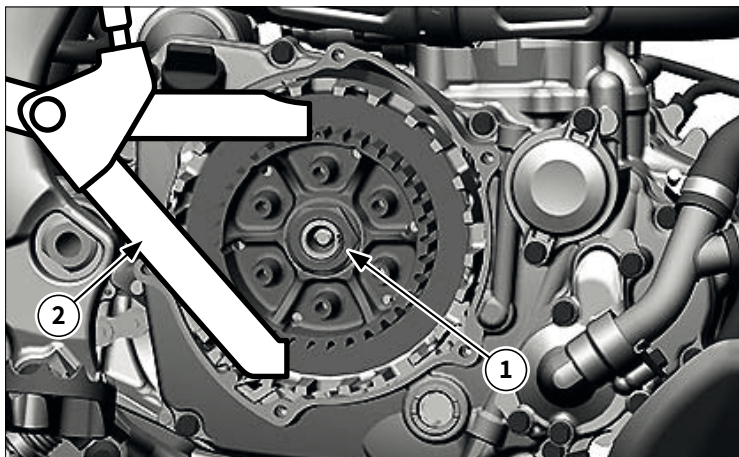
Distortion limit (XXF 450 / XEF 450):
0.10 mm (0.004 in)



Clutch installation

- Install the clutch housing "1", spacer "2", hub "3" and lock washer "4";

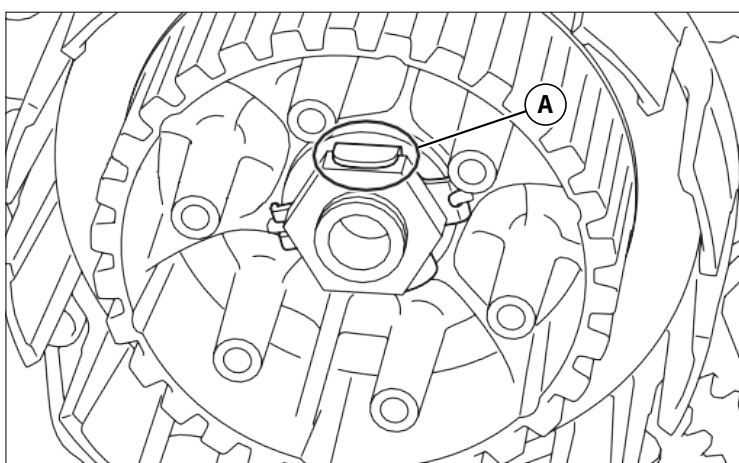
i Install washer "4" by aligning its retainers with the ribs of the clutch hub.



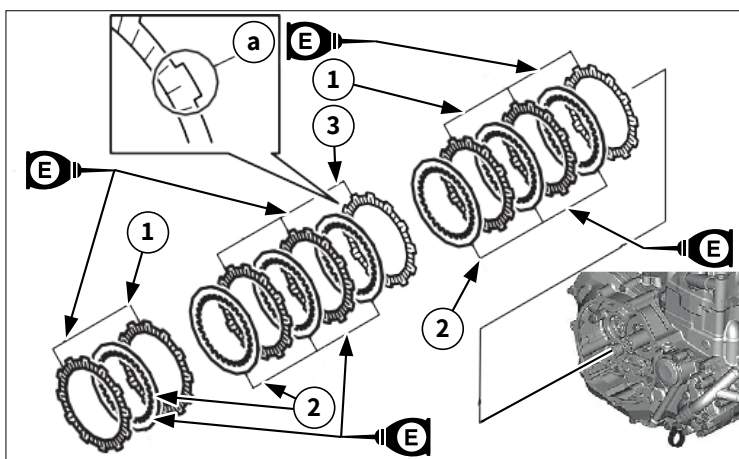
– Install nut “1”, lock the clutch hub with universal locking tool “2” and tighten the nut to the specified torque;

Nut (clutch boss):
75 Nm (7.5 m•kg, 55 ft•lb)

i Apply engine oil to the thread and contact surfaces of the clutch hub nut.



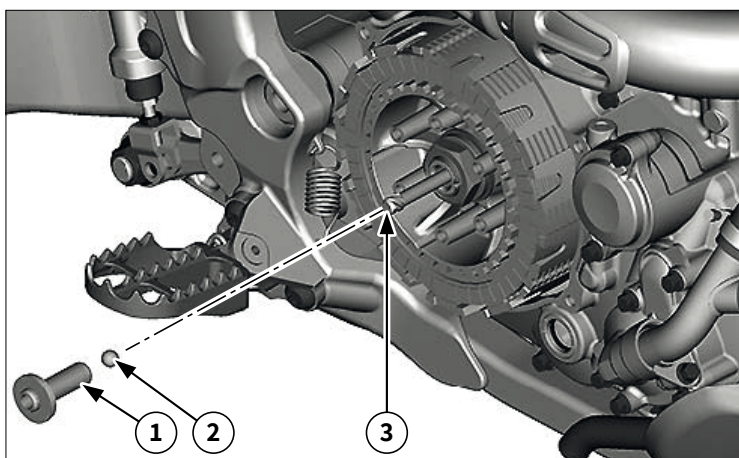
i Fold in tab “A” of the lock washer.



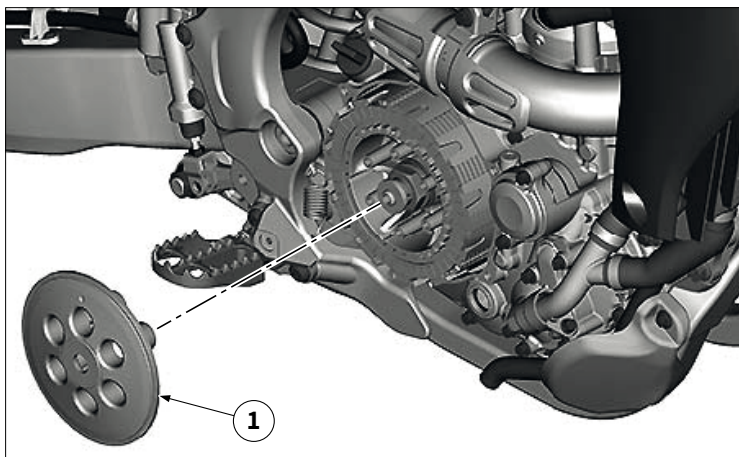
– Install friction discs and clutch discs “2” alternately on the clutch hub, starting and ending with a friction disc.
– Install friction discs in this order:

1. friction disk “1” x3;
2. friction disk “3” (identification colour “a”: violet) x3;
3. friction disk “1” x2.

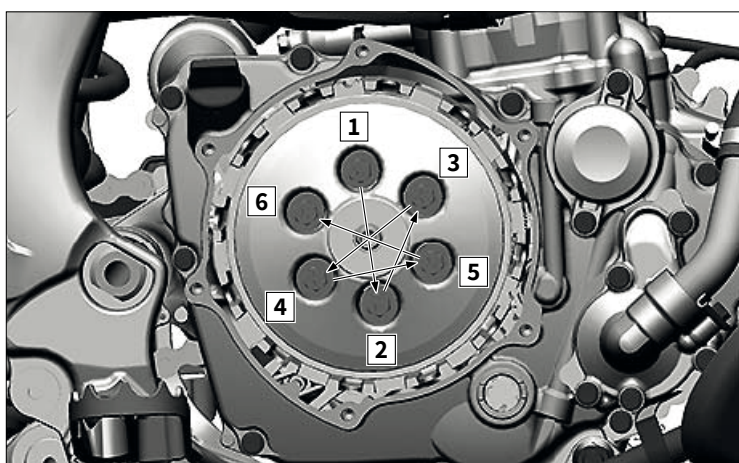
i Apply engine oil to the friction and clutch discs.



– Install thrust rod “1”, the ball “2” and thrust bearing “3”;

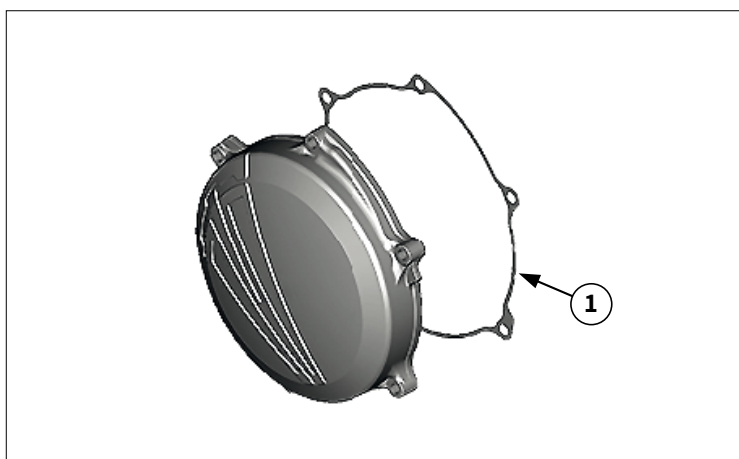


- Install the thrust plate “1”;

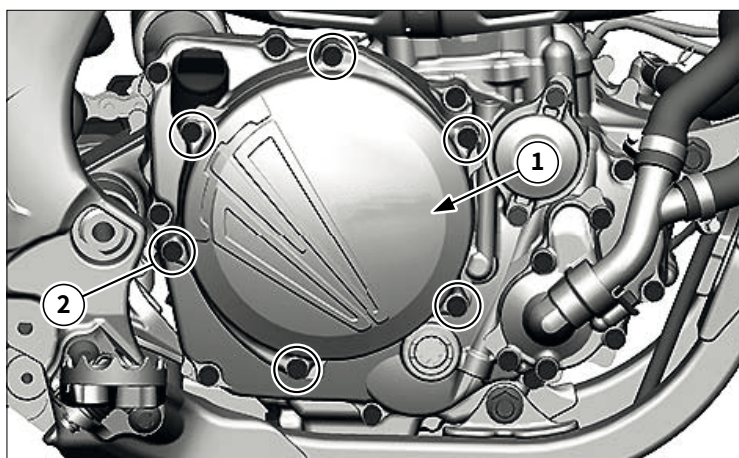


- Install the springs and bolts of the clutch and tighten them following a cross pattern;

 **Bolt (clutch spring):**
10 Nm (1.0 m•kg, 7.2 ft•lb)

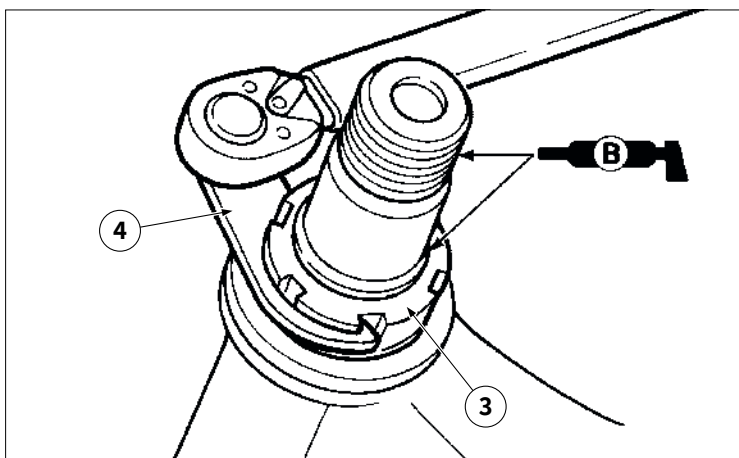
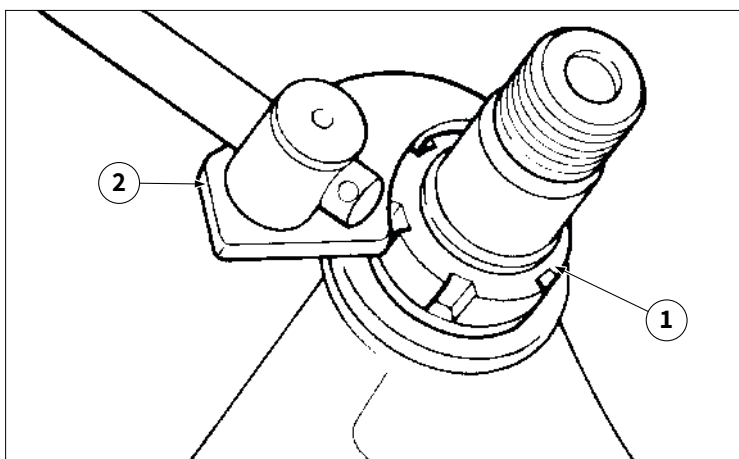
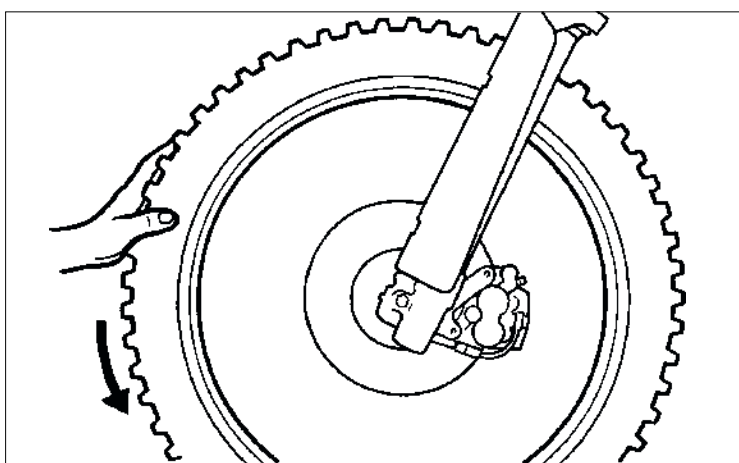
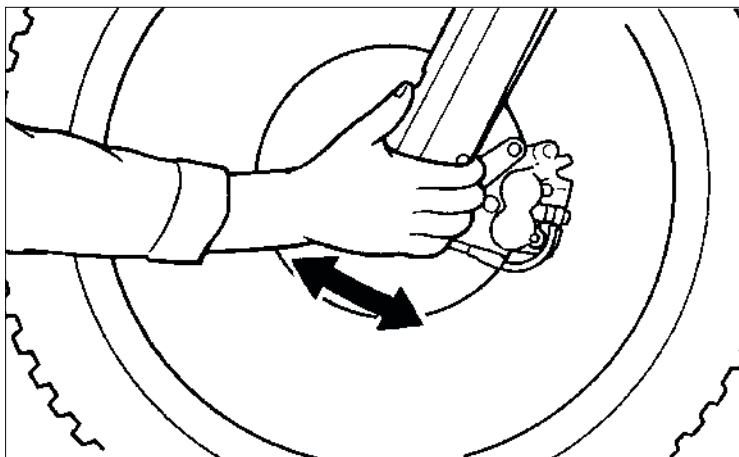


- Install a new O-ring “1”;



- Install the clutch crankcase “1” and bolts “2”. Tighten them following a cross pattern.

 **Bolt (clutch cover):**
10 Nm (1.0 m•kg, 7.2 ft•lb)



4.10 STEERING PLAY CONTROL AND ADJUSTMENT

Steering play control

- Place a stand under the engine to raise the front wheel off the ground;

⚠ **Securely support the vehicle so that there is no danger of it falling over.**

- Grasp the bottom of the forks and gently rock the fork assembly back and forth. If free play is present adjust the steering head;
- Check that the steering is working evenly by turning it fully to the right and left. If play is present, adjust the steering head.

Steering play adjustment

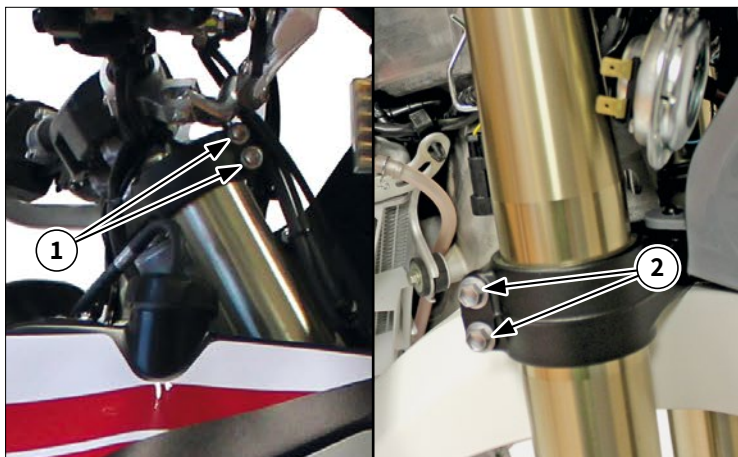
- Remove the front number plate, handlebars, upper fork plate and the washer on the steering sleeve;
- Loosen the lock nut “1” on the steering ring nut using a ring nut spanner “2”;

- Start tightening the steering ring nut “3”, with a ring nut spanner and a torque spanner “4”, to the specified torque;

🔧 **Initial clamping of the handlebar ring nut:**
38 Nm (3.8 m•kg, 27 ft•lb)

- Turn the steering wheel left and right a few times to check that it moves smoothly. If not, check the steering bearings and replace if necessary;
- Then loosen the handlebar ring nut “3” by one turn and tighten it to the specified torque.

🔧 **Handlebar ring nut final tightening:**
7 Nm (0.7 m•kg, 5.1 ft•lb)



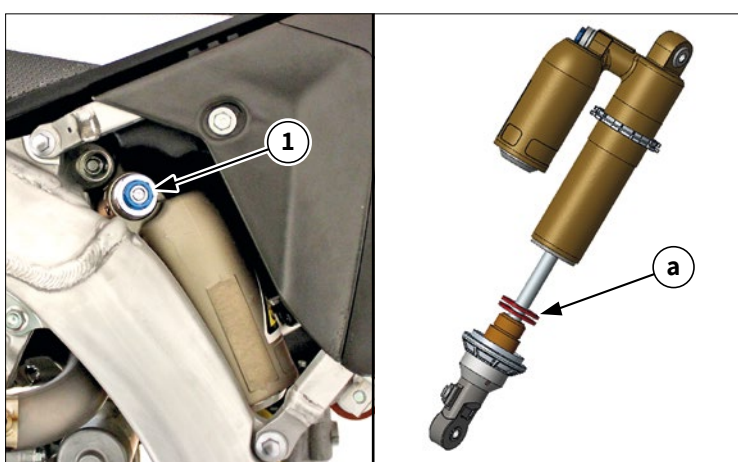
4.11 FORK

⚠ For the maintenance of hydraulic components, contact an authorised Fantic workshop.

- Regularly check the upper “1” and lower “2” fastening screws of both stems. If they are loose, tighten them to the specified torque.

🔧 Nut “1”: 21 Nm (2.1 m•kg, 15 ft•lb)

🔧 Nut “2”: 21 Nm (2.1 m•kg, 15 ft•lb)



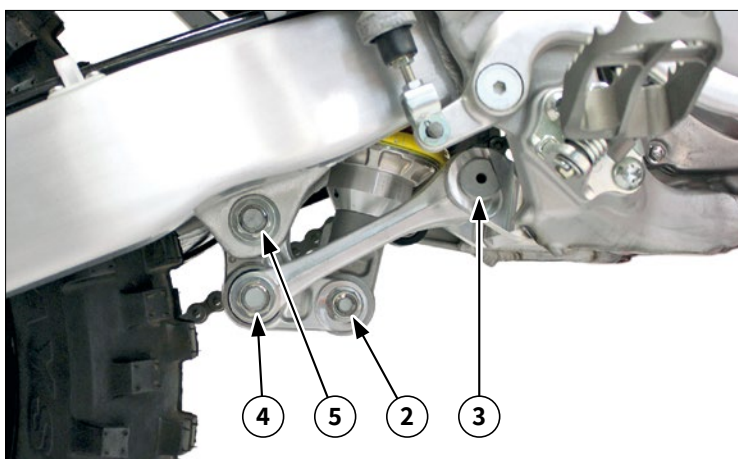
4.12 SHOCK ABSORBER

⚠ For the maintenance of hydraulic components, contact an authorised Fantic workshop.

⚠ Do not remove the two spacers “a”.

- Regularly check the upper fastening screw of the shock absorber “1”. If it is loose, tighten it to the specified torque.

🔧 Nut “1”: 56 Nm (5.6 m•kg, 41 ft•lb)



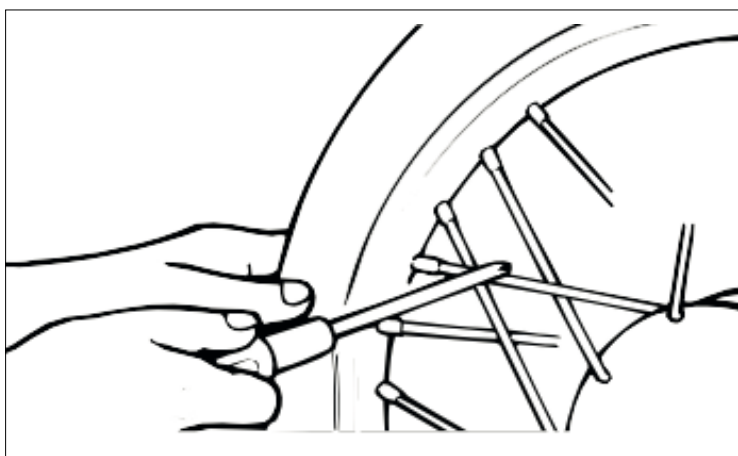
- Regularly check the shock absorber lower fastening screw “2” and linkage fastening screws “3”, “4” and “5”. If they are loose, tighten them to the specified torque.

🔧 Nut “2”: 53 Nm (5.3 m•kg, 41 ft•lb)

🔧 Nut “3” - “4”: 80 Nm (8.0 m•kg, 59 ft•lb)

🔧 Nut “5”: 70 Nm (7.0 m•kg, 52 ft•lb)

i To ensure the best operation and durability of the rear shock absorber linkage, it is recommended to check, clean and grease the linkage bearings periodically.



4.13 WHEELS

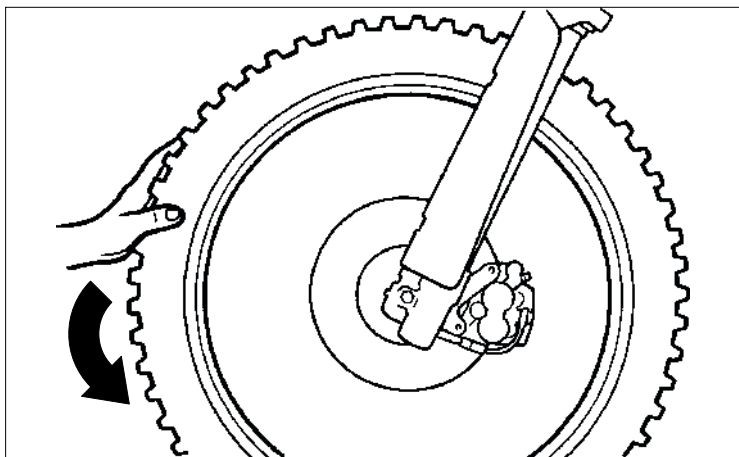
Spokes check and tightening

i The following procedure applies to all spokes of both wheels.

- Check that the spokes are not broken or deformed, if they are, they must be replaced;
- Check the tension of the spokes by tapping on them with a screwdriver. A well tightened spoke will emit a light, tinkling tone, while a loose one will emit a deaf tone. In the case of a loose spoke, tighten it with a spoke wrench to the specified torque;

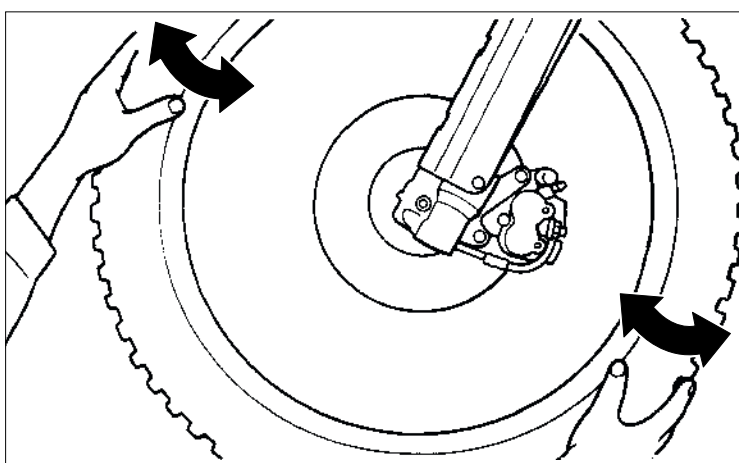
🔧 Spokes: 3 Nm (0.3 m•kg, 2.2 ft•lb)

⚠ Be sure to tighten the spokes before and after the running-in.

**Wheel check**

i The following procedure applies to both wheels.

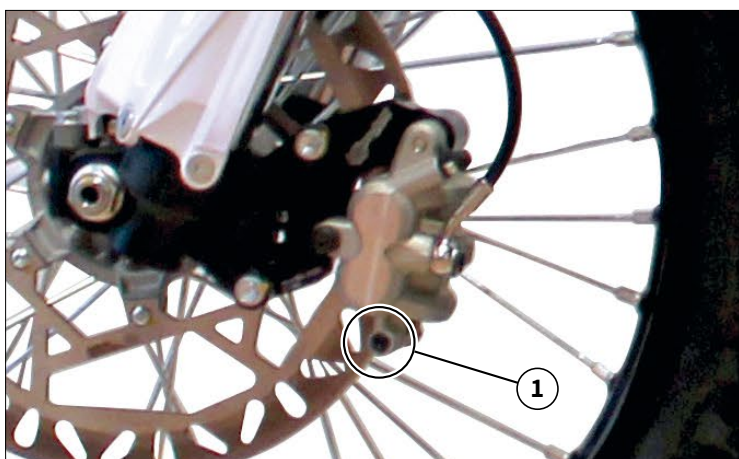
- Place a stand under the engine, lift the wheel and turn it. Check the centering and alignment of the rim channel with respect to the wheel hub. If there are any anomalies, proceed with the correction by pulling the spokes;



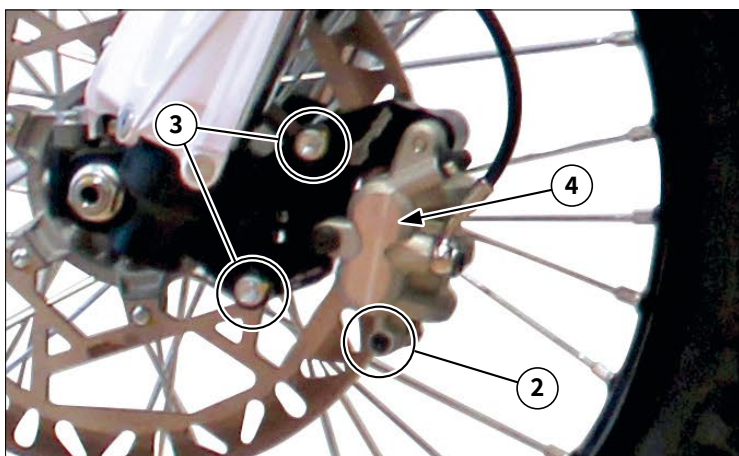
- Check that the wheel bearings do not have axial clearance. If there is, change the bearings.

! If there are cracks or splits in the rim channels, it is necessary to replace them.

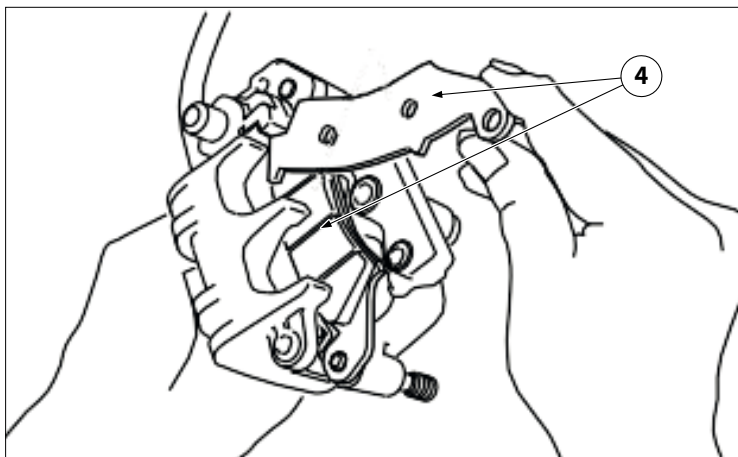
! Never try to repair the wheel rims.

**4.14 BRAKE PADS****Replace the front brake pads**

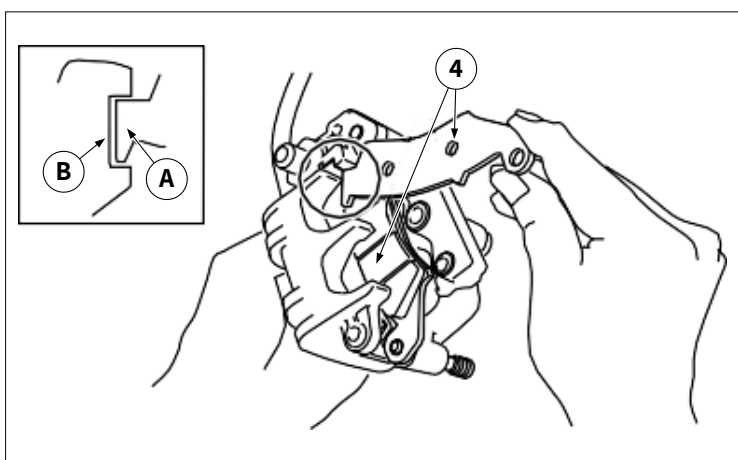
- Remove the pad pin plug “1”;



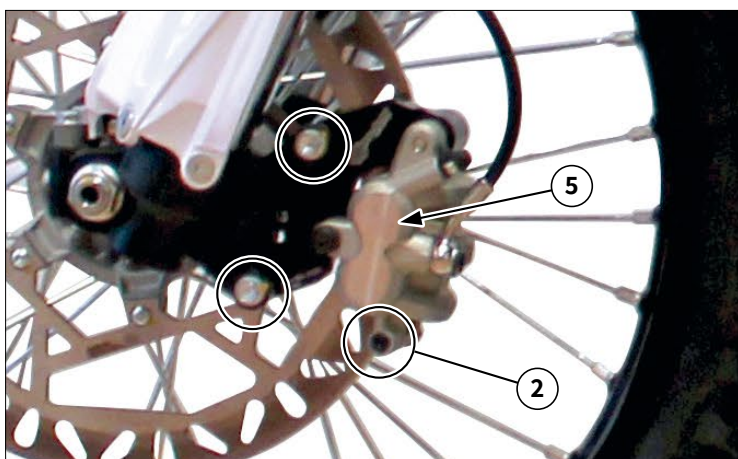
- Loosen the pad pin “2”;
- Unscrew the screws “3” securing the brake caliper;
- Remove brake caliper “4” from the fork;



- Remove the pad pin and brake pads “4”;

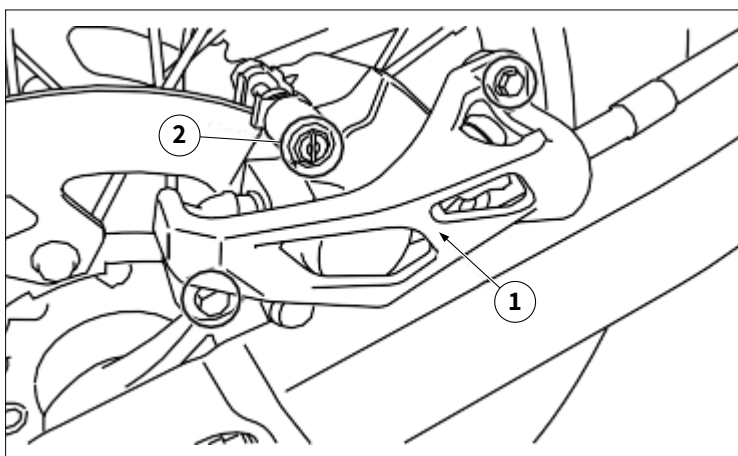


- Install the brake pads “4” with their protrusions “A” in the recesses of the brake caliper “B”. Temporarily tighten the pads pin “2”;



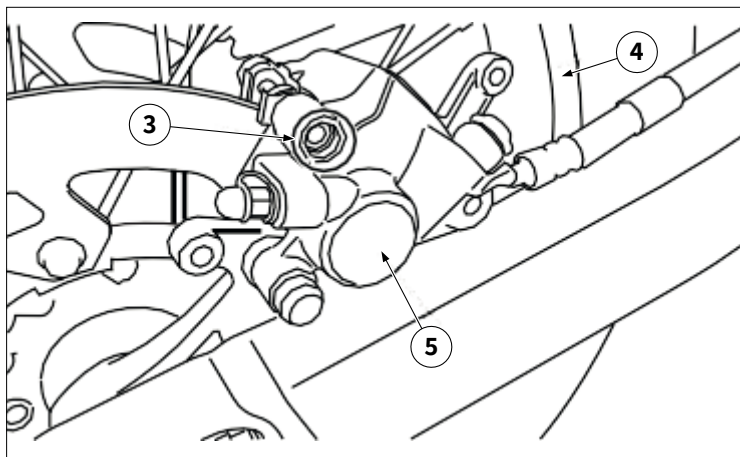
- Install the brake caliper “5” and tighten the relevant bolts to the specified torque. Tighten the pad pin “2” and insert the relative cap previously removed;

- 🔧 **Bolt (brake caliper):**
28 Nm (2.8 m•kg, 20 ft•lb)
- 🔧 **Brake pad pin:**
17 Nm (1.7 m•kg, 13 ft•lb)

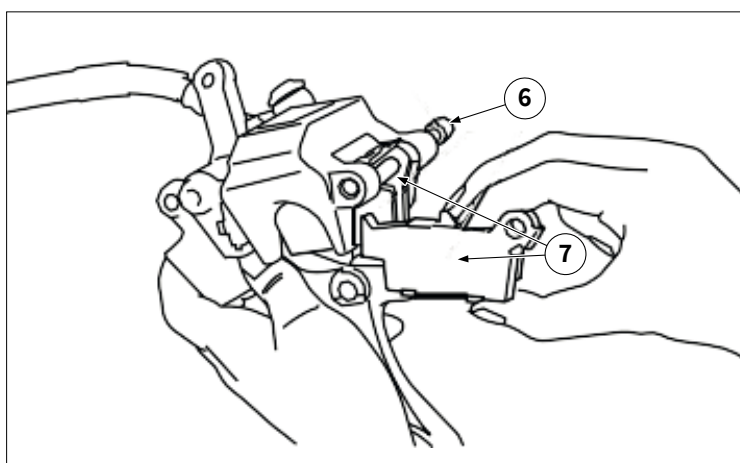


Replace the rear brake pads

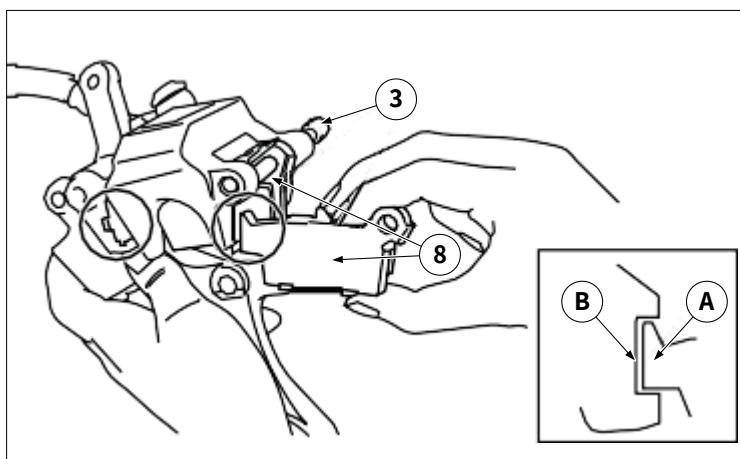
- Remove the protection “1” and the pad pin plug “2”;



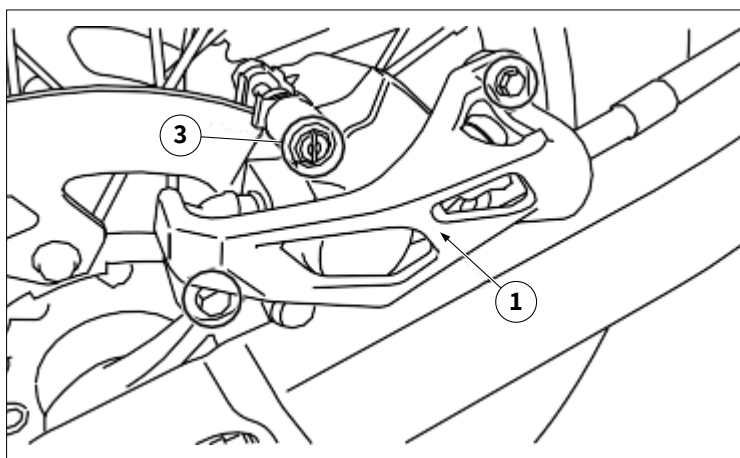
- Loosen the pad pin "3", remove the rear wheel "4" and the brake calliper "5";



- Remove the pad pin "6" and brake pads "7";



- Install the brake pads "8" with the relative protrusions "A" in the recesses "B" of the brake calliper. Temporarily tighten the pads pin "3".



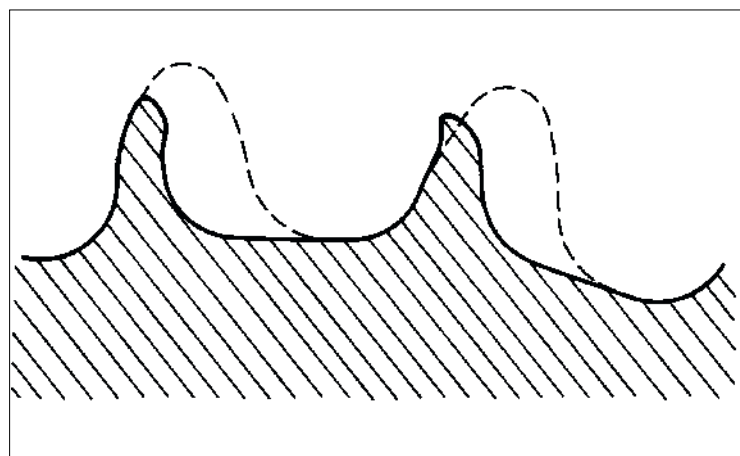
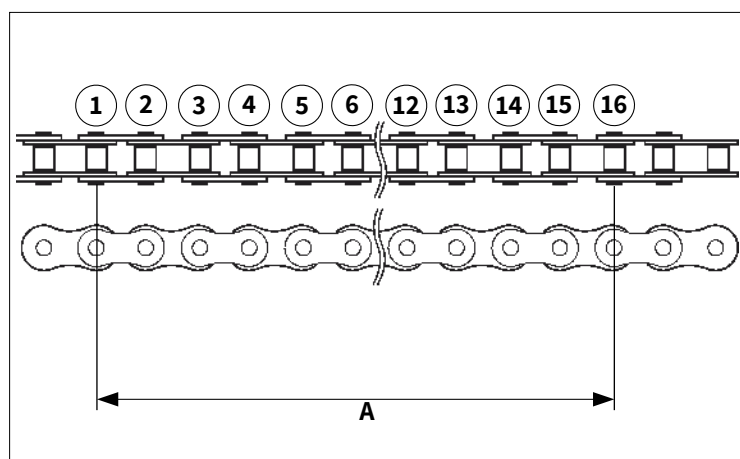
- Install the brake caliper "5" and rear wheel "4". Tighten the pad pin "3" and install the pad pin plug. Installa the protector "1".

4.15 TYRES

- Check the tire while it is cold;

Model/version	Front tyre standard pressure	Rear tyre standard pressure
XEF 450 Rally with road use configuration	200 kPa (2.00 kgf/cm ² , 29 psi)	220 kPa (2.20 kgf/cm ² , 32 psi)
XEF 450 Rally with race use configuration	100 kPa (1.00 kgf/cm ² , 15 psi)	100 kPa (1.00 kgf/cm ² , 15 psi)

- Loose bead stoppers allow the tire to slip off its position on the rim when the tire pressure is low;
- A tilted tire valve stem indicates that the tire slips off its position on the rim;
- If the tire valve stem is found tilted, the tire is considered to be slipping off its position. Correct the tire position.



4.16 CHAIN, CROWN AND SPROCKET

Chain check

- Measure the length of 15 joints “A” of the transmission chain, if the length “A” is longer than the service limit, replace the chain.

i While measuring the drive chain length, push down on the drive chain to increase its tension.

i Measure the length between drive chain roller “1” and “16” as shown.

! Perform this measurement at two or three different places.

✂ Service limit (XEF 250 / XEF 450 versions):
239.3 mm (9.42 in)

✂ Service limit (XXF 250 / XXF 450 versions):
242.9 mm (9.56 in)

Pinion and crown check

- Check the pinion and crown teeth. If they are damaged and/or excessively worn, replace them.

! Always replace chain, rim and pinion all together. This will ensure uniform wear of the components and a longer service life of the components.

4.17 CLEANING AND VEHICLE STORAGE

Frequent cleaning of your machine will enhance its appearance, maintain good overall performance, and extend the life of many components.

1. Before washing the machine, block off the end of the exhaust pipe to prevent water from entering. A plastic bag secured with a rubber band may be used for this purpose.
2. If the engine is excessively greasy, apply some degreaser to it with a paint brush. Do not apply degreaser to the chain, sprockets, or wheel axles.
3. Rinse the dirt and degreaser off with a garden hose; use only enough pressure to do the job.

 **Do not use high-pressure washers or steam-jet cleaners since they cause water seepage and deterioration seals.**

4. After the majority of the dirt has been hosed off, wash all surfaces with warm water and a mild detergent. Use an old toothbrush to clean hard-to-reach places.
5. Rinse the machine off immediately with clean water, and dry all surfaces with a soft towel or cloth.
6. Immediately after washing, remove excess water from the chain with a paper towel and lubricate the chain to prevent rust.
7. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
8. Automotive wax may be applied to all painted or chromed surfaces. Avoid combination cleanerwaxes, as they may contain abrasives.
9. After completing the above, start the engine and allow it to idle for several minutes.

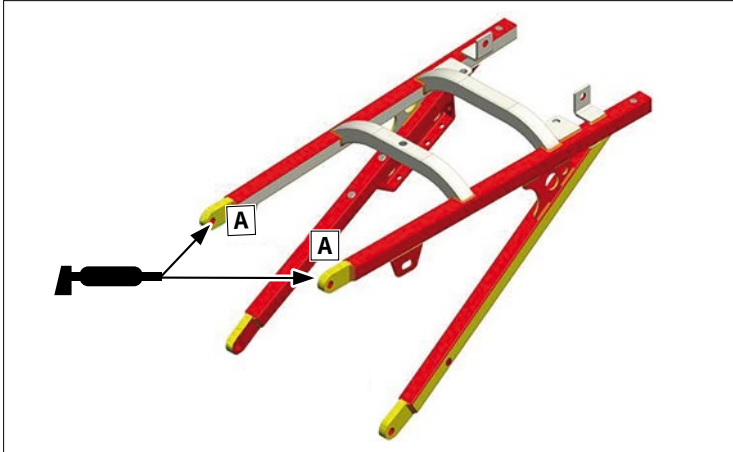
4.18 LONG TIME VEHICLE INACTIVITY

 **If your machine is to be stored for 60 days or more, some preventive measures must be taken to avoid deterioration.**

After cleaning the machine thoroughly, prepare it for storage as follows:

1. Remove the spark plug, pour a tablespoon of motor oil in the spark plug hole, and reinstall the plug. With the engine stop switch pushed in, kick the engine over several times to coat the cylinder walls with oil.
2. Remove the drive chain, clean it thoroughly with solvent, and lubricate it. Reinstall the chain or store it in a plastic bag tied to the frame.
3. Lubricate all control cables.
4. Block the frame up to raise the wheels off the ground.
5. Tie a plastic bag over the exhaust pipe outlet to prevent moisture from entering.
6. If the machine is to be stored in a humid or salt-air environment, coat all exposed metal surfaces with a film of light oil. Do not apply oil to rubber parts or the seat cover.

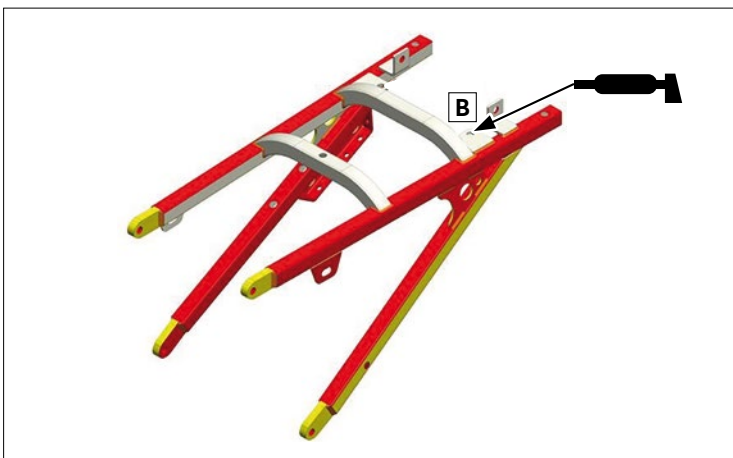
 **Make any necessary repairs before the machine is stored.**



4.19 SEAT FRAME (ONLY FOR MY23 VEHICLES)

Surfaces cleaning and greasing

- ① Perform this operation at each disassembly-reassembly, or as needed.
- Clean the surface of the inner faces "A" of the seat frame and apply new grease specifically for electrical contacts.



- Clean the surface "B" of the seat frame and apply new grease specifically for electrical contacts to both the surface "B" and under the grounding eyelets of the main wiring in order to protect the seat frame from oxidation and ensure proper grounding conductivity.
- ① After applying grease and refastening the eyelets on the seat frame, it is recommended that this grease is also applied over the eyelets and on the fastening screw.

INTRODUCTION

The vehicle covered by this manual is designed to achieve maximum performance. Versions approved for use on public roads have performance limits. Any modification to vehicles approved for use on public roads will be considered by Fantic to increase performance.

Vehicles approved for use on public roads that remain in a condition of conformity may be covered by the FANTIC 24 MONTHS COMMERCIAL WARRANTY (see conditions described below).

Vehicles not approved for use on public roads, or vehicles approved but subsequently modified with original Fantic components, are intended for use to achieve maximum performance which cannot be covered by the legal warranty. In these cases, Fantic will provide a 3 MONTH OFF-ROAD FANTIC COMMERCIAL WARRANTY (see conditions described below).

Modello	Fantic commercial warranty duration
XEF 450 Rally (approved configuration)	24 months
XEF 450 Rally (with original Fantic racing kit)	3 months

i The dealer is responsible for activating the FANTIC MOTOR warranty within one week of sale and/or registration.

⚠ La mancata o non corretta attivazione della garanzia comporta la perdita della copertura di garanzia sul veicolo.

FANTIC 24-MONTH COMMERCIAL WARRANTY

Fantic Motor S.p.A. located in via Tarantelli no. 7, 31030 Dosson di Casier-TV (hereinafter referred to as Fantic), although it is not the final seller to the consumer, intends to support the final seller's responsibilities with its own warranty called Fantic Commercial Warranty, provided through its authorised technical assistance network under the conditions set out below. This warranty is in addition to and does not affect the rights of the purchaser under the laws of the territory in which the purchase took place (in the European territory in compliance with EU Directive n 2019/771).

1. Warranty content

- 1.1. Fantic warrants the quality, the absence of defects and the proper operation of its products and undertakes to eliminate any design or manufacturing defects.
- 1.2. This commercial warranty covers all the products in the official Fantic lists sold in the territory of the European Union and in countries where there is an official Fantic distributor of the warranted product (see <http://fantic.com>).
 - 1.2.1. On e-bikes, some vehicle components are covered by the warranty provided directly by the component manufacturer (e.g. transmission, brakes, forks, shock absorbers). These components are not covered by Fantic's commercial warranty. Your Fantic dealer will be able to provide more information at the time of purchase.
- 1.3. Warranty Commencement and Duration
 - 1.3.1. The warranty begins on the date of purchase.
 - The duration of the guarantee coincides with the months stipulated in the legal guarantee in the country in which the vehicle is sold.
 - Spare parts are guaranteed for 24 months from the date of invoice of Fantic to the first purchaser.
 - For vehicles equipped with an electric powertrain, the battery pack is warranted for the same period as the vehicle or up to 300 charge cycles, whichever occurs first. The batteries are designed to retain at least 60% of their nominal capacity at the end of the warranty period.
 - 1.3.2. Replacement of parts under warranty extends the warranty period of the replaced part by 12 months.
 - 1.3.3. However, repairs carried out under warranty shall not entitle the customer to:
 - extensions or renewals of the warranty on the entire product.
 - an alternative means of transport for the period of the repair
 - reimbursement of the costs of transporting the product to the service centre
- 1.4. Parts replaced under warranty will remain the property of Fantic.
- 1.5. Fantic reserves the right to provide components under warranty that are different from the defective ones but with the same functional characteristics.

2. Effectiveness

- 2.1. The customer must be in possession of the proof of purchase: invoice or receipt showing the date of purchase and vehicle identification data (frame serial number or VIN).
- 2.2. It is not possible to make use of the Fantic Commercial Warranty if more than 36 months have passed from the date of invoicing of the product by Fantic to the first purchaser. The end buyer will be responsible for checking with the seller whether the product can access the benefits of Fantic's commercial warranty.
- 2.3. The warranty and the respective conditions may be transferred to any subsequent purchasers. The warranty period is in any case calculated from the date of the first purchase. The end buyer will be responsible for obtaining proof of the first purchase from the previous owner.
- 2.4. The first start-up of the product must be carried out by a Fantic dealer.
- 2.5. The Commercial warranty expires under the following conditions:
 - Incorrect use of the product not in accordance with the instructions or use not in accordance with the purposes for which the product was designed.
 - Use in races or sporting competitions or for commercial purposes (e.g. rental).
 - Tampering or incorrect adjustments or repairs carried out on the product by personnel not authorised by Fantic.
 - Use of spare parts or accessories not original or not recommended by Fantic.
 - Regular maintenance (if required) has not been carried out by a Fantic Service Centre.
 - If product serial numbers (or VIN) have been removed or tampered with from the product
- 2.6. During the warranty period, the customer must report the non-conformity within 2 (two) months from the date of its discovery. The action shall be terminated if, after this period, the right is not exercised.
- 2.7. To access the warranty, the user must be able to show the Authorised Service Centre the relevant tax documentation proving the date of purchase.
- 2.8. The commercial warranty is not valid if the product is located outside the European Union or in a country where there is no official Fantic distributor of the warranted product (see <http://fantic.com>).

3. Exclusions

- 3.1. The following are excluded from this warranty:
 - Routine maintenance
 - Malfunctions due to normal wear and tear (tyres, inner tubes, chain, brake discs, brake pads, rubber parts, etc.).
 - Rust, oxidation and degradation.
 - Damage due to the use of liquids containing impurities/debris capable of damaging its components.
 - Damage due to forced or prolonged interruption of operation.
 - Noise, vibrations or deterioration that do not affect the functionality and driveability of the vehicle.
 - Slight seepage of liquids from seals or oil seals that do not alter the required levels.
 - Non-conformity of the product with respect to specifications requested by the customer, accepted by the seller, but not foreseen by the normal use of the vehicle and/or not conforming to the purposes for which the product was designed.
 - Indirect costs incurred (breakdown assistance, replacement rental vehicle, etc.) and/or economic disadvantages suffered (loss of use, loss of earnings, loss of time, etc.) as a result of a product defect within the guarantee period.

4. Disputes

The Court of Treviso shall have jurisdiction for any legal action. The pending legal action does not exempt the client from payment obligations.

FANTIC 3-MONTH OFF-ROAD COMMERCIAL WARRANTY

Fantic Motor S.p.A. located in via Tarantelli no. 7, 31030 Dosson di Casier-TV (hereinafter referred to as Fantic), although it is not the final seller to the consumer, intends to support the final seller's responsibilities with its own warranty called Fantic Off-Road Commercial Warranty, provided through its authorised technical assistance network under the conditions set out below. This warranty is in addition to and does not affect the rights of the purchaser under the laws of the territory in which the purchase took place (in the European territory in compliance with EU Directive n 2019/771).

5. Warranty content

- 5.1. Fantic warrants the quality, the absence of defects and the proper operation of its products and undertakes to eliminate any design or manufacturing defects.
 - 5.1.1. This commercial guarantee covers all products which are not approved for use on public roads, or vehicles which are approved but subsequently modified with original Fantic components, sold within the European Union and in countries where there is an official Fantic distributor of the warranted product (see <http://fantic.com>).

5.1.2. This commercial warranty covers all vehicle components that have not been subjected to severe conditions of use searching for performance.

5.2. Warranty Commencement and Duration

5.2.1. The warranty begins on the date of purchase.

- The duration of the guarantee is 3 months.

5.2.2. Replacement of parts under warranty extends the warranty period of the replaced part by 3 months.

5.2.3. However, repairs carried out under warranty shall not entitle the customer to:

- extensions or renewals of the warranty on the entire product.
- an alternative means of transport for the period of the repair
- reimbursement of the costs of transporting the product to the service centre

5.3. Parts replaced under warranty will remain the property of Fantic.

5.4. Fantic reserves the right to provide components under warranty that are different from the defective ones but with the same functional characteristics.

6. Effectiveness

6.1. The customer must be in possession of the proof of purchase: invoice or receipt showing the date of purchase and vehicle identification data (frame serial number or VIN).

6.2. It is not possible to make use of the Fantic Off-Road Commercial Warranty if more than 36 months have passed from the date of invoicing of the product by Fantic to the first purchaser. The end buyer will be responsible for checking with the seller whether the product can access the benefits of the Fantic Off-Road Commercial Warranty.

6.3. The first start-up of the product must be carried out by a Fantic dealer.

6.4. The Commercial warranty expires under the following conditions:

- Incorrect use of the product not in accordance with the instructions or use not in accordance with the purposes for which the product was designed.
- Tampering or incorrect adjustments or repairs carried out on the product by personnel not authorised by Fantic.
- Use of spare parts or accessories not original or not recommended by Fantic.
- Regular maintenance (if required) has not been carried out by a Fantic Service Centre.
- If product serial numbers (or VIN) have been removed or tampered with from the product

6.5. During the warranty period, the customer must report the non-conformity within 15 (fifteen) days from the date of its discovery. The action shall be terminated if, after this period, the right is not exercised.

6.6. To access the warranty, the user must be able to show the Authorised Service Centre the relevant tax documentation proving the date of purchase.

6.7. The commercial warranty is not valid if the product is located outside the European Union or in a country where there is no official Fantic distributor of the warranted product (see <http://fantic.com>).

7. Exclusions

7.1. The following are excluded from this warranty:

- Routine maintenance
- Malfunctions due to normal wear and tear (tyres, inner tubes, chain, brake discs, brake pads, rubber parts, etc.).
- Rust, oxidation and degradation.
- Damage due to the use of liquids containing impurities/debris capable of damaging its components.
- Noise, vibrations or deterioration that do not affect the functionality and driveability of the vehicle.
- Slight seepage of liquids from seals or oil seals that do not alter the required levels.
- Non-conformity of the product with respect to specifications requested by the customer, accepted by the seller, but not foreseen by the normal use of the vehicle and/or not conforming to the purposes for which the product was designed.
- Indirect costs incurred (breakdown assistance, replacement rental vehicle, etc.) and/or economic disadvantages suffered (loss of use, loss of earnings, loss of time, etc.) as a result of a product defect within the guarantee period.

8. Disputes

The Court of Treviso shall have jurisdiction for any legal action. The pending legal action does not exempt the client from payment obligations.

Intervention request

If a fault should occur with your vehicle, contact your FANTIC MOTOR dealer which, after ensuring that the part or parts causing the fault are covered by the dedicated warranty, will report the problem to the FANTIC MOTOR After-Sales Service requesting authorisation to carry out warranty work.

No warranty service may be carried out without prior authorisation.

Warnings for maintenance and care

The purchaser is responsible for ensuring that maintenance work is carried out at the prescribed intervals and documented by means of completed, stamped and proof of purchase receipts.

- Always inspect your motorcycle before each use. This check is especially important for your safety.
- Before starting maintenance work, allow the motorcycle to cool down to avoid burns.
- Self-locking nuts once removed must be replaced by new nuts.
- When removing bolts and nuts secured with threadlocking fluid, these must be refitted and secured in the same way.
- When washing the motorcycle, do not use a high-pressure cleaner, as the water may penetrate into the bearings, carburettor, electrical connectors, etc.
- Dispose of oils, grease, filters, fuel, detergents, brake fluid, etc. by following the regulations in force in your country. Also observe the safety regulations on the handling of these substances. Under no circumstances should used oil be dispersed into the sewer system or the environment.

WARRANTY DATA

VEHICLE DATA

Vehicle Type (PRODUCT CODE)

Engine Type (DISPLACEMENT)

VEHICLE IDENTIFICATION NUMBER (V.I.N.)

ENGINE NUMBER

INVOICE DATE AND NUMBER

FIRST REGISTRATION DATE

REGISTRATION PLATE NUMBER

USER DATA

Name and Surname (or Business Name)

Address

Zip Code - City - Country

Phone Number

E-Mail Address

Variation of User name/address

STAMP OF THE DEALER

 **Keep the data in this handbook up to date. Fill in any changes of address or change of user or owner of the vehicle.**

 **If all the spaces are already used, ask your Dealer for a new Warranty Manual.
Filled and verified before the delivery of the vehicle by:**

Date

Sign for Acceptance

SERVICE

Registration of service

⚠ Give the handbook to your dealer at each service.

⚠ It is the responsibility of the user to inform the Dealer of any maintenance carried out so that it is not repeated unnecessarily.

Next service			
1 Dealer's stamp			
Hours		Date	
Invoice No.			
Routine maintenance	☐	Main maintenance	☐
Spark plug	☐	Air filter	☐

Next service			
2 Dealer's stamp			
Hours		Date	
Invoice No.			
Routine maintenance	☐	Main maintenance	☐
Spark plug	☐	Air filter	☐

Next service			
3 Dealer's stamp			
Hours		Date	
Invoice No.			
Routine maintenance	☐	Main maintenance	☐
Spark plug	☐	Air filter	☐

Next service	
4 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance	☐
Main maintenance	☐
Spark plug	☐
Air filter	☐

Next service	
5 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance	☐
Main maintenance	☐
Spark plug	☐
Air filter	☐

Next service	
6 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance	☐
Main maintenance	☐
Spark plug	☐
Air filter	☐

Next service	
7 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance	☐
Main maintenance	☐
Spark plug	☐
Air filter	☐

Next service	
8 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
9 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
10 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
11 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
12 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
13 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
14 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Next service	
15 Dealer's stamp	
Hours	Date
Invoice No.	
Routine maintenance ☐	Main maintenance ☐
Spark plug ☐	Air filter ☐

Declarations of conformity

EU Directive 2014/53/EU



Simplified EU conformity declaration:

Your vehicle is equipped with a range of radio equipment. The manufacturers of this radio equipment declare that these equipment complies with directive 2014/53/EU where required by law. The complete text of the EU declaration of conformity is available at the following web address: www.Fantic.com/RED

Addresses of radio component manufacturers:

All radio components must carry the manufacturer's address according to the provisions of directive 2014/53/EU. For components that, due to their size or nature, cannot be furnished with a sticker, the respective manufacturers' addresses as required by law are listed in the second table. Note Only skilled person can access and install the device.

RADIO DEVICE INSTALLED ON THE VEHICLE		FREQUENCY BAND	RADIO TRASMISSION MAX POWER
Carpe Iter Pad v4b	GSM	GSM900: 880-915 Mhz (TX), 925-960 Mhz (RX) DCS1800: 1710-1785 Mhz (TX), 1805-1880 Mhz (RX)	GSM900: 32.91 dBm DCS1800: 31.17 dBm
	WCDMA	FDD band I: 1920-1980MHz (TDX), 2110-2170MHz (RX) FDD Band VIII: 880-915MHz (TX); 925-960 MHz (RX)	Band I: 23.42dBm Band VII: 21.98dBm
	LTE	FDD Band I: 1920-1980MHz (TDX), 2110-2170MHz (RX) FDD Band 3: 1710-1785MHz (TX), 1805-1880 MHz (RX) FDD Band 7: 2500-2570Mhz (TX), 2620-2690MHz (RX) FDD Band 20: 832-862MHz (TX), 791-821MHz (RX)	Band I: 23.19dBm Band 3: 23.43dBm Band 7: 23.21dBm Band 20: 22.05dBm
	WiFi	2412-2472 Mhz	17.62dBm
	Bluetooth	2400-2480MHz	8.33dBm
Terrain Command III	Bluetooth	2402-2480MHz	< 10dBm e.i.r.p.

RADIO DEVICE INSTALLED ON THE VEHICLE	MANUFACTURER
Carpe Iter Pad v4b	ULW Czech s.r.o. V raji 34 19800 Praha 9 Czech Republic
Terrain Command III	

 Only skilled person can access and install the device.

CODE 09930005



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