SERVICE MANUAL OF ENGINE KS150

LXFD0901-054

CHONGQING LONCIN ENGINE CO.,LTD April, 2023

PREFACE

With the increasing variety number of motorcycles on the market, new structures and new technologies are being used continuously. In order to help the huge consumers and maintenance technicians grasp the engine maintenance, adjustment and repairing technology of KS150 engine, we prepare this maintenance manual. Wish this manual can bring convenience and give maintenance technical guidance to the huge consumers and the maintenance technicians.

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Catalog

I、summarize

Maintenance code

1. Please use the spare parts, lubricating oil or other auxiliary materials manufactured by LONCIN or approved and recommended by LONCIN. If the material used does not meet the specifications or requirements of "LONCIN", it may damage the motorcycle

2. Do not use non-metric tools when repairing motorcycles. Metric bolts, nuts and screws are not interchangeable with inch fasteners;

3. After disassembly, it's necessary to replace washers, O-rings, cotter pins and lock pieces when reassembling ;

4. When tightening a bolt or nut, please firstly tighten the bolt with a larger diameter or the inner bolt. Each bolt is then gradually tightened in a diagonal sequence to its specified torque value unless a special sequence is specified;

5. To clean the removed parts with a cleaner. Before assembly, lubricating oil should be applied to the sliding surface of the parts;

6. After reassembly, it shall check whether all parts are correctly installed and properly operated. And it's also necessary to carry out rotation, movement and operation inspection;

7. Coolant, oil, discarded parts and other pollutants must be treated in accordance with national environmental protection requirements during maintenance;

SPECIFICATION

GENERAL SPECIFICATION

	ITEMS	DATA
ENGINE	TYPE	
	ENGINE DISPLACEMENT	
	Cylinder alignment and inclination Angle	1,10°
	Cylinder diameter x stroke	
	combustion chamber space	
	Compression ratio	10.6：1
	Max.power	
	Max. torque	
	Valve mechanism	OHC
	Intake valve	Intake valve open (intake valve lift 1mm) : -6° BTDC
		Intake valve close (intake valve lift 1mm) : 38°ABDC
	Exhaust valve	Exhaust valve open (intake valve lift 1mm) : 34°BBDC
		Exhaust valve closed (intake valve lift 1mm) : -5°ATDC
	Lubricating system	Forced pressure lubrication + splash lubrication
	Cooling system	Water cooling
	Engine net weight	29.7kg
BELT DRIVE ASSY.	CVT transmission ratio primary reduction ratio	0.81～2.52
		3.667（55/15）
	Secondary reduction ratio	2.688（43/16）
ELECTRIC SYSTEM	Ignition system	FTI
	Startup system	Electric starting
	Lighting system	Battery
	Type of spark plug	CPR8EA-9 (NGK)
	Spark plug clearance	(0.8 to 1.0)mm
	Voltage regulating rectifier	Three phase full wave rectification

Cooling system specification

ITEMS		SPECIFICATION
Coolant capacity	Radiator and engine	0.46 L
	Water tank	/
Radiator cap relief pressure		(98～110) kPa
thermostat	The starting temperature	(80～84) ℃
	Full opening temperature	(90～94) ℃
	valve lift	≥ 7mm
Coolant is recommended		Coolant with ethyl alcohol, without silicate
Standard of coolant concentration		Mix with distilled water 1:1

Specification of Lubricating system

unit: mm

Items		Standard value	Maintenance limit
Oil capacity	After the change of engine oil	0.9L	—
	After the disassembly of engine	0.8L	—
80W-90 gear oil	After the change of engine oil	0.18L	—
	After the disassembly of engine	0.12L	—
The recommended engine oils		The recommended engine oil: SF15W-40/SG15W-40 API quality level: SG or higher (don't use the energy-saving oil with the circular API service label)	—
Oil pump rotor	Tip clearance	≤ 0.15 (Inner and outer rotor)	0.16
	Middle clearance	0.016～0.074 (Inner turning hole and shaft)	0.084
	Bilateral clearance	0.06～0.12 (Up and down direction)	0.13

The Specification of Cylinder head/valve unit:mm

Items			Standard value	Maintenance limit
Electric-start cylinder pressure			(800～1000)kPa	—
Valve clearance		Air-inlet valve	0.06～0.08	—
		Air-exhaust valve	0.14～0.16	—
Rocker arm	Inner diameter	Air-inlet/air exhaust	13.968～13.98	13.982
	Outside diameter Of bearing	Air-inlet/air exhaust	13.992～14	13.99
	The clearance of the rocker arm and bearing	Air-inlet/air exhaust	-0.012～-0.032	-0.008
	Inner diameter of bearing	Air-inlet/air exhaust	10.013～10.031	10.041
	Outside diameter Of Rocker shaft	Air-inlet/air exhaust	9.972～9.987	9.962
	The clearance of the rocker arm bearing and rocker shaft	Air-inlet/air exhaust	0.026～0.059	0.079
CAM shaft	CAM convex height	Air-inlet	33.676～33.776	33.666
		Air-exhaust	33.463～33.563	33.453
	The clearance between bearing and hole		0.002～0.026	0.036
	pulsation		—	—
valve、valve guide tube	Diameter of valve pole	Air-inlet	4.975～4.99	4.965
		Air-exhaust	4.955～4.97	4.945
	Inner diameter of valve guide tube	Air-inlet/air exhaust	5～5.012	5.022
	The clearance from valve pole to valve guide tube	Air-inlet	0.01～0.037	0.057
		Air-exhaust	0.03～0.057	0.077
	The height of guide tube	Air-inlet/air exhaust	10.8～11.2	—
	Width of valve base	Air-inlet/air exhaust	1.0～1.2	1.6
free length of Valve spring		Inner diameter	14.45～14.75	—
		Outside diameter	17.03～17.37	—
Flatness of cylinder head			0.05	0.05

CVT specification

unit: mm

ITEMS		Standard value	Usage limit
Belt	Belt width mm	22.3～22.9	21.3
Driving pulley parts	mounting hole aperture of Sliding drive disk mm	24～24.021mm	24.061
	outside diameter of Sliding drive disc sleeve mm	23.959～23.998	23.559
	Roller outside diameter mm	19.9～20.1	19.4
Driven pulley parts	The mounting hole aperture of the driven sliding disc combination mm	34～34.039	34.079
	The mounting shaft diameter of the driven fixed disc assembly mm	33.966～33.991	33.916
	free length of Press spring mm	144	139
	friction material thickness of the Clutch shoe block combination	2.95～3.05	＜1
	Inside diameter of clutch outer disc mm	125～125.2	125.5

Cylinder body and transmission system specifications

unit: mm

ITEMS			Standard value	Maintenance limit value
transmission mechanism	Main shaft	Shaft diameter at clutch	19.98～19.993	/
	output shaft	Shaft diameter	25.077～25.095	/

The specifications of Crankshaft, piston and cylinder body

unit: mm

ITEMS		Standard 值	Maintenance limit value
crankshaft	Big head side clearance of connecting rod	0.10～0.35	0.45
	The clearance between the connecting rod big head bearing bush and crank pin	0.097～0.127	0.07
	throb	—	0.05
cylinder body	**cylinder bore**	57.3～57.31	57.4
	Loss of circle	—	
	Taper	—	
	flatness	—	
Piston, piston pin, piston ring	The diameter of Piston base circle	57.275～57.285	57.19
	The hole diameter of pin	14.002～14.008	14.02

	Piston pin diameter		13.994～14	13.98
	The clearance between Piston and piston pin		0.002～0.014	0.22
	Piston ring closing gap	One 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
	The clearance between Piston ring and ring groove	The clearance between one ring and slot	0.020～0.060	/
		The clearance between second ring and slot	0.020～0.060	/
Cylinder clearance			0.010～0.045	0.055
Connecting rod small head bore diameter			14.01～14.021	14.121
The fit clearance between connecting rod and pin			0.01～0.027	/

torque value

Standard of torque value

type of fastener	torque valueN.m		type of fastener	torque valueN.m
5mmBolt and Nut	5.2		5mm screw	4.2
6mmBolt and Nut	10		6mm screw	9.0
8mmBolt and Nut	22		6mm flange bolt（ 8mm head, small flange）	10
10mmBolt and Nut	34		6mm flange bolt（ 8mm head, big flange）	12
12mmBolt and Nut	54		6mm flange bolt（ 10mmhead） and nut	12
			8mm flange Bolt and Nut	27
			10mm flange Bolt and Nut	39

Torque value of engine (**routine maintenance**)

ITEMS	quantity	**diameter of thread mm**	torque valueN.m	Remark
sparking plug	1	10	12～15	
valve cover	1	30	20～25	Coarse colander cover
seal screw plug	1	12	25～30	Crankcase drain bolt
Drive box drain bolt	1	8	18～22	With gasket

Cooling system

ITEMS	quantity	**diameter of thread mm**	torque value N.m	Remark
Radiator protective cover bolt	3	6	8～12	
Radiator bolt	4	6	8～12	
Radiator support clip nut	3	6	8～12	
Radiator support tapping screws	3	4.8	2～3	
Dust cover bolt	1	6	8～12	

Tightening bolt for outer cover of breathing tank	3	6	8～12	
Water pump mounting bolt	3	6	8～12	
Fan mounting bolt	3	6	7～9	Apply 1262 thread glue
Tee bolt	2	6	8～12	
Thermostat mounting bolt	2	6	8～12	
Engine sensor	1	12	14～15	**water temperature sensor**

Cylinder head and valve

ITEMS	quantity	**diameter of thread mm**	torque value N.m	Remark
Cylinder head nut	4	8	28～32	Nut end stained with oil
Camshaft baffle bolt	1	6	8～12	
Valve rocker arm shaft bolt	2	5	5～9	
Oil and gas separation plate screw	4	ST4.2	2～3	
Cylinder head bolt	4	6	8～12	
Cylinder head cover see-oil bolt	1	5	8～12	
Tensioner adjusting bolt	1	6	Hand tightening	
connection bolt of Cylinder body	2	6	8～12	

Belt combination

ITEMS	quantity	**diameter of thread mm**	torque value N.m	Remark
Driving pulley fastening nut	1	14	63～77	Auxiliary tooling needed
Driven pulley fastening nut	1	12	43～53	Auxiliary tooling needed

Left crankcase cover bolt	10	6	8～12	

Magneto

ITEMS	quantity	diameter of thread mm	torque value N.m	Remark
Magneto rotor bolt	1	12	80～90	Apply 1262 thread glue
Magneto spindle bolt	3	6	18～12	
Hall sensor bolt	1	6	7～9	Apply 1262 thread glue
Trigger bolt	2	6	8～12	
Press-plate bolt	2	6	8～12	
Right crankcase cover bolt	10	6	8～12	

Crankcase case and transmission system

ITEMS	quantity	diameter of thread mm	torque value N.m	Remark
Crankcase 6mm bolts	10	6	8～12	
Crankcase positioning stud	4	6	8～12	
Transmission-case 8mm bolts	7	8	18～22	
Press- pin fastening bolt	1	6	8～12	The fastening position of Timing chain limit plate

Crankshaft, piston, cylinder body

ITEMS	quantity	diameter of thread mm	torque value N.m	Remark
Drain bolt	1	6	12	At upper side of the drain of cylinder body

Lubricate and seal position

Engine

Material		Location	Remarks
sealant	1596	Crankcase coupling surface Cylinder seal gasket	
		Dust cover seal	
Thread locker	1262	Fastening bolt of timing driven pulley Magneto rotor nut Hall sensor bolt Fan fastening bolt	
Engine oil		The whole surface of the inner and outer rotors of the oil pump the whole surface of Rocker arm shaft Valve rod sliding face and rod end Camshaft rolling surface Main oil hole on-end face of cylinder body Cylinder body & cylinder hole A/B Bolt leakage end **piston skirt** Outer surface of piston pin Gear teeth (transmission countershaft gear, output shaft gear) Each bearing rotation area Thermostat seal	
Molybdenum disulfide oil		Cylinder head CAM shaft hole	
Multi-purpose grease		Each oil seal lip	The oil seal manufacturer comes with it
MP3		Tee seal ring	
degreaser		All joint surfaces	

II、Maintenance

Maintenance information

summarize

- Before all operations, please place the motorcycle on a horizontal plane

Tools

Driving pulley fastening AIDS：

Driven pulley fastening AIDS：

Magneto rotor retainer

Water pipe clamp：

Maintenance specification

Please check the maintenance cycle according to the maintenance table in the Instruction Manual。

I： Inspect, clean, adjust, lubricate or replace if necessary; C: Clean; R: Replace; L: lubrication

The following maintenance ITEMS require certain mechanical knowledge. Some ITEMS, especially those marked with * and ** symbols, may require more technical information and tools。

the periodic table of MAINTENANCE

Serial NO.	Period / ITEMS	×1000km	1	6	12	18	24
		Months	1	6	12	18	24
*1	**bolt and nut**		I		I		I
*2	**sparking plug**			I	I	I	R
*3	**compression pressure**		I		I		I
*4	**valve clearance**						I
*5	Oil filter net		I	I	I	I	I
*6	Engine oil		R	R	R	R	R
*7	**liquid coolant**		I	I	I	I	R
*8	**cooling system**			I	I	I	I
*9	Oil sprayer				I		I
10	Cylinder head snorkel			C	C	C	C
*11	clutch			I	I	I	I
*12	belt			I	R	I	R
*13	Rear shock sleeve			I	R	I	R
*14	Left crankcase cover bushing				L		L

Note: 1. If the motorcycle is used in a harsher environment such as abnormal humidity and dust, it should be maintained more frequently。

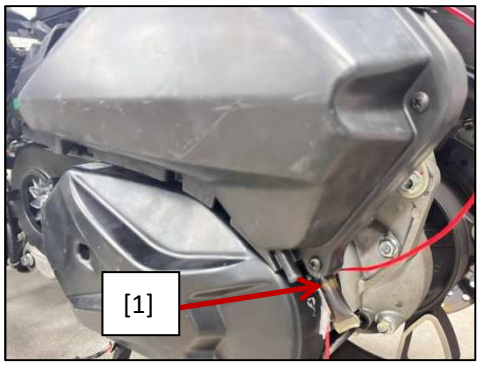
2. * Marking ITEMS require special tools, data and professional skills, which shall be carried out by LONCIN dealers。

crankcase breather

Note：

- Maintenance should be increased in the rain or at full speed, and after the motorcycle is washed or inverted. Check to see if sediment is visible in the transparent part of the vent pipe.

Unplug the empty colander cleaning tube plug [1] and channel the sediment into a suitable container. Relocate the plug。

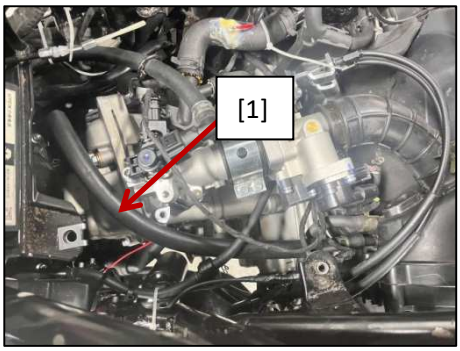


Remove the fuel tank and hold.

Check crankcase exhaust pipe [1] for cracks, aging, damage and loosening.

Replace the exhaust pipe if necessary.

Install fuel tank.



Spark Plug

Remove the fuel tank.

Remove the spark plug[1].

Note：

Before removing the spark plug, blow around the base of the spark plug with an air gun and ensure that no dust falls into the combustion chamber.

Check the insulator for cracks or damage, and the electrode for damage, dirt or discoloration. Replace the spark plug if necessary.

Check the spark plug:

Clean the spark plug electrodes with wire or a special spark plug cleaner.

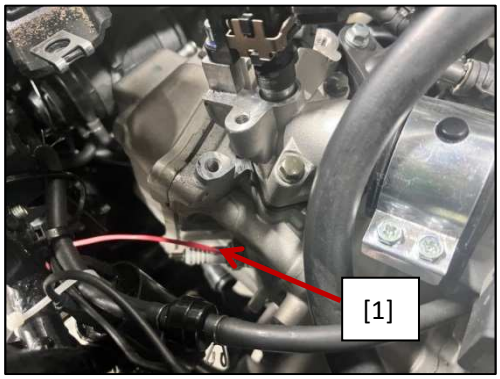
Check the gap between the center electrode and the side electrode with a plug gauge.

spark plug gap： (0.80～1.0)mm

If necessary, carefully bend the side electrodes to adjust the clearance.

Manually tighten the spark plug to the cylinder head and then tighten spark plug to specified torque value

torque value： 13N • m



valve clearance

Check

Note：

- Please check and adjust the valve clearance under cooling condition (below 35℃).

Remove the following components:

- Cylinder head cover
- Breathing tank cover

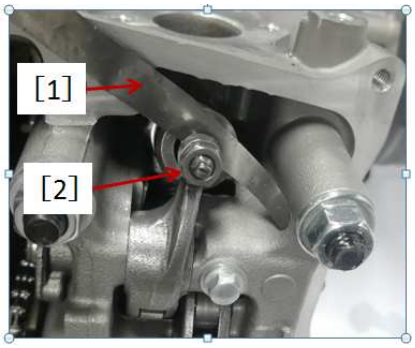
Turn the crankshaft counterclockwise so that the "-" mark [1] on the timing slave wheel is flush with the cylinder head joint surface, and the indicating circle point [2] on the timing slave wheel is perpendicular to the cylinder head joint surface towards the cylinder head side.

Adjust

Note：

- Valve clearance adjustment is achieved by adjusting the valve adjustment screw.

Insert feeler ruler [1] between valve rocker arm adjustment screw [2] and valve to check valve clearance.

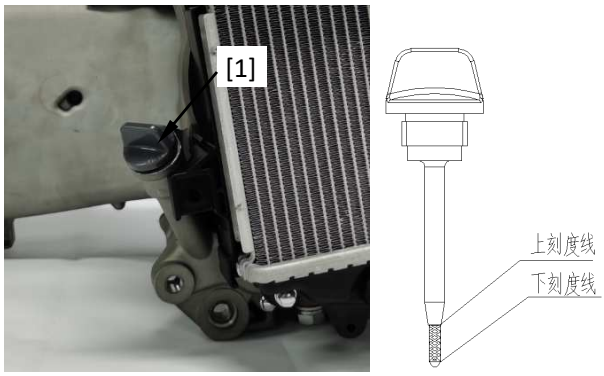


valve clearance：

IN：(0.07±0.01)mm

EX：(0.15±0.01)mm

Engine oil



Oil level check

Start the engine and idle for (3 to 5) minutes.

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

Position the motorcycle in an upright position on a horizontal plane.

Check the oil gauge。

If the oil level is lower than the lower scale line, use the specified oil to add to the engine, and use the oil gauge to determine that the oil level is in the upper middle scale。

Designated oil： SF15W-40/SG15W-40

API Quality rating: SG or higher (do not use oil labeled as energy efficient on the circular API service label)

JASO T903 standard：MA

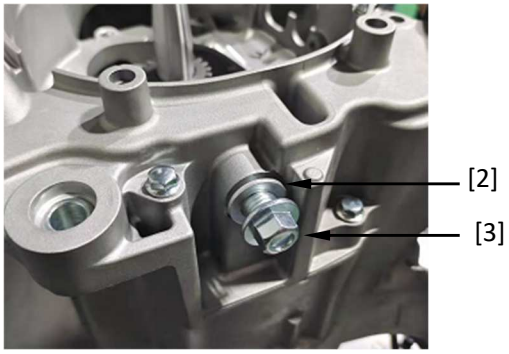
viscosity： SAE15W-40

Check whether the O-ring seal of the oil gauge is in good condition, and replace it if necessary.

Apply oil to O-ring surface.

Mounting oil gauge

Change of engine oil



To heat engine.

Shut off engine and remove drain bolt.

Remove the oil bolt [3] and washer [2] and drain the oil.

After the oil is completely drained, install the drain bolt and replace the washer with a new one.

Tighten drain bolt to specified torque.

Torque： （25～30）N•m。

Fill crankcase with designated oil.

Oil capacity:

New machine: add 0.9L;

After engine maintenance or overhaul: Add 0.8L

Check the oil level.

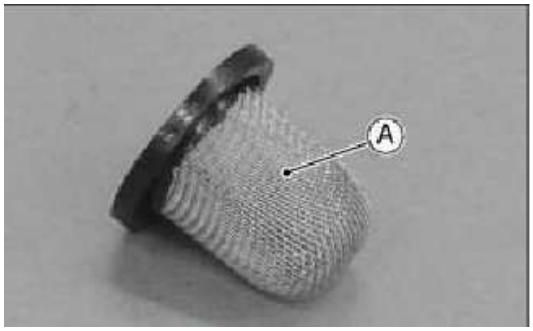
Make sure there is no oil leakage.

To clean the oil filter net

· Drain the oil.

· Remove oil filter cover A and press spring.

· Clean the oil filter with a solvent with high ignition point to remove particles stuck to the oil filter.



Warning
Do not clean the oil filter using gasoline or solvents with low ignition point, which may be flammable and/or explosive and may result in serious burns. Clean the oil filter in a well-ventilated area and Note that there are no sparks or flames near the work area, including any appliances with lights

• Carefully check whether the oil strainer A is damaged and whether the strainer pad falls off.

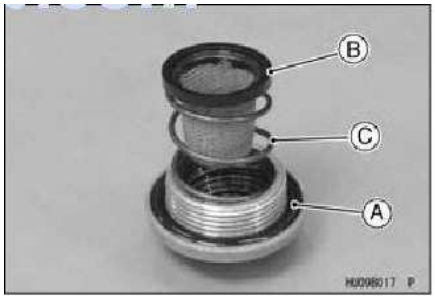
★If the oil filter is damaged, replace it.

· Replace with A new O-ring A.

· Install oil strainer B and press spring C.

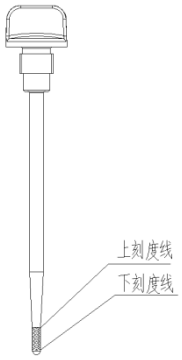
· The smaller diameter side of the spring faces down.

The tightening torque of oil filter cover： （20～25）N・m。



transmission case oil

Engine oil



Oil level check

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

Position the motorcycle in an upright position on a horizontal plane.

Check the oil gauge.

If the oil level is lower than the lower scale line, use the specified oil to add to the engine, and use the oil gauge to determine that the oil level is in the upper middle scale。

The specified engine oil： 80W-90 gear oil

Check whether the O-ring seal of the oil gauge is in good condition, and replace it if necessary.

Apply oil to the surface of type 0 sealing ring.

Install oil gauge

Replacement of engine oil

To heat engine.

Turn off the engine and remove the oil drain screws.

Remove the oil bolt [2] and washer [3] and drain the oil.

After the oil is completely drained, install the drain bolt and replace the washer with a new one.

Tighten drain bolt to specified torque

Torque：（18～22）N•m。

Fill transmission case with specified oil。

Oil capacity：

New engine: Add 0.2L;

After engine maintenance or overhaul: Add 0.12L

Check the oil level.

Make sure there is no oil leakage。

Engine idle speed

Note：

- After completing all engine maintenance ITEMS and confirming within the specified range, to recheck and adjust the idle speed.
- Before checking the idle speed, check the following ITEMS：
  - No fault indicator is blinking
  - Spark plug condition
  - Air filter element status
  - Free travel of throttle switch and throttle handle
- The idle speed must be accurately checked and adjusted below the engine's thermal condition.

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

Check idle speed。

Idling speed：(1700±150)rpm

If the idle speed is not in the Maintenance limit value, check the following components：

- Air intake or engine tip problem
- Idle control valve operation

III、Cooling system

Maintenance information

summarize

△, ! WARNING

Do not remove the radiator cover before the engine and radiator cool, in case the coolant spills out and burns people

Note

Using coolant with silicate corrosion inhibitors can lead to premature wear of pump seals or blocked radiator channels.

Running tap water can cause engine damage.

- Add coolant to secondary tank。 Do not remove the radiator cap except to add or drain coolant.
- There is no need to remove the engine from the frame to service the cooling system.
- Avoid coolant leakage to the painted surface.
- After system maintenance, the cooling system tester should be used to check for leaks.
- Coolant temperature indicator/water temperature sensor inspection

Cooling system specification

ITEMS		Specification
Coolant filling amount		460ml
Water pump flux	Thermostat on	15.3L/min
	Thermostat off	1.1L/min
thermostat	Turn on the temperature	(80～84)℃
	Full opening temperature	(90～94)℃
Coolant is recommended		Coolant with ethyl alcohol & without silicate

Troubleshooting

Engine overtemperature

- Coolant temperature indicator/water temperature sensor is faulty
- Thermostat valve is not opened;
- radiator cap failure
- Coolant lacking
- radiator passage, hose or pipe has blockage
- Cyclic system has air-intaking
- Cooling fan has malfunction
- Water pump has malfunction

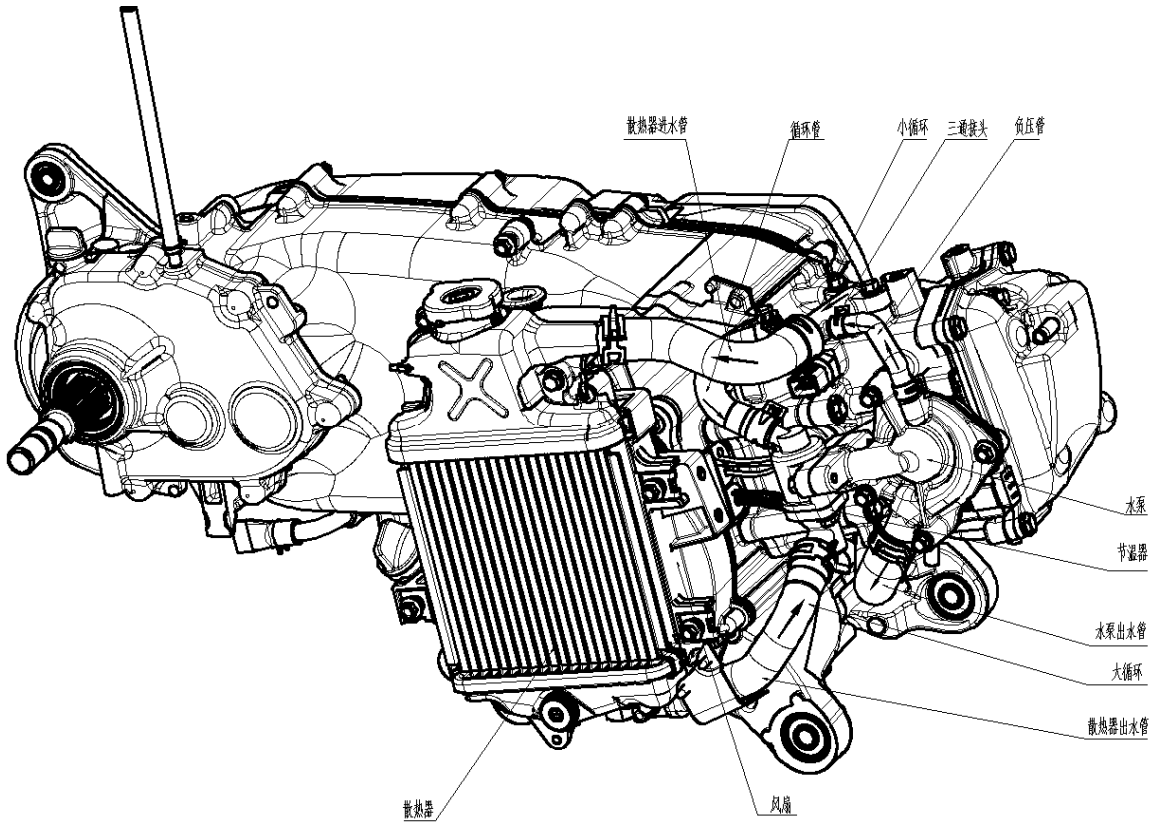
The engine temperature is too low

- Coolant temperature indicator/water temperature sensor is faulty
- Thermostat valve is opened

The coolant is leaked

- The mechanical mechanism of water pump is defective
- 0 seal ring is aged
- radiator cap has failure
- cylinder head gasket is damaged or aged
- Hose connection is loosened or pipe clamp is not tightened
- Hose is damaged or aged
- Radiator damaged
- thermostat cover, water pump cover connection is loose

System flow pattern



Special tooling for this chapter：

Replacement of Coolant

Replace coolant/exhaust

Note： When adding coolant to the cooling system or auxiliary tank or checking the coolant dosage, place the engine on level ground and in an upright position。

- Discharge coolant

1、Remove water pump drain bolt [1] and radiator cover [2] and drain coolant；

2、 Remove the drain bolt [3] and flat washer [4] on the cylinder body and drain the coolant。

3、 After replacing the new flat washer, preinstall the drain bolt (2 ~ 3) teeth on the cylinder block and tighten the bolt.

Torque：

Water Pump drain bolt：**(8～12)N•m**

Cylinder head drain bolt：**（8～12）N•m**

- **To clean storage tank of the radiator**

1、 Release pipe clamp with pipe clamp [1]；

2、 Remove the radiator outlet pipe [2]；

3、 Drain the coolant from the storage tank by placing the hose low outside the engine frame；

4、 Flush the inside of the storage tank with water after draining the coolant；

5、 Install the radiator outlet pipe [2] to the thermostat and install pipe clamp [1]。

- Filling coolant.

Fill the cooling system up to the neck with the recommended coolant through the radiator water injection hole [1].

Antifreeze is recommended：

Coolant with ethyl alcohol & without silicate

Remove air from the cooling system as follows：

1、 Start the engine and let it idle for 2 to 3 minutes.

2、 Open and close the throttle three to four times to exhaust the air in the system.

3、 Shut off engine and refill coolant if necessary.

4、 Install the radiator cover.

5、 Fill the storage tank with the recommended coolant

Thermostat component

Note： If the thermostat is not opened during engine startup, it needs to be replaced.

Disassembly/installation

- **disassembly**

1、 Discharge coolant；

2、 Loosen two pipe clamps with pipe clamps [1]；

3、 Remove the exhaust pipe [2]；

4、 Remove the radiator outlet pipe [3]；

5、 Unscrew thermostat mounting bolt [4]；

6、 Remove the thermostat.

- Installation

1、 Replace the sealing ring with a new one [5]；

2、 Tighten thermostat mounting bolt [4]；

3、 Cover exhaust pipe [2] and radiator outlet pipe [3]；

4、 Clamp pipe clamp with pipe clamp [1]；

5、 To add Coolant。

Water pump assembly

Face seal inspection

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

1、 It is normal for a small amount of coolant to flow out.

2、Make sure there is no continuous coolant leakage when starting the engine.

Replace the "water pump assembly" if necessary

Disassembly / Installation

- Disassembly

1、 Discharge coolant;

2、 Completely release pipe clamp [1];

3、Remove the water pump outlet pipe [2] and the negative pressure pipe [3];

4、 Discharge pump。

- Installation

The installation sequence is opposite to the disassembly sequence

T-joint

Disassembly / Installation

- **Disassembly**

1、 Drain the coolant;

2、 Loosen three pipe clamps[2] with pipe clamps [1];

3、 Unload three water pipes [3];

4、 Remove the bolt [4] and remove the joint。

- Installation

1、 Replace the sealing ring with a new one [1];

2、 Cover the pipe and clamp the pipe clamp;

3、 Install the bolts and tighten them。

Torque： the fastening torque (8～12)N•m

Note：

1、 Replace the seal ring;

2、 The system fills or drains coolant

water temperature sensor

Disassembly / Installation

- Disassembly

1、 Discharge coolant

2、 Disconnect the sensor lead connector

4、 Disassemble water temperature sensor[1]

- Installation

1、Apply silicone sealant to thread [2] of sensor [1] and tighten;

2、 Tighten the water temperature sensor completely;

3、 To add coolant.

Torque：Fastening Torque（14～16）

N•m

- check the water temperature sensor

Please refer to the Electrical System section to check the water temperature sensor

Radiator / cooling fan

Disassembly / Installation

- Disassemble the Radiator shield

1、Drain the coolant;

2、Remove 3 assembly bolts [1] and remove radiator protective cover [2];

- Disassemble the Radiator component

1、Loosen pipe clamp [1] and remove radiator inlet pipe and radiator outlet pipe;

2、Remove the four bolts of the radiator tank component [2], and remove the radiator [3] and the lower bracket assembly of the radiator。

Note: Do not damage the radiator fins.

- Disassemble fan

1、Remove three fan assembly bolts [1];

2、Remove the fan [2]。

The Installation sequence is opposite to the disassembly sequence

- Installation

IV、Lubricating system

Maintenance information

summarize

△, ! WARNING
Repeated, long-term skin exposure to used engine oil can lead to skin cancer. This is rare unless you come into daily contact with used engine oil. However, we recommend that you clean your hands with soap box water as soon as possible after disposing of the used oil

- When servicing the oil pump, the engine needs to be removed (see Section 8 engine crankcase Maintenance Guide).
- The premise of each repair step in this chapter is to drain the engine oil;
- When disassembling and installing oil pump, be careful not to let dust and dirt into the engine;
- If any of the oil pump components wear out beyond the specified Maintenance limit value, replace the components and replace the inner and outer rotors of the oil pump together。
- After installing oil pump, to check if there is any oil leakage.

Lubrication system specification

ITEMS	Standard value	Maintenance limit value

Amount of oil filling	New engine	crankcase	900ml	—
		transmission case	80W-90 Gear oil filling 200mL	—
	After analysis	crankcase	800ml	—
		transmission case	80W-90 Gear oil filling120mL	—
Type of lubricating oil			SF15W-40/SG15W-40	—

Troubleshooting

Overlow oil level

- High oil consumption
- External component leakage
- piston ring scuffing or incorrect installation
- Cylinder body wear
- Valve guide pipe wear

Overlow oil pressure

- Overlow oil level
- Oil filter is blocked
- Inner components leaked
- Incorrect engine oil use

No oil pressure

- Overlow oil level
- The opening of **oil pressure relief valve is blocked**
- The main and driven wheel teeth of the oil pump are broken
- The oil pump is damaged
- Inner components leaked

Overhigh oil pressure

- **oil pressure relief valve is closed**
- Oil screen, oil return hole, or oil measuring hole is blocked
- Incorrect engine oil use

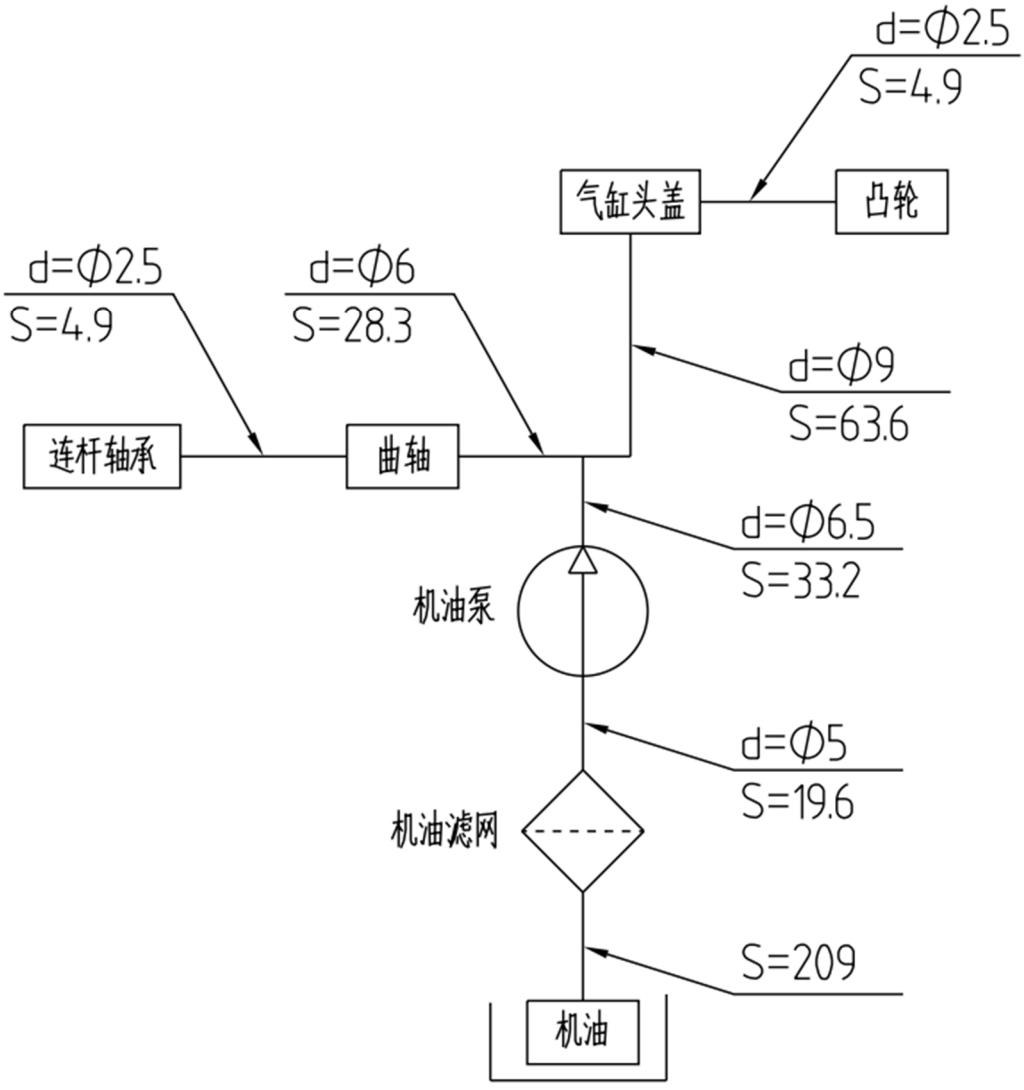
Oil staining

- There is no regular change of oil and filter
- The piston ring is damaged

Oil **emulsification**

- Expansion cracking of cylinder head cover
- The coolant channel has leakage
- There is water entering into engine

Lubricating system drawing



Oil pump

Disassembly / Installation

- Disassembly

1、To disassemble the Magneto and right crankcase cover (see other sections of the service guide for details) ；

2、 Remove oil pump opening retainer with appropriate tools [1]；

3、 Remove the driven pulley of oil pump [2]；

4、Remove two hex screws [3] and take out the oil pump [4].

Note： Before disassembly, the oil needs to be drained

- decompose the oil pump

1、**inner rotor**[1]；

2、outer rotor [2]；

3、Oil pump cover[3]；

4、Oil pump shaft [4]。

- Installation

The installation process is opposite to the disassembly process.

Note：

1、Apply lubricating oil when assembling the inner and outer rotors of the oil pump。

2、To check if the locating pin is installed correctly.

3、To Check whether the drive shaft of the oil pump rotates freely

4、To replace with a new oil pump opening retainer

Fastening Torque of Oil Pump bolt：(8～12)N·m。

CHECK

- The checking of Driving & driven pulley of Oil Pump

  Check the following parts if there is damage, abnormal wear, deformation or combustion

  1、Oil pump driving shaft

  2、Inner rotor

  3、Outer rotor

  4、Oil pump rotor hole

- Measure oil pump clearance according to lubrication system specifications。

  If any measured value exceeds the specified Maintenance limit value, please replace the worn parts and replace the inner and outer rotors of the oil pump in complete sets.

Oil Strainer

Disassembly / Installation

- Disassembly

1、 Drain oil;

2、Disassemble valve cover [1];

3、Remove seal ring [2], press spring [3] and oil strainer [4].

- Installation

The installation process is opposite to the disassembly process。

Note:

1、 To replace with a new seal ring

2、 To Screw valve cover into left crankshaft case hole with fastening torque;

Fastening Torque of Valve cover: (20～25)N·m。

CHECK

1、 To Check whether the crude oil filter is damaged, if damaged, replace it directly;

2、 To Clean the crude oil filter with a solvent with high ignition point and to remove the particles stuck to the oil filter.

V、Cylinder head and Valves

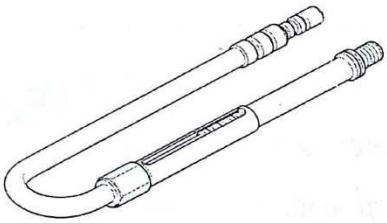
Maintenance information

summarize

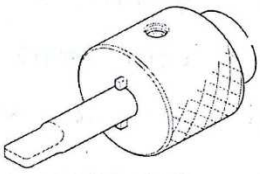
- This chapter covers the maintenance and inspection of cylinder heads, valves, camshafts and rocker arm;
- When maintaining the camshaft, rocker arm, or tensioner adjustment screw, no need to remove the engine from the frame; When maintaining the cylinder head or valve, the engine must be removed from the frame;
- When disassembled, the disassembled parts should be marked and put away to ensure that they are properly placed when reassembled;
- Before inspection, clean all removed parts with a cleaner and dry them with compressed air;
- Camshaft lubricating oil is injected through the oil line in the cylinder head and head cover, so the oil line should be cleaned before assembling the cylinder head and head cover;
- When disassembling cylinder head and cylinder head cover,please don't damage the joint surface。

TOOLS

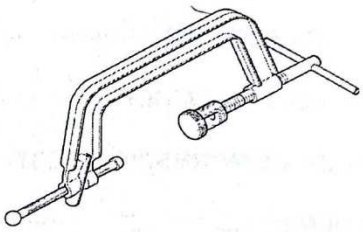
压缩表附件



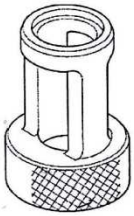
张紧装置夹 B



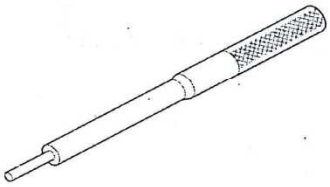
气门弹簧压缩工具



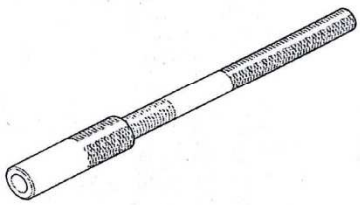
气门弹簧压缩附件



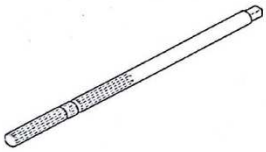
阀导管驱动装置，4.5mm



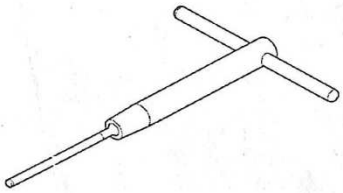
气门导管调整驱动器



气门导管铰刀，4.5mm



刀座，4.5mm



阀座修整刀具，27.5mm（IN，45°）

阀座修整刀具，24 mm（EX，45°）

平铣刀，28mm（IN，32°）

平铣刀，24mm（EX，32°）

内铣刀，26mm（IN，60°）

内铣刀，32mm（EX，60°）

Cylinder head / Valve specification

unit: mm

ITEMS		Standard	Usage Extreme Value
valve rocker arm	The clearance between valve rocker arm and valve rocker shaft mm	0.026～0.059	0.079
Camshaft CAM height	Air exhaust mm	33.676～33.776	33.666
	Air intake mm	33.463～33.563	33.453
cylinder head	Cylinder pressure kpa	**usable range:** 800～1200(900～1100rpm)	/
	Flatness mm	0.05	0.05
valve clearance	Air intake valve mm	0.06～0.08	/
	Air exhaust valve mm	0.14～0.16	/
Clearance between valve and valve tube	Air intake valve mm	0.01～0.037	0.057
	Air exhaust valve mm	0.03～0.057	0.077
Valve spring free length	Outer spring of valve mm	36.5	35.9

Troubleshooting

- Failure at the top of an engine usually affects engine performance. These faults can be diagnosed using compression tests, or the source of engine noise can be traced up to the top using a dowsing rod or stethoscope.
- If the engine performance is not good at low speed, check the crankcase vent tube for white smoke. If the hose is smoking, check whether the piston ring is stuck.

When the engine is running at low speed, the compression pressure is too low, it is difficult to start or the performance is poor

- Valves
  - Improper valve clearance adjustment
  - Valve burns or bends
  - Improper valve timing
  - Breaking of valve spring

- Cylinder head
  - The cylinder head gasket is leaking or damaged
  - The cylinder head is warped or broken
  - The spark plug is loose
- cylinder, piston, piston ring wear

The compression pressure is too high, overheat or make a knocking sound

- Overmuch carbon deposition in cylinder head or combustor
- EFI system is abnormal

Oversmoke

- Cylinder head
  - Valve stem or valve guide wear
  - The valve rod seal is damaged
- Cylinder, piston, or piston ring wear

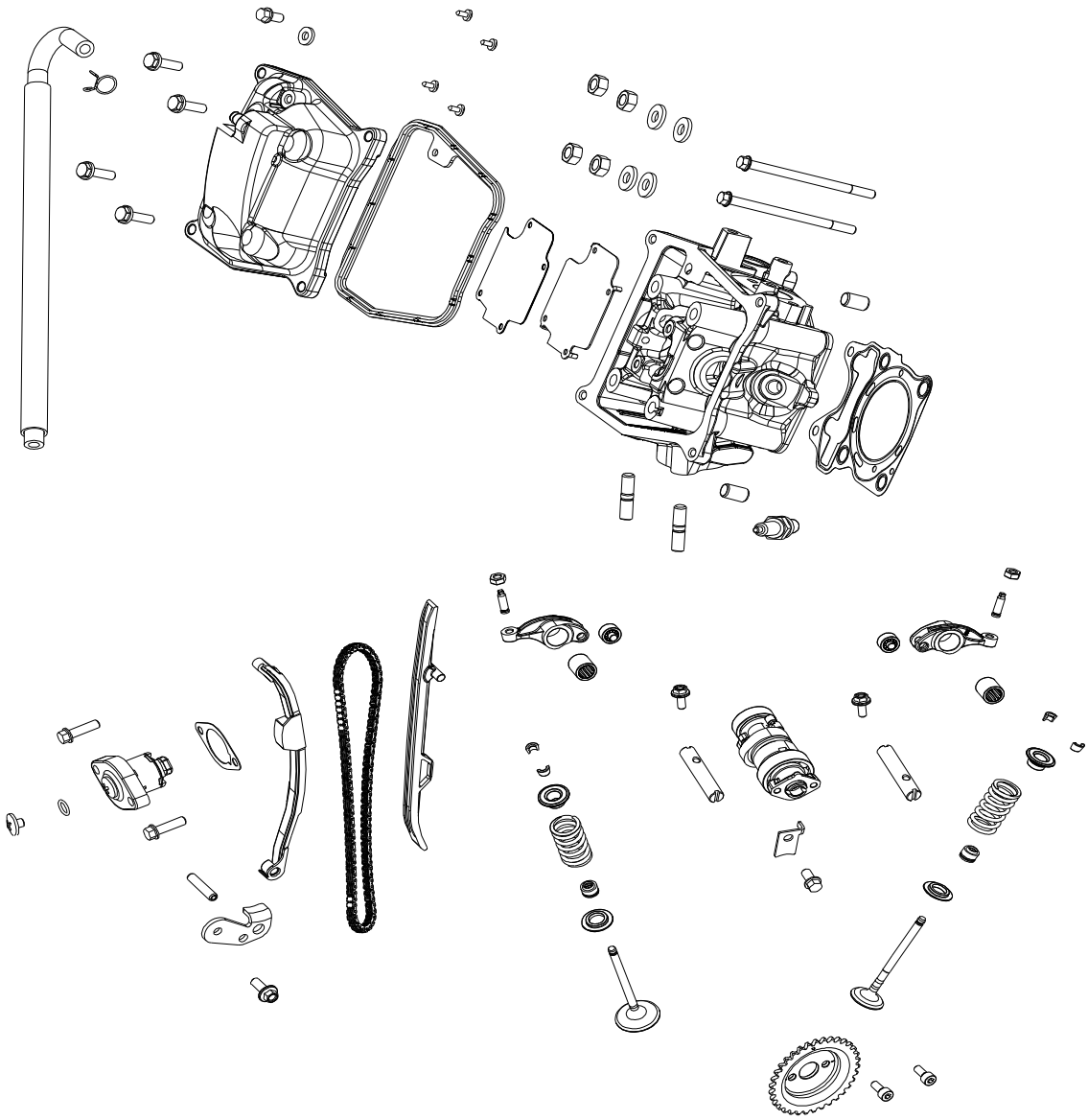
Overhigh noise

- Cylinder head
  - Improper valve clearance adjustment
  - Valve stuck or valve spring broken
  - The camshaft is worn or damaged
  - The rocker arm or rocker arm shaft is worn
  - Rocker arm and valve rod end wear
  - The CAM chain is loose or worn
  - The timing chain is worn
  - CAM sprocket teeth wear
  - The reducing valve on the camshaft is stuck
- Cylinder, piston or piston ring wear

Unhealthy idling speed

- The cylinder compression pressure is too low

Element Position



Cylinder compression test

To heat the engine to normal operating temperature.

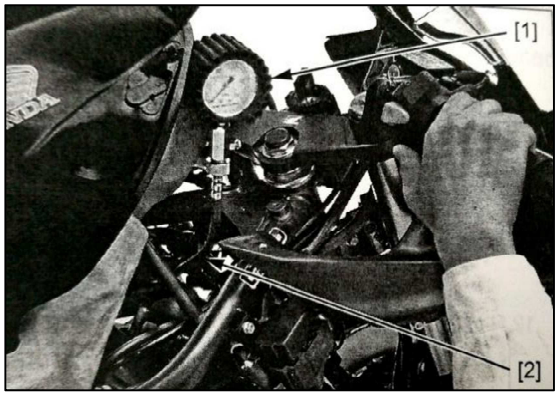
Stop the engine and remove the spark plug.。

To install ECM cable temporarily and connect 33 (black)connector.

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

TOOLS：

[2]**Compression instrument attachment**



Set the ignition switch to "on" and the engine switch to "

Keep the throttle on full and start the engine until the pressure gauge no longer reads L .

Maximum readings usually last 4 to 7 seconds

compression pressure：

When at (900～1100)rpm，it normally says (800～1200)kPa

Low pressure cause analysis：

- Cylinder head Gasket leak
- Improper valve clearance adjustment
- Valve leakage
- The piston ring or cylinder is worn

High pressure cause analysis：

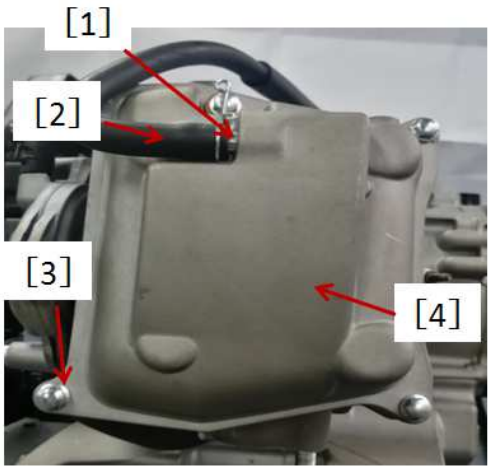
- Carbon deposits appear at the top of the combustion chamber or piston

Cylinder head Cover

Disassembly of Cylinder head cover

- To disassemble clip[1] and breather pipe [2]。

· To disassemble the 4 installation bolts of Cylinder head cover [3] and the Cylinder head cover [4]。



Installation of Cylinder head cover

· To change with a new sealing gasket for Cylinder head cover[1]。

· To install Cylinder head cover and fasten。

Bolt Torque：8～12N·m。

· To install the breathing tube and clip;

· To install the disassembled parts.

Tensioner

To disassemble the tensioner

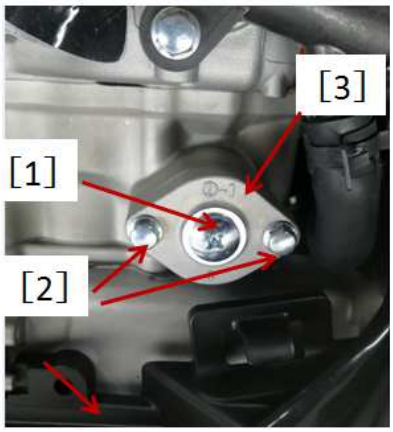
Note
This is not an automatic return tensioner. When the putter is pushed out to compensate for slack in the timing chain, the putter will not return to its original position。 It's necessary to follow the following principles： When disassembling the tensioner， do not only disassemble the installation bolt at one side,because this can easily damage the tensioner and timing chain. Once the bolt is released, the tensioner must be removed and reset as described in the tensioner installation instructions。 Do not turn the crankshaft when removing the tensioner. This may upset the timing and damage the valve.

- Disassembly：

  Tensioner bolt [1] and seal ring

  Tensioner mounting bolt [2]

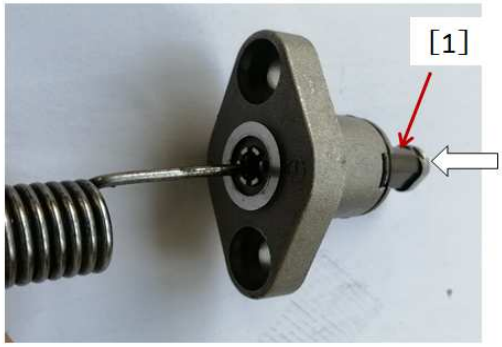
  Tensioner [3]



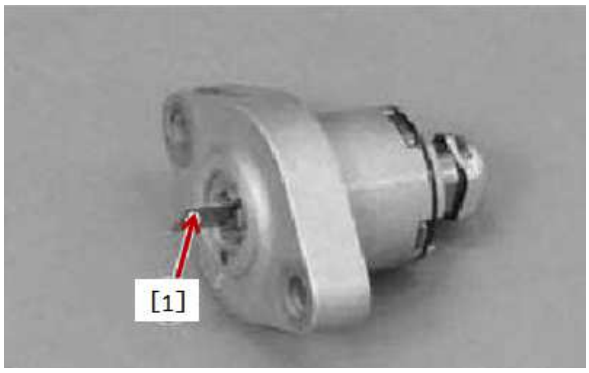
Installation Tensioner

- Press the push rod [1] and turn it clockwise with a suitable screwdriver until it is in place

Note
Do not turn the push rod counterclockwise before installing the tensioner. This may cause the push rod to detach and make it impossible to reinstall the tensioner.


[1]

• To replace with a new tensioner gasket. Hold the pusher in place with a suitable pusher support plate [1], then install the tensioner on the cylinder body

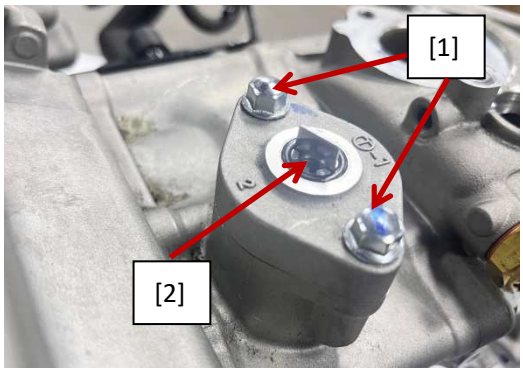


• To fasten the installation bolt[1] of tensioner。

Torque：

the installation bolt [1] of tensioner

Fastening Torque：(8～12)N·m。



· To remove support plate [2]。

· To replace with a new seal ring。

· To apply proper oil to the new seal ring。

· To Install new seal ring and tighten tensioner bolts。

· To install the disassembled parts

Valve rocker arm and valve rocker arm shaft

Disassembly of Valve rocker arm

- Disassembly:

  Timing driven pulley mounting screw [1]

  Timing driven pulley [2]

  Support the timing chain with appropriate tools [3]

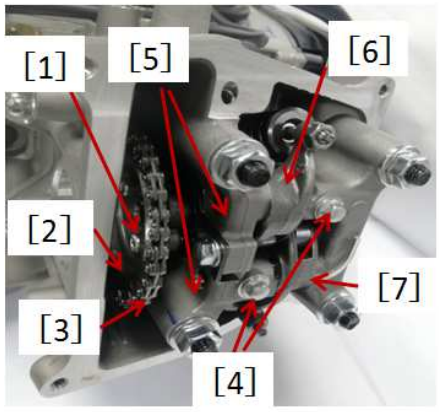
  Remove rocker arm shaft mounting bolt [4]

  Remove valve rocker arm shaft [5], intake rocker arm [6], exhaust rocker arm [7] with appropriate tools

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

- The valve rocker arm falls off with the valve rocker arm shaft

Note
Do not install the intake and exhaust rocker arm incorrectly, as shown in the figure on the right. [1] is the exhaust rocker arm marked "E"; [2] is the intake valve rocker arm marked "I".



Installation of Valve rocker arm

- **Apply oil to the following parts:**

  valve rocker arm shaft

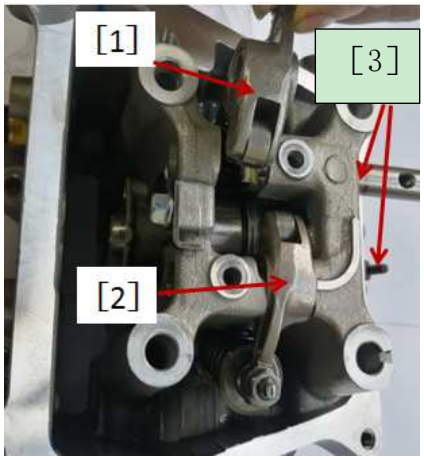
  Cylinder head rocker arm shaft mounting hole

- **Install the following parts as shown:**

  Intake valve rocker arm [1]

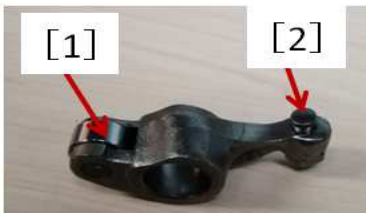
  Exhaust valve Rocker arm [2]

  Valve rocker arm shaft [3]



Check valve rocker arm and valve rocker arm shaft

- Check outer circle of roller bearing on valve rocker arm [1]



★If the rocker arm bearing is scratched, caved in, or otherwise damaged, replace the valve rocker arm and check the camshaft peach tip.

- Check where the valve adjustment bolt [2] contacts the valve.

★If the end of the valve adjusting bolt is mushroomy or otherwise damaged, or the bolt does not rotate smoothly, replace it and 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 Extreme Value, replace it at the same time.

Valve rocker arm/valve rocker arm shaft clearance

Standard：（0.026～0.059）mm

Usage Extreme Value：0.079mm。

Camshaft

Disassembly of Camshaft

- Disassembly:

Tensioner of Cylinder head cover

Cooling pump unit

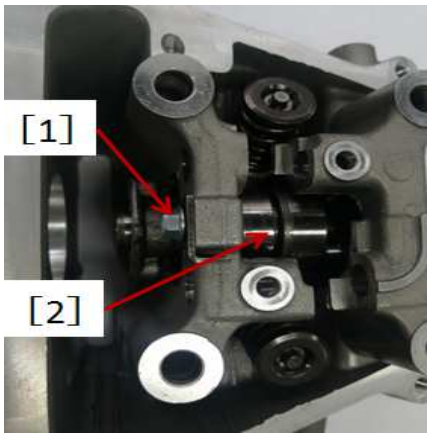
Timing driven pulley（The piston turns to top dead center）

Support the timing chain with appropriate tools

To remove valve rocker arm shaft and intake and exhaust rocker arms

To remove camshaft press bolt[1]

To disassemble the camshaft[2]。



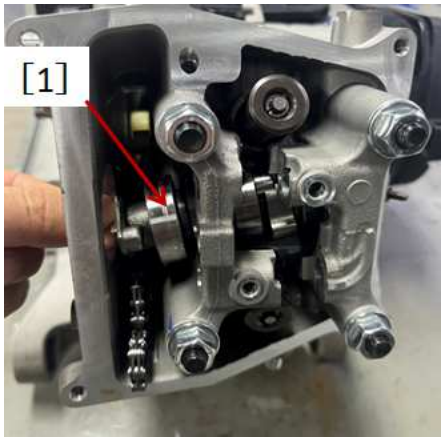
Installation of camshaft

- Oil should be applied to all joint surfaces of CAM parts [1] prior to camshaft assembly
- Installation of Camshaft press plate

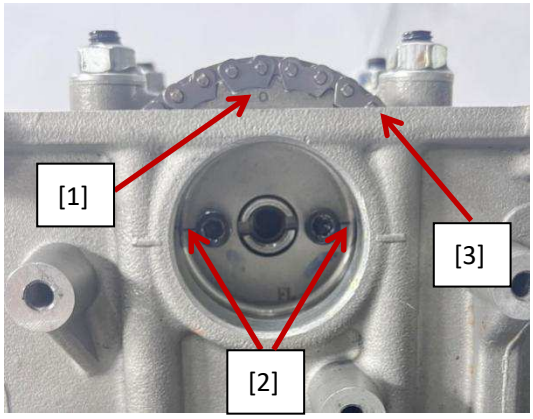
Bolt Torque:(8～12)N·m

- Connect the timing chain to the timing driven pulley
- To install the bolt of driven pulley

Bolt Torque:(5～9)N·m



- Keep the timing driven pulley dot mark [1] upward, the straight line with carved line "-" mark [2] is parallel to the cylinder head plane [3] (inlet and exhaust CAM peach tips downward)



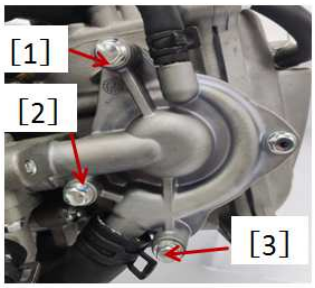
- Installation of Cooling pump and thermostat components
- Fastening bolt[1][2][3]

  Bolt Torque:(8～12)N•m
- To install pipe clamps with special tooling

· To Install the tensioner.

· Turn the crankshaft 2 turns clockwise to open the tensioner and recheck the timing to adjust the valve clearance.

· To install the disassembled parts



CHECK CAM WEAR

- To disassemble the camshaft
- Use micrometer to measure the height A of the CAM

★If the measured value exceeds the CAM wear limit, replace the camshaft

Height of CAM

Standard:

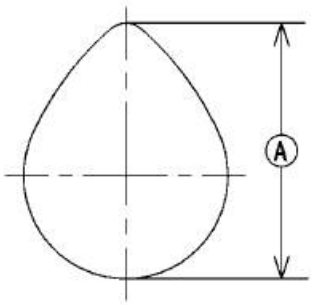
Air intake: (33.676～33.776)mm

Air exhaust: (33.463～33.563)mm

Usage Extreme Value:

Air intake: 33.666mm

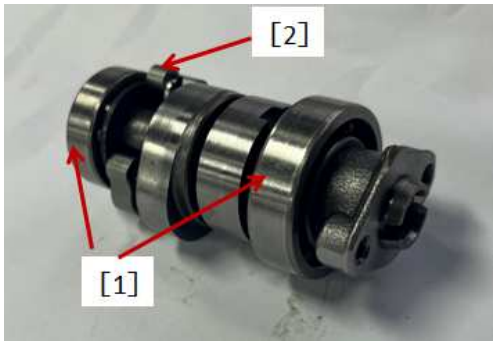
Air exhaust: 33.453mm



Check the camshaft bearings

- Check each bearing pressed on the camshaft [1]. Check whether the reducing valve is normal and whether the toggle flying block [2] is normal.
- Because the production tolerance of bearings is very small, the wear of bearings must be by feel rather than measurement. Clean the bearing with a solvent with high ignition point, dry it (do not rotate the bearing while drying), and grease it with oil。
- Quickly rotate the bearing by hand to check its condition。

★Replace the camshaft if there is abnormal noise, uneven rotation, or any violent stop in the bearing.



Disassembly timing chain

- Disassembly:

  Cooling pump kit

  Timing sprocket wheel

  Cylinder head

  Cylinder body

  Driving gear of oil pump [1]

  Guiding plate for chain [2]

  Limit plate for timing chain [3]

  Tension plate for chain [4]

- Remove timing chain [5] from timing sprocket wheel

Installation for timing chain

- Hang up the timing chain [1] onto timing driving gear.
- Installation:

  Guiding plate for chain [2]

  Tension plate for chain[3]

  Bolt on guiding plate [4]

  Bolt on tension plate

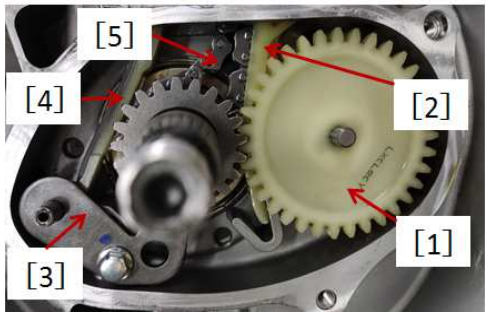
  FasteningTorque:(10～15)N•m 。

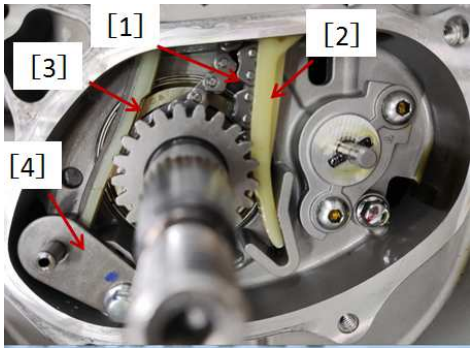
- Parts for Installation and Disassembly

Wear-out for guiding plate for chain and tension plate.

Visually check contact surface between guiding and tension plates.

★In case there is rubber damaged, cut or dropped off, please replace the guiding and tension plates for a new one.





Cylinder head

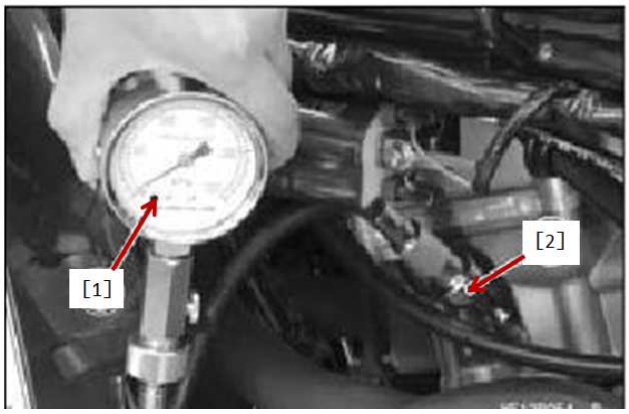
Measure pressure in cylinder

Note
Fully charge the battery.

- Start engine and get it pre-heated, then stop it.
- Disassemblespark plug.
- Firmly connect cylinder pressure gauge [1] and adapter [2] into hole on spark plug.

  Tool - Cylinder pressure gauge 20kg/cm^2

  Adapter M12×1.25



- Start engine, fully open throttle until data on cylinder pressure gauge stopped rising, now the data is the highest pressure in cylinder.

  Range for cylinder pressure: (800～1200)kPa(900～1100rpm).

In case pressure in cylinder is out of range, please refer to table below:

Problem	Diagnosis	Measures
Cylinder pressure is higher than range	Carbon build-up on piston, cylinder head, or combustion chamber, it may cause of oil shield cover broken/oil ring of piston damaged (White smoke))	Please clean up carbon build-up and replace broken parts.
	In correct thickness of gasket for cylinder head.	Replace gasket for one with standard size
Cylinder pressure is lower	There is air leakage around cylinder head	Replace broken gasket for a new one, check distortion of cylinder

than range		head
	Abnormal spring base of valve	Replace if it is necessary.
	Incorrect valve clearance	Adjust valve clearance
	Incorrect piston/cylinder clearance	Replace piston or(and) cylinder for a new one
	Piston scraping	Check cylinder, replace/repair cylinder or/and piston for a new one.
	Abnormal piston ring/Groove of piston ring.	Replace piston or/and piston ring

DisassemblyCylinder head

- Drain off coolant
- Disassembly:

  Air inlet tube

  Air exhaust pipe

  Spark plug cap

  Cooling pump kit

  Camshaft

  Hex. nut [1] and flat washer

  Hex. flange bolt [2]

  Cylinder head[3 and cylinder head gasket.

InstallationCylinder head

- **Replace gasket forc** ylinder headfor a new one.
- Installation:

  Positioning pin [1]

  New gasket for cylinder head [2]

  Cylinder head

  Camshaft

- Fasten hex. bolt for cylinder head

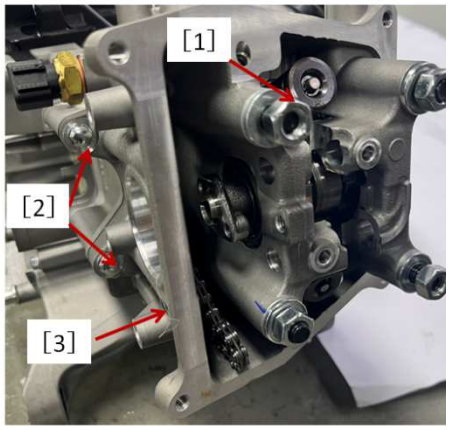
Fastening requirement:

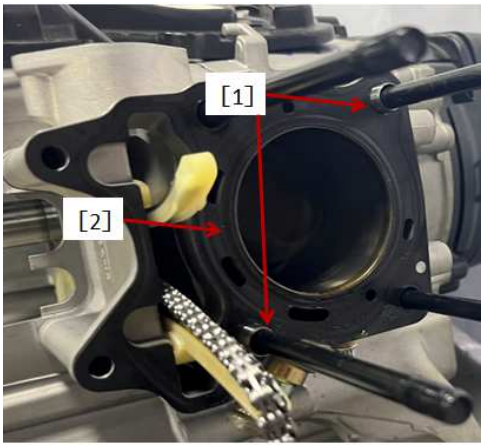
Alternative and crossing angle.

Fasten nut by toque of 15N•m、25N•mFastening, untill FasteningTorque (28～32) N•m。

Clean up cylinder head

- DisassemblyCylinder head;
- Clean up carbon build-up in combustion chamber and air exhaust port by suitable tools;
- Wash up cylinder head by solvent with high fire point.




[1]
[2]

Check distortion of cylinder head

• Clean up cylinder head;

• 在 Flatly lay a ruler under cylinder head;

• Measure gaps on lower surface of cylinder head and ruler [2] by feeler gauge [1]

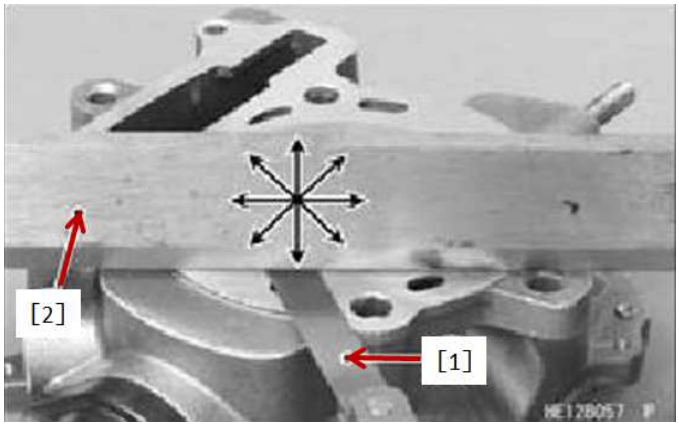
Distortion amount of Cylinder head

Standard Without gaps

Usage Extreme Value：0.05mm

★ In case cylinder head distortion passed Usage Extreme Value, please replace for a new one.

★ In case cylinder head distortionis lower than Usage Extreme Value, please grind the lower surface by fine sand paper.



Valves

Check valve clearance

Note
The valve clearance could be checked only when engine cooled down to temperature of air surrounding.

- Disassembly:
  Cylinder head cover
  Protective shield of heat radiator
  Heat radiator
  Lower bracket for heat radiator
- Turn the outer case of magneto Clockwise, until mark , "T" on rotor of magneto [1] aligned with protrusion [2]on right crankcase as picture shows: End of compression stroke of cylinder。

- Measure valve clearance by feeler gauge [1], measure clearance between end of valve rod and adjusting screw [2].
- Valve clearance(Cold engine)
  Air exhaust valve: (0.06～0.08)mm
  Air inlet valve: (0.14～0.16)mm

★In case valve clearance is incorrect, please adjust.

Adjust valve clearance

- Loosen locking nut, turn the adjusting screw until clearance got correct:
- Hold adjusting screw [2] by fixture [1], fasten locking nut [3].;

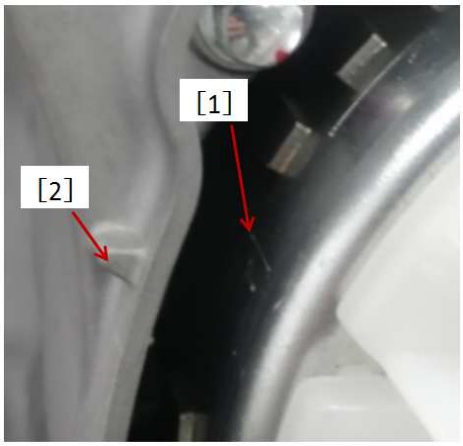
FasteningTorque for locking nut: (7～11)N·m .

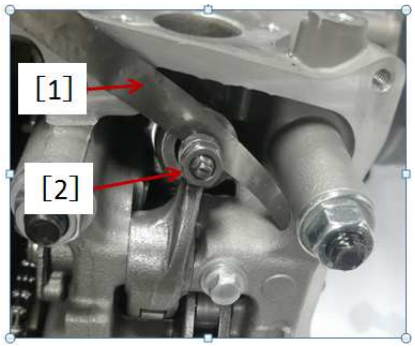
Tools-Adjusting fixture for screw.

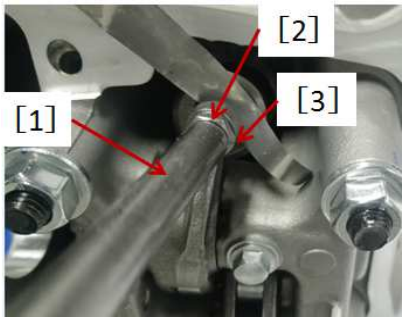
- Check valve clearance once again.

★In case valve clearance is incorrect, please adjust once again.

★In case valve clearance is correct, please adjust another one.







Disassembly for valve

- Disassembly for cylinder head;
- Mark up valve’s position for easy re-installation;
- Remove valve by compression device [1] for valve spring and adapter [2].。

  Tools-Compression device for valve spring;

  -Adapter

Installation for valve

- Replace oil shield [3] for a new one.
- In case adopt a new valve, check clearance between valve [1] and its guiding tube.
- In case too wide or narrow the clearance, please replace cylinder head。
- Coat valve rod with oil. Re-assemble valve and lower base [2] for spring[2].
- Installationfor valve spring [4], The thin side of spring face upward, thick side face downwards.
- Installation for upper base [4] of valve spring
- Installation for lock clip [6]

Measure clearance between valve and its guiding tube

- Measure external diameter of each valve rod and internal diameter of guiding tube.
- Let internal diameter of guiding tube minus external diameter of valve rod, the result is clearance between them.

★In case clearance is more than Usage Extreme Value, replace cylinder head。

Clearance between valve and its guiding tube

Standard:

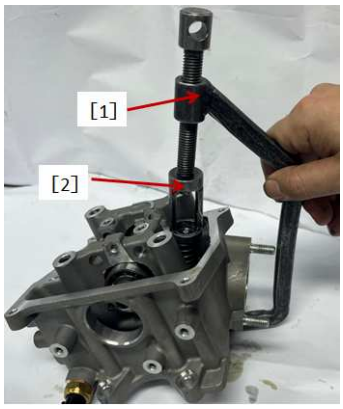
Air inlet valve: (0.01～0.037)mm

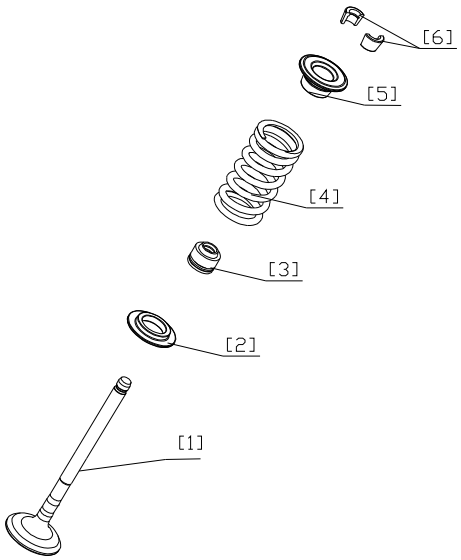
Air exhaust valve: (0.03～0.057)mm

Usage Extreme Value:

Air inlet valve: 0.057mm

Air exhaust valve: 0.077mm





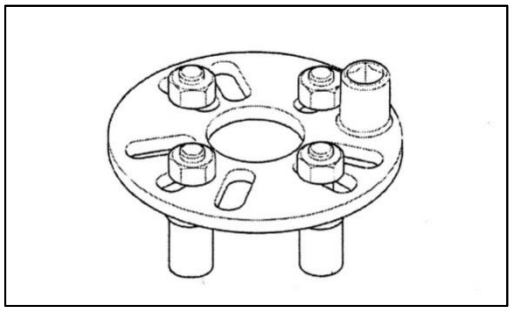
6. CVT system

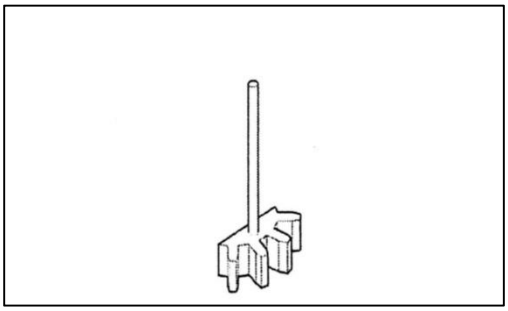
Maintenance information

Summarize

- This chapter introduce you maintenance for clutch and gearshift device, whose operate needn’ t remove engine from frame.
- The viscosity and oil level work on separation of clutch. In case the clutch failed separating but motorcycle is still slowly running, please check oil level before inspection and repair of clutch system.

Tools





Specification

unit：mmITEMS		Standard	Usage Extreme Value
Driving belt	Width mm	22.3～22.9	21.3
Driving wheel for transmission belt	Sliding plate Installation hole’s diameter mm	24～24.021mm	24.061
	External diameter for sleeve of sliding platemm	23.959～23.998	23.559
	External diameter of roller mm	19.9～20.1	19.4
Driven belt for transmission belt	Driven sliding plate kit Installation hole’s diameter mm	34～34.039	34.079
	Droven fixing plate Installation shaft’s diameter mm	33.966～33.991	33.916
	Free length for pressing spring mm	144	139
	Thickness for braking lining of clutch shoe	2.95～3.05	＜1
	Internal diameter for outer plate of clutch	125～125.2	125.5

	mm		

Troubleshooting

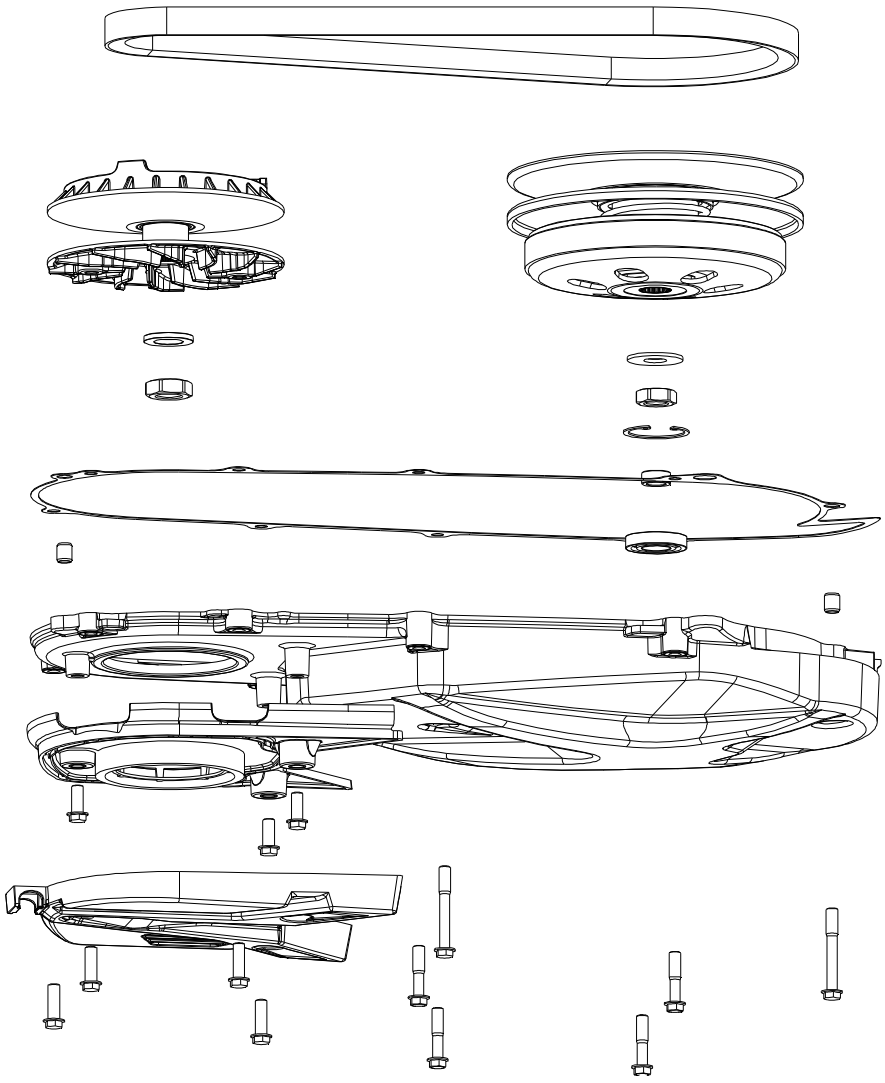
Clutch sliding in acceleration

- Driving belt wear-out
- Clutch shoe wear-out or burn-out

Abnormal noise for clutch

- Abnornal abrasion on arch surface of roller
- Welding place of friction plate of clutch gets loosened
- Lubricant for clutch doesn’ t work

Components’ layout



Left crankcase cover

Disassembly for left crankcase cover

Fastening torque: (8～12)N·m

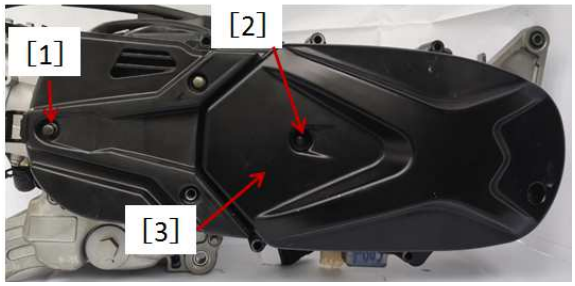
• Disassembly:

Bolt [1] for breathing groove/s cover

Left cover installation bolt [2]

Left crankcase cover [3] and gasket.

Installation for left crankcase cover



• Replace filtering screen, seal strip and sealing ring for a new one

• Installation:

Positioning pin [1]

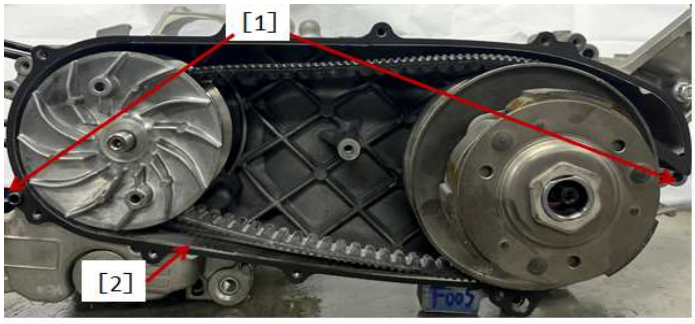
Gasket [2]

Left crankcase cover[3]

Seal ring[4]

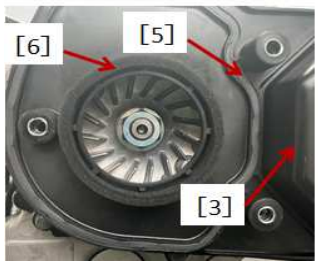
Seal strip [5]

Filtering screen [6]



• Fasten bolt on left crankcase cover and that on external cover of breathing groove.

Left crankcase cover installation bolt



Check bearing

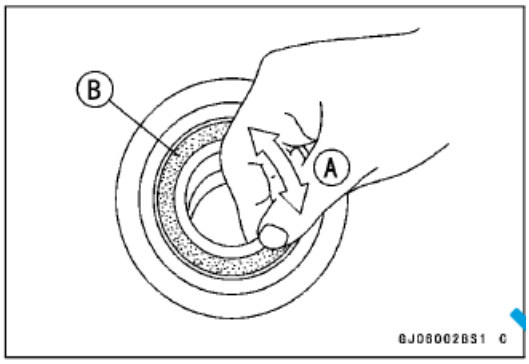
Note
Don’ t remove the bearing. Once bearing removed, it needs be replaced for a new one.

• Check and confirm if there is clearance or freely turning without jamming, turn back and forth the bearing A.

★In case clearance, rouoghness or adhesion between bearing was found, please replace the bearing.

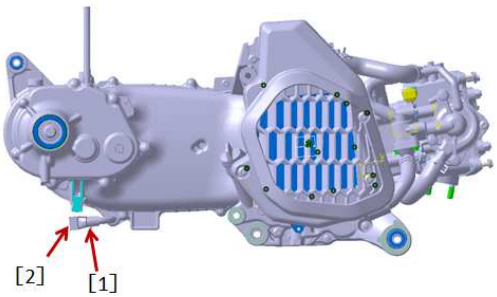
• Check if there is crack on end surface B of bearing.

★In case there is crack on sealing surface, left cover.



CVT chamber water drainage

Note: Water gets into CVT chamberisnot aloowed, in case water got in please disassembly wire clip[1] and water tube [2], drain off the water. Meanwhile disassemble left crankcase cover, dry related parts by blwoing, then fasten bolts on left crankcase cover.



Driving belt

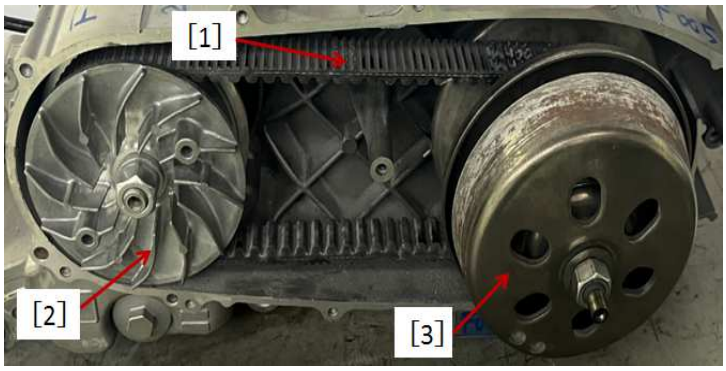
Disassemble driving belt

• Disassemble driving belt wheel kit.

• Disassemble outer plate of clutch.

Note
Before disassembling, check information [1] stamping on driving belt (Such as manufacturer name) facing side, for easy re-assembly onto belt wheel, while having a same turning direction to initial status.

• Remove driving wheel [2]for belt and driven wheel [3] for belt.。



Installation for driving belt

Note
Make sure the staping information facing to same direction, so the driving belt could be installed to original turning direction, When assembling new driving belt, the stamping information [1] could be read from side of vehicle.

•Re-assembly is precisely opposite to disassembly.

Check wear-out of driving belt

WARNING
Any wrong operation or skidding of cluch may badly damage, wear out driving belt or lock up gear box or wheel, which may bring driver out of control and accident, even hurt or death, so please maintain it according to Maintenance Table

• Disassembly for left crankcase cover.

• As picture shows, measure width A ofdriving belt by a pair of rulers at several suitable position.

★In case measured result passedUsage Extreme Value, please replace the driving belt for a new one.

• Width of driving belt.

Standard: (22.3～22.9)mm

Usage Extreme Value: 21.6mm

• Check if there is crack, break-up or drop on belt.

• Make inspection of driving belteach 6000km（6 months）, according to abrasion, replace it, which needs be replaced each, 12000km;

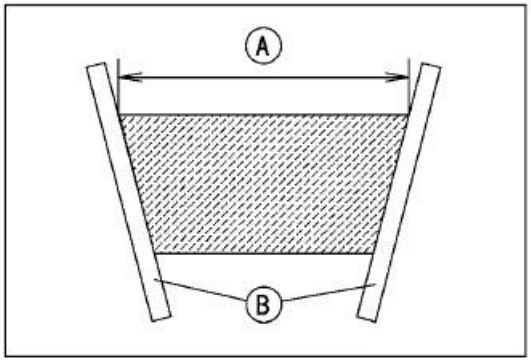
Driving belt A

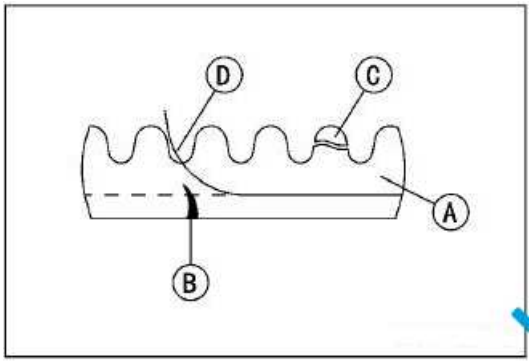
Crack B

Break-up C

Drop D

Note
When replacing driving belt, check driving and driven wheel for belt.





Driving wheel for transmission belt

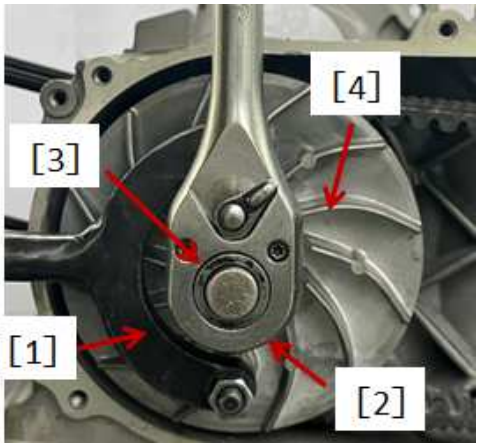
Disassemble driving wheel for transmission belt

•Disassemble left crankcase cover.

• Install turning stop fixture [1], Disassemble driving wheel's installation nut [2] and collar [3]。

• Disassemble driving plate [4].

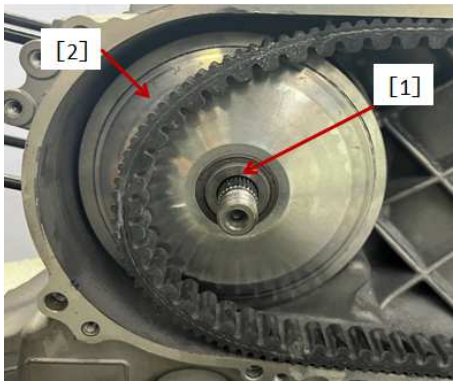
Tool-Turning stop fixture.



• Disassembly:

Sleeve [1] for sliding & driving plate

Sliding & driving plate [2]

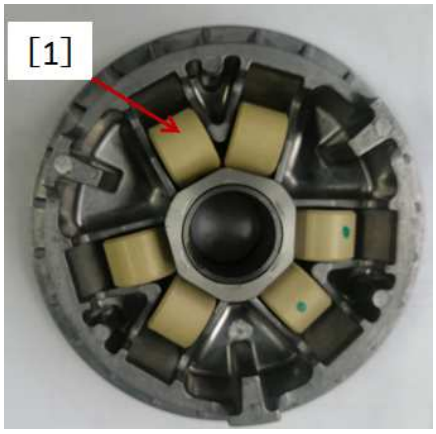


• Disassembly:

Sloping plate [1] and its side piece [2].

• Disassembly:

Roller [1] of weight.



Check driving wheel for transmission belt

★In case surface [1] of driving wheel damaged, please replace sliding drivingplate or/and driving plate

★ In case installationhole of driving plate damaged or worn-out, please replace.

• Sliding drving plate's installation hole diameter A

Standard: 24～24.021mm

Usage Extreme Value: 24.06mm

★In case the collar damaged or worn-out, please replace.

• External diameter A of collar

Standard: 23.959～23.998mm

Usage Extreme Value: 23.92mm

★Roller needs be cleaned up each 5000km (6 months), replace it according to its abrasion.

• External diameter A of roller.

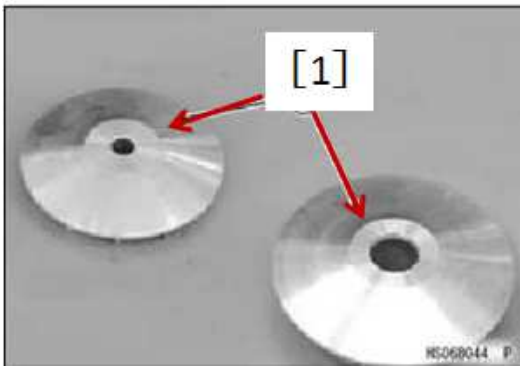
Standard: 19.9～20.1mm

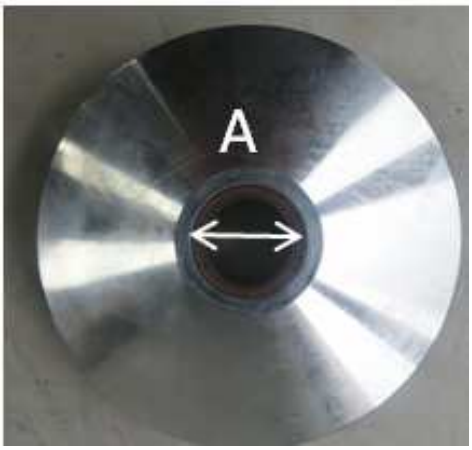
Usage Extreme Value: 19.4mm

Installation for driving wheel of transmission belt

•Re-assembly is precisely opposite to disassembly. Attention to below:

Wash parts below by cleanser for oil only, then wipe up their conical surface and crankshaft of driving plate by clean clotch.

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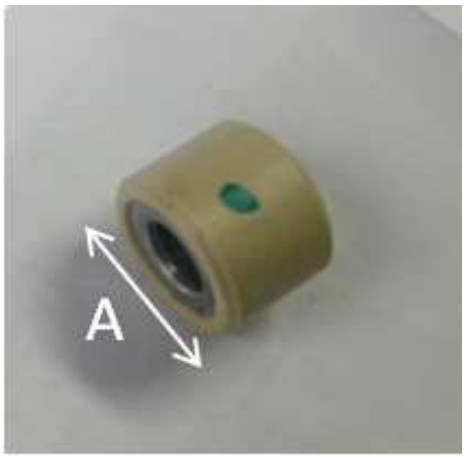
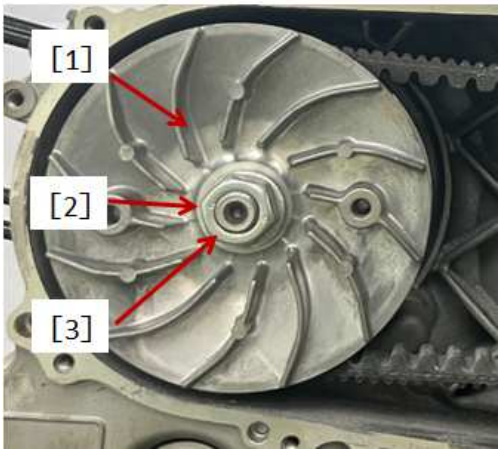

A

WARNING
These kinds of cleanser are usually highly combustible, breathing in them for a long time is harmful. Please pay attention to manufacturer’s WARNING.

•When installing driving plate[1],, tightly press the sleeve of sliding driving plat to let transmission belt move outwards and get to lowest position, then re-assemble collar [2] and nut [3], who coated with a few oil before installation.



• Install turning stop fixture, then fasten nut for transmission belt.

Fastening torquefor driving wheel: (63～77) N•m。

Tool-Turning stop fixture

Driven wheel for transmission belt

Disassembly for driven wheelof transmission belt

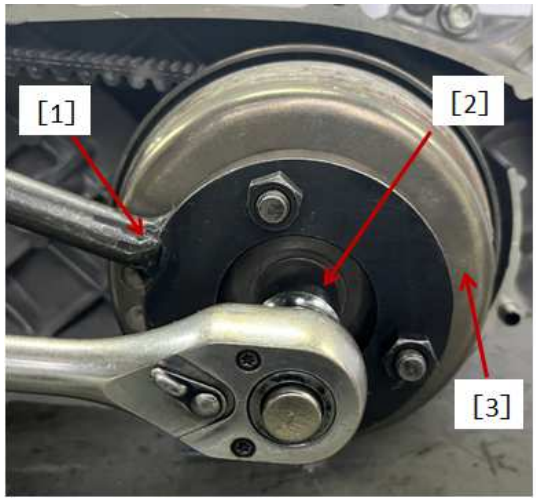
- Disassembly:

  Left crankcase cover

  Driving wheel for transmission belt

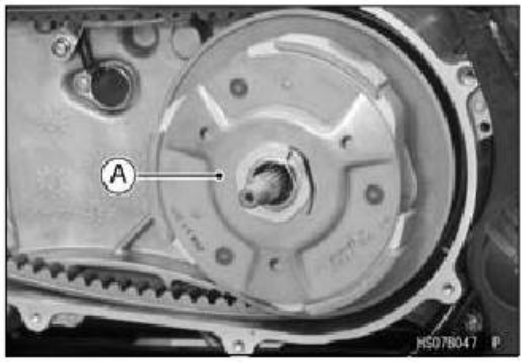
- Install turning stop fixture [1], disassemble driven wheel. install nut [2].
- Disassemble washer and frictio n plate [3] of clutch.
- Disassembly:

  Driven wheel kit [1]

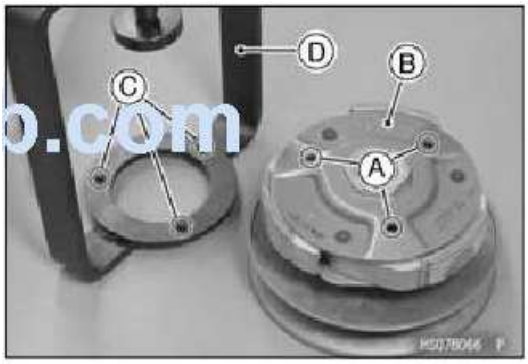


Disassemble driven wheel kit

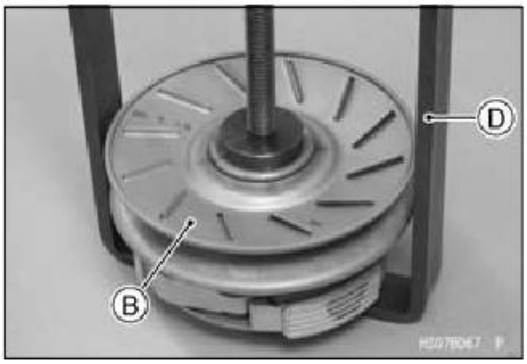
Note
Please adopt spring compressing machine to avoid damage on spring.



- Get driven gear kit’ s [1] hole [2] fixing on spring comressping maichine’ s[3] pin [4].
- Fix driven wheel kit and spring compressing device for clutch.

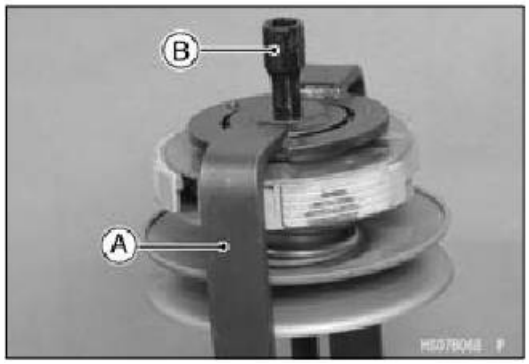


Tool-Spring compressing device for clutch


D
B

• Tightly hold the compressing device [1] onto pliers.

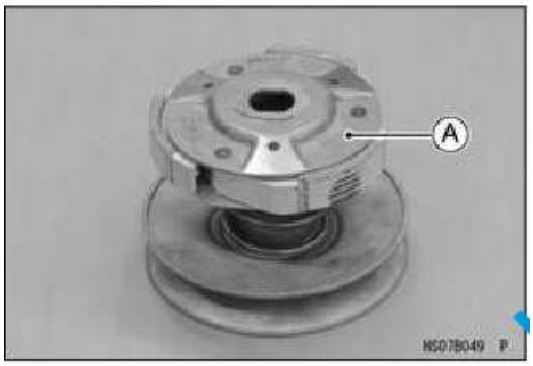
• Disassemble nut on driven friction plate by wrench for hex . nut [2] in size of 39mm



Tool-Spring compressing device for clutch

• Release compressing device, remove the driven wheel kit for transmission belt.

• Disassemble driving plate component [1] for clutch.



Check driven wheel kit:

• Clean up each 5000km (6 months), according to abrasion, replace it if it is necessary, and replae each 15000km.

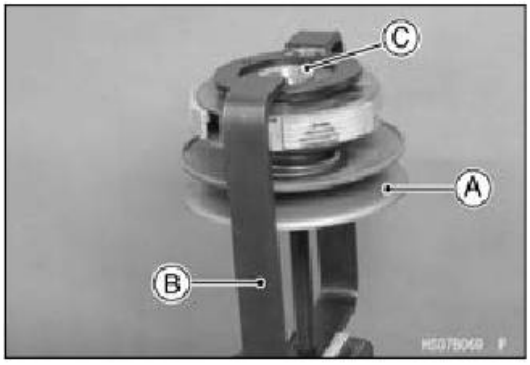
• When thickness of clutch shoe got to Usage Extreme Value of 1mm, replace driven wheel kit for transmission belt.

•Check the condition of bearing and oil sea, replace of it is necessary.

• Get hole A on driven wheel 将从 nstall onto pin B on spring compressing device.

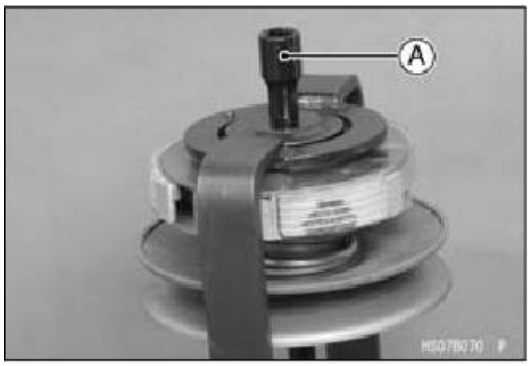
• Fix spring compressing device and driven wheel kit for transmission belt.

Tool-Spring compressing device for clutch



• Get compressing device into pliers.

• CFasten nut C for driven friction plate of clutch for a while.

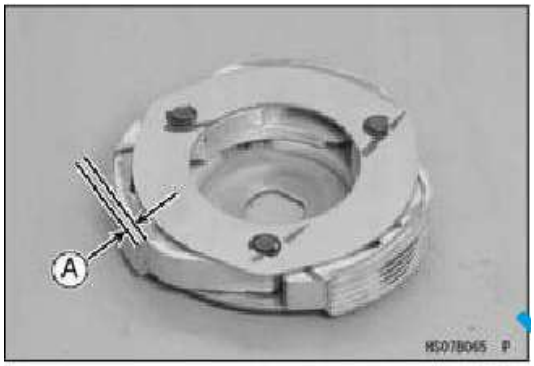


• Fasten hex. nut A on driven friction plate of clutch to given torque by wrench in size 39mm.

Tool-Spring compressing device for clutch

•Release spring compressing device for clutch , then remove the driven wheel kit for transmission belt.

Check clutch



• Check and confirm if the clutch shoe damaged.

★In case any damage was found, please replace.

• Measure thickness A for liner piece of clutch.

★In case thickness of abrasion for liner piece is more than Usage Extreme Value, please replace the clutch shoe.

• Thickness for liner piece of clutch

Standard: 3.6～4.4mm

Usage Extreme Value: 2mm

• Check and confirm if the external plate of clutch is damaged.

★In case any damage was found, please replace.

• Measure external diameter A for outer plate of clutch.

★In case abrasion for outer plate of clutch is more than Usage Extreme Value, please replace.

• Internal diameter for outer plate of clutch.

Standard: 153～153.25mm

Usage Extreme Value: 153.5mm

Installation for driven wheel of transmission belt.

• Install transmission belt and its driven wheel kit.

• Install outer plate of clutch and collar.

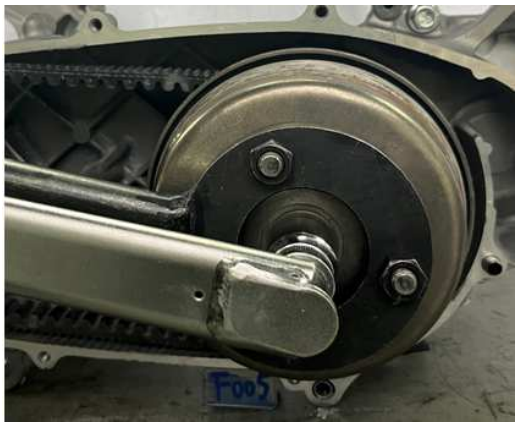
• Coat the top of driven shaft with oil.

• Install turning stop fixture, fastening driven wheel kit, install nut,

Tool-Turning stop fixture

Fastening torque for installation

nut of belt wheel：55～60 N·m



7. Mageneto

Maintenance information

Summarize

- This chapter introduces the maintenance for stator and rotor for magneto. All the operations needn't remove engine from frame.
- Content related to checking for charging coil of alternative generator.
- Content related to checking for trigger.

Tool

Fixer for rotor of magneto	Fixture for removing rotor of magneto
	

Troubleshooting

Engine starting failure

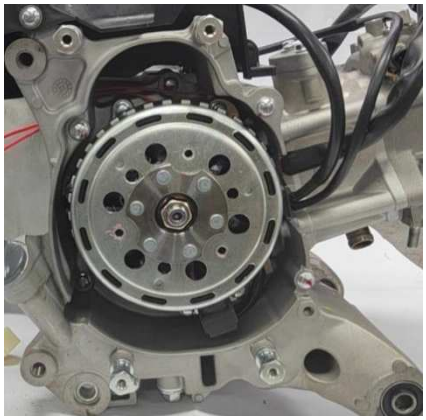
- Malfunction in controller
- Malfunction for magneto

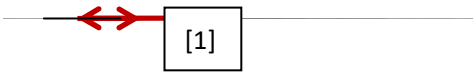
Rotor of magneto

Disassembly

Disassemble protective shield of heat radiator, radiator kit and electric fan.

Details please refer to Chapter 3rd.





Fix rotor [1]of magneto by its fixer, Disassemble fastening nut by torque wrench [2].
Remove fastening nut and flat washer.

Eject out fixture [1] by magneto, then remove the rotor.

Note:

- Fixing piece for magneto fixer is necessary to stop rotor turning.

Remove limit bolt [1] of hall sensor, fastening bolt [2] of trigger and bolt [3] for wire pressing plate, then remove wire pressing plate [4].

[1]

Check

Remove fastening screw [1] of stator by socket hex. wrench.
Remove stator kit of magneto.

Check scratch, damage, abnormal abrasion or distortion on parts below. In case it is necessary, please replace.

- Semicircle key
- Hall sensor

Installation

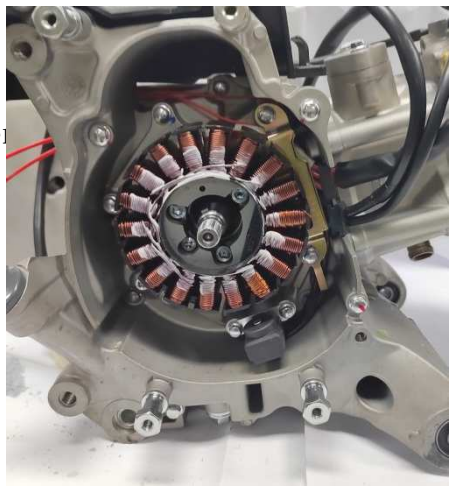
Before installation of stator kit, put the wire [1] of trigger into case body in place.

Installation for hall sensor , pre-installaxial bolt of socket hexagon, pre-fasten to given torque.

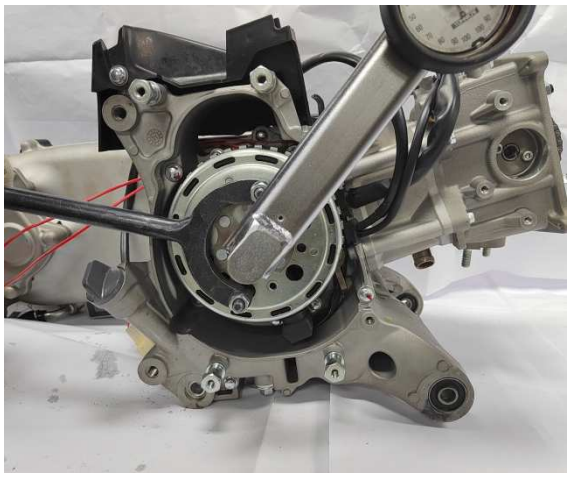
Torque：9N•m（9kgf•m，6.7lbf•ft）

Install socket hex. screw, then fastening to given torque。
Torque：10N•m（10kgf•m，7.4lbf•ft）

Straighten up wires of trigger,install wire pressing plate, then fasten bolt to given torque.
Install trigger fastening bolt, then fasten to given torque。
Torque：9N•m（9kgf•m，6.66bf•ft）



Lock up crankshaft by rotor fixture.
Install stator, then nstall flat washer to crankshaft,and fasten nut to given torque.
Torque：90•m（90kgf•m，66.6lbf•ft）



Note

- Limit cylindrical pillar need get deeply of limit groove on hall sensor, coat bolt with glue 1262 before installation.
- Get rid of grease on conical surface of crankshaft and rotor.
- Coat nut with glue 1262 before installation, coat the threaded part. Coat for semi-round, after fastening wipe up residual glue.

Install electric fan, heat radiator and its protective cover.

8. Crankcase body and transmission system

Maintenance information

summarize

- Remove engine from frame
- Crankcase must be broken up for servicing parts below：
  1. Transmission system
  2. Crankshaft
- Remove parts below before breaking up crankcase：
  1. Cylinder head kit
  2. Air system
  3. Cylinder body kit
  4. Cooling system
  5. Magneto kit
  6. Right crankcase cover kit
  7. Oil pump kit
  8. Left crankcase cover kit
- Don’t damage contact surface of case body when repairing.
- Wash up oil passage before installing crankcase.
- Before case combination, evenly coat combinatioh surface with sealing glue for end surface, then clean up the residual and surplus glue.

Tool for this chapter only：

Specification for crankcase body and transmission system

unit: mm

ITEMS	Standard value	Maintenance

				limit value
Transmission device	Main shaft	Shaft diameter	20.002～20.015	/
		Bearing	19.992～20.000	/
		Bearing clearance	0.002～0.023	/
	Output shaft	Shaft diameter	25.077～25.095	/
		Bearing	25.000～25.015	/
		Bearing clearance	0.062～0.095	/

Troubleshooting

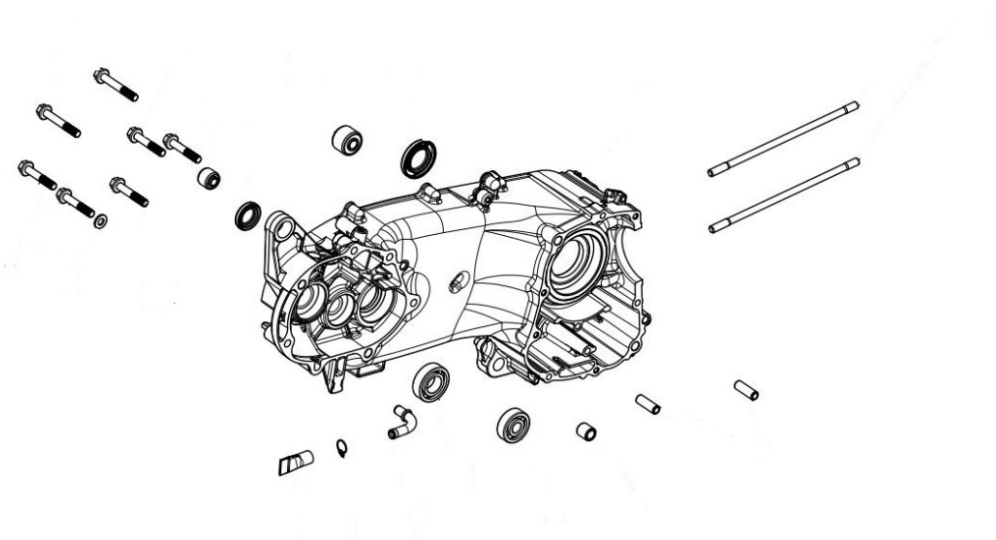
Gear jump in gearshift system

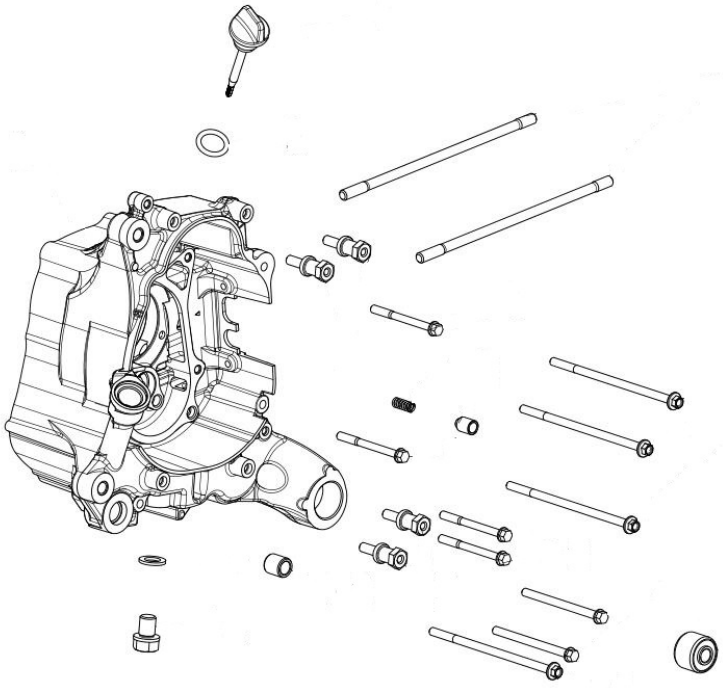
- Gear wear-out
- Transmissio belt distortion

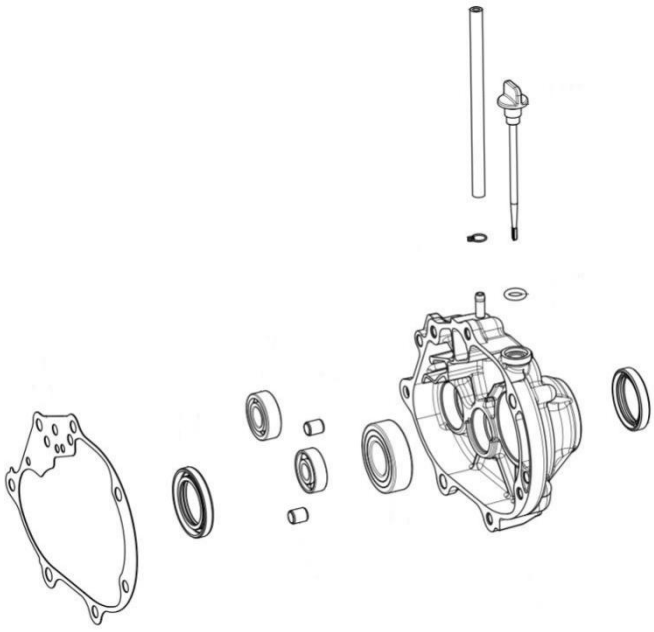
Noisy engine

- Transmission gear worn-out or damaged
- Transmission bearing worn-out or damaged

Components layout







Gear box/Power transmission system

Disassembly and re-assembly

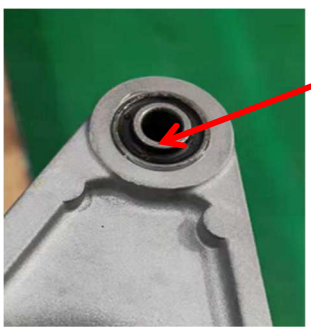
Disassemble left crankcase cover and CVT kit.

Remove fastening bolt [1] of gear box.

Remove gear box kit [1]。

Remove countershaft kit [1] and output shaft kit [2].

Remove gasket [1] of gear box and positioning pin.[2].



Remove lower damping sleeve by suitable tools, please pay attention hold its lower end by suitable tool.

Note:

- When disassembling gear box, please drain off oil in it first.

Check

Check and confirm scratch, damage, abnormal abrasion or distortion on parts below,in case it is, please replace.

- Seal ring
- Oil seal
- Gasket

Re-assembly

Press-fit rear damping sleeve [1] into installation hole on left crankcase by pressing tool, after press-fitted, confirm the external surface of installation hole is aligned with end

surface of rear da lee

[1]

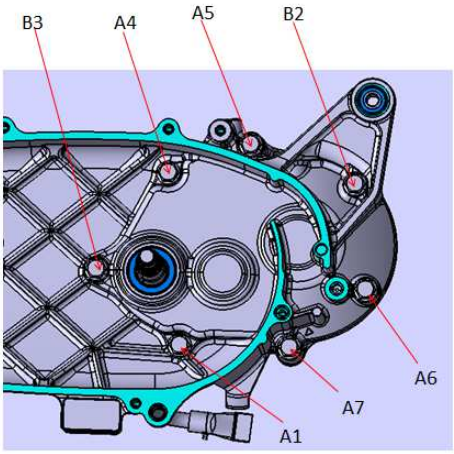
Coat lubricant in inner ring of bearing on countershaft and output shaft, then confirm their free turning. Re-assemble positioning pin and gasket, and check if the parts in gear box are complete, re-assemble gear box, and fasten case combination bolt to give torque in turn.

Check if the washers of countershaft are complete, re-assemble countershaft and output shaft kit, then coat the meshing position of gear with lubricant when re-assembled, check runout of output shaft and free turning of each gear.

Torque：20•m（20kgf•m，14.74bf•ft）

Note：

- Check the runout of output shaft and free turning of each gear.
- The washer of bearing faces to gear box's side, runout of output shaft shall be 0.1~0.6.



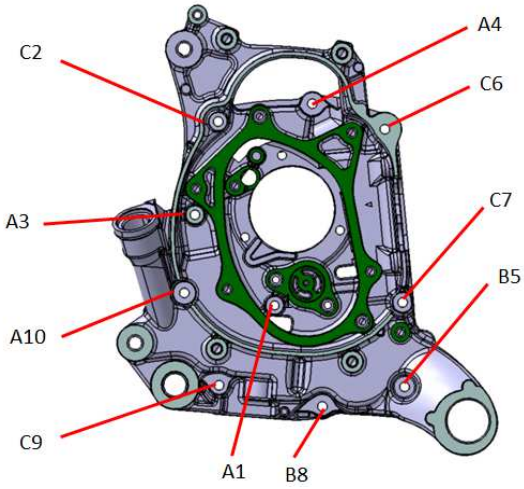
Disassembly and re-assembly

Remove case combinatioh bolt from right side case.

Note：

- When breaking up the crankcase, don't knock the crankshaft, if it is necessary, please slightly knock the technique piece on crankcase.

Case body



Re-assembly

Wash left and right combination surface, please don't damage it.

Check if the oil passage is smooth, clean it up when it is necessary.

Note：

- Don't coat too much sealing glue for

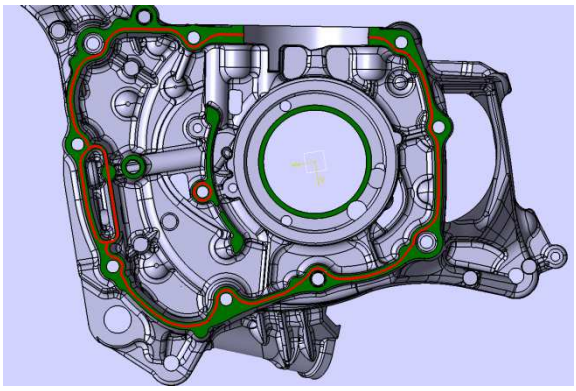
end surface.

- Don’ t let the sealing glue drop into crankcase.

Install positioning pin, install right crankcase onto left one, installation case combination bolts and fastening to given torque.

Torque: 10N•m (10kgf•m, 7.41bf•ft)

As picture shows, evenly coat combination sur of right crankcase with sealing glue.



9. Crankshaft, piston and cylinder body

Maintenance information

summarize

In case maintenance for crankshaft, cylinderbody,piston and connecting rod is needed, the crankcase must break up. The way for breaking up crankcase please refer to Chapter for it, be careful when doing maintenance, collision or scratch is not allowed, the check for side clearance of connecting rod needs plastic feeler gauge.

Specification for crankshaft, piston and cylinder body

unit：mm

ITEMS			Standardvalue	Maintenance limit value
Crankshaft	Clearance on bigger end of connecting rod		0.130-0.312	0.45
	Clearance between shaft pad on bigger end of connecting rod and crankshaft pin		0.097～0.127	0.07
	Journal runout		—	0.05
Piston, piston pin and piston ring	Diameter of basic circle for piston		57.3(-0.015,-0.025)，	57.19
	Pin’s hole		ø14（+0.008，+0.002 ）	14.02
	Diameter for piston pin		ø14（0， -0.006）	13.98
	Closing clearance for piston ring	1st ring	0.1～0.3	0.35
		2nd ring	0.2～0.4	0.45
Innter diameter for smaller end of connecting rod			Φ14（+0.021， +0.01）	14.128
Side clearance for bigger end			0.1～0.35	0.65
Cylinder body	Stroke		58	/
	Cylinder bore		57.3（+0.01,0）	57.4

Troubleshooting

Too low the pressure in cylinder, difficult starting or bad performance under low speed

- Air leakage of gasket at cylinder head
- Wear-out, jamming or damage of piston ring
- Wear-out or damage on cylinder head/piston

Too high the pressure in cylinder, too hot or cylinder knocking

- Too much carbon build-up on piston top or in combustion chamber
- Pressure decreasing device of cam gets failure

Too much waste gas

- Abrasion for cylinder body, piston or piston ring
- Incorrect assembly for piston ring
- Scratch on piston or cylinder wall

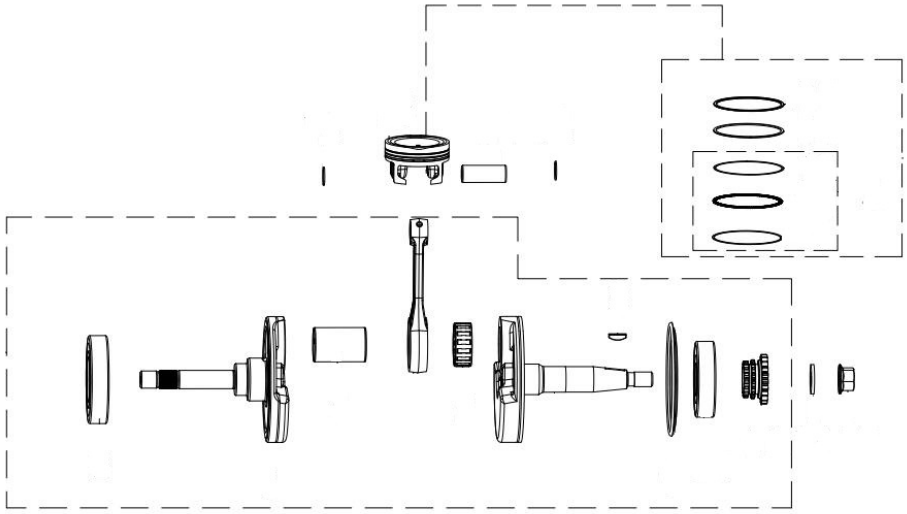
Abnormal engine noise

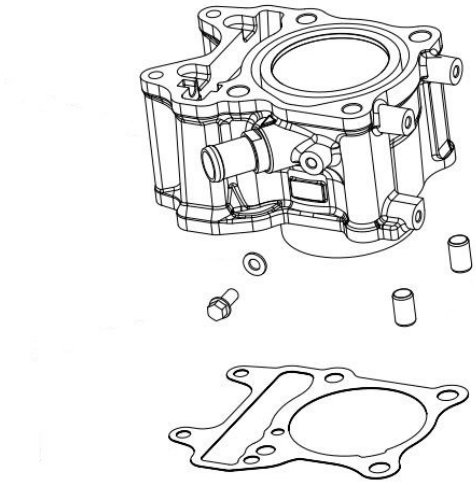
- Wear-out on piston pin or its hole
- Smaller end of connecting rod worn out
- Cylinder body, piston or piston ring worn out
- Crankshaft pad worn out

Engine vibration

- Too heavy the runout of crankshaft

Components layout





Cylinder body

Disassembly

Disassemble cylinder head and cooling pump kit.
Clamp [1]
Water tube [2]
Chain tensioning plate （Refer to air system）
Cylinder body [3]
Pry up cylinder body by rubber hammer and screwdriver, draw it upwards, get piston out of hole of cylinder, then take out the cylinder body.

Check

Check if there is scratch, damage, abnormal abrasion, distortion, burn-out or oil passage block on cylinder body.。Measure each part according to specification for crankcase body, cylinder body and transmission system, any part passed Maintenance limit value，please replace.

Installation

Cylinder body and piston installation Chapter are in a same one.

Piston

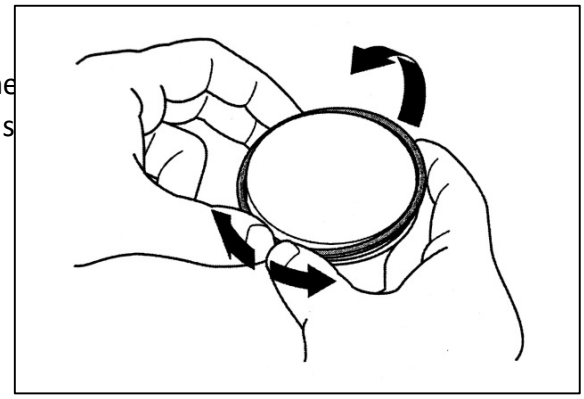
Disassembly

When disassembled cylinder body, lay a clean cloth
Remove circlip of steel wire
of piston pin by suitable tool.

Attention
Don’t repeatedly use circlip of steel wire for piston pin, the disassembly makes it weaker or distort, it may drop off and scratch cylinder wall.

Remove piston pin by suitable tools.
Remove piston

Disassembly for piston ring



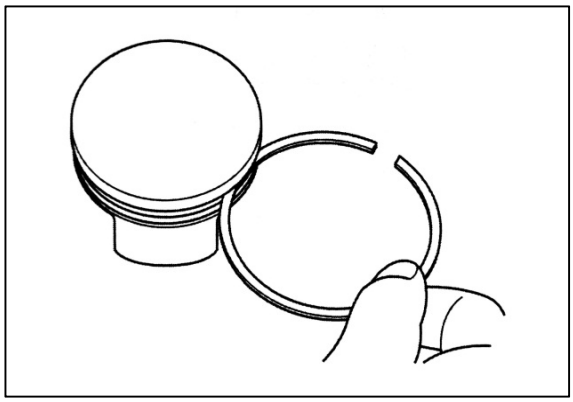
Get opening of each piston ring apart, then remove the ring upwards along opposite position of opening on pis

Note：

Don’t move the opening apart too far,

Otherwise the piston ring may damage.

Note scrach on piston when removing its ring is not allowed.



Clean up the carbon build-up in groove of piston ring by replaced old piston ring.

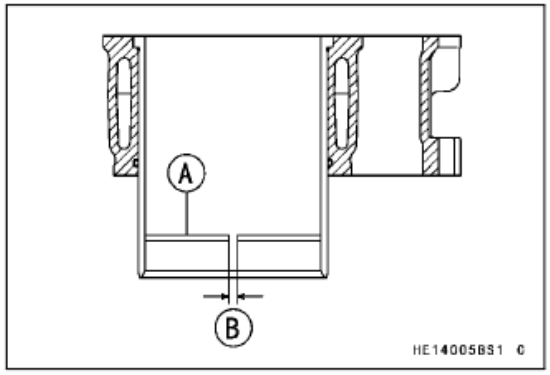
Note：

Don’t adopt steel brush, otherwise the piston ring may be damaged.

Check

Check and confirm if there is scratch, damage, abnormal abrasion, distortion, burn-out or oil passage block on parts below.

- Cylinder body
- Piston
- Piston ring
- Piston pin
- Smaller end of connecting rod



Check closing clearance for piston ring, put the ring A into cylinder, then locate the ring by piston to suitable position. Set it at position near to bottom of cylinder and smaller abrasion of cylinder. Measure the clearance [B] of closing clearance of piston ring between two ends by thickness gauge. In case any end clearance of piston is more than using limit, please replace all the piston rings.

Check width of piston ring’s groove and the thickness of ring, confirm the clearance between ring and its groove, in case it is more than maintenance limit, replace the piston ring for a new one and measure it once again, in case still falling short to meet the demand, please replace the piston for a

new one.
Measure every part and calculate clearance according to specification of crankshaft, piston and cylinder body. Any parts passed maintenance limit, replacement is necessary.

Re-assemble piston ring

Totally clean up groove of piston ring and re-assemble piston rings.
Coat all the surface of piston rings and their groove with oil.
Put left end of opening on liner ring [1] into groove for the ring,then turn it around and get into oil rin, then assemble oil ring [2] into groove for oil ring on piston.
Put the left end of opening on the second oil ring into groove for oil ring, turn it around and get into groove, the liner ring for two oilring assemble on both sides of oil ring, the oil ring and its liner ring with staggering angle of 90°, turn the oil ring and its linter ring, confirm they turn around smooth without jamming.
Put the opening [2] of second ring with side stamped with letter faces upwards, whose left end put into groove of second ring, turn the second ring around and get into its groove, the opening of second ring and oil ring are staggering by 180°, turn around the second ring and confirm it iturns freely without jamming while piston without scratch. Put the opening [3] of first ring with side stamped with letter faces upwards, whose left end put into groove of first ring, turn the first ring around and get into its groove, the opening of first ring and second ring are staggering by 180°, turn around the first ring and confirm it turns freely without jamming while piston without scratch.
1st ring（Stampped with letter if 1R）[1]
2nd ring (Stampped with letter of RN) [2]

Re-assemble pistong

Clean up contact surface of cylinder body with sealing glue, then coat thrusting surface of cylinder wall and piston with oil.
Assemble the cirlip of steel wire on the left of piston into groove of piston ring, whose opening is staggering opening on piston by 180 °.
Get the contact surface between cylinder body and head face downwards, while contact surface between cylinder body and crankcase body face upwards then put onto platform.
Put guiding sleeve of piston onto cylinder body, whose head face downwards and assemble piston into cylinder body, please let letter “IN” on piston face air inlet direction of engine.
Evenly coat sealing line of sealing surface on cylinder head with glue, don’t left piston drop off from its hole on cylinder.
Get the kit of cylinder body and piston through stud bold and assemble onto crankcase body, when assembling, please don’t get damage on sealing glue, the hole on tensioner faces to direction of air inlet.
Coat surface of piston pin with lubricant, get it through left hole on piston and smaller end of connecting rod and arrive right hole on piston.
Get circlip of steel wire on the right of piston, whose opening is staggering with opening on piston by 180 °, please don’t let the circlip of steel wire drop into crankcase.
Slightly knock cylinder body by rubber hammer face to direction of crankcase, assemble cylinder body in place, when combination surfaces between cylinder body and crankcase completely contacted, finally assemble cylinder head.