

# IBEX 450

# 450 MT

*Service Manual*

Edition Date: 20231231

Edition Item: CF400-8 CF400-8F (6AQ2-00WX01-11) SM-20231231

## FOREWORD

This manual introduces CF400-8, CF400-8F maintenance information, including disassembly procedure checking & adjustment methods, troubleshooting and technical specifications. There are some illustrations, drawing to guide your operation.

The first three chapters mainly introduce general operation information, special tool, vehicle structure, basic specification, inspection&maintenance methods etc.,

The rest chapters introduce vehicle part removal, installation, adjustment, service, fault diagnosis and etc.,

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This manual has been improved by using many ways to make it accuracy. But we are no response for any difference and missing. CFMOTO reserves right to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle. And CFMOTO is not responsible for production improvements and modifications. This manual is only for reference. If any objections, please ask the nearest dealer to get the latest information.

The information in this manual are the latest depends on latest productions on coming out. The images in this manual may not stand for real model assembly and parts.

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**CFMOTO reserves right to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle.**

**Conversion table**

A	Ampere	lb	Pound
ABDC	After bottom dead center	m	Meter
AC	Alternating current	min	Minute
ATDC	After top dead center	N	Newton
BBDC	Before bottom dead center	Pa	Pascal
BDC	Bottom dead center	PS	Metric horse power
BTDC	Before top dead center	Psi	Pound/Square Inch
°C	Centigrade	r	Revolutions
DC	Direct current	rpm	Revolutions per minute
F	Farad	TDC	Top dead center
°F	Fahrenheit	TIR	Total indicator reading
ft	Feet	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	Litre	in	Inch
US gal	Gallon(US)	US qt	Quart(US)
oz	Ounce	HP	British horsepower
cm Hg	Centimeter of mercury	pint	Pint
cu in	Cubic inch	mL	Milliliter

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US gal	Gallon(US)	US qt	Quart(US)
oz	Ounce	HP	British horsepower
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## **Forward**

This manual is intended for use by experienced technicians in a fully equipped workshop and is intended primarily for reference. All references to left and right are made from the perspective of the driver while seated in the driving position.

Certain procedures outlined in this manual require a sound knowledge of mechanical or electrical theory, tool use and shop procedures in order to perform the work safely and correctly. Technicians should read the contents of this manual and understand the procedures before beginning repairs. Certain procedures require the use of specialized tools. Use only the proper tools specified. If you have any questions about your ability to perform any of the procedures outlined in this manual, contact an authorized dealer for service.

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All service and scheduled maintenance should be executed base on the instructions of service manual. Any consequences are responsible by the vehicle's owner resulted from any rule-breaking operations.

### **How to get Long Service Life:**

Follow scheduled maintenance and service operations based on service manual.

Non-periodical maintenance in special situations.

Use tools properly and use CFMOTO genuine parts.

Special tools, dashboard and tester have been listed into this service manual for necessary genuine parts.

Strictly operate based on the correct service procedures.

Keep fully service records and specify the date of new parts replacement.

### **How to use this manual:**

In this manual, the production will be separated as several systems. All the systems are shows up in the contents. That will help you to lock the chapter. And each chapter has its own contents. For example, if you want to find ignition coil information, lock the electrical system chapter by using the contents, and then find the ignition coil in electrical system chapter.

Whenever you see the warning or warning symbol, you must keep attention and comply with the safety operation and maintenance method.

**DANGER:** This symbol means it will cause serious injuries even death if you don't follow the procedure.

**WARNING:** This symbol means the special steps. It may cause the vehicle damage if you don't follow the procedure.

**CAUTION:** This symbol means to take precautions to prevent parts from damaging.

**NOTE:** It makes operation process easier or offers clearer information. It has no symbol.

**NOTE:**

The disassemble steps exclude the electrical parts, police implements and engine, etc. Electrical parts and engine are shown in the separate chapters.

All connectors are unplugged by default during removal.

The guide line without serial number in the picture indicates the direction of removal.

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## 1.1 Operation Cautions

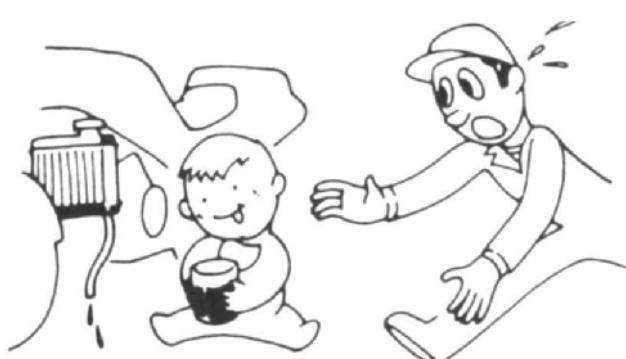
**DANGER:** Hazardous components in exhaust. Do not run the engine in a enclosed or poor ventilated place for a long time.

**WARNING:** Don't touch the engine or muffler with bare hands when the engine has just stopped to avoid hurt. Wear long-sleeve work clothes.



**WARNING:** Battery liquid (dilute sulfuric acid) is highly caustic and may cause burns to skin and eyes. Flush with water if splashed to skin and get immediate medical attention. Flush with water if splashed to clothes to avoid burns. Keep battery and liquid away from reach of children.

**WARNING:** Coolant is poisonous. Do not drink or splash to skin, eyes or clothes. Flush with plenty of soap water if splashed to skin. Flush with water and consult doctors if touches eyes. If drinking the coolant, induce vomiting and consult doctors. Keep coolant away from reach of children.



**⚠WARNING:** Wear proper work clothes, cap and boots. Wear dust-glass, gloves and mask if necessary.



**⚠DANGER:** Coolant Gasoline is highly flammable. No smoking or fire. Also keep against sparks. Vaporized gasoline is also explosive. Operate in a well-ventilated place.



**⚠DANGER:** When charged, Battery may generate hydrogen which is explosive. Charge the battery in a well-ventilated place.



**⚠Warning:** When more than two people are operating, keep reminding each other for safety purpose.



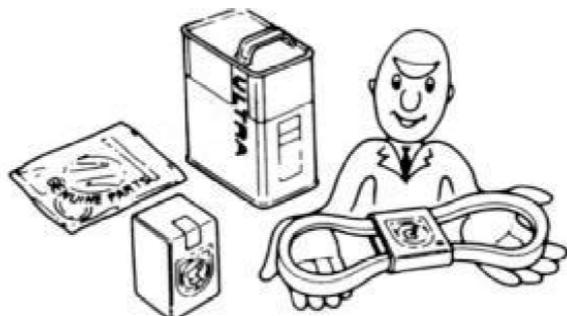
**⚠DANGER:** Be careful to get clamped by the turning parts like wheels and clutch.



## 1.2 Disassembly and Assembly Cautions

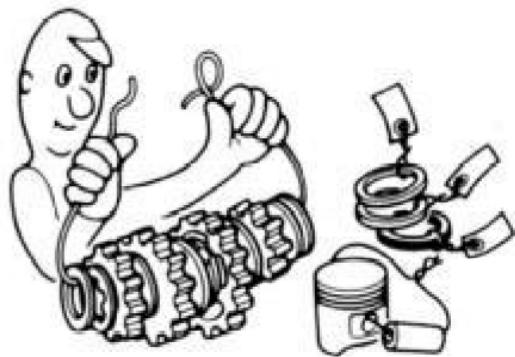
- Use genuine CFMOTO Parts, lubricants and grease.

- Clean the mud, dust before overhauling.



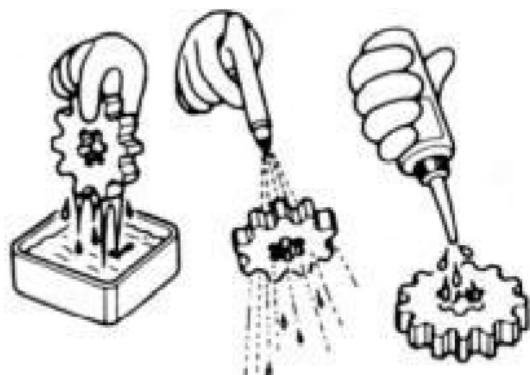
- Place and store the disassembled parts separately in order for correct assemble.

- Replace the disassembled washers, O-rings, piston pin circlip and cotter pin with new ones.
- Elastic circlips might get distorted after disassembled. Do not use the loosed circlips.

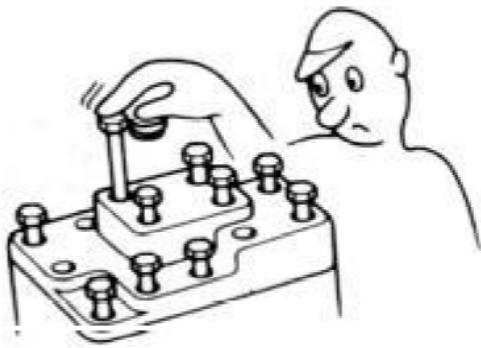


- Clean and blow off the detergent after disassembling the parts. Apply lubricants on the surface of moving parts.

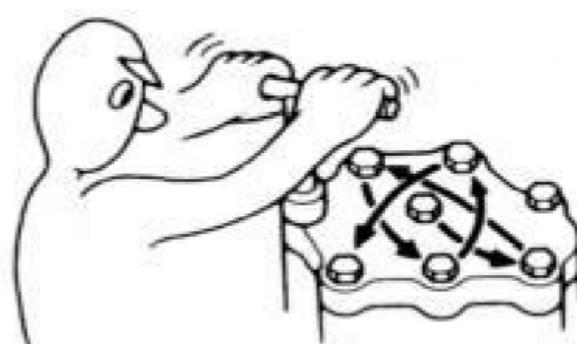
- Measure the data during disassembly for correct assembly.



■ If not know the length of screws, install the screws one by one and tighten with same torque.



■ Pre-tighten the bolts, nuts and screws, then tighten them according to the specified torque, from big to small and from inner side to outer side.



■ Check if the disassembled rubber parts are aged and replace it if necessary. Keep the rubber parts away from grease.



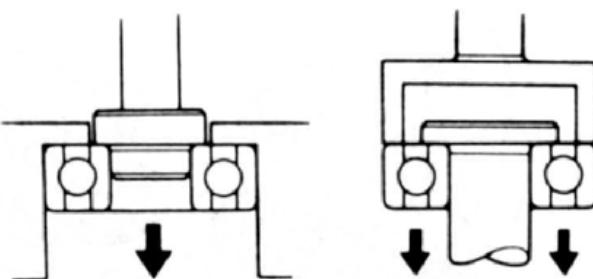
■ Apply or inject recommended lubricant to the specified parts.



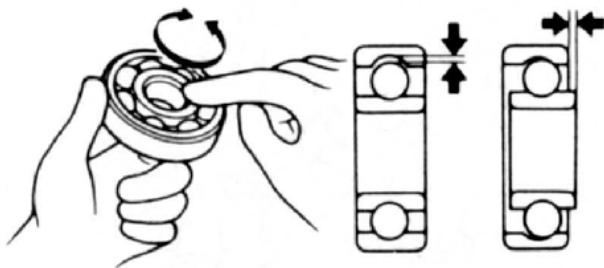
■ Use special tools wherever necessary.



■ If the disassembling of pressed ball bearing is done by pressing the balls, the disassembled should not be used again.

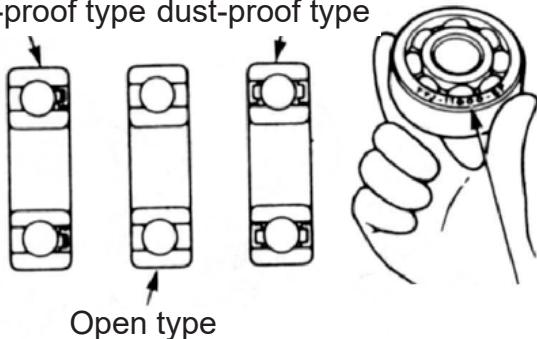


■ Turn the ball bearing with hands to make sure the bearing will turn smoothly. Replace if the axial or radial play is too big. If the surface is uneven, clean with oil and replace. If the cleaning does not help. When pressing the bearing into the machine or to the shaft, replace the bearing if it could not be pressed tight.



■ Install the one-side dust-proof bearing in the right direction. When assembling the open type or double-side dust-proof bearing, install with manufacturer's mark outward.

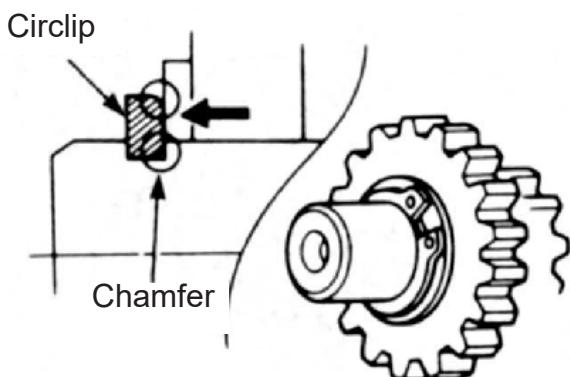
Single side Double side  
dust-proof type dust-proof type



■ Keep the bearing block still when blowing dry the bearing after washing clean. Apply oil or lubricant before assembling.



■ Install the elastic circlip after assembling to make sure it has been installed into the slot.



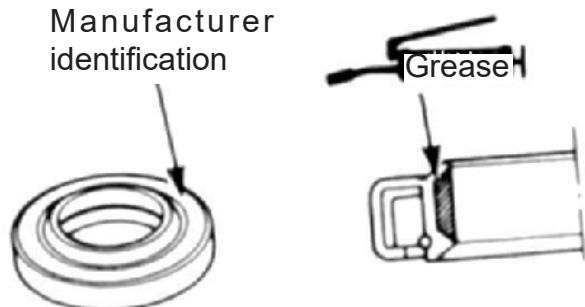
■ After assembling, check if all the tightened parts are properly tightened and can move smoothly.



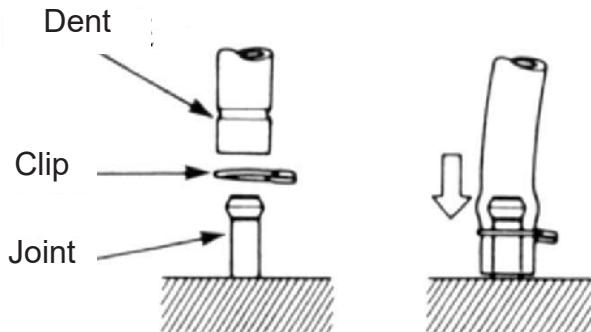
■ Brake fluid and coolant may damage coating, plastic and rubber parts. Flush these parts with water if splashed.



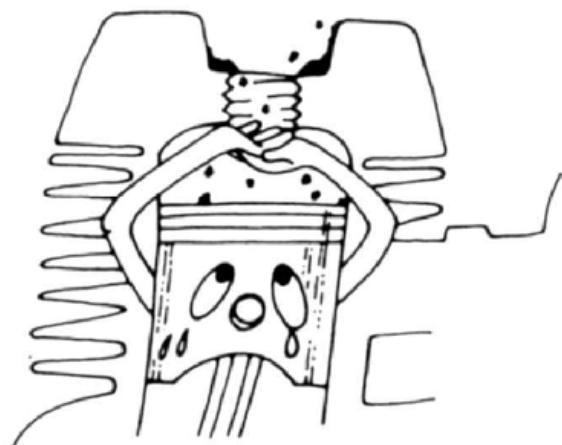
- Install oil seal with the side of manufacturer's mark outward. Do not fold or scratch the oil seal lip. Apply grease to the oil seal lip before assembling.



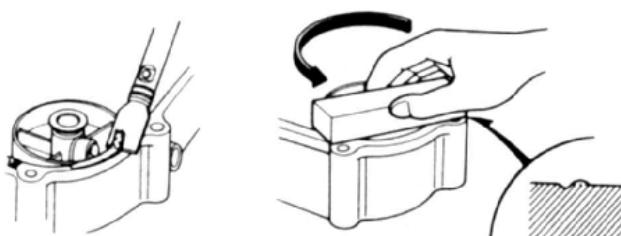
- When installing pipes, insert the pipe till the end. Fit the pipe clip, if any, into the rove. Replace the pipes or hoses that cannot be tightened.



- Do not mix mud or dust into engine or the hydraulic brake system.



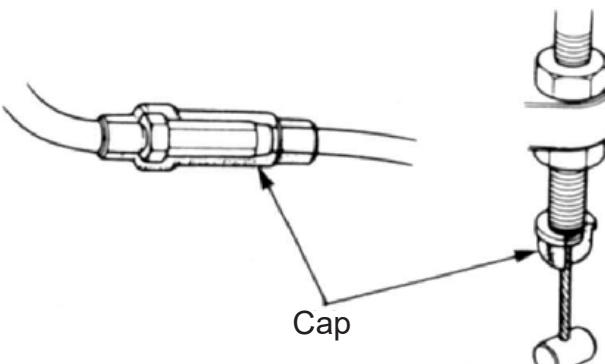
- Clean the gaskets and washers of the engine cases before assembling. Remove the scratches on the contact surfaces by polishing evenly with an oil stone.



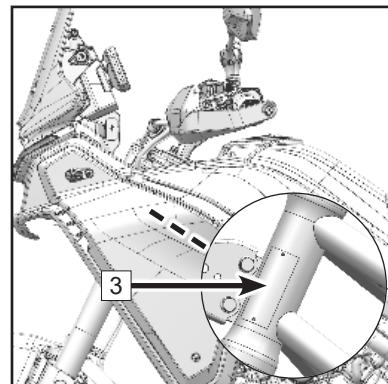
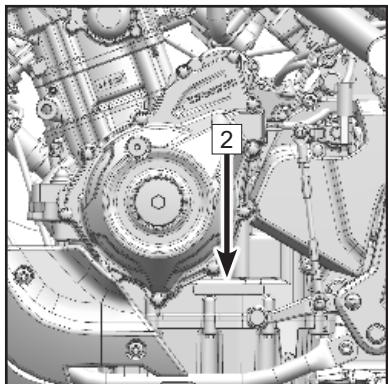
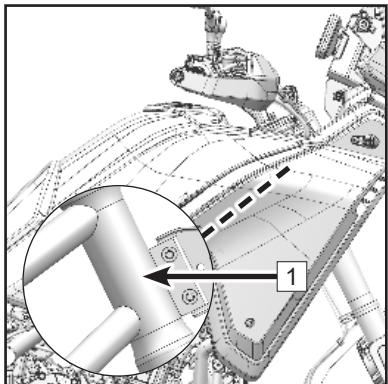
- Do not twist or bend the cables too distorted or damaged cables may cause poor operation.



- When assembling the parts of protection caps, insert the caps to the grooves, if any.



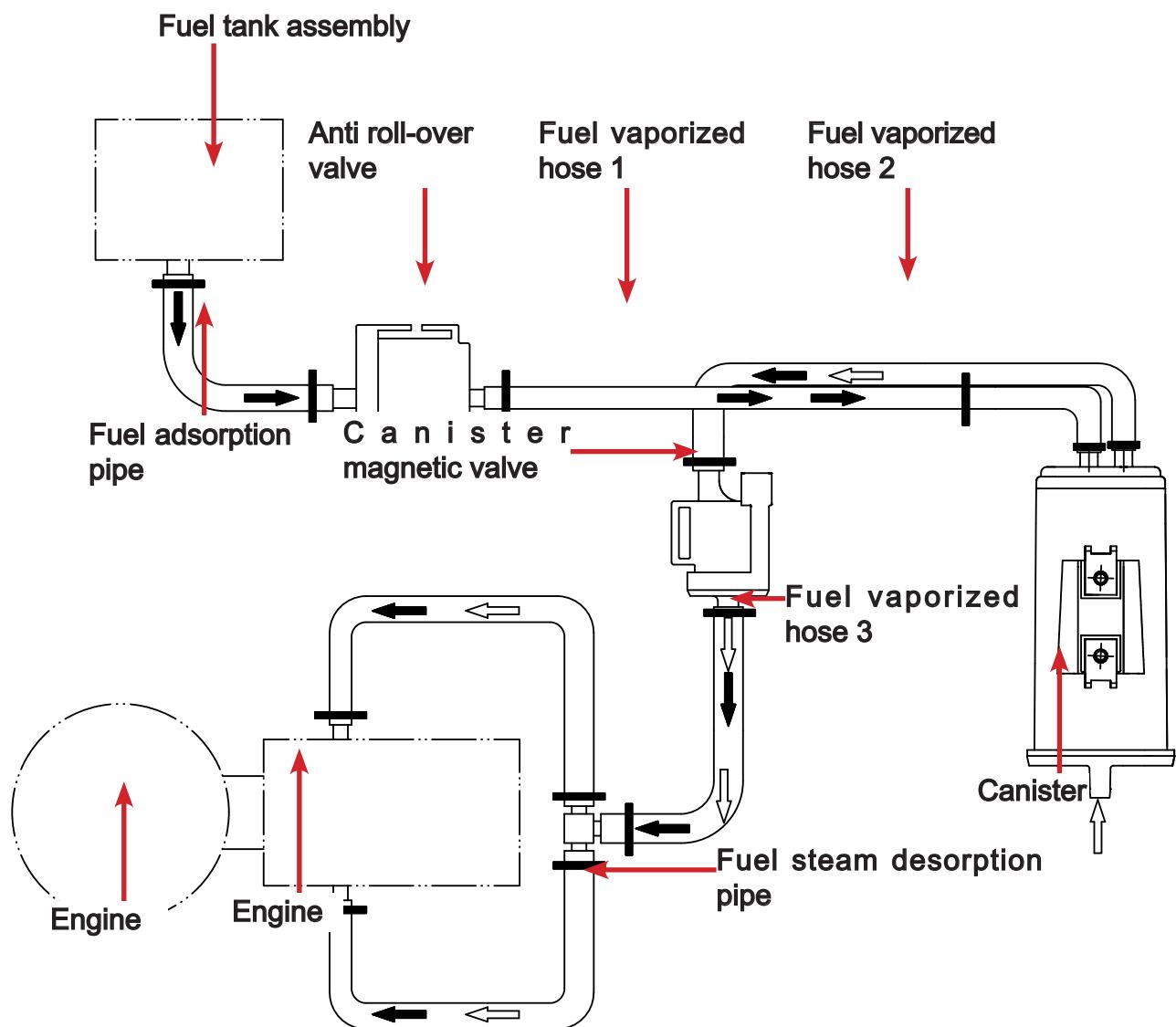
## 1.3 Number Engrave Place



1	VIN	2	Engine number	3	Vehicle nameplate position
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## 1.4 Fuel Evaporation System Diagram

**⚠ CAUTION:** To fixed the anti roll-over valve as horizontal position. Don't change the fuel evaporation system. Tube connection should be well connected after maintenance by disassembling without air leakage, blocking, squeezing, broken and damage etc. Fuel steam will be released into carbon tank by absorption tube from fuel tank. Absorbing fuel steam by active carbon when engine stop; Fuel steam of carbon tank will follow into combustion chamber for burning when engine working in order to avoid environment pollution if fuel stem released into air directly. Meanwhile, Air pressure of fuel tank should be balanced by absorption tube. If inner pressure of fuel tank is lower than outside, it is available to replenish air pressure by air tube of carbon tank or absorption tube. So, All tube system should be smooth running without blocking and squeezing, otherwise fuel pump will be damaged, fuel tank will be deformed or broken.



## 02 Maintenance Information

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## 2.1 Maintenance Information

### Cautions

- = Severe Use Item. Reduce interval by 50% on vehicles subjected to severe use.  
■ = Have an authorized dealer perform repairs that involve this component or system.

### 2.1.1 Daily Maintenance Schedule

Item	Maintenance before riding				Remarks
	Hour	Calendar	km		
<b>Fuel system</b>					
Fuel tank and hose	-	Daily	-	Inspect for aging	
<b>Electrical system</b>					
Switches	-	Daily	-	Inspect	
Lights and horns	-	Daily	-		

## 2.1.2 Break-in Maintenance Schedule

Item	Break-in Maintenance Interval (Service whichever interval comes first)				Remarks
	Hour	Calendar	km		
<b>Engine</b>					
■ Oil and oil filter	-	-	1000	Replace	
Idle	-	-	1000		Inspect
■ Coolant	-	-	1000		
Throttle system	-	-	1000		
<b>Electrical system</b>					
■ Functions of electrical parts	-	-	1000		Inspect
Battery	-	-	1000		
Fuses or circuit breakers	-	-	1000		
<b>Brake system</b>					
Brake discs	-	-	1000		Inspect
Brake pads	-	-	1000		
Brake fluid level	-	-	1000		
■ Brake line	-	-	1000	Inspect for damage and sealing	
Brake pedal	-	-	1000	Inspect for free play	
<b>Wheels</b>					
Tire condition	-	-	1000		Inspect
Tire pressure	-	-	1000		
<b>Suspension system</b>					
■ Rear shock absorber and front forks	-	-	1000	Inspect for leaking (maintain front fork and rear shock absorber according to the requirement and use purpose)	
<b>Cooling system</b>					
Coolant fluid level	-	-	1000		Inspect
■ Coolant	-	-	1000		
■ Radiator fan function	-	-	1000		
Cooling hose	-	-	1000		
<b>Steering system</b>					
■ Steering bearings	-	-	1000	Inspect	
<b>Other parts</b>					
■ Diagnosis connector	-	-	1000	Read with DSCAN	
■ Mobile parts	-	-	1000	Lubricate, inspect for flexibility	
■ Bolts and nuts	-	-	1000	Inspect for fastness	
■ Cables and wires	-	-	1000	Inspect for damage, bending and routing	

**2.1.3 Periodic Maintenance Schedule**

Item	Periodic Maintenance Interval (Service whichever interval comes first)				Remarks
	Hour	Calendar	km		
<b>Engine</b>					
Oil and oil filter	-	6M	5000	Replace	
■ Clutch	-	-	10000		Inspect
Idle	-	-	10000		
■ Coolant	-	-	10000		Replace
Throttle system	-	-	10000	Inspect	
■ Throttle valve body	-	-	5000	Clean	
► ■ Air filter element	-	-	10000	Inspect	Replace
■ Spark plug	-	-	10000		
■ Valve clearance	-		40000	Inspect	
<b>Electrical system</b>					
■ Functions of electrical parts	-	12M	10000		Inspect
Battery	-	6M	5000		
Fuses or overload protector	-	6M	5000		Inspect for damage, bending and routing
■ Wires	-	12M	10000		
<b>Brake system</b>					
Front and rear brake system	-	12M	10000		Inspect
	-	24M	20000		
Brake discs	-	12M	10000		Inspect
	-	24M	20000		
► Brake pads	-	12M	10000		Inspect
	-	24M	20000		
Brake fluid level	-	12M	10000		Inspect for free play
	-	-	20000		
Brake pedal	-	24M	20000		Inspect for damage and sealing
	-	12M	10000		
■ Brake line	-	24M	20000		Inspect for damage and sealing
	-	12M	10000		
■ Brake fluid		24M	-	Replace	
<b>Wheels</b>					
Tire condition	-	12M	10000		Inspect
	-	24M	20000		
Tire pressure	-	12M	10000		Inspect
	-	24M	20000		
■ Wheel bearings	-	-	10000		Inspect
	-	-	30000		

## 02 Maintenance Information

Item	Periodic Maintenance Interval (Service whichever interval comes first)			
	Hour	Calendar	km	Remarks
<b>Suspension system</b>				
■ Suspension system	-	-	5000	Inspect
	-	-	10000	
	-	-	15000	
■ Rear shock absorber and front forks	-	12M	10000	Inspect for leaking (maintain front fork and rear shock absorber according to the requirement and use purpose)
	-	24M	20000	
■ Swing arms	-	-	10000	Inspect
	-	-	30000	
<b>Cooling system</b>				
Coolant fluid level	-	12M	10000	Inspect
	-	24M	20000	
■ Coolant	-	12M	10000	
	-	24M	20000	
■ Radiator fan function	-	12M	10000	
	-	24M	20000	
■ Cooling hose	-	12M	10000	
	-	48M	30000	
<b>Frame system</b>				
Frame system	-	-	30000	Inspect
<b>Steering system</b>				
■ Steering bearing	-	12M	10000	Inspect
	-	24M	20000	
<b>Chain</b>				
► Chain, rear sprocket and engine sprocket	-	12M	10000	Inspect
	-	24M	20000	
<b>Other parts</b>				
■ Diagnosis connector	-	12M	10000	Read with DSCAN
	-	24M	20000	
■ Mobile parts	-	12M	10000	Lubricate; inspect for flexibility
	-	48M	30000	
■ Bolts and nuts	-	12M	10000	Inspect for fastness
	-	48M	30000	
■ Cables and wires	-	12M	5000	Inspect for damage, bending and routing
	-	24M	15000	
■ Pipes, ducts, hoses and sleeves	-	12M	10000	Inspect for cracks, sealing and routing
	-	48M	30000	

## 03 Technical Information

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## 3.1 General Specification

Item		Specifications		
Model		IBEX 450		
		CF400-8	CF400-8F	
Length		2210 mm		
Width		870 mm		
Height		1390 mm		
Wheel Base		1505 mm		
Engine Model		272MQ-B		
Displacement		449CC		
Fuel Grade		Gasoline		
Gross Weight		185kg		
Passengers		Two passengers (including driver)		
Tire	Front	90/90-21		
	Rear	140/70 R18		
Min Ground Clearance		220 mm		
Turning Circle Diameter		5400 mm		
Load		175kg		
Steering	Steering Angle	Right	36°	
		Left	36°	
Brake System		Front	Hydraulic Disc	
		Rear	Hydraulic Disc	
Shock Absorber	Suspension	Front Wheel	Telescopic	
		Rear Wheel	Cantilever Type	
Frame			Steel Tube	

Item		Standard
Fuel Supplier	Fuel Capacity	17.5 L
	Injector	Type: F01R00MH06
	Fuel Pump	Voltage: DC13.5V±0.3V
		Pressure: 0.40MPa ± 0.01MPa
		Flow: ≥20 L/h
		Current: ≤2.2 A

## 3.2 Engine Specification

Item	Type/Specification		
Model	IBEX 450		
	CF400-8	CF400-8F	
Type	Single cylinder/4-stroke/wind-cooled/		
Bore×Stroke	72.0mm ×55.2 mm		
Displacement	449CC		
Compression Ratio	11.5: 1		
Low Idling Speed(Idling)	1350r/min±135r/min		
Starting System	Electric		
Maximum net power and corresponding speed	32.5kw, 8500rpm	31kw, 8500rpm	
Maximum torque and corresponding speed	44N·m, 6250rpm	42N·m, 6250rpm	
Electrical System	Ignition Type	ECU ignition	
	Spar Plug/Electrode Gap	BN8RT1/0.8mm ~ 1.0 mm	
	Magneto Type	Out rotor, flywheel	
Combustion System	Air Filter Type	Sponge, paper filter	
	Gasoline	RQ-95 and above	
Valves System	Valves Type	DOHC/Chain Drive	
Lubrication System	Lubrication Type	Pressure and splash	
	Oil Pump Type	Rotor drive	
	Oil Filter Type	Paper type, replaceable	
	Engine Oil Type	Primary choice: SAE 10W-40 SJ JASO MA2 Secondary choice: SAE 10W-30 SJ / SAE 10W-50 SJ / SAE 20W-40 SJ / SAE 20W-50 SJ JASO MA2	
Cooling System	Cooling Type	Closed coolant circulation cooling	
	Coolant Type	-35°C Antirust and antifreeze solution	
Drive Train System	Clutch	Wet and multi plate manual clutch	
	Transmission Type	6-gear, constant mesh, step transmission	
	Reducer Gear	6 gears	
	Gearshift Methods/orders	Mechanical Reciprocating/1-0-2-3-4-5-6-5-4-3-2-0-1	
	Gear Ratio	Primary Ratio	2.088
		1st	2.929
		2nd	2.056
		3rd	1.579
		4th	1.333
		5th	1.154
		6th	1.037
Dry Weight	47.3kg		
Output Type	Chain		
Rotation of Engine Output	When forward, counter clockwise (left view)		

## 3.3 Maintenance Specifications

### 3.3.1 Front Wheel

Item		Standard	Service Limit
Front Wheel	Front wheel shaft bending	-	0.2 mm
	Rim Run-out	Longitudinal	0.8 mm
		Horizontal	0.8 mm
	Tire	Remaining Groove	-
		Tire Pressure	225 kPa

### 3.3.2 Rear Wheel

Item		Standard	Service Limit
Rear Wheel	Rim run-out	Longitudinal	0.8 mm
		Horizontal	0.8 mm
	Tire	Remaining Groove	-
		Tire Pressure	225kPa

### 3.3.3 Brake System

Item		Standard	Service Limit
Front Brake	Front (hand) Brake Free Travel	5mm~10mm	-
	Brake Disc Abrasion	4.5 mm	4 mm
Rear Brake	Rear (foot) Brake Free Travel	10mm~20mm	-
	Brake Disc Abrasion	5 mm	4 mm

### 3.3.4 Lights, Dashboard and Switches

Item		Standard
Fuse	Main fuse	30 A
	Secondary fuse	1×25A 3×10A 3×15A 2×5A
Lights	Headlight	LED
	Position light	LED
	Tail light	LED
	Turn light	LED
	License light	LED

### 3.3.5 Suspension

Project		Standard
Suspension	Front suspension	200mm
	Rear suspension	77.5mm
Front shock absorber	Recovery damping	Adjustable
	Compression damping	Adjustable
Rear shock absorber	Recovery damping	Adjustable
	Compression damping	Non-adjustable

If the rear shock spring has a preload setting, the factory setting is 89 mm.

## 3.4 Service Specification

### 3.4.1 Valve Train+Cylinder Head

Item	Standard		Limit	Remark		
Valve Clearance(cold engine)	IN	0.10mm~0.15mm	-			
	EX	0.25mm~0.31mm	-			
Clearance, Valve Guide Bush and Valve Stem	IN	0.01mm~0.037mm		0.075mm		
	EX	0.03mm~0.057mm		0.095mm		
I.D of valve guide bushing	IN&EX	4.500mm~4.512mm		4.540mm		
O.D of valve stem	IN	4.475mm~4.490mm		4.465mm		
	EX	4.455mm~4.470mm		4.445mm		
Free Length, Valve Spring	36.8mm			35mm		
Valve Spring Force	When compress to 33mm, elasticity is 106N~124N			-		
	When compress to 25mm, elasticity is 423N~467N			-		
Camshaft lift	IN	33.945mm~34.055mm		33.850mm		
	EX	32.945mm~33.055mm		32.850mm		
Camshaft to hole clearance	IN&EX	0.028mm~0.071mm		0.13mm		
O.D of camshaft	IN&EX	23.950mm~23.972mm		23.920mm		
I.D of camshaft mating hole	IN&EX	24.000mm~24.021mm		24.050mm		
Camshaft runout	$\leq 0.02\text{mm}$			0.1mm		

## 3.4.2 Lubrication System

Item	Standard		Service Limit	Remark
Outer Rotor to Inner Rotor Clearance	0.08mm~0.15mm		0.25mm	
Outer Rotor to Pump Body Clearance	0.15mm~0.193mm		0.25mm	
Oil Pressure	1500r/min, 1.4bar 6000r/min, 2.4bar		-	
Oil Type	SAE 10W-40 SJ JASO MA2		-	
Oil Capacity	Change oil and filter	2500 mL	-	
	At engine overhaul	2700 mL	-	

## 3.4.3 Cylinder/Piston/Piston Ring/Connecting Rod

Item	Standard		Service Limit	Remark
Cylinder Pressure	1.43MPa~1.55MPa		-	
Piston-to-Cylinder Clearance	0.033mm~0.052mm		0.10mm	
Dia. of Piston at Skirt	71.960mm~71.975mm		71.910mm	Measure 10mm from the lower edge of piston
I.D. Cylinder	72mm~72.019mm		72.065mm	
Piston Ring Opening Gap	1Ring	0.15mm~0.30mm	0.55mm	
	2Ring	0.10mm~0.30mm	0.55mm	
	Oil Ring	0.20mm~0.70mm	0.85mm	
Piston Ring/Piston Ring Groove Clearance	1Ring	0.02mm~0.06mm	0.15mm	
	2Ring	0.02mm~0.06mm	0.15mm	
	Oil Ring	0.01mm~0.15mm	-	
Thickness, Piston Ring	1Ring	0.97mm~0.99mm	0.93mm	
	2Ring	0.97mm~0.99mm	0.93mm	
	Oil Ring	1.38mm~1.50mm	-	
Width, Piston Ring Groove	1Ring	1.01mm~1.03mm	1.10mm	
	2Ring	1.01mm~1.03mm	1.10mm	
	Oil Ring	1.51mm~1.53mm	-	
I.D. Piston Pin Hole	17.002mm~17.008mm		17.035mm	
Piston Pin Diameter	16.992mm~16.997mm		16.980mm	
I.D. Connecting Rod Small End	17.015mm~17.025mm		17.035mm	
Connecting Rod Big End Side Clearance	0.15mm~0.30mm		0.50mm	
Crankshaft Main Journal Diameter	33.985mm~34.000mm		33.965mm	
Crankshaft Main Journal Radial Diameter	0.028mm~0.060mm		0.070mm	

## 03 Technical Information

Crankshaft Connecting Rod Journal Diameter	34.985mm~35.000mm	34.955mm	
Connecting Rod Big End Side Clearance	0.04mm~0.06mm	0.07mm	
Crankshaft Run-out	≤0.02mm	0.05mm	

### 3.4.4 Clutch+Transmission

Item	Standard	Service Limit	Remark
Clutch friction pad assembly 1	-	-	
Quantity	3		
Clutch friction pad assembly 2	-	-	
Quantity	3		
Clutch friction pad assembly thickness	2.9 mm ~3.1mm	2.8 mm	
Driven Plate 1	-	-	
Quantity	1		
Driven Plate 2	-	-	
Quantity	4		
Flatness of clutch friction pad or driven plate	≤0.15mm	0.30mm	
Clutch spring free length	42.5mm~43.5mm	41.5mm	
Thickness, Gear Shift Fork	4.93mm~5.00mm	4.83mm	
Shift Fork Groove Width	5.10mm~5.17mm	5.27mm	

### 3.4.5 Cooling System

Item	Standard/Specification			Service Limit	Remark
Start temp. of thermostat	80°C~84°C			-	
Lift range of thermostat valve	95°C, ≥8 mm			-	
Open pressure of radiator cap	135kPa~160kPa (standard 140kPa)			-	
The relationship between the resistance of water temp. sensor and temperature	Temp. (°C)	Resistance between B and housing (Ω)	Resistance between A and C (kΩ)	-	
	-20	-	13.71~16.94	-	
	25	-	1.825~2.155	-	
	50	176~280	-	-	
	80	63.4~81.4	0.303~0.326	-	
	110	24.6~30.6	0.1383~0.1451	-	
Coolant type	-35°C anti-rust and anti-freeze fluid with high boiling point			-	

### 3.4.6 Air Inlet System

Item	Specification	Remark
Mouth Size(mm)	φ39 mm	

Idle(r/min)	1400 r/min ± 140 r/min	
-------------	------------------------	--

### 3.4.7 Electrical System

Item	Specification		Remark
Spark Plug	Model	BN8RTI	
	Gap	0.8mm~1.0mm	
Spark	> 8 mm (100kPa)		
Ignition Coil	Primary Coil	0.8 Ω ~1.4 Ω	
	Secondary Coil	12.5k Ω ~13.5k Ω	
Magneto Coil Resistance	Trigger	400 Ω	
Max Output Power	350W (7000r/min)		
Stabilized Voltage	13.5V~15.0V		
Secondary Voltage, Ignition Coil	≥27kV		
Trigger Peak Voltage	≥20V (1300r/min)		

### 3.5 Tighten Torque

Normal Tighten Torque Follows:

Item	Torque N·m	Category	Torque N·m(kgf·m)
5mm Bolt, Nut	5	5mm Screw	4
6mm Bolt, Nut	10	6mm Screw	9
8mm Bolt, Nut	20~30	6mm Flange Bolt, Nut	12
10mm Bolt, Nut	30~40	8mm Flange Bolt, Nut	20~30
12mm Bolt, Nut	40~50	10mm Flange Bolt, Nut	30~40

#### 3.5.1 Tighten Torque Table for Vehicle

Tighten to standard torque where not recorded in the table below

**NOTE: 1: Apply thread locker on the joint surface of thread part.**  
**2: The self-locking bolt should be replaced when disassembling.**

Position	Type	QTY	Tighten Torque N·m
Engine front LH mounting bolt	M10×1.5×60	1	50~55
Engine front RH mounting bolt	M10×1.5×30	1	50~55
Engine middle RH mounting bolt	M10×1.5×30	1	50~55
Engine middle LH mounting bolt	M10×1.5×60	1	50~55
Engine rear mounting nut	M10×1.25	1	45~50
Auxiliary frame upper mounting nut	M10×1.25×25	2	50~55
Auxiliary frame lower mounting nut	M10×1.25	2	50~55
Front wheel shaft	M16×1.5	1	80~85
Rear wheel shaft nut	M16×1.5	1	105~110
Upper triple clamp lock screw	M25×1.5	1	20~25 (before the upper triple clamp shock absorber lock screw is tightened)
Upper triple clamp steering column lock bolt	M8×25	1	20~25

## 03 Technical Information

Upper and lower triple clamps shock absorber lock screw	M8×30	6	20~25
Front shock absorber lock front wheel shaft bolt	M8×25	2	20~25
Rear shock absorber upper mounting bolt	M10×1.25×50	1	45~50
Rear shock absorber lower mounting nut	M10×1.25×50	1	45~50
Triple swing arm lower mounting nut	M12×1.25	1	50~55
Triple swing arm upper mounting nut	M12×1.25	1	50~55
Pull rod assembly mounting bolt	M10×1.25×130	1	45~50
Front brake caliper mounting bolt	M10×1.25×60	2	45~50
Handlebar bracket mounting bolt	M10×1.25×60	2	45~50
Handlebar block mounting bolt	M8×25	4	20~25
Rear fork shaft lock bolt	M12×1.25×35	2	105~110
Front LH/RH footrest bracket bolt	M8×20	2	20~25
Rear LH/RH footrest bracket bolt	M8×20	4	20~25
Rear handrail mounting bolt	M8×20	4	20~25
Clutch lever press cover bolt	M6×20	2	7~9 (without bolt glue)
NOTE: In addition to the nuts, bolt glue is required for bolt assembly			

## 3.5.2 Tighten Torque Table for Engine

Item	Qty.	Screw Specification	Torque (N·m)	Remark
Crankcase bolt	3	M6	10	
Crankcase bolt	13	M8	8→20→27	Apply appropriate amount of oil, MoS2 grease mixture (weight ratio 10:1)
Crankcase bolt	6	M9	8→20→35	Apply appropriate amount of oil, MoS2 grease mixture (weight ratio 10:1)
LH bearing panel bolt	2	M6	10	Apply thread locker
RH bearing panel bolt	2	M6	10	
Fork shaft cover	1	M14×1.25	5	
Fuel injector	2	M5	5.4	
Oil pressure switch	1	R3/8	20	Apply silicone sealant
Main oil passage cone blocke	1	R <sub>2</sub> 3/8	20	Apply thread locker
Oil filter mounting bolt	1	M20×1.5	25	
Shift positioning torsion spring pin	1	M8	20	Apply thread locker
RH side cover bolt	11	M6	10	
Timing viewing hole cover	1	M12×1.5	4	
Oil filling plug	1	3/4"	Tighten by hand	
Filter cover	1	M35×1.5	10	
LH side cover bolt	11	M6	10	
Magneto stator bolt	3	M6	10	Apply thread locker
Trigger bolt	2	M5	5	Apply thread locker
Press plate bolt	1	M6	10	
Cylinder head bolt	4	M6	10	
Labyrinth press plate bolt	3	M6	10	
Cylinder head bolt	6	M10	New bolt 20→54 Old bolt 20→49	Apply appropriate amount of oil, MoS2 grease mixture (weight ratio 10:1)
Cylinder head bolt	2	M6	10	
Cylinder head shock absorber bolt	1	M6	10	
Water temperature sensor	1	M12×1.5	15	
Thermostat cover bolt	3	M6	10	

## 03 Technical Information

Item	Qty.	Screw Specification	Torque (N·m)	Remark
Spark plug	2	M10×1	15	
Cylinder head plug	2	R <sub>2</sub> 3/8	20	Apply silicone sealants
Camshaft seat bolt	12	M6	5→8→12	
Tensioner assembly bolt	2	M6	10	
Throttle body connecting pipe bolt	3	M6	10	
Timing sprocket bolt	4	M6	10	
Thread pin shaft	1	M8	20	
Magneto rotor assembly fixing bolt	1	M12×1.25	155	
Connecting rod bolt	4	M8×0.75	(20 N·m±2 N·m) +(100°±5°)	Apply appropriate amount of oil, MoS <sub>2</sub> grease mixture (weight ratio 10:1)
Clutch press plate bolt	3	M6	10	
Clutch nut	1	M14×1.25	125	
Output sprocket nut	1	M20×1.5	125	
Gearshift drum bolt	1	M6	10	Apply thread locker
Gearshift swing arm screw	1	M6	10	
Gear sensor bolt	2	M6	10	Apply thread locker
Shift drum limit screw	1	M6	10	
Oil pump sub assembly bolt	4	M6	10	
Oil filter	1	M20×1.5	17	Apply oil on the seal ring
Water pump assembly bolt	4	M6	10	
Drain bolt	1	M12×1.5	35	
Oil pan retaining bolt	13	M6	10	
Starter motor bolt	2	M6	10	
Others		M5	4.5~6	
		M6	8~12	
		M8	18~25	

## 3.6 Lubrication Requirements

The control cable, bearing and rotating parts shall be lubricated according to the following table.

### 3.6.1 Vehicle Consumption Materials

Application Areas	Notes	Type
Side bracket rotating part Steering column bearing Rear fork needle bearing Triple swing arm needle bearing Tie rod assembly needle roller bearing Front wheel LH/RH oil seal Rear brake padel rotating part Rear wheel RH oil seal Sprocket seat oil seal Cable Moving parts of windshield support Rotating parts of front footrest Rotating parts of rear footrest Rotating parts of shift lever	Lubrication	Lithium grease GB/T5671

### 3.6.2 Engine Consumption Materials&Assembling Materials

Item	Specification	Using parts	Remark
Lubricant oil	SAE10W/40 SJ, JASOMA2	Rotation and moving section in cylinder, crankcase and cylinder head. Details refer to lubricant chart.	Oil Capacity: 2500mL(oil and filter change) 2700mL(at overhaul)
Lubricant oil with molybdenum		Oil seal, o-ring and rubber seal face, bearing with sealant	
Lubricant grease	#3 MoS <sub>2</sub> lithium grease	Oil seal, o-ring and rubber seal face, bearing with sealant	
Coolant	-35°C anti-rust and anti-freeze fluid with high boiling point	Cooling system, water seal installation	Capacity depends on radiator water pipes
Flange sealant		Crankcase faying face , crankcase and cylinder joint cylinder head and cylinder head cover joint	
Thread locker		Parts of thread	

<b>4.1 Seat Removal.....</b>	<b>4-2</b>
<b>4.2 Seat Installation .....</b>	<b>4-2</b>

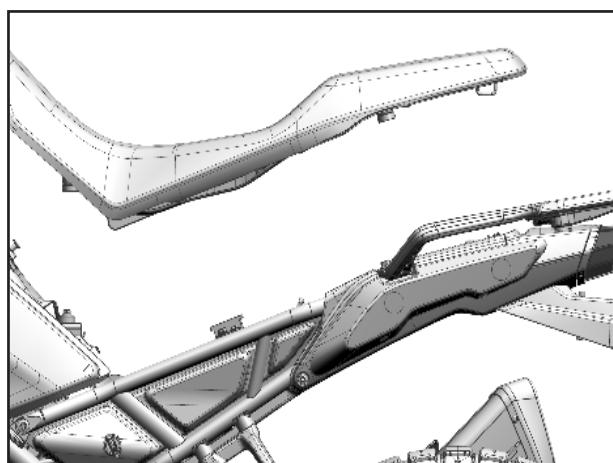
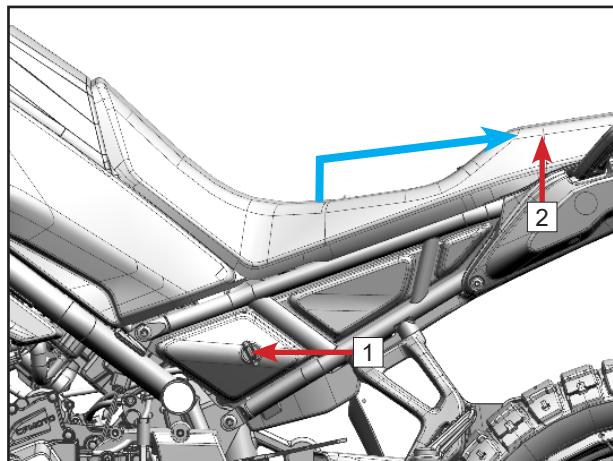
## 4.1 Seat Removal

Place the vehicle on the level surface and park.

Insert the key 1 into the seat lock, turn the key clockwise and release the seat.

Lift the front part of rear seat 2.

Remove the seat from synclinal rear.

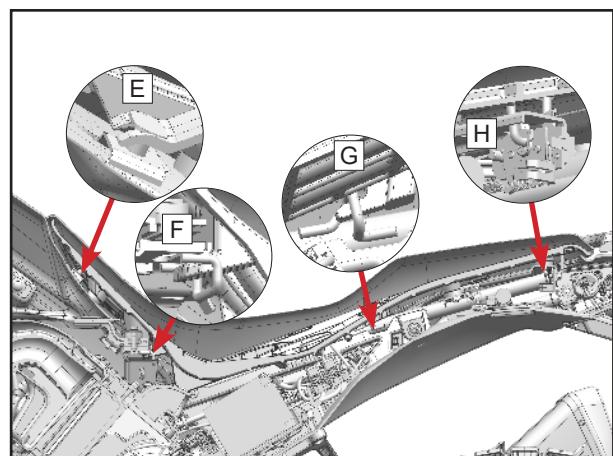
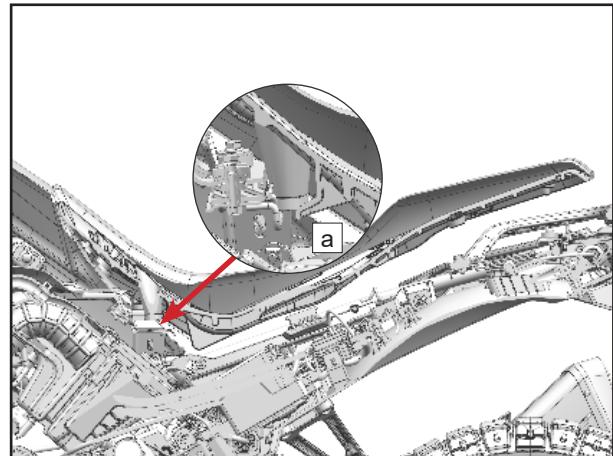


## 4.2 Seat Installation

Place the seat cushion on the vehicle along the body lengthwise, place the front rubber cushion on the sheet metal (see picture a), and lift the tail.

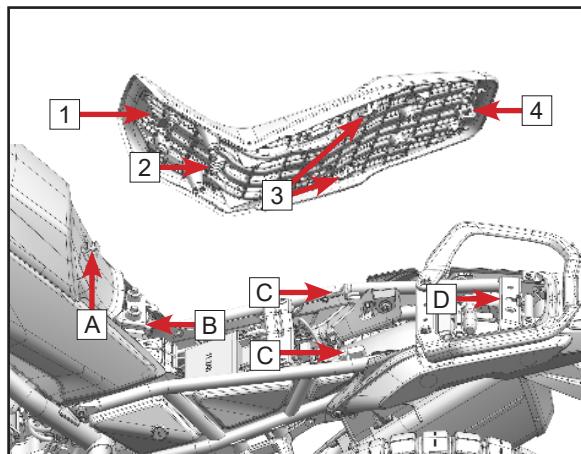
Push the front end of seat down and slightly forward so that the fixed point A at the fuel tank tail part is raised into the seat slot 1 (see picture E).

Press the middle part of seat downward, and slowly push forward so that the seat latch 2 is fastened into the rear seat hook of fuel tank B, so that the seat latch 3 is fastened into the frame fixing hook C (see pictures F, G).



Continue to push the seat downward, install in place, and finally press the tail of seat to make the lock latch **4** into the seat lock **D** (see picture H), the seat installation is complete.

After completing the installation, hold the seat and shake it slightly from side to side to confirm that it is in place.



**NOTE: If the seat is not properly installed, it may become loose. Pull up the seat to check that it is locked properly.**

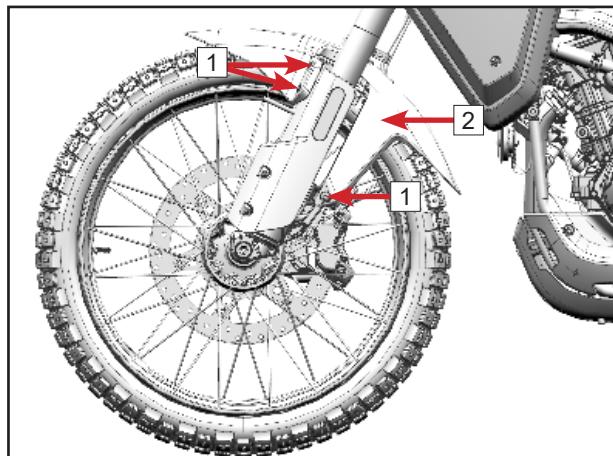
<b>5.1 Front Fender Assembly .....</b>	<b>5-2</b>
5.1.1 Front Fender Deco Plate.....	5-3
<b>5.2 Handle Guard .....</b>	<b>5-3</b>
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<b>5.4 Vehicle Panel Assembly.....</b>	<b>5-4</b>
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<b>5.9 Small Sprocket Guard.....</b>	<b>5-13</b>
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5.10.1 Engine LH Panel.....	5-13
5.10.2 Engine RH Panel .....	5-13
5.10.3 Engine Lower Panel .....	5-13
<b>5.11 Rear Fork Panel .....</b>	<b>5-13</b>

## 5.1 Front Fender Assembly

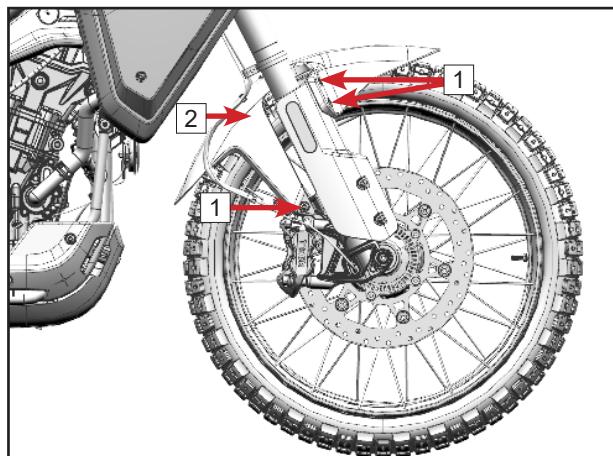
### Low Fender

#### Removal

Remove three bolts **1** on both sides.



Remove front fender **2**.



#### Installation

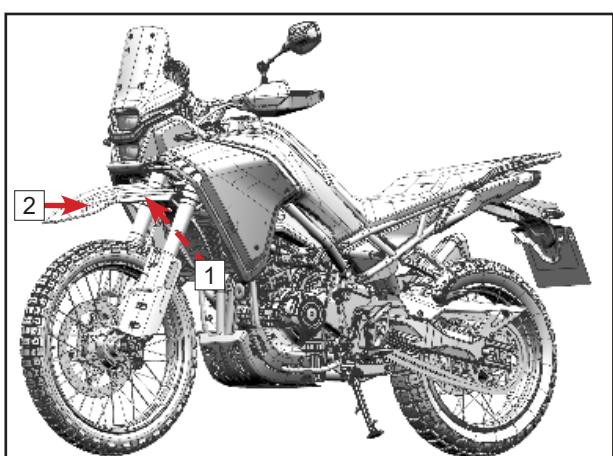
Reverse the removal procedures for installation.

### High Fender

#### Removal

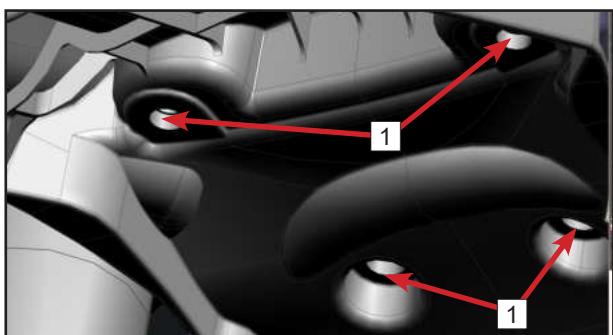
Remove four bolts **1**.

Remove front fender **2**.



#### Installation

Reverse the removal procedures for installation.

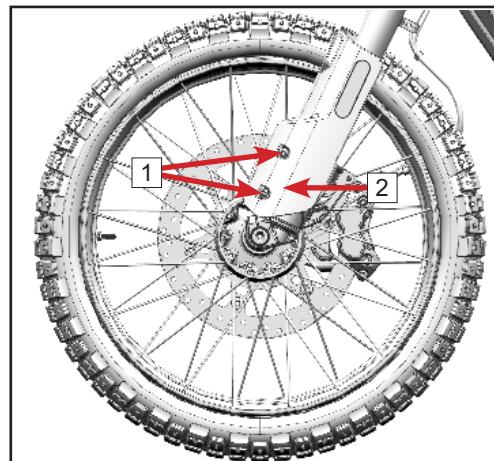


## 5.1.1 Front Fender Deco Plate

### Removal

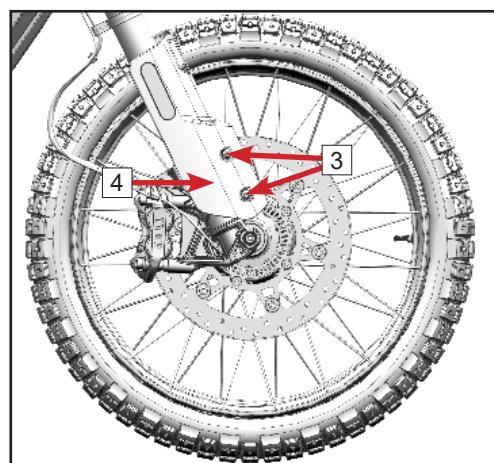
Remove screws **1**.

Remove front fender LH deco plate **2**.



Remove screws **3**.

Remove front fender RH deco plate **4**.



### Installation

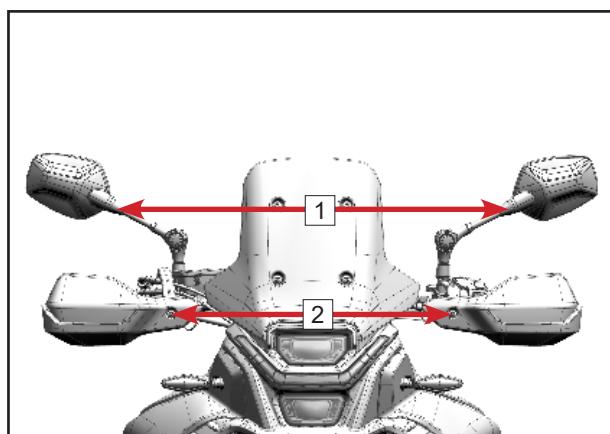
Reverse the removal procedures for installation.

## 5.2 Handle Guard

### Removal

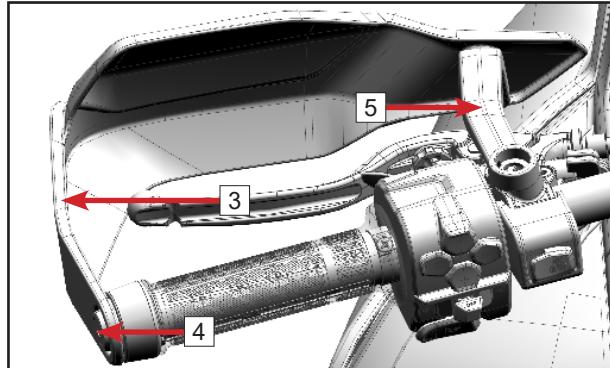
Rotate to remove two rear view mirrors **1**.

Remove two stepped screws **2**.



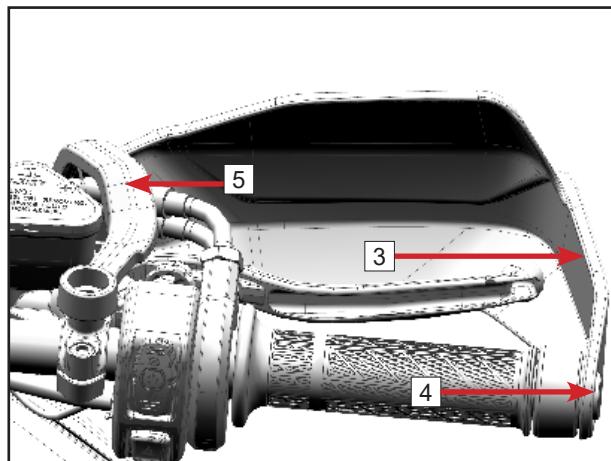
Remove stepped screw **4**.

Remove LH hand guard **3** and **5** assembly.



Remove stepped screw **4**.

Remove RH hand guard **3** and **5** assembly.



## Installation

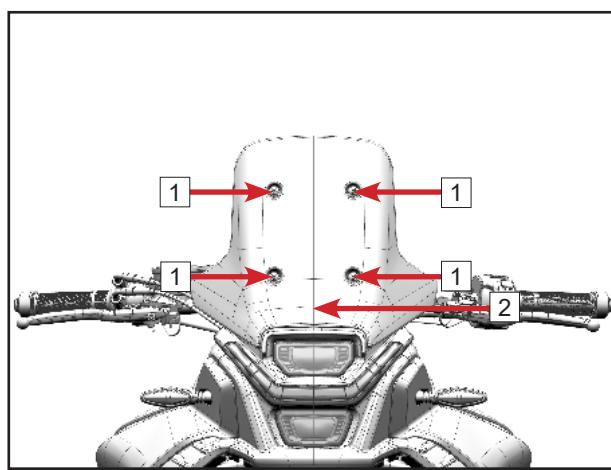
Reverse the removal procedures for installation.

## 5.3 Front Fender

### Removal

Remove four inner hex stepped screws **1**.

Remove front fender **2**.



## Installation

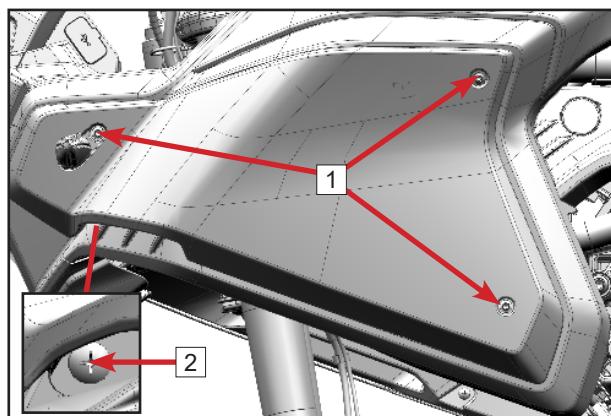
Reverse the removal procedures for installation.

## 5.4 Vehicle Panel Assembly

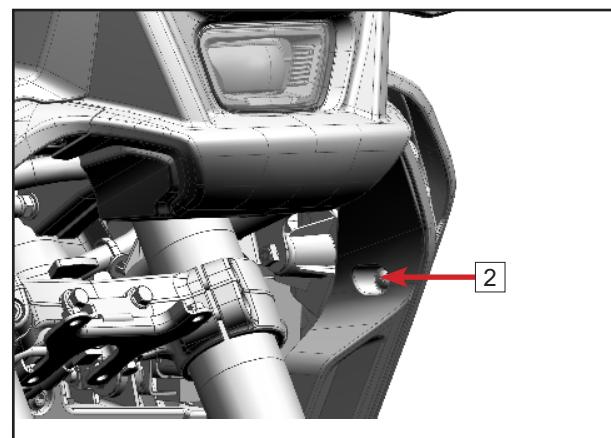
### 5.4.1 Radiator LH Panel and LH Turn Light Removal

#### Removal

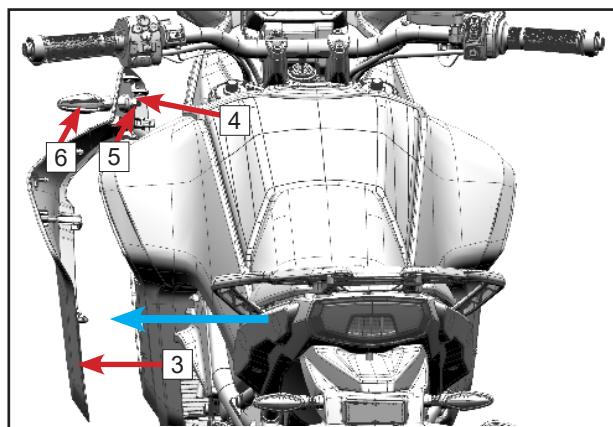
Remove three bolts **1**.



Remove two self-tapping screws **2**.



Remove the radiator LH panel **3** in the direction shown.  
 Disconnect the turn light harness **4**.  
 Remove bolt **5**.  
 Remove LH turn light **6**.

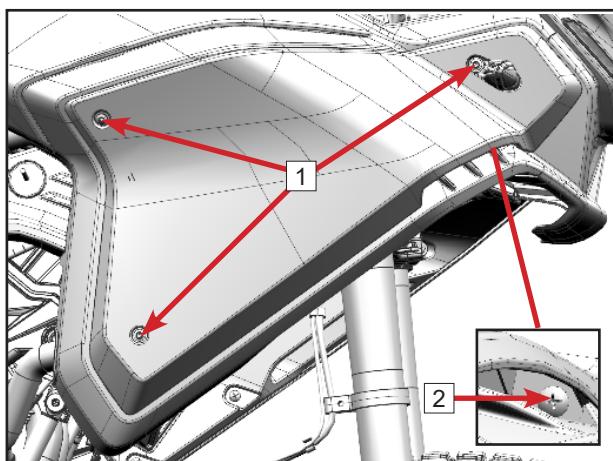


## Installation

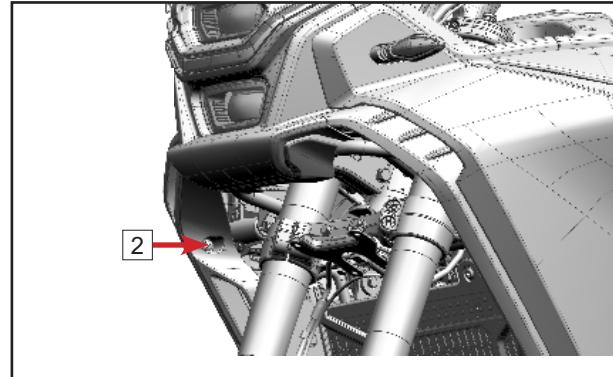
Reverse the removal procedures for installation.

### 5.4.2 Radiator RH Panel and RH Turn Light Removal

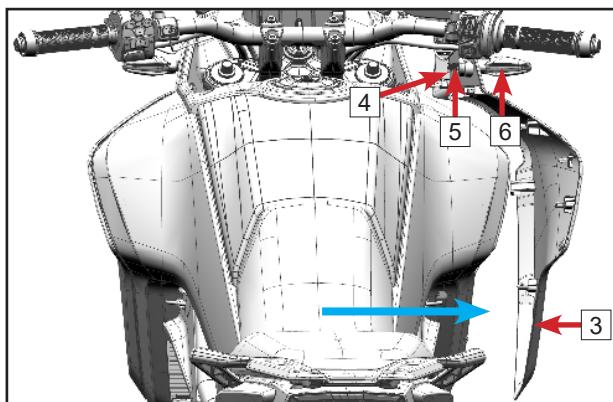
Remove three bolts **1**.



Remove two self-tapping screws **2**.



Remove the radiator RH panel **3** in the direction shown.  
 Disconnect the turn light harness **4**.  
 Remove bolt **5**.  
 Remove RH turn light **6**.



## Installation

Reverse the removal procedures for installation.

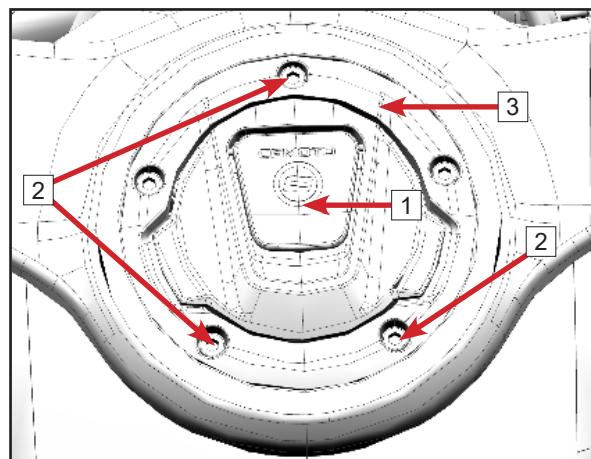
## 5.4.3 Fuel Tank Upper Panel Removal

Open fuel tank cover 1.

Insert the key to open fuel tank lock.

Remove three screws 2.

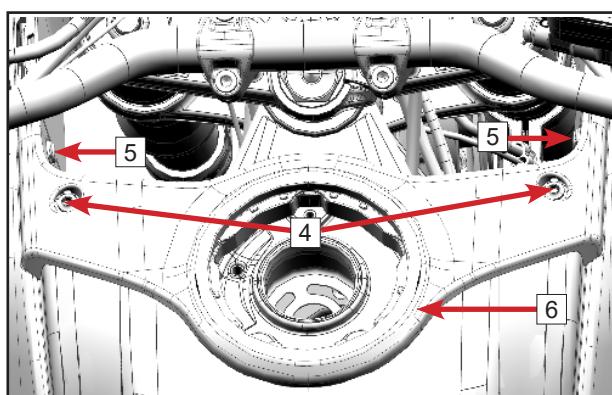
Remove fuel tank lock 3.



Remove two bolts 4.

Remove two plastic clasps 5.

Remove fuel tank upper panel 6.



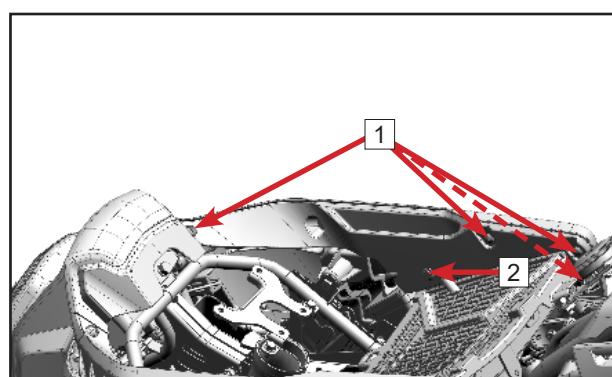
## Installation

Reverse the removal procedures for installation.

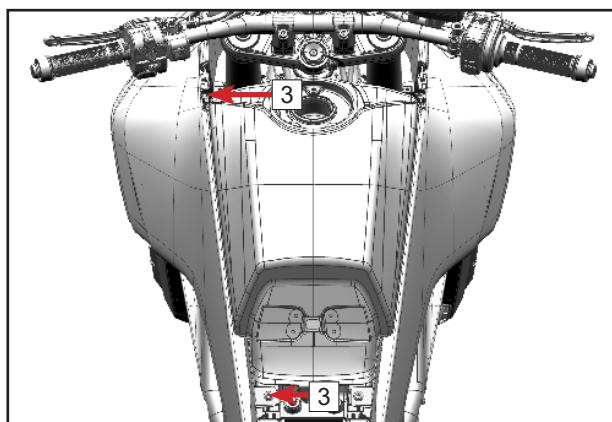
## 5.4.4 Vehicle LH Panel Removal

Remove four bolts 1.

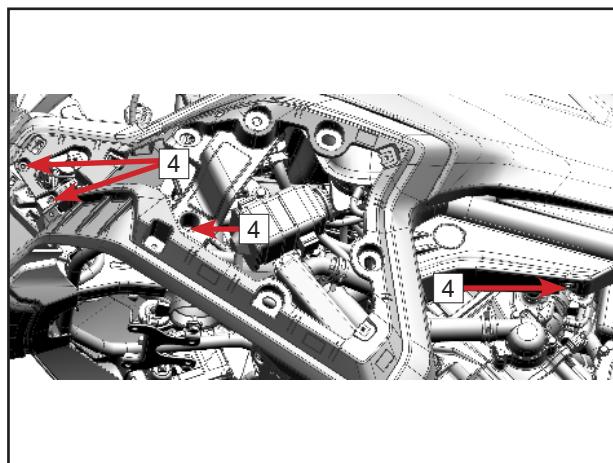
Remove plastic clasp 2.



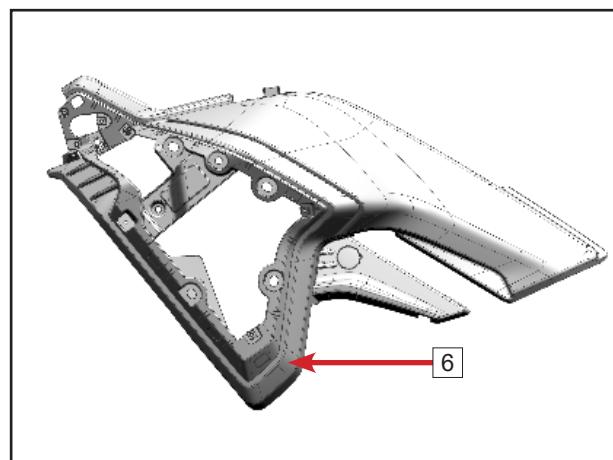
Remove two bolts 3.



Remove four bolts 4.



Remove vehicle LH panel assembly 6.



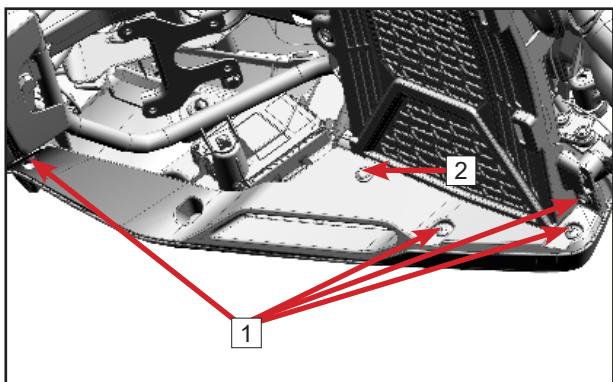
## Installation

Reverse the removal procedures for installation.

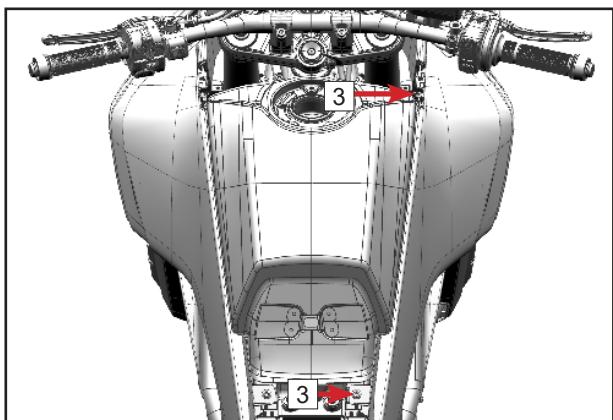
### 5.4.5 Vehicle RH Panel Removal

Remove four bolts 1.

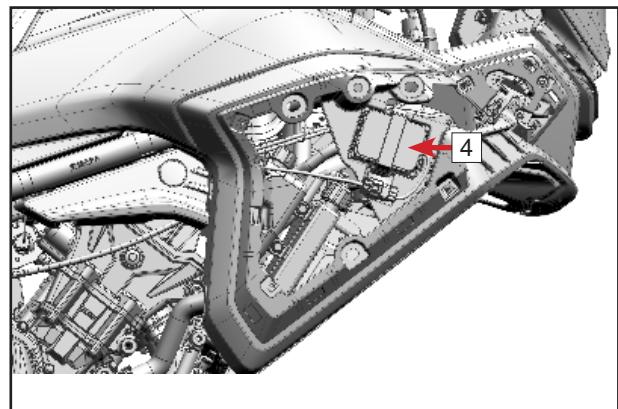
Remove plastic clasp 2.



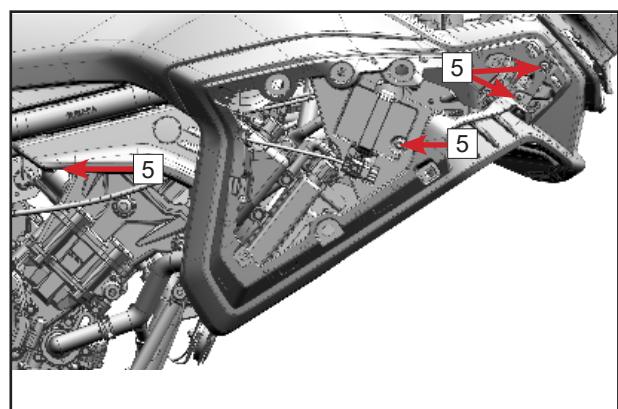
Remove two bolts 3.



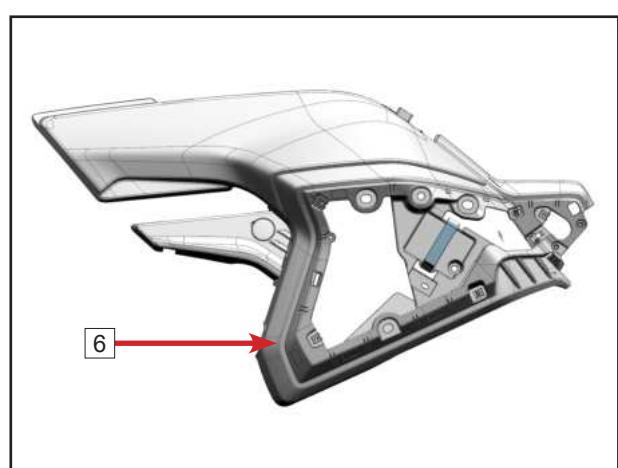
Remove T-BOX 4.



Remove four bolts 5.



Remove vehicle RH panel assembly 6.



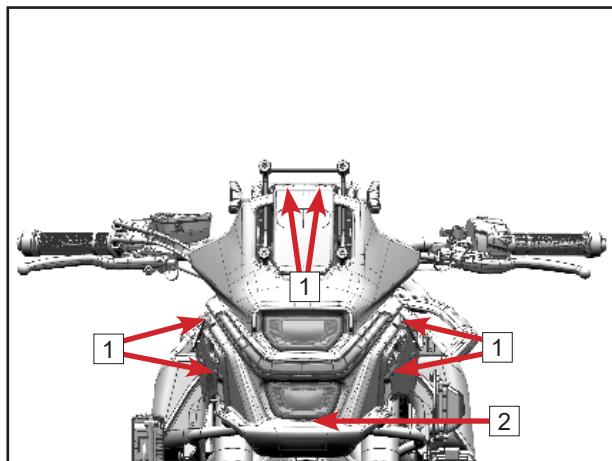
## Installation

Reverse the removal procedures for installation.

## 5.5 Headlight

### Removal

- Remove six screws **1**.
- Remove two bolts **3**.
- Remove headlight assembly **2**.



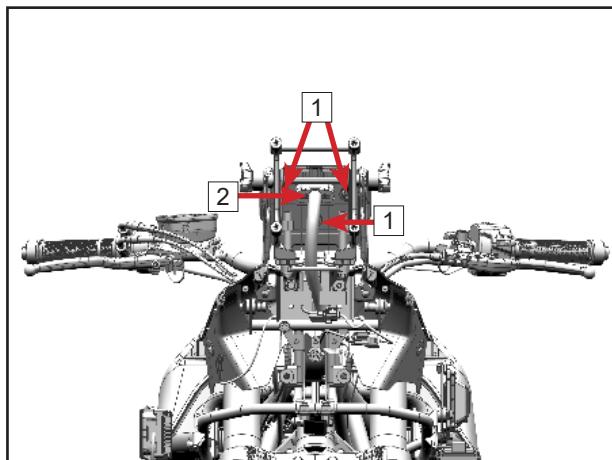
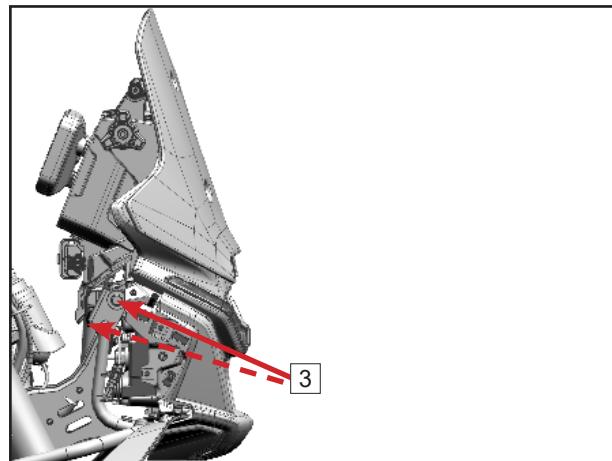
### Installation

Reverse the removal procedures for installation.

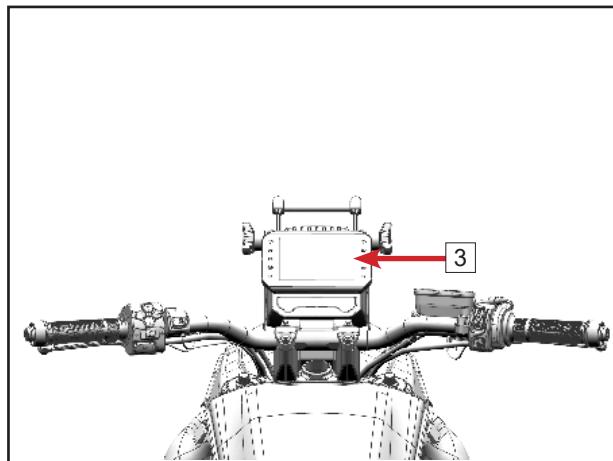
## 5.6 Dashboard

### Removal

- Remove three nuts **1**.
- Disconnect main cable **2**.



Remove dashboard [3].



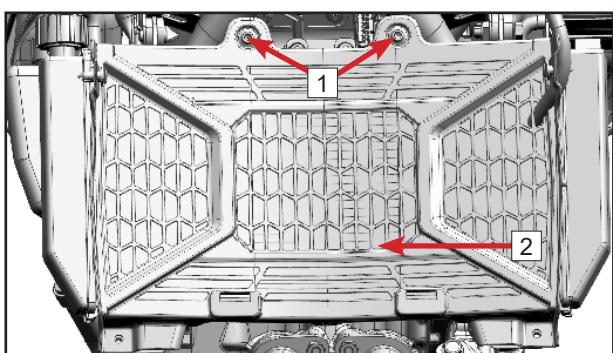
## Installation

Reverse the removal procedures for installation.

## 5.7 Radiator Front Panel Removal

Remove two bolts [1].

Remove radiator front panel [2].



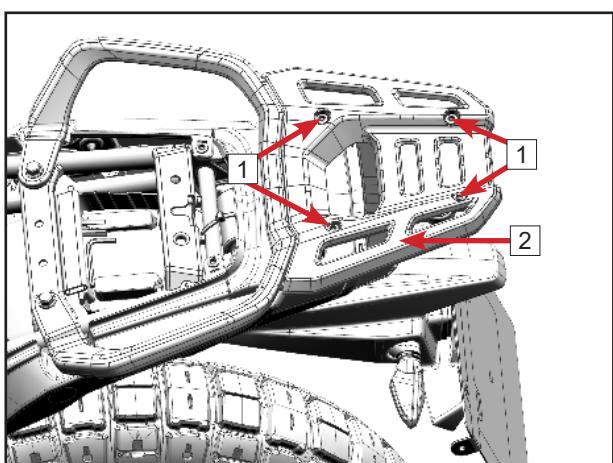
## 5.8 Rear Rim Guard Assembly

### 5.8.1 Rear Armrest Cover Removal

#### Removal

Remove four bolts [1].

Remove rear armrest cover [2].



#### Installation

Reverse the removal procedures for installation.

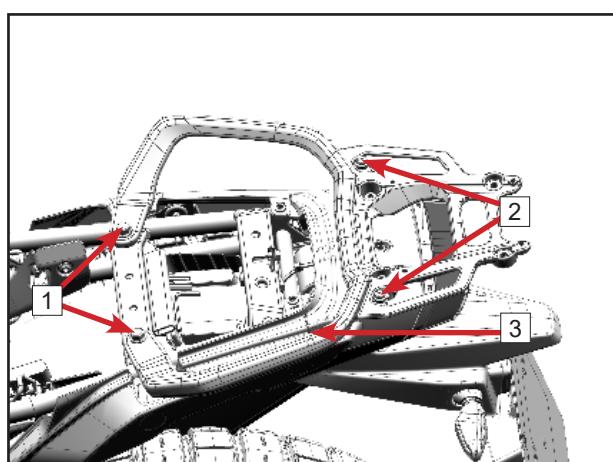
### 5.8.2 Rear Armrest Removal

#### Removal

Remove two bolts [1].

Remove two bolts [2].

Remove rear armrest [3].



#### Installation

Reverse the removal procedures for installation.

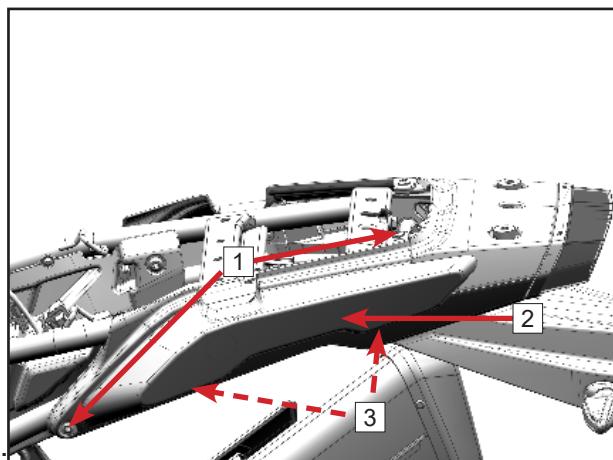
## 5.8.3 Rear LH Deco Plate

### Removal

Remove two bolts **1**.

Remove two expansion screws **3**.

Remove rear LH deco plate **2**.



### Installation

Reverse the removal procedures for installation.

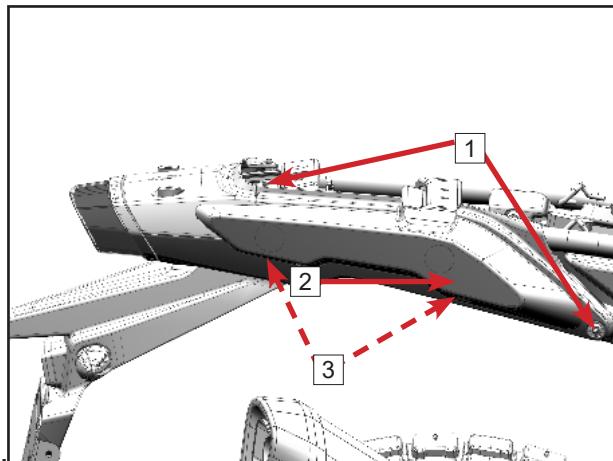
## 5.8.4 Rear RH Deco Plate

### Removal

Remove two bolts **1**.

Remove two expansion screws **3**.

Remove rear RH deco plate **2**.



### Installation

Reverse the removal procedures for installation.

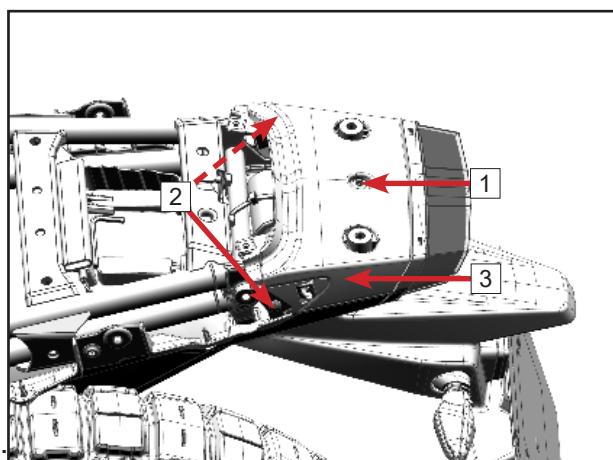
## 5.8.5 Tail Light Upper Guard

### Removal

Remove stepped screw **1**.

Remove two self-tapping screws **2**.

Remove tail light upper guard **3**.



### Installation

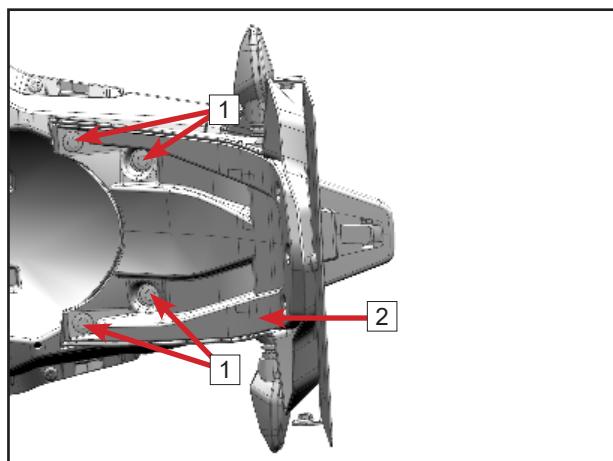
Reverse the removal procedures for installation.

## 5.8.6 Rear Fender Assembly

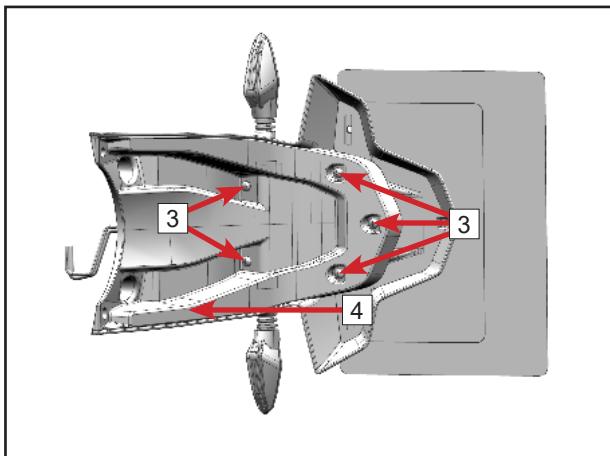
### Removal

Remove four bolts **1**.

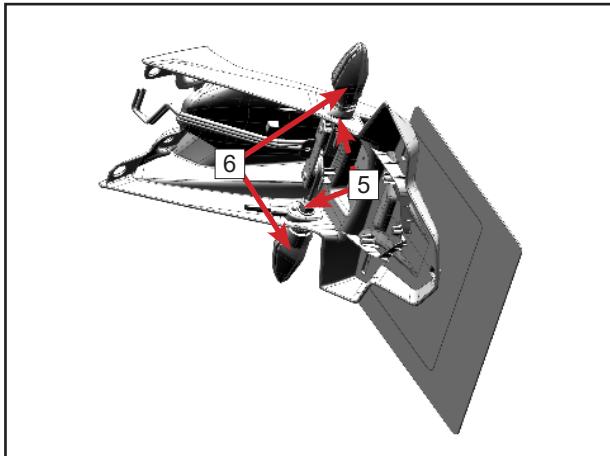
Remove rear fender assembly **2**.



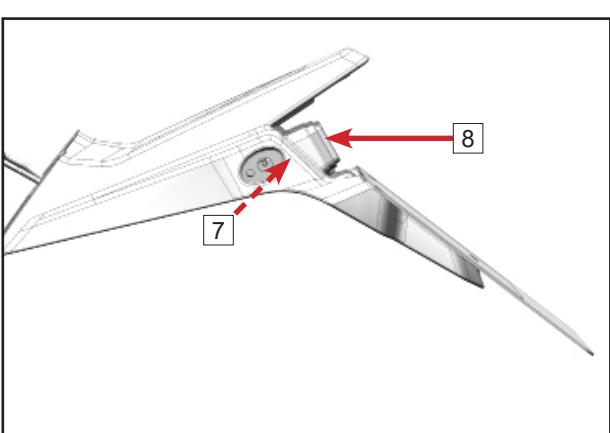
Remove two bolts [3].  
Remove plastic part [4].



Remove two bolts [5].  
Remove turn lights [6].



Remove bolt [7].  
Remove rear reflector [8].



## Installation

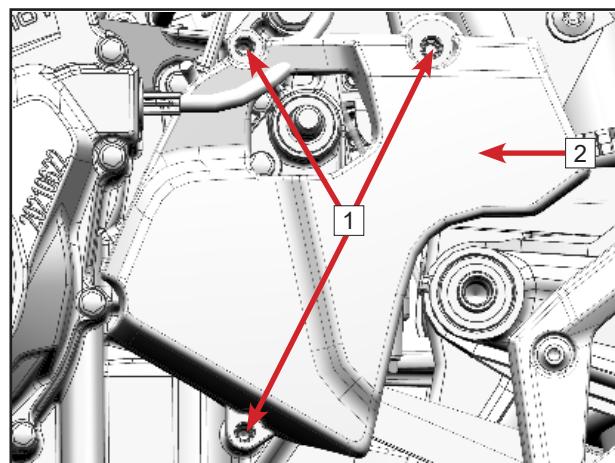
Reverse the removal procedures for installation.

## 5.9 Small Sprocket Guard

### Removal

Remove three inner hex screws **1**.

Remove small sprocket guard **2**.



### Installation

Reverse the removal procedures for installation.

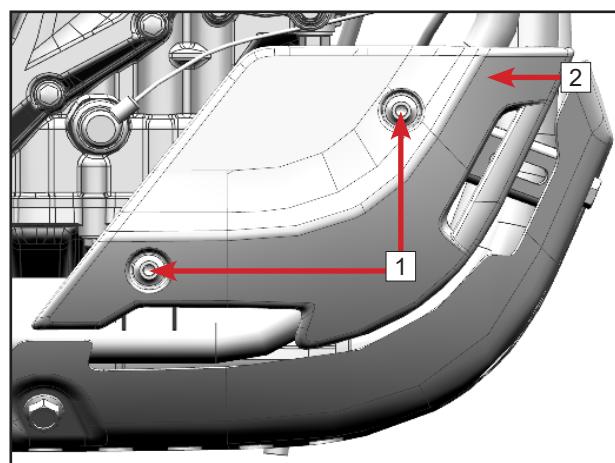
## 5.10 Engine Panel

### 5.10.1 Engine LH Panel

#### Removal

Remove two stepped screws **1**.

Remove engine LH panel **2**.



### Installation

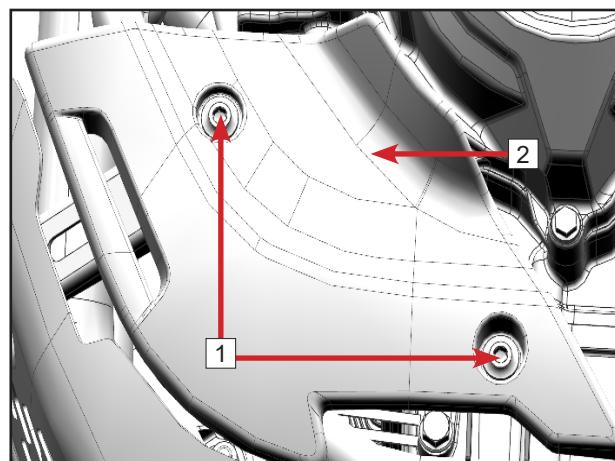
Reverse the removal procedures for installation.

### 5.10.2 Engine RH Panel

#### Removal

Remove two stepped screws **1**.

Remove engine RH panel **2**.



### Installation

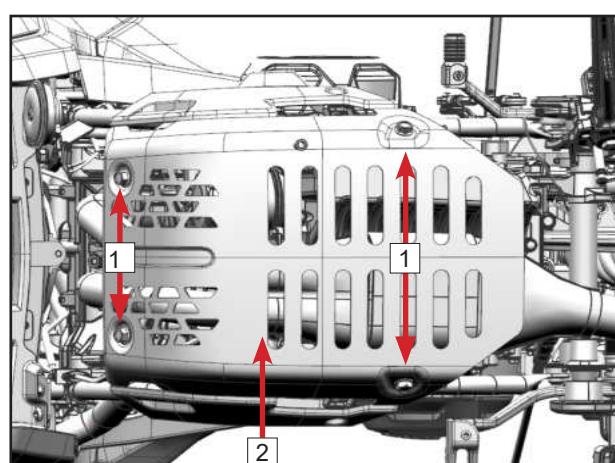
Reverse the removal procedures for installation.

### 5.10.3 Engine Lower Panel

#### Removal

Remove four bolts **1**.

Remove engine lower panel **2**.



### Installation

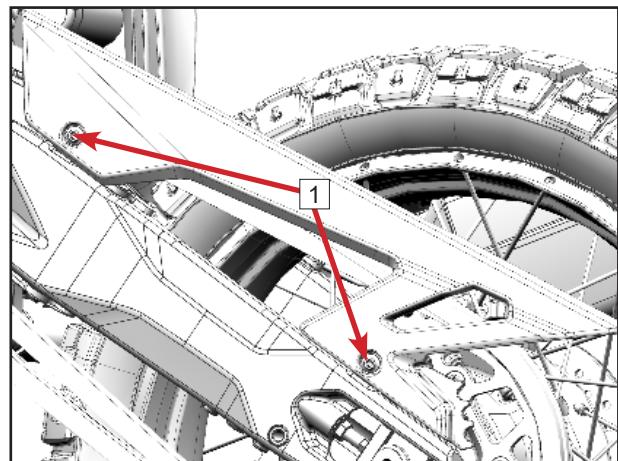
Reverse the removal procedures for installation.

## 5.11 Rear Fork Panel

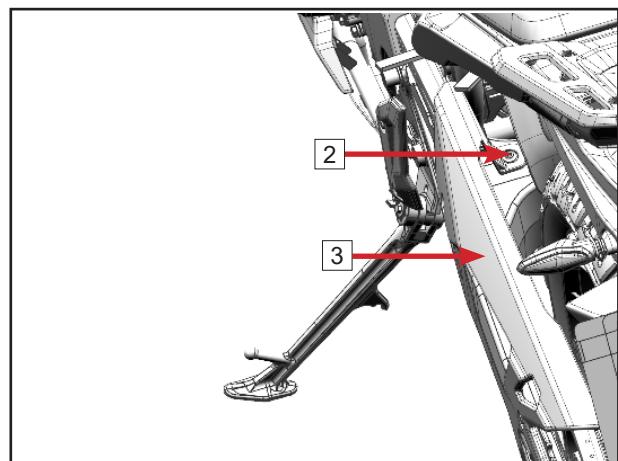
### Removal

Remove two inner hex stepped screws **1**.

Remove one inner hex stepped screw **2**.  
Remove rear fork panel **3**.



**Installation**  
Reverse the removal procedures for installation.



## **06 Fuel System**

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<b>6.1 Fuel Evaporative System .....</b>	<b>6-3</b>
<b>6.2 Fuel Tank Removal .....</b>	<b>6-3</b>
<b>6.3 Fuel Pump .....</b>	<b>6-4</b>
<b>6.4 Fuel Level Sensor Assembly .....</b>	<b>6-4</b>

## **DANGER:**

Fuel is extremely flammable and can be explosive under certain conditions. Always maintain it in a well-ventilated area, turn off the engine in advance and wait for the engine and muffler to cool. No smoking or any acts that cause sparks is allowed in the fuel filling area or fuel storage area.

Never tilt or place upside down the tank. Avoid overflowing onto high temperature parts.

Fuel is toxic and harmful to health. Avoid touching with skin, eyes and clothes. Do not inhale fuel vapor.

If touched skin, wash with plenty of clean water.

If touched to eyes, wash eyes immediately with clean water and see a doctor immediately.

If touched to clothes, change the clothes immediately.

Seek medical attention immediately if accidentally contact your eyes or swallow gasoline.

Dispose of fuel properly to avoid damage to the environment.

## **WARNING:**

Please use genuine parts for maintenance. Otherwise, the normal operation of the electronic injection system cannot be guaranteed.

During maintenance, do not disassemble EFI parts.

Carefully handle EFI parts during maintenance.

Turn the ignition switch off during unplugging or plugging in connectors to prevent damaging EFI parts.

Do not electrify the oil pump during removal to prevent electric spark and fire.

The fuel pump is not allowed to run in dry condition or in water. Otherwise, its service life will be reduced. The positive and negative wires of the fuel pump can't be connected backwards.

The pressure is high (around 400kPa) in fuel system. All fuel hoses are high-pressure resistance. The fuel rail keeps high fuel pressure even the engine doesn't work. Do not remove fuel hose during maintenance.

Spark jumping test should be carried out only when necessary. The testing time should be as short as possible. The throttle valve should not be opened during the test. Otherwise, a large amount of unburned fuel will enter the exhaust pipe and damage the three-way catalytic converter.

When the fuel system needs to be repaired, the fuel system should be decompressed before the oil hoses are removed. The method of pressure relief: to remove the oil pump relay and start the engine to idle until the engine stops by itself.

Fuel hoses removal and fuel filter replacement shall be operated by professional technicians in a well-ventilated place.

Do not mis-connect the positive and negative pole of battery. Remove the negative wire first if disassembling battery, in case it damages electrical elements. The system of this vehicle uses negative earth mode.

Battery wires are not allowed to be removed while the engine is working.

Battery positive/negative wires and electrical control units have to be removed before welding on the vehicle.

It is forbidden to puncture the wire to test the input/output electrical signals.

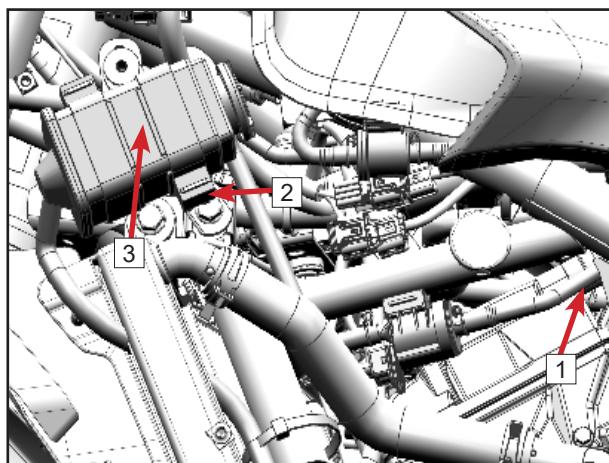
Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

## 6.1 Fuel Evaporative System

### Removal

Remove fuel steam desorption pipes **1** on both sides of the throttle.

Remove the canister **3** from canister holder **2**.



### Installation

Reverse the removal procedures for installation.

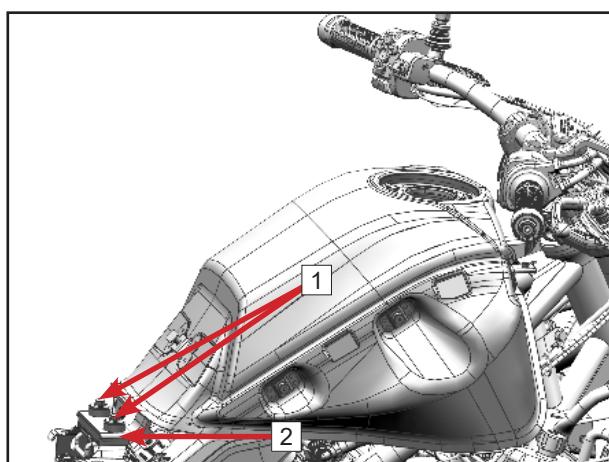
## 6.2 Fuel Tank Removal

### Removal

Remove two bolts **1**.

Lift the fuel tank tail **2**.

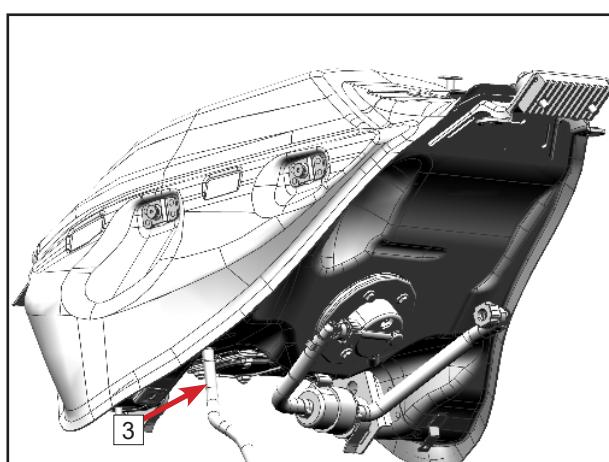
**NOTE: Prevent rubber mat from lossing.**



Disconnect the fuel tank leakage pipe **3**.

Remove high pressure tubing assembly **4**.  
Remove the whole fuel tank assembly.

**DANGER: Never put fuel tank up side down to prevent fuel leaking.**



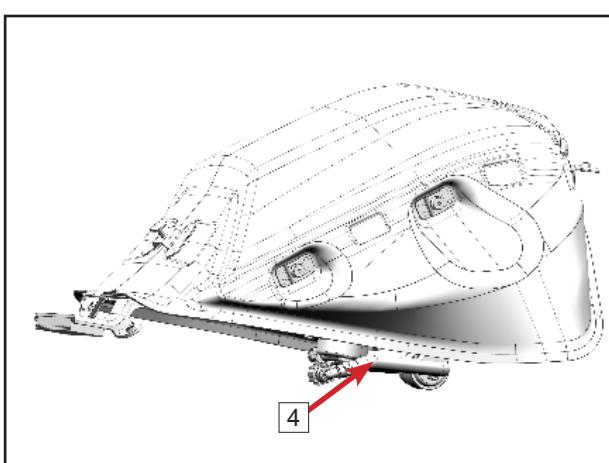
**WARNING: When installing fuel tank, all hoses, pipes and cables can not be extruded.**

### Installation

Reverse the removal procedures for installation.

### Inspection

Inspect fuel tank if sunk, cracked or other damage. Replace if any defect is found.  
Inspect hose if cracked, aged or leaked. Replace if any defect is found.



## 6.3 Fuel Pump

Release pressure in fuel system.

Ensure that static electricity is released by grounding the vehicle.

Unplug cables related to fuel pump.

Unplug quick joint. Cover with cloth to prevent fuel leaking.

Remove fuel pump cables and connectors.

Clean fuel tank and fuel pump to prevent foreign matters into fuel tank.

**NOTE: Excessive foreign matter in the tank may cause the fuel pump to wear out prematurely or block fuel filter.**

Remove bolt 1~bolt 5 in sequence.

Remove fuel pump 6 carefully.

**NOTE: There is still some fuel remained in removed fuel pump. Be careful to transfer the fuel pump into a proper container.**

Check the fuel tank for impurities. Clean the tank thoroughly with clean fuel before reinstalling a new fuel pump. Do not use water or other chemicals to clean the tank.

### Installation

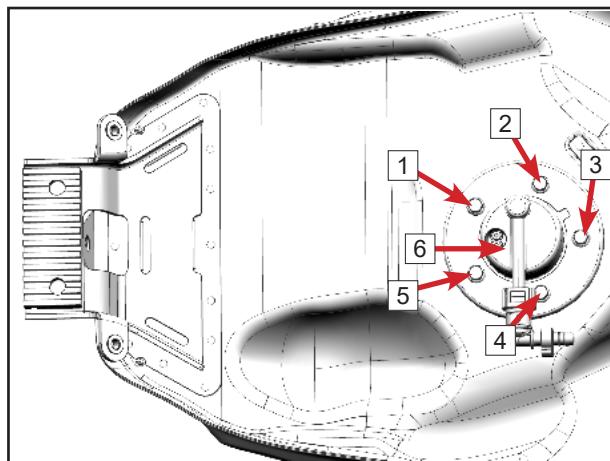
Put the fuel pump seal ring in place from bottom to top and then position the fuel pump on the mounting hole on fuel tank assembly.

**NOTE: The arrow on fuel pump aligns to fuel tank mark all the way.**

Put fuel pump cap on the junction area of fuel pump and fuel tank assembly.

Install the bolt 1~bolt 5 in sequence.

Plug in quick joint, cables and connectors. Start to check if fuel pump works.

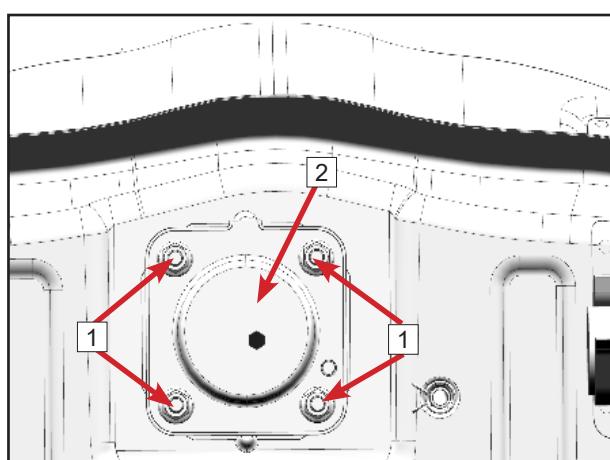


## 6.4 Fuel Level Sensor Assembly

### Removal

Remove four bolts 1 in criss-cross way.

Remove floating ball 2 carefully.



### Inspection

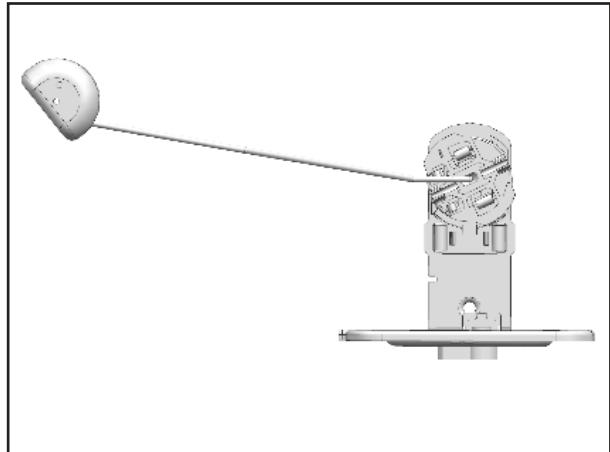
Check fuel level sensor seal ring for deformation, damage or hardening. Replace if it does.

Check the electrical resistance of the fuel level sensor at high and low poles.

### Resistance:

High:  $(10\pm1.5)\Omega$

Low:  $(450\pm5)\Omega$



Connect fuel level sensor and main cable. Turn on ignition switch, the floater of fuel level sensor swings up and down slowly. See the fuel gauge pointer **4** on dashboard. If the pointer can not reach F or E, it means the fuel gauge is not qualified, replace a new one.

If the pointer swings unsteadily, it means the fuel gauge is not qualified, replace a new one.

**NOTE: Check leakage after fuel level sensor installation.**

### Installation

Reverse the removal procedures for installation.

# 07 Lights, Dashboard and Switches

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<b>7.1 Maintenance Information .....</b>	<b>7-2</b>
<b>7.1.1 Operation Caution.....</b>	<b>7-2</b>
<b>7.1.2 Maintenance Information.....</b>	<b>7-2</b>
<b>7.2 Trouble Shooting .....</b>	<b>7-2</b>
<b>7.3 Ignition Lock .....</b>	<b>7-3</b>
<b>7.4 Front Brake Light Switch.....</b>	<b>7-3</b>
<b>7.5 Handlebar Switch .....</b>	<b>7-4</b>
<b>7.5.1 Left Handlebar Switch .....</b>	<b>7-4</b>
<b>7.5.2 Right Handlebar Switch.....</b>	<b>7-5</b>
<b>7.5.3 ABS Switch .....</b>	<b>7-5</b>
<b>7.6 Dashboard.....</b>	<b>7-6</b>
<b>7.7 Battery .....</b>	<b>7-7</b>
<b>7.8 GND Cable.....</b>	<b>7-8</b>
<b>7.9 T-BOX.....</b>	<b>7-8</b>

## 7.1 Maintenance Information

### 7.1.1 Operation Caution

**⚠ Caution:**

- Check if the battery is normal.
- Inspection of switch continuity can be done without removing the switches from the vehicle.
- After the inspecting and overhauling of each part, cables and wires should be routed properly.

### 7.1.2 Maintenance Information

Item		Standard
Fuse	Main fuse	30A
	Auxiliary fuse	2×5A 3×10A 3×15A 1×25A
Lights&Bulb	Headlight	Low-beam LED:15W High-beam LED:26W Position light LED:9.9W
	Turn light	LED: 1.5W×4
	Tail light	Rear position light LED: 2.3W Brake light LED: 4.4W

## 7.2 Trouble Shooting

### Switch light cannot turn on, Hi/Lo switch

doesn't work.

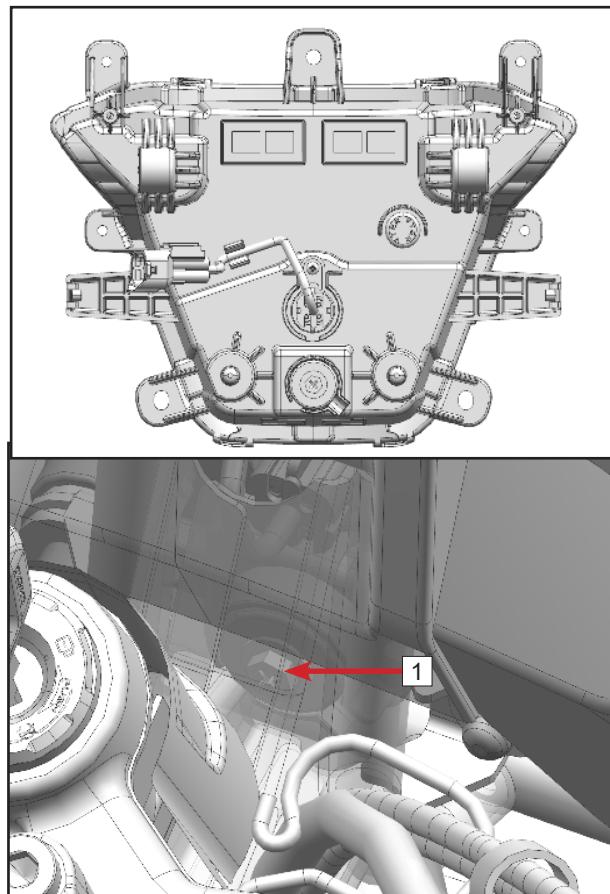
Possible cause:

- 1) Fuse is blown.
- 2) Switch is damaged.
- 3) Battery bad connection or no electricity.
- 4) Abnormal connection such as the needle is withdrawn, the needle is crooked, or the connector is not in place.
- 5) BCM is faulty.

### Headlight

#### Removal

Headlight removal refers to chapter 05.



Adjust the gear 1 directly by using the cross screwdriver on the right side of headlamp, adjust the angles of low-beam/high-beam light.

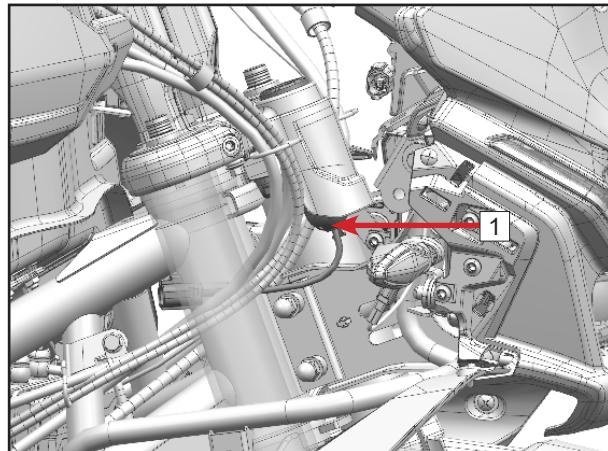
**NOTE: Headlight is consisted of LED light. When the light damages, replace the whole set.**

## 7.3 Ignition Lock

### Inspection

Remove the connectors between ignition switch **1** and main cable to check its performance.

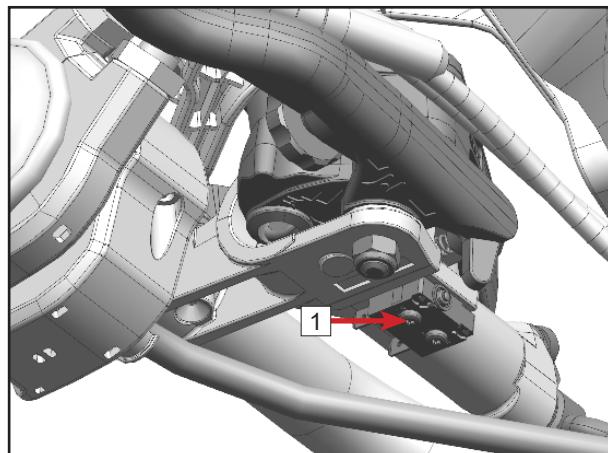
Ignition Switch			
Gear/color	R	B	Key reaches out or not
○	●	●	— NO
×			YES
■			YES



## 7.4 Front Brake Light Switch

Pull out the connectors between front brake light switch **1** and main cable to check its performance.

1. Grip front brake lever, the brake light is on.
2. Loosen front brake lever, the brake light is off.



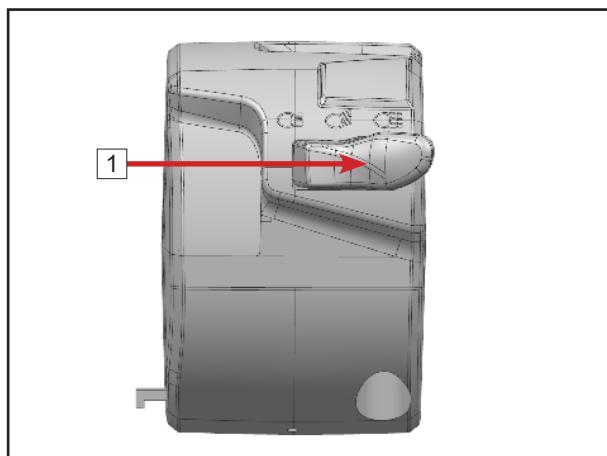
## 7.5 Handlebar Switch

### 7.5.1 Left Handlebar Switch

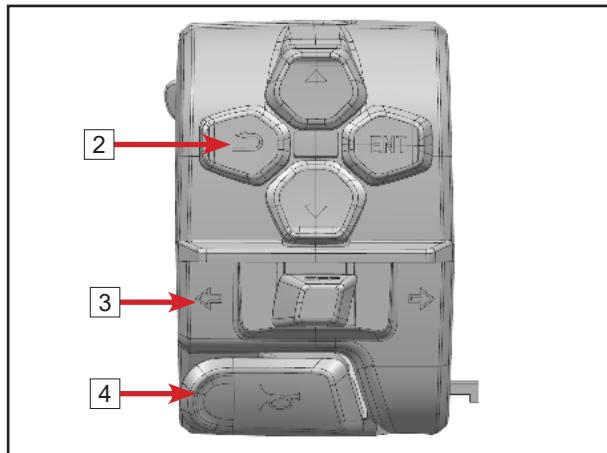
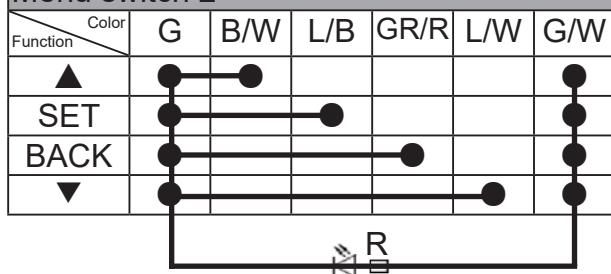
Remove connectors between left handlebar switch and main cable to check switch performance.

Dimmer switch 1

Function	Color	G/W	L
		●	●
		●	
		●	



Menu switch 2



Turn switch 3

Function	Color	O	GR	SB
		●	●	
			●	●

Horn Switch 4

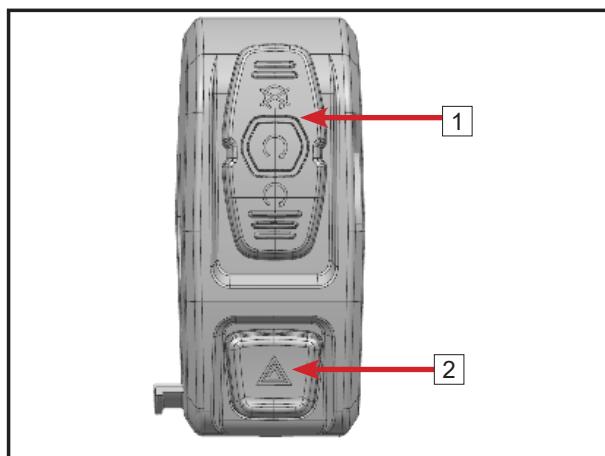
Function	Color	G/W	LG
		●	●

## 7.5.2 Right Handlebar Switch

Remove the connectors between right handlebar switch and main cable to check switch performance.

Stop/start switch 1

Function	Color	B/BR	BR/B	Y/R
		●	●	
		●	●	●



Warning switch 2

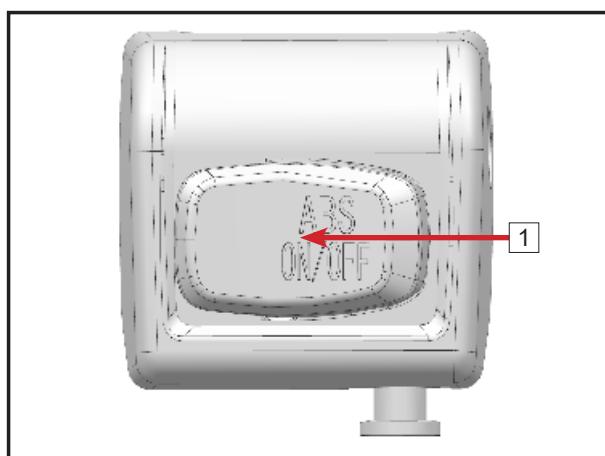
Function	Color	O	GR	SB
	push	●	●	●
	Bounce			

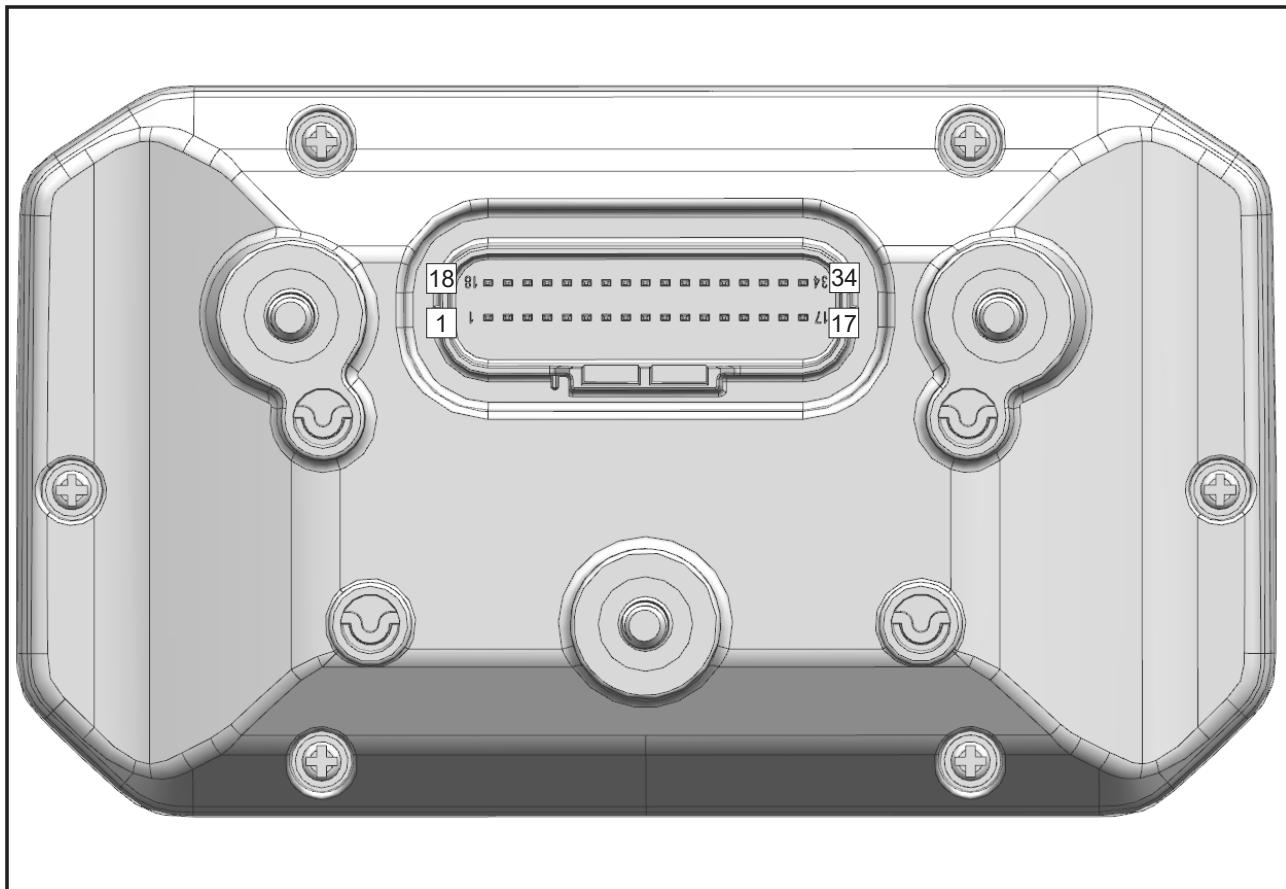
## 7.5.3 ABS Switch

Remove the connectors between ABS switch harness and main cable to check switch performance.

ABS switch

Function	Color	L/Y	G/B
(Push)		●	●
(Bounce)			



**7.6 Dashboard**

No.	Pin Function	No.	Pin Function	No.	Pin Function
1	Keyless system indicator	2	EFI failure light	3	ABS alarm light
4	Oil pressure signal	5	Fuel signal (450Ω big resistance)	6	High-beam signal
7	Position light signal	8	RH turn signal	9	LH turn signal
10	Handlebar switch: return	11	Handlebar switch: confirm	12	Handlebar switch: down
13	Handlebar switch: up	14	Power negative	15	Power negative
16	Electric door lock	17	Power positive	18	Fuel signal(90Ω small resistance)
19	Speed signal	20	Starting GND signal	21	Gear signal 6
22	Gear signal 5	23	Gear signal 4	24	Gear signal 3
25	Gear signal 2	26	Gear signal 1	27	Gear signal N
28	ABS off signal	29	Mode selection	30	12V power output
31	air temperature sensor	32	Stop switch signal	33	CAN-L
34	CAN-H				

## 7.7 Battery

### ⚠ CAUTION:

1. Even if the battery is not used, it also loses power every day.
2. Charging condition and charging mode are very important for the service life of the battery. Using high charging current will have a negative impact on the service life.
3. If the charging current, charging voltage and charging time are exceeded, the battery will be damaged.
4. If the battery becomes empty due to repeated start of the vehicle, it needs to be charged immediately.
5. When the battery is stored in the discharge condition for a long time, deep discharge and sulfuric acid salination will occur, which damages the battery.
6. The battery does not need to be maintained, which means the acid level does not need to be checked.
7. Do not remove battery cables when the engine is running.
8. It is forbidden to puncture the wire to test the input/output electrical signals.
9. Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

### Battery Removal

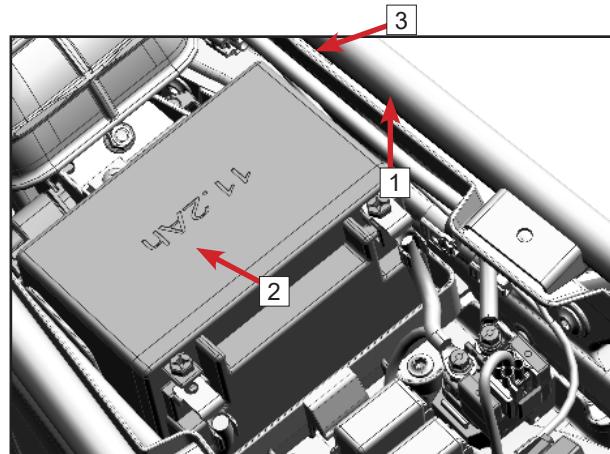
Remove seat.

Remove battery rubber belt.

Remove negative bolt **1** and positive bolt **2**

Remove battery **3**.

**⚠ CAUTION: Negative wire must be removed first. Otherwise, it will cause battery short circuit.**



### Charge

Shut down all the electrical devices and engine.

Remove battery.

Connect charger and battery.

After charging, remove the charger from the battery.

**CFMOTO recommends for vehicles not used within 30 days (battery remains in the vehicle) to charge the battery monthly or keep the battery connected to a trickle charger (battery maintainer).**

5000rpm      13.5V~15.0V

### If less than specification:

Inspect the connectors between engine and regulator.

Inspect the connectors between regulator and cables.

Inspect engine electronic winding.

### If more than specification:

Replace regulator.

### Charging Voltage Inspection

The battery has proper performance and is fully charged.

Start the vehicle and measure the voltage.

Measuring point is positive pole (+), the other measuring point connects ground (-).

Charging Voltage

## 7.8 GND Cable

GND cable **1** is located above the front left side of the frame.

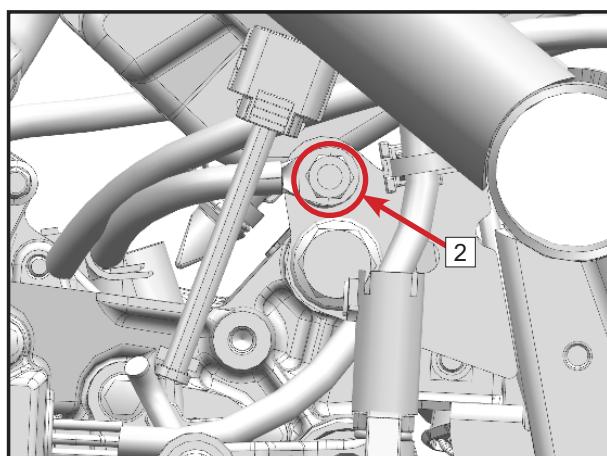
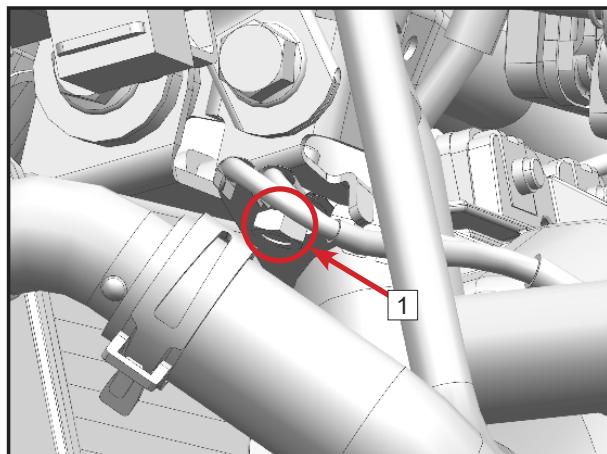
GND cable **2** is located in the lower left center of the frame.

### Inspection

Close the engine and all electrical parts.

Check GND cable harness for abnormality.

Check bolts **1** and **2** for looseness.



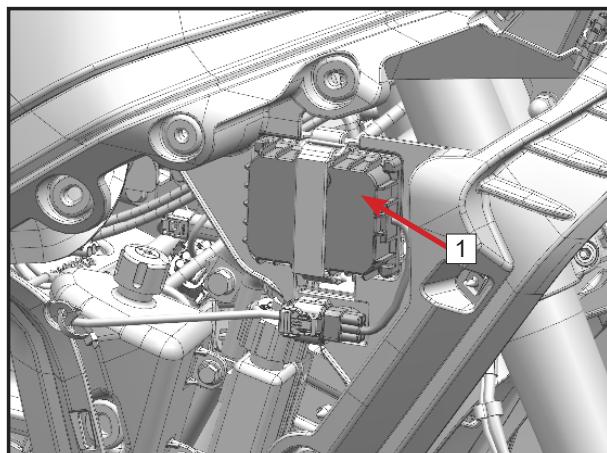
## 7.9 T-BOX

Refer to chapter 05 Body Covering Part.

T-BOX is located in the front right panel.

Remove T-BOX **1**.

Check the connector for connection condition.



# 07 Lights, Dashboard and Switches

## T-BOX Fault Code

No	Display DTC	DTC Value	Mature Condition	Demature Condition	Possible Fault Causes	Corrective Action
(demo)	B111716	Vehicle power supply voltage below threshold	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage <= 9V, and keep the status at least at t >= 1000ms;"	1.battery voltage >= 10V, and keep the voltage status at too low	Battery	Check power supply battery;
1	B111716	Low voltage of system power supply	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage < 9V, and keep the status at least at t >= 1000ms;	1.battery voltage >= 10V, and keep the voltage status at too low	Battery	Check power supply battery;
2	B111717	High voltage of system power supply	1.Ignition state shall be IGN ON; 2.The engine status is not in Cranking;(FV only) 3.Power supply voltage > 16V, and keep the status at least at t >= 1000ms;	1.battery voltage <= 15V, and keep the voltage status at too high	Battery	Check power supply battery;
3	U007388	BICAN main cable BusOff	1.Ignition state shall be IGN ON; 2.Power supply voltage is in the range of 9-16V; 3.BusOff fault definition Refer to ISO-11898-1 is met;	1.Refer the BusOff fault demature	CAN bus	Check the CAN bus circuit is short or open
4	U118287	Lost communication of MMI	1 . I g n i t i o n s t a t e s h a l l b e I G N O N ; 2.Power supply voltage is in the range of 9-16V; 3.The condition of diag enable time=1.5s is met; 4.Lost MMI(CANID=0x151) message time >= 10 times the transmission cycle and Lost MMI(CANID=0x151) message time >= 500ms;	1.Received M M I (CAN bus CAN ID = 0 x 151 ) short or message at open least once;	CAN bus	Check the CAN bus circuit is short or open

5	U11C087	Lost communication of BCM	1.Ignition state shall be IGN ON; 2.Power supply voltage is in the range of 9-16V; 3.The condition of diag enable time=1.5s is met; 4. Lost BCM(CANID=0x150) message time >= 10 times the transmission cycle and Lost BCM(CANID=0x150) message time >= 500ms;	1.Received B C M (CAN bus CAN ID = 0x130 ) message at least once;	Check the CAN bus circuit or open	Check the CAN bus circuit or EMC.
6	B1A4087	KL15 power on , KL30 disconnect	When KL15 is powered on, KL30 disconnects for 30s	When KL15 is powered on, KL30 connects over 1s	Harness damage, malicious damage	
7	U220D00	Limp home DTC	1.Power supply voltage is in the range of 9-16V; 2.Nmrxcnt >4 or Nmtrxcnt >8; 3.tLimpHomeDTC >= 2000ms.	1.Received a n d sent ring message successfully at least once;	CAN bus short or open	Check the CAN bus circuit or open

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## 8.1 Service Tool

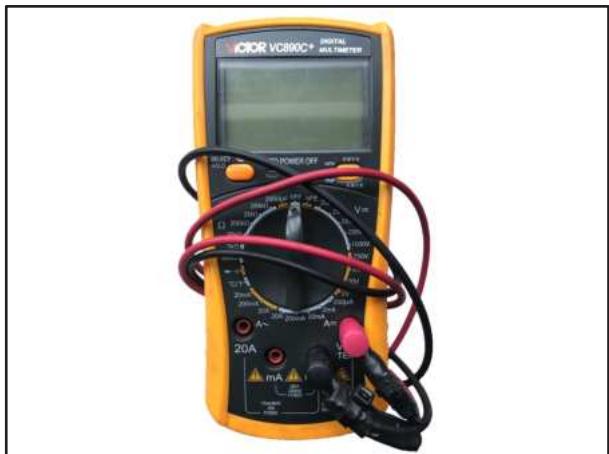
### CFMOTO DSCAN

**Function:** Read/clear EFI system fault code, observe data flow, update and write ECU program, etc.



### Digital Multimeter

**Function:** Inspect the parameter of EFI system like voltage, current and resistant etc.



## 8.2 Charging System

### 8.2.1 Magneto Coil Resistance

Measure 3-phase magneto stator coil resistance. If the resistance is within the specification, it indicates that the magneto is good. If the resistance is out of specification, replace with a new stator.

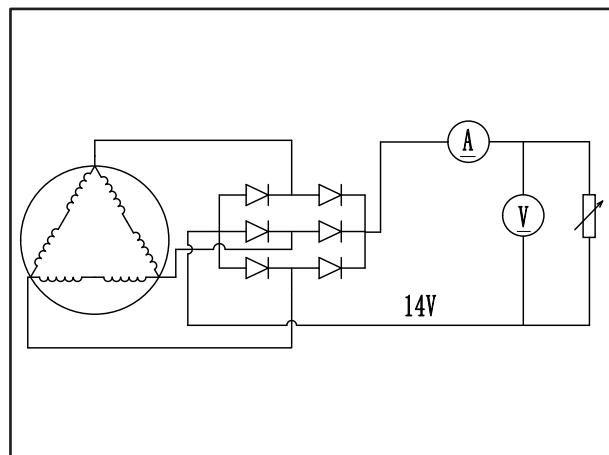
MAG Coil Resistance:

$0.55\Omega \sim 1.5\Omega$  (Y-Y)

Insulation Resistance:  $\infty \Omega$  (Y-G)

Check for the insulation between stator coil and core.

Turn multimeter to  $1 \times 10\Omega$



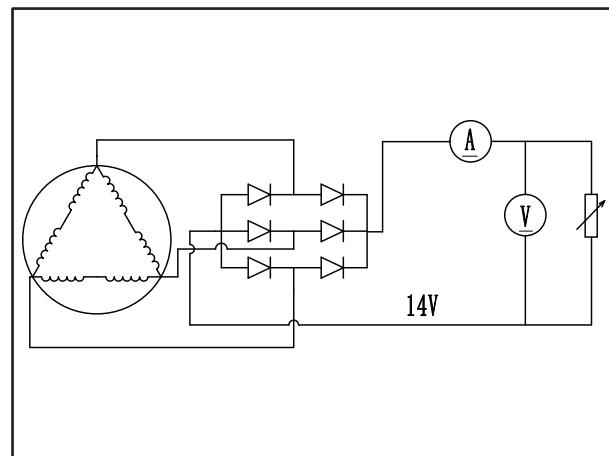
### 8.2.2 MAG Non-loaded Performance

Start the engine and allow it run at 5000r/min. Use multimeter to measure the voltage between 3 output lines.

If the reading is below specification, replace with a new magneto.

Voltage between Output Lines When MAG Non-loaded: >50V(AC) at 5000r/min

Turn Multimeter to V(AC).



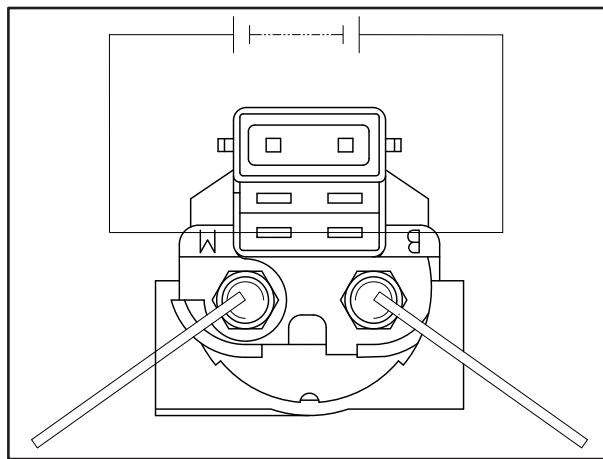
## 8.2.3 Starter Relay

Load DC12V voltage on the positive and negative contacts of the control loop coil of the starter relay, and then use the multimeter to measure whether the contacts are connected.

If the relay contact makes a ticking sound and the multimeter makes a continuous beep, it means that the two contacts are connected; Otherwise, it means that there is no communication.

When DC12V voltage is not loaded at both ends of coil, the two contacts are not connected.

The above two items can confirm whether the relay status is good, and the multimeter should be set in the diode gear when measuring.



**⚠ CAUTION: The voltage time applied to the relay coil should not exceed two minutes, otherwise it will cause the coil to overheat and cause the coil to burn.**

When using the multimeter to measure the resistance between relay coils, if the resistance is not within the specified range of  $3\Omega$  to  $5\Omega$ , replace it with a new part.

Turn multimeter to  $1\times 10\Omega$ .

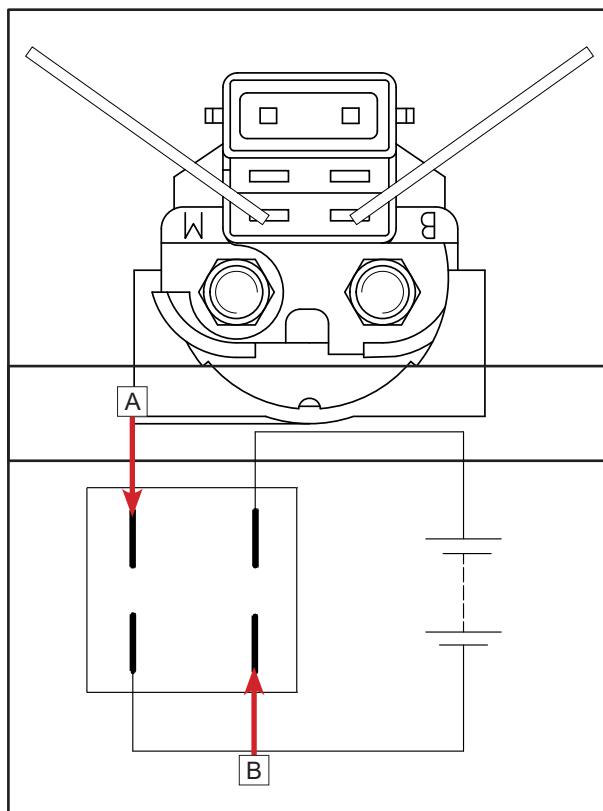
## Auxiliary Relay

Apply the DC12V voltage to the positive and negative poles of the control loop coil of auxiliary relay, and the multimeter is used to measure whether the two contacts A and B are connected. The multimeter is set to the diode gear during measurement. If the contact makes a ticking sound and the multimeter makes a continuous beep, it means that the two contacts are connected; Otherwise, it means that there is no communication.

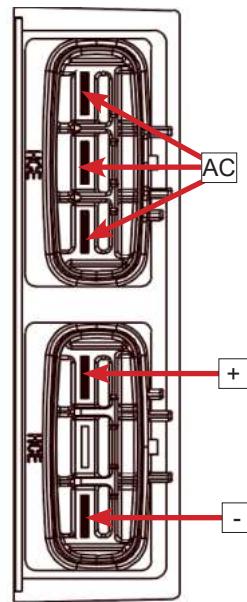
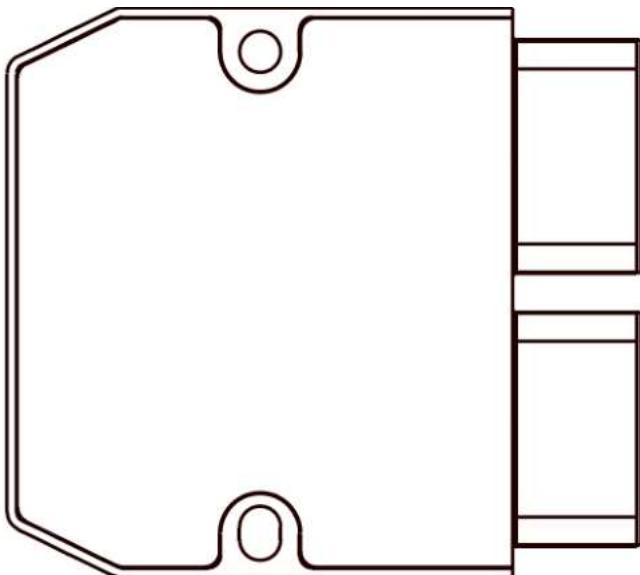
When DC12V voltage is not loaded at both ends of coil, the two contacts are not connected.

The above two items can confirm whether the relay status is good, and the multimeter should be set in the diode gear when measuring.

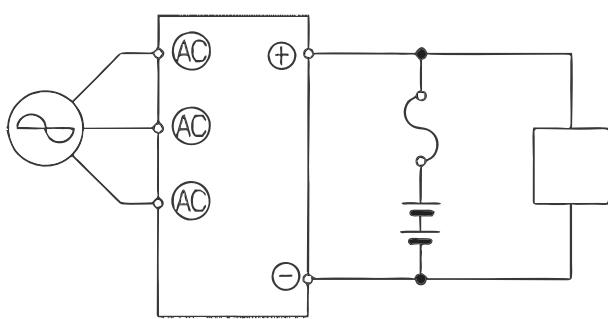
Coil Resistance:  $90\Omega\sim 100\Omega$ .



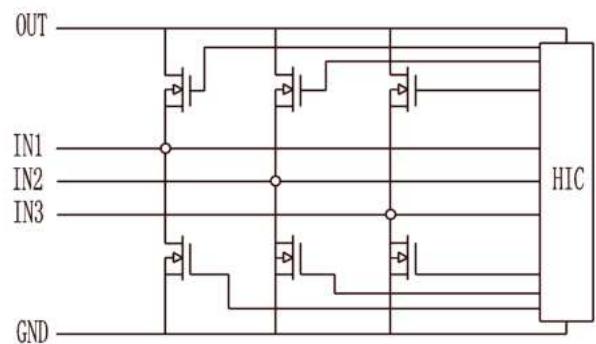
## 8.2.4 Regulator



Connection Diagram

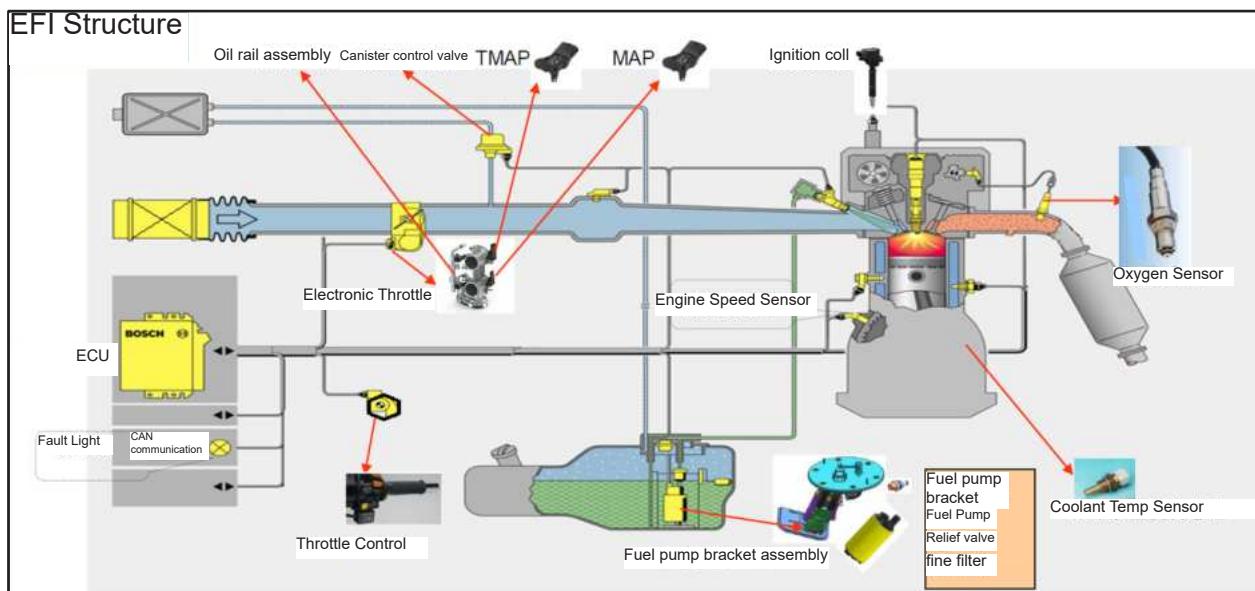


Wire Diagram



## 8.3 EFI

### 8.3.1 EFI Structure



#### 8.3.1.1 Sensors

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Sensors in EFI system include:

- **Air pressure sensor (load information)**
- **Air temp. pressure sensor (Air density information)**
- **TPS (Load, load range, speed information)**
- **Trigger (Crankshaft information)**
- **Water temp. sensor (Engine temp. information)**
- **Speedometer sensor (Output shaft RPM information)**
- **Gear sensor (gear information)**
- **Oxygen Sensor (Air factor=  $\lambda > 1$  or  $< 1$ )**

#### 8.3.1.2 ECU

Electronic control unit, the brain of EFI system. It analyzes and processes all kinds of information provided by the sensor, and sends the conclusions to the actuator in the form of instructions, so as to make the engine run in the optimal state.

#### 8.3.1.3 Actuators

Actuators execute the ECU instruction. The actuator is the executor of the electronic control unit. Main actuators include:

- **Fuel Pump(supply high-pressure fuel)**
- **Fuel Injector(quantitative injection fuel makes fuel atomization better)**
- **Ignition Coil(supply spark plug with high-pressure ignition energy)**
- **Idle Air Control Valve(supply idle air intake valve)**

### 8.3.1.4 EFI System Maintenance Notice

Always use genuine CFMOTO parts for maintenance. Otherwise it can not assure a normal performance to EFI system.

During the maintenance procedure, never try to break down the EFI components.

In the course of maintenance, EFI parts must be handled carefully.

Ignition switch must be shut off before connecting or disconnecting connectors. Otherwise, it may cause the EFI parts damage.

When removing fuel pump from fuel tank, do not energize the fuel pump. Otherwise, a spark can cause a fire.

Fuel pump is not allowed to operate in a dry environment or under water. Otherwise, its life would be shortened.

Besides, reverse connections between positive and negative terminal of fuel pump is not permitted.

The fuel pressure in EFI fuel supply system is very high (about 400 kPa), accordingly, all fuel lines are high pressure resisting. Even if the engine is not running, the fuel pressure is high. Therefore, do not disassemble the fuel line unless it's necessary.

If possible, don't do the spark test. If spark test is done unavoidably, try to complete the test as soon as possible. Besides, don't open the throttle, otherwise, a large quantity of unburnt fuel would enter muffler, causing the catalytic converter damage.

Idle speed is controlled by EFI, so it's unadjustable.

When the fuel line needs to be repaired, release the fuel pressure as follow shows: Remove fuel pump relay, start the engine and allow it to idle until the engine stalls automatically.

Fuel line removal and fuel filter replacement should be practiced by a professional person in a well-ventilated place.

Don't reverse the battery cable connections. This may damage electrical components. This system uses negative GND.

Never remove the battery cables When the engine is running.

Always remove cables and electrical control units which are connected with battery terminals.

Never test the component input and output electric signal by piercing the cable plastic jacket.

- Respect the environment and dispose of the left during maintenance.

## 8.3.2 Structure and Performance of EFI Parts

### 8.3.2.1 ECU

Electronic control unit, is the brain of EFI system. It analyzes and cope with the information provided by sensors, and send the conclusion in the form of instruction to actuator, then make the engine run in the optimal condition.

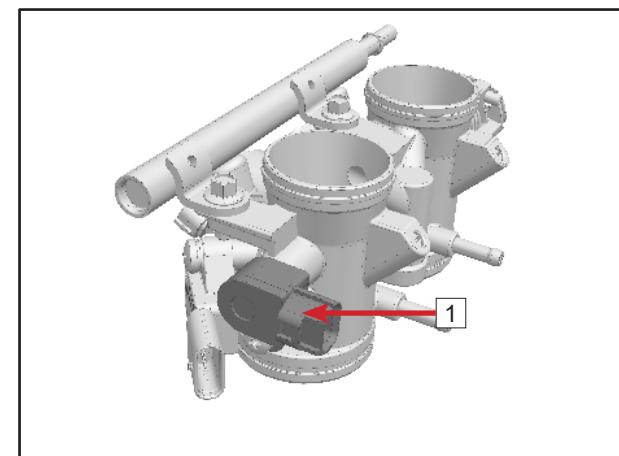
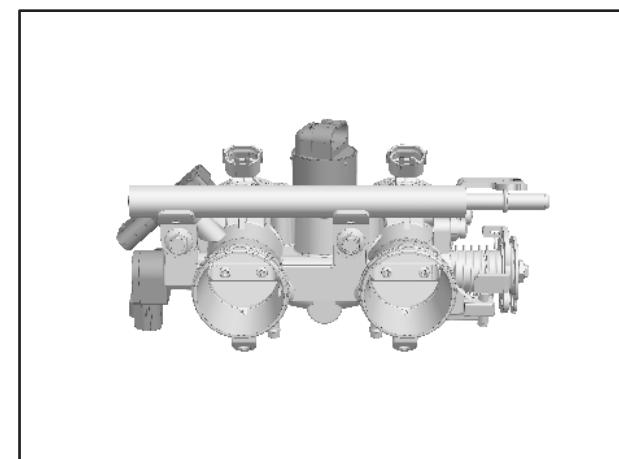


#### ECU Pin Function:

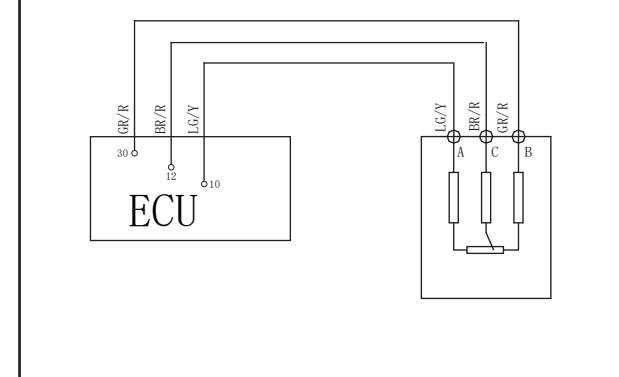
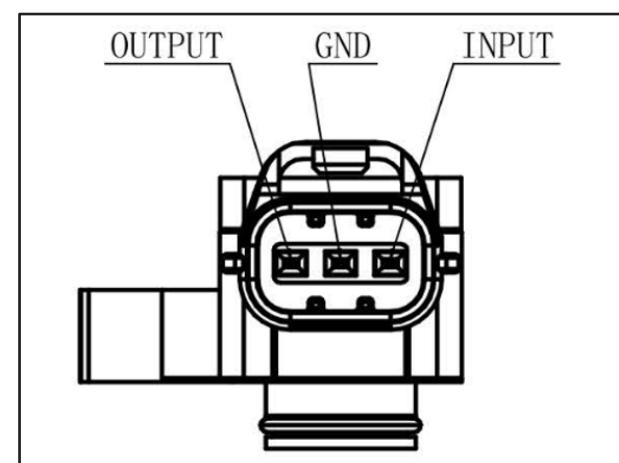
No.	Function	No.	Function	No.	Function
1(M1)	Oxygen sensor heating 2	2(L1)	Oxygen sensor heating 1	3(M2)	Ignition coil 1
4(L2)	SAS valve	5(M3)	Ignition GND	6(L3)	Canister valve
7(M4)	Ignition coil 2	8(L4)	Key-on power supply	9(K1)	Air intake pressure sensor
10(J1)	Sensor GND 1	11(H1)	Air intake temp signal	12(G1)	TPS signal
13(F1)	Engine coolant temperature sensor	14(E1)	Main relay control	15(D1)	CAN L
16(C1)	CAN H	17(B1)	Stepper motor phase D	18(A1)	Stepper motor phase C
19(K2)	Oxygen sensor signal 1	20(J2)	Oxygen sensor signal 2	21(H2)	Ignition diagnostic 2
22(G2)	Empty	23(F2)	Side stand switch	24(E2)	Stop switch
25(D2)	Empty	26(C2)	Starting auxiliary relay	27(B2)	Stepper motor phase A
28(A2)	Stepper motor phase B	29(K3)	MIL	30(J3)	5V power
31(H3)	Empty	32(G3)	KL15	33(F3)	Battery power supply
34(E3)	K-line	35(D3)	N gear	36(C3)	Ignition diagnostic 1
37(B3)	Clutch switch	38(A3)	Roll over sensor	39(K4)	Mode switch
40(J4)	RPM output	41(H4)	Speed sensor signal	42(G4)	Engine RPM sensor B
43(F4)	Engine RPM sensor A	44(E4)	Headlight relay	45(D4)	Fan relay
46(C4)	Fuel pump relay	47(B4)	Injector 2	48(A4)	Injector 1

## 8.3.2.2 Throttle Body Assembly

Connect with air filter and the engine, control the on-off angle of throttle by throttle cable. Send out the angle signal through TPS 1 to ECU.

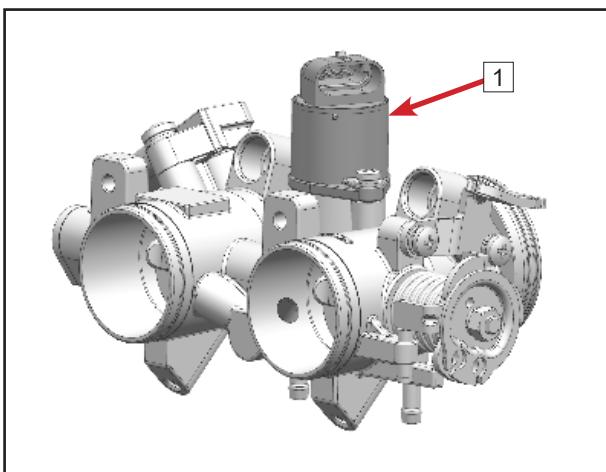


The wiring diagram of connection with ECU. See the right picture.



### 8.3.2.3 Stepper Motor

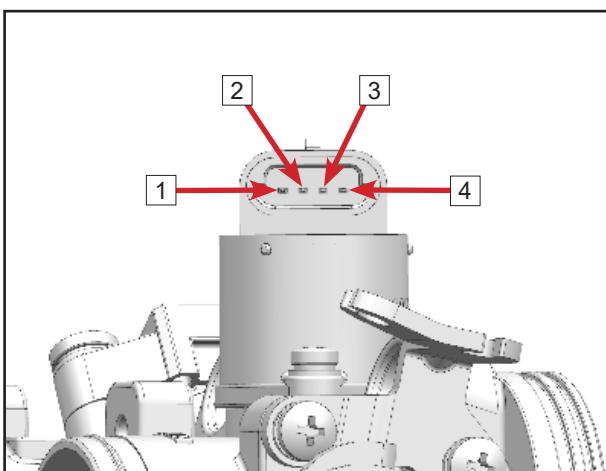
When the engine is idle normally, adjust by the stepper motor 1 control valve plate Angle is adjusted.



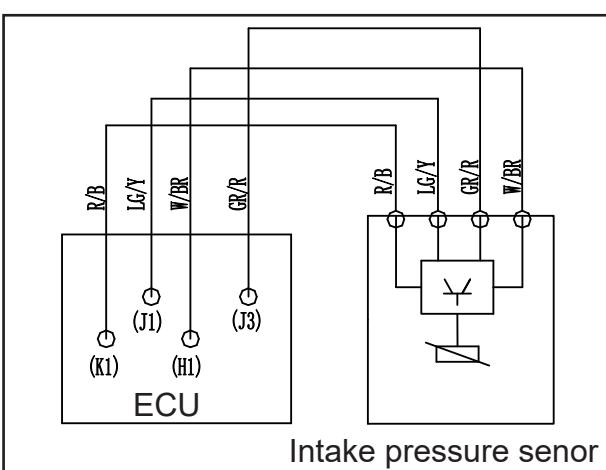
Throttle position sensor pin functions:

1 and 2 are a set of loops.

3 and 4 are a set of loops.

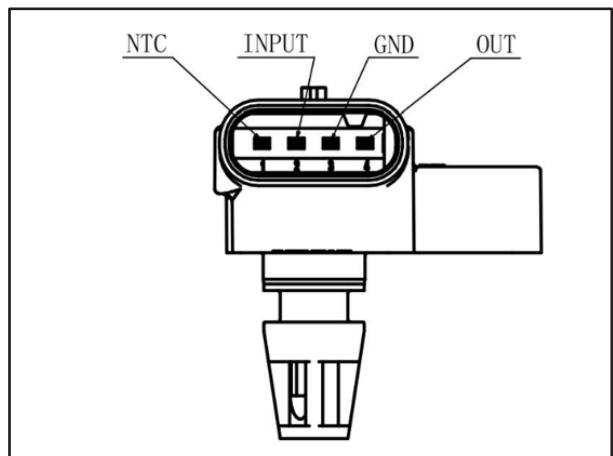
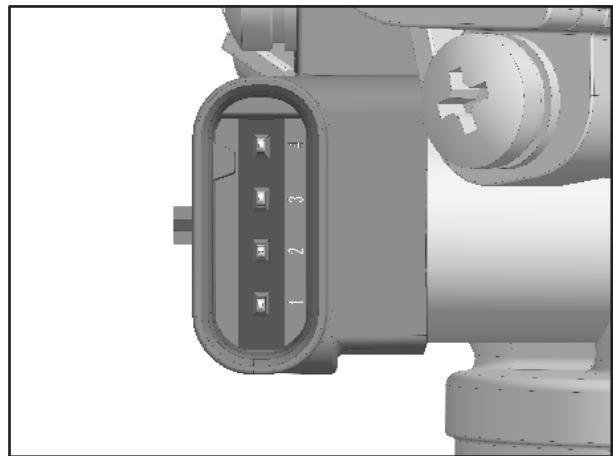


The circuit of connection between the stepper motor and ECU.

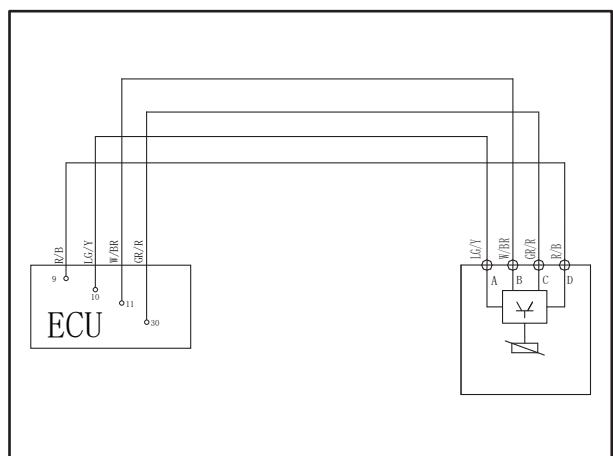


### 8.3.2.4 Air Intake Pressure Temperature Sensor

Monitor the pressure of intake pipe to provide the ECU with the load information of engine.

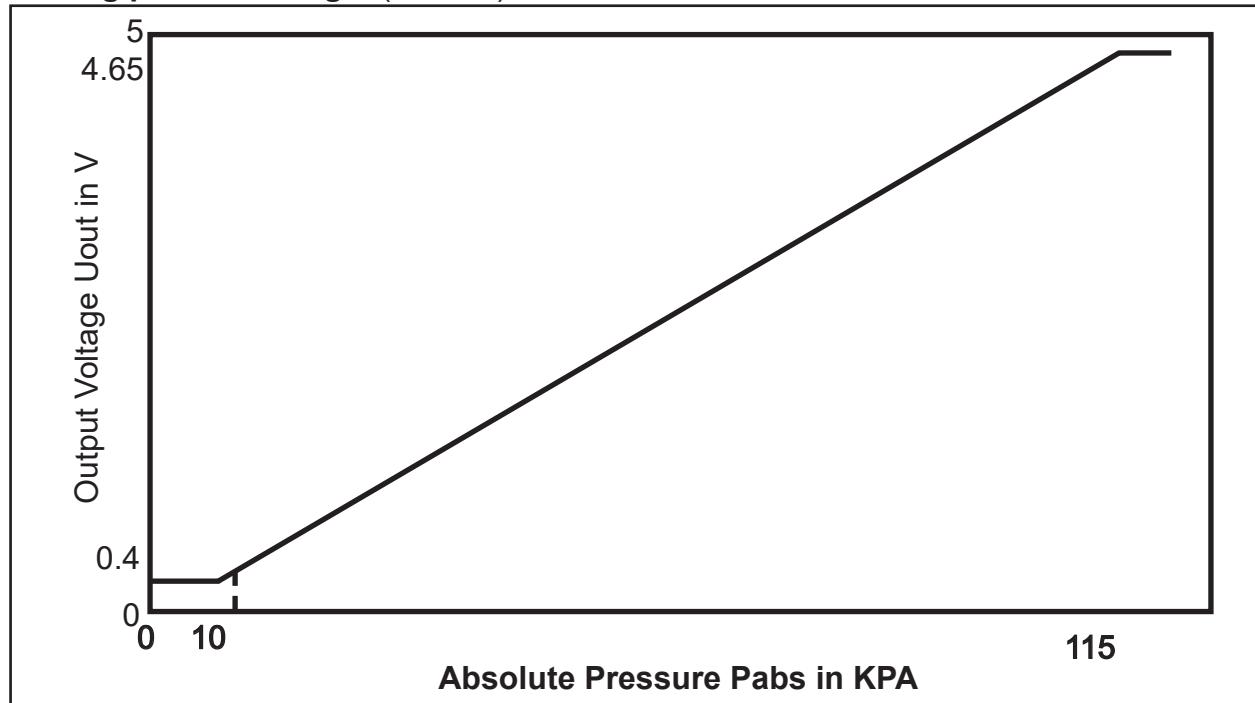


The circuit of connection between the sensor and ECU.

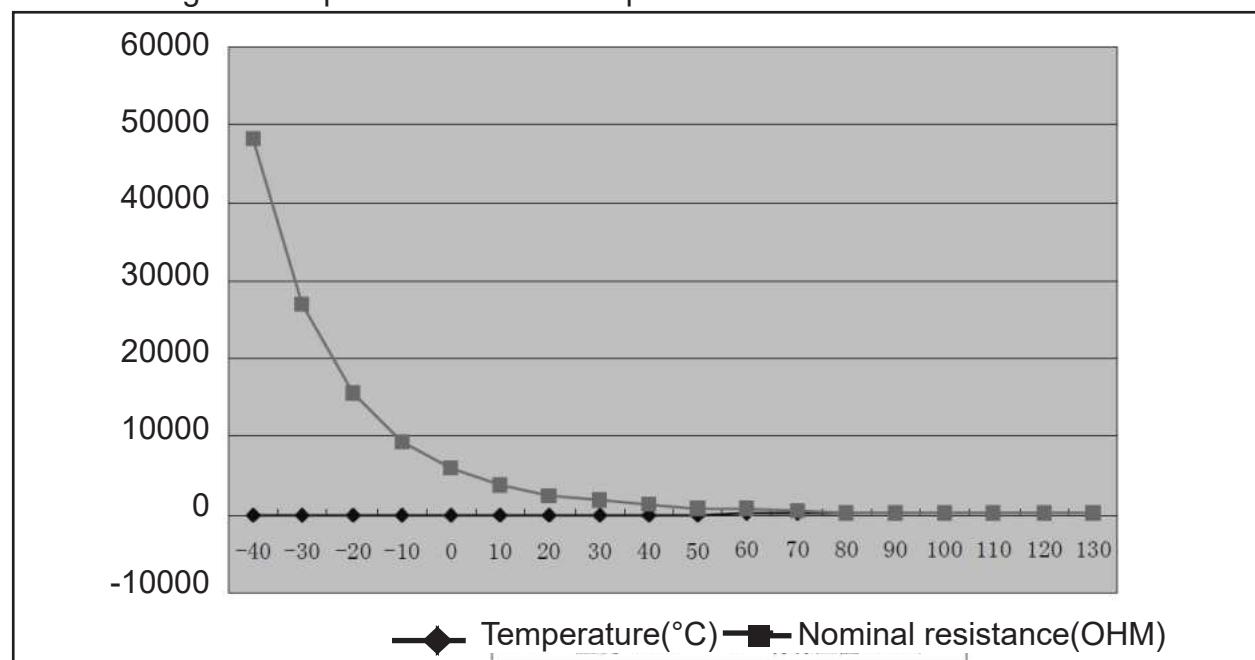


The following figure refers to output voltage-pressure relation.

**Testing pressure range: (10~115) kPa**



The following chart explains resistance-temperature relation

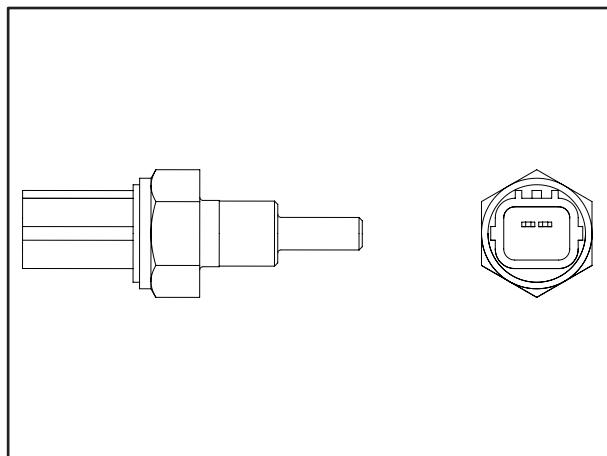


### 8.3.2.5 Coolant Temperature Sensor

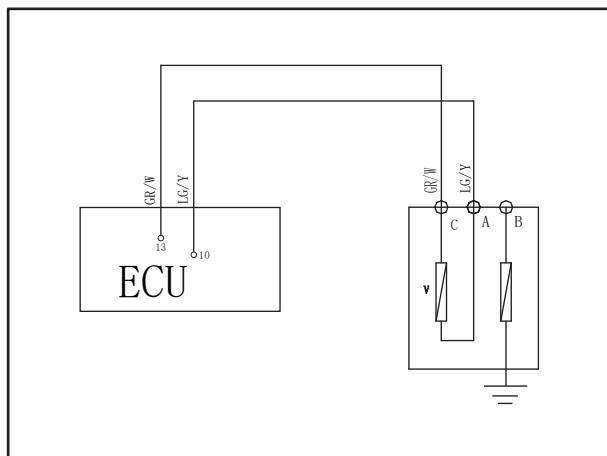
This sensor is two groups of negative temperature coefficient (NTC) thermistance, whose resistance increases with the temperature of coolant decreases, but the relationship is not linear. One is for ECU to monitor the thermal state of the engine, the other is for a meter to monitor the coolant temperature.

A and C consists of one group, which provides signal for ECU.

Provide coolant temperature signal to dashboard through ECU.



The circuit of connection between sens or and ECU.

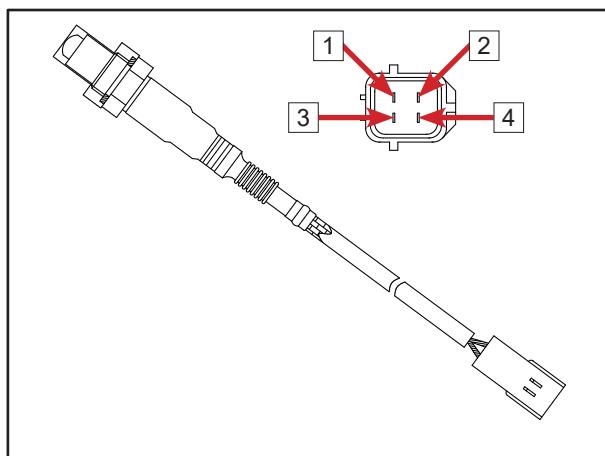


This right chart is A and C terminal temperature. The signal is to the ECU.

Temp.°C	Resistance between B and housing (Ω)
-20±0.1	13.71~16.94
25±0.1	1.825~2.155
80±0.1	0.303~0.326
110±0.1	0.1383~0.1451

## 8.3.2.6 Oxygen Sensor

This sensor is used in closed-loop feedback controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission. It's located in the exhaust stream to measure the amount of oxygen in exhaust and send the signal to ECU, which can revise the fuel injector output, so as to reduce the amounts of unburnt fuel and make catalytic converter convert HC, CO and NOX of Nitrogen efficiently.

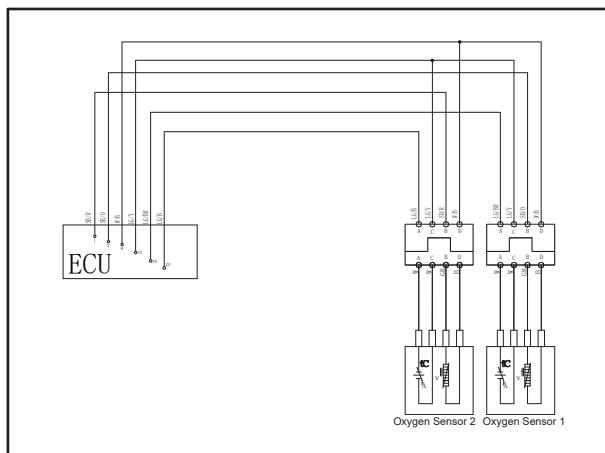


[2]

### Pin Function:

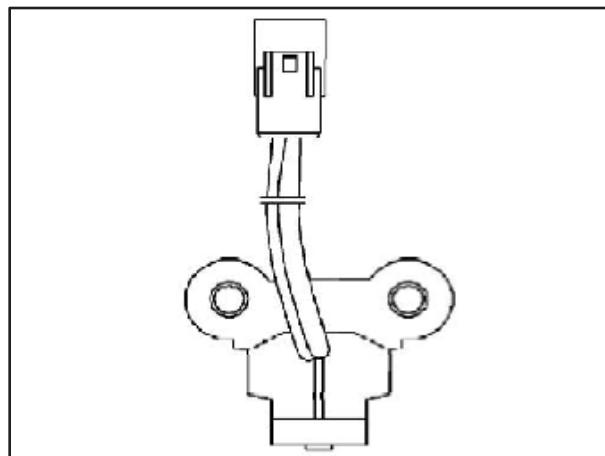
1. Output signal positive
2. Output signal negative
3. Heating GND negative
4. Heating power positive

The circuit of connection between the oxygen sensor and ECU

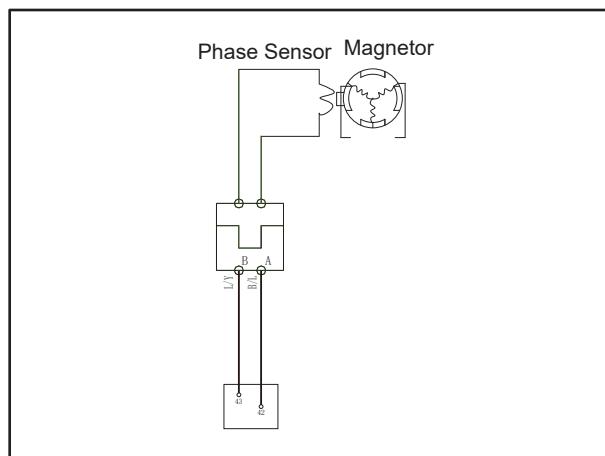


### 8.3.2.7 Trigger

The trigger transfers signal of engine speed to ECU and by which ECU to confirm engine speed ignition angle and injecting phase.



The circuit of connection between trigger and ECU.



Measure trigger resistance value.

Set multimeter to  $1 \times 100\Omega$  range.

Trigger coil resistance:  $260\Omega \sim 300\Omega (20^\circ\text{C})$

Replace a new one when resistance is not within above value range.

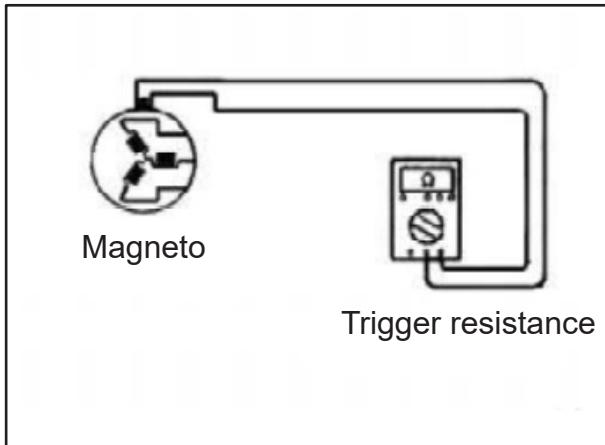
Measure trigger peak voltage.

Connect multimeter and peak voltage adapter as shown as right picture:

+ probe: Green (B) cable

- probe: Blue (A) cable

**NOTE: Refer to owner manual when use peak value voltage adapter.**



Set multimeter to ACV range.

Set engine to Neutral gear, turn on ignition switch.

Press starter button and keep engine running for seconds, then measure trigger coil peak value voltage.

Repeat a few times and record the highest value.

Trigger coil peak value voltage:  $\geq 20\text{V}$  ( $1300\text{r/min}$ )

Replace a new one when peak value voltage is not within above value range.

## 8.3.2.8 Fuel Pump Assembly

The right picture shows the fuel pump assembly, fuel pump relay and ECU wiring diagram.

This fuel pump assembly consists of fuel pump, plastic bracket, fuel strainer, fuel filter element and pressure-regulating valve. It delivers fuel from the tank to the engine at a certain oil pressure and flow rate.

### Pin Function:

1: GND

2: Connect fuel pump relay output

### Performance parameter:

Pressure-regulating valve open pressure:

(0.4±0.01)MPa

Flow rate: ≥20L/h

This fuel pump assembly is used inside the fuel tank.

Do not run the fuel pump assembly when there is no fuel inside the fuel tank, in case of fuel pump damage.

Handle the fuel pump gently. Do not drop it on hard surfaces.

The battery supplies power to the fuel pump through the relay. Only when starting or running the engine can the circuit be switched on.

### Measure fuel pressure:

Connect fuel pressure gauge and fuel pump fuel port, lock with clamp to ensure there is no leak from the junction.

Connect the line according to the right picture.

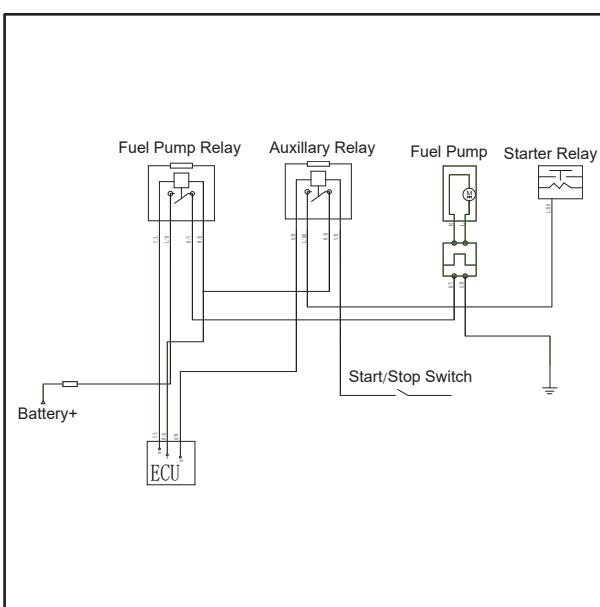
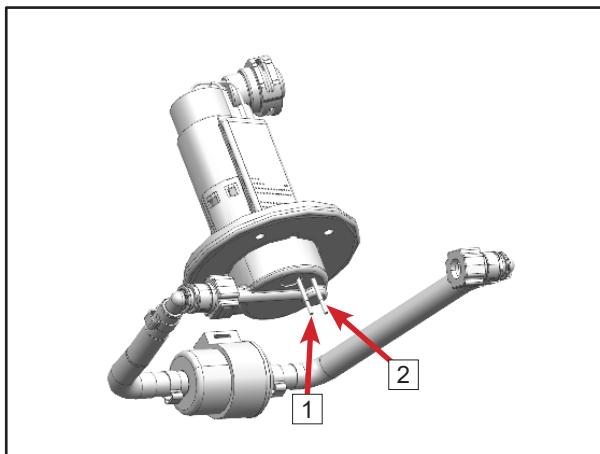
Turn off ignition switch and stop switch.

The fuel pump will work for 5 seconds. When stop working, the fuel pressure should reach the specified value. Otherwise, replace with new fuel pump.

After stopping working, the pressure should maintain 0.2MPa for at least 5 minutes. Otherwise, replace fuel pump assembly.

### Fuel hose pressure release method:

The fuel supply pressure in EFI system is high, all fuel hoses are high-pressure resistance. Even the engine does not work,



the pressure in fuel passage is still high. So when in the maintenance process, be careful not to remove the fuel hose causally.

When servicing EFI system, release the pressure before removing the fuel hose. The release method is like:

Remove the fuel relay. Start the engine and make it idle until the engine stops automatically.

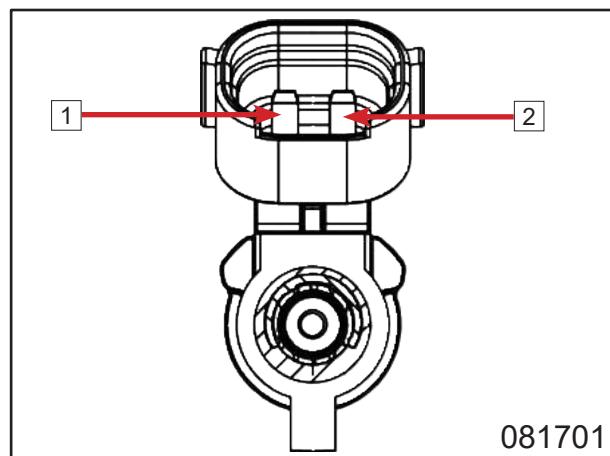
### 8.3.2.9 Fuel Injector

One end of fuel injector mounts into fuel injector seat, and the other end attaches to the injector cap, which connects with a fuel line. Fuel injector is controlled by ECU to inject fuel at stated time into the engine. This injector nozzle is a 4-hole style. Don't turn injector after the joint between injector and injector cap is installed.

Pin Function:

1: + connects fuel pump relay

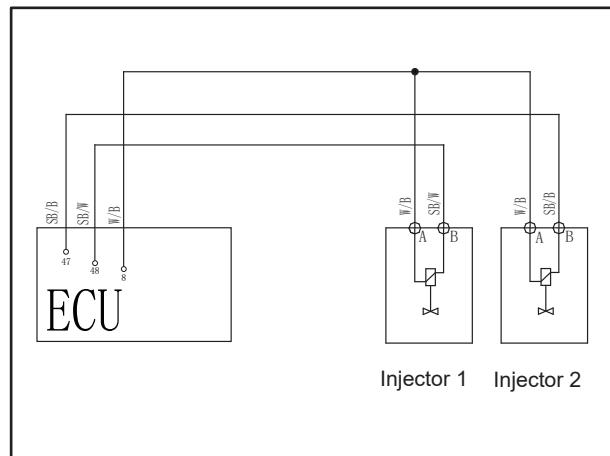
2: - connects ECU



Fuel injector resistance:  $12\Omega \pm 0.6\Omega (20^\circ\text{C})$

1	+ connects fuel pump relay	2	- connects ECU
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The circuit of fuel injector and ECU.



### Fuel Injector Installation

Install fuel injector manually. Never knock fuel injector with a hammer.

When removing and installing fuel injector, the O-rings on both ends must be replaced.

Perform pressure relief before fuel injector removal if necessary.

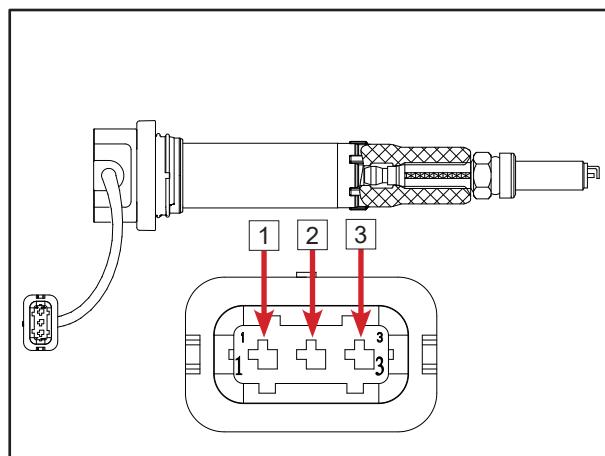
Test the fuel injector sealing after installation to ensure no leaks.

## 8.3.2.10 Ignition Coil

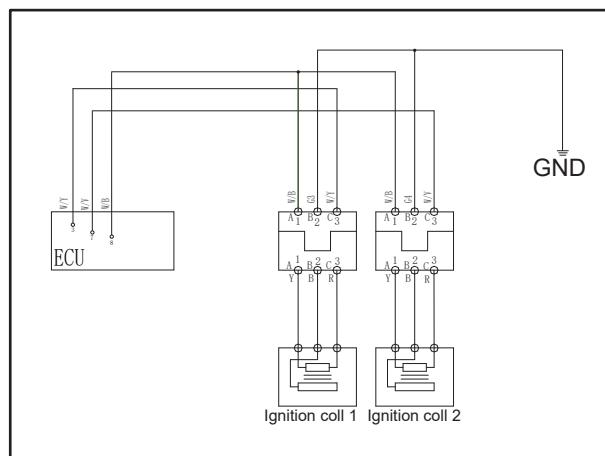
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil needed to spark the spark plug and ignite the mixture of air and fuel in cylinder.

### Pin Function:

- 1.Signal
- 2.GND
- 3.Power



The circuit of connection between ignition coil and ECU.

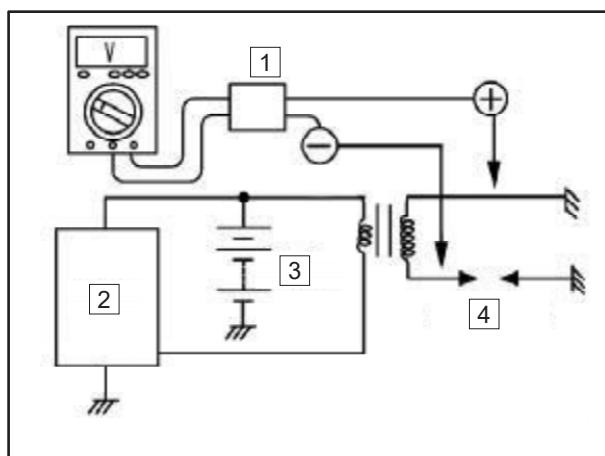


Measure secondary ignition voltage:  
Connect the engine according to the EFI diagram.

Connect the peak voltage measuring instrument according to the picture on the right.

Start the engine.

After starting, the secondary ignition voltage should >15000V;



1	Peak voltage measuring instrument	3	Battery
2	ECU	4	Spark plug

### Ignition coil parameter:

Quantity	Value			
	Min	Standard	Max	Unit
Nominal voltage		14		V
Working voltage	6		16.5	V
Resistance value (20°C to 25°C)	Primary obstruction	0.74	0.76	0.78
	Secondary obstruction	10.1	10.6	11.1
Primary current		7		A

## 8.3.3 UP6.0 Fault Code Table

No.	Code	Description
1	P0030 00	Route 1 Oxygen Sensor Heater Circuit Failure
2	P0031 00	Route 1 Oxygen Sensor Heater Circuit Low Voltage
3	P0032 00	Route 1 Oxygen Sensor Heater Circuit High Voltage
4	P0050 00	Route 2 Oxygen Sensor Heater Circuit Failure
5	P0051 00	Route 2 Oxygen Sensor Heater Circuit Low Voltage
6	P0052 00	Route 2 Oxygen Sensor Heater Circuit High Voltage
7	P0053 00	Route 2 Oxygen Sensor Heater Unreasonable Internal Resistance
8	P0059 00	Air Intake Pressure Sensor Signal 2 Unreasoal
9	P0130 00	Route 1 Oxygen Sensor Signal Unreasoal
10	P0131 00	Route 1 Oxygen Sensor Signal Circuit Low Voltage
11	P0132 00	Route 1 Oxygen Sensor Signal Circuit High Voltage
12	P0133 00	Route 1 Oxygen Sensor Response Delay to the Thick Mixture and Thin Mixture
13	P0134 00	Route 1 Oxygen Sensor Signal Circuit Failure
14	P0150 00	Route 2 Oxygen Sensor Unreasoal
15	P0151 00	Route 2 Oxygen Sensor Signal Circuit Low Voltage
16	P0152 00	Route 2 Oxygen Sensor Signal Circuit High Voltage
17	P0153 00	Route 2 Oxygen Sensor Response Delay to the Thick Mixture and Thin Mixture
18	P0154 00	Route 2 Oxygen Sensor Signal Circuit Failure
19	P0122 00	TPS 1 Signal Circuit Low Voltage
20	P0123 00	TPS 1 Signal Circuit High Voltage
21	P0105 00	Air Intake Pressure Sensor Signal Failure
22	P0106 00	Air Intake Pressure Sensor Signal Overrun
23	P0107 00	Air Intake Pressure Sensor Shortage to the Ground
24	P0108 00	Air Intake Pressure Sensor Shortage to Power
25	P0111 00	Air Intake Temp. Sensor Unreasoal Signal
26	P0112 00	Air Intake Temp. Sensor Circuit Low Voltage/Overrun
27	P0113 00	Air Intake Temp. Sensor Circuit High Voltage
28	P0116 00	Engine Coolant Temp. Sensor Unreasoal Signal
29	P0117 00	Engine Coolant Temp. Sensor Circuit Low Voltage/Overrun
30	P0118 00	Engine Coolant Temp. Sensor Circuit High Voltage
31	P0119 00	Engine Coolant Temp. Sensor Discontinuity
32	P1116 00	Engine Coolant Temp. Overrun
33	P0201 00	Cylinder 1 Injector Control Open Circuit
34	P0261 00	Cylinder 1 Injector Control Circuit Shortage to the Ground
35	P0262 00	Cylinder 1 Injector Control Circuit Shortage to Power
36	P0202 00	Cylinder 2 Injector Control Open Circuit
37	P0264 00	Cylinder 2 Injector Control Circuit Shortage to the Ground
38	P0265 00	Cylinder 2 Injector Control Circuit Shortage to Power
39	P2300 00	Cylinder 1 Ignition Coil Shortage to the Ground

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40	P2303 00	Cylinder 2 Ignition Coil Shortage to the Ground
41	P0300 00	Multiple Cylinders Caught Fire
42	P0301 00	Cylinder 1 Caught Fire
43	P0302 00	Cylinder 2 Caught Fire
44	P0322 00	RPM Sensor Signal Failure
45	P0413 00	Secondary Gulp Magnetic Valve Open Circuit
46	P0414 00	Secondary Gulp Magnetic Valve Circuit Low Voltage
47	P0412 00	Secondary Gulp Magnetic Valve Circuit High Voltage
48	P0411 00	Secondary Air System Flow Detection Failure
49	P0441 00	Canister Magnetic Valve Improper Flow
50	P0444 00	Canister Magnetic Valve Open Circuit
51	P0458 00	Canister Magnetic Valve Circuit Low Voltage
52	P0459 00	Canister Magnetic Valve Circuit High Voltage
53	P0480 00	Cooling Fan Control Open Circuit
54	P0691 00	Cooling Fan Control Circuit Low Voltage
55	P0692 00	Cooling Fan Control Circuit High Voltage
56	P0501 00	Speed Sensor Signal Failure
57	P0506 00	Idle Control Speed Lower Than Target Idle Speed
58	P0507 00	Idle Control Speed Higher Than Target Idle Speed
59	P0511 00	Stepper Motor Drive Control Circuit Failure
60	P0615 00	Starting Control Open Circuit
61	P0616 00	Starting Control Circuit Low Voltage
62	P0617 00	Starting Control Circuit High Voltage
63	P0627 00	Fuel Pump Relay Control Open Circuit
64	P0628 00	Fuel Pump Relay Control Circuit Low Voltage
65	P0629 00	Fuel Pump Relay Control Circuit High Voltage
66	P0650 00	MIL Light Drive Circuit Failure
67	P0560 00	System Battery Unreasonable Voltage Signal
68	P0562 00	System Battery Low Voltage
69	P0563 00	System Battery High Voltage
70	P1098 00	Tipper Sensor Signal Low Voltage
71	P1099 00	Tipper Sensor Signal High Voltage
72	P2177 00	Air-fuel Ratio Self-learning for Closed Loop Control Beyond the Upper Limit
73	P2178 00	Air-fuel Ratio Self-learning for Closed Loop Control Under the Lower Limit
74	P2179 00	Air-fuel Ratio Self-learning for Closed Loop Control Beyond the Upper Limit
75	P2180 00	Air-fuel Ratio Self-learning for Closed Loop Control Under the Lower Limit
76	P0602 00	ECU Code Failure
77	P0604 00	ECU RAM Failure
78	P0605 00	ECU ROM Failure
79	U0198 00	TOX CAN Failure
80	U0155 00	ECU and IPC (Dashboard Control Module) CAN Abnormal
81	U0073 00	CAN bus off Failure

82	U0121 00	ECU and ABS Control Module CAN Lost
83	P0508 00	Idle Actuator Control Circuit Shortage to Ground
84	P0509 00	Idle Actuator Control Circuit Shortage to Power
85	P0511 00	Idle Actuator Control Circuit Failure
86	P0511 00	Idle Actuator Control Circuit Failure

## 8.4 Normal Troubles

### Engine Body

Troubles	Possible Cause	Countermeasures
Cannot start or difficult to start	<p>Cylinder pressure too low</p> <ol style="list-style-type: none"> <li>1. Cylinder worn</li> <li>2. Piston ring worn</li> <li>3. Air leakage of cylinder gasket</li> <li>4. Valve stem worn or unsuitable valve seat</li> <li>5. Spark plug loosen</li> <li>6. Starting motor rotate too slowly</li> <li>7. Improper valve timing</li> <li>8. Improper valve clearance</li> </ol> <p>Spark plug cannot ignite or weak ignition</p> <ol style="list-style-type: none"> <li>1. Improper spark plug clearance</li> <li>2. Spark plug dirty or wet</li> <li>3. Ignition coil failure</li> <li>4. Trigger short circuit or open circuit</li> <li>5. Magneto malfunction</li> </ol> <p>Insufficient fuel inside throttle body</p> <ol style="list-style-type: none"> <li>1. Breather hole block</li> <li>2. Injector blocked or failure</li> <li>3. High Pressure oil pump failure</li> <li>4. Low pressure,oil pump</li> <li>5. Oil pump filter net blocked</li> </ol>	<p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Service or replace</p> <p>Tighten</p> <p>Check electrical parts</p> <p>Adjust</p> <p>Adjust</p> <p>Adjust or replace</p> <p>Clean &amp; dry or replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Clean or replace</p>
No idle speed or unstable speed	<ol style="list-style-type: none"> <li>1. Improper valve clearance</li> <li>2. Unsuitable valve seat</li> <li>3. Defective valve</li> <li>4. Rocker or rocker arm wear</li> <li>5. Dirty spark plug</li> <li>6. Incorrect valve clearance</li> <li>7. Ignition coil failure</li> <li>8. In &amp; Ex a air hose blocked, idle valve</li> <li>9. Magneto failure</li> </ol>	<p>Adjust</p> <p>Replace or repair</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace or repair</p> <p>Replace</p> <p>Replace or repair</p> <p>Replace</p>

Troubles	Possible Cause	Countermeasures
High RPM unstable	1. Valve spring getting worn 2. Camshaft worn 3. Spark plug dirty 4. Spark plug gap too narrow 5. Valve timing incorrect 6. Ignition coil failure 7. Low pressure,oil pump 8. Air filter too dirty	Replace Replace Clean or replace Adjust or replace Adjust Replace Adjust or replace Clean or replace
Blue or black exhaust gas	1. Engine oil too much 2. Piston ring worn 3. Valve worn 4. Cylinder worn or scraped 5. Valve stem worn 6. Oil seal of valve stem damaged	Check oil level and drain Replace Replace Replace Replace Replace
Engine power not enough	1. Valve clearance improper 2. Valve spring getting weak 3. Valve timing incorrect 4. Cylinder worn 5. Piston ring worn 6. Improper valve seat 7. Spark plug dirty 8. Improper spark plug gap 9. Injector blocked 10. Insufficient pressure,oil pump 11. Air filter too dirty 12. Rocker arm or camshaft worn 13. Air leakage of inlet pipe 14. Engine oil too much	Adjust Replace Adjust Replace Replace Replace or repair Clean or replace Clean or replace Clean or replace Adjust or replace Clean or replace Replace Tighten or replace Check oil level and change
Engine overheating	1. Carbon deposit on piston head 2. Engine oil too less or too much 3. Oil pump failure 4. Fuel hose blocked 5. Air leakage of inlet pipe 6. Unsuitable engine oil 7. Cooling system failure	Clean Check and add or drain Replace Clean Tighten or replace Change oil

Troubles	Possible Cause	Countermeasures
Engine abnormal noise	<b>Valve abnormal noise</b> 1. Valve clearance too big 2. Valve spring worn or broken 3. Swing arm or camshaft worn	Adjust Replace Replace
	<b>Piston abnormal noise</b> 1. Piston worn 2. Cylinder worn 3. Carbon deposit inside combustion chamber 4. Piston pin or pin hole worn 5. Piston ring or groove worn	Replace Replace Clean Replace Replace
	<b>Timing chain abnormal noise</b> 1. Chain stretched out 2. Chain sprocket worn 3. Tensioner failure	Replace chain and sprocket Replace chain and sprocket Repair or replace
	<b>Clutch abnormal noise</b> 1. Clutch gear worn or damaged 2. Cushion rubber aging or damaged	Replace clutch gear Replace clutch gear
	<b>Crankshaft abnormal noise</b> 1. Bearing noise 2. Crankshaft pin bearing down 3. Clearance too big	Replace Replace Replace
	<b>Transmission abnormal noise</b> 1. Gear worn or damaged 2. Main shaft or counter shaft worn 3. Bearing worn 4. Bushing worn	Replace Replace Replace Replace
Clutch slippery	1. Clutch driven disc worn or damaged 2. Clutch driven disc worn or damaged 3. Clutch spring getting weak	Replace Replace Replace

## Ignition System:

Troubles	Possible Cause	Countermeasures
No spark or spark too weak	1. Ignition failure 2. Spark plug ablation 3. Spark plug clearance too big or too small 4. Carbon deposit in spark plug 5. Magnetor failure 6. Battery voltage insufficient or failure 7. Ignition coil failure 8. Trigger coil failure 9. Trigger clearance too big or too small 10. Other line failure	Replace Replace Adjust Clean Replace Charge or replace Replace Replace Adjust Inspect

## 8.5 Trouble Diagnosis In Accordance With Engine Error

**Before trouble diagnosis by engine problems, initial checking should be done as follows:**

1. Confirm if trouble light is ok.
2. Confirm there's no trouble code record by DSCAN checking.
3. Confirm there's really trouble existing complained by end-users.

**Then check the following points:**

- (1) Check fuel hoses if any fuel leakage.
- (2) Check vacuum pipes if any broken, twist or improper connection.
- (3) Check intake manifold if any blocked, air leakage or damaged.
- (4) Check high-tension cable if any damaged, aging or ignition order is correct.
- (5) Check wiring close to ground if it's clean and firm.
- (6) Check connector of all sensors and actuator if any loose or improper connection.

**Important NOTE: In case there are some problems as above-mentioned, then removal work should be done firstly, then go to next diagnosis.**

**Diagnosis helps:**

1. Confirm engine without any trouble record.
2. Confirm there's really trouble existing.
3. During checking, do not neglect vehicle periodic maintenance, cylinder pressure, valve timing, fuel supply and so on.
4. Replace ECU to test.

In case trouble disappears, then it's a problem of ECU. If trouble still exists, then assemble original ECU and check other points.

**Frequent troubles list:**

1. When starting the engine, engine cannot rotate or rotate slowly.
2. When starting engine, starter motor can rotate but cannot start engine.
3. Difficult to start warm or hot engine.
4. Difficult to start cold engine.
5. RPM is ok, but difficult to start engine.
6. Starting is ok, but idle speed is unstable at any time.
7. Starting is ok, but idle speed is unstable during engine warm-up period.
8. Starting is ok, but idle speed is unstable after engine warm-up.
9. Starting is ok, idle speed is unstable or engine stop when switch on some lights or other electric components.
10. Starting is ok, but too high idle speed.
11. RPM cannot go up or engine stop when acceleration.
12. Slow acceleration.
13. Insufficient power and bad performance when acceleration.

## (1) Starting Failure/Hard Starting

General failure part: 1. Battery, 2. Starter motor, 3. Wirings harness or ignition switch, 4. Engine mechanism part.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Use multi-meter to check battery voltage if voltage is between 8V~12V or not when engine starts.	YES	Next step
		NO	Replace battery
2	Turn on ignition switch, stop switch side stand switch and check if voltage of ECU pin 32 is around 12V.	YES	Next step
		NO	Repair switches or change harness
3	Keep ignition switch "on", use multi-meter to check if voltage of starting motor anode is over 8V.	YES	Next step
		NO	Repair switches or change harness
4	Disassemble starting motor and check its working status, especially whether there was broken circuit or jammed by bad lubrication.	YES	Repair or replace starting motor
		NO	Next step
5	If error only occur in Winter, check if starting motor resistance is too big caused by improper oil used.	YES	Change to proper lubrication
		NO	Next step
6	Check if mechanical resistance is too big inside engine, which causes starter engine does not work or rotates slowly.	YES	Check and repair engine inside resistance
		NO	Repeat

## (2) When starting, engine can rotate but cannot start

General failure part: 1. No fuel, 2. Fuel pump, 3. Trigger, 4. Ignition coil, 5. Mechanical parts of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
2	Connect DSCAN, check if there's signal of RPM data after starting engine.	YES	Next step
		NO	Check and repair RPM sensor circuit
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check ignition system
4	Test cylinder pressure and check if pressure is enough.	YES	Eliminate engine mechanical failures
		NO	Next step
5	Use EFI system adaptor, turn on ignition switch, check if power supply of ECU pin 32# and 32# is normal, check if ECU pin 5# and 6# works normally.	YES	Use DSCAN to check
		NO	Repair related circuit

### (3) Difficult to start hot engine

General failure part: 1. Water in fuel tank, 2. Fuel pump, 3. Water temp. sensor, 4. Ignition coil.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check ignition system
3	Disconnect engine water temp. sensor joint, start the engine, and check whether the engine starts successfully. (Or replace the engine temp. sensor with a 300 ohm resistance in series at the engine water temp. sensor junction, and check whether the engine successfully starts at this time.)	YES	Check and repair circuit or replace sensor
		NO	Next step
4	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
5	Use EFI system adaptor, turn on ignition switch, check if power supply of ECU pin 32# and 32# is normal, check if ECU pin 5# and 6# works normally.	YES	Use DSCAN to check
		NO	Repair related circuit

## (4) Difficult to start cold engine

General failure part: 1. Water in fuel tank; 2. Fuel pump; 3. Engine water temp. sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Mechanical parts of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pump gauge ,start engine, check if pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
3	Disconnect engine water temp. sensor joint, start the engine, and check whether the engine starts successfully. (Or replace the engine temp. sensor with a 300 ohm resistance in series at the engine water temp. sensor junction, and check whether the engine successfully starts at this time.)	YES	Check and repair circuit or replace sensor
		NO	Next step
4	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and by-pass
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

## (5) Difficult to start in any conditions

General failure part: 1. Water in fuel tank; 2. Fuel pump; 3. Water temp. sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Air intake pipe; 8. Ignition timing; 9. Spark plug; 10. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pump gauge, start engine, check if pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Check and repair ignition system
4	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
5	Disconnect engine water temp. sensor joint, start the engine, and check whether the engine starts successfully.	YES	Check and repair circuit or replace sensor
		NO	Next step
6	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and by-pass
		NO	Next step
7	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
8	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
9	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanical failures
		NO	Next step

## (6) Normal starting, but unstable idle speed during engine warming

General failure part: 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Ignition timing; 8. Spark plug; 9. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if air control valve is blocked.	YES	Clean or replace
		NO	Next step
3	Check cylinder spark plug, and observe whether its type and clearance meet the specification.	YES	Next step
		NO	Adjust or replace
4	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage, block or flow overshoot.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
7	Check engine cylinder pressure, observe whether there is large difference in the engine cylinder pressure.	YES	Eliminate engine mechanical failures
		NO	Next step
8	Check if the mechanical ignition timing is beyond specification.	YES	Next step
		NO	Check ignition timing

## (7) Normal starting, but unstable idle speed after engine warming

General failure part: 1. Water in fuel tank; 2. Engine water temp. sensor; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
3	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean
		NO	Next step
4	Disconnect water temp. sensor connector and start engine to check idle speed is stable or not.	YES	Check circuit and replace sensor
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage, block or flow overshoot.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
7	Check engine cylinder pressure, observe whether there is large difference in the engine cylinder pressure.	YES	Eliminate engine mechanical failures
		NO	Next step

## (8) Normal starting, but unstable idle speed after engine warming

General failure part: 1. Water in fuel tank; 2. Water temp. sensor; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
3	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean
		NO	Next step
4	Disconnect the engine water temp. sensor joint, start engine, and observe whether engine is unsteady at idle during engine warming.	YES	Check and repair circuit or replace sensor
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage, block or flow overshoot.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after fueling.	YES	Change fuel
		NO	Next step
7	Check engine cylinder pressure, observe whether there is large difference in the engine cylinder pressure.	YES	Eliminate engine mechanical failure
		NO	Next step

**(9) Normal starting, unstable idle speed or engine stop when it is electronic loaded (e.g. headlight is on)**

General failure part: 1. Air control valve; 2. Injector

General diagnosis procedures:

Item	Procedures	Results	Next
1	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean
		NO	Next step
2	Check if output power increases when lighting, by using DSCAN to test if ignition advance angle, fuel spray and air intake volume is normal.	YES	To step 4
		NO	Next step
		NO	Check and repair air conditioner system
3	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
4	Use EFI system adaptor, turn on ignition switch, check if power supply of ECU pin 32# and 32# is normal, check if ECU pin 5# and 6# works normally.	YES	Use DSCAN to check
		NO	Repair related circuit

**(10) Engine starts normally, but idle speed is too high**

General failure part: 1. Throttle body and by-pass; 2. Injector seat; 3. Air control valve; 4. Water temp. sensor; 5. Ignition timing

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if throttle cable is jammed or too tight.	YES	Adjust
		NO	Next step
2	Check if air filter is blocked or air intake pipe leaks.	YES	Check and repair air intake system
		NO	Next step
3	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean
		NO	Next step
4	Remove water temp. sensor connector, start engine to check if idle speed is too high.	YES	Check circuit and replace sensor
		NO	Next step
5	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing

## (11) RPM cannot increase or engine stop when accelerating

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Injector; 8. Ignition timing; 9. Exhaust pipe.  
General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
3	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step
5	Check if intake pressure sensor, TPS and its circuit is normal.	YES	Next step
		NO	Check circuit and replace sensor
6	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

## (12) Low acceleration

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Injector; 8. Ignition timing; 9. Exhaust pipe.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
3	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step

Item	Procedures	Results	Next
5	Check if TPS and its circuit is normal.	YES	Next step
		NO	Check circuit and replace sensor
6	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

### (13) Difficult to accelerate and bad performance

General failure part: 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Ignition coil; 5. Throttle body and by-pass; 6. Air intake pipe; 7. Air control valve; 8. Injector; 9. Ignition timing; 10. Exhaust pipe.

General diagnosis procedures:

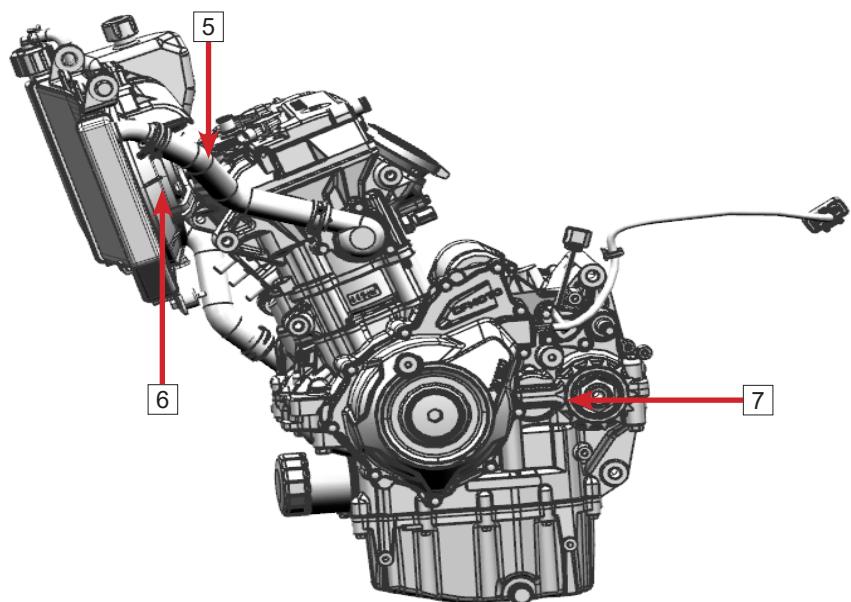
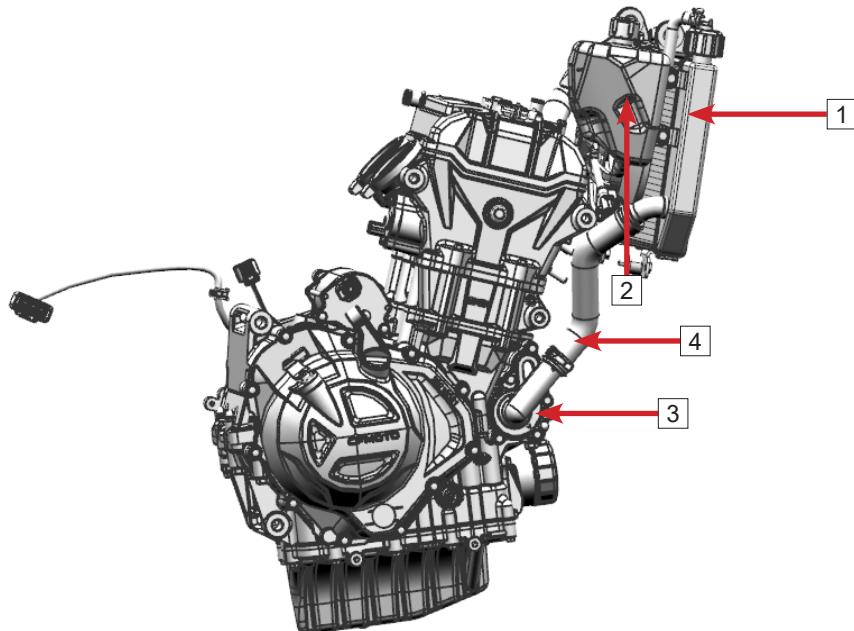
Item	Procedures	Results	Next
1	Check if clutch sliding, low tire pressure, bad brake or wrong tire size.	YES	Repair
		NO	Next step
2	Check if air filter is blocked.	YES	Check and repair air intake system
		NO	Next step
3	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 400kPa.	YES	Next step
		NO	Check and repair fuel supply system
4	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if spark is strong enough.	YES	Next step
		NO	Check and repair ignition timing
5	Check if spark plug is suitable for requirement including its type and clearance.	YES	Next step
		NO	Adjust or replace
6	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean
		NO	Next step
7	Check if TPS and its circuit is normal.	YES	Next step
		NO	Check circuit and replace sensor
8	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace
		NO	Next step
9	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
10	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Check and repair ignition timing
11	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

# 09 Cooling System

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<b>9.1 Cooling System Diagram .....</b>	<b>2</b>
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<b>9.3 Engine Coolant .....</b>	<b>4</b>
<b>9.3.1 Coolant Inspection.....</b>	<b>4</b>
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<b>9.4 Seal Inspection .....</b>	<b>6</b>
<b>9.5 Radiator and Water Pipes Inspection and Clean.....</b>	<b>7</b>
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## 9.1 Cooling System Diagram



1	Radiator assembly	2	Reservoir tank assembly	3	Water pump assembly	4	Radiator water outlet pipe
5	Radiator water inlet pipe	6	Fan motor	7	Engine assembly		

## ⚠ DANGER:

Coolant is toxic. Don't drink nor spill on skin, eyes, clothing. If coolant is swallowed, induce vomit and seek for medical attention. If you get coolant on your skin or in your eyes, immediately wash it off before medical attention. If you spill coolant on your clothing, change your clothing.

Rusting and corroding residues in engine and radiator must be treated according to regulations. The chemical inside can do harm to humans.

## ⚠ CAUTION:

If tap water is added to the cooling system, scale deposit will accumulate inside the cooling system. When the temperature is below zero, ice will be generated, which will seriously affect the operation of the cooling system.

Antifreeze is added anti-rust agent and antiseptic. When it is diluted, it will lose resistance of rust and corrosion. The dilution concentration of antifreeze must be consistent with the manufacturer's instructions.

The coolant added into the cooling system is green and contains ethylene glycol. When the ambient temperature is at -35°C, please choose the coolant whose freezing point is lower than -35°C.

## ⚠ WARNING:

The coolant will be very hot and under pressure when the vehicle is running.

Never open the radiator cap when the engine is still hot. Otherwise, the vapor or hot coolant will cause injury.

If get scalded, rinse the wound with flowing cold water for more than 10 minutes until the wound is no longer painful and seek medical advice immediately.

## 9.2 Cooling System Removal

Place a container under water pump.

Remove drain bolt 1.

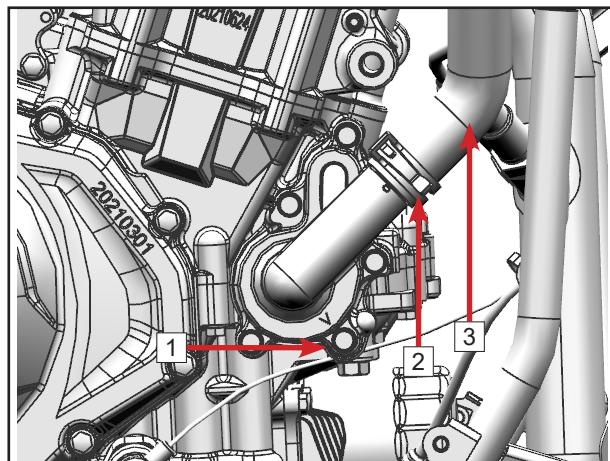
Drain coolant.

Loosen clamp 2.

Remove water outlet pipe 3.

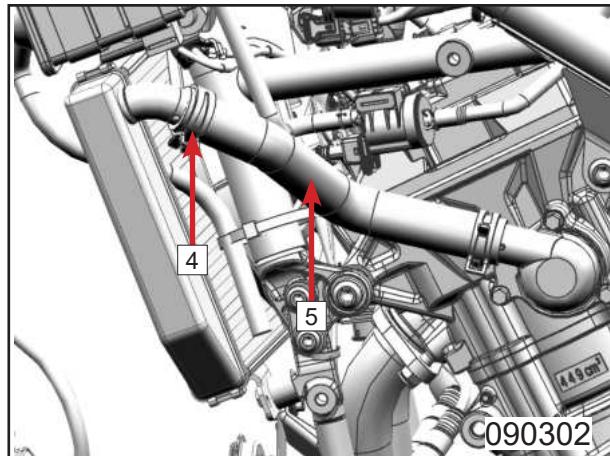
**NOTE:** After water outlet pipe removal, there is still some coolant spilling out.

**NOTE:** The cooling system has a certain pressure, and the coolant will shoot a long distance after removing the drain bolt.



Loosen clamp 4.

Remove water inlet pipe 5.



Loosen clamp 1.

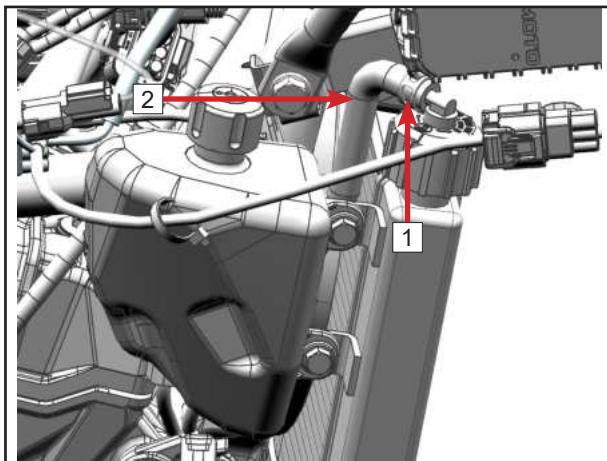
Remove reservoir tank siphon 2.

Remove two bolts 3.

Remove radiator 4.

## Installation

Reverse the removal procedures for installation.



## 9.3 Engine Coolant

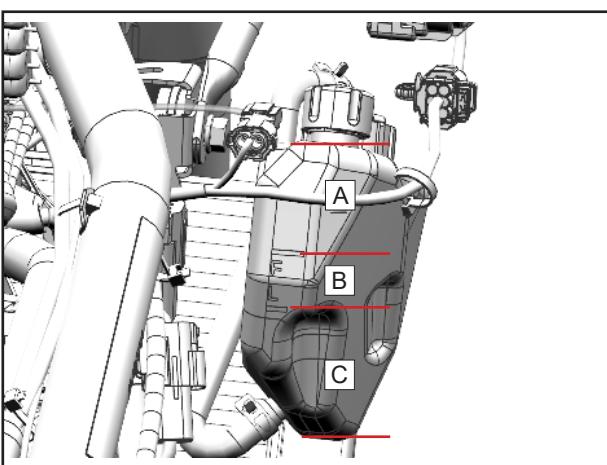
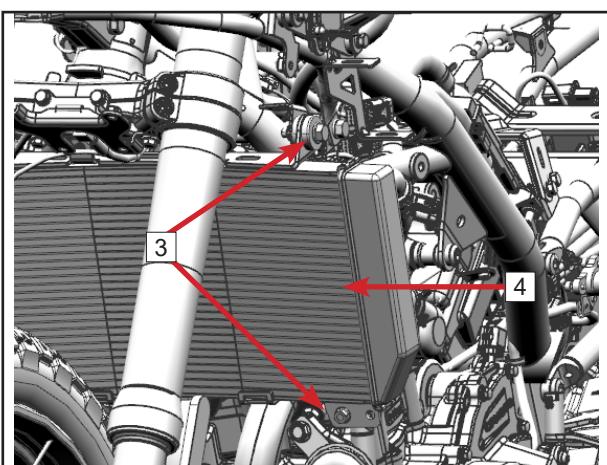
Coolant in cooling system is a mixture of 51.5% distilled water, 46% ethylene glycol antifreeze and 2.5% additive. This mixture ratio provides optimized corrosion resistance and fine heat production. The mixture has good anti-corrosion and endothermic function, and its solidification point is -35°C. If engine works under -35°C, choose coolant with solidification point of -40°C or -50°C.

### ⚠ CAUTION:

CFMOTO coolant is an Organic Acid Technology (OAT) formula. When replenishing or replacing coolant, verify the label states 'compatible with one or more of the following formulas: OAT or Si-OAT, G30, G40, G12++.

### ⚠ CAUTION:

Use high quality ethylene glycol base antifreeze mixed with distilled water. Never mix alcohol base anti-freeze or other different brands of antifreeze. The ratio of mixture should not be more than 60% or less than 50%. Do not use anti-leak additive.



### 9.3.1 Coolant Inspection

Support the vehicle upright on a level surface.

Check the reservoir coolant level after coolant has cooled down.

If the coolant level is in level A: Drain excess coolant to level B.

Level should be at B.

If the coolant level is in level C or not visible: Refill the same coolant to level B.

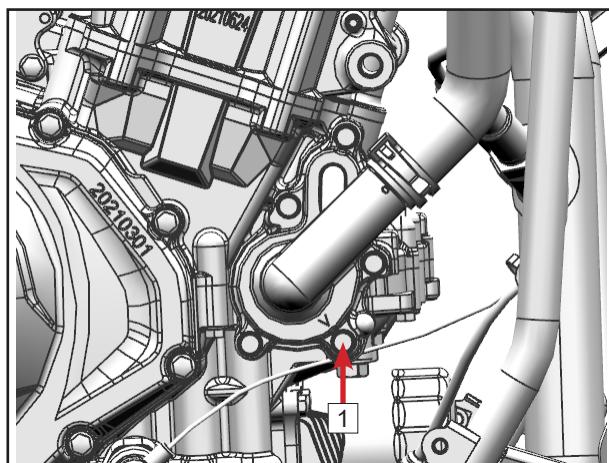
⚠ CAUTION: The coolant will be very hot and under pressure while the vehicle is running. Do not open any other cooling system parts such as the radiator, radiator hoses, reservoir, etc. until the engine or cooling system has cooled completely. In the event of a burn, rinse the wound with running cold water for 10 minutes or more until the wound is no longer painful and then seek medical attention.

## 9.3.2 Coolant Addition

Open the reservoir cover and add the same coolant to area B.

**⚠ CAUTION: If the coolant needs to be replenished frequently, or if the coolant in the reservoir is frequently backed up and drained, there may be a leak in the cooling system, contact your dealer to have the cooling system checked.**

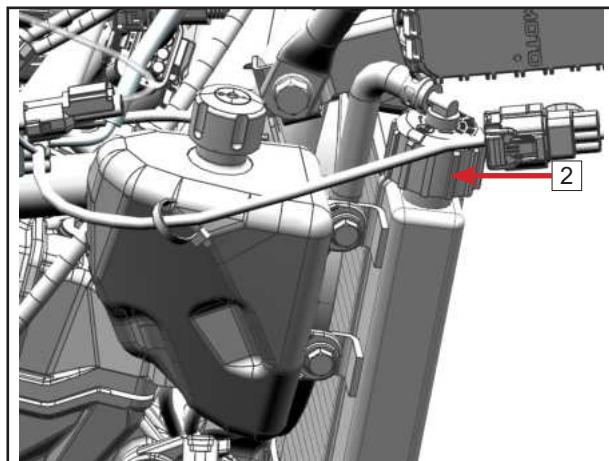
Only the original CFMOTO coolant is recommended. Mixing different coolants may cause engine damage, contact your dealer to replace the coolant.



## 9.3.3 Coolant Replacement

**Prerequisites: Prop up the vehicle on level ground or fix the vehicle on the level control console so that the vehicle is perpendicular to the ground.**

1. Place a container under the water pump.
2. Remove the drain bolt **1**.
3. Release radiator pressure cap.
4. Drain the coolant (Make sure that the coolant in the reservoir is cleared).
5. Install the drain bolt.
6. Open radiator pressure cap **2**.
7. Use a funnel to fill the coolant from the radiator mouth to the radiator neck.
8. Start the vehicle to heat engine for 2~3 minutes (do not close the radiator pressure cover during vehicle starting).
9. After heating the engine, add coolant from radiator mouth to radiator neck.
10. Close radiator pressure cap **2**.
11. Start the vehicle until the fan runs, and observe the reservoir at the same time to check whether the coolant in the radiator is flowing into the reservoir through the reservoir connecting pipe.
12. If no coolant flows out, repeat steps 6 ~ 11 above (make sure the engine is cooled).
13. If any coolant flows out, fill the reservoir with coolant between the Upper and Lower limits.
14. After the engine is cooled, check the level of reservoir. If the level is lower than the Lower limit line, add the coolant between the Upper and Lower limits. If the level is higher than the Upper limit line, drain out the excess coolant to restore the



level to the Upper and Lower limits.

## 9.4 Seal Inspection

### Radiator Cap Inspection

Remove radiator cap.

Measure the open pressure of radiator cap with pressure gauge.

If the pressure is out of standard, replace a new part.

Mixing ratio	Freezing point
50%	-30°C
55%	-40°C
60%	-55°C

### Radiator Cap Open Pressure

135kPa~160kPa

1.35kgf/cm<sup>2</sup>~1.6kgf/cm<sup>2</sup>

19.58psi~23.2psi

**Standard:**

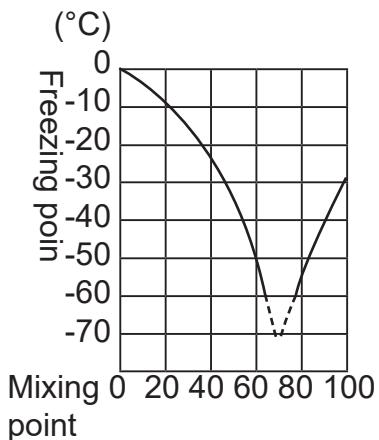
140kPa

1.4kgf/cm<sup>2</sup>

20.3psi

### Seal Inspection

Connect the pressure gauge with reservoir tank joint.



#### ⚠️WARNING:

Never open the radiator cap when the engine is still hot. Otherwise, the vapor or hot coolant will cause injury.

Inflate to 135 kPa, and last for 10s.

If the pressure decreases within 10s, there is leaking inside the system. Inspect the whole system and replace the broken parts.

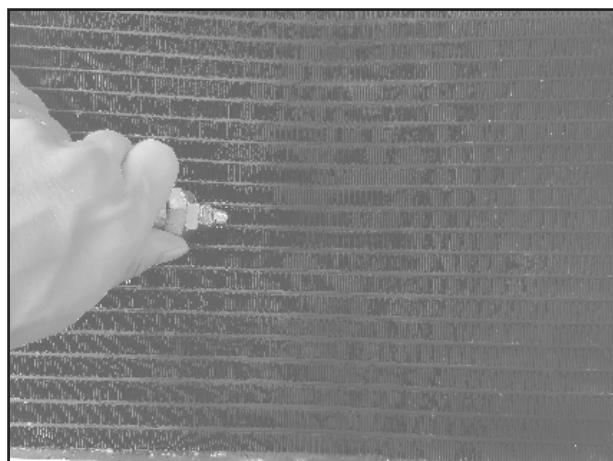
**NOTE: When remove the gauge, cover radiator cap with cloth, in case the coolant spills out.**

**NOTE: The testing pressure does not exceed the open pressure.**

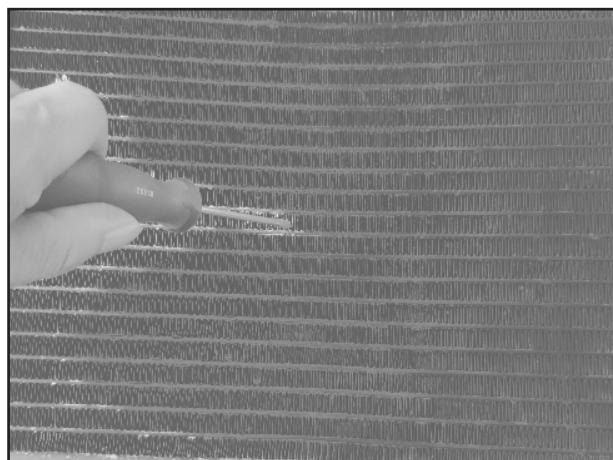
## 9.5 Radiator and Water Pipes Inspection and Clean

### Radiator Inspection and Clean

Remove dirt and dust from the radiator with high-pressure air.



Repair radiator fins with a small screwdriver.



### Radiator Water Pipes Inspection

Inspect radiator water pipes for leakage, damage. Replace if necessary.

Inspect radiator water pipe clamps. Replace if loose.

After radiator and water pipes inspection, inspect the coolant. Add coolant if necessary.

## 9.6 Fan Motor Inspection

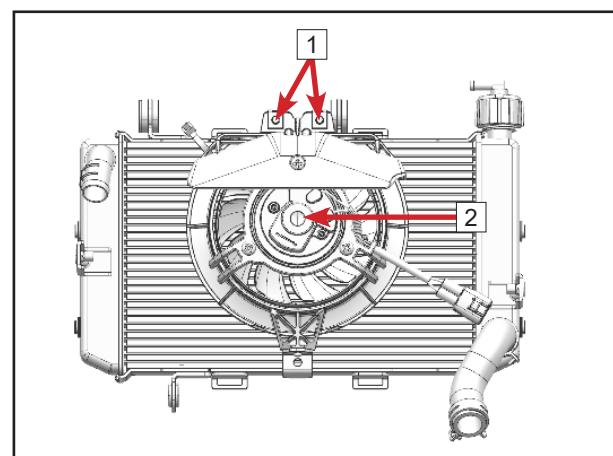
Remove two bolts **1**.

Remove fan motor assembly **2**.

Rotate impeller to check performance.

Replace new fan motor assembly **2** if stuck or damaged.

Battery voltage is 12V, make motor work, the electrical current is no more than 5A. Replace if motor doesn't work or current exceeds **2**.



### Installation

Reverse the removal procedures for installation.

# **10 Exhaust System**

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<b>10.1 Engine Panel, Exhaust Pipe and Muffler Assembly Removal ....</b>	<b>10-2</b>
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10.1.2 Exhaust Pipe.....	10-3
10.1.3 Muffler Assembly.....	10-4
<b>10.2 Exhaust Pipe Inspection.....</b>	<b>10-4</b>

**DANGER:** The temperature of muffler is very high after engine runs for a while. Do not park the vehicle near inflammable and explosive articles when removing muffler. Never operate high temperature parts like muffler when the vehicle isn't cool down, in case of burnt issue.

The muffler will emit toxic and hazardous gas. Do not operate in a closed or no effective ventilation environment. The poisonous and harmful gas emitted by the muffler may cause poisoning or even death.

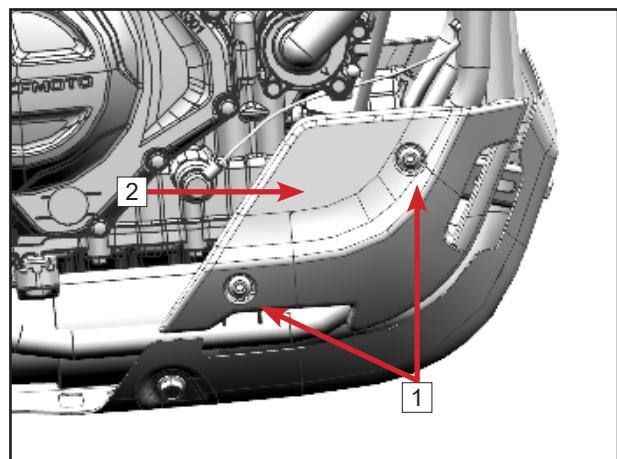
## 10.1 Engine Panel, Exhaust Pipe and Muffler Assembly Removal

### 10.1.1 Engine Panel

Remove inner hex bolts 1.

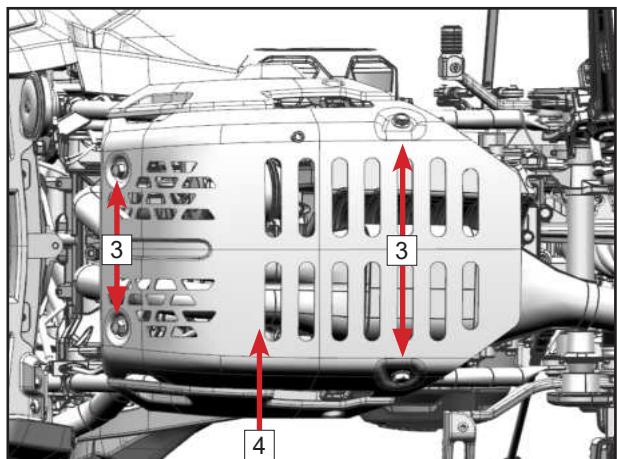
Remove engine RH panel 2.

Engine LH panel operation refers to the RH.



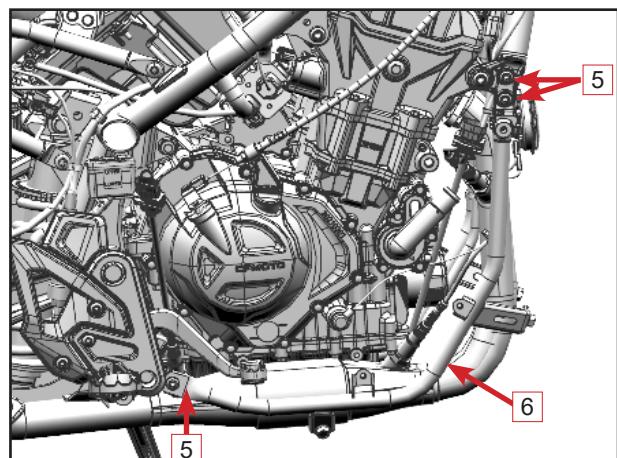
Remove four bolts 3.

Remove engine lower panel 4.



Remove inner hex bolts 5.

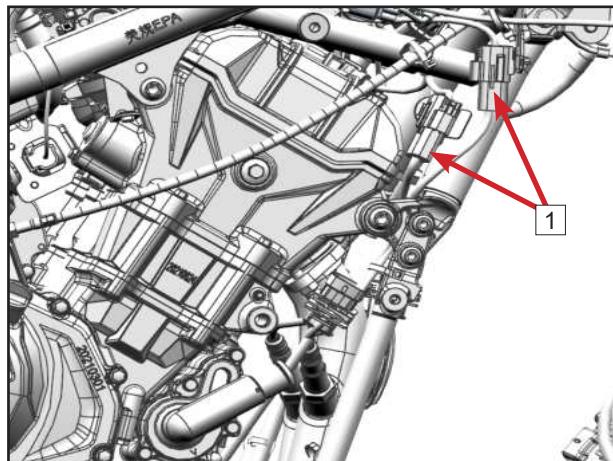
Remove guard bar 6.



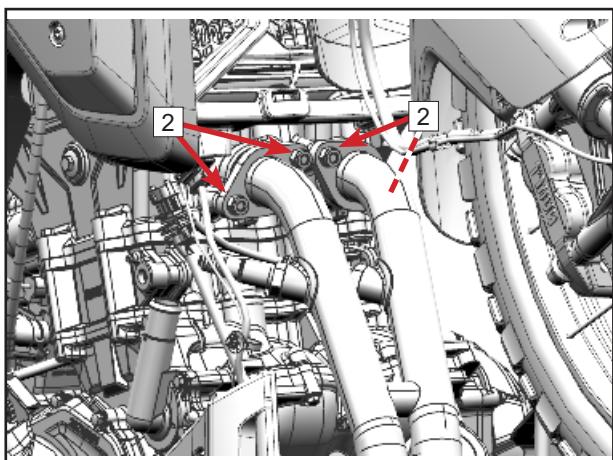
## 10.1.2 Exhaust Pipe

Remove oxygen sensor connector 1.

**NOTE:** Mark the oxygen sensor terminals so that they correspond to the "L" and "R" marks of the connector.

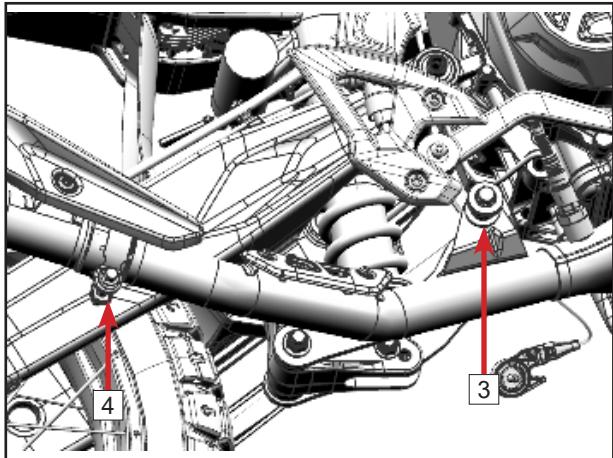


Remove lock nuts 2.

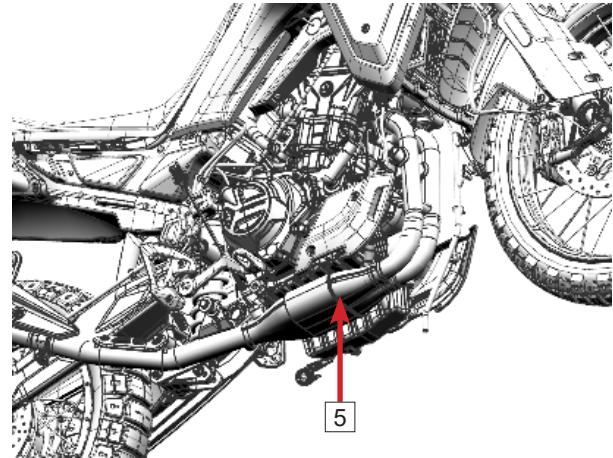


Remove bolt 3.

Remove clamp 4.



Remove exhaust pipe assembly 5.



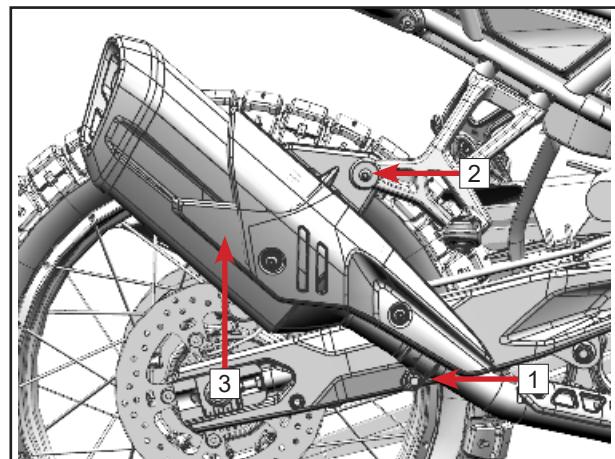
## 10.1.3 Muffler Assembly

Loosen the clamp **1**.

Remove inner hex bolt **2**.

Remove muffler assembly **3**.

**NOTE: The muffler tail should be held steady to prevent sudden fall when disassembling.**



## 10.2 Exhaust Pipe Inspection

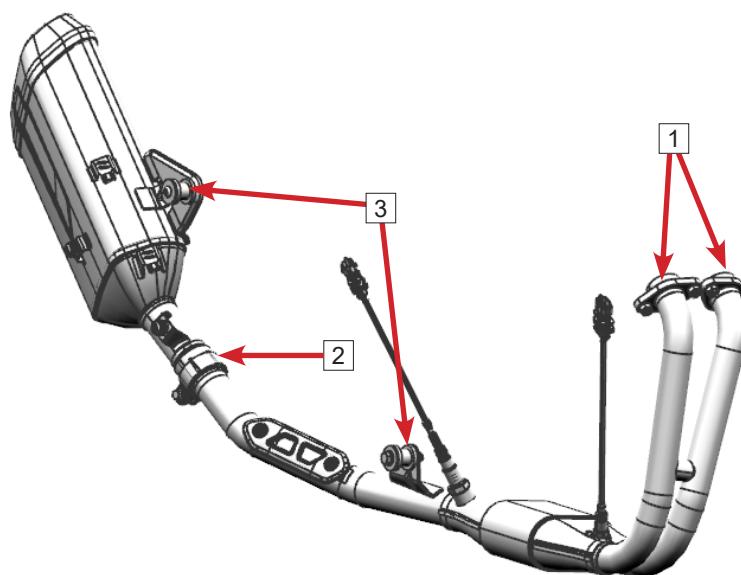
Check the appearance of exhaust pipe for damage. Replace if it does.

Check exhaust pipe graphite sealing sleeve **1** **2**.

Check exhaust pipe sealing gasket **1** for corrosion, crack or deformation.

Replace with new parts in time if it does.

Check the cushion collar **3** for crack or corrosion. Replace it in time if it does.



# 11 Front, Rear Wheels and Brake System

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<b>11.1 Front Brake Caliper .....</b>	<b>11-2</b>
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11.9.2 Rear Brake Pedal Free Play.....	11-13

**NOTE: Before removing the tires, reinstall the center/side braces or use the bracket to support the vehicle so that the front/rear wheels are off the ground.**

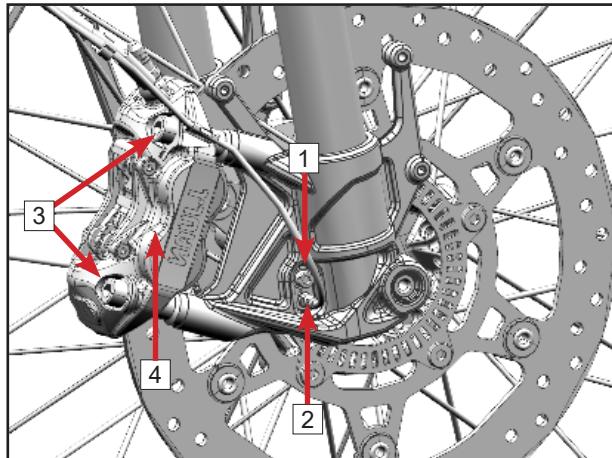
## 11.1 Front Brake Caliper

Remove inner hex bolt **1**.

Remove wheel speed sensor **2**.

Remove inner hex bolts **3**.

Remove RH front brake caliper **4**.

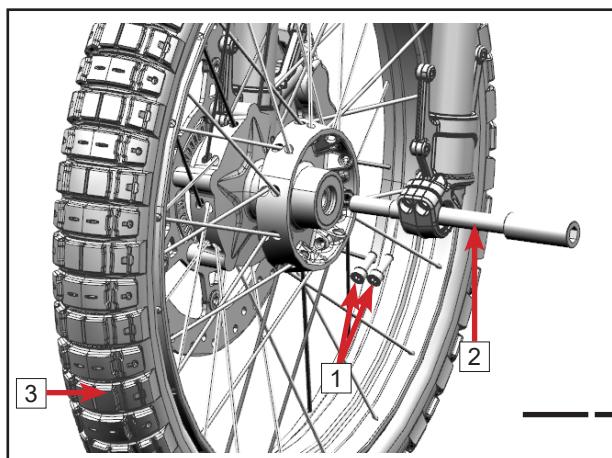


## 11.2 Front Wheel Removal

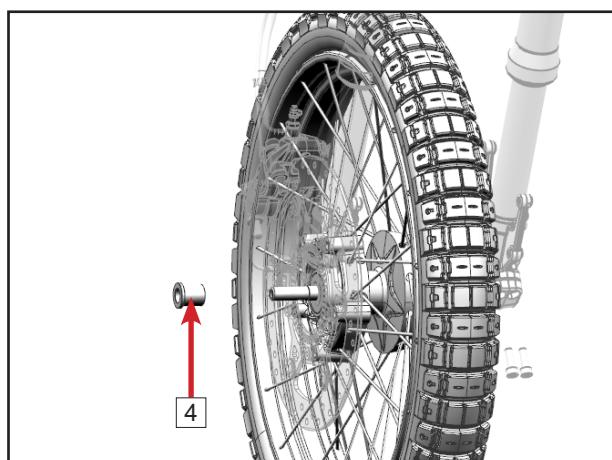
Loosen inner hex bolts **1**.

Remove and push out front wheel shaft **2**.

Remove front wheel **3**.



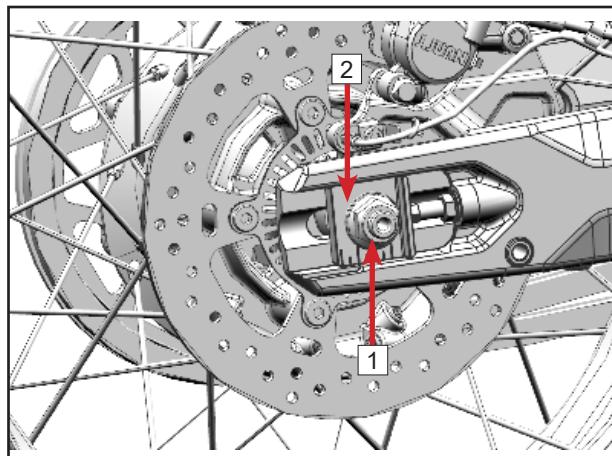
Prevent front wheel shaft sleeve **4** from lossing.



## 11.3 Rear Wheel Removal

Remove rear wheel shaft lock nut **1**.

Remove chain adjusting block **2**.

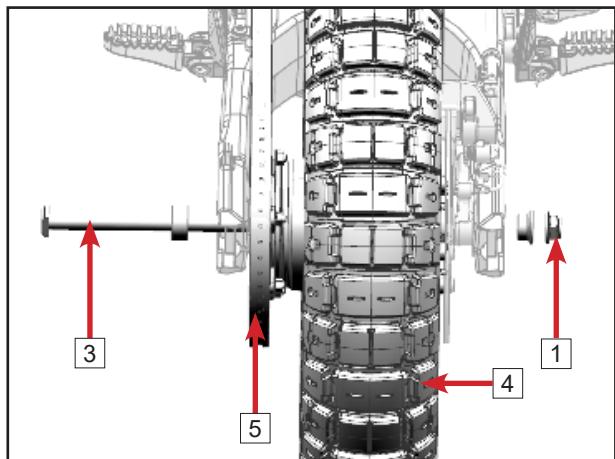


# 11 Front, Rear Wheels and Brake System

Remove rear wheel shaft **3**.

Push the rear wheel **4** forward of the vehicle.

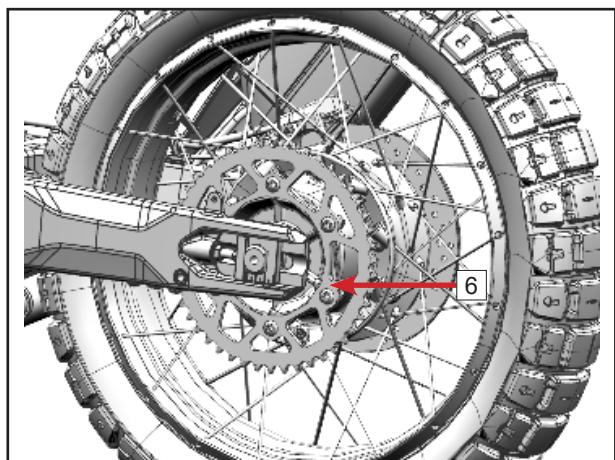
Remove the chain **5** from sprocket.



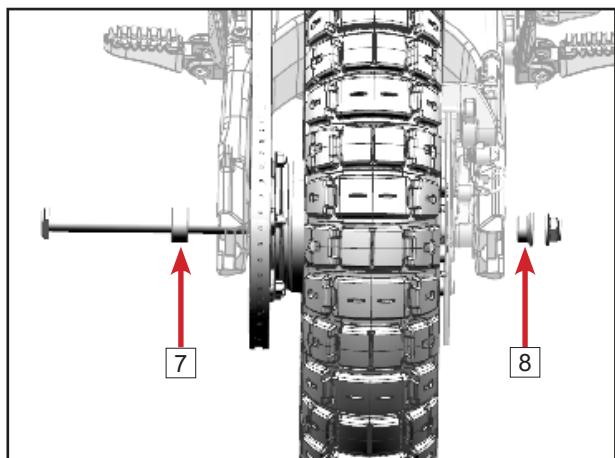
Remove rear wheel **4**.

Avoid sprocket seat **6** falling from the left side.

**CAUTION: Lean rear wheel slightly to right during removal, in case of sprocket seat falling down to cause injury.**

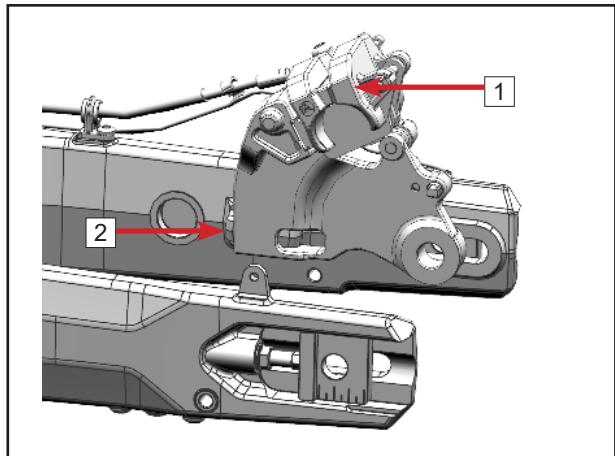


Prevent rear wheel LH shaft sleeve **7** and RH shaft sleeve from lossing **8**.



## 11.4 Rear Brake Caliper Removal

Remove rear brake caliper **1** from limit block **2**.



## 11.5 Brake Master Cylinder

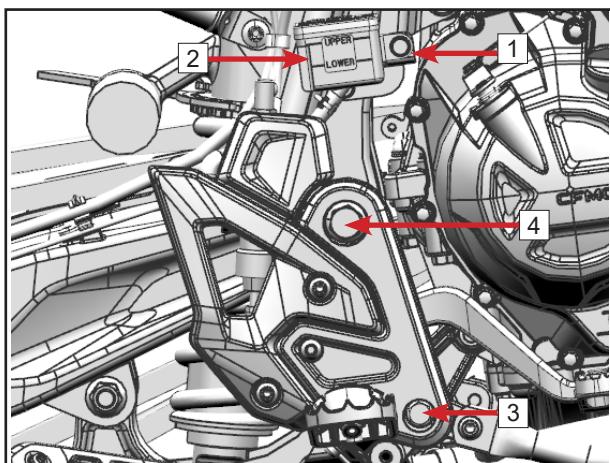
### 11.5.1 Rear Brake Master Cylinder Removal

Remove bolt 1.

Remove rear brake fluid reservoir 2.

Remove RH footrest bolt 3.

Remove RH footrest bolt 4.



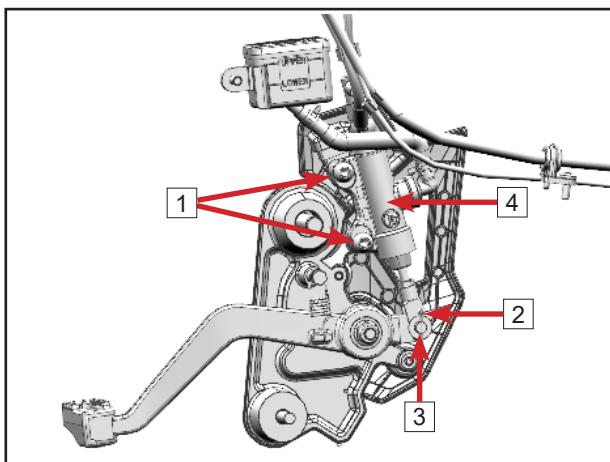
**CAUTION:** Never put brake fluid reservoir up side down, in case the air gets into the system, which leads to brake system failure.

Remove main brake pump bolts 1.

Remove main brake pump bayonet pin 2.

Remove main brake pump pin shaft 3.

Remove main brake pump 4.



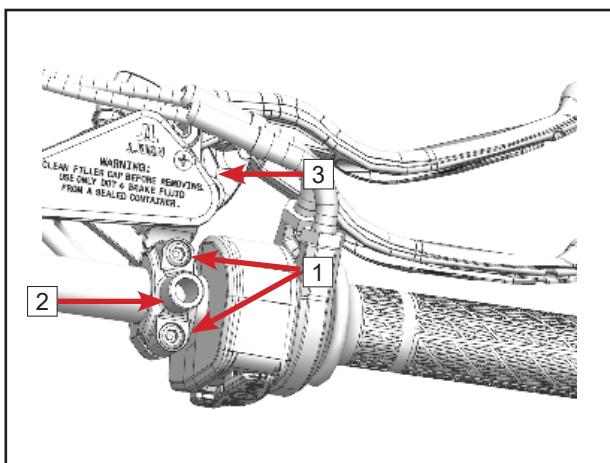
### 11.5.2 Hand Brake Master Cylinder Assembly Removal

#### Removal

Remove bolts 1.

Remove press cover 2.

Remove hand brake master cylinder assembly 3.



**CAUTION:** Never put brake fluid reservoir up side down, in case the air gets into the brake pipe, which leads to brake system failure.

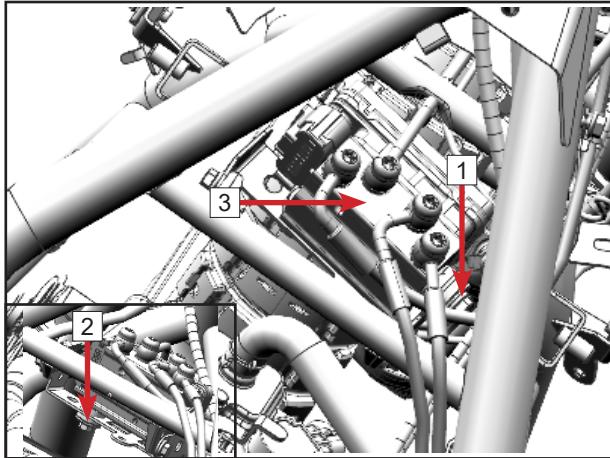
## 11.6 ABS Execution Unit

### Removal

Remove bolts and gaskets 1 on the right side.

Remove the bottom bolt 2.

Remove ABS execution unit 3.



### Installation

Reverse the removal procedures for installation.

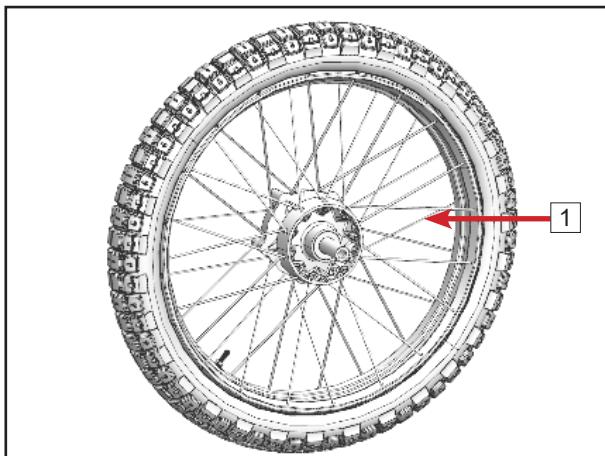
## 11.7 Tire Maintenance

**NOTE:** Use the special tire pressure machine to remove the tire, and unseating the tire should be avoided near the valve cap to prevent damage to the tire pressure sensor.

### 11.7.1 Front Wheel

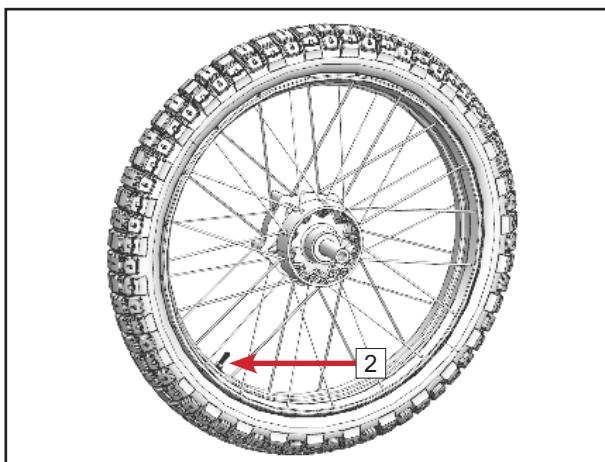
Check the spoke **1** for distortion, breakage, crack or other damage. Replace it if it damaged.

Inspect whether the spoke spring ring is deformed and misaligned. If the spring ring is deformed and misaligned, it may lead to rim leakage and damage. Replace the rim if necessary.



#### If equipped with the tire pressure sensor:

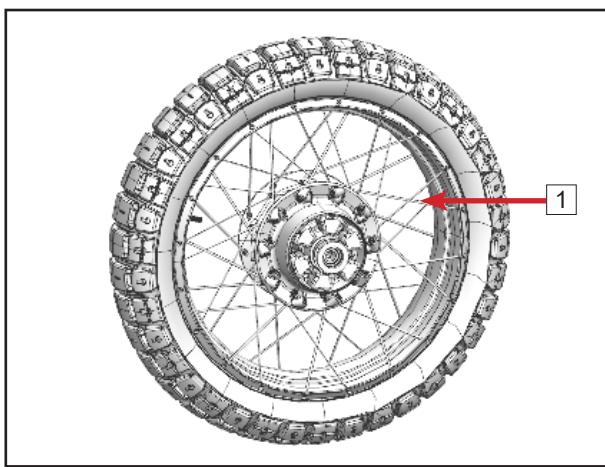
Check tire pressure sensor valve nozzle **2** for damage and leakage. The vehicle uses the tire pressure sensor, if the valve nozzle is broken or the tire pressure display is abnormal, replace the tire pressure sensor with a new one.



### 11.7.2 Rear Wheel

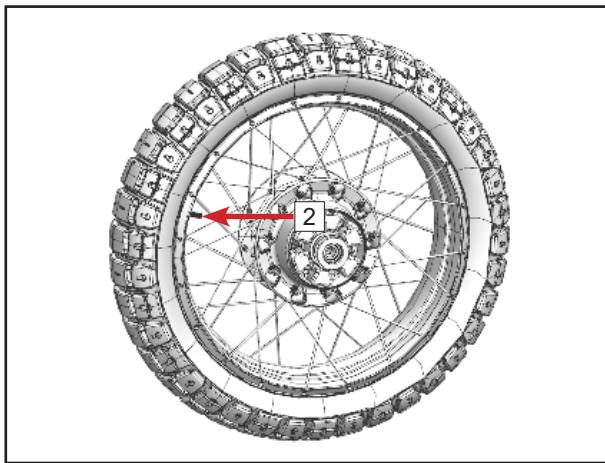
Check the spoke **1** for distortion, breakage, crack or other damage. Replace it if it damaged.

Inspect whether the spoke spring ring is deformed and misaligned. If the spring ring is deformed and misaligned, it may lead to rim leakage and damage. Replace the rim if necessary.



#### If equipped with the tire pressure sensor:

Check tire pressure sensor valve nozzle **2** for damage and leakage. The vehicle uses the tire pressure sensor, if the valve nozzle is broken or the tire pressure display is abnormal, replace the tire pressure sensor with a new one.

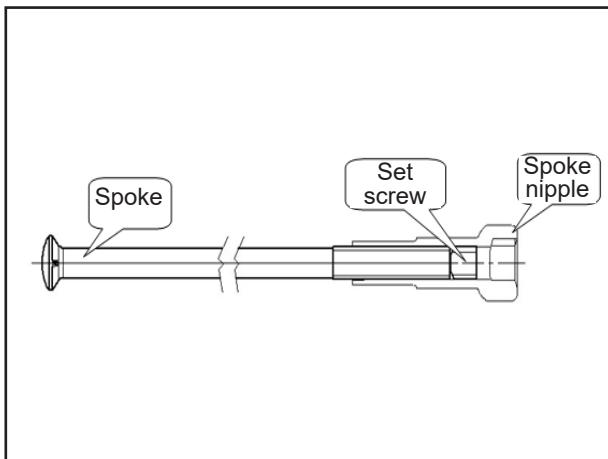


## 11.7.3 Spoke

Check the tread runout when replacing the tire. If the tread runout is  $> 1.0$ , adjust the spoke nut.

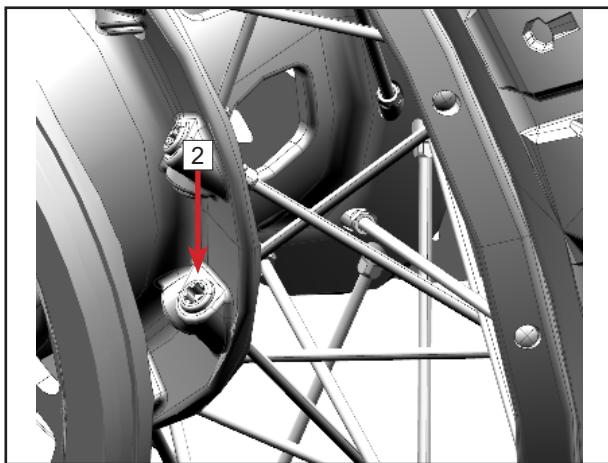
Check the spoke for loosening or breakage. Replace if it does.

Check spoke nut torque (torque:  $4N\cdot m \sim 6N\cdot m$ ). If the torque is incorrect, confirm the torque and adjust the runout to  $< 1.0$ .



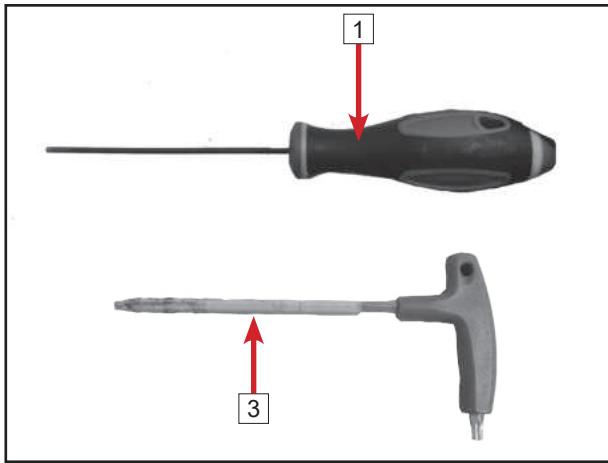
### Inspection Method:

Check the torque value of each bar with torque wrench, which should be  $\geq 4N\cdot m$ . If there is no torque wrench, use the screwdriver and other tools to knock the spokes for inspection, the sound is clear on behalf of the spoke tension is enough, the sound is low and hoarse on behalf of the tension is insufficient, and the loosened steel wire can be felt directly by hand.



### Adjustment Method:

For undertensioned spokes, use the 2mm hex screwdriver ① to unscrew the setting screw ② from the bar. Then use the T40 box wrench ③ to check that the torque is between  $4\text{-}6N\cdot m$ . Finally, reinstall the setting screw and tighten it.



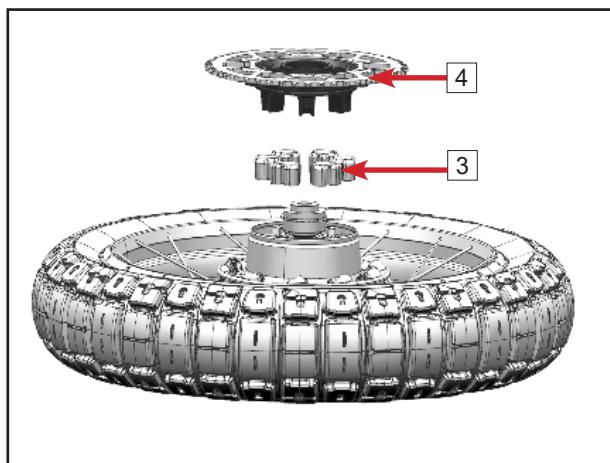
# 11 Front, Rear Wheels and Brake System

Check six cushion rubber blocks **3** for aging or damage.

If the cushion rubber block is aged or damaged, replace the cushion rubber block directly.

Check sprocket seat **4** and rear sprocket for wear or damage.

Replace sprocket seat or rear sprocket directly if the sprocket seat or rear sprocket is worn or broken.



## 11.7.4 Tire Pressure

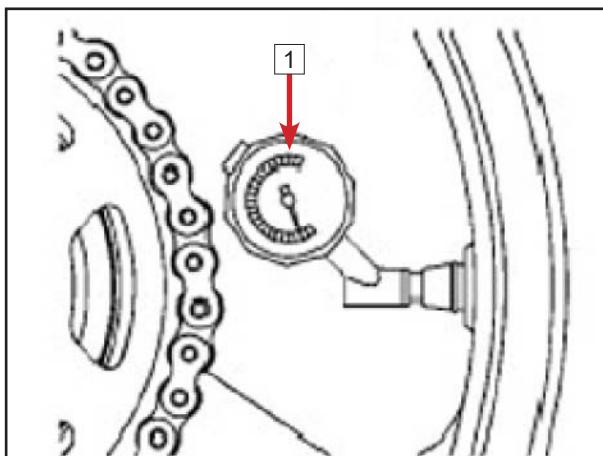
Remove tire inflation valve cap.

Measure the tire pressure with air gauge **1** when it is cool.

Pressure	Single Person
Front wheel	225kPa
Rear wheel	250kPa

Adjust the tire pressure according to the standard if necessary.

Install tire inflation valve cap.



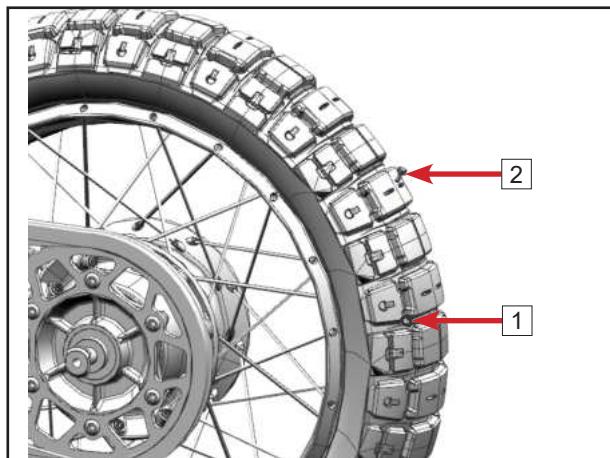
## 11.7.5 Tire Appearance

Clean the embedded stone **1** or other inclusions **2** on tires.

Inspect all parts of the tire tread for cracks, cuts, or dents.

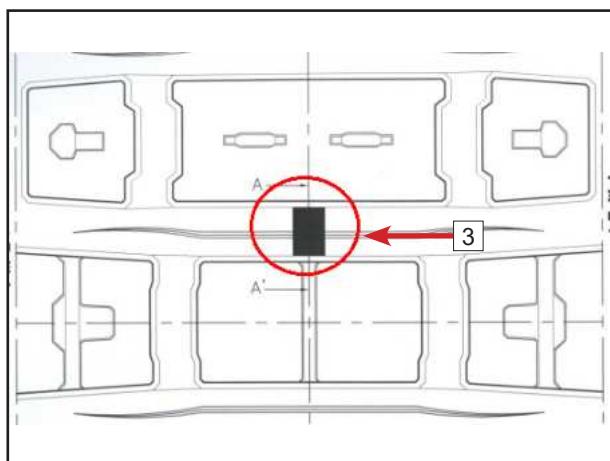
Inspect tire appearance for expansion or pulge. Expansion or pulge indicates damage inside the tire.

Replace it if any defect is found to avoid rapid expansion of tire damage.



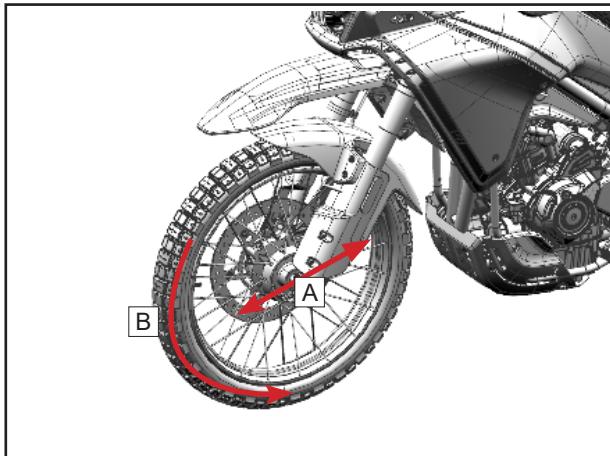
Inspect tire for wear condition. The tire may be punctured or damaged if beyond service limit. Majority of the tire accidents happen due to exceeding service limit. Pay attention not to use the tire if the pattern is worn in case of injury.

When the tire thread wears to the block **3** height, replace a new tire.

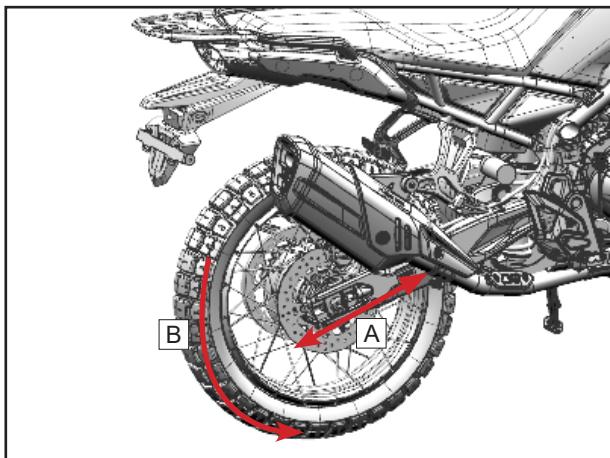


## 11.7.6 Wheel Bearing

Lift the front wheel off the ground.  
Inspect the front wheel bearing for damage by pushing or pulling the wheel **A**.  
Rotate the front wheel **B** to inspect for the smooth movement and noise.  
Replace if any defect is found.

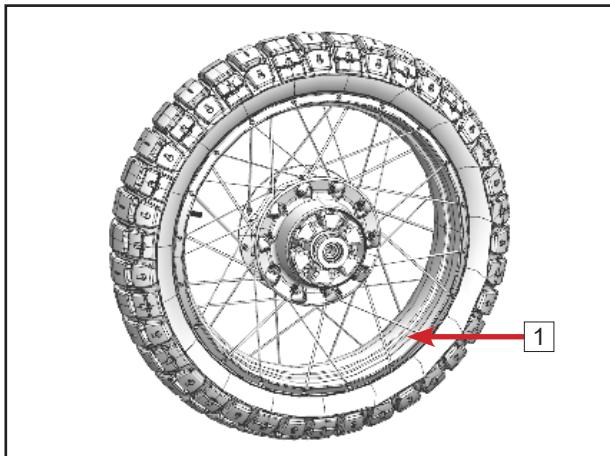
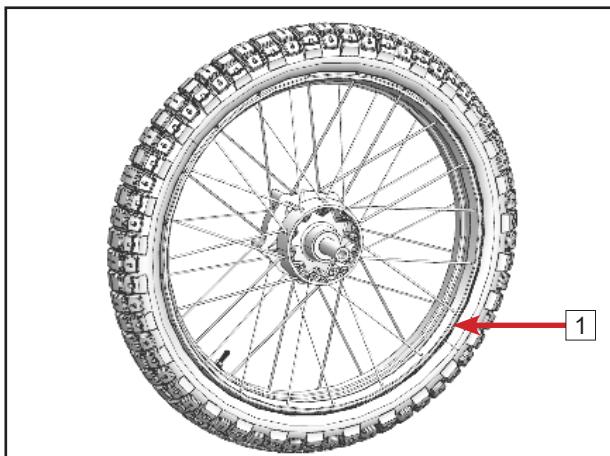


Lift the rear wheel off the ground.  
Inspect the rear wheel bearing for damage by pushing or pulling the wheel **A**.  
Rotate the rear wheel **B** to inspect for the smooth movement and noise.  
Replace if any defect is found.



## 11.7.7 Rim

Inspect rim if sunk or damaged **1**.  
Inspect front wheel or rear wheel completely if any defect is found. Replace if necessary.



# 11 Front, Rear Wheels and Brake System

## 11.8 Brake System Maintenance

### **WARNING:**

Brake fluid can stimulate the skin.

Keep the brake fluid out of reach of children.

Do not let brake fluid contact skin, eyes or clothing. Wear protective gears and goggles during operation.

If swallow brake fluid by accident, seek for medical attention immediately.

If you get brake fluid on skin, rinse contact area with clean water immediately.

If you get brake fluid in your eyes, immediately wash it off and seek for medical attention.

If you spill brake fluid on your clothing, change your clothing.

### 11.8.1 Hand Master Cylinder Maintenance

#### Front Brake Fluid Level Inspection

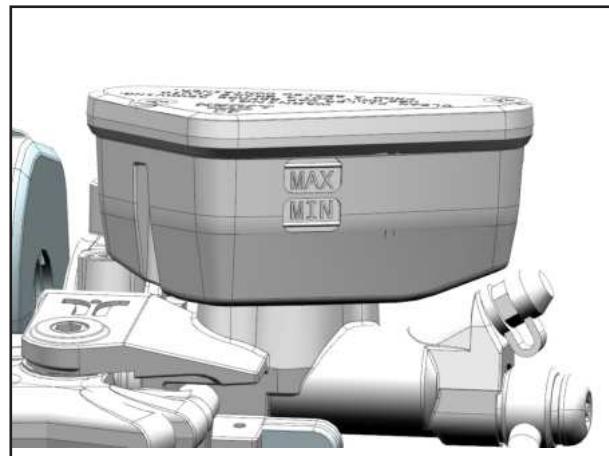
Straighten the vehicle to make the hand brake fluid reservoir parallel the ground.

Check the brake fluid level of fuel reservoir.

If the fluid level is higher than the reservoir gasket, release some brake fluid between the reservoir gasket and MIN.

If the fluid level is between the reservoir gasket and MIN, the fluid level is appropriate.

If the fluid level is lower than MIN, add brake fluid between the reservoir gasket and MIN.



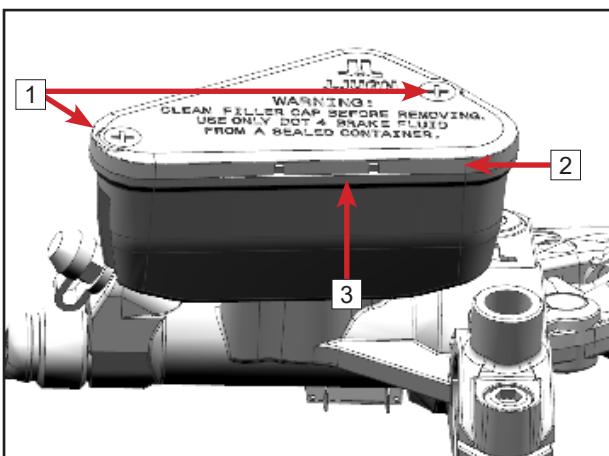
#### Brake Fluid Replacement

Remove two screws **1**.

Remove reservoir cap **2**.

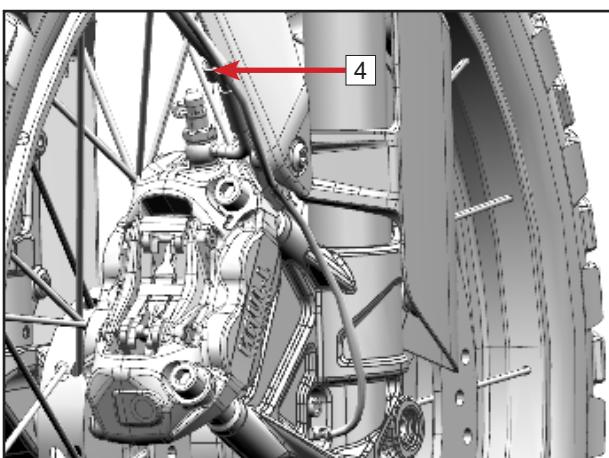
Remove reservoir gasket **3**.

**NOTE:** Reservoir gasket may be sunk due to negative pressure caused by brake fluid reducing. It doesn't affect normal use but needs to be restored during installation.



Open air-bleed bolt rubber sleeve.

Connect a clean plastic hose with air-bleed bolt **4**, with other side into a container.



Repeatedly hold and loose **A** brake lever until it feels hard.

Loose air-bleed bolt **4** a little bit.

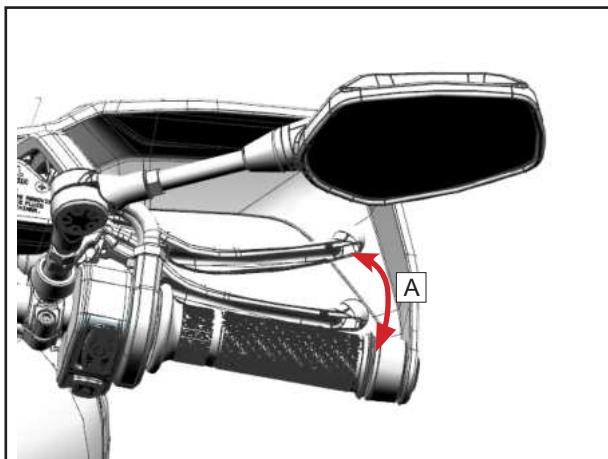
Tighten the air-bleed bolt right after the brake fluid doesn't spray out or the lever feels soft.

Add brake fluid.

Repeat the above procedures until the new brake fluid sprays out.

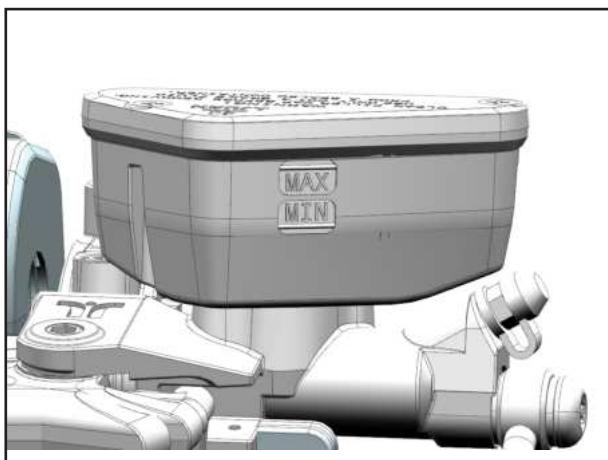
**⚠WARNING: Keep brake fluid level above LOWER, in case air gets into brake system, which results in brake system failure and injury.**

**⚠WARNING: If there is air inside of brake system, replace brake fluid repeatedly until there is no air in drained brake fluid.**



## Brake Fluid Addition

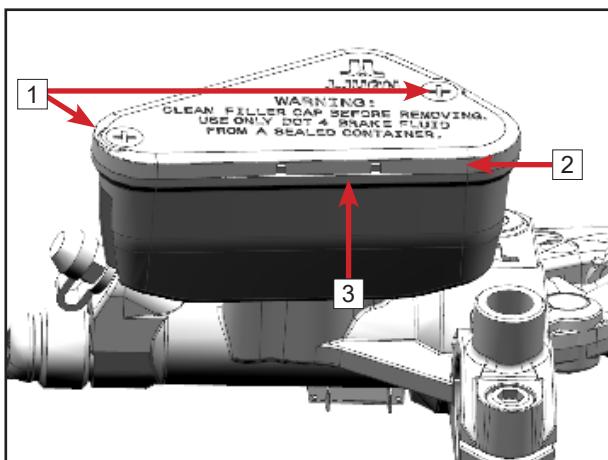
Add brake fluid between UPPER and LOWER of fuel reservoir.



Install reservoir gasket **3**.

Install reservoir cap **2**.

Install two screws **1**.



## 11.8.2 Rear Brake Master Cylinder Maintenance

### Rear Brake Fluid Level Inspection

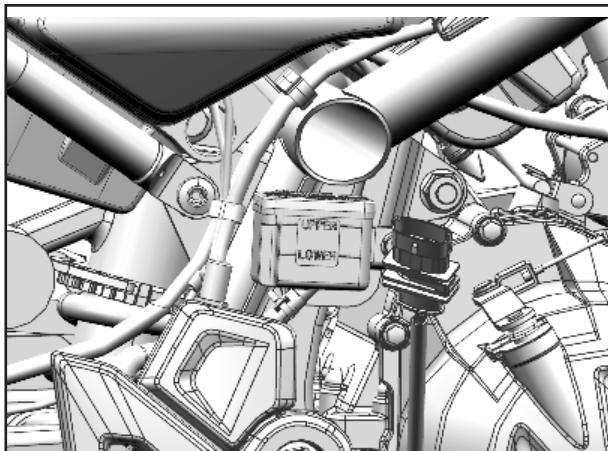
Straighten the vehicle to make the rear brake fluid reservoir parallel the ground.

Check brake fluid level of fuel reservoir.

If the fluid level is higher than UPPER line, release some brake fluid between the UPPER and LOWER.

If the fluid level is between UPPER and LOWER, the fluid level is appropriate.

If the fluid level is lower than LOWER line, add brake fluid between UPPER and LOWER.



# 11 Front, Rear Wheels and Brake System

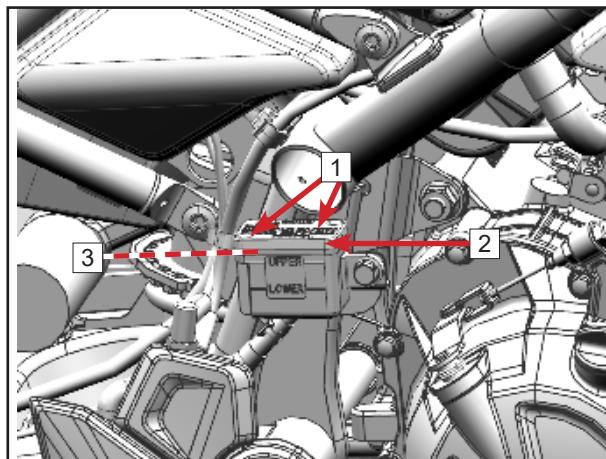
## Brake Fluid Replacement

Remove reservoir cap screws **1**.

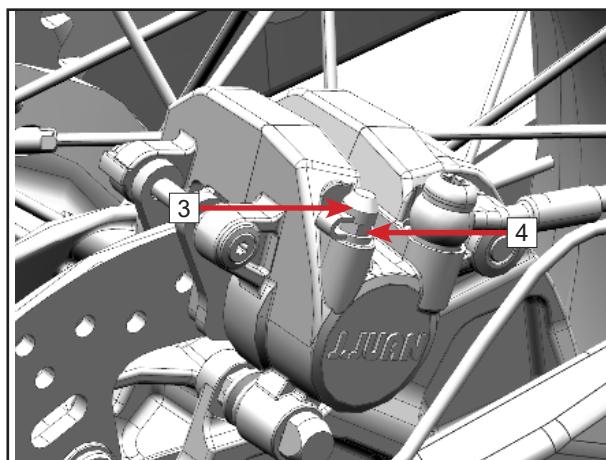
Remove reservoir cap **2**.

Remove reservoir gasket **3**.

**NOTE: Reservoir gasket may be sunk due to negative pressure caused by brake fluid reducing. It doesn't affect normal use but needs to be restored during installation.**



Open air-bleed bolt rubber sleeve **3**. Connect a clean plastic hose with air-bleed bolt **4**, with other side into a container.



Repeatedly hold and loose **A** brake lever until it feels hard.

Loose air-bleed bolt **4** a little bit.

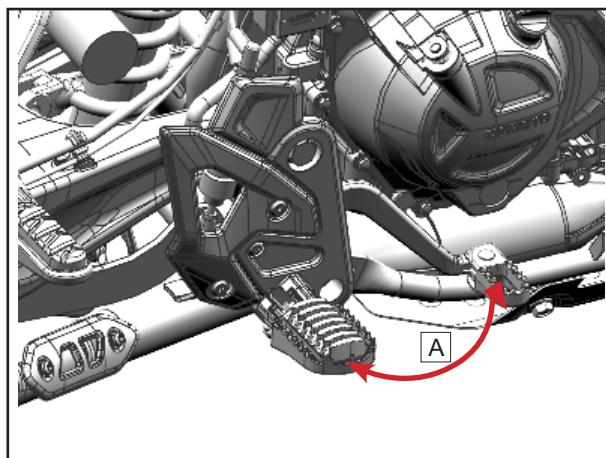
Tighten the bolt right after the brake fluid doesn't spray out or the lever feels soft.

Add brake fluid until the level is between UPPER and LOWER.

Repeat the above procedures until the new brake fluid sprays out.

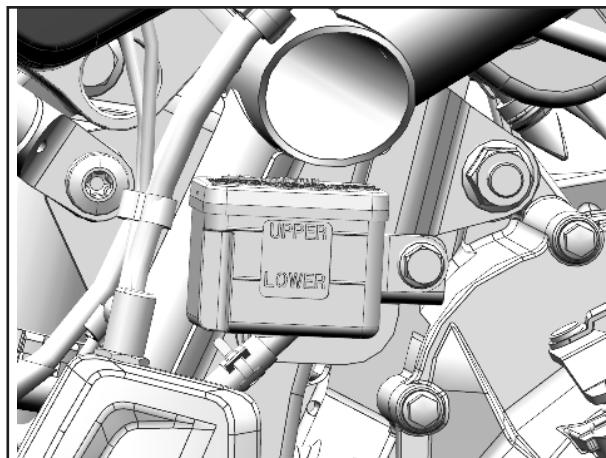
**⚠WARNING: Keep brake fluid level above LOWER, in case air gets into brake system, which results in brake system failure and injury.**

**⚠WARNING: If there is air inside of brake system, replace brake fluid repeatedly until there is no air in drained brake fluid.**



## Brake Fluid Addition

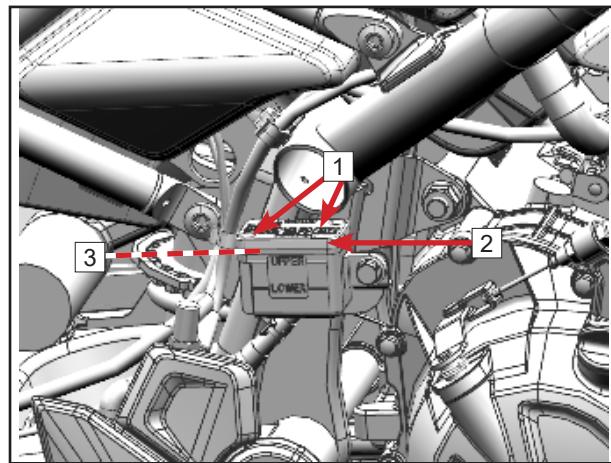
Add brake fluid until the level is between UPPER and LOWER.



Install reservoir gasket **3**.

Install reservoir cap **2**.

Install reservoir cap screws **1**.



### 11.8.3 Brake Hose Maintenance

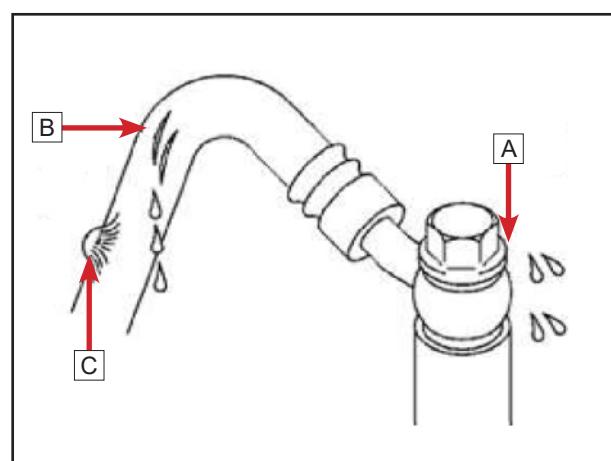
Check brake hose, connectors and pipes for damage, cracks or leakage.

With improper maintenance, the high pressure inside the brake hose can cause fluid leakage **A** or hose burst.

Inspect brake hose for bending or twist. Replace with new hoses and pipes if crack **B**, bulge **C** or leakage detected.

Tighten all the brake hose connecting bolts and nuts.

Inspect brake hose route. Reset the hose route if not proper or correct.



### 11.8.4 Front/Rear Brake Caliper and Brake Pad Maintenance

#### Front/Rear Brake Caliper

Remove brake caliper.

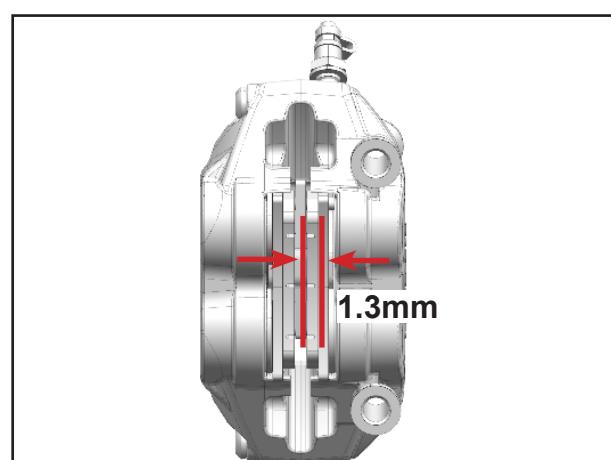
Check the minimum thickness of each brake pad.

Minimum friction pad thickness: 1.3mm

Replace brake pads before it reaches to minimum limit. Replace brake pads in set.

Inspect brake pads for deep scratches or other damages. Replace if any defect is found. Replace brake pads in set.

**⚠️WARNING:** Replace with new brake disc or brake friction pad, do not drive immediately. The brake pad needs to be run in and the front/rear brake lever manipulated (held) several times until the brake disc is well engaged with the brake caliper.



#### Front/Rear Brake Disc

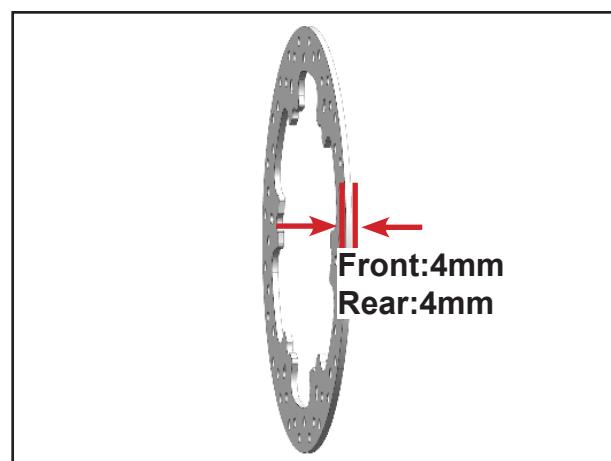
Check the minimum thickness of each brake disc.

Minimum front brake disc thickness: 4mm.

Minimum rear brake disc thickness: 4mm.

Replace brake disc before it reaches to minimum limit.

Inspect brake pads for deep scratches or other damages. Replace if any defect is found.



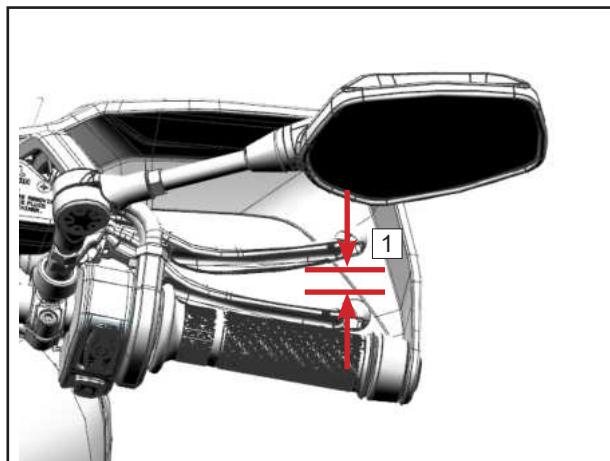
# 11 Front, Rear Wheels and Brake System

## 11.9 Free Play

### 11.9.1 Front Brake Lever Free Play

Check the free play of front brake lever 1.

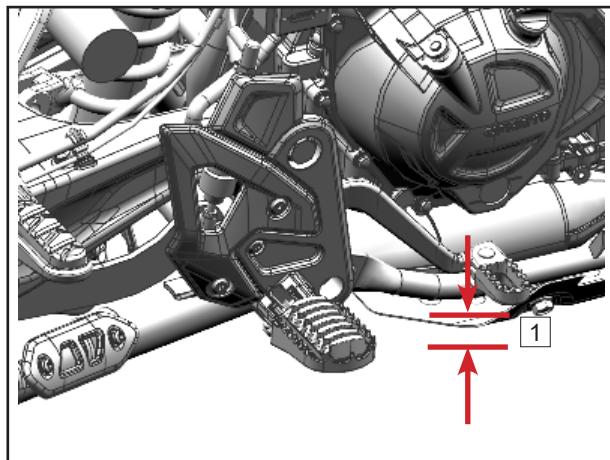
Free Play: 5mm~10mm



### 11.9.2 Rear Brake Pedal Free Play

Check the free play of rear brake pedal 1.

Free Play: 10mm~20mm



# 12 Shock Absorber and Rear Fork

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12.1.2 Recovery Damping Adjustment.....	12-3
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## 12.1 Front Shock Absorbers

### Pre-work

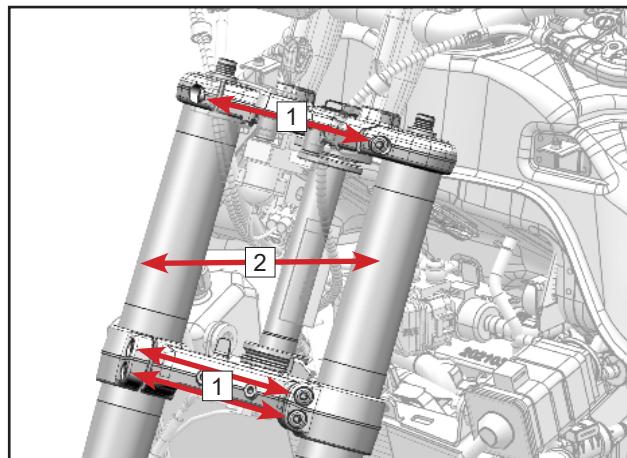
Remove front wheel (refer to chapter 11).

### Removal

Remove inner hex bolts 1 of upper and lower triple clamps.

Remove front shock absorbers 2.

**Bolt torque: 20N·m~25N·m**



### Installation

Reverse the removal procedures for installation.

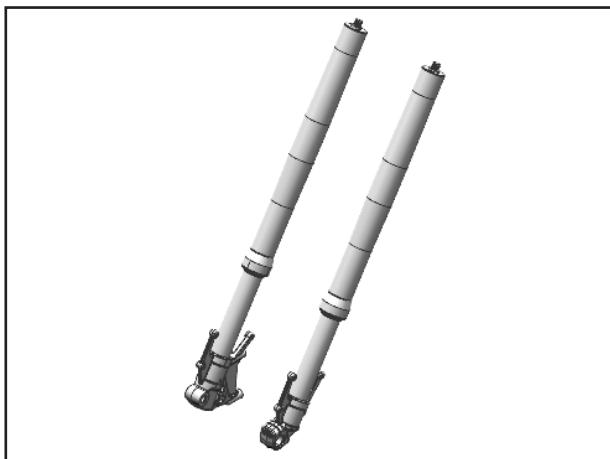
#### 12.1.1 Front Shock Absorber Inspection

##### Inspection

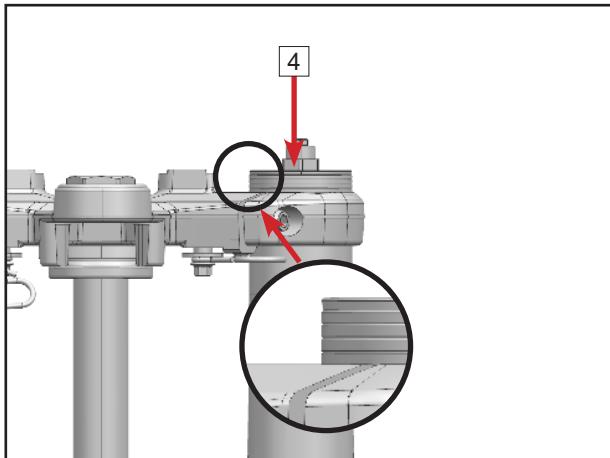
Inspect the appearance of front shock absorber for crack or other damage. Replace it if so.

Clean the dust and mud of front shock absorber.

Hold the handlebar to press for several times. Inspect whether the compression rebound of front shock absorber is normal.



**CAUTION:** When installing front shock absorber, the inner hoses upper end faces 4 of the two front shock absorbers should be flush, and the upper end of front shock absorber is flush with the upper triple clamp.



### Adjustment

The front shock absorber has been adjusted to the best state, which is suitable for most cases when the vehicle leaves the factory.

### 12.1.2 Recovery Damping Adjustment

Engrave with the word TEN on the recovery damping end.

The recovery damping affects the reaction speed during the damping recovery. The higher the damping gear 1, the slower the suspension rebound speed, and the lower the damping gear, the faster the suspension rebound speed.

Primary gear: 10 gear

Total gear: 20 gear ± 2 gear



Use a flat-head screwdriver to rotate the gear counterclockwise (S direction) and record the times to reduce the recovery damping. Use a flat-head screwdriver to rotate the gear clockwise (H direction) and record the times to increase the recovery damping.

Reverse rotation according to the recorded number of rotations to restore factory settings. Or rotate counterclockwise (S direction) to the minimum, then rotate clockwise (H direction) to the shock absorber 10th gear.

**Contact your dealer to adjust the damping. Do not adjust it yourself.**

### 12.1.3 Compression Damping Adjustment

Engrave with the word COMP on the compression damping end.

The compression damping affects the reaction speed during the damping underdraught. The higher the damping gear 2, the slower the suspension underdraught speed, and the lower the damping gear, the faster the suspension underdraught speed.

Primary gear: 10 gear

Total gear: 20 gear ± 2 gear



and record the times to increase the compression damping.

Reverse rotation according to the recorded number of rotations to restore factory settings. Or rotate counterclockwise (S direction) to the minimum, then rotate clockwise (H direction) to the shock absorber 10th gear.

**Contact your dealer to adjust the damping. Do not adjust it yourself.**

Use a flat-head screwdriver to rotate the gear counterclockwise (S direction) and record the times to reduce the compression damping. Use a flat-head screwdriver to rotate the gear clockwise (H direction)

## 12.2 Chain

### Pre-work

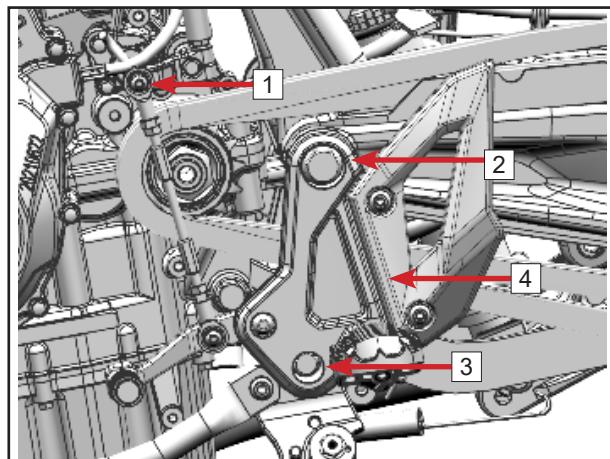
Remove rear wheel (refer to chapter 11).  
Remove gearshift rod and connecting rod bolt **1**.

Remove LH side rear fork bolt **2**.

Remove LH side bolt **3**.

Remove LH foot pedal **4**.

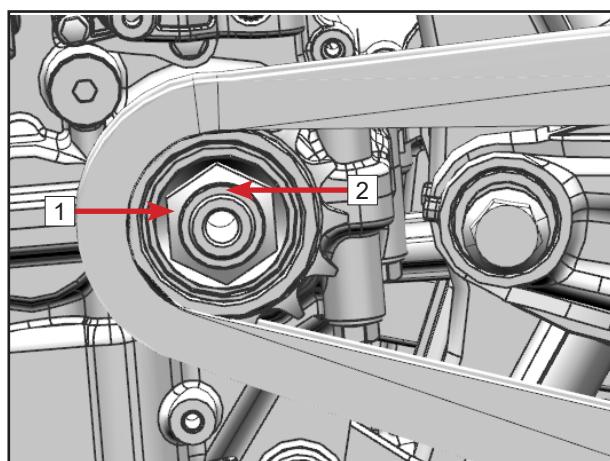
Reinsert the bolt **2**.



Turn up lock washer **2**.

Remove nut **1**.

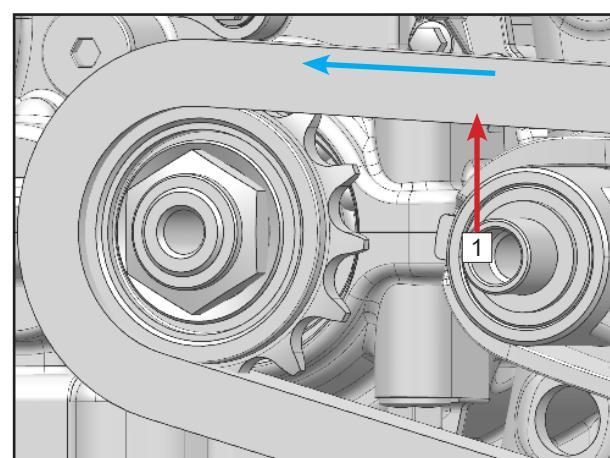
Remove lock washer **2**.



Push the chain **1** forward.

Remove the chain **1**.

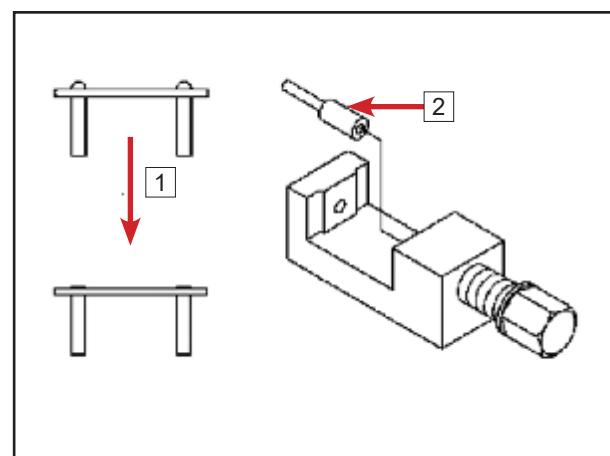
**To prevent the chain from falling on the ground or contacting with other dirt, such as chain dirt, use professional chain cleaning agent and chain oil to clean and lubricate the chain when reinstalling.**



### 12.2.1 Drive Chain Maintenance

Press hard **1** to make two pin heads parallel.

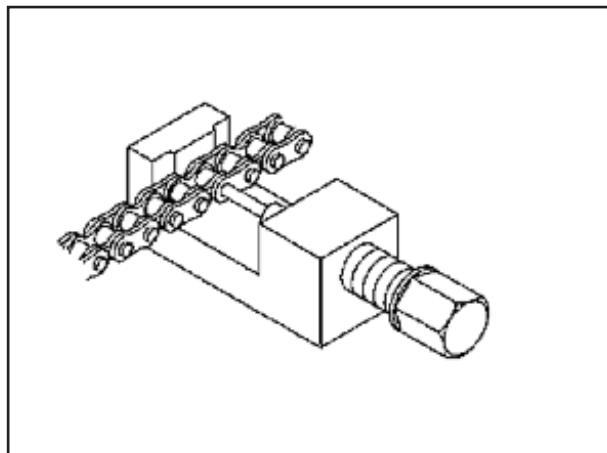
Set the cutting and riveting pin **2** as picture shows.



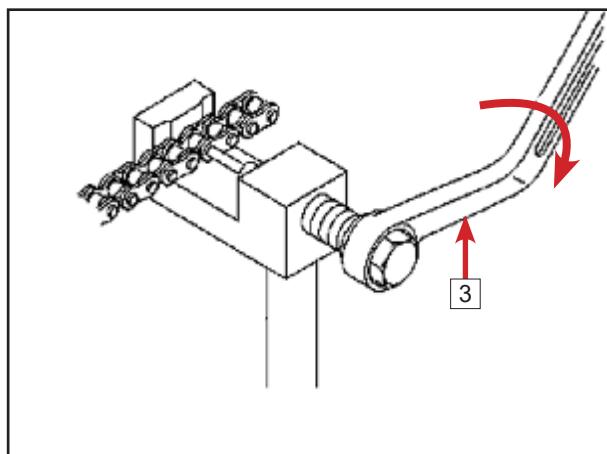
## 12 Shock Absorber and Rear Fork

Tighten the bolt to narrow the pin seat until it touches chain pin.

Make sure the centers of cutting and riveting pin and chain pin are aligned.



Rotate the pin seat with wrench 3 clockwise to remove the chain pin.



### Drive chain installation

Install new chain knots on chain to replace the old ones.

Remove the chain boards of new drive chain.

Apply grease on chain pin 2 and seal rings 1.

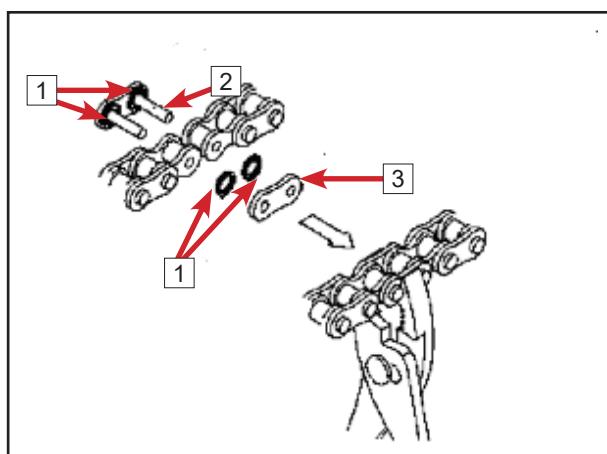
Engage the chain and rear chain sprocket. Insert chain pins into chain knots.

Install seal rings 1.

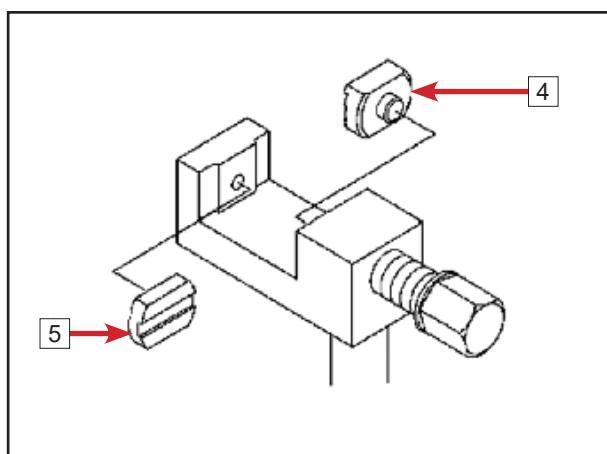
Install chain boards and make the mark 3 face outside.

Fix the chain board with hand or plier.

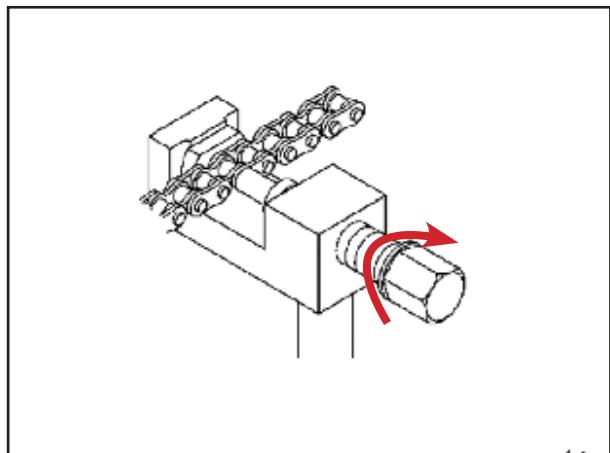
Make sure the seal ring is installed correctly in case of the chain grease leaking.



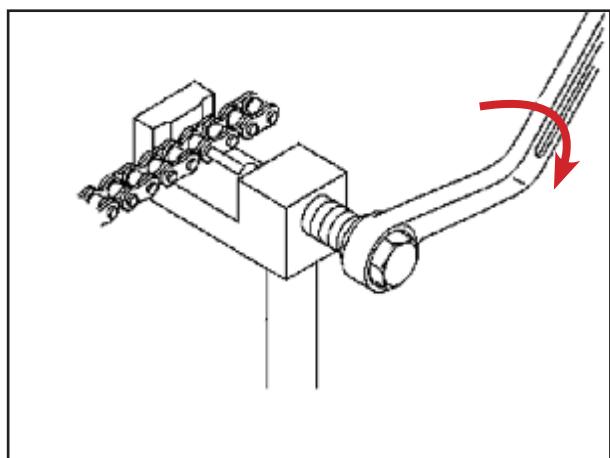
Set the holder 4 and 5 on the pin seat.



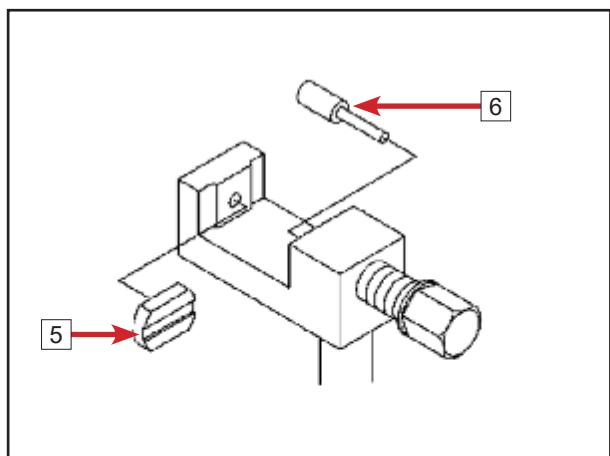
Install the holder on the chain board.  
Rotate the pin seat until it touches the chain board.



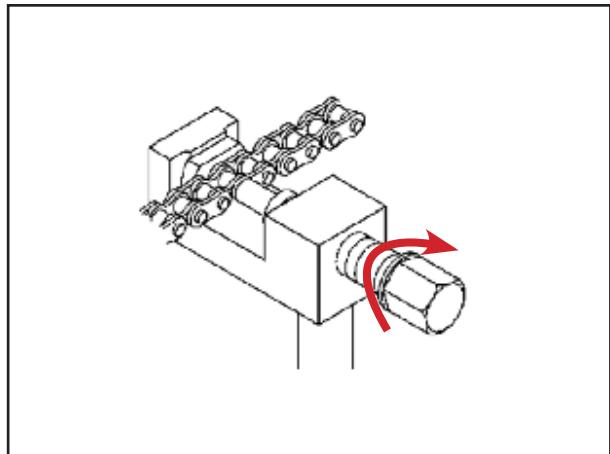
Rotate the pin seat with wrench clockwise until two pins get into the grooves of holder **4**.  
Remove the holder **4**.



Set the holder **5** and cutting and riveting pin **6** as picture shows.

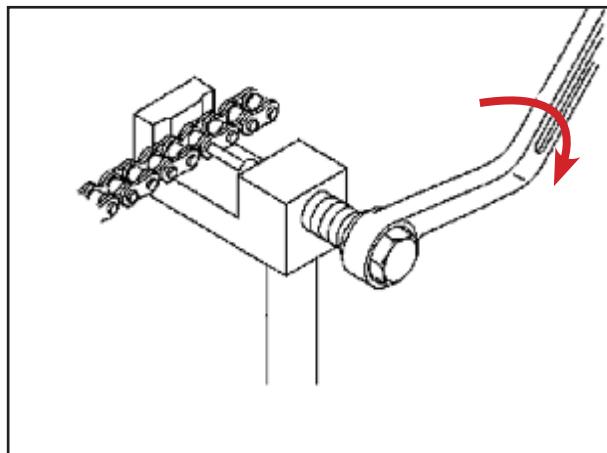


Rotate the pin seat until it touches chain pin.



Rotate the wrench clockwise until cutting and riveting pin head touches chain pin to rivet.

Other chain pins installation follows the same procedures.



## Inspection

After riveting, check the riveting knots of chain pin for cracks.

Measure the outer diameter **1** and width **2** of chain pin and chain board.

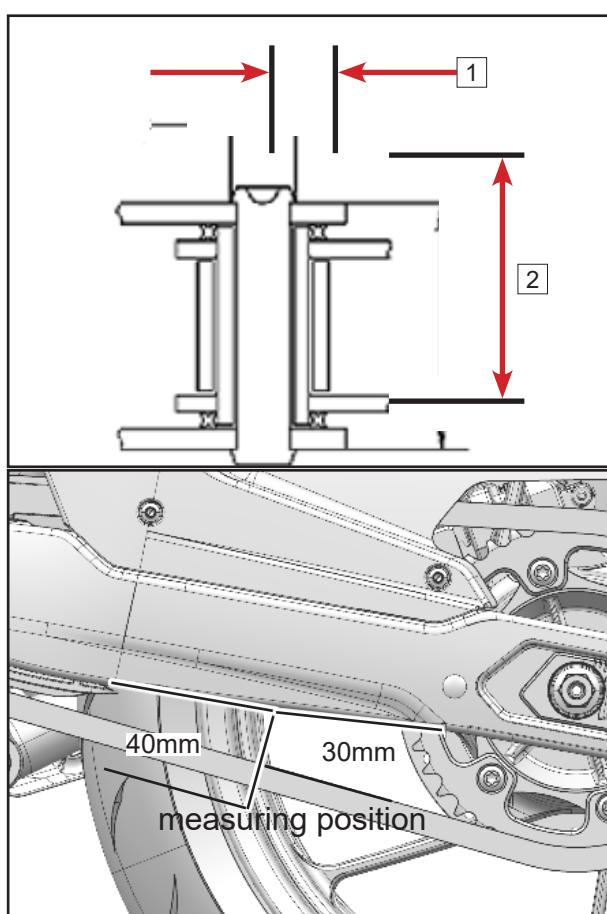
Chain pin outer diameter

Standard: 5.45mm~5.55mm

Chain board outer width

Standard: 17.25mm~17.45mm

Cut and re-rivet the chain knots if out of standard.



## 12.2.2 Chain Looseness Adjustment

### Chain Looseness Inspection

Put it in neutral.

Support the vehicle with side brace.

In the natural state, the distance between the chain and the lowest point of swing arm does not exceed 30mm.

Pull down the chain, the distance between the chain and the lowest point of swing arm does not exceed 40mm.

If the tightness of chain does not conform to the regulation, adjust to the standard value.

**NOTE: The wear degree of chain is not always uniform, rotate the rear wheel several times, and repeatedly measure the tightness at different positions.**

### Drive Chain Looseness Adjustment

Loosen rear wheel shaft nut **1**.

Loosen the left and right lock nuts **3**.

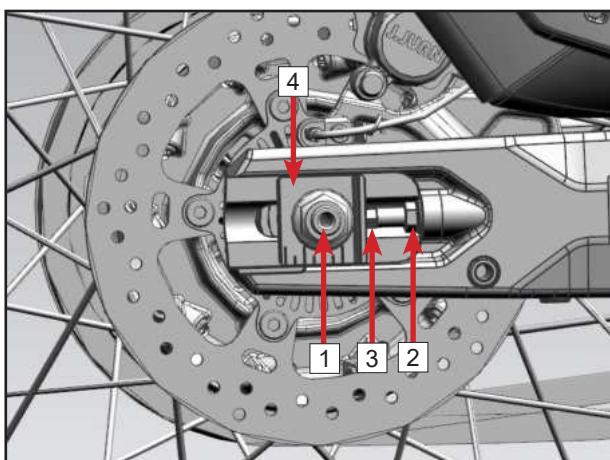
Rotate the left and right adjusting bolts **2** to adjust chain tightness.

Ensure that the relative position between the left and right chain tensioner **4** mark and the reference mark is the same.

Make sure the tensioner is tight against the adjusting bolt.

Tighten the left and right lock nuts **3**.

Tighten rear wheel shaft nut (105N·m~110N·m).



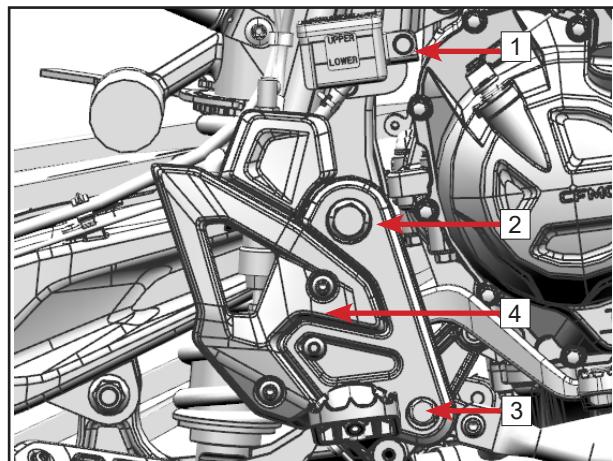
## 12.3 Rear Fork Assembly

Remove fuel reservoir bolt **1**.

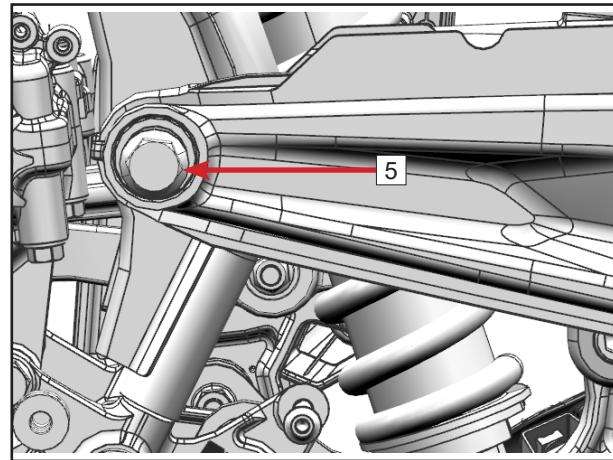
Remove RH side rear fork bolt **2**.

Remove RH side bolt **3**.

Remove RH footrest **4**.



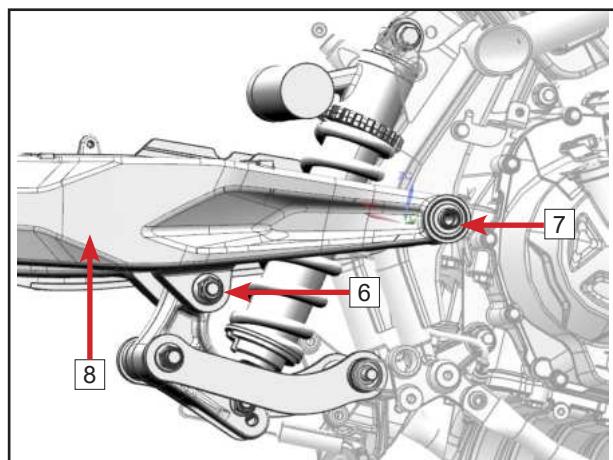
Remove LH side rear fork bolt **5**.



Remove bolt and nut assembly **6**.

Pull out rear fork shaft **7**.

Remove rear fork assembly **8**.



## 12.4 Rear Shock Absorbers

### Removal

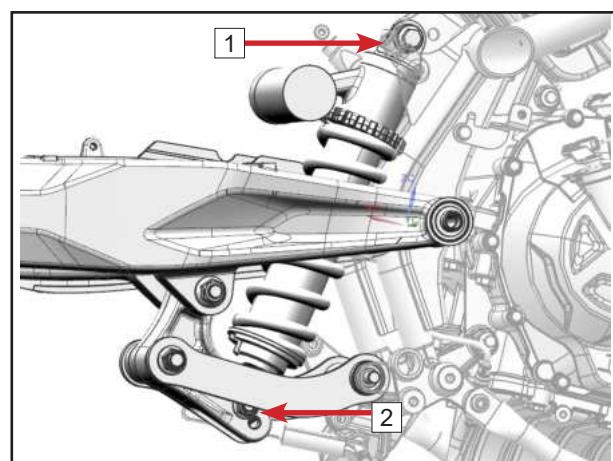
Remove bolt and nut assembly **1**.

Remove bolt and nut assembly **2**.

**Bolt torque: 20N·m~25N·m**

### Installation

Reverse the removal procedures for installation.



## 12.4.1 Rear Shock Absorber Inspection Inspection

Check the appearance of rear shock absorber for damage or crack. Replace if it does.

Clean the dust and mud of rear shock absorber.

Press down on the seat several times to check whether the compression rebound of rear shock absorber is normal.

### Adjustment

The rear shock absorber spring preload can be adjusted to suit the rider's weight and riding conditions.

#### Adjust Spring Preload by following these steps

Use a special tool 1 to turn counterclockwise in the direction a to reduce the spring preload.

Use a special tool 1 to turn clockwise in the direction b to increase the spring preload.

**NOTE: The rear shock absorber has been adjusted to the best state, which is suitable for most cases when the vehicle leaves the factory.**

**DANGER:** This part contains high-pressure nitrogen. Improper operation may result in explosion. Read the relevant instructions and do not put it in the fire, open holes or open it.

### Recovery Damping Adjustment

The recovery damping affects the reaction speed during the damping recovery. The higher the damping gear 1, the slower the suspension rebound speed, and the lower the damping gear, the faster the suspension rebound speed.

Primary gear: 10 gear

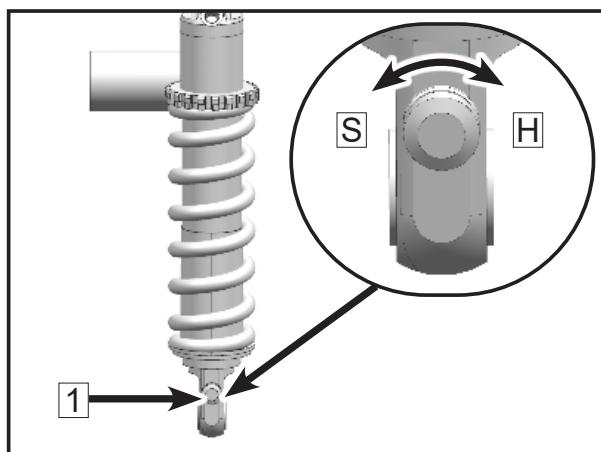
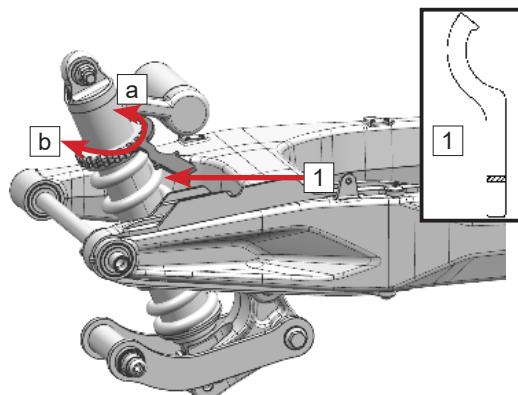
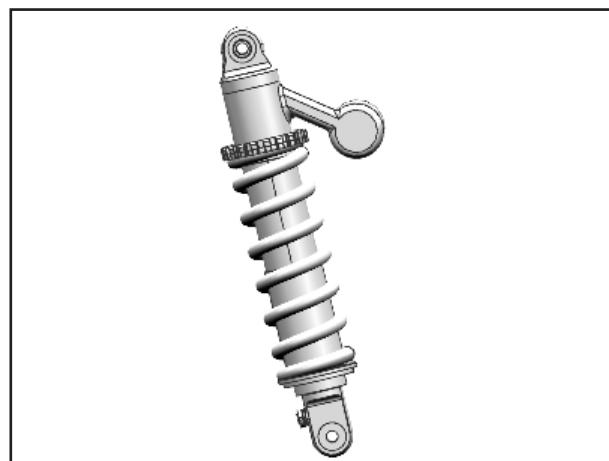
Total gear: 20 gear  $\pm$  2 gear

Adjust the Angle as shown on the right

Turn the adjusting knob clockwise (H direction), rotate the gear and record the times to increase the recovery damping.

Turn the adjusting knob counterclockwise (S direction), rotate the gear and record the times to reduce the recovery damping.

Reverse rotation according to the recorded number of rotations to restore factory settings. Or rotate counterclockwise (S



direction) to the minimum, then rotate clockwise (H direction) to the shock absorber 10th gear.

**Contact your dealer to adjust the damping. Do not adjust it yourself.**

#### **DANGER**

**This part contains high-pressure nitrogen. Improper operation may result in explosion. Read the relevant instructions and do not put it in the fire, open holes or open it.**

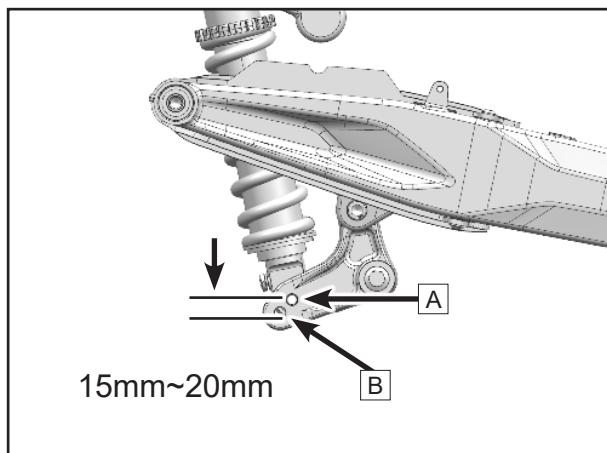
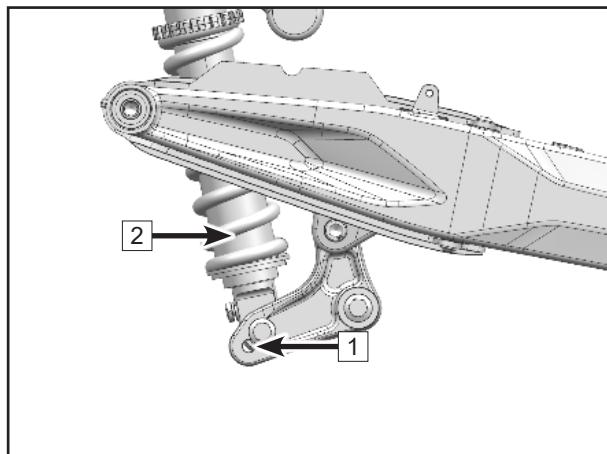
## Seat Height Adjustment

Remove rear shock absorber lower bolt and nut assembly **1**.

Move the rear shock absorber **2** from the high seat mounting point of triangle swing arm **A** to the low seat mounting point of triangle swing arm **B**, and the seat cushion height is reduced by 15mm to 20mm.

Install rear shock absorber lower bolt and nut assembly **1**.

**Rear shock absorber torque:**  
**45N·m~50N·m**



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## 13.1 Preparation Instructions

This engine maintenance manual introduces in detail the 272MQ-B engine maintenance adjustment procedures, disassembly and assembly essentials, inspection and maintenance points, troubleshooting methods and maintenance technical data, and with detailed graphic information to guide the operation. Read this manual carefully and perform engine operations according to specifications.

### 13.1.1 Unit Conversion Table

Item	Unit conversion
pressure	$1\text{kgf/cm}^2=98.0665\text{kPa}$ $1\text{kPa}=1000\text{Pa}$ $1\text{mmHg}=133.322\text{Pa}=0.133322\text{kPa}$
torque	$1\text{kgf}\cdot\text{m}=9.80665\text{N}\cdot\text{m}$
volumn	$1\text{mL}=1\text{cm}^3=1\text{cc}$ $1\text{L}=1000\text{cm}^3$
force	$1\text{kgf}=9.80665\text{N}$

### 13.1.2 Warnings

Whenever you see the following symbols, pay attention to their instructions! Always follow these safe operation and maintenance methods.

#### DANGER

Indicates that if no measures are taken, the operator or other personnel may die.

#### WARNING

Indicates that an operator may be injured or parts may be damaged if no measures are taken.

#### CAUTION

Indicates that precautions need to be taken to avoid parts damage.

#### NOTE

Represents information that makes the operation process simpler or clearer. No symbol used.

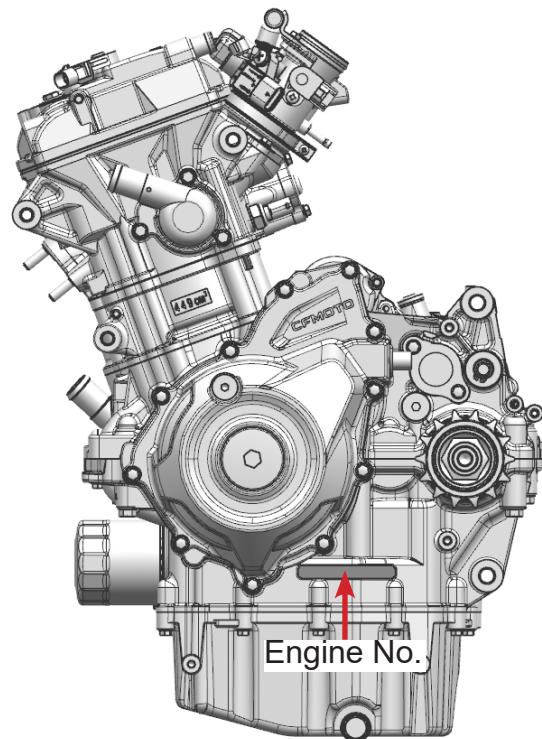
However, please note that the "warning" and "caution" contained in this maintenance manual cannot cover all potential hazards in the use and maintenance of engines. Therefore, in addition to the relevant provisions of "warning" and "caution", maintenance personnel must also have basic mechanical safety knowledge. If you are not sure how to complete the maintenance operation, please consult a more experienced senior mechanic.

**The contents in this manual are subject to change without prior notice due to engine improvements. Maintenance should be subject to the actual state of the engine.**

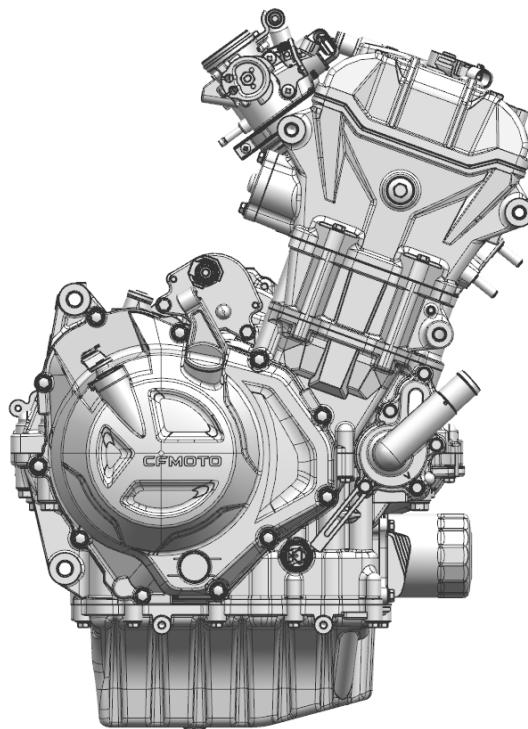
## 13.2 Maintenance Information

### 13.2.1 Engine Appearance

Magneto side



Clutch side



## 13.2.2 General Precautions

### **WARNING**

Correct maintenance process is very important for the safety of the maintenance personnel and the reliability and safety of the engine.

When two or more people work together, they should pay attention to each other's safety.

When the engine needs to be started indoors, it must be sure to exhaust the exhaust to the outside.

If toxic or flammable materials are used at work, strictly follow the manufacturer's instructions and ensure that the workplace is well ventilated.

Do not use gasoline as a cleaning fluid.

To avoid burns, do not touch uncooled engine, oil and exhaust system parts.

If fuel, lubrication and exhaust systems have been serviced, they must be checked for lines and leaks.

In order to protect the natural environment, do not dispose of oil and unused parts.

### **CAUTION**

During maintenance, if parts need to be replaced, the original pure parts of Zhejiang Chunfeng Power Co., Ltd. or recommended products must be used.

Disassembled parts, need to be used again, keep the habit of placing in order, so that there is no confusion during assembly.

Ensure the use of special tools as specified in the maintenance manual.

Ensure assembly parts are clean and lubricated where necessary.

Use special lubricating oil, binder and sealant.

When tightening bolts, screws and nuts, tighten the large ones first and tighten them with specified torque from inside to outside.

Tighten torque bolts using torque wrenches. Remove grease and oil from threads.

Parts should be inspected after disassembly and cleaned before measurement.

After assembly, check the fastening and operation of the parts.

Do not use dismantled oil seals, gaskets, self-locking nuts, locking gaskets, split pins, elastic rings and other parts, should be replaced with new parts during assembly.

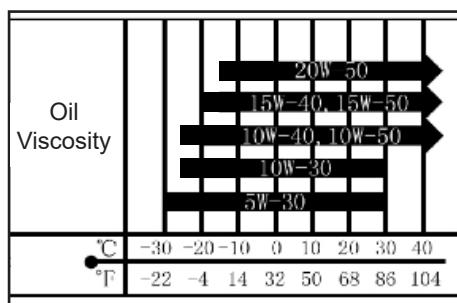
## 13.2.3 Selection of Fuel and Oil

### Fuel

Only 92# or above unleaded gasoline.

### Engine oil

First choice SAE 10W-40 SJ JASO-MA2, Depending on temperature second choice SAE 10W-30 SJ / SAE 10W-50 SJ / SAE 20W-40 SJ / SAE 20W-50 SJ JASO-MA2.



## 13.2.4 Engine Break-in

Engine has a lot of relative motion components, such as piston, piston ring, cylinder block, mutually meshing gear, etc., as a result, in the early days of its use, it is necessary to carry out standard break-in. Break-in can make the moving parts adapt to each other, adjust the clearances, and form a good smooth friction surface that can bear large loads. Only when the engine had been through standardized break-in, can it have excellent performance and reliability.

Recommended break-in period is 1000km, specification as follows:

1. After the engine works, the throttle rotation should be slow, not suddenly moves.
2. Try to drive on the road with better conditions, not for a long time climbing and bumpy road.
3. Keep the lubricating oil pipe unblocked.
4. Avoid sudden acceleration or high-speed engine operation when there is no load.
5. During running-in, maintenance shall be carried out according to daily maintenance and regular regulations, fix problem when being found.
6. After the run-in, it is necessary to replace the oil, filter element, clean the coarse filter screen, check the spark plug electrode and valve clearance, and according to the manual requirements of the machine for a more comprehensive inspection adjustment maintenance, can gradually enter the normal running stage.

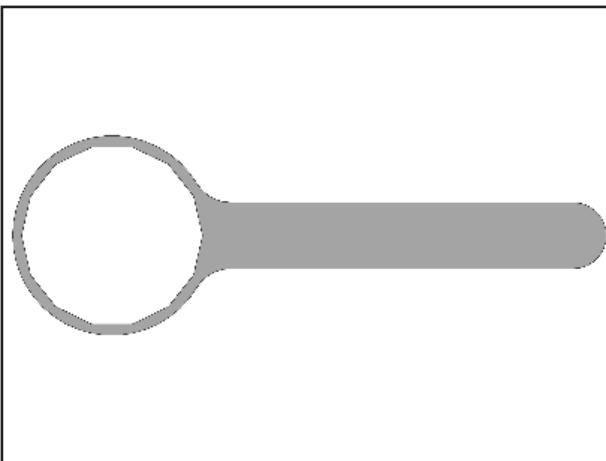
0km ~ 500km: Avoid continuous operation in  $\geq 50\%$  throttle state, should constantly change the speed, do not run in a fixed throttle position. Avoid rapid acceleration, throttle transformation should be slow, not suddenly big or small. After every hour of operation, cool the engine for 5 to 10 minutes.

500km ~ 1000km: Avoid running for a long time under the throttle state greater than 3/4.

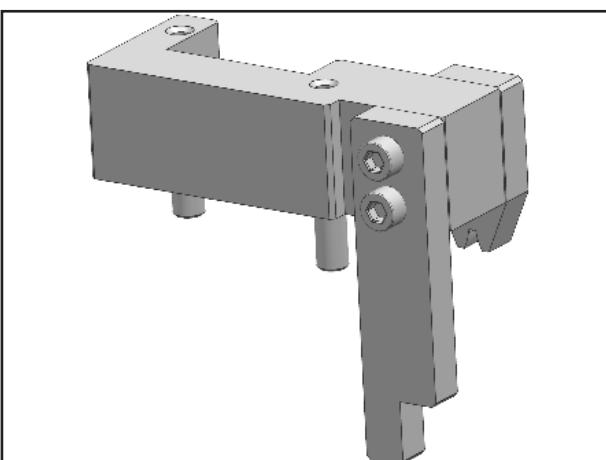
**NOTE: During the running-in period, the maintenance shall be carried out according to the daily maintenance regulations. After running in, the whole machine shall be maintained after the running in period of 1000km before entering the normal running stage.**

## 13.2.5 Special engine maintenance tool

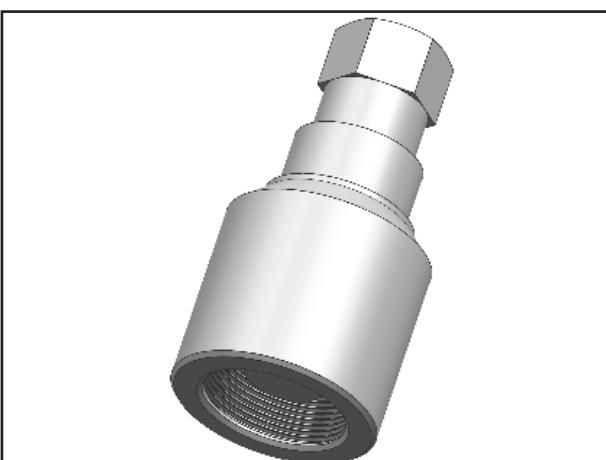
Special wrench for oil filter  
0700-070200-922-001



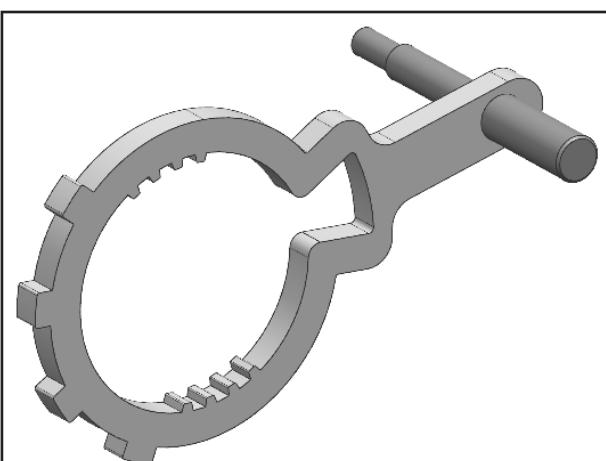
Rear balance shaft positioning stop gear  
0SQ0-000000-922-005



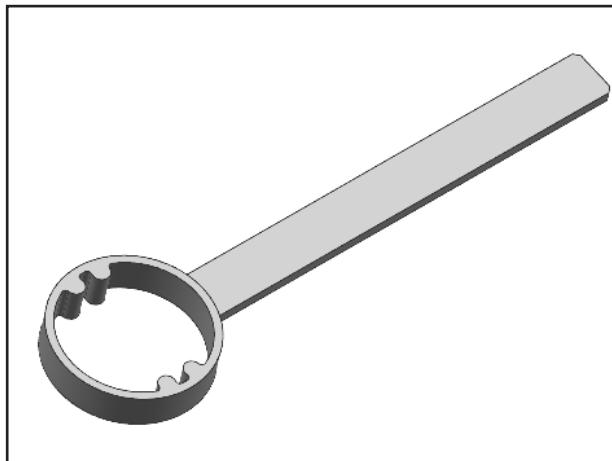
Tool for removing magneto rotor  
0SQ0-031000-922-002



Clutch master/slave hub stop gear  
0SQ0-050000-922-001



Output sprocket stop wrench  
0MQ0-062030-922-001



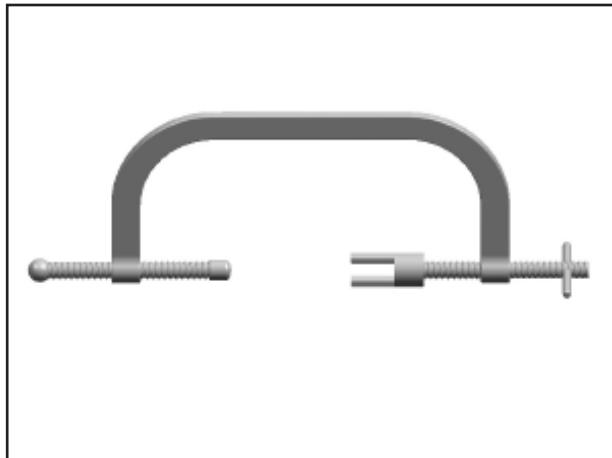
Magneto rotor stop gear  
0SQ0-031000-922-001



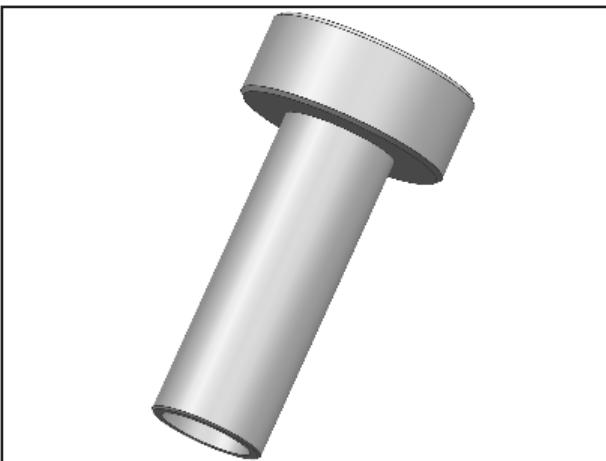
Valve stem seal ring punch  
0700-022400-923-002



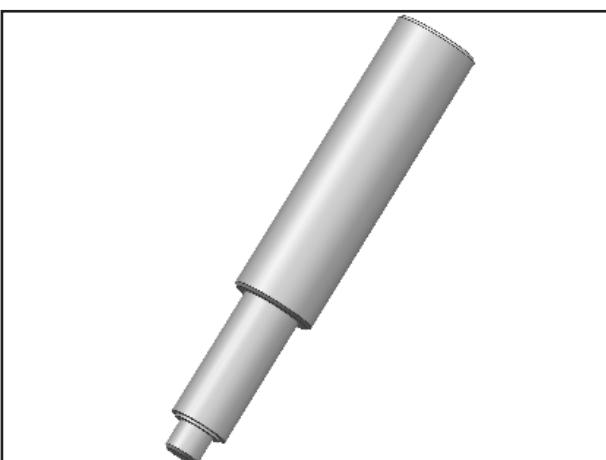
Valve spring compression clamp  
0180-022006-922-001



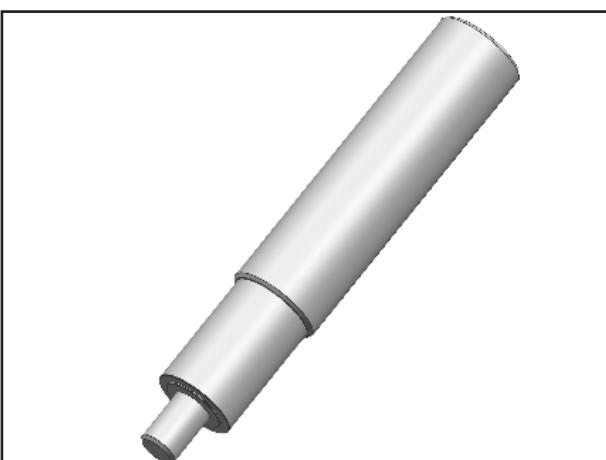
Oil level observation mirror punch  
0SQ0-013100-923-001



RH cover needle roller bearing punch  
0SQ0-013000-923-003



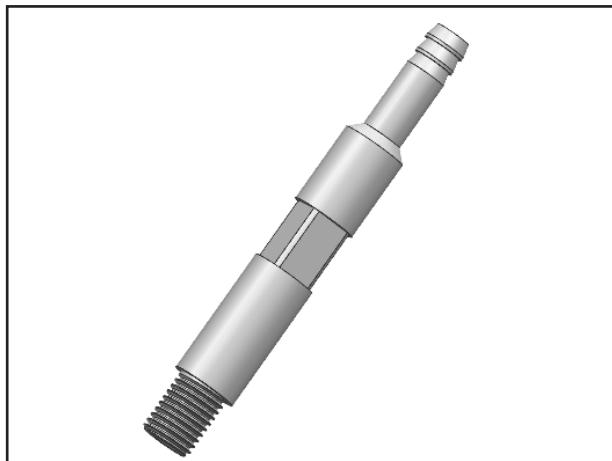
RH cover oil seal punch  
0SQ0-013000-923-002



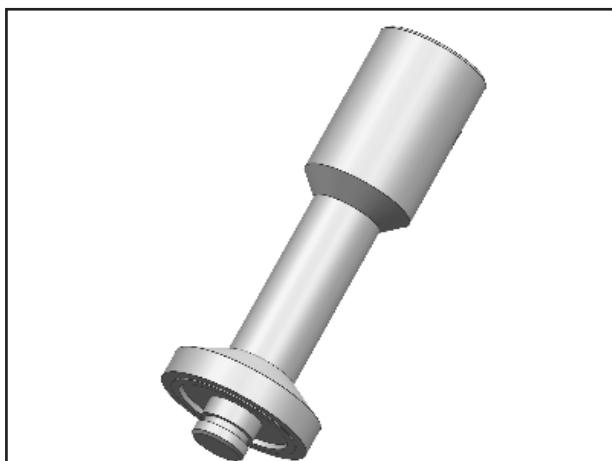
Auxiliary shaft oil seal punch  
0SQ0-010001-923-001



Box oil hole connector (used to test oil pressure)  
0SQ0-000000-922-014



Bearing 6204 head  
0SQ0-011101-921-002



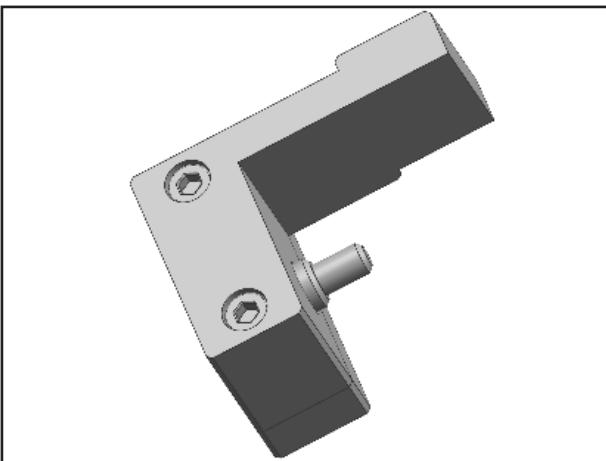
14×24×6 Oil seal punch  
0SQ0-011101-923-001



HK1412 Needle bearing punch  
0SQ0-011101-923-002



Timing sprocket stop gear  
0SQ0-000000-922-004



## 13.3 Engine Removal

### Pre-work

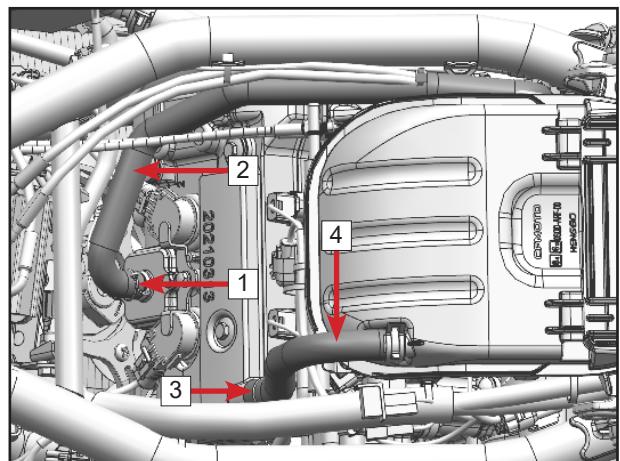
Remove seat. (refer to Seat section)  
Remove fuel tank. (refer to Fuel System section)  
Remove relevant body covering parts.  
(refer to Body Covering Parts section)  
Drain coolant.

### Main work

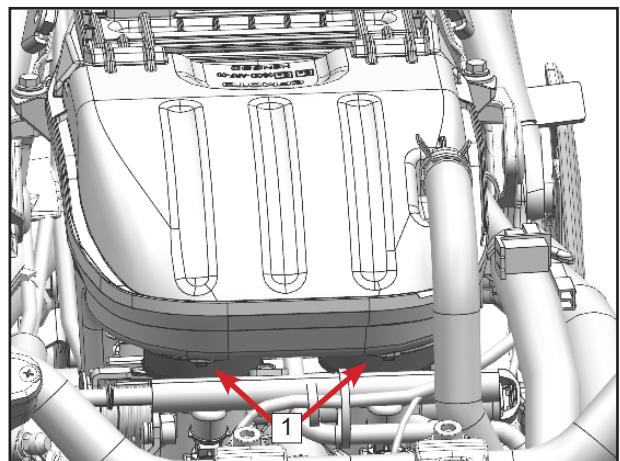
The content inside { } is the procedure for EU5 status:

{  
Loosen clamp 1, unplug AIS exhaust pipe 2.  
}

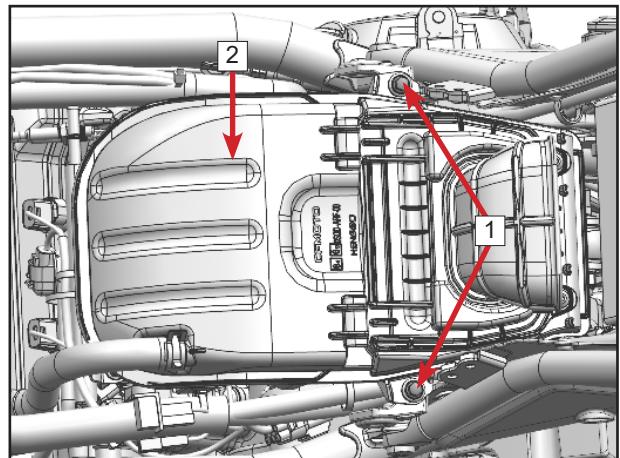
Loosen clamp 3, unplug crankcase breather hose 4.



Loosen clamps 1.



Remove bolt 1.  
Remove air filter assembly 2.

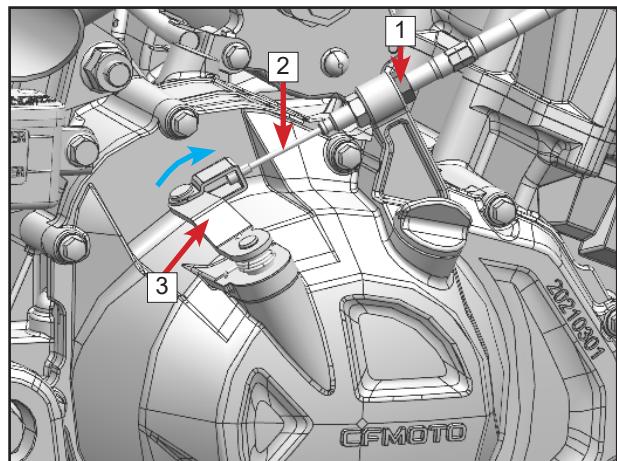


Release nut 1.

Clockwise rotate clutch release lever 3,

and detach clutch cable 2.

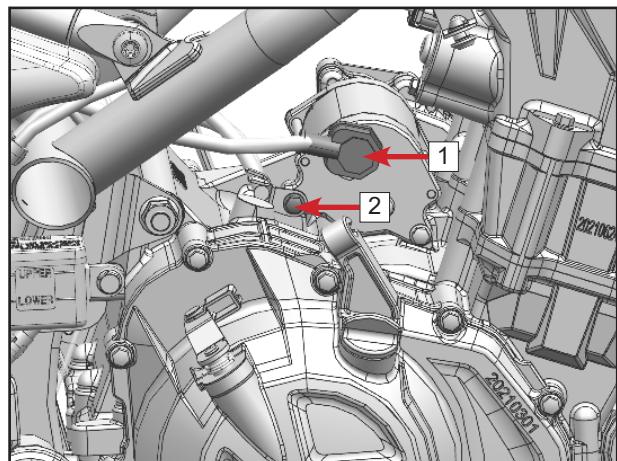
Hang clutch cable aside.



Push back cap 1, and remove positive connection cable fixing nut.

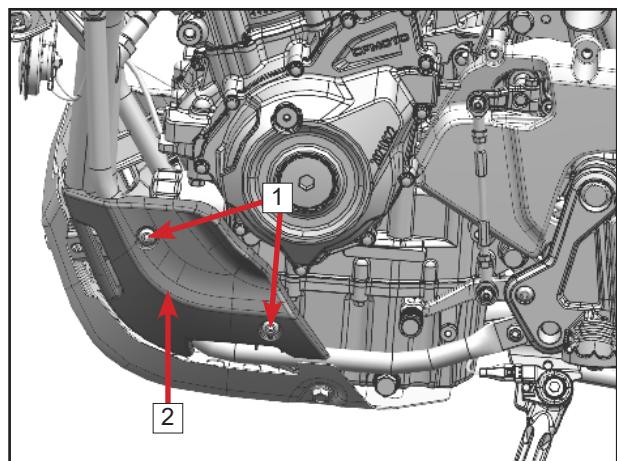
Hang positive connection cable aside.

Remove bolt 2, hang ground cable aside.



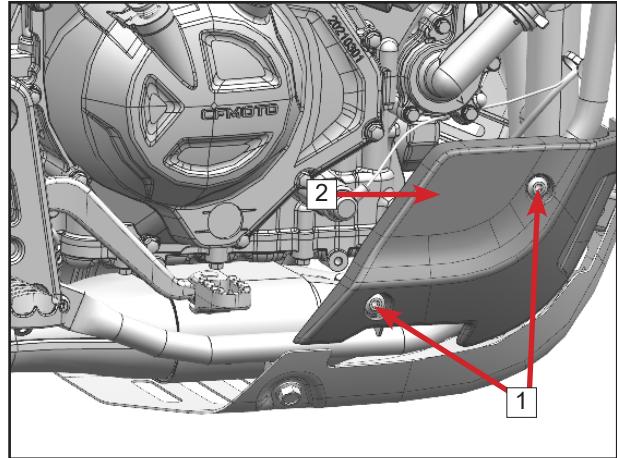
Remove bolts 1.

Remove engine LH panel 2.



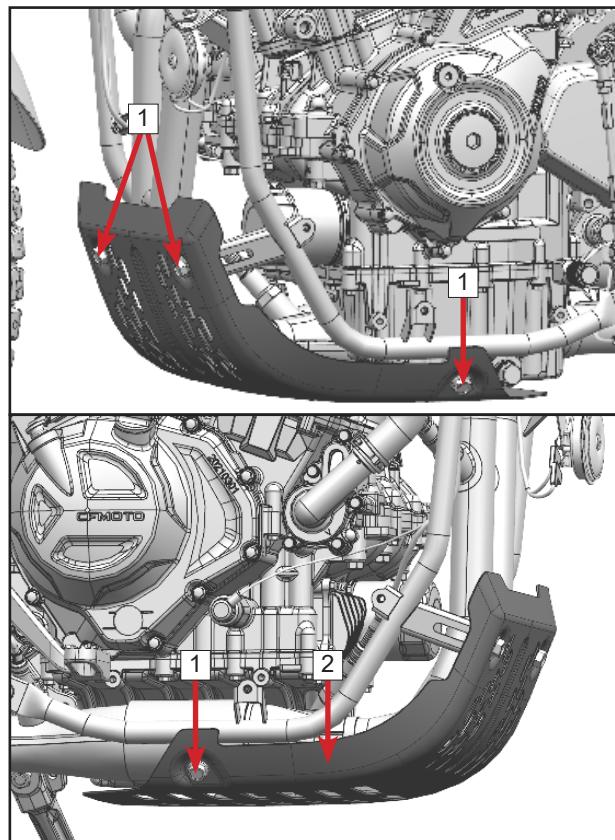
Remove bolts 1.

Remove engine RH panel 2.



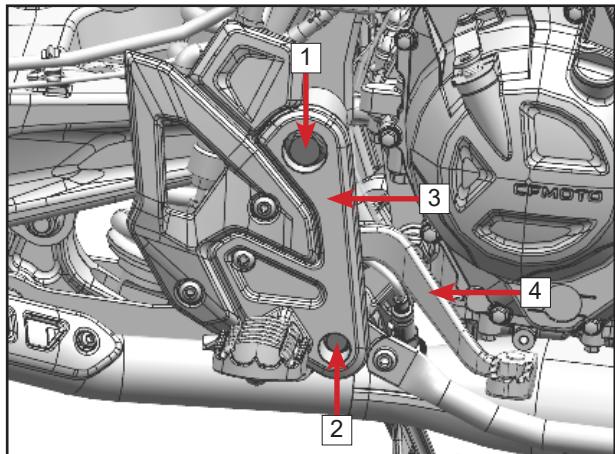
Remove bolts 1.

Remove engine lower panel 2.



Remove bolt 1 and bolt 2.

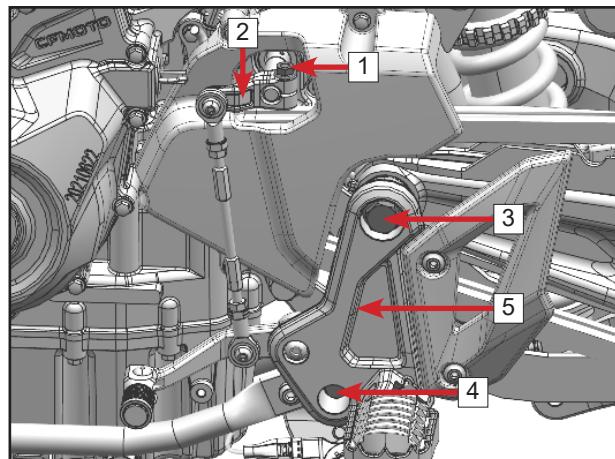
Remove RH front footrest bracket assembly 3 and rear brake pedal assembly 4.



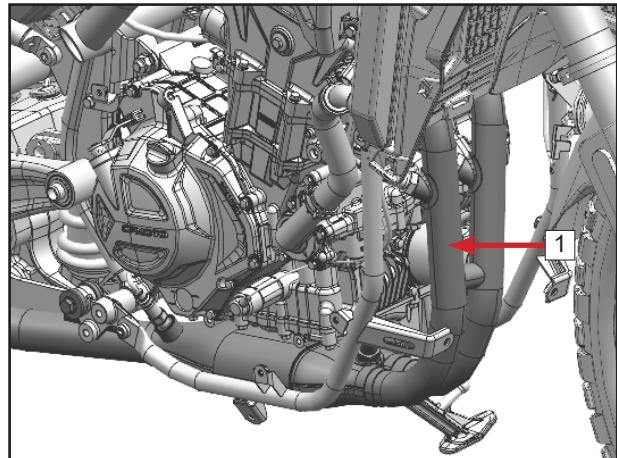
Remove bolt 1, disconnect gearshift lever assembly 2 and engine.

Remove bolt 3 and bolt 4.

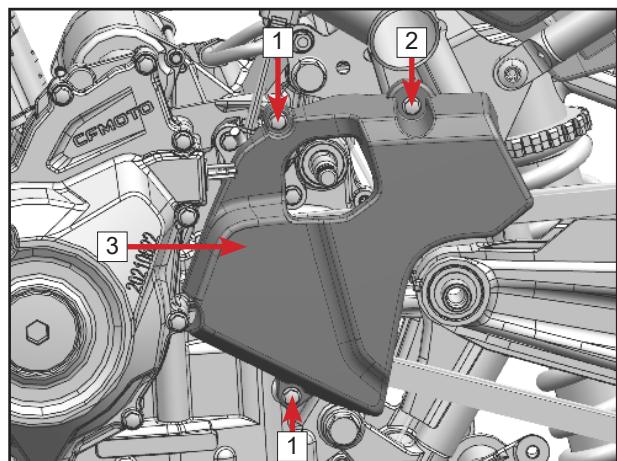
Remove LH front footrest bracket assembly 4 and gearshift lever assembly 2.



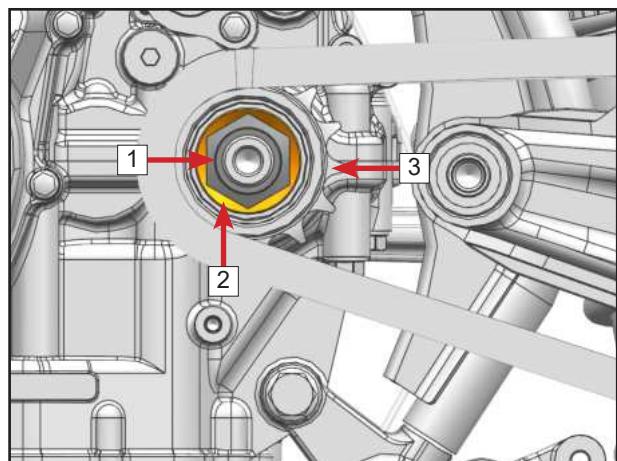
Remove exhaust system **1**. (refer to Exhaust System section)



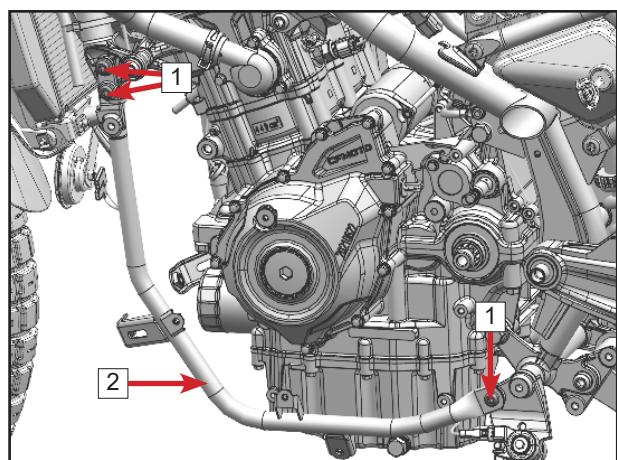
Remove bolts **1** and bolt **2**.  
Remove sprocket guard **3**.



Remove nut **1**.  
Remove lock washer **2**.  
Remove output sprocket assembly **3**.

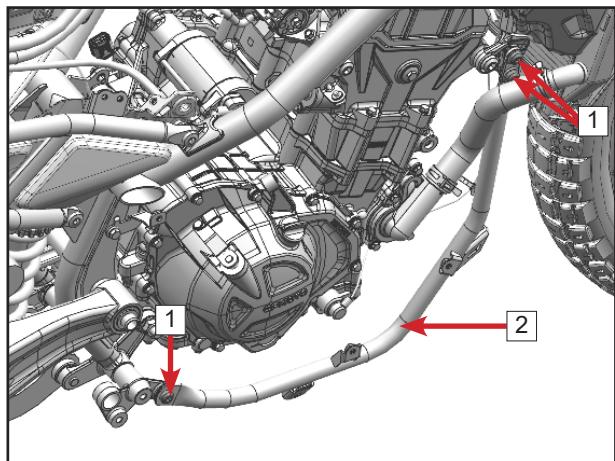


Remove bolts **1**.  
Remove engine LH bumper assembly **2**.



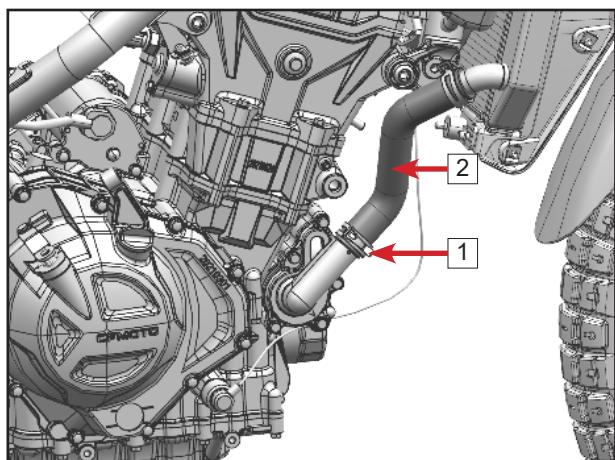
Remove bolts 1.

Remove engine RH bumper assembly 2.



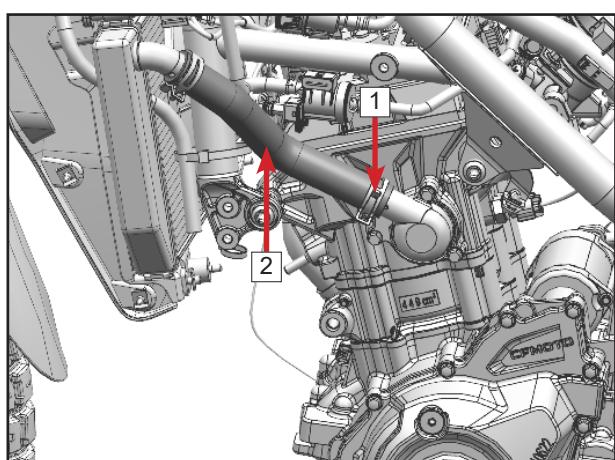
Loosen clamp 1.

Unplug radiator outlet pipe 2.



Loosen clamp 1.

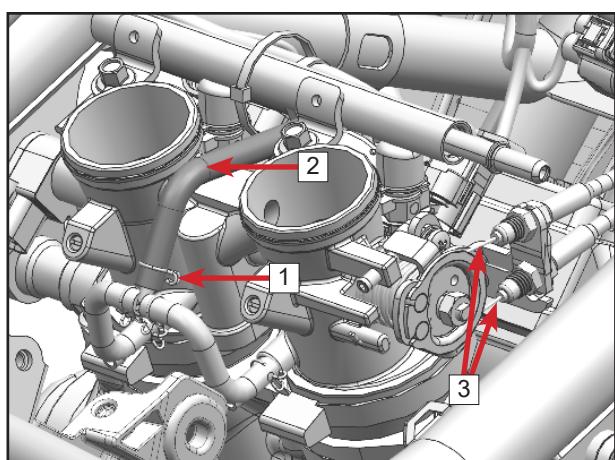
Unplug radiator intake pipe 2.



Loosen clamp 1, unplug pipe 2.

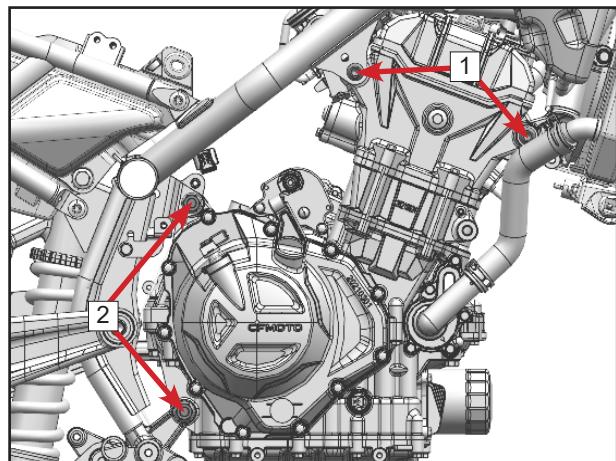
Remove throttle cable 3 from engine.

Disconnect all electrical connectors to the engine.



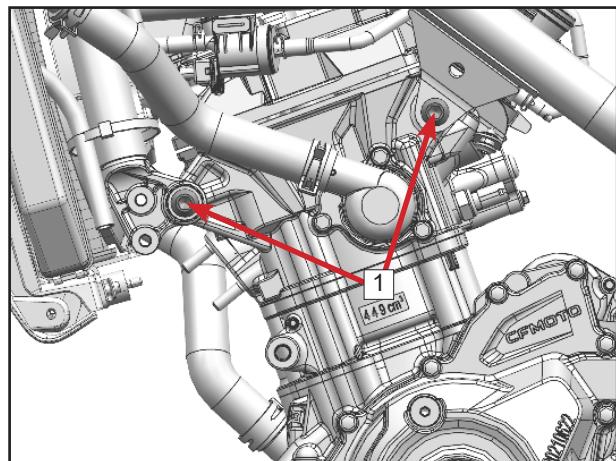
Remove bolts 1.

Remove bolts and nuts 2.



Remove bolts 1.

Carefully remove the engine and transfer it to a work bench.



## Engine Installation

Install the engine to the vehicle in reverse order of removal.

## 13.4 Intake System

### 13.4.1 Air Filter Assembly

#### Air Filter Assembly Removal

Remove seat. (refer to Seat section)

Remove relevant body covering parts.  
(refer to Body Covering Parts section)

Remove fuel tank. (refer to Fuel System  
section)

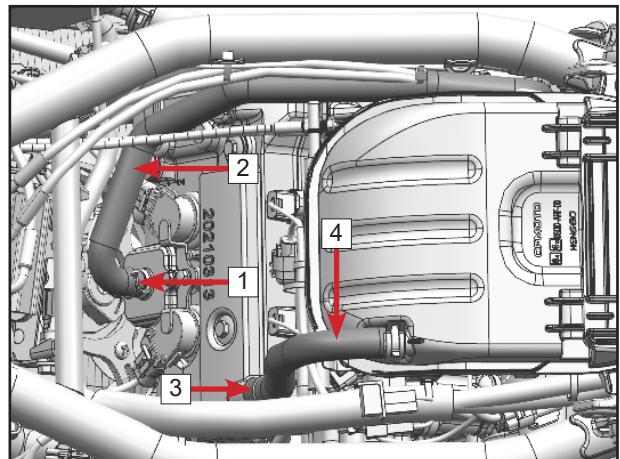
The content inside { } is the procedure  
for EU5 status:

{

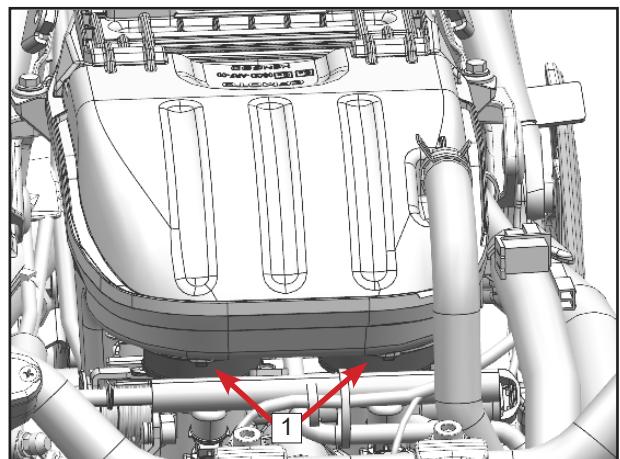
Loosen clamp **1**, unplug AIS exhaust pipe  
**2**.

}

Loosen clamp **3**, unplug crankcase  
breather hose **4**.

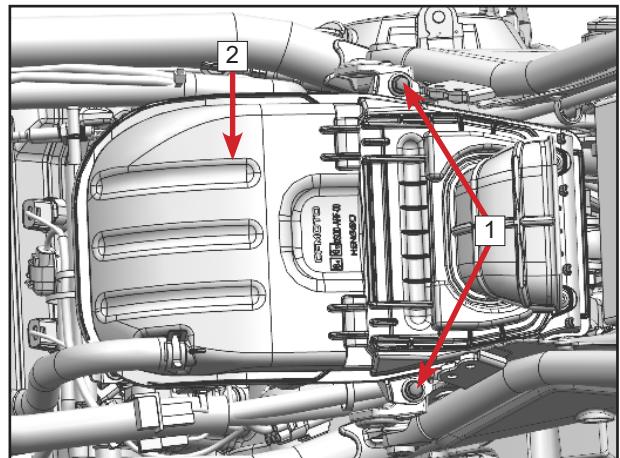


Loosen clamps **1**.



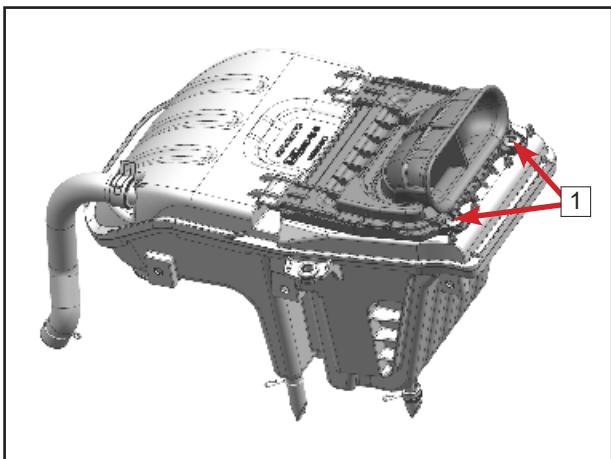
Remove bolts **1**.

Remove air filter assembly **2**.

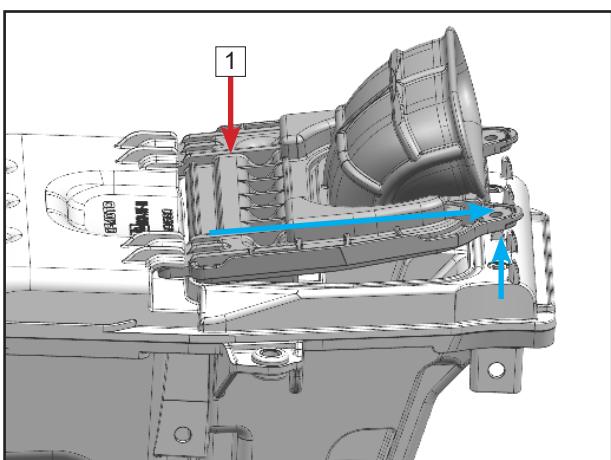


## Filter Element Removal

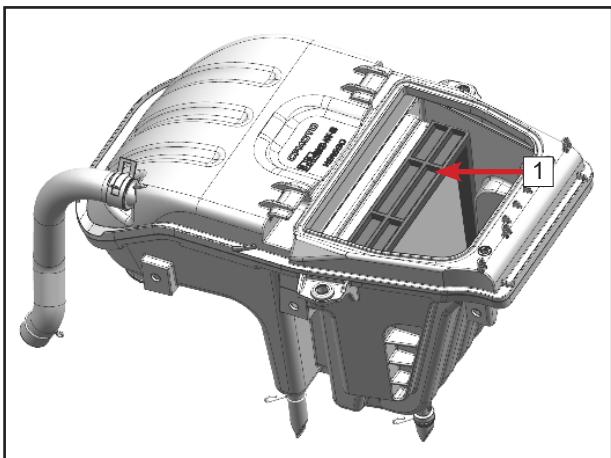
Remove screws 1.



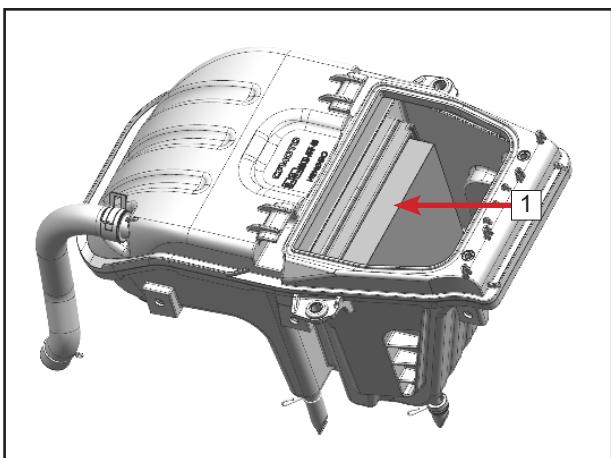
Remove air filter cover 1.



Take out filter element wedge 1.



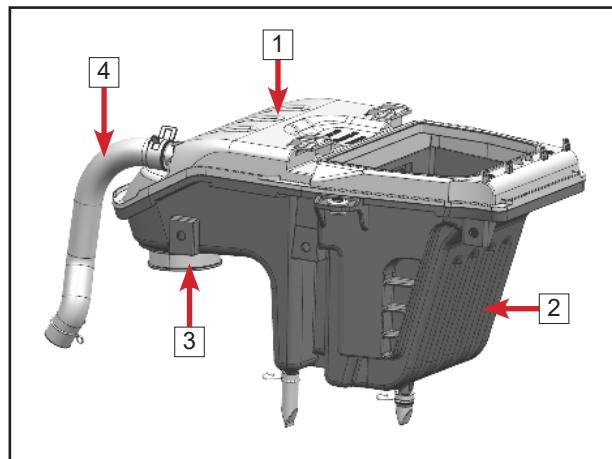
Take out filter element 1.  
Clean air filter housing.



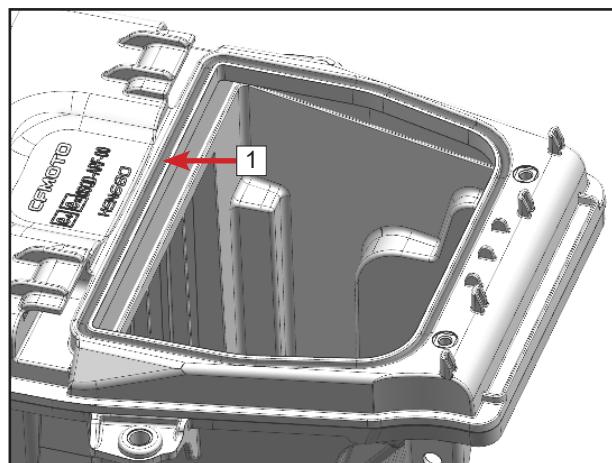
## Air Filter Housing Inspection

Inspect upper housing **1**, lower housing **2** and exhaust pipe **3** for breakage or other damages. If any of them is faulty, replace the whole.

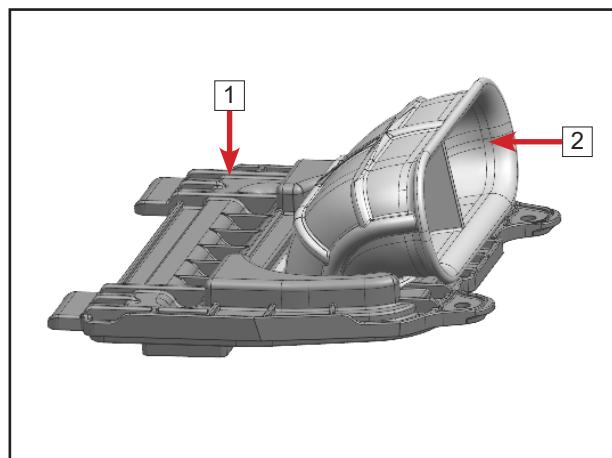
Inspect crankcase breather hose **4** for aging or other damages. Replace if any.



Inspect seal ring **1** for hardening or other damages. Replace if any.



Inspect air filter cover **1** and intake pipe **2** for breakage or other damages. Replace if any.



## Filter Element Inspection and Cleaning

Check and determine if the filter element can continue to be used.

Judge according to the following criteria:

1. Filter element not deformed.
2. Filter element not contaminated by moisture or oil. (If a certain amount of oil or moisture is found inside the air filter, stop the air filter element replacement immediately, replace the entire air filter and check the engine for any abnormalities.)
3. Filter element not broken.
4. Filter element not showing other abnormalities visible to the naked eye.

If the filter element can no longer be used, replace it with a new one and perform the installation procedure.

If can continue to be used, perform the cleaning procedure:

Use a soft brush to remove dust from the inlet side of the element.

Use compressed air to blow dirt outward from the outlet end of the element.

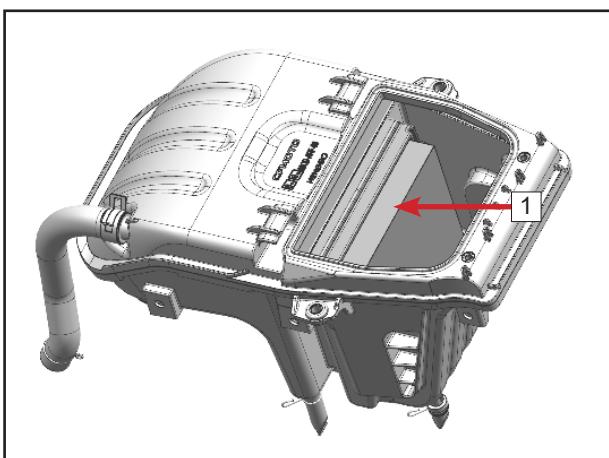
Using compressed air to blow on the inlet end of the element from the side.

### CAUTION

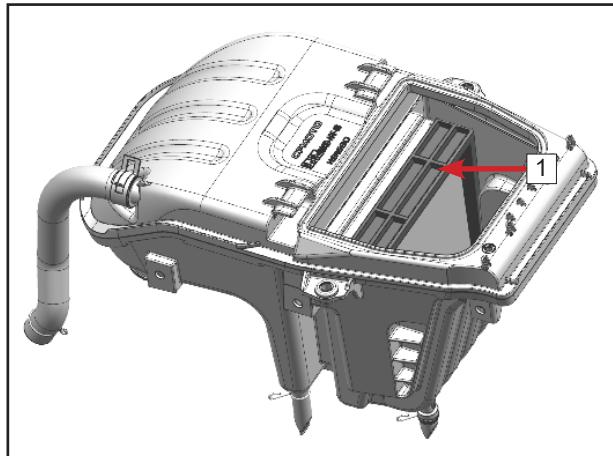
**The vertical use of compressed air from the inlet end of the filter element will blow dust into the filter microholes of the paper filter element, resulting in blockage of the filter element and affecting the intake efficiency.**

## Filter Element Installation

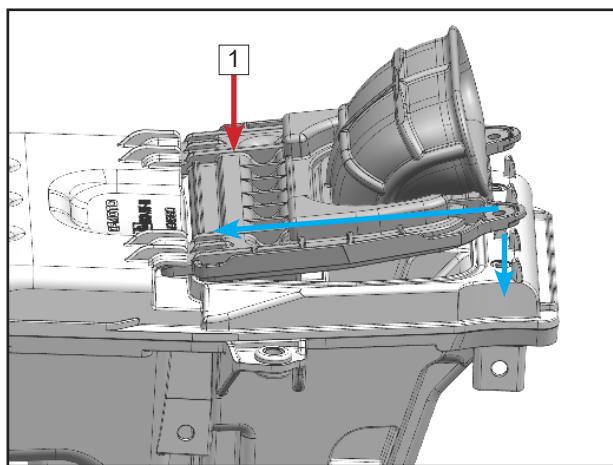
Install clean filter element or new filter element **1** into the air filter housing.



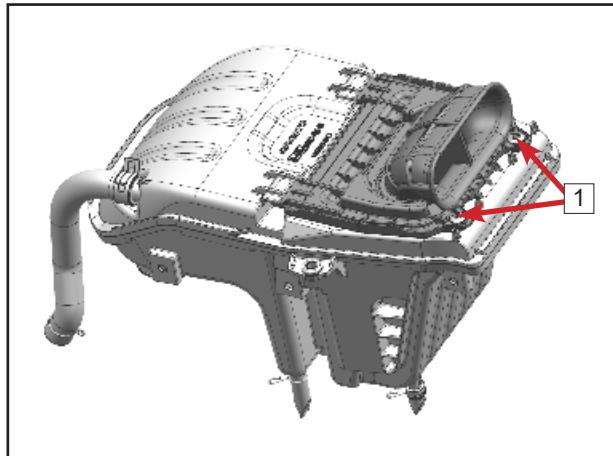
Install filter element wedge 1.



Install air filter cover 1.



Install screws 1.



## Air Filter Assembly Installation

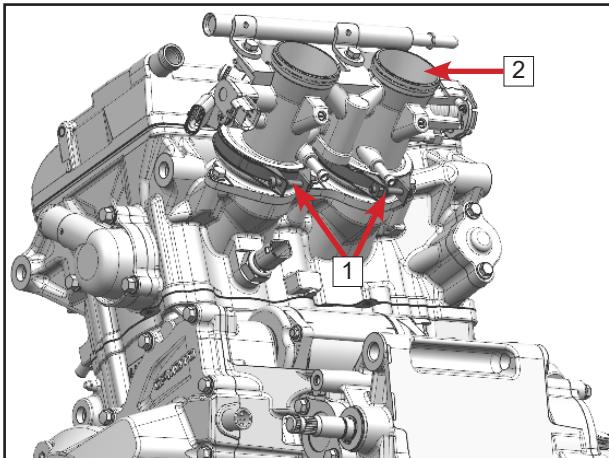
Install air filter assembly in reverse order of removal.

## 13.4.2 Throttle Valve Body Assembly

### Throttle Valve Body Assembly Removal

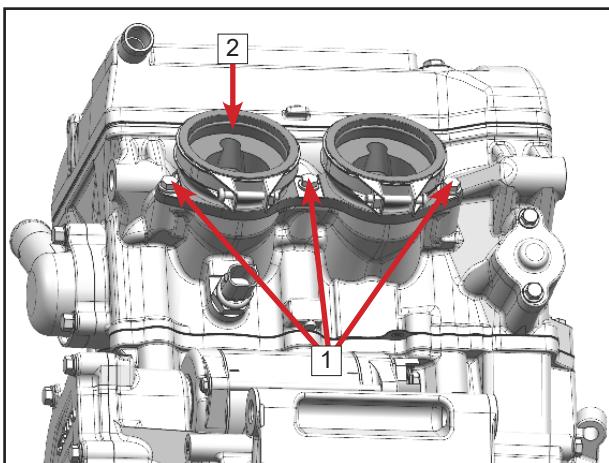
Loosen clamps 1.

Take off throttle valve body assembly 2.



Remove bolts 1.

Remove throttle valve body connecting pipe assembly 2.

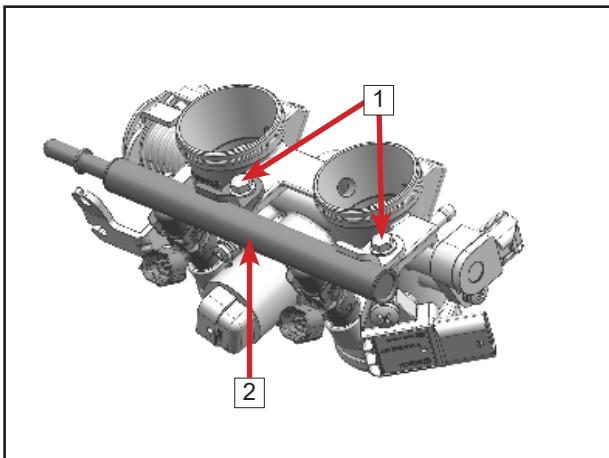


### Throttle Valve Body Assembly

#### Disassembly

Remove bolts 1.

Remove fuel pipe assembly 2.



Remove screw 1.

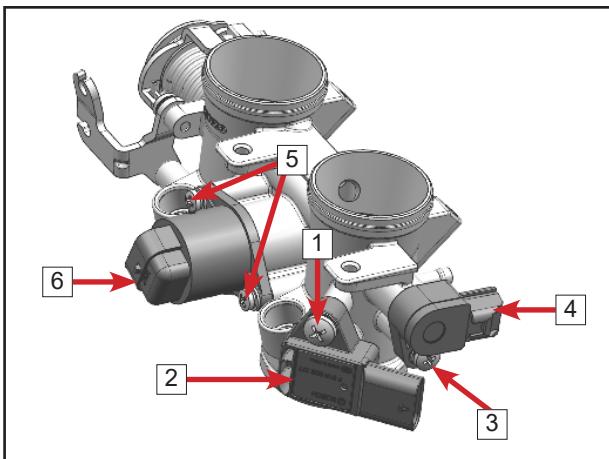
Remove air intake temperature pressure sensor 2.

Remove screw 3.

Remove TPS 4.

Remove screws 5.

Remove idle stepper motor 6.

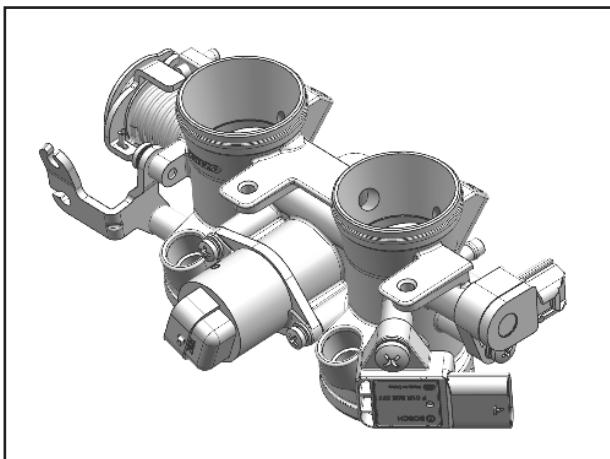


## Throttle Valve Body Assembly

### Inspection

Inspect throttle valve body for breakage and other damages, replace if any.

Inspection of idle stepper motor, TPS and air intake temperature pressure sensor, see Electricals section.



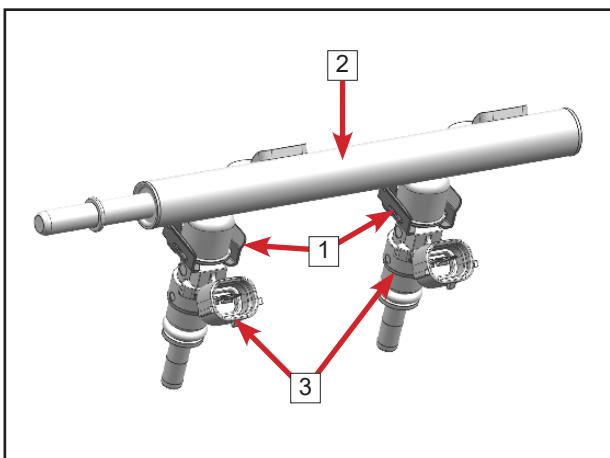
## Fuel Pipe Assembly

### Disassembly

Use both thumbs to separately push both sides of circlips **1**, then remove **1**.

Remove fuel injector **3** from fuel pipe **2**.

Inspection of fuel injector, see Electricals section.



### Installation

Install fuel injector **3** onto fuel pipe **2**, then install circlip **1**. The boss of the fuel pipe must be clamped into the groove of the circlip **1**.

## Throttle Valve Body Connecting Pipe

Inspect throttle valve body connecting pipe **1** for breakage and other damages, replace if any.

Inspect O-ring **2** for breakage, hardening and other damages, replace if any.



## Throttle Valve Body Assembly Assembling

Install idle stepper motor **6**.

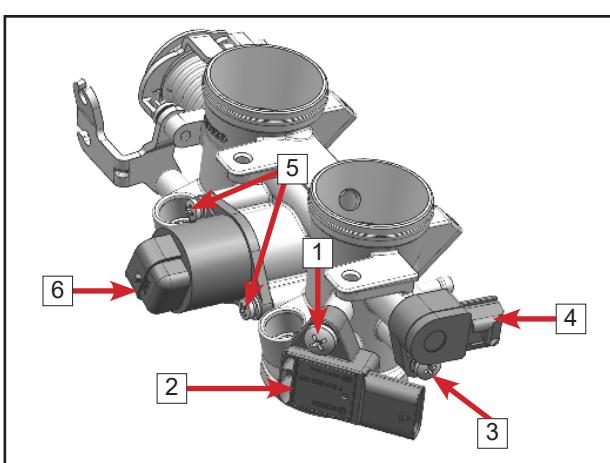
Install screws **5**. (torque: 2N·m ~ 3N·m)

Install TPS **4**.

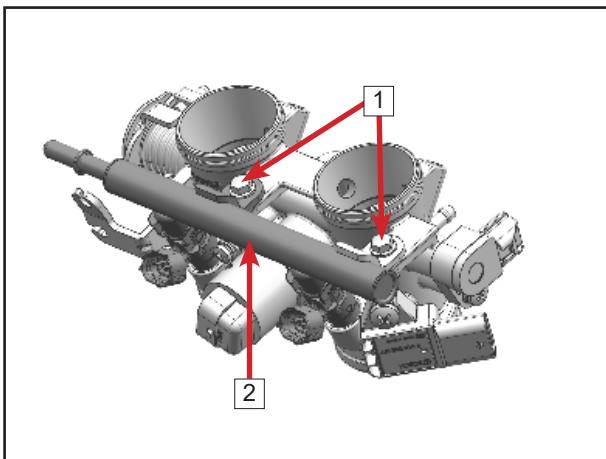
Install screw **3**. (torque: 3N·m ~ 4N·m)

Install air intake temperature pressure sensor **2**.

Install screw **1**. (torque: 3.5N·m ~ 4.5N·m)

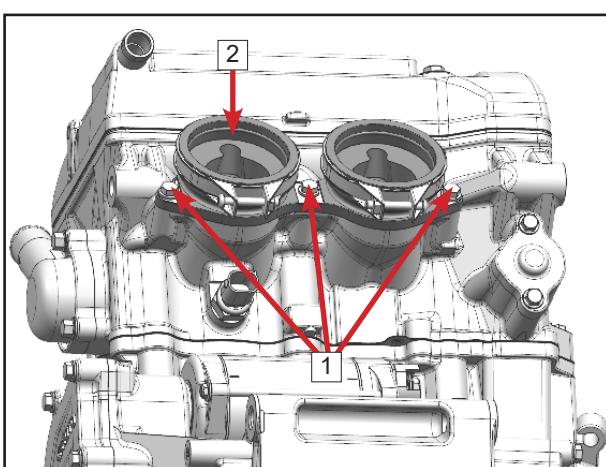


Install fuel pipe assembly **[2]**.  
Install bolts **[1]**. (torque: 10N·m)

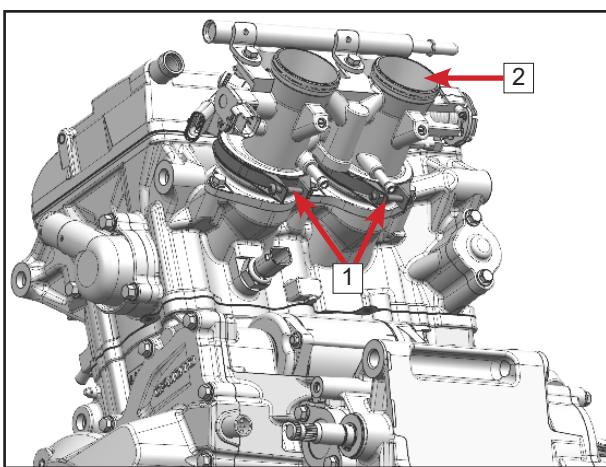


## Throttle Valve Body Assembly Installation

Install throttle valve body connecting pipe assembly **[2]**.  
Install bolts **[1]**. (torque: 10N·m)



Install throttle valve body assembly **[2]**.  
Tighten clamps **[1]**.



## 13.5 Engine Disassembly

### 13.5.1 Fix the Engine

Fix the engine firmly on the removal table.

#### WARNING

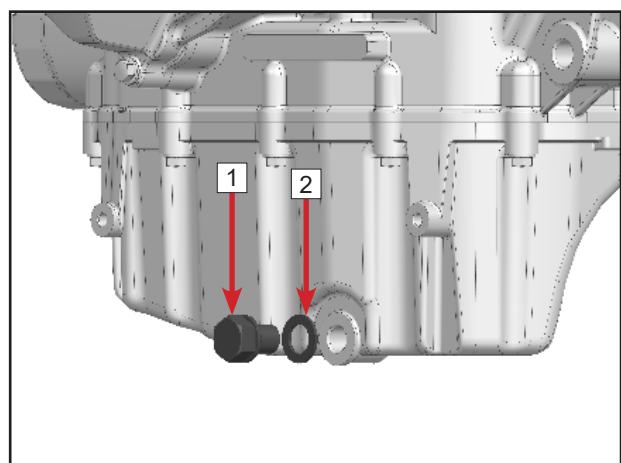
**The engine must be firmly fixed on the disassembly table to prevent the engine from falling, injuring workers or causing engine damage. The engine must be completely cooled, or special protective clothing must be worn before disassembly and maintenance can be carried out to avoid burns.**

### 13.5.2 Engine Oil Releasing

Put a container under the disassembly table to receive oil.

Remove the M12 magnetic drain bolt **1** and washer **2**.

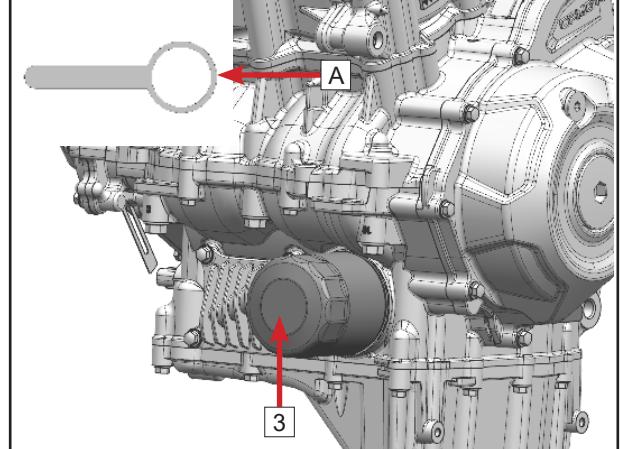
Completely drain the oil.



Use special wrench for oil filter **A** (0700-070200-922-001) to remove the oil filter **3**.

#### CAUTION

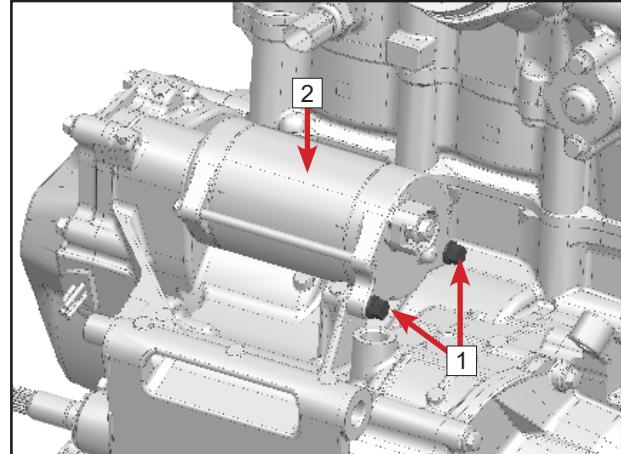
**When disassembling, a layer of buffer, such as a rag, needs to be added between the special wrench and the oil filter to prevent damage to the oil filter.**



### 13.5.3 Starter Motor Removal

Remove M6×25 bolt **1**.

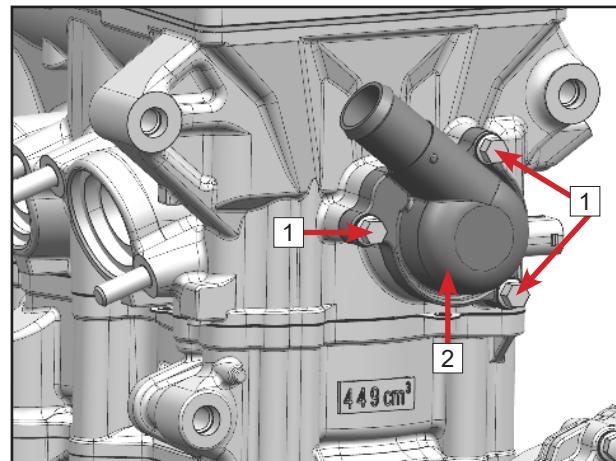
Remove the starter motor **2**.



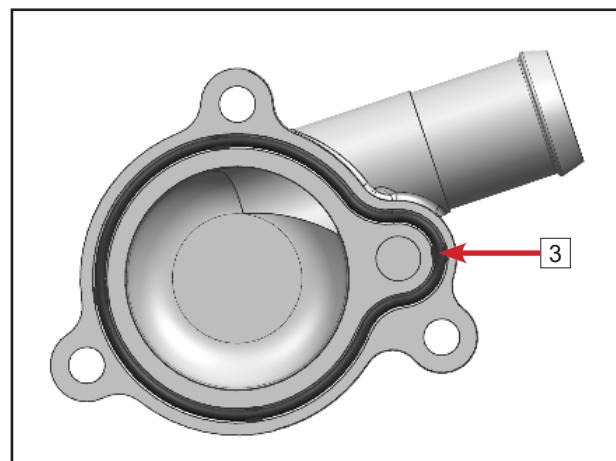
## 13.5.4 Thermostat Removal

Remove M6×22 bolt **1**.

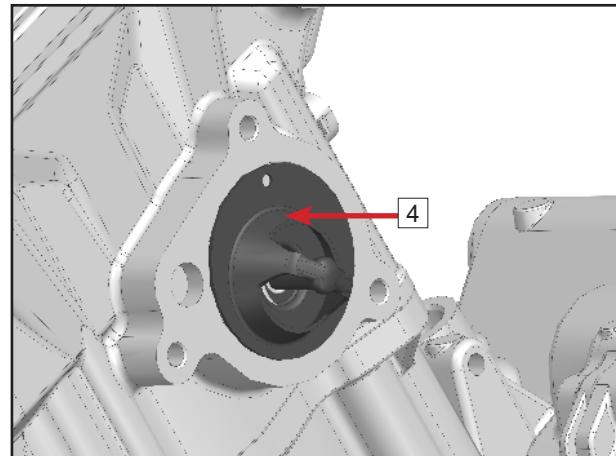
Remove thermostat cover **2**.



Remove the thermostat cover seal **3**.



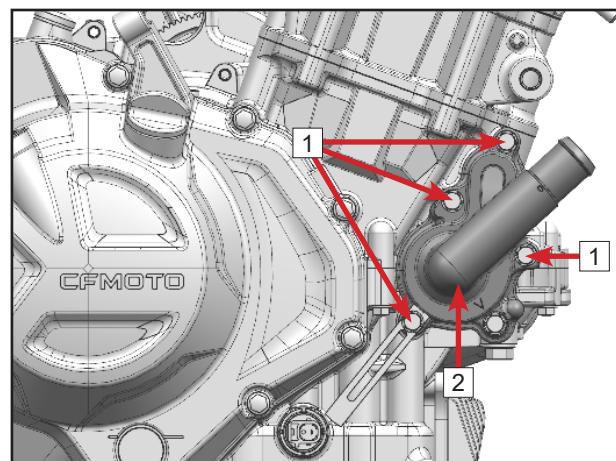
Remove thermostat **4**.



## 13.5.5 Pump Removal

Diagonal cross remove M6×42 bolt **1**.

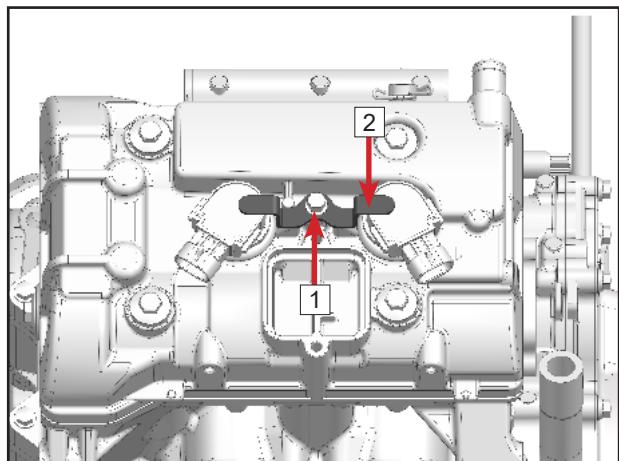
Remove the pump **2**.



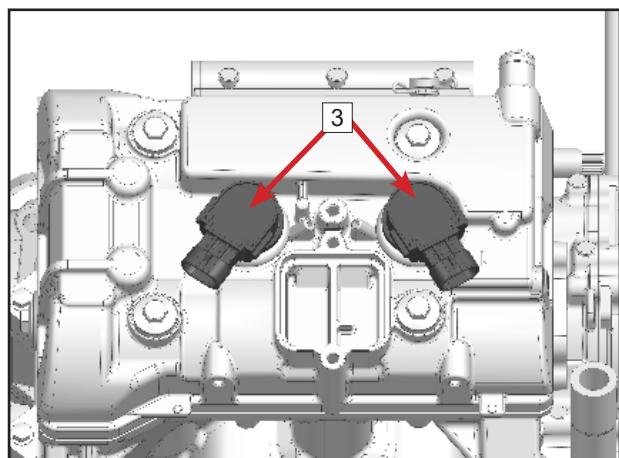
## 13.5.6 Cylinder Head Cover Removal

Remove M6×12 bolt 1.

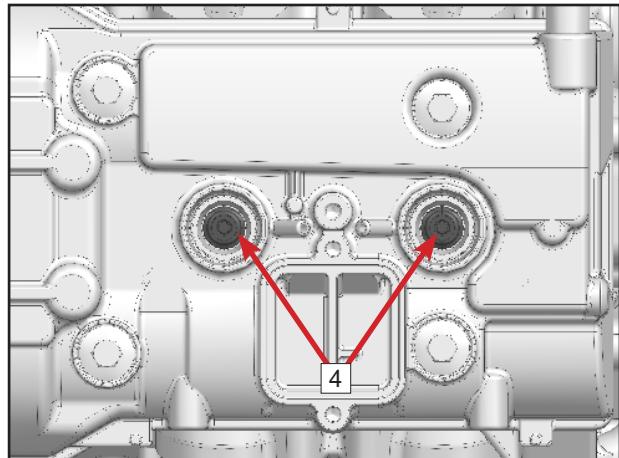
Remove the clamp 2.



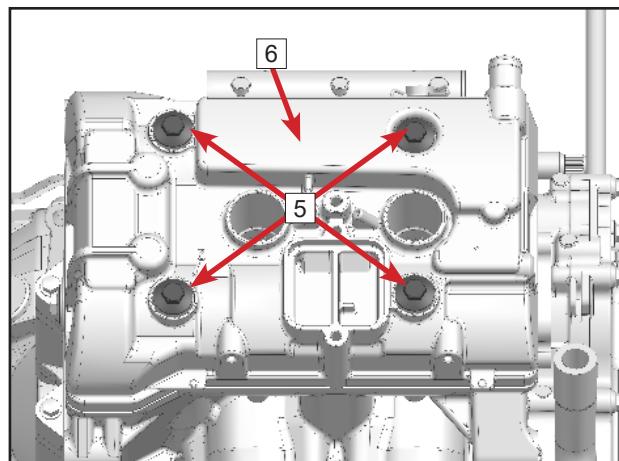
Remove ignition coil 3.



Remove spark plug 4.

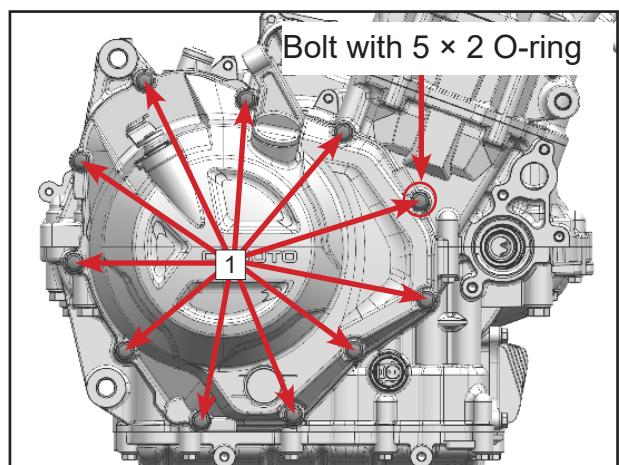


Diagonal cross remove M6 cylinder head cover bolt **5** and seal ring.  
Remove the cylinder head cover **6**.



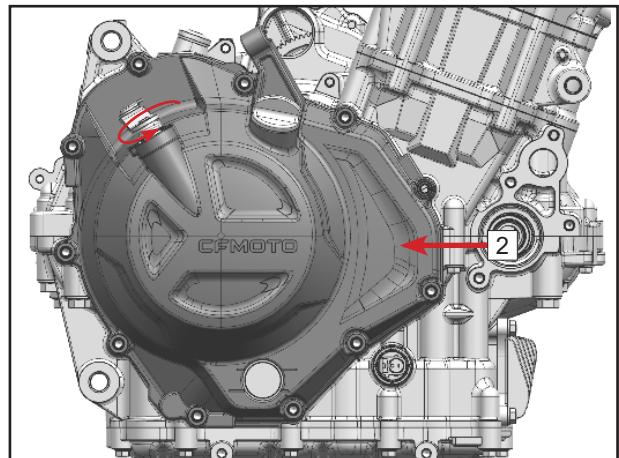
## 13.5.7 RH Cover Removal

Diagonal cross remove M6×25 bolt **1**.



Rotate the clutch control shaft counterclockwise to disengage the clutch pull rod.

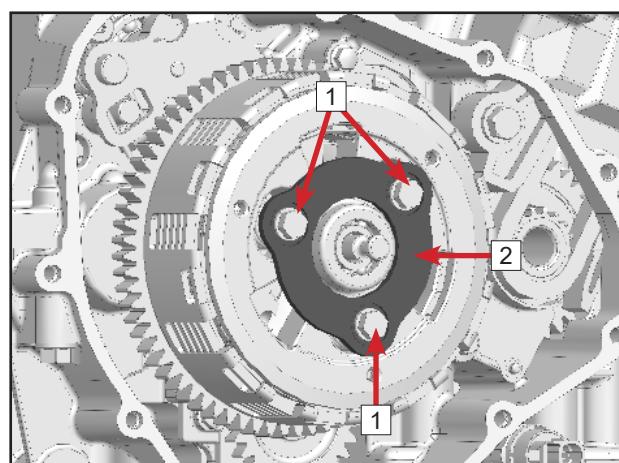
Remove RH side cover **2**.



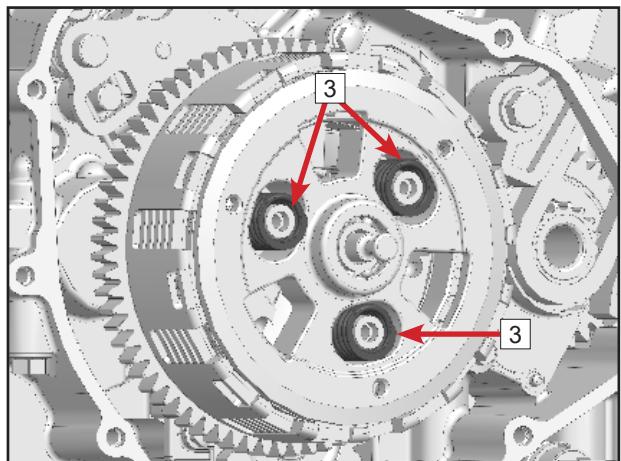
## 13.5.8 Clutch Removal

Remove M6×35 bolt **1**.

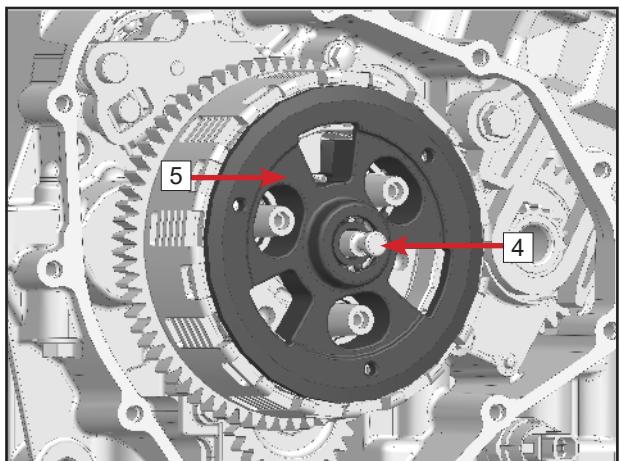
Remove the clutch spring pressure plate **2**.



Remove clutch spring 3.



Pull the pull rod 4 to pull out the pressure plate 5.

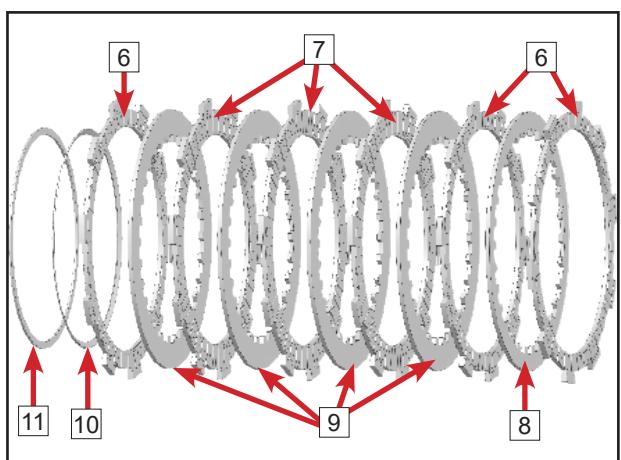


Remove friction disc/driven plate combination.

Check the combination sequence of friction disc/driven plate, which is as follows:

Friction disc assembly II 6 - driven disc I 8 - friction disc assembly II 6 - Driven disc II 9 - friction disc assembly I 7 - driven disc II 9 - friction disc assembly I 7 - driven disc II 9 - friction disc assembly II 6 - disc spring 10 - Disc spring seat 11.

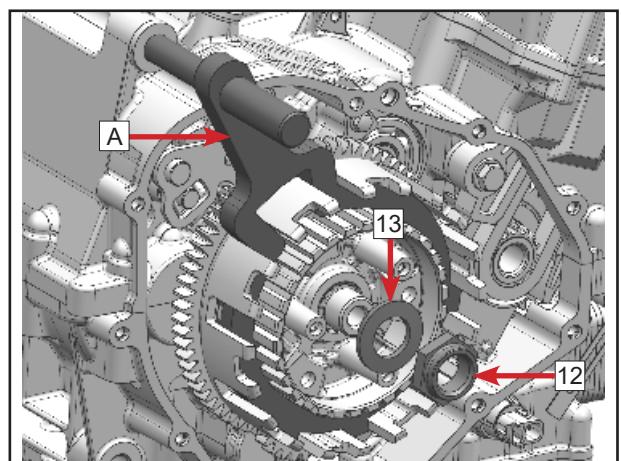
Use tie bands to bind the friction/driven plate assy.



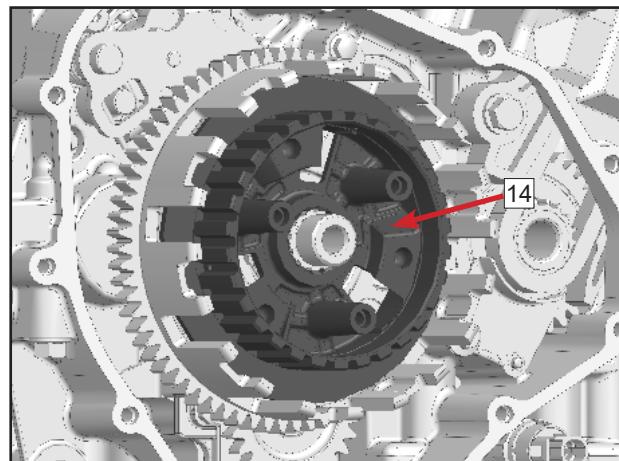
Use the clutch master/slave hub stop gear A (0SQ0-050000-922-001) to fix central sleeve.

Remove M20×1.5 nut 12.

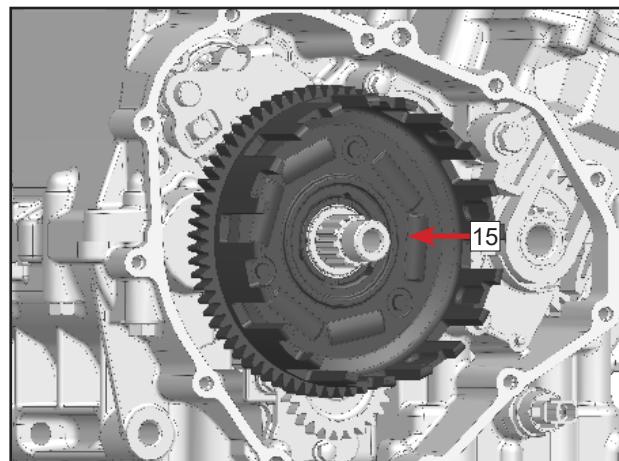
Remove elastic circlip 20 13.



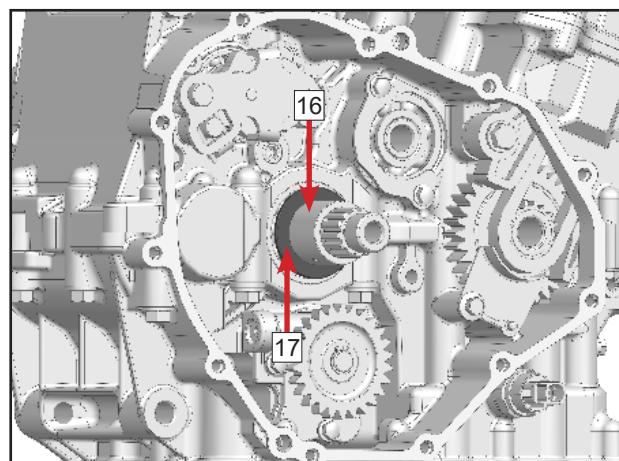
Remove the center sleeve 14 and the 25.2×39×2 washer below.



Remove the primary driven gear combination 15.

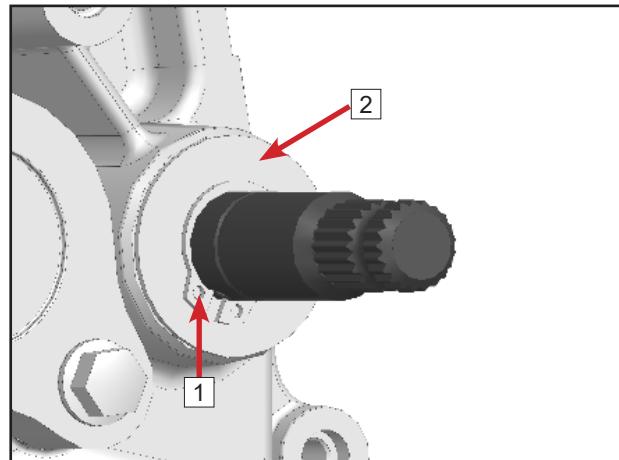


Remove the clutch sleeve 16.  
Remove the 25.2 x 46 x 5.8 gasket 17.

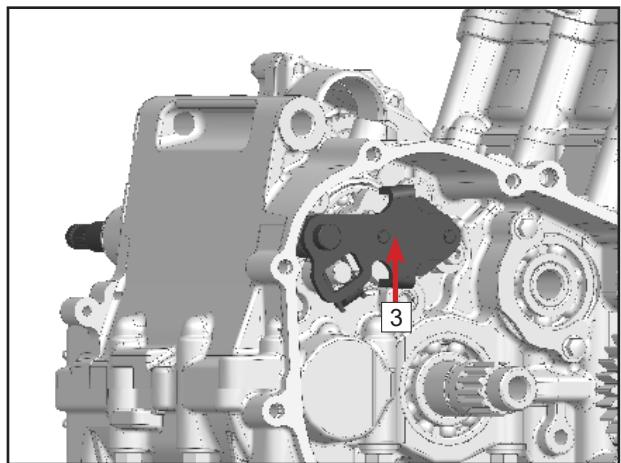


### 13.5.9 Shift Lever Assembly, Shift Positioning Component and Positioning Star Wheel Removal

Remove the  $\Phi 14$  circlip for shaft 1 and 14×28×1 washer 2.

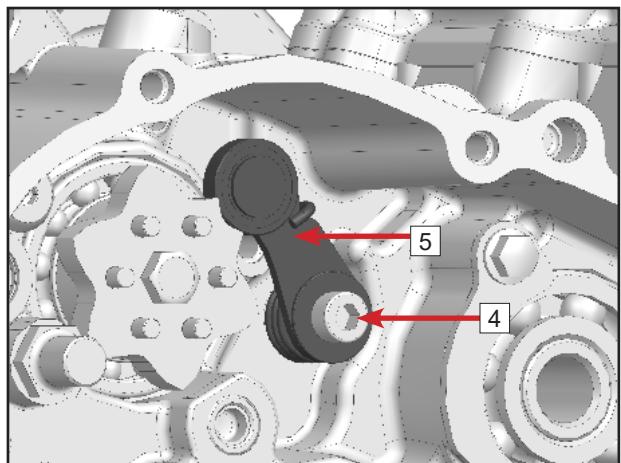


Remove the shift lever assembly 3.



Remove M6×16 hex socket cap screw 4.

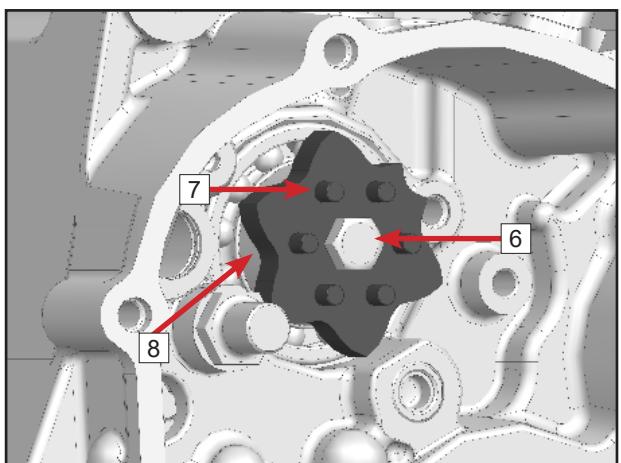
Remove the gear shift locating unit 5.



Remove M6×16 bolt 6.

Remove the locator wheel 7.

Remove gear hub bushing 8.

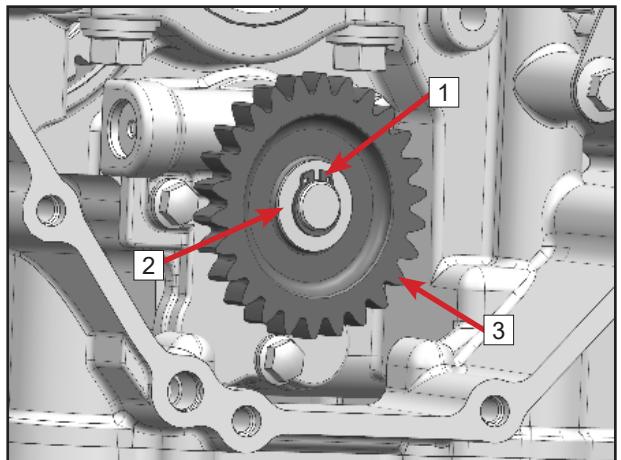


## 13.5.10 Oil Pump Removal

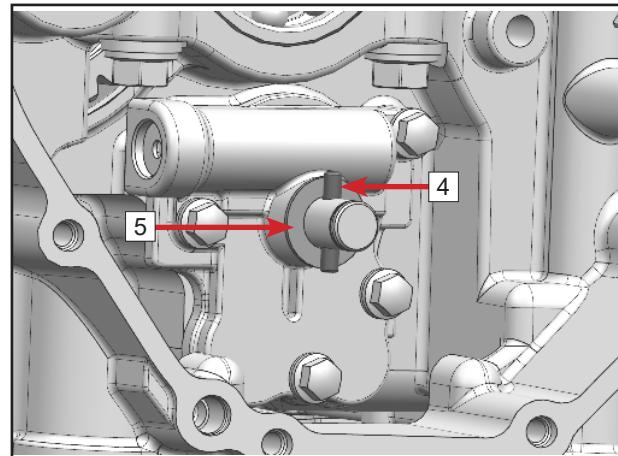
Remove  $\Phi 11$  shaft ring 1.

Remove 11×20×1 washer 2.

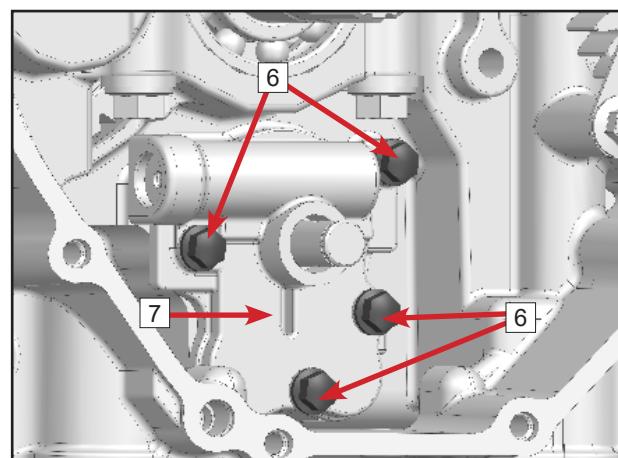
Remove the oil pump gear 3.



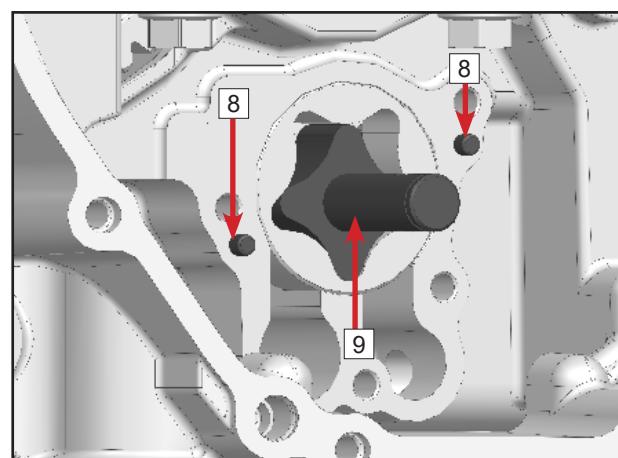
Remove P4×21.8 needle roller **4** and 11×20×1 washer **5**.



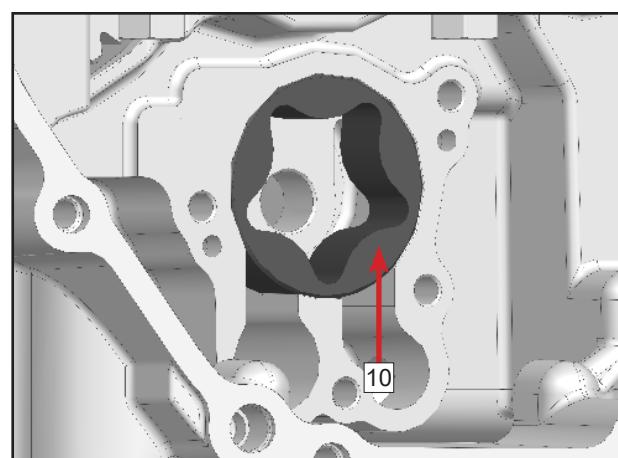
Remove diagonal cross M6×22 bolt **6**.  
Remove the oil pump cover **7**.



Remove P4×7.8 needle roller **8**.  
Remove inner rotor of oil pump, oil pump shaft and P4×15.8 needle roller assembly **9**.



Remove the outer rotor of oil pump **10**.

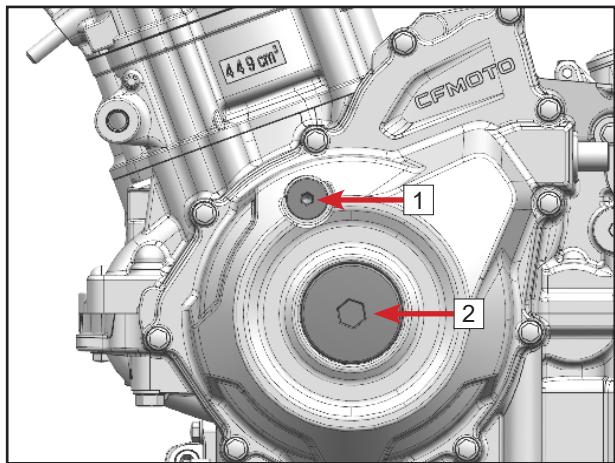


**13.5.11 Cylinder Head Removal**

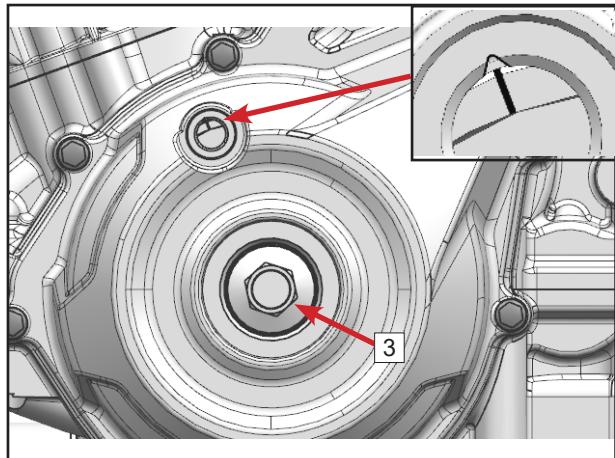
Remove the timing observation hole cover

1.

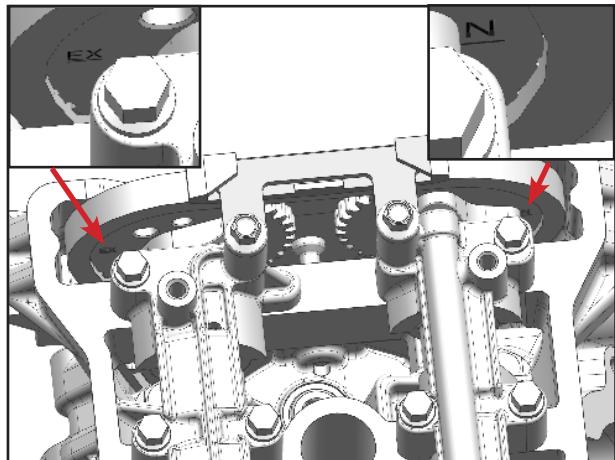
Remove strainer cover 2.



Rotate the crankshaft 3 counterclockwise to align the mark "I" on the magneto rotor with the notch center of the timing observation hole on the left cover.

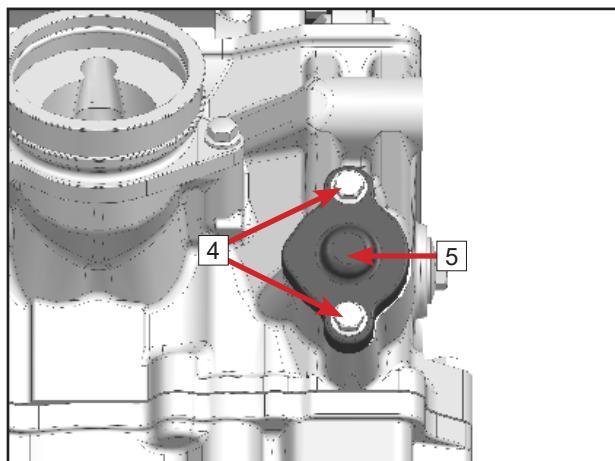


At the same time, the "IN" line on the intake timing sprocket is parallel to the plane on the cylinder head, and the "EX" line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown in the figure on the right.



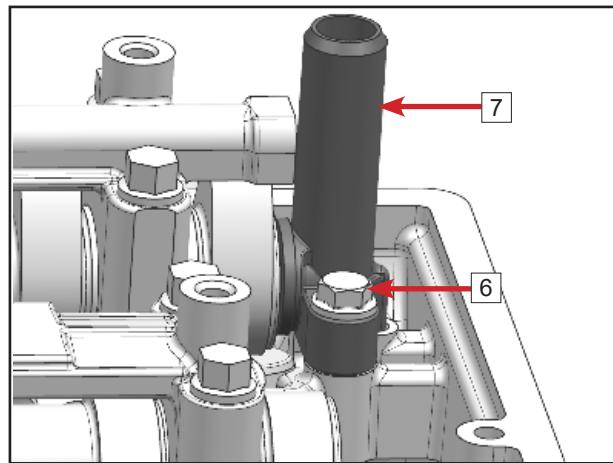
Remove M6×20 bolt 4.

Remove hydraulic tensioner assembly 5.



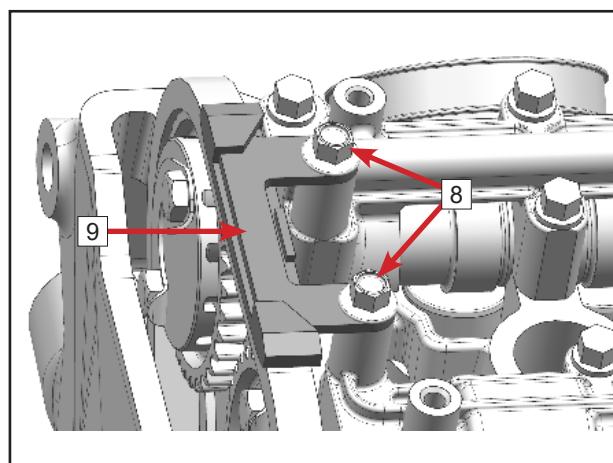
Remove M6×22 bolt **6**.

Remove the transition connector assembly **7**.



Remove M6×65 bolt **8**.

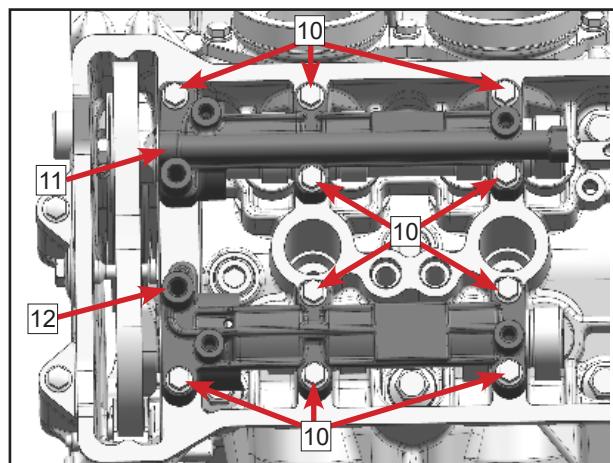
Remove guide chain block **9**.



Remove diagonal cross M6×45 bolt **10**.

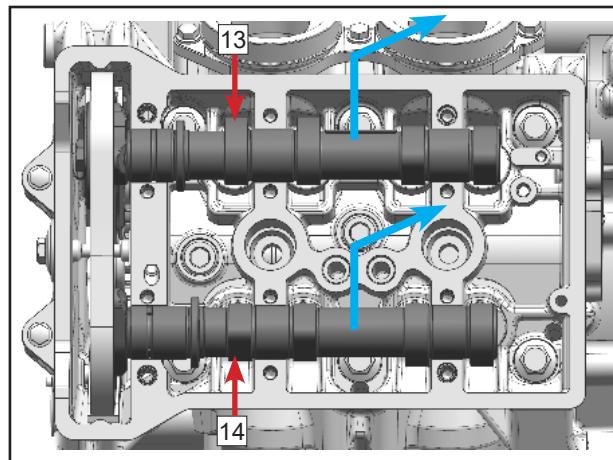
Remove intake camshaft seat assembly **11**.

Remove exhaust camshaft seat **12**.



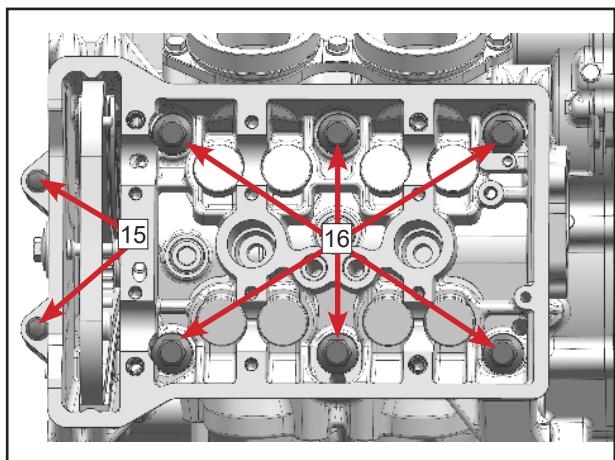
Remove intake camshaft assembly **13**.

Remove exhaust camshaft assembly **14**.

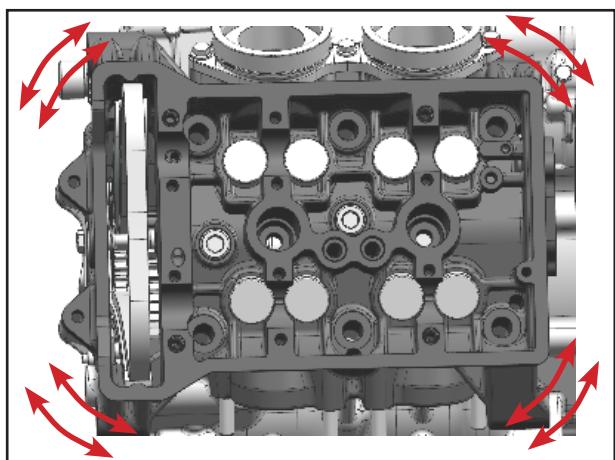


Remove M6×90 bolt 15.

Diagonally cross remove M10×150 cylinder head bolt 16 and washer.

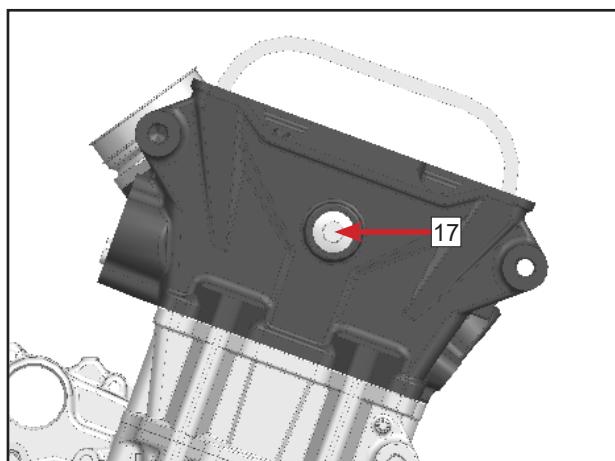


Shake the cylinder head from side to side to make it easier to disassemble, pay attention to the shaking range should not be too large, otherwise it will lead to the positioning pin fall off.



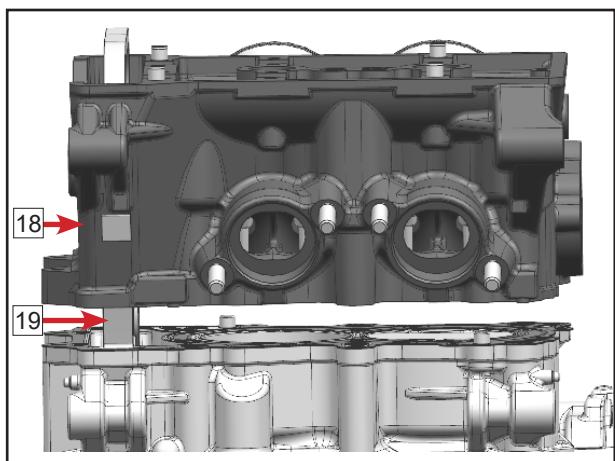
Hook the timing chain to prevent it from falling.

Remove shock absorbing bolt 17 and its gasket.



Lift the cylinder head 18, and hook the timing chain 19 from the gap to prevent falling.

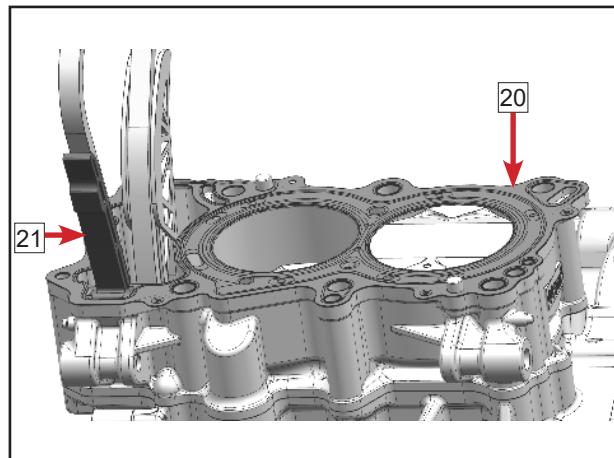
Remove cylinder head 18.



Remove and discard cylinder head gasket

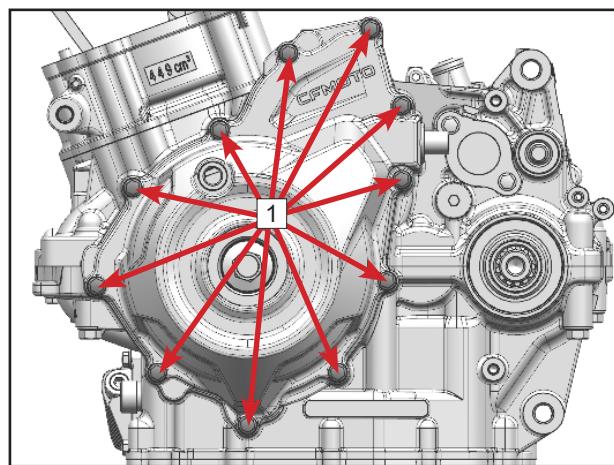
20.

Remove chain guide plate 21.

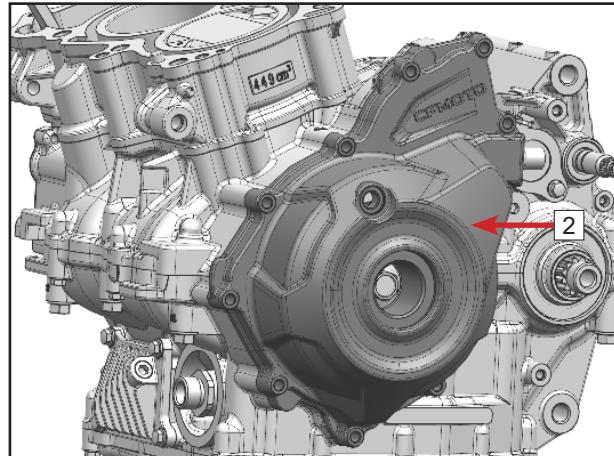


## 13.5.12 Magneto and Double Gear Removal

Remove diagonal cross M6×30 bolt 1.



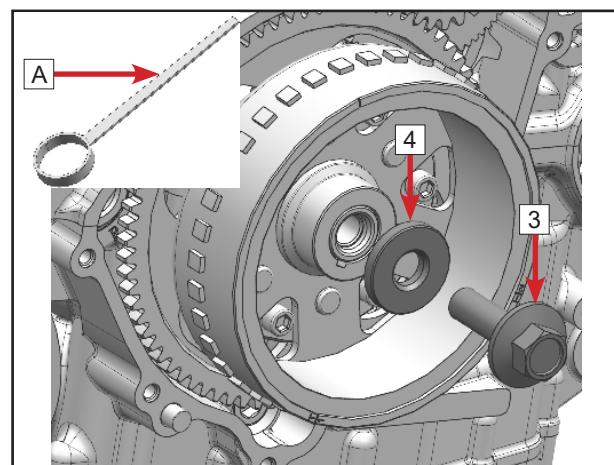
Remove LH side cover 2.



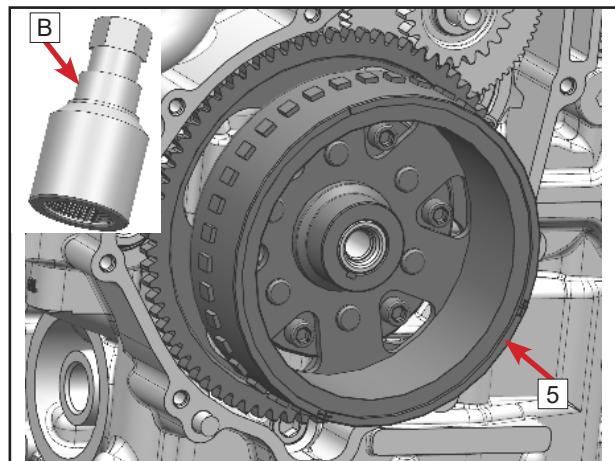
Use magneto rotor stop gear A (0SQ0-031000-922-001) to fix magneto rotor.

Remove M12×40 bolt 3.

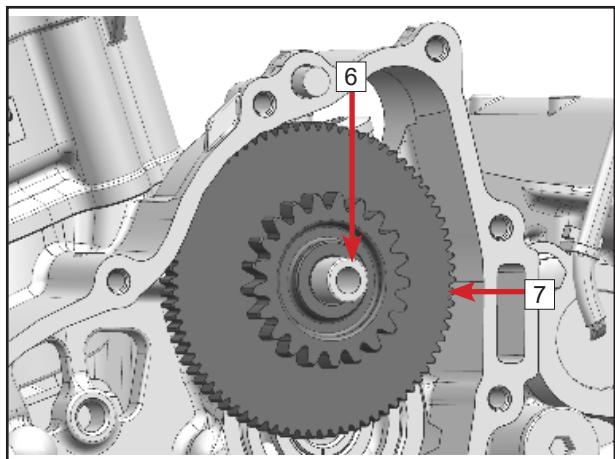
Remove 12.5×33×5 washer 4.



Use the magneto rotor removal tool **B** (0SQ0-031000-922-002) to eject magneto rotor and starting large gear assembly **5**.



Remove the intermediate gear shaft **6**.  
Remove the double gear **7**.

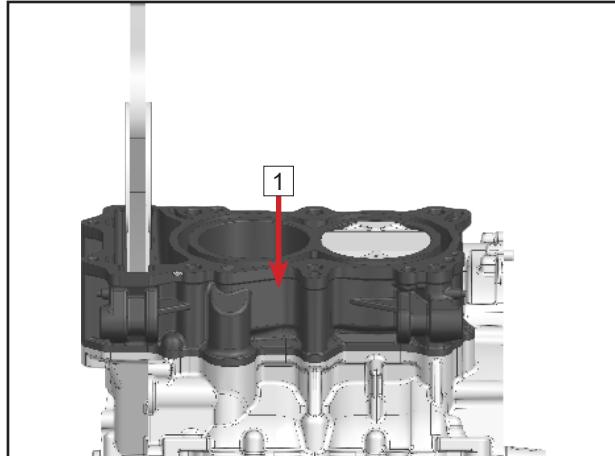


### 13.5.13 Cylinder Body Removal

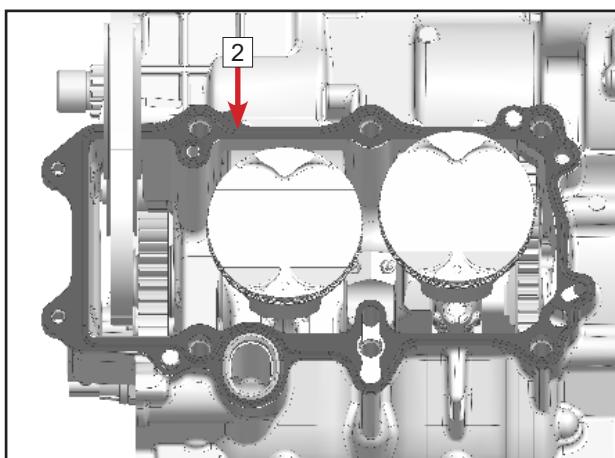
Gently shake the cylinder block **1** to loosen and pull it up.

#### **CAUTION**

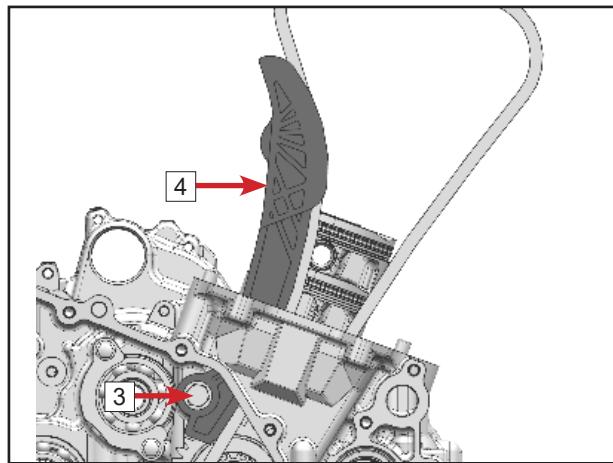
**When the piston is about to break away from the cylinder block, hold the piston by hand to prevent it from colliding with the casing. If necessary, use dust-free paper to separate the piston from the crankcase.**



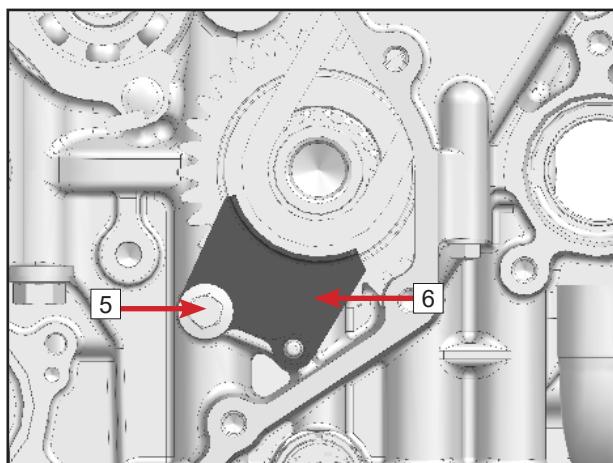
Remove and discard cylinder block gasket **2**.



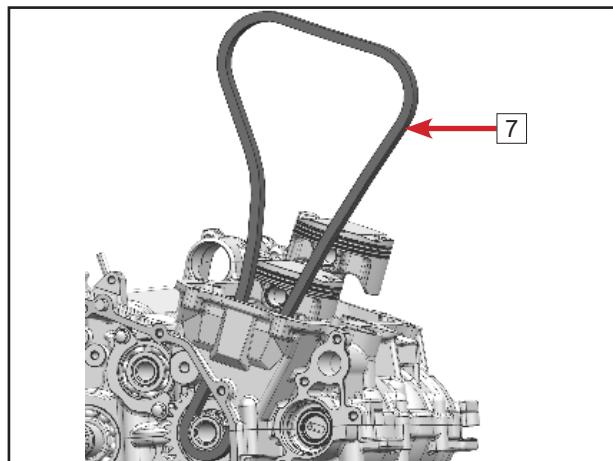
Remove threaded pin shaft **3**.  
Remove the tensioning plate **4**.



Remove M6×12 bolt **5**.  
Remove timing chain tray **6**.



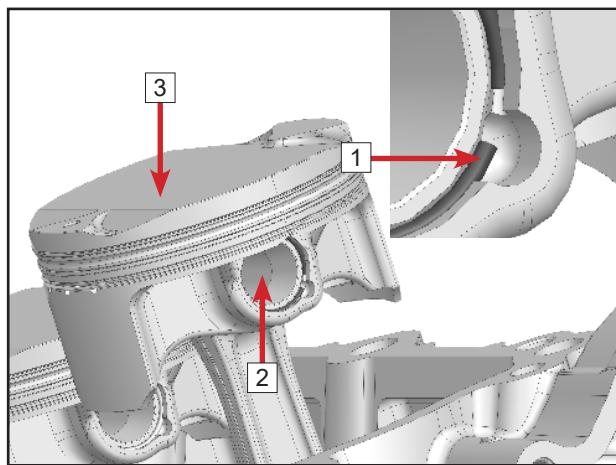
Remove timing chain **7**.



## 13.5.14 Piston Removal

Turn the crankshaft and adjust the piston to a position suitable for disassembly. Adjust the piston pin retaining ring opening to the piston notch position. Use needle-nosed pliers to remove the piston pin retaining ring 1 and discard it. Push the piston pin 2 from the other side. Remove the piston 3.

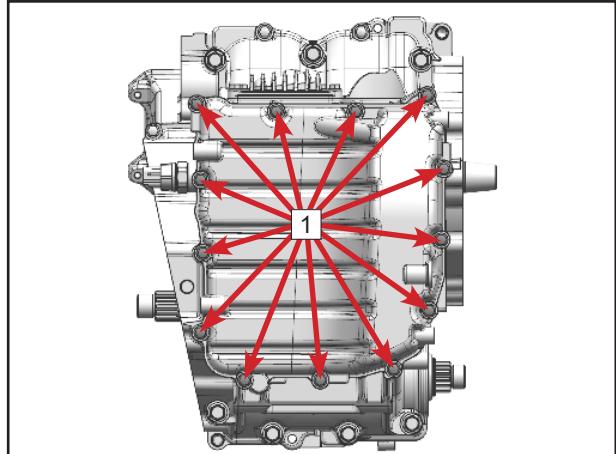
The two pistons are removed in the same way.



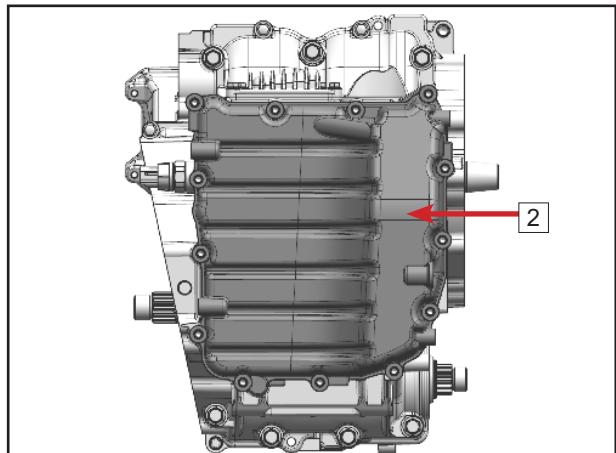
## 13.5.15 Oil Pan Removal

Flip engine.

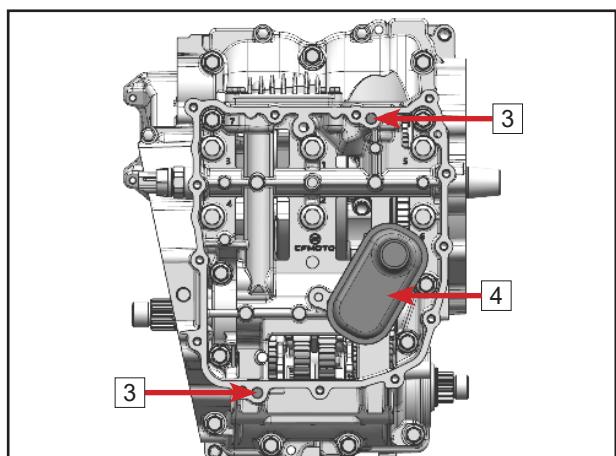
Remove diagonal cross M6×25 bolt 1.



Remove oil pan 2.

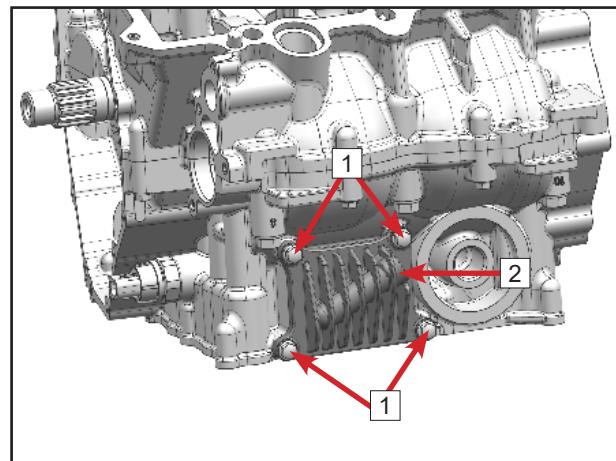


Remove  $\Phi 8 \times 12$  cylindrical roller 3. Remove the set filter assembly 4.



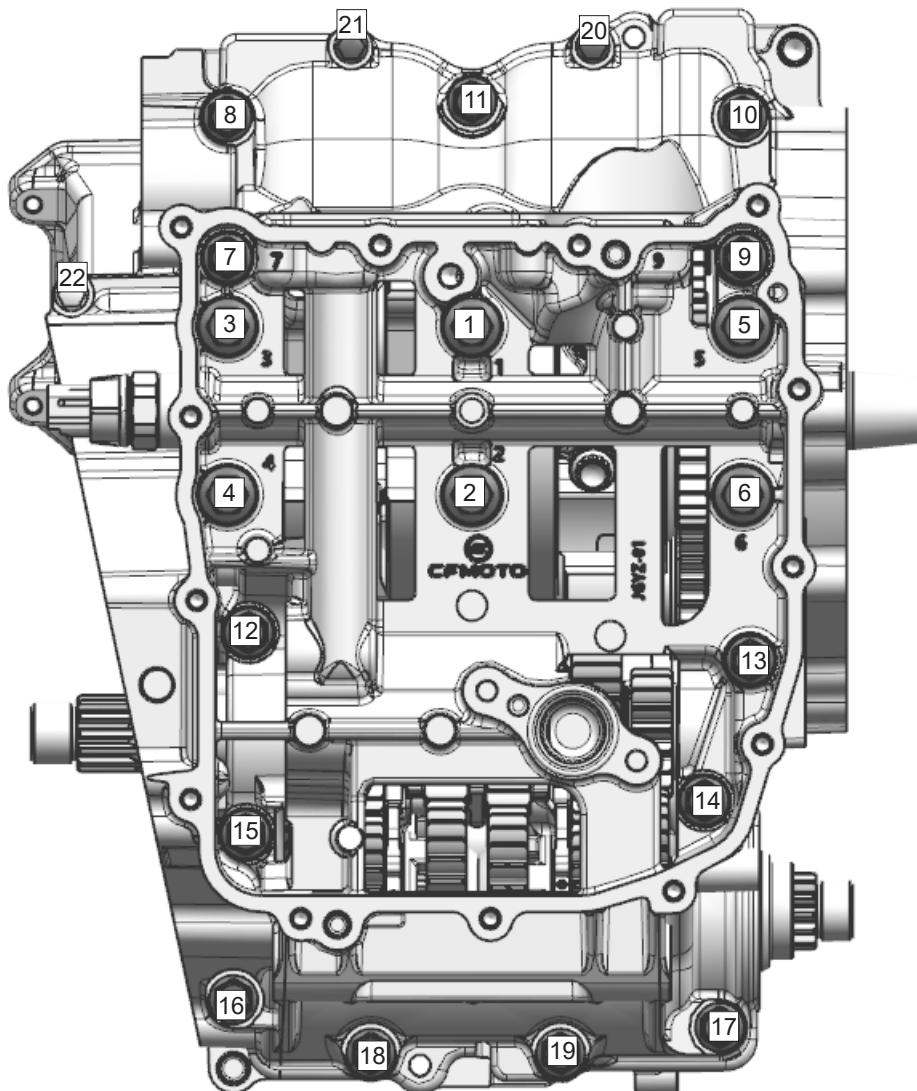
## 13.5.16 Oil Rail Cover Plate Assembly Removal

Diagonally remove M6×18 bolts 1.  
Remove oil rail cover plate assembly 2.



## 13.5.17 Compartment

In turn remove bolt 1 ~ bolt 22.



1 ~ 6:  
M9×108 bolt assy

7, 9, 13:  
M8×105 bolt assy

8, 10, 16, 17:  
M8×55 bolt

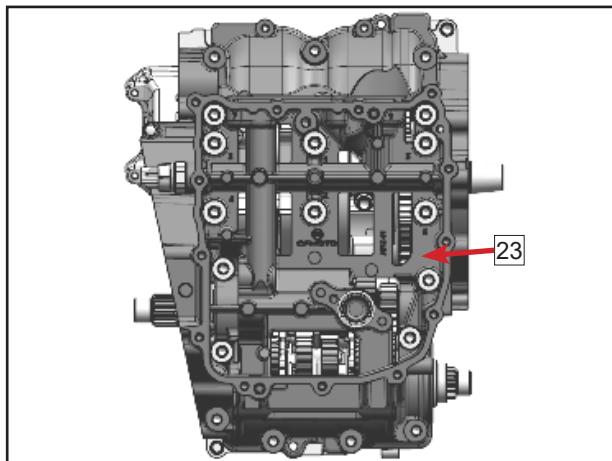
11, 18, 19:  
M8×45 bolt

12, 15:  
M8×45 bolt assy

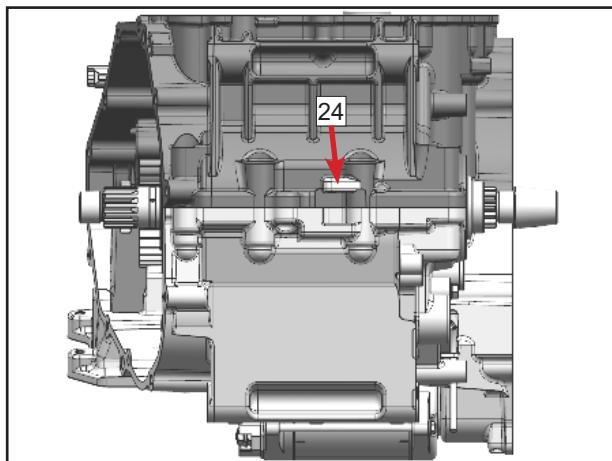
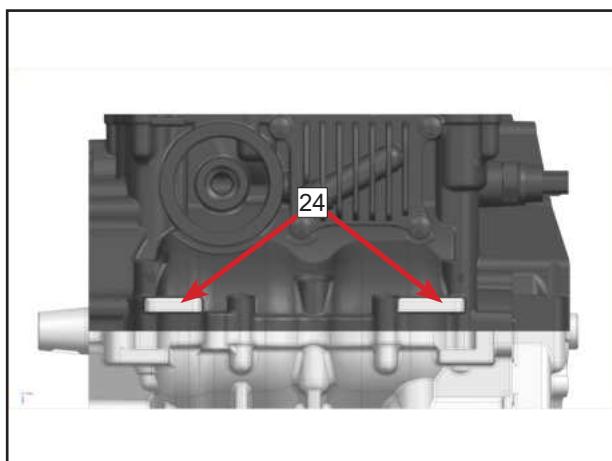
14:  
M8×55 bolt assy

20, 21, 22:  
M6×30 bolt

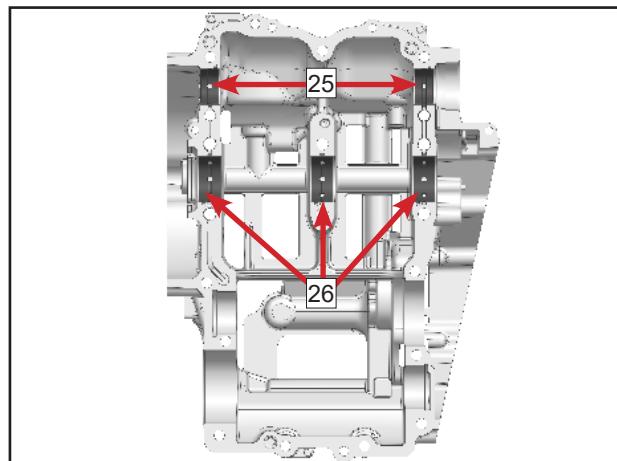
Remove lower crankcase 23.



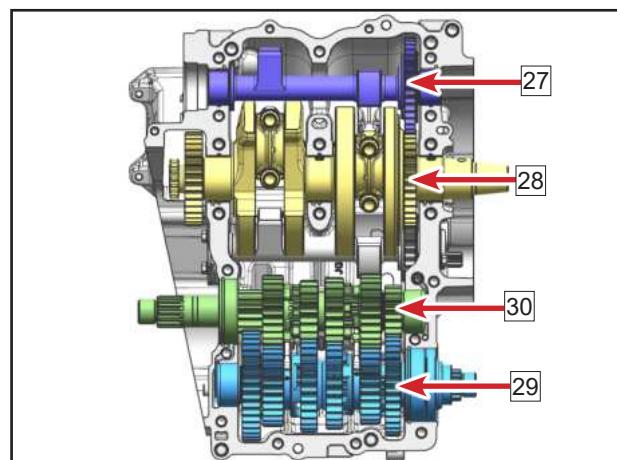
During disassembly, use rubber hammer to hit the crankcase convex 24 gently so that the upper and lower crankcase is easier to separate.



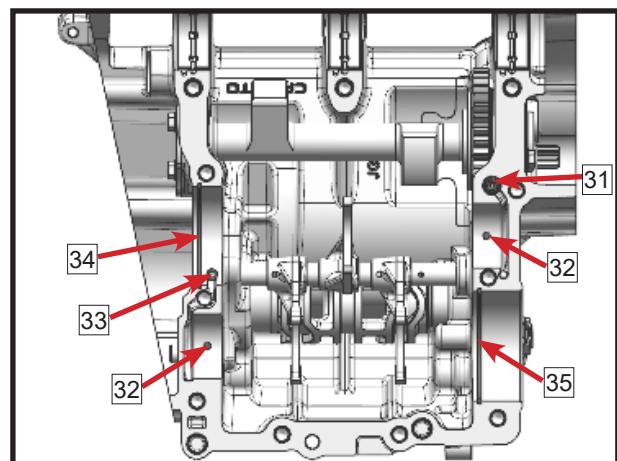
Ensure that the balance bearing **25** and spindle bearing **26** are left in the lower crankcase.



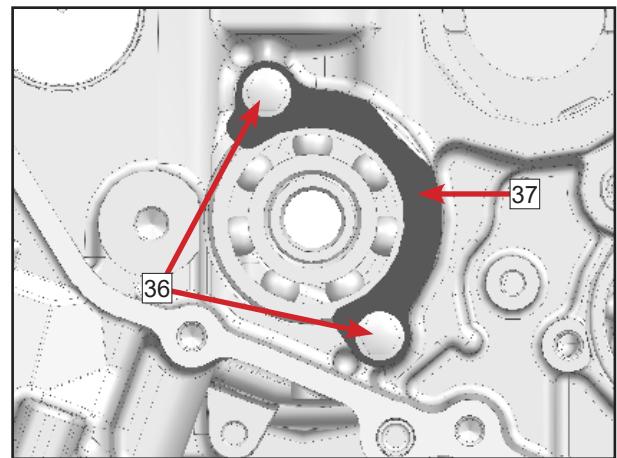
Remove front balancing shaft assembly **27**, crankshaft connecting rod assembly **28**, countershaft **29** and main shaft **30**.



Remove the throttle plug **31**.  
Remove P4×7.8 roller pin **32**.  
Remove 6×16.2 locating pin **33**.  
Remove 6205 Bearing stop ring **34**.  
Remove 62-28 Bearing stop ring **35**.



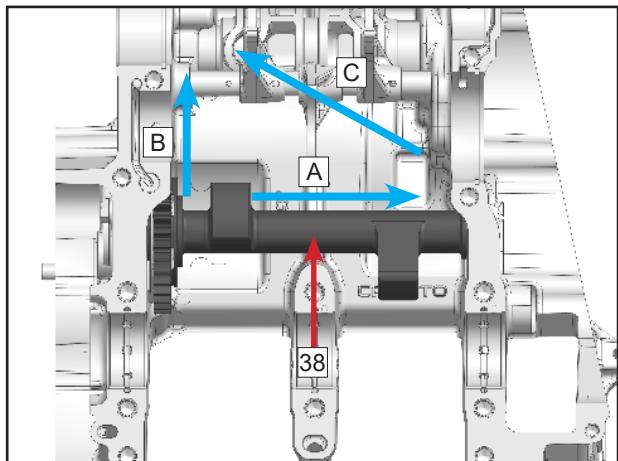
Remove M6×16 bolt **36**.  
Remove the RH bearing baffle **37** (clutch side).



**A:** Push the rear balance shaft assembly to the clutch side, remove the bearing 6204 of the rear balance shaft (clutch side).

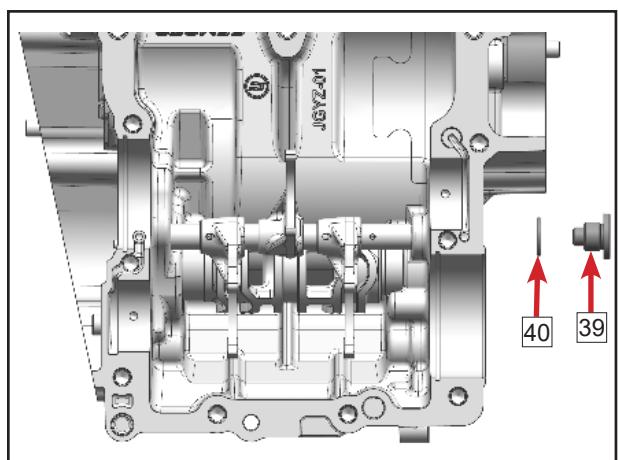
**B:** Lift the rear balance shaft gear end.

**C:** Remove the rear balance shaft assembly 38.



Remove the fork shaft cover 39.

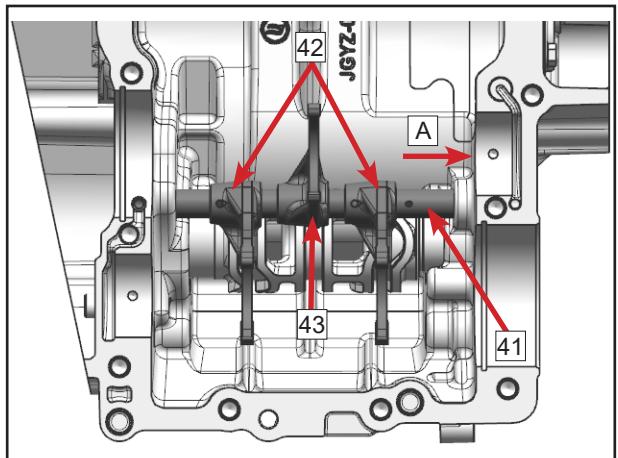
Remove 15×1.9 O-seal 40.



Push the fork shaft assembly 41 along the direction **A**.

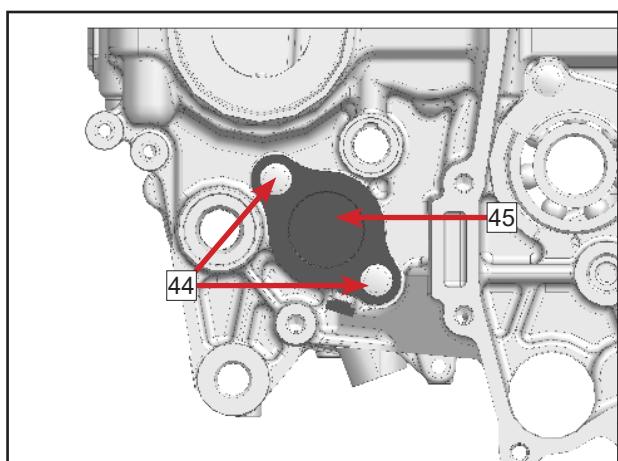
Remove shift forks (left and right) 42 and shift fork (middle) 43.

Remove the dial fork shaft assembly 41.



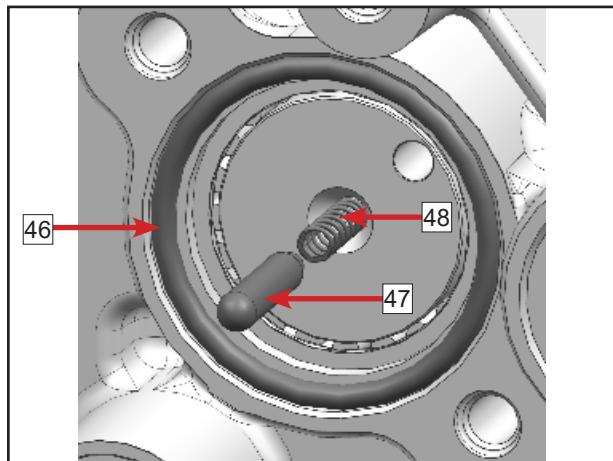
Remove M6×25 bolt 44.

Remove the gear sensor assembly 45.



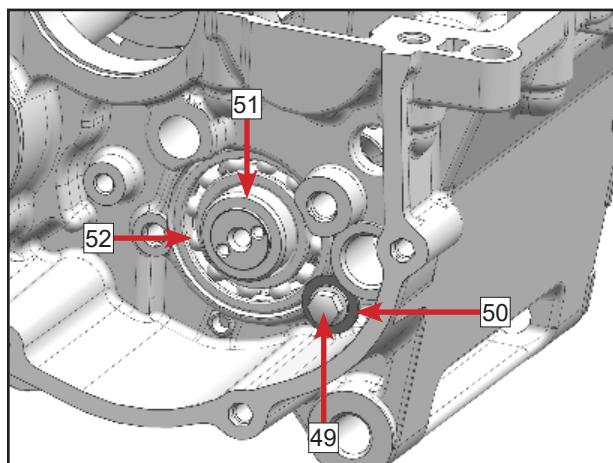
Remove 31.5×2.5 O-ring **46**.

Remove the ball contact **47** and contact spring **48** from the gear hub.



Remove M6×16 bolt **49** and 6.3×16.3×1.2 washer **50**.

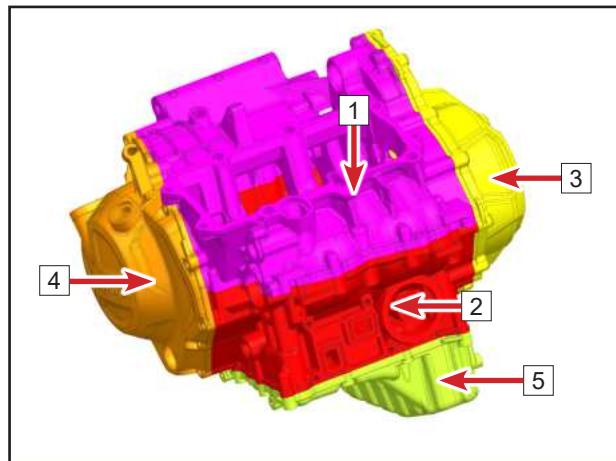
Remove the gear hub **51** and 16005 rolling bearing **52** from the clutch side.



## 13.6 Engine Inspection

### 13.6.1 Crankcase

- [1]: Upper crankcase
- [2]: Lower crankcase
- [3]: LH side cover
- [4]: RH side cover
- [5]: Oil pan

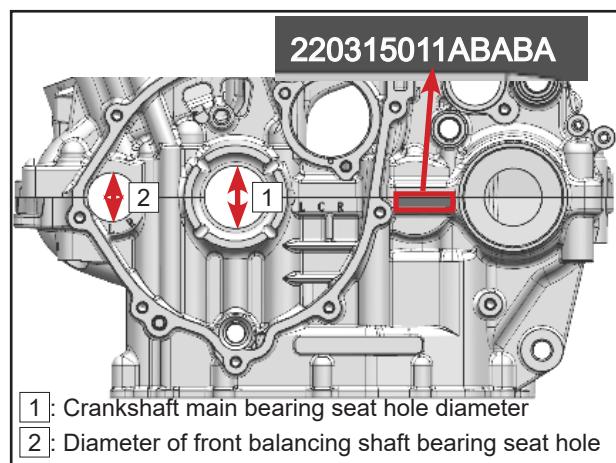


#### 13.6.1.1 Selecting Plain Bearing

##### Crankshaft main bearing seat hole/front balancing shaft bearing seat hole

Crankshaft main bearing seat holes and front balancing shaft bearing seat holes are grouped according to the following table, and group marks are engraved on the lower crankcase, as shown in the example on the right.

Crankshaft Main Bearing Seat Hole (New Part)	
Mark	Diameter [1]
A	37 mm ~ 37.008 mm
B	37.009 mm~37.016 mm



Front Balancing Shaft Bearing Seat Hole (New Part)	
Mark	Diameter [2]
A	29 mm ~ 29.006 mm
B	29.007 mm ~29.013 mm

For example “220315011ABABA”:

From LH to RH:

First character A: indicates LH (magneto side) The grouping of the bearing seat hole of the balance shaft is marked as A.

Second character B: indicates RH (clutch side) The grouping of the bearing seat hole of the balance shaft is marked as B.

Third character A: indicates LH (magneto side) The grouping of crankshaft main bearing seat hole is marked as A.

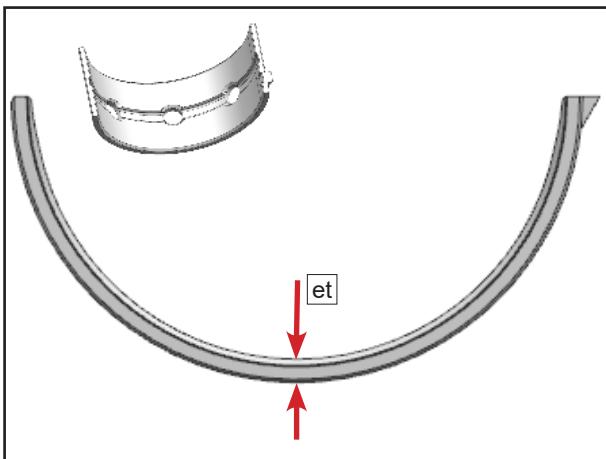
Fourth character B: The grouping mark of the crankshaft main bearing seat hole in the middle position is B.

Fifth character A: indicates RH (clutch side) The grouping of crankshaft main bearing seat hole is marked as A.

## Main plain bearing

Main plain bearing wall thickness  $\text{et}$

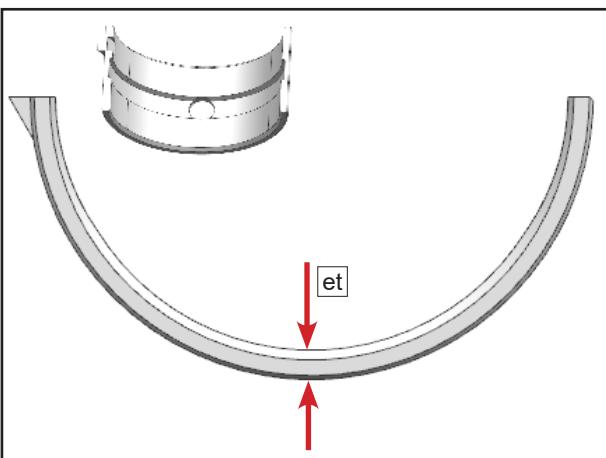
<b>Main Plain Bearing (New Part)</b>	
Color Mark	Wall Thickness $\text{et}$
Red	1.486 mm ~ 1.490 mm
Black	1.491 mm ~ 1.494 mm
Blue	1.495 mm ~ 1.498 mm



## Balance shaft plain bearing

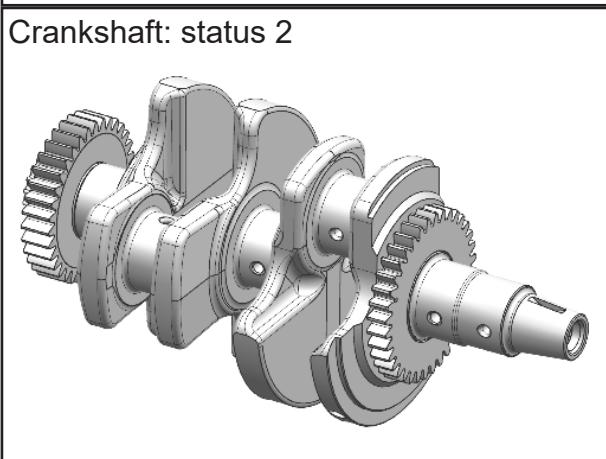
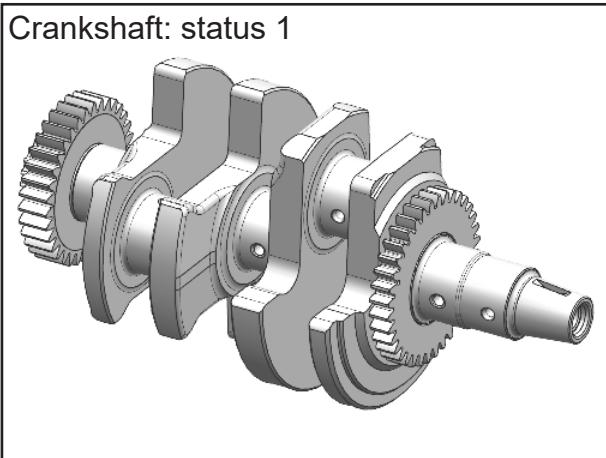
Balance shaft plain bearing wall thickness  $\text{et}$

<b>Balance Shaft Plain Bearing (New Part)</b>	
Color Mark	Wall Thickness $\text{et}$
Red	1.484 mm ~ 1.488 mm
Black	1.489 mm ~ 1.492 mm
Blue	1.493 mm ~ 1.496 mm



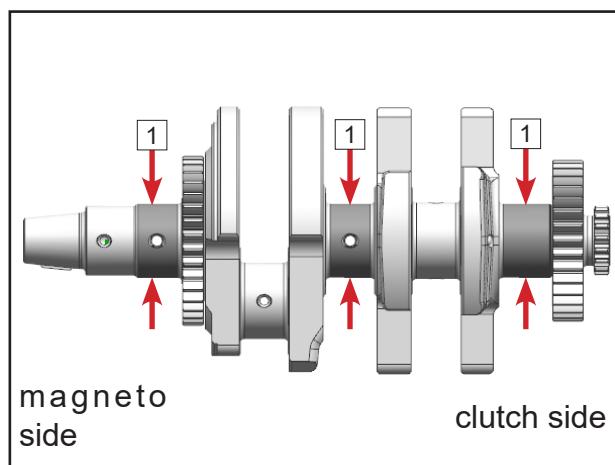
## Crankshaft main journal

The state of the crankshaft is shown on the right.



Crankshaft journal diameter 1

Crankshaft Main Journal (New Part)	
Mark	Diameter 1
B	33.985 mm ~ 33.992 mm
A	33.993 mm ~ 34.000 mm

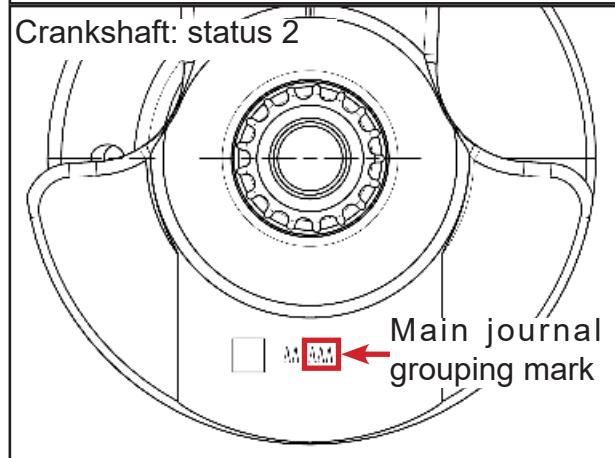
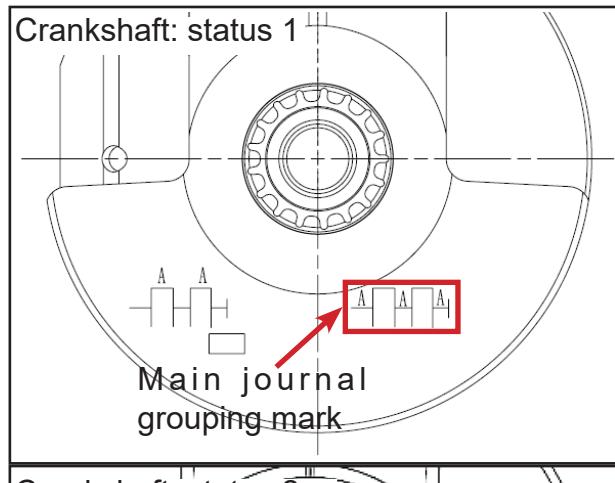


Group marking positions are shown in the example on the right, from left to right are the magnetic motor side, the middle, and the clutch side of the main neck group marking.

Measure crankshaft journal diameter, if less than repair limit, replace with a new piece.

### Crankshaft Journal Diameter

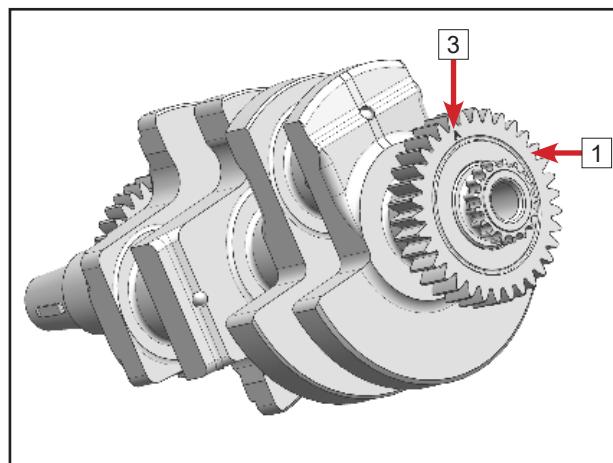
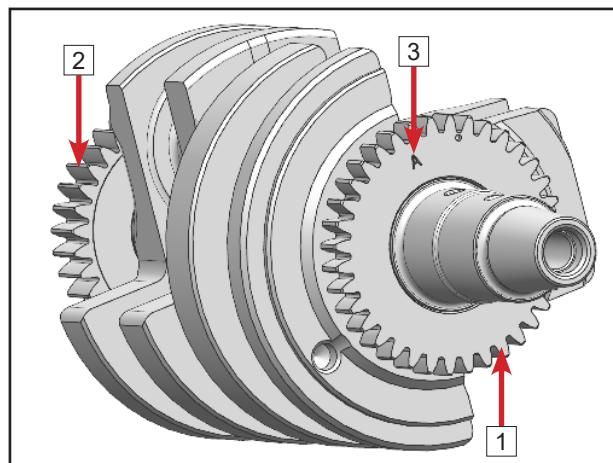
Service Limit	33.965 mm
---------------	-----------



## Crankshaft grouping

Inspect the tooth surface of balance shaft drive gear **1** and output gear **2** for severe wear or other damage. Replace it if it does.

The crankshaft is divided into group A and group B according to its balance shaft drive gear **1** and output gear **2**. A grouping mark **3** is stamped into each gear.



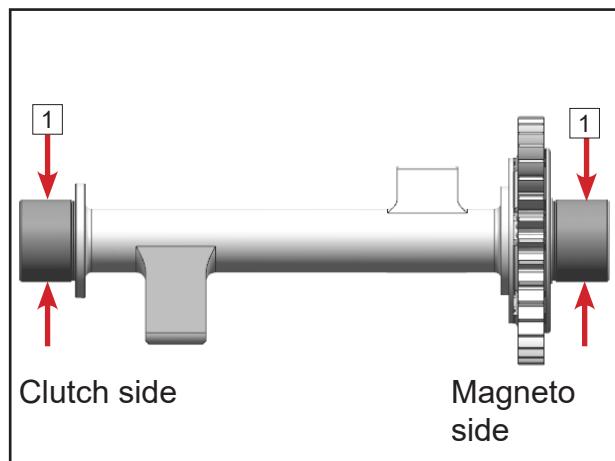
The crankshaft must be paired with the correct primary driven gear on the clutch and the correct driven gears on the balance shafts. These gears are also divided into group A and group B and stamped with a grouping mark. The table below shows the correct pairings.

Crankshaft Gears	Clutch Primary Driven Gear	Front Balance Shaft Driven Gear	Rear Balance Shaft Driven Gear
A	B	B	B
B	A	A	A

## Front balance shaft journal

Front balance shaft journal diameter 1

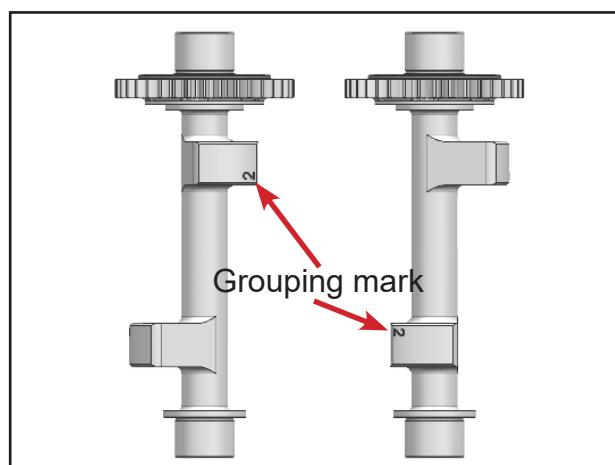
Front Balance Shaft Journal (New Part)	
Mark	Diameter 1
1	25.987 mm ~ 25.993 mm
2	25.994 mm ~ 26.000 mm



Location of grouping markers as shown in the example on the right, the grouping markers on both sides of the journal are engraved on close balance blocks.

Measure front balance shaft journal diameter 1, if it is less than the service limit, replace with new part.

Front Balance Shaft Journal Diameter	
Service Limit	25.967 mm



## Front balance shaft grouping

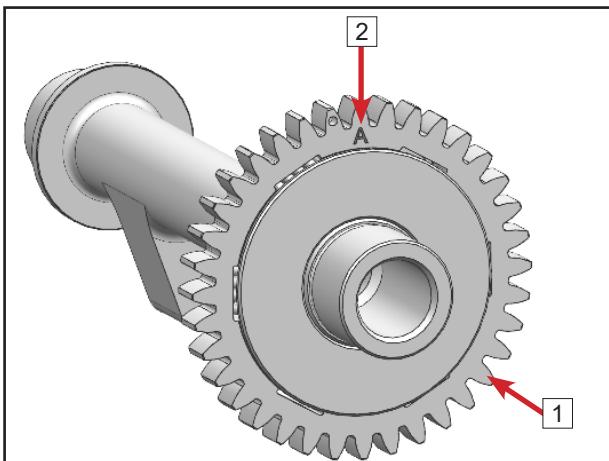
Inspect the tooth surface of balance shaft driven gear **1** for severe wear or other damage. Replace it if it does.

The front balance shaft is divided into group A and group B according to its driven gear **1**. A grouping mark **2** is stamped into the driven gear.

## Assemble crankshaft and front balance shaft in pairs

Assemble crankshaft and front balance shaft in pairs according to the following:

Crankshaft Grouping Mark	Front Balance Shaft Grouping Mark
A	B
B	A



## Matching

### NOTE

Ensure that the assembly of crankshaft and front balance shaft meet the above requirements before matching plain bearing.

Crankcase and main plain bearing matching as below:

Crankshaft Main Bearing Seat Hole Mark	Crankshaft Main Journal Mark	Main Plain Bearing Color
A	A	Red
A	B	Black
B	A	Black
B	B	Blue

Assemble crankcase and balance shaft plain bearing in pairs according to the following:

Front Balancing Shaft Bearing Seat Hole Mark	Front Balance Shaft Journal Mark	Balance Shaft Plain Bearing Color
A	1	Black
A	2	Red
B	1	Blue
B	2	Black

## 13.6.1.2 Crankcase

### Crankcase cleaning

#### **WARNING**

**Use protection for eyes to prevent harming.**

Use cleaning tools to clean the crankcase. Blow dry the crankcase with compressed air.

Clean the oil duct with compressed air.

### Crankcase inspection

Check whether the upper crankcase, lower crankcase, left cover, right cover, oil pan are cracked or otherwise damaged. If yes, replace it.

Check whether there are scratches, wear and tear, or other damage to main plain bearing and balance shaft plain bearing. If yes, replace it.

### Bearing/oil seal

#### Inspection

Check 6204 bearing 1 whether the rotation is flexible, if there is damage, replace it.

Check if 14×24×6 oil seal 2 and HK1412 needle bearing 3 has any damages, replace if it does.

#### Removal

##### **NOTE**

**If the bearing or oil seal is not damaged, the following disassembly steps are not necessary.**

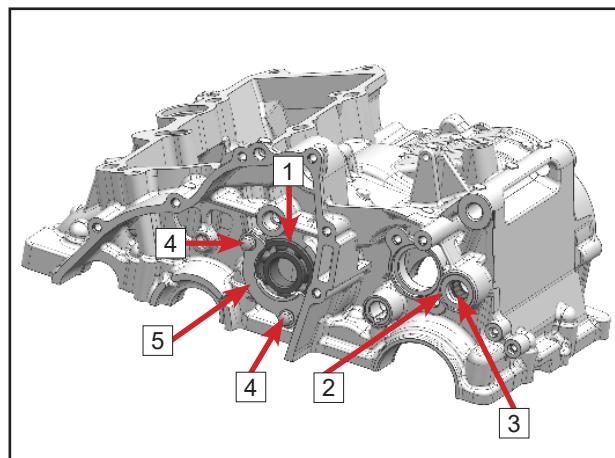
Remove M6×16 bolt 4.

Remove LH bearing baffle 5.

Pull out 6204 bearing 1 from crankcase with bearing puller.

Use screwdriver to pry up 14×24×6 oil seal 2 and discard.

Pull out HK1412 needle bearing 3 from crankcase with bearing puller.



## Assembly

Reverse the removal procedures for installation.

When assembling bearings, appropriate supporting tools should be put on the bearing holes of the box body, as shown in the right picture.

Use needle bearing punch (0SQ0-011101-923-002) to load HK1412 needle bearing ③ into the corresponding hole of crankcase, and install it in place.

Use the oil seal punch (0SQ0-011101-923-001) to put the 14×24×6 oil seal ② (marked face outward) into the corresponding hole of the crankcase, and smear appropriate amount of grease on the lip of the oil seal after installation in place.

Use the bearing head (0SQ0-011101-921-002) to load the 6204 rolling bearing ① (marked face outward) into the corresponding hole of the crankcase, and install it in place.

Fasten the LH bearing baffle plate ⑤ to the crankcase with M6x16 bolts ④ (the thread part is coated with 243 thread locking glue), and press the rolling bearing 6204 ①.

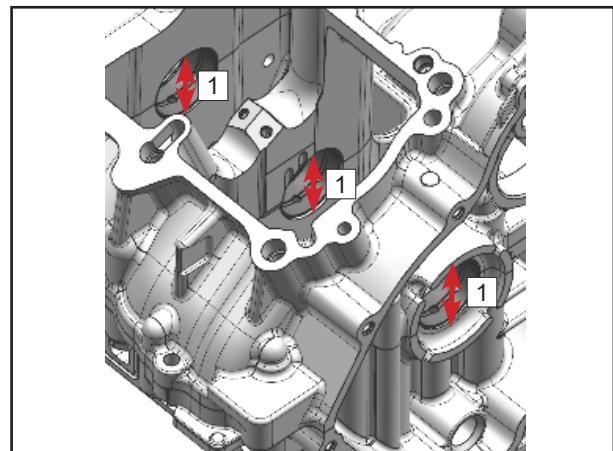
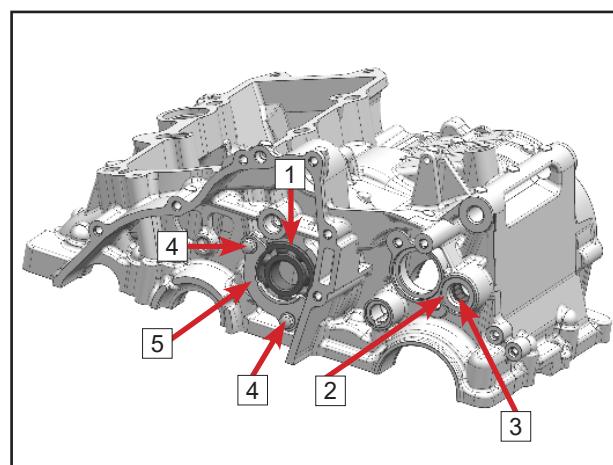
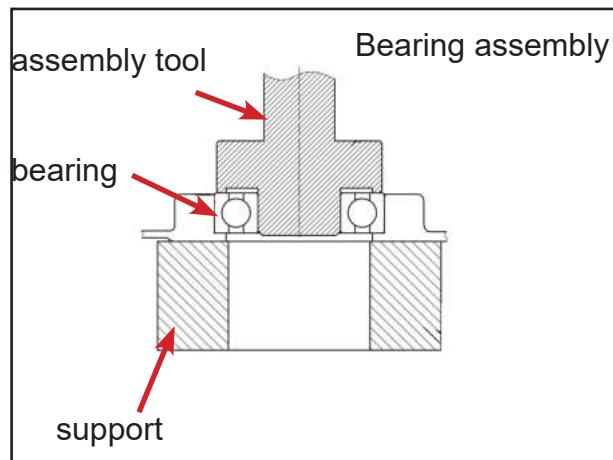
## Crankshaft main bearing hole, front balance shaft bearing hole diameter inspection

Close the upper and lower crankcases together. (Install the main plain bearing and balance shaft plain bearing, and tighten the box closing bolts according to the specified torque. Refer to the section of "Engine Assembly - Crankcase Closing")

Use lever micrometer to measure the inner diameter ① of crankshaft main bearing at 3 places on the vertical direction of crankcase sub-box surface, and compare the diameter of crankshaft main journal at the corresponding position.

Inner diameter ① of crankshaft main bearing	
service limit	34.055 mm
<b>Radial clearance of crankshaft spindle journal</b>	
standard	0.028 mm ~ 0.060 mm
service limit	0.070 mm

If the service limit is exceeded, replace the main plain bearing, or even replace the crankcase.



Use a lever dial meter to measure the inner diameter [2] of the bearing of the two front balancing shafts in the vertical direction of the sub-surface of the crankcase, and compare the diameters of the journal of the front balancing shafts at the corresponding positions.

**Inner Diameter of Front Balancing Shaft Bearing [2]**

Service Limit	26.050 mm
<b>Radial Clearance of Front Balance Shaft Journal</b>	
Standard	0.040 mm ~ 0.060 mm
Service Limit	0.070 mm

If the service limit is exceeded, replace the balance shaft bearing or even the crankcase.

**NOTE**

**The upper crankcase and the lower crankcase must be replaced in sets.**

**13.6.1.3 RH Side Cover**

**Inspection**

Check whether the RH side cover [3] is broken or damaged, if so, replace it with a new one.

Check whether the oil level observation mirror [2] is damaged or leaking oil, if so, replace it with a new one.

Check whether the 12×20×5 oil seal [5] is damaged, if so, replace it with a new one.

**New RH side cover installation**

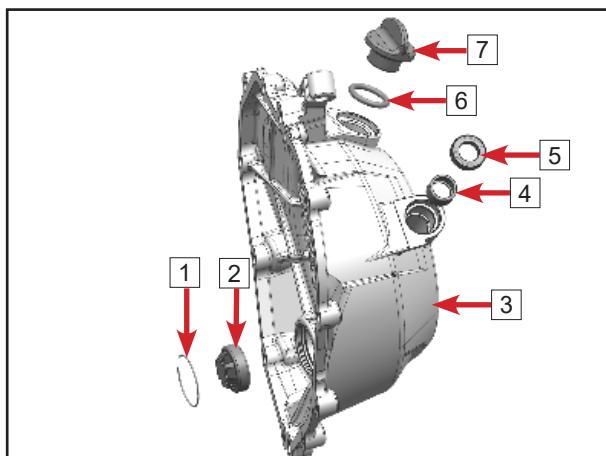
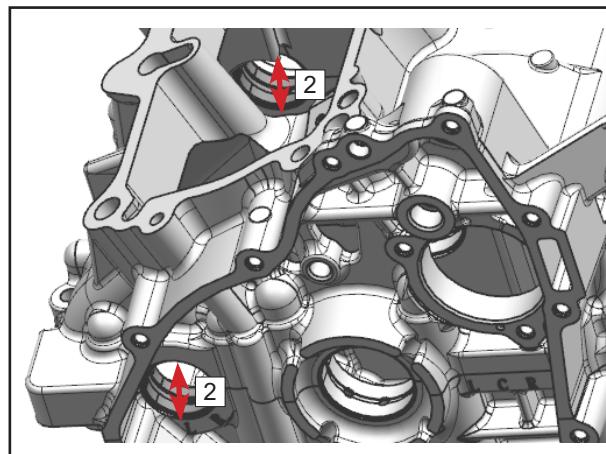
Use special tool (0SQ0-013100-923-001) to put oil level observation mirror [2] into RH side cover [3] into corresponding hole.

Put circlip [1] into RH side cover [3] into circlip groove completely.

On HK1210 needle bearing [4] surface, put some oil, use special tool (0SQ0-013000-923-003) to put needle bearing [4] (marked side should face outward) into RH side cover [3] into corresponding hole.

Use special tool (0SQ0-013000-923-002) to put 12×20×5 oil seal [5] into RH side cover [3] corresponding hole. Then smear proper amount of grease on the lip of the oil seal. Put 18×3.55 O-ring [6] onto filler plug [7].

Put filler plug [7] on RH side cover [3] and tighten.

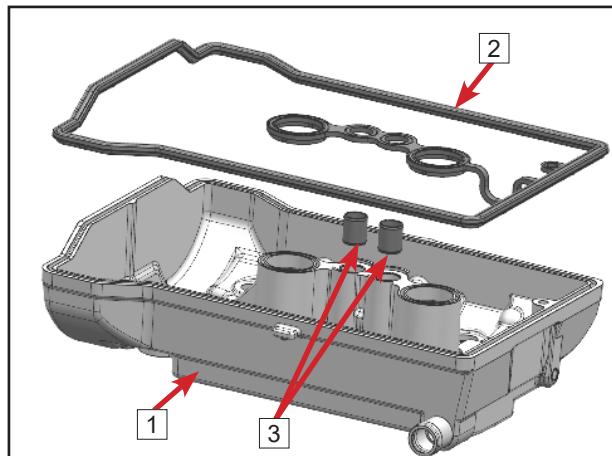


## 13.6.2 Cylinder Head Cover Assembly

### Disassembly

From cylinder head cover **1** remove cylinder head cover seal washer **2**.

From cylinder head cover **1** remove gulf pin **3**.

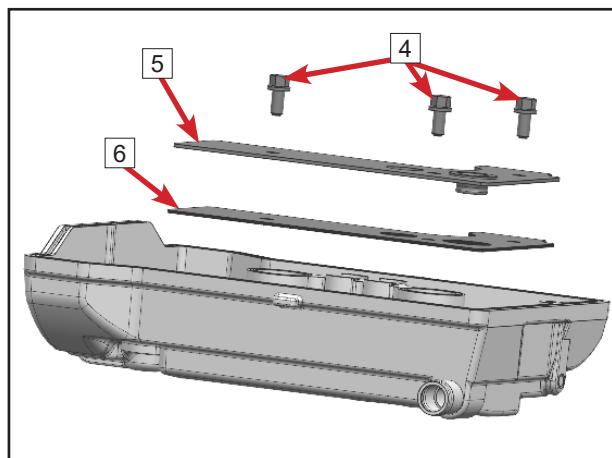


**NOTE:** If maze cover plate **5** has no damage, following steps may not be carried out.

Remove M6×12 bolt **4**.

Remove maze cover plate **5**.

Remove and discard maze cover plate washer **6**.

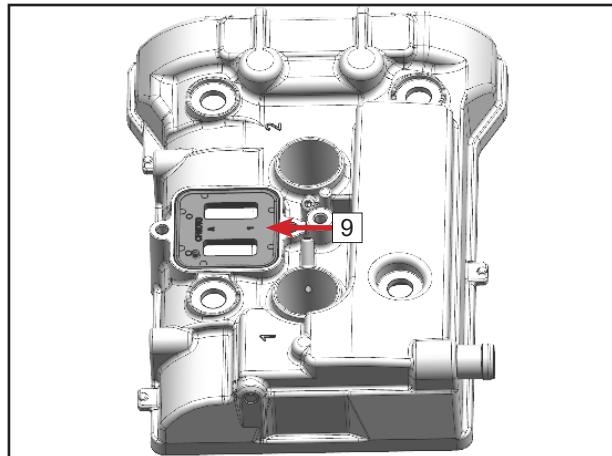
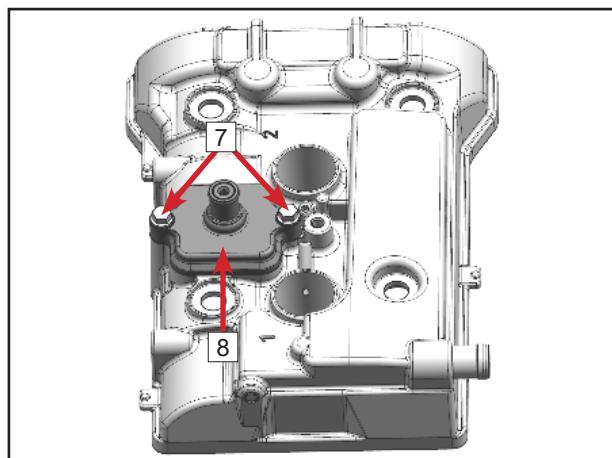


Within the range of "{' }" are the steps of the operation for EU5:

{ Remove the M6 x 20 bolts **7**.

Remove one-way valve cap assembly **8**.

Remove the spring valve assembly **9**. }

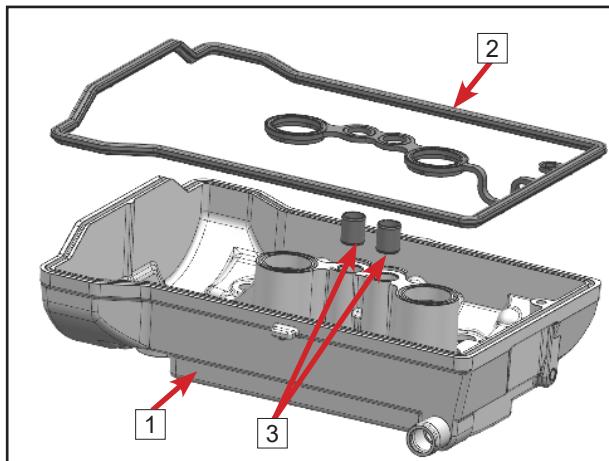


**Inspection**

Check cylinder head cover seal gasket **2** for breakage, hardening, or other damage, replace if necessary.

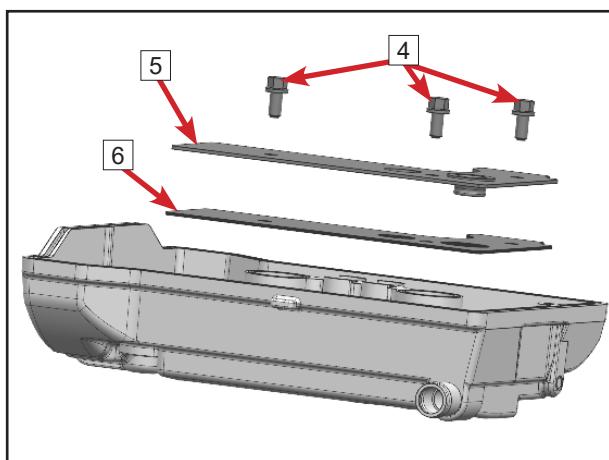
Check cylinder head cover **1** for breakage, hardening, or other damage, replace if necessary.

Check maze cover plate assembly **5** for breakage or other damage, replace if necessary.



Check one-way valve cap assembly **8** for breakage or other damage, replace if necessary.

Check spring valve assembly **9** for damage, replace if necessary.

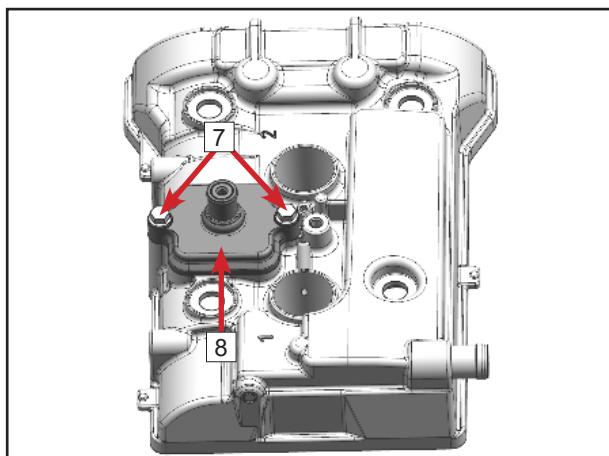
**Assembly**

Assemble in reverse order of disassembly.

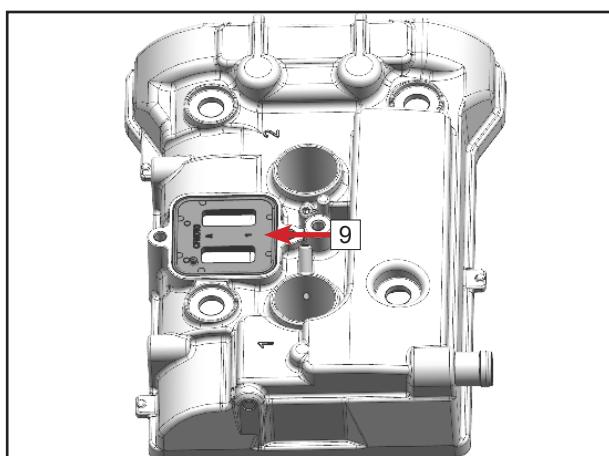
**NOTE**

**The maze cover plate gasket shall not be used again and must be replaced with a new one. Note the mounting direction of the spring valve assembly.**

<b>Maze Cover Plate Bolt <b>4</b> Torque</b>
10N·m



<b>One-way Valve Cap Bolt <b>7</b> Torque</b>
10N·m



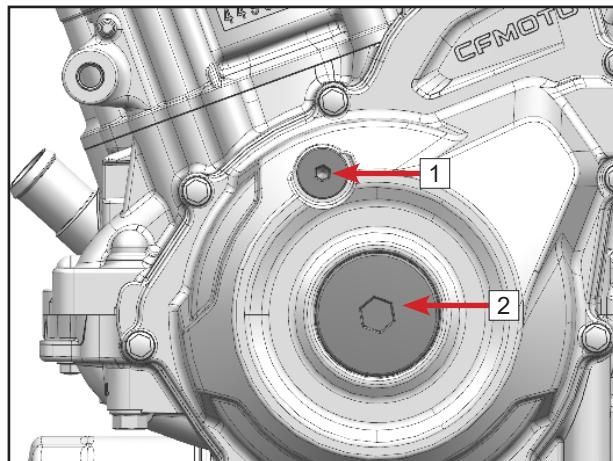
## 13.6.3 Cylinder Head Assembly Valve Clearance Inspection

### NOTE

**NOTE: Inspect and adjust valve clearances on a cold engine.**

Remove the timing observation hole cover **1**.

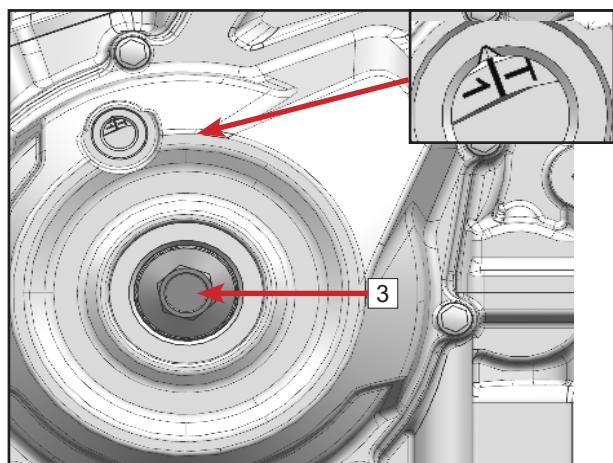
Remove strainer cover **2**.



### Cylinder 1 valve clearance

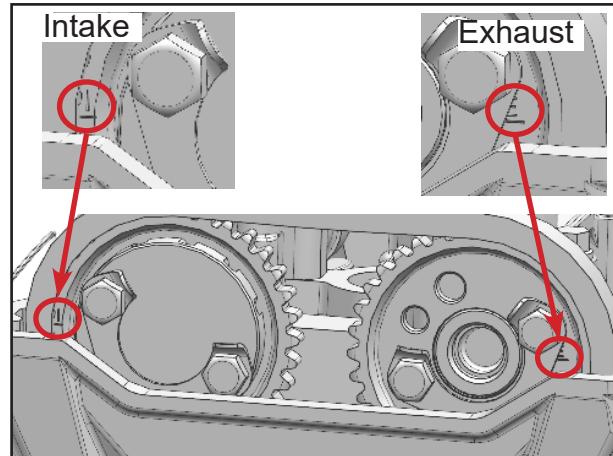
Turn the crankshaft **3** counterclockwise, make cylinder 1 piston at ignition top dead center.

At this point, the "I" marked "T1 I" on the magneto rotor is aligned with the notch center of the timing observation hole on the left cover.



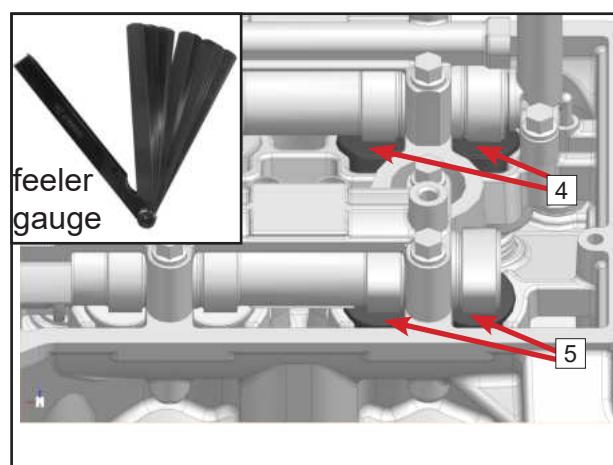
At the same time, the line on the intake timing sprocket is parallel to the plane on the cylinder head, and the line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown on the right.

Use feeler gauge to measure intake valve **4** and exhaust valve **5** clearance of cylinder 1 (magneto side) respectively.



Record the measurement data, compare with the "cold engine valve clearance" table, if not meet the standard, then replace the valve tappet of different thickness. After replacing the valve tappet, measure the clearance again until it meets the standard.

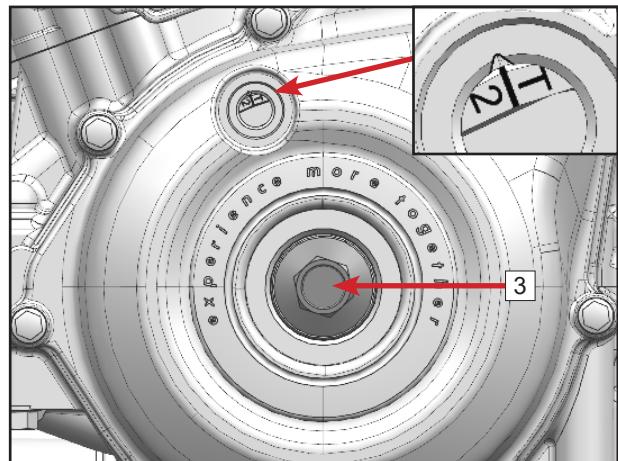
Cold Engine Valve Clearance	
Valve	Clearance
Intake	0.10 mm ~ 0.15 mm
Exhaust	0.25 mm ~ 0.31 mm



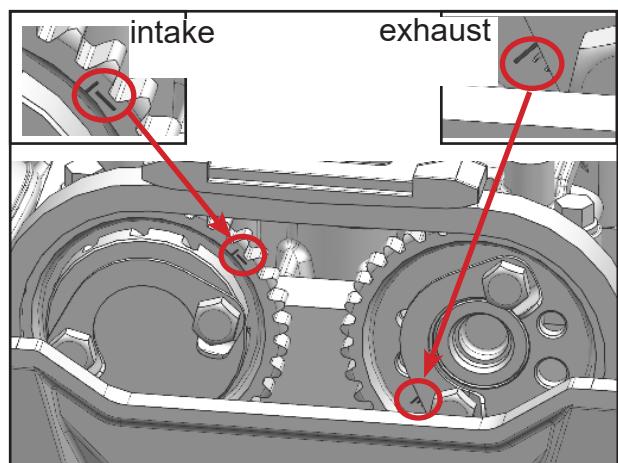
**Cylinder 2 valve clearance**

Turn the crankshaft 3 counterclockwise  $270^\circ$ , make cylinder 2 piston at ignition top dead center.

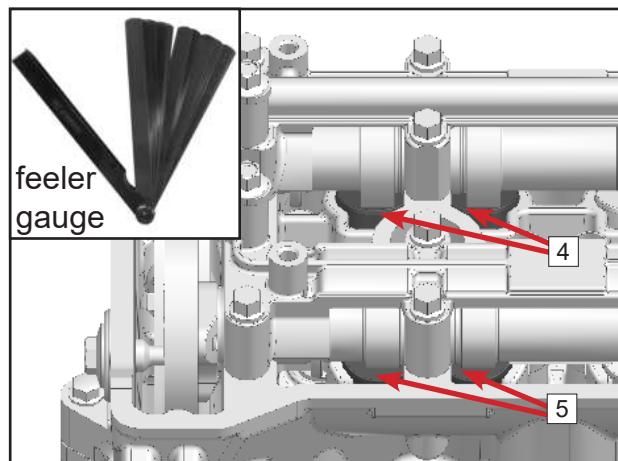
At this point, the "I" marked "T2 I" on the magneto rotor is aligned with the notch center of the timing observation hole on the left cover.



At the same time, the line on the intake timing sprocket is at a  $45^\circ$  angle with the plane on the cylinder head, and the line on the exhaust timing sprocket is at a  $45^\circ$  angle with the plane on the cylinder head, as shown on the right.



Use feeler gauge to measure inlet valve 4 and exhaust valve 5 clearance of cylinder 2 (clutch side) respectively.



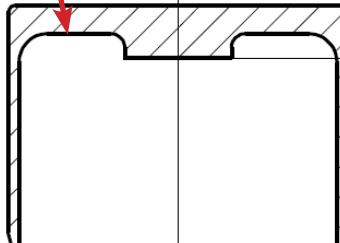
Record the measurement data, compare with the "cold engine valve clearance" table, if not meet the standard, then replace the valve tappet of different thickness. After replacing the valve tappet, measure the clearance again until it meets the standard.

Cold Engine Valve Clearance	
Valve	Clearance
Intake	0.10 mm ~ 0.15 mm
Exhaust	0.25 mm ~ 0.31 mm

Valve tappets are grouped according to thickness T as follows:

Valve Tappet T Grouping Table			
Mark	T (mm)	Mark	T (mm)
320	3.20	370	3.70
322	3.22	372	3.72
324	3.24	374	3.74
326	3.26	376	3.76
328	3.28	378	3.78
330	3.30	380	3.80
332	3.32	382	3.82
334	3.34	384	3.84
336	3.36	386	3.86
338	3.38	388	3.88
340	3.40	390	3.90
342	3.42	392	3.92
344	3.44	394	3.94
346	3.46	396	3.96
348	3.48	398	3.98
350	3.50	400	4.00
352	3.52	402	4.02
354	3.54	404	4.04
356	3.56	406	4.06
358	3.58	408	4.08
360	3.60	410	4.10
362	3.62	412	4.12
364	3.64	414	4.14
366	3.66	416	4.16
368	3.68	418	4.18

Group marking position



## Cylinder head disassembly

Remove valve tappet [1].

### NOTE

Record the position of the tappets so that they can be quickly reassembled to the original position.

Install valve spring compression clamp (0180-022006-922-001).

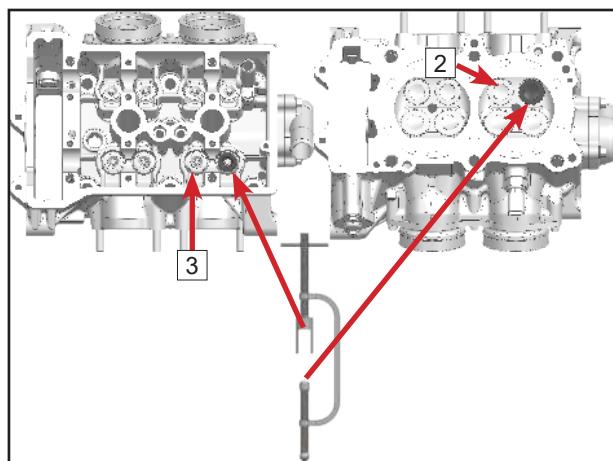
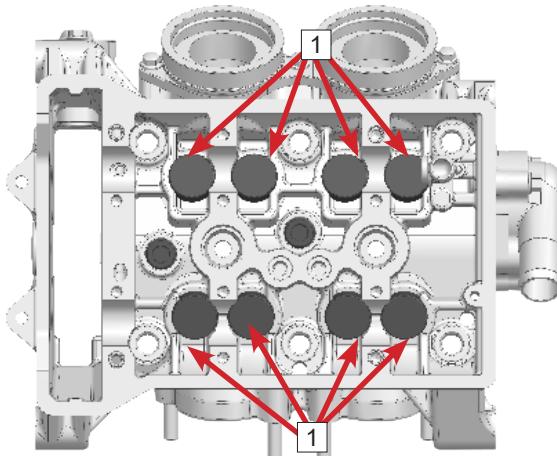
Install the valve spring compression clamp and place the lower part of the valve spring compression clamp against the valve disc [2].

The upper part is pressured on the valve spring seat [3].

Slowly rotate the rotating rod at the top of the valve spring compression fixture to compress the valve spring until the valve lock clamp is fully exposed.

### WARNING

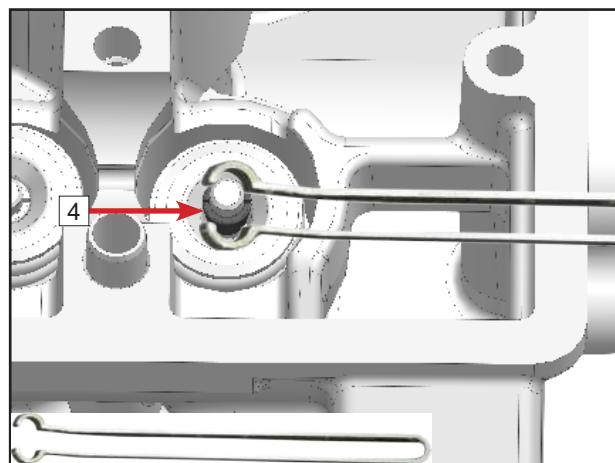
Wear goggles when compressing the valve spring. Improper operation may cause the valve spring to fly out and injure people under strong pre-pressure.



Use the valve lock tweezers to remove the valve lock clamp 4.

**NOTE**

Add grease to the valve lock tweezers to prevent them from falling off.

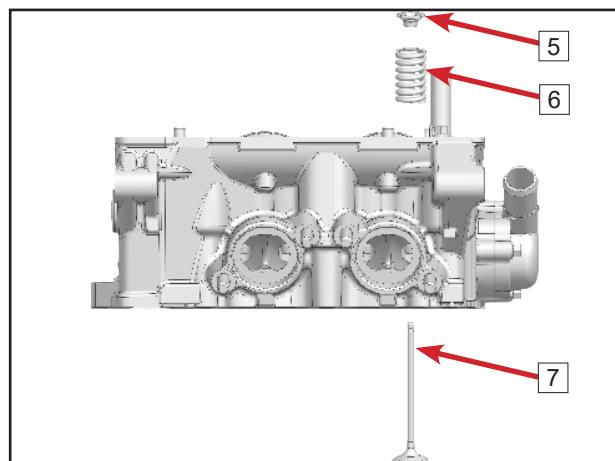


Slowly rotate the rotating rod at the top of the valve spring compression fixture, so that the valve spring back to the relaxation state.

Remove valve spring upper seat 5.

Remove valve spring 6.

Remove valve 7.



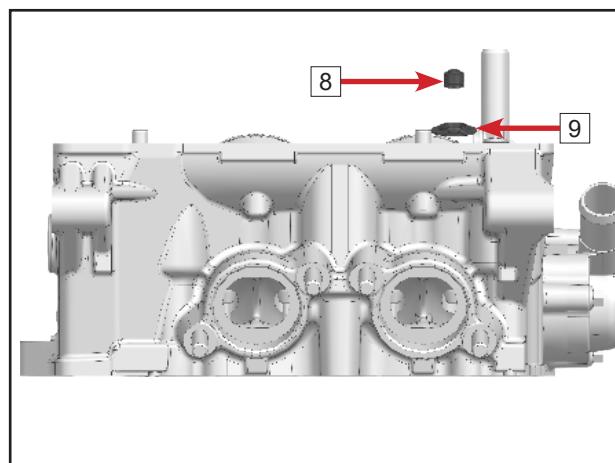
Gently clamp the valve stem seal ring 8 with pliers and remove.

Remove valve spring lower seat 9.

To remove other 7 is the same way.

**NOTE**

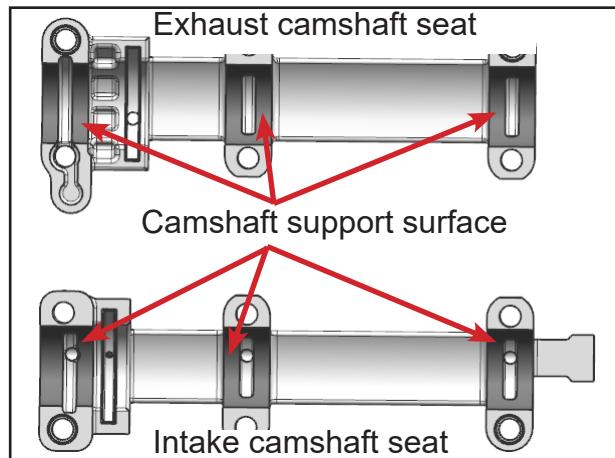
**Each time the valve is removed, a new valve stem seal ring needs to be replaced. Removed valves and related parts should be placed one by one so that they can be quickly installed to the original position during reassembly.**



### Cylinder head inspection

Check whether there are cracks between the cylinder head valve seat, if so, replace. Check whether the camshaft bearing holes on the cylinder head are bruised, severely worn or otherwise damaged. If so, replace.

Check whether the surface of the camshaft supported by the camshaft seat is bruised, severely worn or otherwise damaged. If so, replace it.

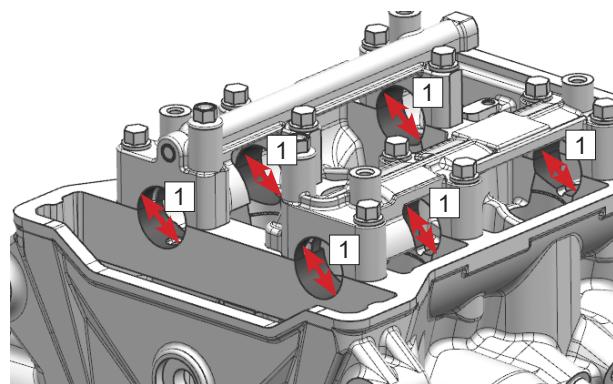


Clean the cylinder head and camshaft seat.

Assemble the cylinder head and camshaft seat together with camshaft seat bolts (diagonal cross tightening, divided into 3 times:  $5\text{N}\cdot\text{m} \rightarrow 8\text{N}\cdot\text{m} \rightarrow 12\text{N}\cdot\text{m}$ ).

Use lever micrometer to measure inlet and exhaust camshaft bearing hole diameter 1 separately. Replace cylinder head and camshaft seat if the hole diameter exceeds service limit.

Camshaft Bearing Hole Diameter (Intake and Exhaust)	
New Part	24.000 mm ~ 24.021 mm
Service Limit	24.050 mm



#### NOTE

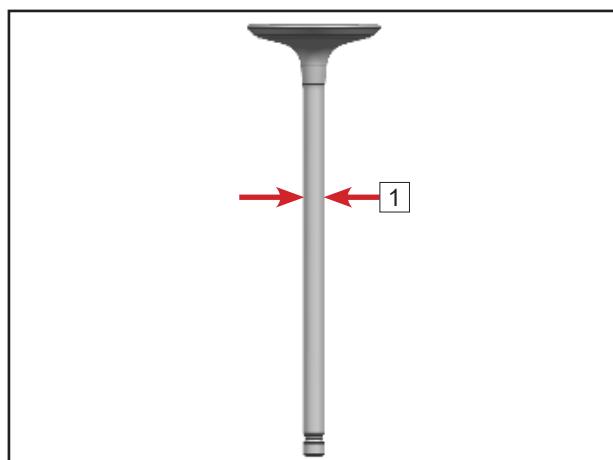
**Cylinder head, intake camshaft seat and exhaust camshaft seat need to be replaced in a complete set.**

## Valve

Check valve stem for abnormal wear and bending, if any, replace.

Measure valve stem diameter 1 with micrometer, replace if exceed service limit.

Valve Stem Diameter	
Intake Valve	
New Part	4.475 mm ~ 4.490 mm
Service Limit	4.465 mm
Exhaust Valve	
New Part	4.455 mm ~ 4.470 mm
Service Limit	4.445 mm



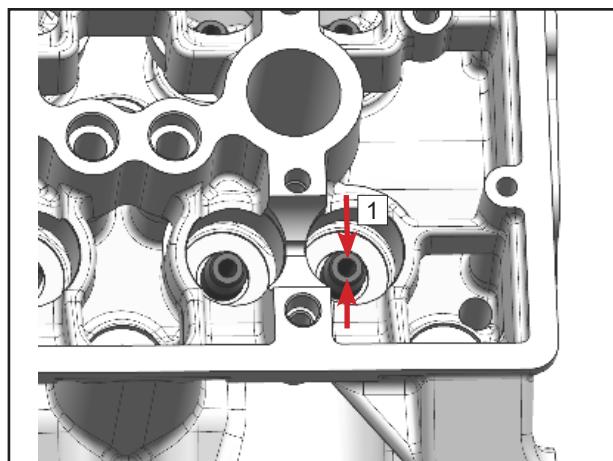
## Valve guide

Check valve guide for severe wear or other damage, if so, replace the cylinder head.

Measure valve guide diameter 1 with a small bore gauge and replace the cylinder head if service limit is exceeded.

#### NOTE

**Clean valve guide before measurement to remove carbon deposition.**



Valve Guide Aperture (Intake and Exhaust)	
New Part	4.500 mm ~ 4.512 mm
Service Limit	4.540 mm

### Valve stem and valve guide clearance

Check valve stem and valve guide clearance. Replace valve or cylinder head if it exceeds service limit.

Valve Stem and Valve Guide Clearance	
Intake Valve	
New Part	0.01 mm ~ 0.037 mm
Service Limit	0.075 mm
Exhaust Valve	
New Part	0.03 mm ~ 0.057 mm
Service Limit	0.095 mm

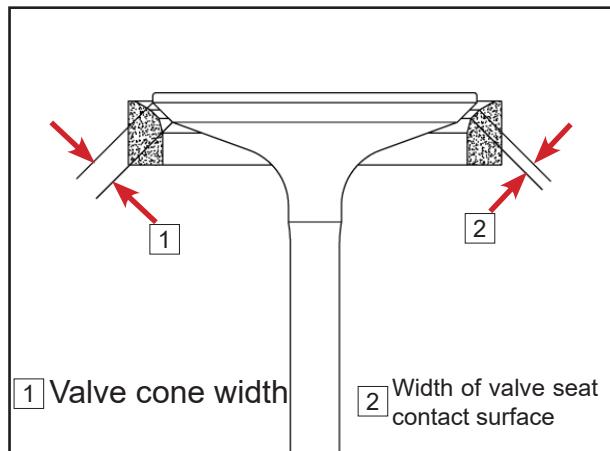
### Valve cone and valve seat

Check whether the valve cone or valve seat is corroded or dented. If so, replace the valve or cylinder head.

Measure valve seat contact width 2 with caliper.

Width of Valve Seat Contact Surface (Intake and Exhaust)	
New Part	0.9 mm ~ 1.1mm
Service Limit	1.4 mm

Replace the cylinder head if the measured value exceeds the service limit.

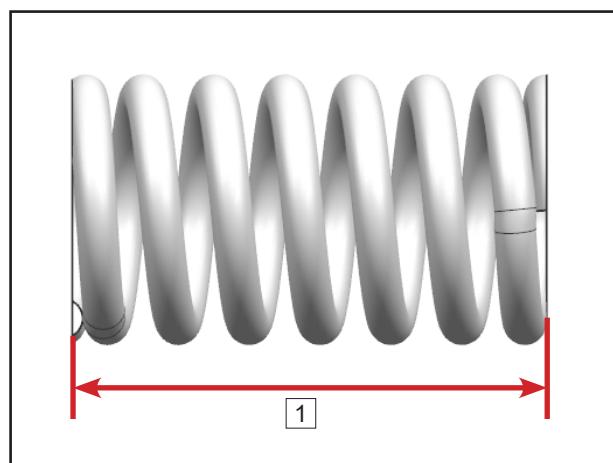


## Valve spring

The valve spring ensures the sealing of the valve and valve seat, and the reduction of spring elasticity will lead to the reduction of engine power output, and make the valve produce large mechanical noise.

Measure the free length of spring **1**.

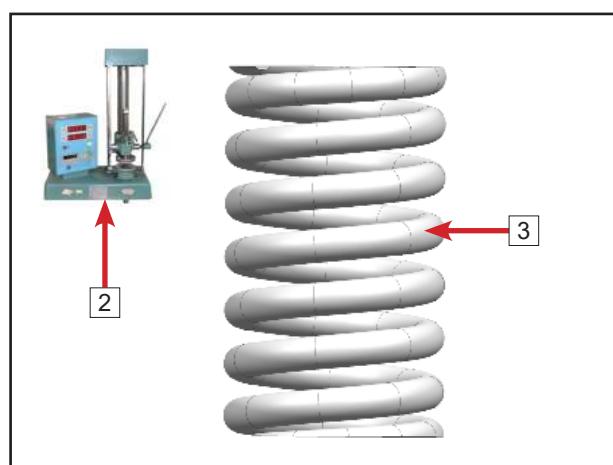
Valve Spring Free Length	
New Part	36.8 mm
Service Limit	35 mm



Use spring elasticity tester **2** to measure the spring **3** force when the valve spring is compressed to the specified length.

Compare "valve spring force value standard", if the force value is not within the specified range, replace the valve spring.

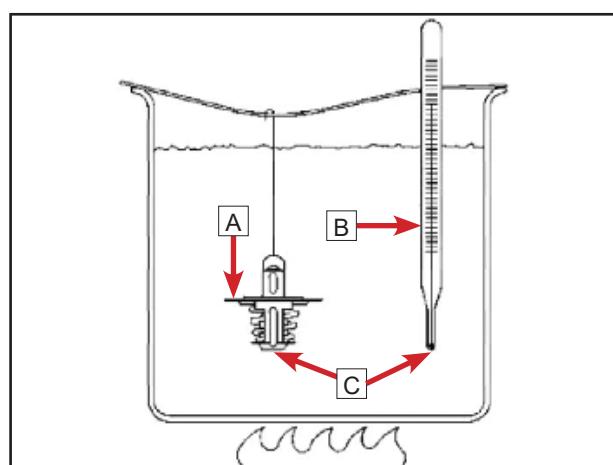
Valve Spring Force Standard	
When the valve spring compressed to the length of 33mm, the spring force value is 106N ~ 124N. When the valve spring is compressed to 25mm in length, the spring force value is 423N ~ 467N.	



## Thermostat

Check thermostat valve at room temperature. If valve is open, replace thermostat.

To check the valve opening temperature, suspend the thermostat **A** in a water container. The thermostat must be completely submerged in water and must not touch the side or bottom of the container. Also suspend a standard thermometer **B** in the water, again out of contact with the container. Lock the thermosensitive position **C** of the thermostat and thermometer at the same depth and heat the bottom of the container.



Thermostat Opening Temperature and Full Opening Lift	
First Open Temperature	80°C ~ 84°C
Full Open Temperature	95°C
Fully Open Lift	≥8 mm

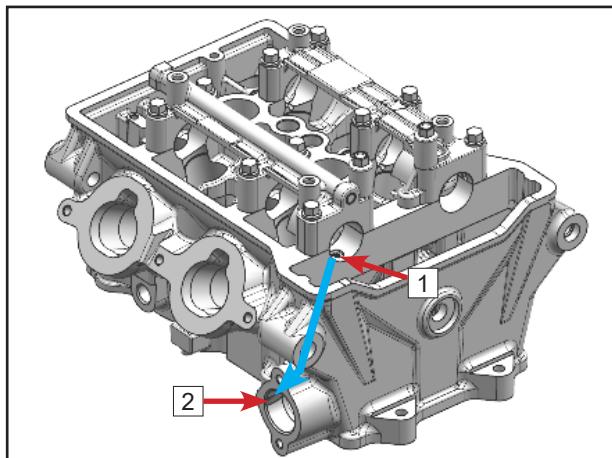
If the measurement results are outside the specified range, replace the thermostat.

**New cylinder head assembly**

Cylinder head and camshaft seat shall be used together, check whether the two codes are corresponding to the same, replace any one of them should be replaced in a complete set.

Check each plane of cylinder head for obvious aluminum chips, knock, scratch, sand holes, etc. If found, it should be cleaned or replaced with a new piece.

Use an air gun to blow air into the blow hole 1 to detect whether the oil passage is smooth. Feel whether the air is out from the air outlet 2, if not, replace the cylinder head.

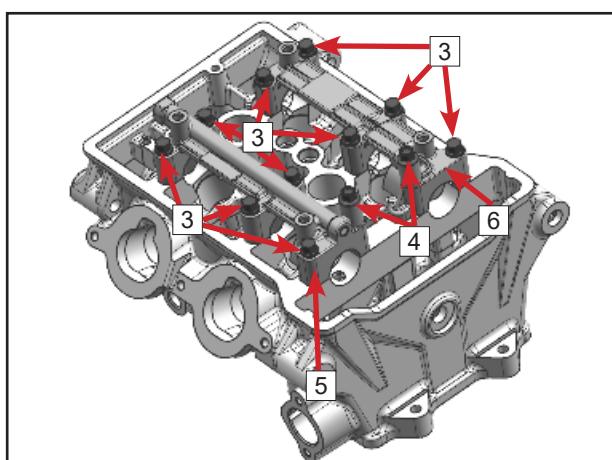


Remove diagonal cross M6×45 bolt 3 and M6×65 bolt 4.

Remove intake camshaft seat assembly 5. Remove exhaust camshaft seat 6.

**NOTE**

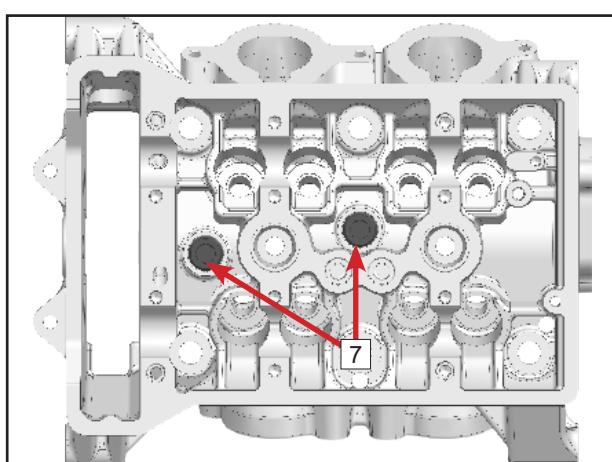
**Do not drop the dowel pins. The removed camshaft seat and bolts should be placed in a set.**



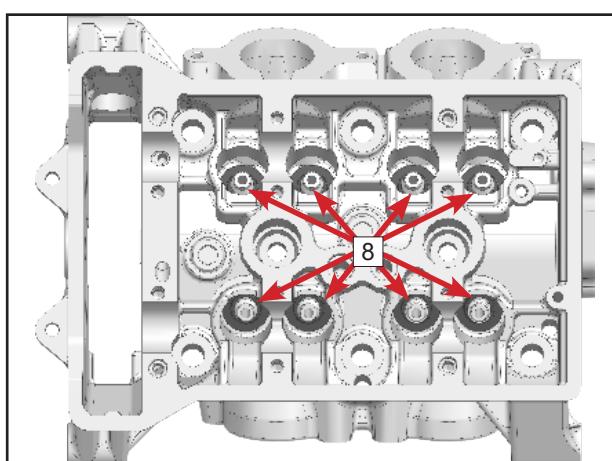
Apply an appropriate amount of 567 thread locker to the thread part of the main oil passage cone plug 7.

Install the main oil passage cone plug 7.

Main Oil Passage Cone Plug Torque
20N·m

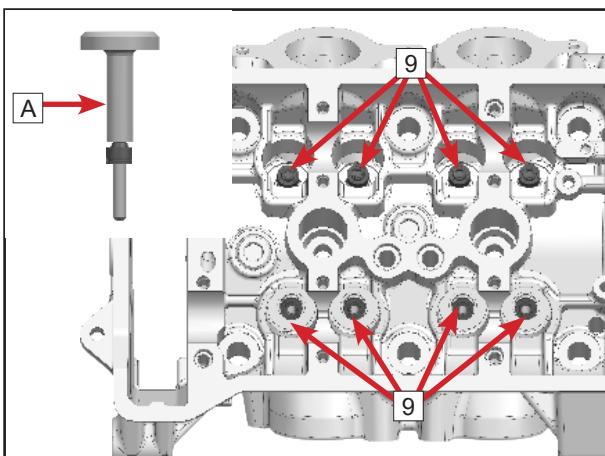


Install valve spring lower seat 8 (large end faces down).



Apply proper amount of oil on the valve guide (assembly valve rod sealing ring). Put the valve stem seal ring 9 on the valve stem seal ring hand punch A (0700-022400-923-002).

Put the valve stem seal ring 9 on the valve guide.



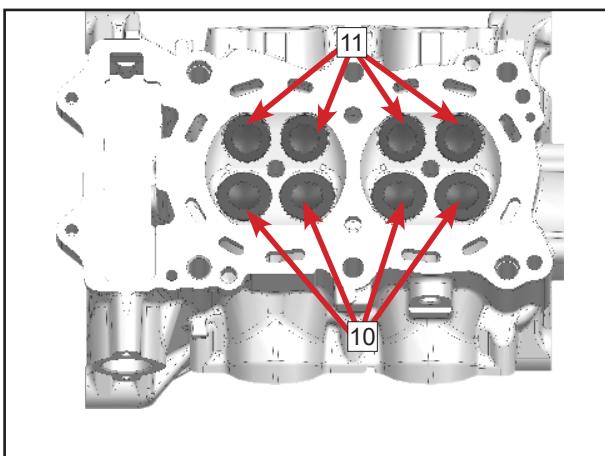
Flip the cylinder head.

Apply proper amount of oil on the end of inlet and exhaust valve stem.

Insert the inlet valve 10 into the inlet side valve guide, do not fall into the valve seat. Insert the exhaust valve 11 into the exhaust side valve guide, do not fall into the valve seat.

Use air gun to blow clean the joint surface of valve and cylinder head.

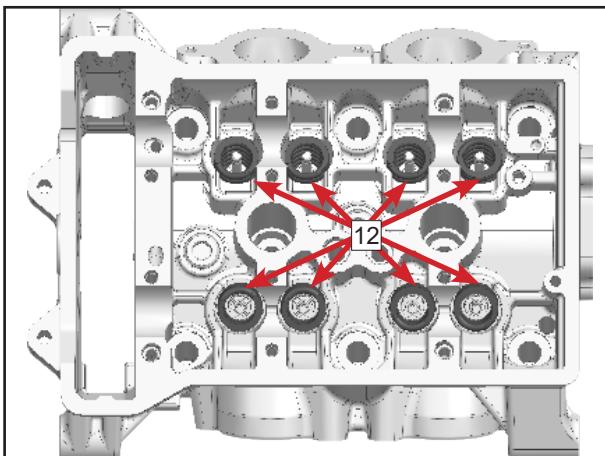
Push the valve so that it falls into the valve seat and inverts the cylinder head.



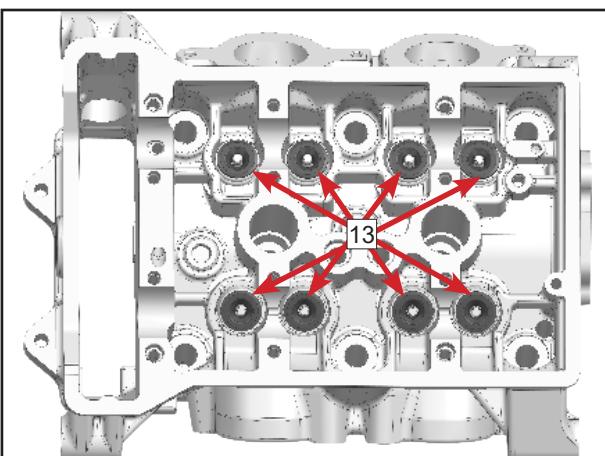
Install valve spring 12.

**NOTE**

**The painted end of the valve spring faces up.**



Install valve spring seat 13.



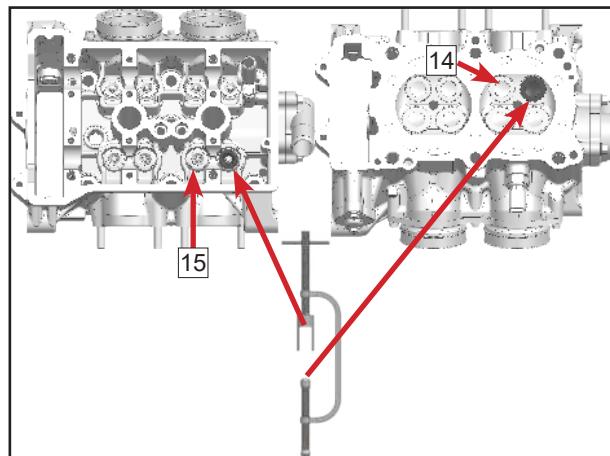
Install valve spring compression fixture (0180-022006-922-001).

Put the lower part of the valve spring compression fixture against the valve disc 14, and the upper part is pressed on the valve spring seat 15.

Slowly rotate the rotary rod at the top of the valve spring compression fixture to compress the valve spring until the locking groove on the valve is completely exposed.

**WARNING**

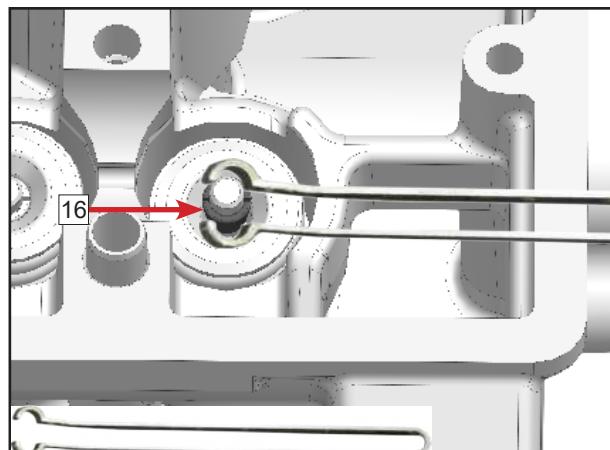
**Wear goggles when compressing the valve spring. Improper operation may cause the valve spring to fly out and injure people under strong pre-pressure.**



Install the valve lock clamp 16 to the valve lock clamp tweezers.

**NOTE**

**Add butter to the valve lock clamp tweezers to prevent them from falling off.**



Install the valve lock clamp 16 to the valve lock clamp groove.

Slowly rotate the rotating rod at the top of the valve spring compression fixture, so that the valve spring back to the relaxation state.

Install other valve lock clamps in the same manner.

Use rubber rod and rubber hammer to gently hit each valve spring seat to make valve related parts in place.

Check the sealing of the cylinder head.

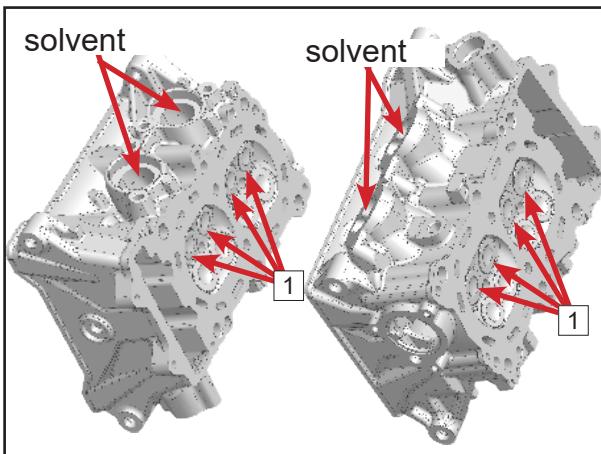
## Cylinder head sealing inspection

### Oil inspection

Clean the bottom of the cylinder head and the valve disc with dust-free paper.

Inject proper amount of cleaning solvent into the intake and exhaust channels.

After five minutes, check whether solvent is flowing from the valve seat ring 1.



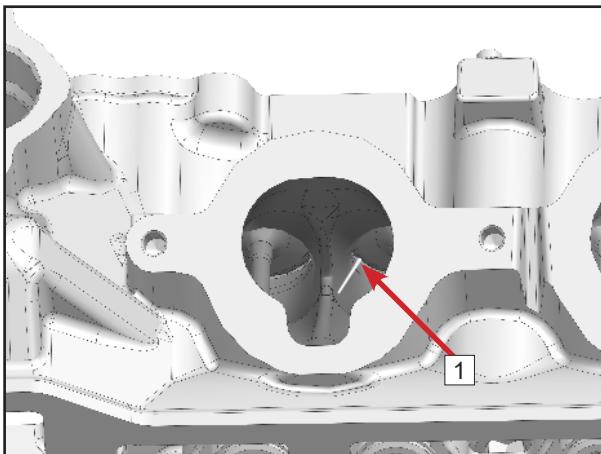
### Light inspection

When there is no suitable cleaning solvent, use light inspection.

Align the bottom of the cylinder head with the light source.

Observe the valve seat ring from the intake and exhaust duct for light leakage 1.

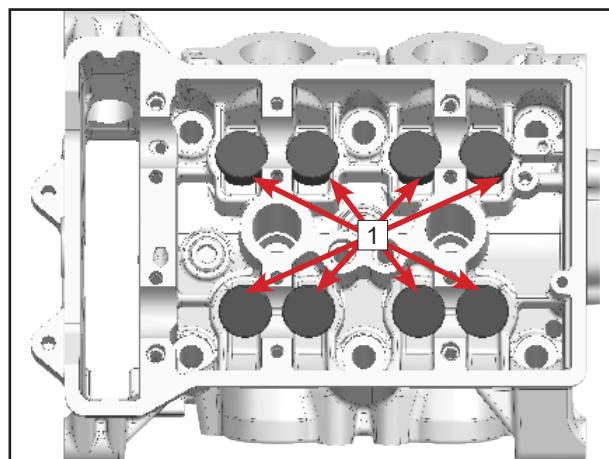
If the seal of the cylinder head does not pass the oil test or light test, remove the valve and check the surface of the corresponding valve and valve seat ring. If there is no problem, clean the valve and valve seat ring again after assembly. If the cylinder head still does not pass the oil test or light test, replace the new part.



**Valve tappet installation**

Apply a mixture of oil and MoS<sub>2</sub> grease (weight ratio 10:1) on the outer surface of the valve tappet.

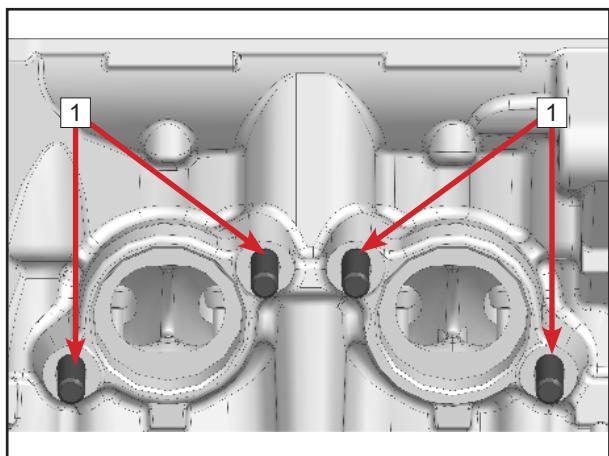
Install valve tappet 1.

**Stud installation**

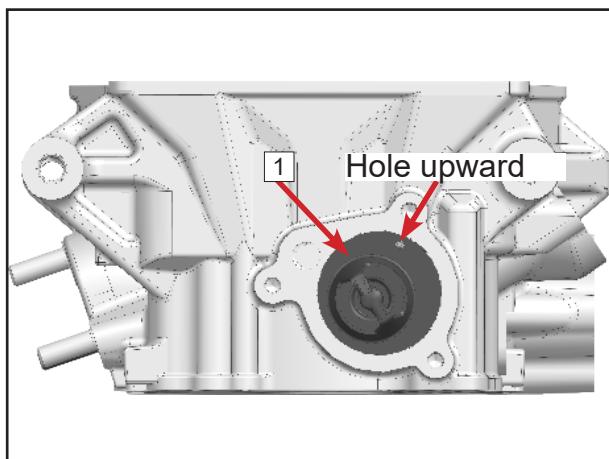
Install M8×42 double stud 1.

**Cylinder Head Double Stud Torque**

25N·m

**Thermostat installation**

Install thermostat 1 (hole upward).

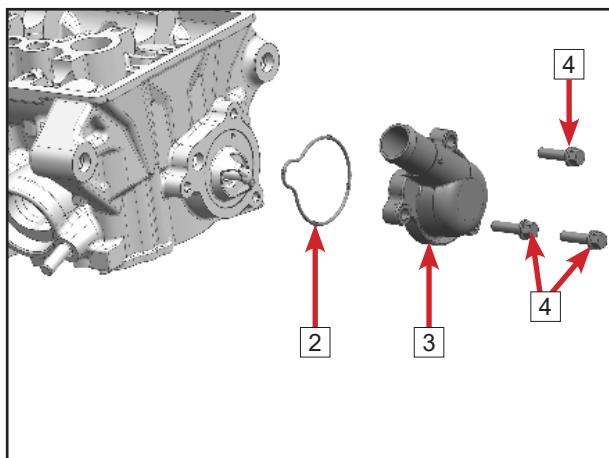


Put thermostat cover sealing ring 2 in thermostat cover 3.

Use M6×22 bolt 4 to install thermostat cover on cylinder head.

**Thermostat Cover Bolt Torque**

10N·m

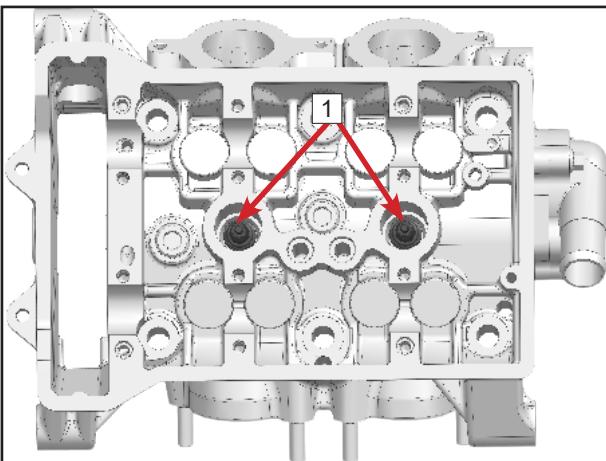


## Spark plug installation

Install spark plug 1.

<b>Spark Plug Torque</b>
--------------------------

15N·m
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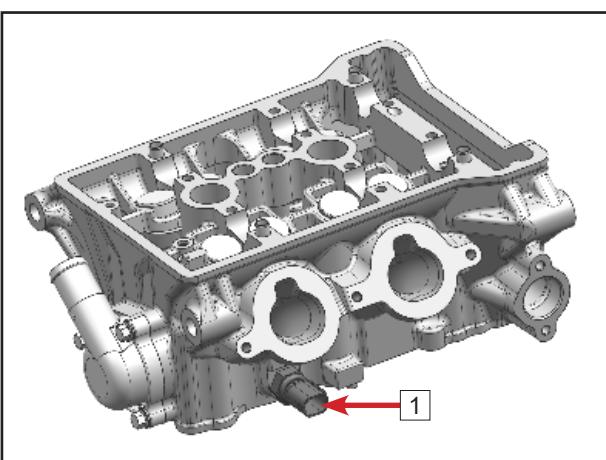


## Water temperature sensor installation

Install water temperature sensor 1.

<b>Water Temperature Sensor Torque</b>
--

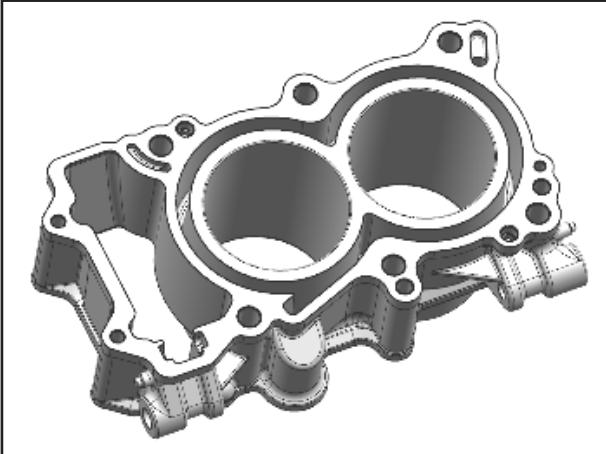
15N·m
-------



## 13.6.4 Cylinder Body

### Cylinder body inspection

Check cylinder for cracks, strains and worn steps at upper and lower ends. If yes, replace it.

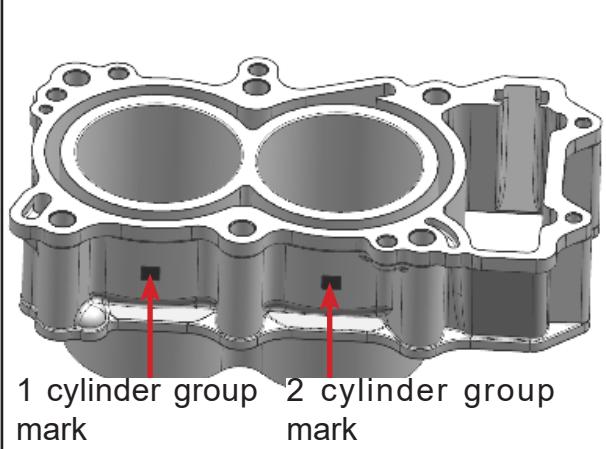


### Cylinder diameter

The cylinder diameter is grouped according to the following table, and the group marking position is shown in the picture on the right.

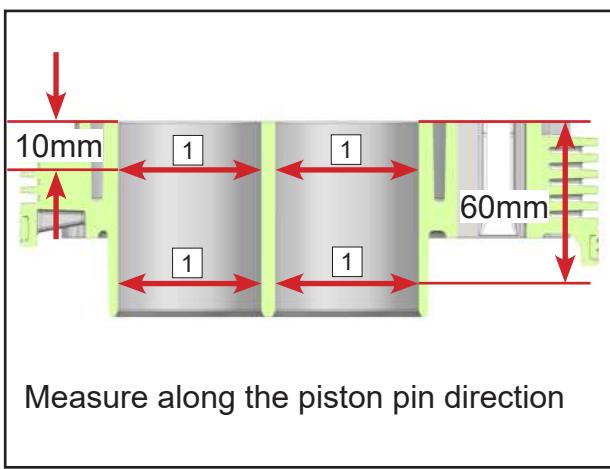
<b>Cylinder (New Part)</b>	
Mark	Cylinder Diameter

<b>Cylinder (New Part)</b>	
Mark	Cylinder Diameter
I	72.000 mm ~ 72.010 mm
II	72.011 mm ~ 72.019 mm

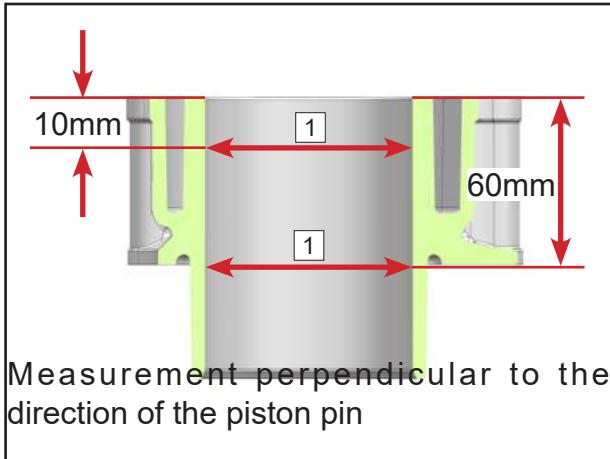


Due to different wear degrees of the cylinder block in different directions, in the position shown on the right, 10mm and 60mm away from the upper plane of the cylinder block, along the piston pin direction and perpendicular to the piston pin direction, respectively measure the diameter **1** of the two cylinders. If any cylinder block diameter **1** exceeds service limit, replace the cylinder block.

Cylinder Block Diameter <b>1</b>	
Service Limit	72.065 mm



NOTE	
When replacing the cylinder block, a new piston ring must be replaced.	



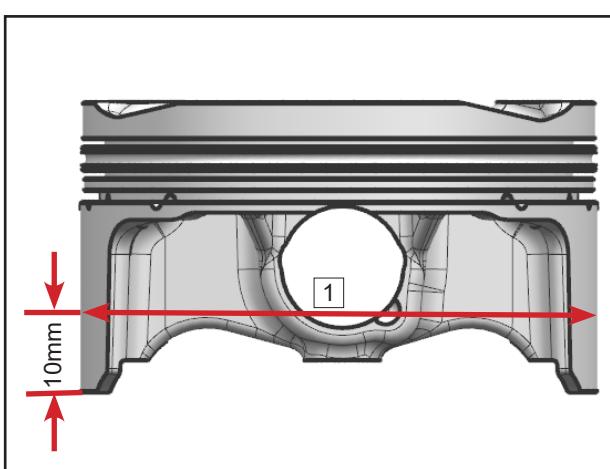
## 13.6.5 Piston/Piston Ring/Piston Pin

### Piston inspection

Inspect piston for scratches, cracks, or other damage. If yes, replace the piston and piston ring.

In the direction perpendicular to the piston pin hole and 10mm from the bottom of the piston, measure the piston skirt diameter **1**, if less than the service limit, replace the piston.

Diameter of Piston Skirt <b>1</b>	
New Part	71.960 mm ~ 71.975 mm
Service Limit	71.910 mm



### Piston/cylinder block clearance

Based on the above measurement results, calculate the fit clearance between piston and cylinder block. If the clearance is greater than the service limit, replace the piston or cylinder block, or both.

Piston/Cylinder Block Clearance	
Standard	0.033 mm ~ 0.052 mm
Service Limit	0.10 mm

## Piston ring/Pinston ring groove clearance

When the piston ring is in the piston ring groove, the feeler is used to measure the clearance between the piston ring and the ring groove.

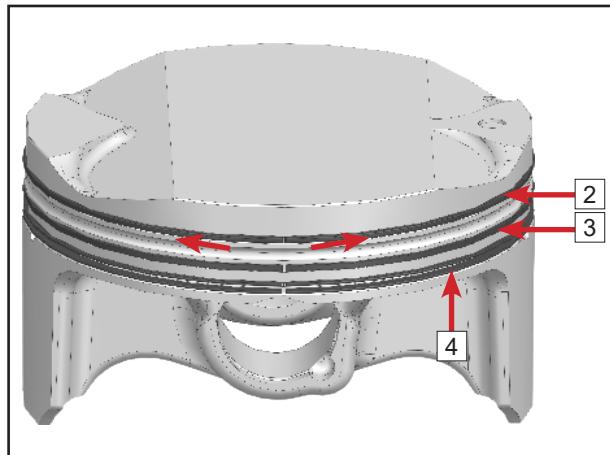
If the clearance is greater than the service limit, replace the piston and piston ring.

Piston Ring / Pinston Ring Groove Clearance	
First Gas Ring / Groove	
Standard	0.02 mm~0.06 mm
Service Limit	0.15 mm
Second Gas Ring / Groove	
Standard	0.02 mm~0.06 mm
Service Limit	0.15 mm

## Piston disassembly

Carefully open the opening of the first ring **2** with the thumb and push the ring outward to remove the first ring.

Remove the second ring **3** and combined oil ring **4** in the same manner.

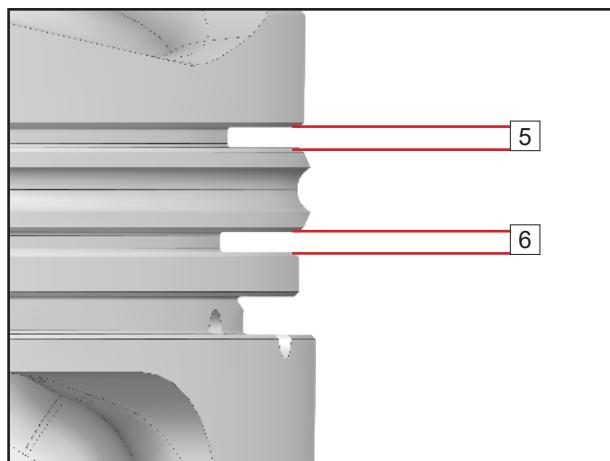


## Piston ring groove width

Use vernier calipers to measure the width of the first gas ring groove **5** and the second gas ring groove **6** of the piston.

If ring groove width is greater than service limit, replace piston.

Piston Ring Groove Width	
First Gas Ring Groove	
New Part	1.01 mm ~ 1.03 mm
Service Limit	1.10 mm
Second Gas Ring Groove	
New Part	1.01 mm~1.03 mm
Service Limit	1.10 mm

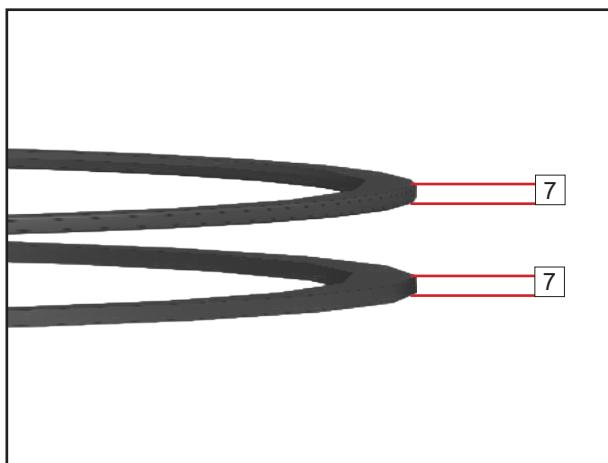


## Piston ring thickness

Use micrometer to measure the thickness **7** of the piston ring.

If the measured value is less than the service limit, replace the gas ring.

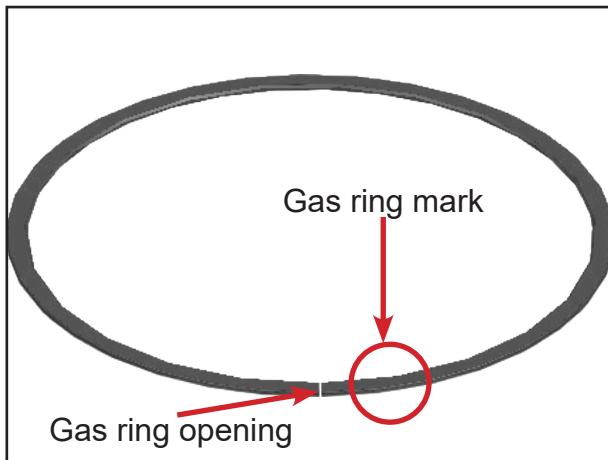
Piston Ring Thickness	
First Gas Ring	
New Part	0.97 mm ~ 0.99 mm
Service Limit	0.93 mm
Second Gas Ring	
New Part	0.97 mm ~ 0.99 mm
Service Limit	0.93 mm



## Gas ring mark

first: ATG-V

second: A



## Piston ring opening clearance

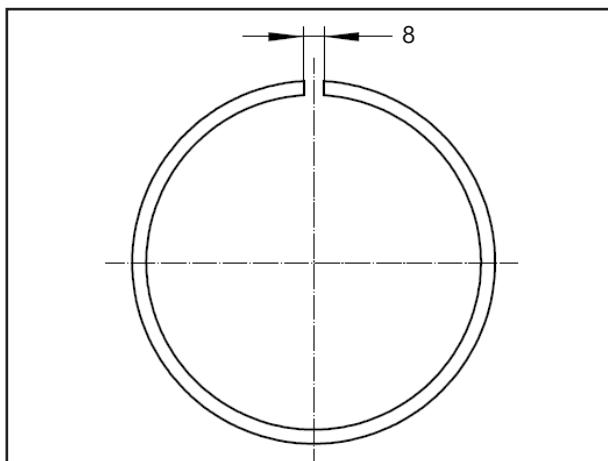
Put piston ring at the bottom of the cylinder hole of the cylinder block (i.e. the least wear position of the cylinder hole).

### NOTE

To place the piston ring correctly in the cylinder, use piston to push it in.

Use feeler gauge to measure piston ring opening clearance **8**.

If the clearance is greater than the service limit, replace the piston ring.



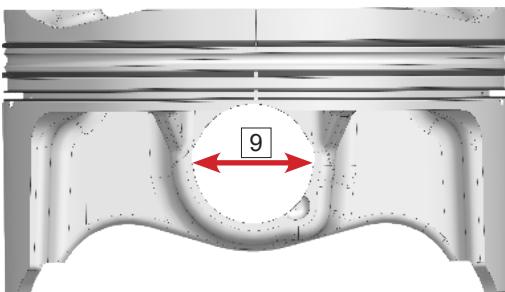
Piston Ring Opening Clearance	
First Gas Ring	
New Part	0.15 mm ~ 0.30 mm
Service Limit	0.55 mm
Second Gas Ring	
New Part	0.10 mm ~ 0.30 mm
Service Limit	0.55 mm

## Piston pin hole

Use inner diameter dial gauge to measure the diameter **9** of piston pin hole.

If the measured value exceeds the service limit, replace the piston.

Diameter of Piston Pin Hole <b>9</b>	
New Part	17.002 mm~17.008 mm
Service Limit	17.035 mm

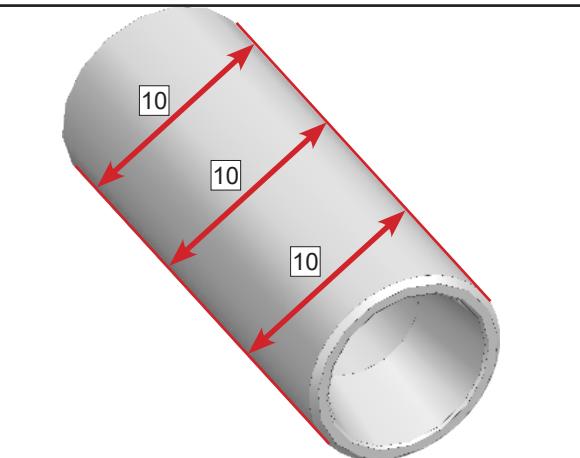


## Piston pin diameter

Use micrometer to measure piston pin diameter **10** at multiple points.

Piston Pin Diameter <b>10</b>	
New Part	16.992 mm ~ 16.997 mm
Service Limit	16.980 mm

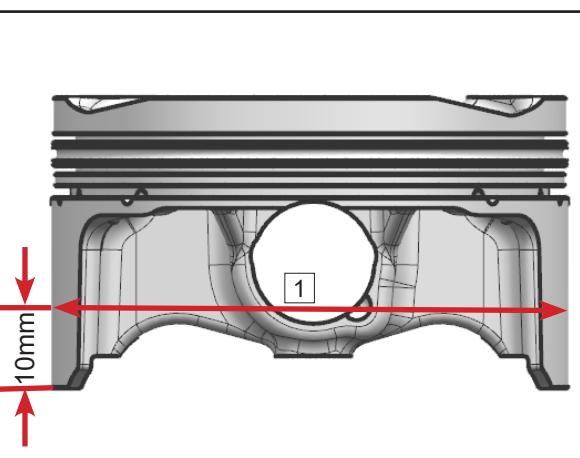
If the measured value is less than the service limit, replace the piston pin.



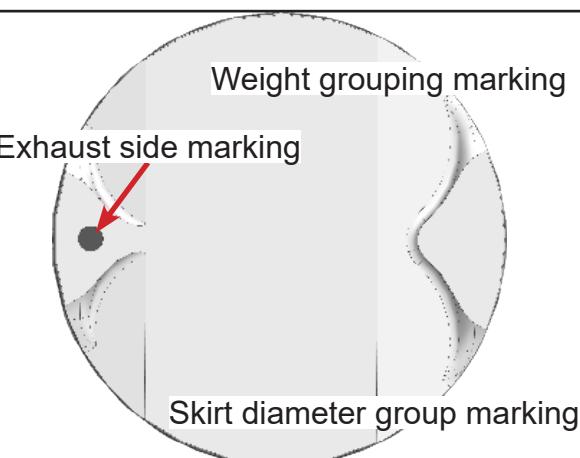
## The piston group

The diameter **1** of the piston skirt and weight are grouped in the following table, and the marking positions are shown in the figure on the right.

Piston (New Part)	
Mark	Skirt Diameter
I	71.960 mm ~ 71.967 mm
II	71.968 mm ~ 71.975 mm



Piston (New Part)	
Mark	Weight
O	152.3 g ~ 155.3 g
No Mark	155.4 g ~ 158.3 g



## NOTE

Pistons of the same weight group must be fitted to the same engine.

**Piston/ cylinder grouping**

Piston and cylinder must be fitted in accordance with the following table.

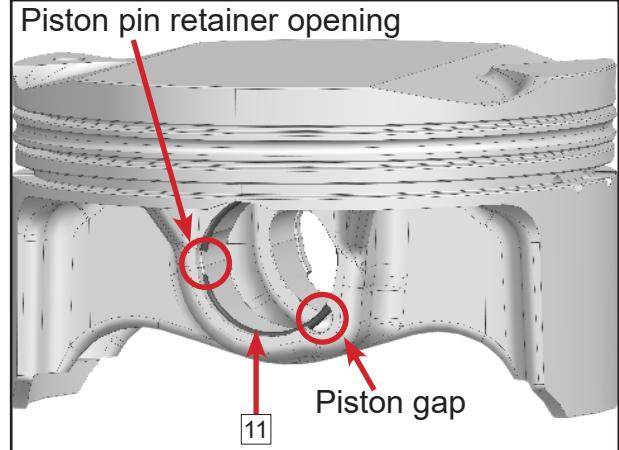
Cylinder	Piston
I	I
II	II

**Piston assembly**

Use needle-nosed pliers to load only one side of piston pin retaining ring 11 of the piston pin from the piston notch position. Stagger the piston pin retainer ring opening with the piston notch.

**NOTE**

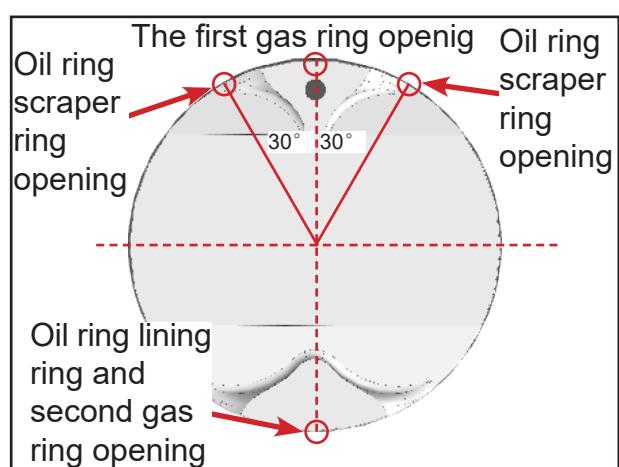
**The piston pin retaining ring shall not be used twice and must be replaced with a new one.**



Install the combined oil ring, the second gas ring and the first gas ring into the corresponding piston ring groove according to the picture on the right.

**NOTE**

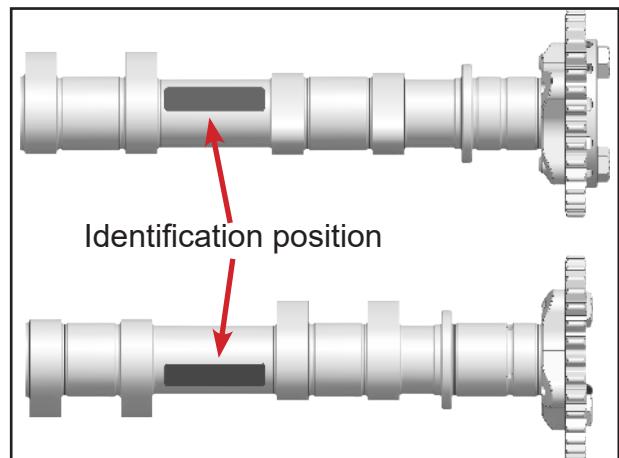
**When assembled, the "ATG-V" mark on the first gas ring is toward the top of the piston, and the "A" mark on the second gas ring is toward the top of the piston.**

**13.6.6 Distribution Drive Sub-assembly****Camshaft identification**

The camshaft is marked in casting between 1 cylinder CAM and 2 cylinder CAM.

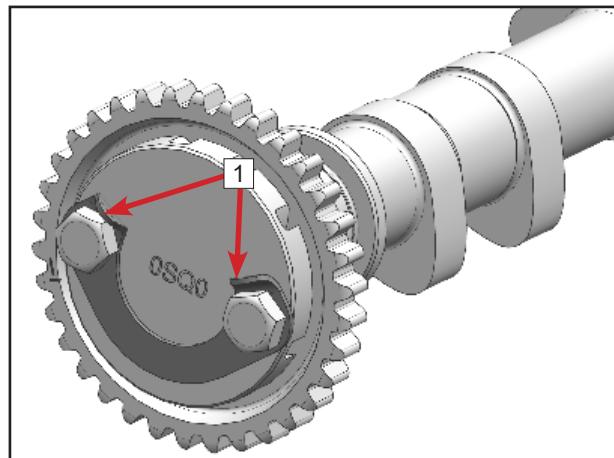
Intake camshaft : IN

Exhaust camshaft : EX

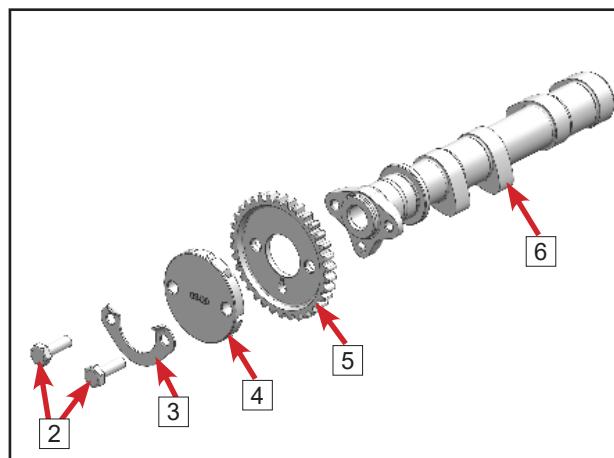


## Disassembly of intake camshaft assembly

Turn over the tightening part of the stop baffle 1.

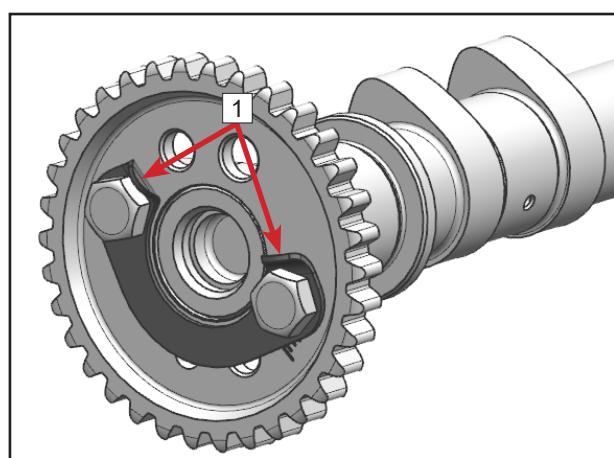


From the intake camshaft assembly 6 in turn remove M6×19 bolt 2, stop block 3, centrifugal wheel 4, intake timing sprocket 5.

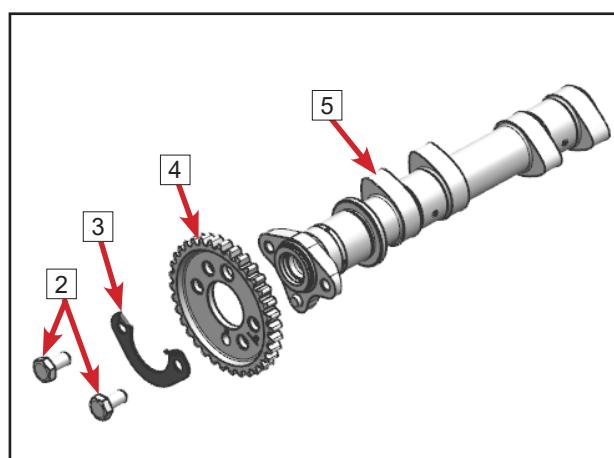


## Disassembly of exhaust camshaft assembly

Turn over the tightening part of the stop baffle 1.



From exhaust camshaft 5 in turn remove M6×12 bolt 2, stop block 3, exhaust timing sprocket 4.



**Camshaft journal**

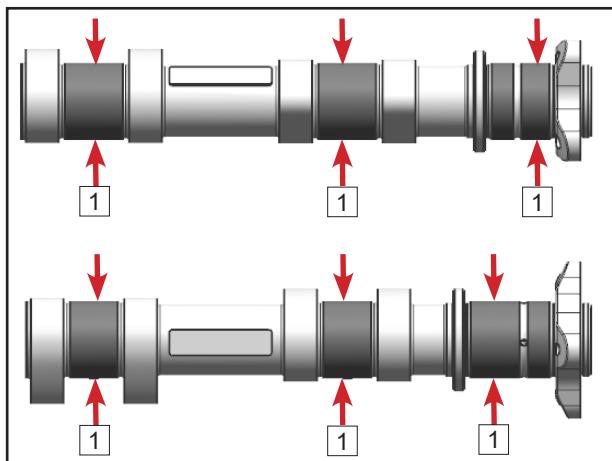
Measure camshaft journal diameter 1.

<b>Camshaft Journal Diameter 1 (Intake and Exhaust)</b>	
New Part	23.950 mm ~ 23.972 mm
Service Limit	23.920 mm

If the measured value exceeds the service limit, replace the camshaft with a new one.

Check the clearance between the camshaft journal and the camshaft bearing hole. If the clearance exceeds the service limit, replace the camshaft or cylinder head.

<b>Clearance between The Camshaft Journal and The Camshaft Bearing Hole</b>	
Standard	0.028 mm ~ 0.071 mm
Service Limit	0.13 mm

**CAM height of camshaft**

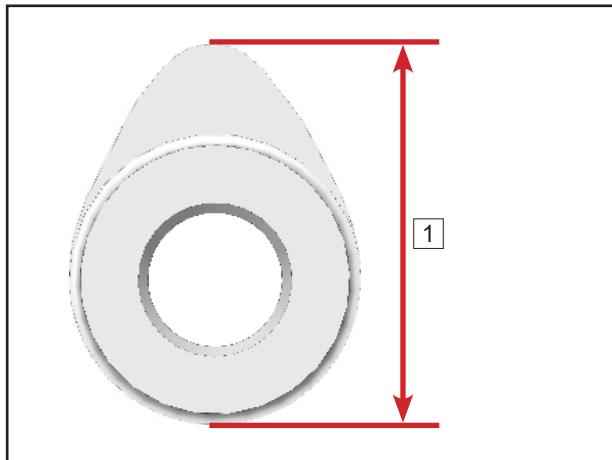
Measure CAM height 1 of intake/exhaust camshaft respectively.

If the measured value exceeds the service limit, replace the camshaft with a new one.

<b>CAM Height (Intake)</b>	
New Part	32.298 mm ~ 32.408 mm
Service Limit	32.200 mm

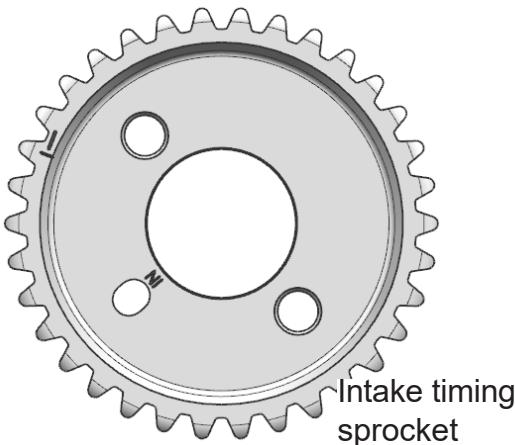
  

<b>CAM Height (Exhaust)</b>	
New Part	33.008 mm ~ 33.118 mm
Service Limit	32.910 mm

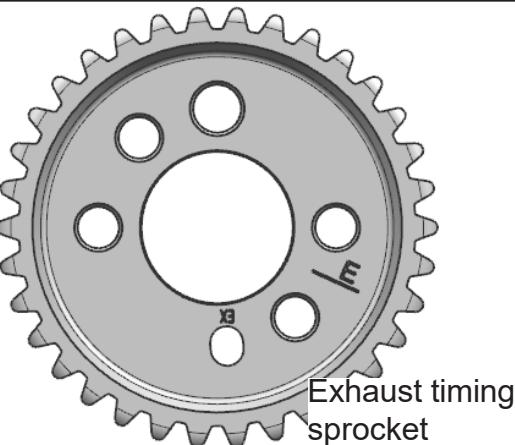


## Timing sprocket

Check the intake/exhaust timing sprocket for broken, broken teeth or other damage, or severely worn teeth, if so, replace the timing sprocket.



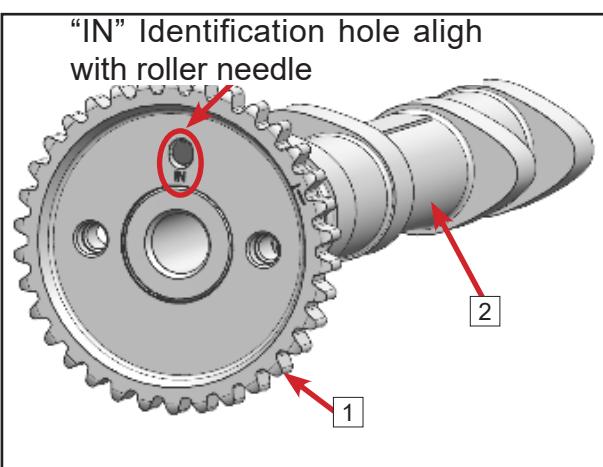
Intake timing sprocket



Exhaust timing sprocket

## Assembly of intake camshaft assembly

Align the hole marked "IN" of the intake timing sprocket **1** with the roller needle on the intake camshaft **2** assembly, and install the intake timing sprocket on the intake camshaft.

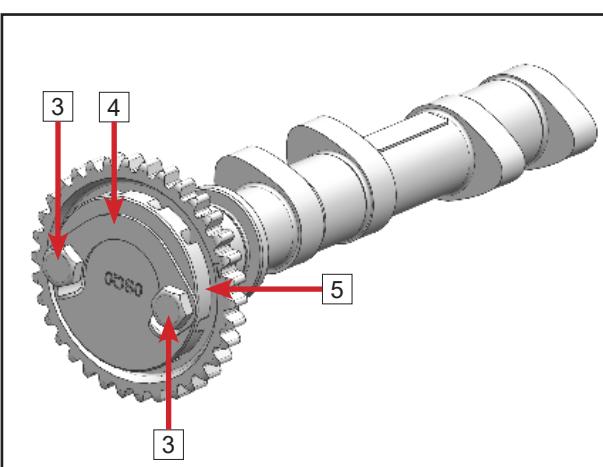


"IN" Identification hole align with roller needle

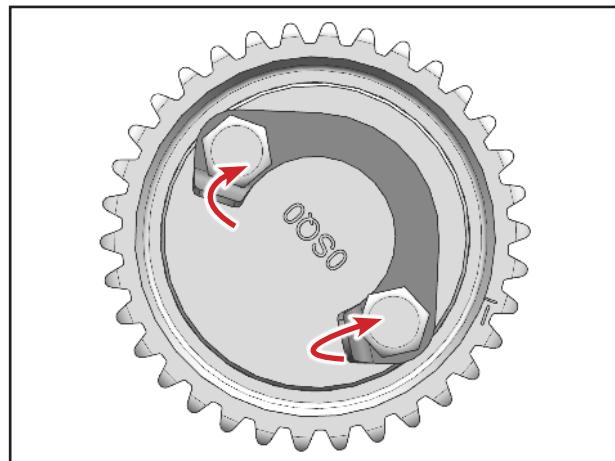
Put M6×19 bolt **3** in turn through stop block **4**, centrifugal wheel **5**, onto intake camshaft.

### Intake Timing Sprocket Bolt Torque

10N·m

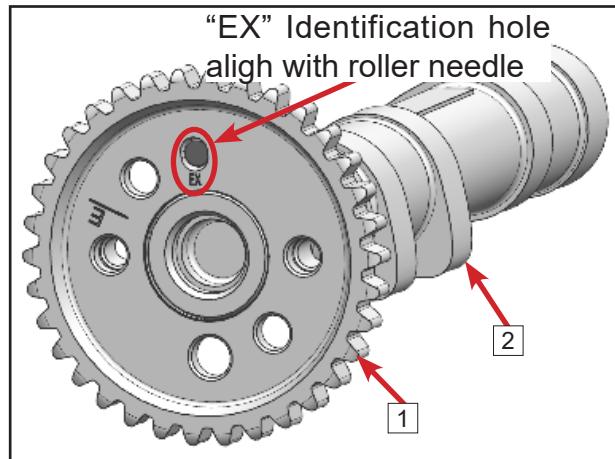


Flanging the stop block to prevent the bolt from loosening.



### Assembly of exhaust camshaft assembly

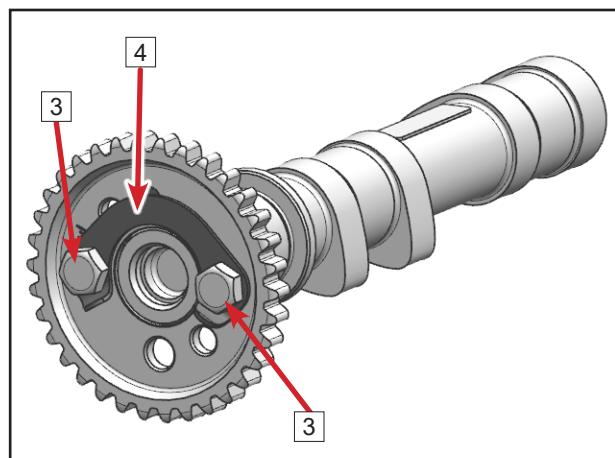
Align the hole marked "EX" of the exhaust timing sprocket 1 with the roller needle on the exhaust camshaft assembly 2, and mount the exhaust timing sprocket on the exhaust camshaft.



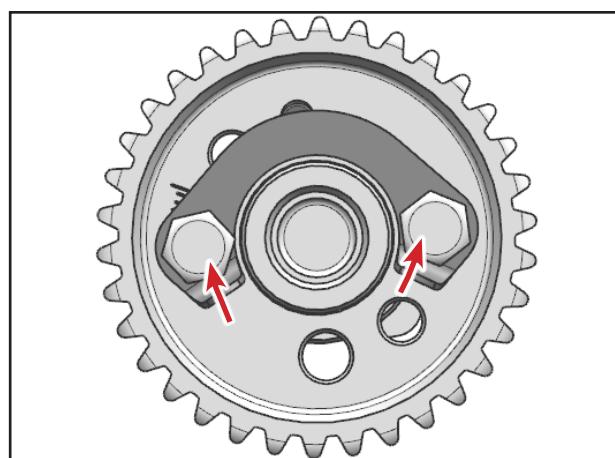
Put M6×12 bolt 3 through stop block 4, onto exhaust camshaft.

#### Exhaust Timing Sprocket Bolt Torque

10N·m



Flanging the stop block to prevent the bolt from loosening.

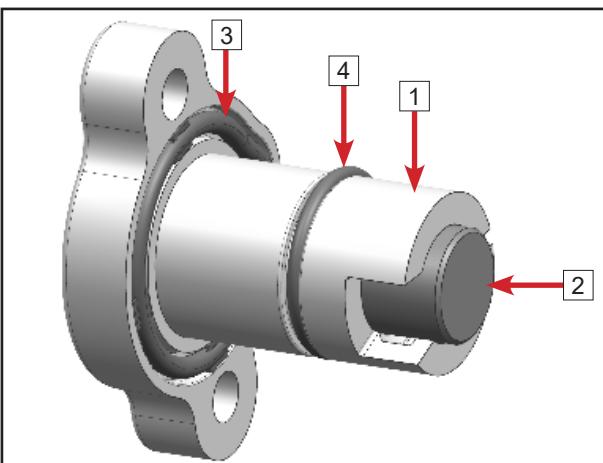


## Hydraulic tensioner assembly

Check whether the shell **1** and plunger **2** of the tensioner are damaged or seriously worn, if so, replace the tensioner.

Check whether the sealing ring **3** and O-ring **4** of the tensioner are cracked or hardened, if so, replace with a new one.

Check whether the compression rebound of the hydraulic tensioner is smooth and powerful. If it is jammed, replace it with a new one.

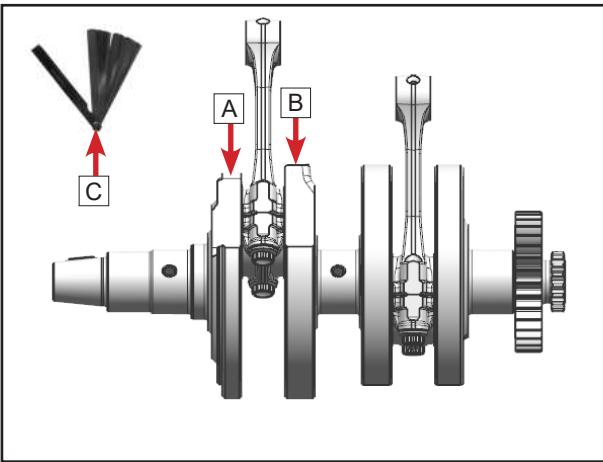


## 13.6.7 Crankshaft Connecting Rod

### Big end clearance of connecting rod

Measuring the end clearance of the connecting rod: first, one side of the connecting rod big end is close to the crank arm **A** of the crankshaft, and then the gap between the other side of the connecting rod big end and the crank arm **B** of the crankshaft is measured with a feeler gauge **C**.

The big end clearance of the other connecting rod is measured by the same method.



### Big End Clearance of Connecting Rod

Standard	0.15 mm~0.30 mm
Service Limit	0.50 mm

If the clearance is greater than the maintenance limit, replace the connecting rod and measure the clearance again. If the clearance still exceeds the service limit after replacing the connecting rod, the crankshaft must be replaced.

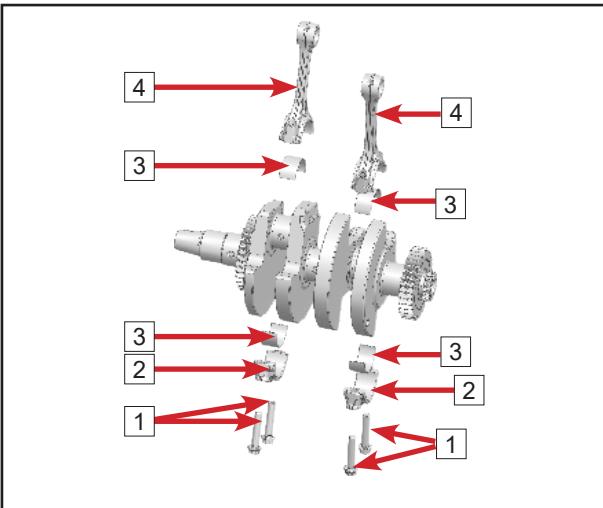
### Disassembly of crankshaft connecting rod

Remove connecting rod bolts **1**.

Remove connecting rod cap **2**.

Remove connecting rod **4**.

From connecting rod cap **2** and connecting rod **4** remove connecting rod bearing **3**.



#### NOTE

When disassembling, the connecting rod cover, connecting rod body and connecting rod bearing should be marked and placed one by one, so that they can be quickly installed to the original position when reassembling. Do not remove if the connecting rod bearing is not excessive wear or damaged.

### Connecting rod grouping

The diameter 1 of the crank bore of the connecting rod and the weight of the connecting rod are grouped in the following table.

Crank Bore (New Part)	
Mark	Diameter 1
1	38.000 mm ~ 38.008 mm
2	38.009 mm ~ 38.015 mm

### Connecting Rod Weight G (New Part)

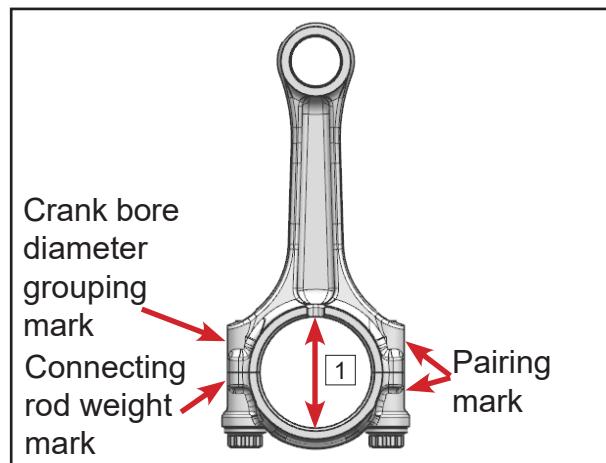
Mark	Weight Range (g)
294	293≤G < 295
296	295≤G < 297
298	297≤G < 299
300	299≤G < 301
302	301≤G < 303
304	303≤G < 305
306	305≤G < 307
308	307≤G < 309
310	309≤G < 311
312	311≤G < 313

#### NOTE

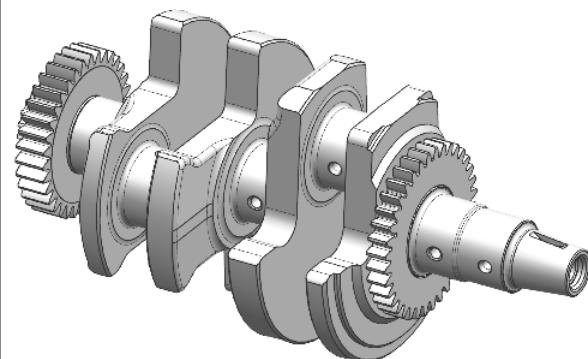
The same crankshaft must be fitted with the same weight group marked connecting rod.

### Crankshaft connecting rod journal grouping

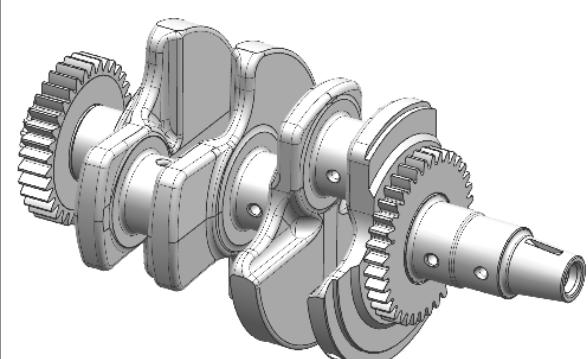
The state of the crankshaft is shown on the right.



Crankshaft: status 1

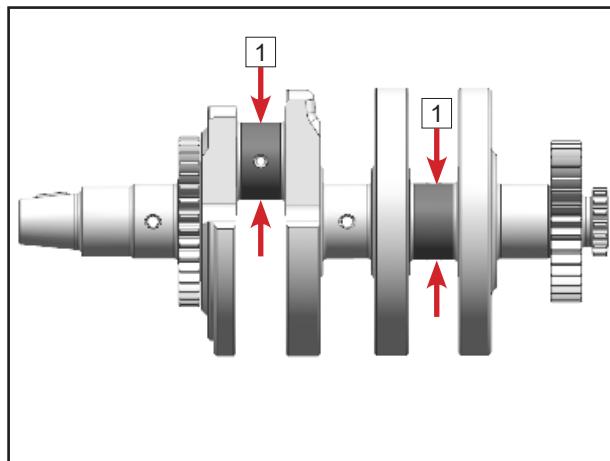


Crankshaft: status 2

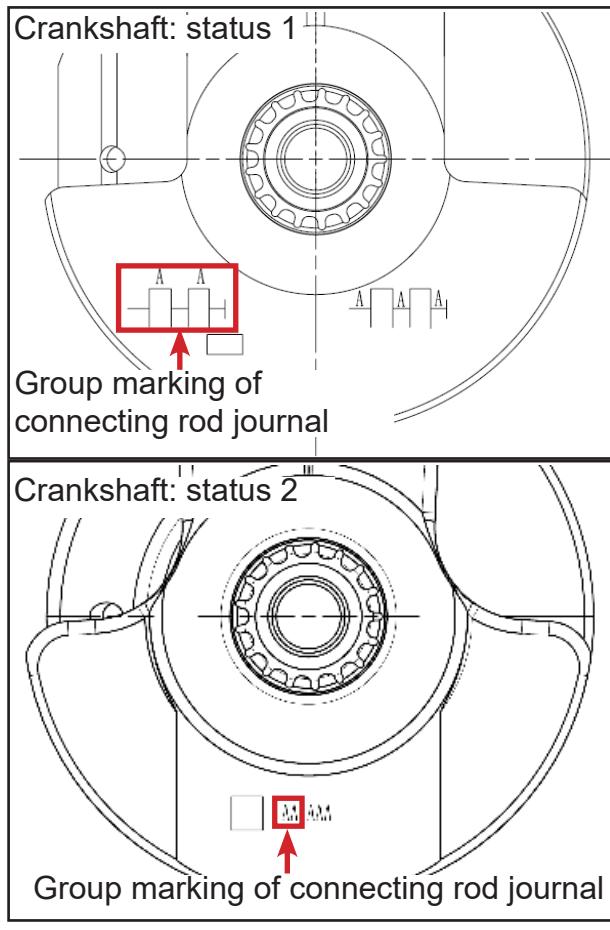


Crankshaft connecting rod journal diameter 1 grouping is shown in the table below.

Crankshaft Connecting Rod Journal (New Part)	
Mark	Diameter
B	34.985 mm ~ 34.992 mm
A	34.993 mm ~ 35.000 mm



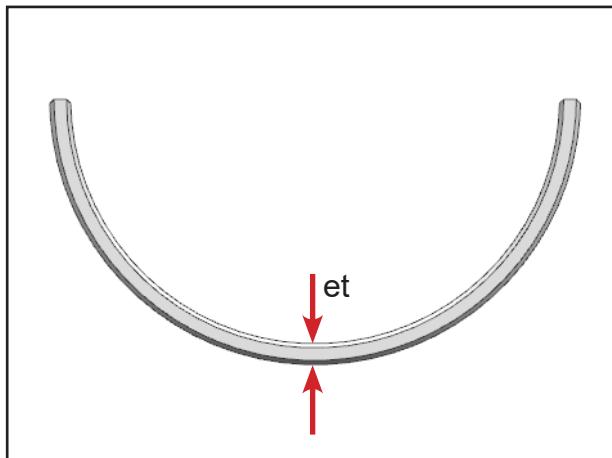
The group marking position of crankshaft connecting rod journal is shown in the example on the right, from left to right are the group marking of cylinder 1 and cylinder 2 connecting rod journal.



**Connecting rod bearing grouping**Connecting rod bearing thickness  $et$ .

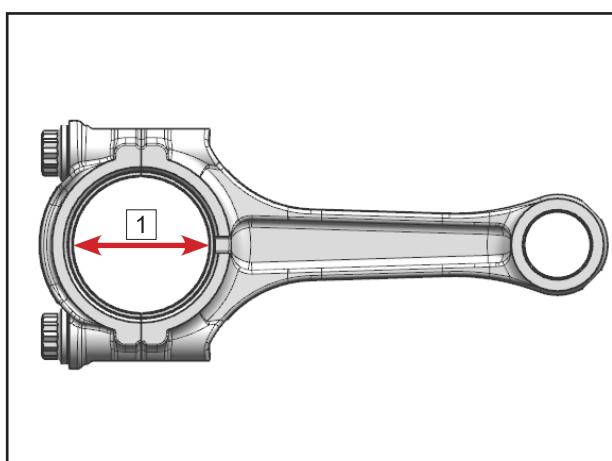
The grouping is shown in the table below.

Connecting Rod Bearing (New Part)	
Color Mark	Thickness $et$
Red	1.482 mm~1.486 mm
Black	1.487 mm~1.490 mm
Blue	1.491 mm~1.494 mm

**Connecting rod big end radial clearance**

Install the connecting rod bearing as in the initial state, install the connecting rod bolts and tighten them in two steps as shown below, then measure the inner diameter  $1$  of the big end bearing of the connecting rod.

First Step: Torque	
20N·m±2N·m	
Second Step: Corner Mounting	
100°±5°	



Measure the journal diameter of the crankshaft connecting rod and compare the inner diameter of the big end bearing of the connecting rod.

Journal Diameter of Connecting Rod	
New Part	34.985 mm ~35.000mm
Service Limit	34.955 mm

Inner Diameter of Big End Bearing of Connecting Rod	
Service Limit	35.055 mm

Radial Clearance of Big End of Connecting Rod	
Standard	0.04 mm ~ 0.06 mm
Service Limit	0.07 mm

If the service limit is exceeded, replace the crankshaft or connecting rod bearing, or both.

## Crankshaft/connecting rod/connecting rod bearing grouping

Crankshaft/connecting rod/connecting rod bearing grouping must follow the table below.

Crank Bore Mark	Crankshaft Connecting Rod Journal Mark	Connecting Rod Bearing Mark
1	A	Red
1	B	Black
2	A	Black
2	B	Blue

Crankshaft connecting rod assembly is the reverse of the disassembly process, but pay attention to the following details:

When the inner diameter of the big end bearing of the connecting rod exceeds the maintenance limit, it is necessary to replace the new connecting rod bearing.

Connecting rod bearing into the connecting rod cover and connecting rod body, with compressed air carefully clean connecting rod bearing and connecting rod splitting surface.

The connecting rod head cover and connecting rod body must be assembled in pairs according to the marks on its side, and the matching marks of the two are the same.

Before connecting rod is installed to crankshaft, apply proper amount of oil on the inner surface of connecting rod bearing and crankshaft connecting rod journal.

Connecting rod bolts are tightened according to the statement mode:

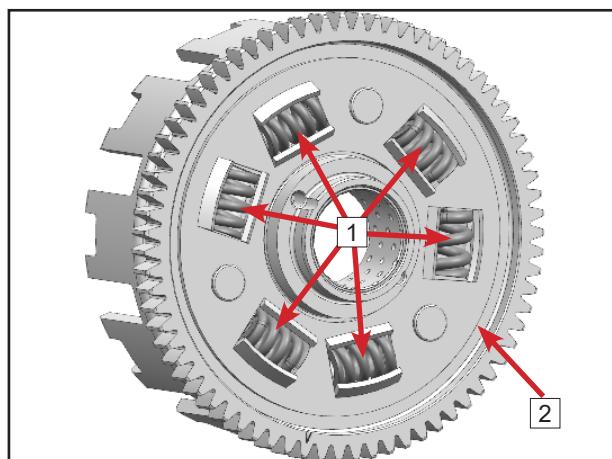
First step: torque  $20N\cdot m \pm 2N\cdot m$

Second step: corner mounting,  $100^\circ \pm 5^\circ$

### 13.6.8 Clutch

#### Clutch cover

Check whether the internal buffer spring 1 is worn, if worn, there will be shaking between the gear and clutch housing, and produce abnormal noise, such as shaking larger, then need to replace the primary driven gear assembly 2.



**Lining disc or driven disc**

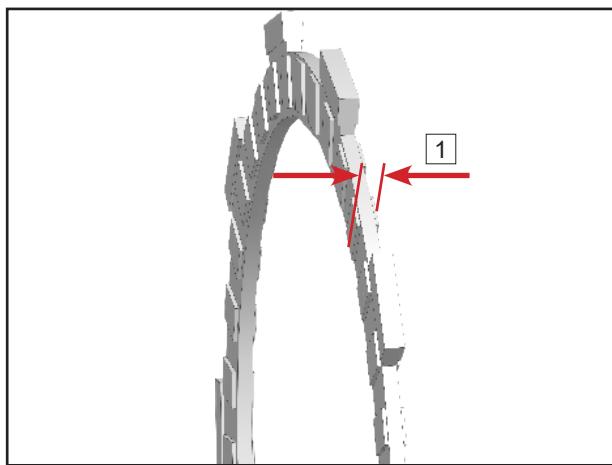
Check lining disc and driven disc one by one.

if the friction material fall off, loose and other defects.

if the friction surface has discoloration or uneven wear caused by overheating.

Measure the thickness 1 of each lining disc at different points.

If any piece shows signs of damage or wear exceeds the maintenance limit, replace with a new one.

**Lining Disc Thickness**

New Part	2.90 mm ~ 3.10 mm
Service Limit	2.80 mm

Lining disc or driven disc is placed on the plate.

Use a feeler gauge to measure the clearance between the friction plate or driven plate and the plate from multiple directions. The clearance is the flatness of the lining disc or driven disc.

**Flatness of The Lining Disc or Driven disc**

New Part	$\leq 0.15$ mm
Service Limit	0.3 mm

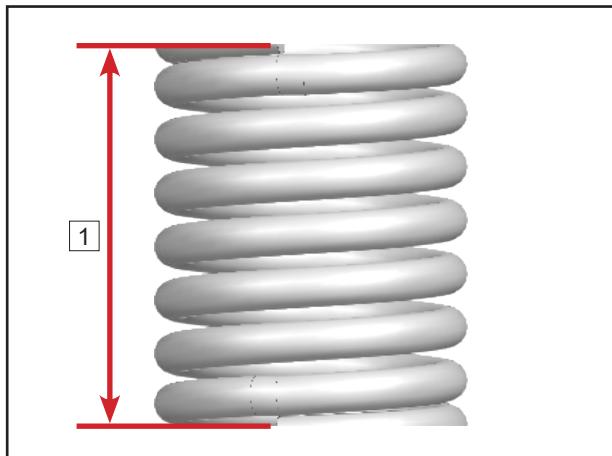
**Clutch spring**

Measuring the free length 1 of clutch spring.

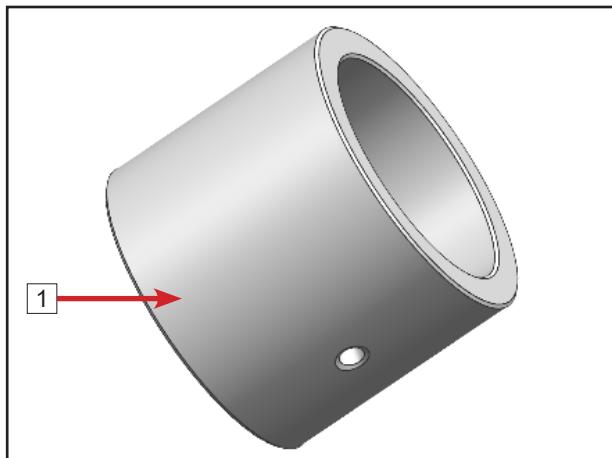
If the measured value is less than the maintenance limit, replace the pressure spring.

**Clutch Spring Free Length**

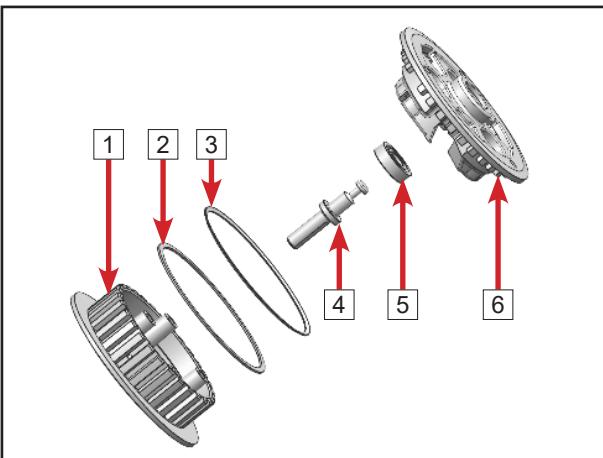
New Part	42.5 mm ~ 43.5 mm
Service Limit	41.5 mm

**Clutch shaft sleeve**

Check the clutch sleeve 1 for serious wear or damage. Replace if any.



Check central sleeve **1**, disc spring seat **2**, disc spring **3**, tie rod **4**, rolling bearing **5**, press plate **6** for severe wear or damage, replace if any.

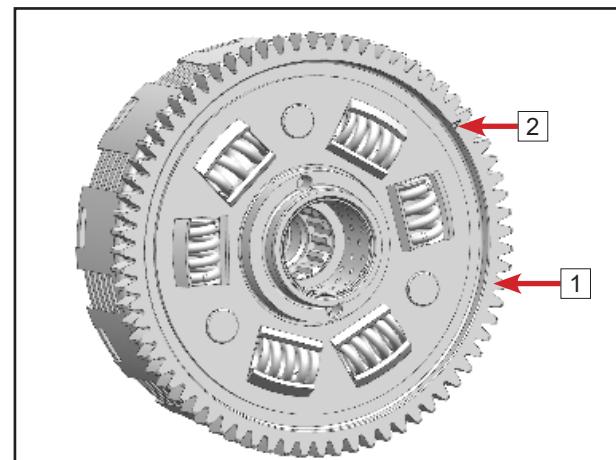


## Clutch grouping

The clutch is divided into group A and group B according to its primary driven gear **1**. A grouping mark **2** is stamped into the primary driven gear.

Assemble clutch and crankshaft in pairs according to the following.

Clutch Grouping Mark	Crankshaft Grouping Mark
A	B
B	A



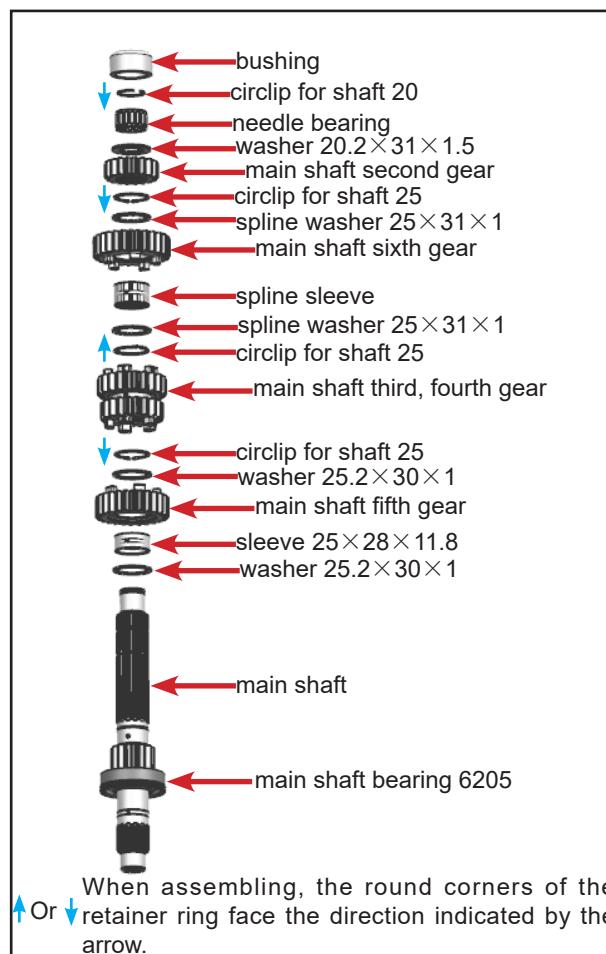
The grouping of crankshaft refers to chapter 13.6.1.1.

### 13.6.9 Shift Gear

#### 13.6.9.1 Main Shaft

##### Disassembly

Disassemble the main shaft assembly as shown on the right. Check whether the tooth surface of each gear has pitting, collision and excessive wear, check whether the needle roller bearing, bearing sleeve, spline sleeve and gasket wear or damage, if there is abnormal, replace the new part.



When assembling, the round corners of the retainer ring face the direction indicated by the arrow.  
Or

##### Inspection

##### Gear

###### NOTE

**When changing gears, they must be replaced in pairs. The retaining ring must be replaced after removal.**

Check whether the gear is damaged, if so, then replace the new parts.

Measure the inner diameter 1 of the sixth gear of the main shaft. If it is greater than the maintenance limit, replace it with a new one.

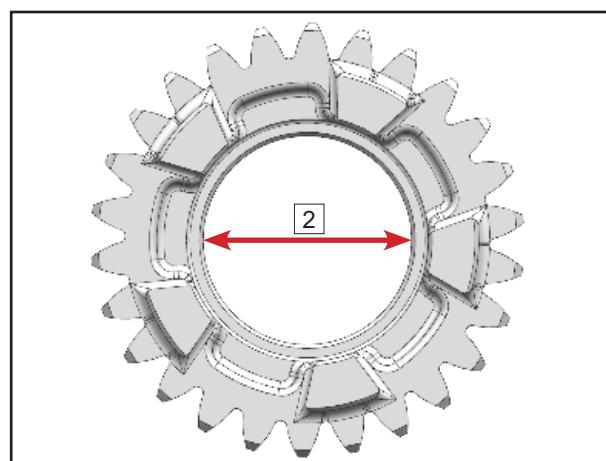
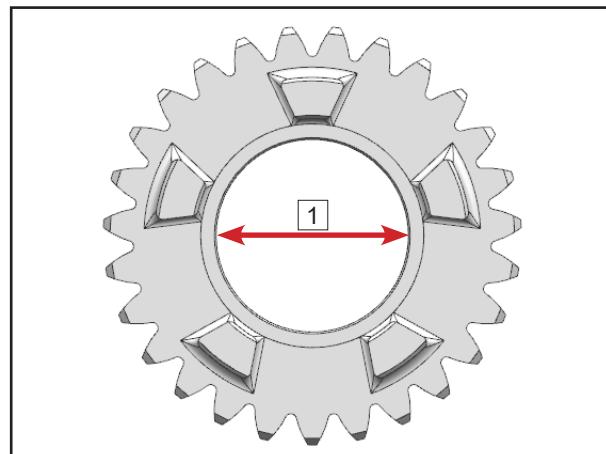
###### Inner Diameter of Sixth Gear of The Main Shaft

New Part	28 mm ~ 28.021 mm
Service Limit	28.027 mm

Measure the inner diameter 2 of the fifth gear of the main shaft. If it is greater than the maintenance limit, replace it with a new one.

###### Inner Diameter of Fifth Gear of The Main Shaft

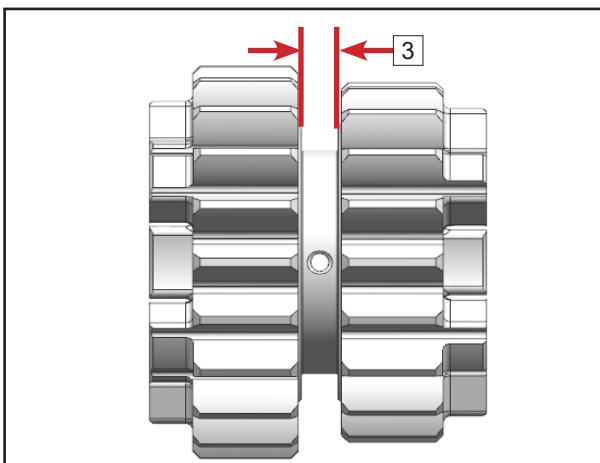
New Part	28 mm ~ 28.021 mm
Service Limit	28.027 mm



Measure the width **3** of the fork groove of the third and fourth gear of the main shaft, if it is greater than the maintenance limit, replace it with a new one.

### Width of The Fork Groove of The Third and Fourth Gear of The Main Shaft

New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm



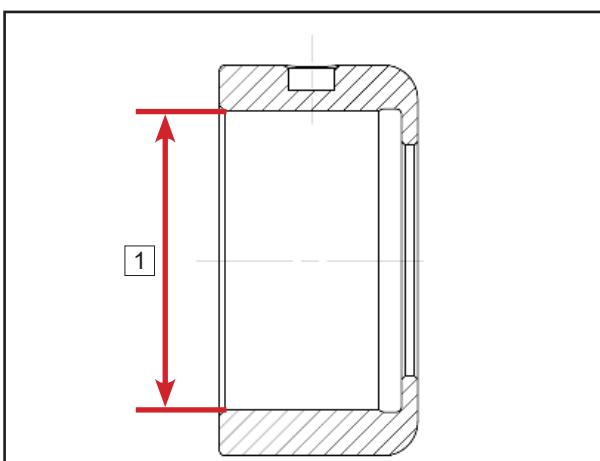
### Bushing

Check whether the bushing is seriously worn or damaged, if so, replace it with a new one.

Measure the inner diameter **1** of the bushing. If it is larger than the maintenance limit, replace it with a new one.

### Bushing Inner Diameter

New Part	26.007 mm ~ 26.020 mm
Service Limit	26.027 mm



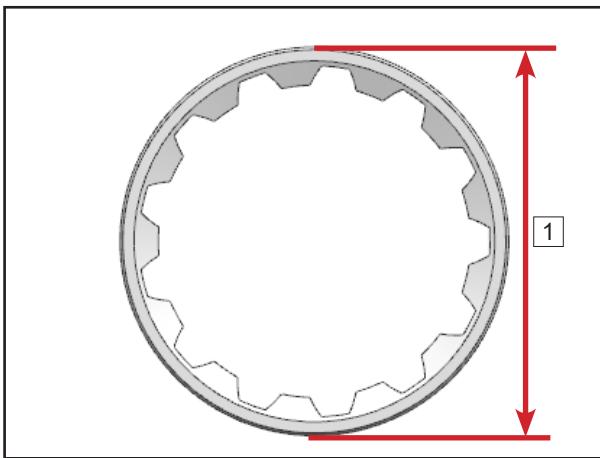
### Spline sleeve

Check whether spline sleeve is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter **1** of spline sleeve, if less than repair limit, replace with a new one.

### Spline Sleeve Outer Diameter

New Part	27.959 mm ~ 27.980 mm
Service Limit	27.952 mm



### Bushing

Check whether the bushing is severely worn or otherwise damaged, if so, replace it with a new one.

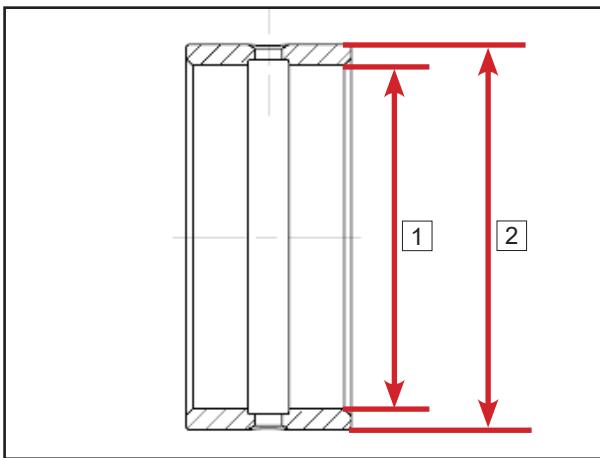
Measure the inner **1** and outer **2** diameters of the bushing, and replace it with a new one if it exceeds the service limit.

### Bushing Inner Diameter **1**

New Part	25.000 mm ~ 25.021 mm
Service Limit	25.027 mm

### Bushing Outer Diameter **2**

New Part	27.959 mm ~ 27.980 mm
Service Limit	27.952 mm

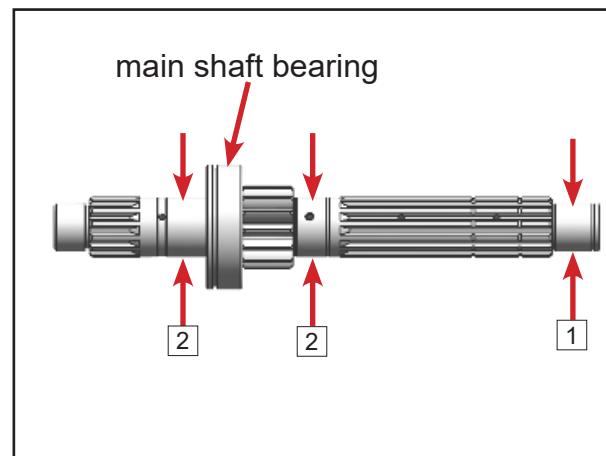


### Main shaft and main shaft bearing

Check whether the main shaft is damaged. Check whether the spline on the main shaft has pitting, collision and excessive wear, if there is abnormal, replace the new part.

Check whether the main shaft bearing rotates flexibly, whether there is stuck or abnormal sound, if so, replace the new parts.

Measure the main shaft outer diameter [1] and diameter [2], if less than the maintenance limit, then replace the new parts.



#### Main Shaft Outer Diameter [1]

New Part	19.987 mm ~ 20.000 mm
Service Limit	19.980 mm

#### Main Shaft Outer Diameter [2]

New Part	24.967 mm ~ 24.980 mm
Service Limit	24.960 mm

#### NOTE

**When the main shaft or main shaft bearing needs to be replaced, the main shaft and main shaft bearing must be replaced together.**

### Installation

Assemble in the reverse order of disassembly, but pay attention to the following details:

Before assembly, apply appropriate amount of oil on the matching surface of the main shaft, sleeve, main shaft fifth gear, spline sleeve and sixth gear.

The third and fourth gear of the main shaft should slide smoothly under its own weight after installation.

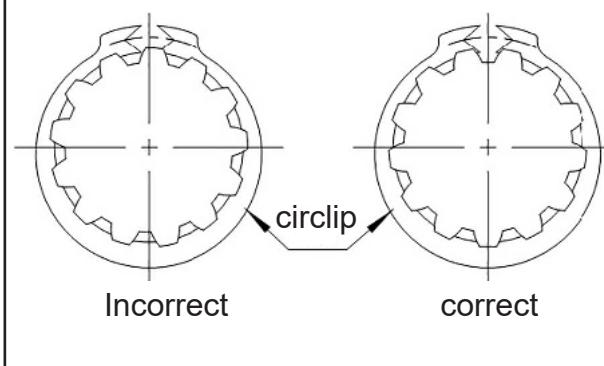
The removed circlip can not be used again, must be replaced with a new one.

The circlip for shaft is not allowed to be installed backwards. Please refer to the disassembly section of section 13.6.9.1 for details about the direction of the circlip.

The circumferential direction assembly of circlip for shaft should be as shown in the figure on the right.

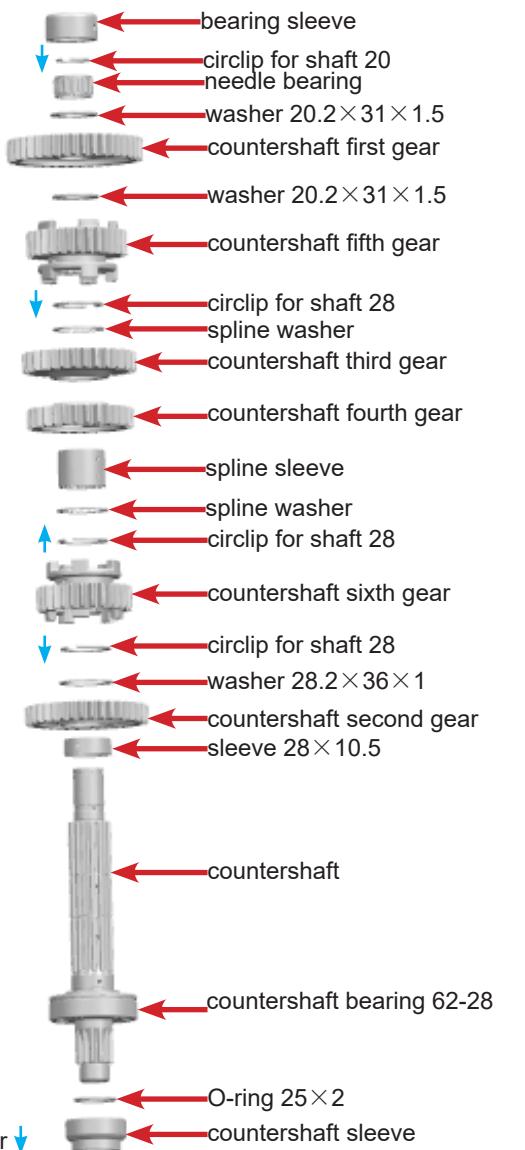
Make sure the circlip is fully inserted into the clamping slot.

Assembly diagram of circlip in circumferential direction



## 13.6.9.2 Countershaft Disassembly

Disassemble the Counter shaft assembly as shown in the picture on the right. Check whether the tooth surface of each gear has pitting, collision and excessive wear, check whether the needle roller bearing, shaft sleeve, spline sleeve and gasket are worn or damaged, if there is abnormal, replace the new part.



When assembling, the round corners of the baffle ring should face the direction indicated by the arrow.

### Inspection

#### Gear

##### NOTE

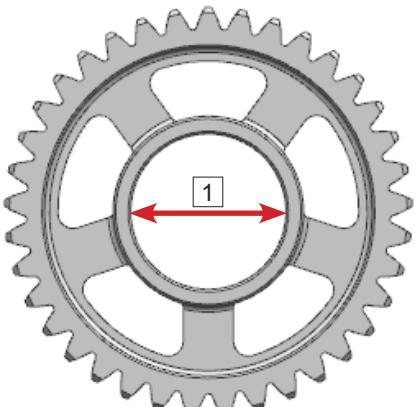
**When changing gears, they must be replaced in pairs. The retaining ring must be replaced after removal.**

Check whether the gear is damaged, if so, then replace the new parts.

Measure the inner diameter 1 of the second gear of the auxiliary shaft. If it is greater than the maintenance limit, replace it with a new one.

#### Inner Diameter of The Second Gear of The Auxiliary Shaft

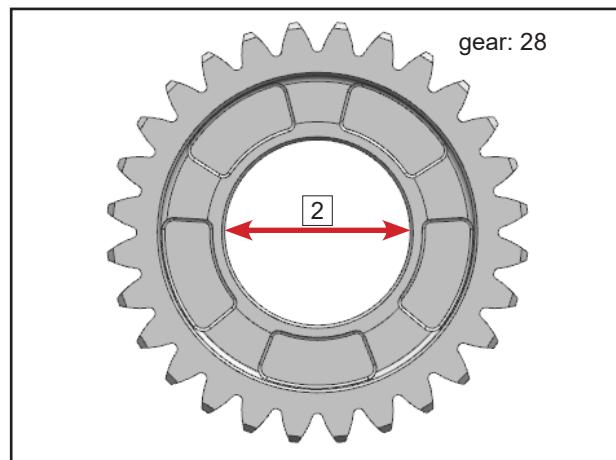
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



Measure the inner diameter **2** of the fourth gear of the counter shaft. If it is bigger than the maintenance limit, replace it with a new one.

**Countershaft Fourth Gear  
Inner Diameter**

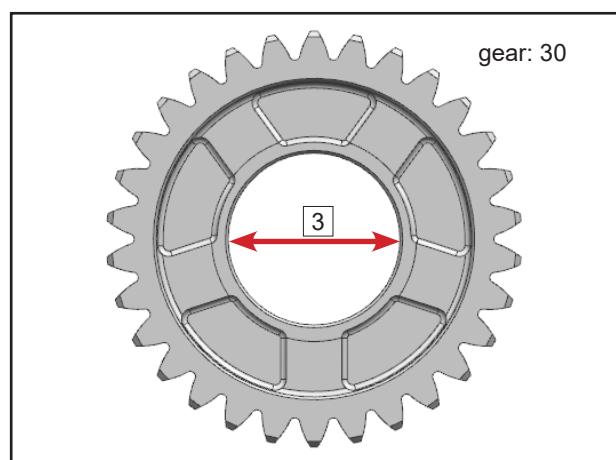
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



Measure the inner diameter **3** of the third gear of the counter shaft. If it is greater than the maintenance limit, replace it with a new one.

**Countershaft Third Gear Inner Diameter**

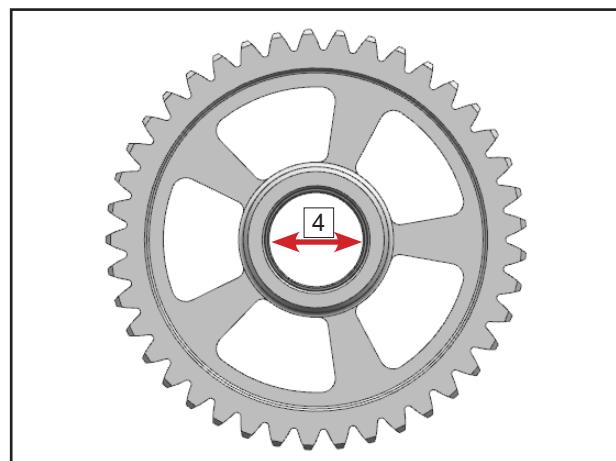
New Part	31.000 mm ~ 31.025 mm
Service Limit	31.032 mm



Measure the inner diameter **4** of the first gear of the counter shaft. If it is greater than the maintenance limit, replace it with a new one.

**Countershaft First Gear Inner Diameter**

New Part	20.020 mm ~ 20.041 mm
Service Limit	20.048 mm



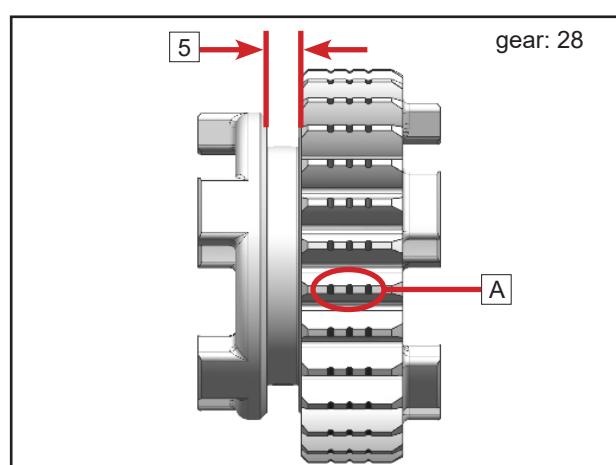
Measure the width **5** of countershaft sixth gear fork slot. Replace it if it is above service limit.

**Countershaft Sixth Gear  
Fork Slot Width**

New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm

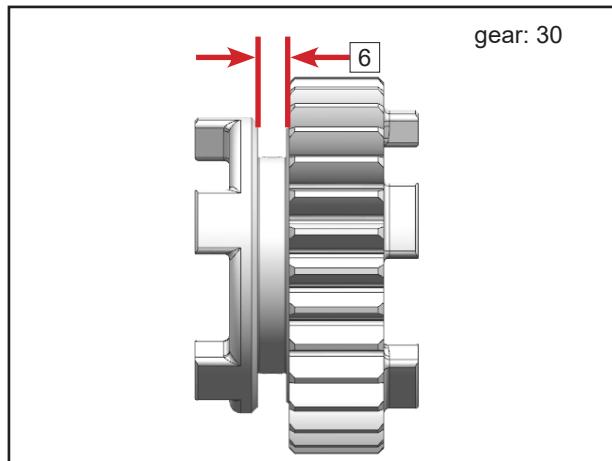
**NOTE**

A mark slot **A** on the countershaft sixth gear distinguishes it from the countershaft fifth gear.



Measure the width **6** of countershaft fifth gear fork slot. Replace it if it is above service limit.

Countershaft Fifth Gear Fork Slot Width	
New Part	5.10 mm ~ 5.17 mm
Service Limit	5.27 mm

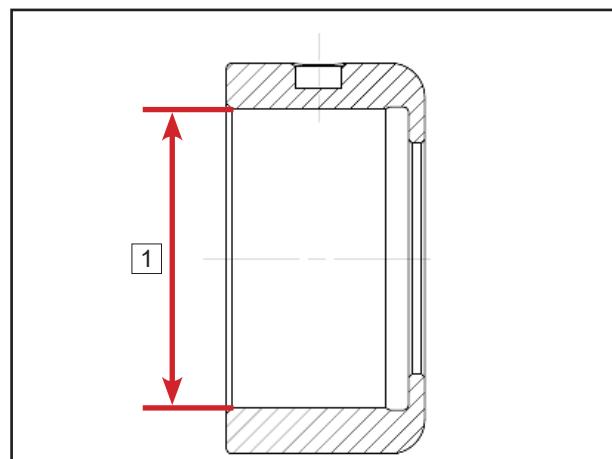


## Bearing sleeve

Check whether the bearing sleeve is severely worn or otherwise damaged. If so, replace it with a new one.

Measure the inner diameter **1** of the bearing sleeve. If it is larger than the maintenance limit, replace it with a new one.

Bearing Sleeve Inner Diameter	
New Part	26.007 mm ~ 26.020 mm
Service Limit	26.027 mm

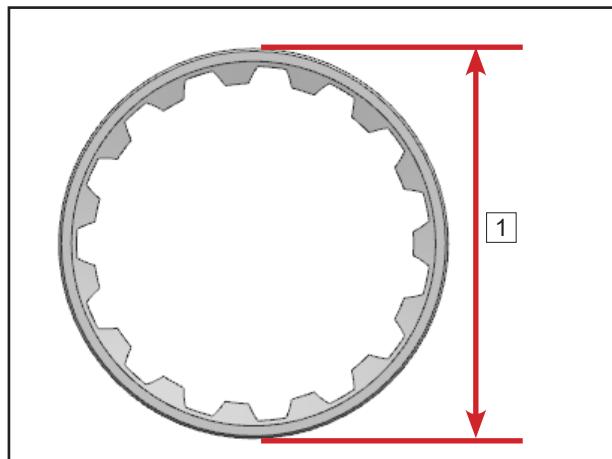


## Spline sleeve

Check whether spline sleeve is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter **1** of spline sleeve, if less than repair limit, replace with a new one.

Spline Sleeve Outer Diameter	
New Part	30.950 mm ~ 30.975 mm
Service Limit	30.943 mm

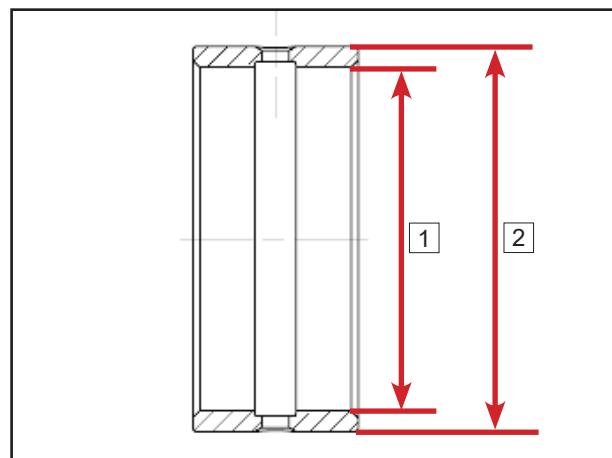


## Shaft bushing 28×10.5

Check whether the shaft bushing is severely worn or otherwise damaged, if so, replace it with a new one.

Measure the inner **1** and outer **2** diameters of it, and replace it with a new one if it exceeds the service limit.

Shaft Bushing Inner Diameter <b>1</b>	
New Part	28.000 mm ~ 28.021 mm
Service Limit	28.027
Shaft Bushing Outer Diameter <b>2</b>	
New Part	30.950 mm ~ 30.975 mm
Service Limit	30.943 mm

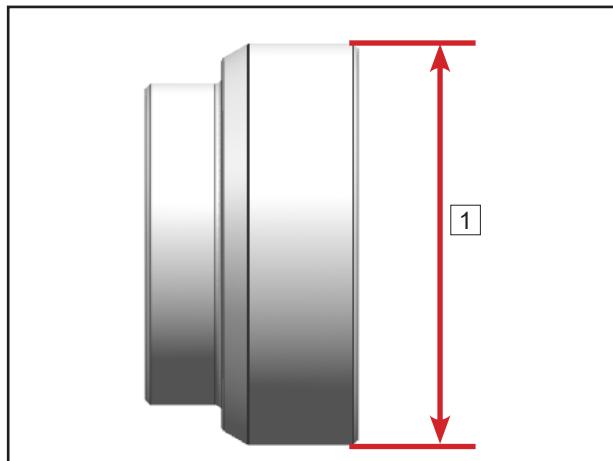


**Countershaft collar**

Check whether the countershaft collar is seriously worn or damaged, if so, replace it with a new one.

Measure the outer diameter 1 of counter shaft collar, if less than the service limit, replace the new part.

Countershaft Collar Outer Diameter	
New Part	39.975 mm ~ 40.000 mm
Service Limit	39.965 mm

**Countershaft and countershaft bearing**

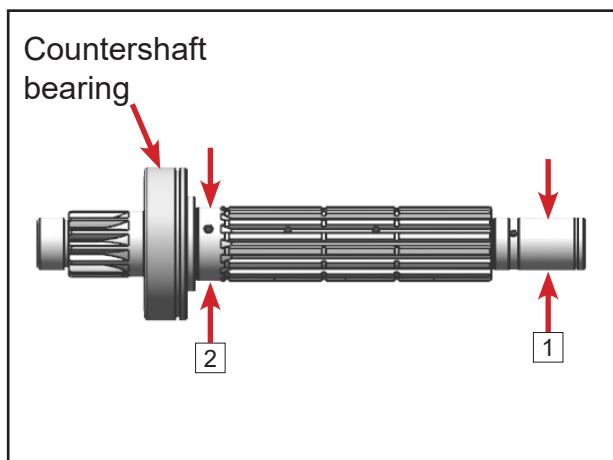
Check whether the countershaft is damaged.

Check whether the spline on the countershaft has pitting, bruise and excessive wear, if there is abnormal, replace it with a new one.

Check whether the countershaft bearing rotates flexibly, whether there is stuck or abnormal sound, if so, replace the new parts.

Measure the outer diameter 1 and outer diameter 2 of the countershaft, if less than the service limit, then replace the new part.

Countershaft Outer Diameter 1	
New Part	19.987 mm ~ 20.000 mm
Service Limit	19.980 mm
Countershaft Outer Diameter 2	
New Part	27.967 mm ~ 27.980 mm
Service Limit	27.960 mm

**NOTE**

When the countershaft or countershaft bearing needs to be replaced, the countershaft and countershaft bearing must be replaced together.

## Installation

Assemble in the reverse order of disassembly, but pay attention to the following details:

Before assembly, daub appropriate amount of oil on the matching surface of the countershaft, shaft sleeve, spline sleeve and each gear.

The sixth gear and the fifth gear of the countershaft should slide smoothly under the dead weight after installation.

O-ring must be replaced with a new one.

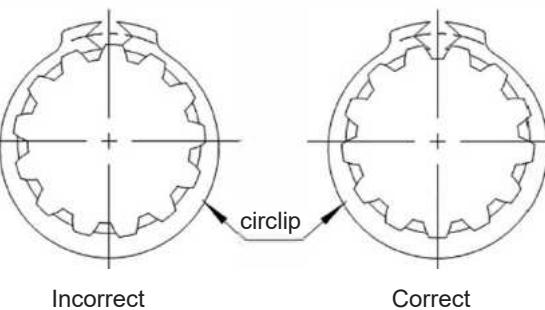
The removed elastic retaining ring can not be used again, must be replaced with a new one.

The elastic retaining ring for shaft is not allowed to be installed backwards. Please refer to the direction of the retaining ring in the disassembly section of section 13.6.9.2.

The circumferential direction assembly of elastic retaining ring for shaft should be as shown in the figure on the right.

Make sure the retaining ring is fully inserted into the clamping slot.

Assembly diagram of circlip in circumferential direction



## Shift fork

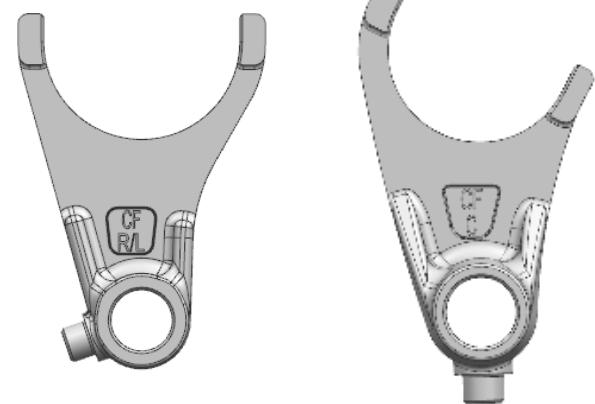
### Fork identification

Identification marks are attached to the fork body.

Shift fork(LH, RG): CF R/L

Shift fork(middle): CF C

Shift fork (LH, RH) Shift fork (Middle)

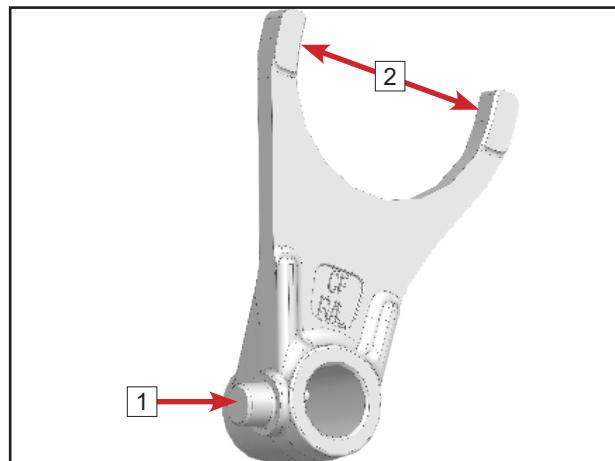


**Fork inspection**

Check the fork guide pin **1** and fork claws **2** for severe wear or other damage.

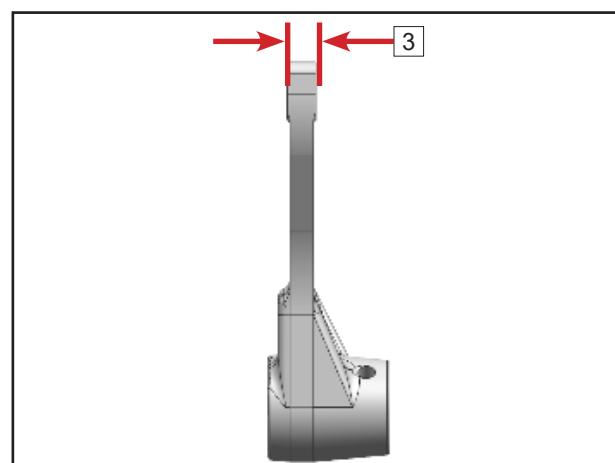
Check whether the shifting fork claws **2** are bent. The bent shifting fork will lead to shifting difficulties or abnormal gear meshing.

If there is any abnormality, replace with new part.



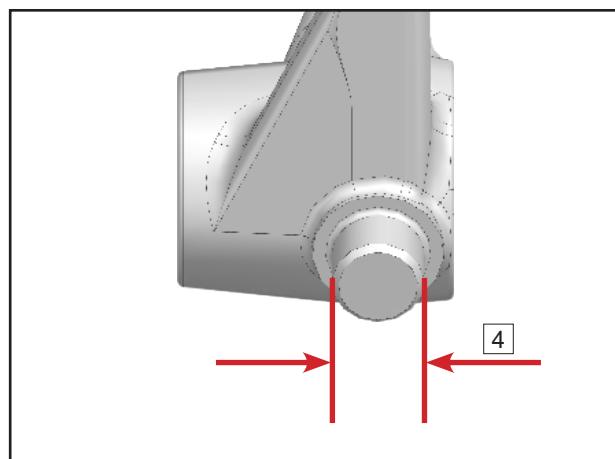
The thickness of the shifting fork (LH and RH) and the shifting fork (middle) is the same, measure the thickness **3** of the shifting fork claw, if less than the service limit, replace with new part.

Shifting Fork Claw Thickness	
New Part	4.93 mm ~ 5.00 mm
Service Limit	4.83 mm



The diameters of the guide pins of the shift forks (LH and RH) and the shift forks (middle) are the same. Measure the diameters **4** of the guide pins of the shift forks. If the diameters are smaller than the service limit, replace them with new ones.

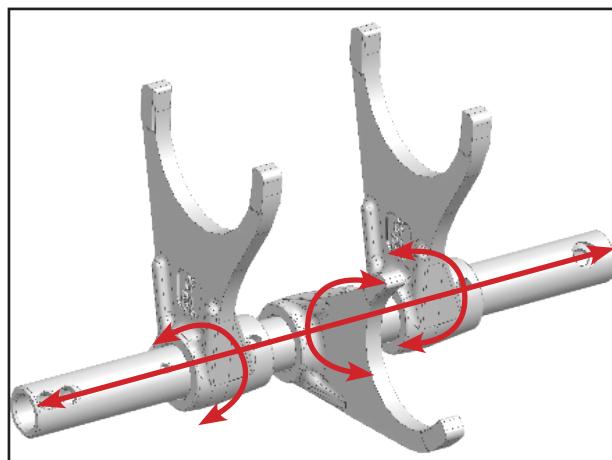
Diameter of Fork Guide Pin	
New Part	6.942 mm ~ 7.000 mm
Service Limit	6.850 mm



## Fork shaft

Check whether there is deformation, scratch, wear and other damage to the fork shaft, if so, replace it with a new one.

Set the fork on the fork shaft, move the fork back and forth, turn the fork left and right, check whether the action is smooth, if not, replace the new part.

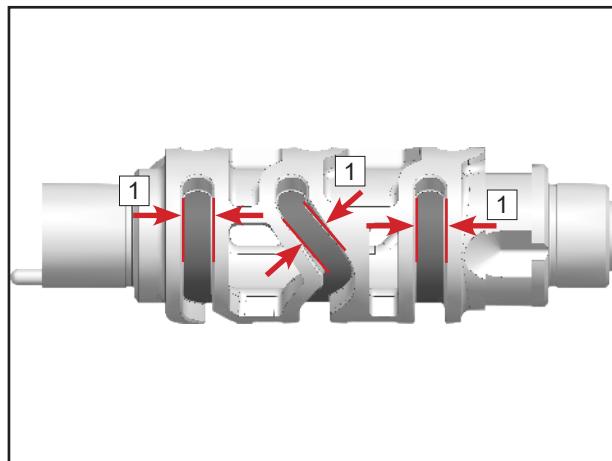


## Shift drum

Check whether the shift drum is excessively worn or damaged, if so, replace it with a new one.

Measure the slot width 1 of the shift drum. If it is smaller than the service limit, replace it with a new one.

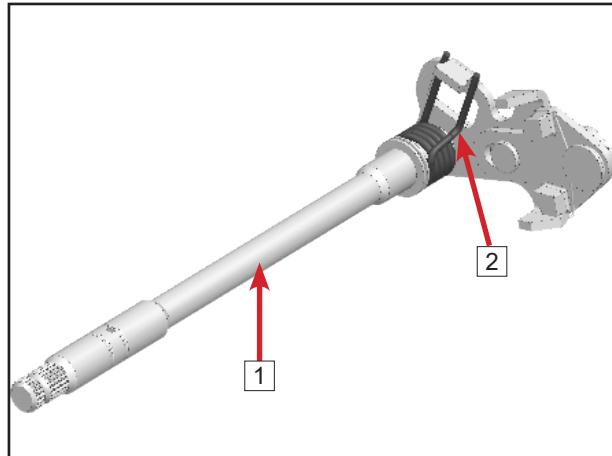
Slot Width of Shift Drum	
New Part	5.45 mm ~ 5.55 mm
Service Limit	5.35 mm



## Gearshift lever assembly

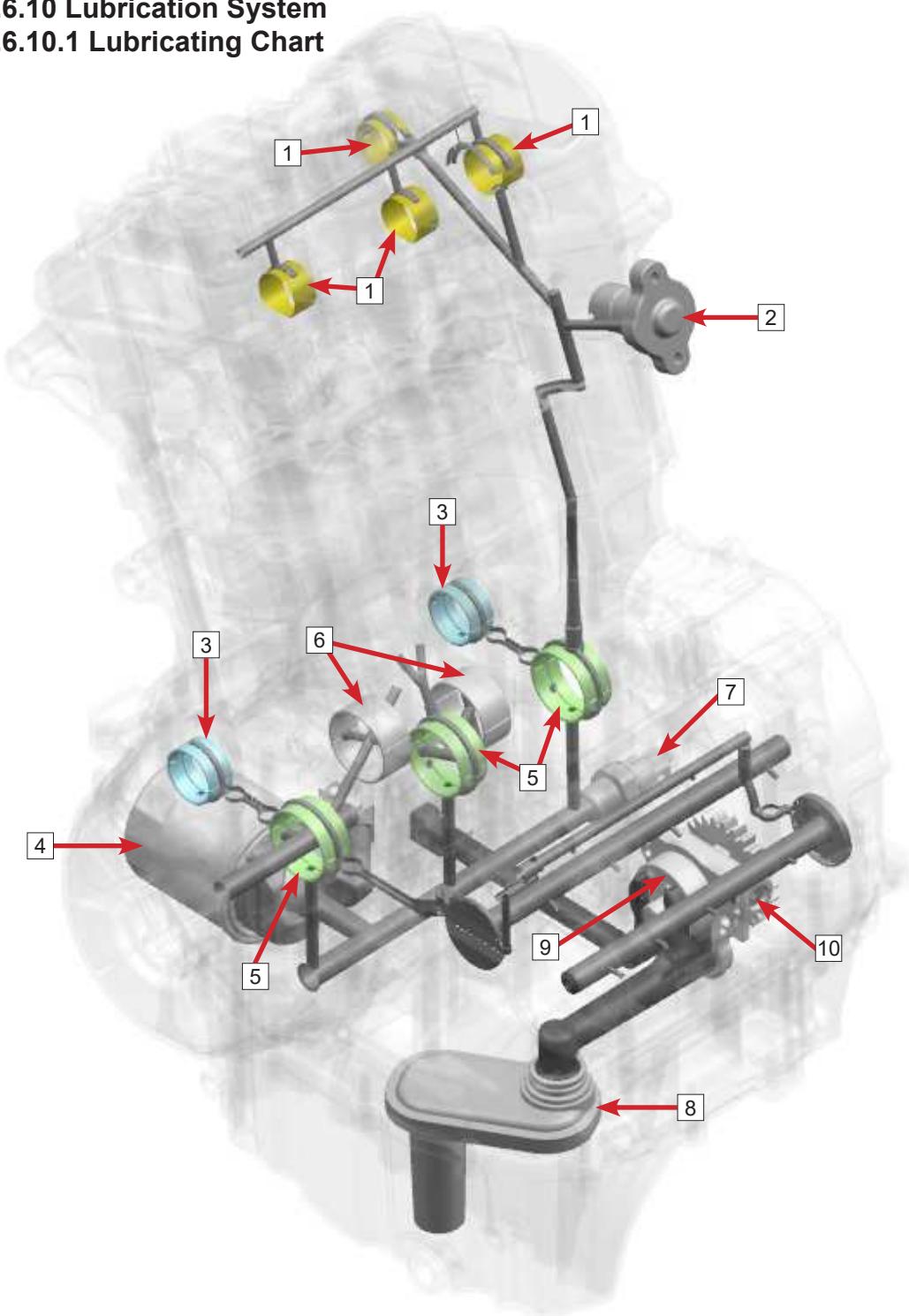
Check whether there is any damage, bending, serious wear of the welding components of the gearshift lever assembly 1, if there is, replace with new parts.

Check whether the return spring 2 of the gearshift lever is damaged or seriously deformed. If so, replace it with a new one.



## 13.6.10 Lubrication System

### 13.6.10.1 Lubricating Chart

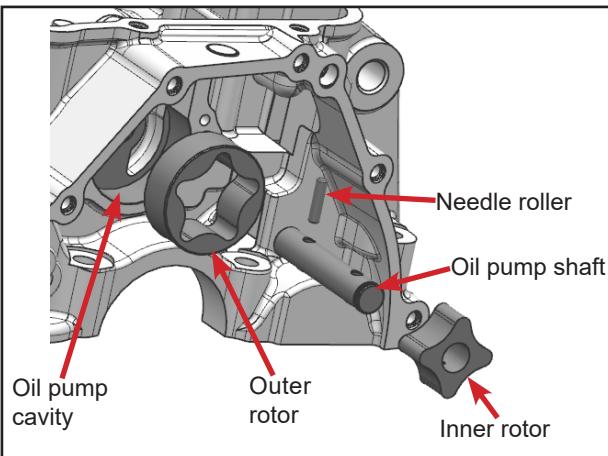


- [1]: Camshaft bearing
- [2]: Hydraulic tensioner assembly
- [3]: Balance shaft bearing
- [4]: Oil filter
- [5]: Main shaft bearing
- [6]: Connecting rod bearing

- [7]: Oil pressure switch
- [8]: Suction filter
- [9]: Oil pump
- [10]: Oil pressure relief valve

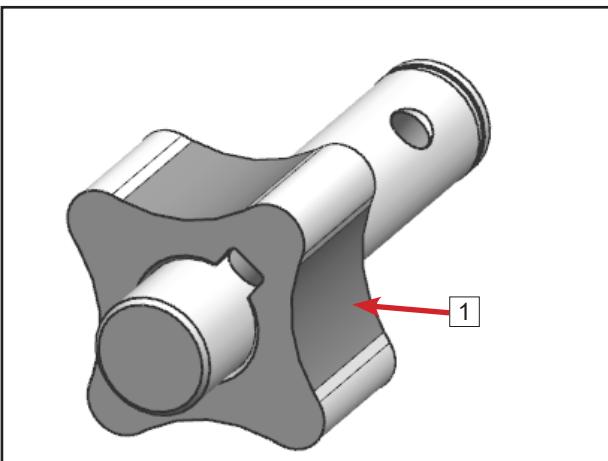
## 13.6.10.2 Oil Pump

Check the friction and wear of oil pump. Check the friction and wear between the outer rotor of the oil pump and the oil pump cavity on the crankcase. If the parts are severely worn or damaged, they must be replaced with new ones.



Check the friction and wear of the needle groove on the inner rotor, if it is seriously worn or damaged, it must be replaced with a new inner rotor.

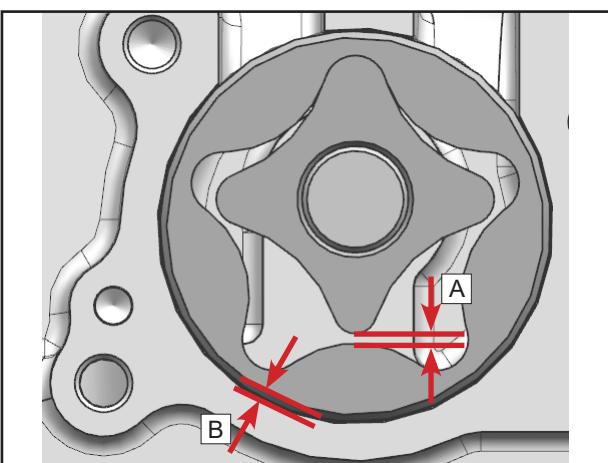
Check the wear of the concave surface 1 of the inner rotor, if it is seriously worn or damaged, it must be replaced with a new inner rotor.



Measure top clearance A (clearance between inner and outer rotors) and side clearance B (clearance between outer rotor and oil pump cavity) with a feeler gauge. If the service limit is exceeded, the inner and outer rotors must be replaced at the same time.

Clearance between Inner and Outer Rotors A	
Service Limit	0.25 mm

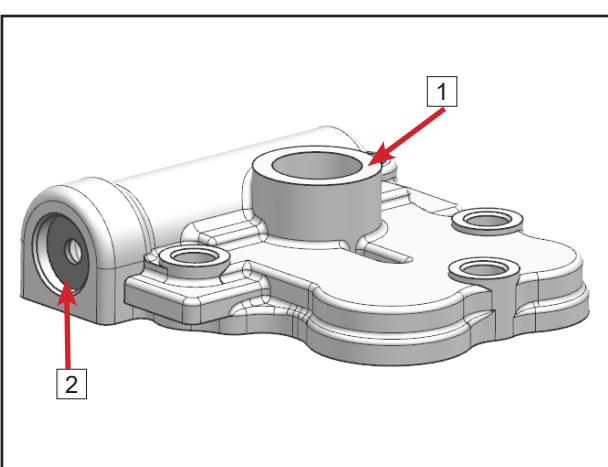
Clearance between Outer Rotor and Oil Pump Cavity B	
Service Limit	0.25 mm



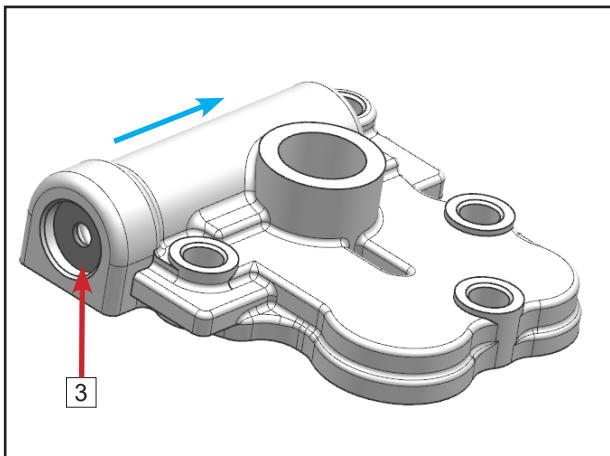
## 13.6.10.3 Oil Pressure Relief Valve

Check whether the oil pump cover 1 is seriously worn or damaged, if so, replace it with a new one.

The oil pressure limiting valve 2 is installed on the oil pump cover.



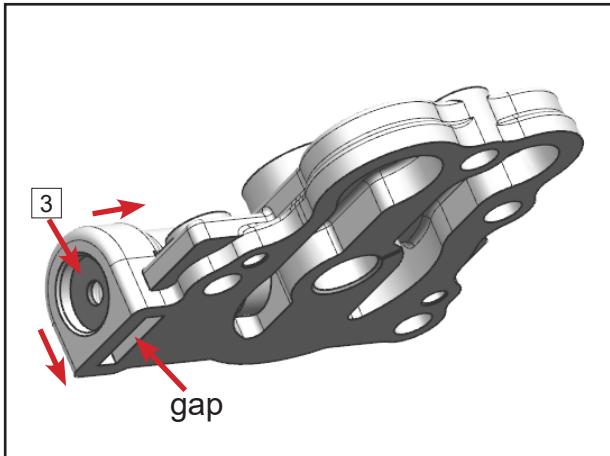
Press the gasket 3 of the oil pressure limiting valve with the appropriate tool in the direction indicated by the arrow on the right to feel whether the spring movement is smooth or not. If the phenomenon of stagnation occurs, remove the oil pressure limiting valve and carefully check each part.



### Oil pressure relief valve

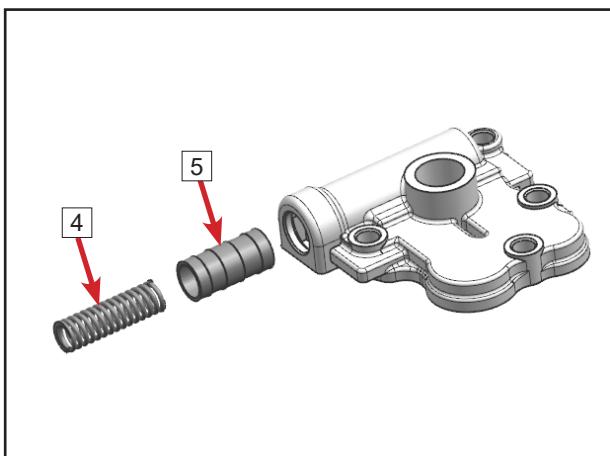
#### Removal

Use appropriate tools to push the gasket 3 to the gap of the oil pump cover, remove the gasket 3 from the gap.



Remove spring 4.

Remove plunger 5.



#### Inspection

Check whether gaskets, springs and plungers are severely worn or damaged, if so, replace them with new ones.

Measure the free length of the spring, if less than the service limit, replace the spring.

Spring Free Length	
New Part	39.4 mm
Service Limit	38.5 mm

## Installation

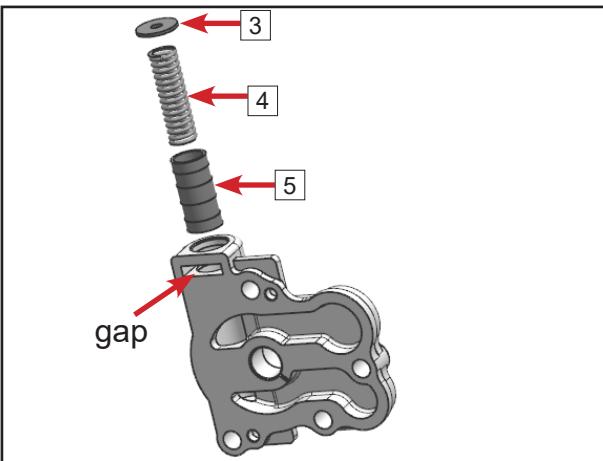
Assemble the oil pressure limiting valve in the reverse order of disassembly.

Daub appropriate amount of oil on the outer surface of the plunger 5, put the plunger 5 into the corresponding hole of the oil pump cover.

Daub appropriate amount of oil on the surface of the spring 4, put the spring 4 into the plunger 5.

Use appropriate tools to compress the spring 4, from the oil pump cover gap to load the gasket 3, and ensure that the gasket 3 completely fall in the step hole of the oil pump cover.

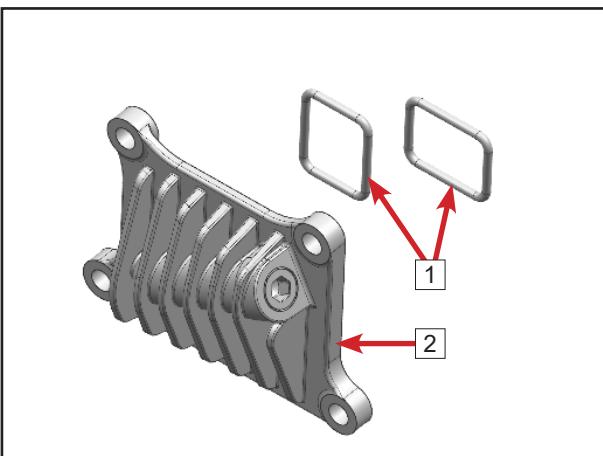
Press gasket 3 with appropriate tool, spring 4 movement should be smooth without stuck.



## 13.6.10.4 Oil Rail Cover Plate Assembly

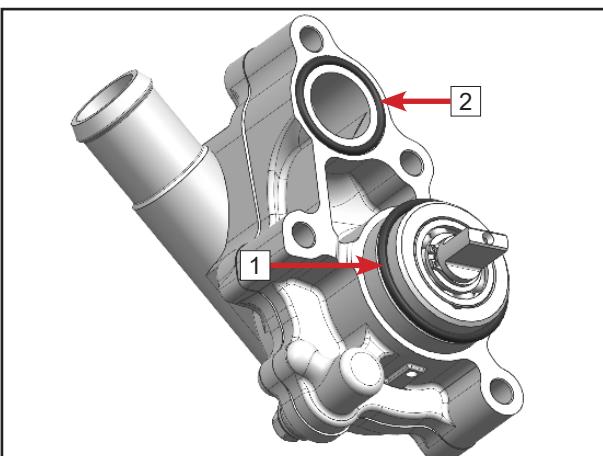
Inspect oil cooler seal ring 1 for damages or hardening, replace if any.

Inspect oil rail cover plate assembly 2 for damages, replace if any.



## 13.6.11 Water Pump Assembly

Check whether the O-ring 34×2.5 1 and the O-ring 22×2.3 2 are aging, damaged or seriously deformed, if so, replace them with new ones.

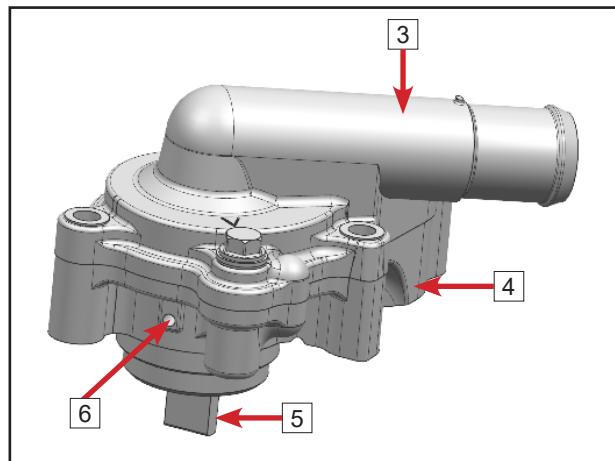


## Water pump sub assembly

Check whether the pump cover **3** and pump body **4** are cracked or damaged, if so, replace with a new one.

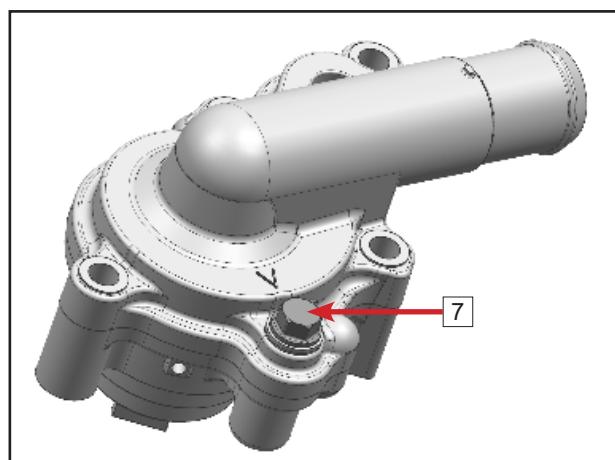
Check whether the pump shaft **5** rotation is flexible, if the bearing stuck, replace with new parts.

Check whether there is coolant leakage at the joint surface of the water pump cover and water pump body. If there is, it indicates that there is a problem with the sealing ring of the water pump cover, or the water pump cover or water pump body is seriously deformed and needs to be replaced. Check whether there is liquid flow out of the leakage hole **6** on the pump body. If there is coolant flow out, it means that the water seal has problems. If there is oil flow out, it means that the oil seal has problems and needs to be replaced with a new part.



## Pump cover removal

Remove M6×22 bolt **7** and washer, remove pump cover.

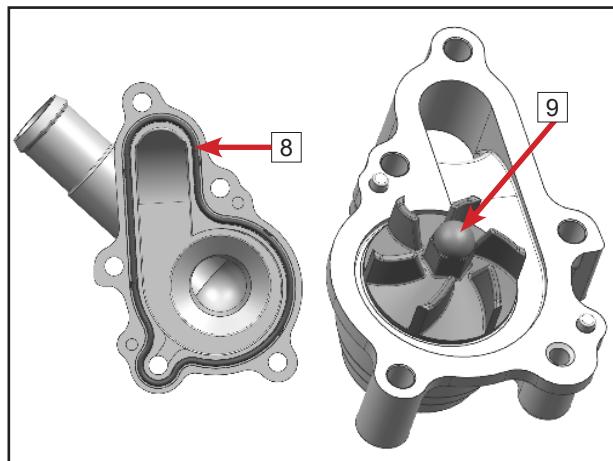


Check whether the sealing ring [8] of the water pump cover is aging, damaged or seriously deformed, if so, replace it with a new one.

Check whether the pump impeller [9] is broken or damaged. If yes, replace it.

## NOTE

**Water pump sub assy is high-requiring in sealing of the parts, during maintenance, in addition to the pump cover and pump cover sealing ring can be replaced separately, the rest should be replaced as a whole. Replacement of the entire pump sub assy is recommended.**



## Pump cover installation

Assemble pump cover in reverse order of disassembly with M6x22 bolt torque of 10N·m.

## 13.6.12 Electric Starter

### Overriding clutch assembly

#### Disassembly

Remove the starting gear assembly [1].

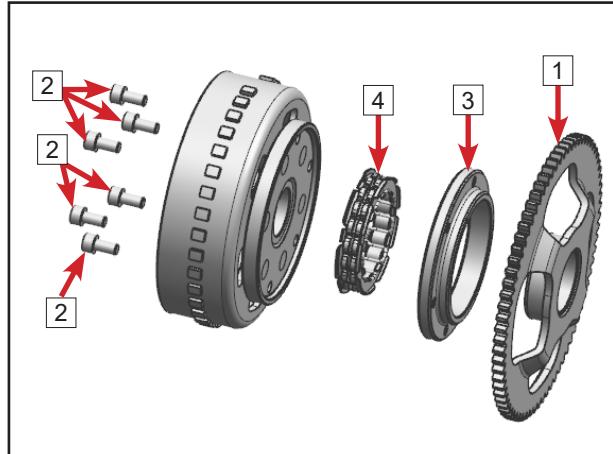
Remove M6×12 hexagon socket cap screws [2].

Remove overriding clutch seat [3].

Remove overriding clutch [4].

## NOTE

**If the overriding clutch does not fail, it does not need to be removed.**



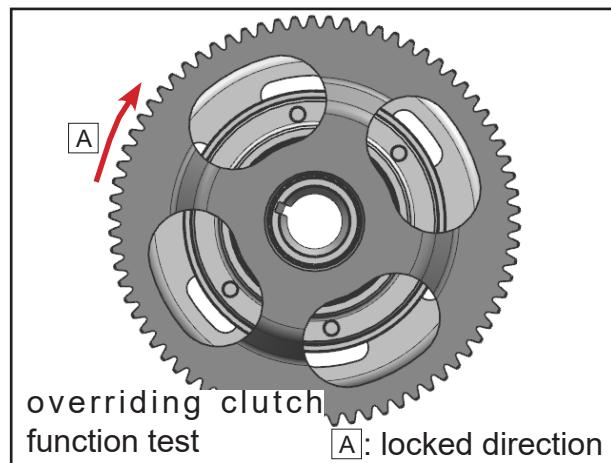
**Inspection**

Carry out function test of overriding clutch, rotate the big gear assembly.

Inspect overriding clutch and overriding clutch seat for wear and other damage.

**NOTE**

**Overriding clutch must be locked when starting big gear assembly by clockwise rotation. Overriding clutch, overriding clutch seat and starting gear assembly should be replaced simultaneously if damaged.**

**Installation**

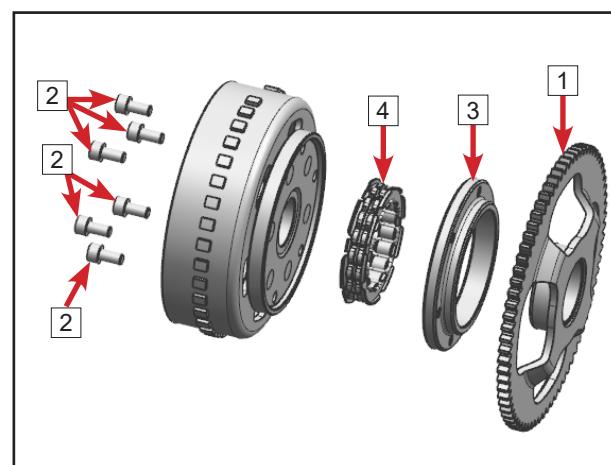
Install overriding clutch **4** onto overriding clutch seat **3**.

Install overriding clutch seat **3** onto magneto rotor.

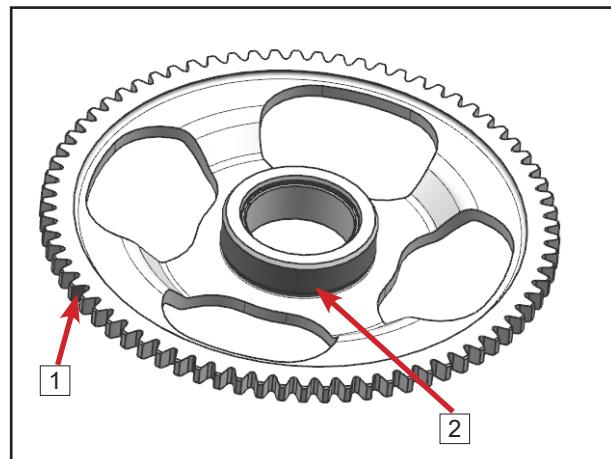
Install M6×12 hexagon socket cap screw **2** (Apply 243 thread locking glue on the thread), screw torque: 10N·m.

At overriding clutch **4** inner circle, apply some oil.

Rotate the starting big gear **1** into overriding clutch **4**.

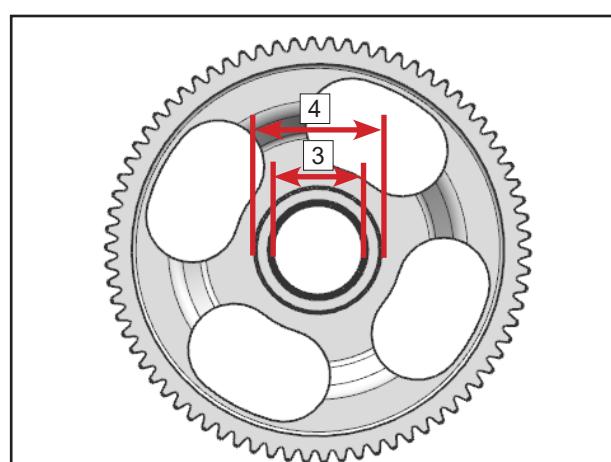
**Starting big gear assembly, double gear, double gear shaft inspection**

Check the wear and other damage of the starting big gear assembly, especially the tooth surface **1** and clutch cylinder surface **2**. If necessary, replace the starting gear assembly.

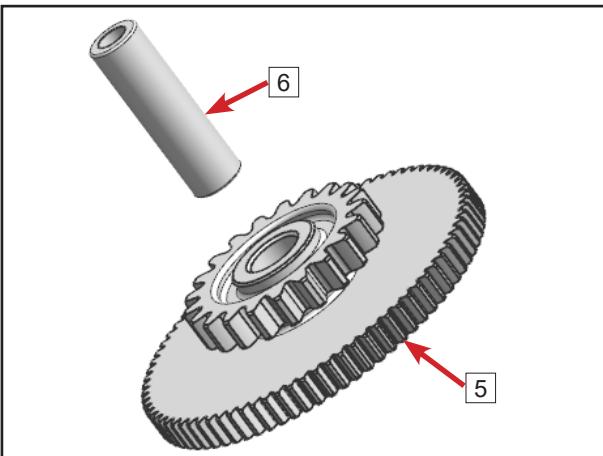


Measure the inner **3** and outer **4** diameters of the starting big gear assembly, and replace it if it exceeds the service limit.

<b>Inner Diameter of Starting Big Gear</b>	
New Part	32.025 mm ~ 32.050 mm
Service Limit	32.075 mm
<b>Outer Diameter of Starting Big Gear</b>	
New Part	45.660 mm ~ 45.673 mm
Service Limit	45.635 mm

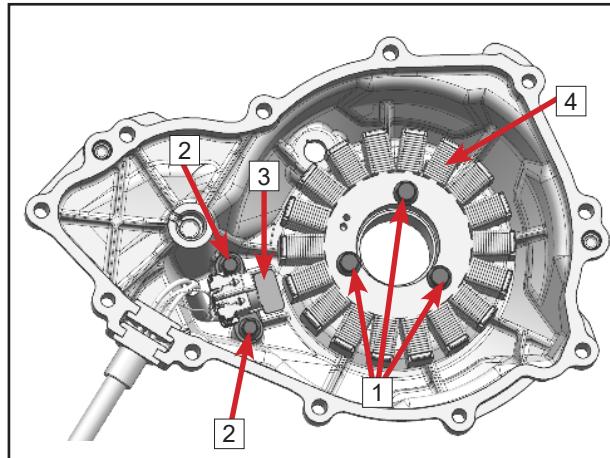


Check whether the double gear **5** and double gear shaft **6** are seriously worn or damaged. If so, replace them with new ones.



### 13.6.13 Magneto Stator Removal

Remove M6×30 bolt **1**.  
 Remove M5×16 bolt **2**.  
 Remove stator wire plate **3**.  
 Remove magneto stator **4**.



### Inspection

Check whether the stator is damaged, if so, replace it with a new one.

Check whether the metal coil is damaged, aged or otherwise damaged. If so, replace it.

### Installation

Install the magneto stator **4** on the left cover.

Install M6x30 bolts **1** (apply 243 thread locking glue on the thread part).

#### Magneto Stator Bolt Torque

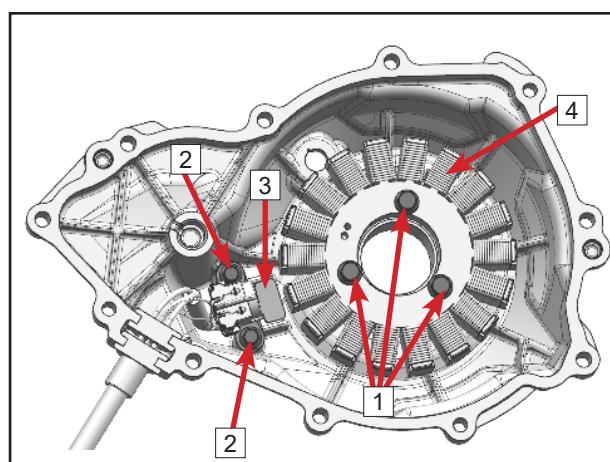
12N·m

Tidy the magneto stator wire harness, install stator wire pressing plate **3** to press the wire harness.

Install M5×16 bolts **2**.

#### Stator Wire Pressing Plate Bolt Torque

6N·m



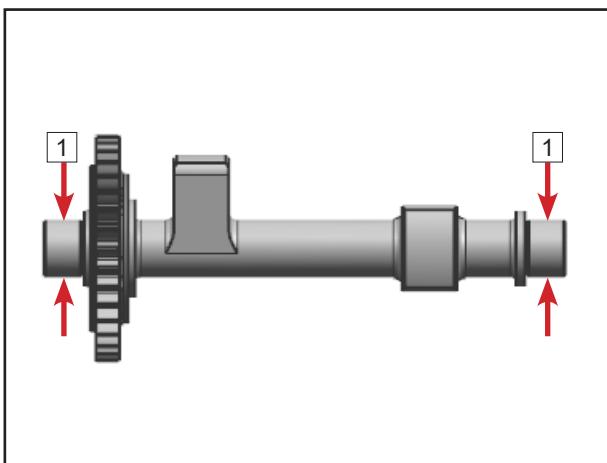
### 13.6.14 Rear Balance Shaft Assembly

Check whether the rear balance shaft is seriously worn or damaged, if so, replace it with a new one.

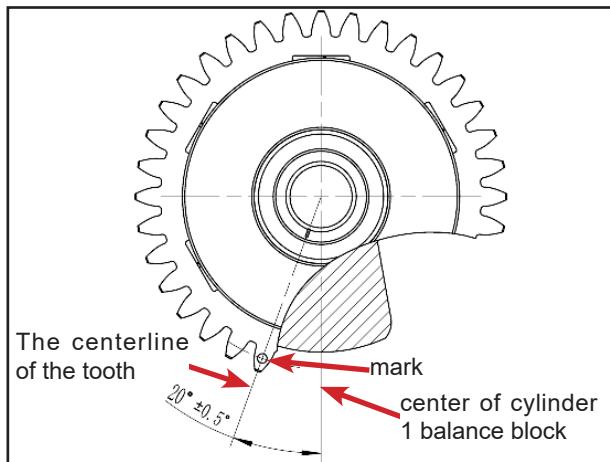
Use micrometer to measure the rear balance shaft journal diameter 1, if it is less than service limit, replace with a new one.

#### Rear Balance Shaft Journal Diameter

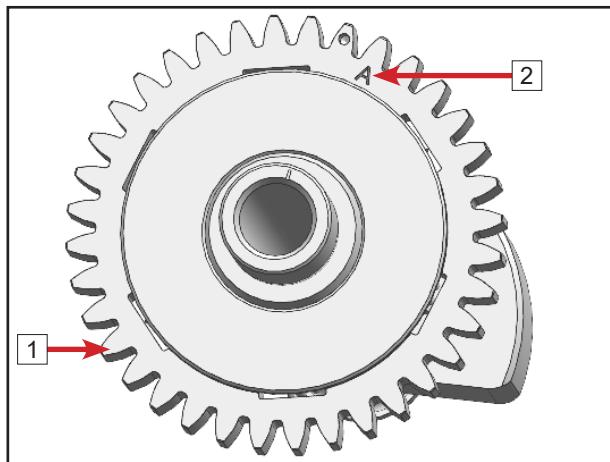
New Part	19.980 mm ~ 19.993 mm
Service Limit	19.960 mm



Check to make sure the balance shaft marks are correctly located, as shown on the right.



The rear balance shaft is divided into group A and group B according to its driven gear 1. A grouping mark 2 is stamped into the driven gear .



Assemble rear balance shaft and crankshaft in pairs according to the following.

Rear Balance Shaft Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

The grouping of crankshaft refers to chapter 13.6.1.1.

## 13.7 Engine Assembly

### 13.7.1 Rear Balance Shaft Assembly Installation

#### NOTE

Assemble crankshaft and rear balance shaft in pairs according to the following.

Rear Balance Shaft Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

The grouping of rear balance shaft refers to chapter 13.6.14.

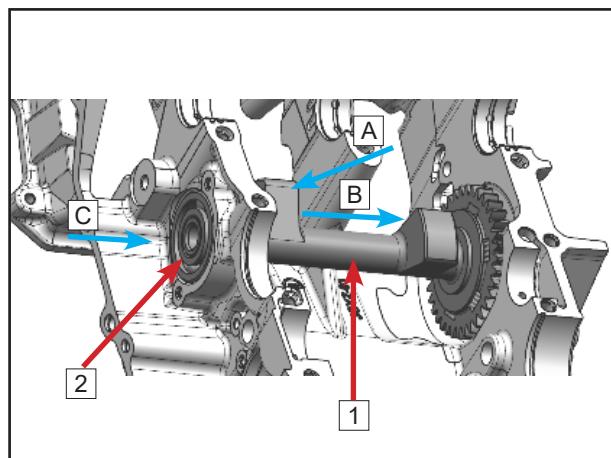
The grouping of crankshaft refers to chapter 13.6.1.1.

Apply an appropriate amount of oil evenly on the surface of the mounting hole of the upper crankcase bearing and the inner ring of the two rolling bearings.

**A:** Tilt the clutch side of the rear balance shaft assembly 1, and then sleeve it into the bearing mounting hole of the upper crankcase.

**B:** The gear side journal of the rear balance shaft assembly 1 is loaded into the magneto side rolling bearing.

**C:** From the clutch side install the 6204 rolling bearing 2 (bearing marked surface outward) into the corresponding hole on the crankcase, and make the bearing inner ring through the balance shaft journal.

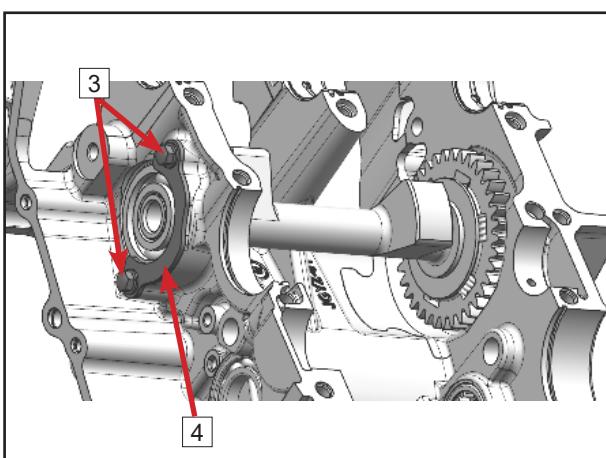


At M6×16 bolt 3 evenly apply 243 thread locking glue to the thread part.

Use M6×16 bolt 3 to put the right bearing baffle 4 tighten the upper crankcase.

#### Right Bearing Baffle Bolt Torque

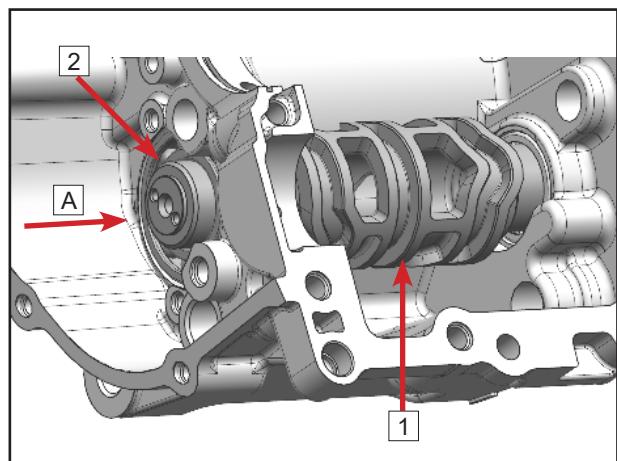
10N·m



### 13.7.2 Shift Drum, Position Cam, Position Swing Arm Installation

On shift drum 1 both side support shaft, apply some oil. Put 16005 rolling bearing 2 (The marked bearing faces the clutch side) onto shaft of shift drum 1.

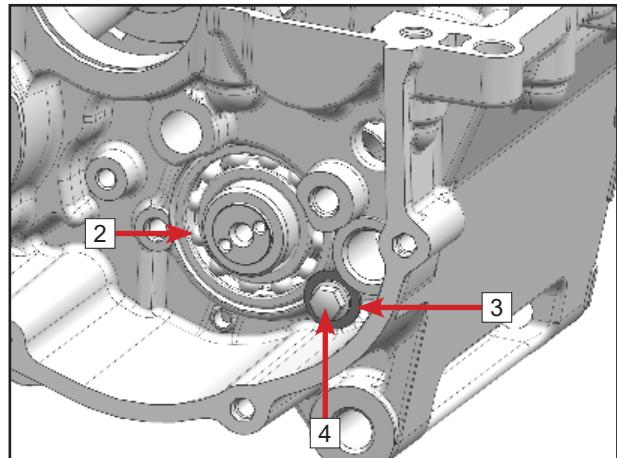
A: From clutch side put shift drum 1 and 16005 rolling bearing 2 onto upper crankcase.



Install 6.3×16.3×1.2 washer 3 and M6×16 bolt 4, press down 16005 rolling bearing 2.

#### M6×16 Bolt Torque

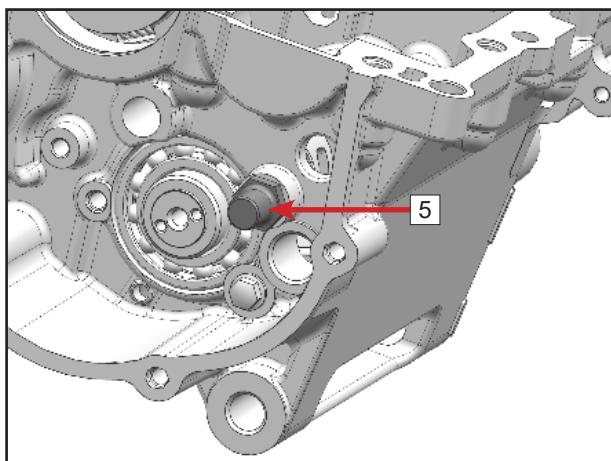
10N·m



Apply 243 thread locking glue evenly on the thread part of the shift positioning torsion spring pin **5**.

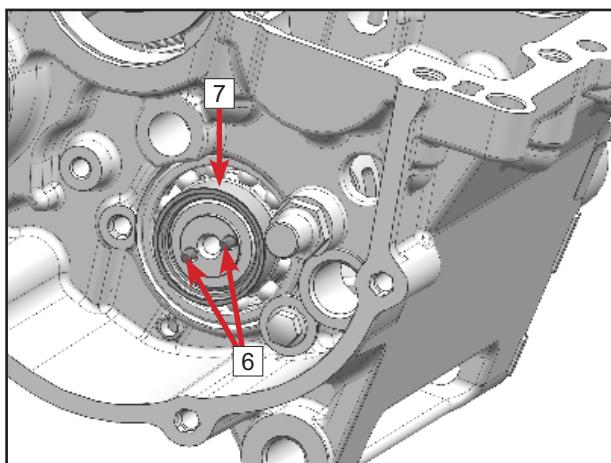
The shift positioning torsion spring pin **5** is mounted on the top crankcase.

<b>Shift Positioning Torsion Spring Pin Torque</b>
20N·m

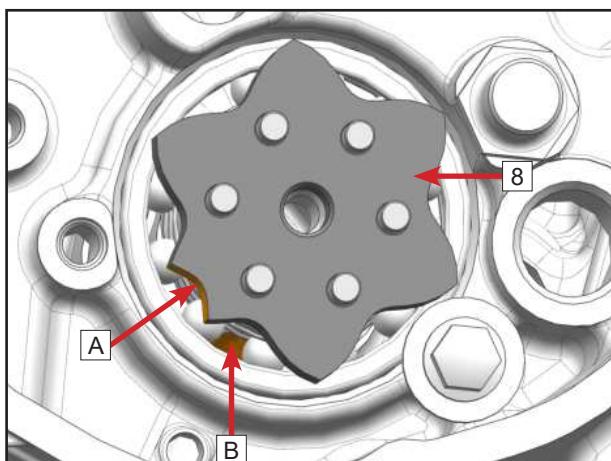


Install P3×9.8 needle roller **6** into the corresponding hole of the shift drum.

Install shift drum sleeve **7** onto the shift drum.



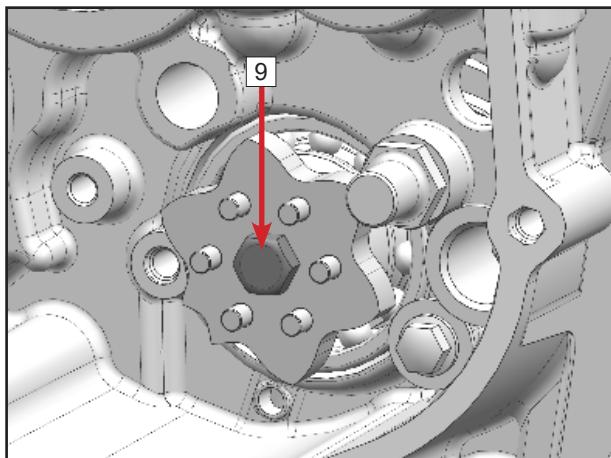
Align the pin hole of the position cam **8** with P3×9.8 needle roller **6**, assemble the position cam **8** on the shift drum and ensure that the neutral position **A** of the position cam is close to the neutral stop groove **B** of the shift drum.



Apply 243 thread locking glue evenly on the thread part of M6x16 bolt **9**.

Fix the position cam to the shift drum with M6x16 bolt **9**.

<b>Position Cam Bolt Torque</b>
10N·m



### Position swing arm installation

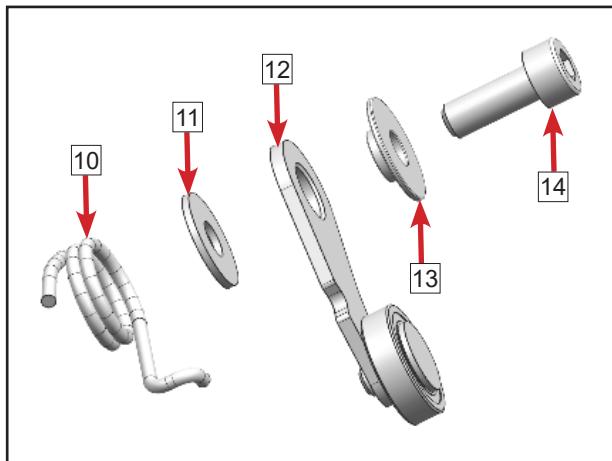
As shown in the figure on the right, assemble the gear shifting positioning swing spring **10**, washer 6.3×16.3×1.2 **11**, gear shifting positioning swing arm parts **12**, gear shifting positioning swing arm sleeve **13** and M6x16 inner hexagon head screws **14** together.

The end of the spring of the shift positioning swing arm should be stuck into the groove of the shift swing arm part.

Shifting swing arm parts in shifting positioning swing arm sleeve rotation should be flexible.

#### NOTE

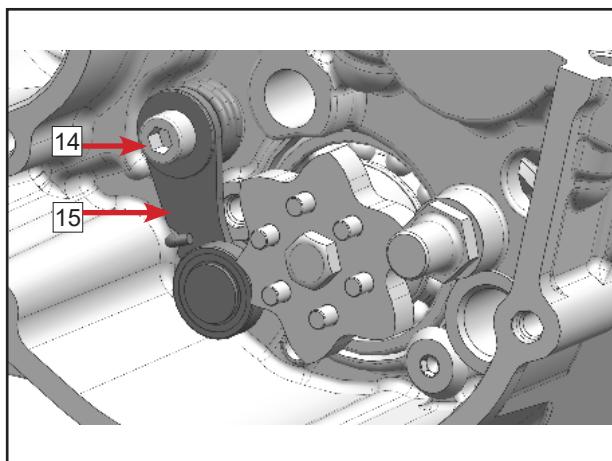
**Washer 6.3 x 16.3 x 1.2 smooth face towards shift positioning swing arm parts.**



Turn the shift drum to the position shown on the right.

The gear shifting positioning parts **15** is fixed on the top crankcase, and the positioning wheel of the gear shifting swing arm part is clamped into the neutral position of the positioning cam.

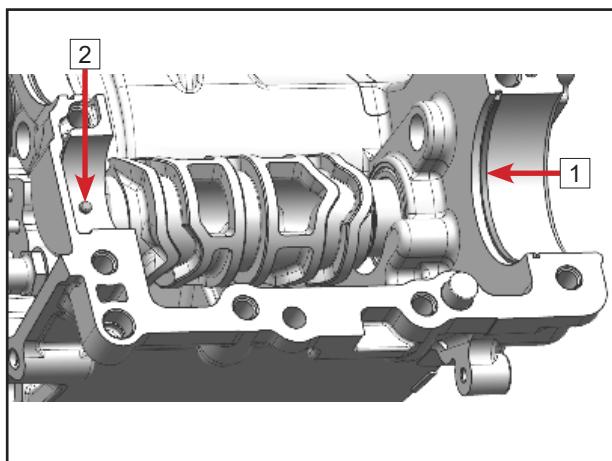
<b>M6x16 hexagon socket head screw <b>14</b> Torque</b>
10N·m



### 13.7.3 Countershaft Installation

Install the 62-28 bearing stop ring **1** into the groove of the upper crankcase to ensure that it is fully slotted.

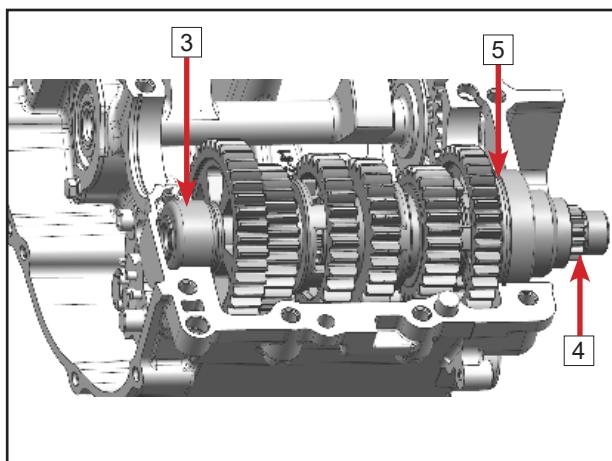
Install P4×7.8 needle roller **2** into the corresponding hole of the upper crankcase.



Apply an appropriate amount of oil evenly on the inner surface of the bearing sleeve **3**.

The bearing sleeve **3** is set to the needle roller bearing of the countershaft assy **4**.

Align the bearing thrust groove **5** of the countershaft assy **4** with the 62-28 bearing stop ring **1**, align the limit hole of the bearing sleeve **3** with P4×7.8 needle roller **2**, and install the countershaft assy **4** on the upper crankcase.



## 13.7.4 Fork Shaft and Gearshift Fork Installation

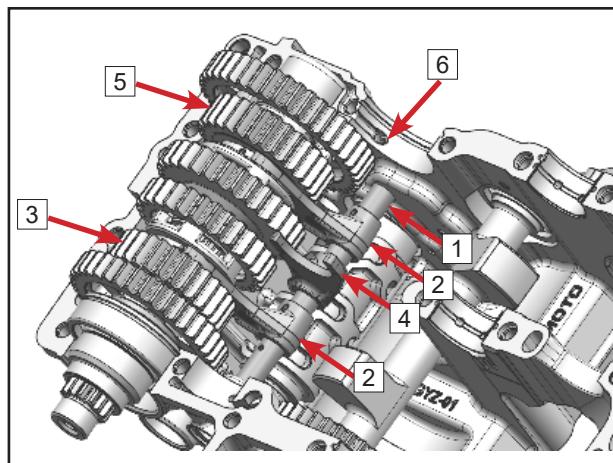
Daub an appropriate amount of oil evenly on the outer surface of the fork shaft assembly.

Pass the fork shaft assembly 1 (with the end of the bowl plug facing the magneto side) through the mounting hole of the upper crankcase.

The shift fork (LH and RH) 2 is inserted into the fork slot of the sixth gear 3 of the countershaft, and the fork shaft assembly 1 is pushed through the fork hole.

The shift fork (middle) 4 is mounted on the fork shaft assembly 1.

The shift fork (LH and RH) 2 is inserted into the fork slot of the fifth gear 5 of the countershaft, and the fork shaft assembly 1 is pushed through the fork hole.



Rotate the fork shaft assembly 1, so that the upper needle align with the groove of upper crankcase, push the fork shaft assembly 1 in place (At this point, the positioning hole at the other end of the fork shaft assembly 1 is aligned with the hole in the upper crankcase).

Insert the 6×16.2 positioning pin 6 into the positioning hole of the fork shaft assembly 1 to fix the position of the fork shaft assembly 1.

### NOTE

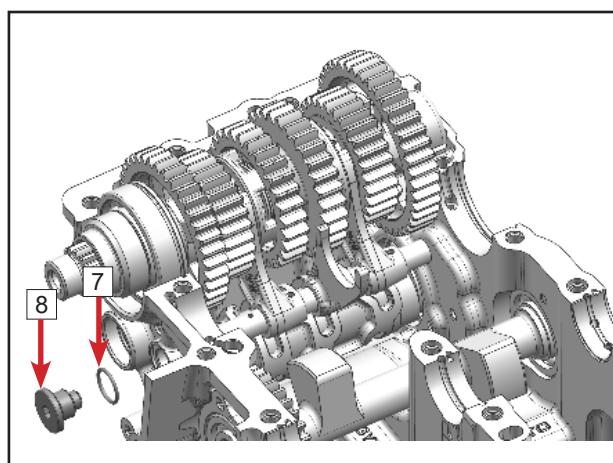
**The label "CF R/L" of the shift fork (left and right) faces the magneto side, the label "CF C" of the shift fork (middle) faces the clutch side, and the guide pin of the shift fork is correctly stuck into the slot of the shift drum.**

Put an appropriate amount of oil on the surface of the 15× 1.9 O-ring 7 evenly and put it into the corresponding hole of the upper crankcase.

Install fork shaft cover 8 on upper crankcase.

### Fork Shaft Cover Torque

5N·m



### 13.7.5 Main Shaft Installation

Install the 6205 bearing stop ring 1 into the groove of the upper crankcase to ensure that it is fully slotted.

Install P4×7.8 needle roller 2 into the corresponding hole of the upper crankcase.

Apply an appropriate amount of oil evenly on the inner surface of the bearing sleeve 4.

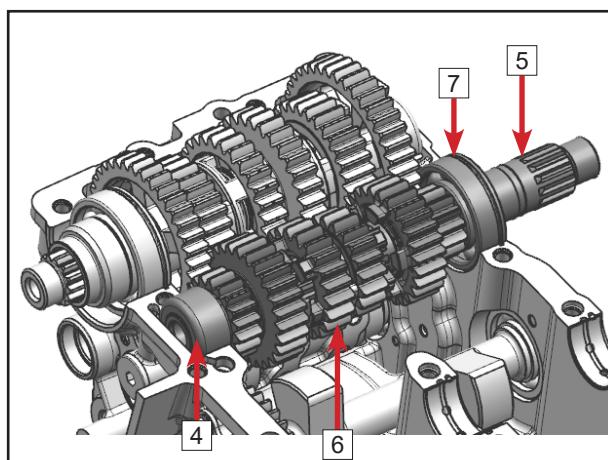
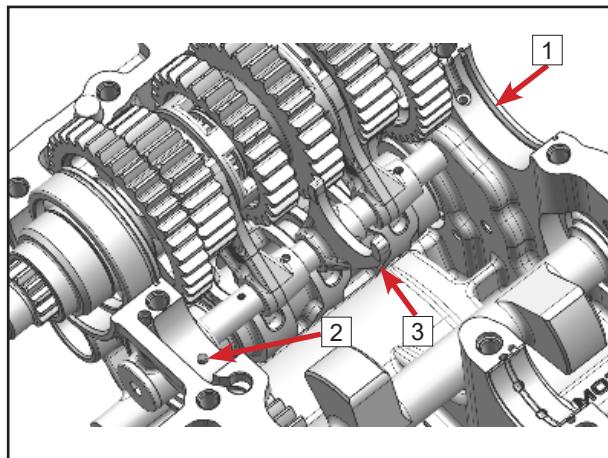
Set the bearing sleeve 4 to the needle roller bearing of the shaft assembly 5. The shift fork (middle) 3 is clamped into the fork groove of the third and fourth gear 6 of the main shaft.

Align the bearing thrust groove 7 of the shaft assembly 4 with the 6205 bearing stop ring 1, align the limit hole of the bearing sleeve 4 with P4×7.8 needle rolling 2, and install the shaft assembly 5 on the upper crankcase.

The gears of the main and countershafts should be engaged normally.

Daub appropriate amount of oil on the tooth surface of each gear.

Rotate the shaft combination 5, should be flexible without stuck.



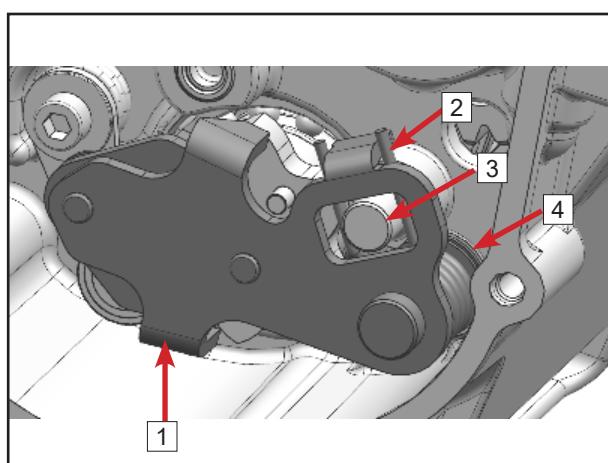
### 13.7.6 Gearshift Lever Installation

Daub an appropriate amount of oil evenly on the mating surface of the gearshift lever.

Align the lever with the mounting hole on the box body, use gearshift lever return spring 2 to stuck the shift positioning spring pin 3, and the gearshift lever 1 is assembled on the crankcase.

#### NOTE

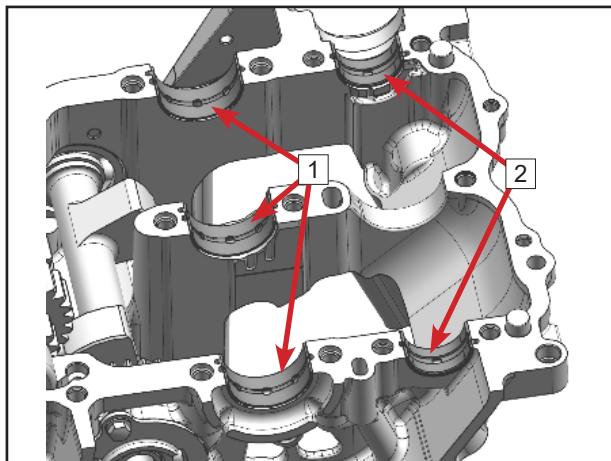
**Before assembly, check whether the shaft elastic retaining ring 14 (4) on the gearshift lever is completely located in the retaining ring groove, and whether the washers 14×21×1 on both sides of the retaining ring are lost.**



## 13.7.7 Crankshaft Connecting Rod and Front Balance Shaft Installation

Before assembly, according to the following table, confirm again that the main shaft bearing 1 and the balance shaft bearing 2 on the upper crankcase are correctly assembled.

Crankcase/Crankshaft/Main Shaft Bearing Grouping		
Crankshaft main bearing seat hole mark	Crankshaft main journal mark	Main shaft bearing color
A	A	red
A	B	black
B	A	black
B	B	blue

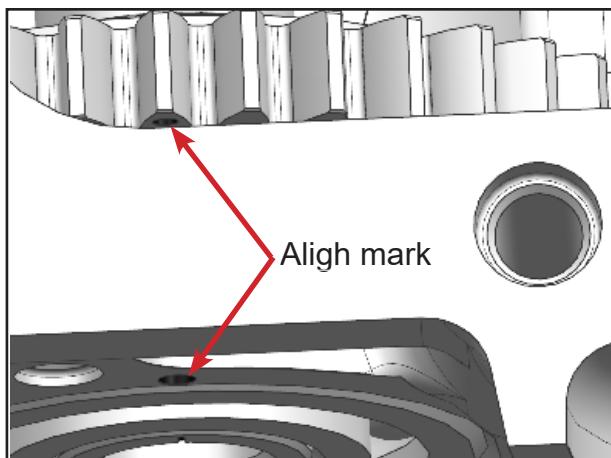
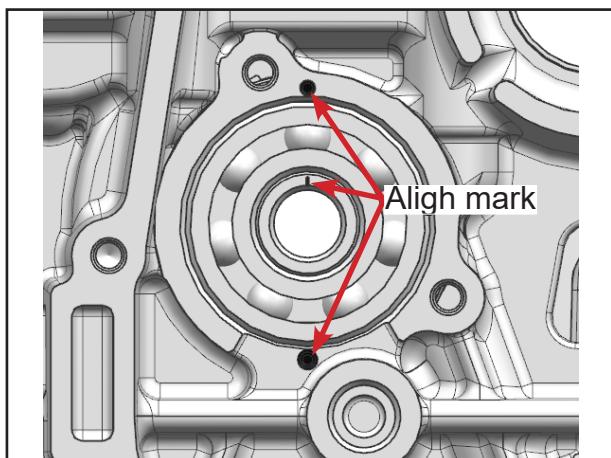


Crankcase/front balance shaft/balance shaft bearing grouping		
Front Balance Shaft Bearing Seat Hole Mark	Front Balance Shaft Journal Mark	Balance Shaft Bearing Color
A	1	Black
A	2	Red
B	1	Blue
B	2	Black

Clean the surface of main shaft bearing and balance shaft bearing with dust-free paper.

Evenly apply proper amount of oil on the inner surface of the main shaft bearing and balance shaft bearing.

Rotate the balance shaft to align the marking line with the marking pit on the crankcase vertically.

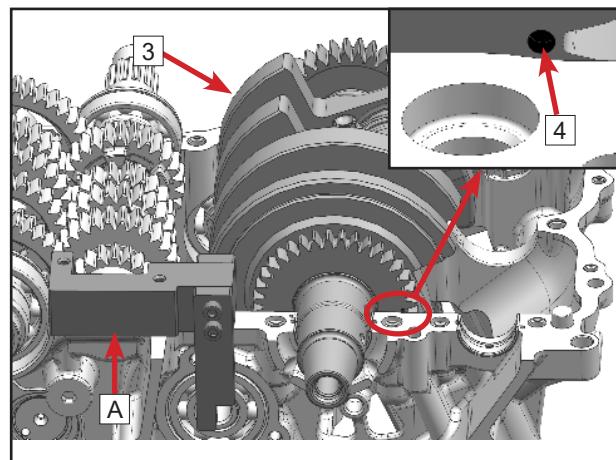


At this point, the dot mark on the balance shaft driven gear and the pit mark on the crankcase are also vertically aligned.

Fix the rear balance shaft in the position with the rear balance shaft positioning stop fixture **A** (0SQ0-000000-922-005).

Clean crankshaft journal with dust-free paper.

Hold the cone part on the left side of the crankshaft and the timing sprocket on the right side respectively with both hands, from right to left with the horizontal direction of 45°, slowly place the crankshaft connecting rod assembly **3** in place, at this time the mark **4** on the driving gear of the balance shaft is flush with the box closing surface.



**NOTE**

Assembly crankshaft and rear balance shaft in pairs according to the following.

Crankshaft Grouping Mark	Rear Balance Shaft Grouping Mark
A	B
B	A

The grouping of crankshaft refers to chapter 13.6.1.1.

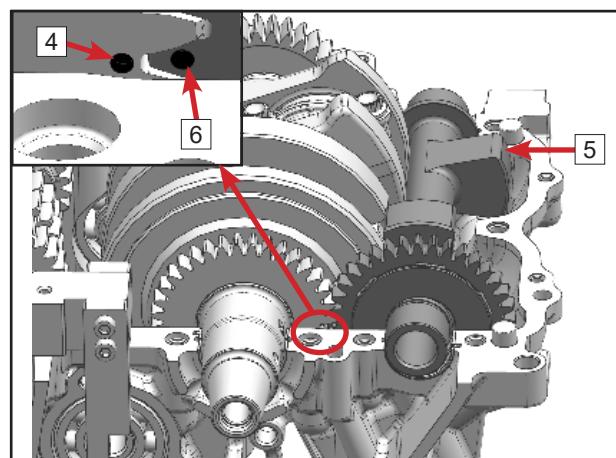
The grouping of rear balance shaft refers to chapter 13.6.14.

Clean the journal of the front balance shaft assembly **5** using dust-free paper.

Align the mark **6** on the balance shaft driven gear with that **4** on the balance shaft driving gear, and slowly place the front balance shaft assembly **5** in place.

**NOTE**

Assembly crankshaft and front balance shaft in pairs according to the following.



Crankshaft Grouping Mark	Front Balance Shaft Grouping Mark
A	B
B	A

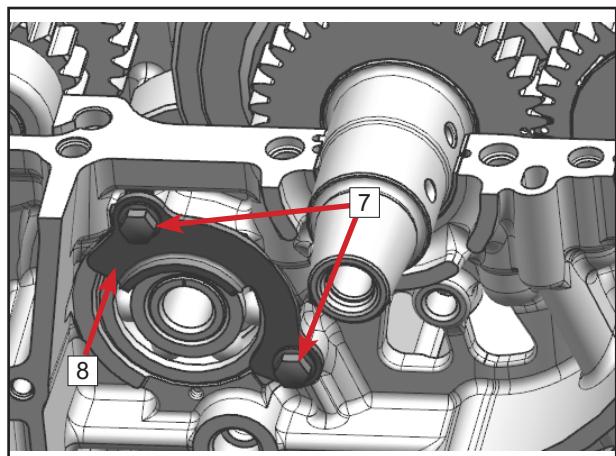
The grouping of front balance shaft refers to chapter 13.6.1.1.

Daub an appropriate amount of oil evenly on the surface of the exposed crankshaft journal and the front balance shaft journal. Remove the rear balance shaft positioning stop gear. Rotation crankshaft, should be flexible without stuck.

Apply 243 thread locking glue evenly on the thread part of M6x16 bolt 7.

Fix the left bearing baffle plate 8 on the upper crankcase with M6x16 bolts 7, and press the bearing.

<b>Left Bearing Baffle Plate Bolt Torque</b>
10N·m



### 13.7.8 Crankcase Closing

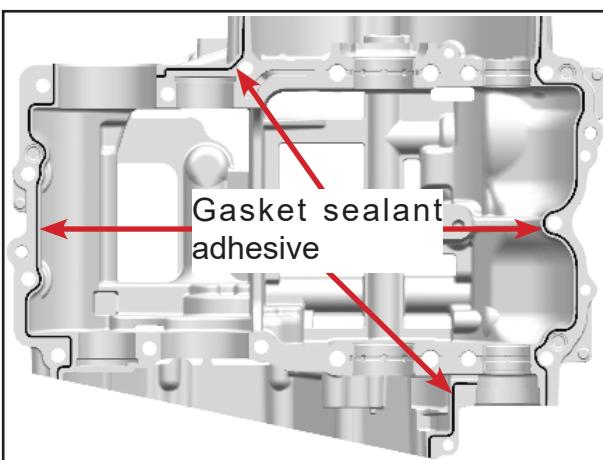
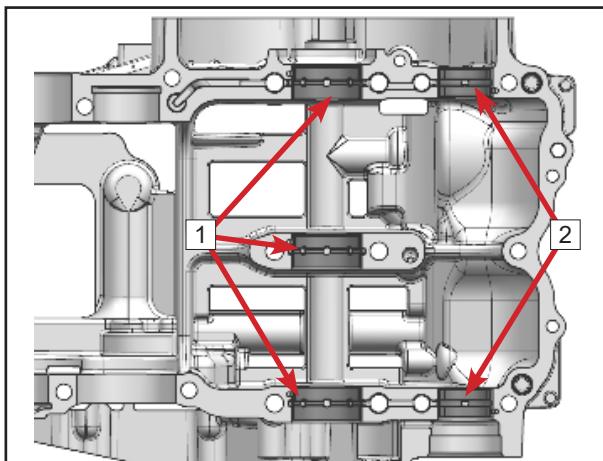
According to the paired assembly list in the section of "Engine assembly - Mounting crankshaft connecting rod assembly and front balancing shaft assembly", reconfirm that the main shaft bearing 1 and balancing shaft bearing 2 assembly on the lower crankcase are correct.

Clean the surface of main shaft bearing and balance shaft bearing with dust-free paper.

Evenly apply proper amount of oil on the inner surface of the main shaft bearing and balance shaft bearing.

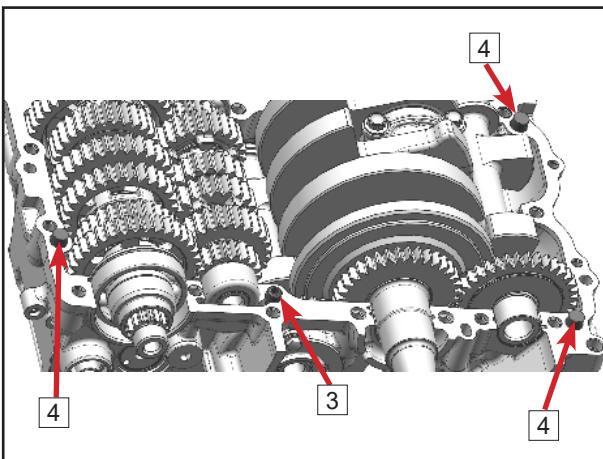
Wipe the upper and lower crankcase sealing surface with dust-free paper to ensure that the sealing surface is clean and dry.

The sealing surface of the lower crankcase is coated with KB598 sealant, the diameter of the glue line is  $(1.5\pm0.5)$  mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

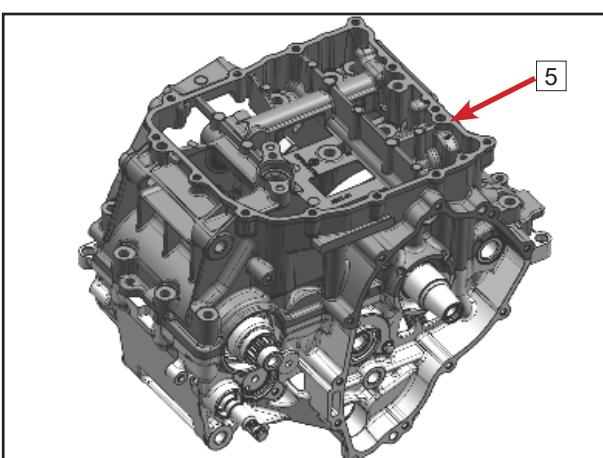


Install the throttle plug 3 (small hole down) into the corresponding hole of the upper crankcase.

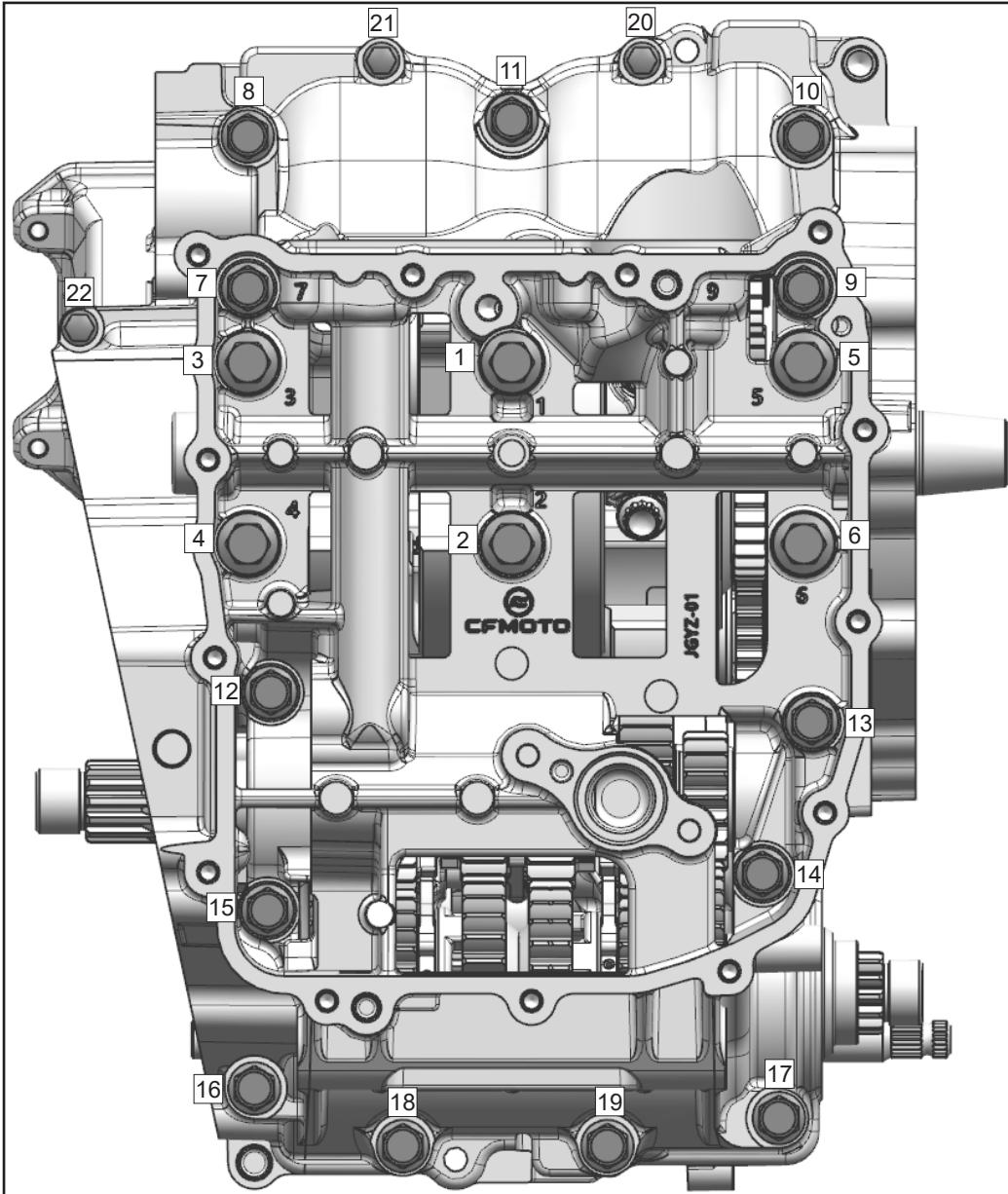
Check whether  $\Phi10\times14$  locating pins 4 are missing at all places of the upper crankcase.



The positioning hole 5 of the lower crankcase is aligned with the  $\Phi10\times14$  positioning pin 4 on the upper crankcase, and the lower crankcase is assembled on the upper crankcase.



According to the serial order shown, pretighten the box bolts until the bolt heads just fit the box surface (torque not higher than 4N·m)



Tighten the box bolts in the same sequence and in the following steps.

Step	Bolt No.	Torque (N·m)
1	1 ~ 19	8
2	1 ~ 19	20
3	1 ~ 6	35
4	7 ~ 19	27
5	20 ~ 22	10

Use dust-free paper to wipe clean the sealant squeezed out of the box surface.

The crankshaft, main shaft and counter shaft should be rotated flexibly without stagnation, otherwise, the box closing bolts should be loosened for inspection.

Bolt No.	Part Name
1 ~ 6	bolt assy M9×108
7 9 13	bolt assy M8×105
14	bolt assy M8×55
12 15	bolt assy M8×45
11 18 19	bolt M8×45
8 10 16 17	bolt M8×55
20 21 22	bolt M6×30

**NOTE**

It should be controlled within 5 minutes from the beginning of glue coating to the completion of box tightening bolts. Before assembling bolts, evenly daub the mixture of oil and MoS<sub>2</sub> grease (weight ratio 10:1) on the supporting surface of bolt head and thread part of bolt 1 ~ 6, evenly daub the mixture of oil and MoS<sub>2</sub> grease on the thread part of bolt 7~19 (weight ratio 10:1).

### 13.7.9 Oil Pump Sub-assembly and Oil Pressure Switch Installation

Install the P4×7.8 needle roller 1 into the corresponding hole of the lower crankcase. Install the outer rotor of the oil pump 2 into the corresponding hole of the lower crankcase.

Insert P4×15.8 needle roller 3 into the hole of the oil pump shaft 4, and make the length of the hole exposed at both ends of the needle roller roughly the same.

Make the needle groove of the rotor 5 of the oil pump face inward and align with P4×15.8 needle rolling 3, and install the rotor of the oil pump on the shaft of the oil pump.

Install the oil pump shaft and the inner rotor of the oil pump together on the lower crankcase.

**NOTE**

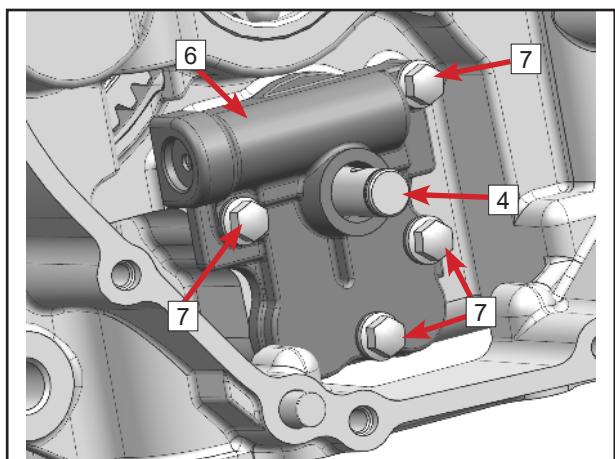
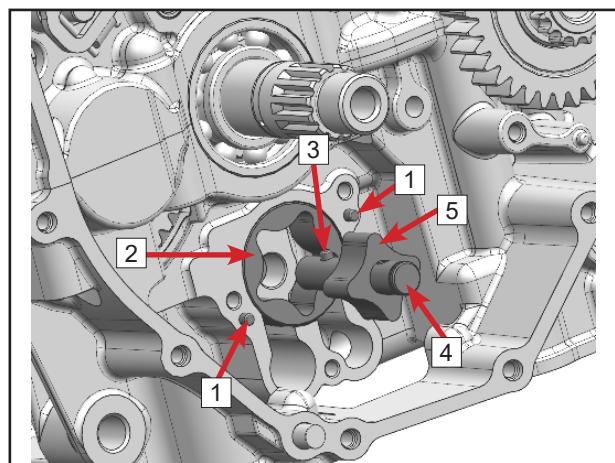
Before assembly, evenly apply proper amount of oil on the surface of oil pump mounting hole of the lower crankcase and oil pump shaft.

Pass the oil pump cover assembly 6 through the oil pump shaft 4, align the P4×7.8 needle, and install it on the lower crankcase.

Install and diagonally cross tighten M6x22 bolts 7.

**Oil Pump Cover Bolt Torque**

10N·m

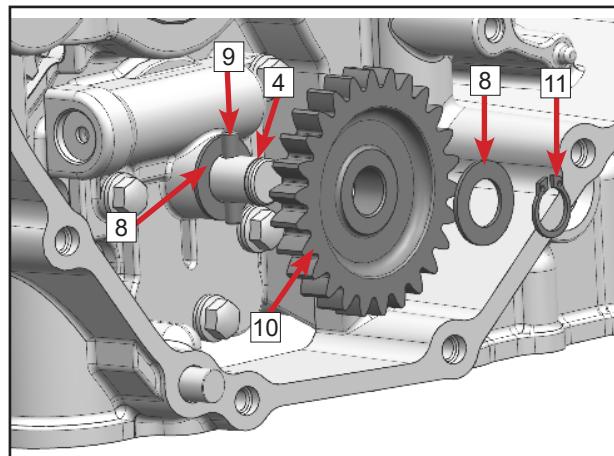


Install the washer  $11 \times 20 \times 1$  [8] on the oil pump shaft.

Insert P4×21.8 needle roller [9] into the hole of the oil pump shaft [4], and make the length of the hole exposed at both ends of the needle roller roughly the same.

Make the needle roller groove of the oil pump gear [10] face inward and align with P4×21.8 needle roller [9], and install the oil pump gear on the oil pump shaft.

Then the washer  $11 \times 20 \times 1$  [8] and elastic ring [11] for  $\Phi 11$  shaft are installed on the oil pump shaft.



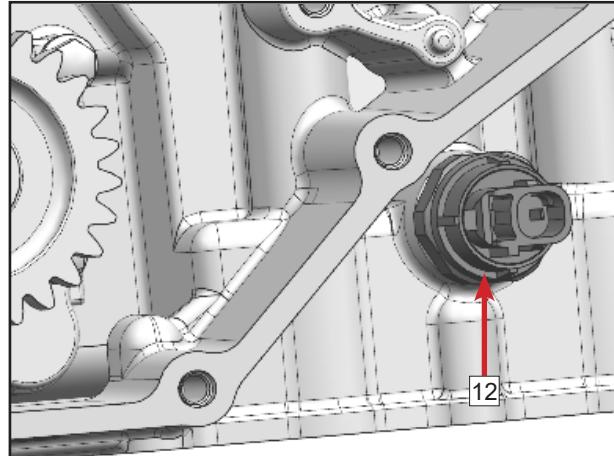
#### NOTE

**Circlips for shaft shall not be used twice, must be replaced with a new. The circlip must fall completely into the clamping groove of the oil pump shaft.**

Apply an appropriate amount of 567 thread sealant to the thread part of the oil pressure switch [12] and install it on the lower crankcase.

#### Oil Pressure Switch Torque

10N·m

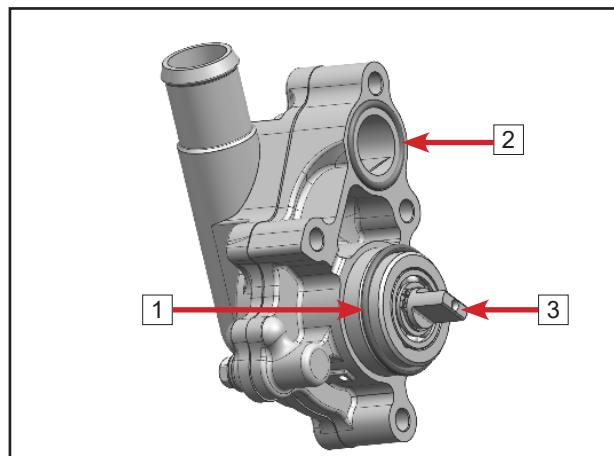


### 13.7.10 Water Pump Installation

Check and confirm that O-ring  $34 \times 2.5$  [1] and O-ring  $22 \times 2.3$  [2] are not damaged or lost.

Turn the pump shaft [3], so that the square part of the shaft is aligned with the square groove on the balance shaft.

Insert the pump shaft [3] into the square groove of the front balance shaft.



Use M6x42 bolts [4] (one of which passes through the wire clip assy [5]) to fix the water pump assembly [6] onto the crankcase, and tighten the bolts diagonally.

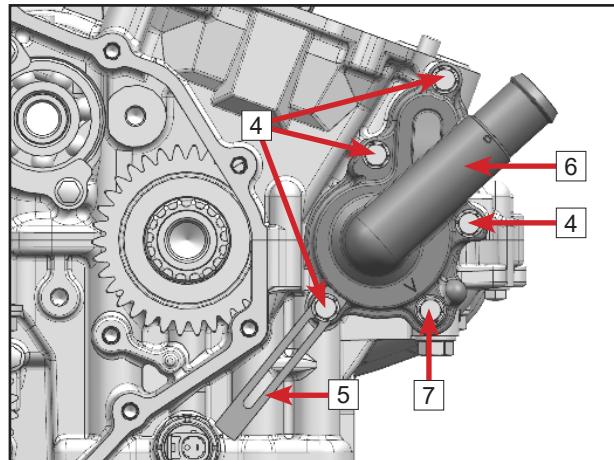
#### Water Pump Bolt Torque

10N·m

Tighten M6×22 bolt [6].

#### M6×22 Bolt Torque

10N·m



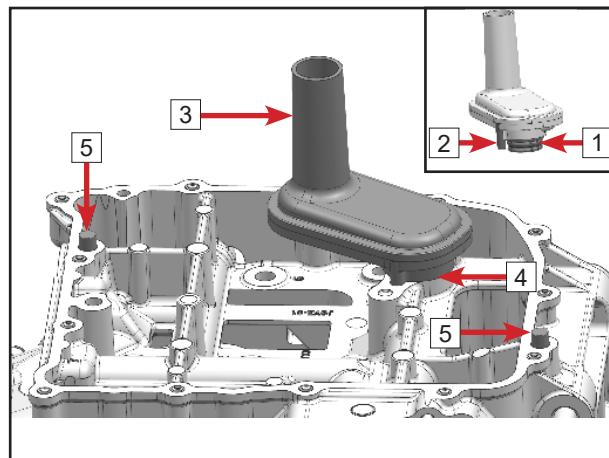
### 13.7.11 Oil Pan Installation

Check and confirm no damage and loss of oil suction pan sealing ring **1**.

Align the positioning column **2** of the filter set **3** with the positioning hole on the crankcase, and insert the filter set **3** into the corresponding hole of the lower crankcase.

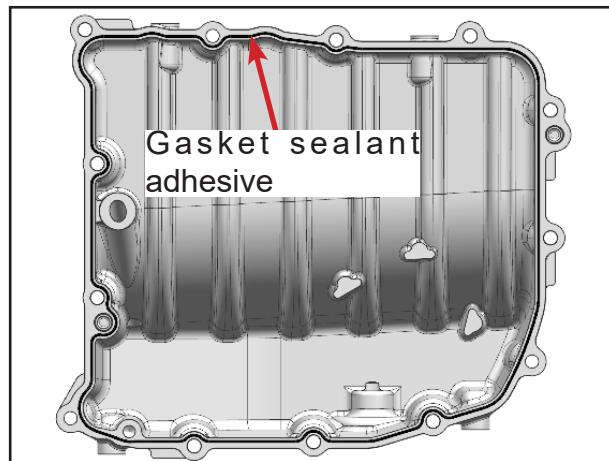
Press the filter set **3** to make its end face **4** contact with the lower crankcase and install it in place.

Install  $\Phi 8 \times 12$  positioning pin **5**.



Wipe the sealing surface of the crankcase and oil pan with dust-free paper to ensure that the sealing surface is clean and dry.

KB598 sealant is applied on the sealing surface of the oil pan. The diameter of the sealant line is  $(1.5 \pm 0.5)$  mm. The glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

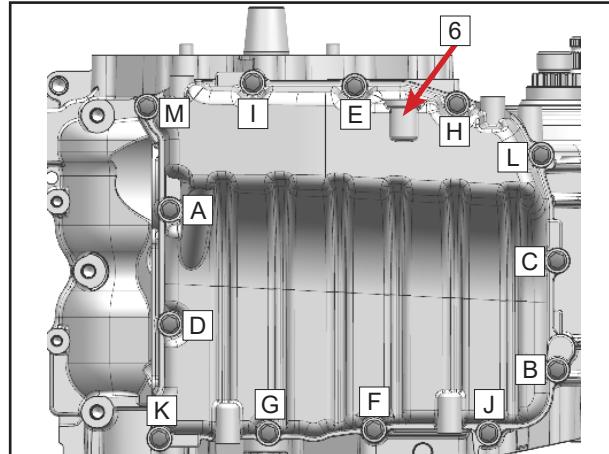


Align the positioning hole of the oil pan **6** with  $\Phi 8 \times 12$  positioning pin on the lower crankcase, and install the oil pan to the lower crankcase.

Install and tighten the M6x25 bolts in the sequence of **A** ~ **M**.

#### Oil Pan Bolt Torque

10N·m



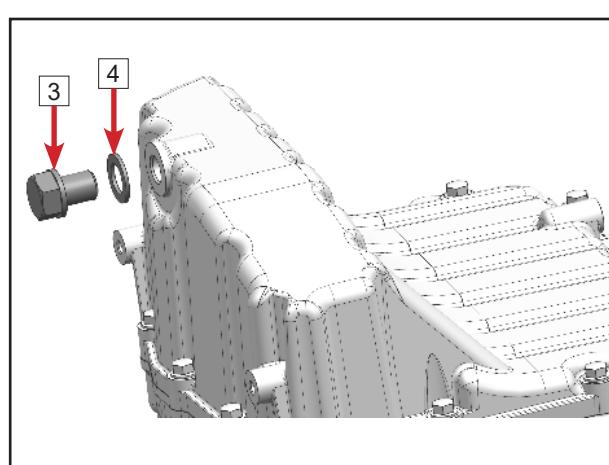
#### NOTE

It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.

The M12x1.5 magnetic oil drain bolt **3** is fitted with a washer **4** and installed on the oil pan.

#### Magnetic Oil Drain Bolt Torque

35N·m



## 13.7.12 Oil Rail Cover Plate Assembly Installation

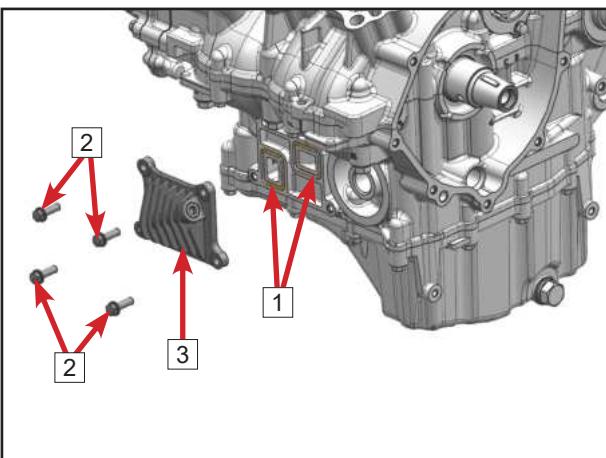
Turn over the housing assembly and place it securely.

Install the oil cooler seal ring **1** to the lower crankcase, making sure that the seal ring is fully seated in the groove.

Fasten the oil rail cover plate assembly **3** to the lower crankcase using M6 x 18 bolts **2**, tighten the bolts diagonally.

### Oil Rail Cover Plate Bolt Torque

10N·m

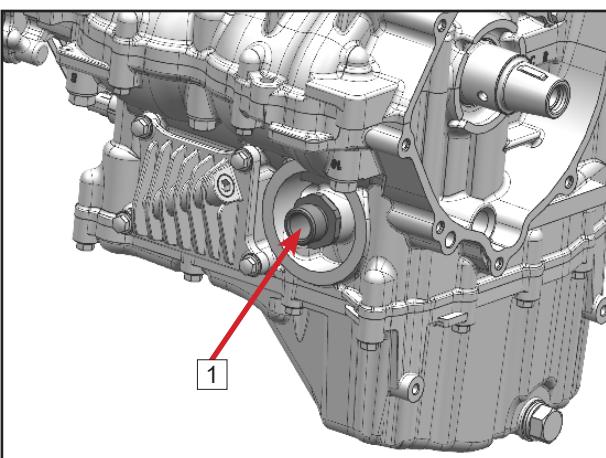


## 13.7.13 Oil Filter Installation

Install the oil filter installation bolt **1** to the lower crankcase.

### Oil Filter Installation Bolt Torque

25N·m

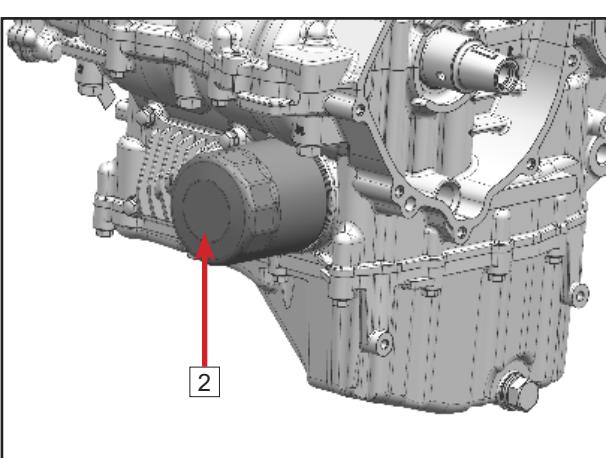


Evenly daub appropriate amount of oil on the sealing ring of the oil filter **2**.

Install the oil filter **2** on the lower crankcase.

### Oil Filter Torque

17N·m



## 13.7.14 Cylinder Body and Piston Parts Installation

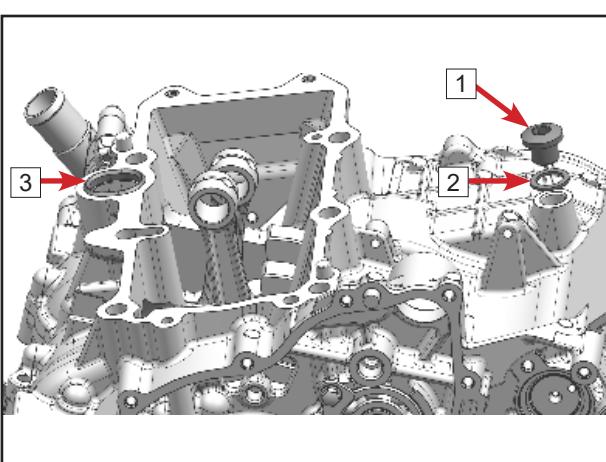
The M14×1.25×12 bolt **1** is fitted with gasket 14 **2** and then installed on the upper crankcase.

### M14×1.25×12 Bolt Torque

25N·m

Check and confirm that there is no damage to the sealing ring **3** of the upper nozzle.

The upper nozzle sealing ring **3** (chamfering side up) is installed on the upper crankcase.

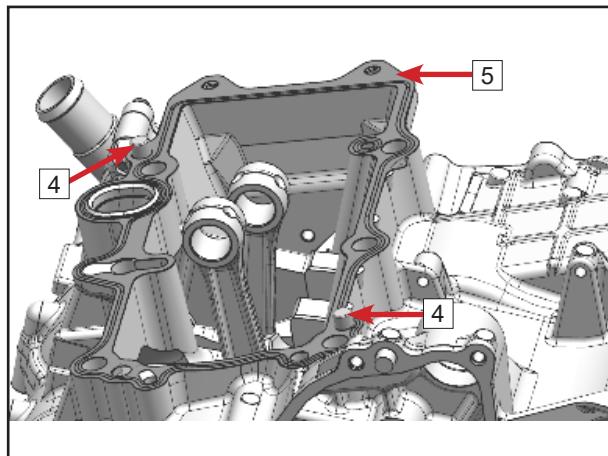


Check and confirm that  $\Phi 8 \times 12$  locating pin **4** is not lost.

The cylinder body gasket **5** is mounted on the upper crankcase.

**NOTE**

**Cylinder body gaskets should not be used twice and must be replaced.**



Rotate the crankshaft, adjust the small head of one connecting rod to the highest point.

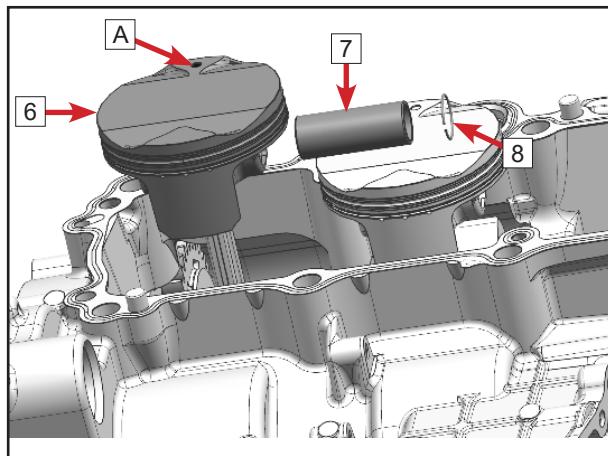
Apply proper amount of oil evenly on the surface of the piston pin hole and the outer surface of the piston pin.

Pass the piston pin **7** through the piston pin hole and the small head hole of the connecting rod, and install the piston parts **6** on the connecting rod.

The piston pin retaining ring **8** on the other side shall be assembled with needle-nose pliers, and the retaining ring shall be fully slotted, and the gap of the retaining ring shall be staggered with the piston gap. Assemble another piston part in the same manner.

**NOTE**

**When assembling, the pit **A** on the top of the piston shall be toward the exhaust side. The piston pin retaining ring shall not be used twice and must be replaced with a new one.**



In order to facilitate the piston into the cylinder body 9, evenly apply an amount of oil in the bottom 20mm range of the cylinder hole.

Press the piston ring of one of the pistons by hand and insert the ring completely into the cylinder body 9.

Rotate the crankshaft until the piston of the other cylinder is easily assembled.

Insert another piston part into the cylinder body 9 in the same manner.

Align the positioning hole of the cylinder body 9 with  $\Phi 8 \times 12$  positioning pin, and install the cylinder body 9 on the upper crankcase.

Press the cylinder body, turn the crankshaft should be flexible.

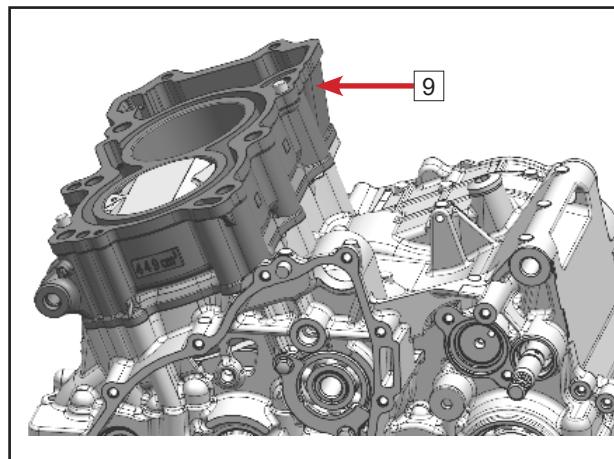
Use dust-free paper to remove oil from the top of the piston.

When assembling, pay attention to the following details:

The piston and cylinder body must be assembled in pairs according to the requirements in the table below.

Cylinder Body Mark	Piston Mark
I	I
II	II

Each engine must be fitted with pistons in the same weight group as described in the section 13.6.5.



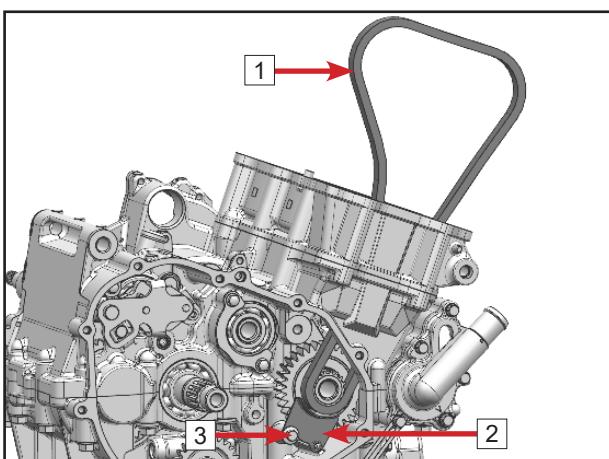
### 13.7.15 Timing Chain Installation

Put the timing chain assembly 1 from the chain chamber of the cylinder block, and hang it on the crankshaft sprocket.

Pass the limit hole on the timing chain tray 2 through the limit column on the lower crankcase.

Install M6x12 bolt 3 to fix the timing chain tray 2 to the lower crankcase.

Timing Chain Tray Bolt Torque
10N·m

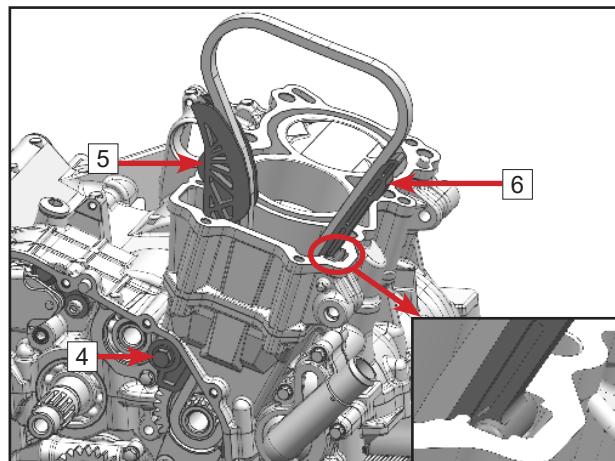


Install thread pin shaft 4, the tension plate 5 is fixed on the upper crankcase.

**Thread Pin Shaft Torque**

20N·m

Install the chain guide 6 in place.



### 13.7.16 Cylinder Head Installation

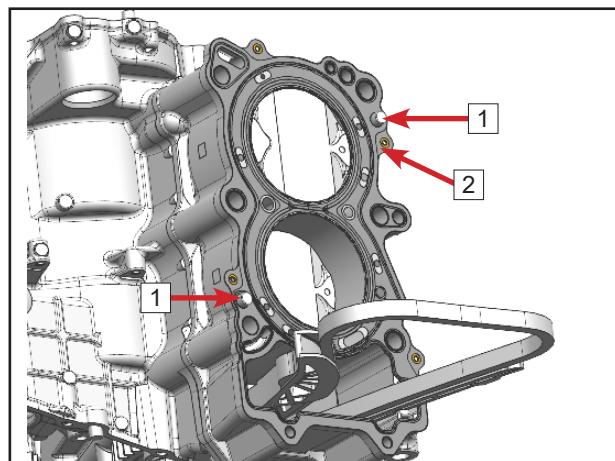
Clean the upper plane of the cylinder body with dust-free paper.

Check and confirm that  $\Phi 8 \times 12$  locating pin 1 is not lost.

The cylinder head gasket assembly 2 is mounted on the cylinder body.

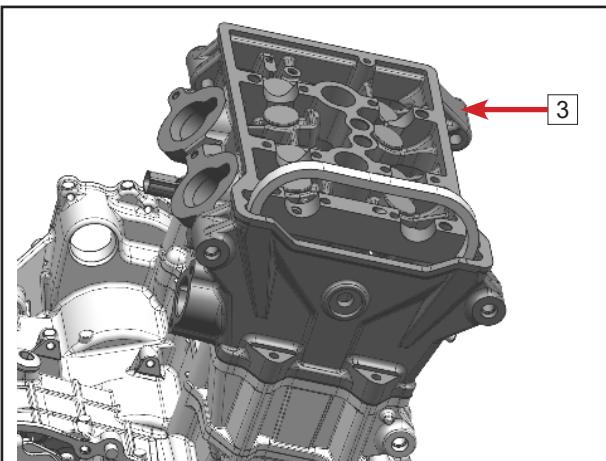
**NOTE**

**The cylinder head gasket assembly must not be reused and must be replaced.**



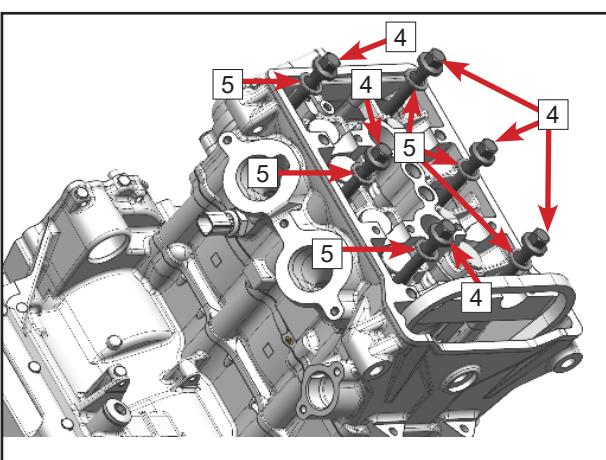
Clean the lower plane of the cylinder head assembly with dust-free paper.

Align the positioning hole of the cylinder head assembly 3 with  $\Phi 8 \times 12$  positioning pin, and install the cylinder head assembly 3 on the cylinder body.



Apply proper amount of oil and MoS<sub>2</sub> grease mixture (weight ratio 10:1) evenly on the thread part of M10×150 cylinder head bolts 4.

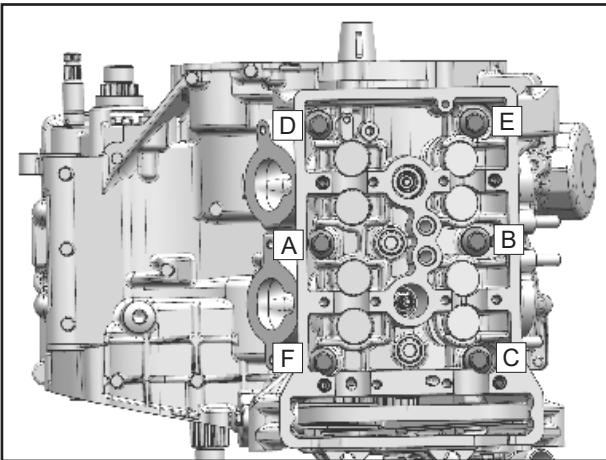
Insert the M10×150 cylinder head bolt 4 through the 10.5×19×2.3 washer 5 into the cylinder head mounting hole.



Tighten the M10×150 cylinder head bolts 4 twice in sequence according to the order of A~F, the torque is shown in the table below.

#### M10×150 Cylinder Head Bolt Torque

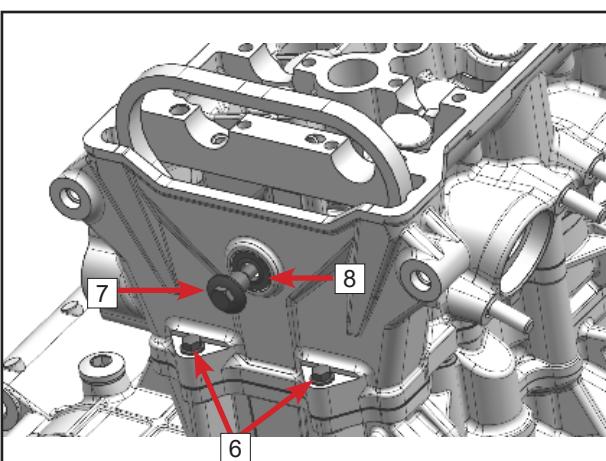
New Bolt	1	20N·m
	2	54N·m
Old Bolt	1	20N·m
	2	49N·m



Install M6×90 bolt 6.

#### M6×90 Cylinder Head Bolt Torque

10N·m



Install the cylinder head shock absorbing bolts 7 through the cylinder head cover bolt sealing ring 8 (with one side of sealing belt facing inward) and timing chain assembly to the cylinder head.

#### Cylinder Head Shock Absorbing Bolt Torque

10N·m

### 13.7.17 Magneto Rotor Assembly Installation

Apply 567 thread sealant evenly on the thread part of the main oil passage plug 1. Install the main oil passage plug 1 to the lower crankcase.

#### Main Oil Passage Plug Torque

20N·m

Clean the conical hole of the magneto rotor and the conical surface of the crankshaft with dust-free paper.

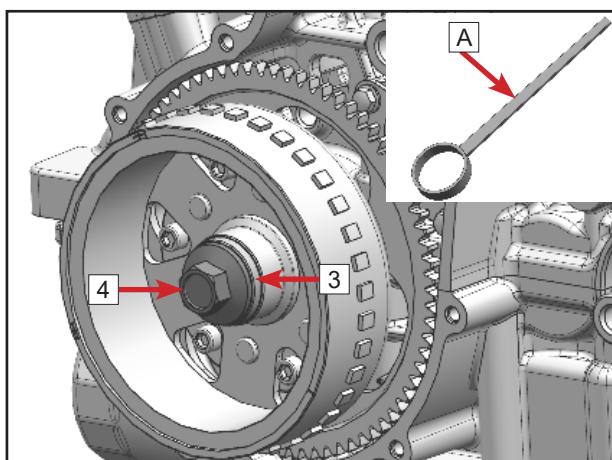
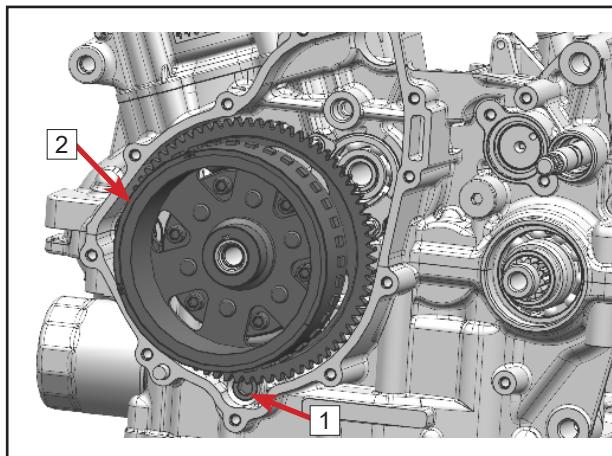
Align the keyway of the magneto rotor with the semicircular keys on the crankshaft, and install the magneto rotor assembly 2 on the crankshaft.

Fix the magneto rotor with the magneto rotor stop fixture A (0SQ0-031000-922-001).

Install 12.5×33×5 gasket 3 (with large chamfering side facing bolt flange) and M12×1.25×40 bolt 4, fix magneto rotor to crankshaft.

#### Magneto Rotor Bolt Torque

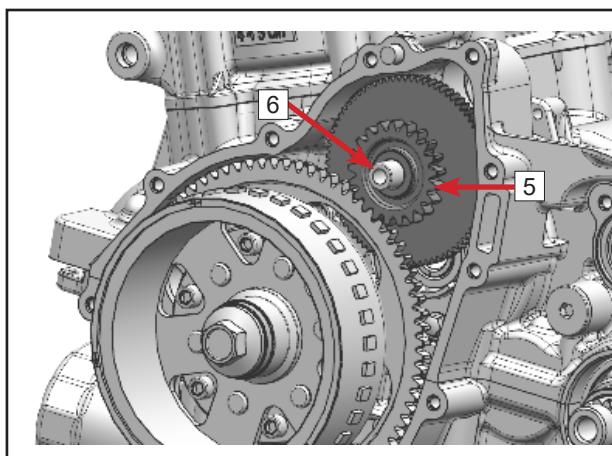
155N·m



Tilt the double gear 5 into the crankcase, and make the teeth of the double gear and the teeth of the starting gear meshing.

Evenly daub an appropriate amount of oil on the outer surface of the intermediate gear shaft 6.

Insert the intermediate gear shaft 6 into the holes in the double gear 5 and crankcase.



## 13.7.18 LH Side Cover Installation

Check if  $\Phi 8 \times 12$  locating pin 1 is lost.

Wipe the closing surface of the crankcase and the left cover with dust-free paper to ensure that the closing surface is clean and dry.

In the rubber block groove inside the stator of the magneto daub an appropriate amount of KB598 plane sealant, the rubber block clamp to the left cover.

KB598 plane sealant is coated on the box surface of the left cover, the diameter of the glue line is  $(1.5 \pm 0.5)$  mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

Align the positioning hole on the left cover with  $\Phi 8 \times 12$  positioning pin on the crankcase, and install the left cover assembly 2 to the crankcase.

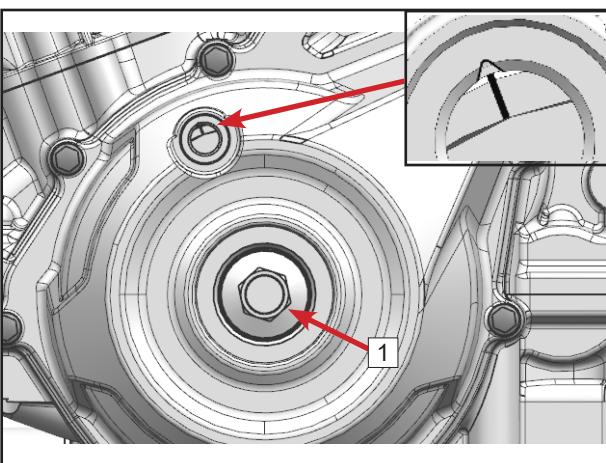
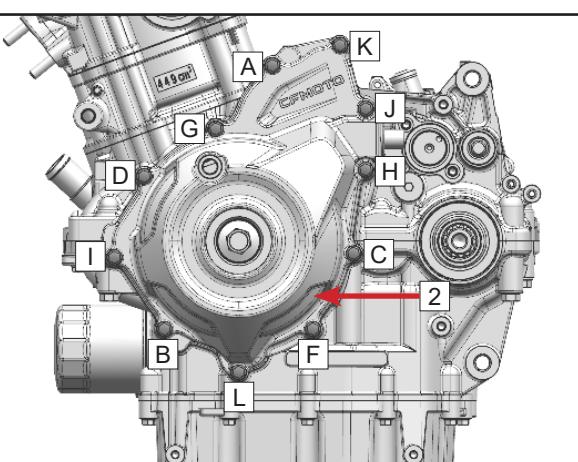
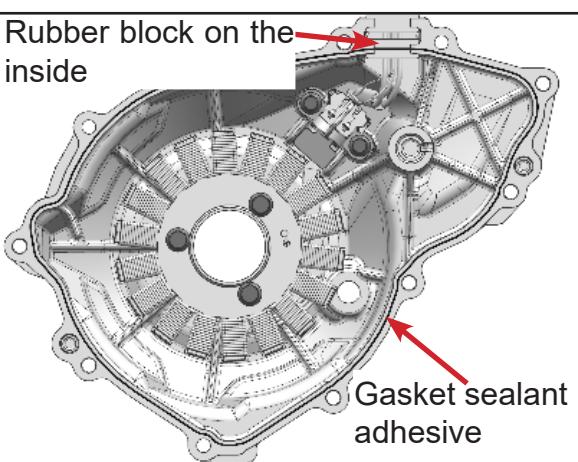
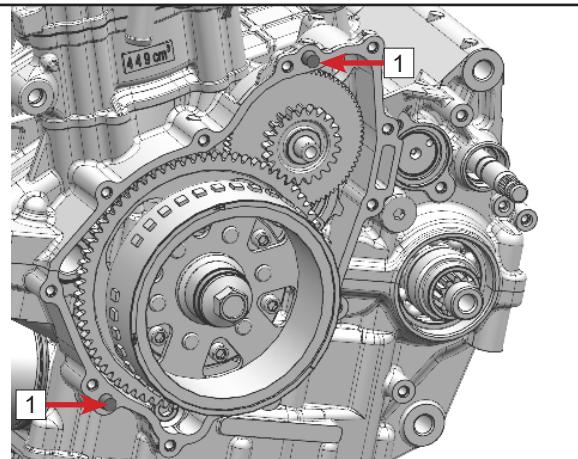
Install and tighten M6x30 bolts to fix the left cover in the order of A ~ L.

### Left Cover Bolt Torque

10N·m

### NOTE

It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.



## 13.7.19 Intake and Exhaust Camshaft Installation

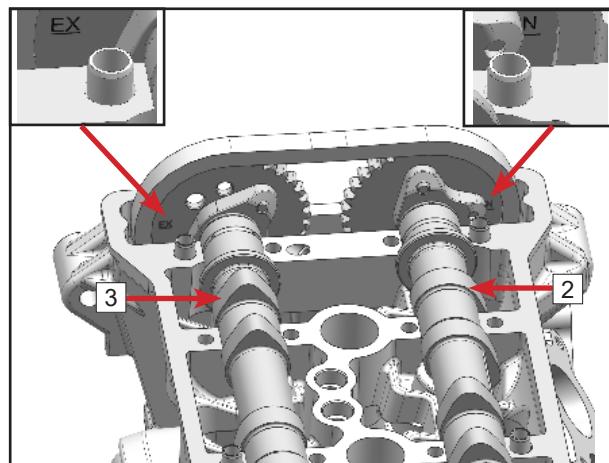
Rotate the crankshaft 1 counterclockwise to align the assembly mark "I" on the magneto rotor with the notch center of the timing observation hole on the left cover.

Evenly daub appropriate amount of oil on the supporting journal of the intake camshaft assembly **2** and exhaust camshaft assembly **3**.

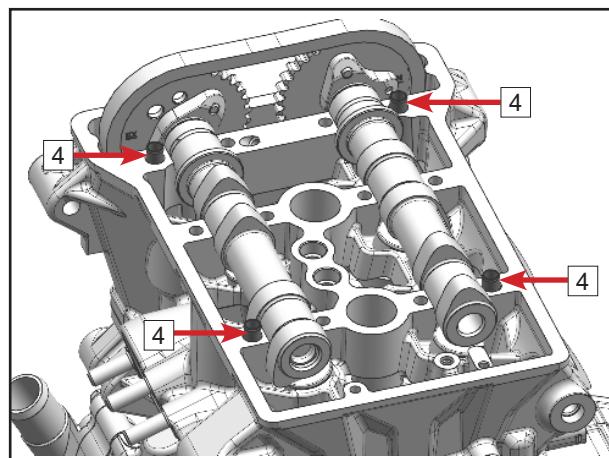
The timing sprocket of the intake camshaft assembly **2** and exhaust camshaft assembly **3** is mounted on the cylinder head after hanging into the chain.

**NOTE**

**During assembly, the "IN" line on the intake timing sprocket is parallel to the plane on the cylinder head, and the "EX" line on the exhaust timing sprocket is parallel to the plane on the cylinder head, as shown in the figure on the right.**



Check if  $\Phi 8 \times 14$  location pin **4** is lost.



The intake camshaft seat assembly **5** and exhaust camshaft seat **6** are mounted on the cylinder head.

**NOTE**

**Intake and exhaust camshaft seats and cylinder heads shall be assembled with the same code mark above.**

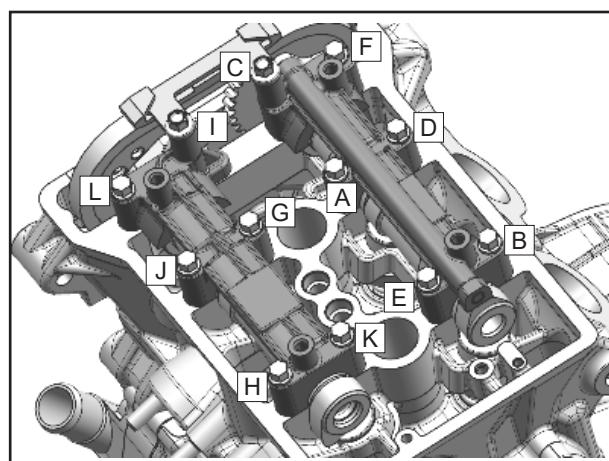
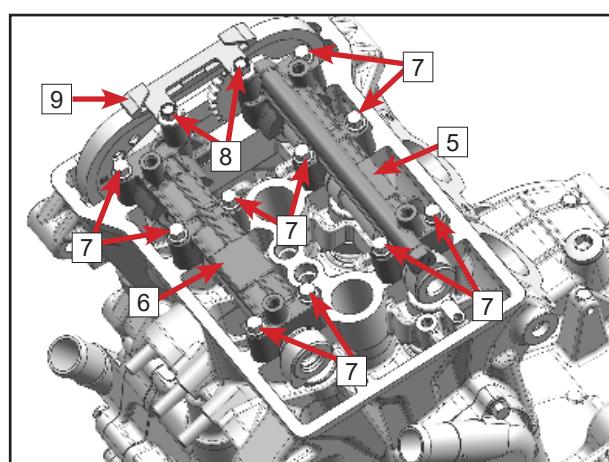
Install M6×45 bolt **7**, M6×65 bolt **8** and guide chain block **9**.

**NOTE: According to the order of A ~ L, tighten the camshaft seat bolt three times in turn, the torque is shown in the following table.**

Camshaft Seat Bolt Torque	
First Time	5N·m
Second Time	8N·m
Third Time	12N·m

Adjust the valve clearance in the cooling state (refer to section 13.6.3).

Valve Clearance (Cold Engine)	
Intake Valve	0.10 mm ~ 0.15 mm
Exhaust Valve	0.25 mm ~ 0.31 mm



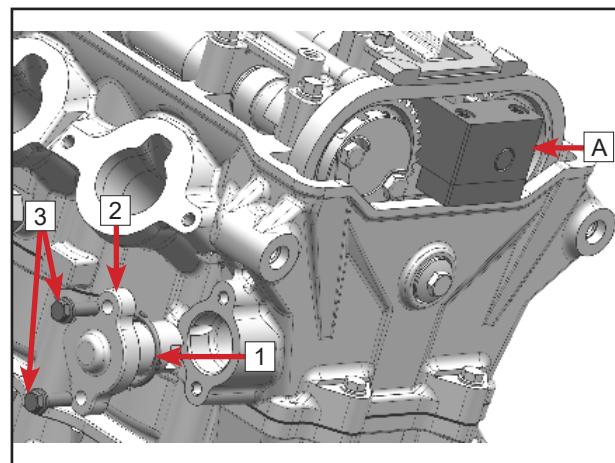
## 13.7.20 Hydraulic Tensioner Installation

Use timing sprocket stop fixture **A** (0SQ0-000000-922-004) to jam the exhaust timing sprocket at the top dead center of 1 cylinder ignition.

Evenly daub proper amount of oil on the surface of the tensioner sealing ring **1**, the tensioner mounting hole, the tensioner assembly **2** and the part in contact with the tensioner plate.

The tensioner sealing ring **1** is loaded into the sealing groove of the tensioner assembly **2**.

Fix the tensioner assembly **2** to the cylinder head with M6x20 bolts **3**.



### Tensioner Bolt Torque

10N·m

Turn the crankshaft clockwise (from the left side of the engine) (the torque does not exceed 10N·m) to check and confirm whether the tensioner is tensioning the chain.

After the tensioner plunger eject and tensioning the chain, remove the timing sprocket stop gear.

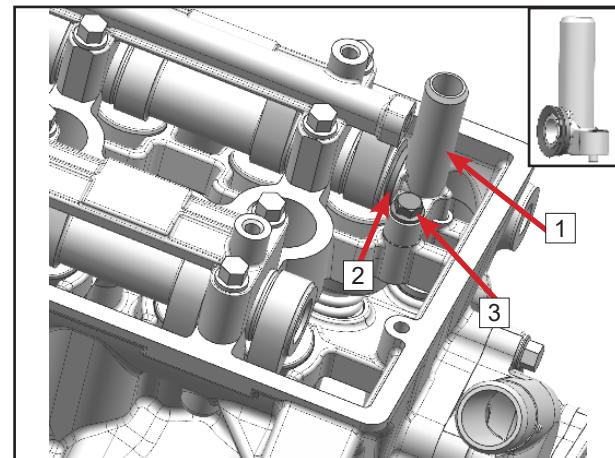
## 13.7.21 Cylinder Head Cover Installation

Apply proper amount of oil evenly on the surface matching the transition joint assembly **1** and the end oil seal **2**.

Install the end oil seal **2** on the joint assembly **1**, the oil seal lip toward the camshaft.

Daub an appropriate amount of oil evenly on the contact surface between the intake camshaft and the end oil seal.

Fix the transition joint assembly **1** to the cylinder head with M6x20 bolt **3** (torque 10N·m), and the lip of the end face oil seal **2** should fit well with the end face of the camshaft.

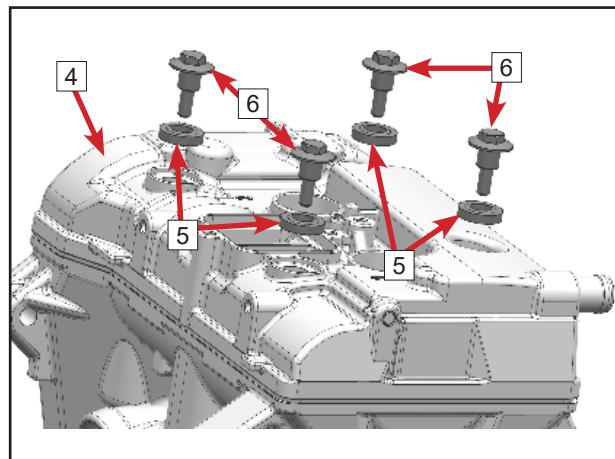


The cylinder head cover assembly **4** is mounted on the cylinder head.

Install cylinder head cover bolt seal ring **5** (with sealing belt side down) and cylinder head cover bolt **6** (diagonal cross tightening).

**Cylinder Head Cover Bolt Torque**

10N·m

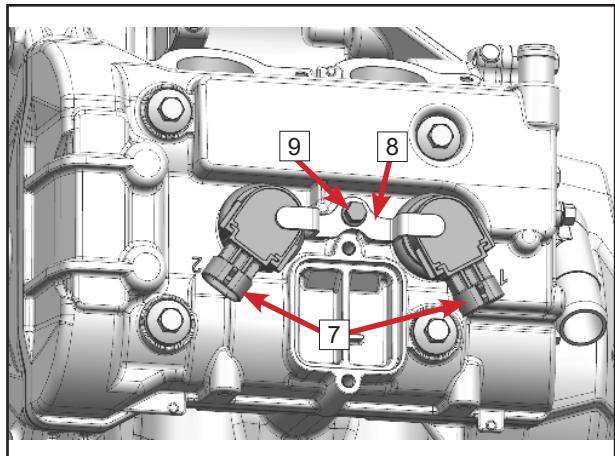


Insert the ignition coil **7** (the orientation and position of the connector are shown in the picture on the right) into the corresponding position of the cylinder cover and press the assembly into place.

The pressure plate **8** is fixed to the cylinder cover with M6x12 bolt **9**, and the ignition coil **7** is pressed tightly.

**Ignition Coil Pressure Plate Bolt Torque**

10N·m



## 13.7.22 Starter Motor Installation

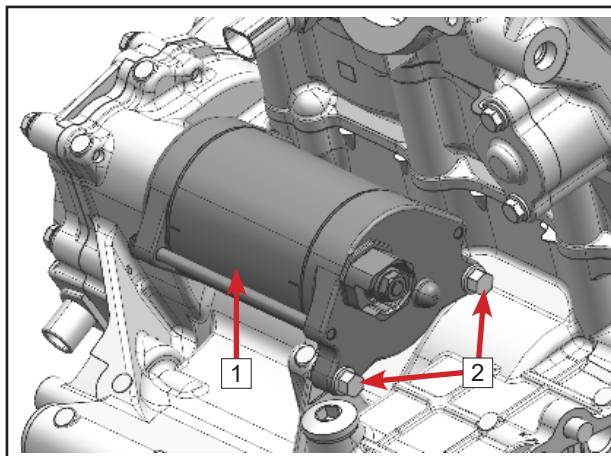
Evenly daub an appropriate amount of oil on the surface of the sealing ring of the starter motor 1 and the crankcase mounting hole.

Make the gear of the starter motor 1 engage with the double gear, and install the starter motor 1 on the crankcase.

Install M6x25 bolts 2.

### Starter Motor Bolt Torque

10N·m



## 13.7.23 Clutch Installation

### NOTE

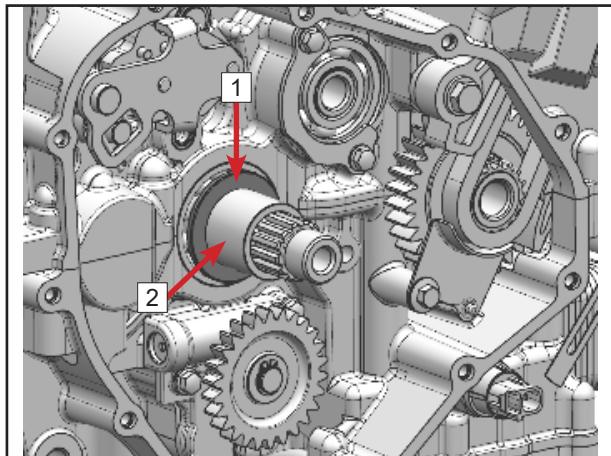
Assembly clutch and crankshaft in pairs according to the following.

Clutch Grouping Mark	Crankshaft Grouping Mark
A	B
B	A

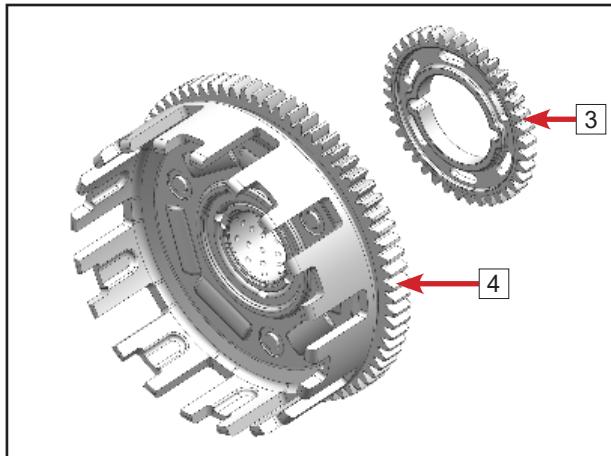
The grouping of clutch refers to chapter 13.6.8.

The grouping of crankshaft refers to chapter 13.6.1.1.

Install 25.2×46×5.8 gasket 1 (big end outward) and clutch sleeve 2 (evenly apply proper amount of oil on the inner ring).

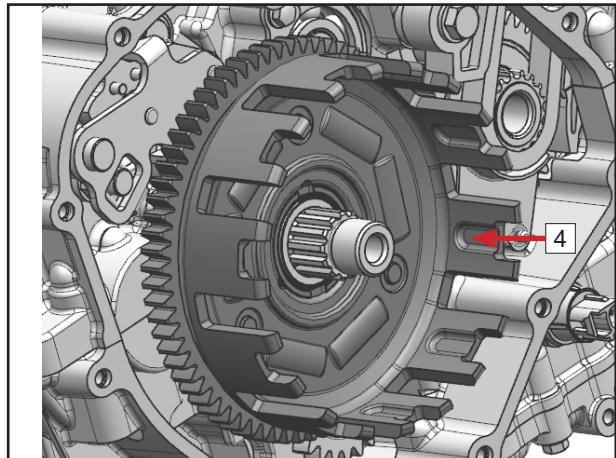


Install the driving gear 3 of oil pump on the primary driven gear 4.

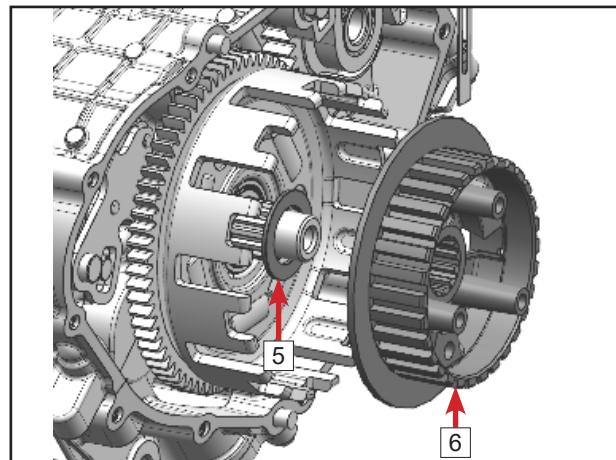


Evenly daub an appropriate amount of oil on the surface of the bushing of the primary driven gear 4.

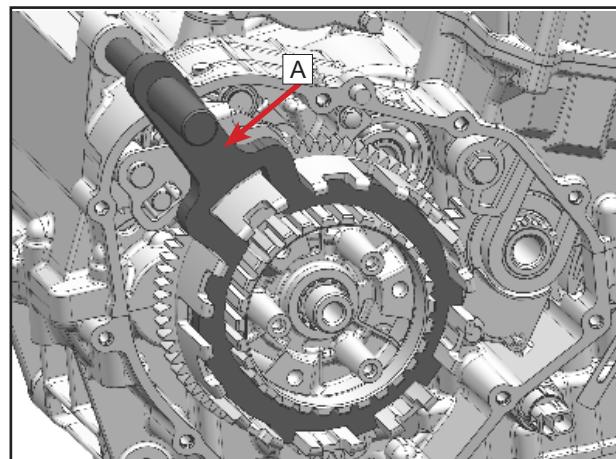
Assemble the primary driven gear 4 on the main shaft.



In turn put the 25.2×39×2 washer 5 and central sleeve 6 on the main shaft.



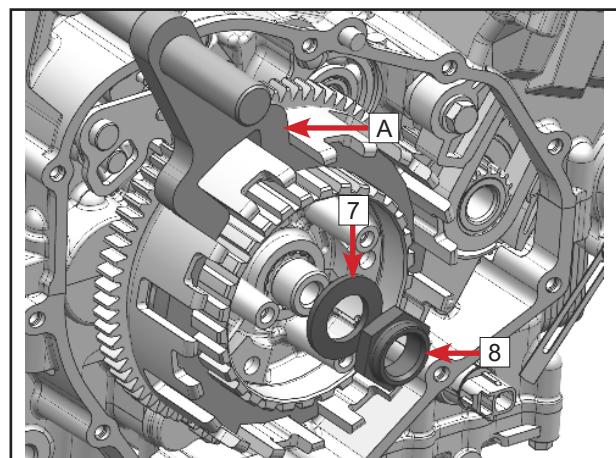
Use the clutch master/slave hub stop gear A (0SQ0-050000-922-001) to fix the central sleeve.



Install an elastic washer 20 7 (the small end of the cone facing the M20×1.5 nut 8). Install M20×1.5 nut 8 and fix primary driven gear.

<b>Clutch Nut Torque</b>
125N·m

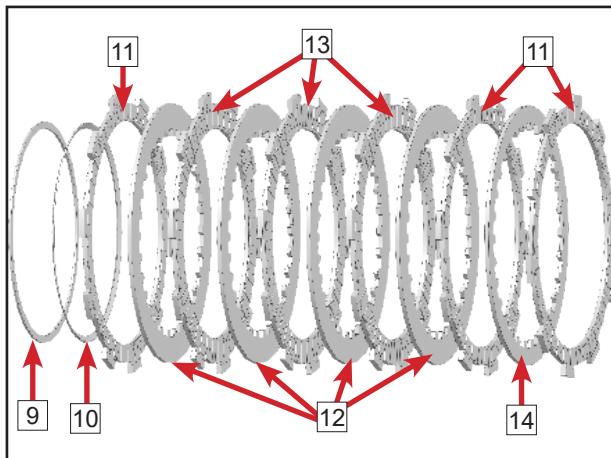
Remove the clutch main and slave hub stop gear A.



In order to install the disc spring seat **9** in the central sleeve, disc spring **10**, lining disc assembly II **11**, driven disc II **12**, lining disc assembly I **13**, driven disc II **12**, lining disc assembly I **13**, driven disc II **12**, lining disc assembly II **11**.

## NOTE

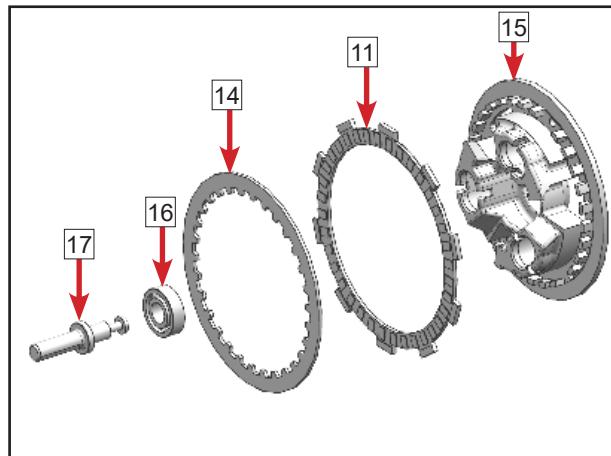
**The small end of the disc spring cone faces inward (magneto side) to assemble. Lining disc I is wider than lining disc II. Driven disc II is wider than driven disc I.**



In turn load the lining disc II **11**、driven disc I **14** onto pressure disc **15**.

Load 6001 rolling bearing **16** onto the bearing hole of the pressure disc **15**, the marked face of the bearing is outwards (magneto side).

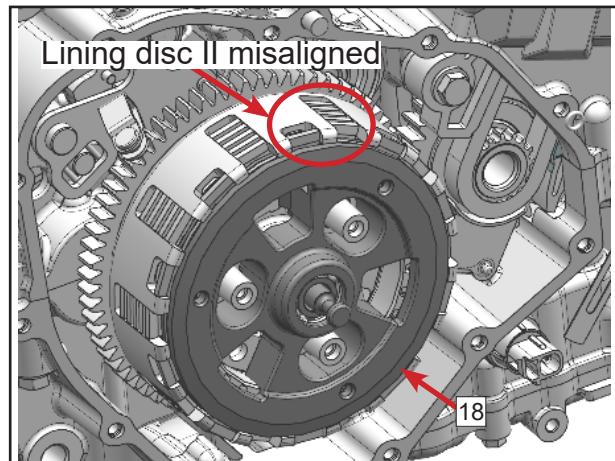
Load the pull rod **17** into the 6001 rolling bearing **16**.



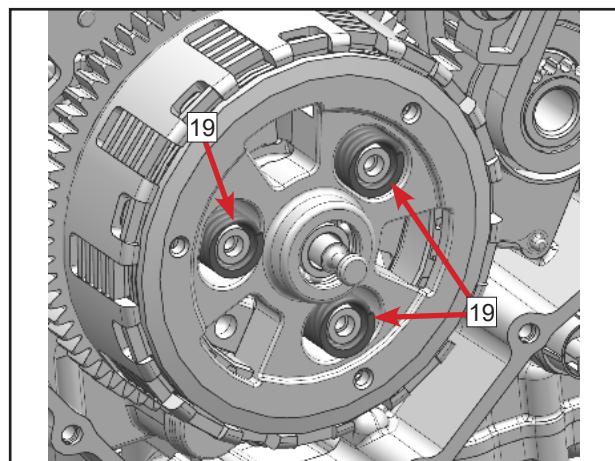
Load the pressing plate 18 into the central sleeve.

**NOTE**

**The outermost lining disc assembly II shall be misaligned.**

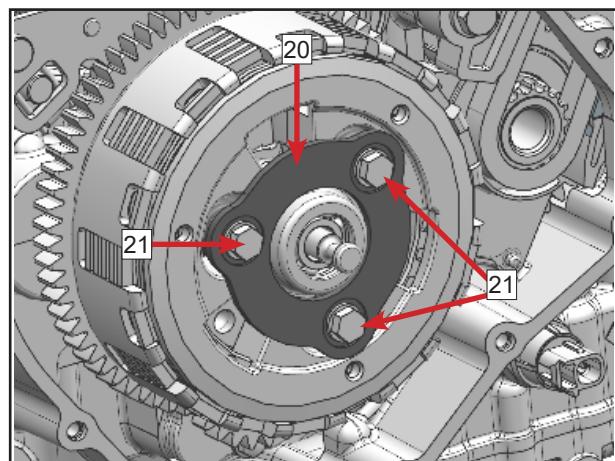


Install clutch spring 19.



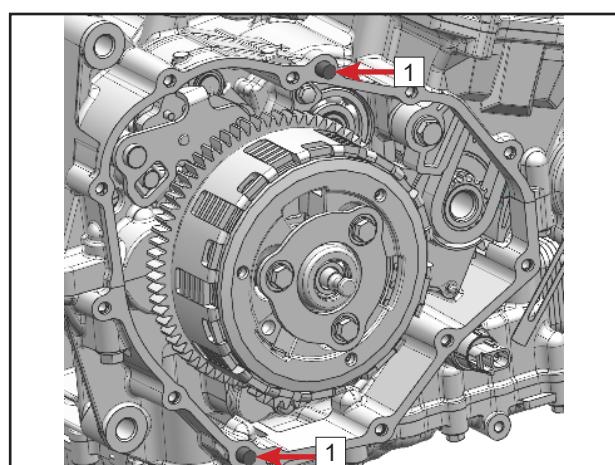
Install M6×35 bolt 21 to fix clutch spring pressure plate 20.

<b>Clutch Spring Pressure Plate Bolt Torque</b>
10N·m



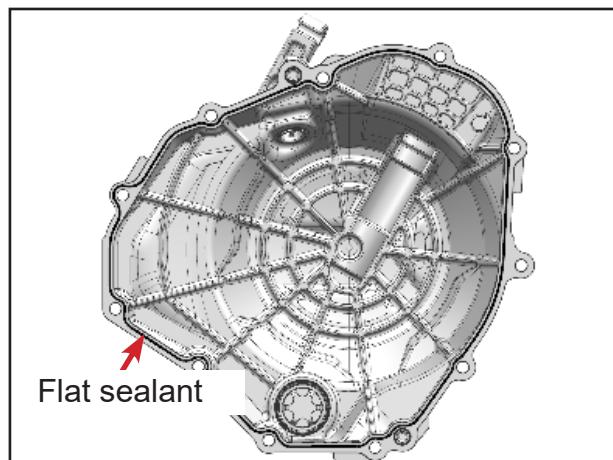
## 13.7.24 RH Side Cover Installation

Check if  $\Phi 8 \times 12$  locating pin 1 is lost.



Wipe the closing surface of the crankcase and the RH side cover with dust-free paper to ensure that the closing surface is clean and dry.

KB598 flat sealant is coated on the closing surface of the RH cover, the diameter of the glue line is  $(1.5\pm0.5)$  mm, the glue line should be continuous and uniform, and the glue track is shown in the black area on the right.

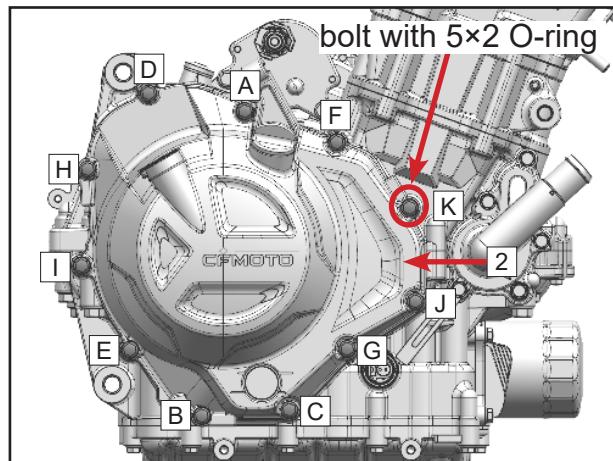


Align the positioning hole on the RH cover with  $\Phi8\times12$  positioning pin on the crankcase, and install the RH cover 2 on the crankcase.

Install the M6x25 bolts to fix the RH cover in the sequence of A ~ K.

#### RH Cover Bolt Torque

10N·m

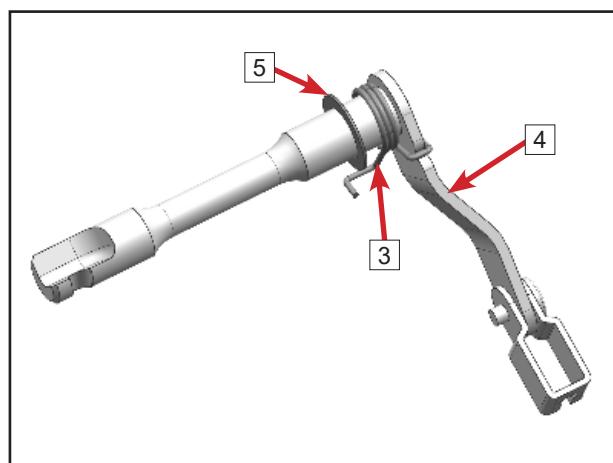


#### NOTE

**It should be controlled within 5 minutes from the beginning of gluing to the completion of bolt tightening.**

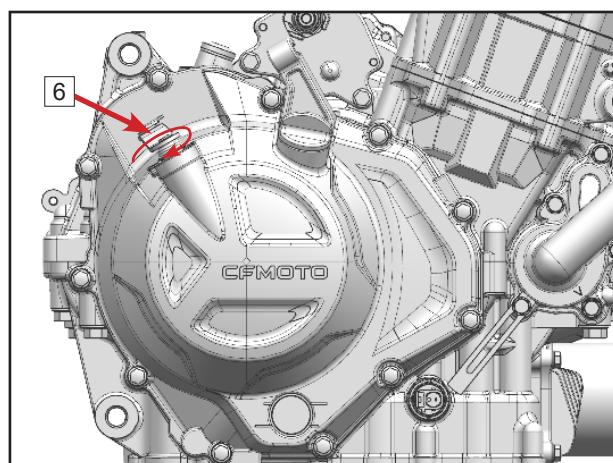
The return spring 3 of the clutch lever is mounted on the clutch control shaft, and the end of the spring is clamped into the gap of the clutch control arm 4.

Install the 12.5×18.5×0.6 washer 5 on the clutch control shaft.



The clutch control shaft 6 is mounted on the RH cover, and the other end of the clutch control lever return spring 3 is hung on the RH cover.

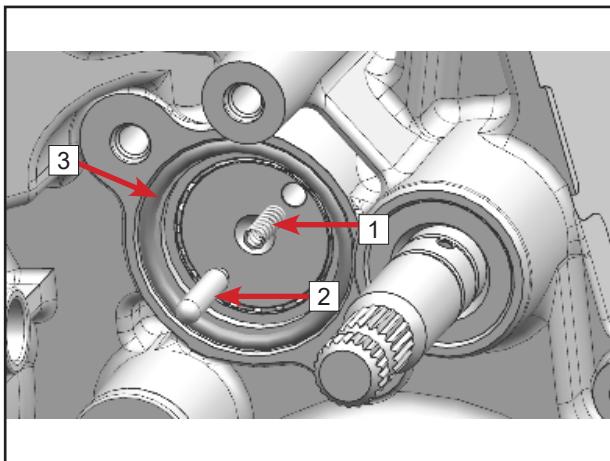
Rotate the clutch control shaft 6 clockwise to feel it fit the clutch pull rod.



### 13.7.25 Gear Sensor Installation

In turn, the contact spring **1** and the ball contact **2** are loaded into the corresponding hole of the shift drum.

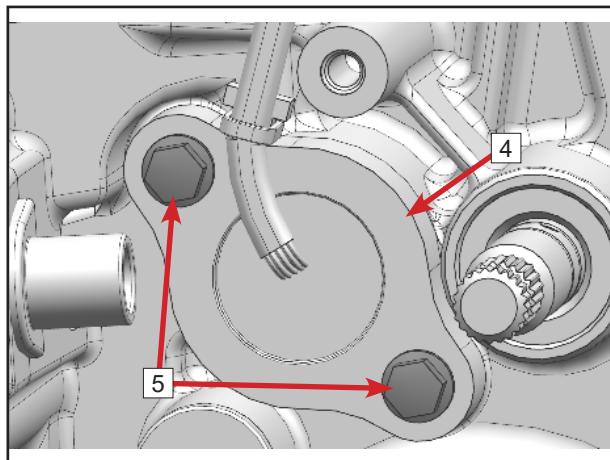
Apply proper amount of oil on 31.5× 2.5 O-ring **3** and put it into the corresponding hole of the upper crankcase.



The gear sensor **4** (with cylindrical surface and end face coated with appropriate amount of oil) mounted on the crankcase. Install M6x25 bolts **5** (the thread part is coated with 243 thread locking glue) to fix the gear sensor assembly **4**.

#### Gear Sensor Bolt Torque

10N·m



In turn install the 14×28×1 washer **6** and  $\Phi 14$  elastic circlip for shaft **7** to the shift shaft.

#### NOTE

**Φ14 elastic circlip for shaft can not be used twice, must be replaced with a new one, must be completely into the groove.**

Check if 13×2 O-ring **8** and 35×3.5 O-ring **9** are damaged.

Apply an appropriate amount of oil to the 13×2 O-ring **8** and put it into the corresponding hole on the LH cover.

Install the timing observation hole cover **10** on the LH cover.

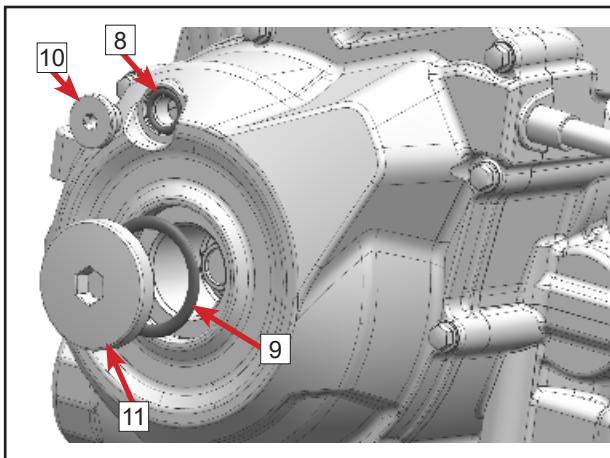
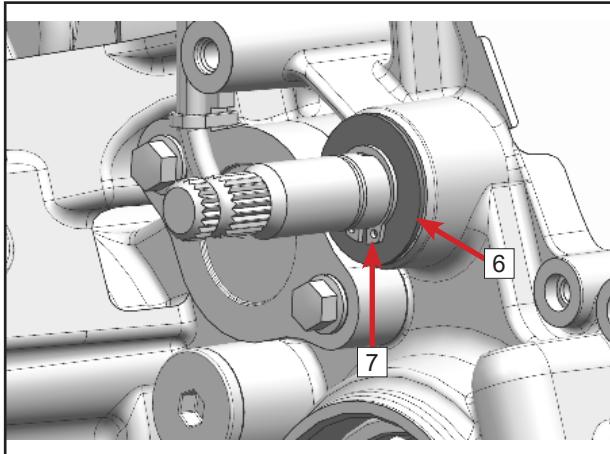
#### Timing Observation Hole Cover Torque

4N·m

Apply proper amount of oil to the 35× 3.5 O-ring **9** and install it on the filter cover **11**. Install the strainer cover **11** on the LH cover.

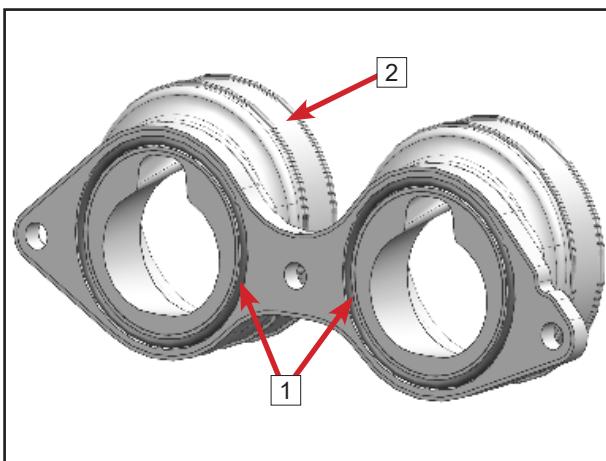
#### Strainer Cover Torque

10N·m



## 13.7.26 Throttle and Fuel Pipe Assembly Installation

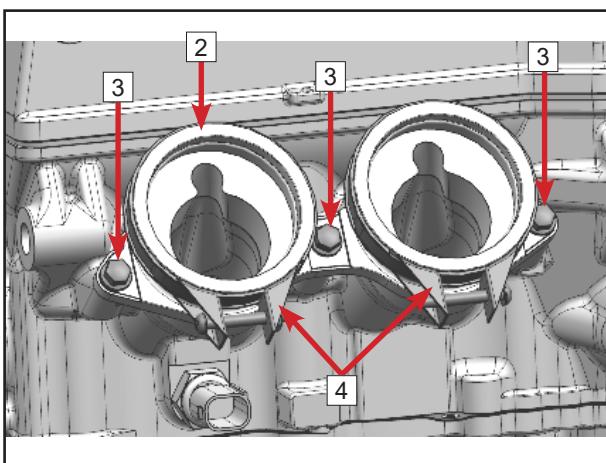
The 46.2×2 O-ring **1** is loaded into the sealing groove of the throttle body connecting pipe **2**.



The throttle body connecting tube assembly **2** is fixed to the cylinder head with M6x18 bolts **3**.

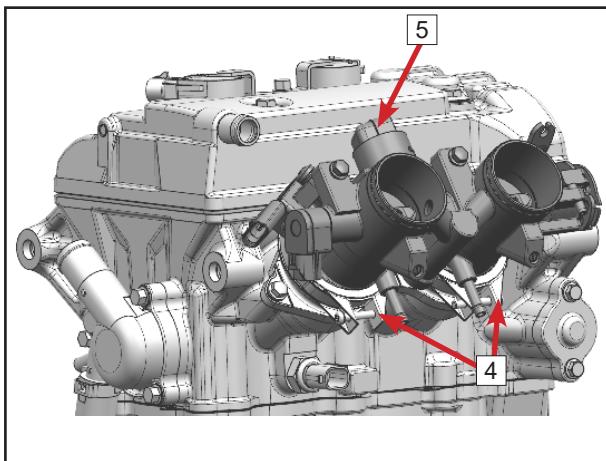
Throttle Body Connecting Tube Bolt Torque
10N·m

Clamp 62 **4** (direction as shown in the figure, not tightened) on the throttle body connecting pipe combination **2**.



The throttle body assembly **5** is installed on the throttle body connecting pipe assembly.

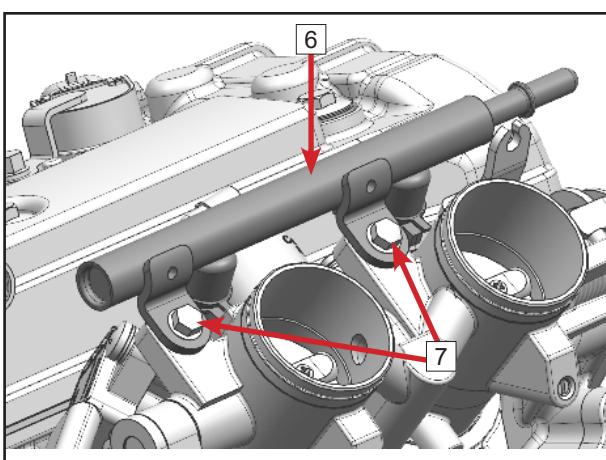
Tighten clamp 62 **4**.



The fuel pipe assembly **6** is installed on the throttle body assembly.

Install M6x16 bolts **7** to secure the fuel pipe assembly **6**.

Fuel Pipe Assembly Bolt Torque
10N·m

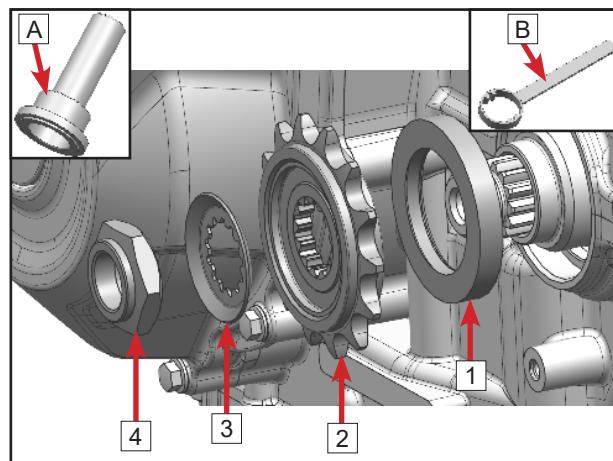


**13.7.27 Output Sprocket Installation**

Use the countershaft oil seal punch **A** (0SQ0-010001-923-001) to put  $40 \times 58 \times 8$  countershaft oil seal **1** (lip with appropriate amount of grease) into the crankcase hole. In turn install the output sprocket assembly **2** and lock washer **3** on the countershaft. Use output sprocket stop wrench **B** (0MQ0-062030-922-001) to secure output sprocket assembly **2**. Install M20×1.5 nut **4**.

**Output Sprocket Nut Torque**

125N·m



Flush the lock washer **3** with a flat-head screwdriver and hammer to prevent the M20 x 1.5 nut **4** from coming loose.

**13.7.28 Oil Filling, Oil Level Inspection, Oil Pressure Inspection****Oil filling**

Unscrew the filler plug **1**, inject oil, and then tighten the filler plug.

Oil filling amount:

Change oil and oil filter: 2.5L

Total oil (dry crankcase) : 2.7L

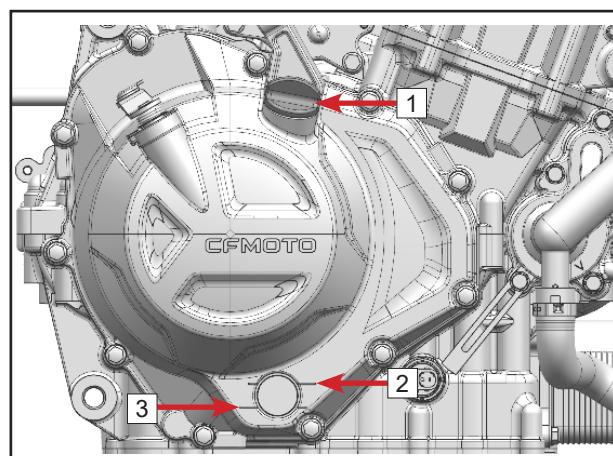
**Oil level inspection**

Keep the engine in a horizontal position.

Start the engine and let it run at idle for several minutes.

Turn off the engine and wait for a few minutes until all the oil flows back into the oil pan.

Observe the oil level from the oil level observation mirror, the oil level should be between the upper line **2** and lower line **3**. If the oil level is lower than the lower line **3**, the oil should be appropriately increased until the oil volume is appropriate.

**NOTE**

**Strictly follow the above steps, otherwise the wrong amount of oil will be displayed. The engine must be in a horizontal position.**

## Oil pressure inspection

Remove the engine oil pressure switch.  
Install box oil hole connector (0SQ0-000000-922-014) and oil pressure gauge.  
Start the engine, check the engine oil pressure.

Engine oil temperature	
90°C	0.08~0.12MPa
Engine idle	

If the oil pressure does not meet the requirements, please check whether the oil circuit is blocked, whether the oil pump is worn.

**NOTE: The temperature of the engine is very high after running for a period of time. Please take protective measures to avoid scalding.**

### **WARNING**

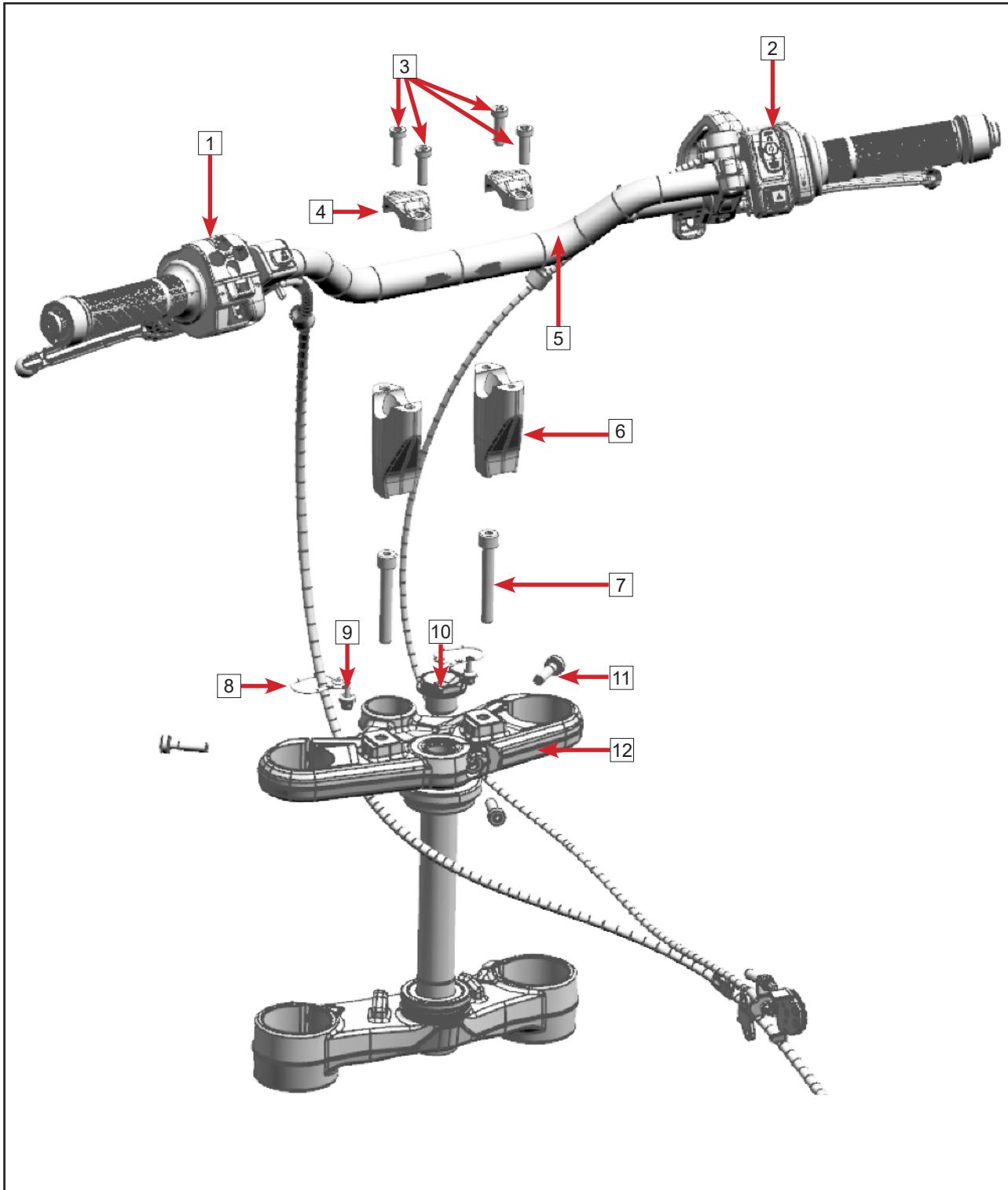
**Carry out operation in well-ventilated area.**

# **14 Handlebar, Triple Clamps Assembly**

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<b>14.1 Handlebar Assembly .....</b>	<b>14-2</b>
14.1.1 Handlebar Switch .....	14-3
14.1.1.1 LH Handlebar Switch Assembly .....	14-3
14.1.1.2 RH Handlebar Switch Assembly .....	14-4
<b>14.2 Throttle Grip.....</b>	<b>14-4</b>
<b>14.3 Handlebar Maintenance .....</b>	<b>14-5</b>
14.3.1 Throttle Cable Free Play .....	14-5
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## 14.1 Handlebar Assembly



<b>1</b>	LH handlebar switch assembly	<b>2</b>	RH handlebar switch assembly	<b>3</b>	Inner hex bolt	<b>4</b>	Handlebar upper press cover
<b>5</b>	Handlebar	<b>6</b>	Handlebar mounting seat	<b>7</b>	Bolt	<b>8</b>	Wire hook
<b>9</b>	Bolt	<b>10</b>	Upper triple clamp screw	<b>11</b>	Inner hex socket cap screw	<b>12</b>	Upper triple clamp assembly

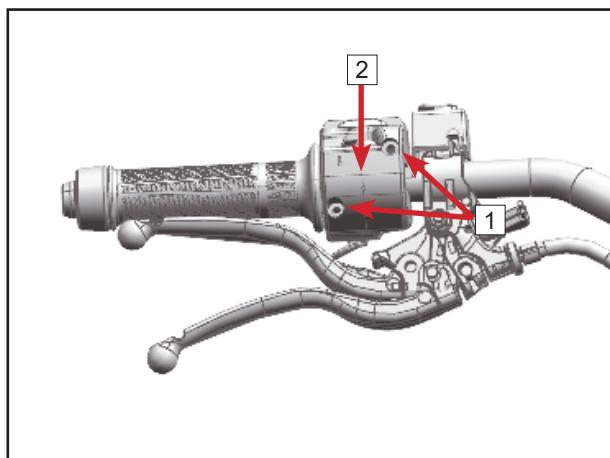
# 14 Handlebar, Triple Clamps Assembly

## 14.1.1 Handlebar Switch

### 14.1.1.1 LH Handlebar Switch Assembly Removal

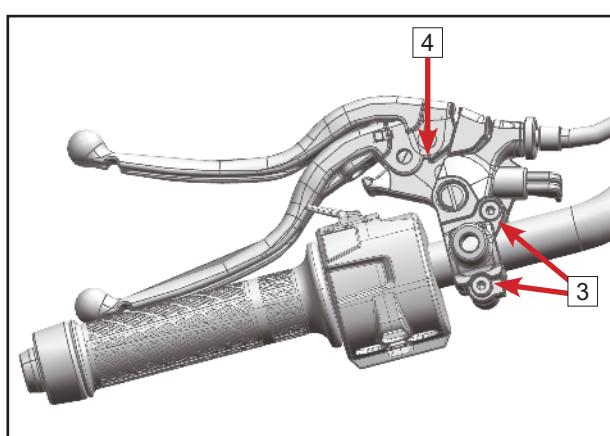
Remove screws **1**.

Remove switch **2**.



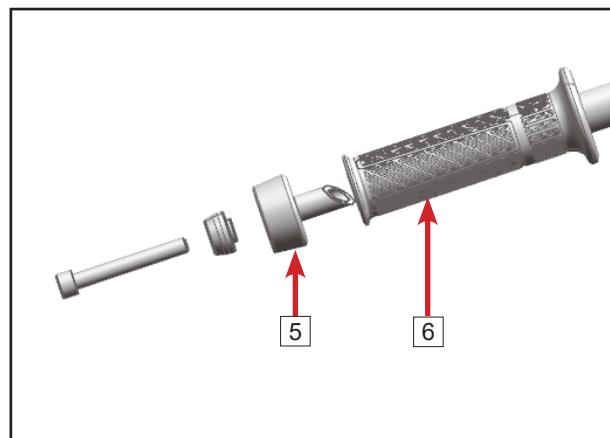
Remove inner hex bolt **3**.

Remove clutch lever **4**.



Remove LH handlebar balance block **5**.

Remove throttle grip **6**.

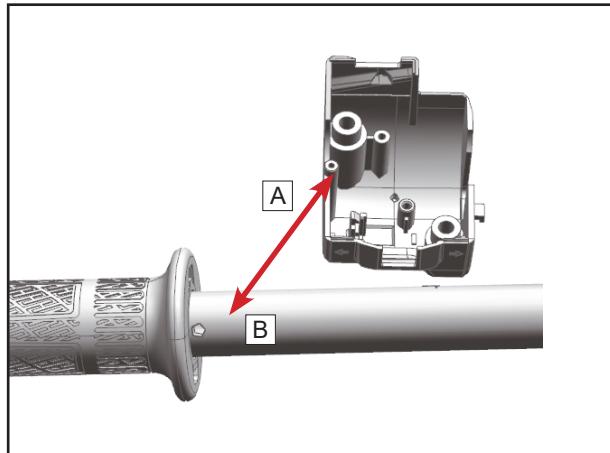


## Installation

Reverse the removal procedures for installation.

### NOTE:

**When installing the switch to handlebar pipe, there is positioning structure inside the switch. Connect device A to the handlebar pipe fixing point B and tighten the bolt.**

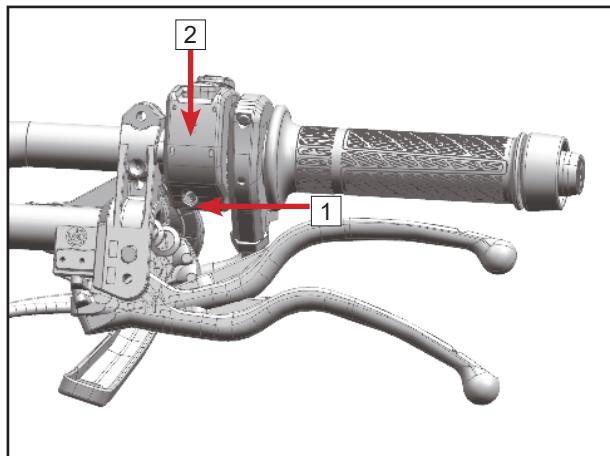


## 14.1.1.2 RH Handlebar Switch Assembly

### Removal

Remove bolt **1**.

Separate RH handlebar switch lower cover **2**.

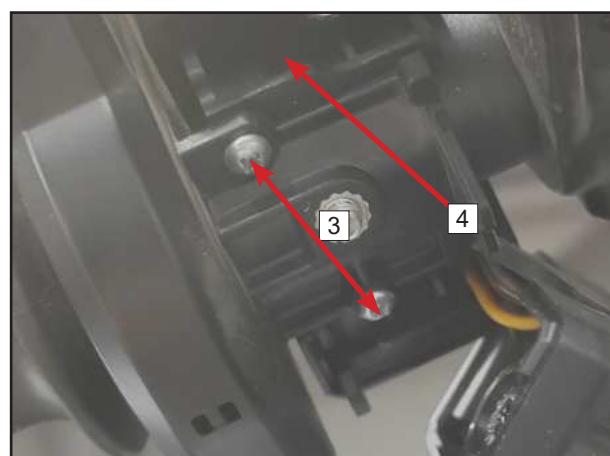


Remove bolts **3**.

Remove RH handlebar switch **4**.

### Installation

Reverse the removal procedures for installation.

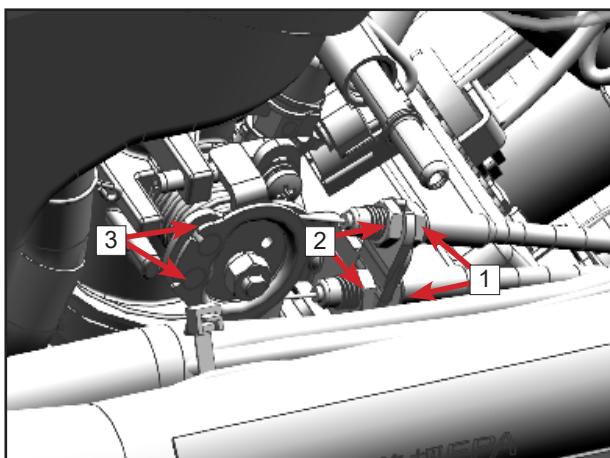


## 14.2 Throttle Grip

### Removal

Remove related body covering parts and other parts.

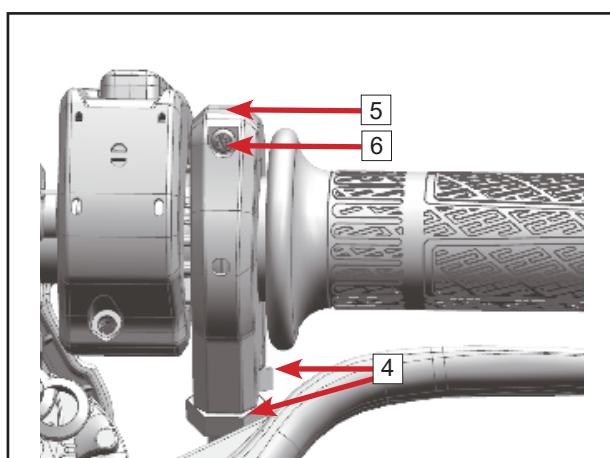
Loosen nuts **1** and nuts **2**, and remove throttle cable terminal **3**.



Loose nuts **4**.

Remove bolt **5**.

Separate throttle seat upper cover **6**.

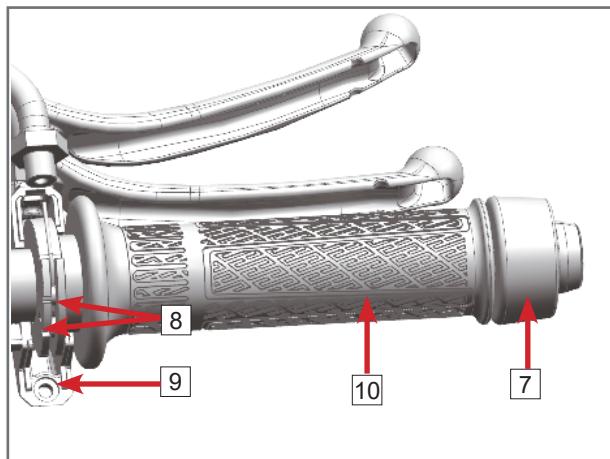


# 14 Handlebar, Triple Clamps Assembly

Remove RH handlebar balance block **7**.  
Separate throttle wire and throttle seat **8**.  
Remove throttle seat lower cover **9**.  
Remove throttle grip **10**.

## Installation

Reverse the removal procedures for installation.



**⚠ WARNING:** Install the new throttle cable must be in accordance with the factory layout, otherwise it is easy to cause throttle stuck, which may lead to danger.

## 14.3 Handlebar Maintenance

### 14.3.1 Throttle Cable Free Play

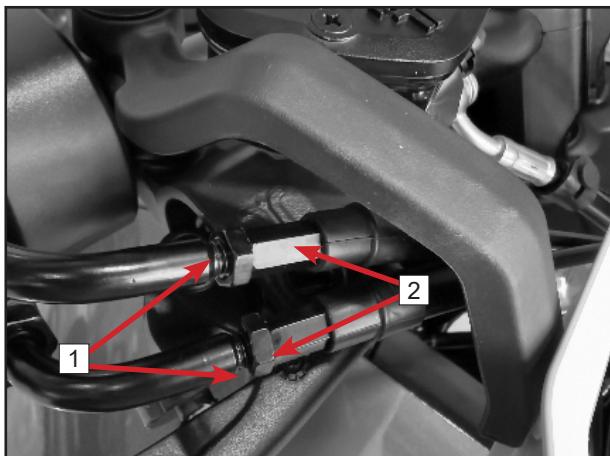
Check whether the throttle handle refuel and return is smooth.

Check throttle cable free play.

Free play: 2mm~5mm

#### Adjust throttle cable

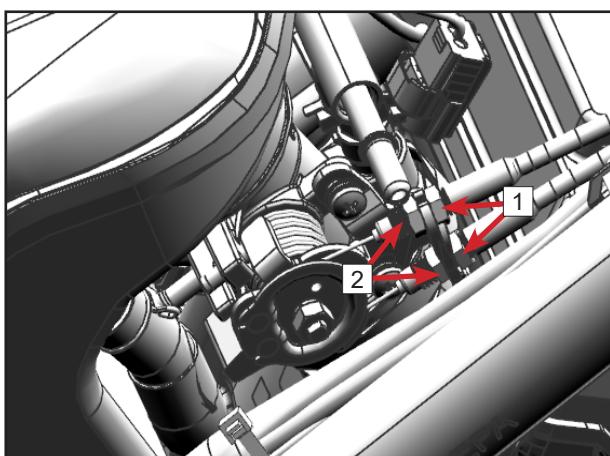
When fine-tuning the grip end: remove the anti-dust sleeve, loosen the lock nut **1**, rotate the adjusting nut **2** to adjust, and tighten the lock nut after adjustment **1**.



#### Pre-work

Remove related body covering parts.

When the engine end is in major adjustment: loosen the nuts **2**, adjust the adjustment nuts **1** to the appropriate position, and tighten the nuts **2**.

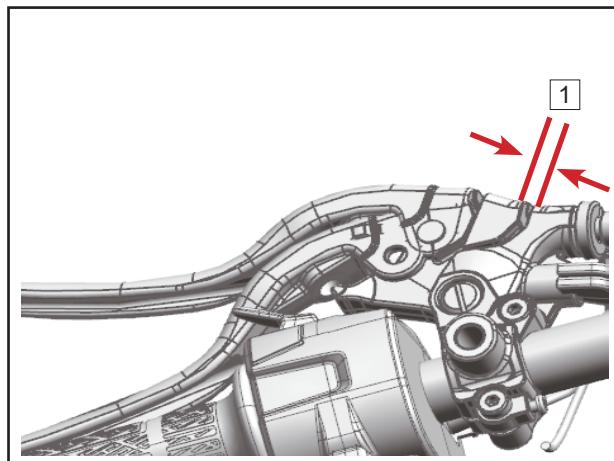


## 14.3.2 Inspect Clutch Lever Clearance

Check whether the return of clutch lever is smooth.

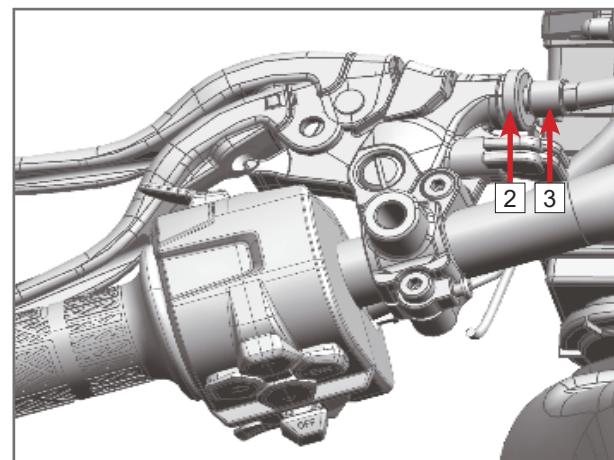
Check clutch lever free play [1].

Free play: 2mm.

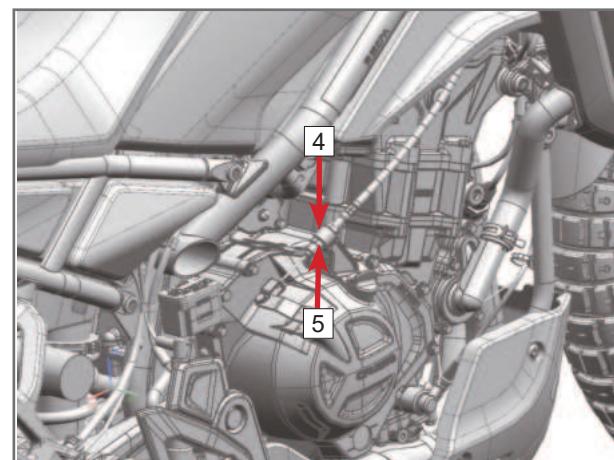


## 14.3.3 Adjust Clutch Cable Free Play

When fine-tuning the handle end: loosen the lock nut [2], rotate the adjusting nut [3], and tighten lock nut [2].

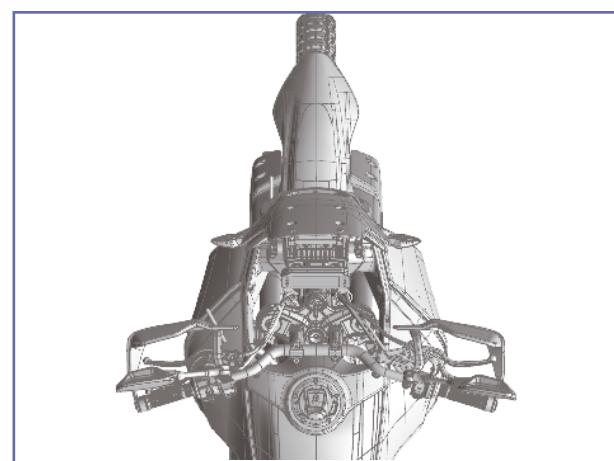


When major-tuning the engine end: loosen the lock nut [5], rotate the adjusting nut [4] and tighten lock nut [5].



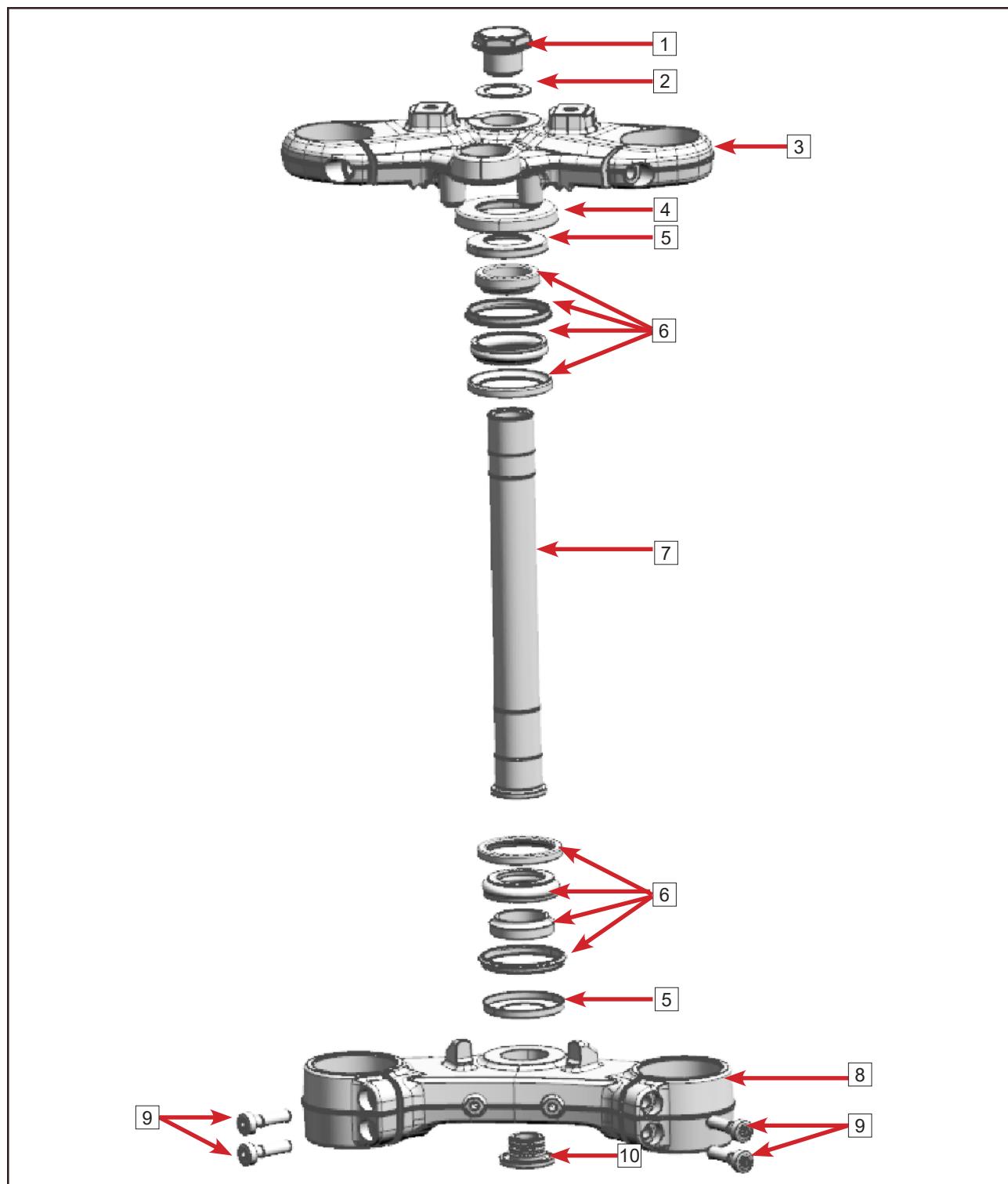
## 14.3.4 Inspect Handlebar Interference

Swing the handlebar to check whether all kinds of wires interfere with the front wheel, whether the handlebar of maximum steering interferes with the fuel tank.



# 14 Handlebar, Triple Clamps Assembly

## 14.4 Upper and Lower Triple Clamp Assembly



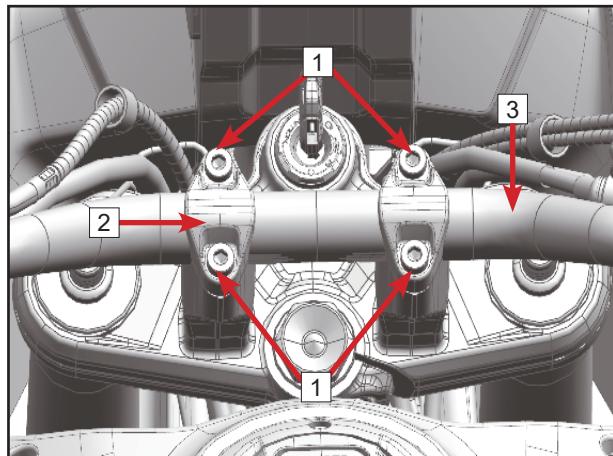
1	Upper triple clamp screw	2	Washer 25x35x0.5	3	Upper triple clamp	4	Anti-dust cap
5	Anti-dust ring assembly	6	Steering bearing assembly	7	Front fork pipe	8	Lower triple clamp
9	Inner hex socket cap screw	10	Front fork pipe plug				

## 14.4.1 Upper Triple Clamp Assembly Removal

Remove inner hex bolt **1**.

Remove handlebar press cover **2**.

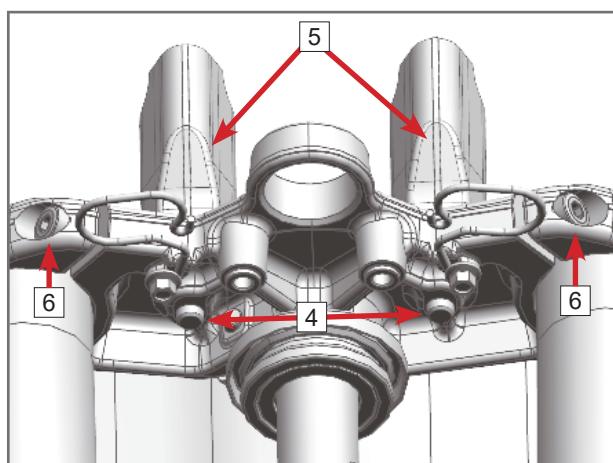
Remove handlebar pipe **3**.



Remove the bolt connecting upper triple clamp with mounting seat **4**.

Remove handlebar pipe mounting seat **5**.

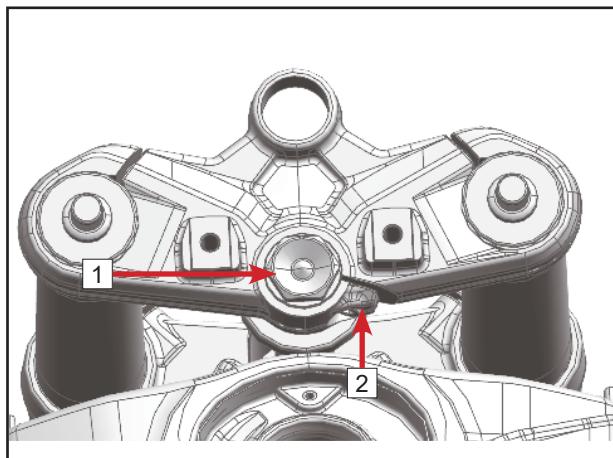
Remove upper triple clamp shock absorber bolt **6**.



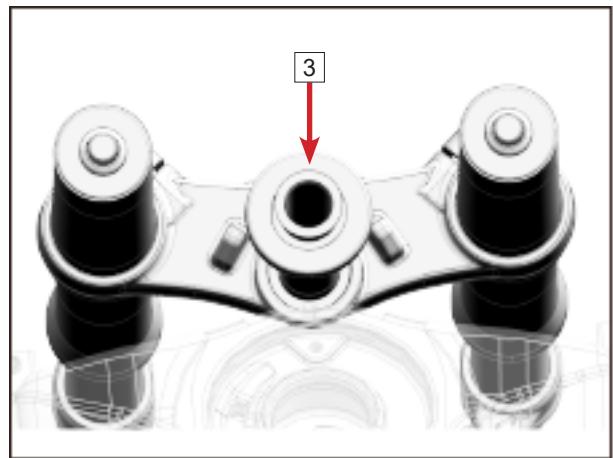
## 14.4.2 Front Fork Pipe and Lower Triple Clamp Assembly Removal

Remove nut **1**.

Remove bolt **2**.



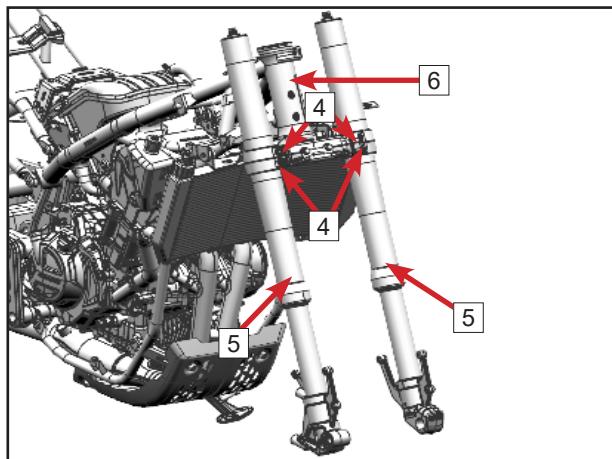
Remove anti-dust cover and anti-dust ring assembly **3**.



## 14 Handlebar, Triple Clamps Assembly

Remove inner hex bolts **4**.

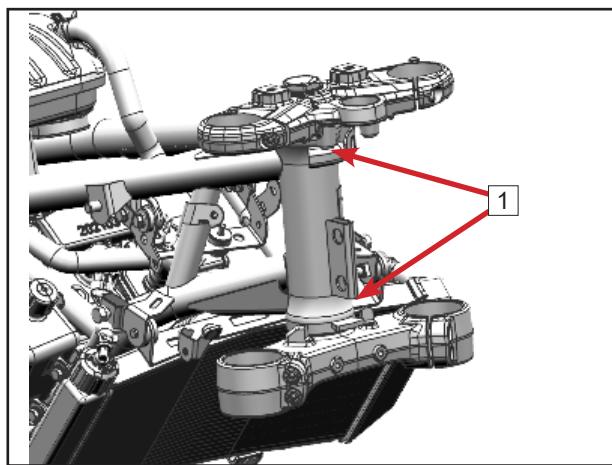
Remove front shock absorbers **5**, lower triple clamp and front fork pipe assembly **6**.



### Inspection

Check whether the upper and lower steering bearing assembly **1** is complete or worn, and replace it in time.

Check whether the bearing steel bowl has cracks or abnormal wear, and replace it in time.



### Installation

Reverse the removal procedures for installation.

**Steering column lock nut torque: 25 N·m**

**Upper triple clamp lock screw torque: 20 N·m**

**NOTE: When installing and replacing, apply sufficient grease in the bearing steel bowl.**

# Appendix A

## IBEX 450

