



TY250T-6E

SERVICE MANUAL



Foreword

This service manual contains the technical data of each component inspection and repair for the TY250T-6E motorcycle. The manual is shown with illustrations and focused on "Service Procedures", "Operation Key Points", and "Inspection Adjustment" so that provides technician with service guidelines.

If the style and construction of the motorcycle, TY250T-6E, are different from that of the photos, pictures shown in this manual, the actual vehicle shall prevail. Specifications are subject to change without notice.

Zhejiang Tianying Locomotive Co., Ltd.

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I. General information

01-Main technical parameters:

Item	Technical parameters
Engine model	1P72MM
Engine type	Water-cooled four-stroke engine
Transmission ratio	18.291~5.801
Compression ratio	11.5:1
Bore diameter × stroke mm	72×60
Working volume	244cm ³ (Calculated: 244.2cm ³)
Clutch type	CVT
Lubrication method	Pressure splash type
Idling r/min	1700±150
Crankcase lubricating oil volume L	1.35
Lubricant grade	SL 5W/40(winter),SL 10W/40(summer)
Ignition method	ECU
transmission case oil volume L	0.15
Gear oil grade	SAE 80W/90
Fuse	15 A
Spark plug specifications	CR8E
Spark plug gap	0.7~0.8mm

02-Cooling system specifications:

Item		Technical parameters
Coolant capacity	Radiators and engines	0.45~0.47 L
	Water tank	/
Radiator cap relief pressure		(98~110)kpa
Thermostat	Start to turn on the temperature	(80~84)°C
	Full open temperature	(90~94)°C
	Valve lift	7mm
Coolant recommended		Alcohol-free, silicate-free coolant
Standard coolant concentration		Mix 1:1 with distilled water

03-Lubrication system specifications:

unit: mm

Item		Standard value	Maintenance threshold
Engine oil capacity	change engine oil	1.35L	-
	after removing the engine	1.5L	-
80W-90 Gear Oil	change gear oil	0.15 L	-
	after removing the engine	0.2 L	-
Recommended engine oil		Recommended engine oil: SL 5W/40(winter),SL 10W/40(summer) API Quality Grade: SG or higher (do not use oils marked as energy efficient on the circular API service label)	-
Engine oil pump rotor	Tip clearance	Not more than 0.15 (between inner and outer rotors)	0.16
	Intermediate gap	0.016~0.074 (inner rotor hole and shaft)	0.084
	Gap on both sides	0.06 to 0.12 (up and down direction)	0.13

04-Crankshaft, piston and cylinder specifications:

unit: mm

Item			Standard value	Maintenance threshold
Crankshaft	Large end side clearance of connecting rod		0.10~0.35	0.45
	Clearance between connecting rod big end bearing bush and crank pin		0.097~0.127	0.07
	Beat		-	0.05
Cylinder block	Bore		52.400~52.410	52.500
	Out-of-roundness		-	0.05
	Taper		-	0.05
	Flatness		-	0.05
Pistons, Piston Pins, Piston Rings	Piston base circle diameter		52.370~52.390	52.30
	Pin hole diameter		15.002~15.008	15.04
	Piston pin diameter		14.994~15.000	14.96
	Piston to Piston Pin Clearance		0.002~0.014	0.02
	Piston ring closed gap	First ring	0.10~0.30	0.35
		Second ring	0.20~0.40	0.45
		Oil ring (scraper ring)	0.20~0.70	0.9
	Piston ring and ring groove clearance	Clearance between first ring and groove	0.020~0.060	/
		Gap between second ring and groove	0.020~0.060	/
Cylinder clearance			0.010~0.045	0.10
Inner diameter of connecting rod small end			15.016~15.034	15.06
Fitting clearance between connecting rod and pin			0.016~0.040	0.06

05-Cylinder head and valve specifications:

unit: mm

Item			Standard value	Maintenance threshold
Electric start cylinder pressure			(800~1200)kPa	-
Valve clearance		Intake valve	0.08~0.12	-
		Exhaust valve	0.12~0.16	-
Rocker arm, rocker arm shaft	Rocker arm inner diameter	Intake/exhaust	10~10.015	10.10
	Rocker bearing outer diameter	Intake/exhaust	9.972~9.987	9.91
	Rocker arm and bearing	Intake/exhaust	-0.012~-0.032	-0.008
	Gap	Intake/exhaust	10.013~10.031	10.041
	Rocker bearing inner diameter	Intake/exhaust	9.978~9.988	9.962
	rocker shaft outer diameter	Intake/exhaust	0.026~0.059	0.079
Camshaft	Camshaft hull height	Intake	29.435~29.555	29.39
		Exhaust	29.140~29.260	29.10
	Bearing and bore clearance		0.002~0.026	0.036
	Beat		-	-
Valve/vale catheter	Valve stem diameter	Intake	4.975~4.99	4.965
		Exhaust	4.955~4.97	4.945
	Valve guide inner diameter	Intake/exhaust	5~5.012	5.022
	Valve stem to valveduct gap	Intake	0.01~0.037	0.057
		Exhaust	0.03~0.057	0.077
	Catheter height (leakage)	Intake/exhaust	10.8~11.2	-
Valve spring free length		Outside the spring	38.0	37.0
		inner spring	35.5	34.5
Cylinder head flatness			0.05	0.05

06-Torque values:

The torque values listed in below are for more important tightening torque values. Please see standard values for those not listed in the table.

Standard torque values for reference

Type	Tighten torque	Type	Tighten torque
5 mm bolt、nut	0.45~0.6kgf.m	5 mm screw	0.35~0.5kgf.m
6 mm bolt、nut	0.8~1.2kgf.m	6 mm screw、SH nut	0.7~ 1.1kgf.m
8 mm bolt、nut	1.8~2.5kgf.m	6 mm bolt、nut	1.0 ~1.4kgf.m
10 mm bolt、nut	3.0~4.0kgf.m	8 mm bolt、nut	2.4 ~3.0kgf.m
12 mm bolt、nut	5.0~6.0kgf.m	10 mm bolt、nut	3.5~4.5kgf.m

Engine torque value (regular maintenance)

Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Spark plug	1	10	12~15	
Valve cover	1	30	20~25	Strainer cover
Sealing plug	1	12	25~30	Crankcase oil drain bolt
Transmission case oil drain bolt	1	8	18~22	With gasket
Transmission case refueling bolt	1	8	18~22	With gasket

Cooling system

Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Radiator guard bolts	3	6	8~12	
Radiator bolts	4	6	8~12	
Radiator bracket clip nut	3	6	8~12	
Radiator bracket self-tapping screws	3	4.8	2~3	
Dust cover bolts	1	6	8~12	
Auxiliary water tank protection plate and auxiliary water tank screws	3	5	Hand tighten	
Fastening bolts for the outer cover of the breathing tank	3	6	8~12	
Water pump mounting bolts	3	6	8~12	
Fan mounting bolts	3	6	7~9	Apply 1262 thread glue

Tee pipe bolts	2	6	8~12	
Thermostat mounting bolts	2	6	8~12	
Engine sensor	1	12	14~15	Water temperature sensor

Cylinder head and valve

Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Cylinder head nut	4	8	28~32	Oil on the nut end
Camshaft flapper bolt	1	6	8~12	
Valve rocker shaft bolt	2	5	5~9	
Oil and gas separation plate screw	4	ST4.2	2~3	
Cylinder head bolts	4	6	8~12	
Cylinder head cover see oil bolt	1	5	8~12	
Tensioner adjusting bolt	1	6	Hand tighten	
Cylinder connecting bolt	2	6	8~12	

Belt combination

Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Main drive pulley tightening nut	1	14	63~77	Auxiliary tooling required
Driven pulley tightening nut	1	12	43~53	Auxiliary tooling required
Left crankcase cover bolts	10	6	8~12	

Magneto

Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Magneto rotor bolts	1	12	80~90	Apply 1262 thread glue
Magneto stator bolts	3	6	18~12	
Hall sensor bolt	1	6	7~9	Apply 1262 thread glue
Trigger fixing bolt	2	6	8~12	
Clamping plate bolts	2	6	8~12	
Right crankcase cover bolts	10	6	8~12	

Case and transmission system

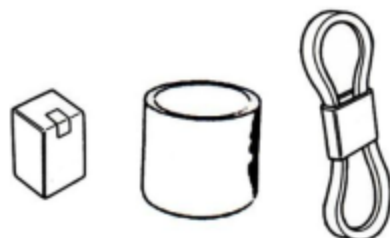
Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Crankcase bolts	10	6	8~12	
Crankcase positioning stud	4	6	8~12	
Transmission case bolts	7	8	18~22	
Pin lock nut	1	8	18~22	transmission case brake drum locating pin
Rear brake camshaft limit bolt	1	6	8~12	Rear brake arm
Press pin body tightening bolt	1	6	8~12	Timing chain limit plate fastening
Fastening bolt for speed sensor	1	6	8~12	
Speed sensor protection board, lower	2	6	Hand tighten	

Crankshaft, piston,cylinder

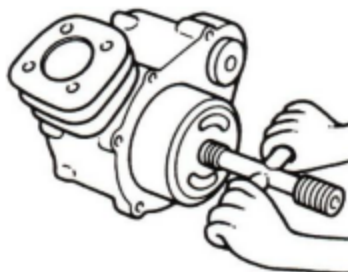
Item	Quantity	Thread diameter mm	Torque value N.m	Remark
Drain bolt	1	6	12	Drain port on cylinder block

07-Service precautions:

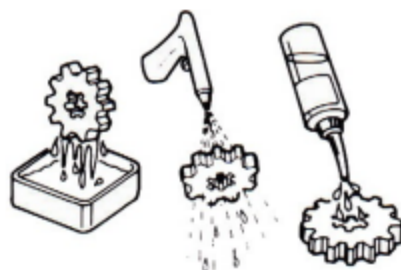
- Always use genuine parts and recommended oil. Using improper parts may cause damage to or destruction of the vehicle.



- Special tools are designed for removal and installation of component parts without damaging them. Using wrong tools may result in parts damage.



- When servicing this vehicle, use only metric tools. Metric bolts, nuts, and screws are not interchangeable with the Britain system, using wrong tools and fasteners may damage this vehicle.
- Clean the outside of the parts or the cover before removing it from the vehicle. Otherwise, dirt and deposit accumulated on the part's surface may fall into the engine, chassis, or brake system to cause damage.
- Wash and clean parts with high flash point solvent, and then blow dry with compressed air. Pay special attention to O-rings or oil seals because most of the cleaning agents have bad effect on them.

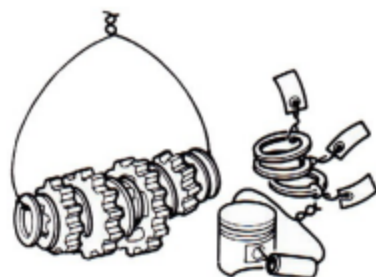


- Never bend or twist control cables to avoid unsmooth control and premature worn out.



- Rubber parts may become deteriorated when old, and be damaged by solvent and oil easily. Check these parts before installation to make sure that they are in good condition, replace if necessary.
- When loosening a component which has different sized fasteners, operate with a diagonal pattern and work from inside out. Loosen the small fasteners first. If the bigger ones are loosen first, small fasteners may receive too much stress.

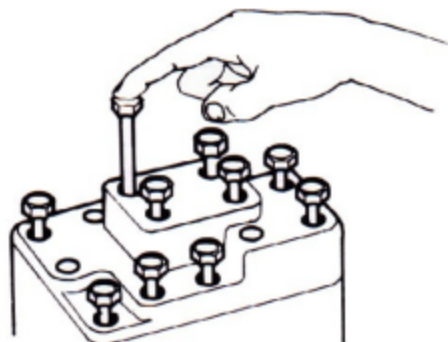
- Store complex components such as transmission parts in the proper assemble order and tie them together with a wire for ease of installation later.



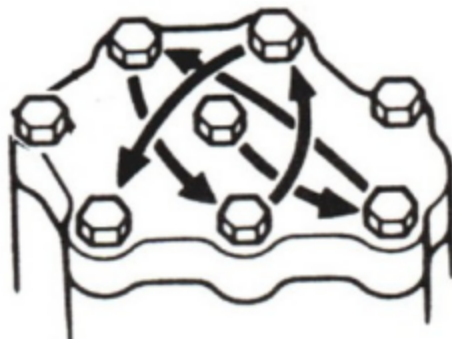
- Note the reassemble position of the important components before disassembling them to ensure they will be reassembled in correct dimensions (depth, distance or position).
- Components not to be reused should be replaced when disassembled including gaskets metal seal rings, O-rings, oil seals, snap rings, and split pins.



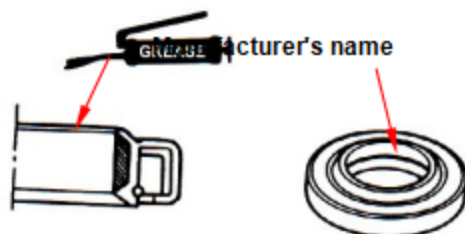
- The length of bolts and screws for assemblies, cover plates or boxes is different from one another, be sure they are correctly installed. In case of confusion, Insert the bolt into the hole to compare its length with other bolts, if its length out side the hole is the same with other bolts, it is a correct bolt. Bolts for the same assembly should have the same length.



- Tighten assemblies with different dimension fasteners as follows: Tighten all the fasteners with fingers, then tighten the big ones with special tool first diagonally from inside toward outside, important components should be tightened 2 to 3 times with appropriate increments to avoid warp unless otherwise indicated. Bolts and fasteners should be kept clean and dry. Do not apply oil to the threads.



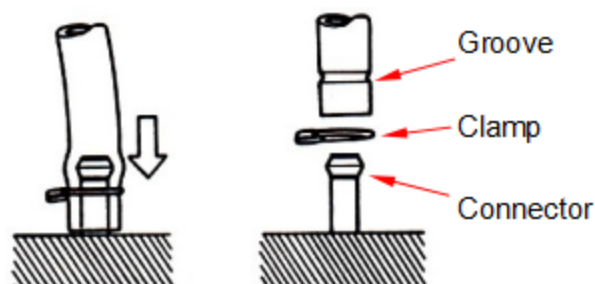
- When oil seal is installed, fill the groove with grease, install the oil seal with the name of the manufacturer facing outside, and check the shaft on which the oil seal is to be installed for smoothness and for burrs that may damage the oil seal.



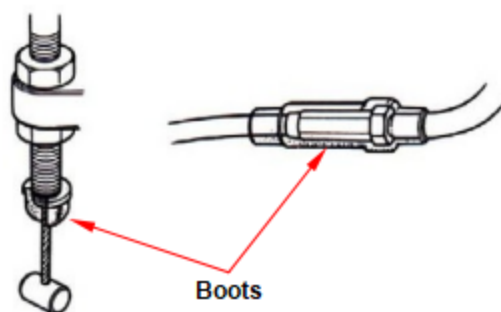
- Remove residues of the old gasket or sealant before reinstallation, grind with a grindstone if the contact surface has any damage.



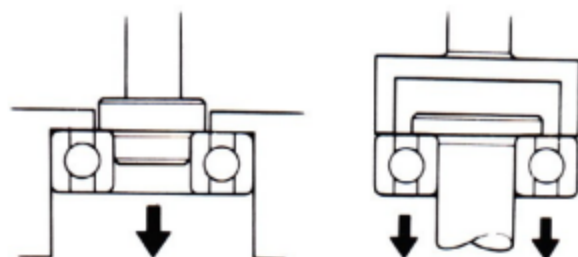
- The ends of rubber hoses (for fuel, vacuum, or coolant) should be pushed as far as they can go to their connections so that there is enough room below the enlarged ends for tightening the clamps.



- Rubber and plastic boots should be properly reinstalled to the original correct positions as designed.

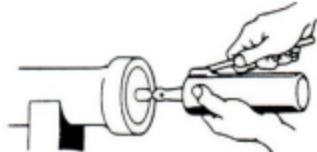


- The tool should be pressed against two (inner and outer) bearing races when removing a ball bearing. Damage may result if the tool is pressed against only one race (either inner race or outer race). In this case, the bearing should be replaced. To avoid damaging the bearing, use equal force on both races.



Both of these examples can result in bearing damage.

- Lubricate the rotation face with specified lubricant on the lubrication points before assembling.



- Check if positions and operation for installed parts is in correct and properly.



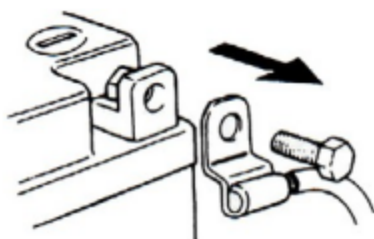
- Make sure service safety each other when conducting by two persons.



- Note that do not let parts fall down.

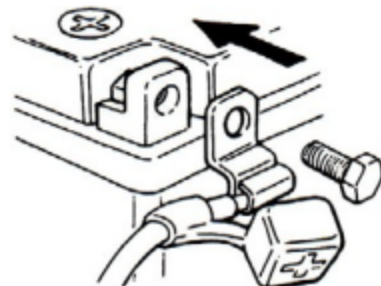


- Before battery removal operation, it has to remove the battery negative (-) cable firstly. Notre tools like open-end wrench do not contact with body to prevent from circuit short and create spark.

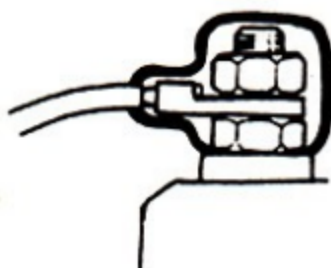


- After service completed, make sure all connection points is secured. Battery positive (+) cable should be connected firstly

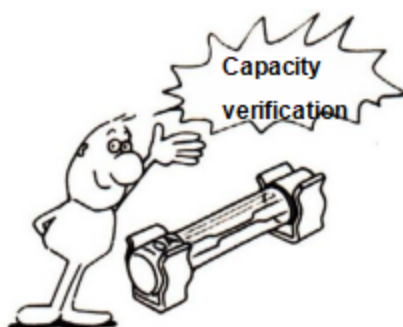
- And the two posts of battery have to be greased after connected the cables.



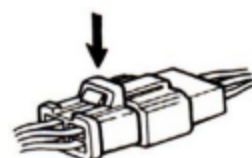
- Make sure that the battery post caps are located in properly after the battery posts had been serviced.



- If fuse burned, it has to find out the cause and solved it. And then replace with specified capacity fuse.



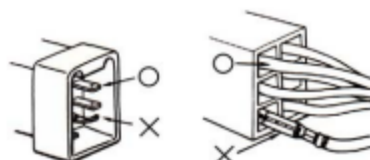
- When separating a connector, it locker has to be unlocked firstly; Then, conduct the service operation.



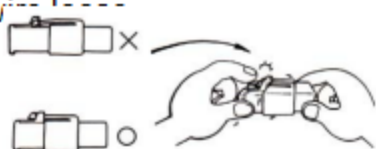
- Do not pull the wires as removing a connector or wires; Hold the connector body.



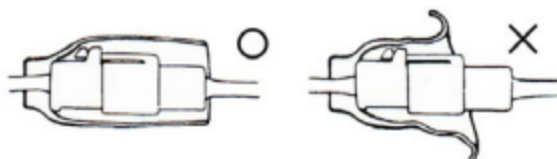
- Make sure if the connector pins are bent, extruded or loosen.



- Insert the connector completely. If there are two lockers on two connector sides, make sure the lockers are locked in properly. Check if any wires are loose.



- Check if the connector is covered by the twin connector boot completely and secured properly.



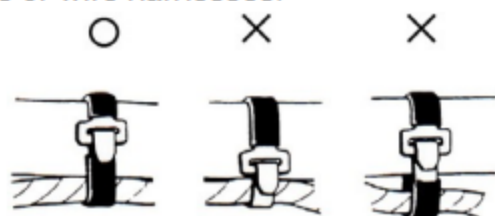
- Before terminal connection, check if the boot is cracked or the terminal is loose.



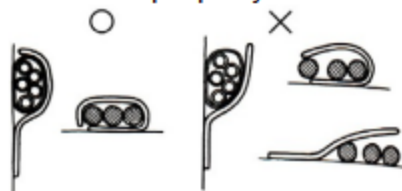
- Insert the terminal completely. Check if the terminal is covered by the boot. Do not let boot open facing up.



- Secure wires and wire harnesses to the frame with respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.



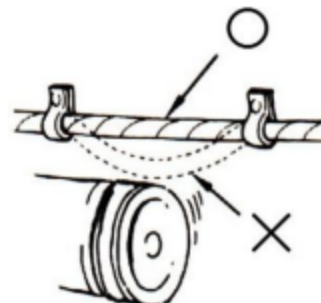
- Wire band and wire harness have to be clamped secured properly.



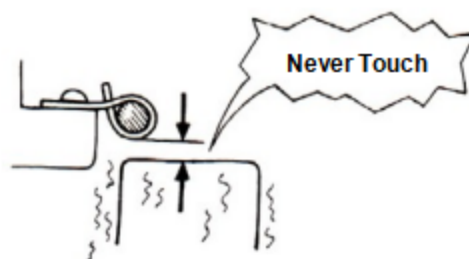
- Do not squeeze wires against the weld or its clamp.



- Do not let the wire harness contact with rotating, moving or vibrating components as routing the harness.



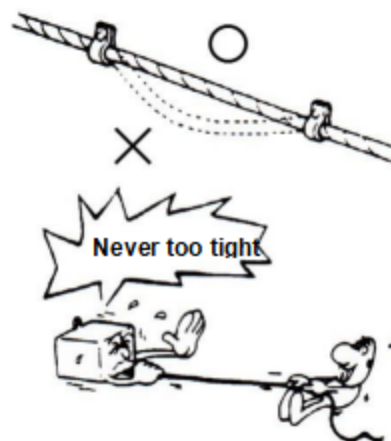
- Keep wire harnesses far away from the hot parts.



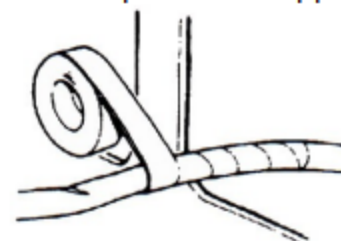
- Route wire harnesses to avoid sharp edges or corners and also avoid the projected ends of bolts and screws.



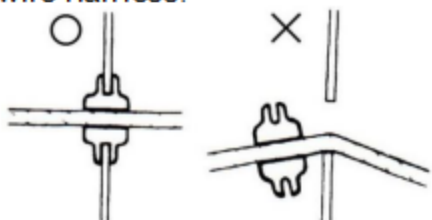
- Route harnesses so that they neither pull too tight nor have excessive slack.



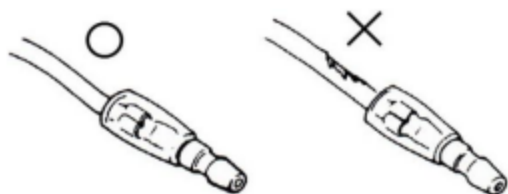
- Protect wires or wire harnesses with electrical tape or tube if they contact a sharp edge or corner. Thoroughly clean the surface where tape is to be applied.



- Secure the rubber boot firmly as applying it on wire harness.



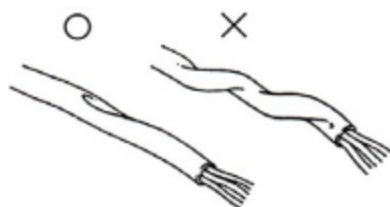
- Never use wires or harnesses which insulation has been broken. Wrap electrical tape around the damaged parts or replace them.



- Never clamp or squeeze the wire harness as installing other components.

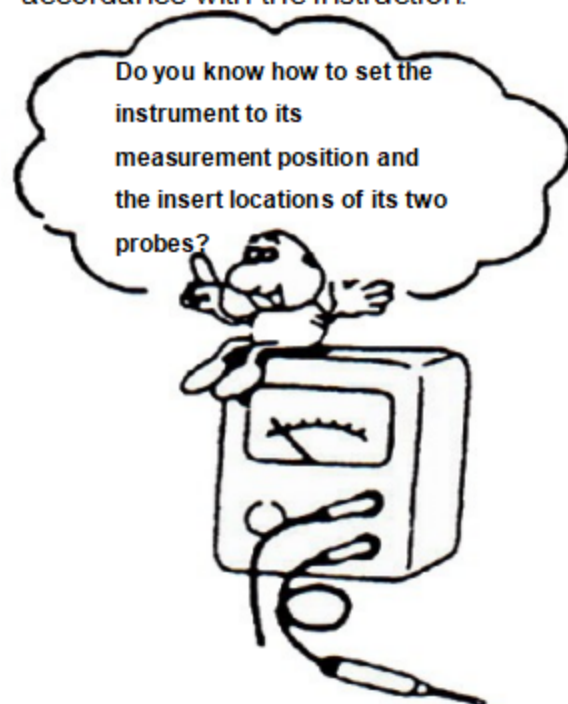


- Do not let the wire harness been twisted as installation.



- Wire harnesses routed along the handlebar should not be pulled too tight or have excessive slack, be rubbed against or interfere with adjacent or surrounding parts in all steering positions.

- Before operating a test instrument, operator should read the operation manual of the instrument. And then, conduct test in accordance with the instruction.

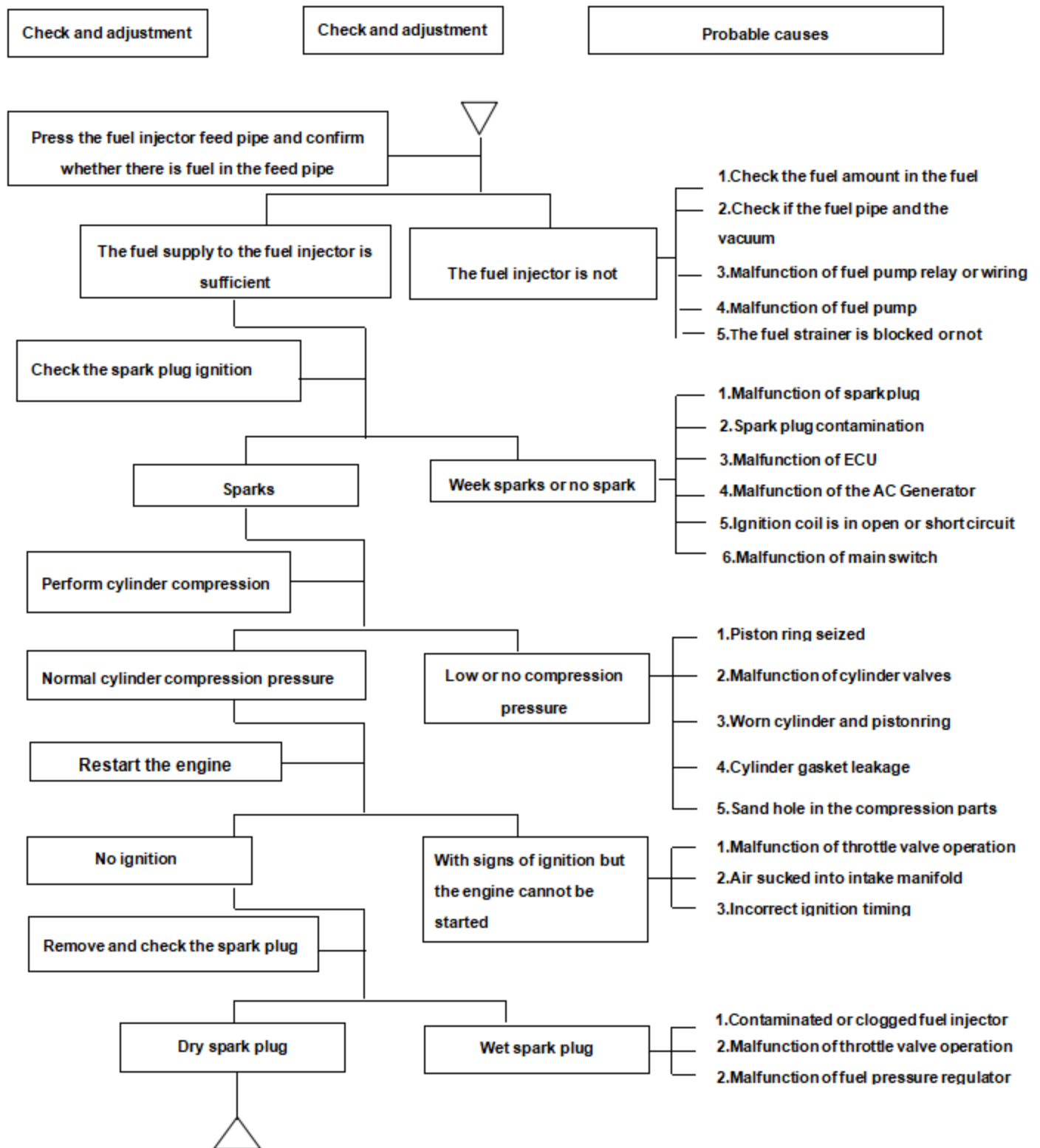


- With sand paper to clean rust on connector pins/terminals if found. And then conduct connection operation later

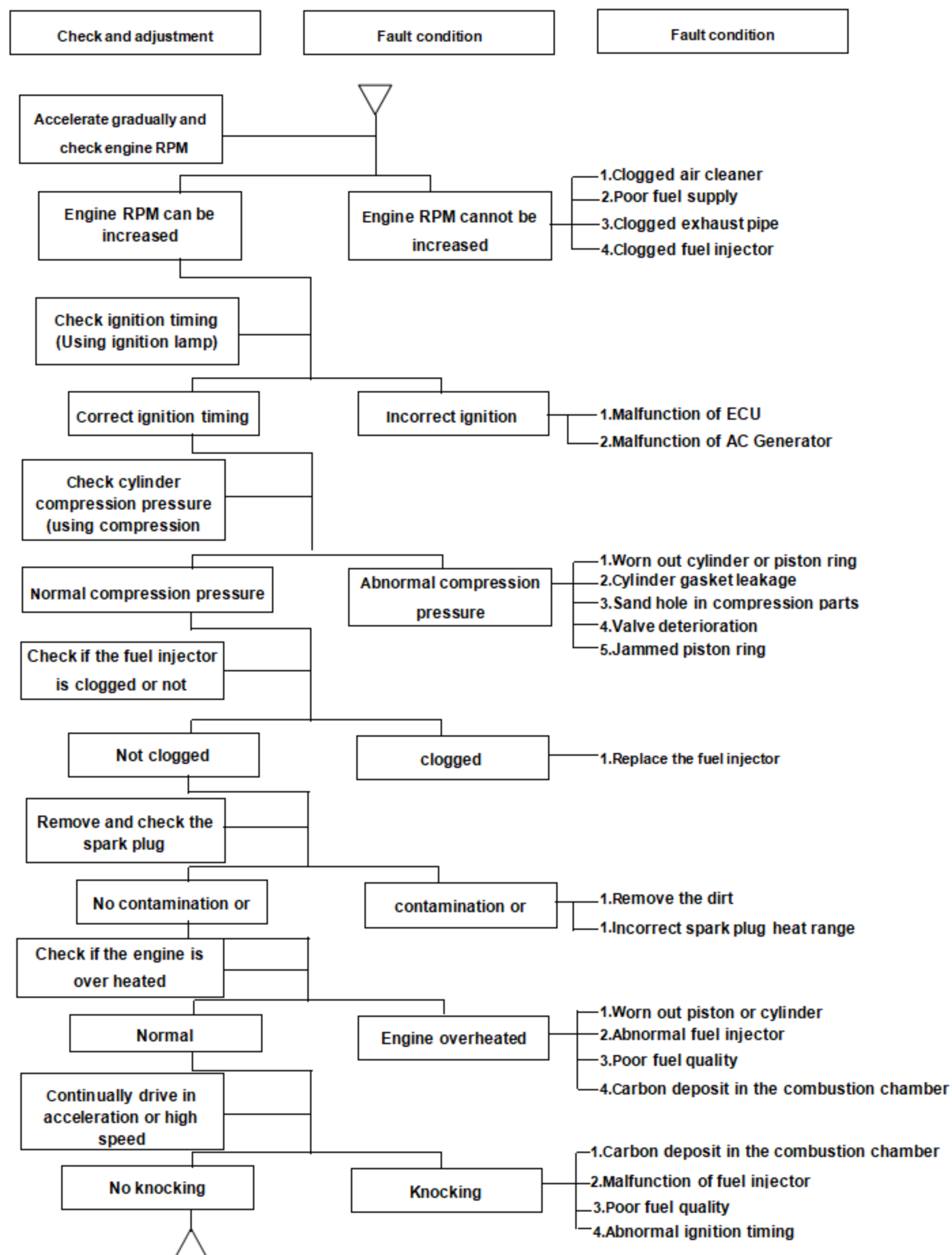


08-Troubleshooting:

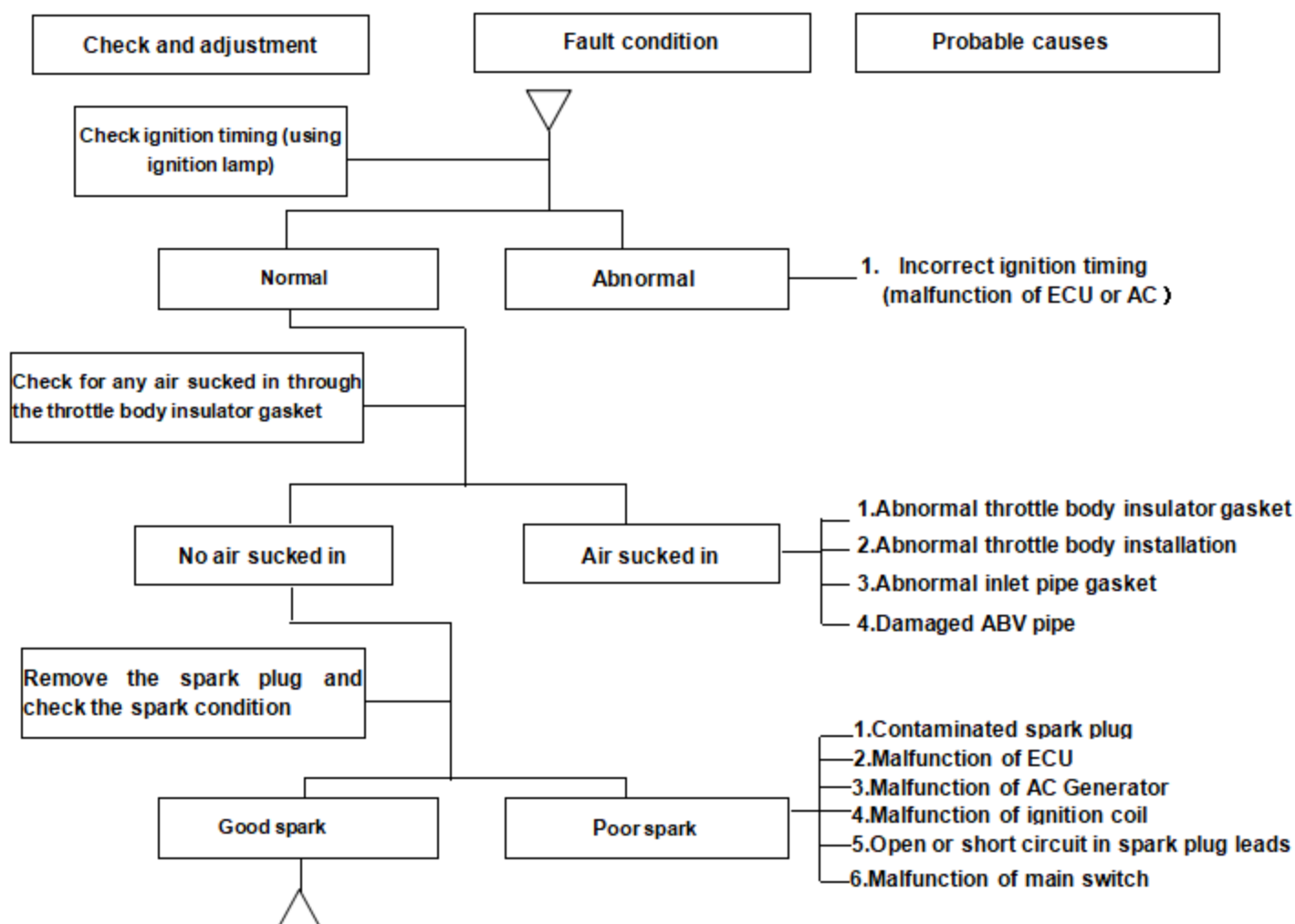
A. Engine cannot be started or difficult to be started



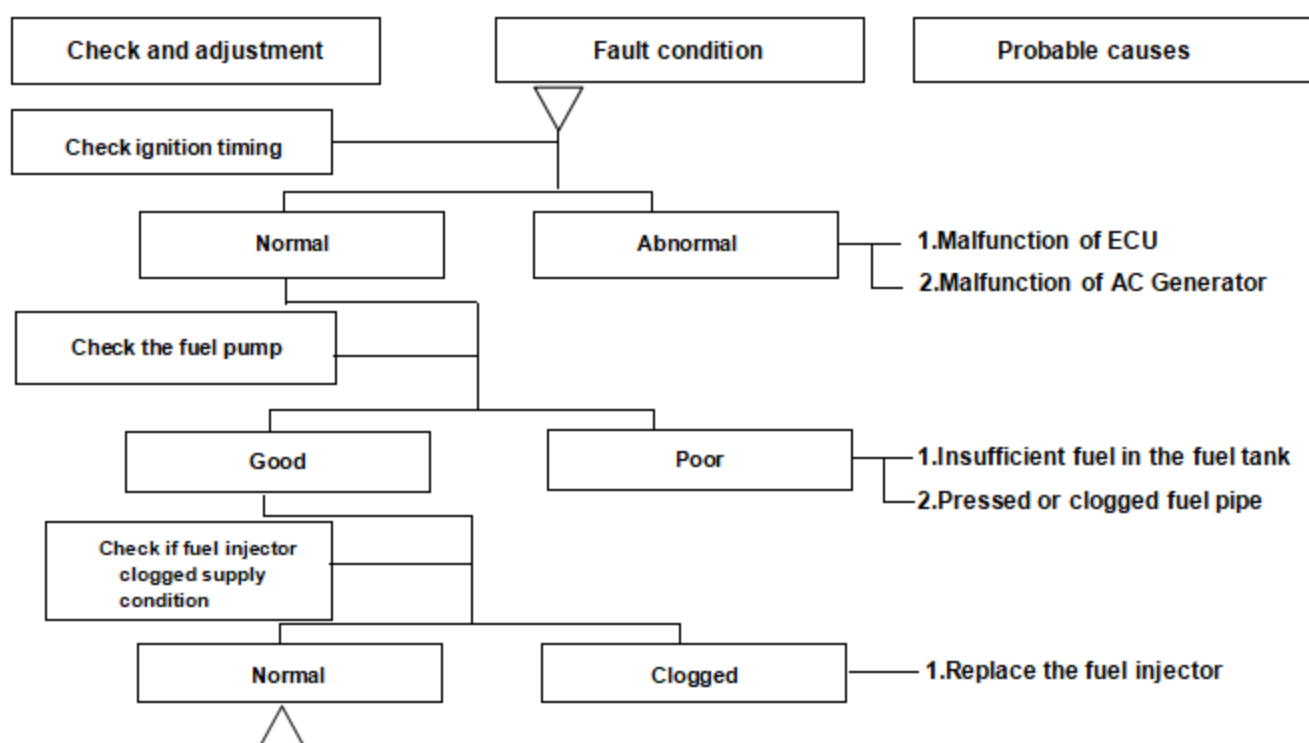
B. Engine runs sluggish (Speed does not pick up, lack of power)



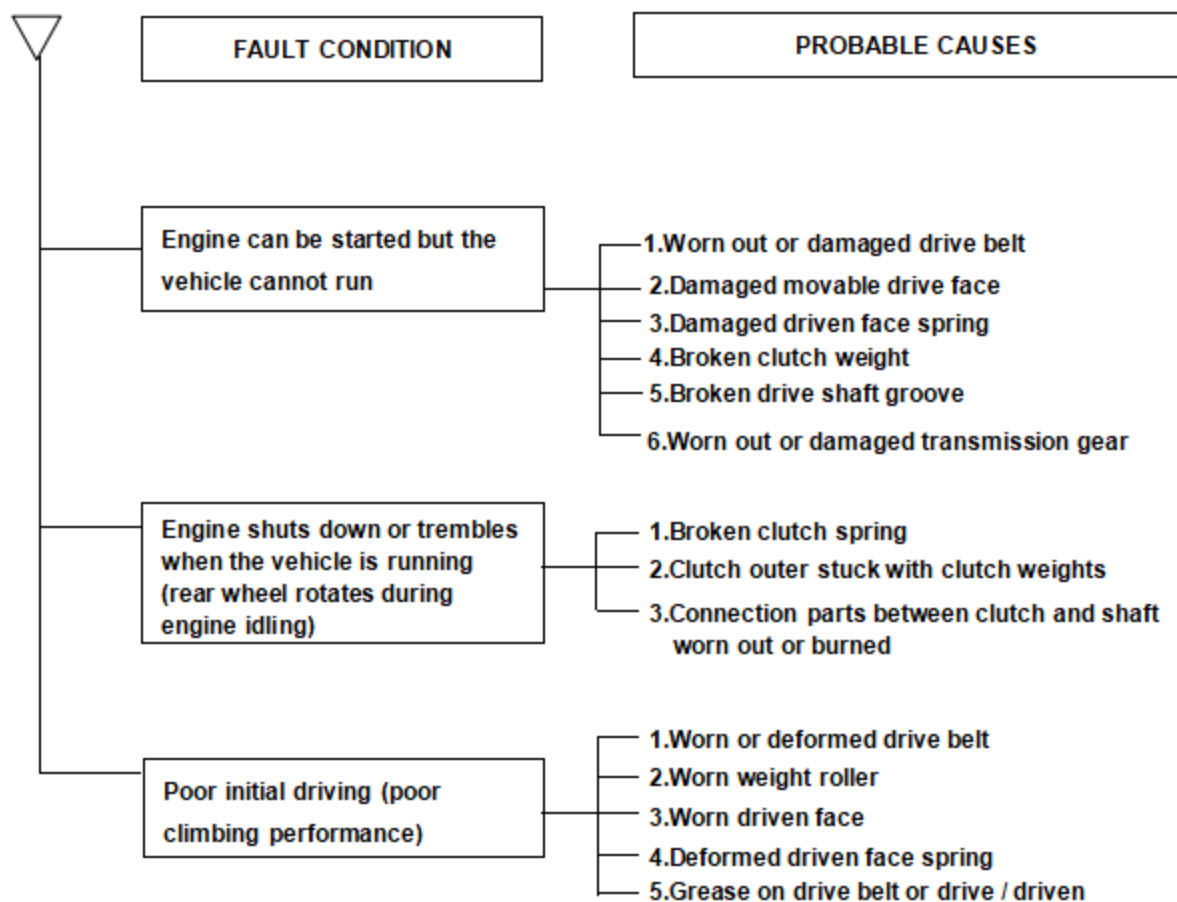
C. Engine runs sluggish (especially in low speed and idling)



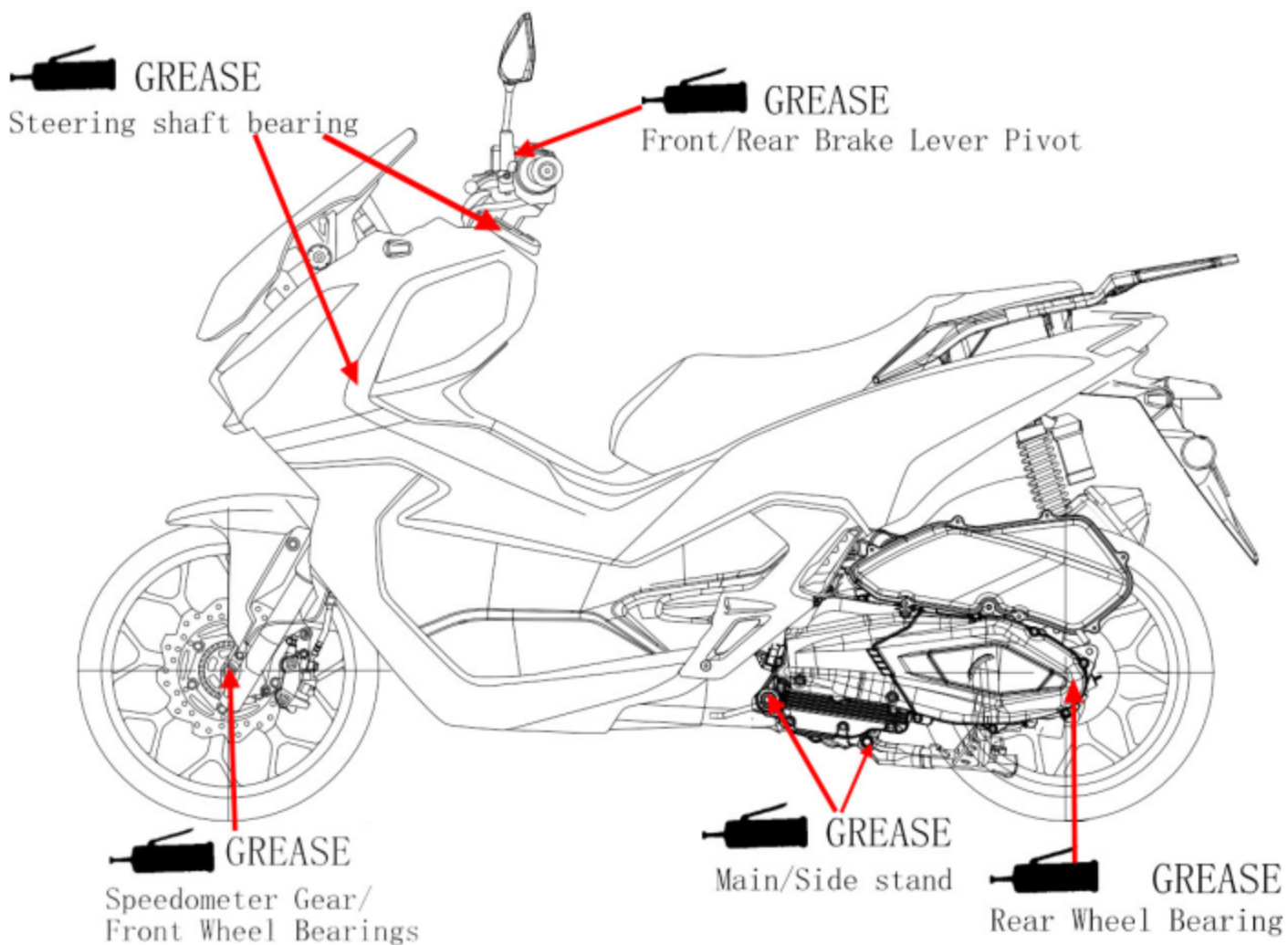
D.Engine runs sluggish (High speed)



E.CLUTCH AND DRIVING PULLEY



09-Lubrication points:



II. Maintenance Information

10-Air Cleaner:

1. Remove 8 screws from the air cleaner cover and then remove the cover;

2. Remove the air cleaner element;

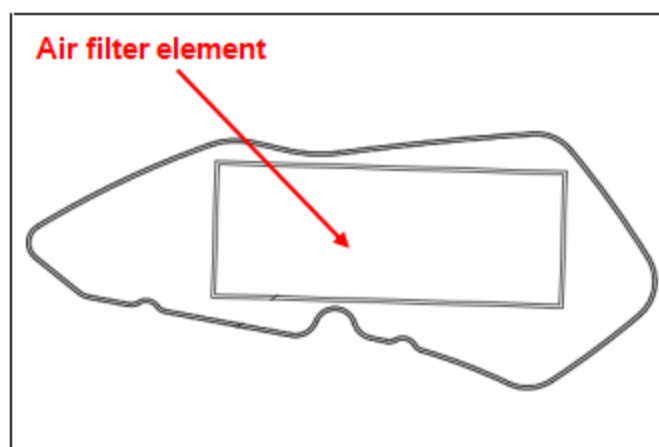
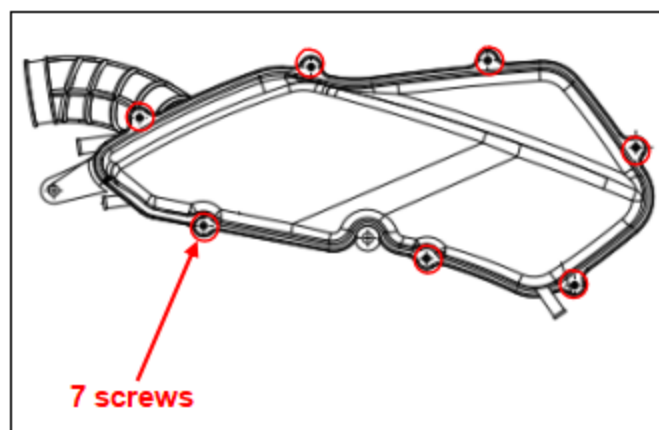
3. Clean air cleaner element:

Use compressed air to remove the adhesion of dirt, if too much dirt, please new replacement.



Cauti

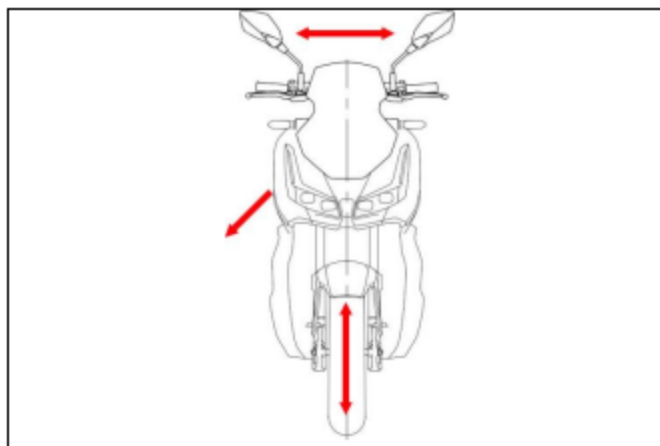
- The air cleaner element is made of paper so do not soap it into water or wash it with water.



11-Steering handle top bearing:

Caution

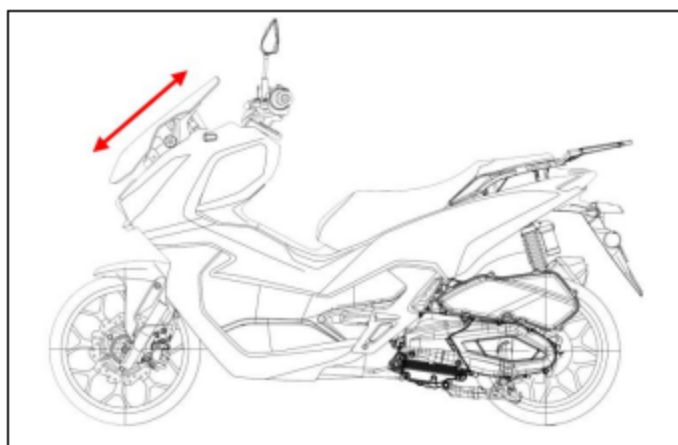
- Check all wires and cables if they are interfered with the rotation of steering handle bar.
- Lift the front wheel out of ground;
- Turn handle from right to left alternative and check if turning is smoothly;
- If handle turning is uneven and bending, or the handle can be operated in vertical direction, then adjust the handle top bearing.



12-Cushion:

Caution

- Do not ride the motorcycle with poor cushion.
- Looseness, wear or damage cushion will make poor stability and drive-ability.

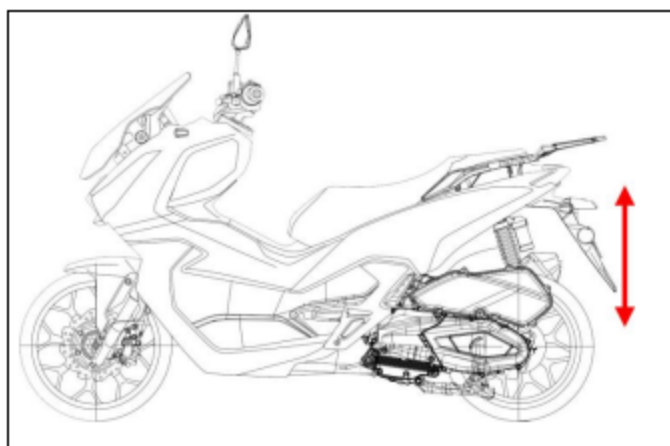


Front cushion

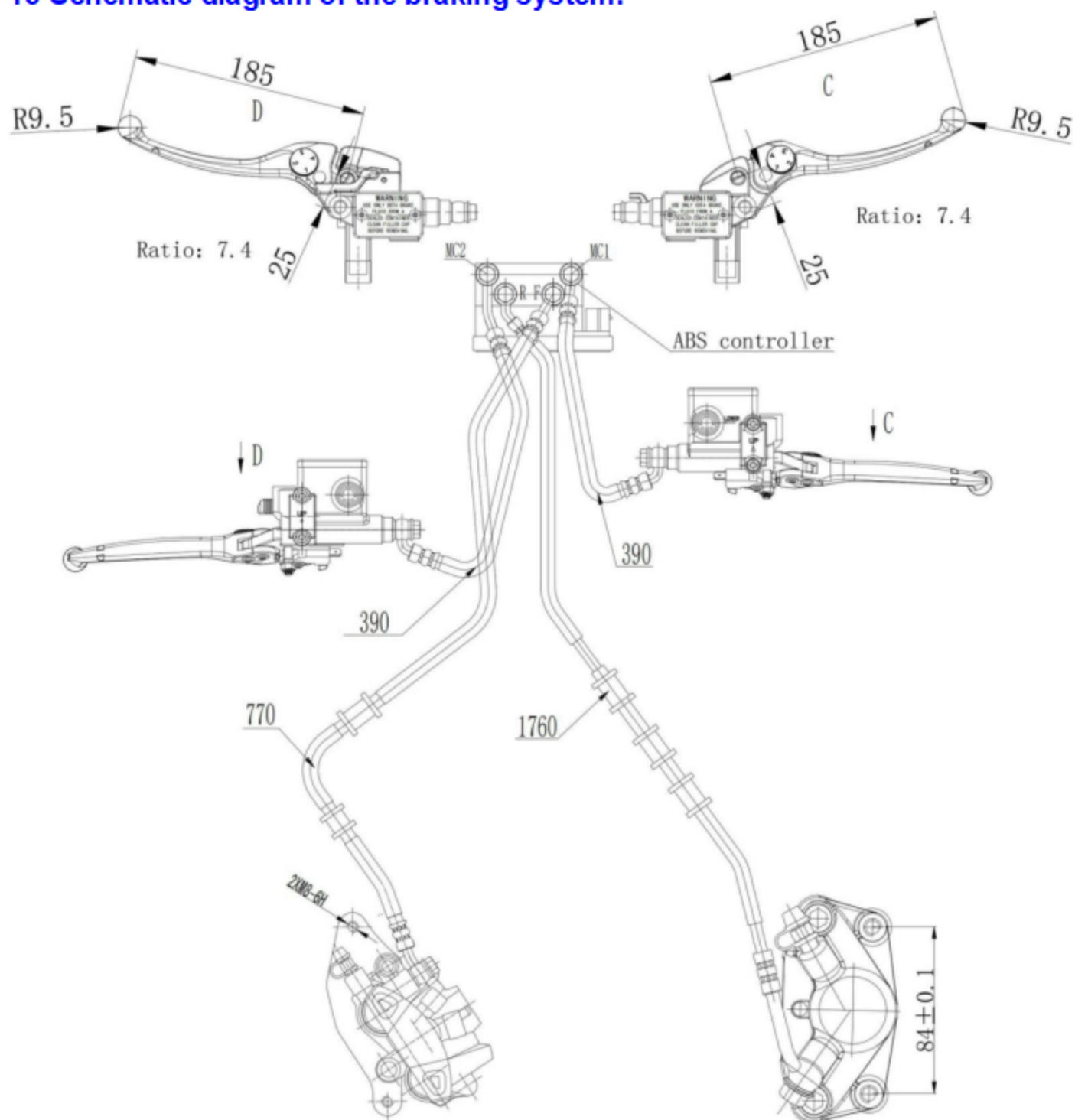
- Press down the front cushion for several times to check its operation;
- Check if it is damaged. Replace relative parts if damage is found;
- Tighten all nuts and bolts.

Rear Cushion

- Press down the front cushion for several times to check its operation;
- Check if it is damaged. Replace relative parts if damage is found;
- Park motorcycle with main stand;
- Turn the rear wheel forcefully and check if engine bracket bushing is worn out. Replace the bushing if looseness is found;
- Tighten all nuts and bolts.



13-Schematic diagram of the braking system:



13.1-Precautions in operation:

- Inhaling asbestos may cause disorders of respiration system or cancer, therefore, never use air hose or dry brush to clean brake parts. Use vacuum cleaner or other authorized tool instead.

Caution

- The brake caliper can be removed without removing the hydraulic system;
- After the hydraulic system is removed, or the brake system is felt to be too soft, bleed the hydraulic system;
- While refilling brake fluid, care should be taken not to let the foreign material entering into the brake system;
- Do not spill brake fluid on the painted surfaces, plastic or rubber parts to avoid damage;
- Check the operation of the brake system before riding.

Specifications

unit: mm

Item	Standard	Limit
The thickness of front brake disk	3.000	2.000
The thickness of rear brake disk	5.000	4.000
Front and rear brake disk eccentricity	< 0.100	0.300
Front brake master cylinder inner diameter	$12.7^{+0.055}_0$	12.765
Front brake master cylinder piston outer diameter	$12.7^{+0.055}_0$	12.765
Rear brake master cylinder inner diameter	$12.7^{0}_{-0.045}$	12.645
Rear brake master cylinder piston outer diameter	$12.7^{0}_{-0.045}$	12.645
Thickness of front brake lining	8.000	5.000
Thickness of rear brake lining	8.000	5.000

Torque values:

Brake hose bolts:	3.0~4.0kgf.m
Bolt for front brake caliper:	2.9~3.5kgf.m
Brake lever nut:	0.8~1.0kgf.m
Air-bleed valve:	0.8~1.0kgf.m

13.2-Troubleshooting:

Soft brake lever

1. Air inside the hydraulic system
2. Hydraulic system leaking
3. Worn master piston
4. Worn brake pad
5. Poor brake caliper
6. Worn brake lining/disk
7. Low brake fluid
8. Blocked brake hose
9. Warp/bent brake disk
10. Bent brake lever

Hard operation of brake lever

11. Blocked brake system
12. Poor brake caliper
13. Blocked brake pipe
14. Seized/worn master cylinder piston
15. Bent brake lever

Uneven brake

16. Dirty brake lining/disk
17. Poor wheel alignment
18. Clogged brake hose
19. Deformed or warped brake disk
20. Restricted brake hose and fittings

Tight brake

21. Dirty brake lining/disk
22. Poor wheel alignment
23. Deformed or warped brake disk

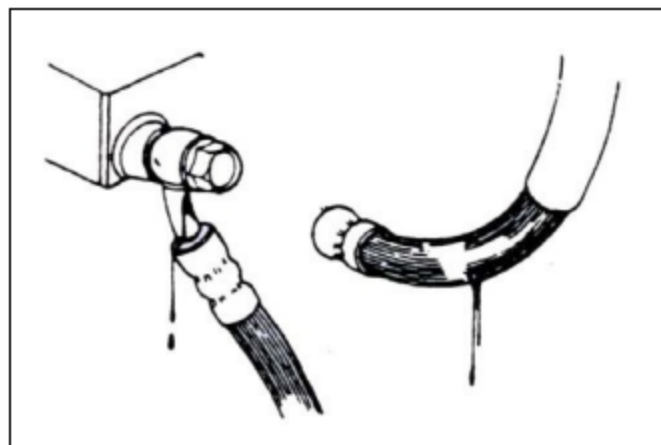
Brake noise

24. Dirty lining
25. Deformed brake disk
26. Poor brake caliper installation
27. Imbalance brake disk or wheel

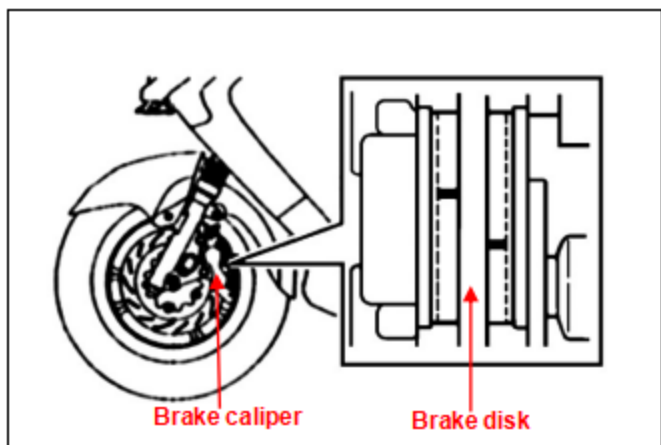
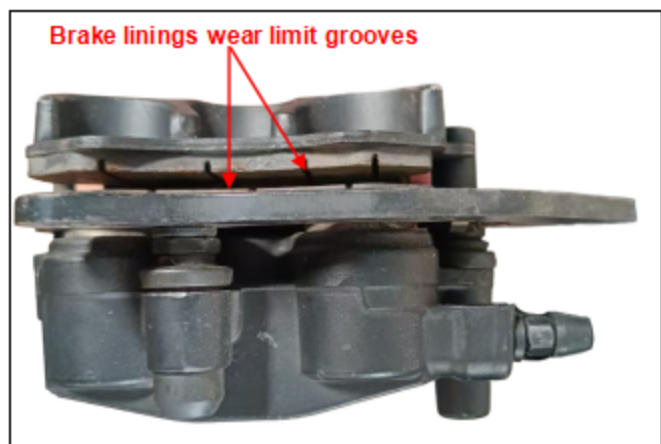
13.3-Disk brake system inspection:

Inspection

- By visual examination whether divulges or the damage, with spanner inspection brake tube seam whether becomes less crowded, and the inspection handle bar turn right or turn left, or pressure the cushion, whether besides the pipeline protection department, whether there is interferes, contacts other parts of;



- Remove the front brake pad cap;
- Check the brake from behind the brake caliper;
- The brake pad must be replaced with new lining when the brake pad wear limit reaches the brake disk;
- Park the motorcycle on a level ground, and check if fluid level is under the "LOWER" mark;
- Recommended Brake Fluid: WELL RUN BRAKE OIL (DOT 3).



Caution

- The vehicles inclined or just stop, the survey oil level could not be accurate, had to settle the 3~5 minute ;
- In order to prevent has the chemical change, please do not use counterfeiting or other unclear trade marks brake fluid ;
- Uses by all means must with the trade mark brake fluid, guarantees the ghost vehicle efficiency.



13.4-Add brake fluid:

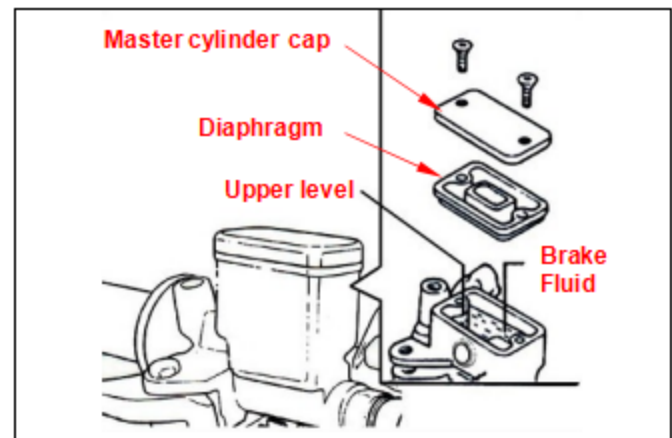
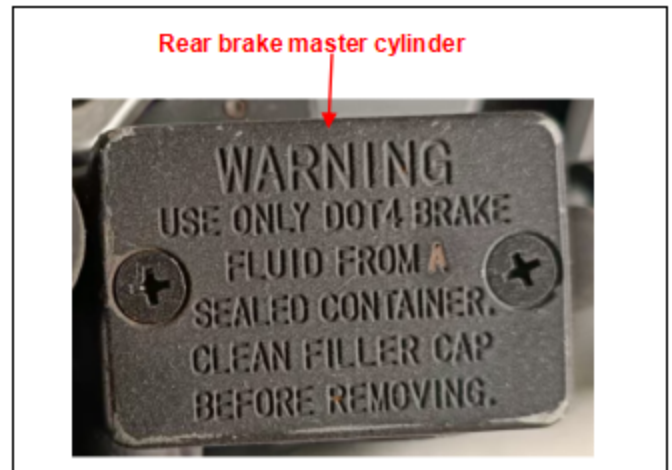
- Before the brake fluid reservoir is removed, turn the handle so that the brake fluid reservoir becomes horizontal, and then remove the brake fluid reservoir.
- When maintenance brake system, will be supposed to paint the surface or the rubber parts catches up by the rags.

Caution

- Supplement brake fluid please do not surpass the upper limit, spilled brake fluid on painted surfaces, plastic or rubber components may result in their damages.
- Remove the master cylinder cap and diaphragm;
- Increases the high quality brake fluid, uses by all means must with the trade mark brake fluid joins in the master cylinder;
- Clean the dirty brake disk.

Caution

- The dirty brake lining or disk will reduce the brake performance.
- To mixed non-compatible brake fluid will reduce brake performance.
- Foreign materials will block the system causing brake performance to be reduced or totally lost.



13.5-Brake fluid replacement / Air-bleed:

- 1.Connect drain hose to air-bleed valve;
- 2.Open the drain valve on the calipers and delay valve the brake lever until the old brake fluid is entirely drained out;
- 3.Close the drain valve and add specified brake fluid into the brake master cylinder.

Recommended brake fluid:

WELLRUN DOT 3 brake fluid

- 4.Connect one end of transparent hose to the drain valve, and put the other end into a container;
- 5.Open the drain valve around 1/4 turns, and at the same time hold the brake lever until there is no air bubble in the drain hose and also feeling resistance on the brake lever;
- 6.Close the drain valve when finishing the brake system refilling fluid procedure, and operate the brake lever to check whether air bubble is in brake system or not;
- 7.If brake is still soft, please bleed the.

7.1.Tightly hold the brake lever and open the drain valve around 1/4 turns, and then close the valve;

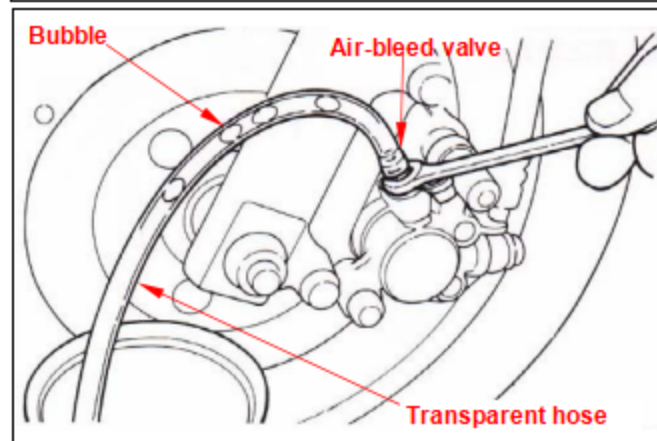
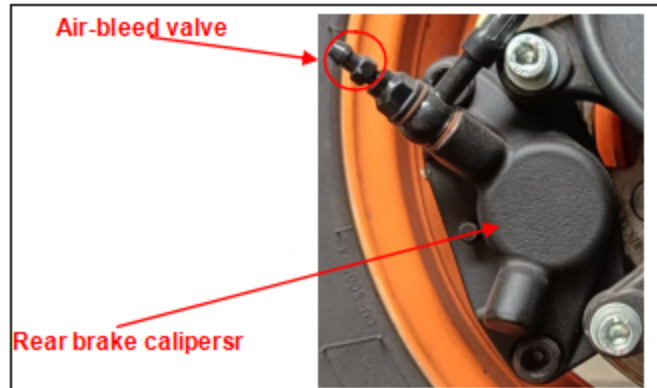
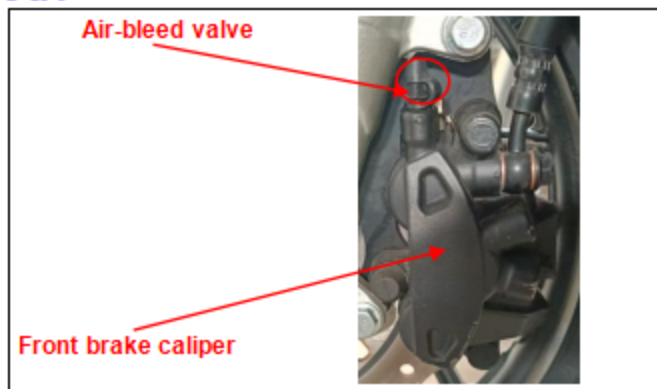
7.2.Slowly release the brake lever, and wait for a few seconds until it reaches its top position;

7.3.Repeat the steps 1 and 2 until there is no air bubble at the end of the hose;

7.4.Tightly close the drain valve;

7.5.Make sure the brake fluid is in the UPPER level of the master cylinder, and refill the fluid if necessary;

7.6.Cover the cap.



Caution

- Discharge air from the lower pump;
- The brake fluid can be replaced by machine, with shorter time and less bubbles.
- Do not release the brake lever before the drain valve is closed.
- Always check the brake fluid level when carrying out the air bleeding procedure to avoid air enter into the system.

13.6-Front brake caliper:

Removal

- Place a container under the brake caliper, and loosen the brake hose bolts and finally remove the brake hoses;

Caution

- Do not spill brake fluid on painted surfaces.
- Remove two caliper mounting bolts and the caliper.

Installation

- Install the brake caliper and tighten the mounting bolts.

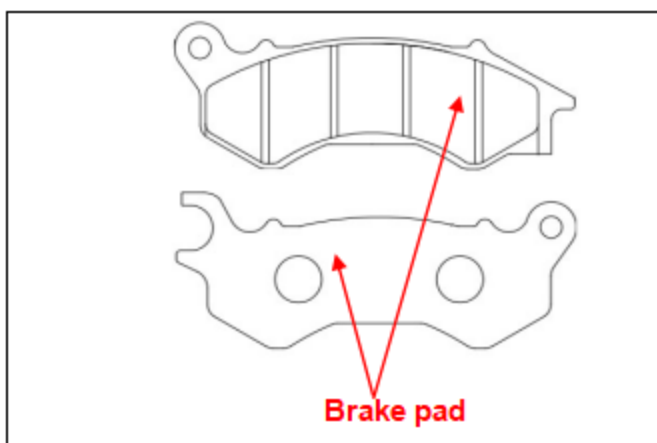
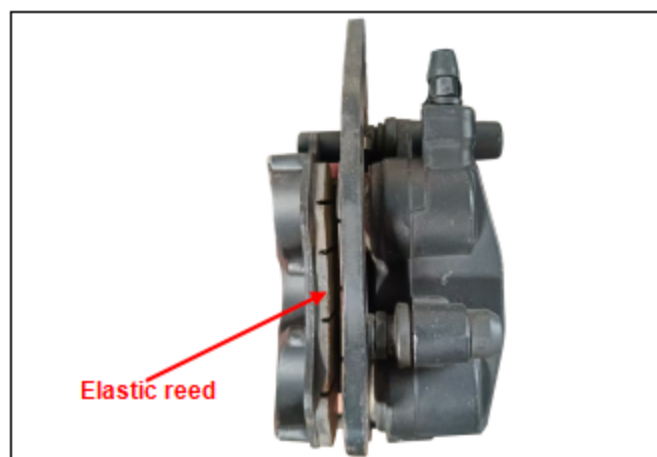
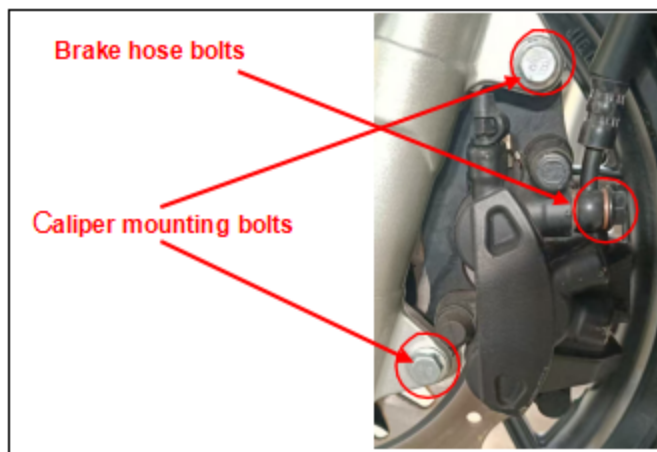
Torque: 2.9~3.5kgf.m

Caution

- Use M8 x 35 mm flange bolt only.
 - Long bolt will impair the operation of brake disk.
 - Use two seal washers and hose bolts to lock the hoses and brake caliper in place.
- Torque: 3.0~4.0kgf.m**
- Refill up the brake fluid to the reservoir and make necessary air bleeding.

Brake pad replacement

- Remove brake caliper.
- remove brake pads.
- Install the Elastic reed.
- Install the Elastic reed.new brake pads onto brake caliper.
- tighten the mounting bolts.



13.7-Rear Brake Caliper:

Removal

- Place a container under the brake caliper, and loosen the brake hose bolts and finally remove the brake hoses.

⚠ Caution

- Do not spill brake fluid on painted surfaces.
- Remove two caliper mounting bolts and the caliper.

Installation

- Install the brake caliper and tighten the mounting bolts.

Torque: 2.9~3.5kgf.m

⚠ Caution

- Only use M6 x 35 mm hex socket head cap screw.
- Long bolt will impair the operation of brake disk.

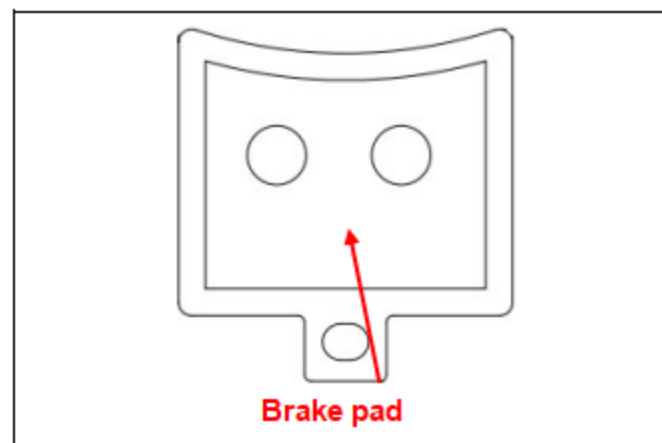
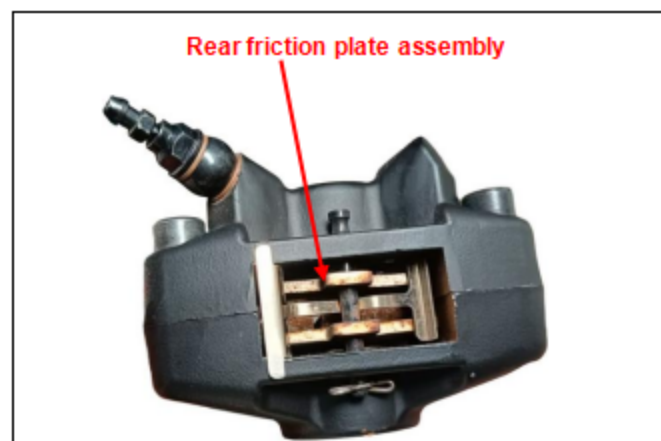
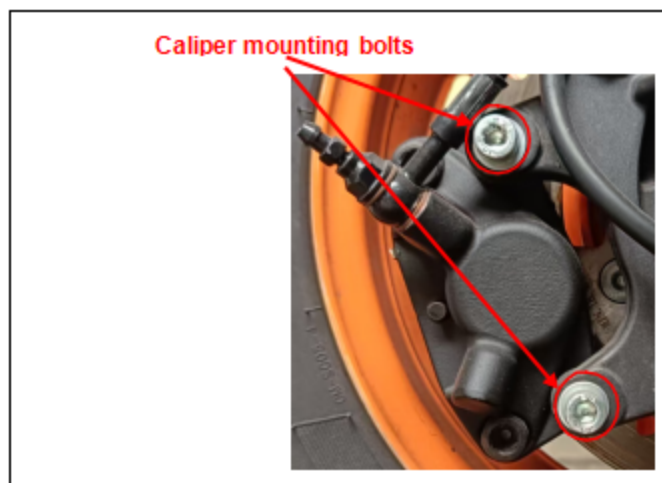
- Use two seal washers and hose bolts to lock the hoses and brake caliper in place.

Torque: 3.0~4.0kgf.m

- Refill up the brake fluid to the reservoir and make necessary air bleeding.

Brake pad replacement

- Remove the brake caliper ;
- Remove the rear friction plate assembly flange bolt ;
- Take out the brake pads;
- Install the new brake pads onto brake caliper;
- Install Flange bolt and tighten.



13.8-Brake Disk:

Inspection

- Visually check the brake disk for wear or break.
- Measure the thickness of the disk at several places.
- Replace the disk if it has exceeded the service limit.

- **Allowable limit:**

Front brake disk 2.5mm

Rear brake disk 3.5 mm

- Remove the brake disk from wheel.
- Check the disk for deformation and bend.
- **Allowable limit: 0.30 mm**

- Dirty brake linings or discs can degrade brake performance.
- Brake pads contain asbestos and cannot be cleaned with air guns. Operators should wear masks and gloves and clean with a vacuum cleaner.

⚠ Caution

13.9-Master Cylinder:

Master Cylinder Removal

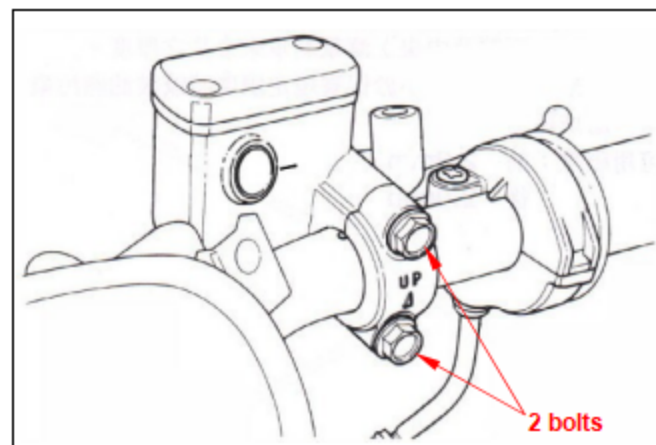
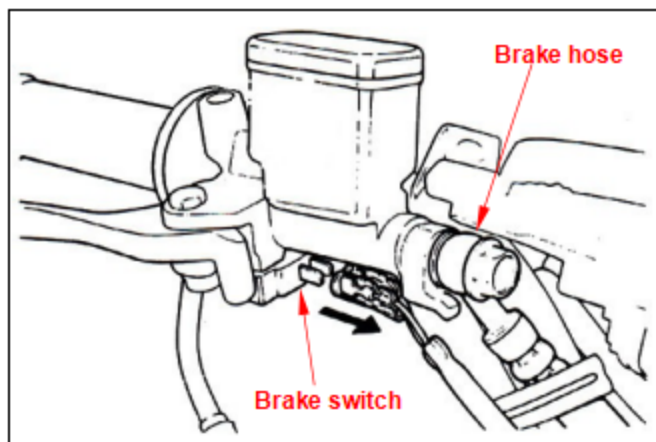
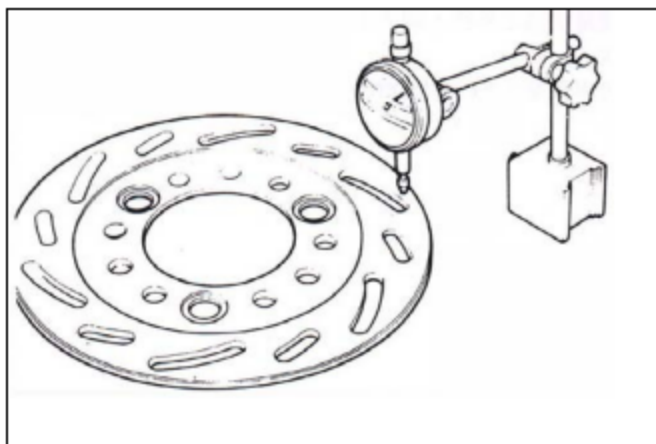
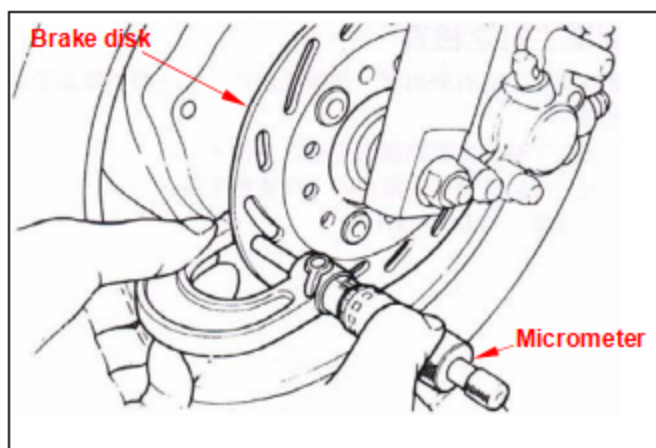
⚠ Caution

- Do not let foreign materials enter into the cylinder.

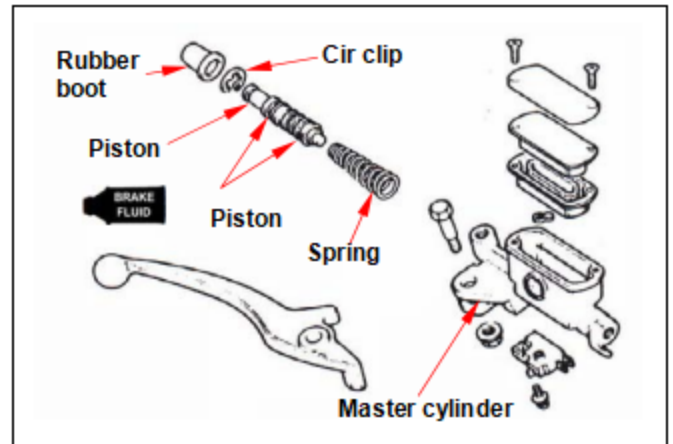
⚠ Caution

- The whole set of master cylinder, piston, spring, diaphragm and cir clip should be replaced as a set.

- Remove the handlebar covers;
- Remove the leads of brake light switch;
- Drain out the brake fluid;



- Remove the brake lever from the brake master cylinder;
- Remove the brake hose;
- Remove the master cylinder bolts and the master cylinder.
- Remove the rubber pad;
- Remove the cir clip;
- Remove the piston and the spring;
- Clean the master cylinder with recommended brake fluid.



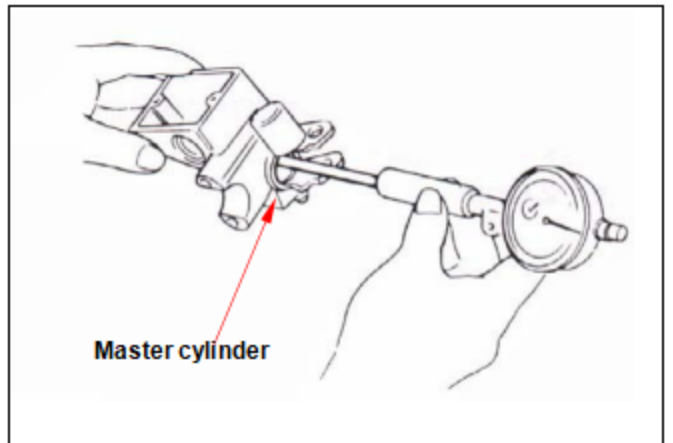
Master Cylinder Inspection:

- Check the master cylinder for damage or scratch, Replace it if necessary;
- Measure the cylinder inner diameter at several points along both X and Y directions;
- Replace the cylinder if the measured values exceed allowable limit.

● Allowable limit:

Front brake: 12.755 mm

Rear brake: 12.755 mm



Measure the outer diameter of the piston:

- Replace the piston if its measured value exceeds allowable limit.

● Allowable limit:

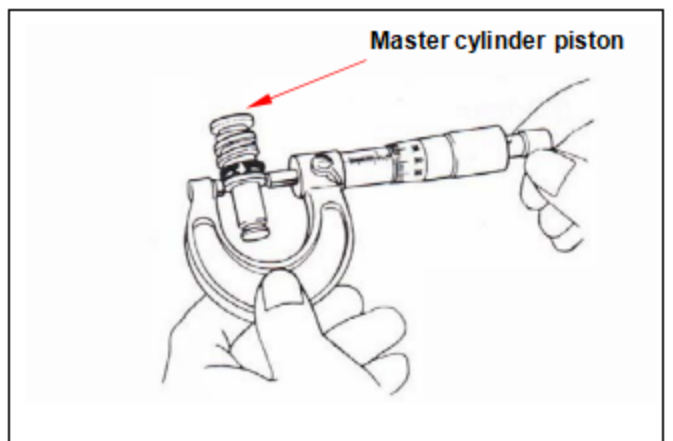
Front brake: 12.645 mm

Rear brake : 12.645 mm

Master Cylinder Assembly

⚠ Caution

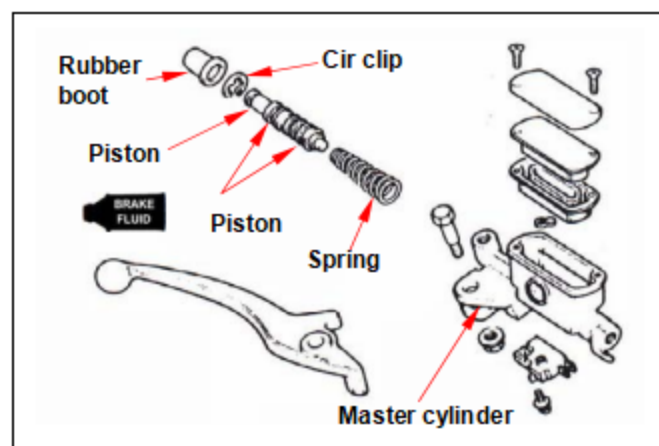
- It is necessary to replace the whole set comprising piston, spring, piston cup, and cir clip.
- Make sure there is no dust on all components before assembling.



- Apply clean brake fluid to the piston cup, and then install the cup onto the piston;
- Install the larger end of the spring onto the master cylinder;
- The master cup's cavity should be face inside of master cylinder when installing the master cup;
- Install the cir clip.

⚠ Caution

- Never install cup lip in the opposite direction.
- Make sure the cir clip is seated securely in the groove.

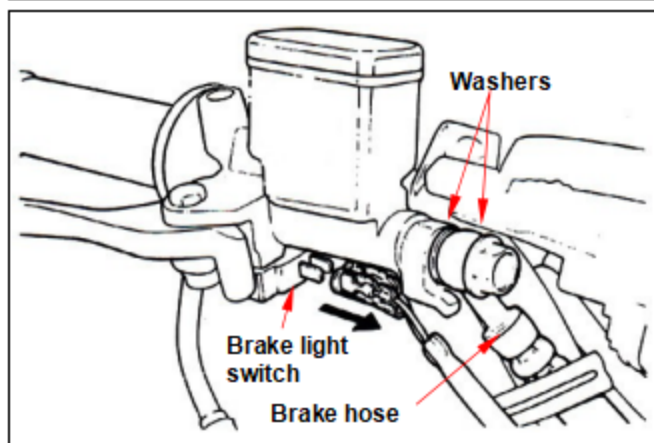
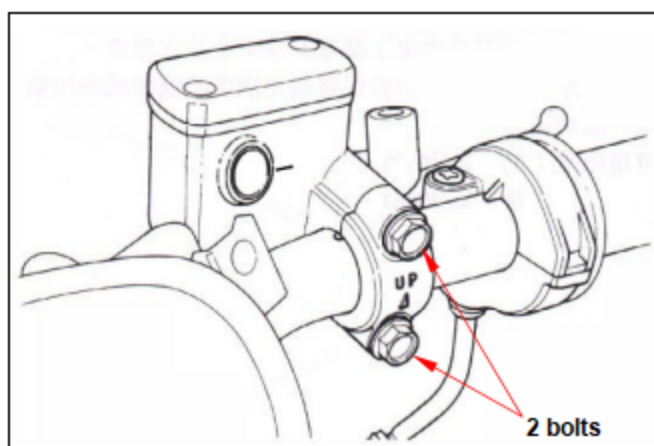


Master Cylinder Install:

- Install the rubber pad into the groove correctly;
- Place the master cylinder onto handlebar, and install the bolts;
- Install the brake lever, and connect leads to brake light switch.
- Connect brake hoses with 2 new washers;
- Tighten the brake hose bolt to the specified torque value;
- Make sure the hose is installed correctly;
- Install all wires, hoses, and components carefully so avoid to twisting them together.

⚠ Caution

- Kink of brake leads, hose or pipe may reduce brake performance.
- Improper routing may damage leads, hoses or pipes.



Add specified brake fluid and bleed the system

III. Engine maintenance

14: Maintenance:

👉 Before performing any operation, please place the motorcycle on a horizontal surface.

Tools (Specialized)



Clutch driving wheel fixture



Clutch driven wheel fixture



Magnetic motor rotor tooling

14.1: Maintenance Specifications

Please follow the maintenance cycle listed in the "User Manual" for inspection.

I: Inspection; if necessary, perform cleaning, adjustment, lubrication or replacement;
C: Cleaning; R: Replacement; L: Lubrication.

The following maintenance items require some mechanical knowledge. Some items (especially those marked with * and ** symbols) may require more technical information and tools.

Maintenance Schedule Table

Serial Number	Term Project	×1000km	1	6	11	16	20	21
		Month	1	6	12	18	24	
*1	Spark plug			I	I	I		R
*2	Engine oil		R	R	R	R		R
*3	Oil fine filter		R	R	R	R		R
*4	Valve clearance		I	I	I	I		I
*5	Coolant		I	I	I	I		R
*6	Cooling system			I	I	I		I
*7	Fuel injector				I			I
*8	Clutch			I	I	I		I
9	Belt			I	I	I	R	

Note: 1. If the motorcycle is used in extremely humid or dusty environments that are more harsh, it should undergo more frequent maintenance.

2. *The items marked with * require special tools, data and professional skills, and should be handled by Longxin dealers.

14.2:Crankcase ventilation pipe

Note:

. When driving in the rain or at high speed, as well as after the motorcycle has been washed or inverted, the maintenance frequency should be increased. Check whether the deposits in the transparent part of the ventilation discharge pipe are clearly visible.

Remove the plug [1] of the air filter cleaning tube, and transfer the deposits to an appropriate container. Reinstall the plug.

Check for any cracks, aging, damage or looseness in the exhaust pipe of the crankcase [1].

If necessary, replace the exhaust pipe.



14.3: Spark plug

Remove the seat cushion and seat pan, and remove the spark plug cap.

Remove the spark plug [1]. Note:

Before removing the spark plug, use an air gun to blow and clean the area around the spark plug base, and at the same time ensure that no dust falls into the combustion chamber.

Check if the insulator has cracks or damage, and whether the electrodes are damaged, dirty or discolored. If necessary, replace the spark plug.



Inspect the spark plugs:

Clean the electrodes of the spark plugs with wire or a dedicated spark plug cleaner.

Check the gap between the center electrode and the side electrode with a feeler gauge.

Spark plug gap: (0.70 - 0.80) mm

If necessary, carefully bend the side electrode to adjust the gap.

Install and hand-tighten the spark plugs to the cylinder head, then tighten them to the specified torque value.

Torque value: 14 N·m (1.4 kgf·m, 10.3 lbf·ft)

Insert the spark plug cap, install the seat barrel and seat pad.

14.4: Valve clearance

Check

Note: Align.

☞ Check and adjust the throttle clearance in the cold engine state (below 35°C).

Remove the following components:

- Cylinder head cover
- Sight hole cover and O-ring
- Exhaust manifold cover plate
- Exhaust manifold filter assembly

3. Rotate the crankshaft counterclockwise (rotate the CVT driving disc blade or the active wheel locking nut) to align the "T" mark [1] on the magnetic motor rotor with the timing boss mark [2] on the right crankcase cover.



The timing gear timing pinhole is aligned with the timing pinhole of the cylinder head, and is fixed by a timing pin [1]; the " - " mark of the timing gear is parallel to the joint surface of the cylinder head.

If the timing mark is not in the specified position, turn the crankshaft counterclockwise by one full circle (360°), and then align the "T" mark with the timing mark on the right crankcase cover again.



Adjustment Note:

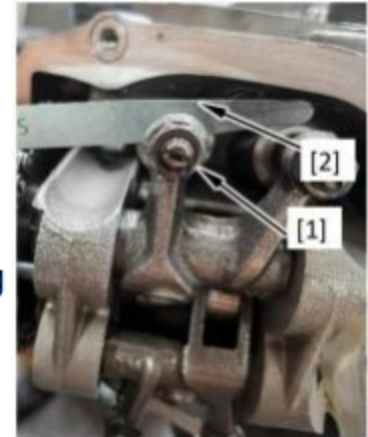
 The valve clearance adjustment is achieved by adjusting the valve adjustment screws.

Insert a feeler gauge [2] between the rocker arm adjusting screw [1] and the top of the valve to check the valve clearance.

Valve clearance:

Intake valve: (0.08 - 0.12) mm;

Exhaust valve: (0.13 - 0.17) mm;



14.5:Engine crankcase oil

Oil level check

Start the engine and let it idle for 3 to 5 minutes. Turn off the engine and wait for 2 to 3 minutes. Place the motorcycle on a level surface in an upright position (with the tires flat on the ground). Check the oil level using the oil dipstick (fully screw in the dipstick).

If the oil level is below the minimum oil level line [1], remove the oil dipstick [2] and fill the crankcase with the specified oil up to the oil level line [3]

SL 10W/40

GL-3API quality grade: SL or higher (do not use the circular API service label marked as energy-saving type), JASO T903 standard: MA, viscosity: SAE 10W-40).

Check if the O-ring of the oil dipstick is in good condition.

Replace it if necessary.

Apply oil to the surface of the O-ring.

Install the oil dipstick.



14.6:Oil change

Heated engine.

Turn off the engine and remove the oil filter [1].

Remove the oil filter cover and O-ring [2], and drain the oil.

After completely draining the oil, install the oil filter cover and replace the new O-ring.

Tighten the oil filter cover to the specified torque.

Torque: 13N • m (1.3kgf • m, 9.61bf • ft)

Fill the crankcase with the specified grade of oil.

Oil capacity:

After draining: 1.35L

After replacing the oil fine filter: 1.4L

After disassembly: 1.5L

Check the oil level.

Ensure there is no oil leakage.



14.7: Clean the oil filter screen

- Drain the engine oil.
- Remove the oil filter [1].
- Clean the oil filter with a high-flashpoint solvent to remove the particles adhering to it.

Warning

Do not use gasoline or low-temperature flammable solvents to clean the oil filter screen. Gasoline and low-temperature flammable solvents may be flammable and/or explosive, which could cause severe burns. Injury.

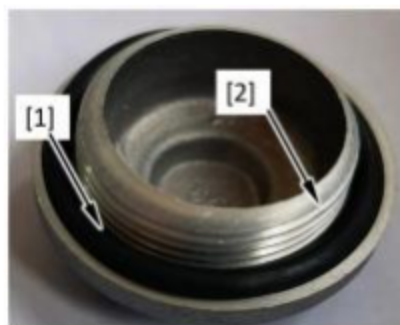
Clean the oil filter in a well-ventilated area,

and be sure there are no sparks or flames near the working area, including any devices with indicator lights.



- Carefully check if the oil filter is damaged.
- ★ If the oil filter is damaged, replace it.
- Replace a new O-ring [1].
- Install the oil filter and the filter cover [2].

Torque for tightening the oil filter cover:
13 N·m (1.3 kgf·m, 9.6 1 lb·ft).



14.8:Oil fine filter

Drain the engine oil.

Remove the oil filter [1] using a 30mm socket wrench or adjustable wrench.



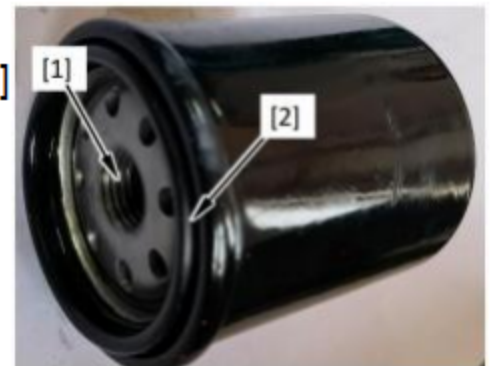
Apply engine oil to the threads [1] and rubber gasket [2] of the new oil fine filter.

Install the oil fine filter and tighten it to the specified torque.

Torque:

11 N·m (1.1 kgf·m, 8.11 lb·ft)

Fill the crankcase with the specified amount of engine oil.



14.9:Engine transmission gearbox lubricating oil

Gear oil level check

Start the engine and run it at idle (3 to 5 minutes).

Turn off the engine and wait for (2 to 3 minutes).

Place the motorcycle on a horizontal surface in an upright position.

Check the oil level [1] of the gear oil.

If the oil level is below the lower scale line, add the specified gear oil to the engine and use the oil level gauge to ensure it is at the middle-upper scale.

Specified gear oil: 80W-90 gear oil

Check if the O-type sealing ring of the oil level gauge is in good condition.

Replace it if necessary.

Apply oil to the surface of the O-type sealing ring.

Install the oil level gauge



Gear oil replacement

Heated engine.

Turn off the engine.

Remove the drain bolt [1] and washer [2], and drain the

After completely draining the gear oil, install the drain bolt and washer.

Tighten the drain bolt to the specified torque.

Torque: 13N·m (1.3kgf·m, 9.61bf·ft).

Inject the specified gear oil into the transmission case.



”

[2]

Gear oil capacity:

New machine: Add 0.25L;

After engine maintenance or major repair: Add 0.25L

Check the gear oil level.

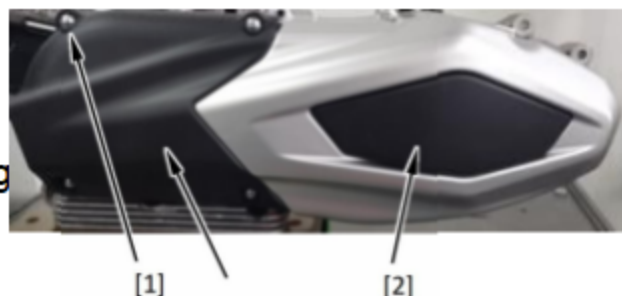
Make sure there is no leakage of gear oil.

14.10:CVT system belt inspection and replacement

Remove

The bolts [1] of the outer cover plate of the breathing channel and the left decorative cover [2]

Remove the outer cover plate of the breathing channel [3]

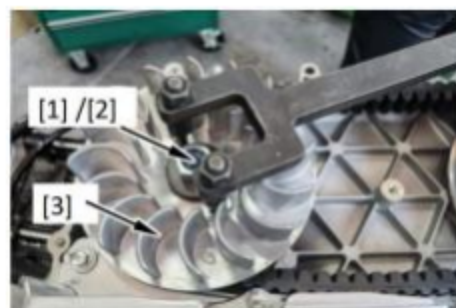


The fastening nuts and washers of the driven wheel [1]



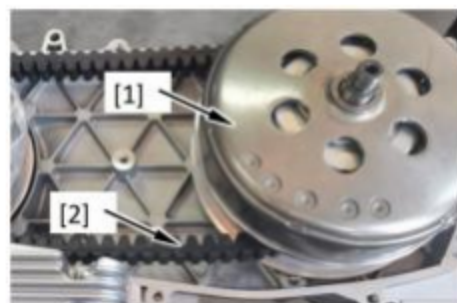
Left cover mounting bolt [1]

Left crankcase cover [2]



The tightening nut [1] and washer [2] of the driving pulley

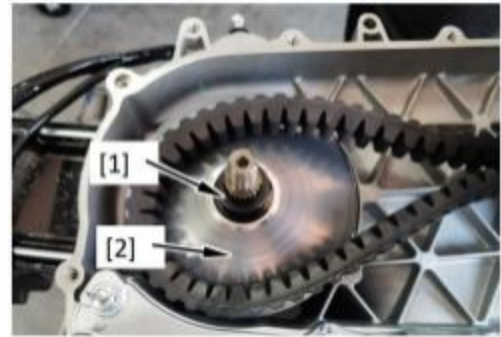
The driving disc of the driving pulley [3]



Drive pulley component [1] and belt [2]

Sliding drive disc sleeve [1] and drive disc assembly [2]

The installation process is the opposite of the disassembly process.



14.11:Engine idle speed

Note:

☞ After completing all the maintenance items for the engine and confirming that they are within the specified range, then check and adjust the idle speed.

☞ Before checking the idle speed, first check the following items:

No fault indicator light is flashing.

— Spark plug condition

— Air filter element condition

— Free travel of the accelerator switch and accelerator lever

☞ The idle speed can only be accurately checked and adjusted when the engine is in a hot running state.

Start the engine, heat it to the normal operating temperature, and let it idle.

Check the idle speed.

Idle speed: (1700 ± 200) r/min

If the idle speed is not within the maintenance limit range, check the following components:

— Air intake or engine terminal problems

— Idle speed control valve operation

15: Cooling System

Maintenance Information

Overview



Warning

Do not remove the radiator cap before the engine and radiator have cooled down. This is to prevent coolant from splashing out and causing burns to people.

Attention

Using coolant with silicate corrosion inhibitors will cause the pump seal ring to wear out prematurely or the radiator channels to get clogged.
Using tap water will cause damage to the engine.

☞ Add coolant to the auxiliary water tank. Apart from adding or draining the coolant, do not remove the radiator cap.

☞ When repairing the cooling system, there is no need to remove the engine from the frame.

☞ Prevent coolant from leaking onto the painted surface.

☞ After the system maintenance, a cooling system tester should be used to check for any leaks.

☞ Coolant temperature indicator / water temperature sensor inspection

☞ Fan control relay inspection

15.1: Cooling system specifications

Project		Specification
Coolant capacity	Radiator and engine	1.4L
	Auxiliary water tank	0.1L
Thermal radiator cover pressure relief pressure		(110~135) kPa
Thermostat	Start to adjust the temperature	85°C
	Full open temperature	95°C
	Valve lift	≥4mm
It is recommended to use coolant.		The ethylene glycol-based light-duty vehicle engine coolant LEC-II-40 that complies with the GB 29743 standard

15.2:Troubleshooting

Excessive engine temperature

- 🔧 Coolant temperature indicator / water temperature sensor failure
- 🔧 Thermostat valve not activated
- 🔧 Radiator cap malfunction
- 🔧 Insufficient coolant
- 🔧 Blockage in radiator channels, hoses, and pipes
- 🔧 Circulation system intake
- 🔧 Cooling fan motor failure
- 🔧 Fan control relay failure
- 🔧 Water pump failure

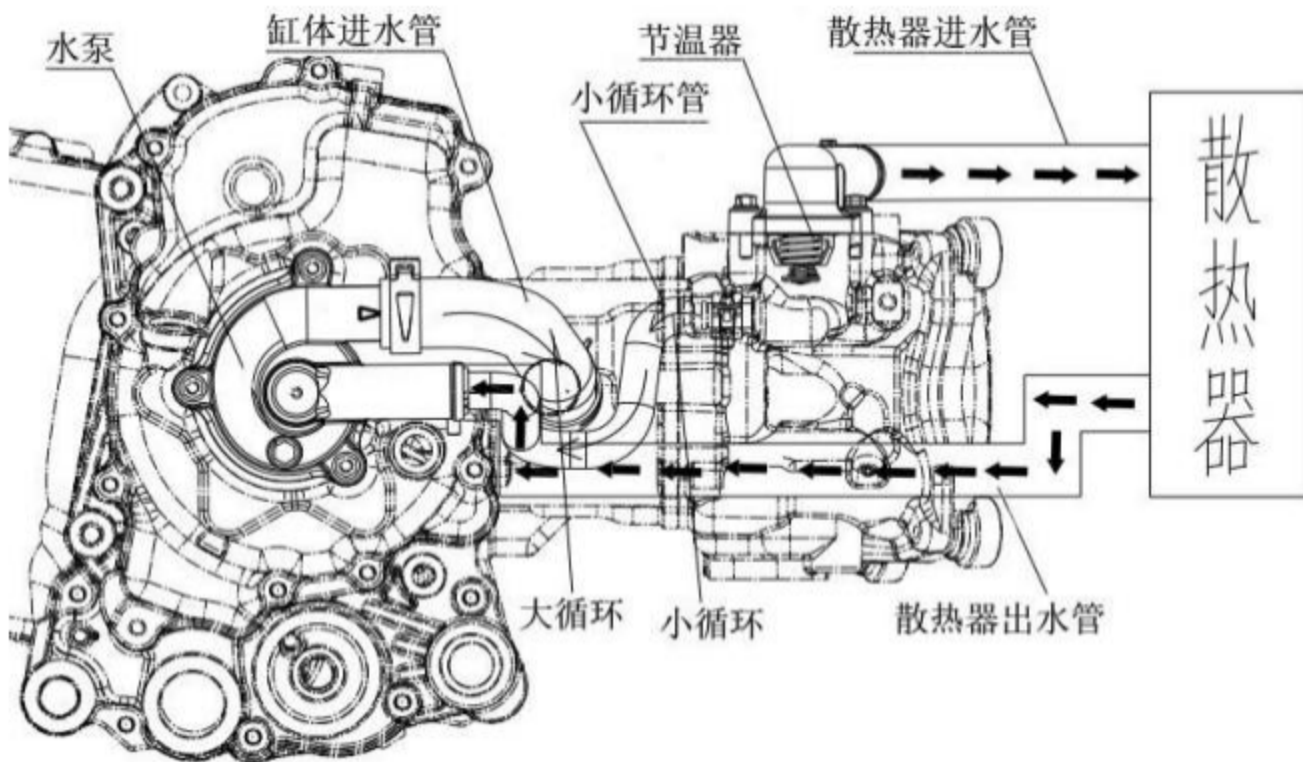
Engine temperature is too low.

- 🔧 Coolant temperature indicator / water temperature sensor failure
- 🔧 Thermostat valve opens
- 🔧 Fan control relay failure

Coolant leakage

- 🔧 Pump defects
- 🔧 O-ring aging
- 🔧 Radiator cap malfunction
- 🔧 Cylinder head gasket damaged or aged
- 🔧 Loose hose connection or loose hose clamp
- 🔧 Hose damage or aging
- 🔧 Radiator damage
- 🔧 Loose pipe joint of thermostat cap and pump cap

15.3: System flow mode



System Testing

Cooling radiator cap/system pressure check

Remove the cooling radiator cap [1]



Moisten the sealing gasket of the radiator cover, and then install the cover into the detector [2].

Apply pressure to the radiator cap using a detector.
If the radiator cap fails to maintain the pressure or if the released pressure is too high or too low, it needs to be replaced.
The radiator cap must be able to withstand the specified pressure for at least 6 seconds.

Cooling fan cover pressure: (110 - 135) kPa

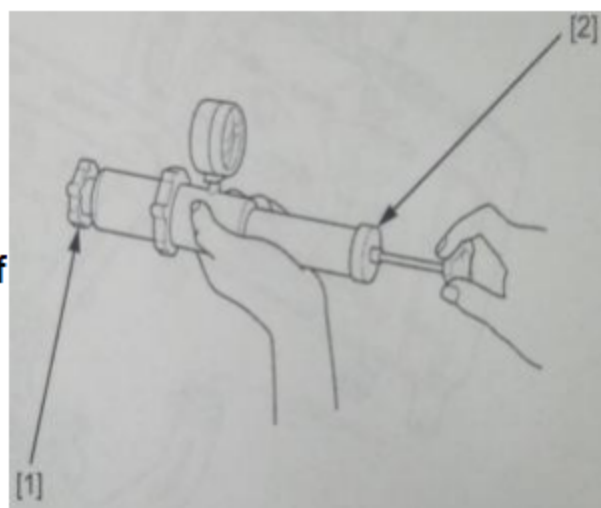
Connect the detector to the radiator.

Use the detector to apply pressure to the radiator, the engine and the hose, and test their airtightness.

Attention

Excessive pressure will damage the components of the cooling system. The pressure should not exceed 135 kPa.

If the system cannot withstand the specified pressure for at least 6 seconds, it needs to be repaired or the components replaced.



15.4: Coolant replacement

Replace coolant / exhaust

Note: When adding coolant to the system or the auxiliary water tank or checking the coolant dosage, the motorcycle should be placed on a level surface and in an upright position (support the main stand).

Remove the radiator cap [1] and drain the coolant.



Remove the drain bolts [1] and washers [2] on the pump cover, drain the coolant.

After replacing the new washer, install the drain bolt. Tighten the drain bolt to the correct torque.

Pump drainage bolt torque:

10 N • m (1.0 kgf • m, 7.4 lbf • ft)

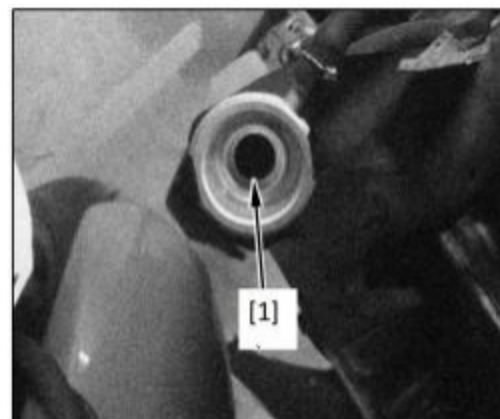


Fill the cooling system with the recommended coolant through the water injection hole until the neck port [1].

To remove air from the system, follow these steps:

1. Start the engine and let it idle for 2-3 minutes.
2. Open and close the throttle three to four times to expel the air from the system.
3. Shut off the engine. If necessary, add coolant.
4. Install the radiator cap.

Fill the storage tank with the recommended coolant.



Recommended coolant:

Compliant with GB 29743 standard, ethylene glycol-based light-duty vehicle engine coolant LEC-II -40

15.5:Thermostat

Disassembly/Installation

Empty the coolant.

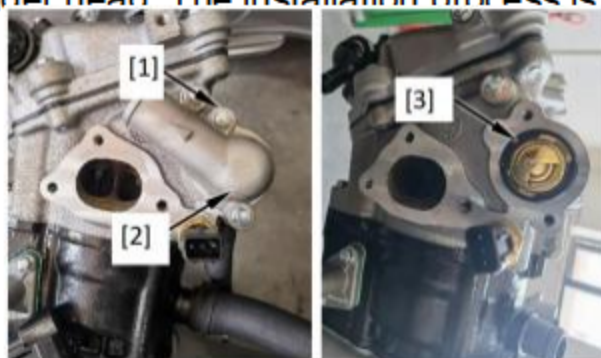
Remove the bolts [1] and the thermostat cover [2].

Remove the thermostat valve [3] from the cylinder head. The installation process is the opposite of the disassembly process.

Torque:

Thermostat cap bolt:

7N·m (0.7kgf·m, 5.2 lbf·ft)



Inspection/Testing

Check if the exterior of the thermostat valve [1] is damaged.

If the thermostat valve is in an open position at room temperature, it needs to be replaced.

Check if the sealing ring [2] is damaged. If necessary, replace it.

Note:

Put on heat-resistant gloves and take appropriate eye protection measures.

Keep flammable substances away from electrical components.

Don't let the thermostat and thermometer come into contact with the chassis, otherwise you will get incorrect readings.

Use an electric heater to heat the water to the working temperature and keep it for 5 minutes.

Hang the thermostat in hot water to check if its function is abnormal.



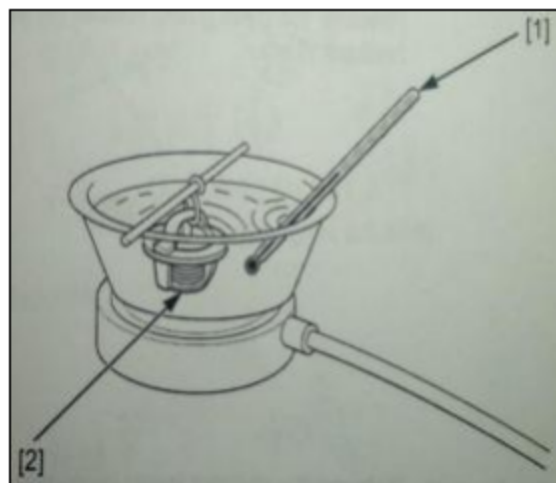
Thermostat opening temperature:

85°C (183°F)

Valve fully open height:

Not less than 4mm (0.16 in) at 95°C (203°F)

If the thermostat does not open at the specified temperature, it needs to be replaced.



15.6:Pump

End face seal inspection

Check the overflow hole [1] of the water pump to confirm if there is any coolant leakage.

☞ A small amount of coolant flowing out is normal.

☞ Ensure there is no continuous coolant leakage when starting the engine.

If necessary, replace the water pump assembly.



Disassembly / Installation

Note:

☞ Place a clean oil pan under the engine.

When removing the pump body, oil will flow out. Ann

After installation, add the specified amount of engine oil to the designated position (refer to the lubrication system maintenance guide).

Drain the coolant.

Keep the motorcycle upright on a flat surface.

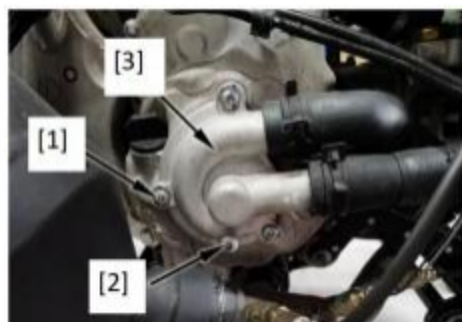
Loosen the pipe clamp [1], and release the following device

- Water pump outlet pipe [2]
- Water pump inlet pipe [3]



Remove the following components:

- 3 pump cover bolts [1]
- Drain bolt [2]
- Pump cover [3]



Remove the sealing ring [1] from the pump cover.

Remove the water pump impeller [1] from the right crank



The installation sequence is the opposite of the disassembly sequence.

Torque for tightening:

Impeller:

14 N • m (1.4 kgf • m, 10.3 lbf • ft)

Lagging cover bolt:

10 N • m (1.0 kgf • m, 7.4 lbf • ft)

Note:

- ☞ Replace the O-ring.
- ☞ The O-ring of the pump cover is not lubricated.

Check the oil level.

Fill the system with coolant.

Recommended coolant:

Compliant with GB 29743 standard, ethylene glycol-based light-duty vehicle engine coolant LEC-II -40

16:Lubrication system

Maintenance Information

Overview

Warning

Repeated and long-term exposure of the skin to used engine oil may lead to skin cancer. This is quite rare, except if you come into contact with used engine oil every day. However, we still recommend that you wash your hands with soap and water as soon as you finish handling the used oil.

When repairing the oil pump, there is no need to remove the engine from the frame.

-  The prerequisite for each maintenance step in this chapter is to drain the engine oil.
-  When disassembling and installing the oil pump, be careful not to let dust and dirt enter the engine.
-  If any part of the oil pump is worn beyond the specified maintenance limit value, replace the entire oil pump assembly.
-  After installing the oil pump, check for any oil leakage and ensure the oil pressure is correct.
-  Check the engine oil pressure indicator.

Tool

Oil pressure measuring instrument



Oil pressure gauge accessory



16.1: Lubrication system specifications

Unit: mm

项目		标准值	维修界限值
Oil capacity (Crankcase)	After changing the engine oil	1.35L	—
	After re-installing the oil filter	1.4L	—
	After disassembling the engine	1.5L	—
Oil capacity (Transmission box)	After changing the engine oil	0.25L	—
	After disassembling the engine	0.25L	—
Recommended engine oil		It is recommended to use engine oil: Crankcase: SL 10W/40, Transmission case: 80W/90 API quality grade: SL or higher (do not use the oil marked as energy-saving on the circular API service label) JASO T903 standard: MA Viscosity: SAE 10W/40, 80W/90	—
Oil pressure sensor opening pressure		80°C and normal temperature: (30 - 60) kPa	—
Oil pump rotor	Leaf tip gap	0.15max	0.20
	Intermediate gap	0.15max	0.20
	The gap on both sides	0.02~0.08	0.11

16.2: Troubleshooting

The oil level is too low.

- 🔧 Excessive oil consumption
- 🔧 Oil leakage from external components
- 🔧 Wear or improper installation of piston rings
- 🔧 Cylinder wear
- 🔧 Wear of valve guides

Low oil pressure

- 🔧 Low oil level
- 🔧 Clogged oil filter
- 🔧 Internal components leaking oil
- 🔧 Incorrect oil usage

No oil pressure

- 🔧 Low oil level

- 📖 The hydraulic safety valve is stuck when opening.
- 📖 The transmission chain of the oil pump is broken.
- 📖 The teeth of the main and driven wheels of the oil pump are broken.
- 📖 The oil pump is damaged.
- 📖 Internal components are leaking oil.

Excessive oil pressure

- 📖 The oil pressure safety valve has closed
- 📖 The oil filter screen, return oil hole, and oil level observation hole are clogged
- 📖 The oil is used improperly

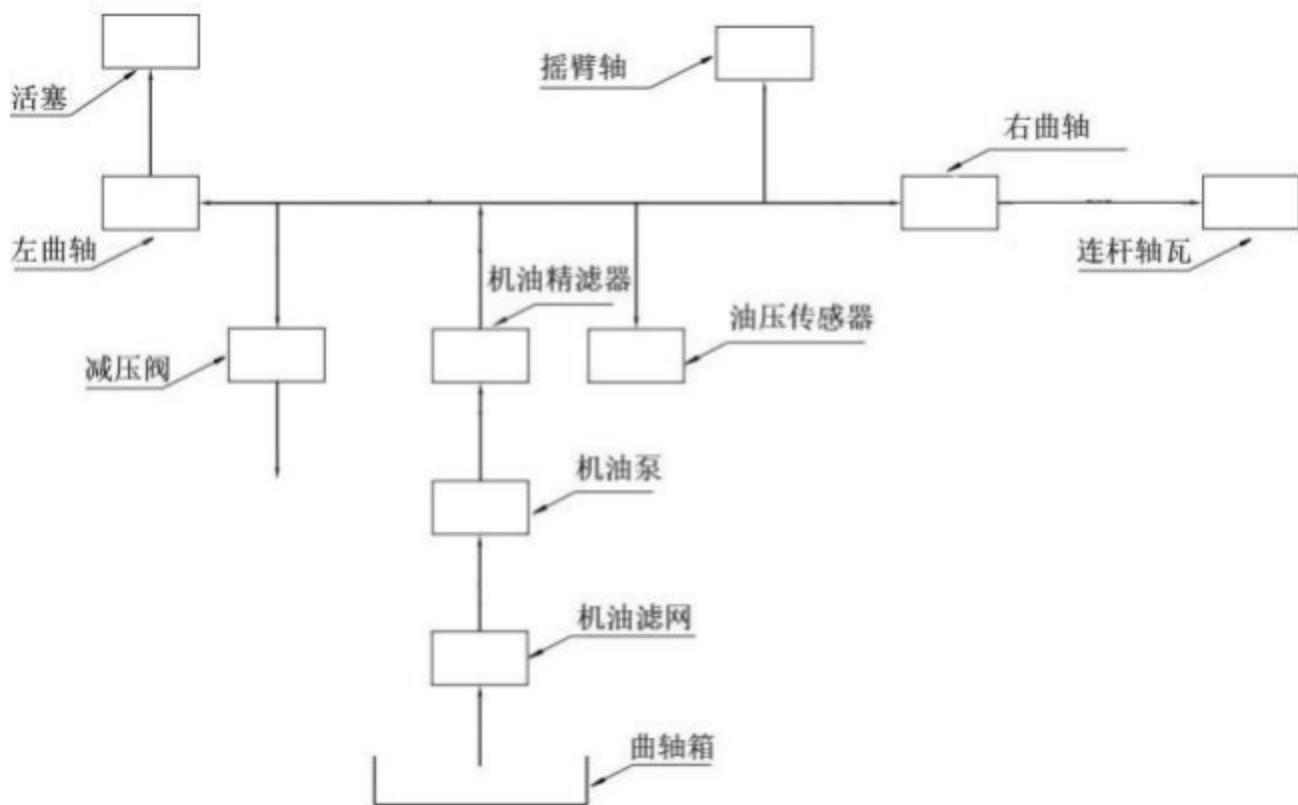
The engine oil has become dirty.

- 📖 The engine oil and filter were not replaced regularly.
- 📖 The piston rings were damaged.

Oil emulsification

- 📖 Cylinder head gasket expansion and cracking
- 📖 Cooling fluid passage leakage
- 📖 Water ingress into the engine

16.3:Lubrication system diagram



16.4:Oil pressure check

Note:

☞ When the engine is running, if the engine oil pressure gauge remains stable, check the pressure gauge system before checking the oil pressure.

Remove the oil pressure sensor.

Install the oil pressure measuring instrument accessory [1] into the switch base.

Connect the oil pressure measuring instrument [2] to the instrument accessory.

Tools:

Oil pressure measuring instrument

Oil pressure gauge accessory

Check the oil level. If necessary, recommend using engine oil.

Heat the engine to the operating temperature (approximately 80°C/176°F), and increase the engine speed to 1700 rpm. Read the oil pressure value.

Standard:

**At 1700 rpm and 80°C, the reading is: 45 kPa
(0.45 kgf/cm²)**

Turn off the engine, remove the tools.

Install the oil pressure sensor.



16.5:Oil pump

Disassembly/Installation

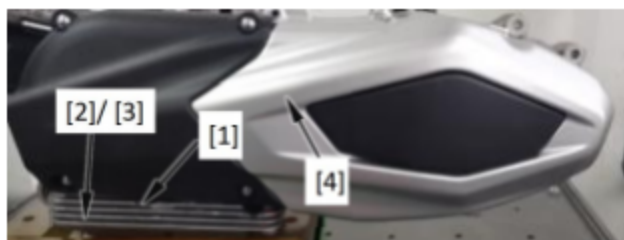
Remove the left crankcase cover component [4] (see CVT system). Remove the driving pulley component (see CVT system).

Remove the driven pulley component and the belt (see CVT system). Remove the oil pan bolt [1].

Remove the oil pan [2] and the sealing gasket [3].

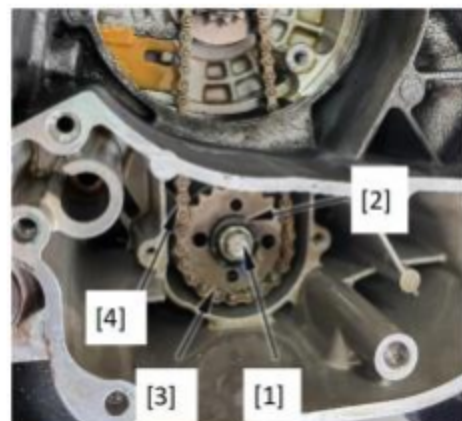
Remove the bolt [1].

Remove the timing chain cover [2] and the sealing ring [3].



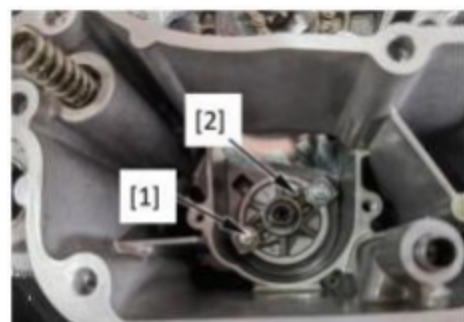
Remove the bolt [1] and the return oil baffle [2].

Remove the bolt [1] and the disc-type washer [2] using a locking tool.
Remove the driven wheel of the oil pump [3].
Unscrew the oil pump chain [4].



Remove the bolts [1] and the oil pump [2].

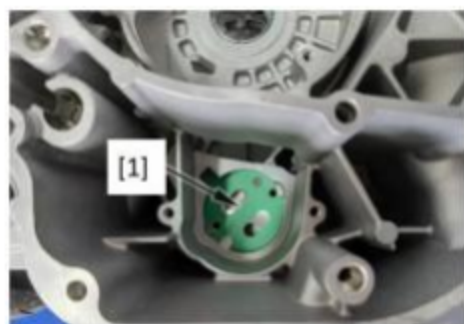
Remove the oil pump gasket [1].



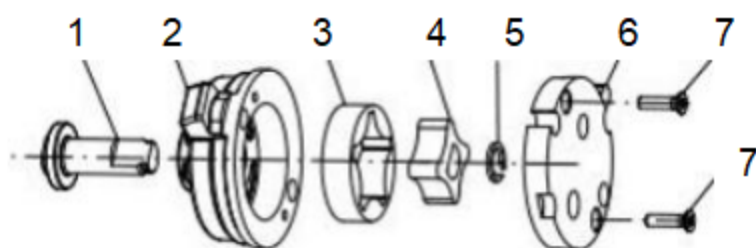
The installation process is the opposite of the disassembly process.

Note:

👉 New oil pump gaskets, timing chain cover seals, and oil pan gasket must be replaced.



16.6:Disassembly / Assembly



1 - Oil pump drive shaft 2 - Oil pump base 3 - Outer rotor 4 - Inner rotor 5 - Elastic retaining ring 6 - Oil pump cover 7 - Screw

Inspection:

👉 Inspection of the main and driven wheels of the oil pump, as well as the chain. Check whether the following components are damaged, abnormally worn, deformed, or corroded.

- Oil pump drive shaft
- Inner rotor
- Outer rotor
- Oil pump housing
- Oil pump cover

Measure the oil pump clearance according to the lubrication system specifications. If any measurement value exceeds the specified maintenance limit value, replace the oil pump assembly.

16.7:Oil filter screen

Disassembly/Installation

Disassembly

Drain the engine oil.

Remove the valve cover [1] and the sealing ring [2].



Remove the oil filter screen [1].



Installation

The installation process is the opposite of the disassembly process.

Note:

1. Replace the new sealing ring.
2. When installing the valve cover, apply the specified tightening torque.

Valve cover tightening torque:

13 N•m (1.3 kgf•m, 9.61 lb•ft).

Check

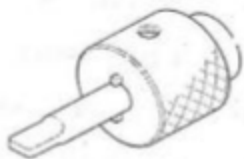
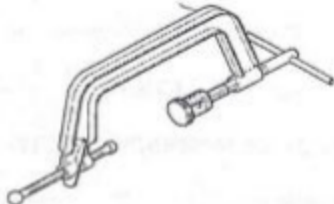
1. Check if the oil coarse filter is damaged. If it is damaged, remove the particles that are stuck on the oil filter. Just replace directly.
2. Clean the oil coarse filter with a solvent that has a high ignition point.

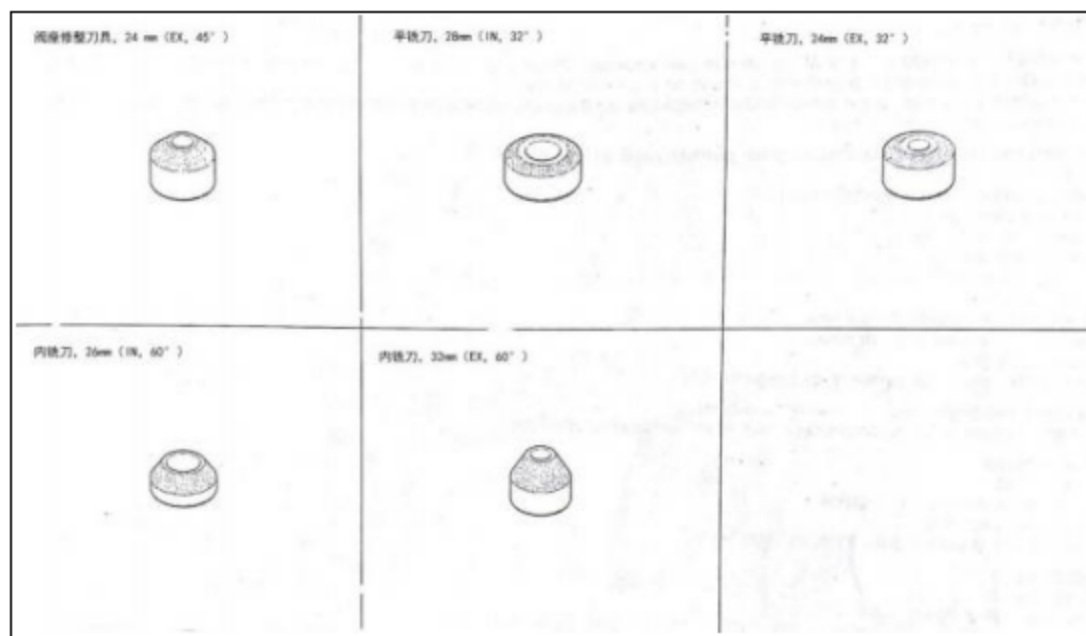
17:Cylinder head and valves

Maintenance Information Overview

- ☞ This chapter covers the maintenance and inspection of the cylinder head, valves, camshaft and rocker arms.
- ☞ When repairing the camshaft, rocker arms, tensioner adjustment screw, cylinder head and valves, there is no need to remove the engine from the frame.
- ☞ During disassembly, mark and place the disassembled parts properly to ensure correct reassembly.
- ☞ Before inspection, clean all the removed components with a cleaner and blow them dry with compressed air.
- ☞ The camshaft lubricant is injected through the oil pipes in the cylinder head and cylinder head cover. Therefore, before assembling the cylinder head and cylinder head cover, clean the oil pipes.
- ☞ When removing the cylinder head and cylinder head cover, be careful not to damage the joint surface.

Tool

压缩表附件 	张紧器固定夹 	气门弹簧压缩工具 
气门弹簧压缩附件 	阀导管驱动装置, 4.5mm 	气门导管调整驱动器 
气门导管铰刀, 4.5mm 	刀座, 4.5mm 	阀座修整刀具, 27.5mm (1IN, 45°) 



17.1:Cylinder head / valve specifications

Unit : mm

Project			Standard value	Maintenance limit value
Electric start cylinder pressure			(400 ~ 1000) kPa	400 kPa
Valve clearance		Intake valve	0.08 ~ 0.12	0.13
		Exhaust valve	0.13 ~ 0.17	0.18
Rocker arm, rocker arm shaft	Shaft inner diameter	Intake/Exhaust	10.000 ~ 10.015	10.025
	The outer diameter of the rocker arm shaft	Intake/Exhaust	9.987 ~ 9.972	9.85
	The clearance between the rocker arm and the rocker arm shaft	Intake/Exhaust	0.013 ~ 0.043	0.10
Camshaft	The protrusion height of the cam	Intake	30.126 ~ 30.226	30.116
		Exhaust	29.877 ~ 29.977	29.867
	Axle journal and hole clearance		0.022 ~ 0.062 (Small head) 0.025 ~ 0.066 (Big head)	0.10
	Fluttering		—	0.04
Valves, valve guides	Valve stem diameter	Intake	4.957 ~ 4.972	4.947
		Exhaust	4.960 ~ 4.975	4.950
	Inner diameter of the valve guide tube	Intake/Exhaust	5.000 ~ 5.012	5.030 (进) 5.040 (排)
	Clearance between the valve stem and the valve guide	Intake	0.028 ~ 0.055	0.08
		Exhaust	0.025 ~ 0.052	0.09
	Height of the catheter	Intake/Exhaust	11.7 ~ 12.3	—

	Valve seat width	Inlet / Exhaust	1.0~1.2	1.5
Free length of the valve spring			39.4	37.4
Flatness of the cylinder head			0.05	0.1

17.2: Troubleshooting

🔧 Top-end faults of the engine usually affect its performance. These faults can be diagnosed through compression tests, or the source of engine noise can be traced using a probe or a stethoscope, with the tracing range reaching the top end.

🔧 If the engine performs poorly at low speed, check if there is white smoke in the crankcase ventilation pipe. If the hose is smoking, check if the piston rings are stuck.

When the engine is running at a low speed, the compression pressure is too low, making it difficult to start or resulting in poor performance.

🔧 Valve

- Inappropriate adjustment of valve clearance
- Valve burn or bending
- Incorrect valve timing
- Valve spring fracture

🔧 Cylinder head

- Leakage or damage of the cylinder head gasket
- Warping or cracking of the cylinder head
- Loose spark plugs
- 🔧 Wear of the cylinder, piston, and piston rings

Excessive compression pressure, overheating or abnormal knocking sounds

- 🔧 Excessive carbon deposits on the piston head or in the combustion chamber

Excessive smoke emission

- 🔧 Cylinder head
 - Wear of valve stem or valve guide
 - Damage to valve stem seal
- 🔧 Cylinder, piston, piston rings

Excessive noise

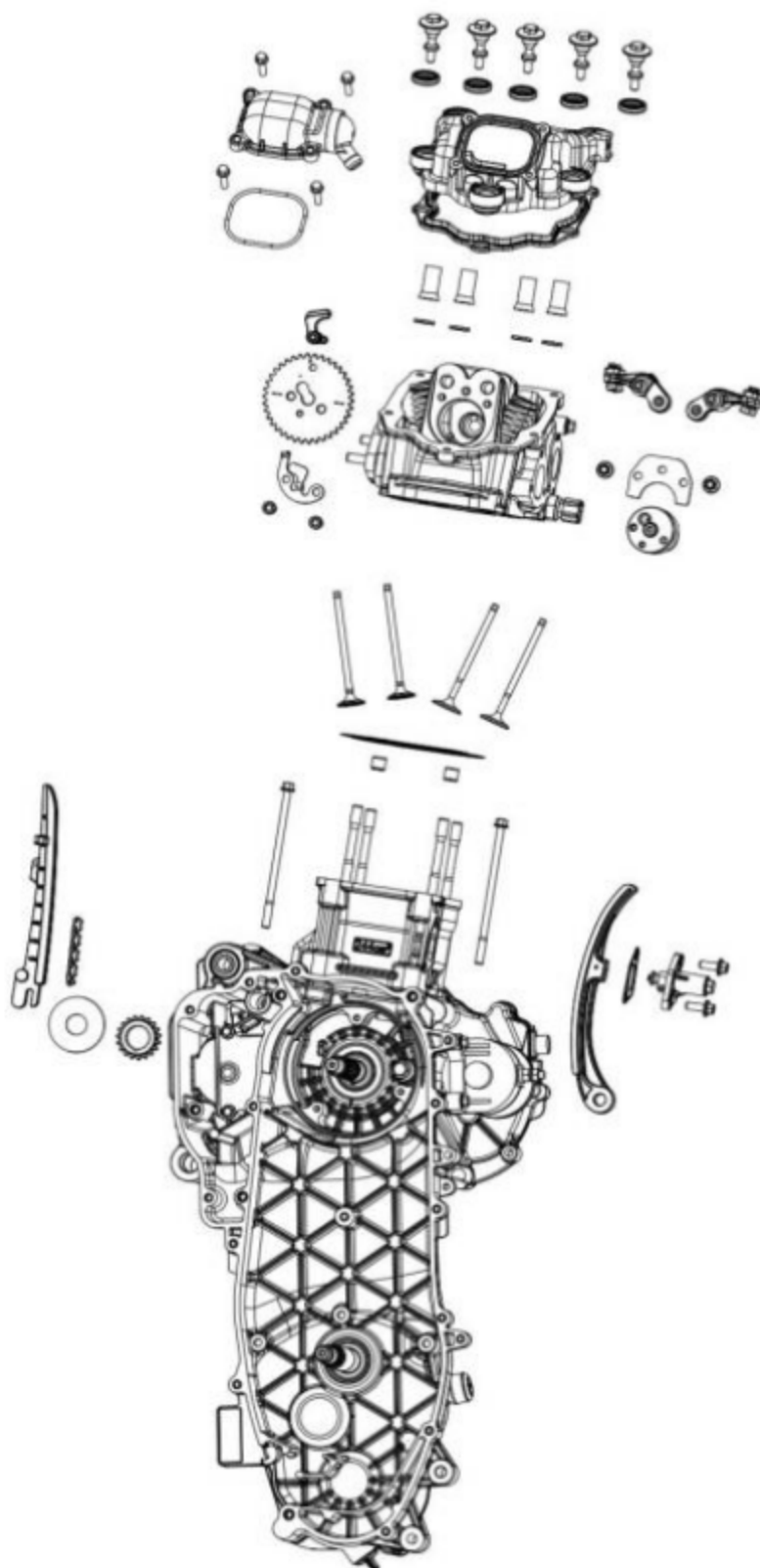
- 🔧 Cylinder head
 - Inappropriate valve clearance adjustment
 - Valve sticking or valve spring breakage
 - Camshaft wear or damage
 - Rocker arm or rocker shaft wear
 - Rocker arm and valve stem end wear
 - Timing drive pulley loosening or wear

- Timing chain wear
- 👉 Cylinder, piston, piston rings wear

Poor idle performance

- 👉 Insufficient cylinder compression pressure

17.3:Component position



17.4:Cylinder compression test

Heat the engine to its normal operating temperature.

Stop the engine, remove the spark plugs.

Temporarily install the wiring connector of the ECM.

Insert the threaded end of the cylinder pressure gauge [1] into the spark plug hole.

Tool:

[2] Compressed instrument accessories

Set the ignition switch to the "ON" position and adjust the engine switch to " ^ ".

Keep the maximum throttle open and start the engine until the pressure gauge reading stops rising.

The maximum reading usually lasts for 4-7 seconds.

Compression pressure:

At (450 - 500) r/min, it is (700 - 1000) kPa

Analysis of low-pressure causes:

- Leakage of the cylinder head gasket
- Inappropriate adjustment of valve clearance
- Valve leakage
- Wear of piston rings or cylinder
- Fault of the pressure reducing valve

Analysis of high-pressure causes:

- Carbon deposits in the combustion chamber or on the top of the piston



Cylinder head cover

Disassembly/Installation

Note:

☞ The repair of the cylinder head does not require removing the engine from the frame.

Remove the seat cushion and seat pan.

Remove the following components:

Crankcase exhaust pipe clamp [1]

Crankcase exhaust pipe [2]



Remove the cylinder head cover bolts [1] and the rubber seat [2].

Remove the cylinder head cover [3] from the cylinder head.

Note:

To prevent the cylinder head cover from moving, please stick it firmly with tape.

Remove the cylinder head gasket [1] from the cylinder head cover.

The installation sequence is the reverse of the removal sequence.

Torque:

Cylinder head bolts:

10 N•m (1.0 kgf•m, 7.41 lb•ft)

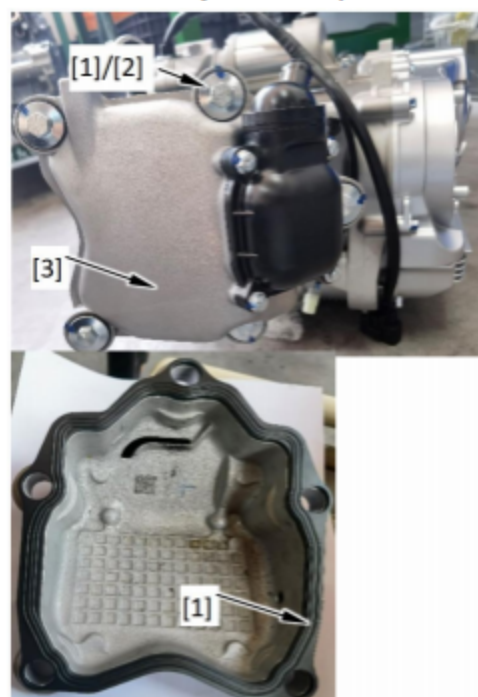
Note:

👉 Replace the new cylinder head gasket.

👉 During installation, make sure to insert the cylinder head gasket into the groove of the cylinder head.

Retriever

Remove the tensioner



Attention

This is not an automatic return-type tensioner. When the push rod is pushed out and the timing chain becomes slack during correction, the push rod will not return to its original position. The following principles should be followed:

When disassembling the tensioner, do not only remove the installation screw on one side. This is likely to damage the tensioner and the timing chain. Once the screw is loosened, it must be disassembled and reset in accordance with the instructions for installing the tensioner.

When disassembling the tensioner, do not rotate the crankshaft. This may disrupt the timing and damage the valves.

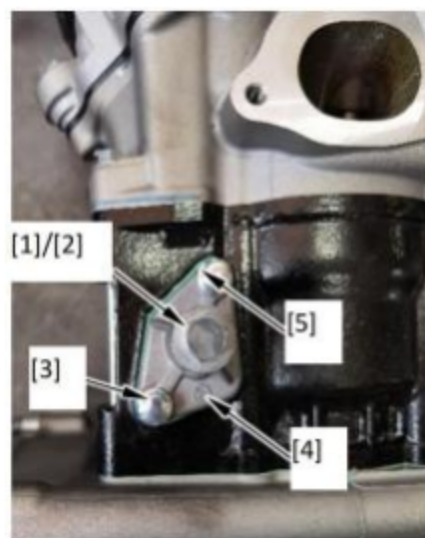
• Disassembly:

Tensioner bolt [1] and sealing ring [2]

Tensioner installation bolt [3]

Tensioner [4]

Tensioner sealing gasket [5]



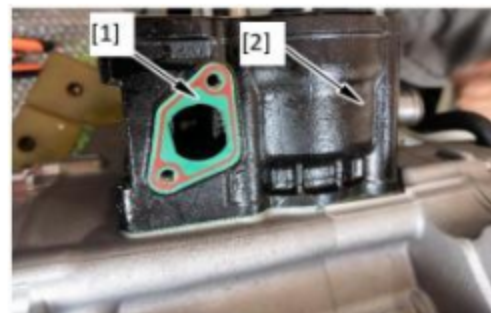
Install the tensioner

Press the wedge block [1], and push the push rod [2] with your hand until the push rod is in place. Then release the wedge block.

Attention
Do not rotate the push rod counterclockwise before installing the tensioner. This may cause the push rod to come off and prevent the tensioner from being reinstalled.

Replace the new tensioner gasket [1].

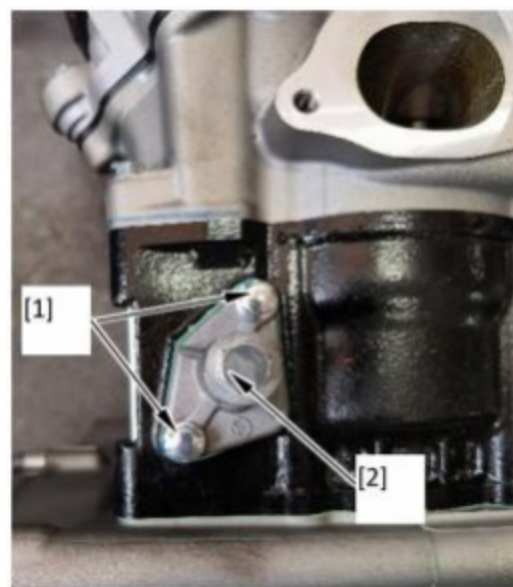
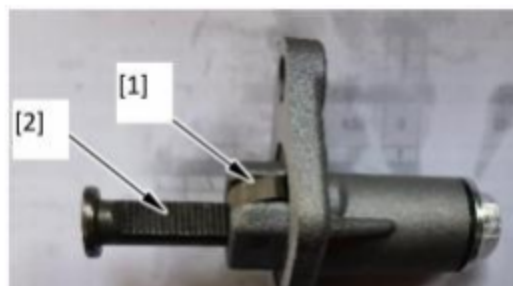
Install the compressed tensioner on the cylinder block [2].



- Tighten the mounting bolts [1] of the tensioner.

Torque: 10 N•m (1.0 kgf•m, 7.4 1 lb•ft).

- Replace a new sealing ring.
- Apply an appropriate amount of oil on the new sealing ring.
- Install the new sealing ring and tighten the tensioner bolts [2].
- Install the disassembled parts.



17.5: Valve rocker arm and valve rocker arm shaft

Remove the valve rocker arm

- Removal:

Timing drive pulley mounting screw [1]

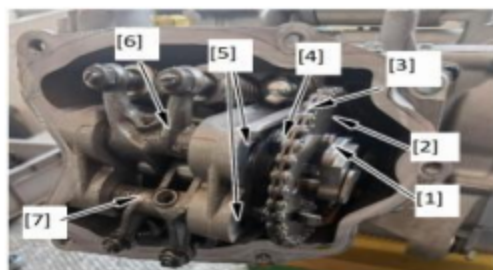
Timing drive pulley [2]

Support the timing chain with a suitable tool [3]

Remove the camshaft retaining bolt [4]

Remove the valve rocker shaft with a suitable tool [5]

Intake valve rocker [6], Exhaust valve rocker [7]

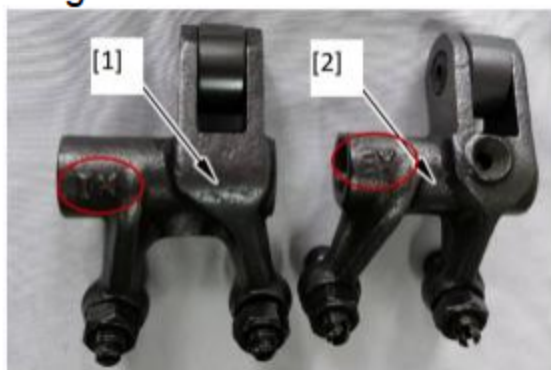


• Mark and record the position of the valve rocker so that it can be installed back to its original position.

- Remove the valve rocker and the rocker shaft together.

Attention

Make sure the intake and exhaust valve rocker arms are not installed incorrectly. As shown in the picture on the right, [1] is the intake valve rocker arm, marked as "IN", and [2] is the exhaust valve rocker arm, marked as "EX".



Install the valve rocker arms

- Apply oil to the following parts:

Valve rocker arm shaft

Rocker arm installation hole

- Install the following parts according to the diagram:

Intake valve rocker arm [1]

Exhaust valve rocker arm [2]

Valve rocker arm shaft [3]

17.6: Check the valve rocker arm and the valve rocker arm shaft.

- Inspect the outer circle of the roller bearing on the valve rocker arm [1].
- ★ If the rocker bearing has scratches, collapse or any other damage, replace the valve rocker arm and also check the camshaft tip.
- Check the position where the valve adjustment screw [2] contacts the valve.
- ★ If the end of the valve adjustment screw shows a mushroom-like shape or any other damage, or the screw cannot rotate smoothly, replace it and also check the end of the valve.
- Insert the valve rocker arm shaft into the valve rocker arm and measure the clearance.
- ★ If the clearance exceeds the usage limit, replace it simultaneously.

Valve rocker arm/valve rocker arm shaft clearance

Standard: (0.013 - 0.043) mm

Usage limit: 0.10 mm.



17.7:Camshaft

Remove the camshaft

Disassembly:

Cylinder head cover

Tensioner

Timing drive wheel (when piston reaches top dead center)

Support the timing chain with the appropriate tool

Remove the camshaft retaining bolt

Remove the valve rocker shaft and intake and exhaust rocker arms

Remove the pressure plate assembly of the relief valve [1]

Remove the camshaft [2]

Install the camshaft

- Before assembling the camshaft, apply engine oil to all the mating surfaces of the camshaft [2].

- Install the camshaft retaining plate and bolts.

Bolt torque:

10 N•m (1.0 kgf•m, 7.4 1 lb•ft)

- Join the timing chain and the timing driven pulley.

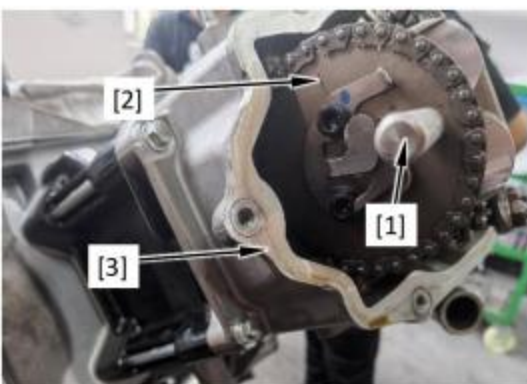
- Assemble the pressure relief valve assembly and the pressure relief valve retaining plate.

- Assemble the driven pulley bolts.

Bolt torque:

10 N•m (1.0 kgf•m, 7.4 1 lb•ft)

- Align the timing pinhole of the timing driven pulley with the timing pinhole of the cylinder head. Use the timing pin [1] to fix it; the straight line marked with the line "-" [2] should be parallel to the top surface of the cylinder head [3] (with the intake and exhaust cam tips pointing downwards).



- Install the tensioner.
 - Rotate the crankshaft clockwise for 2 turns to open the tensioner.
- Then recheck the timing and adjust the valve clearance.
- Install the removed components.

Check for camshaft wear

- Remove the camshaft.
 - Use a micrometer to measure the height A of the cam.
- ★ If the measured value exceeds the cam wear limit, replace the camshaft.

Cam height

Standard:

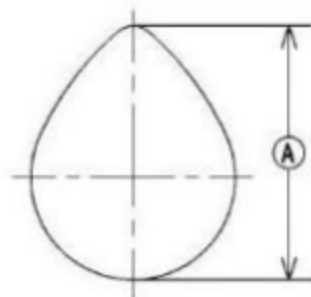
Intake: (30.126 - 30.226) mm

Exhaust: (29.877 - 29.977) mm

Limiting value:

Intake: 30.116 mm

Exhaust: 29.867 mm



Disassembly of the timing chain

- Disassembly:

Cylinder head cover assembly

Cylinder head assembly

Chain guide plate [1]

Cylinder block

Timing chain cover

Oil pan

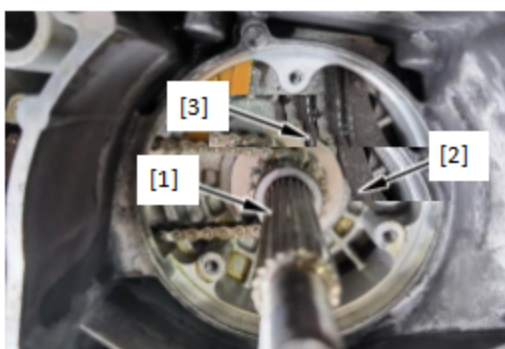
Oil pump driven gear

Oil pump chain

Oil pump driving gear [1]

Chain tensioner plate [2]

Remove the timing chain from the timing driving gear [3] on the front.



Install the timing chain

- Attach the timing chain [1] to the timing drive gear.
- Installation:

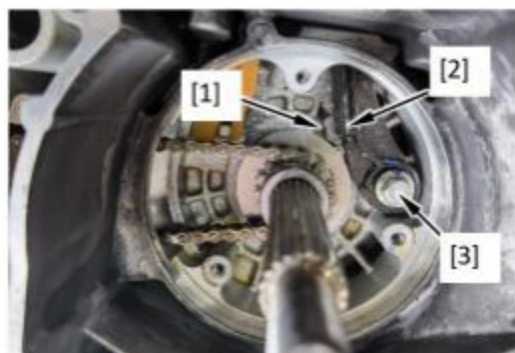
Chain tensioning plate [2]

Tensioning plate bolts [3]

Torque for tightening:

10 N·m (1.0 kgf·m, 7.4 1 lb·ft).

- Install and remove the disassembled parts.



Check for wear on the chain guide plate and tension plate

- Conduct a visual inspection of the bonding on the guide plate and tension plate Face
- ★ If the rubber is damaged, cut or peels off, replace the guide plate and tension plate.

17.8:Cylinder head

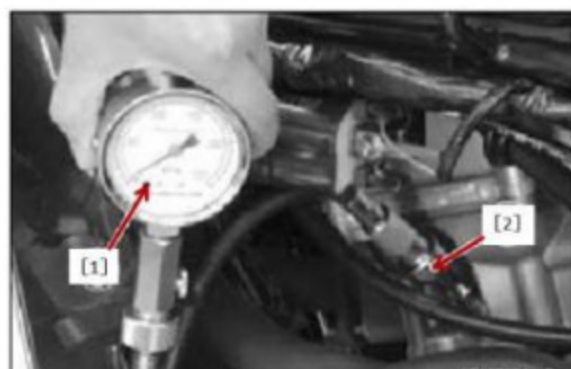
Measure cylinder pressure

Attention
Use a fully charged battery.

- Preheat the engine and then stop.
- Remove the spark plugs.
- Firmly connect the cylinder pressure gauge [1] and the adapter [2] into the spark plug hole.

Tools - Cylinder pressure gauge: 20 kg/cm²

Adapter: M10×1



- Start the engine and fully open the throttle until the cylinder pressure gauge reading stops increasing. At this point, the reading on the cylinder pressure gauge will be the maximum cylinder pressure.

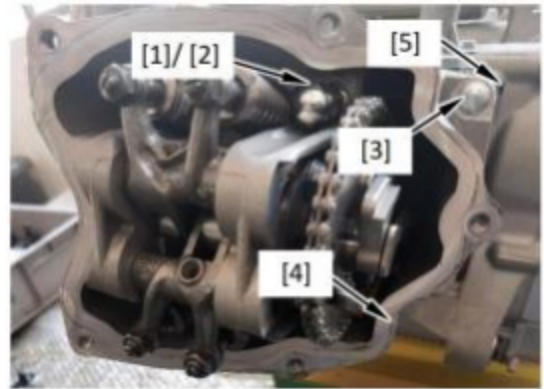
Cylinder pressure range: (400 - 1000) kPa.

If the cylinder pressure gauge reading is not within the available range, please refer to the following table:

Question	diagnosis	Remedial measures
The cylinder pressure is above the operational range	The piston is clogged with carbon, and the cylinder head and combustion chamber may be damaged due to the failure of the oil shield and/or the piston oil ring (resulting in smoke emission)	If necessary, remove the carbon deposits and replace the damaged parts.
	Incorrect thickness of the cylinder head gasket	Replace with standard-sized sealing gaskets
Cylinder pressure is below the operational range	There is gas leakage around the cylinder head.	Replace the damaged gasket and check for deformation of the gun head
	Abnormal valve spring seat	Replace when necessary
	Incorrect valve clearance	Adjust the valve clearance
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder
	Piston cylinder seizure	Inspect the cylinder. If necessary, replace/maintain the cylinder and/or piston.
	Abnormality of piston rings and/or piston ring grooves	Replace the piston and/or piston rings.

Disassembly of the cylinder head

- Drain the coolant
- Remove:
 - Intake pipe
 - Exhaust pipe
 - Spark plug cap
 - Timing drive pulley
 - Cylinder head nut [1] and washer [2]
 - Hexagonal head flange bolt [3]
 - Cylinder head [4] and cylinder head gasket [5]



Install the cylinder head

- Replace a new cylinder head gasket.
- Install:
 - Positioning pin [1]
 - New cylinder head gasket [2]
 - Cylinder head
 - Camshaft
- Tighten the cylinder head nut and hexagonal head flange bolt.

Assembly requirements: Tighten the nuts diagonally, first with a preload of 10N•m, then with a torque of 30N•m.

Torque:

30N•m (3.0kgf•m, 22.21bf•ft).

Torque for hexagonal flange bolt:

10N•m (1.0kgf•m, 7.41bf•ft).



Clean the cylinder head

- Remove the cylinder head;
- Use the appropriate tools to scrape off the carbon deposits in the combustion chamber and the exhaust port;
- Clean the cylinder head with a high-temperature solvent.

Check for cylinder head deformation

- Clean the cylinder head;
- Place a straightedge on the lower surface of the cylinder head;
- Use a feeler gauge [1] to measure the gap between the straightedge [2] and the lower surface of the cylinder head at several positions.

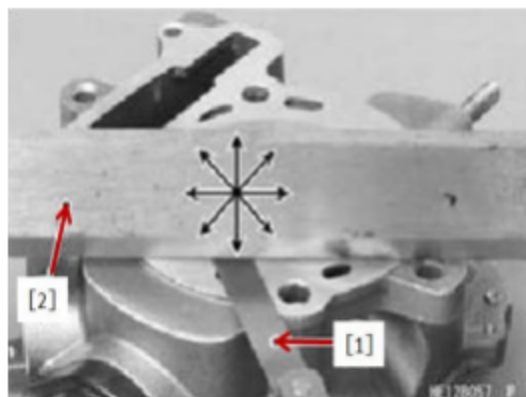
Deformation of the cylinder head

Standard: No gap

Maximum usage limit: 0.1mm

★ If the deformation of the cylinder head exceeds the maximum usage limit, please replace it.

★ If the deformation of the cylinder head is below the maximum usage limit, grind the lower surface with fine sandpaper.



17.9:Valve

Check the valve clearance

Attention
Only when the engine has cooled down to normal temperature can the valve clearance be checked.



Disassembly:

Cylinder head cover

View hole cover and sealing ring on the right cover

Breathing groove cover plate

Breathing groove filter assembly

· Rotate the driving pulley counterclockwise until the "T" mark [1] on the magnetic motor rotor aligns with the protrusion mark [2] on the right crankcase cover, as shown in the figure. This is at the end of the compression stroke of the cylinder.

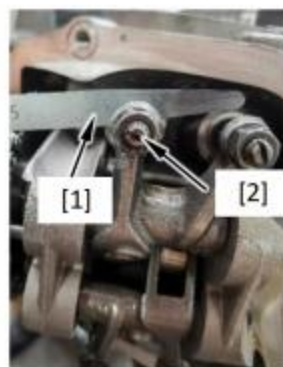
· Use a feeler gauge [1] to measure the valve clearance. Measure the gap between the end of the valve stem and the adjusting screw [2].

· Valve clearance (at cold engine)

Intake valve: (0.08 - 0.12) mm;

Exhaust valve: (0.13 - 0.17) mm;

★ If the valve clearance is incorrect, adjust the valve clearance.



Adjust valve clearance

· Loosen the locking nut and rotate the adjusting screw until the clearance is correct.

· Hold the adjusting screw [1] steady and tighten the locking nut [2].

Locking nut tightening torque:

10 N·m (1.0 kgf·m, 7.4 1 lb·ft).

Tool - Adjusting screw holder.

· Recheck the valve clearance.

★ If the clearance is incorrect, re-adjust.

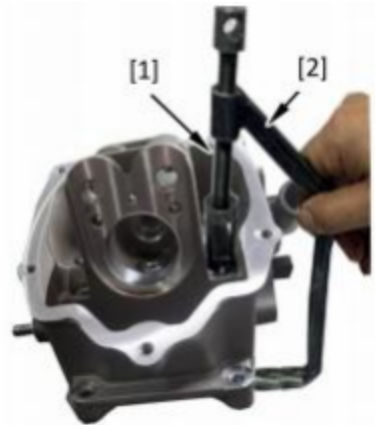
★ If the clearance is correct, adjust the clearance of another valve.



Remove the valve

- Remove the cylinder head;
- Mark the valve positions so that they can be installed back to their original positions;
- Remove the valve using the valve spring compression device [1] and the adapter [2].

Tools - Valve spring compression device;
- Adapter.



Exhaust valve: 0.09mm

Install the valves

- Replace the oil seal cover [3].
- If new valves are to be used, check the clearance between the valve [1] and the valve guide.
- If the clearance is too large or too small, replace the cylinder head or the valve.
- Apply engine oil to the valve stem, install the valve and the spring seat [2].
- Install the valve spring [4], with the spring flange facing upwards and the compression ring facing downwards.
- Install the valve spring seat [5].
- Install the lock clip [6]

Measure the clearance between the valve and the valve guide.

- Measure the outer diameter of each valve stem and the inner diameter of each valve guide.
- Subtract the outer diameter of the valve stem from the inner diameter of the valve guide to obtain the clearance between them.

★ If the clearance exceeds the usage limit, replace the cylinder head or the valve.

Valve and valve guide clearance

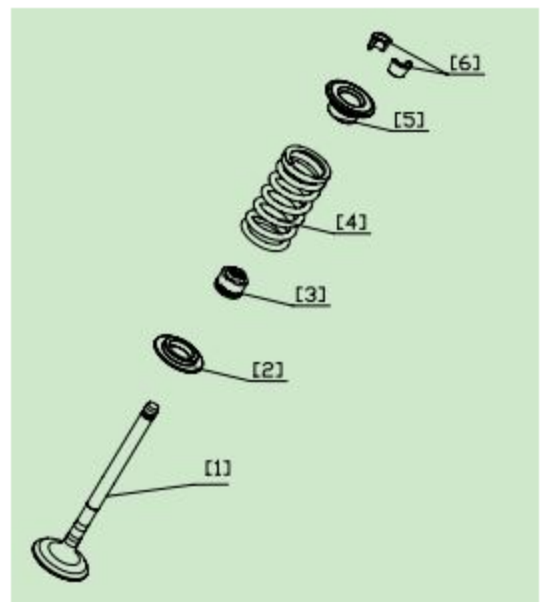
Standard:

Intake valve: (0.028 - 0.055) mm

Exhaust valve: (0.025 - 0.052) mm

Usage limit:

Intake valve: 0.08 mm



18:CVT system

Maintenance Information

Overview

. This chapter explains the maintenance of the CVT system. All operations do not require removing the engine from the frame.

Tool



Clutch driving disc tooling



Clutch driving disc tooling

18.1:CVT System Specifications

Unit: mm

Project		Standard	Usage Limit
Belt	Width of the belt	21~22	20
Active pulley component	Diameter of the installation hole for the sliding drive disc	24~24.021	24.071
	Outer diameter of the sleeve of the sliding drive disc	23.959~3.98	243.94
	Outer diameter of the roller	20.9~21.1	20.6
The driven pulley component	The diameter of the installation holes for the driven sliding disc assembly	41~41.025	41.075
	The diameter of the installation shaft for the driven fixed disc assembly	40.966~40.991	40.926
	The free length of the compression spring	122.7	117.7
	The thickness of the friction material for the clutch shoe assembly	3.25~3.35	1
	The inner diameter of the clutch outer disc in mm	134~134.2	134.5

Troubleshooting

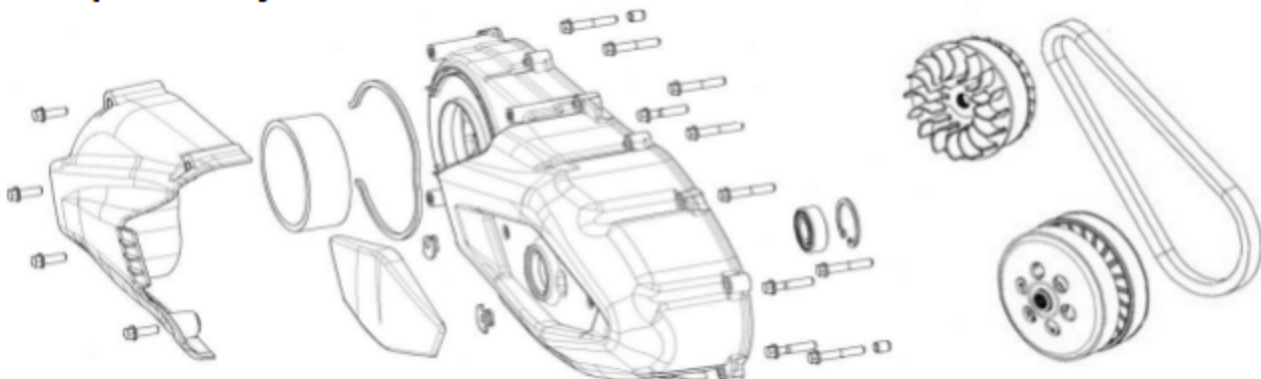
Slippage of the clutch during acceleration

- ☞ Belt wear
- ☞ Wear or erosion of the clutch shoes

Clutch abnormal noise

- ☞ The welding joint of the clutch friction disc is loose
- ☞ The clutch lubricating grease has failed
- ☞ The clutch moving roller is abnormally worn
- ☞ The edge part of the clutch slope plate is abnormally worn
- ☞ The shock-absorbing rubber pad of the clutch shoe is worn

Component layout



18.2:Left crankcase cover

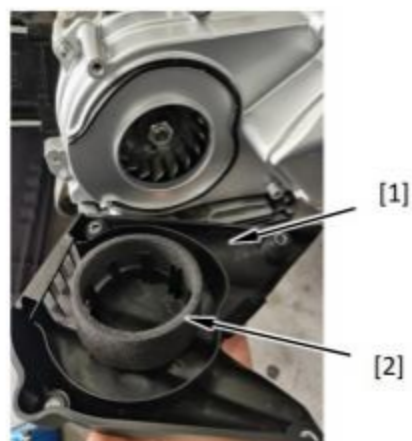
Remove the left crankcase cover

· Removal:

Exhaust flange cover bolts [1] and left decorative cover [2]



Remove the outer cover plate [1] of the breathing channel and the filter [2] of the breathing channel.



Remove the sealing strip [1]



The fastening nuts and washers of the driven wheel [1]



**Left cover mounting bolt [1]
Left crankcase cover [2]**



Install the left crankcase cover

- Replace the new breathing channel filter screen
- Install:

Left crankcase cover

Sealing strip

Breathing channel filter screen

Breathing channel outer cover plate

Left decorative cover

- Tighten the bolts of the left crankcase cover and the outer cover plate of the breathing channel.

Left crankcase cover tightening torque:

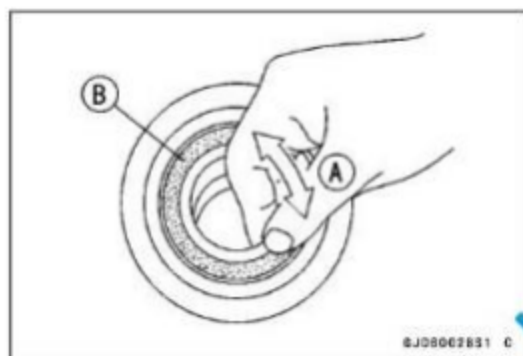
10 N·m (1.0 kgf·m, 7.4 1 lb·ft)

Breathing channel outer cover plate tightening torque:

10 N·m (1.0 kgf·m, 7.4 1 lb·ft)

·Inspect the bearings

Attention
Do not remove the bearing for inspection. If the bearing is removed, a new one will need to be replaced.



- When checking for any gaps or whether the bearing rotates smoothly, turn the bearing A back and forth.

★If you find any gaps, roughness or adhesion in the bearing, replace it.

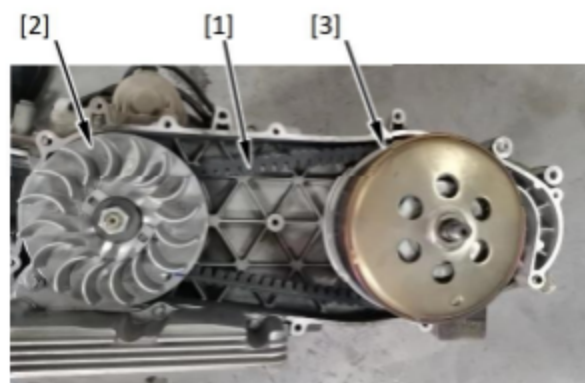
- Check if there are any cracks on the end face B of the bearing.

18.3:Belt

Remove the belt

- Remove the active pulley component.
- Remove the clutch friction disc.

Attention
Before disassembling, observe the orientation of the information (such as the manufacturer's name) engraved on the belt, so that the belt can be reinstalled on the pulley and rotate in the same direction as the initial installation.



- Remove the driving pulley component [2] and the driven pulley component [3].

Install the belt

Attention
Make sure that the imprint information is in the same direction, so that the belt can be installed back in its original rotation direction. When installing a new belt, the imprint information [1] can be read from the side of the vehicle.

The installation steps are the opposite of the disassembly steps.

Check for belt wear

Warning

Any improper operation or clutch stall and slipping may cause severe wear or damage to the belt, jam the transmission and the wheels. This may result in the operator losing control and causing an accident, leading to injury or death. Perform maintenance according to the maintenance schedule.

- Remove the left crankcase cover.
- As shown in the figure, place a pair of appropriate straight rulers at several positions to measure the width A of the belt.
- ★ If the measurement value exceeds the usage limit, replace the belt.
- Belt width

Standard: (21 - 22) mm

Maximum usage limit: 20 mm

- Check if the belt has cracks, breaks or peeling.
- Inspect and clean the belt every 6000 km (6 months).

Replace it when necessary based on the wear condition.

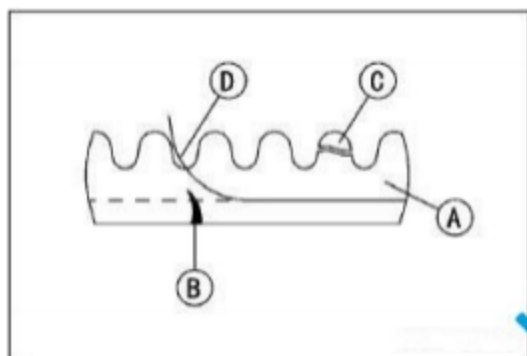
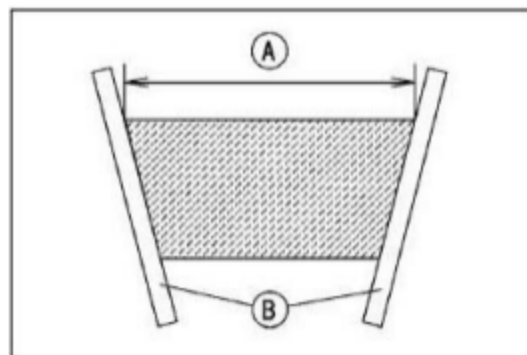
Replace it at 12000 km. .

Belt A

Crack B

Breakage C

Peeling D



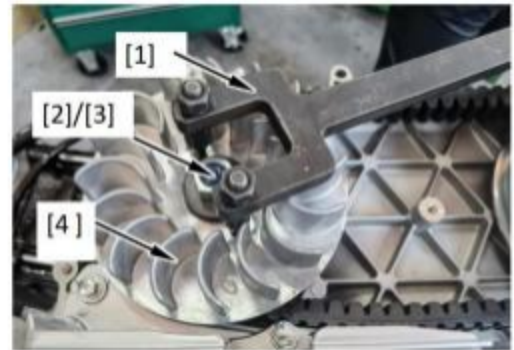
Attention

When replacing the belt, check the driving pulley components and the driven pulley components.

18.4:Active pulley component

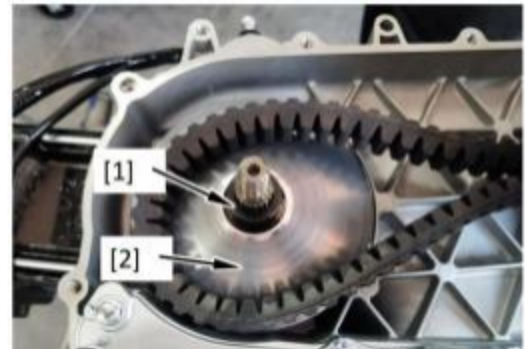
Disassemble the active pulley component

- Remove the left crankcase cover component.
- Install the anti-turning tool [1], then remove the active pulley mounting nut [2] and washer [3].
- Remove the drive disc [4].

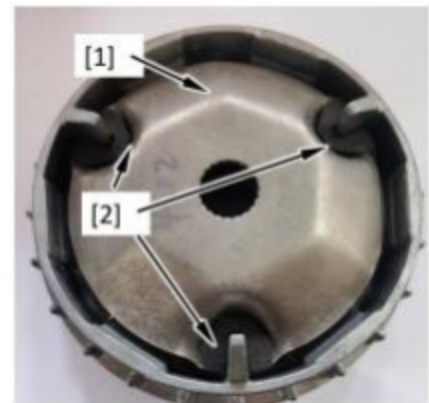


Tools - Anti-turning tool.

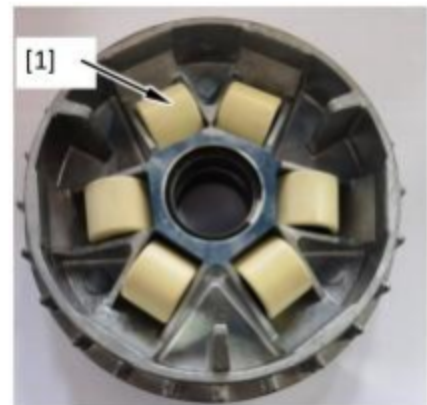
- Remove the sliding drive disc sleeve [1]
- Remove the sliding drive disc assembly [2]



- Remove the slope board [1] and the edge pieces of the slope board [2]

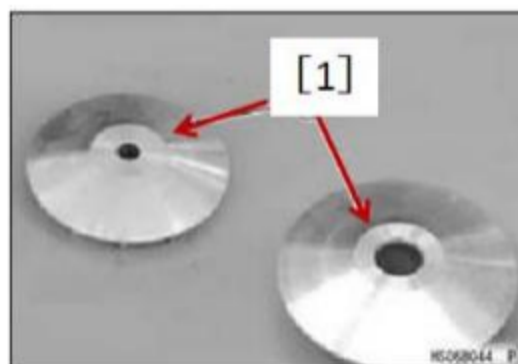


- Remove the counterweight roller [1]



Inspect the driving pulley components

- ★ If the surface [1] of the driving pulley is damaged, replace the sliding drive disc and/or the drive disc.
- ★ If the installation holes of the drive disc are damaged or worn, replace it.



- Diameter of the installation hole for the sliding drive disc A

Standard: 25.03 - 25.07 mm

Maximum usage limit: 25.12 mm

- ★ If the sleeve is damaged or worn out, please replace it.

- **Outer diameter of the bushing A**

Standard: 25 - 25.025 mm

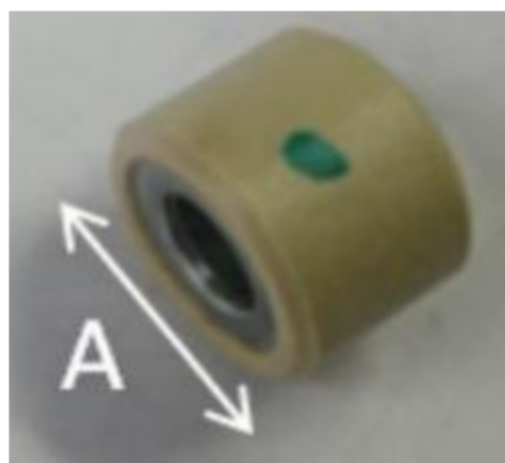
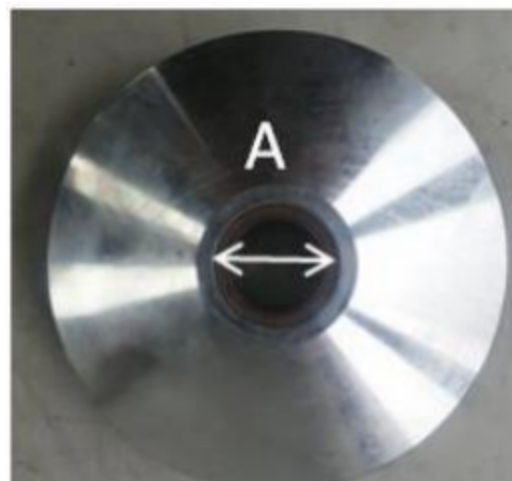
Maximum usage limit: 24.96 mm

- ★ The rollers should be inspected and cleaned every 6000 km (6 months). Replace them when necessary based on the wear condition.

- Outer diameter A of the rollers

Standard: 20.9 - 21.1 mm

Maximum usage limit: 21.4 mm



Install the active pulley component

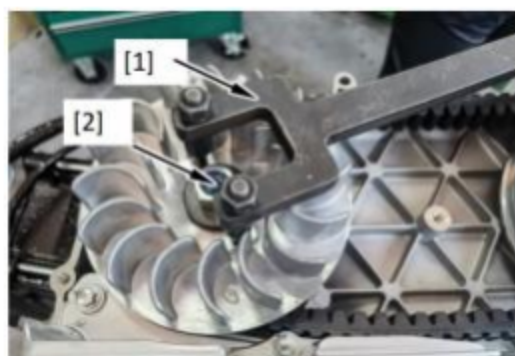
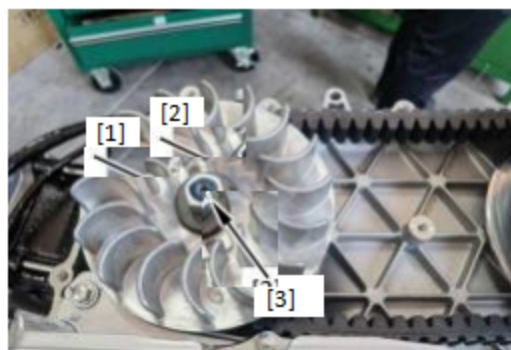
- Installation and disassembly are exactly the opposite. Note: Clean the following parts with the degreasing cleaner, and then Dry the conical surface of the drive disc with a clean cloth

Warning

These cleaners are usually highly flammable and prolonged inhalation can be harmful. Be sure to pay attention to the manufacturer's warnings.

When installing the drive disc [1], press the sliding drive disc sleeve to compress it, move the belt to the lowest position outward, then install the gasket [2], and after applying thread locking adhesive to the threads of the nut [3], assemble it.

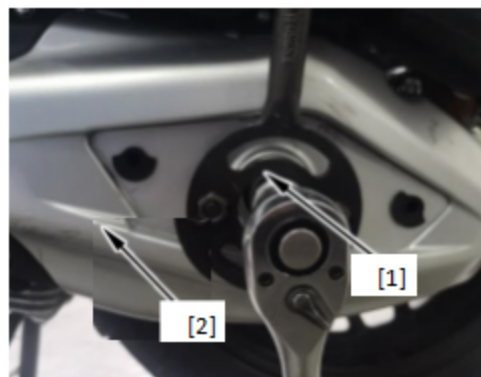
- Install the anti-turning fixture [1]
 - Tighten the belt pulley nut [2]
- Torque of the main belt pulley nut:**
80N·m (8.0kgf·m, 59.2 lbf·ft).
Tool - Anti-turning fixture.



18.5: The driven pulley component

Remove the driven pulley component

- Remove the fastening nut and washer of the driven pulley [1]
- Remove the left crankcase cover [2]
- Remove the driving pulley component [1]
- Remove the driven pulley component [2] and the belt [3]



• **Inspect the clutch**

- Check if the clutch shoes are damaged.
- ★ If there is any damage, replace it.
- Measure the thickness of the clutch lining A.
- ★ If the thickness of the lining wears beyond the usage limit, replace the clutch shoes.
- Clutch lining thickness

Standard: (3.25 - 3.35) mm

Usage limit: 1 mm

- Check if the outer disc of the clutch is damaged.
- ★ If there is any damage, replace it.
- Measure the inner diameter A of the outer disc of the clutch.
- ★ If the outer disc of the clutch is worn beyond the usage limit, please replace it.
- Outer diameter of the clutch disc

Standard: (134 - 134.2) mm

Usage limit: 134 mm

Install the driven pulley component

- Install the belt and the driven pulley component.
- Install the outer disc of the clutch and the left crankcase cover.
- Tighten the installation nut of the driven pulley.

Torque for tightening the pulley installation nut:

80 N•m (8.0 kgf•m, 59.2 lb•ft).

Tool - anti-rotation fixture.



19:Magnetic motor and starting clutch

Maintenance Information

Overview

- ☞ This chapter covers the maintenance of the magnetic motor stator and rotor. All operations do not require removing the engine from the frame.
- ☞ Inspection of the trigger.
- ☞ Maintenance of the starting motor.

Specifications of the magnetic motor and the starting clutch

Project	Standard Value	Maintenance Boundary Value
Outer diameter of the boot for the drive shaft of the starting disk	45.660~45.673	45.560
Length of the common normal line of the driving wheel of the double-link gear	23.395~23.445	23.455
Length of the common normal line of the driven wheel of the double-link gear	21.707~21.754	21.764

Unit: mm

Tool



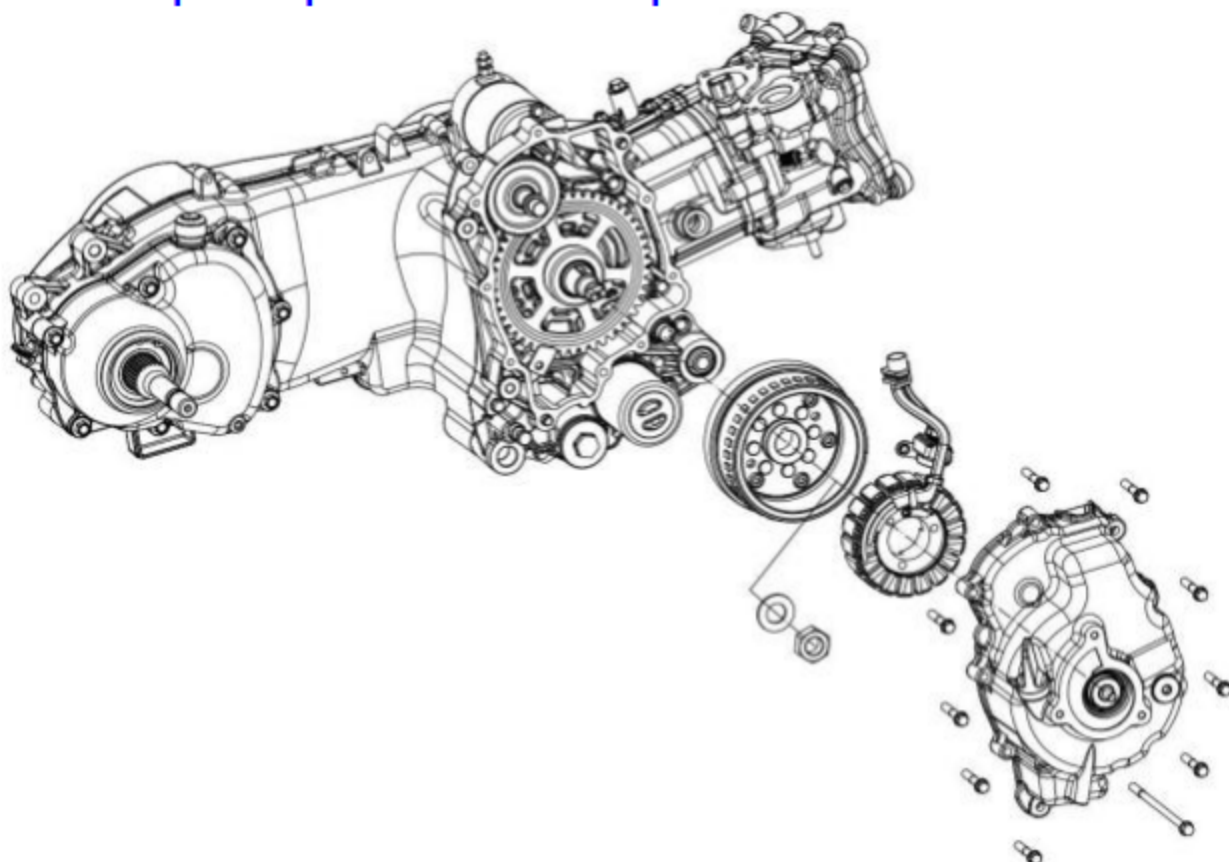
Magnetic motor rotor tooling

Troubleshooting

The motor starts but the engine does not start.

- ☞ The start clutch is faulty.
- ☞ The dual gear of the start motor is faulty.
- ☞ The small gear of the start motor is faulty or worn out.
- ☞ The drive gear of the starter is faulty.

19.1:Component position relationship



19.2:Right crankcase cover

Disassembly / Installation

Note:

When removing the right crankcase cover, place a clean oil pan at the bottom of the engine to prevent the oil from leaking. After installation, add the recommended engine oil to the specified quantity.

Place the motorcycle on a level surface and keep it upright.

Remove the muffler [1].

Remove the magnetospinners, trigger wire connector plugs from the frame.

Loosen the right crankcase cover bolts [2] in steps along the diagonal.

Remove the following components:

- Bolts
- Right crankcase cover assembly [3] Note:

The pinion mounted on the upper part of the right crankcase cover is subjected to the magnetic attraction of the rotor. Be careful when disassembling and installing it.



Remove the locating pin [1] and the paper gasket [2].

Clear all the sealing gaskets on the joint surface of the right crankcase and the cover.
Material.

The installation sequence is the reverse of the disassembly sequence.

Torque:

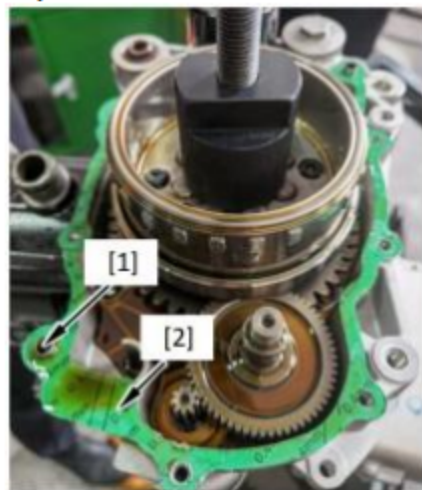
Right crankcase cover bolt:

10N·m (1.0kgf·m, 7.41bf·ft) Note:

Replace the new sealing gasket of the right crankcase cover.

Check the oil level.

Make sure there is no oil leakage.



19.3:Magnetic motor rotor and trigger

Disassembly / Installation

Remove the right crankcase cover assembly.

Remove the magnetos/trigger wiring sleeve [1]

Remove the trigger [2] and the bolt [3]

Remove the magnetos core [4] and the bolt [5]

When assembling, pay attention to:

☞ Apply thread sealant to the threads of the core bolt.

☞ Apply end face sealant to the sealing surface of the magnetos/trigger wiring sleeve.

The installation sequence is the reverse of the disassembly sequence.

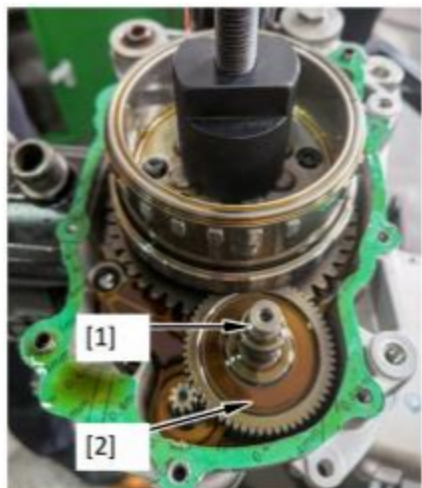


Magnetic motor rotor

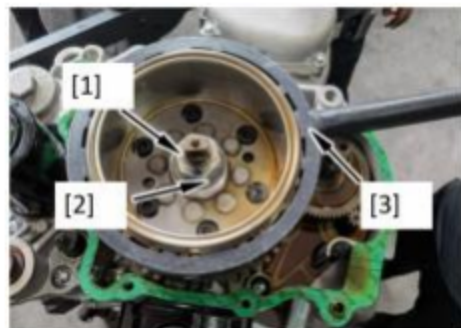
Disassembly

Remove the right crankcase cover assembly.

Remove the double gear shaft [1] and the double gear [2].



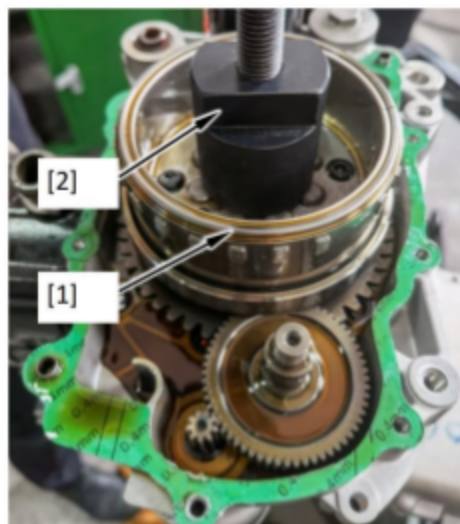
Remove the nut [1] and the washer [2].
Tool - Torque Stop Tool [3].



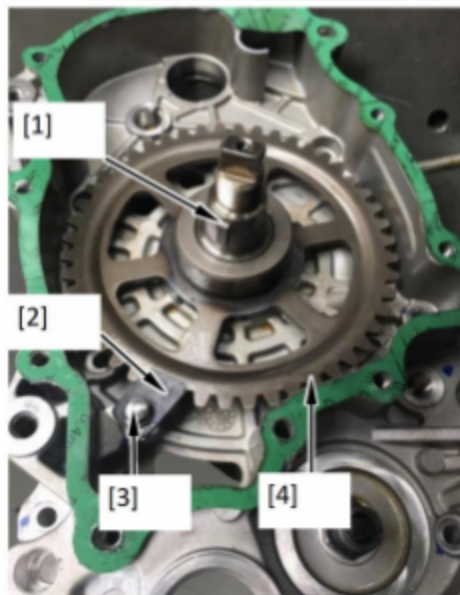
Use the tool to remove the rotor [1].

Tools:

Rotor Disassembler [2]



Remove the semi-circular key [1].
Remove the starting disk tooth retaining plate [2] and the bolt [3].
Remove the starting disk tooth [4].
Be careful not to damage the semi-circular key slot and the crankshaft.



Check

Check whether the following components are scratched, damaged, abnormally worn or deformed. If necessary, replace them.

- Dual gear shaft
- Dual teeth
- Semi-circular key
- Starting disc teeth

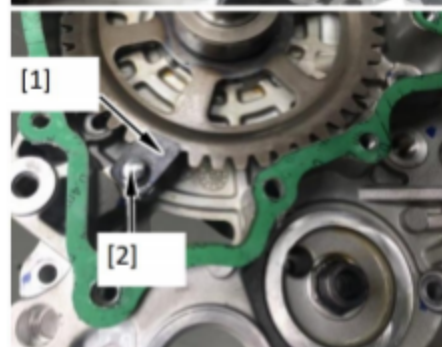
Installation

Install the semi-circular key [1].

Be careful not to damage the semi-circular key slot and the crankshaft.

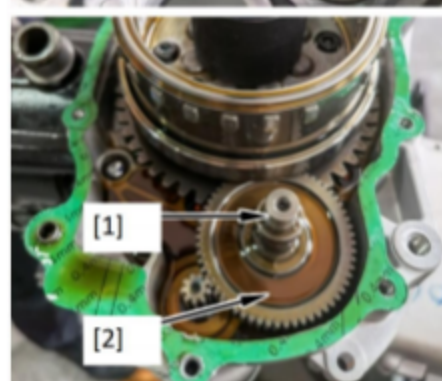


Install the disk tooth pressing plate [1] and the bolts [2].
Torque: 10 N•m (1.0 kgf•m, 7.41 lb•ft)



Apply the molybdenum disulfide solution to the outer surface of the double-gear shaft.

Install the double-gear shaft [1] and the gears [2].



Thoroughly clean the oil from the camshaft cone surface and the inner hole of the rotor.

Install the rotor [1], and be sure to align the semi-circular key [2] on the crankshaft with the key slot on the rotor.



Apply clean engine oil to the threaded surfaces and installation surfaces of the rotor bolts.

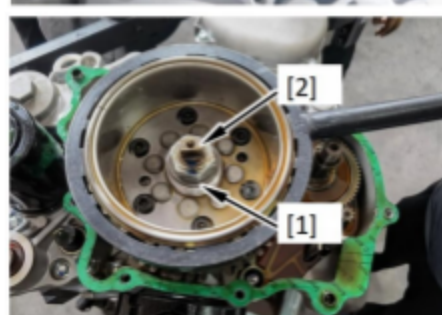
Install the gasket [1] and the nut [2].

Tighten the nut to the specified torque. Note:

Fix the rotor holder of the magnetic motor rotor to prevent it from rotating.

Torque: 100N•m (10kgf•m, 74 1bf•ft)

Install the right crankcase cover assembly.



19.4:Engage the clutch

Start clutch operation check

Remove the rotor.

Check the operability of the starter clutch by rotating the disc teeth [1].

Check if the disc teeth rotate clockwise smoothly and without counterclockwise rotation. Disassembly

Remove the rotor.

Rotate the gear clockwise and remove the gear [1].

Check

Check whether the following components are scratched, damaged, abnormally worn or deformed.

If necessary, replace them.

- Spokes
- Starting clutch

Ensure that all components are in accordance with specifications.

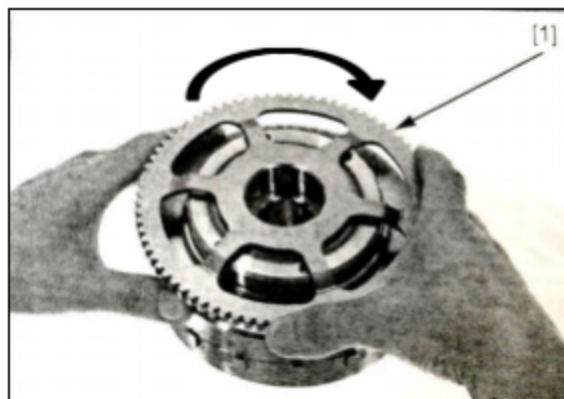
If they exceed the repair limit values, replace the components.

Installation

Turn the gear [1] clockwise and install it onto the outer cover of the starter clutch.

Check the operability of the starter clutch.

Install the rotor.



20:Cabinet and transmission system

Maintenance Information

Overview

👉 The crankcase must be separated in order to serve the following components:

1. Transmission system
2. Crankshaft
3. Piston, connecting rod, cylinder block

👉 Before separating the crankcase, the following components must be removed:

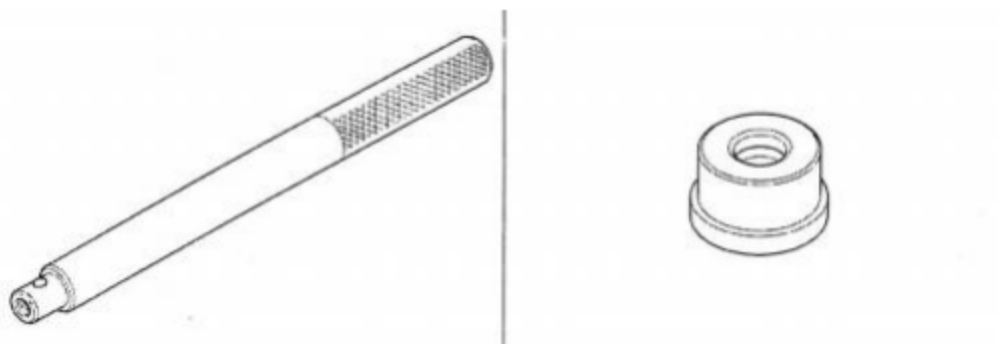
1. Engine
2. Starter motor
3. Magneto assembly
4. Cylinder head components
5. Tensioner
6. Tension plate, guide plate
7. Oil coarse filter
8. Oil fine filter
9. Water pump
10. Water pipe
11. Oil pressure sensor

👉 Be careful not to damage the joint surface of the box during maintenance.

👉 Clean the oil passage before assembling the crankcase.

👉 Mark the crankshaft bearing with the appropriate color. Select the bearing according to the requirements in the bearing selection table. Check the oil gap after installing the bearing. An incorrect oil gap may cause major damage to the engine.

Tool



20.1:Box body and transmission system specifications

Project			Standard Value	Maintenance Boundary Value
Transmission mechanism	Spindle	Clutch shaft diameter	14.98~14.99	14.97
		Left bearing shaft diameter	16.98~16.99	16.97
		Right bearing shaft diameter	19.98~19.99	19.97
		Spiral gear pitch line length	11.875~11.912	11.922
	Transmission shaft	Left and right bearing shaft diameters	14.98~14.99	14.97
		Spiral gear pitch line length	13.645~13.688	13.698
	Transmission pinion gear	Spiral gear pitch line length	30.079~30.126	30.136
	Output shaft	Left bearing shaft diameter	14.98~14.99	14.97
		Right bearing shaft diameter	29.974~29.987	29.964
	Output shaft gear	Spiral gear pitch line length	24.338~24.385	24.395

Troubleshooting

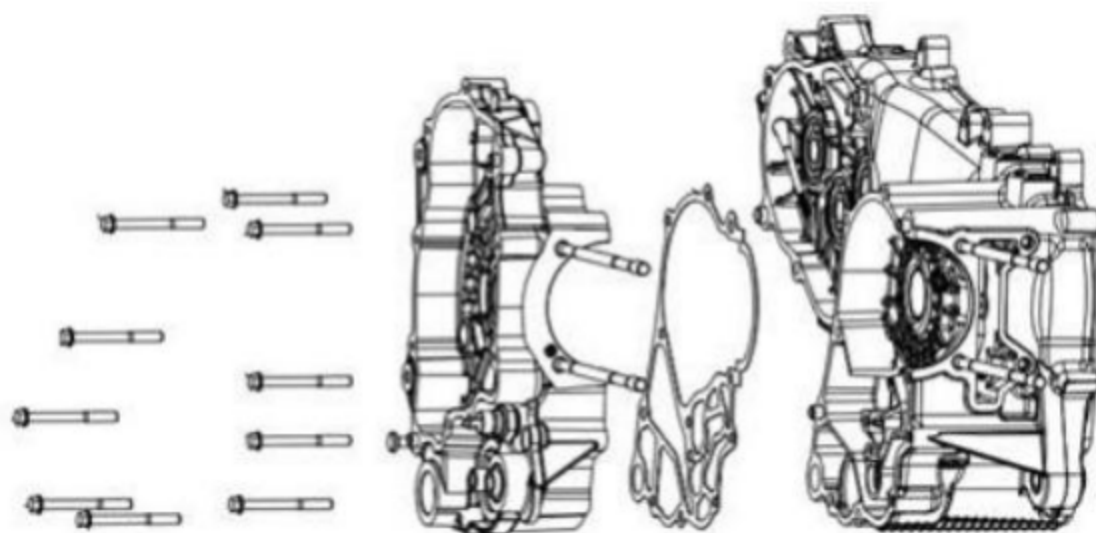
Variable speed system tooth breakage

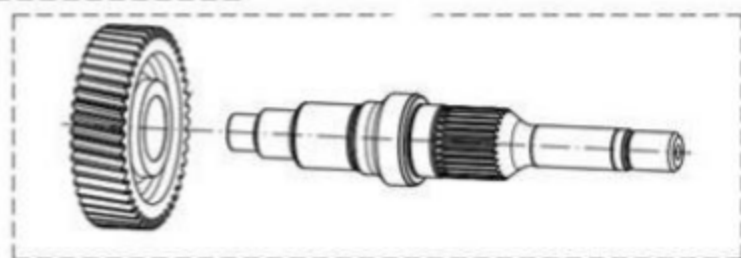
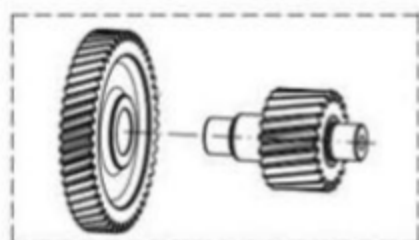
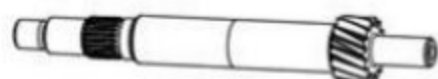
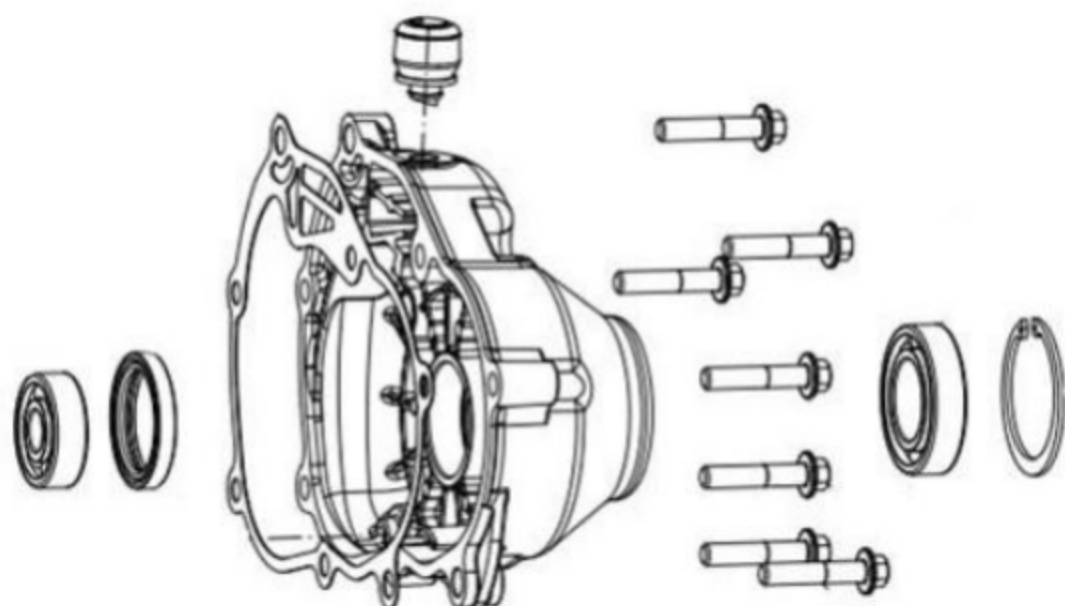
- ☞ Gear wear
- ☞ Belt deformation

Excessive engine noise

- ☞ Wear or damage of transmission gears
- ☞ Wear or damage of transmission bearings

Component layout





20.2: Transmission box / Transmission system

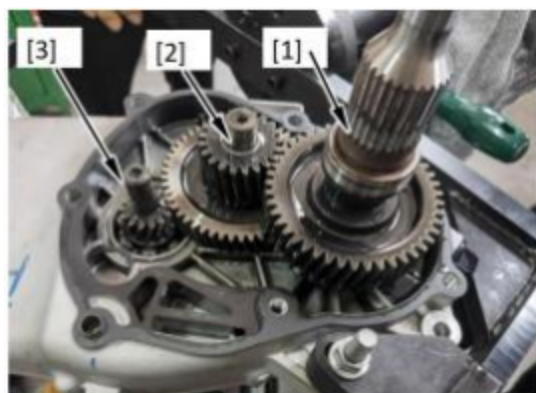
Disassembly and Assembly

Remove the fastening bolts [1] of the transmission case, and then remove the transmission case components. [2]



Remove the sealing gasket [1] and the locating pin [2] of the transmission case.

Remove the output shaft component [1], the auxiliary shaft component [2] and the main shaft [3] in sequence.



Note:

When disassembling the transmission box, be sure to drain all the **transmission fluid from it**.

Check

Check if the following components are scratched, damaged, abnormally worn or deformed. If necessary, replace them.

- Oil seal
- Gasket
- Bearing

The installation sequence is the reverse of the disassembly sequence.

Torque: 20N•m (2.0kgf•m, 14.8 lbf•ft) Note:

Check

☞ whether the output shaft is wobbling and whether each gear rotates smoothly without any abnormal noise.

Box body

Disassembly and Assembly

Remove the coupling bolts [2] from the right crankcase [1] direction.

Note:

When dividing the boxes, do not strike the crankshaft. If necessary, gently tap the processing ribs on the box body.



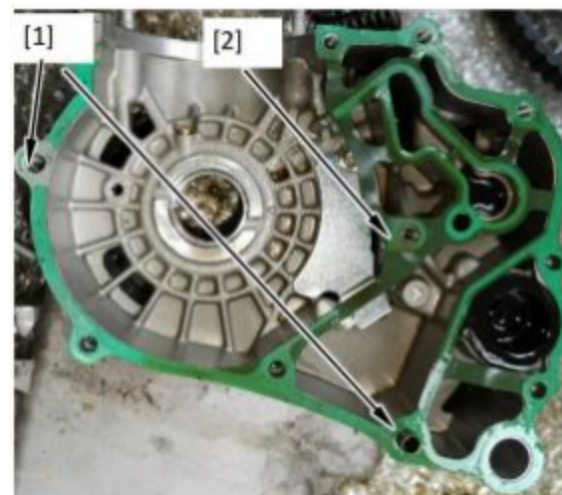
Assembly

Clean the joint surfaces of the left and right boxes, be careful not to damage the joints.

Check if the oil passage is unobstructed, and clean it if necessary.

Install the positioning pins [1] and the crankcase gasket [2], install the right crankcase on the left crankcase, and install the joint bolts and tighten them to the specified torque.

Torque: 10N•m (1.0kgf•m, 7.41lbf•ft)



21:Cylinder block, piston, crankshaft

Maintenance Information

Overview

When maintaining the crankshaft, the crankcase must be separated. The method for separating the crankcase is described in the section on the casing.

The main journal bearing shells are selected by color and matched. Select the bearing shells according to the color matching chart. After selecting new bearing shells, recheck the oil film gap with a plastic gauge. An incorrect oil film gap can lead to severe engine wear.

Cylinder block, piston, crankshaft specifications

Project		Standard Value	Maintenance Boundary Value
Crankshaft	Connecting rod head side clearance	0.2~0.5	0.5
	Connecting rod head bearing bushing clearance with crankshaft pin	0~0.012	0.02
	Crankshaft journal and bearing bushing clearance	0.03~0.05	0.06
	Vibration	—	0.01
Cylinder	Cylinder diameter	72.000~72.012	72.022
	Roundness / Cylindricity	—	0.008
	Flatness	—	0.08
Pistons, piston pins, piston rings	Piston base circle diameter	71.945~71.955	71.935
	Pin hole diameter	17.004~17.009	17.02
	Piston pin diameter	16.995~17.000	16.98
	Piston and piston pin clearance	0.004~0.014	0.04
	Cup gap of piston ring	Ring	0.10~0.20
		Ring 2	0.14~0.27
		Oil ring	0.20~0.70
	The clearance between the piston ring and the ring groove	Gap between ring 1 and groove	0.030~0.070
		Gap between ring 2 and groove	0.030~0.070
	Cup gap of piston ring		0.10
Cylinder bore clearance		0.045~0.067	0.087
Inner diameter of the crankshaft small end		17.006~17.017	17.027
The clearance between the connecting rod and the pin		0.006~0.022	0.04

Unit: mm

Troubleshooting

Low cylinder pressure, difficult starting or poor low-speed performance

-  Cylinder head gasket leaks
-  Piston rings worn, stuck or damaged
-  Cylinder head / piston wear or damage

High cylinder pressure, overheated cylinder block or knocking

-  Excessive carbon deposits on the piston top or in the combustion chamber

Excessive exhaust gas

-  Cylinder block, piston or piston ring wear
-  Incorrect piston ring assembly
-  Piston or cylinder wall scratches

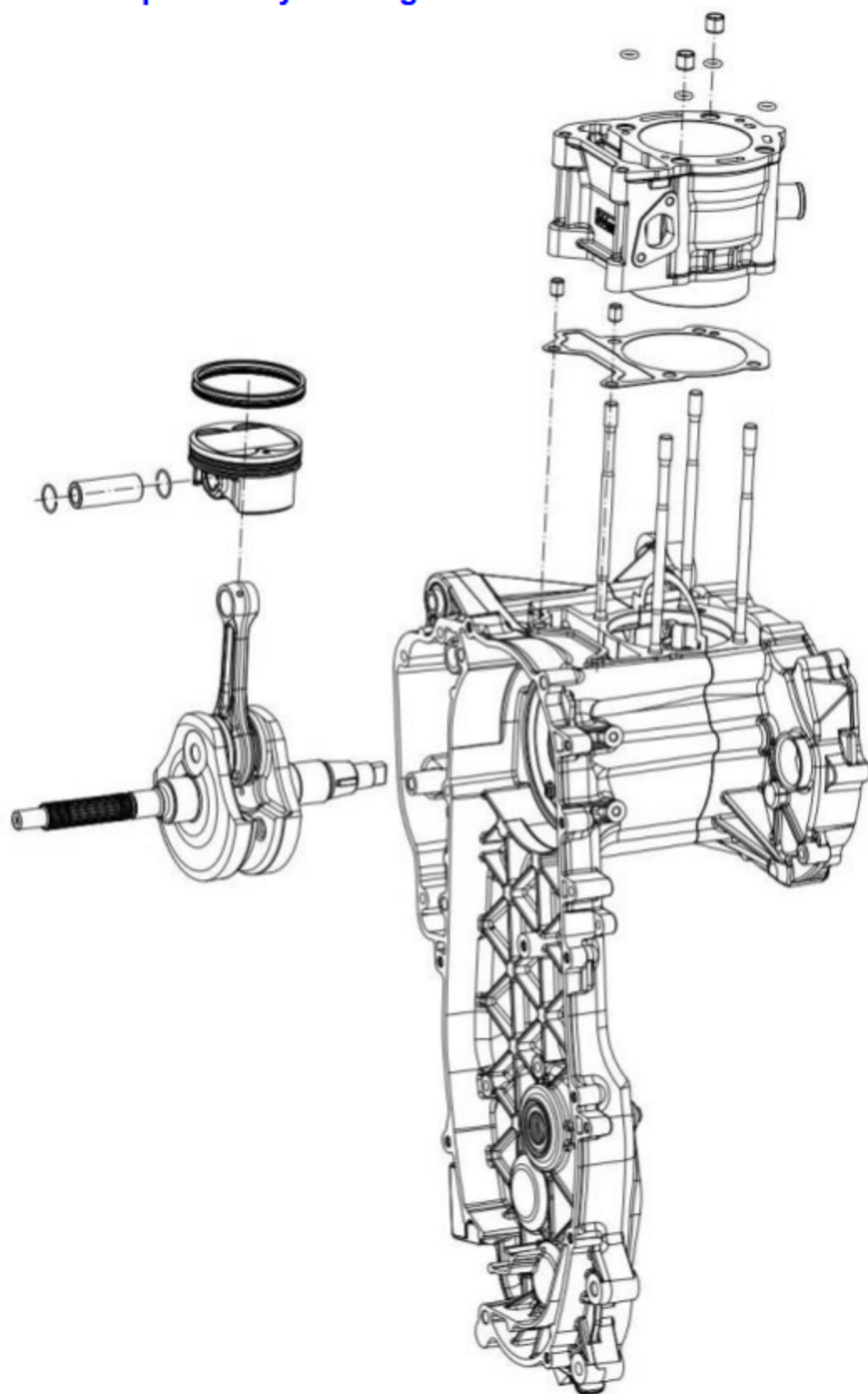
Engine abnormal noise

-  Wear of piston pin or piston pin hole
-  Wear of the small end of the connecting rod
-  Cylinder block, piston or piston ring wear
-  Wear of the crankpin journal

Engine vibration

-  Excessive crankshaft vibration

21.1:Component layout diagram



Cylinder block

Disassembly

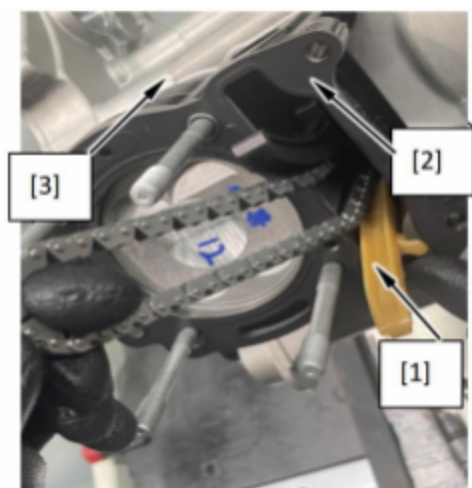
Remove the cylinder head cover and cylinder head components (see cylinder head and valves)

Chain guide plate [1]

Cylinder block sealing gasket [2], locating pin, sealing ring

Cylinder block [3]

Use a rubber mallet and screwdriver to gently pry open the cylinder block, pull it out from the top, allow the piston to come out of the cylinder hole, and remove the cylinder block.



Check

Check whether the cylinder block has scratches, damage, abnormal wear, deformation, burning, oil passage blockage. Measure each part according to the specifications of the cylinder block, piston and crankshaft. If any part exceeds the maintenance limit value, replace it.

Installation

The sections on cylinder body installation and piston installation are presented together.

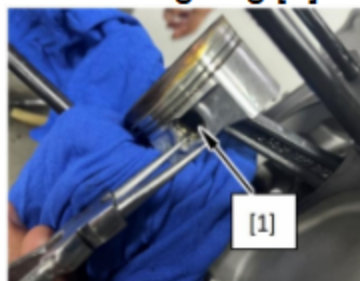
Piston

Disassembly

After disassembling the cylinder block, place a clean cloth under the piston.

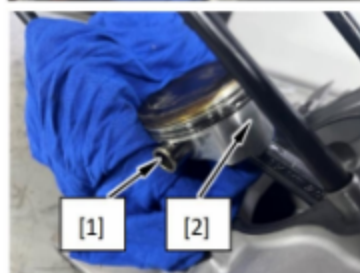
Use the pointed-nose pliers to remove the piston pin steel wire retaining ring [1]

Please note
Do not reuse the piston pin wire retaining ring. When removing it, it may be weakened and deformed, and it might fall off and scratch the cylinder wall.



Use the appropriate tools to remove the piston pin [1]

Remove the piston [2]



Remove the piston rings

Separate the ports of each piston ring, and then lift the ring out from the opposite position of the piston ring opening. Note:

Do not place the ports too far apart to avoid damaging the piston rings. Be careful not to scratch the piston when removing the piston rings.

Use the discarded piston rings to remove the carbon deposits in the piston ring grooves.

Note:

Do not use a steel brush as it may scratch the piston rings.



Check

Check if the following components have any scratches, damages, abnormal wear, deformation, burning, oil passage blockage. Cylinder block

Piston

Piston ring

Piston pin

Connecting rod head

Check the closed gap of the piston ring. Put piston ring A into the cylinder and use the piston to position the piston ring to the appropriate position.

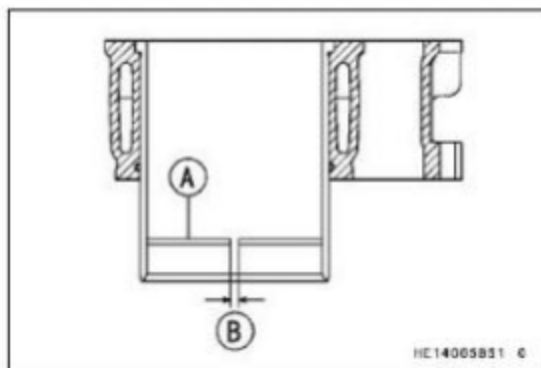
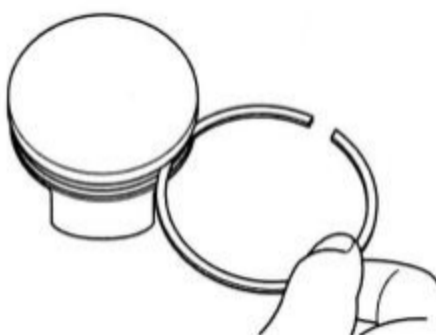
Set it near the bottom of the cylinder, where the cylinder wear is smaller. Use a thickness gauge to measure the gap between the two ends of the ring

[B] Piston ring closed gap. If the end gap of any ring exceeds the usage limit, replace all the piston rings. Check the width of the piston ring groove and the thickness of the piston ring to determine

the gap between the piston ring and the groove. If it exceeds the maintenance limit, replace the new piston ring and re-measure. If it still

doesn't meet the requirements, replace the new piston.

Measure each component and calculate the clearance based on the specifications of the cylinder block, piston and crankshaft. Replace any component that exceeds the maintenance limit.



Install piston rings

Thoroughly clean the piston ring grooves and install the piston rings.

Apply engine oil to the entire surface of the piston rings and the piston ring grooves.

During the installation process, prevent damage to the piston and the piston rings.

When installing, place the ring with the marking side up.

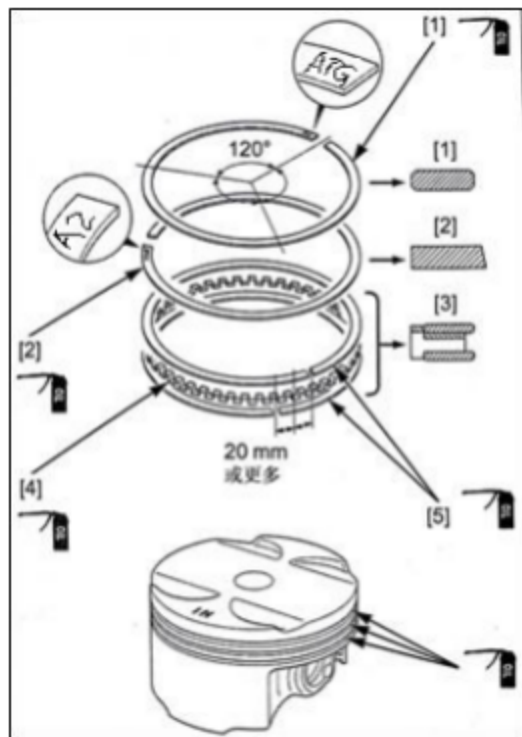
"1R" marking: One ring [1].

"RN" marking: Two rings [2].

When installing the oil ring assembly [3], first install the liner ring [4], then install the scraper ring [5].

Intersect the openings of the piston rings at 120 °.

Offset the opening positions of the scraper rings as shown in the figure.



☞ Do not align the opening of the steel wire retaining ring with the notch of the piston.

Install the piston

Apply engine oil to the inner surface of the piston pin hole.

Apply engine oil to the inner surface of the crankshaft small end.

Apply engine oil to the outer surface of the piston pin.

Install the piston pin [1] and fix it using a new steel wire retaining ring [2].

Note:

☞ Make sure that the steel wire retaining ring is installed properly.

Install the locating pin [1] and the new cylinder block gasket [2].

Apply engine oil to the cylinder wall and the piston thrust surface.

Use the piston ring compression tool available on the market to install the piston assembly into the cylinder block (when installing the piston assembly, the "IN" mark on the top of the piston should face the direction of the intake).

Notes:

☞ When installing the piston, be careful not to damage the upper surface of the piston, especially the part that mates with the cylinder bore.

☞ Do not use brute force to press-fit the cylinder block.

☞ After assembly of the cylinder block, ensure that the piston is at the top dead center.

Crankshaft



Side clearance inspection

Measure the side clearance of the connecting rod.

Maintenance limit value: 0.5mm.

If the side clearance exceeds the maintenance limit, replace the connecting rod.
Reconfirm the side clearance. If it still exceeds the limit, replace the crankshaft.

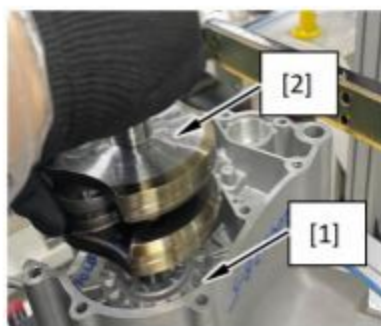
Remove

Remove the joint bolts [1] of the left and right crankcase bodies.

Remove the right crankcase body [2].



Remove the crankshaft [2] from the left crankcase [1].



Check

Support the two end journal of the crankshaft.

Place a micrometer above the middle journal of the crankshaft. Avoid the oil grooves and oil holes when placing it.

Rotate the crankshaft two full turns (720°), and read the runout value. Maintenance limit: 0.01 mm.



Applying an appropriate amount of lubricating oil to the surfaces of the main journal at both ends of the crankshaft and the bearing holes of the left crankcase.

Install the crankshaft [1] into the crankshaft hole of the left crankcase [2].

Assembly

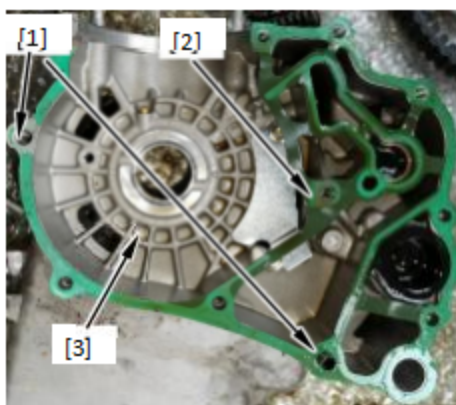
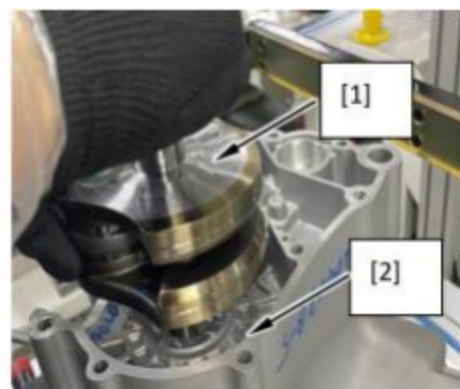
Install the locating pin [1] and the crankcase gasket [2] into the left crankcase [3].

Note:

The sealing gasket of the crankcase needs to be replaced with a new one.

If there are through-type scratches on the mating surface of the box, the entire box needs to be replaced.

When replacing the box or the crankshaft, the original type of parts must be replaced.



Install the right crankcase [1] onto the left crankcase.

Clean the mating bolts (reuse) with the solution and thoroughly dry them.

Install the mating bolts [2].

Torque:

10 N•m (1.0 kgf•m, 7.4 1 lb•ft)

21.2: Main journal bearing bushing

Note:

Do not change the position of the bearing shells.

The bearing shells must be installed in their original position; otherwise, it will disrupt the correct oil film gap, causing damage to the engine.

Check the bearing shells

Remove the crankshaft.

Check if the main journal bearing shells [1] are abnormally worn or flaked. Check if the bearing shell projections [2] are damaged.



If the bearing of the main shaft journal is damaged, select the bearing from the same group for replacement.

Replacement.

Select the bearing housing

Record the numerical designation [1] of the inner diameter of the bearing housing installation hole located on the left side of the upper crankcase, as shown in the figure (the side of the cylinder block joint surface of the left and right crankcases, 1, 2 or 3, represent the sequence of inner diameter numerical designations of the bearing housing installation holes).



If the crankshaft needs to be replaced, record the corresponding number [1] located on the crankshaft counterweight block (the numbers (1 or 2) on the crankshaft counterweight block represent the sequence of the outer diameters of the main journal).

Select the replaceable bearing color by referring to the installation hole numbers of the main shaft journal and the bearing housing [1].

Bearing thickness for the main shaft journal:

A: Brown: Thick

B: Green:

C: Yellow:

D: Blue: Thin



Main shaft journal bearing matching table:

			Inner diameter number of the bearing housing installation hole		
			1	2	3
			32.982~32.988 mm	32.988~32.994 mm	32.994~33.000 mm
Outer diameter number of the main journal	1	29.014~29.020 mm	D (Blue)	C (Yellow)	B (Green)
	2	29.008~29.014 mm	C (Yellow)	B (Green)	A (Brown)

Note: After replacing the new bearing bush, recheck the clearance using a plastic gauge

22-List and purpose of all components monitored by the OBD system

<u>Component/ System</u>	<u>Fault code</u>	<u>Monitor Strategy Description</u>	<u>Malfunction Criteria</u>	<u>MIL activation</u>	<u>Secondary Parameters</u>	<u>Preco nditio ning</u>	<u>Demon stratio n test</u>
<u>Engine Coolant temperature Sensor</u>	<u>P0118</u>	<u>Circuit check</u>	<u>signal voltage, engine temperature sensor</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>Idle</u>
	<u>P0117</u>	<u>Circuit check</u>	<u>signal voltage, engine temperature sensor</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>Idle</u>
	<u>P0116</u>	<u>engine temperature exceeds plausible threshold</u>	<u>the engine temperature sensor signal is lower than the threshold after engine start time 2s</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>Idle</u>
	<u>P0126</u>	<u>engine temperature is stuck</u>	<u>The difference between the raw sensor value and low-pass filtered raw sensor value less than the threshold</u>	<u>3 driving cycles</u>	<u>N.A.</u>	<u>N.A.</u>	<u>driving cycle</u>
<u>Fuel injector1</u>	<u>P0262</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0261</u>		<u>short to ground</u>		<u>N.A.</u>		<u>idle</u>
	<u>P0201</u>		<u>open circuit</u>		<u>N.A.</u>		<u>idle</u>
<u>Fuel pump</u>	<u>P0629</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0628</u>		<u>short to ground</u>		<u>N.A.</u>		<u>idle</u>
	<u>P0627</u>		<u>open circuit</u>		<u>N.A.</u>		<u>idle</u>
<u>Stepping motor</u>	<u>P0509</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0508</u>		<u>short to ground</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0511</u>		<u>open circuit</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0511</u>		<u>Over current</u>		<u>N.A.</u>	<u>N.A.</u>	
<u>Ignition Coil "A" Primary Control</u>	<u>P2300</u>	<u>Circuit check</u>	<u>short to ground</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
<u>MIL</u>	<u>P0650</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>OFF</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
			<u>short to ground</u>		<u>N.A.</u>		
			<u>open circuit</u>		<u>N.A.</u>		
	<u>P0414</u>		<u>short to ground</u>		<u>N.A.</u>		
<u>Evaporative Emission System Purge Control Valve</u>	<u>P0413</u>		<u>open circuit</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0459</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>driving cycle</u>
	<u>P0458</u>		<u>short to ground</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0444</u>		<u>open circuit</u>		<u>N.A.</u>	<u>N.A.</u>	
<u>Manifold absolute pressure sensor</u>	<u>P0108</u>	<u>Circuit check, max limit exceeds</u>	<u>pressure sensor voltage ≥ UADPSMX</u>	<u>5 sec. after Fault</u>	<u>time after start end > 2sec.</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0107</u>	<u>Circuit check, min limit exceeds</u>	<u>pressure sensor voltage ≥ UADPSMN</u>			<u>N.A.</u>	<u>idle</u>
	<u>P0105</u>	<u>signal check: no pressure drop after start</u>	<u>pressure drop after start</u>	<u>3 driving cycles</u>	<u>engine speed threshold value for SIG fault check >1000rpm no pressure sensor Circuit fault throttle angle referred to lower limit <20%</u>	<u>N.A.</u>	<u>driving cycle</u>
	<u>P0106</u>	<u>signal non plausible</u>	<u>the measured intake manifold pressure is used for air charge which is compared with a minimum and maximum modelled air charge</u>	<u>3 driving cycles</u>	<u>time after start end >25sec. Delta air charge between unfiltered and filtered value ≤2.94% Nmot w>1200</u>	<u>N.A.</u>	<u>driving cycle</u>
	<u>P0322</u>	<u>Synchronisation didn't take place by some certain phase sensor signals has been detected.</u>	<u>pressure indicated by pressure sensor</u>	<u>5 sec. after Fault</u>	<u>engine speed</u>	<u>N.A.</u>	<u>driving cycle</u>
			<u>battery voltage, scanned value from ADC (wub)</u>		<u>N.A.</u>	<u>N.A.</u>	

<u>Idle speed control</u>	<u>P0507</u>	<u>actuator blocked at higher position</u>	<u>difference of idle speed precontrol (dns)</u>	<u>3 driving cycles</u>	<u>high canister load (B_tehb)</u>	<u>N.A.</u>	<u>idle</u>
			<u>with idle speed control integrator reach lower limit</u>		<u>idle condition (B_II)</u>	<u>N.A.</u>	
					<u>Vehicle speed diagnosis completed, and no fault happened.</u>	<u>N.A.</u>	
	<u>P0506</u>	<u>actuator blocked at lower position</u>	<u>difference of idle speed precontrol (dns)</u>		<u>vehicle speed (vfzg) =0</u>	<u>N.A.</u>	
			<u>with idle speed control integrator reach upper limit</u>		<u>altitude correction factor(fho)>0.844</u>	<u>N.A.</u>	
					<u>engine coolant temp.(tmot) > 69.8°C</u>	<u>N.A.</u>	
<u>Intake Air Temperature Sensor</u>	<u>P0113</u>	<u>Circuit check</u>	<u>signal voltage, intake manifold temperature senso</u>	<u>5 sec. after Fault</u>	<u>N.A</u>	<u>N.A.</u>	<u>idle</u> —
	<u>P0112</u>	<u>Circuit check</u>	<u>signal voltage, intake manifold temperature sensor</u>		<u>N.A</u>	<u>N.A.</u>	
	<u>P0111</u>	<u>:intake manifold temperature exceeds plausible threshold</u>	<u>the intake temperature sensor singnal is lower than the threshold after engine start time 2s</u>		<u>N.A</u>	<u>N.A.</u>	
	<u>P0114</u>	<u>intake manifold temperature is stuck</u>	<u>The difference between the maximum and minimum intake manifold temperature during driving cycle.</u>	<u>3 driving cycles</u>	<u>Engine temperature at start <40 °C</u> <u>air mass flow integrator output ≥23kg/h(when Engine temperature = 10°C)</u>	<u>N.A.</u>	<u>driving cycles</u>
<u>battery voltage (onboard)</u>	<u>P0563</u>	<u>rationality check max limit exceeds</u>	<u>battery voltage, scanned value from ADC (wub)</u>	<u>OFF</u>	<u>engine speed >5000rpm & time after start >3 s</u>	<u>N.A.</u>	<u>driving cycles</u>
	<u>P0562</u>	<u>rationality check min limit exceeds</u>				<u>N.A.</u>	
	<u>P0560</u>	<u>implausibility check</u>				<u>N.A.</u>	
<u>Vehicle speed</u>	<u>P0501</u>	<u>lower limit exceeded during fuel cut off</u>	<u>vehicle speed (vfzg)</u>	<u>5 sec. after Fault</u>	<u>3000rpm <engine speed< 8000rpm</u>	<u>N.A.</u>	<u>driving cycles</u>
					<u>Engine temperature > 39.76 °C</u>	<u>N.A.</u>	
					<u>fuel cut off</u>	<u>N.A.</u>	
					<u>clutch pedal no pressed & no neutral gear</u>	<u>N.A.</u>	
<u>Throttle Position Sensor</u>	<u>P0123</u>	<u>Circuit check, max limit exceeds</u>	<u>Throttle/Pedal Pos.Sensor</u>	<u>5 sec. after Fault</u>	<u>engine speed >192rpm</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0122</u>	<u>Circuit check, min limit exceeds</u>	<u>Throttle/Pedal Pos.Sensor</u>				
<u>Fuel system monitoring</u>	<u>P2177</u>	<u>fuel trim high limits exceded out of idle</u>	<u>multiplicative adaption value reach upper limit</u>	<u>3 driving cycles</u>	<u>fuel adaption close loop control</u>	<u>N.A.</u>	<u>driving cycles</u>
	<u>P2178</u>	<u>fuel trim low limits exceded out of idle</u>	<u>multiplicative adaption value reach lower limit</u>			<u>N.A.</u>	
	<u>P2187</u>	<u>fuel trim high limits exceded at idle</u>	<u>additive adaption value reach upper limit</u>			<u>N.A.</u>	
	<u>P2188</u>	<u>fuel trim high limits exceded at idle</u>	<u>additive adaption value reach lower limit</u>			<u>N.A.</u>	

<u>misfire</u> <u>Cylinder</u>	<u>P0301</u>	<u>misfire rate that</u> <u>harmful to catalyst</u> <u>(mx fault)</u>	<u>fault counter of catalyst</u> <u>damaging misfiring of all</u> <u>cylinders</u>	<u>MIL-</u> <u>blinking at</u> <u>present</u> <u>driving</u> <u>cycle &</u> <u>MIL-</u> <u>blinking</u> <u>off after ti-</u> <u>cutoff</u>	<u>fuel cut off</u>	<u>N.A.</u>	<u>driving</u> <u>cycles</u>
	<u>P0301</u>	<u>misfire rate that</u> <u>deteriorate emission</u> <u>(mn fault)</u>	<u>fault counter of emission</u> <u>relevant misfiring of all</u> <u>cylinders</u>	<u>3 driving</u> <u>cycles</u>	<u>engine load</u>		
	<u>P0301</u>	<u>implausible fault</u>	<u>fault counter of emission</u> <u>relevant misfiring of all</u> <u>cylinders at the first</u> <u>interval after start.</u>	<u>3 driving</u> <u>cycles</u>	<u>N.A.</u>		
<u>Oxygen</u> <u>Sensor heater</u>	<u>P0032</u>	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after</u> <u>Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
	<u>P0031</u>	<u>Circuit check</u>	<u>short to ground</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0030</u>	<u>Circuit check</u>	<u>open circuit</u>		<u>N.A.</u>	<u>N.A.</u>	
	<u>P0053</u>	<u>current sensor</u> <u>resistance is greater</u> <u>than threshold value</u>	<u>current lambda sensor</u> <u>resistance</u>	<u>3 driving</u> <u>cycles</u>	<u>11V < battery voltage <</u> <u>16.6V</u> <u>engine speed > 1100rpm</u> <u>lambda sensor reach dew</u> <u>point</u> <u>300°C < Exhaust gas</u> <u>temperature ≤ 750 °C</u>	<u>N.A.</u>	<u>driving</u> <u>cycle</u>
<u>Oxygen</u> <u>Sensor</u> <u>deterioration</u> <u>(slow</u> <u>response)</u>	<u>P0133</u>	<u>filtered cycle delay</u> <u>time of sensor signal</u> <u>upstream cat is</u> <u>greater than</u> <u>threshold value</u>	<u>filtered cycle delay time</u> <u>of sensor signal upstream</u>	<u>3 driving</u> <u>cycles</u>	<u>present cycle counter or</u> <u>ready flag of cycle</u> <u>duration monitoring > 1</u> <u>lambda close loop active</u> <u>basic mixture adaptation</u> <u>not disabled</u> <u>engine speed lie in</u> <u>diagnosis window</u> <u>(2600~8000 rpm)</u> <u>main load lie in active</u> <u>window (30~90%)</u>	<u>N.A.</u>	<u>driving</u> <u>cycle</u>
<u>O2 sensor</u> <u>signal</u> <u>check(bank1)</u>	<u>P0132</u>	<u>O2 Sensor Circuit</u> <u>High Voltage</u>	<u>output voltage O2 sensor</u> <u>upstream catalyst</u>	<u>5 sec. after</u> <u>Fault</u>	<u>general disabling</u> <u>conditions for DLSV</u> <u>ub battery voltage > 11 V</u> <u>1cyl O2 sensor reach the</u> <u>dew point and no O2</u> <u>sensor heating fault</u> <u>engine speed > 40rpm</u> <u>no fuel injector fault</u> <u>lamson=1.0 required</u> <u>lambd are ferred to</u> <u>lambda sensor fitting</u> <u>location</u>	—	<u>idle</u>
	<u>P0131</u>	<u>O2 Sensor Circuit</u> <u>Low Voltage</u>	<u>output voltage O2 sensor</u> <u>upstream catalyst</u>		<u>general disabling</u> <u>conditions for DLSV</u> <u>ub battery voltage > 11 V</u> <u>1cyl O2 sensor reach the</u> <u>dew point and no O2</u> <u>sensor heating fault</u> <u>nmot engine speed ></u> <u>40rpm</u>		

	P0134	<u>O2 Sensor Circuit No Activity Detected</u>	<u>output voltage O2 sensor upstream catalyst</u>		<u>general disabling conditions for DLSV</u> <u>ub battery voltage > 11 V</u> <u>1cyl O2 sensor reach the dew point and no O2 sensor heating fault</u>	—	
	P0130	<u>O2 Sensor Voltage has a restricted amplitude Signal</u> <u>Sensor Voltage current has leakage to UB</u> <u>O2 Sensor Voltage coupled with heater line</u>	<u>output voltage O2 sensor upstream catalyst</u> <u>output voltage O2 sensor upstream catalyst</u> <u>threshold for delta sensor voltage to check heater coupling upstr.cat</u> <u>coupling upstr.cat</u>		<u>condition theoretical lambda sensor operation readiness with heating and status keep > 60s</u> <u>general disabling conditions for DLSV</u> <u>ub battery voltage</u> <u>O2 sensor bank1 reach the dew point and no O2 sensor heating fault</u> <u>nmot engine speed > 40rpm</u> <u>Status of completion of heater ramping phase, before cat (LSF with Pumped Reference)</u>	—	
<u>Oxygen Sensor2 heater</u>	P0038	<u>Circuit check</u>	<u>short to battery plus</u>	<u>5 sec. after Fault</u>	<u>N.A.</u>	<u>N.A.</u>	<u>idle</u>
	P0037	<u>Circuit check</u>	<u>short to ground</u>		<u>N.A.</u>	<u>N.A.</u>	
	P0036	<u>Circuit check</u>	<u>open circuit</u>		<u>N.A.</u>	<u>N.A.</u>	
	P0054	<u>current sensor resistance is greater than threshold value</u>	<u>current lambda sensor resistance</u>	<u>3 driving cycles</u>	<u>11V < battery voltage < 16.6V</u> <u>engine speed > 1100rpm</u> <u>lambda sensor reach dew point</u> <u>300°C < Exhaust gas temperature < 750 °C</u>	<u>N.A</u>	<u>driving cycle</u>
<u>Oxygen Sensor2 deterioration (slow response)</u>	P2270	<u>O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2</u>	<u>Signal stuck</u>	<u>3 driving cycles</u>	<u>Idle</u> <u>Stuck time > TUSSA</u>	<u>N.A</u>	<u>driving cycle</u>
	P2271	<u>O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2</u>	<u>Signal stuck</u>		<u>Idle</u> <u>Stuck time > TUSSA</u>		
<u>O2 sensor2 signal check(bank1 sensor2)</u>	P0138	<u>O2 Sensor2 Circuit High Voltage</u>	<u>output voltage O2 sensor2 upstream catalyst</u>	<u>5 sec. after Fault</u>	<u>general disabling conditions for DLSH</u> <u>ub battery voltage > 11 V</u> <u>1cyl O2 sensor2 reach the dew point and no O2 sensor heating fault</u> <u>engine speed > 40rpm</u> <u>no fuel injector fault</u> <u>lamson=1.0 required</u> <u>lambd are ferred to lambda sensor2 fitting location</u>	—	<u>idle</u>
	P0137	<u>O2 Sensor2 Circuit Low Voltage</u>	<u>output voltage O2 sensor2 upstream catalyst</u>		<u>general disabling conditions for DLSH</u> <u>ub battery voltage > 11 V</u> <u>1cyl O2 sensor2 reach the dew point and no O2 sensor heating fault</u> <u>nmot engine speed > 40rpm</u>		

	<u>P0136</u>	<u>O2 Sensor2 Circuit</u> <u>No Activity Detected</u>	<u>output voltage O2</u> <u>sensor2 upstream catalyst</u>		<u>general disabling</u> <u>conditions for DLSH</u> <u>ub battery voltage>11 V</u> <u>1cyl O2 sensor2 reach the</u> <u>dew point and no O2</u> <u>sensor heating fault</u>	—	
	<u>P2232</u>	<u>O2 Sensor2 Voltage</u> <u>has a restricted</u> <u>amplitude Signal</u> <u>Sensor2 Voltage</u> <u>current has leakage to</u> <u>UB</u> <u>O2 Sensor2 Voltage</u> <u>coupled with heater</u> <u>line</u>	<u>output voltage O2</u> <u>sensor2 upstream catalyst</u> <u>output voltage O2</u> <u>sensor2 upstream catalyst</u> <u>threshold for delta</u> <u>sensor2 voltage to check</u> <u>heater coupling upstr.cat</u> <u>coupling upstr.cat</u>		<u>condition theoretical</u> <u>lambda sensor2 operation</u> <u>readyness with heating and</u> <u>status keep > 60s</u> <u>general disabling</u> <u>conditions for DLSH</u> <u>ub battery voltage</u> <u>O2 sensor2 bank1 reach</u> <u>the dew point and no O2</u> <u>sensor2 heating fault</u> <u>nmot engine speed ></u> <u>40rpm</u> <u>Status of completion of</u> <u>heater ramping phase,</u> <u>before cat (LSF with</u> <u>Pumped Reference)</u>	—	
<u>Catalyst</u>	<u>P0420</u>	<u>Catalyst System</u> <u>Efficiency Below</u> <u>Threshold</u>	<u>Catalyst System</u> <u>Efficiency Below</u> <u>Threshold</u>	<u>3 driving</u> <u>cycles</u>	<u>system output of the ahkat</u>		<u>driving</u> <u>cycle</u>
<u>Misfire cyl. 0</u>	<u>P0301</u>	<u>misfire rate that</u> <u>harmful to catlyst (mx</u> <u>fault)</u> <u>misfire rate that</u> <u>deteriorate emission</u> <u>(mn fault)</u> <u>implausible fault</u>	<u>fault counter of catalyst</u> <u>damaging misfiring of all</u> <u>cylinders</u> <u>fault counter of emission</u> <u>relevant misfiring of all</u> <u>cylinders</u> <u>fault counter of emission</u> <u>relevant misfiring of all</u> <u>cylinders at the first</u> <u>interval after start,</u>		<u>fuel cut off</u> <u>engine load</u>		<u>driving</u> <u>cycle</u>
<u>Fuel system</u>	<u>P2177</u> <u>P2178</u>	<u>fuel trim high limits</u> <u>exceeded out of idle</u> <u>fuel trim low limits</u> <u>exceeded out of idle</u>	<u>multiplicative adaption</u> <u>value reach upper limit</u> <u>multiplicative adaption</u> <u>value reach lower limit</u>	<u>3 driving</u> <u>cycles</u>	<u>fuel adaption close loop</u> <u>control</u>		<u>driving</u> <u>cycle</u>

<u>Component</u>	<u>Fault code</u>	<u>Malfunction Criteria</u>	<u>Description</u>
<u>Fuel injector</u>	<u>P0262</u>	<u>short to battery plus</u>	<u>Unable to complete fuel injection, engine power loss</u>
	<u>P0201</u>	<u>open circuit</u>	
	<u>P0261</u>	<u>short to ground</u>	<u>fuel injection in long term then cylinder flooded, engine misfire, power loss;</u>
<u>Ignition Coil</u>	<u>P2300</u>	<u>Short to ground</u>	<u>Loss of ignition, loss of engine power</u>
<u>Fuel pump</u>	<u>P0629</u>	<u>short to battery plus</u>	<u>Fuel supply failure, power loss; engine stalled</u>
	<u>P0627</u>	<u>open circuit</u>	
<u>Fuel system</u>	<u>P2177</u>	<u>fuel trim high limits exceeded out of idle</u>	<u>Increase fuel supply, Engine torque fluctuation</u>
	<u>P2178</u>	<u>fuel trim low limits exceeded out of idle</u>	<u>Reduce fuel supply, Engine torque reduction</u>
<u>Manifold absolute pressure sensor</u>	<u>P0105</u>	<u>signal check: no pressure drop after start</u>	<u>The system switches the control mode; torque fluctuation</u>
	<u>P0108</u>	<u>Manifold Abs.Pressure or Bar.Pressure High Input</u>	
	<u>P0107</u>	<u>Manifold Abs.Pressure or Bar.Pressure Low Input</u>	
	<u>P0106</u>	<u>Manifold Abs.Pressure or Bar.Pressure Range/Performance</u>	
<u>Oxygen sensor</u>	<u>P0131</u>	<u>Low voltage</u>	<u>Abnormal closed-loop correction, torque decrease; exit closed-loop, power fluctuation</u>
	<u>P0132</u>	<u>High voltage</u>	<u>Abnormal closed-loop correction, torque fluctuation; exit closed-loop, power fluctuation</u>
	<u>P0130</u>	<u>O2 Sensor Circ.,Bank1-Sensor1 Malfunction</u>	<u>exit closed-loop, torque fluctuation</u>
	<u>P0133</u>	<u>O2 Sensor Circ.,Bank1-Sensor1 Slow Response</u>	<u>exit closed-loop, torque fluctuation</u>
<u>Misfire cylinder</u>	<u>P0301</u>	<u>Cyl.1 misfire detected</u>	<u>torque fluctuation; engine stalled</u>
<u>Throttle Position Sensor</u>	<u>P0122</u>	<u>Throttle/Pedal Pos.Sensor Circ. Low Input</u>	<u>The system switches the control mode and the power drops</u>
	<u>P0123</u>	<u>Throttle/Pedal Pos.Sensor Circ. High Input</u>	
<u>Engine speed sensor</u>	<u>P0322</u>	<u>Eng.SpeedInp.Circ. No Signal</u>	<u>Loss of synchronization, loss of power</u>
<u>Idle air control system</u>	<u>P0511</u>	<u>Idle actuator power stage Fault</u>	<u>Idle torque fluctuates and may even stall</u>

<u>Request current powertrain diagnostic data</u>	<u>SID 0x01</u>	—	—	—	—
<u>PID Description</u>	<u>PID</u>	<u>Bytes</u>	<u>Rang,Scaling</u>	<u>Service x01</u>	<u>Service x02</u>
<u>Request supported PIDs from PID 0x01-0x20</u>	<u>PID S00</u>	<u>4</u>	—	√	√
	<u>ByteA</u>	—	—		
	<u>ByteB</u>				
	<u>ByteC</u>				
	<u>ByteD</u>				
<u>01 Monitor status since DTCs cleared</u>	<u>PIDS01</u>	<u>4</u>	—	√	×
	<u>ByteA</u>	—			
	<u>ByteB</u>				
	<u>ByteC</u>				
	<u>ByteD</u>				
<u>DTC that caused required freeze frame data storage</u>	<u>PID S02</u>	<u>2</u>	<u>0000~FFFF</u>	×	√
<u>Fuel system status</u>	<u>PID S03</u>	<u>ByteA</u>	<u>Bit coding</u>	√	√
		<u>ByteB</u>	<u>Bit coding</u>		
<u>Calculated Load Value</u>	<u>PID S04</u>	<u>1</u>	<u>0~100%,100/255%</u>	√	√
<u>Engine Coolant Temperature</u>	<u>PID S05</u>	<u>1</u>	<u>-40~215°C, 1°C</u>	√	√
<u>Short Term Fuel Trim Bank1</u>	<u>PID S06</u>	<u>1</u>	<u>-100%~99.22%, 100/128%</u>	√	√
<u>Long term Fuel Trim-bank1</u>	<u>PID S07</u>	<u>1</u>	<u>-100%~99.22%, 100/128%</u>	√	√
<u>Intake Manifold Absolute Pressure</u>	<u>PID S0B</u>	<u>1</u>	<u>0~255kpa, 1kpa</u>	√	√
<u>Engine RPM</u>	<u>PID S0C</u>	<u>2</u>	<u>0~16383.75/min, 0.25/min</u>	√	√
<u>Vehicle speed sensor</u>	<u>PID S0D</u>	<u>1</u>	<u>0.0...511.9922</u>	√	√
<u>Ignition Timing Advance for #1 Cylinder</u>	<u>PID S0E</u>	<u>1</u>	<u>-64~63.5°, 0.5°</u>	√	√
<u>Intake Air Temperature</u>	<u>PID S0F</u>	<u>1</u>	<u>-40~215°C, 1°C</u>	√	√
<u>Absolute Throttle Position</u>	<u>PID S11</u>	<u>1</u>	<u>0%~100%, 100/255%</u>	√	√
<u>Location of Oxygen sensor</u>	<u>PID S13</u>	<u>1</u>	<u>Bit coding</u>	√	×
<u>Oxygen Sensor Output Voltage Bank1 sensor1</u>	<u>PID S14</u>	<u>2</u>	<u>0~1.275, 0.005V</u>	√	×
<u>Short term fuel trim Bank 1 Sensor 1</u>	—	<u>1</u>	<u>-100%~99.22%, 100/128%</u>	√	√
<u>O2 Sensor and SHRET Bank 1, Sensor 2</u>	<u>PID S15</u>	<u>2</u>		√	×
<u>O2 Sensor Bank 1, Sensor 2</u>		<u>ByteA</u>	<u>0V~1.275V, 0.005V</u>	√	×
<u>OBD requirements to which vehicle or engine is certified.</u>	<u>PID S1C</u>	<u>1</u>	<u>Bit coding</u>	√	×
<u>Time Since Engine Start</u>	<u>PID S1F</u>	<u>2</u>	<u>65.535sec,1sec</u>	√	√
<u>Distance traveled while MIL is activated</u>	<u>PID S21</u>	<u>1</u>	—	√	×
<u>Absolute load value</u>	<u>PID S43</u>	<u>1</u>	<u>0~100%,100/255%</u>	√	√
<u>Relative throttle position</u>	<u>PID S45</u>	<u>1</u>	<u>0%~100%, 100/255%</u>	√	√

<u>Outputs</u>	<u>Description</u>
<u>PID S02</u>	<u>Pcode of the fault which freeze frame</u>
<u>PID S03</u>	<u>Fuel system bank1/bank2 status</u>
<u>PID S04</u>	<u>Calculated load value</u>
<u>PID S05</u>	<u>Engine coolant temperature</u>
<u>PID S06</u>	<u>Short term fuel trim - Bank 1</u>
<u>PID S07</u>	<u>Long term fuel trim - Bank 1</u>
<u>PID S0B</u>	<u>Intake manifold absolute pressure</u>
<u>PID S0C</u>	<u>Engine speed</u>
<u>PID S0D</u>	<u>Vehicle speed</u>
<u>PID S0E</u>	<u>Ignition angle</u>
<u>PID S0F</u>	<u>Intake air temperature</u>
<u>PID S11</u>	<u>Absolute throat position</u>
<u>PID S43</u>	<u>Absolute load value</u>

Service 03

<u>Fault code</u>	<u>Description</u>	<u>EOBD</u>	
		<u>Class</u>	<u>Active MIL</u>
P0262	Fuel injector short to battery plus	4	✓
P0261	Fuel injector short to ground	4	✓
P0201	Fuel injector open circuit	4	✓
P0629	Fuel pump short to battery plus	4	✓
P0628	Fuel pump short to ground	4	✓
P0627	Fuel pump open circuit	4	✓
P0509	Stepper motor short to battery plus	4	✓
P0508	Stepper motor short to ground	4	✓
P0511	Stepper motor open circuit	4	✓
P0511	Stepper motor Over current	4	✓
P0412	Secondary air valve short to battery plus	4	✓
P0459	canister purge valve short to battery plus	4	✓
P0458	canister purge valve short to ground	4	✓
P0444	canister purge valve open circuit	4	✓
P2300	Ignition Coil short to ground	4	✓
P0650	MIL short to battery plus	5	×
P0650	MIL short to ground	5	×
P0650	MIL open circuit	5	×
P0108	Manifold absolute pressure sensor voltage > UADPSMX	4	✓
P0107	Manifold absolute pressure sensor voltage > UADPSMN	4	✓
P0105	Manifold absolute pressure sensor no pressure drop after start	3	✓
P0106	Manifold absolute pressure sensor signal non plausible	3	✓
P0322	Synchronisation didn't take place by some certain phase sensor signals has been detected.	4	✓
P0507	actuator blocked at higher position	3	✓
P0506	actuator blocked at lower position	3	✓
P0118	Engine temperature sensor short to 5V	4	✓
P0117	Engine temperature sensor short to ground	4	✓
P0116	Engine temperature exceeds plausible threshold	4	✓
P0126	Engine temperature engine temperature is stuck	3	✓
P0113	Intake manifold temperature sensor short to 5V	4	✓
P0112	Intake manifold temperature sensor short to ground	4	✓
P0111	intake manifold temperature exceeds plausible threshold	4	✓
P0114	intake manifold temperature is stuck	3	✓
P0563	rationality check max limit exceeds	5	×
P0562	rationality check min limit exceeds	5	×
P0560	implausibility check	5	×
P0501	lower limit exceeded during fuel cut off	4	✓
P0123	Throttle position sensor max limit exceeds	4	✓
P0122	Throttle position sensor min limit exceeds	4	✓

P2177	multiplicative adaption value reach upper limit	11	✓
P2178	multiplicative adaption value reach lower limit	11	✓
P2187	additive adaption value reach upper limit	11	✓
P2188	additive adaption value reach lower limit	11	✓
P0301	misfire rate that harmful to catalyst (mx fault)	2	✓ or Blink
P0301	misfire rate that deteriorate emission (mn fault)	2	✓
P0301	misfire implausible fault	2	✓
P0032	O2 sensor heater short to battery plus	4	✓
P0031	O2 sensor heater short to ground	4	✓
P0030	O2 sensor heater open circuit	4	✓
P0053	current O2 sensor resistance is greater than threshold value	3	✓
P0133	filtered cycle delay time of O2 sensor signal upstream cat.is greater than threshold value	3	✓
P0132	O2 Sensor Circuit High Voltage	4	✓
P0131	O2 Sensor Circuit Low Voltage	4	✓
P0134	O2 Sensor Circuit No Activity Detected	4	✓
P0130	O2 Sensor Voltage coupled with heater line	4	✓
P0138	O2 Sensor2 Circuit High Voltage	4	✓
P0137	O2 Sensor2 Circuit Low Voltage	4	✓
P0136	O2 Sensor2 Circuit No Activity Detected	4	✓
P2232	O2 Sensor2 Voltage coupled with heater line	4	✓
P2270	O2 Sensor2 Signal Biased&Stuck Lean Bank 1 Sensor 2	3	✓
P2271	O2 Sensor2 Signal Biased&Stuck Rich Bank 1 Sensor 2	3	✓
P0036	O2 sensor2 heater open circuit	4	✓
P0037	O2 sensor2 heater short to ground	4	✓
P0038	O2 sensor2 heater short to battery plus	4	✓
P0054	current O2 sensor2 resistance is greater than threshold value	3	✓
P0420	Catalyst System Efficiency Below Threshold Bank 1	3	✓