

ZF800LS Motorcycle Maintenance Manual

Edition 1 (March 2024)

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MOTORCYCLE CO., LTD. The contents and pictures in this
maintenance manual are for reference only.

The actual product shall prevail.

Preface

This motorcycle manual introduces the basic structure, working principle, disassembly and maintenance, fault diagnosis and troubleshooting methods of ZF800LS motorcycles to readers in detail. In addition, it also introduces the technical specifications, performance parameters and maintenance adjustment data of this model. This manual is informative, illustrated and practical. We hope that this manual can provide technical support and guidance for KOVE motorcycle users and after-sales service personnel in terms of maintenance.

The technical specifications, performance parameters and maintenance adjustment data marked in this manual are determined according to the latest state. We will improve this model later without notice and may cause any inconsistency between the latest model and that described in this manual. We apologize for any inconvenience caused thereof.

We sincerely hope that you will give us your valuable opinions and comments on the design, manufacture and quality of this model to improve it in time. Thank you for your support and cooperation.

All the information, charts, data, and performance indicators published in this manual are as of the printing of this manual. Please understand that TIBET NEW SUMMIT MOTORCYCLE CO., LTD. reserves the right to modify this manual without prior notice. Any part of this manual is the property of TIBET NEW SUMMIT MOTORCYCLE CO., LTD. No unit or individual is allowed to reprint it without our consent. Otherwise, they will be held legally responsible.

Due to the limited abilities of the editor, errors and omissions are inevitable in this manual. We kindly welcome criticism and correction from users and readers.

TIBET NEW SUMMIT MOTORCYCLE CO., LTD.

Customer service hotline: 400-8818603

For more information, please visit our website at cn.kovemoto.com
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Chapter I

How to use this manual

This manual describes the maintenance procedures of ZF800LS.

Chapters II and III apply to the complete motorcycle. Chapter IV describes the procedure for removing/installing components that may be used to provide the services described in the following sections. Chapters IV to XIII describe the parts of the motorcycle that are grouped according to their positions. If you are not familiar with this motorcycle, please read the technical characteristics in Chapter III. Please comply with the recommendations in the Maintenance Cycle List to ensure that the motorcycle is in the best running condition and the emission level meets the local environmental protection requirements. Then go to the contents on the first page of this part, most of which start with procedure set or system descriptions, maintenance instructions, and troubleshooting. The detailed process is described in the following pages. Refer to Troubleshooting in each section to eliminate the fault or symptom.

Your safety and the safety of others are very important. To help you make an informed decision, we provide safety information and other information in this manual.

You must use your good judgment, and you will find important safety information in various forms.

Including:

Including:

* Safety labels on the motorcycle

* Safety Information - Add one of three signal words before the safety warning symbol, i.e. Warning, Caution, or Notice, meaning:



Warning

This symbol indicates a dangerous situation. This dangerous situation will lead to fatality or serious injury if not avoided.

Note

This is the [Notes] symbol. This symbol indicates the specified precautionary measures that you must follow to avoid damage to the motorcycle or financial loss.

Note

This is the [Note] symbol. This symbol indicates some key information that can make certain procedure steps easy to perform.

Note: How to properly and safely repair this motorcycle.

Symbol

The symbols used in this manual indicate specific maintenance procedures. If supplementary information related to these symbols is needed, they will be explained in detail in the text without using these symbols.

	Replace parts with new ones before assembly.
	Use the recommended oil unless otherwise specified.
	Use molybdenum oil solution (oil and molybdenum grease are mixed in a ratio of 1:1).
	Multi-purpose high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y)
	Use molybdenum disulfide grease (NLGI #2 or equivalent product containing more than 3% molybdenum disulfide).
	Use molybdenum disulfide paste (NLGI #2 or equivalent product containing over 40% molybdenum disulfide).
	Use silicone grease.
	Coat thread locker unless otherwise specified.
	Apply sealant.
	Use DOT4 brake fluid. Use the recommended brake fluid unless otherwise specified.
	Use shock absorber oil.

Basic Information

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Maintenance Instructions

1. Please use KOVE original parts and lubricants or equivalents recommended by KOVE. Parts that do not meet the design specifications of KOVE may damage the motorcycle.
2. Use special tools designed for this product to avoid damage and incorrect assembly.
3. Only tools using metric unit can be used to repair motorcycles, and bolts, nuts and bolts using metric unit cannot be interchanged with fasteners using imperial unit.
4. Use new gaskets, O-rings, cotter pins and lock plates when reassembling.
5. Unless a specific order is specified, when tightening bolts or nuts, start with the one with larger diameter or internal bolts, and then tighten them to the specified torque in diagonal increments.
6. Clean the parts with detergent before disassembly and lubricate all sliding surfaces before reassembly.
7. After reassembly, check all parts for proper installation and operation.
8. Do not bend or twist the control cable. Damaged control cables may not function properly and may get stuck or tangled.

Abbreviations

In this manual, the following abbreviations are used to identify respective components or systems.

Abbreviations	Full name
ABS	Anti-lock braking system
CKP sensor	Crankshaft position sensor
DLC	Data link connector
DTC	Diagnostic trouble code
ECU	Engine control module
ECT sensor	Engine coolant temperature sensor
EOP switch	Engine oil pressure
EVAP	Evaporative emission
IAT sensor	Intake air temperature sensor
MAP sensor	Intake pressure sensor
MIL	Fault indicator
O ₂ sensor	Oxygen Sensor
OBD Service connector	Maintenance diagnostic interface
TP sensor	Throttle position sensor

Model Identification-ZF800LS



Basic Information

Item		Parameter
Size	Total length (mm)	2267
	Total width (mm)	880
	Total height (mm)	1395
	Wheelbase (mm)	1545
	Seat height (mm)	-
	Ground clearance (mm)	-
	Curb weight	176kg
	Carrying capacity	2 person
	Payload (kg)	164kg
Frame	Frame type	High-strength steel twin-spar cradle frame
	Front suspension	Inverted fully adjustable damper shock absorber
	Front absorber free play (mm)	270
	Rear suspension	Fully adjustable external airbag shock absorber
	Rear absorber free play (mm)	100
	Tire manufacturer and model (front, rear)	Front: CST 90/90-21 EX01 pattern 54H
	Rear: CST 140/80-18 EX01 pattern 70H	
	Front brake/disc (mm)	Double-piston floating caliper (Taisco)/single disc 320
	Rear brake/disc (mm)	Single-piston hydraulic brake caliper/single disc 240
	Forward angle (°)	27.15
	Fuel tank capacity (L)	20
Engine	Model	Z288 MW
	Displacement	799 ml
	Type	Twin-cylinder, four-stroke, Water-cooled, DOHC, 8-valve
	Cylinder diameter × stroke	88.0×65.7
	Combustion chamber volume	25.6ml
	Compression ratio	13:1
	Maximum net power	71.0/9000 (kW/r/min)
	Maximum torque	80.0/7500 (N·m/r/min)
	Idle rpm	1500±100r/min
	Starting mode	Electric starting
	Valve mechanism	DOHC/chain-driven
	Lubrication method	Forced pressure lubrication + splash lubrication
	Cooling method	Closed coolant circulation cooling
	Net engine mass	52kg
Drivetrain	Clutch form	Wet multi-piece manual clutch
	Shift mode	Six-speed constant-mesh stepped transmission
	Reducer gear	6
	Shift mode/sequence	Mechanical reciprocating type / 1-N-2-3-4-5-6-5-4-3-2-N-1
	Primary transmission ratio	1.923
	Final transmission ratio	3.000
	Gear transmission ratio	1st gear: 2.846; 2nd gear: 2.000; 3rd gear: 1.550; 4th gear: 1.273; 5th gear: 1.083; 6th gear: 0.957

Item		Parameter
Electric system	Ignition mode	ECU-controlled digital ignition
	Starting mode	Electric starting
	Lighting system	Battery
	Spark plug model	BN9RSI (Weichai Torch)
	Spark plug clearance	0.95mm-1.05mm
	Magneto model	Permanent magnet three-phase AC generator with outer rotor flywheel type

Cooling System Specification Unit: mm

Item		Specification
Coolant capacity	Radiator (including all water channels)	1.6 Litre
	Water reservoir (exceeding maximum level)	0.18 Litre
Radiator cap relief pressure		1.3bar

Lubrication System Specifications Unit: mm

Item		Standard value	Ultimate state
Oil capacity	After disassembly and reassembly	3.2 Litre	-
	After replacing the engine oil fine filter	3.0 Litre	-
	Only after draining through the oil drain bolt	2.8 Litre	
Recommended oil	Brand	AMSOIL exclusive (fully synthetic lubricant)	
	Model	SN 10W-50	-
	Grade	API Quality Grade: SN or above grade (do not use the oil marked as energy-saving on the circular API service label).	-

Specification of EFI system Unit: mm

Item	Specification
Engine idle speed (high/low)	1400±100 r/min
Water temperature sensor (output resistance at 20 °C)	2.4320kΩ
Fuel injector resistance (20°C/68°F)	12Ω
Oxygen sensor resistance (20°C/68°F)	9Ω

Fuel System Specification Unit: mm

Item		Specification
Throttle valve body identification number		S100
Fuel pressure at idle speed		330 Kpa±10kPa
Fuel pump flow (at 12V and 330 ± 10 kPa)		≥30L/h
	Type	BOSCH EFI
	Throttle orifice	46mm
Carben canister solenoid valve resistance		17Ω
Gasoline octane rating		No.95 GB17930 - 2016

Front Wheel/Suspension/Steering System Specifications

Unit: mm

Item		Standard	Ultimate state
Tire tread depth		10	Tire wear limit marks at Δ TWl mark on sidewall and center of tire
Cycling on paved roads		200 kPa (2.00 kgf/cm ² , 29 psi)	-
Cycling on unpaved roads		200 kPa (2.00 kgf/cm ² , 29 psi)	-
Shaft runout		0.05	0.1
Rim runout	Radial	1.0	2.0
	Axial	1.0	2.0
Front Shock Absorber	Free length of spring	475	
	Tube runout	-	0.2
	Recommended specifications of shock absorber oil	AMSOIL Thunderbolt High-Performance Shock Absorber Oil 10W	
	Shock absorber fluid adding capacity	Shock absorber outer chamber (spring chamber) 350 $\pm$ 3ml, equal amount of filling for both sides	
Steering bearing locking torque		First torque to 40N.m, then loosen and torque to 10N.m, and finally back off by 1/4 turn	

Rear Wheel/Suspension/System Specifications

Unit: mm

Item		Standard	Ultimate state
Tire tread depth		13	Tire wear limit marks at Δ TWl mark on sidewall and center of tire
Cycling on paved roads		225 kPa (2.25 kgf/cm ² , 32 psi)	-
Cycling on unpaved roads		200 kPa (2.00 kgf/cm ² , 29 psi)	-
Shaft runout		0.05	0.1
Rim runout	Radial	1.0	2.0
	Axial	1.0	2.0
Drive chain	Size/link	Choho 520 SX2 (X-type oil seal) / 120 clicks	-
	Slack	35-50	-
Rear shock absorber	Free length of spring	220	-
	Recommended specifications of shock absorber oil	AMSOIL Thunderbolt High-Performance Shock Absorber Oil 10W	
	Shock absorber oil adding volume	180ml	-
	Nitrogen volume of gas cylinder	1.0mpa	-

Battery/Charging System Specifications

Unit: mm

Item			Specification
Battery	Model		HJ13L-FPZ
	Capacity		6.0AH
	Leakage value	It can be stored for more than one year at 25 °C, and the higher the temperature, the shorter the storage time.	
	Voltage (28 °C, 68°F)	Fully charged	≥13.3V
		Need to be charged	≤12.8V
	Charging current	Normal	3.0A
		Fast	24A
Magneto	Charging capacity		5000r/min>26A
	Charging coil resistance (28 °C, 68 °F)		0.2Ω±20%

Lights/Instruments/Switches Specifications

Item		Specification
Bulbs/ indicators/ warning lamps	Bulbs	
	Headlights (high/low beam)	LED
	Front turn signal lamp	LED
	Rear turn signal lamp	LED
	Brakes/taillights	LED
	License plate lamp	LED
	Instrument backlight	LED
	Indicator/warning lamp	
	Neutral indicator lamp	LCD
	Oil pressure warning lamp	LCD
	Coolant temperature warning lamp	LCD
	Turn indicator light	LCD
	Engine fault warning lamp (MIL)	LCD
	ABS warning lamp	LCD
	Shift overturn indicator	LCD
	High beam indicator	LCD
Fuse	Spare	7.5A,10.0A,15.0A
	ABS1 motor fuse	15.0A
	ABS2 solenoid valve fuse	10.0A
	light/headlight fuse	10.0A
	Signal	10.0A
	ABS control unit fuse	1A
	EFI/NC fuel Injection fuse	7.5A
	FAN/fan motor fuse	15.0A
	BUMP	7.5

Torque Value——Vehicle Body

Installment position	Specification status	Torque force value N·m	Notes
License plate lamp pressure plate and rear fender rear bracket	ST3.5	1	
License plate lamp pressure plate and rear fender rear rear section	ST4.2	1	
Rear fender rear section and rear fender rear bracket	ST4.2	1	
Vehicle body inner lining (left and right) and vehicle body (left and right)	ST4.2	1	
Water tank air guide cover - left and right and fuel tank side protector - left and right	ST4.2	1	
Fuel tank side protector inner lining (left and right) and side protector (left and right)	ST4.2	1	
Fuel tank side trim (left and right) and side protector (left and right)	ST4.2	1	
OBD interface and rear fender front section	ST4.2	1	
Vehicle body inner lining (left and right) and rear fender front section	ST4.8	1	
Fuel tank drain pipe pressure plate and fuel tank	M5	5	
Fuel pump and fuel tank	M5	2	
Oil pipe clamp and swingarm	M5	6	
ABS ring gear and front/rear wheel hub	M5	4	Sealant application
Rear brake pedal and brake rocker arm	M5	3	Sealant application
ECU and rear fender front section	M5	3	
Fuel level sensor and fuel tank	M5	3	
Fuel level sensor mounting bracket and fuel tank	M5	3	
Taillight assembly and rear tailgate	M5	5	
Side tilt sensor and carbon canister	M5	3	
Rear fender inner panel and rear fender rear section	M5	5	
Rear fender inner panel and rear fender rear bracket	M5	6	
Rear tailgate and rear fender front section	M5	6	
Fuel tank lock base and fuel tank	M5	3	
Rear wheel small fender and rear fender front section trim	M5	6	
Fuel tank lower protector (left and right) and fuel tank	M5	6	
Headlight trim (left and right) and fuel tank side protector inner lining (left and right)	M5	6	
Fuel tank side protector (left and right) and fuel tank	M5	6	
Fuel tank front shield and fuel tank	M5	6	
Fuel tank front shield and instrument housing rear section (left and right)	M5	6	
Instrument housing rear section (left and right) and fuel tank	M5	6	
Wire hook, upper connecting plate, and ignition lock cover	M5	6	
Fuel tank side protector (left and right) and instrument housing	M5	6	
Headlight trim and instrument housing	M5	6	
Headlight trim and instrument bracket	M5	6	
Headlight bracket and headlight assembly	M5	6	
Headlight bracket pressure plate and headlight bracket	M5	6	

Installment position	Specification status	Torque force value N·m	Notes
Front windshield and front windshield bracket	M5	6	
Instrument bracket and instrument trim	M5	6	
Instrument bracket and instrument assembly	M5	6	
Front brake hose clamp (locking)	M5	3	
Chain guide and chain guide wear block	M5	3	
Hexagon self-locking nut connecting chain guide and wear blocks	M5	3	
Side cover (left and right) and frame	M6	6	
Seat cushion lock and frame	M6	8	
Rear brake pump and frame	M6	12	
Fuel tank front protector bracket and fuel tank	M6	6	
Fuel tank seat cushion stopper	M6	6	
Seat cushion mounting bracket and fuel tank	M6	6	
Magneto plug bracket and fuel tank	M6	6	
ABS hydraulic unit bracket and frame	M6	10	
ABS hydraulic unit and ABS hydraulic unit bracket	M6	10	
Fuel tank side protector bracket (left and right) and frame	M6	10	
Exhaust heat shield and exhaust pipe	M6	10	
Water reservoir and radiator	M6	10	
Radiator upper mounting point and frame	M6	10	
Radiator lower mounting point and frame	M6	10	
Shift rockerarm and engine	M6	10	
Shift rod end bearing and shift rockerarm	M6	10	Sealant application
Hex nut connecting shift rod end bearing to shift rod (left hand)	M6	6	
Hex nut connecting shift rod end bearing to shift rod (right hand)	M6	6	
Shift rod end bearing and shift pedal connecting rod	M6	10	Sealant application
Fuel rail and throttle valve	M6	10	
Carbon canister and frame	M6	10	
Air filter and frame	M6	10	
Chain clip pressure plate and swingarm	M6	6	
Brake hose 3 and frame	M6	10	
Brake rockerarm and rear brake rod end bearing	M6	10	
Front wheel speed sensor and front wheel bushing-left	M6	8	
Rear wheel speed sensor and rear brake caliper bracket	M6	8	
Horn and frame	M6	10	
Regulating rectifier and frame	M6	10	
Ground wire to frame (left front)	M6	10	
Engine lower protector (lower) rear mounting point	M6	10	

Installment position	Specification status	Torque force value N·m	Notes
Engine lower protector side mounting point	M6	10	
Engine sprocket cover and engine	M6	10	
Chain guard and swingarm	M6	10	
Rear fender front section and subframe (side mounting point)	M6	8	
Rear fender inner panel and rear fender rear bracket with frame	M6	10	
Rear tailgate trim, vehicle body inner lining (left and right) and frame	M6	8	
Rear tailgate, rear tailgate trim, and subframe	M6	8	
Vehicle body inner lining (left and right) and subframe	M6	8	
Rear fender rear section and frame	M6	8	
Rear fender front section trim and rear fender front section	M6	8	
Rear fender front section trim and subframe	M6	8	
Fuel tank side protector (left and right), fuel tank lower protector (left and right), and fuel tank side protector bracket	M6	8	
Battery box and frame	M6	10	
Instrument bracket and bracket	M6	10	
Front windshield bracket and instrument bracket	M6	10	
Front brake disc and front wheel hub	M6	12	Sealant application
Chain guide and mounting bracket	M6	8	
Chain guide mounting bracket and swingarm	M6	8	
Steering damper adjustment seat and frame	M6	10	
Rear brake disc and rear wheel hub	M6	12	Sealant application
Front fender and lower connecting plate	M6	8	
Front brake pump and rear mirror mounting base	M6	10	
Steering damper and lower connecting plate	M6	10	
Front shock absorber trim and front shock absorber	M6	8	
Ignition lock and upper connection plate	M8	22	
Rear brake rocker arm and frame	M8	25	Sealant application
Bumper mounting bracket (left and right) and frame	M8	22	
Bumper (left and right) and frame	M8	22	
Fuel tank (front and rear) mounting points	M8	22	
Engine lower reinforcement bracket-left with engine	M8	22	
Engine lower reinforcement bracket-left with frame	M8	22	
Engine lower reinforcement bracket-right with frame	M8	22	
Engine lower reinforcement bracket-right with engine	M8	22	
Engine lower protector(right) front bracket connected with engine	M8	22	
Engine lower protector(left) front bracket connected with engine	M6	10	
Exhaust pipe front section and frame	M8	22	

Installment position	Specification status	Torque force value N·m	Notes
Hexagon flange nut connecting exhaust pipe front section to engine	M8	18	
Shift pedal connecting rod and frame	M8	25	Sealant application
Upper clamp and lower socket of the steering handlebar	M8	22	
Upper connecting plate and shock absorber (locking)	M8	22	
Chain guide mounting bracket and swingarm	M8	15	
Lower connecting plate and shock absorber (locking)	M8	22	
Front shock absorber bottom cylinder - left with caliper (Taisco)	M8	35	Sealant application
Rear sprocket and buffer	M8	37	
Front shock absorber and front wheel shaft locking	M8	22	
Upper connecting plate and steering handlebar lower socket	M8	22	
Exhaust pipe mounting bracket and subframe	M8	22	
Exhaust pipe rear section and exhaust pipe mounting bracket	M8	22	
Engine and rear frame suspension	M10	54	
Engine upper suspension (left and right) and engine	M10	54	Sealant application
Bumper (left and right) and bumper bracket	M10	45	
Engine front suspension(upper/lower) - left/right with engine	M10	54	Sealant application
Engine lower reinforcement bracket-left with engine	M10	44	Sealant application
Engine lower reinforcement bracket-right with engine	M10	44	Sealant application
Rear shock absorber and frame	M10	44	
Brake hose 1 with front brake pump and front brake switch (oil passing bolt)	M10×1.25	32	
Oil passing bolt connecting brake hose to ABS hydraulic unit	M10×1.0	25	
Oil passing bolt connecting brake hose 3 to front caliper	M10×1.25	32	
Oil passing bolt connecting brake hose 5 to rear caliper	M10×1.0	32	
Brake hose 4, rear brake pump and rear brake switch (oil passing bolt)	M10×1.25	32	
Double-threaded stud connecting upper connecting plate to steering handlebar lower socket	M10	30	
Triangular cradle and shock absorber	M10	44	
Subframe and main frame	M10	45	
U swingarm and frame	M12	60	
Triangular cradle and U swingarm	M12	60	
Triangular cradle and swingarm	M12	60	
Front wheel axle locking nut	M16	88	
Plain fork axle locking nut	M16	88	
Steering stem locking bolt	M16	70	
Rear wheel axle locking nut	M22	128	
Front/rear wheel spoke nipples	M6/M7	6	
Front/rear tire clamp locking nut	M8	12	
Front/Rear brake pad guide pin bolt	M10	15	

Installment position	Specification status	Torque force value N·m	Notes
Upper/lower sliding axle bolt and front/rear caliper bracket	M8	20	Apply sealant
Spark plug and cylinder head	M10	12	
Intake pipe assembly mounting bolt	M6	10	
Oil pan drain bolt	M20	22	
Engine oil fine filter cover bolt	M5	6	
Timing adjusting bore cover	M24	10	
Water pump drain bolt	M6	10	
Radiator fan and radiator	M6	8	
Thermostat cover mounting bolt	M5	6	
Oxygen sensor and exhaust pipe front section	M16	50	Apply high-temperature resistant grease
Drive chain adjusting block locking bolt (nut)	M8	16	
Rear shock absorber spring pre-load locking nut	M60	44	
Rear brake pump push rod adjustment nut	M6	6	
Reservoir groove cover of rear brake pump	M4	2	
Front brake pump reservoir cover	M4	1	
Left handlebar grip screw	M5	7	
Accelerator and steering handlebar mounting bolt	M6	10	
Accelerator cable adjustment assembly A/B nut (handlebar side)	M6/M7	5	
Accelerator cable adjustment assembly A/B nut (throttle side)	M6	4	
Handlebar switch-left	M4	3	
Handle switch-right	M4	4	
Clutch cable adjusting nut (engine side)	M8	8	
Clutch rockerarm and engine	M6	8	
Clutch cable bracket and engine	M6	10	
Clutch lever shoulder bolt	M6	5	
Rear mirror (left and right) locking (nut)	M10	25	
Front brake pump rocker arm adjustment assembly	M5	6	
Front hand brake lever shoulder bolt	M6	5	
Taillight bracket and subframe	M6	8	
Subframe reinforcement plate and subframe	M6	8	
Battery positive/negative terminal mounting bolt	M5	5	
Starter relay terminal installation	M6	5	
Front shock absorber air pressure adjusting screw	M4	1.3	
Front shock absorber spring chamber upper adjustment cap	M50	30	
Air filter element bracket and air filter housing	M5	2	
Brake caliper bleed screw	M6	6	
Ground wire and starting motor	M6	10	

Installment position	Specification status	Torque force value N·m	Notes
Battery box cover and battery box	M5	6	
Special mounting bolts for side stand connection	M10	Bolt 2 N·m, then tighten bolt fully. Tightening nut torque: Hexagonal immobility Nut tightening torque 22N·m	Sealant application Oil application
Hex flange self-locking nut connecting side stand			
8-slot adjusting nut tightening steering stem	M25	First stage: 40N·m, second stage: loosen the adjusting nut by two turns and then tighten it to 10N·m, third stage: keep the direction fixed and loosen by 1/4 turn	

Lubrication and Sealing Points - Vehicle Body

Material	Position	Notes
Multi-purpose high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y)	Contact area of upper and lower bearings and steel bowls of steering stem	
	Dust-proof seal of steering bearing	
	Contact area of steering stem locking bolt, gasket, and upper connecting plate	
	Rear swingarm shaft rod, flat bearing, needle roller bearing	
	U swingarm rotation area and needle roller bearing	
	Triangular cradle rotation area and needle roller bearing	
	Accelerator handle cable groove and winding area	
	Clutch control lever sliding area	
	Rear brake arm pivot rotation area	
	Sliding area of shift arm pivot	
	Sliding area of smooth portion of upper and lower sliding shafts of front brake caliper	
	Contact area of smooth portion of guide pin of front brake caliper	
	Contact area of front brake pump pushrod and piston combination rocker arm	
	Contact area of smooth portion of hand brake lever bolt	
	Sliding area of smooth portion of upper and lower sliding shafts of rear brake caliper	
	Contact area of smooth portion of guide pin of rear brake caliper	
	Contact area of push rod and piston of rear brake pump	
	Sliding area of side stand pivot	
	Contact area of oil seal lip of front wheel hub bearing	
	Contact area of oil seal lip of rear wheel hub bearing	
	Contact area of oil seal lip of rear swing arm	

Material	Position	Notes
Multi-purpose high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y)	Contact area of oil seal lip of U swingarm	
	Contact area of oil seal lip of triangular cradle	
	Rear wheel hub left O-ring	
Silicone oil	Contact area of dustproof washer, seal ring, and piston of front brake caliper	
	Contact area of front and rear cups and piston of front brake pump	
	Contact area of dustproof washer, seal ring, and piston of rear brake caliper	
	Contact area of front and rear cups and piston of rear brake pump	
Shock absorber fluid specialized	Seal lip of front shock absorber oil seal	
	Dust-proof seal lip of front shock absorber	
	O-ring of front shock absorber end cover	
Cable lubricant	Clutch cable	
	Seat lock cable	
	Throttle cable	
Special chain lubricant or equivalent	Entire surface of chain	
Thread locker (Huitian 7272)	Front and rear brake disc mounting bolts	
	Front and rear ABS ring gear mounting screws	
	Engine front suspension (upper/lower) - left/right and engine	
	Engine upper suspension (left and right) and engine	
	Engine lower reinforcement bracket (left and right) and engine	
	Upper/lower sliding axle bolt and front/rear caliper bracket	
Thread locker (Huitian 7262)	Rear brake rocker arm and frame	
	Rear brake pedal and rear brake rockerarm	
	Rear brake pump push rod end bearing and brake rockerarm	
	Shift pedal connecting rod and frame	
	Shift rod end bearing and shift rockerarm	
	Shift rod end bearing and shift pedal connecting rod	
	Front shock absorber bottom cylinder - left with caliper (Taisco)	
	Steering handlebar lower socket and special through bolt	
	Lower connecting plate and front shock absorber	
	Special bolts for side stand connecting frame	

Regular Maintenance and Adjustment

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Care Instructions

Overview:

This chapter contains all relevant information for conducting the recommended inspections and adjustments. Regular implementation of these maintenance procedures will make motorcycle operation smoother, extend its lifespan, and reduce maintenance costs. The information described in this Chapter applies to motorcycles both already in use and not sold yet. All maintenance technicians shall be familiar with all the information described in this Chapter.

Exhaust Gas Control System Maintenance Schedule

1. Annual inspection must be carried out once a year for items requiring annual inspection.
2. After the odometer reading reaches 50,000 km, additional maintenance shall be carried out in a repeated manner started from 10,000 km of the regular maintenance meter.
3. ☆ : Refers to the items recommended to KOVE Moto Service Network for inspection and maintenance as they have special tools, materials and professional skills.

S/N	Item	Contents of inspection or maintenance	Odometer reading (km)					
			1000	10,000	20,000	30,000	40,000	Annual inspection
1	☆	Gasoline pipeline		•	•	•	•	•
2	☆	Spark plug		•		•		
		• Replace if necessary.			•		•	
3	☆	Valve clearance		Every 36,000 km				
4	☆	Fuel injection	•	•	•	•	•	•
		• Check and make synchronization adjustments.		•	•	•	•	•
5	☆	Exhaust system	•	•	•	•	•	
6	☆	Evaporative emission control system			•		•	
7	☆	Engine exhaust gas reflux device		•	•	•	•	•
8	☆	Secondary air supply system	-	-	-	-	-	-

General Periodic Maintenance/Lubrication Table

Note

1. Annual inspection must be carried out once a year for items requiring annual inspection.
2. After the odometer reading reaches 50,000 km, additional maintenance shall be carried out in a repeated manner started from 10,000 km of the regular maintenance meter.
3. ☆ : Refers to the items recommended to KOVE Moto Service Network for inspection and maintenance as they have special tools, materials and professional skills.

S/N	Item	Contents of inspection or maintenance	Odometer reading (km)					
			1000	10,000	20,000	30,000	40,000	Annual inspection
1	☆	Diagnostic system check	• Use KOVE diagnostic tools for dynamic inspection. • Check the fault code.	•	•	•	•	•
2	☆	Air filter element	• Replace.	•	•	•	•	•
3	☆	Air filter box and hose	• Cleaning.	•	•	•	•	•
4		Fuel filter	• Replace.	•	•	•	•	
5		Clutch	• Check the operation. • Adjustment.	•	•	•	•	•
6	☆	Front brake	• Check the operation, brake fluid level and leakage. • Replace brake pads if necessary.	•	•	•	•	•
7	☆	Rear brake	• Check the operation, brake fluid level and leakage. • Replace brake pads if necessary.	•	•	•	•	•
8	☆	Brake hose	• Check for cracks or damage. • Replace.	•	•	•	•	•
9	☆	Brake fluid	• Replace.	Every 2 years				
10	☆	Rim	• Check for runout, spokes tightness, and damage. • Tighten the spokes if necessary.	•	•	•	•	•
11		Tire	• Check the depth and damage of wheel tread. • Replace if necessary. • Check the tire pressure. • Correct if necessary.	•	•	•	•	•
12	☆	Wheel bearing	• Check whether the bearing is loose or damaged.	•	•	•	•	
13	☆	swingarm pivot bearing	• Check operation and free play. • Lubricate with lithium soap-based grease.	•	•	•	•	
14		Drive chain	• Check the chain for looseness and alignment. • Dedicated chain lubricant to thoroughly adjust and lubricate the chain.	Every 1000 km and after washing the motorcycle, or after riding in rainy or humid areas.				
15	☆	Steering head bearing	• Check the bearing assembly for tightness. • Apply a proper amount of composite lithium grease for lubrication.	•	•	•	•	

S/N		Item	Contents of inspection or maintenance	Odometer reading (km)					
				1000	10,000	20,000	30,000	40,000	Annual inspection
16	☆	Complete motorcycle fastener	· Ensure that all nuts, bolts and screws are tightened to the specified torque.		•	•	•	•	•
17		Front brake handle pivot	· Apply composite lithium grease for lubrication.		•	•	•	•	•
18		Brake pedal pivot	· Apply composite lithium grease for lubrication.		•	•	•	•	•
19		Clutch handle pivot	· Apply composite lithium grease for lubrication.		•	•	•	•	•
20		Shift pedal pivot	· Apply composite lithium grease for lubrication.		•	•	•	•	•
21		Side stand	· Check the operation. · Apply composite lithium grease for lubrication.		•	•	•	•	•
22	☆	Front shock absorber	· Check the operation and oil leakage. · Replace if necessary.		•	•	•	•	
23	☆	Rear shock absorber	· Check the operation and oil leakage. · Replace if necessary.		•	•	•	•	
24	☆	Rear suspension components	· Check the operation and seals for damage · Apply composite lithium grease for lubrication.		•	•	•	•	
25		Engine oil	· Replace (preheat the engine before draining). · Check the oil level and the motorcycle for oil leakage.	500 km, 1,500 km, Replaced every 5,000 km.					•
26		Engine fuel filter element/coarse filter	· Replace. · Check and clean.	Replace the fine fuel filter and clean the coarse filter with every oil change.					
27	☆	Cooling System	· Check the amount of cold liquid and whether it leaks.		•	•	•	•	•
			· Replace.	Every 2 years					
28	☆	Front and rear brake switches	· Check the operation.	•	•	•	•	•	•
29	☆	Moving parts and cables	· Lubrication.		•	•	•	•	•
30	☆	Accelerator handle housing and cable	· Check the operation and free play. · Adjust the free play of the accelerator cable if necessary. · Lubricate the accelerator handle housing and cable.		•	•	•	•	•
31	☆	All lighting, signals and switches	· Check the operation. · Adjust the headlight beam.	•	•	•	•	•	•
32	☆	Battery	· Check whether the battery voltage is normal. · Clean the terminals.		•	•	•	•	•

Note

- Air filter

- This kind of air filter element is paper type and cannot be cleaned with compressed air to avoid damage.
- When driving in unusually humid or dusty areas, the air filter element must be replaced frequently.

- Hydraulic brake

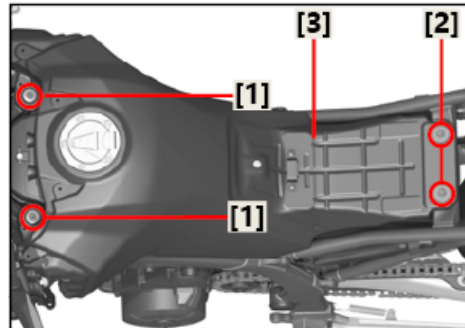
- Regularly check brake fluid and replenish when necessary.
- Replace the inner parts of brake master cylinder and brake caliper every 2 years, and replace brake fluid at the same time.
- Replace the brake hose every four years. Replace it immediately if there are cracks or damages.

※ Inspection of Fuel Pipeline

1. Disassemble:

- Seat cushion assembly
- Bumper (left and right)
- Fuel tank front cover
- Rear section of the instrument housing (left and right)
- Fuel tank side protector (left and right)
- Fuel tank lower protector (left and right)

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.



2. Disassemble:

- Front mounting bolt for gasoline fuel tank [1]
- Rear mounting bolt for gasoline fuel tank [2]
- Lift the fuel tank assembly [3]

Notes

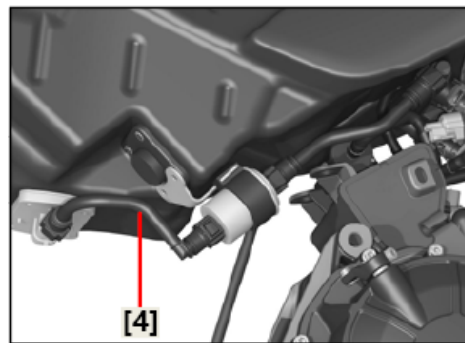
- When lifting the fuel tank, be careful not to pull the fuel tank vent hose/overflow hose.

3. Check:

- Gasoline hose [4]
- Fuel tank vent/overflow hose [5]
- Fuel tank drain pipe assembly [6]

Crack/damage → Replace.

Loose connection → Properly connect.



Notes

- Ensure that the fuel tank vent hose/overflow hose and drain pipe are routed correctly.

4. Installation:

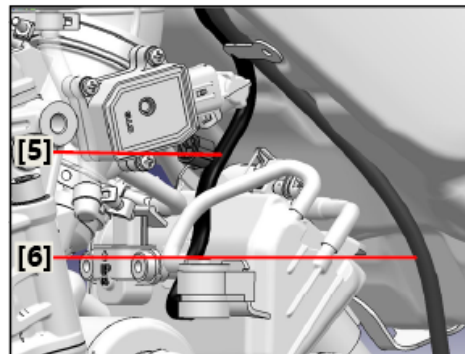
The installation sequence is reversed from the removal sequence.

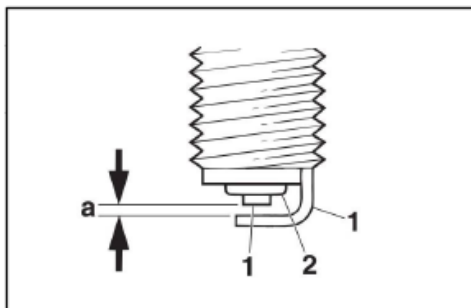
Torque:

- Gasoline fuel tank

Gasoline fuel tank and frame (front and rear) mounting points

22N·m(2.2kgf·m,16lbf·ft)





※ Inspection and adjustment of spark plug

Notes

• Before removing the spark plugs, use an air gun to blow around the spark plug seats while ensuring no dust falls into the cylinder.

1. Check:

- Spark plug type

Mistake → Replace.

Manufacturer/model

TORCH / BN9RSI

2. Check:

- Electrode [1]

Damage/Consume → Replace the spark plug.

- Insulator [2]

Abnormal color → Replace the spark plug.

The normal color shall be tan or light tan.

3. Check:

- The resistance value between the connection screw and the center electrode [1] is $5K\Omega$.

4. Cleaning:

- Spark plug

(using spark plug detergent or wire brush)

5. Measurement:

- Spark plug gap [a]

(measured with a feeler gauge)

Off-specification → Adjust the gap.

Spark plug clearance

0.95-1.05 mm

6. Installation:

- Spark plug

Install the spark plug and tighten it to the specified torque

12 N·m (1.2 kgf·m, 9.0 lbf·ft)

Note

• Before installing the spark plug, clean the surfaces of the spark plug and the gasket first.

※ **Inspection of Throttle Valve Body Intake Pipe**

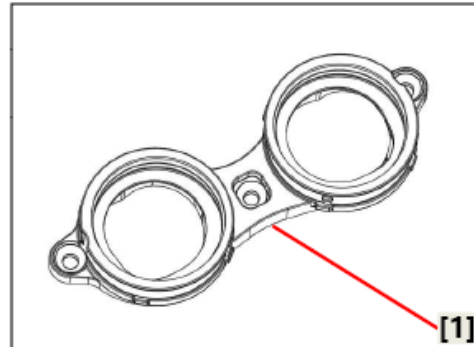
1. Disassemble:

- Seat cushion assembly
- Bumper (left and right)
- Fuel tank front cover
- Rear section of the instrument housing (left and right)
- Fuel tank side protector (left and right)
- Fuel tank lower protector (left and right)

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

- Fuel tank assembly

See "Fuel system" on page 95 for details.



2. Disassemble:

- Air filter assembly
- Throttle body assembly and intake pipe

See "Fuel system" on page 95 for details.

3. Check:

- Throttle valve body intake pipe [1]

Crack/damage → Replace.

4. Installation:

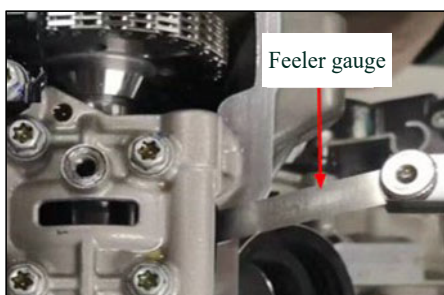
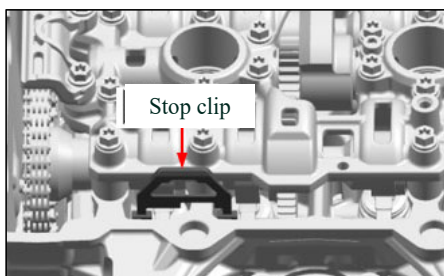
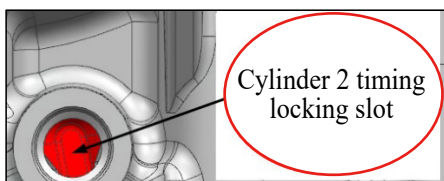
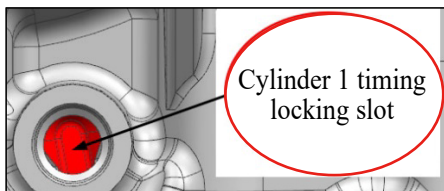
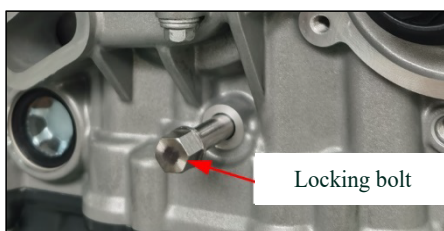
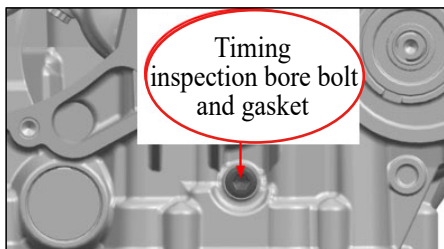
The installation sequence is reversed from the removal sequence.

Torque:

- Intake pipe

Intake pipe assembly mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



※ Inspection and adjustment of valve clearance

Inspection steps:

- Remove all the vehicle accessories that block the engine cylinder head, generally including the body panels, fuel tank, air filter, and water tank;

- Remove the engine cylinder head cover assembly, adjusting bore cap, and timing inspection bore bolt and gasket;

- Use a 15mm socket wrench on the magneto bolt assembly and turn the engine crankshaft a few turns. Turn the crankshaft counterclockwise to position it at the ignition top dead center (TDC) of cylinder 1 (the left cylinder). Insert the locking bolt from the timing inspection bore into the locking slot on the crank end face to secure the crankshaft and prevent any deviation. At this point, the linear markings on the intake and exhaust camshaft sprockets must align flush with the cylinder head cover sealing surface. Use a feeler gauge to check the valve clearance between the intake and exhaust rockerarms of cylinder 1 and the cam. Turn the crankshaft counterclockwise to position it at the ignition top dead center (TDC) of cylinder 2 (the right cylinder). Insert the locking bolt from the timing inspection bore into the locking slot on the crank end face to secure the crankshaft and prevent any deviation. At this point, the dot markings on the intake and exhaust camshaft sprockets must align flush with the cylinder head cover sealing surface. Then remove the exhaust stop clip and use a feeler gauge to check the valve clearance between the cam and the curved surfaces of the intake and exhaust rockerarms of cylinder 2.

- Check that there is no abnormality in the valve clearance, then reassemble the components in reverse order. If any abnormality is found, it is necessary to adjust the valve clearance (see the following content) and reassemble the components in reverse order after passing the inspection.

Note

- The inspection and adjustment of valve clearance must be performed at room temperature when the engine is cooled.

Instruction:

Cylinder 1 ignition top dead center:

- Turn the crankshaft counterclockwise to position it at the ignition top dead center of cylinder 1 (the left cylinder). The linear markings on the intake camshaft "IN" and exhaust camshaft "EX" sprockets must be flush with the cylinder head cover sealing surface. Lock the timing inspection bore using the locking bolt.

Cylinder 2 ignition top dead center:

- Turn the crankshaft counterclockwise to position it at the ignition top dead center of cylinder 2 (the right cylinder). The dot markings on the intake camshaft "IN" and exhaust camshaft "EX" sprockets must be flush with the cylinder head cover sealing surface. Lock the timing inspection bore using the locking bolt.

- Valve clearance (cold: 20 °C)

Intake valve (IN): 0.10–0.15 mm.

Exhaust valve (EX): 0.15mm - 0.21mm

- Use a micrometer to record the clearance corresponding to each valve during inspection to facilitate the selection of valve gasket specifications later.

Adjust the valve clearance

Adjustment procedures:

To adjust the valve clearance for cylinders 1 and 2, disassemble the following components. Before disassembly, ensure that cylinder 1 is in the ignition TDC (see above).

- Remove the cylinder head cover
- Remove the camshaft cover assembly
- Remove the intake and exhaust camshaft assembly
- Remove the tensioner

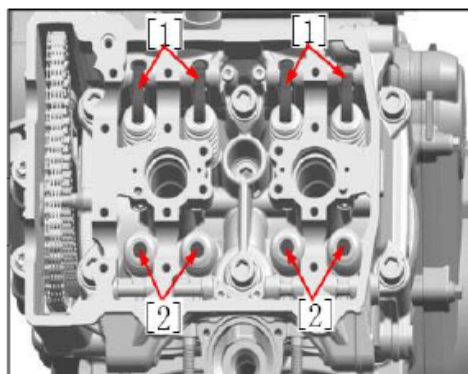
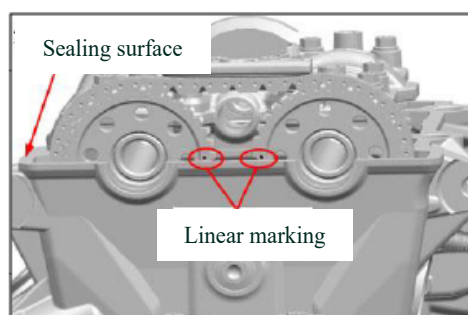
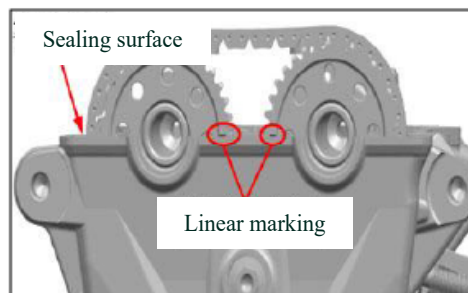
Adjustment method:

Lift the rockerarm [1]. Remove the valve gaskets [2] and place them in order, remembering their respective installation positions.

Measure and record the thickness of the valve gasket [2], then select the appropriate gasket based on the valve gasket specifications and methods provided below. Place the appropriate valve gasket in the marked order. Install the intake and exhaust camshaft assembly and the camshaft cover assembly, then fasten the tensioner. Continue to rotate the crankshaft counterclockwise for several turns, then return to the timing position and use a feeler gauge to recheck whether the intake and exhaust valve clearances are within the specified range. If it fails, continue adjusting (method as mentioned above) until it falls within the specified range, then reassemble the components in reverse order.

Detailed disassembly and assembly instructions

(See "Disassemble the cylinder head" on page 126 for details).


Note

- Cover the timing chain opening with a cloth to prevent the valve clearance adjusting gasket from falling into the crankcase.

The exhaust valve clearance adjustment of cylinder 2 does not require disassembling the camshaft.

Adjustment method:

First, adjust the engine to the cylinder 2 ignition TDC installation position (see above). Remove the rockerarm stop clip, use tweezers to move the rockerarm to one side, and extract the valve adjusting gasket with tweezers. Select the appropriate valve adjusting gasket and install it into place with tweezers. Then, use tweezers to position the rockerarm above the valve adjusting gasket (note: prevent the gasket from falling off), and finally reinstall the rockerarm stop clip.

Notes

- During the reassembly process, an appropriate amount of engine oil should be applied to each moving friction pair;
- The calculation formula for the new valve adjusting gasket: $A = (B - C) + D$. Select the valve adjusting gasket group closest to the calculated result;
A: Thickness of the new gasket;
B: Recorded valve clearance value;
C: Specified valve clearance value;
D: Thickness of the removed gasket.
- There are 22 groups of valve adjusting gaskets available for adjusting the valve clearance. The thickness difference between adjacent groups is 0.04mm, and the thickness range is 1.72mm - 2.60mm. The washer markings are 1720 = 1.72mm, 1760 = 1.76mm... 2600 = 2.60mm.

※ Engine oil level inspection and replacement

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

Note

- Place the vehicle on a suitable stand.
- Make sure it remains upright.

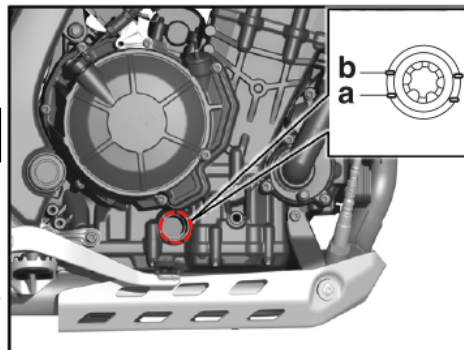
2. Start the engine, warm the motorcycle for several minutes and then turn off the engine.

3. Check:

- Engine oil level

The engine oil level shall be maintained between the lowest level mark "a" and the highest level mark "b".

Below the lowest level mark → Fill the recommended engine oil to the appropriate level.



Note

- Before checking the engine oil level, allow a few minutes for the oil to settle.

Notes

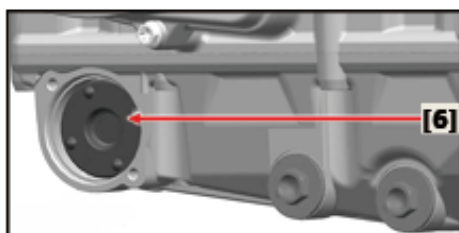
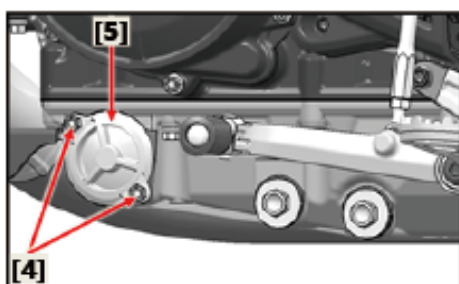
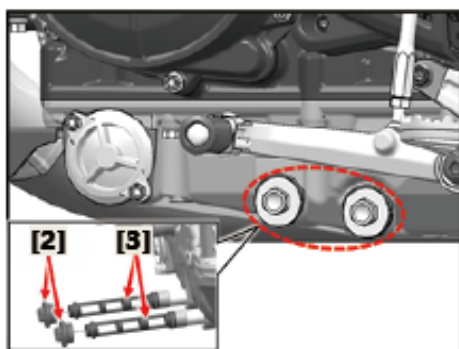
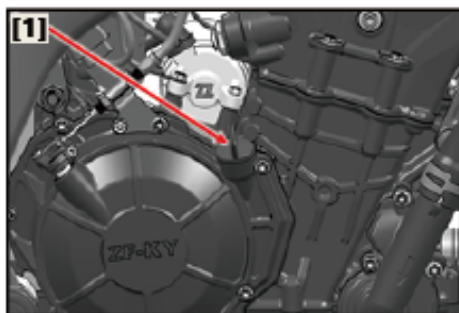
- It is recommended to use the engine oil specified by KOVE: API service grade SN or higher (do not use engine oil labeled as energy-efficient on the round API service label).
- Recommended SAE viscosity grade for engine oil: 10W-50.
- JASO T903 Standard:MA GB 11121-2006
- Avoid foreign matter entering the crankcase.

4. Start the engine, warm the motorcycle for several minutes and then turn off the engine.

5. Check the engine oil level again.

Note

- Before checking the engine oil level, allow a few minutes for the oil to settle.



Replace the engine oil

1. Start the vehicle, warm the motorcycle for several minutes and then turn off the engine.

2. Place a container under the engine oil drain bolt.

3. Disassemble:

- Engine oil cap [1]
- Engine oil drain bolt and O-ring [2]
- Oil coarse filter

4. Exhaust:

- Engine oil

(Completely drain from the oil pan)

5. If the engine oil filter (fine filter) also needs to be replaced, proceed with the following steps.

- Engine oil fine filter cover bolt [4].
- Engine oil fine filter cover and O-ring seal [5]
- Engine oil fine filter [6]

a. Coat engine oil to the O-ring of the oil fine filter cover.

b. Tighten the engine oil filter cover bolt to the specified torque.

Torque:

Engine oil fine filter cap bolt 6.0 N·m

Oil drain bolt 22 N·m

Notes

- Install the engine oil fine filter with the oil seal facing inward.

- Inspect the O-ring on the fine filter cover for damage and replace if necessary.

- Verify that the O-ring is properly placed in the grooves of the engine oil fine filter cover and the engine oil cover.

6. Installation:

- Engine fuel drain bolt
(and engine oil coarse filter element)

7. Adding engine oil:

- It is recommended to use the engine oil specified by KOVE

Requirements for oil filling volume:

- Only after draining from the oil drain bolt: **2.8L**;
- After replacing the oil fine filter: **3.0L**;
- After disassembly and reassembly: **3.2L**.

8. Installation:

- Engine oil cap
(and O-ring)

9. Start the engine, warm the motorcycle for several minutes and then turn off the engine.

10. Check:

- Engine
(Whether there is an oil leakage)

11. Check:

- Engine oil level

See "Engine oil level inspection and replacement" on page 29 for details.

※ Engine oil pressure measurement

1. Stand the vehicle on a flat surface.

⚠ Warning

- Support the vehicle firmly so as not to turn over.

Note

- Place the vehicle on a suitable stand.
- Make sure it remains upright.

2. Check:

- Engine oil level

The oil level is below the lowest level mark [a] → Add the recommended oil to the appropriate level.

3. Start the vehicle, warm the motorcycle for several minutes and then turn off the engine.

Notes

- When the engine is cold, the oil has a higher viscosity, which will cause an increase in oil pressure. Therefore, be sure to measure the engine oil pressure after the engine is pre-heated.

4. Disassemble:

- Oil pressure sensor

⚠ Warning

- The engine, exhaust pipe, and engine oil are very hot.

5. Installation:

- Oil pressure gauge adapter [2]
- Oil pressure gauge [3]

Note

- Make sure the vehicle remains horizontally upright.

6. Measurement:

- Engine oil pressure
(under the following conditions)
- Oil pressure

190.0 kPa/5000 r/min
1.90 kgf/cm² / 5000 r/min,
27.5 psi/5000 rpm

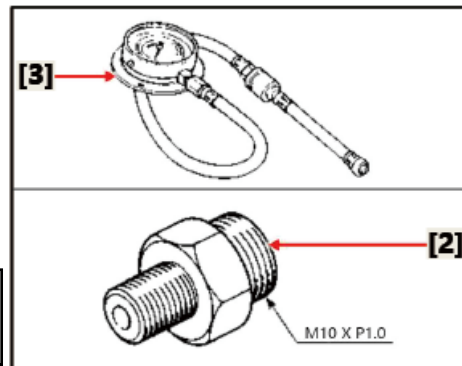
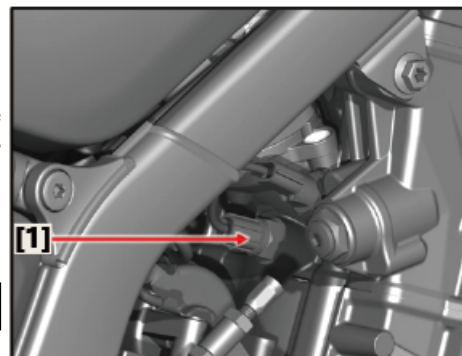
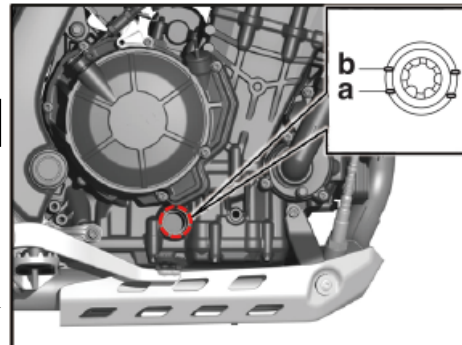
Not meet the specifications → Check.

7. Installation:

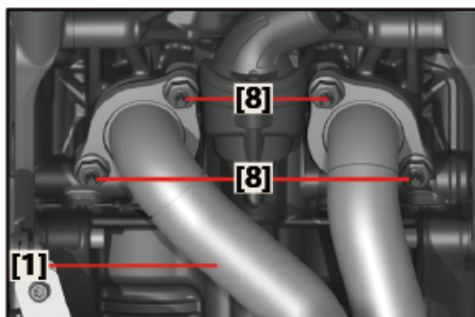
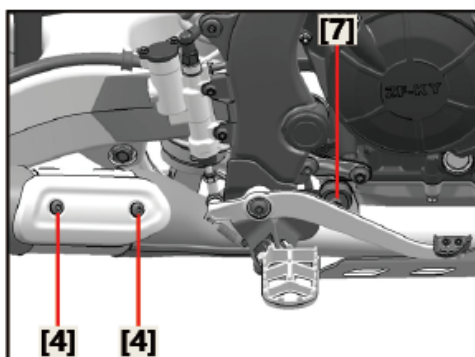
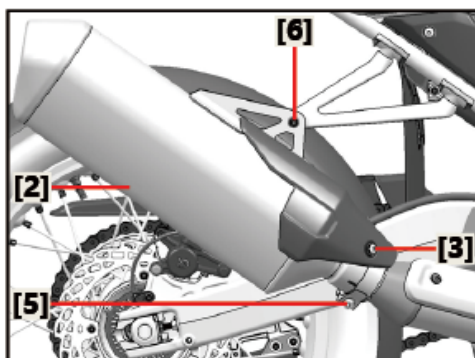
- Install the oil pressure sensor.

Installation torque

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



Engine oil pressure	Possible reasons
Higher than the standard pressure	• Oil filter failure • Too high oil viscosity
Lower than the standard pressure	• Oil pump fault • Oil filter blockage • Oil passage leakage • Broken or damaged oil seal



※ Inspection of Exhaust Pipe Assembly

Notes

- Wait for the exhaust pipe to cool down before disassembly to avoid burns.

1. Check:

- Exhaust pipe front/rear section [1][2]

Crack/damage → Replace.

- Exhaust seal ring/gasket

Exhaust leakage → Replace

2. Check:

Locking torque

- Shield/plate mounting screws [3][4]

- Exhaust pipe clamp locking bolt

- Bolt connecting the exhaust pipe and its mounting bracket [6]

- Exhaust pipe bolt [7]

- Exhaust pipe nut [8];

Exhaust pipe mounting torque:

Exhaust pipe front section and engine exhaust port (nut)

18 N·m (1.8 kgf·m, 13 lbf·ft)

Exhaust pipe front section and frame

22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe rear section and exhaust pipe mounting bracket

Exhaust pipe mounting bracket and subframe

22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe clamp bolt:

22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe shield mounting screws

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

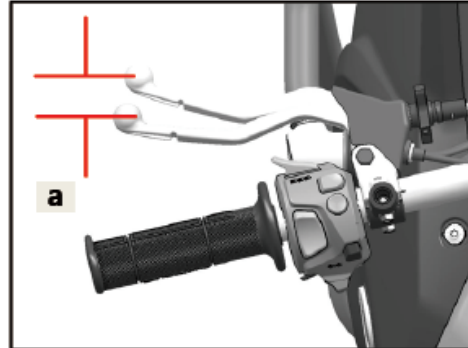
※ Inspection and adjustment of clutch free play

Inspect the clutch cable for twists or damage, and lubricate it if necessary.

Inspect the free play [a];

Free play: 10-20mm

Adjust it to the specified range if necessary. Improper adjustment of the free play will cause premature wear of the clutch.

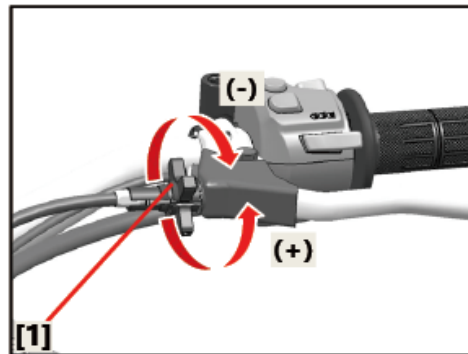


1. Usually, fine-tune at the adjustment knob at the end of the clutch cable. Turning the adjustment knob [1] in the (+) direction will increase the free play, and turning it in the (-) direction will reduce the free play.

(+) Increase free play;

(-) Decrease free play;

If the correct free play cannot be obtained even when the adjustment knob exceeds the adjustment limit, fully screw in and out the adjustment knob for 5 circles, and then make more adjustments on the left case side.



2. Use the lower adjusting bolt [1] on the clutch lifter arm for major adjustments. Loosen the locking nut [2] and turn the adjusting nut as needed to reach the specified free play. Hold the adjusting nut [1] with a wrench while tightening the nut [2].

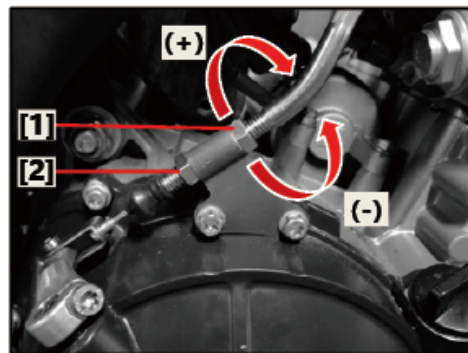
Torque:

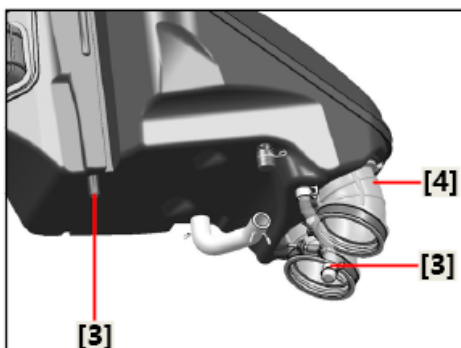
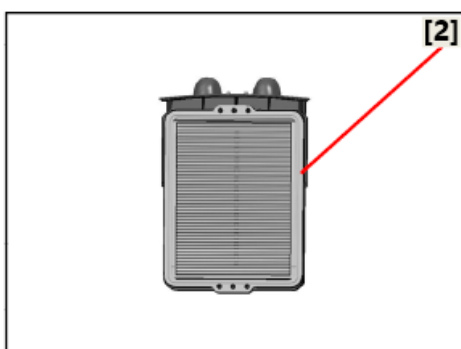
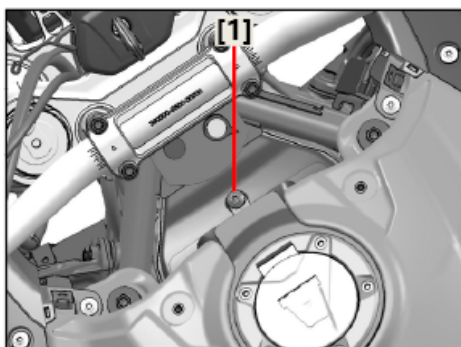
Clutch cable adjusting nut (engine side)

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

3. Start the engine, pull the clutch handlebar, shift gears, and ensure that the engine does not stall and the motorcycle does not move unexpectedly.

Gradually release the clutch handlebar and open the accelerator. The vehicle shall move smoothly to ensure that the clutch is working properly.





※ **Replacement of air filter element/inspection of hose cleanliness**

1. Disassemble:

- Fuel tank front cover

See "Frame, body trim and exhaust system" on page 59 for details.

2. Disassemble:

- Bolt [1]
- Air filter element [2]

3. Check:

- Check if the air filter tank [1] nut is loose
Loose → Tighten.

According to the maintenance interval or whenever the air filter element [2] is dirty/damaged → Replace.

- Check the air filter tank drain pipe [3]

Cracked/broken → Replace.

Clean the accumulated water in the drain pipe.

- Check if the intake pipe [4] is intact.

Cracked/broken → Replace.

4. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Air filter element sponge mounting screw

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

※ **Inspection of Evaporation System and Tipping Valve**

1. Disassemble:

- Fuel tank assembly

See "Fuel system" on page 95 for details.

2. Check:

- Evaporative emission carbon canister box [2]
- Evaporative emission carbon canister box connecting hose [3]
- Overflow hose connecting fuel tank to tipping valve [1]

Cracked/broken → Replace.

Loose connection → Correct connection.

3. Installation:

- Fuel tank assembly

See "Fuel system" on page 95 for details.

4. Installation:

- Carbon canister box

Carbon canister and frame mounting point

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

※ **Inspection of Engine Exhaust Pipe**

1. Disassemble:

- Air filter assembly

See "Fuel system" on page 95 for details.

2. Check:

- Inspect the crankcase vent hose [1]

Crack/damage → Replace.

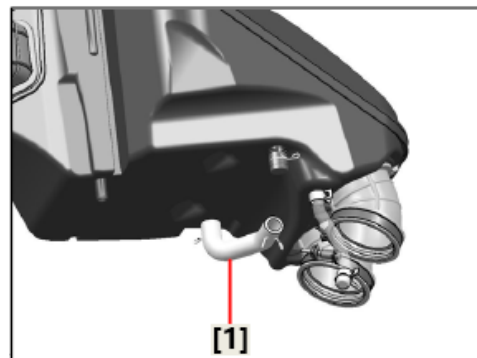
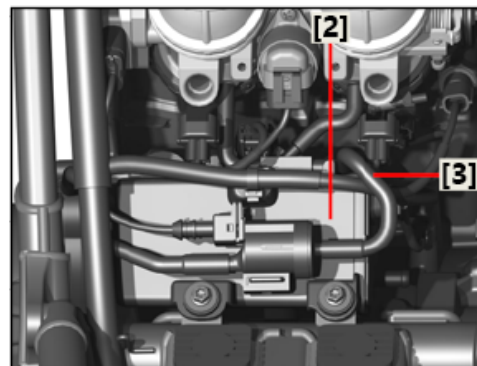
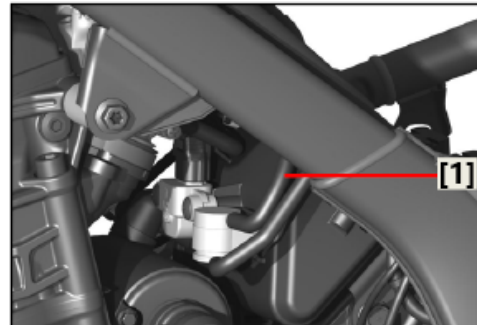
Loose connection → Correct connection.

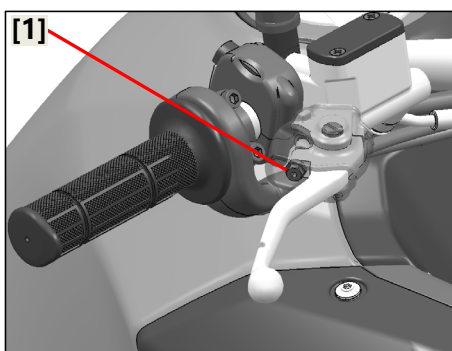
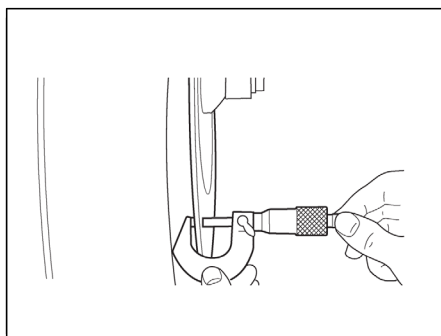
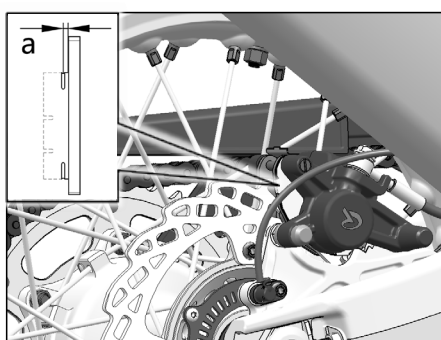
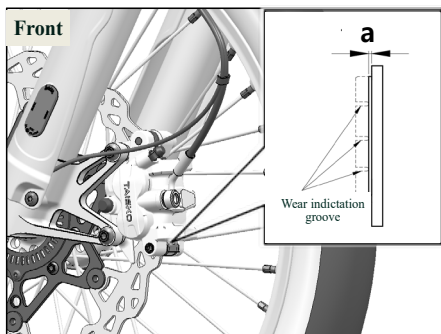
3. Installation:

The installation sequence is reversed from the removal sequence.

Notes

- Verify that the hose of the exhaust pipe assembly is configured correctly.





※ Inspection of brake operation

The following procedure applies to all brake pads.

1. Check:

- Brake operation

Brake is not functioning properly → Check brake system

See "Hydraulic Braking System" on page 259 for details.

Notes

- Drive on a dry road and run both the front and rear brakes separately to check if they are functioning properly.

※ Inspection of brake pads

The following procedure applies to all brake pads.

1. Run brake

2. Check:

- Front and rear brake pads

When worn down to the indicator [a] → Replace the entire set of brake pads.

See "Hydraulic Braking System" on page 259 for details.

Notes

- The limit wear mark [a] indicates a thickness of 1.0 mm.

※ Inspection and replacement of brake discs

Inspection:

- Visually check the brake disc for damage or cracks.

Measure the wear limit of brake disc:

Front brake disc: **3.5 mm**

Rear brake disc: **3.5 mm**

Damage/deformation/off-specification → Replace

See "Hydraulic Braking System" on page 259 for details.

※ Adjustment of front hand brake lever

Adjust

- Front hand brake lever position

The distance between the hand hand brake lever and the accelerator handle can be adjusted by rotating the adjusting bolt.

Loosen the locking nut [1] of the hand brake lever adjusting bolt.

Rotate the adjusting bolt [2] clockwise to increase the distance, and counterclockwise to decrease the distance.

After adjustment, tighten the locking nut of the hand brake lever adjuster.

Torque

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

※ **Inspection of front brake hose**

1. Check:

- Brake hose [1]

Crack/damage → Replace.

2. Check:

- Brake hose clip

Loosen → Install correctly.

- Brake hose (bolt) [2]

Loosen → Lock bolt.

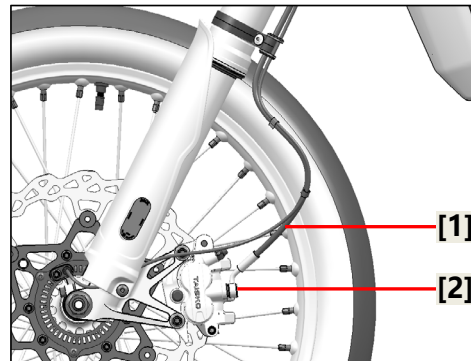
3. Keep the vehicle upright and run the brakes several times.

4. Check:

- Brake hose [1]

Brake fluid leaks → Replace damaged brake hose

See "Hydraulic Braking System" on page 259 for details.



※ **Inspection of rear brake hose**

1. Check:

- Brake hose [1]

Crack/damage → Replace.

2. Check:

- Brake hose clip

Loosen → Install correctly.

- Brake hose (bolt) [2]

Loosen → Lock bolt.

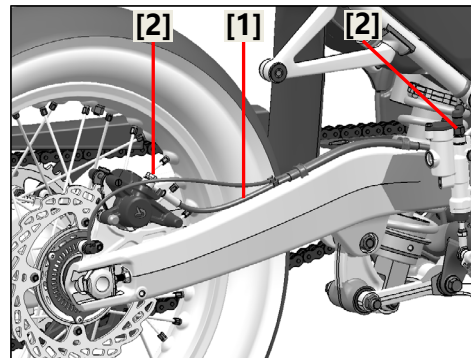
3. Keep the vehicle upright and run the rear brake several times.

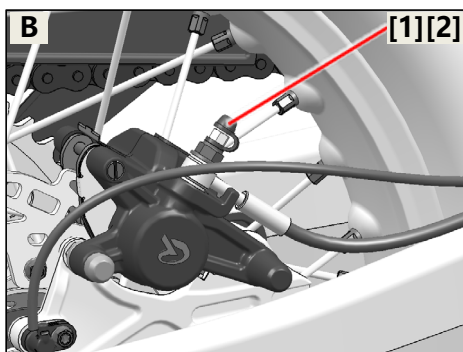
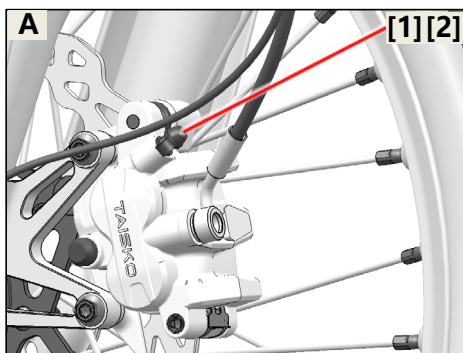
4. Check:

- Brake hose [1]

Brake fluid leaks → Replace damaged hose

See "Hydraulic Braking System" on page 259 for details.





A. Front
B. After

g. Loosen the bleed screw.

Note

• Loosen the bleed screw to release air and ensure that the brake handle makes full contact with the throttle grip or brake pedal.

h. Tighten the bleed screw and release the brake handle or brake pedal.

i. Repeat steps (e) to (h) no bubbles are visible in the brake fluid within the plastic hose.

j. After operating the ABS, repeat steps (e) to (i) and fill the brake master cylinder reservoir or brake fluid reservoir to the appropriate level using the specified brake fluid.

k. Tighten the bleed screw to the specified torque.

Brake caliper bleed screw [1]

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Fill the brake master cylinder or brake fluid reservoir to the appropriate level using the specified brake fluid.

See "Add brake fluid" on page 262 for details.

※ Hydraulic brake system bleeding

⚠ Warning

• After removing the brake-related parts, ensure to bleed the brake system.

Note:

- Exhaust the brake system in the following sequence.
- Step 1: Front brake caliper.
- Step 2: Rear brake caliper.

⚠ Warning

State of releasing brake system air:

- Brake pump is disassembled.
- Brake hose is loose, removed or replaced.
- Brake fluid level is below the minimum mark.
- There is a malfunction in the brake operation.

Note

- Take care to avoid spilling brake fluid or allowing the brake master cylinder reservoir or brake caliper reservoir to overflow.
- When releasing the air from the hydraulic brake system, ensure that the brake fluid level is sufficient before running the brake. Skipping this step will allow air to enter the hydraulic brake system, resulting in a significant increase in the time required for the bleeding procedure.
- If releasing is difficult, it may be necessary to allow the brake fluid to settle for several hours. Once the small bubbles in the hose have disappeared, repeat the release procedure.

1. Exhaust:

- Fill the brake fluid reservoir to the appropriate level using the specified brake fluid.
- Install gasket (brake master cylinder reservoir or brake fluid reservoir).
- Connect the clear plastic hose [1] tightly to the bleed bolt [2].
- Place the other end of the hose in the container.
- Run the brake slowly/several times.
- Pull up the brake handle completely, or press the brake pedal all the way down until it is fully engaged.

⚠ Warning

• After air is completely removed from the hydraulic brake system, check the operation of the brakes.

Bleed operating procedure (ABS)

After the maintenance personnel install ABS, it is essential to remove any air from the lines to ensure proper functioning of ABS. To accomplish this, ABS needs to be bled manually with the assistance of a diagnostic instrument.

Note: Please use the brake fluid recommended by the manufacturer and avoid mixing different types of brake fluids.

The following is an example of bleeding the front wheel ABS system:

1. Open the brake fluid reservoir cap on the master cylinder, add sufficient brake fluid, and open the drain bolt on the caliper.
2. Connect the diagnostic instrument and initiate the front wheel bleeding stage 1 by double-clicking the routine. During this stage, the maintenance personnel shall simultaneously squeeze the brake handle or step on the brake pedal while filling brake fluid. The frequency of actuating the handbrake shall be approximately 1 time per second. This process lasts about 25s.
3. After completing front wheel bleeding stage 1, the diagnostic instrument interface will display a prompt indicating the completion of the process. At this point, double-click the routine: front wheel bleeding stage 2. During this stage, the maintenance personnel shall continue to squeeze the brake handle or pedal while filling brake fluid. This process lasts about 90s.
4. Once front wheel bleeding stage 2 is completed, hold the brake handle/press the brake pedal and close the lowe pump bleed bolt. Then, repeatedly squeeze the front brake handle/press the brake pedal several times, and feel the force to judge whether bleeding is finished.
5. Precautions for bleeding: It is strictly prohibited to repeat the bleeding procedure twice or more in a short period of time. If it is necessary to repeat the bleeding procedure, please wait for 5 minutes to allow the solenoid valve to cool down and prevent overheating damage.

※ Inspection of ABS gear ring clearance

Use a crane or equivalent to firmly support the motorcycle and lift the wheels off the ground.

Turn the wheel slowly and measure the clearance between the sensor and the ring gear at multiple points.

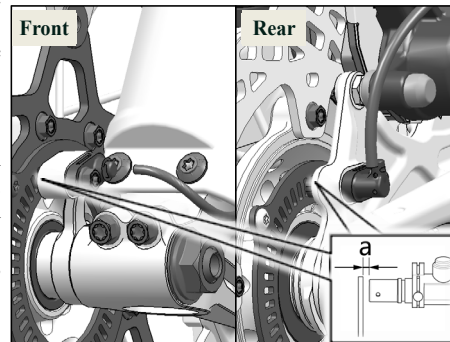
[a] It must be within specifications.

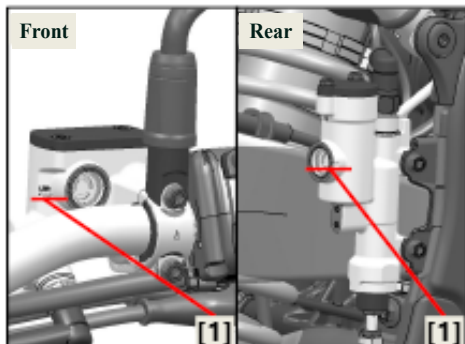
Standard: 0.5-1.2 mm

If the clearance cannot be adjusted or is not within specifications, check each part for deformation, looseness, or damage. Check whether the wheel speed sensor is damaged, and replace it if necessary.

Check whether the ring gear is deformed or damaged, and replace it if necessary.

- Front ring gear
- Rear ring gear





※ Inspection and replenishment of brake fluid level

⚠ Warning

- Spilled brake fluid can damage paint, plastic or rubber parts.

Notes

- Ensure not to mix incompatible types of brake fluids together.
- When adding brake fluid, do not allow foreign matter to enter the reservoir.

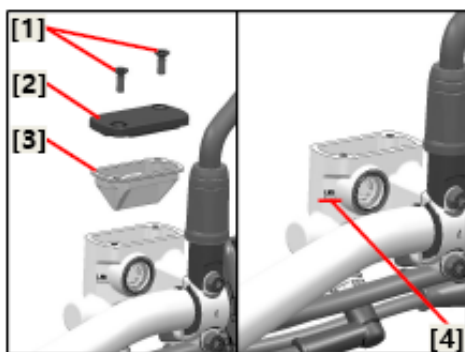
※ Level inspection

Check the brake fluid level in both the front and rear brake pump liquid reservoirs.

If the level is close to the lower level line [1], check the brake pads for wear. If the brake pads are not worn and the level is low, check the entire system for leaks and proceed to fill the reservoir with brake fluid.

Brake fluid addition

- Front brake pump:



Remove the front brake pump reservoir cover screw [1], reservoir cover [2], and lining [3].

Fill the reservoir with the recommended brake fluid to the upper level line [4]. Use the recommended brake fluid: DOT4 brake fluid

Install the lining and reservoir cover.

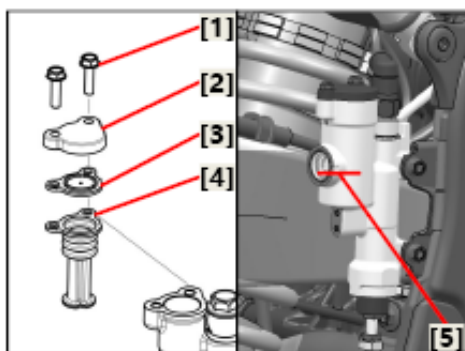
Install and tighten the front brake reservoir cap screws to the specified torque.

Torque:

1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)

Check the front brake hydraulic system for leaks.

- Rear brake pump:



Remove the rear brake pump reservoir cover screw [1], reservoir cover [2], gasket [3], and lining [4].

Fill the reservoir to the upper level line using the recommended brake fluid [5]. Recommended brake fluid: DOT4 brake fluid

Install the lining [4], gasket [3], and cover [2].

Install and tighten the rear brake pump reservoir cover screw [1] to the specified torque.

Torque:

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

Check the front brake hydraulic system for leaks.

※ Inspection of cooling system

1. Stand the vehicle on a flat surface.

Note

- Place the motorcycle on the appropriate bracket.
- Make sure the motorcycle stays upright.

2. Check:

- Radiator [1]
- Radiator outlet hose [2]
- Radiator inlet hose [3]
- Thermostat cover [4]
- Thermostat [5]
- Water reservoir [6]
- Water reservoir return hose [7]
- Water reservoir overflow hose [8]

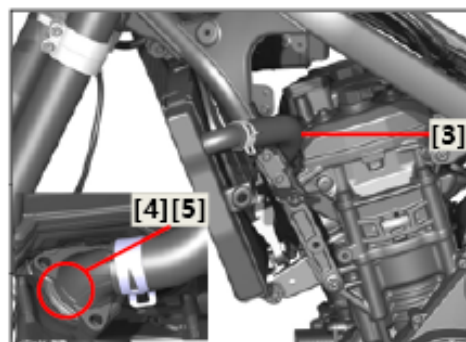
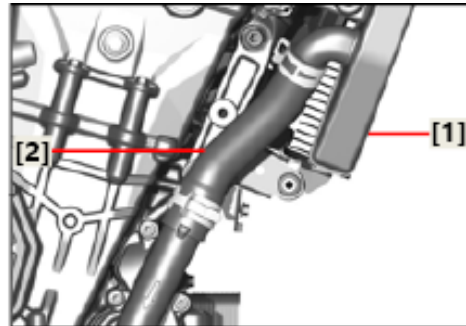
- Hose

Crack/damage → Replace

See "Cooling system" on page 117 for details.

- Thermostat

See "Cooling system" on page 119 for details.



※ Inspection of coolant level

1. Check:

- Coolant level

The coolant level shall be maintained between the lowest level mark "a" and the highest level mark "b".

Below the lowest level mark → Fill the recommended coolant to the appropriate level.

Notes

- Replacing coolant with water will lower the concentration of antifreeze in the coolant. If water is used instead of coolant, check and correct the concentration of antifreeze in the coolant if necessary.
- Use only distilled water for filling the coolant. In the absence of distilled water, soft water can be used as an alternative.

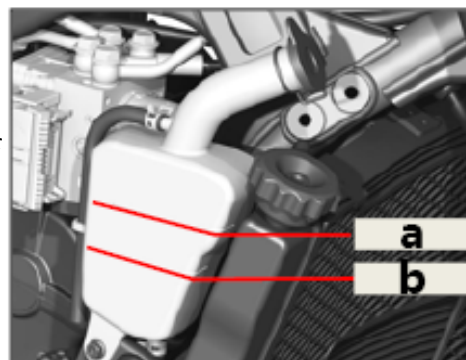
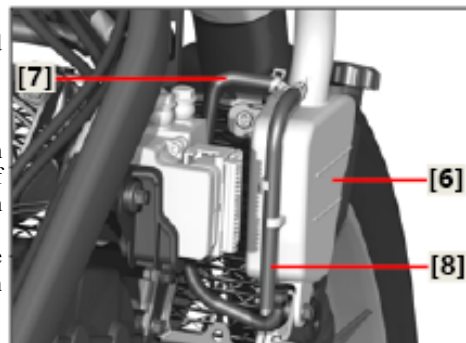
2. Start the engine, warm the motorcycle for several minutes and then turn off the engine.

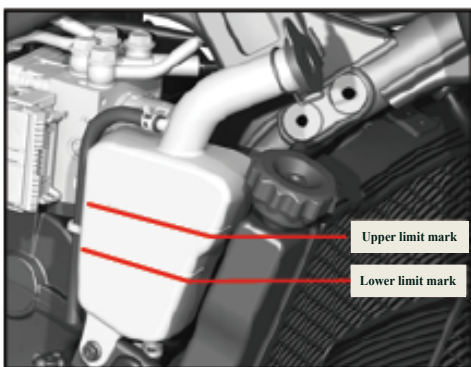
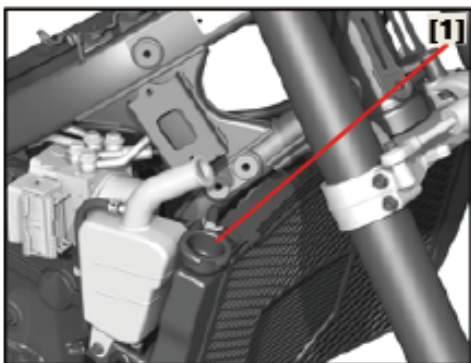
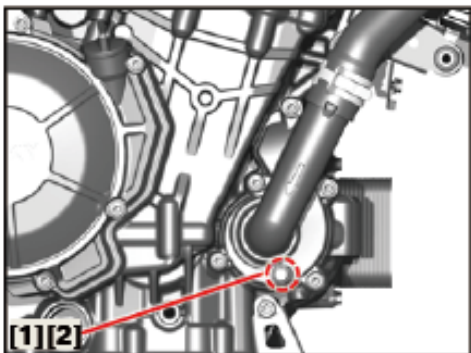
3. Check:

- Coolant level

Note

- Before checking the coolant level, allow a few minutes for the coolant to settle.





※ Coolant replacement

1. Stand the vehicle on a flat surface.

Note

- Place the motorcycle on the appropriate bracket.
- Make sure the motorcycle stays upright.

⚠ Warning

• The pressure of the water radiator will rise. Therefore do not remove the water radiator cap when the engine is hot. Serious injury may occur when hot liquid and vapor are sprayed out. Wait for the engine to cool, then open the water radiator cap as follows:

Cover the water radiator cap with a thick cloth such as a towel, rotate the cap slowly counterclockwise until it touches the groove, allowing residual pressure to release. Wait for the hissing sound to stop before pressing down on the water radiator cap and rotating it counterclockwise to remove it.

2. Disassemble:

- Remove water pump drain bolt [1] and flat gasket [2];
- Remove radiator cover [3] and drain coolant.

Torque:

Water pump drain bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

3. Add:

- Using the water hole, fill the cooling system with the recommended coolant up to the neck [1].

Recommended antifreeze:

-40°C Ethylene glycol organic light-load engine antifreeze

Radiator (including all lines)

1.6 Litre

Coolant storage water reservoir (between upper and lower level marks)

0.18 Litre

⚠ Warning

- If coolant splashes on your eyes, please rinse your eyes thoroughly with clear water and seek medical advice.

4. Exhaust:

Exhaust air from the radiator system as follows:

- 1). Shift the engine into neutral, start it, and let it idle for 2-3 minutes.
- 2). Open and close the throttle for 3 or 4 times to remove the inside air completely.
- 3). Install the radiator cap.
- 4). Shut down the engine and, if necessary, fill the water reservoir between the upper and lower level marks.
- 5). Check the coolant for leaks.

Notes

- If water is used instead of coolant, check and correct the coolant concentration if necessary.
- Use distilled water only. In the absence of distilled water, soft water can be used as an alternative.
- Ensure not to mix different types of coolants.

※ **Lubrication of front brake handle**

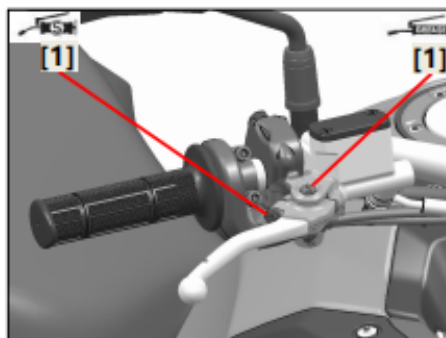
Apply lubrication to the pivot point of the handle and the contact areas of the metal parts [1].



Recommended lubricating oil
Use silicone grease



Recommended lubricating oil
Use silicone grease



※ **Lubrication of rear brake rocker arm**

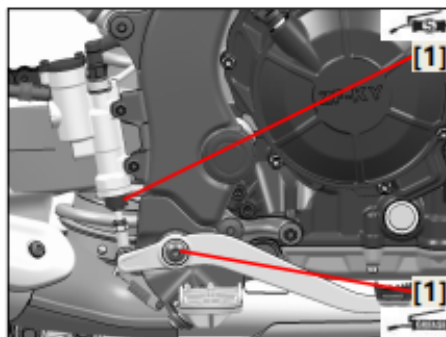
Apply lubrication to the pivot point of the brake rocker arm and the contact areas of the metal parts [1].



Recommended lubricating oil
Lithium-based multipurpose grease



Recommended lubricating oil
Use silicone grease



※ **Lubrication of clutch handle**

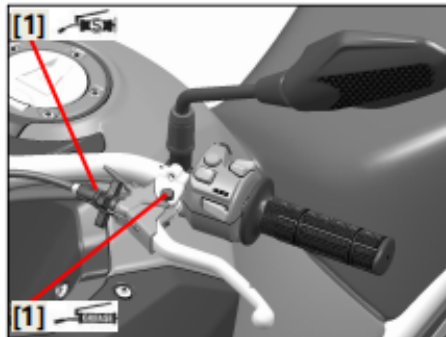
Apply lubrication to the pivot point of the handle and the contact areas of the metal parts [1].



Recommended lubricating oil
Use silicone grease



Recommended lubricating oil
Lithium-based multipurpose grease



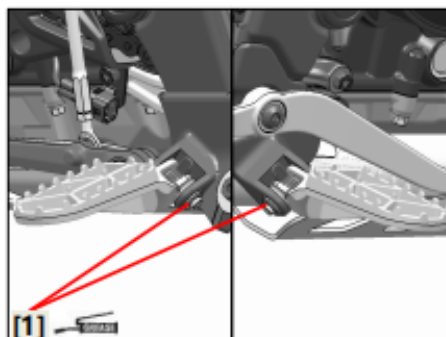
※ **Inspection and lubrication of pedal**

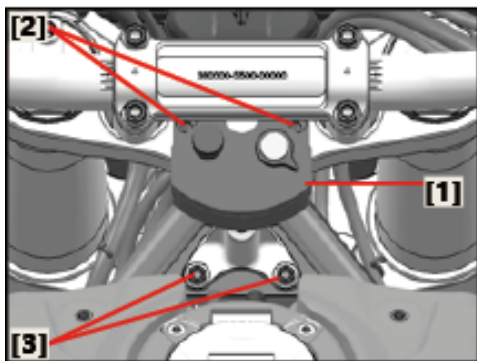
The anti-slip teeth of the pedal can be repaired by filing the grooves between the teeth with a triangular file. However, be aware that filing too much will reduce the lifespan of the sole. Only file the tips of the anti-slip teeth. Filing the grooves too deep will weaken the pedal. Make sure that the bolts can rotate freely and keep the cotter pins of the pivot pins in good condition.

Apply lubrication to the pivot point of the pedal and the contact areas of the metal parts [1].



Recommended lubricating oil
Lithium-based multipurpose grease





※ Inspection of steering damper

1. Stand the vehicle on a flat surface.

Note

- Place the motorcycle on the appropriate bracket.
- Make sure the motorcycle stays upright.

2. Check:

- Grip the left and right handlebars and turn the head dampers [1] to see if they are working properly
The steering damper is leaking oil and the damping is not working → Repair.

Steering damper and bracket mounting (bolt) [2] [3]

Loosen → Lock bolt.

See "Front Wheels, Suspension, Steering" on page 233 for details.

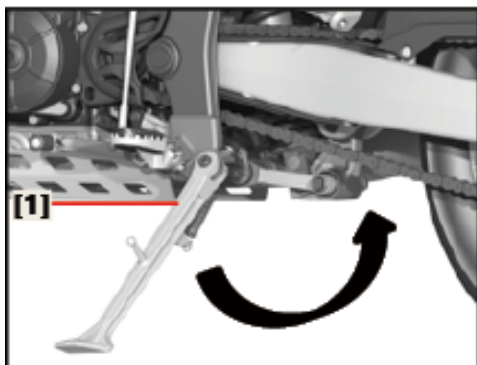
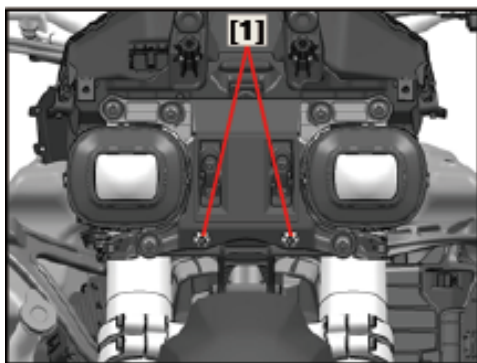
※ Adjustment of headlight beam

Notes

- Adjust the headlight alignment according to local laws and regulations.
- Support the motorcycle vertically on a horizontal plane.

Adjust the screw by turning [1].
Turn clockwise to move the beam downward.

Turn counterclockwise to move the beam upward.



※ Inspection and Lubrication of Side Stand

Inspection:

Inspect whether the side bracket [1] moves smoothly or not

Unsmooth movement → Maintenance.

Apply lubrication to the pivot point of the side stand, the contact areas of the metal parts and the spring contact point.

Recommended lubricants:

UNIVERSAL SU-T330Y grease.

※ Inspection and adjustment of steering head

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

Note

- Use a suitable stand to lift the front wheels of the motorcycle.

2. Check:

- Upper and lower dustproof washers [1]
Cracked/broken → Replace.

3. Check:

- Steering head

Hold the front shock absorber bottom cylinder and gently shake the front fork.

Stuck/loose → Adjust steering head.

4. Disassemble:

- Steering handle
- Upper connecting plate

5. Adjustment:

- Steering head

a. Loosen the steering column fixing 4-slot nut [2].

b. Use a torque wrench to lock the nut to the specified torque.

Note

- Make sure that the torque wrench is aligned perpendicular to the 4-slot nut socket.

Steering stem 4-slot nut (locking torque)

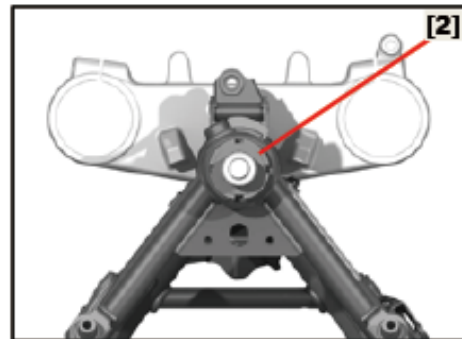
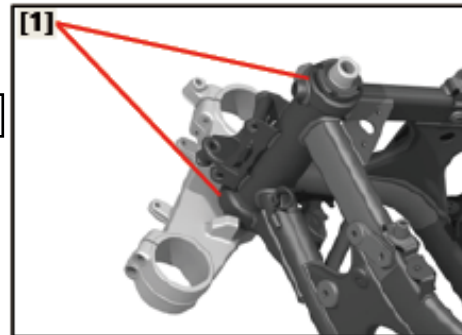
First torque to 40N·m, then loosen and torque to 10N·m, and finally back off by 1/4 turn.

c. After installing the upper bracket and handlebar, rotate the front shock absorber fully to both sides and check for any looseness or sticking in the steering head. In case of dry sticktion, remove the steering stem assembly from the lower bracket and inspect the upper and lower bearings.

※ Inspection and lubrication of front and rear wheel seals

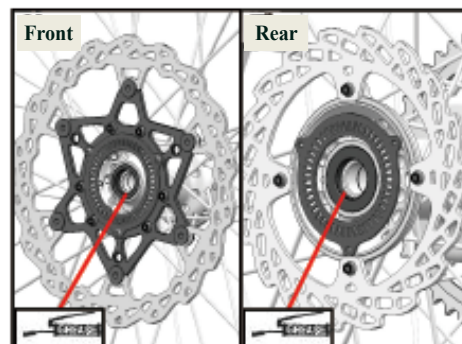
Regularly clean, inspect, and lubricate oil seals, particularly when riding on wet, muddy, or dusty roads, to ensure that all dustproof seals are in good condition. During installation, apply grease in the groove between the main and auxiliary lips of the oil seal.

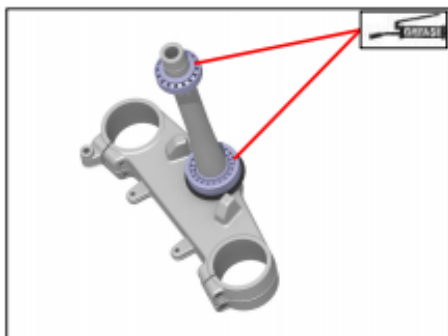
Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).



Warning

- Do not over-tighten the steering stem 4-slot nut.

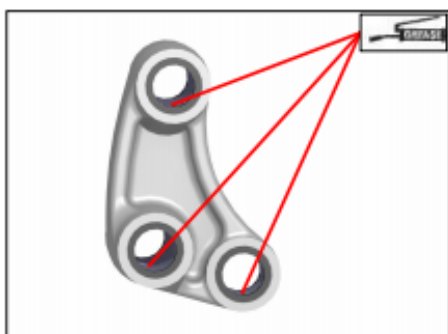




※ **Inspection and lubrication of steering head Bearing**
Regularly clean, inspect and lubricate steering head bearings, particularly when riding on wet, muddy, or dusty roads.
Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).



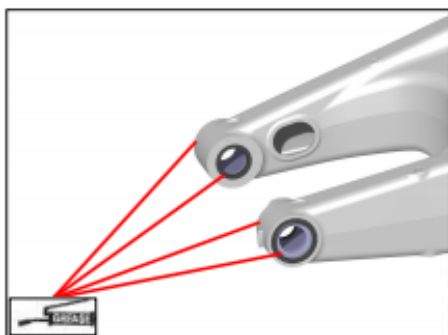
Recommended lubricating oil
Lithium-based multipurpose grease



※ **Inspection and Lubrication of triangular cradle**
Clean, inspect and lubricate the triangular cradle bearing regularly. Make sure all dustproof seals are in good condition. During installation, apply grease in the groove between the main and auxiliary lips of the oil seal.
Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).



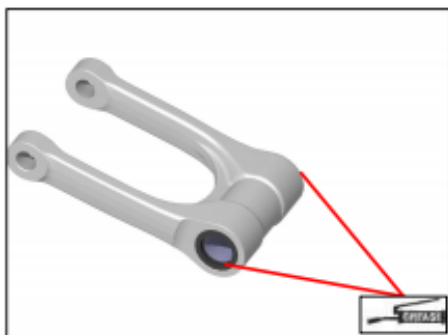
Recommended lubricating oil
Lithium-based multipurpose grease



※ **Inspection and lubrication of swingarm bearing**
Clean, inspect and lubricate the swingarm bearing regularly. Make sure all dustproof seals are in good condition. Apply a small amount of grease in the groove between the main and auxiliary lips of the oil seal.
Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).
Do not attempt to weld or repair damaged swingarms, as welding can weaken the strength of the swingarms.



Recommended lubricating oil
Lithium-based multipurpose grease



※ **Inspection and lubrication of U-cradle**
Clean, inspect and lubricate the U-cradle bearing regularly. Make sure all dustproof seals are in good condition. Apply the grease in the groove between the main and auxiliary lips of the oil seal.
Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).



Recommended lubricating oil
Lithium-based multipurpose grease

※ Inspection of wheels and tires

Check tires for cuts, embedded nails, or any other signs of damage.

Check that the front and rear wheels are properly installed. Ensure the tire is in a cold state, then use a tire pressure gauge to check the tire pressure.

Tire pressure:

Cycling on paved roads

Front wheels: 200 kPa (2.00 kgf/cm², 29 psi)

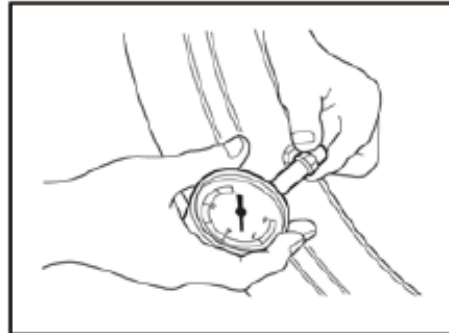
Rear wheels: 225 kPa (2.25 kgf/cm², 32 psi)

Cycling on unpaved roads

Front wheels: 200 kPa (2.00 kgf/cm², 29 psi)

Rear wheels: 200 kPa (2.00 kgf/cm², 29 psi)

☆ Adjust the tire pressure appropriately based on the specific usage requirements.



※ Inspection of rim damage and runout

1. Check:

Check the wheel rim [1] and spokes [2] for damage. Use a spoke wrench [3] to tighten any loose spokes to the specified torque. Tighten the rim tire clip nuts [4] to the specified torque.



Tools

Front wheel: Spoke wrench, 6.0mm

Rear wheel: Spoke wrench, 7.0mm

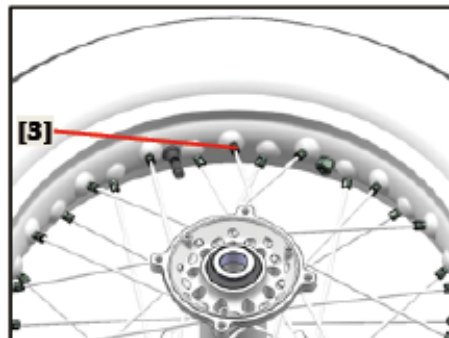
Torque:

Front/rear wheel spokes

6 N·m (0.6 kgf·m, 4.4 lb·ft)

Front/rear tire clamp locking nut

12 N·m (1.2 kgf·m, 9.0 lbf·ft)



2. Measurement

- Radial wheel rim runout [1]

- Axial wheel rim runout [2]

Exceed the specified limit → Replace.

Wheel rim runout:

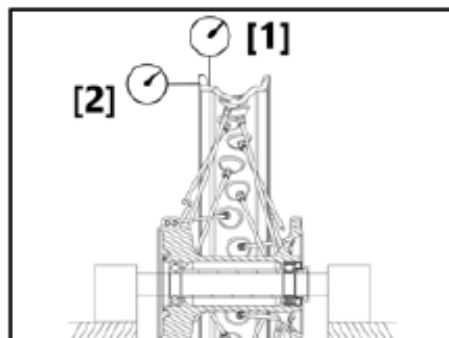
Limit value:

Front wheel: Radial: 2.0 mm

Axial: 2.0 mm

Rear wheel: Radial: 2.0 mm

Axial: 2.0 mm



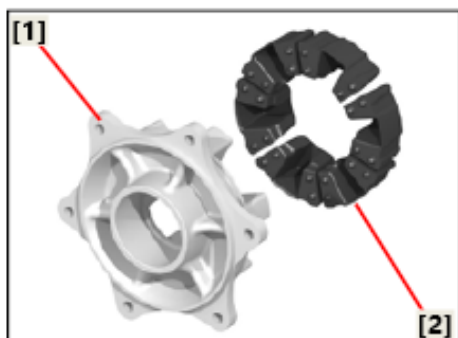


Notes

- ROTATON → Mark the tire rolling direction.
- Tire wear limit marks at Δ T.W.I. mark on sidewall and center of tire

Tire specifications:

Front wheel	90/90-21 54H	
	Chengxin/CST	EX01
Rear wheel	140/80-18 70H	
	Chengxin/CST	EX01
Type	Inner tube	



※ Replacement of tires

KOVE's tires provide outstanding handling, braking, durability, and comfort in various riding conditions.

⚠ Warning

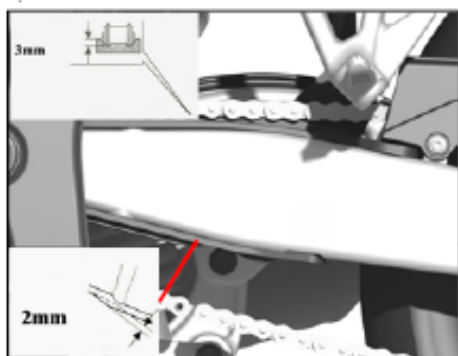
- Installing improper tires on your motorcycle can affect handling and stability, which may result in an accident or injury.
- Make sure to use the sizes and types of tires recommended in this manual.
- Driving a motorcycle with worn tires can lead to danger. Tires must be replaced immediately when the tread reaches the limit of wear.

When replacing tires, use original tires or equivalent tires of the same size.

When changing tires, ensure that the pattern, rated speed and load range of the new tires match those of the original tires.

※ Inspection of buffer assembly

1. Check:
 - Buffer [1]
 - Crack/damage → Replace.
 - Buffer rubber [2]
 - Damage/wear → Replace.



※ Inspection of chain clip

Inspect the **chain clip** for excessive wear.

Wear limit:
Upper side 3mm
Underside 2mm

Notes

- Please replace the chain clip in time if it exceeds the wear limit.
- If the chain clip reaches its wear limit or is damaged, it can lead to damage in the rear swingarm or drive chain.

Torque:

Chain clip mounting screw

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

※ Inspection and adjustment of slack of drive chain

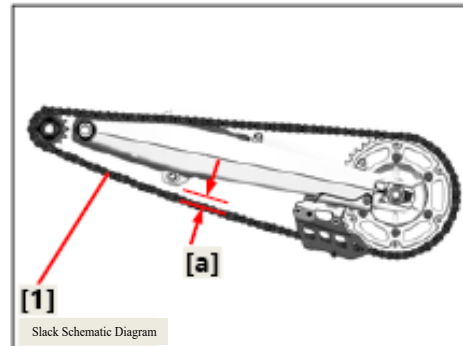
1.1. Place the vehicle on the workbench.

⚠ Warning

• Support the vehicle firmly so as not to turn over.

Notes

• An overly tight drive chain can overload the engine and other major components, and an overly loose drive chain can cause slippage and damage the rear flat swingarms or cause an accident. It is therefore necessary to ensure that the drive chain slack is within the specified limits.



2. Put the vehicle in neutral.

3. Check:

- Slack drive chain

Off-specification → Adjust.

Note

• Lift the drive chain upward from the position indicated by the arrows as shown in the right figure and measure the distance [a] between the centers.

Standard: 35-50 mm

Limit: 50 mm

Notes

• Improper slack in the drive chain can overload the engine and other critical components of the motorcycle, leading to chain slippage or breakage. If the drive chain slack exceeds the specified limit, it may damage the frame, swingarm, and other parts. To prevent this, maintain the drive chain slack within the specified limit.

4. Release:

- Rear wheel axle nut [1]

See "Rear wheel suspension" on page 247 for details.

5. Adjustment:

- Looseness of transmission chain

a. Loosen the drive chain adjusting block locking nuts on the both sides [2].

b. Turn the two drive chain adjusting block bolts [3] until the specified range of drive chain slack is obtained.

Note

• To maintain correct wheel alignment, make sure to align the adjusting blocks on both sides with the scale marking line [4].

• There shall be no clearance between the adjusting blocks and the head of the adjustment bolt.

c. Tighten the rear axle nut to the specified torque.

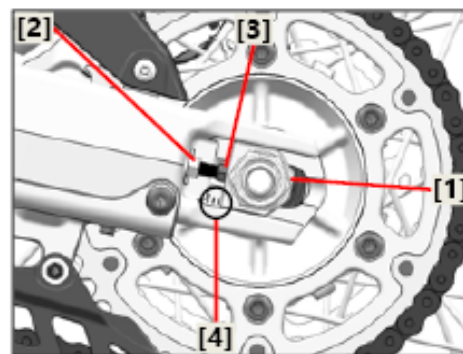
Rear wheel axle nut

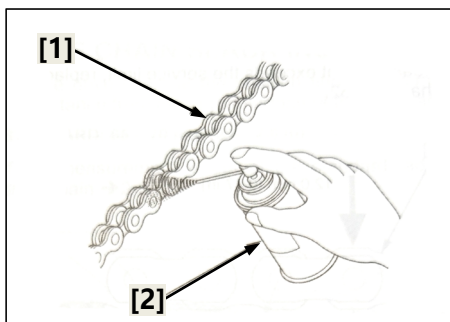
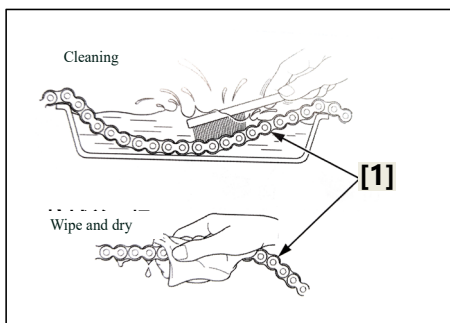
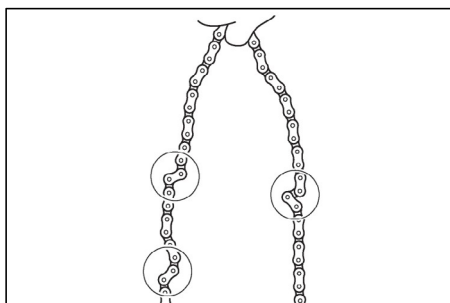
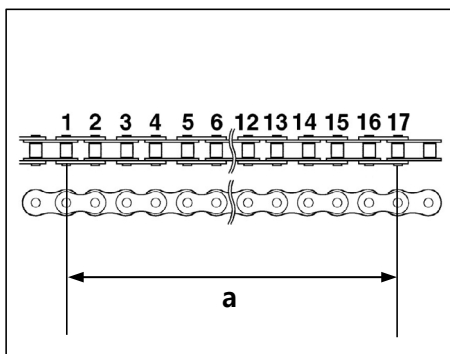
128 N·m (12.8 kgf·m, 94 lbf·ft)

d. Tighten the adjusting block locking nuts to the specified torque.

Drive chain adjusting block locking nut

16 N·m (1.6 kgf·m, 12 lb·ft)





※ Inspection, cleaning and lubrication of drive chain

⚠ Warning

•To ensure the service life and strength of the chain, please use the original manufacturer's specification for the drive chain.

Notes

•For optimal service life, it is highly recommended to clean and lubricate the drive chain after every drive.

1.Measurement

Measure the distance [a] between 17 pins (16 pitches) from the center of one pin to the center of the next, while ensuring the chain remains tight and any bent joints are straightened.

Usage limit: 257 mm

If the measured value exceeds the maintenance limit, please replace the drive chain.

2.Inspection

Inspect whether the chain gear is bent or damaged, please replace it if necessary.

3.Cleaning

This drive chain has small rubber rings between each link plate. Avoid cleaning the drive chain with high-pressure water or air jets, steam, gasoline, certain solvents (such as volatile oil), or abrasive brushes. Using high-pressure methods can result in dirt or water flowing into the inner part of the drive chain, while solvents can cause aging of the X-type oil seal. Abrasive brushes can also cause damage to the X-type oil seal. Therefore, only kerosene is suitable and allowed for cleaning the drive chain.

Notes

•Avoid immersing the drive chain in kerosene for more than 10 minutes, as it can cause damage to the X-type oil seal.

4.Lubrication

Apply drive chain lubricant [2] to properly lubricate the drive chain [1].

Recommended lubricants:

Use chain lubricant or SAE #80-90 gear oil to wipe off any excess oil or lubricant.

※ Replacement of drive chain

1. Place the vehicle on the maintenance workbench.



• Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Gear shift lever assembly [1]
- Front sprocket decorative cover [2]
- Chain guard [3]

See "Frame, body trim, exhaust system" on page 69 for details.

- Bolt and chain guide wear-resistant block [4]

3. Disassemble:

- Swingarm axle and U swingarm bolts [5]
- Detach the swingarm from the frame
- Remove the drive chain [6]

4. Installation:

The installation sequence is reversed from the removal sequence.

Note

- After replacing the chain, adjust the drive chain looseness to the specified range again.

Standard link: 120 links (Choho)

Replacement of chain: 520 SX2 (X-type oil seal, closed)

Notes

- Never use new drive chains on worn sprockets. Both the chain and sprocket must be in good condition; otherwise, the newly replaced drive chain will wear out quickly.
- When replacing the drive chain, inspect the sprocket as well.

※ Inspection of drive/driven sprockets

- Remove the drive sprocket cover

Check the drive sprocket gear teeth and driven sprocket gear teeth for wear or damage, replace them if necessary. Consult your dealer to replace the drive sprocket and driven sprocket.

Notes

- Never use new drive chains on worn sprockets.

Both the chain and sprocket must be in good condition; otherwise, the newly replaced drive chain will wear out quickly.

Check the bolts and nuts on the drive sprocket and driven sprocket. If there is any looseness, tighten to the specified torque value.

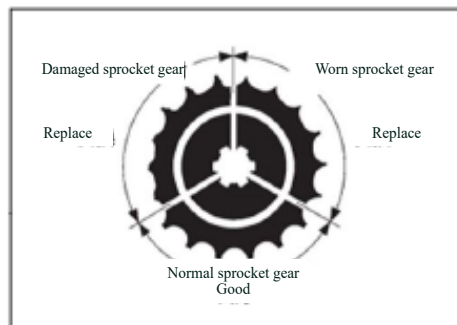
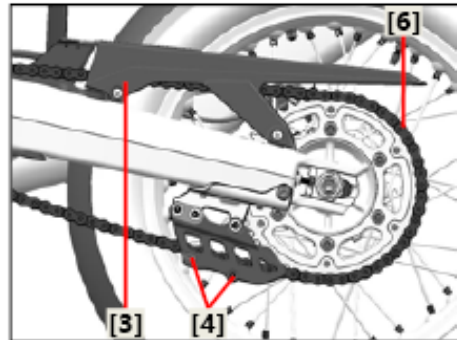
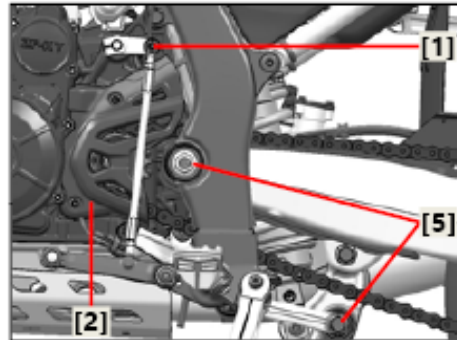
Torque:

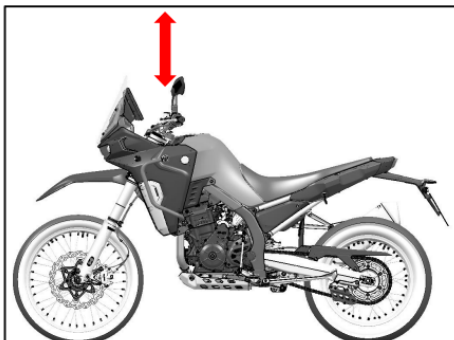
Driving sprocket locking nut:

100 N·m (10 kgf·m, 74 lbf·ft)

Driven sprocket and buffer bracket connecting bolt

37 N·m (3.7 kgf·m, 27.4 lbf·ft)





※ Inspection of front shock absorber

1. Stand the vehicle on a flat ground.

⚠ Warning

• Ensure that the vehicle is securely supported and not at risk of tipping over.

2. Check:

- Front swingarm hose

Damage/scratch → Replace.

- Front shock absorber bottom cylinder

Oil leaks between swingarm hose and outer tube → Replace oil seal.

3. Keep the vehicle upright and engage the front brake.

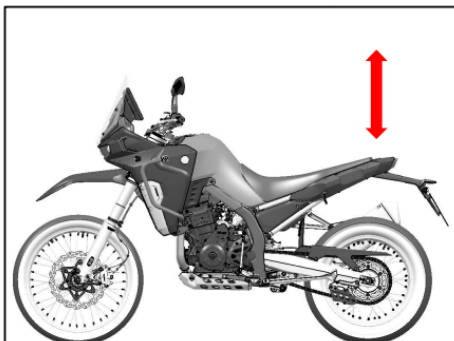
4. Check:

- Front shock absorber actuation

Press down firmly on the handlebar several times to check for smooth rebound of the front shock absorber.

Unsmooth movement → Maintenance

See "Front Wheels, Suspension, Steering" on page 233 for details.



※ Inspection of rear shock absorber

1. Stand the vehicle on a flat ground.

⚠ Warning

• Ensure that the vehicle is securely supported and not at risk of tipping over.

2. Check:

- Rear shock absorber inner rod

Bend/damage → Replace rear shock absorber.

- Rear shock absorber

Oil leaks → Replace rear shock absorber.

- Spring

Damage/wear → Replace rear shock absorber.

- Size of Bolts

Bend/damage/wear → Replace.

3. Check:

- Rear shock absorber actuation

Press down firmly on the rear of the vehicle seat cushion several times to check for smooth rebound of the rear shock absorber.

Irregular movement → Adjust

See "Maintenance and Adjustment" on page 17 for details.

※ Front shock absorber settings and adjustments

1. Compression damping adjustment

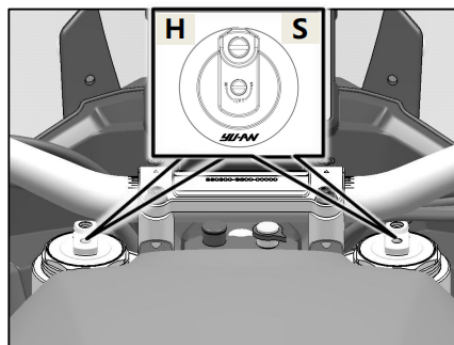
The adjustment of the compression damping affects the speed at which the front shock absorber compresses. The front shock absorber features 22 stages of compression damping. Each segment is a quarter turn. Turning the compression damping adjustment bolt one full turn will rotate the adjuster by 4 segments.

The compression damping increases (slower) when the adjuster is rotated clockwise (H), and the compression damping decreases (faster) when the adjuster is rotated counterclockwise (S).

Set standard compression damping:

1. Clockwise rotate the compression damping adjuster until it cannot be rotated;
2. Rotate the adjusting bolt in a counterclockwise(S) direction. The standard compression damping is to rotate 10 clicks counterclockwise from the hardest position (where a click sound is heard).

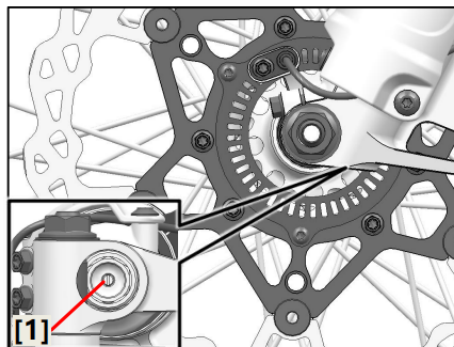
You can make adjustments based on your weight and riding conditions. Ensure that the adjustment bolt stops at the click position and both ends are set to the same level after each adjustment.



2. Rebound damping adjustment

The adjustment of rebound damping will affect the rebound speed of the front shock absorber. The front shock absorber features 22 stages of rebound damping. Each segment is a quarter turn. Rotating the compression damping adjusting bolt [1] one full turn will advance the adjuster by 4 stages.

Rotate the adjusting bolt clockwise (H) to increase the rebound damping (slower), and turn it counterclockwise (S) to decrease the rebound damping (faster).



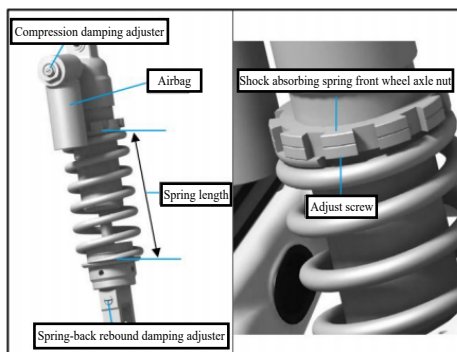
Set the standard rebound damping:

1. Clockwise rotate the spring-back rebound damping adjuster until it cannot be rotated;
2. Rotate the adjusting bolt in a counterclockwise direction. The standard rebound damping is to rotate 10 clicks from the hardest position (where a click sound is heard).

You can make adjustments based on your weight and riding conditions. Ensure that the adjustment bolt stops at the click position and both ends are set to the same level after each adjustment.

Notes

- Gently rotate the adjusting bolt to prevent damage to the shock absorber.
- When adjusting compression damping or rebound damping, always use a properly sized tool to avoid damaging the device.
- Do not continue to rotate the adjusting bolt after it has been turned to the bottom, otherwise it may damage the adjusting device. The adjusting torque shall not exceed 0.5N·m.



※ Rear shock absorber settings and adjustments

⚠ Warning

· The rear shock absorber assembly includes a shock airbag containing high pressure nitrogen. Do not attempt to remove, repair or dispose of the device. Piercing or exposure to flame may also cause an explosion, causing serious injury. Repair or disposal should be completed by special repair shop of KOVEMOTO.

1. Spring preload adjustment

The spring preload shall be adjusted when the engine is cooled. Rotate the shock absorber spring preload adjusting knob to set the spring preload.

Adjustment method:

1. Securely support your motorcycle with a maintenance bracket or a crane and lift the rear wheels off the ground.
2. Check if the spring preload force is at the standard length (210mm).
3. Loosen the shock absorber spring locking nut and rotate the adjusting nut. The spring length will change by 1.5 mm for each turn of the adjusting nut.
4. Make corresponding adjustments as needed.
5. After the adjustment is completed, hold the adjusting nut and tighten the shock absorber spring lock nut (torque: 44N·m).

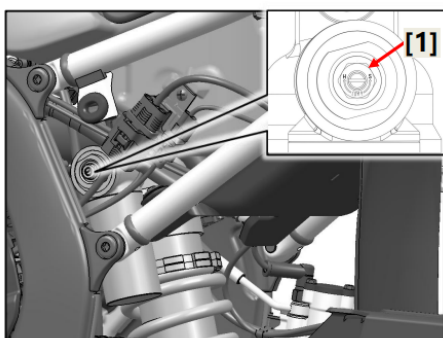
Increase spring preload:

Use a special tool to loosen the shock absorber spring locking nut, then rotate the adjusting nut to shorten the spring length.

Reduce spring preload:

Use a special tool to loosen the shock absorber spring locking nut, then rotate the adjusting nut to increase the spring length.

Each turn of the adjusting nut will change the spring length and spring preload.



2. High-speed compression damping adjustment

When it is necessary to adjust the compression damping of the shock absorber at high speed, adjust the hexagonal part of the compression damper, and adjust the stroke by about 4 turns. The compression damping increases after clockwise (H) adjustment, and the damping decreases after counterclockwise (S) adjustment.

Set standard compression damping:

1. Rotate the adjuster clockwise (H) until it cannot be rotated.
2. Rotate the adjuster counterclockwise for 2 turns from the hardest position.

Notes

- Gently rotate the adjusting bolt to prevent damage to the shock absorber.
- When adjusting compression damping or rebound damping, always use a properly sized tool to avoid damaging the device.
- Make sure that the adjusting bolt is firmly in the fixed position during each adjustment.
- The adjusting torque for compression damping and rebound damping shall not exceed 0.5 N·m.

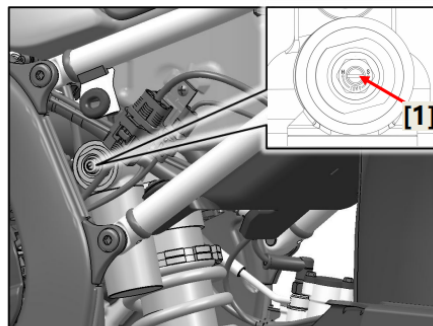
3. Low-speed compression damping adjustment

When it is necessary to adjust the compression damping of the shock absorber at high speed, adjust the center slotted bolt part of the compression damper. The adjustment range is 16 segments in total, and each segment is 1/4 circle. The compression damping increases after clockwise (H) adjustment, and the compression damping decreases after counterclockwise (S) adjustment.

Set standard compression damping:

Rotate the adjuster clockwise (H) until it cannot be rotated.

Rotate the adjusting bolt for 8 clicks counterclockwise from the hardest position (where a click sound is heard).



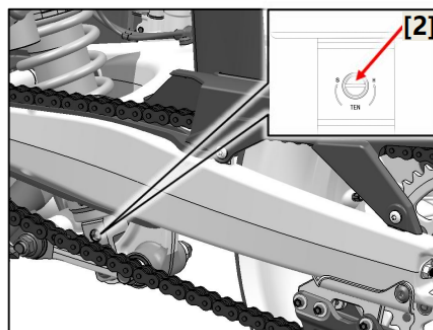
4. Rebound damping adjustment

The spring-back rebound damping adjuster is located at the lower left end of the rear shock absorber. Rotating the adjusting bolt clockwise (H) increases rebound damping; rotating it counterclockwise (S) reduces rebound damping.

Set the standard rebound damping:

1. Rotate the rebound damping adjuster clockwise (H) until it cannot be rotated.

2. Rotate the adjuster in a counterclockwise (S) direction. The standard rebound damping is to rotate 10 clicks counterclockwise from the hardest position (where a click sound is heard).



※ Adjustment of air pressure inside front shock absorber

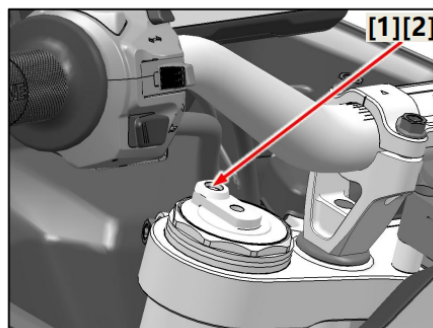
The shock absorber generates internal air pressure during operation, which acts like a progressive resistance, subsequently affecting the performance of the shock absorber. So as the race conducts, the front shock absorber on this motorcycle will become stiff.

After the race or practice, it is necessary to release the accumulated air pressure in the front shock absorber in a timely manner.

Ensure the front shock absorber is fully extended, the front wheel is off the ground, and completely loosen the front shock absorber bleed bolt [1]. Check if the O-ring [2] of the bleed bolt is damaged, and replace it if necessary. Apply the recommended silicon grease to the O-ring.

Install and tighten the front bleed bolt to the specified torque.

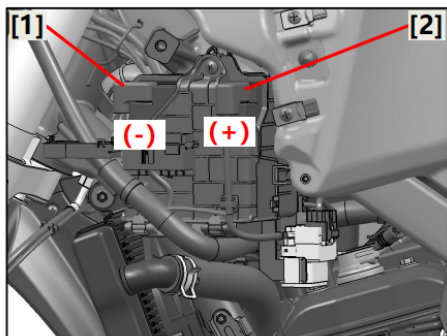
1.3 N·m (0.1 kgf·m, 1.0 lbf·ft)



※ **Inspection of vehicle locking torque**

Check that all nuts, bolts and screws are properly locked (every 3 months or 10000km).

See "Torque value-body torque value" on page 10 for details of torque value.



※ **Inspect and recharge batteries**

1. Disassemble:

- Guard - left
- Fuel tank front cover
- Instrument housing rear section-left
- Fuel tank side protector assembly - left

See "Frame, body trim and exhaust system" on page 59 for details.

2. Disconnect:

- Battery conductor
- (From battery terminal)

Notes

• First, disconnect the negative battery wire [1], and then disconnect the positive battery wire [2].

3. Disassemble:

- Battery

See "Frame, body trim and exhaust system" on page 59 for details.

4. Check:

- Battery voltage

5. Charge:

- Battery

6. Installation:

- Battery

See "Frame, body trim and exhaust system" on page 59 for details.

7. Connect:

- Battery conductor.
- (To battery terminal)

Notes

• First, connect the battery positive lead [1], and then connect the battery negative lead [2].

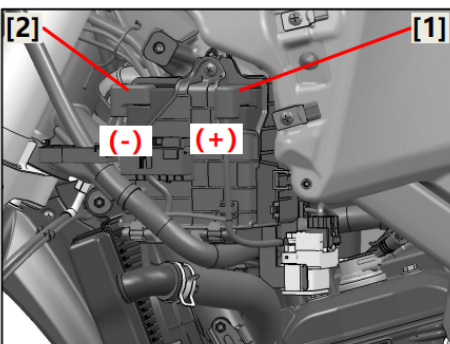
8. Check:

- Battery terminal fouling → clean with wire brush.
- Connection unsecured → tighten.

9. Installation:

- Fuel tank side protector assembly - left
- Instrument housing rear section-left
- Fuel tank front cover
- Guard - left

See "Frame, body trim and exhaust system" on page 59 for details.



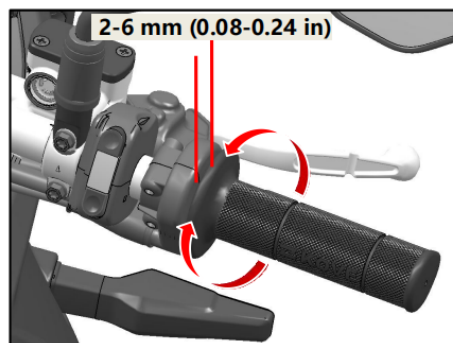
※ **Inspection and adjustment of accelerator free stroke**

Check whether the throttle cable is aged, damaged or kinked. Turn the accelerator handle and check that the throttle opens smoothly and closes automatically in any steering position.

If the accelerator handle does not rotate well, check that the cables are wired correctly, the accelerator is clean and greased, and the accelerator drum rotates normally. If Ok, but the throttle does not rotate well, replace the accelerator cable (oil inlet and oil return).

Measure the free play at the accelerator handle flange.

Free play: 2-6mm (0.08-0.24 in)



1. Fine-tuning on accelerator cable

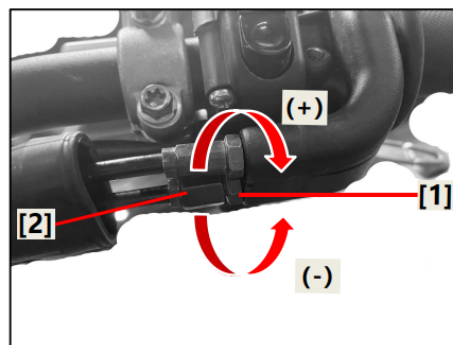
Loosen the locking nut [1] and turn the adjuster [2].

Turning the adjuster in the (-) direction will reduce the free play, and turning the adjuster in the (+) direction will increase the free play.

After adjustment, hold the adjuster and tighten the locking nut.

If the correct free play cannot be obtained despite turning the regulator to the end, turn it back in the (+) direction until it lightly touches the end, make one turn in the (-) direction, and then make more adjustments on the throttle side. Nut [1] torque:

5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)



2. Adequately adjust on the throttle side

Loosen the accelerator cable adjuster lock nut [1] and turn the adjuster [2] in the (-) direction to reduce the free clearance and in the (+) direction to increase the free clearance.

After the adjustment, hold the adjuster and tighten the locking nut of the inlet accelerator cable adjuster to the specified torque.

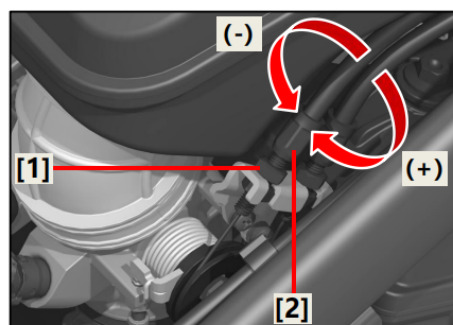
Torque:

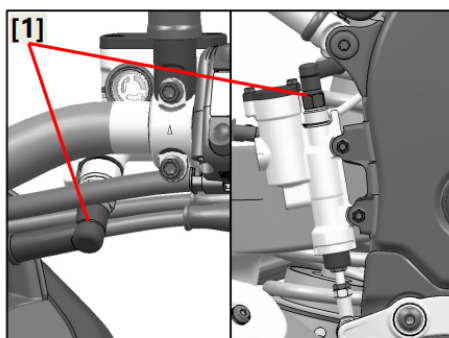
4.0 N·m (0.4 kgf·m, 3.0 lbf·ft)

(The oil inlet and oil return cables are subjected to the same adjustment)

Notes

• Re-check whether the accelerator rotates smoothly or not.





※ **Inspection of brake switch**

Inspection of brake switch [1]

1. Check:

- Front brake switch operation
- Rear brake switch operation

2. Check:

- Brake switch wiring harness

Crack/damage → Replace.

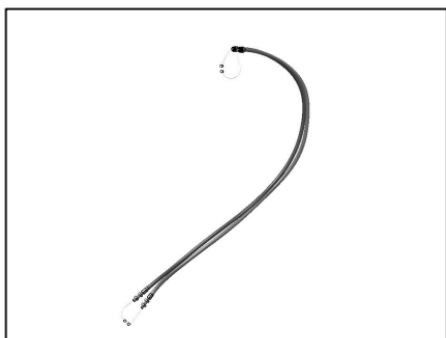
- Brake switch (bolt)

Loosen → Lock bolt.

Make sure the brake light is on when operating the brake handle and brake pedal.

※ **Inspection of switches, lights and signals**

1. Check that all switches are operating properly and all lights are on.



※ **Inspection and lubrication of steel cable**

The following procedures apply to all cables.

1. Check:

- Outer cables

Damage → Replace.

2. Check:

- Cable operation

Unsmooth movement → Lubricate.



Recommended lubricants
Engine oil or appropriate cable lubricant

Notes

- Stand the tail end of the cable upright, apply a few drops of lubricant into the cable, or use appropriate lubrication equipment.

Warning

- Damaged cable rubber covering will cause cable corrosion and affect its operation. Replace damaged cable as soon as possible.

Frame, Body Trim, Exhaust System

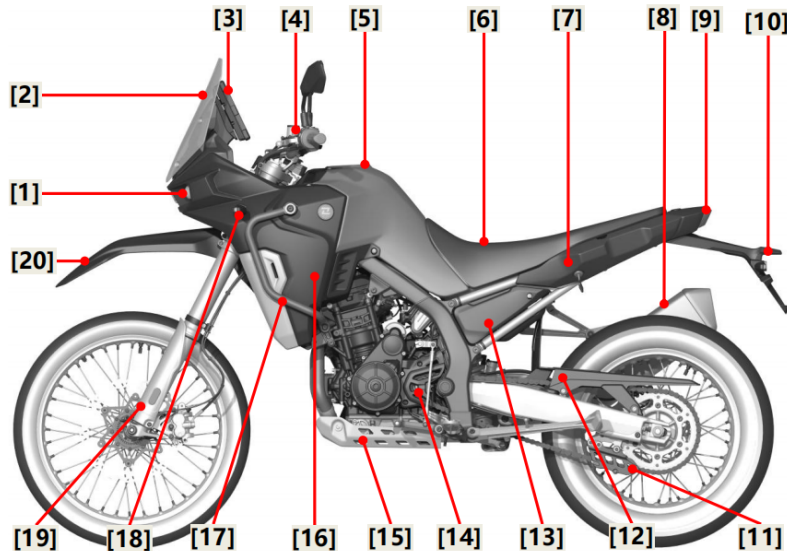
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Maintenance Instructions

- This section describes the disassembly and reassembly of body trim and exhaust system;
- For disassembly, mark and store the mounting fasteners to ensure that they are reinstalled in their original positions;
- For bonnet installation, ensure that the matching areas are correctly aligned before tightening the fasteners;
- After removing the exhaust system, be sure to use new washers;
- When installing the exhaust system, loosen all fasteners first. Be sure to tighten the exhaust pipe joint nut before tightening the mounting bolts;
- After installation, be sure to check for the exhaust system leak, or unacceptable exhaust noise at the time of troubleshooting;
- Exhaust system damage;
- Inadequate exhaust gas leak performance;
- Exhaust system deformation;
- Exhaust gas leak;
- Muffler blockage.

Body Trim Position/Disassembly Drawing



(1) Headlight assembly	(7) Vehicle body (left and right)	(13) Side cover (left and right)
(2) Front windshield	(8) Muffler/exhaust assembly	(14) Engine front sprocket cover
(3) Instrument cluster assembly	(9) Taillight assembly	(15) Engine lower protector
(4) Handlebar and handlebar components	(10) Rear license plate lamp and reflector	(16) Fuel tank side protector and inner lining (left and right)
(5) Fuel tank assembly	(11) Chain guide assembly	(17) Bumpers (left and right)
(6) Seat cushion assembly	(12) Chain guard	(18) Front turn signals (left and right)
(19) Front shock absorber trims (left and right)	(20) Front fender	

After the motorcycle is powered off, carry out disassembly in this order below:

Front fender → Bumper (left/right) → Front windshield → Front windshield bracket → Fuel tank front cover → Instrument housing rear section (left/right) → Fuel tank side protector (left/right) → Water tank trim (left/right) → Water tank air guide cover (left/right) → Fuel tank side protector inner lining → Fuel tank side trim (left/right) → Battery box cover → Headlight trim → Headlight assembly → Headlight bracket → Instrument cluster assembly and instrument housing trim → USB charger → Instrument housing → Instrument bracket → Fuel tank lower protector (left/right) → Engine lower protector → Gear shift lever assembly → Engine front sprocket cover → Seat cushion assembly → Side cover (left/right) → Rear tail cover trim → Body (left/right) and inner lining → Ignition lock cover → Complete vehicle lock set assembly → Rear tail cover → Taillight assembly → Rear fender rear bracket and inner lining → Rear fender rear section → Reflector and rear turn signal/license plate light → Rear wheel small fender → Oxygen sensor → Exhaust pipe rear section → Exhaust pipe front section → Exhaust pipe mounting bracket → Fuel tank assembly → Air filter assembly → Fuel evaporation system → Throttle body assembly and fuel rail assembly → Battery box and battery → All electrical components → Main wiring harness → Rear fender front section → Rear fender front section trim → Water reservoir → Water radiator → Front and rear wheel assembly → ABS pump and bracket → Brake system → Chain guard → Rear suspension assembly → Rear swingarm → Drive chain → Chain guide assembly → Front footpeg (left/right) → Side stand → Steering damper → Front shock absorber → Handlebar and components → Upper and lower connecting plates and steering stem → Subframe → Bumper mounting bracket (left/right) → Engine section.

※ **Hand windshield (left and right)**

Disassembly/installation

Disassemble the following parts:

- Hand windshield mounting bolt [1];
- Bolt [2];
- Flanged bushing [3];
- Hand windshield - left [4];
- Hand windshield bushing [5];

The right-hand windshield removal position is the same as the left side.

The installation sequence is reversed from the removal sequence.

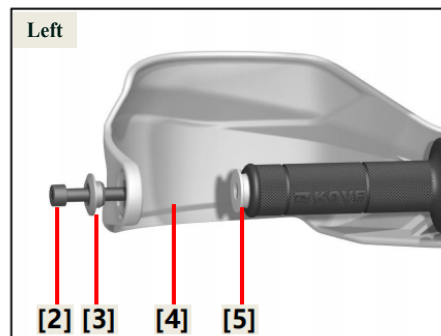
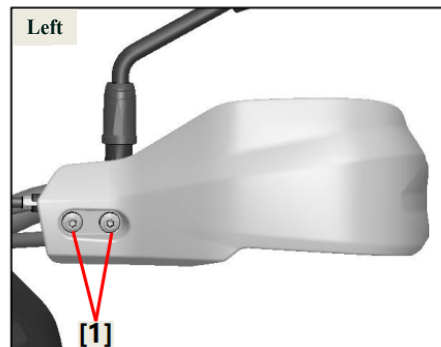
Torque:

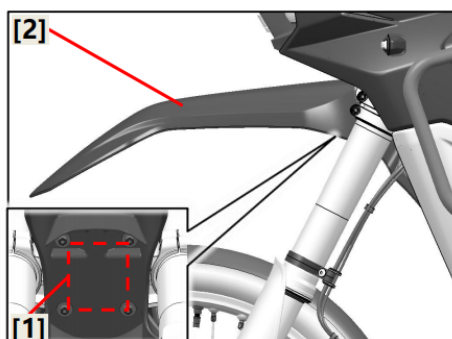
Mounting bolt for hand windshield

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)

Hand windshield and handlebar connecting bolt

25 N·m (2.5 kgf·m, 19 lbf·ft)





※ Front fender

Disassembly/installation

Disassemble the following parts:

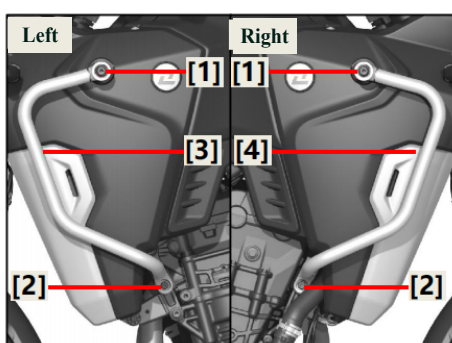
- Bolt, flat gasket, flanged bushing [1];
- Front fender [2].

The installation sequence is reversed from the removal sequence.

Torque:

Front fender and lower connecting plate

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)



※ Bumper (left and right)

Disassembly/installation

Disassemble the following parts:

- Remove the 4 screws at locations [1] and [2].
- Remove the left [3] and right [4] bumpers.

The installation sequence is reversed from the removal sequence.

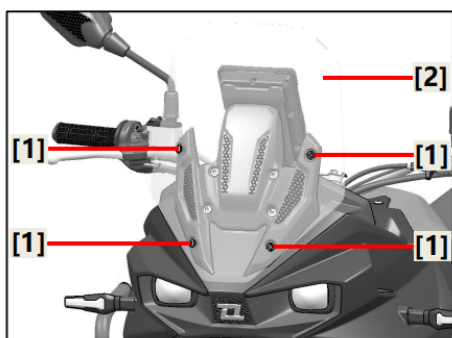
Torque:

Bumper lower mounting bolts

22 N·m (2.2 kgf·m, 16 lbf·ft)

Bumper upper mounting bolts

45 N·m (4.5 kgf·m, 33 lbf·ft)



※ Front windshield and windshiled bracket

Disassembly/installation

Disassemble the following parts:

- Remove the 4 screws at location [1].
- Remove the front windshield [2];
- Remove the 4 screws at location [3].
- Remove the front windshield bracket [4].

The installation sequence is reversed from the removal sequence.

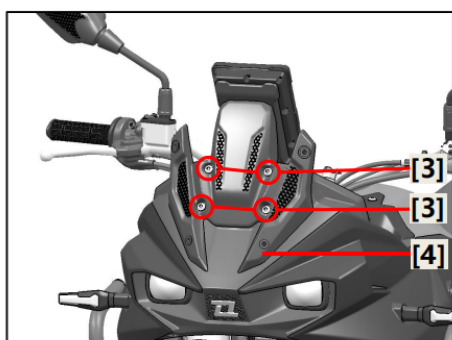
Torque:

Front windshield mounting screw

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Front windshield bracket mounting screw

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



※ Rear view mirror

Disassembly/installation

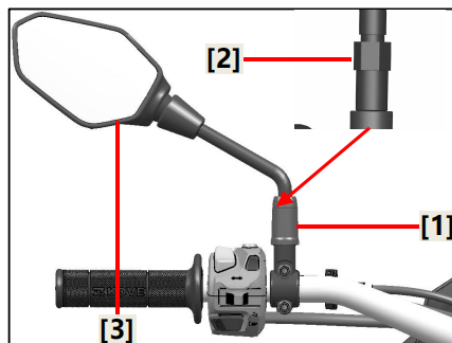
Disassemble the following parts:

- Pull back the rubber grommet [1];
- Loosen the nut [2];
- Rotate the rear mirror [2] until it is removed.

The installation sequence is reversed from the removal sequence.

Note

- The disassembly and assembly methods of the left and right rear mirror are the same.



※ Fuel tank front cover

Disassembly/installation

Disassemble the following parts:

- Remove the 4 screws at location [1].
- Remove the front shield of fuel tank [2]

The installation sequence is reversed from the removal sequence.

Torque:

Fuel tank front shield mounting screws

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

※ Rear section of the instrument housing (left and right)

Disassembly/installation

Disassemble the following parts:

- Remove the 1 expansion screws at location [1];
- Remove the 1 screws at location [2].
- Remove the instrument housing rear section - right [3];
- The right-side removal position is the same as the left side.

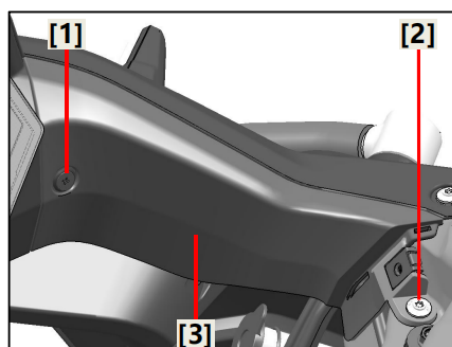
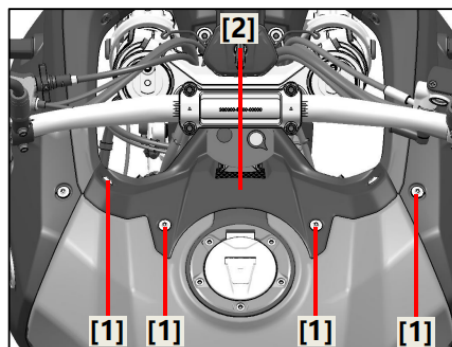
The installation sequence is reversed from the removal sequence.

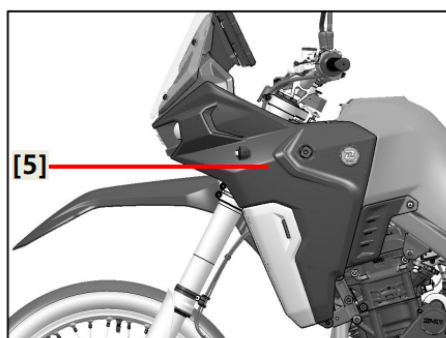
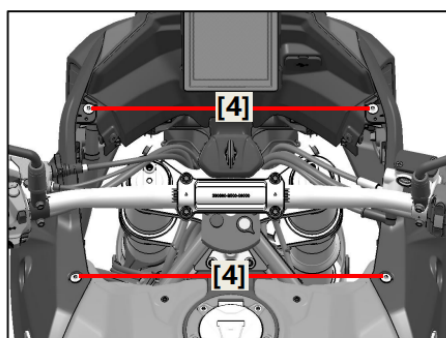
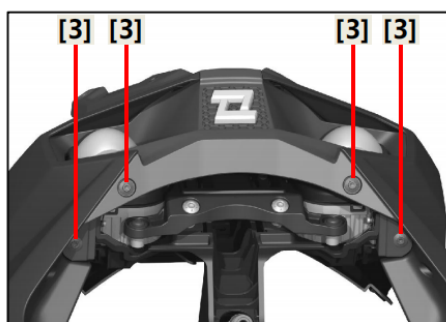
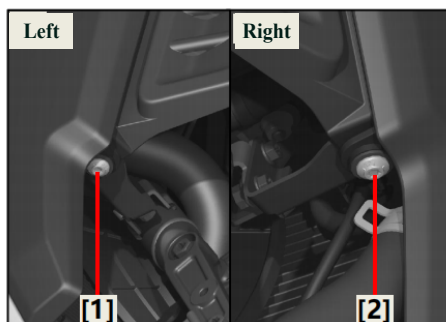
Torque:

Instrument housing rear section mounting screws

[2]

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)





※ Fuel tank side protector assembly

Disassembly/installation

Disassemble the following parts:

- Remove the 2 screws at positions [1] and [2] and flip the bushing over;
- Remove the 4 screws at position [3].
- Remove the 4 screws and flat gasket at position [4];
- Disconnect the left and right connecting plugs of front turn signal;
- Then the left and right side protector assemblies of the fuel tank [5] can be removed.

The installation sequence is reversed from the removal sequence.

Torque:

Fuel tank side protector mounting screws [3], [4]

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Fuel tank side protector and side protector bracket bolts [1], [2]

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

※ Fuel tank lower protector (left and right)

Disassembly/installation

Disassemble the following parts:

- Remove the 2 screws at the left location [1];
- Then the fuel tank lower protector can be removed [2];
- The right-side removal position is the same as the left side.

The installation sequence is reversed from the removal sequence.

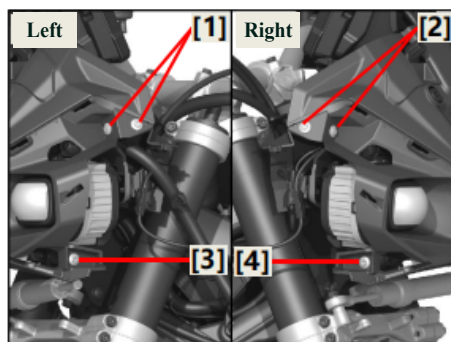
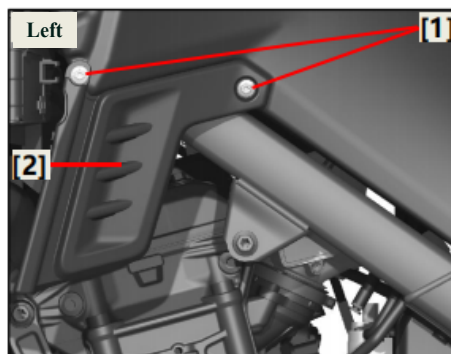
Torque:

Fuel tank lower protector mounting screws

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Bolt connecting the fuel tank lower protector and side protector bracket

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)



※ Headlight trim/instrument housing

Disassembly/installation

Disassemble the following parts:

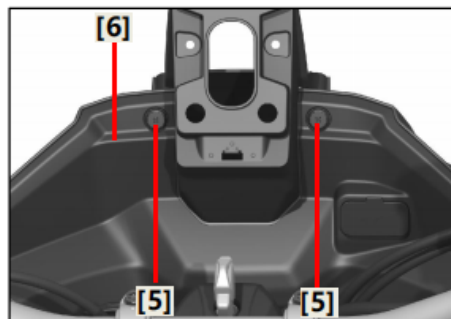
- Remove the four screws at positions [1] and [2] on both left and right sides;
- Remove the 2 screws at position [3] and [4];
- Remove the two expansion screws at position [5];
- Disconnect the USB harness connector;
- Then the headlight trim and instrument housing [6] can be removed simultaneously.

The installation sequence is reversed from the removal sequence.

Torque:

Headlight trim and instrument housing mounting screws

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

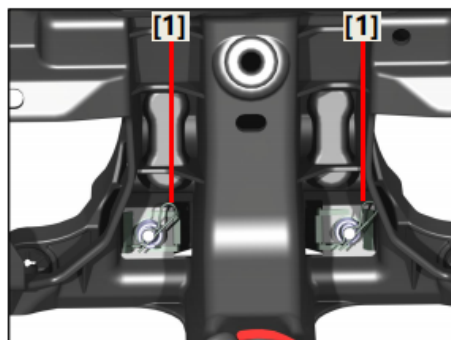


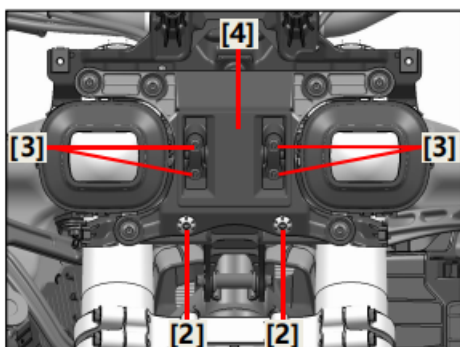
※ Headlight bracket

Disassembly/installation

- Disassemble the following parts:
- Disconnect the headlight harness connector before disassembly;
- Remove the 2 cotter pins at position [1];
- Remove the 2 headlight adjusting bolts at position [2];
- Remove the 4 bracket baffle mounting screws at position [3].
- Then the headlight bracket [4] can be removed;

The installation sequence is reversed from the removal sequence.





※ Headlight assembly

Disassembly/installation

Disassemble the following parts:

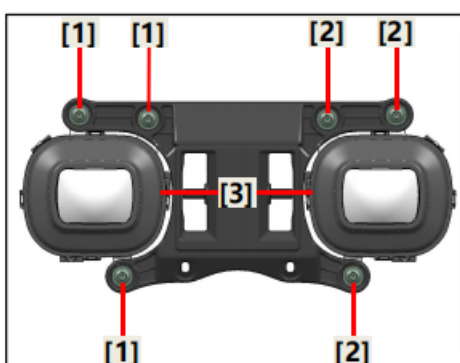
- Remove the 6 screws at positions [1] and [2], along with the flat gaskets and flanged bushings
- Then the headlight assembly [3] on both the left and right sides can be removed.

The installation sequence is reversed from the removal sequence.

Torque:

Headlight and headlight bracket mounting bolt

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ Instrument assembly

Disassembly/installation

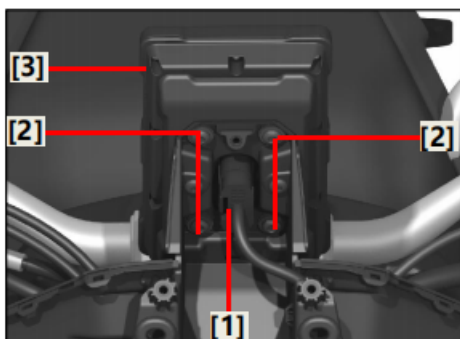
Disassemble the following parts:

- Disconnect the instrument wiring harness connector [1];
- Remove the 6 screws at position [2], along with the flat gaskets and flanged bushings
- Remove the instrument cluster assembly [3].

The installation sequence is reversed from the removal sequence.

Instrument cluster assembly and instrument bracket mounting bolt

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ Instrument trim

Disassembly/installation

Disassemble the following parts:

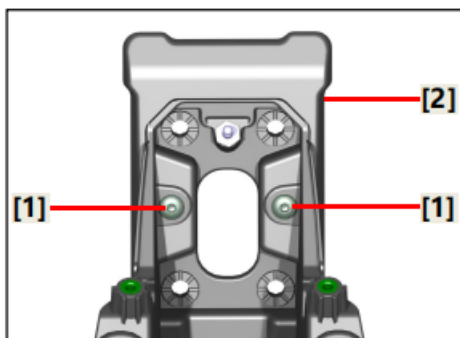
- Remove the screw [1];
- Remove the instrument trim [2].

The installation sequence is reversed from the removal sequence.

Torque:

Instrument trim mounting bolt

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ Instrument bracket

Disassembly/installation

Disassemble the following parts:

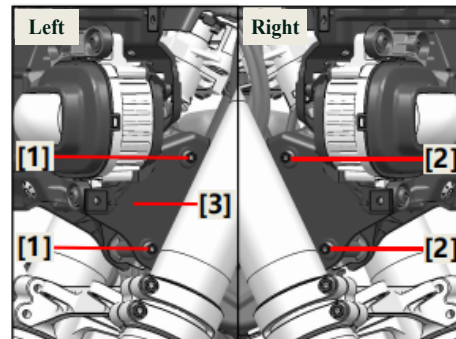
- Remove the 4 screws at locations [1] and [2].
- Then the instrument bracket [3] can be removed;

The installation sequence is reversed from the removal sequence.

Torque:

Instrument bracket and frame mounting bolts

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



※ Engine lower protector

Disassembly/installation

Disassemble the following parts:

- Remove the 4 screws at [1] and [2], and flanged bushing;
- Then the engine lower protector [3] can be removed.

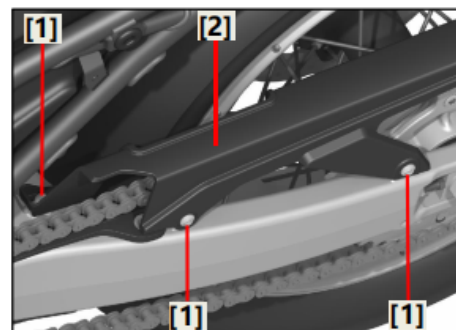
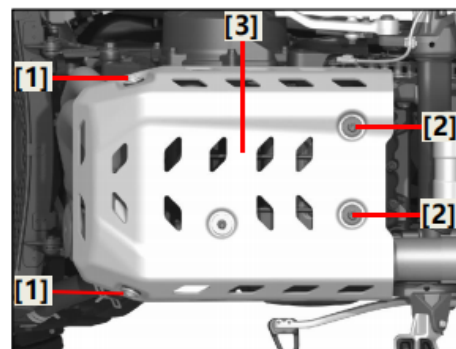
The installation sequence is reversed from the removal sequence.

Torque:

Engine lower protector mounting screws [1]

Engine lower protector mounting screws [2]

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



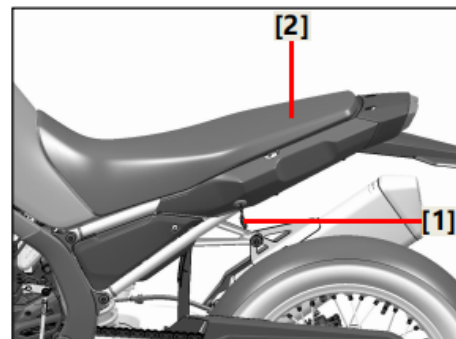
※ Seat cushion assembly

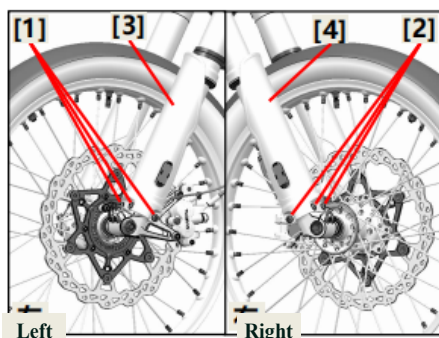
Disassembly/installation

Disassemble the following parts:

- Use the key to rotate the seat cushion lock hole [1];
- The latch will automatically pop up; lift the seat cushion upward and pull it backward to remove [2].

The installation sequence is reversed from the removal sequence.





※ Front shock absorber trim (left and right)

Disassembly/installation

Disassemble the following parts:

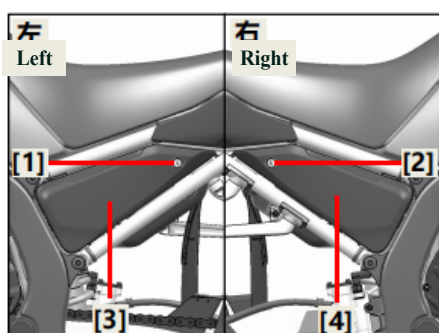
- Remove the screws at positions [1] and [2] respectively;
- Remove the left and right trims [3] and [4] of front shock absorber.

The installation sequence is reversed from the removal sequence.

Torque:

Mounting bolts of front shock absorber trims

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)



※ Side cover (left and right)

Disassembly/installation

Disassemble the following parts:

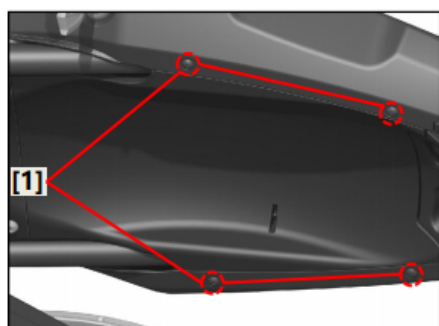
- Remove the 2 screws at positions [1] and [2] respectively;
- Pull out the clip to remove the side covers [3] and [4].

The installation sequence is reversed from the removal sequence.

Torque:

Mounting bolts for left and right side cover

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ Vehicle body (left and right) and inner lining rear tailgate trim

Disassembly/installation

Disassemble the following parts:

- Remove the 4 screws [1];
- Remove the four vehicle body side mounting bolts [2] on the left and right sides.
- Remove the tailgate trim [3];
- Remove the left [4] and right [5] vehicle body.

The installation sequence is reversed from the removal sequence.

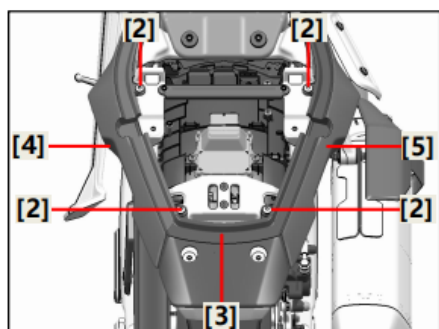
Torque:

Vehicle body inner lining - left and right mounting bolts

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

Rear tailgate trim mounting bolts

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)



※ **Rear wheel small fender**

Disassembly/installation

Disassemble the following parts:

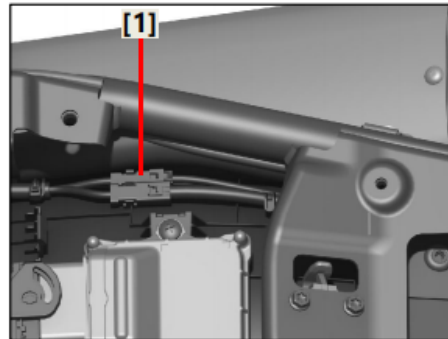
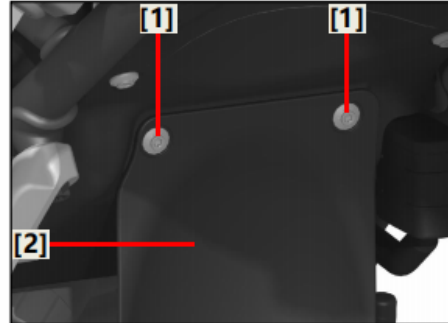
- Remove the 2 screws [1];
- Remove the rear fender [2];

The installation sequence is reversed from the removal sequence.

Torque:

Rear wheel fender mounting bolt

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ **Rear tailgate and taillight assembly**

Disassembly/installation

Disassemble the following parts:

- Disconnect the taillight's wiring harness connector [1];
- Remove the 4 mounting screws [2] and [3] on the left and right side respectively;
- Remove the rear tailgate and taillight assembly [4].

The installation sequence is reversed from the removal sequence.

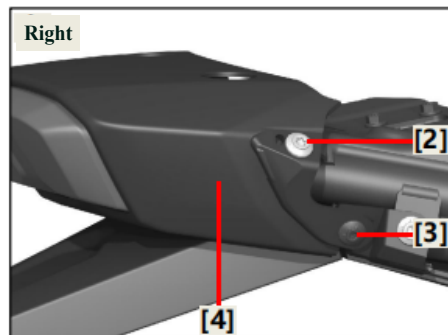
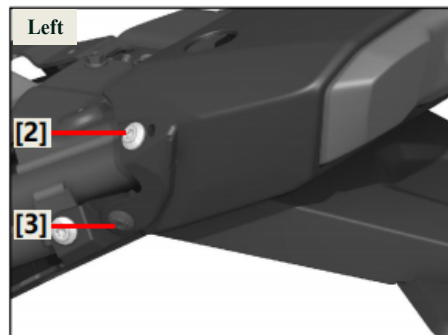
Torque:

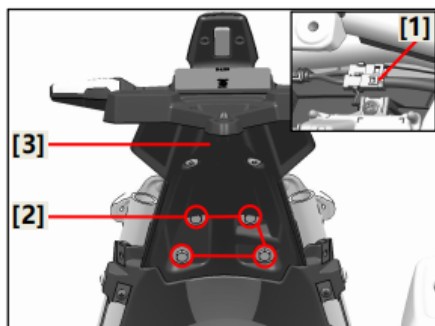
Rear tailgate and subframe mounting bolts [2]

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

Rear tailgate and rear fender front section mounting bolts [3]

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)





※ Rear fender rear bracket

Disassembly/installation

Disassemble the following parts:

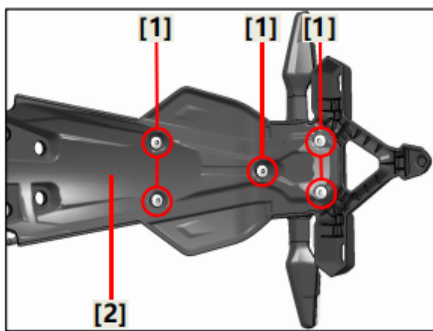
- Disconnect the cable plug [1];
- Remove the 4 screws [2];
- Rear fender rear bracket [3].

The installation sequence is reversed from the removal sequence.

Torque:

Rear fender rear bracket mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



※ Rear fender liner panel

Disassembly/installation

Disassemble the following parts:

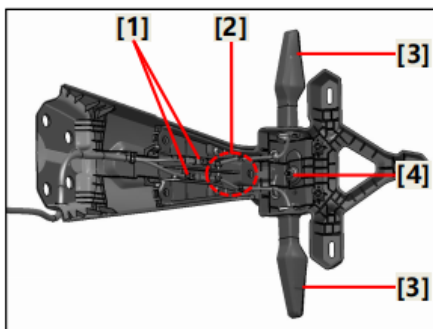
- Remove the 5 screws at location [1];
- Take off the rear fender liner panel [2].

The installation sequence is reversed from the removal sequence.

Torque:

Rear fender liner panel mounting bolt

5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)



※ Reflector and rear turn signal

Disassembly/installation

Disassemble the following parts:

- Plug [1];
- Remove the wiring harness from the wire clamp [2];
- Turn signal - left and right [3];
- Nut [4] and rear reflector.

The installation sequence is reversed from the removal sequence.

Note

- When disassembling the rear turn signal, press the clip and pull the turn signal outward to release it.

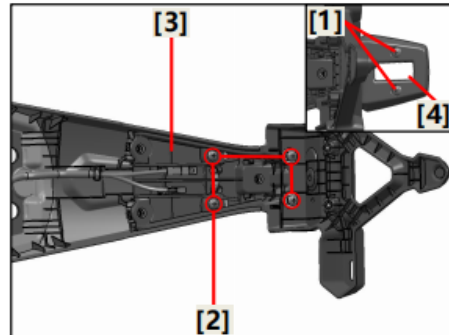
※ **Rear fender rear section and license plate lamp**

Disassembly/installation

Disassemble the following parts:

- 2 screws [1];
- 4 screw [2];
- Remove the rear fender rear section [3];
- License plate lamp [4].

The installation sequence is reversed from the removal sequence.



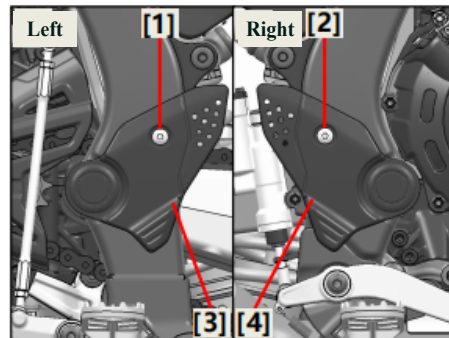
※ **Swingarm axle trim**

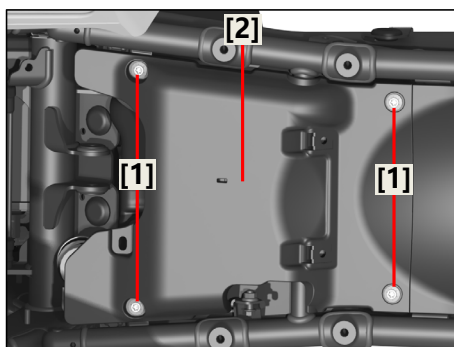
Disassembly/installation

Disassemble the following parts:

- Screw [1][2];
- Swingarm axle trim - left [3];
- Swingarm axle trim - right [4].

The installation sequence is reversed from the removal sequence.





※ Front trim of rear fender

Disassembly/installation

Disassemble the following parts:

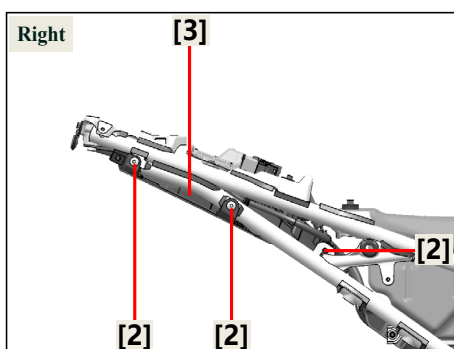
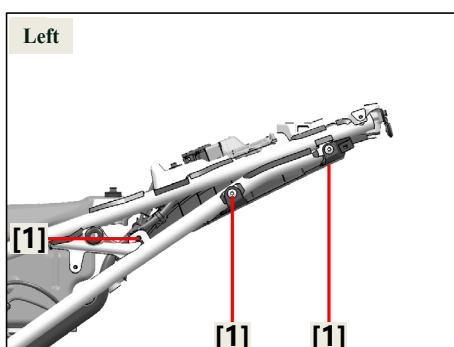
- Remove the 4 mounting screws [1];
- Then the front section of the rear fender [2] can be removed.

The installation sequence is reversed from the removal sequence.

Torque:

Rear fender front section mounting bolt

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)



※ Rear fender front section

Disassembly/installation

Disassemble the following parts:

- Remove the electrical component from the trim panel;
- Remove the 3 mounting screws [1] on the left side;
- Remove the 3 mounting screws [2] on the right side;
- Then the rear fender trim [3] can be removed.

The installation sequence is reversed from the removal sequence.

Torque:

Rear fender front section trim mounting bolt

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

※ Engine heat shield

Disassembly/installation

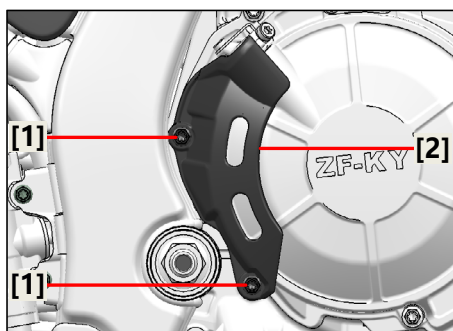
Disassemble the following parts:

- Screw [1];
- Heat shield [2];

The installation sequence is reversed from the removal sequence.

Engine heat shield mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf.ft)



※ Gear shift lever assembly

Disassembly/installation

Disassemble the following parts:

- Remove the screw [1];
- Remove the screw [2];
- Remove the shift rocker arm [3];
- Remove the screw [4];
- Remove the shift rod [5];
- Remove the screw [6];
- Then the shift pedal connecting rod can be removed [7].

The installation sequence is reversed from the removal sequence.

Torque:

Shift rocker arm mounting screw

Shift rod mounting screw

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Shift pedal connecting rod mount screw

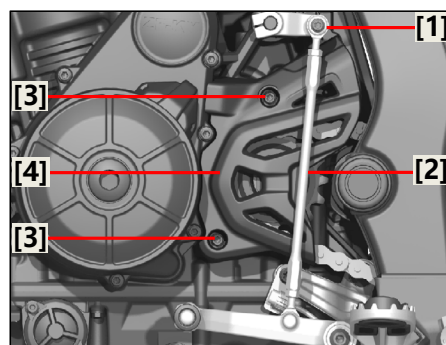
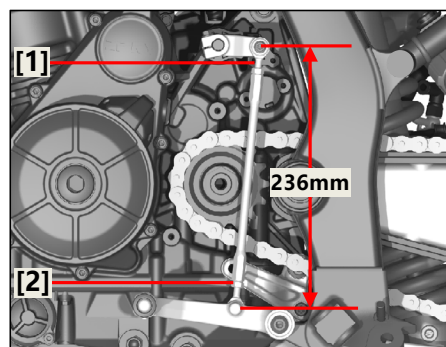
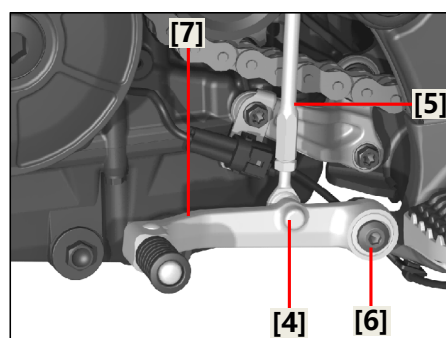
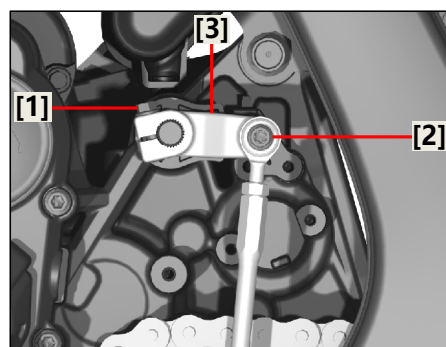
22 N·m (2.2 kgf·m, 16 lbf·ft)

Adjustment of shift rod

After removing the rod, adjust its length so that the distance between the both ends of the mounting holes of the shift rod is the standard length of 236mm. If adjusting to a longer length, ensure the lower end of the push rod thread [1] is within the rod connector by 5mm, then tighten the connecting nut [2] to the specified torque.

Adjusting and tightening nut of the shift rod:

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)



※ Front sprocket decorative cover

Disassembly/installation

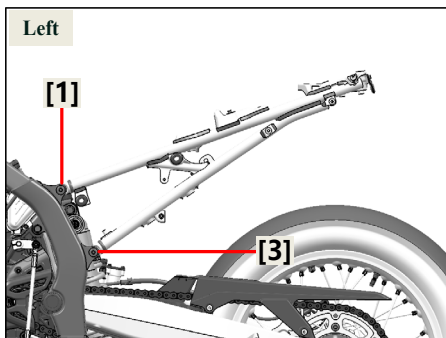
Disassemble the following parts:

- Remove the bolt at position [1].
- Remove the shift rod [2]
- Remove the 2 bolts at location [3];
- Then the front sprocket cover [4] can be removed.
- The installation sequence is reversed from the removal sequence.

Torque:

Engine small sprocket cover mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



※ **Subframe**

Disassembly/installation

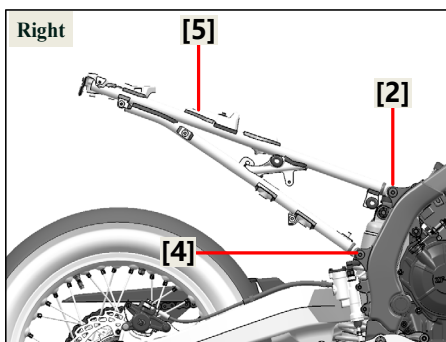
Disassemble the following parts:

- Remove bolts [1] and [2] on the left and right side of the subframe respectively;
- Remove bolts [3] and [4] on the left and right side of the subframe respectively;
- Take off the subframe [5].

The installation sequence is reversed from the removal sequence.

Torque:

Connecting bolt between subframe and main frame
45 N·m (4.5 kgf·m, 33 lbf·ft)



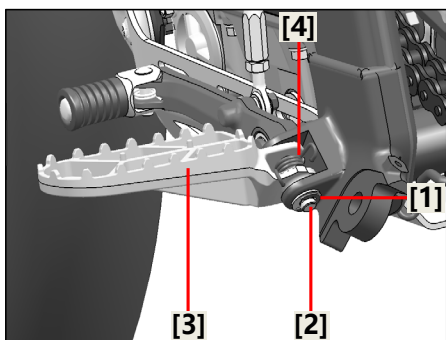
※ **Front footpeg assembly**

Disassembly/installation

Disassemble the following parts:

- Remove the C-type circlip and flat gasket [1];
- Take out the footpeg main pivot bolt [2];
- Remove the footpeg [3] and the left torsion spring [4];
- The left and right installation and disassembly are the same.

The installation sequence is reversed from the removal sequence.



※ **Side stand**

Disassembly/installation

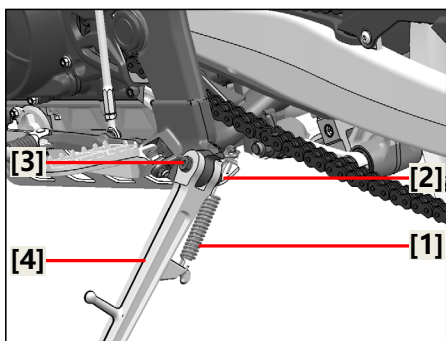
Disassemble the following parts:

- Remove the side stand torsion spring [1];
- Remove the bolt [2];
- Remove the special bolts [3] for side stand;
- Remove the side stand [4].

The installation sequence is reversed from the removal sequence.

Torque:

Side stand \mounting bolt
22 N·m (2.2 kgf·m, 16 lbf·ft)



※ Battery box

⚠ Warning

- Please disconnect the positive and negative connections of the battery before disassembly.

Disassembly/installation

Disassemble the following parts:

- Fuse box [1];
- Wire clip [2];
- Starting Relay [3];
- Screw [4];
- Battery box cover [5];
- Rubber pad, battery [6];
- 3 mounting screws [7];
- Remove the battery box [8].

The installation sequence is reversed from the removal sequence.

Notes

- When installing, correctly route the wiring harness and plugs.

Torque:

Battery box mounting bolt

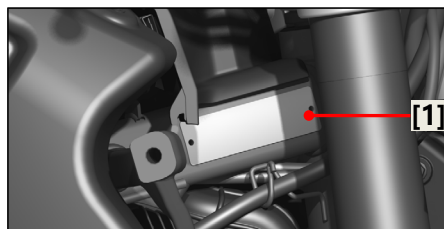
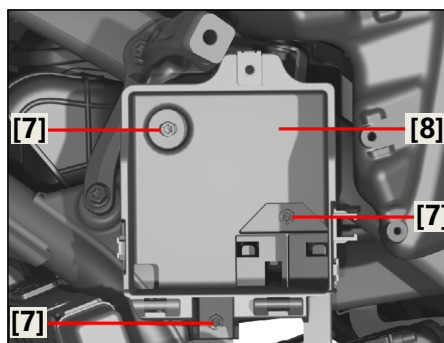
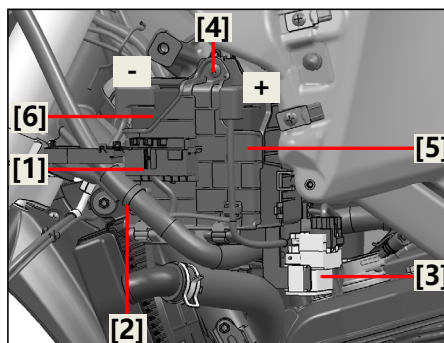
10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Battery box cover mounting bolt

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Battery terminal wiring screw

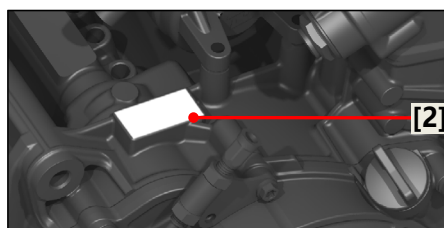
5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)



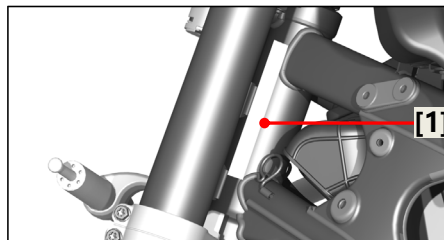
※ Vehicle nameplate, engine number and frame serial number

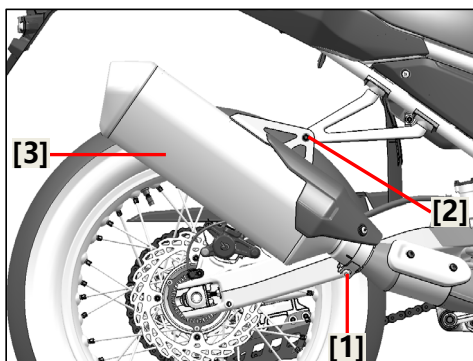
The vehicle nameplate [1] is riveting on the right side of the main frame beam.

The engine number [2] is printed on the right-hand crankcase.



When registering a motorcycle, the frame number and engine number need to be provided. These numbers are unique and used to identify your vehicle. (Tampering without informing is strictly prohibited.) They may also be required when ordering accessories. You can record this number in this manual. The VIN [3] is printed on the left side of the frame's head tube.





※ Exhaust pipe assembly

⚠ Warning

· Wait for the exhaust pipe to cool down before disassembly to avoid burns.

1. Exhaust tail section

Disassembly/installation

Disassemble the following parts:

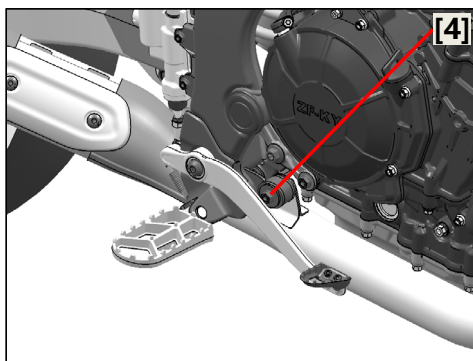
- Remove the pipe clamp locking bolt [1];
- Remove the screw at position [2];
- Remove the exhaust tail section [3].

2. Exhaust front section

Disassembly/installation

Disassemble the following parts:

- Disconnect the oxygen sensor harness connector;
- Remove the screw at position [4];
- Remove the connecting nut between muffler front section and engine exhaust port [5];
- Take out the exhaust front section [6].



3. Check:

- Exhaust sealing gasket
Exhaust leakage → Replace
- Exhaust pipe front tail section
Crack/damage → Replace.

The installation sequence is reversed from the removal sequence.

Torque:

Exhaust pipe front section and engine (nut)

18 N·m (1.8 kgf·m, 13 lbf·ft)

Exhaust pipe front section and frame

22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe rear section and exhaust pipe mounting bracket

Exhaust pipe mounting bracket and subframe

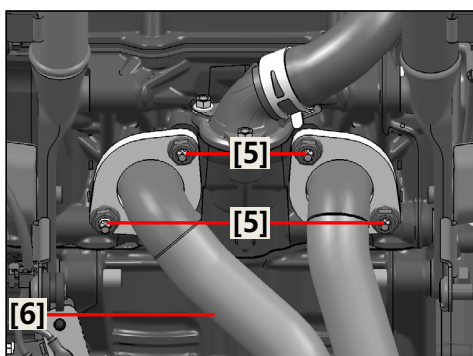
22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe clamp bolt

22 N·m (2.2 kgf·m, 16 lbf·ft)

Exhaust pipe shield mounting screws

10 N·m (1.0 kgf·m, 7.0 lbf·ft)



Electronic Fuel Injection (EFI) System

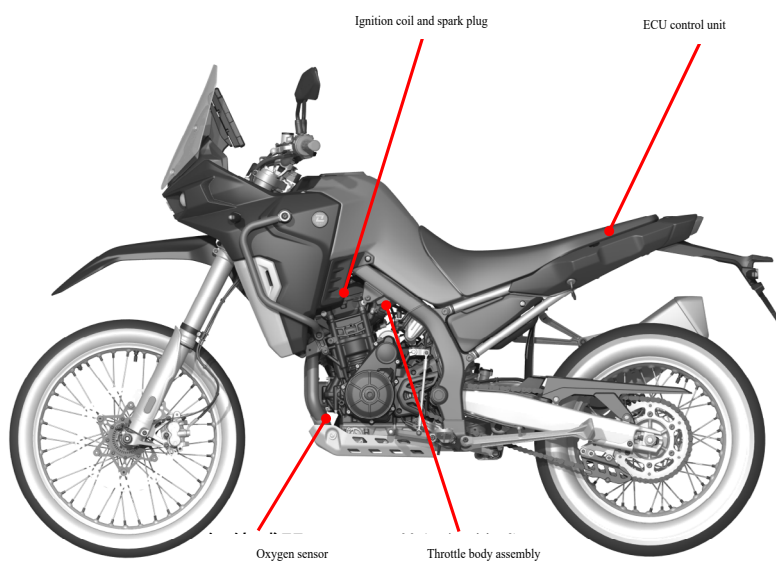
Section 1 Maintenance Instructions	78
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Maintenance Instructions

Overview:

- This section introduces UMC's MSE6.0 EFI system equipped with self-diagnostic capabilities. For troubleshooting, please check and rectify faults according to the diagnostic codes and symptoms.
- EFI system failures are usually caused by poor connector connection or terminal corrosion. Please check before troubleshooting.
- During maintenance, it is forbidden to disassemble the parts of EFI system.
- During maintenance, extreme care shall be exercised on work with electronic components (ECUs, sensors, etc.) to prevent missing. Furthermore, do not touch the pins of electrical components at will to avoid damage caused by electrostatic breakdown.
- Do not remove the connectors of any components of the EFI system from their installation positions without authorization, to avoid accidental damage or foreign matters such as water and oil entering the connectors, which may affect the normal operation of the EFI system.
- When disconnecting and connecting the connector, be sure to put the ignition switch in the off position, otherwise the electrical components will be damaged.
- Since idle speed adjustment is completely completed by EFI system, manual adjustment is not needed. The limit screw of the throttle body has been adjusted at the factory, and the user is not allowed to change its initial position at will.
- This vehicle uses 36-2 teeth trigger signal to identify the speed.

System Location



Introduction of System Troubleshooting

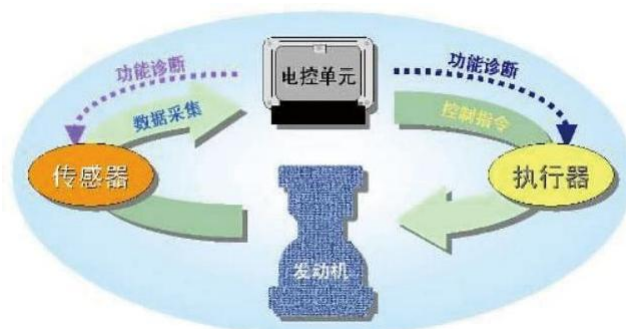
On-board diagnosis system (OBD system) refers to the diagnosis system integrated in the engine control system, which can monitor the components that affect exhaust emissions and the main functional states of the engine. It has the function of identifying and storing EFI faults. When repairing vehicles with OBD system, maintenance personnel can quickly and accurately locate the faulty parts through diagnostic instrument, which greatly improves the efficiency and quality of maintenance.

OBD technology involves many brand-new concepts. First of all, some basic knowledge related to OBD technology is introduced in order to facilitate understanding.

Fault information record

The ECU constantly monitors sensors, actuators, related circuits, fault indicators, battery voltages, etc., and even the ECU itself, and detects the reliability of sensor output signals, actuator drive signals and internal signals (such as closed-loop control, coolant temperature, idle speed control, etc.). Once any fault is identified, or any signal value exceeds the normal range, the electronic control unit immediately records the fault information in the fault memory of RAM. Fault information is stored in the form of fault code and displayed in the order of fault occurrence.

Faults can be divided into "current faults" and "historical faults" according to their occurrence time.



Schematic of Fault Diagnosis of EFI System

Description of fault lamp and its control strategy

Fault Indicator (malfunction indicator light, MIL): It is used to indicate the failure of emission-related components or systems. MIL lamps are generally an indicator lamp that can be displayed on the dashboard and shaped to meet the requirements of regulations and standards.

The activation of MIL lamp follows the following principles:

1) In normal mode, and the fault memory is empty

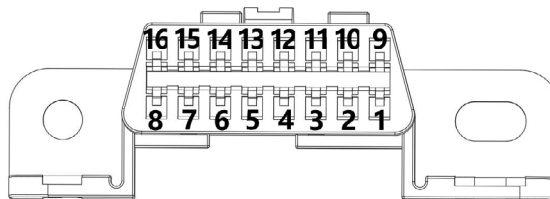
Turn on the ignition switch, turn on the stop switch, and the ECU will be initialized immediately. From initialization, the MIL lamp is on. The MIL lamp goes out immediately after the engine starts.

2) In normal mode, and the failed memory has failed

When the ignition switch is turned on and ECU is initialized, the MIL lamp remains on; If the fault manager requires the MIL to be illuminated in the fault mode, the MIL lamp is illuminated in the subsequent driving cycle; If the fault manager does not require the MIL to light up in fault mode, the MIL lamp goes out after startup.

Introduction of OBD Interface

The pins for connecting the engine management system (EMS) are pins 4, 6, 14 and 16 on the OBD diagnostic interface. Pin 4 of the standard diagnostic connector is connected to the battery negative terminal. Pins 6, 14 are connected to pins C1, D1 of ECU, that is, the "CAN" line of ECU. Pin 16 is connected to the battery positive terminal.



ISO9141-2 Standard Diagnostic Interface Pin Sequence Number

The diagnostic instrument can communicate with the ECU through the "CAN" line and can read the following information:

- **Version information display**

ECU hardware number, ECU software number.

- **Fault code display**

Intake pressure sensor, intake temperature sensor, engine temperature sensor, throttle position sensor, oxygen sensor, oxygen sensor heating circuit, air-fuel ratio correction, fuel injector, fuel pump relay, speed sensor, canister control valve, speed signal, idle speed, idle speed regulator, system voltage, ECU, fault lamp and other fault information.

- **Engine parameter display**

Battery voltage, engine speed, target idle speed, vehicle speed, engine temperature, engine temperature sensor signal voltage, intake air temperature, intake air temperature sensor signal voltage, intake air pressure, intake air volume, stepper motor target position, throttle position sensor signal voltage, throttle opening, relative throttle position, canister control valve duty cycle, charging time, fuel injection pulse width, ignition advance angle, oxygen sensor short-term correction, oxygen sensor voltage, oxygen sensor long-term correction, engine relative load, canister control relative fuel injection, canister purification rate, canister load, ambient pressure, altitude correction factor, fuel injection phase and other parameters.



Tool name:

Diagnostic instrument for EFI system:
(XCM-PT100X/PT300X)

Function:

This diagnostic instrument can perform data brushing, read fault and data flow, etc.

The diagnostic instrument kit includes diagnostic instrument, USB cable and OBD cable.



Tool name:

Adapter of EFI system

Function:

Check the electrical signal of each ECU pin, check the circuit condition, etc.



Tool name:

Ignition timing lamp

Function:

Check engine ignition timing, etc.



Tool name:

Digital multimeter

Function:

Check the characteristic parameters such as voltage, current and resistance in EFI system.

Tool name:

Vacuum meter

Function:

Check the pressure in the intake manifold.

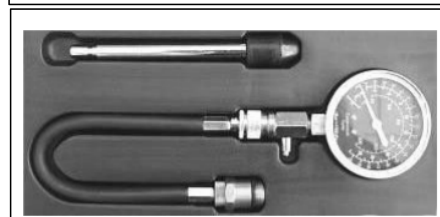


Tool name:

Cylinder pressure gauge

Function:

Check the cylinder pressure of each cylinder.

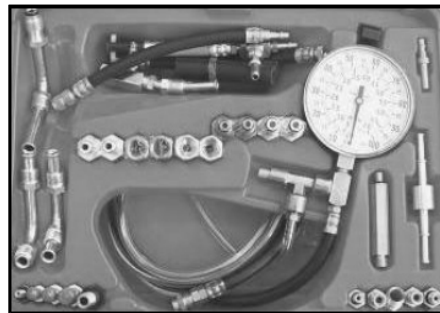


Tool name:

Fuel pressure gauge

Function:

Check the pressure of the fuel system for finding out the working conditions of the fuel pump and fuel pressure regulator in the fuel system.



Tool name:

Exhaust gas analyzer

Function:

Checking vehicle exhaust emission is helpful to troubleshooting of EFI system.



Tool name:

Fuel injector cleaning analyzer

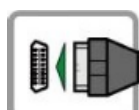
Function:

The fuel injector can be cleaned and analyzed.



Maintenance and Troubleshooting Process

Usage of diagnostic instrument



1. Connect the diagnostic instrument to the diagnostic interface.



2. Turn on the "ignition switch".



3. Read fault related information (fault code, frozen frame, etc.); read the maintenance manual to confirm the faulty parts and types; make the maintenance plan according to fault related information.



4. Troubleshooting.



5. Turn on the ignition switch again, start the vehicle to read the fault information, and confirm that the fault has been eliminated.

Preliminary check

Before starting the troubleshooting steps based on engine fault codes, a preliminary check shall be performed:

1. Confirm that the engine fault indicator lamp works normally;
2. Confirm the existence of the fault phenomena complained by the vehicle owner, and confirm the conditions under which the fault occurs. Then make a visual inspection:
 - Check whether there is leakage in the fuel pipeline;
 - Check whether the vacuum pipeline is broken, kinked and connected correctly;
 - Check whether the air intake pipeline is blocked, leaked, squashed or damaged;
 - Check whether the high-voltage wire of the ignition system is broken and aged, and whether the ignition sequence is correct;
 - Check whether the harness ground joint is clean and firm;
 - Check whether the sensors and actuator connectors are secured or in poor contact.

Important note: If the above phenomenon exists, the maintenance operation shall be carried out. If not, it will affect the subsequent fault diagnosis and maintenance work.

Troubleshoot according to Fault Codes

This Section introduces the meaning of fault codes used in MSE 7817 system, the corresponding diagnosis strategy, possible fault causes and fault treatment strategy, which can be used as a reference in the process of vehicle maintenance.

For details of the relevant ECU pins mentioned below, the actual harness diagram of the project may prevail.

Fault code: P0030 Oxygen sensor heating control circuit malfunction

Maintenance tips: The fault has been confirmed and may have the following problems 1) There is an open circuit between the circuit connected to the ECU pin and the upstream oxygen sensor pin 2. 2) Open circuit for upstream oxygen sensor pin 1 to main relay 3) Open circuit between pin 1 and pin 2 of upstream oxygen sensor	Maintenance tips: Check the followings 1) Measure the resistance of the line between ECU connector pin and upstream oxygen sensor pin 2 to assess its performance 2) Measure the resistance between the upstream oxygen sensor pin 1 and the main relay to assess its performance 3) Measure the resistance between pin 1 and pin 2 of the upstream oxygen sensor to assess its performance
---	--

Fault code: P0030 Oxygen sensor heating control circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) The circuit connected to the ECU pin is short-circuited to ground	Maintenance tips: Check the followings 1) Measure whether the ECU's resistance to ground pin is normal
--	---

Fault code: P0030 Oxygen sensor heating circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Short circuit between the circuit connected to the ECU pin and the upstream oxygen sensor pin 1 circuit. 2) Short circuit between the circuit connected to ECU pin and other power supply circuits.	Maintenance tips: Check the followings 1) Measure whether ECU voltage is normal. 2) Measure the resistance between the ECU pin and the upstream oxygen sensor pin 1 circuit. Measure whether the ECU's resistance to ground pin is normal
---	---

Fault code: P0131 Oxygen sensor signal voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) The signal circuit connected to the ECU pin is short-circuited to ground	Maintenance tips: Check the followings 1) Measure the resistance between the signal circuit connected to the ECU pin and ground
---	--

Fault code: P0132 Oxygen sensor signal voltage too high

Fault cause description: When the engine is started, the ECU measures the voltage of the oxygen sensor circuit. When the signal voltage remains > **1.5 V** for an extended period, it is determined that the oxygen sensor signal circuit is shorted to the power supply.

Maintenance tips: The fault has been confirmed and may have the following problems 1) Short circuit between signal circuit connected to ECU pin and oxygen sensor pin 1 2) Short circuit between signal circuit connected to ECU pin and other power supply circuit	Maintenance tips: Check the followings 1) Measure the resistance between the signal circuit connected to the ECU pin and the oxygen sensor pin 1 2) Measure the voltage of the signal circuit connected to the ECU pin
---	--

Fault code: P0134 Oxygen sensor signal circuit malfunction

Fault cause description: When the ECU measures the voltage of oxygen sensor circuit after the engine starts, and when the signal voltage always changes between **0.4 ~ 0.6** volts, it is assessed that the oxygen sensor signal circuit suffers open-circuit fault.

Maintenance tips: The fault has been confirmed and may have the following problems 1) Open circuit for oxygen sensor to ECU pin 2) Poor connection of oxygen sensor connector (pin oxidation)	Maintenance tips: Check the followings 1) Measure the resistance of ECU connector to oxygen sensor 4
---	---

1) Fault code: P0105 Intake pressure sensor signal malfunction

Maintenance tips: The fault has been confirmed and may have the following problems 1) ECU detects that the fluctuation amplitude of intake pressure is too small when the sensor signal is running normally; 2) Intake pressure sensor sampling port icing or blockage 3) Intake pressure sensor severely aging.	Maintenance tips: Check the followings 1) Severe intake system leakage; 2) The sampling port of the pressure sensor is mounted downstream of the throttle valve; 3) Reinstall after the ice inside the sensor has melted at room temperature 4) Replace the intake pressure sensor
--	--

Fault code: P0107 Intake pressure sensor circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) The ECU sensor signal circuit is shorted to ground	Maintenance tips: Check the followings 1) Resistance between ECU pin and ground
--	---

Fault code: P0108 Intake pressure sensor circuit voltage too high.

Maintenance tips: The fault has been confirmed and may have the following problems 1) ECU detects that the sensor signal circuit is short-circuited to the power supply	Maintenance tips: Check the followings 1) Voltage of ECU pin
---	--

Fault Code: P1098 Tilt sensor control circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) Sensor signal circuit connected to ECU pin is short-circuited to ground	Maintenance tips: Check the followings 1) Measure the resistance between the sensor signal circuit at the ECU pin and ground
---	--

Fault Code: P1099 Tilt sensor control circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Sensor signal circuit connected to ECU pin short circuit to ground	Maintenance tips: Check the followings 1) Measure whether the voltage of the sensor signal circuit of ECU pin is normal
--	---

Fault code: P0112 Intake temperature sensor signal voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) Sensor signal circuit connected to ECU pin is short-circuited to ground	Maintenance tips: Check the followings 1) Measure the resistance between the sensor signal circuit at the ECU pin and ground
---	--

1) Fault code: P0113 Intake air temperature sensor signal voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Sensor signal circuit connected to ECU pin short circuit to ground	Maintenance tips: Check the followings 1) Measure whether the voltage of the sensor signal circuit of ECU pin is normal
--	---

Fault code: P0117 Engine coolant temperature sensor signal voltage is too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) Fault code: P0122 Circuit connected to ECU pin short to ground	Maintenance tips: Check the followings 1) Measure the resistance between the ECU pin and ground
---	--

Fault code: P0118 Engine coolant temperature sensor signal voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Short circuit between circuit connected to ECU pin and other power supply circuit	Maintenance tips: Check the followings 1) Measure whether the voltage connected to the ECU pin is normal
--	---

Fault code: P0122 Throttle position sensor circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) Fault code: P0122 Circuit connected to ECU pin short to ground	Check the followings 1) Measure the resistance between the ECU pin and ground
---	---

Fault code: P0123 Throttle position sensor circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Short circuit between circuit connected to ECU pin and other power supply circuit	Maintenance tips: Check the followings 1) Measure whether the voltage connected to the ECU pin is normal
--	---

Fault code: P0322 No pulse signal from speed sensor

Fault cause: When the engine starts, ECU monitors the speed sensor signal and other signals as well. According to the rationality of the signal, the system assesses that the signal of the speed sensor is lost.

Maintenance tips: The fault has been confirmed and may have the following problems 1) Open circuit for speed sensor connected to ECU 2) The circuit of the speed sensor connected to the ECU is short-circuited 3) Open circuit of speed sensor coil	Maintenance tips:
---	--------------------------

Fault code: P0506 Idle speed lower than target idle speed

Fault cause description: The engine idle speed is controlled via a closed-loop system. If the ECU enters idle control mode for a certain period of time, but the actual engine speed remains below the target idle speed by a certain value, this condition is identified as a fault.

Maintenance tips: The fault has been confirmed and may have the following problems 1) The stepper motor is stuck at a smaller opening; 2) Check whether the throttle adjusting screw, accelerator cable, throttle operating condition, etc. are functioning properly. 3) The throttle body is too dirty.	Maintenance tips:
---	--------------------------

Fault code: P0507 Idle speed higher than target idle speed

Fault cause description: The engine idle speed is controlled via a closed-loop system. If the ECU enters idle control mode for a certain period of time, but the actual engine speed remains above the target idle speed by a certain value, this condition is identified as a fault.

Maintenance tips: The fault has been confirmed and may have the following problems 1) Check whether the throttle adjusting screw, accelerator cable, throttle operating condition, etc. are functioning properly. 2) The throttle body is too dirty. 3) The stepper motor is stuck at a larger opening; 4) Check whether the crankcase forced ventilation pipe is detached or leaking air	Maintenance tips:
---	--------------------------

Fault code: P0508 Stepper motor drive control circuit voltage too low

Fault code: P0509 Stepper motor drive control circuit voltage too high

Fault code: P0511 Stepper motor drive control circuit malfunction

Fault cause description: When the engine starts, the circuit control module in ECU continuously monitors the driving circuit voltage of the idle stepper motor. When any one of the four circuits has short circuit to ground/short circuit to power supply/open circuit, the system assesses that the stepper motor circuit has the fault.

Maintenance tips: The fault has been confirmed and may have the following problems 1) Any one of the drive circuits of the stepper motor connected to the ECU has short circuit to ground/short circuit to power supply/open circuit	Maintenance tips: Check the followings 1) Measure the resistance or voltage between each stepper motor drive circuit connected to ECU and ground
---	---

Fault code: P0627 Fuel pump relay control circuit malfunction

Fault code: P0628 Oil pump relay control circuit voltage too low

Fault code: P0629 Oil pump relay control circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) The circuit between the control circuit connected to ECU pump relay and pump relay is open/short to ground/short to power supply. 2) Open circuit between relay and main relay 3) Open circuit of electromagnetic coil of relay	Maintenance tips: Check the followings 1) Measure the resistance or voltage of the fuel pump relay control circuit connected to ECU 2) Resistance between relay and main relay 3) Resistance between relay pins
--	--

Fault Code: P0650 MIL lamp control circuit fault

Maintenance tips: The fault has been confirmed and may have the following problems 1) MIL lamp control circuit connected to ECU is open/short to ground/short to power supply. 2) Open circuit between MIL and main relay 3) MIL lamp burns out	Maintenance tips: Check the followings 1) Measure the resistance or voltage of the MIL lamp control circuit connected to the ECU
--	---

Fault code: P0201 Injector control circuit of cylinder 1 malfunction

Fault code: P0202 Injector control circuit of cylinder malfunction

Maintenance tips: The fault has been confirmed and may have the following problems 1) Check if the injector coil is open-circuited 2) Check if the connection between injector connector pin and ECU pin is secured 3) Check if the connection between injector connector pin and main relay is secured	Maintenance tips: Check the followings
--	---

Fault code: P0261 Cylinder 1 fuel injector control circuit voltage too low

Fault code: P0264 Cylinder 2 fuel injector control circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) Each drive circuit connected to the ECU pin is short-circuited to ground	Maintenance tips: Check the followings 1) Measure the resistance of the circuit connected to the ECU pin to ground
---	---

Fault code: P0262 Cylinder 1 fuel injector control circuit voltage too high

Fault code: P0265 Cylinder 2 fuel injector control circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) The circuit connected to the ECU pin is short-circuited to another power supply	Maintenance tips: Check the followings 1) Measure the voltage of the circuit connected to the ECU pin
--	--

Fault code: P0480 Fan relay control circuit open

Fault code: P0691 Fan relay control circuit voltage too low

Fault code: P0692 Fan relay control circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) The circuit between the fan relay control circuit connected to ECU and fan relay is open/short to ground/short to power supply. 2) Open circuit between relay and main relay 3) Open circuit of electromagnetic coil of relay	Maintenance tips: Check the followings 1) Measure the resistance or voltage of the fan relay control circuit connected to ECU 2) Resistance between relay and main relay 3) Resistance between relay pins
--	--

Fault code: P0444 Carbon canister control valve circuit malfunction

Maintenance tips: The fault has been confirmed and may have the following problems 1) Open circuit between the circuit connected to ECU and pin 2 of canister control valve. 2) Open circuit for pin 1 of canister control valve connected to main relay 3) Open circuit of solenoid between pin 1 and pin 2 of canister control valve	Maintenance tips:
---	--------------------------

Fault code: P0458 canister control valve circuit voltage too low

Maintenance tips: The fault has been confirmed and may have the following problems 1) The circuit connected to the ECU is short-circuited to ground.	Maintenance tips: Check the followings 1) Measure whether the resistance to ground connected to the ECU pin is normal.
--	--

Fault code: P0459 Canister control valve circuit voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) Open circuit between the circuit connected to ECU and pin 2 of canister control valve. 2) Short circuit between the circuit connected to ECU pin and other power supply circuits.	Maintenance tips: Check the followings 1) Measure whether the voltage of ECU pin is normal. 2) Measure the resistance between ECU pin and pin 1 circuit of canister control valve.
--	---

Fault code: P0562 System battery voltage too low

Fault code: P0563 System battery voltage too high

Maintenance tips: The fault has been confirmed and may have the following problems 1) The generator is damaged and unable to work well, or the battery is leaking 2) Open circuit of generator excitation circuit 3) The generator adjuster is damaged and unable to control the power generation, resulting in too high generation voltage.	Maintenance tips: Check the followings 1) Check the generating capacity of the generator (measure the generator voltage after starting)
--	---

Troubleshoot according to Fault Phenomena

This section introduces the meaning of current fault phenomena, corresponding diagnosis strategies, possible fault causes, and fault treatment strategies, which can be used as a reference in the process of vehicle maintenance.

(1) Start normally but idle at high speed.

Common fault locations: 1. Throttle body and idle bypass air passage; 2. Vacuum pipe; 3. Idle speed controller; 4. Engine temperature sensor; 5. Ignition timing.

General diagnostic process:

S/N	Operational procedures	Testing result	Subsequent procedures
1	Check whether the accelerator cable is stuck or overtightened.	Yes	Adjust
		No	Next step
2	Check the air intake system and the connected vacuum pipe for air leakage.	Yes	Maintain the air intake system
		No	Next step
3	Remove the idle speed controller and check the throttle body, idle speed controller and idle bypass air passage for carbon deposition.	Yes	Clean related parts
		No	Next step
4	Remove the engine temperature sensor connector, start the engine, and observe whether the engine is idling too high at this time.	Yes	Maintain the line or replace the sensor
		No	Next step
5	Check whether the mechanical ignition timing of the engine meets the specifications.	Yes	Next step
		No	Maintain the ignition timing
6	Connect the EFI system adapter, power on the ignition switch (ON), and check if the power supply to the L4# pin is normal; check if the ground connection of the J1# pin is normal.	Yes	Diagnostic help
		No	Maintain corresponding lines

(2) When accelerating, the engine speed does not increase or flames out during acceleration.

Common fault location: 1. water in fuel; 2. air intake pressure sensor and throttle position sensor; 3. spark plug; 4. throttle body and idle bypass air passage; 5. air intake duct; 6. idle speed controller; 7. fuel injector; 8. ignition timing; 9. exhaust pipe.

General diagnostic process:

S/N	Operational procedures	Testing result	Subsequent procedures
1	Check whether the air filter is clogged.	Yes	Maintain the air intake system
		No	Next step
2	Connect the fuel pressure gauge (the connection point is at the front end of the fuel injector inlet pipe), start the engine, and check that the fuel pressure is around 300 kPa at idle.	Yes	Next step
		No	Maintain the fuel supply system
3	Check the spark plug of the cylinder to see whether its model and clearance meet the specifications	Yes	Next step
		No	Adjust or replace
4	Remove the idle speed controller and check the throttle body, idle speed controller and idle bypass air passage for carbon deposition	Yes	Clean related parts
		No	Next step
5	Check whether the intake pressure sensor, throttle position sensor and their lines are normal	Yes	Next step
		No	Maintain the line or replace the sensor
6	Remove the fuel injector and check the fuel injector for leakage or blockage using a special fuel injector cleaning analyzer.	Yes	Replace it in case of failure
		No	Next step

S/N	Operational procedures	Testing result	Subsequent procedures
7	Check the fuel condition to see if the fault phenomenon happens just after refueling.	Yes	Change fuel
		No	Next step
8	Check whether the ignition sequence and ignition timing of the engine meet the specifications.	Yes	Next step
		No	Maintain the ignition timing
9	Check whether the exhaust pipe exhausts smoothly	Yes	Next step
		No	Repair or replace exhaust pipe
10	Connect the EFI system adapter, power on the ignition switch (ON), and check if the power supply to the L4# pin is normal; check if the ground connection of the J1# pin is normal.	Yes	Diagnostic help
		No	Maintain corresponding lines

(3) Slow response when accelerating.

Common fault location: 1. water in fuel; 2. air intake pressure sensor and throttle position sensor; 3. spark plug; 4. throttle body and idle bypass air passage; 5. air intake duct; 6. idle speed controller; 7. fuel injector; 8. ignition timing; 9. exhaust pipe.

General diagnostic process:

S/N	Operational procedures	Testing result	Subsequent procedures
1	Check whether the air filter is clogged.	Yes	Maintain the air intake system
		No	Next step
2	Connect the fuel pressure gauge (the connection point is at the front end of the fuel injector inlet pipe), start the engine, and check that the fuel pressure is around 330 kPa at idle.	Yes	Next step
		No	Maintain the fuel supply system
3	Check the spark plug of the cylinder to see whether its model and clearance meet the specifications.	Yes	Next step
		No	Adjust or replace
4	Remove the idle speed controller and check the throttle body, idle speed controller and idle bypass air passage for carbon deposition.	Yes	Adjust or replace
		No	Next step
5	Check whether the intake pressure sensor, throttle position sensor and their lines are normal	Yes	Next step
		No	Maintain the line or replace the sensor
6	Remove the fuel injector and check the fuel injector for leakage or blockage using a special fuel injector cleaning analyzer.	Yes	Replace it in case of failure
		No	Next step
7	Check the fuel condition to see if the fault phenomenon happens just after refueling	Yes	Change fuel
		No	Next step
8	Check whether the ignition sequence and ignition timing of the engine meet the specifications.	Yes	Next step
		No	Maintain the ignition timing
9	Check whether the exhaust pipe exhausts smoothly	Yes	Next step
		No	Repair or replace exhaust pipe
10	Connect the EFI system adapter, power on the ignition switch (ON), and check if the power supply to the L4# pin is normal; check if the ground connection of the J1# pin is normal.	Yes	Diagnostic help
		No	Maintain corresponding lines

(4) Weak acceleration and poor performance.

Common fault location: 1. Water in fuel; 2. Air intake pressure sensor and throttle position sensor; 3. Spark plug; 4. Ignition coil; 5. Throttle body and idle bypass air passage; 6. Air intake channel; 7. Idle speed controller; 8. Fuel injector; 9. Ignition timing; 10. Exhaust pipe. General diagnostic process:

S/N	Operational procedures	Testing result	Subsequent procedures
1	Check for clutch slippage, low tire pressure, brake drag, and incorrect tire size.	Yes	Repair
		No	Next step
2	Check whether the air filter is clogged.	Yes	Maintain the air intake system
		No	Next step
3	Connect the fuel pressure gauge (the connection point is at the front end of the fuel injector inlet pipe), start the engine, and check that the fuel pressure is around 330 kPa at idle.	Yes	Next step
		No	Maintain the fuel supply system
4	Remove the ignition high-voltage wire, connect a spark plug, and place the spark plug electrode about 5 mm from the engine body. Start the engine and check if the spark plug ignition intensity is normal.	Yes	Next step
		No	Maintain the ignition system
5	Check the spark plug of the cylinder to see whether its model and clearance meet the specifications.	Yes	Next step
		No	Adjust or replace
6	Remove the idle speed controller and check the throttle body, idle speed controller and idle bypass air passage for carbon deposition	Yes	Clean related parts
		No	Next step
7	Check whether the intake pressure sensor, throttle position sensor and their lines are normal.	Yes	Next step
		No	Maintain the line or replace the sensor
8	Remove the fuel injector and check the fuel injector for leakage or blockage using a special fuel injector cleaning analyzer.	Yes	Replace it in case of failure
		No	Next step
9	Check the fuel condition to see if the fault phenomenon happens just after refueling.	Yes	Change fuel
		No	Next step
10	Check whether the mechanical ignition timing of the engine meets the specifications.	Yes	Maintain the ignition timing
		No	Next step
11	Check whether the exhaust pipe exhausts smoothly	Yes	Next step
		No	Repair or replace exhaust pipe
12	Connect the EFI system adapter, power on the ignition switch (ON), and check if the power supply to the L4# pin is normal; check if the ground connection of the J1# pin is normal.	Yes	Diagnostic help
		No	Maintain corresponding lines

Appendix:

1) List of fault codes (PCODE)

S/N	Fault code	Description (UAES)
1	P0030	Oxygen sensor heating control circuit open (malfunction)
2	P0031	Oxygen sensor heating control circuit voltage too low
3	P0032	Oxygen sensor heating control circuit voltage too high
4	P0131	Oxygen sensor circuit voltage too low
5	P0132	Oxygen sensor circuit voltage too high
6	P0134	Oxygen sensor circuit signal malfunction
7	P0105	Intake pressure sensor voltage (signal) fault
8	P0107	Intake pressure sensor circuit voltage too low
9	P0108	Intake pressure sensor circuit voltage too high
10	P0112	Intake temperature sensor signal voltage too low

S/N	Fault code	Description (UAES)
11	P0113	Intake temperature sensor signal voltage too high
12	P0117	Engine coolant temperature sensor circuit voltage too low
13	P0118	Engine coolant temperature sensor circuit voltage too high
14	P0122	Throttle position sensor circuit voltage too low
15	P0123	Throttle position sensor circuit voltage too high
16	P0322	Speed sensor signal malfunction
17	P0506	Idle speed below target idle speed
18	P0507	Idle speed above target idle speed
19	P0508	Stepper motor drive control circuit voltage too low
20	P0509	Stepper motor drive control circuit voltage too high
21	P0511	Stepper motor drive control circuit malfunction
22	P0627	Oil pump relay control circuit malfunction
23	P0628	Oil pump relay control circuit voltage too low
24	P0629	Oil pump relay control circuit voltage too high.
25	P0650	MIL light control circuit malfunction/driver stage circuit fault
26	P0201	Malfunction for fuel injector control circuit of cylinder 1
27	P0261	Cylinder 1 fuel injector control circuit voltage too low
28	P0262	Cylinder 1 fuel injector control circuit voltage too high
29	P0202	Malfunction for fuel injector control circuit of cylinder 2
30	P0264	Cylinder 2 fuel injector control circuit voltage too low
31	P0265	Cylinder 2 fuel injector control circuit voltage too high
32	P0480	Fan relay control circuit open
33	P0691	Fan relay control circuit voltage too low
34	P0692	Fan relay control circuit voltage too high
35	P1098	Tilt sensor control circuit voltage too low
36	P1099	Tilt sensor control circuit voltage too high
37	P0444	Carbon canister solenoid valve control circuit malfunction
38	P0458	Carbon canister solenoid valve control circuit voltage too low
39	P0459	Carbon canister solenoid valve control circuit voltage too high
40	P0563	System battery voltage too high
41	P0562	System battery voltage too low

Fuel System

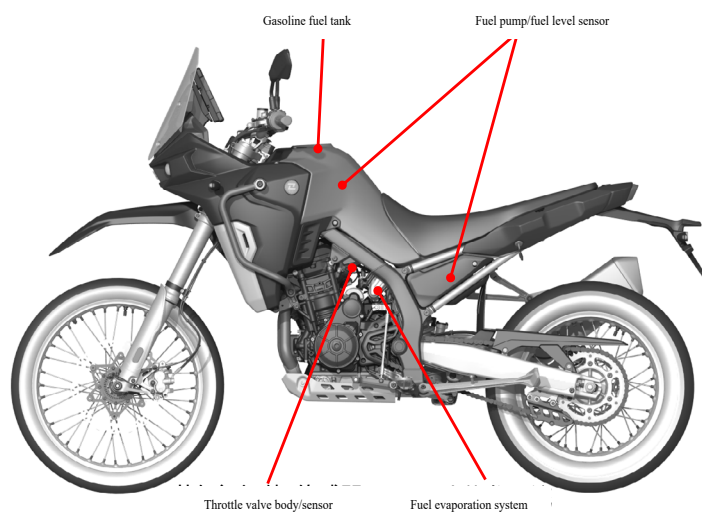
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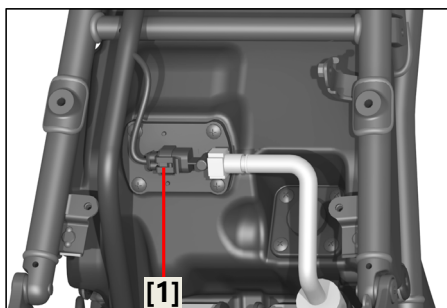
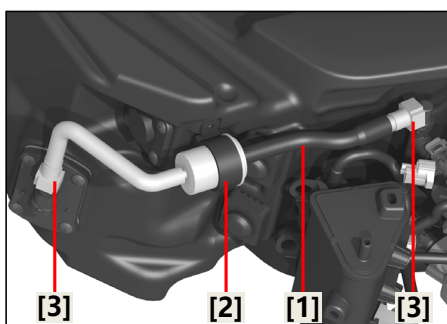
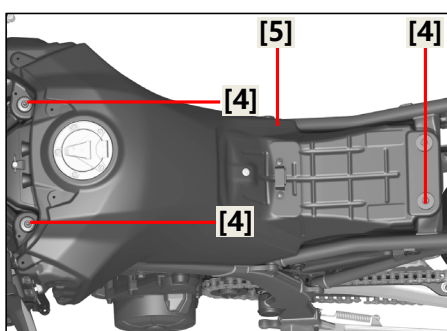
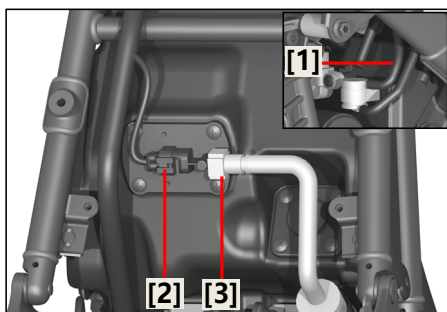
Maintenance Instructions

Overview:

- Bending or kinking the control cable can affect the operation and may cause the cable to bind or tangle, resulting in loss of vehicle control.
- Please work in a well-ventilated area. Smoking in a place where gasoline is stored can cause a fire or explosion.
- Release the fuel pressure in the system before disconnecting the fuel supply hose.
- Do not turn the throttle flap from fully open to fully close after removing the throttle, as this may cause erratic idle speed.
- Seal the intake port with tape or a clean cloth to prevent dirt and foreign matters from entering the engine after the throttle body is removed.
- Keep dust and debris out of the throttle bore and air passages after the throttle body is removed. Clean them using compressed air, if necessary.
- Do not loosen or tighten any nuts or screws on the throttle body painted with torque markers, as this may cause throttle valve and idle speed control malfunctions.
- Do not apply commercial carburetor detergent on the inside of the throttle bore.

Position of Components





※ Fuel tank assembly

1. Stand the vehicle on a flat surface.

Note

- Place the motorcycle on the appropriate bracket.
- Make sure the motorcycle stays upright.

2. Disassemble:

- Fuel tank overflow hose [1]
- Disconnect the fuel pump harness connector [2]
- Disconnect the fuel pump oil supply hose quick connector [3]
- Screw [4]
- Fuel tank assembly [5]

The installation sequence is reversed from the removal sequence.

Torque:

Fuel tank and frame (front and rear mounting points)

22 N·m (2.2 kgf·m, 16 lbf·ft)

2. Check the fuel pipeline

Notes

- Do not hang the fuel tank from the fuel supply hose.
- Cover the frame with a rag to prevent damage to the frame.
- If the quick connector and its surroundings are dirty, please clean them.
- Check the fuel hose [1] and the fuel filter and rubber grommet [2], quick connector [3] and single ear stepless clamp for looseness, damage or leakage.

Check if there are any of the following situations

Squeeze/loosen → Connect correctly.

Crack/damage/leak → Replace.

Note

- Do not use tools to remove or install the fuel supply hose, connectors, and fuel pipes to avoid damage.

※ Fuel pressure release

Notes

- Before disconnecting the fuel supply hose, release the system pressure as follows.

1. Disconnect the power supply harness connection plug [1] of the fuel pump unit.

2. Start the engine and let it idle until it stops to release the fuel pressure in the fuel supply hose.

※ Quick connector

Disassembly

Notes

- Clean around the quick connector before disconnecting the fuel supply hose, ensuring no dust enters the fuel system.

- Do not twist or bend the fuel supply hose which may result in a fuel leakage.

1. Release the fuel pressure;

2. Disconnect the battery negative (-) terminal bolt [1];

3. Place a cloth at the fuel line quick connector;

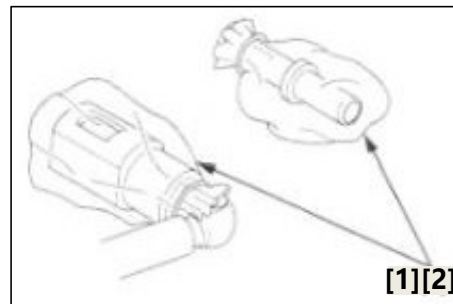
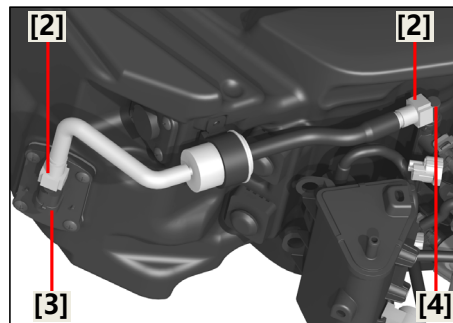
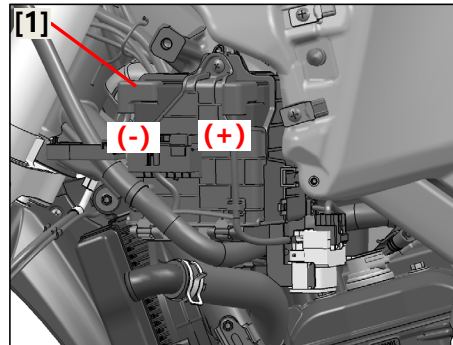
Press the release button [2] on the fuel connector and disconnect the quick connectors from the fuel pump unit connector [3] and the fuel injector connector [4].

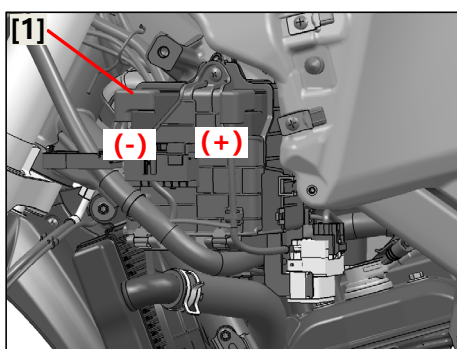
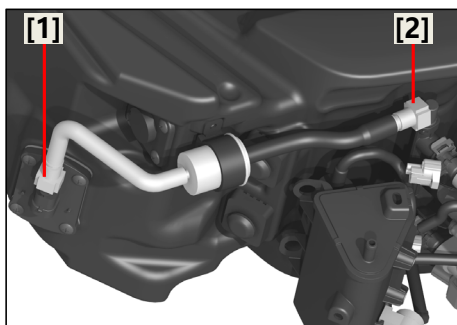
Note

- Drain the remaining fuel in the fuel supply hose into a suitable container and wipe off the spilled fuel immediately.

- Be careful not to damage the sliding collar and the hose.

- Cover the disconnected connector [1] and fuel connector end [2] with plastic bags to prevent damage and foreign materials from getting in.





※ Quick connector

Installation

1. Connect the quick connectors [1], [2] to the fuel pump unit connector and the injector connector, respectively, while holding the quick connector housing until a "click" sound is heard.

2. If it is not easy to connect, apply a small amount of machine oil to the fuel connector end, making sure the connection is secure and the quick connector is firmly locked in place; visually inspect and pull the connector housings [1], [2].

3. Connect the battery negative (-) cable [1] and tighten the battery terminal bolt to the specified torque.

Torque:

Battery terminal mounting bolts

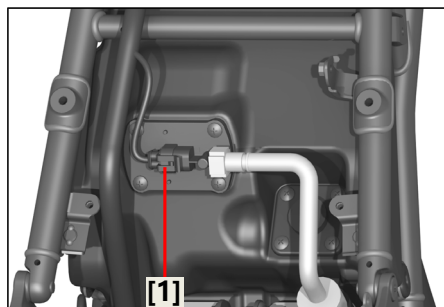
5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)

Notes

- Do not reuse kinked or damaged fuel supply hoses, as this could cause a fuel leak.

※ Fuel pressure addition

1. Connect the power supply harness plug 2P [1] of the fuel pump.
2. Temporarily place the fuel tank onto the frame.
3. With the throttle fully closed, pull the clutch lever all the way to the bottom and press the starter switch. The engine will start by increasing the fuel pressure;
4. Turn off the engine and check if there is any leakage in the fuel pipeline.

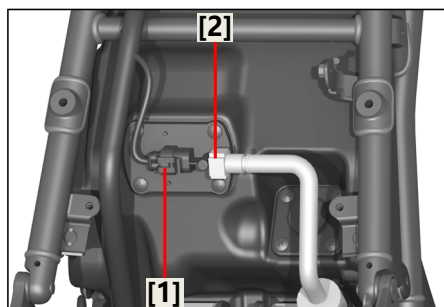


※ Fuel pump unit

Disassembly/installation

Disassemble the following parts:

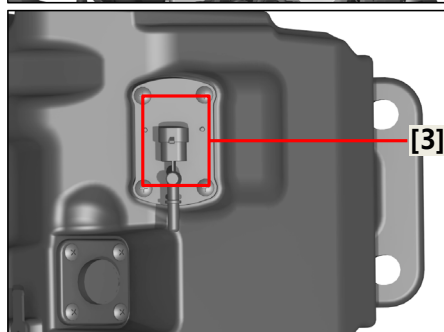
- Remove the fuel tank and clean the area around the fuel pump;
- Disconnect the oil pump power supply plug [1] and the fuel pipe quick connector [2];
- Remove the 4 mounting bolts [3];
- Carefully remove the fuel pump [4] and the rubber seal [5].



The installation sequence is reversed from the removal sequence.

Note:

- Be careful not to damage the fuel pump unit. Drain the remaining fuel from the fuel pump into a suitable container, immediately wipe away any spilled fuel, and replace with a new rubber seal.
- Clean the contact areas between the rubber seal seat and the fuel tank to ensure there is no foreign matter.

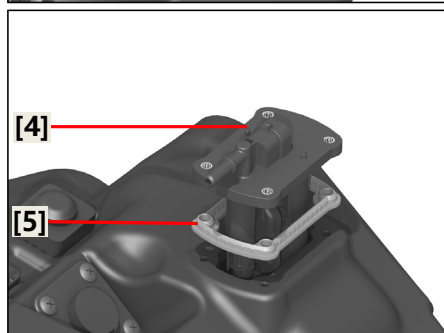


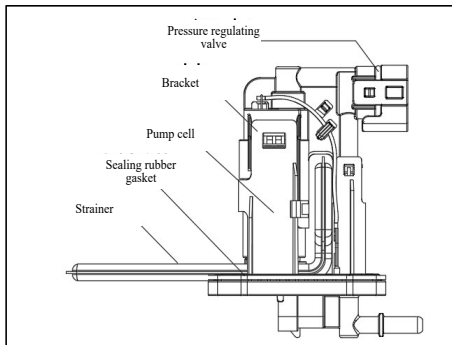
Tighten the 4 mounting nuts to the specified torque in the order as shown.

Torque:

Fuel pump mounting bolts:

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)





※ Fuel pump assembly

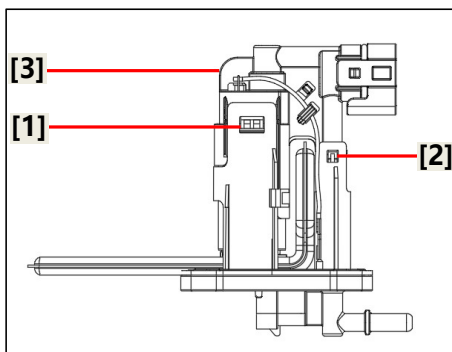
As shown in the left figure: Diagram of the fuel pump unit assembly.

1. Disassemble:

- Disassemble the clips [1], [2] on the left and right sides of the fuel pump bracket
- Pull out the fuel pump core and bracket [3];
- The strainer can be removed.

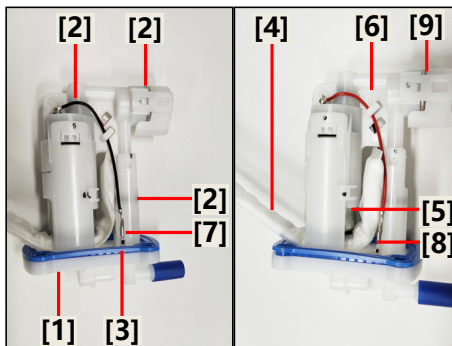
Notes

- Check if the fuel filter (strainer) is stuck, damaged, or aged, and replace if necessary.



Remove the fuel pump assembly as shown in the right figure.

- Fuel pump base [1]
- O-rings x3 [2]
- Rubber seal [3]
- Fuel filter (strainer) [4]
- Fuel pump core [5]
- Fuel pump unit bracket [6]
- Fuel pressure regulator [9]



The installation sequence is reversed from the removal sequence.

Notes

- Correctly lay the black wire [7] and red wire [8], aligning the rubber seal with the groove on the fuel pump base.

※ Installation

Apply a little amount of engine oil to the new rubber seal [1].

Install the following components:

- 4 M5×16 fuel pump mounting bolts.
- Ensure that the rubber seal [1] is placed in the groove of the fuel pump base [2].

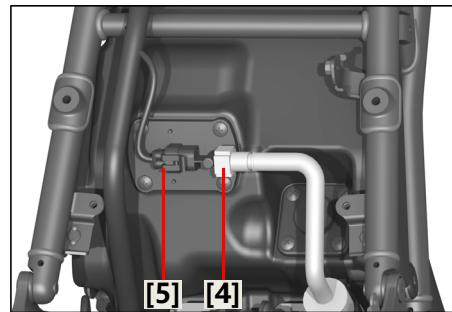
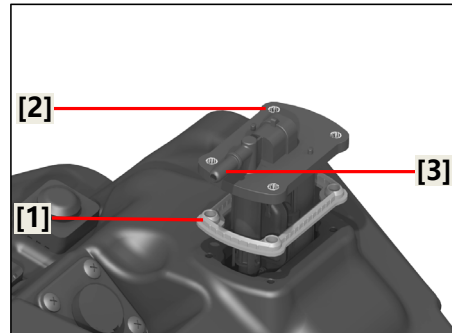
- Align the fuel pump plate groove with the lugs of the fuel pump unit. Install the fuel pump assembly so that the fuel connector [3] faces the left of the fuel tank. Be careful not to damage the fuel pump unit.

Tighten the mounting bolts of the fuel pump device to the specified torque in the cross order.

Torque:

Fuel pump mounting bolts:

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)



- Hold the fuel tank and connect the fuel quick connector [4] to the fuel tank outlet interface;

- Connect the power supply wire harness 2p connector [5] of the fuel pump unit

- Install the fuel tank onto the frame.

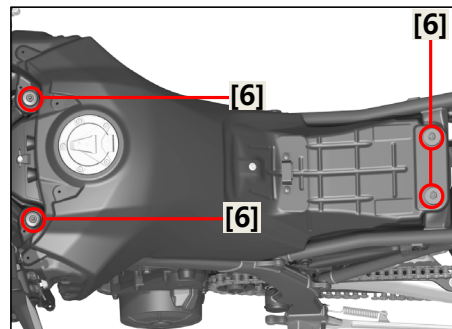
- Install the subframe.

- Install the front connecting bolt [6] of the fuel tank and the rear connecting bolt [6].

- Connect the fuel tank overflow hose [7] to the anti-roll valve.

Notes

- Be careful not to twist or bend the fuel supply hose.

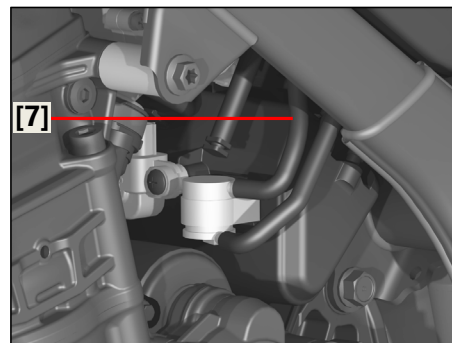


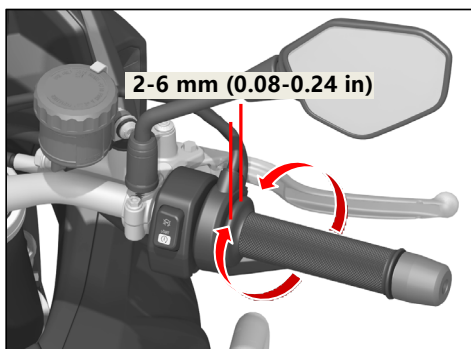
- Tighten the fuel tank mounting bolts to the specified torque.

Torque:

Fuel tank and frame (front and rear mounting points)

22 N·m (2.2 kgf·m, 16 lbf·ft)





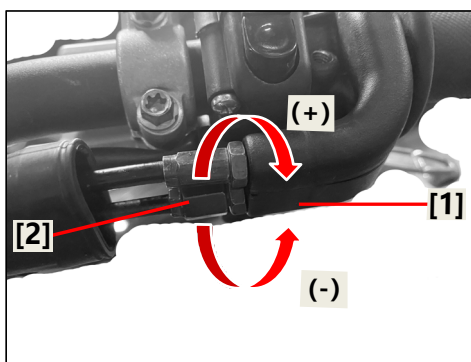
※ Accelerator free play

Check whether the throttle cable is aged, damaged or kinked. Turn the accelerator handle and check that the throttle opens smoothly and closes automatically in any steering position.

If the accelerator handle does not rotate well, check that the cables are wired correctly, the accelerator is clean and greased, and the accelerator drum rotates normally. If Ok, but the throttle does not rotate well, replace the accelerator cable (oil inlet and oil return).

Measure the free play at the accelerator handle flange.

Free play: 2-6mm (0.08-0.24 in)



1. Fine-tuning on accelerator cable

Loosen the locking nut [1] and turn the adjuster [2].

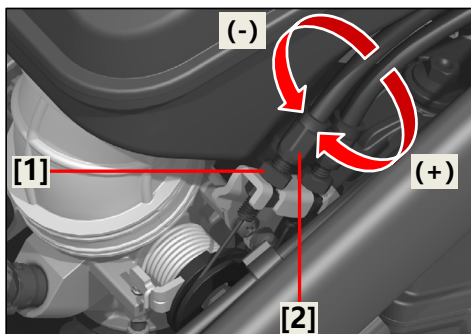
Turning the adjuster in the (-) direction will reduce the free play, and turning the adjuster in the (+) direction will increase the free play.

After adjustment, hold the adjuster and tighten the locking nut.

If the correct free play cannot be obtained despite turning the regulator to the end, turn it back in the (+) direction until it lightly touches the end, make one turn in the (-) direction, and then make more adjustments on the throttle side.

Nut [1] torque:

5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)



2. Adequately adjust on the throttle side

Loosen the accelerator cable adjuster lock nut [1] and turn the adjuster [2] in the (-) direction to reduce the free clearance and in the (+) direction to increase the free clearance.

After the adjustment, hold the adjuster and tighten the locking nut of the inlet accelerator cable adjuster to the specified torque.

Torque:

4.0 N·m (0.4 kgf·m, 3.0 lbf·ft)

(The oil inlet and oil return cables are subjected to the same adjustment)

Notes

• Re-check whether the accelerator rotates smoothly or not.

※ Air filter assembly

Disassemble the following parts:

- Remove the bolt at position [1] shown in Figure 1
- Remove the exhaust gas hose [2] shown in Figure 3
- Remove the intake pipe clamp screw [1] in Figure 4
- Then the air filter [2] in Figure 1 can be removed

The installation sequence is reversed from the removal sequence.

1. Check (Figure 1):

- Check if the nut on the air filter tank [1], [3] has looseness.

Loose → Tighten.

2. Check (Figure 2):

- According to the maintenance interval or whenever the air filter element [1] is dirty/damaged → Replace.
- Too dirty or damaged → Replace.

3. Check (Figure 3):

- Check if the intake hose [3] is intact
- Cracked/broken → Replace.
- Check if the exhaust gas hose [2] and secondary air supply hose [4] are intact
- Cracked/broken → Replace.
- Air filter tank drain pipe [1];
- Cracked/broken → Replace.

Clean the accumulated water in the drain pipe.

4. Check (Figure 4):

- Check if the pipe clamp installation position is correct
- Incorrect position → adjustment → correct installation.

The convex point [2] on the intake pipe must be aligned with the bore.

5. Check (Figure 5):

- Tighten the intake pipe clamp screw [1] with the stopper until it reaches the limit [2].

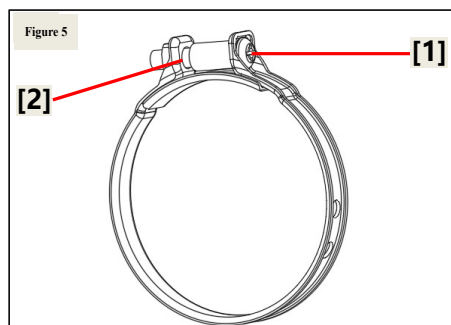
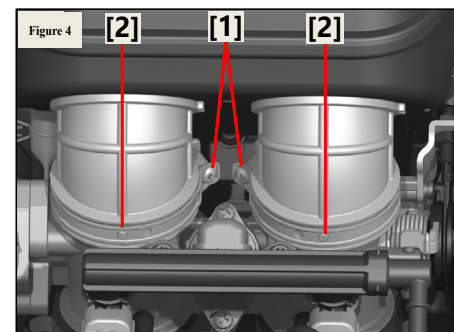
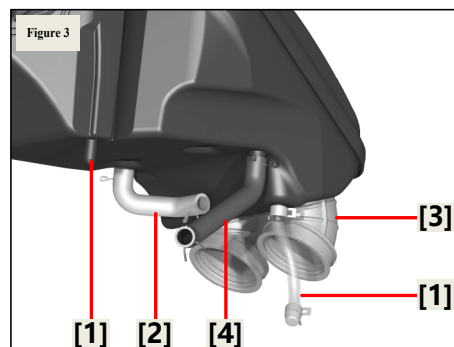
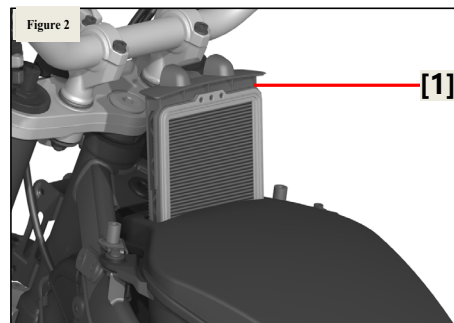
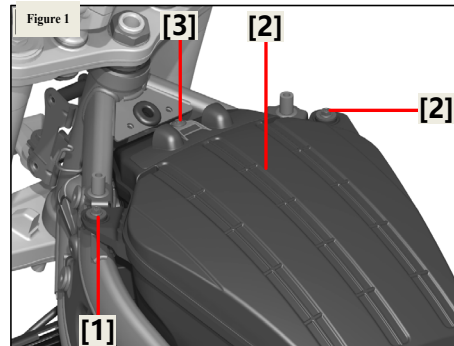
Torque:

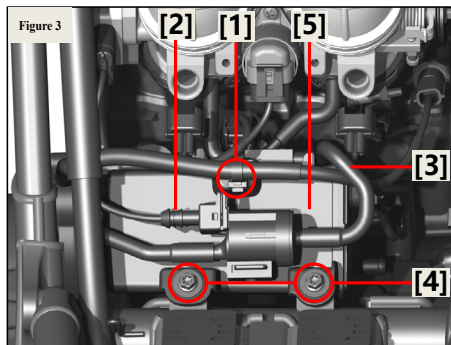
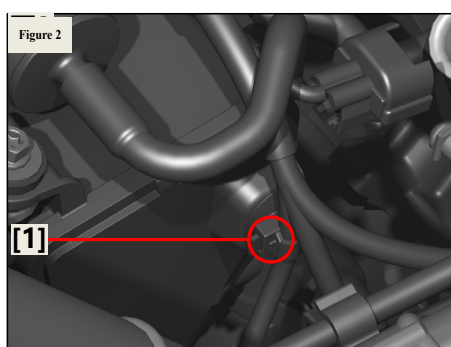
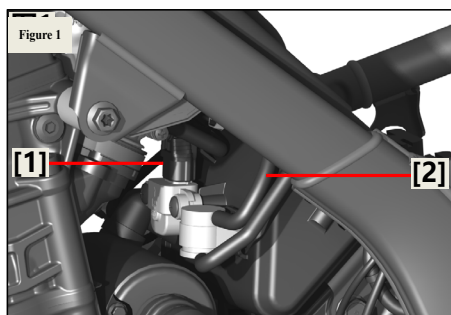
Air filter element bracket and air filter tank

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

Air filter tank and frame mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)





※ Fuel evaporation system

1. Disassemble:

- Remove the tilt sensor connection plug [1] shown in Figure 1
- Remove the hose [2] connecting the tipping valve to the fuel tank shown in Figure 2
- Remove the harness clamp [1] shown in Figure 2
- Remove the harness clamp [1] shown in Figure 3
- Remove the carbon canister solenoid valve plug [2] shown in Figure 3
- Remove the connecting pipe [3] between the throttle and the carbon canister solenoid valve shown in Figure 3
- Remove the evaporator box mounting bolt [4] shown in Figure 3
- Then the evaporator box [5] shown in Figure 3 can be removed

2. Check:

Check whether the connecting hose is intact.
Cracked/broken → Replace.

3. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Carbon canister and frame mounting point

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Tilt sensor mounting screw

3.0 N·m (0.3 kgf·m, 2.2 lbf·ft)

※ Throttle body assembly and intake pipe

Disassembly/installation

Disassemble the following parts:

- Remove the throttle-to-solenoid valve connecting hose [1] shown in Figure 1
- Remove the fuel injector connection plug [2] shown in Figure 1
- Disconnect the idle speed stepper motor connection plug [3] shown in Figure 1
- Remove the three-in-one sensor connection plug [4] shown in Figure 1
- Remove the throttle cable [1] shown in Figure 2
- Loosen the intake pipe clamp screw [1] shown in Figure 3
- Remove the throttle assembly [3] and intake pipe [4] shown in Figure 3

The installation sequence is reversed from the removal sequence.

Notes

- During installation, the bore of the intake pipe clamp should be aligned with the intake pipe boss [2].

Torque:

Accelerator cable A/B (throttle end)

4.0 N·m(0.4 kgf·m, 3.0 lbf.ft)

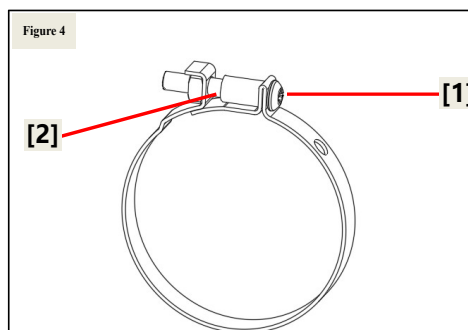
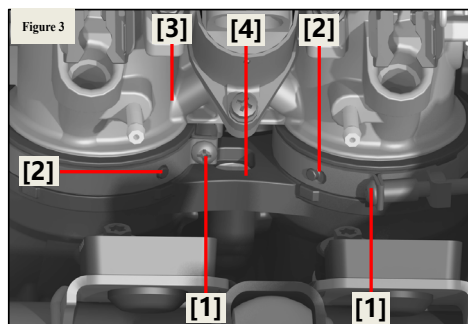
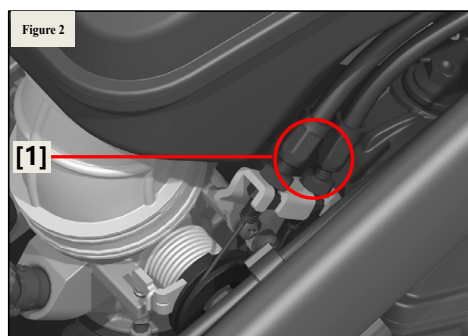
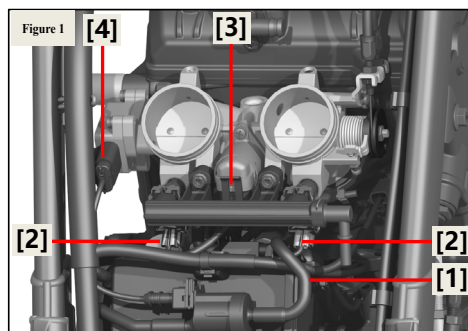
Inspection:

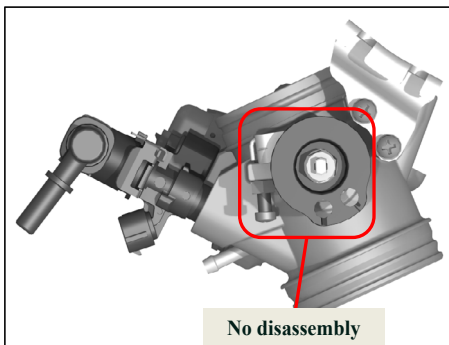
Check if the installation position of the hoop [6] is correct.

Incorrect position → adjustment → correct installation.

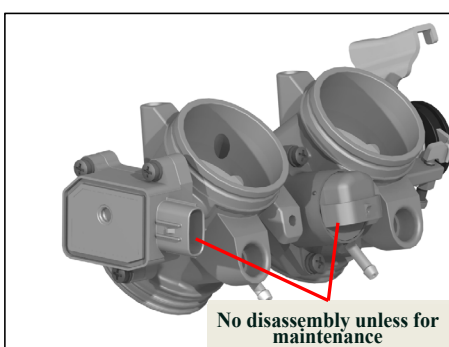
As shown in Figure 3: The convex point on the intake pipe [2] must be aligned with the pipe clamp bore.

As shown in Figure 4: Tighten the intake pipe clamp screw [1] to the stop position [2].





No disassembly



No disassembly unless for maintenance

※ Throttle Valve Body

⚠ Warning

- The throttle body is pre-assembled at the factory and must not be disassembled in any manner other than as specified in this manual.
- After removing the throttle cable, do not let the throttle from fully open to fully closed, as this may damage the throttle.
- Do not damage the throttle body; this may cause the throttle to malfunction.
- Do not loosen or tighten the nuts and screws marked with torque values, as loosening or tightening them may cause malfunctions of the throttle body.

Idle motor/three-in-one sensor

1. Disassembly: As shown in Figure 1

- 3 screws [1]
- Remove the three-in-one sensor unit [2]
- 2 screws [3]
- Idle motor valve body [4]

Clean the throttle body and the pipeline of the idle speed motor valve body with compressed air.

2. Check:

- Check if there is carbon deposition in the air passage of idle stepper motor in the throttle body.
- Check if the O-ring on the idle stepper motor/three-in-one sensor for deterioration or damage.

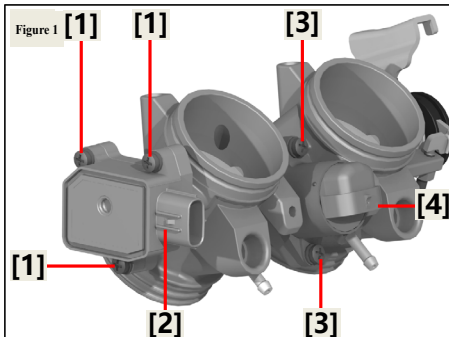


Figure 1

Notes

- Cleaning with a steel wool will damage the throttle body.

The installation sequence is reversed from the removal sequence.

Note

- Replace the rubber seal with a new one.
- Install each clamp on the intake pipe as shown in Figure 2, with the screw head facing to the right, and align the clamp bore with the intake pipe convex point [1].

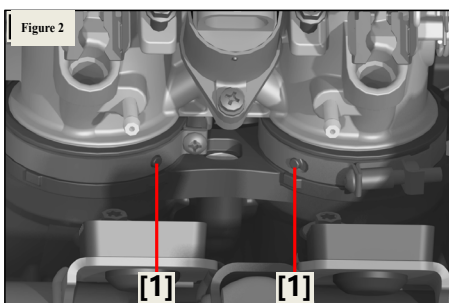


Figure 2

Torque:

Three-in-one sensor mounting screw

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

Idle motor valve body mounting screw

4.0 N·m (0.4 kgf·m, 3.0 lbf·ft)

Throttle cable remainer screw

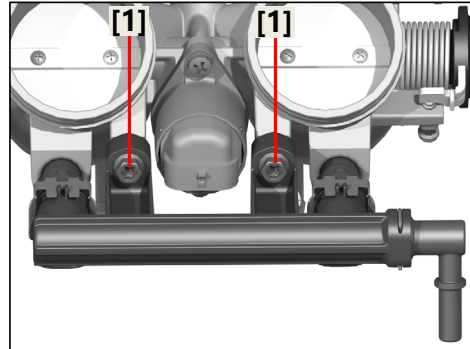
3.5 N·m (0.35 kgf·m, 2.6 lbf·ft)

※ Fuel Rail Assembly

Disassembly/installation

Disassemble the following parts:

- Remove the 2 screws [1]
- Remove the fuel rail assembly from the throttle assembly.



- Remove the fuel rail connector circlip [2]
- Remove the fuel rail connector [3]
- Remove the fuel rail connector seal ring [4]
- Remove the fuel injector rail [5]
- Remove the fuel injector clip [6]
- Remove the fuel injector [7]
- Remove the O-ring [8]

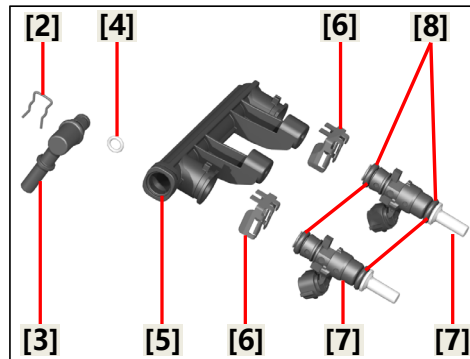
The installation sequence is reversed from the removal sequence.

Torque:

Fuel rail bracket mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Check each part for wear or damage and replace it if necessary.



Notes

- Apply engine oil when replacing new O-rings and seal rings
- Be careful not to damage the O-ring when installing the fuel injector.
- Align the fuel injector connector with the fuel connector and insert them.

Cooling System

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Maintenance Instructions

Overview:

Warning

- Do not remove the radiator cap before the engine and radiator have cooled down, to prevent the coolant from splashing and scalding people.

Notes

Using tap water will cause engine damage.

- Add coolant to the water reservoir. Do not disassemble the radiator cap except when adding or draining the coolant.
- It is not necessary to remove the engine from the frame when servicing the cooling system.
- Avoid spilling coolant on painted surfaces.
- Check the coolant temperature indicator/water temperature sensor.

Cooling System Specification

Item		Specification
Coolant capacity	Radiator (including water channel)	1.6 Litre
	Water reservoir (exceeding maximum level)	0.18 Litre
Radiator cap relief pressure		108.0-133 kPa
Thermostat	Opening start temperature	75°C
	Fully open temperature	87°C
	Valve lift	≥8mm

Troubleshooting

Engine temperature too high

- Coolant temperature indicator fault/water temperature sensor fault
- Thermostat valve not opened
- Radiator outlet
- Insufficient coolant
- Radiator passages, hoses, water pipes blocked
- Circulatory system intake
- Cooling fan motor malfunction
- Fan control relay failure
- Water pump failure

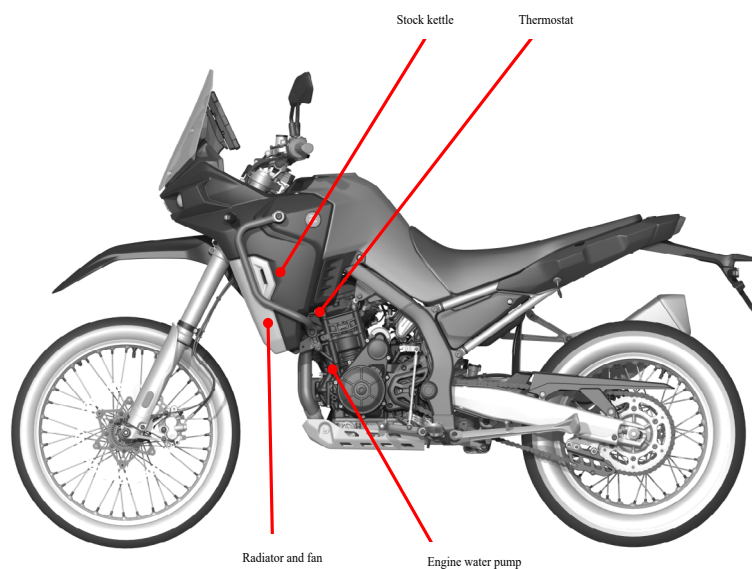
Engine temperature too low

- Coolant temperature indicator fault/water temperature sensor fault
- Thermostat valve opened
- Fan control relay failure

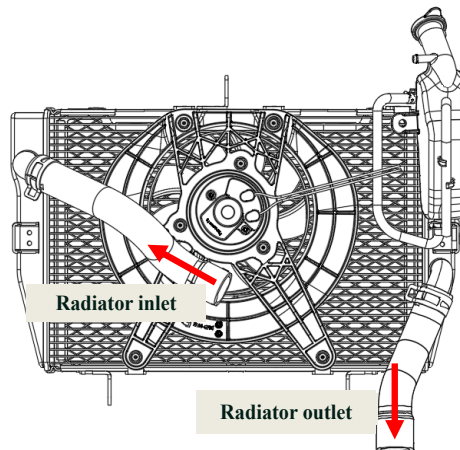
Coolant leakage

- Defects in water pump mechanical mechanism
- O-ring seal ring aged
- Radiator outlet
- Leakage or damage of cylinder head gasket
- Hose connections loosened or hose clamps not tightened
- Hoses damaged or aged
- Radiator damaged
- Thermostat cover and water pump cover pipe joints loose

Position of Components



System Process Mode



※ Cooling system test

Radiator cap/system pressure detection
- Remove the radiator cap [1].

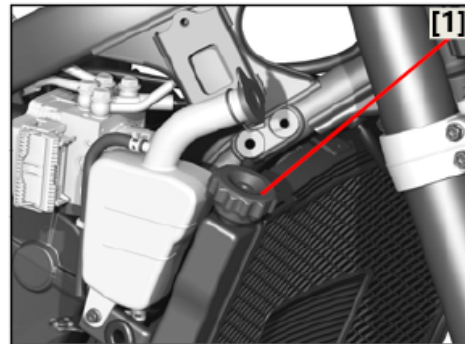
Install the radiator cap tester [1] and radiator cap tester adapter [2] to the radiator cap [3].

Pressurize the radiator cap with a tester.

If the radiator cap cannot maintain the pressure or the released pressure is too high or too low, replace the radiator cap.

The radiator cap must maintain the specified pressure for at least **6 seconds**.

Radiator cap release pressure: 108.0–130.0 kPa (standard 1.3 bar)

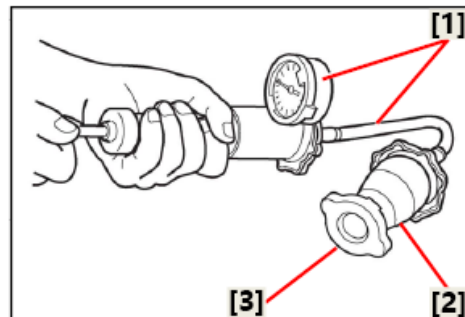


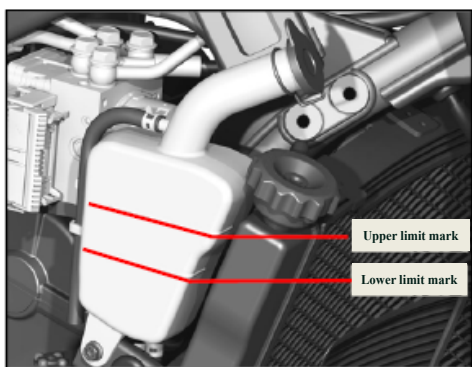
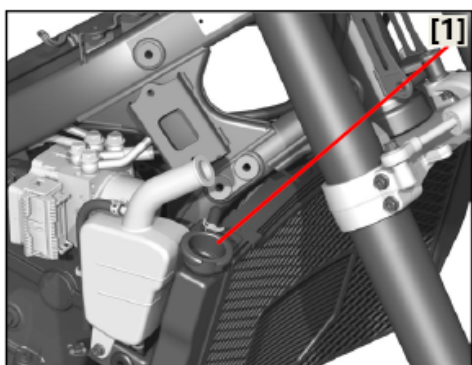
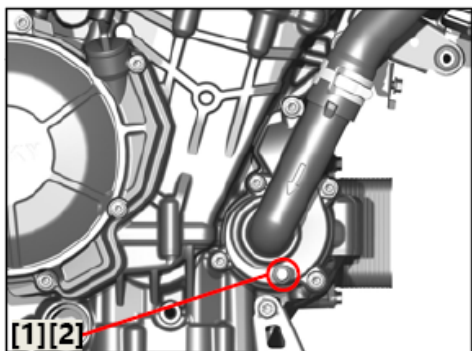
Connect the detector to the radiator.

Use the detector to pressurize the radiator, engine and hose to check their air tightness.

Notes

- This operation shall be conducted when the vehicle is in cold status.
- Excessive pressure will damage cooling system components. Do not exceed 130kPa.
- If the system cannot maintain the specified pressure for at least 6s, repair or replace the component.





※ Coolant replacement

1. Stand the vehicle on a flat surface.

Note

- Place the motorcycle on the appropriate bracket.
- Make sure the motorcycle stays upright.

⚠ Warning

• The pressure of the water radiator will rise. Therefore do not remove the water radiator cap when the engine is hot. Serious injury may occur when hot liquid and vapor are sprayed out. Wait for the engine to cool, then open the water radiator cap as follows:

- Cover the water radiator cap with a thick cloth such as a towel, rotate the cap slowly counterclockwise until it touches the groove, allowing residual pressure to release. Wait for the hissing sound to stop before pressing down on the water radiator cap and rotating it counterclockwise to remove it.

2. Disassemble:

- Remove water pump drain bolt [1] and flat gasket [2];
- Remove radiator cover [3] and drain coolant.

Torque:

Water pump drain bolt
10 N·m (1.0 kgf·m, 7.0 lbf·ft)

3. Add:

Using the water hole, fill the cooling system with the recommended coolant up to the neck [1].

Recommended antifreeze:

-40°C Ethylene glycol organic light-load engine antifreeze

Radiator (including all lines)

1.6 Litre

Coolant storage water reservoir (between upper and lower level marks)

0.18 Litre

⚠ Warning

- If coolant splashes on your eyes, please rinse your eyes thoroughly with clear water and seek medical advice.

Notes

- If water is used instead of coolant, check and correct the coolant concentration if necessary.
- Use distilled water only. In the absence of distilled water, soft water can be used as an alternative.
- Ensure not to mix different types of coolants.

4. Exhaust:

Exhaust air from the radiator system as follows:

1. Shift the engine into neutral, start it, and let it idle for 2-3 minutes.
2. Open and close the throttle for 3 or 4 times to remove the inside air completely.
3. Install the radiator cap.
4. Shut down the engine and, if necessary, fill the water reservoir between the upper and lower level marks.
5. Check the coolant for leaks.

※ Stock kettle

Disassembly/installation

Disassemble the following parts:

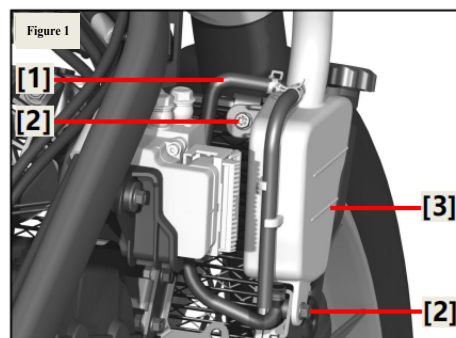
- Remove the siphon [1]
- Remove the 2 mounting screws [2]
- Remove the kettle [3]

The installation sequence is reversed from the removal sequence.

Torque:

Water reservoir mounting bolt

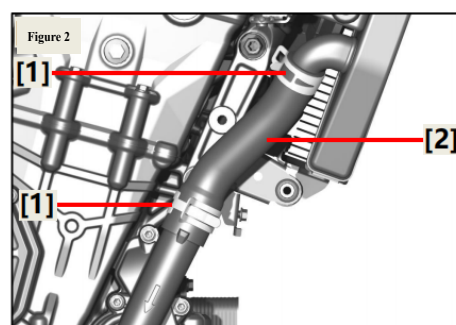
10 N·m (1.0 kgf·m, 7.0 lbf·ft)



Radiator inlet and outlet pipe

Note

Use special water pipe clamps and similar tools for disassembly and assembly.

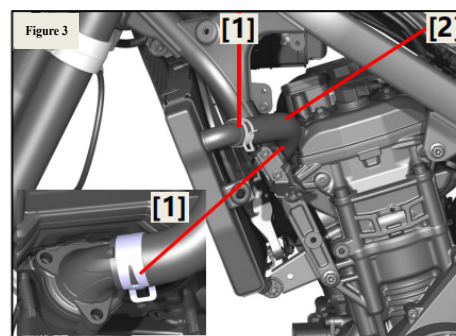


※ Engine inlet pipe

- Remove the inlet pipe clamp [1] on the right side of Figure 2
- Remove the radiator inlet pipe [2] on the right side of Figure 2

Engine outlet pipe

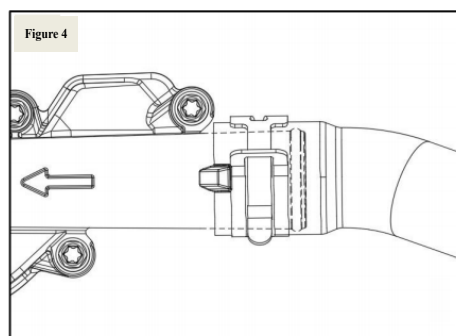
- Remove the radiator outlet pipe clamp [1] on the left side of Figure 3
- Remove the radiator outlet pipe [2] on the left side of Figure 3

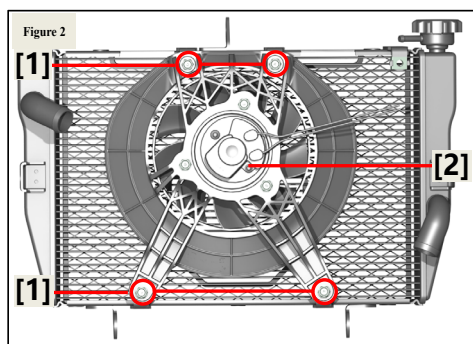
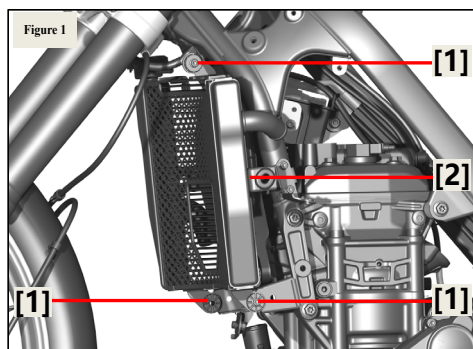


Notes

- Try to thoroughly drain antifreeze in the radiator and water channel in advance when the vehicle is in cold state.

As shown in Figure 4: Installation diagram of the water pump inlet pipe clamp.





※ Radiator and fan

Disassembly/installation

Disassemble the following parts:

- Remove the fan harness connector
- Remove the mounting screws [1] shown in Figure 1
- Remove the radiator assembly [2] shown in Figure 1
- Remove the fan mounting screws [1] shown in Figure 2
- Remove the fan [2] shown in Figure 2 [2]

Inspection of fan motor:

The battery voltage is 12V, the motor runs at full speed, and the ammeter current does not exceed 4A. If the motor does not rotate or the current exceeds the specified value, replace the fan motor.

The installation sequence is reversed from the removal sequence.

Torque:

Radiator fan and radiator

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)

Radiator and frame

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

※ Thermostat

Disassembly/installation

- Drain the coolant
- Remove the bolt [1] and the thermostat cover [2]

Remove the thermostat [3] from the cylinder head.
The installation sequence is reversed from the removal sequence.

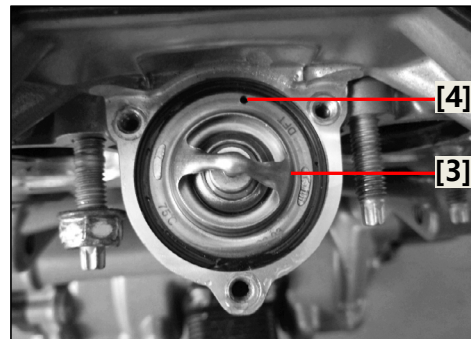
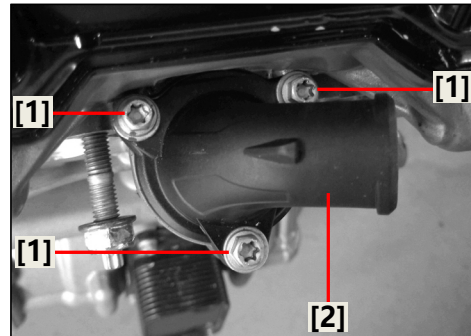
Torque:

Thermostat cover mounting bolt:

6.0 N·m (0.6 kgf·m, 4.0 lbf·ft)

Notes

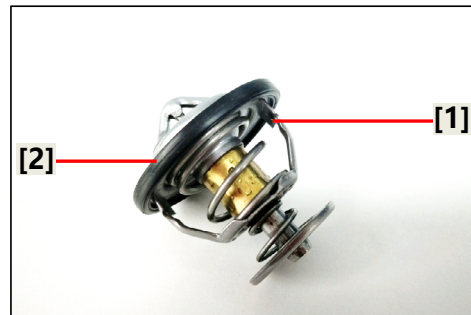
- When installing the thermostat, ensure the thermostat seal ring is properly installed and secured into the circular groove of the middle cylinder's water channel.
- The thermostat small circulation bore [4] must be placed upward, i.e., facing the intake direction.
- Coat thread locker to the bolts.



Thermostat Inspection

Check whether the exterior of the thermostat [1] is damaged.

If the thermostat valve is in an open state at room temperature, replace it. Check whether the sealing ring [2] is damaged, replace it if necessary.



Heat the water to the operating temperature with an induction cooker for 5 minutes.

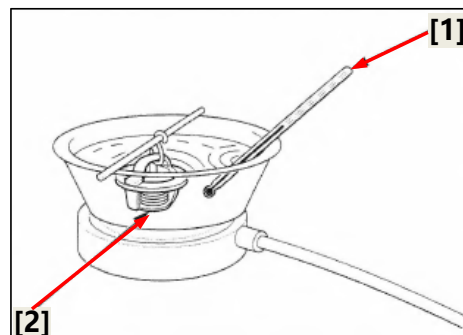
Suspend the thermostat [2] in hot water and check its operation.

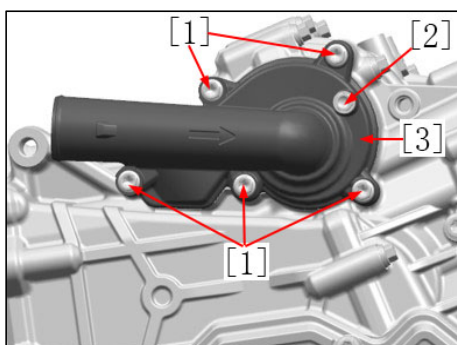
Thermostat start temperature: $75 \pm 2^{\circ}\text{C}$

Fully open temperature: $87 \pm 2^{\circ}\text{C}$

Valve lift: $\geq 8 \text{ mm}$

If the thermostat responds at a temperature other than specified, replace the thermostat.





※ Water pump impeller assembly

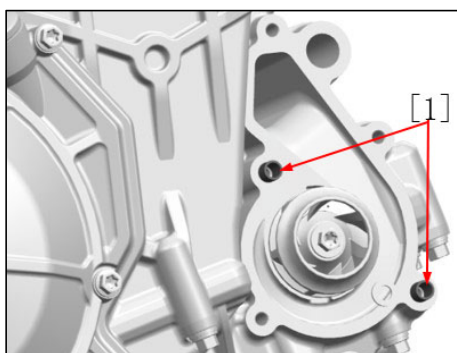
Disassembly/installation

Disassemble the following parts:

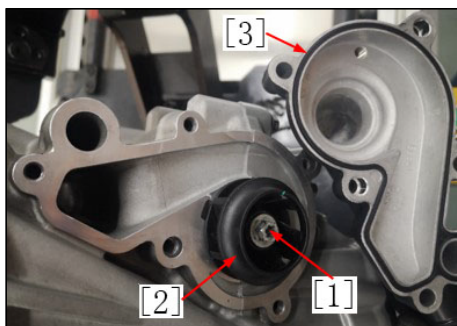
Remove the assembly bolts [1]

Drain bolt and washer [2]

Water pump cover [3]

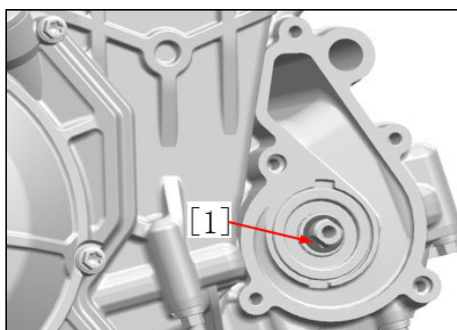


Remove the dowel pin



Remove the bolt [1] and check if the water pump impeller assembly [2] and water pump cover gasket [3] are deformed. If deformed, they need to be replaced.

Note that the drain bolt and washer must be replaced after disassembly.



Remove the washer [1]

The installation sequence is reversed from the removal sequence.

Notes

· Apply thread locker to the water pump impeller fastening bolts.

Torque: 10 N·m

Water pump cover bolt tightening torque: 10 N·m.

Engine

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Maintenance Instructions

1. Please use the parts, lubricating oils or other auxiliary materials produced by or approved and recommended by Xinchiyue Power Equipment Co., Ltd. If the materials used fail to meet the specifications or requirements, the motorcycle may be damaged.
2. Before maintenance, clean up the dirt and dusts on the car. Immersion of dust and dirt into the engine and the oil hydraulic system of the brake is prohibited.
3. When disassembling, it is required to sort out and keep the parts of each system separately, so that each part can be reassembled onto its original position.
4. Do not use the non-metric tools at the time of maintenance. Metric bolts, nuts and screws cannot be interchanged with inch fasteners.
5. When reassembling, replace the washer, O-ring, cotter pin and lock plate with new ones.
6. When the circlip is disassembled, if its opening is too large, it will deform and fall off easily after reassembly. Do not use the circlip that has been loose or inelastic.
7. When tightening the bolts or nuts, tighten the bolts with larger diameter or inside bolts, and then gradually tighten other bolts one by one to the specified torque value in diagonal order, unless a special order is specified.
8. Any part shall be cleaned before determination after disassembly for inspection, and the cleaning agent must be removed with compressed air. Apply lubricating oil to the moving surface before assembly.
9. During disassembly, check the necessary places and measure relevant data, so that the parts can be reassembled to their original position.
10. Check rubber parts for aging at the time of disassembly, and replace them in advance if necessary. In addition, as rubber parts are not resistant to the erosion of gasoline/kerosene, ensure that no volatile oils or greases are attached onto them as much as possible.
11. When installing the circlip, the chamfered side shall face the stress direction. Do not use the circlip that has been loose and inelastic. Upon assembly, turn the circlip to verify that it has been firmly installed in the slot.
12. When the ball bearing is purged with compressed air after it is cleaned, ensure the bearing race is not rotary. In case of failure to do this, its high-speed rotation speed will exceed the limit, potentially causing damage to the bearing. The bearing shall be applied with oil or grease before assembly.
13. When removing the press-in ball bearing, if the removal method of applying force on the ball is used, the removed bearing shall not be reused.
14. Since brake fluid and coolant will damage the coating surface, plastic parts and rubber parts, etc., such fluid and coolant shall not be attached onto these parts. In case of attachment, rinse with water immediately.
15. After reassembly, check the parts in each position for correct installation, proper operation, rotation and movement.

Auxiliary materials for engine operation and installation

Material	Specification and brand	Application position	Notes
Grease	Apply lithium grease No. 2.	Lip of oil seal, O-ring seal, sealing surface of other rubber sealing materials, sealed bearing	
Plane sealant	Loctite 5910	Joint surfaces of the case, the left and right crankcase covers, the water pump cover, and the semi-circular corners of the top cover gasket.	
Engine oil	SN10W/50 SN grade or higher	Rotating parts and sliding areas inside the cylinder Rotating and sliding areas inside the crankcase Rotating and sliding areas inside the cylinder head	New engine oil adding volume: 3.2L
Lubricating oil/ engine oil	SN 10W/50	Piston outer surface, piston pin bore, piston pin surface, entire piston ring surface, valve rod, valve oil seal, camshaft assembly, cylinder bore inner surface, idler mandrel, gear shaft, shift fork shaft working surface, connecting rod piston pin hole, each bearing rotation areas.	
Thread locker	Loctite 243	Some of threads	
Degreaser		All joint surfaces	
Coolant	-40°C Ethylene glycol organic light-load engine antifreeze	Cooling system, water seal installation	The capacity is determined according to the radiator water pipe system.

Bolt Torque Value

Standard Torque Value

Types of fasteners	Torque N·m	Types of fasteners	Torque N·m
5mm bolt and nut	5.2	5mm Screw	4.2
6mm bolt and nut	10	6mm Screw	9.0
8mm bolt and nut	22	6mm Flange Bolt and Nut	10
10mm bolt and nut	34	8mm Flange Bolt and Nut	27
12mm bolt and nut	54	10mm Flange Bolt and Nut	39

For areas not specified in the table, tighten to the standard torque.
Engine bolt and nut tightening torque

S/N	Item	Thread outer diameter	Torque value N·m	Whether the threads are sealed
1	Star wheel bolt	M6	10±2	Yes
2	Combination bolt for limit plate	M6	10±2	Yes
3	Shift shaft baffle	M6	10±2	Yes
4	Magneto bolt combination	M12	90±5	No
5	Spark plug	M10	12±2	No
6	Cylinder head fastening bolt	M10	See the following instructions	
7	Valve rockerarm shaft plug	M10	10±2	No

S/N	Item	Thread diameter	Torque value N·m	Whether the threads are sealed
8	Tensioner plug	M10	10±2	No
9	Tensioner base assembly	M24	25±2	No
10	Oil drain bolt	M20	20±2	No
11	Upper and lower case assembly bolt	M8	25±2	No
12	Upper and lower case assembly bolt	M6	12±1.2	No
13	Top dead center bolt	M8	20±2	No
14	Oil pump idler mounting bolt	M8	15±2	Yes
15	Counter shaft sprocket fastening special-shaped nut	M20	100±5	Yes
16	Clutch fastening hex nut	M20	90±5	Yes
17	Thermostat cover bolt	M5	6±1	Yes
18	Water pump impeller bolt	M6	10±2	Yes
19	Vent pipe connector bolt	M6	8±1.5	Yes
20	Oil-gas separation cover bolt	M6	12±1.2	Yes
21	Connecting rod bolt	M8	See the following instructions	
22	Magneto rotor bolt	M6	10±2	Yes
23	Tensioner bolt	M8	15±2	Yes
24	Transmission drum bearing baffle screw	M5	6±1	Yes
25	Oil separator screw	M5	3±0.3	Yes
26	Main shaft fixed bearing seat	M6	10±2	Yes
27	Intake seat screw	M6	10±2	Yes
28	Oil pressure sensor component	M10	10±2	No
29	Water temperature sensor component	M10	10±2	No
30	Gear sensor bolt	M5	6±1	No
31	Camshaft cover combination bolt	M6	See the following instructions	Yes
32	Magneto trigger bolt	M5	6±1	Yes
33	Engine oil fine filter cover bolt	M5	6±1	No
34	Chain pressure plate bolt	M6	10±2	Yes
35	One-way clutch assembly bolt	M6	10±2	Yes
36	Balance weight shaft limit screw	M5	6±1	Yes
37	Rockerarm positioning screw	M5	6±1	Yes
38	Adjusting bore cap	M24	10±2	No
39	Main shaft oil passage plug	M8	10±2	Yes
40	Fuel injector	M5	2±0.2	Yes
41	Exhaust through stud	M8	15±2	Yes
42	Remaining M6 bolts	M6	10±2	No

Bolt Tightening Methods for Key Parts

Connecting rod bolt

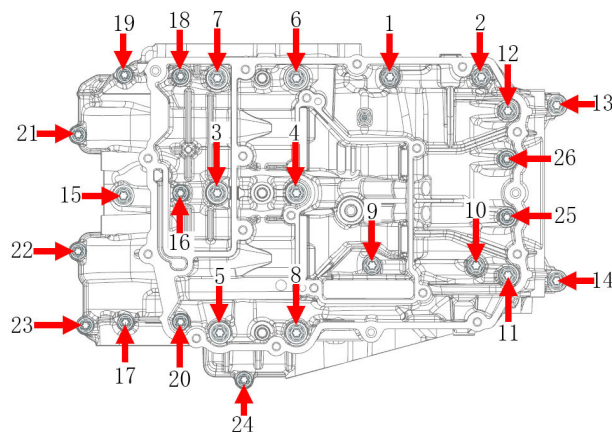
Lubricate the inner surface of the bearing liner with engine oil, ensuring there is no engine oil or grease on the connecting rod joint surface. Install the other part of the connecting rod onto the connecting rod body. First, coat the thread portion and supporting surface of the M8 connecting rod bolt with engine oil, then fasten it in sequence using a special tool for connecting rod bolts. The first stage is 5 N·m; the second stage is 15 N·m; and the third stage is 90°.

Note: The numerical markings on the sides of the connecting rod must be identical and clearly visible. After disassembling the connecting rod, new bolts need to be replaced. Do not twist the connecting rod during fastening.

Special tools: multi-tooth socket, angle gasket



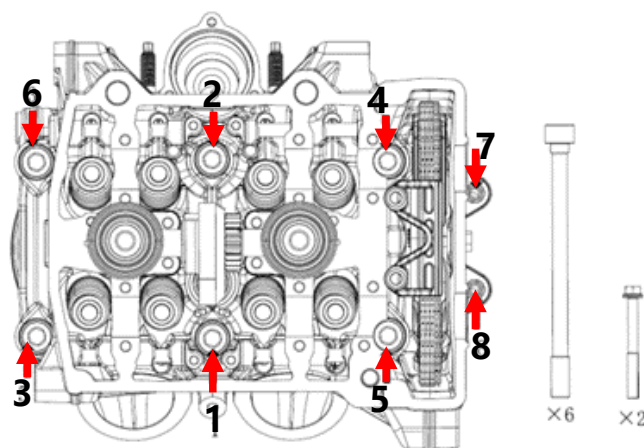
Crankcase bolt



The tightening steps are as follows (apply sealant to the joint surface, coat the supporting surfaces of all M8 bolts with a proper amount of engine oil, replace bolts 1–15 with new ones after disassembly, and replace new washers for bolts 3–8):

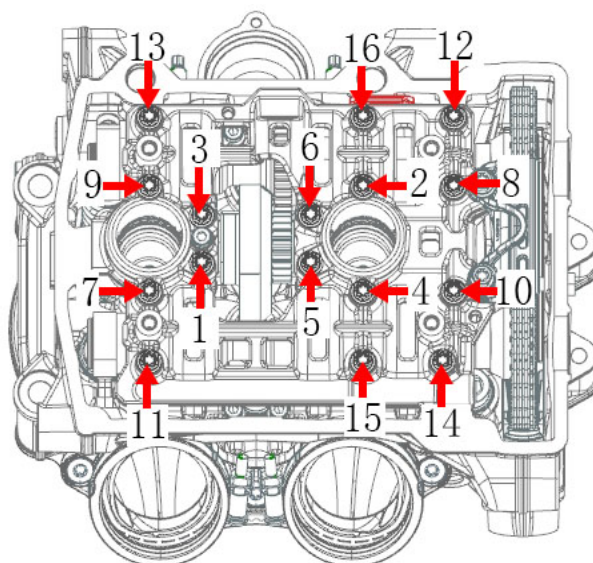
1. Tighten in the order of marks 1–15 as shown in the figure above; the bolt tightening torque is 25N·m;
2. Tighten in the order of marks 16–26 as shown in the figure above; the bolt tightening torque is N·m;

Cylinder head bolt



1. Apply engine oil to the threads and supporting surfaces of bolts 1–6, as well as both ends of the washers; after removing the cylinder head bolts and washers, new bolts and washers must be replaced.
2. Pre-tighten bolts 1–6 in the order shown in the figure above: Stage 1: 5N·m; Stage 2: 15N·m; Stage 3: 90°; Stage 4: 90°; and record the bolt torque values.
3. Tighten bolts 7–8 to 10N·m in the order shown in the figure above.

Camshaft gland bolt



1. Apply thread locker to the threads of all camshaft cover combination bolts.
2. Tighten bolts 1–16 to 10N·m in the order shown in the figure below.

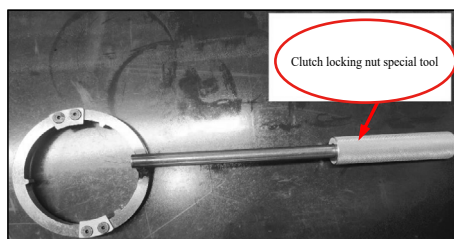
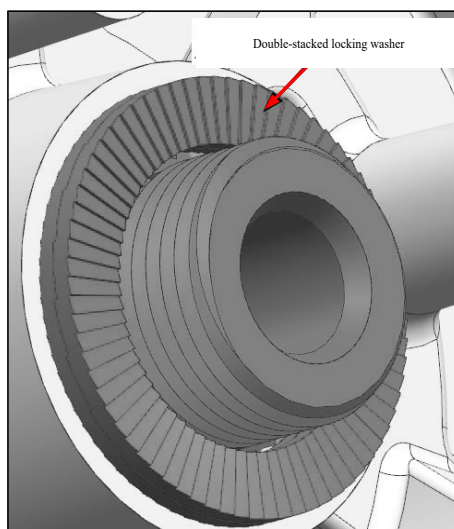
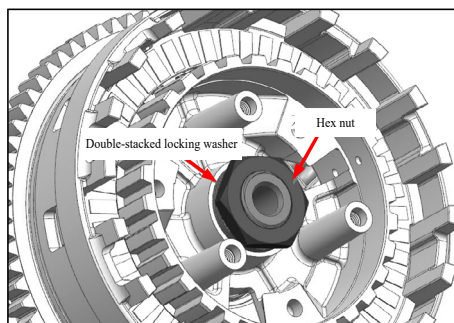
Clutch nut / Magneto bolt / One-way clutch bolt

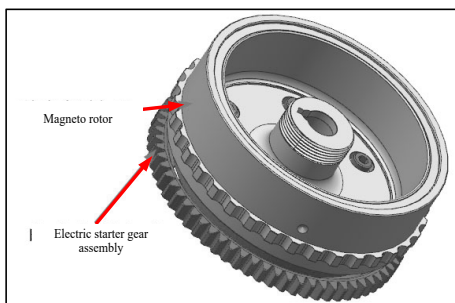
Clutch nut fastening methods:

1. After installing the clutch center bushing, mount two sets of clutch plates.
2. Install the double-stacked locking washer as shown in the right figure, and then screw the clutch nut until it touches the washer. Pay attention to the direction of the washer, otherwise the anti-loosening function will fail;
3. Install the special tool (anti-rotation wrench) into the clutch center bushing to fix the clutch center assembly. Note that the tool must be placed flat; otherwise, the clutch center bushing will be damaged;
4. Use a torque wrench with the special tool and tighten clockwise to the specified torque.

Notes

- Coat thread locker to the threads of the clutch fastening nut.
- Hex nut tightening torque: 90 N·m.

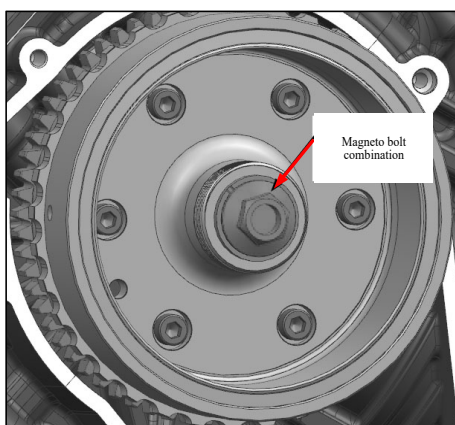
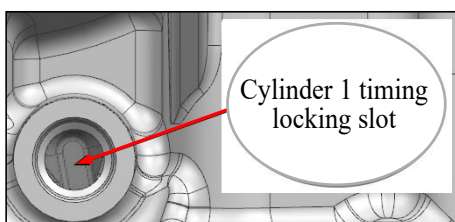
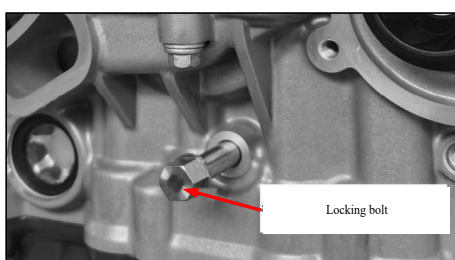




Magneto bolt fastening method:

1. Apply engine oil to the inner bore of the electric starter gear assembly for lubrication, then rotate the electric starter gear counterclockwise to install it on the magneto rotor;

2. Rotate the crankshaft to the TDC of cylinder 1, then use a special tool (locking bolt) to lock the crankshaft through the timing inspection positioning bore to prevent the crankshaft from rotating when tightening the magneto bolts.



3. Assemble the magneto rotor and the electric starter gear assembly onto the crankshaft and install them in place;

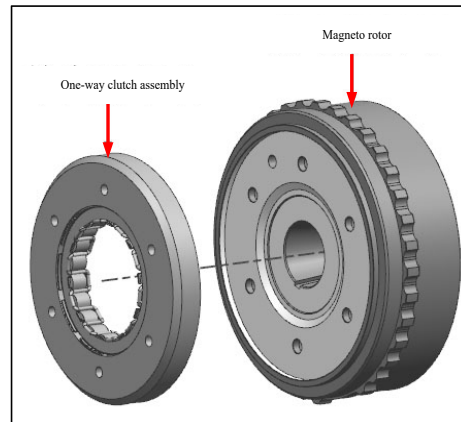
4. Lubricate the magneto bolt threads with engine oil and fasten the bolts to the specified torque using a torque wrench.

Bolt torque: 90 N·m.

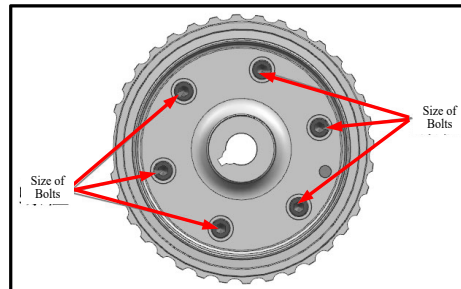
One-way clutch bolt fastening methods:

Apply clean engine oil to the contact surface of the one-way clutch assembly.

1. Install the one-way assembly onto the magneto rotor.



2. Secure the magneto rotor using the rotor fixing tooling, coat the thread locker to the threads of the one-way clutch fastening bolt, and then fasten it sequentially to 10 N·m.



Common Engine Faults

Fault phenomenon	Fault cause	Processing method
The engine cannot start or has difficulty starting	The cylinder pressure is too low. 1.Cylinder, piston and piston ring got wear 2.Leaky or damaged cylinder head gasket 3.Worn valve guide or improperly fitted valve seat 4.Loose spark plug 5.Starting motor rotating too slowly 6.Improper valve timing 7.Improper valve clearance adjustment	Replace Replace Replace Repair or replace Tighten and check the electrical part Adjust Adjust
	No ignition or weak ignition on spark plug 1.Incorrect spark plug gap 2.The spark plug is wet or dirty 3.Faulty ignition coil 4.Trigger circuit open or short 5.Magneto failure	Adjust or replace Clean, dry or replace Replace Replace Replace
	The throttle valve body lacks fuel 1.The fuel tank vent hole is blocked 2.Fuel injector blockage or malfunction 3.High-pressure fuel pump out of work 4.Low pressure of the high-pressure fuel pump 5.The filter screen of the high-pressure fuel pump is blocked	Clean or replace Clean or replace Check or replace Check or replace Clean or replace
The engine has no idle speed or the idle speed is unstable	1.Improper valve clearance adjustment 2.Poor sealing or damage of valve seat retainer 3.Defective valve guide 4.Worn rockerarm or rockerarm shaft 5.Dirty spark plug 6.Incorrect spark plug gap 7.Ignition coil fault 8.Idle valve inlet and exhaust pipe blockage 9.Magneto failure	Adjust Replace or repair Replace Replace Replace Replace or repair Replace
The engine exhaust emits blue or black smoke	1.Excessive lubricating oil 2.Piston ring wear 3.Valve guide wear 4.Cylinder wall wear or scratches 5.Valve rod wear 6.Valve rod seal damaged	Check the oil level and drain the excessive oil Replace Replace Replace Replace Replace
Unstable engine operation at medium and high speeds	1.The engine lacks power 2.Camshaft wear 3.Dirty spark plug 4.The spark plug gap is too small 5.Incorrect valve timing 6.Ignition coil fault 7.Insufficient oil supply pressure of the high-pressure fuel pump 8.The air filter is too dirty	Replace Replace Clean or replace Adjust or replace Adjust Replace Adjust or replace Clean or replace
The engine lacks power	1.Valve clearance too small 2.The engine lacks power 3.Incorrect valve timing 4.Cylinder wear 5.Piston ring wear 6.Improper valve seat 7.Dirty spark plug 8.Improper spark plug gap 9.The fuel injector nozzle is blocked 10.Insufficient oil supply pressure of the high-pressure fuel pump 11.The air filter is too dirty 12.The rockerarm or camshaft is worn 13.Air leakage in the intake pipe 14.Too much lubricating oil	Adjust Replace Adjust Replace Replace Replace or repair Clean or replace Clean or replace Clean or replace Adjust or replace Clean or replace Replace Replace Fasten or replace Check the fuel level and change the oil
Engine overheating	1.Excessive carbon deposits on the piston top or inside the combustion chamber 2.Too little or too much lubricating oil 3.Oil pump fault 4.Oil passage blockage 5.Air leakage in the intake pipe 6.Inappropriate lubricating oil 7.Cooling system fault	Clean Check and then add or reduce Replace Clean Fasten or replace Change the oil Repair
Abnormal noise of engine	Valve abnormal knocking 1.The valve clearance is too large 2.The valve spring is worn or broken 3.The rockerarm or camshaft is worn	Adjust Replace Replace
	Abnormal knocking in the piston section 1.Piston wear 2.Cylinder wear 3.Combustion chamber in combustion chamber 4.Wear of piston pin or piston pin hole 5.Wear of piston ring or ring groove	Replace Replace Clean Replace Replace
	Abnormal knocking from the timing chain section 1.Chain elongation or damage 2.Sprocket wear or damage 3.Tensioner assembly operation malfunction	Replace the chain and sprocket Replace the chain and sprocket Repair or replace
	Clutch abnormal knocking 1.Wear, excessive fitting clearance, or damage of the clutch gear and main drive gear 2.Aging and damage of the clutch buffer rubber 3.Wear, excessive fitting clearance, or damage of the main drive gear and clutch gear	Replace the clutch gear Replace the clutch gear Replace the main drive gear
	Crankshaft abnormal knocking 1.Bearing liner wear and damage 2.Crank pin bearing liner wear or sintering 3.Excessive fit clearance	Replace the bearing liner or crankshaft Replace the bearing liner or crankshaft Replace bearing liner
	Drive transmission system abnormal knocking 1.Gear wear or gear damage 2.Main shaft or counter shaft wear 3.Bearing wear 4.Bushing wear	Replace Replace Replace Replace
The clutch slips	1.The clutch driving piece is worn or damaged 2.The clutch driven piece is worn or damaged 3.The spring force of the clutch spring becomes weaker	Replace Replace Replace
No spark or spark too weak	1.Faulty igniter 2.Spark plug ablation 3.The spark plug gap is too small 4.The spark plug gap is too large or too small 5.Magneto fault 6.Insufficient voltage or invalidation of battery 7.Faulty ignition coil 8.Faulty ignition coil 9.The trigger plug gap is too small 10.Other pipeline faults	Replace Replace Adjust Clean Replace Charge or replace Replace Replace Adjust Inspection

Valve Train System

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Section 3 Camshaft/Cylinder Head Cover Inspection and Installation	139
Section 4 Disassemble The Cylinder Head.....	145
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Crank Connecting Rod Mechanism

Item		Standard value		Maintenance limit value
Electric starting cylinder pressure		14.5-17.5 bar/360-460 rpm		/
Valve clearance	Intake valve	0.10-0.15		/
	Exhaust valve	0.15-0.20		/
Rockerarm and shaft	Rockerarm bore diameter	7.505-7.518		/
	Rockerarm shaft diameter	7.486-7.495		/
Camshaft	Cam protrusion height	Intake	21.26-21.32	21.16
		Exhaust	21.27-21.33	21.17
	Clearance between journal and bracket		0.02-0.06	/
	Runout		0.04	0.05
Valve Valve guide	Valve rod diameter	Intake	4.976-4.99	4.946
		Exhaust	4.956-4.97	4.926
	Inner diameter of valve guide	Intake/exhaust	5.004-5.016	5.046
	Clearance between valve rod and valve guide	Intake	0.014-0.04	0.08
		Exhaust	0.034-0.06	0.10
	Valve seat width	Intake/exhaust	0.95-1.05	/
Free length of valve spring		Intake/exhaust	43.9	41.9
Installation length of valve spring		Intake/exhaust	35	/
Flatness of cylinder head		0.03		0.05

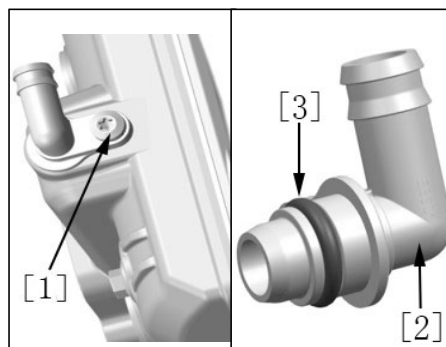
Disassembly of cylinder head cover/camshaft assembly

Ignition coil/cylinder head cover

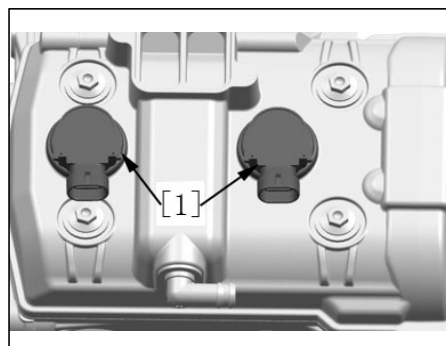
1. Remove the bolt [1], vent pipe connector [2], O-ring [3], and bushing. The installation sequence is reversed from the removal sequence.

Notes

- Apply thread locker to the bolt threads.
 - If the O-ring is damaged, inelastic or deformed, it needs to be replaced with a new O-ring.
- Bolt torque: 8N·m.



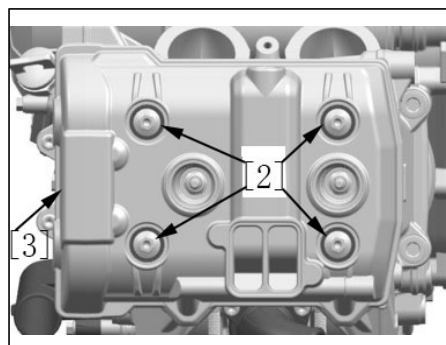
2. Remove the ignition coil [1]

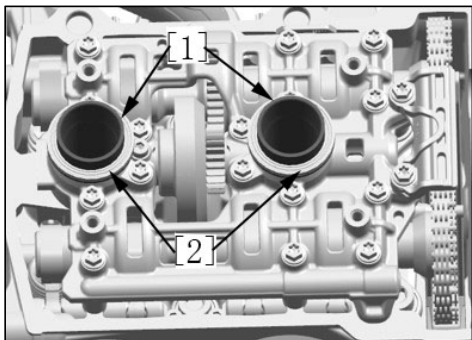


3. Remove the cylinder head cover bolt [2] and rubber gasket. Remove the cylinder head cover [3] and the gasket from the cylinder head. The installation sequence is reversed from the removal sequence.

Cylinder head cover bolt: 10 N·m.

Note: Clean the cylinder head cover and remove oil during installation.



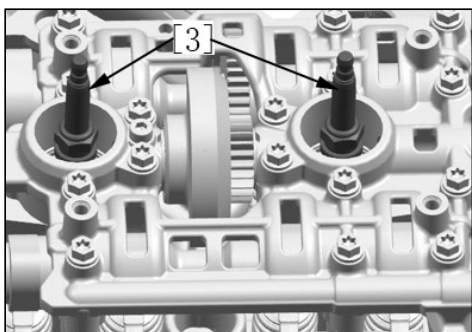


4. Remove the spark plug shaft sleeve [1] and the washer [2].

Notes

- When reinstalling, it is necessary to replace the spark plug shaft sleeve washer with a new one;
- The spark plug shaft sleeve must not be damaged; replace if necessary.

The installation sequence is reversed from the removal sequence.



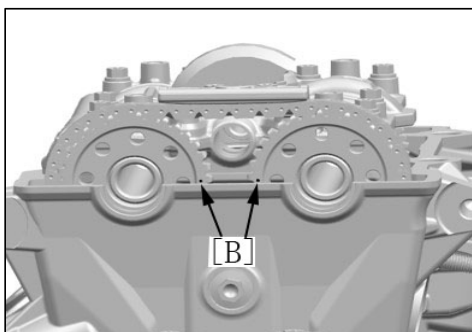
5. Use a special tool (spark plug socket) to remove the spark plug [3].

Notes

- Clean the area around the spark plug base with an air gun before removing the spark plug.
- Check the spark plug for any malfunction (see page 24 for details). If any are found, replace the spark plug with a new one.

The installation sequence is reversed from the removal sequence.

Torque: 12 N·m



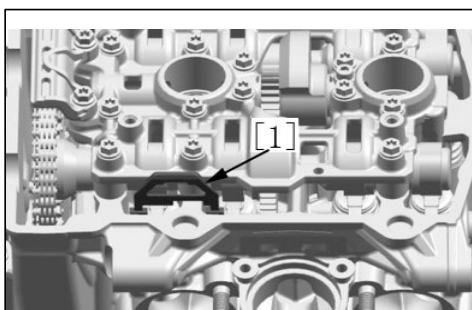
Camshaft / rockerarm

6. Turn the crankshaft counterclockwise and position cylinder 2 at the ignition TDC.

Ensure that the timing mark [B] of the cylinder 2 is aligned with the sealing surface.

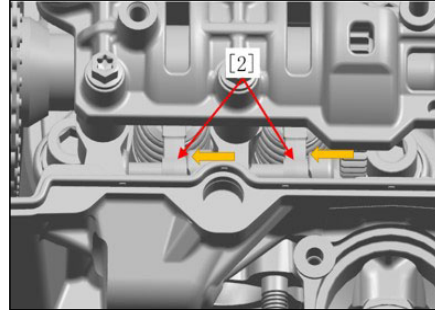
Notes

- The timing mark for the cylinder 2 is a dotted mark.



7. Remove the rockerarm stop clip [1]

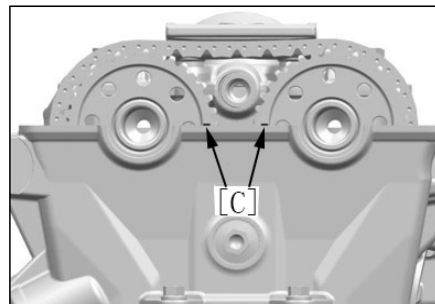
8. Push the cylinder 2 exhaust rockerarm [2] aside.



9. Turn the crankshaft counterclockwise to position cylinder 1 at the ignition TDC. Ensure that the timing mark [C] of cylinder 1 is aligned with the sealing plane.

Notes

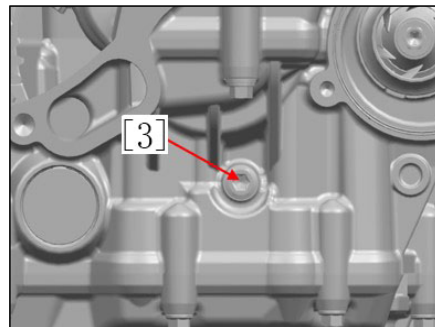
- The timing mark for the cylinder 1 is a line indicator.



10. Remove the bolt [3] and copper washer.

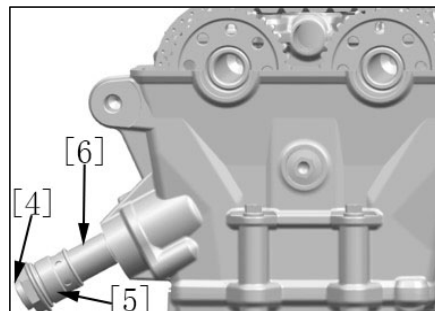
Notes

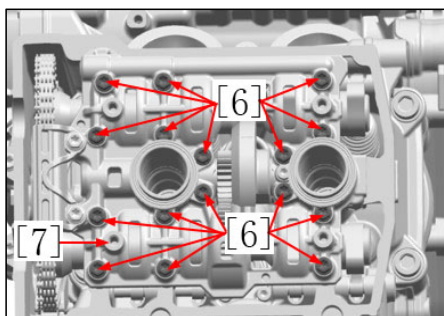
- Check through the timing inspection bore to see if the crankshaft's positioning mark groove is visible.
- Install special tools (locking bolt).



11. Remove the screw plug [4] and the O-ring. Remove the tensioner base [5], tensioner rod [6] and O-ring.

Note: During installation, the O-ring on the screw plug, the O-ring on the tensioner base, and the O-ring on the lower part of the tensioner base must all be replaced with new O-rings.

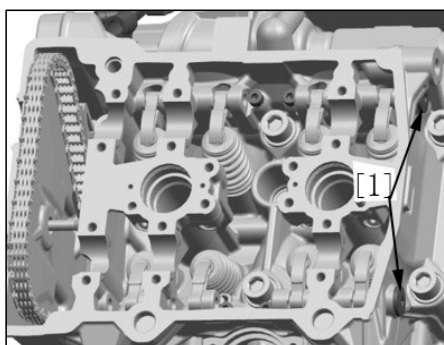
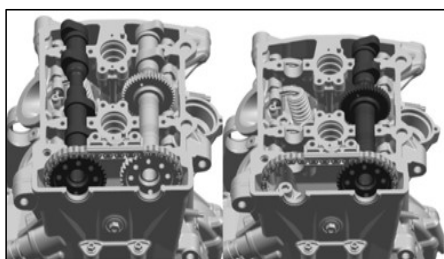




12. Remove the camshaft cover assembly fastening bolts [6]. The bolt removal sequence shall follow the reverse order 16 to 1 as specified on page 126. Remove the camshaft cover assembly [7] from the cylinder head

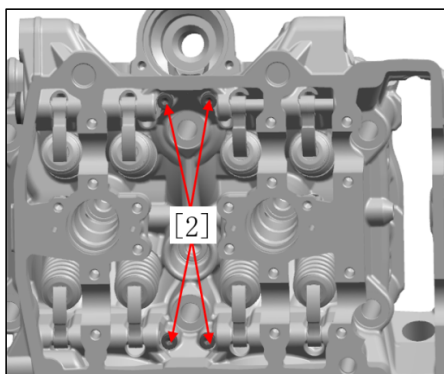
Notes

- From the outside to the inside, loosen the camshaft cover assembly bolts in several staggered steps to avoid damaging the camshaft cover.
- Do not force the dowel pin to be removed from the cylinder head or camshaft cover. Lift the camshaft cover assembly from the rear and remove the timing chain from the sprocket. Remove the camshaft assembly.



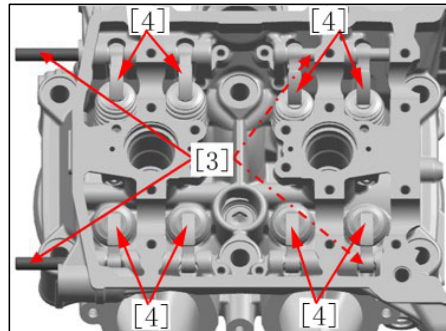
13. Remove the screw plug [1] and the O-ring.

Note: Replace the O-ring with a brand new one when reinstalling.



14. Remove the bolt [2].

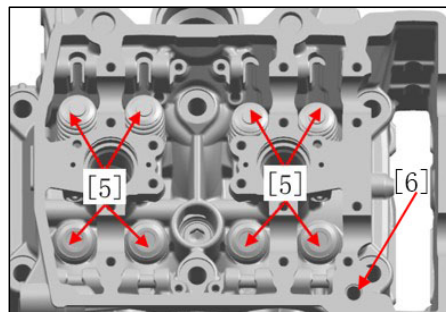
15. Use M4 disassembly tool. Remove the rockerarm shaft [3] and rockerarm [4]. Note: Make corresponding marks on where rockerarms and rockerarm shaft locates to ensure they are installed in the original positions.



16. Remove the valve adjusting gasket [5] and cylinder head oil filter [6].

Notes

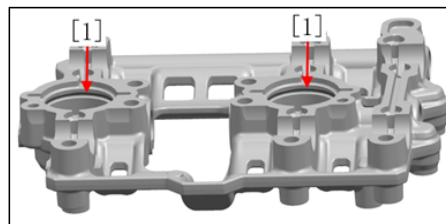
- Be careful to prevent the valve adjusting gasket from falling into the engine.
- Mark the location of the gasket to ensure it is reinstalled in the original position.
- The adjustment gasket is easier to remove with tweezers or a magnet piece.



17. Decompose the cam balance weight section

17.1. Remove the O-ring [1]. And check for any damage.

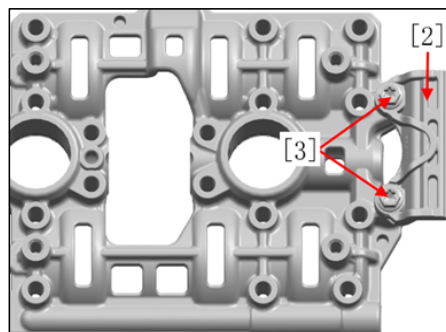
Note: Replace the O-ring with a brand new one when reinstalling.

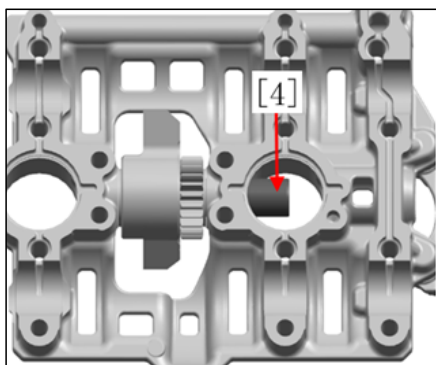


17.2. Remove the bolt [3]. Remove the chain pressure plate [2].

Notes

- Apply thread adhesive to the M6 bolt threads during reinstallation.
 - Check the contact surface with the chain for wear or damage, and replace the chain pressure plate if necessary.
- Torque: 10 N·m

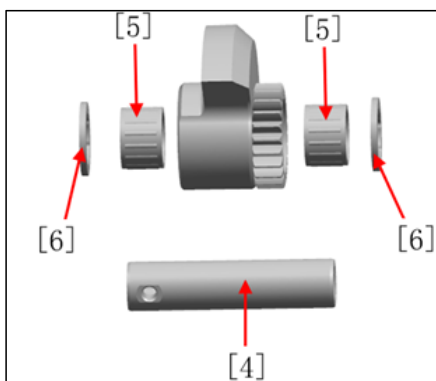




17.3 Remove the hexalobular socket cap head limit bolt of the balance shaft, and use a suitable M10×1.25 bolt to pull out the balance shaft component [4].

Note: Check the balance shaft for wear or strain, and replace it if necessary.

Torque: 6 N·m



17.4 Remove the balance weight shaft [4], needle roller bearing [5], and washer [6].

Check if the needle roller has fallen off and ensure there is no stuck during rotating. If necessary, replace the needle roller bearing.

The installation phase of the cam counterweight section is the reverse of the disassemble phase.

Notes

- Replace the bearing and turn with new ones and lubrication them with engine oil.
- Apply thread locker to M5 and M6 bolts.

Camshaft/Cylinder head cover inspection and assembly

Inspection

Check the following components for damage, abnormal wear, deformation, burning or blockage of oil passages.

Camshaft sprocket/camshaft

Camshaft cover assembly/dowel pin

Valve rockerarm/valve adjusting gasket

Camshaft runout

Fix both ends of the camshaft with a V-block and measure its runout with a dial indicator. Maintenance limit: 0.05 mm. If it exceeds the maintenance limit, replace it with a new part.

Tensioner release inspection

Place two auxiliary devices (similar to those shown in the illustration) beside the tensioner piston. When pressing down the tensioner, the piston will not fully retract.

Reference: At thickness 2 mm–2.5 mm, release tensioner. The pawl system works to prevent the piston from moving. Please note that this step is necessary. (The first notch is 5mm-6mm, and the remaining notches are 2mm-2.5mm). When the tensioner continues to be compressed (during installation), the piston will automatically extend to each gear position. At this point, the pawl system engages, preventing further compression of the tensioner. This feature is necessary to ensure sufficient tension is maintained even at low oil pressure.

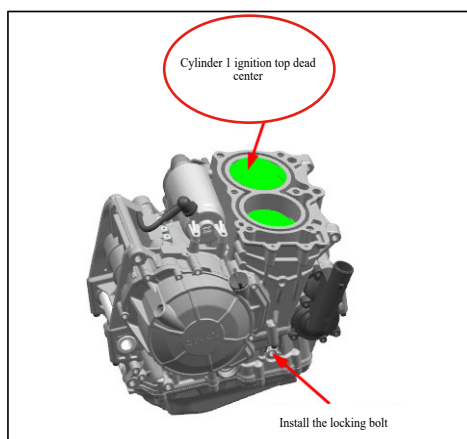


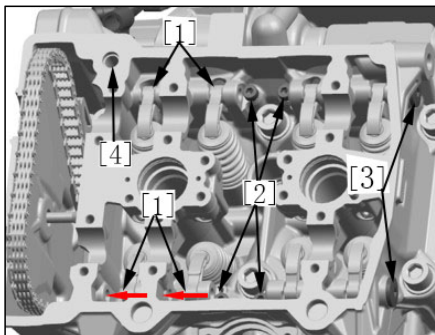
Installation steps

1. Ensure that cylinder 1 is positioned at the ignition TDC (left cylinder), and the crankshaft's timing mark groove is locked by installing a special tool (locking bolt) through the timing inspection bore.

Notes

- Before installing the tensioner, the tensioner rod must be compressed to the lowest position.
- When the camshaft is not installed and the tensioner pops up, the chain must be tightened to prevent the chain from being stuck in the rotating crankshaft.





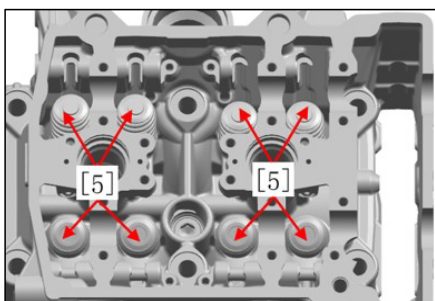
2. Install the rockerarm and rockerarm shaft [1] sequentially back to their original positions on the cylinder head, then push the rockerarm shaft to the cylinder 2, and move the exhaust rockerarm aside (in the direction of the red arrow). Install and fasten the bolt [2] and plug [3] with a new O-ring, then install the cleaned cylinder head engine oil filter [4].

Notes

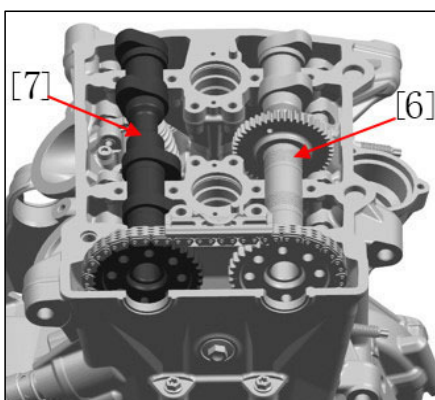
- Apply engine oil to the rockerarm shaft, rockerarm bore, and working surface for lubrication and installation.
- Apply thread locker to the threads of bolt [2] and screw plug [3].

Hex nut tightening torque: 6 N·m.

Screw plug torque: 10 N·m.



3. Reinstall the valve adjusting gaskets [5] back in sequence to its original position on the valve spring cover.



Notes

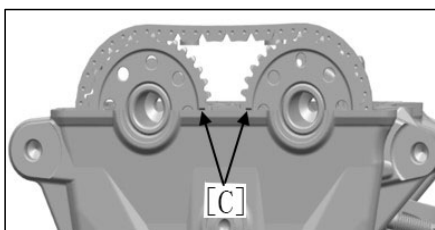
- Shaft with balance gear [6] or sprocket marked "EX": Exhaust camshaft.
- Shaft without balance gear [7] or sprocket marked "IN": Intake camshaft.

4. Apply engine oil to the camshaft cam, journal, and load-bearing surfaces.

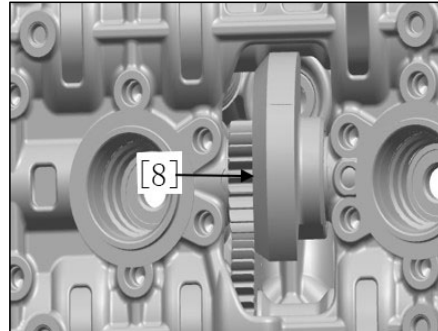
Apply engine oil to the entire surface of the cam chain. Pull up the timing chain and place it on the exhaust camshaft assembly [6], then place the intake camshaft assembly [7].

Notes

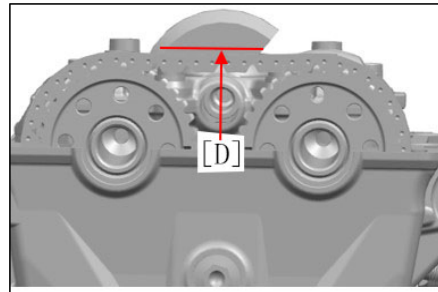
- The balance shaft drive gear is on the exhaust camshaft.
- Place the timing chain on the exhaust camshaft sprocket.
- The mark for cylinder 1 [C] is flush with the sealing surface of the cylinder head cover. Note that the mark for cylinder 1 is a linear mark.



5. Install the balance weight assembly [8] to mesh with the gear on the exhaust camshaft.



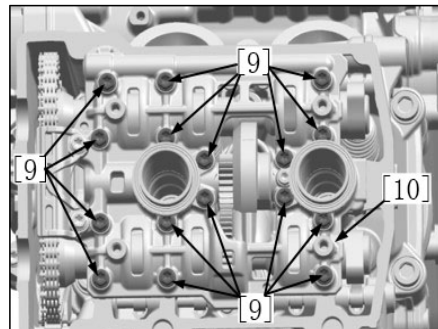
Note: The balance weight marking line [D] must be flush with the sealing plane during installation.



6. Ensure that the pin hole of the camshaft cover assembly [10] is aligned with the dowel pin on the cylinder head during installation. Then fasten with bolts [9].

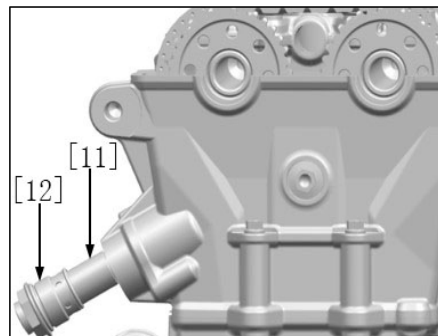
Notes

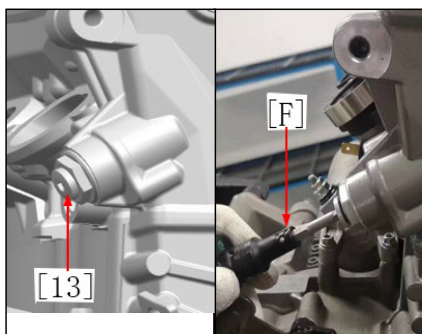
- Apply thread locker to the bolt threads. The bolts are fastened from the inside to the outside to the specified torque value. For fastening methods and torque values, see **page 126 for details**.
- The camshaft cover assembly must be replaced at the same time as the cylinder head as a set.
- The camshaft cover assembly code and cylinder head code must match.



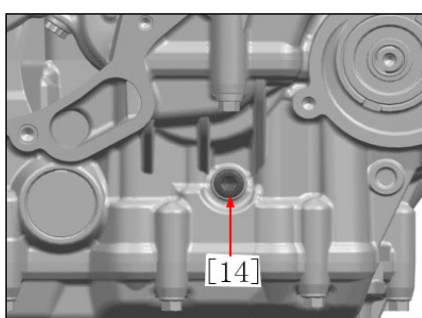
7. Remove the tensioning rod piston to the bottom. After aligning the installation position, insert the tensioner rod [11] with the new O-ring. Replace the tensioner base assembly [12] with a new O-ring, then install and fasten it.

Tensioner base assembly torque: 25 N·m

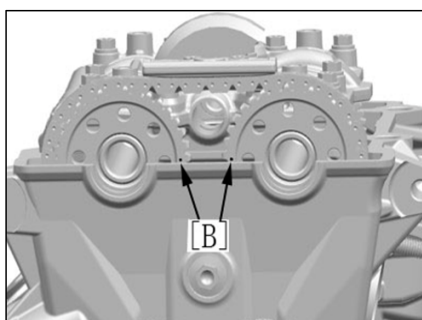




8. Use a special tool (tensioner release tool [F]) to push the tensioner toward the timing chain, placing the tensioner in a tensioned working state. Then install and fasten using the plug [13] with a new O-ring. Screw plug torque: 10 N·m.

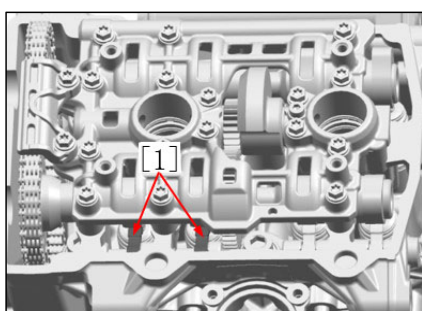


9. Remove the special tool (locking bolt), install and fasten bolt [14] along with the gasket. Bolt torque: 15 N·m



10. Turn the crankshaft counterclockwise to position cylinder 2 at the ignition TDC. Align the timing mark [B] of the cylinder 2 with the cylinder head cover sealing surface.

Note: The timing mark for the cylinder 2 is a dotted mark.



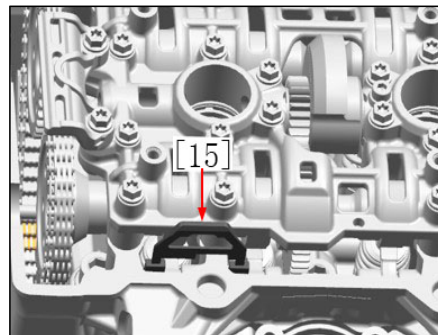
11. Use tweezers to place the exhaust valve rockerarm [1] to the left (in the direction of the arrow) on the cylinder 2 exhaust valve adjusting gasket.

Note: Prevent the valve adjusting gasket from falling.

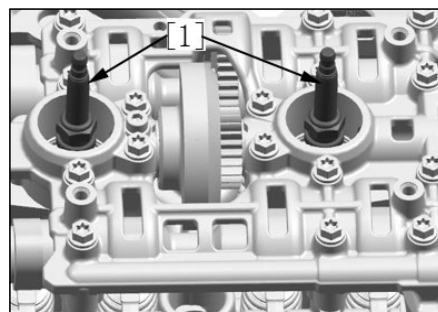
12. Install the rockerarm stop clip [15].

Notes

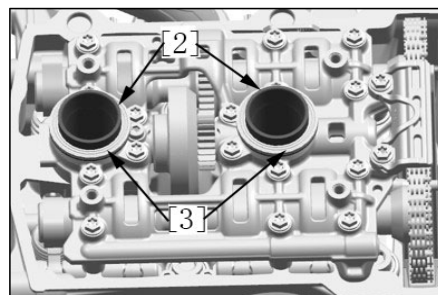
- Rotate the crankshaft several turns, then readjust cylinder 1 and cylinder 2 to the installed position respectively to recheck the valve timing.
- Check and adjust the valve clearance (see "Inspection and adjustment of valve clearance" on page 26 for details).



13. Use a special tool (spark plug socket) to install and fasten the spark plug.
Spark plug torque: 12 N·m.

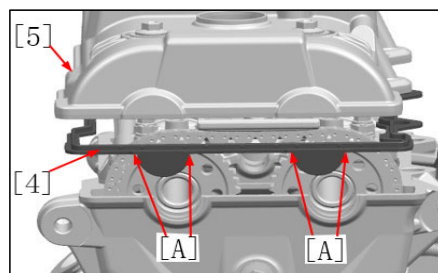


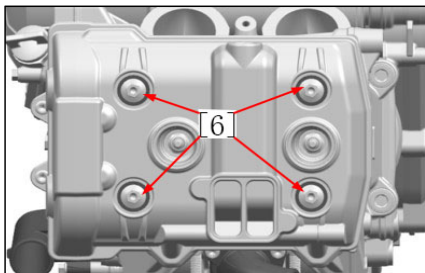
14. Install the spark plug shaft sleeve [2] and the new spark plug shaft sleeve washer [3].



15. Clean the cylinder head cover and remove oil, then apply a layer of sealant to the area of the top cover gasket [A]. Install the cylinder head cover [5] and the new top cover gasket [4].

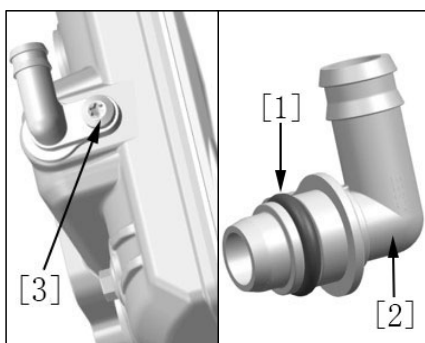
Note: Install the top cover gasket into the groove of the cylinder head cover.





16. Install the cylinder head cover bolts [6] and new rubber gaskets.

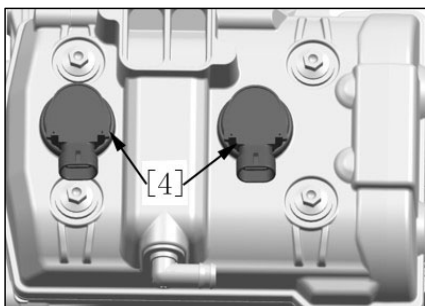
Hex nut tightening torque: 10 N·m.



17. Lubricate the new O-ring [1]. Place the vent pipe connector [2] and bushing on the cylinder head cover. Install and fasten bolt [3].

Note: Apply thread adhesive to the bolt threads.

Torque: 8 N·m

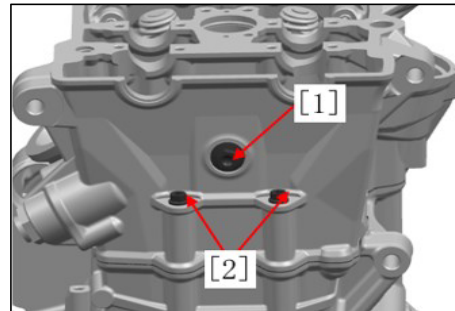


18. Install the ignition coil [4].

Disassemble the cylinder head

Remove the ignition coil, cylinder head cover, tensioner, camshaft, spark plug, rockerarm, and valve adjusting gasket according to the method in the last section.

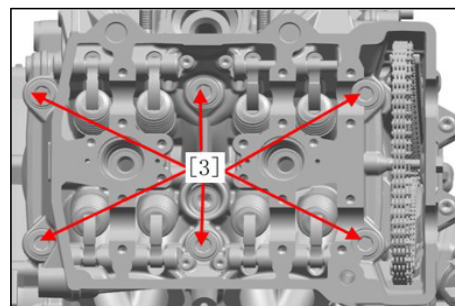
1. Remove the shock absorber bolt [1] and the gasket. Remove the bolt [2]. Remove bolt [2] and the seal ring inside the spark plug bore of the cylinder head.



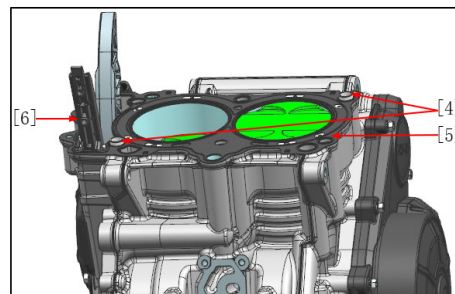
2. Loosen bolt [3] in a crisscross pattern for 2-3 times, then remove the bolt and gasket. Remove the cylinder head.

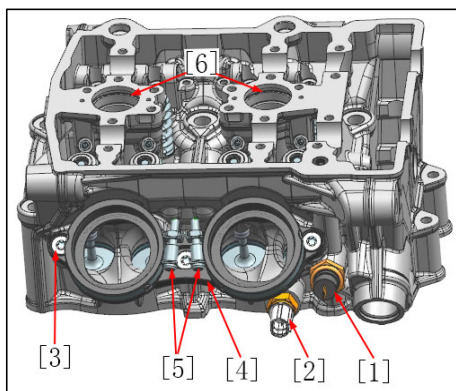
Notes

Do not tap the cylinder head excessively, and do not use any tool as a lever to damage the joint surface.



3. Remove the dowel pin [4] and the gasket [5].
4. Remove the chain guide panel [6].





5. Decompose the cylinder head assembly:

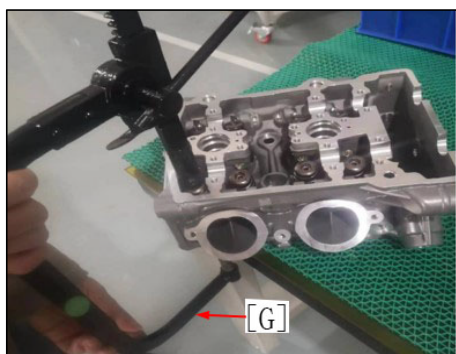
Disassemble the following parts:

- Engine oil pressure sensor [1] and O-ring;
- Water temperature sensor assembly and O-ring [2];
- Hexalobular countersunk screw [3];
- Intake seat [4];
- Clamp [5] and O-ring [6].

Use a special tool to remove the valve lock clip.

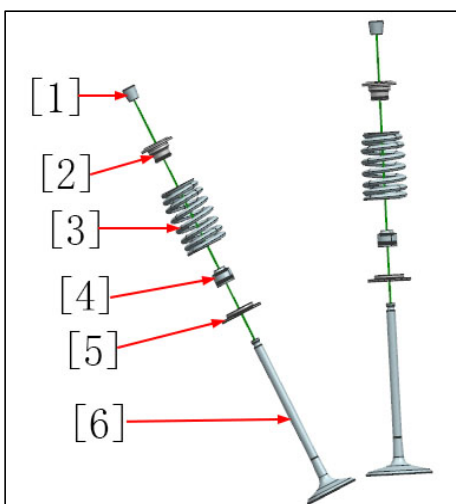
Tools:

Valve spring compression tool [G] compresses the valve spring to release and remove the valve lock clip.



Remove the valve spring compression tool and the following components:

- Valve lock clip [1]
- Valve spring cover [2]
- Valve spring [3]
- Valve rod seal [4]
- Valve spring seat [5]
- Valve [6]

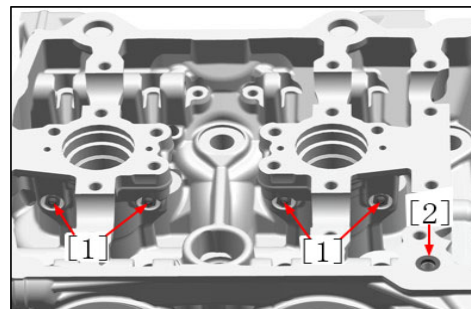
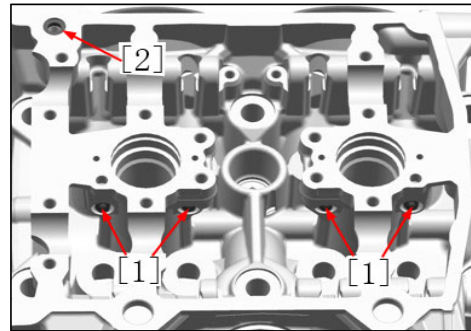


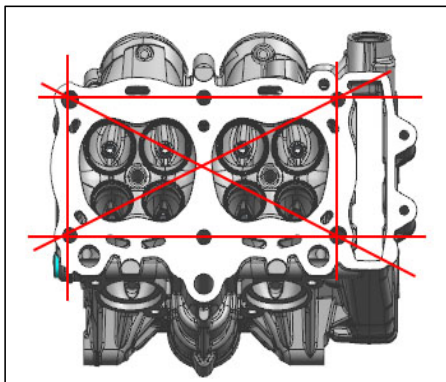
6. Remove the left and right fuel injectors [1]. Remove the cylinder head engine oil filter [2] and clean it.

Notes

- Do not damage the cylinder block joint surface and valve seat surface.
- To prevent permanent deformation of the valve spring, do not compress the valve spring excessively during removal.
- When disassembling, make marks on each corresponding part for convenient installation.

Clean carbon deposition from the combustion chamber and cylinder head gasket surfaces.



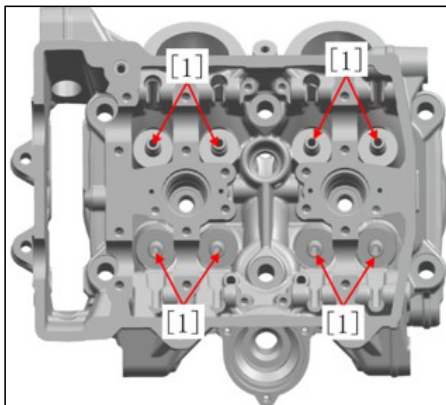


Cylinder head inspection and installation

Cylinder head flatness inspection

Measure the flatness of the cylinder head and cylinder joint surface using a straightedge and feeler gauge to check for wear. The service limit for the cylinder head joint surface is ≤ 0.05 mm.

If the measured data exceeds the service limit, repair and replace the cylinder head and camshaft cover assembly.



Inspection of valve guide

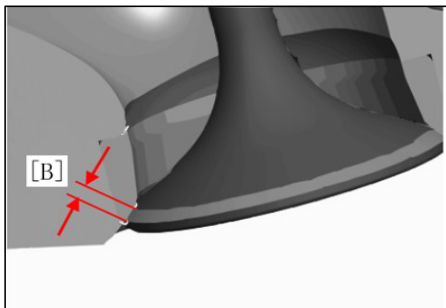
Valve guide: Use a three-jaw internal micrometer to inspect the valve guide bore [1].

If the measured value is between $\phi 5$ and $\phi 5.02$, it is acceptable. If the value exceeds the specified limit, replace the cylinder head assembly.

Valve seal seat width [B]:

Valve seal seat width, intake: (1-1.1) mm;

Valve seal seat width, exhaust: (1-1.1) mm; if the measured value exceeds the limit, replace the cylinder head. Blow the oil passages and fuel injectors with compressed air, and check if they are thoroughly cleaned.



Valve mating parts inspection

Valve [2]: Valve runout:

At valve disc ≤ 0.03 mm;

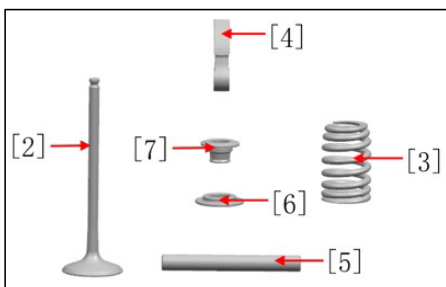
At valve rod ≤ 0.05 mm;

Valve rod diameter:

Exhaust: 4.956 mm - 4.97 mm;

Intake: 4.976 mm - 4.99 mm;

If the measured value exceeds the limit, replace the valve or repair it.



Valve spring [3]: Measure the minimum length of the valve spring (without the valve spring seat) as 43.9 mm;

If the measured value exceeds the limit, replace the valve spring.

Rockerarm [4], rockerarm shaft [5], valve spring seat [6], and valve spring cover [7]

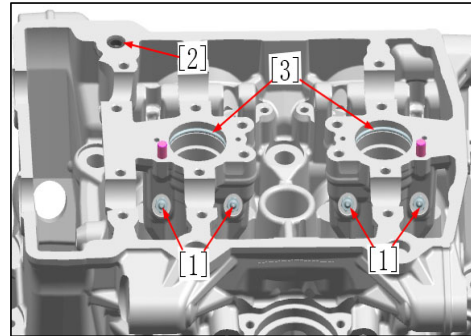
If there is damage, abnormal wear, deformation, or burning, replace it with a new part if any.
Check the working surface of the chain guide panel for damage or wear. If any, please replace it with a new part.

Assembly steps

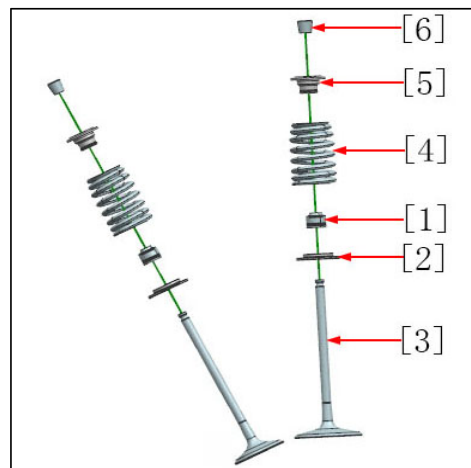
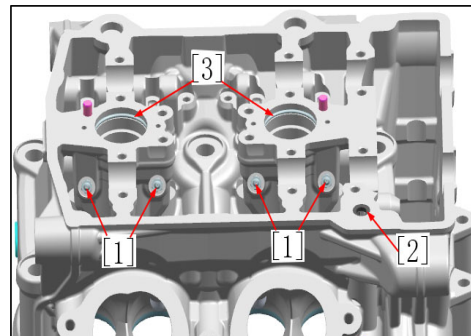
Clean the cylinder head assembly with a degreaser and blow to wash all oil passages with compressed air.

1. Install the cleaned cylinder head filter [2]; use a special tool to install the fuel injectors [1] coated with thread locker on both left and right sides; lubricate the new O-ring [3] with engine oil and install it in place.

Fuel injector torque: 2 N•m;



2. Lubricate the new valve rod seal with engine oil [1]. Install the lower valve spring seat [2] and the valve rod seal. Lubricate the sliding surfaces and rod ends of each valve rod with engine oil. Insert the valve [3] into the valve guide, rotating the valve slowly during insertion to prevent damage to the valve rod seal. Install the valve spring [4] with the larger coil end facing the combustion chamber. Install the valve spring cover [5].



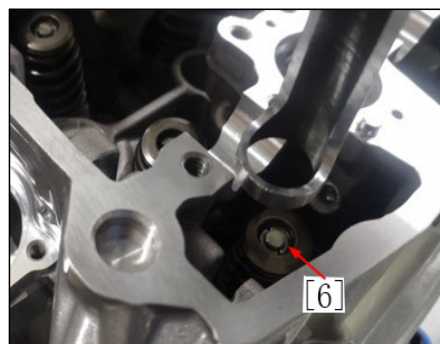
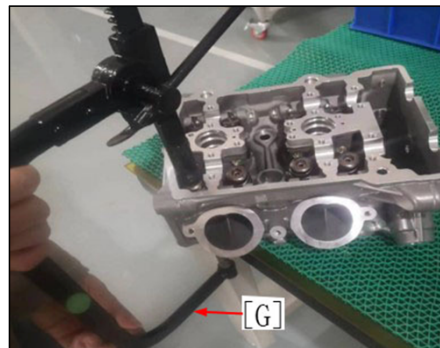
3. Install the valve lock clip [6] with special tools.

Tools:

After compressing the valve spring with the valve spring compression tool [G], place the valve lock clip [6] inside the valve spring cover. Once the lock clip is installed, release the special tool [G].

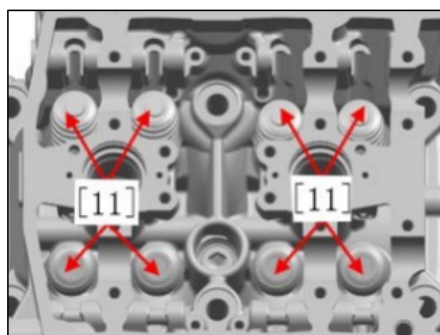
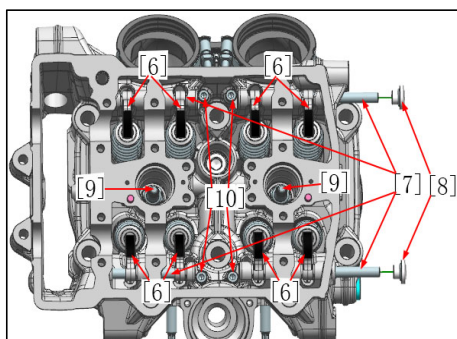
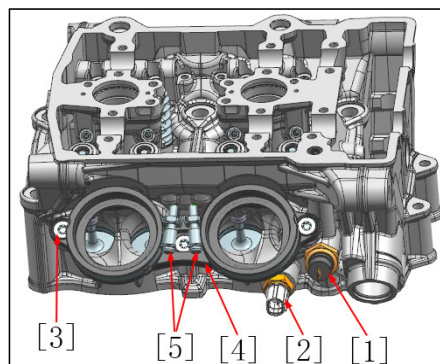
Notes

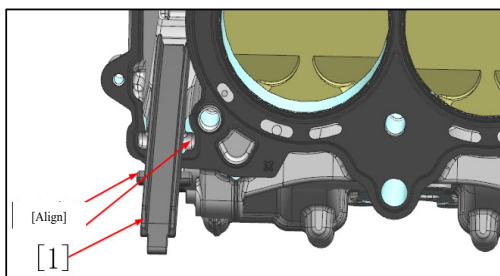
• When installing the valve lock clip, check that it is properly seated, and it's best to use a small amount of grease to assist with installation.



4. Install the following components:

- Engine oil pressure sensor [1] and new O-ring
- Water temperature sensor assembly and O-ring [2]
- Hexalobular countersunk screw [3]
- Intake seat [4]
- Clamp [5]
- Rockerarm [6]
- Rockerarm shaft [7]
- Screw plug and new O-ring [8]
- Spark plug [9]
- Hexalobular socket cap head screw [10]
- Adjusting gasket [11]



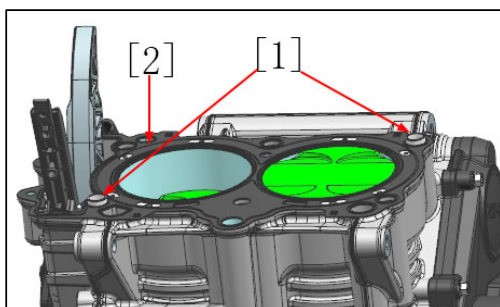


Remove the gasket material from the cylinder joint surface.

Note:

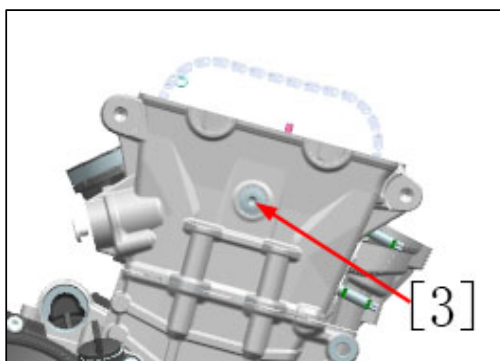
- Do not allow dust and residue to enter the cylinder.
5. Pull up the chain, install the chain guide panel [1], and align its protruding part with the groove on the cylinder.

6. Install the dowel pin [1] and the new gasket [2].



7. Pass the timing chain through the cylinder head and install the cylinder head onto the cylinder block. Install the cylinder head shock absorber bolt [3] and gasket in place.

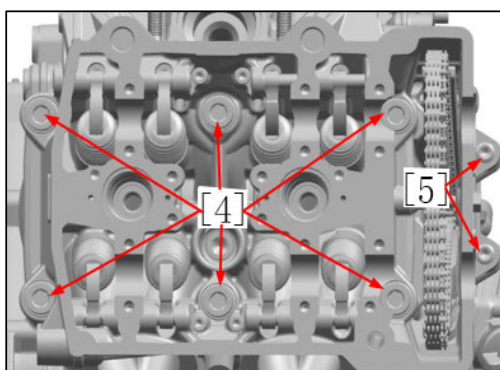
Torque: 10 N·m



8. Place the cylinder head component. Install the cylinder head bolt [4], bolt [5], and washers, then tighten to the specified torque.

Note: Cylinder head bolts and washers must be replaced with new parts during installation. Coat a proper amount of lubricating oil to both sides of the washers, bolt threads, and supporting surfaces. Tightening method and torque value: **see page 126 for details.**

Install camshaft/cylinder head cover: **see page 139 for details.**



Crank Connecting Rod Mechanism

Section 1 Specifications of Crankshaft, Piston and Cylinder Block.....	154
Section 2 Disassemble The Crank Connecting Rod/Piston	155
Section 3 Crank Connecting Rod/Piston Inspection.....	158
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Specifications of Crankshaft, Piston and Cylinder Block

Item			Standard value	Maintenance limit value
Crankshaft	Connecting rod big end side clearance		0.15-0.3	0.35
	Crankshaft side clearance		0.15-0.35	0.37
Cylinder block	Cylinder diameter		87.995-88.011	88.061
Piston, piston pin, piston ring	Diameter of piston base circle		87.951-87.969	87.900
	Pin hole diameter		20.004-20.01	20.02
	Piston pin diameter		19.992-20	19.982
	Closed clearance of piston ring	First ring	0.20-0.35	0.55
		Second ring	0.2-0.4	0.6
		Wiper ring	0.25-0.50	0.8
	Clearance between piston ring and ring groove	Clearance between the first ring and the groove	0.015-0.06	0.10
		Clearance between the second ring and groove	0.020-0.06	0.08
Cylinder clearance			0.026-0.06	0.1
Inner diameter of connecting rod small end			20.007-20.013	20.035
Fit clearance between connecting rod and pin			0.007-0.021	0.041

Disassemble the crank connecting rod/piston

The crankcase must be separated when disassembling the crankshaft, balance shaft, and piston/connecting rod. The method for separating the upper and lower crankcase is described in the crankcase section below (page 171).

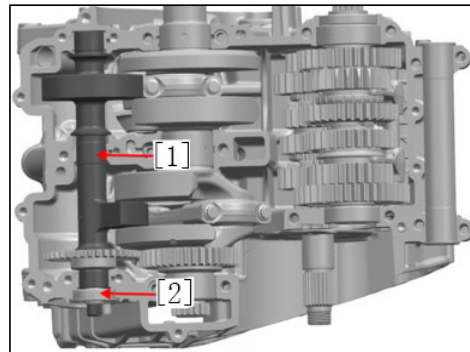
Mark and store the connecting rod, connecting rod bearing cap, and bearing liner to ensure these components are in the correct position during reassembly.

Crankshaft bearing liners and connecting rod bearing liners are selected and be paired with by color. Select the bearing liner by pairing the color of the bearing liner to the letter on the crank end face. Incorrect bearing liner clearance can cause severe engine wear.

1. Remove the balance shaft assembly

Separate the upper and lower case sections.

Remove the balance shaft [1], oil-water seal [2], bushing, and O-ring. Check the balance shaft journal, oil-water seal, bushing, and O-ring for any damage.



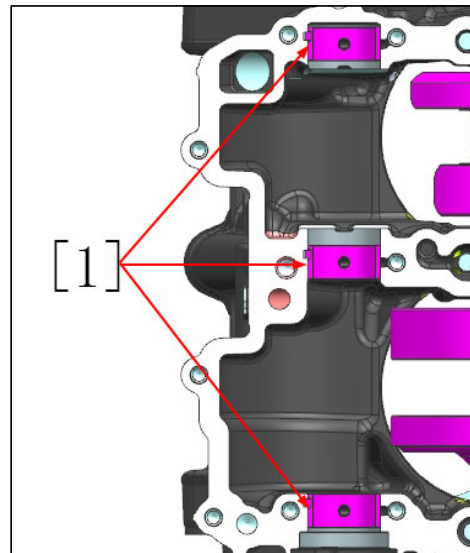
2. Remove the balance shaft bearing liner

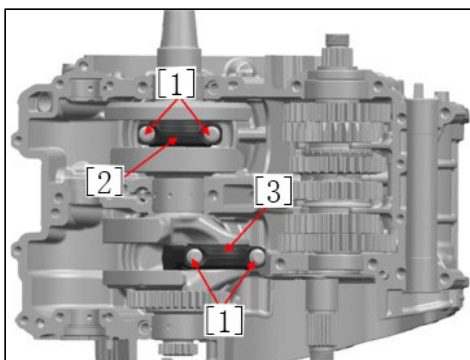
Remove the balance shaft bearing liner from the upper and lower cases and ensure proper assembly, otherwise the correct oil film clearance will be compromised, leading to engine damage.

If the main shaft bearing liner is damaged, it is necessary to clean the bearing liner base and select a new bearing liner for replacement.

Notes

- There should be no engine oil or impurities on the back of the bearing liner or the base.
- Do not change the bearing liner position. The bearing liner must be installed in the original position. Otherwise, it will damage the correct oil film clearance and cause engine damage.

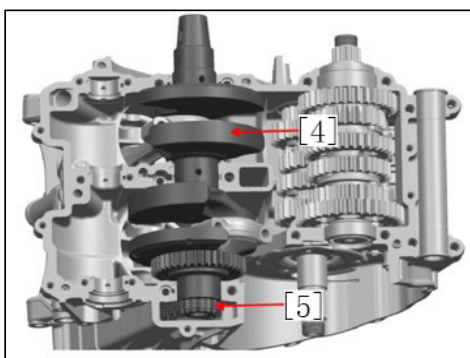




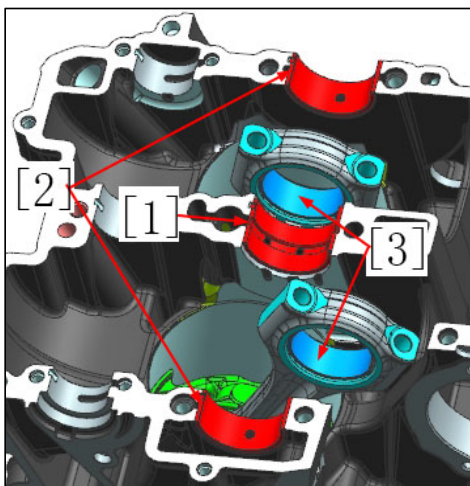
3. Remove the connecting rod cap bolt [1], connecting rod bearing liner caps [2], and [3].

Notes

- Remove the connecting rod bearing cap and bearing liner after marking them to ensure they are matched and used together. Do not mix them up. This is to assembly easily and correctly.
- Do not change the bearing liner position. The bearing liner must be installed in the original position. Otherwise, it will damage the correct oil film clearance and cause engine damage.



4. Remove the crankshaft [4] and the timing chain [5].



5. Remove the crankshaft bearing liners [1] and [2] from the upper and lower crankcase halves. Remove the connecting rod bearing liner [3] from the connecting rod body and the bearing cap.

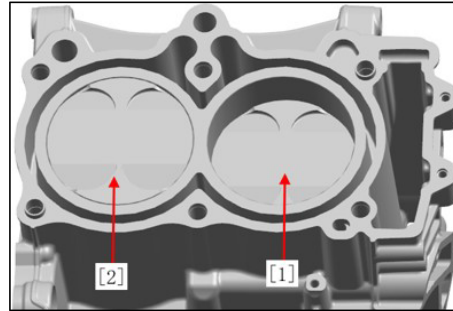
Notes

- Do not change the bearing liner position. The bearing liner must be installed in the original position. Otherwise, it will damage the correct oil film clearance and cause engine damage.

6. Remove the piston

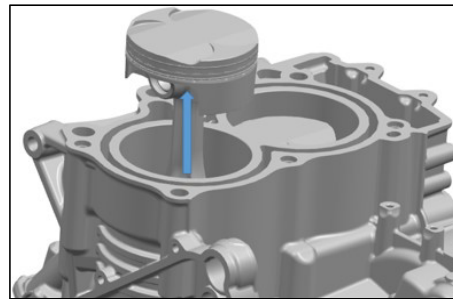
Remove piston/connecting rod

- Before removing the piston, tangle a clean, lint-free cloth around the connecting rod's big end to prevent damage to the cylinder liner.
- Do not change the bearing liner position.
- Shake the engine upper case upward and mark pistons [1] and [2]. Remove the piston/connecting rod from the top of the cylinder.



7. Remove the piston

- Use tweezers to remove the piston pin retainer [1]. Push the piston pin [2] out of the piston [3] and the connecting rod small end [4], then remove the piston.

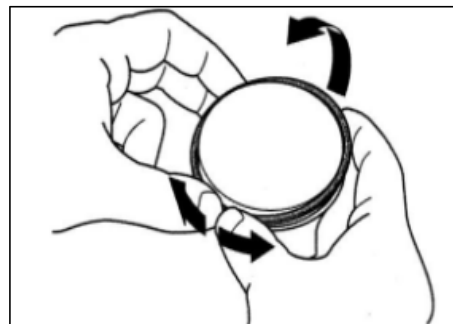
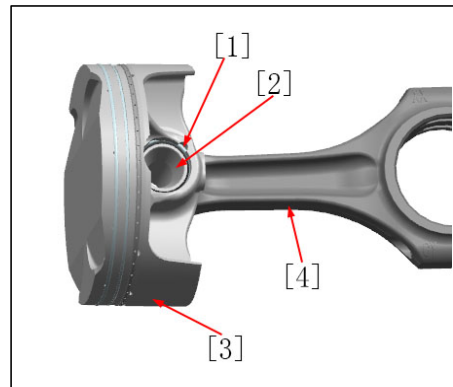


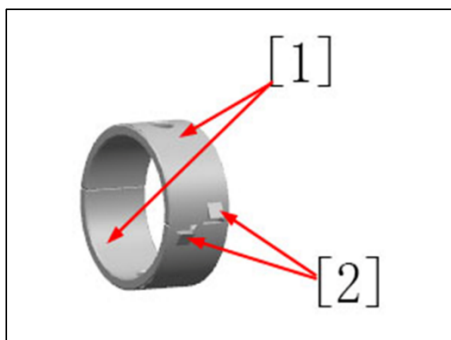
8. Remove the piston ring

- Separate the ends of each piston ring, and then lift the ring out upwards from the position reverse to the opening of the piston ring.

Notes

- Do not separate the ends too far to avoid damaging the piston rings.
- Be careful not to scratch the piston when removing the piston rings.



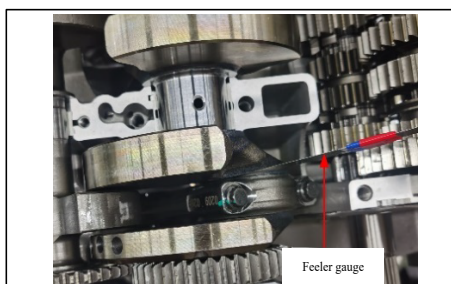


Crank connecting rod/piston inspection and installation

Balance shaft bearing liner inspection

Check the bearing liner [1] for abnormal wear or peeling.

Check the bearing liner boss [2] for any damage.



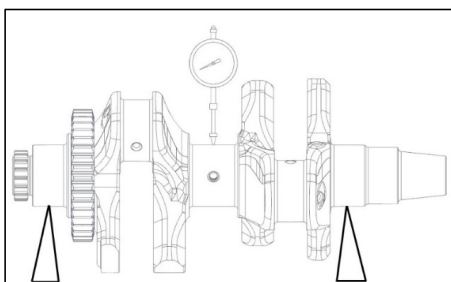
Crankshaft connecting rod side clearance inspection

Separate the upper and lower crankcase.

Measure the connecting rod side clearance. Maintenance limit: 0.35mm.

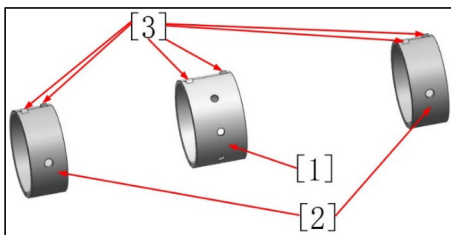
If the clearance exceeds the maintenance limit, replace the connecting rod.

Re-confirm the side clearance. If it still exceeds the limit value, then replace the crankshaft.



Crankshaft runout

Support the journal at both ends of the crankshaft using the V-block. Place a dial indicator above the middle main shaft journal. When placing, avoid the oil groove and oil hole. Rotate the crankshaft two turns (720°), then read the runout value. Maintenance limit: 0.03 mm

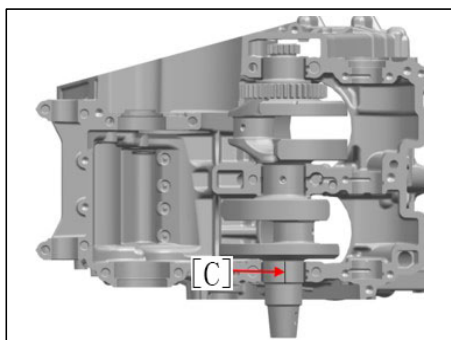


Main journal bearing liner inspection

Inspect the main journal bearing liner and [2] for abnormal wear or peeling.

Check the bearing liner boss [3] for any damage.

If the main journal bearing liner is damaged, select a bearing liner for replacement.



Crankshaft main journal bearing liner clearance

Check the radial clearance of the crankshaft main bearing liner

Place the crankshaft on the upper crankcase. Insert the plastigage [C] vertically into the journal.

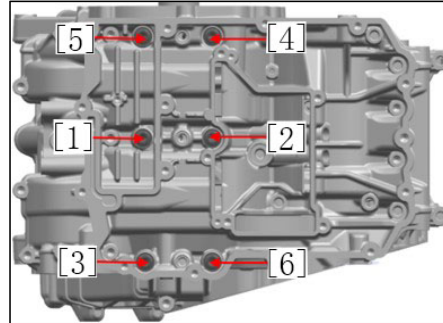
Install the lower case. Install mounting bolts [1] to [6] and fasten them in sequence to the specified torque.

Torque: 25 N·m.

Note: Do not twist the crankshaft.

Disassemble the lower case again. Check whether the clearance value of the feeler gauge is reasonable during case closing.

The fit clearance for new crankshaft bearing liners is 0.030 mm to 0.060 mm, **with a service limit of 0.080 mm.**



Notes

- The plastigage measures the bearing liner clearance. Clean all components.

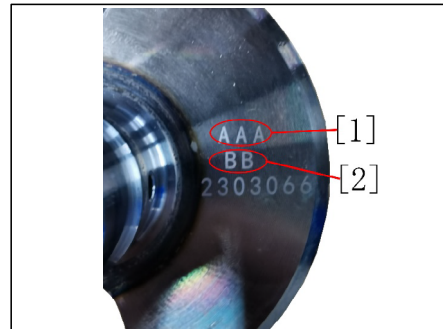
Selection of main journal bearing liners

Number the bearing liners in the crankshaft journal bores of the case from left to right to facilitate the sequential installation of the selected bearing liners. The letters [1] on the right crank end face represent the matching code for the crankshaft main journal bearing liner, while the letters [2] below represent the matching code for the connecting rod bearing liner.

Notes

- Main journal groups are identified sequentially from the tapered end of the crankshaft to the sprocket end.
- The connecting rod journals are identified in groups, sequentially from the crankshaft taper end to the sprocket end.
- Main shaft journal diameter grouping:
A (φ37.994 mm ~ φ38 mm);
- Main shaft journal diameter grouping:
B (φ37.988mm ~ φ37.994mm).

Select the replaceable bearing liner colors [1] and [2] according to the letter markings [1] on the right crank end face.



Main journal bearing liner thickness:

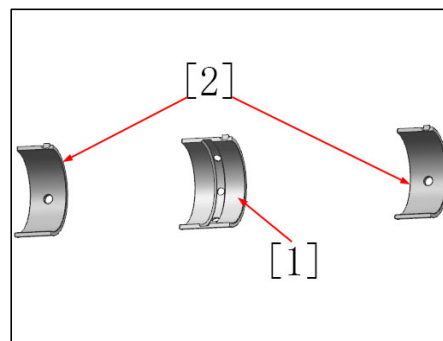
a: L Thick



b: red Thin

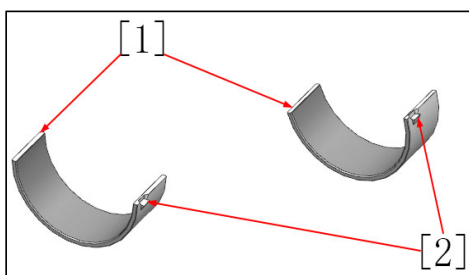
Blue: 1.984mm~1.988mm;

Red: 1.981~1.985 mm.



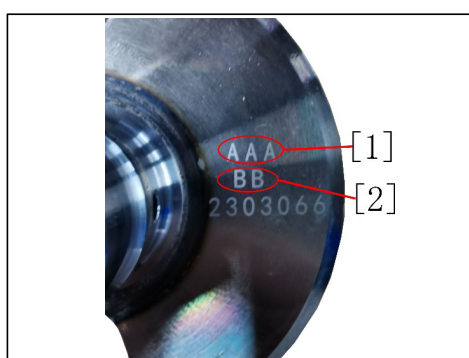
Main Journal Bearing Matching Table:

Crankshaft main journal	A	B
Main journal bearing liner	R	L



Connecting rod bearing liner

Check the connecting rod bearing liner [1] for abnormal wear or peeling.
Inspect the bearing liner boss [2] for damage.
If the connecting rod bearing liner is damaged, select a bearing liner for replacement.



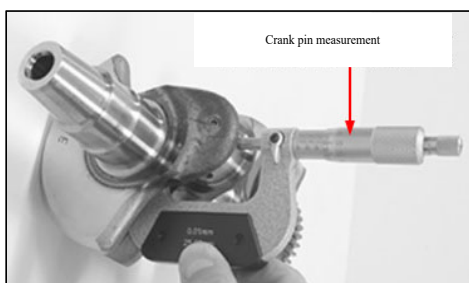
Select the connecting rod bearing liner

If the crankshaft needs to be replaced, record the corresponding number [2] located on the crank end face (the letters A or B on the crank end face represent the crank pin outer diameter number sequence from left to right), then select the matching bearing liner color according to the connecting rod bearing pairing table.
If the crankshaft is reused, measure the crank pin outer diameter with a micrometer.
Select the connecting rod bearing liner color according to the measured values using the connecting rod bearing liner matching table.

Notes

- Connecting rod journal diameter grouping:
A ($\phi 37.994 \text{ mm} \sim \phi 38 \text{ mm}$);
- Connecting rod journal diameter grouping:
B ($\phi 37.988 \text{ mm} \sim \phi 37.994 \text{ mm}$).

Select the replaceable bearing liner color [1] according to the connecting rod journal diameter code on the crank end face.

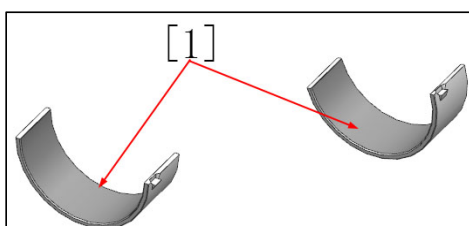


Thickness of connecting rod bearing liner:

a: Blue Thick



b: Red Thin
Blue: $1.984 \text{ mm} \sim 1.988 \text{ mm}$;
Red: $1.981 \sim 1.985 \text{ mm}$.

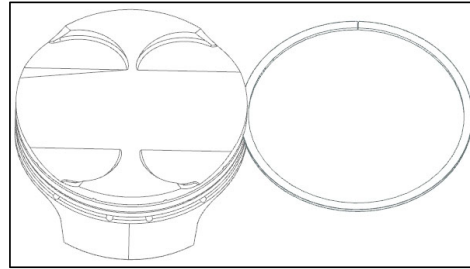


Connecting rod journal	A	B
Connecting rod bearing liner	R	L

Main Journal Bearing Matching Table:

Piston inspection and measurement

- Check the piston surface for any damage. If any damage, please replace with a new part. If necessary, replace the cylinder (upper and lower cases) as well.
- Check if the piston ring can move freely within the piston ring groove. If any stuck, clean the piston ring groove. Use piston rings that are ready to be discarded to remove carbon deposition from the piston ring groove.
- Check the piston ring for damage. If any, please replace it with a new part.



Note:

- Do not use a steel brush to avoid scratching the piston and piston ring.

Use a feeler gauge to measure the clearance between the piston ring and the groove (A).

Piston ring groove clearance:

First ring (rectangular ring) ≤ 0.06 mm;

Second ring (lower compression ring) ≤ 0.06 mm;

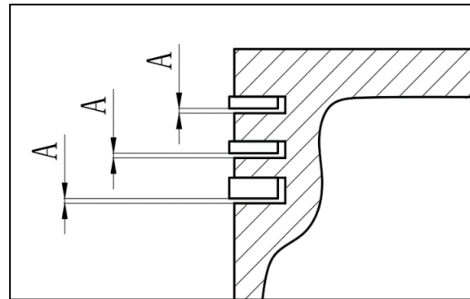
Oil ring ≤ 0.06 mm.

If the clearance (A) exceeds the maximum value:

Replace the piston and piston rings, then inspect and measure the piston.

Check the piston pin coating for discoloration, wear, or peeling. If there is any malfunction, please replace it with a new one.

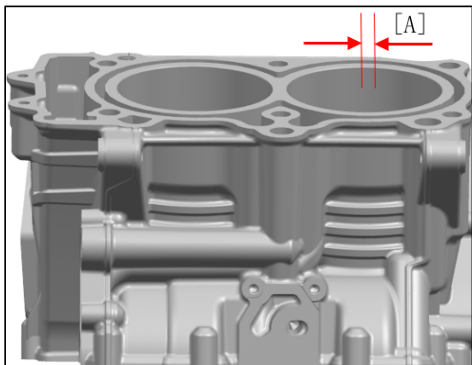
Place the piston pin at the connecting rod to check for movement. If the play between the piston pin and the connecting rod is too large: replace the connecting rod and piston pin.



Measure the piston diameter at the gauge point on the printed surface as shown in the figure.

Piston: 87.951 mm~87.969 mm.





Check the piston ring opening clearance

Remove the piston ring from the piston.

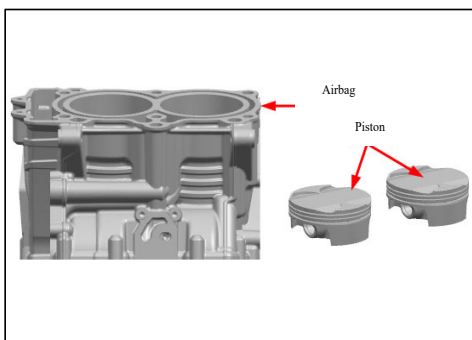
Place the piston ring at the cylinder, aligning it with the piston.

Position it 10 mm from the top edge of the cylinder and measure the end gap (A) with a feeler gauge.

Piston ring opening clearance:

Compression ring: ≤ 0.60 mm; oil ring: ≤ 0.8 mm

If the opening clearance exceeds the limit value: check and measure the cylinder. If the cylinder is within the service limit: replace the piston ring. Install the piston ring with the marked side facing upward into the piston.



Piston and cylinder fit clearance

Inspect and measure the cylinder.

Inspect and measure the piston.

The minimum fit clearance is the difference between the minimum cylinder inner diameter and the maximum piston diameter.

The maximum fit clearance is the difference between the maximum cylinder inner diameter and the minimum piston diameter.

Piston/cylinder fit clearance

New part: 0.026mm~0.060mm

Service limit: 0.10mm

Timing chain inspection

Check whether the working surface of the timing chain is damaged or worn (such as the link plate being gnawed, etc.). If any, please replace it with a new part.

Inspect the timing chain for smooth link movement. Allow the chain to hang naturally. If the chain is no longer straight or has been stretched (compare with a new chain), replace the timing chain.

Installation steps

1. Piston ring installation

Thoroughly clean the piston ring groove and install the piston ring.

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

Prevent damage to the piston and piston ring during installation.

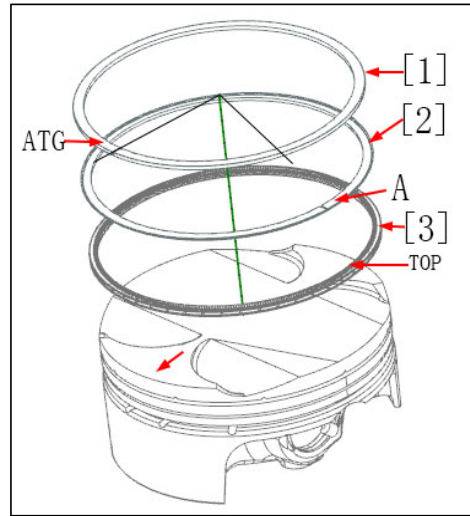
When installing, the marked side of the piston ring shall face up;

"ATG": 1st ring [1].

"A": 2nd ring [2].

"TOP": oil ring assembly [3].

Cross the piston ring openings 120° apart from each other. Install the expander spring and the side rails together as a unit.

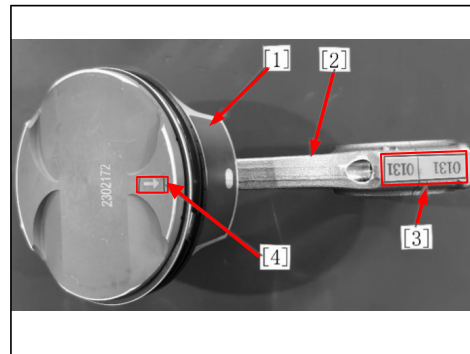


2. Piston connecting rod installation

Install the connecting rod bearing liner in its original position. Apply engine oil to the surface of the piston pin bore.

Apply engine oil to the inner surface of the connecting rod small end.

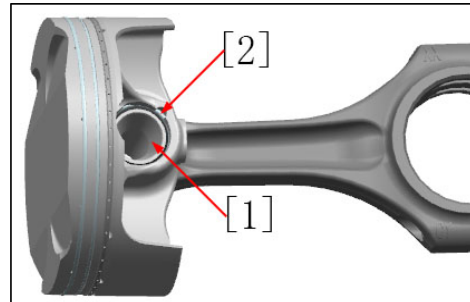
When assembling the piston [1] and connecting rod [2], align the connecting rod weight-class identification mark [3] with the piston "→" mark [4].

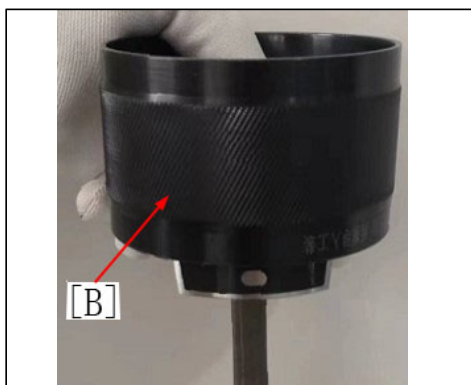


3. Coat engine oil to the outer surface of the piston pin. Install the piston pin [1] and secure it with a new piston pin retainer [2].

Notes

- Ensure the piston pin snap ring is properly installed.
- Do not align the opening of the piston pin retainer with the notch on the piston.

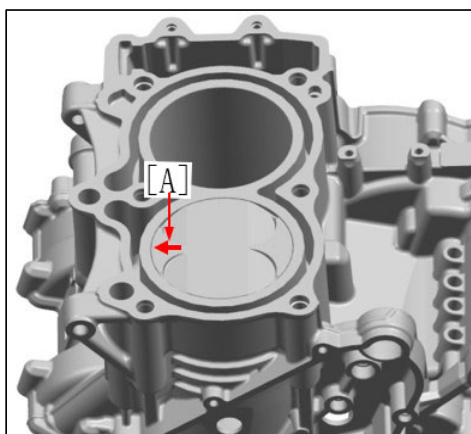




4. Apply engine oil on the cylinder wall and piston thrust surface. Position the piston ring openings at 120° intervals. Place the piston in the installation tool (Piston Ring Installation Tool B). Use the tool to lock the piston ring.



5. Use special tools to place the piston in the cylinder. Use the rubber mallet to gently tap the head of the piston ring press tool to align it flush with the cylinder.



6. Ensure the piston "➡" mark [A] faces the exhaust side.

Note:

- The special tool must compress all piston rings evenly and keep them flush with the cylinder. Carefully tap the piston with the hammer handle to insert it into the cylinder.
- Do not hit the piston ring, as it can easily be damaged.
- When installing the piston, be careful not to damage the upper surface of the piston, especially the part that fits with the cylinder bore;
- Be careful not to let the cylinder liner and the crank pin be damaged by the connecting rod;
- Make sure that the connecting rod weight-class identification marks are the same for both cylinders.

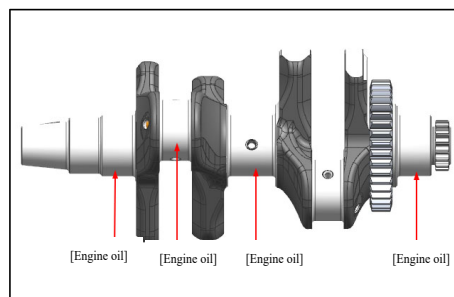
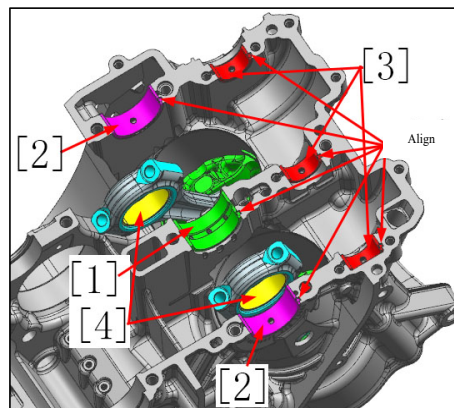
7. Crankshaft and balance shaft bearing liner assembly

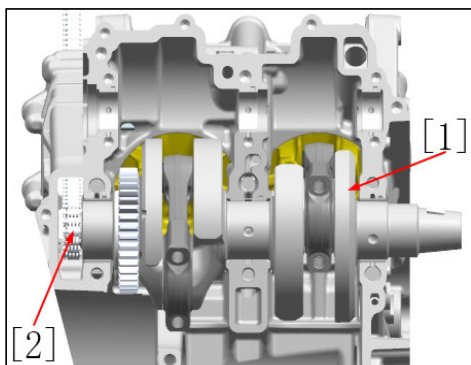
Clean the outer surface of the bearing liner, the crankcase, and the connecting rod bearing liner bore. Install the main journal bearing liners [1] and [2], balance shaft bushings [3], and connecting rod bearing liners [4] in their original positions. In the mounting bores, align each boss and groove of the bearing liner.

Notes

- The back surface of the bearing liner and the bearing liner mounting bore must be wiped clean and free of engine oil or impurities.
- During installation, first align the bearing liner boss with the notch on the bearing liner bore, then press the bearing liner down from the other side until it is properly seated.
- Do not change the bearing liner position. The bearing liner must be installed in the original position. Otherwise, it will damage the correct oil film clearance and cause engine damage.
- After matching the bearings, ensure the installation order follows the letter sequence on the right crankcase from left to right, corresponding to the bearing liner bores on the crankcase.

Apply engine oil to the inner surface of the main journal bearing liners in the upper crankcase and the connecting rod bearing liners in the big end of the connecting rod.





8. Place the crankshaft [1] above the crankcase, and then insert the crank pin into the connecting rod. At the same time, place the timing chain [2].

Notes

- Do not damage the crank pin, main journal, and bearing liner.

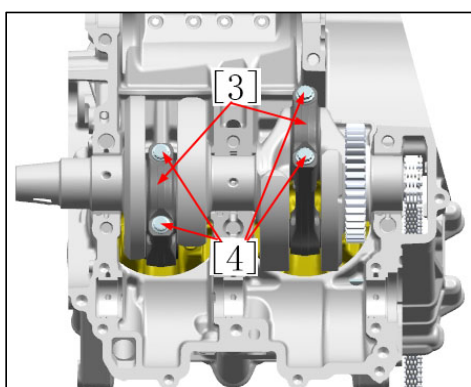
Install the crankshaft into the upper crankcase.



9. Clean the joint surface of the connecting rod and the connecting rod bearing liner, then dry it with compressed air. Apply engine oil to the inner surface of the connecting rod bearing cap. Ensure that the numbers on the connecting rod bearing caps and the connecting rod are the same and clearly visible, then pair and install the connecting rod bearing caps.

Notes

- Ensure each part is installed in its original position, as marked when removed.

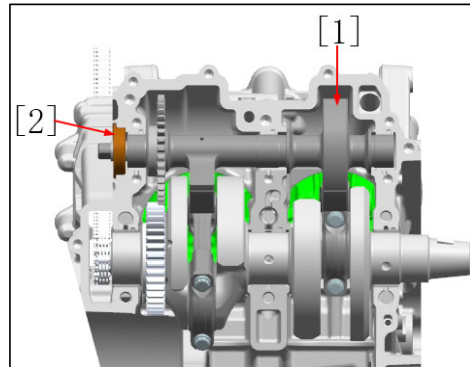


10. Replace the bolts and apply engine oil to the threaded part of the bolts and the supporting surface. Install the connecting rod bearing caps [3] on the connecting rod, and install the connecting rod bolts [4] and tighten them securely. For fastening methods, see **page 125 for details**.
Torque: **15 N·m + 90°**.

Notes

- If the connecting rod bolts are disassembled during maintenance, they must be replaced with new bolts during installation and fastened strictly according to the angle control method.

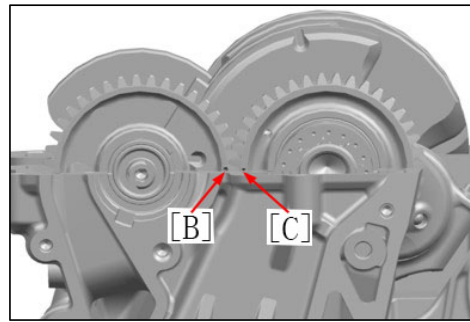
11. Coat engine oil to the journal of the balance shaft and the inner surface of the bearing liner. Then place the balance shaft assembly [1] along with the newly lubricated oil-water seal [2], bushing, and new O-ring.



Notes

- Marks (B) and (C) must be aligned during installation.
- The two marks are dot marks.

Assemble the lower crankcase (see "Case section" on page 171 for details).



Case Section

Section 1 Specification Of Housing And Transmission.....	170
Section 2 Disassembly Of Right Crankcase Cover Assembly.....	171
Section 3 Case Section Inspection	175
Section 4 Case Section Installation.....	176

Specification of Housing and Transmission

Item			Standard value	Maintenance limit value
Transmission mechanism	Gear bore inner diameter	Main 5th gear	28.007-28.02	28.22
		Main 6th gear	28.007-28.02	28.22
		Counter 3rd & 4th gear	30.007-30.02	30.22
		Counter 1st gear	28.007-28.02	28.22
	Outer diameter of bushing			
	Inner diameter of bushing			
	Main/counter shaft journal	Fit with the main 5th gear shaft bearing	23.991-24	23.971
		Fit with the main 6th gear bushing	23.991-24	23.971
		Counter 3rd & 4th gear	25.991-26	25.971
		Counter 1st gear	23.991-24	23.971
Shift fork and shift fork shaft	Shift fork shaft journal		11.77-11.78	11.37
	Shift fork inner diameter		11.8-11.818	11.838
	Thickness of shift fork tip		4.81-4.89	4.51

Disassembly of right crankcase cover assembly

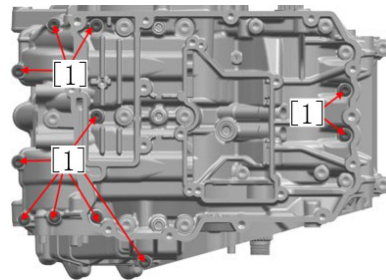
Note:

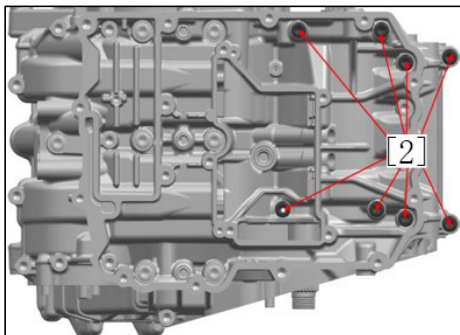
Before disassembling the crankcase components, the following components must be removed:

1. Valve train system related components
 2. Crankshaft connecting rod assembly components
 3. Clutch and clutch control mechanism related components
 4. Transmission shift mechanism related components
 5. Cooling and lubrication system related components
 6. Components related to the starting system
- Be careful not to damage the right/left crankcase covers or case joint surface.
 - Clean the joint surface and oil passage before case assembly;
 - Before closing the case, evenly apply the end sealant on the closing surface, and clean up the excess sealant.
 - Select the bearing liners with appropriate color marks. Choose the bearing liners according to the requirements in the bearing liner matching table. Incorrect bearing liner colors can cause severe damage to the engine.

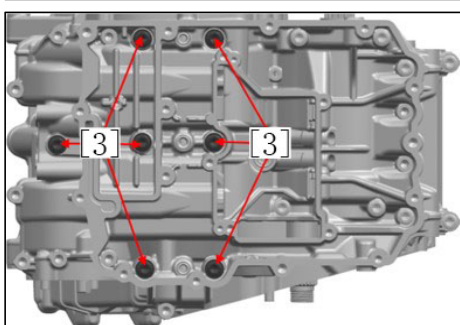
Disassemble the upper and lower cases

1. Disassemble the case closing bolts [1].





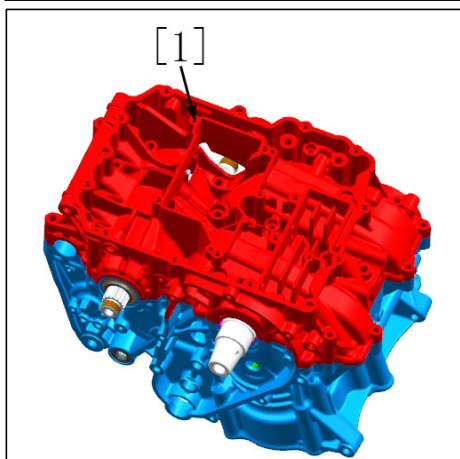
2. Disassemble the case closing bolts [2].



3. Loosen and remove the bolts [3] in a crisscross pattern.

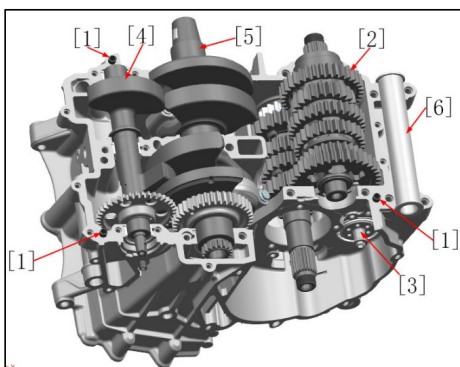
Notes

· The bolts are fitted with washers, which typically remain attached to the crankcase during removal.



4. Remove the lower crankcase [1] from the upper crankcase;

(**Note:** Do not use tools to pry the crankcase closing surface. You can gently tap the non-machined surface with a rubber mallet to facilitate removal). Ensure the bearing liner remains in place.

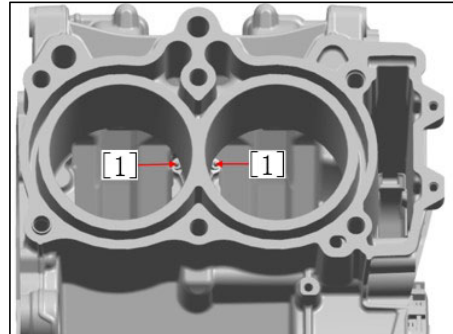


5. Remove the dowel pin [1]. Remove the main/counter shaft sleeve [2]

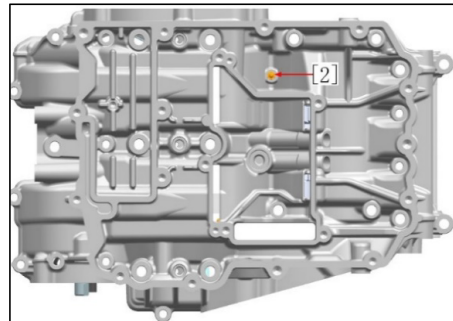
Remove the transmission drum [3] and shift fork (See page 195 for disassembling and assembling the transmission shift mechanism), then remove the balance shaft [4] and crankshaft [5] (See page 155 for disassembling and assembling the crankshaft and balance shaft).

Remove the swingarm bushing [6].

6. Use special tools to remove the fuel injectors [1] and [2] from the upper and lower crankcase bores. Do not damage the fuel injectors, and thoroughly clean them with solution.



7. Remove the screw plug [4]. Since the fuel injector [3] is press-fitted into the upper case with an interference fit, there is no need to disassemble it unless there is blockage or damage.



Notes

- Check if the fuel injector has a blockage and replace it if necessary.

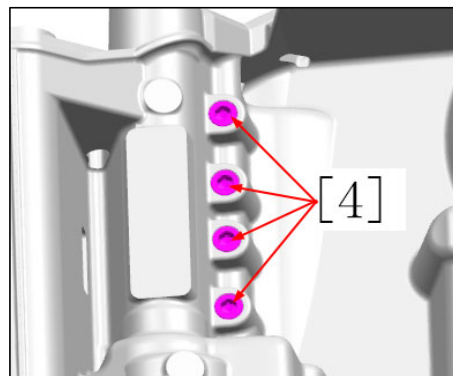
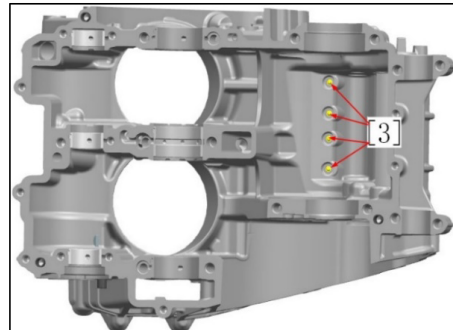
If there are no malfunctions, use compressed air to blow out the oil passages in the upper crankcase and the fuel injector; then install them in place in the reverse order of disassembly.

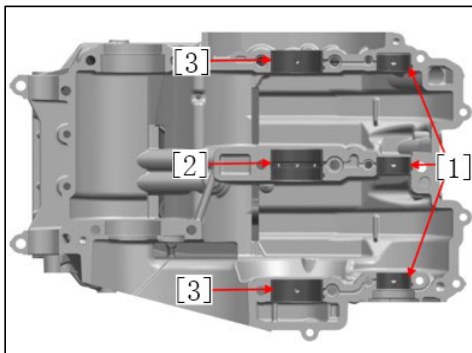
Apply thread locker to fuel injectors [1] and [2] before installation.

Install the threaded plug [4] with thread locker.

Fuel injector mounting torque: 2 N•m.

Screw plug installation torque: 12 N•m.

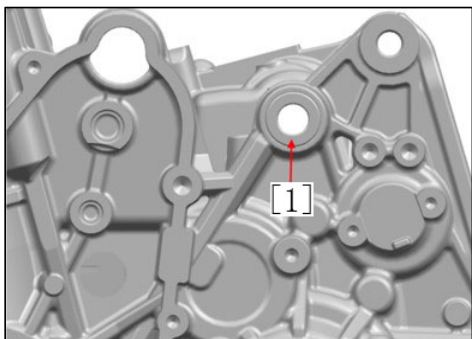




8. Clean the bearing liner and bearing liner base
Remove the balance shaft bearing liner [1] from the lower case.
Remove the crankshaft bearing liners [2] and [3] from the lower case.
Clean the bearing liner base.

Notes

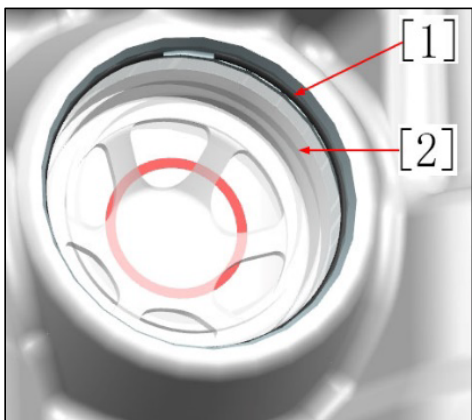
- Ensure the bearing liner remains in place.
- To replace and install a new bearing liner, select the appropriate bearing liner according to the matching table on page 159.



9. Remove the shift shaft oil seal [1] and press-fit a new shift shaft oil seal.

Notes

- During press-fitting, the shift shaft oil seal is pressed inward with its opening facing, and the end face of the oil seal is 0.5 mm lower than the end face of the oil seal bore.



10. Disassemble the lower snap ring [1] and the oil level inspection window [2], press-fit a new oil level inspection window, and install the snap ring into the turn groove.

Note: The newly press-fitted oil level inspection window must not exhibit any cut edge.

11. Disassemble the upper case bearing.

Heat the upper engine case appropriately.
At around 130 °C, tap both sides of the engine crankcase with a wooden block to allow the bearings to drop out of their bearing bores.

Notes

- Any bearings remaining in the engine crankcase must be removed using the appropriate special tools. There is a gasket behind the main shaft bearing; make sure that the gasket is not damaged.

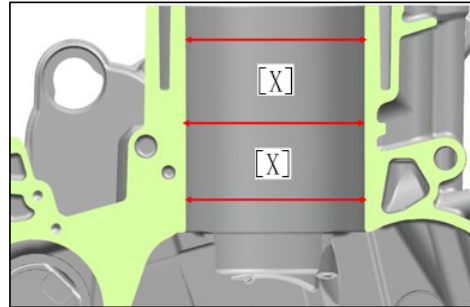
Case section inspection and installation

Inspect and measure the cylinder

Check the cylinder surface for any damage. If any damage, please replace the cylinder (upper and lower case) and piston. Use a micrometer to measure the inner diameter of the cylinder along the X-axis and Y-axis at different positions to determine if there is any wear.

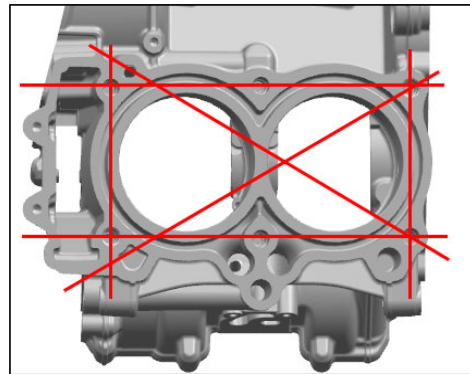
Cylinder - Inner Diameter

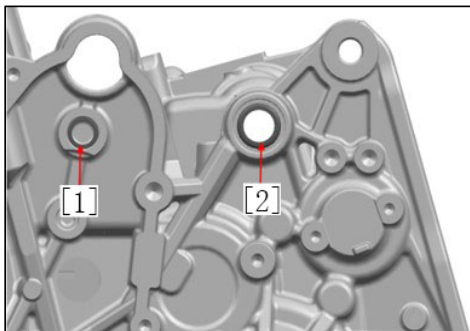
Size: 87.995mm to 88.011mm



Cylinder flatness inspection

Use a straightedge and feeler gauge to measure the flatness of the cylinder and cylinder head joint surface, and check for wear. The service limit for the upper case joint surface is ≤ 0.05 mm. If the measured data exceeds the service limit, please repair or replace the upper and lower cases.



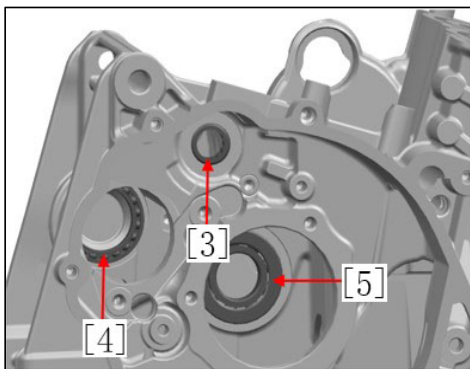


Upper and lower case assembly steps

1. Clean the left and right crankcase body joint surface, and do not damage the joint surface;
2. Heat the engine upper case appropriately. Reference: At around 130 °C, install the new cold needle roller bearings [1] and [2] into the bearing bore located on the left side of the heated case. If possible, use a suitable press-fit tool to install the bearing into the seat.

Notes

- During press fitting, ensure that the engine case is level to avoid damage. Apply pressure only to the outer turn of the bearing during press fitting. Otherwise, bearing damage may occur during the press-fitting process.



3. Install the cold new needle roller bearing [3], bearings [4] and [5] into the bearing bore located on the right side of the heated upper case. If possible, use a suitable press-fit tool to install the bearing into the bore. Be careful not to miss the gasket behind bearing [5]. During press fitting, ensure that the engine case is level to avoid damage. After the case has cooled, confirm whether the bearings are properly press-fitted in place.

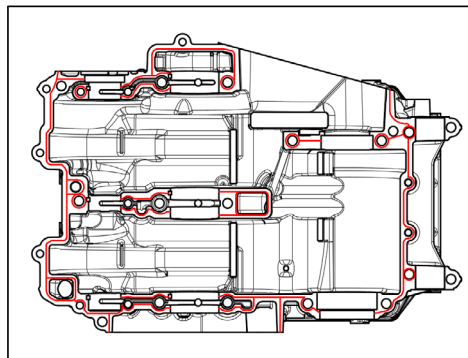
Notes

- If the bearing is not pressed into place after cooling down, it may rotate while the engine is operating. If this occurs, replace the case with a new one.

4. Case closing assembly

Install the main/counter shaft components, crankshaft, balance shaft, transmission drum assembly, shift fork, shift fork shaft, and swingarm bushing to the upper crankcase (for the transmission shift mechanism, see the following section; for the crankshaft and balance shaft, **see page 155**).

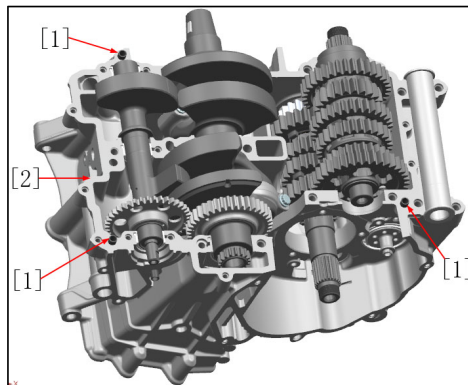
As shown in the right figure, evenly coat end sealant to the joint surface of the lower case.



Notes

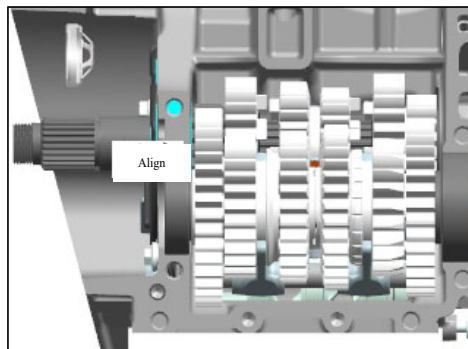
- Do not apply an excessive amount of end sealant.
- Do not apply end sealant to the oil passage bore.

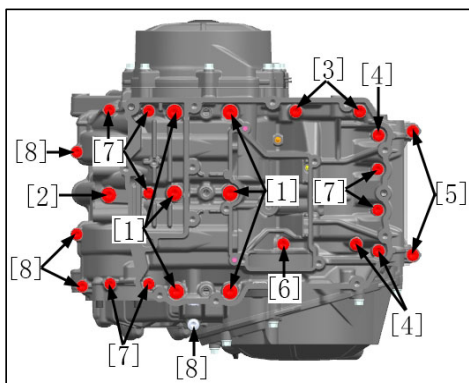
5. Install the dowel pin [1] onto the upper crankcase [2].



6. Align the main/counter shaft gear teeth one by one to ensure they are in neutral position, then recheck that all parts on the case are properly and correctly installed.

Note: Align the shift forks one by one with the shift fork grooves of the transmission drum.





7. Install the lower crankcase onto the upper crankcase.

Notes

- The main journal bolts should be pre-coated with engine oil before installation to enhance their axial tensile stability. Do not wipe the engine oil off the bolt surface during installation.
- If necessary, gently tap with a rubber mallet.
- Bolts [1] and [2] require washers to be installed, with engine oil coated on both end faces.
- Install bolts M8×90 for [1] and [3]; install bolts M8×65 for [2] and [4]; install bolts M8×55 for [5]; install bolts M8×45 for [6]; install bolts M6×60 for [7]; install bolts M6×30 for [8].

Verify that the upper and lower crankcase are securely installed. Replace the washer and the case closing bolts with new ones, and tighten the case closing bolts to the specified torque.

Torque: For torque and fastening methods, see page 125 for details.

Clutch Operating Mechanism

Section 1 Specification of Clutch And Shift Mechanism.....	180
Section 2 Disassemble The Right Crankcase Cover/Clutch	181
Section 3 Clutch/Shift Shaft Inspection.....	185
Section 4 Clutch/Shift Shaft Installation.....	186

Specification of Clutch and Shift Mechanism

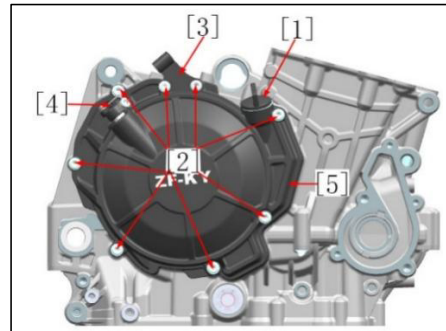
Item		Specification	Maintenance limit value
Free stroke of clutch handle		3.0-6.0	/
Clutch	Free length of spring	47.2	45
	Thickness of friction plate	2.95-3.05	2.8
	Flatness of driven plate	/	0.1
Clutch bushing	Inner diameter	/	
	Outer diameter	/	
Clutch bushing main shaft outer diameter		/	

Clutch operating mechanism

Disassemble the right crankcase cover/clutch

1. Disassemble the right crankcase cover

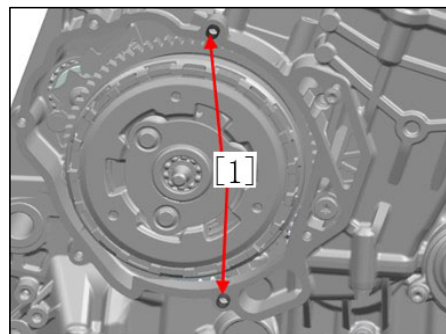
1.1 Remove the fuel filler cap [1] and the O-ring. Loosen and remove bolts [2] and pull brackets [3] in 2~3 staggered steps. Turn the clutch operating shaft [4] counterclockwise and remove the right crankcase cover [5] along with the right crankcase cover gasket. When disassembling, pay attention to the installation position of the bolts and number them to prevent incorrect installation.



1.2 Install the dowel pin [1].

2. Remove the bolt and shaft sleeve [2].

3. Remove the chain tensioning panel [1] upward.

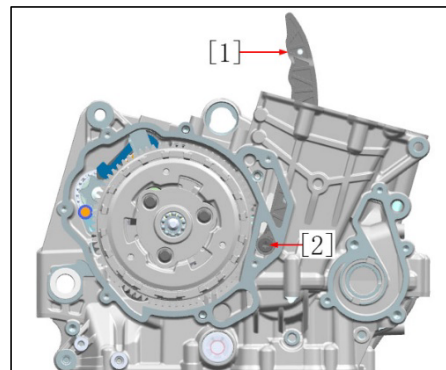


Notes

To remove the tensioning panel, the cylinder head must be disassembled.

4. Control shaft disassembly/assembly

Disassemble the snap ring [1];
Remove the control shaft [2];
Remove the control torsion spring [3];
Remove the right crankcase cover gasket [4];
Remove the crankshaft oil seal from the right crankcase cover.



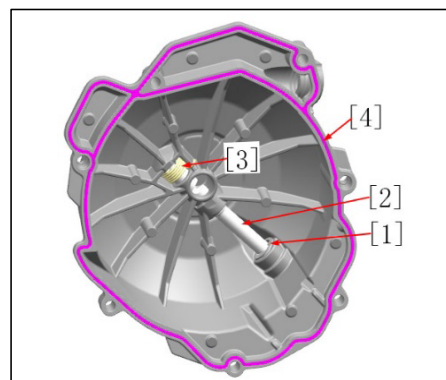
Notes

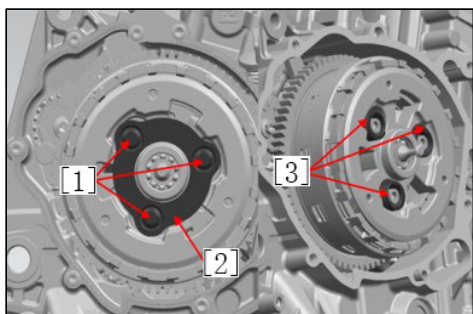
- This snap ring must be replaced with a new one after disassembly.
- Replace the right crankcase cover gasket with a new one.
- Replace the oil seal with a new one.

The assembly sequence is the reverse of the disassembly order.

Note

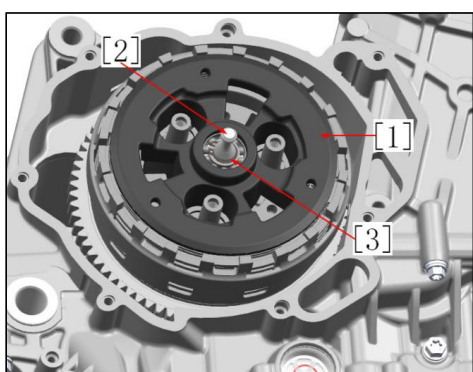
- Coat engine oil to the sliding surfaces of the control shaft and push rod.



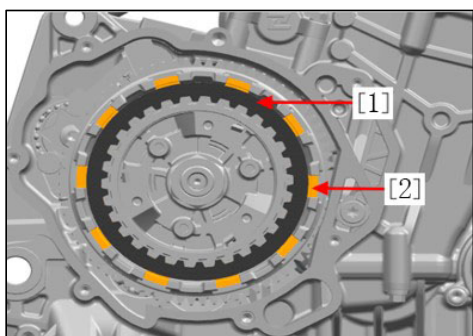


5. Disassemble the clutch

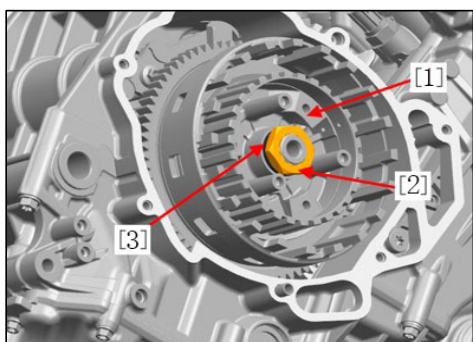
5.1 Loosen and remove the clutch lifting plate bolts [1] in 2-3 staggered steps, then remove the lifting plate [2] and compression spring [3].



5.2 Remove the clutch pressure plate [1], clutch push rod [2], and snap ring [3].



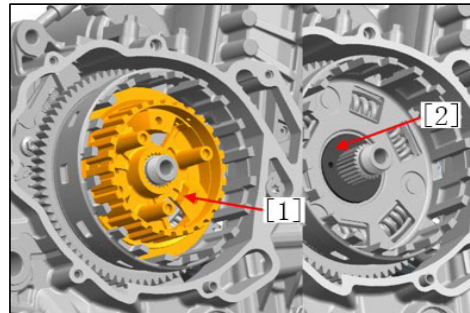
5.3 Remove the clutch rod [1] and the friction plate [2].



6. Use a special tool (anti-rotation wrench) to secure the clutch center bushing [1]. Remove the hex nut [2] and the double-stacked locking washer [3].

Note: The gasket is usually attached to the clutch center bushing.

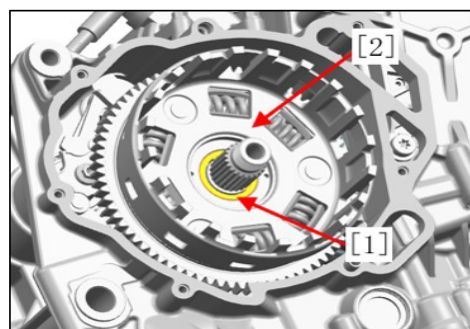
7. Remove the clutch center bushing [1] and spline washer [2].



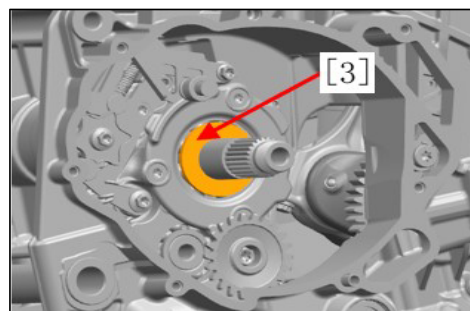
8. Remove the needle roller bearing [1].

Note: Using a magnetic rod makes it easier to disassemble. Do not use pliers, otherwise the needle roller bearing will be damaged.

9. Remove the clutch housing assembly [2].

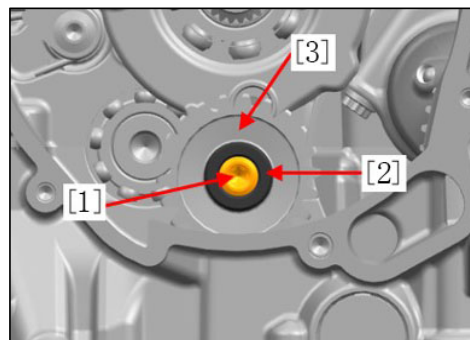


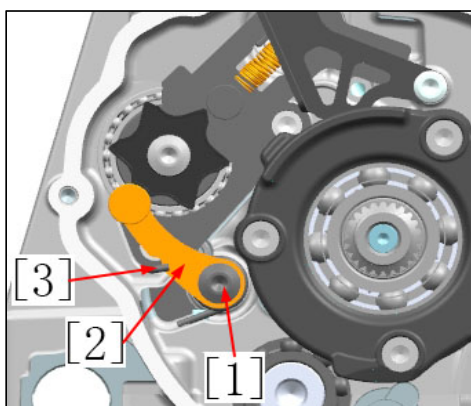
10. Remove the washer [3].



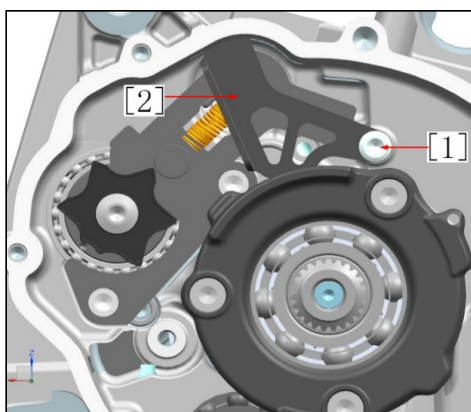
11. Remove the bolt [1]. Remove the oil pump idler shaft bushing [2] and the oil pump idler assembly [3].

Note: Check the oil pump idler assembly for damage and deformation. If any, replace it.

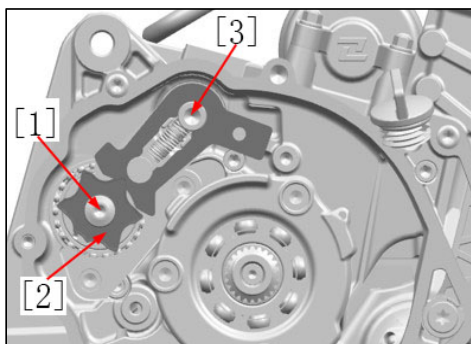




12. Disassemble the limit plate: Remove bolt [1] and disassemble limit plate [2], along with the bushing and limit plate torsion spring [3].



13. Remove the bolt [1] and the shift shaft baffle [2]



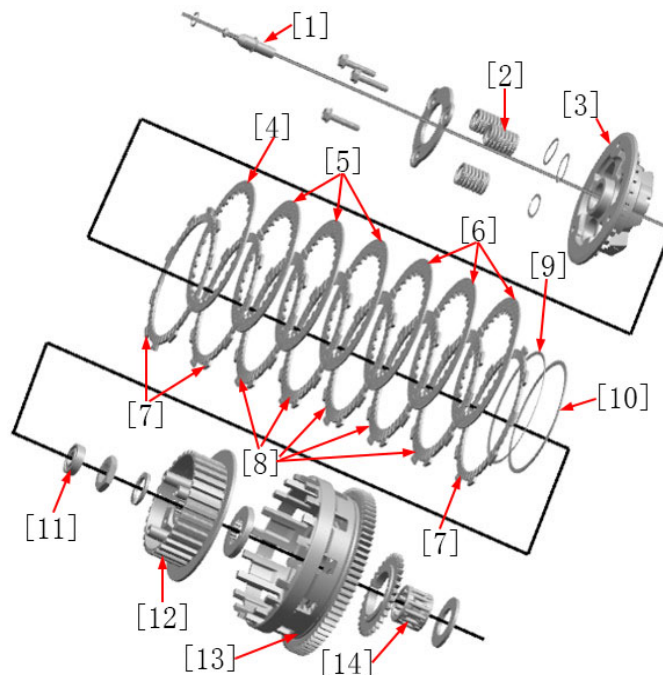
14. Remove the bolt [1] and the star wheel [2]. Remove the shift shaft assembly [3] and the gasket.

Note: The gasket is usually attached inside the engine.

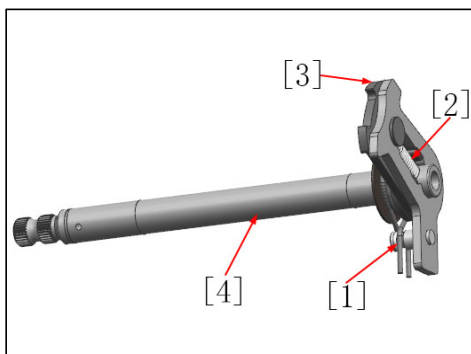
Clutch/Shift Shaft Inspection and Installation

Clutch assembly inspection

- Check the clutch push rod [1] for damage or wear. If any, please replace it with a new part.
- Check the length of the clutch compression spring [2]. Clutch compression spring length ≥ 47.2 mm. If the measured value is less than the minimum, replace all clutch compression springs.
- Inspect the clutch pressure plate [3] for damage or wear. If any, please replace it with a new part.
- Check clutch steel pieces [4], [5], and [6] for damage or wear. If there is any abnormality, replace the steel piece.
- Check the clutch friction plates [7] and [8] for discoloration or wear. If there is any abnormality, replace the friction plate.
- Check the thickness of the clutch plate combination. Clutch plate set - thickness, new: 36.1 mm~36.7 mm; service limit: 35.3 mm. If the thickness of the clutch plate set exceeds the service limit, replace the entire set of steel plates and friction plates.
- Check if the disc spring [9] and disc spring washer [10] are damaged or worn. If any, please replace it with a new part.
- Check ball bearing [11] for any stuck or not smooth rolling. If there is stuck or rolling is not smooth, please replace it with a new one.
- Check the center bushing [12] for damage or wear. If any, please replace it with a new part.
- Check whether the common normal W5 of the driven gear in the clutch housing [13] is less than 27.61 mm. If any, replace the clutch housing assembly.
- Check if the needle roller bearing [14] is stuck or not rolling smoothly. If there is stuck or rolling is not smooth, please replace it with a new one.



Shift shaft assembly inspection

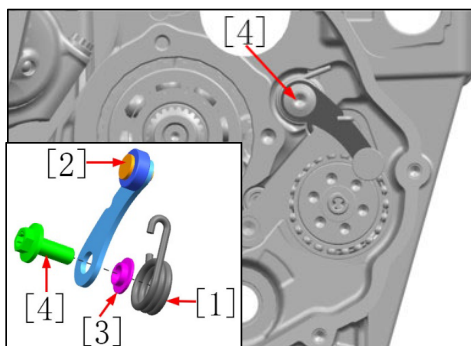


Inspect the following components for damage, abnormal wear or deformation. Replace if necessary.

Star wheel
Limit plate assembly
Limit torsion spring

Check the return torsion spring [1] and compression spring [2] for fatigue or wear; inspect the shift slide plate [3] for wear or bend;

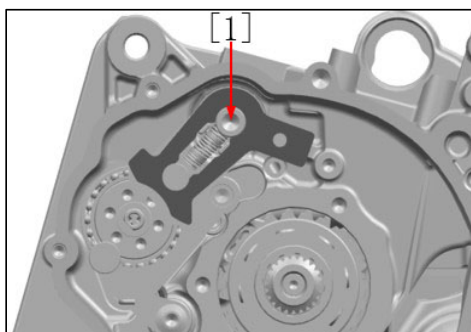
Check the shift shaft [4] for wear, damage or deformation; if replacement is required, replace the shift shaft components as a set.



Assembly steps

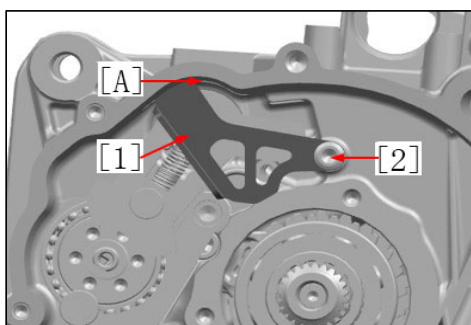
1. Place the limit plate spring [1], limit plate assembly [2] and stepped bushing [3]. Install and fasten the bolt [4].

Note: Coat thread locker to the bolts.
Torque: 10 N·m



2. Insert the shift shaft component [1] and the gasket into the needle roller bearing bore, and align the shift return torsion spring with the torsion spring limit boss on the case to install it in place.

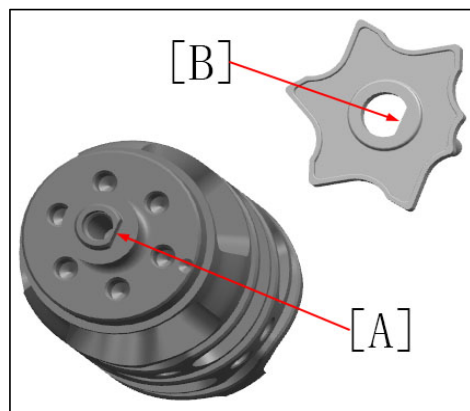
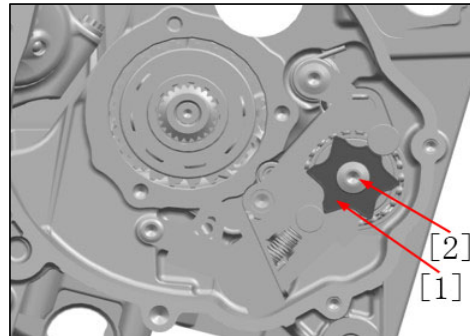
Note: Coat lubricating oil to the contact surface between the shift shaft and the needle roller. Place the shift shaft baffle [1] into groove [A]. Install and fasten the bolt [2]. Coat thread locker to the bolts. Torque: 10 N·m



3. Place the star wheel [1]. Install and fasten the bolt [2] (Coat thread locker to the bolt).

Note: Align the star wheel notch [A] with the transmission drum notch [B] for installation.

Torque: 10 N·m

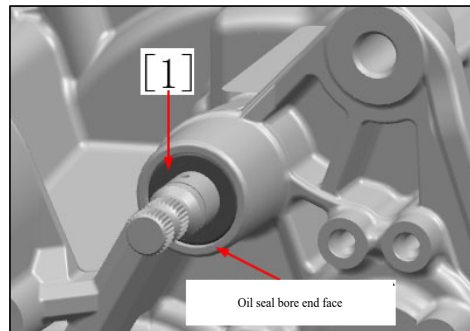


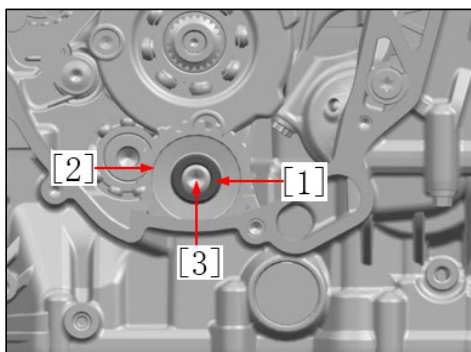
4. Install the shift shaft oil seal [1] onto the upper crankcase.

During press-fitting, the shift shaft oil seal is pressed inward with its opening facing, and the end face of the shift shaft oil seal is 0.5 mm lower than the end face of the oil seal bore.

Notes

- Replace the shift shaft oil seal with a new one after disassembly.



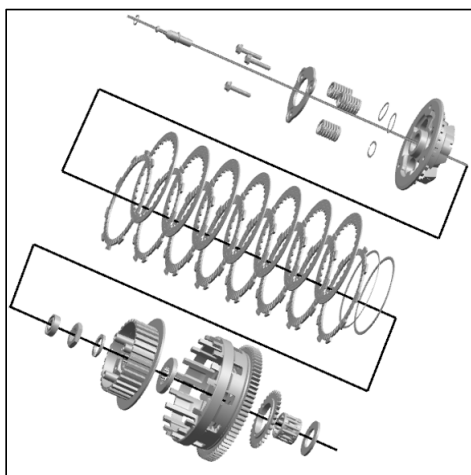


5. Fully lubricate the oil pump idler shaft sleeve [1]. Place the oil pump idler shaft sleeve [1] and the oil pump idler assembly [2]. Install and fasten the new bolt [3].

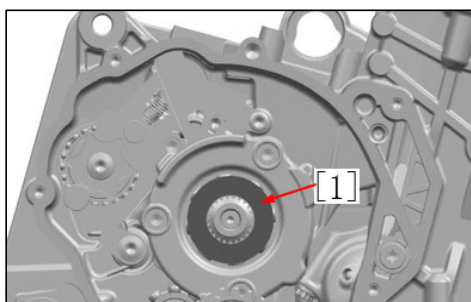
Note: Coat the thread with thread coating, and bolt [3] must be replaced.

Torque: 15 N·m

Clutch Installation Diagram:



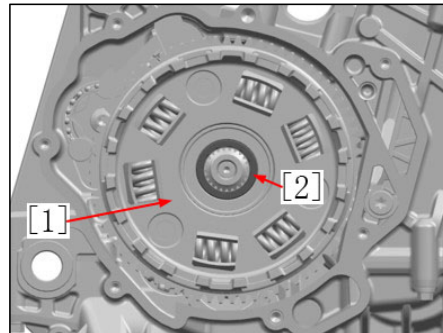
6. Install the washer [1].



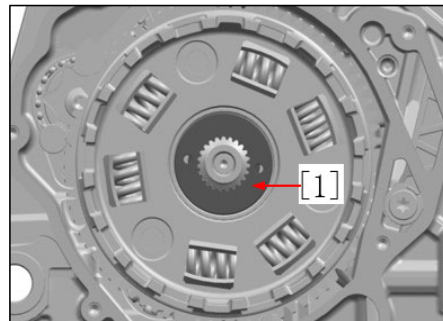
7. Place the housing assembly [1], gently rotate the housing assembly and the oil pump idler assembly back and forth to ensure smooth gear meshing, then install the needle roller bearing [2].

Notes

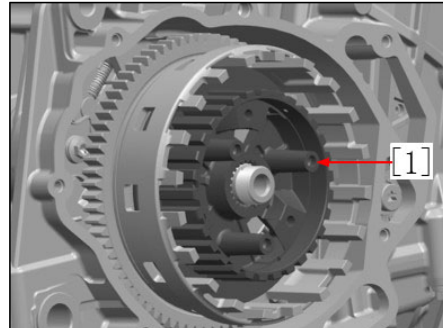
- Ensure the housing is properly installed, and the clutch housing driven gear is correctly meshing with the primary driving gear on the crankshaft and the oil pump idler assembly.



8. Install the spline washer [1].



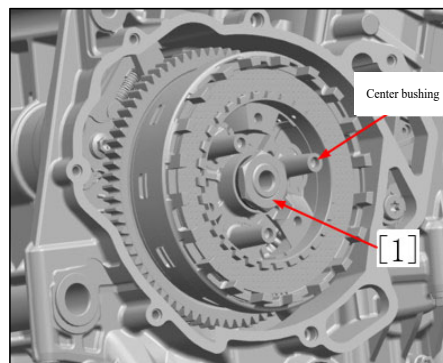
9. Install the center bushing.

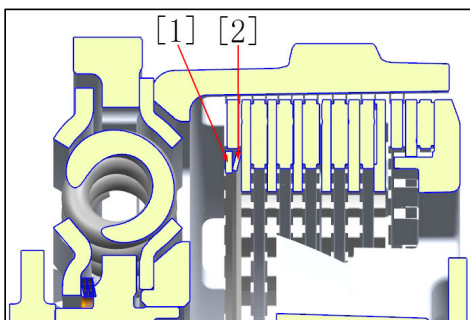


10. Install the hex nut [1] and double-stacked locking washer. Use a special tool (anti-rotation wrench) to lock the center bushing and fasten the hex nut [1] to the specified torque.

Note: Coat thread adhesive to the hex nut threads.

Torque: 90 N·m.

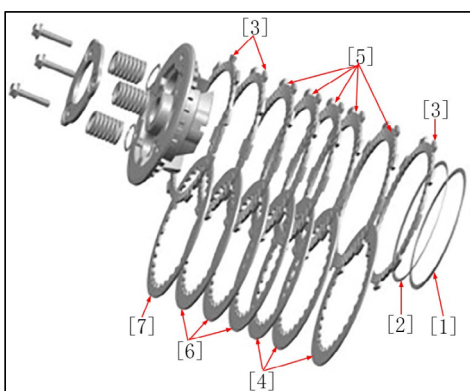




11. Install the disc spring washer [1] and the disc spring [2].

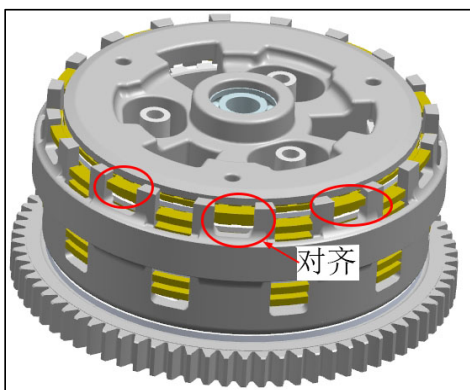
Note: The conical surface of the disc spring [2] should face the disc spring washer [1] on the small end, and the large end should face the steel plate end.

As shown in the right figure.



12. First, install the narrow friction plates [3], then install the 1.6mm thick steel plates [4] for 3 pieces, alternating with the wide friction plates [5] for 3 pieces. Next, install the 2mm thick steel plates [6] for 3 pieces, alternating with the remaining 2 wide friction plates [5]. Finally, alternate the narrow friction plates [3] with the 2mm thick narrow steel plates [7], with the last friction plate [3] positioned closer to the pressure plate and displaced from the other friction plates. The pressure plate is properly assembled and closely fitted to the friction plate.

As shown in the left figure, the friction plates and steel plates are assembled alternately.

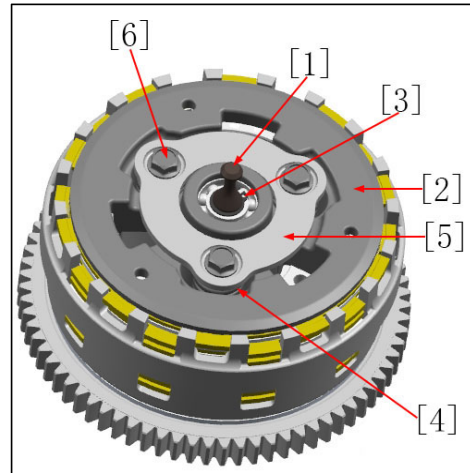


Notes

- Align the teeth of the friction plate with the gear grooves on the housing one by one. The top narrow friction plate aligns with the short gear groove of the clutch housing as shown in the right figure.

13. Install the clutch push rod [1] through the bearing bore of the pressure plate [2] and secure it in place with the snap ring [3]. Install the compression spring [4], the lifting plate [5], and the fastening bolt [6]. Tighten the pressure plate bolts gradually in several passes in a crisscross pattern, and torque them to the specified value.

Torque: 10 N·m

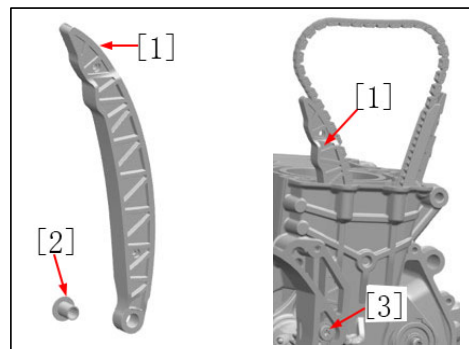


14. Install the chain tensioning panel [1] and the shaft sleeve [2]. Coat fastening agent to the thread of bolt [3] and fasten it securely.

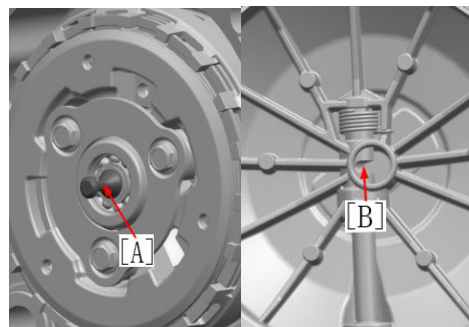
Torque: 15 N·m

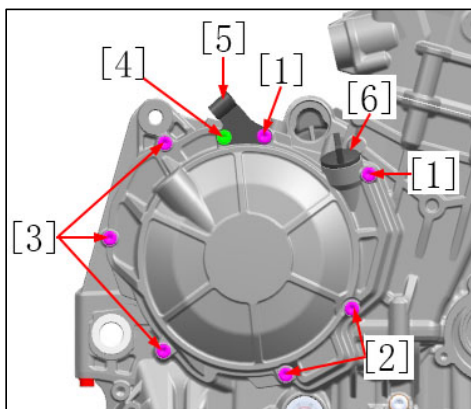
Notes

- Ensure there is no thread locker on the rod, otherwise, the tensioning panel may get stuck and cause damage.



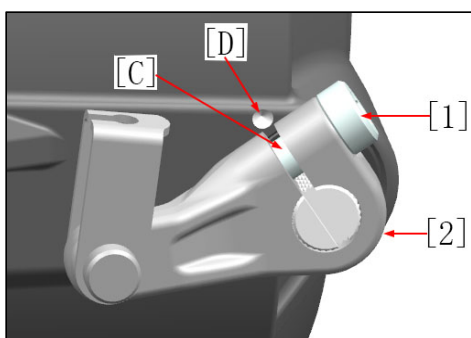
15. Install the dowel pin on the upper and lower cases. Align the clutch push rod (A) with the groove (B), then install the right crankcase cover and right crankcase gasket.





16. Install bolt [1] M6×35, bolt [2] M6×30, bolt [3] M6×25, bolt [4] M6×12, and the stay bracket [5], and pre-tighten them. Then tighten all bolts in a diagonal sequence. Tighten the fuel filler cap [6] and the new O-ring.

Bolt torque: 10 N·m



17. Remove the bolt [1] again. Remove the control arm assembly [2], adjust the angle, and reassemble it. Use a slotted screwdriver to rotate the control shaft clockwise to the end, then align the opening position (C) of the control arm assembly with the right cover marking point (D).

Bolt torque: 10 N·m

Transmission Shift Mechanism

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Transmission Shift Mechanism Specification

Item			Standard value	Maintenance limit value
Transmission mechanism	Gear bore inner diameter	Main 5th gear	28.007-28.02	28.22
		Main 6th gear	28.007-28.02	28.22
		Counter 3rd & 4th gear	30.007-30.02	30.22
		Counter 1st gear	28.007-28.02	28.22
	Outer diameter of bushing			
	Inner diameter of bushing			
	Main/counter shaft journal	Fit with the main 5th gear shaft bearing	23.991-24	23.971
		Fit with the main 6th gear bushing	23.991-24	23.971
		Counter 3rd & 4th gear	25.991-26	25.971
		Counter 1st gear	23.991-24	23.971
Shift fork and shift fork shaft	Shift fork shaft journal		11.77-11.78	11.37
	Shift fork inner diameter		11.8-11.818	11.838
	Thickness of shift fork tip		4.81-4.89	4.51

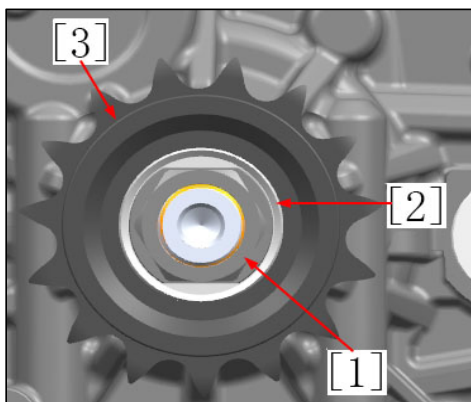
Transmission shift mechanism**Disassemble the main shaft/counter shaft/transmission drum****Note:**

Before disassembling the transmission shift mechanism, the following components must be removed:

1. Right crankcase cover
2. Clutch assembly
3. Left crankcase cover
4. Starting system
5. Oil pan section
6. Oil pump assembly
7. Case section

8. Lubrication cooling system

- Pay attention not to damage the joint surface of the case during maintenance.
- Clean the joint surface before assemble the case cover.
- Before closing the case, evenly apply the end sealant on the closing surface, and clean up the excess sealant.
- Each bearing liner should be kept in place and not moved, otherwise it may cause major damage to the engine.

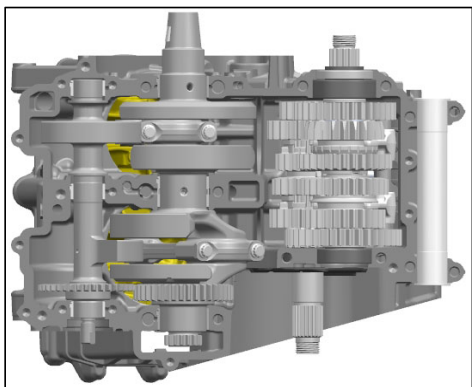


Disassemble the sprocket

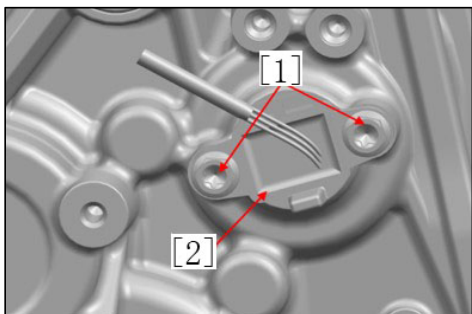
1. Remove the locking gasket, flatten the piece where the locking gasket is in close contact with the edge of the special-shaped nut using a tool, then shift to the gear position, and use a tool to disassemble the special-shaped nut [1], locking gasket [2], and sprocket [3]. The installation process is the reverse of the removal process.

When installing, ensure that the locking gasket horn opening faces outward.

Tightening torque: 100 N•m.



Disassemble and separate the upper and lower crankcase.

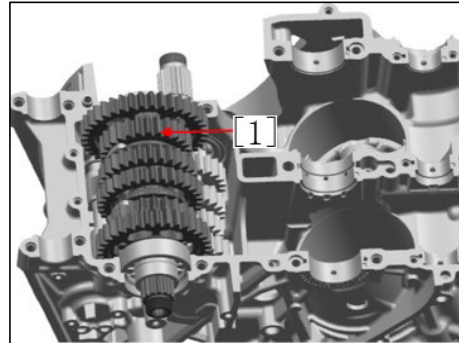


2. Remove the bolt [1] and the gear sensor [2].

The installation process is the reverse of the removal process.

Tightening torque: 6 N•m

3. Remove the counter shaft [1].

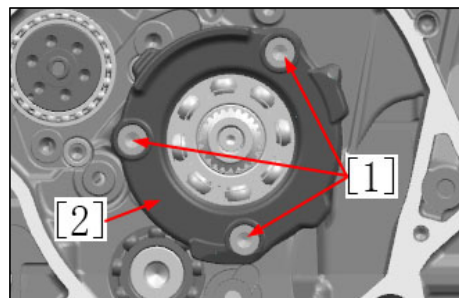
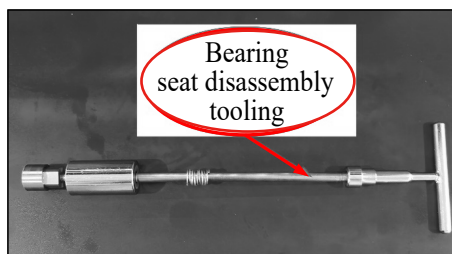
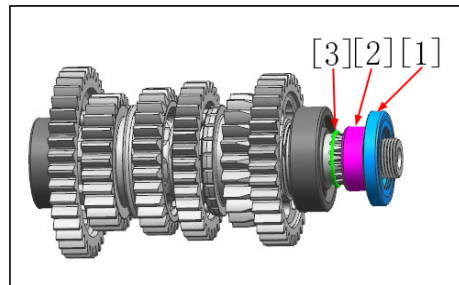


4. Remove the counter shaft oil seal [1], bushing [2], and O-ring

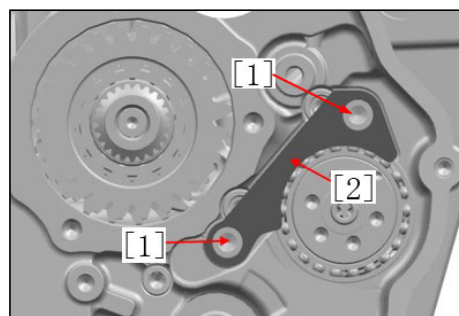
Notes

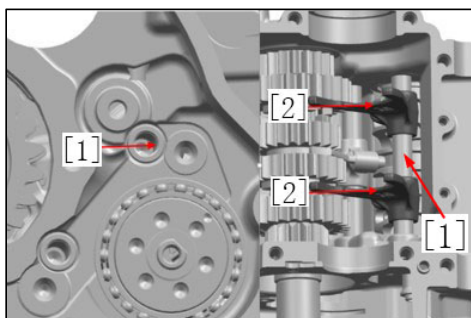
• Check the bearing and bushing for wear; replace if any is found.

5. Remove the hexalobular countersunk screw [1], then use the dedicated tooling to remove the bearing seat [2].

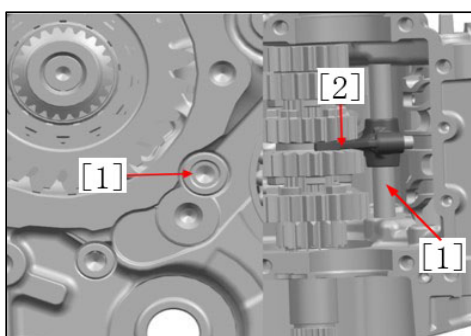


6. Remove the screw [1]. Remove the bearing baffle [2].



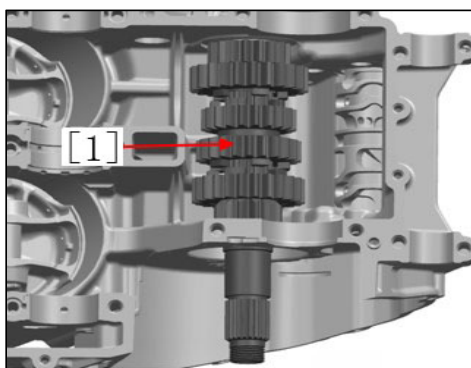


7. Install the appropriate M8 bolt on the countershaft shift fork shaft [1].
Remove the countershaft shift fork shaft [1] and the countershaft shift fork [2].

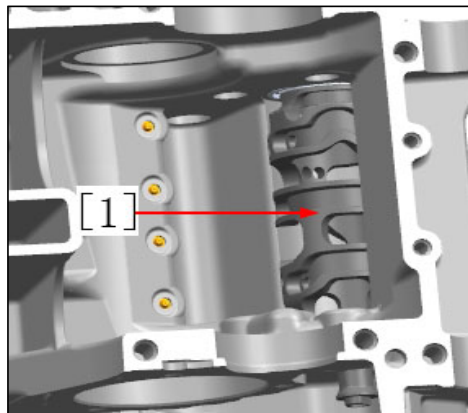


8. Install the appropriate M8 bolt on the main shaft shift fork shaft [1].
Remove the main shaft shift fork shaft [1] and main shaft shift fork [2].

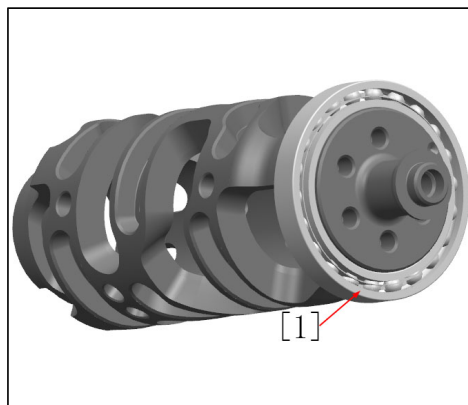
9. Remove the main shaft [1].



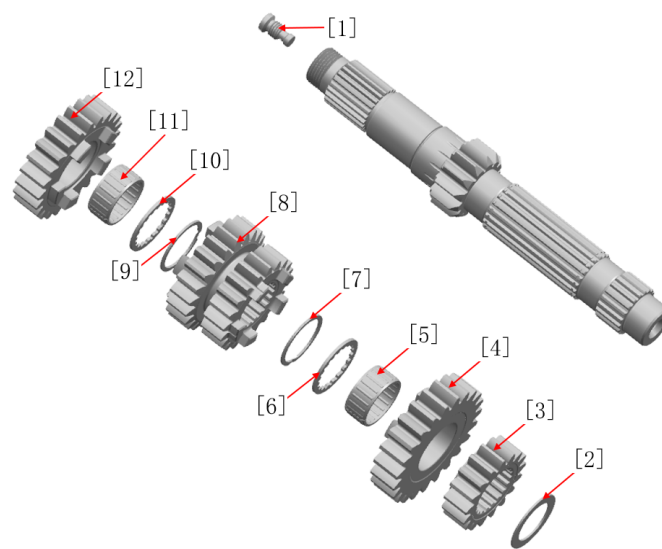
10. Remove the transmission drum [1] and the upper bearing section.



11. Remove the ball bearing [1].



12. Exploded View of Main Shaft



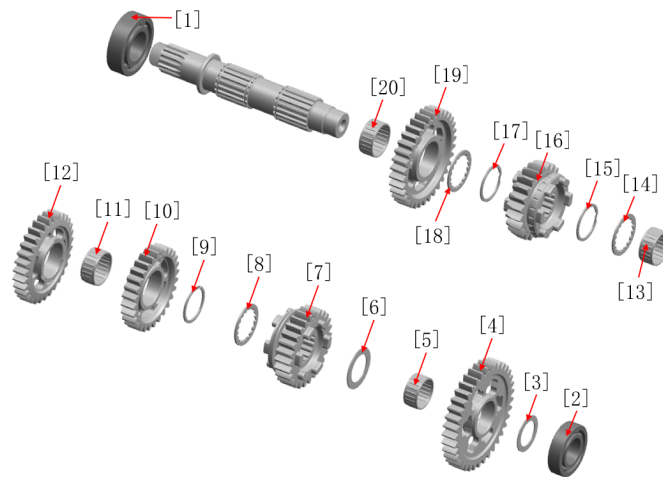
Fix Main Shaft

- Remove the oil passage plug [1].
- Remove the thrust washer [2] and main second gear [3].
- Remove the main sixth gear [4].
- Remove the needle roller bearing [5] and spline washer [6].
- Remove the spring washer [7].
- Remove the main third and fourth gears [8].
- Remove the spring washer [9].
- Remove the spline washer [10] and main fifth gear [12].
- Remove the needle roller bearing [11].

Notes

- Place the disassembled gear, bushing, washer and snap ring in a special container or in a straight line; Do not expand the circlip beyond its limit. When disassembling the circlip, first expand it, and then use the gear behind the circlip to push the circlip out;

13. Exploded View of Counter shaft



Fix Counter Shaft.

- Remove the bearing [1].
- Remove the bearing [2].
- Remove the thrust washer [3] and counter first gear [4].
- Remove the needle roller bearing [5] and thrust washer [6].
- Remove the counter fifth gear [7] and splined washer [8].
- Remove the spring washer [9] and counter fourth gear [10].
- Remove the needle roller bearing [11] and counter third gear [12].
- Remove the needle roller bearing [13] and spline washer [14].
- Remove the spring washer [15] and counter sixth gear [16].
- Remove the spring washer [17] and spline washer [18].
- Remove the counter second gear [19] and needle roller bearing [20].

Notes

- Place the disassembled gear, bushing, washer and snap ring in a special container or in a straight line; Do not expand the circlip beyond its limit. When disassembling the circlip, first expand it, and then use the gear behind the circlip to push the circlip out;

14. Main and counter shaft assembly

Clean all parts with solvent and let them dry thoroughly. Apply engine oil to the gear tooth surface, rotating surface and bearing;

Apply engine oil to the outer surface of the gear spline sleeve, the entire surface of the gear bushing, the rolling bearing rotation area and the gear transmission groove area.

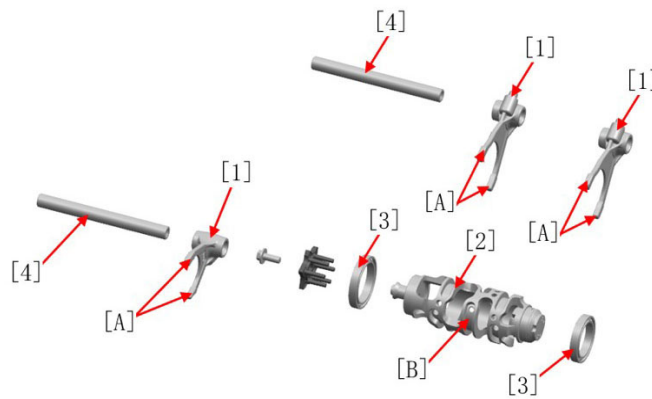
The installation process is the reverse of the removal process.

Notes

- Apply engine oil to each gear and check whether it rotates smoothly.
- Align the internal spline of the spline washer with the keyway.
- Use a new spring washer for each service.
- Ensure the spring washer is fully seated in the shaft groove after installation.

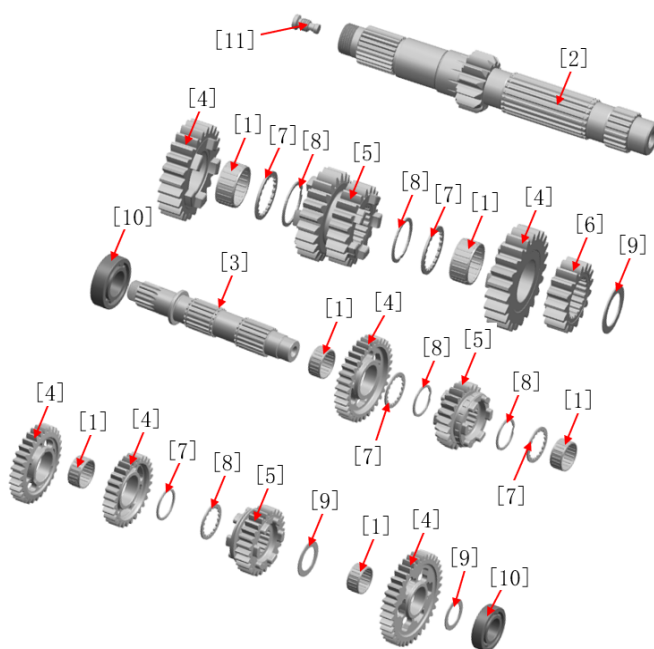
Transmission shift mechanism inspection and installation

- Check the shift mechanism
- Inspect the claw [A] of the main/counter shaft shift fork [1] for damage or wear (visually), and replace it with a new one if any is found.
- Check the transmission drum [2] groove [B] for wear. If any, please replace it with a new part.
- Check the transmission drum bearing [3] for any stuck or not smooth rotation. Replace the bearing if it is stuck or rolling is not smooth.
- Check the shift fork shaft [4] for wear. If any, please replace it with a new part.
- Check if the main/counter shaft shift fork moves smoothly on the shift fork shaft. If any abnormal, please replace it with a new part.



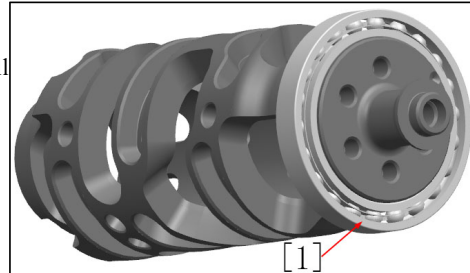
Check the drive transmission system

- Check if the needle roller bearing [1] is stuck or not rolling smoothly. Replace the bearing if it is stuck or rolling is not smooth.
- Inspect the main shaft [2] and counter shaft [3] bearing mounting shaft diameters for damage or wear. If any, please replace it with a new part.
- Inspect the main shaft [2] and counter shaft [3] for any damage or wear on the gear surfaces. If any, please replace it with a new part.
- Check the idler gear [4] for damage or wear on the gear surfaces. If any, please replace it with a new part.
- Check the idler gear [4] and sliding gear [5] shift positions for damage or wear. If any, please replace it with a new part.
- Inspect the idler gear [4], sliding gear [5], and fixed gear [6] for damage or wear on the gear surfaces. Please replace the gear set if any.
- Check the gear surface of the sliding gear [5] for damage or wear. Please replace the gear set if any.
- Check if the sliding gear [5] moves freely on the main shaft [2]. If the gear is stuck, replace the sliding gear or Main shaft.
- Check if the sliding gear [5] moves freely on the counter shaft [3]. If the gear is stuck, replace the sliding gear or counter shaft.
- Check the spline washer [7] for damage or wear. If any, please replace it with a new part.
- Use new spring washers [8] and thrust washers after each service.
- Check bearing [10] for damage or wear. If any, please replace it with a new part.
- Check if the oil passage plug [11] is clear. If the oil plug has a blockage, clean the oil passage plug and replace it with a new part if any.

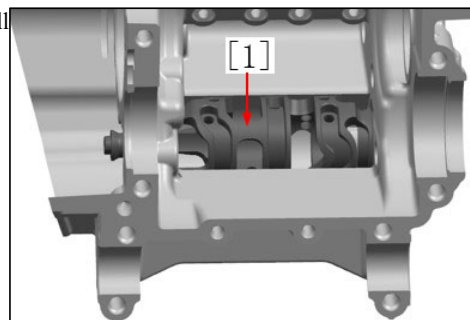


Assembly steps

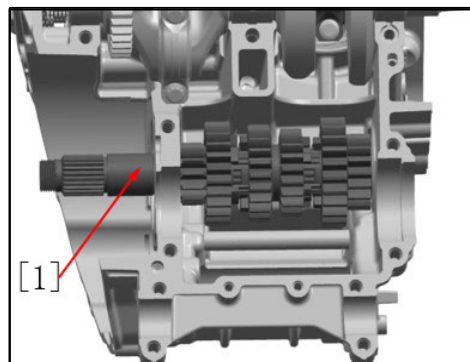
1. Secure the transmission drum and install the ball bearing [1]

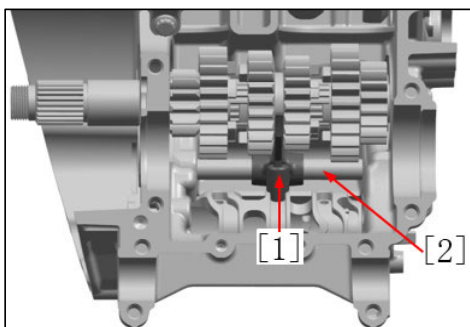


2. Install the transmission drum [1] and lubricate the ball bearings with engine oil.



3. Install the main shaft [1]

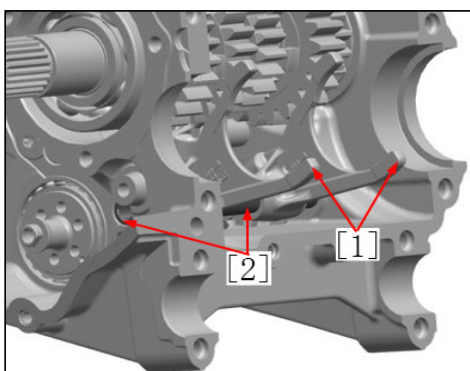




4. Place the main shaft shift fork [1]. Install the shift fork shaft [2].

Notes

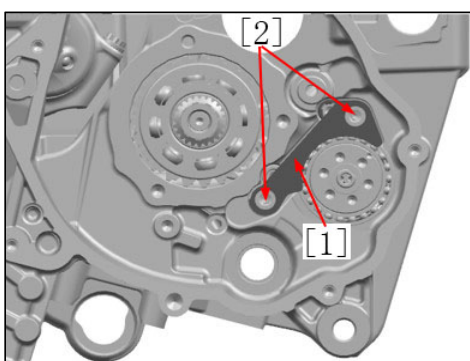
- The main shaft shift fork marked "EBSC" faces toward the sprocket.
- Coat engine oil to the working surface of the shift fork shaft for lubrication.



5. Place the countershaft shift fork [1]. Install the shift fork shaft [2].

Notes

- The countershaft shift fork labeled "EBS CR/L" faces the clutch.
- Coat engine oil to the working surface of the shift fork shaft for lubrication.



6. Place the bearing baffle [1]. Install and fasten the bolt [2].

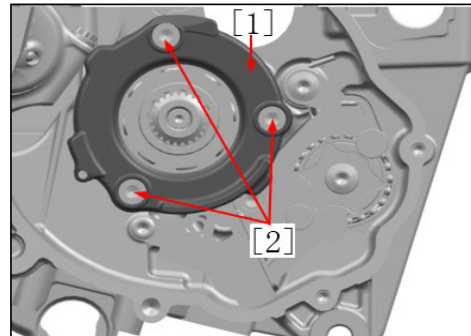
Notes

- Coat thread locker to the bolts.
- Torque: 6 N·m

7. Place the bearing seat [1] and bearing. Install and fasten the bolt [2].

Notes

- Coat thread locker to the bolts.
- Torque: 10 N·m



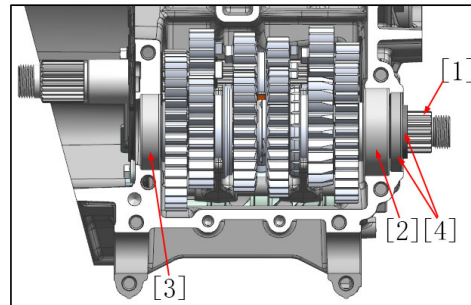
8. Place the counter shaft [1]. Roller bearing [2], ball bearing [3], counter shaft oil seal, bushing [4] and O-ring.

Notes

- After disassembling, it is necessary to replace the counter shaft oil seal and O-ring with new ones.

Install the lower case and fasten it securely.

Torque: For torque and fastening methods, see page 125 for details.

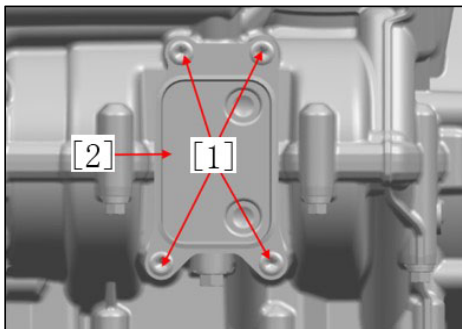


Lubrication Mechanism

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Section 7 Oil Pump/Oil Pan Installation Steps	217

Lubrication System Specifications

Item		Standard value	Ultimate state
Oil capacity	After disassembly and reassembly	3.2 Litre	/
	Recommended oil	2.8 Litre	/
	After replacing the engine oil fine filter	3.0 Litre	/
Recommended oil	Brand	AMSOIL dedicated oil	/
	Model	SN10W-50	/
	Grade	API quality grade: SN or above (do not use the oil marked as energy-saving on the circular API service label), JASO T903 standard: MA	/
Oil pressure sensor pressure		The upper limit value of engine oil alarm pressure is	-
Oil pump rotor	Clearance between inner and outer rotors	0.13-0.33bar	/
	Clearance between the outer rotor and the pump body	0.08-0.15	0.2
	Clearance between inner/outer rotors and pump body	0.14-0.23	0.3



Cooling and lubrication mechanism Disassemble cooling and lubrication mechanism

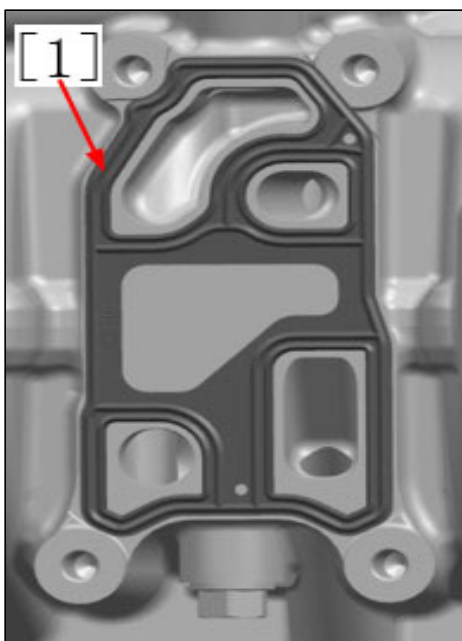
1. Oil cooler

Disassembly/installation

Remove bolt [1] and engine oil cooler [2].

Remove the oil cooler sealing gasket [1].

The installation sequence is reversed from the removal sequence.



Notes

• Ensure the "Outer Side" marking on the oil cooler sealing gasket faces outward.

Bolt fastening torque: 10 N·m

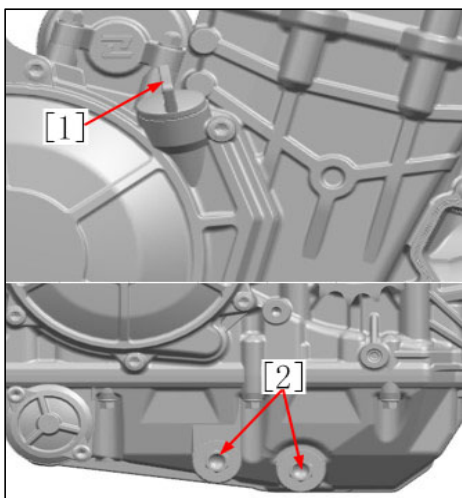
2. Oil full-flow filter

Disassembly/installation

Engine oil replacement: Stop the engine and remove the fuel filler cap [1]. Remove the drain bolt [2] along with the O-ring. Check the O-ring. Remove the oil full-flow filter and drain the oil. After draining the engine oil, install the oil full-flow filter and drain bolt [2] along with the O-ring. Tighten the oil drain bolt to the specified torque. Add engine oil up to the upper scale line on the turn.

Torque: 20 N·m

Engine oil adding volume (see page 29 for details).



3. Oil fine filter assembly

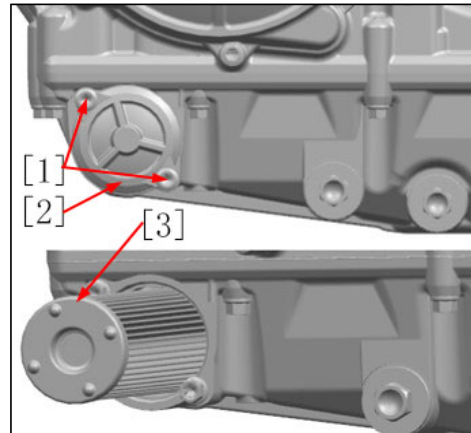
Disassembly/installation

Drain the engine oil and remove bolt [1].
Remove the engine oil fine filter cover [2] and the O-ring.

Remove the engine oil fine filter assembly [3].
The installation process is the reverse of the removal process.

Bolt fastening torque: 6 N·m.

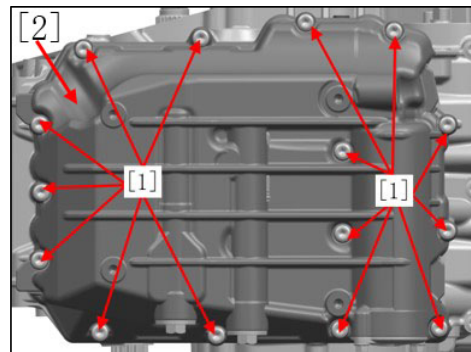
For the engine oil fine filter assembly, please refer to "Maintenance Cycle List" on page 21.



4. Oil pan/oil pump assembly

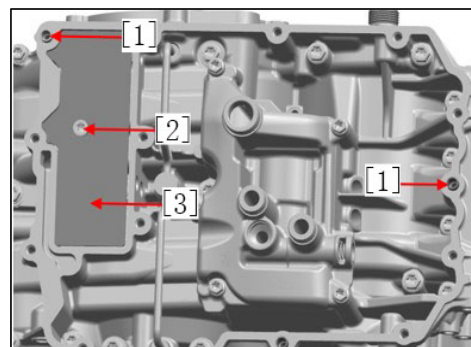
Remove the oil pan

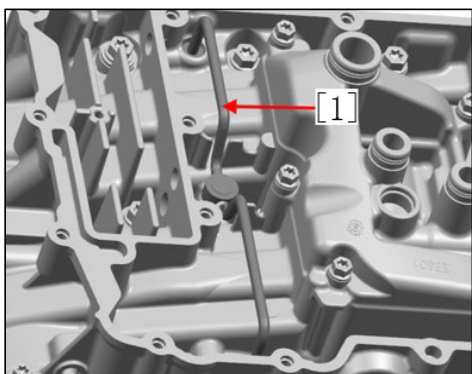
Remove the oil pan bolts [1] diagonally and remove the oil pan assembly [2].



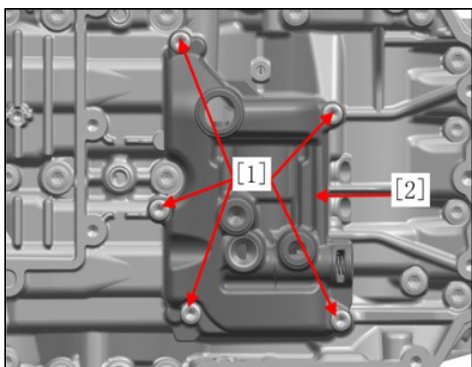
Remove the dowel pin [1] and oil pan gasket.

Remove the screw [2]; Remove the oil separator [3].

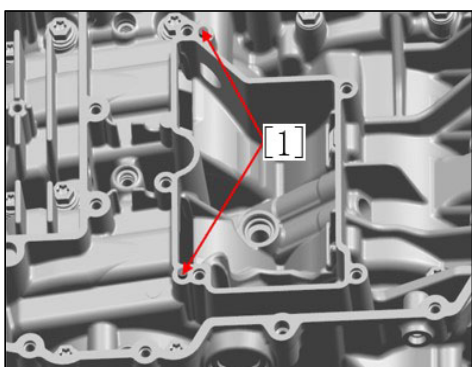




Remove the oil passage connecting pipe assembly [1].



5. Remove the oil pump assembly
Remove the bolt [1]; Remove the engine oil pump assembly [2].



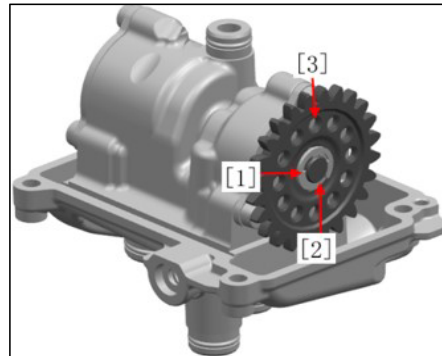
Remove the dowel pin [1].

6. Oil pump assembly

Disassemble/Assemble

Remove the snap ring [1] and gasket [2].

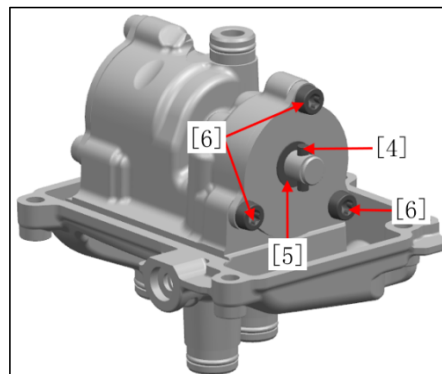
Remove the oil pump gear [3]



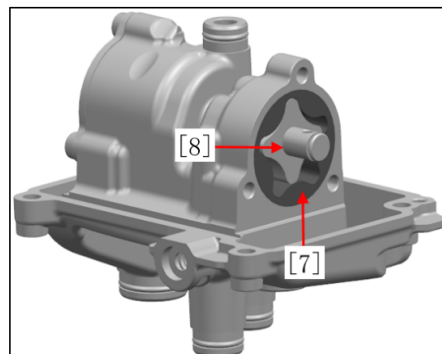
Remove the needle roller [4] and the gasket [5].

Remove the screw [6];

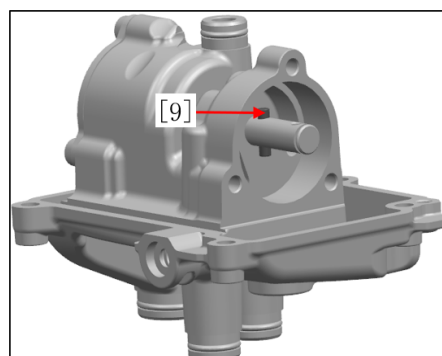
Remove the oil pump cover.

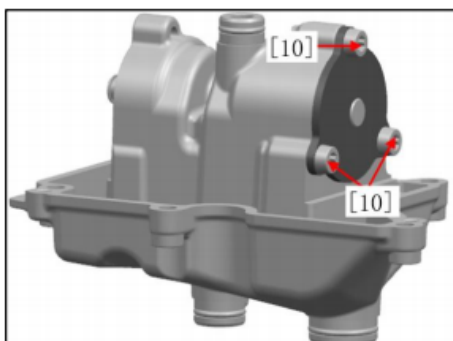


Remove the outer rotor [7]. Remove the inner rotor [8].

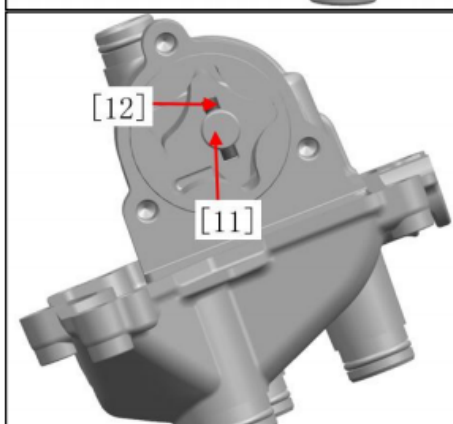


Remove the needle roller [9]

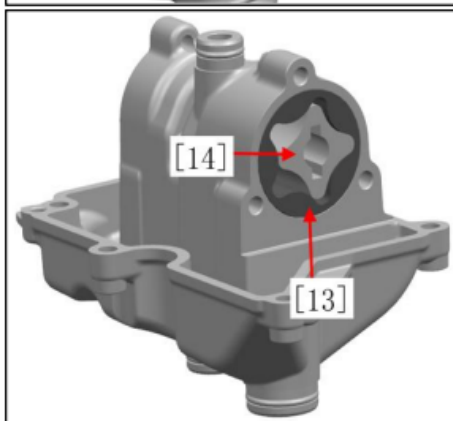




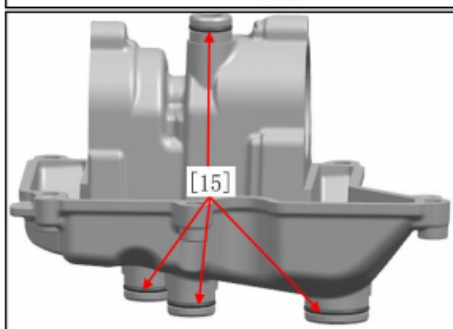
Remove the bolt [10]. Remove the oil pump cover.



Remove the oil pump shaft [11] and needle roller [12].



Remove the outer rotor [13] and inner rotor [14].



Remove the O-ring [15].

The installation process is the reverse of the removal process.

Notes

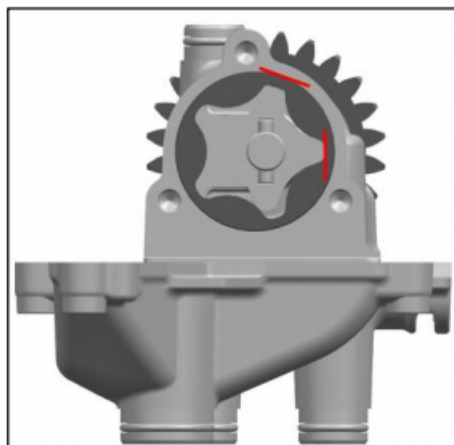
- After disassembly, replace the O-ring with a new one and coat engine oil.
 - Apply thread locker to the bolt.
 - After assembly, rotate the oil pump gear by hand for more than 2 turns to ensure there is no stuck.
- Bolt fastening torque: 10 N·m

Inspection and installation of oil pump/oil pan**Check the oil pump**

Use a feeler gauge to measure the clearance between the outer rotor and the oil pump housing, as well as between the inner and outer rotors.

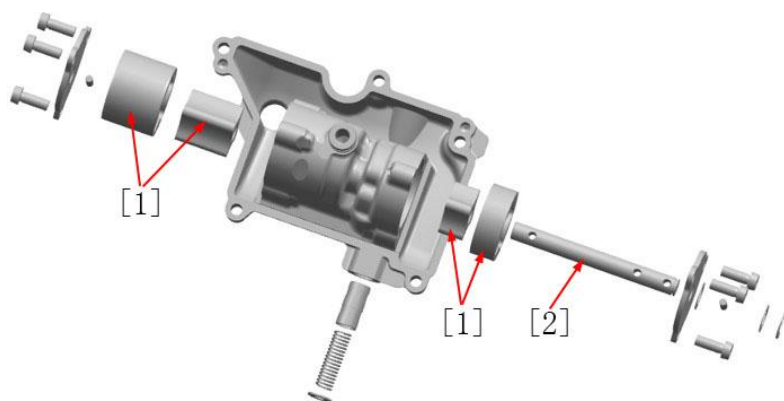
The clearance between the inner and outer rotors tips is ≤ 0.2 mm;

Clearance between outer rotor outer diameter and housing: 0.14–0.23 mm



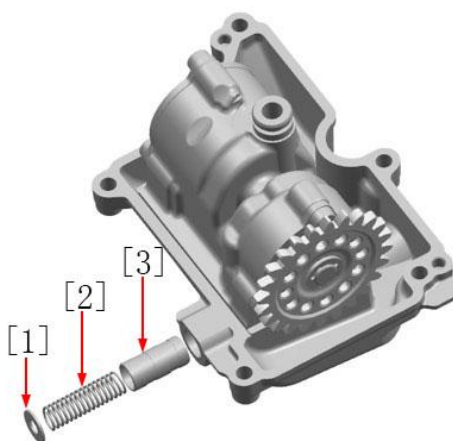
Inner and outer rotors and oil pump shaft inspection

- Check the oil pump inner and outer rotors [1] for damage or wear. Replace the oil pump if any damage or wear is found.
- Check the oil pump shaft [2] for damage or wear. Replace the oil pump shaft if necessary.
- Check the oil pump cover for damage or wear. Replace the oil pump cover if necessary.



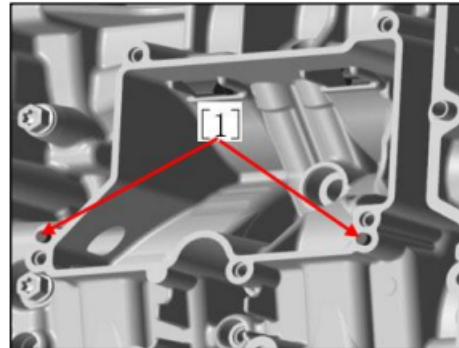
Oil pressure relief valve inspection

- Remove the washer [1].
- Remove the spring [2] and measure its free length. Minimum free length of oil pressure relief valve spring: 40 mm. If the length is less than the limit, replace the spring.
- Check the valve [3] for damage or wear. Replace if necessary.
- Ensure the valve [3] moves smoothly within the oil pump housing. If sticking occurs, replace the valve [3] or the oil pump housing. Thoroughly lubricate the valve [3] and spring [2], then install them. Install the gasket [1].

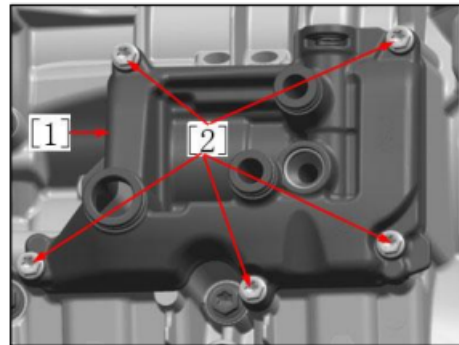


Assembly steps

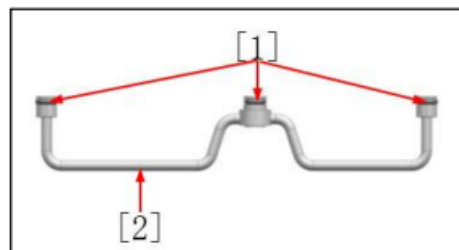
1. Install the dowel pin [1].



2. Lubricate the O-ring of the oil pump. Install the oil pump assembly [1]. Tighten the mounting bolts [2] to the specified torque. Torque: 10 N·m



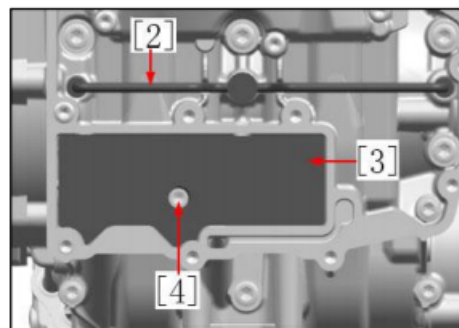
3. Apply lubrication to the new O-ring [1] and install it on the oil passage connecting pipe assembly [2]. Install the oil passage connecting pipe assembly [2].

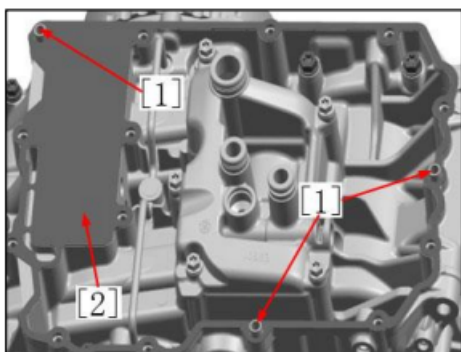


4. Place the oil separator [3]. Install and fasten the bolt [4].

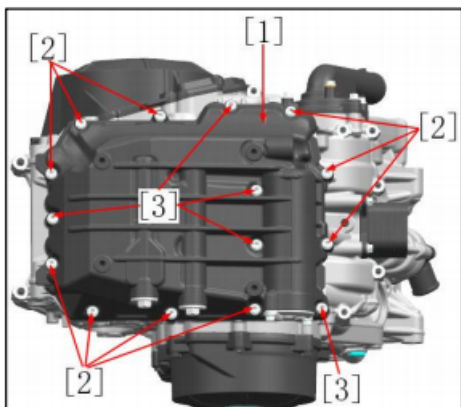
Notes

- Coat thread locker to the bolts.
- Torque: 3 N·m.





5. Install the dowel pin [1] and oil pan gasket [2].



6. Install the oil pan assembly [1], install 10 bolts M6×30 [2], install 5 bolts M6×35 [3], and fasten the bolts diagonally to the specified torque.
Torque: 10 N·m

Starting System

Section 1 Specifications of Magneto And Starting Clutch.....	222
Section 2 Disassemble Left Crankcase Cover/Double-Idler Gear Assembly	223
Section 3 Disassembly and Installation Of Magneto Rotor And Trigger	224
Section 4 Starting System Inspection	227
Section 5 Starting System Installation	228

Specifications of Magneto and Starting Clutch

Item	Standard value	Maintenance limit value
Outer diameter of starting disc gear shaft sleeve	51.69-51.703	51.67
Inner diameter of starting clutch housing	53-53.046	53.066

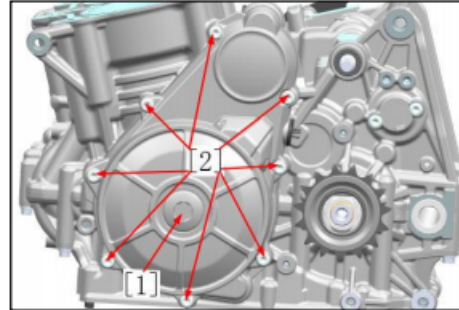
Starting system

Disassemble left crankcase cover/double-idler gear assembly

1. Disassemble the left crankcase cover
Remove the adjusting bore cap [1] and the O-ring.
Torque for adjusting bore cap: 10N·m.
Loosen the crankcase cover bolts [2] diagonally in several steps.

Notes

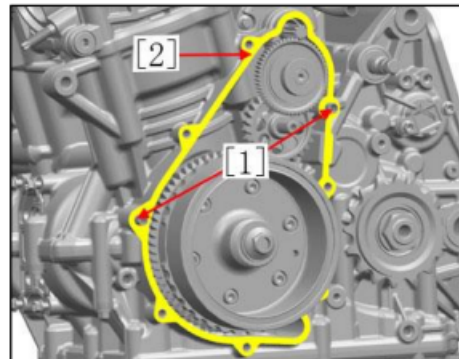
- The left crankcase cover (rotor housing) is subject to the rotor's magnetic attraction, so be careful when disassembling and installing.
- Replace the adjusting bore cap O-ring with a new one.



2. Remove the dowel pin [1] and the left crankcase cover gasket [2].

Notes

- Replace the left crankcase cover gasket with a new one.

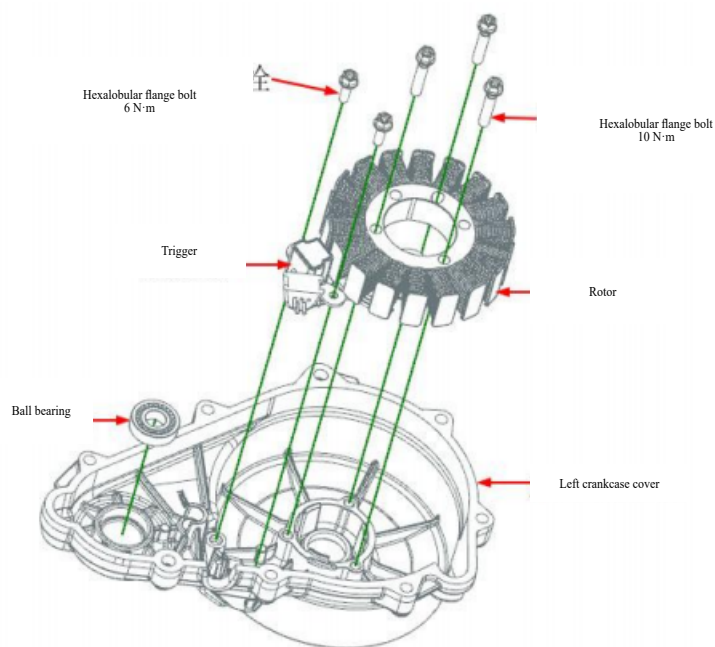


3. Magneto rotor and trigger Disassembly/installation

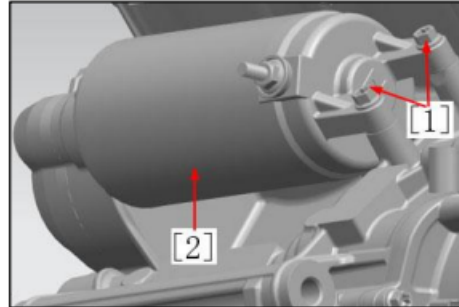
Remove the left crankshaft cover.

Disassemble and install the ball bearing/rotor/trigger as shown in the figure below.

- Coat thread adhesive to the thread of the rotor and trigger bolt.
- Use a special tool (inner bearing puller) to remove the bearing.
- Use a dedicated tool to press-fit the new bearing (secure the left crankcase cover during press-fitting).
- The installation sequence is reversed from the removal sequence.

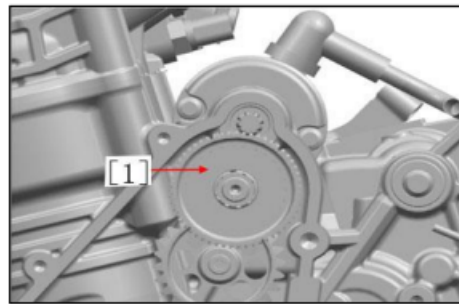


4. Remove the bolt [1] and the starting motor assembly [2].



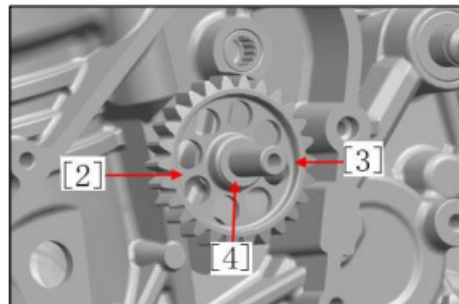
5. Remove the double-idler gear assembly [1] and the gasket.

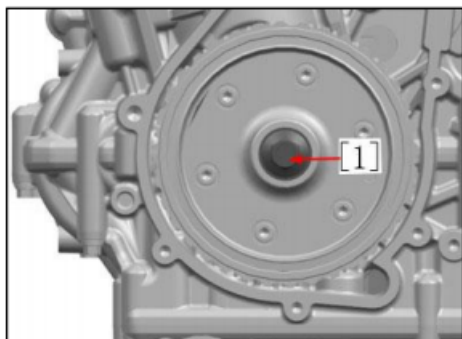
Note: The gasket is usually attached inside the engine.



6. Remove the idler mandrel [2], idler [3], as well as the needle roller bearing and gasket [4].

Note: The gasket is usually attached inside the engine.

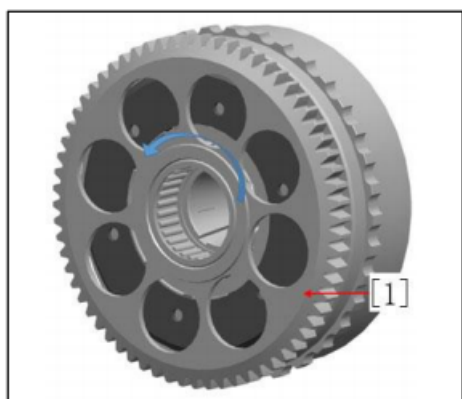




7. Remove the magneto bolt assembly [1].
Install special tools (press-fit tools).
Mount the special puller tool onto the magneto rotor.
Secure the special tool and, by tightening the bolt, remove the magneto rotor together with the electric starter gear assembly.

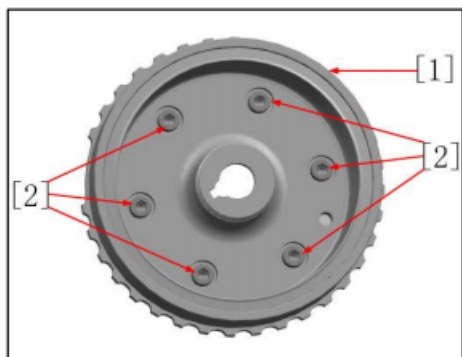
Notes

- To prevent damage to the crankshaft taper-end threads during removal, do not allow the tool to press directly against the crankshaft; instead, position the tool against the head of the bolt.

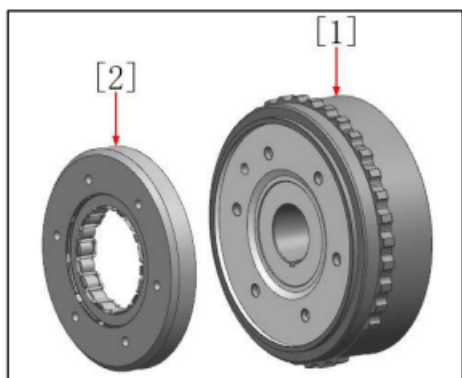


8. Disassemble the one-way clutch assembly.

Remove the rotor.
Rotate the electric starter gear assembly counterclockwise and remove it [1].



Secure the magneto rotor [1] using the rotor fixing tooling.
Remove the one-way clutch assembly fastening bolt [2].

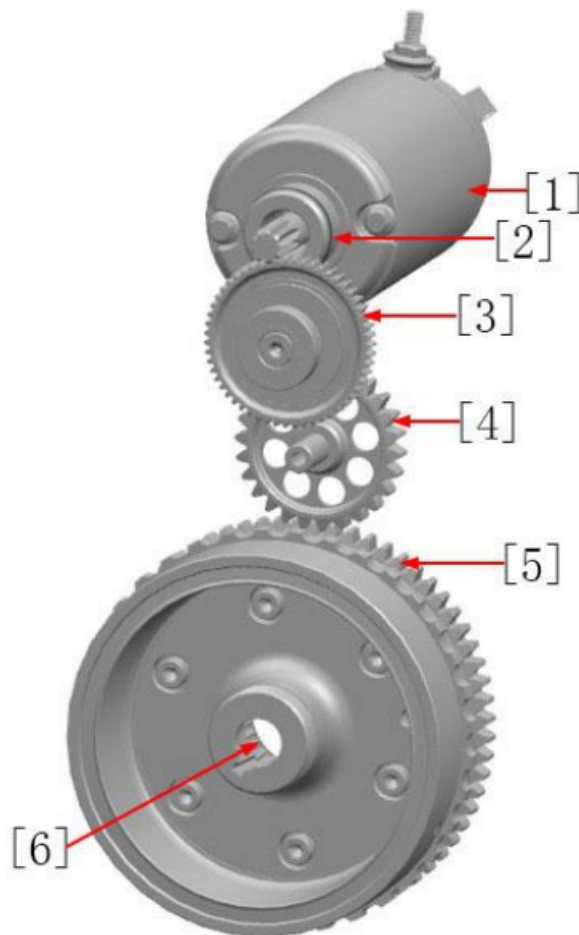


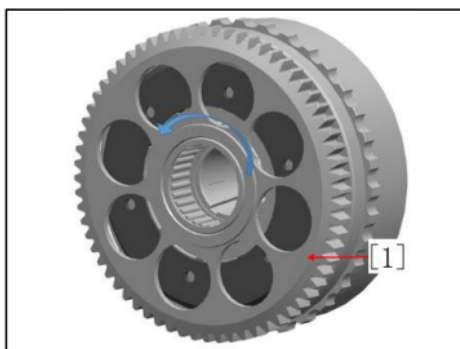
Remove the one-way clutch assembly [2] from the magneto rotor [1].

Starting system inspection and installation

Check the starting system

- Inspect the starting motor [1] gear for damage or wear. If any, replace the starting motor. Replace the starting motor and also replace the O-ring [2].
- Connect the negative wire of the 12V power supply to the housing of the starting motor and the positive wire to the interface of the starting motor. When the circuit is closed and the starting motor does not rotate, replace the motor.
- Inspect the double-idler gear assembly assembly [3] and bearings for damage or wear. Please replace the double-idler gear assembly assembly and bearings if any.
- Check the idler [4] and bearings for damage or wear. Replace the idler pulley and bearing if any.
- Check the electric starter gear [5] for damage or wear. Please replace it assembly if any.
- Check the gear meshing and the electric starter gear bearing [6] for any stuck or smooth issues. If there is stuck or not smooth rolling, replace the electric starter gear assembly.

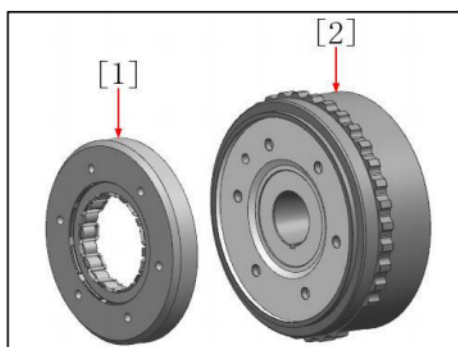
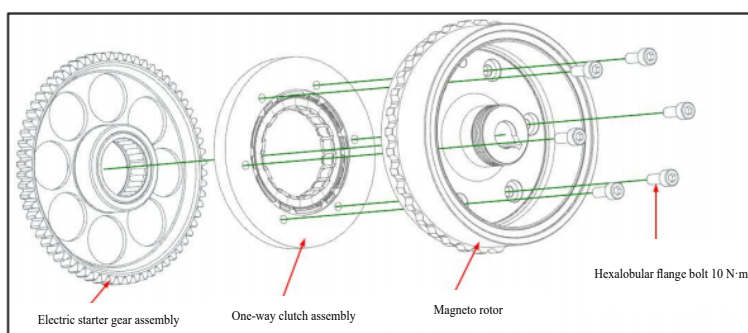




One-way clutch operation inspection

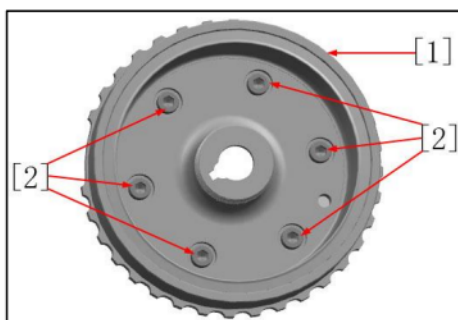
Check the operability of the one-way clutch assembly by rotating the electric starter gear assembly [1]. Check if the electric starter gear assembly rotates smoothly counterclockwise; clockwise rotation is not allowed. If it can rotate clockwise, the one-way assembly must be replaced.

Assembly steps



1. Apply clean engine oil to the contact surface of the one-way clutch assembly. Install the one-way clutch assembly [1] onto the rotor [2].

2. Secure the magneto rotor [1] using the rotor fixing tooling. Install and tighten the fastening bolts [2] to the specified torque.

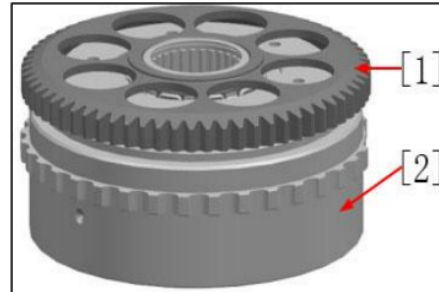


Notes

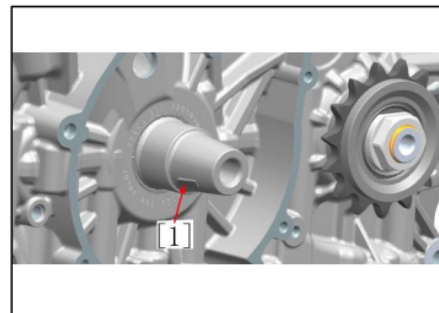
• Apply thread locker to the threads of the one-way clutch fixing bolt.

Torque: 10 N·m

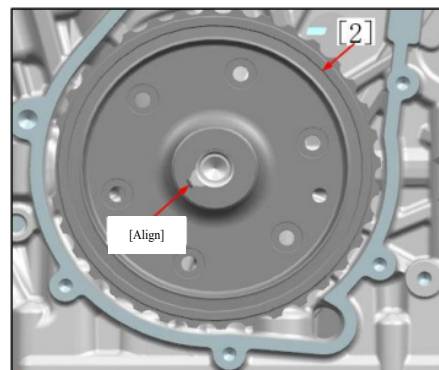
3. Rotate the electric starter gear assembly counterclockwise and install it onto the magneto rotor [2].



4. Check if the semi-circular key [1] is damaged. Thoroughly clean the engine oil and impurities from the crankshaft cone and the rotor bore.



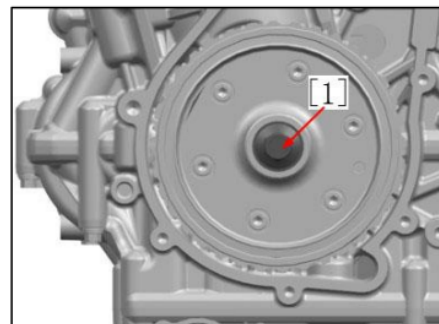
5. Install the magneto rotor [2], ensuring the semi-circular key on the crankshaft aligns with the keyway on the rotor.

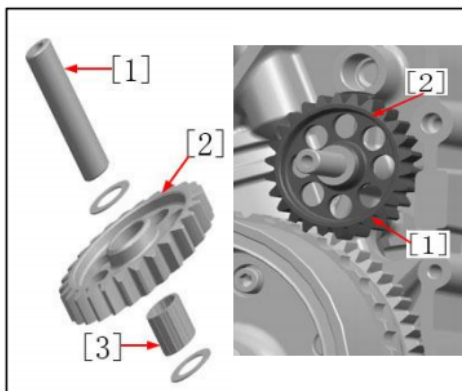


6. Coat the threaded surfaces and mounting surfaces of the rotor bolts with clean engine oil. Install the magneto bolt [1].

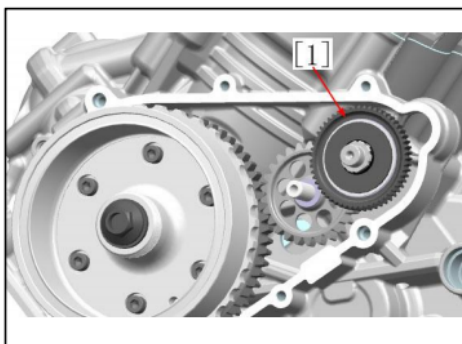
Secure the crankshaft with a locking bolt (see page 128 for details on magneto bolt tightening) and tighten the bolt to the specified torque.

Torque: 90 N·m



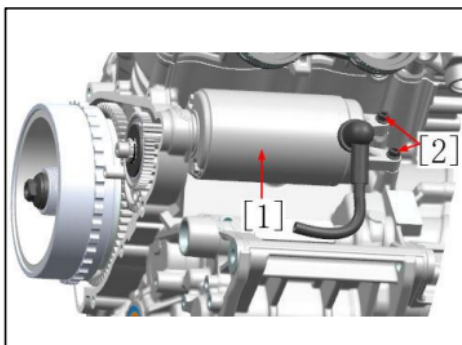


7. Idler mandrel [1], idler [2], needle roller bearing [3], and gasket.



8. Double-idler gear assembly [1] and gasket.

Note: The gasket is installed on the lower shaft bore end face of the double-idler gear assembly, while there is no gasket on the upper shaft hole end face.



9. Starting motor assembly [1], fasten with bolts [2] to the specified torque.

Notes

· Coat engine oil for lubrication of the O-rings on the starting motor assembly.

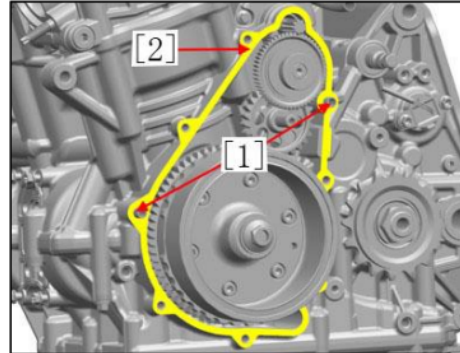
Torque: 10 N·m

Install the left crankcase cover

10. Install the dowel pin [1] and the left crankcase cover gasket

Notes

- Replace the left crankcase cover gasket with a new one.



11. Install the left crankcase cover

Install bolts [1] M6×35 and bolts [2] M6×30, then tighten the left crankcase cover bolts in a diagonal sequence.

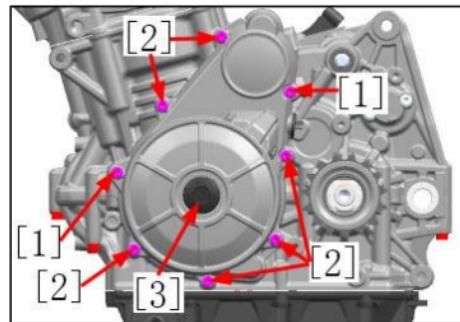
Install and adjust the bore cap [3] and the O-ring.

Bolt torque: 10 N·m

Torque for adjusting bore cap: 10N·m

Notes

- Replace the adjusting bore cap O-ring with a new one.



Front Wheel, Suspension, Steering

Section 1 Maintenance Instructions	234
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Section 3 Position of Components	235
Section 4 Front Wheel Assembly	236
Section 5 Steering Damper	237
Section 6 Front Shock Absorber	238
Section 7 Replacement Of Front Shock Absorber Oil	239
Section 8 Steering Handle and Components	242
Section 9 Steering Handlebar and Upper/Lower Connecting Plate Steering Stem Assembly	244

Maintenance Instructions

- In maintenance of front wheel, front shock absorber and steering stem, dedicated work bench or equivalent means shall be used to support the motorcycle.
- Do not operate the brake handle after the front and rear wheels are removed.
- After installing the front wheel, check the braking operation with the brake handle.
- After the front wheel is installed, conduct a clearance check. Standard: **0.5-1.2 mm**

Troubleshooting

Inflexible steering

- Insufficient tire pressure
- Faulty tire
- Over-tight adjusting nut on steering stem
- Wear or damage of bump steering retainer
- Steering stem bending

Turning to one side or not going straight

- Axle bending
- Incorrect installation of wheel
- Wear or damage of wheel bearing
- Damaged or loose steering bearing
- Frame deformation and damage
- Failure of wheel bearing

Front wheel shaving

- Bending and deformation of rim edge
- Faulty tire
- Wear or damage of wheel bearing
- Axle slack

Unbalanced tires and wheels

Wheels are difficult to turn

- Damaged wheel bearing
- Axle deformation
- Brake failure

Soft suspension

- Low tire pressure
- Metal fatigue of absorber spring
- Low liquid level in shock absorber
- Incorrect specification of absorber oil (low viscosity)

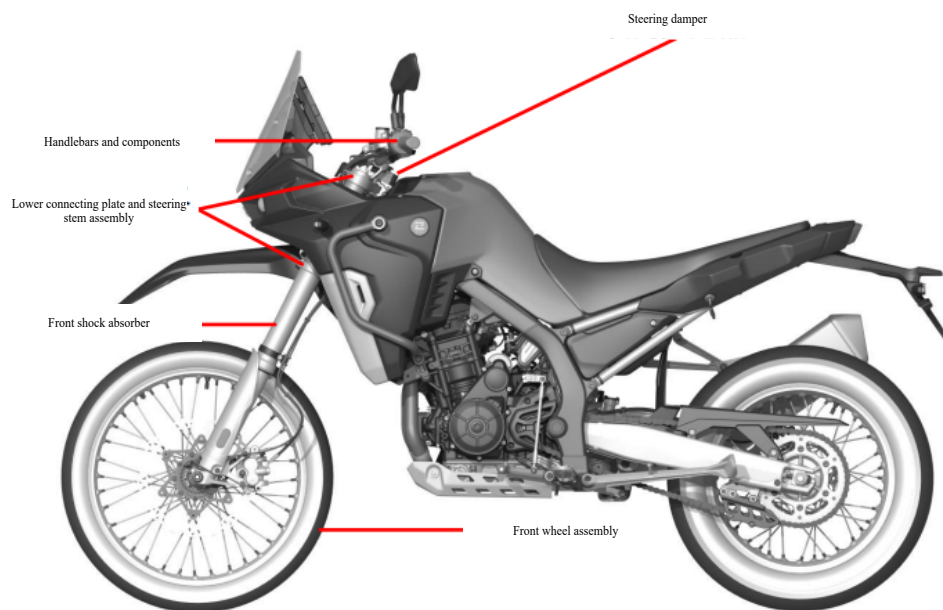
Hard suspension

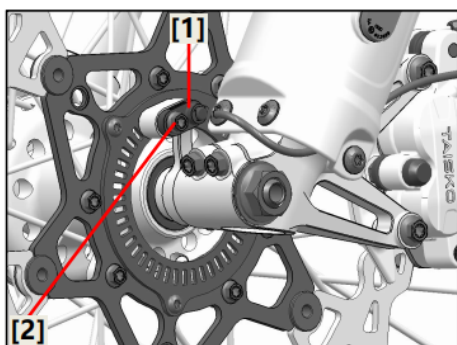
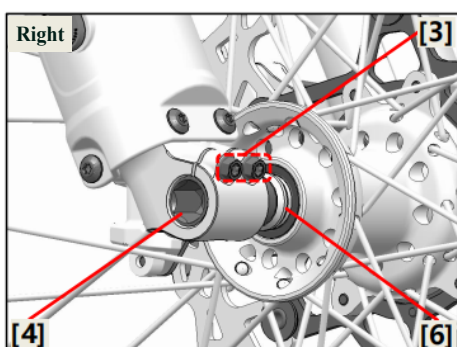
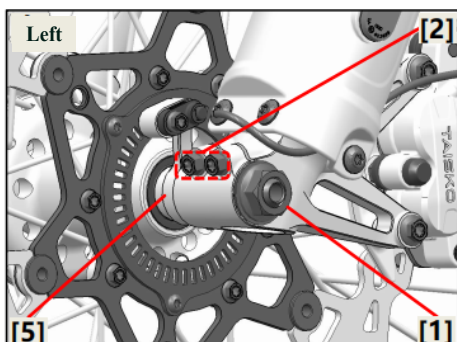
- High tire pressure
- Deformation of absorber components
- High liquid level in shock absorber
- Incorrect specification of absorber oil (high viscosity)
- Blockage in absorber oil passage

Abnormal noise from front suspension

- Loose absorber fastener
- Incorrect specification of absorber oil (low viscosity)
- Wear of slider on front absorber bushing

Position of Components





Note

- Wipe the tip and mounting area of the front wheel speed sensor [1] to remove any foreign matter.
- Install the speed sensor and tighten the bolt [2].
- Check the gap between the wheel speed sensor and the ring gears. Standard: 0.5-1.2 mm

※ Front wheel assembly

1. Place the vehicle on the workbench.

⚠ Warning

- The vehicle shall be supported firmly without the danger of overturning.

Notes

- Any type of magnet (including magnetic pickup tools, magnetic screwdrivers, etc.) should be kept away from the wheel speed sensor and the ring gear; otherwise, the sensor may be damaged, resulting in poor ABS system performance.
- Do not let the front wheel ABS ring gear fall or be impacted.
- If the front wheel ABS ring gear is stained with solvent, wipe it off immediately.

2. Disassemble:

- Front wheel axle locking nut [1]
- Left bottom cylinder bolt of shock absorber [2]
- Right bottom cylinder bolt of shock absorber [3]
- Lift the front wheels off the ground
- Pull out the front wheel axle [4]
- Left and right bushing [5][6]
- Front wheel assembly

Notes

- Do not operate the hand brake lever after disassembling the front wheel.
- During installation, apply a very small amount of grease in the groove between the main and auxiliary lips of the hub bearing oil seal.
- Never touch the surface of ABS ring gear with sharp objects.

3. Installation:

The installation sequence is reversed from the removal sequence.

Note

- Place the wheel between the front shock absorbers, carefully align the axle holes and insert the front wheel axle from the left side. Pre-tighten the shock absorber bottom cylinder shaft locking bolt to a torque of 5N·m.
- Tighten the front wheel axle locking nut to the specified torque.
- With the front brake engaged, move the front shock absorber up and down several times to seat the axle and check the operation of the brake.
- Tighten the shock absorber bottom cylinder bolts to the specified torque.

Torque:

Front wheel axle locking (nut)

88 N·m (8.8 kgf·m, 65 lbf·ft)

Front shock absorber bottom cylinder locking bolt

22 N·m (2.2 kgf·m, 16 lbf·ft)

Wheel speed sensor mounting bolt

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)

※ **Steering damper**

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Steering handlebar clamp [1]

See "Front Wheels, Suspension, Steering" on page 244 for details.

- Front shield of fuel tank [2]

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

3. Disassemble:

- Screw [3]
- Steering damper [4]
- Screw [5]
- Steering damper adjusting seat [6]

4. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

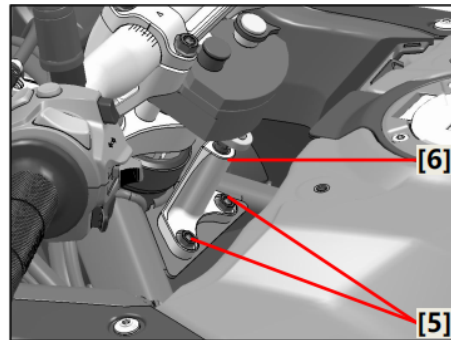
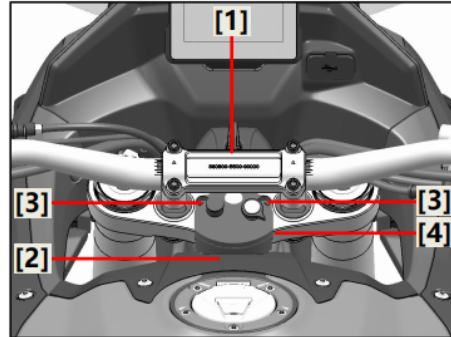
Steering damper and lower connecting plate

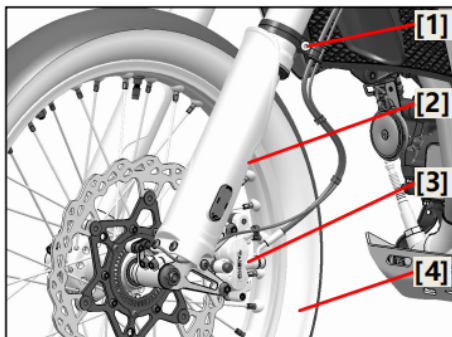
Steering damper adjustment seat and frame

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Notes

- Please refer to the vehicle manual for specific steering damper settings and adjustments.





※ Front shock absorber

1. Place the vehicle on the workbench.

⚠ Warning

- Support the vehicle firmly so as not to turn over.

2. Disassemble the front shock absorber:

- Front brake hose clamp [1]

- Front shock absorber trim (left and right) [2]

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

- Front brake caliper [3]

See "Hydraulic Braking System" on page 259 for details.

- Front wheel assembly [4]

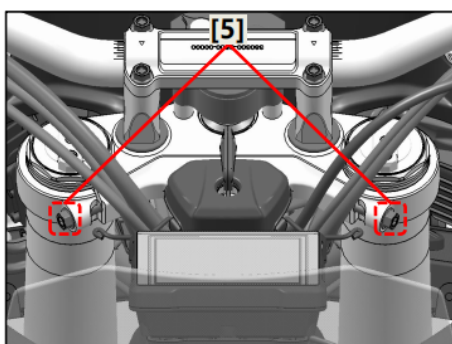
See "Front Wheels, Suspension, Steering" on page 233 for details.

Notes

- Do not hang the brake caliper on the brake hose.
- Do not operate the brake handle after removing the brake caliper.

⚠ Warning

- Support the front shock absorber first before loosening the locking bolts connecting the upper and lower plates.



3. Disassemble:

Loosen the upper connecting plate locking bolt [5], firmly support the shock absorber, loosen the lower connecting plate locking bolt [6], and pull the shock absorber outer cylinder [7]. Then rotate it downward to remove it from the bores of the upper and lower connecting plates until it is fully extracted.

4. Installation:

The installation sequence is reversed from the removal sequence.

Notes

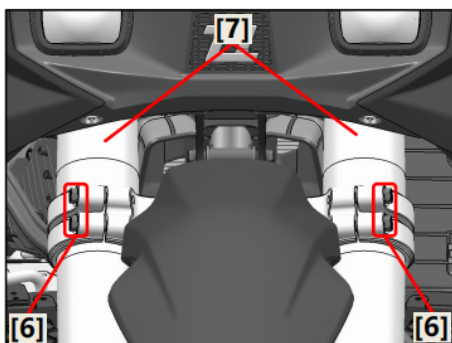
- When installing the lower connecting plate locking bolt, coat thread locker (Huitian 7262) on the threads.

Torque:

Mounting bolt of the upper connecting plate

Mounting bolt of the lower connecting plate

22 N·m (2.2 kgf·m, 16 lbf·ft)



※ Replacement of front shock absorber oil

The following procedure for removal of the front shock absorber applies to both left and right.

1. Disassemble;

- Front wheel assembly

See "Front Wheels, Suspension, Steering" on page 233 for details.

- Front brake caliper

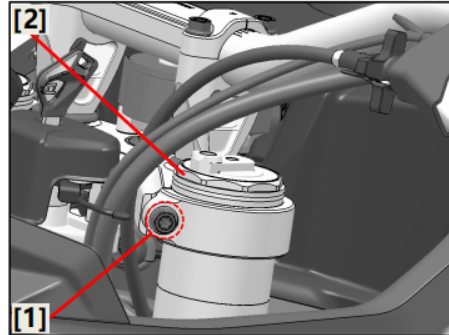
See "Hydraulic Braking System" on page 259 for details.

- Front shock absorber trim (left and right)

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

- Loosen the locking bolt [1] of the upper bracket

- Loosen the upper cover assembly [2] of the shock absorber adjustment inner chamber.



Notes

- If you plan to replace the front shock absorber oil, loosen the shock absorber adjustment inner chamber cover assembly.

- Do not remove the upper adjustment cover assembly of the front shock absorber inner chamber.

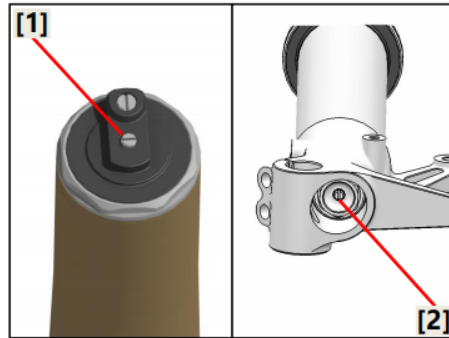
Use a special tool to loosen the upper cover assembly of the front shock absorber inner chamber.

Tools:

Locking nut wrench, 50mm

Notes

- Remove the inner chamber cover of the reducer.



2. Disassemble:

- Front shock absorber

See "Front Wheels, Suspension, Steering" on page 233 for details.

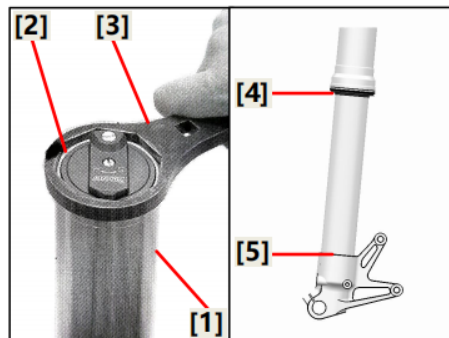
Notes

- Record the current positions of the compression damping adjuster [1] and the rebound damping adjuster [2].

- Turn the compression and rebound damping adjusters counterclockwise and set them to the softest positions.

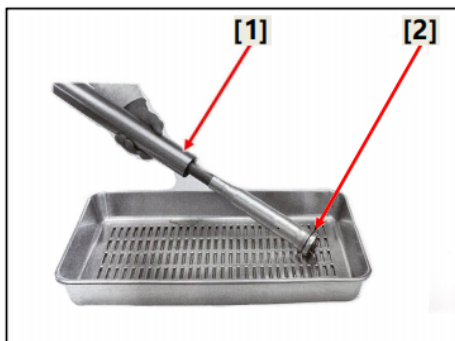
Hold the outer hose [1] and use a special tool [3] to remove the upper cover [2] of the front shock absorber from the outer hose

- Slowly slide the outer hose down until the dustproof seal [4] is on the bottom cylinder [5].

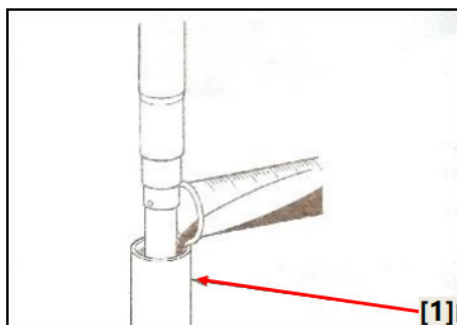


Tools:

Locking nut wrench, 50mm [3]



- Compress the outer hose [1] several times to drain the shock absorber oil from it, and then remove the O-ring [2] from the shock absorber.



3. Add:

Pour the recommended shock absorber oil into the fork tube [1].

Recommended shock absorber oil: AMSOIL

Thunder High-Performance Shock Absorber Oil

Shock absorber oil (viscosity: 10W)

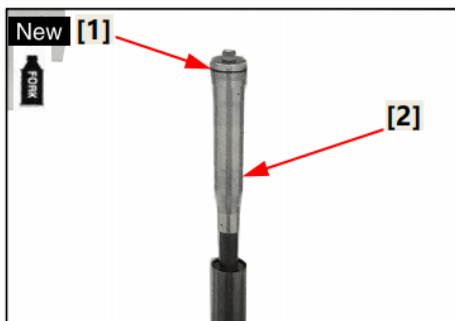
Standard shock absorber oil total capacity: 510±3ml

Shock absorber inner chamber (damper): 260±3 mL

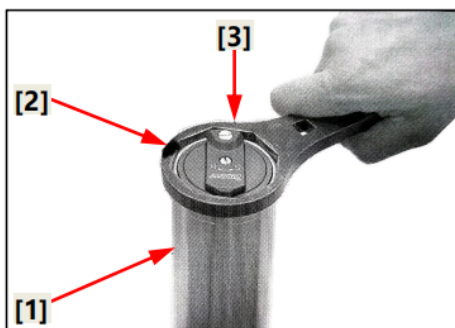
Shock absorber outer chamber (spring chamber) 350±3ml

Notes

· Pump the fork tube slowly several times to remove the trapped air at the lower part of the fork hose.



- Apply the recommended shock absorber oil to the new O-ring [1] and install the O-ring on the front shock absorber [2].



- Slowly pull up the outer hose [1].

Use a special tool to temporarily tighten the upper adjustment cover [2] of the shock absorber into the front fork tube.

Tools:

Locking nut wrench, 50mm [3]

Torque

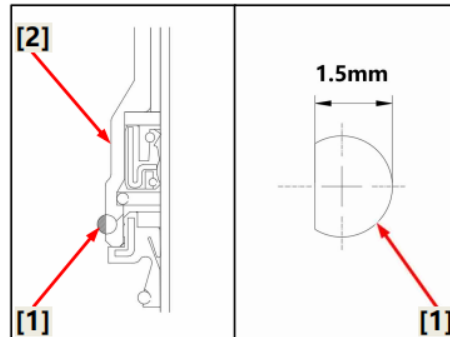
Front shock absorber spring chamber upper adjustment cap

30 N·m (3.0 kgf·m, 22 lbf·ft)

※ **Inspection of front shock absorber wear ring**

Check the operation of the front shock absorber by operating the front brake and compressing the front shock absorber several times.

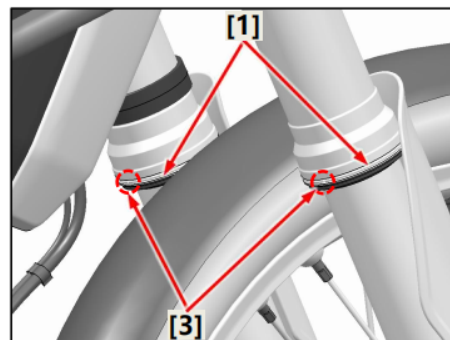
Check the entire front shock absorber assembly for signs of leakage, damage, or loose fasteners. Check if the decorative protector and the dustproof seal ring of the front shock absorber are clean, free of dirt or dust. Remove the dirt or dust accumulated at the bottom of the front shock absorber seal.

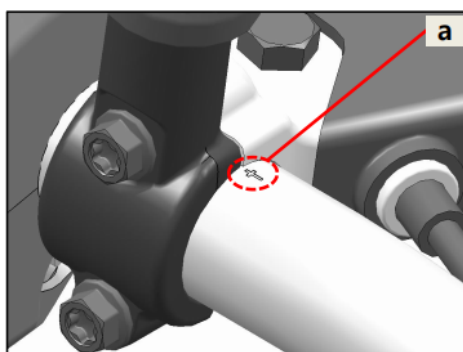
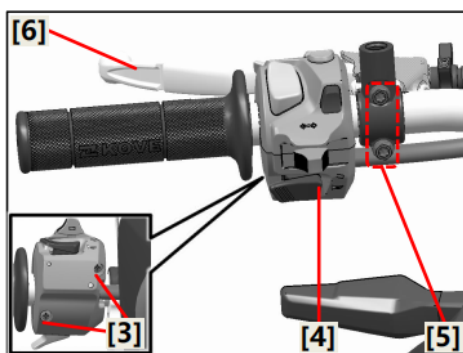
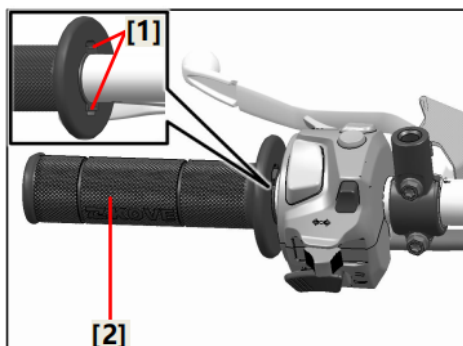


Check the wear ring [1] for wear or damage.

If the wear ring is less than 1.5 mm or flush with the front fork tube [2], replace the wear ring.

Ensure that the end clearance [3] of the wear ring faces backward.





※ Steering handle and components

1. Stand the vehicle on a flat surface.

⚠ Warning

• Support the vehicle firmly so as not to turn over.

2. Disassemble:

Right steering handlebar assembly

- Rear mirror (left)

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

3. Disassemble:

Left handlebar grip of steering handlebar

- Screw [1]

- Left handlebar grip [2]

4. Disassemble:

Handlebar switch combination-left

- Bottom screw of switch [3]

- Handlebar switch combination [4]

5. Disassemble:

Clutch handle

- Screw [5]

- Clutch handle [6]

6. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Clutch handle mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Handlebar switch mounting screw

3.0 N·m (0.3 kgf·m, 2.2 lbf·ft)

Handlebar grip mounting screw

7.0 N·m (0.7 kgf·m, 5.2 lbf·ft)

Notes

• Install the clutch handle fixing socket by aligning its mating surface with the marking point [a] on the left side of the handlebar.

1. Disassemble:

Right steering handlebar assembly

- Rear mirror (left)

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

2. Disassemble:

Right handlebar grip/accelerator

- Screw [1]
- Accelerator and handlebar grip [2]

3. Disassemble:

Handlebar switch - right

- Screw [3]
- Handlebar switch [4]

4. Disassemble:

Front brake pump

- Screw [5]
- Front brake pump handle [6]

5. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Front brake pump mounting bolts

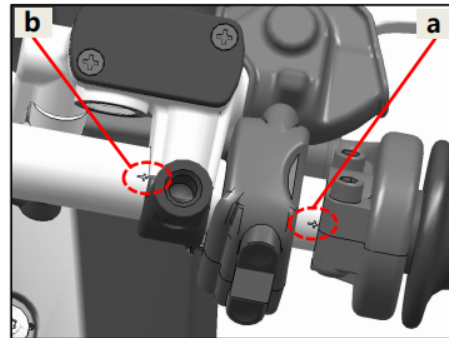
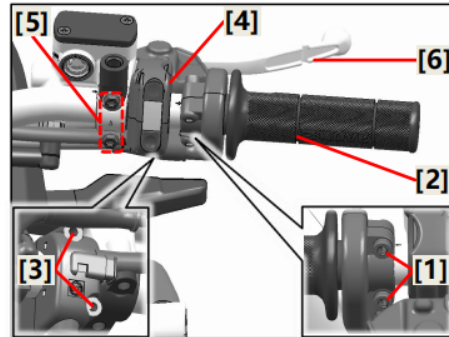
10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Oiler mounting bolt

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

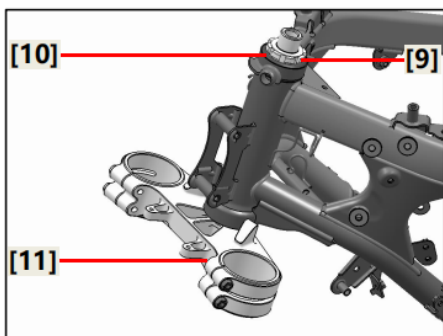
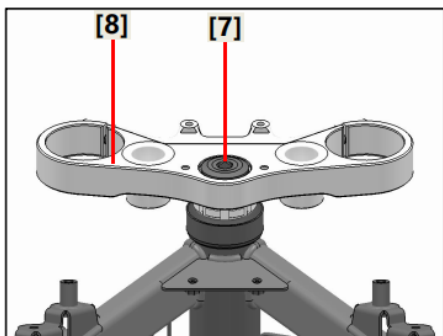
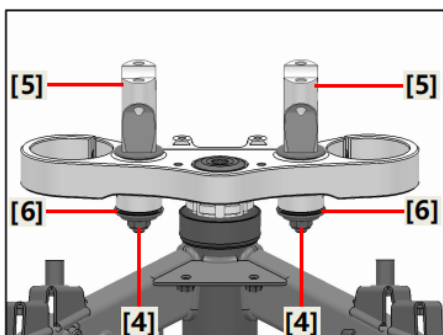
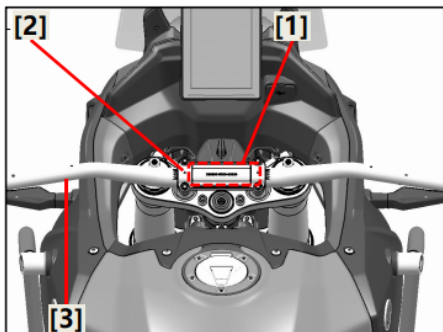
Handlebar switch right mounting screw

4.0 N·m (0.4 kgf·m, 3.0 lbf·ft)



Notes

- Align the joint surface of the refueling socket with the marking point [a] on the right side of the steering handlebar for installation.
- Align the joint surface of the front brake handlebar fixing socket with the marking point [b] on the right side of the handlebar for installation.



※ Steering handlebar and upper/lower connecting plates, steering stem assembly

1. Place the vehicle on the workbench.

▲ Warning

• Support the vehicle firmly so as not to turn over.

2. Disassemble:

Steering handle

- 4 bolts [1]
- Steering handlebar clamp [2]
- Steering handlebar [3]

3. Disassemble:

- Nut and flat gasket [4]
- Steering handlebar lower socket [5]
- Buffer rubber [6]

Notes

• The handlebar buffer rubbers are rubber products. If they are deformed or damaged, please replace them in time.

4. Disassemble:

Upper connecting plate

- Steering stem locking bolt and flat gasket [7]
- Upper connecting plate [8]

5. Disassemble:

Upper connecting plate and steering stem assembly

- Remove the 4-slot nut [9]
- Upper dustproof washer [10]
- Lower connecting plate and steering stem assembly [11]

6. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Upper and lower sockets on the steering handlebar
Lower end of double-ended thread bolt to upper connecting plate

22 N·m (2.2 kgf·m, 16 lbf·ft)

Upper end of double-ended threaded bolt to lower socket of steering handlebar

30 N·m (3.0 kgf·m, 22 lbf·ft)

Fastening nut between upper bracket and steering stem

70 N·m (7.0 kgf·m, 52 lbf·ft)

Steering stem locking 4-slot nut

First torque to 40N·m, then loosen and torque to 10N·m, and finally back off by 1/4 turn

Notes

• Head tube pressure bearing: (tapered roller bearing)
Model: Upper 32005 Lower 32006
Brand: (C&U Bearing).

Rear Wheel/Suspension

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Maintenance Instructions

- In maintenance of rear wheel, suspension and relevant components, dedicated work bench or equivalent means shall be used to support the motorcycle.
- Do not operate the brake pedal after the rear wheel is dismounted.
- After installing the rear wheel, step on the brake pedal to check the brake operation.
- After the rear wheel is installed, conduct a clearance check. (Standard: 0.5-1.2 mm)
- All suspension pivots and mounting points can only be replaced with original KOVE bolts and nuts.

Troubleshooting

Turning to one side or not going straight

- Non-uniform adjustment of drive chain adjuster
 - Axle bending
 - Wear of swingarm axle
 - Wheel vibration
 - Tire deformation
 - Wear or damage of wheel bearing
 - Improper tightening of axle
 - Damage to rear swingarm pivot bearing
 - Improper tightening of suspension assembly bolts
 - Unbalanced tires and rims
- Wheels are difficult to turn
- Damaged wheel bearing
 - Curved axle
 - Over-tight drive chain
 - Brake resistance

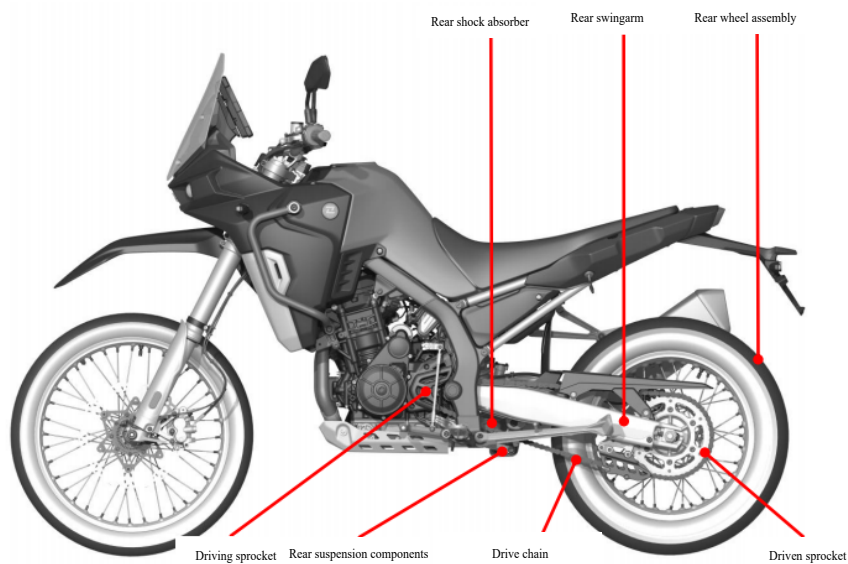
Soft suspension

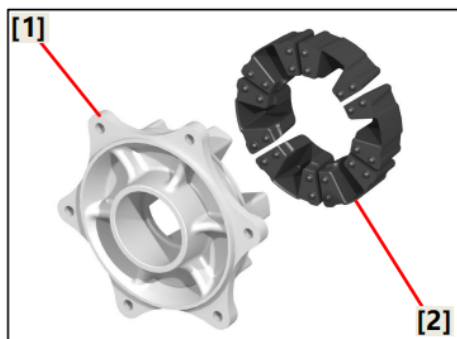
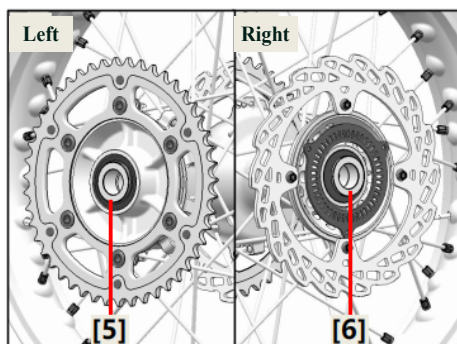
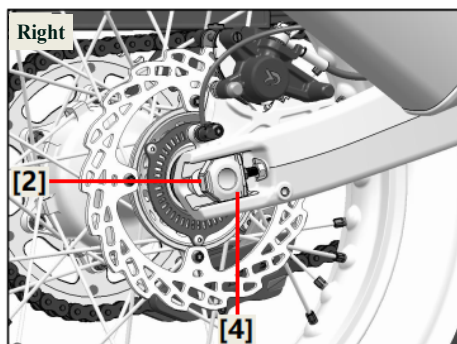
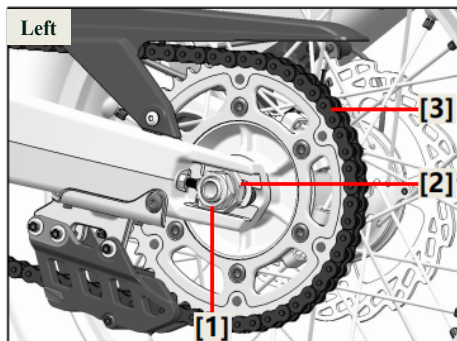
- Low tire pressure
- Improper adjustment of suspension
- Metal fatigue of absorber spring
- Oil leakage from shock absorber

Hard suspension

- High tire pressure
 - Improper adjustment of suspension
 - Bending of shock absorber rod
 - Damage to suspension or slewing pivot bearing
 - Improper tightening of slewing pivot
- Noise from rear suspension
- Loose suspension fasteners.
 - Wear or damage of suspension pivot bearing
 - Shock absorber failure

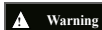
Position of Components





※ Rear wheel assembly

1. Stand the vehicle on a flat surface.



Warning

• Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Rear wheel locking nut [1]
- Withdraw the chain adjusters on both the left and right sides [2] so that the wheel can move forward
- Push the rear wheel forward to disengage the drive chain [3] from the large sprocket
- Hold the rear wheel and remove the rear wheel axle [4]
- Rear wheel assembly

3. Disassemble:

- Rear wheel T-shaped bushing - left [5]
- Rear wheel bushing - right [6]

Notes

- Do not hang the brake caliper on the brake hose.
- Do not operate the brake pedal after the wheel is disassembled.

4. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

Rear wheel axle locking nut

128 N·m (12.8 kgf·m, 95 lbf·ft)

Notes

- When installing the rear wheel, be careful not to let the brake caliper fall out of the rear swing arm boss or damage the brake pad.
- Apply a very small amount of grease to the groove between the main and auxiliary lips of the hub bearing seal during installation.
- Lubricate with high-temperature extreme pressure composite lithium grease (UNIVERSAL SU-T330Y or equivalent).

※ Inspection of buffer assembly

1. Check:

- Buffer [1]
- Crack/damage → Replace.
- Buffer rubber [2]
- Damage/wear → Replace.

※ Inspection of wheels and tires

Check tires for cuts, embedded nails, or any other signs of damage. Check that the front and rear wheels are properly installed. Ensure the tire is in a cold state, then use a tire pressure gauge to check the tire pressure.

Tire pressure:

Cycling on paved roads

Front wheels: 200 kPa (2.00 kgf/cm², 29 psi)

Rear wheels: 225 kPa (2.25 kgf/cm², 32 psi)

Cycling on unpaved roads

Front wheels: 200 kPa (2.00 kgf/cm², 29 psi)

Rear wheels: 200 kPa (2.00 kgf/cm², 29 psi)

☆ Adjust the tire pressure appropriately based on the specific usage requirements.

※ Inspection of rim damage and runout

1. Check:

Check the wheel rim [1] and spokes [2] for damage. Use a spoke wrench to tighten any loose spokes to the specified torque. Tighten the rim tire clip nuts [3] to the specified torque.

Tools

Front wheel: Spoke wrench, 6.0mm

Rear wheel: Spoke wrench, 7.0mm

Torque:

Front/rear wheel spoke nipples

6 N·m (0.6 kgf·m, 4.4 lb·ft)

Front/rear tire clamp locking nut

12 N·m (1.2 kgf·m, 9.0 lb·ft)

2. Measurement

- Radial wheel rim runout [1]

- Axial wheel rim runout [2]

Exceed the specified limit → Replace.

Wheel rim runout:

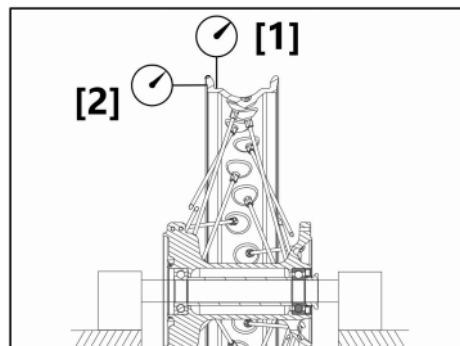
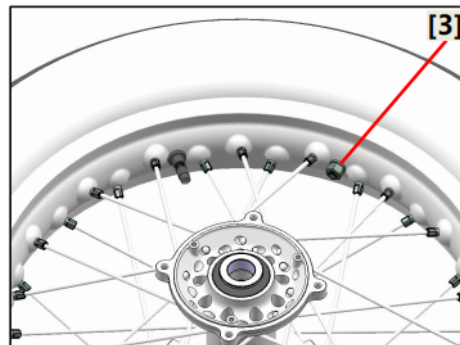
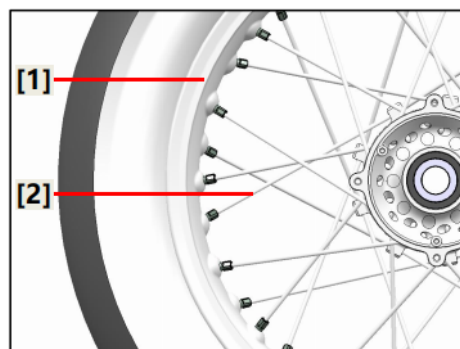
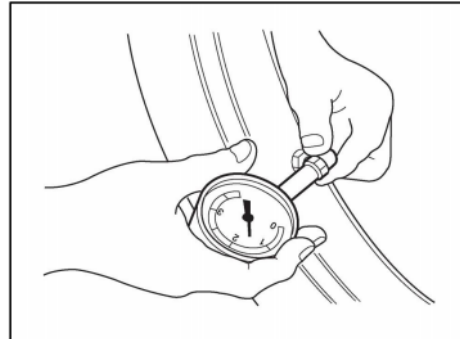
Limit value:

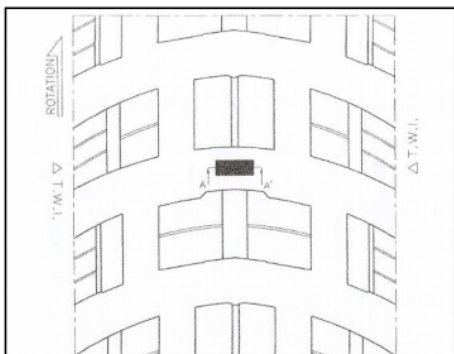
Front wheel: Radial: 2.0 mm

Axial: 2.0 mm

Rear wheel: Radial: 2.0 mm

Axial: 2.0 mm



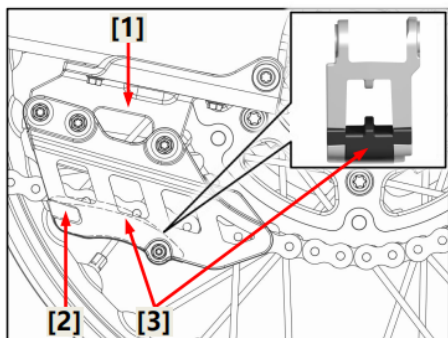
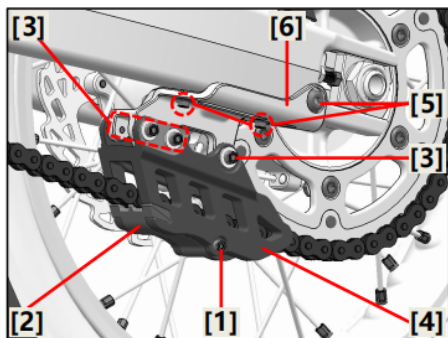


Notes

- ROTATON → Mark the tire rolling direction.
- Tire wear limit marks at Δ T.W.L. mark on sidewall and center of tire

Tire specifications:

Front wheel	90/90-21 54H	
	Chengxin/CST	EX01
Rear wheel	140/80-18 70H	
	Chengxin/CST	EX01
Type	Inner tube	



※ Replacement of tires

KOVE's tires provide outstanding handling, braking, durability, and comfort in various riding conditions.

▲ Warning

- Installing improper tires on your motorcycle can affect handling and stability, which may result in an accident or injury.
- Make sure to use the sizes and types of tires recommended in this manual.
- Driving a motorcycle with worn tires can lead to danger. Tires must be replaced immediately when the tread reaches the limit of wear.

When replacing tires, use original tires or equivalent tires of the same size.

When changing tires, ensure that the pattern, rated speed and load range of the new tires match those of the original tires.

※ Chain guide assembly

1. Stand the vehicle on a flat surface.

▲ Warning

- Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Guide slider mounting bolt [1]
- Guide slider wear block [2]
- Bolt [3]
- Chain guide [4]

3. Disassemble:

- Bolt [5]
- Chain guard mounting bracket [6]

4. Install and inspect:

The installation sequence is reversed from the removal sequence.

Torque:

Chain guide bracket mounting bolt

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)

15 N·m (1.5 kgf·m, 11 lbf·ft)

Chain guide mounting bolt

8.0 N·m (0.8 kgf·m, 6.0 lbf·ft)

Guide slider wear block mounting bolt

3.0 N·m (0.3 kgf·m, 2.2 lbf·ft)

Check if the chain guide [1] is deformed or damaged.

Notes

- If the frame of the chain guide box is deformed, it may hit the drive chain, causing the drive chain to fall off, wear or generate noise.
- Check if the wear block [2] of the chain slider has wear.
- If the wear block of the guide chain wears down to the position at the bottom [3], replace the wear block of the drive chain guide.

※ Swingarm/suspension assembly/rear shock absorber

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Rear wheel assembly [1]

See "Rear wheel/suspension" on Page 247 for details.

- Rear brake caliper assembly [2]

- Rear brake hose and wheel speed sensor harness [3]

See "Hydraulic Braking System" on page 259 for details.

Notes

- When removing or installing the rear swingarm, be careful with the rear brake hose to avoid excessive bending or damage.

- Do not operate the brake pedal after the wheel is disassembled.

3. Disassemble:

- Nut/bolt [4]

- U swingarm [5]

- Nut/bolt [6]

- Nut/bolt [7]

- Triangular cradle [8]

4. Disassemble:

- Gear shift lever bolt [9]

- Engine front sprocket cover [10]

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

- Nut and flat gasket [11]

- Rear swingarm axle (bolt) [12]

5. Disassemble:

- Side cover-right

See "Vehicle Body, Body Trim, Exhaust System" on page 59 for details.

- Bolt [13]

- Rear shock absorber assembly [14]

6. Installation:

The installation sequence is reversed from the removal sequence.

Torque:

U swingarm and frame

Swingarm and triangular cradle

U swingarm and triangular cradle

60 N·m (6.0 kgf·m, 44 lbf·ft)

Rear shock absorber upper mount to frame

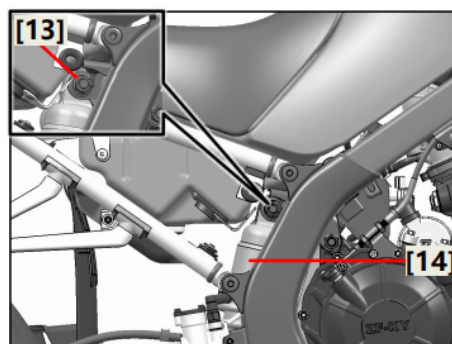
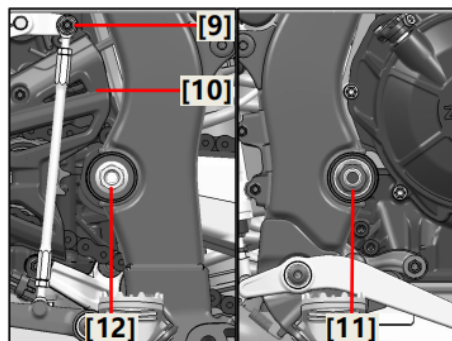
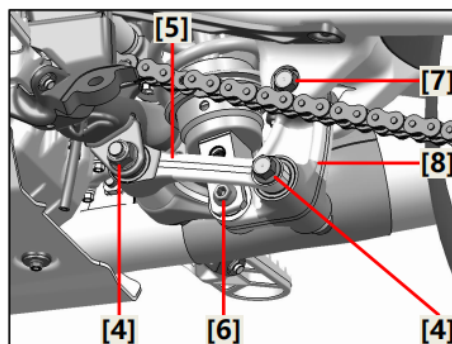
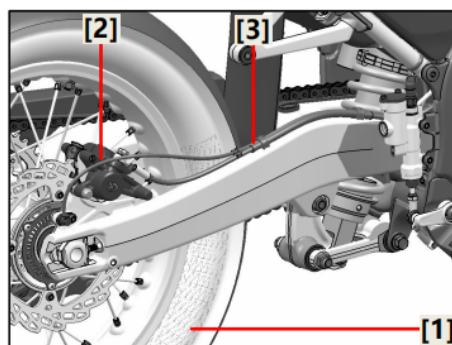
54 N·m (5.4 kgf·m, 40 lbf·ft)

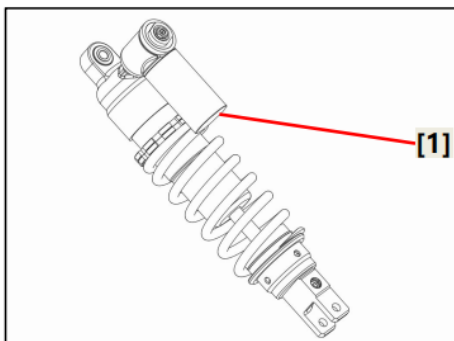
Rear shock absorber lower section and triangular cradle

44 N·m (4.4 kgf·m, 33 lbf·ft)

Swingarm axle (nut)

88 N·m (8.8 kgf·m, 65 lbf·ft)





Rear shock absorber assembly

Disposal of rear shock absorber

1. Before disposing of the rear shock absorber, the internal gas pressure of the shock absorber must be released. Drill a hole with a diameter of 2 - 3mm in the flat part of the gas cylinder [1] as shown in the figure.

Warning

- Wear goggles to prevent eye injury caused by released gas or metal debris.

Warning

- This rear shock absorber contains nitrogen compressed under high pressure. Before handling the rear shock absorber, please read and understand the following information. The manufacturer is not liable for any property or personal injury that may be caused by improper handling of the rear shock absorber.
- Do not modify or attempt to remove the rear shock absorber.
- Do not place the rear shock absorber around an open flame or any other high-temperature heat source, since the high temperature may cause excessive gas pressure and lead to an explosion.
- Do not use a rear shock absorber that is deformed or damaged. A damaged shock absorber will result in a decline in performance.

Disassemble the rear shock absorber assembly

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

Note

- Support the vehicle with the maintenance bracket so that the rear wheel is lifted
- When removing the bolt, fix the swingarm to prevent it from falling down.

2. Disassemble:

Rear shock absorber

See "Rear wheel/suspension" on Page 253 for details.

Check the rear shock absorber assembly

3. Check:

- Rear shock absorber inner rod

Bent/damage → Replace the rear shock absorber assembly.

- Rear shock absorber assembly (built-in airbag)

Bent/damage → Replace the rear shock absorber assembly.

- Bushing

- Spring

Damage/wear → Replace the rear shock absorber assembly.

- Size ovvf Bolts

Bent/damage/wear → replace.

※ Inspection and adjustment of slack of drive chain

1. Place the vehicle on the workbench.

Warning

- Support the vehicle firmly so as not to turn over.

Notes

• An overly tight drive chain can overload the engine and other major components, and an overly loose drive chain can cause slippage and damage the rear flat swingarms or cause an accident. It is therefore necessary to ensure that the drive chain slack is within the specified limits.

2. Put the vehicle in neutral.

3. Check:

- Slack drive chain

Off-specification → Adjust.

Note

• Lift the drive chain upward from the position indicated by the arrows as shown in the right figure and measure the distance [a] between the centers.

Standard: 35-50 mm

Limit: 50 mm

Notes

• Improper slack in the drive chain can overload the engine and other critical components of the motorcycle, leading to chain slippage or breakage. If the drive chain slack exceeds the specified limit, it may damage the frame, swingarm, and other parts. To prevent this, maintain the drive chain slack within the specified limit.

4. Release:

- Rear wheel axle nut [1]

See "Rear wheel suspension" on page 247 for details.

5. Adjustment:

- Looseness of transmission chain

a. Loosen the drive chain adjusting block locking nuts on the both sides [2].

b. Turn the two drive chain adjusting block bolts [3] until the specified range of drive chain slack is obtained.

Note

• To maintain correct wheel alignment, make sure to align the adjusting blocks on both sides with the scale marking line [4].

• There shall be no clearance between the adjusting blocks and the head of the adjustment bolt.

c. Tighten the rear axle nut to the specified torque.

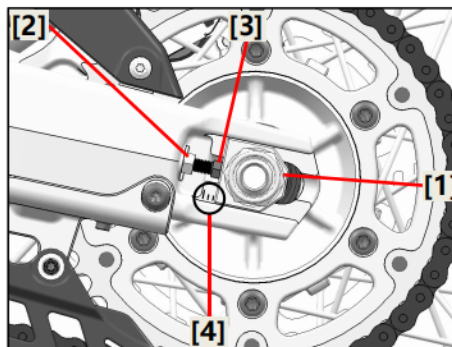
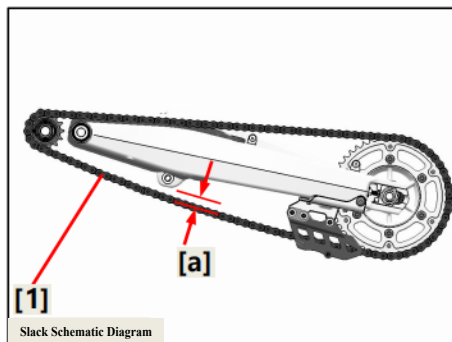
Rear wheel axle nut

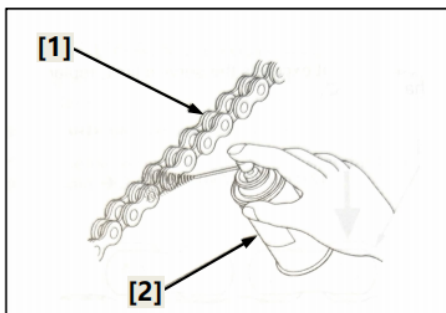
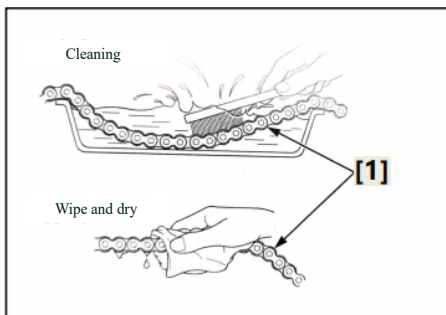
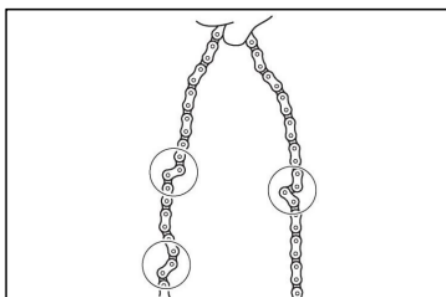
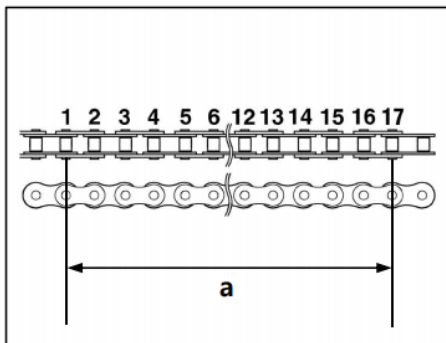
128 N·m (12.8 kgf·m, 94 lbf·ft)

d. Tighten the adjusting block locking nuts to the specified torque.

Drive chain adjusting block locking nut

16 N·m (1.6 kgf·m, 12 lb·ft)





※ Inspection, cleaning and lubrication of drive chain

⚠ Warning

- To ensure chain longevity and strength, never cut the chain separately for installation.

Notes

- For optimal service life, it is highly recommended to clean and lubricate the drive chain after every drive.

1. Measurement:

Measure the distance [a] between 17 pins (16 pitches) from the center of one pin to the center of the next, while ensuring the chain remains tight and any bent joints are straightened.

Usage limit: 257 mm

If the measured value exceeds the maintenance limit, please replace the drive chain.

2. Check:

Inspect whether the chain gear is bent or damaged, please replace it if necessary.

3. Cleaning:

A drive chain with a small rubber ring positions between the link plates. Avoid cleaning the drive chain with high-pressure water or air jets, steam, gasoline, certain solvents (such as volatile oil), or abrasive brushes. Using high-pressure methods can result in dirt or water flowing into the inner part of the drive chain, while solvents can cause aging of the X-type oil seal. Abrasive brushes can also cause damage to the X-type oil seal. Therefore, only kerosene is suitable and allowed for cleaning the drive chain.

Notes

- Avoid immersing the drive chain in kerosene for more than 10 minutes, as it can cause damage to the X-type oil seal.

4. Lubrication:

Apply drive chain lubricant [2] to properly lubricate the drive chain [1].

Recommended lubricants:

Use chain lubricant or SAE #80-90 gear oil to wipe off any excess oil or lubricant.

※ Replacement of drive chain

1. Place the vehicle on the workbench.

⚠ Warning

- Support the vehicle firmly so as not to turn over.

2. Disassemble:

- Gear shift lever assembly [1]
- Front sprocket decorative cover [2]
- Chain guard [3]

See "Frame, body trim, exhaust system" on page 69 for details.

- Bolt and chain guide wear-resistant block [4]

3. Disassemble:

- Swingarm axle and U swingarm bolts [5]
- Detach the swingarm from the frame
- Remove the drive chain [6]

4. Installation:

The installation sequence is reversed from the removal sequence.

Note

- After replacing the chain, adjust the drive chain looseness to the specified range again.

Standard link: 120 links (Choho)

Replacement of chain: 520 SX2 (X-type oil seal, closed)

Notes

- Never use new drive chains on worn sprockets. Both the chain and sprocket must be in good condition; otherwise, the newly replaced drive chain will wear out quickly.
- When replacing the drive chain, inspect the sprocket as well.

※ Inspection of drive/driven sprockets

- Remove the drive sprocket cover

Inspection:

Check the drive sprocket teeth and driven sprocket teeth for wear or damage, replace them if necessary. Consult your dealer to replace the drive sprocket and driven sprocket.

Never use new drive chains on worn sprockets. Both the chain and sprocket must be in good condition; otherwise, the newly replaced drive chain will wear out quickly. Check the bolts and nuts on the drive sprocket and driven sprocket.

If there is any looseness, tighten to the specified torque value.

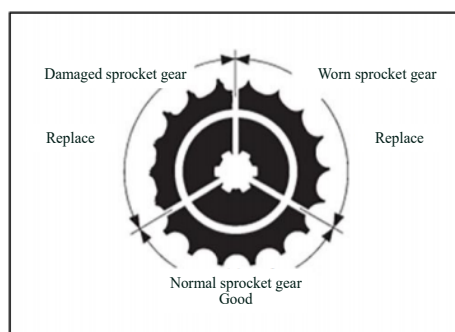
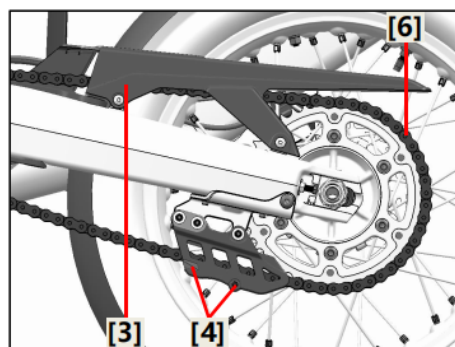
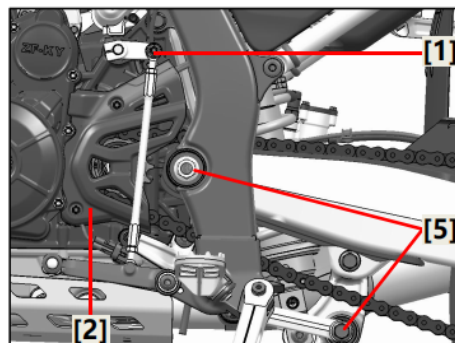
Torque:

Driving sprocket locking nut:

100 N·m (10 kgf·m, 74 lbf·ft)

Driven sprocket and buffer bracket connecting bolt

37 N·m (3.7 kgf·m, 27.4 lbf·ft)



Hydraulic Braking System

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Maintenance Instructions

- This section describes the maintenance of conventional brake components of the brake system.
- This model is equipped with an anti-lock braking system (ABS), and provided with the execution method of brake fluid replacement procedure and bleed procedure.
- Contaminated brake discs or brake pads will reduce braking efficiency.
- Discard contaminated brake pads and clean contaminated brake discs with high-quality brake degreaser.
- In maintenance of the system, be sure to use fresh DOT 4 brake fluid in a sealed container and do not mix different types of fluids which may not be compatible.
- Prevent any contaminants (dirt, water, etc.) from entering the unclosed reservoir.
- Once the hydraulic system is turned on, or if the braking force is insufficient, the brake system must be emptied, and the brake operation must be checked.
- When dismounting the wheel speed sensor, be sure to check the clearance between wheel speed sensor and ring gear after installation.
- Spilled brake fluid can severely damage instrument panels, painted surfaces and rubber components.
- Be careful when disassembling the reservoir cover, first ensuring the liquid reservoir is level.

Troubleshooting

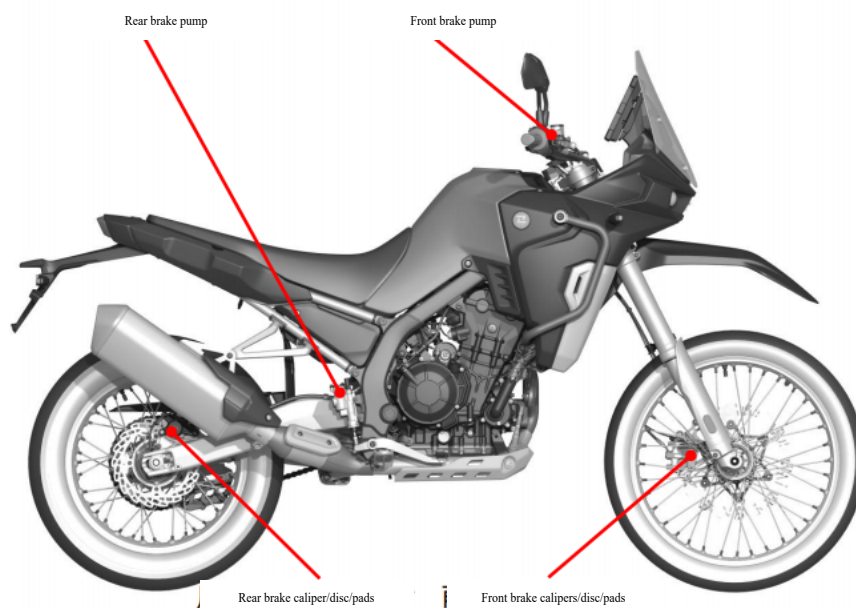
Insufficient braking force of brake handle/pedal

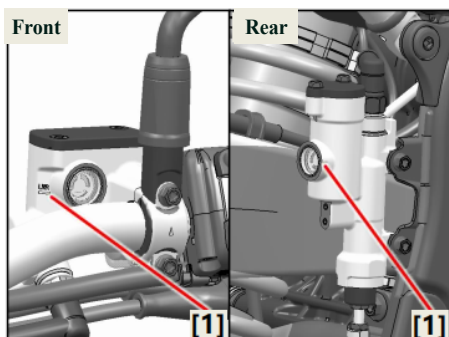
- Air in hydraulic system
- Leakage in hydraulic system
- Contaminated brake pads/discs
- Wear of brake caliper piston seal
- Wear of main piston cup
- Contaminated brake pads/discs
- Contaminated brake caliper
- Contaminated brake pump
- Abnormal sliding of brake caliper shaft
- Low brake fluid level
- Oil passage blockage
- Distortion/deformation of brake disc
- Brake caliper piston stuck/worn
- Main piston stuck/worn
- Brake handlebar/pedal bend

Brake handlebar/pedal requires force

- Blocked/restricted oil passage
- Brake caliper piston stuck/worn
- Abnormal sliding of brake caliper
- Wear of brake caliper piston seal
- Main piston stuck/worn
- Brake handlebar/pedal bend
- Brake resistance
- Contaminated brake pads/discs
- Misaligned wheels
- Severe wear of brake pads/discs
- Distortion/deformation of brake disc
- Abnormal sliding of brake caliper
- Blocked/restricted oil passage
- Caliper piston stuck

Position of Components





※ Inspection and replenishment of brake fluid level

⚠ Warning

- Spilled brake fluid can damage paint, plastic or rubber parts.

Notes

- Ensure not to mix incompatible types of brake fluids together.
- When adding brake fluid, do not allow foreign matter to enter the reservoir.

※ Level inspection

Check the brake fluid level in both the front and rear brake pump liquid reservoirs.

If the level is close to the lower level line [1], check the brake pads for wear. If the brake pads are not worn and the level is low, check the entire system for leaks and proceed to fill the reservoir with brake fluid.

Brake fluid addition

- Front brake pump:

Remove the front brake pump reservoir cover screw [1], reservoir cover [2], and lining [3].

Fill the reservoir with the recommended brake fluid to the appropriate level [4]. Use the recommended brake fluid: DOT4 brake fluid

Install the lining and reservoir cover.

Install and tighten the front brake reservoir cap screws to the specified torque.

Torque:

1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)

Check the front brake hydraulic system for leaks.

- Rear brake pump:

Remove the rear brake pump reservoir cover screw [1], reservoir cover [2], gasket [3], and lining [4].

Fill the reservoir to the upper level line using the recommended brake fluid [5]. Recommended brake fluid: DOT4 brake fluid

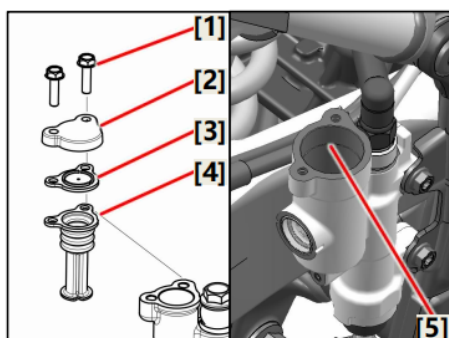
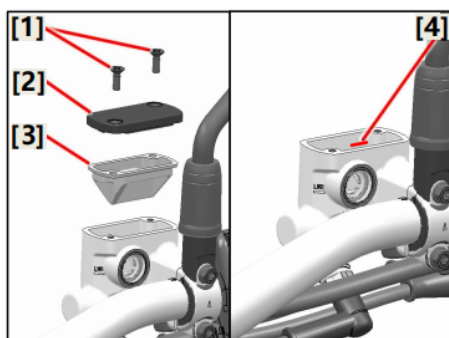
Install the lining [4], gasket [3], and cover [2].

Install and tighten the rear brake pump reservoir cover screw [1] to the specified torque.

Torque:

2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

Check the front brake hydraulic system for leaks.



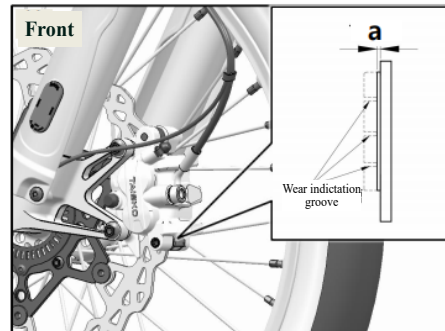
※ Inspection and replacement of brake pads

Check the brake pads.

If either brake pad is worn to the limit mark [a], both pads must be replaced.

Notes

- The limit wear mark [a] indicates a thickness of 1.0 mm.
- When replacing the brake pads, it is not needed to disassemble the brake hose.



Replace front/rear brake pads

The following steps apply to the front/rear brake pad piece.

1. Disassembly: Front brake pad

- Bolt [1]
- Caliper [2]
- Brake pad guide pin bolt [3]
- Brake pad and spring plate [4]

2. Disassembly: Rear brake pad

- Slotted screw plug and brake pad guide pin bolt [5]
- Brake pad, heat insulator [6]
- Spring plate [7]

Note

- When replacing brake pads, please replace them as a complete set.

The steps are as follows:

- Connect the transparent hose to the bleed screw and place the other end into an empty container.
- Loosen the bleed screw and use an appropriate tool to push the caliper piston into the brake caliper bore.
- Tighten the bleed screw.
- Install the brake pad spring, brake pads, and heat insulator.

3. Installation:

- Brake pad guide pin bolt, screw plug
- Brake caliper. (Front brake caliper)

4. Check:

- Brake fluid level

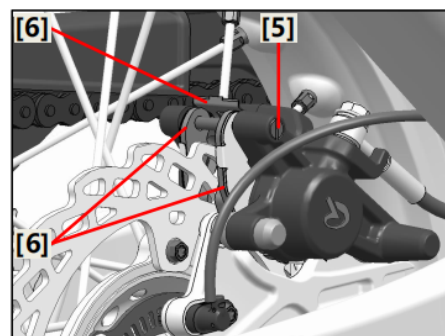
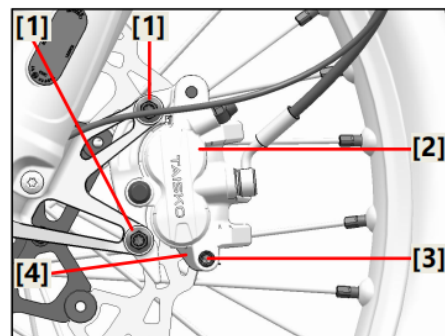
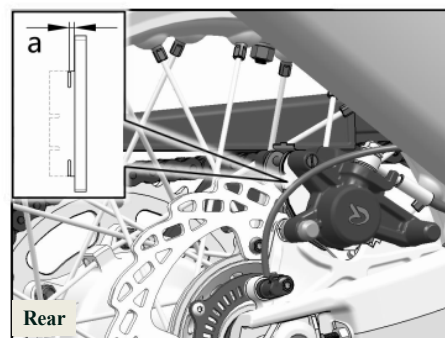
Below minimum level → Add brake fluid.

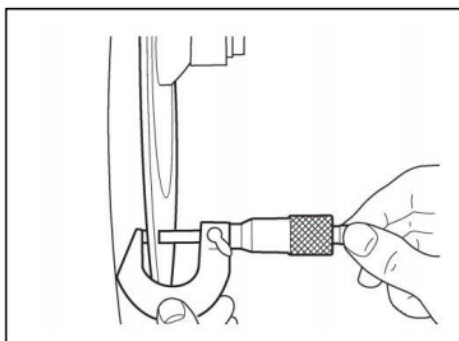
See "Brake fluid addition" on page 262 for details.

- Hand brake lever operation

Soft → Bleed the brake system

See "Hydraulic brake system bleeding" on Page 265 for details.





※ Inspection and replacement of brake discs

Inspection
Visually check the brake disc for damage or cracks.
Measure the wear limit of brake disc:
Front brake disc: **3.5 mm**
Rear brake disc: **3.5 mm**

Damage/deformation/off specification → Replace.

Replace brake discs

The following steps apply to the front/rear brake discs.

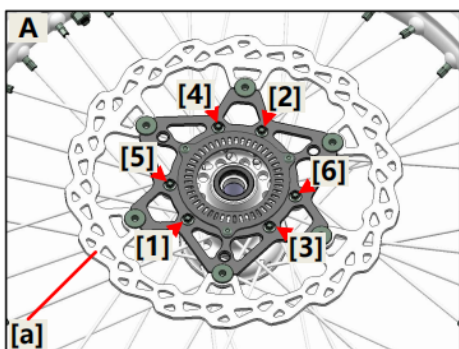
1. Disassemble:

A: Before

- Front wheel assembly

See "Front Wheels, Suspension, Steering" on page 233 for details.

- Remove 6 mounting bolts [1] of the brake disc
- Remove the disc brake disc [a]



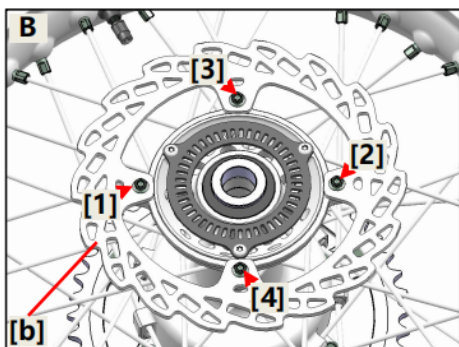
2. Disassemble:

B: Rear

- Rear wheel assembly

See "Rear Wheel, Suspension" on Page 247 for details.

- Remove 4 mounting bolts [1] of the brake disc
- Remove the disc brake disc [b]



Torque:

Front brake disc mounting bolts

12 N·m (1.2 kgf·m, 9.0 lbf·ft)

Rear brake disc mounting bolt

12 N·m (1.2 kgf·m, 9.0 lbf·ft)

Note

- When installing the brake disc, tighten the bolts in the order indicated by the arrow numbers.

Notes

- When installing, coat thread locker (Huitian 7272) to the threads of the front/rear brake discs.

※ Hydraulic brake system bleeding

Warning

- After removing the brake-related parts, ensure to bleed the brake system.

Note:

- Exhaust the brake system in the following sequence.
- Step 1: Front brake caliper.
- Step 2: Rear brake caliper.

Warning

State of releasing brake system air:

- Brake pump is disassembled.
- Brake hose is loose, removed or replaced.
- Brake fluid level is below the minimum mark.
- There is a malfunction in the brake operation.

Note

- Take care to avoid spilling brake fluid or allowing the brake master cylinder reservoir or brake caliper reservoir to overflow.
- When releasing the air from the hydraulic brake system, ensure that the brake fluid level is sufficient before running the brake. Skipping this step will allow air to enter the hydraulic brake system, resulting in a significant increase in the time required for the bleeding procedure.
- If releasing is difficult, it may be necessary to allow the brake fluid to settle for several hours. Once the small bubbles in the hose have disappeared, repeat the release procedure.

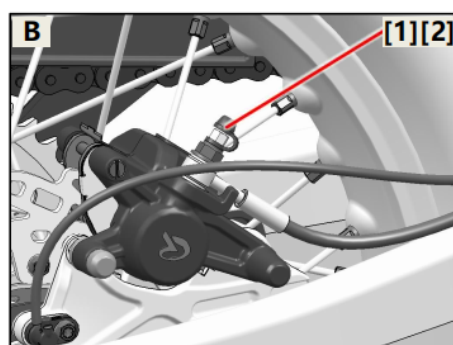
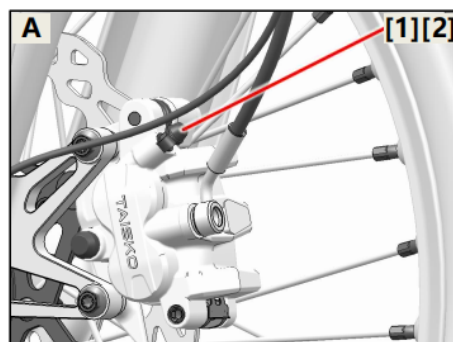
1.Exhaust:

- a.Fill the brake fluid reservoir to the appropriate level using the specified brake fluid.
- b. Install gasket (brake master cylinder reservoir or brake fluid reservoir).
- c.Connect the clear plastic hose [1] tightly to the bleed bolt [2].

A. Front

B. Rear

- d.Place the other end of the hose in the container.
- e.Run the brake slowly/several times.
- f.Pull up the brake handle completely, or press the brake pedal all the way down until it is fully engaged.
- g.Loosen the bleed screw.



Note

- Loosen the bleed screw to release air and ensure that the brake handle makes full contact with the throttle grip or brake pedal.

- h.Tighten the bleed screw and release the brake handle or brake pedal.
- i.Repeat steps (e) to (h) no bubbles are visible in the brake fluid within the plastic hose.
- j.After operating the ABS, repeat steps (e) to (i) and fill the brake master cylinder reservoir or brake fluid reservoir to the appropriate level using the specified brake fluid.
- k.Tighten the bleed screw to the specified torque.

Brake caliper bleed screw [1]

6.0 N·m (0.6 kgf·m, 4.4 lb·ft)

- m. Fill the brake master cylinder or brake fluid reservoir to the appropriate level using the specified brake fluid.
- See "Brake fluid addition" on page 262 for details.

Warning

- After air is completely removed from the hydraulic brake system, check the operation of the brakes.

Bleed operating procedure (ABS)

After the maintenance personnel install ABS, it is essential to remove any air from the lines to ensure proper functioning of ABS. To accomplish this, ABS needs to be bled manually with the assistance of a diagnostic instrument.

Note: Please use the brake fluid recommended by the manufacturer and avoid mixing different types of brake fluids.

The following is an example of bleeding the front wheel ABS system:

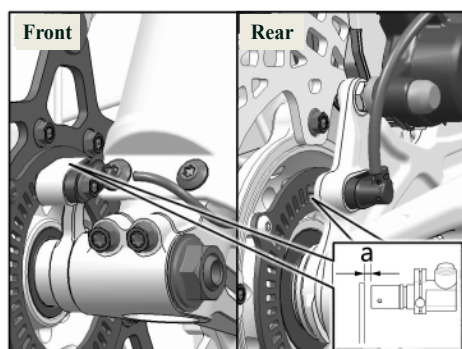
1. Open the brake pump reservoir cover, add a sufficient amount of brake fluid, and open the caliper drain/bleed screw.

2. Connect the diagnostic instrument and initiate the front wheel bleeding stage 1 by double-clicking the routine. During this stage, the maintenance personnel shall simultaneously squeeze the brake handle or step on the brake pedal while filling brake fluid. The frequency of actuating the handbrake shall be approximately 1 time per second. This process lasts about 25s.

3. After completing front wheel bleeding stage 1, the diagnostic instrument interface will display a prompt indicating the completion of the process. At this point, double-click the routine: front wheel bleeding stage 2. During this stage, the maintenance personnel shall continue to squeeze the brake handle or pedal while filling brake fluid. This process lasts about 90s.

4. Once front wheel bleeding stage 2 is completed, hold the brake handle/press the brake pedal and close the brake caliper bleed bolt. Then, repeatedly squeeze the front brake handle/press the brake pedal several times, and feel the force to judge whether bleeding is finished.

Precautions for bleeding: It is strictly prohibited to repeat the bleeding procedure twice or more in a short period of time. If it is necessary to repeat the bleeding procedure, please wait for 5 minutes to allow the solenoid valve to cool down and prevent overheating damage.



※ Inspection of ABS gear ring clearance

Use a crane or equivalent to firmly support the motorcycle and lift the wheels off the ground.

Turn the wheel slowly and measure the clearance between the sensor and the ring gear at multiple points.

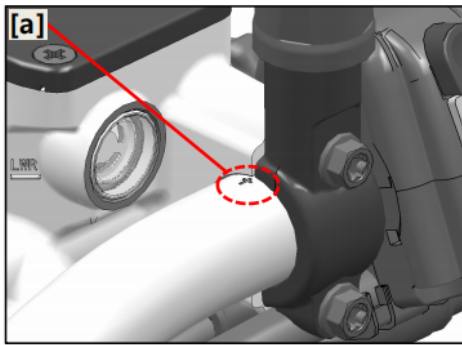
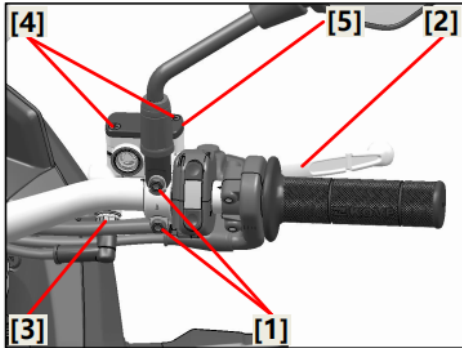
[a] It must be within specifications.

Standard: **0.5-1.2 mm**

If the clearance cannot be adjusted or is not within specifications, check each part for deformation, looseness, or damage. Check whether the wheel speed sensor is damaged, and replace it if necessary.

Check whether the ring gear is deformed or damaged, and replace it if necessary.

- Front ring gear
- Rear ring gear



Warning

- Only use the specified brake fluid. Other brake fluids may cause aging of the rubber oil seal, resulting in leakage and poor braking performance.
- Please add the same kind of brake fluid as used in the system. Mixed brake fluid may cause adverse chemical reactions, resulting in degradation of braking performance.
- When adding, be careful not to allow water to enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and cause vapor lock.

※ **Front brake pump**

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

Note

- Before removal of the front brake pump, bleed the brake fluid of the entire brake system.

2. Disassemble:

- Brake pump mounting screw [1]
- Front brake pump [2]
- Brake switch bolt and washer [3]
- Reservoir cover screw [4]
- Reservoir cover and lining [5]

Notes

- Brake fluid may damage the painted surface and plastic parts. Be sure to clean up any spill of brake fluid immediately.

3. Check:

Brake pump

- Brake master cylinder

Damage/scratch /wear → Replace.

- Brake fluid passage

(Brake master cylinder body)

Blocked → Blow through with compressed air.

- Brake master cylinder assembly

Damage/scratch /wear → Replace.

- Brake master cylinder reservoir

- Master cylinder reservoir cover/lining

Crack/damage → Replace.

- Brake hose

Crack/damage /wear → Replace.

4. Installation:

The installation sequence is reversed from the removal sequence.

Note

- Replace the new (oil passing bolt) sealing washer.
- Align the joint surface of the front brake pump fixing socket with the marking point [a] on the right side of the steering handlebar for installation.

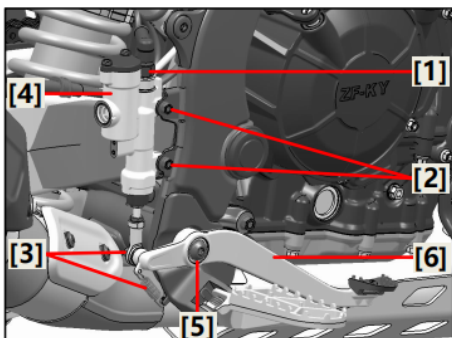
Torque:

Front brake pump

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

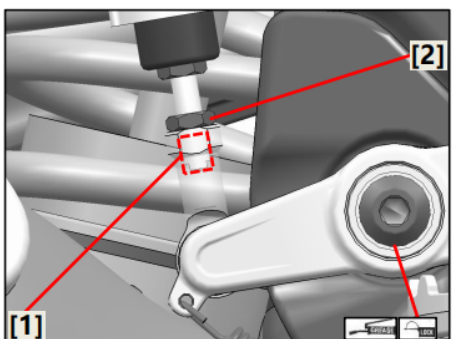
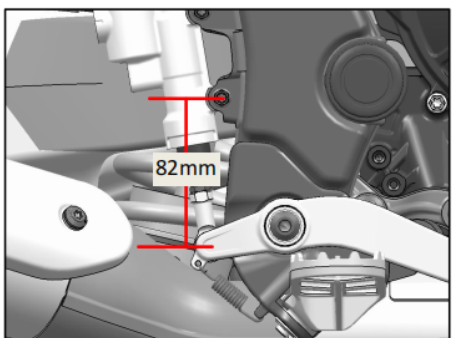
Brake oil pipe locking bolt

32 N.m (3.2 kgf·m, 24 lbf·ft)



Warning

- Only use the specified brake fluid. Other brake fluids may cause aging of the rubber oil seal, resulting in leakage and poor braking performance.
- Please add the same kind of brake fluid as used in the system. Mixed brake fluid may cause adverse chemical reactions, resulting in degradation of braking performance.
- When adding, be careful not to allow water to enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and cause vapor lock.



※ **Rear brake pump/rear brake rockerarm**

1. Stand the vehicle on a flat surface.

Warning

- Support the vehicle firmly so as not to turn over.

Note

- Before removal of the rear brake pump, bleed the brake fluid of the entire brake system.

2. Disassemble:

- Oil passing bolt/ rake switch and washers [1]
- Bolt [2]
- Bolt and tension spring [3]
- Rear brake pump [4]
- Brake rockerarm mounting bolt [5]
- Brake rockerarm [6]

3. Check:

- Brake master cylinder

Damage/scratch /wear → Replace.

- Rear brake rocker arm pivot oil seal

Damage → Replace.

4. Installation:

The installation sequence is reversed from the removal sequence.

5.Adjustment:

After removing the push rod, adjust its length so that the distance from the center of the mounting bolt hole of the brake pump to the center of the connecting pin hole is the standard length of **82mm**. If the length is adjusted to a longer position, make sure that the lower end of the push rod thread [1] is 5 mm in the connector, and tighten the connecting nut [2] to the specified torque after adjustment.

Notes

- Brake fluid may damage lacquered surfaces and plastic parts. Please wipe up the splashed brake fluid immediately.

Note

- When installing the rear brake pump and rear brake rockerarm, apply thread locker (Huitian 7272) to the threaded parts.
- When tightening the brake hose locking bolt, make sure that the oil pipe joint is against the limit protrusion.
- Replace the new (oil passing bolt) sealing washer.

Torque:

Rear brake pump push rod adjustment nut

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Rear brake pump mounting bolt

12 N·m (1.2 kgf·m, 9.0 lbf·ft)

Rear brake rocker arm mounting bolt

25 N·m (2.5 kgf·m, 18 lbf·ft)

Brake hose locking bolt (oil passing bolt)

32 N·m (3.2 kgf·m, 24 lbf·ft)

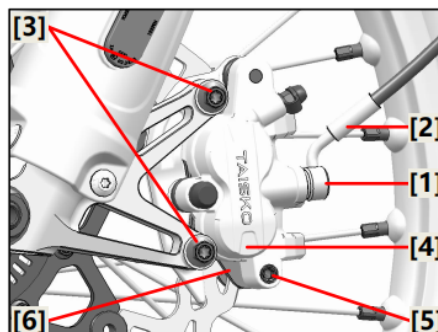
※ Front brake caliper

Notes

• Brake fluid may damage the painted surface and plastic parts. Be sure to clean up any spill of brake fluid immediately.

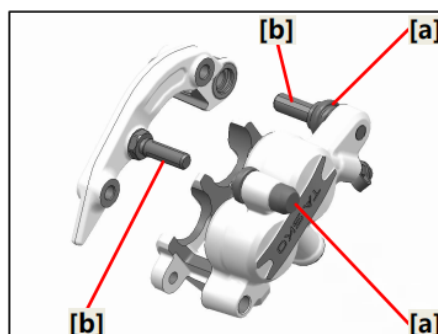
1. Disassemble:

- Oil passing bolt and shim [1]
- Brake hose [2]
- Bolt [3]
- Front brake caliper and caliper bracket [4]
- Brake pad guide pin bolt [5]
- Front brake pad [6]



2. Check:

- Brake Caliper
- Brake wheel cylinder
- Damage/scratch /wear → Replace.
- Brake fluid passage (Brake wheel cylinder body)
- Blocked → Blow through with compressed air.
- Brake wheel cylinder assembly
- Damage/scratch /wear → Replace.
- Front brake caliper upper and lower sliding shaft rubber grommet [a]
- Crack/damage → Replace.
- Brake hose
- Crack/damage /wear → Replace.



3. Installation:

The installation sequence is reversed from the removal sequence.

Note

- During installation, the sliding areas [b] of the upper and lower smooth portions of the rods need to be coated with silicone grease for lubrication.
- During installation, apply thread locker (Huitian 7272) to the threads of both the sliding shaft bolt and the brake pad guide pins.
- When tightening the brake hose locking bolt, always ensure the hose connector rests against the limit protrusion on the brake caliper body.
- Replace with the new gasket (oil passing bolt).

Torque:

Front brake caliper mounting bolt

35 N·m (3.5 kgf·m, 26 lbf·ft)

Brake hose bolt

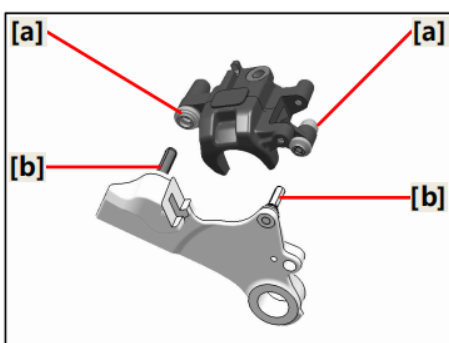
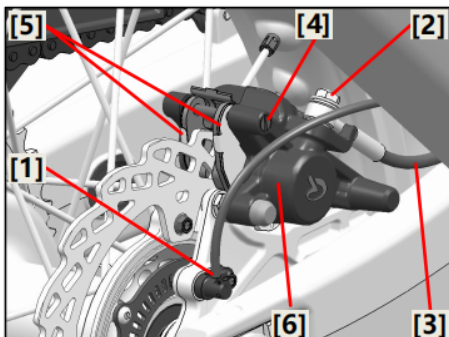
32 N·m (3.2 kgf·m, 24 lbf·ft)

Brake pad guide pin bolt

15 N·m (1.5 kgf·m, 11 lbf·ft)

Upper and lower sliding shaft bolts

20 N·m (2.0 kgf·m, 15 lbf·ft)



※ Rear brake caliper

Notes

· Brake fluid may damage the painted surface and plastic parts. Be sure to clean up any spill of brake fluid immediately.

1. Disassemble:

- Wheel speed sensor [1]
- Oil passing bolt and shim [2]
- Brake hose [3]
- Slotted screw plug and brake pad guide pin bolt [4]
- Rear brake pad, heat insulator and spring [5]
- Rear wheel assembly;
- See “Rear Wheel, Suspension” on Page 247 for details.
- Rear brake caliper and caliper bracket [5]

2. Check:

Brake Caliper

- Brake wheel cylinder
Damage/scratch /wear → Replace.
- Brake fluid passage
(Brake wheel cylinder body)
Blocked → Blow through with compressed air.
- Brake wheel cylinder assembly
Damage/scratch /wear → Replace.
- Rear brake caliper upper and lower sliding shaft rubber grommet [a]
Crack/damage → Replace.
- Brake hose
Crack/damage /wear → Replace.

3. Installation:

The installation sequence is reversed from the removal sequence.

Note

- During installation, the sliding areas [b] of the upper and lower smooth portions of the rods need to be coated with silicone grease for lubrication.
- During installation, apply thread locker (Huitian 7272) to the threads of both the sliding shaft bolt and the brake pad guide pins.
- When tightening the brake hose locking bolt, always ensure the hose connector rests against the limit protrusion on the brake caliper body.
- Replace with the new gasket (oil passing bolt).

Torque:

Brake hose bolt

32 N·m (3.2 kgf·m, 24 lbf·ft)

Brake pad guide pin bolt

15 N·m (1.5 kgf·m, 11 lbf·ft)

Upper and lower sliding shaft bolts

20 N·m (2.0 kgf·m, 15 lbf·ft)

Anti-Lock Braking System

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Maintenance Instructions

ABS is a safety related component. Therefore, in addition to the general safety and preventive measures, the following diagnostic precautions must be observed when performing maintenance diagnosis:

(1) The ABS system must be maintained by technicians who have received professional training and mastered skills of maintenance, and only original parts can be used for replacement.

(2) Before diagnosis of the ABS system, any fault, if existing in the basic braking system, must be removed, such as:

- Noise from brake system.
- Insufficient force of brake pedal or handle.
- Brake pedal or vehicle vibration during regular braking.

(3) ABS assembly (refers to ABS electronic control unit and hydraulic regulator assembly, excluding brake line, sensor and other attachments) can only be replaced as a whole, and cannot be disassembled for inspection or partially replaced/exchanged. Our company does not provide separate spare parts, and does not provide warranty for the disassembled ABS assembly, and shall not be responsible for any adverse consequences caused due to disassembly for inspection or partial replacement/exchange of the ABS hydraulic regulator.

(4) The following two situations indicate that the ABS system has detected a fault:

Turn on the ignition switch. When the vehicle speed exceeds 10 km/h, and the system self-check is completed, the warning lamp remains on.

The warning lamp remains on during running.

Now the driver can apply regular braking, but shall reduce the applied braking force as much as applicable to prevent wheel lockup. When the warning lamp is turned on, drive carefully and go to the appointed store immediately for maintenance, in order to prevent the occurrence of more failures which may lead to traffic accidents.

(5) When connecting ABS and sensor wiring harness, pay attention to the following:

Be sure to turn off the ignition switch before unplugging the ABS harness and sensor harness.

Ensure that the connector assembly is dry and clean, and prevent intrusion of any foreign matters.

The ABS harness must be connected in place horizontally and vertically, without causing any damage to the connector assembly.

(6) When connecting the ABS brake line, ensure that it is connected correctly. ABS ECU is unable to judge whether the brake line is properly connected. Incorrect connection may lead to a serious accident. When connecting the brake line, be sure to follow the marking on the ABS assembly:

- **FM**: Connect the front brake pump master cylinder pipeline;
- **FW**: Connect the front brake caliper master cylinder pipeline;
- **RM**: Connect the rear brake pump master cylinder pipeline.
- **RW**: Connect the rear brake caliper master cylinder pipeline;

Function Introduction of ABS System

The ABS unit consists of a Hydraulic Control Unit (HCU), an Electronic Control Unit (ECU), and a motor. It is installed in the vehicle frame. There is a wheel speed sensor installed on each of the front and rear wheels.

Function of ABS warning light: It is used for indicating whether the ABS is working properly. If there is a fault in the ABS, the warning light will turn on to alert the rider.

In the case of significant speed difference between the front and rear wheels under extreme driving conditions, such as performing a Wheelie or in the case of a rear wheel slip, when returning to normal driving, ABS may fail. In order to ensure the normal function of ABS, it is necessary to park and turn off the ignition switch. If the motorcycle gets restarted, after the motorcycle speed reaches 10 km/h, the warning light will automatically turn off and the ABS will be reactivated.

Function status of warning light: After the ignition switch is turned on, the ABS warning light will come on. When the first riding speed is greater than 10 km, after self-inspection, the warning lamp will go out, and if there is no malfunction warning lamp in the same ignition cycle, it will remain off. If the ABS is always on during driving (≥ 10 km/h), it indicates that there is a fault in the ABS. At this time, ABS cannot be activated and its function fails. The braking system itself still works, but the ABS control unit system malfunctions.

ABS status switch: disable or enable the ABS function.

To conduct ABS status switching, please ensure that the motorcycle is always powered on; it is only feasible when the vehicle speed is lower than a certain value. It is recommended to conduct status switching when the vehicle is stationary.

ABS modes include: ABS full on, rear wheel off separately, ABS full off. The ABS mode can be selected through the instrument setting. No matter whether the ABS function is on or off, after power off, power on again, the ABS will automatically change to the on state.

Attentions for Braking

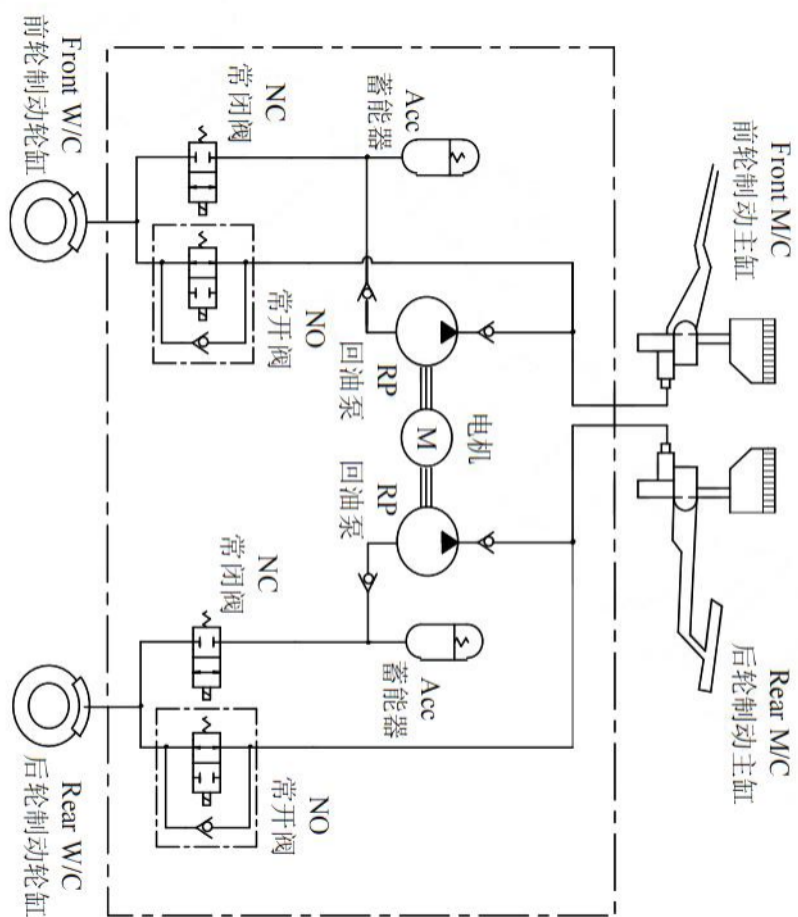
ABS Function Impairment

Modifications, such as shortening or extending the damping stroke, use of other hub and other tire specifications, improper tire pressure, other brake linings, etc., may stop ABS from continuing to function optimally. Only when using spare parts and tires approved or recommended by the supplier for the braking system can the best function of ABS be ensured.

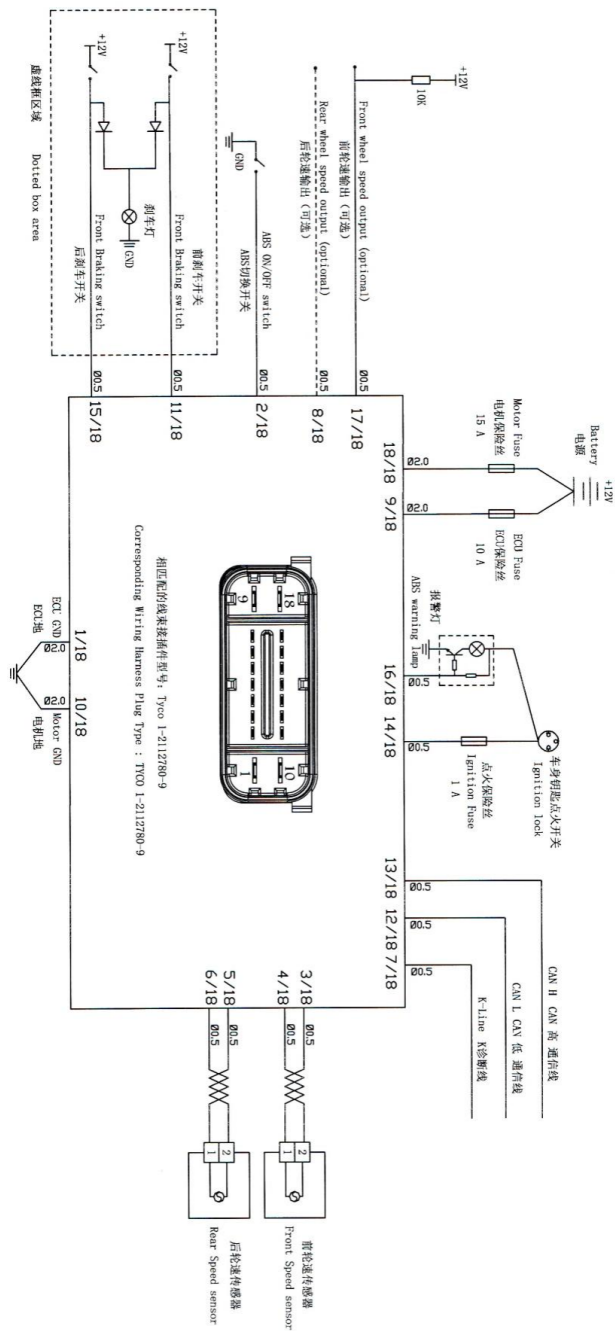
Tips For Braking With ABS

- Basic principle of ABS braking: applying brake as if it is not equipped with ABS.
- When braking with the brake handle, avoid too quick and forceful. After the brake pads are fully engaged, increase the braking pressure significantly.
- The intervention status of ABS through slight vibrations and brief sounds from the brake handle or rear brake rod can be received.
- Do not perform a full braking operation with the gear engaged.
- Regularly practicing braking within the ABS control range enables you to fully utilize the full potential of ABS in case of a serious accident.

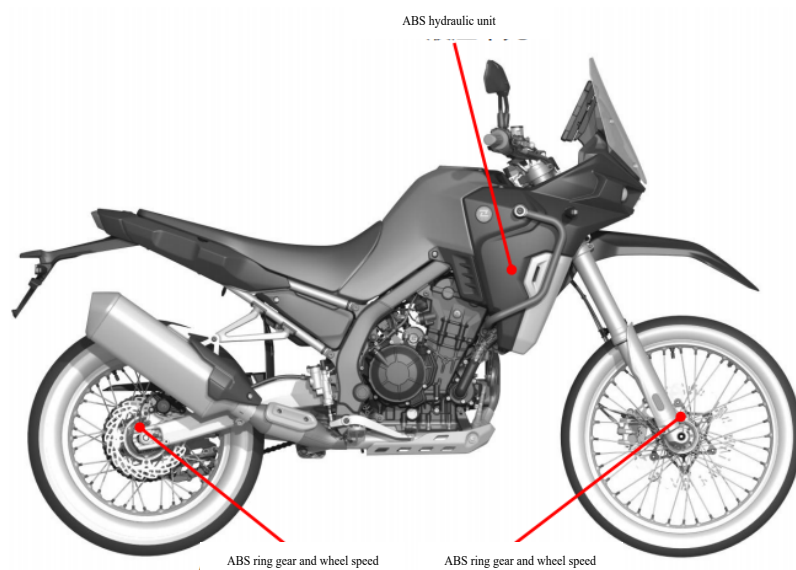
Mechanical Schematic Diagram



Electrical Schematic Diagram



System Location



※ ABS hydraulic unit assembly

Notes

- Unless necessary, do not remove and install the brake hose of the hydraulic unit assembly.

Warning

- Please add the same kind of brake fluid as used in the system. Mixed brake fluid may cause adverse chemical reactions, resulting in degradation of braking performance.

Notes

Always take care with the ABS components for all of them have been accurately adjusted. Do not dirty or subject these components to impacts.

- Do not switch the main switch to "ON" when dismantling the hydraulic unit assembly.
- Never clean with compressed air.
- Do not reuse the brake fluid.
- Brake fluid may damage lacquered surfaces and plastic parts. Please wipe up the splashed brake fluid immediately.
- Never let the brake fluid come into contact with the connectors, since the brake fluid may damage the connectors and result in poor contact.
- If the connecting bolts of the hydraulic unit assembly have been removed, be sure to lock the connected bolts to the specified torque and bleed air from the brake system.

1. Disassemble:

- ABS ECU plug [2]

Note

- Pull the fixing rod [1] of the ABS ECU connector in the direction of the arrow shown in the figure, and disassemble the plug.

2. Disassemble:

- Brake hose

Note

- Do not operate the brake handle and pedal when dismantling the brake hose.

Notes

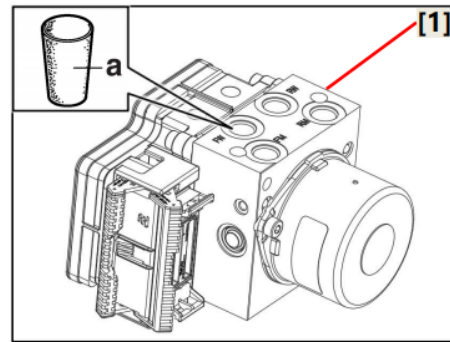
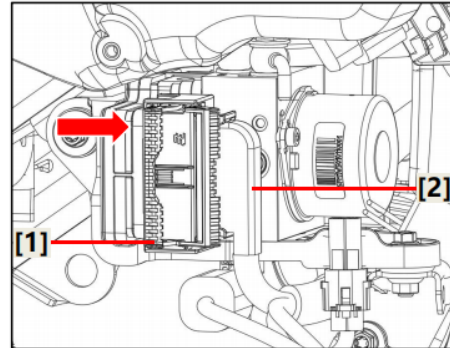
- Disassemble the brake hose, cover the area around the hydraulic unit to receive spilled brake fluid. Keep the brake fluid from coming into contact with other parts.

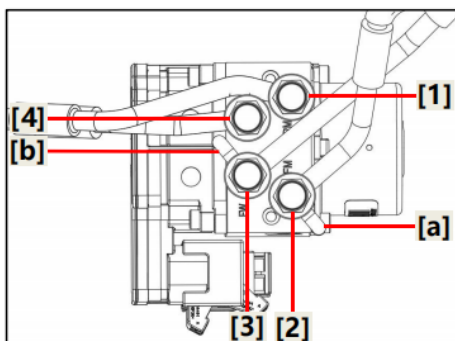
3. Disassemble:

- Hydraulic unit assembly [1]

Note

- To prevent brake fluid from overflowing and foreign matters from entering the hydraulic unit assembly, plug each brake hose connecting bolt hole with a rubber plug [a] or a bolt (M10x1.0).
- When using a bolt, do not tighten the bolt before the bolt head comes into contact with the hydraulic unit, otherwise the seat surface of the brake hose connecting bolt may be deformed.





a. Install the brake hose as shown in the above figure.

b. Place the rear brake hose (front master cylinder to the front caliper) [2], make the protrusion point [a] touch the hydraulic unit, and then temporarily tighten the connecting bolt of the brake hose.

c. Place the rear brake hose (front caliper to the front caliper) [3], make the protrusion point [a] touch the hydraulic unit, and then temporarily tighten the connecting bolt of the brake hose.

d. Place the rear brake hose (rear master cylinder to the hydraulic unit) [1], so that its connector is aligned side by side with the brake hose (rear caliper to the hydraulic unit) [4], and then temporarily tighten the connecting bolt of the brake hose.

e. Place the rear brake hose (rear master cylinder to the hydraulic unit) [4], so that its connector is aligned side by side with the brake hose (from the hydraulic unit to the front master cylinder) [1], and then temporarily tighten the connecting bolt of the brake hose.

Note

- Make sure that the brake hose is installed in correct position.
- Lock the brake hose connecting bolts in sequence

※ Inspection of hydraulic unit

1. Check:

- Hydraulic unit assembly

Crack/damage → Replace the entire hydraulic unit assembly and the brake hose connecting the assembly.

Installation of hydraulic unit assembly

2. Installation:

- Hydraulic unit assembly

Mounting bolts for hydraulic unit assembly

Mounting bolts for hydraulic unit bracket

10 N·m (1.0 kgf·m, 7.0 lbf·ft)

Note

- When installing the hydraulic unit assembly, prevent any foreign matters from entering the hydraulic unit assembly or brake hose.

Notes

- Do not remove the rubber plug or bolt (M10×1.0) installed in the brake hose connecting bolt bore before installing the hydraulic unit assembly.

3. Disassemble:

- Rubber plug or bolt (M10 × 1.0)

4. Installation:

- Rear brake hose (rear master cylinder to hydraulic unit) [1]
- Front brake hose (front master cylinder to hydraulic unit) [2]
- Front brake hose (hydraulic unit to front caliper) [3]
- Rear brake oil pipe (hydraulic unit to rear caliper) [4]

Torque:

Oil passing bolt connecting brake hose to ABS pump

25 N·m (2.5 kgf·m, 18 lbf·ft)

Notes

- If the brake hose connecting bolt cannot be turned easily, replace the entire hydraulic unit assembly, brake hose and relevant parts.

5. Connect:

- ABS ECU plug [2]
- Connect the ABS ECU plug and push in the plug retaining rod [1] in the direction of the arrow shown in the figure.
- Make sure the ABS ECU plug is connected to the correct position as shown in Figure "A".

6. Add:

- Brake master cylinder reservoir
- Brake master cylinder reservoir

(Add the specified brake fluid to the specified capacity)
Brake Fluid/DOT 4

Warning

- Only use the specified brake fluid. Other brake fluids may cause worsening of the rubber oil seal, resulting in leakage and reducing braking performance.
- Please add the same kind of brake fluid as used in the system. Mixed brake fluid may cause hazardous chemical reactions, resulting in degradation of braking performance.
- Be careful not to allow water to enter the brake fluid reservoir during filling. The water will significantly reduce the boiling point of the brake fluid and cause air resistance.

Notes

- Brake fluid may damage lacquered surfaces and plastic parts. Please wipe up the splashed brake fluid immediately.

7. Drain:

- Brake system.

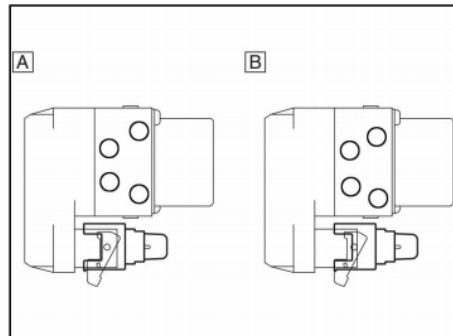
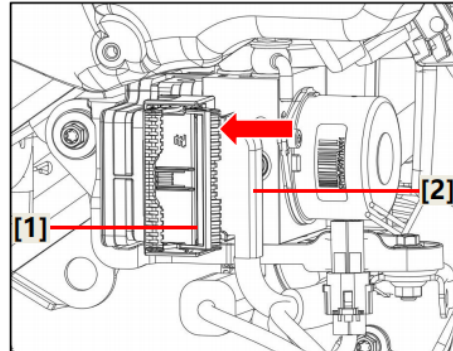
See "Hydraulic brake system bleeding" on Page 265 for details.

8. Check:

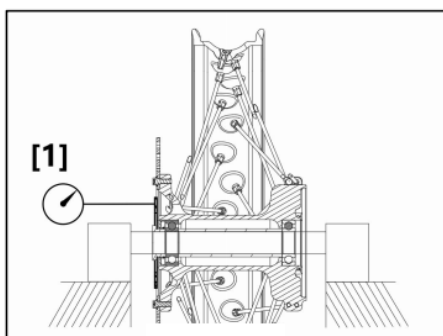
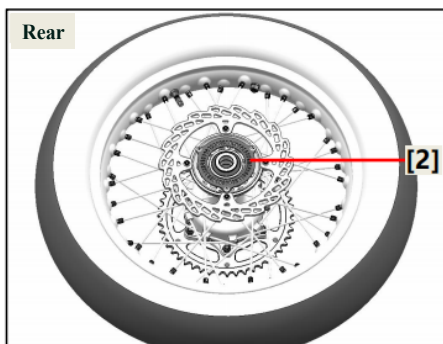
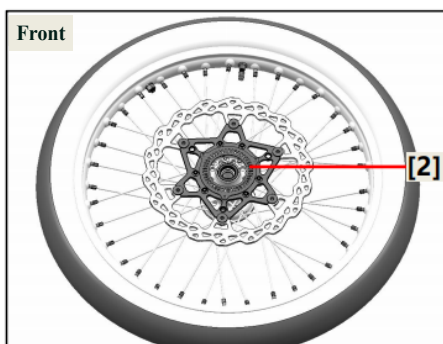
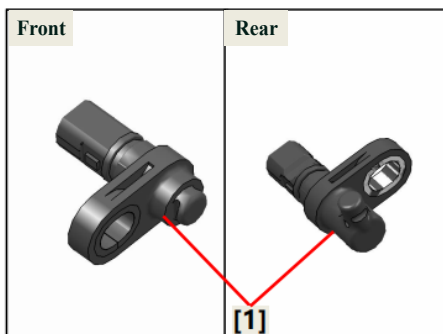
- Check brake fluid leakage around the hydraulic unit.
- Brake fluid leakage → Replace the whole set of hydraulic unit, brake hose and relevant parts.
- If the hydraulic unit is operating properly, please delete all fault codes.

Inspection of ABS warning lamp

Upon completion of all inspections and maintenance, run or conduct test run at a speed above 10 km/h (6.0 mph) and make sure the ABS warning lamp is off.



A: The ABS ECU plug is correctly connected.
B: The ABS ECU plug is not correctly connected.



※ Wheel speed sensor and ABS ring gear

1. Place the vehicle on the workbench.

⚠ Warning

- Support the vehicle firmly so as not to turn over.

Note

- Place the motorcycle on a proper stand so that the front or rear wheel can be elevated.
- Always take care with the ABS components for all of them have been accurately adjusted. Do not dirty or subject these components to impacts.
- The wheel speed sensor cannot be disassembled, so please do not attempt to disassemble it. If there is a malfunction, please replace it with a new part.
- The wheel speed sensor must be kept away from any kinds of magnet (including magnetic pickup tools, magnetic screwdrivers, etc.).
- Protect the wheel speed sensor from falling or impact.

2. Check:

- Wheel speed sensor [1]

Crack/Bend/Deformation → Replace.

Iron powder/dust → Clean up.

- ABS ring gear [2]

Crack/damage/scratch → Replace ABS ring gear.

Iron powder/dust → Clean up.

Note

- The ABS ring gear is mounted on the inside of the hub.
- When cleaning ABS ring gear, please be careful not to damage the surface of the ring gear.

3. Measurement:

- ABS ring gear deflection

Non-conformance → Clean the mounting surface of ABS ring gear and adjust the ABS ring gear deflection, or replace the ring gear.

ABS ring gear deflection.

Limit: 0.25 mm

a. Hold a dial indicator against the ABS ring gear surface at a right angle.

b. Measure the deflection of ABS ring gear.

Note

- Never touch the surface of ABS ring gear with sharp objects.
- c. If the deflection exceeds the standard, remove the ABS ring gear from the wheel, turn one or two bolt holes and install.

ABS ring gear mounting bolt

4.0 N·m(0.4 kgf·m, 3.0 lbf.ft)

Notes

- Replace with new ABS ring gear mounting screws.
- d. If the deflection exceeds the standard, replace the ABS ring gear.

4. Installation:

- Wheel speed sensor

Wheel speed sensor mounting bolt

8.0 N·m(0.8 kgf·m, 6.0 lbf.ft)

ABS ring gear mounting bolt

4.0 N·m(0.4 kgf·m, 3.0 lbf.ft)

Notes

- Make sure there is no foreign matter between the wheel speed sensor and the ABS gear ring. The foreign matter can cause damage to the wheel speed sensor and the ABS gear ring.

Note

- When installing the wheel speed sensor, check the sensor wiring harness for twisting.
- When installing the gear ring, apply thread fastener (Huitian 7272) to the threads.

5. Measurement:

- Distance between ABS ring gear [1] and wheel speed sensor [2].

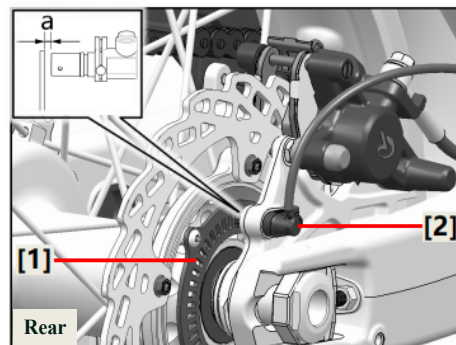
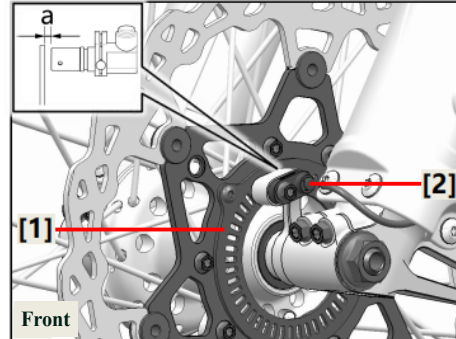
Off-specification → Check whether the wheel shaft bearing has looseness, and the installation conditions of the wheel speed sensor and ABS ring gear (deformation due to over-tighten, incorrect installation direction, off-center position of the ABS ring gear, thread locker on the mounting surface of the ABS ring gear, deformation caused by impact during maintenance, and foreign matter get stuck in place). If any parts are defective, repair or replace the defective parts.

Distance [a] (distance between ABS ring gear and wheel speed sensor)

0.50-1.20 mm

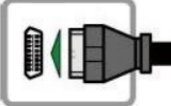
Note

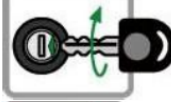
- Measure the distance between ABS ring gear [1] and wheel speed sensor [2] from each position in one revolution of the ring gear. Do not turn the wheel when using a feeler gauge, or the ABS ring gear and wheel speed sensor may be damaged.



Maintenance and Troubleshooting Process

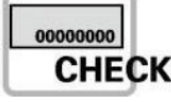
(1). Usage method of the diagnostic instrument

- 

1. Connect the diagnostic instrument to the diagnostic interface.
- 

2. Turn on the "ignition switch".
- 

3. Read fault related information (fault code, frozen frame, etc.); read the maintenance manual to confirm the faulty parts and types; make the maintenance plan according to fault related information.
- 

4. Troubleshooting.
- 

5. Turn on the ignition switch again, start the vehicle to read the fault information, and confirm that the fault has been eliminated.

(2). Preliminary inspection

Before starting the troubleshooting steps based on ABS fault codes, a preliminary check shall be performed:

1. Confirm that the ABS fault indicator lamp works normally;
2. Confirm the existence of the fault phenomena complained by the vehicle owner, and confirm the conditions under which the fault occurs.

Then check the following:

- Check for proper sensor gap;
- Check that the ABS ring gear is flat without deformation;
- Check that the ABS fuse is normal;
- Check that the power wiring harness and grounding area are clean and secure;
- Check the ABS assembly and sensor connector for looseness or poor contact.

Important note:

If the above phenomenon exists, the maintenance operation shall be carried out. If not, it will affect the subsequent fault diagnosis and maintenance work.

Troubleshooting-Diagnostic instrument

Fault diagnosis needs to be tested in parking state. Maintenance personnel can read the information of ABS by connecting OBD interface via the diagnostic instrument. See the following table for fault types and handling measures.

(3). Fault code information table

DTC	Failure Description
C0024	MCU_MU_CLK_Monitor_Failed 微控制器时钟检测错误
C0032	MCU_MC_ROM_Failed 微控制器ROM错误
C0033	MCU_MC_RAM_Failed 微控制器RAM错误
C0040	MCU RAM Stack Overflow Fault 微控制器RAM堆栈错误
C0041	MCU Hardware Reset 微控制器硬件复位
C0044	Solid State Relay_Relay over current 固态继电器_过流
C0045	Solid State Relay_Relay shorted (Stuck on) 固态继电器_继电器短路(卡死)
C0046	Solid State Relay_shorted to ground 固态继电器_与地短接
C0051	Battery Voltage_Battery under-voltage 1 (7V < Voltage < 9V) 电池电压过低1, (大于7伏小于9伏)
C0052	Battery Voltage_Battery under-voltage 2 (Voltage <= 7V) 电池电压过低2, (小于等于7伏)
C0053	Battery Voltage_Battery over-voltage 电池电压过高
C0060	Brake Pedal Not Applied with Decel不踩刹车有减速度
C0061	Brake Pedal Always Applied Without Decel Fault 踩下刹车时没有减速度
C0062	Brake Diode Breakdown 刹车二极管击穿
C0070	Pump Motor control_Bad connection or Pump supply open or low voltage 泵电机连接差或供电端开路或电压过低
C0071	Pump Motor control_Pump ground open or Motor open 泵电机开路或地线开路
C0072	Pump Motor control_Pump FET shorted 泵电机开关管短路
C0073	Pump Motor control_Pump FET open 泵电机的开关管开路
C0074	Pump Motor control_Pump over current 泵电机过流
C0075	Pump Motor control_Pump motor blocked 泵电机堵转
C0080	Front_WSS_HSS_Short_To_Battery前轮轮速传感器高端与电源短接
C0081	Front_WSS_LSS_Short_To_Battery前轮轮速传感器低端与电源短接
C0082	Front_WSS_HSS_Short_To_Ground or WSS short circuited 前轮轮速传感器高端接地或短路
C0083	Front_WSS_LSS_Short_To_Ground or WSS open 前轮轮速传感器低端接地或开路
C0084	Front_WSS_Plausibility01前轮轮速传感器信号失真等级01
C0085	Front_WSS_Plausibility02前轮轮速传感器信号失真等级02
C0086	Front_WSS_Plausibility03前轮轮速传感器信号失真等级03

C0087	Front_WSS_Plausibility04前轮轮速传感器信号失真等级04
C0088	Front_WSS_Plausibility05前轮轮速传感器信号失真等级05
C0100	Rear_WSS_HSS_Short_To_Battery后轮轮速传感器高端与电源短接
C0101	Rear_WSS_LSS_Short_To_Battery后轮轮速传感器低端与电源短接
C0102	Rear_WSS_HSS_Short_To_Ground or WSS short circuited 后轮轮速传感器高端接地或短路
C0103	Rear_WSS_LSS_Short_To_Ground or WSS open 后轮轮速传感器低端接地或开路
C0104	Rear_WSS_Plausibility01 后轮轮速传感器信号失真等级01
C0105	Rear_WSS_Plausibility02后轮轮速传感器信号失真等级02
C0106	Rear_WSS_Plausibility03后轮轮速传感器信号失真等级03
C0107	Rear_WSS_Plausibility04后轮轮速传感器信号失真等级04
C0108	Rear_WSS_Plausibility05后轮轮速传感器信号失真等级05
C0120	Front_NO Coils Short to battery 前轮常开线圈接电源
C0121	Front_NO Coils Short to ground or Open solenoid 前轮常开线圈接地或开路
C0130	Front_NC Coils Short to battery 前轮常闭线圈接电源
C0131	Front_NC Coils Short to ground or Open solenoid 前轮常闭线圈接地或开路
C0160	Rear_NO Coils Short to battery 后轮常开线圈接电源
C0161	Rear_NO Coils Short to ground or Open solenoid后轮常开线圈接地或开路
C0170	Rear_NC Coils Short to battery后轮常闭线圈接电源
C0171	Rear_NC Coils Short to ground or Open solenoid后轮常闭线圈接地或开路
C0210	Warning Lamp output_ Short to battery 报警灯输出与电源短路
C0213	Warning Lamp output_ Short to ground or open报警灯输出与地短路或开路
C0230	Vehicle speed output_ Short to ground 车速输出口与地短路
C0231	Vehicle speed output_ Short to battery 车速输出口与电源短路

(4). Treatment measures corresponding to fault codes

故障类型(failure type)	DTC	采取措施(Handling)
微控制器故障 (MCU Failure)	C0024~C0041	ABS 故障 , 请咨询供应商后, 更换新 ABS ABS failure, please replace new ABS after consulting supplier.
固态继电器故障 (Solid State Relay Failure)	C0044~C0046	ABS 故障 , 请咨询供应商后, 更换新 ABS ABS failure, please replace new ABS after consulting supplier.
电池电压故障 (The battery voltage Failure)	C0051~C0052	主要是外围电路故障! Mainly peripheral circuit failure! 检查车辆供电系统(线束连接、保险丝、电瓶、整流器) Check the vehicle power supply system(The fuse, battery, rectifier)
刹车信号故障 (The brake signal failure)	C0060~C0062	主要是外围电路故障! Mainly peripheral circuit failure!

		1.检查刹车二极管是否损坏; Check the brake diode 2.检查刹车信号线和 ABS 连接情况。 Check the connection between brake line and ABS
电机故障(Pump motor fault)	C0070、C0071	主要是外围电路故障! Mainly peripheral circuit failure! 检查电机供电线 Check the motor power supply line
电机故障(Pump motor fault)	C0072~C0075	ABS 故障 , 请咨询供应商后, 更换新 ABS ABS failure, please replace new ABS after consulting supplier.
轮速传感器接线故障 (Wheel speed sensor wiring fault)	C0080~C0083 C0100~C0103	主要是外围电路故障! Mainly peripheral circuit failure! 1.检查传感器线束与 ABS 连接通断情况, 若问题未解决, 进行下一步; Check the connection between sensor wire and ABS 2.尝试更换轮速传感器。 Try to change the wheel speed sensor.
轮速信号质量故障 (Wheel speed signal quality failure)	C0084~C0088 C0104~C0108	主要是外围电路故障! Mainly peripheral failure! 1.检查前后轮速传感器安装是否规范(传感器头部与齿圈的距离 $\leq 1.5\text{mm}$); Check the installation of wheel speed sensor(The gap between sensor head and the tone wheel is 1.5 mm or less) 2.检查齿圈是否有变形以或损坏。 Check if there is a deformation , or a damage with the tone wheel
线圈故障 (coil failure)	C0120~C0171	ABS 故障 , 请咨询供应商后, 更换新 ABS ABS failure, please replace new ABS after consulting supplier.
报警灯输出故障 (warning lamp output failure)	C0210、C0213	主要是外围电路故障! Mainly peripheral circuit failure! 检查仪表盘与 ABS 连接处线束, 若问题未解决, 请更换仪表, 若问题仍未解决, 请咨询供应商 Check the connection between dash board and ABS, if the problem not solved, please change the dash board. If the problem remains unresolved, please consult the supplier.
轮速输出口故障 (WSS output failure)	C0230、C0231	主要是外围电路故障! Mainly peripheral circuit failure! 检查外围电路和仪表, 若问题未解决, 请咨询供应商后, 更换新 ABS Check the circuit and dash board, if the problem not solved, please replace new ABS after consulting supplier.

Note: For products with software configurations without brake signals, faults C0060, C0061, and C0062 will not occur.

Vehicle Electrics

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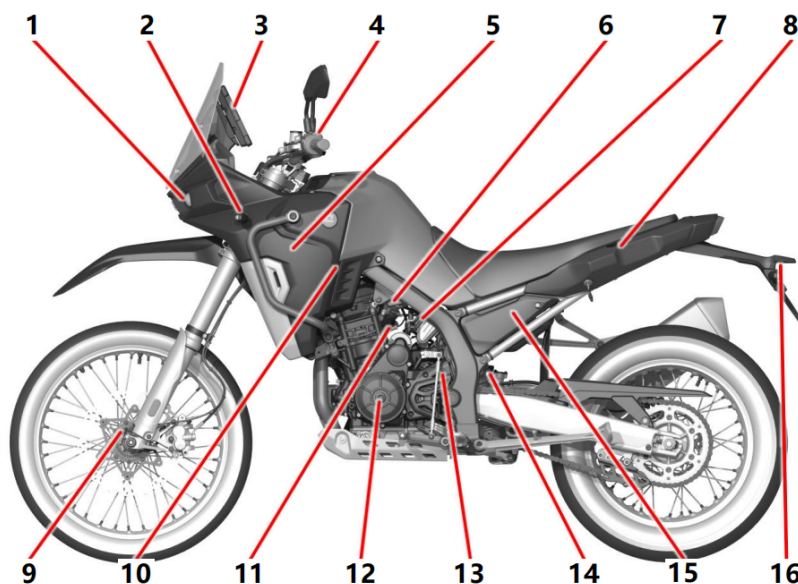
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Maintenance Instructions

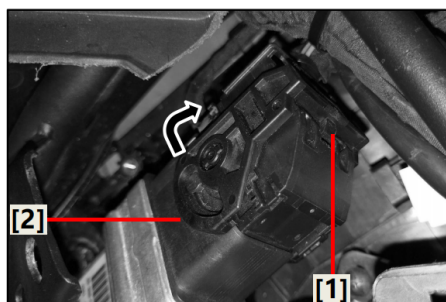
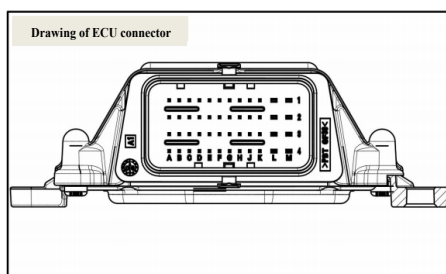
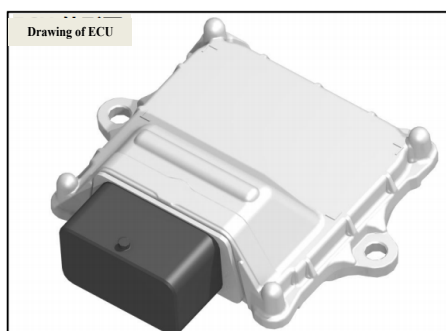
Precautions:

- During maintenance, it is forbidden to disassemble the parts of EFI system.
- During maintenance, extreme care shall be exercised on work with electronic components (ECUs, sensors, etc.) to prevent missing. Furthermore, do not touch the pins of electrical components at will to avoid damage caused by electrostatic breakdown.
- Do not remove the connectors of any components of the EFI system from their installation positions without authorization, to avoid accidental damage or foreign matters such as water and oil entering the connectors, which may affect the normal operation of the EFI system.
- When disconnecting and connecting the connector, be sure to put the ignition switch in the off position, otherwise the electrical components will be damaged.

System Location



S/N	Component Name
1	Headlight assembly
2	Turn signal
3	Instrument cluster/USB charging port
4	Handlebar switch
5	Battery
6	Three-in-one sensor
7	Carbon canister solenoid valve/tilt sensor
8	ECU control unit
9	Wheel speed sensor
10	Starting relay
11	Water temperature sensor
12	Magneto/trigger
13	Gear sensor
14	Rear brake switch
15	Fuel pump assembly/fuel level
16	License plate lamp



※ Electronic control unit (ECU)

The electronic control unit (ECU) is the brain of the whole EFI system and electrical appliances. It analyzes and processes all kinds of information provided by sensors, and sends the conclusion to the actuator in the form of command, so that the engine can run in the optimum state.

⚠ Warning

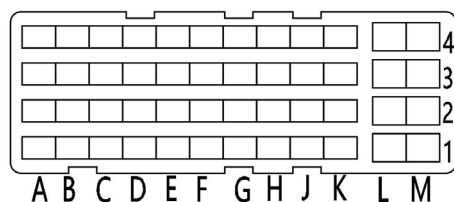
- Do not use tools when disassembling the ECU to avoid damaging the connector clip.
- It is not allowed to increase the load on the housing or cover plate; handle with care and prevent falling to the ground.
- When disconnecting and connecting the ECU connector assembly, be sure to set the ignition switch to OFF position, or the electrical components will be damaged.

Note

- Remove the ECU mounting screw;
- While pressing position [1], turn position [2] clockwise, then the connection between the ECU and the cable can be disconnected.

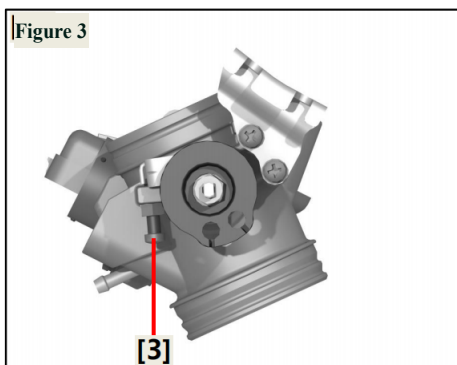
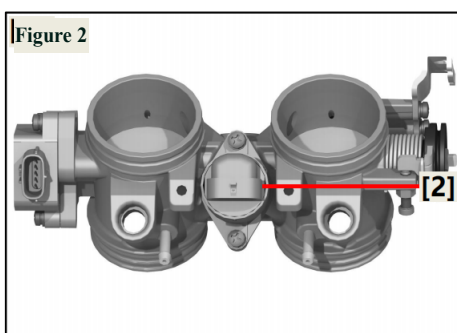
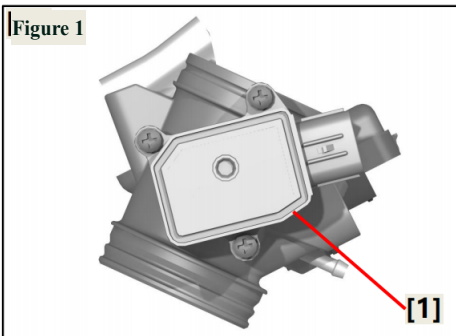
Quantity Value					
		Minimum	Standard	Maximum	Unit
Vehicle voltage	Normal operation	9.0	12.8	15.0	V
Limit and time to withstand vehicle over-voltage	15V	Some functions are maintained and fault diagnosis can be performed.		120	min
Operating temperature		-30		+70	°C
Storage temperature		-30		+85	°C

※ Schematic Diagram of Outgoing Direction of ECU Connector



Function definitions of ECU pins:

PIN-NO	FUNCTION	Wire harness color	PIN-NO	FUNCTION	Wire harness color
1(A1)	Idle stepper motor C	B-L	25(A3)	Side tilt sensor	Y
2(B1)	Idle stepper motor D	Gr/L	26(B3)	-	-
3(C1)	CAN communication line - high	G/L	27(C3)	-	-
4(D1)	CAN communication line - low	R/Y	28(D3)	Neutral signal	Lg/R
5(E1)	Main relay	B/R	29(E3)	Diagnostic K-line	W/G
6(F1)	Water temperature sensor signal	Gr/G	30(F3)	Continuous power supply (12V)	R
7(G1)	Throttle position	P/W	31(G3)	OFF switch	B/W
8(H1)	Intake air temperature sensor	P/B	32(H3)	-	-
9(J1)	Sensor GND	LB	33(J3)	5V power supply	P
10(K1)	Intake pressure sensor	P/G	34(K3)	MIL lamp (fault lamp)	V/B
11(L1)	Oxygen sensor 1 heating	O/L	35(L3)	Carben canister solenoid valve	P/L
12(M1)	-	-	36(M3)	Ignition GND	G
13(A2)	Idle stepper motor B	Y/G	37(A4)	Fuel injector 1	O/B
14(B2)	Idle stepper motor A	Gr/Y	38(B4)	Fuel injector 2	O/w
15(C2)	-	-	39(C4)	Oil pump relay	Gr/B
16(D2)	-	-	40(D4)	Fan relay	Gr/W
17(E2)	-	-	41(E4)	-	-
18(F2)	Side stand OFF switch	W/B	42(F4)	Pulse signal A	L/W
19(G2)	-	-	43(G4)	Pulse signal B	G/W
20(H2)	Clutch signal/ignition diagnosis_2	R/V	44(H4)	-	-
21(J2)	-	-	45(J4)	-	-
22(K2)	Oxygen sensor signal_1	Y/Gr	46(K4)	-	-
23(L2)	-	-	47(L4)	Main relay output: 12V	V
24(M2)	Ignition coil Left_1	B/Y	48(M4)	Ignition coil Right_2	B/L



※ Throttle valve body assembly

Connect the air filter and engine, control the angle of the throttle plate through the accelerator cable, and the throttle position sensor will send the angle signal to ECU.

Figures 1 and 2 show the mounting positions of the sensor.

Three-in-one sensor [1]

2. Idle stepper motor [2]

Precautions in sensor installation:

1. The terminals shall not be stained with water, oil and other liquids;
2. Do not contact harmful gases (Cl, SO₃, etc.);
3. Do not exert external force to cause deformation or damage of parts;
4. Direct contact with terminals is not allowed (to prevent static electricity);
5. It is necessary to block the pressure channel when cleaning the throttle.

As shown in Figure 3, the idle limit screw [3] is not allowed to be adjusted.

▲ Warning

- The engine idle speed is completely adjusted by EFI system, and manual adjustment of the idle limit bolts is not allowed.
- It is not allowed to increase the load on the shell or cover plate.
- When dismounting, handle with care to avoid falling.

As shown in the Figure 1:

Three-in-one sensor mounting screw

Torque: 2.0 N·m (0.2 kgf·m, 1.5 lbf·ft)

As shown in the Figure 2:

Idle stepper motor mounting screw

Torque: 4.0 N·m (0.4 kgf·m, 3.0 lbf·ft)

Figure 3:

Throttle cable bracket mounting screw

Torque: 3.5 N·m (0.35 kgf·m, 2.6 lbf·ft)

Throttle valve body inspection:

1. The throttle plate moves flexibly and is not stuck;
2. There is no foreign matter in throttle body and oil/gas passages (foreign particle size < 0.34 mm);
3. There is no missing assembly and incorrect assembly of parts or missing parts, and the internal parts are installed firmly without falling off;
4. The throttle screw is tightened reliably without loosening.

※ **Three-in-one sensor**

Intake air temperature sensor

It is installed on the right side of the air filter box bottom and used to detect the real-time temperature of air before it is drawn into the engine cylinder and feeds back the signal to the ECU to adjust the fuel injection quantity of the engine, thereby enhancing engine combustion efficiency.

- Intake pressure sensor

Monitor the intake pipe pressure and provide the engine load information for ECU.

- Throttle position sensor

The throttle position sensor is generally equipped with a throttle coupling shaft. By turning the accelerator handle, the driver drives the throttle flap to rotate, and then transmits the rotation information to the throttle position sensor through the throttle shaft and the throttle coupling shaft, so as to monitor the opening of the throttle and transmit the position signal to the ECU, measure the intake air volume, control the fuel injection volume of the engine, and realize the real-time control of the engine speed.

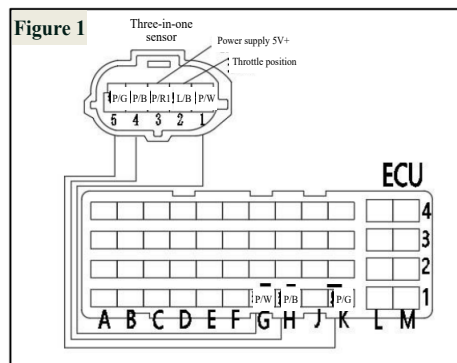
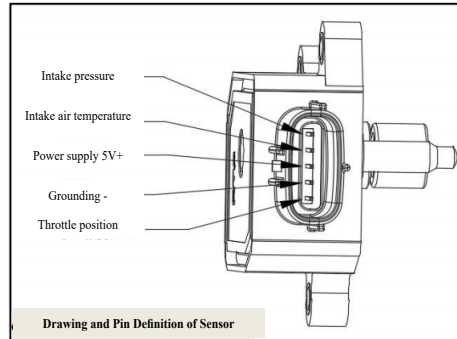
Figure 1: Wiring diagram for connection between three-in-one sensor and ECU

Function definitions of pins:

1. Throttle position to ECU (G1) P/W
2. Grounding - (L/B)
3. Power supply 5V+ P/R 1
4. IAT to ECU (H1) P/B
4. IP to ECU (K1) P/G

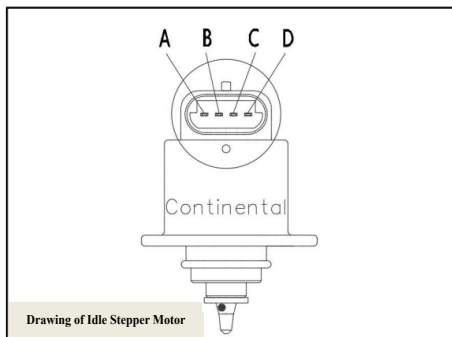
Sensor voltage/resistance parameters

- Throttle position sensor voltage: at idle position: 0.5–0.9 V; at fully open position: 3.7–4.2 V.
- Intake pressure sensor voltage: at 10 kPa: 0.4 V; at 115 kPa: 4.65 V.
- Intake air temperature sensor resistance: at 25 °C: 1940–2060 Ω.



Install:

It shall be installed within a permissible range, making sure that no condensate water will be generated in the sensor, because condensate water will damage the sensing elements inside the sensor.



※ Idle stepper motor

It is designed to control the bypass air flow. The stepper motor is controlled by ECU using the engine sensor based on the engine load, and the fuel injection volume is different under different operating conditions, thus it is required to supplement air intake for the motor, and connect in specified method, otherwise it may cause unstable idle speed.

Functions of pins:

Stepper motor pin A/connected to ECU (B2) Gr/Y

Stepper motor pin B/connected to ECU (A2) Y/G

Stepper motor pin C/connected to ECU (A1) Br/L

Stepper motor pin D/connected to ECU (B1) Gr/L

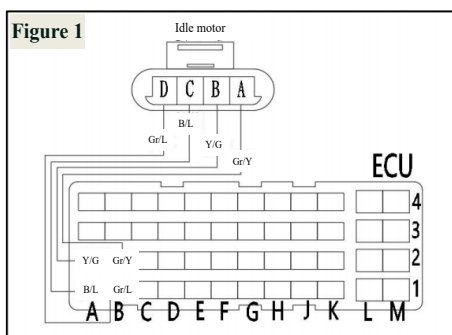


Figure 1: wiring diagram between phase pin of idle stepper motor and ECU

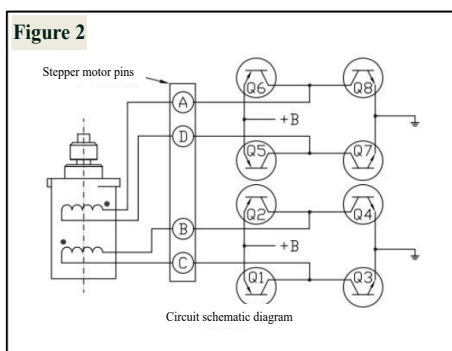


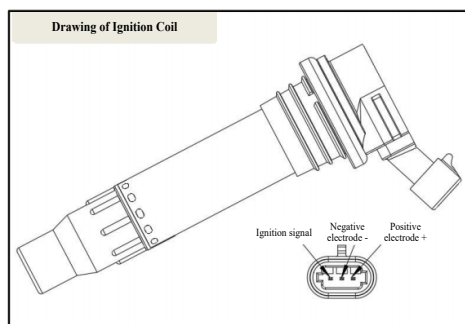
Figure 2 is a circuit diagram of idle stepper motor.

The following table shows the characteristic parameters of idle stepper motor.

Characteristic parameters			
NO	Item	Specification	Conditions
1	Rated voltage	12V DC	
2	Minimum/maximum operating voltage	7.5V-14V	
3	Phase resistance	53±5.3Ω	27°C
4	Operating temperature	-40°C-125°C	

※ Ignition Coil

The ignition coil converts low voltage electricity of the primary winding into high voltage electricity of the secondary winding, and generates sparks through the discharge of spark plugs to ignite the fuel mixture in the cylinder.



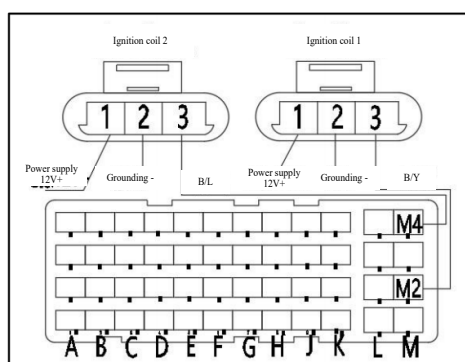
Function definitions of pins:

Ignition coil 1:

1. Positive electrode + connected to power supply 12V + (purple)
2. Grounding - G/P
3. Ignition signal to ECU (M2) B/Y

Ignition coil 2:

1. Positive electrode + connected to power supply 12V + (purple)
2. Grounding (G/P)
3. Ignition signal to ECU (M2) B/L

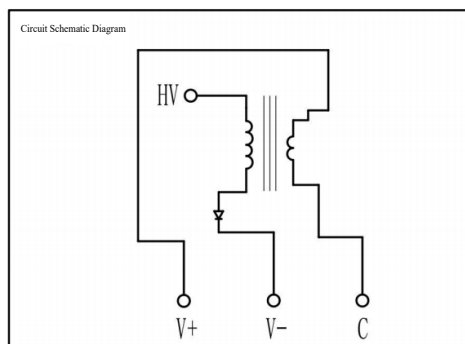


Measure secondary ignition voltage:

Connect the engine according to the schematic diagram of EFI

Connect the peak voltage measuring instrument as shown in the figure

In ignition, the secondary ignition voltage shall be > 22500V



Ignition coil parameters

1. Static parameters

Primary resistance: $0.70 \pm 10\% \Omega$

Secondary resistance:

Primary inductance: $2.13 \pm 15\% \text{ mH}$

Secondary inductance:

2. Dynamic parameters:

Rated voltage: $14 \pm 0.5\text{V}$

Primary current: $7.7 \pm 0.8\text{A}$

Ignition pulse width: $1.6 \pm 0.5 \text{ msec}$

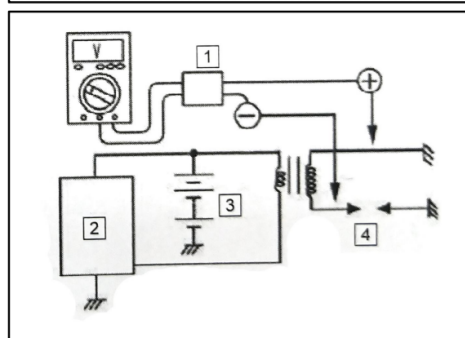
Secondary voltage:

not lower than 25 KV at 25pF load

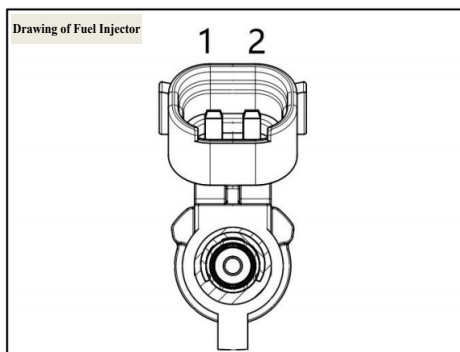
Not lower than 20 KV at 25pF/ 1 M Ω load

Ignition energy: not lower than 30mJ

Operating temperature: -35°C -125°C



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



※ Fuel injector

One end of the injector is installed on the injector seat, and the other end is connected to the oil pipe through the injector cap. It injects fuel within the specified time according to the command of ECU, thus providing fuel to the engine and atomizing it. The fuel injector adopts four-hole injection, and cannot rotate after the circlip is fixed.

Function definitions of pins:

Fuel injector 1

1. Connected to power supply 12V + (V)
2. Signal connected to ECU A4(O/B)

Fuel injector 2

1. Connected to power supply 12V + (V)
2. Signal connected to ECU B4 (O/W)

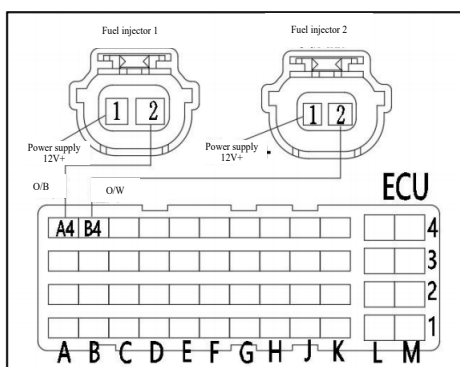


Figure 1: Wiring diagram between fuel injector and ECU.

Inspection of fuel injector

1. Check:

- Fuel injector

Stuck → Replace and check the fuel pump/fuel system.

Accumulation → Replace.

Damage → Replace.

2. Check:

- Fuel injector resistance

Injector resistance: 12 Ω

Note:

1. In order to avoid contamination to the injecting area, the fuel inlet end of the injector shall always be above the fuel outlet end (at the injector mounting position on the entire vehicle);
2. To achieve the best assembly of fuel injector, it is necessary to lubricate the upper and lower O-ring with clean silicone-free engine oil; Lubricating oil shall not contaminate the inside and orifice of the injector;
3. The O-ring must be replaced when removing and reassembling the injector, and the sealing surface must not be damaged during such operation.

Installation of fuel injector:

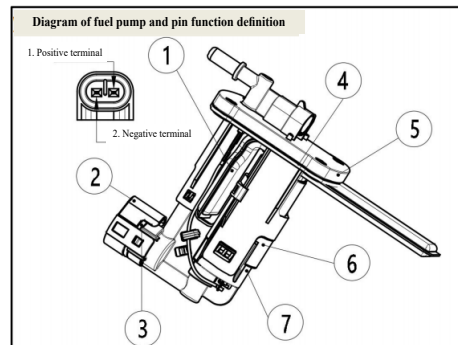
The fuel injector shall be installed by hand and the use of tools such as hammers to strike is prohibited. The O-ring must be replaced when removing and installing the fuel injector; Before disassembling the fuel injector, relieve pressure if necessary; after installation of the injector, check the sealing performance to ensure no leakage.

※ Fuel pump assembly

The fuel pump assembly integrates the fuel pump, plastic bracket, full-flow filter, fine filter and pressure regulating valve. The working process is to use the certain oil pressure and flow to pump the fuel from the fuel tank to the engine.

Function definitions of pins:

- 1: Connect to the output terminal of the oil pump relay (O/Lg)
- 2: Connect to the negative battery electrode (G)



Performance parameters:

Pressure regulator opening pressure: at a flow rate of 40L/h, the corresponding rated pressure is 300 ± 10 kPa

Notes

- This fuel pump is installed at the bottom of the vehicle's fuel tank. Do not operate the fuel pump in a no-load or fuel-free state to prevent damage;
- Handle with care during installation or disassembly, and do not drop it to the ground.

S/N	Component Name
1	Strainer
2	Adjusting valve clip
3	Pressure regulator
4	Sealing washer
5	Flange cover assembly
6	Bracket
7	Pump cell

Measure oil pressure

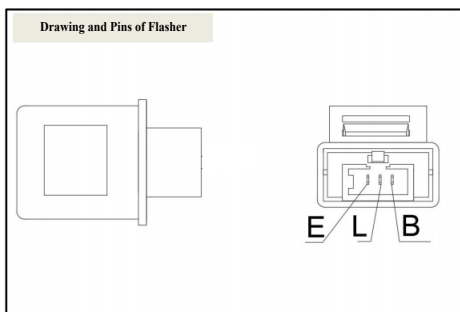
Connect the oil pressure gauge to the fuel outlet of the fuel pump assembly, and lock it with a clamp to ensure that there is no leakage at the junction. Press the stop switch, and the fuel pump will stop running after an operation of 5 seconds. Now measure to check that the oil pressure reaches the specified pressure value (300 kpa). If so, it indicates that the fuel pump is in good condition, on the contrary, it indicates that the fuel pump is in abnormal condition and needs to be replaced.

Fuel Pump Basic Parameters Table

Name	Voltage (V)	Test Pressure (kPa)	Flow (L/h)	Current (A)
Fuel pump assembly	DC12	280 ± 10	≥ 30	≤ 2.5
Pump cell	DC12	330 ± 10	≥ 30	≤ 2.5
Shut-off pressure	DC8	100kPa		

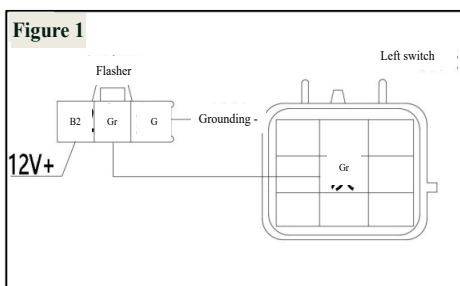
Pressure relief of fuel line

The fuel supply pressure of the electronic fuel injection system is high. All fuel pipes are made of high-pressure resistant hoses. Even when the engine is not running, there is still a relatively high pressure in the oil circuit. Therefore, note during maintenance: do not disassemble the fuel pipes easily; when maintaining the fuel system that needs repair, relieve the pressure of the fuel system before disassembling the fuel pipes and the methods are as follows: remove the fuel pump relay or the 2P (black) wire harness connector of the fuel pump, start the vehicle and let it idle until the engine shuts off on its own.



※ Flasher

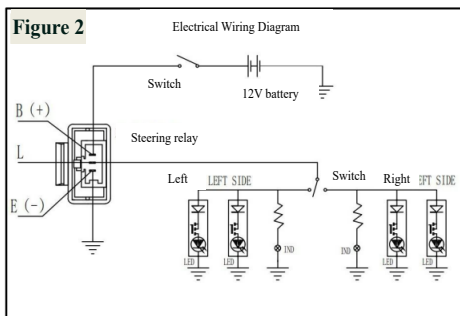
Note: This flasher is designed with the functions of wire break alarm prompt and the overload protection.



As shown in Figure 1: Wiring diagram of flasher.

Relay circuit inspection

1. Open circuit inspection of power cord:
Turn on the ignition switch and measure the voltage between the black line and the green line. Battery voltage is the normal voltage, if not, check the black and green lines for open circuit or fuse failure.
2. Open circuit inspection of output wire
Check the connection between the left switch and the gray wire of the flasher
3. Abnormal flashing frequency or no flashing:
Check each turn signal lamp for damage;
Check the signal wire of the turn signal lamp for short to ground, resulting in short circuit protection of flasher.

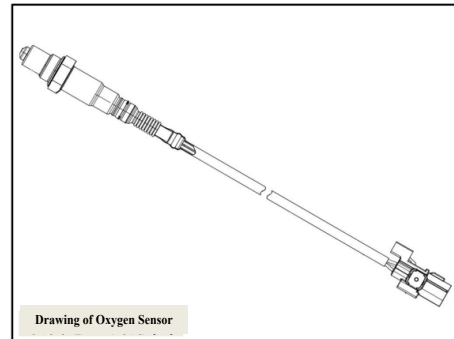


As shown in Figure 2: Electrical wiring diagram of flasher.

1. Rated voltage: DC12.8V;
2. Rated power: LED lamp, front and rear turn signal lamps + instrument: 1.5W*2+0.05W;
3. Working voltage range: DC 11 ~ 16V, minimum operating voltage: $\leq 9V$;

※ Oxygen Sensor

The sensor detects the oxygen content in the exhaust gas to obtain the rich and lean signals of the air-fuel ratio in the mixture, converts the testing result into a voltage signal, and inputs it into the ECU. Based on the signal from the oxygen sensor, the ECU continuously adjusts the fuel injection pulse width. Maintain the mixture concentration within the ideal range to achieve feedback control of the air-fuel ratio, also known as closed-loop control.

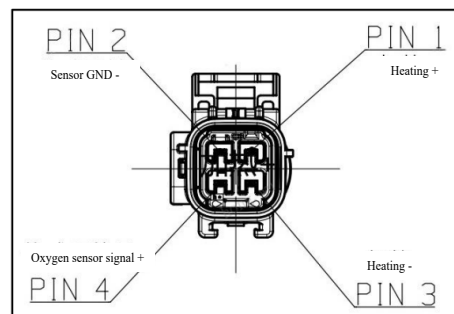
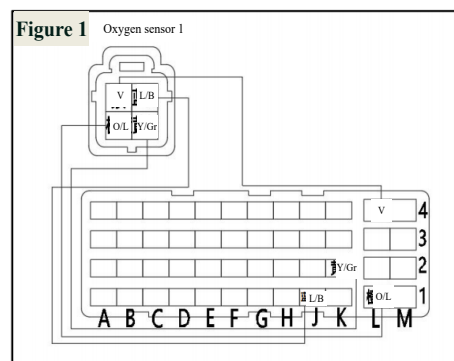


As shown in Figure 1: Wiring diagram between oxygen sensor and ECU.

Function definitions of pins:

Oxygen sensor 1

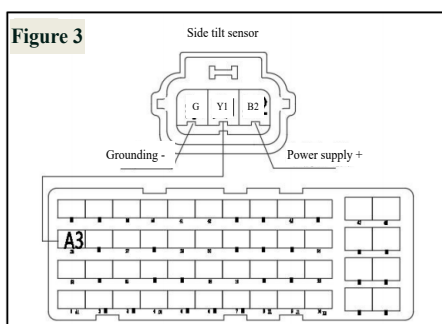
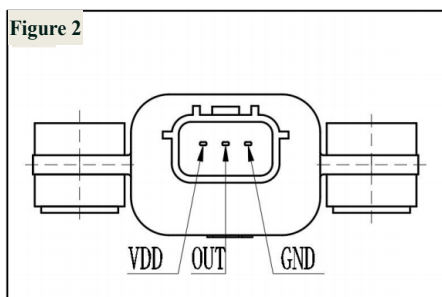
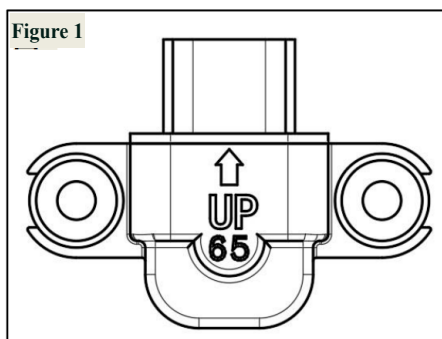
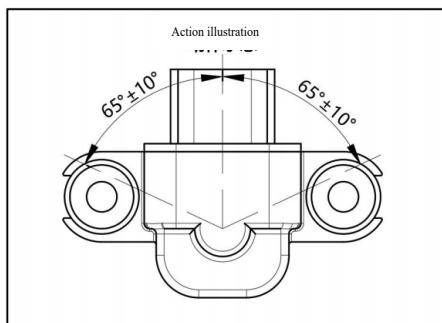
- PIN1: Oxygen heating + L4 (V)
- PIN2: Sensor ground-J1 (L/B)
- PIN3: Heating-L1 (O/L)
- PIN 4: Sensor signal + K2 (Y/Gr)



Notes

- Apply high temperature resistant grease to the thread area during installation.

Tightening torque: 50N·m



※ Side tilt sensor

The sensor is designed to provide side tilt protection. When the side tilting angle of vehicle exceeds an allowable range ($65^{\circ} \pm 10^{\circ}$), the OUT pin signal is transmitted to ECU, and ECU controls the engine stall, thus providing protection for both the driver and the vehicle.

Figure 1: Install with the "UP" facing up.

Figure 2: Function definition of pins

VDD: Connect to +DC 12 V (B2)

OUT: Connect to ECU A3# pin (Y1)

GND: Grounding (G)

Inspection:

Output voltage of tilt sensor

Off-specification → Replace.

Output voltage of tilt sensor

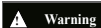
Operating angle: $65^{\circ} \pm 10^{\circ}$

The sensor output voltage before actuation angle is at a high level, ≥ 13.5 V.

The output voltage of sensor within the operating angle range is low-level voltage of ≤ 0.2 V

As shown in Figure 3: Wiring diagram between side tilt sensor and ECU.

※ Battery



Warning

• Please disconnect the positive and negative connections of the battery before disassembly.

Disassembly/installation

Disassemble the following parts:

- Fuse box [1]
- Wire clip [2]
- Starting relay [3]
- Screw [4]
- Battery box cover[5]
- Rubber pad, battery [6]

The installation sequence is reversed from the removal sequence.

Note

• Battery is designed with over-charge protection, and the voltage for over-charge protection is 15.3V-15.9V.

Charging

- a. Turn the main switch to "OFF" and disconnect the positive and negative electrodes of the battery from the battery terminal;
- b. Remove battery;
- c. Connect the charger to the battery, turn on the charger.

When the charging is completed, turn off the charger, and unplug it from the battery;

Notes

• If the vehicle is not in use, recharge its battery every 3 months.

Check charging voltage

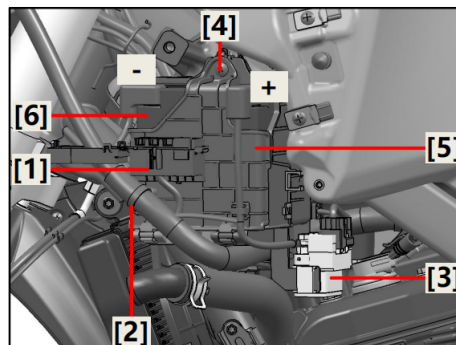
The battery must function properly and be fully charged.

Start the vehicle for a voltage test;

Measuring point positive (+), measuring point grounding (-).

Note

• When measuring the battery voltage after charging, it shall be maintained for at least 30 minutes, otherwise accurate results cannot be obtained due to battery voltage fluctuations after charging.



Torque:

Battery box cover mounting bolts

6.0 N·m (0.6 kgf·m, 4.4 lbf·ft)

Battery terminal bolt

5.0 N·m (0.5 kgf·m, 3.7 lbf·ft)

Battery specification:

Battery model: HJ13L-FPZ

Full charging voltage: > 13.2V

Required charging voltage: < 12.8V

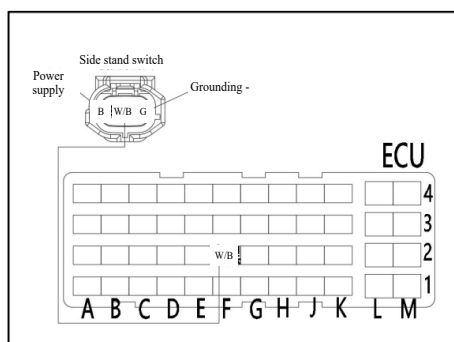
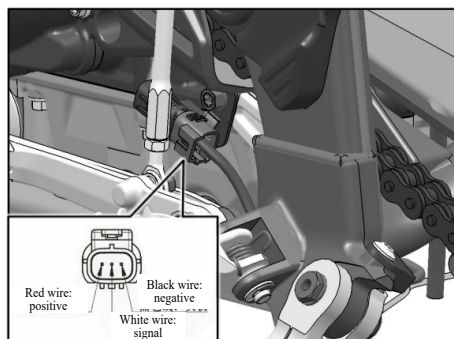
Charging current: standard 3.0A, max. 24A

Operating temperature: -20°C - 60°C

Battery capacity: 12.8V/6.0Ah

Overall dimension: Length × Width × Height: 112×70×110(2±mm)

Charging voltage	
5000rpm	14.4±0.5V



※ Side stand OFF switch

Inspection:

Check the side bracket switch for proper ignition cut-off:

1. Straddle the motorcycle and retract the side stand;
2. Start the engine when the gearbox is in neutral, and then shift the gearbox into gear while clenching the clutch lever;
3. Completely put down the side stand;
4. The engine shall stop when the side stand is put down.

If the vehicle fails to stall when the side stand is put down → Replace.

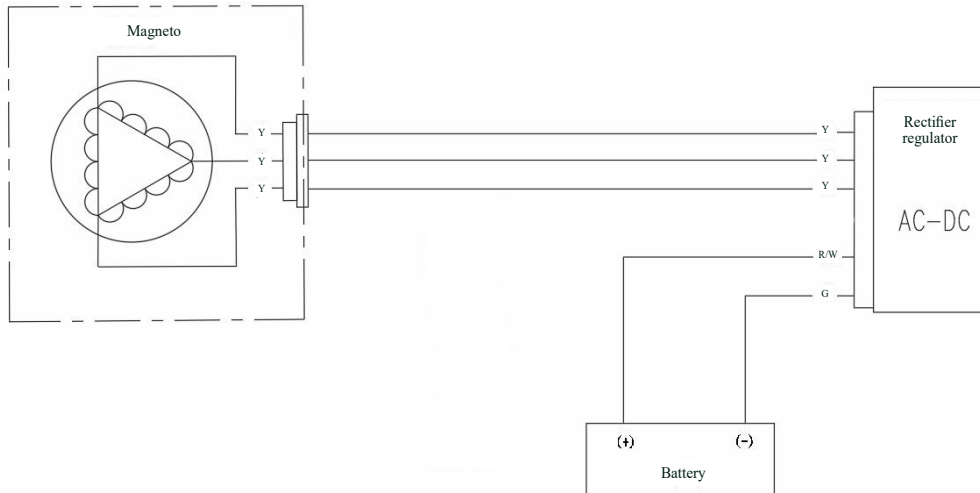
Inspection of wiring connection:

1. Check the white-black wire from the side stand switch to ECU for open circuit or short circuit.
2. Connection of side stand switch connector.
3. Check the fixing condition of the harness connector.
4. Remove the connector assembly, and check all bolts in the connector (check the terminals for bending or damage, and check the fixing condition of all bolts).

Right figure: Wiring diagram of side stand switch and ECU.

※ **Power supply system**

Charging Circuit Diagram



※ **Magneto**

Magneto coil resistance

Measure the resistance between magneto stator coils, if within the specified range, it indicates that the magneto is in good condition; On the contrary, it indicates an abnormality and an immediate replacement is required;

Normal resistance range of magneto coil:

$0.2\Omega \pm 20\%$ (Y/Y):

Insulation resistance $\infty \Omega$ (Y-grounding):

When checking, turn the multimeter to the gear $1 \times 10 \Omega$.

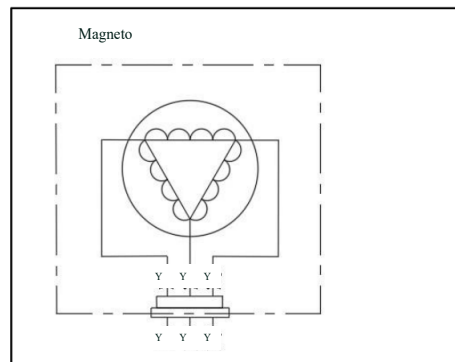
Performance of magneto under load

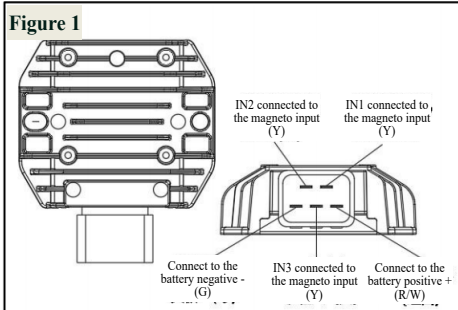
Start the engine, use a multimeter to measure and check for consistent voltage among the three output lines of the magneto stator coil, if consistent, it indicates that the magneto is in good condition; if not, it indicates an abnormality and a replacement is required;

Charging performance

Speed (rpm) 5000

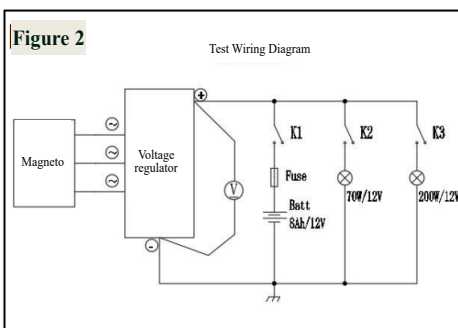
Output current (A) ≤ 8.5





※ Regulating rectifier

The engine generally runs at 5,000r/min, in a fully charged state of battery, use a multimeter to measure the voltage at positive and negative ends of battery, which is 13.8V-14.8V.



Function definitions of pins:

- 1: IN1 connected to magneto input (Y)
- 2: IN2 connected to magneto input (Y)
- 3: IN3 connected to magneto input (Y)
- 4: GND connected to battery: negative terminal (G)
- 5: Load (V)
- 6: OUT connected to battery positive terminal (R/W)

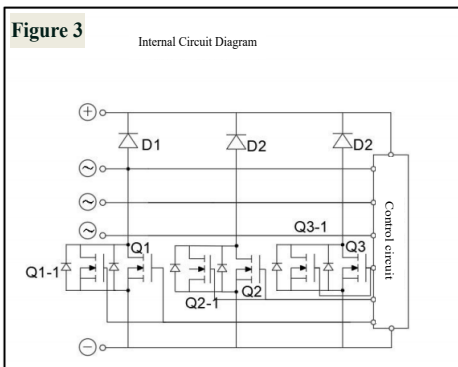


Figure 1: Drawing of regulating rectifier and definition of pins

Figure 2: Test wiring diagram of regulating rectifier.

Figure 3: Internal circuit diagram of voltage regulating rectifier.

※ **Trigger**

It provides engine speed signal to ECU, and the ECU determines the ignition angle and fuel injection phase, etc. based on the signal.

Drawing of Trigger

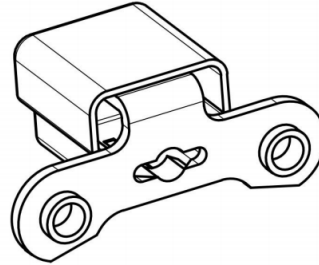
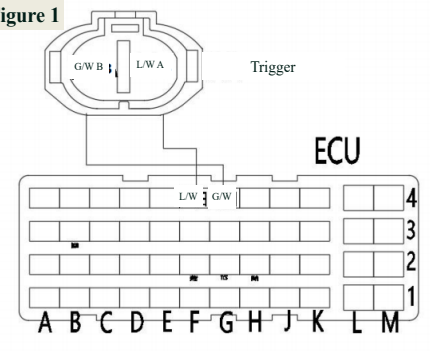


Figure 1: Wiring diagram between trigger and ECU.

Figure 1



Measure the resistance value of trigger unit:

Set the multimeter to the $1 \times 100\Omega$ range:

Trigger coil resistance: 100-200 Ω (20°C)

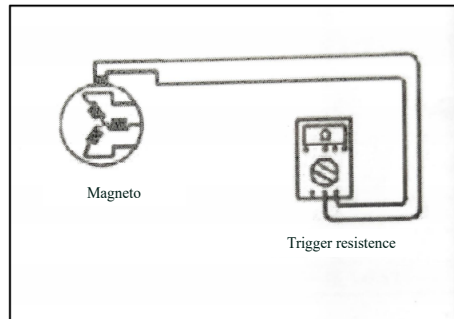
If the resistance value of trigger unit is not within the above range, replace the trigger unit.

Measure the peak voltage of trigger unit

Connect the multimeter to the peak voltage adapter as shown in the figure:

+ Probe: L/W (A) lead

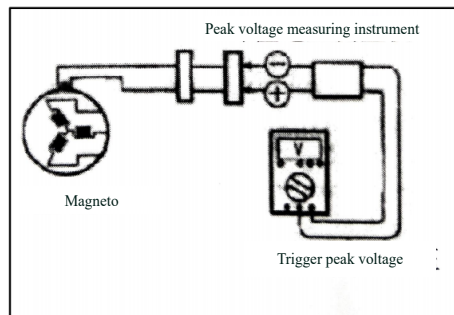
- Probe: G/W (B) lead

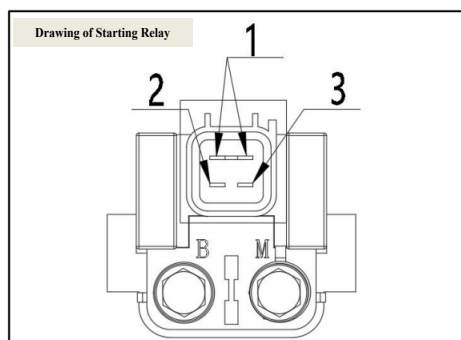


Multimeter voltage is set to the AC gear:

Set the engine in neutral, press and hold the start button to make the engine running for a few seconds, and then measure the trigger coil voltage:

Repeat the measurement several times, and the measured highest output voltage of trigger coil is >2V (200r/min)



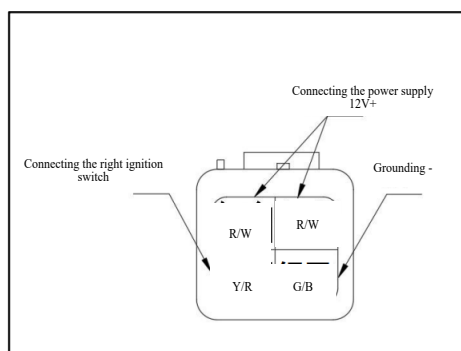


※ Starting relay

Apply DC12V to the contacts at both ends of the control circuit coil of starting relay, and measure with a multimeter to check for interconnection between the contacts (B and M) :

If the relay contacts make a tick sound and the multimeter makes a continuous beep sound, it indicates that the two contacts are interconnected, if not, it indicates that they are not interconnected. if there is no DC12V voltage applied to two ends of the coil, the two contacts are not interconnected:

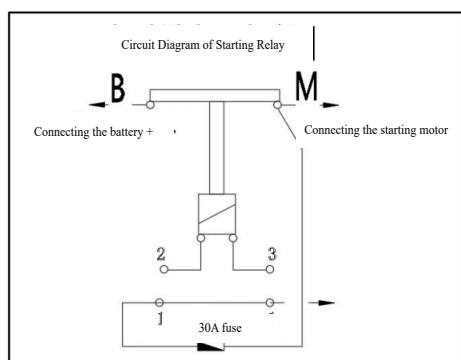
The above two items can be used to confirm whether the relay is in good condition, and the multimeter shall be set to the on-off gear during the measurement:



⚠ Warning

• The time for applying voltage to the relay coil shall not exceed 1 minute, otherwise it may cause overheating and even burnout of the coil.

As shown in the right figure: Wiring diagram of starting relay.



When measuring the resistance between relay coils using a multimeter, if the resistance is not within the specified range of 3Ω - 5Ω , replacement with new parts is need.

Measure with the multimeter set to the $1 \times 100\Omega$ range.

As shown in the right figure: Circuit diagram of starting relay.

※ Fuse

To avoid short circuit, be sure to set the main power switch to "OFF" before checking or replacing the fuse wire.

1. Check:

Fuse

a. Connect the digital multimeter to the fuse wire and check for conduction.

b. If it is not conductive, replace the fuse wire.

2. Replace:

Replace the fuse wire.

a. Set the main power switch to "OFF".

b. Install new fuse wire with correct ampere value.

c. Turn on the power switch and check for normal operation of the circuit.

d. If the fuse wire burns out again immediately, check the circuit.

⚠ Warning

• Never use fuses with non-specified ampere value. Use of inappropriate fuse wire or use of fuse wire with incorrect ampere value may cause extensive damage to electrical components, lead to failure of lighting and ignition systems, and may cause fire.

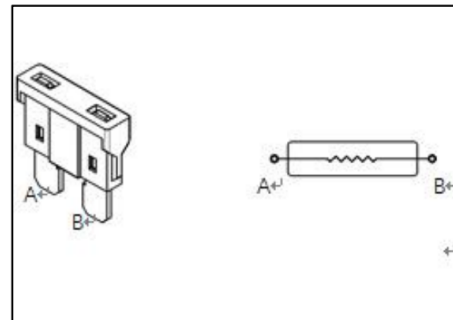
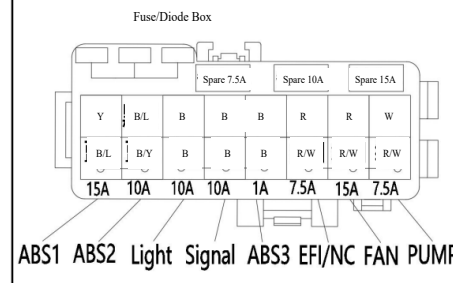
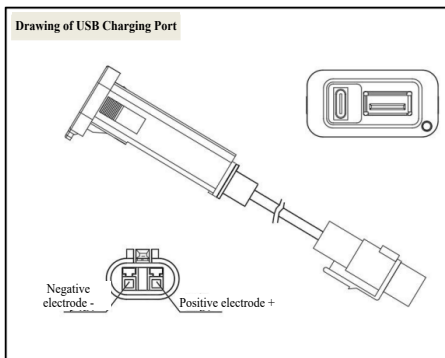


Figure 1



As shown in **Figure 1**: Wiring diagram of fuse box.



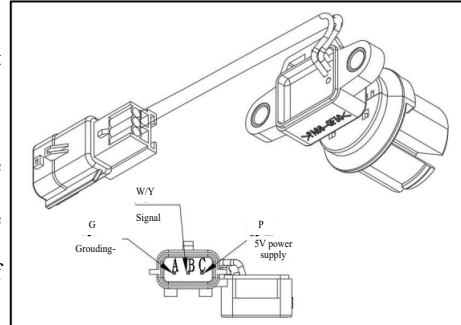
※ **USB charging port**

1. Working environment temperature: $-30^{\circ}\text{C} \sim +95^{\circ}\text{C}$;
2. Working voltage: $\text{DC}10\text{V} \sim 24\text{V}$;
3. Output voltage range: $\text{DC}3\text{V} \sim 12\text{V}$ (automatically adjusted according to the fast charging protocol);
4. Fast charging protocols: support Qualcomm QC2.0, QC3.0 fast charging protocols, support Huawei fast charging protocol FCP, support Samsung fast charging protocol AFC, etc.;
5. Charging interface: Type-A + Type-C;
6. Maximum output power: $18\text{W} + 18\text{W}$ ($5\text{V}@3\text{A}$, $9\text{V}@2\text{A}$, $12\text{V}@1.5\text{A}$)
7. In case the fast charging protocol is not recognized, the output is $5\text{V}@3\text{A}$;
8. Insulation resistance: insulation resistance between the housing and the internal

※ **Gear sensor**

Inspection:

1. Check the gear sensor wires for open circuit or short circuit.
2. Connection of gear sensor connector.
3. Check the fixing condition of the harness connector.
4. Remove the connector and check each pin inside the join
(Check for any bent or damaged terminals, and verify the security of each pin).
5. The sensor mounting bolt is M5x12 with a torque of 6N.m.

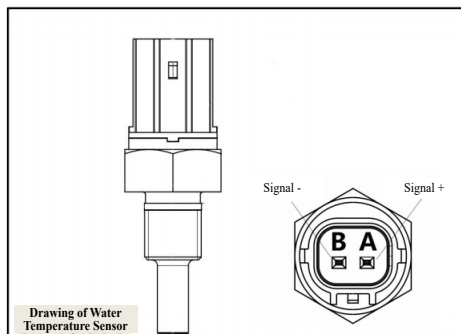


Parameter

1. Service temperature of sensor: -30~125°C;
2. Service voltage of sensor: DV 5V ± 0.25V.

Gear - Voltage Output Relationship Table

1ST(-30°)	N (0°)	2ND(30°)	3RD(90°)
4.415V	4.028V	3.640V	3.147V
4TH(150°)	5TH(210°)	6TH(270°)	
2.346V	1.569V	0.5389V	



※ Water temperature sensor (engine)

The working principle of this sensor is based on a negative temperature coefficient thermistor (NTC). The sensor is installed on the water jacket of the engine block or cylinder head, in direct contact with the cooling water, so as to measure the temperature of the engine cooling water. The electronic control unit (ECU) measures the temperature of the engine cooling water according to this change and sends it to the instrument via CAN signal for displaying the current water temperature and water temperature alarm.

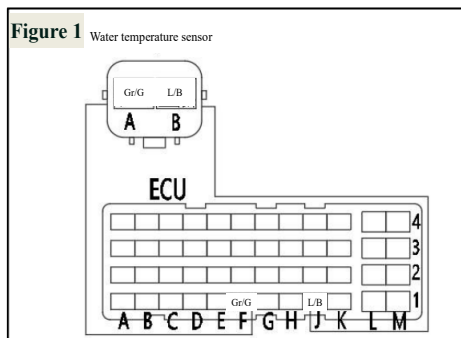


Figure 1: Wiring diagram between water temperature sensor and ECU.

Function definitions of pins:

A: Signal + connected to ECU (F1) pin (Gr/G)

B: Signal - connected to ECU (J1) pin (L/B)

As shown in the water temperature sensor characteristic table on the right, different temperatures correspond to different resistance signals.

Temperature range (°C)	Resistance value (kΩ)		
	Minimum value	Standard value	Maximum value
-20	13.820	14.770	15.790
20	2.3180	2.4320	2.5500
80	0.3084	0.3170	0.328
100	0.1789	0.1830	0.1870

※ **Ignition lock**

Pull out the connector assembly that connects ignition switch with the main cable, and check the switch connection status of the ignition switch.

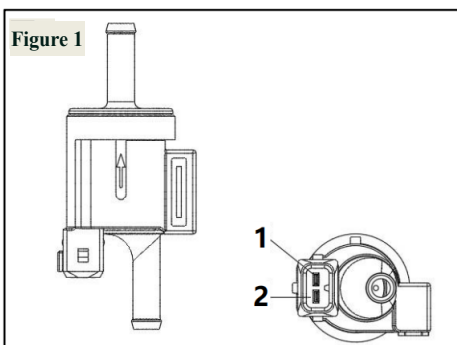
When the key is in the "❌" position, turn the direction handle to the leftmost, press the key, and rotate it counterclockwise to the "🔒" position, and the direction can be locked; if users need to unlock, rotate the key clockwise.



Warning

- During the parking (including parking for a long time), the ignition switch must be in the "❌" or "PUSH" position to ensure the safety of the vehicle and prevent the battery from "losing power".
- Do not push the motorcycle while the steering mechanism is locked, otherwise it will be out of balance.

Position	Function	Notes
❌	Used in parking (vehicle is powered off)	Key can be removed
↻	Used in starting or driving	Key cannot be removed
🔒	Use when locking the vehicle (the vehicle is powered off and the direction is locked)	Key can be removed



※ **Carben canister solenoid valve**

The canister control valve is used to regulate the flow of fuel vapor from the fuel tank through the carbon canister. It is triggered by pulses, and the duration of the pulses or the frequency of the electronic controller is adjusted according to the engine's operating conditions.

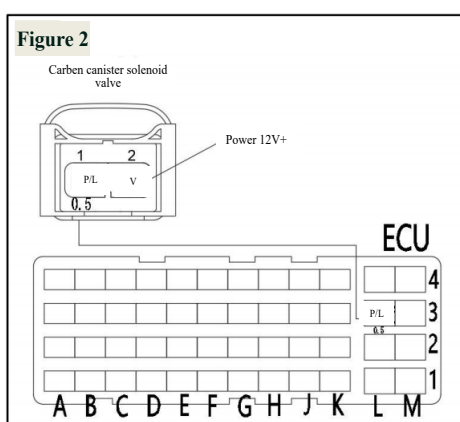


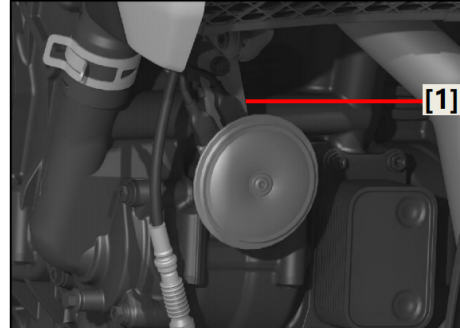
Figure 1: Drawing and pin definition of carbon canister solenoid valve

Figure 2: Circuit connection diagram of canister solenoid valve.

Resistance: 17 Ω

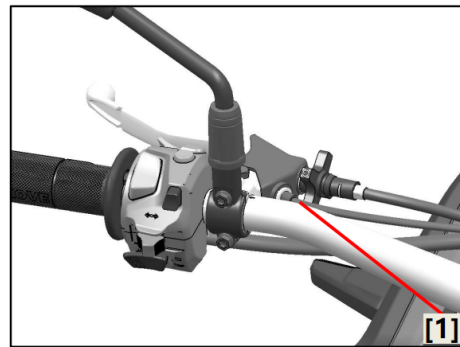
※ **Horn**

Pull out the harness connector from the horn [1] and connect it with 12V power supply. It indicates a normal state if the horn rings normally, if not, it needs to be replaced.



※ **Clutch switch**

When it is in gear, clench the clutch lever, and then press the start button to start the vehicle.



※ **Brake switch**

Identify the working state of the brake switch according to the lighting of brake light.

- 1: Clench the front brake handle: the brake light is on
- 2: Release the front brake handle: the brake light is off
- 3: Press the rear brake pedal: the brake light is on
- 4: Release the rear brake pedal: the brake light is off

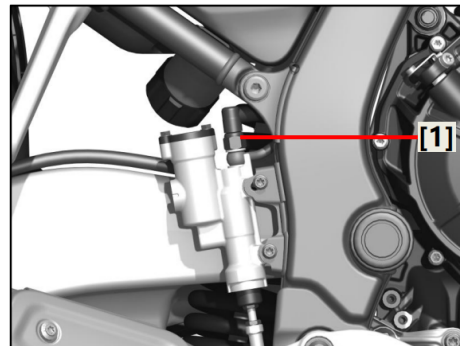
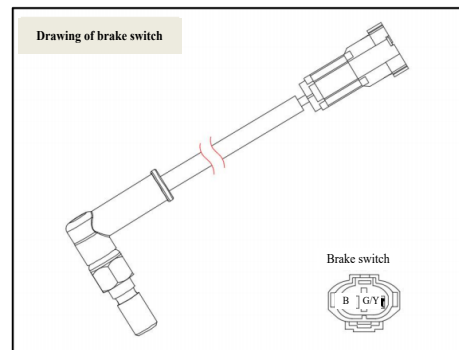
As shown in the left figure: Position [1] indicates the mounting position of brake switch.

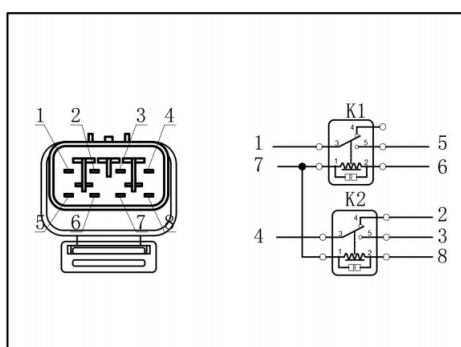
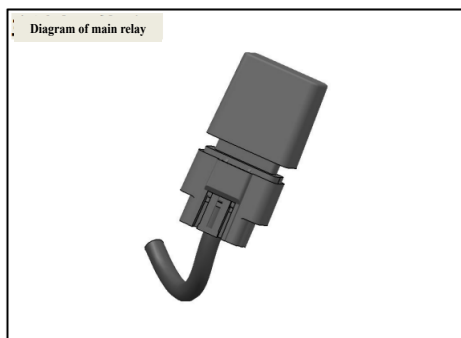
Torque:

Installation of brake switch

M10X1.25

22N·m(2.2kgf.ft;18lbf.ft)





※ Main relay inspection

Check if each switch is conducting with a digital multimeter.

1. Remove the relay from the harness plug.
2. As shown in the figure, connect the multimeter and the battery (12V) to the relay terminals.

Check the relay operation.

When measuring, set the multimeter to the continuity test mode to check for continuity between the terminals.

[7] Connect the battery's positive terminal

[6] Connect the battery's negative terminal

[1] Multimeter positive probe

[5] Multimeter negative probe

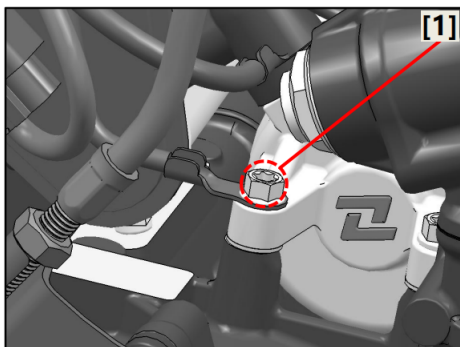
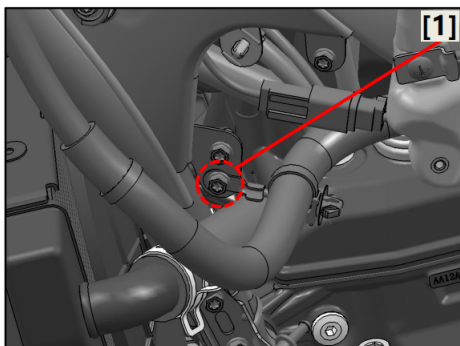
No continuity between terminals → replace the main relay.

※ Inspection of vehicle ground wire harness

Check the ground wire harness for any malfunctions

Check if the bolt [1] has looseness or has fallen off.

Each grounding bolt must be tightened to the required torque



※ Handle switch-right

Disconnect the plug connector linking the right handlebar switch harness to the main cable, and check the ON/OFF status of each switch action.

Emergency OFF switch:

Only when the switch is in "○"(ON) position, the engine can be started.;

When the switch is in "⊗"(OFF) position, the engine cannot be started.

In case of emergency, switch to the "⊗" (stop) position to extinguish the engine.

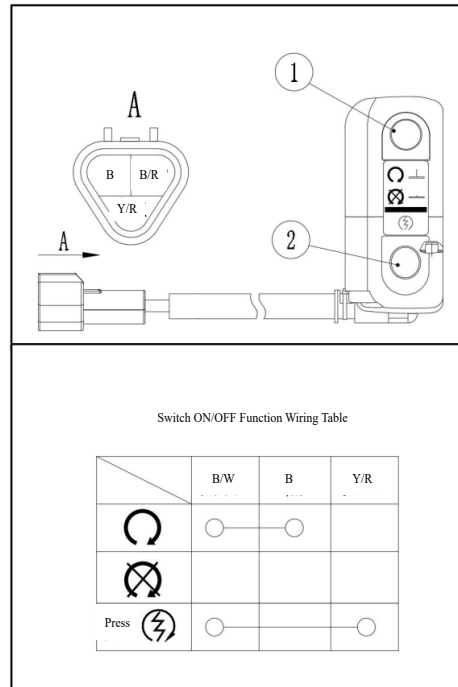
Electric starter button:

When the OFF switch is set to "○" position:

① If the engine is in neutral, press the "⚡" button to start the engine.

② If the engine is not in neutral, users should retract the side stand and squeeze the clutch handle, then press the "⚡" button to start the engine.

As shown in the right figure: ON/OFF schematic diagram of handlebar switch (right)



※ Handlebar switch-left

Disconnect the plug connector linking the left handlebar switch harness to the main cable, and check the ON/OFF status of each switch action.

[1]: Dimming switch. (self-reset)

[2]: Instrument return button; (self-reset)

[3]: Instrument confirm button; (self-reset)

[4]: Instrument up/down button; (self-reset)

[5]: Hazard/emergency light button; (self-lock)

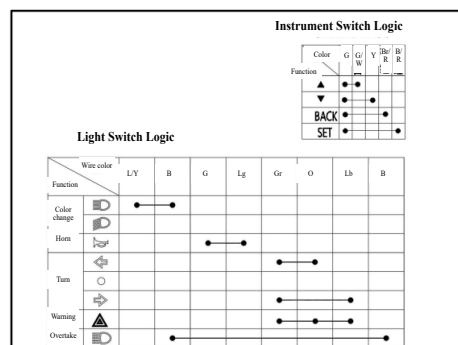
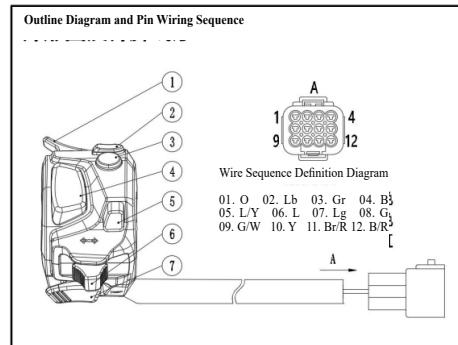
[6]: Turn signal button; (self-reset)

[7]: Horn switch button; (self-reset)

Inspection:

Check for any connector malfunctions such as: pin retraction, crooked pins, improper plugging, etc.

As shown in the right figure: ON/OFF schematic diagram of handlebar switch (left)

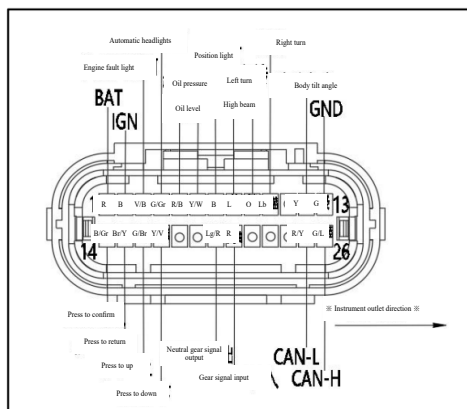




※ Instruments Display check:

When the ignition switch is turned to "ⓘ" (ON), the instrument is powered on to play the start-up animation, and then self-test is performed, and all functional modules and symbols are displayed. If the display is missing during self-test, Please go to the special repair shop of KOVEMOTO for repair.

Above: Drawing of main interface of instrument



As shown in Figure 2: Definitions of each pin function for the instrument.

※ **Oil level sensor**

Convert the fuel liquid height signal into standard electric signal and output it to the instrument indicator lamp for display.

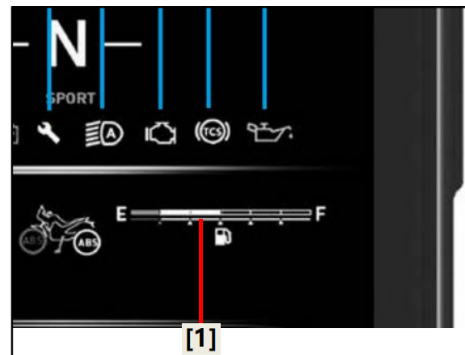
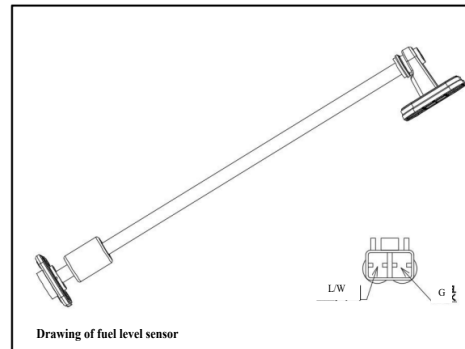
1. After the instrument starts up and switches to the main interface, the current remaining fuel in the tank shall be displayed;
2. Display range: 0-6 bars;
3. When the oil volume = 1 bar, the last bar of oil volume will be shown in red;
4. When the oil volume is ≤ 1 bar, the last bar of oil volume will turn red and flash;

- **In case of fault**

When the value of the oil volume sensor is beyond the normal range or no data is received, the dial of the oil gauge flashes in full bars.

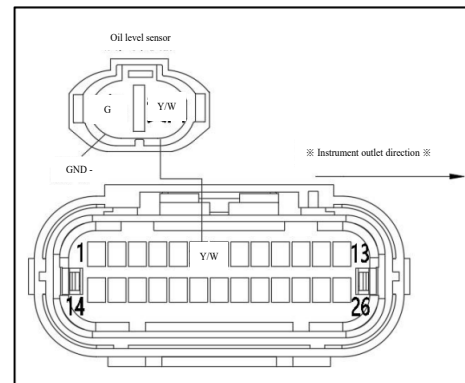
Floating location	Top (full)	Below (blank)
Resistance (20°C/68°F)	10-12Ω	95-98Ω
Stroke (mm)	382±4	≤44.5×4

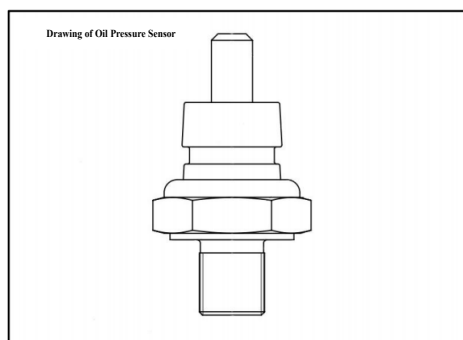
If the resistance does not meet the specification, replace the oil level sensor.



As shown in the above figure, the position [1] shows the 7 bars of oil volume in the oil volume display area of the instrument.

Figure 2: Wiring diagram of fuel level sensor and TFT instrument.





※ Oil pressure sensor

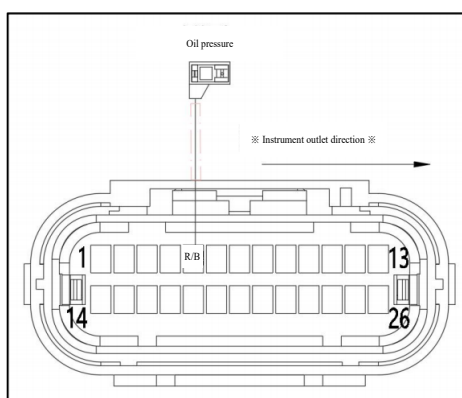
When the ignition switch is set to "ON", the oil pressure warning light on the instrument does not turn on.

1. Check the circuit of the oil pressure sensor
Circuit damaged → Replace.

2. Disconnect the wire harness connector from the oil pressure sensor. Then check whether the oil pressure warning light functions when connecting the wire harness to the engine ground,
Not turn on → Replace instrument assembly.
Turns on → Replace oil pressure sensor.

After the engine is started, the oil pressure warning light remains on continuously.

1. Check the circuit of the oil pressure sensor
Circuit damaged → Replace.



2. Check the engine oil pressure.

See "Inspection and replacement of engine oil" on page 30 for details.

Compliant → Replace the oil pressure sensor

3. If the oil pressure is not within the specified value, continue to check whether the engine oil is leaking, the type of engine oil, the oil seal, the oil filter or the oil pump.

Right figure: Wiring diagram of oil pressure sensor and instrument.

※ Headlight assembly

When turning on the ignition lock switch, the position light of the headlight turns on. When the vehicle is started: The position light and the low beam turn on simultaneously.

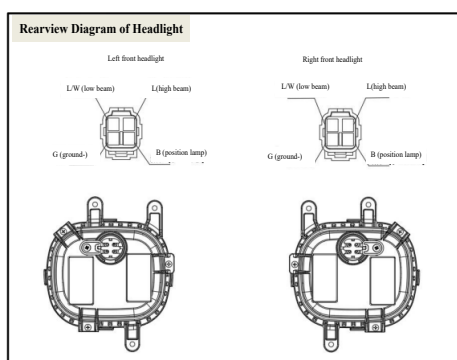
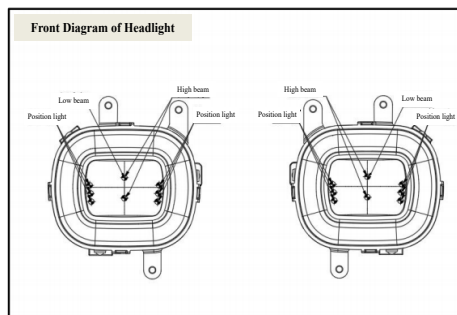
Notes

- When starting the vehicle, the headlight switches to the functions high beam: both the high and low beam are lit simultaneously.

When starting the vehicle, the headlight fails to light up, or the high beam and low beam fail to be switched Inspection:

1. Switch damage
2. Headlight relay damage
3. Connector abnormality, such as pin retraction, crooked pin, improper plugging, etc.

Left figure: Wiring diagram of headlight assembly.

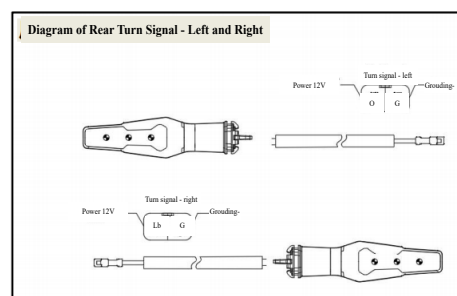
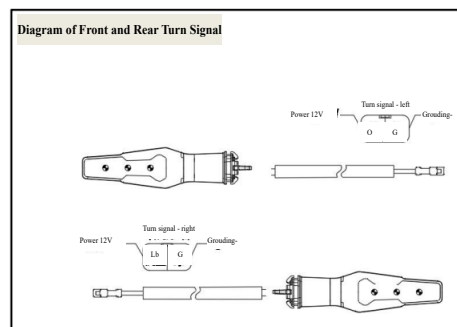


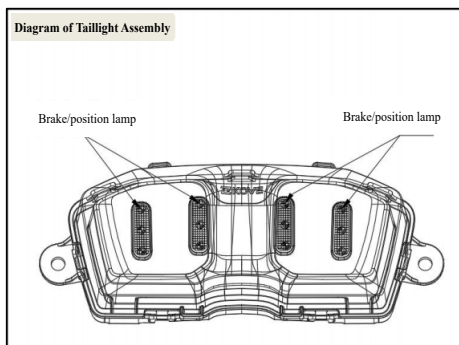
※ Front and rear turn signals

When turning on the ignition lock switch or starting the vehicle:

1. Press the left and right turn signal buttons respectively, the lights turn on
2. Press the turn signal center button, the light turns off

Left figure: Wiring diagram of front and rear turn signals

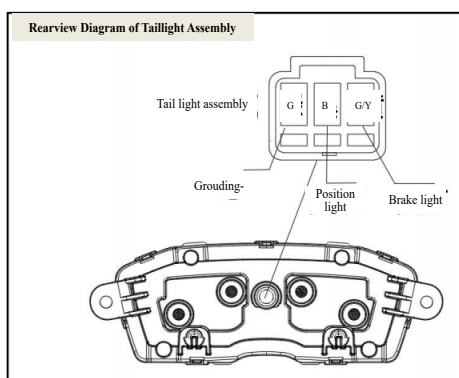




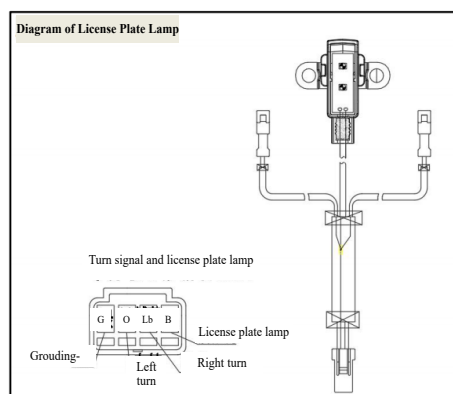
※ Tail light assembly

When turning on the ignition lock switch or starting the vehicle:

1. Position lamp: dimly lit
2. Brake lamp: dimly lit
3. Press the rear brake pedal: the brake light is on
3. When releasing the rear brake pedal: brake lamp dimly lit
5. After the vehicle is turned off and the ignition lock is turned off: lamps off



Right figure: Wiring diagram of headlight assembly.



※ License plate lamp

Turn on the ignition lock switch.

1. When the vehicle starts, the license plate lamp is on
2. When the ignition lock switch is turned off after stall, the license plate lamp turns off

The figure on the right is a wiring diagram of license plate lamp.

Abbreviation letters corresponding to wire colors:

B	Black
Br	Brown
G	Green
Gr	Grey
L	Blue
O	Orange
P	Pink
R	Red
Lb	Light Blue
W	White
Y	Yellow
V	Purple
Lg	Light Green
Lg/R	Light Green/Red
V/B	Purple/Black
V/Y	Purple/Yellow
V/G	Purple/Green
B/L	Black/Blue
B/W	Black/White
B/Y	Black/Yellow
Br/R	Brown/Red
Br/B	Brown/Black
Br/L	Brown/Blue
G/L	Green/Blue
G/W	Green/White
G/Gr	Green/Grey
Gr/G	Grey/Green
Gr/Y	Grey/Yellow
Gr/W	Grey/White
Gr/L	Grey/Blue
L/B	Blue/Black
L/W	Blue/White
P/B	Pink/Black
P/L	Pink/Blue
P/R	Pink/Red
P/W	Pink/White
P/G	Pink/Green
R/B	Red/Black
R/Y	Red/Yellow
R/V	Red/Purple
W/P	White/Pink
W/G	White/Green
Y/G	Yellow/Green
Y/L	Yellow/Blue
Y/W	Yellow/White
Y/Br	Yellow/Brown
Y/Gr	Yellow/Grey
O/B	Orange/Black
O/W	Orange/White
O/L	Orange/Blue
W/Br	White/Brown