Lambretta

SERVICE MANUAL I ENGLISH
Model X125

This manual details maintenance information, Disassembly and assembly procedures, Installation, Inspection and Adjustment methods, Crash correction and Technical specifications of the LAMBRETTA X125.

Tools used by the service structure and specifications according to basic techniques of the motorcycle provides details on how to inspect and adjust and how to maintain the bike, provides details about parking parts, installation, configuration, maintenance and crash resolution.
Due to continuous improvements in the design and quality of parts and manufacturing, there may be minor discrepancies between the actual bike and the information published in this documents.
The illustrations and procedures in this document are intended for reference only.
For more information, please contact the Training Department.

LAMBRETTA ASIA LTD. reserves the right to update and amend this manual with prior notice. Major repairs and maintenance should be carried out according to the actual condition of the bike.

Training Department
LAMBRETTA ASIA LTD.

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Regulations
To ensure your safety while carrying out repairs, plese follow the following regulations.

Safety rules
General specifications of operation manual repair

- When starting the engine, make sure that the operating area is well ventilated.
- The electrolyte solution in the battery contains sulfuric acid. Avoid contact with eyes, skin and clothing. If this gets in contact with eyes or skin, rinse with plenty of clean water for at least 15 minutes and seek medical attention immediately.
- Batteries can produce hydrogen gas, a gas that can be flammable and explosive. Therefore, while charging the battery and storing the battery, **DO NOT** smoke and avoid sparks or flames in such areas.
- Fuel can be easily ignited and exploded in certain conditions. **DO NOT** smoke in the work area and avoid flames or sparks near the work area.
- Cleaning the brake pads and clutch assembly should be done in a well-ventilated area, as they are parts that are subject to fine dust while cleaning will be scattered, which is harmful to the respiratory system.
- Only genuine Lambretta parts and manufacturer-recommended lubricants must be used. To prevent damage to the motorcycle.
- Use special tools that accurately match the vehicle model only to carry out repairs.
- Replace gaskets, seals, O-rings, pins, latches, bolts, studs. When every engine is disassembled and assembled.
- After disassembling the engine, it must be cleaned using low-flash or non-flammable chemicals and lubricant applied to the moving parts.
- After assembling and disassembling the engine, it must be ensured that all components are properly assembled, installed and working properly.
- Use only equipment or instruments with dimension indicators measured in metric units for removing or assembling bolts, nuts, screws. The equipment or tools used must be suitable for operation. If improper equipment or tools are used, it may cause damage.
- When performing electrical maintenance, it must be checked that the electrical system is properly connected. Especially, Battery connection, Harness wires.

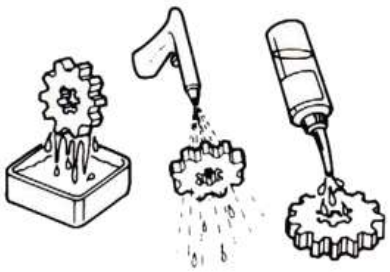
Applicable
This manual is refer from Lambretta X125 model year 2025 Euro5+ only.
We reserve the right to change and update any information without any notice.

Always use Lambretta Genuine Parts and recommended lubricants. Using parts not designed for Lambretta motorcycles may damage the motorcycle.

Special tools are designed to disassemble and install components without damaging the working part. Using the wrong tool may damage the part.

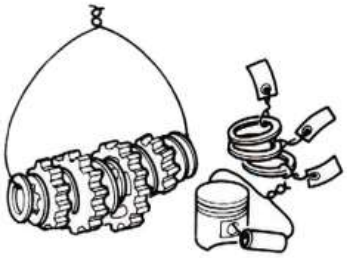



When servicing this motorcycle, use only Metric tools. Bolts, nuts and metric screws are not interchangeable with the English system, Using incorrect tools and fasteners may damage this vehicle.
Clean the outside of the part or cover before removing it from the motorcycle. Otherwise, dirt and deposits accumulated on the surface of the part may fall into the engine, frame or brake system to cause damage.
Wash and clean parts with a high-ignition solvent and blow dry with compressed air. Pay special attention to O-rings or oil seals, since most cleaning agents have a negative effect on them.

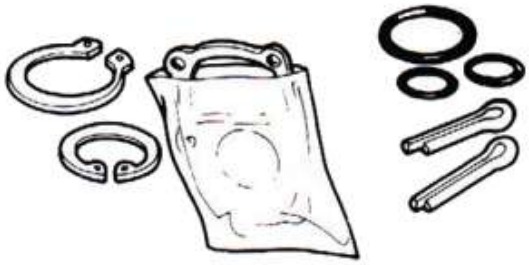


Never bend or twist a control cable to prevent stiff control and premature worn out.

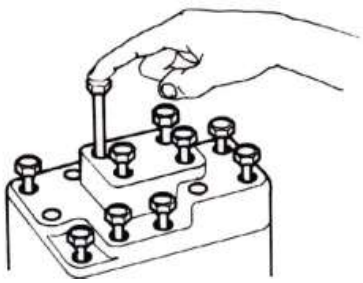
Rubber parts can wear out as they age and are prone to damage from solvents and oils. Check these parts before installation to make sure they are in good condition, replace them if necessary.
When loosening of components with fasteners of different sizes, work with a diagonal pattern and work from the inside out. Loosen the small fasteners first. If the larger one is loosened before, the smaller fasteners may be subjected to excessive stress.
Store complex components such as gear parts in proper assembly order and tie them together with wires for ease of installation later.



Observe the location of important components before disassembling to ensure they are reassembled in the correct size (depth, distance or position).
Components that should not be reused (need to be replaced when disassembling), including gaskets, metal sealing rings, O-rings, oil seals, snap rings and split pins.

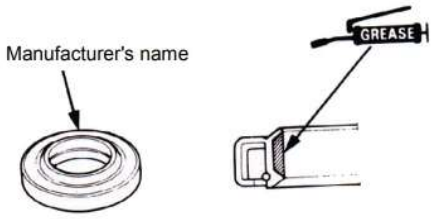


The length of bolts and screws for assembling the cover plate or box is different from the other, make sure they are installed correctly. In case of confusion, insert the bolt into the hole to compare the length with other bolts. If the length out on the side of the hole is the same as the other bolts, then this is the correct bolt. The bolts for the same assembly should be the same length.



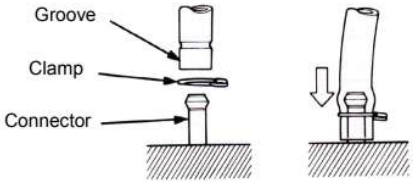
Compact kit includes various dimensional fasteners as follows :
Tighten all fasteners with fingers, and then first tighten the large fasteners with a special tool diagonally from the inside out 2 to 3 times, increasing gradually to avoid warping unless otherwise noted. Bolts and fasteners should be kept clean and dry. Do not apply oil to the thread.

Once the oil seal is installed, add grease to the groove, install the oil seal with the manufacturer's name facing the outside, check the shaft where the oil seal will be installed for smoothness and for fins that may damage the oil seal.

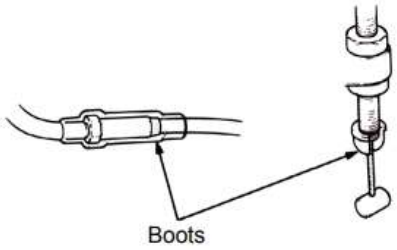


Remove residues of old gaskets or sealants before reinstalling, grind with a grindstone if the contact surface has any damage.

The end of the rubber hose (for vacuum fuel or coolant) should be pushed as far as possible to allow enough space under the enlarged end for tightening the clamps.



Rubber and plastic boots should be properly reinstalled in the correct position as designed.



The tool should be pressed against two bearing fixtures (inside and outside). When removing bearings Damage may be caused if the instrument is pressed against only one race (either an internal or external race). To avoid damage to the bearings, apply the same force to both species

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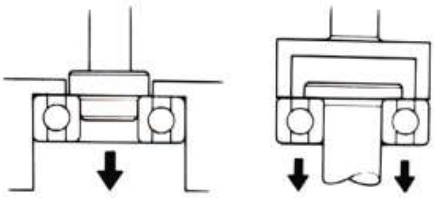
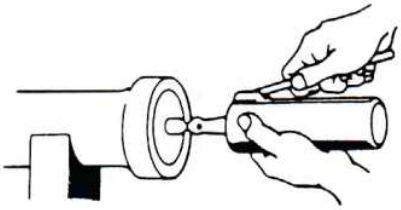
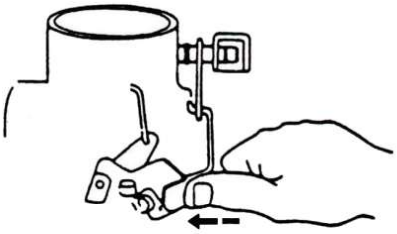


Both of these examples may result in damage to the bearing.

Lubricate the rotating pages with the lubricant that is specified on the lubrication points before assembly.

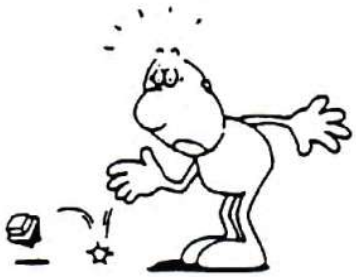


Check whether the position and application of the correct and correct installation parts.

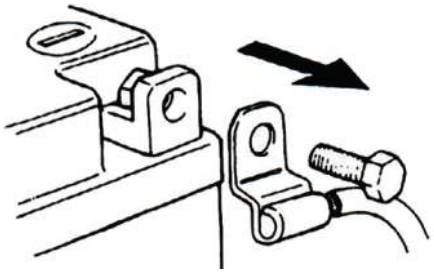


Ensure that the service is safe with each other when performed by two people.

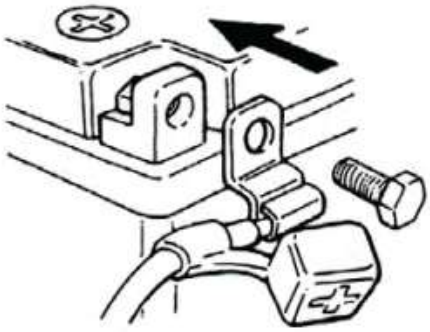
Note that do not allow parts to fall.



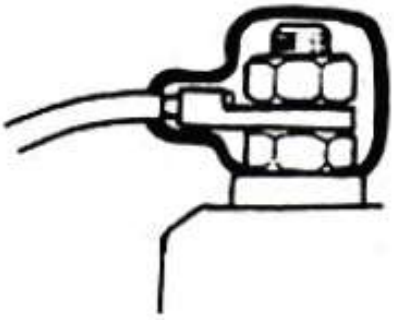
Before proceeding with battery removal, the negative (-) wire of the battery must first be disconnected, without the wrench coming into contact with the body to prevent the circuit from short circuiting and generating sparks.



After the service is completed, make sure all connection points are secure, the positive (+) battery cable should be connected first, and the battery terminals must be greased after connecting the cable.

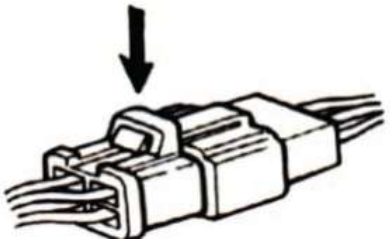


Make sure the battery cover is positioned correctly after the battery pole has been serviced.



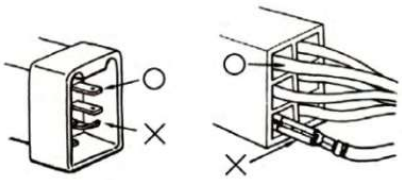
If the fuse burns, it must be determined and corrected, and then replaced with the specified capacity fuse.

When isolating the connector, the locker must be unlocked first, and then the service is performed.

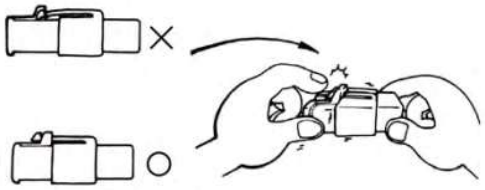


Do not pull the power cord to disconnect the connector or the power cord from the connector.

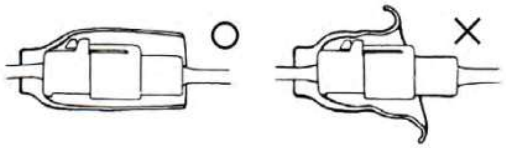
Make sure the terminal pins are bent or loosened.



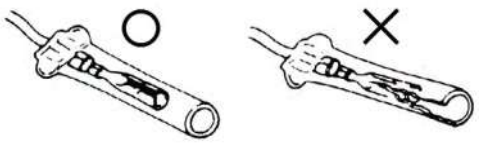
Fully insert the connector. If there are two storage cabinets on the two connector sides, make sure the locker locks properly. Check if there is a loose wire.



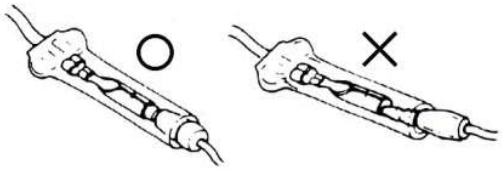
Check if the connectors are completely covered with a pair of connector boots.



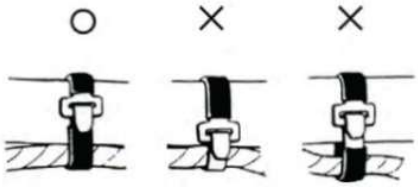
Before connecting the terminal, check if the boot is broken or the terminal is loose.



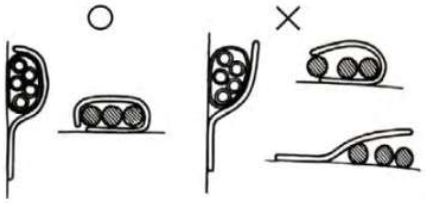
Fully insert the connector, check if the connector is covered with a boot, do not allow the boot to open.



Secure the power cord and the strap to the frame with the strip in sequence in the designated location. Tighten the strip so that only the shielded surface touches the wire or strap.

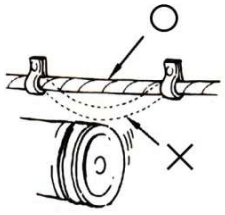


Wire bands and straps must be securely fastened.

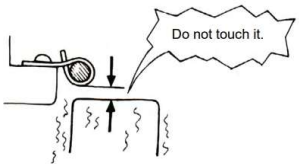


Do not squeeze the power cord against a weld or clamp.

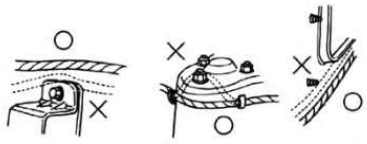
Do not allow the harness to contact rotating, moving, or vibrating components to route the harness.



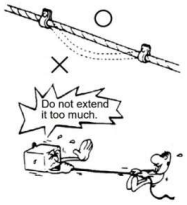
Keep the strap away from hot parts.



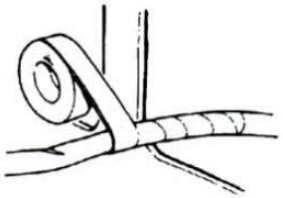
Route the straps to avoid sharp edges or corners, and also avoid protruding ends of bolts and screws.



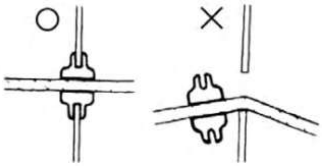
Route straps so as not to pull too tightly or slack too much.



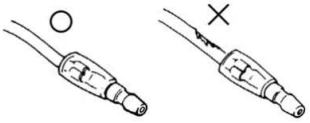
Protect wires or straps with electrical tape or hoses if they come into contact with sharp edges or corners. Thoroughly clean the surface on which the tape will be applied.



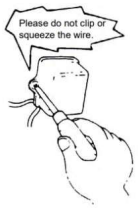
Secure rubber shoes when applied to the strap.



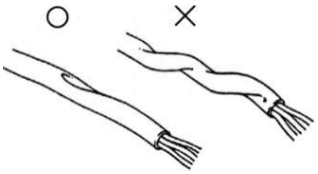
Do not use broken cords or harnesses. Wrap electrical tape around damaged parts or replace them.



Do not pinch or squeeze the strap as it does to install other components.

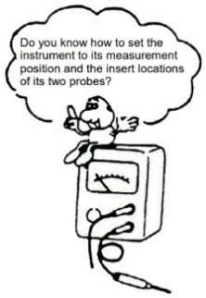


Do not allow the wiring harness to twist while installing.

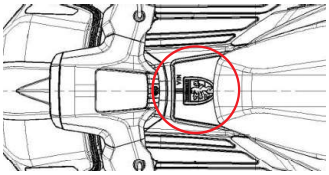


The straps that walk along the handlebars should not be pulled too tightly or too slack, rubbing or interfering with adjacent or surrounding parts in any steering position.

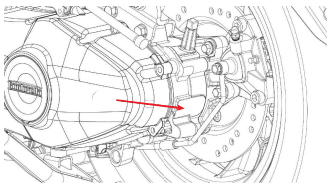
Before operating the test tool, the operator should read the instruction manual of the instrument, and then perform the test according to the instructions.



Frame Number (VIN) :
Remove the rubber cover of the footrest. The frame number (2) is stamped on the frame.



Engine Number :
The engine number (1) is stamped at the rear of the engine



Perform the following pre-delivery inspections before deliver to the customer.

External conditions
Check general condition:
- Painting.
- Various plastic components and parts.
- Scratches.
- Dust, dirt stains.

Tightening torque
Make sure that the color markings are made on the following points:
- Screws – nuts fastening safety-related parts.
- Screws - nuts fasten various parts.

Safety parts
- Front shock absorbers.
- Rear shock absorber.
- Swing arm.
- Front wheel brake calipers.
- Rear wheel brake calipers.
- Radiator rubber hose and water pump cover.
- Install rear view mirrors.

Electrical parts
- Ignition Switch.
- Lighting system: high beam, low beam, Dimmer, taillight, license plate light and emergency light.
- Adjust the headlight level according to applicable laws.
- Headlight switches, brake lights and switchgear related lighting systems.
- Turn signals and related lighting.
- Fuel and temperature indicator.
- Instrument cluster lights, warning lights.
- Horn.
- Starter Motor.

Caution
- To optimal battery life and performance, the battery must be fully charged before being put into operation.
- When installing batteries, alway connected the anode first before cathode.

Warning
The electrolyte solution in the battery is a dangerous substance and can cause severe burns, irritation. Due to the presence of sulfuric acid, it is best to avoid contact with eyes, skin and clothing. If accidentally touched by eyes or skin, it must be washed off with a large amount of clean water. Take at least 15 minutes and immediately seek medical attention.if swallowed, drink plenty of clean water or drink vegetable oil and immediately seek medical attention. the battery can produce explosive gases. it should not be stored near open flames, sparks or smoking areas. the charging area should be well ventilated. when charging chemicals in the battery, eye protection should be worn and for safety reasons, children should not be near the area.

Fluid level
- Brake fluid level.
- Transmission oil level.
- Coolant level.
- Engine oil level.

Test Riding
- Push starting.
- Check default reading of speedometer.
- Check throttle and brake control.
- Check engine and transmission operation.
- Check front and rear suspension for smooth operation.
- Check steering for smooth turning.
- Check abnormal noise.

After riding

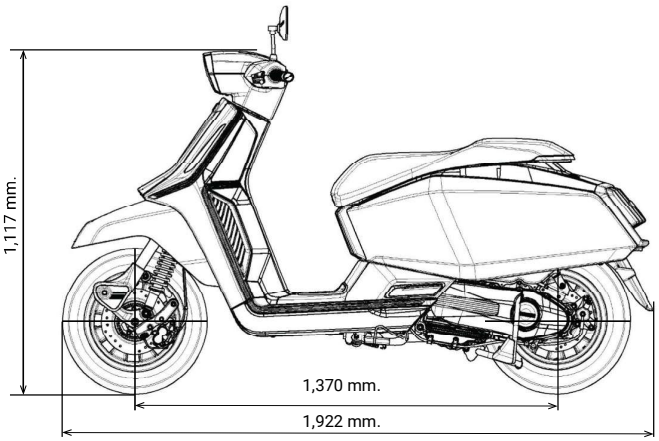
- Restarting the engine while the engine is warm.
- Check default reading of speedometer.
- Check any leakage of various system.
- Check cooling fan operation.

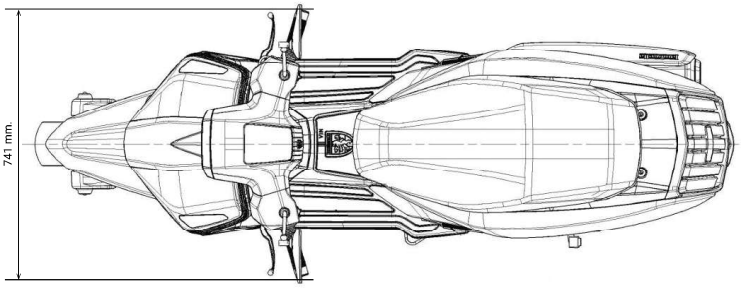
Caution

- Only check tire pressure when cold.
- Excessive tire pressure may cause tire explode.

Others

- Check that all manuals, tools, plate number are equipped.
- Check frame number and engine number are correct.





	Dimensions
Length	1,922 mm (75.6 in)
Width	741 mm (29.1 in)
Height	1,117 mm (43.9 in)
Wheelbase	1,370 mm (53.9 in)
Minimum ground clearance	153 mm (6.0 in)
Caster angle	26.5°
Trail range	90°
Curb weight	174 kg (383 lb)
Maximum weight capacity	165 kg (363 lb)
Passenger capacity	Rider and 1 passenger
	Engine
Type	Single cylinder, 4 stroke, 4 valve, DOHC, Liquid-cooled
Bore x stroke	58 x 47 mm
Displacement	124.2 cm³
Compression ratio	12.8 : 1
Idle speed	1,600 ± 150 rpm
Max power	9.5 kW at 9,500 rpm
Max torque	10.0 Nm at 7,500 rpm
Valve clearance (cold engine)	Inlet valves : 0.10 - 0.15 mm Exhaust valves : 0.20 - 0.25 mm
Drive system	V-Matic continuously variable
Lubrication system	Lubrication by high pressure oil pump
Starting system	Electric starter motor with freewheel
Ignition system	Electronic system (ECU control)
Spark plug type	NGK CR9EB
Fuel supply	Electronic injection is controlled by a 34 mm diameter throttle body and electric fuel pump.
Fuel	Fuel Unleaded gasoline, 91 or 95 octane, mixed with not more than 10% ethanol.
Vehicle emissions standards	EURO 5
	Information
Frame	Backbone
Front suspension	Dual front shock absorbers / link arm
Back suspension	Dual rear shock absorbers
Front brake	Hydraulic system 2 pistons, right hand operated Single disc brake, diameter 220 mm, with ABS
Rear brake	Hydraulic system 2 pistons, left hand operated Single disc brake, diameter 219 mm, with ABS
Type of wheels	Aluminum alloy
Front rim	12 x 3.5 inches
Rear rim	12 x 3.5 inches
Front tire	120 / 70 - 12 51M Tubeless
Rear tire	130 / 70 - 12 56M tubeless
Front tire pressure	28 PSI
Rear tire pressure	32 PSI (34 PSI when there are passengers)
Battery	YTZ10 12V, 9.1Ah (Yuasa)

Liquid capacity	
Engine oil type	4 stroke JASO : MB, SAE : 5W-40, API : SG or higher
	Oil change only : 1.15 L
Engine oil capacity	Change engine oil and oil filter : 1.3 L
	After disassembly : 1.5 L
Gear oil type	API : GL - 4 / GL - 5 SAE 80W - 90
Gear oil capacity	After draining : 0.23 L
	After disassembly : 0.25 L
Coolant type	LEC - II - 40 antifreeze coolant
Coolant capacity	2 L
Fuel tank capacity	7.5 L
Brake fluid type	DOT 4

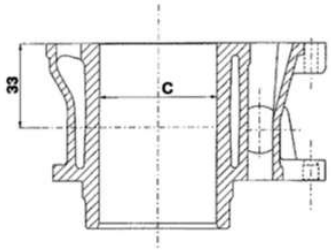
Torque value

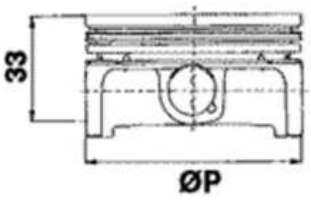
Various components around the steering handle		
Name	Q'ty	Torque in Nm
Headlight fixing nut	2	8 - 12 Nm
Headlight mounting bolt	1	3 - 5 Nm
Neck adjusting nut lower	1	17 Nm
Neck adjusting nut upper	1	40 Nm
Fixing bolt for handlebar control assembly	1	40 - 50 Nm
Frame		
Name	Q'ty	Torque in Nm
Side stand fixing bolt	1	35 - 45 Nm
Side stand sensor	1	8 - 12 Nm
Dual stand bolts	1	37 - 43 Nm + Threadlocker 243
The nut attaches to the rocker to the engine.	1	37 - 43 Nm + Threadlocker 243
The nut holds the rocker to the frame.	1	50 - 55 Nm + Threadlocker 243
Nuts attaching the rocker frame to the engine.	1	35 - 40 Nm
Anti-shock rubber mounting bolt	1	8 - 12 Nm
BKT ECU box with frame	2	8 - 12 Nm
Steel that holds the radiator to the frame.	1	8 - 12 Nm
Fixing boltBKT ABS with frame	2	8 - 12 Nm
Key switch bolt	2	18 - 22 Nm
Bolt attaches to water pipe (aluminum) to the frame.	2	8 - 12 Nm
Footrest mounting bolt, right	3	20 - 25 Nm + Threadlocker 243
Left footrest mounting bolt	3	20 - 25 Nm + Threadlocker 243
Bolts attach the pot to the frame.	2	8 - 12 Nm
Bolts attach the rear fender to the frame.	2	8 - 12 Nm
ECU and BKT	2	8 - 12 Nm
Radiator cover fixing bolt	3	8 - 12 Nm
Fastening nutBKT front windshield	2	18 - 22 Nm
Front fender and lower neck bolts	3	8 - 12 Nm
Color set screws	everypoint	1 - 3 Nm
Color fastening bolt (hexagonal head)	every point	3 - 5 Nm
Bolt securing the reserve water tank	2	5 - 8 Nm
Ignition coil mounting bolt	2	3 - 5 Nm + threadlocker 243
Bolt fixing turn signal	2	3 - 5 Nm
Suspension system		
Name	Q'ty	Torque in Nm
Box boltABS vs. BKT	2	8 - 12 Nm
BKT shock mount (left side)	2	30 - 35 Nm
Bolt securing the rear shock to the frame (top left)	1	18 - 22 Nm
Bolt securing the rear shock (lower left) to BKT	1	37 - 43 Nm
Bolt attaches right rear shock to frame (above)	1	37 - 43 Nm
Bolt to secure rear right shock to swingarm (lower)	1	18 - 22 Nm + Threadlocker 243
Bolt held under the front fork	1	18 - 25 Nm

Suspension system		
Name	Q'ty	Torque in Nm
Front shock strut boltM12x50 with lower mane (top)	2	40 - 50 Nm + Threadlocker 243
Front shock strut boltM12x60 with pedal (bottom)	2	28 - 30 Nm + Threadlocker 263
Shock rocker shaftM10x60	2	40 - 50 Nm + Threadlocker 243
Cap nut securing right-left shock absorber(top-bottom)	4	40 - 50 Nm + Threadlocker 243
Cap nut securing shock cover (right – left)	2	5 - 7 Nm
Stud boltM6x16 fork cover fixing (right-left)	2	8 - 12 Nm + threadlocker 243
Brake system		
Name	Q'ty	Torque in Nm
Bolts attaches the front brake caliper to the rocker.	2	25 - 30 Nm + threadlocker 243
Stud bolts M8x34.5 fixing front caliper connecting rod	2	15 - 20 Nm + threadlocker 263
Rear brake caliper mounting bolts.	2	35 - 40 Nm + threadlocker 243
Bolts secures the rear brake hose bracket.	3	10 - 15 Nm
Front wheel		
Name	Q'ty	Torque in Nm
Disc brake bolts	5	20 – 25 Nm + threadlocker 243
Front axle	1	60 – 70 Nm
Sensor mounting bolt	1	8 – 12 Nm
Rear wheel		
Name	Q'ty	Torque in Nm
Disc brake bolts	5	20 – 25 Nm
ABS sensor mounting bolts	5	8 – 12 Nm
Rear axle nut	1	90 – 105 Nm
Swing arm pivot bolts	2	25 – 30 Nm
ABS sensor mounting bolt	1	8 – 12 Nm
Sensor cable bracket bolt.	1	8 – 12 Nm
Exhaust pipe		
Name	Q'ty	Torque in Nm
exhaust pipe nuts	2	20 – 25 Nm
O2 sensor 1	1	20 – 25 Nm
O2 sensor 2	1	20 – 25 Nm
Muffler clamp bolt	1	18 – 25 Nm
Fuel tank		
Name	Q'ty	Torque in Nm
fuel level sensor bolts	4	8 – 12 Nm
fuel pump nuts	8	5 Nm
Engine		
Name	Q'ty	Torque in Nm
Cylinder head cover bolts	3	10 - 12 Nm
Cylinder head bolts (M8)	4	15 + 27 Nm + 90°
Cylinder head bolts (M6)	2	11 - 12 Nm
Spark plug	1	10 - 12 Nm
IN & EX camshaft bracket	8	10 - 12 Nm
Intake pipe bolts	3	8 - 12 Nm
Chain tensioner fixing bolts	2	10 - 14 Nm
Chain tensioner adjuster bolt	1	10-12 Nm
Decompression valve counterweight mounting bolt	1	11 - 15 Nm
Decompression valve stop plate bolt	1	5 - 6 Nm
Camshaft mounting bolt	1	4 - 6 Nm
Timing chain slipper bolt	1	11 - 13 Nm
RH engine cover fixing bolts	10	11 - 13 Nm
Magneto fixing screws	3	3 - 4 Nm (using LOCTITE 242 threadlocker)
CPS sensor fixing screws	2	3 - 4 Nm
Magneto nut	1	88 ± 2 Nm
Flywheel bolts	6	8 - 12 Nm
Pickup cable clamp bolts	2	13 - 15 Nm
Drive pulley cover screws	3	4 - 6 Nm
Crankcase bolts	10	11 - 13 Nm

Engine		
Name	Q'ty	Torque in Nm
Crankcase bolts	10	11 - 13 Nm
Starter motor mounting bolts	2	11 - 13 Nm
Ground cable fixing bolt	1	7 - 8.5 Nm
Air filter bracket bolt	1	8 - 12 Nm
Coolant pipe fixing bolts	2	11 - 13 Nm
Coolant bleed valve	1	4 - 6 Nm
Coolant hose clamps	All	3 - 5 Nm
BKT attaches the water hose to the engine.	2	10-12 Nm
Transmission unit		
Name	Q'ty	Torque in Nm
Clutch mounting nut - belt drive wheel	1	58 - 62 Nm
Drive pulley nut	1	78 - 82 Nm
Transmission cover bolts	7	11 - 13 Nm

Assembly clearance
Cylinder - piston assy.



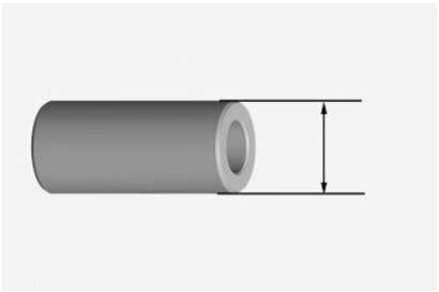


Cylinder - Piston

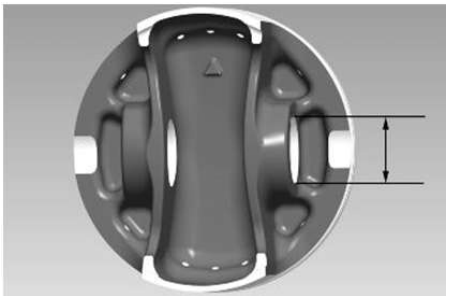
Piston diameter (P)	74.967 ± 0.014 mm
Bore diameter (C)	75 + 0.038 + 0.01 mm

- The piston rings must be installed with the word <TOP> or the stamped mark racing upwards.
- Measure the outer diameter of the piston pin.

Standard diameter of piston pin
16 + 0.006 - 0.001 mm.



- Measure the diameter of the bearings on the piston.



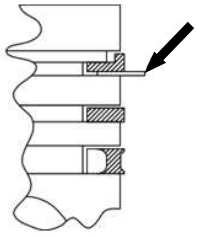
Standard diameter
16 + 0.006 - 0.001 mm.

- Calculate the piston pin coupling clearance.

Note
The pin housings have 2 lubrication channels. For this reason, measurements must be made according to the piston axis.

Standard diameter
0.001 - 0.010mm

- Carefully clean the sealing ring housings.
- Measure the coupling clearance between the sealing ring and the grooves using suitable sensors, as shown in the diagram.
- If the clearance is greater than that indicated in the table, replace the piston.



Note

- Measure the clearance by inserting the blade of the feeler
  Thickness gauge from the second seal side.
- Top piston ring – standard coupling clearance : 0.015 - 0.06 mm
  (Top piston ring - maximum clearance allowed after use : 0.07 mm)
- Middle piston ring – standard coupling clearance : 0.015 - 0.06 mm
  (Middle piston ring - maximum clearance allowed after use : 0.07 mm)
- Oil scraper ring – standard coupling clearance : 0.015 - 0.06 mm
  (Oil scraper ring - maximum clearance allowed after use : 0.07 mm)

Piston ring

- Check the spacing on every ring lip by inserting them one at a time so that the ring size remains.
  Original diameter size the ring should be inserted perpendicular to the cylinder.
- Check ring lip clearance using a feeler gauge.
- The ring should be replaced if it is found that the gap between the ring lips exceeds the specified value.

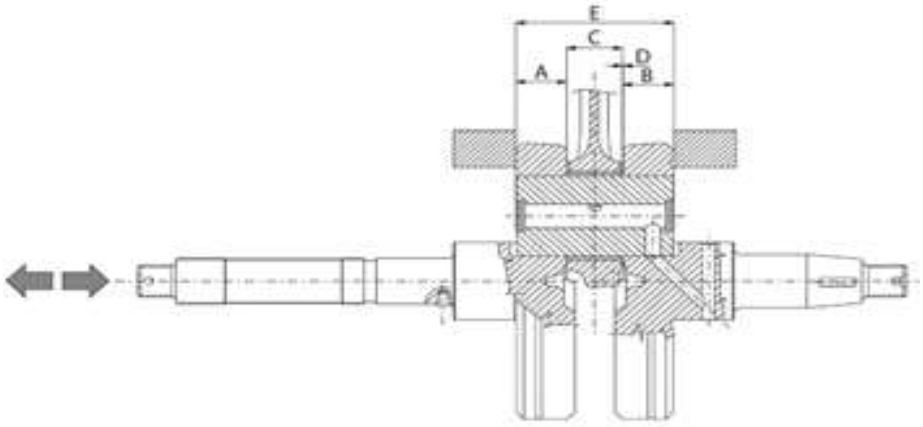
Note

Before replacing the piston rings, the clearance must be checked.
between the ring and the ring groove within the specified standard values.
If the distance it is not as specified to change the piston and new cylinder block.

Standard diameter

Top piston ring
Standard value for ring lip spacing is 0.15 - 0.30 mm
Middle piston ring
Standard value for ring lip spacing is 0.20 - 0.40 mm
Oil scraper ring
Standard value for ring lip spacing is 0.20 - 0.40 mm

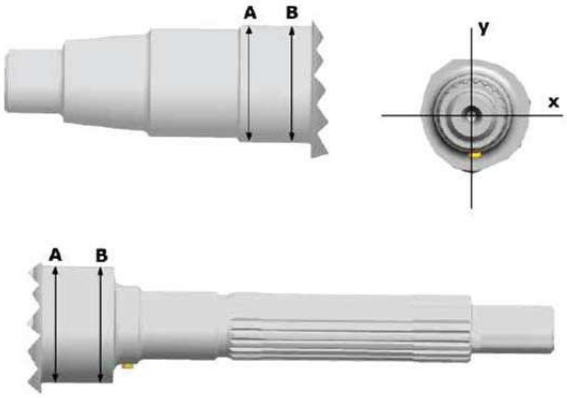
Crankcase - crankshaft - connecting rod



Axial clearance between crankshaft and connecting rod

Name	Size	Position	Quantity
Transmission side half-shaft	16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side haft-shaft	16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod	18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool	51.4 +0.05	E	D = 0.20 - 0.50

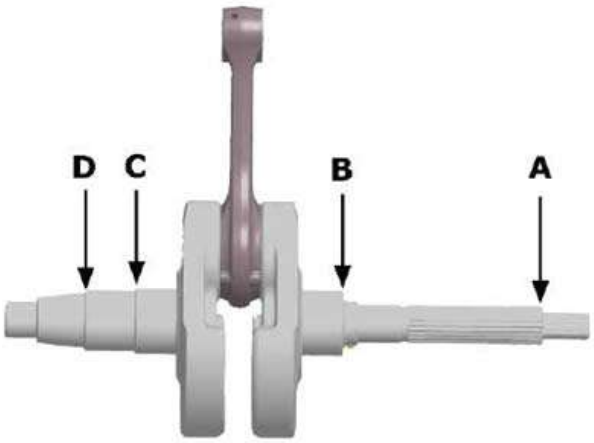
Diameter of crankshaft bearing
Measure the bearings on both axes X-Y.



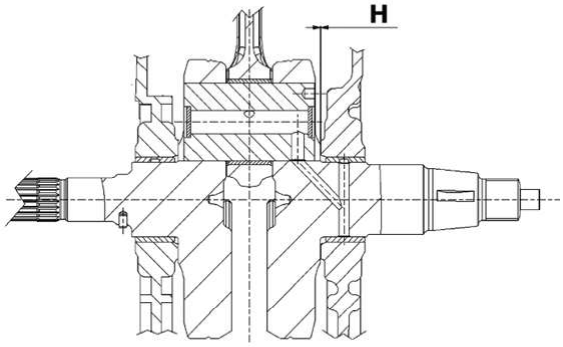
Crankshaft

Crankshaft bearing : standard diameter : Group. 1	34.010 - 34.035 mm
Crankshaft bearing : standard diameter : Group. 2	34.015 - 34.040 mm

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.



Maximum admissible displacement	
A	0.15 mm
B	0.010 mm
C	0.010 mm
D	0.10 mm



Standard diameter
Crankshaft – crankcase axial clearance <H> : 0.20 - 0.50 mm

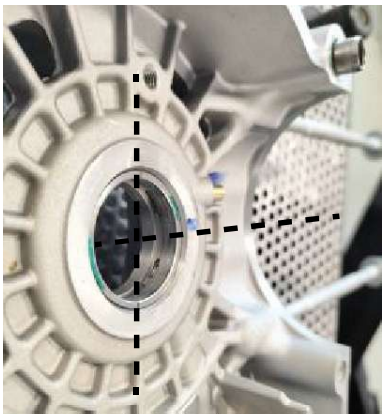
- Using a bore gauge, measure the connecting rod small end diameter.

Note
If the connecting rod small end diameter exceeds the standard diameter, Exhibits wear or Overheating, proceed to replace the crankshaft as described In the crankshaft chapter.

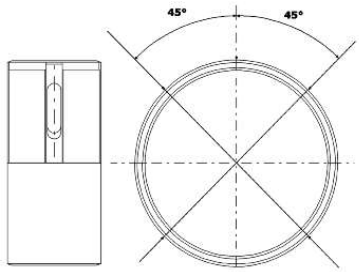
Standard diameter
16 +0.025 +0.015 mm

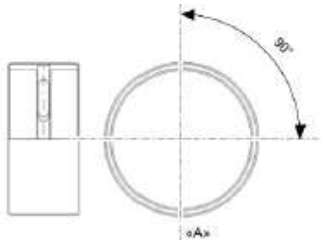
- So that the bushings have good lubrication There must be two important parts: Proper lubricant pressure and good lubricant flow rate components bushing must be in the correct position In order not to obstruct the lubricating oil passageway.
- The main bushing will contain bearings. (Sharp connecting rod) is a piece made of metal with 1 hole and an oil groove.
- The bearing acts as a support for the spindle or movement, resulting in wear from the movement of the part. For this reason, 2 bearings must be installed in a splicing manner. to prevent the oil passage from being clogged Match the pair of bearings correctly as in the picture.
- The distance between the crankshaft gap and the depth of the bushings affect the lubricant flow.
- Check the inner diameter of the main bushing in all 3 directions given as shown.
- There is only one type of main bushing housing hole in the crankcase. The standard bushing diameter after driving is variable on the basis of a coupling selection.

Bushings



- The main bushings have 2 half-bearings, 1 with and 1 without the lubrication channel.
- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposite the cylinder.
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the photo.





Bearins

Type	Colour	Diameter of crankshaft half-bearing
A	RED	2.000-2.004
B	BLUE	2.004-2.008

- The section of the oil feeding channels is also influenced by the driving depth of the bushings.
- Visually check the wear of the bushings: in the coupling ends shown in the photo the bushing usually keeps the original look, check in the rest of the bushing if there is evident removal of material. If this occurs as stated, proceed to replace the crankcase halves.

Note
Small marks and scratches of the shaft rotation are normal signs of engine usage, and do not affect the correct functioning.

Measurement of crankcase halves - crankshaft coupling clearance
- The nominal diameters of the bushings, even if of the same coupling category, may differ by hundredths due to the plastic slackening of the material of the crankcase due to the driving load.
- Measure along the axis of the cylinder, using a bore meter at two depths indicated in the figure,the diameter of the bushings.
- After measuring the two diameters, take the average.
- The bushings housing hole in the crankcase half is divided into two categories depending on the size, Category 1 and Category 2.

Diameter of crankcase without bushing

Type	Diameter
1	38.000 - 38.007
2	38.007-- 38.014

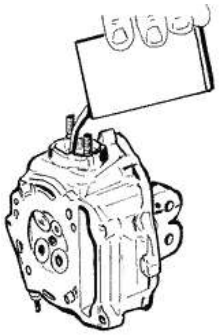
- Combine the shaft with two category 1 crankwebs with the category 1 crankcase. Furthermore a spare crankcase cannot be matched with a crankshaft with mixed categories. The spare crankshaft has half-shafts of the same category.
- According to the classification of the shaft Type.1 - Type.2 combine a complete crankcase pre-fitted with suitable bushings according to the starting shaft.

	Categories	
Crankcase	Crankshaft assy	Bushing
Group 1	Group 1	
Group 1	Group 1	

Cylinder head

- Before doing anything, clean all contact surfaces of the cylinder head. Assemble the valve and valve spring to their original position.
- Using a trued bar and a feeler gauge, check that the cylinder head surface is not worn or distorted.

Standard diameter
Maximum allowable run-out : 0.1 mm



- If the measured value is greater than the specified standard value Replace the cylinder head with a new one.
- Inspect the surfaces around the intake and exhaust ports.
- Inspect the camshaft and rocker-arm must not wear.
- Check that the valve covers are free of signs of wear.
- Check that there is no coolant leaking from the sealing area.
- Assemble the valve to the cylinder head.
- Inspect both intake and exhaust valves.
- Check the valve for leaks by pouring fuel.
  At the intake and exhaust ports, use your finger to push the valve (as in the picture).

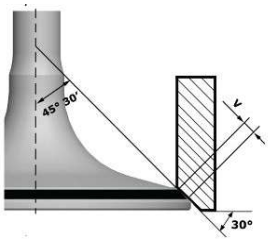
- Measure the diameter of the bearings on the cylinder head, camshaft, Rocking lever support pin with a bore diameter.
- According to the value specified.

Camshaft, Camshaft Cap Wear Inspection / Bearing diameter at cylinder head
Bearing<A> 12.000 - 12.018 mm
Bearing<B> 20.000 - 20.021 mm
Bearing<C> 37.000 - 37.025 mm

Valve springs standard

Free length
Intake valve : 33.24 mm
Exhaust valve : 33.24 mm
Working length (valve closed)
Intake valve : 26.00 mm
Exhaust valve : 26.00 mm

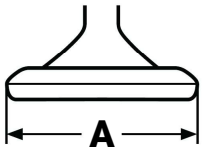
- Measuring the length of valve springs
- Clean the valve seats of any carbon residues.
- Using the Prussian blue, check the width of the impression on the valve seat (V).



Standard value
1.0 - 1.3 mm.

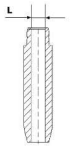
- If the impression width on the valve seat is larger than the prescribed limits, true the seats with a 45° mill and then grind.
- In case of excessive wear or damage, replace the head.

Valve diameters (A)
Intake valve : 21.90-22.05 mm
Exhaust valve : 18.70-18.85 mm



Valve stem diameter
Intake valve : 3.97-3.98 mm
Exhaust valve : 3.96-3.97 mm

- Measure the valve guide.

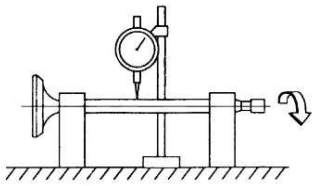


Valve guide internal diameter (A)
Intake valve : 3.97-3.98 mm
Exhaust valve : 3.97-3.98 mm

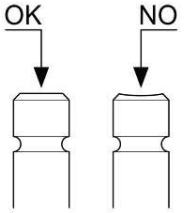
- After measuring the valve guide diameter and the valve stem diameter, check clearance between guide and stem.

Valve guide - stem service limit clerance
Intake valve : 0.015 - 0.042 mm
Exhaust valve : 0.015 - 0.042 mm

- Check the deviation of the valve stem by resting it on a (V) shaped abutment and measuring the extent of the deformation with a dial gauge.



Valve warp
0.1 mm

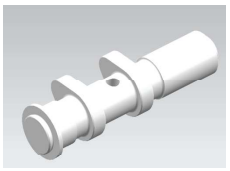


- Check that there are no signs of wear on the mating surface with the set screw articulated terminal.

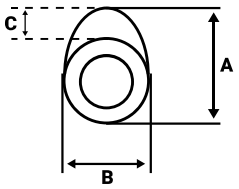
- If no anomalies are found during the above checks, you can use the same valves. To obtain better sealing performance, grind the valve seats. Grind the valves gently with a fine-grained lapping compound. During the grinding, keep the cylinder head with the valve axes in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide.

Caution
- To avoid scraping the mating surface, do not rotate the valve when no lapping compound is left. Carefully wash the cylinder head and the valves with a suitable product for the type of lapping compound being used.
- Do not reverse the fitting positions of the valves (right - left).

Camshaft

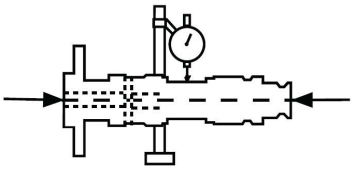


- Check the camshaft lobe dimensions A and B.



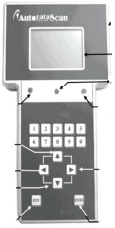
Standard diameter
Intake **A** : 31.44 - 31.54 mm
Intake **B** : 23.95 - 24.05 mm
Intake (liftled) **C** : 7.49 mm
Exhaust **A** : 30.81 - 30.89 mm
Exhaust **B** : 23.95 - 24.05 mm
Exhaust (liftled) **C** : 6.86 mm

- Check the axial clearance of the camshafts.



Standard diameter
Max. camshaft warp
Intake : 0.008 mm
Exhaust : 0.008 mm
Max. camshaft axial
Intake : 0.4 mm
Exhaust : 0.4 mm

Special tools

No	Name	Pasts numbers	pictures	How to use
1	Flywheel holder	TOOLS LAMX-16		
2	Timing system fixing	TOOLS LAMX-17		
3	Front pulley nut fixing	TOOLS LAMX-19		
4	Rear pulley nut fixing	TOOLS LAMX-23		
5	Flywheel dis-assembling	TOOLS LAMX-24		
6	Oil filter assembling	TOOLS LAMX-25	 	
7	Pulley shaft oil seal assembling 1	TOOLS LAMX-26		
8	Pulley shaft oil seal assembling 2	TOOLS LAMX-27		
9	Timing cover assembling	TOOLS LAMX-28		
10	PDA Diagnostic scanner tool	TOOLS V91		

Periodic maintenance table

Period inspection / Inspection items	Mileage / Km / Time / Month	First 1,000 / First 3	4,000 / 15	8,000 / 30	12,000 / 45
Fuel line		J		J	
Throttle operation		J		A	
Air filter element			J	R	
Crankcase ventilation				A	
Spark plug ＊				R	
Valve clearance					A
Engine oil		R	R	R	R
Engine oil filter ＊		R		R	
Engine idle speed				J	
Radiator coolant ＊/▲				J	
Cooling system				J	
Secondary Air Supply System				J	
Evaporative Emission Control System				J	
Drive Belt ＊				J	R
Belt case filter ＊				J	
Final Drive Oil		R		R	
Brake fluid ＊/▲		J		J	
Brake pads wear ＊				J	
Brake system ＊				J	
Headlight Aim				A	
Lights / horn				J	
CVT's Parts ＊				J	R
Side Stand / Center Stand				J	
Suspension ＊				J	
Nut, Bolt, Fasteners		J		J	
Wheel / tire		J	J		
Steering ＊				A	
Muffler ＊＊					J

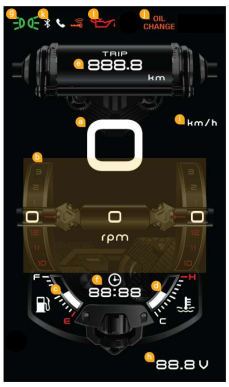
J : Check and clean, adjust, or replace if necessary. R : Replace. A : Check and clean. ▲ : Replace every 2 years.
＊ : This job must be carried out by the authorized dealer only. ＊＊ : This job for E5+ motorcycle.

Specification of liquids

Product introduction

Product	Description	Specifications
Engine oil 5W-40	Synthetic base oil for engines 4 stroke	SAE 5W - 40; JASO MB; API SL; ACEA A3
Transmission oil 80W - 90	Lubricating oil for gears and Transmission	SAE 80W-90 API GL-4
Coolant	Ready-mixed coolant type Ethylene Glycol	ASTM D 3306 - ASTM D 4656 – ASTM D 4985 -
		CUNA NC 956 -16
Brake fluid DOT4	Synthetic brake fluid type DOT 4	SAE J 1703; FMVSS 116; ISO 4925;CUNA NC 956
		DOT4

Maintenance warning



- This function will remind you of scheduled maintenance. To turn the key to ON position each time the dashboard will perform a preliminary check.
  The maintenance warning symbol shows when it comes to maintenance
  This symbol will disappear when reset after completed servicing.

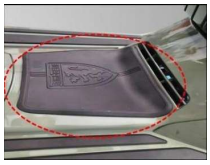
Resetting the maintenance warning symbols

- Push the hazard switch to the ON position.
- Press and hold the MODE button.
- Press the ignition switch.
- Turn the ignition switch to the ON position.
- When the screen animation finished, the oil change indicator light will off.

Caution
The procedure for resetting the maintenance symbols must be done while the motorcycle is stationary only.

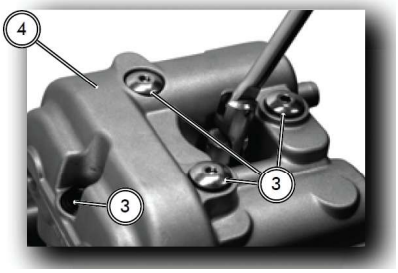
Spark plug

- Place the vehicle on the center stand on firm and level ground.
- Remove the rubber mat at middle footrest.



- Remove the middle footrest by loosen 2 screws and 2 bolts (M6).

- Remove the spark plug cable.
- Loosen the spark plug with the spark plug box wrench.
- Remove the spark plug.



- Check the spark plug status and the electrode gap.
  Standard valve
  Spark plug
  NGK CR9EB
  Electrode gap
  0.7 - 0.9 mm

- When assembling the spark plug, turning in by hand and tighten with the specified torque value.
  Torque Tightening
  10 - 12 Nm
- Reinstall the removed parts in vice versa.

Caution
Removing the spark plug must only be done while the engine is cold. Spark plug must be changed at the specified intervals, Unspecified spark plug or worn-out spark plug will damage the engine and electrical system.

Checking the ignition timing

- Remove the LH engine cover.
- Remove the spark plug.
- Remove the plastic cap on the flywheel cover.
- Position the engine at the top dead center (TDC) by rotating the crankshaft with a wrench.

- Turning drive pulley to align the mark “T” on the magneto wheel with reference mark on RH engine cover, as shown in the picture.

- Remove the cylinder head cover.
- The locking pins to ensure the alignment. In this situation, the cams should be positioned outwards.

Caution
At TDC on the compresion stroke, the bridge orifices should coincide with those of the camshafts.

- Using a feeler gauge measure the valve clearance between the cam and the valve lifter.

Standard valve
valve clearance (Cold engine)
Intake valve : 0.10 - 0.15 mm
Exhaust valve : 0.15 - 0.20 mm

- If valve clearance does not meet the specified value, replace the valve shim to adjust.
- Reinstall the removed parts in vice versa.

Engine lubrication system

For 4-stroke engine, the lubricant is responsible for lubricating parts such as bearings, cylinder, piston, etc. Inadequate lubricant may damage the engine. In general the operation of a 4-stroke engine can degrade the lubricant and its properties, especially during the run-in period. The amount of engine oil decreases depending on operating conditions (e.g. accelerateing the engine at high revs for long periods of time will result in high oil consumption).

Check the engine oil level

- Start the engine and warm it more than 5 minutes, then stop the engine and wait a few minutes.
- Place the vehicle on the center stand on firm and level ground.
- Clean the area around the oil filler cap before removing the oil filler cap
- Remove the dipstick and wipe it clean.
- Insert the dipstick until it seats, but don’t screw it in.
- Remove the dipstick and check the oil level.
- Check the oil level on the tip of dipstick, the oil level should be between the upper (MAX) and lower (MIN).
- If the oil level is too low, top up the oil not more than upper (MAX) level with the same oil.
- Reinstall the dipstick.

Engine oil change

- Place the vehicle on the center stand on firm and level ground.
- Start the engine, warm it up for several minutes, and then turn it off.
- Place a container under the engine oil drain bolt.

- Unscrew the oil dipstick to make it easier for the engine oil to drain out.
- Unscrew the oil drain plug and remove the strainer to allow the engine oil to drain into the container.

- Remove the oil filter.

- Check the O-ring on the drain plug and strainer.

- Apply the new engine oil to the O-ring, install the strainer.
- Apply the new engine oil to the O-ring install and tighten the oil drain plug to the specified torque.

Torque value
Oil drain plug : 24 - 30 Nm.

- Apply the new engine oil to the O-ring of new oil filter and tighten the filter with the specified torque.

Torque value
Oil filter : 10 - 12 Nm.

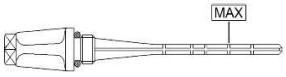
- Fill the Rh crankcase cover with recommended engine oil.
  Engine oil capacity
  Oil change only : 1,150 ml.
  Oil change and Oil filter : 1,300 ml.
  Disassemby engine : 1,500 ml.

- Install the oil dipstick.
- Check the oil level.
- Make sure there are no oil leaks.

Caution
The procedure for resetting the maintenance symbols must be done while the motorcycle is stationary only.

Check the transmission oil level

- Place the vehicle on the center stand on firm and level ground.
- Unscrew and remove the oil dipstick, wipe it clean with a clean cloth and then fit it back into place, tightening fully.
- Remove the dipstick and check the oil level.
- unscrew and remove the dipstick again and check that the oil level reaches the 1st notch on the dipstick from the bottom end.
- If the oil level is too low, top up the oil not more than upper (MAX) level with the same oil.
- Reinstall the dipstick.



Transmission oil change

- Place the vehicle on a center stand on level ground.
- Place a container under the transmission oil drain bolt.
- Unscrew the oil dipstick to make it easier for the transmission oil to drain out.
- Unscrew the transmission oil drain bolt.

- Install and tighten the transmission oil drain bolt to the specified torque.

Torque value
Transmission oil drain bolt : 12-15 Nm

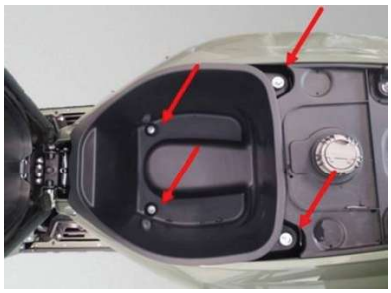
- Fill the transmission oil with recommended transmission oil.

Transmission oil capacity
Transmission oil only : 230 ml
Disassemby transmission : 250 ml

- Install the oil dipstick.

Cooling system

Check the coolant level



- Place the vehicle on the center stand on firm and level ground.
- Open the seal.
- Remove the luggage box by loosen 4 mounting bolts.
- If the coolant level is at low level or below, top up more coolant, it must be between the low (L) and full (F) level.
- Reinstall the removed parts in vice versa.

Caution

- Make sure that the coolant does not exceed the full level to prevent coolant from flowing out of the reservoir while riding.
- For safety, do not open the radiator cap while the engine is hot.

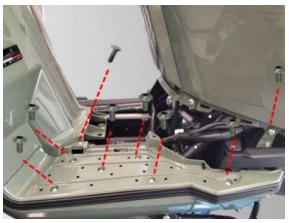
Air filter

- Place the vehicle on the center stand on firm and level ground.
- Open the seal.
- Remove the luggage box by loosen 4 mounting bolts.
- Remove the rubber mat at middle footrest.
- Remove the middle footrest by loosen 2 screws and 2 bolts (M6).

- Remove the LH footrest cover by loosen the screw and push down the lock pin behind the cover.

- Remove the RH footrest cover by loosen the screw and push down the lock pin behind the cover.

- Remove the 3 rubber floor strips on the left side.



- Pull out the left footrest by loosen 8 bolts (M6).

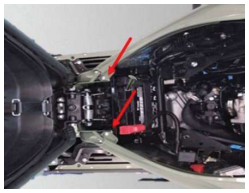
- Remove the rear armrest by loosen 3 bolts (M8).

- Remove the fuel tank cap.

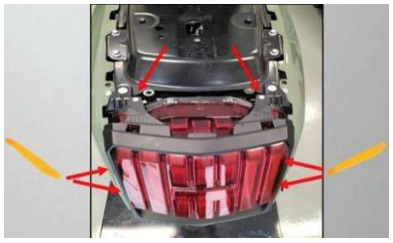
- Remove the rubber plate.

- Remove the drain hose.
- Remove the plastic cover.

- Remove upper body cover by loosen 2 screws and 2 bolts (M8).



- Remove the taillight rim by loosen 2 screws.



- Remove the LH side cover by loosen 4 bolts.

- Remove the air filter cover by loosen 9 screws .

caution

Replace the air filter element according to the maintenance schedule.
If the vehicle is operated on rough or dusty roads. It is essential to inspect the air filter more frequently to prevent damage to the engine.

- Reinstall the removed parts in vice versa.

Crankcase breather

Service more frequently when ridden in rain, at full throttle, or after the scooter is washed or overturned. Service if the deposit level can be seen in the transparent section of the drain plug.
Remove the crankcase breather drain plug and drain the deposits into a suitable container, then reinstall it securely.

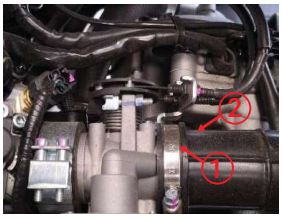
Headlight Aim

Follow these steps:
1. Adjust the vehicle position so that it is straight. Check that the tire pressure is within value according to specified standard, The vehicle is located on a level surface away from the screen or white wall about 10 meters. The the longitudinal axis of vehicle must be perpendicular to the screen or wall in the front.
2. Turn on the headlight and check the beam on the screen or wall is not higher than 9/10 or lower than 7/10 of the distance from the ground to the center of vehicle headlight.
3. Adjust the headlight by turning the adjusting screw if beam level is found out of specified level.

Throttle operation

Check for any deterioration or damage to the throttle cable. Check the throttle grip for smooth operation.
Check that the throttle opens and automatically closes in all steering positions. If the throttle grip does not return properly, overhaul and lubricate the throttle grip housing. If the throttle grip still does not return properly, replace the throttle cable.
With the engine idling, turn the handlebar all the way to the right and left to ensure that the idle speed does not change. If idle speed increases, check the throttle grip freeplay and the throttle cable connection.

- Measure the throttle grip freeplay at the throttle grip.
  Freeplay : 2 - 6 mm
- Minor adjustments are made with the upper adjuster.
- Slide the rubber boot [1] off the adjuster [2].
- Loosen the lock nut, turn the adjuster as required and tighten the lock nut.
- Install the rubber boot securely.
- After adjustment, recheck the throttle operation.



- Major adjustments are made with the lower adjuster on the throttle body.
- Remove the luggage box
- Loosen the lock nut [1], turn the adjusting nut [2] as required and tighten the lock nut to specified torque.

Torque value
Lock nut : 8.5 N·m (0.9 kgf·m, 6.3 lbHt)

- After adjustment, recheck the throttle operation.
- Install the luggage box.

Engine idle speed

- Inspect the idle speed after all other engine maintenance items have been performed and are within specifications.
- Before checking the idle speed, inspect the following items.
  - No MIL blinking.
  - Spark plug condition.
  - Crankcase breather system condition.
  - Air cleaner element condition.
- The engine must be warm for accurate idle speed inspection.
- Start the engine and let it idle.
- Check the idle speed.

Idle speed : 1,600 ± 150 min.

- If the idle speed is out of the specification, check the following:
  - Intake air leak or engine top-end problem
  - Throttle operation and freeplay
  - IACV operation

Fuel line

- Place the vehicle on the center stand on firm and level ground.
- Open the seal.
- Remove the luggage box by loosen 4 mounting bolts.
- Check the fuel feed hose between the fuel pump and injector for deterioration, damage or leakage. Replace the fuel feed hose if necessary
- Also, check the fuel feed hose fittings for damage or looseness.

Drive belt

Remove LH engine cover

- Place the vehicle on the center stand on firm and level ground.
- Open the seal.
- Remove the luggage box by loosen 4 mounting bolts.
- Remove the rubber mat at middle footrest.
- Remove the middle footrest by loosen 2 screws and 2 bolts (M6).
- Remove the LH footrest cover by loosen the screw and push down the lock pin behind the cover.
- Remove the 3 rubber floor strips on the left side.
- Pull out the left footrest by loosen 8 bolts (M6).
- Remove the right bottom footrest cover by loosen 4 bolts.

Replacing the Drive belt

- Use a screw driver flat remove the front plastic cover.

- Use a special tool to lock the pulleys.

Special tools
TOOLS LAMX-23 : REAR PULLEY NUT FIXING

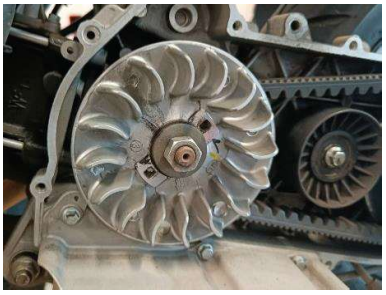
- Loosen the retaining nut and remove the retaining nut with the washer.

- Loosen bolts and remove LH engine cover fixing bolts.
- Remove LH engine cover.

- Remove the clutch outer.

Note
The clutch outer can be removed without removing the driven pulley.

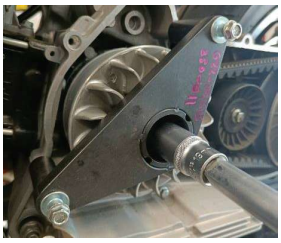
Removing Drive pulley



- Turn the crankshaft until the attachment point position coincides with the special tool, as shown.

- Use special tools to lock the drive pulley suit.

Special tools
TOOLS LAMX-19 : Front pulley nut fixing



- Loosen the drive pulley fastening nut.
- Remove special nuts and tools.

- Remove the washer, belt and drive pulley.

Assembling the drive pulley assembly

- Reassemble the removal and tightening process with the required torque value.

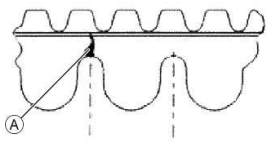
Torque value
Drive pulley retainer nut 79 ± 4.0 Nm

Assembling the LH engine cover

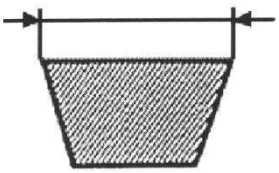
- Align the latch and belt cover gasket in position before assembling.
- Replace the belt case airfilter and tighten the screws with the specified torque value.
- Reassemble the removal process
- Insert the pulley mounting nut accordingly, assemble the special tool and tighten with the required torque value.

Torque value
LH engine cover screws : 11 ± 1.0 Nm
Driven pulley locking nut : 58 ± 2.0 Nm

Drive-Belt Inspection



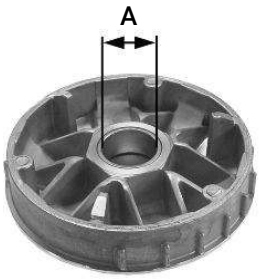
- Check that the belt is not damaged, torn or worn abnormally.
- Check the wear condition of the belt especially visually.
  The belt groove may have cracks as shown. If the belt is found to be worn or there are cracks to replace.



- The belt must have the correct width according to the standard value.

Standard value
Drive belt : 22.4 - 22.8 mm.
Service limit : 21 - 22 mm.

Inspecting the movable drive face



- Check the inside of the pulley slide bush rod must be free of damage. or abnormal wear and measure the inner diameter at position A.

Standard value
Movable drive face : 26 - 26.021 mm.
Service limit : 26.05 mm.

- Measure the outer diameter of the bush slide axis at position B as shown in the figure.

Standard value
The slide sleeve : 24.959 - 25.98 mm.
Service limit : 25.93 mm.

- Inspect rollers must be free of damage or wear.
- Check the wear of the roller housings and of the belt contact surfaces on both pulley halves.
- Check that the outer pulley must not be in abnormal wear and tear condition.
- Check that the contact surface of the pulley to the belt is not damaged or abnormal wear and tear.
- Check the locking ring must be in normal condition, not deformed.

Standard value
Rollers weight : 18.9 - 19.1 mm.
Service limit : 18.5 mm.

Clutch outer inspection

- Check that the clutch outer is not deformed or abnormal.
- Measure the inside diameter.

Standard value
Clutch outer : 134 - 134.2 mm.
Maximum value : 134.5 mm.

Check the rotation of the clutch outer.

- Install the clutch outer on a driven pulley shaft using 2 bearings (inner diameter 15 and 17 mm.).
- Lock with the original spacer and nut.
- Place the clutch/shaft assembly on the support to check the crankshaft alignment.
- Rotate the shaft and read the value from the dial gauge by measuring eccentricity on inner edges.
- Repeat the measurement in 3 positions (central, internal, external).
- If the value exceeds the standard, replace the Clutch outer.

Standard value
Maximum value : 0.15 mm.

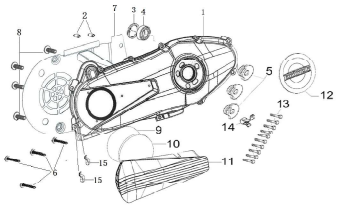
Inspecting the clutch

- Check the thickness of the clutch cloth.
- Check that the clutch lining contact surfaces are free of grease or lubricant. If lubricant is found, check the seals.

Note
The thickness of the entire clutch cloth the 3 parts must not be too different.If the difference in thickness is too large it may cause the clutch to slip or make a sound.

Standard value
Minimum value : 1 mm.

The belt case air filter



- Remove the belt case air filter by loosen 4 screw.
- Remove the belt case air filter from Lh engine cover.
- Blow the compresseld air to the outer surface of the belt case air filter.
- Check that the 0-ring of the belt case air filter is in good condition, and replace if necessary.
- Check that the belt case air filter is not damaged, torn or worn abnormally and replace if necessary.

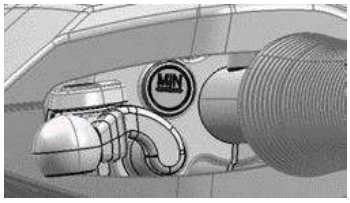
Caution

If the vehicle is used on dusty roads, it is necessary to service the belt case air filter more often to avoid damaging the CVT parts.

Brake system

Checking the brake fluid level

- Put the vehicle on level ground with the center stand holding the handlebars straight.
- In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.
- If the fluid level is near the “MIN” level mark, fill the reservoir with DOT 4 brake fluid.



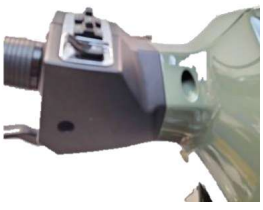
Caution

- When the fluid level of the master cylinder is low, check the brake pads for wear.
- A low fluid level may be due to wear of the brake pads. If the brake pads are worn, the caliper piston is pushed out, this accounts for a low reservoir level. If the brake pads are not worn and the fluid level is low, check entire system for leaks.
- Be careful not to let the brake fluid touch your skin or clothing. If contacted, rinse thoroughly with water.
- Be careful not to let the brake fluid come into contact with the painted parts.
- Brake fluid has the ability to absorb moisture from the air. If the brake fluid has high humidity will result in reduced braking performance.
- Do not use brake fluid that has been used or has been opened or is left over from previous use.
- Brake fluid should be replaced at the intervals specified in the maintenance schedule.

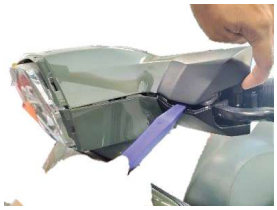
Adding brake fluid

- Remove the headlight rim.

- Remove the handlebar cover by loosen 4 screws.



- Remove the handlebar cover.



- Disconnect the speedometer from harness.

- Remove the reservoir cover and fill with recommended brake fluid.

Recommended Brake fluid

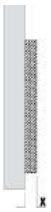
Brake fluid : DOT4 SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4

Brake pads wear

- Check the brake pads for wear.
- Check the thickness of the brake pads. If the thickness is lower than the standard, replace the brake pads with new ones.

Standard value

Minimum thickness : 1.5 mm.



- Check the condition of the brake pads, the surface of the brake pads must be smooth and even. If the brake pads are worn unevenly beyond the specified value, replace the new brake pads.

The hydraulic brake system

- Inspect the brake hose and fittings for deterioration, cracks, damage or signs of leakage.
- Tighten any loose fittings.
- Replace hose and fittings as required.

Sidestand / centerstand

- Check the centerstand spring for damage or loss of tension.
- Check the centerstand for freedom of movement and lubricate the sidestand pivot if necessary.
- Place the vehicle on the center stand on firm and level ground.
- Check the sidestand spring for damage or loss of tension.
- Check the sidestand for freedom of movement and lubricate the sidestand pivot if necessary.
- Check the sidestand ignition cut-off system:
  - Start the engine.
  - The engine should stop as the sidestand is lowered.

If there is a problem with the system, check the sidestand switch

Note

Lubricate the pivoting point, metal-to-metal moving parts, and spring contact point of the sidestand and centerstand.

Suspension

The front shock absorber
- Check the operation of the front shock absorber by compressing it several times.
- Check the front shock absorber for damage or loose.
- Check the front shock absorber for oil leaking.
- Replace damaged components which cannot be repaired.

The rear shock absorber
- Check the operation of the rear shock absorber by compressing it several times.
- Check the rear shock absorber for damage or loose.
- Check the rear shock absorber for oil leaking.
- Replace damaged components which cannot be repaired.

Nut, Bolt, Fasteners

- Check that all chassis nuts and bolts are tightened to their correct torque values.
- Check that all cotter pins, safety clips, hose clamps and cable stays are in place and properly secured.

Wheel / tire

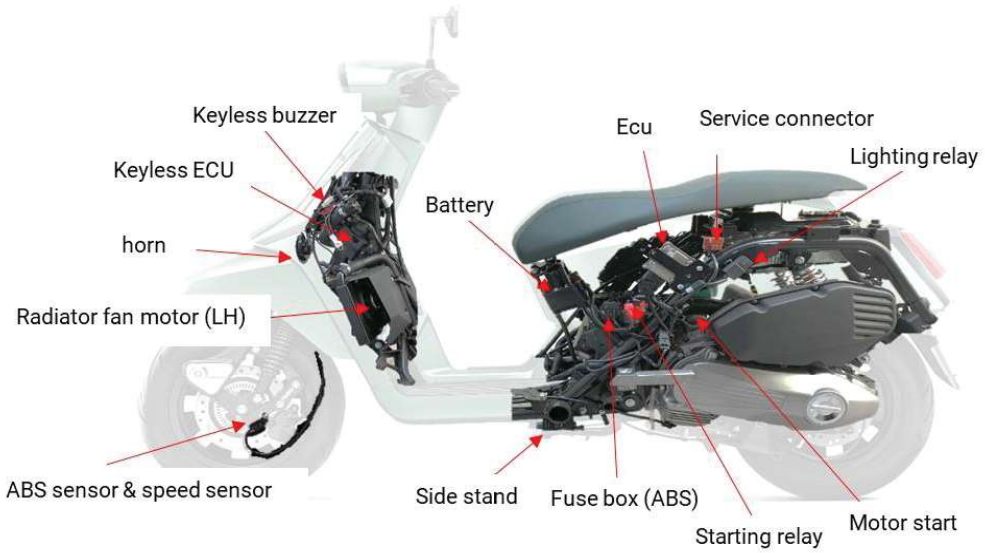
- Place the vehicle on the center stand on firm and level ground.
- Place a support under the chassis.
- Turn the wheel and check that it rotates smoothly with no unusual noises.
- Check the wheels for damage or loose.
- Check the tires for cuts, embedded nails, or other damage.
- Measure the tread depth at the center of the tires.Replace the tires when the tread depth reaches the service limits.
- Check the tire pressure with a tire pressure gauge when the tires are cold.

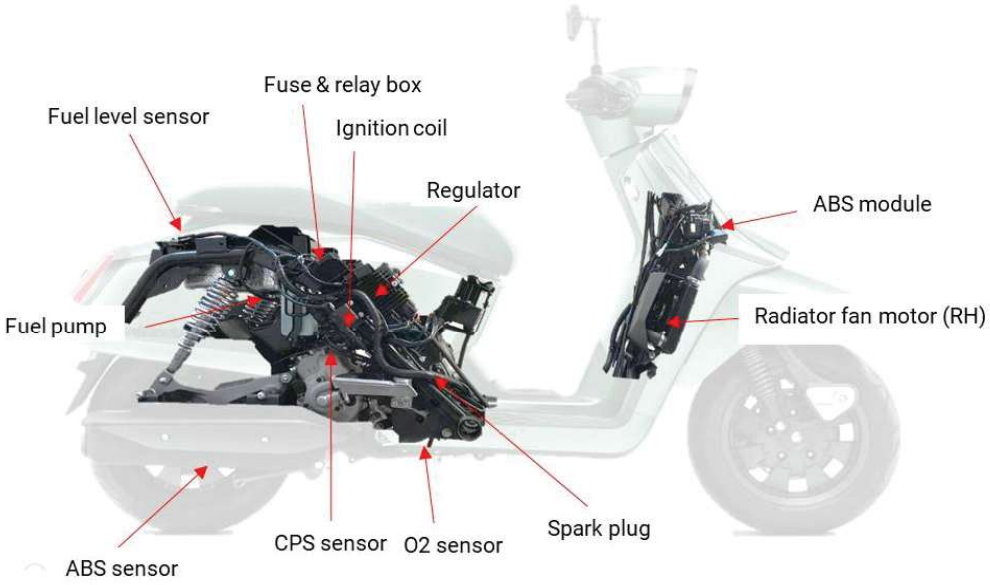
Note
After a tire or wheel has been replaced, always balance the wheel.

Steering bearing

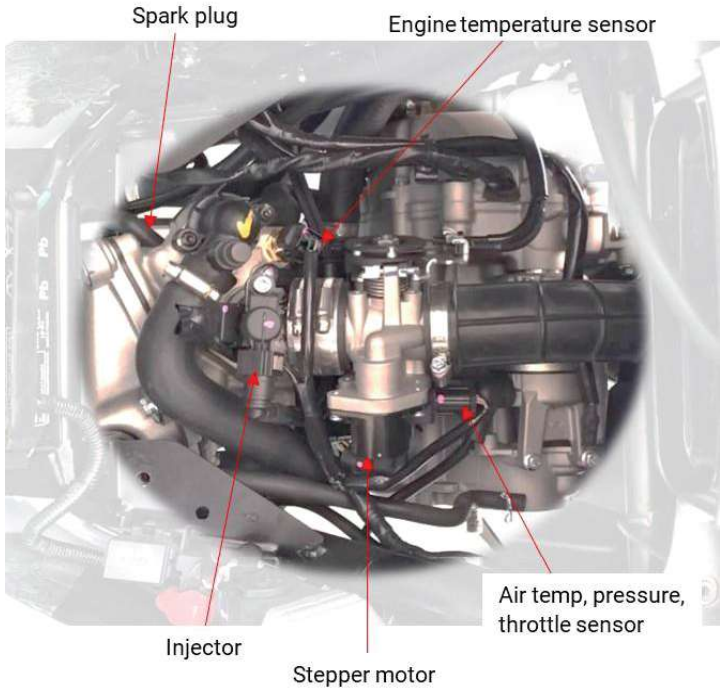
- Place the vehicle on the center stand on firm and level ground.
- Place a support under the chassis.
- Check that the handlebar moves freely from side to side. Make sure the control cables do not interfere with the handlebar rotation.
- Check for steering stem bearings by grabbing the steering tube and attempting to move the steering tube forward to backward.
- If the handlebar moves unevenly, binds, or has vertical movement, inspect the steering bearings

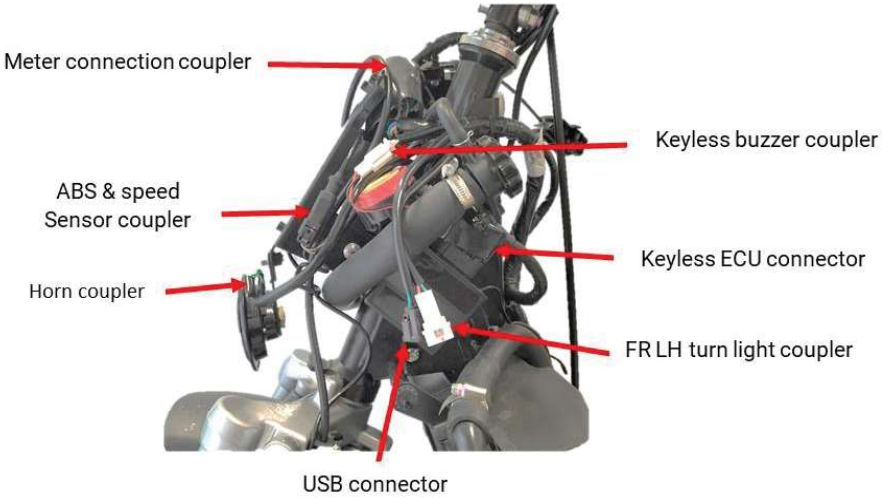
Location of electrical equipments



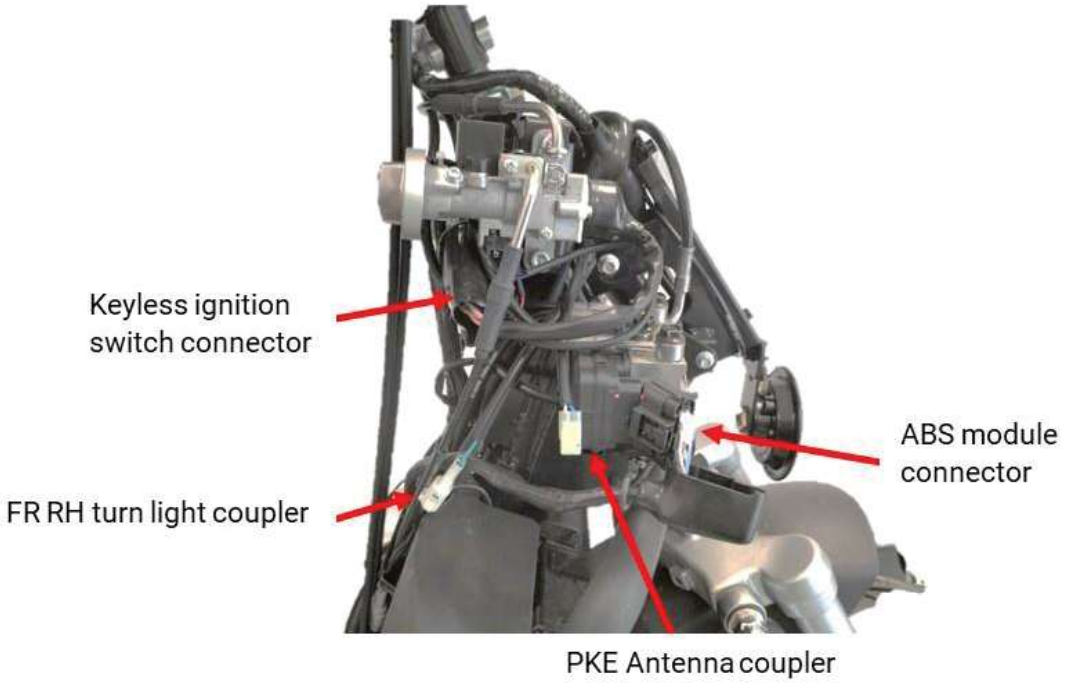


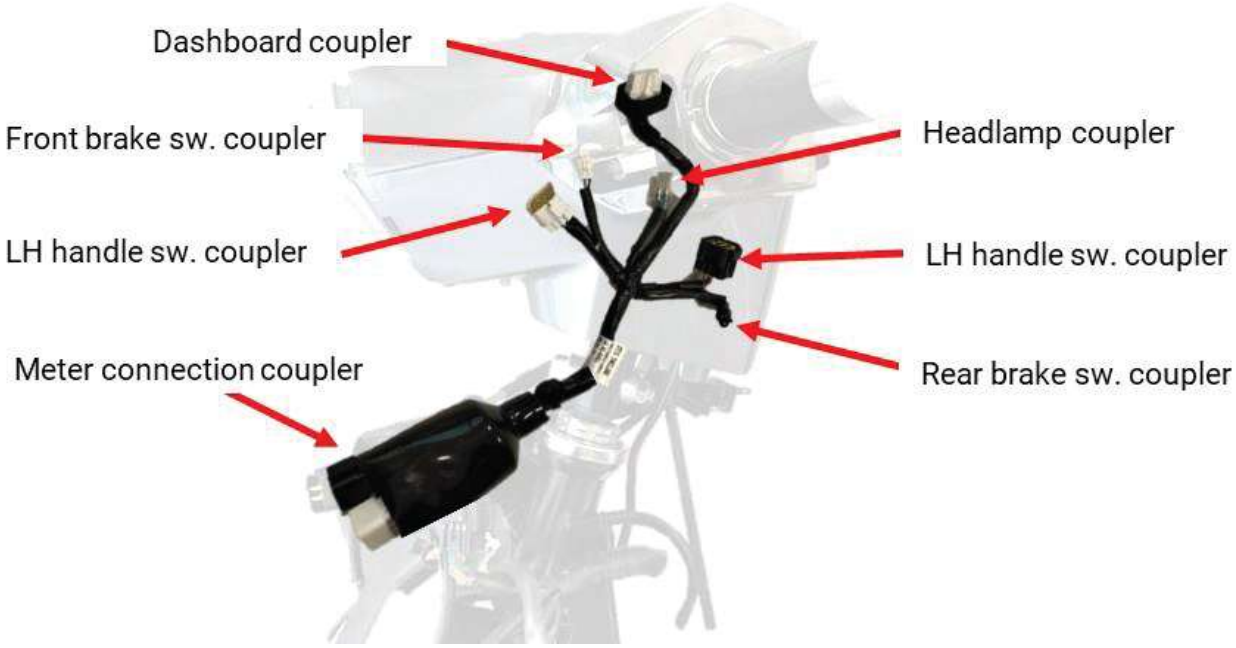
Location of electrical equipments

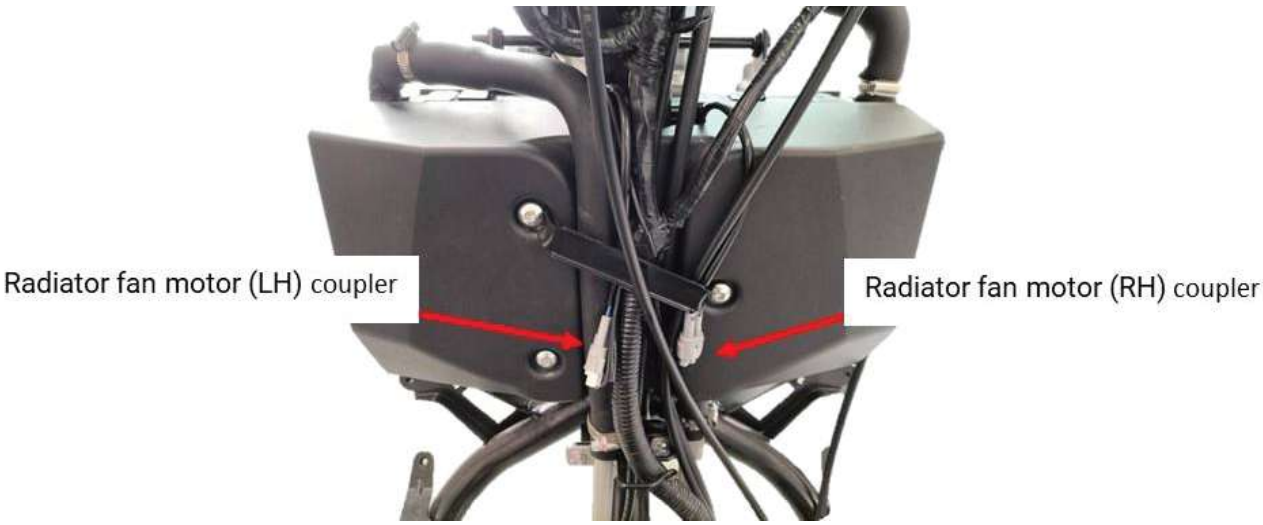




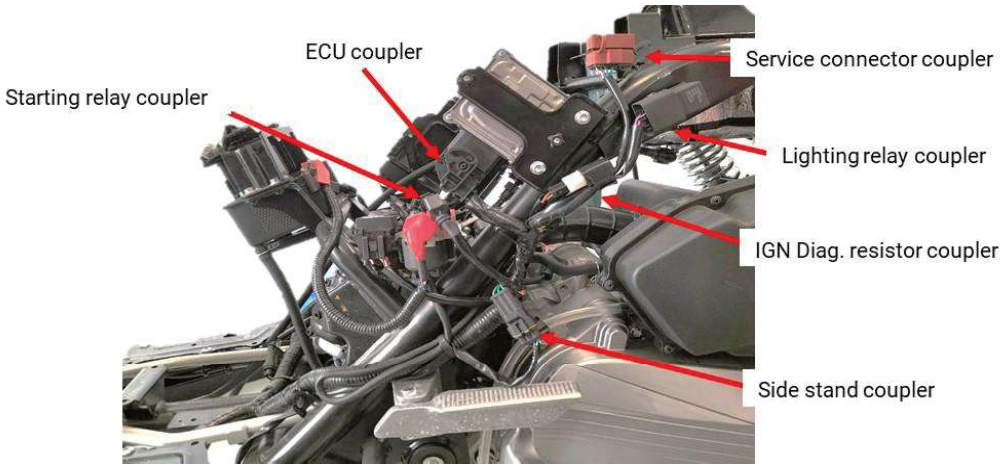
Location of electrical equipments

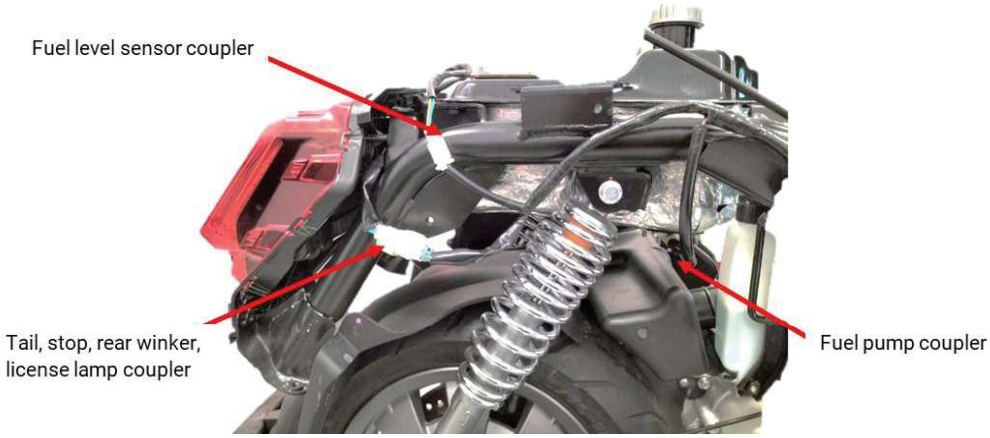


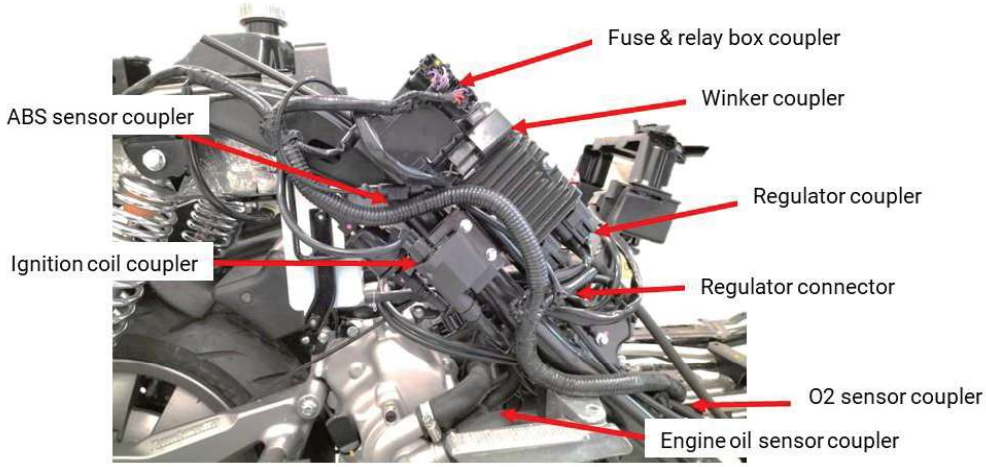


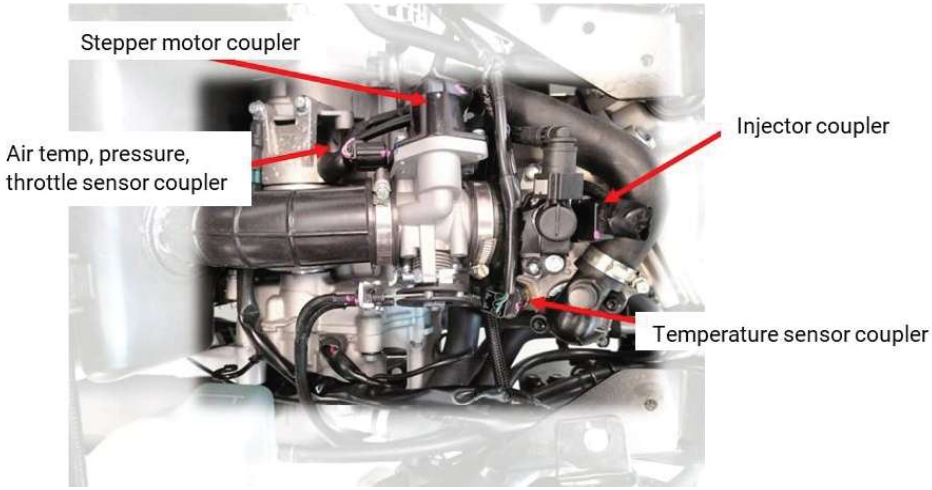


Location of electrical equipments

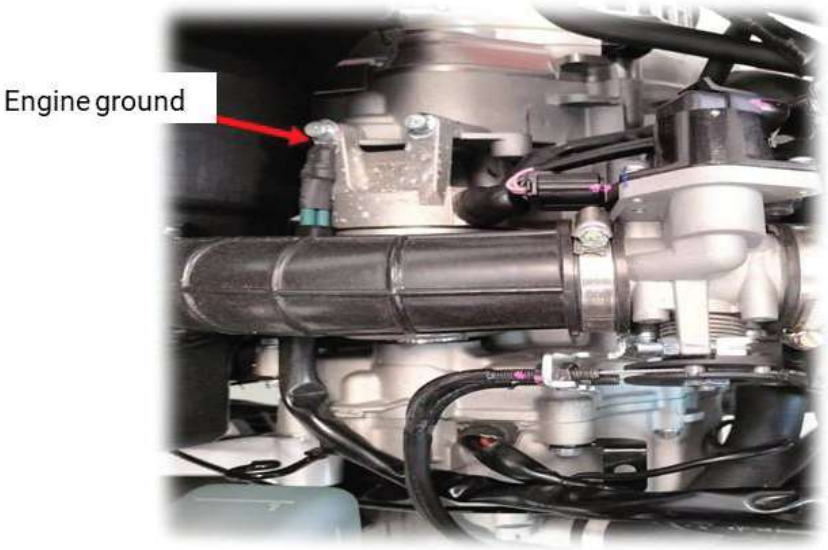








Location of electrical equipments



Location of electrical equipments

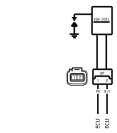
1. ABS Module
- Located inside the right front windscreen as shown in the picture.

2. APK Antenna
- Located inside the right front windshield as shown in the picture.

3. ECU box
- Located under U Box left side.

4. PDA connector
- Located under U Box on the left above ECU box.

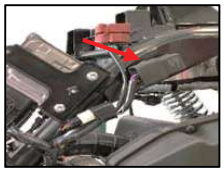
5. Ignition coil
- Located inside the right body cover. Under the regulator.



connect plug
IGN = on - pin 1 – GND = 12V

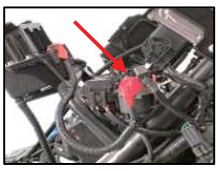
measure resistance @ 20°C (primary) pin 1- pin 2 : 0.5-1.0Ω

6. Headlight relay
- Located inside the left body cover, under the connector plug.PDA



7. Horn
- around inside shield Front wind

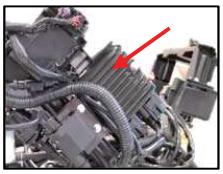
8. Starter relay
- Located inside the left body cover. Under the ECU box



Location of electrical equipments

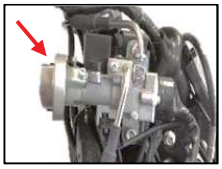
9. Fuse box
 - The ABS fuse box is located under the left luggage box.
 - The main fuse box is located inside the right body cover, above the regulator.

10. Regulator
- Located inside the right body cover. Under the main fuse box



11. Magnetic wheel connector
- Located Inside the right body cover Under the regulator

12. Key switch
- Located inside the front windshield.



13. fuel level sensor
- in the southtop tank cover

14. Engine temperature sensor
- Located under the storage box under the seat.

15. turn signal relay
- Located in the area around inside shield Front wind

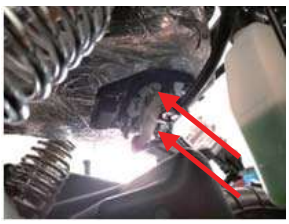
16. Front wheel speed sensor plug
- located in the area of the front windshieldNext to the speaker

Location of electrical equipments

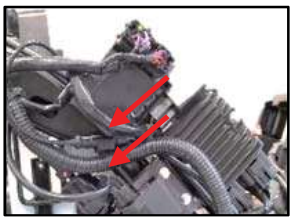
17. Left front turn signal assembly
- Located in the area of the left front windshield

18. Set of front right turn signals
- Located in the area of the windshield on the right side

19. fuel pump
- Locate under fuel tank

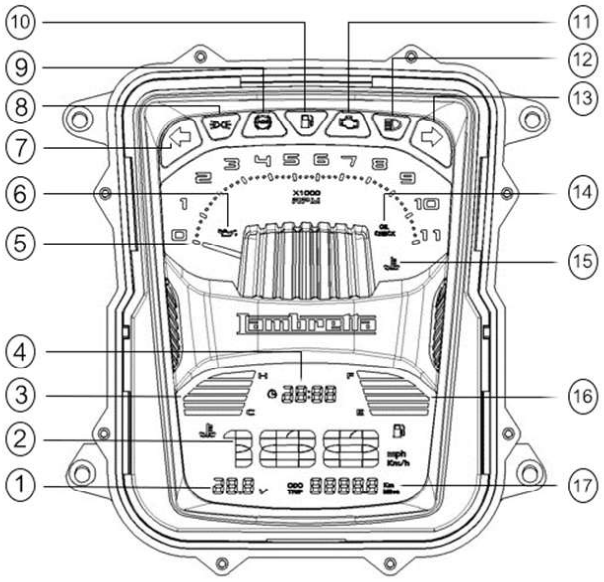


20. rear wheel speed sensor plug
- Locate Inside right body cover Under turn signal relay



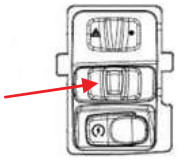
21. Fuel injector and fuel injector holder
- located under U Box under the seat

Dashboard LCD



① battery voltage gauge
② speedometer
③ coolant temperature gauge
④ clock
⑤ tachometer
⑥ Low oil pressure warning light
⑦ left turn signal
⑧ dimmer signal
⑨ system warning light ABS
⑩ Low fuel warning light
⑪ Warning lightEFI
⑫ high beam warning light
⑬ right turn signal
⑭ warning ligh taction Check distance
⑮ overheat warning light
⑯ fuel gauge
⑰ Odometer

Mode button (MODE)
It allows access to information displayed on the screen. It also helps.
Set parameters with short or long press of a button.
Note
Press short button : Press on the button 1 seconds.
Press long button: Press on the button hold for more than 2 seconds.



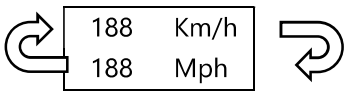
The oil check warning lamp
Each time you turn the ignition swicth to ON position, The screen will display an Oil check warning lamp.
This symbol indicates a periodic maintenance reminder.
If a certain distance is reached, every time the ignition is turned to the ON position, this symbol is always displayed.Until the periodic check-up service.

Resetting the oil check warning lamp
Resetting the oil check warning lamp must follow the procedure. As follows :
- Turn the ignition switch to the ON position.
- Keep the odometer at the ODO position.
- Press and hold the MODE button for 15 seconds. Oil check will turn off. If you release your hand from the MODE button before 15 seconds, The range check will not turn off because the system has not reset.

Note
The procedure for resetting the oil check warning light.Must be done while the vehicle is stationary only.

Multi- function display

Speedometer display
Setting the speed unit on display with the following steps :
- KM/H
- MpH

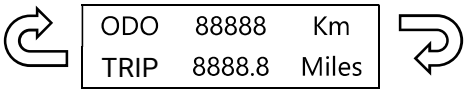


- Press and hold the MODE button.
- Turn the ignition switch to the ON position.
- The self-test of the display is finished.

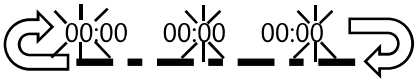
Distance display
The distance display is equipped with the following :
- Odometer
- Tripmeter

Press the MODE switch to change the display between the Odometer and tripmeter.

Resetting the Tripmeter
Press and hold the MODE button for 5 seconds.

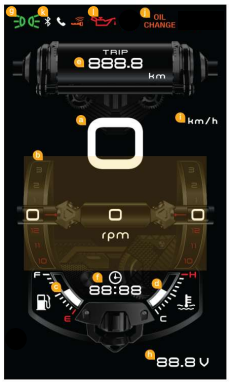


Clock settings
Setting the clock display with the following steps :
- Press and hold the mode button for 5 seconds
- Short press to select the hour
- Then hold for 2 seconds to switch from hour to minute,
- Short push to select the minute
- Hold for 2 seconds to finish setting



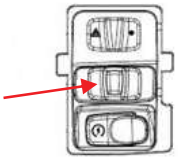
Note
Disconnecting the battery terminals will cause the watch to be reset.

Dashboard TFT



(a.) Tachometer
(b.) Speedometer
(c.) Fuel gauge
(d.) Coolant temperature gauge
(e.) Odometer and Tripmeter (km/mi)
(f.) Clock display
(g.) Illuminating headlamp indicator
(h.) Battery voltage meter (V)
(i.) km/h or mph
(j.) Oil change warning lamp
(k.) Bluetooth indicator
(l.) Low oil pressure warming lamp

Mode button (MODE)
It allows access to information displayed on the screen. It also helps.
Set parameters with short or long press of a button.
Note
Press short button : Press on the button1 seconds.
Press long button: Press on the button hold for more than 2 seconds.



Menu setting
Following items to change sequentially

- **Theme Interface**
  The 5 theme Interface styles :
  - Night white theme
  - Night red theme
  - Night blue theme
  - Night yellow theme
  - Day theme

Display brightness
The screen brightness settings can be adjusted as follows.
Auto
Custom : Select 6 levels of brightness
Back

Date / Time
Date and time settings can be adjusted as follows :
Date : DD/MM/YYYY
Show on screen
Time zone : England GMT
Italy GMT+1
Thailand GMT+7
China GMT+8
Korea GMT+9
Time : 00:00
Show on screen

Unit
The speedometer settings can be adjusted as follows :
KM/H (metric)
MPH (imperial)

Language
The language settings can be adjusted as follows :
English
ภาษาไทย
Italiano

Malfunctions
Checking the fault status of the system can be checked as follows.
Current
History
Back
Recommend
The system fault status can be displayed on a maximum of 4 codes. If there are more than 4 fault codes, the system will be displayed additionally on the next page.

Mobile connection
The mobile connection to the system can be connected as follows :
Bluetooth connect
Open
Close
BT name
Back

About
Checking the version of instrument can be checked as follows.
System version
Firmware version
The version of the instrument can not be selected or changed.

Removing the engine from the vehicle

- Place the vehicle on the center stand on firm and level ground.
- This operation must only be done while the engine is cold.
- Remove the luggage box.
- Remove the covers (Refer to the steps checking the ignition timing)
- Remove the battery terminals.

Exhaust pipe removal

- Loosen the muffler clamp.
- Loosen the 3 screws mounting muffler.
- Remove muffler.

- unplug O2 sensor.
- Loosen 2 nuts mounting the exhaust pipe.
- Remove exhaust pipe.

Caution

When reinstall the exhaust pipe and muffler, both gaskets must be replaced.

- Place a container under the engine to accommodate the amount of coolant.
- Unbolt the water pump cover and remove cover.

- Unplug the rear ABS sensor.
- Unplug CPS and the magneto coil.
- Remove the rear wheel nut lock clip.
- Remove the rear wheel nut.
- Remove a bolt (M8) mounting the rear shock absorber.
- Remove the swingarm by loosen 2 bolts (M8).

- Remove the mounting ABS sensor by loosen 5 bolts (M6).

- Slightly loosen 5 bolts (M8) mounting rear wheel.

- Remove 2 bolts (M6) air filter holder.

- Unplug the spark plug cap.
- Unplug the injector.
- Unplug Map sensor.
- Unplug the idle speed sensor.
- Unplug the temperature sensor.
- Disconnect the fuel line.
- Remove the throttle cables.
- Disconnect the ground wire.
- Disconnect the wires to the starter motor.
- Disconnect the air filter pipe and remove the air filter.

- Unplug the oil pressure switch.

- Remove the rear brake cable mounting bracket to the engine crankcase.

- Remove 2 bolts (M8) mounting rear brake caliper.
- Remove a bolt (M8) mounting rear shock absorber.

Disassemble of engine

Remove LH engine cover

- Use a screw driver flat remove the front plastic cover.

- Use a special tool to lock the pulleys.

special tools

TOOLS LAMX-23 Rear pulley nut fixing

- Loosen the retaining nut and remove the retaining nut with the washer.

- Loosen bolts and remove belt cover fixing bolts.

- Remove the belt cover.

Removing the clutch shaft bearing

- Remove the bearing locking ring.

- Use a special tool to remove the axle shaft seal.

Clutch shaft bearing assembly

- Use a hot air gun to blow the ball socket.

- Use a special tool to hammer the ball into the socket.

Removing the driven pulley

- Remove the clutch outer and clutch assembly.

Note
The clutch outer can be removed without removing the driven pulley assembly.

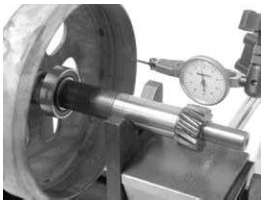
Clutch outer inspection

- Check that the clutch outer is not deformed or abnormal.
- Measure the inside diameter.

Standard value
Maximum value : Diameter : 134.5 mm
Standard value : Diameter : 134 - 134.2 mm

Check the rotation of the clutch outer

- Install the Clutch outer and clutch shaft with 2 bearings (inside diameter : 15 and 17 mm.)
- Lock with the original spacer and nut.
- Place the clutch/shaft bowl on the support to check the shaft alignment.

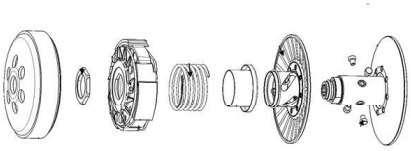


- Using a dial gauge and the magnetic base, measure the shaft eccentricity.
- Repeat the measurement in 3 positions (center, inside, outside)
- If the value exceeds the standard, replace the Clutch outer.

Standard value
Maximum allowable : 0.15 mm

Remove the clutch

- Fit the driven pulley unit in the tool so as the bolt get into the masses clutch support holes. Afterwards make the support screw make contact with a minimum force.
- Using the specific wrench, inserted 46 mm from the side, remove the clutch central locking nut.



- Separate the components of the driven pulley.

Caution
The tool must be firmly fixed in the vice and the central screw must not be tightened with excessive torque as this may damage the pulley or deform the specific tool.

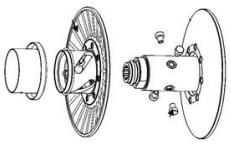
Inspecting the clutch

- Check the thickness of the clutch cloth.
- Check that the clutch lining contact surfaces are free of grease or lubricant. If lubricant is found, check the seals.

Note
The thickness of the entire clutch clothThe 3 parts must not be too different.
If the difference in thickness is too large it may cause the clutch to slip or make a sound.

Standard value
Minimum thickness : 1 mm.

Pin retaining collar



- Simultaneously turn and pull the collar manually to remove it.
- Remove the four pins and pull the pulley halves apart.
- Make sure the pins and collar are not worn, refit the pins and the collar.

Note
Use two screwdrivers if you have any difficulty.
Be carful not to push the screwdrivers in too far to avoid damage that colud compromise the o-ring seal.

Removing the driven half-pulley bearing

- Check the pulley bearings must be worn or noisy If found, replace it.
- Remove the retainer ring using two flat blade screwdrivers.
- Place the pulley using a support stick.
- Using a hammer and pin, knock the ball bearing out.
- Remove the bearing and the rollers with the specific extractor.

- Place the parts using wood or other suitable tools as shown.

- Use a special tool to suck out the inner bearing.

Inspection the driven fixed half-pulley

Measure the outside diameter of the pulley bushing.

Standard value

Standard diameter : 40.98 ± 0.01 mm

Service limit : 40.93 mm

- Check that the contact between the pulley and the belt is not damaged.
- Check the joint, pins, various pivot points.
- Check the belt contact is consistent.

Inspection the driven sliding half-pulley

- Measure the outside diameter of the pulley bushing.
- Measure the size bushing inside of the front pulley
- Check that the contact between the pulley and the belt is not damaged.
- Check the joint, pins, various pivot points.
- Check the belt contact is consistent.

Standard value

Standard diameter : 41.00 - 41.035 mm

Service limit : 41.08 mm

Inspection the clutch spring

- Measure the length of the spring while the spring is fully extended.

Standard value

Standard diameter : 106 mm

Assembling clutch assembly

- Reassemble the removal process

Removing drive pulley

- Turn the crankshaft until the attachment point position coincides with the special tool, as shown.

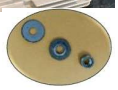
- Use special tools to lock the drive pulley.

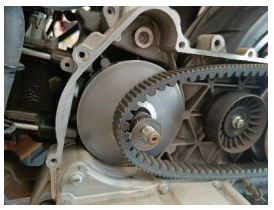
Special tools

TOOLS LAMX-19 : Front pulley nut fixing

- Remove the drive pulley by Loosen the nut.

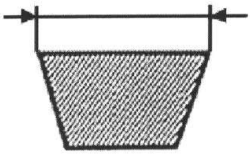
- Remove special tools.
- Remove the nut, washer, drive pulley fixed.





- Remove the washer, drive belt and movable drive pulley.

Drive-Belt inspection

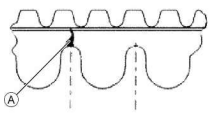


- Check that the belt is not damaged, torn or worn abnormally.
- The belt must have the correct width according to the standard value.

Standard value

Minimum belt width : 22.6 ± 0.2 mm

Service limit : 21.5 ± 0.5 mm



- Check the wear condition of the belt especially visually.
  The belt groove may have cracks as shown. If the belt is found to be worn
  Or there are cracks to replace.

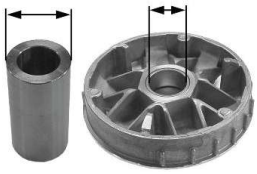
Movable drive pulley inspection

- Check the inside of the pulley slide bush rod must be free of damage.
  or abnormal wear and measure the inner diameter at position A.
- Measure the outer diameter of the bush slide axis at position B as shown in the figure.
- Check that the rollers are not damaged or worn.
- Check the sliding shoes for the ramp plate are not worn.
- Check the wear of the roller housings and of the belt facing surfaces on both pulley halves.

Caution

Do not lubricate or clean sintered bushing

Standard value
Movable drive pulley : 26.010 ± 0.010 mm
Pulley sliding bushing : 24.95 - 25.93 mm
Roller diameter : 19 ± 0.1 mm



Assembling drive pulley
- Reassemble the removal and tightening process with the required torque value.

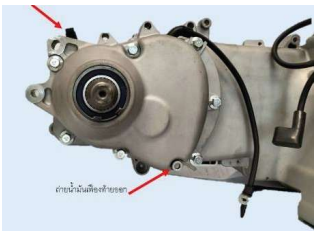
Torque value
Drive pulley nut : 80 ± 2.0 Nm

Assembling the LH cover
- Align the latch and belt cover gasket in position before assembling.
- Replace the belt cover and tighten the screws with the specified torque value.
- Reassemble the removal process
- Insert the pulley mounting nut accordingly, assemble the special tool and tighten with the required torque value.

Torque value
Lh cover bolt : 11 ± 2.0 Nm
Driven pulley nut : 60 ± 2.0 Nm

Transmission set

- Remove transmission gear.



- Loosen the dipstick.
- Drain the transmission oil by loosen the oil drain.

- Loosen 7 bolts as shown.

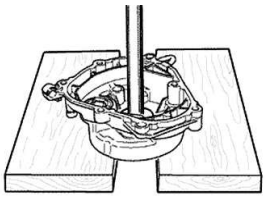
- Remove the transmission housing and gasket.
- Remove the wheel axle and the intermediate gear.
- Remove the drive shaft.

Transmission bearing removal
- Check the condition of the bearings (wear , looseness , noise)
  If abnormalities are found, proceed as follows.
- Use a special tool to pull out 3 bearings
  (3 bearings in the engine crankcase , 2 bearings in the transmission housing).

Remove the wheel axle bearing

- Remove the bearing lock ring from the outside of the transmission housing.

- Support the transmission housing properly to avoid damaging the sealing surface with the crankcase.
- Remove the wheel axle bearing using the special tool.

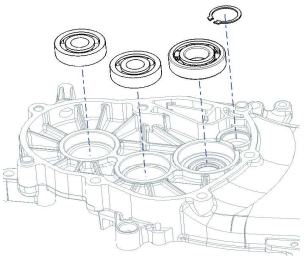


- Place the transmission housing and use a special tool to install the wheel axle bearing and the intermediate gear bearing as shown.

Remove the drive shaft bearing

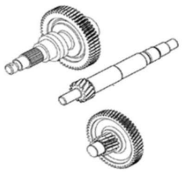
- Remove the drive shaft bearing using the special tool.

- Remove the bearing lock ring from the outside of the crankcase.
- Remove the drive shaft bearing using the special tool.
- Remove the intermediate gear bearing using the special tool.
- Remove the wheel axle bearing using the special tool.



Inspection transmission set

- Check the transmission teeth, bearing surfaces and oil seals for wear.
- Check that the surface is not worn or deformed.
- If worn or damaged parts are found, replace them.



Assembling transmission bearings

Assembling the wheel axle bearing

- Place the transmission housing on the wooden floor.
- Use a hot air gun to blow the bearing socket.
- insert the new bearing using the special tool.
- insert the bearing lock ring.

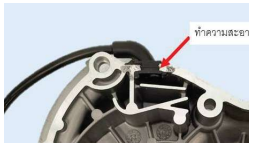
Assembling the intermediate gear bearings

- Support the transmission housing properly to avoid damaging the sealing surface with the crankcase.
- Use a hot air gun to blow the bearing socket.
- insert the new bearing using the special tool.

Assembling the drive shaft bearings

- Use a hot air gun to blow the bearing socket.
- insert the new bearing using the special tool.

Assembling the transmission set



- Reassemble the transmission housing oil line to its original position and install a new gasket. Apply black silicone on the gasket area.
- Assemble the transmission housing, making sure the oil line are in the correct position.
- Insert 7 bolts bolts in the position as shown.
- Tighten to the specifited torque.

Remove the Rh engine cover

- Remove the clip fixing the coolant pipe on the cylinder block.
- Remove the coolant pipe.
- Remove the Rh engine cover by loosen 10 bolts.

- Remove the gasket and spring.

Remove the magneto

- Remove the 2 bolts on the CPS sensor and 3 mounting bolts as shown.
- Remove the magneto and CPS sensor.

Assembling the magneto

- Reverse the disassembly process. Follow Tightening torque of 5 bolts.

Torque value

CPS sensor : 5 Nm
magneto : 10 Nm

Remove the flywheel and the starter motor

Remove the starter motor

- Remove the positive wire on the starter motor.
- Remove 2 bolts and disconnect the ground wire.
- Remove the starter motor.

Remove the flywheel

- Use the flywheel holder to hold the flywheel and loosen nut to remove the flywheel as shown in the picture.

Special tools

TOOLS LAMX-16 : Flywheel holder

- Use the flywheel dis-assembling to remove the flywheel as shown in the picture.

Special tools

TOOLS LAMX-24 : Flywheel dis-assembling

- Remove the flywheel.
- Remove the shaft and the twin gear.

Assembling the flywheel and the starter motor

Install the starter motor

- Install the starter motor with the crankcase.
- Install the ground cable and tighten the bolt with the specified torque value .

Torque value

12 ± 1 Nm

- Install the shaft and the twin gear.

Install the flywheel

- Lubricate the starter gear with engine oil.

- Install the starter gear to the flywheel.

- Use the flywheel holder to install the flywheel tighten torque value.

Torque value

88 ± 2 Nm

Assembling the RH engine cover

Caution

When assembling the RH engine cover, align the marks of water pump shaft and flywheel as shown.

- Install RH engine cover, vice versa, tightening the mounting screws to the specified torque.

Torque value

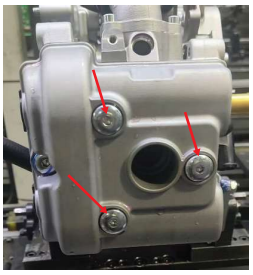
12 ± 1 Nm

Cylinder head system

Remove intake manifold

- Remove the throttle body and injector.
- Remove the intake manifold by loosen 3 bolts.

Remove the cylinder head cover



Remove the cylinder head cover by loosen 3 bolts.

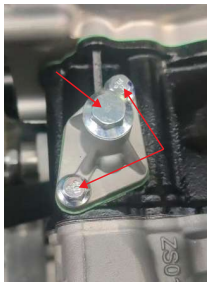
Remove the timing sprocket

- Turning drive pulley to align the mark “T” on the magneto wheel with reference mark on RH engine cover.

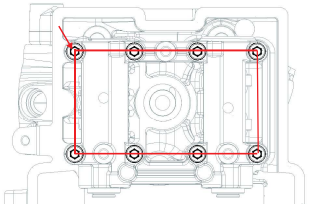
- After securing the sprocket with a timing sprocket.
- The locking pins to ensure the alignment. In this situation, the cams should be positioned outwards.

Caution

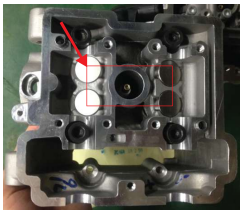
At TDC on the compresion stroke, the bridge orifices should coincide with those of the camshafts.



- Loosen the chain tensioner adjusting bolt.
- Remove the chain tensioner by loosen 2 mounting bolts.



- Remove the IN & EX camshaft bracket by loosen 8 bolts.
- Remove the IN & EX camshaft.



- Remove the valve stem.

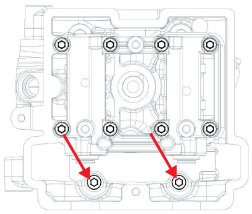
Caution

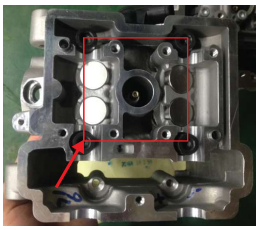
Mark and record the valve lifter and shim locations so they can be reinstalled in their original positions.

If the valve clearance is not within the specified range, first record the clearance, and adjust it.

Remove the cylinder head

- Remove the cylinder head by 2 bolts (M6) and 4 bolts (M8).
- Remove the cylinder head gasket.

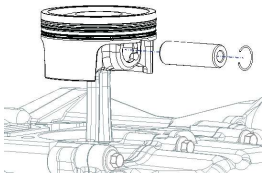




Remove the cylinder and piston

- Remove the chain guide plate.
- Remove the pin.
- Remove the cylinder.

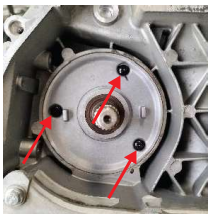
- Remove the piston.
- Remove the piston pin.

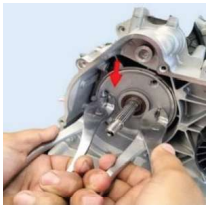


Crankcase and crankshaft

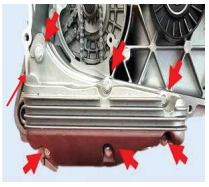
Removing the oil pump.

- Remove the oil chian cover by loosen 3 bolts.



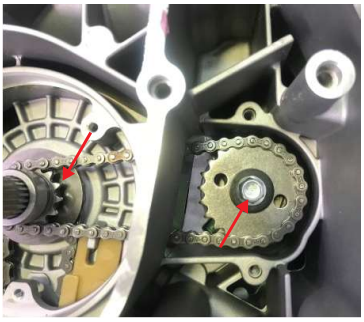


- Remove the engine oil pan by loosen 7 bolt.
- Remove the engine oil pan gasket.

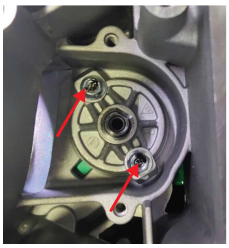


- Remove the oil pressure relief valve.

- Remove the oil pump cover by loosen 2 bolts.
- Remove the oil pump sprocket by loosen a bolt.



- Remove the oil chain.
- Remove the specer and O-ring.



- Remove the oil pump by loosen 2 bolts.
- Remove the oil pump gasket.

Inspection the engine oil pump

- Assemble the rotor with the pump housing. Use a feeler gauge to measure the value as shown in the picture.

Standard value
Rotor shaft clearance : 0.09 mm
Distance from outside rotor to pump housing : 0.20 mm

- Use the angle line to place on the pump as shown. Measure the distance between plane of the rotor and pump housing.

Standard value
Plane clearance of rotor to pump housing : 0.12 mm

Inspection the timing system

- Check the chain guide, timing chain, and chain tensioner pad to make sure they are not worn.
- Check the condition of the sprocket teeth to see if they are not worn.
- If it is found that the parts are worn, replace them with new ones.
  If found either the timing chain or camshaft sprocket worn, replace all parts together.

Inspection the timing system

- Remove the screw from the center of the chain tensioner and inspect the movement mechanism of the chain tensioner. If any wear is detected, replace it.

Inspection of valve spring seats and valve cotter

- Check both valve spring seats and valve cotter for wear or abnormal conditions.
  If worn parts are found, replace them.
- The inspection is performed when disassembly valve.

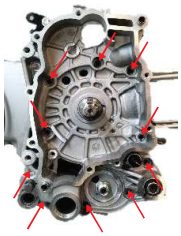
Inspection the oil pressure relief valve

- Check the parts for abnormal wear.
- If parts are worn or values are out of standard, replace them.
- Check the length of the spring.

Standard value

Standard length of spring : 54.0 ± 0.2 mm
Service limit : 52 mm

Removing the crankcase



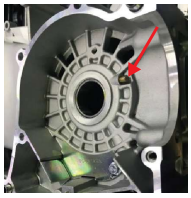
- Remove the 10 crankshaft coupling screws.
- Separate the crankcase while keeping the crankshaft in one of the two halves of the crankcase.
- Remove the half crankcase.

- Remove the gasket.
- Remove the oil strainer seal.
- Check clearance of crankshaft and connecting rod.
- Check the size on the small end on the connecting rod.
- Check the inside surface of the main bearing.
- The main bearing are comprised of two half bearings, one with holes and channels for lubrication whereas the other is solid.
- Check crankshaft bearing diameter.
- Check inner diameter of main bearing.

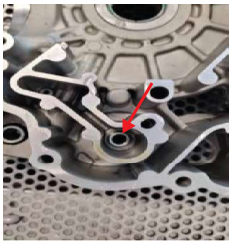
Caution

- The old crankshaft can still be used. If it is within the specified standard value.
- When disassemble the engine crankcase, be careful not to damage the surface of main bearings by the crankshaft groove.

Inspection of crankcase



- To clean the engine crankcase , oil nozzle.
- Be careful when handling other components such as oil pipe , bypass pipe , bushing , oil spray on the left engine crankcase to prevent damage.



- Check the parts to make sure they are not broken or damaged.
  The contact surfaces of the engine crankcase on both sides must not be damaged.

- Check and measure the various parts that are within the specified values.

Assembling the crankcase

- The assembly process reverses the disassembly process.
- Cleaning contact surface of both side of crankcase.
- Replace the new crankcase gasket.
- Place the gasket so that the holes align with where the screws are inserted.
- Assemble both sides of the engine crankcase together .
- Insert the bolts and tighten it to the specified torque.

Torque value

- Cover plate fixing screw : 5 ± 1 Nm
- Screw fixing the dampen plate inside the engine crankcase : 11 ± 1 Nm
- Oil drain plug : 30 ± 3 Nm
- Oil filter : 27 ± 3 Nm

Assembling the oil pump.

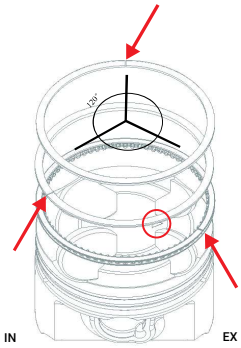
- The assembly process reverses the disassembly process.
- Check the rotor and pump housing for wear.
- Make sure the cover is not scratched.
- If worn or scratched parts are found, replace them.
- Assemble in reverse according to the disassembly procedure.
- Tighten the fixing screws with the specified torque.

Note

Make sure the gasket is positioned properly as shown in the picture.

Assembling the cylinder and piston

- The assembly process reverses the disassembly process.
- Replace the new crankcase gasket.
- Point the arrow mark of the piston towards the exhaust side.
- Insert the ring with the “TOP” mark facing upwards and align each ring gap 120 degrees apart.
- Lubricate with oil while assemble.
- Top ring with L - shaped cross section.
- Use a piston ring compressor tool to install the cylinder block.

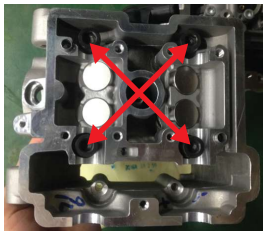


Note

Before assemble the cylinder block, use compressed air to clean the dirt in the oil passages of the cylinder block.

Assembling the cylinder head

- The assembly process reverses the disassembly process.
- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Tighten up the nuts to an initial pre-torque of 15 N.m
- Tighten up the nuts to a second pre-torque of 27 N.m
- Rotate by an angle of 90°.
- To carry out the operations described above, follow the tightening sequence in the figure.



Excessive engine oil consumption / smoke from the exhaust pipe	
Causes	Inspection and remedy
Incorrect valve clearance	Check and adjust the valve clearance to meet the standard values.
Damaged valve , worn valve seat ?	Replace cylinder head , valves / grind valves
Cylinder - worn pistons , damaged or broken piston rings	Replace cylinder , piston , piston ring
Piston rings wear out , in the wrong position	Check the piston ring position and correct it. / change
Engine oil leaking from different gaskets or seals other	Check for leaks and replace with new gaskets or seals.
valve stem seal is damaged	Replace new valve stem seals
Tube valve wear	inspect , replace cylinder head
Low oil pressure	
Causes	Inspection and remedy
Pressure relief valve stuck open	Check the operation of the relief valve , clean the relevant parts or
	replace the valve with a new one.
The oil pump has too much clearance.	Check and measure the size of the oil pump parts or replace
	them.
Filter clogged	change oil filter
Low engine oil level	Fill the engine oil to the specified level. by using engine oil of the
	specified standard grade
Transmission and braking system	
inefficiency of transmission or clutch slipping .	
Causes	Inspection and remedy
The clutch or malfunction of the clutch system.	Inspect the clutch lining - the clutch outer must not have
	grease between the contact surfaces and all 3 parts of the
	clutch lining should be evenly worn. together
	Inspect the clutch outer. It must not be distorted, deformed or
	abnormally worn .
The braking system is not working efficiently.	
Causes	Inspection and remedy
The braking system is not working efficiently.	Check the brake pads (must be 1.5 mm thick) , disc brakes
	must not
	Check the brake fluid level in the brake pump or replace it with
	new brake fluid. There must be no air in the brake system.
	If there is, bleed air from the system.
	Check that the movement of the brake caliper must be level
	with the brake disc.
The brake fluid in the system is leaking.	Check for leaks and fix or replace parts.
The disc brake is loose or the disc brake is faulty .	Check the brake system fixing screws. Use the dial gauge to
	measure the smoothness of the disc by rotating the wheel shaft
	until it completes. If the plate is crooked, replace it.
Burnt brake-pads	
Causes	Inspection and remedy
Stuck brake piston	Check the caliper - piston. replace defective parts
Loose disc brake or disc brake	Check the brake system fixing screws. Use the dial gauge to
	measure the smoothness of the disc by rotating the wheel shaft
	until it completes. If the plate is c , replace it with a new one.
The hole in which the brake master cylinder is clogged.	Use air to clean with care.
Brake shoes are swollen or jammed.	Change brake rubber
The steering system is difficult / stiff.	
Causes	Inspection and remedy
Difficult to steer	Check tightness – Adjust the nut, fix the upper and lower neck
	bearings , check the bearings and bearing rails. If found to be
	damaged, replace it with a new one.

The steering system is loose.	
Causes	Inspection and remedy
Incorrect torque value	Check the tightness of the bolts, fix the upper and lower necks,
	adjust the correct settings , check the bearings and bearing rails.
	If it is found to be damaged, replace it with a new one.
	The weight support system is noisy.
Causes	Inspection and remedy
there is noise	Check the operation of the shock absorber , mounting bolts ,
	bushings Check the torque value Shock absorber mounting bolts
	, wheels , calipers , discs and neck axis
The weight support system is leaking oil.	
Causes	Inspection and remedy
Damaged fork seals damaged	Change new shock absorbers. Verify that the fork cover is not
	damaged and The anchor point is in the correct position.
Can't start	
Causes	Inspection and remedy
Problems that the ECU can detect	RELAY PUMP , COIL , INJECTOR , RPM SENSOR
Fuel system	Fuel , fuel pump operation Fuel pressure (low), dirty injectors - ton
Fire into the spark plug	Coil wire insulation
Parameter value	Engine temperature , timing settings , injector settings while starting air
	temperature
Compressive strength	Check compression
	Hard to start
Problems that the ECU can detect	Pump relay , coil , injector , engine speed sensor , air temperature sensor
	engine temperature
speed at startup	Starter motor , relay , battery , ground terminal
compression	Check the compression
Spark plug	Spark plugs , coil wires , ignition coils , rpm sensors , ignition advance
	degrees
Fuel system	Fuel pressure (low) , dirty injectors - clogged , leaking injector seals.
Check the parameters.	Engine temperature , Air temperature , Idle control motor opening time ,
	Clean throttle body , Air filter
The engine cannot idle / does not idle smoothly / rpm drops / stall while idling	
Causes	Inspection and remedy
Problems that the ECU can detect	Pump relay , coil , injector , engine speed sensor , air temperature sensor
-	engine temperature
Performance of the ignition system	Spark plug , ignition angle
Check the parameters.	Throttle position sensor , air temperature sensor - engine temperature
Intake Air Cleanliness	Air filter , throttle body , idle control valve
intake valve leak	Intake pipe neck , throttle body , air filter , air pipe
low fuel pressure	Fuel pump , regulator , fuel filter , injector
Engine does not slow down to idle / high idle rpm	
Causes	Inspection and remedy
Problems that the ECU can detect	Relay pump , coil , injector , engine speed sensor , air temperature sensor
	engine temperature
ignition system	ignition timing degree
Check the parameters.	Throttle position sensor Air temperature sensor - machine temperature
intake valve	leak Intake pipe neck , throttle body , air filter , air pipe
low fuel pressure	Fuel pump , regulator , fuel filter , injector
Engine backfire while decelerating	
Causes	Inspection and remedy
Problems that the ECU can detect	Pump relay , coil , injector Engine speed sensor , air temperature sensor -
	machine temperature , oxygen sensor
Check the parameters	Throttle position sensor , air temperature sensor - engine temperature
intake valve leak	intake manifold , throttle body , air filter , air pipe
low fuel pressure	Fuel pump , Regulator , Fuel filter , Injector
exhaust leak	Exhaust manifold , Exhaust manifold - welding seam

The engine has no power while gradually accelerating / the engine rpm is abnormal.	
Causes	Inspection and remedy
Dirty intake system	Clogged air filter , dirty throttle body
Intake valve leak	Air filter , air duct connection point
Ignition system	spark plug wear
Throttle opening	Change the throttle
Check the parameters.	engine temperature , air temperature , throttle position , ignition advance
	degree
Problems that the ECU can detect	Coil , nozzle , engine speed sensor , air temperature sensor - engine
	temperature , oxygen sensor
The engine has no power while accelerating / There is no power when twisting the throttle fully.	
Causes	Inspection and remedy
Problems that the ECU can detect	Relay pump , coil , injector , engine speed sensor , air temperature sensor
	engine temperature , oxygen sensor
Spark plug	Spark plugs , coil wires , ignition coils
Intake system	Air filter , leaking air filter , leaking intake system
Check the parameters	Engine temperature , air temperature , throttle position , ignition advance
	degree
Fuel system	Fuel level , fuel pressure , fuel filter , injector
Engine misfire	
Causes	Inspection and remedy
Problems that the ECU can detect	Pump relay , coil , injector Engine speed sensor , air temperature sensor -
	engine temperature , oxygen sensor
Ignition system	Spark plug
Check the parameters.	Throttle position , engine temperature , air temperature , ignition advance
	Intake leak Air filter , air pipe connection point
Throttle opening	Change the throttle
Fuel system	fuel pressure , fuel filter , injector , fuel quality
Cylinder block gasket	Engine gasket thickness

Components/systems	Fault type	Fault code	Check the strategy description	Anomaly criteria
Fuel injector	max	P0262	Circuit check	Cylinder 1 Injector Circuit High
	min	P0261		Cylinder 1 Injector Circuit Low
	sig	P0201		Injector Circuit / open Cylinder 1
Fuel injector	max	P0265	Circuit check	Cylinder 2 Injector Circuit High
	min	P0264		Cylinder 2 Injector Circuit Low
	sig	P0202		Injector Circuit/open Cylinder
Fuel pump	max	P0629	Circuit check	Fuel Pump "A" Control Circuit High
	min	P0628		Fuel Pump "A" Control Circuit Low
	sig	P0627		Fuel Pump "A" Control Circuit / open
Cooling Fan	max	P0629	Circuit check	Fan 1 Control Circuit High
	min	P0691		Fan 1 Control Circuit Low
	sig	P0480		Fan 1 Control Circuit
Idle air control system	max	P0509	Circuit check	Idle Air Control System Circuit High
	min	P0508		Idle Air Control System Circuit Low
	sig	P0511		Idle Air Control Circuit
Ignition Coil	min	P2300	Circuit check	Ignition Coil "A" Primary Control Circuit Low
Ignition Coil	min	P2303	Circuit check	Ignition Coil "B" Primary Control Circuit Low
MIL	max min sig	PO650	Circuit check	Malfunction Indication Lamp (MIL) Control circuit
DUMP Sensor	max	P1099	Circuit check	Short to battery plus
	min	P1098		Short to ground
second air system valve power stage	max	P0415	Circuit check	Secondary Air Injection System Switching Valve "B" circuit
	min	P0414		
	sig	P0413		Secondary Air Injection System Switching Valve "A" circuit Shorted
	npl	P0411		Incorrect Flow Detected Secondary Air Injection System Incorrect Flow Detected
Engine speed sensor	sig	P0322	Synchronization didn't take place by some certain phase sensor signals has been detected	Ignition / Distributor Engine Speed Input Circuit No Signal
Idle speed control	max	P0507	actuator blocked at higher position	Idle air Control System RPM Higher Than Expected
	min	P0506	actuator blocked at higher position	Idle air Control System RPM Lower Than Expected
Intake air temperature	max	P0113	Option 1 : The voltage value of intake manifold temperature sensor is above the permissible upper threshold Option 2 : Jitter Check	Intake Air Temperature Sensor 1 Circuit High
	min	P0112	The voltage value of intake manifold temperature sensor is below the permissible lower threshold Option 1 : intake manifold temperature exceeds plausible threshold	Intake Air Temperature Sensor 1 Circuit Low
	npl	P0111	Option 2 : intake manifold temperature is stuck Option 3 : intake manifold temperature exceeds plausible threshold	Intake Air Temperature Sensor 1Circuit Range / performance

Components/Systems	Fault type	Fault code	Check the strategy description.	Anomaly criteria
Engine coolant temperature	max	P0118	Signal-voltage of the coolant temperature sensor lies above the permissible maximum threshold	Engine Coolant Temperature Temperature Sensor 1 Circuit High
	min	P0117	Option 1 : Signal-voltage of the coolant temperature sensor lies below the permissible minimum threshold Option 2 : coolant temperature constantly lies below the threshold	Engine Coolant Temperature Sensor 1 Circuit Low
	npl	P0116	Jitter Check	Engine Coolant Temperature Sensor 1 Circuit Range / Performance
System voltage (onboard)	max	P0563	rationality check max limit exceed	System Voltage High
	min	P0562	rationality check max limit exceed	System Voltage Low
	npl	P0560	implausibility check	System Voltage
Vehicle speed	sig	P0501	Option 1 : lower limit exceeded during fuel cut off	Vehicle Speed Sensor "A" Range / performance
			Option 2 : vehicle speed is absolutely constant (stuck)	
			Option 3 : vehicle speed sensor pulse non plausible	
Throttle position sensor	max	P0123	Circuit check, max limit exceeds	Throttle / Pedal Position Sensor / Switch "A" Circuit High
	min	P0122	Circuit check, max limit exceeds	Throttle / Pedal Position Sensor / Switch "A" Circuit Low
Fuel system cy1.1	max	P2177	fuel trim high limits exceded	System Too Lean Off Idle
	min	P2178	fuel trim high limits exceded	System Too Rich Off Idle
Fuel system cy1.2	max	P2179	fuel trim high limits exceded	System Too Lean Off Idle
	min	P2180	fuel trim high limits exceded	System Too Rich Off Idle
Misfire cy1.0	max	P0301	misfire rate that harmful to catlyst (mx fault)	Cylinder 1 Misfire Detected
	min		misfire rate that deteriorate emission (mn fault)	
	npl		implausible fault	
Misfire cy2.0	max	P0302	misfire rate that harmful to catlyst (mx fault)	Cylinder 2 Misfire Detected
	min		misfire rate that deteriorate emission (mn fault)	
	npl		implausible fault	
O2 sensor heater (Bank1)	max	P0032	Circuit check	HO2S Heater Control Circuit High
	min	P0031		HO2S Heater Control Circuit Low
	npl	P0030		HO2S Heater Control Circuit
	npl	P0053	current sensor resistance is greater than threshold value	HO2S Heater Resistance
O2 sensor heater (Bank2)	max	P0052	Circuit check	HO2S Heater Control Circuit High
	min	P0051		HO2S Heater Control Circuit Low
	npl	P0050		HO2S Heater Control Circuit
	npl	P0059	current sensor resistance is greater than threshold value	HO2S Heater Resistance
O2 sensor slow response (Bank1)	max	P0133	filtered cycle delay time of sensor signal upstream cat.is greater than threshold value	O2 sensor Circuit Slow Response
O2 sensor slow response (Bank2)	max	P0153	filtered cycle delay time of sensor signal upstream cat.is greater than threshold value	O2 sensor Circuit Slow Response

Components/Systems	Fault type	Fault code	Check the strategy description.	Anomaly criteria
O2 sensor (Bank1)	max	P0132	O2 sensor circuit High Voltage	O2 sensor circuit High Voltage
	min	P0131	O2 sensor circuit Low Voltage	O2 sensor circuit Low Voltage
	sig	P0134	O2 sensor circuit No activity detected	O2 sensor circuit No activity detected
	npl	P0130	O2 sensor Voltage has a restricted amplitude Signal	O2 sensor circuit
			Sensor Voltage current has leakage to UB	
			O2 Sensor Voltage coupled with heater line	
O2 sensor (Bank2)	max	P0152	O2 sensor circuit High Voltage	O2 sensor circuit High Voltage
	min	P0151	O2 sensor circuit Low Voltage	O2 sensor circuit Low Voltage
	sig	P0154	O2 sensor circuit No activity detected	O2 sensor circuit No activity detected
	npl	P0150	Sensor res. Is high when exgaust Temperature high	O2 sensor circuit
			O2 sensor Voltage has a restricted amplitude Signal Sensor Voltage current has leakage to UB	
			O2 Sensor Voltage coupled with heater line	
Evaporativac Emixsson system purge contri valve	max	P0459	Circuit check	Evaporative Emission System Purge Control Valve Circuit Low
	min	P0458		Evaporative Emission System Purge Control Valve Circuit High
	sig	P0444		Evaporative Emission System Purge Control Valve Circuit Open
	Npl	P0441	Incorrect Purge Flow	engine speed jump exceed threshold due to evaprative purge valve open or close
Manifold absolute pressure	max	P0108	Circuit check, max limit exceeds	Manifold Absolute Pressure / Barometric Pressure Circuit High
	min	P0107	Circuit check, min limit exceeds	Manifold Absolute Pressure / Barometric Pressure Circuit Low
	Si	P0105	signal check : no pressure drop after start	Manifold Absolute Pressure / Barometric Pressure Circuit
	Npl	P0106	signal non plausible	Manifold Absolute Pressure / Barometric Pressure Circuit Range / Performance