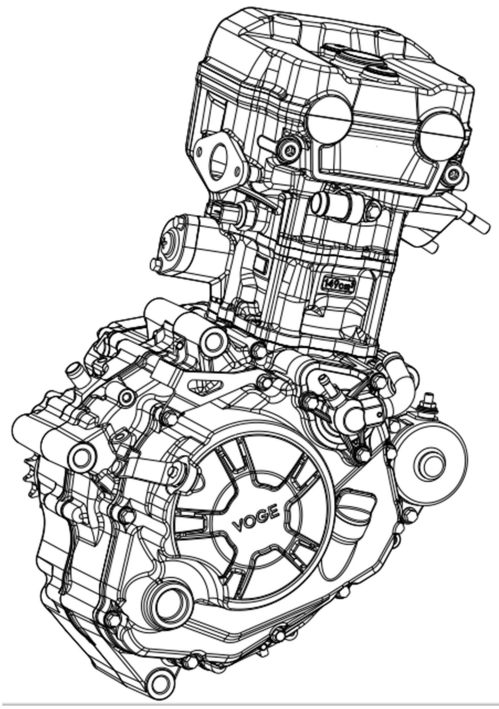
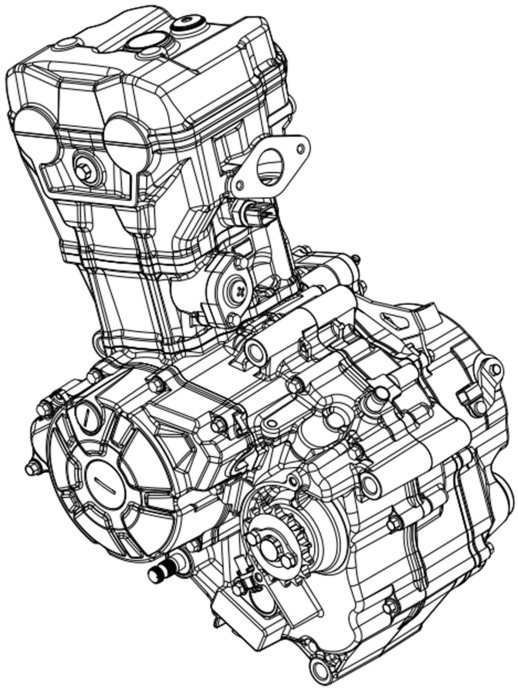
Service Manual for engine KE150

LXFD0901-054





Chongqing Loncin Motor co.ltd. July 2021

Foreword

There are more and more motorcycles getting onto market with each passing day, and new structure and technologies are also adopted. For all the Loncin users and service workers know well about the maintenance, adjustment and repair for engine KE150, we made this service manual, we hope which bring you more convenience when you need them.

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Content list

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Summary

Rules for maintenance

1. Please adopt the Loncin motor co.ltd. produced or suggested spare parts, lubricant or other auxiliary materials when maintenance is necessary. In case materials were adopted fail to meet Loncin standard, it may damage your motorcycle.

2. When maintenance is necessary, please adopt the tools, bolt, nut and screw in metric standard, the ones out of metric standard such as imperial standard are not allowed.

3. When parts were replaced or re-assembled, please also replace their washer, o-ring, split pin and locking piece.

4. Please fasten the bolt or nut with bigger diameter or inside, then fasten the rest in alternative angle sequence, unless there is another specially stipulated sequence.

5. Wash up the removed parts by cleanser. Coat the moving surface with lubricant before re-assembling.

6. When re-assembled, please check and confirm the correct re-assembly and proper operation, turn, move and operate them for checking.

Specification for engine

Normal specification

	Itenms	Data
Engine	Type	LX157MJ
	Displacement	149.6ml
	Cylinder numbers and strokes	单缸四冲程°
	Bore×Stroke	57.3×58mm
	Combustion chamber type and capacity	Unregular combustion chamber, capacity:9.2±0.2mL
	Compression ratio	11.3：1
	Valve mechanism	Camshaft on the top
	Air inlet valve	Open（rising stroke of 1mm）：10° BTDC
		Close（rising stroke of 1mm）：38° ABDC
	Air exhaust valve	Open（rising stroke of 1mm）：38° BBDC
		Close（rising stroke of 1mm）：3° ATDC
	Lubricating system	Forced pressure + splashing
	Cooling system	Water cooling
	Engine net weight	26.5kg
Transmission system	Clutch	Multiple and wet layers
	Gear box	International 6 gears
	Primary transmission ratio	3.261（75/23）
	End transmission ratio	1.153（41/13）
	Gear transmission ratio	1^{st} ：3.083 2^{nd} ：1.941
		3^{rd} ：1.5 4^{th} ：1.227
		5^{th} ：1.042 6^{th} ：0.923
	Gearshift	1-0-2-3-4-5-6-1
Electrical system	Ignition system	EFI
	Starting system	Electrical starting
	Lighting system	Battery
	Specification for spark plug	CR9E（NGK）
	Clearance of spark plug	0.6-0.7mm
	Rectifier regulator	Regulating of 3 phases and complete wave

Cooling system’s specification

Items		Specification
Coolant capacity	Heat radiator (With all water passages)	0.6 L
Coolant features and top temperature at outlet port		Ethanol, 115℃
Thermostat	Initial temperature when	82℃±2℃

	opening	
	Temperature when completely opened	92℃±2℃
	Rising travel of valve	≥4mm

Specification for lubrication system

Unit: mm

Items		Standard	Limit
Oil capacity	When oil replaced	1.1 L	—
	New engine or engine disassembled	1.3 L	—
Oil we suggest		Engine oil we suggest: SG10W～40 API’s quality grade: SG or higher (Round lable for API service of energy saving is not allowed) JASO T903 Standard: MA Viscosity: SAE10W～40	— —
Flowing amount for oil pump		Oil temperature of 80℃, Rotation speed of 1500r/min, oil capacity for pump 0.72L/min	
Rotor of oil pump	Clearance for internal rotor	≤0.15	0.22

Specification for cylinder head/Valves

Unit:mm

Item			Standard	Limit
Pressure in cylinder of electrical starting				—
Valve clearance		Air inlet	0.13-0.19	—
		Air exhaust	0.22-0.28	—
Camshaft	Height of camshaft	Air inlet	30.565-30.695	30.465
		Air exhaust	30.065-30.185	29.965
	Clearance between journal and bracket		0.02-0.054	0.08

	Runout		0.02	0.03
Valve and its guiding tube	Rod diameter of valve	Air inlet	4.475-4.490	4.455
		Air exhaust	4.465-4.480	4.445
	Inner diameter of valve guiding tube	In/Exhaust	4.500-4.512	4.550
	Clearance between valve rod and its guiding tube	Air inlet	0.010-0.037	0.075
		Air exhaust	0.020-0.047	0.090
	Width of valve base	In/Exhaust	0.9-1.1	1.5
Free length of valve spring		In/Exhaust	37.5	35.6
Installation length of valve spring		In/Exhaust	33.1	—
Flatness of cylinder head		0.05		0.08

Specification for clutch and gearshift device

Unit: mm

Items		Standard	Limit
Free travel for clutch lever		10-20	—
Clutch	Free length of spring	28.2-28.8	27.1
	Thickness of friction plate	2.35-2.45	2.2
	Flatness of driven plate	—	0.10
Collar in clutch	Inner diameter	17.000-17.018	17.031
	Outer diameter	23.972-23.93	23.96
Outer diameter of main shaft in clutch' s collar		16.966-16.984	16.95

Specification for magneto and starting clutch

Unit: mm

Items	Standard	Limit
Outer diameter of jacket of starting plate gear' shaft	42.195-42.208	30.855
Inner diameter for outer case of starting clutch	58.854-58.88	58.89

Specification for case body and transmission system

Unit: mm

Items			Standard	Limit
Transmission mechanism	Diameter of inner hole on gear	M5、M6	20.00-20.021	17.07
		C2、C4	22.02-22.033	22.08
		C3	23.02-23.041	23.09
		C1	18.02-18.033	18.08
	Outer diameter for shaft's jacket	C1	17.979-18.00	17.90
	Inner diameter of shaft's jacket	C1	15.00-15.021	15.10
	Diameter for main shaft	Matched with jacket of M5	16.959-16.98	16.93
	Diameter for countershaft	Gear matched with shaft's jacket C2	19.978-19.989	19.92
		Gear matched with shaft's jacket C 1	14.966-14.984	14.90
	Clearance between gear and main & countershaft	Matched with jacket of M5	0.02-0.054	0.10
	Clearance between gear and shaft's jacket	C2	0.02-0.054	0.10
		C1	0.02-0.054	0.10
	Clearance between shaft's jacket and main & countershaft	C2	0.02-0.062	0.10
		C1	0.016-0.055	0.10
Gearshift fork and its shaft	Diameter of fork shaft		9.966-9.984	9.91
	Inner diameter of fork		10.00 -10.018	10.03
	Thickness of fork's tip		4.93-5.00	4.90

Specification for crankshaft, piston, cylinder body and balancing shaft

Unit: mm

Items	Standard	Limit

Crankshaft	Clearance at bigger end of connecting rod		0.10-0.35	0.38
	Radial clearance at bigger end of connecting rod		0.005-0.015	0.025
	Runout		0.03	0.05
Cylinder	Cylinder bore		57.301-57.322	57.344
	Roundness		0.004	0.006
Piston, piston pin and piston rings	Diameter of basic circle for piston		57.275-57.285	57.265
	Diameter for pin's hole		14.002-14.008	14.02
	Diameter of piston pin		13.995-14.0	13.985
	Closing clearance of piston ring	1st ring	0.1-0.3	0.45
		2nd ring	0.2-0.4	0.6
		Scratching ring	0.2-0.7	0.85
	Clearance between piston ring and its groove	Clearance between 1st ring and its groove	0.02-0.06	0.09
		Clearance between 2nd ring and its groove	0.02-0.06	0.09
Clearance for cylinder matching			0.025-0.047	0.60
Smaller end of connecting rod and its inner diameter			14.013-14.025	14.045
Matching clearance between connecting rod and its pin			0.013-0.030	0.05

Torque

Standard torque

Fastening parts	Torque N.m	Fastening parts	Torque N.m
5mm bolt and nut	5.2	5mm screw	4.2
6mm bolt and nut	10	6mm screw	9.0
8mm bolt and nut	22	6mm flange bolt (8mm head, small flange)	10
10mm bolt and nut	34	6mm flange bolt (8mm head, big flange)	12
12mm bolt and nut	54	6mm flange bolt (10mm head) and nut	12
		8mm flange bolt and nut	27
		10mm flange bolt and nut	39

Torque for engine

Items	Numbers	Thread diameter mm	Torque N.m	Note
Spark plug	1	10	14	
Left decorative cover	1	30	10	
View hole cover	1	14	5	
Oil drainage bolt on engine	1	12	24	

Cooling system

Items	Numbers	Thread diameter mm	Torque N.m	Note
Water drainage bolt	1	6	10	
Bolt on cover of thermostat	2	6	10	
Bolt for water pump's chamber	3	6	10	
Coolant temperature sensor	1	12	15	

Cylinder head and valves

Items	Numbers	Thread diameter mm	Torque N.m	Note
Nut on cylinder head	4	8	30	
Side bolt of cylinder body	2	6	10	
Bolt on camshaft's bracket	8	6	12	Coat the thread and surface of base with oil, and the fastening way is in the following chapter
Bolt on cylinder head cover	4	6	10	
Tensioner bolt	2	6	10	
Bolt on tensioner's cap	1	6	4	
Noiseless bolt (On the left side of cylinder head)	1	6	10	

Clutch and gearshift device

Items	Numbers	Thread diameter mm	Torque N.m	Note
Nut on clutch	1	14	74	Coat thread with oil
Bolt of clutch's spring	4	6	12	
Nut on primary driving gear	1	14	74	Coat thread with oil
Bolt on locating plate of clutch drawing cable	2	6	10	
Bolt on right crankcase cover	7	6	10	
Bolt of five star	1	6	12	Coat thread with

shaped turning plate				Loctite

Magneto and starting clutch

Items	Numbers	Thread diameter mm	Torque N.m	Note
Fastening bolt for starting clutch	3	8	29	Coat thread with sealing glue
Bolt on magneto's rotor	1	12	64	Coat thread and base surface with oil
Bolt on magneto's stator	3	6	10	Coat thread with sealing glue
Fixing bolt on trigger	2	6	10	Coat thread with sealing glue
Bolt on left crankcase	9	6	10	

Case body and transmission system

Items	Numbers	Thread diameter mm	Torque N.m	Note
Limit plate for timing chain	2	6	12	
Bolt on pressing plate of adjustive plate	2	6	10	Coat thread with sealing glue
Bolt for check plate of main shaft's bearing	2	6	12	Coat thread with sealing glue
Side bolt of combination for left case body	10	6	10	Replace the bolt for a new one as below: Pre-fasten the case combination bolts in alternative angle sequence, the fasten to given torque in

				turn.
Side bolt of combination for right case body	4	6	10	Replace the bolt for a new one as below: Fasten by two steps in crossing way.

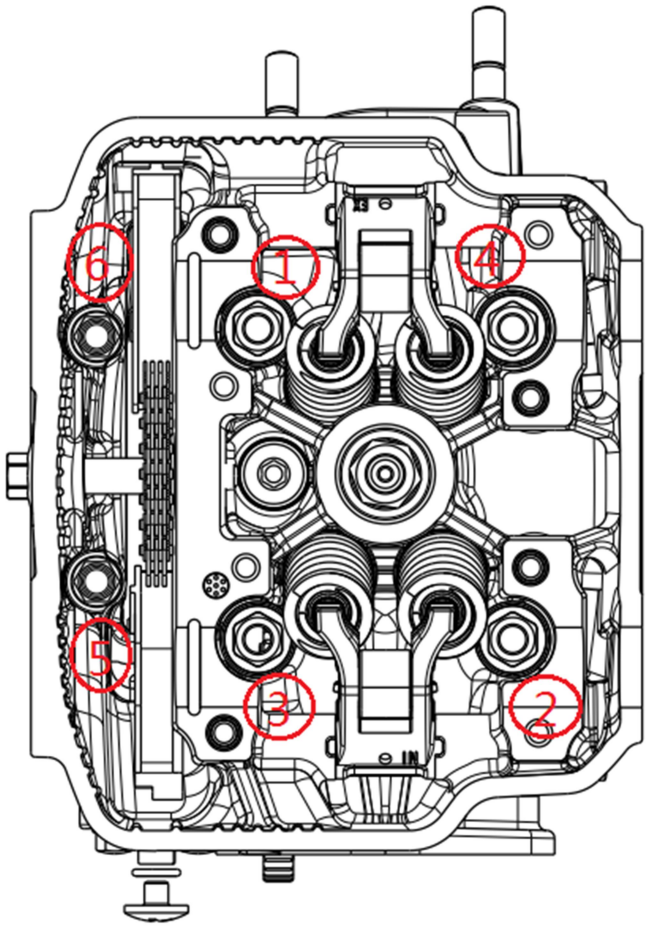
Positions for lubrication and sealing

Engine

Material		Position	Note
Sealing glue	1596	Combination surface of crankcase	
	1262	Thread fastening	
Oil in engine		The complete surface for inner and outer rotor of oil pump Rod end and sliding surface of valve rod Complete surface of timing chain Rolling surface of camshaft Inner surface of hole on cylinder External surface of piston, hole of piston pin and groove of piston ring External surface of piston pin Complete surface of piston ring Complete surface of clutch’s friction plate External and internal surface for clutch collar Surface of internal hole on driven gear Gearshift rod and turning plate Complete surface for double gear’s shaft Complete surface for starting clutch Complete surface for turning fork’s shaft Internal hole on smaller end of connecting rod of crankshaft Gear(Primary transmission, crankcase, starting deceleration)	

	Sliding surface of plate-shaped gear Turning area of each bearing Surface of each o-ring	
Oil of molybdenum disulfide	Swinging arm Surface of camshaft Hole on camshaft of cylinder head	
Multi-functional lubricant	Seal ring for starting motor Seal ring for speed sensor Seal ring for left decorative cover	
Degreaser	All surfaces for combination	

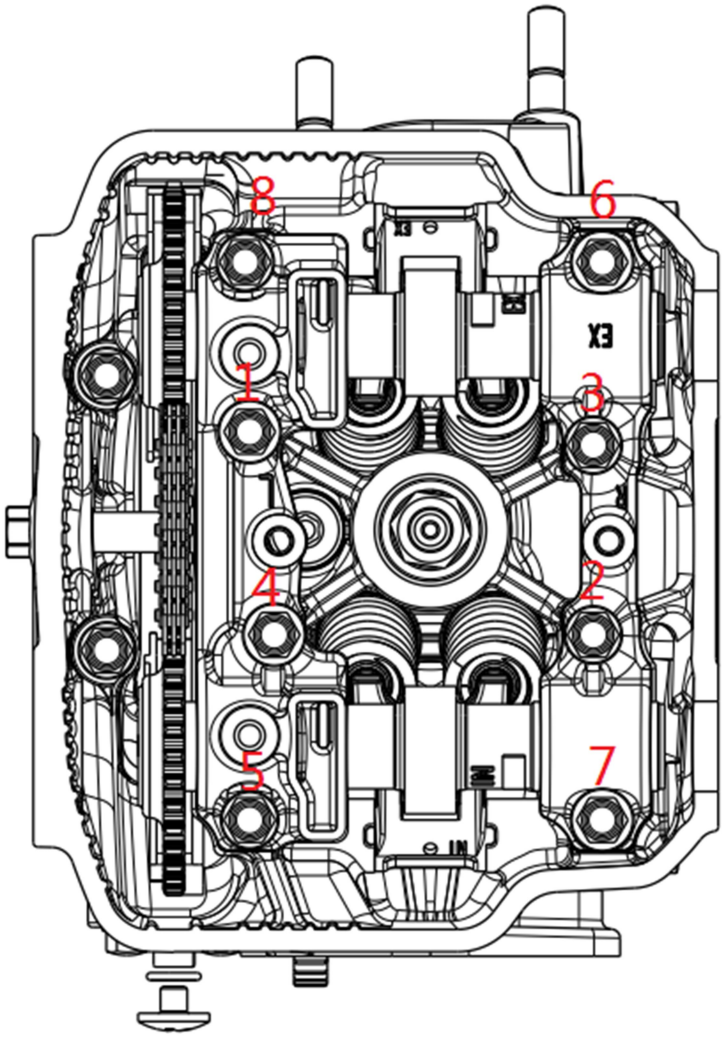
Fastening for bolts on cylinder head



1. Coat the thread and contact surface of nut （M8×8.5） of 1-4 on cylinder head with oil;
2. Fasten the bolt of 1-4 by sequence as pictures above shows to 5N·m;
3. Fasten the bolt of 1-4 by sequence as pictures above shows to 15N·m;
4. Fasten the bolt of 1-4 by sequence as pictures above shows to 30N·m;

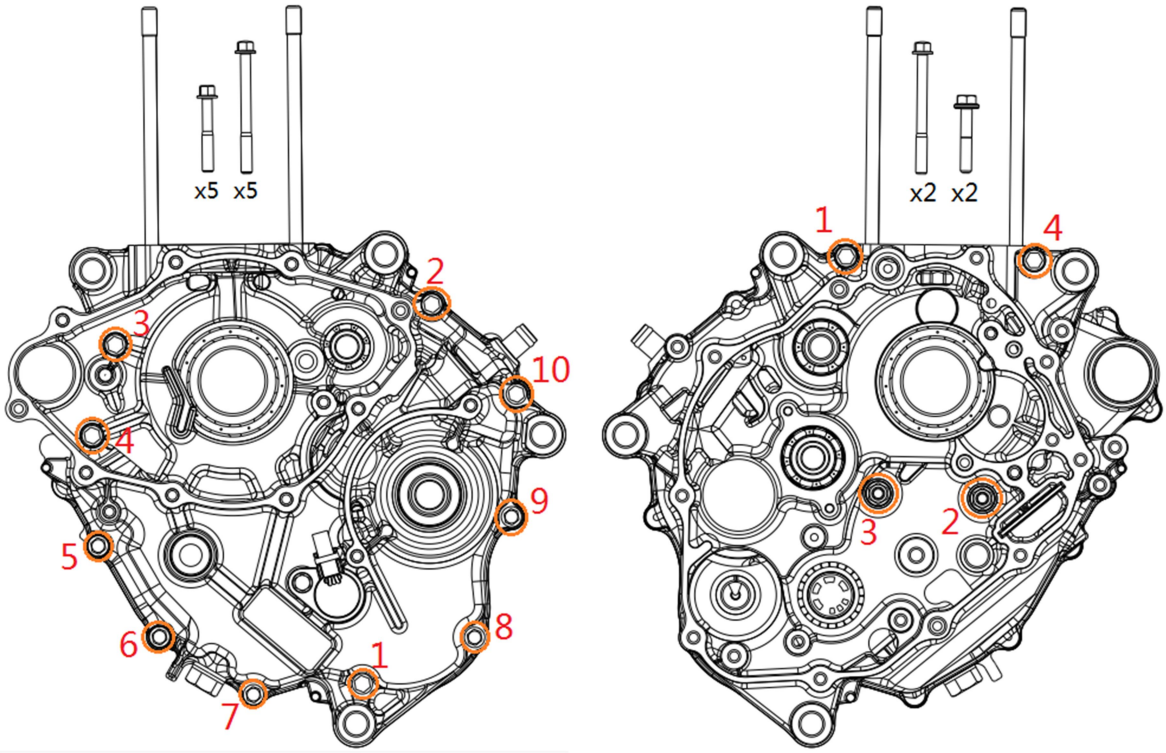
5. Fasten bolt 5-6（M6×115） to 10 N·m.

Fastening for bolt on bracket of camshaft



1. Coat all the contact surface and thread of bolt with oil:
2. Fasten the bolt of 1-8 by sequence as pictures above shows to 5 N·m;
3. Fasten the bolt of 1-8 by sequence as pictures above shows to 12 N·m;

Fastening for bolt on crankcase



1. Put all the bolts in place according to their depth of thread (The exposing part of thread shall be about 10mm),
2. Fasten the bolts （M6×40、M6×65）1-10 on left crankcase according to the sequence showing in picture below to 10 N·m;
3. As the bolts showing in picture above, the bolt 1, 2, 3, 4, 10 are the ones of M6×65;
4. As the bolts showing in picture above, the bolt 5, 6, 7, 8, 9 are the ones of M6×40.
5. Fasten the bolts 1-4 （M6×35、M6×65）on right crankcase according to sequence in picture to 10 N·m;
6. As the bolts showing in picture above, the bolt 1 and 4 are the ones of M6×65.
7. As the bolts showing in picture above, the bolt 2 and 3 are the ones of M6×35.

2

Maintenance

Information of maintenance

Summary

- Please put the motorcycle on a horizontal ground before all operations latter.

Tools

Socket wrench for spark plug

Specification for maintenance

Please inspect according to <Periodic Maintenance table> in User Manual.

In order to keep good power performance and economic working, the maintenance below is necessary.

Start from 36000km or the 36th month, repeat the maintenance with interval of 12000km or 12 months.

I: Inspection, clean it up, adjust, lubricate or replace when it was necessary. C: Clean up. A: Adjust. L: Lubricate.

The maintenance below need you know something about machinery. Some items (Especially with mark *), they may need more skill or tools and information.

Periodic Maintenance table

Ref.No	Interval / Items	X1000km	1	6	12	18	24	30	36
		Month	1	6	12	18	24	30	36
*1	Spark plug				R		R		R
*2	Oil in engine		R	R	R	R	R	R	R
*3	Oil filtering screen				C		C		C
*4	Valve clearance		Each 42000km，I						
*5	Coolant		I	I	I	I	R	I	I
*6	Cooling system			I	I	I	I	I	I
*7	Fuel tube			I	I	I	I	I	I
8	Breathing tube			C	C	C	C	C	C

	of crankcase								
9	Clutch system		I	I	I	I	I	I	I
10	Driving sprocket wheel of countershaft			I	R	I	R	I	R

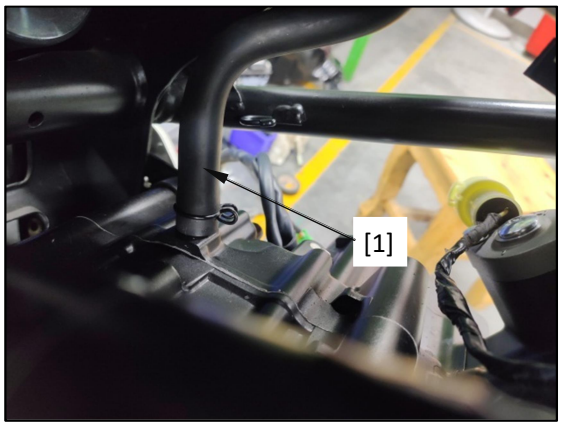
Caution:

1. More frequent maintenance is necessary in case driving under dusty or wet conditions
2. Driving in rain or under full speed, the more maintenances are needed.
3. The mileage and working time, who was reached first then start the maintenance.
4. *Means special tools, data and specialized skill is needed, which shall be done by Loncin dealer.

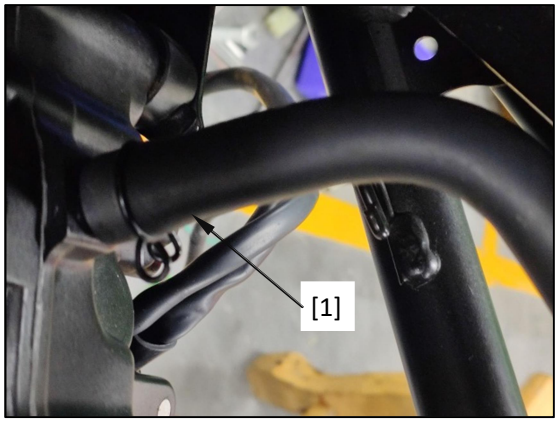
Breathing tube on crankcase

Caution:

- When driving in rain or under full speed, when washed or oppositely put the motorcycle, the more maintenance is needed. Check the sediment in breathing tube by viewing its transparent part.
  Pull off the plug [1] of cleaning tube on air filter, then drain off the sediment into suitable container and re-assemble the plug.



Remove the fuel tank and hold it on.
Check the crack, aging, damage or flexibility on cleaning tube [1] of air filter, replace if it is necessary.
Re-assemble the fuel tank.



Spark plug

Remove the fuel tank and surrounding parts.
Remove the spark plug[1].
Caution：
Before removing the spark plug, blow and wash its surroundings of base by air gun and make sure there is not any dust drops into the combustion chamber. Check and confirm the damage or crack on insulators, also check the damage, dirt or color fading on terminal, please replace the spark plug in case it is necessary.

Check the spark plug：

Wash the terminal of spark plug by iron wire or the washer for it only.

Check the clearance between the central and side terminals by feeler gauge.

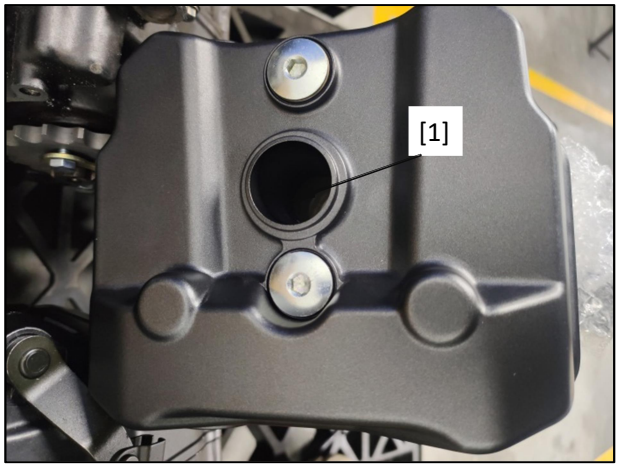
Clearance of spark plug：0.60-0.70mm

Carefully get the side terminal bent to adjust the valve clearance if it is needed.

Install the fasten the spark plug to cylinder head by hand, then fasten the spark plug to fixed torque.

Fastening torque：14N • m

Re-assemble the fuel tank and the parts surrounding.



Valve clearance

Check

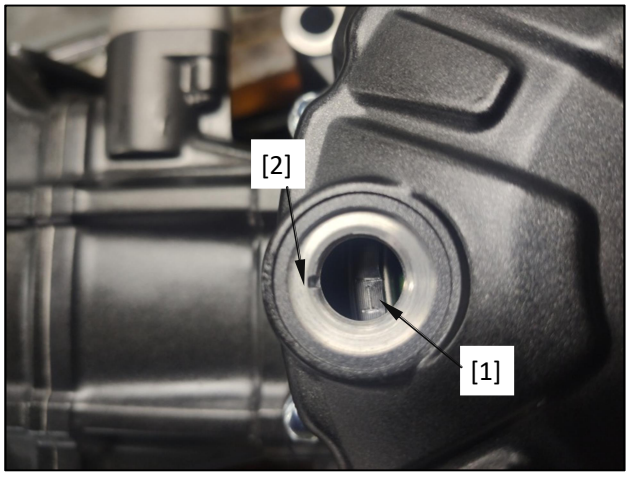
注意：
Note：

- Please check and adjust the valve clearance when the engine is cold (Under 35℃)

Please remove the parts below:

- Cylinder head cover
- Left decorative cover and its o-ring
- View-hole's cover and its o-ring.

Assembly: Turn the crankshaft anti-clockwise by socket wrench of 17mm, get mark "T" [1] on magnetic cylinder aligned with the indicating scale line [2] on left front cover.



Make sure the timing marks (IN and EX) on sprocket wheel get aligned with the surface of cylinder head, ensure the punching mark of round point face upward.

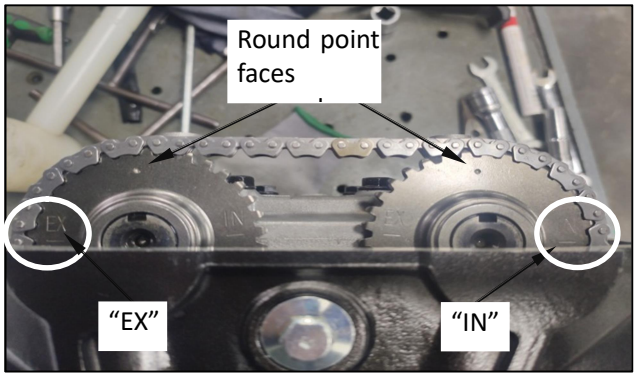
(As picture shows) In case the timing marks are not at the demanded position, turn the crankshaft anti-clockwise by 360 °

Caution：

- When the engine is under this condition, it's the timing condition, at the upper stopping point of cylinder, the 2 tips of cam didn't touch the swinging arm, which is Alignment for timing: Turn the crankshaft anti-clockwise, until the scale line |T on magneto gets aligned with timing gap on edge of view-hole's cap at left, meanwhile the scale mark IN on end surface of driven sprocket wheel of air inlet shaft and scale mark EX on that of air exhaust get parallel to installation surface of cylinder head.

Insert the feeler gauge between swinging arm and cam of air inlet and exhaust to check the valve clearance.

convenient for disassembly or re-assembly.



Valve clearance：

IN：0.16±0.03mm

EX：0.25±0.03mm

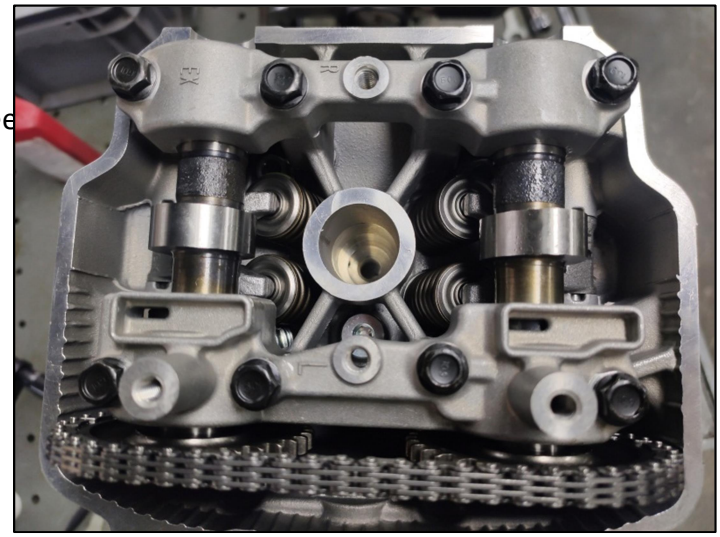
Caution：

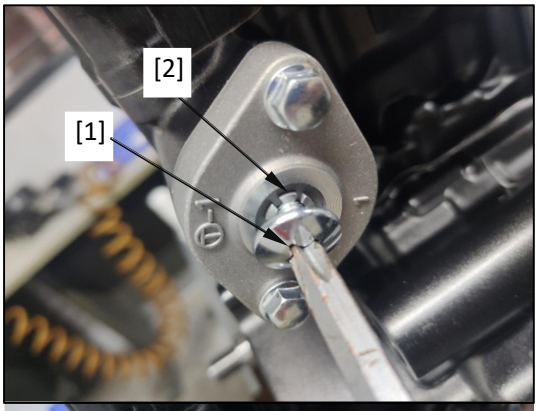
- Take record for each valve clearance to get reference for selection of shims when adjustment was needed.

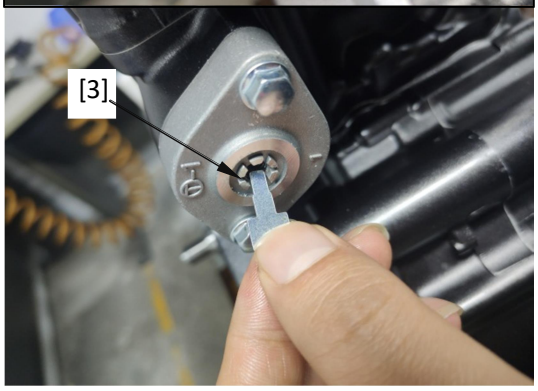
Adjustment

Caution：

- Adjustment for valve clearance nee the swinging arm shaft.
- Adjust the engine to condition of installation as former chapter shows.







Operate as below：

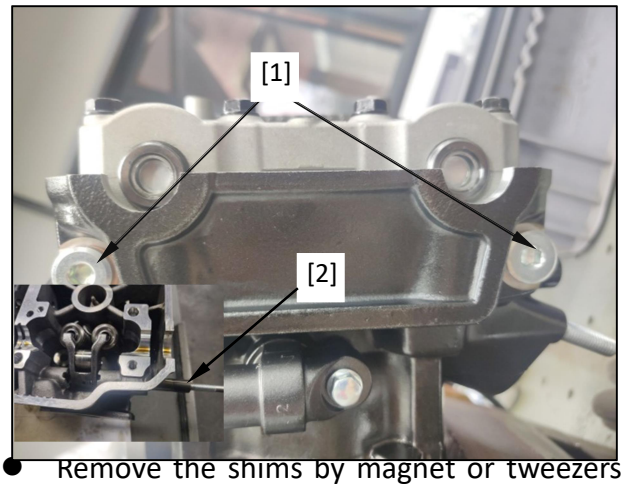
- Remove bolt [1] of tensioner and seal ring[2]，
- Insert a single sheet into tensioner.
- Get back clockwise to tensioner [3].

Remove the parts below:

- Screw on swinging arm and its shim [1]
- Swinging arm shaft [2] of valve.

Caution：

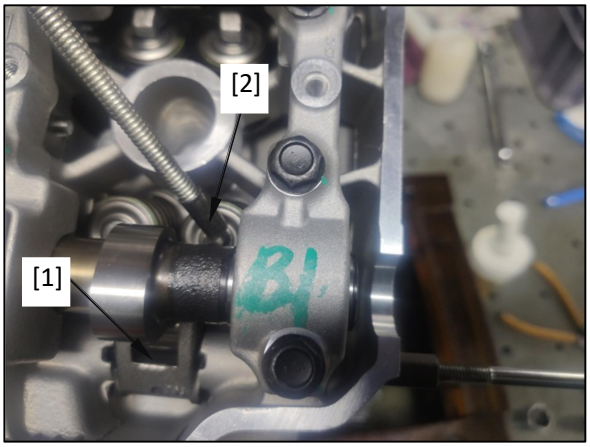
- To avoid the damage on swinging arm shaft of valve, please confirm the engine is at the timing position, then slightly turn the bolt into shaft and slightly take out.



Operate as below:

- [Move the swinging arm [1] of valve outwards
- Remove the shims [2] by magnet bar tweezers may let your work easier.

- Remove the shims by magnet or tweezers may let your work easier.



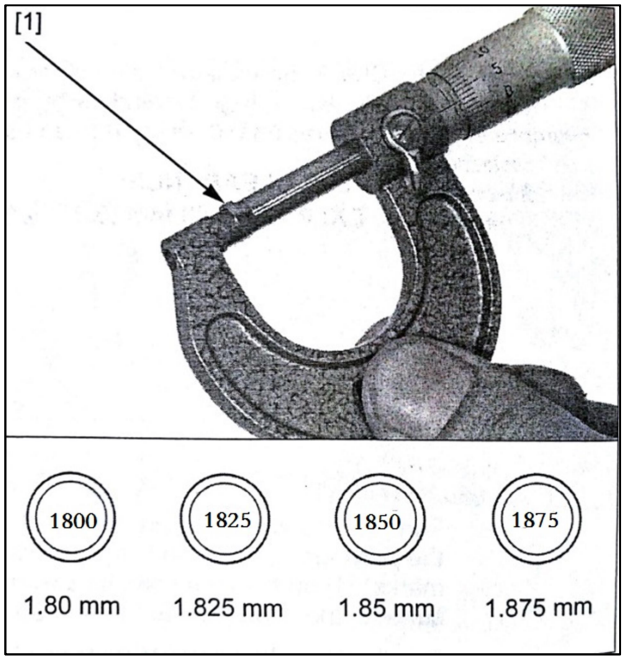
Caution：

- Avoid the shim drop into crankcase and spark plug’s hole.
- Mark up all the shims to make sure their correct re-assembly.

Measure the thickness of shim [1] and take record.

Note:

- There are 69 different thickness of shims are selectable with difference of 0.025mm between each adjuscent two (1.200～2.900mm)
- Calculate the thickness of new shim by equations below:
  A=(B-C)+D
  A: Thickness of new shim
  B: Take record for valve clearance
  C: The stipulated valve clearance
  D: Thickness of removed shim
  Adopt micrometer to ensure the thickness of shim.



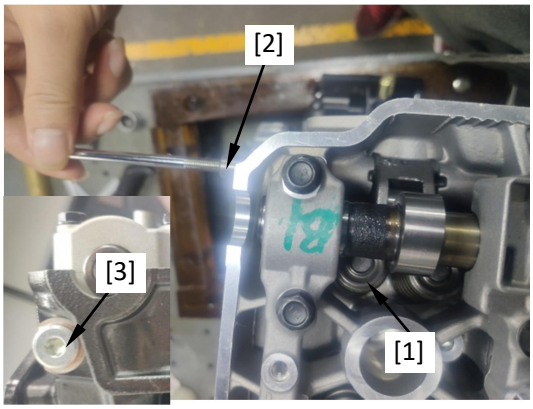
Coat the end part of valve rod with oil.

Re-assemble the new shim [1] to the valve spring's base.

Coat the sliding area, thrust surface and external surface of swinging arm's shaft with oil.

Fix the swinging arm, then insert its shaft [2] into cylinder head and the arm itself.

Coat the threaded part of bolt of swinging arm's shaft with oil, and replace the washer [3] for a new one.



Fasten the bolt to stipulated torque.

Fastening torque：13N • m

Loosen the single sheet to let the tensioner recover to its normal condition, then install the bolt and seal ring for tensioner.

Turn the camshaft several times by turn the crankshaft clockwise.

Measure the valve clearance once again.

Replace the o-ring for a new one and coat it with oil, then install it into the groove on view-hole's cap.

Coat the threaded part of view-hole's cap with lubricant and re-assemble the cap.

Fasten the view-hole's cap to given torque.

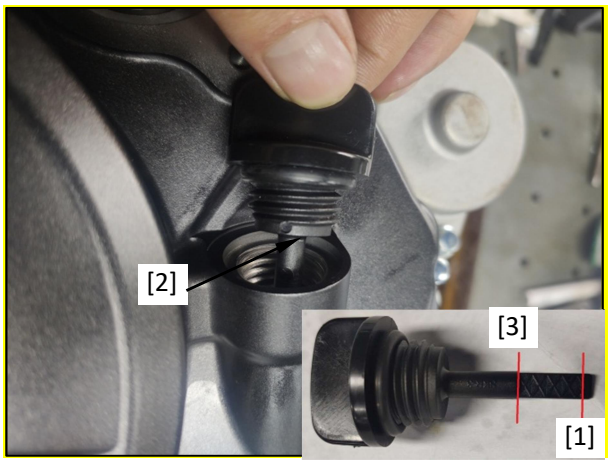
Fastening torque：5N • m

The way for re-assembling the cylinder head cover please refer to Chapter 5th.

Oil in engine

Check the residual oil in engine

Start and idly run the engine for 3~5 minutes.
Stop the engine and wait for 2~3 minutes.
Lay the motorcycle on horizontal ground and make it upright.
Check the residual oil by the oil gauge [2].
Insert the oil gauge into its hole, in case the oil level is lower than the lowest line {1}, please fill up to highest level line [3], in case the level is higher than line [3], suck some by suction nozzle back to highest line [3].



Appointed oil：For Loncin only

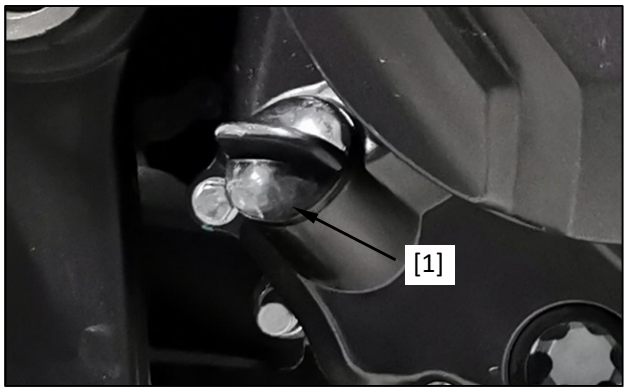
API grade of quality: SG or higher(Adopt the one with round service label of API whose mark is energy saving is not allowed.）

JASO T903 standard：MA

Specification:

SAE10W-30,10W-40,10W-50,15W-40, 20W-40, 20W-50。

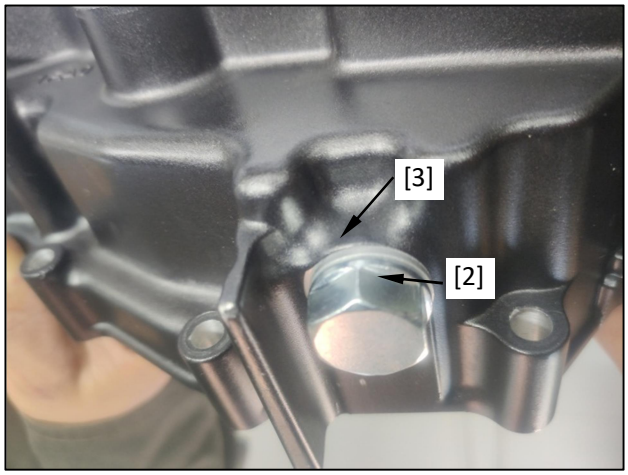
Check the normal performance of o-ring on oil plug, replace if it is necessary.。
Coat the o-ring with oil.
Re-assemble the oil plug.



Replacement for oil

Stop the engine and remove oil gauge [1].
Remove the oil drainage bolt [2] and washer [3], then drain off the oil.
When the oil drained off, re-assemble the drainage bolt [2] and replace the washer for a new one.
Fasten the oil drainage bolt to given torque.

Fastening torque: 24 • m



Fill up the oil to upper scale mark.
When drained off：1.1L
New engine or after broke up：1.3L
Check the oil level.
Make sure there is not any oil leakage.

Engine idling

Caution：

- When finish all the maintenance items and confirmed they meet demands, then check the idling.
- Check the items before inspecting the idling:

- The malfunction indicating light didn't flash
- The normal performance of spark plug
- The normal work of element of air filter
- The free travel of throttle switch and throttle lever

The idling could be checked and adjusted when the engine is hot only.
Start the engine to let it get to normal working temperature, then make it idly run.
Check the idling.
Idling speed: 1500±100

In case the idling speed is out of limited range, please check the parts below:

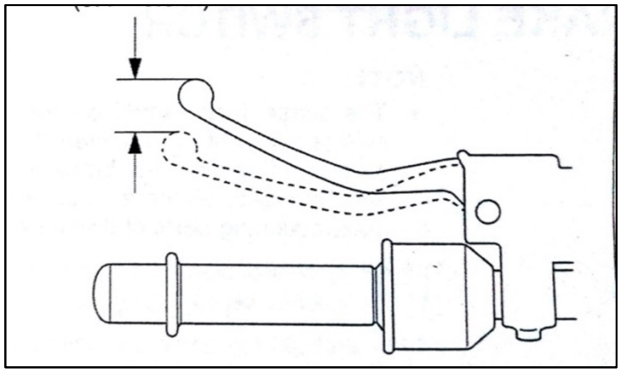
- The problem of air inlet amount or engine's end
- Operation of controlling valve for idling
- Wire, circuit and each connector

Clutch

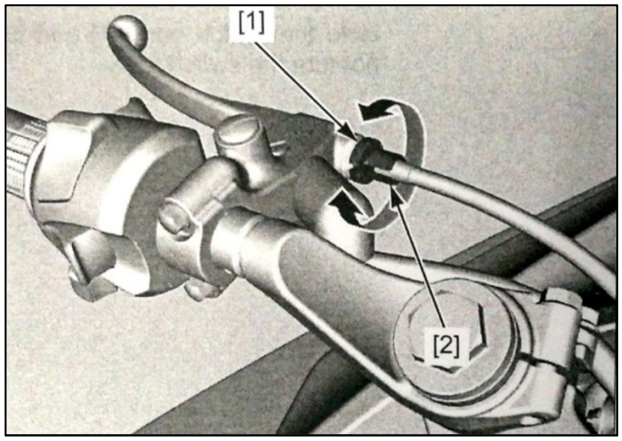
Check the distortion or damage or clutch cable, then lubricate the clutch cable when it is necessary.

Check the free travel of clutch lever at its end part.

Free travel： 10-20mm



Adjustment in a small range could be done by the adjustor on clutch lever.'
Loosen the locking nut [1], turn the adjustor according to your demand.
Hold the adjustor, meanwhile fasten the locking nut.
When you passed the wire limit of adjustor, the precise free travel could not be got, at this moment, we need the main adjustor.

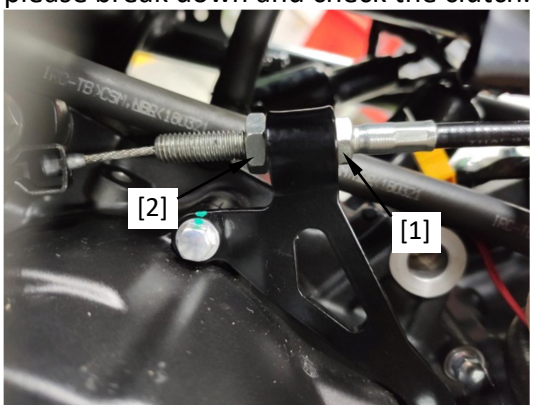


Adjust the main adjustor by turn its nut [1] on operation arm of clutch.

Loosen the locking nut [2], turn the adjustor according to your demand.

Hold the adjustor meanwhile fasten the locking nut.

In case the correct clutch travel failed to be got, or it gets skidding when making trial driving, please break down and check the clutch.



3

Cooling system

Information for maintenance

Summary

⚠Warning
Please don’t remove the cover of heat radiator when the engine and radiator completely cooled down, otherwise the coolant may inject or splash out and get your injured.

Caution:

The coolant with silicate solvent of anti-corrosion may accelerate the wear-out of seal ring on water pump and block up the passage of heat radiator.

Use the running water may damage the engine

- Fill up the sub tank with coolant, except filling up of draining off, please don’t

remove the cover of heat radiator.

- The engine needn’ t be removed from frame when maintaining the cooling system.
- The coolant touches the painting surface is not allowed.
- Check by coolant temperature indicator/Water temperature sensor.
- Check the relay of cooling fan’ s controller.

Specification of cooling system

Items		Specification
Coolant capacity	Heat radiator (With all water passages)	0.6 L
Coolant features and top temperature at outlet port		Ethanol, 115℃
Thermostat	Initial opening temperature	82℃±2℃
	Completely opened temperature	92℃±2℃
	Rising of valve	≥4mm
Coolant we suggest	Coolant with ethanol but without silicate	

Troubleshooting

Too high the engine temperature

- Malfunction in coolant temperature indicator/Water temperature sensor
- The thermal valve failed to be opened
- Malfunction on heat radiator’ s cover
- Coolant is not enough
- Passage, soft hose and water tube of heat radiator blocked up
- Air got into circulation system
- Malfunction in motor of cooling fan
- Malfunction in relay of cooling fan’ s controller
- Malfunction in water pump

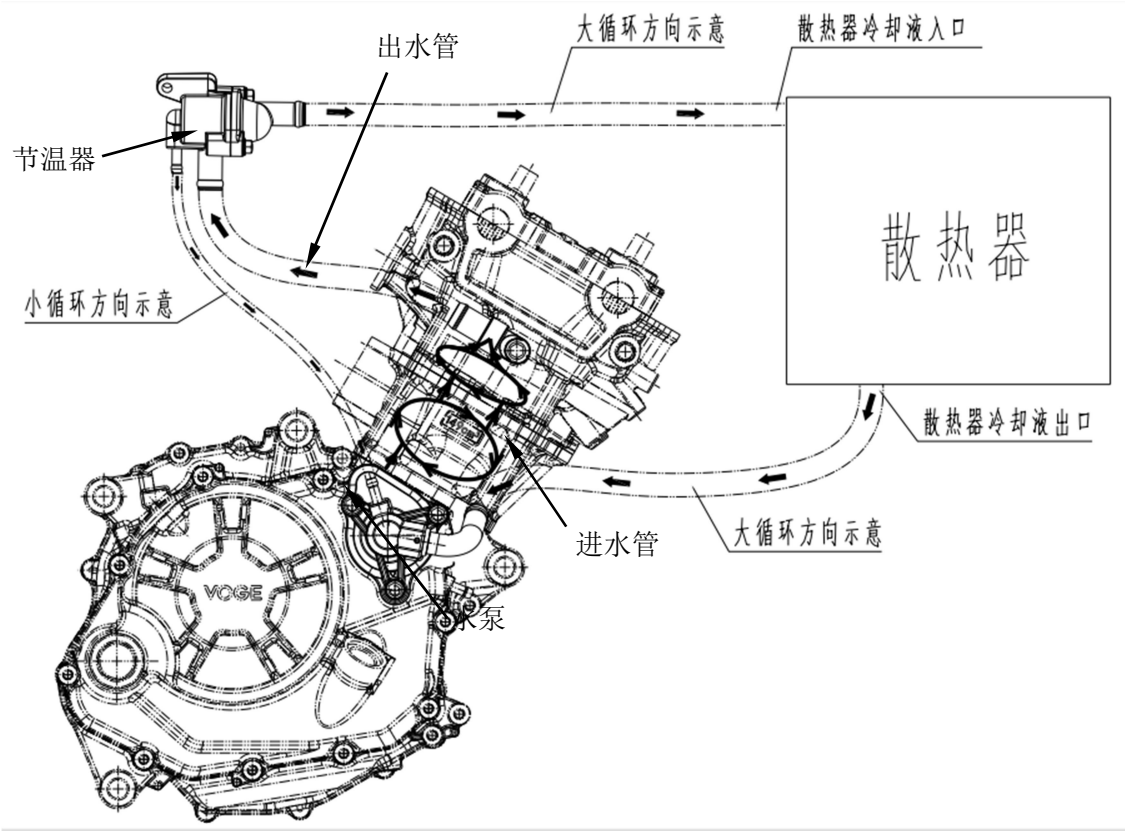
Too low the engine temperature

- Malfunction in coolant temperature indicator/Water temperature sensor
- The thermal valve was opened
- Malfunction in relay of cooling fan’s controller

Coolant leakage

- Defect on machinery structure of water pump
- O-ring gets aged
- Malfunction on cover of heat radiator
- Gasket of cylinder head gets damaged or aged
- The joint of soft hose or tube clamp get loose
- Soft hose gets damaged or aged
- Heat radiator gets broken
- The cover of thermostat or tube joint of water pump’s cover is flexible.

Mode of system procedure



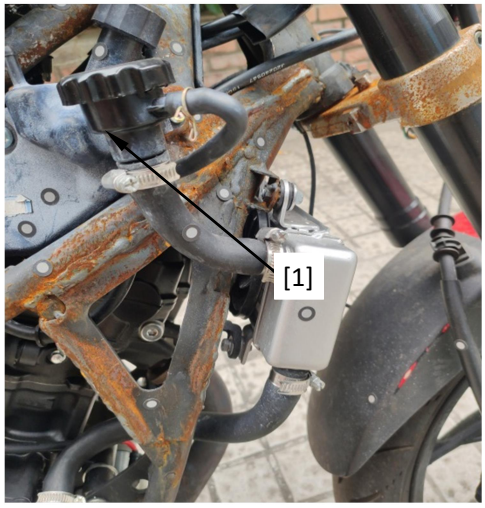
散热器：Heat radiator 出水管：Water outlet tube 小循环方向示意图：Figure for sub-circulation 进水管：Water inlet tube 节温器：Thermostat 大循环方向示意图：Figure for major-circulation 散热器冷却液入口：Inlet port for coolant of heat radiator 散热器冷却液出口：Outlet port for coolant of heat radiator

Test for system

Pressure test for cover of heat radiator/System

Remove the fairing of right middle impeller

Remove the cover [1] of heat radiator



Get the gasket of cover of heat radiator wet, then install the cover into tester [2].

Lay the pressure on the cover by tester. In case the cover failed to keep pressure or too high or low the releasing pressure, the cover need be replaced.

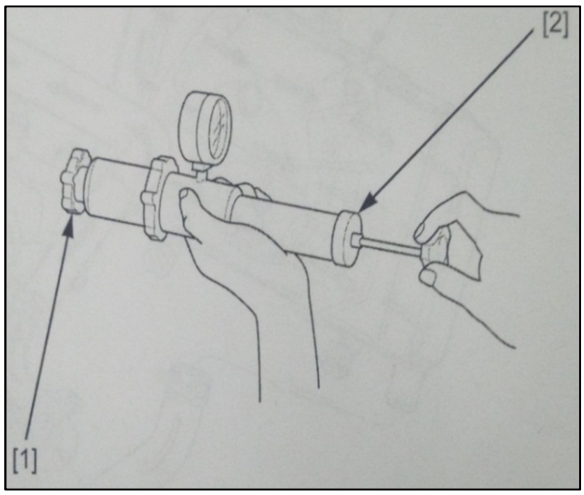
The cover must bear the stipulated pressure at least by 6 seconds.

The pressure on heat radiator' s cover:

108 KPa

Connect the tester to heat radiator.

Lay the pressure on heat radiator, engine and their soft hose by tester to check their air tightness.



Caution:

- Overpressure may damage the cooling system or its components. The pressure must not be higher than 108 KPa.
- In case the system failed to bear the pressure at least by 6 seconds, please repair

or replace the components.

Replacement for coolant

Coolant replacement/Air exhaust

Caution:

When filling up coolant into sub tank , system, or check the coolant level, please lay the motorcycle on horizontal ground and stay it upright.

Remove the fairing of cooling fan.

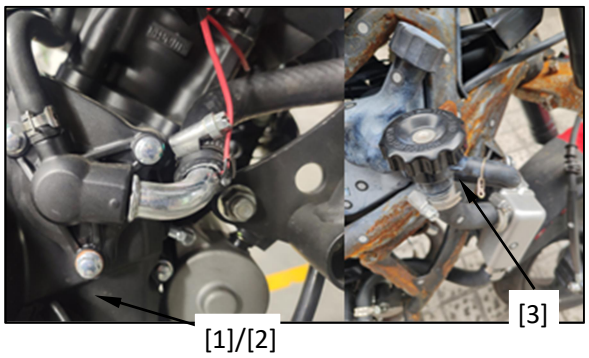
Remove the drainage bolt [1] and flat washer [2] of water pump.

Remove the cover [3] of heat radiator and drain off the coolant.

Fastening torque:

Water drainage bolt on cooling pump:10N . m

Drain off the coolant.



Fill up the system with the recommended coolant through the filling port until reached its neck [1].

Recommended coolant:

With ethanol but without silicate

Exhaust the air in system by steps below:

1. Shift the engine to neutral gear.
   Start the engine and let it idly run for 2-3 minutes.

2. Open and stop the throttle by 3-4 times to exhaust the air in system.

3. Stop the engine, fill up the coolant if it is necessary.

4. Install the cover of heat radiator.

Fill up the storage case by recommended coolant.

Re-assemble the fairing cover.

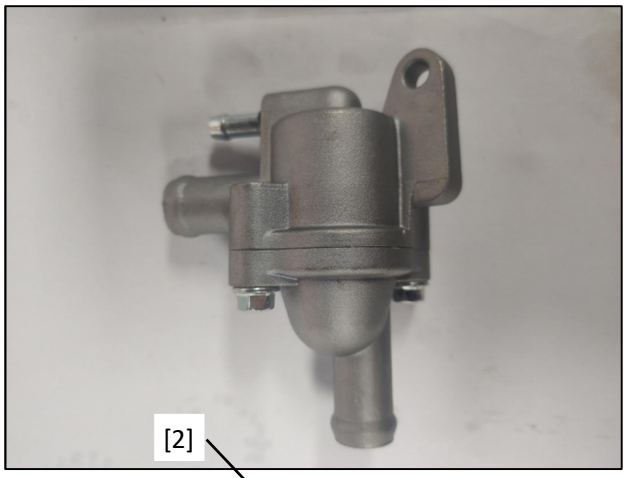
Thermostat

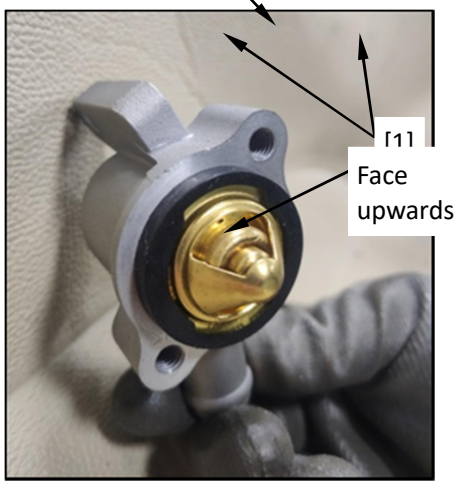
Disassembly/Re-assembly

Drain off the coolant.

Remove the thermostat from cooling water tube.

Remove the bolt [1] and thermostat's cover [2].





The re-assembly is precisely opposite to disassembly.

Fastening torque:

Bolt on thermostat's cover: 10N·m

Caution:

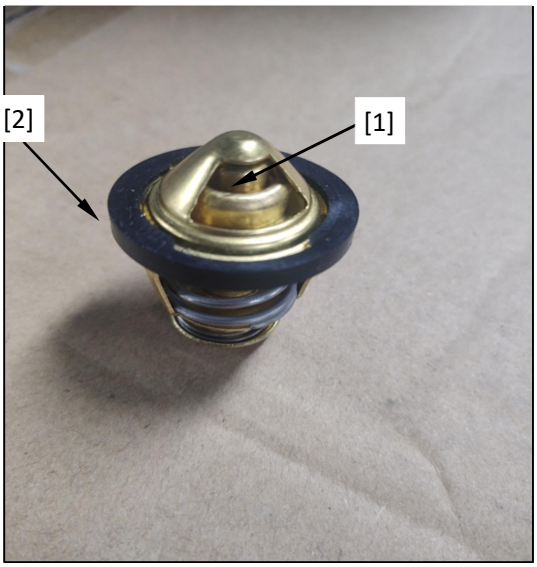
- When re-assembling the thermostat, make sure its air exhaust hole face upwards to exhaust the air bubble in coolant.

Check/Test

Check if there is damage on the surface of thermostat [1].

In case the thermal valve was open under room temperature, which means it need be replaced.

Check the damage on seal ring [2], replace if it is necessary.



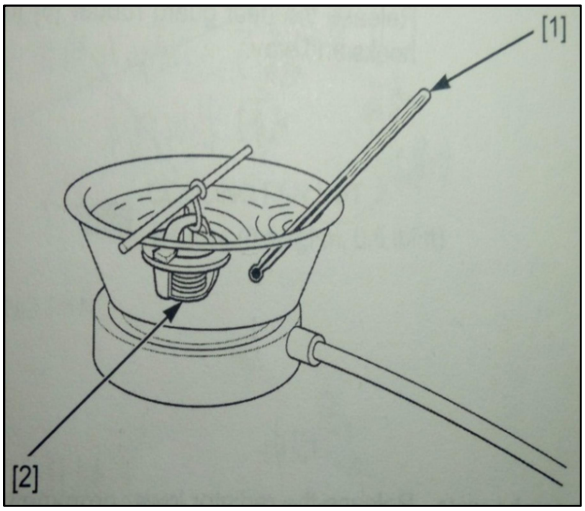
Caution:

- Wear the oven gloves and suitably protect your eyes.
- Keep the combustible materials far away from electrical parts.

Don't let the thermostat and thermometer [1] touch the bottom plate, otherwise the data you got may be wrong.

Heat the water to working temperature by electrothermal furnace and keep it for 5 minutes.

Suspend the thermostat [2] in hot water to check and confirm its normal performance.



Initial opening temperature of thermostat:

80 -84℃

Height when the valve completely opened:

Under 90-94℃ no less than 4mm

In case the thermostat gets opened when the temperature was out of stipulation, please replace it.

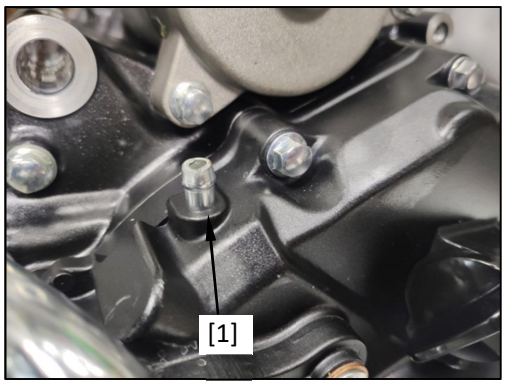
Cooling pump

Check the sealing of end surface

Check the coolant leakage from overflow hole [1] on water pump.

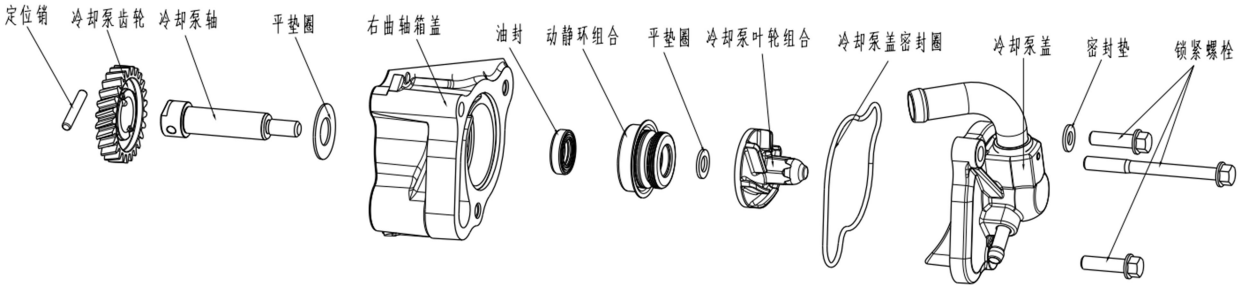
- Just a few coolant overflow means it is normal.
- Make sure there is not coolant keeps overflowing when engine started.

In case it is necessary, please replace the water pump and right crankcase cover set.



Disassembly/Re-assembly

The disassembly and re-assembly for cooling pump is as picture below:



定位销：Positioning pin 冷却泵齿轮：Gear for cooling system

冷却泵轴：Shaft for cooling system 平垫圈：Flat washer

右曲轴箱盖：Right crankcase cover 油封：Oil seal

动静环组合：Dynamic and static ring set

冷却泵叶轮组合：Impeller set for cooling system

冷却泵盖密封圈：Seal ring for cooling pump's cover

冷却泵盖：Cover for cooling pump 密封垫：Gasket 锁紧螺栓：Locking bolt

Disassembly

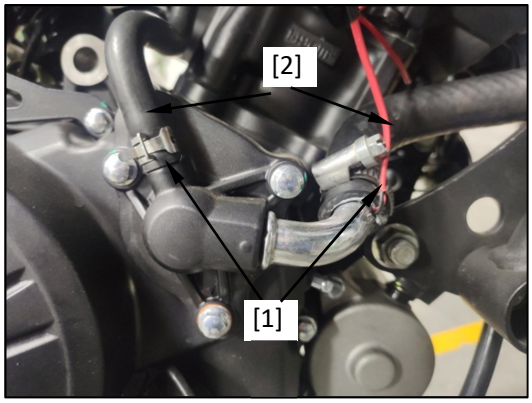
Caution:

- Lay a clean oil tray under engine, when removing the right crankcase cover, there may have oil flow out. When re-assembled, fill up with recommended oil to stipulated position (By referring the Maintenance Guidance).

Drain off the coolant

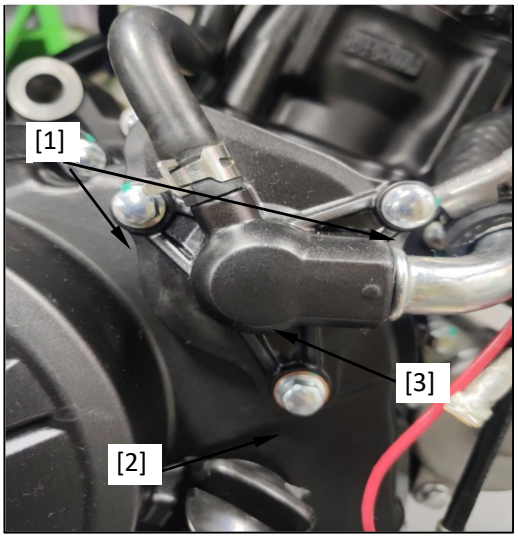
Lay the motorcycle on a horizontal ground and make it upright.

Loosen the tube clamp [1], then loosen water inlet tube [2] on cooling system.

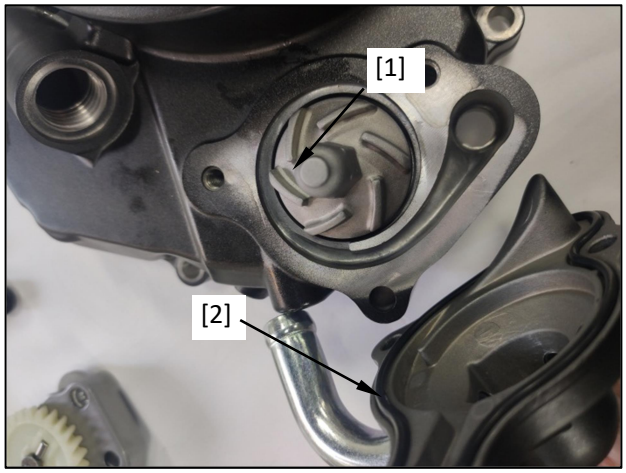


Remove the parts below:

- Bolt [1] on water pump’s cover
- Water drainage bolt and washer [2]
- Cooling pump cover [3]



Check distortion and damage on seal ring [2] of cooling pump’s cover, in case it is, please replace.



Remove the cooling pump set,

Remove the right crankcase cover set,

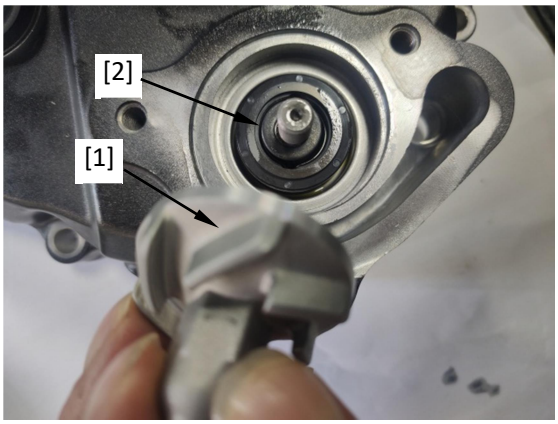
Remove the impeller [1] and flat washer [2] of cooling pump by turning anti-clockwise.

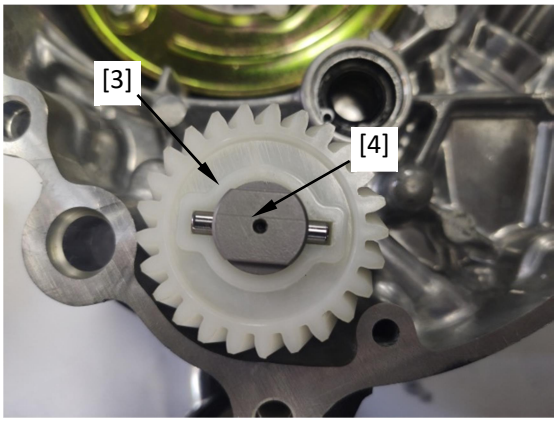
Turn the gear [3] of cooling pump to check jamming.

Remove the gear and shaft [4] of cooling pump, check distortion or damage on gear, shaft, and impeller of cooling pump, in case there is, please replace.

Caution:

- There is some resistance when turning the gear of cooling pump is normal, but it should keep going on without jamming.





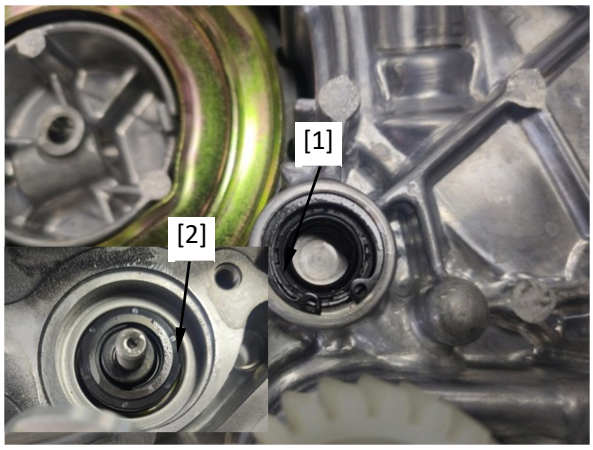
Check the distortion or damage on oil seal [1] and dynamic & static ring [2] set, in case it is , please replace.

The re-assembly is precisely opposite to disassembly.

Fastening torque:

Installation torque for impeller of cooling pump: 10N·m

Check the oil amount.



4

Lubrication system

Information for maintenance

Summary

⚠Warning
Repeatedly touch the engine oil in long time may get skin cancer, but this kind of situation is rarely to be seen, unless your skin touches the engine oil every day, but we still you suggest you wash up your hands by soap and clean water as soon as you deal with the replaced oil.

Caution:

- When repairing the oil pump, we needn’t remove the engine from frame.
- The pre-condition for all maintenance steps in this Chapter is drain off the oil in engine.
- When disassembling and re-assembling the oil pump, please don’t let dust or dirt get into engine.
- Any part in oil pump passed the limit for maintenance, please replace the oil pump as a complete set.
- When the oil pump re-assembled, please check the oil leakage and correct oil quality.

Specification for lubrication system

Unit: mm

Items		Standard	Limit
Oil capacity	Capacity (New engine or breaking down)	1.3L	—
	Capacity (Only replacement)	1.1L	—
Recommended oil	Brand	Oil for Loncin only	—
	Specification	SAE 10W-30,10W-40,10W-50, 15W-40, 20W-40, 20W-50	—
	Grade	API quality grade: SG or higher (Don't adopt the one with round label of API service for energy saving) JASO T903 standard: MA	
Rotor of oil pump	Clearance between external and internal rotors	≤0.15	0.22

Troubleshooting

Too low the oil level

- Too heavy the oil consumption
- Oil leakage on external components
- Piston ring worn out or without assembling in place
- Cylinder worn out
- Valve guiding tube worn out

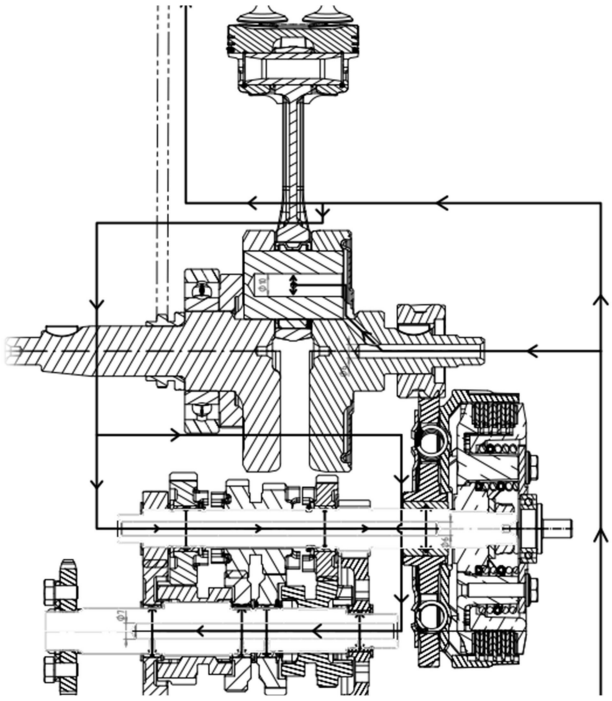
Oil gets dirty

- Didn't replace oil and filtering screen periodically
- Piston ring gets damaged

Oil emulsified

- Leakage on coolant passage
- Water gets into engine

Diagram for lubrication system

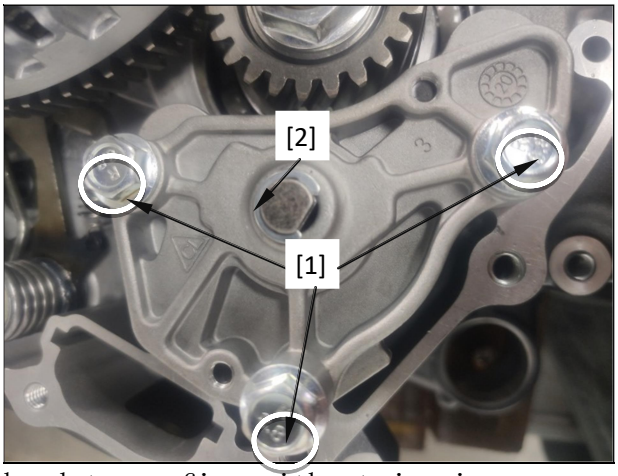


机油泵：Oil pump 机油滤网：Oil screen 油底壳：Oil bottom case

Oil pump

Disassembly/Re-assembly

Remove the right crankcase cover set, Remove the fastening bolt [1] and oil pump [2].



The re-assembly is precisely opposite to disassembly.

Caution: Before re-assembly, turn the gear of oil pump by more than 2 rounds by hand to confirm without jamming.

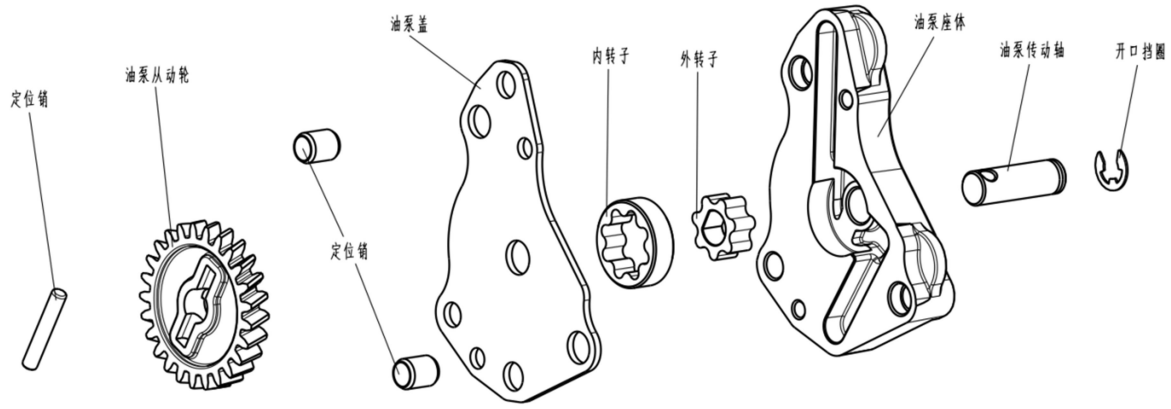
Torque

Bolt on oil pump: 12N．m

机油滤网

Disassembly/Re-assembly

The disassembly and re-assembly for oil pump is shown as below:



油泵盖：Oil pump’s cover 定位销：Positioning pin 平垫圈：Flat washer 油泵座体：Oil pump’s base body 油泵传动轴：Transmission shaft for oil pump 内转子：Internal rotor 外转子：External rotor 开口挡圈：Opening circlip 油泵从动轮：Driven gear of oil pump

Check:

- Check the driving and driven gear of oil pump.

Check the damage, wear-out, distortion and burn-out on parts below:

- Shaft of oil pump
- Positioning pin
- Internal rotor
- External rotor
- Base body of oil pump

Measure the oil pump clearance according to specification of lubrication system. Any measured result passed the maintenance limit, please replace the complete oil pump set.

5

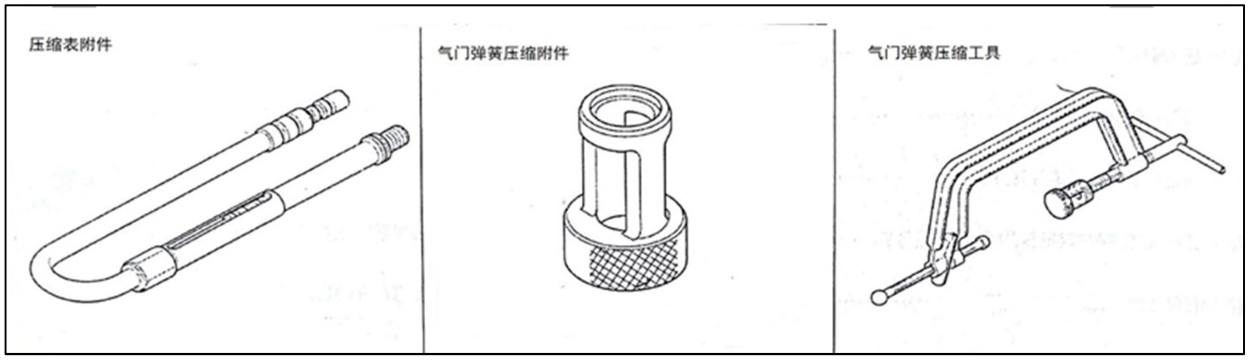
Cylinder head, body and air system

Information for maintenance

Summary

- This chapter includes the inspection and maintenance for cylinder head, body, valve, camshaft, swinging arm, piston and pin pressor.
- When repairing the cylinder head cover, camshaft, and tensioner, judge from the shielding piece to decide if we need remove the engine from frame; But when repairing the cylinder head, cylinder body, air valves, piston and pin pressor, we need remove the engine from frame.
- When disassembling the components, mark up the removed parts for a correct re-assembly.
- Before checking, wash up all the removed parts by cleanser, then dry them up by compressed air.
- The lubricant on camshaft is got through the oil passage in cylinder head and camshaft' s bracket, in this case, before re-assembling the cylinder head and camshaft' s bracket, wash up their oil passage first.
- Please don' t damage the contact surface when disassembling the cylinder head, its cover, and cylinder body.

Tool(s)



压缩表附件：Compression gauge’s accessory
气门弹簧压缩附件：Compression accessory for valve spring
气门弹簧压缩工具：Compression tool for valve spring

Specification for cylinder head, valves, piston and cylinder body

Unit: mm

Items			Standard	Limit
Cylinder pressure under electrical starting			1200-1400kPa/390r/min	—
Valve clearance		Air inlet valve	0.13-0.19	—
		Air exhaust valve	0.22-0.28	—
Camshaft	Protrusion height of cam	Air inlet	32.565-30.695	32.465
		Air exhaust	30.065-30.185	29.965
	Clearance between journal and bracket		0.02-0.054	—
	Runout		0.02	0.03
Valve and its guiding tube	Diameter of valve rod	Air inlet	4.475-4.490	4.455
		Air exhaust	4.465-4.480	4.445
	Internal diameter of valve’s guiding tube	Air inlet/Exhaust	4.500-4.512	4.550

	Clearance from valve rod to guiding tube	Air inlet	0.010-0.037	0.075
		Air exhaust	0.020-0.047	0.090
	Width of valve base	Air inlet/Exhaust	0.9-1.1	-
Free length of valve spring		Air inlet/Exhaust	37.50	35.60
Installation length of valve spring		Air inlet/Exhaust	33.10	—
Flatness of cylinder head				0.05
Cylinder body	Cylinder bore		57.301-57.322	57.344
Piston, piston pin and piston ring	Cylindricity		0.004	0.006
	Diameter for base circle of piston		57.275-57.285	57.265
	Diameter for pin's hole		14.002-14.008	14.02
	Diameter for piston		13.995-14.00	13.985
	Closing clearance for piston ring	1st ring	0.10-0.30	0.50
		2nd ring	0.2-0.4	0.6
		Oil ring	0.2-0.7	0.85
	Clearance between piston ring and its groove	Clearance between 1st ring and its groove	0.02-0.06	0.09
		Clearance between 2nd ring and its groove	0.02-0.06	0.09
Cylinder matching clearance			0.025-0.047	0.06

Troubleshooting

- Malfunction at the top place of engine is usually bad for engine performance. We can find out these malfunctions by compression test, also we can find them by detective rod or stethoscope to know where the engine noise comes from
- In case the power output of engine is weak when it under low speed, please check if there is white smoke in beathing tube of crankcase. In case the soft hose is smoky, please check the jamming on piston ring.

When engine is working under low speed, too low the compressing pressure, difficult starting or poor performance

- Valve

- Incorrect adjustment for valve clearance
- Valve burned out or got bent
- Wrong valve timing
- The valve spring got cracked

- Cylinder head
  - The gasket of cylinder head with leakage or damage
  - Cylinder head gets bow, twist or crack
  - Spark plug is flexible
- Cylinder, piston or piston ring worn out

Compressing overpressure, overheat or cylinder knock

- Too much carbon buildup on piston head or in combustion chamber

缸体过热或敲缸 **Cylinder head overheated or knocking**

- Too much carbon buildup on piston head or in combustion chamber

Smoky

- Cylinder head
  - Valve rod or guiding tube worn out
  - Sealing piece for valve rod damaged
  - Cylinder, piston, or piston ring worn out

Noisy

Cylinder head

- Incorrect adjustment for valve clearance
- Valve gets jammed or its spring cracked
- Camshaft worn out or damaged
- Swinging arm and its shaft worn out
- Swinging arm and valve rod’s end worn out
- Camshaft got flexible or worn out
- Timing chain worn out
- Gear of cam’s sprocket wheel got worn out

- Cylinder, piston, and piston ring got worn out

Poor idling

- Too low the compressing pressure in cylinder

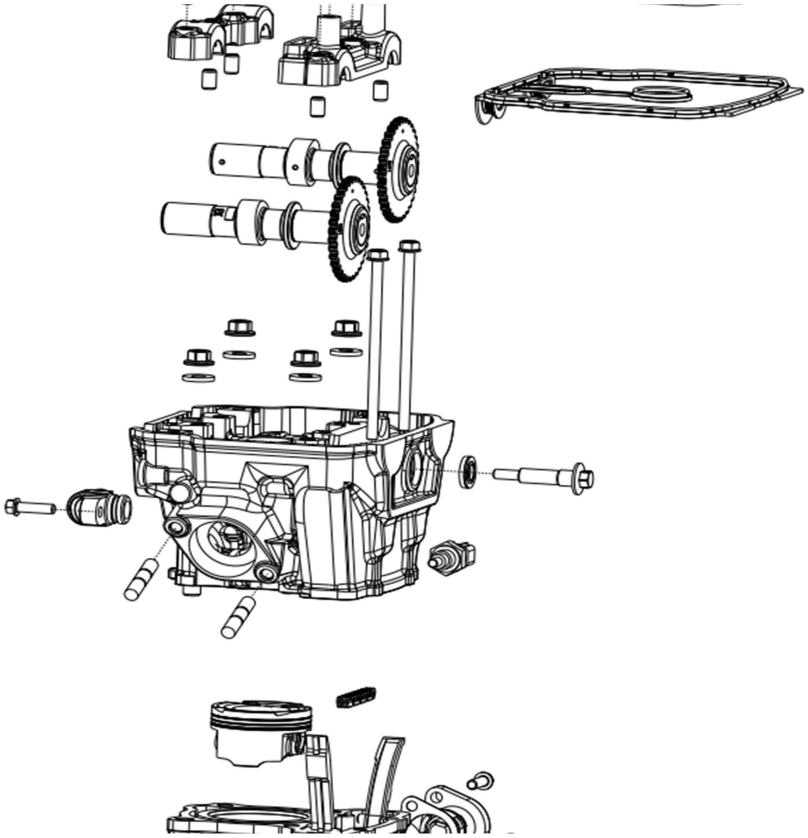
Too much waste gas

- Cylinder body, piston or piston ring got worn out
- Incorrect piston ring assembly
- Scratch on piston or cylinder wall

Abnormal noise of engine

- Piston pin and its hole worn out
- Cylinder body, piston or piston ring worn out
- Pin of crankshaft worn out

Components position



Cylinder compression test

Start engine for several minutes to pre-heat it.

Stop the engine and remove the spark plug.

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

Compression gauge

Tool:

Turn the ignition switch and engine switch to the position ON.

Turn the gear position to neutral.

Turn the throttle to top position and hold on, start engine until the data on pressure gauge stopped rising.

The max. data may usually keep for 4-7 seconds.

Compressing pressure:

When 450rpm, it is 1200-1600kPa

Analysis for low pressure:

- Leakage at cylinder head’s gasket
- Incorrect adjustment for valve clearance
- Valve leakage
- Piston ring or cylinder worn out
- Battery power loss, weak starting

Analysis for high pressure:

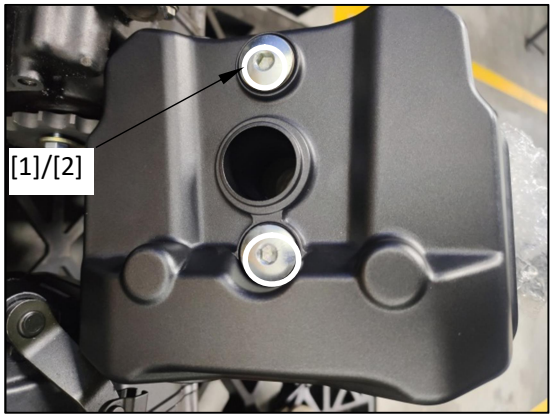
- Carbon buildup in combustion chamber or on piston’s top.

Cylinder head cover

Disassembly/Re-assembly

Remove the shielding parts such as fuel tank.

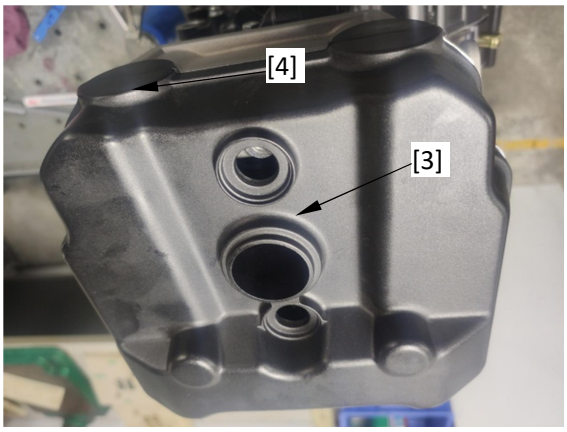
Remove the bolt [1] on cylinder head cover and oil seal [2].



Remove the cylinder head cover [3] from cylinder head and its seal ring [4].

Caution:

- Please don't forcedly remove the seal ring on cylinder head cover.
- Please check the damage or oil leakage on seal ring of cylinder head cover.



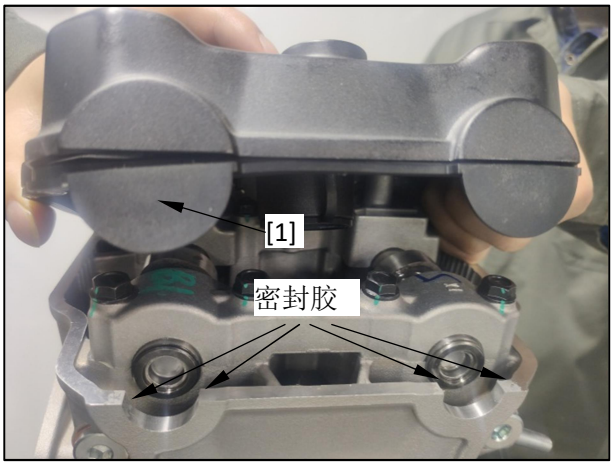
The re-assembly is precisely opposite to disassembly.

Torque:

Bolt on cylinder head cover: 10N•m

Caution:

- Replace the seal ring [1] of cylinder head cover for a new one.
- When re-assembling, align the seal ring of cylinder head cover to the semi-circular groove on cylinder head cover and then install in, then install the cover into cylinder head.
- Coat the contact place of semi-circular groove and seal ring of cylinder head cover with sealing glue.



Tensioner

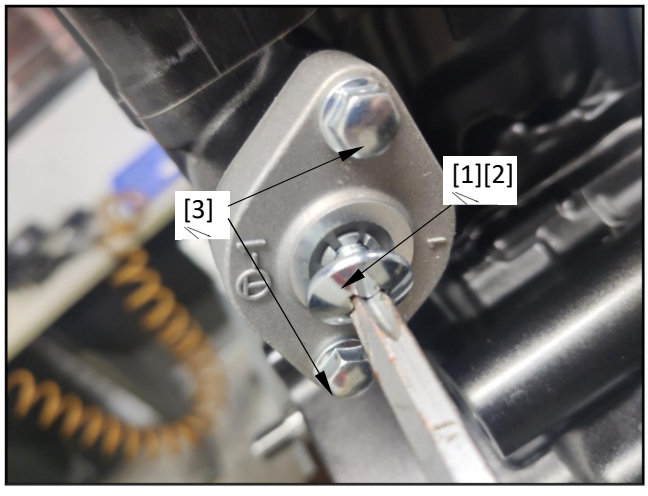
Disassembly/Re-assembly

Remove the seal bolt [1] and seal ring [2].

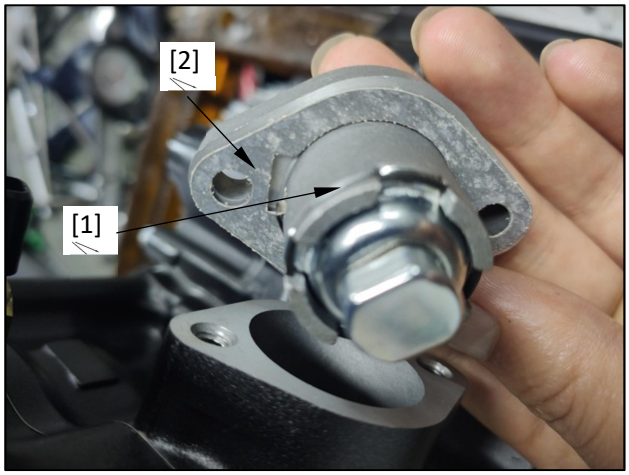
Turn the tensioner clockwise by the tool for it only, make sure the tensioner completely moved back.

Tool:

Single sheet or screwdriver



Remove the installation bolt [3] of tensioner.
Remove the tensioner [1] and its gasket [2].



The re-assembly is precisely opposite to disassembly.

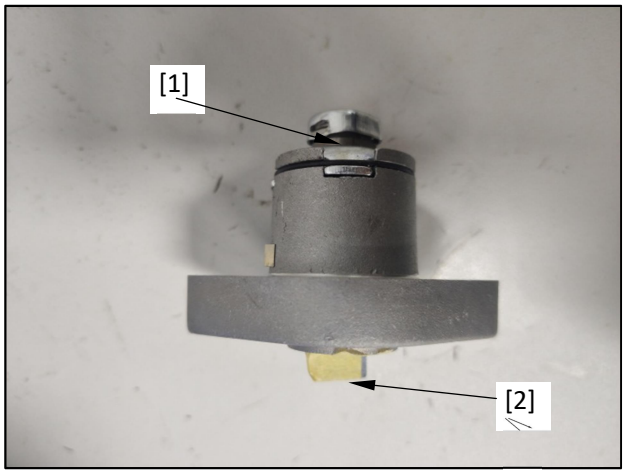
Fastening torque: 10N·m
Caution:

- Replace the gasket for a new one.

Check

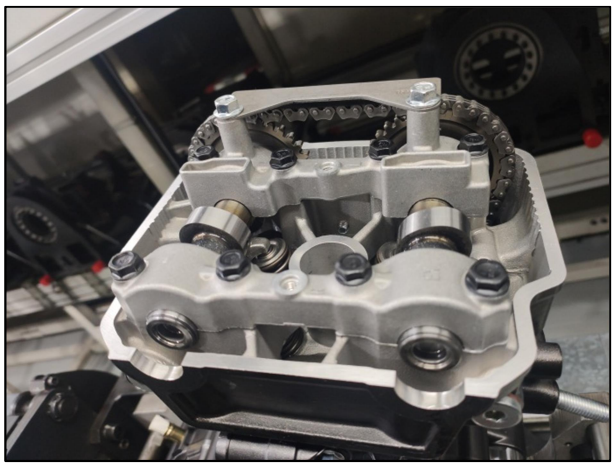
Check the operational performance for tensioner [1].

- When pressing down the adjusting rod of tensioner, the rod shall not be press into the adjustor.
- When turn the adjusting rod clockwise by single sheet [2], the rod shall be pick into tensioner; When the tool removed, the adjusting rod shall bounce out from adjustor immediately.

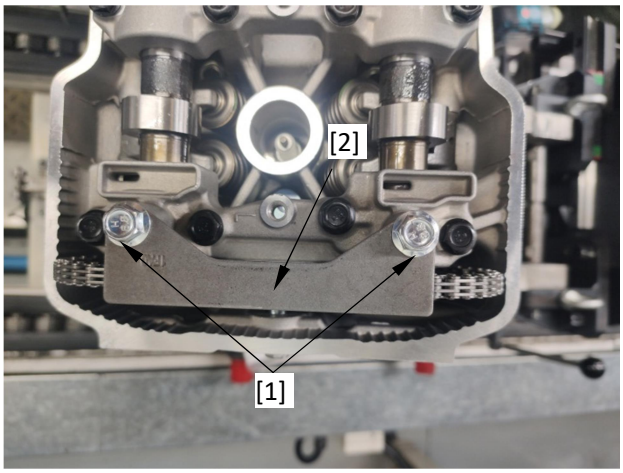


Camshaft

Remove the cylinder head cover.
Make sure the crankshaft and cam is at timing status (The piston is at upper stopping point).
Then remove the tensioner.



Remove the bolt [1] on the limit plate of timing chain, then remove the limit plate [2] of timing chain.

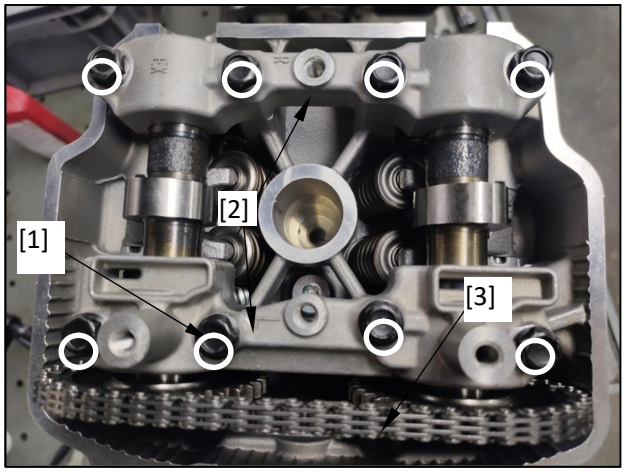


Alternatively loosen the bolts [1] of camshaft’s bracket by 2 to 3 times, then remove them.
Remove the bracket [2] of camshaft from cylinder head.

Caution:

- From outside to inside, alternatively loosen the bracket’s bolts, otherwise the camshaft’s bracket may damage.
- Please don’t forcedly remove the positioning pin from camshaft’s bracket

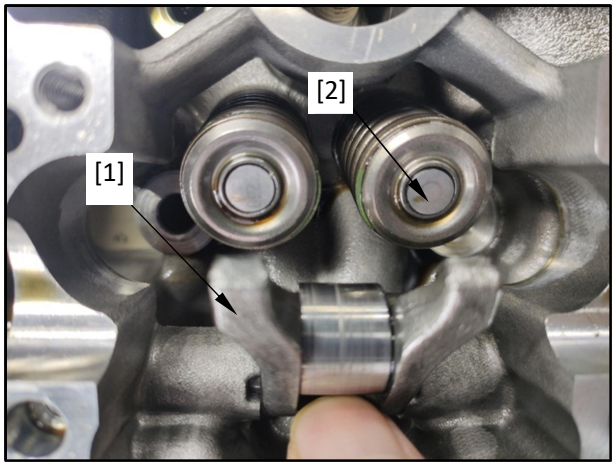
Remove the chain [3] from sprocket wheel, then remove the camshaft.



Lift up the swinging arm [1].
Remove the valve adjustment shim [2].

Caution:

- Be careful, don’t let the adjusting shim of valve drop into engine.
- Mark up the shim to make sure correct re-assembly.
- Remove shim by tweezers or magnet may make your work easier.



Check

Check the damage, wear-out, distortion, burn-out or block in oil passage for parts below:

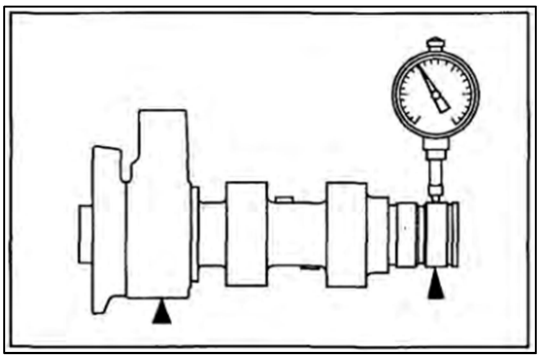
- Cam’s sprocket wheel/Camshaft
- Camshaft’s bracket/Positioning pin
- Adjusting shim for valve
- Swinging arm

Measure each part according to specification of cylinder head/valves

Runout of camshaft

Fix the both ends of camshaft by V-shaped piece, and measure its runout by dial plate.

Limit for maintenance: 0.03mm



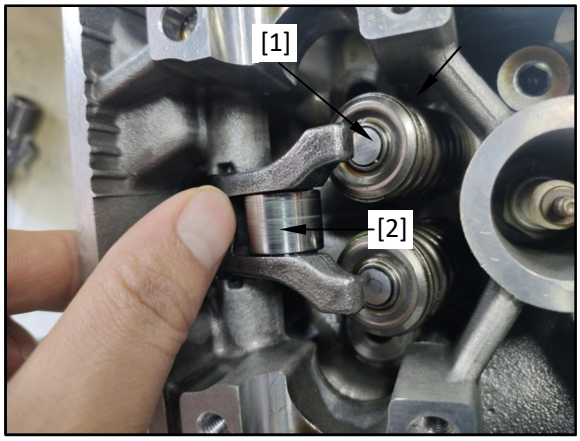
Re-assembly:

Make sure the crankshaft is under timing status.

Caution:

- When the camshaft bounced out of tensioner without re-assembling, when turning the camshaft, make the chain tense to avoid dropping into crankshaft. Re-assemble the adjusting shim [1] back into the original place on valve’s base ring in turn.

Lay down the swinging arm [2].



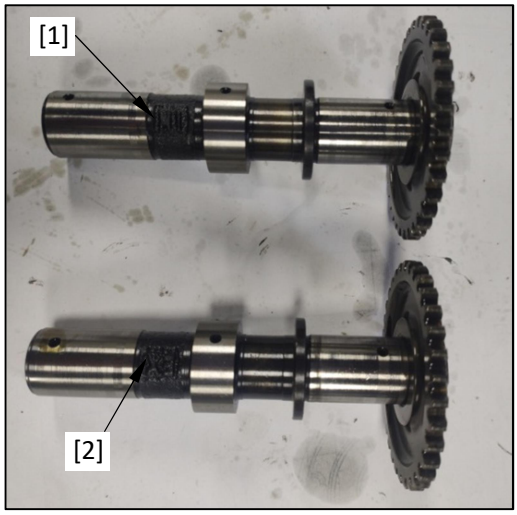
Caution:

- “IN” mark [1]:Air inlet camshaft
- “EX”mark [2]:Air exhaust camshaft
- When re-assembling, make the chain at air exhaust side tense and re-assembly the air exhaust camshaft first.

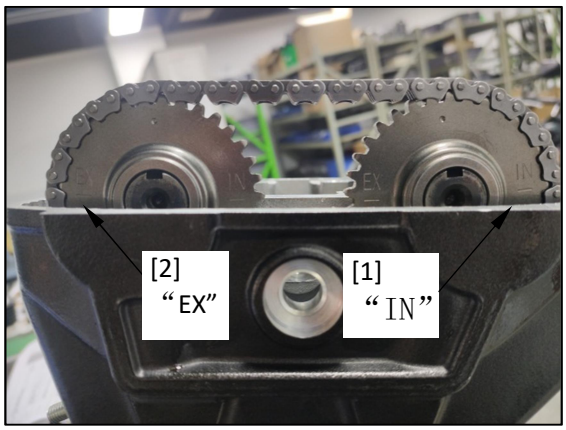
Coat the cam, journal and thrusting surface with oil.

Coat the chain of cam and all their surface with oil

Match and re-assemble the chain and sprocket wheel of cam, then re-assemble the camshaft on cylinder head.



Align the mark [1] IN on sprocket of air inlet cam with mark [2] EX on sprocket wheel of air exhaust cam and the upper surface of cylinder head.



Make sure the positioning pin of bracket of camshaft align with its hole on cylinder head.

Make sure the left camshaft bracket’s EX [1] face to the air exhaust side as picture shows.

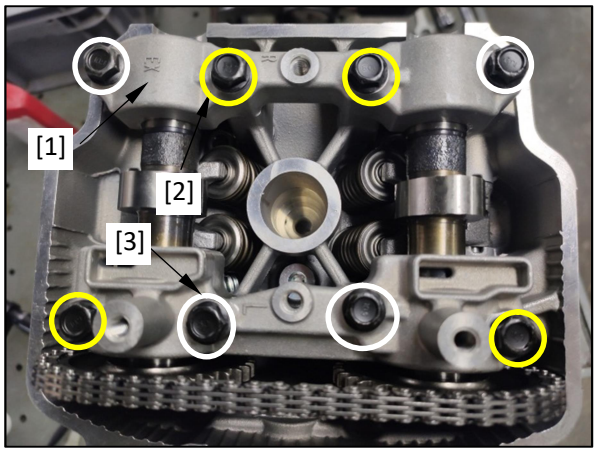
Bracket of left camshaft (Mark “L”)

Bracket of right camshaft (Mark “R”)

Bolt on camshaft’s bracket:

- M6×40mm Bolt [2]
- M6×32mm Bolt [3]

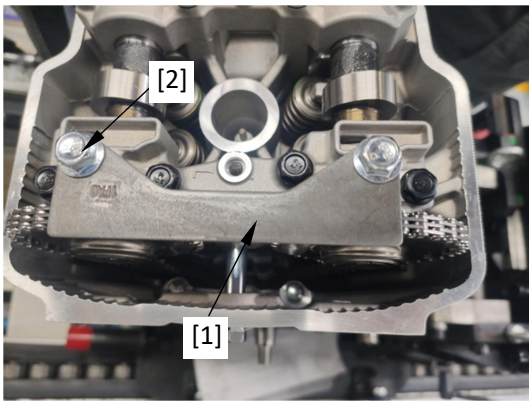
Alternatively fasten the bolts on camshaft’s bracket to given torque by 2-3 times, whose fastening way and torque are show as page 1-15.



Caution:

- The camshaft’s bracket must be replaced with cylinder head as one set.
- Coat the contact surface of each camshaft’s bracket and seal surface with oil.

Re-assemble the pressing plate [1] of cam’ s chain, check its tightness.
Caution: Be careful, don’ t let the bolt of pressing plate on cam’ s chain drop into crankcase.
Re-assemble and fasten the bolt [2] on pressing plate of cam’ s chain.
Fastening torque: 12N·m

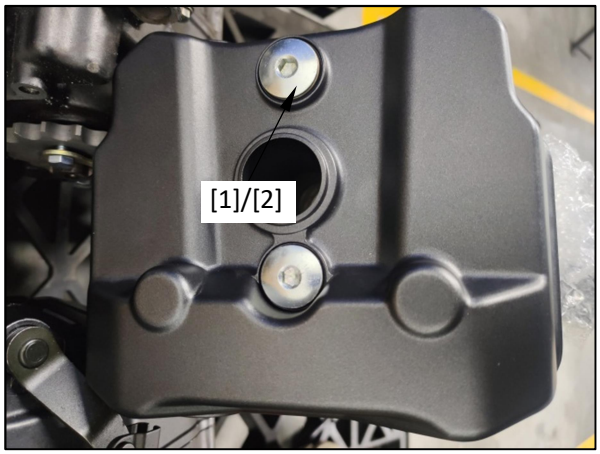


Draw off the special on the tail of tensioner. Turn the crankshaft for several rounds, then adjust to the status when it just re-assembled and check the timing of valve.

Check and adjust the valve clearance （Refer to page 2-5）.

Re-assemble the bolt [1] on cylinder head cover, please also replace the gasket [2] for a new one.

Re-assemble the cylinder head cover.



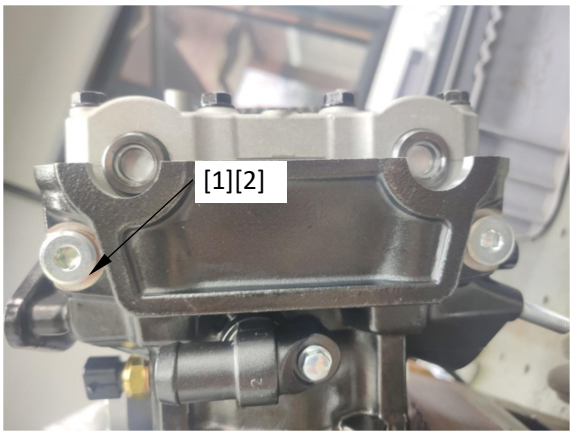
Swinging arm

Disassembly/Re-assembly

Caution:

- When repairing the swinging arm’s shaft, we needn’t remove the engine from frame.
- The steps for repairing swinging arm’s shaft on air inlet valve and exhaust valve are the same.
- Remove the camshaft.

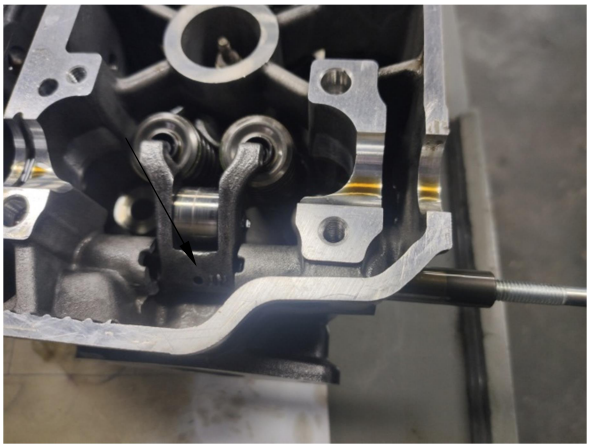
Remove the socket screw [1] and copper washer [2].



Fix the swinging arm [1], and remove its shaft [3] by the bolt [2] in size of 6mm.
Remove the swinging arm.
Coat the sliding area, force bearing surface, external surface of swinging arm’s shaft with lubricant.
Caution:

- The swinging arm could be identified by its mark:

— “IN” mark [4]: Swinging arm at air inlet side
— “EX” mark [5]: Swinging arm at air exhaust side

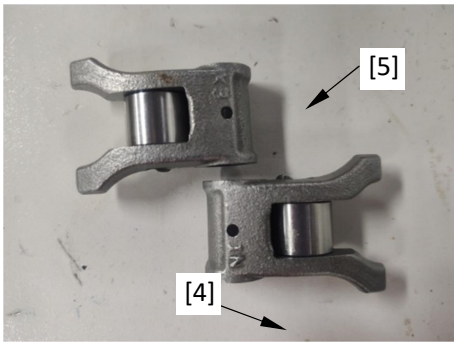


The re-assembly is precisely opposite to disassembly.
Caution:

- Coat with oil and replace the copper washer for a new one.
- Fastening torque for socket hex screw of swinging arm:
  Fastening torque: 13N·m

Check

Check the damage, wear-out, distortion, burn-out and blocking-up in oil passage on parts below.
— Swinging arm
— Shaft for swinging arm
Measure each part and their clearance according to specification for cylinder head/valve.
Any parts passed the limit for maintenance, please replace.



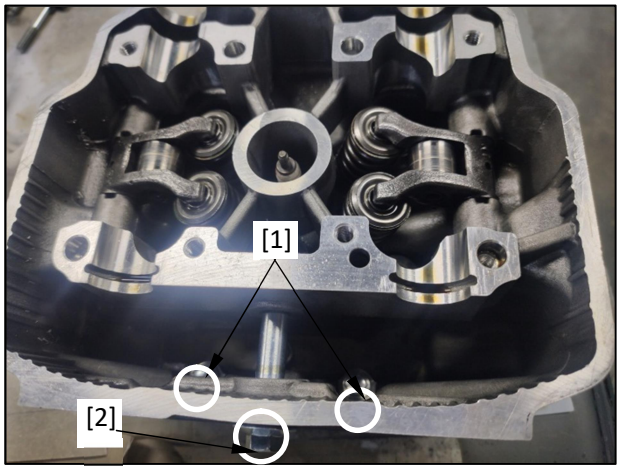
Cylinder head

Disassembly:

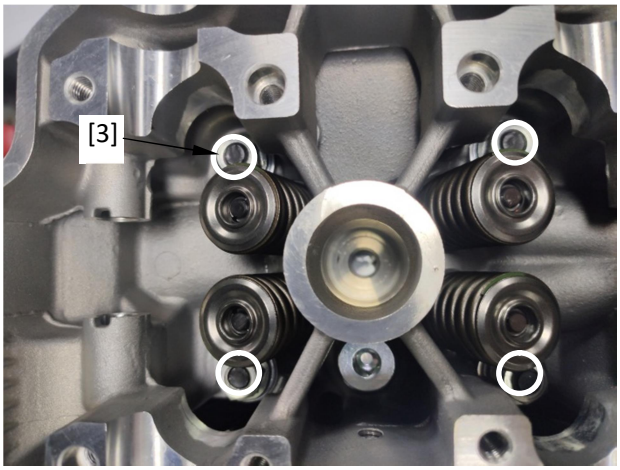
- Disassemble the parts below in turn:
- Muffler
- Air filter and air inlet tube
- Water tube joint of engine
- Electrical connectors
- Other covering parts

Remove the engine from motorcycle and put it on the bench

Remove cylinder head cover, limit plate of chain, cam's bracket, camshaft, swinging arm, swinging arm shaft and adjusting shim for valve in turn by referring previous chapter.



Remove side bolt [1] of cylinder head.
Remove the noiseless bolt [2].
Loosen the nut [3] of 8mm alternatively by 2-3 times, then remove the nut and washer.

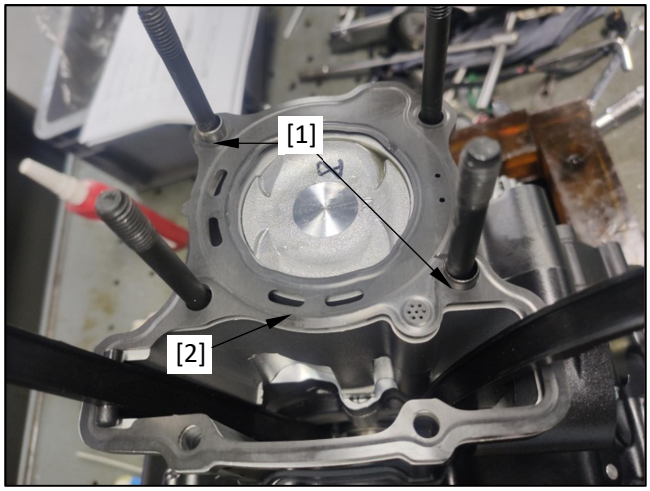


Remove the cylinder head.

Caution:

- Please don't heavily knock the cylinder head, don't damage the contact surface by lever of any tool.

Remove the positioning pin [1] and gasket [2].



Breaking down

Remove the parts below:

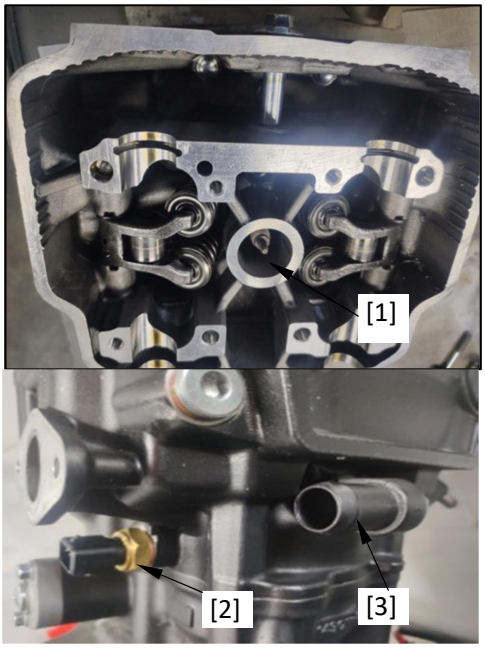
- Spark plug [1]
- Water temperature sensor [2]
- Seal ring [3] of cooling joint

Remove the valve locking clip by special tools.

Tool:

Compressing tool for valve spring

Pressing accessories for valve spring



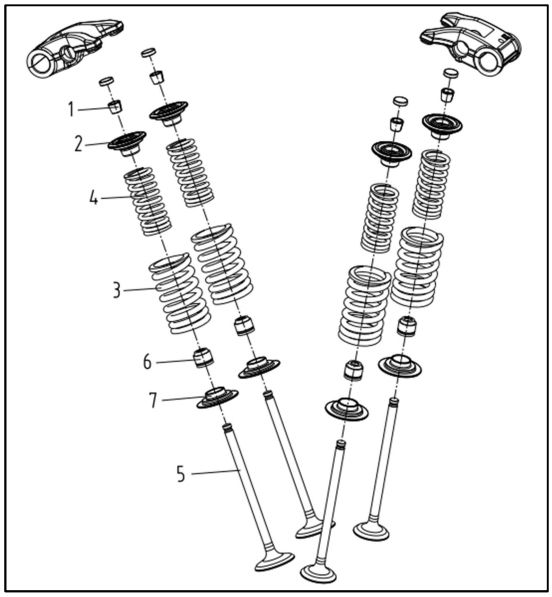
Remove the compressing tools of valve spring and parts below:

- Locking clip [1]
- Upper valve spring base [2]
- External spring [3] of valve
- Internal spring [4] of valve
- Valve [5]
- Oil shield cover [6]
- Lower valve spring base ring [7]

Caution:

- Please don't damage the contact surface of cylinder and surface of valve base.
- In order to prevent the permanent distortion of valve spring, heavy compression is not allowed.
- Mark up each part when disassembling for an easy re-assembly.

Clean up the carbon buildup in combustion chamber and surface of gasket.

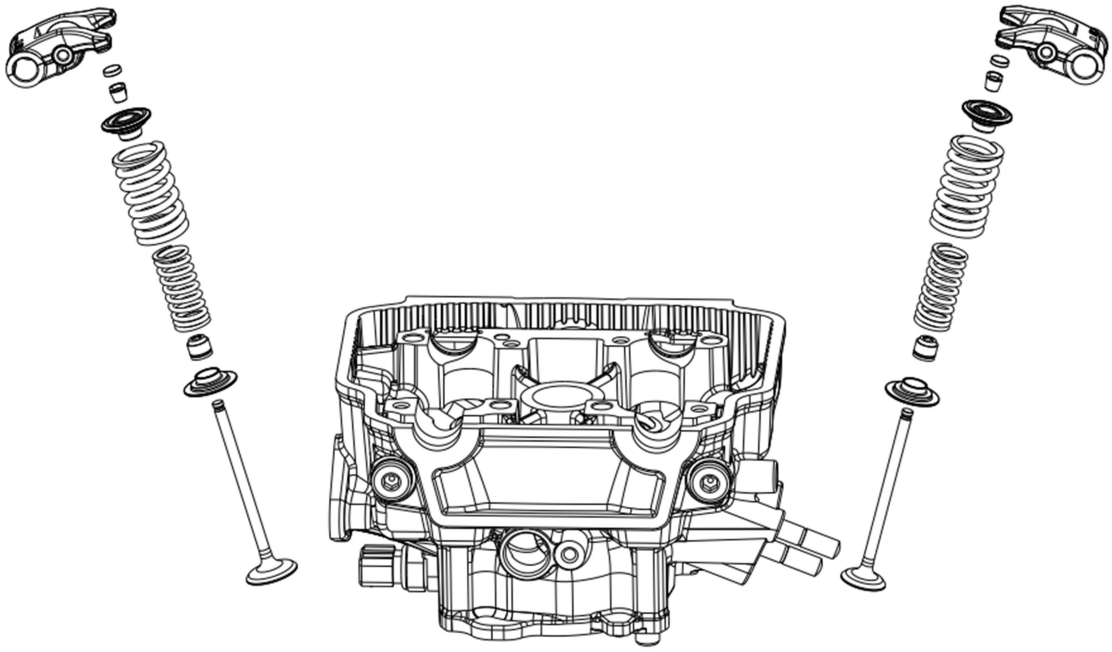


Check

Check the damage, wear-out, distortion, burn-out of blocking up of oil passage on parts below.

- Cylinder head
- External spring
- Valve
- Guiding tube of valve

Re-assembly



Wash up the cylinder head set by solvent, then dry all the oil passage up by blowing by compressed air

Lubricate the new oil shield cover [1] by oil.

Re-assemble the spring base [2] of lower valve and oil shield cover.

Lubricate the sliding surface and rod end of each valve rod by oil.

Insert the valve [3] into its guiding rod, slowly turn the valve when inserting.

Re-assemble the internal and external valve spring [4] [5], the side with denser coil face to combustion chamber.

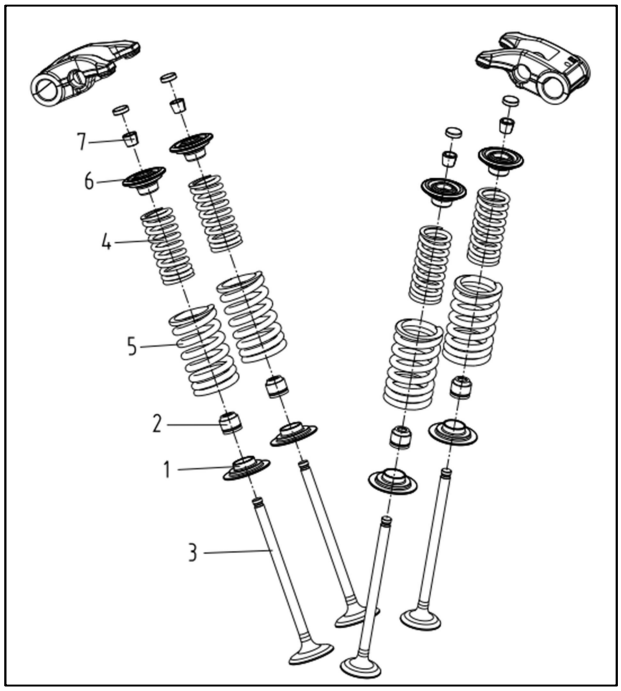
Re-assemble spring base ring [6] of upper valve.

Re-assemble the valve locking clip [7] by special tools.

Tool:

Compressing tool for valve spring

Compressing accessory for valve spring.



Re-assemble the parts below:

- Spark plug [1]
- Water temperature sensor [2]
- Cooling joint and seal ring [3]

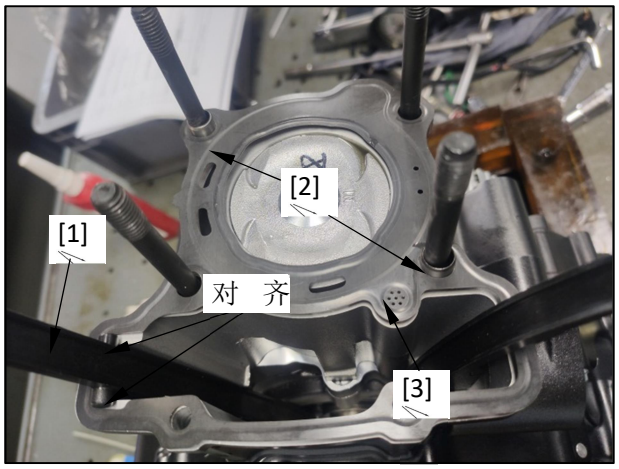
new gasket [3].

Re-assembly

Clean up the residual gasket of contact surface of cylinder.

Caution:

- Don’t let the dust and dirt into cylinder.



Make the chain tense, re-assemble the guiding plate [1], then get its protrusion aligned with groove on cylinder head.

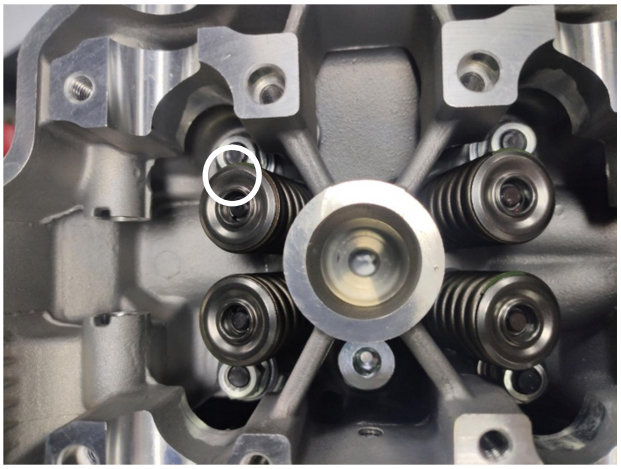
Re-assemble the positioning pin [2] and

Get the timing chain through cylinder head, then re-assemble the cylinder head onto cylinder body.

Coat the threaded part and base surface of fastening nut (8mm) on cylinder head with engine oil

Re-assemble the fastening nut and washer of cylinder head alternatively by 2-3 times to given torque.

Torque: Wet torque 30N.m



Timing chain/Sprocket wheel

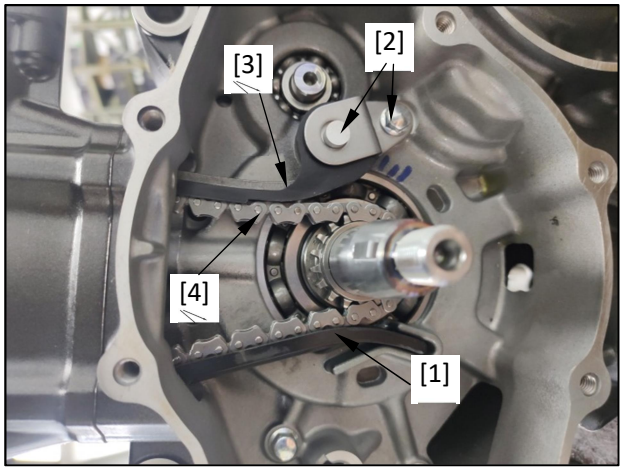
Removal

Remove the parts below:

- Cylinder head cover
- Camshaft
- Noiseless bolt of cylinder head
- Left crankcase cover set
- Rotor of magneto
- Plate shaped gear

Remove the guiding plate [1] for chain, then remove the pressing plate of adjusting plate, bolt [2] and tensioning plate [3] of chain.

Remove the timing chain [4] from crankshaft.



Check

Check scratch, damage, wear-out and distortion on parts below, please replace the parts below if it is necessary:

- Timing chain
- Tensioning plate of chain
- Guiding plate of chain

Re-assembly

Coat the all surface of timing chain [1] with oil, then match and re-assemble with timing driving sprocket wheel.

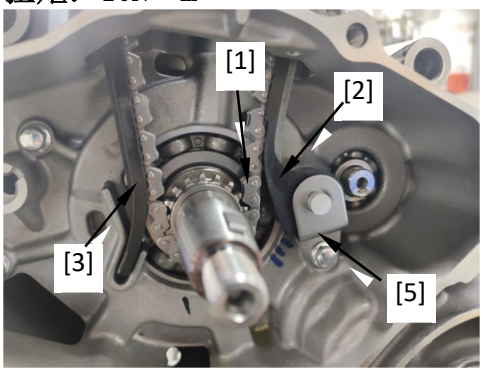
Re-assemble the tensioning plate [2]of chain.

Re-assemble guiding plate [3] of chain.

Re-assemble pressing plate of adjusting plate and bolt[4].

Turn the bolt on pressing plate of adjusting plate to given torque.

扭矩：10N·m



Re-assemble the parts below:

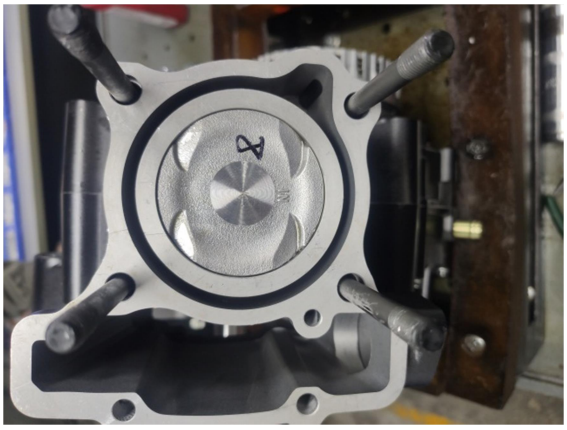
- Plate shaped gear
- Rotor of magneto
- Left crankcase cover set
- Noiseless bolt
- Camshaft
- Cylinder head cover

Cylinder head/Piston

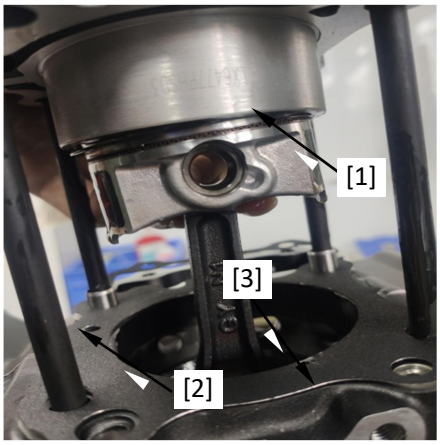
Removal

Remove the parts below:

- Cylinder head cover
- Camshaft
- Noiseless bolt of cylinder head
- Left crankcase cover set
- Rotor of magneto
- Plate shaped gear
- Timing chain and tensioning plate

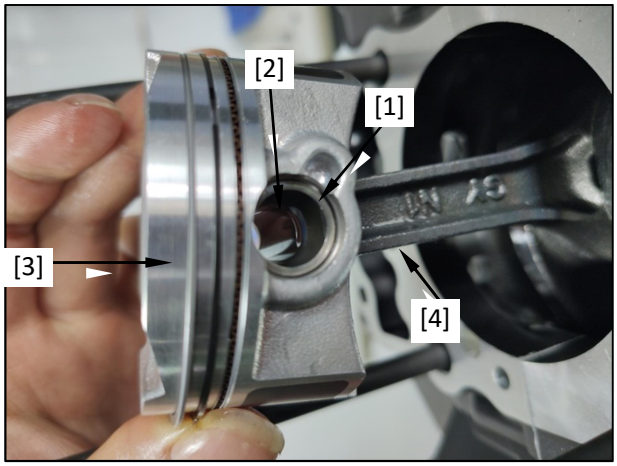


Remove cylinder body [1], Remove the gasket[2] and positioning pin [3] of cylinder head.



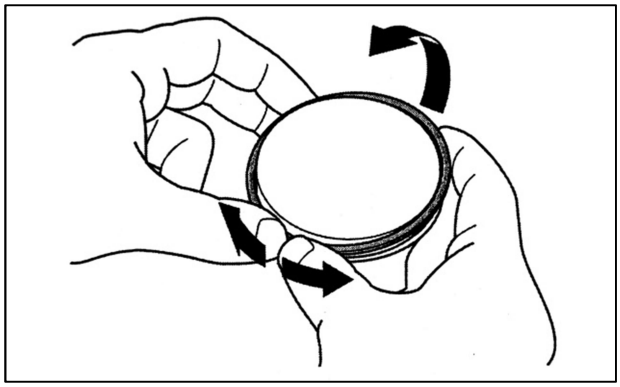
Remove the piston

Remove the circlip [1] of steel wire by tweezers
Push the piston pin [2] out from piston [3] and smaller end [4] of connecting rod, then remove the piston.



Removal for piston ring

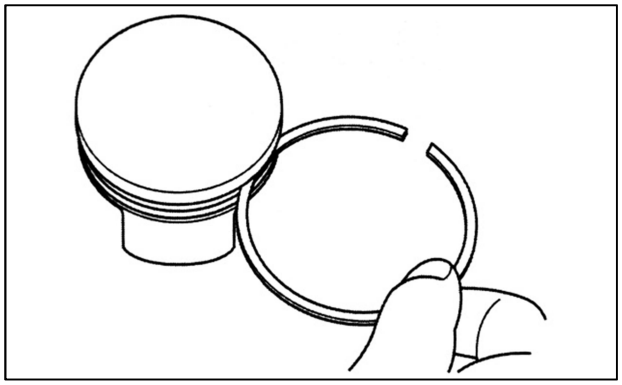
Get every opening of piston ring breaking apart, then remove the ring upwards along the opposite position of its opening.



Caution：

- Don’t break apart the two ends of opening too far to avoid damage on piston ring.
- Please don’t leave scratch on piston when removing its rings.

Clean up the carbon buildup in groove of piston ring by replaced ring who is about to throw away.



Caution:

- Don’t use the steel brush to avoid leaving scratch on piston ring.

Check

Check the scratch, damage, wear-out, distortion, burn-out or block in oil passage for parts below.

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

Measure every part according to specification for crankshaft/piston/cylinder/balancing shaft, then calculate their clearance.

Any part got passed the limit for maintenance needs be replaced.

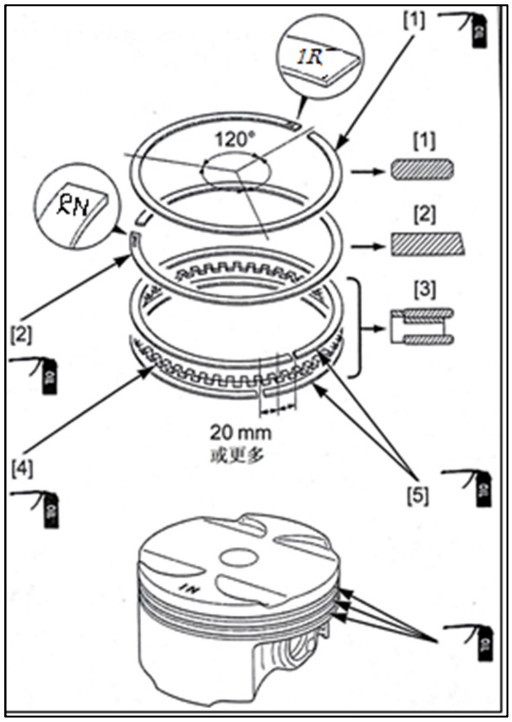
Re-assembly

Totally clean up the groove of piston ring and install the rings.

- Coat the surface of piston rings and their grooves with oil.
- Don’t damage the piston and its rings when re-assembling.
- 安 The side of piston ring with mark face upwards when re-assembling.
  - Mark “1R”：1st ring [1]。
  - Mark “RN”：2nd ring[2]。
- When re-assembling the oil ring set [3], install the liner ring [4] first, then the scratching ring [5].
- Get the opening on piston rings mutually cross by 120° .

The staggering position for openings on

scratching ring is shown as picture.



Coat the internal surface of piston pin's hole with oil.

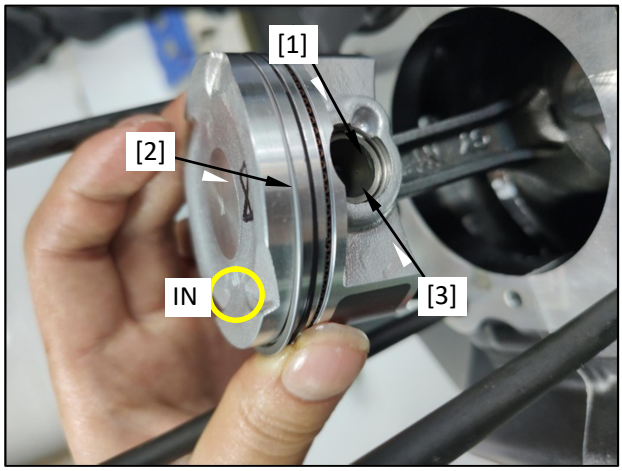
Coat the internal surface of smaller end of connecting rod with oil.

Re-assemble steel wire circlip [1] onto one end of piston pin's hole.

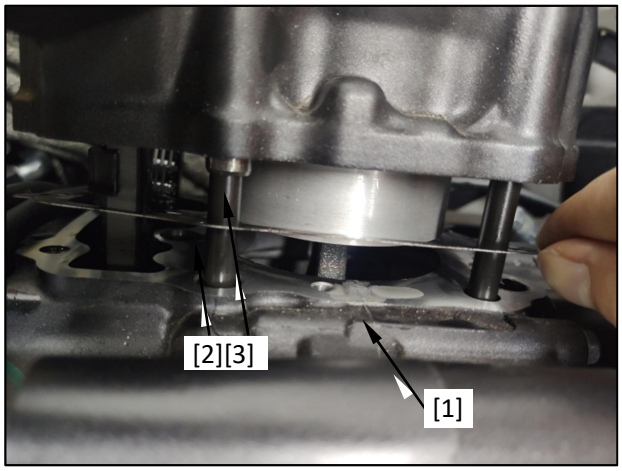
There is mark IN at piston [2] as picture shows, it faces to air inlet side, coat the external surface of piston pin with oil, get piston pin [3] through piston and connecting rod, then assemble steel wire circlip on the other side.

Caution:

- Make sure the steel wire circlip was assembled in place.
- Don't align the opening of steel wire circlip with the gap on piston.

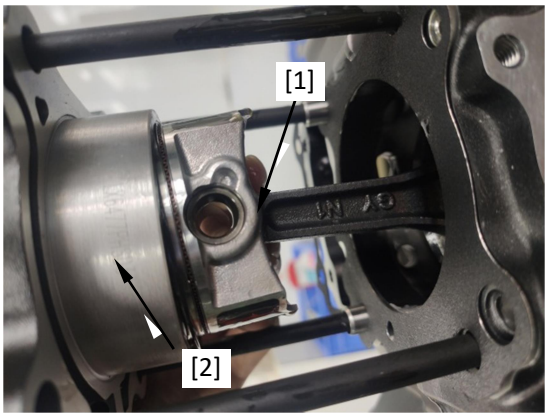


Coat the case combination plate with sealing glue [1], then re-assemble the gasket [2] and positioning pin [3] of cylinder body.



Coat the cylinder wall and thrusting surface with oil.

Re-assemble the piston/connecting rod set [1] into cylinder body [2] (The side on piston with mark IN face to air inlet direction) by compressing tools for piston ring which could be found from market.



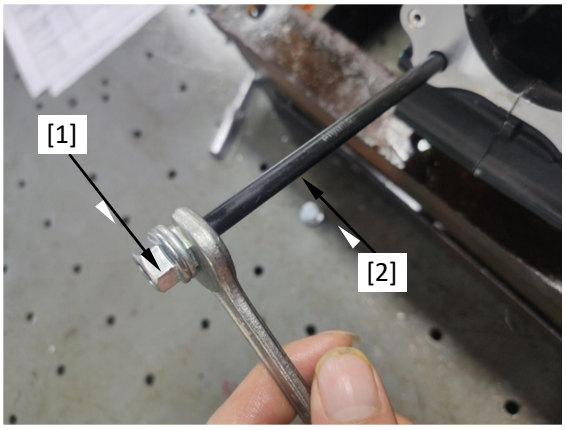
Caution:

- When re-assembling the piston, please don't damage the upper surface of piston, especially the matching part with cylinder hole.
- Please don't damage the cylinder liner by crankshaft pin and connecting rod.
- Make sure the piston repeatedly move up and down in cylinder body freely without noise and jamming.

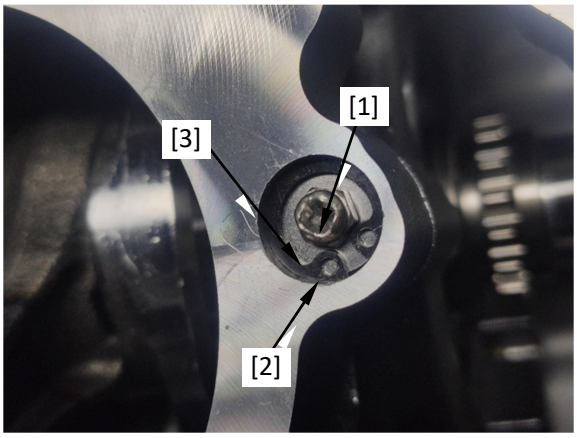
Stud/Pressing pin piece

Disassembly

Fasten the stud by its tool [1], then remove the stud [2].



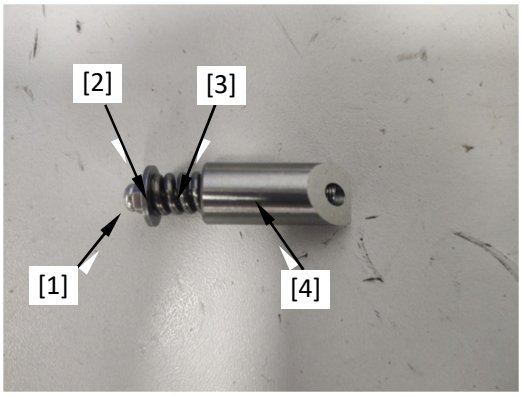
Fasten the pressing pin piece by the bolt [3] of M3 for it only, then remove the elastic circlip [2] and pressing pin piece set [3].



Remove the bolt [1] of M3 from pressing pin piece set, then remove flat washer [2], pressing spring and pressing pin piece [4].

Caution:

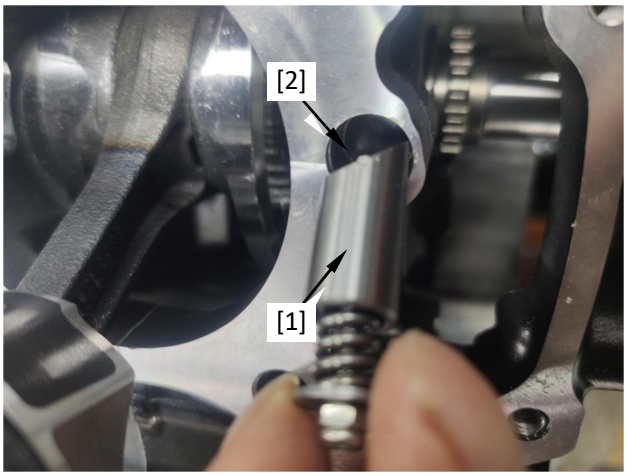
- Check the damage, wear-out, or distortion on pressing pin piece, in case it is, please replace the corresponding parts.



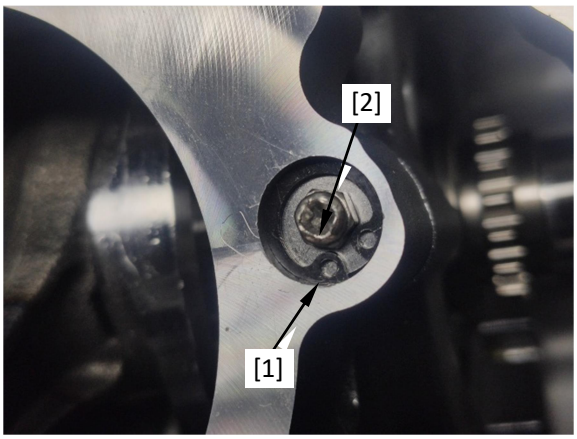
Re-assembly

Re-assembly is opposite step for disassembly, put the pressing spring and flat washer into pressing pin piece in turn, then fasten them by bolt M3 for them only, then let the upper end of flat washer is lower than the lower rim of circlip’s groove.

Put the well assembled pressing pin piece set [1] into the hole [2] on crankcase, the inclined surface of pressing pin piece face to the angle R of external ring of crankshaft’s bearing.



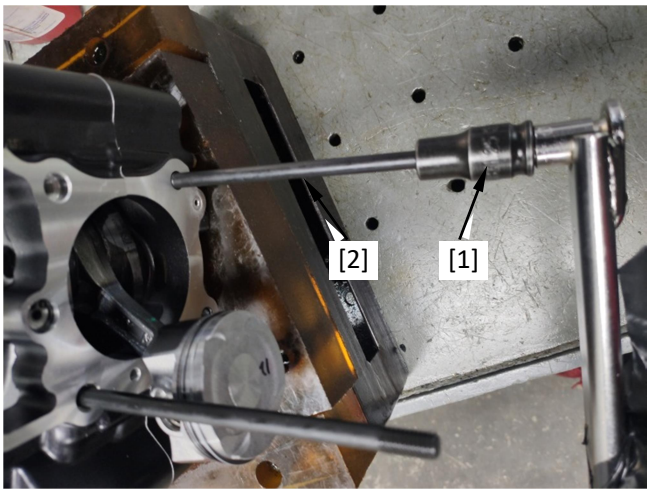
Assemble the elastic circlip [1] to its groove by caliper, then turn the circlip and confirm it is in place, then remove the bolt M3 [2], finally confirm the pressing pin piece is normal.



Turn the longer threaded part of stud [2] into left crankcase body by tool [1] and fasten.

Fastening torque: (3～5)N.m

Exposing length after fastened (127～129.5)mm。



6

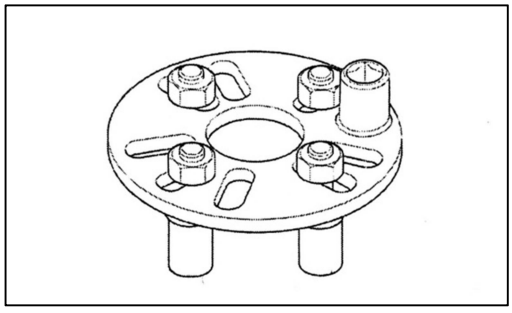
Clutch and gearshift system

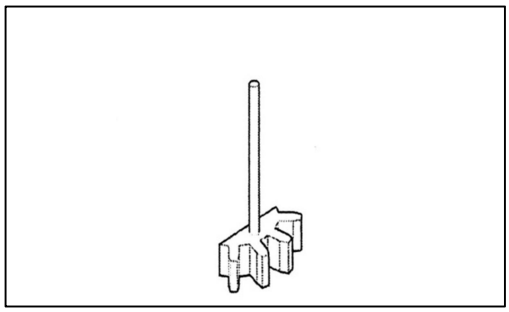
Information for maintenance

Summary

- The maintenance for clutch and gearshift device in this chapter needn’t remove the engine from frame.
- The oil level and viscosity has influence on separation of clutch. When the clutch failed to separate or the motorcycle is still in low speed when clutch separated, please check the oil level before clutch maintenance.

Tool





Specification for clutch and gearshift device

Unit: mm

Items		Standard	Limit
Free travel for clutch lever		10. 0-20.0	—
Clutch	Free length for spring	28.2-28.8	27.10
	Thickness of friction plate	2.35-3.45	2.20
	Flatness for driven plate	—	0.10
Collar of clutch	Internal diameter	17.000-17.018	17.031
	External diameter	23.972-23.93	23.96
External diameter for main shaft at clutch' s collar		16.966-16.984	16.95

Troubleshooting

Difficult to hold clutch lever tightly

- The clutch cable damaged, twisted or too dirty
- Wrong wiring for clutch cable
- The thrust mechanism of clutch got damaged
- Malfunction in bearing of clutch' s pushing rod
- Incorrect installation for operational rod of clutch

Clutch skidding in acceleration

- Jamming on clutch' s pushing rod
- Driving friction plate worn out
- Poor performance for clutch spring
- Not any free travel on clutch lever
- Molybdenum disulfide or graphite additive gets into oil

When clutch separated or failed to separate, the motorcycle is still under low speed

- Too wide the free travel of clutch lever
- The friction plate of clutch gets warped
- Too high the oil level, wrong viscosity or incorrect additive
- The locking nut on clutch center case gets loosened
- Thrust mechanism of clutch gets damaged
- Incorrect installation for clutch' s operational rod
- The inserting groove on clutch outer case and clutch gear worn out
- Wrong operation for clutch

Difficult gearshift

- Incorrect adjustment for clutch cable
- Wrong operation on clutch
- Wrong viscosity of oil
- The gearshift fork gets damaged or bent
- The shaft of gearshift fork gets bent
- The claw of gearshift fork gets bent
- The bolt on five-star shaped plate gets loosened
- The five-star shaped turning plate gets damaged
- The guiding groove on gearshift drum gets damaged
- Five-star shaped turning plate gets worn out or damaged

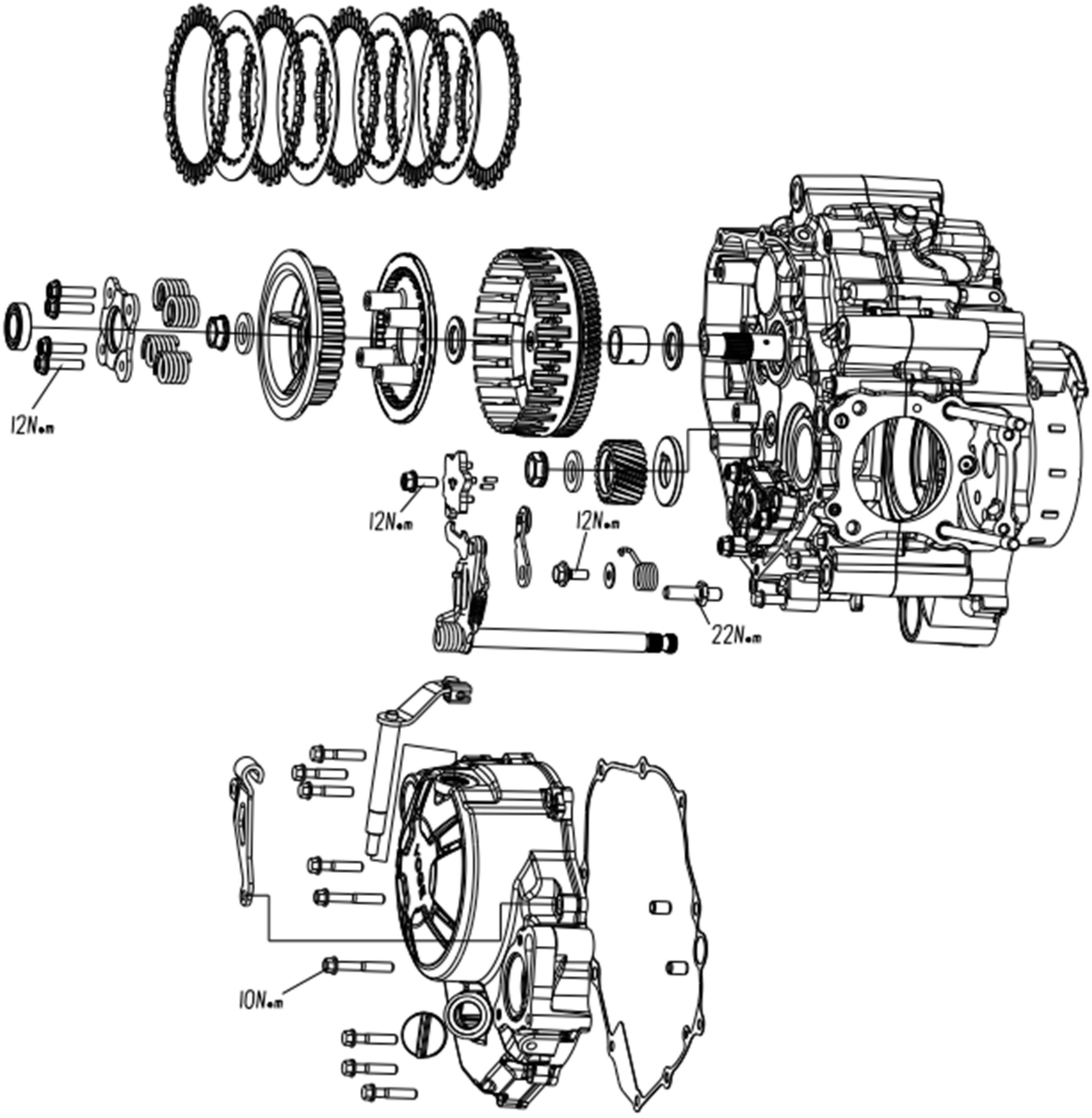
Gear jump in transmission system

- Check plate gets worn out
- Poor performance even damage on returning spring of check plate
- The bolt on five-star shaped turning plate gets loosened
- Five-star shaped turning plate gets damaged
- Shaft of gearshift fork gets bent, gearshift fork gets bent or damaged
- The meshing surface or teeth groove gets damaged

Gearshift plate fail to return

- The poor elasticity of returning spring of gearshift spindle or gets cracked
- Gearshift spindle gets bent or damaged

Layout for components



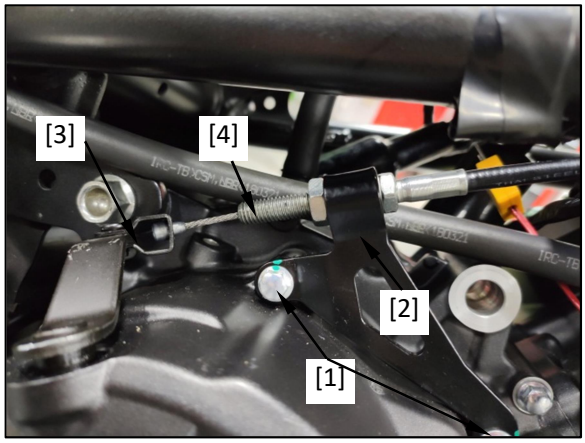
Right crankcase cover

Disassembly

Remove the shielding parts of motorcycle.

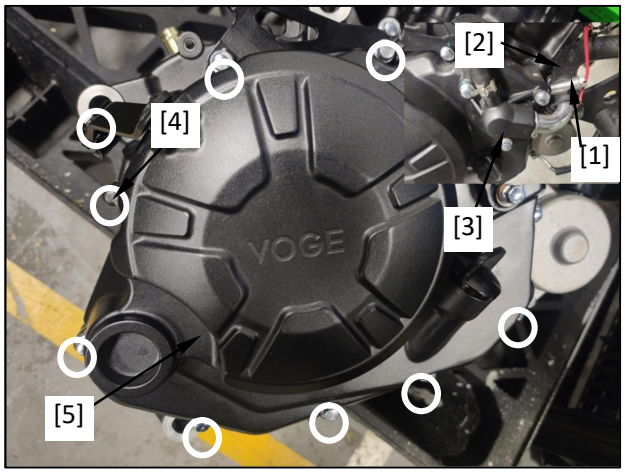
Drain off the oil in engine and the coolant.

Remove the bolt [1] and locating plate [2] for clutch drawing cable, then remove the clutch cable [4] from clutch operational arm [3].

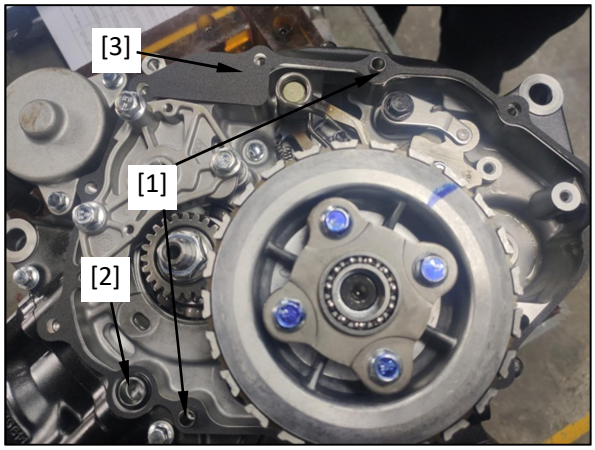


Loosen the tube clip [1] of water inlet tube, then remove the water inlet tube [2] from cooling pump cover [3].
Loosen the bolt [4] of right crankcase cover in alternative sequence by 2-3 times.
Remove the parts below:

- Bolt [4]
- Right crankcase cover [5]



Remove positioning pin [1], collar's seal ring set [2] and gasket [3].

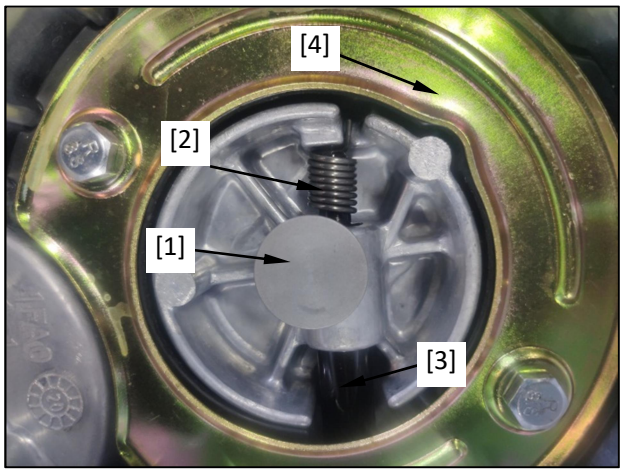


Disassembly/Re-assembly

Remove the ejector rod [1], remove the turning spring [2].

Caution:

- Insert the inclined end of turning spring for installation into operational rod, another end put into clipping groove on right side cover.



Remove the operational rod [3] of clutch.
Remove the damping sheet and its cover [4].
Remove the oil seal from right crankcase cover.

Re-assembly is precisely opposite to disassembly.

Disassembly and re-assembly for cooling pump set please refer to the page 3-9.

Torque:

Bolt on right crankcase cover: 10N·m

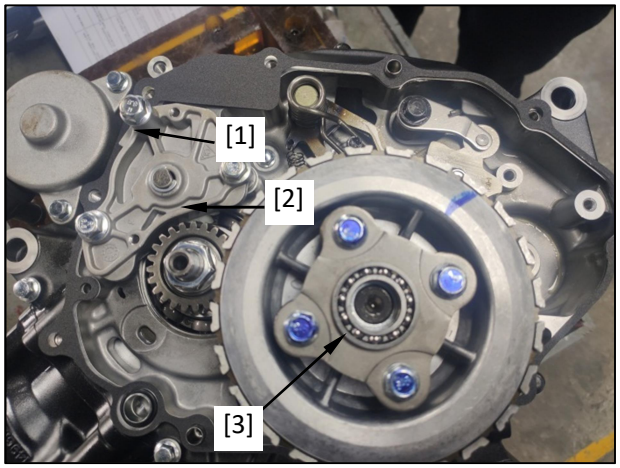
Caution:

- Replace the gasket for right crankcase cover for a new one.
- The 2 bolts for positioning pin on right crankcase cover are longer than others, please pay attention to their assembling position.
- Adjust the free travel of clutch lever.
- Fill up the crankcase with oil of our suggested, then check the oil leakage.

Clutch

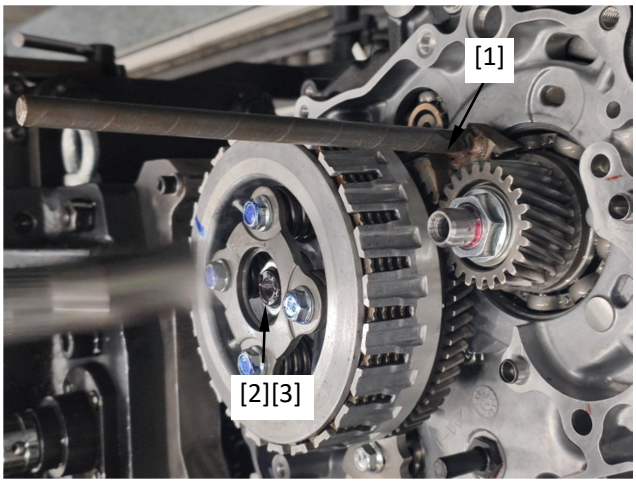
Disassembly

Remove the right crankcase cover.
Remove the bolt [1] for oil pump and the pump [2] itself.
Remove the bearing [3] for pressing plate of clutch.

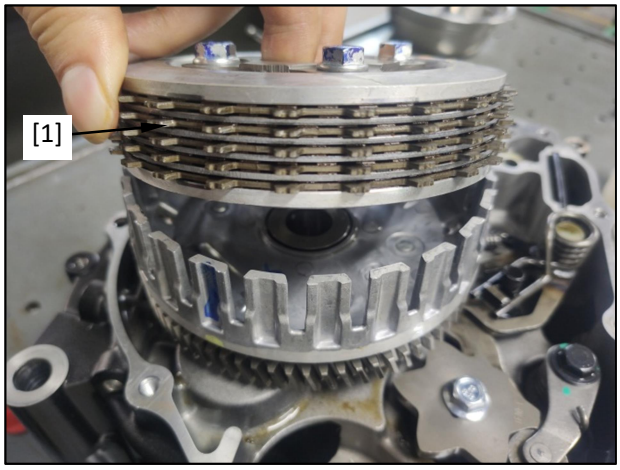


Stop the joint of clutch gear and primary driving gear by special tool [1], then remove the locking nut [2] and washer [3] by torque wrench.

Tool:
[1] Gear stopper



Remove the central case set [1] of clutch.



Remove the bolt [1] on lifting plate of clutch alternatively by 2-3 times, then remove the lifting plate [2] and clutch spring [3].

Caution:

- Under this condition, the driving and driven friction plate could be replaced separately.
- Don’t damage the surroundings of clutch and keep it clean.。

Fix the lifting plate of clutch by tools,

Remove the parts below:

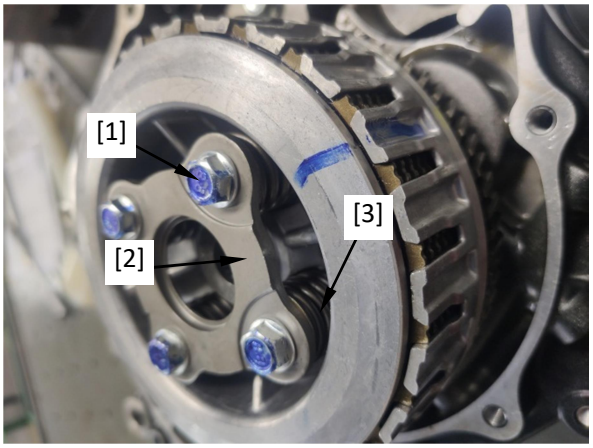
- Pressing plate [1]
- Driving friction plate [2] of clutch
- Driven friction plate [3] of clutch
- Central case [4]

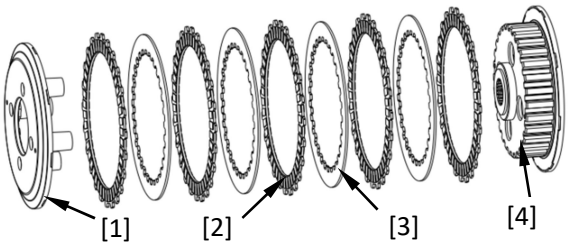
Remove thrust washer [1].

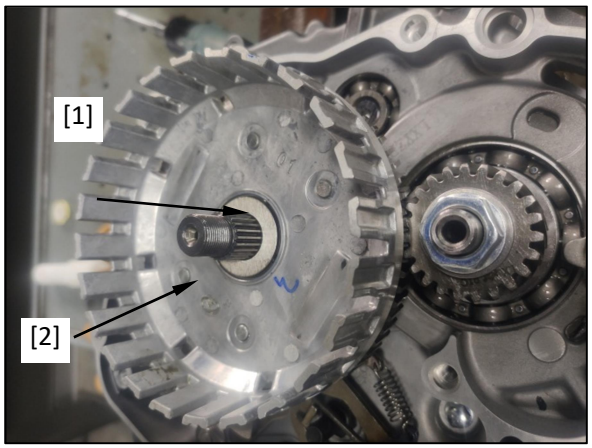
Remove outer case [2] of clutch.

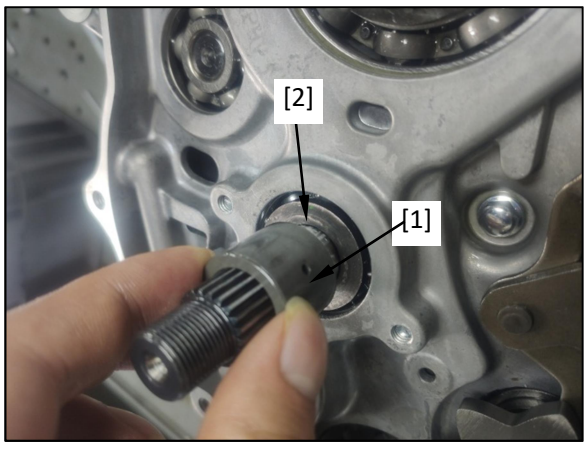
Remove collar [1] of clutch and its washer [2].

meanwhile fastening the locking nut.









Check

Check the scratch, damage, wear-out or distortion on parts below, in case it is, please replace.

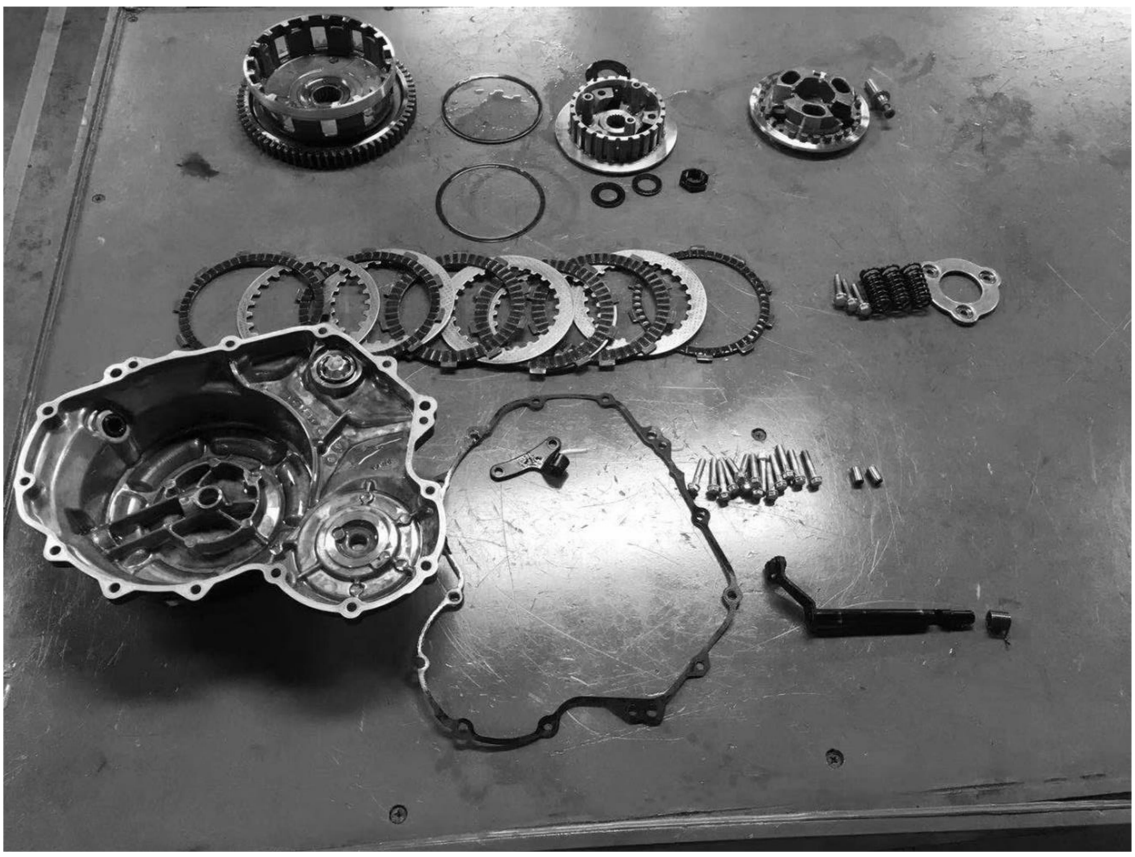
- Pressing plate of clutch
- Bearing for clutch pressing plate
- Spring
- Central case
- Flat washer
- Disc spring
- Driving and driven friction plate
- Outer case of clutch/Primary driven gear
- Collar of clutch

Measure each part according to specification for clutch and gearshift device. In case any part passed the limit, please replace.

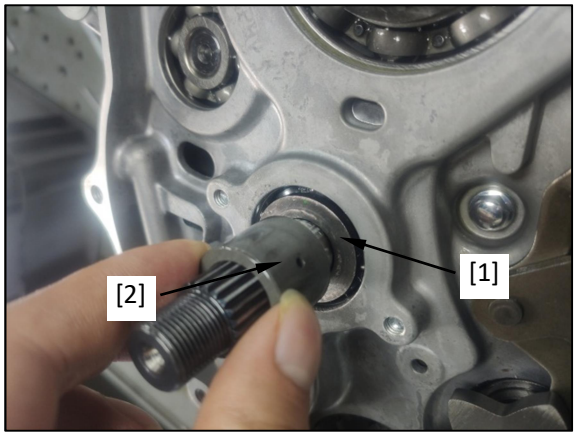
Caution:

- Replace the springs on clutch as a complete set.
- Replace the driving and driven plate of clutch as a pair or complete set.

Re-assembly



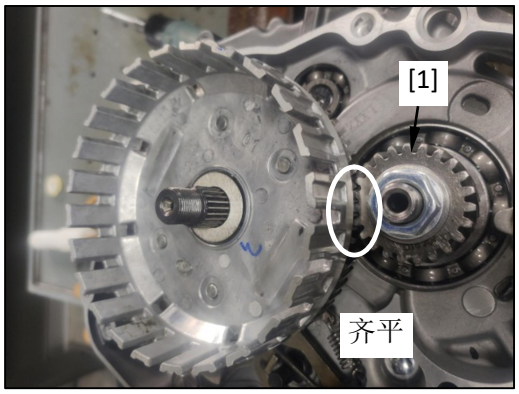
Coat the external surface of clutch collar with oil, then re-assemble the flat washer [1] and clutch collar [2] onto main shaft.



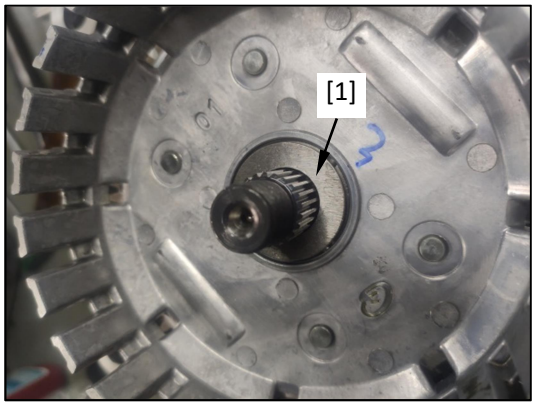
When re-assembling the outer case, turn the primary driving gear [1] and make sure its correct meshing.

Caution:

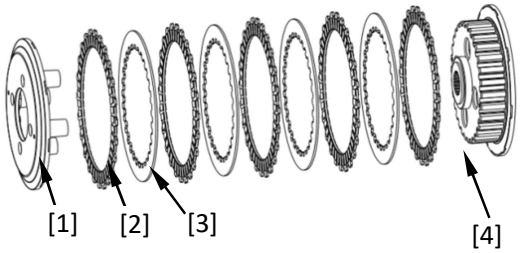
- Confirm the outer case was re-assembled in place, make sure the correct meshing between plate shaped gear on clutch outer case and primary driving gear.



Re-assemble the thrust washer [1].



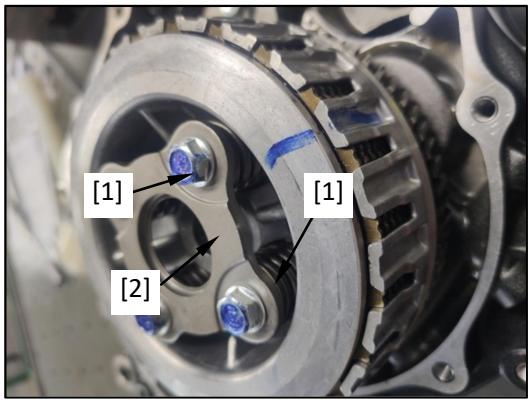
Fix the central case [1], from the driving friction plate [2], re-assemble the driving and driven friction plate [3] to the central case alternatively, finally well cover the pressing plate [4].



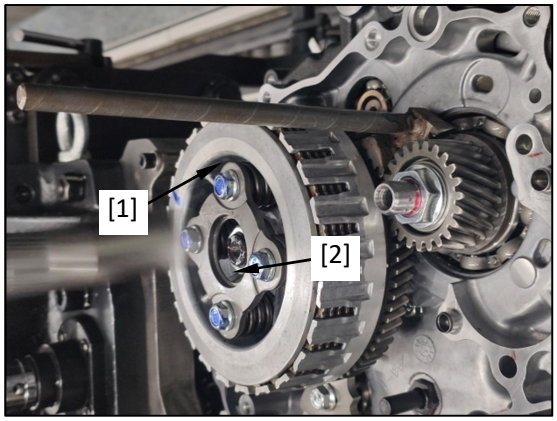
Caution:

- Get the teeth on driving friction plate align with that on outer case one by one.

Re-assemble clutch spring [1], pressing plate [2] and fasten bolt [3].
Slowly and alternatively fasten the bolt on lifting plate by several times and fasten to given torque.
Torque: 12N • m



Re-assemble the central case set [1] of clutch, then assemble the locking nut and washer [2] onto main shaft, then stop the joint between clutch gear and primary driving gear by tool, finally fasten the locking nut of clutch to given torque by torque wrench.
Tool:
Gear stopper
Torque: 74N • m



Re-assemble oil pump and right crankcase cover.

Primary driving gear

Disassembly

Remove right crankcase cover and oil pump.

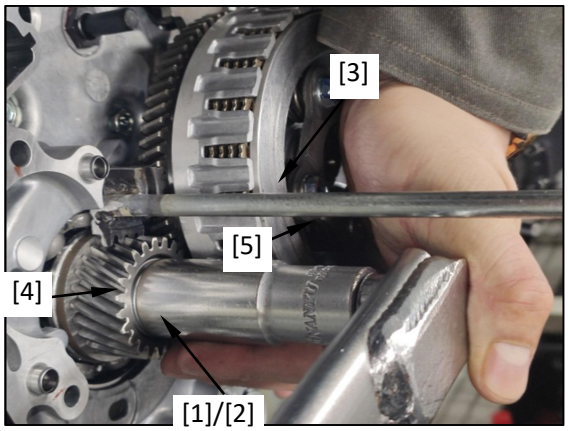
Fix the primary driving gear and outer case of clutch by special tool [5], then remove bolt [1] on primary driving gear and washer [2].

Remove clutch set [3].

Remove primary driving gear and flat washer [4].

Special tool:

[5] Gear stopper



Check

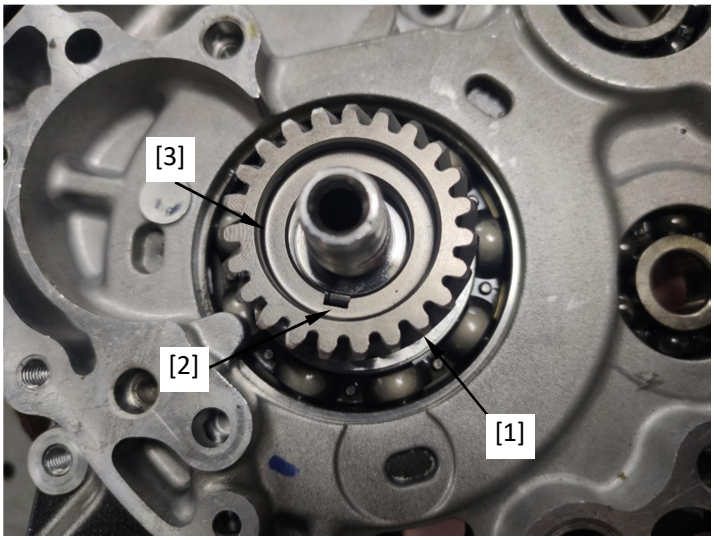
Check the scratch, damage, wear-out and distortion on parts below, replace if it is necessary.

- Primary driving gear
- Bolt
- Washer

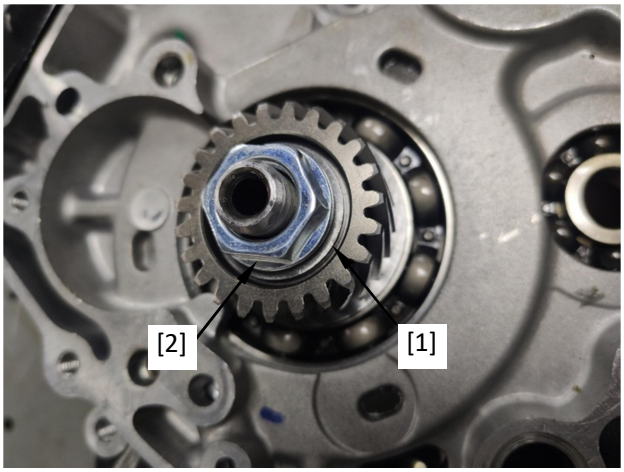
Re-assembly

Align the flat washer [1] with the semi-round key [2] on right crankshaft, then assemble into right crankshaft.

Align the key groove on primary driving gear [3] with the semi-round key on right crankshaft, then assemble into right crankshaft.



Then assemble the flat washer [1] and hex. Flange nut [2] in turn and turn in by 2-3 thread by hand.

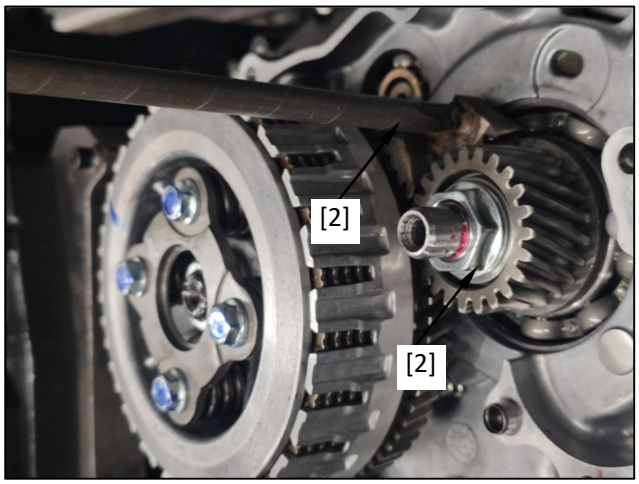


Re-assemble the outer case of clutch, fix the primary driving gear and outer case of clutch by special tool [1], then fasten the bolt [2] of the gear.

Caution:

- Re-assemble the primary driving gear first, then the outer case of clutch.
- The outer case of clutch as clearance for axial runout.

Tool [1]:
Gear stopper
Torque: 74N•m



Re-assemble clutch, oil pump and right crankcase cover.

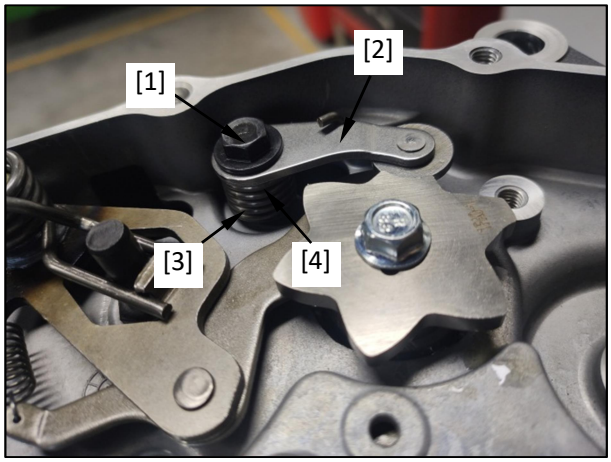
Gearshift system

Disassembly

Drain off oil and remove the parts below:

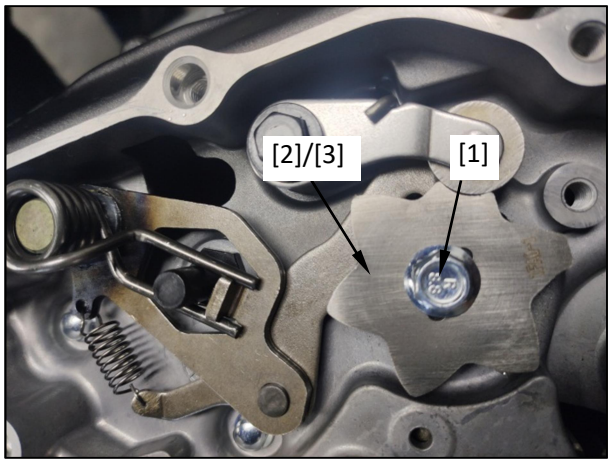
- Remove the gearshift pedal and clean up the dirt on spline
- Right crankcase cover set
- Clutch set

Remove the bolt [1] of check plate first, then the check plate [2], returning spring [3] and washer [4].

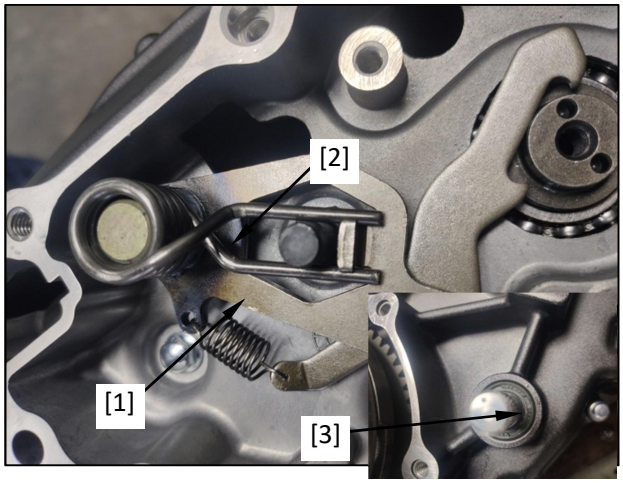


Remove the parts below

- Bolt [1] of five star shaped plate
- Five-star shaped plate [2]
- Positioning pin [3]



Draw the gearshift spindle set [1] and thrust washer [2] out of crankcase.
Remove oil seal [3] from left crankcase body.



Check

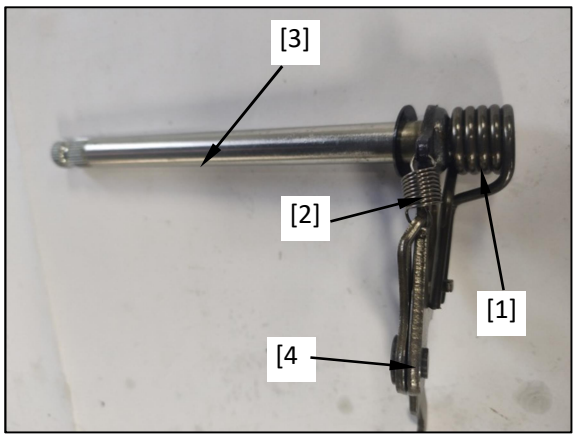
Check damage, wear-out or distortion on parts below, in case it is, please replace.

- Five-star plate
- Check plate
- Return spring for check plate

Gearshift arm

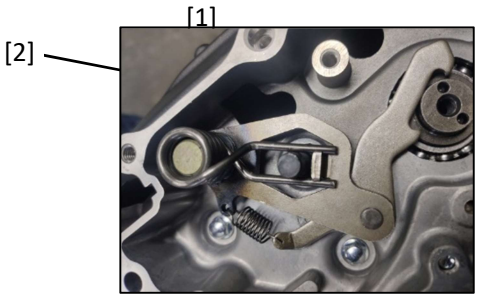
Check the wear-out or fatigue on twist spring [1] on gearshift arm and drawing spring [2] on gearshift plate; Check the wear-out or bending on gearshift spindle; Check wear-out, damage or distortion on gearshift plate [4].

In case it is necessary to replace, please replace the gearshift arm set completely.



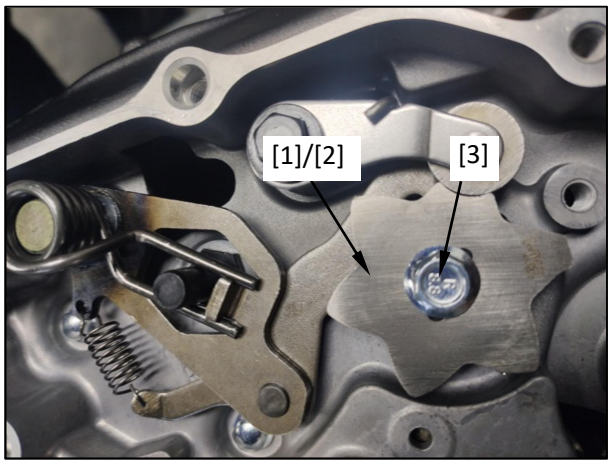
Re-assembly

Re-assemble the thrust washer [1] and gearshift arm [2] into crankcase, then clip the gearshift turning spring into locating bolt of gearshift arm.



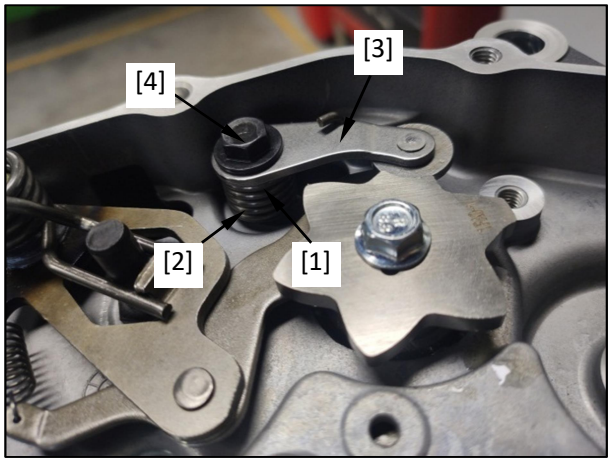
Re-assemble the positioning pin [1] into its hole on gearshift drum. Re-assemble five star shaped plate [2], then get its pin’s nail align with positioning pin downwards, then assemble into gearshift drum. Re-assemble the locating bolt [3] of five star shaped plate, coat the head of bolt with Loctite and fasten to given torque.

Torque: 12N•m



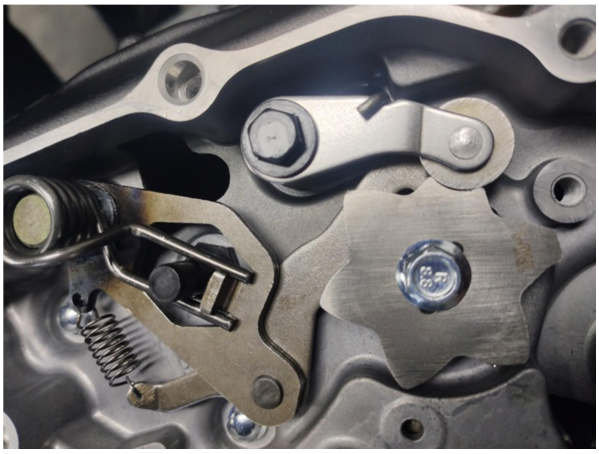
Re-assemble the thrust washer [1], returning spring [2] and check plate [3] onto its bolt [4], coat the threaded part of bolt with Loctite, assemble to crankcase body and fasten to given torque.

Torque: 12N • m



Caution:

- When re-assembling, the protrusion on five-star plate face to crankcase, the roller of check plate face to crankcase
- The U shaped hook of returning spring face upwards and stick to semi-round key's groove of check plate.
- Turn the bolt of turning plate on gearshift drum by T-shaped plate, then check the gearshift of each gear position in turn of clockwise and anti-clockwise.

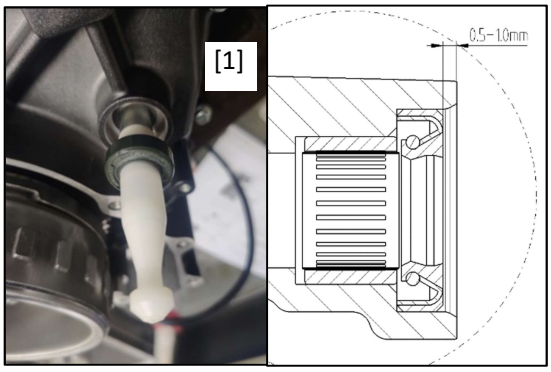


Coat the external surface of gearshift spindle with clean engine oil.

Re-assemble the oil seal [1] of gearshift spindle to left crankcase body.

Caution:

- Re-assemble the oil seal to given depth as picture shows.



Re-assemble clutch set and right crankcase cover set, then check the oil level.

7
Magneto and starting clutch

Information for maintenance

Summary

- The maintenance for stator and rotor of magneto needn't remove the engine from frame.
- Check about the charging coil of alternative power generator.
- Check about the trigger.
- Maintenance about starting motor.

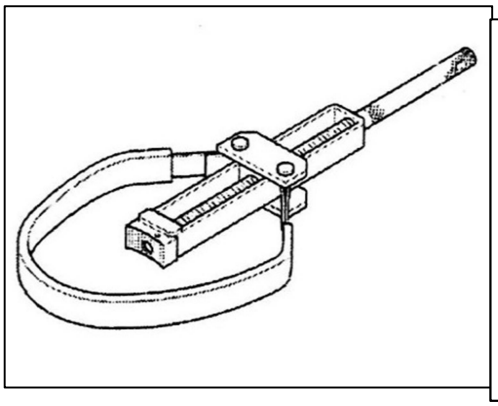
Specification for magneto and starting clutch

- Unit: mm

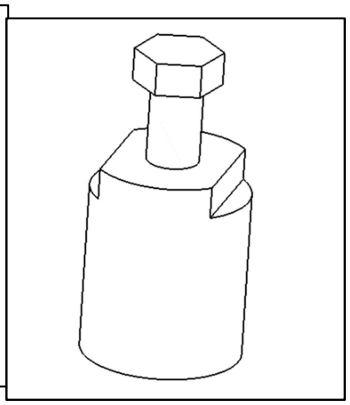
Items	Standard	Limit
External diameter for shaft jacket of starting plate shaped gear	42.195-42.208	42.175
Internal diameter for outer case of starting clutch	28.02-28.041	28.061

Tool(s)

Fixture for rotor



Removal tool for magneto

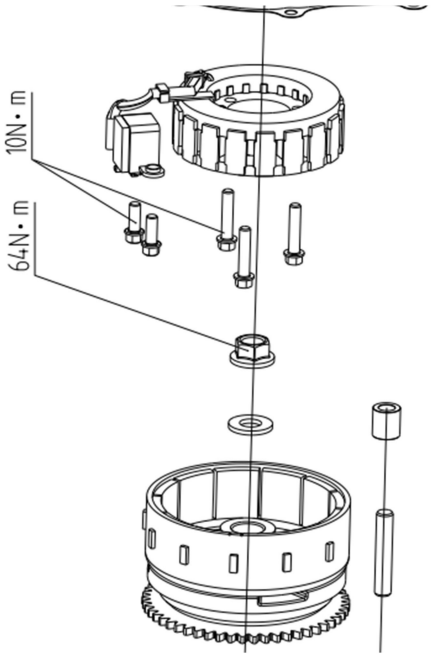


Troubleshooting

Starting motor is run, while engine failed starting

- Malfunction in starting clutch
- Malfunction in double gear or its shaft of starting motor
- Smaller gear of starting motor in malfunction or worn out

Position for components



Left crankcase cover

Disassembly/Re-assembly

Caution:

- When disassembling the left crankcase cover, lay a clean oil tray under it to prevent oil flowing out. When re-assembled, fill up our suggested oil to given volume.

Lay the motorcycle on horizontal ground and make it upright.

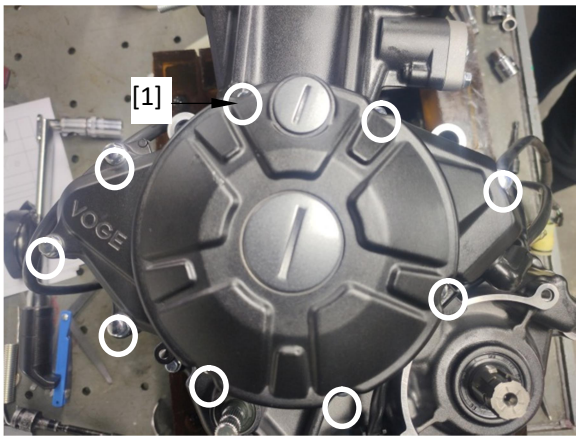
Remove the parts below:

- Shielding parts
- Connector of rectifier regulator
- Connector of trigger

Loosen the bolts [1] on left crankcase cover in alternative way and the wire pressing plate.

Caution:

- The left crankcase cover (Stator) is under the magnetic attraction of rotor, please pay attention to safety when disassembling or re-assembling.

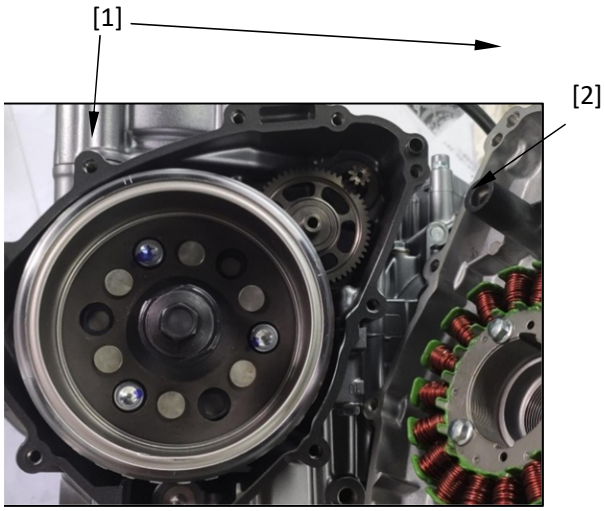


Remove the positioning pin [1] and gasket [2].

The re-assembly is precisely opposite to disassembly.

Torque:

Bolt on left crankcase cover: 10N·m



Caution:

- Replace the gasket of left crankcase cover for a new one, then check the oil level.
- Make sure there is not any oil leakage.

Stator of magneto and trigger

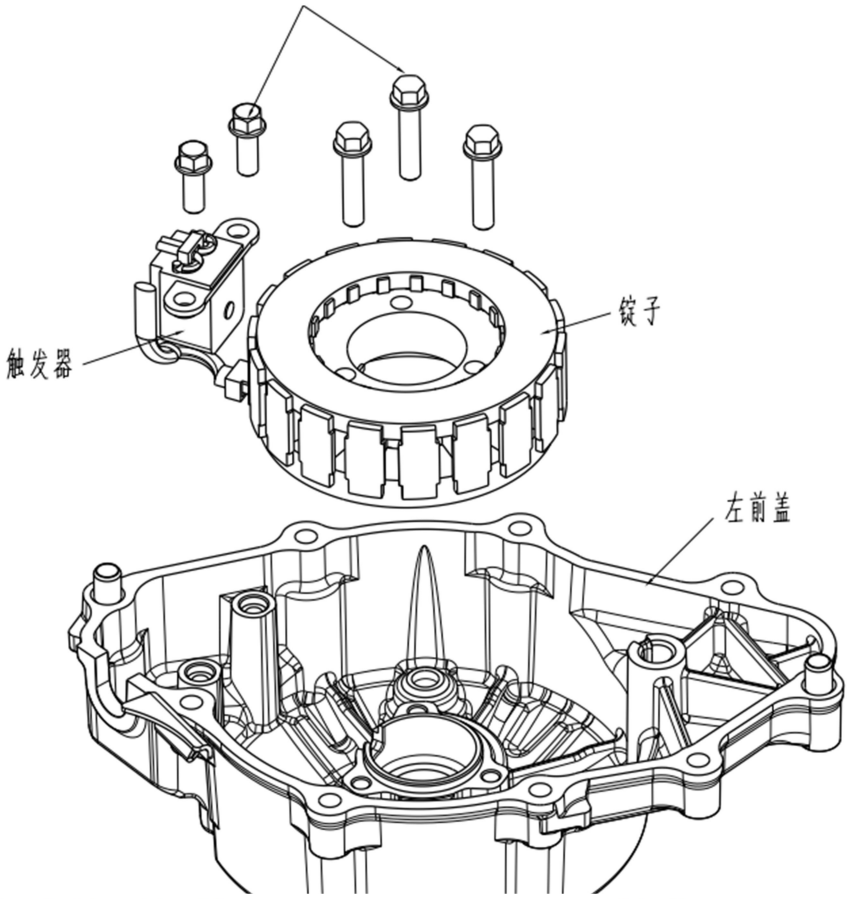
Disassembly/Re-assembly

Remove the left crankcase.

Disassemble and re-assemble the stator/trigger as picture below shows:

- Coat the threaded part of bolt on stator and trigger with Loctite.
- Coat the sealing surface of wire’s ring jacket of magneto/trigger with sealing glue.

The re-assembly is precisely opposite to disassembly.

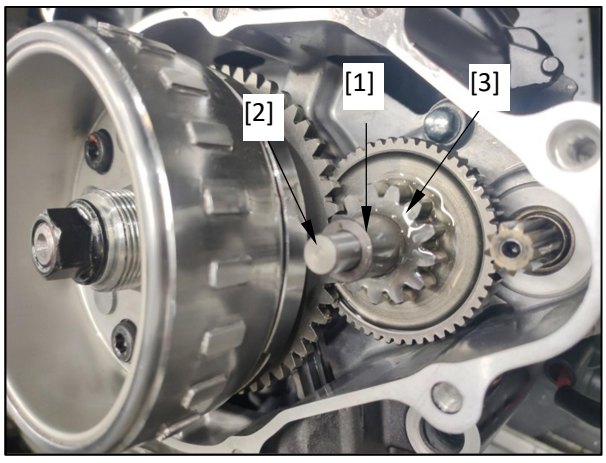


六角头法兰面螺栓：Hex. Flange bolt 触发器：Trigger 锭子：Stator 左前盖：Left front cover

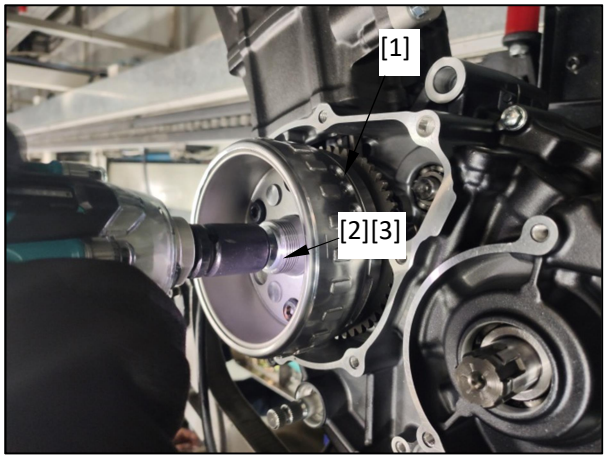
Rotor of magneto

Disassembly

Remove the left crankcase cover.
Remove limit collar [1], double gear [3] and its shaft [2].



Fix the rotor [1] of magneto by its fixer, then loosen bolt [2] and washer [3], then move bolt outwards by 5-10mm without completely removed for a easy disassembly for rotor latter.



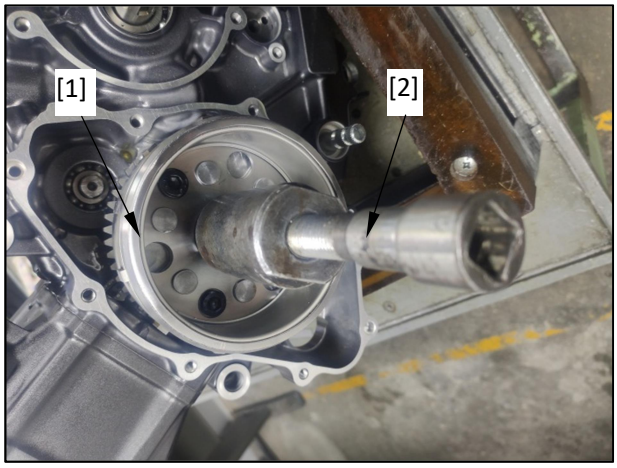
Remove the rotor [1] of magneto by special tool [2].

Tool:

[2] Removing tool for rotor

Caution

- To avoid damage on threaded part with conical degree on crankshaft, the tool can't push up the crankshaft directly, the tool needs to push up the head of bolt.



Remove the bolt of rotor.

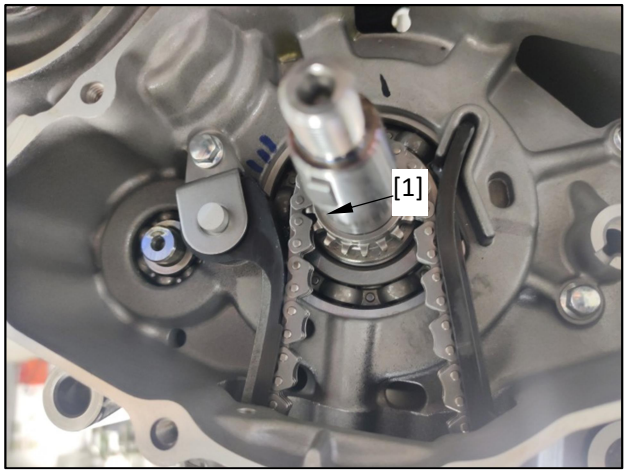
Check

Check the scratch, damage, wear-out or distortion on parts below. Please replace if it is necessary.

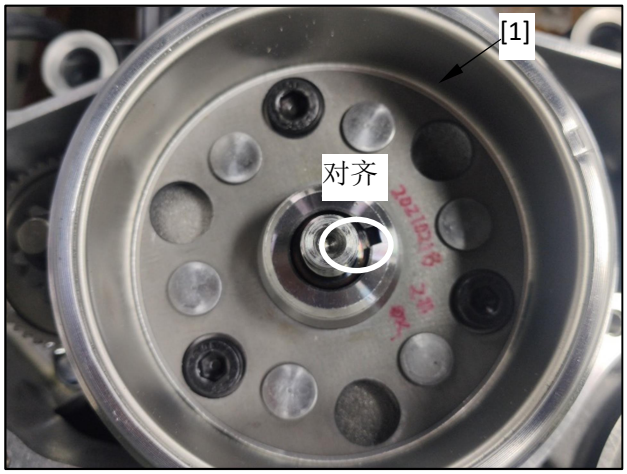
- Shaft of double gear
- Double gear

Re-assembly

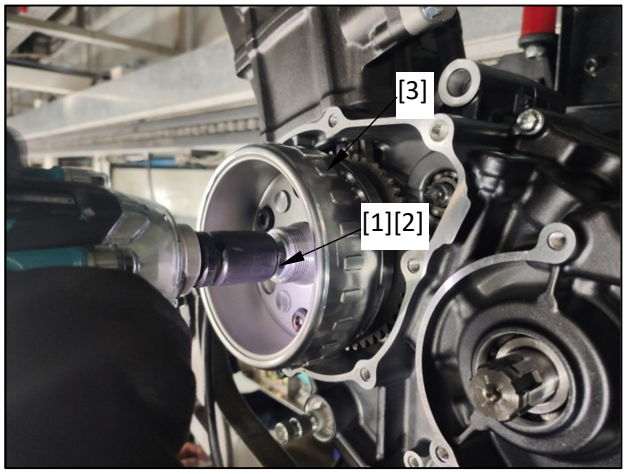
Check the damage on semi-round key [1]. Coat the gear plate part of left crankshaft with oil, then totally clean up the oil and impurities in conical surface of crankshaft and internal hole of rotor.



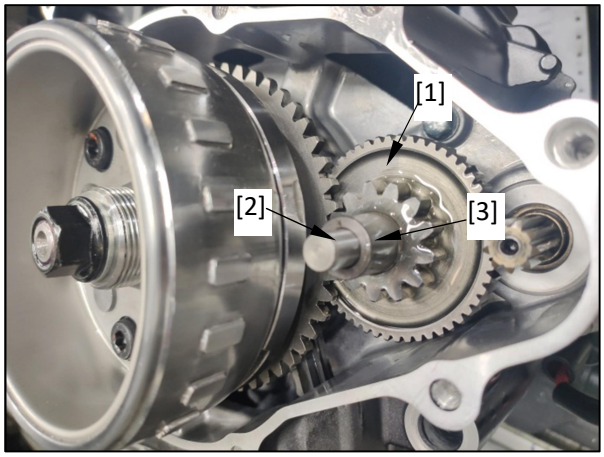
Re-assemble rotor [1], align the semi-round key on crankshaft with key’s groove on rotor.



Coat the threaded part of rotor’s bolt and installation surface with clean engine oil.
Re-assemble shim [1] and bolt [2] of rotor.
Fix the rotor [3] by its fixer and fasten the bolt to given torque.
Torque: 64N•m



Re-assemble the double gear [1], its shaft [2] and limit collar [3].
Re-assemble the left crankcase cover.



Starting clutch

Check the operation of starting clutch

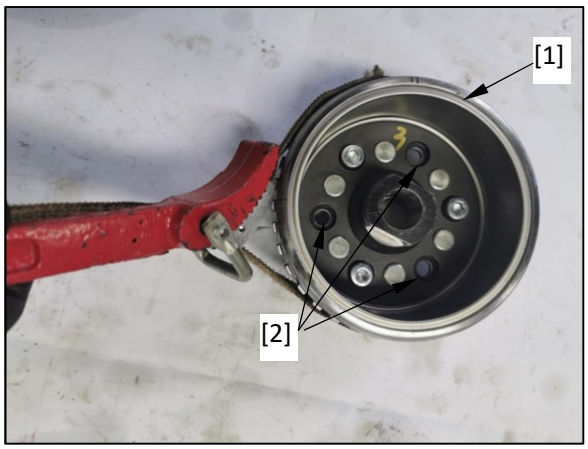
Remove the rotor.
Check the operational performance of starting clutch by turning plate shaped gear [1].
Check and confirm the anti-clockwise turning of plate shaped gear is smooth and without clockwise turning.

Disassembly

Remove the rotor.

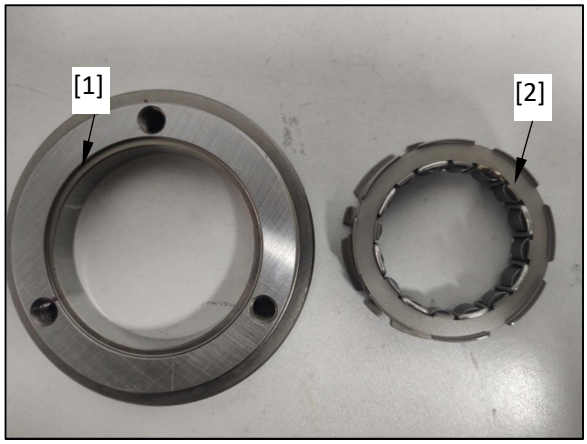
Turn the plate shaped gear anti-clockwise and remove it [1].

Fix the rotor [1] by its fixer, then remove the fastening bolt [2] of starting clutch.



Remove the starting clutch set.

Remove the starting clutch body set [2] from rotor [1].



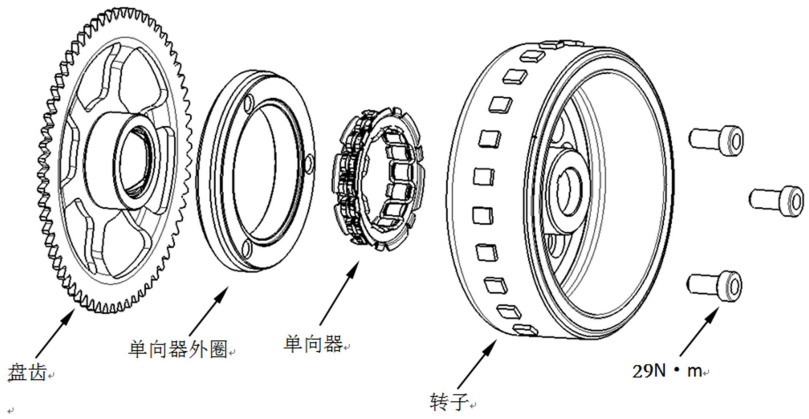
Check

Check the scratch, damage, wear-out or distortion on parts below. Please replace if it is necessary.

- Plate shaped gear
- Holding bracket for starting clutch
- Roller for starting clutch

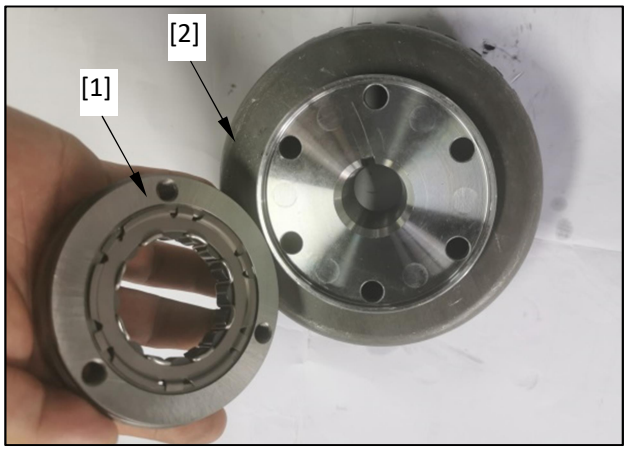
Make sure each part meets the specification for magneto and starting clutch. In case any part passed the limit for maintenance, please replace.

Re-assembly



盘齿：Plate shaped gear
单向器外圈：Outer ring for one-way device

单向器：One-way device 转子：Rotor
Coat the contact surface of starting clutch with clean engine oil.
Re-assemble the starting clutch body set [1] onto rotor [2].



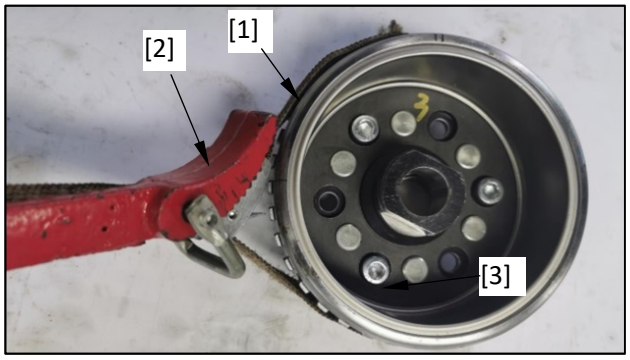
Fix the rotor [1] by its fixer.

Caution:

- Coat Loctite to threaded part of bolt on clutch

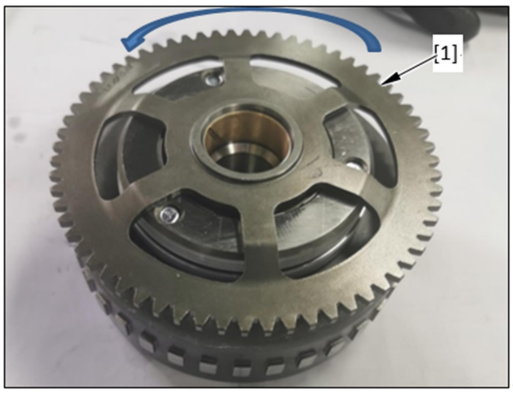
Re-assemble and fasten the fastening bolt [3] to given torque.

Torque: 29N·m



Turn the plate shaped gear [1] anti-clockwise, then re-assemble the gear into outer case of starting clutch. Check the operational performance for starting clutch.

Re-assemble the rotor.



8

Crankcase body and transmission system

Information for maintenance

Summary

- Break up the crankcase for the maintenance and replacement below:
  1. Transmission system
  2. Crankshaft and connecting rod system
- Remove the parts below before breaking up the crankcase:
  1. Cylinder head set
  2. Cylinder body set
  3. Air system and related parts
  4. Pressing pin piece

5. Right crankcase cover set
6. Oil pump set
7. Clutch set
8. Primary driving gear
9. Gearshift system set
10. Starting motor set
11. Left front cover set
12. Double gear set
13. Magneto set

- Please don't damage the combination surface of crankcase when repairing.
- Wash up the oil passage and combination surface before re-assembling the crankcase.
- Before combining the case, coat the combination surface with sealing glue for end surface evenly, the surplus sealing glue must be cleaned up.

Specification for crankcase body and transmission system

Unit: mm

Items			Standard	Limit
Transmission system	Diameter of gear's internal hole	M5、M6	20.00-20.021	20.07
		C3、C4	22.02-22.033	22.08
		C2	23.02-23.041	23.09
		C1	18.02-18.033	18.08
	External diameter of shaft's jacket	C1	17.979-18.00	17.90
	Internal diameter of shaft's jacket	C1	15.00-15.021	15.10
	Diameter for main shaft	Matching with shaft' jacket of M5	16.959-16.98	16.93
	Diameter for countershaft	Gear matching with shaft's jacket of C2	19.978-19.989	19.92
		Matching with shaft's jacket of C1	14.966-14.984	14.90
	Clearance between main and counter	Gear matching with shaft' jacket of M5	0.02-0.054	0.10

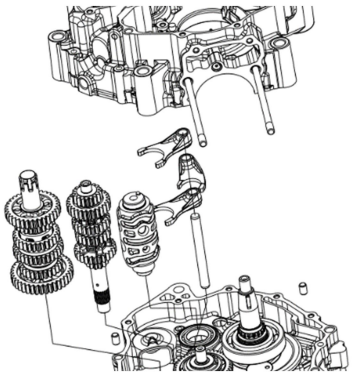
	shaft			
	Clearance between shaft’s jacket and gear	C2	0.02-0.054	0.10
		C1	0.02-0.054	0.10
	Clearance between shaft’s jacket and main or counter shaft	C2	0.02-0.062	0.10
		C1	0.016-0.055	0.10
Gearshift fork and its shaft	Diameter for gearshift fork’s shaft		9.966-9.984	9.91
	Internal diameter of gearshift fork		10.00 -10.018	10.03
	Thickness of gearshift fork’s tip		4.93-5.00	4.90

Troubleshooting

Noisy engine

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

Layout for components



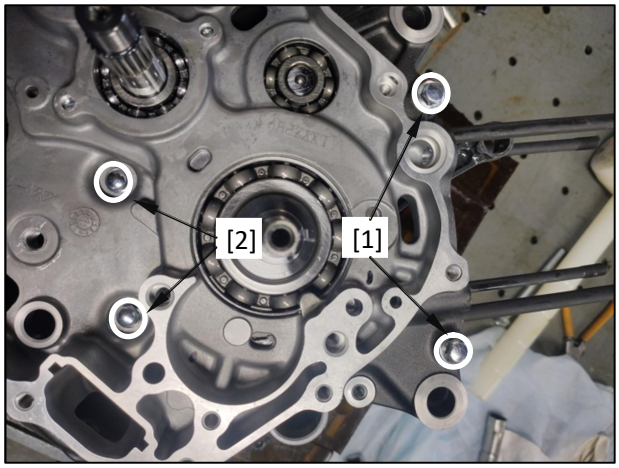
Crankcase body

Disassembly/Re-assembly

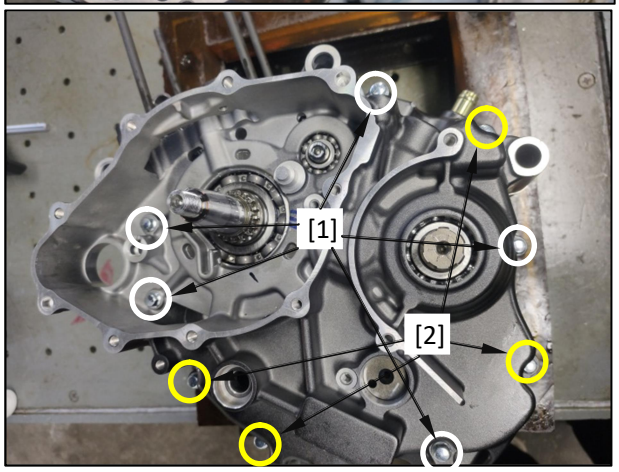
Remove the parts below

- Left cover set
- Right crankcase cover set
- Starting motor set
- Magneto set
- Pressing pin piece
- Clutch set
- Oil pump set
- Primary driving gear
- Gearshift system set

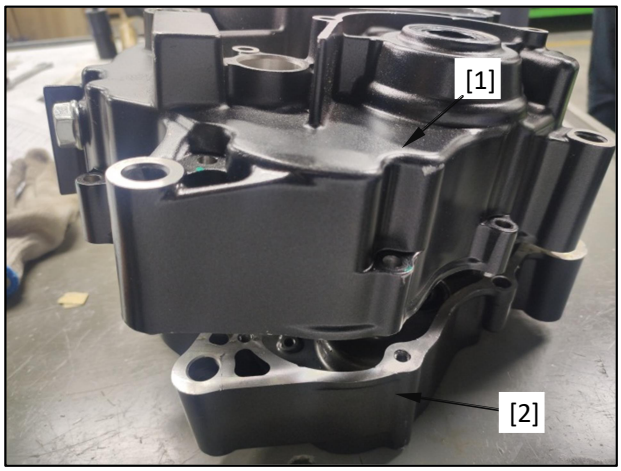
Loosen case combination bolt M6×65[1] and M6×35[2] by 2 times.



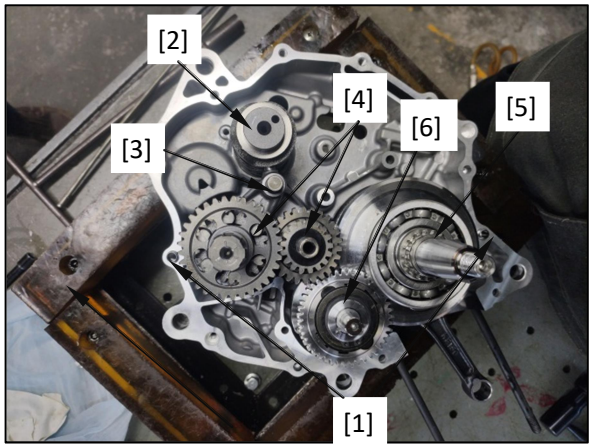
Put the engine up side down.
Loosen bolt M6×65[1] on left crankcase body and M6×40[2] by 2 times, then remove all the bolts.



Remove the left crankcase body [1] from the right one [2] (Caution: Please don't pry up the case combination surface of crankcase by tools, knock the surface without machining by rubber hammer can easily remove it).



Remove positioning pin [1]. Remove gearshift drum [2], gearshift fork and its shaft [3], then remove main and counter shaft set [4] (Whose disassembly and re-assembly refer to chapter later), remove crankshaft [5] and balancing shaft [6] (Whose disassembly and re-assembly refer to chapter 9th).



Re-assembly

Wash up the combination surface of left and right crankcase and don't damage the surface.
Check the blocking-up in the oil passage of crankcase, wash it up when it is necessary.

Case combination

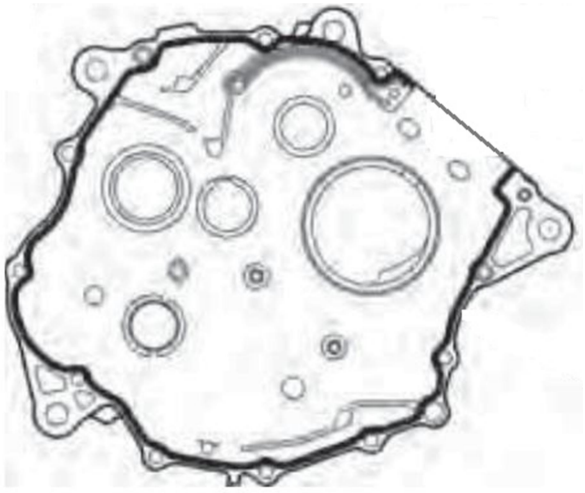
Re-assemble the main & counter shaft set, crankshaft & balancing shaft to right crankcase (Whose details refer to later chapter and chapter 9th).

Re-assemble the gearshift drum set, fork, and fork shaft to right crankcase (Refer to chapter later)

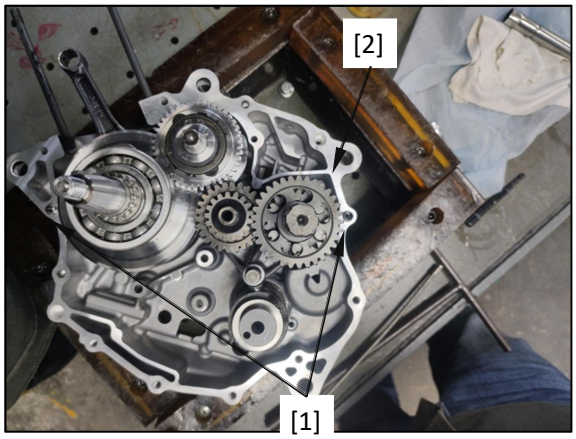
Evenly coat the combination surface of left crankcase with sealing glue as picture at right side shows.

Caution:

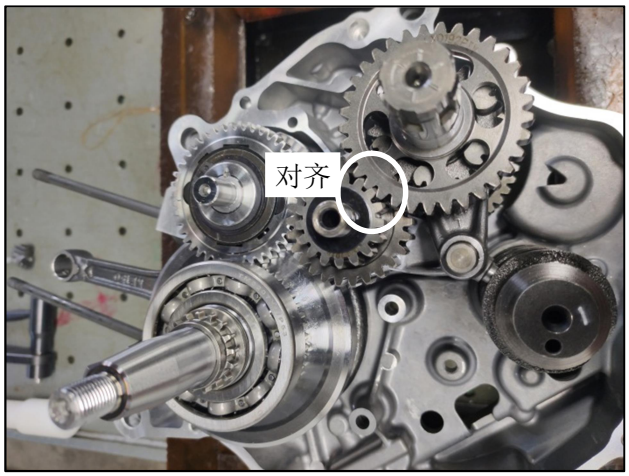
- Too much the end surface sealing glue is not allowed.
- Don't spread the end surface sealing glue to bolt of main shaft's journal and hole of oil passage.



Re-assemble the positioning pin [1] onto crankcase body [2].



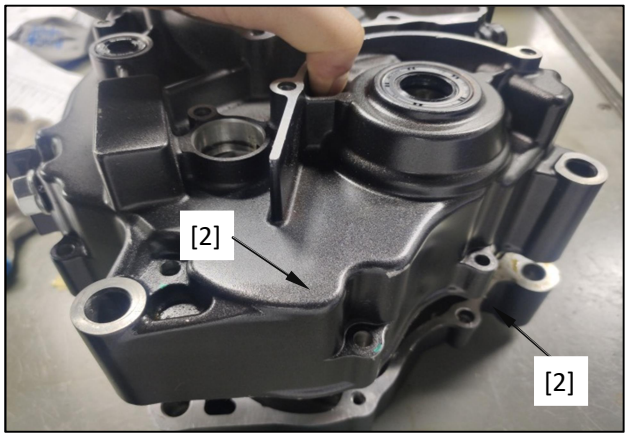
Check the gears between main and counter shaft are aligned and make them at neutral gear. Check once again and confirm all the parts on crankcase body are assembled in place.



Re-assemble the left crankcase body [1] onto the right one [2].

Caution:

- The case combination bolt already used can't be adopted once again.
- Confirm the clearance between crankshaft and crankcase body is within (0.05-0.418).
- Confirm the flexible turning of crankshaft without noise and jamming.



Confirm the left and right crankcase are firmly assembled.

Replace the flat washer and case combination bolt for new ones, then fasten the bolt to given torque.

Torque: The torque and fastening please refer to page 1-13.

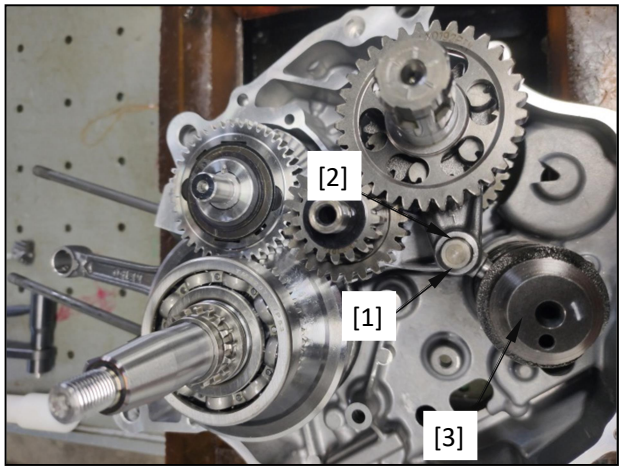
Gearshift system

Disassembly

Break up the crankcase body.

Remove gearshift fork's shaft [1], then the gearshift drum [3], finally the fork itself [2].

Check the damage and defects on gearshift fork, its shaft and gearshift drum.



Re-assembly:

The gearshift fork is with mark as below:

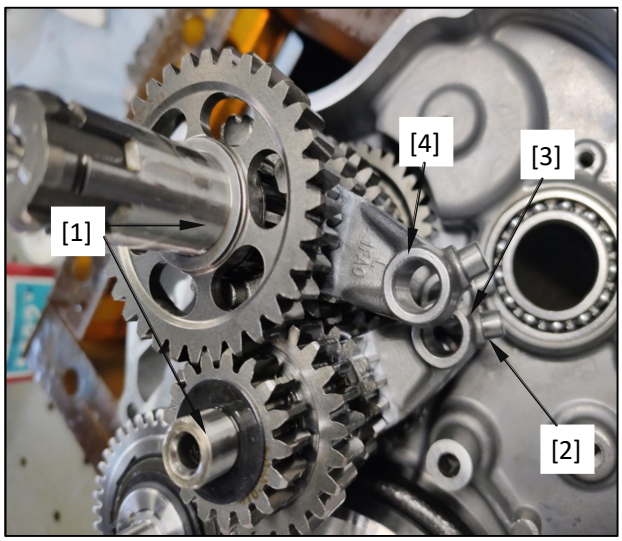
"L": Left fork

"C": Middle fork

"R": Right fork

Coat the guiding area and pin of gearshift fork with oil.

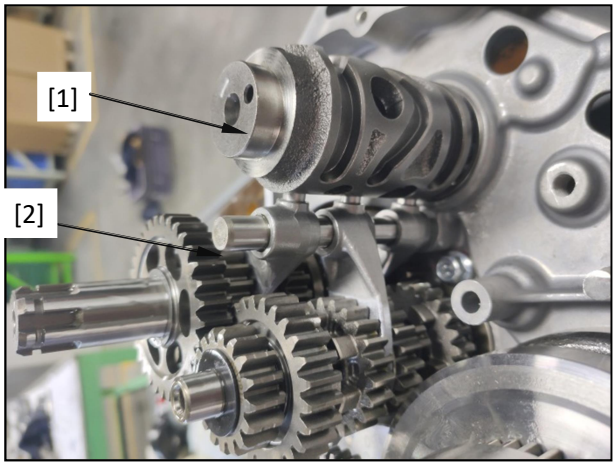
Press down the right fork [2], middle one [3] and the left one [4] in turn from main and counter shaft [1] into gear groove on the shafts, the side with mark face upwards (Face to the left crankcase body).



Coat the journal with threaded hole on gearshift drum [1] and groove of gearshift forks with oil, then assemble downwards to bearing's hole on right crankcase body, then assemble the fork's pin into its groove, coat the fork's shaft [2] with oil, then get through the hole on three forks and re-assemble into crankcase body.

Caution:

- When re-assembling the fork into its guiding groove on gearshift drum, lift up the fork and clip it into neutral gear, so when the fork's shaft assembled in place, the main and counter shaft could be freely turned.

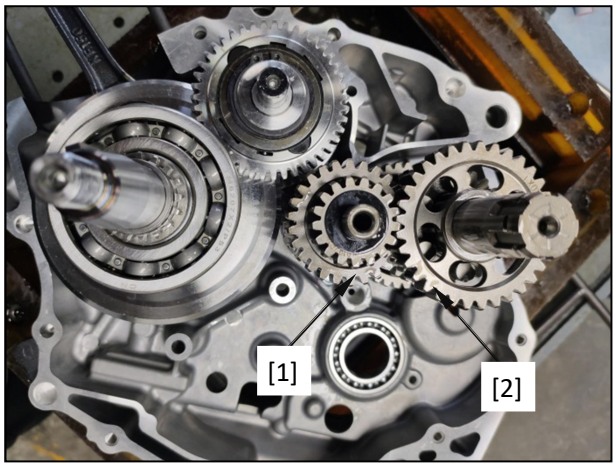


Transmission system

Disassembly

Remove the counter shaft [1].

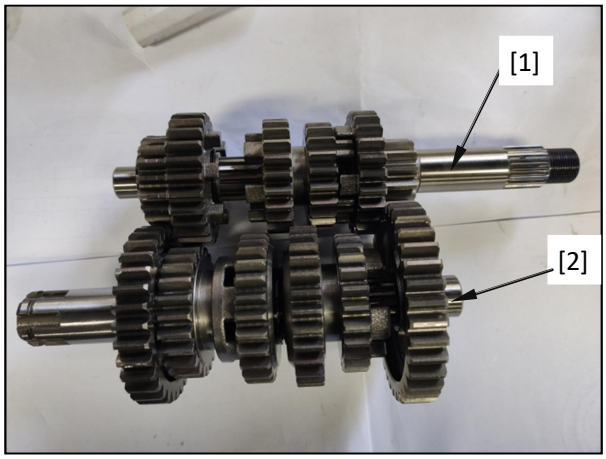
Remove the main shaft [2].



Bread up the main shaft set [1] and countershaft set [2].

Caution:

- Put the removed gears, collars, washers, and circlip rings in a line in a special container.。
- Don't expand the circlip ring passed its limit, when removing it, expand it first, then push it out by the gear behind it.。
- The gears on main shaft adopt interference fit, which could not be removed or replaced, in case there is damage, please replace the main shaft as a complete set.



Check

Check the scratch, damage, wear-out and distortion for parts below, replace if it is necessary.

- Transmission gear
- Transmission shaft's jacket
- Gearshift drum
- Gearshift fork
- Gearshift fork's shaft

Measure size for every part and calculate their matching clearance according to standard.
In case any part's matching clearance passed the standard limit, please replace it for a new one.

Re-assembly for main and counter shaft

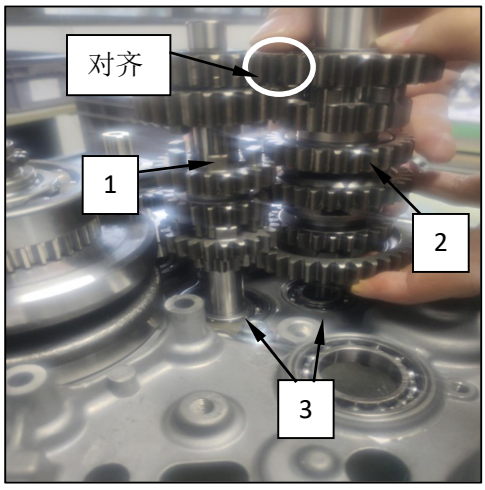
Wash and clean all the parts by solvent and make them totally dry up.
Coat the surface of teeth, turning area and bearing of gears with oil. Coat the outer surface of gear's spline jacket, collar, turning area of needle bearing and groove of gear changer with oil.
Re-assemble the main shaft and counter shaft.
Caution:

- Coat every gear with oil and check its smooth and stable turning.
- Get the inner spline of spline washer aligned with its groove.
- Re-assemble the thrust washer always along the axial thrust surface of gear.

- When re-assembling the circlip ring, get its opening gap aligned with spline groove [1].
- Make sure the circlip is completely in the shaft's groove when re-assembled.

Re-assembly

Coat the journal on the right end of main shaft [1] and counter shaft [2] with oil, then mesh up the corresponding gears on main and counter shaft, then assemble the main and counter shaft set into bearing's hole [3] on the right crankcase.



Caution:

- The main and counter shaft shall be freely turned without jamming.
- The washer on the left end of main shaft, and the washer on the both ends of countershaft shall be without dropping.

9

Crankshaft, balancing shaft and accessories for

case body

Information for maintenance

Summary

When maintaining the crankshaft and balancing shaft, the crankcase must break up. How to break up please refer to previous chapter.

Specification for crankshaft and balancing shaft

Unit: mm

Items		Standard	Limit
Crankshaft	Clearance between crankshaft and connecting rod	0.10-0.35	0.38
	Radial clearance of bigger end of connecting rod	0.005-0.015	0.025
	Runout	0.03	0.05
Internal diameter for smaller end of connecting rod		14.013-14.025	14.045
Matching clearance between connecting rod and its pin		0.013-0.030	0.05

Troubleshooting

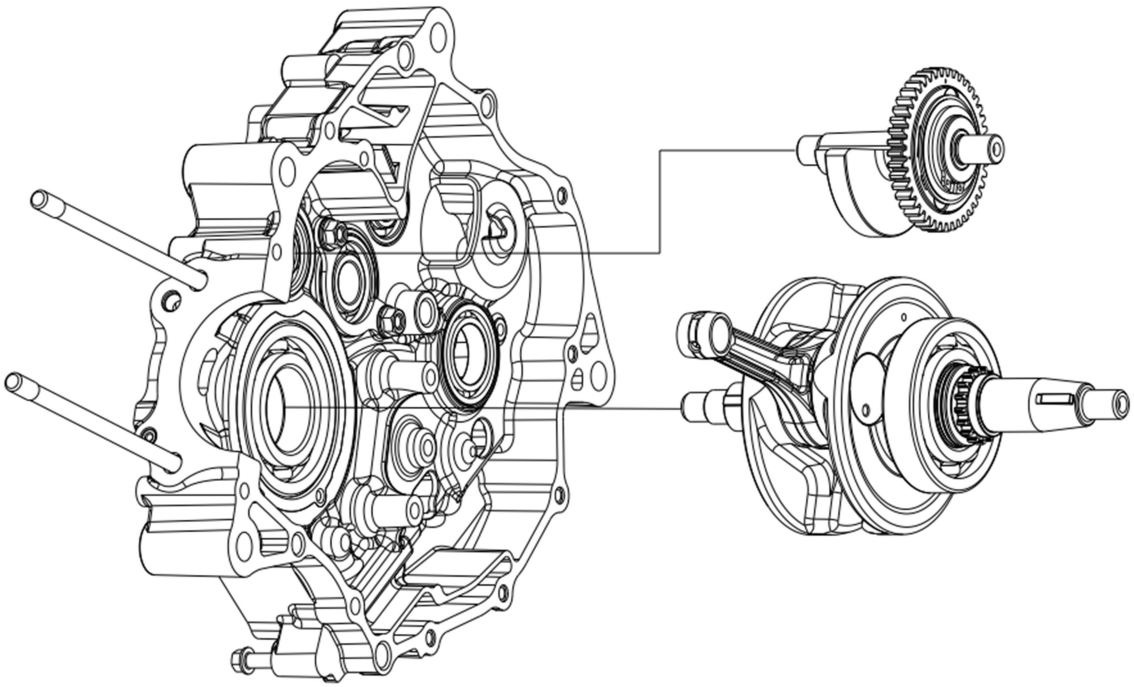
Engine shaking

- Too strong the crankshaft runout

Noisy engine

- Gear on balancing shaft gets damaged

Layout for components



Crankshaft and balancing shaft

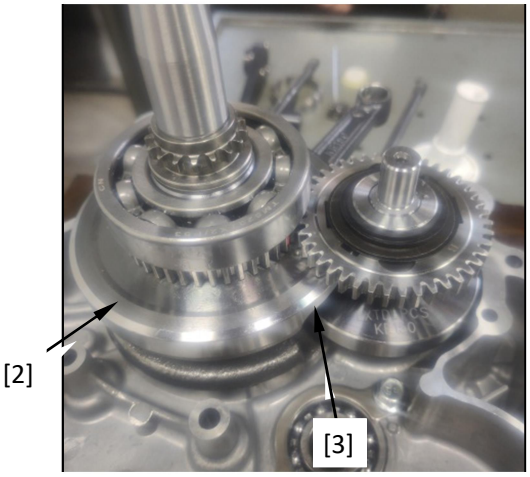
Disassembly

Before removing crankshaft and balancing shaft, please remove the parts below:

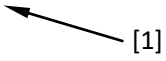
- Right crankcase body
- Gearshift drum and fork
- Main and counter shaft

Caution:

- The maintenance for parts above please refer to the chapter 8th for gearshift and transmission system.



Fix the left crankcase body [1], remove the crankshaft [2] and balancing shaft [3] together from left crankcase body.



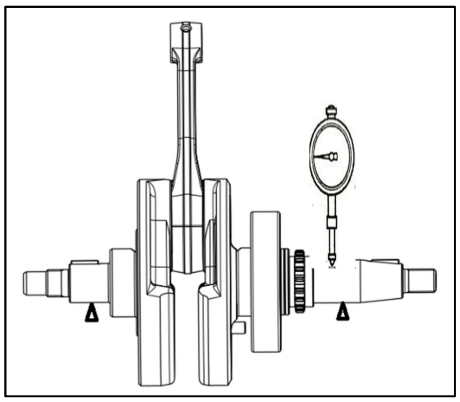
Check

Hold the journal on both ends of crankshaft.

Lay a micrometer at the middle above journal of main shaft, please avoid the oil groove and hole.

Turn the crankshaft by 2 rounds（720° ）, then read its runout.。

Limit for maintenance: 0.05 mm



Check the driven gear of balancing gear, check scratch, damage, wear-out or distortion on parts below, in case it is, please replace.

- Driven gear of balancing shaft and pressing spring
- Balancing shaft

Breaking up

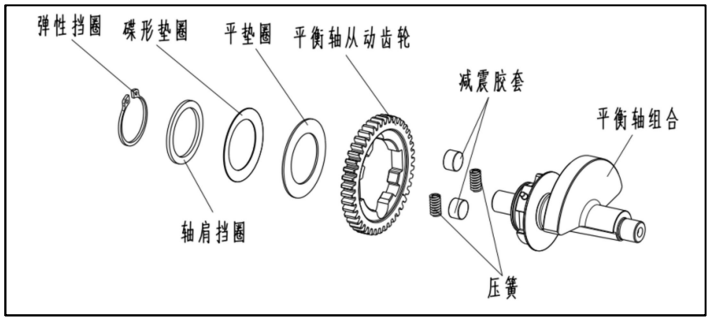
Remove elastic circlip of balancing shaft, then remove the shoulder circlip, disc washer,

shoulder circlip, damping rubber, pressing spring and driven gear of balancing shaft in turn.

Caution:

Check damage, wear-out or distortion on parts below, in case it is, please replace.

- Driven gear of balancing shaft
- Pressing spring
- Balancing shaft

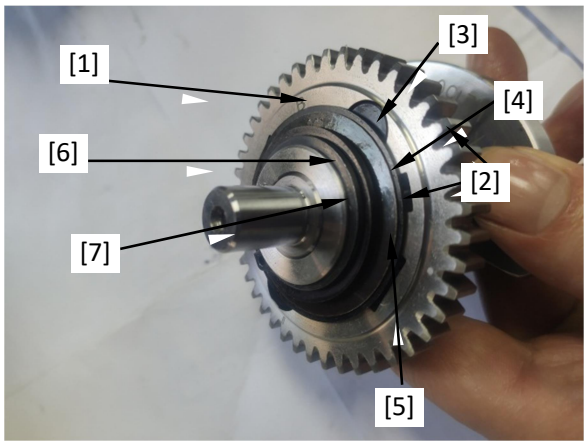


Re-assembly

Coat the internal hole of driven gear of balancing shaft with oil, then re-assemble driven gear [1], pressing spring [2], damping rubber [3], flat washer (With external diameter of 45mm)[4], disc washer [5], shoulder circlip (With external diameter of 36mm)[6], and elastic circlip onto balancing shaft.

Caution:

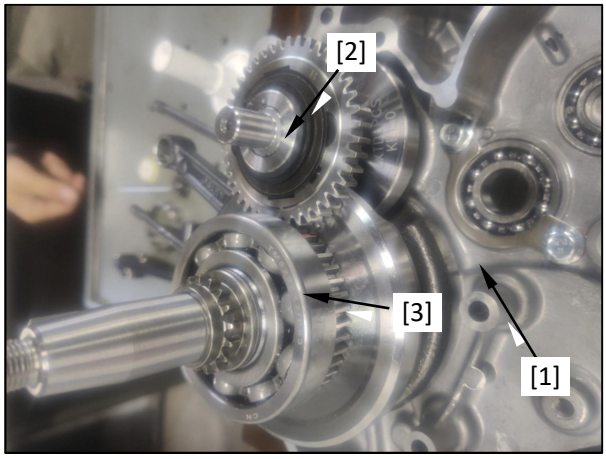
- The side with mark on driven gear face outwards.
- The driven gear and internal semi-round groove made up a complete circle without mislocate.
- The elastic circlip completely clipped into internal ring groove of balancing shaft without permanent distortion.



Put the right crankcase [1] on the bench with case combination surface face upwards, coat the journal at right end of balancing shaft [2] and crankshaft [3] with oil, align the driving gear of balancing shaft with mark point [4] on crankshaft, then mesh up the driving and driven gear, finally assemble the crankshaft and balancing shaft into bearing hole on right crankcase body.

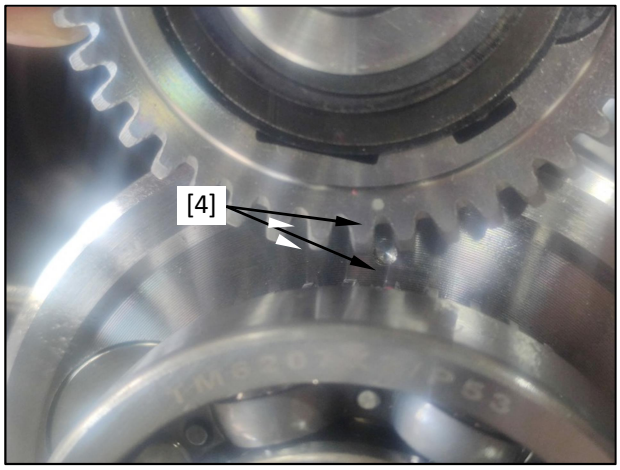
Caution:

Align the points on crankshaft and balancing shaft first, then assemble into right crankcase bearing's hole, otherwise it may lead to jamming or mislocate.



Check

The crankshaft and balancing shaft must turn freely without jamming, turn the crankshaft and balancing shaft for a round and check the balancing gear's aligning point [4], who keeps a correct position.

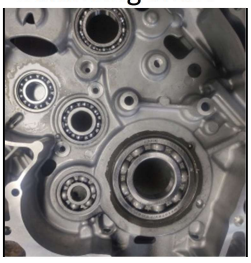


Accessories for left and right crankcase body

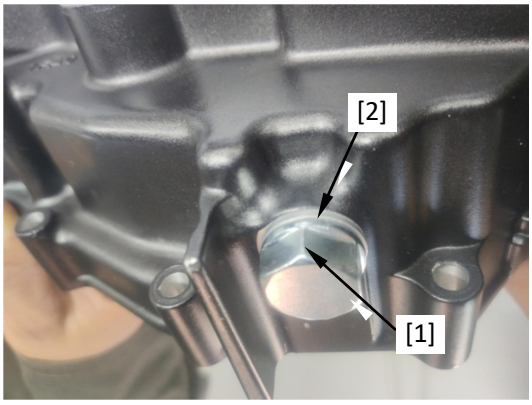
Removal

Before maintaining left and right crankcase, we need to remove the parts below:

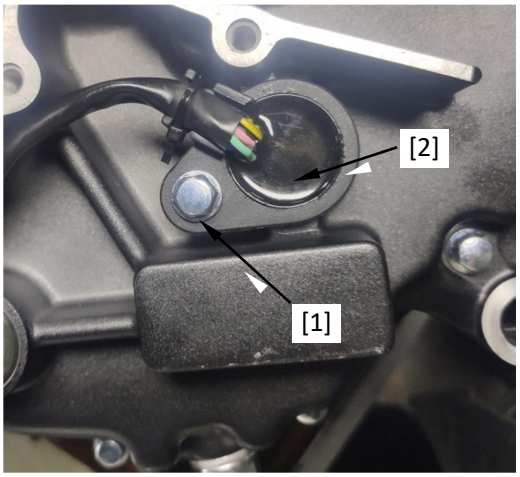
- Gearshift drum, fork
- Main and counter shaft
- Crankshaft
- Balancing shaft



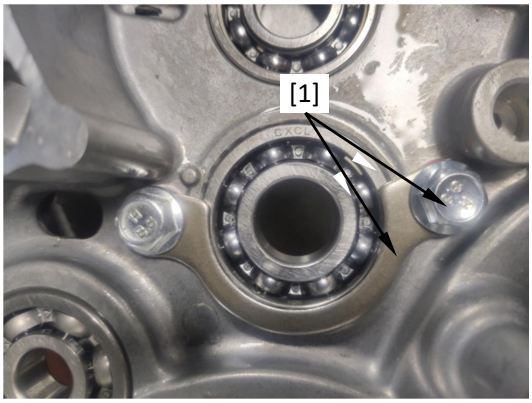
Remove the screw plug [1] for sealing and flat washer [2].



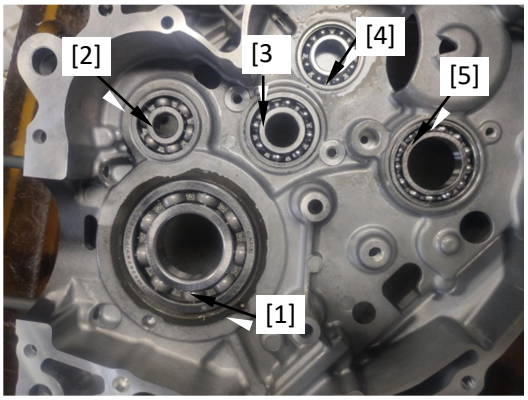
Remove the fastening bolt [1] for gear indicating switch set on left crankcase body, then remove the switch set [2].



Remove the check plate for bearing on main shaft on right crankcase body and the bolt [1].

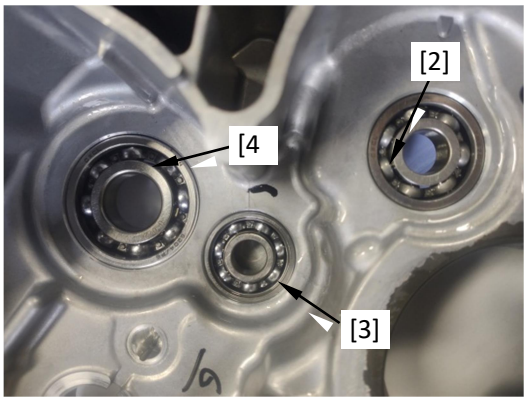


Heat the left and right crankcase by oven for 30 min, then take out, remove the bearing [1] for crankshaft on left and right crankcase body, then the balancing shaft bearing [2], main shaft bearing [3], counter shaft bearing [4] and bearing [5] on gearshift drum.



Caution:

- The oven is hot when it is working, please wear gloves for protection and adopt specialized tools before operation.



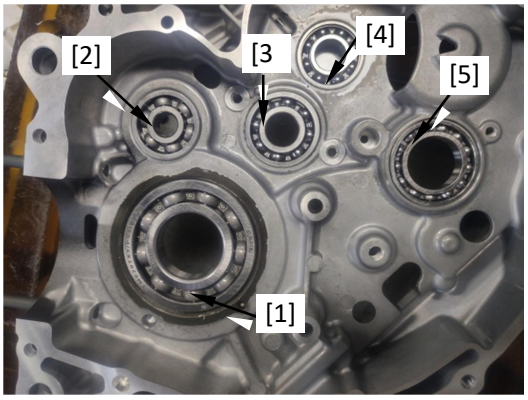
Check

Check jamming, damage, wear-out or distortion on each bearing, in case it is, please replace

Re-assembly

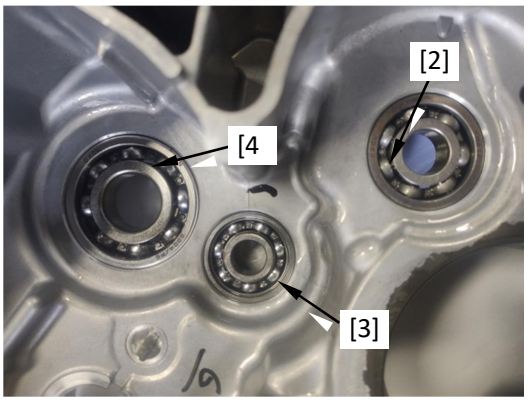
Coat suitable lubricant in bearing's hole, whose side with letter face upwards(In case it is a seal bearing of single side, the sealing side face downwards), then press-fit bearings below into case body by tools for them only, and check bearing's depth：

- Crankshaft bearing [1]
- Balancing shaft bearing [2]
- Main shaft bearing [3]
- Counter shaft bearing [4]
- Gearshift drum bearing [5]



Caution:

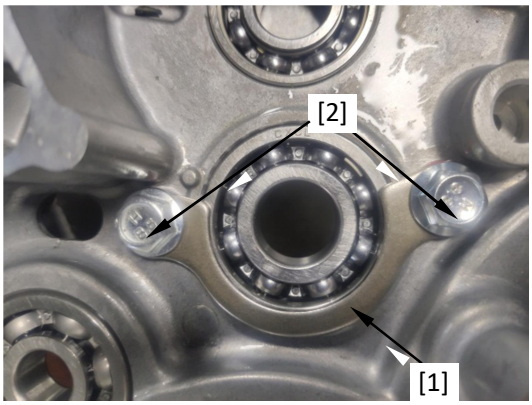
- The tool could be the machine for press-fitting or other specialized tools, but don't knock the internal ring of bearings.



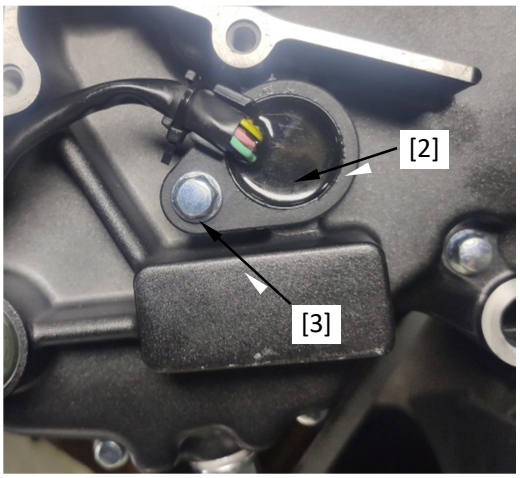
Re-assemble the check plate [1] for bearing of main shaft on right crankcase, coat the head of bolt [2] with Loctite then assemble into its hole.

Assembling torque:

10N.m



Re-assemble pressing pin and moving contact [1], coat seal ring of gear indicator with suitable grease and re-assemble gear indicator [2], when press-fitted the gear indicator in place, fasten by bolt [3].



Re-assemble the screw plug [1] for sealing and flat washer [2] on left crankcase body.