



# BN302/TNT300/302S Service Manual

BN302/TNT300



302S



## Preface

This maintenance manual which is prepared by Benelli·QJ Company is intended for the use by Benelli·QJ dealers and professional maintenance personnel. Not all the information related to motorcycles is included in this manual, so it is used only for repairing and maintaining Benelli·QJ motorcycles, so as to learn principles, maintenance procedures and maintenance technologies of motorcycles. It is hoped that the person who uses this manual for repairing and maintaining Benelli·QJ motorcycles has basic knowledge of motorcycle in machinery and necessary procedures for repair and maintenance of motorcycles. The assembly may be conducted improperly when repairing motorcycles and dangers may be caused after assembly without these knowledges.

This service manual was added 302S (2018 models) on the basis of BN302/TNT300, which is only for BN302/TNT300/302S maintenance manual.

Benelli·QJ Company will continue to promote and improve this type of motorcycle. Modifications or major changes in product specifications will be told to all the Benelli·QJ authorized dealers, and compiled in the later version of maintenance manual.

### Notes

Designs and specifications are subject to change without prior notice.

## Important Information in This Maintenance Manual

The following important items are included in this manual:

**Warning:** If there is this symbol, failure to follow the instructions may cause severe injuries and even death to cyclists, people nearby or the one who is repairing the motorcycle.

**Important:** “Important” means specific preventive measures to avoid damaging motorcycles.

**Note:** “Note” means important information which can make procedures much simpler and more accurate.



## User Guide

This manual is a practical reference guide which is easy to operate and use by technicians. Instruction, assembly, removal, disassembly, repair and check of all the procedures are in sequence, one step for each time.

1. Each chapter is divided into several sections. And the headline of current part is included on the top of each page.
2. In order to better identify parts and make different processes clearer, breakdown drawings are offered at the start of each section involving in parts disassembly.
3. Operating sequences are listed on breakdown drawings, and the sequences are numbered one by one. Each number means each step during the disassembly.
4. Parts that need to be lubricated and changed should be symbolized. Please refer to the section “Symbol”.
5. Breakdown drawings are equipped with a table with serial numbers, including operating sequence, parts name, precaution for work, etc.
6. Describe any other required information (such as special tools and technical data) in sequence.

## Exhaust Emission Control Information

In order to protect our environment, Benelli-QJ Company has introduced the provisions that conform to environmental protection regulations of China, European countries and other countries. This motorcycle is equipped with (1) crankcase blow-by gas filtering system, (2) exhaust emission control system and (3) fuel evaporation recovery system.

### 1. Crankcase blow-by gas filtering system

This system can prevent gas in crankcases from being discharged into the environment. The gas in crankcases is pressed into air inlet sides of engines by oil separator. When the engine is running, the gas is put into combustion chambers, and then combusts with air and fuel pushed out of fuel injection system.

### 2. Exhaust emission control system

This system can reduce the number of pollutants of exhaust gas from this type of motorcycle into the environment. Fuel injection system, ignition system and exhaust system of this type of motorcycle have been carefully designed and assembled to have efficient engines and low quantity of pollutants discharged.

A catalytic converter system is included in this type of motorcycle.

### 3. Fuel evaporation recovery system

Fuel vapor in fuel injection systems will not be discharged into the environment, but be pressed into the working engine to be combusted. If the engine is not started, the vapor will be stored in charcoal canisters. If it is liquid fuel, it will be inhaled into oil separators, and then come back to fuel tanks.

## Warning

1. Before final buyers purchase or receive any motorcycle or motorcycle engine, no one shall disassemble or destroy any parts mounted on the motorcycle or motorcycle engine based on the provisions of this manual; any manufacturer or dealer shall not deliberately disassemble or destroy any parts after any motorcycle or motorcycle engine is sold or delivered to the final buyers.
2. After any motorcycle or motorcycle engine is sold or delivered to final buyers, any one who is engaged in repairing, maintaining, selling, leasing or trading motorcycles or motorcycle engines, or managing motorcycle teams shall not disassemble or destroy any parts mounted on the motorcycles or motorcycle engines based on the provisions of this manual..."

## Remarks

"Disassembling or destroying any parts" is generally defined as follows:

1. Temporarily disassembling any parts or the situation in which the parts cannot temporarily run for the repairing purpose does not belong to "refit".
2. The following situations belong to "refit":
  - a) Improperly adjust motorcycle parts to make its exhaust gas discharged exceed emission standards.
  - b) Use Replacement of parts or accessories to impact the performance or durability of motorcycles.
  - c) Add parts or accessories to make motorcycles exceed standards.
  - d) Permanently disassemble, separate or destroy any parts on exhaust emission control systems.

**It is suggested that all the dealers should abide by the abovementioned provisions of local laws.**

# Symbols

## Specific Symbols



General Information



Specifications



Check and Regular  
adjustment

Motorcycle



Engine



Cooling System



Fuel System



Electrical System



Fault and  
Troubleshooting

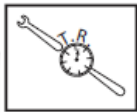
## Symbol Interpretation



Wear Limit



Special Tool



Tightening Torque



Lubricating Point



Lubricating Grease



Sealant



New parts to use



Thread Sealant



# Content

<b>GEN INFO</b>		<b>General Information</b>	<b>Chapter I</b>
<b>SPEC</b>		<b>Specification</b>	<b>Chapter II</b>
<b>CHK ADJ</b>		<b>Check and Regular adjustment</b>	<b>Chapter III</b>
		<b>Motorcycle</b>	<b>Chapter IV</b>
<b>ENG</b>		<b>Engine</b>	<b>Chapter V</b>
<b>COOL</b>		<b>Cooling System</b>	<b>Chapter VI</b>
<b>FUEL</b>		<b>Fuel System</b>	<b>Chapter VII</b>
<b>ELEC</b>		<b>Electrical System</b>	<b>Chapter VIII</b>
<b>FAULT</b>		<b>Fault and Troubleshooting</b>	<b>Chapter IX</b>

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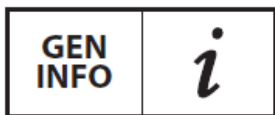
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## General safety

### Carbon monoxide

If engines must be started, the workplaces should be well-ventilated. The engines are not allowed to run in enclosed places.

#### Notes

**A poisonous gas-carbon monoxide included in exhaust gas can make us lose consciousness and may cause death.**

Engines are required to run in open places. Scavenging systems should be used in enclosed places.

### Gasoline

Gasoline must be used in well-ventilated places. Smoking is strictly prohibited in workplaces or the places where gasoline is stored.

### Storage battery

Since storage battery may emit explosive gas, it must stay away from sparks, open flames and smoking areas. Keep the areas well-ventilated while it is charging.

Storage battery contains sulfuric acid (electrolyte). Since it may cause burns once exposed to skin or eyes, we must wear protection suits and masks.

—Flush skin immediately with running water once electrolyte is splashed on it.

—Flush eyes immediately with running water for more than 15min and ask doctors for examinations once electrolyte is splashed on them.

Electrolyte is poisonous. Drink a large of water, milk, milk of magnesium oxide (a kind of laxative antacid) or vegetable oil immediately and ask doctors for examinations once electrolyte is accidentally drunk by mistake. Therefore, it should be put beyond the reach of children.

### Engine oil

Skin exposure to engine oil and then to the air for a long time again and again may cause canceration to human body. Although you may not be exposed to engine oil in daily life, you should flush yourself with water and soap immediately once it happens. Therefore, engine oil should be put beyond the reach of children.

Used oil contains carcinogenic, mutagenic and teratogenic substances along with waste acid and heavy metal which are extremely harmful to human health. Aromatic compounds and other organic compounds among them are quite harmful to body. These substances not only stay in lungs but also go into blood and the whole body to disturb our hematopoietic system, nervous system and other systems, which result in anemia, thrombocytopenia and other blood diseases, dizziness, nausea, anorexia and weakness and even cancer for a long time. Lead, cadmium and other heavy metals which are difficult to be discharged out of body and may accumulate in human body have severe impacts on nervous system resulting in oral ulcer, gingival and other diseases and symptoms. Since iron is an active metal, it will cause chronic inflammation in respiratory tracts and lungs further resulting in pulmonary fibrosis, emphysema and other diseases.

### Thermal energy section

At start-up, engines and heat-removal system sections may generate heat, and then start to cool down after the heat lasts for some time at shut-down. These sections should be handled with heat insulating gloves or after the engines or heat-removal systems cool down.

## Identification

### Motorcycle identification

Identification data are as follows:

1. Serial number of frame (at the right side of steering tube on the frame)
2. Serial number of engine (at the lower right side of the engine)
3. Motorcycle nameplate (at the left side of steering tube on the frame)



## Important parts

- (1) Left rearview mirror
- (2) Clutch handle
- (3) Left handle switch
- (4) Ignition switch
- (5) Instrument
- (6) Right handle switch
- (7) Right rearview mirror
- (8) Front brake handle
- (9) Throttle control grip
- (10) Fuel tank
- (11) Engine oil filler
- (12) Rear brake foot lever
- (13) Front foot pedal
- (14) Rear foot pedal
- (15) Rear brake
- (16) Front brake
- (17) Side stay
- (18) Shift foot lever
- (19) Seat cushion lock



## Features

### Instruments and lights

When the ignition key is rotated to “ON”, instruments and lights may be turned on.

After preliminary inspections, information will correspond to the overall conditions of motorcycle at that time.

The following indicator lights are included in dashboards.

#### Status indicator lights

##### 1A: Direction indicator light (green)

This flickering indicator light means that the direction light is on.

##### 1B: Neutral indicator light (green)

When this indicator light is on, it means that the motorcycle is in a neutral state.

##### 1C: High beam indicator light (blue)

When this indicator light is on, it means that the high beam light is on.

##### 1D: Oil pressure warning light (red)

When the engine is not started after the power is turned on, the engine oil indicator light is always on; if the oil pressure is normal after the engine is started, the engine oil indicator light will be off; if the engine oil indicator light is not off, the oil pressure may be abnormal, which means that it is required to shut down the engine for inspection;

If there is fuel oil or water in oil circuits, the indicator light will be always on, which means that it is required to shut down the engine for inspection.

##### FI: “FI” means fault code diagnosis of EFI system (orange)

When a key turn on the EFI indicator light, it will be on, the oil pump is running for 3sec, and the motorcycle is started. If the indicator light is off after the motorcycle is started, the motorcycle is normally running without faults; if the indicator light is on, it means that there are some faults on the motorcycle. In the same driving process, if the indicator light is off, the motorcycle is normally running; if the indicator light is on, it means that there are some faults on the motorcycle, which means that it is required to shut down the engine for inspection, and please contact dealerships of Benelli& QJ which will use special motorcycle fault diagnosis tester to check your motorcycles.

Function button (2)

Function button (3)

Button Function Table						
	Function	Power supply	Current interface display	Left button	Right button	Display interface after switching
	Function switching	ON	TOTAL	<3sec		TRIP A
	Function switching	ON	TRIP A	<3sec		TRIP b
	Function switching	ON	TRIP A	>3sec		TRIP A
	Function switching	ON	TRIP b	>3sec		TRIP b
	Function switching	ON	TOTAL → TRIP A → TRIP b → TOTAL			
	Function switching	ON	km km/h		<3sec	
	Function switching	ON	miles mph		<3sec	
	Clock setting	ON	TOTAL	>3sec		Hour bit flickering
		ON	TOTAL		<3sec	Hour bit+1 (0-23)
		ON	TOTAL	<3sec		Switch to ten-of-minute flickering
		ON	TOTAL		<3sec	Tens of minutes+1 (0-5)
		ON	TOTAL	<3sec		Switch to unit-of-minute flickering
		ON	TOTAL		<3sec	Units of minutes+1 (0-9)
		ON	TOTAL	<3sec		Exit clock menu
Note	In the adjusting state of clock, automatically exit the menu with no button being pressed in 5sec.					



Tachometer (4):

It indicates the rotations per minute of the engine at that time.

Coolant temperature measurement (5):

It indicates the coolant temperature in °F (Fahrenheit) or °C (Centigrade).

Counter of whole/part of km (6)

You can choose the functions of relative mileage (TRIP) or total mileage (TOTAL) on the odometer, and choose the units of mph (miles) or km (km) according to your needs.

Relative mileage (TRIP): It is an odometer that can be reset for recording the driving mileage in a certain period. Pressing and holding function button 2 can reset the odometer in the state of relative mileage (TRIP).

Total mileage (TOTAL): It is used for recording the whole driving mileage.

An odometer is used for recording the km of total driving distance.

Speedometer (7):

A speedometer indicates the driving speed. Short press function buttons (2) and (3) simultaneously to choose whether the unit is mph (miles/hour) or km/h (km/hour) according to your needs.

Digital clock (8):

The time is shown in hours and minutes. See the following function button (3) if time is necessarily adjusted.

Fuel meter (9):

It indicates how much fuel is stored in the fuel tank. It will indicate 7 fuel levels with full fuel; when the fuel level is 1 or less than 1, the fuel indicator will be flickering without enough fuel.



## Important information

### Preparation for disassembly and disassembling operation

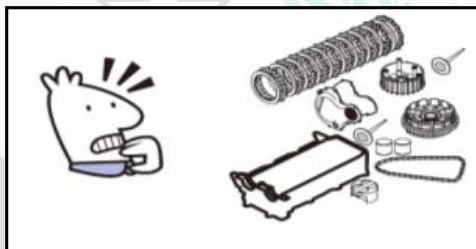
Please get rid of dirt, mud, dust or foreign matters before any disassembly and disassembling operation.

Only use appropriate cleaning tools and products. See the section “Special Equipment”.

When the motorcycle is disassembled, we suggest putting fit parts together. These parts include gear, cylinder, piston and other items. Their surfaces may “run in” during normal wear. Fitting pieces must be used or changed in pairs. During disassembling operation, clean all the parts, and put removed parts in order according to various sections in case of mix or loss, which will make it easy to assemble parts and make all the parts be accurately assembled.

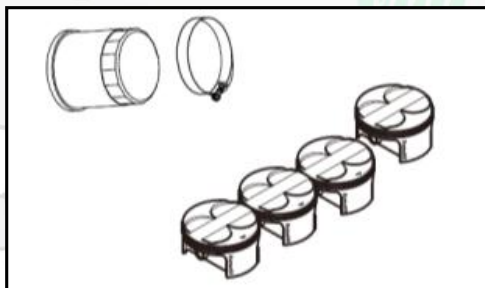


All the parts should keep away from any heat source.



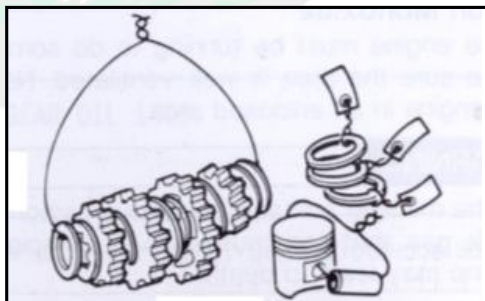
### Replacement of parts

Only use original Benelli·QJ Replacement of parts. And only use oil and grease recommended by Benelli·QJ to lubricate parts.

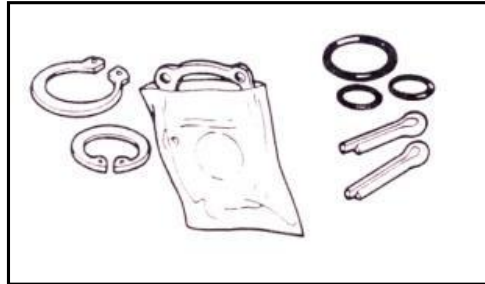


The parts with multiple assembling units should be loosened from outside to inside and small assembling units should be loosened first.

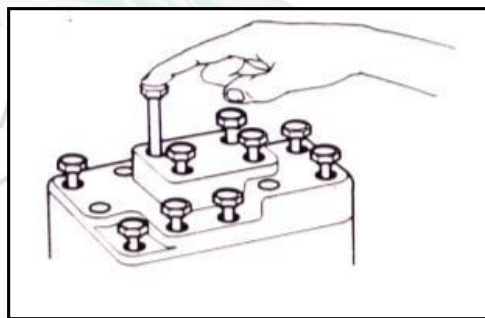
Gearbox and other complicated assembling units should be stored in a proper assembly sequence for future assembly.



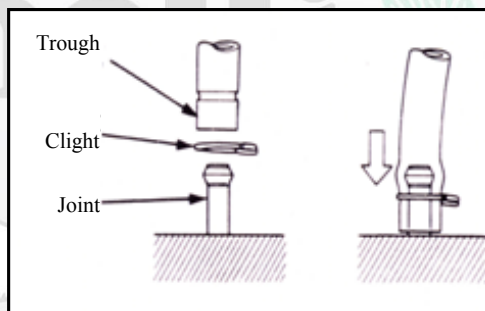
Pay special attention to important assembly positions before disassembly. Prepare for the parts which are no longer used before disassembly, and change the parts in time after disassembly.



Different assembling units and backplates have different bolts or screws which must be mounted in accurate positions. If they are mixed, put the bolts into holes to check whether they are fitted.

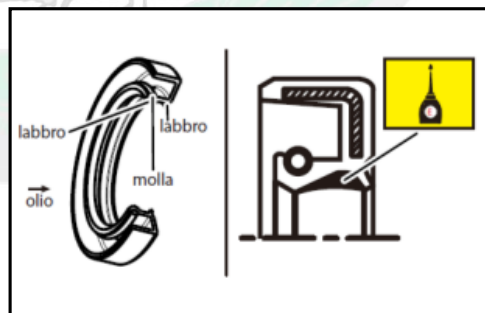


The end of rubber hose (fuel pipe, vacuum tube or coolant pipe) should be inserted at the bottom of joint so that hose clights have enough space to clight the joint. Rubber or plastic dirt-proof boots should be assembled to their original design positions.



## Gasket, O-ring, seal ring and bearing

Change all the gaskets, oil seals and O-rings when engines are repaired.  
Clean the surface of gaskets, oil seal lips and O-rings.

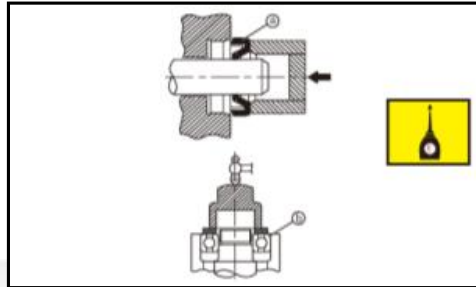


Assemble bearings and oil seals so that trademarks or manufacturer numbers are outwards and visible. Assemble oil seals, and appropriately lubricate the lubricating lips of oil seals. Appropriately lubricate bearings during assembly.

- a. Oil seal
- b. Bearing

#### Important Note

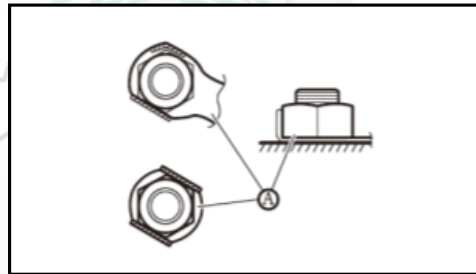
*Never use compressed air to dry bearings, which may damage their surfaces.*



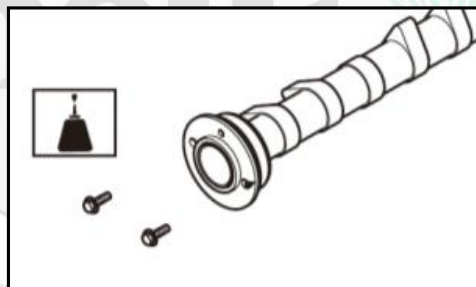
### Lock washer/locking plate, bolt and thread sealant

Replace all the lock washers or locking plates “A” after lock washers, locking plates, bolts or nuts are disassembled.

After bolts or nuts are locked with specified torques, lock washers or locking plates are opposite to the planes of bolts or nuts; use locking marks and lock washers in case of the curved tail end of locking plates.



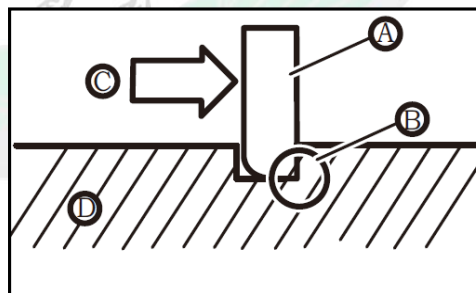
Degrease the both sides of bolts or nuts with solvents before the use of thread sealants.



### Circlip

Carefully check all the circlips, and change all the damaged or deformed closing rings before reassembly. And all the used circlips of piston pins should be also changed.

The sharp edge “B” of circlip should be on the opposite of thrust “C” felt by this circlip when the circlip “A” is assembled. And “D” is an axle.

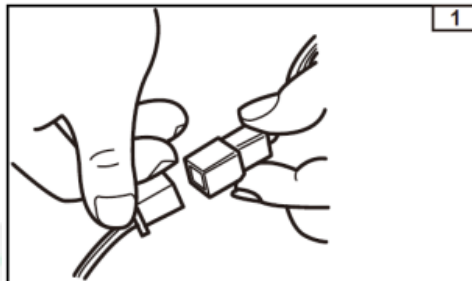


## Cable-to-cable connector check

Ensure that there is no mark, rust, water, wiring and other items on connectors.

### 1. Disconnect

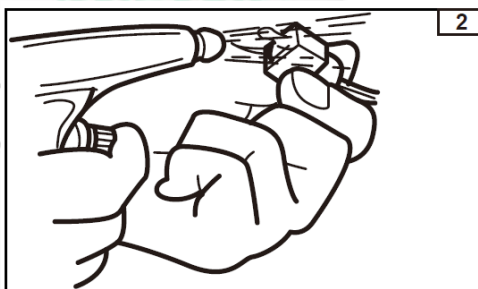
Wire  
Connector  
Joint



### 2. Check

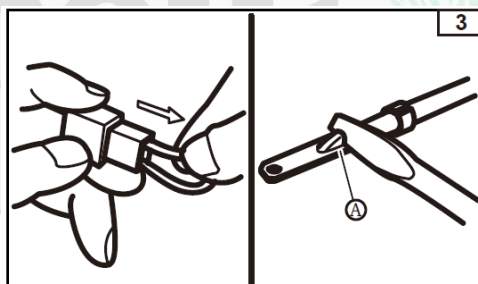
Wire  
Connector  
Joint

Use compressed air to dry water if any.  
Connect and insert connecting parts for several times if there is rust.



### 3. Check

All the connecting parts  
Properly reconnect any joint if it is loose.



### Notes

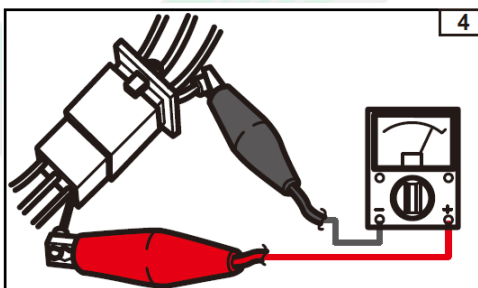
Please bend foot "A" on terminals if it becomes flat.

### 4. Check

Wire  
Connector  
Joint

### Notes

Ensure that all the joints are firmly assembled.





## 5. Check

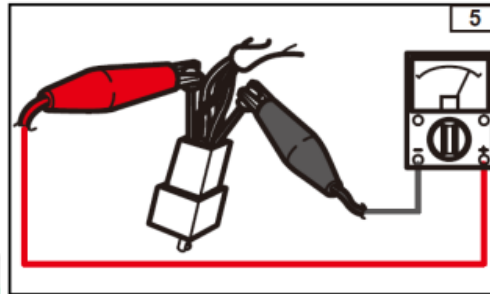
Continuity (using multimeters)

### Notes

Clean terminals if there is no item that needs to be checked.

Wire sleeves should be checked according to steps 1-3.

Please use [contact rehabilitating agents] which are sold in the most of parts stores for quick correction.



Loose cables are the hidden danger of electrical

safety. Check the next cable after the cable is

clighted to ensure the electrical safety;

Cable clights are not allowed to bend towards

welding spots;

Bind cables at specified positions;

Cables are not allowed to be at the end of frame or

at sharp corners;

Cables are not allowed to be at the end of bolts or

screws;

Cables should keep away from heat sources or from

the positions in which cables may be clighted during

movement;

Cables along faucet handles should be prevented

from being too tight or too loose, and should not

interfere with their adjacent parts in any turning

position;

Cables should be smooth without any twist or knot;

Confirm whether connector jackets are damaged,

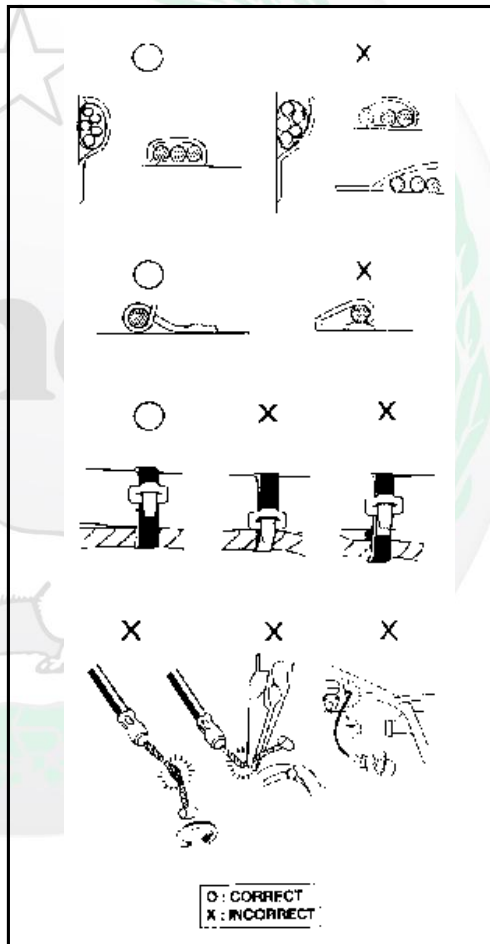
and connectors are excessively stretched before

connectors are oppositely jointed.

Please protect cables with tapes or hoses if they are








at sharp corners or in turning positions;








Bind up exposed cables with tapes after cables are







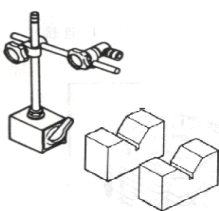



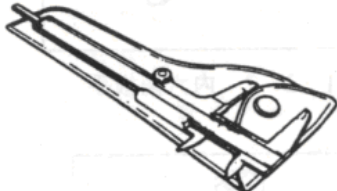


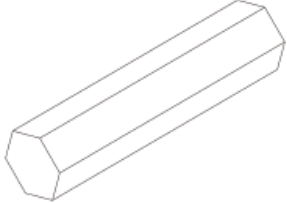

## Special tool

The following special tools are the ones necessary to conduct complete and correct adjustment and assembly. The use of correct special tools can avoid damage caused by improper tools or non-professional technologies. Required special tools may be different in different countries. Please refer to the following data when tools are ordered in case of any error.

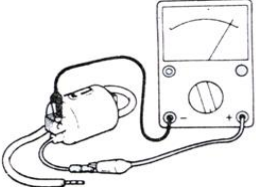
Special tools for engine		
Quantity	Name	Image
1	Valve stem oil seal tools are used for inserting valve oil seals.	
1	Clutch disassembling tools are used for preventing clutch drums from turning and for loosening nuts.	
1	Sprocket locking tools are used for locking sprockets easy to mount or disassemble output sprocket nuts.	
1	Piston pin removers are used for taking out piston pins.	
1	Camshaft sprocket adjustment tools are used for adjusting the tension of chains.	
1	Valve stem oil seal removers are used for taking oil seals out of cylinder heads.	
1	Breather pipe installation tools for are used for mounting breather pipes on cylinder head covers and cylinder heads.	

1	Ring light tools are used for assembling closing rings on pistons and inserting them into cylinders.	
1	Gearshift lever drum assembling tools are used for assembling gearshift lever drums.	
1	Flywheel extractors are used for removing flywheels from crankshafts.	
1	Engine adjusting tools for are used for setting TDC positions.	
1	Oil filter tools are used for tightening or disassembling oil filters on engines.	
1	Chain tensioner locking tools are used for locking tensioners when chain tensioners are assembled.	
1	Bearing shell compression tools are used for mounting bearing shells. Lock the either end of bearing shell into the trough, put the tool on it, and press the tool by hand to make the bearing shell stuck into the trough.	

1	Tools for disassembling / fastening clutch component clight nuts are used for disassembling / fastening clutch component clight nuts.	
1	Valve spring disassembling tools are used for disassembling springs from valves.	
1	Valve removal adapters are used for removing valves.	
1	Gauges are used for measuring internal dimensions of holes.	
1	Gauges are used for measuring external dimensions of parts.	
1	Feeler gauges are used for measuring clearances.	
1	Magnetic stands and V-blocks are used for aiding in measuring dimensions.	

1	Dial gauges are used for measuring dimensions.	
1	Vernier calipers are used for measuring dimensions.	
1	Flywheel locking tools are used for disassembling the flywheels on crankshafts.	
1	Locking tools for lock nut at steering head are used for locking lock nut and fastening steering heads..	
1	Locking tools for fastening screw on upper connecting plate are used for locking fastening screws on upper connecting plates.	
1	Clight pliers are used for locking tubing clights.	



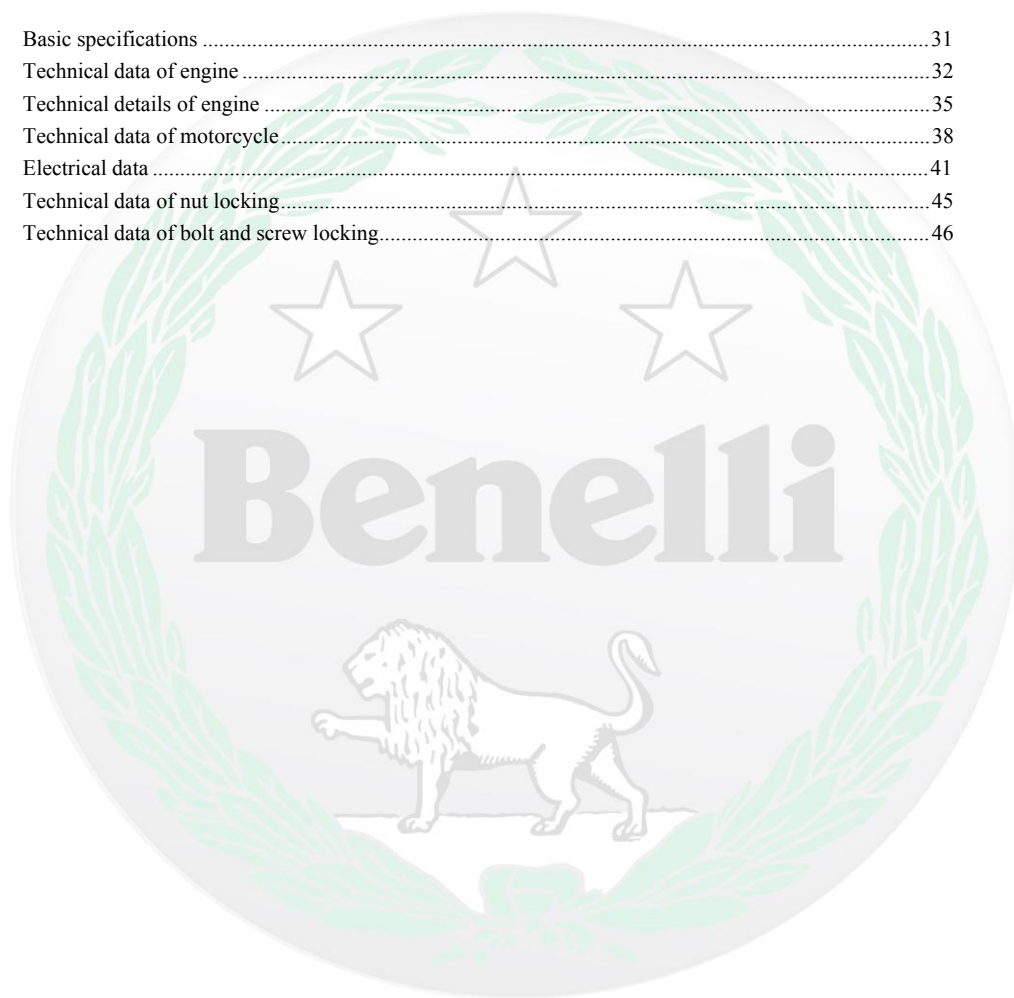
1	Multimeters are used for measuring the voltage, current and resistance of electrical parts.	
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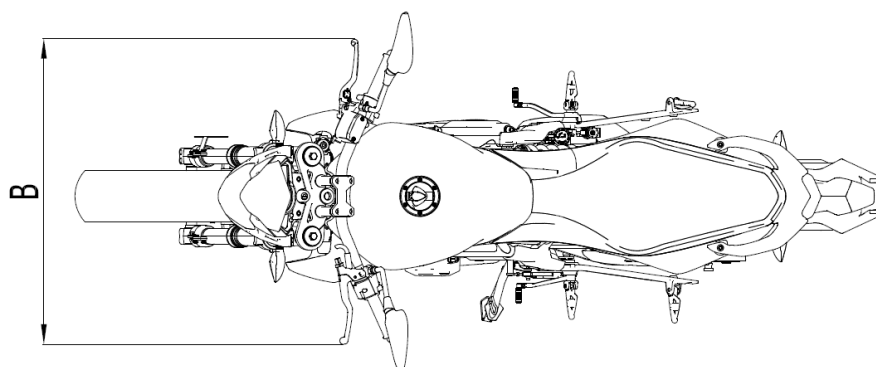
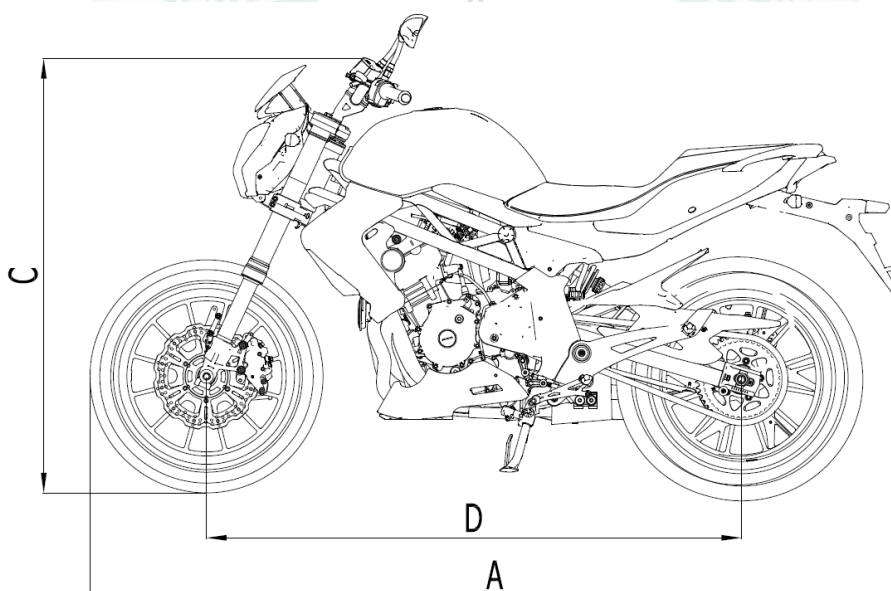
## Chapter II Specification

Basic specifications .....	31
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Technical details of engine .....	35
Technical data of motorcycle.....	38
Electrical data .....	41
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Technical data of bolt and screw locking.....	46



## Basic specifications

Dimension	Standard
Total length (A)	2130mm
Total width (B)	775mm
Total height (C)	1120mm
Wheelbase (D)	1410mm
Weight	Standard
Kerb weight (with full oil and fuel oil)	196Kg
Empty motorcycle (with no oil and empty fuel tank)	.....
Maximum allowable load capacity (with cyclists and load)	160Kg

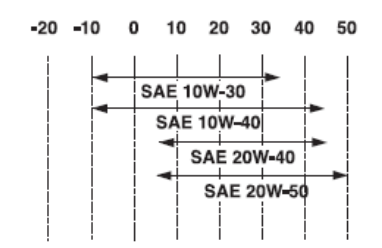


## Technical data of engine

Engine specifications	
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Engine	Standard
Engine	Four-stroke, inline double-cylinder, water cooling, four-valve for each cylinder, and double overhead camshaft (DOHC)
Total displacement	299.82CC
Quantity of cylinders	2
Inside diameter × stroke	65.0×45.2
Compression ratio	12: 1
Low free speed	.....
High free speed	.....
Distribution	Double overhead camshaft, chain-controlled, and four-valve for each cylinder
Maximum net power	26.0kW/12000rpm
Maximum net torque	27.0N.m/9000rpm
Fuel consumption limit	≤5.2L/100km
Start-up mode	Electrical starting

Fuel oil	
Recommended fuel oil	Lead-free 93 and above

Engine oil	
Lubricating mode	Force and splash lubrication
Total quantity	3.0L
Total quantity without replaced engine oil filter	2.8L
Total quantity with replaced engine oil filter	3.0L
 <p>Recommende engine oil</p>	<p>Type: API SH, SJ or SL, JASO MA</p> <p>Viscosity: SAE 10W-40</p>

Air filter	
Type of air filter	Sponge
Intake resistance	1.2±0.12KPa

## Technical data for engine

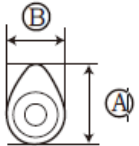
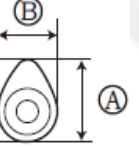
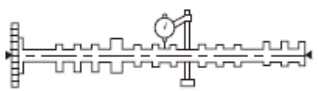
Engine specifications
-----------------------

Oil pump	
Type of oil pump	Rotor pump
Radial clearance of internal and external rotor	0.03-0.13mm

Ignition device	
Ignition mode	TLI

Spark plug	
Type of spark plug	NGK CR8E
Spark plug clearance	0.6-0.7mm

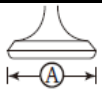
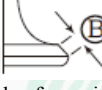
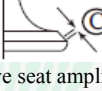
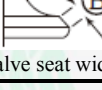
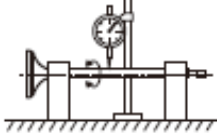
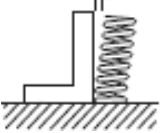
Cylinder head	
Maximum curvature of cylinder gasket	0.03 mm

Camshaft	
Control system	Chain transmission
Diameter of camshaft support	Ø23 (0, +0.021) mm
Clearance between support and camshaft follower	0.03-0.064 mm
Camshaft lobe dimension, intake side 	Measurement A= 32.495 mm Measurement B= 25 mm
Camshaft lobe dimension, exhaust side 	Measurement A= 32.495 mm Measurement B= 25 mm
Maximum bounce of camshaft 	0.03 mm



## Technical data of engine

Engine specifications
-----------------------

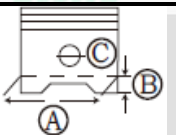
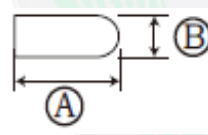
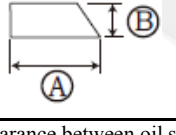
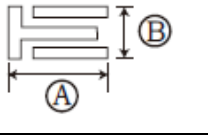
Valve, valve seat and valve guide		
Intake valve clearance (cold)		0.13-0.19 mm
Exhaust valve clearance (cold)		0.19-0.25 mm
Valve dimension		
 Valve head diameter	Intake	Ø 25 mm
	Exhaust	Ø 22 mm
 Valve face width	Intake	1.9-2.1 mm
	Exhaust	1.75 ~ 1.95 mm
 Valve seat amplitude	Intake	1 ~ 1.1 mm
	Exhaust	1 ~ 1.1 mm
 Valve seat width	Intake	1.9 ~ 2.1 mm
	Exhaust	1.75 ~ 1.95 mm
Valve stem diameter	Intake	3.965 ~ 3.98 mm
	Exhaust	3.965 ~ 3.98 mm
Clearance between valve stem and valve guide	Intake	0.04 ~ 0.065 mm
	Exhaust	0.05 ~ 0.075 mm
 Bounce of valve stem		0.05 mm
Valve spring	Intake	37.2 mm
	Exhaust	40.5 mm
Effective pressure of intake/exhaust	Intake	895MPa~1024MPa
	Exhaust	Lower end 751≥1000MPa, stem end 895-1042MPa
	Intake	0.5mm
	Exhaust	0.5mm

## Technical details of engine

Engine specifications	
-----------------------	--

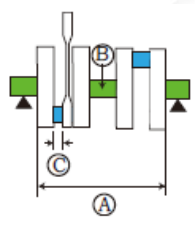
Timing chain	
Link number/type	92RH2015
Automatic tensioning	Self-adjusting type

Cylinder	
Cylinder layout	Vertical inline
Stroke ratio	65.0: 45.2
Compression ratio	12: 1
Stroke	45.2 mm
Largest oval	/O/ 0.008 mm
	/O/ 0.006 mm

Piston		
Clearance between piston and cylinder		0.035~0.045mm
	Piston diameter "A"	65 (-0.03, -0.025) /65 (-0.025, -0.02)
	Piston height "B"	11 mm
	Piston pin boss diameter "C"	16 (0.002, 0.008) mm
External diameter of piston pin		16 (-0.008, 0) mm
Clearance between top piston ring and ring trough		0.05-0.09 mm
	Type of piston ring	Drum type
	Dimension A*B	2.3 × 0.8 mm
Clearance between the second piston ring and ring trough		0.04-0.08 mm
	Type of piston ring	Ladder type
	Dimension A*B	2.3 × 0.8 mm
Clearance between oil scraping ring and ring trough		0.04-0.14mm
	Dimension A*B	2.25 × 1.5 mm

## Technical details of engine

Engine specifications	
-----------------------	--

Piston stem	
Color code of bearing	A=red, B=blue, C=yellow
Stem weight code	K1=black, K2=green, K3=white, K4=brown, K5=orange
Crankshaft	
	
Width A	131mm
Maximum centrifugal force	$22.6 \pm 0.01$ mm
Side clearance C at the large end C of connecting stem	0.1-0.25 mm
Color code of main bearing	A=red, B=blue, C=yellow

Clutch	
Clutch mode	Oil-bath clutch with multiple plates
Clutch release mode	Cable and spring
Clutch control action	Cable action
Action	Use left handles.
Position of clutch disengaging lever	Align slotting positions with scribed lines on right covers.
Free clearance of clutch disengaging lever	Unadjustable
Clutch cable clearance (at the end of clutch lever)	2 ~ 3 mm
Thickness of friction plate	$3.0 \pm 0.1$ mm
Quantity of friction plate	7
Thickness of steel plate	$2.0 \pm 0.1$ mm
Effective length of spring	36.7 (0~0.2) mm
Quantity of spring	4

Throttle body	
Diameter	34mm
Switch mode of throttle	Rotating type

## Technical details of engine

### Engine specifications

Transmission device		
Type of transmission device		6-speed, constant mesh
Final ratio		2.645
The second decelerating system		3.071
Transmission ratio	Level 1	2.846
	Level 2	1.947
	Level 3	1.556
	Level 4	1.333
	Level 5	1.190
	Level 6	1
Maximum speed		140km/h

Gear control mechanism		
Type of gear control mechanism		Sequence driven selector and preselector
Maximum deformation of gear-shift guide rod		Straightness 0.02mm Roundness 0.005mm

Coolant		
Recommended type		Permanent antifreezing agent
Color		Green
Mixed ratio		50% soft water, 50% coolant
Freezing point		-35°C (-31°F)
Total quantity		2 L

Fuel oil pump		
Type of fuel oil pump		Electric type
Model (manufacturer)		Delphi
Output pressure		250KPa

## Technical data of motorcycle

Motorcycle specifications
---------------------------

Motorcycle	
Frame type	Steel pipe truss
Gradient	25°
Castor	86mm

Front wheel	
Wheel type	6-spoke aluminum alloy
Wheel disc (dimension)	17×MT3.50
Wheel disc (material)	Aluminum alloy
Wheel disc (diameter)	17 inches

Rear wheel	
Wheel type	6-spoke aluminum alloy
Wheel disc (dimension)	17×MT4.50
Wheel disc (material)	Aluminum alloy
Wheel disc (diameter)	17 inches


Front tyre	
Tyre type	120/70-17 M/C
Model (trademark)	Pirelli
Tyre pressure	230±5kPa


Rear tyre	
Tyre type	160/60-17 M/C
Model (trademark)	Pirelli
Tyre pressure	250±5kPa



## Technical data of motorcycle

### Motorcycle specifications

Front hydraulic brake		Limit
Brake type	Floating disc double-brake	
Action	Use right hand	
Recommended liquid	DOT04	
Brake disc		
 Diameter×thickness	Φ260×4	
Maximum thickness	4mm	3 mm
Maximum deformation		0.1mm
Thickness of worn brake pad		1mm
Diameter of pump cylinder	16mm (0.62 in)	
Diameter of clight cylinder	34 (1.33in)	

Rear hydraulic brake		
Brake type	Single disc brake	
Action	Use right foot	
Recommended liquid	DOT04	
Brake disc		
 Diameter×thickness	Φ260×5	
Maximum thickness	5mm	4 mm
Maximum deformation		0.1mm
Thickness of worn brake pad		1mm
Diameter of pump cylinder	12.9mm	
Diameter of clight cylinder	32 mm	

## Technical data of motorcycle

Motorcycle specifications	
---------------------------	--

Front suspension		
Suspension type		Extension sleeve type
Maximum stroke		135mm
Spring	Free length	310 mm
	Gasket length	80 mm
	Elasticity	8.9 N/mm
	Spring stroke	0 ~ 135 mm
Damping oil		
Recommended oil		SAE 7.5 32#
Each amount of each damping oil		400ml
Horizon (pipes are fully compressed without fork spring from the top of lateral pipes)		130 mm

Steering		
Type of steering bearing		Ball bearing
Left steering angle		30°
Right steering angle		30°

Rear suspension		
Suspension type		Rocker arm type with adjustable gas shock
Maximum stroke		42 mm
Spring	Free length	170±1, 5 mm
	Gasket length	No gaske
	Elasticity	180 N/mm
	Spring stroke	42±1 mm
Standard pressure of preloading gas/air of spring		1.5Mpa
Adjustment location of spring preloading	Minimum location	0
	Standard	9 mm
	Maximum location	20 mm
Adjustment location of rebound damping	Minimum location	500N
	Standard	1900N
	Maximum location	5000N V=0.1m/s

Drive chain		
Model (trademark)		525HO
Chain pitch quantity		108

## Electrical data

Electrical specifications	
---------------------------	--

System voltage	
System voltage	12V
Ignition coil	
Model (trademark)	Delphi
Resistance of primary coil	0.6Ω
Resistance of secondary coil	10kΩ
Choke of primary coil	2.5 mH (1 kHz 0.3V)
Choke of secondary coil	23.5 mH (1kHz)
Maximum endurable current	7.6 A

Charging system	
System type	Magnetic AC (between white and white: 0.1~0.2Ω)
Model (trademark)	5-101211-502-1 (DENSO)
Rated output	13.5 V 48 A at 5000 rpm
Voltage regulator (in AC generator)	Three-phase full wave
Voltage setting	14.5 + 0.3 V (5000 rpm 10 A 25 C°)

Starting relay	
Model (trademark)	.....
Amperage	100 A
Coil resistance	4.4Ω at 20 C°

Starting motor	
Model (trademark)	.....
Brush length of starting motor	12.5mm/5.5mm (limit of usage)
Bushing of starting idler shaft	8.3mm (limit of usage)
Outside diameter of starting idler shaft	7.94mm (limit of usage)

Battery	
Model (trademark)	YTX9-BS
Voltage of battery capacity	12V/8Ah
Relative density of electrolyte	1.280±0.01

## Electrical data

Electrical specifications
---------------------------

Horn	
Horn type	Low pitch
Model (trademark)	DL122 K.X.D
Maximum amperage	3A
Performance	105 ~ 118 db (A)

Headlight		
Headlight type		Halogen
Light bulb (watt×quantity)	Headlight	H7(12V 55W)
	Front position indicator light	W5W
	Rear position indicator light/brake light	LED
	Steering light	LED
	License plate light	W5W
	Neutral indicator light	LED
	High beam indicator light	LED
	Oil level warning light	LED
	Steering indicator light	LED
	Engine fault indicator light	LED

Flasher	
Model (trademark)	Lihua 355 E10
Flasher type	Digital controlled flasher
Flicker frequency of steering light	Normal: 80±10 times/min; variable frequency: 160±10 times/min
Power	10W×4

Engine oil pressure sensor	
Model (trademark)	Delphi
Alarm	55KPa

Throttle body position sensor	
Model (trademark)	Delphi
Resistance	3k~12kΩ

Throttle body barometric sensor	
Model (trademark)	Smart

## Electrical data

Electrical specifications
---------------------------

Fuse (amperage×quantity)	
Fuse ECU (control unit)	15A (blue)
Headlight fuse	15A (blue)
Hot wire fuse	10A (red)
Radiator-fan fuse	15A (blue)
Backup fuse	15A (blue)+ 10A (red)
Oil pump fuse	15A (blue)
Charging fuse	40A (orange)

Fuel oil pump	
Model	Delphi
Working voltage	12V~14V
Maximum amperage	1.8A
Output oil pressure	250kPa

Fuel oil sensor	
E end (resistance value)	100Ω
F end (resistance value)	10Ω

Air temperature sensor	
Model (trademark)	HAIHUA
Structure	Resistance type

Cylinder head temperature sensor	
Model (trademark)	HAIHUA
Structure	Resistance type

Crankshaft position sensor	
Model (trademark)	CHONGQING LIJIAN

Outlet water temperature switch	
Working temperature	98℃

Velocity sensor	
Model (trademark)	CHONGQING SANMU
Type	Induction type



## Electrical data

Electrical specifications
---------------------------

Oxygen sensor	
Model (trademark)	Delphi
Resistance	9.6±1.5Ω (measured at 21°C)

Fuel injector	
Model (trademark)	Delphi

Relay unit	
Model (trademark)	Panasonic

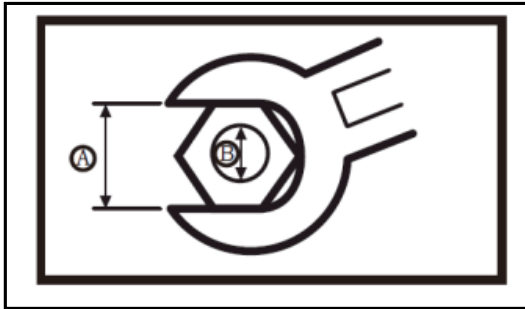
Stepping motor	
Model (trademark)	Smart

Benelli



## Technical data of nut locking

### Basic locking specifications



Locking torques of parts or specific components are offered in each chapter of this manual.

In order to avoid the risk of deforming the components with several fasteners, cross locking parts in proper orders until required torques are achieved.

Locking torques are specified, and the thread of parts is clean and dry, unless otherwise specified. Parts must be fastened at room temperature.

Nut	Basic fastening torque	
	N.m	Kgf.m
4mm	2.3	0.23
5mm	4.5	0.45
6mm	10	1.01
8mm	25	2.54
10mm	45	4.58
12mm	80	8.15
14mm	130	13.25
16mm	200	20.39
18mm	240	24.47

## Technical data of bolt and screw locking

### Basic locking specifications

Fastening torque of bolt and screw and relevant parameters

Bolt/screw	Basic fastening torque					
	Level 8.8		Level 10.9		Level 12.9	
	N.m	Kg.f	N.m	Kg.f	N.m	Kg.f
M4×0.7	3	0.31	4.2	0.43	5.2	0.53
M5×0.8	6	0.61	7.5	0.77	9	0.92
M6×1	10	1.02	13	1.33	16	1.63
M8×1.25	22	2.24	30	3.06	40	4.08
M8×1(*)	25	2.55	36	3.67	45	4.59
M10×1.5	45	4.59	65	6.63	80	8.16
M10×1.25(*)	50	5.10	70	7.14	85	8.67
M12×1.75	80	8.16	110	11.22	135	13.78
M12×1.5(*)	85	8.67	120	12.24	145	14.80
M12×1.25(*)	90	9.18	130	13.27	150	15.31
M14×2	130	13.27	185	18.88	220	22.45
M14×1.5(*)	150	15.31	205	20.92	245	25.00
M16×2	200	20.41	280	28.57	335	34.18
M16×1.5(*)	225	22.96	310	31.63	360	36.73
M18×2.5	265	27.04	370	37.76	450	45.92
M18×1.5(*)	320	32.65	450	45.92	550	56.12
M20×2.5	390	39.80	550	56.12	650	66.33
M20×1.5(*)	440	44.90	630	64.29	750	76.53
M22×2.5	540	55.10	750	76.53	900	91.84
M22×1.5(*)	600	61.22	850	86.73	1000	102.04
M24×3	670	68.37	950	96.94	1130	115.31
M24×2(*)	750	76.53	1050	107.14	1250	127.55

\*: It refers to fine thread.

## Technical data of bolt and screw locking

### Locking torque

#### Engine

Fastener	Torque			Remarks
	N m	kgf m	ft lb	
Cooling system				
Coolant drain bole	10	1.0	89 in·lb	
Cylinder fitting fixing bolt	9.8	1.0	87 in·lb	
Radiator fixing bolt	9.8	1.0	87 in·lb	
Radiator (water pipe) hose fastening screws	2.0	0.20	18 in·lb	
Expansion kettle fixing bolt	6.9	0.70	61 in·lb	
Bolt on the housing cover of thermostat	5.9	0.60	52 in·lb	
Thermostat shell fixing bolt	9.8	1.0	87 in·lb	
Water pump cover bolt	9.8	1.0	87 in·lb	
Water pump impeller fastening bolt	9.8	1.0	87 in·lb	
Cylinder head and cylinder head cover of engine				
Camshaft sprocket fixing bolt	20	20	14.75	L
Camshaft cover bolt	12	1.2	106 in·lb	S
Camshaft timing chain fairleader bolt	12	1.2	106 in·lb	
Camshaft timing chain tensioner fixing bolt	12	1.2	106in·lb	
Cylinder cover bolt (M10)	55	5.5	40.56	MO、S
Cylinder cover bolt (M6)	12	1.2	106 in·lb	S
Cylinder head cover bolt	12	1.2	106 in·lb	S
Spark plug	13	1.3	115 in·lb	
Throttle body assembly fixing bolt	12	1.2	106 in·lb	S
Clutch				
Right cover bolt	12	1.2	106 in·lb	Tighten them manually
Hexagon head bolt	12	1.2	106 in·lb	
Engine oil filler plug screw	—	—		
Clutch spring bolt	10	1.0	89 in·lb	
Sprocket mounting bolt	8	0.8	71 in·lb	
Balance shaft driving gear lock nut	60	6.1	44	L
Clutch lock nut	95	9.7	70	
Clutch driving sprocket screw	8	0.8	71 in·lb	
Engine lubrication system				
Oil pan drain magnetic bolt	20	2.0	15	
Oil pan bolt	10	1.0	89 in·lb	
Engine oil pump mounting bolt	10	1.0	89 in·lb	
Engine oil pump cover bolt	10	1.0	89 in·lb	
Sprocket mounting bolt	8	0.8	71 in·lb	
Engine oil pressure switch bolt	24.5	2.5	18 ft·lb	L
Engine oil filter bolt	17	1.7	13 ft·lb	

## Technical data of bolt and screw locking

### Locking torque

Fastener	Torque			Remarks
	N m	kgf m	ft lb	
<b>Crankshaft/transmission mechanism</b>				
Balance shaft driven gear lock nut	100	10.2	73.7	L
Connecting rod big end nut	See the text.			
Crankshaft flywheel nut	105	10.7	77.4	L
Balance shaft driving gear lock nut	60	6	44	L
Follower bolt (M6, L = 14 mm)	10	1	89 in·lb	L
Oil passage plug (M16, L = 15 mm)	24.5	2.5	18.1	L
Follower screw (M6, L = 16 mm)	7	0.71	62 in·lb	L
Support bolt (M6, L = 20 mm)	10	1	89 in·lb	L
Crankcase bolt (M8, L = 85 mm)	24.5	2.5	18.1	MO、S
Crankcase bolt (M6, L = 40 mm)	10	1	89 in·lb	S
Crankcase bolt (M10, L = 60mm)	45	4.6	33.3	MO、S
Crankcase bolt (M8, L = 75 mm)	24.5	2.5	18.1	S
Crankcase bolt (M8, L = 115 mm)	24.5	2.5	18.1	S
Crankcase bolt (M10, L = 100mm)	45	4.6	33.3	MO、S
Crankcase bolt (M8, L = 45 mm)	24.5	2.5	18.1	S
Flywheel lock nut	100	10.2	73.7	
Overrunning clutch bolt	20	2.04	15	L
Positioning roller rocker arm bolt	12	1.22	106.49 in·lb	L
Shift positioning star wheel fixing bolt	12	1.22	106.49 in·lb	
Left cover bolt	12	1.22	106.49 in·lb	

Locking torques of main fasteners that need thread fastening adhesive, silicone sealant and other adhesives are listed in the above table. And the letters in the column of “Remark” are defined as follows:

AL: Alternatively tighten fastening bolts twice according to higher locking torques.

G: Coat lubricating grease.

L: Coat thread fastening adhesive.

M: Coat lubricating grease containing molybdenum disulfide.

MO: Coat oil solvent containing molybdenum disulfide.

(Mixture of engine oil and lubricating grease containing molybdenum disulfide prepared at the weight ratio of 10:1)

R: Replace parts.

S: Follow the specified tightening sequences.

Si: Coat silicone grease.

SS: Coat silicone sealants.



## Chapter III Check and Regular adjustment

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## Regular maintenance and lubrication interval

The specified time interval in the scheduled maintenance form is just a general guide in normal use. It is necessary to reduce the time interval according to weather, topography, geographical position and personal usage condition. If users have necessary skills, some operations can be completed by themselves; if it is explicitly mentioned in this manual, they also can be completed by users.

In brief, these operations should be completed in an authorized Benelli·QJ repair shop. The list of authorized repair shops is available on the websites of [www.qjmotor.com](http://www.qjmotor.com) and [www.benelli.com](http://www.benelli.com) or from our after-sales service centers.


Generally, motorcycles are erected by a rear support, engines are shut down, and switches are turned to OFF when maintenance is conducted for the motorcycles:

Preferably, motorcycles should be on a level surface, and front and rear tyres should be on the ground and vertical to the ground without rear support when liquid levels are under check.

### Notes:

Annual check should be conducted unless motorcycles have been maintained according to set time intervals (according to mileage in Britain).

At 36000km, for example, start to repeat maintenance services at 12000km.

For marked time intervals , we suggest contacting with Benelli·QJ dealers because of some special equipment, professional information and experience of professional skills needed.

The following part shows all maintenance operations.

### Notes:

#### Air filter


Air filter elements should be often replaced if motorcycles are used in a particularly humid or dusty environment.

#### Hydraulic brake maintenance

Regularly check brake fluid levels and complement brake fluids.

Replace brake pumps and the oil seals in calipers every two years; and replace brake fluids.

Replace brake hoses every four years; or replace them in time if they are found broken or damaged.

Symbol interpretation	
<b>I</b>	Check, adjustment, cleaning, lubrication or replacement as required
<b>R</b>	Replacement
<b>T</b>	Tightening
	Dealer

## Regular maintenance and lubrication interval schedule

Frequency									
-----------	--	--	--	--	--	--	--	--	--

	Item	Content	0 km	1000 km	6,000 km	12,000 km	18,000 km	24,000 km	Annual inspection
1	Engine oil	Check / add / replace	I	R	R	R	R	R	R
		Check engine oil level before using the motorcycle							
2	Engine oil filter	Replace		R	R	R	R	R	R
		or when replacing oil engine							
3	Fuel oil filter	Check / replace			I	I	R	I	
		Check / replace			I	R	I	R	
4	Air filter	Repair and maintenance must be conducted after 3000 km; the cycle may be shortened appropriately under special environment							
5	Coolant	Check / add / replace	I	I	I	I	R	I	I
		Replace	Every two years, or 18000km (11184mi)						
6	Cooling system	Check the cooling liquid level, and ensure there is no liquid leakage in motorcycle	I	I	I	I	I	I	I
7	Spark plug	Check / replace			I	R	I	R	I
		Check the situation, wash and restore spark plug clearance							
8	Drive chain	Check chain tensioner, ensure that the rear wheel has been correctly aligned, clean and lubricate		I	I	I	I	I	I
		After a new motorcycle has run for 1000km, adjust the chain extension, paste the correct chain oil after every cleaning; later, adjust the chain extension once every 3000km; under special use conditions, the adjustment cycle can be shortened according to the actual situation							
9	Large chain wheel	Check / lubricate		I	I	I	I	I	I
		Replace it when replacing chain							
10	Small chain wheel / gasket	Check / replace		I	I	I	I	I	I
		Replace it when replacing chain							
11	Fuel oil pipe	Fault / leakage check			I	I	I	R	
		Replace it every 24000km (14912mi); or under any circumstances, replace it every three years							
12	Brake liquid	Check / add	I	I	I	I	I	I	I
		Replace	Replace it every 15000km (9320mi), or under any circumstances, replace it every two years						
13	Front / rear brakes	Check operation and liquid level, and ensure there is no liquid leakage in motorcycle	I	I	I	I	R	I	I
14	Brake shoes	Check / replace		I	I	I	I	I	
		If the wear reaches the limit, please replace							
15	Drive chain protector	Check / replace		I	I	I	I	I	
		If the wear reaches the limit, please replace							
16	Throttle grip	Check operation; if possible, adjust throttle cable clearance, lubricate throttle grip enclosure and throttle cable	I	I	I	I	I	I	I













Continued

## Frequency

		Item	Contents	0 km	1000 km	6,000 km	12,000 km	18,000 km	24,000 km	Annual inspectio n
17	☉	Clutch	Check/adjust	I	I	I	I	I	I	I
18	☉	Valve clearance	Check operation/ adjust the clearance						I	
19	☉	Timing chain	Check / replace						R	
20	☉	Timing chain leading plate	Check / replace						R	
21	☉	Chain tensioner distribution	Check / replace						R	
22	☉	Steering bearing	Check / replace				T		T	
23	☉	Front / rear wheel bearing	Check / replace				I			
24	☉	Swing arm bearing	Check / replace			I	I	I	R	
25	☉	Rocker arm	Check operation and ensure that there is no too much clearance/lubrication			I	I	I	I	
26	☉	Front suspension	Check operation and ensure that there is no leakage		I	I	I	I	I	I
27	☉	Front suspension oil	Replace					R		
28	☉	挂 Rear suspension	Check / adjust and ensure that there is no leakage			I	I	I	I	
29	☉	Wheel	Ensure that there is no eccentricity or damage				I	I	I	
30	☉	Tyre	Check the tyre tread pattern depth and whether the tyre has been damaged, and replace it when necessary; check the tyre pressure, and fill the tyre with air when necessary		I	I	I	I	I	I
31	☉	Single stay	Check operation	I	I	I	I	I	I	I
32	☉	Single stay switch	Check operation	I	I	I	I	I	I	I
33	☉	Instrument light signal and switch	Check operation	I	I	I	I	I	I	I

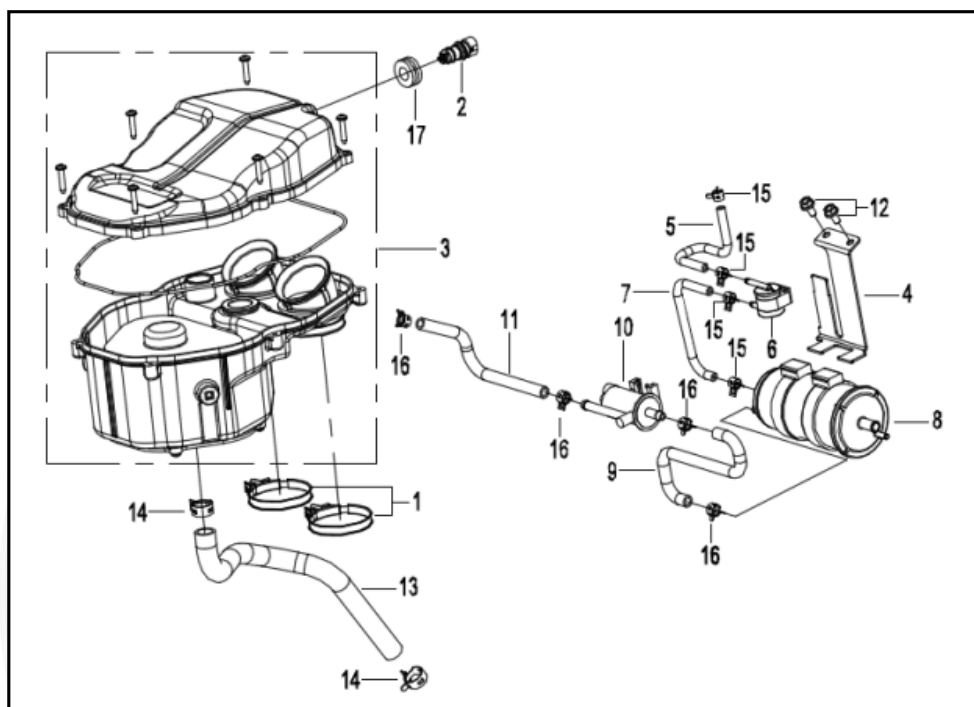
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## Frequency

		Item	Contents	0 km	1000 km	6,000 km	12,000 km	18,000 km	24,000 km	Annual inspectio n
34		Headlight	Check operation	I	I	I	I	I	I	
			Adjust							
35		Audible alarm	Check operation	I	I	I	I	I	I	I
36		Instrument	Check operation	I	I	I	I	I	I	I
37		Connecting battery	Check operation	I	I	I	I	I	I	I
38		Electrical system	Check operation	I	I	I	I	I	I	I
39		Ignition system	Check operation	I	I	I	I	I	I	I
40		Fan	Check operation	I	I	I	I	I	I	I
41		Fuel oil filter element	Check / replace	I	I	I	I	I	I	I
			Every 18000km (11184mi)							
42		Fastening of motorcycle parts	Ensure that all nuts, bolts and screws have been accurately fastened		T	T	T	T	T	T
43		Catalytic converter	Check / replace		I	I	I	I	R	
			Fault	Without maintenance requirements, do not replace it unless there is fault						
44		Charcoal canister	Check / replace		I	I	I	I	R	
			Fault	Without maintenance requirements, do not replace it unless there is fault						
45		Brake / clutch hose	Fault/leakage check	I	I	I	I	I	I	I
			Every four years							

## Air filter

### Disassembly / installation of air filter



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Clight components	2	10	Charcoal canister solenoid valve	1
2	Intake air temperature sensor	1	11	Solenoid valve and throttle valve connecting pipe	1
3	Air filter assembly	1	12	Screw M6×12-8.8-ZG	2
4	Charcoal canister mounting plate	1	13	Waste gas recovery pipe	1
5	Oil tank and check valve connecting pipe	1	14	Plate clight	2
6	Check valve components	1	15	Plate clight	4
7	Check valve and charcoal canister connecting pipe	1	16	Plate clight	4
8	Charcoal canister combination	1	17	Rubber bushing II	2
9	Charcoal canister and solenoid valve connecting pipe	1			

## Air filter

### Disassembly / installation of air filter

#### Replacement of air filter

Remove the fuel tank guard, and see (the chapter of motorcycle covering parts/fuel tank guards).

Open the seat cushion lock, and take off the seat cushion.



Remove the fuel tank fixing bolt (1), and take off the fuel tank.



Remove the air filter cover.  
Take off the air filter element.

#### Check:

Whether the filter element is polluted or damaged.  
Please replace the filter element, if any.

#### Cleaning:

- Rinse gently and thoroughly the filter element with cleaning agents.
  - Do not use gasoline so as not to cause fires.
  - Do not distort or wring the filter element so as not to damage foam materials.
- Then, coat engine oil on the filter element, and squeeze out the extra oil to make it moist without oil dripping.





## Air filter

### Disassembly / installation of air filter

#### Time replacement

Air filter elements should be often replaced if motorcycles are used in a particularly humid or dusty environment.

##### \*Notes

**When disassembling the air filter element, do not start the engine; otherwise, the unfiltered air will enter the engine resulting in sharp wear on parts or possible damage on the engine.**

**Additionally, operation without the filter element may impact the engine and then the engine may function improperly, and overheat.**

Assembly should be conducted in inverse order to disassembly.



# Benelli

## Fuel oil hose

### Fuel oil hose check

#### Check:

Fuel oil hose (fuel oil leakage, hose crack and hose installation)

#### Notes:

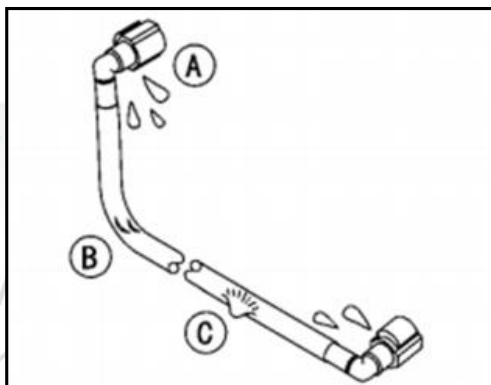
**If the motorcycle is improperly handled, high pressure from fuel pipe will cause fuel oil leakage [A] or fuel oil pipe crack.**

#### Disassembly:

Remove the fuel oil tank (see Section “Air filter” of Chapter III “Check and Regular adjustment”).

#### Check: fuel oil pipe

If any wear, crack [B] or expansion [C] is found, the fuel oil pipe must be replaced.

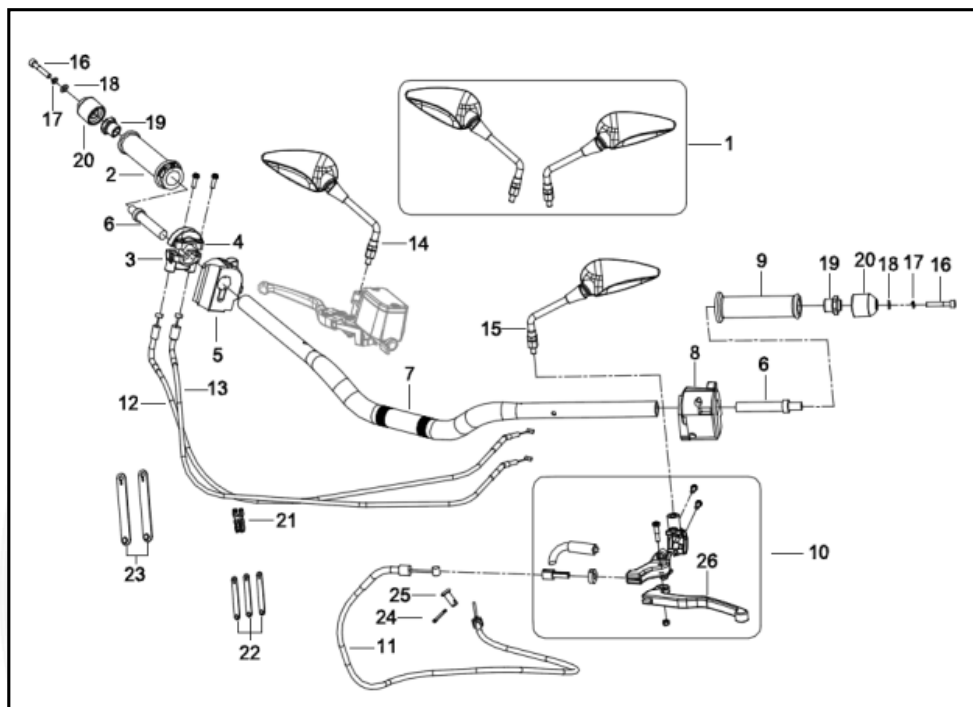


# Benelli



## Control

### Control cable



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Rearview mirror component	1	14	Right rearview mirror	1
2	Throttle grip	1	15	Left rearview mirror	1
3	Throttle cable back cover	1	16	Socket head screw M6×35	2
4	Throttle cable front cover	1	17	Spring washer 6	2
5	Right combined switch	1	18	Gasket 6	2
6	Balance block	2	19	Balance block assembling stand	2
7	Handlebar	1	20	Balance block	2
8	Left combined switch	1	21	Cable clight	1
9	Left grip	1	22	Globe valve soft cable clight	3
10	Clutch handle	1	23	Handlebar soft cable clight	2
11	Clutch cable component	1	24	Cotter pin 2×18	1
12	Throttle cable component I	1	25	Hinge pin 6×14	1
13	Throttle cable component II	1	26	Clutch handle	1

## Throttle cable

### Throttle cable adjustment

#### Check:

##### Throttle cable clearance (A)

Ensure that the throttle control grip works properly, and can reach the maximum open position and automatically closed position in all the control positions. Make some adjustments if needed, as shown in Fig. A.



#### \*Notes

**The engine idling speed should be properly adjusted before the throttle steel rope stroke is adjusted.**

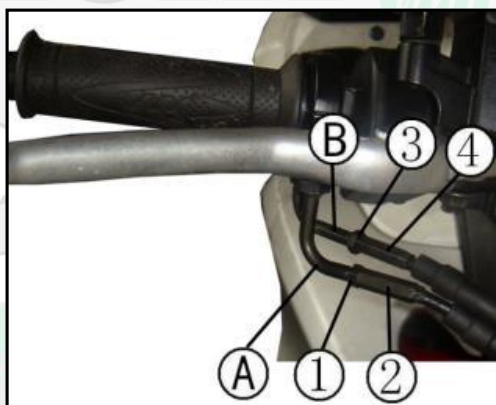
Check the free stroke of throttle steel rope which is 3-5mm.

Make some adjustments if it does not conform to specified values. Adjust the free stroke of throttle steel rope.

#### Adjustment:

The motorcycle is equipped with double-cable throttle steel rope. Throttle steel rope A is refueling door cable, and throttle steel rope B is oil return cable. Please adjust the free stroke of throttle grip according to the following steps:

- (1) Remove the dirt-proof boot of throttle cable.
- (2) Loosen the lock nut ③.
- (3) Completely screw in and adjust the nut ④.
- (4) Loosen the lock nut ①.
- (5) Rotate the adjusting nut ② to make the free stroke of throttle control grip be 10°~15°.
- (6) Tighten the lock nut ①.
- (7) Adjusting nut ④; and check whether the throttle grip turns flexibly.
- (8) Tighten the lock nut ③.



After the free stroke is adjusted, the handbar should be turned to the left or right to make sure that there is no change in the engine idling speed.

## Clutch cable

### Adjustment of clutch cable clearance

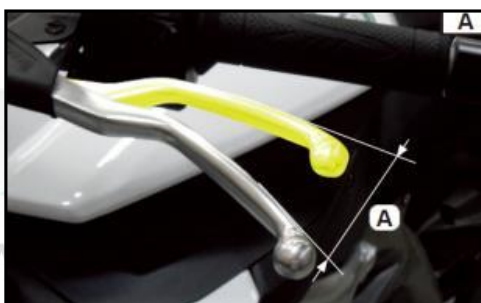
#### Check:

Free stroke of clutch handle (A)

Make some adjustments if needed:

Measure the free stroke of clutch handle at the tip of clutch handle.

**Free stroke: 10-20mm**



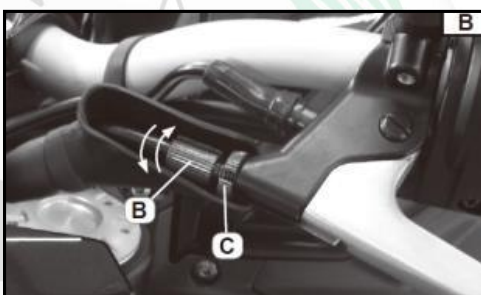
#### Adjustment:

1. Loosen the ring nut C.

2. Rotate and adjust the device B clockwise or anticlockwise to set the clutch cable clearance as specified, as shown in Fig. B.

**Increase clearance in clockwise direction.**

**Reduce clearance in anticlockwise direction.**



#### Notes

Use the adjusting nut at E side of engine if the clutch cable does not reach the specified clearance from one side of handle, as shown in Fig. C.



## Rearview mirror

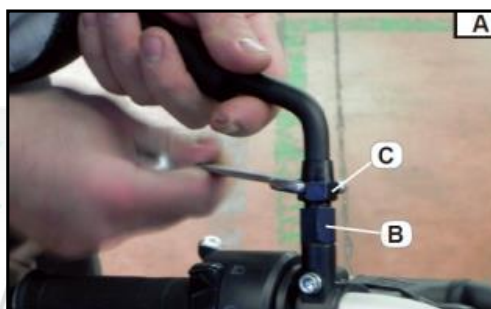
### Adjustment of rearview mirror

The following steps are applicable to the adjustment of two rearview mirrors.

#### Adjustment

Fasten the rearview mirror on the handle, check the nut B and fasten and press it to its base, as shown in Fig. A.

1. Unscrew the nut C.
2. Rotate the rearview mirror rod to the proper position, and adjust the mirror position.
3. Fasten the nut C.



#### Notes

Adjust the right rearview mirror in the same way.

# Benelli





## Engine oil

### Check of engine oil level

#### Recommended engine oil

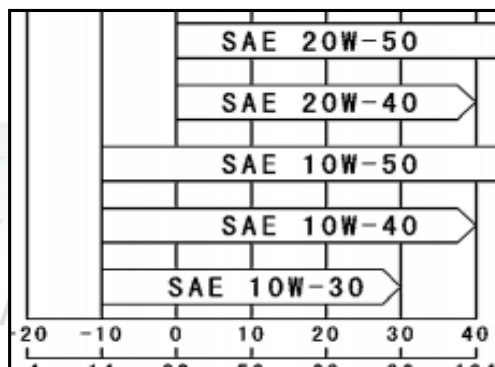
Model: API SE, SF or SG

API SH, SJ or SL, JASO MA, MA1 or MA2

Viscosity: SAE 10W-40

Capacity: 2.8 L (during oil change)

3.0 L (during disassembly)



#### Notes

- It is forbidden to add any chemical additive in engine oil! The engine oil that meets the above requirement is carefully prepared, which can adequately lubricate the engine and clutch.
- Make corresponding changes according to the atmospheric conditions of specific areas, although it is recommended to use the engine oil with viscosity of 10W-40 in most cases.

**Parking:** Park the motorcycle on a horizontal ground.

#### Notes

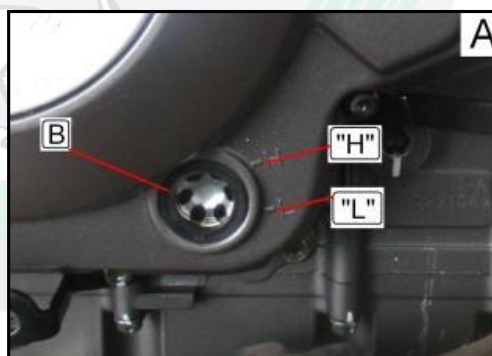
**During parking, the motorcycle body should be in a vertical position on the flat.**

#### Start:

View the oil lens at B after the motorcycle body is in a vertical position, the engine is running at idling speed for 2-3min, and then stops for 2-3min, as shown in Fig. A.

#### Warning

**Please do not start the engine if the oil level is less than the lowest value (L).**



## Engine oil

### Check of engine oil level

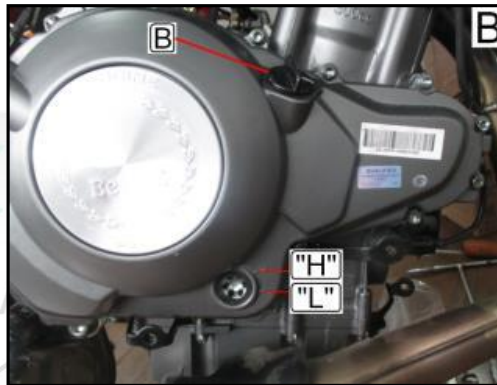
#### Check

##### Engine oil level

Add the recommended engine oil to make the oil level lay between the lowest value (L) and the highest value (H) if it is less than the lowest value (L).

#### Engine oil adding:

1. Shut down the engine, and unscrew the oil cover B.
2. Pour enough proper engine oil into the place between "H" and "L", as shown in Fig. B.
3. Turn the oil cover back to its original position.
- 4.



#### Note:

**When checking the engine oil level, restart the engine to preheat it for several minutes, and then shut it down. Wait for a while to have enough time for the engine oil to flow down.**

#### Important:

- Since engine oil also lubricates the clutch, the engine oil in wrong types or containing additives may cause clutch slipping. Therefore, we recommend you to use the engine oil without any chemical additive or other types of engine oil not listed in the list of engine technical specification.
- People or pets that swallow the engine oil will be poisoned. In case of swallowing, send the poisoned people or pets to the hospital; do not force them to vomit to prevent the items from being inhaled. The short exposure to engine oil may cause skin irritation.
- Put the engine oil beyond reach of children and pets.
- Please wear long-sleeved clothes and waterproof gloves every time adding the engine oil.
- Please flush the skin that is exposed to the engine oil with soap or water.
- Please recycle or properly handle the used engine oil.

## Engine oil

### Replacement of engine oil

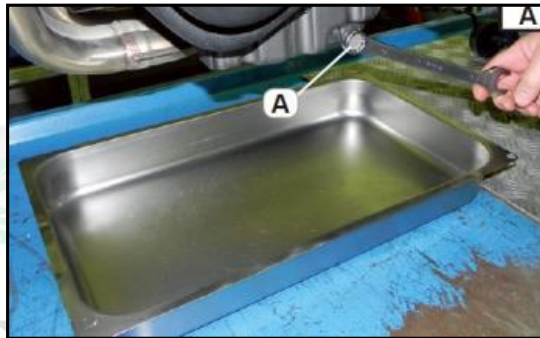
**Start:** engine, and preheat it for several minutes before shutdown.

**Take off:** oil pan drain plug.

**Place:** an appropriate container under the magnetic bolt A to collect the engine oil, as shown in Fig. A.

**Disassemble:** magnetic bolt A (with the copper gasket).

**Drain:** engine oil in the crankcase.



**Note:**

Replace: sealing gasket of magnetic bolt.

#### Assemble

New sealing gasket

Magnetic bolt

Fasten the magnetic bolt according to the following torque.



Torque: 22N\*m

**Filling:** the specified amount of recommended engine oil to crankcase filling port.

**Assemble:** oil cover B, as shown in Fig. B.

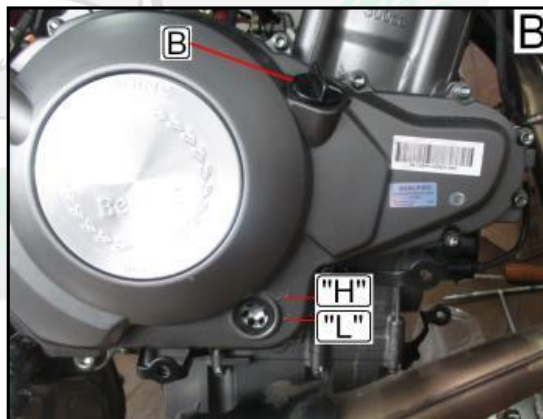
**Start:** engine.

Preheat the engine for several minutes before shutdown.

**Note:**

Ensure that the oil level is between the symbols “H” and “L” on the oil lens, as shown in Fig. B.

Add the engine oil if needed.



## Engine oil filter

### Replacement of engine oil filter

#### Replacement of engine oil filter

- Drain the engine oil (see “Replacement of engine oil”).
- Remove the engine oil filter [A] with the oil filter wrench.



#### Special tool-engine oil filter wrench

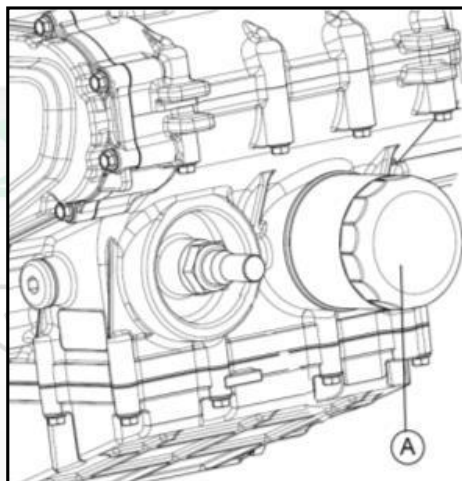
- Change the engine oil filter into a new one.
- Tighten the engine oil filter with the engine oil filter wrench.

Tightening torque:

#### Locking torque of engine oil filter:



Torque: 17 N m (1.7 kgf m, 13 ft lb)



#### Note:

- Please do not tighten the engine oil filter manually, because it cannot reach the specified locking torque.
- Pour the engine oil in the specified type according to the specified amount (see “Replacement of engine oil”).

## Coolant

### Coolant liquid level check

**Parking:** Park the motorcycle on a flat ground.

#### Note:

During parking, the motorcycle body should be in a vertical position on the flat.

#### Remarks

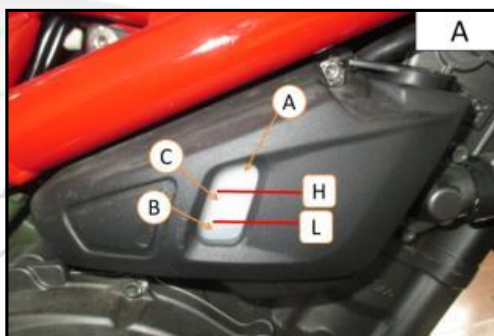
- Check the liquid level during engine cooling (at room temperature or ambient temperature).

- Place the motorcycle vertically (do not use the single stay), and check the coolant liquid level in the auxiliary radiator [A], as shown in Fig. A.

- ★ Unscrew the cover of auxiliary radiator, and add the coolant until the liquid level reaches the liquid level “H” [C] if the coolant liquid level is less than the liquid level “L” [B].

“L”: Lowest level

“H”: Highest level



#### Notes

When adding the coolant, add the specified mixture of coolant and soft water. Adding water separately will dilute the coolant and reduce its anticorrosive property. The diluted coolant may corrode aluminum engine parts. It is allowed to add soft water separately in case of emergency, but it is required to use the proper ratio again within a few days.

If it is required to frequently add the coolant or completely dry the auxiliary radiator, leak problems may exist in the cooling system. Check whether the cooling system leaks, since the coolant may corrode the painted surface.

Immediately flush with water if the frame, engine, wheel or other painted parts are spattered with the coolant.



## Radiator pipe

### Check of radiator pipe

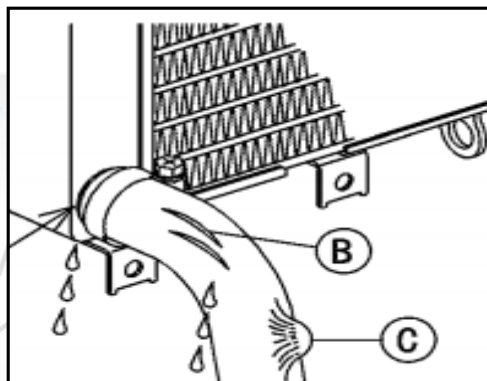
**Check:** radiator pipe (coolant leakage, radiator pipe damage and installation of radiator pipe)

#### Warning:

If the radiator pipe is improperly repaired, high pressure from water pipe will cause coolant leakage [A] or water pipe crack.

#### Check:

Check whether the soft hose is corroded. After the soft hose is squeezed, it is shown that it is corroded if it becomes hard, fragile, soft or swelling.



#### Note:

If any wear, crack [B] or expansion [C] is found, the soft pipe must be replaced.

#### Check:

Check whether the soft pipe is firmly linked, and the clight is properly tightened.

Tightening torque of radiator (water) pipe fastening screw: 2.0 N·m (0.20 kgf·m, 18 in·lb).



## Spark plug

### Disassembly of spark plug

The following steps are applicable to all the spark plugs.

#### Warning:

The engine must be cooled during check and replacement of spark plug.

#### Disassembly:

Follow the instructions of the abovementioned chapters “Air filter” and “Disassembly / assembly of air filter” during disassembly of air filter.

#### Important:

Before disassembly of spark plug, wipe out the dust from cylinder cover with a stream of compressed air to prevent the dust from falling into the cylinder.

#### Disassemble:

Screw (6)  
Support (8)  
Rubber gasket (2)  
O-ring (3)

#### Disconnection:

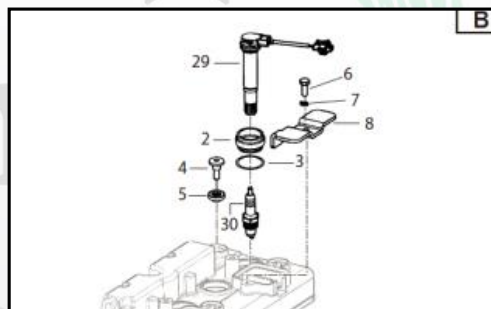
Disconnect the connector (X) from the coil (29), as shown in Fig. A.

Take out: coil (29)

Disassemble: spark plug (30) below, as shown in Fig. B.

#### Note:

During disassembly of spark plug, do not make impurities enter the engine through the spark plug hole.



## Spark plug

### Spark plug check

The following steps are applicable to all spark plugs.

Check the model of spark plug.

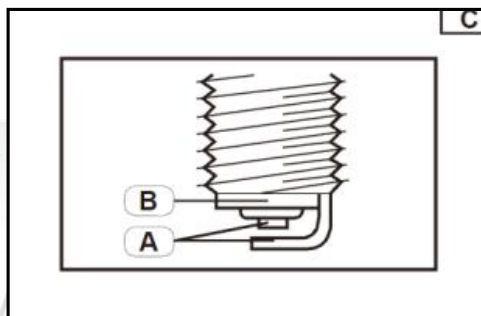
Check:

1. Replace the spark plug if there is any damage / wear on the electrode (A), as shown in Fig. C.
2. Insulated part (B), as shown in Fig. C.

If the color is abnormal,

Replace the spark plug.

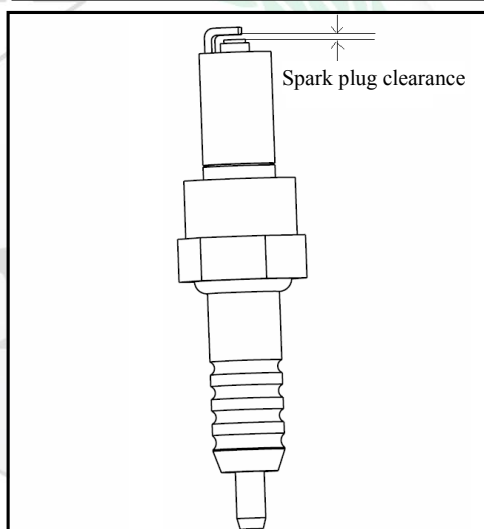
The normal color is medium-light brown.



Check:

Check spark plug clearance.



**Clearance: 0.6-0.7mm**



## Spark plug

### Spark plug check

The following table contains typical damages on spark plug due to different causes and their solutions.

	Polluted spark plug		Overheated spark plug
Cause	Solution	Cause	Solution
Over-rich fuel mixture Vaporization setting error	Adjust fuel / vaporization systems.	Ignition advance  Inadequate air / fuel mixing	Adjust ignition timing.
Electrical failure Poor coil connection	Check coil connection and relevant impedance	Lack of coolant / or lubricating oil	Adjust air / fuel ratio.
Special cycling Long-term low speed	Check coil connection and relevant impedance	Too low torque of spark plug	Add coolant and / or lubricating oil.
Too cold spark plug	The speed of motorcycle needs to be 80km/h. Use hotter spark plug as specified.	Use of hot spark plug	Fasten it to the proper torque.
			Use colder spark plug as specified.

## Spark plug

### Assembly of spark plug

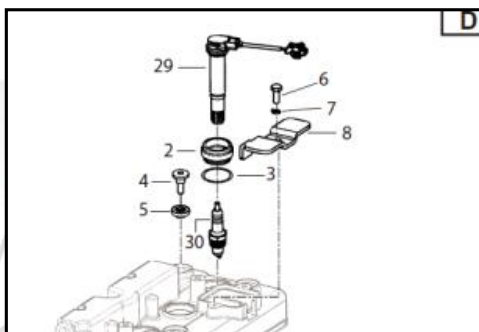
The following steps are applicable to all spark plugs.

**Warning:** Lubricate the spark plug thread with copper-based grease.

**Note:** Before assembly of spark plug, clean the parts and the side contacting with the gasket.

#### Assembly:

Assemble the spark plug on the cylinder head. At first, put the spark plug in the spark plug socket by hand and tighten it, and then fasten it with the spark plug wrench to the proper torque.



Torque: 12N\*m

#### Note:

The spark plug should not be too tight or threads are staggered to prevent the threads on cylinder cover from being damaged.

During assembly of spark plug, do not make impurities enter the engine through the spark plug hole.

#### Assemble:

Coil (29)

Rubber end (2) and O-ring gasket, as shown in Fig. D.

#### Connect:

Coil connector

#### Assemble:

Coil (6)

Support (8)

Fasten them to the proper torque.



Torque: 8N\*m

## Valve clearance

### Check of valve clearance

#### Note:

- Valve clearance can only be checked and adjusted when the engine has cooled down (indoor temperature).

#### Disassembly:

Disassemble cylinder cover of the engine (see “engine/cylinder head cover” section of Chapter V)

#### Check:

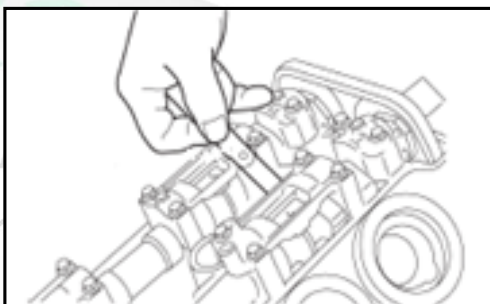
- Measure the valve clearance between the cam and the valve tappet with thickness gauge.

Valve clearance

#### Standards:

Exhaust valve: 0.19 ~ 0.25 mm (0.0075 ~ 0.0099 in.)

Intake valve: 0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)



#### Note:

- Insert the thickness gauge on the valve tappet horizontally.

Suitable: [A]

Unsuitable: [B]

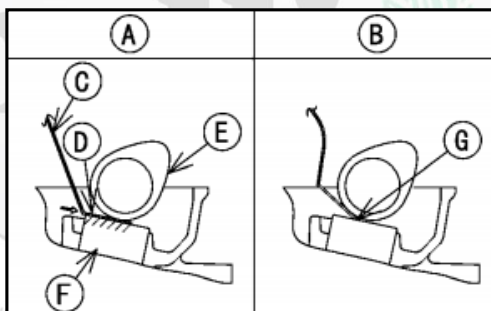
Feeler gauge: [C]

Insert horizontally: [D]

Cam: [E]

Valve tappet: [F]

Clipping the front end of feeler gauge on the valve tappet is the wrong way: [G]



- ★ If the valve clearance is not within the specified range, record the valve clearance first, and then adjust the clearance.

#### Assembly:

Assembly should be conducted in the reverse sequence of disassembly (see “engine/cylinder head cover” section of Chapter V)

## Valve clearance

### Adjustment of valve clearance

#### Adjustment of valve clearance

● In order to change the valve clearance, remove the camshaft chain tensioner, camshaft and valve tappet. Replace the currently used valve shim with valve shim of different thickness.

#### Note:

○ To install the valve tappet and valve shim to the original position, mark their locations before removing them.

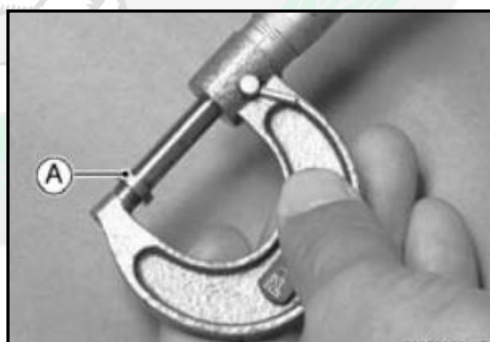
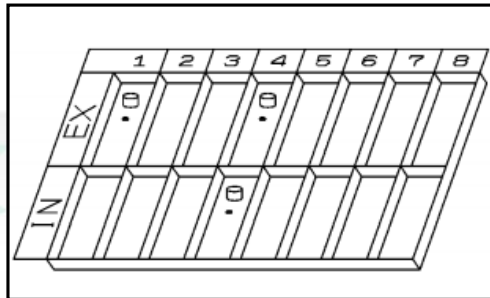
○ In addition to standard valve shims in the valve clearance adjustment table, the following valve shims can also be used.

#### Adjustment of valve shims:

Thickness	Thickness	Thickness
1.600mm	1.850mm	2.100mm
1.625mm	1.875mm	2.125mm
1.650mm	1.900mm	2.150mm
1.675mm	1.925mm	2.175mm
1.700mm	1.950mm	2.200mm
1.725mm	1.975mm	2.225mm
1.750mm	2.000mm	2.250mm
1.775mm	2.025mm	2.275mm
1.800mm	2.050mm	
1.825mm	2.075mm	

#### Check:

- Clean the dust or grease on the valve shims.
- Measure the thickness of the removed valve shim [A].





## Valve clearance

### Adjustment of valve clearance

#### Valve clearance adjustment table of exhaust valve

		Examples of the current valve shims																				
Thickness (mm)		1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3
Examples of measured values (mm) of valve clearance	0.00~0.02	—	—	—	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05
	0.03~0.06	—	—	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1
	0.07~0.10	—	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15
	0.11~0.14	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2
	0.15~0.18	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25
	0.19~0.25	valve clearance/adjustment is unnecessary																				
	0.26~0.30	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3	
	0.31~0.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3		
	0.36~0.40	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3			
	0.41~0.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3				
	0.46~0.50	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3					
	0.51~0.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3						
	0.56~0.60	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3							
	0.61~0.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3								
	0.66~0.70	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3									
	0.71~0.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3										
	0.76~0.80	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3											
	0.81~0.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3												
	0.86~0.90	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3													
	0.91~0.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3														
	0.96~1.00	2.05	2.1	2.15	2.2	2.25	2.3															
	1.01~1.05	2.1	2.15	2.2	2.25	2.3																
	1.06~1.10	2.15	2.2	2.25	2.3																	
	1.11~1.15	2.2	2.25	2.3																		
	1.16~1.20	2.25	2.3																			
	1.21~1.25	2.3																				

1. Measure the valve clearance (engine has cooled down).
  2. Check the size of the current valve shims.
  3. The valve clearance in vertical column corresponds to size of the current valve shim in horizontal column.
  4. The values in the crossing blank spaces of vertical and horizontal columns are specified valves of shim size.
- When size of the valve shim is equal to the value in the blank space, size of the valve clearance is suitable.

**Example:** Thickness of the current valve shim is **1.90 mm**.

The measured valve clearance is **0.33 mm**.

Replace the **1.90 mm** gasket with **2.00 mm** valve shim.

5. Re-measure the valve clearance, and re-adjust it if necessary.

## Valve clearance

### Adjustment of valve clearance

#### Valve clearance adjustment table of exhaust valve

		Examples of the current valve shims																					
Thickness (mm)		1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3	
Examples of measured values (mm) of valve clearance	0.00~0.04	—	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	
	0.05~0.08	—	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	
	0.09~0.12	—	1.3	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	
	0.13~0.19	valve clearance/adjustment is unnecessary																					
	0.20~0.24	1.35	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3		
	0.25~0.29	1.4	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3			
	0.301~0.34	1.45	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3				
	0.35~0.39	1.5	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3					
	0.40~0.44	1.55	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3						
	0.45~0.49	1.6	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3							
	0.50~0.54	1.65	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3								
	0.55~0.59	1.7	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3									
	0.60~0.64	1.75	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3										
	0.65~0.69	1.8	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3											
	0.70~0.74	1.85	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3												
	0.75~0.79	1.9	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3													
	0.80~0.84	1.95	2.0	2.05	2.1	2.15	2.2	2.25	2.3														
	0.85~0.89	2.0	2.05	2.1	2.15	2.2	2.25	2.3															
	0.90~0.94	2.05	2.1	2.15	2.2	2.25	2.3																
	0.95~0.99	2.1	2.15	2.2	2.25	2.3																	
	1.00~1.04	2.15	2.2	2.25	2.3																		
	1.05~1.09	2.2	2.25	2.3																			
	1.10~1.14	2.25	2.3																				
	1.15~1.19	2.3																					

Thickness (mm) of valve shims to be installed

Thickness (mm) of valve shims to be installed

1. Measure the valve clearance (engine has cooled down).
  2. Check the size of the current valve shims.
  3. The valve clearance in vertical column corresponds to size of the current valve shim in horizontal column.
  4. The values in the crossing blank spaces of vertical and horizontal columns are specified valves of shim size.
- When size of the valve shim is equal to the value in the blank space, size of the valve clearance is suitable.

**Example:** Thickness of the current valve shim is **1.85 mm**.

The measured valve clearance is **0.36 mm**.

Replace the **1.85 mm** gasket with **2.05 mm** valve shim.

5. Re-measure the valve clearance, and re-adjust it if necessary.

## Brake adjustment

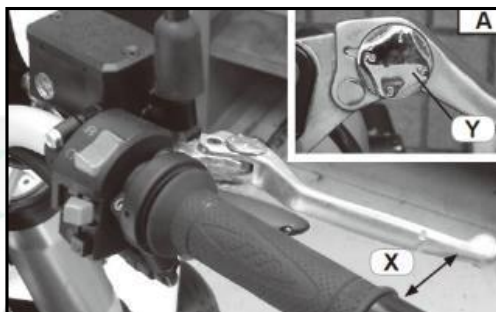
### Adjustment of front hydraulic brake

#### Adjustment

Position of the brake handle is shown in Fig. A ("X" is the distance between the throttle and the brake handle)

#### Note:

Push the brake handle forward, offset thrust of the spring, at the same time, rotate the ring nut "y", and adjust its position clockwise or counterclockwise until the brake handle is in the suitable position.



Position of the ring nut	Distance
1Position 1	Away from the handle
Position 4	Close to the handle

#### Warning:

If the brake handle feels soft when you hold it, there may be air in the brake system. Before using the motorcycle, it is necessary to discharge air in the brake circuit. Air in brake circuit will reduce the brake performance, and may even make the vehicle become out of control, and cause accidents. So, check the system and, if necessary, exhaust air in the brake circuit.

#### Important:

After adjusting position of the brake handle, make sure that there is no braking drag.

## Brake adjustment

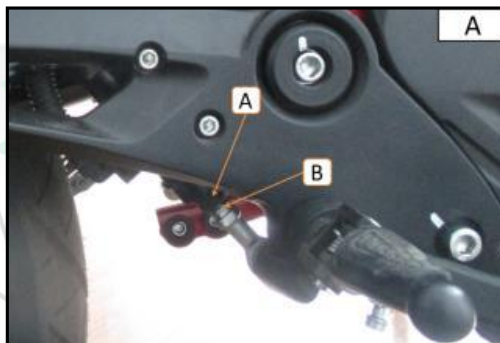
### Adjustment of rear hydraulic brake

#### Adjustment:

Adjust the position of the brake pedal with nuts and ejector rod pin, as shown in Fig. A

Loosen the locknut B

Unscrew the ejector rod pin A



Position of the ejector rod pin	Position of the brake pedal
Clockwise	The pedal goes up
Anticlockwise	The pedal goes down

#### Warning:

If the brake handle feels soft when you hold it, there may be air in the brake system. Before using the motorcycle, it is necessary to discharge air in the brake circuit. Air in brake circuit will reduce the brake performance, and may even cause the vehicle become out of control, and cause accidents. So, check the system and, if necessary, exhaust air in the brake circuit.

#### Important:

After adjusting position of the brake pedal, make sure that there is no braking drag.

## Check of brake fluid

### Check of front brake fluid level/filling

**Parking:** Park the vehicle on flat ground

**NOTE:** Prop the motorcycle up with parking rack and make sure it is vertical

**Check:** the brake fluid level

If the brake fluid is below the minimum mark oil lens A in Figure A, add the recommended brake fluid until it reaches the right liquid level

**Liquid adding procedure:**

When parking the motorcycle on flat ground, unscrew the oil brake fluid cylinder cover B from the brake pump, as shown in Fig. A

**Check:**

Check the brake fluid cylinder diaphragm on the cover. If there is any damage/wear, replace the brake fluid cylinder diaphragm

**Important:**

Brake fluid may damage painted surfaces or plastic parts. Thus, wrap the pump with absorbent paper, and clean up the spilled brake fluid immediately.

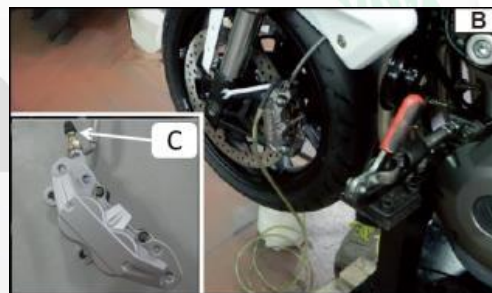
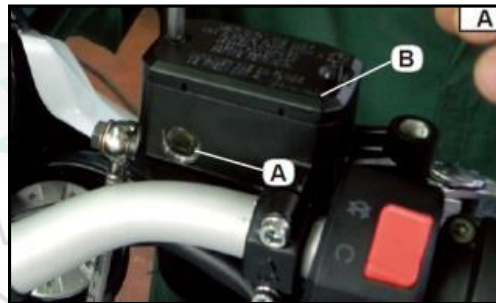
Add liquid, until the liquid level is above the observation hole of the pump, as shown in Fig. C

**Warning**

Use only the specified brake fluid. Other brake fluids may cause deterioration of the rubber gasket, leakage, and improper operation of the braking system.

Use the same brake fluid in the system when adding brake fluid. Different brake fluid mixture may cause adverse chemical reactions, which can lead to degradation of the brake system.

Be careful not to let water flow into the oil cup when adding brake fluid. Water will significantly reduce the boiling point of the brake fluid and will produce vapor bubbles when it is heated, which will cause degradation of the brake system.



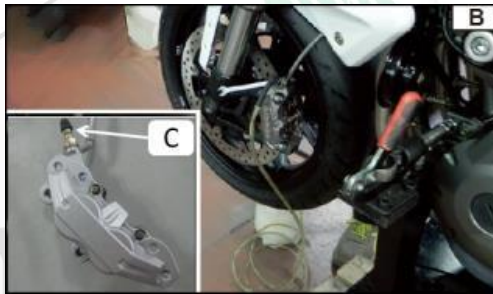
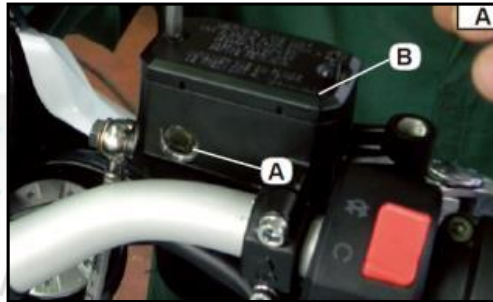


## Check of brake fluid

### Check of front brake fluid level/filling

#### Replacement of brake fluid:

1. Place the master cylinder horizontally, and remove brake fluid cylinder cover.
2. Mount a tube on the front end of the oil drain screw, and prepare a drip pan at the front end of the tube, as shown in Fig. B
3. Loosen the oil drain screw.
4. Repeat barking for several times until the oil discharge screw no longer discharges brake fluid.
5. Tighten the oil drain screw.
6. Inject brake fluid until it is above the lower limit.
7. Pull the brake handle, and fill the tube with brake fluid.
8. Operate the brake handle slowly, until bubbles no longer come out of holes in the brake cylinder and the brake handle feels powerful.
9. Release air.
10. After adjustment is completed, conduct assembly in the reverse sequence of disassembly.



#### Note:

Add brake fluid at the same time. The brake fluid should not fall below the lower limit.

Tighten the drain screw to the following torque:



Torque: 6N\*m

#### Sequence of releasing air

1. Remove the brake fluid cylinder cover.
2. Remove the brake fluid cylinder diaphragm.
3. Mount a tube on the front end of the oil drain screw, and prepare a drip pan at the front end of the tube.
4. After braking for several times, seize the brake handle, loosen the oil drain screw about 1/2 circle, and tighten it rapidly.
5. Repeat the above action until bubbles has been completely discharged out of the oil drain screw.
6. Install the brake fluid cylinder diaphragm
7. Install the brake fluid cylinder cover

#### Note:

Do not loosen the brake handle before re-tightening the oil drain screw.

#### Note:

Add brake fluid at the same time. The brake fluid should not fall below the lower limit.



## Check of brake fluid

### Check of front brake fluid level/add brake liquid

**Parking:** Park the vehicle on flat ground

**NOTE:** Prop the motorcycle up with parking rack and make sure it is vertical

**Check:** the brake fluid level

If the brake fluid is below the minimum mark oil lens A in Figure A, add the recommended brake fluid until it reaches the right liquid level

**Important:**

Brake fluid may damage painted surfaces or plastic parts. Thus, wrap the pump with absorbent paper, and clean up the spilled brake fluid immediately.

**Liquid adding procedure:**

When parking the motorcycle on flat ground, unscrew the oil cup cap B from the oil cup, as shown in Fig. B

**Check:**

Check the oil cup sealing gasket at C. If there is any damage/wear, replace the oil cup sealing gasket, as shown in Fig. C



## Check of brake fluid

### Check of front brake fluid level/add brake liquid

Add liquid, until it is above lower limit.

#### Warning

Use only the specified brake fluid. Other brake fluids may cause deterioration of the rubber gasket, leakage, and improper operation of the braking system.

Use the same brake fluid in the system when adding brake fluid. Different brake fluid mixture may cause adverse chemical reactions, which can lead to degradation of the brake system.

Be careful not to let water flow into the oil cup when adding brake fluid. Water will significantly reduce the boiling point of the brake fluid and will produce vapor bubbles when it is heated, which will cause degradation of the brake system.



#### Sequence of releasing air

1. Remove the oil cup cap.
2. Remove the oil cup sealing gasket.
3. Mount a tube on the front end of the oil drain screw D, and prepare a drip pan at the front end of the tube.
4. Disassemble bolt E fastening outside rear brake caliper to lift the brake cylinder
5. After braking for several times, press on the brake pedal, loosen the oil drain screw about 1/2 circle, and tighten it rapidly.
6. Repeat the above action until bubbles has been completely discharged out of the oil drain screw.
7. Install the oil cup sealing gasket.
8. Install the oil cup cap.



#### Note:

Do not loosen the brake pedal before re-tightening the oil drain screw.

#### Note:

Add brake fluid at the same time. The brake fluid should not fall below the lower limit.

Tighten the drain screw to the following torque:



Torque 6N\*m

Upon completion of the liquid adding procedure, lower the caliper, and tighten fastening bolt D to the following torque:



Torque 30N\*m

## Check of brake fluid

### Check of front brake fluid level/add brake liquid

#### Replacement of brake fluid:

1. Place the oil cup horizontally, and remove the oil cup cap.
2. Mount a tube on the front end of the oil drain screw, and prepare a drip pan at the front end of the tube.
3. Loosen the oil drain screw.
4. Repeat barking for several times until the oil discharge screw no longer discharges brake fluid.
5. Tighten the oil drain screw.
6. Inject brake fluid until it is above the lower limit.
7. Press on the brake pedal, and fill the tube with brake fluid.
8. Operate the brake handle slowly, until bubbles no longer come out of holes in the brake cylinder and the brake handle feels powerful.
9. Release air.
10. After adjustment is completed, conduct assembly in the reverse sequence of disassembly.

#### Note:

Add brake fluid at the same time. The brake fluid should not fall below the lower limit.

Tighten the drain screw to the following torque:



Torque 6N\*m

## Check of brake shoes

### Check of front and rear brake shoes

The following procedures are applicable to all brake shoes.

#### Check:

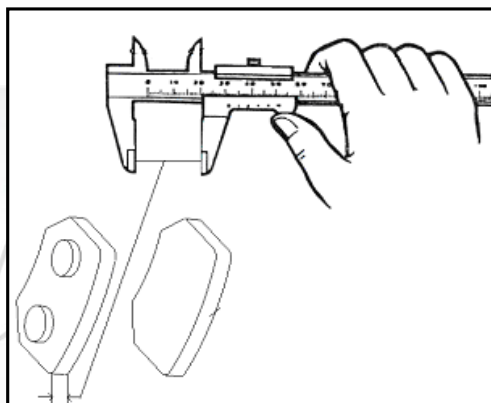
Front brake shoe/rear brake shoe

Wear limit of front and rear brake shoes

If the wear limit has been reached, replace the brake in pairs



Brake shoe	Standard	Wear limit
Front brake shoe	7.8mm	3.8mm
Rear brake shoe	7.0mm	3.7mm



#### Note:

For replacing brake shoes, see “Front brake shoe / rear brake shoe” “Front and rear brake / rear brake shoe” in the chapter “Motorcycle”.

## Check of brake hoses

### Check of brake hoses

The following procedures are applicable to all brake hose and brake hose clights.

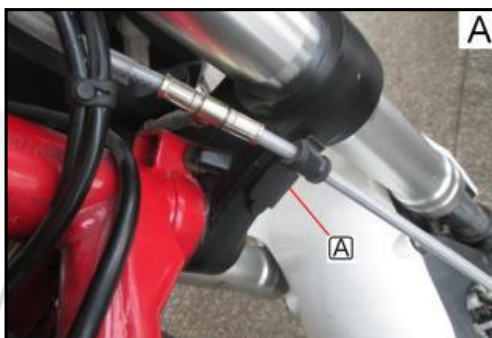
#### Check:

Front /rear brake hose

If there are any signs of cracks / wear or damage, please replace it.

#### Check:

Clight A of front brake hose, shown in Fig. A. If the front brake hose is loosened, tighten the clighting screw.



#### Check

Clight A of rear brake hose, shown in Fig. B. If the front brake hose is loosened, tighten it using cable clight.





## Adjustment of drive chain

### Adjustment of drive chain

**Note:** When the engine is running, do not check or adjust drive chain.

**Note:** When checking drive chain, conduct the operations at the point which looks loosest.

**Warning:** If the drive chain is too tight, overload may be caused to engine or other key parts; if the drive chain is too loose, it may fall and damage lifter or cause an accident. We recommend keeping the chain sag within the specified range.

**Parking:** Park the motorcycle on flat ground.

**Warning:** Support the motorcycle using parking rack, so as to avoid tipping and lift the rear wheel. Rotate the rear wheel several times to find the position where the drive chain is loosest.

**Check:** If the sag of drive chain is not within the specified value, adjust it. Fig. A



Sag of drive chain

10-20mm

**Adjustment:** Tension of drive chain. Fig. B

1. Loosen the rear wheel shaft.
2. Loosen lock nut using open-ended wrench.
3. Screw into or out the adjusting bolt, until the specified slackness has been reached.
4. Tighten the lock nut.
5. Fasten the rear wheel shaft.

Fasten the rear wheel shaft according to the following torque.



Torque 120N\*m

Screw into	The slackness increases
Screw out	The slackness decreases



## Adjustment of drive chain

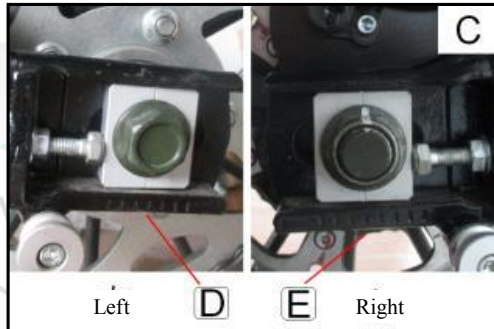
### Adjustment of drive chain

#### Important:

If the drive chain slackness is too small, overload may be caused to engine and other main parts and chain may skid or break. To prevent these phenomena, the chain slackness must be kept within the specified range.

#### Note:

If the scale of right chain adjusting block is at the eighth slot E of the swing arm (count backwards), and then the scale of left chain adjusting block is at the eighth slot D of the swing arm (count backwards). Fig. C



### Lubrication of drive chain

#### Important:

Drive chain consists of many interacting chain rollers.

Chain needs proper maintenance to prevent rapid deterioration.

Therefore, we suggest maintaining the drive chain, especially when using it in the places with a lot of dust.

This motorcycle is equipped with drive, and rubber O-ring is installed between chain plate and roller. The drive chain should not be cleaned using steam nozzle or high pressure water gun, corrosive solvent, or brush with too stiff bristles, to avoid damaging the rubber O-ring.

We suggest using only the recommended methods to clean, dry and lubricate the drive chain, or conduct lubrication using other lubricating oils specially designed for the chains with O-rings.

#### Note:

After lubricating the drive chain, only a thin layer of lubricating oil is attached to the entire chain. Attention should be paid to not touching the surrounding parts, especially pneumatic tools.

## Check and adjustment of steering gear

### Check and adjustment of steering gear

**Parking:** Park the motorcycle on flat ground

**Note:**

Support the motorcycle using suitable bracket; the front wheel can be lifted easily.

**Check:** Steering gear

Hold the end of faucet handle, gently swing the front fork, and adjust the direction if there is any sticking /catching point. Fig. A

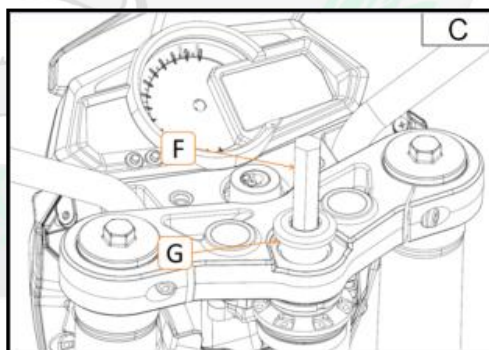
**Disassembly:** Handle (see special section)

**Disassembly:** Upper holder block B, Fig. B

**Loosening:** Fasten the screw A of upper connecting plate, Fig. B

**Disassembly:**

Remove the fastening screw G using special tool F, Fig. C



## Check and adjustment of steering gear

### Check and adjustment of steering gear

#### Adjustment:

Faucet handle

1. Remove lock nut D from pillar, and loosen gland nut E. Fig. D

Tighten gland nut E using the relevant wrench



Tighten gland nut E to reach the following value,



Torque 30~35N\*m

2. Rotate the handlebar to left and right for 2-3 times, and ensure that there is no catching and the bearing race is not loose;
3. Loosen the gland nut by 1/4 turn and then tighten it, and tighten gland nut E using the relevant wrench.



Tighten gland nut E to reach the following value,



Torque 20~24N\*m

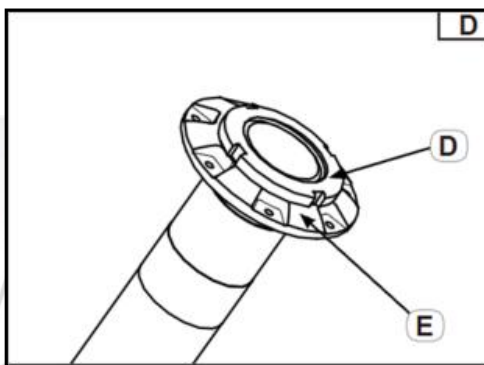
4. Tighten lock nut D using special tools,



Tighten lock nut D to reach the following torque



Torque 60N\*m



#### Warning:

Do not tighten lock nut D excessively

#### Check:

Ensure that the pillar is not loose, and rotate the front fork to the left and right to reach the end of stroke to ensure that there is no blocking point. If there is any blocking point, disassemble the connecting plate parts, and check the upper and lower steering bearings.

## Check and adjustment of steering gear

Check and adjustment of steering gear
---------------------------------------

### Assembly:

Conduct assembly in inverse order to disassembly.

### Recheck: Steering gear

Hold the end of the pipe with faucet handle, rotate it to the left and right, repeat the operations to adjust the steering gear if there is any sticking /catching point.



## Check of front fork

### Check

**Parking:** Park the motorcycle at flat ground.

**Note:** Support the motorcycle correctly, to avoid tipping.

### Check

Outer cylinder of shock absorber A, Fig. A

Outer cylinder of shock absorber B, Fig. A

If there is any damage, please replace

Oil seal

If there is any leakage, please replace



**Keeping:** The motorcycle is vertical

**Enabling:** Front brake

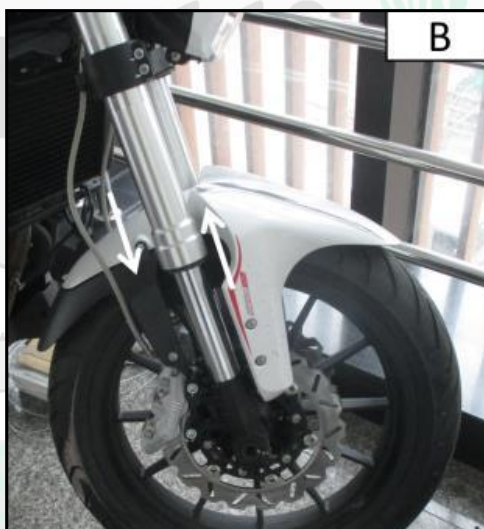
### Check:

Front fork operation

Push down firmly on the handle a few times to ensure that the front fork can quickly slip back into place.

Fig. B

If it cannot move smoothly, please repair it





## Check of rear shock absorber

### Adjustment of rear shock absorber

**Note:** Support the motorcycle correctly, to avoid tipping.

**Adjustment:** Adjust the preload of spring, Fig. A

The rear shock absorber is equipped with adjusting O-ring nut A and return O-ring nut D for spring preload



1. Loosen the above-mentioned lock O-ring nut D using shock absorber O-ring nut adjusting tool
2. Loosen the above-mentioned lock O-ring nut A using shock absorber O-ring nut adjusting tool, to adjust the rear shock absorber to appropriate hardness.
  - Rotate the adjusting O-ring nut A in the direction of B to increase the preload of spring, to make the rear shock absorber become too hard.
  - Rotate the adjusting O-ring nut A in the direction of C to reduce the preload of spring, to make the rear shock absorber become too soft.
3. Upon completion of adjustment, tighten return O-ring nut D using shock absorber O-ring nut adjusting tool.



## Check of front and rear tyres

### Check

The following procedures are applicable to front and rear tyres.

#### Check

Adjust if the tyre pressure is not within the specified value, Fig. A.

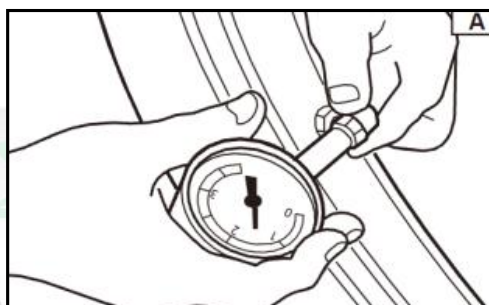
#### Warning:

When checking and adjusting tyre pressure, the wheel must be at room temperature.

Tyre pressure and suspension should be adjusted according to the total weight (including luggage, rider, passenger and accessories), and assumed riding speed should also be considered.

Tyres may be damaged when overloaded during riding, causing the risk of accidents and injuries.

In any case, overload should be avoided.



Cold tyre pressure	Front	Rear
Load below 0-90Kg *	230kPa	250kPa
100Kg to the maximum load*	240kPa	260kPa
Load includes luggage, rider, passenger and accessories.		

Specifications of front tyre	120/70-17 M/C
Specifications of rear tyre	160/60-17 M/C

**Warning:** It is very dangerous when the tread pattern reaches the wear limit during riding.

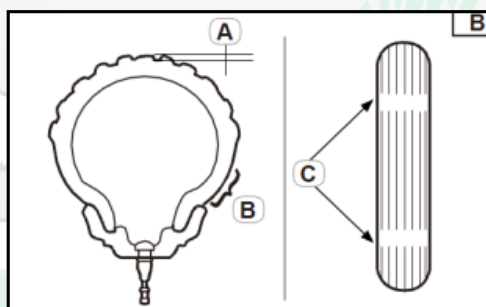
If the tread reaches the wear limit, replace the tyre immediately.

**Check:** Tyre surface, Fig. B

Tire damage / wear → Replace



Minimum depth of tread pattern: 1mm



A. Depth of tread pattern

B. Sidewall

C. Wear sign

#### Warning:

If the tyre is new, its road holding is not as good as that when slightly worn. Therefore, we suggest riding the motorcycle at the speed of above 100Km/h only after riding it for 100km at the speed of below 100Km/h and resulting in slight wear to tyre.

## Check and battery charging

### Battery

#### Warning:

Battery will produce the explosive gas comprising hydrogen. Battery contains electrolyte composed of sulfuric acid which is poisonous and highly corrosive substance. Therefore, the following precautions are required:

- When handling batteries or working on the side, please wear goggles.
- Battery must be charged at the appropriate place with good ventilation.
- Battery must be far away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes, etc.).
- When charging or handling batteries, do not smoke.
- Batteries and electrolyte should be placed out of reach of children.
- Any parts of the body do not touch the electrolyte, because it may cause severe burns or cause permanent eye damage.

Give first aid treatment if accidentally exposed:

#### Detoxification methods (external contacts):

Skin: Wash with water

Eyes: Wash with plenty of water for 15 minutes and seek immediate medical attention.

#### Detoxification methods (internal):

Drink plenty of water or milk, and then milk containing magnesium oxide, egg juice or vegetable oil, and seek immediate medical attention.

#### Important:

Battery is sealed. Do not disassemble sealed cover under any circumstances, because this will damage the balance between the batteries and affect battery performance.

The charging time, amperage and voltage of this battery is different from that of traditional batteries. If the battery is overcharged, the electrolyte level will be relatively lowered. Therefore, please be very careful when charging the battery.

**Note:** Inspect the electric quantity through measuring the density of electrolyte.

Therefore, check battery charging through measuring the voltage on the endpoint of battery.

#### Disassembly:

Open the seat cushion using key, Fig. A



## Check and battery charging

### Battery

**Disconnection:** Disconnect the cable from the end of cable, Fig. B

**Important:** First disconnect the negative cable from battery A, and then disconnect the positive cable B. Fig. B

**Disconnection:**

Battery

Disassemble the four screws C which are used to tighten the lock bracket of battery, and then disassemble battery D

**Check:** Battery voltage

Connect a multimeter to the endpoint of battery, Fig. C

As shown in the following chart in Figure D, check battery charging

**Note:** Detect battery charging through measuring the voltage in the loop (voltage when disconnecting the positive terminal). If the open-circuit voltage is equal to or exceeds 12.8V, charging is not required.

**Example:**

Open-circuit voltage = 12.0V

Charging time = 6.5 hours

Battery charge amount = 20 -30%

Charging

Battery (see the picture describing suitable charging method)

**Important:** Do not use quick charging for battery.

**Warning:**

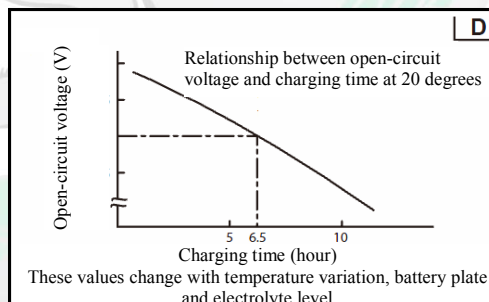
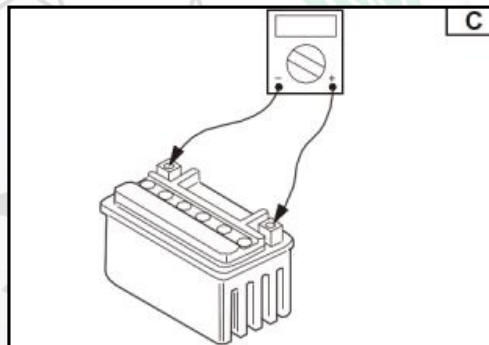
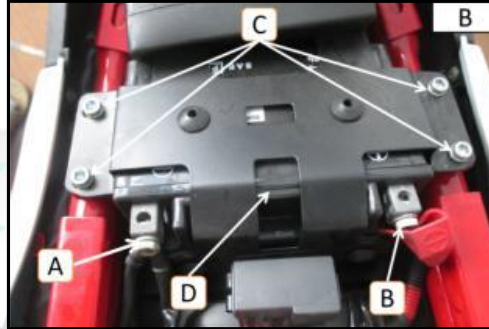
Do not disassemble the cover which is used to seal batteries.

Do not use quick chargers, because they will send high ampere current to battery at a very high speed; this may cause overheating and damage to batteries.

If the charging current of battery cannot be adjusted, be careful not to overcharge

Batteries should be disassembled from motorcycle when charging. (If batteries can be charged on the motorcycle, disconnect the negative cable from battery terminal)

To reduce the possibility of generating sparks, connect the battery charger to power only after connecting cable to battery.



## Check and battery charging

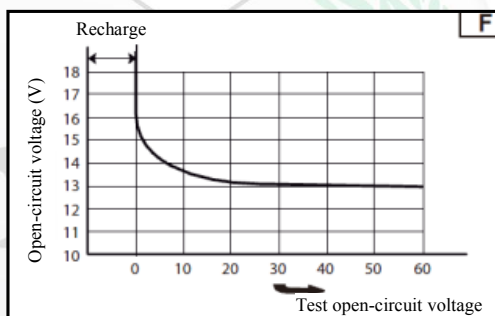
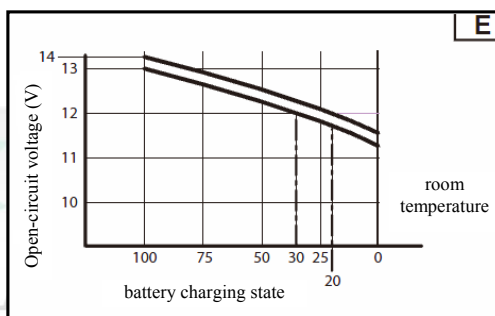
### Battery

Cut off the power before disassembling clight from battery terminal.

Ensure that the clight at battery charger cable has fully contacted with battery terminal, and here is no short circuit. The corroded endpoint will generate heat in the contact area, and sparks will be produced at invalid endpoint.

If battery is overheated during charging, please immediately disconnect charger and fully cooling the battery before continuing to charge. Overheated battery will explode!

As shown in Fig. F, the voltage is table after charging the open-circuit voltage of battery for 30 minutes and completing charging, or before measuring open-circuit voltage.



## Check and battery charging

### Battery

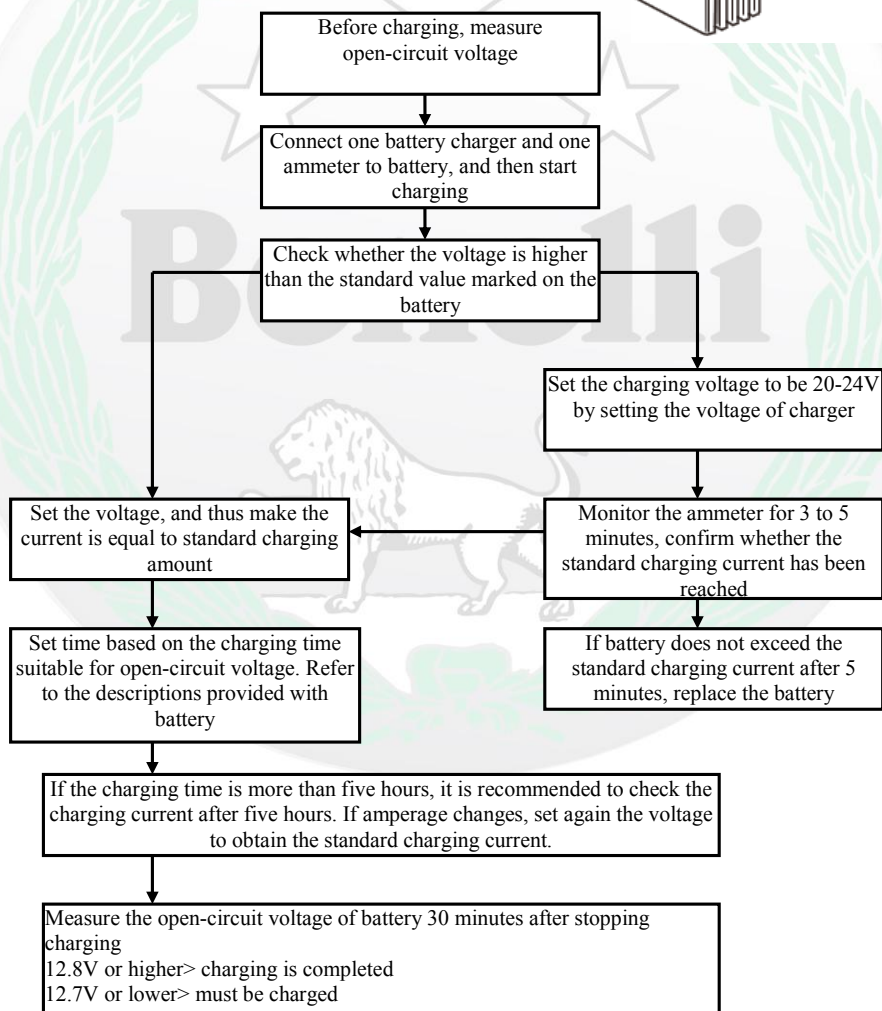
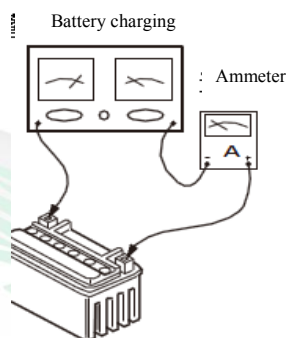
Charging method: use the charger with variable current (voltage)

#### Note:

Measure the open-circuit voltage of battery 30 minutes after completing charging

Set the charging voltage to 16-17V (low setting may cause insufficient charging, while high setting may cause overload of battery)

Connect one battery charger and one ammeter to battery, and then start charging



## Check and battery charging

### Battery

Charging method: Use the charger with variable current (voltage)

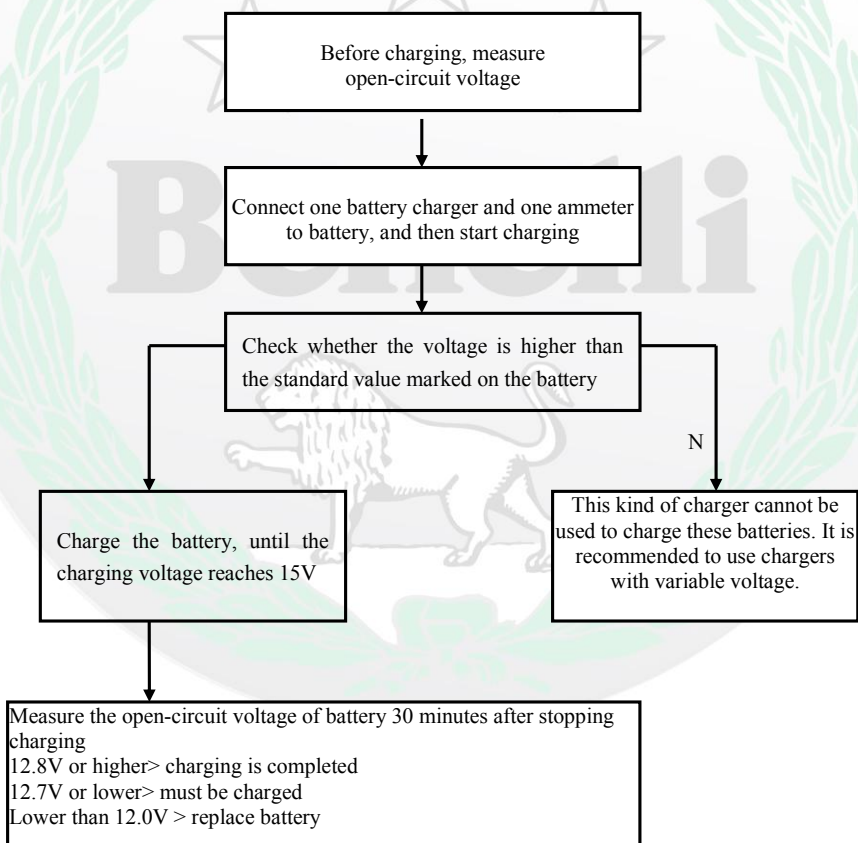
Note:

Measure the voltage of battery 30 minutes after completing charging

Set the maximum charging time to be 20 hours

Note:

To ensure the maximum performance and durability of battery, we recommend using electronic charger which can provide stable charging voltage and current, and thus achieve the desired charging technology of battery





## Check and battery charging

### Battery

#### Disassembly:

Battery

Tighten 4 screws C, and fasten battery rack.

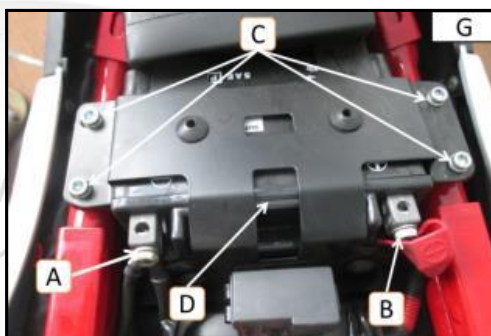
**Connection:** Connect cable to the battery terminal

**Important:** First connect the positive cable B of battery D, and then negative cable A, Fig. G

**Check:** Battery terminal

If it is dirty, remove the dirt using a metal brush

Re-tighten if there is any loosened connector.



## Check of fuse

### Fuse

⚠ The following procedures are applicable to all fuses.

**Important:** To prevent short circuit, the fuse is always set to OFF to close the main switch.  
Open the seat cushion using key, Fig. A



Open fuse box B, Fig. B

**Check:** Fuse

Connect a multimeter to fuse and check whether it is in good condition.

**Note:** Set the selection key to the function of ohm  
If the reading of multimeter is " $\infty$ ", replace fuse.

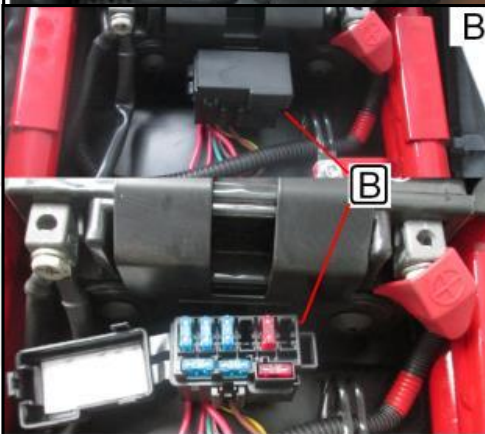
**Replacement:** Burned-out fuse

Rotate the main switch to OFF

Assemble a new fuse, and ensure the correction of amperage

Turn on the switch, ensure the working of circuit

If fuse is immediately burned out, check power circuit.



## Check of fuse

### Fuse

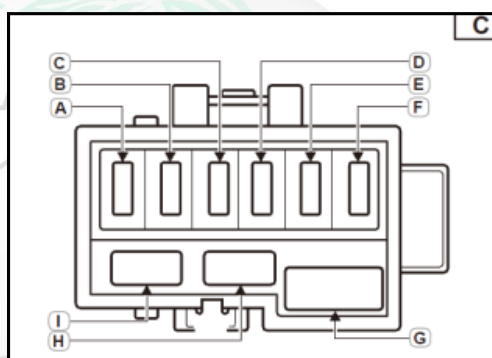
#### Warning:

Do not use the fuse whose amperage is not specified. The makeshift fuse or the one with mistaken amperage may cause irreversible damages to electrical system, affect the normal working of lights and ignition, and even result in fire.

#### Lines of fuse

Reference drawing C

- A. Fuel pump: 15A (blue)
- B. Fan: 15A (blue)
- C. ECU: 15A (blue)
- D. Empty
- E. Power lock: 10A (red)
- F. Empty
- G. Spare fuse 10A (red)
- H. Spare fuse 15A (blue)
- I. Spare fuse 15A (blue)



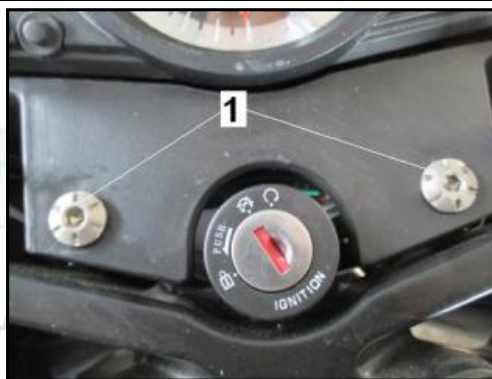
## Replacement of headlight bulb

### Replacement of headlight bulb

The following procedures are applicable to headlight.

#### Disassembly:

Disassemble headlight support fastening bolt (1).



Turn the combination of headlight and fairing.  
Disassemble self-tapping screw (2)  
Take down the rear decorative plate of fairing



Disassemble self-tapping screw (3)  
Take down headlight dust cover.



## Replacement of headlight bulb

### Replacement of headlight bulb

Unplug the socket connector of headlight (4), taken down socket seat, release clight spring and taken down bulb.

In the following figure, 4 is low-beam light and 5 is high-beam light. Respectively disassemble the power cord socket, bulb bayonet-socket fixing screw and bulb bayonet-socket, and finally taken down the damaged bulb.



Align the position of bulb bayonet socket, replace it with a new light.

Bulb type: H7 (12V / 55W)

#### \* Note

When the light is on and it is hot at this time, do not touch it before it cools down.

#### Assembly:

Install the headlight in inverse order to disassembly.

#### Note:

Avoid directly touching the glass part of bulb and do not make it oily; otherwise, the transparency, service life and luminous flux of bulb will be affected.

If it is stained with oil, completely wipe it with a damp cloth with alcohol or other solvents.



## Adjustment of headlight

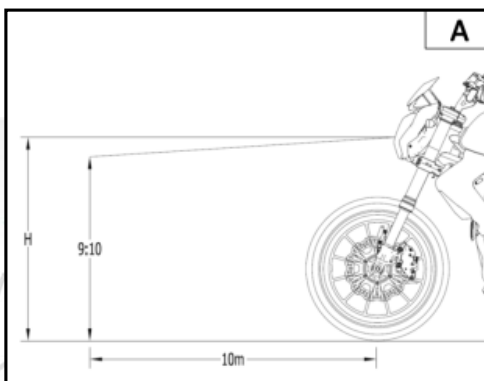
### Adjustment of headlight

Correctly adjust the beam of headlight according to the following steps:

Park the motorcycle at the place which is about 10 m away from the upright wall, and park it at perfectly flat surface. Fig. A

Ride in the motorcycle and sit in the position of rider. Ensure the highest point of beam; if the beam falls on the wall, make it 1/10 lower than the horizontal axis of headlight.

If the beam does not fall within these ranges, make adjustment and keep it at the correct position.



### Adjustment:

Use the adjusting screw A at the back of light to adjust the beam of headlight, Fig. B

Rotary screw at upper left corner

Rotate the screw counterclockwise to lower the beam

Rotate the screw clockwise to raise the beam

Rotary screw at lower left corner

Rotate the screw counterclockwise to move the beam towards the left

Rotate the screw clockwise to move the beam towards the right





## Replacement of front signal light bulb

### Replacement of front signal light bulb

#### Replacement of front signal light

Front signal light and headlight are designed in the same light body. As shown in the figure, there is one front signal bulb ① at left and right respectively.

- (1) Conduct operations according to the prompts in the section “**Replacement of headlight bulb**”.
- (2) Take down the damaged bulb, and replace it by the new bulb with the same specifications and model.

**Bulb specifications: W5W (12V/5W)**

#### Assembly:

Install the light in inverse order to disassembly.



# Benelli

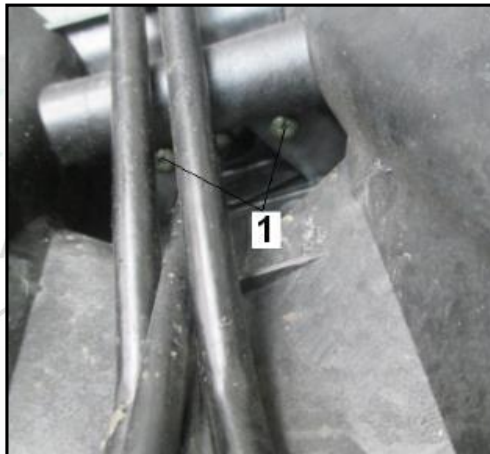


## Replacement of rear license plate light

### Replacement of rear license plate light

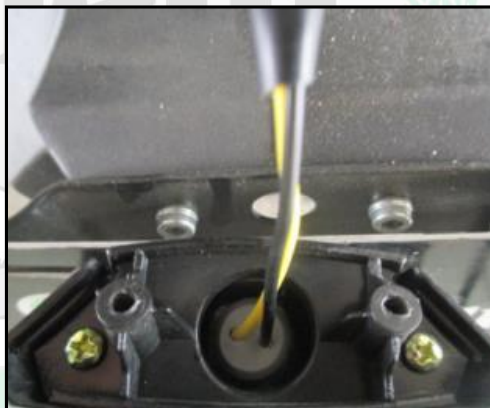
#### Replacement of rear license plate light

1. Disassemble the fixing screw of rear license plate light (1), and then disassemble the rear license plate light.



2. Take down the damaged bulb, and replace it by the new bulb with the same specifications and model.

**Bulb specifications: W5W (12V/5W)**



## Replacement of rear license plate light

### Replacement of rear license plate light

- (1) After replacing bulb, install the light in inverse order to disassembly.



Benelli





## Section IV Motorcycle

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## Front wheel and front brake disc

### Disassembly of front wheel

Parking: Park the motorcycle at flat ground

Note:

Support the motorcycle using suitable bracket, to lift the front wheel easily.

Disassembly: Disassemble the fastening screw A from two brake cylinders, Fig. A



Separation: Right front caliper

Note

Repeat the above operations for left front caliper.

Note

When disassembling caliper, do not pull front brake handle.

Loosening: Fixing screw B, Fig. B



Disassembly:

Front wheel shaft, Fig. C

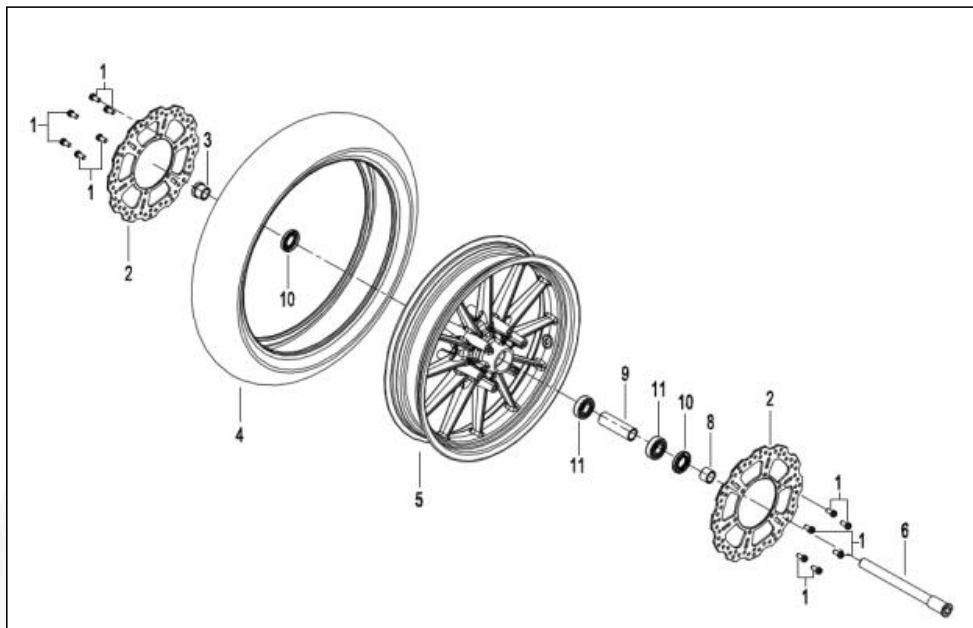
Front wheel





## Front wheel and front brake disc

### Disassembly and assembly of front wheel



No.	Name	Quantity
1	Bolt M8×16	12
2	Front brake disc /disc chuck φ260×4	2
3	Left bushing of front wheel	1
4	Vacuum tyre 120/70-17	1
5	Front wheel rim	1
6	Front wheel shaft	1
7	Valve	1
8	Right bushing of front wheel	1
9	Intermediate sleeve of front wheel	1
10	Dust ring components	2
11	Rolling bearing 6204-2RS	2



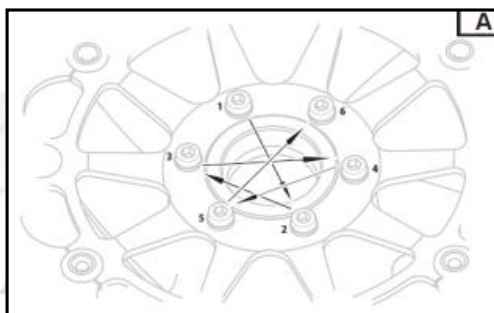
## Front wheel and front brake disc

### Disassembly and assembly of front wheel

#### Disassembly:

After disassembling the wheel from the front fork, disassemble the 6 screws (1) used for fastening two discs (2), Fig. A

If two discs need to be replaced, please conduct the operations as follows:



#### Assembly:

Insert the front brake disc (2) into the edge of wheel rim (5).

After dripping one drop of thread sealant at the end of thread, insert 6 fastening screws (1)



#### Note

Repeat the above steps for the front right brake disc.

The following procedures are applicable to two brake discs.

Tighten the bolts to the brake disc in the form of cross step by step, Fig. A

Fasten 6 screws according to the following torque:



Torque 22N \*m

## Front wheel and front brake disc

### Disassembly and assembly of front wheel

The following procedures are applicable to all brake discs.

**Check:** Brake disc

If there is any damage / wear, please replace



Brake discs	Deformation limit
Front brake disc	0.1mm
Rear brake disc	0.15mm

Park the motorcycle at the suitable bracket, to lift the wheel easily.

Before measuring the bending of front brake disc, turn the handle to the right, and then to the left to ensure that the front wheels is stopped.

Disassemble brake cylinder.

Place the gauge at the surface of brake disc at a right angle.

Measure bending 1.5mm (0.05in) below the edge of brake disc. Fig. A

#### Note

Tighten bolt to the brake disc step by step in the form of cross, Fig. C



#### Tightening torque

Brake discs	Tightening torque
Front brake disc	22N.m
Rear brake disc	10N.m

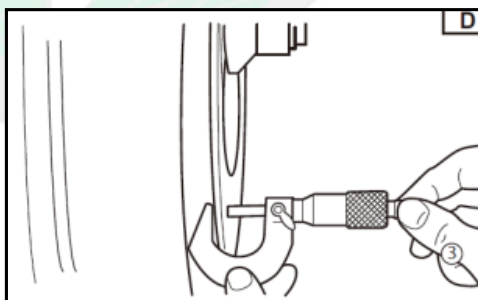
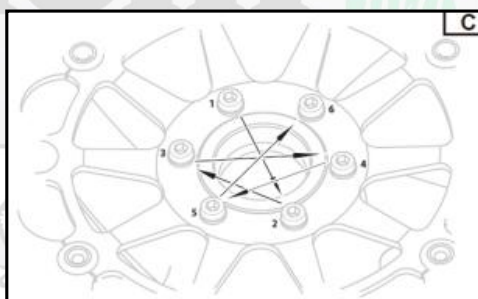
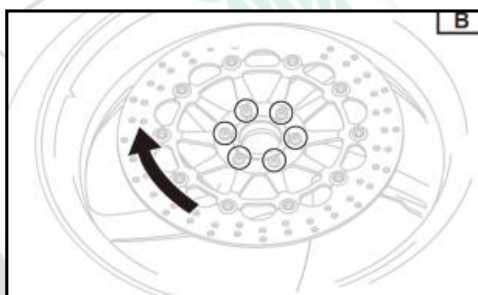
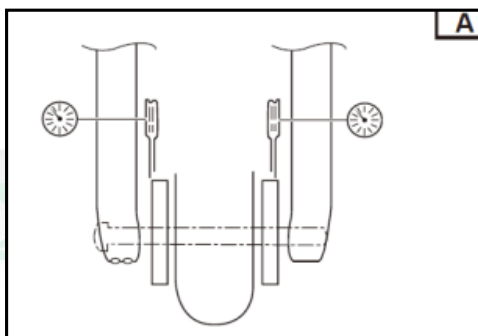
#### Measurement:

Brake disc thickness

Measure the brake disc thickness at several different points, Fig. D

If it exceeds the specifications, please replace.

Brake discs	Standard	Lower wear limit
Front brake disc	4.0mm	3.0mm
Rear brake disc	5.0mm	4.0mm



## Front wheel and front brake disc

### Check / replacement of front wheel bearing

#### Check

Wheel shaft bearing

If the front wheel rotates irregularly or it is loosened, please replace wheel bearing

#### Replacement:

Wheel shaft bearing

Disassemble wheel A using conventional bearing remover. Fig. B

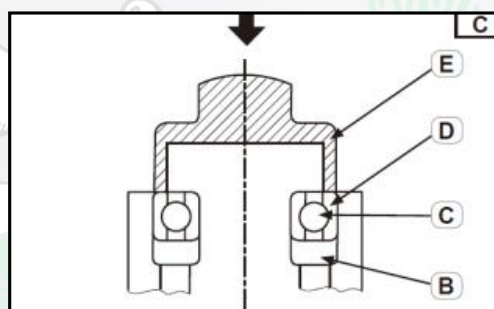
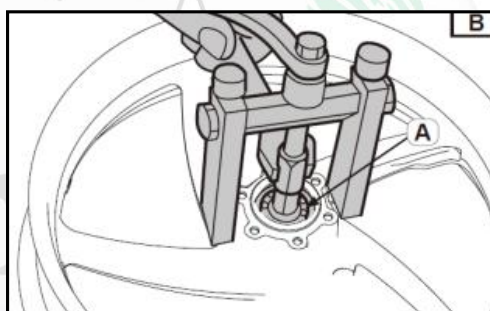
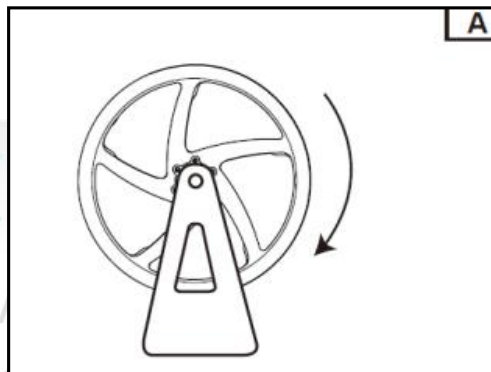
Install new wheel bearing in inverse order to disassembly.

#### Important

When pressing bearing, do not touch inner seat B or the ball bearing C of wheel. Only contact the outer seat D of bearing, Fig. C

#### Note

The tools should be suitable for the diameter of the side D of wheel bearing, Fig. C



## Front wheel and front brake disc

### Check / replacement of front wheel and front wheel shaft

#### Check:

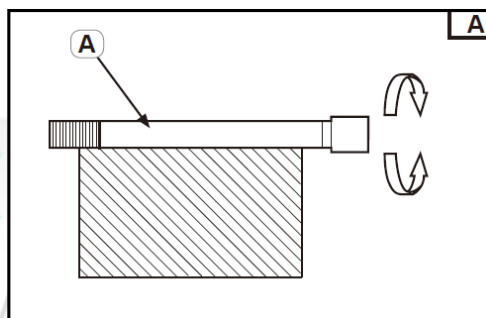
Front wheel shaft

Roll front wheel shaft A at flat surface, Fig. A

If there is any bending, please replace.

#### Warning

If the front wheel shaft is bent, do not try to straighten it in a forced way



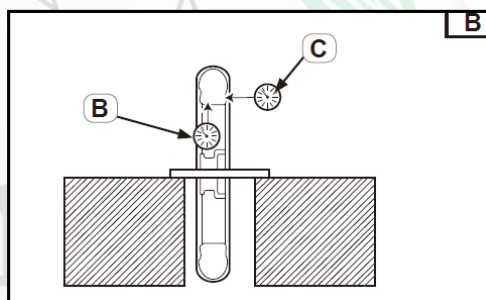
#### Check:

Front wheel

Please refer to "Chapter III Check of front and rear tyres"

Front wheel rim

If there is any bending, please replace



#### Measurement:

Radial run-out of wheel B. Fig. B

Axial run-out of wheel C. Fig. B

If it exceeds the specified limit, please replace



Run-out	Limit
Longitudinal	0.05mm
Lateral	0.05mm

## Front wheel and front brake disc

### Static balance adjustment of front wheel

Note:

- After replacing outer tyre, wheel rim or the both, regulate the static balance of front wheel.
- When adjusting the static balance of front wheel, the brake disc should be installed properly.

Disassembly:

Balance weight

Searching:

- Gravity point of front wheel

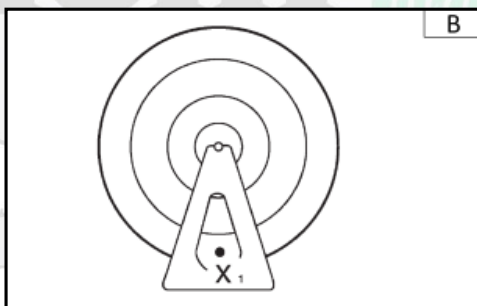
Note:

Place the front wheel at the proper balance stand

1. Rotate front wheel; Fig. A

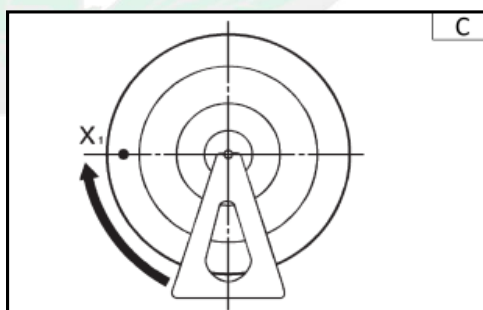


2. When the front wheel stops rotating, make "X<sub>1</sub>" mark at the bottom of front wheel; Fig. B



3. Rotate the front wheel by 90° to make "X<sub>1</sub>" mark stop at the position shown in the figure; Fig. C

4. Release front wheel;

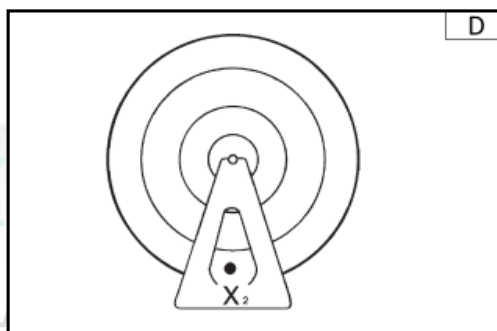




## Front wheel and front brake disc

### Static balance adjustment of front wheel

5. When the front wheel stops rotating, make "X<sub>2</sub>" mark at the bottom of front wheel; Fig. D
6. Repeat the above steps for 3 to 5 times, until all marks stop at the same position;
7. The position where all marks stop is the gravity point of front wheel "X".

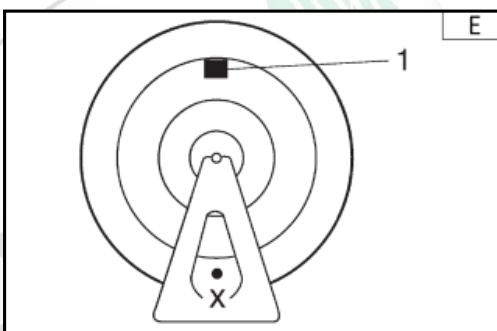


#### Adjustment:

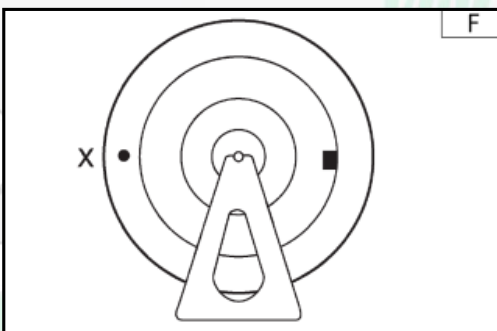
- Static balance of front wheel
1. Install "balance weight" 1 at the lower opposite side of hard point "X" at wheel rim, Fig. E

#### Note:

Start from the lightest balance weight.

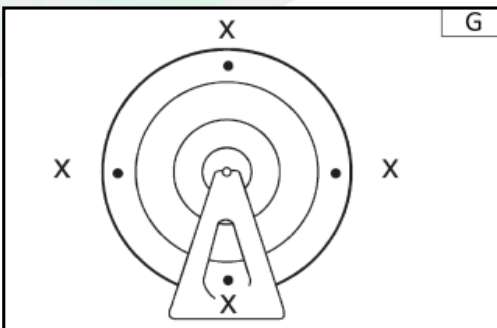


2. Rotate the front wheel by 90° to make the gravity point at the position shown in the figure. Fig. F
3. If the gravity point does not stop at the position, please use heavy balance weight;
4. Repeat steps 2 and 3, until the front wheel becomes balanced.



#### Check

- Static balance of front wheel
- Rotate front wheel, and ensure that it will stop at each position shown in the figure. Fig. G  
If front wheel will remain still at each position, please re-balance it.



## Front wheel and front brake disc

### Front wheel assembly

#### Assembly:

Put the shaft sleeve of front wheel to the oil seal of front wheel, and apply the oil seal of front wheel with appropriate amount of grease;

Insert the entire front wheel between two front shock absorbers to drive the brake disc.

First apply grease for the front wheel shaft (C) and then insert.

Fasten front wheel shaft using special tools.



The tools used for tightening the front wheel shaft are shown in the list of special tools



Tightening torque 100N\*m

#### Assembly:

Insert two screws B and tighten them with hands.

Press the front force downward for two to three times to place the front wheel shaft (6), Fig. B

Fasten two screws B using the following torque:



Tightening torque 8N\*m

#### Assembly:

Right brake cylinder, insert fastening screw A. Fig. C

Use the following torque to fasten two screws A:



Fastening torque 45N\*m

#### Note

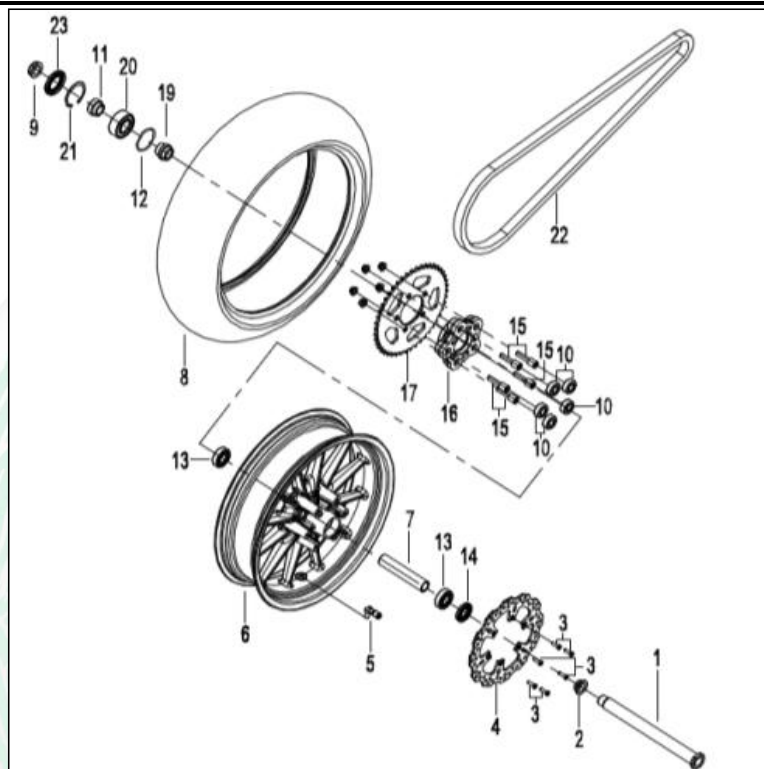
For left brake cylinder, please repeat the above steps.  
Put the calipers between brake discs, and ensure that there is an enough gap between brake shoes.

Check whether the arrangement of brake hose is correct.



## Rear wheel and rear brake disc

### Disassembly of rear wheel



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Rear wheel shaft	1	13	Rolling bearing 6204-2RS	2
2	Right bushing of rear wheel	1	14	Dust ring components	1
3	Screw M6×20-10.9-ZG	6	15	Chain wheel fixing bolt M10×1.25×41	5
4	Rear brake disc	1	16	Chain wheel hub	1
5	Valve	1	17	Chain wheel	1
6	Rear wheel rim	1	18	Self-locking nut M10×1.25	5
7	Intermediate shaft sleeve of rear wheel	1	19	Chain drive shaft sleeve	1
8	Vacuum tyre 160/60-17	1	20	Bearing 30×62×23.8	1
9	Self-locking nut M20×1.5	1	21	Closing ring Φ62	1
10	Cushion cover of rear wheel	5	22	Chain 108 sections	1
11	Left shaft sleeve of rear wheel	1	23	Lip seal components	1
12	O-ring φ53×φ3.55	1			

## Rear wheel and rear brake disc

### Disassembly of rear wheel

**Parking:** Park the motorcycle at flat ground

Support the motorcycle using suitable bracket, to lift the front wheel easily.

**Disassembly:** Disassemble the fastening screw A from two brake cylinders, Fig. A

#### Note

Support the motorcycle using suitable bracket, to lift the rear wheel easily.

**Disassembly:** Disassemble the tightening screw

A from rear brake cylinder. Fig. A

**Separation:** Brake cylinder.

**Disassembly:** Self-locking nut (9) and rear wheel shaft (1)

#### Note

During this process, note that the following parts may be separated:

Mounting plate of brake cylinder, Fig. A.

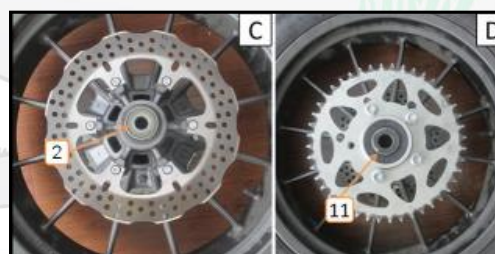
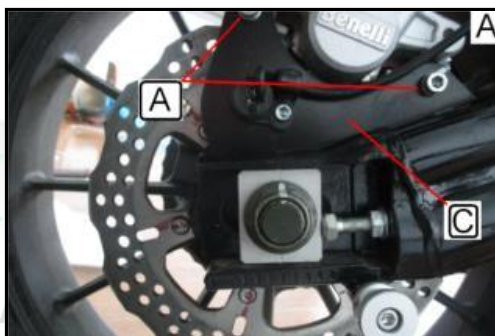
Chain adjusting block B, Fig. B.

Right shaft sleeve at the edge of brake disc, Fig. C

Right shaft sleeve at the edge of chain wheel, Fig. D

#### Disassembly:

Side of brake disc of right shaft sleeve (9) (Fig. C), side of chain wheel of left shaft sleeve (11) (Fig. D).



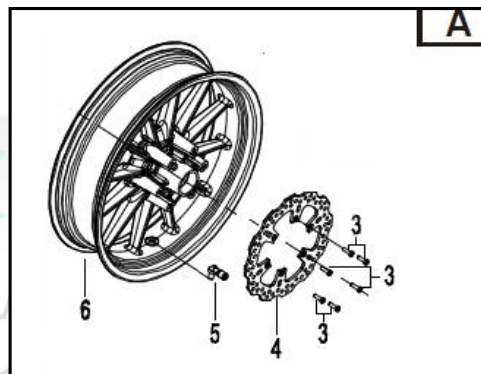
## Rear wheel and rear brake disc

### Disassembly of rear brake disc of chain wheel

#### Disassembly of brake disc

After removing rear wheel, take down the brake disc.  
Loosen 6 fastening screws (3), and take down brake disc (4)

Fig. A

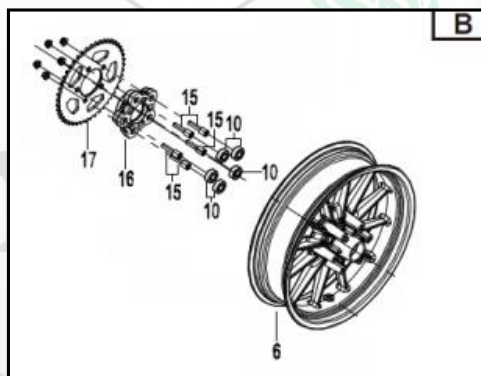


#### Disassembly of chain wheel:

After removing rear wheel, disassemble chain wheel (17), Fig. B

Disassemble 5 fastening nuts, and separate chain wheel from chain wheel hub (16).

Separate chain wheel hub (16) from screw (15) and rear wheel cushion cover (10).



#### Check:

Chain wheel hub

If there is crack / damage, please replace

Rear wheel cushion cover

If there is crack / damage, please replace



## Rear wheel and rear brake disc

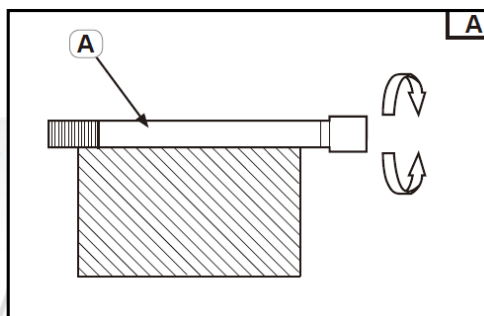
### Check of rear wheel and rear wheel shaft

#### Check:

Rear wheel shaft

Roll rear wheel shaft A at flat surface, Fig. A

If there is any bending, please replace.



#### Warning

If the rear wheel shaft is bent, do not try to straighten it in a forced way

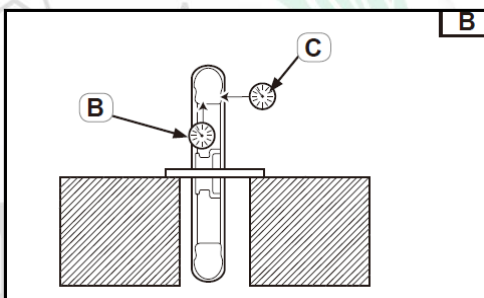
#### Check:

Rear wheel

Please refer to "Chapter III Check of front and rear tyres"

Rear wheel

If there is any bending, please replace



#### Measurement:

Radial run-out of wheel B. Fig. B

Axial run-out of wheel C. Fig. B

If it exceeds the specified limit, please replace



Run-out	Limit
Longitudinal	0.05mm
Lateral	0.05mm



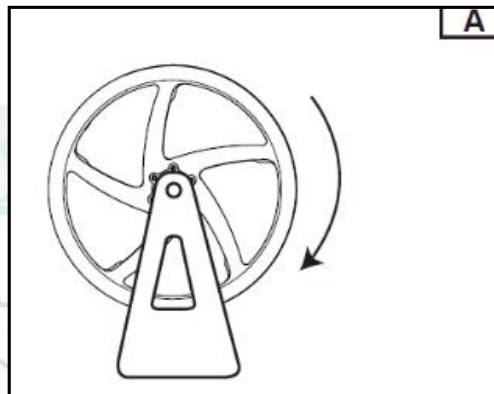
## Rear wheel and rear brake disc

### Check / replacement of rear wheel bearing

#### Check:

Wheel bearing

If the rear wheel rotates irregularly or it is loosened, please replace wheel bearing

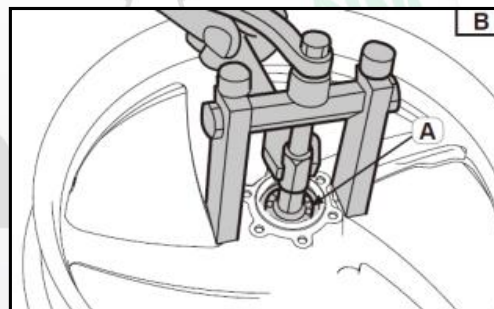


#### Replacement:

Wheel bearing

Disassemble the bearing from wheel A using general bearing remover. Fig. B

Install new wheel bearing in inverse order to disassembly.

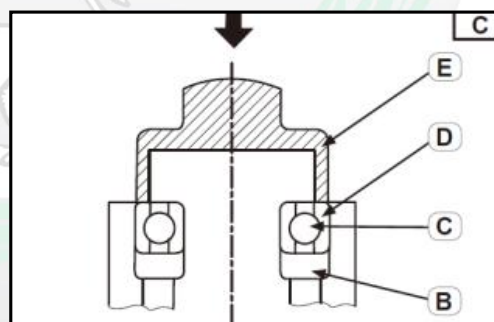


#### Important

When pressing bearing, do not touch inner ring B or the ball bearing C of wheel. Only contact the outer seat D of bearing, Fig. C

#### Note

The wrench should be suitable for the diameter of the outer side D of wheel bearing, Fig. C



## Rear wheel and rear brake disc

### Static balance adjustment of rear wheel

Note:

- After replacing outer tyre, wheel rim or the both, regulate the static balance of front wheel.
- When adjusting the static balance of front wheel, the brake disc should be installed properly.

### Adjustment

Please refer to “Static balance adjustment of front wheel”



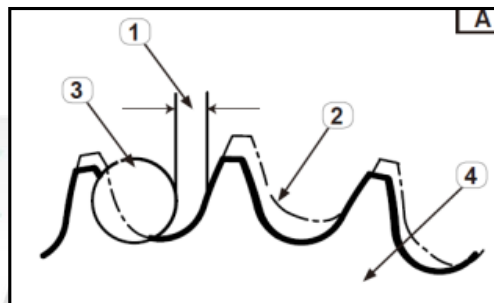
## Rear wheel and rear brake disc

### Check and replacement of chain wheel

#### Check: Chain wheel

If more than 1/4 of each tooth has been worn, replace chain wheel.

If the tooth is bent, replace chain wheel.



#### Replacement of chain wheel:

After disassembling rear wheel, take down chain wheel, as described in the above section.

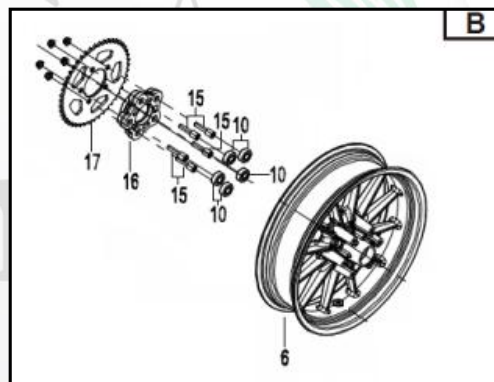
#### Replacement:

Wipe the dust at the surface of chain wheel seat (16) with clean cloth, especially the surface in contact with chain wheel.

Insert 5 fastening bolts (15), and tighten the self-locking nuts to the following torque.



Torque 45N\*m



#### Note

Fasten self-locking nuts in steps by crossed sequence.

## Rear wheel and rear brake disc

### Assembly of rear brake disc

#### Brake disc:

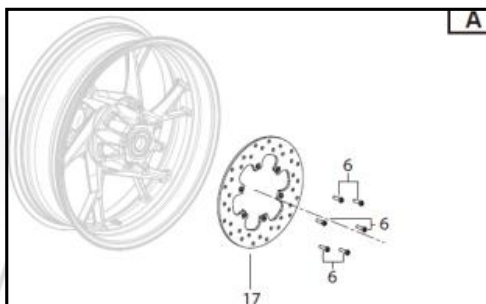
After disassembling rear wheel, take down brake disc, as described in the above section.

Wipe the dust at the surface of wheel hub with clean cloth, especially the surface in contact with brake disc.

#### Assembly:

Brake disc (17) and 6 screws (6), Fig. A

Use thread sealant at the end of thread



Tighten the fastening screws to the following torque:



Torque 10N\*m

#### Note

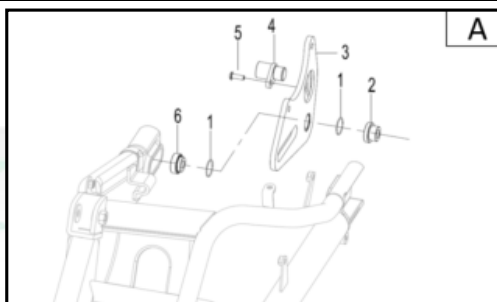
Fasten screws in steps by crossed sequence.

## Rear wheel and rear brake disc

### Assembly of rear wheel

#### Assembly:

Preassemble support, connecting plate (3), and install speed sensor (4) and screws (5).



Insert the shaft sleeve (11) into the side of chain wheel, and insert the shaft sleeve (2) to brake disc, Fig. B



Insert the chain tensioner adjusting device to the side of chain wheel, and insert the rear wheel to the side of brake disc, Fig. C

#### Assembly: Rear wheel

Lubricate and assemble:

Rear wheel shaft (14)

Fasten nut (1) to the following torque, Fig. D



Torque 140N\*m

Assembly: Brake cylinder, and respectively fasten screws to the following torque:



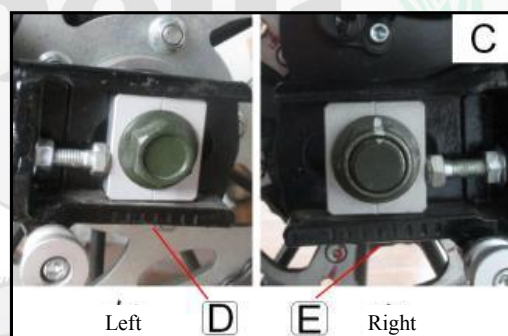
Torque 25N\*m

#### Note

Install the calipers on the relevant brake disc, ensure that there is enough space between two brake shoes.

#### Important

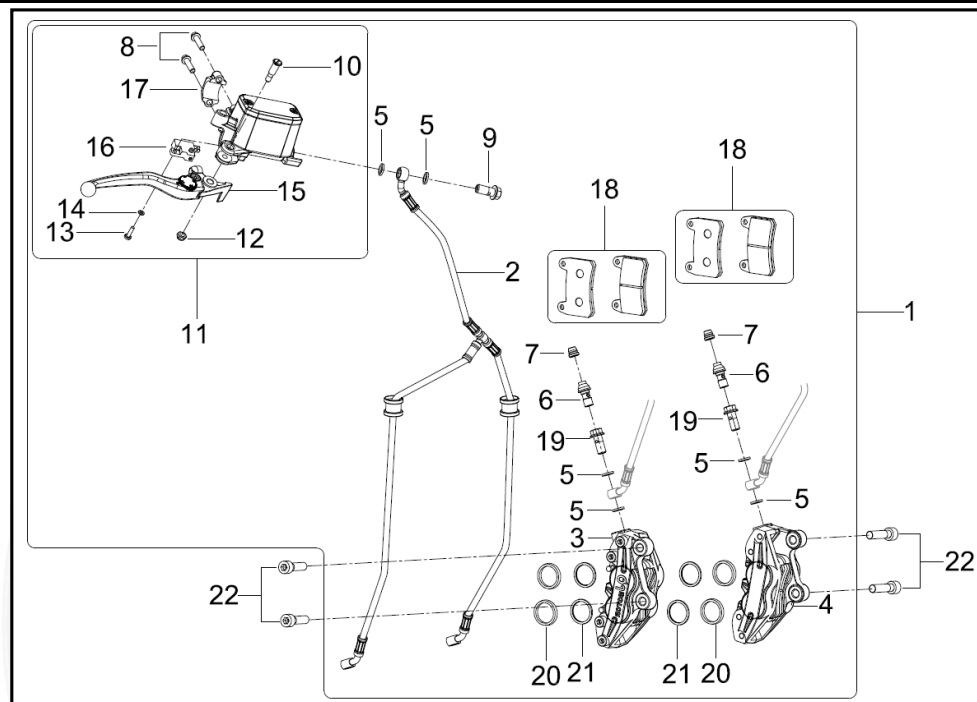
Ensure that the path of brake hose is correct.





## Front and rear brakes

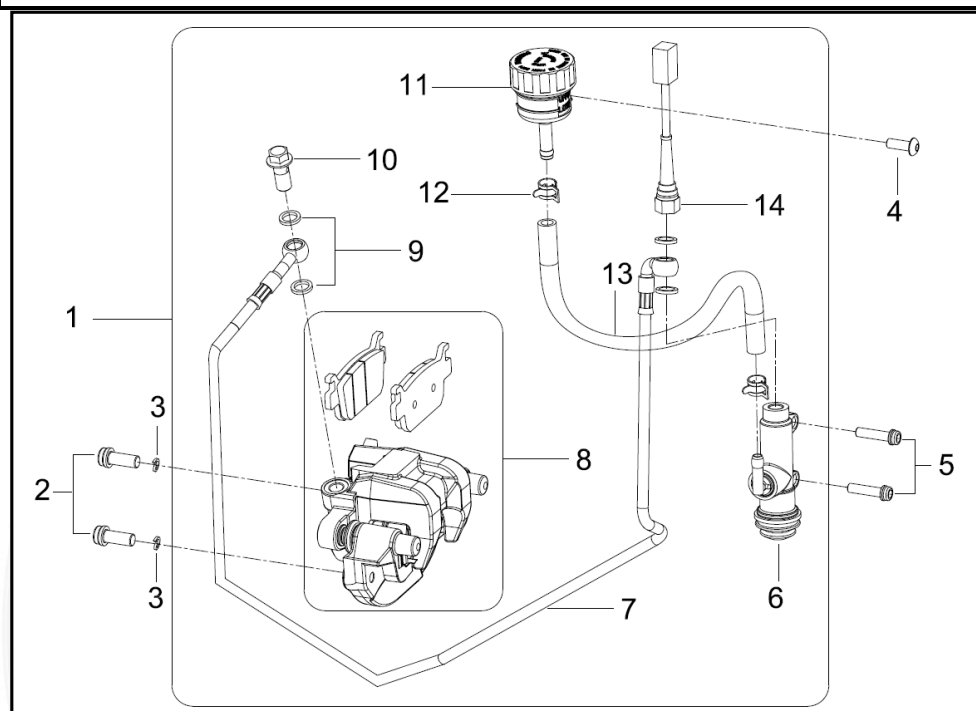
Front brake



No.	Name	Quantity	No.	Name	Quantity
1	Front hydraulic brake components	1	12	Nut M6	1
2	Front brake hose assembly	1	13	Button head screw M4×12	1
3	Front right brake cylinder components	1	14	Gasket 4	1
4	Front left brake cylinder components	1	15	Front hydraulic brake handle components	1
5	Gasket	6	16	Brake switch components	1
6	Valve	2	17	Fixing cover	1
7	Dust cover of valve	2	18	Brake shoe components (including two)	4
8	Bolt M6×23	2	19	Oil pipe mounting bolt	2
9	Hexagon flange bolt	1	20	Square seal ring A	4
10	Handle screw	1	21	Square seal ring B	4
11	Oil pump components	1	22	Socket head cap screw M10×1.25×40	4

## Front and rear brakes

Rear brake



No.	Name	Quantity
1	Rear hydraulic brake components	1
2	Bolt M8×1.25×25	2
3	Spring gasket φ8	2
4	Screw M6×20	1
5	Bolt M6×30	2
6	Rear brake pump	1
7	Rear brake hose	1
8	Rear brake cylinder components	1
9	Sealing spacer	4
10	Bolt	1
11	Oil cup	1
12	Brake shoe components	1
13	Oil pipe	1
14	Brake light switch	1

## Front and rear brakes / front brake shoe

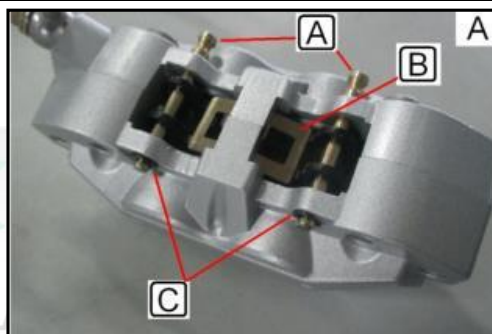
### Disassembly and assembly of front brake shoe

#### Disassembly

Disassemble closing ring C with circlip pliers and then disassemble the locating pin A used for fixing brake shoe, Fig. A

#### Note

When pulling out pin A, press safety spring B, Fig. A

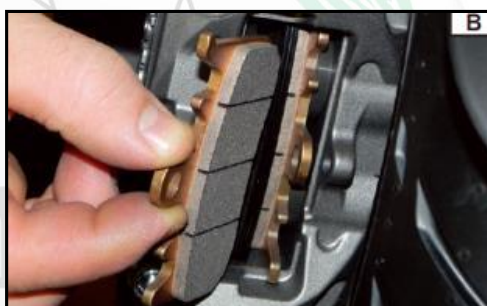


Disassemble worn brake shoe, Fig. B

#### Measurement:

Wear limit of brake shoe

If it exceeds the specifications, please replace the brake shoes in pairs



Brake discs	Standard	Lower wear limit
Front brake disc	7.8mm	3.8mm

**Assembly:** Continue to assemble in inverse order to disassembly.

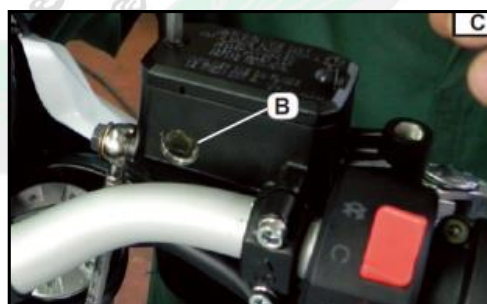
**Check:** Brake fluid level B, Fig. C

If it is lower than the minimum notch, add a sufficient amount of recommended brake fluid, until it reaches the correct fluid level.

#### Check:

Operation of brake handle

If brake handle is soft or light, exhaust the air in the brake circuit.



Front and rear brakes / rear brake shoe

Disassembly and assembly of rear brake shoe

Disassembly

Disassemble two fastening screws A from brake cylinder, Fig. A.  
Disassemble bolt B from brake caliper, and rotate brake caliper E towards the direction C.



Taking out: Brake shoe D, Fig. B

Measurement: Wear limit of brake shoe.  
If it exceeds the specifications, please replace the brake shoes in pairs



Brake discs	Standard	Lower wear limit
Rear brake disc	7.0mm	3.7mm

Assembly:

Continue to assemble in inverse order to disassembly.  
Fastening bolt B to the following torque:



Torque 25N\*m

Check:

Brake fluid level B, Fig. C  
If it is lower than the minimum notch, add a sufficient amount of recommended brake fluid, until it reaches the correct fluid level.

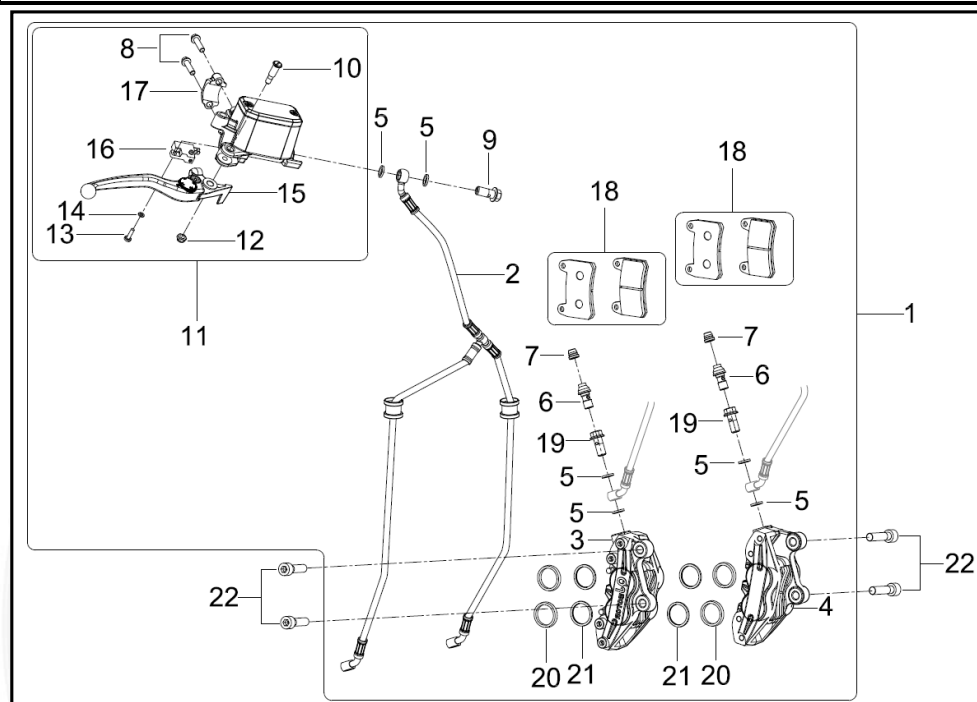
Check:

Operation of brake pedal  
If brake pedal is soft or light, exhaust the air in the brake circuit.



## Front and rear brakes / front brake

Front brake



No.	Name	Quantity	No.	Name	Quantity
1	Front hydraulic brake components	1	12	Nut M6	1
2	Front brake hose assembly	1	13	Button head screw M4×12	1
3	Front right brake cylinder components	1	14	Gasket 4	1
4	Front left brake cylinder components	1	15	Front hydraulic brake handle components	1
5	Gasket	6	16	Brake switch components	1
6	Valve	2	17	Fixing cover	1
7	Dust cover of valve	2	18	Brake shoe components (including two)	4
8	Bolt M6×23	2	19	Oil pipe mounting bolt	2
9	Hexagon flange bolt	1	20	Square seal ring A	4
10	Handle screw	1	21	Square seal ring B	4
11	Oil pump components	1	22	Socket head cap screw M10×1.25×40	4



## Front and rear brakes / front brake

### Assembly of front brake pump

#### Assembly:

Conduct the operations according to the following steps

#### Warning

Before assembly, wash all internal parts of brake, and lubricate using clean or new brake fluid.

Do not apply any solvent on the internal parts of brake.

Assemble brake light switch by tightening screw (13) and gasket (14) to pump. The torque is as follows:



Torque 1.5N\*m

Insert the X connector of front brake switch (16), Fig. A

Assemble special screw (9) and related gasket (5) to front brake hose and connect it to pump.

Fasten screw to the following torque:



Torque 26N\*m

#### Warning

To ensure the safety of motorcycle, the path of brake hose must be correct.

Tighten nut (12) and fastening screw (10) to the following torque, and assemble the front brake handle (15):



Torque 7N\*m

Assemble support (17) to handle, and tighten two fastening screws (8) to the following torque, first upper one and then lower one;

#### Note

Brake pump bracket assembly, "UP" toward the arrow, A, Figure B

#### Note

Upon completion of these operations, add a little brake fluid. See Chapter 3, "checks and pre-maintenance", "front brake fluid check / add a little



Torque 8N\*m

#### Note

Assemble brake pump support, make "UP" toward the arrow, A, Fig. B

#### Note

Upon completion of these operations, add a sufficient amount of brake fluid. See Chapter III "Checks and early maintenance", "Check / adding of front brake fluid".





## Front and rear brakes / front brake

### Fastening of front brake cylinder

**Disassembly:** The following procedures are applicable to two brake cylinder.

#### Note

Before disassembling brake cylinder, drain the brake fluid in the brake circuit. Before disassembling brake cylinder, drain the brake fluid in the brake circuit.

#### Separation:

Special screw (19) and seal gasket (5), Fig. A  
Disassemble rear brake hose.

#### Note

Insert the end of brake hose into a container, and then slowly pull it out to drain all brake fluid. Disassemble two calipers, and release the fastening screw A at front fork, Fig. B

#### Separation:

Brake cylinder piston B, Fig. C

Piston gasket E on brake cylinder (first the smallest oil seal - washer, followed by the seal ring – large gasket)

Fix the piston at brake cylinder using a large piece of wood, Fig. D

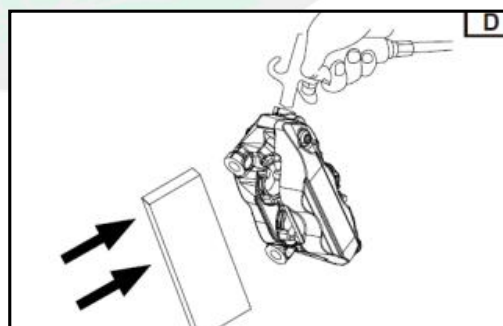
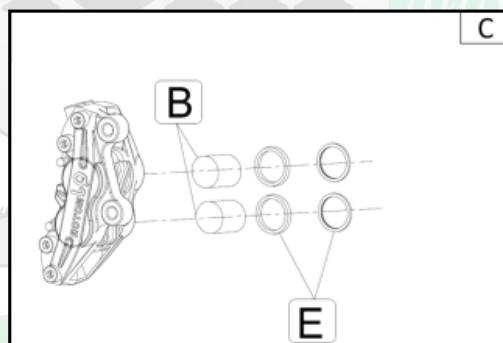
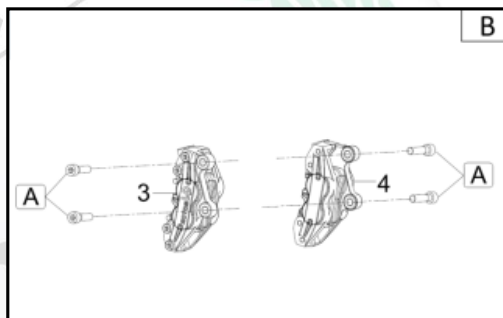
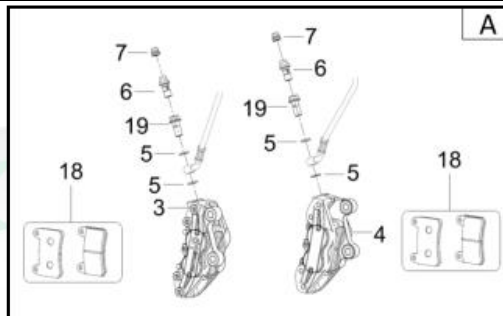
Blow the compressed air into brake cylinder connectors to extrude the piston of brake cylinder, Fig. D

#### Warning

Do not try to open the piston of calipers

Disassemble the seal ring of piston from brake cylinder.

Repeat the same steps to extrude the piston at the right of brake cylinder, Fig. D



## Front and rear brakes / front brake

### Assembly of front brake cylinder

Disassembly: The following steps are applicable to two brake cylinders.

#### Warning

Before assembly, wash all internal parts of brake, and lubricate using clean or new brake fluid.

Do not apply any solvent on the internal parts of brake, because solvent may cause piston gasket to swell or bend.

Replace piston gasket when disassembling brake caliper each time.

#### Assembly:

Install piston gasket E on brake caliper, Fig. A (first the smallest oil seal - washer, followed by the seal ring – large gasket)

Brake caliper piston B, Fig. A

Assembly: Tighten fastening screws A to front fork using two calipers, Fig. B, according to the following torque:



Torque 45N\*m

Front brake hose, Fig.

Seal gasket (5)

Special screw (19)

#### Note

Tighten the special screws, fasten them with a torque wrench twice, and tighten it to the following torque



Torque 26N\*m

#### Warning

To ensure the safety of motorcycle, the path brake hose must be correct.

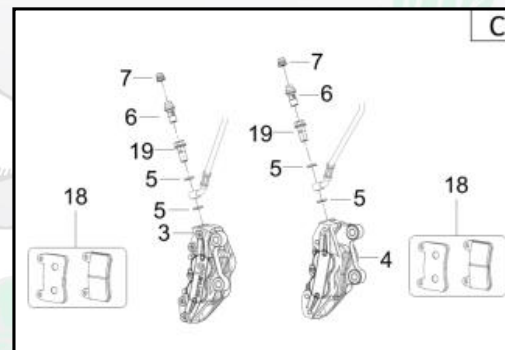
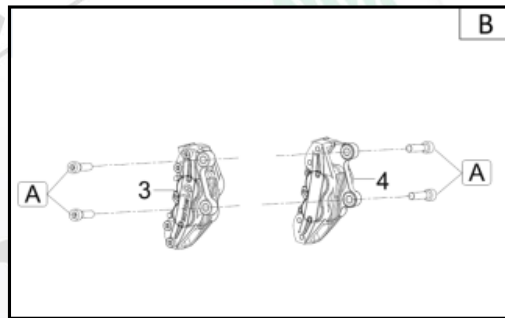
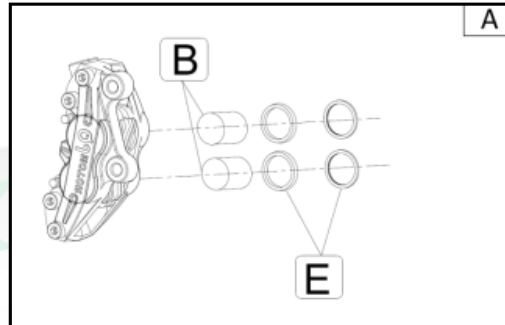
Filling: brake fluid container

#### Warning

Use only the specified brake fluid. Rubber seal ring may be damaged when using other types of brake fluid, resulting in leakage and reducing brake performance.

Use the brake fluid with the same brand when filling brake fluid. The mixture of brake fluid with different brands should not be used, because this may cause a dangerous chemical reaction, and reduce brake performance.

When adding brake fluid, be careful not to let any water into the container. Water will significantly reduce the boiling point of the fluid and lead to the formation of steam bubbles.



## Front and rear brakes / front brake

### Assembly of front brake cylinder

#### Important

Brake fluid may damage painted surfaces and plastic parts. Clean up spilled brake fluid.

#### Emptying:

Brake circuit

#### Check:

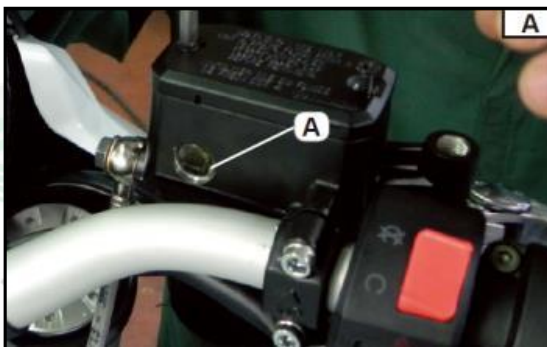
Check the brake fluid level, A, Fig. A

If it is lower than the minimum notch, add a sufficient amount of recommended brake fluid.

#### Check:

Operation of brake handle

If brake handle is soft or light, exhaust the air in the brake circuit.

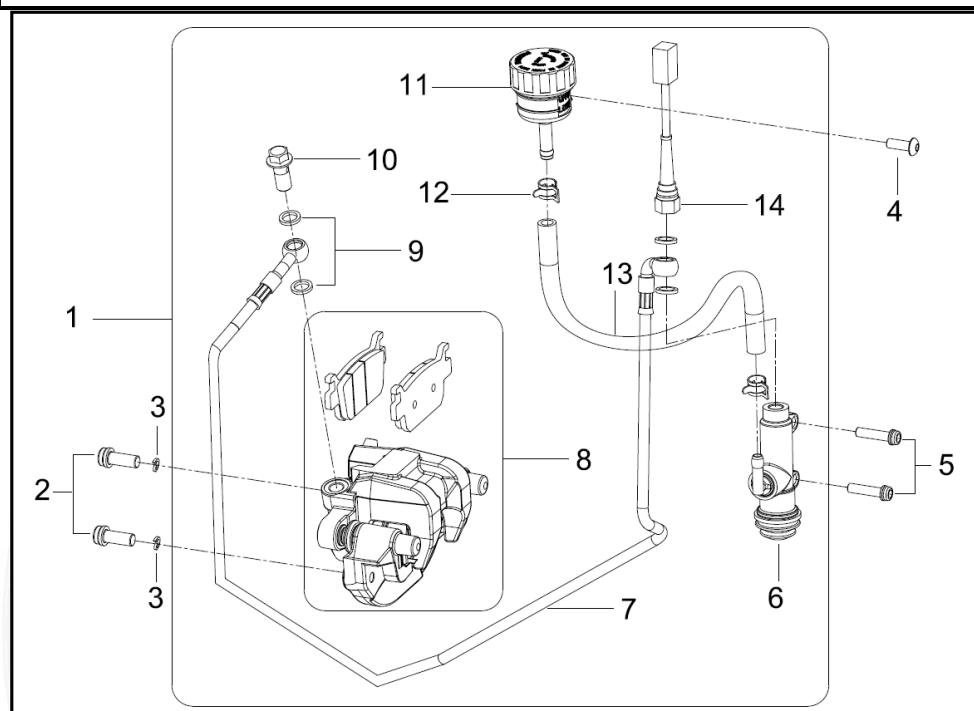


# Benelli



## Front and rear brakes / rear brake

Assembly of rear brake pump



No.	Name	Quantity
1	Rear hydraulic brake components	1
2	Bolt M8×1.25×25	2
3	Spring washer φ8	2
4	Screw M6×20	1
5	Bolt M6×30	2
6	Rear brake pump	1
7	Rear brake hose	1
8	Rear brake cylinder components	1
9	Sealing spacer	4
10	Bolt	1
11	Oil cup	1
12	Brake shoe components	1
13	Oil pipe	1
14	Brake light switch	1

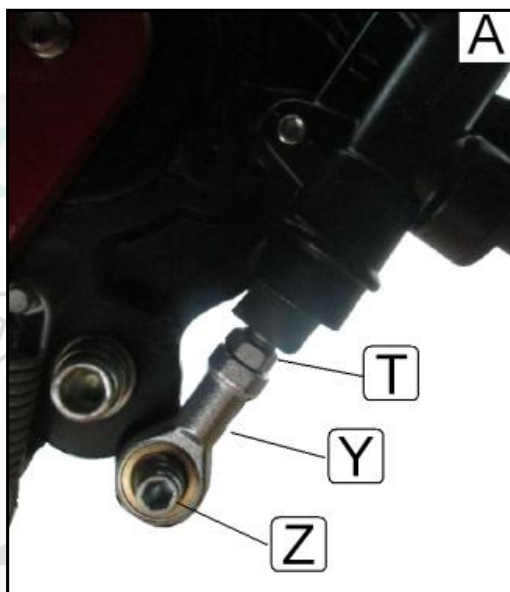
## Front and rear brakes / rear brake

### Assembly of rear brake pump

Assembly: Assemble according to the

following order:

Install connector (Y) at brake control lever (T),  
fasten connector (Y) to brake foot lever, Fig. A



Tighten fastening screw (x) on brake pump (6), Fig. B, to the following torque:

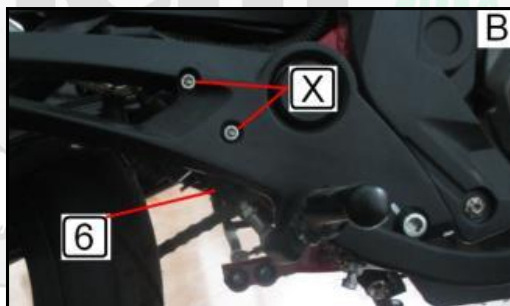


Torque 10N\*m

Connect rear brake caliper and related gaskets to rear brake hose and brake pump. Tighten rear brake caliper to the following torque:



Torque 26N\*m



### Warning

To ensure the safety of motorcycle, the path brake hose must be correct.



## Front and rear brakes / rear brake

### Rear brake cylinder

#### Disassembly

##### Note

Before disassembling brake cylinder, drain the brake fluid in the brake circuit.

##### Separation

Special screw A and gasket B, Fig. A  
Disassemble rear brake hose.

##### Note

Disassemble brake cylinder, and release the fastening screw at the supporting plate of brake cylinder

##### Separation:

Brake cylinder piston B, Fig. B

Spacer C

Piston gasket on brake cylinder (first the smallest oil seal - washer, followed by the seal ring – large gasket)

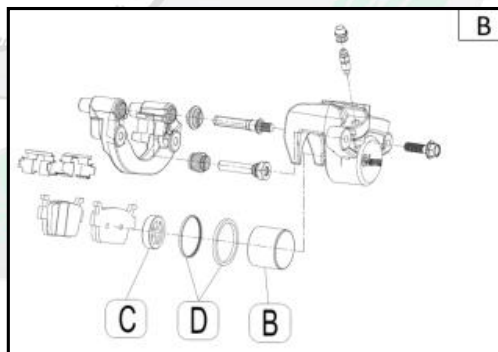
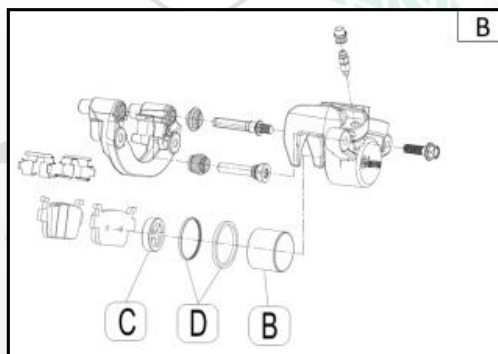
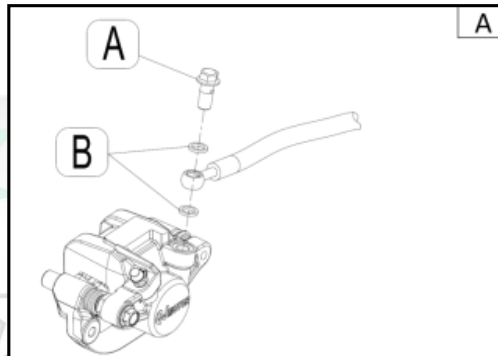
Support the piston at brake cylinder using a piece of wood, Fig. D

Blow the compressed air into brake hose connectors to extrude the piston at the right of brake cylinder, Fig. C

##### Warning

Do not try to open the piston of brake cylinder

Disassemble the seal ring of piston from brake cylinder. D



## Front and rear brakes / rear brake

### Check of rear brake cylinder

#### Check:

Brake cylinder piston

If there is rust / patterns / sign of wear, replace the brake cylinder piston.

Brake cylinder

If there is pattern / sign of wear, replace the entire brake cylinder.

Main brake cylinder body

If there is crack / damage, replace the entire brake cylinder.

Brake fluid conveying pipe (main brake cylinder body)

If there is an obstacle, clean with a surge of compressed air.

Dust-proof boot

If there is any crack / sign of wear, replace the dust-proof boot.

#### Important

Replace piston gasket when disassembling brake cylinder.

#### Check:

Connectors at rear brake cylinder support and rear wheel fork.

If there is any rust / sign of wear, please replace.

## Front and rear brakes / rear brake

### Assembly of rear brake cylinder

Assembly:

#### Warning

Before assembly, wash all internal parts of brake, and lubricate using clean or new brake fluid.

Do not apply any solvent on the internal parts of brake, because solvent may cause piston gasket to swell or bend.

Replace piston gasket when disassembling brake caliper each time.

#### Assembly:

Install piston gasket D on brake caliper, Fig. A (first the smallest oil seal - washer, followed by the seal ring – large gasket)

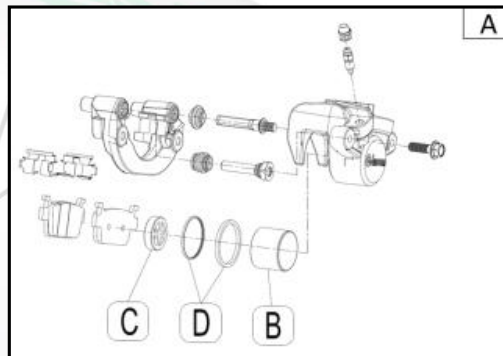
Insulator C, Fig. A

Brake caliper piston B, Fig. A

Assembly: Tighten fastening screws A to caliper supporting plate using caliper according to the following torque:



Torque 22N\*m



Front brake hose, Fig.

Seal gasket B, Fig. B

Special bolt A, Fig. B

#### Note

Tighten the special bolt, and restore the torque twice after relaxing according to the following torque

#### Warning

To ensure the safety of motorcycle, the path brake hose must be correct.

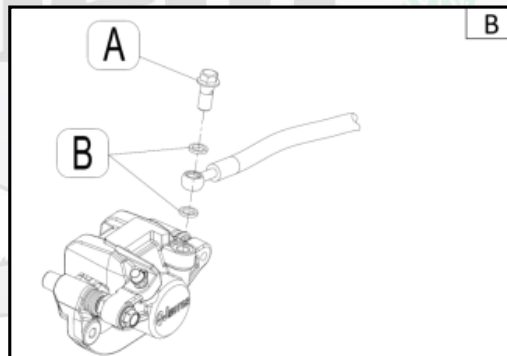
Filling: Oil cup of brake pump

#### Warning

Use only the specified brake fluid. Rubber seal ring may be damaged when using other types of brake fluid, resulting in leakage and reducing brake performance.

Use the brake fluid with the same brand when filling brake fluid. The mixture of brake fluid with different brands should not be used, because this may cause a dangerous chemical reaction, and reduce brake performance.

When adding brake fluid, be careful not to let any water into the container. Water will significantly reduce the boiling point of the fluid and lead to the formation of steam bubbles.



## Front and rear brakes / rear brake

### Assembly of rear brake cylinder

#### Important

Brake fluid may damage painted surfaces and plastic parts. Clean up spilled brake fluid.

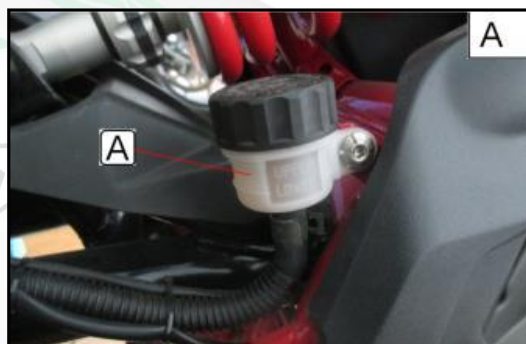
#### Emptying:

#### Emptying:

Brake circuit

#### Check:

Check the brake fluid level, A, Fig. A  
If it is lower than the minimum notch, add a  
sufficient amount of recommended brake fluid.



#### Check:

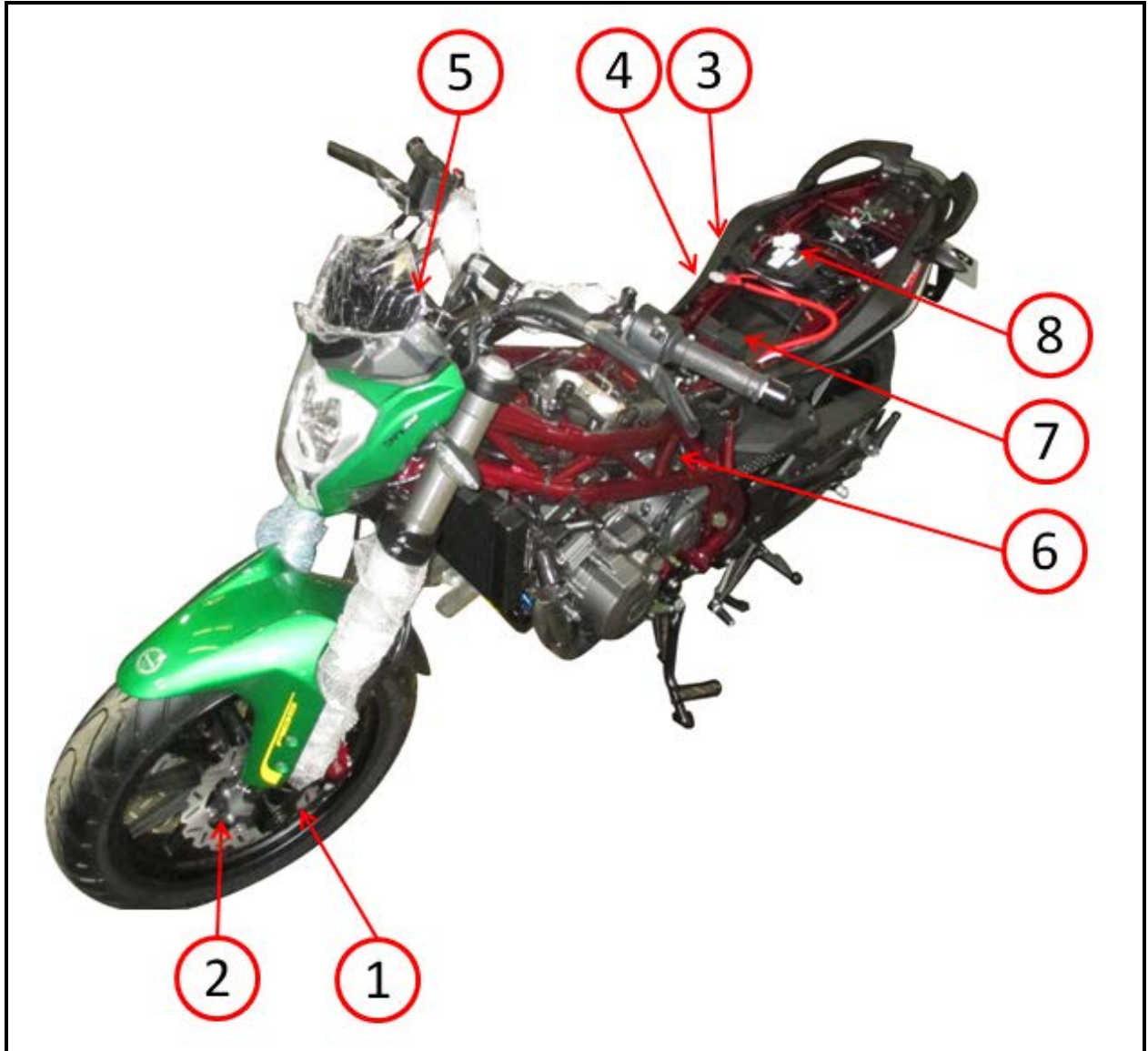
Operation of brake pedal

If brake pedal is soft or light, exhaust the air in the brake circuit.

## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

#### Components Location

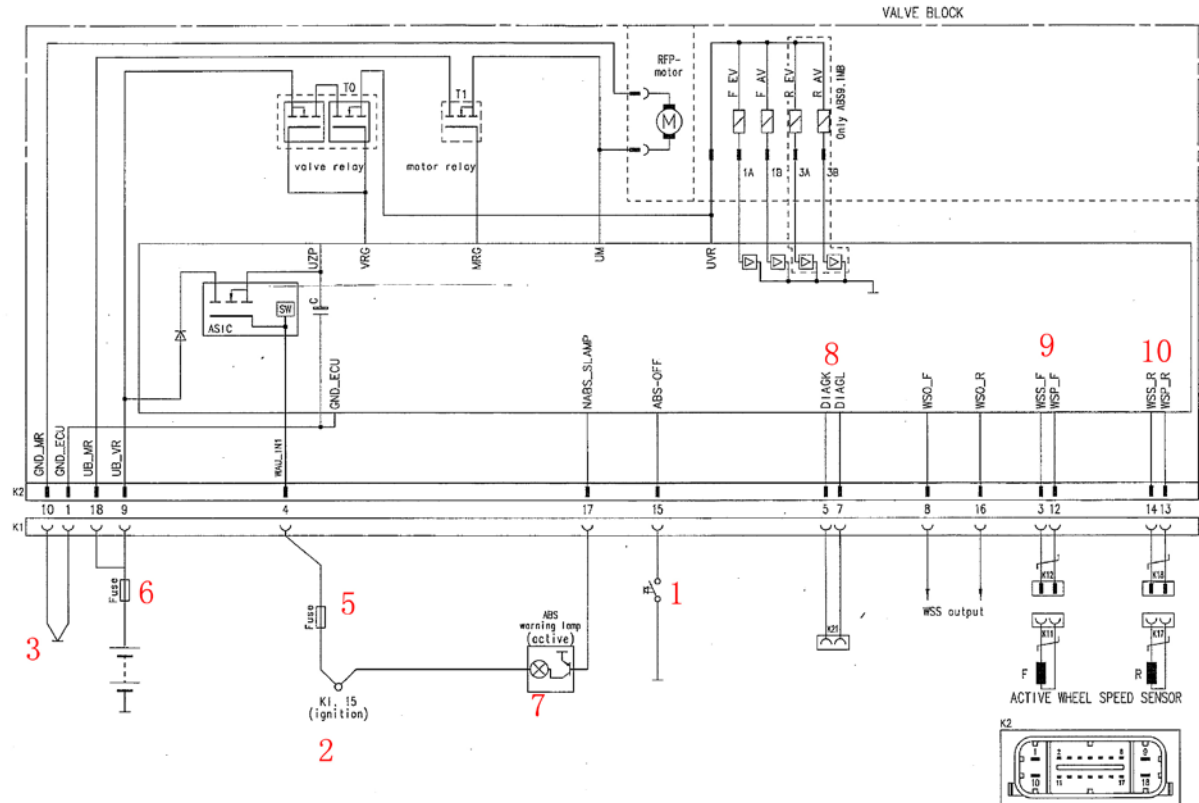


1. Front Wheel Speed Sensor
2. Front Wheel Speed Sensor Rotor
3. Rear Wheel Speed Sensor
4. Rear Wheel Speed Sensor Rotor
5. ABS Indicator (LED)
6. ABS Control Unit
7. ABS Fuse Box
8. ABS Diagnostic Connector

# Anti-lock Brake System (Equipped Models)

## Anti-lock Brake System ABS

### ABS System Wiring Diagram



1. ABS Switch
2. Main switch
3. Ground
5. Fuse
6. ABS Fuse (40 A)
7. Speedometer
8. ABS Diagnostic System connector
9. Front Wheel Speed Sensor
10. Rear Wheel Speed Sensor

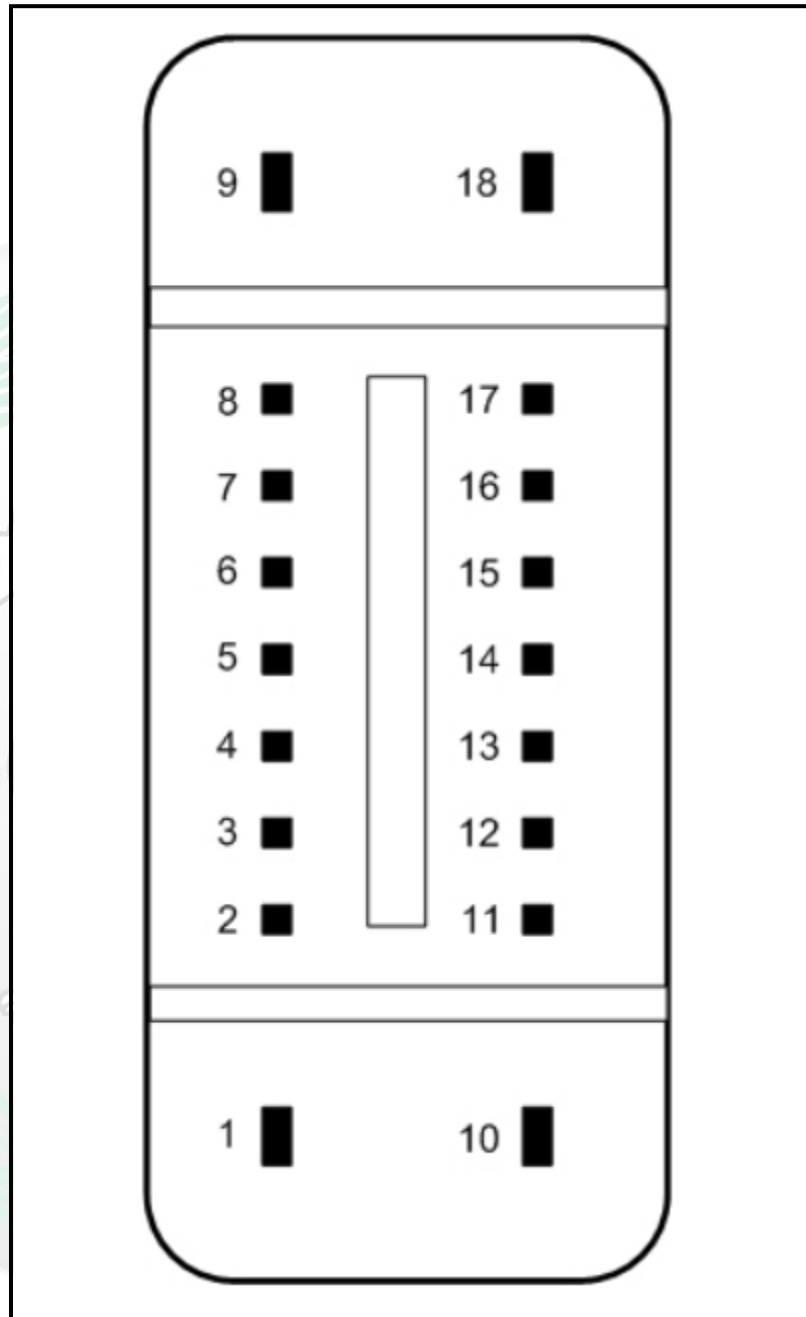


## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

#### Pin Description

1. GND\_ECU
2. CAN1P
3. WSS\_F
4. WAU\_IN1
5. DIAGK
6. BLS - input\_PD -SW2H\_NO
7. DIAGL
8. WSO\_F
9. UB\_VR
10. GND\_MR
11. CAN1M
12. WSP\_F
13. WSP\_R
14. WSS\_R
15. ABS\_OFF -input\_PU -SW2L\_NO
16. WSO\_R
17. NABS\_SLAMP
18. UB\_MR



## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

There are several precautions that should be followed when servicing ABS system.

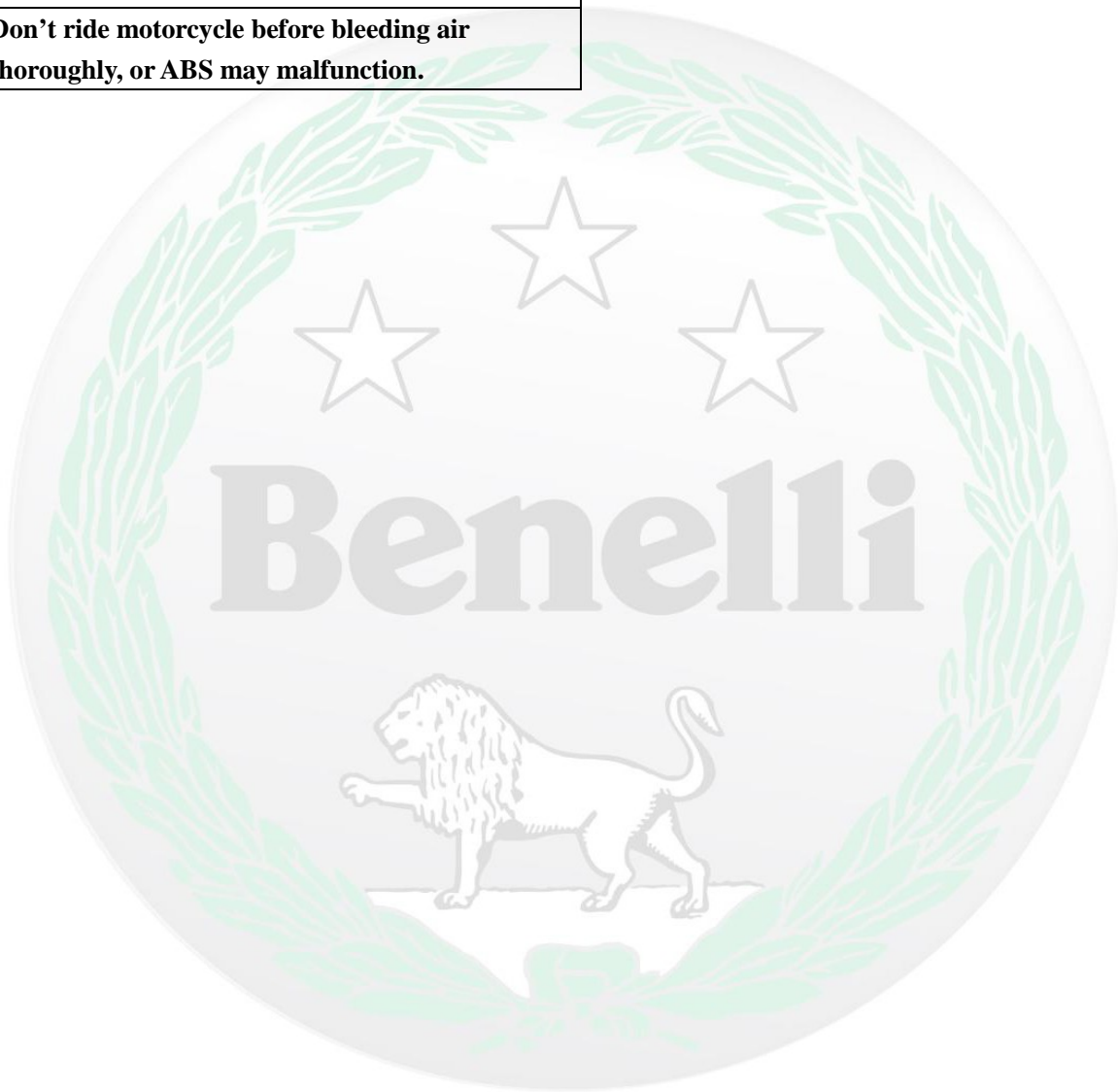
- The power of ABS system should be supplied by 12V sealed battery. Don't use any other batteries.
- Don't connect the batter cable reversely, or the ABS hydraulic control unit system will be damaged.
- Don't disconnect the batter cable or other electric components when the main switch is on or engine is working to avoid damaging of ABS components.
- Don't short circuit the battery positive electrode (+) with chassis ground.
- Don't turn the main switch ON when ABS electric components are disconnected. ABS control unit will memorize the diagnostic trouble code.
- Don't spray water to electric components, ABS components, connectors, leads and wirings.
- Please make sure the ABS system will not be affected by transceiver equipped in the motorcycle. The antenna should be located as far as possible from the ABS control unit.
- Turn off the main switch before disconnecting ABS electric components.
- Never hit ABS components with hammer or let ABS components fall on hard surface. These kinds of shock may damage the ABS components.
- Don't disassemble or try to repair ABS components even the ABS is malfunctioning. Please replace the ABS components directly.
- There are lots of brake tubes and wires in ABS system. ABS system cannot detect the conventional brake system malfunction (bake disc worn out, uneven brake shoes worn out, other mechanical problems). In order to avoid problems, please check the brake tube for right connecting, the wiring for right layout, the brake system for normal brake performance. Please check if any leakage of brake fluid. Make sure air is bled thoroughly.



**If any brake tube connecting parts including ABS hydraulic control unit bolts or air bleeding bolts are removed, the air in brake tube should be bled then.**

**Caution**

**Don't ride motorcycle before bleeding air thoroughly, or ABS may malfunction.**



## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

○The ABS indicator (LED) will light when the tyre pressure is wrong, non-recommended tyre is assembled or rim deformed. Please repair the ABS system and delete the diagnostic trouble code.

**Equipping non-recommended tyres will resulting in ABS malfunction and prolong braking distance, accidents may occur in the worst condition. Therefore, please use recommended standard tyres in this motorcycle.**

○If the engine is running and engaged in gear when the motorcycle is supported by bike stand, the ABS indicator (LED) will on. Please turn off the switch and clear the ABS diagnostic trouble code. (Front Wheel Speed Sensor malfunction).

○ABS will make noise when it works, riders can feel the reacting force of brake lever and brake pedal. This normal condition is to inform the rider that the ABS is operating normally.

○ABS hydraulic control unit will memorize the diagnostic trouble code once any diagnostic trouble code is detected. Delete the diagnostic trouble code every time after the maintenance work finished. Do not erase diagnostic trouble code in trouble shooting processing in order to avoid duplication of previous diagnostic trouble code or dispensable maintenance work.

○Delete ABS system diagnostic trouble codes before delivering vehicle to customers. Make sure ABS indicator will light by using self-diagnosis feature. Fully charge the battery. Test if the ABS indicator will go off when vehicle speed reached above 5km/h. You should have the ABS checked if ABS indicator not go off. At last, test if the vehicle can stop smoothly and the ABS can operate normally by riding the vehicle above 5km/h and brake suddenly (riders can feel reacting force from brake lever and brake pedal). The inspection finished.

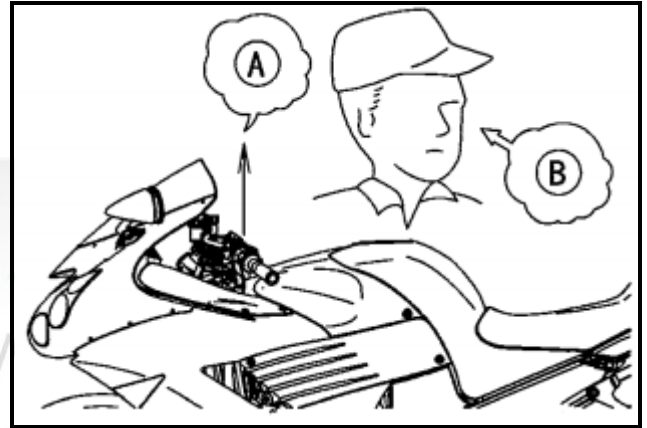


## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

#### ABS troubleshooting overview.

If ABS malfunction, the ABS indicator (LED) will keep on after vehicle speed reached 5km/h to arouse rider's attention. In addition, the diagnostic trouble code will be record in ABS hydraulic control unit [A]. Therefore, the trouble should be deleted after the problems are solved. If the ABS indicator (LED) keep on, figure the problem out thoroughly then repair it. Consult the driver the condition when the problem occurred [B], then try to figure the problem out[C]. Don't rely on the ABS diagnostic system completely, use common sense at the same time. Such as: check the brake fluid level, check brake performance, check brake fluid leakage, etc.



In below condition, ABS indicator (LED) will on even the ABS operates well. Turn the main switch off to stop the ABS indicator on.

Riding on rough road continually.

Keep the engine working and rear wheel rotating when vehicle supported by bracket and engine engaged in gear.

Accelerate abruptly and let front wheel leave ground.

When ABS interfered by strong electric signal.

When the tyre pressure is incorrect. Please adjust the tyre pressure.

When the vehicle equip non-standard tyre. Please use standard tyre.

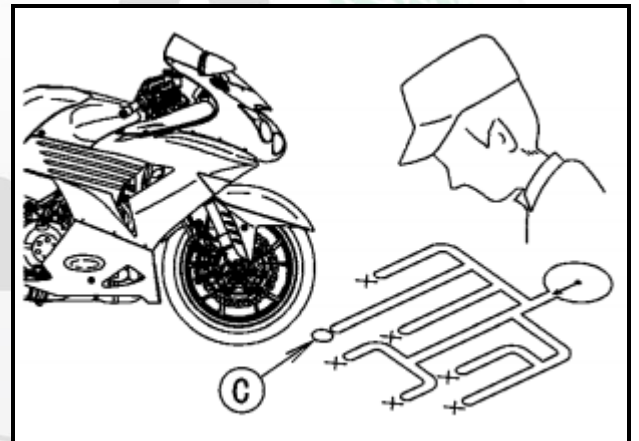
When rims deformed. Please replace the rims.

Majority of ABS troubleshooting work need to confirm if the electric circuit works well. It is unnecessary to disassemble or repair ABS components as ABS components are assembled and adjusted well by suppliers. But sometimes may need replace ABS hydraulic control unit.

Troubleshooting procedure are as follow:

- Preliminary inspection.
- Troubleshooting with ABS diagnostic tool.
- Troubleshooting with multimeter to check ABS hydraulic control unit connector or wiring.

**Special tool: Multimeter:**





## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

●Visually check if any burning or worn out of wires.

★Replace the wire if any broken.

●Disconnect each connectors, check for rust, contamination or broken.

★Clean the connector if it is rusty or contaminated.

Replace the connector if it is broken.

●Check if the wiring is normal.

○Search for the two ends of suspected malfunctional wire with wiring diagram.

○Connect multimeter with the two ends.

#### Special tool—Multimeter:

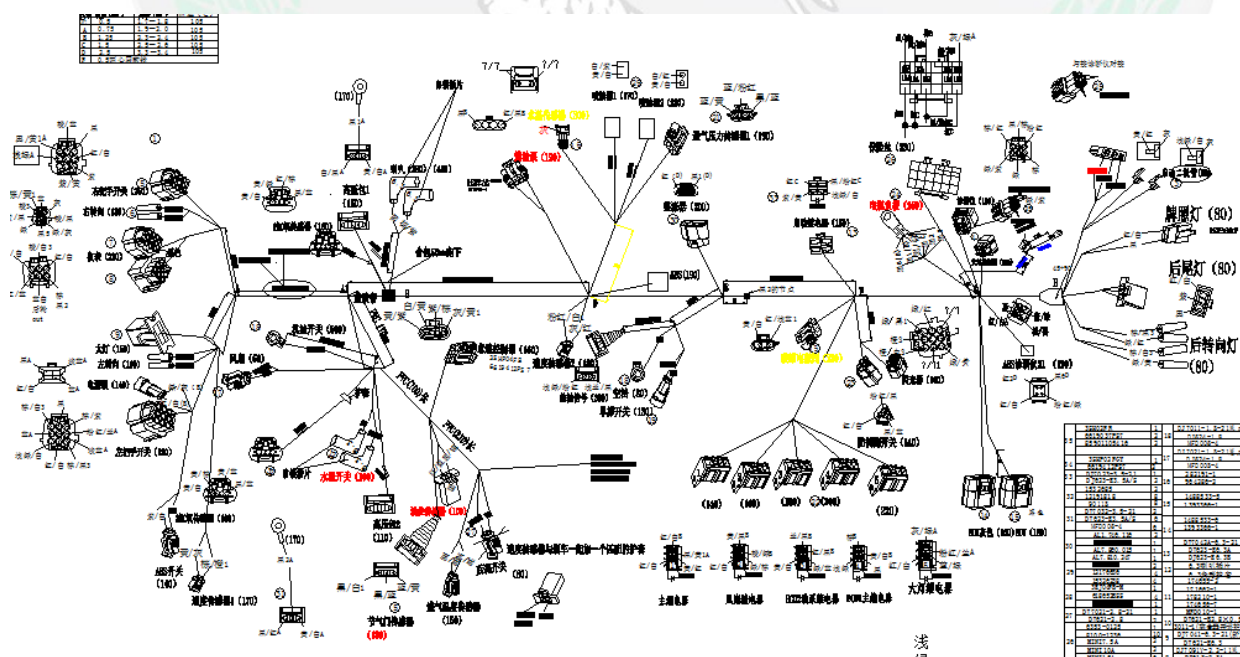
○Set the multimeter range in  $\times 1 \Omega$  and read the multimeter reading.

★The wire is broken if the multimeter reading is not  $0\Omega$ . Replace the wiring harness if necessary.

●Reducing suspicious parts by checking wiring repeatedly, check the ABS component then.

★The ABS components may malfunction if all wires and connectors are normal. Need check one by one.

★Replace ABS components if any abnormal detected.

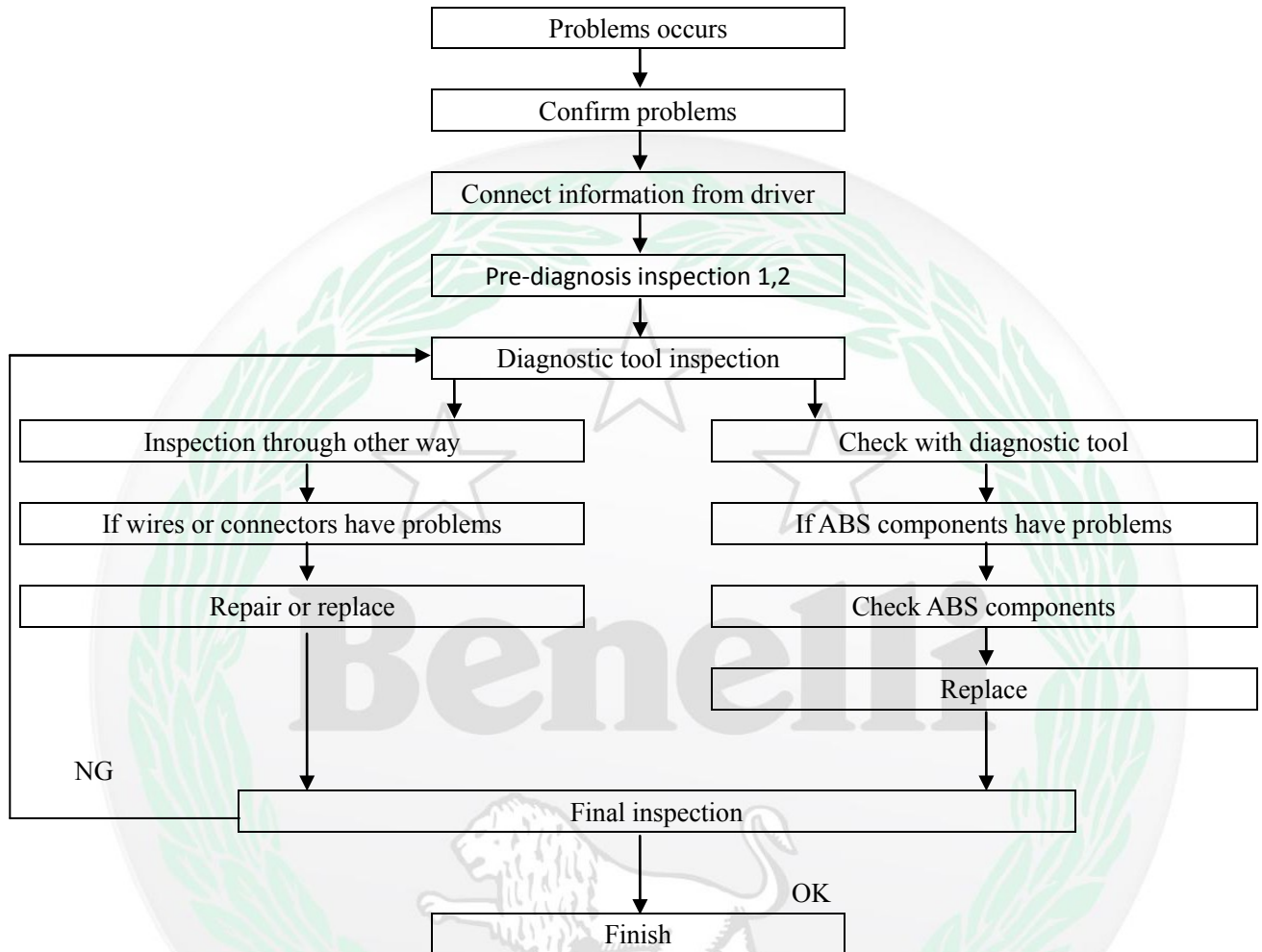




## Anti-lock Brake System (Equipped Models)

### Anti-lock Brake System ABS

ABS Diagnosis flow chart.



## Anti-lock brake system (Equipped model)

### Anti-lock brake system

#### Gather info from rider

- Check which problems the rider encountered.
- Check in which conditions the problems happened?
- Diagnosis chart can help to check any key points of the problems, so it is necessary to use diagnosis chart.

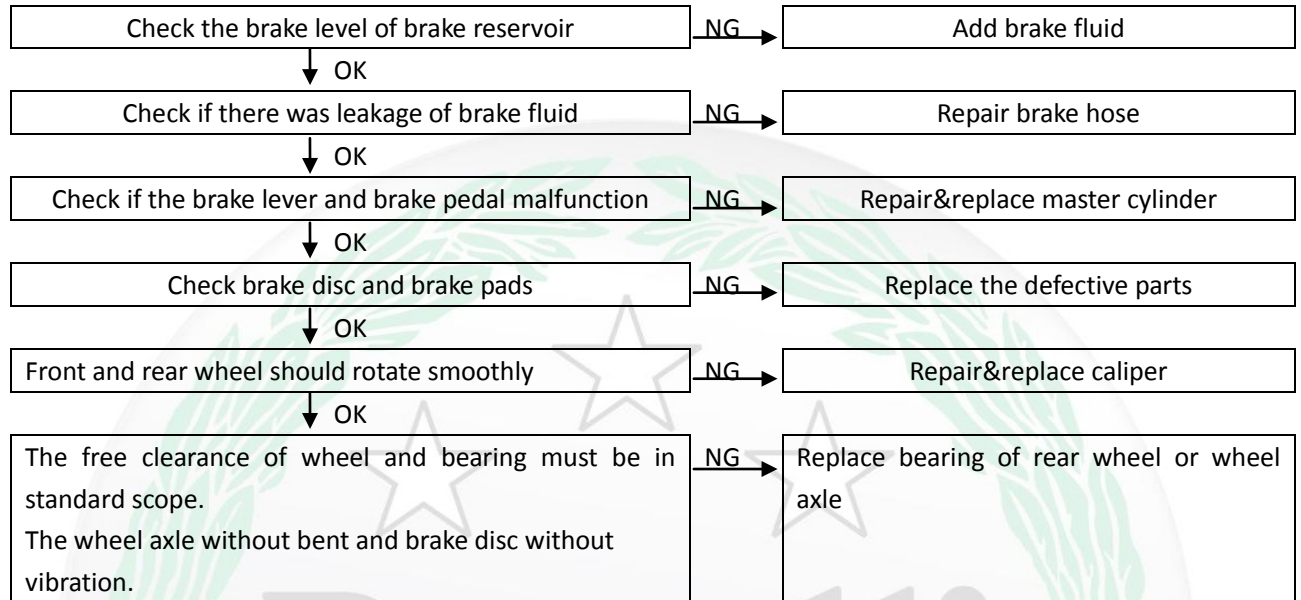
#### Diagnosis chart

Name of rider:				License plate:			
Register year:				Model:			
Engine NO.:				VIN:			
Date:				Frequency:			
Weather:				Mileage:			
Phenomenon	<input type="checkbox"/> Brake level vibration or noisy	<input type="checkbox"/> Indicator blink	<input type="checkbox"/> Brake distance too long	<input type="checkbox"/> Brake level free play abnormal	<input type="checkbox"/> ABS Malfunction	<input type="checkbox"/> ABS running, indicator OFF	<input type="checkbox"/> ABS operation too frequency
	<input type="checkbox"/> Brake pedal vibration or noisy	<input type="checkbox"/> Indicator always ON		<input type="checkbox"/> Brake pedal free play abnormal			
The engine statue when problem happened		<input type="checkbox"/> When ignition <input type="checkbox"/> After ignition <input type="checkbox"/> RPM≥5 000 r/min					
Conditions of road surface		<input type="checkbox"/> Slippery ( <input type="checkbox"/> Snow、 <input type="checkbox"/> Gravel road、 <input type="checkbox"/> Others ) <input type="checkbox"/> Rocky road <input type="checkbox"/> Other conditions					
Driving conditions		<input type="checkbox"/> Corner at speed <input type="checkbox"/> Vehicle speed≥10 km/h (6 mph) <input type="checkbox"/> Vehicle speed<10 km/h (6 mph) <input type="checkbox"/> Parking <input type="checkbox"/> Turning					
Brake status		<input type="checkbox"/> Normal braking <input type="checkbox"/> Sudden braking					
Other conditions		<input type="checkbox"/> Brake level excessive free play <input type="checkbox"/> Brake pedal excessive free play					

## Anti-lock brake system (Equipped models)

### Anti-lock brake system

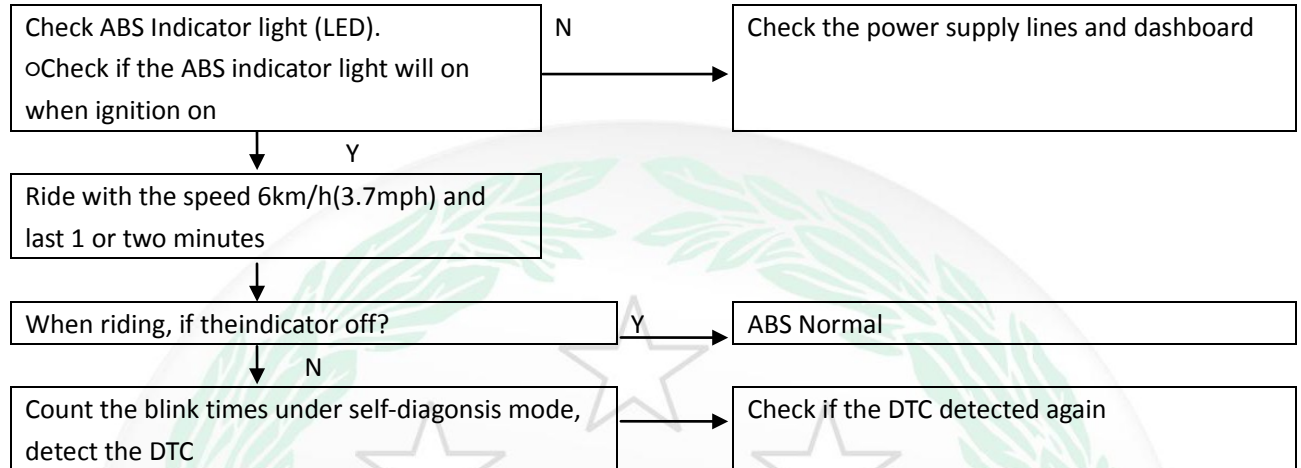
#### Pre-diagnosis inspection 1



## Anti-lock brake system (Equipped models)

### Anti-lock brake system

#### Check before self-diagnosis (Phase 2)



GL 14111B F

#### Self-diagnosis description

When a problem is detected in any of the signal systems, the ECU turns on the ABS indicator in the speedometer to alert the driver that a malfunction has occurred. The code is stored in memory for access at a later time. Diagnostic trouble codes can be read by ABS diagnostic tool. The ABS ECU will also store the diagnostic trouble codes for any ABS malfunction.

ABS hydraulic system can record all the DTC (16TCs). If more DTCs detected, must delete all the stored DTCs

(16DTCs), Then the new DTC can be stored. If without DTC, ABS indicator will (LED)on, shows "ABS normal".

#### Self-diagnosis system

- o IF ABS malfunction, ABS indicator (LED)[A]ON

#### Remarks

- o The battery must be with sufficient power during self-diagnosis, or the indicator blink slowly, even without blink.
- o The ignition switch must be off



## Anti-lock brake system (Equipped models)

### Anti-lock brake system

#### Check ABS Indicator (LED)

- Turn the ignition switch ON
  - ★ If ABS Indicator (LED) [A] On, Normal.
  - ★ If ABS Indicator (LED) not on, go to the next step
- “ABS indicator (LED) OFF (Turn the ignition switch ON)”.



- Turn the ignition switch OFF”.
- ★ If ABS warning light (LED)[A] OFF, Normal
- ★ If ABS warning light (LED) ON, Go to next step: “ABS indicator (LED) ON, (When driving—No DTC)”.



#### ABS Indicator (LED) OFF (Turn the ignition switch ON)

- Step 1
- Check the plug Black/white voltage of speedometer[A]

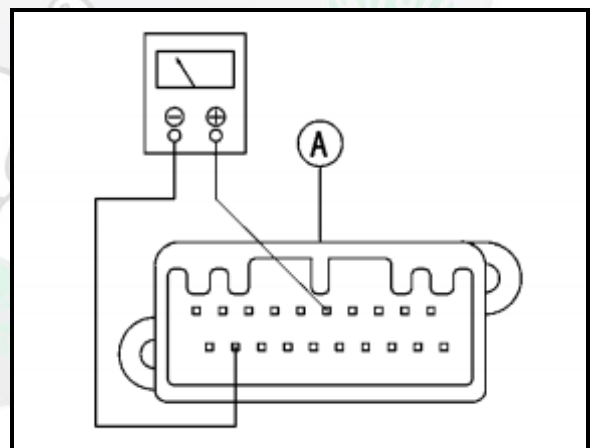
**Special tool: Multimeter**

- Turn the ignition switch ON

**Voltage of pins**

**Standard: Around 10 V**

- ★ If the voltage not in the scope, go to step2
- ★ If the voltage normal, change the speedometer.





## Anti-lock brake system (Equipped models)

### Anti-lock brake system

- Step 2

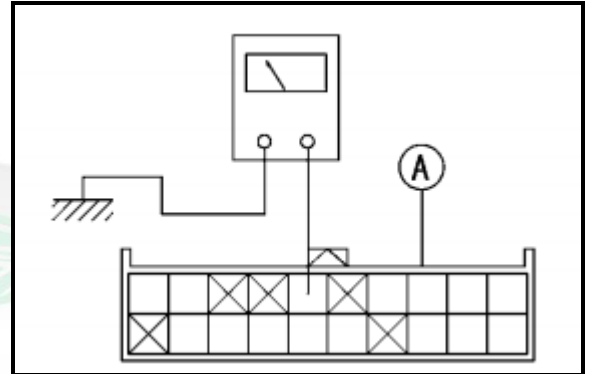
- Disconnected the speedometer cable plug

- Check if the circuit route of main wire harness plug

- [A] Black/White to GND is abnormal.

- ★ If circuit route is normal, repair or replace the main wire harness.

- ★ If circuit route is abnormal, go to step 3



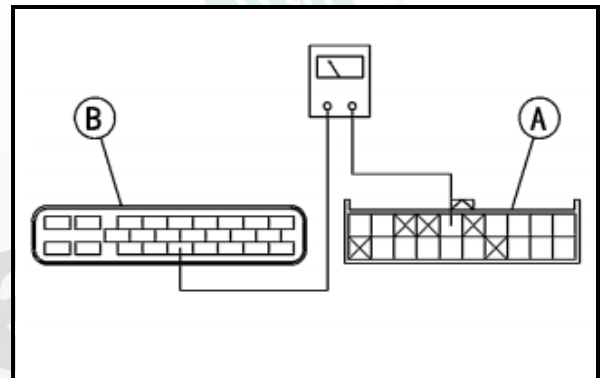
- Step 3.

- Disconnect the ABS hydraulic control unit plug

- Check if the ABS Black/white plug of main wire harness and the main wire harness Black/white plug of main wire harness circuit route is abnormal

- ★ If in normal condition, Replace ABS hydraulic system

- ★ If abnormal, repair or replace main wire harness.



## Anti-lock brake system (Equipped models)

### Anti-lock brake system

#### ABS indicator (LED) ON (When in running)

- Test

- Disconnect the plugs of ABS hydraulic unit and speedometer.

- Check if the ABS Black/white plug of main wire harness and the speed sensor Black/white plug of main wire harness circuit route is abnormal

- Check if rear/front speed sensor or teeth ring malfunction&abnormal

- Check if the ABS fuse of wire harness malfunction

#### Special tool—multimeter:

- ★ If wire route, ABS fuse, rear&front speed sensor normal, replace ABS control unit.

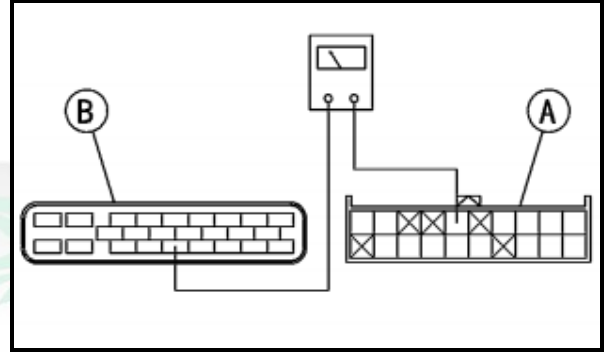
- ★ If wire route, ABS fuse, rear&front speed sensor abnormal, repair&replace.

#### Battery Voltage

Standard: Voltage $\geq$ 12V

- ★ If the battery voltage is not in the scope, replace battery.

- ★ If the battery voltage is normal, go to next step.



## Anti-lock brake system (Equipped models)

### Anti-lock brake system

#### ABS ECU inner units malfunction (5055)

★ Replace ABS.

#### Pump relay malfunction (5019)

★ Replace ABS.

#### ABS solenoid relay short circuit (Front: 5017 Rear: 5013)

★ Replace ABS.

#### ABS Solenoid Relay open circuit (Front: 5018 Rear: 5014)

★ Replace ABS.

#### ABS High voltage ABS Lower voltage (High voltage: 5053 Lower voltage: 5052)

Standard: Battery voltage  $\geq 12V$

★ If the power of the battery not in the range of voltage, charge or replace the battery

#### ABS Hydraulic control unit or DC motor malfunction (5035)

★ Replace ABS.

#### Varcode EEPROM Read error (5122)

★ Replace ABS.

#### Varcode Invalid or beyond the scope (5223)

★ Replace ABS.

#### Wheel speed sensor intermittent signal (Front: 5042 Rear: 5044)

○ Check if the clearance of speed sensor core to gear tooth tip 0.5~1.2mm.

○ Check if the wheel is rotating when vehicle is supported by brackets.

★ Adjust the clearance of speed sensor and sensor rotor.

★ Sensor rotor defective.

● ABS wheel excessive speed difference.

○ Check if change the specification of rim and tire.

○ If the wheel is rotating when vehicle is supported by brackets.

★ Please use the specific rim and tire.

★ Turn the main switch off after rotation heels then turn the main switch ON.

## ABS system (Model with ABS)

### ABS system

#### Front wheel speed sensor fault (diagnostic trouble code: 5042)

- Trouble shooting step 1.

- Measure the clearance between the wheel speed sensor and sensor rotor with feeler gauge[A]

#### Clearance

**Standard: 0.5 ~ 1.2 mm**

★ If measurement result is out of standard range, please check the related parts and readjust. Measure the clearance after readjust.

★ If the measurement result is up to standard, proceed to the next step.



- Trouble shooting step 2.

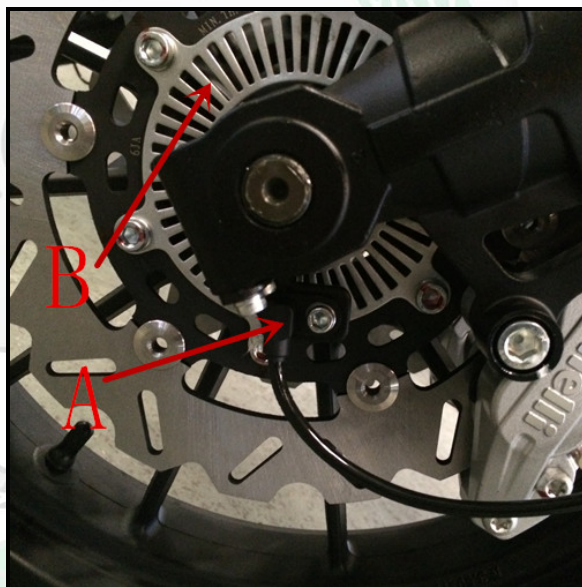
- Check if there is magnetic foreign parts between wheel speed sensor[A] and sensor rotor[B], if the intervals of teeth are blocked.

- Check if the wheel speed sensor is loose.

- Check if the wheel speed sensor and sensor rotor is deformed or damaged (For example: there is gap on teeth).

★ Please adjust or replace the sensor rotor and wheel speed sensor if necessary.

★ If all the parts are normal, proceed to the next step.



- Trouble shooting step 3.

- Recheck diagnostic trouble code; clear diagnostic trouble code, check before self-diagnostic (Step1 and step2), reread diagnostic trouble code.

★ If ABS indicator(LED)[A] is on, diagnostic trouble code show ABS hydraulic control unit fault. Please replace ABS hydraulic control unit fault.

★ If ABS indicator (LED) [A] is not on, it means ABS is normal (Diagnostic trouble code is not recorded; temporary fault).





## ABS system (Model with ABS)

### ABS system

#### Rear wheel speed sensor fault (diagnostic trouble code: 5044)

- Trouble shooting step 1.

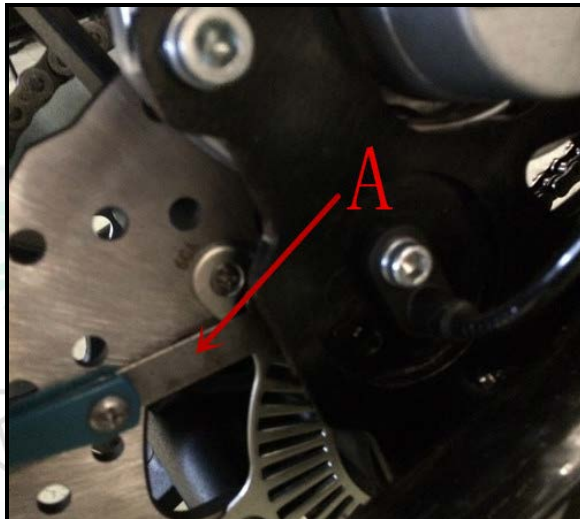
- Measure the clearance between the wheel speed sensor and sensor rotor with feeler gauge[A]

#### Clearance

**Standard: 0.5 ~ 1.2 mm**

★If measurement result is out of standard range, please check the related parts and readjust. Measure the clearance after readjust.

★If the measurement result is up to standard, proceed to the next step.



- Trouble shooting step 2.

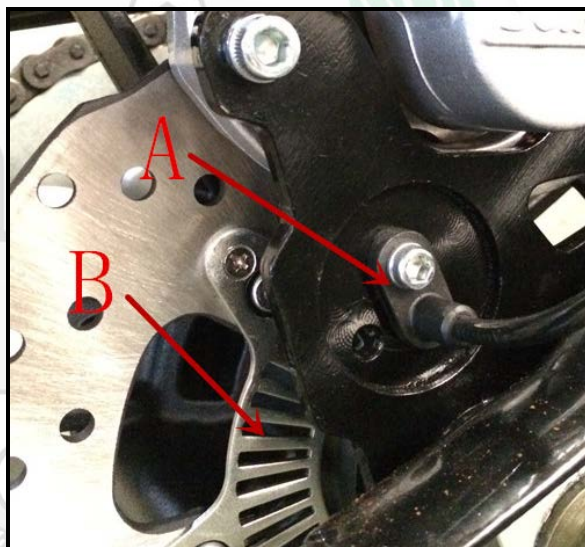
- Check If there is magnetic foreign parts between wheel speed sensor[A] and sensor rotor[B], if the intervals of teeth are blocked.

- Check if the wheel speed sensor is loose.

- Check if the wheel speed sensor and sensor rotor is deformed or damaged (For example: there is gap on teeth).

★Please adjust or replace the sensor rotor and wheel speed sensor if necessary .

★If all the parts are normal, proceed to the next step.



- Trouble shooting step 3.

- Recheck diagnostic trouble code; clear diagnostic trouble code, check before self-diagnostic (Step1 and step2), reread diagnostic trouble code.

★If ABS indicator(LED)[A] is on, diagnostic trouble code show ABS hydraulic control unit fault. Please replace ABS hydraulic control unit fault.

★If ABS indicator (LED) [A] is not on, it means ABS is normal (Diagnostic trouble code is not recorded; temporary fault).





## ABS system (Model with ABS)

### ABS system

- Trouble shooting step 3.

- Recheck diagnostic trouble code; clear diagnostic trouble code, check before self-diagnostic (Step1 and step2), reread diagnostic trouble code.

- ★If ABS indicator(LED)[A] is on, diagnostic trouble code show ABS hydraulic control unit fault. Please replace ABS hydraulic control unit fault.

- ★If ABS indicator (LED) [A] is not on, it means ABS is normal (Diagnostic trouble code is nor recorded; temporary fault).



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## ABS system (Model with ABS)

### ABS system

- Trouble shooting step 4.

- Recheck diagnostic trouble code; clear diagnostic trouble code, check before self-diagnostic (Step1 and step2), reread diagnostic trouble code.

- ★If ABS indicator(LED)[A] is on, diagnostic trouble code show ABS hydraulic control unit fault. Please replace ABS hydraulic control unit fault.

- ★If ABS indicator (LED) [A] is not on, it means ABS is normal (Diagnostic trouble code is nor recorded; temporary fault).



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## ABS system (Model with ABS)

### ABS system

Check ECU (diagnostic trouble code: **5055**)

- Trouble shooting step 1.

- Recheck diagnostic trouble code; clear diagnostic trouble code, check before self-diagnostic (Step1 and step2), reread diagnostic trouble code.

- ★ If ABS indicator(LED)[A] is on, diagnostic trouble code show ABS hydraulic control unit fault. Please replace ABS hydraulic control unit fault.

- ★ If ABS indicator (LED) [A] is not on, it means ABS is normal (Diagnostic trouble code is not recorded; temporary fault).



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## ABS system (Model with ABS)

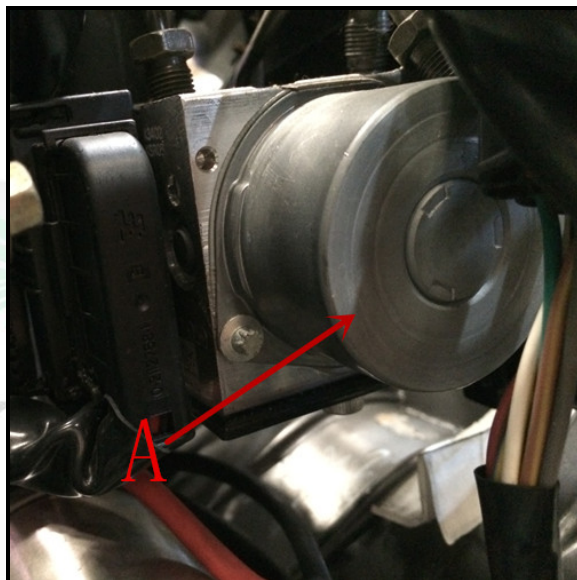
### ABS system

Remove ABS hydraulic control unit

#### Attention

**Please prevent ABS hydraulic control unit from knock, impact and dirty when removing.**

- Drain the brake fluid out from front brake hose and rear brake hose.
- Draining the brake fluid out from draining bolt by pressing the brake lever/pedal.



- Remove:  
Fuel tank [Check “Fuel system” — “Remove fuel tank”],  
Battery (Check “Electric system” — “Remove battery”),  
bolts  
Fuel tank cover

- Clean ABS hydraulic control unit.

#### Attention

**Clean all the joint on the ABS hydraulic control unit, or the dirty around the joint may pollute the brake fluid.**

**Protect the parts around the controller to prevent from brake liquid splash when removing the brake hose.**





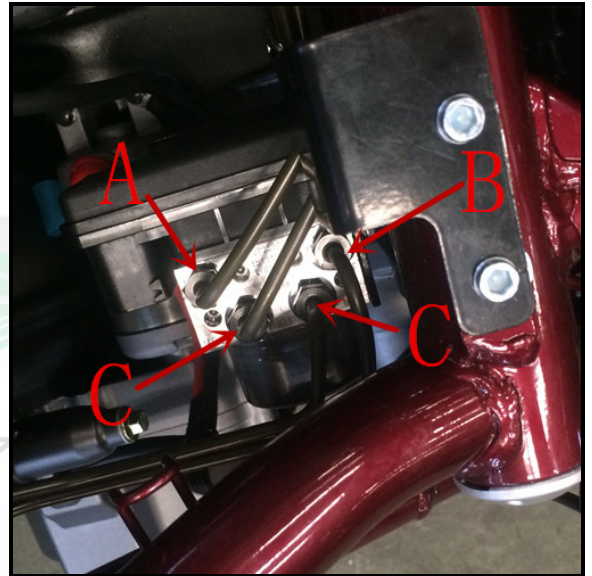
## ABS system (Model with ABS)

### ABS system

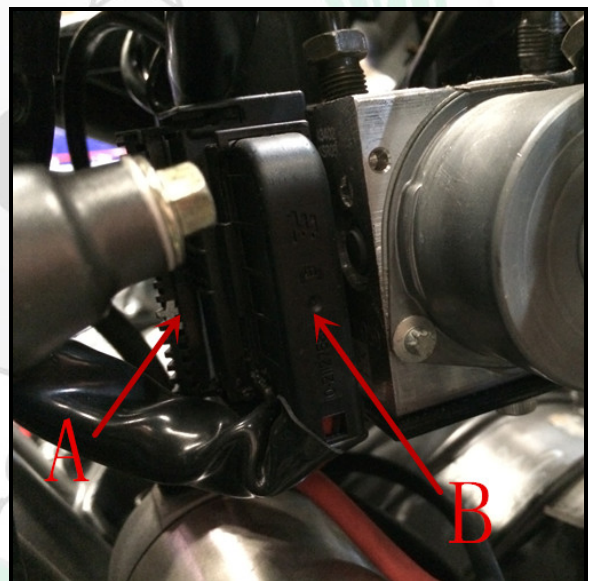
- Remove brake hose nuts[A]、[B]、[C]、[D]。
- Cover the joint on ABS hydraulic control unit to prevent from brake fluid leakage and dirty entering。

#### Attention

**Brake fluid will corrode the parts, please clean and flush the parts when it is stained by brake fluid**



- Disconnect the joint[A]。
- Please disconnect the joint by following the way as the right picture[B]。

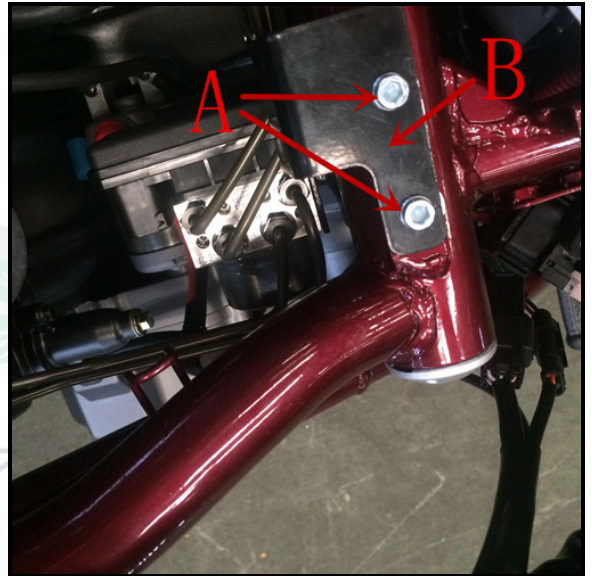




## ABS system (Model with ABS)

### ABS system

- Remove bolts[A].
- Remove ABS hydraulic control unit and bracket[B].



- Remove bolts and bracket.

#### Attention

ABS hydraulic control unit has been adjusted and settled, please do not try to disassemble or repair it



## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

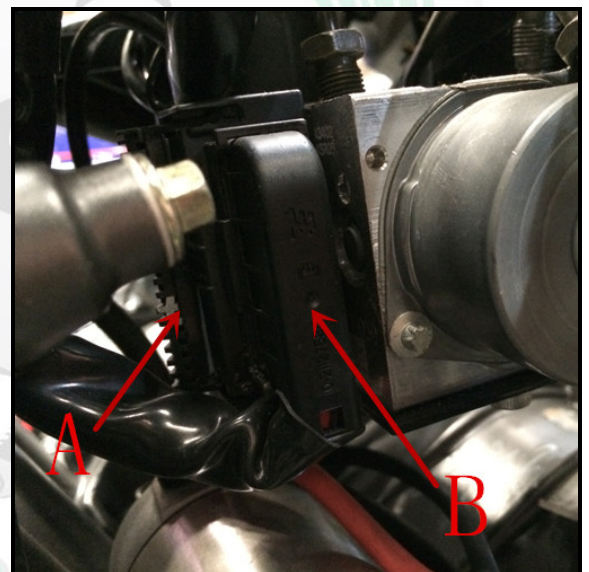
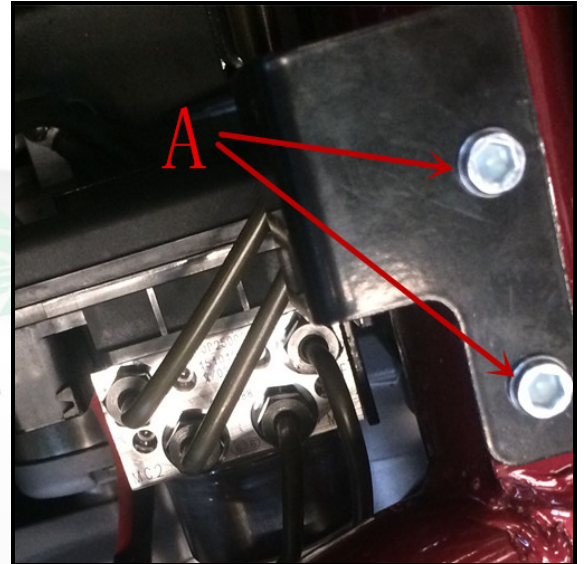
#### Install the ABS hydraulic control unit

- Install the ABS hydraulic control unit on the bracket

##### Notice

**The brake fluid is extremely destructive to paints and plastics, with fiendishly corrosive effects. If carelessly splash the brake fluids onto any parts, must remove thoroughly immediately.**

- Fix and tighten the bolt [A] onto the frame
- Rout the cable in proper location, and connect the connector [A]
- Fix the connector [B] as shown.



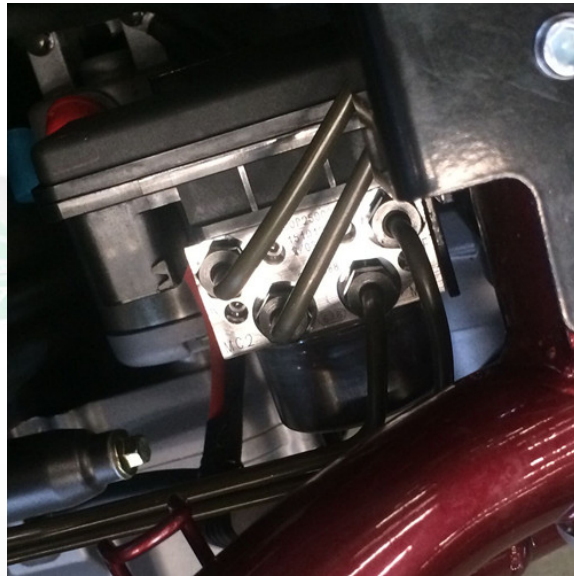
## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

- Install the brake hoses properly as shown
- Tighten the nuts

**The tightening torque of the fixing bolts: 18 N·m**

- Bleed air inside the brake hoses. (refer to the chapter “Bleed air inside the brake hoses”)
- Check the brake performance whether normal or not, and make sure there is no leakage.
- Install the removed parts.



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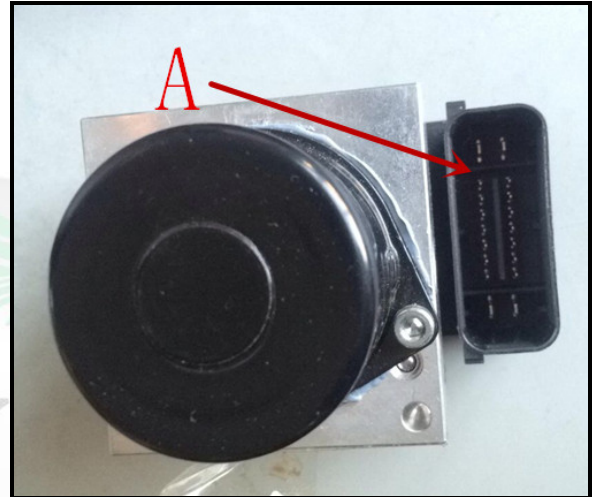


## Anti-lock brake system (for the vehicle with ABS)

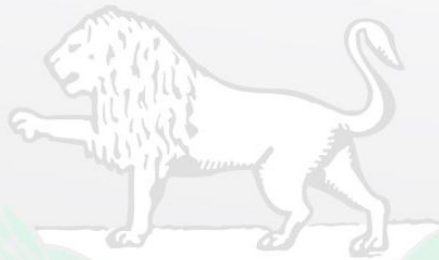
### Anti-lock brake system (ABS)

Check the ABS hydraulic control unit

- Disassemble the ABS hydraulic mudulator. ( refer to “Disassemble the ABS hydraulic control unit” )
- Visual check the ABS hydraulic control unit.
- ★ If any crack or damage, replace with a new one
- Visual check the connector pins [A].
- ★ If the pins are damaged or bent, replace with a new one.
- ★ If the connector was blocked by mud or dust, clean it with compressed air.



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Anti-lock brake system (for the vehicle with ABS)

## Anti-lock brake system (ABS)

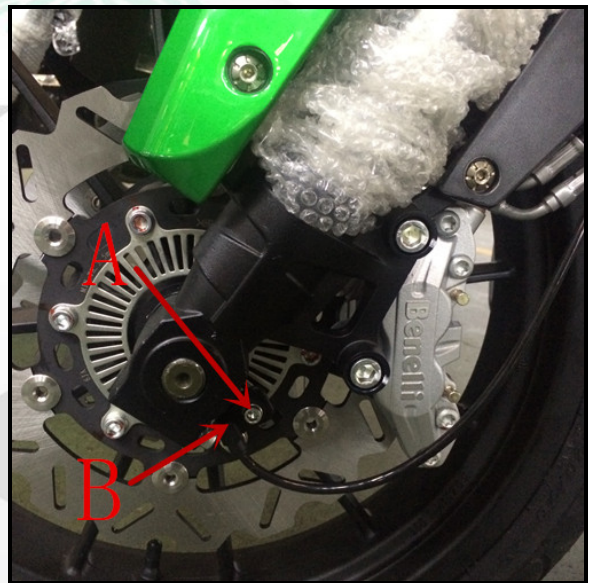
## Remove the front speed sensor

## Notice

**Never hit the speed sensor with hammer and keep it from falling on the ground as it is a very precise component and must be cautiously treated.**

**Do not disassemble or maintain the speed sensor!**

- Remove:  
Bolt [A]、  
Clamp、  
Front speed sensor [B]





## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

Install the front speed sensor

- For installation, reverse the removal procedure
- Route the cable properly (Refer to “appendix” — “cable, wire and hose routing” )

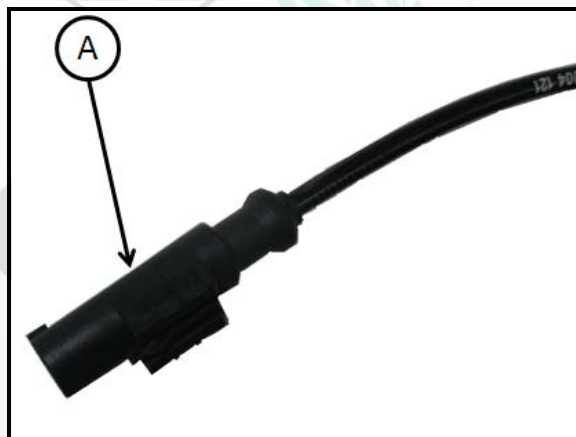
Remove the rear speed sensor

#### Notice

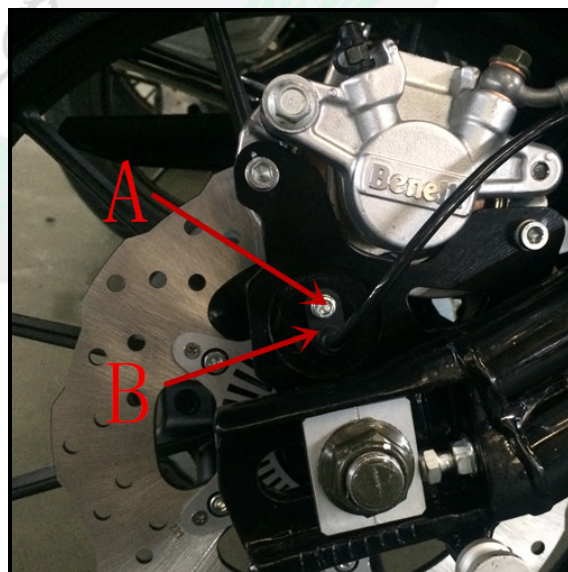
**Never hit the speed sensor with hammer and keep it from falling on the ground as it is a very precise component and must be cautiously treated.**

**Do not disassemble or maintain the speed sensor!**

- Remove:  
Seat cushion
- Disconnect the connector [A]



- Remove:  
Clamp  
Bolt [A]、  
Rear speed sensor [B]



## Anti-lock brake system (for the vehicle with ABS)

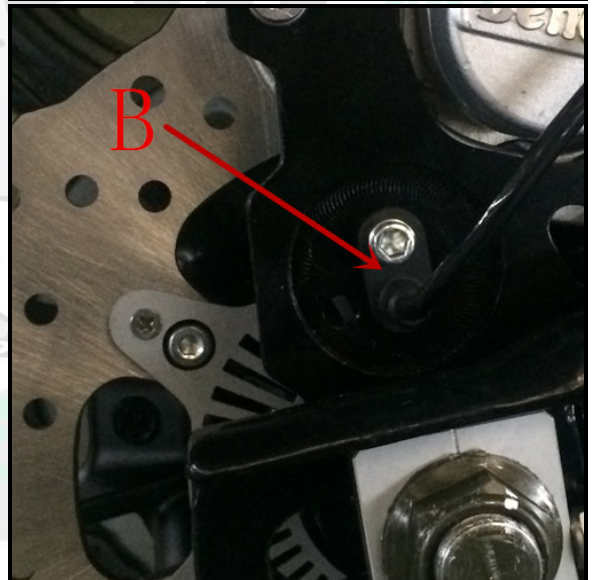
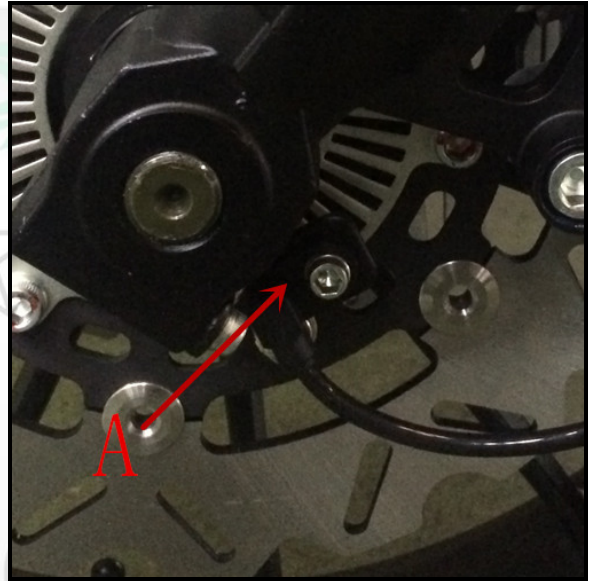
### Anti-lock brake system (ABS)

Install the rear speed sensor

- For installation, reverse the removal procedure
- Route the cable properly (Refer to “appendix” — “cable, wire and hose routing” )

#### Speed sensor inspection

- Remove the front speed sensor [A]
- Remove the rear speed sensor [B]
- Visual check the sensors
- ★ If any crack, deformation or damage, replace with a new one.



## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

Check the clearance between speed sensor and sensor rotor

- Lift the front/rear wheel away from the ground ( Refer to "wheel/tire" — “remove front wheel/rear wheel” )
- Slowly rotate the wheel, measure the clearance value in several different position

Feeler gauge [A]

**Standard clearance value:**

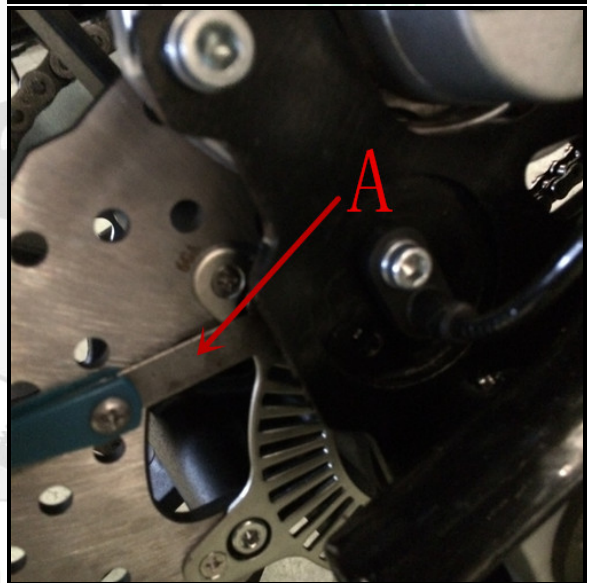
**Front**    0.5 ~ 1.2 mm

**Rear**    0.5 ~ 1.2 mm

#### **Remark**

○The clearance is unadjustable

★ If the clearance is out of specification, check the bearing of the rim ( Refer to “wheel/tire” — “check the bearing of the rim” ), speed sensor installation and their function (Refer to “sensor rotor inspection” )





## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

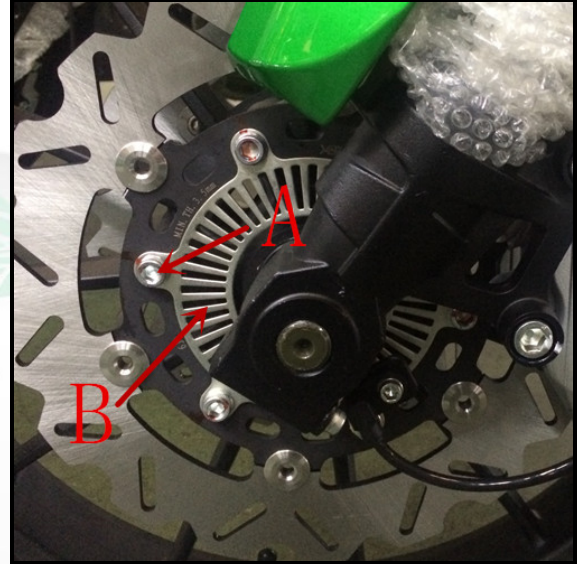
#### Sensor rotor inspection

- Remove:

Wheel (Refer to “wheel/tire” — “remove front wheel/rear wheel” )

Bolts [A],

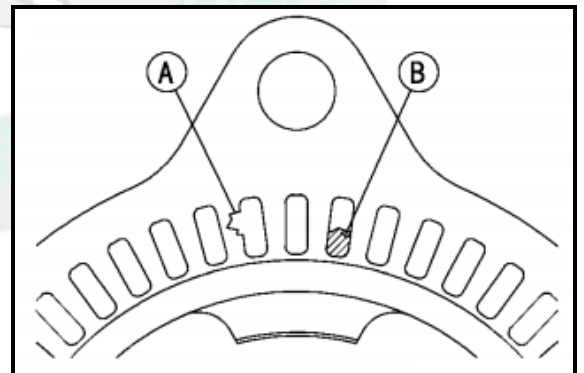
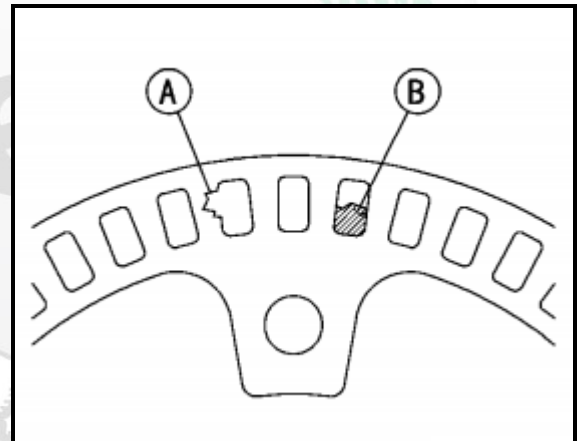
Sensor rotor [B]



- Visual check the sensor rotor

★ If any deformation or broken (such as the tooth has a notch [A]), replace with a new one

★ If any foreign material such as burr or other magnetic deposits [B] sticking to the ring, clean it.



## Anti-lock brake system (for the vehicle with ABS)

### Anti-lock brake system (ABS)

#### Exchange brake fluid and refill

The brake fluid suggested to be replaced every two years. Apply the vacuum pump to exhaust the air inside the calipers, hoses and ABS hydraulic control unit when exchanging brake fluid.



#### ABS brake fluid exchange procedure:

- Open the fluid reservoir cap
- Connect the vacuum pump with caliper bleeding valve
- Start the vacuum pump
- Unscrew the bleeding valve nut
- Connect with diagnostic tool and press the button on the tool to start bleeding brake fluid until all brake fluid is bled out.
- Fill brake fluid into the reservoir continuously, start the vacuum pump, make sure that the brake fluid in the reservoir will not be exhausted.
- Press the button on the diagnostic tool to start filling
- Operate and release the brake lever/pedal quickly for several times during the filling process, tighten the bleeding valve nut after finishing the filling.
- Operate and release the brake lever/pedal quickly for several times again until getting proper brake performances
- If the brake lever/pedal response soft, it means the air bleeding is not complete, should repeat the work until getting proper brake performance.
- When exchanging the brake fluid for FL&FR calipers, do the bleed & refill process from the end of the fluid channel first, then do the same process on the other side, then return to the end

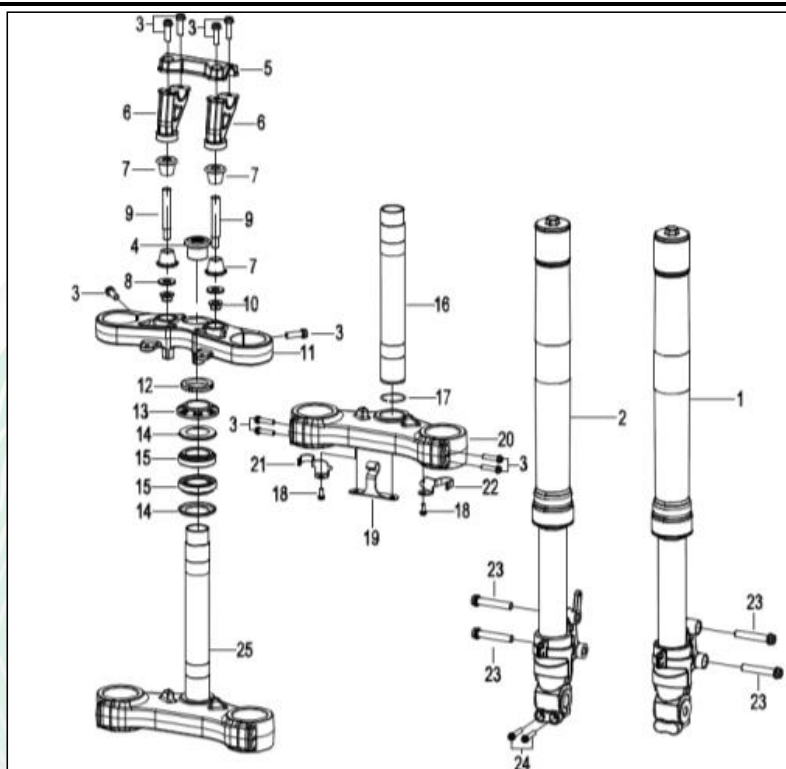


channel to repeat the process again.



## Front suspension

### Disassembly of front shock absorber



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Front right shock absorber components	1	11	Upper connecting plate	1	21	Left hydraulic brake cable clight	1
2	Front left shock absorber components	1	12	Fastening nut of upper connecting plate	1	22	Right hydraulic brake cable clight	1
3	Bolt M8×1.25×25	10	13	Gland nut	1	23	Screw M10×1.25×40	4
4	Fastening screw of upper connecting plate	1	14	Dust ring	2	24	Bolt M6×30	2
5	Upper holder block	1	15	Steering bearing	2	25	Lower connecting plate components	1
6	Lower base of handlebar	2	16	Column	1			
7	Silencer plug	4	17	Lock ring	1			
8	Handle positioning gasket	2	18	Screw M6×14	2			
9	Handle positioning double-end stud	2	19	Hydraulic brake cable clight	1			
10	Self-locking nut M10×1.25	2	20	Lower connecting plate	1			

## Front suspension/front fork

### Disassembly of front fork

The following procedures are applicable to two front shock components.

**Parking:** Park the motorcycle at the flat ground.

#### Note

Support the motorcycle using suitable bracket, to lift the front wheel easily.

#### Disassembly

Front brake caliper (see the steps in the section “front and rear brake”)

Front wheel (see the steps in the section “front wheel and front brake disc”)

Front fender (see the steps in the section “covering parts/front fender”)

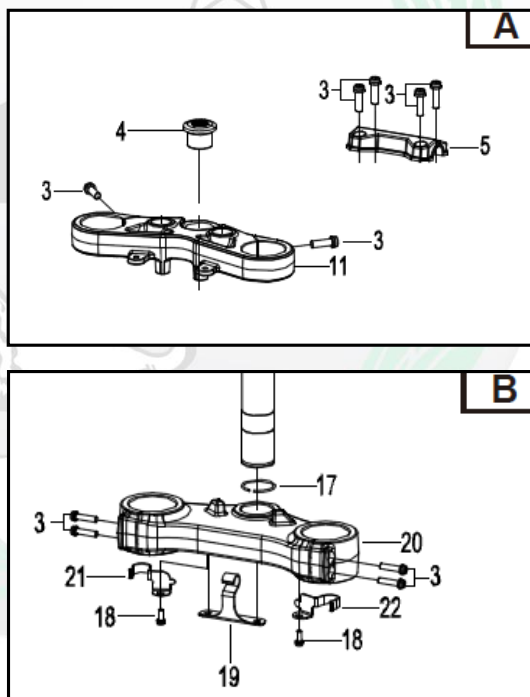
#### Disassembly

Release fastening screw (3) from upper connecting plate (11), Fig. A

Release fastening screw (3) from lower connecting plate (20), Fig. B

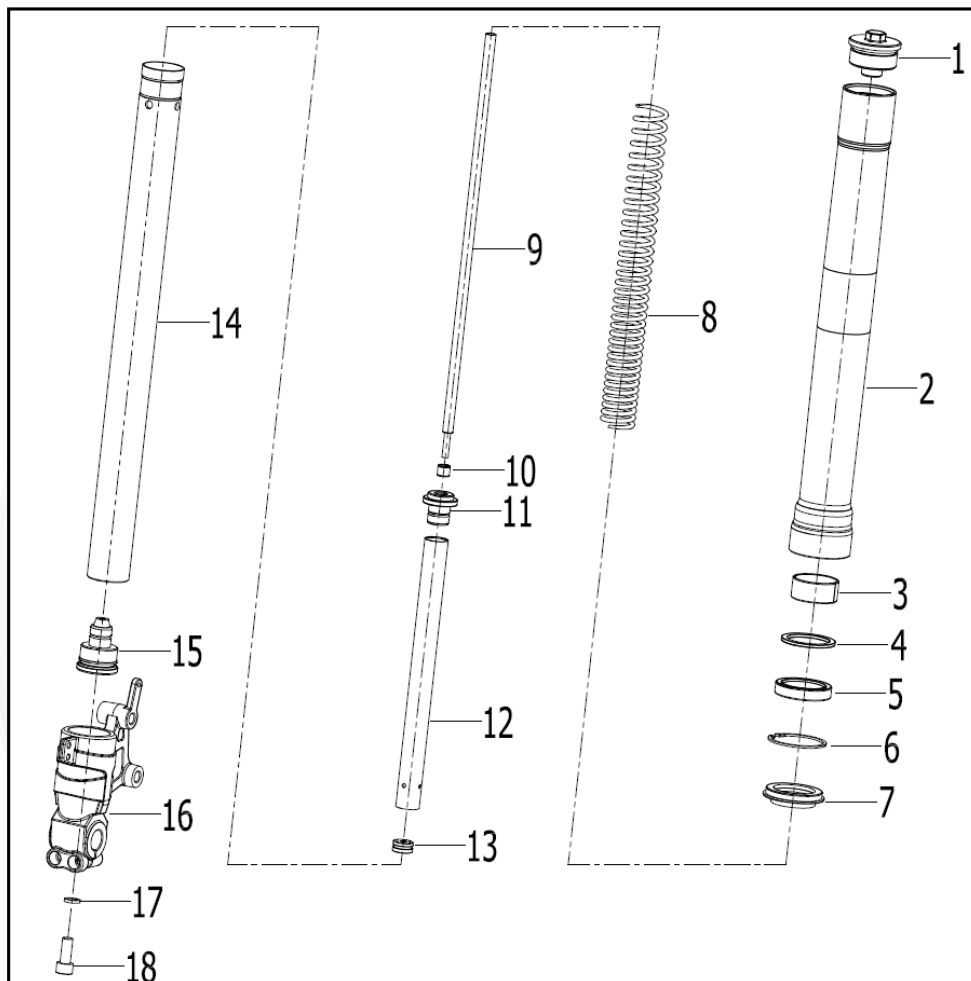
#### Important

Before releasing the fastening screws on lower connecting plates, first disassemble the support on upper front shock absorber.



## Front suspension/front shock absorber

### Disassembly of front shock absorber



**Note:** The following steps are applicable to two front shock absorber

#### Disassembly

Release front shock absorbing bolt (1), Fig. A

**Important:** Front shock absorbing spring is compressed.



## Front suspension/front shock absorber

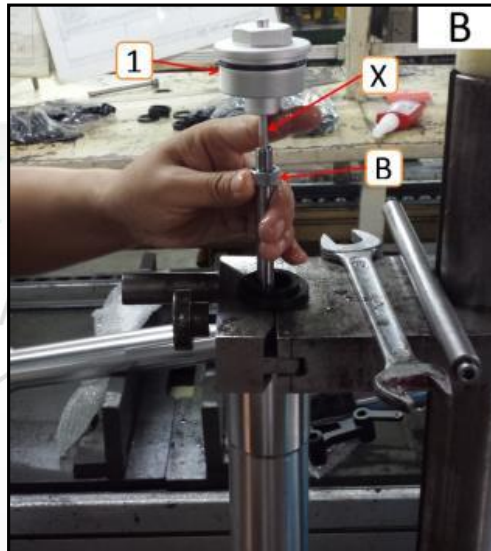
### Disassembly of front shock absorber

#### Pushdown:

After pressing the spring using special tooling, disassemble front shock absorbing bolt (1) and nut (B) using wrench, Fig. B

#### Note:

This is right shock absorber, the left shock absorber bolt is not equipped with adjustment lever (X), and the disassembly method is the same.



Slide out from sleeve, Fig. C:

Buffer block and adjusting sleeve seat (L)

Adjusting sleeve (M)

Spring seat (N)

Shock absorbing spring (8)



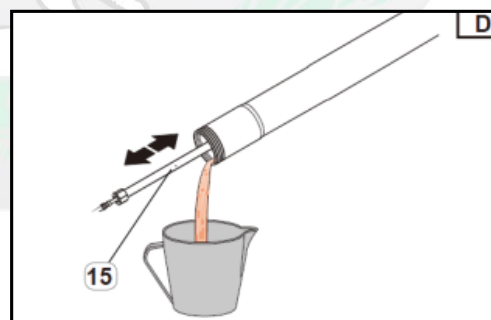
#### Releasing:

Release rod from clight

Pour shock absorbing oil into the container with

proper volume, Fig. D **Note**

To help to drain the oil in shock absorber, push the pump lever (15) to move forwards and backwards, Fig. D



#### Important

This operation can only be conducted after draining the oil in shock absorber.



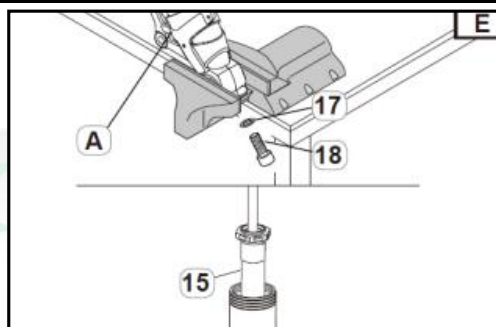
## Front suspension/front shock absorber

### Disassembly of front shock absorber

Lock support (A) in the clight, Fig. E

#### Disassembly

Screw (18), gasket (17), damping cylinder (15)

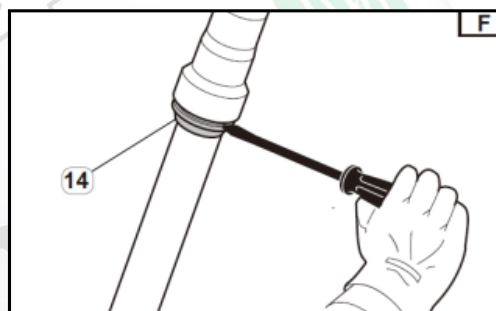


#### Important

This operation can only be conducted after draining the oil in shock absorber.

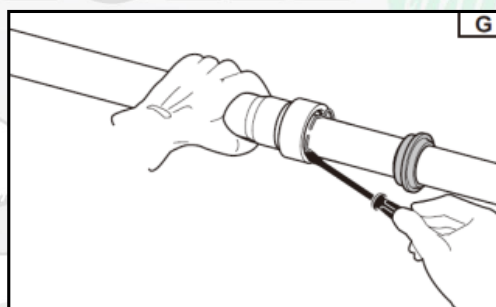
#### Disassembly

Disassemble the dust ring (14) from base using one small flathead screwdriver. Fig. F



#### Disassembly

Disassemble closing ring using the same screwdriver, Fig. G



#### Sliding out:

Slide the inner pipe B of shock absorber from the outer cylinder (10) of front shock absorber, Fig. H

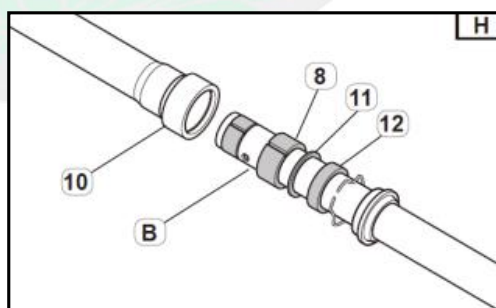
#### Note

To separate these two parts, pull them with a small force

Oil seal (12)

Positioning ring (11)

Lower guide sleeve (8)



## Front suspension/front shock absorber

### Disassembly of front shock absorber

#### Manual disassembly

Upper guide sleeve (6), Fig. 1

#### Note

If it is difficult to operate, use flathead screwdriver in the cylinder slot of shock absorber to make it easy.

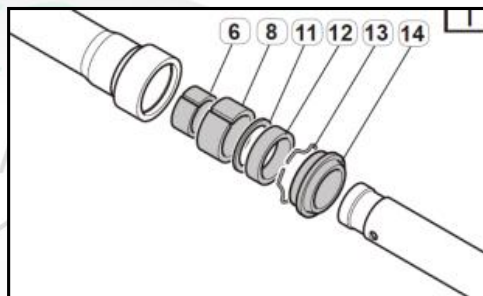
Lower guide sleeve (8)

Positioning ring (11)

Oil seal (12)

Closing ring (13)

Dust ring (14)



#### Note

If oil seal and dust ring has been disassembled, they cannot be reused.

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Front suspension/front shock absorber

Check of front shock absorber

The following steps are applicable to two front shock absorbers.

Check:

Shock absorber A, Fig. A  
Outer cylinder of shock absorber (10)  
If there is deformation / damage /wear, please replace

Warning

If the internal pipe of shock absorber is bent, do not try to straighten it, because this may cause the internal pipe of shock absorber become weak with time and result in great danger.

Measurement: Full length (B) of spring (5)  
(uncompressed state).  
If it exceeds the specifications, please replace



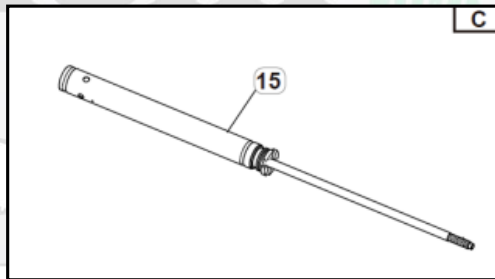
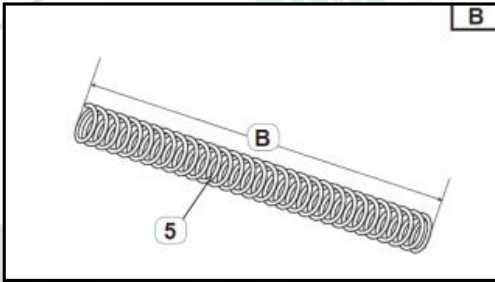
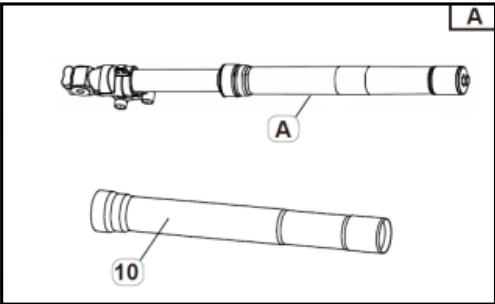
Item	Standard	Lower deformation limit
Front shock absorbing spring	310mm	300mm

Check:

Damping cylinder (15), Fig. C  
If there is any damage or wear, please replace.  
If there is any block, blow out the entire oil passage with compressed air.

Important

When disassembling or reinstalling front shock absorber, do not let foreign bodies enter the shock absorber.



## Front suspension/front shock absorber

### Assembly of front shock absorber

The following steps are applicable to two front shock absorbers.

#### Important

After disassembly, oil seal and dust ring cannot be reused.

Before reinstallation, check the situation of sleeve and guide; check guide; if there is pattern or scratch, replace it.

Cover the end of internal shock absorbing pipe with tape, Fig. A

In this way, cover sleeve base.

Slightly lubricate lower oil seal and dust ring with grease.

Insert dust ring, Fig. B

Dust ring (14)

Closing ring (13)

Oil seal (12)

Positioning ring (11)

Lower guide sleeve (8)

#### Important

Pay attention to the orientation of oil seal (12).

Disassemble the tape at the end of internal shock absorbing pipe, and remove the remaining mark.

Insert the following part with hands: upper guide sleeve (6), Fig. C

Insert the internal shock absorbing pipe into the sleeve slowly, so as not to damage the guide sleeve.

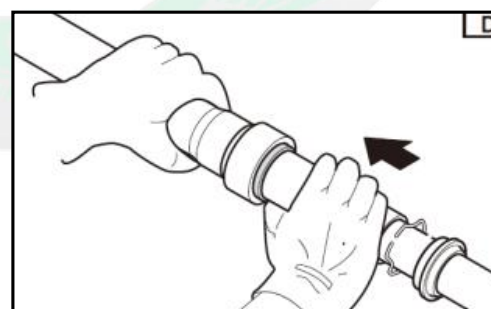
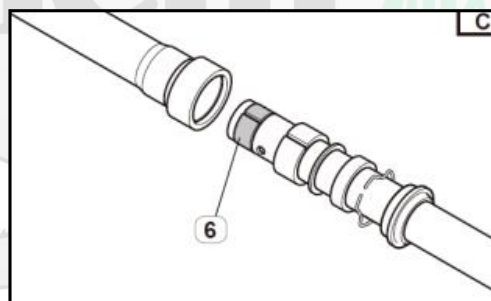
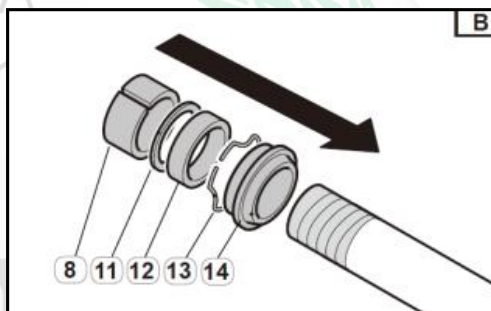
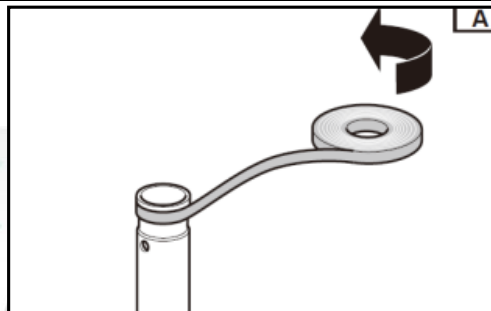
#### Inserting simultaneously

Lower guide sleeve, until the sleeve contacts with the front fork, Fig. D

Positioning ring

Oil seal

And then install them in the base of outer shock absorbing pipe.

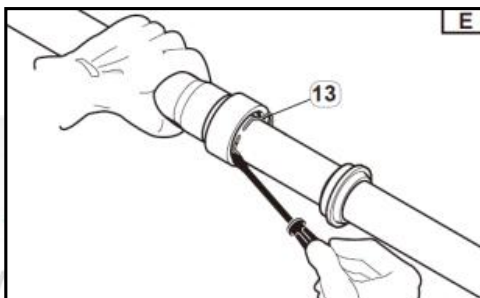


## Front suspension/front shock absorber

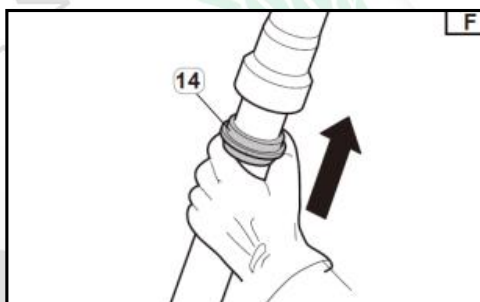
### Assembly of front shock absorber

#### Assembly:

Install the closing ring (13) on the oil seal with a small flathead screwdriver, ensure that it is properly inserted to the special rail, and pay attention to not damage the front internal shock absorbing pipe, Fig. E

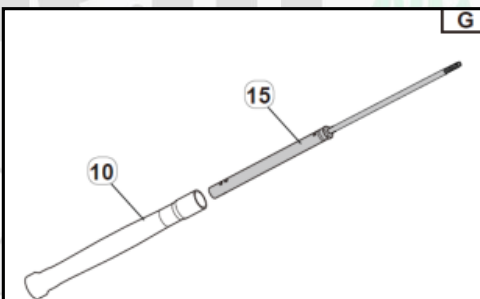


And then put the following parts into the base:  
Install dust ring (14) through pulling with hands, Fig. F



#### Inserting:

Insert the assembled damping cylinder (15) to outer cylinder (10), Fig. G

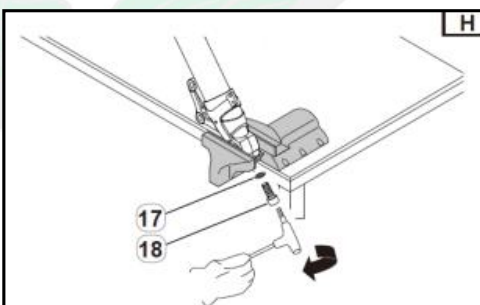


#### Assembly:

Install the internal shock absorbing pipe on support, and clight the support with bench clight. Fig. H  
Fasten shock absorbing tube and support with gasket (17) and socket head screw (18), and fasten it to the following torque using socket head wrench



Torque 22N\*m

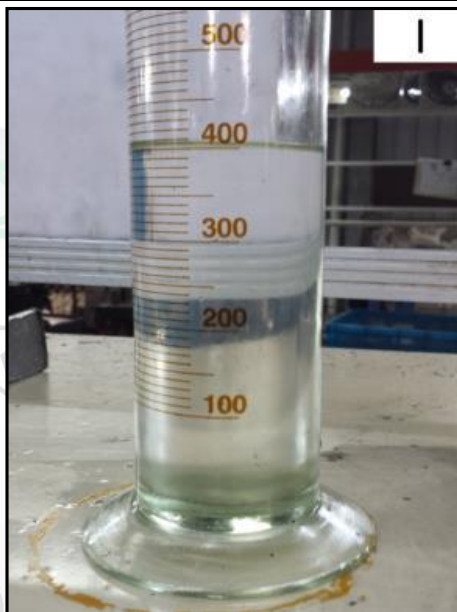




## Front suspension/front shock absorber

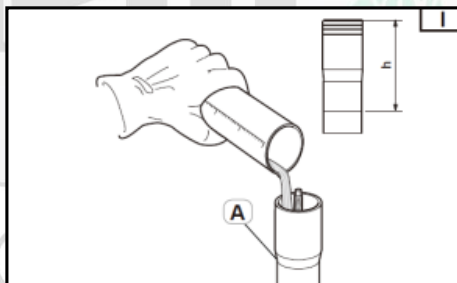
### Assembly of front shock absorber

Add 400mL of 32# shock absorbing oil with graduated container, Fig. I



Lift the entire outer cylinder of shock absorber, use graduated measuring container, prepare the correct amount of oil and pour it into the rod, pour about 2/3 of oil into fork cylinder (A), and then move the rod to exhaust air. Fig. I

Continue to pour, until the required number is reached.



### Assembly:

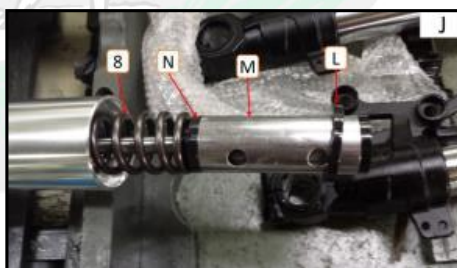
Install the following components on the outer cylinder of shock absorber, Fig. J

Shock absorbing spring (8)

Spring seat (N)

Adjusting sleeve (M)

Buffer block and adjusting sleeve seat (L)



## Front suspension/front shock absorber

### Assembly of front shock absorber

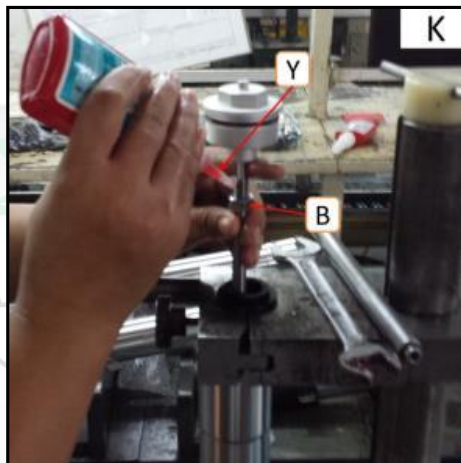
#### Assembly:

Press the spring with special tooling, apply a proper amount of thread sealant (1261# glue), and lock it with wrench, Fig. K

Fasten it to the following torque:



Torque 16-18N\*m



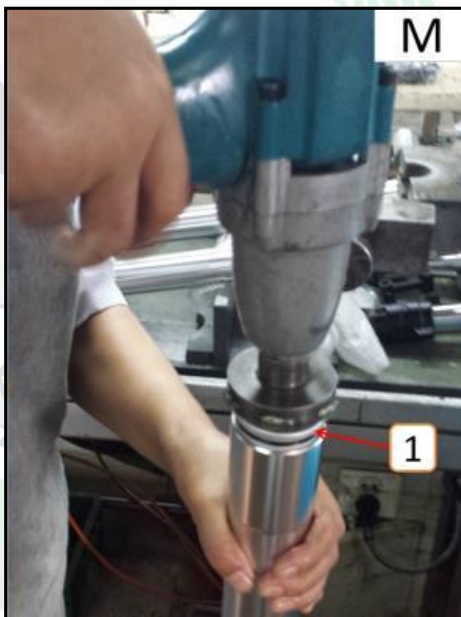
#### Assembly:

Fasten upper bolt (1) using wrench, and lock it, Fig. M

Fasten it to the following torque:



Torque 18-20N\*m



## Front suspension/front shock absorber

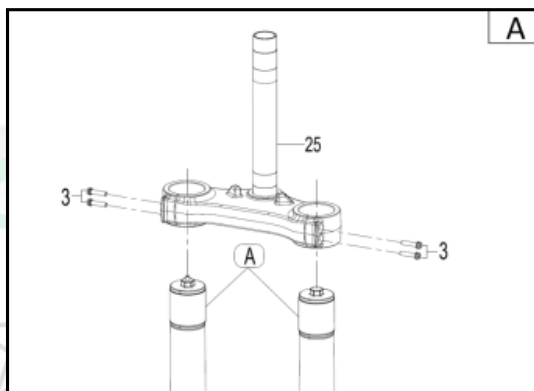
### Assembly of front shock absorber

Assembly: Outer cylinder of shock absorber

(A), Fig. A

Temporary fastening

Fasten anti-locking screw (3) to lower connecting plate, Fig. A



#### Note

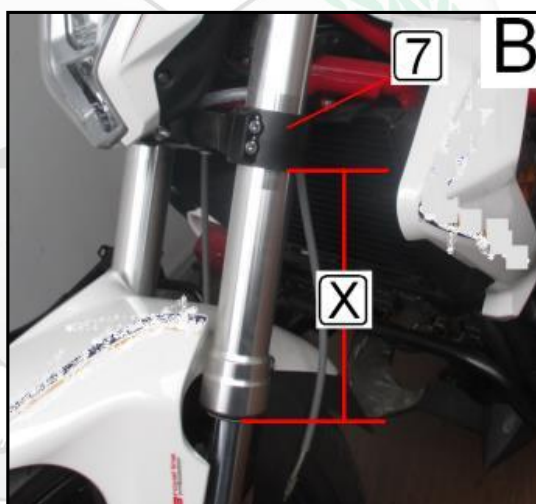
Check assembly position X, as shown in Fig. B

Assembly position (X)
204.5mm

Fastening: Fasten anti-locking screw (3) to lower connecting plate (7); the torque is as follows:



Torque 22N\*m



#### Note

The assembly is divided into three steps

Assemble upper connecting plate, insert backing plate at the opening (Y), so as to simply insert front shock absorber, Fig. C

Fasten: Install lock screw (3) to upper connecting plate (9), and the torque is as follows:



Torque 22N\*m

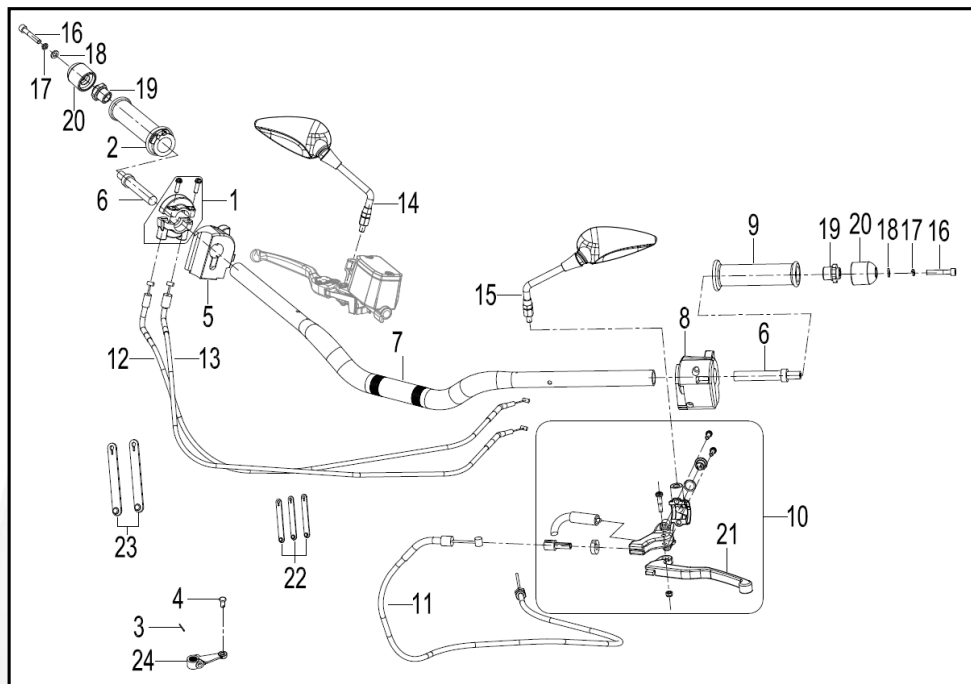


#### Important

Ensure that the path of brake hose is correct.

## Control

### Control disassembly



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Throttle cable assembling stand	1	13	Throttle cable component II	1
2	Throttle grip	1	14	Right rearview mirror component	1
3	2×18 cotter pin	1	15	Left rearview mirror component	1
4	6×14 hinge pin	1	16	M6×35 socket head screw	2
5	Right combined switch	1	17	Spring washer 6	2
6	Balance block	2	18	Washer 6	2
7	Handlebar	1	19	Balance block assembling stand	2
8	Left combined switch	1	20	Balance weight	2
9	Left grip	1	21	Clutch handle	1
10	Clutch handle assembly	1	22	Globe valve soft clight	3
11	Clutch cable component	1	23	Soft clight	2
12	Throttle cable component I	1	24	Release lever	1

## Control/control

### Control disassembly

Park the motorcycle on flat ground.

#### Important

Support the motorcycle with appropriate parking rack, so that it will not topple.

Remove the screw (16), gasket (18) and spring washer (17)

Remove the balance weight (20)

Remove the balance weight assembling stand (19) and the balance weight (6)

**Removal:** Remove the left grip (9) from the handle, and blow compressed air into the handle with a flathead screwdriver. Fig. A

#### Note

Blow compressed air directly between the left side of the handle and its grip, so the handle can be slipped off gently.

Remove the left combined switch

Remove the clutch cable component

Remove the rearview mirror and the adjusting nut

Remove the fixed cap on the clutch handle assembly by unscrewing the two fastening screws on the clutch handle assembly, and then disassemble the clutch handle assembly.

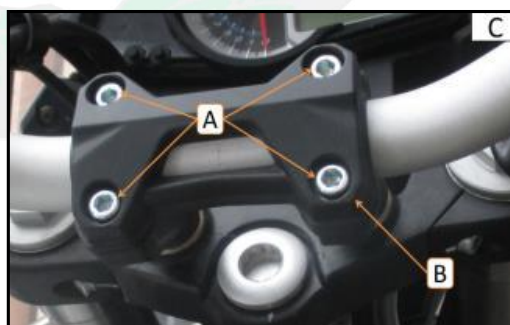
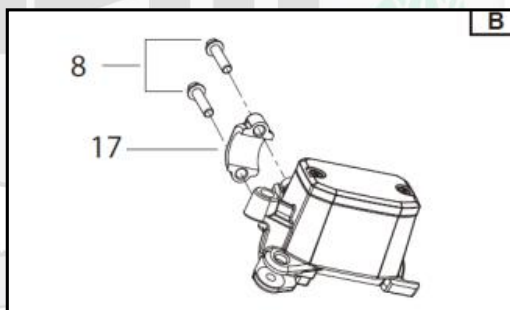
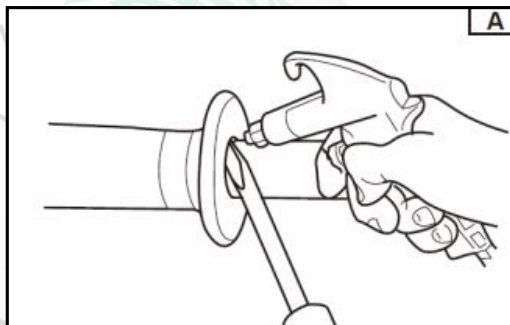
Repeat the same procedures for the right-hand grip, until the throttle grip is removed, and in this case, screws on the throttle cable assembling stand must be removed, so that the throttle grip can be removed.

Remove the throttle cable component I and throttle cable component II

Remove the right combined switch

Unscrew the two fastening screws (8), remove the fixed cap on the oil pump (17), and then remove the oil pump component of the front hydraulic brake component. Fig. B

Loosen the four fastening screws (A) of the lock block on the handle (B), and remove the handle. Fig. C





## Control

### Control check

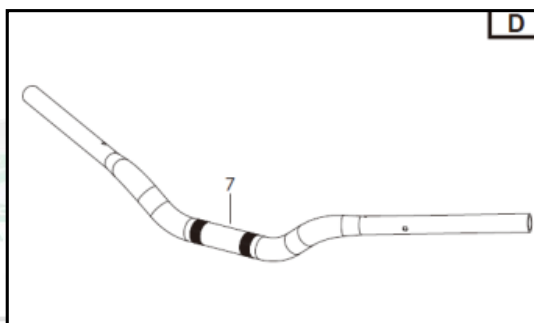
#### Check:

Handlebar (7). Fig. D

If there is bend/ breakage/damage, please replace it.

#### Warning

If the handle is bent, do not try to pull it straight, because the handle will become weak and this action is dangerous.



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## Control

### Control assembly

Prepare for the assembly, and conduct it in the reverse procedures of disassembly, but pay attention to the following contents:

#### Assembly:

Install the switches on the right combined switch (5) and left combined switch (8) handles. Align them with the projected part A of the switch. Hole B is on the right and left handle. Fig. E

Tighten the two screws (8) on the fixed cap of the oil pump (17), as shown in Fig. B, according to the following torque.



Torque 8N\*m

#### Note

Place the UP upwards when assembling the fixed cap on the oil pump. Fig. F. Fasten the screws on it.

There should be a clearance of 2mm between the right handle switch and the pump.

#### Assembly:

When holding the left grip, apply a thin layer of rubber adhesive at the end of the handlebar.

Slide the left grip to the handlebar. Ends of the left grip and the handlebar should be in a line.

Remove all traces of rubber adhesive with clean cloth.

#### Important

Do not touch the left grip until the rubber adhesive is completely dry.

#### Assemble:

##### Handle

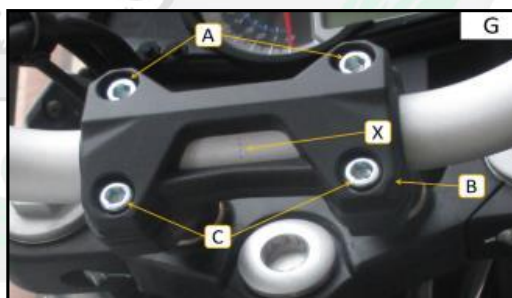
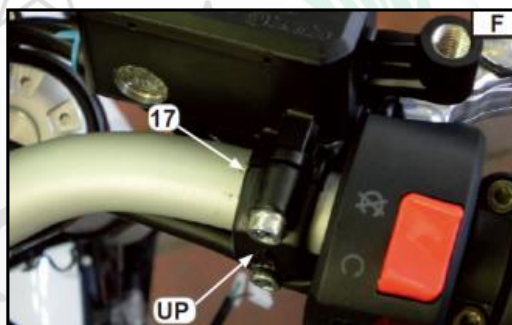
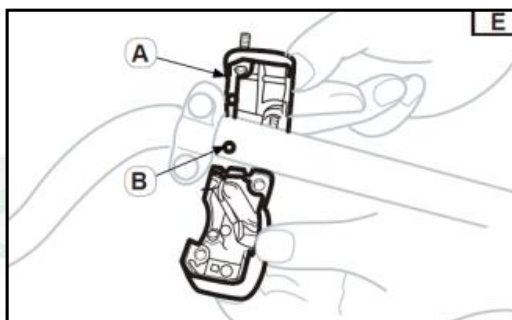
When assemble the handle, put the handle in the correct position, as shown in Fig. G, on the fourth reference mark X.

Tighten the two screws (C) near the fuel tank at the back first, and then tighten two screws (A) near the instrument in the front

Tighten the screws according to the following torque

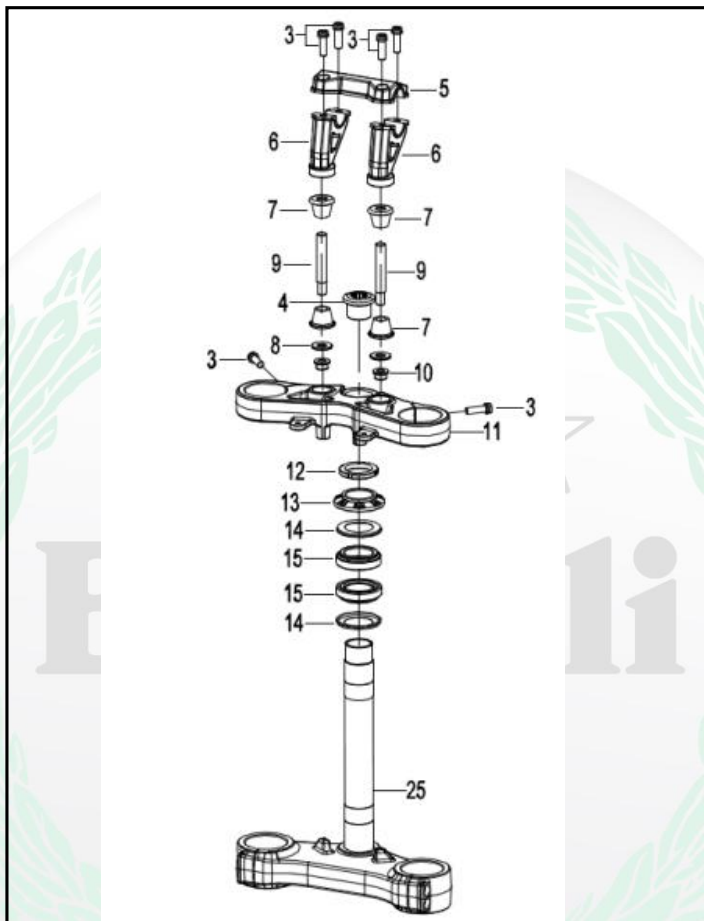


Torque 22N\*m



## Control/handlebar

### Disassembly of handlebar fixing stand



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
3	M8×1.25×25 bolt	4	10	M10×1.25 self-locking nut	2
4	Tightening screw on the upper connecting plate	1	11	Upper connecting plate	1
5	Upper holder block	1	12	Tightening nut on the upper connecting plate	1
6	Lower base of the handlebar	2	13	Gland nut	1
7	Silencer plug	4	14	Scraper seal	2
8	Locating washer of the handlebar	2	15	Steering bearing	2
9	Locating stud of the handlebar	2	25	Lower connecting plate component	1

## Control/handlebar

### Disassembly of handlebar fixing stand

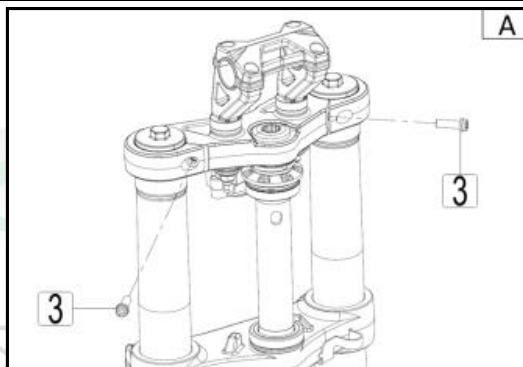
Park the motorcycle on flat ground.

#### Important

Support the motorcycle with appropriate parking rack, so that it will not topple without the front fork.

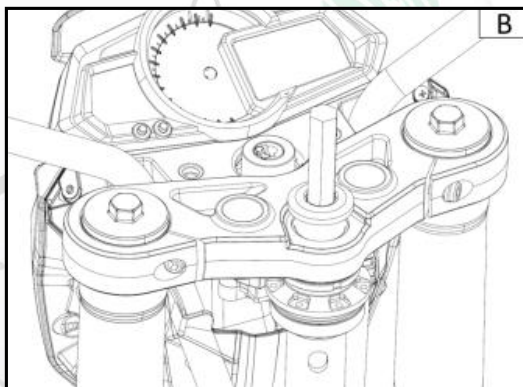
#### Disassemble:

Stop screws on the upper connecting plate (3). Fig. A



#### Disassembly:

Disassemble the tightening screws on the upper connecting plate with special tools. Fig. B



#### Loosen:

Tightening nut on the upper connecting plate

Gland nut

Locking tool used for locknuts of the steering head.

Fig. C



## Control/handlebar

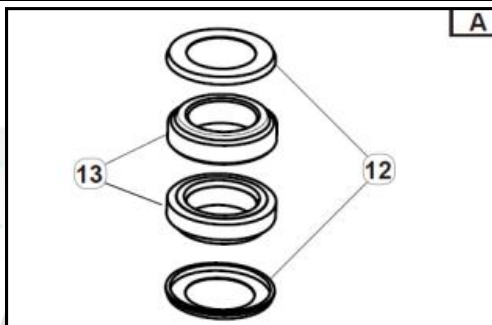
### Disassembly of handlebar fixing stand

#### Check:

Steering bearing (13). Fig. A

Scraper seal (12). 图 A

If there is any damage, replace them.



#### Replace

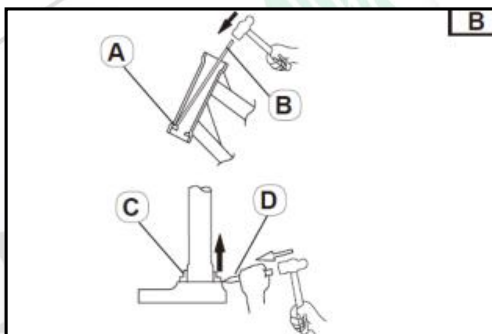
Bearing

Bearing rail

Remove the bearing outer ring (A) from the headstock tube of the motorcycle frame with a pole and a hammer (B). Fig. B

Remove the bearing inner ring (C) from the pillar with a chisel (D) and a hammer. Fig. B

Install a new rubber gasket and new bearing.



#### Important

If the bearing outer ring is not installed properly, the headstock tube will be damaged.

#### Note

Bearing ball and the bearing inner ring should be replaced together.

Each time the steering bearing is disassembled, a new rubber gasket should be installed.

#### Check:

Upper steering bearing

Lower steering bearing (and the bushing)

If there is any bend/crack/damage, replace them.



## Control/handlebar

### Disassembly of handlebar fixing stand

Lubricate:

Bearing ball, Fig. A

Bearing outer ring, Fig. A

Bearing inner ring, Fig. A

**Note:** Use lithium base grease on the steering bearing to prevent rust.

**Assembly:** assemble nuts on the steering ring with special tools according to the following torque:



Torque 16N\*m



Tighten the locknuts on the steering bushing.

#### Important

Do not over-tighten the steering ring nuts.

Tighten the steering ring nuts with special tools to the following torque:



Torque 60N\*m

**Assembly:** assemble the front shock absorber according to the above description.

**Assembly:** tighten the fastening screw on the upper connecting plate (4) with special tools to the following torque:



Torque 60N\*m



Steering head wench

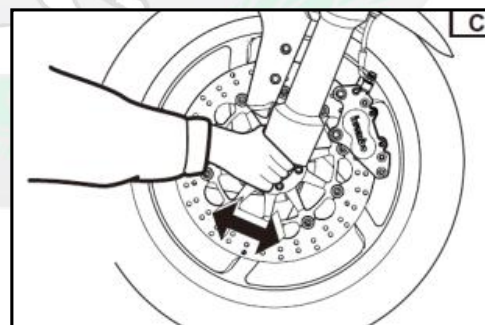
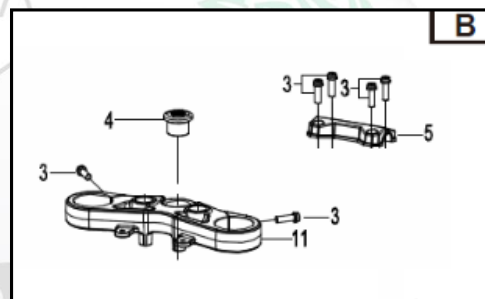
Fasten the stop screw on the upper connecting plate (3), as shown in Fig. B, according to the following torque:



Torque 22N\*m

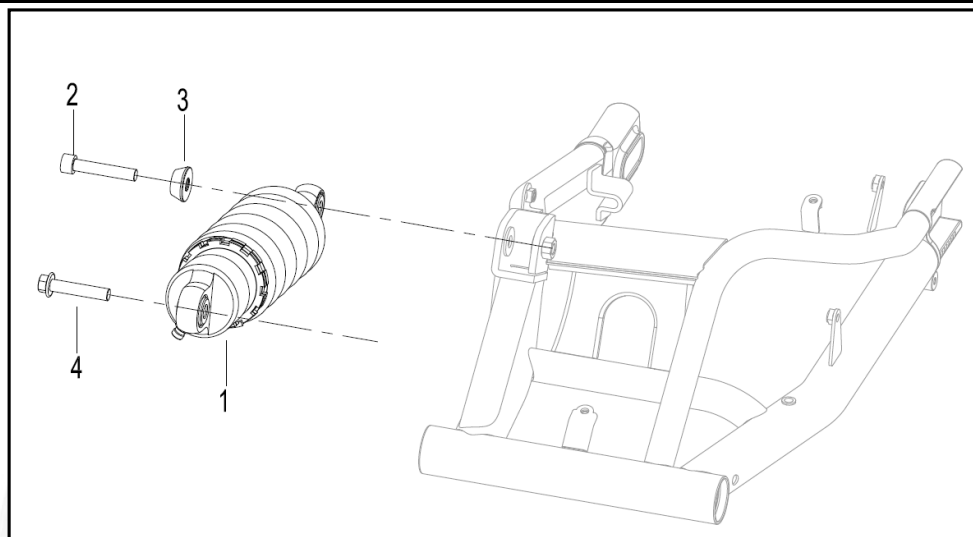
**Check:** Steering sleeve, Fig. C

Seize the end of the pipe, and rotate the front fork gently. If it is stuck/loose, adjust the steering.



## Rear shock absorber

### Disassembly of rear shock absorber



No.	Name and specifications	Quantity
1	Rear shock absorber component	1
2	Lower fixing bolts of the rear shock absorber	1
3	Lower decorating cushion of the rear shock absorber	1
4	Fixing bolts of the shock absorber	1

## Rear shock absorber

### Disassembly of rear shock absorber

Park the motorcycle on flat ground.

#### Important

Support the motorcycle with appropriate parking rack, so that it will not topple without the rear shock absorber.

#### Disassemble:

Screw (16)

Bolt (18), Fig. A



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## Rear shock absorber

### Check of rear shock absorber

Check:

Rear shock absorber rod 9, Fig. B

If there is any bent/damage, replace the rear shock absorber component.

Rear shock absorber cylinder 8, Fig.

B

If there is any gas/oil leakage, replace the rear shock absorber component.

Rear shock absorber spring 7, Fig. B

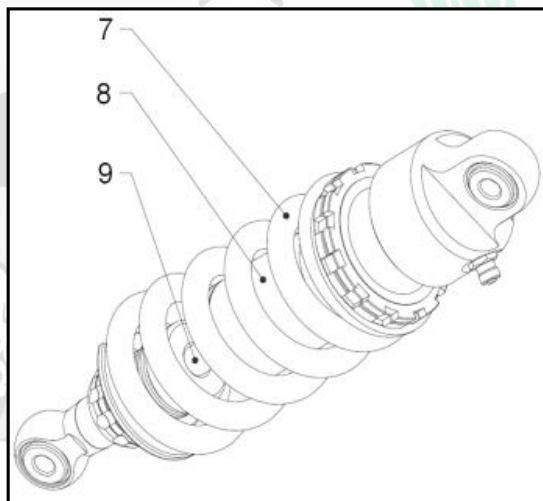
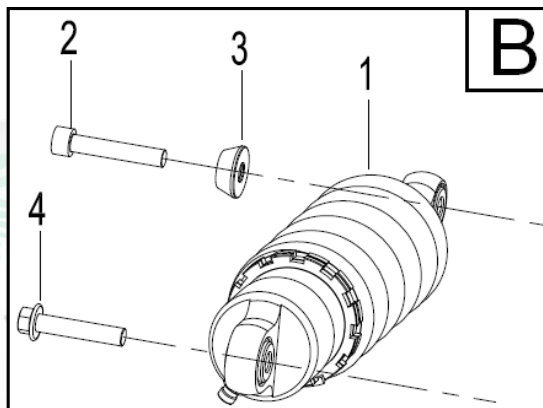
If there is any damage/wear, replace the rear shock absorber component.

Rear shock absorber scraper seal

If there is any damage or wear, replace it.

Bolt 4 and screw 2, Fig. B

If there is any bend/damage/wear, replace them.



## Rear shock absorber

### Assembly of the rear shock absorber

#### Assembly:

Assemble the bolt (4), as shown in Fig C, and tighten it to the following torque:



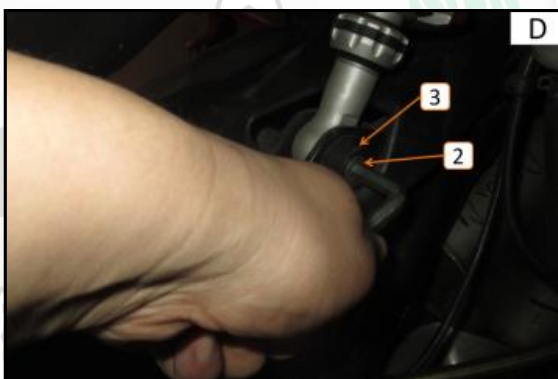
Torque 60N\*m



Assemble the screw (2) and decorating cushion (3) according to the following torque:



Torque 60N\*m





## Drive chain and rear swing arm

### Disassembly of drive chain

Park the motorcycle on flat ground.

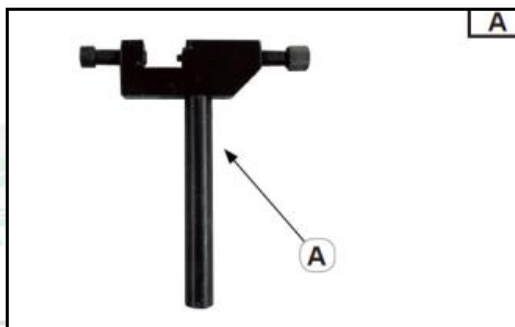
#### Important

Support the motorcycle with appropriate parking rack, so that it will not topple and the rear wheel can be lifted.

#### Remove:

Drive chain

(Use suitable tool for the drive chain (A), as shown in Fig. A, or use special tool for drive chain specified by the manufacturer)



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## Drive chain and rear swing arm

### Check of drive chain

**Check:** drive chain, Fig. C

O-ring (B)

Replace the damaged drive chain

Drive chain roller (D)

Replace the damaged/worn drive chain

Side plate of the drive chain (C)

Replace the damaged/worn drive chain

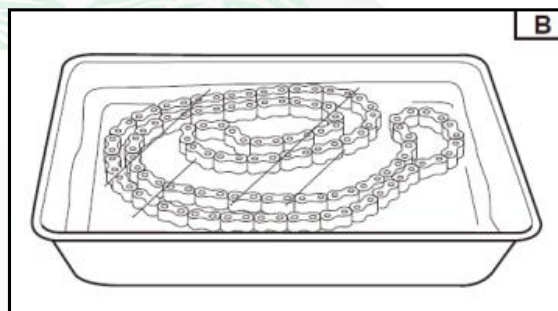
If there are any cracks, replace the drive chain.

**Clean:** drive chain, Fig. B

Use clean cloth to clean the drive chain.

Put the drive chain in neutral detergent and remove all the dirt.

Take the drive chain out of the neutral detergent and dry it thoroughly.



### Important

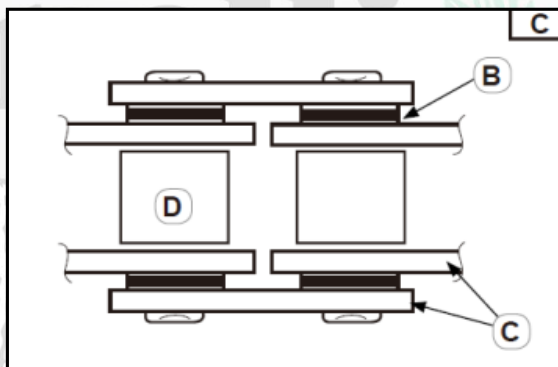
This motorcycle is equipped with drive chain.

There is a rubber O-ring (B) between every two chain plates.

Clean the drive chain. Do not use high pressure water shower or air. Do not use steam, gasoline, corrosive solvents (such as petroleum ether) or excessively hard brush.

Using high pressure will make dust come into the cavity of the drive chain, and corrosive solvents can cause deterioration of the O-ring.

O-ring will be damaged by excessively hard brush.



**Lubricate:** drive chain

It is recommended that only white grease is used to lubricate the drive chain.

## Drive chain

### Check of drive chain

Check: drive gear/rear serrated chain wheel.

Fig. A

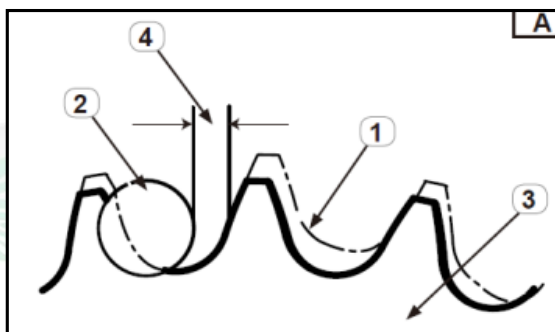
If the wear of each tooth is more than  $1/4$  (4), replace the drive chain and chain wheel together.

If the tooth is bent, replace the drive chain and chain wheel together.

#### Note

Assemble a new chain, and its chain wheel must not be worn.

Chain and chain wheel must be in good state, otherwise the new chain will be worn out quickly.



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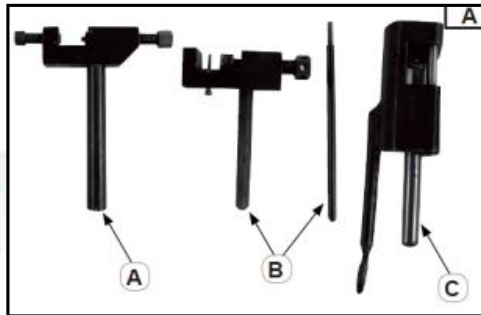
## Drive chain

### Replacement of the drive chain

#### Loosen: the drive chain

Loosen the transmission chain used by this chain and the main link with safety side plate.

Use special tools according to the manufacturer specification as well as the required type for use of chain. There are three tools to disassemble the main chain plate (A), assemble the side plate (B), and fasten the pin on the side plate (C) in Fig. A



#### Warning

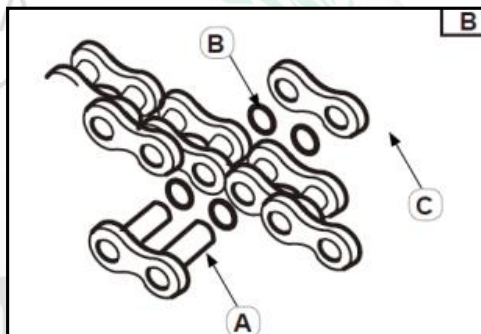
Never use old chain, main chain plate, main chain side plate, or rubber O-ring.

#### Insert:

Main chain plate (A), Fig. B

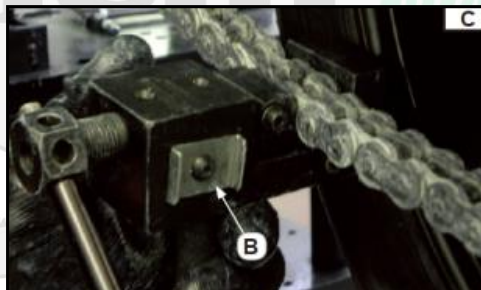
Rubber O-ring (B), Figure B

Main chain side plate (C), Fig. B



#### Important

Insert the chain plate in transmission chain, then assemble the side plate, and place the ID logo outwards.



#### Fastening:

Press the the main chain side plate against the main chain plate with tools for assembling the main chain side plate (B).

#### Clutch:

Nail the pin in the main chain plate (C) with special tools. Fig. D

#### Check:

There must be no openings on surfaces affected by the nailed main chain plate.

If there is any opening, replace the main chain plate, seal ring and side plate.

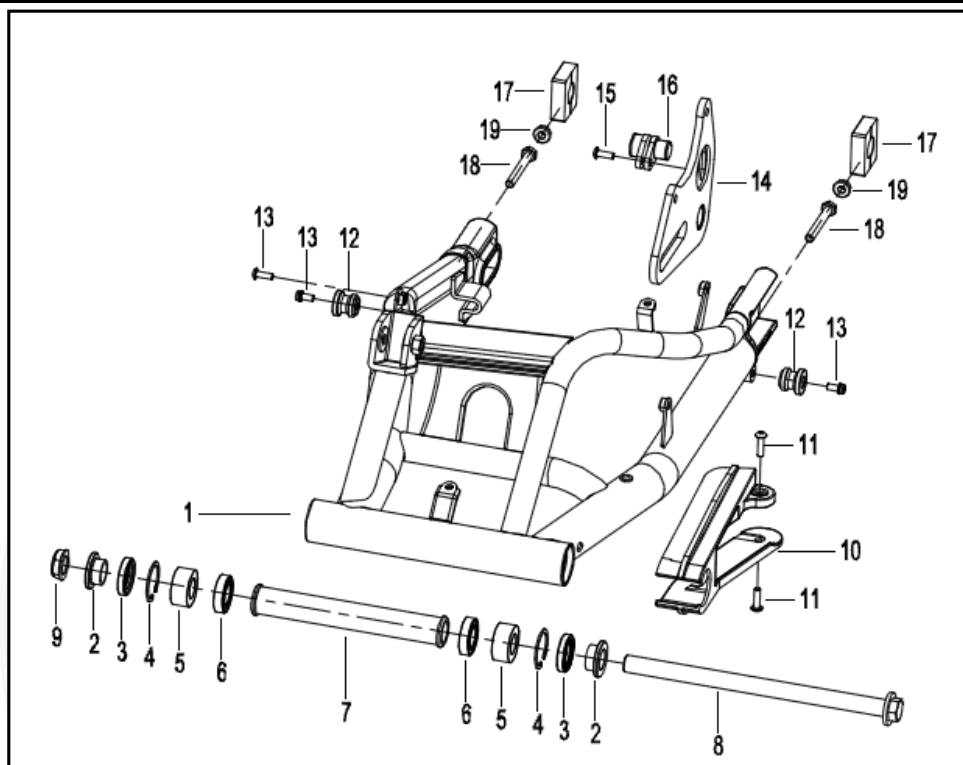
#### Important

Never use transmission chain of the main chain plate with clights.



## Drive chain and rear swing arm/ rear swing arm

### Assembly of the rear swing arm



No.	Name and specifications	Quantity	No.	Name and specifications	No.
1	Rear swing arm weld component	1	11	M6×19.2 screw	2
2	Rear swing arm outer spacer bush	2	12	Support sleeve	2
3	25×37×7 lip-type packing component	2	13	M6×30 bolt	2
4	φ37 circlip for hole	2	14	Rear hydraulic brake mounting plate component	1
5	NA4904 needle roller bearing	2	15	M6×14 screw	1
6	61904-2RS rolling bearing	2	16	Speed sensor	1
7	Rear swing arm intermediate shaft sleeve	1	17	Chain adjusting block	2
8	Rear swing arm assembling shaft	1	18	M8 chain adjusting screw	2
9	M20×1.5 self-locking nut	1	19	M8 nut	2
10	Chain protection block	1			



## Rear swing arm

### Assembly of the rear swing arm

#### Assemble:

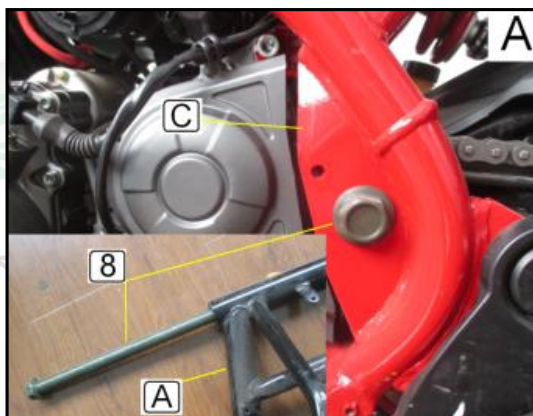
Rear swing arm component (A)

Rear swing arm shaft (8)

Arrange the rear swing arm components (A) in a row on both sides of the rear swing arm shaft (8).

Insert the swing arm shaft (5) from the left side of the motorcycle frame (C) to the right side.

Fig. A



#### Note

Use lithium base grease during assembly. Apply it on inner bores at both ends of the rear swing arm component (A). Fig. B



Screw the nut (9) on the rear swing arm shaft (8) which is fastened to the motorcycle frame, as shown in Fig. C, according to the following torque:



Torque 200N\*m



## Rear swing arm

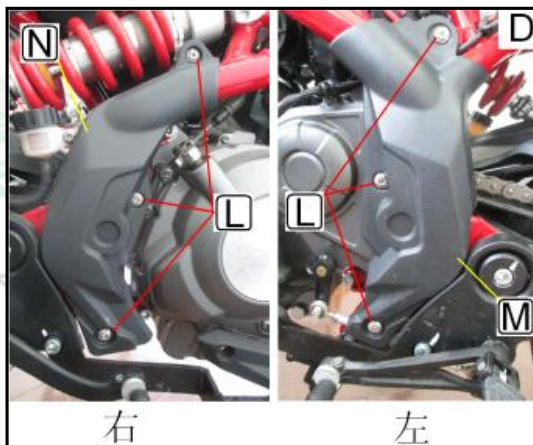
### Assembly of the rear swing arm

#### Assembly:

Install the right decorating plate (N) on the motorcycle frame, and fix it with screws (L);  
Install the left decorating plate (M) on the motorcycle frame, and fix it with screws (L); as shown in Fig. D, according to the following torque:



Torque 10N\*m



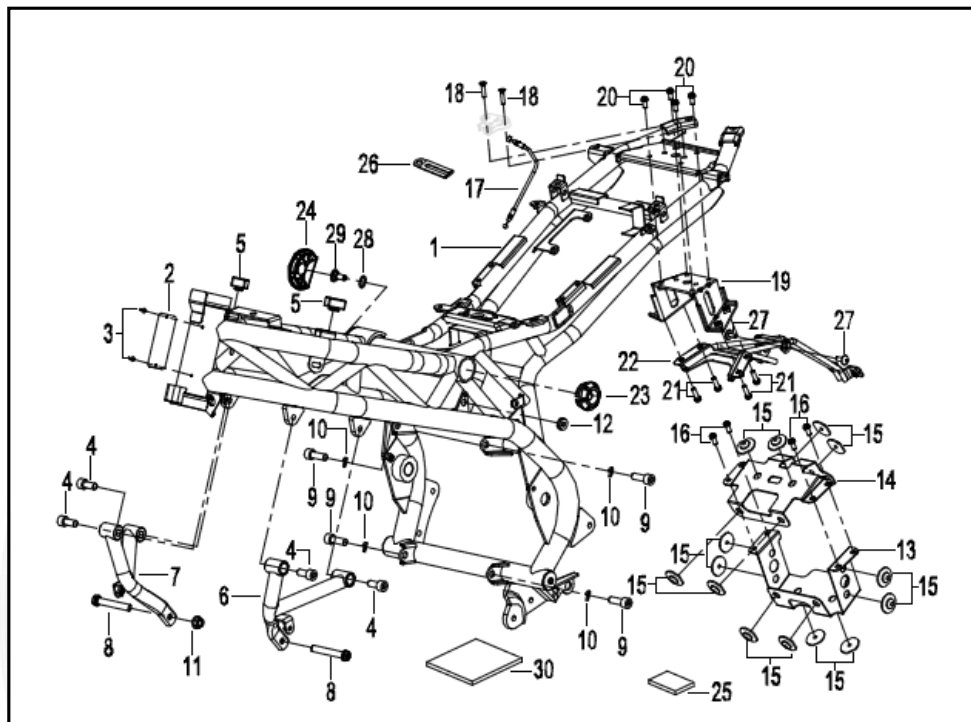
#### Assemble:

Rear shock absorber (see “rear shock absorber section”)

Rear wheel (see “rear wheel section”)

## Frame

### Frame assembly



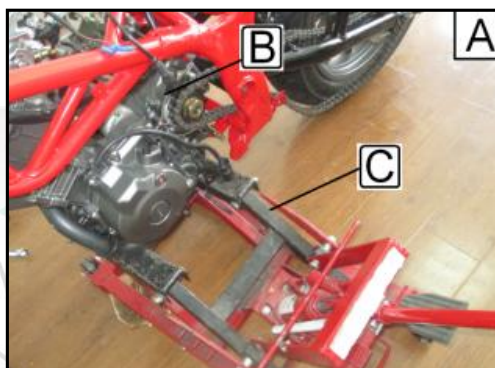
No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Welded assembly of frame	1	16	Screw M6×12-8.8-ZG	4
2	Name plate of frame	1	17	Steel rope assembly of seat cushion II	1
3	Rivet for name plate 3×6	2	18	Bolt M6×30	2
4	Socket head cap screw M10×22	4	19	Mounting plate assembly on rear fender	1
5	Bumper block	2	20	Bolt M6×1×16	4
6	Welded assembly of left power connecting support	1	21	Bolt M6×1×20	4
7	Welded assembly of right power connecting support	1	22	Welded assembly of rear fender support	1
8	Socket head cap screw M10×1.25×45	2	23	Left decorative cover (electroplated silver C9)	1
9	Socket head cap screw M10×30	4	24	Right decorative cover (electroplated silver C9)	1
10	Elastic washer 10	4	25	Spongy cushion of storage battery	1
11	Self-locking nut M10×1.25	1	26	Assembly of cable clight II	1
12	Backplate rubber cushion B	1	27	Screw M6×12	2
13	Battery support II	1	28	Gray nylon	1
14	Battery support assembly I	1	29	Screw M6×15.2	1
15	Rubber protecting ring	12	30	Spongy cushion of storage battery 65×25×4	1

## Frame / engine assembly

### Engine assembly

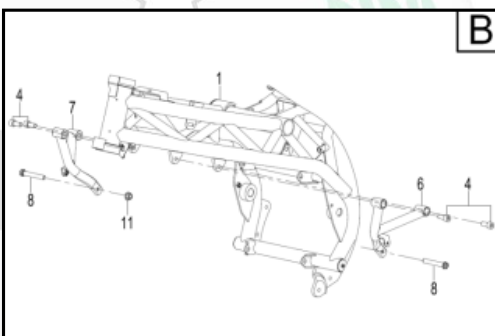
#### Important

Place the engine (B) on the appropriate liftable support (C) so that the engine or parts will not fall down by accident to injure the operators when assembling other motorcycle parts, as shown in Fig. A.



#### Assembly:

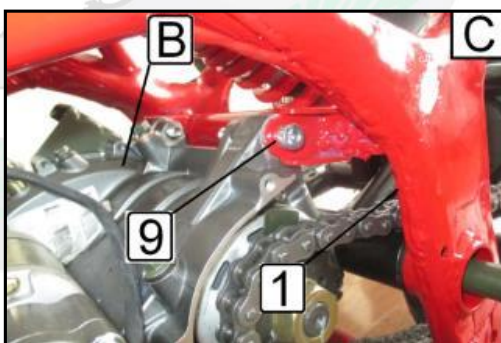
Assemble the welded assemblies of left power connecting support (6) and right power connecting support (7) on the frame (1), and slightly screw on the socket head cap screws (4) on both side of frame (1), as shown in Fig. B.



#### Assembly:

Raise the engine (B), and screw on four socket head cap screws (9) fastened on the back of engine and frame (1).

Screw on the rear upper left socket head cap screws (9) of the engine (B), as shown in Fig. C.



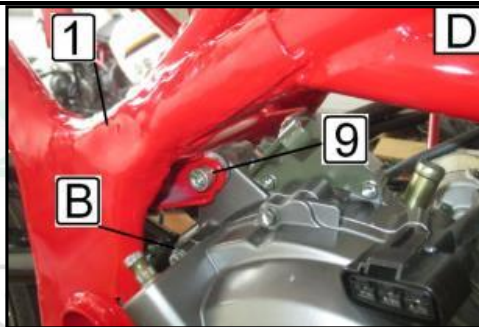


## Frame / engine assembly

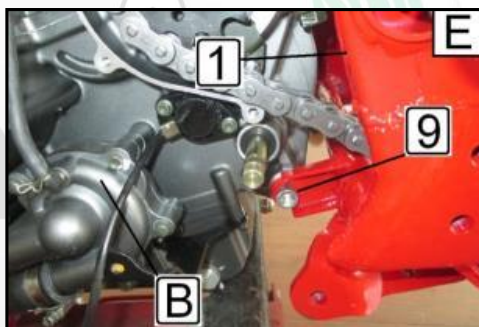
### Engine assembly

#### Assembly:

Screw on the rear upper right socket head cap screws (9) of the engine (B), as shown in Fig. D.



Screw on the rear lower left socket head cap screws (9) of the engine (B), as shown in Fig. E.



Screw on the rear lower right socket head cap screws (9) of the engine (B), as shown in Fig. F.





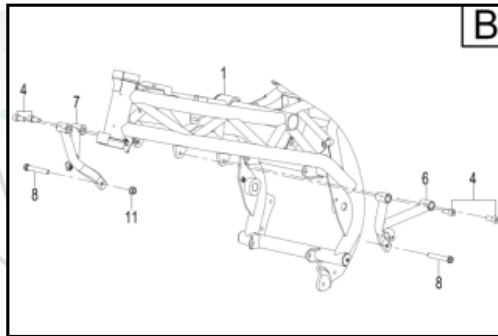
## Frame / engine assembly

### Engine assembly

#### Assembly:

Screw on the socket head cap screws (8) for slightly fixing the welded assembly of left power connecting support (6) and engine (B), as shown in Fig. B.

Screw on the socket head cap screws (8) for slightly fixing the welded assembly of right power connecting support (7) and engine (B), as shown in Fig. B.



#### Tightening:

Fasten the engine mounting screws in order, and mark them after fastening.

1. Four rear socket head cap screws (9) of frame / engine, as shown in Fig. C, D, E and F.
2. Two welded assemblies of front-left frame / left power connecting support (6) and socket head cap screws (4), as shown in Fig. B.
3. Two welded assemblies of front-right frame / right power connecting support (6) and socket head cap screws (4), as shown in Fig. B.
4. One socket head cap screw of front-left engine (8), as shown in Fig. B.
5. One socket head cap screw of front-right engine (8), as shown in Fig. B.

Use the thread sealant at the end of thread.



Tighten the fastening bolt to the following torque:



Torque: 45N\*m

## Frame / engine assembly

Engine disassembly
--------------------

Disassembly:

Conduct disassembly in inverse order to assembly.

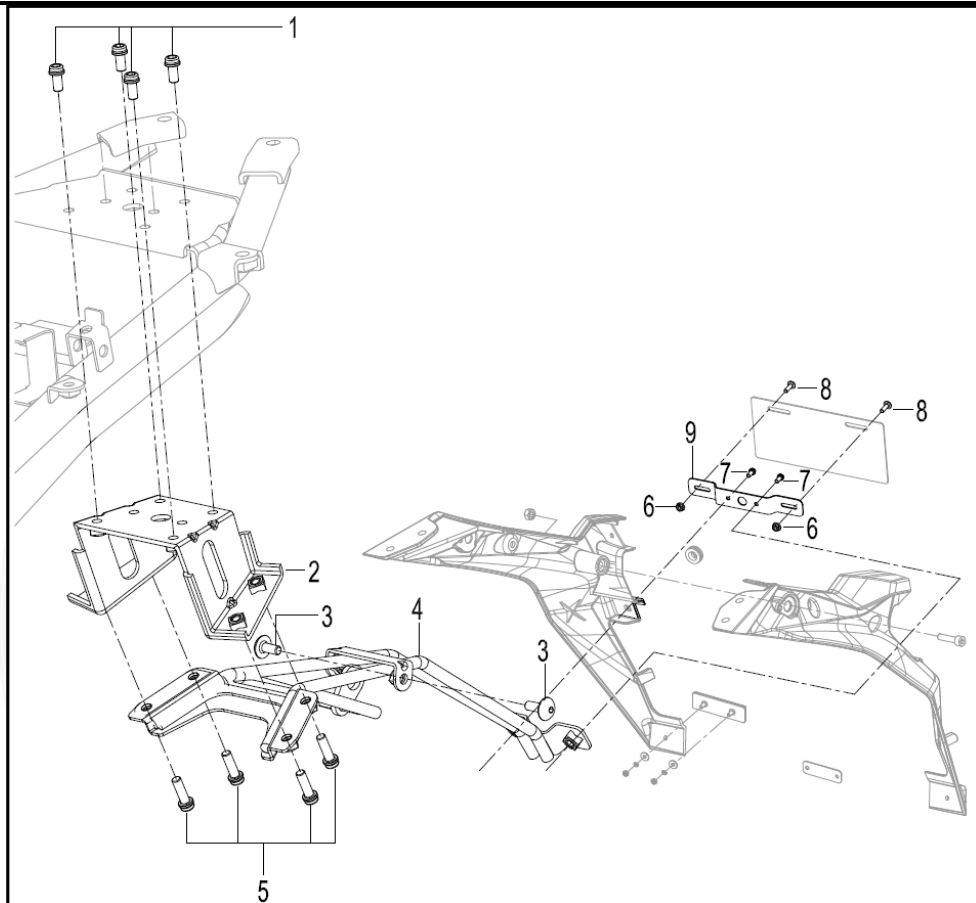
Note:

Disassemble fastening screws from the front to back.



## Frame / rear license plate support

### Assembly of rear license plate support



No.	Name and specifications	Quantity
1	Bolt M6×1×16	4
2	Mounting plate assembly on rear fender	1
3	Screw M6×12	2
4	Welded assembly of rear fender support	1
5	Bolt M6×1×20	4
6	Nut M6	2
7	Bolt M6×1×16	2
8	Bolt M6×16	2
9	License plate holder	1

## Frame / rear license plate support

### Assembly of rear license plate support

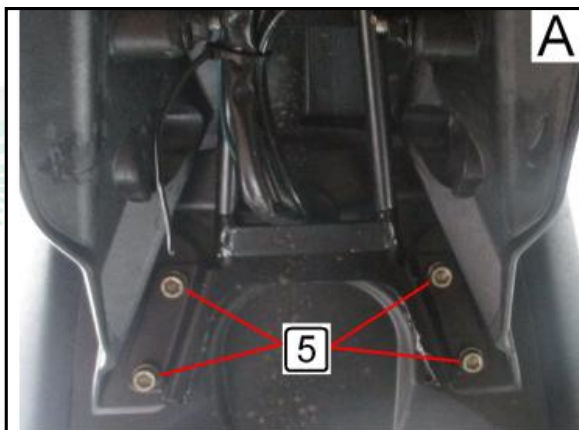
#### Assembly:

Assemble the rear fender, and screw four socket head cap screws (5) to the frame, as shown in Fig. A.

Tighten the fastening bolt to the following torque:



Torque: 10N\*m

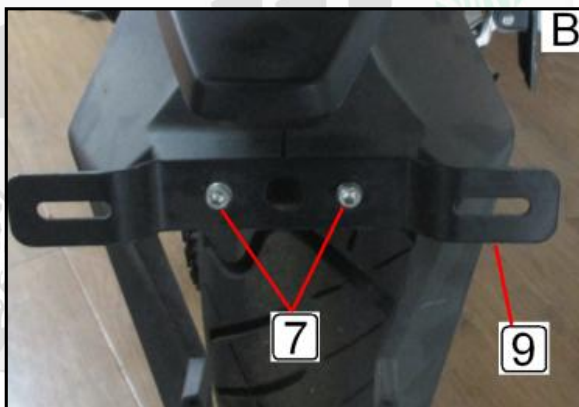


Screw two socket head cap screws (7) to the license plate support (9), and assemble it to the welded assembly of rear fender support (4), as shown in Fig. B.

Tighten the fastening bolt to the following torque:



Torque: 10N\*m



#### Connect:

Rear steering light and license plate light wires.

## Frame / rear license plate support

### Disassembly of rear license plate support

Disassembly:

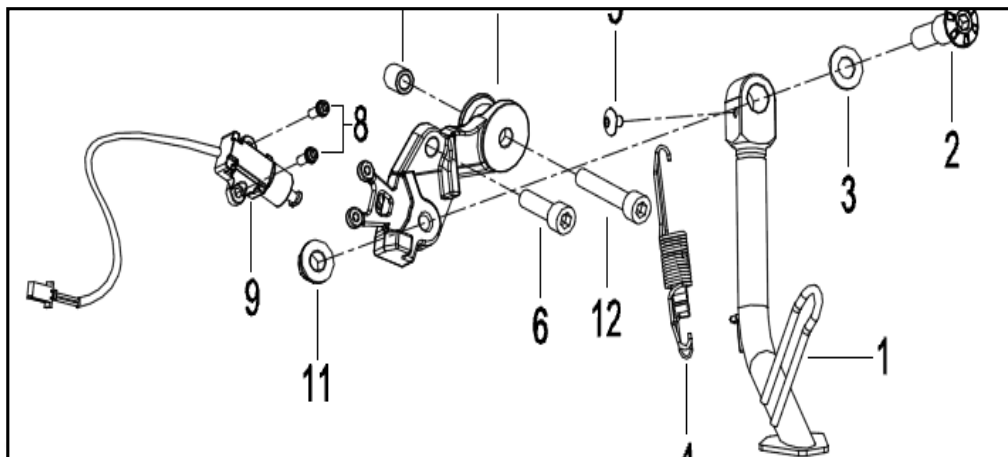
Conduct disassembly in inverse order to assembly.





## Frame / single stay

Assembly of single stay



No.	Name and specifications	Quantity
1	Welded assembly of single stay	1
2	Fitting screw of single stay	1
3	Mounting washer of single stay	1
4	Spring assembly of single stay	1
5	Bolt M6×8	1
6	Socket head cap screw M10×30	1
7	Mounting plate sleeve of single stay	1
8	Bolt M5×0.8×14	2
9	Flameout switch of single stay	1
10	Single stay Mounting support of single stay	1
11	Thin nut M12×1.25	1
12	Socket head cap screw M10×50	1

## Frame / single stay

### Assembly of single stay

#### Assemble:

Assemble the single stay supporting plate (5) on the frame using two fastening screws (X), as shown in Fig. A.

#### Note:

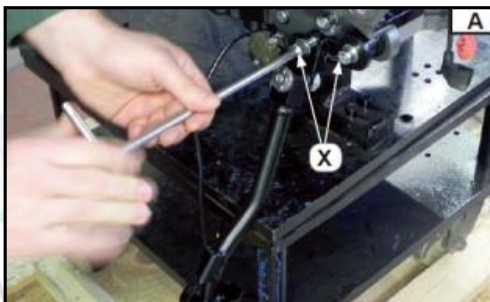
Use the thread sealant at the end of thread.



Fasten two bolts to the following torque:



Torque: 45N\*m



Assemble: inner screw (5) and outer screw (8).

Connect the flameout switch connector of single stay to the cable.

## Frame / single stay

### Disassembly of single stay

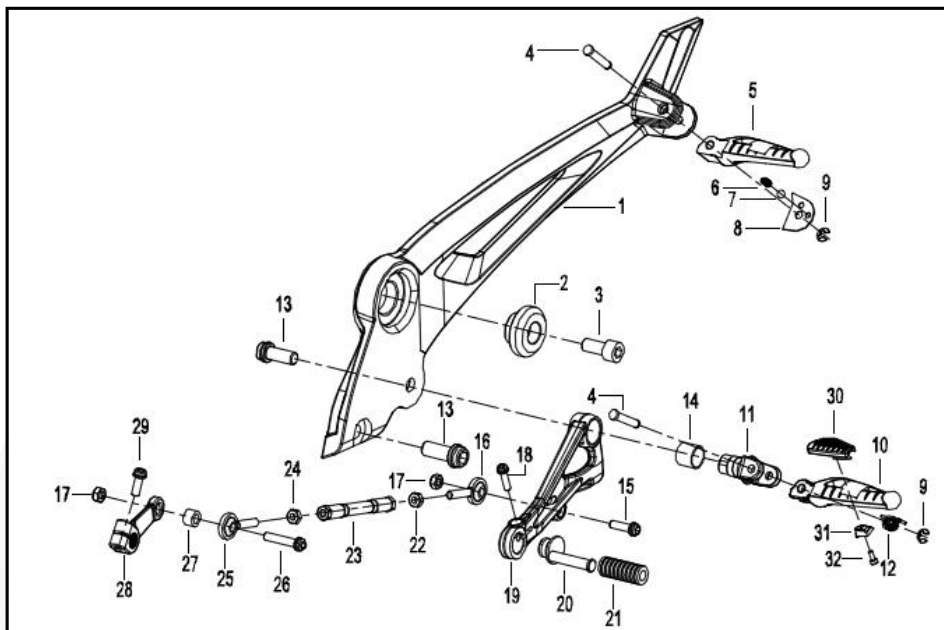
Disassembly:

Conduct disassembly in inverse order to assembly.



## Frame / left foot pedal

Assembly of left foot pedal



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Front-left foot pedal support	1	17	Nut M6	2
2	Assembling bushing of foot pedal support	1	18	Bolt M5×0.8×18	1
3	Socket head cap screw M10×22	1	19	Shift pedal lever	1
4	Rigging pin of foot pedal	2	20	Foot pedal of rear hydraulic brake	1
5	Rear-left foot pedal	1	21	Rubber of shift pedal lever	1
6	Front foot pedal spring	1	22	Nut M6-8-ZG	1
7	Foot pedal ball	1	23	Connecting rod of shift level	1
8	Mounting plate of foot pedal	1	24	Left nut M6	1
9	Closing ring φ5	2	25	M6 left connector	1
10	Left foot pedal	1	26	Screw M6×25-8.8-ZG	1
11	Fork bar	1	27	Sleeve	1
12	Foot pedal spring	1	28	Assembly stand of shift lever	1
13	Bolt M10×25	2	29	Bolt M6×1×20	1
14	Self-lubricating bushing	1	30	Rubber of left foot pedal	2
15	Bolt M6×30	1	31	Rubber pad of left foot pedal	2
16	Connector	1	32	Bolt M4×10	2

## Frame / left foot pedal

### Assembly of left foot pedal

#### Assemble:

Front-left foot pedal support (1), as shown in Fig. A.

#### Note

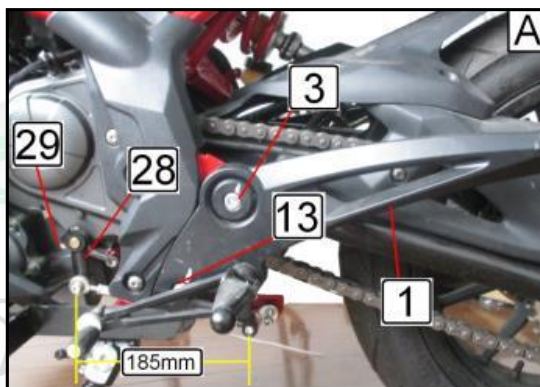
Use the thread sealant at the end of thread.



Fasten two screws (3) and bolts (13) to the following torque:



Torque: 45N\*m



#### Note

Please replace the damaged left foot pedal rubber.

#### Assembly:

Assemble the mounting seat of shift lever (28) on the shift spline shaft of engine, and lubricate it using lithium-based grease.

Fasten the fastening bolt (29) on the mounting base of shift lever.

#### Adjustment:

The distance between the connecting rod of shift level (23) and connectors (16) and (25) is 185mm, as shown in Fig. A.

#### Note

If necessary, change this item according to the comfort of cyclists.



## Frame / left foot pedal

Disassembly of front-left foot pedal
--------------------------------------

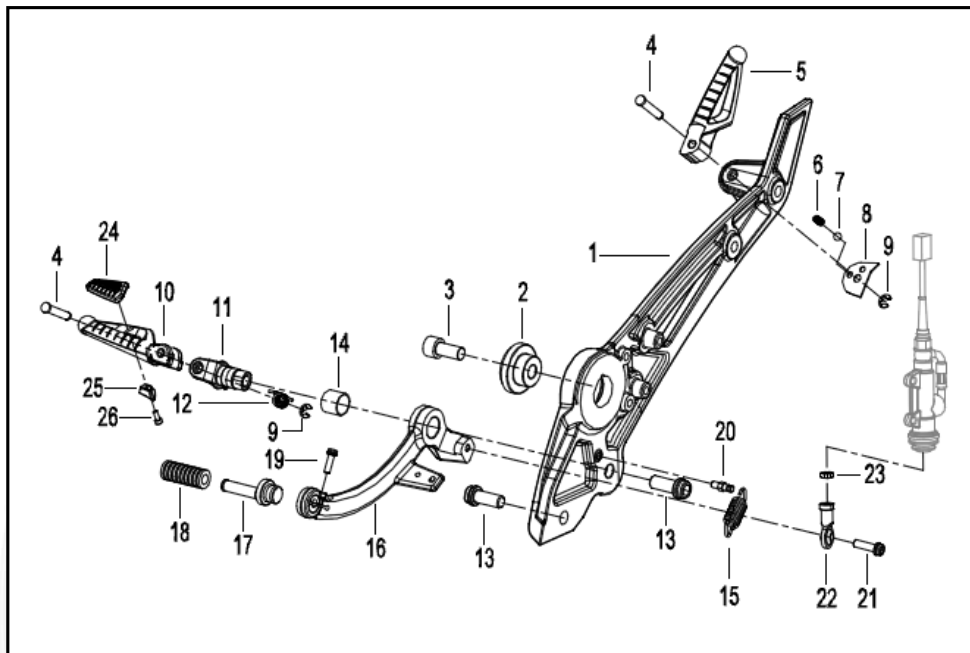
Disassembly:

Conduct disassembly in inverse order to assembly.



## Frame / right foot pedal

### Assembly of front-right foot pedal



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Front-right foot pedal support	1	14	Self-lubricating bushing	1
2	Assembling bushing of foot pedal support	1	15	Reset spring of brake pedal	1
3	Socket head cap screw M10×22	1	16	Brake pedal lever	1
4	Rigging pin of foot pedal	2	17	Foot pedal of rear hydraulic brake	1
5	Rear-right foot pedal	1	18	Rubber of shift pedal lever	1
6	Front foot pedal spring	1	19	Bolt M5×0.8×18	1
7	Foot pedal ball	1	20	Upper spring pin	1
8	Mounting plate of foot pedal	1	21	Screw M6×1×16	1
9	Closing ring φ5	2	22	Connector M6	1
10	Right foot pedal	1	23	Nut M6-8-ZG	2
11	Fork bar	1	24	Right foot pedal rubber	2
12	Foot pedal spring	1	25	Rubber pad of right foot pedal	2
13	Bolt M10×25	2	26	Bolt M4×10	2

## Frame / right foot pedal

### Assembly of front-right foot pedal

#### Assemble:

Front-right foot pedal support (1), as shown in Fig. A.

#### Note

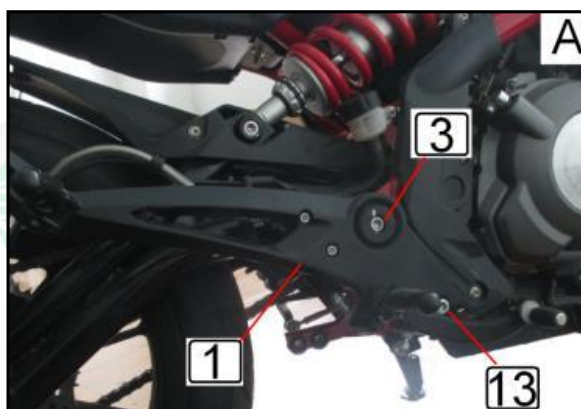
Use the thread sealant at the end of thread.



Fasten two screws (3) and bolts (13) to the following torque:



Torque: 45N\*m



#### Note

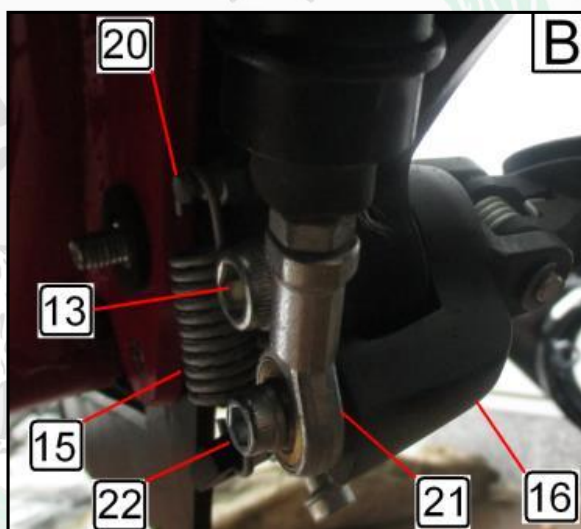
Please replace the worn right pedal foot rubber (24).

#### Assembly:

Assemble the brake pedal lever (22) on the supporting plate of foot pedal, insert the first bushing (14) and then screw (13) after greasing, as shown in Fig. B, and fasten it to the following torque:



Torque: 45N\*m



#### Assembly:

Fix the brake pedal lever (16) and ball connector (22) using the fastening screw (21), as shown in Fig. B, and fasten it to the following torque:



Torque: 10N\*m

#### Assembly:

Assemble the upper spring pin (20) on the front-right foot pedal support (1), as shown in Fig. B.

Assemble the reset spring of brake pedal (15) on the upper spring pin (20) of brake pedal lever (16).

## Frame / right foot pedal

Assembly of front-right foot pedal
------------------------------------

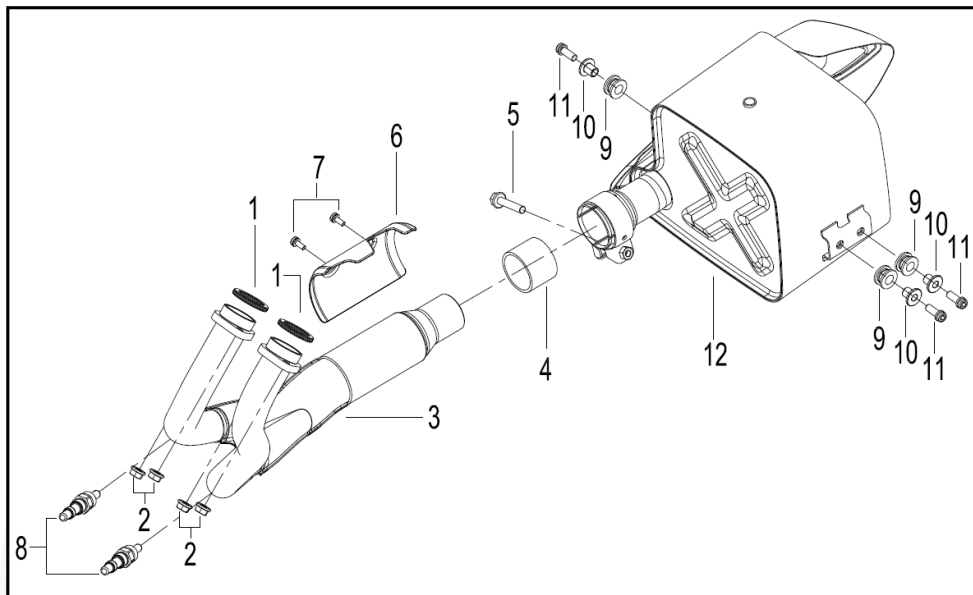
Disassembly:

Conduct disassembly in inverse order to assembly.



## Muffler

### Muffler assembly



No.	Name and specifications	Quantity
1	Sealing gasket assembly of exhaust pipe	2
2	Nut M8	4
3	Exhaust pipe assembly	1
4	Graphite lining ring	1
5	Rear carrier screw II	1
6	Catalytic thermal protective plate	1
7	Combination screw M6×12	2
8	Oxygen sensor	2
9	Rubber boot II	3
10	Backplate bushing	3
11	Bolt M8×1.25×25	3
12	Barrel assembly	1



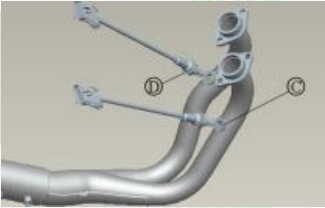


Muffler

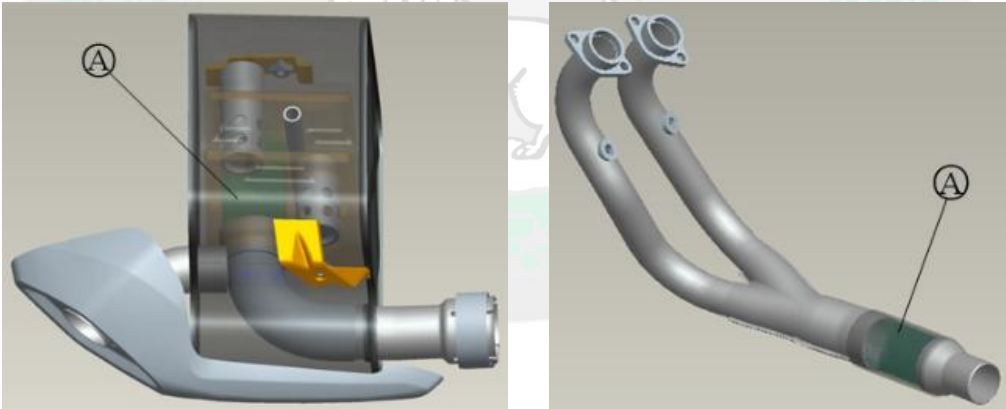
Muffler
---------

Exhaust system

Manifold	Muffler body
<b>Honeycomb catalyst</b>  Sign: N12-1	<b>Honeycomb catalyst</b> Sign: N12-1 CCC noise emission and control information
<b>Honeycomb catalyst</b>  Sign: C5390	<b>Honeycomb catalyst</b> Sign: C5390 European III noise emission and control information

Manifold mark position [A]	Mark position of muffler body	Porous manifold [C] of oxygen sensor [D]
		

The position of honeycomb catalyst [A]



## Muffler

### Muffler disassembly

**Parking:** Park the motorcycle on a flat ground.

**Note:**

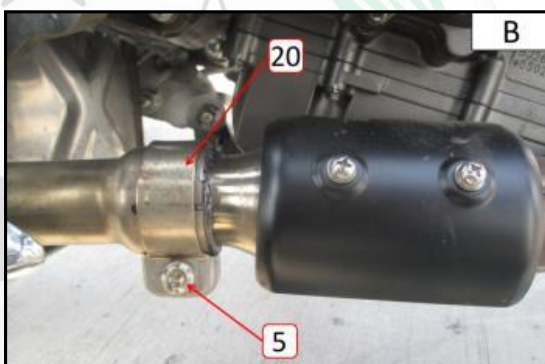
Support the motorcycle with an appropriate stander to prevent it from tipping.

**Disassembly:**

Disassemble the nut fastening the flange of exhaust pipe and engine, as shown in Fig. A.



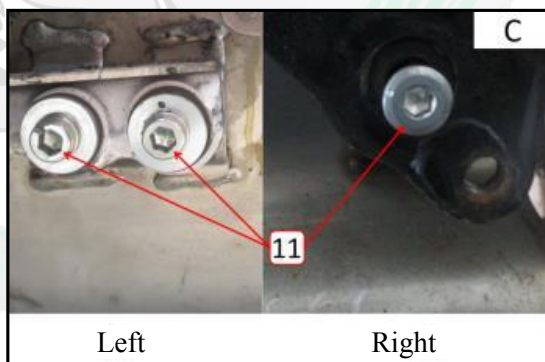
Unscrew the socket head cap screw (5) on the clight (20), as shown in Fig. B.



Disassemble the socket head cap screw (11) fastening the muffler barrel, as shown in Fig. C.

**Note:**

Disassemble the right foot pedal followed by disassembling the socket head cap screw (11) on the right (see Chapter IV “Frame / right foot pedal” of “Motorcycle”).



Left

Right

## Muffler

### Muffler assembly

#### Assembly:

Assemble the oxygen sensor (8) on the exhaust pipe (3), as shown in Fig. A, and fasten it to the following torque.



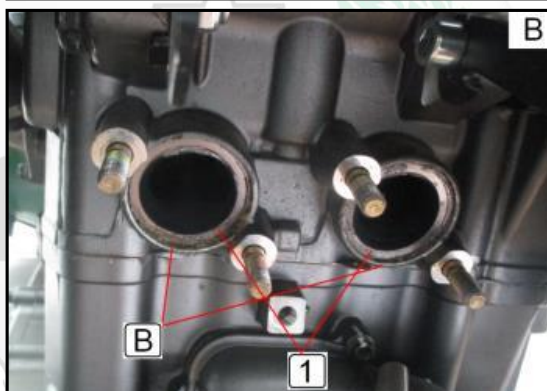
Torque: 40-60 N\*m



Apply lubricating grease to two exhaust outlets (B) of engine, and install the exhaust pipe gasket (1), as shown in Fig. B.

#### Note

Apply lubricating grease to the exhaust pipe gasket to keep it stuck on the engine exhaust outlet, as shown in Fig. B.



Slightly screw the nut (2) on the double-screw bolt, as shown in Fig. C.

#### Note

Conduct this operation for all double-screw bolts.



## Muffler

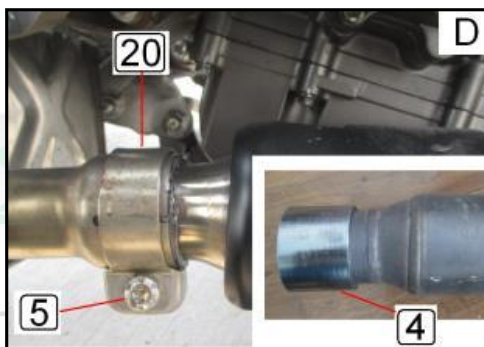
### Muffler assembly

#### Assembly:

Assemble the graphite gasket (4) on the exhaust pipe, as shown in Fig. D.

#### Note

Slightly screw the screw (5) in the clight (20), as shown in Fig. D.



#### Assembly:

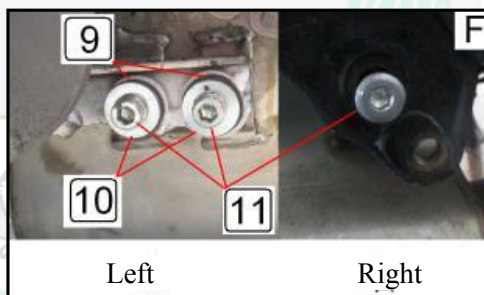
Insert the exhaust manifold in the muffler barrel to align the bottom surface of graphite gasket (4) with the inlet pipe surface of muffler barrel, as shown in Fig. E.



Assemble the muffler barrel. Assemble the rubber boot II (9), backplate bushing (10) and then screw (11) on the frame, and fasten it to the following torque.



Torque: 22N\*m



#### Fastening:

Fasten the nut (2) at the exhaust port of engine, as shown in Fig. C, to the following torque.



Torque: 25N\*m

Fasten the socket head cap screw (5) of clight (20), as shown in Fig. D, to the following torque.

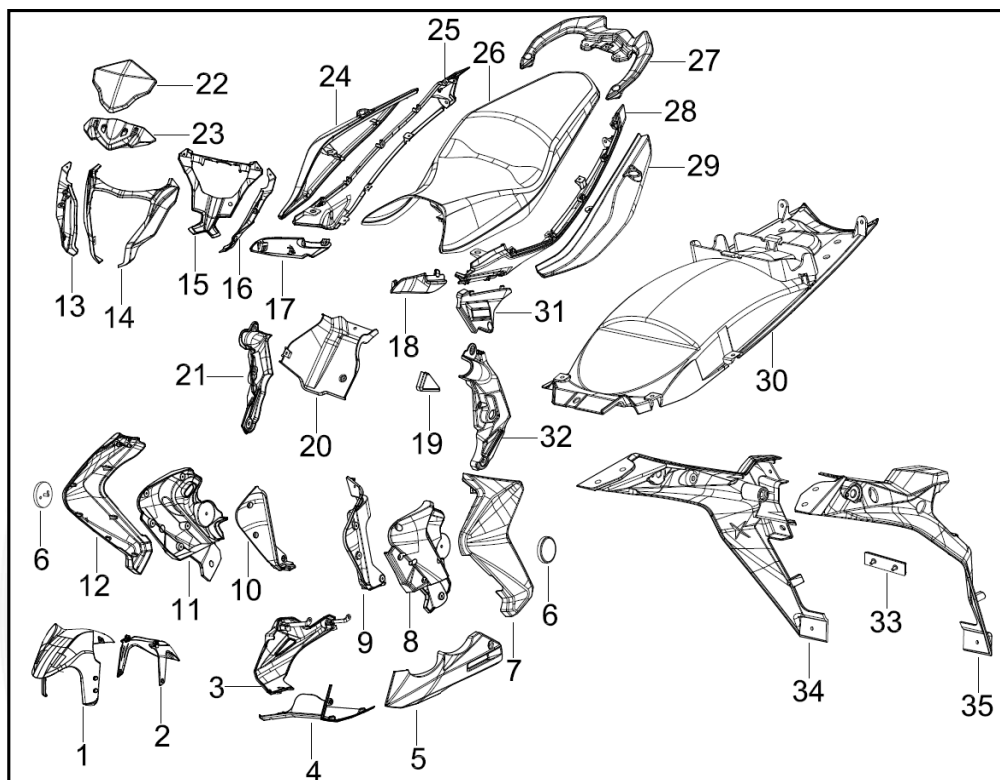


Torque: 22N\*m



## Covering parts

Covering parts

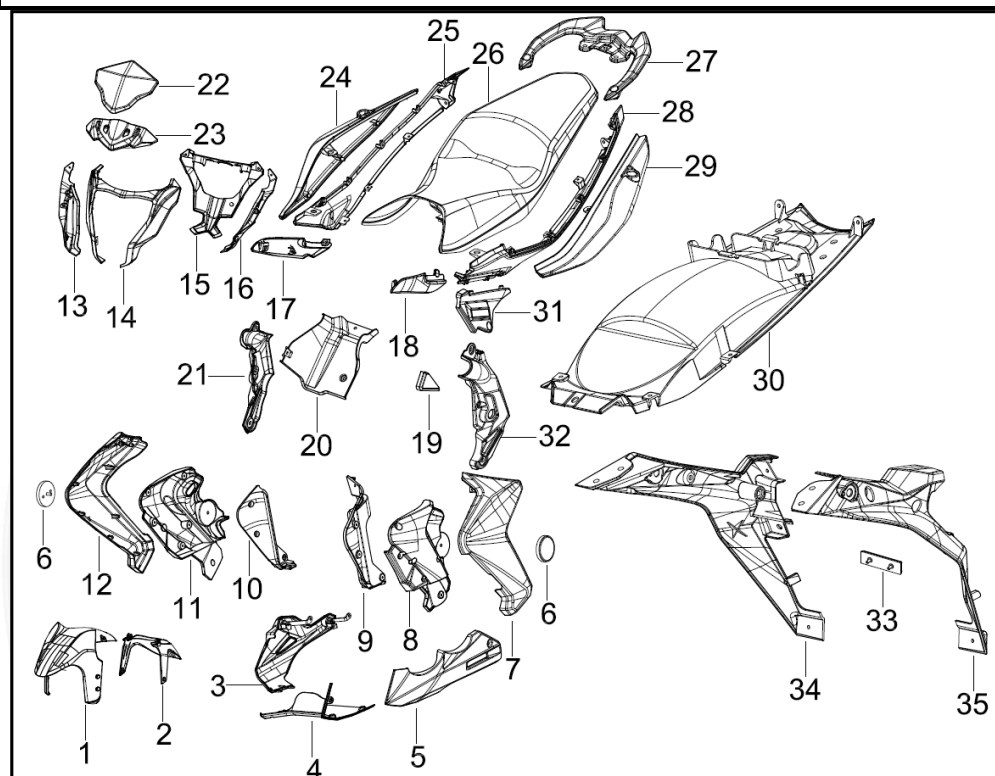


No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Front fender	1	15	Rear decorative plate of fairing	1
2	Small front fender	1	16	Rear decorative plate of left fairing	1
3	Right power bottom cover	1	17	Right decorative plate of fuel tank	1
4	Gusset plate of power bottom cover	1	18	Left decorative plate of fuel tank	1
5	Left power bottom cover	1	19	Left decorative cap of frame	1
6	Side reflector assembly	2	20	Right backplate	1
7	Left fuel tank guard	1	21	Right decorative plate	1
8	Inner baffle of left fuel tank guard	1	22	Sun visor of speedometer	1
9	Decorative plate of left fuel tank guard	1	23	Lower cover of instrument	1
10	Decorative plate of right fuel tank guard	1	24	Rear-right trail cover	1
11	Inner baffle of right fuel tank guard	1	25	Rear lower right trail cover	1
12	Right fuel tank guard	1	26	Seat cushion assembly	1
13	Rear decorative plate of right fairing	1	27	Rear armrest	1
14	Fairing	1	28	Rear lower left trail cover	1



## Covering parts

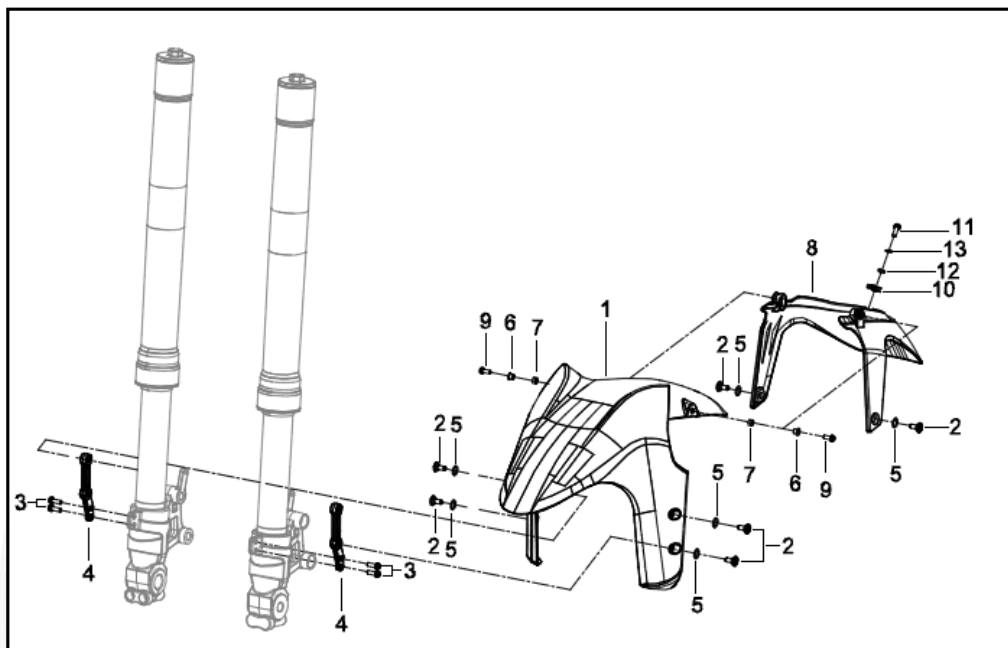
Covering parts



No.	Name and specifications	Quantity
29	Rear-left trail cover	1
30	Front of rear fender	1
31	Left backplate	1
32	Left decorative plate	1
33	Rear reflector	1
34	Right piece of rear fender	1
35	Left piece of rear fender	1

## Covering parts / front fender

### Assembly of front fender



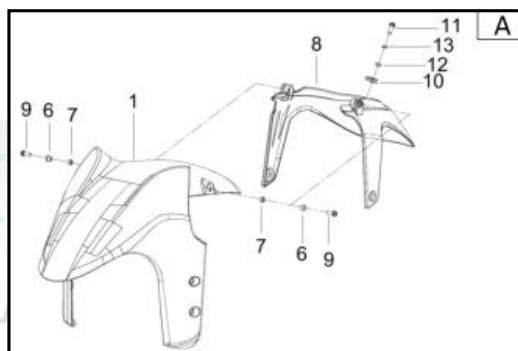
No.	Name and specifications	Quantity
1	Front fender	1
2	Screw M6×15.2	6
3	Screw M6×14	4
4	Mounting plate of front fender	2
5	Gray nylon	6
6	T-type bushing 5×7×6×10×0.8	2
7	Nut M5	2
8	Small front fender	1
9	Bolt M5×0.8×14	2
10	Clighting nut for backplate assembly	1
11	Screw 5×12	1
12	Gasketφ5	1
13	Spring washerφ5	1

## Covering parts / front fender

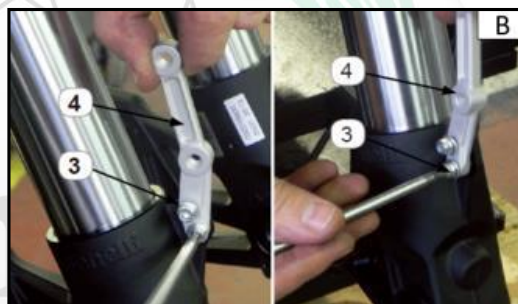
### Assembly of front fender

#### Assembly:

Assemble the front fender (1) and the small front fender (8) together, as shown in Fig. A.



Assemble the mounting plate of front fender (4) and their screws (3) at the bottom of two front forks, as shown in Fig. A.



#### Assembly:

Assemble the front fender (1), small front fender (8) and their fastening screws (2) on both sides, as shown in Fig. C.



## Covering parts / front fender

Disassembly of front fender
-----------------------------

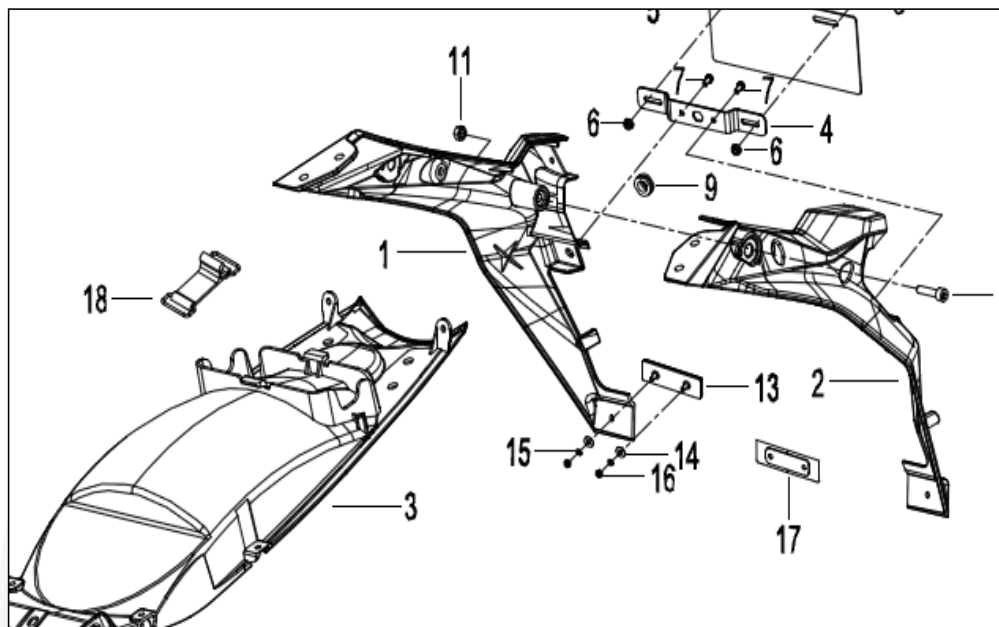
Disassembly:

Conduct disassembly in inverse order to assembly.



## Covering parts / rear fender

### Assembly of rear fender



No.	Name and specifications	Quantity
1	Right piece of rear fender	1
2	Left piece of rear fender	1
3	Front of rear fender	1
4	License plate holder	1
5	Rear license plate	1
6	Nut M6	2
7	Bolt M6×1×16	2
8	Bolt M6×16	2
9	Rubber cushion of rear fender I	1
10	Decorative screw M6×25	1
11	Nut M6	1
12	Ring nut M6	1
13	Rear reflector	1
14	Gasketφ5	2
15	Spring washerφ5	2
16	Nut M5	2
17	Fixing plate of rear reflector	1
18	Basic tool bandage	1



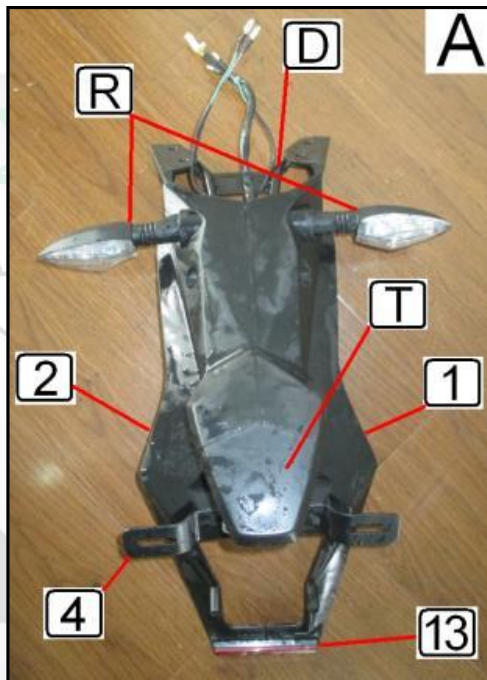
## Covering parts / rear fender

### Assembly of rear fender

#### Assembly:

Assemble the right piece of rear fender (1), left piece of rear fender (2) and the welded assembly of rear fender support (D) together, as shown in Fig. A.

Install the license plate holder (4), rear reflector (3), rear left and right steering lights (R) and rear plate light (T) on the rear backplate assembly, as shown in Fig. A.



Install the front of rear fender (3) on the motorcycle, as shown in Fig. B.



## Covering parts / rear fender

### Assembly of rear fender

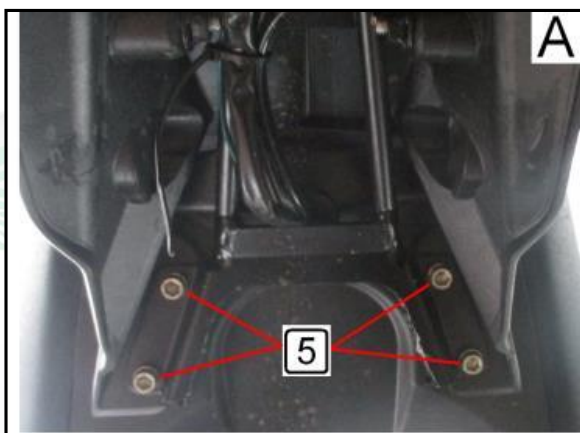
#### Assembly:

Screw four screws (5) into the assembled rear fender, and assemble it on the frame, as shown in Fig. A.

Fasten four screws to the following torque:



Torque: 10N\*m



## Covering parts / rear fender

Disassembly of rear fender
----------------------------

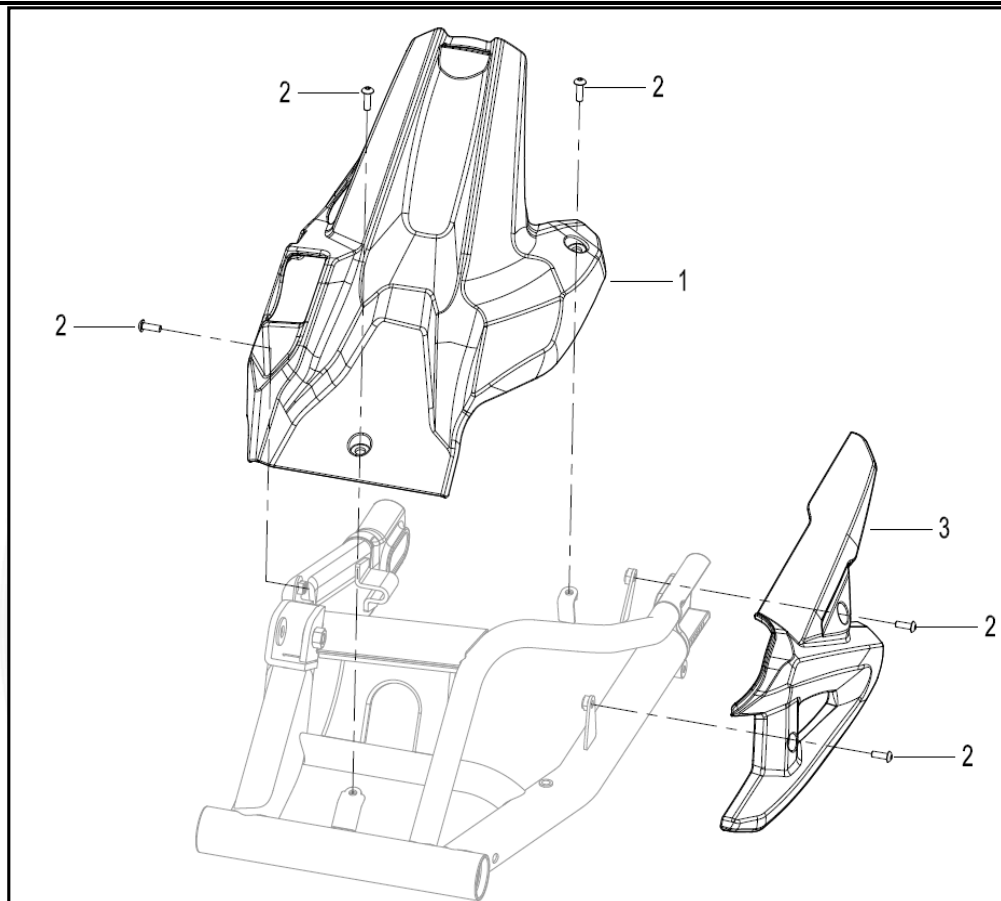
Disassembly:

Conduct disassembly in inverse order to assembly.



## Assembly of covering parts / rear lower fender and chain cover

Assembly of rear lower fender and chain cover



No.	Name and specifications	Quantity
1	Rear lower fender	1
2	Screw M6×15.2	5
3	Chain cover	1

## Covering parts / rear lower fender and chain cover

### Assembly of rear lower fender and chain cover

#### Assembly:

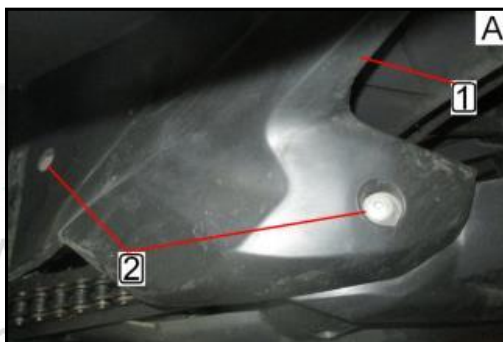
Assemble the rear lower fender (1) on the rocker arm, and assemble their fastening screws (2), as shown in Fig. A and B.

#### Note:

Fasten three screws to the following torque:



Torque: 10N\*m



#### Assemble:

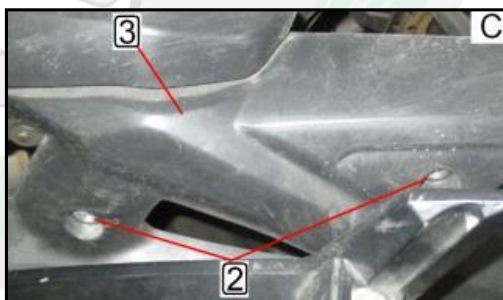
Assemble the chain cover (3) on the rocker arm, and assemble their fastening screws (2), as shown in Fig. C.

#### Note:

Fasten two screws to the following torque:



Torque: 10N\*m





## Covering parts / lower rear fender and chain cover

Assembly of rear lower fender and chain cover
---

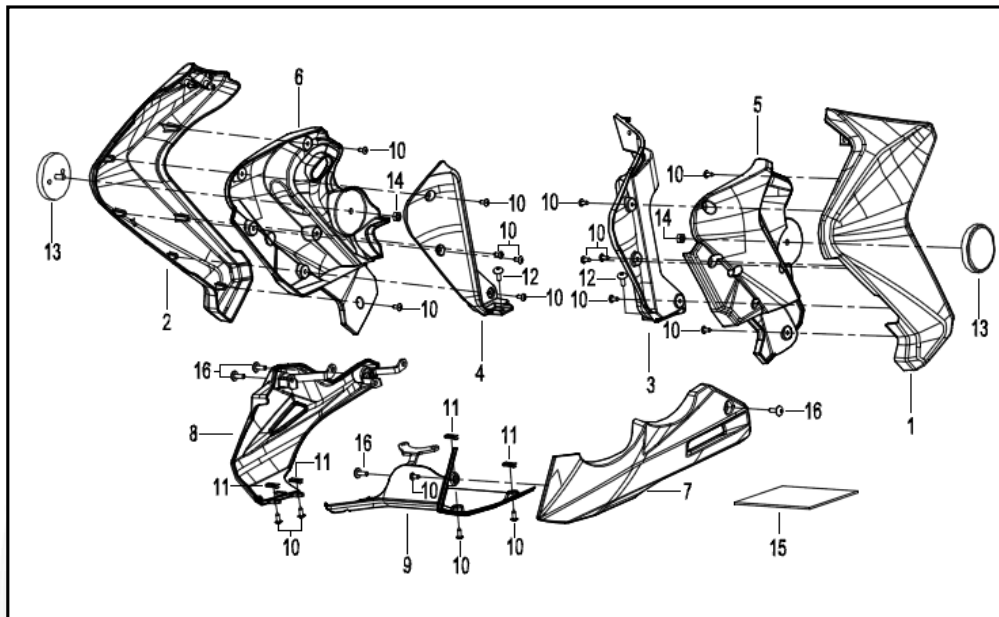
Disassembly:

Conduct disassembly in inverse order to assembly.



## Covering parts / fuel tank guard and power bottom cover

### Assembly of fuel tank guard and power bottom cover



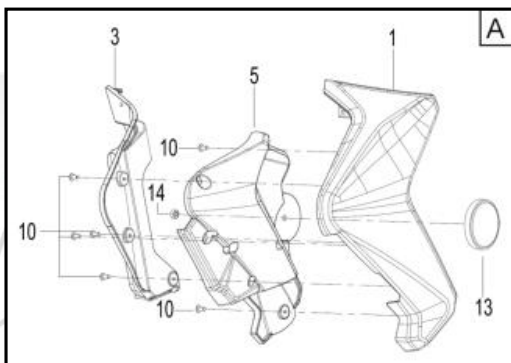
No.	Name and specifications	Quantity
1	Left fuel tank guard	1
2	Right fuel tank guard	1
3	Decorative plate of left fuel tank guard	1
4	Decorative plate of right fuel tank guard	1
5	Inner baffle of left fuel tank guard	1
6	Inner baffle of right fuel tank guard	1
7	Left power bottom cover	1
8	Right power bottom cover	1
9	Gusset plate of power bottom cover	1
10	Self-tapping screw ST4.2×13	17
11	Card ST4.2	4
12	Screw M6×14	2
13	Side reflector assembly	2
14	Nut M5	2
15	Tin foil paper of power bottom cover	1
16	Screw M6×15.2	6

## Covering parts / fuel tank guard and power bottom cover

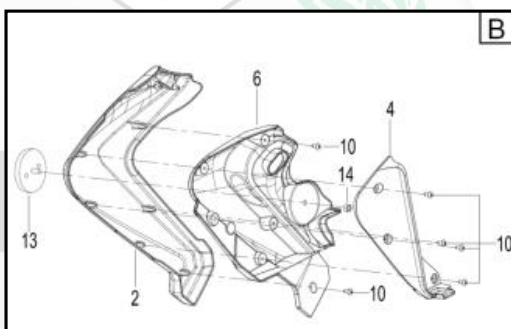
### Assembly of fuel tank guard

#### Assembly:

Assemble the left fuel tank guard (1), decorative plate of left fuel tank guard (3), inner baffle of left fuel tank guard (5) and side reflector assembly (13) together using the self-tapping screw (10), as shown in Fig. A.



Assemble the right fuel tank guard (2), decorative plate of right fuel tank guard (4), inner baffle of right fuel tank guard (6) and side reflector assembly (13) together using the self-tapping screw (10), as shown in Fig. B.

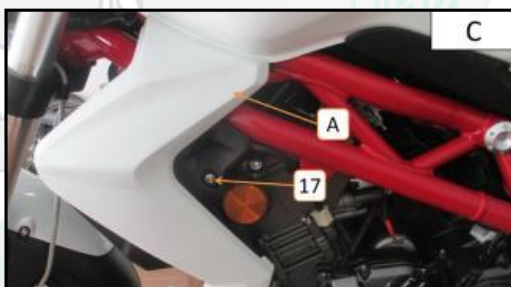


Assemble the assembled left fuel tank guard assembly (A) on the motorcycle, as shown in Fig. C.

Fasten the screw (17) to the following torque:



Torque: 10N\*m



Assemble the assembled right fuel tank guard assembly (B) on the motorcycle, as shown in Fig. D.

Fasten the screw (17) to the following torque:



Torque: 10N\*m



## Covering parts / fuel tank guard and power bottom cover

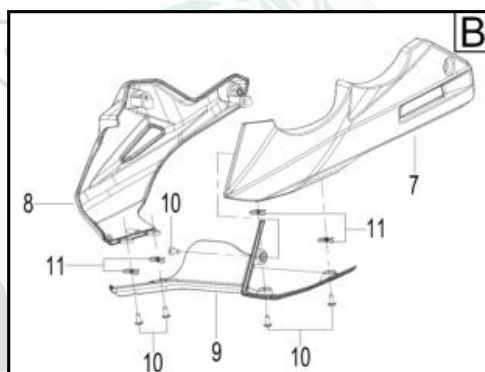
### Assembly of power bottom cover

#### Assembly:

Stick the tin foil paper of power bottom cover (15) on the gusset plate of power bottom cover (9), as shown in Fig. A.



Assemble the left power bottom cover (7), right power bottom cover (8) and gusset plate of power bottom cover (9) together using the self-tapping screw (10), as shown in Fig. B.



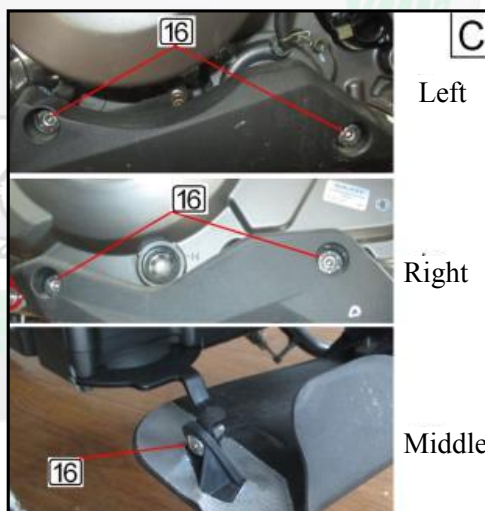
Assemble the assembled power bottom cover assembly on the motorcycle using the screw (16), as shown in Fig. C.

#### Note:

Fasten the screw to the following torque:



Torque: 10N\*m



## **Covering parts / fuel tank guard and power bottom cover**

Disassembly of fuel tank guard and power bottom cover
---

Disassembly:

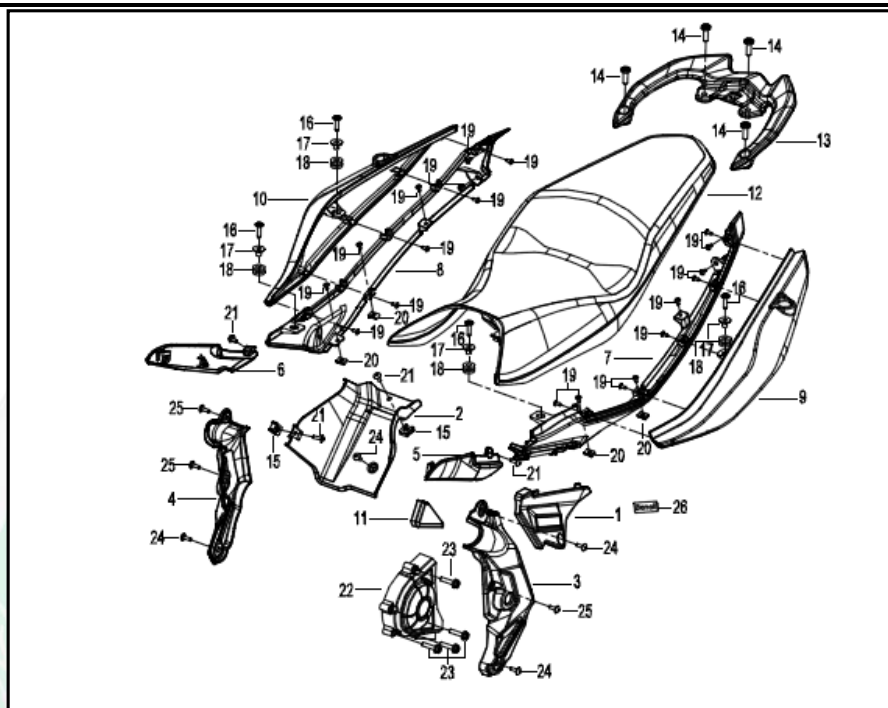
Conduct disassembly in inverse order to assembly.





## Covering parts / backplate

### Backplate assembly



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Left backplate	1	14	Rear carrier screw I	4
2	Right backplate	1	15	Ring nut M6	1
3	Left decorative plate	1	16	Stainless screw M6×25	4
4	Right decorative plate	1	17	Bushing on radiator	4
5	Left decorative plate of fuel tank	1	18	Backplate rubber cushion	4
6	Right decorative plate of fuel tank	1	19	Self-tapping screw ST4.2×13	20
7	Rear lower left trail cover	1	20	Card ST4.2	4
8	Rear lower right trail cover	1	21	Screw M6×14	4
9	Rear-left trail cover	1	22	Rear-left cover assembly	1
10	Rear-right trail cover	1	23	Bolt M6×30	4
11	Left decorative cap of frame	1	24	Screw M6×20	4
12	Seat cushion assembly	1	25	Screw M6×15.2	3
13	Rear armrest (matte black BG)	1	26	Crystal sticker	1

## Covering parts / backplate

### Backplate assembly

#### Assembly:

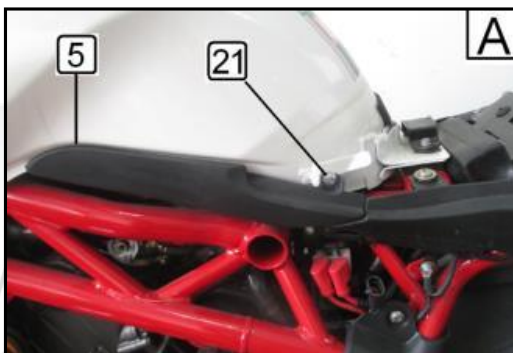
Assemble the left decorative plate of fuel tank (5) on the fuel tank using the screw (21), as shown in Fig. A.

#### Note:

Fasten the screw to the following torque:



Torque: 10N\*m



Assemble the right decorative plate of fuel tank (6) on the fuel tank using the screw (21), as shown in Fig. B.

#### Note:

Fasten the screw to the following torque:



Torque: 10N\*m



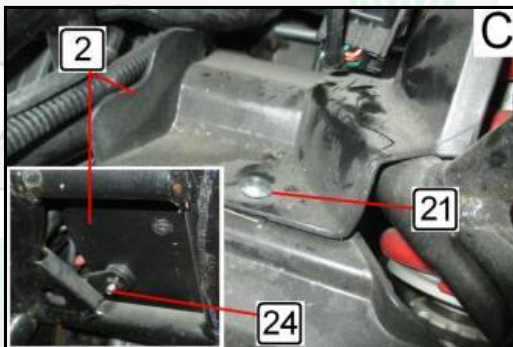
Assemble the right backplate (2) on the frame using the screws (21) and (24), as shown in Fig. C.

#### Note:

Fasten three screws to the following torque:



Torque: 10N\*m

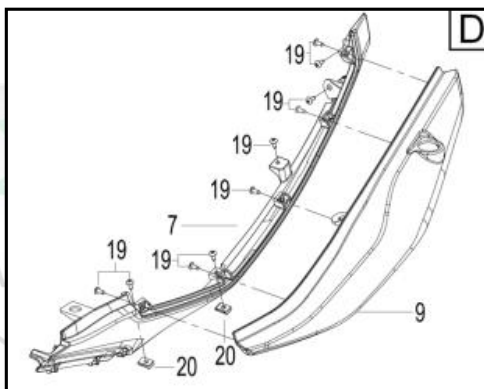


## Covering parts / backplate

### Backplate assembly

#### Assembly:

Assemble the rear lower left trail cover (7) with the rear-left trail cover (9) using the self-tapping screw (19), as shown in Fig. D.

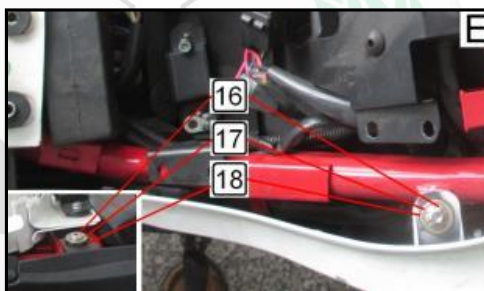


Assemble the assembled rear lower left trail cover and rear-left trail cover on the frame using the screw (16), bushing (17) and backplate rubber cushion (18), as shown in Fig. E.

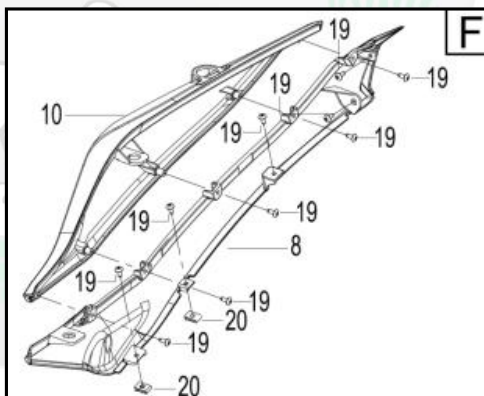
Fasten the screw to the following torque:



Torque: 10N\*m



Assemble the rear lower right trail cover (8) and the rear-right trail cover (10) using the self-tapping screw (19), as shown in Fig. F.



## Covering parts / backplate

### Backplate assembly

#### Assembly:

Assemble the assembled rear lower left trail cover and rear-left trail cover on the frame using the screw (16), bushing (17) and backplate rubber cushion (18), as shown in Fig. G.

#### Note:

Fasten the screw to the following torque:



Torque: 10N\*m

Assemble the left backplate (1) on the frame using the screw (24), as shown in Fig. H.

Fasten the screw to the following torque:



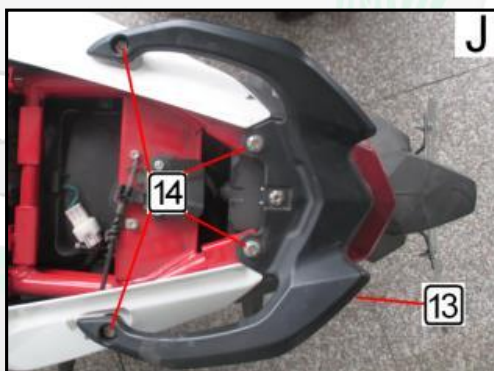
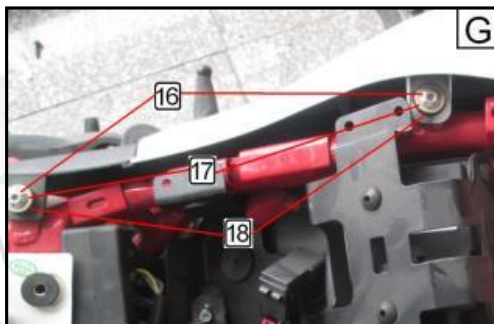
Torque: 10N\*m

Assemble the rear armrest (13) on the frame using the screw (14), as shown in Fig. J.

Fasten the screw to the following torque:



Torque: 22N\*m



## Covering parts / backplate

Backplate disassembly
-----------------------

### Disassembly:

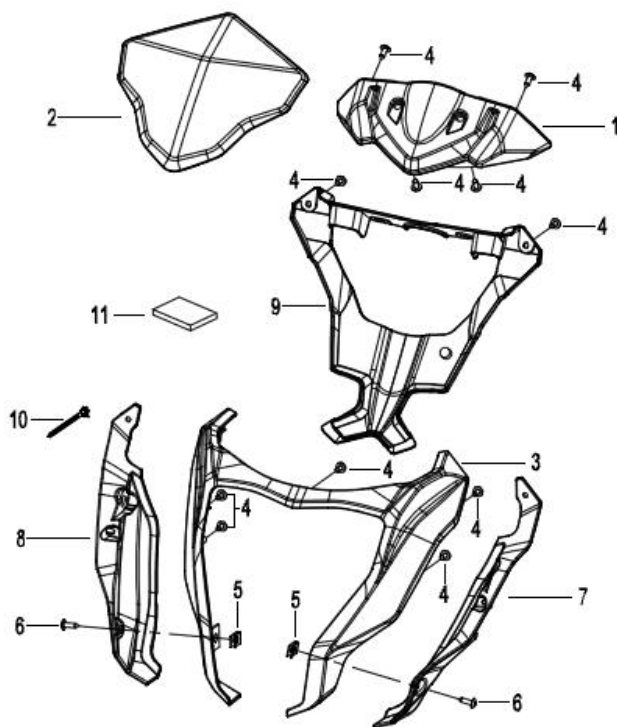
Conduct disassembly in inverse order to assembly.





## Covering parts / fairing

### Fairing assembly



No.	Name and specifications	Quantity
1	Lower cover of instrument	1
2	Sun visor of speedometer	1
3	Fairing	1
4	Self-tapping screw ST4.2×13	11
5	Card ST4.2	2
6	Self-tapping screw ST4.2×16	2
7	Rear decorative plate of left fairing	1
8	Rear decorative plate of right fairing	1
9	Rear decorative plate of fairing	1
10	Bandage 150MM	1
11	Spongy cushion	1

## Covering parts / fairing

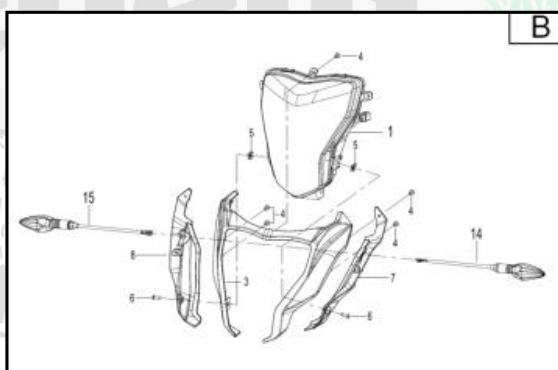
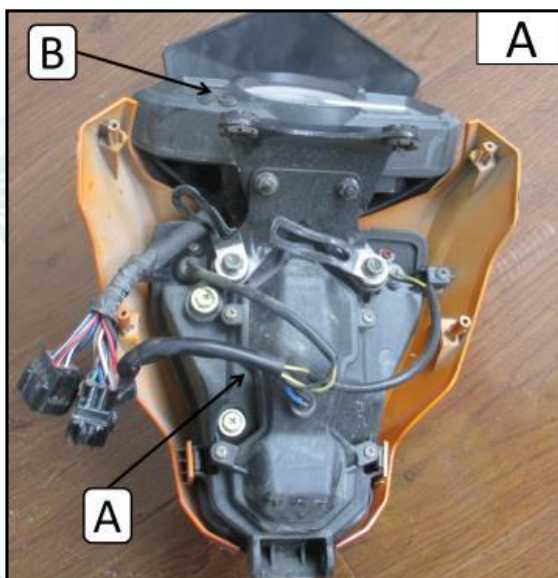
### Fairing assembly

Preassembly: as shown in Fig. A and B.

Assemble the rear decorative plate of right fairing (8) and rear decorative plate of left fairing (7) on the fairing (3).

Assemble the sun visor of speedometer (2) on the lower cover of instrument (1).

Assemble the headlight (A), instrument (B) and preassembled parts together.



Assembly:

Please see the chapter of “Replacement of headlight bulb”.

## Covering parts / fairing

Fairing assembly
------------------

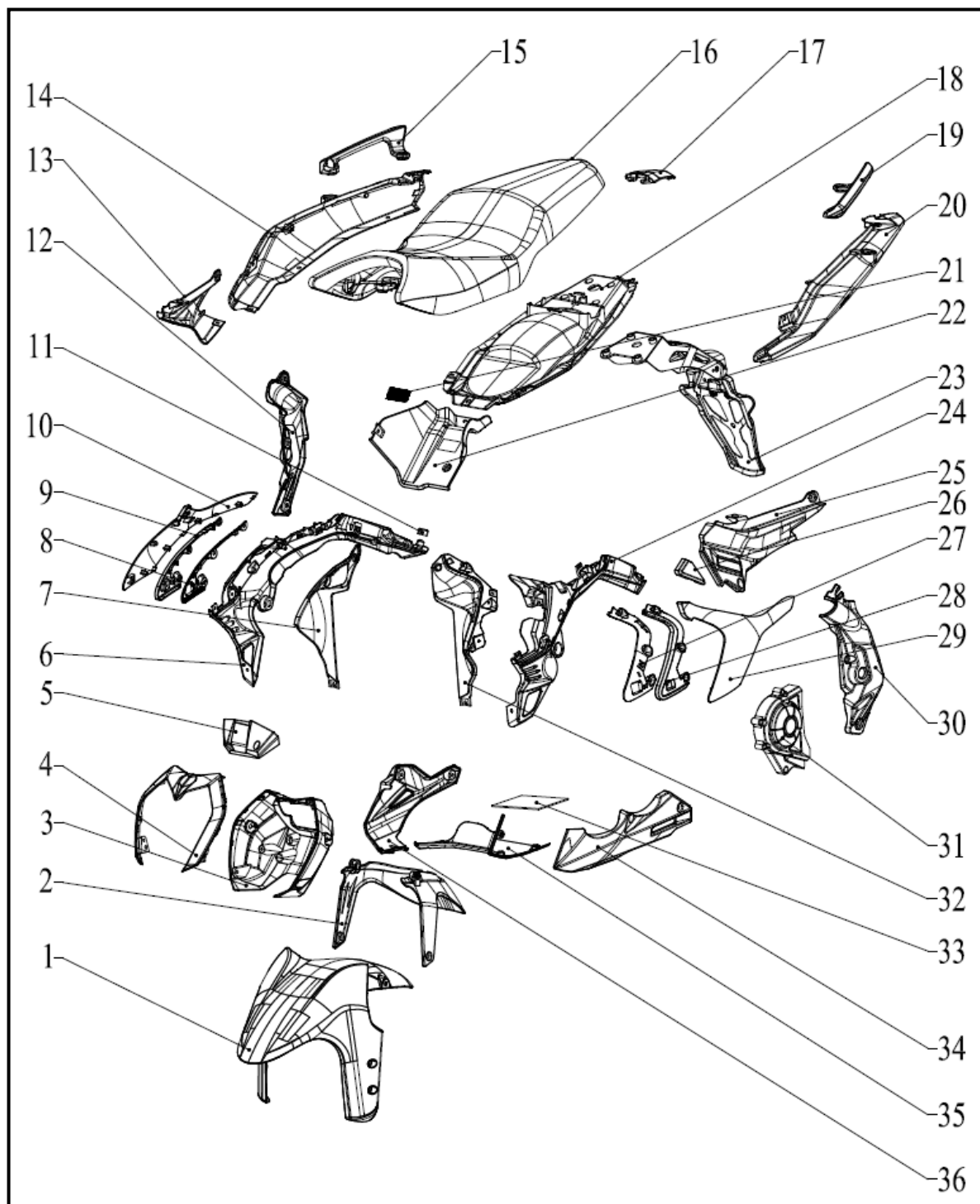
Disassembly:

Conduct disassembly in inverse order to assembly.



## Covering Parts (2018)

### Covering parts



## Covering Parts (2018)

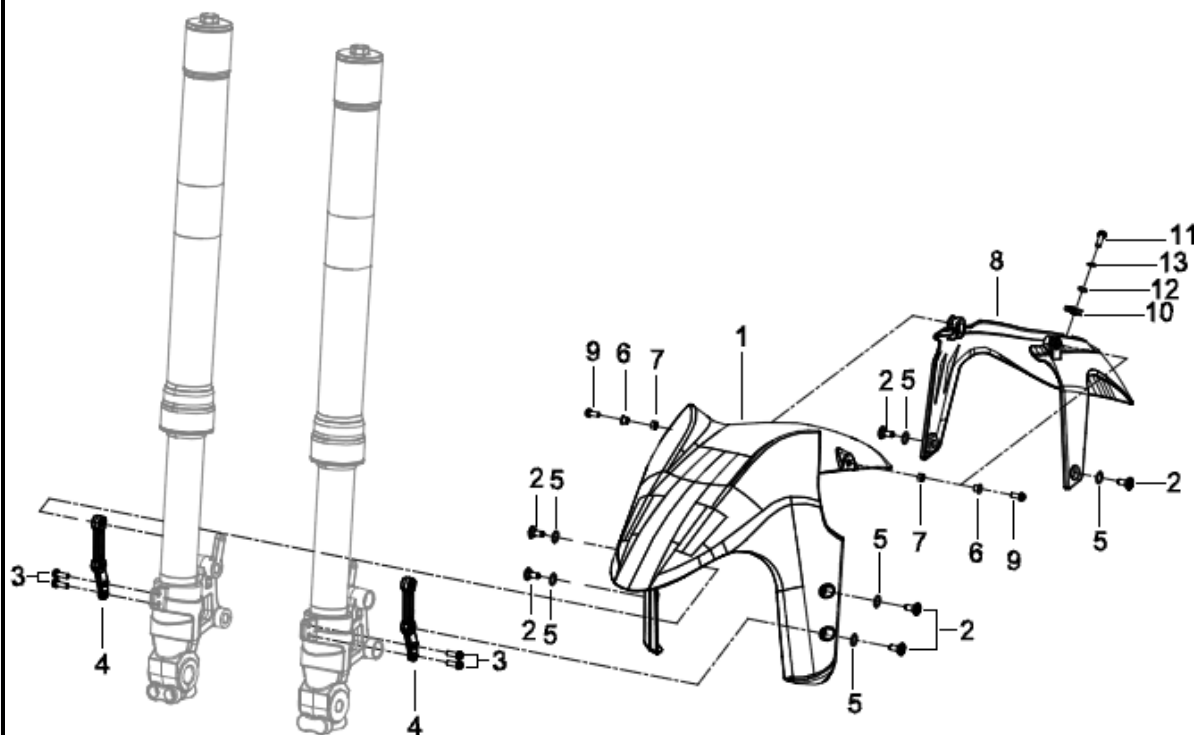
### Covering parts

No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Front fender	1	19	Left rear grab rail	1
2	Front small fender	1	20	Left rear cover	1
3	Rear decoration plate of cowling	1	21	Wire mesh of right cover	1
4	Cowling	1	22	Right cover	1
5	Lower case of meter	1	23	Rear fender bracket component	1
6	Decoration plate of right fuel tank cover	2	24	Decoration plate of left fuel tank cover	1
7	Inner windshield of right fuel tank cover	1	25	Left lower rear cover	1
8	Decoration strip of right fuel tank cover I	1	26	Left decoration cover of frame	1
9	Decoration strip of right fuel tank cover II	1	27	Decoration strip of left fuel tank cover I	1
10	Right fuel tank cover	1	28	Decoration strip of left fuel tank cover II	1
11	Rubber cover	1	29	Left fuel tank cover	1
12	Right decoration plate	1	30	Left decoration plate	1
13	Lower right rear cover	1	31	Left rear cover component	1
14	Right rear cover	1	32	Inner windshield of left fuel tank cover	1
15	Right rear grab rail	1	33	Tin foil paper of engine cowling	1
16	Cushion component	1	34	Left engine cowling	1
17	Rear connecting plate of left and right rear cover	1	35	Engine cowling connecting plate	1
18	Front of rear fender	1	36	Right engine cowling	



## Covering Parts / Front Fender (2018)

### Front fender assembly



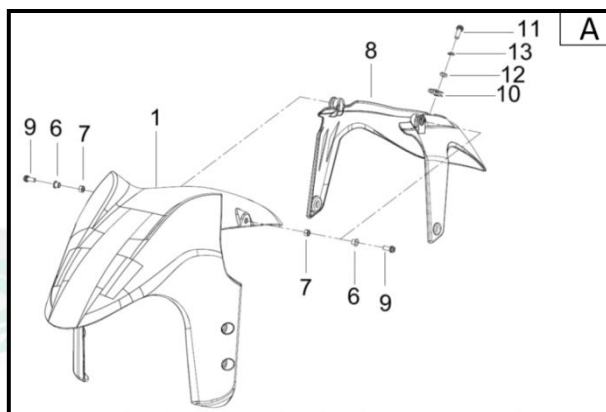
No.	Name and specifications	Quantity
1	Front fender	1
2	Screw M6×15.2	6
3	Screw M6×14	4
4	Mounting plate of front fender	2
5	Gray nylon	6
6	T-type collar 5×7×6×10×0.8	2
7	Nut M5	2
8	Front small fender	1
9	Bolt M5×0.8×14	2
10	Clamping nut for cover assembly	1
11	Screw 5×12	1
12	Washer φ5	1
13	Spring washer φ5	1

## Covering Parts / Front Fender (2018)

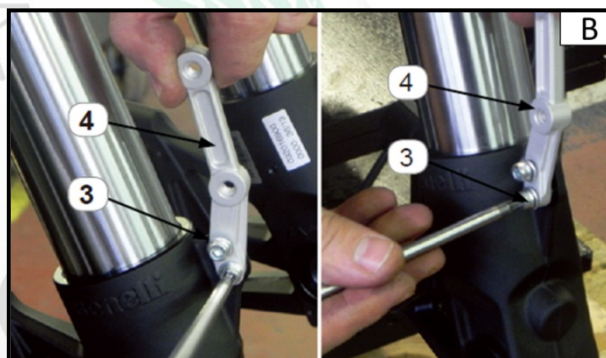
### Front fender assembly

#### Assembly:

Assemble front fender (1) and front small fender (8), as shown in Fig. A

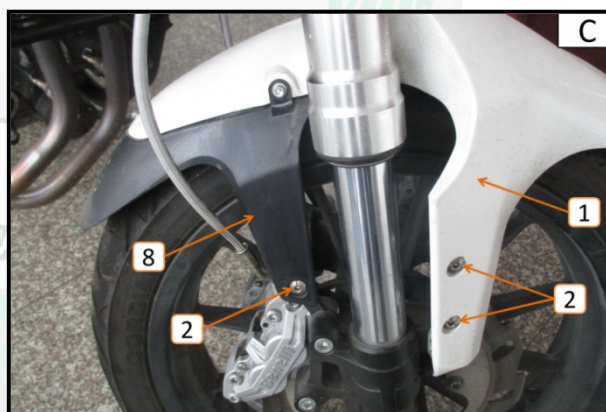


Assemble front fender mounting plate (4) and screws (3) at the bottom of front fork, as shown in Fig. A.



#### Assembly:

Assemble front fender (1), front small fender (8) and screws (2) at two side surfaces, as shown in Fig. C.



## Covering Parts / Front Fender (2018)

### Front fender disassembly

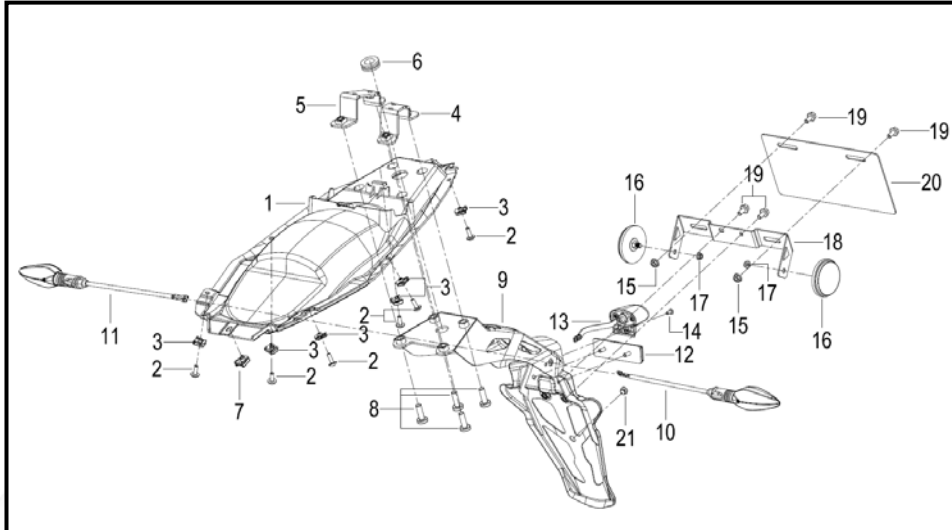
#### Disassembly:

Perform the operations in the reverse order of assembly.



## Covering Parts / Rear Fender (2018)

### Rear fender assembly



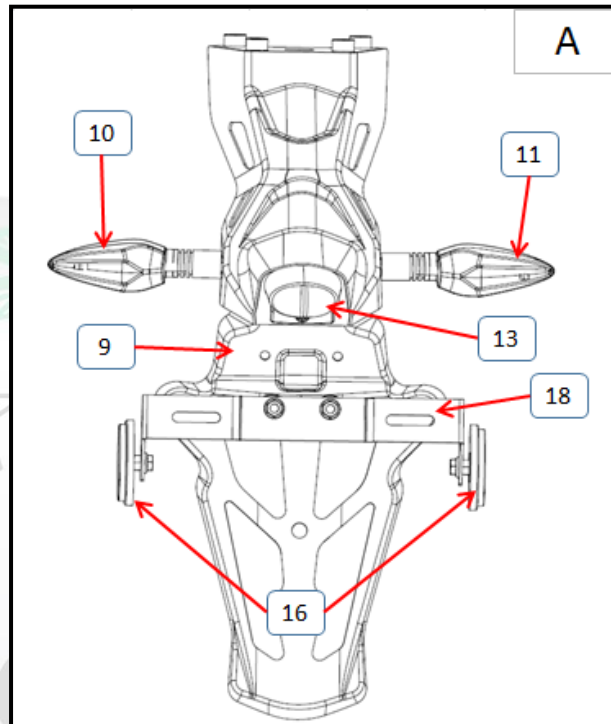
No.	Name and specifications	Quantity
1	Front of rear fender	1
2	Stainless steel bolt M5×12	6
3	Clamping nut M5	6
4	Right mounting plate welding component of rear fender	1
5	Left mounting plate welding component of rear fender	1
6	Rubber washer of rear fender I	1
7	Clamping nut M6	1
8	Bolt M8×1.25×25	4
9	Rear fender bracket component	1
10	Rear left turn signal light	1
11	Rear right turn signal light	1
12	Rear reflector	1
13	License plate light	1
14	Screw M4×12	1
15	Nut M6	2
16	Side reflector component	2
17	Nut M5	2
18	Rear license bracket	1
19	Bolt M6×12	4
20	Rear license	1
21	Side bracket buffer rubber	1

## Covering Parts / Rear Fender (2018)

### Rear fender assembly

#### Assembly:

Mount license holder (18), rear reflector (16), rear left turn signal light (10), rear right turn signal light (11) and rear license light (13) on the rear fender (5), as shown in Fig. A



Mount the front of rear fender (3) on the motorcycle, as shown in Fig. B





## Covering Parts / Rear Fender (2018)

### Rear fender assembly

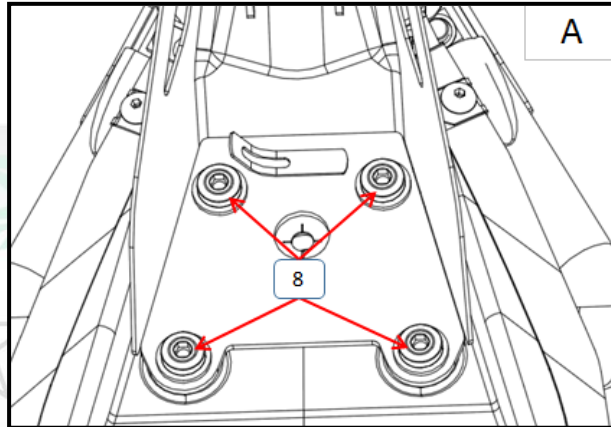
#### Assembly:

Mount the assembled rear fender on the frame by fastening four screws (8), as shown in Fig. A

Tighten four screws to the following torque:



Torque: 22N\*m



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## Covering Parts / Rear Fender (2018)

### Rear fender disassembly

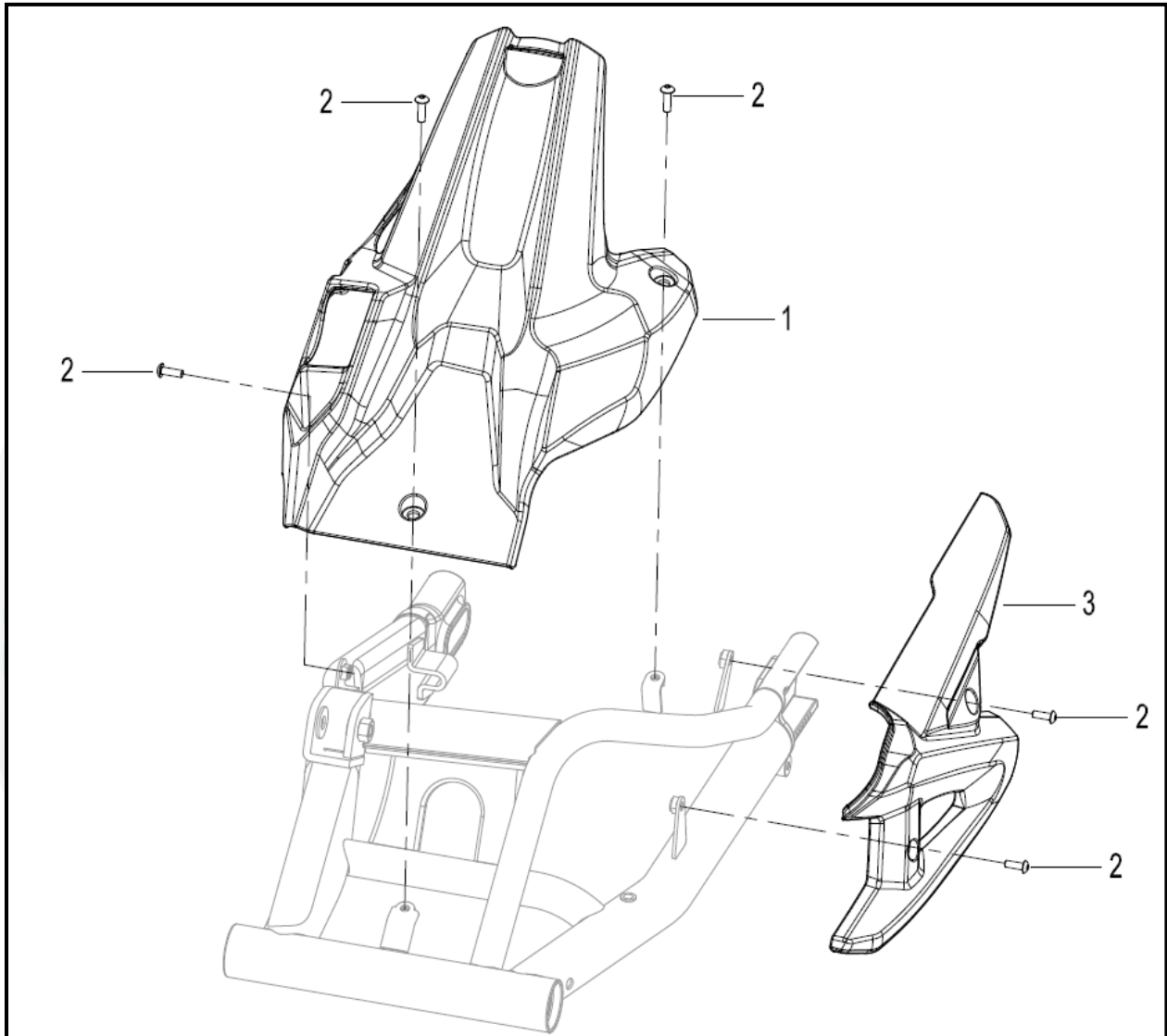
#### Disassembly:

Perform the operations in the reverse order of assembly.



## Covering Parts, Rear Lower Fender, Drive Chain Cover Assembly (2018)

Rear lower fender and drive chain cover assembly



No.	Name and specifications	Quantity
1	Rear lower fender	1
2	M6×15.2 Screw M6×15.2	5
3	Drive chain cover	1

## Covering Parts, Rear Lower Fender, Drive Chain Cover (2018)

### Rear lower fender and drive chain cover assembly

#### Assembly:

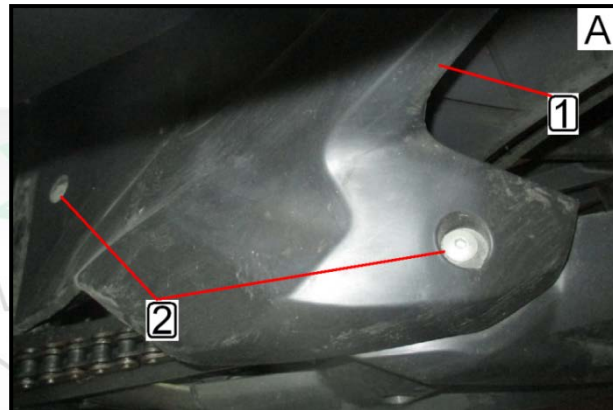
Mount rear lower fender (1) on the rocker arm and fasten the screws (2), as shown in Fig. A and Fig. B

#### Note:

Fasten three screws to the following torque:



Torque: 10N\*m

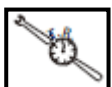


#### Assembly:

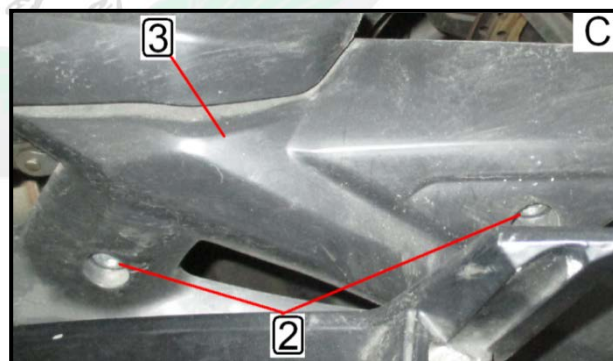
Mount drive chain cover (3) on the rocker arm and fasten the screws (2), as shown in Fig. C

#### Note:

Fasten two screws to the following torque:



Torque: 10N\*m



## **Covering Parts, Rear Lower Fender, Drive Chain Cover (2018)**

Rear lower fender and drive chain cover disassembly

Disassembly:

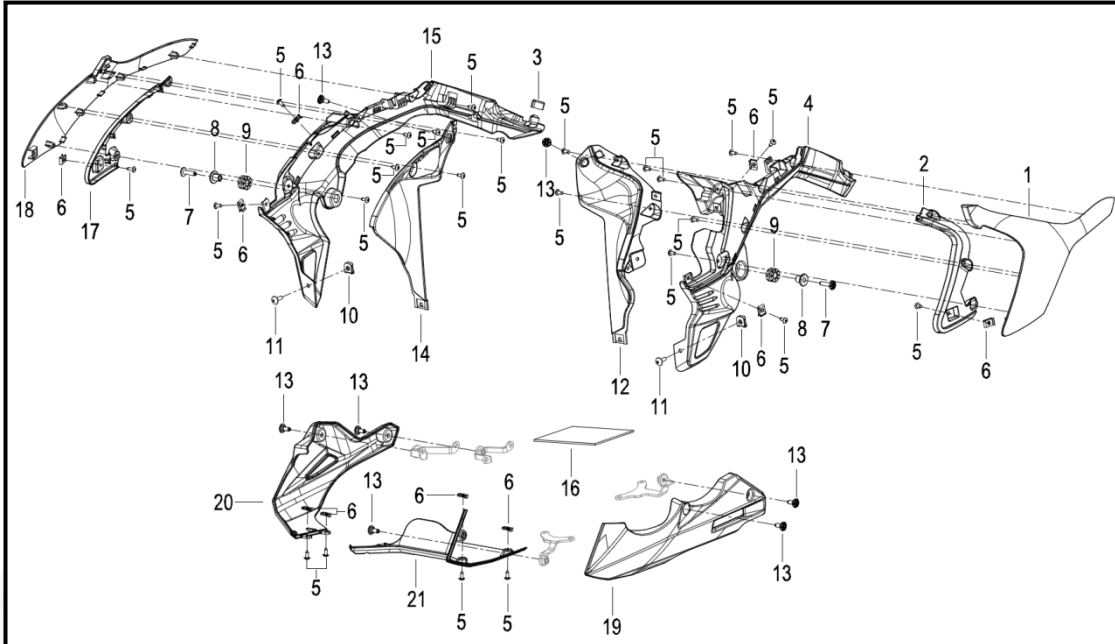
Perform the operations in the reverse order of assembly.





## Covering Parts, Fuel Tank Cover, Engine Cowling (2018)

### Fuel tank cover and engine cowling assembly



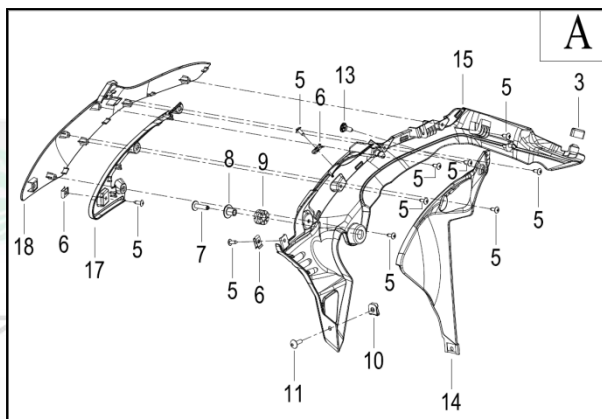
No.	Name and specifications	Quantity
1	Left fuel tank cover	1
2	Decoration strip of left fuel tank cover I	1
3	Rubber cover	1
4	Decoration plate of left fuel tank cover	1
5	Self-tapping screw ST4.2×13	24
6	Clamp ST4.2	10
7	Stainless steel screw M6×25	2
8	Upper collar of radiator	2
9	Rubber washer	2
10	Clamping nut M5	2
11	Stainless steel bolt M5×12	2
12	Inner windshield of left fuel tank cover	1
13	Screw M6×15.2	7
14	Inner windshield of right fuel tank cover	1
15	Decoration plate of right fuel tank cover	1
16	Tin foil paper of engine cowling	1
17	Decoration strip of right fuel tank cover II	1
18	Right fuel tank cover	1
19	Left engine cowling	1
20	Right engine cowling	1
21	Connecting plate of engine cowling	1

## Covering Parts / Fuel Tank Cover, Engine Cowling (2018)

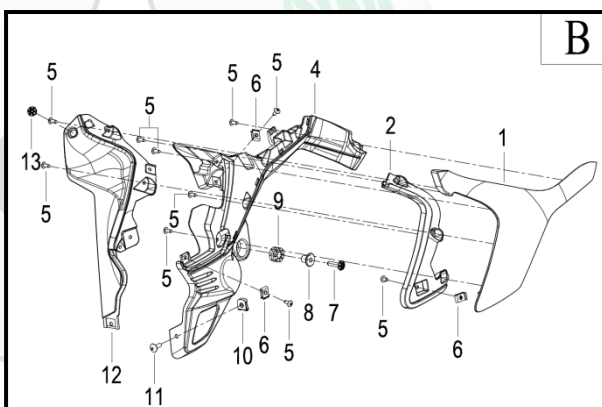
### Fuel tank cover assembly

#### Assembly:

Assemble right fuel tank cover (18), decoration plate of right fuel tank cover (15), inner windshield of right fuel tank cover (14) and decoration strip of right fuel tank cover II (17) using self-tapping screw (5), as shown in Fig. A

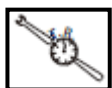


Assemble left fuel tank cover (1), decoration plate of left fuel tank cover (4), inner windshield of left fuel tank cover (12) and decoration strip of left fuel tank cover II (2) using self-tapping screw (5), as shown in Fig. B

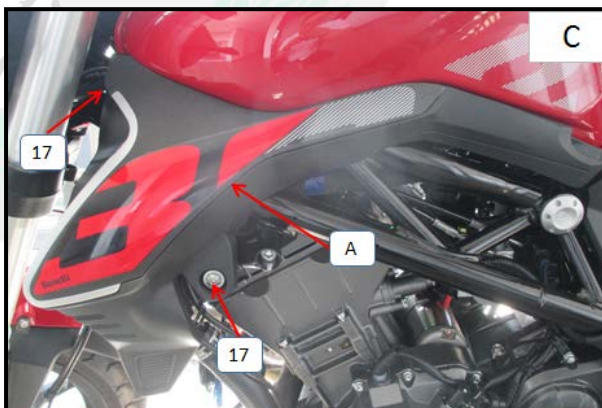


Mount assembled left fuel tank cover component (A) on the motorcycle, as shown in Fig. C

Fasten the screw (17) to the following torque:



Torque: 10N\*m

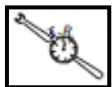


## Covering Parts / Fuel Tank Cover, Engine Cowling (2018)

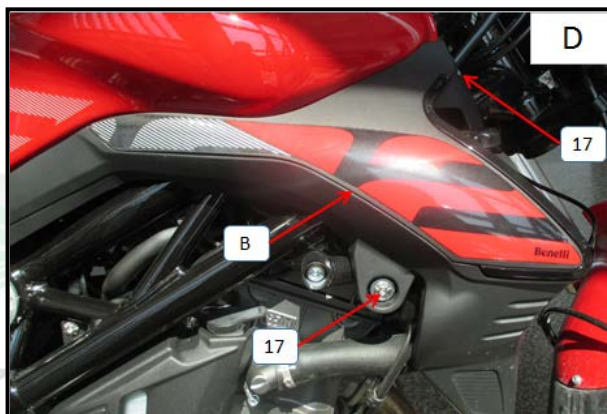
### Fuel tank cover assembly

Mount assembled right fuel tank cover component (B) on the motorcycle, as shown in Fig. D

Fasten the screw (17) to the following torque:



Torque: 10N\*m



# Benelli



## Covering Parts / Fuel Tank Cover, Engine Cowling (2018)

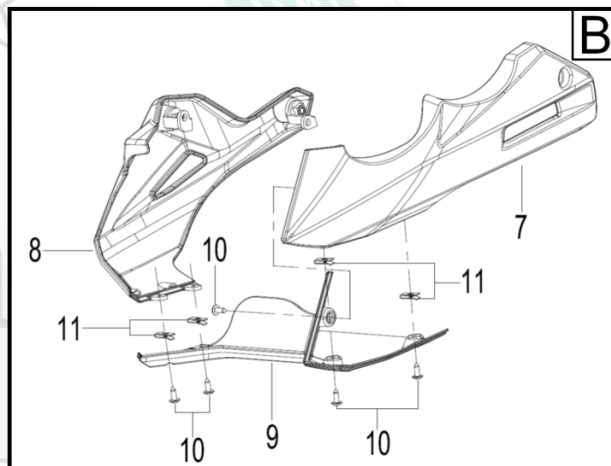
### Fuel tank cover assembly

#### Assembly:

Paste the tin foil paper of engine cowling (15) on the connecting plate of engine cowling (9), as shown in Fig. A



Assemble left engine cowling (7), right engine cowling (8) and connecting plate of engine cowling (9) using the self-tapping screw (10), as shown in Fig. B



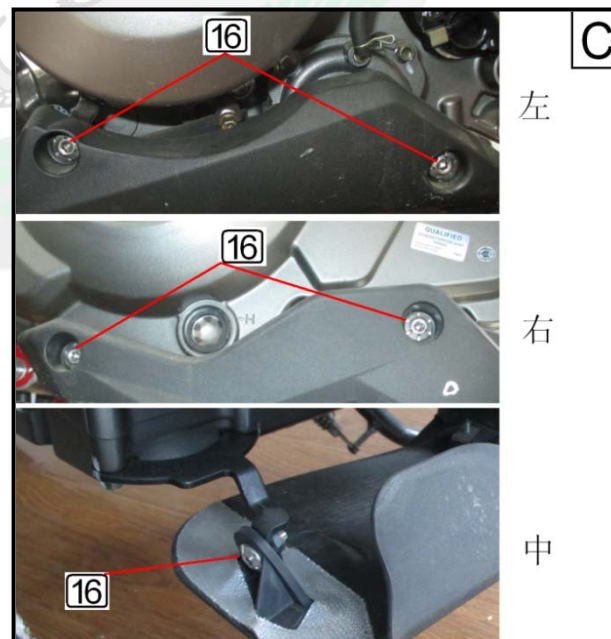
Mount assembled engine cowling component on the motorcycle using screw (16), as shown in Fig. C

#### Note:

Fasten the screw to the following torque:



Torque: 10N\*m



## **Covering Parts / Fuel Tank Cover, Engine Cowling (2018)**

### **Fuel tank cover and engine cowling assembly**

#### **Disassembly:**

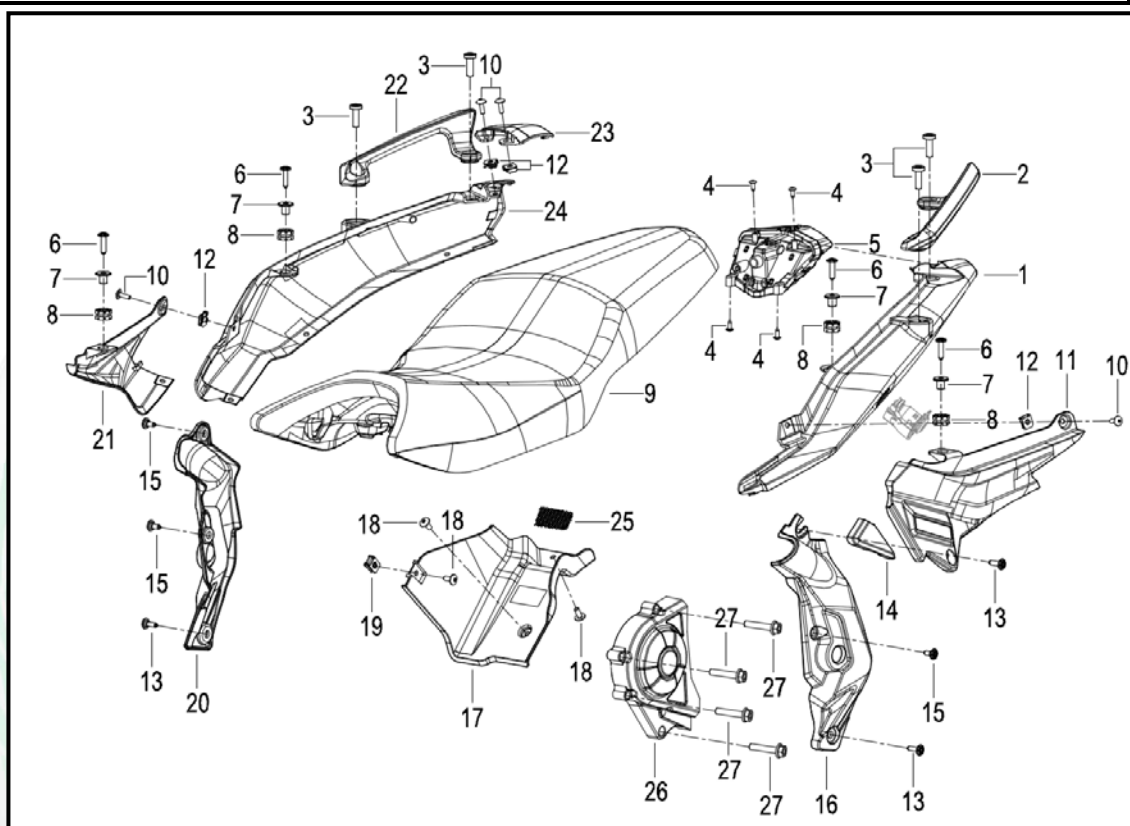
Perform the operations in the reverse order of assembly.





## Covering Parts / Cover (2018)

### Cover assembly



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Left rear side cover	1	15	Screw M6×15.2	3
2	Left rear grab rail	1	16	Left decoration plate	1
3	Rear rack screw I	4	17	Right cover	1
4	Self-tapping screw ST4.2×13	4	18	Screw M6×14	3
5	Tail light	1	19	Clamping nut M6	1
6	Stainless steel screw M6×25	4	20	Right decoration plate	1
7	Upper collar of radiator	4	21	Right lower rear side cover	1
8	Rubber washer	4	22	Right rear grab rail	1
9	Cushion component	1	23	Rear connecting plate of left and right rear side covers	1
10	Stainless steel bolt M5×12	4	24	Right rear side cover	1
11	Left lower rear side cover	1	25	Wire mesh of right cover	1
12	Clamping nut M5	4	26	Left and right cover component	1
13	Screw M6×20	4	27	Bolt M6×30	4
14	Left decoration cover of frame	1			

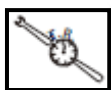
## Covering Parts / Cover (2018)

### Cover assembly

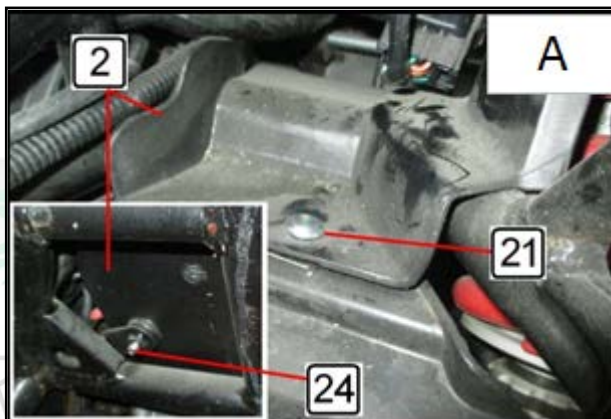
Assemble right cover of fuel tank (2) on the frame using screw (21) and screw (24), as shown in Fig. C

#### Note:

Tighten three screws to the following torque:



Torque: 10N\*m



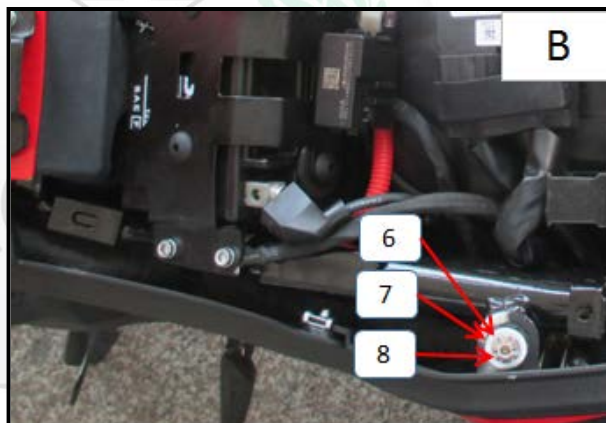
Mount left rear side cover on the frame using screw (6), collar (7) and cover rubber gasket (8), as shown in Fig. B

#### Note:

Fasten the screws to the following torque:



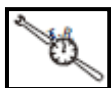
Torque: 10N\*m



Mount left lower rear side cover (11) on the frame using screw (6), collar (7), cover rubber gasket (8), screw (10) and screw (13), as shown in Fig. C

#### Note:

Tighten the screws to the following torque:



Torque: 10N\*m



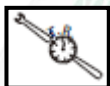
## Covering Parts / Cover (2018)

### Cover assembly

Mount right rear side cover on the frame using screw (6), collar (7) and cover rubber gasket (8), as shown in Fig. D

#### Note:

Tighten the screws to the following torque:

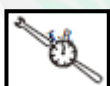


Torque: 10N\*m

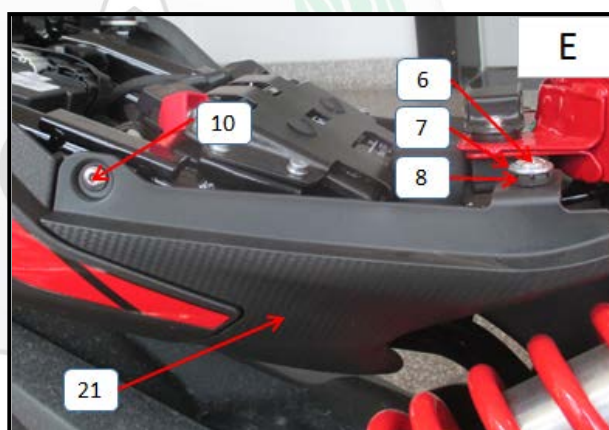
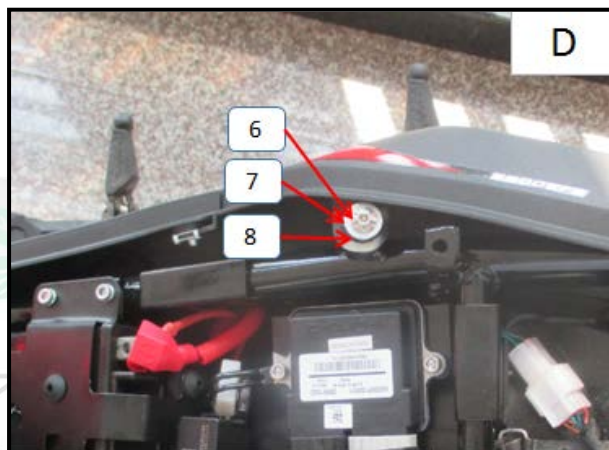
Mount right lower rear side cover (21) on the frame using screw (6), collar (7), cover rubber gasket (8) and screw (10), as shown in Fig. E

#### Note:

Tighten the screws to the following torque:



Torque: 10N\*m



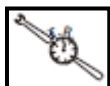
## Covering Parts / Cover (2018)

### Cover assembly

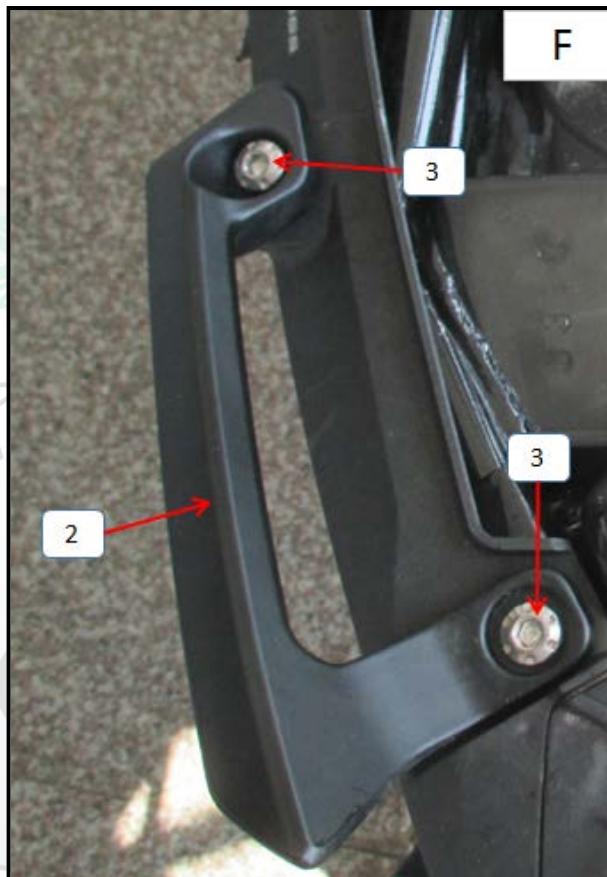
Assembly left rear grab rail (2) on the frame using screw (3), as shown in Fig. F

#### Note:

Tighten the screws to the following torque:



Torque: 22N\*m





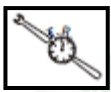
## Covering Parts / Cover (2018)

### Cover assembly

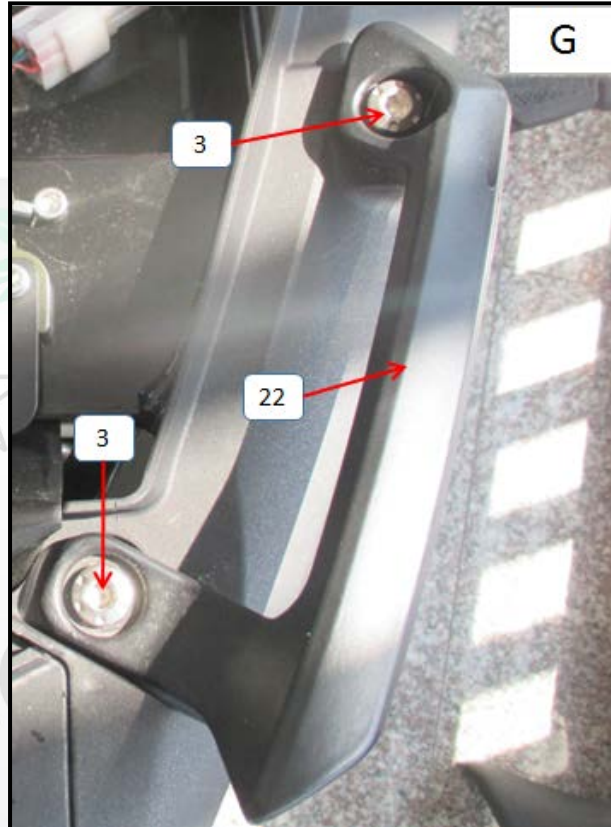
Assembly right rear grab rail (22) on the frame using screw (3), as shown in Fig. G

#### Note

Tighten the screws to the following torque:



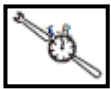
Torque: 22N\*m



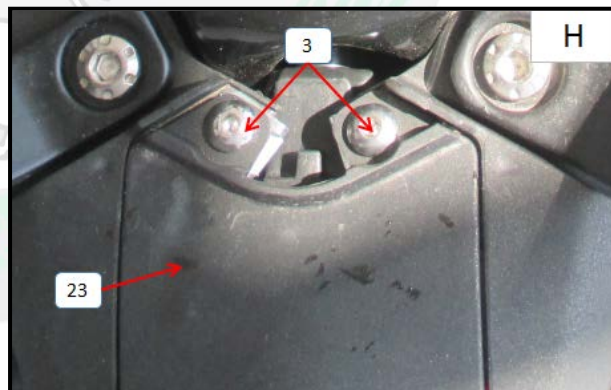
Assembly the rear connecting plate of left and right rear side covers (23) on the left and right rear side covers using screw (3), as shown in Fig. H

#### Note:

Tighten the screws to the following torque:



Torque: 10N\*m





## Covering Parts / Cover (2018)

Cover disassembly
-------------------

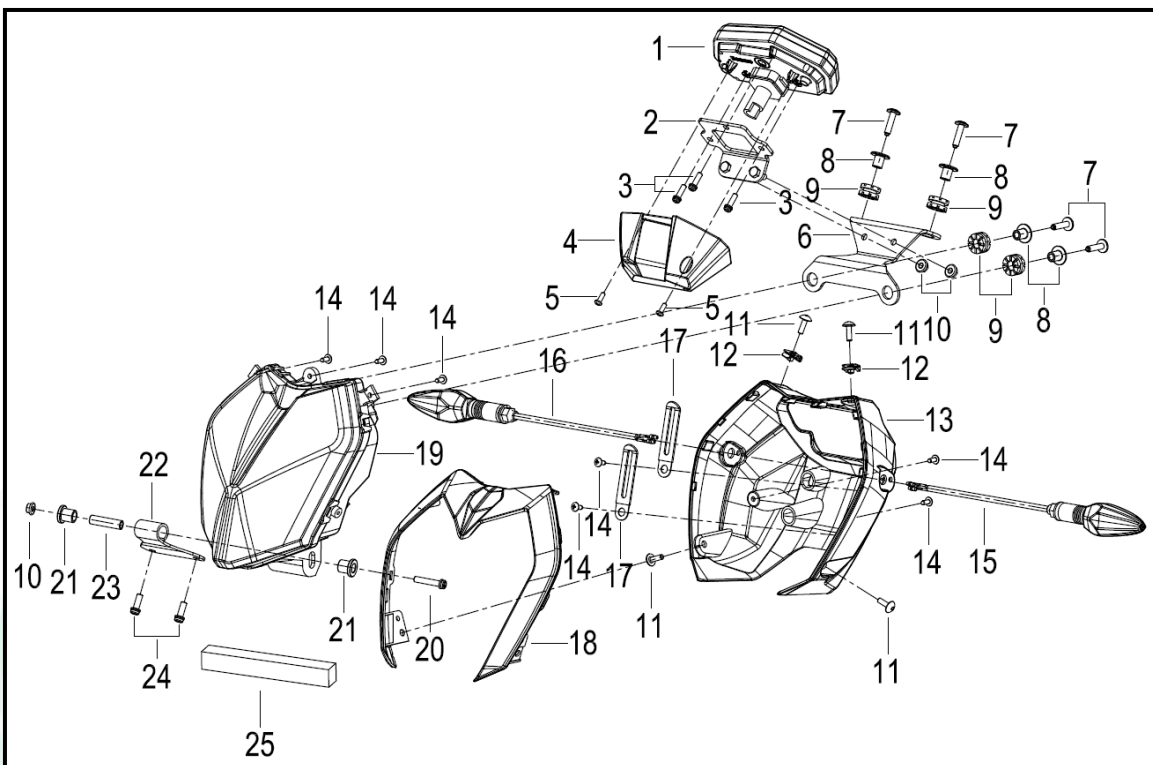
### Disassembly:

Perform the operations in the reverse order of assembly.



## Covering Parts / Cowling (2018)

### Assembly of cowling



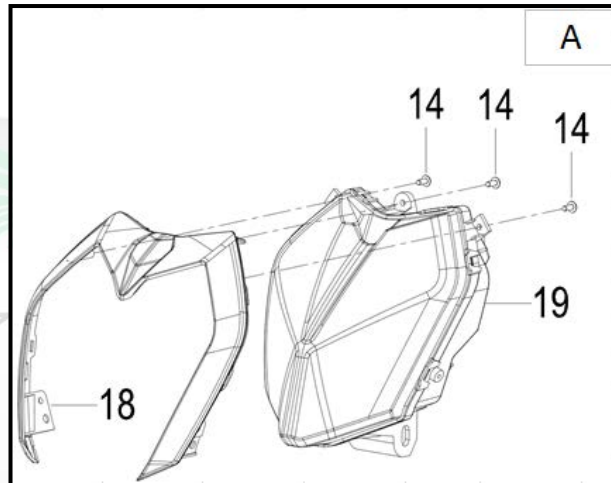
No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Meter assembly	1	14	Self-tapping screw ST4.2×13	7
2	Instrument bracket welding component	1	15	Front left turn signal light	1
3	Bolt M5×0.8×14	3	16	Front right turn signal light	1
4	Lower case of meter	1	17	Clamp component	2
5	Cross recessed pan head self-tapping screw ST4.2×13/F type	2	18	Cowling	1
6	Upper bracket of headlight	1	19	Headlight	1
7	Stainless steel screw M6×25	4	20	Hexagon socket button head screw	1
8	Upper collar of radiator	4	21	Headlight damper	2
9	Rubber gasket of cover	4	22	Lower mounting plate of headlight	1
10	Nut M6	3	23	Lower collar of headlight	1
11	Stainless steel bolt M5×12	2	24	Bolt M6×1×16	2
12	Clamping nut M5	2	25	Sponge damper	1
13	Rear decoration plate of cowling	1			

## Covering Parts / Cowling (2018)

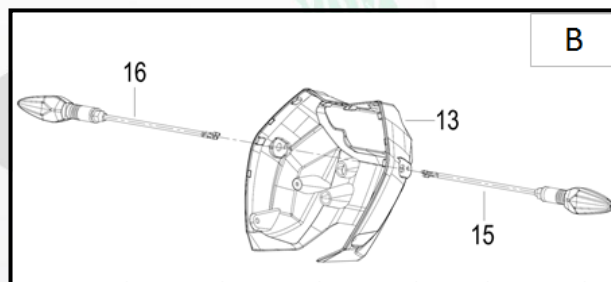
### Cowling assembly

#### Preassembly:

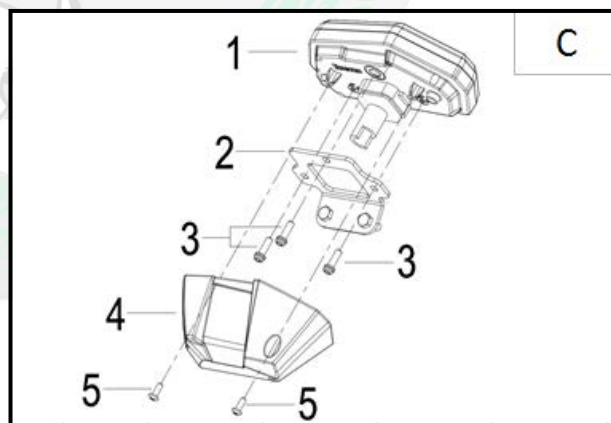
Assemble cowling (18) and headlight (19), as shown in Fig. A



Assemble front left turn signal light (15), front light turn signal light (16) and rear decoration plate of cowling (13), as shown in Fig. B



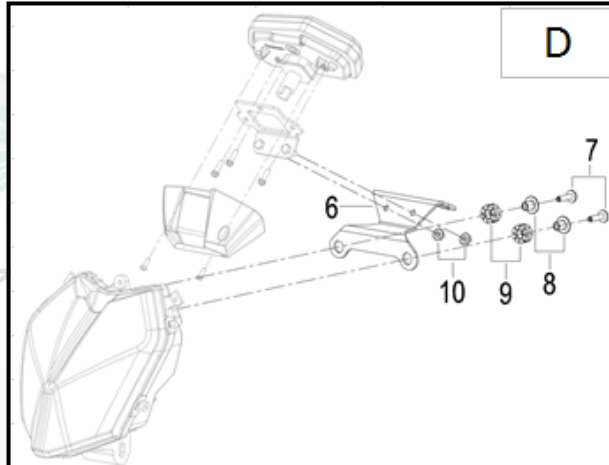
Assemble meter (1), upper bracket of headlight (6) and lower case of meter (3), as shown in Fig. C



## Covering Parts / Cowling (2018)

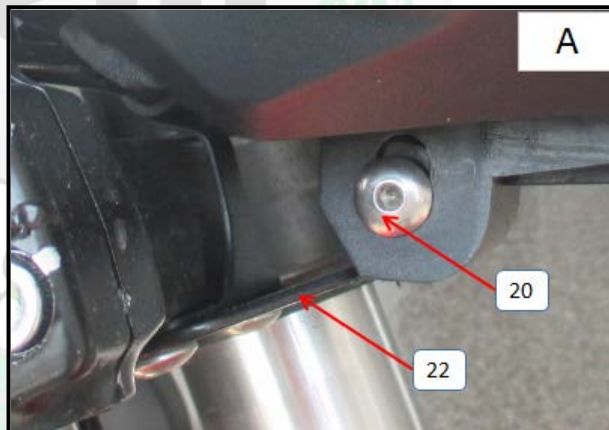
### Cowling assembly

Assemble headlight (A), meter (B) and preassembled parts, as shown in Fig. D

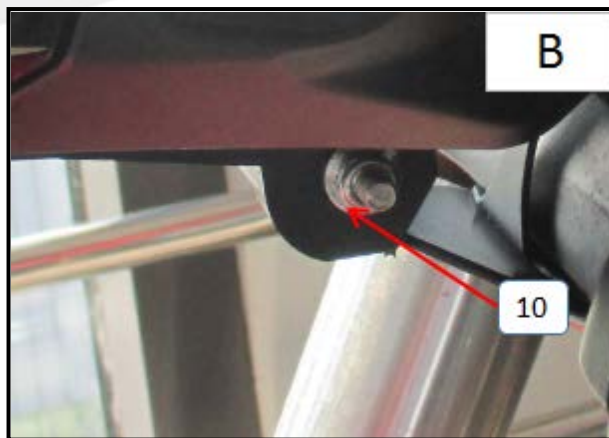


#### Assembly:

Mount the assembled headlight and meter component on the lower mounting plate of headlight (22) using bolt (20), as shown in Fig. A



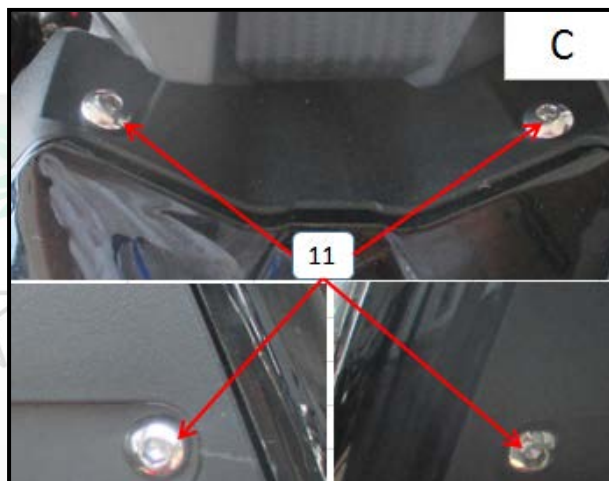
Mount nut (10) and not tighten it, as shown in Fig. B



## Covering Parts / Cowling (2018)

### Cowling assembly

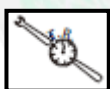
Mount the assembled headlight and meter component and rear decoration plate of cowling using bolt (11), as shown in Fig. C



Assemble cowling component using screw (7), as shown in Fig. D

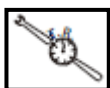
Note:

Tighten the screws to the following torque:



Torque: 10N\*m

Pinch nut (10)



Torque: 10N\*m





## Covering Parts / Cowling (2018)

### Cowling disassembly

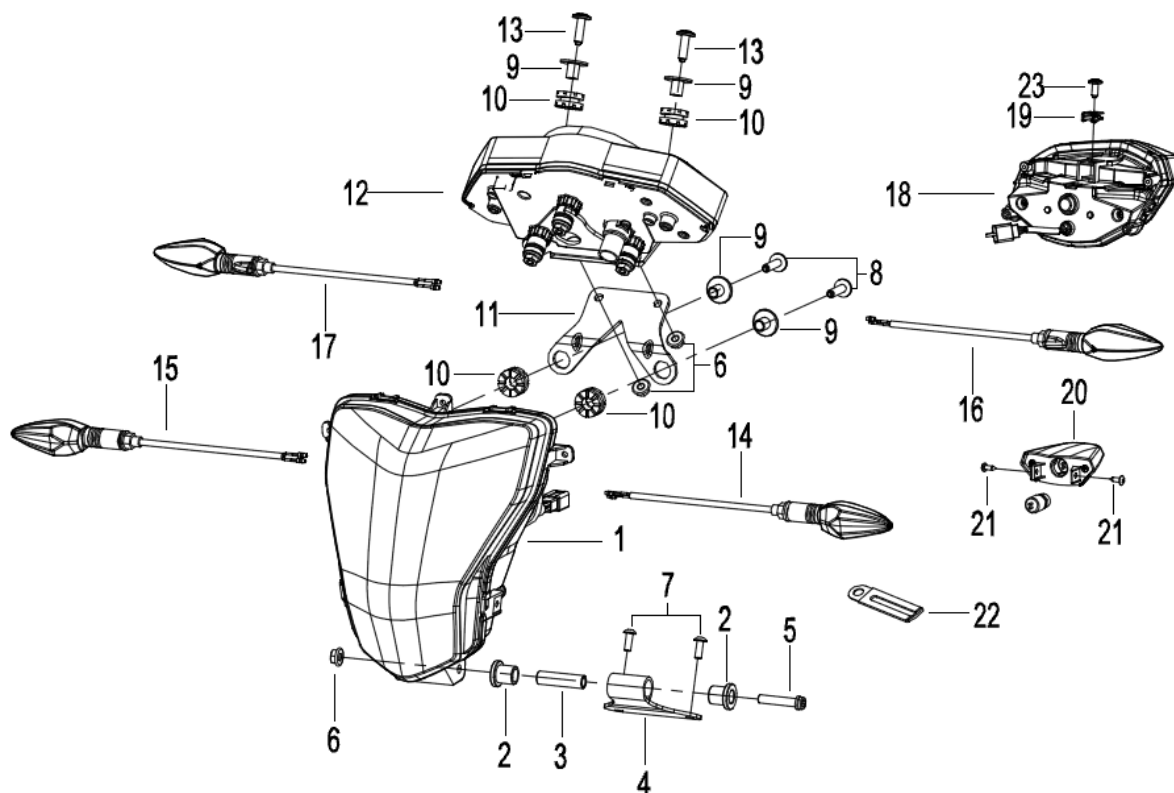
#### Disassembly:

Perform the operations in the reverse order of assembly.



# Lights

## Light replacement



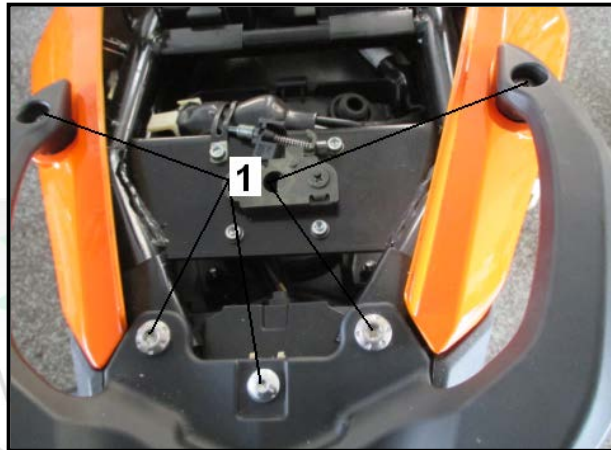
No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Headlight	1	13	Stainless steel screw M6×30	2
2	Headlight damper	2	14	Front left turn signal light	1
3	Lower collar of headlight	1	15	Front right turn signal light	1
4	Lower assembling plate of headlight	1	16	Rear left turn signal light	1
5	Hexagon socket head screw	1	17	Rear right turn signal light	1
6	Nut M6	3	18	Tail light	1
7	Bolt M6×1×16	2	19	Clamping nut M6	1
8	Stainless steel screw M6×25	2	20	Rear license plate light	1
9	Upper collar of radiator	4	21	Self-tapping screw ST4.2×13	2
10	Rubber washer	4	22	Clamp component II	2
11	Upper assembling plate of headlight	1	23	Screw M6×20	1
12	Meter assembly	1			

## Lights / rear tail light

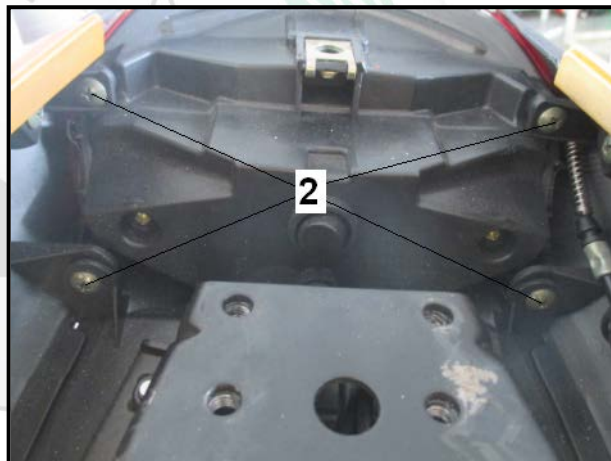
### Rear tail light replacement

#### Rear tail light replacement

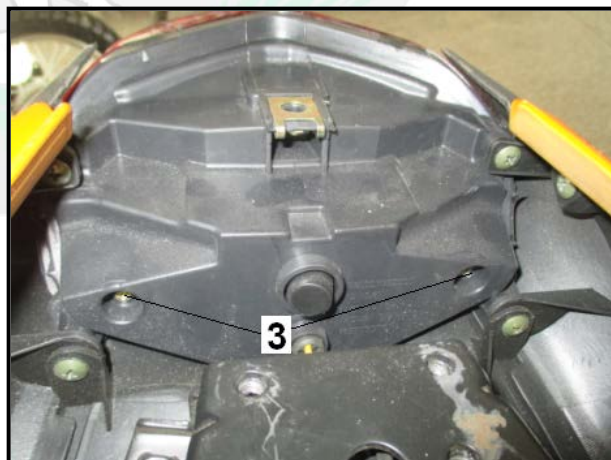
The source of rear tail light is LED and the entire light should be replaced when necessary.



- (1) Remove the cushion.
- (2) Remove the rear grab rail mounting screw (1), and disassemble rear grab rail.
- (3) Remove mounting screw (2).



- (4) Remove the mounting nut (3).
- (5) Remove the cable of rear tail light, disassemble the damaged light and replace it with a new tail light.



#### Assembly:

Mount lights in the reverse order of disassembly.

## Lights / Front Turn Signal Light

### Front turn signal light replacement

#### Front turn signal light replacement

The source of front turn signal light is LED and the entire light should be replaced when necessary.

1. Operate according to the prompt of Chapter “Headlight bulb replacement”.
2. Remove the mounting screw ① of left or right turn signal light.
3. Remove the cable of front turn signal light, remove the damaged light and replace it with a new front turn signal light.



#### Assembly:

Mount the light in the reverse order of disassembly.

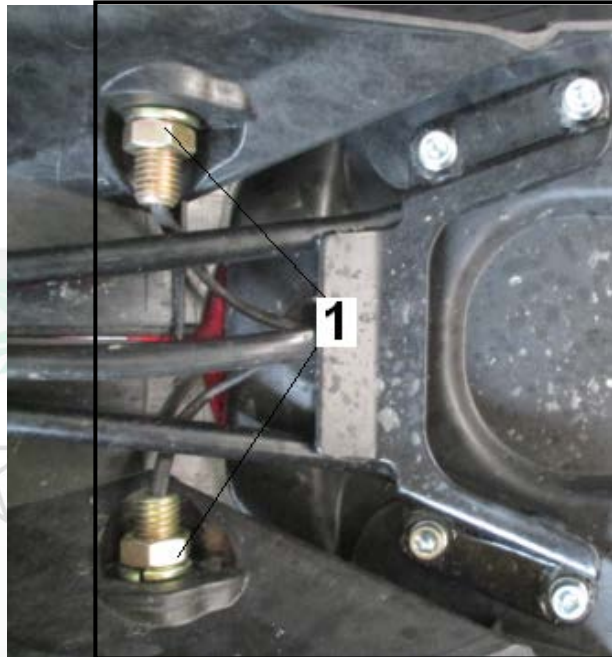
## Lights / Rear Turn Signal Light

### Rear turn signal light replacement

#### Rear turn signal light replacement

The source of rear turn signal light is LED and the entire light should be replaced when necessary.

1. Remove the mounting nut (1) of left or right turn signal light from the back of rear license plate bracket.
2. Remove the cable of rear turn signal light, remove the damaged light and replace it with a new rear turn signal light.



#### Assembly:

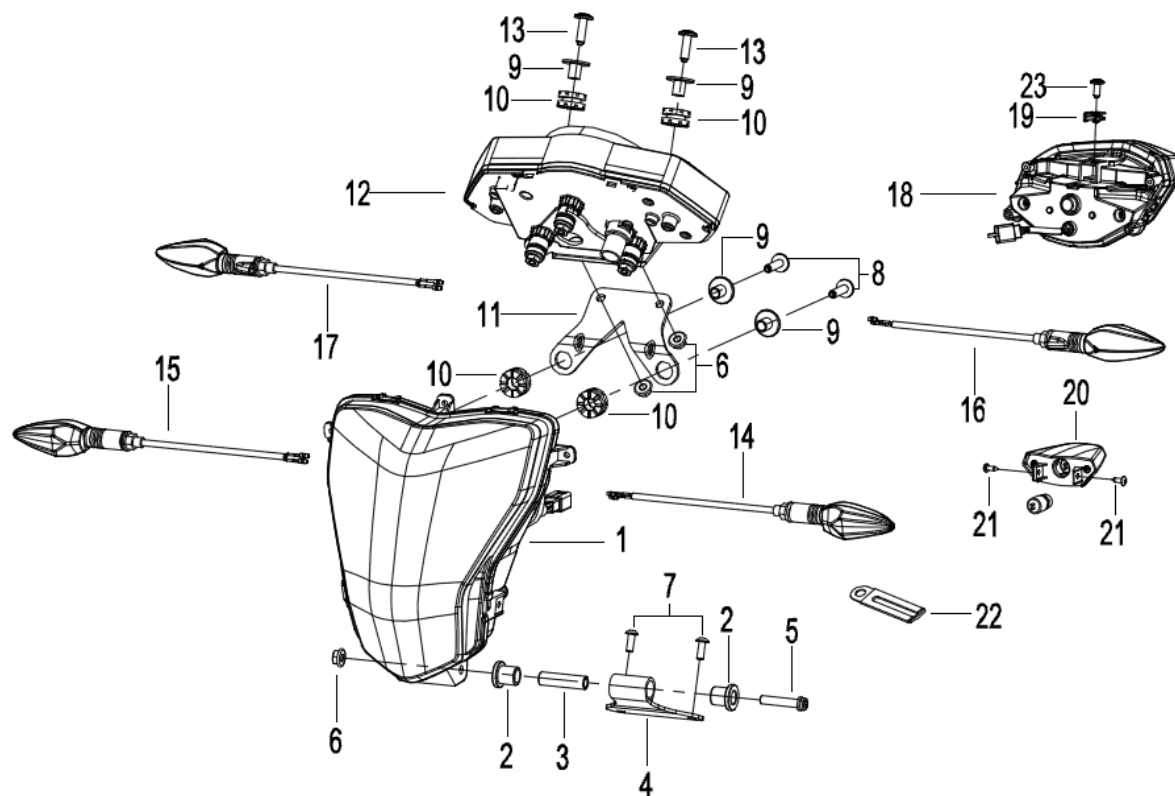
Mount the light in the reverse order of disassembly.





# Lights

## Light replacement



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Headlight	1	13	Stainless steel screw M6×30	2
2	Headlight damper	2	14	Front left turn signal light	1
3	Lower collar of headlight	1	15	Front right turn signal light	1
4	Lower assembling plate of headlight	1	16	Rear left turn signal light	1
5	Hexagon socket head screw	1	17	Rear right turn signal light	1
6	Nut M6	3	18	Tail light	1
7	Bolt M6×1×16	2	19	Clamping nut M6	1
8	Stainless steel screw M6×25	2	20	Rear license plate light	1
9	Upper collar of radiator	4	21	Self-tapping screw ST4.2×13	2
10	Rubber washer	4	22	Clamp component II	2
11	Upper assembling plate of headlight	1	23	Screw M6×20	1
12	Meter assembly	1			

## Lights / rear tail light

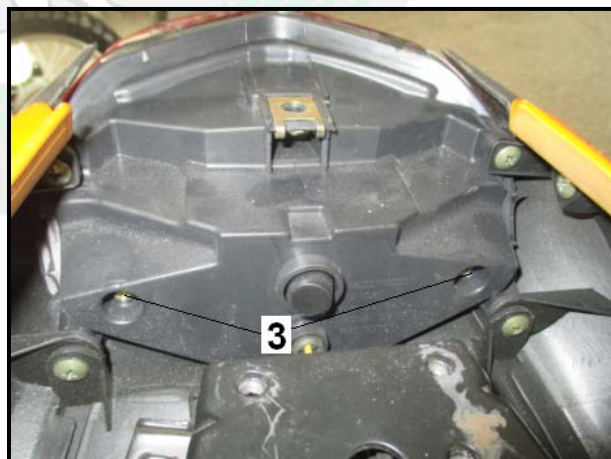
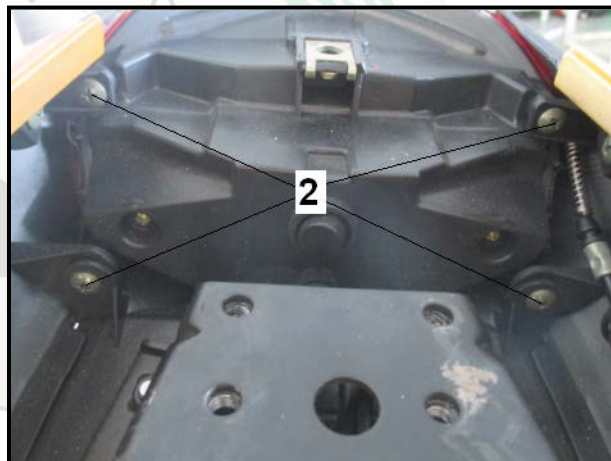
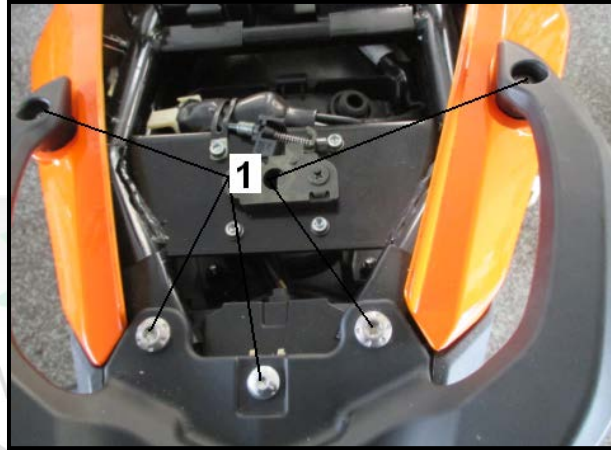
### Rear tail light replacement

#### Rear tail light replacement

The source of rear tail light is LED and the entire light should be replaced when necessary.

- (1) Remove the cushion.
- (2) Remove the rear grab rail mounting screw (1), and disassemble rear grab rail.
- (3) Remove mounting screw (2).

- (4) Remove the mounting nut (3).
- (5) Remove the cable of rear tail light, disassemble the damaged light and replace it with a new tail light.



#### Assembly:

Mount lights in the reverse order of disassembly.

## Lights / Front Turn Signal Light

### Front turn signal light replacement

#### Front turn signal light replacement

The source of front turn signal light is LED and the entire light should be replaced when necessary.

1. Operate according to the prompt of Chapter “Headlight bulb replacement”.
2. Remove the mounting screw ① of left or right turn signal light.
3. Remove the cable of front turn signal light, remove the damaged light and replace it with a new front turn signal light.



#### Assembly:

Mount the light in the reverse order of disassembly.

## Lights / Rear Turn Signal Light

### Rear turn signal light replacement

#### Rear turn signal light replacement

The source of rear turn signal light is LED and the entire light should be replaced when necessary.

1. Remove the mounting nut (1) of left or right turn signal light from the back of rear license plate bracket.
2. Remove the cable of rear turn signal light, remove the damaged light and replace it with a new rear turn signal light.



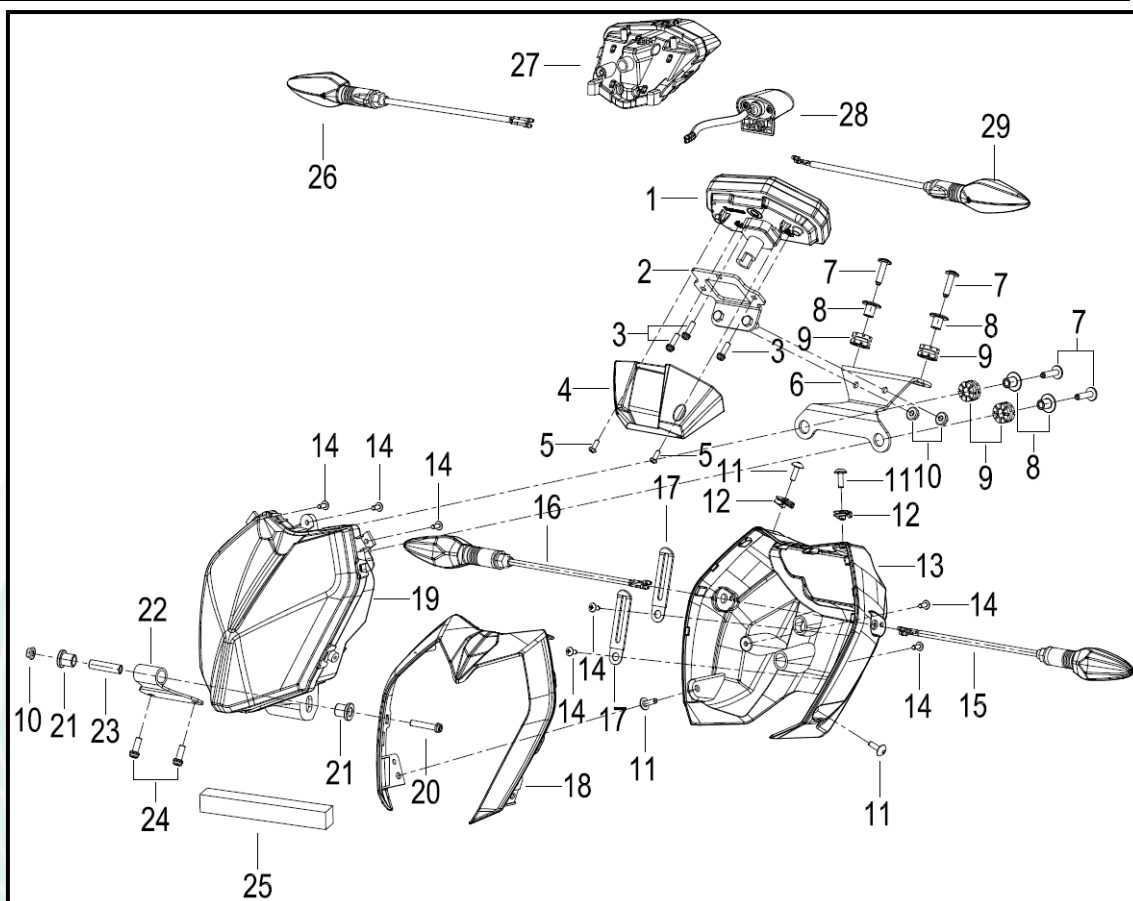
#### Assembly:

Mount the light in the reverse order of disassembly.



## Lights (2018)

### Light replacement



No.	Name and specifications	Quantity	No.	Name and specifications	Quantity
1	Meter assembly	1	16	Front right turn signal light	1
2	Instrument bracket welding component	1	17	Clamp component	2
3	Bolt M5×0.8×14	3	18	Cowling	1
4	Lower case of meter	1	19	Headlight	1
5	Cross recessed pan head self-tapping screw ST4.2×13/F type	2	20	Hexagon socket button head screw	1
6	Upper bracket of headlight	1	21	Headlight damper	2
7	Stainless steel screw M6×25	4	22	Lower mounting plate of headlight	1
8	Upper collar of radiator	4	23	Lower collar of headlight	1



9	Rubber washer	4	24	Bolt M6×1×16	2
10	Nut M6	3	25	Sponge damper	1
11	Stainless steel bolt M5×12	2	26	Rear right turn signal light	1
12	Clamping nut M5	2	27	Tail light	1
13	Rear decoration plate of cowling	1	28	License plate light	1
14	Self-tapping screw ST4.2×13	7	29	Rear left turn signal light	1
15	Front left turn signal light	1			



## Lights / Headlight (2018)

### Rear tail light replacement

#### Headlight replacement

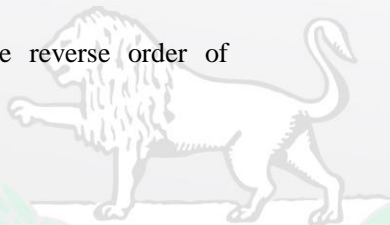
The source of headlight is LED and the entire light should be replaced when necessary.

See chapter “Covering Parts / Cowling”



#### Assembly:

Mount lights in the reverse order of disassembly.



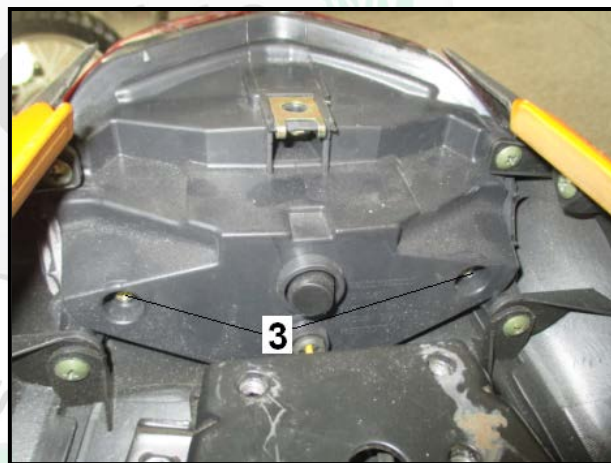
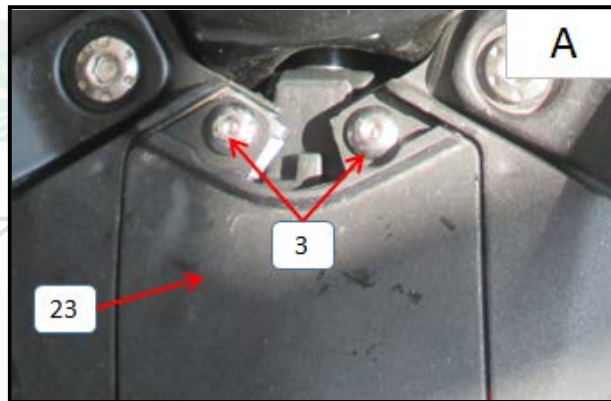
## Lights / Rear Tail Light (2018)

### Rear tail light replacement

#### Rear tail light replacement

The source of rear tail light is LED and the entire light should be replaced when necessary.

- (1) Remove the cushion.
- (2) Remove the rear grab rail.  
See chapter “Covering Parts / Cover”.
- (3) Remove the mounting screw (3), and remove the connecting plate of left and right tail cover (23).
- (4) Remove mounting nut (3).
- (5) Remove the cable of rear tail light, remove the damaged light and replace it with a new rear tail light



#### Assembly:

Mount the light in the reverse order of disassembly.

## Lights / Front Turn Signal Light (2018)

### Front turn signal light replacement

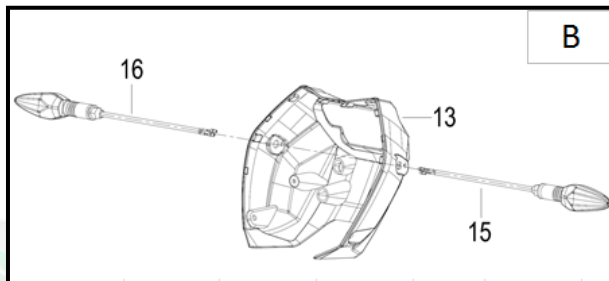
#### Front turn signal light replacement

The source of front turn signal light is LED and the entire light should be replaced when necessary.

See chapter “Covering Parts / Cowling”

#### Assembly:

Mount the light in the reverse order of disassembly.



Benelli



## Lights / Rear Turn Signal Light (2018)

### Rear turn signal light replacement

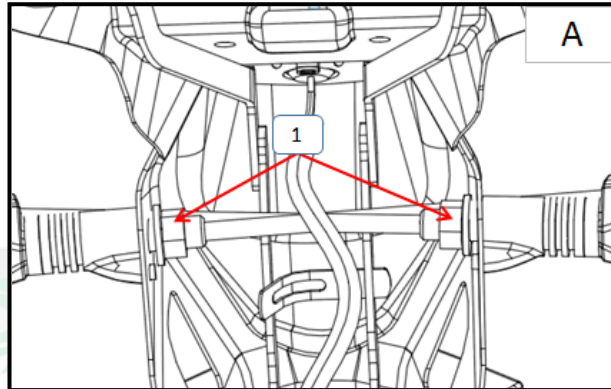
#### Rear turn signal light replacement

The source of rear turn signal light is LED and the entire light should be replaced when necessary.

1. Remove the mounting nut of left or right turn signal light (1) from the back of rear license plate bracket.
2. Remove the cable of rear turn signal light, remove the damaged light and replace it with a new rear turn signal light.

#### Assembly:

Mount the light in the reverse order of disassembly.







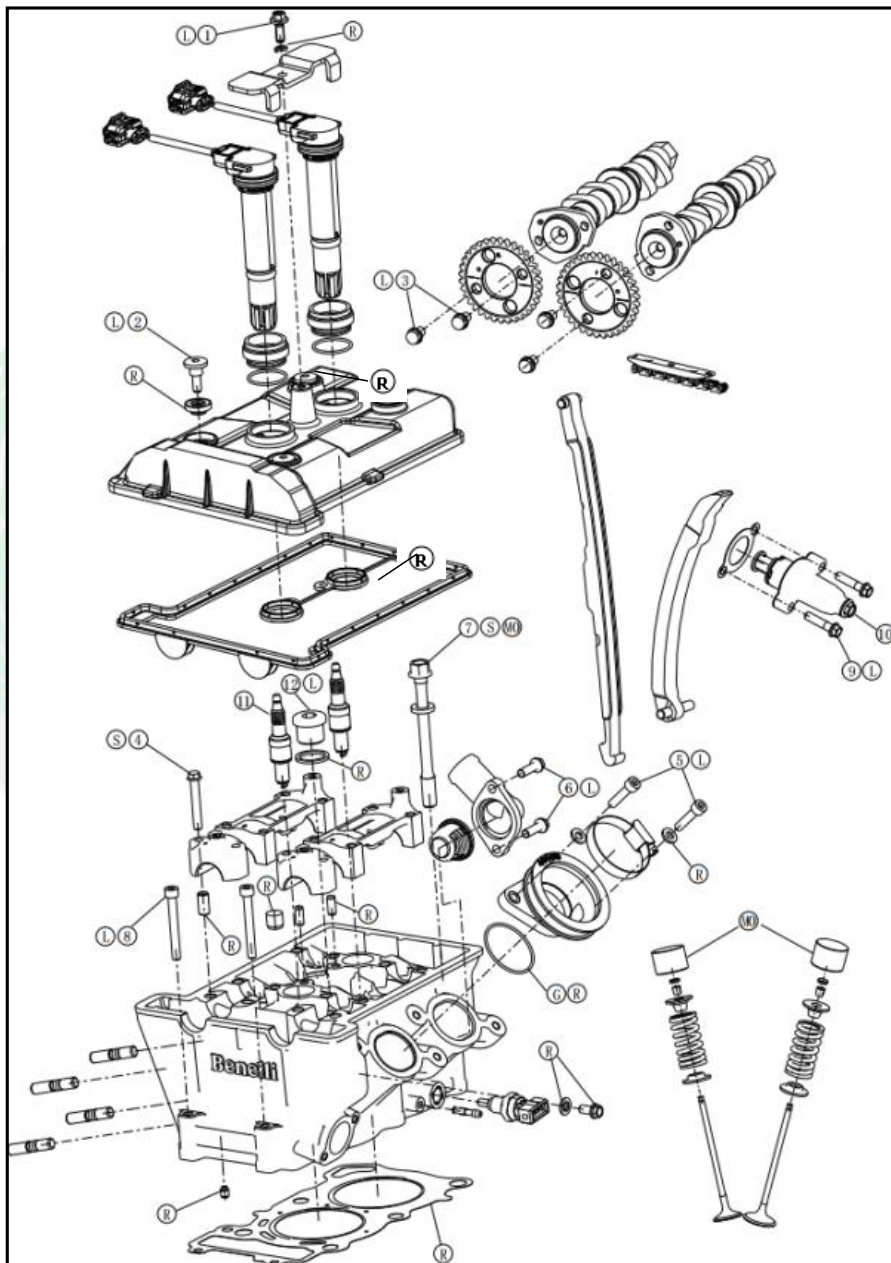
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## Cylinder head and cylinder head cover of engine

Cylinder head and cylinder head cover

### Exploded view



## Cylinder head and cylinder head cover

### Cylinder head and cylinder head cover

Exploded view

No.	Fastener	Torque			Remark
		N m	kgf m	ft lb	
1	Ignition coil set bolt	12	1.2	106in·lb	L
2	Positioning bolt	12	1.2	106in·lb	L
3	Camshaft sprocket fixing bolt	20	2.0	14.75	L
4	Camshaft briquetting bolt	12	1.2	106in·lb	S
5	Intake pipe erection bolt	12	1.2	106 in·lb	L
6	Thermostat cover erection bolt	12	1.2	106 in·lb	L
7	Cylinder head bolt component (M10)	55	5.5	40.56	S、MO
8	Cylinder cover bolt (M6)	12	1.2	106 in·lb	L
9	Tensioner fixing bolt	12	1.2	106in·lb	L
10	Tensioner sealing bolt	12	1.2	106 in·lb	
11	Spark plug	13	1.3	115 in·lb	
12	Water jacket plug	20	2.0	14.75	

G: Apply lubricating grease.

L: Apply thread fastening glue.

M: Apply lubricating grease containing molybdenum disulfide

MO: Apply oil solution containing molybdenum disulfide.

(Ratio of engine oil and lubricating grease containing molybdenum disulfide in weight: 10: 1)

R: Replace parts

S: Comply with the specified tightening order.

SS: Apply silicone sealant

## Cylinder head and cylinder head cover

### Cylinder head and cylinder head cover


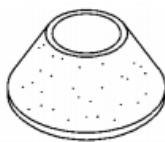
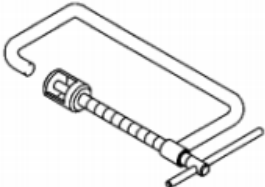
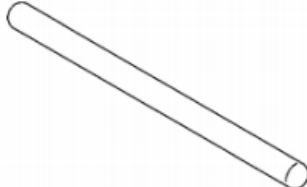
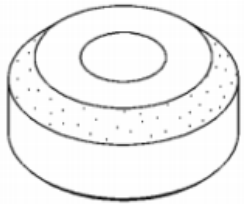
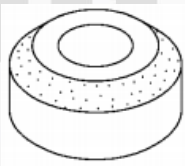
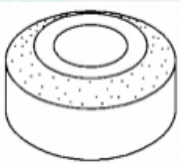
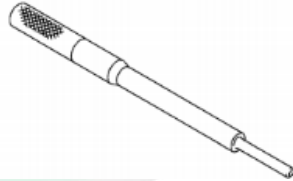
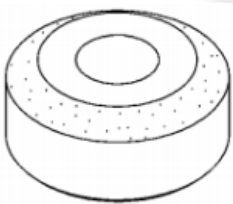

#### Technical parameters

Item	Standard	Operating limit
<b>Camshaft</b>		
Cam height:		
Exhaust valve	32.455 ~ 32.535 mm (1.2778 ~ 1.2809 in.)	32.36 mm (1.274 in.)
Intake valve	32.455 ~ 32.535 mm (1.2778 ~ 1.2809 in.)	32.36 mm (1.274 in.)
Camshaft oil passage, camshaft cover clearance	0.03~ 0.064mm (0.0012 ~ 0.0025 in.)	0.15mm (0.0059 in.)
Camshaft oil passage diameter	22.957 ~ 22.97mm (0.9038 ~ 0.9043 in.)	22.91 mm (0.902 in.)
Camshaft bearing bore diameter	23.000 ~ 23.021 mm (0.9055 ~ 0.9063 in.)	23.08 mm (0.909 in.)
Camshaft radial eccentricity	≤TIR 0.01 mm (0.0004 in.)	TIR 0.05mm (0.002 in.)
<b>Cylinder</b>		
Cylinder	(Application) When the rotating speed is 300 r/min: 1 030 ~ 1 570 kPa (10.5 ~ 16.0 kgf/cm <sup>2</sup> , 149 ~ 228 psi)	—
Cylinder cover bending	—	0.05 mm (0.002 in.)
<b>Valve</b>		
Valve clearance:		
Exhaust valve	0.19 ~ 0.25 mm (0.0074 ~ 0.0098 in.)	—
Intake valve	0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)	—
Valve head thickness:		
Exhaust valve	0.6 mm (0.024 in.)	0.4 mm (0.016 in.)
Intake valve	0.6 mm (0.024 in.)	0.4 mm (0.016 in.)
Valve stem bending	≤TIR 0.01 mm (0.0004 in.)	TIR 0.05mm (0.002 in.)
Valve stem diameter:		
Exhaust valve	3.965~ 3.98 mm (0.1561 ~ 0.1567 in.)	3.95mm (0.155 in.)
Intake valve	3.965~ 3.98 mm (0.1561 ~ 0.1567 in.)	3.95mm (0.155 in.)
Valve guide bore diameter:		
Exhaust valve	4.03 ~ 4.04 mm (0.1587 ~ 0.1590in.)	4.047 mm (0.16in.)
Intake valve	4.02 ~ 4.03 mm (0.1583 ~ 0.1587 in.)	4.037 mm (0.200 in.)
Valve clearance/valve guide clearance (the pendulum test):		
Exhaust valve	0.13~ 0.21 mm (0.0051 ~ 0.0083 in.)	0.40 mm (0.016 in.)
Intake valve	0.12 ~ 0.2 mm (0.0047 ~ 0.0079 in.)	0.34 mm (0.013 in.)
Valve seat cutting angle	30°、45°、60°	—
Valve seat surface:		
Width:		
Exhaust valve	1.1 ~ 1.3 mm (0.043 ~ 0.051 in.)	—
Intake valve	1.1 ~ 1.3 mm (0.043 ~ 0.051 in.)	—
Outside diameter:		
Exhaust valve	23.1 ~ 23.12mm (0.9094 ~ 0.9102in.)	—
Intake valve	26.1 ~ 26.12mm (1.0283 ~ 1.0291 in.)	—
Free length of valve spring:		
Exhaust valve	40.5mm (1.594 in.)	38.8 mm (1.528in.)
Intake valve	37.2mm (1.518 in.)	35.6 mm (1.402 in.)

## Cylinder head and cylinder head cover

Cylinder head and cylinder head cover

### Special tools and sealants

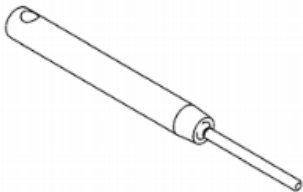
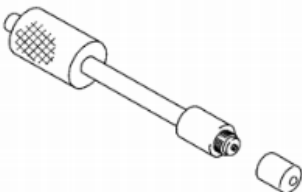
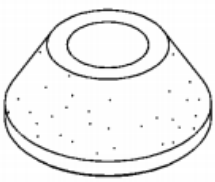
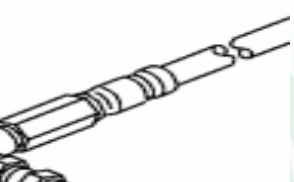
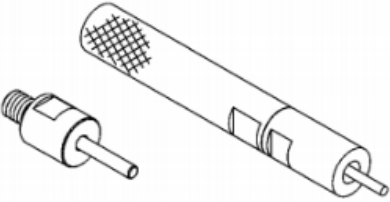
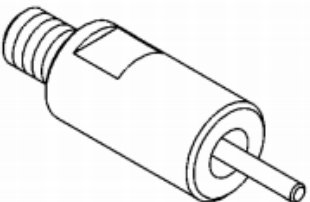
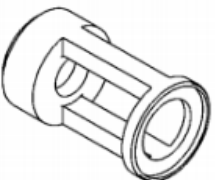
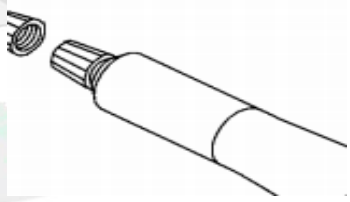
20 kgf/cm <sup>2</sup> pressure gauge	60 °φ 30 valve-seat milling cutter
	
Valve spring compressor assembly	Valve-seat milling cutter fixator rod
	
45 °φ35 valve-seat milling cutter	45 °φ30 valve-seat milling cutter
	
30 °φ30 valve-seat milling cutter	φ4 valve guide arbor
	
30 °φ35 valve-seat milling cutter	φ4 valve guide reamer
	



## Cylinder head and cylinder head cover

Cylinder head and cylinder head cover

### Special tools and sealants

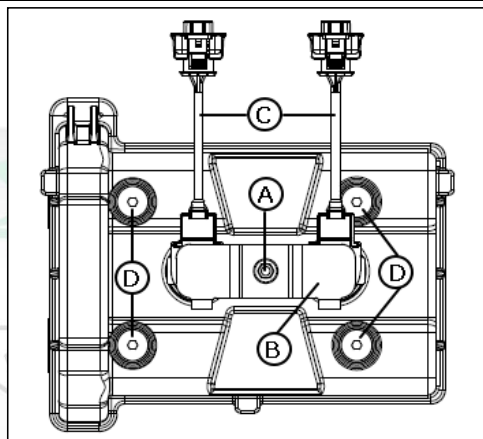
<b>φ4 valve-seat milling cutter fixator</b>	<b>M10 × 1.0 pressure gauge adaptor</b>
	
<b>60 °φ35 valve-seat milling cutter</b>	<b>L-shaped hose</b>
	
<b>Valve guide knock-in device</b>	<b>Valve guide knock-in device accessory E</b>
	
<b>φ24 valve spring compressor adaptor</b>	<b>Adhesive (silicone sealant)</b>
	

## Cylinder head cover

### Cylinder head cover

#### Disassembly of the cylinder head cover

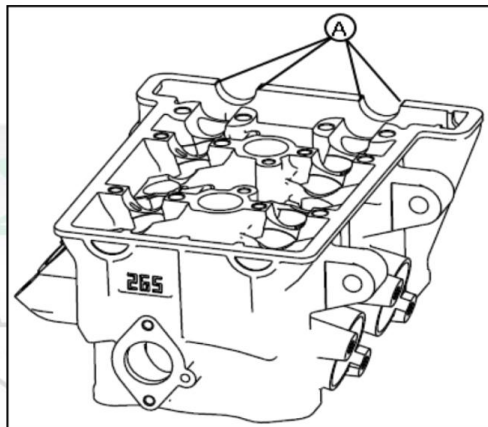
- Loosen the bolt and spring washer [A]
- Remove the ignition coil locating clip [B]
- Remove the ignition coil [C], ignition coil cover, O-ring and so on
- Loosen the positioning screws [D]
- Remove the seal ring subassembly, cylinder head cover and cylinder head cover gasket assembly



Benelli



## Cylinder head cover



Cylinder head cover

Assembly of cylinder head cover

- Apply silicone sealant [A] on the semicircle sharp corner of the cylinder head cover as shown in the figure,

### **Sealant-silicone sealant**

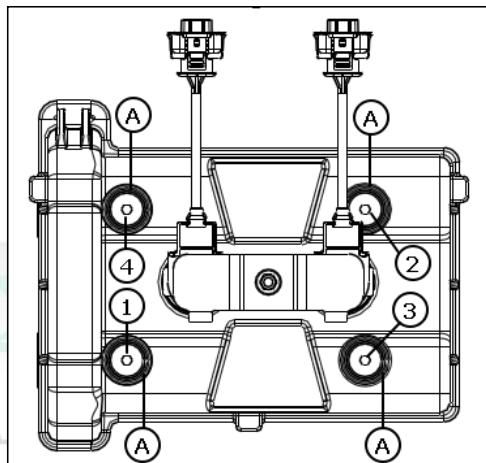
- Cylinder head cover gasket assembly, seal ring subassembly, O-ring and spring washer

**It is necessary to replace them with new parts.**



- Assembly:  
Assemble the disassembled parts on the cylinder head cover in the reverse order of disassembly
- Put the **metal surface** of the seal ring subassembly [A] **upwards**
- Assemble the positioning screw according to the number in the picture and tighten it twice

Locking torque of the positioning screw and the ignition coil locating clip bolt:  
12 N m (1.2 kgf m, 106in lb)



# Benelli



## Camshaft timing chain tensioner

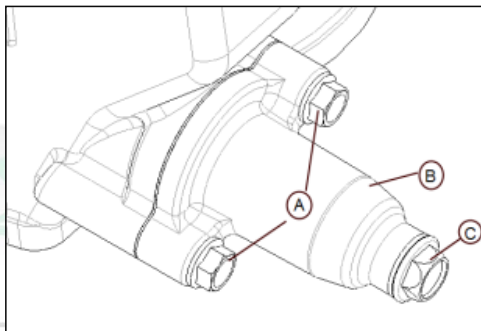
### Camshaft timing chain tensioner

Disassembly of the camshaft transmission chain tensioner

#### Note

**Do not start the crankshaft after the tensioner is removed, otherwise the timing of the camshaft timing chain will be affected, and the valve will be damaged.**

- Remove the sealing bolt [C]
- Remove the fixing bolts [A], and remove the camshaft timing chain **tensioner** [B].



Benelli



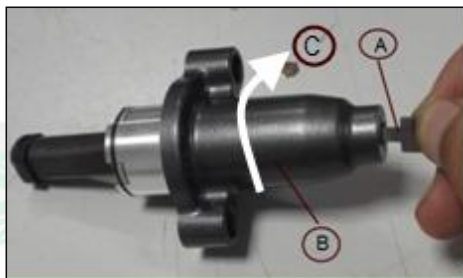


## Camshaft timing chain tensioner

### Camshaft timing chain tensioner

Assembly of the camshaft transmission chain tensioner

- Insert the T-shaped paddle [A] in the cross recess at the back of the tensioner [B], and rotate it in the direction [C]



- Screw the extending part of the tensioner [A] to the minimum and then insert the T-shaped paddle [B] in the cross recess at the back of the tensioner and fix it

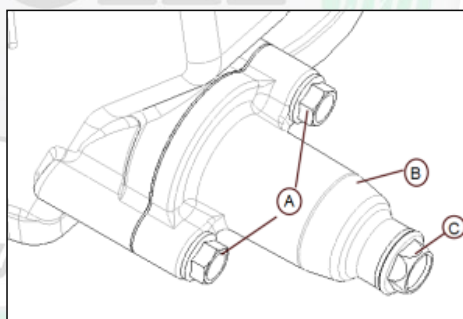


- Tighten the fixing bolts [A] of the **tensioner**.
- Remove the T-shaped paddle
- Tighten the sealing bolt [C].

**Locking torque of the camshaft timing chain tensioner fixing bolt: 10N m (1.0 kgf m, 87 in lb)**

**Locking torque of the camshaft timing chain tensioner sealing bolt: 10N m (1.0 kgf m, 87 in lb)**

- Rotate the crankshaft twice clockwise, and the tensioner will open. Then check the camshaft timing again.



## Camshaft and camshaft timing chain

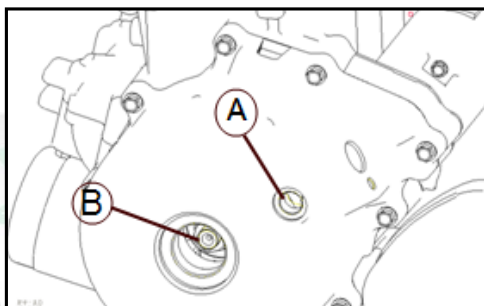
### Camshaft and camshaft timing chain

#### Disassembly of the camshaft

- Remove:

Cylinder head cover (see "disassembly of the cylinder head cover"),

- Rotate the crankshaft [B] and put the crankshaft at the top dead center of the piston. Align the timing observation hole slot [A] with the scribed line on the flywheel.



- Remove:

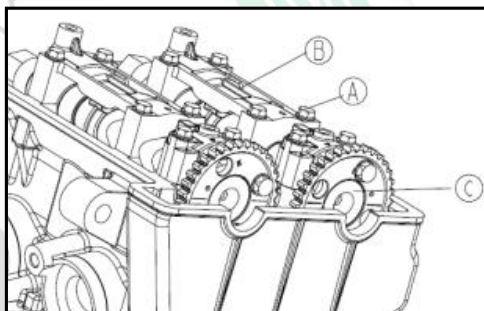
Camshaft timing chain tensioner (see "disassembly of the camshaft transmission chain tensioner"),

Camshaft cover bolt [A] ,

Camshaft cover [B],

Camshaft [C]

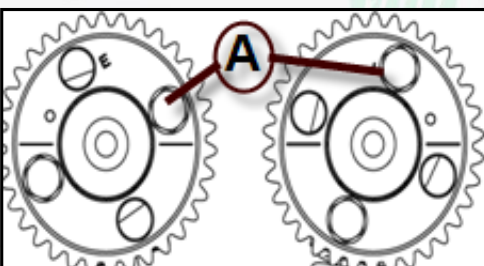
- To prevent parts from falling into the crankcase, plug the transmission chain link with clean cloth.



- Remove:

Camshaft sprocket fixing bolts [A]

Camshaft sprocket



#### Note

**The crankshaft can be rotated after the camshaft is removed. The transmission chain must be tightened during the rotation of the crankshaft, so as to prevent the lower (crankshaft) sprocket of the transmission chain from kinking and damaging the transmission chain and sprocket.**

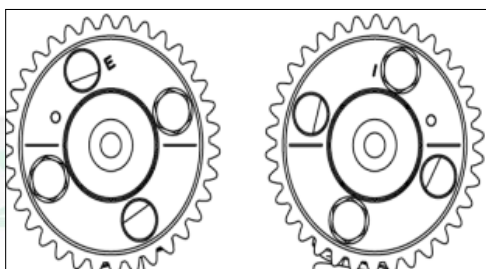
## Camshaft and camshaft timing chain

### Camshaft and camshaft timing chain

#### Assembly of the camshaft

- Disassemble the camshaft sprocket, as shown in the picture.
- Apply thread fastening glue on the threads of the fixing bolt, and then tighten the bolt.

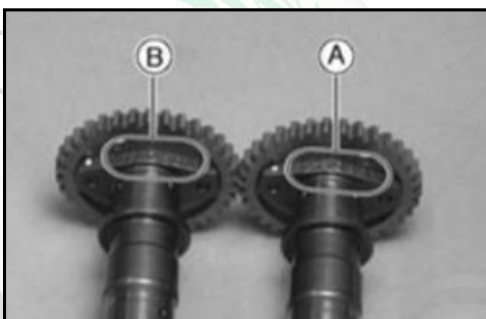
**Locking torque of camshaft sprocket fixing bolt:**  
20N m (2.0 kgf m, 11 ft lb)



- Apply molybdenum disulfide oil solution on all cam parts and journals.
- If it is necessary to use new camshafts, apply a thin layer of molybdenum disulfide lubricating grease on surfaces of the cams.

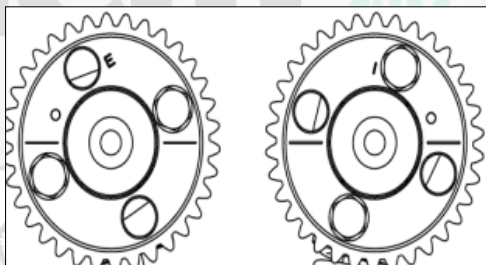
#### Remark

- There is an E sign [A] on the exhaust camshaft sprocket, and there is an I sign [B] on the intake camshaft sprocket. Do not confuse the exhaust camshaft and the intake camshaft!

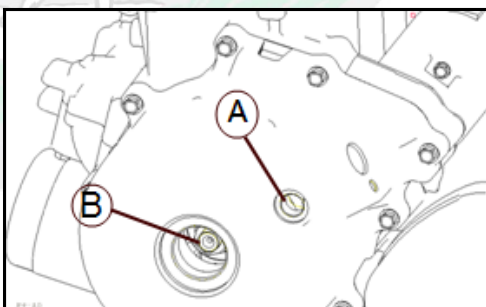


#### Remark

- The E and I signs should be put upwards during the adjustment of the timing.



- Put the crankshaft on the top dead center of the piston.
- Tighten the tight side (exhaust side) of the chain when installing the chain.
- Align the timing observation hole slot [A] with the scribed line on the flywheel.



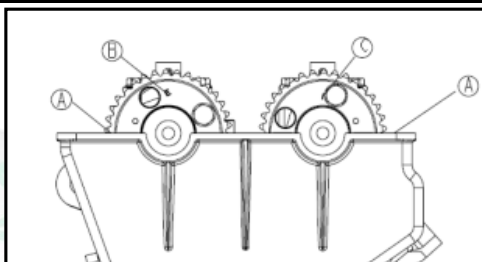
## Camshaft and camshaft timing chain

### Camshaft and camshaft timing chain

○ Align the timing signs with the upper surface [A] of the cylinder.

E sign [B]

I sign [C]

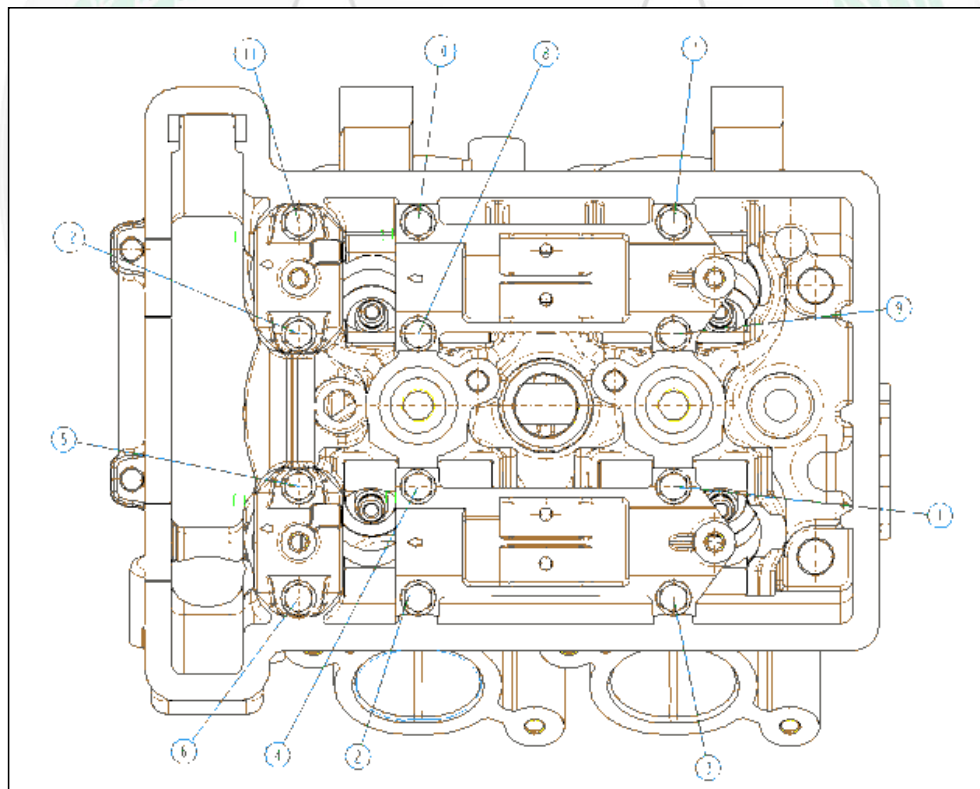


● Assemble the camshaft cover

○ Tighten the camshaft cover first, put the camshaft in proper place, and then tighten all bolts according to the order shown in the figure.

**Locking torque of No.1 to 12 camshaft cover bolt: 12 N•m (1.2 kgf•m, 106 in•lb)**

● Assemble the camshaft timing chain tensioner (see “Assembly of the camshaft transmission chain tensioner”).



## Camshaft and camshaft timing chain

### Camshaft and camshaft timing chain

Check of the camshaft

**Wear of the camshaft and camshaft lock block**

- Remove:

**Camshaft lock block** (see “Disassembly of the camshaft”)

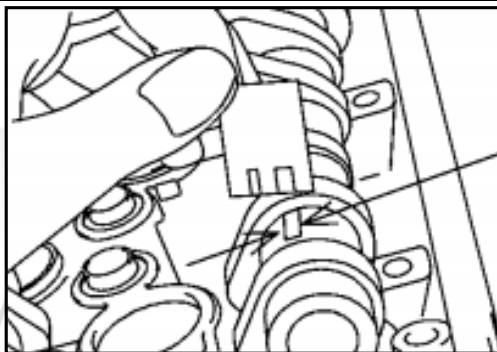
- Cut the plastic clearance gauge into strips according to the width of the journal. Put a strip of plastic clearance gauge in each oil passage, and align it with the camshaft which is installed in the correct position.

- Measure the clearance between each camshaft oil passage and camshaft lock block with the plastic clearance gauge [A].

- Tighten the camshaft briquetting bolt and the chain guide bolt (see “Assembly of the camshaft”).

**Remark**

- Do not rotate the camshaft when plastic clearance gauge is between the oil passage and the camshaft lock block!



**Clearance between the camshaft oil passage and the camshaft lock block**

**Standard: 0.03 to 0.064 mm (0.0012 to 0.0025 in.)**

**Operating limit: 0.15 mm (0.0059 in.)**

- ★ If clearance between any camshaft journal and camshaft cover exceeds the operating limit, measure the diameter of each camshaft oil passage with a micrometer.

**Diameter of camshaft oil passage**

**Standard: 22.957 to 22.97mm (0.9038 to 0.9043 in.)**

**Operating limit: 22.91 mm (0.902 in.)**

- ★ If the diameter of the camshaft oil passage is lower than the operating limit, replace the camshaft, and then re-measure the clearance.

- ★ If the measured clearance is still beyond the limit, replace the cylinder cover.



## Camshaft and camshaft timing chain

### Camshaft and camshaft timing chain

#### Camshaft radial eccentricity

- Remove the camshaft (see “Disassembly of the camshaft”).
- Put the camshaft in the alignment jig or V-shaped block.
- Measure the radial eccentricity of the camshaft with a dial indicator at the position shown in the right figure.
- ★ If the radial eccentricity of the camshaft exceeds the operating limit, replace the camshaft.

#### Radial eccentricity of the camshaft

**Standard:**  $\leq$ TIR 0.01 mm (0.0004 in.)

**Operating limit:** TIR 0.05 mm (0.002 in.)

#### Wear of the cam

- Remove the camshaft (see “Disassembly of the camshaft”).
- Measure the height of each cam with a micrometer [A].

★ If wear of the cam exceeds the operating limit, replace the camshaft.

#### Cam height

**Standard:**

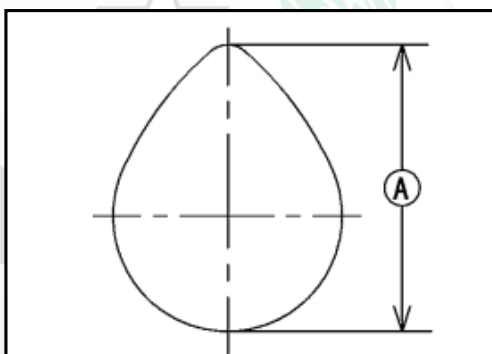
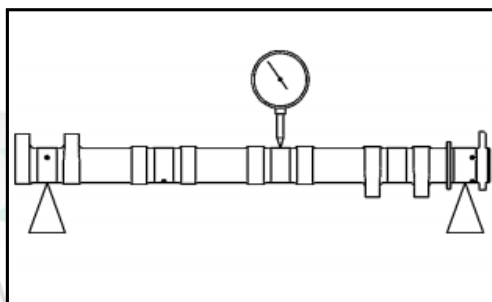
**Exhaust cam:** 32.455 to 32.535 mm (1.2778 to 1.2809 in.)

**Intake cam:** 32.455 to 32.535 mm (1.2778 to 1.2809 in.)

**Operating limit:**

**Exhaust cam:** 32.36 mm (1.274 in.)

**Intake cam:** 32.36mm (1.274 in.)



## Camshaft and camshaft timing chain

### Camshaft and camshaft timing chain

#### Disassembly of the camshaft timing chain

- Remove:

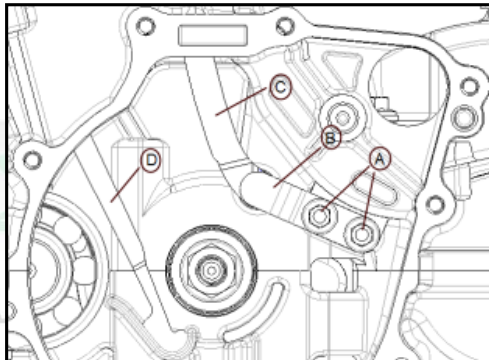
Camshaft (see “Disassembly of the camshaft”)

Auxiliary leading chain plate [D]

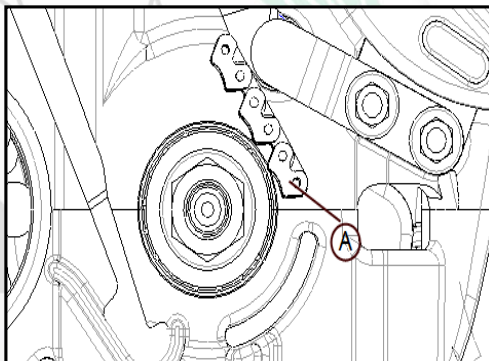
Main leading chain plate follower bolts [A]

Main leading chain plate pressing plate [B]

Main leading chain plate [C]



- Pull the camshaft timing chain [A] out downwards.



#### Assembly of the camshaft timing chain

- Assemble timing chain on the side of cylinder head camshaft first.

- Assemble the crankshaft on the top dead center

- Assemble the auxiliary leading chain plate.

- Assemble the main leading chain plate

- Tighten the main leading chain plate follower bolts

**Tightening torque of the main leading chain plate follower bolts: 9.8N m (1.0 kgf m, 87 in lb)**

- Assemble the removed parts (see the corresponding section).

## Cylinder cover

### Cylinder cover

#### Measurement of cylinder pressure

##### Remark

- Use fully charged battery!
- Heat the engine completely.
- Turn off the engine.
- Remove:

The ignition coil

The spark plug (see “Chapter III Check and Regular Adjustment” and Chapter I “Replacement of the Spark Plug”)

- Connect the pressure gauge [A] and adapter [B] firmly in the spark plug hole.
- Start the motor with the starting motor, and turn on the throttle valve fully until readings of the pressure gauge does not increase. The maximum reading is cylinder pressure of the cylinder.



**Special tool: pressure gauge 20 kgf/cm: 57001-221**

**Pressure gauge adapter M10 × 1.0: 57001-1601**

**L-shaped hose [C]**

#### Cylinder pressure

**Application: when the rotating speed is 300r/min: 1030 to 1570 kPa (10.5 to 16.0 kgf/cm<sup>2</sup>, 149 to 228 psi)**

- Measure the cylinder pressure of other cylinders according to above the steps.
- Install the spark plug.

**Spark plug locking torque: 13 N·m (1.3 kgf·m, 115 in·lb)**

- If the pressure gauge readings are not within the above application scope, please refer to the following table.

Problem	Cause	Solution
Cylinder pressure is higher than pressure in the application scope	Maybe it is due to damage of valve stem seal and/or piston oil ring. There are carbon deposits on the piston and in the combustion chamber (it can be judged from the discharged white exhaust gas).	Clean the carbon deposits, and replace the damaged parts if necessary.
	Thickness of the cylinder cover gasket is unsuitable.	Replace it with a gasket of standard thickness.
Cylinder pressure is lower than pressure in the application scope	There is leakage around the cylinder cover.	Replace the damaged gasket, and check the deformation of the cylinder cover.
	The valve seat is not working properly	Repair it if necessary.
	Valve clearance is incorrect	Adjust the valve clearance.
	Piston/cylinder clearance is incorrect	Replace the piston and/or cylinder.
	Cylinder score	Check the cylinder, and replace/repair the cylinder and/or piston if necessary.
	Piston ring and/or piston ring groove is not working properly	Replace the piston and/or piston ring.

## Cylinder cover

### Cylinder cover

#### Disassembly of the cylinder cover

- Remove:

The cylinder head cover (see “Disassembly of the cylinder head cover”),

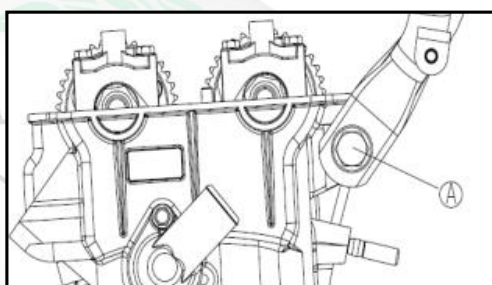
Camshaft (see “Disassembly of the camshaft”),

Main chain guide (see “Disassembly of the camshaft transmission chain”),

Auxiliary chain guide (see “Disassembly of the camshaft transmission chain”),

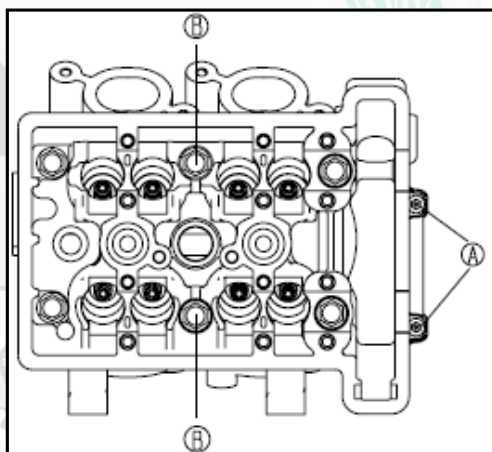
- Remove:

Front engine fixing bolt (M10) [A],



- Remove the M6 cylinder cover bolts [A] and then remove the M10 cylinder cover bolts [B].

- Remove the cylinder cover.



## Cylinder cover

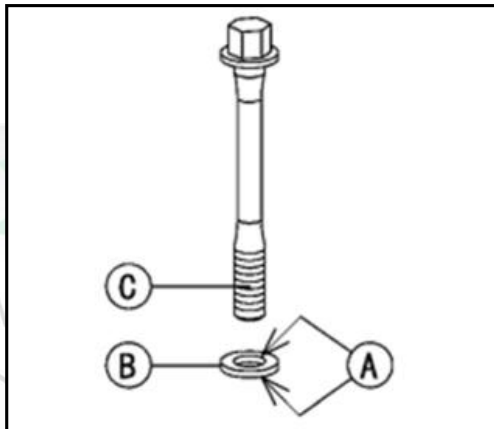
### Cylinder cover

#### Assembly of the cylinder cover

##### Remark

○ Camshaft lock block and the cylinder cover are processed together; therefore, if it is necessary to assemble a new cylinder, please use the camshaft lock block equipped with the new cylinder cover.

- Assemble a new cylinder cover gasket and locating pin.
- Replaced a new cylinder cover bolt washer.
- Apply molybdenum disulfide oil solution on both sides [A] of the cylinder cover bolt washer [B] and threads of the cover bolt [C].



- Tighten the M10 cylinder cover bolts in the order shown in the right figure [1~6].

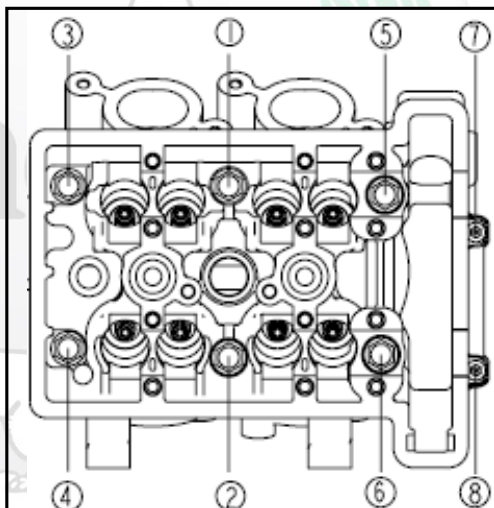
#### Locking torque of cylinder cover bolts (M10):

**Preliminary lock: 30N m (3.0 kgf m,)**

**Final lock: 55 N m (5.5 kgf m,)**

- Tighten the M6 cylinder cover bolts [7 ~ 8].

**Locking torque of cylinder cover bolts (M6): 12 N m (1.2 kgf m,)**





## Cylinder cover

### Cylinder cover

- Assemble:

Auxiliary leading chain plate [A],

Main leading chain plate [B],

Main leading chain plate pressing plate [C]

Pressing plate fixing bolts [D]

- Locking torque:

**Tightening torque of main leading chain plate**

**follower bolts: 9.8N m (1.0 kgf m, 87 in lb)**

- Replace the following bolts with new bolts that has been applied with tightening agents and tighten them.

Engine bracket bolts (M8),

Front engine fixing bolts (M10),

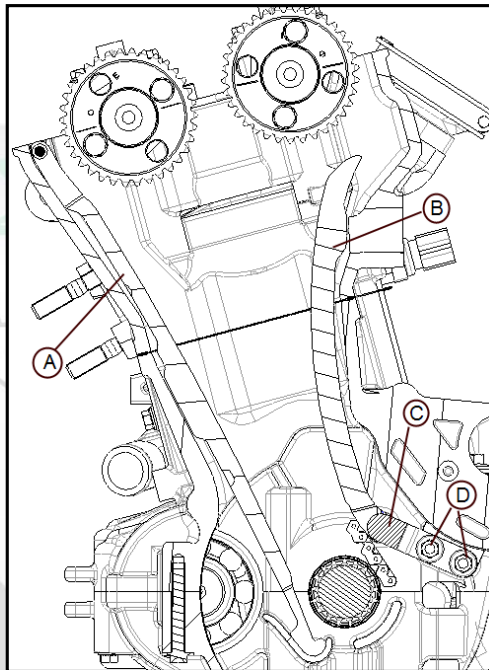
**Locking torque of engine bracket bolts (M8): 25 N m**

**(2.5 kgf m, 18ft lb)**

**Locking torque of front engine fixing bolts (M10): 59**

**N m (6.0kgf m, 44 ft lb)**

- Assemble the removed parts (see the corresponding section).



## Cylinder cover

### Cylinder cover

Check of the deformation of the cylinder cover

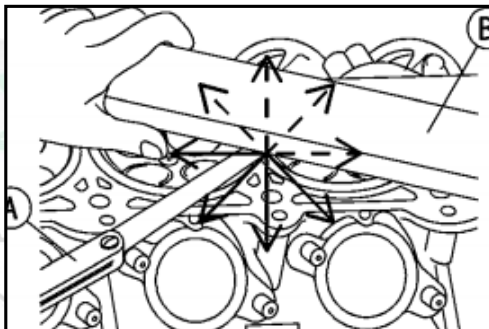
- Clean the cylinder cover.
- Put a ruler at several locations on the lower surface of the cylinder cover.
- Measure the distance between the cylinder cover and the ruler [B] with the clearance gauge [A].

#### Deformation of the cylinder cover

Standard: ---

Operating limit: 0.05 mm (0.002 in.)

- ★ If deformation of the cylinder cover is beyond the operating limit, replace the cylinder cover.
- ★ If deformation of the cylinder cover does not exceed the operating limit, polish the lower surface of the cylinder cover with the sandpaper fixed on the plate (polish it with No.200 sandpaper first, then with No.400 sandpaper).



# Benelli



## Valve

### Valve

#### Check of the valve clearance

- See “Chapter III Check and Regular adjustment” – “Check of the valve clearance.”

#### Adjustment of the valve clearance

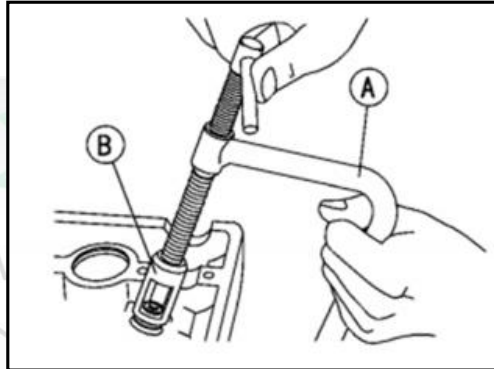
- See “Chapter III Check and Regular adjustment” – “Adjustment of the valve clearance.”

#### Disassembly of the valve

- Remove:
  - Cylinder cover (see “Disassembly of the cylinder cover”),
  - Valve ejector rod and gasket
    - Make marks on the valve ejector rod and gasket, so that the valve ejector rod and gasket can be assembled to the original positions later.
  - Remove the valve with valve spring compressor assembly.

#### Valve spring compressor assembly [A]

Valve spring compressor adapter  $\varnothing 24$  [B]



## Valve

### Valve

#### Assembly of the valve

- It is necessary to use the new oil seal.
- Apply a thin layer of molybdenum disulfide grease on the valve stem first before assembling the valve.
- Put the end with narrower spacing of the spring downwards when assembling the spring.

The valve stem [A],

Oil seal [B],

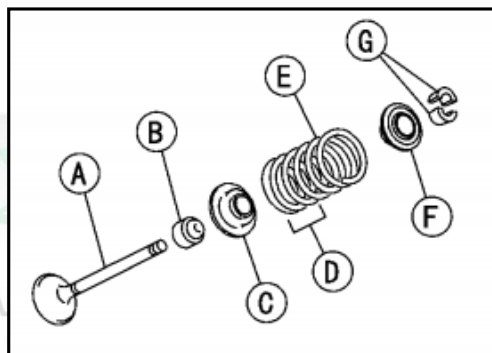
Upper guard ring of the spring [C],

Spring end with narrower spacing [D]

Valve spring [E]

Lower guard ring of the spring [F]

Valve key [G]



# Benelli



## Valve

### Valve

Disassembly of the valve guide

- Remove:

Valve (see “Disassembly of the valve”),

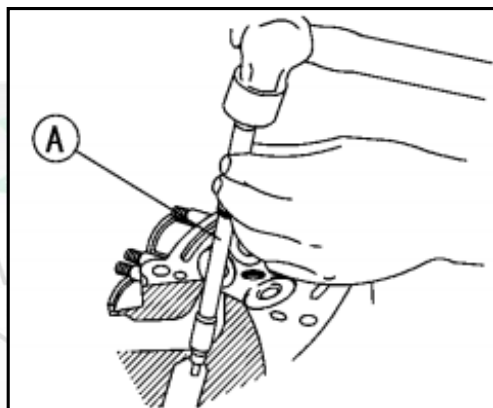
Oil seal,

Spring seat

- Increase the temperature of the valve guide to 120~150°C (248~302°F), then tap the valve guide and remove the tooling [A], and remove the guide from the top.

#### Note

Do not heat the cylinder head directly with fire, otherwise the cylinder cover will be deformed. Soak the cylinder cover in oil and heat the oil.



Special tool - the valve guide removal rod  $\phi 4$

# Benelli





## Valve

### Valve

#### Assembly of the valve guide

- Apply engine oil on the external surface of the valve guide before assembling it.
- Increase the temperature around the valve guide hole to 120 ~ 150°C (248~302°F).

#### Note

**Do not heat the cylinder head directly with fire, otherwise the cylinder cover will be deformed. Soak the cylinder cover in oil and heat the oil.**

- Assemble the parts of valve guide knock-in tooling (fixator and accessory E).

- Insert the rod of the knock-in tooling into the valve guide hole, and then knock the end of the knock-in tooling, until it reaches the bottom.

Valve guide screwdriver accessory E [A],

Valve guide screwdriver (fixator) [B],

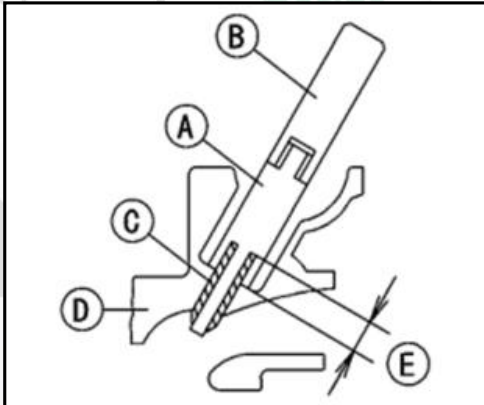
Valve guide [C],

Cylinder cover [D]

Valve guide installation height = 15.1 mm (0.59 in.) [E]

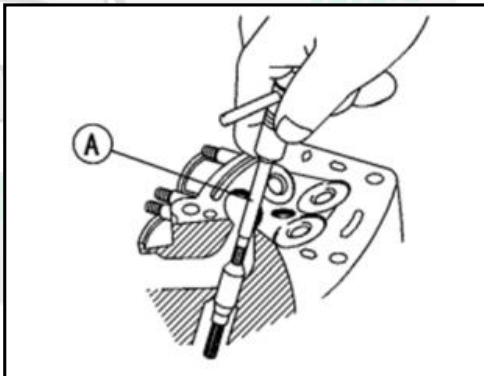
**Special tool - valve guide screwdriver**

**Valve guide screwdriver accessory E**



- Ream the valve guide with the valve guide reamer [A]. The used guide also needs to be reamed with the reamer.

**Special tool - valve guide reamer  $\phi 4$**



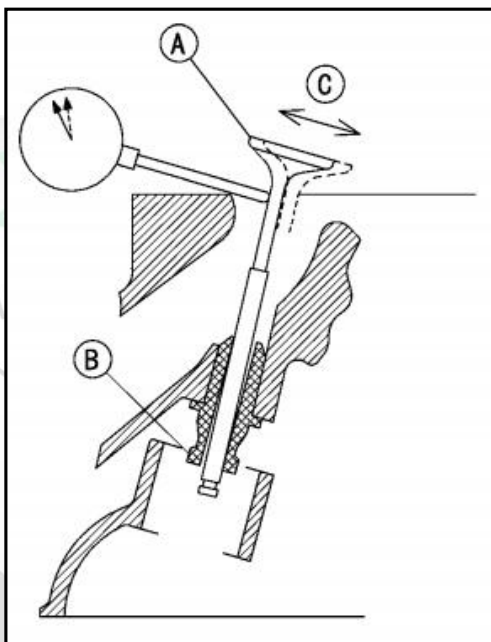
## Valve

### Valve

Measurement of the clearance between the valve and guide (the pendulum test)

If there is no small-sized inside gauge, clearance between the valve and the valve guide can be measured by the pendulum test as shown in the figure, thereby wear of the valve guide can be measured.

- Insert a new valve [A] into the valve guide [B] inside, and make the dial indicator perpendicular to the valve stem and keep it as close to the cylinder cover joint surface as possible.
  - Move the valve stem back and forth [C] and measure the clearance between the valve and the valve guide.
  - Measure the clearance again in the above steps in the same direction and at the right angle.
- ★ If the reading exceeds the operating limit, replace the valve guide.



#### Remark

- Since the measuring point and the valve guide is not in the same plane, so measured values of the pendulum test are not the actual clearance values between the valve guide and valve stem. Please refer to the following table during maintenance and replacement.

#### Clearance between the valve and guide (the pendulum test)

##### Standard:

Exhaust: 0.13 ~ 0.21 mm (0.0051 ~ 0.0083 in.)

Intake: 0.12 ~ 0.2 mm (0.0047 ~ 0.0079 in.)

##### Operating limit:

Exhaust: 0.40 mm (0.016 in.)

Intake: 0.34 mm (0.013 in.)

## Valve

### Valve

#### Check of the valve seat

- Remove the valve (see “Disassembly of the valve”).
- Check the valve seat surface [A] between the valve B] and valve seat [C].
- Measure the outside diameter [D] of the valve seat.
- ★ If the outer diameter of the valve seat is too large or too small, repair the valve seat (see “Repair of the valve seat”).

#### Outside diameter of the valve seat surface:

##### Standard:

**Exhaust valve seat: 21.55 ~ 21.65 mm (0.849 ~ 0.853 in.)**

**Intake valve seat: 24.4 ~ 24.5 mm (0.961 ~ 0.965 in.)**

- Measure the width [E] of the part without carbon deposits (the white part) on the valve seat with a vernier caliper.

##### Normal [F]

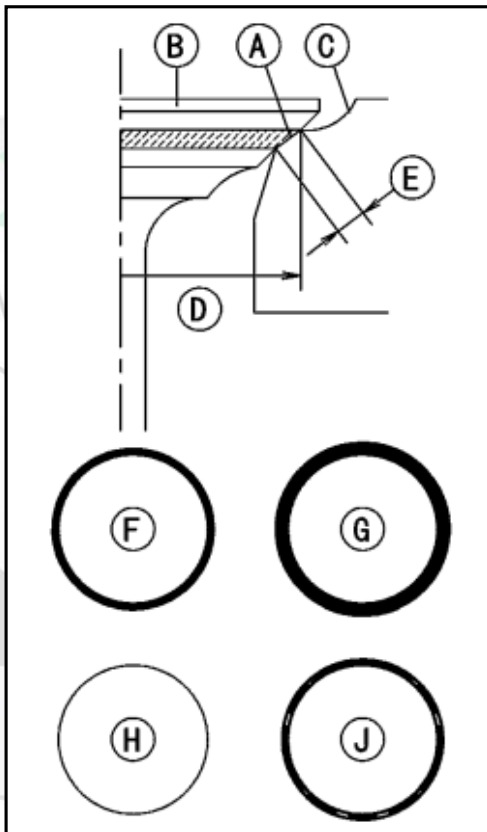
- ★ If the width is too large [G], too small [H] or uneven [J], repair the valve seat (see “Repair of the valve seat”).

#### Width of the valve seat surface:

##### Standard:

**Exhaust valve seat: 1.1 ~ 1.3 mm (0.043 ~ 0.051 in.)**

**Intake valve seat: 1.1 ~ 1.3 mm (0.043 ~ 0.051 in.)**



## Valve

### Valve

Repair of the valve seat

- Repair the valve seat with the valve seat milling cutter [A].

Special tool - valve seat milling cutter fixator rod  
valve seat milling cutter fixator  $\phi 4$

[Special valve seat milling cutter for exhaust valve seat]

Valve seat milling cutter 45°- $\phi 30$

Valve seat milling cutter 30°- $\phi 30$

Valve seat milling cutter 60°- $\phi 30$

[Special valve seat milling cutter for intake valve seat]

Valve seat milling cutter 45°- $\phi 35$

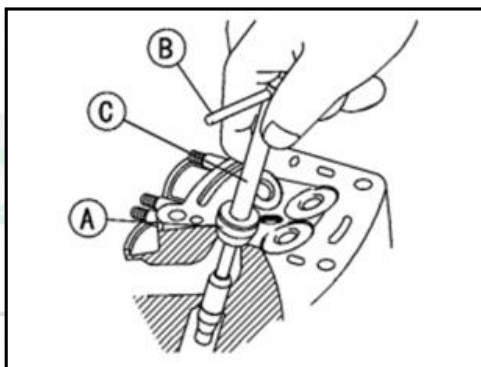
Valve seat milling cutter 30°- $\phi 35$

Valve seat milling cutter 60°- $\phi 35$

★ If you cannot find the instructions provided by the manufacturer, follow the following steps.

**Note for the use of the valve seat milling cutter:**

1. Since the valve seat milling cutter is designed for polishing on the valve seat to fix the valve seat, it can only be used to repair the valve seat and cannot be used for other purposes.
2. The valve seat milling cutter must be protected from dropping or striking to prevent diamond particle from shedding.
3. Apply engine oil on the valve seat milling cutter before polishing on the valve seat surface, and clean the powder on the milling cutter with special cleaning oil.



#### Remark

○ Do not use wire brush to clean the metal powder on the milling cutter, otherwise the diamond particle would fall off.

4. Put the valve seat milling cutter on the fixator, and operate the milling cutter with one hand. Do not use excessive force on the diamond section!

#### Remark

○ Apply engine oil on the valve seat cutter before polishing, and clean the powder sticking to the milling cutter timely with special cleaning oil during the use of the milling cutter.

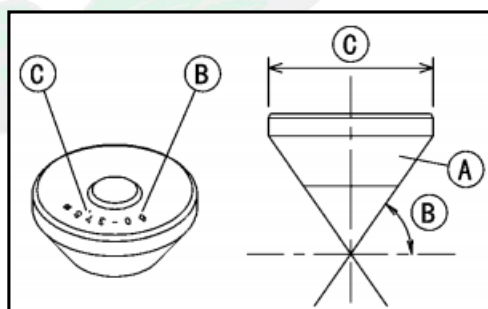
5. Clean the milling cutter with special cleaning oil after use, and then apply a thin layer of oil on it before storage

#### Signs printed on the milling cutter

Meanings of the signs printed on the back of the cutter are as follows:

60° ..... cutting tool angle [B]

37.5 $\phi$  ..... outside diameter of the cutter [C]



## Valve

### Valve

#### Operating procedures:

- Thoroughly clean the valve seat.
- Coat the surface of valve seat with dye for mechanical processing.
- Install a 45 ° milling cutter at the fixator, and then slide it into the valve guide.
- Gently press down the handle, and then rotate it to left or right, polish the surface of valve seat, until it becomes smooth.

#### Note

**Do not polish valve seat excessively, otherwise the valve may go into cylinder head, reducing the valve clearance. If the valve moves upward and goes into cylinder head too deep, the valve clearance cannot be adjusted, and the entire cylinder head assemble should be replaced.**

- Measure the outer diameter of valve seat surface with a vernier caliper.

★ If the outer diameter of valve seat surface is too small, continue to polish with 45 ° milling cutter, until the diameter is within then specified range.

Widened width after polishing with 45 ° milling cutter

[A]

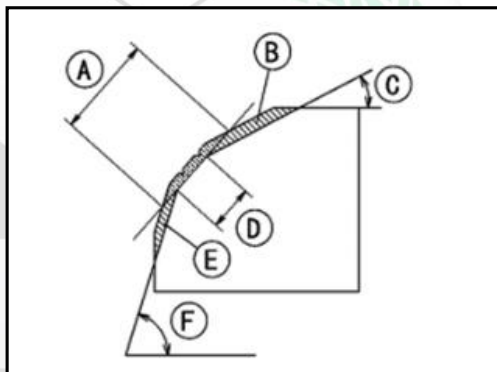
Part polished with 30 ° milling cutter [B]

30 ° [C]

Correct width [D]

Part polished with 60 ° milling cutter [E]

60 ° [F]



- Measure the outer diameter of valve seat surface with a vernier caliper.

★ If the outer diameter of valve seat surface is too small, continue to polish with 45 ° milling cutter, until the diameter is within then specified range.

Original valve seat surface [B]

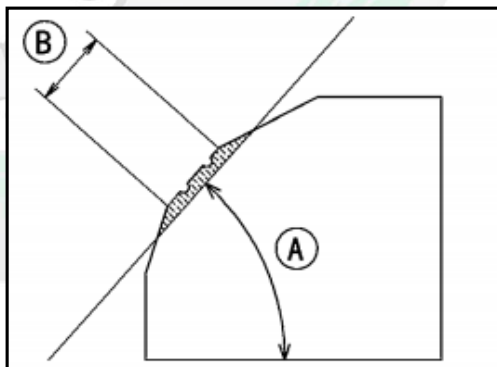
#### Remarks

○ Clean the powder on 45 ° polished surface.

○ After grinding with 45 ° milling cutter, coat a thin

layer of special dye for mechanical processing to make the valve surface seat more obvious and facilitate 30 ° and 60 ° polishing.

○ When replacing valve guide, polish with 45 ° milling cutter, make the valve seat align at the center and ensure good contact.





## Valve

### Valve

★ If the outer diameter of valve seat surface is too large, polish with 30 ° milling cutter according to the following method.

★ If the outer diameter of valve seat surface is within the specified range, measure the width of valve seat according to the following method.

● Grind valve seat at 30° angle [B], until its outer diameter is reduced to the specified range.

○ Install a 30 ° milling cutter at the fixator before polishing at 30° angle, and then make it go into the valve guide.

○ Gently press down the fixator, turn one round once, and check the valve seat once per round.

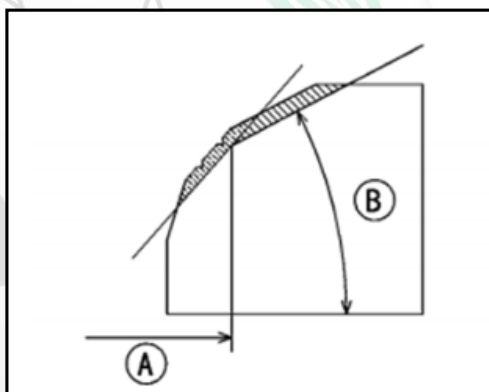
#### Note

**The polishing efficiency of 30 °milling cutter is very high, so it is required to frequently check the outer diameter of valve to avoid excessive polishing.**

○ After polishing using 30 ° milling cutter, go back to the above steps for measuring the outer diameter of valve seat.

● In order to measure the width of valve seat, measure the width of several different parts of valve seat with a vernier caliper.

★ If the width of valve seat is too small, repeat 45° polishing, until valve seat become a little wide, and then go back to the above steps for measuring the outer diameter of valve seat.



★ If the width of valve seat is too large, conduct 60°[A] polishing according to the following method.

★ If the width of valve seat is within the specified range, install the valve on valve seat according to the following methods.

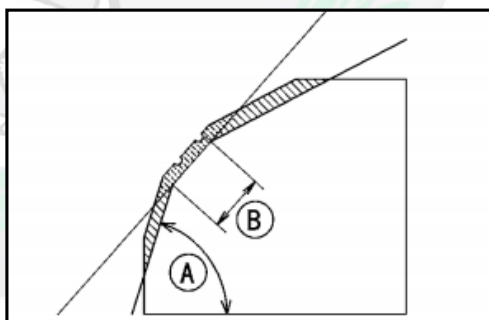
● Polish valve seat at 60° angle, until the width of valve seat is within the specified range.

○ Before polishing at 60° angle, it is required to install 60° milling cutter on fixator, and then slide it into the valve guide.

○ Gently press fixator and rotate it at the same time.

○ After polishing at 60° angle, go back to the above steps for measuring the width of valve seat

Correct width [B]



## Valve

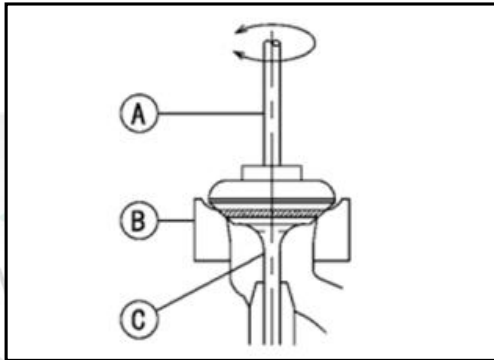
### Valve

- If the width and outer diameter of valve seat are within the specified range, install valve on valve seat.
  - Place a small amount of grinding agent at several parts of around valve head.
  - Rotate the valve, until coarse grinding agent make the contact surface between valve seat and valve become smooth.
  - Repeat the above grinding process using fine grinding agent.

Grinding tools [A]

Valve seat [B]

Valve [C]



- Make the position of base at the middle of valve surface.

★ If the base is not at the correct part of valve, confirm whether the valve is correct part. If it is correct, the problem is excessive polishing, and you need to replace it.

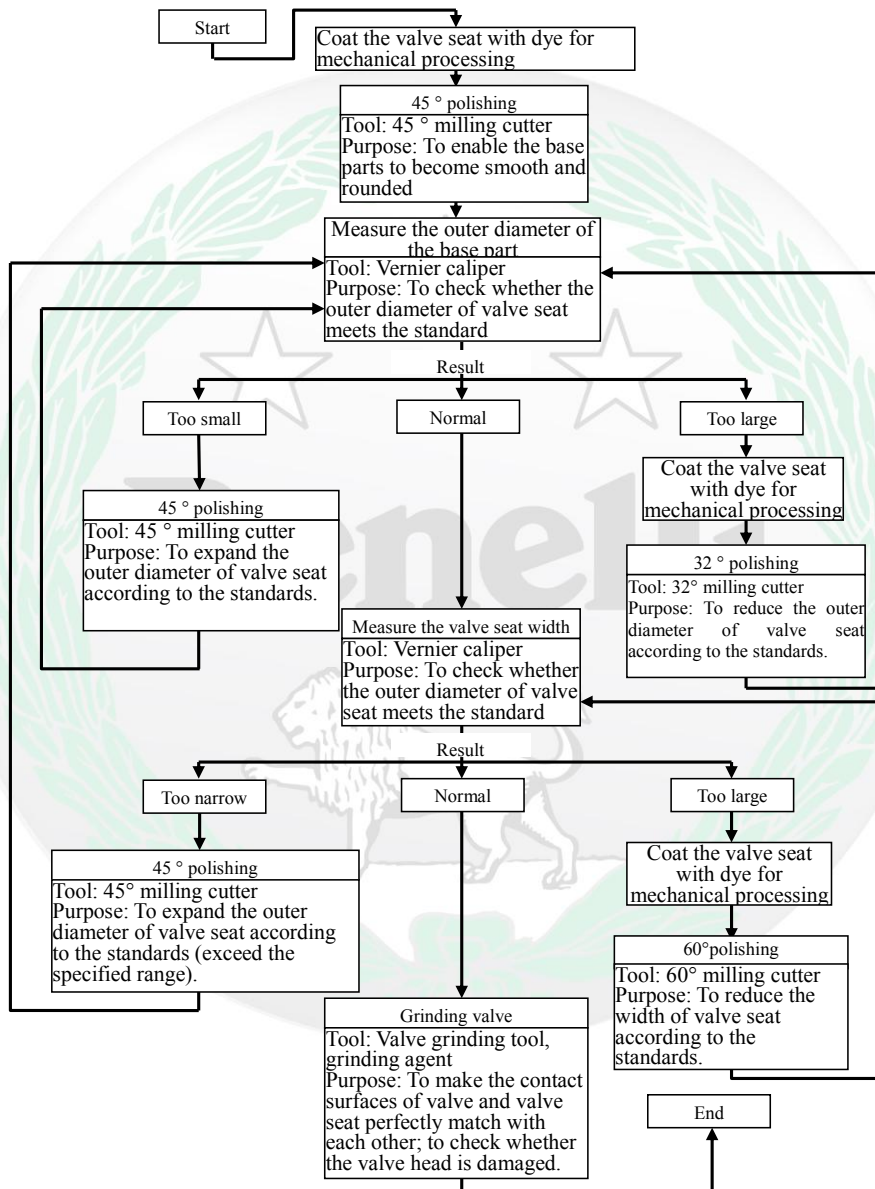
- Thoroughly clean all grinding agent before assembly.

- Adjust valve clearance before assembling engine (See “Chapter III Check and Regular Adjustment” –“Check valve clearance” for details).

## Valve

### Valve

#### Repair of valve seat



## Fixator of throttle valve body

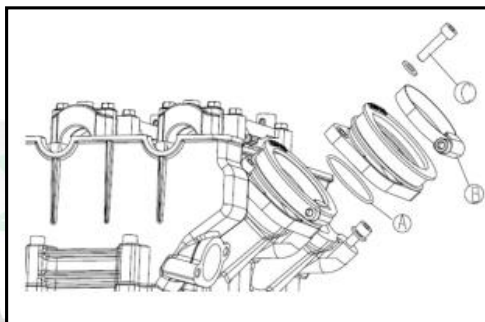
### Fixator of throttle valve body

Installation of fixator of throttle valve body

- Apply grease in sealing O-ring [A].
- Remember to install sealing O-ring.
- As shown in the figure, install clamp [B].
- Tighten the bolt of fixator.

**Locking torque of fixator of throttle valve assembly:**

**12 N m (1.0kgf m, 106in lb)**



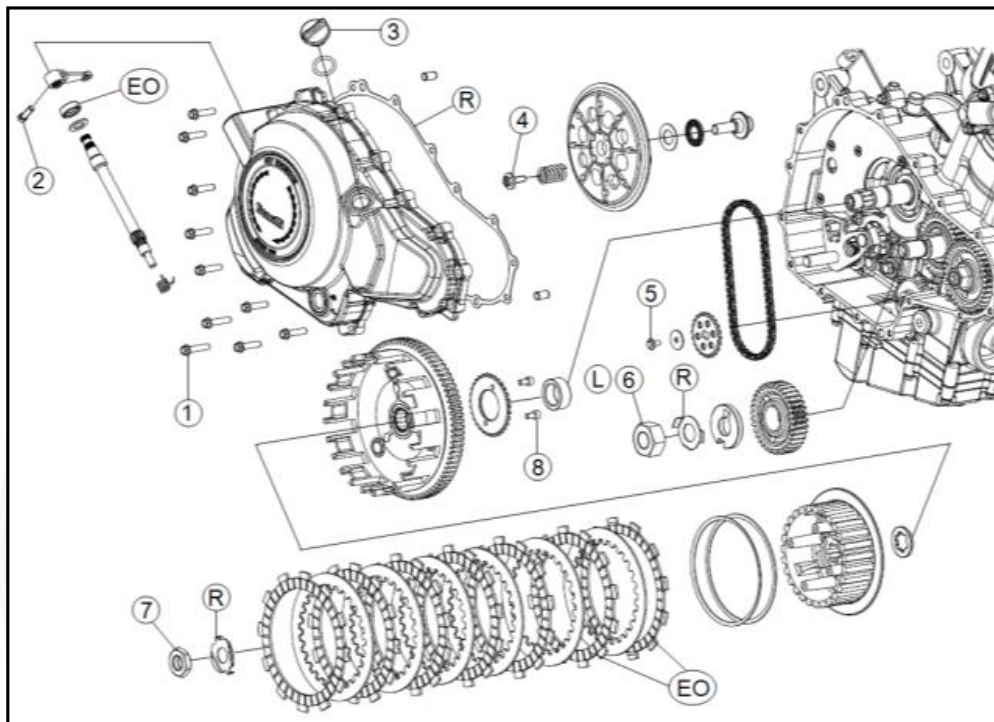
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## Clutch

### Clutch

#### Breakdown drawing



No.	Fastener	Torque			Remarks
		N m	kgf m	ft lb	
1	Right cover bolt	12	1.2	106 in·lb	
2	Hexagon bolt	12	1.2	106 in·lb	
3	Oil filling plug screw	—	—		Manual tightening
4	Clutch spring bolt	10	1.0	89 in·lb	
5	Chain wheel installing bolt	8	0.8	71 in·lb	
6	Driving gear locking nut of balance shaft	60	6.1	44 ft·lb	L
7	Locking nut of clutch	95	9.7	70 ft·lb	
8	Drive sprocket screw of clutch	8	0.8	71 in·lb	

EO: Apply engine oil

L: Apply thread fastening adhesives

R: Replace parts



## Clutch

### Clutch

#### Technical parameters

Item	Standard	Use limit
<b>Clutch operating lever</b>		
Position of clutch operating lever	Align the slotting position at the marked line at right cover	—
Free clearance of clutch operating lever	Cannot be adjusted	—
<b>Clutch</b>		
Clutch pressure plate assembly	32.5 ~ 33.5 mm (1.28 ~ 1.32 in.)	—
Thickness of clutch friction plate:	2.9 ~ 3.1 mm (0.11 ~ 0.12 in.)	2.6 mm (0.1 in.)
Deformation of clutch plate	≤0.15 mm (0.0059 in.)	0.3 mm (0.012 in.)
Free length of clutch spring	36.7 mm (1.45 in.)	35.4 mm (1.4 in.)

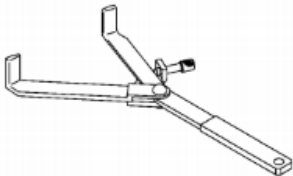
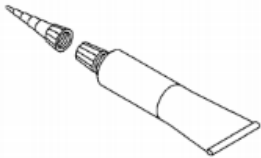
# Benelli



## Clutch

Clutch

### Special tools and fastening adhesives

Clutch fastener	Thread fastening adhesives
	

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## Right cover

### Right cover

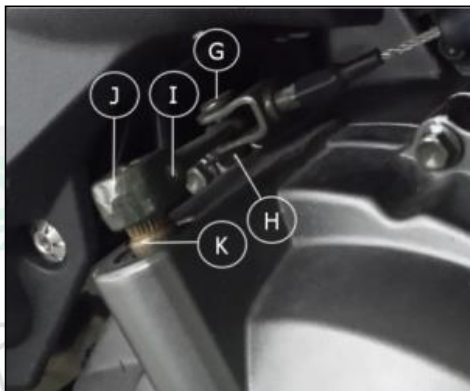
Disassemble right cover

- Release engine oil (see “Check and regular adjustment” – “Engine oil” for details)

Disassemble:

The split pin used for connecting the wire hinge pin of clutch [H]

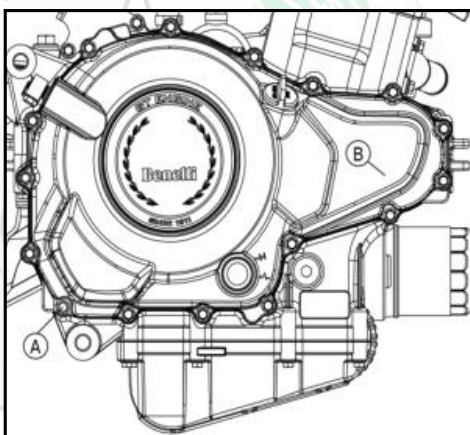
Hexagon bolt [I] used for fixing releasing lever [J]



Disassemble:

Totally 16 right cover bolts [A]

Right cover gaskets and positioning pins at right cover [B]



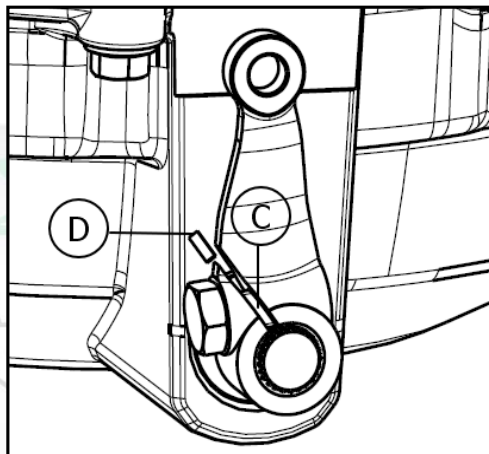
## Right cover

### Right cover

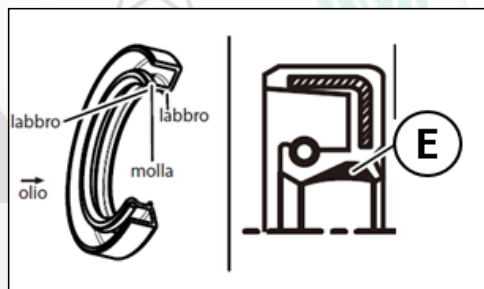
Install right cover

- In inverse order to disassembly
- Replace one right cover gasket
- Fasten right cover bolt
- Align the slot [C] at releasing lever at the mark [D] at right cover

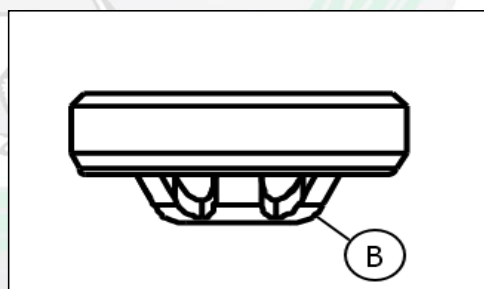
**Locking torque of right cover bolt and hexagon bolt:**  
**12 N m (1.2kgf m, 106 in lb)**



- If oil seal, gasket and clutch operating lever [K] and operating lever spring need to be disassembled, lubricate the lip [E] of oil seal with engine oil when assembling oil seal



- If oil sight glass has been disassembled, make its projecting portion [B] toward the inside. Grease if necessary, to facilitate installation.



## Clutch

### Clutch

#### Disassembly of clutch

- Release engine oil (see “Check and regular adjustment” – “Engine oil” for details)

Disassemble:

Right cover (see “Disassembly of right cover”)

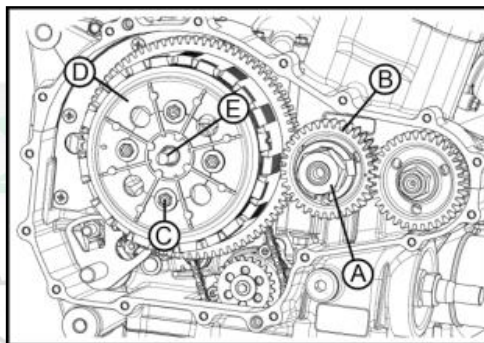
Balance shaft driving gear lock nut [A], lock gasket and gasket

Balance shaft driving gear [B]

Clutch spring bolt [C] and clutch spring

Clutch driven hub pressure plate [D]

Clutch rack [E], flat needle roller bearings and thrust gaskets



- Disassemble:

Clutch friction plate and clutch plate

Disc spring and gasket

Clutch lock nut [A]

- Fix the driven hub [B] with special tool-clutch fixing device, and disassemble clutch lock nut [A] and lock gasket.

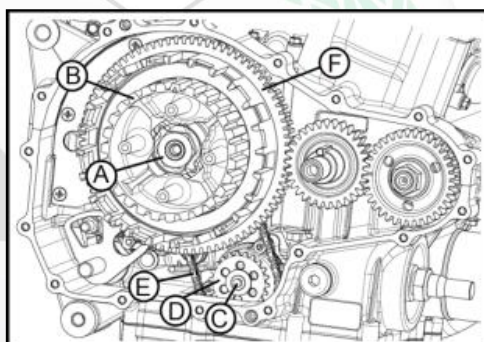
#### Special tool—clutch fixing device

- Disassemble clutch driven hub [B] and spline gasket

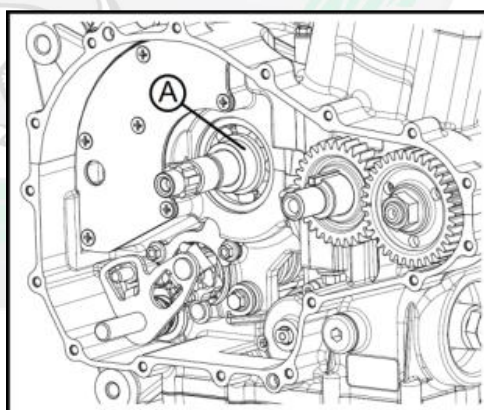
- Disassemble:

Engine oil pump installing bolt [C], gasket and engine oil pump sprocket [D]

Engine oil pump chain [E] and clutch outer disc components [F]



- Disassemble clutch sleeve [A]



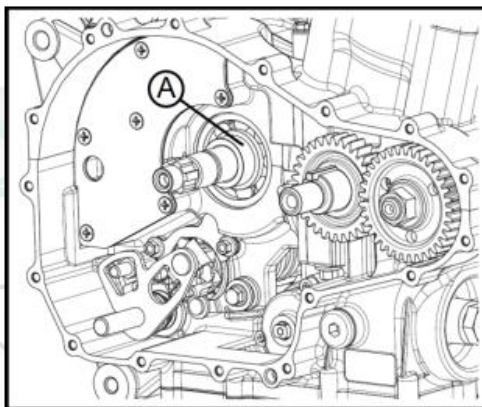


## Clutch

### Clutch

#### Installation of clutch

- Install clutch sleeve [A]



#### •Install:

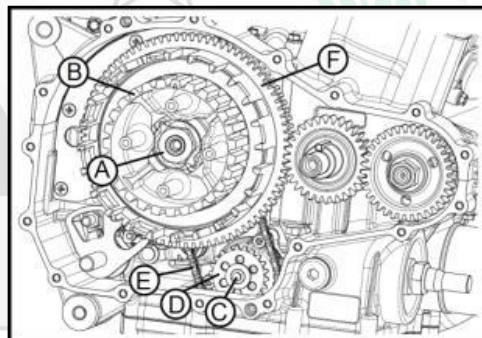
##### Installation:

Clutch outer plate components [F] and engine oil pump chain [E]

Engine oil pump sprocket [D]

Engine oil pump sprocket mounting bolt [C] and gasket

Locking torque:



**Locking torque of engine oil chain wheel mounting bolt [C]: 8 N·m (0.8 kgf·m, 71 in·lb)**

Spline gasket and clutch driven hub [B]

- Install clutch releasing nut [A] and replace new lock gasket, fix clutch driven hub using clutch fixing device, lock clutch lock nut [A] using torque wrench, and conduct mechanical locking using lock gaskets.

**Special tool—clutch fixing device**

**Locking torque of clutch lock nut [A]: 95 N·m (9.7 kgf·m, 70 ft·lb)**

## Clutch

### Clutch

- As shown in the figure, install gasket [A], disk spring [B], clutch friction plates [C] [D] [E] and clutch plate [F].

#### Remarks

○ The inner diameter of the first clutch friction plate is greater than that of other friction plates, because the role of gasket and disk spring is to reduce the noise of vibration.

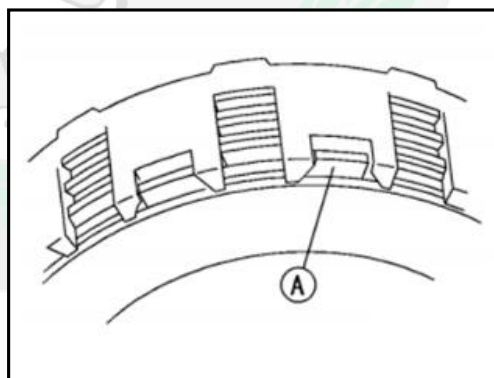
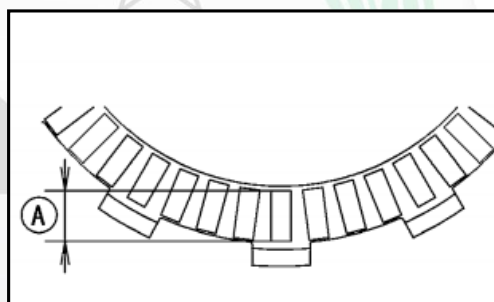
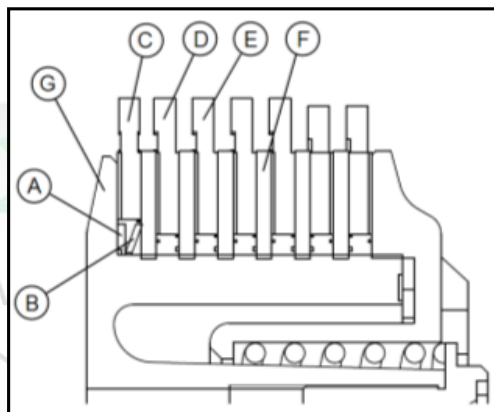
Clutch driven hub [G]

#### Note

**To avoid the seizure of clutch plate, apply engine oil at the surface of each plate when installing dry new clutch friction plate and clutch plate.**

- The clutch friction plate with large area [A] should be placed at the outermost side.

- As shown in the figure, install the bump [A] at the edge of outermost clutch friction plate into the trough of clutch outer plate.



## Clutch

### Clutch

- Install:

Clutch rack [A], plane needle roller bearing [B] and thrust gasket [C]

Clutch driven hub pressure plate [D]

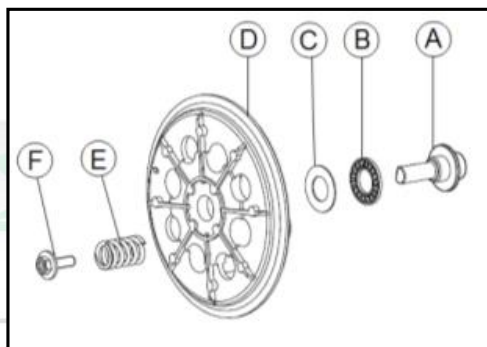
- Install clutch spring [E], evenly lock clutch spring bolts [F].

Locking torque:

**Locking torque of clutch spring bolt[F]: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Install balance shaft driving gear (see “Crankshaft / transmission gear”—“Install crankshaft” for details)

- Install right cover (see “install right cover” for details)



# Benelli



## Clutch

### Clutch

Check of entire group of clutch friction plate

- Check the thickness of clutch friction plate (see “Check whether the entire group of clutch friction plate has been worn or damaged” for details)

- As shown in the figure, measure the length of entire group of clutch friction group and clutch plate [A]

○ Assemble:

Clutch driven hub [B]

Gasket [C]

Disk spring [D]

Friction plates [E] [F] [G]

Clutch plate [H]

Clutch driven hub pressure plate [J]

Clutch spring [K]

Clutch spring bolt [L]

**Locking torque of clutch spring bolt[L]: 10 N·m (1.0 kgf·m, 89 in·lb)**

**Total thickness of entire group of clutch friction plate and clutch plate after installation**

**Standard: 32.5 ~ 33.5 mm (1.28 ~ 1.32 in.)**

★ If the length is not within the above range, please adjust (see “Adjustment of entire group of clutch friction plate and clutch plate” for details)

**Adjustment of entire group of clutch friction plate and clutch plate**

- Check the total thickness of entire group of clutch friction plate and clutch plate after installation, and then replace clutch friction plate, to control the length within the above range.

• Disassemble:

Clutch spring bolt

Clutch spring

Clutch driven hub pressure plate

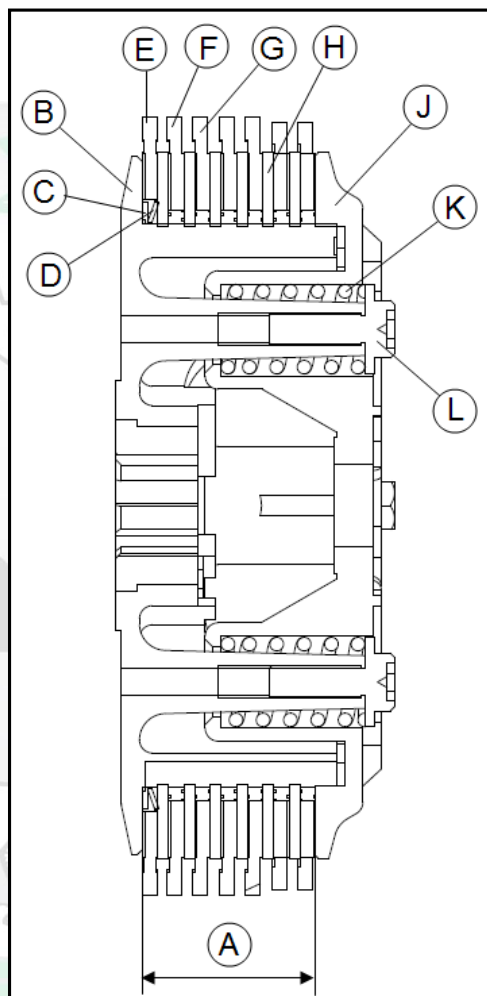
- Replace clutch friction plate

**Clutch friction plate thickness:**

**Standard: 2.9 ~ 3.1 mm (0.11 ~ 0.12 in.)**

- Install the disassembled parts, and check the **total thickness of entire group of clutch friction plate and clutch plate after installation**

**Locking torque of clutch spring bolt: 10 N·m (1.0 kgf·m, 89 in·lb)**



## Clutch

### Clutch

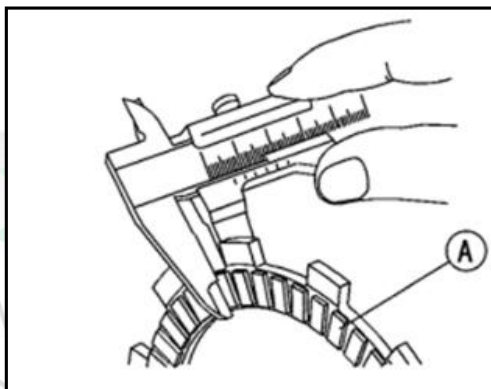
Check whether the entire group of clutch friction plate has been worn or damaged

- Visually check whether there is seizure, overheating (discoloration) or uneven wear in clutch friction plate and clutch plate.
- Measure the thickness of each clutch friction plate [A] at different positions.
- ★ If any clutch friction plate has been broken or the wear exceeds the use limit, please replace a new one!

#### Thickness of clutch friction plate

**Standard:** 2.9 ~ 3.1mm (0.11 ~ 0.12 in.)

**Use limit:** 2.6 mm (0.1 in.)



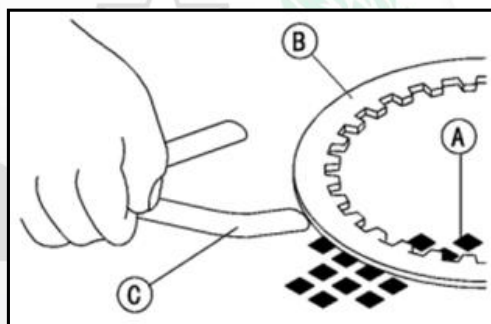
Check the deformation of entire group of clutch plate

- Place each clutch plate at a flat plate, measure the clearance between flat plate and clutch plate with a feeler. The measured clearance is the deformation of clutch.
- ★ If the deformation of any clutch has exceeded the use limit, please replace a new one!

#### Deformation of clutch plate

**Standard:**  $\leq 0.15$  mm (0.0059 in.)

**Use limit:** 0.3 mm (0.012 in.)



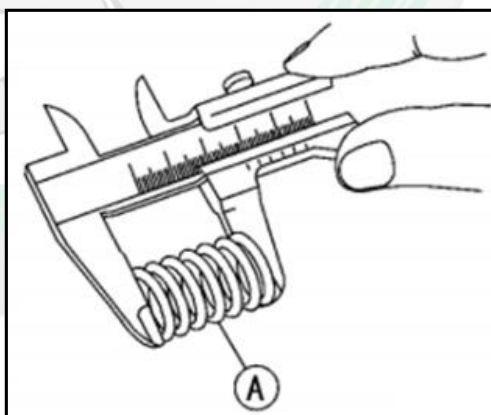
Measure the free length of clutch spring

- Measure the free length of clutch spring [A]
- ★ If the length of any clutch spring is below the use limit, please replace one new!

#### Free length of clutch spring

**Standard:** 36.7 mm (1.45 in.)

**Use limit:** 35.4 mm (1.4 in.)

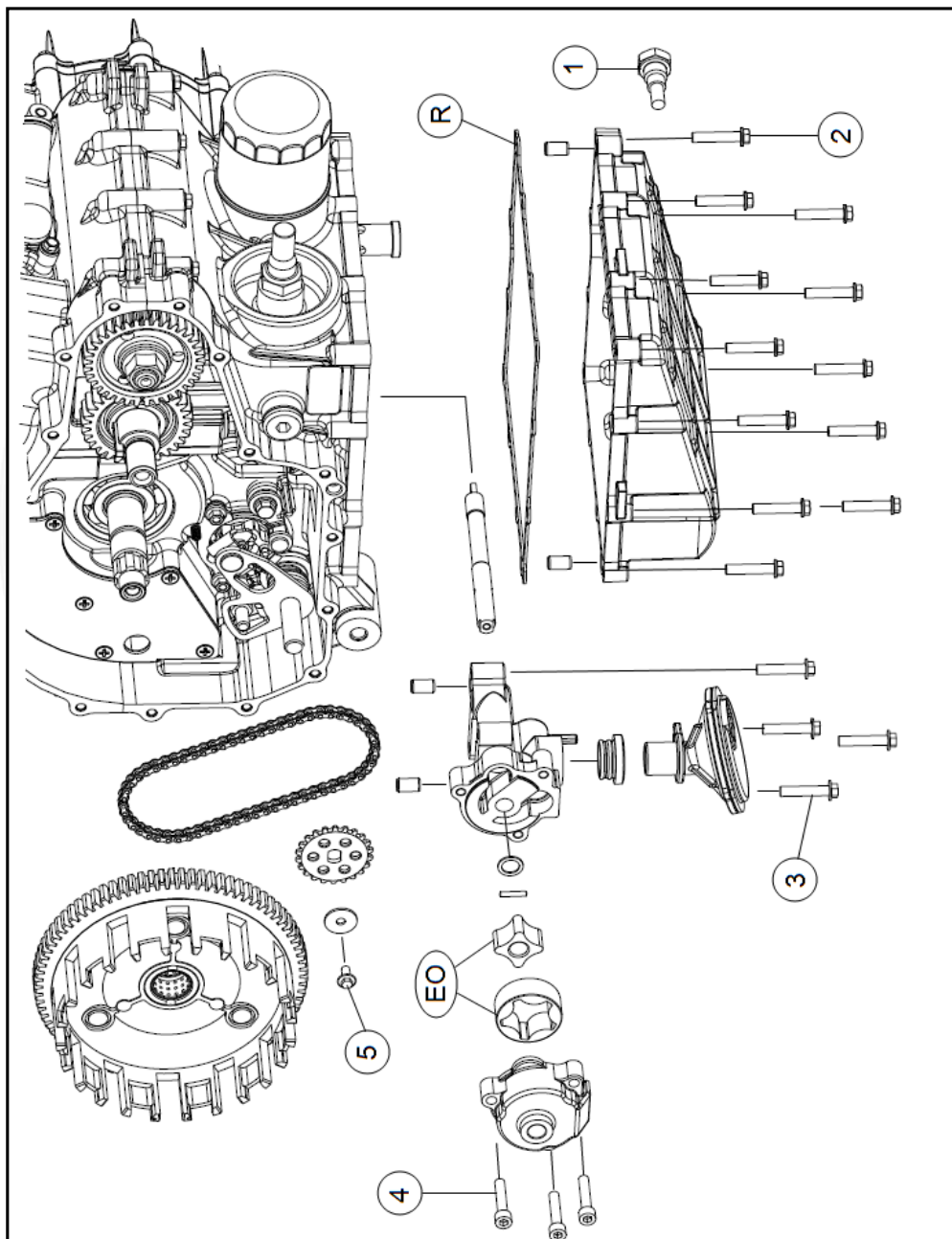




## Engine lubrication system

Engine lubrication system

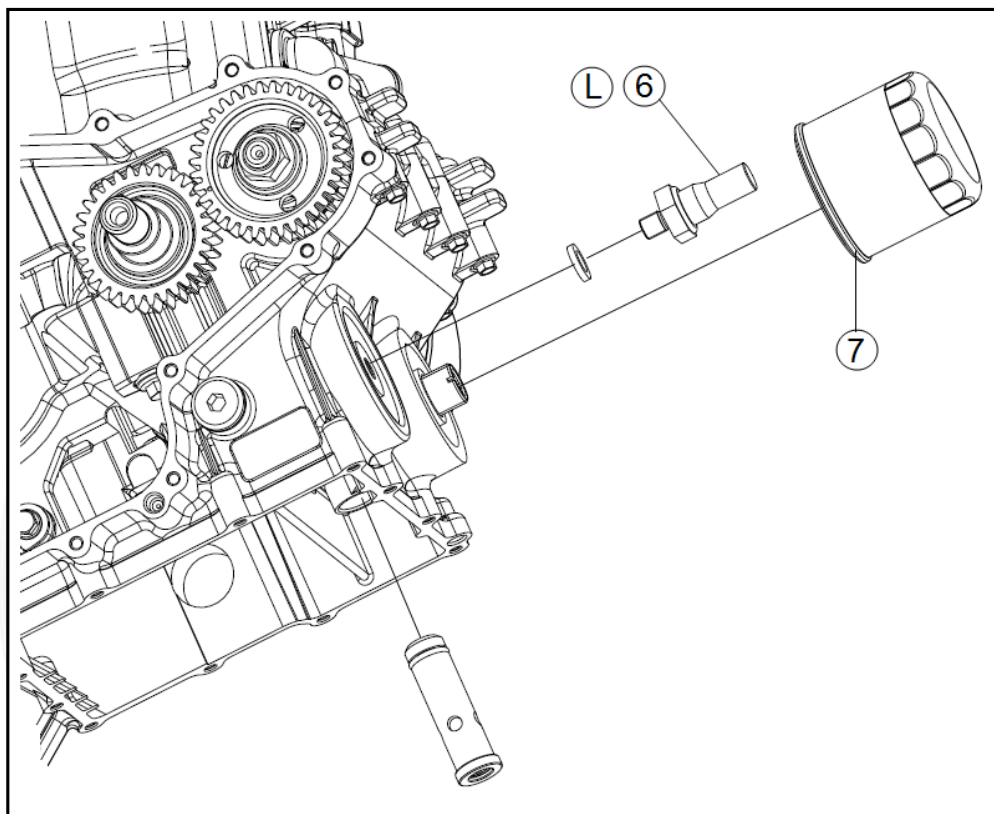
### Breakdown drawing



## Engine lubrication system

### Engine lubrication system

#### Breakdown drawing



No.	Fastener	Torque			Remarks
		N m	kgf m	ft lb	
1	Oil pan drain magnetic bolt	20	2.0	15 ft·lb	
2	Oil pan bolt	10	1.0	89 in·lb	
3	Engine oil pump mounting bolt	10	1.0	89 in·lb	
4	Engine oil pump cover bolt	10	1.0	89 in·lb	
5	Sprocket mounting bolt	8	0.8	71 in·lb	
6	Engine oil pressure switch bolt	24.5	2.5	18 ft·lb	L
7	Engine oil filter bolt	17	1.7	13 ft·lb	

EO: Apply engine oil

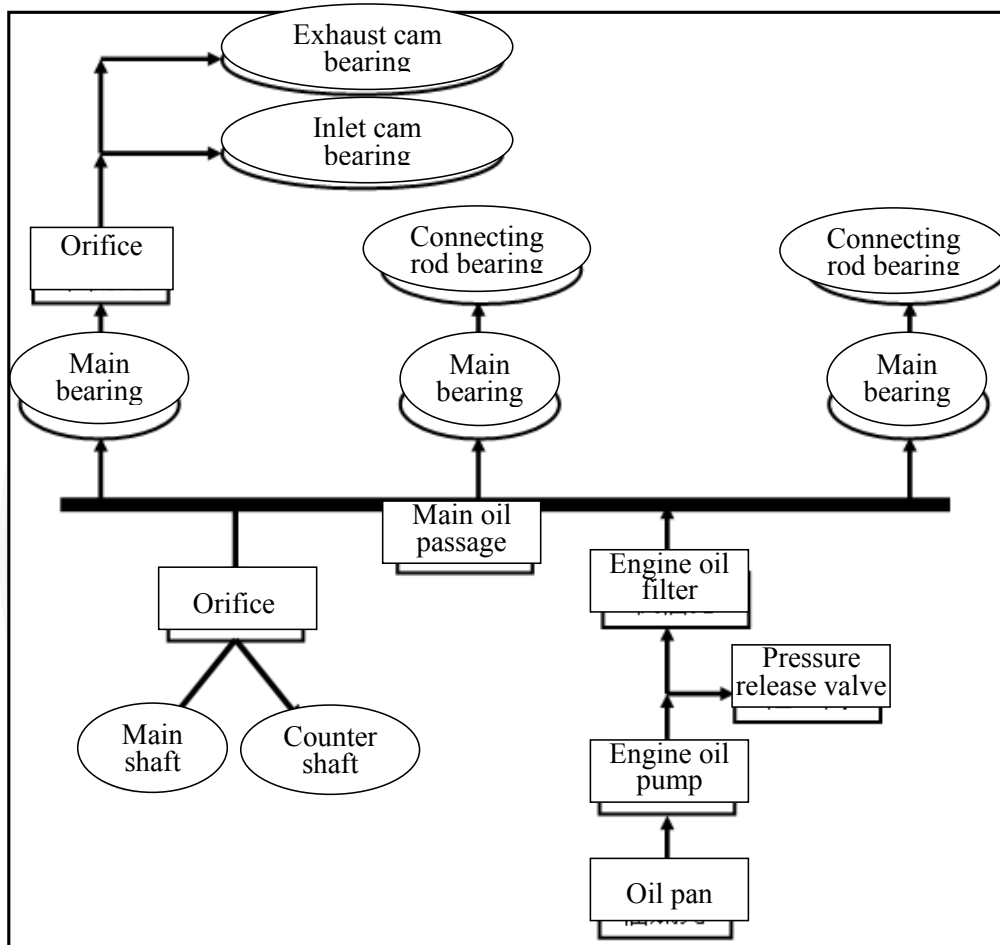
R: Replace parts

L: Apply thread fastening adhesives

## Engine lubrication system

Engine lubrication system

### Engine oil flow diagram



## Engine lubrication system

### Engine lubrication system

## Technical parameters

Item	Standard
<b>Engine oil</b>	
Type	API SE, SF or SG
Viscosity	API SH, SJ or SL, JASO MA, MA1 or MA2
Volume	SAE 10W-40
Oil level	2.8 L (When replacing oil) 3.0 L (When disassembling)
	Between upper and lower limits (2-3 minutes after idle speed or normal running)
<b>Engine oil pump rotor</b>	
Radial clearance between inner and outer rotor	0.05 ~ 0.13 mm (0.002 ~ 0.0051 in.)
Clearance between outer rotor and pump	0.11 ~ 0.17 mm (0.0043 ~ 0.0067 in.)


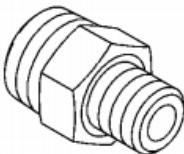
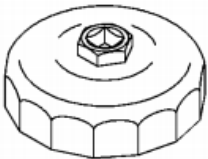
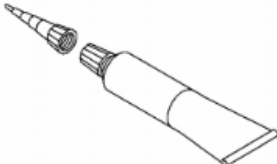
# Benelli



## Engine lubrication system

Engine lubrication system

### Special tools and fastening adhesives

Engine oil pressure gauge 10 kgf/cm <sup>2</sup>	Adaptor of engine oil pressure gauge PT3/8
	
Wrench of engine oil filter	Thread fastening adhesives
	



## Engine oil and engine oil filter

### Engine oil and engine oil filter

#### Warning

The insufficient amount, deterioration or contamination of engine oil will accelerate the wear of motorcycle, may result in seizure of engine or gear group and cause traffic accident and personal injury.

Check of oil level

- Check whether the level of engine oil is between the high oil level line H and low oil level line L of oil sight glass.

Check the oil level

- Check the engine oil level is between the oil mirror the high oil line H and the low oil level line L.

#### Remarks

- Park the motorcycle perpendicular to the ground.
- If you have just used motorcycles, wait a few minutes to let the engine oil cool.
- If you have replaced engine oil, start the engine, make it running at idle speed for a few minutes, and thus fill the engine oil filter. Switch off the engine, wait a few minutes and let the oil settle.

#### Note

If you make the engine run at full speed before engine oil flows to each part, seizure may be caused to engine.

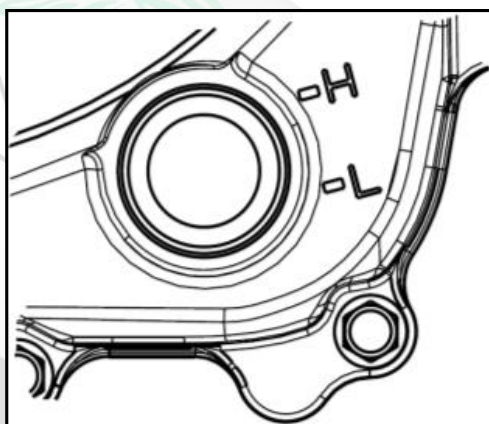
If the volume of engine oil is very low, or engine oil pump or oil passage is blocked or abnormal, the pressure warning light of engine oil will be on. If the running speed is higher than the idle speed and the pressure warning light of engine oil remains on, immediately shut down the engine and find the cause of fault.

- ★ If the engine oil level is too high, please pump out excess engine oil with a syringe or other suitable tools.

- ★ If the engine oil level is too low, please add a proper amount of engine oil to the oil filler! Oil type and manufacturer used should be consistent with that in the engine.

#### Remarks

- If you are not sure about the type and manufacturer of the engine oil, you can fill any specified brand of oil engine to the highest level, but not let engine run when the engine oil level is low. However, you must replace the oil in the engine as soon as possible.



Replacement of engine oil

- See “Chapter III Check and Regular Adjustment” – “Replacement of engine oil” for details

Replacement of engine filter

- See “Chapter III Check and Regular Adjustment” – “Replacement of engine oil filter” for details

## Oil pan

### Oil pan

#### Disassembly of oil pan

- Release engine oil, disassemble oil drain magnetic bolt [A] See “Chapter III Check and Regular Adjustment” – “Replacement of engine oil” for details

Muffler body (see “Top of engine” – “Disassembly / installation of muffler body” for details),

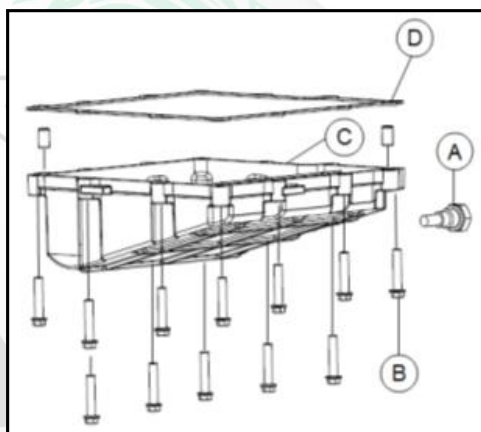
Exhaust pipe (see “Top of engine” – “Disassembly / installation of exhaust pipe” for details),

- Disassemble:

Oil pan bolt [B]

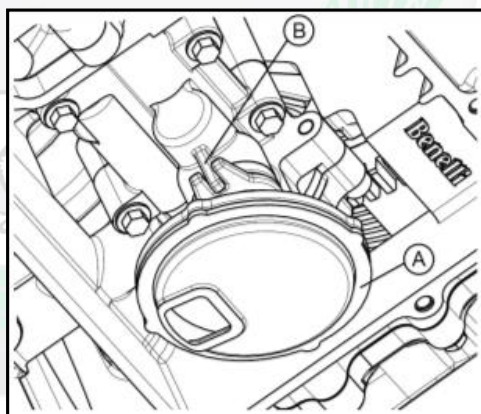
Oil pan [C]

Gasket [D]



- Disassemble:

Engine oil filter [A] and seal cartridge

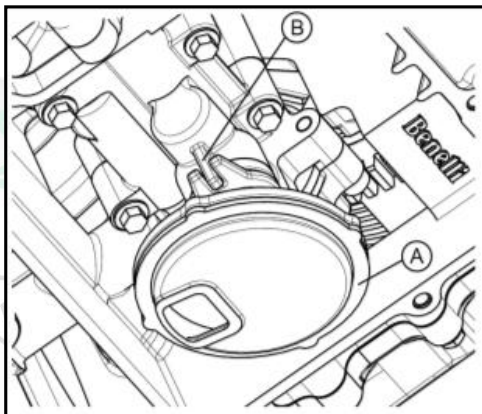


## Oil pan

### Oil pan

#### Installation of oil pan

- Clean engine oil filter [A].
- Install engine oil filter and seal cartridge, and make the raised part [B] of engine oil pump align at the notch of engine oil filter during installation.



- Replace new oil pan gasket [D]

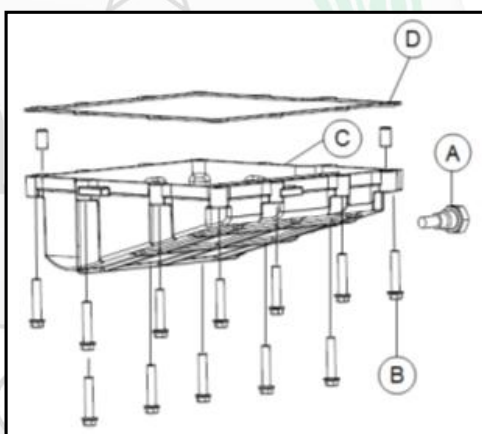
- Install oil pan

Locking torque:

**Locking torque of oil pan bolt [B]: 10 N m (1.0 kgf m, 89 in lb)**

**Locking torque of magnetic oil drain bolt of oil pan [A]: 20 N m (2.0 kgf m, 15 ft lb)**

- Parts disassembled before installation



## Engine oil pump

### Engine oil pump

#### Disassembly of engine oil pump

Release engine oil See “Chapter III Check and Regular Adjustment” – “Replacement of engine oil” for details

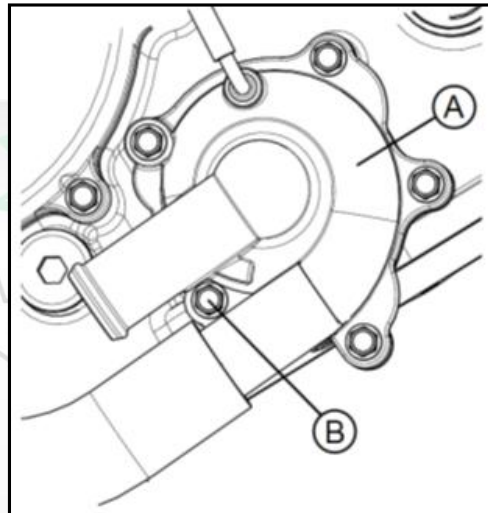
Disassemble right cover (see “Clutch” – “Disassemble clutch” for details)

Disassemble the gear driving balance shaft at the crankshaft (see “Clutch” – “Disassemble clutch” for details)

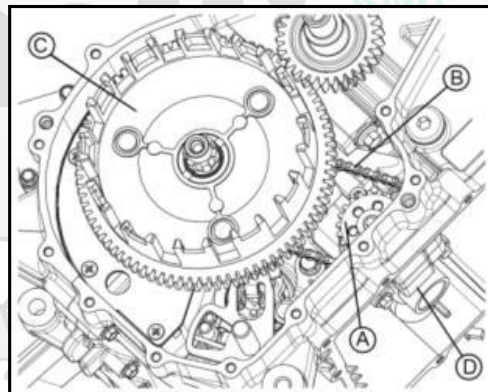
Disassemble clutch hub components (see “Clutch” – “Disassemble clutch” for detail)

Disassemble oil pan and engine oil filter (see “Disassembly of oil pan”)

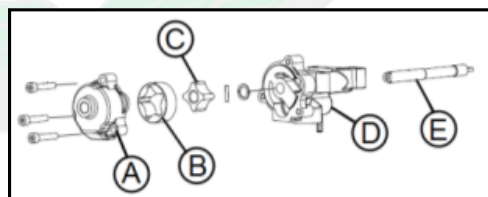
Disassemble water pump mounting bolt [B] and pump components [A]



- Disassemble the oil pump sprocket mounting bolts and gaskets
- Disassemble the oil pump sprocket [A]
- Disassemble the oil pump chain [B] and clutch outer plate components [C]
- Disassemble the oil pump mounting bolts
- Disassemble the oil pump components [D] and positioning pins



- Disassemble the oil pump cover bolts
- Disassemble the oil pump cover [A]
- Disassemble the outer rotor [B] and inner rotor of oil pump [C]
- Disassemble the pin
- Disassemble the gasket
- Disassemble the oil pump shaft [E] and oil pump [D]



## Engine oil pump

### Engine oil pump

#### *Installation of engine oil pump*

- Clean engine oil pump [D], engine oil pump cover [A], outer rotor [B], inner rotor [C] and engine oil pump shaft [E] with engine oil
- Install engine oil pump shaft [E] at the engine oil pump [D]
- Install gaskets and pins
- Install inner rotor [C], outer rotor [B] and oil pump cover [A]

Locking torque:

**Locking torque of engine oil pump cover bolt: 10 N m (1.0 kgf m, 89 in lb)**

- Install the engine oil pump positioning pins on the lower crankcase
- Install the oil pump components [D]

Locking torque:

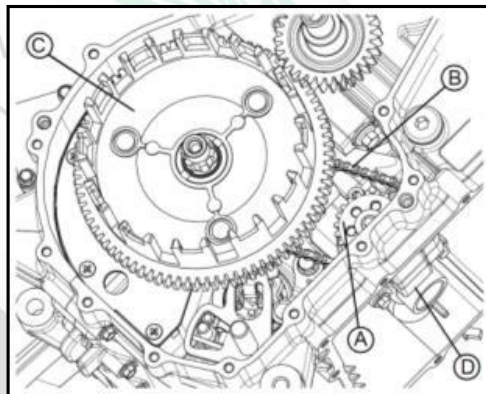
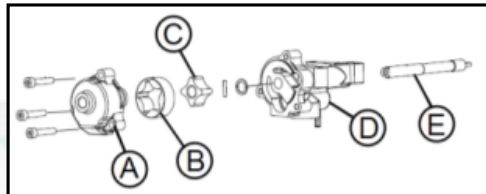
**Locking torque of engine oil pump mounting bolt: 10 N m (1.0 kgf m, 89 in lb)**

- Install the clutch outer plate components [C] and engine oil pump chain [B]
- Install the engine oil pump sprocket [A] and gasket

Locking torque:

**Locking torque of engine oil pump sprocket mounting bolt: 8 N m (0.8 kgf m, 71 in lb)**

- Parts disassembled before installation



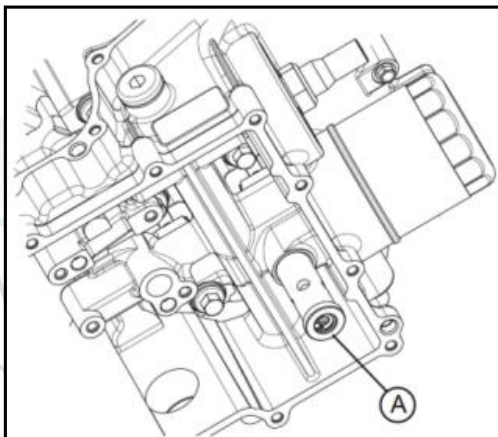


## Engine oil pressure relief valve

### Engine oil pressure relief valve

#### Disassembly of engine oil pressure relief valve

- Release the engine oil (see Chapter III “Check and Regular adjustment”-“Replacement of engine oil”).
- Disassemble the right cover (see “Clutch”-“Clutch disassembly”).
- Disassemble the gear on upper driving balance shaft of crankshaft (see “Clutch”-“Clutch disassembly”).
- Disassemble the central components of clutch see “Clutch”-“Clutch disassembly”).
- Disassemble the oil pan and engine oil strainer (see “Disassembly of oil pan”).
- Disassemble the engine oil pressure relief valve [A].



#### Installation of engine oil pressure relief valve

- Clean the engine oil pressure relief valve [A].
- Install the engine oil pressure relief valve [A].
- Install the disassembled parts.

#### Check of engine oil pressure relief valve

- Check whether the relief valve [A] can slide smoothly, and return to the original position under the pressure of spring [B] when it is pushed by sticks or other soft bars.

#### Remark

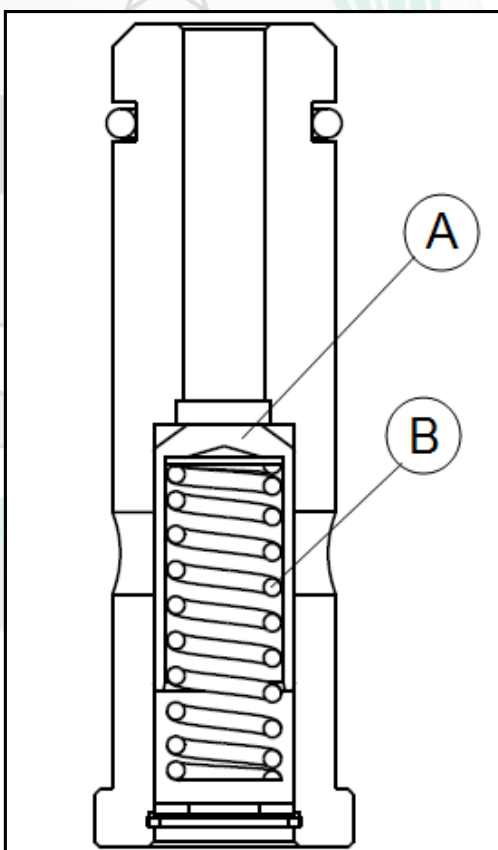
○ Check the relief valve after installation, since the process of disassembling and assembling the relief valve will change its performance.

★ Clean up the relief valve using the high flash solvent, and then blow out the foreign matter in the relief valve using compressed air if any impurity or foreign matter is found in the above checking process.

#### Warning

**Clean the engine oil pressure relief valve in a well-ventilated place, and prevent any spark or flame nearby operating areas. It is forbidden to clean the relief valve using gasoline or low flash solvents, since they are extremely flammable.**

★ Replace the entire engine oil pressure relief valve if the above problem cannot be solved by cleaning the relief valve. It is not allowed to separately replace the individual parts, since the engine oil pressure relief valve is made with refined processing.



## Measurement of engine oil pressure

### Measurement of engine oil

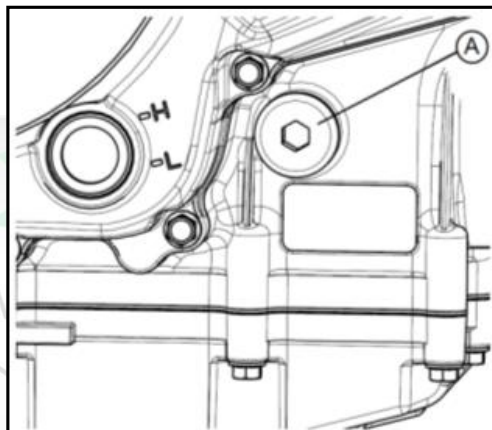
#### Measurement of engine oil

- Disassemble the oil passage plug [A].
- Connect the adaptor of engine oil pressure gauge and engine oil pressure gauge to the low crankcase.

**Special tool-engine oil pressure gauge 10 kgf/cm<sup>2</sup>**

**Adaptor of engine oil pressure gauge PT3/8**

- Start the engine for preheating.
- Run the engine at the specified speed, and take the readings on the engine oil pressure gauge.
- ★ Immediately check the wear patterns of oil pump, relief valve and / or crankcase bearing bush if the engine oil pressure is far lower than the standard.
- ★ Check whether the oil passage is blocked if the engine oil pressure is far higher than the standard.



#### Engine oil pressure

**Standard: 400-420 kPa [Engine speed=4 000 r/min, Engine oil pressure=85 °C]**

- Shut down the engine.
- Disassemble the engine oil pressure gauge and adaptor of engine oil pressure gauge.

#### **⚠ Warning**

**Take care not to let the skin be burnt by the engine oil flowing from oil passage during disassembly of adaptor of engine oil pressure gauge!**

- Install and lock the oil passage plug [A].

**Locking torque of oil passage plug: 20 N m.**

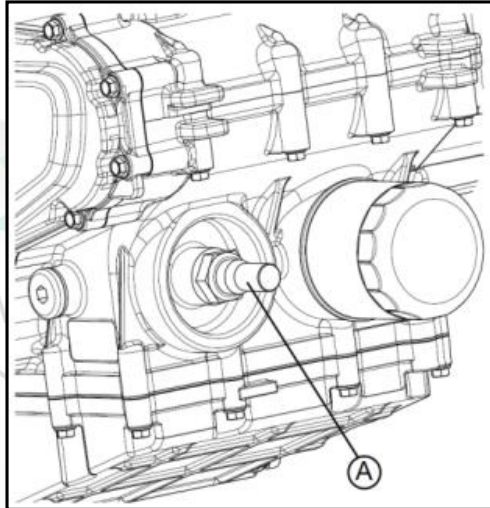
## Engine oil pressure switch

### Engine oil pressure switch

#### Disassembly of engine oil pressure switch

- Release the engine oil (see Chapter III “Check and Regular adjustment”-“Replacement of engine oil”).

Disassemble the engine oil pressure switch wiring.  
Disassemble the engine oil pressure switch [A] and gasket.

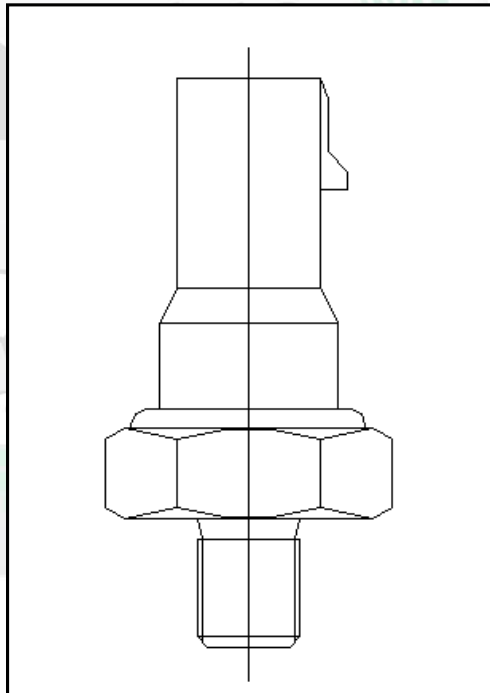


#### Check of engine oil pressure switch

Check whether the connector terminal has good contact with thread position. There is internal open-circuit in the terminal, if not, and it needs to be replaced.

Test whether there is impedance phenomenon on the sensor pin and engine crankcase when unplugging the sensor connector after starting the engine. There may be water or oil inside, or there is insufficient pressure in the engine, if any.

**Initial pressure of alarming:  $0.055 \pm 0.015 \text{ MPa}$**



## Engine oil pressure switch

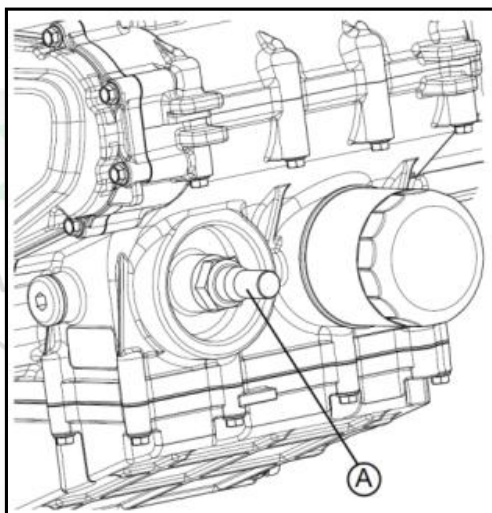
### Engine oil pressure switch

Installation of engine oil pressure switch

- Apply the fastening adhesive to the thread of engine oil pressure switch [A], and then lock the engine oil pressure switch [A] and gasket.

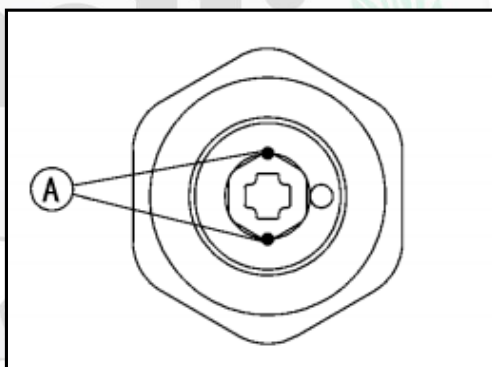
**Locking torque of engine pressure switch [A]: 24.5 N·m (2.5 kgf·m, 18 ft·lb)**

- Install the engine oil pressure switch wiring.



#### Remark

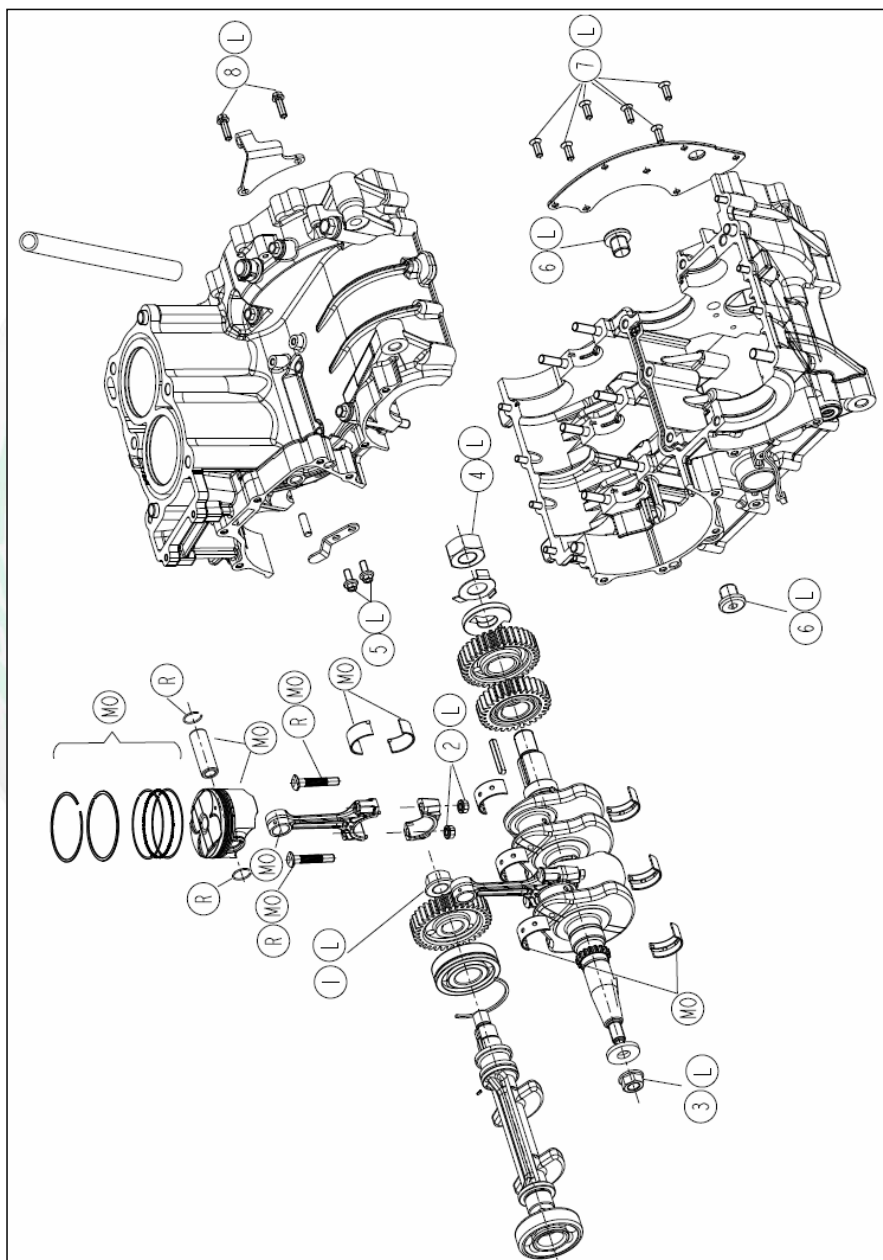
- Add a little amount of lubricating grease to the terminal block so as not to block two air vents [A] of switch membrane.



## Crankshaft / transmission gear

Crankshaft / transmission gear

### Breakdown drawing

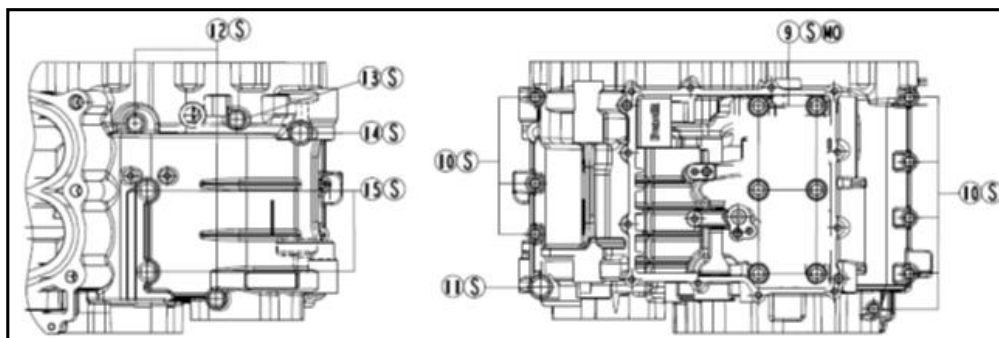




## Crankshaft / transmission gear

### Crankshaft / transmission gear

Breakdown drawing



No.	Fastener	Torque			Remark
		N m	kgf m	ft lb	
1	Balance shaft driven gear lock nut	100	10.2	73.7	L
2	Connecting rod big end nut	See the text			
3	Crankshaft flywheel nut	105	10.7	77.4	L
4	Balance shaft driving gear lock nut	60	6	44	L
5	Follower bolt (M6, L = 14 mm)	10	1	89 in·lb	L
6	Oil passage plug (M16, L = 15 mm)	24.5	2.5	18.1	L
7	Follower screw (M6, L = 16 mm)	7	0.71	62 in·lb	L
8	Support bolt (M6, L = 20 mm)	10	1	89 in·lb	L
9	Crankcase bolt (M8, L = 85 mm)	24.5	2.5	18.1	MO、S
10	Crankcase bolt (M6, L = 40 mm)	10	1	89 in·lb	S
11	Crankcase bolt (M10, L = 60mm)	45	4.6	33.3	MO、S
12	Crankcase bolt (M8, L = 75 mm)	24.5	2.5	18.1	S
13	Crankcase bolt (M8, L = 115 mm)	24.5	2.5	18.1	S
14	Crankcase bolt (M10, L = 100mm)	45	4.6	33.3	MO、S
15	Crankcase bolt (M8, L = 45 mm)	24.5	2.5	18.1	S

G: Apply lubricating grease.

L: Apply thread fastening adhesive.

LG: Apply mould closing adhesive.

M: Apply molybdenum disulfide lubricating grease.

MO: Apply molybdenum disulfide oil solution.

(Weight ratio of engine oil and molybdenum disulfide lubricating grease: 10:1)

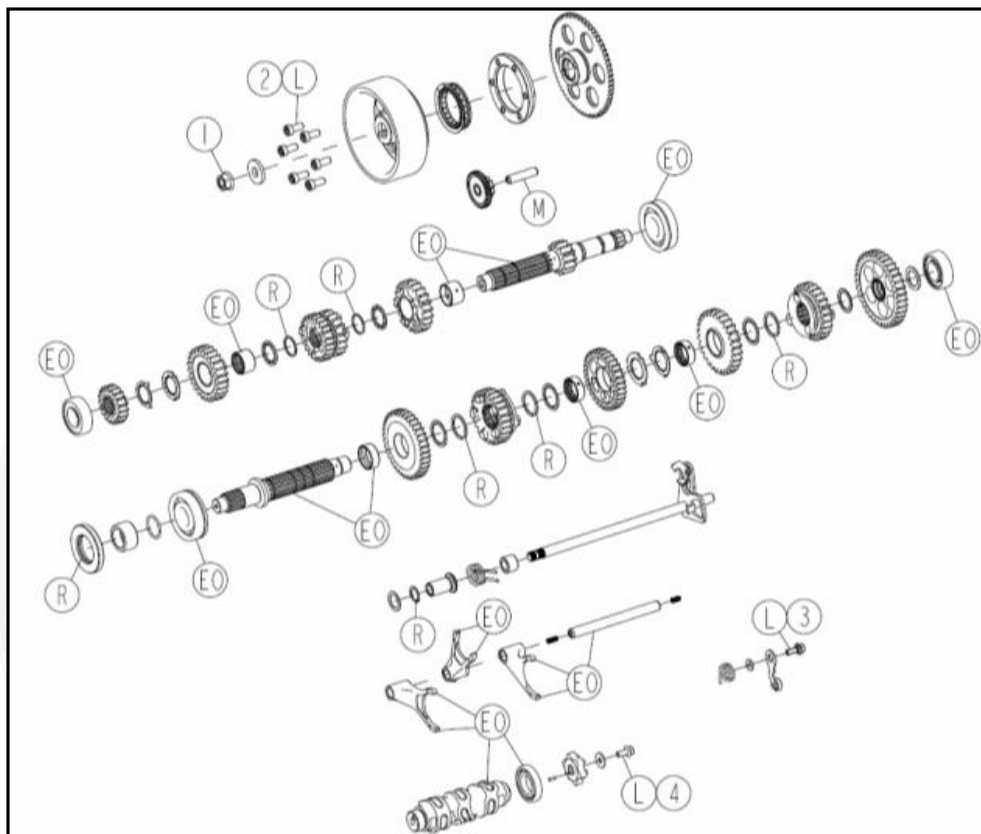
R: Replace parts.

S: Follow the specified tightening sequences.

## Crankshaft / transmission gear

### Crankshaft / transmission gear

Breakdown drawing



No.	Fastener	Torque			Remark
		N m	kgf m	ft lb	
1	Flywheel lock nut	100	10.2	73.7	
2	Overrunning clutch bolt	20	2.04	14.74	L
3	Positioning roller rocker arm bolt	12	1.22	106in·lb	L
4	Shift positioning star wheel fixing bolt	12	1.22	106in·lb	

EO: Apply engine oil.

G: Apply lubricating grease.

L: Apply thread fastening adhesive.

M: Apply molybdenum disulfide lubricating grease.

R: Replace parts.

## Crankshaft / transmission gear

### Crankshaft / transmission gear

#### Technical parameters

Item	Standard	Operating limit
<b>Crankcase, crankshaft and connecting rod</b>		
Bend of connecting rod	—	TIR 0.2/100 mm (0.008/3.94 in.)
Distortion of connecting rod	—	TIR 0.2/100 mm (0.008/3.94 in.)
Clearance of connecting rod big end	0.1 ~ 0.25 mm (0.0039 ~ 0.0098 in.)	0.38 mm (0.015 in.)
Clearance of bearing bush of connecting rod big end / crankshaft pin	0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in.)	0.07mm (0.0027 in.)
Diameter of crankshaft pin:	29.962 ~ 29.976 mm (1.1796 ~ 1.1801 in.)	29.91 mm (1.1775 in.)
Mark: A	29.969 ~ 29.976 mm (1.1799 ~ 1.1801 in.)	—
B	29.962 ~ 29.968 mm (1.1796 ~ 1.1798 in.)	—
Bore diameter of connecting rod big end:	33.000 ~ 33.016 mm (1.2992 ~ 1.2998 in.)	—
Mark A	33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)	—
B	33.009 ~ 33.016 mm (1.2995 ~ 1.2998 in.)	—
Thickness of bearing bush of connecting rod big end:		
Yellow	1.500 ~ 1.503 mm (0.05905 ~ 0.05917 in.)	—
Green	1.503 ~ 1.506 mm (0.05917 ~ 0.05929 in.)	—
Blue	1.506 ~ 1.509 mm (0.05929 ~ 0.05941 in.)	—
Extension of connecting rod bolt:	(Scope of application) 0.25 ~ 0.34 mm	—
New connecting rod	(0.0098 ~ 0.0134 in.)	—
Old connecting rod	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)	—
Side clearance of crankshaft	0.10 ~ 0.25mm (0.0039 ~ 0.0098 in.)	0.30 mm (0.0118 in.)
Radial oscillating quantity of crankshaft	≤TIR 0.02 mm (0.0008 in.)	TIR 0.06 mm (0.0024 in.)
Clearance of main crankshaft bearing bush / oil passage	0.022 ~ 0.045 mm (0.0009 ~ 0.0018 in.)	0.06 mm (0.0024 in.)
Diameter of main crankshaft oil passage:	31.958 ~ 31.972 mm (1.2582 ~ 1.2587 in.)	31.94 mm (1.2575 in.)
Mark 1	31.965 ~ 31.972 mm (1.2585 ~ 1.2587 in.)	—
2	31.958 ~ 31.965 mm (1.2582 ~ 1.2585 in.)	—
Bore diameter of main crankshaft bearing bush:	35.000 ~ 35.021 mm (1.3779 ~ 1.3788 in.)	—

## Crankshaft / transmission gear

### Crankshaft / transmission gear

#### Technical data

Item		Standard	Operating limit
Mark	01	35.000 ~ 35.007 mm (1.3779 ~ 1.3782 in.)	
	02	35.007 ~ 35.014 mm (1.3782 ~ 1.3785 in.)	
	03	35.014 ~ 35.021 mm (1.3785 ~ 1.3788 in.)	
Thickness of main crankshaft bearing bush:			
Yellow		1.500 ~ 1.503 mm (0.0590 ~ 0.0592 in.)	
Green		1.503 ~ 1.506 mm (0.0592 ~ 0.0593 in.)	
Blue		1.506 ~ 1.509 mm (0.0593 ~ 0.0594 in.)	
Red		1.509 ~ 1.512 mm (0.0594 ~ 0.0595 in.)	
<b>Piston</b>			
Bore diameter of cylinder (on the crankcase)		65.010 ~ 65.020 mm (2.5594 ~ 2.5598 in.)	65.10 mm (2.5630 in.)
Piston diameter		64.97 ~ 64.98 mm (2.5579 ~ 2.5583 in.)	64.90 mm (2.5551 in.)
Piston / cylinder clearance		0.030 ~ 0.050 mm (0.0012 ~ 0.0020 in.)	
Clearance of piston ring groove:			
Top		0.05 ~ 0.09 mm (0.0020 ~ 0.0035 in.)	0.17 mm (0.0067 in.)
Section II		0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)	0.16 mm (0.0063 in.)
Width of piston ring groove:			
Top		0.83 ~ 0.85 mm (0.0327 ~ 0.0335 in.)	0.90 mm (0.0354 in.)
Section II		0.83 ~ 0.85 mm (0.0327 ~ 0.0335 in.)	0.90 mm (0.0354 in.)
Thickness of piston ring:			
Top		0.76 ~ 0.78 mm (0.0299 ~ 0.0307 in.)	0.73 mm (0.0287 in.)
Section II		0.77 ~ 0.79 mm (0.0303 ~ 0.0307 in.)	0.74 mm (0.0291 in.)
End clearance of piston ring:			
Top		0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)	0.4 mm (0.0157 in.)
Section II		0.25 ~ 0.45 mm (0.0098 ~ 0.0177 in.)	0.65 mm (0.0256 in.)
Composite oil ring		0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.0 mm (0.039 in.)

## Crankshaft / transmission gear

### Crankshaft / transmission gear

#### Technical data

Item	Standard	Operating limit
<b>Transmission gear</b>		
Thickness of fork	5.8 ~ 5.9 mm (0.2283 ~ 0.2323 in.)	5.65 mm (0.2224 in.)
Width of fork groove on gear	6 ~ 6.05 mm (0.2362 ~ 0.2382 in.)	6.15 mm (0.2421 in.)
Diameter of fork guide pin	7.93 ~ 8.0 mm (0.3122 ~ 0.315 in.)	7.83 mm (0.3083 in.)
Width of shift drum groove	8.05 ~ 8.15 mm (0.3169 ~ 0.3209 in.)	8.25 mm (0.3248 in.)

#### Selection of bearing bush of connecting rod big end

Bore diameter mark of connecting rod big end	Diameter mark of crankshaft pin	Bearing bush	
		Dimension and color	Part No.
A	A	Yellow	170116030000
A	B	Green	170116030000
B	A		
B	B	Blue	170116030000

#### Selection of main crankshaft bearing shaft

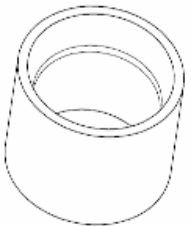
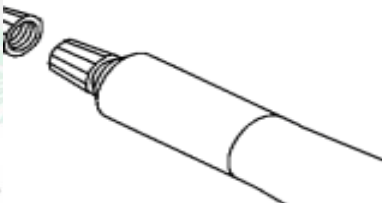
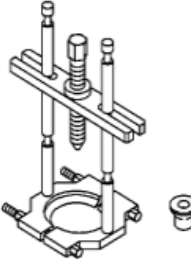
Bore diameter mark of main crankshaft bearing bush	Diameter mark of main crankshaft oil passage	Bearing bush*	
		Dimension and color	Part No.
01	1	Yellow	150026030000
02	1	Green	150026030000
01	2		
03	1	Blue	150026030000
02	2		
03	2	Red	150026030000



## Crankshaft / transmission gear

Crankshaft / transmission gear

### Special tools and fastening adhesives

Tooling of piston installation:	Adhesive:
	
Bearing puller:	
	

## Crankcase

### Crankcase

#### Crankcase disassembly

- Disassemble the engine (see “Frame / engine installation”-“Engine disassembly”).
- Place the engine on a clean surface to ensure that the engine remains stable after disassembling parts.

#### • Disassemble:

Clutch (see “Clutch”-“Clutch disassembly”)

Starting motor (see “Electrical starting system”-“Starting motor”)

Engine oil pump (see “Engine lubricating system”-“Disassembly of oil pump”)

Alternator rotor (see “Electrical system”-“Disassembly of alternator rotor”)

Engine oil filter (see “Engine lubricating system”-“Disassembly of engine oil filter”)

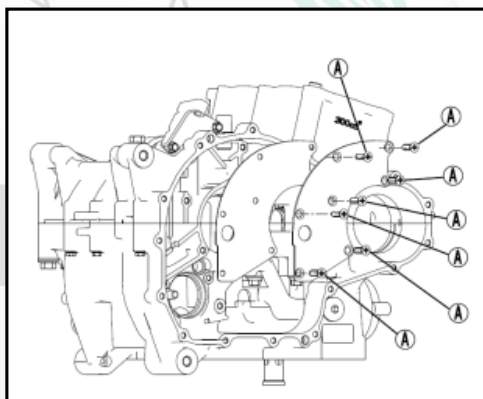
Oil pan (see “Engine lubricating system”-“Disassembly of oil pan”)

External gearshift (see “External gearshift”)

- Disassemble the screw on oil-gas separation labyrinth of right cavity cover, and remove the cover plate and cover plate gasket;

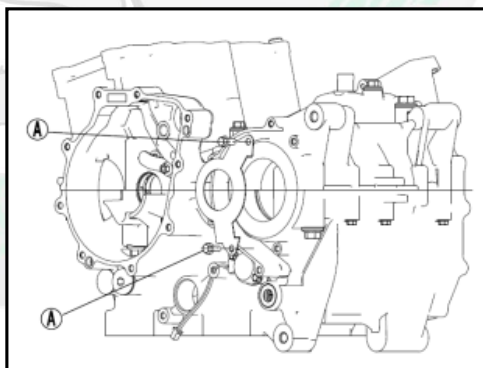
- First, disassemble M6 screw and M6 bolt.

Disassemble M6 bolt [A].



- Disassemble the bolt M6 on side cover plate of output sprocket, and remove the pressing plate of oil seal;

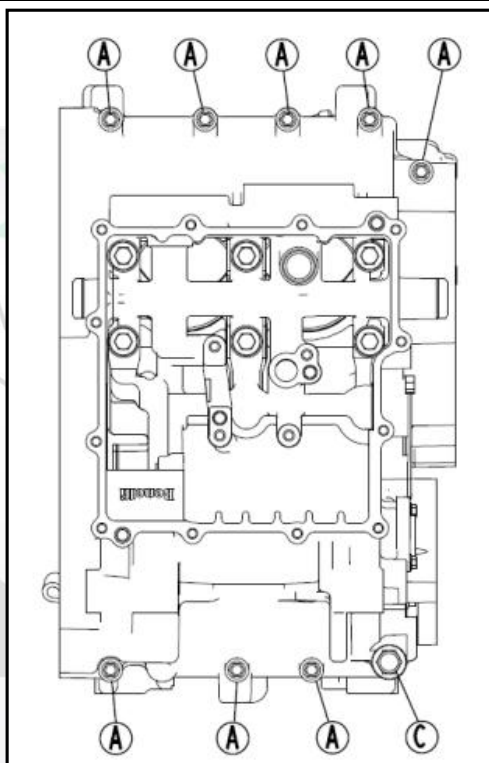
Disassemble M6 bolt [A].



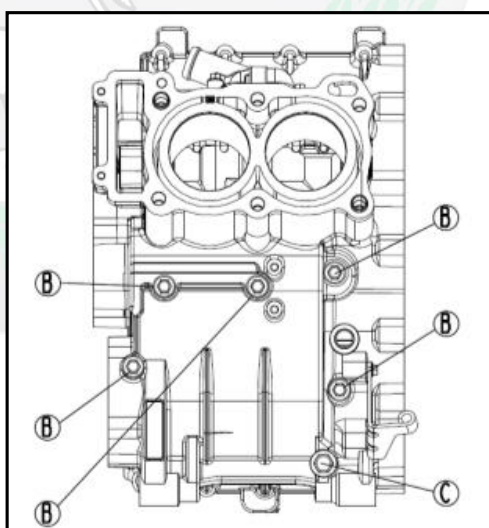
## Crankcase

### Crankcase

- Disassemble the bolt of lower crankcase.
  - First, disassemble M6 bolt [A].
  - Then disassemble M10 bolt [C].



- Disassemble the bolt of upper crankcase.
  - First, disassemble M8 bolt [B].
  - Then disassemble M10 bolt [C].



## Crankcase

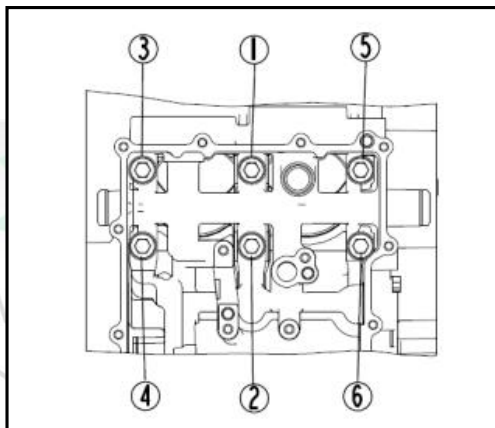
### Crankcase

- Then disassemble M8 bolt (sequence no.: 1-6).

- Gently knock the surfaces around meshing plane of crankcase using a plastic hammer, and disassemble the crankcase. Please avoid damaging the crankcase!

- ★ Disassemble the piston before disassembling the crankshaft (see “Piston disassembly”).

- Disassemble the crankshaft connecting rod assembly and balance shaft assembly in the crankcase (see “Disassembly of crankshaft and balance shaft”).



# Benelli



## Crankcase

### Crankcase

#### Crankcase installation

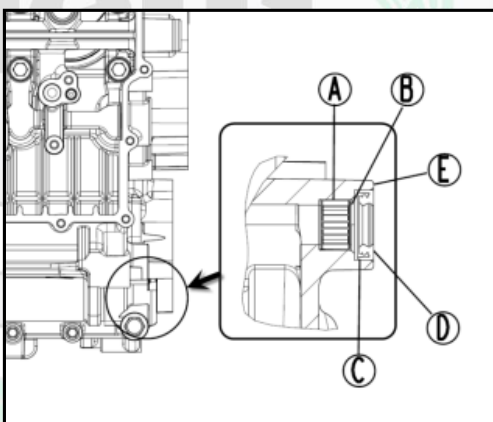
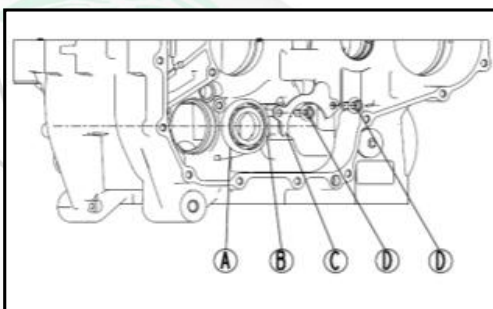
##### Notes

**The upper half and lower half parts of crankcase are entirely processed in the factory, so they must be entirely replaced.**

- Clean the meshing plane of crankcase using high flash solvents, and wipe it out.
- Blow out the oil passage in crankcase using compressed air.
- Marked side [B] of shift drum bearing [A] should be toward the outside during installation, as shown in the figure.
- Install the pressing plate of bearing [C] and bolt M6 [D].
  - The sharp side of pressing plate of bearing should fall down, and its blunt side should be inward during installation.
  - Apply the thread fastening adhesive to the thread of follower bolt on fixed bearing, and then lock the bolt.

**Locking torque of bolt on pressing plate of bearing:**  
**10N·m (0.1 kgf·m, 7.4ft·lb)**

- The direction of marked side [B] of new roller bearing [A] of gear shaft during installation is shown in the figure.
- The surface [D] of new oil seal [C] should be leveled with the crankcase surface [E] during installation of new oil seal [C].



#### • Install:

Piston connecting rod assembly of crankshaft [A] (see “Installation of piston connecting rod assembly of crankshaft”)

Balance shaft assembly [B] (see “Installation of balance shaft assembly”)

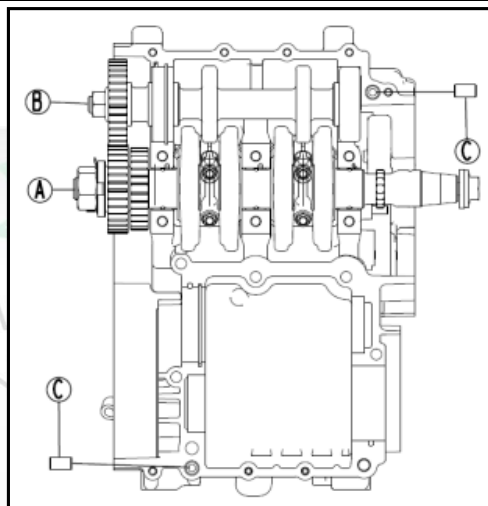
Locating pin [C]



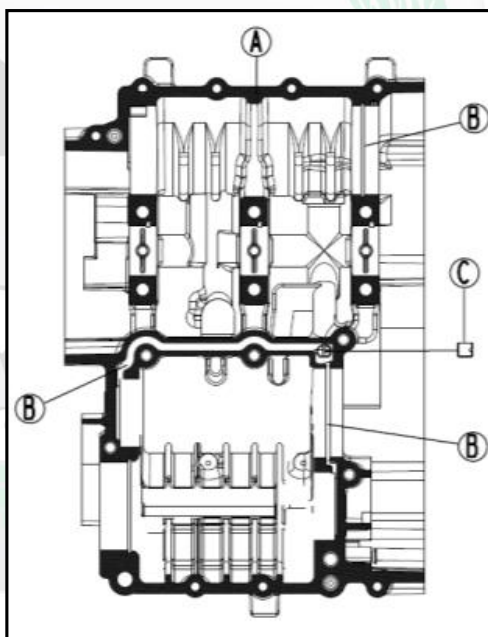
## Crankcase

### Crankcase

- Install the shift assembly of main shaft and counter shaft. (See “Installation of main shaft and counter shaft assembly”)
- Check the following items before connecting the lower crankcase and upper crankcase.
  - Check whether the shift drum and main shaft and counter shaft are in the neutral position.



- Apply the mould closing sealant [A] to the meshing plane on the lower half of crankcase.
- Install the oil passage plug [C], and apply the thread fastening adhesive during installation.



#### Remarks

- Avoid blocking the orifice of oil passage plug [C] when applying the mould closing sealant.
- Apply the mould closing adhesive to the mould closing surface on the lower half of crankcase within 20min.

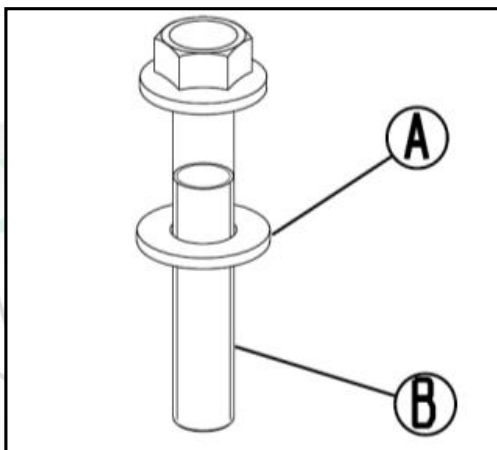
#### Notes

**Do not apply the mould closing sealant to the oil groove [B] nearby the main crankshaft bearing bush and counter shaft bearing of balance shaft!**

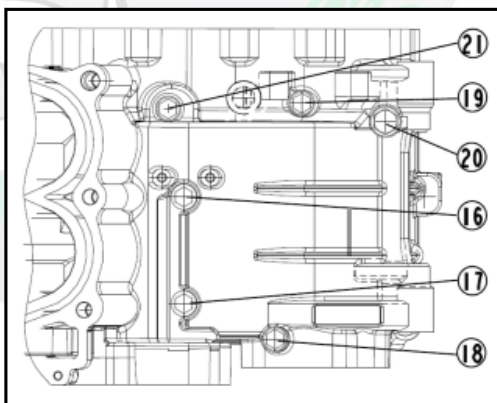
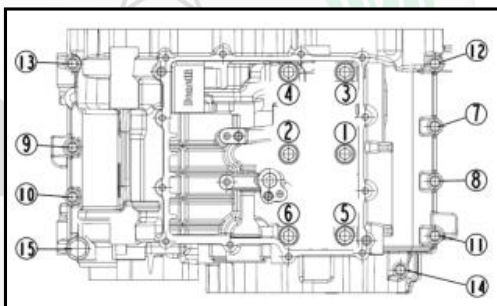
## Crankcase

### Crankcase

- Connect the lower crankcase to the upper crankcase.
- Apply the molybdenum disulfide oil solution to the contact area [A] of gasket and bolt and thread [B] of M10 and M8 bolts.



- Lock the mould closing bolt of upper crankcase in the specified sequence (No.: 1-21).
- M8 and M10 bolts are equipped with gaskets. Please replace the old gaskets into new ones.



## Crankcase

### Crankcase

○ Lock:

M6 bolt [A]

M8 bolt [B] and gasket

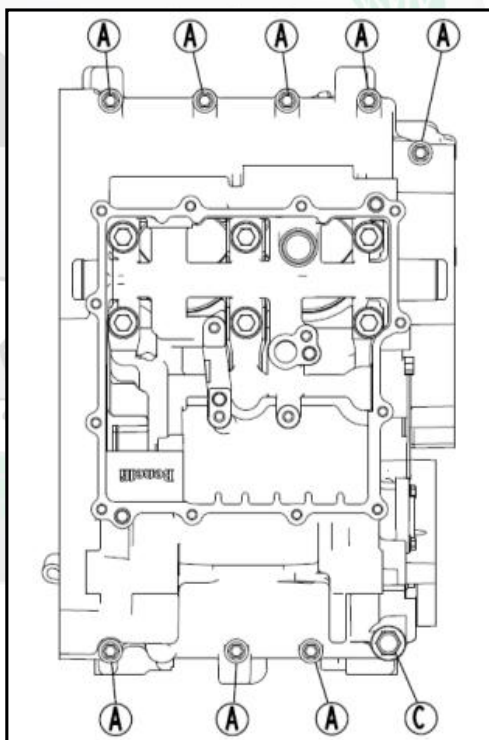
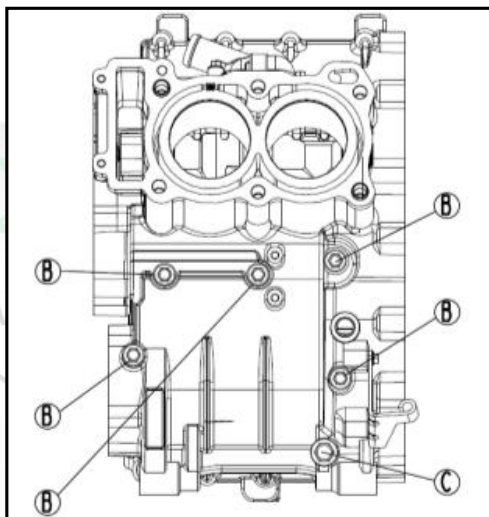
M10 bolt [C] and gasket

**Final locking torque:**

**Crankcase bolt (M6): 10 N m (first tightening)**

**Crankcase bolt (M8): 24.5 N m (second tightenings: 10, 24.5)**

**Crankcase bolt (M10): 45 N m (third tightenings: 10, 24.5, 45)**



● Check the following items after locking all crankcase bolts.

○ Check whether the crankshaft and transmission shaft can rotate smoothly.

○ Check whether the gear can be smoothly shifted from first gear to neutral gear and vice versa when rotating the output shaft.

● Install the disassembled parts (see corresponding chapters).

## Crankshaft and connecting rod

### Crankshaft and connecting rod

Disassemble the balance shaft of crankshaft

- Disassemble the crankcase (See detailed information at "Disassemble the crankcase")

- Disassemble the connecting rod (See detailed information at "Disassemble the connecting rod")

Hex nuts on crankshaft [E]

Driving gear of balance shaft [D]

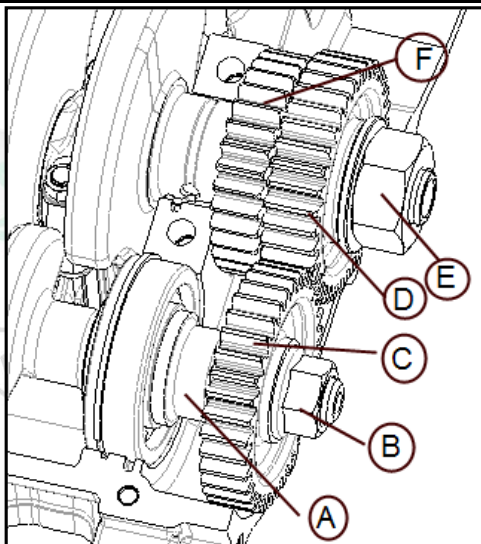
Driving gear [F]

Lock nuts on balance shaft [B]

Gear of balance shaft [C]

Axle sleeve [A]

- Disassemble the crankshaft and balance shaft from the crankcase.



## Crankshaft and connecting rod

### Crankshaft and connecting rod

#### Crankshaft assembly

##### Attention

**To replace the crankshaft, bearing bush or upper crankcase/lower crankcase, select appropriate bearing bush. Check the clearance with a plastic clearance gauge, and then assemble the engine thus to mount appropriate bearing bush.**

- Apply molybdenum disulfide oil solution on the principal axis bushing of crankshaft.

- Install the connecting rod on the crankshaft (See details at "Connecting rod assembly").

- Assembly

Flat key

Driving gear [F]

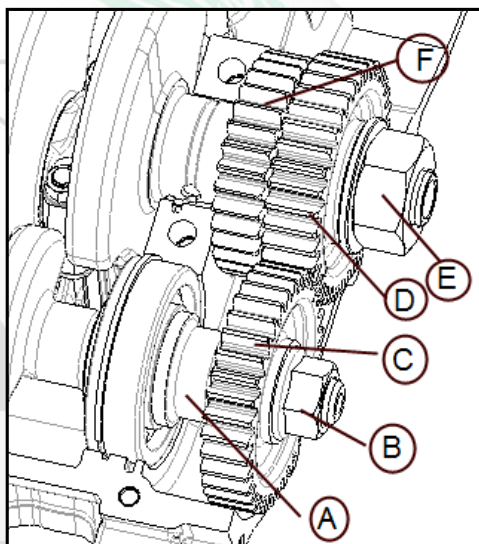
Driving gear of balance shaft [D]

On the gasket

- Apply for tighten glue and lock the nuts [B]

Locking torque

Locking torque on the driving gear of balance shaft **60 N m (6 kgf m, 44ft lb)**



#### Balance shaft assembly

- Rotate the crankshaft to top dead center (TDC)

- Assemble the balance shaft on the upper box

- Assembly

Axle sleeve

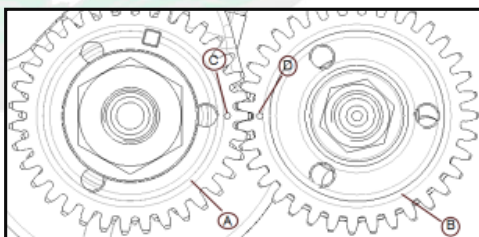
Flat key

Driven gear of balance shaft. Align the mark [D] with the mark [C] on the driving gear of balance shaft [A].

- Apply for tighten glue and lock the nuts

**Locking torque**

Locking torque on the driving gear of balance shaft **100 N m (10.2kgf m, 73.7ft lb)**





## Crankshaft and connecting rod

### Crankshaft and connecting rod

#### Connecting rod disassemble

- Disassemble the crankcase (See detailed information at "Disassemble the crankcase")

- Disassemble:

Connecting rod nut [A]

Crankshaft

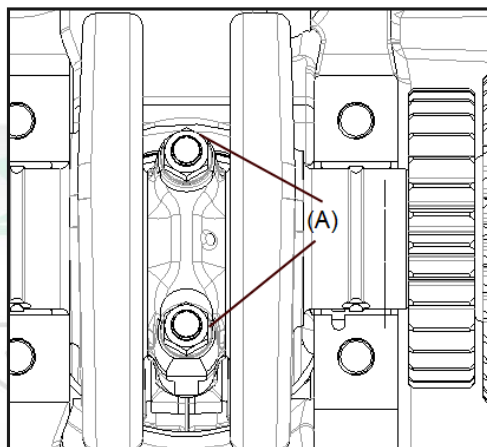
#### Note

- Make a mark on the connecting rod and connecting rod cover thus to assemble them to the original position.

- Disassemble the piston (See detailed information at "Disassemble the piston")

#### Attention

**Discard the disassembled old connecting rod bolt. To avoid damage to the crankshaft pin surface, it is necessary to ensure that the connecting rod bolt will not be knocked down to the crankshaft pin.**



## Crankshaft and connecting rod

### Crankshaft and connecting rod

Connecting rod assembly

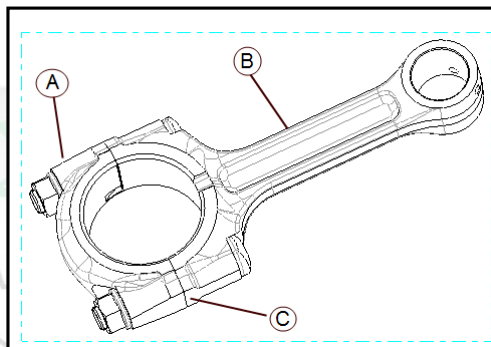
Connecting rod cover [A]

Connecting rod [B]

Diameter symbol [C]: "A" or "B"

#### Attention

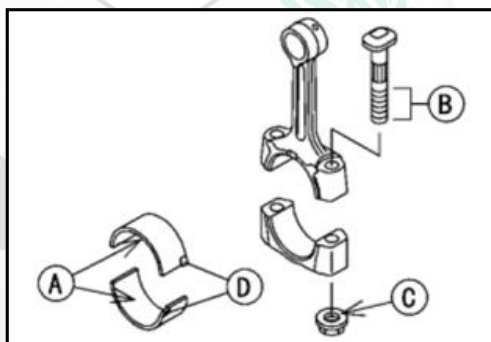
**To replace the connecting rod, big end bearing bush of connecting rod or crankcase, select appropriate bearing bush. Check the clearance with a plastic clearance gauge, and then assemble the engine thus to mount appropriate bearing bush.**



- Apply molybdenum disulfide oil solution on the upper and lower inner surface of bearing bush [A].
- Apply molybdenum disulfide solution on the contact surface [B] of connecting rod nut and screw thread [B].
- Arrange the nails at the same side at installation of bearing bush. Install the bearing bush to the notches of connecting rod and connecting rod cover.

#### Attention

**The bearing bush will be damaged in case of lubricating oil and grease not being applied correctly.**



- Avoid damage on bearing bush surface from connecting rod edge [B] or connecting rod cover [C] at bearing bush assembly. A bearing bush assembly method is as shown below:

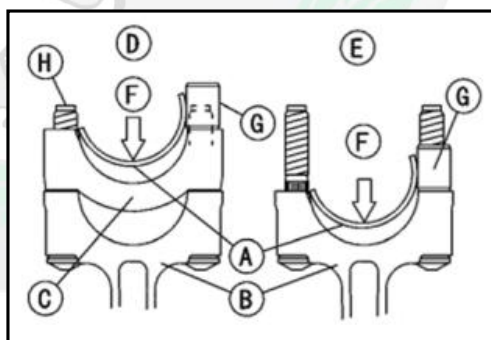
Connecting rod cover assembly [D]

Connecting rod assembly [E]

Push [F]

Spare locating pin [G]

Connecting rod bolt [H]



## Crankshaft and connecting rod

### Crankshaft and connecting rod

- Clean the sundries on the bush, as well as the bearing surface.
- Assemble the lower subsidiary cover of the lock to the connecting rod and align the diameter symbol.
- Assemble the crankcase (See detailed information at "Assemble the crankcase")
- Assemble each connecting rod to the original crankshaft pin
  - Lock the connecting rod big end by adopting "plastic zone fastening method"
  - This approach can accurately achieve the required clamping force. Thus relatively finer and lighter bolts can be used to further reduce the weight of connecting rod.
  - There are two plastic zone fastening methods in total. The first one is bolt length measurement method and the other one is rotation angle method. You can choose either of the following methods. However, it is suggested to adopt bolt length measurement method since the big head nut can be fixed more reliably.

#### Attention

The connecting rod bolt is subject to elongating distortion thus secondary use is prohibited! The detail information of correct operating method for screw bolt and nut is as shown in the table below.

#### Attention

Do not lock the nuts over tightly!  
The bolts should be placed on the contact surface correctly to avoid the bolt head colliding to crankcase.

## Crankshaft and connecting rod

### Crankshaft and connecting rod

#### Connecting rod inspection

##### (1) Bolt length measurement method

- Since new connecting rod, bolt and nut shall be antirust solution processed, the bolt, nut and connecting rod shall be completely cleaned with solvent of high flash point to avoid torque readings error.

#### **Warning**

The bolt, nut and connecting rod shall be cleaned at a place with excellent ventilation condition to strictly avoid any sparks or flames around the operation area, including devices with indicator light. Since gasoline or solvent of low flash point are extremely inflammable, it is forbidden to clean bolt, nut and connecting rod with them.

#### **Attention**

After cleaning, it is necessary to dry bolt and nut with compressed air immediately.

Bear in mind that the bolt and nut shall be rinsed thoroughly!

- Assemble the new bolt to old connecting rod.
- As shown in the Fig. below, make dent marks on two bolt heads and bolt bottom.
- Before locking the bolt, measure the length of connecting rod with a point micrometer and record the measuring value so as to successively calculate the elongation degree after locking the bolt.

Connecting rod [A]

Make dent marks [B]

Nut [C]

Insert micrometer pin to dent mark [D].

- Apply molybdenum disulfide oil solution at the following sections:

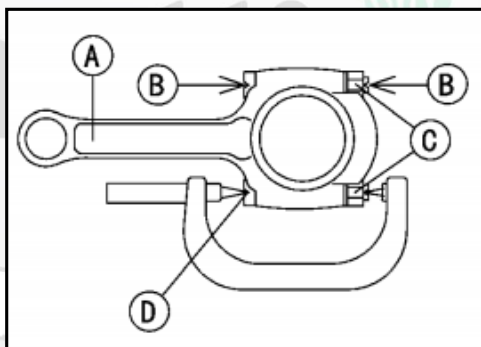
Screw thread on nut and bolt

Contact surface of nut and connecting rod

- Lock the big head nut until that the bolt extension can reach the specified value in the following table.
- Check the length of connecting rod bolt

★ If the elongation amount exceeds application scope, it indicates over extension of bolt. In case of over extension of bolt, the bolt will be damaged during the use process.

Bolt length after locking-bolt length after locking=bolt extension



Connecting rod assembly	Bolt	Nut	Application scope of connecting rod bolt elongation
New	Use bolts matching new connecting rod	Nut matching new connecting rod	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)
		New	
Old	Replace with new bolt	Old	0.25 ~ 0.34 mm (0.0098 ~ 0.0134 in.)
		New	

## Crankshaft and connecting rod

### Crankshaft and connecting rod

#### (2) Rotating moment method

- ★ If there is no point micrometer, rotating moment method can be adopted to lock nut.
- Since new connecting rod, bolt and nut shall be antirust solution processed, the bolt, nut and connecting rod shall be completely cleaned with solvent of high flash point to avoid torque readings error.

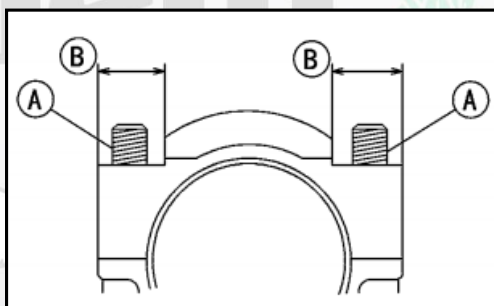
#### ⚠ Warning

The bolt, nut and connecting rod shall be cleaned at a place with excellent ventilation condition to strictly avoid any sparks or flames around the operation area, including devices with indicator light. Since gasoline or solvent of low flash point are extremely inflammable, it is forbidden to clean bolt, nut and connecting rod with them.

#### Attention

After cleaning, it is necessary to dry bolt and nut with compressed air immediately. Bear in mind that the bolt and nut shall be rinsed thoroughly!

- Assemble the new bolt to old connecting rod.
- Apply molybdenum disulfide oil solution at the following sections:  
Screw thread on nut and bolt [A]  
Contact surface of nut and connecting rod [B]



- Lock the nut applying the stipulated locking torque. See the table as below.

Connecting rod assembly	Bolt	Nut	Moment N·m (kgf·m, ft·lb)
New	Use bolts matching new connecting rod	Nut matching new connecting rod	25 (2.5, 18.4) score 10 (1, 7.37), 20(2, 14.7) twice prefixation
		New	25 (2.5, 18.4) score 10 (1, 7.37), 20(2, 14.7) twice prefixation
Old	Replace with new bolt	Old	25 (2.5, 18.4) score 10 (1, 7.37), 20(2, 14.7) twice prefixation
		New	25 (2.5, 18.4) score 10 (1, 7.37), 20(2, 14.7) twice prefixation

#### Crankshaft/connecting rod cleaning

- After removing the connecting rod from crankshaft, clean the connecting rod with solvent of high flash point.
- Discharge the foreign matters and residual oil in the crankshaft oil passage with compressed air.

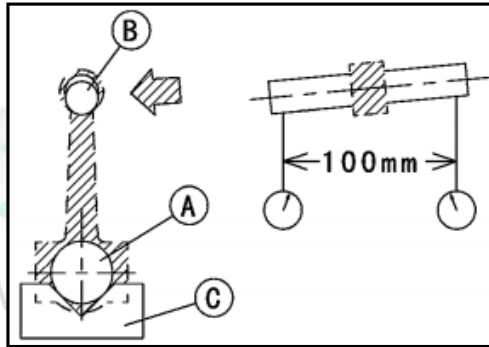


## Crankshaft and connecting rod

### Crankshaft and connecting rod

Check the bend amount of connecting rod

- Disassemble the bearing bush of connecting rod big end. And then assemble the lower subsidiary cover of the lock to the connecting rod.
  - Select a mandrel with a same diameter equal to that of connecting rod big end [A]. And then insert the mandrel from the connecting rod big end.
  - Select a mandrel with a same diameter equal to that of piston pin, and a length at least of 100mm (3.94 in.). And then insert the mandrel from the connecting rod small end.
  - Place the mandrel of connecting rod big end on the V block [C] on the slab.
  - Fix the connecting rod vertically. Measure the difference value of mandrel height over 100mm (3.94 in.) on the slab with a height gauge to determine the bend amount of connecting rod.
- ★ If the bend amount of connecting rod exceeds the service limit, the connecting rod shall be replaced.

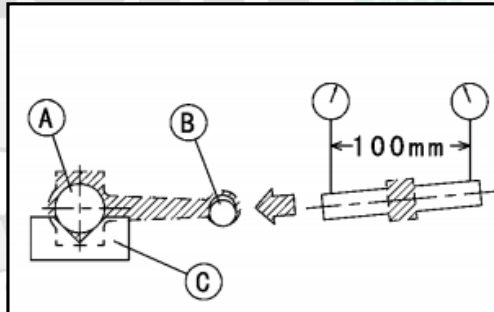


#### Bend amount of connecting rod

**Service limit: TIR 0.2/100 mm (0.008/3.94 in.)**

Check the warp amount of connecting rod

- Fix the big head of mandrel [A] on V block [C]. Horizontally replace connecting rod. Measure the offset of mandrel in mandrel [B] 100 mm (3.94 in.) length parallel to slab to determine the warp amount of connecting rod.
- ★ If the warp amount of connecting rod exceeds the service limit, the connecting rod shall be replaced.



#### Warp amount of connecting rod

**Service limit: TIR 0.2/100 mm (0.008/3.94 in.)**

## Crankshaft and connecting rod

### Crankshaft and connecting rod

Check the side clearance of connecting rod big end

- Measure the side clearance of connecting rod big end
  - Insert the feeler gauge [A] between big end and balance weight of any crankshaft to measure the clearance between them.

#### Side clearance of connecting rod big end

**Standard: 0.1~0.25 mm (0.0039~0.0098 in.)**

**Service limit: 0.38 mm (0.015 in.)**

- ★ If the side clearance exceeds service limit, replace the connecting rod to re-check side clearance. If the side clearance after replacing the connecting rod is too big, it is necessary to replace the crankshaft.

Check the abrasion of connecting rod big end bearing bush/crankshaft pin.

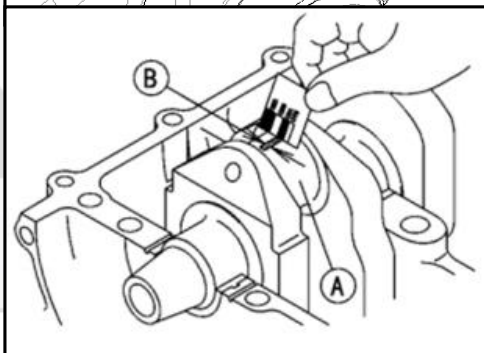
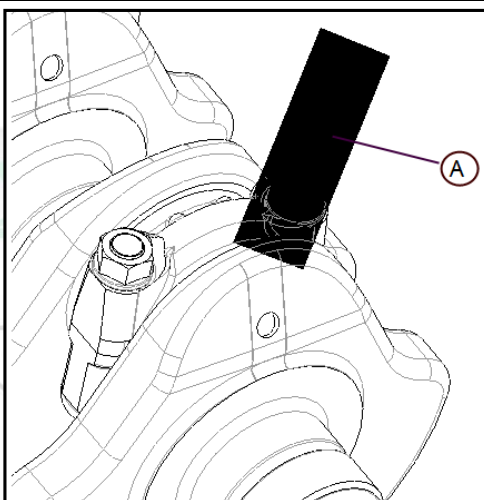
- Check the clearance between bearing bush/crankshaft pin [A] with a plastigauge [B].
- Lock the nuts of connecting rod big end with stipulated moment (See detailed information of "connecting rod assemble")

#### Notes

- Do not rotate connecting rod and crankshaft during the clearance measuring process!

#### Attention

**Replace connecting rod bolt after measuring the clearance.**



#### Clearance of connecting rod big end bearing bush/crankshaft pin

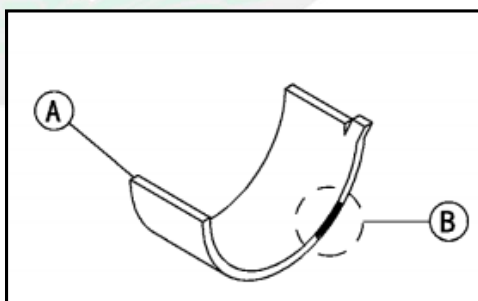
**Standard: 0.028~0.052 mm (0.0011~0.0020 in.)**

**Service limit: 0.07mm (0.0027 in.)**

- ★ If the measured clearance is within the standard, it is not required to replace the bearing.

- ★ If the measured clearance is between 0.052 mm (0.0020 in.) and service limit (0.07 mm, 0.0027 in.), replace the current bearing bush [A] with that with blue paint [B]. Check the clearance between bearing bush/crankshaft pin with a plastigauge. The measured clearance can slightly exceed the standard, but shall not be lower than the minimum value to prevent bearing bush biting.

- ★ If the clearance value exceeds the service limit, measure the diameter of crankshaft pin.



## Crankshaft and connecting rod

### Crankshaft and connecting rod

#### Diameter of crankshaft pin

**Standard: 29.962~29.976 mm (1.1796~1.1801 in.)**

**Service limit: 29.91 mm(1.1775 in.)**

★ If the abrasion of any crankshaft pin exceeds lower limit of maintenance, replace with new crankshaft.

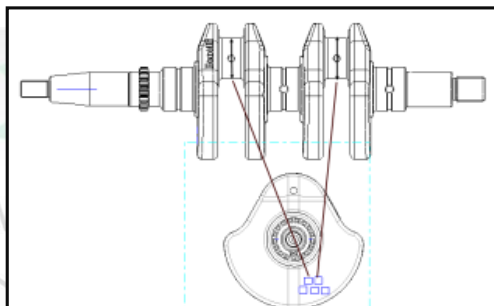
★ If the measured crankshaft pin diameter is equal to or higher than the lower limit of maintenance, and the original diameter symbol on the crankshaft is inconsistent, replace with new diameter symbol.

Diameter symbol of crankshaft pin

A 29.969 ~ 29.976 mm(1.1799 ~ 1.1801 in.)

B 29.962 ~ 29.968 mm(1.1796 ~ 1.1798 in.)

Δ: Diameter symbol of crankshaft pin: "A" or "B"



• Measure the inner diameter of the connecting rod big end. Make corresponding marks on the connecting rod big end according to the measured inner diameter.

• Lock the nuts of connecting rod big end with stipulated locking moment (See detailed information of "connecting rod assemble")

#### Notes

○ The measuring result and connecting rod big end shall be approximate to original symbols.

Inner diameter symbol of connecting rod big end

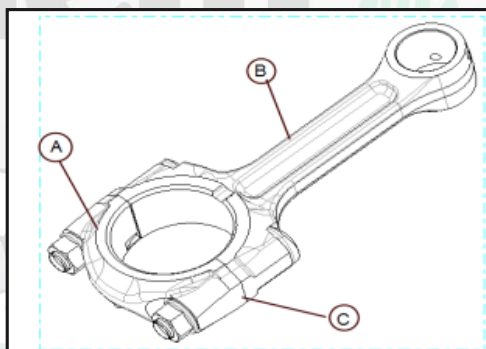
A 33.000 ~ 33.008 mm(1.2992 ~ 1.2995 in.)

B 33.009 ~ 33.016 mm(1.2995 ~ 1.2998 in.)

Connecting rod cap [A]

Connecting rod body [B]

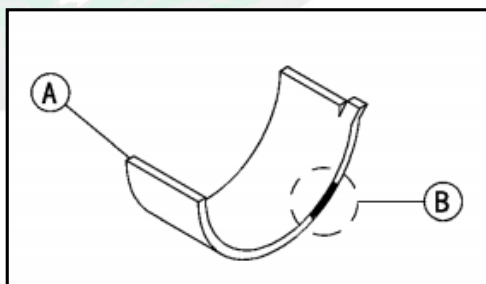
Diameter symbol [C]: "A" or "B"



• Select appropriate bearing bush according to the combination of connecting rod and crankshaft code [A].

Size color [B]

Inner diameter symbol of connecting rod big end	Diameter symbol of crankshaft pin	Bearing bush	
		Size color	Part number
A	A	Yellow	170116030000
B	A	Green	170116030000
A	B		
B	B	Blue	170116030000



## Crankshaft and connecting rod

### Crankshaft and connecting rod

- Assemble the new bearing bush to connecting rod.  
Measure the clearance between bearing bush/crankshaft pin with a plastigauge.

Check the side clearance of crankshaft.

- Move the crankshaft [A] to crankshaft transmission chain.
- Insert the feeler gauge [B] to the 2# main oil duct end and crankshaft end [C] of crankcase to measure the clearance.

#### Side clearance of crankshaft

**Standard: 0.10~0.25 mm (0.0039~0.0098 in.)**

**Service limit: 0.30mm (0.0118 in.)**

#### Notes

- The crankcase shall be replaced for the whole set.

- Check the width of the 2# main oil duct
- Check the width of the 2# main oil duct [A]
- ★ If the measured value exceeds the standard value, replace the crankshaft [B].

#### The width of the 2# main oil duct of crankshaft

**Standard: 24.00~24.05 mm (0.9449~0.9468 in.)**

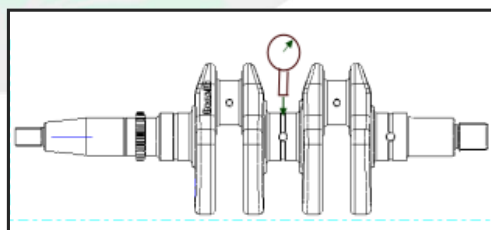
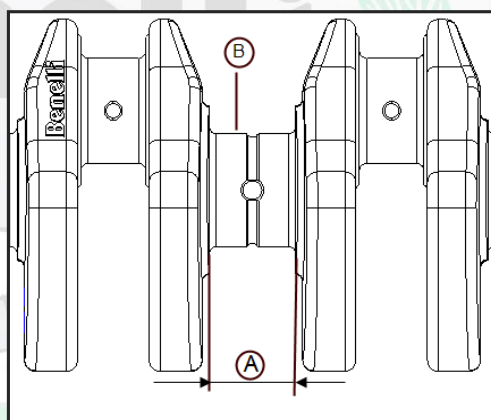
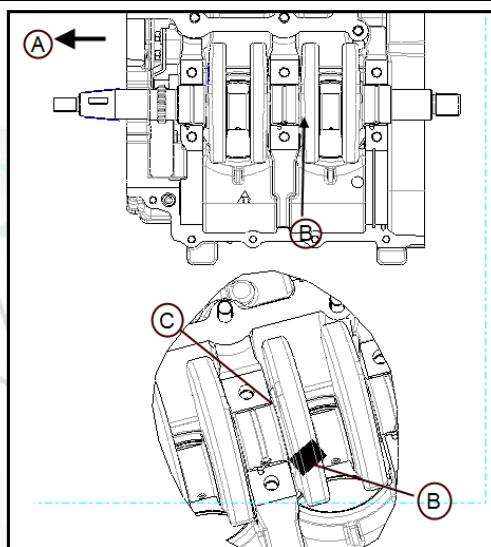
Measure the radial oscillating quantity of crankshaft.

- Jack-up the both ends of crankshaft with a thimble.  
Measure the radial oscillating quantity of crankshaft.
- ★ If the measured value exceeds the standard value, replace the crankshaft.

#### Radial oscillating quantity of crankshaft.

**Standard: ≤TIR 0.02mm (0.0008in.)**

**Service limit: TIR 0.06 mm (0.0024 in.)**



## Crankshaft and connecting rod

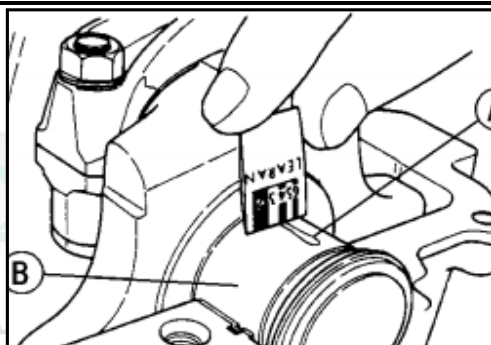
### Crankshaft and connecting rod

Check the abrasion of main bearing bush of crankshaft/oil duct.

- Check the clearance between bearing bush/oil duct [B] with a plastigauge [A].

#### Notes

- Lock the crankcase bolt with stipulated moment (See detailed information for "Crankcase assembly").
- Do not rotate the crankshaft during the clearance measuring process!
- Oil duct clearance less than 0.025mm (0.00098 in.) can not be measured with a plastigauge. Original parts enable the clearance satisfying the minimum standard.



#### Clearance of crankshaft principal axis bushing/oil duct

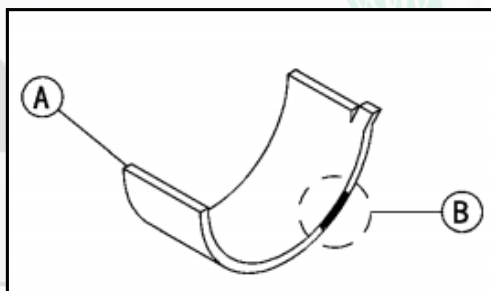
**Standard: 0.022~0.045 mm (0.0009~0.0018 in.)**

**Service limit: 0.06 mm (0.0024 in.)**

★ If the measured clearance is within the aforementioned standard, it is not required to replace the bearing bush.

★ If the measured clearance is between 0.046 mm (0.002 in.) and service limit (0.06 mm, 0.0024 in.), replace the current bearing bush [A] with that with black paint [B]. Check the clearance between bearing bush/crankshaft pin with a plastigauge. The measured clearance can slightly exceed the standard, but shall not be lower than the minimum value to prevent bearing bush biting.

★ If the clearance value exceeds the service limit, measure the diameter of the main oil duct of crankshaft.



#### Diameter of the main oil duct of crankshaft

**Standard: 31.958~31.972 mm (1.2582~1.2587 in.)**

**Service limit: 31.94 mm (1.2575 in.)**

★ If the abrasion of any oil duct exceeds the service limit, replace with new crankshaft.

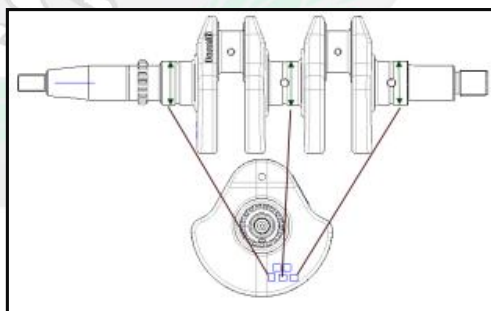
★ If the measured oil duct diameter is not lower than the service limit, and the original diameter symbol on the crankshaft is inconsistent, replace with new diameter symbol.

#### Diameter symbol of the main oil duct of crankshaft

**1 31.965 ~ 31.972 mm (1.2585 ~ 1.2587 in.)**

**2 31.958 ~ 31.965 mm (1.2582~1.2585 in.)**

□: Diameter symbol of the main oil duct of crankshaft: "1" or "2".





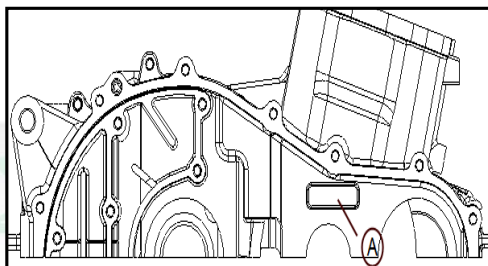
## Crankshaft and connecting rod

### Crankshaft and connecting rod

- Measure the inner diameter of the principal axis bushing. Make corresponding marks on the crankcase according to the measured inner diameter.

A: Inner diameter symbol of the principal axis bushing of crankshaft: "01", "02" or "03".

- Lock the crankcase bolt with stipulated locking moment (See detailed information for "Crankcase assembly").



#### Notes

- The measuring results shall be approximately to original symbols of the upper part of crankcase.

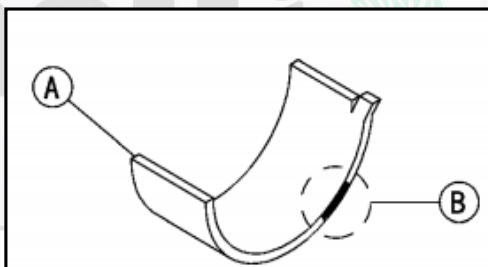
#### Inner diameter symbol of the principal axis bushing of crankshaft

**01** 35.000 ~ 35.007 mm (1.3779 ~ 1.3782 in.)

**02** 35.007 ~ 35.014 mm (1.3782 ~ 1.3785 in.)

**03** 35.014 ~ 35.021 mm (1.3785 ~ 1.3788 in.)

- Select appropriate bearing bush according to the combination of connecting rod and crankshaft code [A].  
Size color [B]



Inner diameter symbol of the principal axis bushing of crankshaft	Spindle oil duct diameter symbol of crankshaft	Bearing bush *	
		Size color	Part number
01	1	Yellow	150026030000
02	1	Green	150026030000
01	2		
02	2	Blue	150026030000
03	1		
03	2	Red	150026030000

- Assemble the new bearing bush to the upper crankcase and lower crankcase. Measure the clearance between bush/oil duct with a plastigauge.

## Piston

### Piston

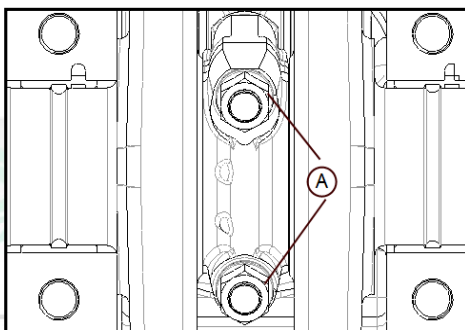
Disassemble the piston

- Disassemble the crankcase (See detailed information at "Disassemble the crankcase")

• Disassemble:

Connecting rod nut [A]

Connecting rod cover at the lower end of connecting rod



- Disassemble the crankshaft.

- Push out the piston in the direction of junk head.



- Disassemble the retainer ring of piston pin [A].

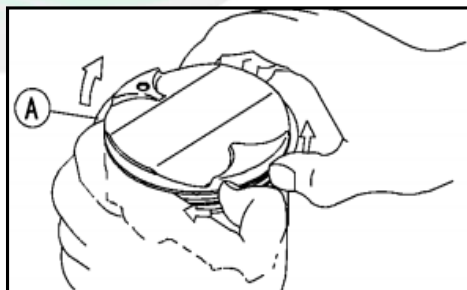
- Disassemble the piston pin.

- Disassemble the piston.



- Unfold the opening of piston ring with thumb carefully. Boost at the back of piston ring [A] to remove the piston ring.

- Disassemble the compound oil ring with thumb according to the same method (including three components).

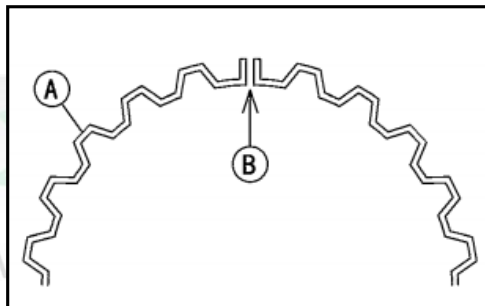


## Piston

### Piston

#### Piston assembly

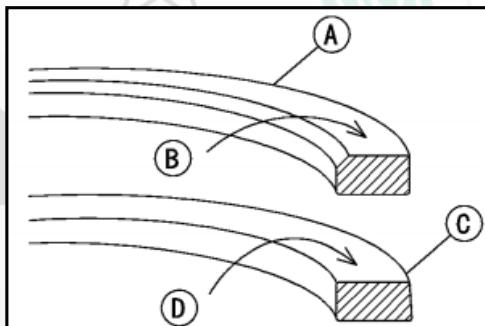
- Apply molybdenum disulfide oil solution on the bushing ring of compound oil ring. Assemble the bushing ring of compound oil ring on the piston ring bottom. Do not stuck the two sides of the bushing ring [B].
- Apply molybdenum disulfide oil solution on scraper of compound oil ring. And then assemble the compound oil ring and scraper ring. Assemble one on the upper side of the bushing ring, and the other on the lower side of the bushing ring.
  - Unfold the scraper ring with thumb carefully. It should not overexert. Put the scraper ring on the piston.
  - Loosen the scraper ring. Make it drop to the piston ring at the bottom.



#### Notes

- Scraper ring is not located at the "top" or "bottom".

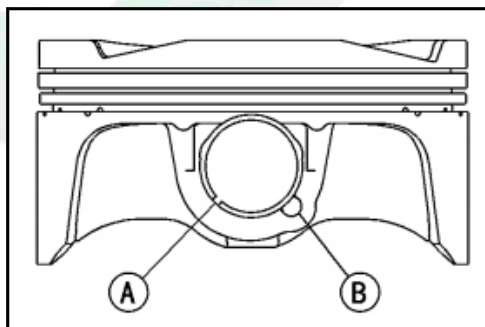
- Do not confuse top piston ring and the secondary piston ring!
- While assembling top piston ring, the symbol "DY" [B] should be upward.
- While assembling the secondary piston ring, the symbol "D" [D] should be upward.
- Apply molybdenum disulfide oil solution on piston ring.



#### Notes

- In case of replacing new piston, it is necessary to replace with a new piston ring.

- Put a new piston pin check ring to piston. Coincide the opening of piston pin check ring [A] and on the hole of piston pin [B].
- Apply molybdenum disulfide oil solution on piston pin and piston pin hole.
- Do not overexert at assembling the piston pin check ring.



#### Attention

**Don't take recycle ring to retaining ring. The check ring will be deformed, weak the locking force, fall off and scratch the casing wall.**

## Piston

### Piston

- The opening of piston ring shall be as shown on the position of the right figure. The opening of compound oil ring shall present an angle of  $30^{\circ} \sim 40^{\circ}$  with the opening of piston ring.

Top piston ring [A]

The secondary piston ring [B]

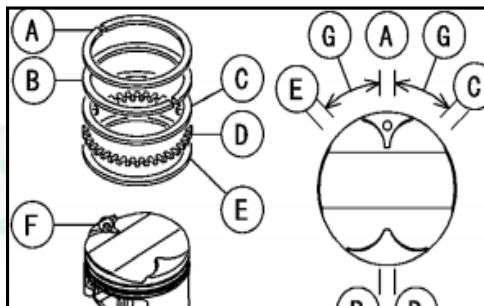
Upper scraper ring assembly [C]

Bushing ring of compound oil ring [D]

Lower scraper ring assembly [E]

Hole [F]

$30^{\circ} \sim 40^{\circ}$  [G]



- The symbol shall be at the air inlet side at piston assembly.

- Assemble the piston with a piston ring installation tool [A] from the side of piston ring.

#### Dedicated tool-Piston ring assemble tool

- Assembly:

Crankcase (See detailed information at "Assemble the crankcase")

Connecting rod cover at the lower end of the connecting rod (See details at "Connecting rod assembly").



## Piston

### Piston

Check abrasion status of cylinder stator (upper crankcase)

- Due to different abrasion status of cylinder stator (upper crankcase), perform measurement from one side to the other side, from the front to the back (four times in total) as shown in the two positions of the right diagram.

★ If any inner diameter measurement value of cylinder stator exceeds the service limit, replace the crankcase!

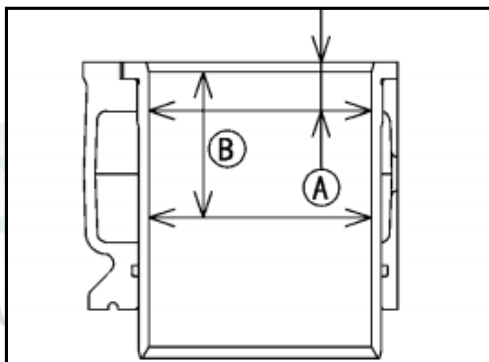
10 mm (0.39 in.) [A]

60 mm (2.36 in.) [B]

**Inner diameter of cylinder stator (upper crankcase)**

**Standard:** 65.010 ~ 65.020 mm ( 2.5594~ 2.5598 in.)

**Service limit:** 65.10 mm (2.5630 in.)



Check the piston abrasion

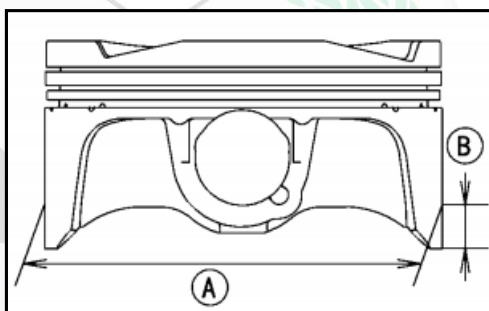
- Measure the outer diameter of each piston [A] at a position 10mm (0.39 in.) [B] away from the piston bottom vertical to the piston pin.

★ If the measured value is less than the lower limit, replace the piston!

**Piston diameter**

**Standard:** 64.97~64.98 mm ( 2.5579~2.5583 in.)

**Service limit:** 64.90 mm ( 2.5551 in.)



Check the abrasion of piston ring and piston ring groove.

- Check the base of piston ring to determine whether the circular groove is subject to uneven wear.

★ The piston ring shall be totally parallel to the surface of circular groove, otherwise pistons and piston rings shall be replaced.

- When the piston ring is in the circular groove, measure the feeler gauge [A] for several times to determine the clearance of piston ring/piston ring groove.

**Clearance of piston ring/piston ring groove**

**Standard:**

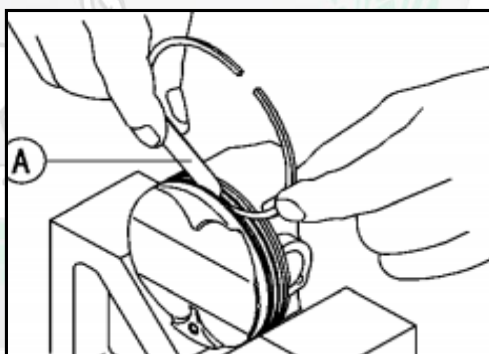
**Top piston ring:** 0.05~0.09mm (0.0020~0.0035in.)

**The secondary piston ring:** 0.77~0.79 mm (0.0303~0.0307 in.)

**Service limit:**

**Top piston ring:** 0.17mm (0.0067 in.)

**The secondary piston ring:** 0.16 mm (0.0063 in.)





## Piston

### Piston

Check the width of piston circular groove

- Measure the width of piston circular groove
- Measure the width of piston circular groove with a vernier caliper at different measuring points.

**Width of piston circular groove**

**Standard:**

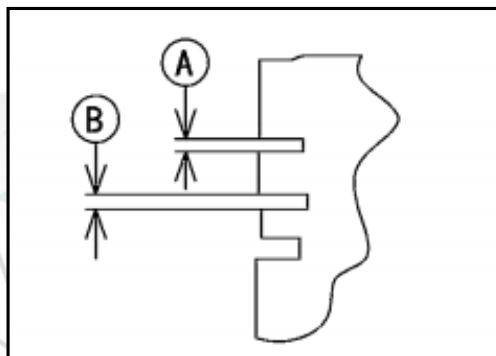
**Top piston ring [A]: 0.83~0.85mm (0.0327~0.0335 in.)**

**The secondary piston ring [B]: 0.83~ 0.85mm (0.0327~ 0.0335 in.)**

**Service limit:**

**Top piston ring [A]: 0.90mm (0.0354 in.)**

**The secondary piston ring [B]: 0.90mm ( 0.0354 in.)**



★ If the width of any piston circular groove measured at any point is greater than the service limit, please replace the piston!

Check the thickness of piston ring

- Check the thickness of piston ring
- Measure the width of piston circular groove with a micrometer at different measuring points.

**Thickness of piston ring**

**Standard:**

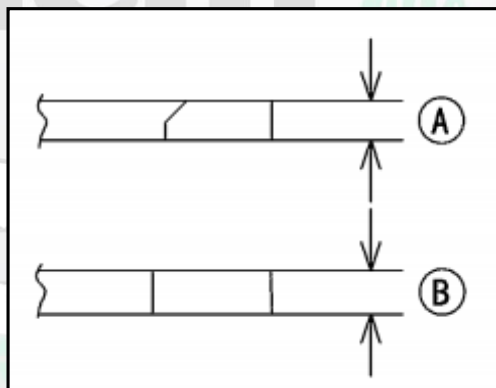
**Top piston ring [A]: 0.76~ 0.78 mm ( 0.0299~0.0307 in.)**

**The secondary piston ring [B]: 0.77~0.79 mm (0.0303~0.0307 in.)**

**Service limit:**

**Top piston ring [A]: 0.73mm (0.0287 in.)**

**The secondary piston ring [B]: 0.74mm (0.0291 in.)**



★ If the width of any piston ring is lower than the service limit, please replace all the piston rings!

#### Notes

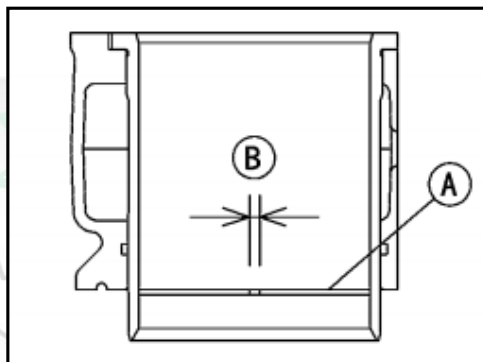
- If the new piston ring is used on the old one, check if the piston circular groove is subject to uneven wear. The piston ring shall be totally parallel to the surface of circular groove, otherwise the pistons shall be replaced.

## Piston

### Piston

Check the open clearance of piston ring.

- Put the piston ring [A] into air cylinder (upper crankcase). Assemble the piston ring to air cylinder bottom by utilizing piston due to smaller abrasion at air cylinder bottom.
- Measure the open clearance of piston ring with a feeler gauge [B].



#### Open clearance of piston ring

##### Standard:

Top piston ring: 0.15~0.30mm (0.0059~0.0118 in.)

The secondary piston ring: 0.25~0.45 mm (0.0098~0.0177 in.)

Oil ring: 0.20~0.70 mm (0.0079~0.0276 in.)

##### Service limit:

Top piston ring: 0.4mm(0.0157 in.)

The secondary piston ring: 0.65 mm(0.0256in.)

Oil ring: 1.0 mm (0.039 in.)

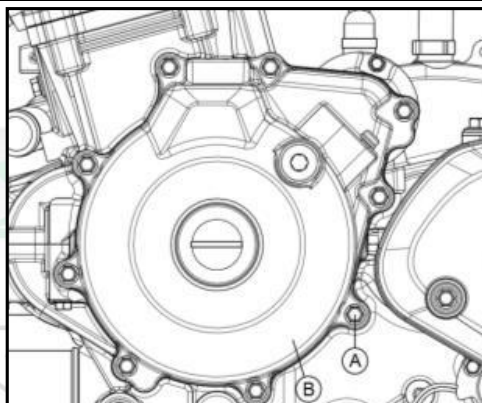
★ If the open clearance of piston ring is higher than the service limit, please replace all the piston rings!

## Electric start

### Electric start

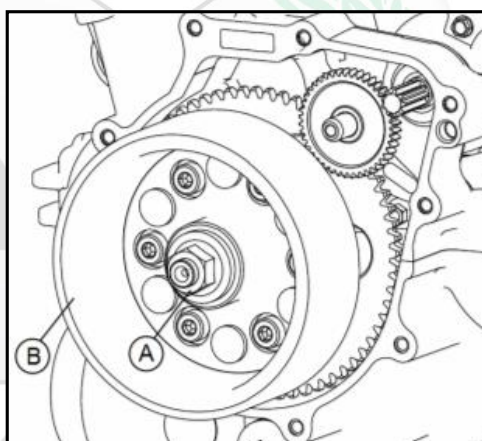
Disassemble the left cover

- Disassemble the engine (See "Disassemble/assemble"-"Disassemble the engine")
- Screw off the left cover bolts [A]
- Disassemble the left cover [B]



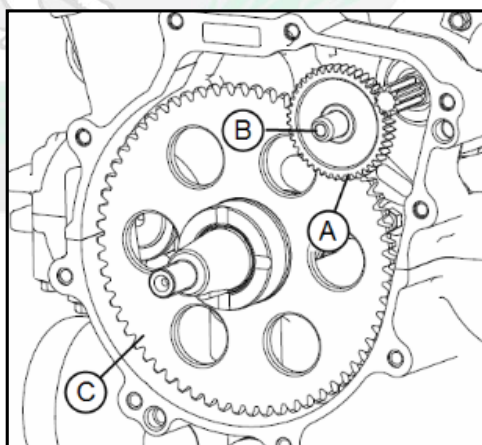
Disassemble the flywheel

- Screw off the flywheel lock nut [A]
- Pull out the flywheel [B]



Disassemble electric starting idle wheel and starting big gear wheel

- Disassemble electric starting idle wheel and starting idler shaft
- Disassemble starting big gear

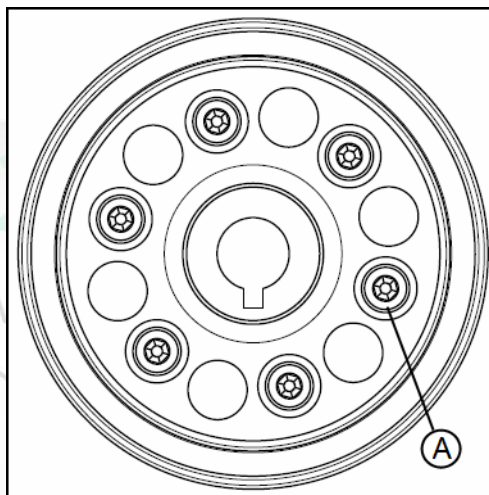


## Electric start

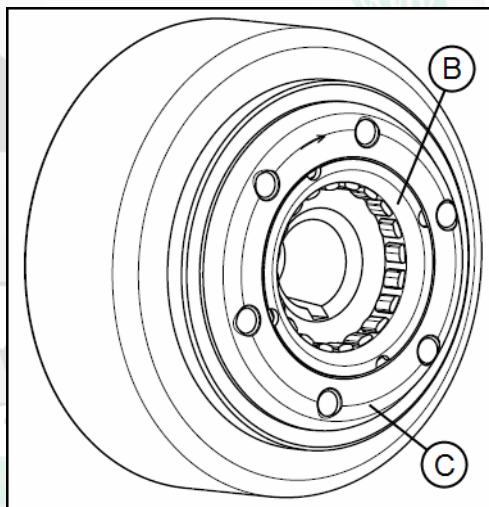
### Electric start

Disassemble the overrun clutch

- Disassemble the flywheel (See detailed information at "Disassemble the flywheel")
- Screw off the bolt of overrun clutch [A]



- Disassemble the overrun clutch [B] and outer ring of overrun clutch [C]



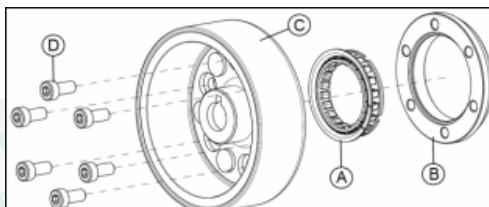
## Electric start

### Electric start

#### Installation the overrun clutch

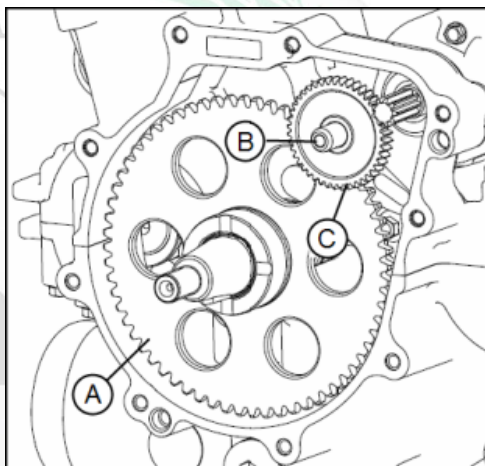
- Disassemble the overrun clutch [A] and outer ring of overrun clutch [B] on the flywheel [C].
- Assemble the bolts of overrun clutch [D]
  - Apply threaded fastening adhesive on the screw thread of overrun clutch bolt.

**Locking torque of overrun clutch bolt [D]: 20N m (2.04 kgf m, 177.48in lb)**



#### Assemble the starting big gear and electric starting idler

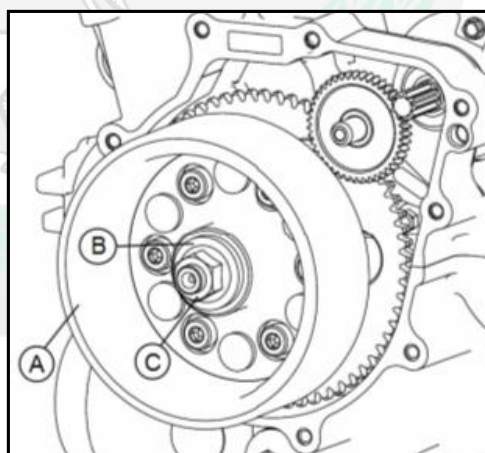
- Assemble the starting big gear [A]
- Assemble the electric starting idler [C] of starting idler shaft [B]
  - Apply molybdenum disulfide lubricating grease on starting idler shaft
- Assemble the electric starting idler [C]



#### Flywheel assembly

- Assemble the overrun clutch (See detailed information at "Overrun clutch assembly")
- Flywheel assembly [A]
- Gasket assembly [B]
- Flywheel lock nut assembly [C]

**Locking torque of flywheel lock: 100N m (10.2 kgf m, 887.75in lb)**





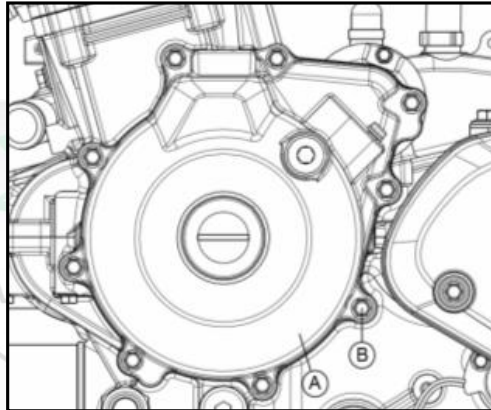
## Electric start

### Electric start

Left cover assembly

- Left cover assembly
- Left cover bolts assembly

**Locking torque of left cover bolt: 12N m (1.22 kgf m, 106.49in lb)**



Check the overrun clutch

- Disassemble:

Left cover (See detailed information at "Left cover disassembly")

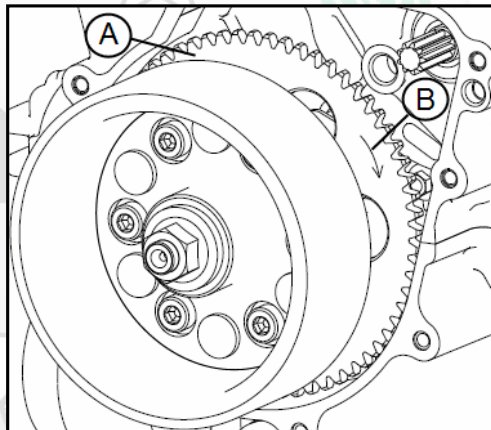
Electric starting idler and starting idler shaft (See detailed information at "Disassemble of starting big gear and electric starting idler").

- Rotate the starting big gear with hands [A].

From the left side of engine, the starting big gear shall rotate smoothly to backward [B], but not forward.

★ If the overrun clutch can not work normally, or run with noise, disassemble the overrun clutch and visual inspect every part.

In case of any worn or damaged parts, please replace them!



## Variable gear

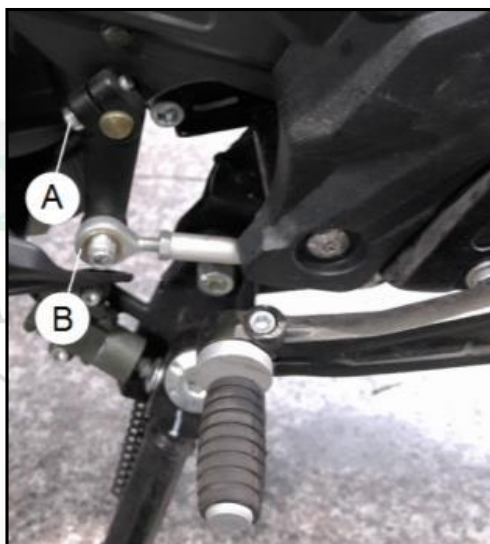
### Variable gear

Disassemble the pedal with variable speed

- Disassemble:

Bolt of gear lever [A]

Gear lever [B]



Gear shift pedal assembly

- Gear shift pedal assembly
- Tighten up the bolts of pedal with variable speed

**Locking torque of bolts of pedal with variable speed: 6.9 N m (0.70 kgf m, 61 in lb)**

## Variable gear

### Variable gear

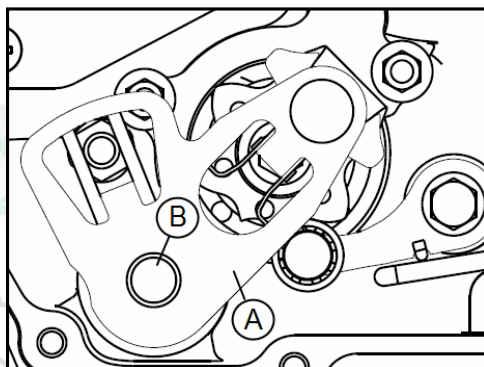
Disassemble the external gear shift mechanism

- Disassemble:

Gear shift pedal

Clutch (See detailed information "clutch"- "Disassemble the clutch")

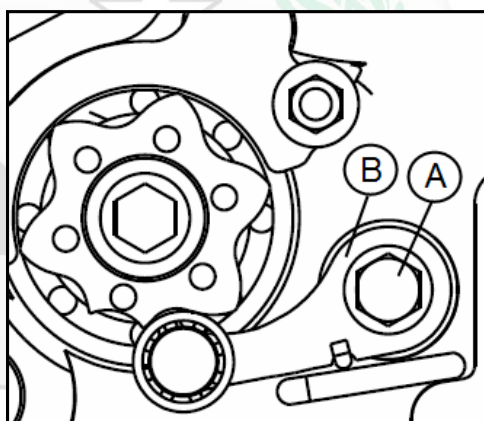
- Pull the variable gear arm [A] and disassemble the variable block arm shaft [B].



- Disassemble:

Rocker arm bolt of positioning idler wheel [A]

Rocker arm, gasket and rocker arm spring of positioning idler wheel



## Variable gear

### Variable gear

Assemble the external gear shift mechanism

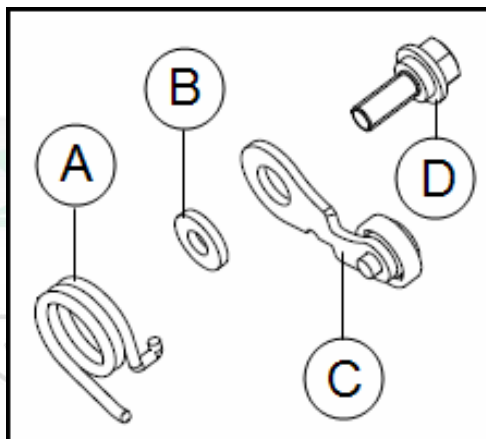
- Assemble the rocker arm spring as shown in the Fig. below [A]

Gasket [B]

Rocker arm of positioning idler wheel [C]

Rocker arm bolt of positioning idler wheel [D]

**Locking torque of rocker arm bolt of positioning idler wheel: 12 N m (1.22 kgf m, 106.49in lb)**



Check the external gear shift mechanism

- Check whether the variable block arm shaft [A] is intact.

★ If the variable block arm shaft is bended, straighten it or replace with the new product.

★ If the spline [B] on the variable block arm shaft is damaged, please replace the variable block arm shaft.

★ If the spring [C] is damaged, please replace the spring.

★ If the variable gear arm [D] or pusher dog [E] is damaged, please replace the variable block arm shaft.

- Check whether the locating shaft of variable gear arm [A] is loosening.

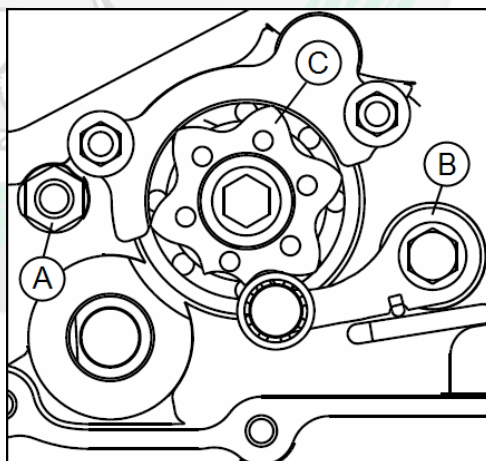
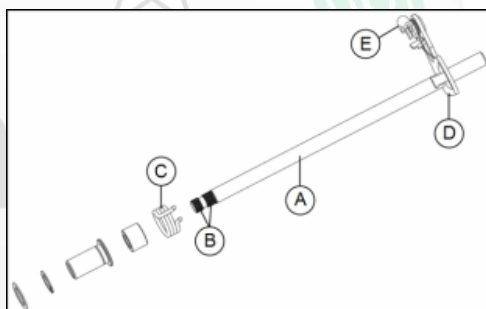
★ If the locating shaft of variable gear arm is loosening, remove it, apply threaded fastening adhesive on the screw thread, and lock the locking torque of bolts of variable block arm shaft: **29 N m (3.0 kgf m, 21 ft lb)**

- Check whether the rocker arm of positioning idler wheel [B] and spring is ruptured or twisted.

★ If the positioning idler wheel rocker arm or spring is damaged, please replace with good one.

- Perform visual inspection on gear shifting star wheel [C]

★ In case of severe wear or any damage of shifting star wheel, please replace with good one.

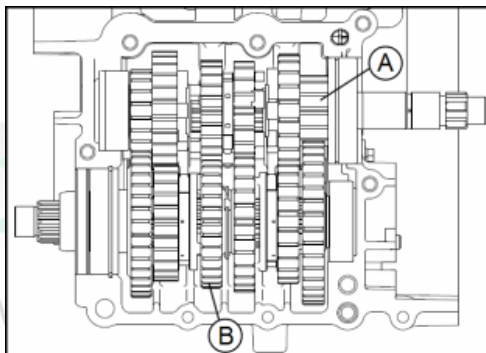


## Variable gear

### Variable gear

Disassemble the principal and auxiliary shaft

- Disassemble the crankcase (See detailed information at "Disassemble the crankcase")
- Disassemble the principal [A] and auxiliary [B] axis



Benelli



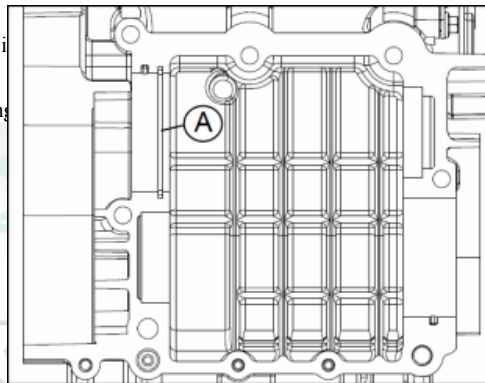


## Variable gear

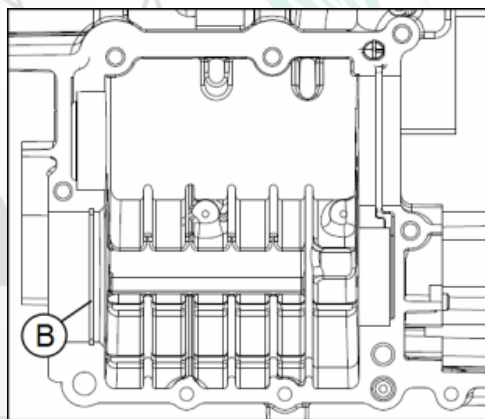
### Variable gear

The principal [A] and auxiliary [B] axis assembly

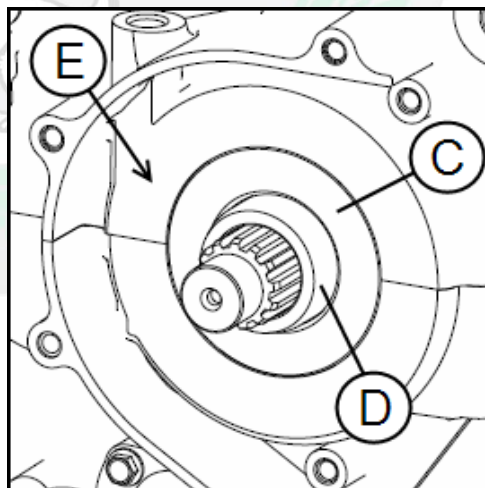
- Check whether the bearing retainer [A] on the crankcase is
- Assemble the principal axis on the crankcase
- The bearing check ring shall align to the groove of bearing



- Check whether the bearing retainer [B] on the crankcase is assembled to right position.
- Assemble the auxiliary axis on the crankcase
- The bearing check ring shall align to the groove of bearing outer ring.



- Crankshaft assembly
- Press the oil seal [C] on the axle sleeve [D]. Align the oil seal surface to the exterior plane [E] of crankcase.



## Variable gear

### Variable gear

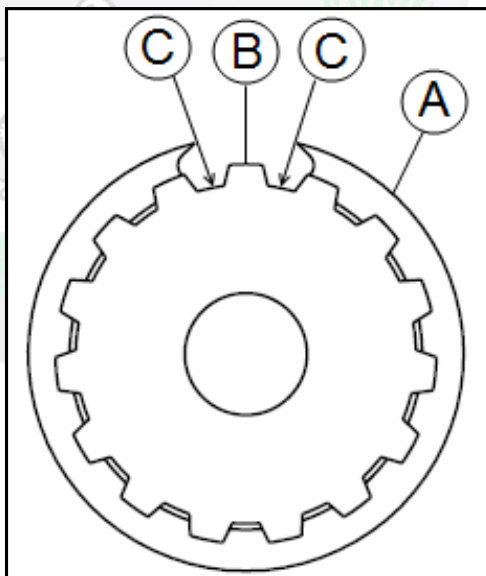
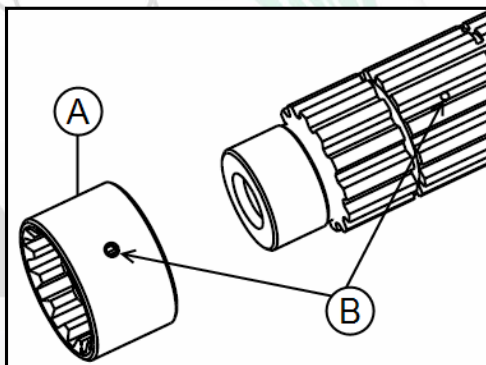
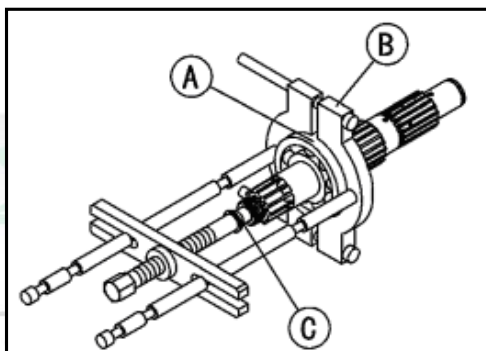
Disassemble the principal and auxiliary axis

- Disassemble the principal and auxiliary axis(See detailed information at "Disassemble the principal and auxiliary axis")
- Disassemble the check ring and gasket. Remove all the gears.
- Remove the ball bearing of each axis [A]  
Dedicated tool-bearing extractor [B]  
Adaptor of bearing extractor [C]
- Discard bearing

The principal and auxiliary axis assembly

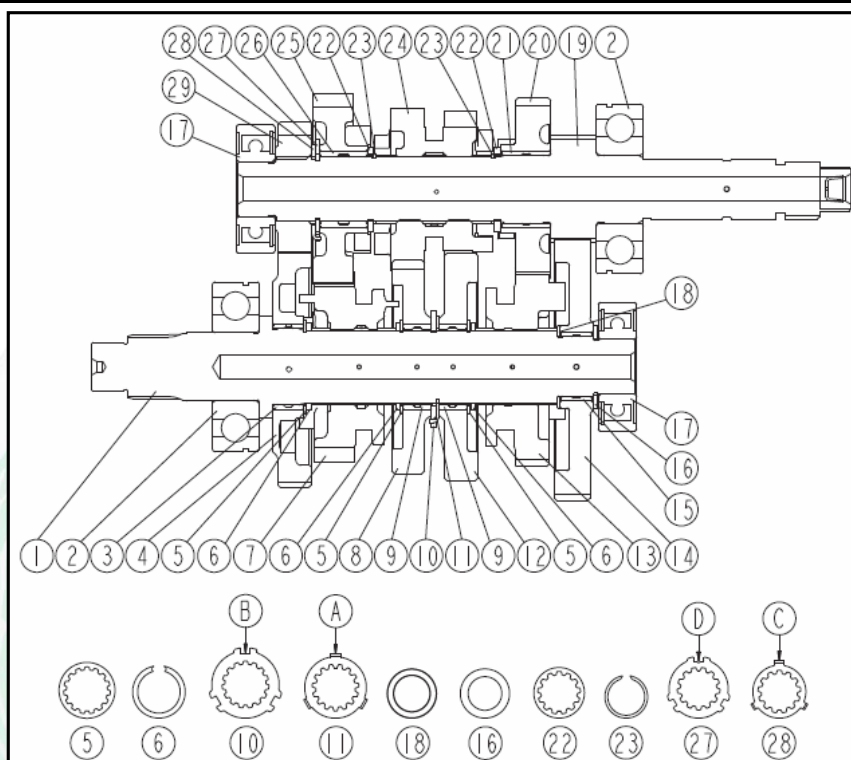
- Apply engine oil on the surface of bush sleeve, ball bearing and axis surface
- Install the gear bush [A] to the axis to align the holes on them [B] mutually.
- All the removed check ring shall be replaced with new products.

- The opening [B] on the check ring [A] shall align to spline groove [C].
- While assembling the check ring, the face of check ring with stamped rounded corners shall face the gasket.
- The principal axis gear can be identified according to the diameter: The one with the Min. diameter is grade I gear. The one with the Max. diameter is grade VI gear. Make sure to assemble all the parts according to the correct order. All the check rings and gaskets shall be installed to right position.
- While assembling the grade III and IV gears to the principal axis, the oil holes on the gear shall be aligned to each other.
- While install bush of six grade gear on the principal axis, the oil holes on the bush shall be aligned.
- The auxiliary axis gear can be identified according to the diameter: The one with the Max. diameter is grade I gear. The one with the Min. diameter is grade VI gear. Make sure to assemble all the parts according to the correct order. All the check rings and gaskets shall be installed to right position.
- While assembling the grade V and VI gears to the auxiliary axis, the oil holes on the gear shall be aligned to each other.
- While install bush of grade III/IV gear on the auxiliary axis, the oil holes on the bush shall be aligned.
- After assembling the principal and auxiliary axis, check whether the gear can be smoothly rotated or slide without being subject to resistance.



## Variable gear

Variable gear



1. Auxiliary axis	16. Gasket
2. Deep groove ball bearing	17. Deep groove ball bearing
3. Axle sleeve	18. Gasket
4. Grade II gear of auxiliary axis	19. Principal axis
5. Gasket of inner spline	20. Grade V gear of principal axis
6. Check ring	21. Axle sleeve
7. Grade VI gear of auxiliary axis	22. Gasket of inner spline
8. Grade IV gear of auxiliary axis	23. Elastic ring 24
9. Axle sleeve of inner spline	24. Grade III, IV gear of principal axis
10. Gasket of inner spline	25. Grade VI gear of principal axis
11. Lock washer of inner spline	26. Axle sleeve of inner spline
12. Grade III gear of auxiliary axis	27. Gasket of inner spline
13. Grade V gear of auxiliary axis	28. Lock washer of inner spline
14. Grade I gear of auxiliary axis	29. Grade II gear of principal axis
15. Axle sleeve 22	

○ The handle-foot [A] of lock washer of inner spline [11] shall be assembled to the notch [8] of lock washer of inner spline [10].

○ The handle-foot [C] of lock washer of inner spline [28] shall be assembled to the notch [D] of lock washer of inner spline [27].

## Variable gear

### Variable gear

Disassemble the gear shift drum and shift fork

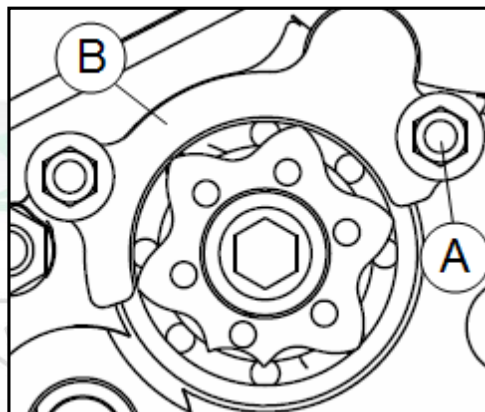
- Disassemble:

Upper crankcase (See detailed information at "Disassemble the crankcase")

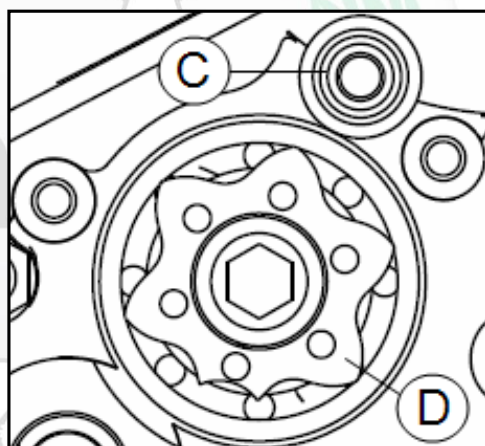
The principal and auxiliary axis (See detailed information at "Disassemble the principal and auxiliary axis")

External gear shift mechanism (See detailed information at "External gear shift mechanism")

- Screw off the bolt [A]. Remove pressing plate [B]

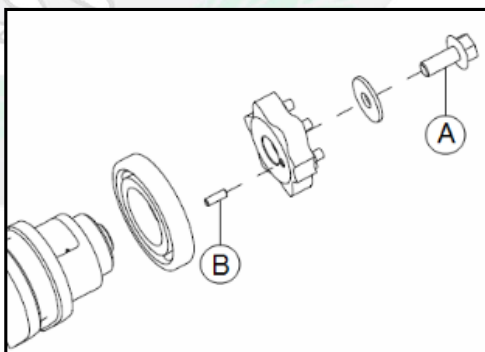


- Pull out shift fork axis [C] and remove the shift fork
- Pull out shift drum [D]



Dismantle the shift drum

- Dismantle the shift drum (See detailed information at "Dismantle the shift drum and shift fork")
- Clamp the shift drum with a jaw vice. Disassemble the fixing bolts of shifting star wheel [A].
- Take down the gasket, shifting star wheel, locating pin [B] and bearing.



## Variable gear

### Variable gear

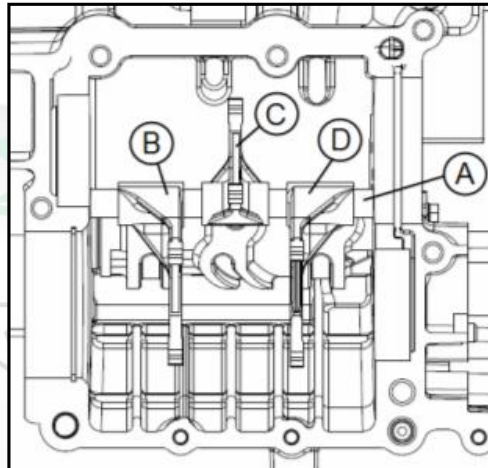
#### Shift drum assemble

- Bear in mind to assemble the locating pin
- Apply threaded fastening adhesive on the thread of shifting star wheel fixation bolt, and then lock the bolt.

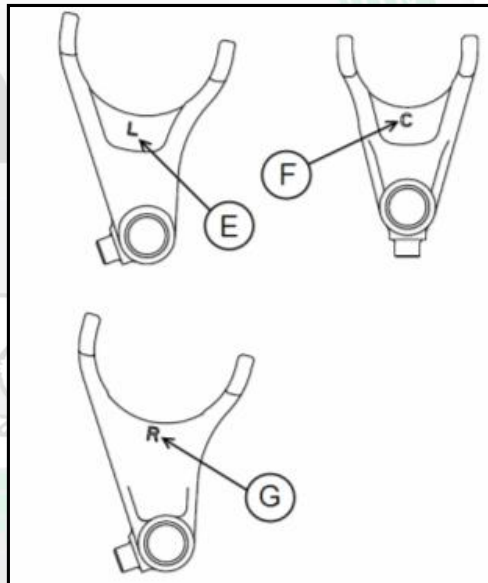
**Locking torque of fixation bolt of shifting star wheel:**  
**12 N m (1.22 kgf m, 106.49 in lb)**

#### Gear shift drum and shift fork assemble

- Apply engine oil on shift drum, shift fork and shift fork shaft
- Shift drum assemble
- Shift fork shaft assemble [A]
- assemble of left shift fork [B], middle shift fork [C] and right shift fork [D].



- There is a symbol “L”[E] on the left shift fork [B], “C”[F] on the middle shift fork [C], and “R”[G] on the right shift fork [D].
- Assemble the middle shift fork on the principal axis. Install the left shift fork and the right shift fork on the auxiliary axis. Insert the guide pin to the center groove of shift drum.
- All the symbols on the shift fork to the right side of the engine.





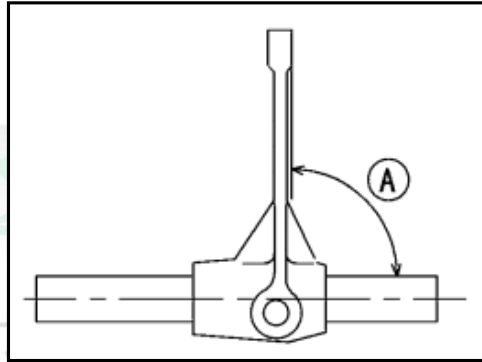
## Variable gear

### Variable gear

Check whether the shift fork is bended.

- Visual inspect whether the shift fork is bended. If yes, it shall be replaced! The shift fork bending will cause shift gears difficulty or trip stop to 90°[A] at driving.

Check the abrasion status of the shift fork and fork groove on gear.



- Measure the thickness of the shift fork and width of shift fork groove [B].

★ If the thickness of the shift fork is less than the service limit, the shift fork shall be replaced.

#### Thickness of the shift fork

**Standard:** 5.8~5.9 mm (0.2283~0.2323 in.)

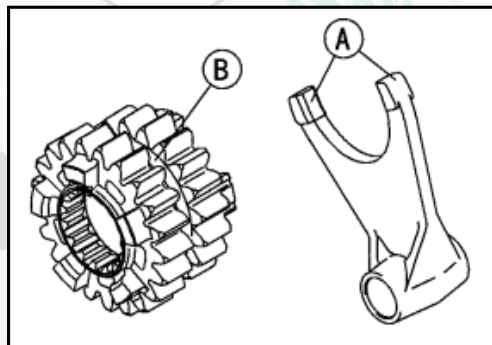
**Service limit:** 5.65 mm (0.2224 in.)

★ If the width of the shift fork exceeds the service limit, the gear shall be replaced.

#### Width of shift fork groove

**Standard:** 6~6.05 mm (0.2362~ 0.2382 in.)

**Service limit:** 6.15 mm (0.2421 in.)



## Variable gear

### Variable gear

Check the abrasion status of the shift fork guide pin and shift drum groove

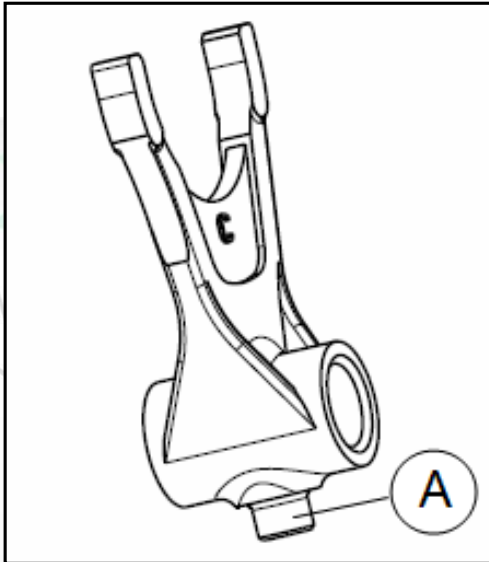
- Measure the diameter of shift fork guide pin [A] and the width of shift drum groove [b]

★ If the diameter of guide pin on shift fork is less than the service limit, the shift fork shall be replaced.

**Diameter of guide pin on shift fork**

**Standard: 7.93~8 mm (0.3122~0.315 in.)**

**Service limit: 7.83 mm (0.3083 in.)**

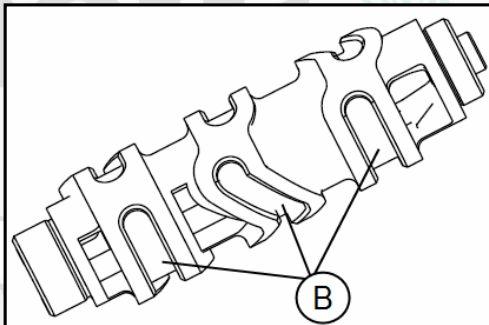


If the groove width of any shift drum is greater than the service limit, the shift drum shall be replaced!

**Groove width of shift drum**

**Standard: 8.05~ 8.15 mm (0.3169~ 0.3209 in.)**

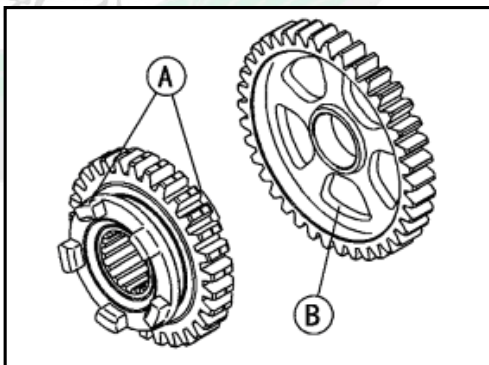
**Service limit: 8.25 mm (0.3248 in.)**

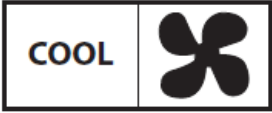


Check whether the gear ratchet and ratchet slot are subject to abrasion.

- Visual inspect whether the gear ratchet [A] and ratchet slot [B] are damaged or not

★ In case of excessive wear of gear ratchet or ratchet slot, replace them with good one!





Chapter VI Cooling system

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    Radiator.....412

    Disassemble the radiator.....412

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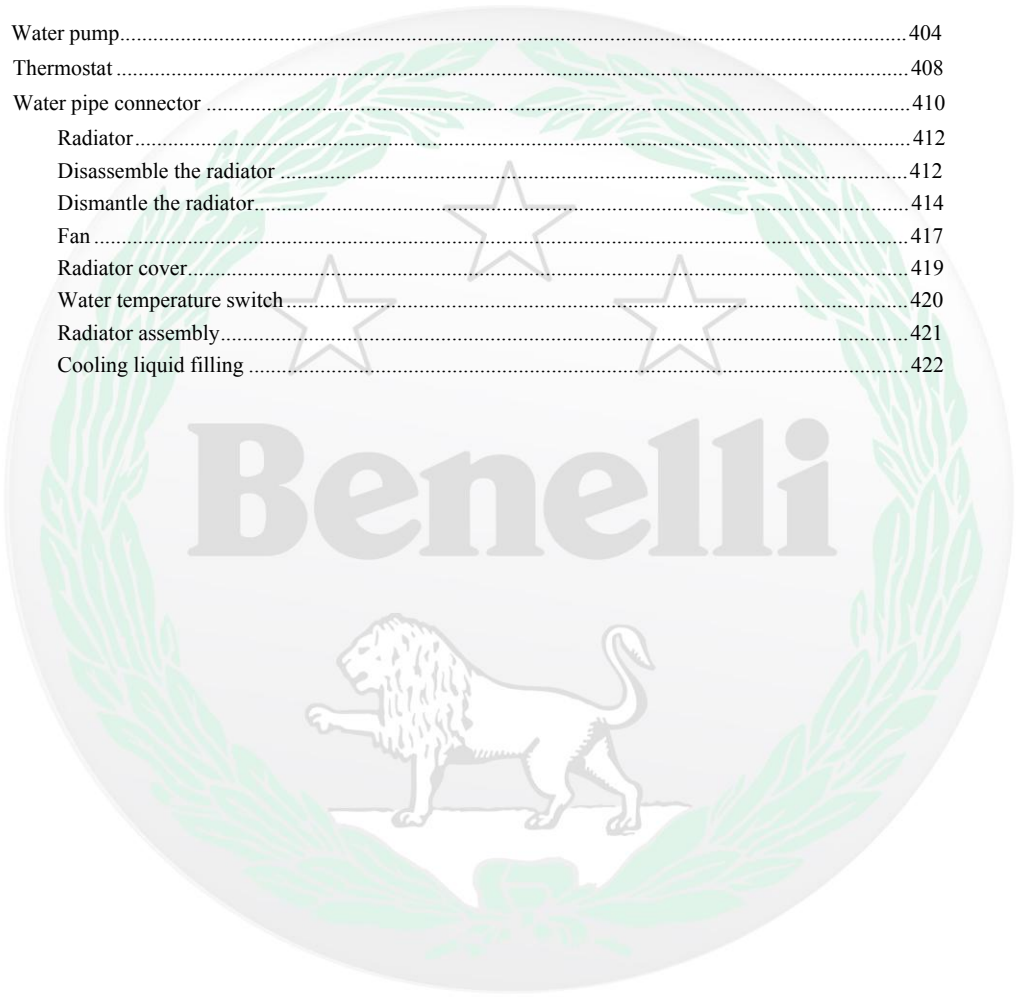
    Fan.....417

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## Cooling system

### Cooling system

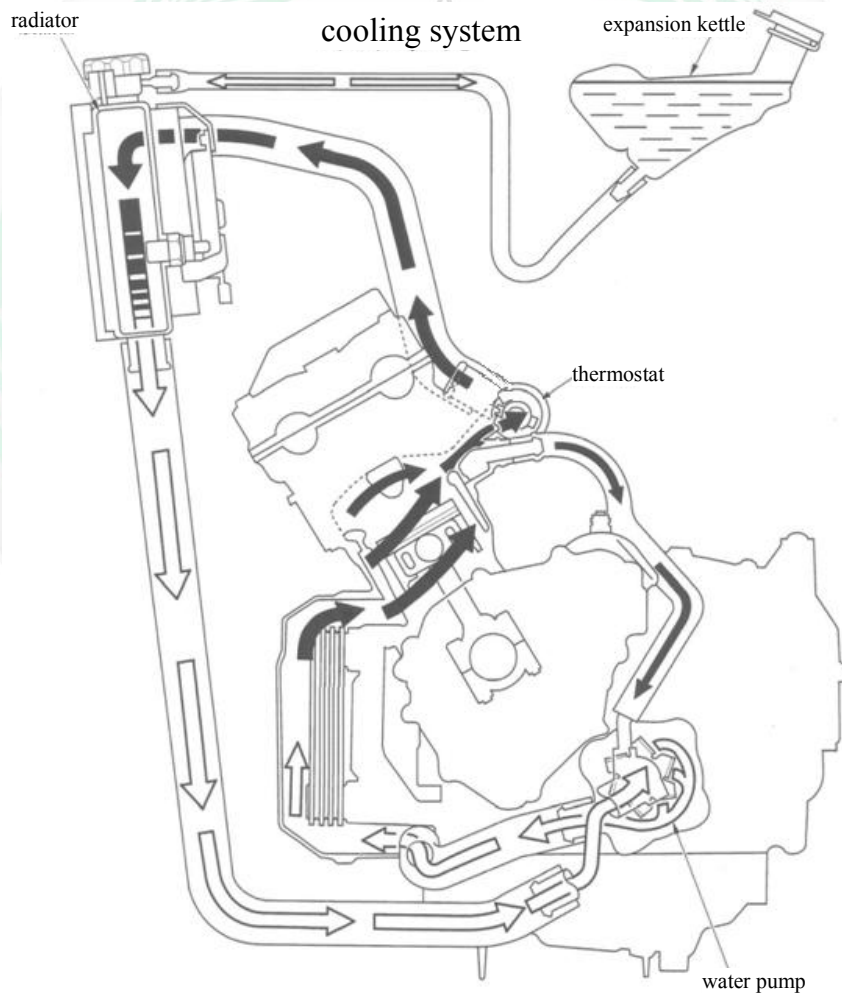
Functions of the cooling system:

Cooling method of the engine: water cooling

Water cooling adopts water as heat absorption medium to cool down the high temperature parts and then transmit the heat to ambient air thus to keep the engine running under the most optimal temperature.

Specific cooling method:

Cooling water enters water jacket from crankcase through crankcase waterway. Up through the cylinder head, the cooling water will eventually enter radiator cooling, relying on fin, it will transfer the heat to ambient air.



## Cooling system

### Cooling system

Permanent type antifreeze can be used as cooling liquid to prevent cooling system rusting or corrosion. As long as the engine starts, the water pump starts running and cooling liquid starts circulation.

Cooling system adopts paraffin based thermostat. It will open or close along with the temperature variation of cooling liquid. In order to make the cooling fluid maintain the proper temperature, thermostat will consistently change the valve opening. If the temperature of cooling liquid is lower than  $55^{\circ}\text{C}$  ( $131^{\circ}\text{F}$ ), the thermostat will close so that the vent holes will restrict cooling fluid flowing thus the engine can heat up quicker. If the temperature of cooling liquid is higher than  $58\sim 62^{\circ}\text{C}$  ( $136\sim 144^{\circ}\text{F}$ ), the thermostat will open and the cooling liquid can flow.

If the temperature of cooling liquid exceeds  $95^{\circ}\text{C}$  ( $203^{\circ}\text{F}$ ), radiator fan switch will start work to make the radiator run. If the air mass flow is insufficient (Such as: low speed driving of motorcycle), the fan of radiator will suck air through radiator rectangular fin to accelerate cooling action of radiator. If the temperature of cooling liquid is lower than  $90^{\circ}\text{C}$  ( $194^{\circ}\text{F}$ ), blower relay of radiator will disconnect. The fan of radiator will stop running.

In this way, control the temperature of engine cooling system to a narrow range. The engine load will change and the engine will work efficiently.

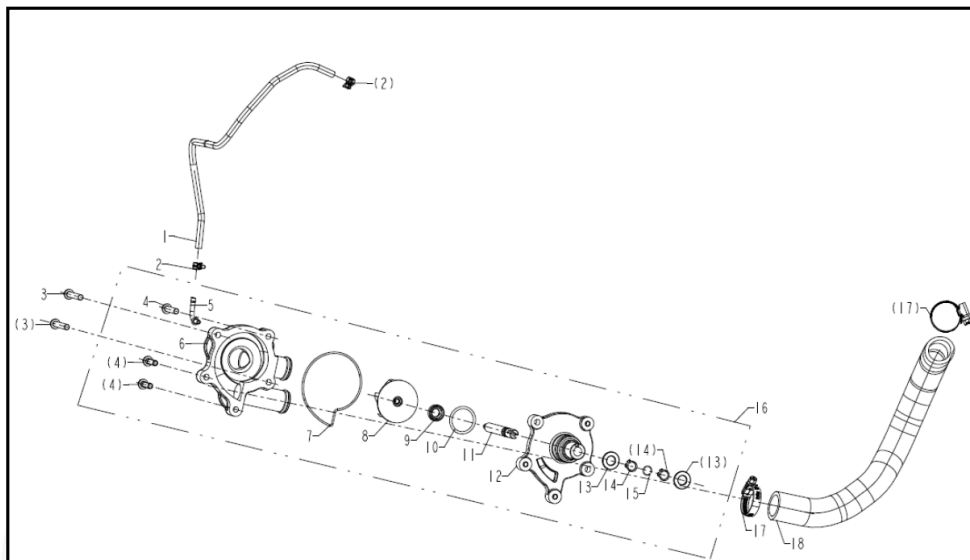
The cooling system will pressurize through radiator cover to avoid cooling liquid boiling to generate bubble and engine overheat. Along with the temperature rising of the engine, the radiator and cooling liquid in water jacket will expand. Extra cooling fluid will flow through the radiator cover and hoses, flow to auxiliary fuel tank and temporarily reserve to auxiliary radiator. On the contrary, with temperature dropping of the engine, the cooling liquid in radiator and water jacket will shrink. The cooling liquid reserved in the auxiliary fuel tank will flow back to the radiator.

There are two valves on the radiator cover. The first one is pressure valve. The pressure valve at engine running will control the pressure in cooling system. If the pressure exceeds  $93\sim 123\text{kPa}$  ( $0.95\sim 1.25\text{kgf/cm}^2$ ,  $13\sim 18\text{psi}$ ), the pressure valve will open and release the pressure of auxiliary radiator. After releasing the pressure, the pressure valve will close and keep the pressure at  $93\sim 123\text{kPa}$  ( $0.95\sim 1.25\text{kgf/cm}^2$ ,  $13\sim 18\text{psi}$ ). At engine cooling process, another small valve at the radiator cover (negative pressure valve) will open. With cooling liquid temperature dropping, the cooling liquid will shrink and form vacuum in the system. With negative pressure opening, the cooling liquid will flow from auxiliary radiator to radiator.



## Water pump

### Water pump



Item Number	Description & specification	Qty
1	Exhaust pipe	1
2	Steel wire clamp 6.5	2
3	Bolt M6*36	3
4	Bolt M6*22	2
5	Pipe	1
6	Water pump cover	1
7	Water pump seal ring	1
8	Impeller	1
9	Oil seal component of water pump shaft	1
10	O-shaped seal ring 25.8*2.651	1
11	Water pump shaft	1
12	Water pump body	1
13	Gasket 10.5*19.8*2	2
14	Check ring	2
15	Steel check ring 10	1
16	Water pump component	1
17	Stainless steel clamp	2
18	Water outlet	1

## Water pump

### Water pump disassembly

#### Note:

Before water pump disassembly, please discharge the engine oil (Oil discharging refer to Chapter III Engine oil)

#### Disassemble:

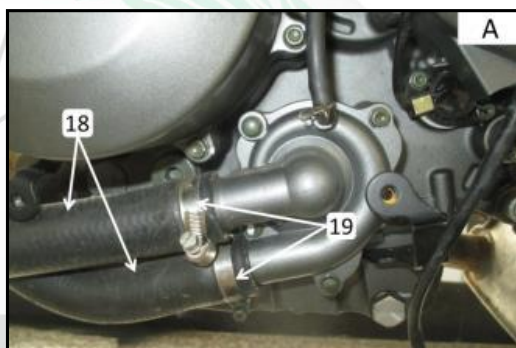
Disassemble the engine bottom cover (See Chapter IV Assembly machine covering part/fuel tank guard plate, engine bottom cover)

#### Disassemble:

Disassemble the water pipe clamp (19) and pull out the water pipe, Fig. A

#### Attention:

- Perform the operation at cooling status.
- Discharge the cooling liquid from the drain opening first.
- While pulling out the water pipe, the cooling liquid shall not splash to the operator.



Loosen the bolt (3) and disassemble the water pump component, Fig. B.

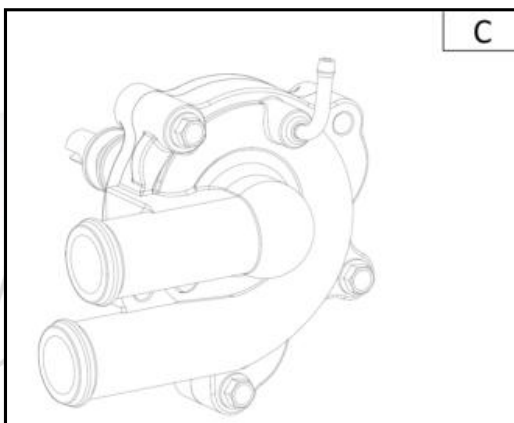


## Water pump

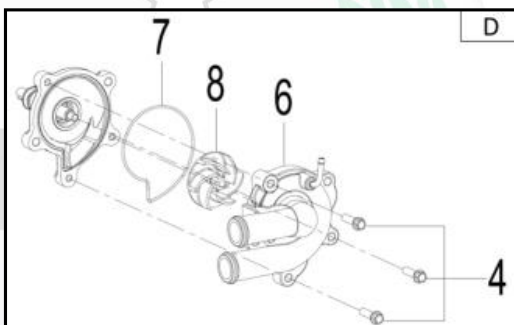
### Water pump inspection

#### Disassemble

Water pump component, Fig. C



Loosen the bolt (4) and disassemble the water pump cover (6)



Remove the impeller (8)

#### Inspection

The surface of impeller has been corroded or the blade has been damaged. Replace the water pump assembly.

#### Attention:

Do not damage the gasket and body joint face during the operation.



## Water pump

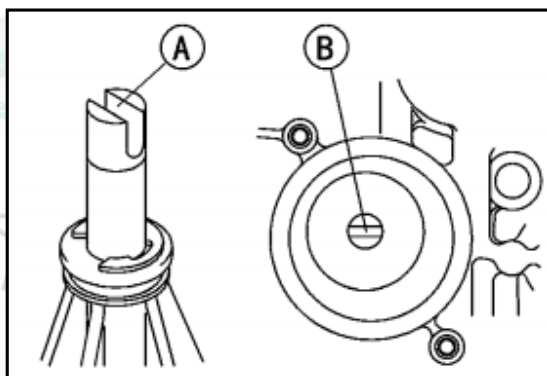
### Water pump assembly

#### Assembly

Water pump assembly shall be in the reverse order of disassembly.

#### Note:

Rotate the water pump shaft to align the card slot [A] on the shaft to the projecting portion of driving gear of oil pump [B].



#### Note:

Tighten screw pump cover to the following moment:



Moment 10N\*m

#### Note:

Tighten screw pump cover to the following moment:



Moment 10N\*m

#### Note:

Tighten water pipe clamp screw to the following moment:



Moment 2N\*m

## Thermostat

### Disassembly/assembly of thermostat

#### Disassemble:

Disassemble the right fuel tank guard plate component (See Chapter IV Assembly machine covering part/fuel tank guard plate, engine bottom cover)

#### Disassemble:

Disassemble the two screws tightening the cover of the thermostat (15). Disassemble the cover of the thermostat; Fig. A

Remove the thermostat (13) from the engine, Fig. A

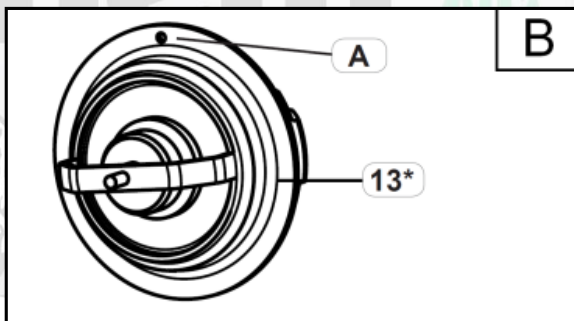


#### Attention

Follow these steps when the engine is under the state of cooling.

#### Inspection:

- By-pass port (A), Fig. B  
If it is blocked, replace it with a good one.
- Thermostat (13\*), Fig. B  
If it is not open at 75°~ 90°C(167 ~ 194°F), replace it with a good one.



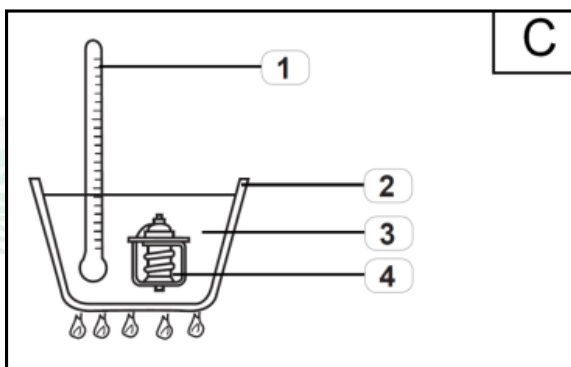


## Thermostat

### Disassembly/assembly of thermostat

#### Inspection of thermostat

- Immerse the thermostat into a container filled with water
- Add heating water slowly
- Put a thermometer into water
- Monitor the temperature readings of thermostat and thermometer.
- After reaching to 75°C, the constant temperature valve will open. After reaching to 90°C, the constant temperature valve will open at least 7mm.



As shown in Fig. C

1. Thermometer
2. Container
3. Water
4. Thermostat

#### Note:

Thermostat and thermometer shall suspend in the fluid hanging with a wire. They shall not contact the interior wall of the container.

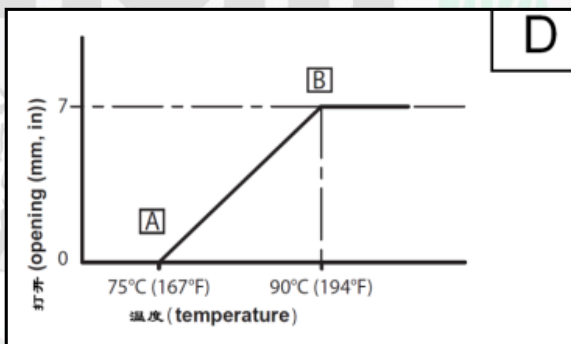
#### On/off status of thermostat, Fig. D

A Totally off

B Totally on

#### Attention:

A damaged thermostat will cause serious over heating or over cooling of the engine.



#### Assembly:

- The by-pass port of thermostat shall be upward at assembly as shown in Fig. A
- Fasten two bolts (15\*) to the following torque:



Moment 12N\*m

#### Attention

Coolant can be added only after completing all the steps mentioned above.

## Water pipe connector

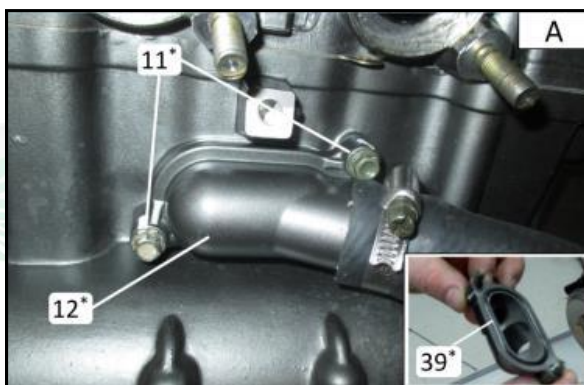
### Disassembly/assembly of water pipe connector

#### Disassemble:

Disassemble the two bolts (11\*) and fasten the water pipe connector (12\*) Fig. A

#### Inspection:

- Water pipe connector (12\*)  
If it is damaged, replace it with a good one.
- Sealing gasket (39\*)  
If it is damaged, replace it with a good one.



#### Assemble:

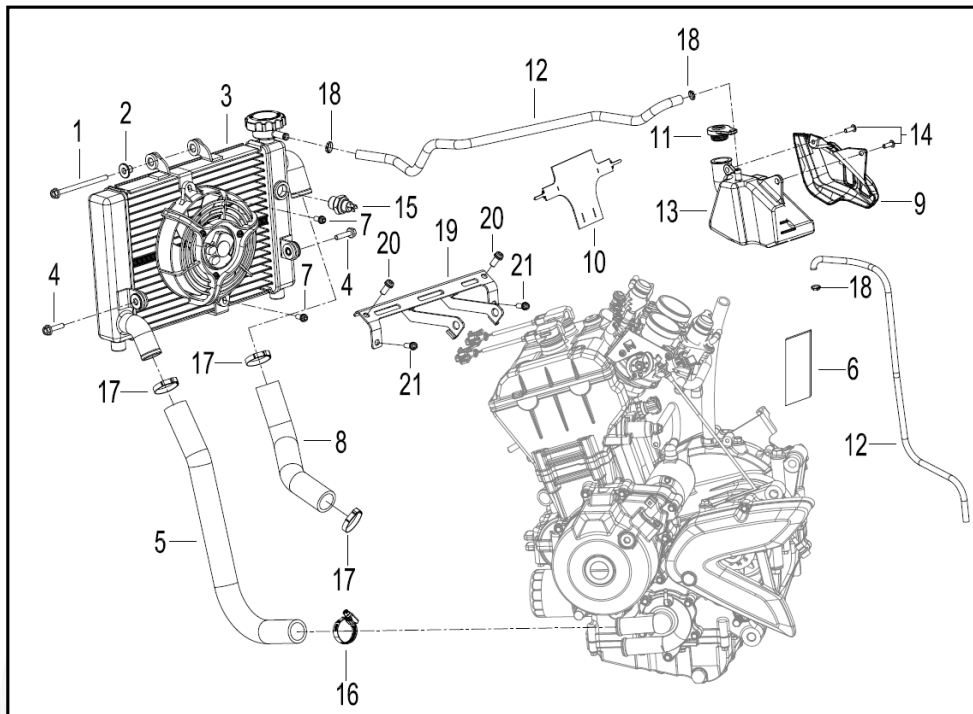
- Water pipe connector (12\*) and sealing gasket (39\*) assembly
- Fasten two bolts (11\*) to the following torque:



Moment 12N\*m

#### Attention

Coolant can be added only after completing all the steps mentioned above.



Item No.	Description & specification	Qty	Item No.	Description & specification	Qty
1	Bolt M6×95	1	12	Outlet pipe of expansion kettle	2
2	Installation bush of radiator	1	13	Expansion kettle	1
3	Radiator grille component	1	14	Screw M6×20	2
4	Screw M6×25-8.8-ZG	2	15	Outlet water temperature switch assembly	1
5	Water inlet of engine	1	16	Stainless steel clamp	1
6	Pipe heat insulation foil	2	17	Clamp 033.1-706R	3
7	Bolt M6×12-8.8-ZG	2	18	ClampΦ10	3
8	Water outlet of engine	1	19	Fuel tank guard plate scaffold welding component	1
9	Kettle decorative plate	1	20	Bolt M6×1×16	2
10	Ventilation rubber	1	21	Screw M6×14	2
11	Expansion kettle cover	1			

## Radiator

### Radiator disassembly

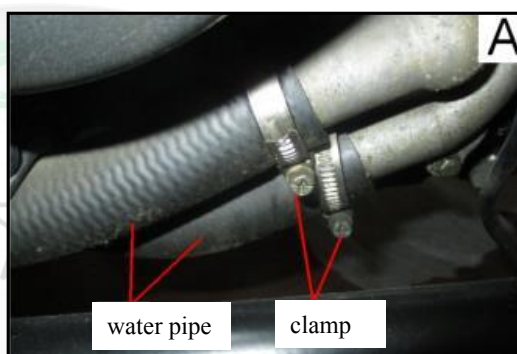
#### Attention

Follow these steps when the engine is under the state of cooling.

#### Disassemble the radiator

Disassemble the left and right fuel tank guard plate component (See Chapter IV Assembly machine covering part/fuel tank guard plate, engine bottom cover)

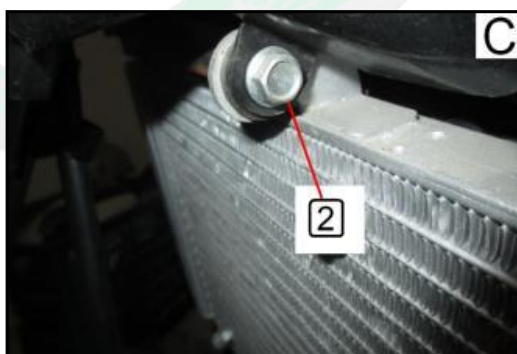
Disassemble the waterpipe connecting the radiator and engine, as shown in Fig. A.



Disassemble the two fastening screws (1) connecting the radiator and the left/right engine connecting bracket welding component as shown in Fig. B.

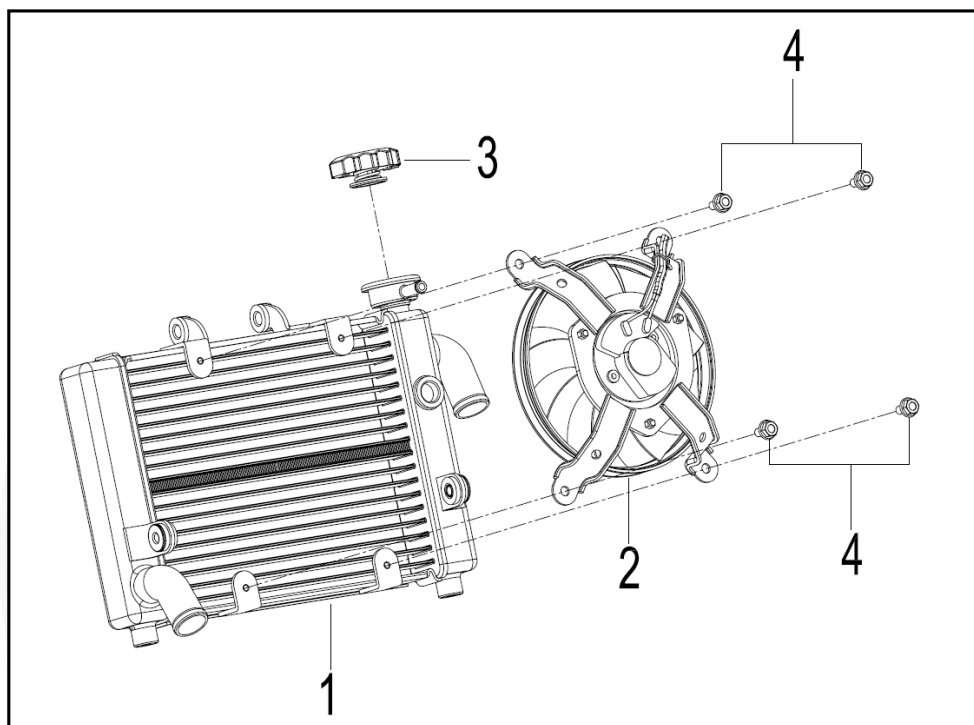


Disassemble the fastening screws connecting the radiator and the frame as shown in Fig. C.



## Radiator

Radiator



Item No.	Name	Qty
1	Radiator	1
2	Fan assembly	1
3	Radiator cover	1
4	Screw M6×16	4



## Screw

### Screw

## Dismantle the radiator

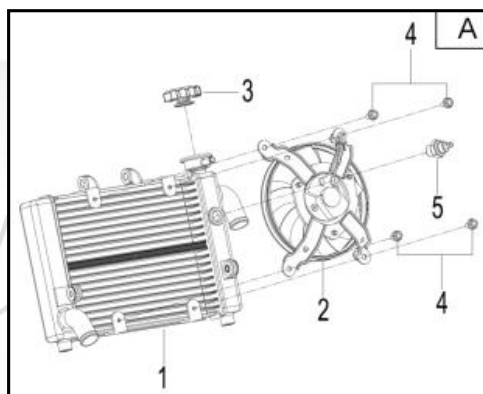
**Dismantle:** Fig. A

Radiator (1)

Fan assembly (2)

Radiator cover (3)

Water temperature switch (5)



## Assembly:

Assembly shall be in the reverse order of disassembly.

## Note:

Tighten two bolts (4) to the following moment:



Moment 10N\*m

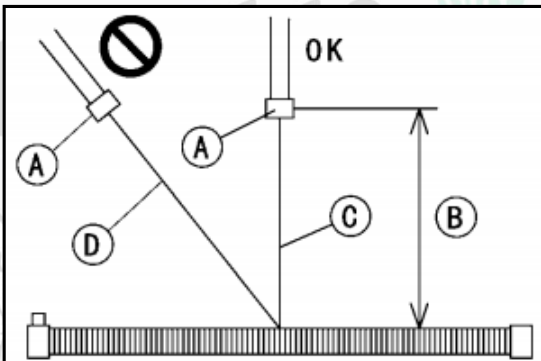
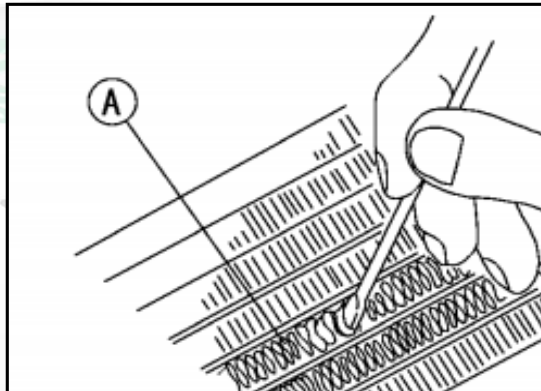
## Radiator

### Radiator

## Radiator

**Check:** rectangular fin of radiator

- ★ Please remove the materials blocking airflow if any!
- ★ In case of deformation of rectangular fin [A], please straighten it carefully.
- ★ If the blocking material failed to be removed or the rectangular fin blocking 20% or above of the air way which can not be fixed, replace with a new radiator.



#### Attention

In order to avoid damage to the radiator, pay attention to the following issues at cleaning the radiator with a steam cleaner.

- Keep the steam gun [A] over 0.5m (1.6ft) [B] away from rectangular fin of radiator.
- Hold the steam gun, and keep it vertical [C] (should not tilt [D]) to the rectangular fin surface of radiator.
- Use the steam gun following the direction of rectangular cooling fin of radiator.

**Check:** Filler of radiator

- Check whether the filler of radiator is damaged or not.
- Check the top and bottom seal cartridge [M] inside the filler. The top and bottom seal cartridge should be smooth and clean to ensure normal operation of the radiator.



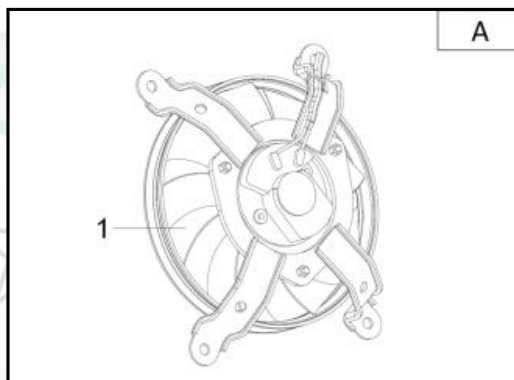
## Radiator

### Radiator

#### Fan

**Check:** Fan blade (1), as shown in Fig. A

In case of fan blade damage, change the fan component.



Confirm whether the copper parts of fan inserter are loosened or not. If not, connect the fan separately to the positive and negative electrode of power as shown in the right figure (The blue one connect to the positive electrode, and the black one connect to the negative electrode)



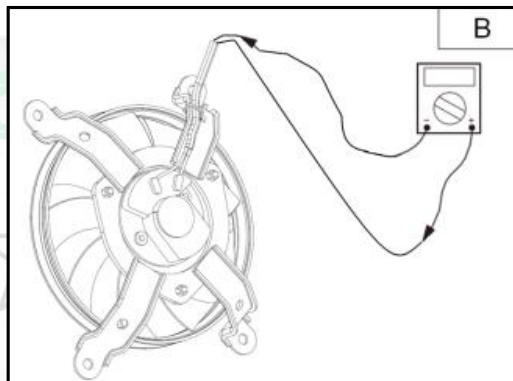
## Radiator

### Radiator

#### Check: Fan motor

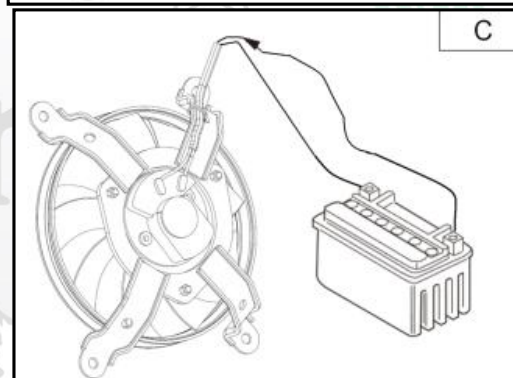
● Detect the fan motor with an avometer grade “ $\Omega$ ”, as shown in Fig. B

If it is shown as “ $\infty$ ”, it means that the motor is damaged. Please replace the fan assembly.



● Connect the fan motor to rechargeable battery as shown in Fig. C

Check whether the fan is operating and is blowing to the direction of installation scaffold. If not, replace the fan; if the blowing direction is not correct, replace the wiring plug wire position.





## Radiator

### Radiator

#### Radiator cover

##### Disassemble:

Disassemble the right fuel tank guard plate component (See Chapter IV Assembly machine covering part/fuel tank guard plate, engine bottom cover)

Check:

Check the base [A], top [B] valve seal and valve spring [C].

★ If any aforementioned part is damaged, replace with a new radiator cover.

- Install the cover [A] to the cooling system pressure gauge [B].

Note:

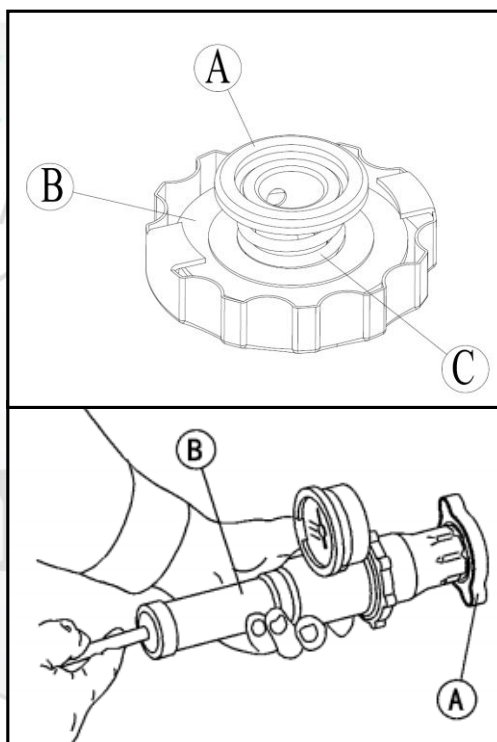
Wet the sealing face of radiator cover with water or cooling liquid to prevent pressure leakage.

Observe the pressure gauge. Pump up to the pressure gage to increase the pressure until the decompression valve is open: Pressure gauge pointer flicks to downward. Stop pumping up and immediately measure the pressure value at air leakage. The decompression valve shall be turned on within the prescribed scope of the table below. In addition, pressure gauge pointer must stay for at least 6 seconds within the range.

##### Pressure release of radiator cover

**Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm<sup>2</sup> ; 13 ~ 18psi)**

★ If the radiator cover prescribed cannot keep the stipulated pressure or keep excessive pressure, it is necessary to replace a new radiator cover.



## Radiator

### Radiator

#### Water temperature switch

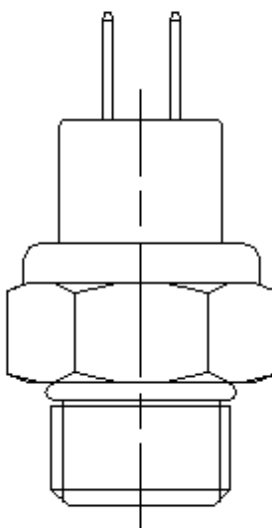
##### Disassemble

Unplug the water temperature switch plug

Disassemble the water temperature switch from radiator with a wrench.

Conduction temperature:  $98 \pm 4^{\circ}\text{C}$

$9^{\circ}\text{C} \geq \text{connecting temperature} - \text{disconnecting temperature} \geq 3^{\circ}\text{C}$



## Radiator

### Radiator

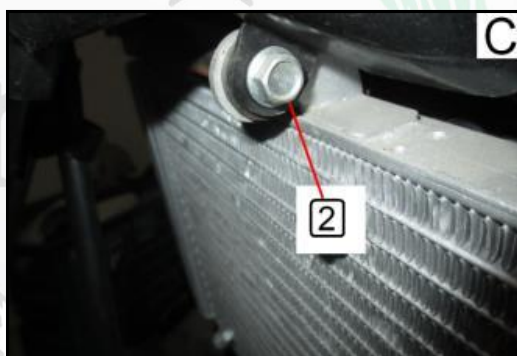
#### Radiator assembly

Assembly shall be in the reverse order of disassembly.

#### Note:

Fasten the radiator according to the following steps:

1. Fasten the bolts connecting the radiator upper end and frame (2). Do not fasten too much tightly. Fig. B
2. Fasten the bolts connecting the radiator lower end and engine connecting bracket (1). Do not fasten too much tightly. Fig. C
3. Fasten tightly
  - Fasten the bolts on the upper end of the radiator, and then the lower one;
  - Fasten in two or three times separately;
  - Tighten all the bolts to the following moment:



Moment 10N\*m

## Radiator

### Cooling liquid filling

#### Cooling liquid filling

Open the radiator cover (1) and fill in cooling liquid as shown in Fig. A.



Open the expansion kettle cover (2) and fill in cooling liquid as shown in Fig. B.



#### Attention

While filling in cooling liquid, it is preferred to keep the cooling liquid level between the Max. and Min. scale of the expansion kettle (3).

#### Discharge

Discharge the air in the cooling system according to the following steps:

1. Start up the engine and remove the radiator cover to make it running. Slightly flap the exposed radiator flexible pipe to discharge the bubble in the pipeline until no bubble can be observed in the coolant. If the liquid level at the radiator port is low, supplement the liquid at any time.
2. Turn off the engine and Waite for about 30s. Add cooling liquid until the liquid level reaching to the liquid filling port neck of the radiator.
3. Assemble the radiator cover and start up the engine to make the vehicle run at idle speed or throttle up the engine slightly. The radiator fan can only be switched off after the radiator fan starts running.
4. After the engine cooling down, check the coolant liquid level of the auxiliary radiator. If the coolant liquid level is lower than the Min. liquid level stipulated, add coolant up to the Max. level as required.

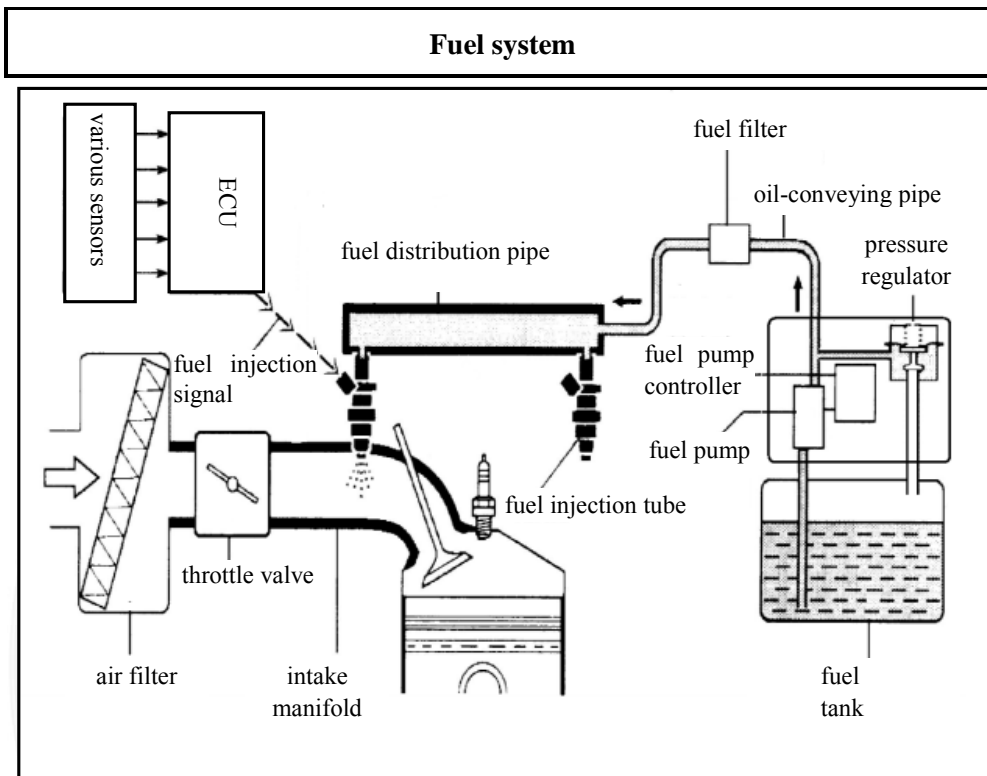


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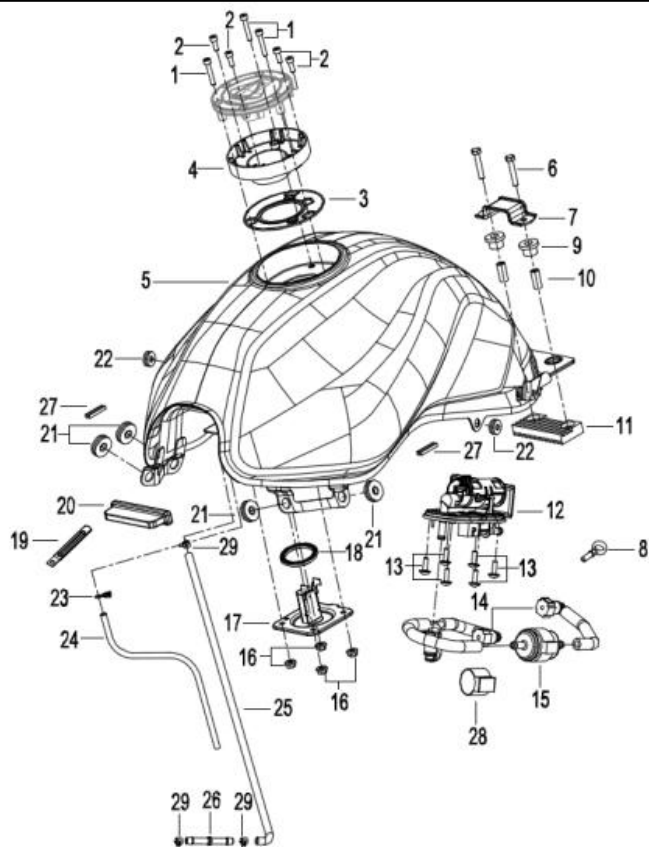
## Fuel system



Schematic diagram of fuel system

## Fuel tank

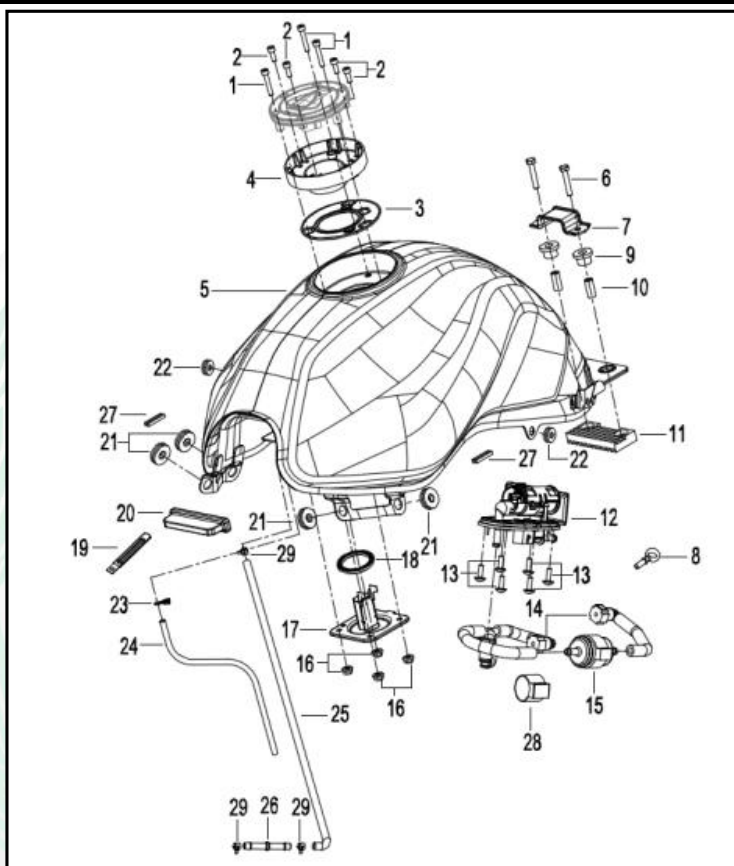
Fuel tank assembly



Item No.	Description & specification	Qty	Item No.	Description & specification	Qty
1	Socket hexagon screw M5×30	3	9	Rubber sleeve	2
2	Socket hexagon screw M5×14	4	10	Fuel tank assembly sleeve	2
3	Sealing gasket of fuel tank cover	1	11	Fuel tank base plate	1
4	Fuel tank cover support component	1	12	Fuel pump component	1
5	Fuel tank component	1	13	Gasoline pump screw M5×16	6
6	Screw M6×35	2	14	Tubing components	1
7	Front assembling stand of seat cushion	1	15	Filter cleaner component	1
8	Oil pump plug	1	16	Nut M6	4

## Fuel tank

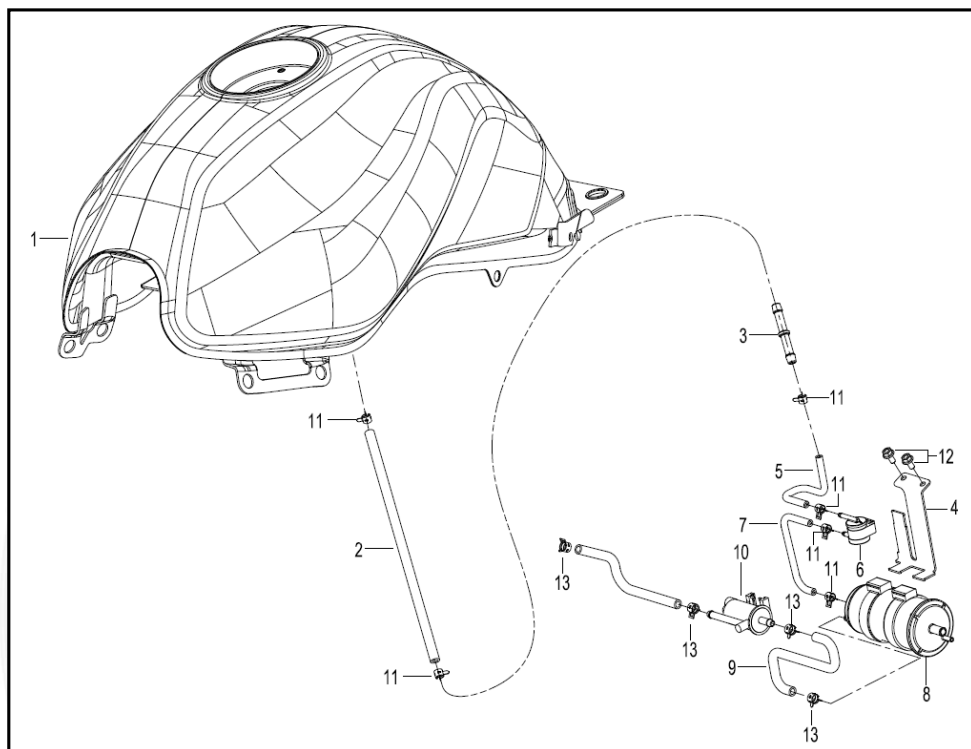
Fuel tank assembly



Item No.	Description & specification	Qty	Item No.	Description & specification	Qty
17	Fuel sensor component	1	25	Check valve, fuel tank connecting pipe/forming pipe	1
18	Rubber blanket of sensor	1	26	Two-way pipe	1
19	Wire clip component	1	27	Rear guard plate strip	2
20	O-Rubber sleeve	1	28	Filter jacket	1
21	Rubber blanket of guard plate C	4	29	Plate clamp	4
22	Rubber blanket of guard plate B	2			
23	Steel wire clamp Φ10.5	1			
24	Sewer pipe/forming pipe Φ7*2*880	1			

## Fuel evaporative recovery system

### Fuel evaporative recovery system



Serial number	Description & specification	Qty
1	Fuel tank component	1
2	Check valve, fuel tank connecting pipe/forming pipe	1
3	Two-way pipe	1
4	Canister mounting plate	1
5	Connecting pipe of fuel tank and check valve	1
6	Check valve component	1
7	Connecting pipe of check valve and canister	1
8	Canister assembly	1
9	Connecting pipe of canister and solenoid valve	1
10	Canister solenoid valve	1
11	Plate clamp	6
12	Screw M6×12-8.8-ZG	2
13	Plate clamp	4

## Fuel tank

### Fuel tank assembly

#### Assemble:

Assemble the fuel tank cover support component (4) on the fuel tank (5)

Apply sealing gasket of fuel tank cover (3) on fuel tank cover supporting component (4)

Fasten backing-up screw (1) and lock the opening

Use three relatively longer fastening screws (2) and tighten tank opening lock as shown in Fig. A.

#### Note:

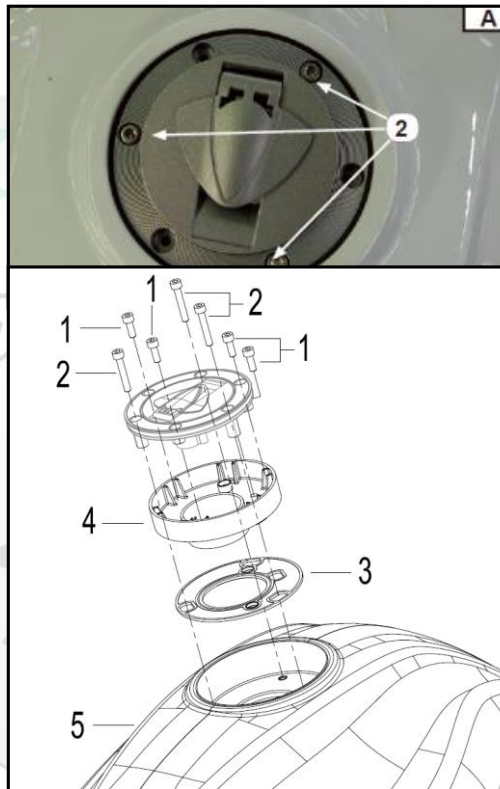
The screws assembled outside the lock are only for visual effect.

#### Note:

Tighten screws to the following moment:



Moment 6N\*m



#### Assemble:

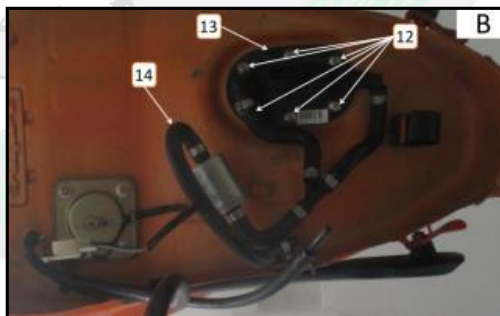
Assemble the fuel pump component (13) to the fuel tank with six gasoline pump screws (12). And then assemble the high-pressure oil pipe (14) correctly as shown in Fig. B

#### Note:

Tighten screws to the following moment:



Moment 3~4N\*m





## Fuel tank

### Fuel tank assembly

#### Assemble:

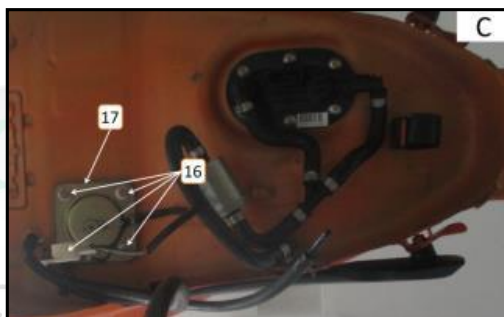
Assemble the fuel sensor components (17) to the fuel tank with four screws (16).

#### Note:

Tighten screws to the following moment:



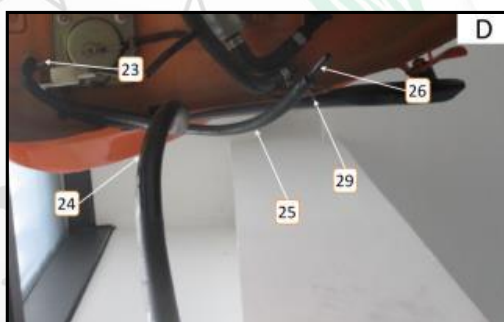
Moment 10N\*m



#### Assemble:

Install the sewer pipe (24) on the fuel tank with steel wire clamp  $\Phi 10.5$  (23) as shown in Fig. D.

Install the check valve and fuel tank connecting pipe (25) on the fuel tank with clamp (29) as shown in Fig. D.



#### Assemble:

Assemble the fuel tank on frame with two bolts M6\*35 as shown in Fig. E

#### Note:

Tighten screws to the following moment:



Moment 10N\*m



## Fuel tank

### Fuel tank disassembly

#### Disassemble:

Disassemble shall be in the reverse order of assembly.



## Fuel pump

### Fuel pump

### Operating principle of fuel pump

**Oil pump assembly:** Provide 250Kpa gasoline fuel oil which satisfies the system requirements for the engine. Install on the fuel tank bottom through connecting pipeline to provide fuel oil.

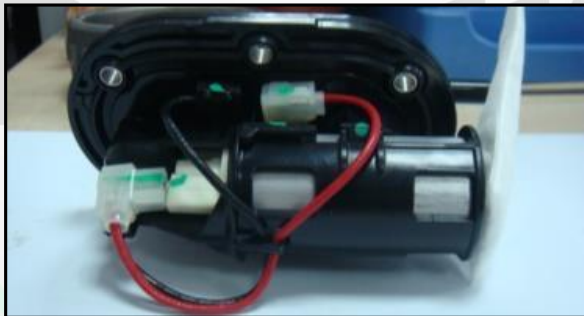
**Oil pump:**

The electrical principle of electric fuel pump is that when the fuel pump with DC motor driving turbine structure running, the fuel oil existing in the circumferential grooves of turbine rotor will make high-velocity motion along with the turbine rotor. Due to the function of centrifugal force caused by high speed, the fuel pressure at the outlet of fuel will increase. In addition, turbine will produce certain vacuum at the inlet of oil pump thus the fuel will be inhaled to turbine blade space. The inlet outlet pressure differential of fuel can urge fuel oil being transported from the outlet side to systematic oil fuel pipe continuously. The fuel delivery pressure generated by fuel pump is up to 250~400kPa.

**Pressure-regulating device:** Mechanical diaphragm type. Perform oil pressure regulation for oil pump unit to realize constant fuel pressure required by the system.

### Fuel pump appearance

Reverse side:



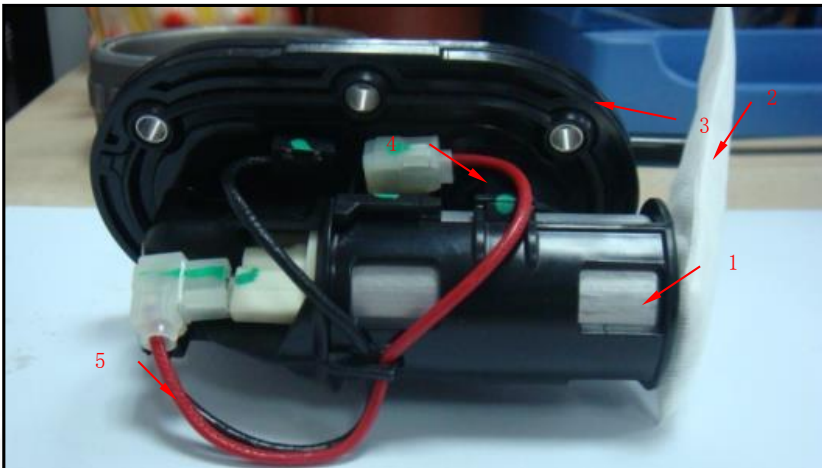
Obverse side



## Fuel pump

### Fuel pump

#### Fuel pump composition



- 1.Oil pump body
- 2.Filter screen
- 3.Seal washer and oil pump scaffold
- 4.Pressure regulator
- 5.Oil pump wiring harness

#### Tag and identification label of fuel pump

Oil pump assembly: Indicate in the form of label on the oil pump assembly mounting cover.

Oil pump: Engrave the marking on the pump body.

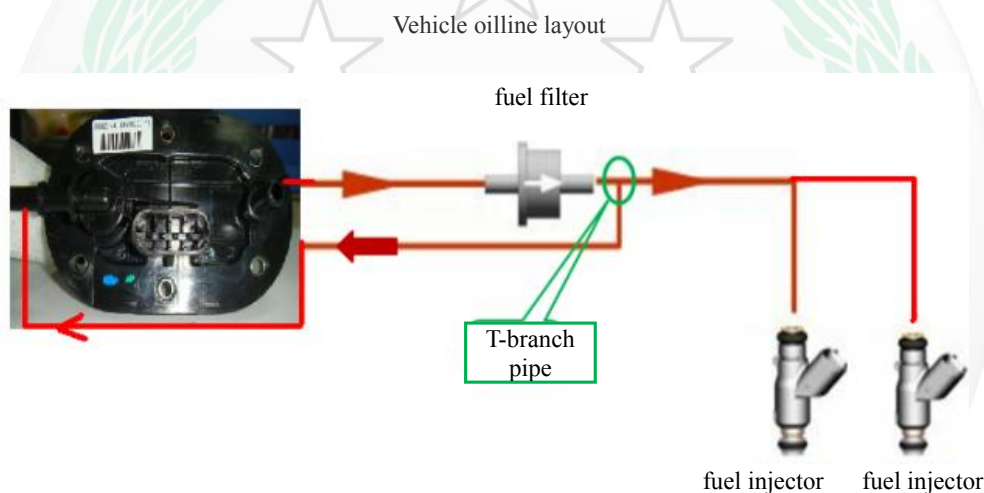
Oil pressure regulator: Engrave the marking on the pump body.

## Fuel pump

### Fuel pump

#### Work environment of fuel pump

- Oil pump assembly shall be installed at the fuel tank bottom according to the installation requirements.
- Generally, oil pump assembly design is only for gasoline fuel, ethanol and gasoline ratio with a proportion of 22%.
- Please make sure that there is sufficient fuel oil at first running of oil pump assembly. Don't run when there is no fuel.
- For pipeline connection method, please refer to the following diagram.





## Fuel pump

### Fuel pump

### Fuel pump maintenance procedure

Safety protection:

In case of fuel system maintenance, watch out to ensure personal safety.

- Disconnect the negative electrode of vehicle battery.
- Smoking strictly prohibited. Set "No smoking" signs around the operating area.
- Ensure extinguishing device.
- Operating environment has excellent ventilation condition and shall be far away from naked light.
- Wear safety protection glasses
- In order to release the fuel vapor in fuel tank, open the fuel tank cover and reassemble it.
- When the engine shuts down and the pressure of the oil-way still remains very high, disassemble or loosen the oil-way, and then the fuel oil will spray out. Operate according to "Fuel pressure release procedure" in the Chapter.
- There will be a small amount of fuel flowing out after disassemble to avoid hazard. Block the oil pipe with occlusion device.
- After maintenance, ensure that oil fuel pipe and clamp are reasonably installed.
- After the maintenance, perform systematic fuel leakage check according to "fuel leakage check procedure".
- After the maintenance, connect to battery cathode. Make sure that there is sufficient fuel oil at oil pump operation.

Fault diagnosis of oil pump assembly:

Procedure	Operation	Yes	No
1	After ignition key being started, oil pump will run for 3s. .	If the sound oil pump running can be heard, skip to step IV directly.	If the sound oil pump running can not be heard, skip to step II directly.
2	Disconnect the oil pump plug connector. Check whether the supply voltage of oil pump is within the range of 10-14V.	Perform step III	Check power supply circuit of the oil pump.
3	Supply 12V DC current for oil pump. Make sure that there is sufficient oil in the fuel tank to prevent oil pump running without oil. Whether the oil pump is operating●	Check the loop from oil pump to ECU. 1. 2.Check ECU	1.Check oil pump wiring harness 2.Check oil pump 1.
4	Check whether the oil supply pressure at the front end of jet nozzle is within the range of 220-270kpa	Oil pump assembly run normally	Perform step V
5	Test whether the oil pipe line pressure is lower than 220kpa with an oil pressure gauge.	1.Check whether the oil pipeline joint is subject to leakage. 2.Check the oil pump device. 3.Check the pressure regulator.	1.Blocking of fuel filter 2.Pipeline bending and twisting 3.Check the pressure regulator.

## Fuel pump

### Fuel pump

#### Dismount the oil pump assembly

- Release the fuel pressure in the oil way referring to "Fuel pressure release process".
- Disconnect the negative electrode of storage battery.
- Disconnect the connector clip of oil pump assembly wiring harness.
- Extract the residual fuel in the fuel tank. Save with appropriate container to ensure safety and reduce pollution.
- Disassemble the connecting oil pipeline of oil pump assembly with a clamp.
- Disassemble the fuel tank from the motorcycle.
- Place the fuel tank upside down. Pay attention to avoid fuel tank scratching and collision.
- Disassemble the oil pump assembly and install bolts
- Take the oil pump assembly out from the fuel tank
- Pay attention not to scratch the oil pump filter screen.

#### Oil pump assembly:

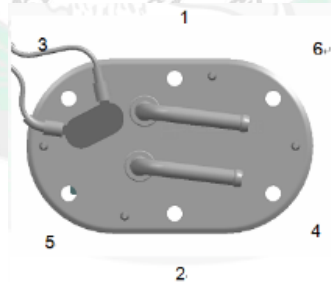
- Replace the seal washer of oil pump assembly (The used gasket may cause fuel oil leakage)
- Slightly hold the oil pump filter screen and put the oil pump assembly into fuel tank. Pay attention not to damage the oil pump filter screen.

Oil pump assembly direction: The installation screw holes of oil pump assembly are arranged in dissymmetric. They can only be assembled in specified direction. The pressure regulator shall face the backside of the fuel tank.

Maintain the fuel tank installation surface clean and flat.

- Install the retaining bolts on oil pump assembly cover. Tighten the bolts uniformly according to the indicated sequence as shown in the Fig. below. Screw assembly direction: 3~4 Nm
- The oil pump assembly shall be fixed with special bolts. Tighten the bolts according to the stipulated sequence and moment at assembly. Over moment and wrong tightening sequence will lead to gasket deformation and leakage.

- Assemble the fuel tank on the motorcycle.
- Connect the oil pipeline and use appropriate clamp to tighten.
- Connect the connector clip of oil pump wiring harness.
- Check leakage before engine running according to "fuel oil leakage check procedure".



Install screw tightening order

## Fuel pump

### Fuel pump

Fuel pressure release procedure:

Matters needing attention: It is strictly prohibited to operate under the heat engine state.

Confirm that the engine is at cooling state. Please conduct the following fuel pressure release operation:

- The motorcycle is located at "neutral gear" state.
- Disconnect the connector clip of oil pump assembly wiring harness and vehicle wiring harness.
- Start up the engine of the motor until the engine automatically extinguish. Consecutively switch ignition key again for 2-3 times with a time interval for 3s.
- After completing the aforementioned operations, connect the connector clip of oil pump assembly wiring harness.

Fuel oil leakage check procedure:

After completing the maintenance of any fuel system, perform fuel oil leakage check procedure.

- Fill sufficient fuel oil in fuel tank
- Switch ignition key for 3s and then turn off for 15s. Repeat the above operations for 3-4 times, in order to establish oil pressure in the oil-way.
- Check if there is any leakage phenomena of components in fuel system (fuel tank, connecting oil pipeline, oil pipeline connector etc..)

## Fuel pump

### Fuel pump

#### Operation precaution:

Attention:	Causes
<b>DON'TS:</b> Throwing and touching the oil pump	It will cause oil pump internal damage.
<b>DON'TS:</b> Oil pump "dry running" (oil pump inlet, free of oil at filter screen outlet). Make sure there is sufficient fuel oil in the fuel tank	It will damage the internal parts of the oil pump.
<b>DON'TS:</b> In case of damage to filter screen	Impurities will enter the oil pump from the damaged filter screen into the damaged pump body.
<b>DON'TS:</b> Disassemble internal parts of the pump and pressure regulator. <b>DON'TS:</b> Regulate oil pump and pressure regulator (replacement excluded).	The damage caused by disassembly without permission is not covered by "Three guarantees".
<b>DON'TS:</b> Lift the oil pump assembly through oil pump assembly wiring harness. <b>DON'TS:</b> Lift and pull the oil pump wiring harness at vertical direction of oil pump cover.	Wiring harness damage/oil pump power supply disconnected
<b>DON'TS:</b> Use the damaged oil pipeline clamp.	Pressure leakage/fuel oil leakage
<b>DON'TS:</b> Use oil pump assembly with seriously damaged or cut oil pump filter screen.	Impurities will enter the oil pump from the damaged filter screen into the damaged pump body.
<b>DON'TS:</b> Use an oil pump to exact oil from the fuel tank.	Oil pump is not designed for this purpose.
<b>DON'TS:</b> Use the mounting screws of oil pump assembly to fix other parts	It will affect the assembly of oil pump assembly.
<b>DON'TS:</b> Damage to oil pump wiring harness and terminals at oil pump assembly maintenance	Lead to poor contact/oil pump power supply disconnecting.
<b>DON'TS:</b> Contact oil pump assembly while extracting oil from the fuel tank with a manual pump	Avoid oil pump assembly damage.
<b>DO'S:</b> Make sure that the oil pipeline is not damaged at maintenance	Avoid fuel oil leakage.
<b>DO'S:</b> Only use the "original" seal washer of oil pump assembly.	Counterfeit products may lead to fuel leakage.
<b>DO'S:</b> Use the specified hose clamp	Ensure that there is no fuel leakage and leakage at oil pipeline connector.
<b>DO'S:</b> Oil pump wiring harness shall be fixed on the motorcycle	Reduce vibration.
<b>DO'S:</b> Use standard fuel oil.	Poor quality fuel oil will lead to premature failure of oil pump.
<b>DO'S:</b> Replace fuel filter within the required time.	Obstructed filter may cause reduction of fuel delivery.
<b>DO'S:</b> Use specified fuel filter in conformity with requirements.	The nonconforming filters will damage the jet nozzle, oil pressure regulator and oil pump.
<b>DO'S:</b> Ensure proper arrangement of oil pipeline without interference with other parts.	Incorrect direction and interference will damage the oil pipeline.
<b>DO'S:</b> Make sure that there is sufficient oil (to submerge the oil pump filter screen) in the fuel tank	Prevent oil pump running without oil.
<b>DO'S:</b> Replace the two O type rings simultaneously at pressure regulator maintenance	Ensure correct pressure adjustment curve of pressure regulator.
<b>DO'S:</b> Carefully connect the connector clip of oil pump assembly wiring harness	Avoid damage to the connector terminal.
<b>DO'S:</b> Return to any touched, damaged, and suspicious parts and describe the problems	Detect the root causes rapidly.

#### Warning:

- For new motorcycles, since there is no gasoline in fuel tank, after filling the fuel tank, there are a lot of air in the oil fuel pipe. The engine needs to be started for many times to discharge the air in the oil pipeline for normal working. This is a normal phenomenon. The engine will have no failure on starting up for a long time in the future.
- Since gasoline plays a role to cool down the fuel pump, the oil pump shall not run with insufficient or even without fuel oil which may lead to fuel pump burnout.

## Throttle body

### Throttle body

#### Operating principle of throttle body:

Throttle body assembly is mainly composed of the following parts: main cast body, bearing, shaft and valve plates, return spring, throttle wire, position sensing system of the throttle valve and bypass air control system. All the subsystems will work together to meet the following functions:

- Inlet flow control
- Idle air flow control
- Position detection of throttle valve - Provide throttle opening feedback signal for engine control system.

Position sensor of throttle body provides throttle opening for ECU; stepping motor on the throttle body controls engine idle speed to maintain target idle speed as required by ECU;

#### Appearance of throttle body:





## Throttle body

### Throttle body

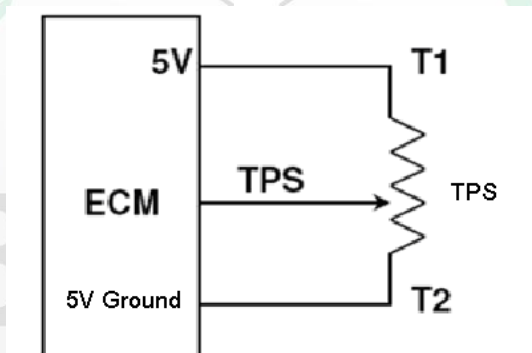
#### Technical parameters

Throttle body:

- 34mm ID: Max. flow:  $\geq 50\text{g/s}$  @ 2.7kPa vacuum degree
- Starting torque of throttle body:  
Idle state:  $0.12 \pm 0.03\text{Nm}$   
Fully open:  $0.32 \pm 0.05\text{Nm}$

Position sensor of throttle valve:

- Reference voltage:  $5 \pm 0.1\text{VDC}$
- Resistance between T1 and T2:  $3\text{k} \sim 12\text{k}\Omega$



Idle air control valve:

- Working voltage: 7.5~14.2 VDC
- Winding resistance:  $53\Omega \pm 10\%$
- Wire winding coil:  $33\text{mH} \pm 20\%$

#### Working environment of throttle valve

Normal operating temperature:  $-30 \sim 120^\circ\text{C}$

#### Disassemble of throttle body

- Disconnect the negative electrode of storage battery
- Disconnect the connector assembly of throttle valve positioning sensor, stepping motor, inlet temperature/pressure sensor (installed on the throttle body assembly).
- Dismantle the throttle wire
- Dismantle the flexible hose connecting air cleaner and air intake manifold.

## Throttle body

### Throttle body

## Negative pressure balance of throttle valve regulation

Method to adjust the negative pressure balance: Connect the detection software; check the fuel injection pulse width of the two cylinders and control the ventilation through adjusting by-pass port screws. After the adjustment, the fuel injection pulse width of the two cylinders will get close to each other. Generally, the fuel injection pulse width is at 2.0ms.

## Throttle valve cleaning method

Clean the throttle body with carburetor cleaner (3M products recommend). Spray the cleaner on interior walls of throttle body. Brush off the dust, carbon deposition etc. slightly. Pay attention that the bypass air way shall not be blocked with dirty materials.

## Assembly of throttle body

For throttle body assembly steps, pay attention to the following points:

- Adjust the throttle wire
- Ensure that all the dismantled parts, such as stepping motor, have been installed to right position.
- Connecting screws assembly

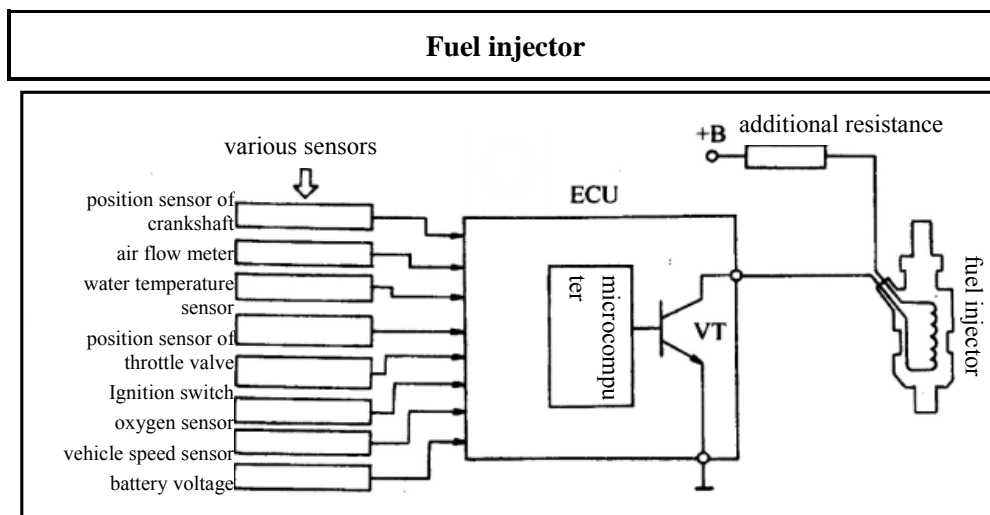
## Installation cautions for throttle valve

- Do not soak the position sensor of throttle valve into liquid.
- Always use throttle wire to start up the valve.
- Do not fill tools or other materials to throttle valve to maintain the opening of the valve, which may cause valve deformation or scratching the interior walls of throttle body. Such damage will cause that the valve can be opened either very easily or very difficultly.

## Operation cautions for throttle valve

Attention:	Causes
<b>DO'S:</b> Install all the throttle body connectors carefully	Avoid damage to wiring terminal.
<b>DO'S:</b> Avoid any liquids entering into the throttle body	Ensure normal operation.
<b>DO'S:</b> Take off and assemble only one throttle valve from the component tray at one time	Avoid damage to key components.
<b>DO'S:</b> Send back the falling, damaged or suspected parts and components with quality issues. Paste the tags to indicate the existing problems (only for the "three guarantees" components).	Quickly identify the causes of the problems
<b>DON'TS:</b> Use any falling or extruded parts	May cause internal damages to the parts.
<b>DON'TS:</b> If it is stored or transported close to saline water without protection conditions	Corrosion may affect normal use.
<b>DON'TS:</b> In case of being exposed to the environment (for example humid environment) before assembly	Corrosion may affect normal use.
<b>DON'TS:</b> Testing with non-system operating voltage	May lead to damage.
<b>DON'TS:</b> Using additional jigs	May lead to damage.
<b>DON'TS:</b> Remove the packaging to enable the parts touch each other.	It may affect the minimum air leakage or cause any other damages.
<b>DON'TS:</b> Suddenly release the throttle fully from any position	May lead to damage.
<b>DON'TS:</b> The bypass channel being blocked by dust or small particles	May affect idle speed stability.
<b>DON'TS:</b> Pick up, store, or hold parts by a means that may contact other components.	This behavior may cause damage.

## Fuel injector



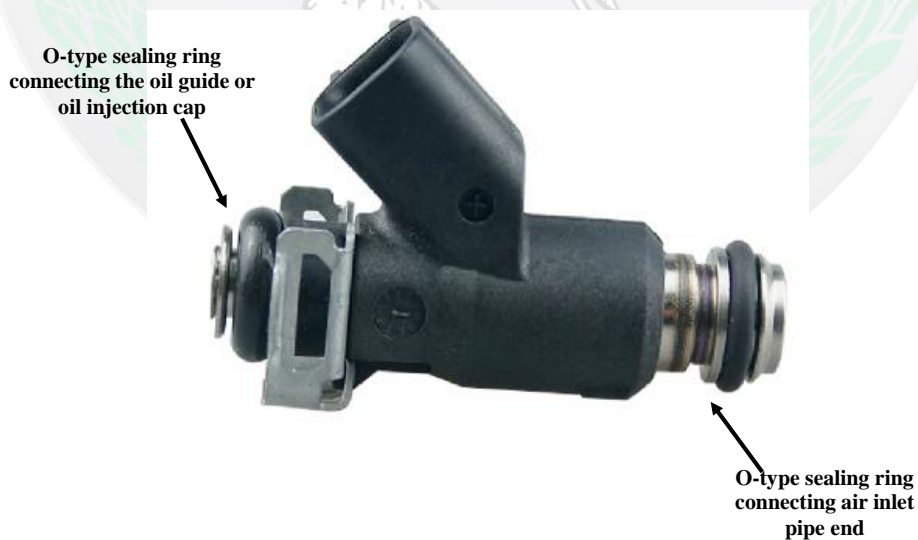
## Operating principle of fuel injector

Fuel injector is an executive component. Inject appropriate fuel oil into air inlet of engine through ECU in time and accurately. In further, inhale the air into the combustion chamber. Mix the oxygen in the fresh air for combustion.

Use the fuel injector with the same part number for replacement.

## Appearance of fuel injector

The Fig. below is the appearance view of fuel injector.



## Fuel injector

### Fuel injector

#### Sealing ring of fuel injector

As shown in the Figure above, O-shaped sealing ring can make sure that the fuel injector will be subject to no leakage within the range of -40°C to 150°C (-40 to 302°F). In addition, it can resist all kinds of fuel additives (such as ethanol etc.). The following data are designed for current seal ring.

O-shaped sealing ring connecting fuel rail or spray cap.

●Size:

- Inner diameter: 6.35 mm
- Outer diameter: 14.85 mm
- Section thickness: 4.25 mm

●Materials

- Viton●GLT (blue): To be applied at the low temperature.
- Viton●A (black): Except to the applications be applied at the low temperature.

O-shaped sealing ring connecting inlet pipe end

●Size:

- Inner diameter: 9.61 mm
- Outer diameter: 14.49 mm
- Section thickness: 2.44 mm

●Materials:

- Viton A (Blue or brown)

Lubricant recommended

Lubricant shall be applied on O-shaped ring to facilitate fuel injector assembly. The following is the list of verified lubricating oil. The experiment demonstrates that the following lubricants have no impact on fuel injector performance.

List of lubricants recommended		
Name of the lubricants	Manufacturer	Viscosity (cSt) @ 40 °C
Spindura 10	Equilon	10
Spindura 22	Equilon	21
DTE-24	Mobil	32
DTE-25	Mobil	46
DTE-26	Mobil	68
Norpar 15	Exxon / Mobil	<1
Drawsol 60	DA Stewart	1-2
NocoLube AW 46	NOCO Energy	46
NocoLube AW 32	NOCO Energy	32
Advantage Spindle Oil	Advantage Lubrication Specialties	10

## Fuel injector

### Fuel injector

#### Overvoltage effects of fuel injector

Fuel injector can run for one minute (operating with oil) at maximum under the voltage of 26V with a pulse width of 100ms and 200ms one cycle operating conditions. It will not affect the flow rate, will not cause permanent damage on electromagnetic coil, and will not weaken the electromagnetic performance.

#### Temperature range of fuel injector

Standard injector working temperature range is as follow. Within the scope of the qualified working temperature, fuel injector flow rate will not lose efficacy within the range of tolerance. In addition, the injector will not be subject to leak, degradation and shortening of the life in proper working environment.

- Operating temperature range: -30~125°C
- Limit range of operation (it may be subject to functional degradation): -40~150°C
- Storage temperature: -60 ~ 60°C

#### Fuel oil pollutants of fuel injector

In spite of its self-clean function, fuel injector is a serviceable part since it is designed to remove impurities with small diameter accumulated between fuel filter and fuel injector. However, the impurities with large diameter can arouse fuel injector cementation, flow rate offset, leakage and other faults. Therefore, the fuel filter system is very important.

#### Wiring harness layout of fuel injector

- Wiring harness layout of fuel injector shall be far away from heating source. It shall protect the wiring harness away from outside worn or damage.
- If it is not necessary, please do not plug fuel injector connector.
- Fuel injector electric appliance connectors can not be distinguished from positive and negative level.



## Fuel injector

### Fuel injector

#### Operation cautions for fuel injector

Attention:	Causes
<b>DON'TS:</b> Use seal ring repeatedly. In case of necessary repeat use, please carefully check whether the seal ring is damaged before use	Avoid leakage.
<b>DON'TS:</b> Immerse the jet nozzle end to the lubricant which	May cause injection hole blocking.
<b>DON'TS:</b> Idle running under the circumstance of free of oil pressure	Will damage internal mechanical components.
<b>DON'TS:</b> Water entering oil circuit at leakage inspection	Will cause fuel injector damage.
<b>DON'TS:</b> Apply force on the head of fuel injector at assembly.	While assembly on nylon air inlet pipe, it is allowed to apply force at the direction of 45°.
<b>DON'TS:</b> Collision on fuel injector while installing the fuel injector on air inlet pipe	Will cause damage to fuel injector and seal ring.
<b>DON'TS:</b> Applying tensile on connector assembly	Will cause an intermittent power supply.
<b>DON'TS:</b> Using broken fuel injector	May be damaged.
<b>DON'TS:</b> Store fuel injector, fuel rail, or engine installed with fuel injector in an environment without protection.	External environment could undermine electronic and mechanical components of the injector.
<b>DON'TS:</b> While lifting the assembly part, treat the fuel injector as the handle	It will damage the fuel injector.
<b>DON'TS:</b> The parts will contact each other during storage process.	It will damage the fuel injector.
<b>DON'TS:</b> The parts will contact each other during transportation process	It will cause damage to the fuel injector.
<b>DON'TS:</b> Tap the fuel injector to perform troubleshooting at occurrence of failure	It will damage the fuel injector.
<b>DON'TS:</b> Substitute the original fuel injector with a new one with part number other than those recommended	It will seriously affect the performance of the fuel injector.
<b>DO'S:</b> Special attention should be paid that the seal ring shall not be damaged by the mounting base at fuel injector assembly	Protect the seal ring.
<b>DO'S:</b> Use correct lubricant for installation. Assemble the part to mounting holes after applying lubricant oil	Protect seal ring and reduce pollution.
<b>DO'S:</b> Perform tests more frequently for fuel injector pasted by needle valve or failed to be seated. (Apply pulse less than 5s for fuel injector with a voltage within 9~15V)	Confirm the failure mode of fuel injector.
<b>DO'S:</b> Before fuel injector assembly, perform an oil leakage test to check whether the needle valve of fuel injector has been seated.	During the transportation and delivery process, the needle valve of fuel injector may not return to the right position and may lead to fuel oil leakage.
<b>DO'S:</b> Avoid the fuel injector being polluted by the fluid	It will lead to short circuit of electromagnetic coil.
<b>DO'S:</b> Disassemble the wiring harness carefully.	It may lead to terminal damage.
<b>DO'S:</b> Use the recommended lubricants at connector assembly.	It may produce corrosion on the terminal.
<b>DO'S:</b> It is not allowed to use falling, damaged components or those with material problems. Take a tag to illustrate the existing problem.	Make sure to detect the fault source quickly.

## Fuel injector

### Fuel injector

#### Installation requirements for fuel injector

During the assembly and disassembly process, please strictly abide by the following methods to avoid damage to the fuel injector body and electronic components.

- Lubrication: Apply small amount of lubricant at the lower side of seal ring. It is recommended to use ISO 10 light material oil or equivalent product.
- Under the permissive conditions, the effects of applying lubricant on fuel injector base are superior to being applied on seal ring. Thus the contamination probability of fuel injector can be reduced to the minimum level.
- The orifice panel shall not contact the lubricant, which will affect the fuel-injection amount. Do not dip the lubricant with the top of fuel injector.
- All the seal rings of fuel injector have been installed properly at delivery. In principle, reuse of seal ring is not allowed. In case of necessary repeat use, please carefully check whether the seal ring is damaged before use. Even tiny damage can cause leakage. Please take special care to fill the seal ring into the fixing seat.
- Pay attention not to destroy the connector at fuel injector assembly. After hearing the sound of "clicks", it means that the fuel injector has been installed to right position.
- Avoid unnecessary disassembling of connectors
- The wiring harness shall not be clamped too tightly. Over tightening will lead to occurrence of short circuit.
- Do not rotate the fuel injector at fuel injector connector assembly which will lead to injection target offset.

#### Fuel injector replacement method

Disassembly and replacement method of fuel injector

Attention: Fuel injector and high surrounding object temperature.

- Vehicle flameout
- Cut off the battery cathode to avoid accidental starting of the engine.
- Pick off the connector assembly of fuel injector.
- Release the fuel pressure.
- Remove the oil pipeline on fuel injector.
- Take down fuel injector from throttle valve.
- Pick off the fuel injector retaining clip. Remove fuel injector from the housing washer carefully.
- Remove the impurities on fuel injector contact surface. Pay attention not to damage the contact surface.
- Apply lubricant on the seal ring on both ends of the fuel injector.
- Put the fuel injector head into air duct carefully. Confirm that the installation shall be consistent with the original one.
- Press to injector seat and fix the retaining clip properly.
- Fuel injection tube assembly
- Insert connector assembly of fuel injector.
- Start up the key to power on. Do not start up the engine to check fuel injector leakage.
- Start the engine to perform running inspection.

#### Replaceability of fuel injector

Use the fuel injector with the same part number for replacement.

## Fuel injector

### Fuel injector

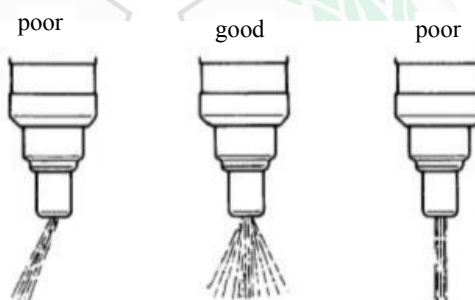
#### Blocking of fuel injector

Fuel impurities accumulation will cause traffic migration and shorten the injection life. At engine stewing, engine heat makes the fuel produce precipitation at fuel injector head. Precipitation gathers at injection holes which will lead to flow deviation.

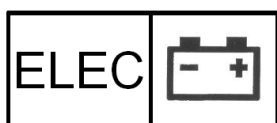
- Such blocking will lead to slow flow, increasing frictional force, impurities accumulation and other problems. It will ultimately affect the emissions and durability.
- Fuel and environmental factors may cause fuel crystallization or fuel injector corrosion which will cause flow deviation as well.
- Poor fuel oil oxidation stability will cause precipitation. Therefore, please use high-quality gasoline.
- Applying appropriate amount of fuel detergent can avoid precipitation.
- In case of fuel injector blocking, clean the fuel injector according to the following cleaning method.

#### Warning:

- A filter is designed within the fuel injector. However, fuel injector is not a serviceable part since it is designed to remove accumulation impurities between fuel filter and fuel injector. Impurities can cause bonding, flow deviation and leakage fault. Thus the fuel filter is very important.
- Use the fuel injector with the same part number for replacement.



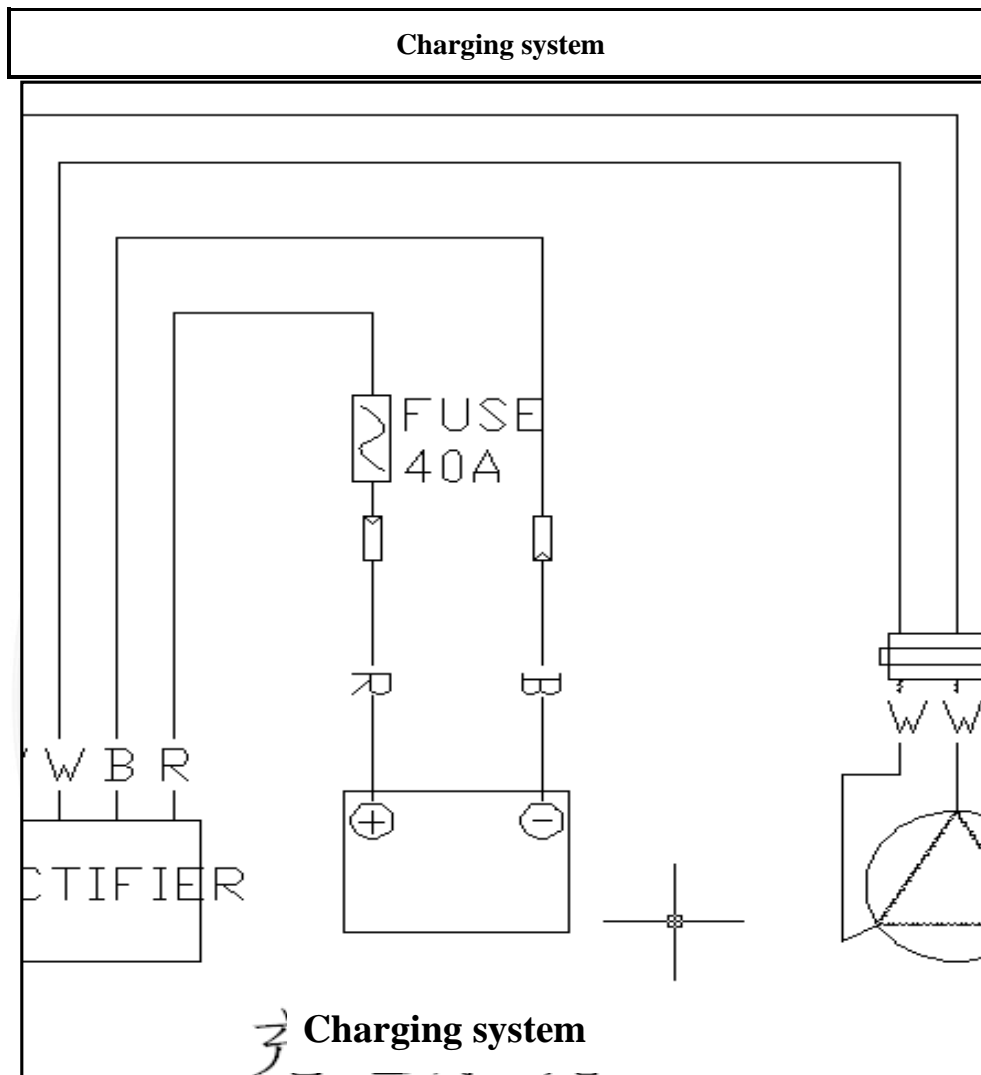
Fuel injector atomization state  
燃油雾化情况



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## Charging system





## Rechargeable battery

### Rechargeable battery

Batteries disassembly

Switch off the electricity lock

Open the cushion

Dismantle the battery cathode

Dismantle the battery cathode

Dismantle disaster box and fixed installation clamp

Remove the batteries from battery fixed bracket

#### \*Attention

Ensure to disconnect the cathode (-) cable

Battery activation

Electrolyte solution filling

●Ensure that the model indicated on the electrolyte bottle [A] match with battery model [B]. These models must be the same.

**Battery model of 300GS: YTX9-L**

#### Warning

**Must use electrolyte solution with an indicating model of storage battery. Since the battery models are different, the volume and density of electrolyte solutions adopted will be different. It is to prevent excessive filling of electrolyte thus to shorten the service life of storage battery, and to reduce storage battery performance.**

#### Warning

**Before using, do not tear the aluminum seal [A] from the filling port [B]. Make sure to use dedicated storage containers to ensure correct volume of electrolyte filling.**

- Put the battery on right horizontal plane.
- Check whether there are peeling, cracks, or holes.
- Disassemble the sealing strip

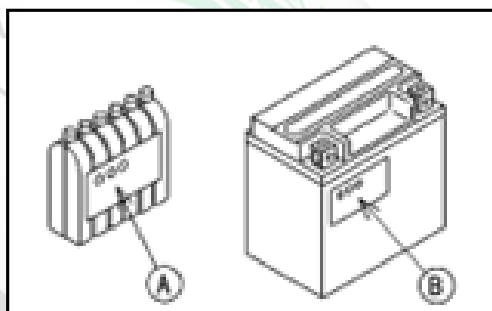
#### \*Attention:

○ The battery is vacuum sealed. In case of air leakage from sealing fin into the battery, the charging time for the first time could be longer.

- Take the electrolyte bottle away from plastic bag.
- Remove the strip lid [A] away from the container. Place the parts slightly to seal the battery.

#### \*Attention

Do not pierce nor open the seal layer of electrolyte bottle [B]. Do not try to open single liquid cavity.



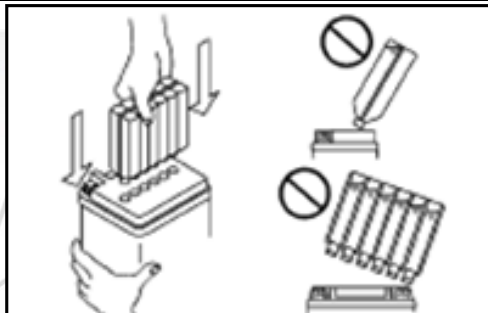
## Rechargeable battery

### Rechargeable battery

● In case of electrolyte bottle dumping, put six seal grooves into filling mouth. Keep the electrolyte bottle horizontal. Push down to pierce all six liquid chamber sealing. As the filling sealing liquid cavity being inserted to filling port, bubble rising will be observed in liquid cavity.

#### \*Attention

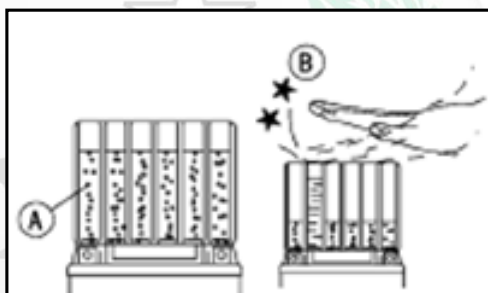
○ Don't lean the electrolyte bottle.



● Check electrolyte flow

★ If bubble rising being observed in liquid cavity [A], or if the electrolyte bottle not being fully filled into storage battery, slightly slap several times of electrolyte bottle [B].

● Hold the electrolyte bottle for 20min. or longer. Before the container being discharged, do not move from the battery. For normal operation of battery, all the electrolyte solution shall be removed from the container.



#### Warning

**If the electrolyte solution in electrolyte bottle not being fully filled into storage battery, the service life of storage battery may be shortened. It needs at least 20 minutes to completely fill the electrolyte solution into storage battery. Do not remove the electrolyte bottle before that.**

● Slightly remove the electrolyte bottle from battery.

● Hold the battery for 60min. Before charging, make the electrolyte solution penetrate to the plate metals to achieve the optimal performance.

#### \*Attention

○ **Immediately recharging batteries will shorten battery life after filling. Hold at least for 60min. after filling.**

## Rechargeable battery

### Rechargeable battery

#### Initial charge

- Slightly cover the cover strip [A] on the filling port. Do not completely press into the port.
- The newly activated maintenance-free storage battery requires initial charge.

Standard charging: 0.9A\*5-10hrs

#### Attention

- Charging rate depends on time and temperature of battery storage, as well as the charger type.
- After initial charge, hold the battery for 30min. Use voltmeter to check voltage. If it failed to reach 12.6V, repeat the charging period.

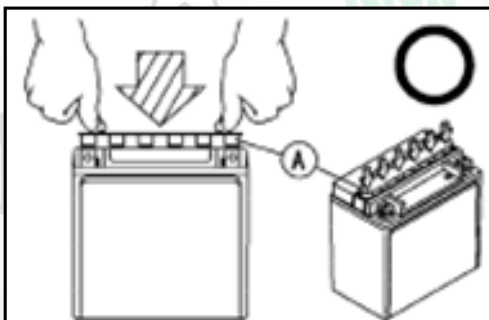
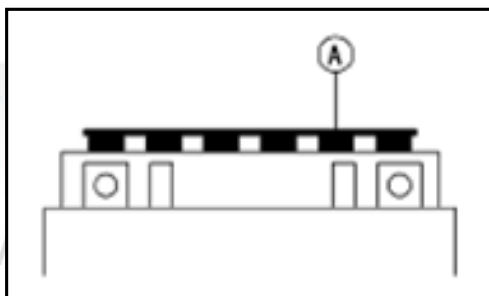
- After charging, press the strip cover [A] to battery with two hands (Do not thump or beat). After correct installation, align the strip cover and the top of the battery.

#### Warning

As soon as the strip cover being installed to battery, do not move the cover, nor apply water or electrolyte solution to battery.

#### \*Attention

- In order to ensure the biggest battery life and higher customer satisfaction, it is suggested to perform 15s load testing under the three times of ampere hour rate. Recheck the voltage. If it is less than 12.6V, perform rechargeable cycle and load testing. If it is still lower than 12.6V, the battery is defective.



## Rechargeable battery

### Rechargeable battery

#### Inspection of charging state

Battery can be checked through a voltmeter to measure the battery terminal voltage.

- Battery disassemble
- Battery terminal voltage measurement

#### \*Attention

**Take a digital display voltmeter with an accuracy to measure the voltage.**

If the reading is 13.6V or higher, it is not required to replenish electric quantity; however, if the reading is lower than the stipulated value, it is required to replenish electric quantity.

The following is the list stipulating terminal voltage and charging mode

Terminal voltage	Charging mode
Between 11.5 and 12.6V	0.9A x 5-10h
Lower than 11.5V	0.9Ax20h

Determine the battery status after replenish electric quantity

After charging, hold the battery for 30min.. And then determine the battery state according to the following table through measuring the terminal voltage.

Standard	Determination
12.6V or higher	Excellent
12.0~lower than 12.6V	Insufficient charging → Recharging
Lower than 12.0V	Unavailable→ Replacement

Use a avometer of rechargeable battery being fully charged state.

Install the fully charged battery after the engine heating.

Connect the voltmeter to the terminal of the rechargeable battery

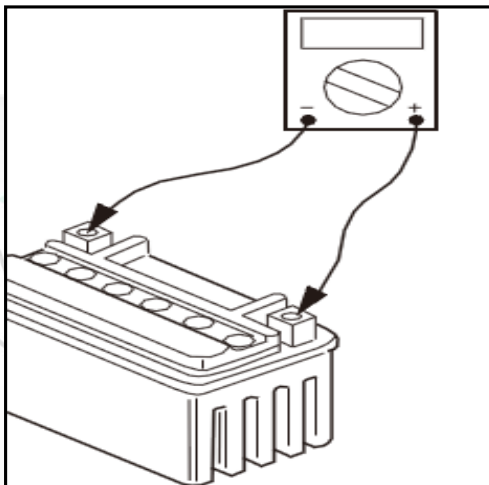
Disassemble the main fuse. Connect Ammeter in series among terminals. (General multimeter limit to 10A)

Start up the engine. Slowly rotate and measure the voltage and current.

**Restriction voltage/rotational speed: 15V (5.000rpm) (DCV)**

Limit voltage is out of the specified value range. Check the voltage regulator.

Lighting system will restrain voltage check.



## Rechargeable battery

### Rechargeable battery

#### Short circuit test

Dismantle the earth lead from rechargeable battery. The voltmeter is to connect to the position between battery cathode and grounding wire. The switch should be turned to OFF. Check whether it is in short circuit.

#### \*Attention

The positive pole of avometer is to be connected to the battery cathode.

In case of any anomaly, check whether there is any short circuit on the master switch and main wiring.

#### Inspection of charging state

Use a avometer of rechargeable battery being fully charged state.

Install the fully charged battery after the engine heating.

Connect the voltmeter to the terminal of the rechargeable battery

Disassemble the main fuse of connect Ammeter in series among terminals.

Start up the engine. Slowly rotate and measure the voltage and current.

**Restriction voltage/rotational speed: 14-15V (5.000rpm)**

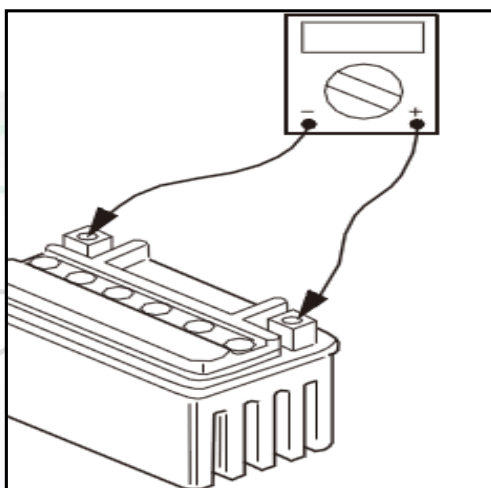
Limit voltage is out of the specified value range. Check the voltage regulator.

Lighting system will restrain voltage check.

Disassemble the seat cushion.

#### \*Attention

Set the avometer at alternating voltage grade.



**Restriction voltage: 13.1 (± 0.5V/5.000rpm)**

Limit voltage is out of the specified value range. Check the voltage electric current regulator.



## Magnetolectric generator

### Magnetolectric generator

#### \*Attention

Check the charging coil of magnetolectric generator. It can operate on the engine.

Left cover of magnetolectric generator disassembly

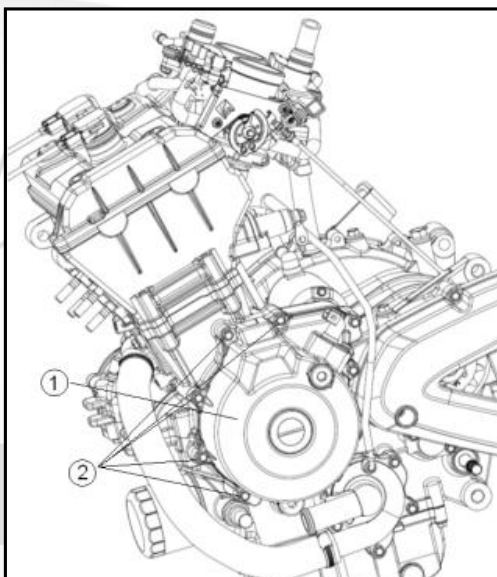
#### Disassemble:

Power cord connector of magnetolectric generator

Place a suitable container under the magnetolectric generator

Loosen the left cover retaining bolt ①. Remove the left cover ② and magnetic coil.

Pull the magneto power cord between engine and scaffold.



#### Disassemble stator coil

Magneto cover (See disassemble section of magnetolectric generator cover)

Support bracket bolts ④ and scaffold

Outgoing line gum cover ③ of magnetolectric generator

Stator coil bolt

Stator coil ①



Loosen three retaining bolts of magnetic coil ②

Remove the magnetic coil.

## Magnetoelectric generator

### Magnetoelectric generator

Flywheel disassembly

Magneto cover disassembly (See disassemble section of disassemble magnetoelectric generator cover)

Disassemble the fixing bolts of flywheel with a flywheel puller.

Remove the flywheel from the crankshaft with a flywheel puller.



## Magnetoelectric generator

### Magnetoelectric generator

Remove the flywheel



Benelli

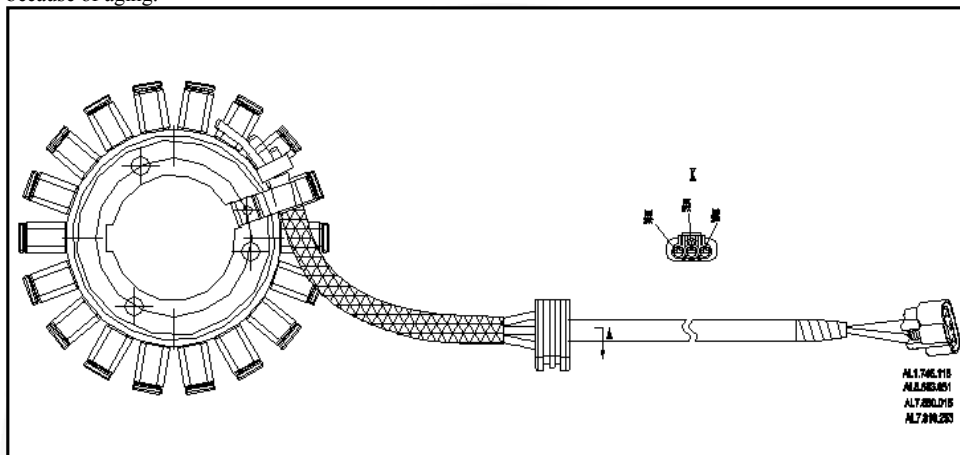


## Charge coil of magnetoelectric generator

### Charge coil of magnetoelectric generator

#### Magnetoelectric generator inspection

There are three types of failure of magnetoelectric generator: Short circuit, open circuit (wire burnout) or rotor magnetic disappear. Short circuit or open circuit will cause low output or even no output. Disappearing of rotor magnetism will lead to low output, which may be caused by AC electric generator or striving. Or it may be because of aging.



#### Close the ignition switch

Disassemble magnetoelectric generator 3P connector.

Measure the resistance value among the three black terminal of magnetoelectric generator with a multimeter.

**Standard value: 0.05~0.5Ω (Room temperature 20℃)**

★ If the resistance is greater than the aforementioned resistance, or any multimeter of any two power cord (infinite value), it is determined as stator line and shall be replaced. When it is far lower than the resistance, it refers to stator short-circuit. It shall be replaced.

● Measure the resistance between every single black power cord and chassis grounding with a multimeter in the highest resistance range.

★ Use tester coil to check whether the engine is through. If yes, it refers to short-circuit of coil and engine. And it needs to check the charge coil.

★ If the resistance of stator coil is normal, but the voltage check shows that the magnetoelectric generator has failure, it means that the rotor magnetism has been weakened. At this moment, the rotor has to be replaced.

#### Start up the engine

○ Run the revolutions per minute (rpm) according to Table 1

○ Record the voltage readings (three measured values in total)

**Table 1 Output voltage of magnetoelectric generator**

Range of tester	Wiring		Reading at 5000 rpm
	Connect tester (+) to	Connect tester (-) to	
750 V AC	A black power cord	Another black power cord	55V or higher

★ If the output voltage indicated is within the range of the table, it means normal operation of the magnetoelectric generator.

★ If the output voltage indicated is much lower than the value within the range of the table, it means malfunction of magnetoelectric generator.

## Magnetoelectric generator

### Magnetoelectric generator

Magnetoelectric generator assembly

Assembly shall be in the reverse order of disassembly.

#### Note:

Apply thread glue on each screw.

Tighten all the bolts to the following moment:



Moment 10N\*m

#### \*Attention

Clean the crankshaft and conical party of flywheel.

Align the groove on the flywheel to the solid key of axis.

Assemble the flywheel to the groove on the flywheel correctly.

There is magnetism existing on inner side of flywheel. Thus there should be no bolts on that surface.



## Rectifier

### Rectifier

Disassemble the rectifier

Disassemble the seat cushion component (See Chapter III Check and Regular Adjustment of "Air filter")

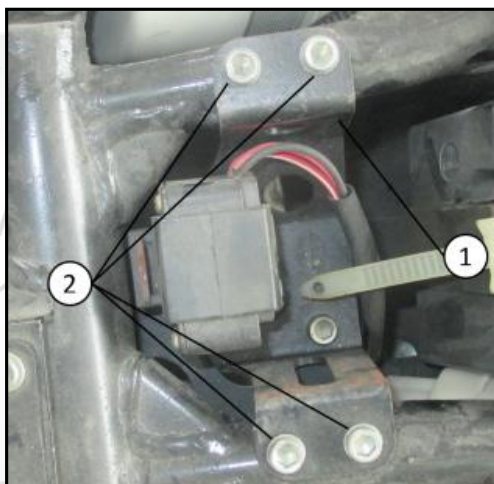
Disassemble the fuel tank (See Chapter III Check and Regular Adjustment of "Air filter")

Disassemble the left guard plate (See Chapter IV

Assembly machine covering part/ guard plate)

Screw off the bolt ②

Disassemble the relay scaffold ①



Screw off the bolt ④

Disassemble the relay ③



Screw off the bolt ⑥

Pull out the rectifier connector

Rectifier ⑤



## Rectifier

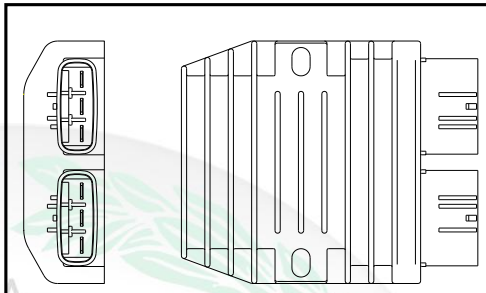
### Rectifier

Loop inspection of the main wiring end terminal

Dismantle the vehicle guard plate

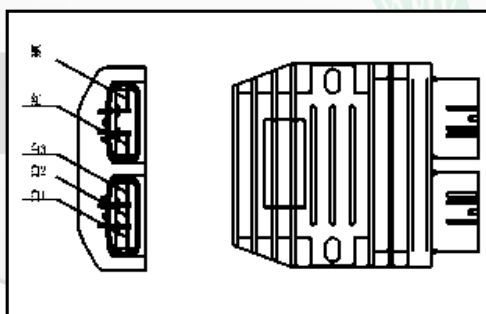
Disassemble the 3P connector of voltage & current regulator. The following method can be used to check the through status of the main wiring end terminal

Item (wiring color)	Determination
Between rechargeable battery (red) and vehicle body GND Ground	Rechargeable battery voltage existing
Between bond strap (black) and vehicle body GND Ground	Wiring existing
Between charging coil (white) and vehicle body GND Ground	No resistance



#### Inspection of rectifier

1. Multimeter selection: Diode grade;
2. The black probe is to connect the red line terminal of voltage regulator. The red probe is to connect the white line terminal of voltage regulator (white 1, white 2 and white 3). The pointer shows a certain value (value range 0.1~0.5V) which indicate that the voltage regulator has to be replaced).
3. The red probe is to connect the red line terminal of voltage regulator port. The black probe is to connect the white line terminal of voltage regulator (white 1, white 2 and white 3). The pointer shows a certain value (value range 0.3~0.8V) which indicate that the voltage regulator has to be replaced).

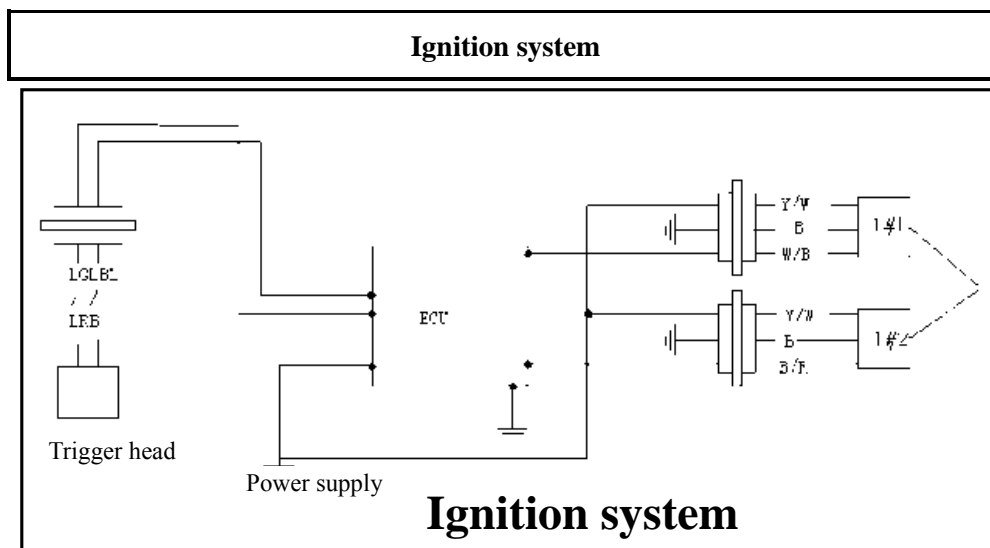


#### \*Attention

- The metal part of multimeter can not be touched by fingers.
- Check with a avometer. For different resistance values of multimeter, the check shall not be correct.

In case of impedance value anomaly between terminals, the voltage regulator should be replaced.

## Ignition system



### Issues to be noted at operation

1. The ignition system shall be checked item by item as stipulated in the Troubleshooting Table.
2. Ignition system is electronic automatic timing angle device. In the cured ECU group, the ignition duration shall not be adjusted.
3. The ignition system shall be checked item by item as stipulated in the Troubleshooting Table.
4. The most common ignition system failure is connector poor contact. Check whether the connector contact is in good condition or not.
5. Check whether the heat value adopted by sparking plug is proper. Improper sparking plug is the primary cause which will lead to unsmooth engine operation or sparking plug burnout.
6. The inspection of master switch shall be implemented according to the Switch Conduction Part. (Attachment)
7. The disassembly of magnetoelectric generator and stator shall follow disassembly demonstration.

#### **⚠ Warning**

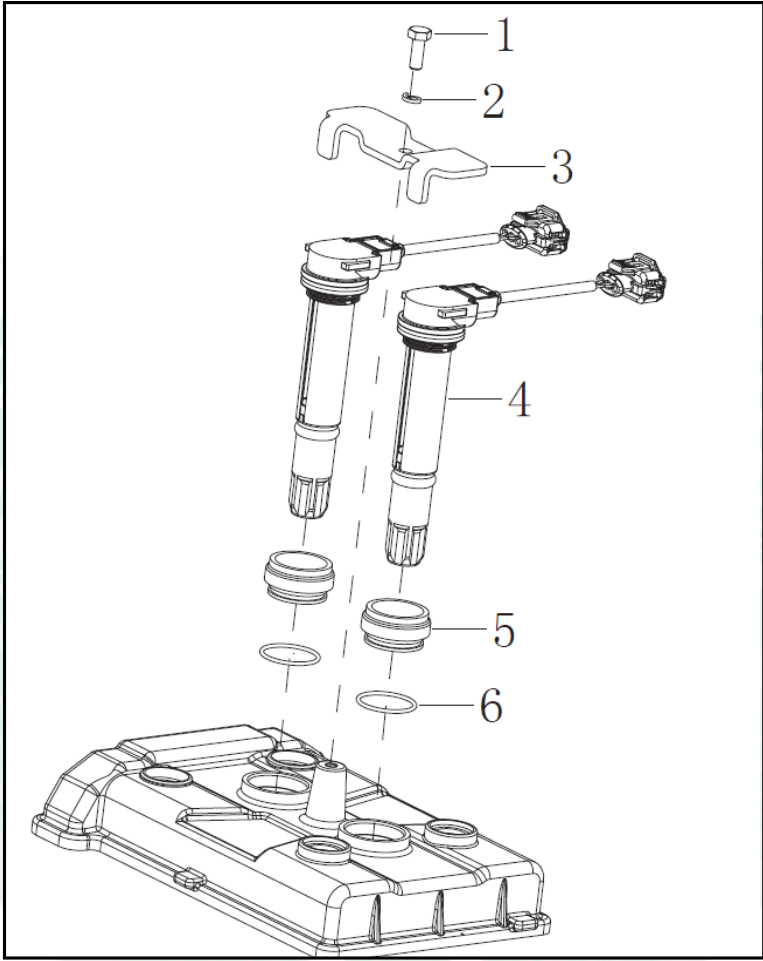
Ignition system will generate extremely high voltage. At engine running, do not touch sparking plug or coil. Otherwise, you man be seriously shocked.

#### **\*Attention**

At ignition lock opening or engine running, do not disconnect the battery cable or any other electrical connection. It is to prevent damage to ECU. Do not install the battery in reverse. The negative electrode shall be grounded. It is to prevent damage to ECU.

Ignition coil

Ignition coil



Serial number	Description & specification	Qty
1	Bolt	1
2	Spring washer	1
3	Ignition coil positioning clamp	1
4	Ignition coil	2
5	Ignition coil set	2
6	O-shaped ring	2

## Ignition coil

### Ignition coil

Disassemble ignition coil

Disassemble the seat cushion.

Disassemble the left and right fuel tank guard plate

Disassemble fuel tank assemble

Disassemble the filter

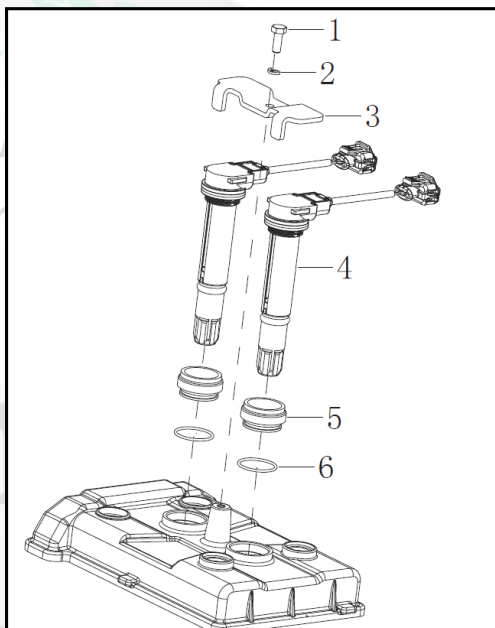
Disassemble the bolt (1), spring washer (2) and ignition coil positioning clamp (3) from the engine

Pull the ignition coil (4) from the engine

Remove the O-shaped ring (6), ignition coil set (5) from ignition coil (5).

#### Warning

**In case of removal the coil, do not prize up the connector of the coil.**





## Ignition coil

### Ignition coil

#### Operating principle of ignition coil

Ignition coil can provide energy to sparking plug which is installed in the combustion chamber. High-tension cable is to connect sparking plug and ignition coil. Ignition coil is the part that can not be maintained.

#### Ignition coil appearance



#### Technical parameters

- Input voltage: 9~14 VDC
- Output voltage: 25~35kV
- Normal operating temperature: -30~110°C
- Storage temperature: -40~155°C

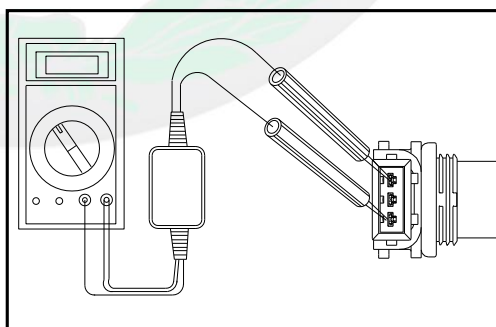
#### Check the coil one time

Coil terminal impedance measurement

Standard value:  $(0.6 \pm 0.1) \Omega (20^\circ\text{C})$

When the resistance value within standard value range shall be excellent.

Resistance value " $\infty$ " indicates coil wire disconnection". It is necessary to replace the ignition coil.



#### Secondary coil

## Ignition coil

### Ignition coil

#### Ignition system inspection

##### \*Attention

- When the sparking plug is free of spark, check whether the wiring components are loosening, access defect etc.. Check whether the voltage value is normal.
- There are many brands of avometer. With different internal resistance, the tests value will be different as well.

Connect high voltage shunt on multimeter.

Or ammeter with an input impedance over  $10M\Omega$ 10CV.

#### Primary voltage of ignition coil

If dismantle the sparking plug, install another sparking plug to realize GND to engine.

##### \*Attention

Test the circuit wiring after correct wiring.

The normal circumstance of cylinder press pressure refers that the sparking plug is installed on the air cylinder.

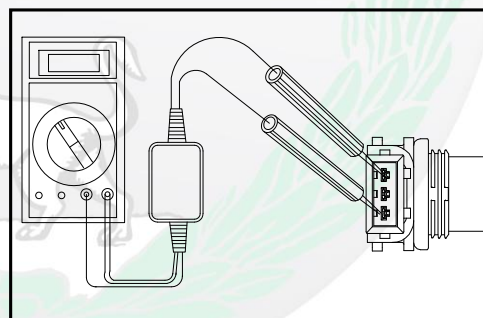
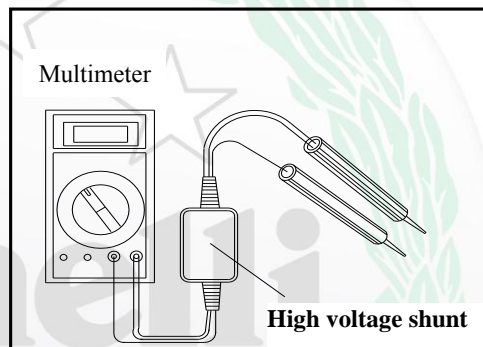
Connect the ignition coil wire. A coil terminal (black/red) is to be set on the current divider of body iron.

Press the start-up motor or ignition coil rod measurements to realize the Max. voltage.

**Min. voltage: over 95V**

##### \*Attention

Pay special attention that the metal part of multimeter can not be touched by fingers to avoid electric shock.



## Ignition coil

### Ignition coil

Operation precaution:

Operation precaution	Causes
<b>DON'TS:</b> Assemble low voltage installation connectors after power on.	The behavior could lead to accident ignition of secondary coil, and may cause personal injury.
<b>DON'TS:</b> Remove the secondary high pressure connectors with a screwdriver. The right tools shall be removed.	It may damage secondary high pressure connector, form additional circuit, produce arc, cause fire or even bodily injury.
<b>DON'TS:</b> Use dropping or physical damaged parts visually inspected.	The damaged parts can lead to premature failure of components.
<b>DON'TS:</b> Scrap the secondary high pressure head or put any material on the surface of high pressure head.	The behavior may damage the sealing surface and cause high voltage leakage.
<b>DON'TS:</b> Use tools to impact ignition system components.	It will lead to physical hazard, and will cause system fault or failure.
<b>DON'TS:</b> Spray paint or other mist spray to connector.	Insulation spray may form high impedance or open circuit. Conduction type spray may form short circuit.
<b>DON'TS:</b> Mount the ignition system components with high-tension cable and ignition wire.	The adapting piece of ignition system shall not bear the part weight which may lead to poor circuit connection or reduce the performance.
<b>DON'TS:</b> Pierce or detect secondary high tension line	It will form a loop outside the system and cause fire or even bodily injury caused by electric arc.
<b>DON'TS:</b> Use without sparking plug being installed.	During the operation period, the technician will come into contact with high voltage life damage; under the circumstance of not running, the material not burnt will cause a potentially dangerous area.
<b>DON'TS:</b> Ignition wire share with other components.	Wiring harness is the only fault which can prevent interference between electrical components.
<b>DON'TS:</b> In addition to the overall power, apply additional voltage on the ignition system.	It may lead to performance reduction or fault of ignition system electric appliance.
<b>DON'TS:</b> Use tools to connect the sparking plug to secondary high pressure head of ignition coil. Manual installation of high-tension cable is the optimal.	It may cause damage to high pressure head and connectors surface.
<b>DO'S:</b> Assemble secondary guide line connecting primary line	The generated secondary voltage may cause ignition components damage, test equipment damage and even personal injury.
<b>DO'S:</b> Be carefully while working around the ignition system.	The high voltage generated by secondary high voltage coil may cause bodily injury or damage to the test equipment.
<b>DO'S:</b> The appropriate operation and transportation modes are conducive to reducing the impact, and damages caused by moisture and contaminants.	The damaged parts can lead to premature failure of components.
<b>DO'S:</b> Avoid frequent connector plug electrical components.	Connecting and disconnecting parts frequently may lead to poor contact.
<b>DO'S:</b> Ensure that the low voltage socket is connected to right position and is locked	This can cause ignition failure due to intermittent connection of electric circuit.
<b>DO'S:</b> Use allowable junction box for test ignition system.	It may cause the damage of the connectors or parts.
<b>DO'S:</b> Ensure proper sealing at connection.	Liquid invasion end connection may lead to circuit short circuit. Under external environment, it may lead to serious corrosion.
<b>DO'S:</b> Use on the gasoline engine.	It is necessary to design another combustion system by using other fuel.
<b>DO'S:</b> Install insurance in power supply circuit.	Protect the system in case of short circuit.

## Ignition coil

### Ignition coil

#### Operation precaution:

Operation precaution	Causes
DO'S: In case of engine operation, take hot plate and guard plate as junction point.	High voltage and current may lead to failure or reducing the module performance.
DO'S: Bind the guard plate and vehicle as far as possible.	This will reduce the potential grounding and improve the module heating.
DO'S: The ground wire of ignition system should be as short as possible. If it is allowable, it can be common-grounded with the engine which will reduce unnecessary ground loop.	This will reduce unnecessary ground loop.
DO'S: The wiring harness of ignition system should be reasonably arranged to prevent additional heat effect and damage.	It helps to prevent virtual circuit, open circuit and short circuit.
DO'S: Ignition secondary high voltage wire shall not connect with primary ignition wires and other wiring harness connection.	The peak voltage generated by secondary high pressure wire may cause reducing or failure of adjacent component performance.
DO'S: Spark plug wire (secondary wire) and primary cable shall not connect to cutting edge. The fixed parts shall not be connected too tightly. It shall be far away from the moving components (belt, fan etc.) Keep a distance at least 125 mm away from 400F heat source. Take protection measures (dirt, oil, water etc.) for environment damages.	Spark plug wire will carry high voltage (30,000V). In case of insulating layer failure, notch or scoring may generate electric arc. This may lead to ignition system fire, fireless or premature failure.
DO'S: Not all the clamp devices are designed as reusable. Pay attention on specifications of the fastening devices. All wiring harness should get supporting within 6 inches away from the connector.	If the clamp device is designed as not reusable, it can not get sufficient retention. The connector can not support the weight of wiring harness in design.
DO'S: Replace the sparking plug according to the following steps: 1-Before removing sparking plug, keep far away from oil and inflammable materials. 2-Pull out the cavity cap connecting to sparking plug. Hold the sparking plug, rotate 90°. 3-Use appropriate socket wrench to loose each spark plug or alternately.	To remove the sparking plug, it is necessary to cool down the engine first. After combustion, the engine and sparking plug are under high temperature. Removal of sparking plug may lead to damage of sparking plug screw thread. Use safety goggles to protect eyes from being damaged by dust from compressed air at sparking plug holes.
DO'S: Clean the sparking plug according to the following steps: 1-Remove the residual oil, water and sewage on the sparking plug surface. 2-If there is still oil contamination on sparking plug after combustion, nonflammable and nontoxic solvent can be used to clean the sparking plug. And then use compressed air to dry the sparking plug. 3-Take propane flame to dry wet sparking plug head. Flames are allowed to enter the center electrode of insulators. 4-If there are any carbon depositions on sparking plug screw thread, wire brush can be used to clean the sparking plug. Pay attention not to damage the electrode and the insulator.	-Cleaning sparking plug will reduce the voltage generated between electrodes arc. -Cleaning and clearance adjustment can not recover the spark plug to total new state. Through cleaning, to substitute the used sparking plug for the new one is the most economic and effective method. -Do not use water or any liquid for cooling. -Cleaning the thread is conducive to sparking plug installation. In addition, sparking plug and cylinder cover shall be contact closely for heat dissipation.
DO'S: Adjust the spark plug gap according to the manufacturer's instructions to maintain the best fuel economy and good performance of the engine; the scale can be used to accurately measure the spark plug gap; the side electrode of sparking plug can be moved. However, the central electrode can not be moved. Too wide gap may lead to fire (higher ignition voltage is required)	Too narrow gap may affect the stability of idling. The used spark plug can not be measured and identified accurately.

## Ignition coil

### Ignition coil

#### Operation precaution:

Operation precaution:	Causes
DO'S: When replacing spark plug, use the ones with same calorific value, thread and size.	Over heating of sparking plug may lead to ignition in advance or piston ring damage. Over cooling of sparking plug may cause pollution or emission problems.
<p>DO'S: Sparking plug installation shall abide by the following steps:</p> <ol style="list-style-type: none"> <li>1-Maintain the cylinder screw thread and sparking plug screw thread clean. The sparking plug screw thread shall be free of burr. Use tools for tapping or threading if necessary.</li> <li>2-Maintain the sparking plug gasket clean. The screw thread gasket and gasket base shall be on the contrary. No gasket is required for sparking plug with taper thread.</li> <li>3-Screw the sparking plug in the cylinder end. And then use torque wrench to tighten up according to manufacturer's recommendation.</li> </ol> <p>The twisting force differs depending on spark plug types and cylinder head materials.</p>	<p>If the screw thread is damaged, this will hinder the optimal transfer heat to the cylinder head.</p> <p>Do not use reverse phase size to match sparking plug. This will reduce the friction spark plug, which will rotate the spark plug and far away from the engine cylinder head which will enhance cylinder head dropping.</p> <p>If the spark plug is too tight, it will cause spark plug lifting and spark plug too tightly. It is difficult to remove.</p>



## Ignition coil

### Ignition coil

#### Ignition coil installation

Install the O-shaped ring (6) and ignition coil set (5) on ignition coil (4).

Install the ignition coil (4) to the engine.

Fix the ignition coil on the engine by utilizing the bolt (1), spring washer (2) and ignition coil positioning clamp (3).

#### Note:

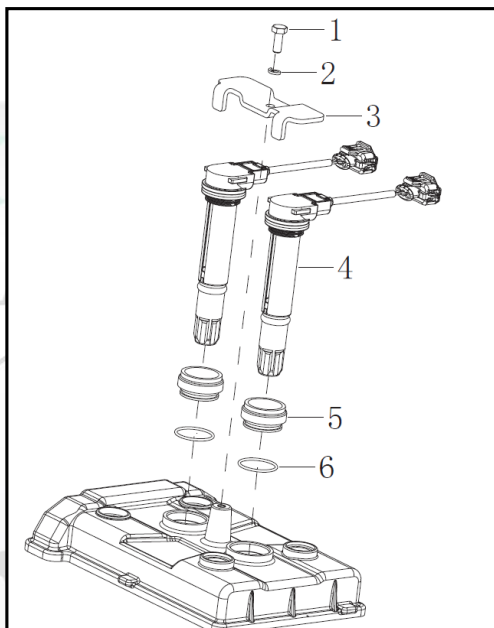
Tighten screws to the following moment:



Moment 10N\*m

#### \*Attention

Primary coil is for black/red line joint installation.



## Position sensor of crankshaft

### Position sensor of crankshaft

Disassemble the position sensor of crankshaft

Bolt of crankshaft sensor [A]

Crankshaft sensor [B]

#### \*Attention

Do not drop the sensor to the ground, especially on hard ground. The sensor may be damaged subjecting to such collision.

Use tester

#### \*Attention

Check whether the trigger can work on the engine.

Check the sensor of crankshaft position

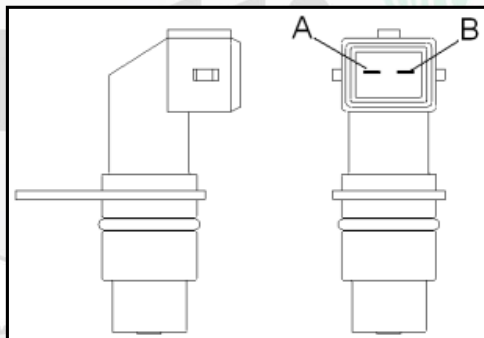
Disassemble conductor joint of trigger

Measure the resistance value at point A and B of engine.

**Standard value:  $550 \pm 50 \Omega (20^\circ\text{C})$**

If the measured resistance is higher than the stipulated value, the coil circuit shall be disconnected and shall be replaced.

If the measured resistance is lower than the stipulated value, the coil circuit is under short circuit and shall be replaced.



## ECU

### ECU

#### ECU disassembly

Disassemble the seat cushion.

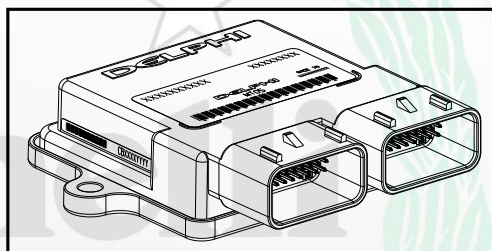
Disassemble the screw (2). Take the ECU (1) out from frame, as shown in Fig. A

Unplug the connector of ECU and cable



#### Check ECU

Dismantle ECU unit. Check the parts associated with ignition system at wiring end. See details at: "electro-jet system, ECU section".



## Sparking plug

### Sparking plug

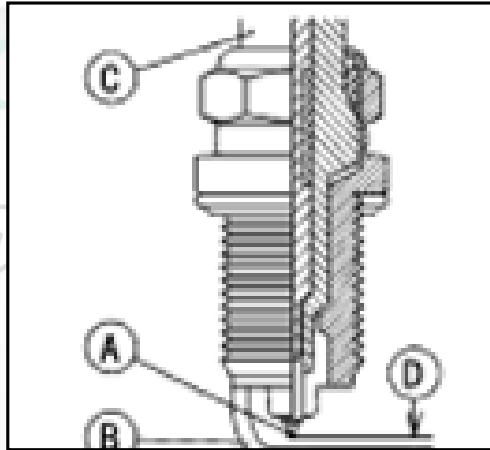
#### Sparking plug inspection

- Sparking plug disassembly (See the section of sparking plug disassembly)
- Visual inspection of sparking plug
- If the central electrode of sparking plug [A] and/or side electrode [A] being corroded or damaged, or the insulated terminal [C] being damaged, replace the sparking plug.
- If the spark plugs being contaminated or with carbon deposition, replace the spark plug.
- Use a line feeler to measure the clearance [D].
- If the clearance is incorrect, replace the sparking plug.

**Sparking plug clearance: 0.6-0.7mm (0.024-0.028 in.)**

- Use standard sparking plug or the same level of products

**Sparking plug: CR8EIA-9**



#### Ignition inspection

- Start up according to the following conditions

#### The first inspection

##### Conditions:

**Transmission device → to grade I**

**Clutch handle → Hold**

**Kick stand → Upper**

- Open the ignition lock and press start button
- If the circuit of start-up system is normal, the motor will not rotate.
- If the engine starts, check start power switch, single flameout switch, gear switch and relay box.
- If all unit status are normal, replace ECU. Start up the engine according to the following conditions

#### The second inspection

##### Conditions:

**Gear → Neutral position**

**Clutch handle → Release**

**Kick stand → Lower**

- Open the ignition lock and press start button
- And then start up the engine. The precondition is that the circuit of start-up system should be normal.
- ★ If the engine failed to be started up, check the start switch, gear switch and relay box.
- ★ If all unit status are normal, replace ECU.

## Sparking plug

### Sparking plug

#### The third inspection

- Perform the following operation. Check whether engine can be safely shut down.
- Run the engine according to the following conditions

##### Conditions:

**Gear → Gear I**

**Clutch handle → Release**

**Kick stand → Holding**

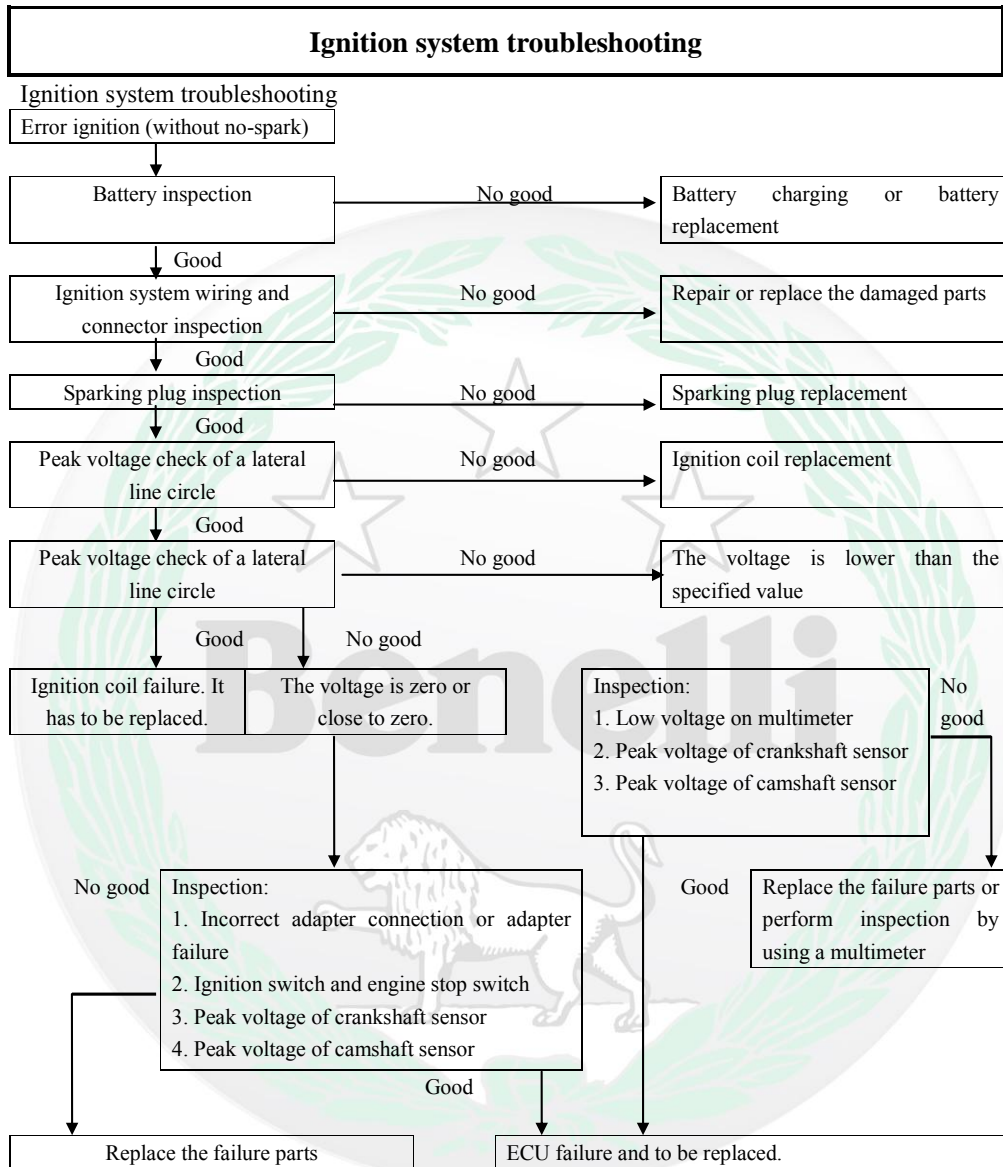
- Put the kick stand on the ground. The engine will shut down.
- ★ If there is no flameout, check the start switch, gear switch, kick stand flameout switch and relay box.
- ★ If all unit status are normal, replace ECU.

#### IC igniter inspection

- Built-in igniter within ECU
  - Refer to the following items
  - Operation inspection related components of electric start safety circuit (See operation inspection related components of electric start safety circuit)
  - Troubleshooting of ignition system (See ignition system section)
  - Voltage check of ECU (See detailed information at electronic fuel injection system (ECU)-ECU power check)

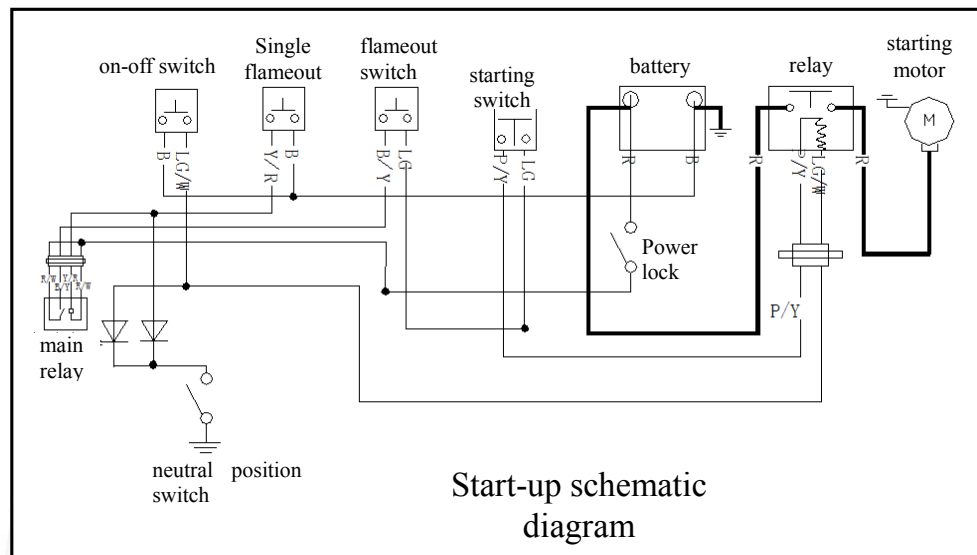


## Ignition system troubleshooting



## Start-up system

### Start-up system



## Motor start-up

### Motor start-up

Disassemble motor start-up

#### \*Attention

Before motor disassembly, it is necessary to turn the master switch to "OFF". Dismantle the rechargeable battery bond strap. Open the power supply to see whether the motor is running to make sure it is safe.

#### Attention:

**Do not flap the motor shaft or fuselage. Otherwise, it will damage the motor body.**

- Kettle decorative plate disassembly
- Kettle disassembly

- Disassemble terminal nuts of motor cable terminals
- Dismantle assembling bolts of starting motor
- Pull out electrical machine from the left

Inspection start-up

Start up the engine according to the following conditions

#### Conditions:

**Gear → Neutral position**

**Clutch handle → Release**

**Kick stand → Lower**

- Open the ignition lock and press start button
- After exclusion of normal operation of start-up system normal circuit, the motor will not start up
- Remove the starter motor and directly connect to positive and negative electrode of storage battery directly. In case of normal operation, it is engine.
- Matching problem: If it failed to run, it means that the starter motor is damaged.

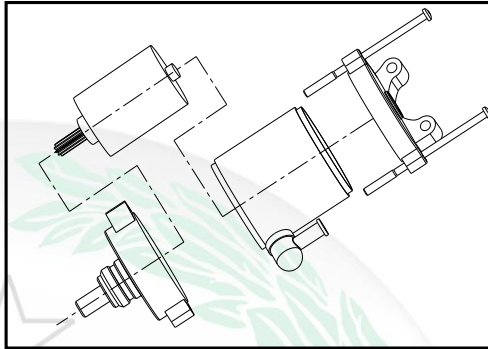


## Motor start-up

### Motor start-up

Decompose starter motor

Dismantle shell screw, front cover, motor shell and other parts.



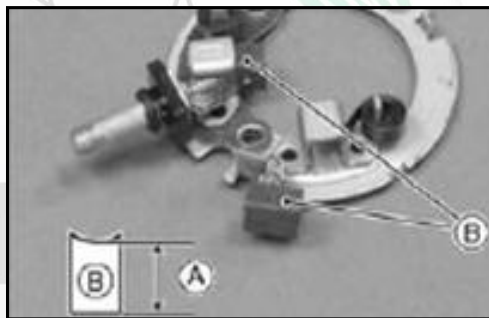
Carbon brush inspection

- Measure the length [A] of each carbon brush [B]
- ★ If a carbon brush has reached the service limit, carbon brush plate assembly has to be replaced.

**Length of the carbon brush**

**Standard: 10mm**

**Service limit: 5.0 mm**

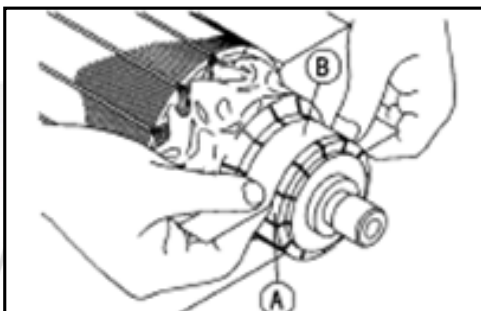


## Motor start-up

### Motor start-up

Cleaning and inspection of commutator

- Grind the commutator surface [A] with crocus cloth [B] if necessary. Cleanup the groove at first.

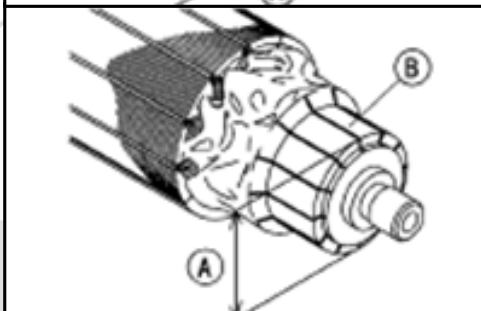


- Diameter [A] of measuring commutator [B]
- ★ If the diameter of commutator is shorter than operation limit, replace the new starter motor.

**Diameter of commutator**

**Standard: 28 mm**

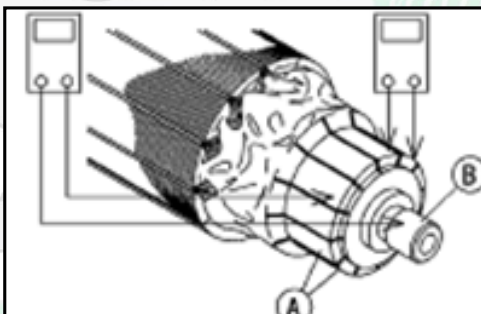
**Service limit: 27 mm**



- ★ If the resistance between two commutators is high or without reading, the coil has open circuit. The starting motor must be replaced.

- Use multimeter to measure the distance between commutator and axis [B]

- ★ If the reading is 0, it means short circuit of armature and the starting motor has to be replaced.





## Motor start-up

### Motor start-up

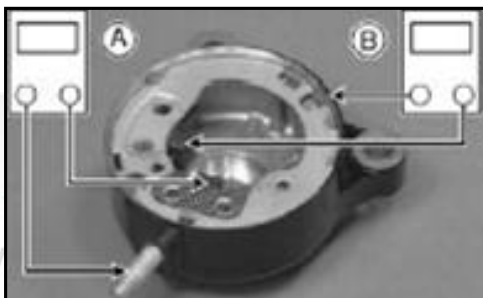
#### Carbon brush inspection

- Measure the resistance with a multimeter of  $\times 1\Omega$  as shown in the Fig. below

Terminal bolt and positive carbon brush [A]

Right end cover and negative carbon brush [B]

- ★ If it is close to  $0\Omega$ . It means open circuit of carbon brush. Carbon brush plate assembly has to be replaced.



#### Right end cover assembly inspection

- Measure the resistance with a multimeter as shown in the Fig. below

Terminal and right end cover [A]

- ★ In case of any reading, short circuit of right end cover. Right end cover assembly inspection

#### Start motor assembly

Oil seal in front cover. Apply lubricating grease.

Install the electric brush on electric brush bracket

Apply lubricating grease at both sides of the electric brush shaft

Press the electric brush to the bracket

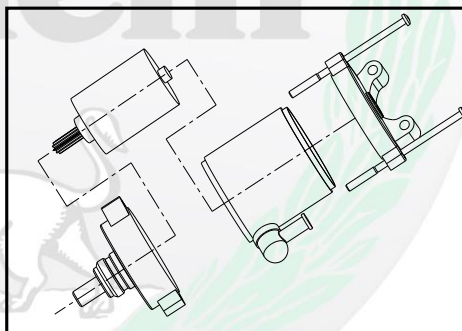
#### \*Attention

- Pay special attention that the contact surface of electric brush and armature shall be free of damage.
- Pay attention that oil seal lip can not be damaged at armature installation shaft.

Install motor back cover.

The screw hole and front cover at motor cover shall be aligned for installation.

Lock the shell screw



#### \*Attention

At shell and front cover assembly, armature can be easily pulled out by absorbing the front cover with a magnet. Gently bet with hands to assemble.

**Motor start-up**

**Motor start-up**



## Motor start-up

### Motor start-up

#### Start motor assembly

Install the start-up motor. Make sure to install dirt-proof boot properly.

Install the start-up motor

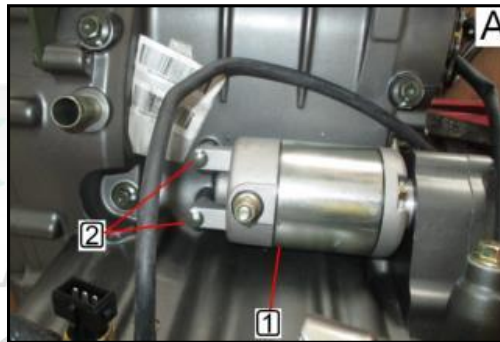
Fix the start-up motor (1) on the engine with fixing bolts (2) as shown in Fig. A.

#### Note:

Tighten the two bolts to the following moment:



Moment 10N\*m



# Benelli



## Relay start-up

### Relay start-up

Disassemble:

#### \*Attention

Before motor disassembly, it is necessary to turn the master switch to "OFF". Dismantle the rechargeable battery bond strap. Open the power supply to see whether the motor is running to make sure it is safe.

Disassemble the left guard plate

Screw off the bolt ④

Disassemble the relay ③

Disassemble start-up motor wire connector

Disassemble start-up motor wire connector



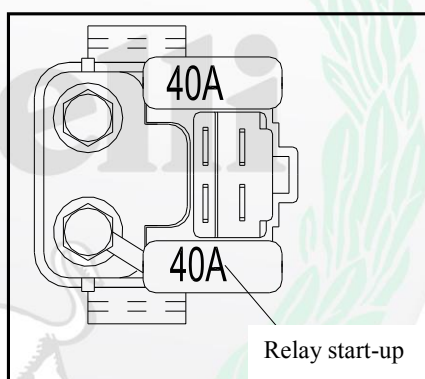
#### Relay start-up inspection

When the master switch is turned to "ON", inspect after hearing the sound "kada".

If any such sound observed, it is normal.

If there is no sound:

- Check the voltage of start-up relay.
- Actuation check of start-up relay
- Actuation check of start-up relay



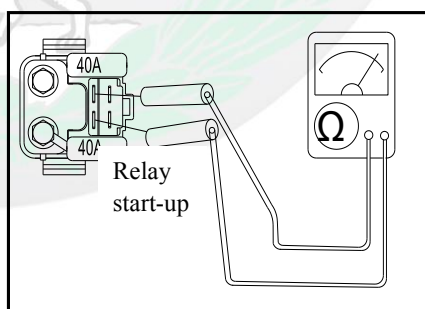
#### Voltage check of start-up relay

Perform stand up. Measure the voltage between start-up relay joint purple/yellow line and car body GND Ground.

When the master switch is turned to "ON", turn on flameout switch. The gears shall be switched to neutral position. The rechargeable battery voltage shall comply with regulations.

In case of no voltage at start-up relay terminal, the flameout switch can be cleaned. Whether it is neutral position.

Perform wire inspection of secondary pipeline.



## Relay start-up

### Relay start-up

Relay start-up inspection

Dismantle the start-up relay connector

Conduction checking of the black wire of wire connector terminals and vehicle GND Ground .

Start up the button. The green/yellow wire and vehicle GND Ground shall be connected properly.

Continuity and guide line inspection at start button while without conduction

Action check of start-up relay

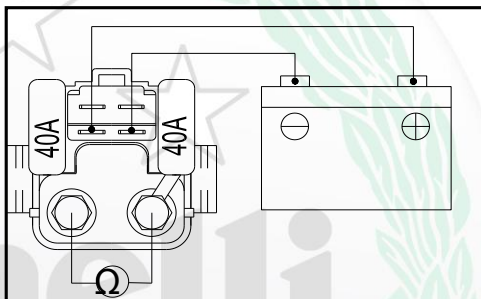
- Connect to engine relay with a multimeter and 12V battery, as shown in the Fig. below
- If the relay failed to work according to regulation, the relay has failure and has to be replaced.

**Test relay**

**Tester range: x 1  $\Omega$  scope**

**Standard: At battery connection  $\rightarrow 0\Omega$**

**At battery disconnection  $\rightarrow \infty\Omega$**





## Relay start-up

### Relay start-up

#### Assembly

Install and start motor wire connector. Install the battery wire connector

Tighten the bolts ④

Relay assembly ③

#### Note:

Tighten screws to the following moment:



Moment 10N\*m



# Benelli



## Instrument

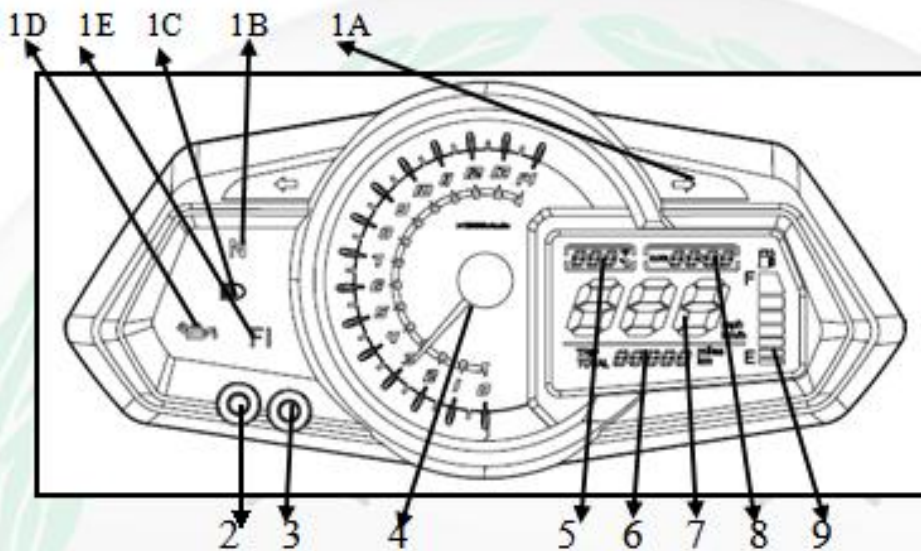
### Instrument

#### Instrument disassembly

Dismantle the retaining nuts at headlight head with a hex socket  
Dismantle the instrument fixed bracket mounting plate with a sleeve (inside the hood)  
Separate the instrument fixed bracket mounting plate with a sleeve  
Dismantle the air guide sleeve with a screwdriver at the front of the instrument

#### Instrument and indicator light

When the ignition key turn to "ON", the instrument and indicator light are open.  
After initial inspection, information is corresponding to the overall health status of the vehicle.  
Indicator lights have the following indicator lights



#### Status indicator lamp

1A: Turn to indicator light (green)  
When the indicator light flashes, it means that the light is on  
1B: Neutral position indicator light (green)  
When the indicator light is on, it means that the whole machine is under neutral gear state.  
1C: High beam lamp (blue)  
When the indicator light is on, it means that the light is on  
1D: Oil pressure warning light (red)  
After open the power supply, and the engine is not started up, the engine oil light is normally on; after starting up, if the engine oil pressure is normal, the engine oil indicator light is not off, if the oil lamp is not extinguished, perform shut down inspection;  
At engine oil pressure oil inlet, engine oil pressure water inlet, the indicator light will be constant on. It needs to stop running for inspection.  
FI: "FI" refers to fault code diagnosis of electro-jet system (orange)

## Instrument

### Instrument

After the key and the electronic injection indicator light are on, oil pump will work for 3 seconds. Start the motorcycle. After the motorcycle being started up, the indicator light will be off, which indicates that the vehicle is normal without fault; otherwise, it means fault. At the same time, if the indicator light is at extinguishing status, the vehicle runs normally. If the indicator light is on, stop running for inspection. Contact Benelli & Qianjiang Motorcycle stores takes dedicated vehicle to carry out fault diagnosis.

#### Function button (2)

Button function table						
Item No.	Function	Power supply	Indication	Left button	Right button	Results
	Functions switching			<3s		TRIP
	Functions switching		TRIP	<3s		TOTAL
	Small mileage reset		TRIP	>3s		Small mileage reset
	Functions switching		km km/h		<3s	miles mph
	Functions switching		miles mph		<3s	km km/h
	Time setting		TOTAL	>3s		Hour place flashing
			TOTAL		<3s	Hour place +1 (0-23)
			TOTAL	<3s		Shift to decade place
			TOTAL		<3s	decade place +1 (0-5)
			TOTAL	<3s		Shift to unit place and flash
			TOTAL		<3s	Unit point +1 (0-9)
			TOTAL	<3s		Exit clock menu
Note	Under clock adjustment state, if there is no pressing action in 5s, automatically exit the menu.					

#### Revolution meter (4):

It indicates revolutions per minute of the engine.

#### Water temperature measuring

It indicates water temperature °F (Fahrenheit) or C° (degrees Celsius)

#### All/part of km counter (6)

According to your needs, select relative odometer mileage (TRIP) or TOTAL mileage (TOTAL) function, and can choose unit as MPH (miles) or km. Short press the function button (2) as well.

Relative odometer mileage (TRIP): It is a milometer that can be reset. Record the driving mileage within a certain time range. Under relative odometer mileage (TRIP) status, long press (6) function button A to reset.

Total distance (TOTAL): Record the total mileages.

Milometer records the total distance traveled.

#### Speedometer (7)

Speedometer refers to driving speed. According to your requirements, short press the function button at the same time.

Choose unit as mph (miles/h) or km/h.

#### Digital clock (8)

Display hour and minute. If the time has to be adjusted, serial number function button (2)

#### Fuel gauge (9):

Refers to the residual oil in the fuel tank. In case of filling fuel and presenting as 7 levels of oil level. When the fuel oil is insufficient, and the oil level is one level or insufficient to one level, fuel gage will flash consecutively.

## Instrument

<b>Instrument</b>
-------------------

### Assembly

Assembly shall be in the reverse order of disassembly.



## Meter (2018)

### Meter

### Disassembly of Meter

Remove the bracket clamp bolts of meter, and remove the relevant assembly data of meter and unplug the meter harness and cable interface.

#### daytime mode



#### night mode





## Meter and Indicator Light

When the ignition key is rotated to “ON”, the meter and indicator lights can be turned on.

After the initial inspection, the information will correspond to the overall conditions of motorcycle at that time.

The dashboard has the following indicator lights.

### State Indicator Light

Turn indicator light (green)

If this indicator light is flashing, the turn signal light is on.

Neutral indicator light (green)

If this indicator light is on, the motorcycle is in a neutral state.

High beam indicator light (blue)

If this indicator light is on, the high beam light is on.

Oil pressure warning light (red)

When the engine is not started after the power is turned on, the oil indicator light is always on; if the oil pressure is normal after starting the engine, the oil indicator light will be off. If the oil indicator light is not off, the oil pressure may not be normal, and the motorcycle needs to be stopped for inspection;

If oil or water enters the engine, the indicator light will always be on, and the motorcycle needs to be stopped for inspection.

This indicator light shows EFI system fault code diagnosis (yellow)

This indicator light shows ABS indicator light (yellow)

When the key is turned on, the EFI indicator light will be on, and motorcycle can be started after oil pump has operated for 3 seconds. If the indicator light goes out after the motorcycle is started, the vehicle is normal and there is no fault; if the indicator light is on, there is a fault. Also, if the indicator light is off during driving, the vehicle is running normally. If the indicator light is on, there is a fault in the motorcycle and it needs to be stopped for inspection. Please contact Benelli & Qianjiang Motorcycle Dealer to check the motorcycle with the special vehicle fault diagnosis instrument.

## Meter

### Meter

#### Function Button

In the ODO state, within 10 seconds after power-on, press and hold the button to enter the clock setting. After 10 seconds, press and hold the button to enter the metric system

Short press button: ODO-TRIPA-TRIPB

In the TRIP state, press and hold the button to clear the current TRIP mileage

Tachometer

Indicate the revolutions per minute of engine at this time.

#### Water Temperature Measurement

Display water temperature interval

#### All/Partial Kilometer Counter

According to your needs, you can select the relative mileage (TRIP) or total mileage (TOTAL) function on the odometer, or you can select the unit of mph or km, you can press them simultaneously.

Relative mileage (TRIP): It is an odometer that can be cleared and used to keep a record of the mileage traveled over a certain period of time. In the relative mileage (TRIP) state, the reading can be cleared.

Total mileage (TOTAL): Keep a record of the total mileage traveled.

The odometer is used to keep a record of the number of kilometers of the total distance traveled by motorcycle.

#### Speedometer

The speedometer indicates the driving speed. According to your needs, you can press the function buttons simultaneously.

Select the unit of mph or km/h.

#### Digital Clock

The time is displayed in hours and minutes. To adjust the time, see the button adjustment above.

#### Oil Gauge

Indicate how much oil is stored in the tank.

Master switch





Master switch

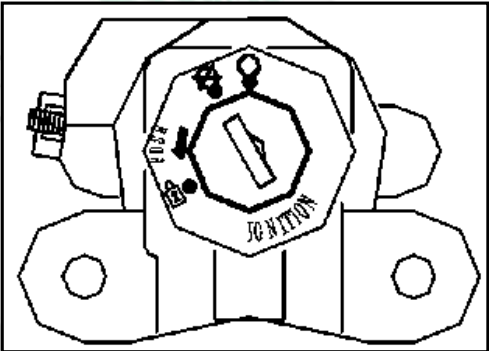
Master switch disassembly

- Disassemble the air guide sleeve
- Disassemble conductor joint of master switch

Check the master switch

Conduction checking on connector terminal  
If do not tally with the conduction table, please replace the main switch.

Schematic wiring diagram		
Wire color	R	R/W
Gear		
		
		
		



## Loudspeaker

### Loudspeaker

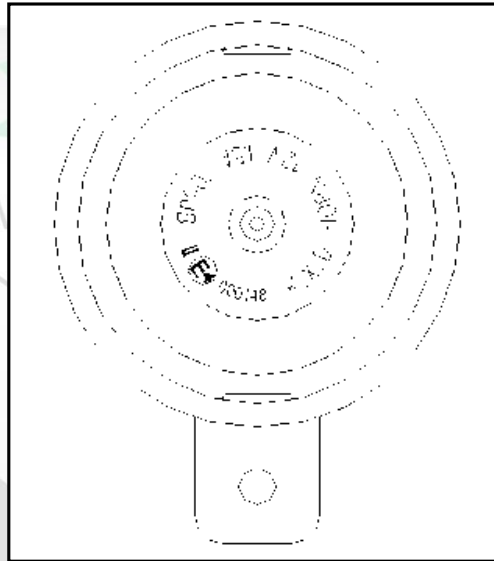
#### Disassemble:

Remove the loudspeaker wiring

#### Inspection

After the external loudspeaker being connected to rechargeable battery, if there is any sound, it refers to normal operation.

**Resistance value:  $3.2\Omega$**

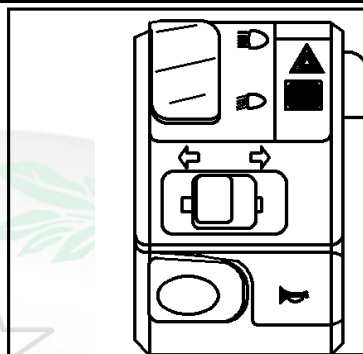


## Handlebar switch (sell on domestic market)















### Handlebar switch

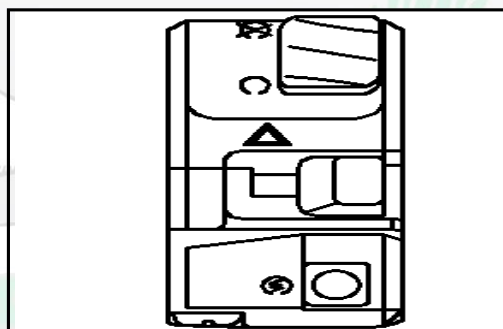
The switches can be divided as:

1. Dimmer switch
2. Change-over switch
3. Loudspeaker switch
4. Headlight switch
5. Flameout switch
6. Start-up switch



Schematic wiring diagram

Dimmer switch					Change-over switch				Loudspeaker switch		
	R/W	BL	R/Y	LBL		G/B	O	G/W		R/W	N
											
											
											



Schematic wiring diagram

Headlight switch				Flameout switch			Start-up switch		
	R/W	Y	Y/R		R	N/Y		N/Y	G/Y
	○—○—○—○				○—○			○—○	

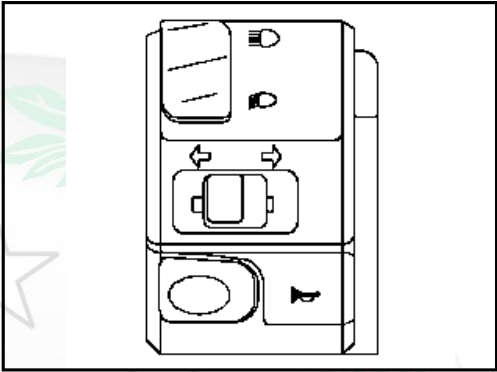


**Handlebar switch (EURO-STANDARD state)**

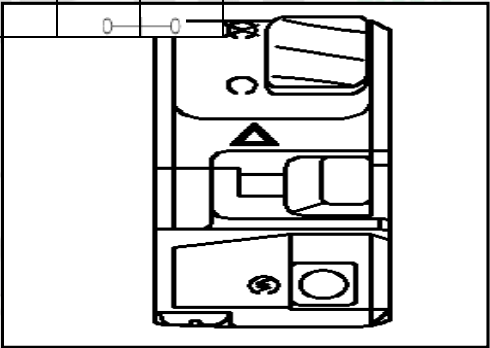
Handlebar switch

The switches can be divided as:

1. Dimmer switch
2. Change-over switch
3. Loudspeaker switch
4. Warning switch
5. Flameout switch
6. Start-up switch



Schematic wiring diagram											
Dimmer switch				Change-over switch			Loudspeaker switch				
	R/W	BL	R/Y	LBL		G/B	O	G/W		R/W	N



Schematic wiring diagram								
Warning switch			Flameout switch			Start-up switch		
	R/Y	BL		R	N/Y		N/Y	G/Y

## Velocity sensor

### Velocity sensor

#### Disassemble velocity sensor

##### Warning

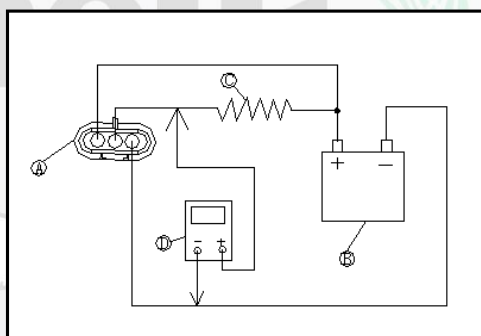
**Do not drop the sensor to the ground, especially on hard ground. Impacting vibration can damage the sensor.**

- Loosen the bolts ② Disassemble velocity sensor ①
- Disconnect the connectors of velocity sensor



#### Check the velocity sensor

- Disassemble velocity sensor (See the velocity sensor disassembly section)
- Connect the velocity sensor connector [A] and battery [B], 10kΩ resistor [C] and handheld multimeter [D] as shown in the Fig..
- Set the multimeter to DC 20V (digital multimeter)
- Slide the whole surface transverse voltage of velocity sensor from storage battery voltage to 0-1V.



#### Velocity sensor assembly

Assembly shall be in the reverse order of disassembly.

#### Note:

Tighten screws to the following moment:



Moment 10N\*m

## Relay and fuse-base block

### Relay

#### Relay

Disassemble the relay

Relay is directly installed on the wiring harness.

Pull out the upper cover at disassembly.

Pull out 2# and 5# relay.

Screw off the fixing screws with five large sized hex Socket.

Take out the relay

#### \*Attention

Relay diode is available at the relay. The diode of relay box is not removable.

#### Warning

**Do not drop the relay to the ground, especially on hard ground. Such vibration on relay may cause damage on it.**



Circuit inspection for relay

• The electrical conductivity of the following terminals through connecting a handheld multimeter and 12V battery to relay (See internal circuit of relay box).

★ If the readings of multimeter are not conforming to the regulations, replace the relay box.

- **Circuit inspection for relay (Disconnect the battery)**
- **Circuit inspection for relay (Installed with battery)**

	Multimeter connection	Readings of multimeter ( $\Omega$ )
Main relay	3-4	$\infty$
	1-2	Not $\infty$ *
Blower relay	7-8	$\infty$
	5-6	Not $\infty$ *
Oil pump relay	11-12	$\infty$
	9-10	Not $\infty$ *
Main ECU relay	15-16	$\infty$
	13-14	Not $\infty$ *
Light relay	19-20	$\infty$
	17-18	NOT $\infty$ *

	Battery connection (+) (-)	Multimeter connection	Readings of multimeter ( $\Omega$ )
Main relay	1-2	3-4	0
Blower relay	5-6	7-8	0
Oil pump relay	9-10	11-12	0
Main ECU relay	13-14	15-16	0
Light relay	17-18	19-20	0

- \*: Actual readings may differ according to different **handheld multimeter** adopted.

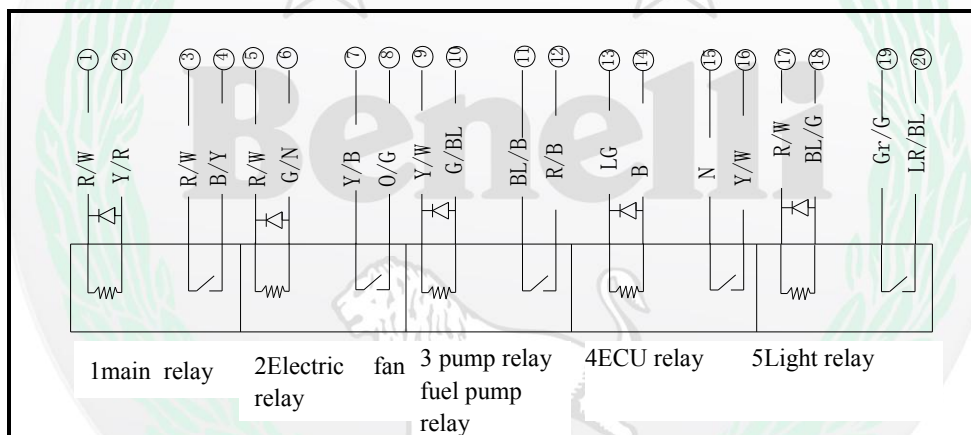
(+): Connect to positive wire

(-): Connect to negative wire

## Relay and fuse-base block

### Relay

Relay (EURO-STANDARD state)



### Relay (sell on domestic market)

Relays for selling on domestic market do not contain #5 relay for export sales. Others are not different with the aforementioned export inspection methods.



## Relay and fuse-base block

### Fuse-base block

#### Fuse-base block

Fuse disassembly

- Seat cushion disassembly (See Chapter Frame, Seat cushion disassembly)



- Open the snap joints and lift the cover
- Straightly pull out the fuse from the fuse-base block with a nipper pliers.



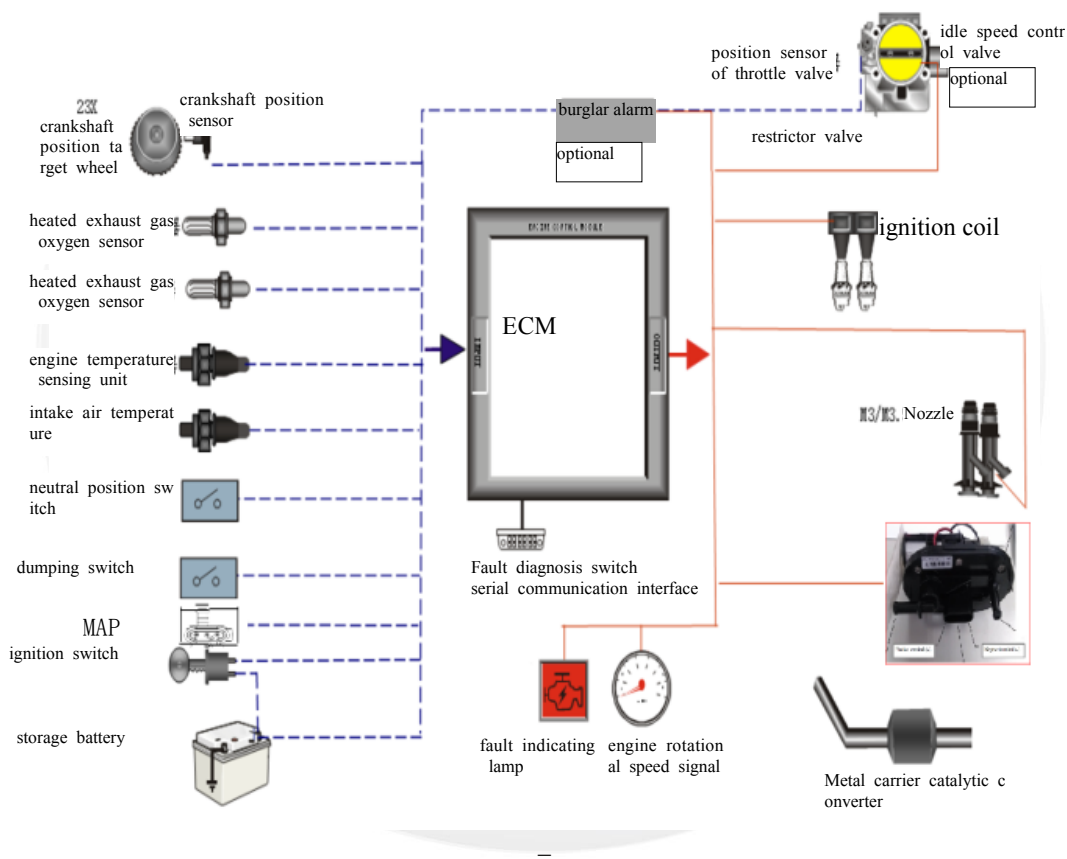


## Electro-jet system

### Electro-jet system

#### Introduction

BJ300GS adopts small sized engine electro-jet system manufactured by Delphi Corporation. The system conducts closed-loop control through two oxygen sensors. Two independent oil cylinder and ignition control. Three-way catalyst is adopted to process engine combustion gas to transform to innocuous gas and discharge to the air. The system adopts closed-loop control self learning system. It can effectively eliminate the manufacturing difference on the system and related mechanical parts manufacturing thus to improve the comprehensive consistency of the whole machine. It can eliminate the error caused by abrasion, and other causes.



## Electro-jet system/ECU

ECU
-----

### Engine control unit (MT05 ECU)

Engine controller is to detect real-time engine running state through various kinds of sensors. Through reasonable calculation and self-learning control output device, it has optimized the driveability of vehicles under various working conditions, and ensured the original vehicle emissions and fuel economy as well. Additionally, in case of system failure, ECU can perform self diagnosis.

### ECU appearance

The upper part of MT05 ECU shell adopts plastic, while the bottom part adopts aluminum alloy. Fig. 2 are front and reverse side photos of MT05 controller.

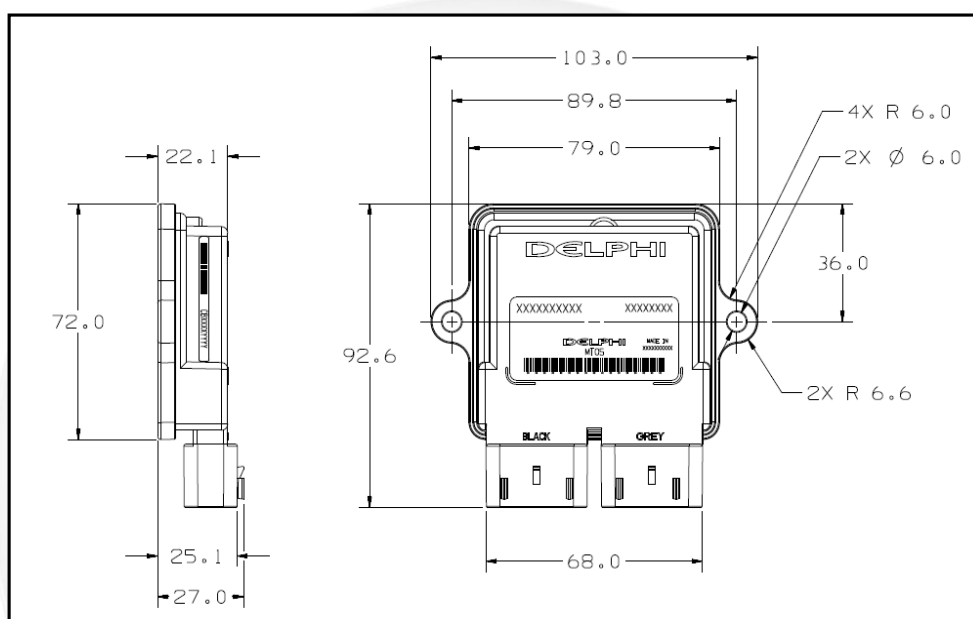


## Electro-jet system/ECU

### ECU

#### Overall dimensions

The Max. overall dimension of the controller is 103\*92.6\*27.1mm. The size of mounting holes, which are used for fixing the controller, have been included, however, not including connectors and wiring harness of the controller. Please refer to the following outline dimension drawing



#### Assembly

Assemble ECU(1) on the frame with screw (2) as shown in Fig. A

#### Note:

Tighten the two bolts to the following moment:



Moment 3.9 N\*m ±10%



#### Warning:

Mounting surface must be flat to prevent generating exterior stress on the controller which may lead to controller circuit board bending.

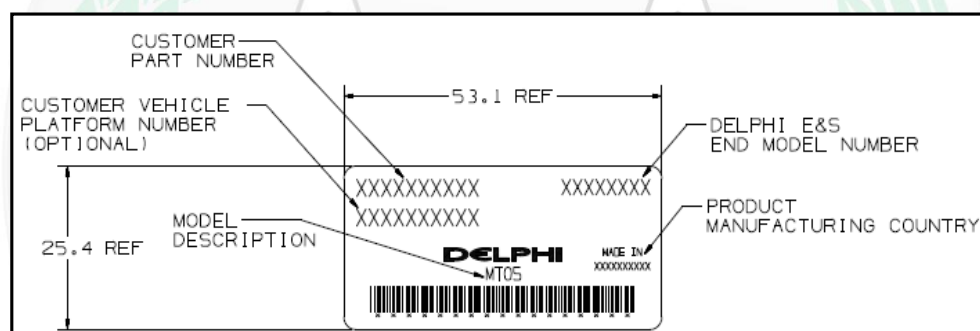
## Electro-jet system/ECU

### ECU

#### Tag and identification label

Each controller has a product identification label for traceability. Label information shall cover Delphi and customer part number, customer vehicle model, controller type description and production date. The label shall not be damaged or contaminated since it is an important basis for Delphi to confirm controller information. If the label is damaged or contaminated, Delphi will not provide after-sales services for the controller. Please refer to the diagram below.

- CUSTOMER PART NUMBER: Product identification number stipulated by the manufacturer;
- DELPHI E&S END MODEL NUMBER: Product serial number identification number of DELPHI;
- CUSTOMER VEHICLE PLATFORM NUMBER: Vehicle information number stipulated by the manufacturer;
- MODEL DESCRIPTION: Product model identification number of DELPHI;
- PRODUCT MANUFACTURING COUNTRY: Manufacturing site of ECM; identification labels should be in English.



## Electro-jet system/ECU

### ECU

#### Definition of ECU pin

J1-1	Idle speed stepper motor high A pin	J2-1	Driving pin of 1-cylinder ignition coil
J1-2	ECP pin	J2-2	System ground pin
J1-3	Fault indicating light pin	J2-3	K line communication pin
J1-4	Heating pin of 2-cylinder oxygen sensor	J2-4	High potential pin of crank signal
J1-5	Signal pin of 2-cylinder oxygen sensor	J2-5	Driving pin of 1-cylinder fuel injector
J1-6	Revolution meter	J2-6	Driving pin of 2-cylinder fuel injector
J1-7	Low CAN line signal	J2-7	Heating pin of 1-cylinder oxygen sensor
J1-8	High CAN line signal	J2-8	Signal pin of intake air temperature sensor
J1-9	System ground pin	J2-9	Pin of oil pump control signal
J1-10	Driving pin of 2-cylinder ignition coil	J2-10	5V Reference voltage ground pin of the system
J1-11	Idle speed stepper motor low A pin	J2-11	Signal pin of MAP
J1-12	Idle speed stepper motor high B pin	J2-12	Signal pin of position sensor of throttle body
J1-13	Idle speed stepper motor low B pin	J2-13	Low potential pin of crank signal
J1-14	Dumping switch (being effective at low position)	J2-14	Signal pin of water temperature sensor
J1-15	Pin of vehicle speed sensor	J2-15	Priming supply (12V positive voltage after key)
J1-16		J2-16	5V reference voltage
J1-17		J2-17	Signal pin of 1-cylinder oxygen sensor
J1-18	Pin of neutral clutch switch	J2-18	Rechargeable battery (rechargeable battery 12V positive power supply)

Viewing from rear side of the engine, the left one is cylinder #1 and the right one is cylinder #2.

Note: J1 refers to the grey connector of ECU; J1 refers to the black connector of ECU; J1-1 refers to #1 pin on the grey connector of ECU.

The Fig. below presented the definition of the pin of MT05 ECU interface as well as the wiring harness connecting diagram of the engine.



ECU
-----



## Electro-jet system/ECU

### ECU

#### Attention:

Attention:	Causes
DON'TS: Place the ECU close to an exhaust pipe or engine	High temperature may reduce the service life of the controller and even cause damage to the controller directly.
DON'TS: Place the ECU close to any place with drop of water, oil or any other liquid	Controller may be damaged by the liquid.
DON'TS: The controller surface is to be covered by clay or other pollutants	Clay or other pollutants which may affect the heat dissipation performance of the controller.
DON'TS: Load additional voltage to the controller	It may cause controller performance failure or even controller damage.
DON'TS: Clean the controller with liquid with dissolution or corrosion action	May damage the controller shell.
DO'S: Ensure that water or a large number of moisture shall not drip or attach on the connectors of the controller	The connectors may be short circuit and further lead to controller damage.
DO'S: Clean the controller with wet cloth and wipe dry	Can prevent controller damage.

#### Power supply requirements

- Power supply: If the battery voltage is greater than 6.3V, the power supply module can start control chip of the controller which is automatically controlled by controller.
- Scope of supply: Enable the controller to work normally within the battery and ignition voltage of 9 to 16v.
- Shutdown: In case of the ignition voltage being lower than 6.2V, the controller will shutdown.
- Controller will enter shutdown procedure and store the important information in the memory of the controller.
- Restart: In the process of restart, all the output will be set to a predefined state. Controller will be under real-time monitoring. In case of any internal error being detected, it will automatically enter the restart status. After restart, the controller will execute according to normal program.
- Overvoltage: Under the circumstance of working for one minute at a DC voltage not exceeding 26V, the controller will not be subject to permanent damage.
- Backward voltage: Under the circumstance of working for one minute at a DC backward voltage not exceeding 13V, the controller will not be subject to permanent damage.

#### Temperature requirements

Operating temperature: The control can run normally between ambient temperature from -20°C to 85°C.

## Electro-jet system/water temperature sensor of engine

### Water temperature sensor of engine

#### Operating principle of water temperature sensor of engine

The sensor is to be used on water cooling engines to measure the temperature of engine water channel. It is assembled on the engine cylinder. Within the sensor temperature range, the resistance will be varied along with different engine temperature. It is characterized of negative temperature coefficient resistor. It is a part that can not be maintained.

#### Appearance of engine water temperature sensor

The appearance of water temperature sensor is as shown below



Wrong picture of water temperature sensor. Ask 665382 for another one.

#### Installation requirements of water temperature sensor of the engine

- Dynamic torque requirements: Should take manual assembly first to correctly mount the screw threads. Tighten them to stipulated moment of torque manually with a wrench. The recommended assembly torsion is as below:



Moment 20~25N\*m

- Static torque requirements: The moment of torque adopted to disassemble the sensor from engine shall not exceed 200% of that used for assembly.

#### Working environment of water temperature sensor of engine

- The sensor is mainly used on water cooling engine
- Normal operating temperature:  $-40\sim 135\text{ }^{\circ}\text{C}$  (consecutive running)
- Relative humidity of working environment: 0~100%
- Typical working pressure: Under the minimum installation torque, the sensor can realize engine coolant sealing under the condition that the actual pressure is up to 206.8kPa (30psi) and the temperature is  $135\text{ }^{\circ}\text{C}$ .
- Limit working environment: Only can work for one hour at the Max. temperature of  $150\text{ }^{\circ}\text{C}$ .

#### Electrical environment of water temperature sensor of engine

- Typical working voltage: reference voltage:  $5 \pm 0.1\text{VDC}$

#### Cleaning method of water temperature sensor of engine

The sensor can be cleaned with isopropyl alcohol and then subject to air drying if necessary. Immerse with isopropyl alcohol for not more than 1 minute. Install necessary sealing connector to prevent cleaning solution invading to internal of the sensor.

## Electro-jet system/intake air temperature sensor

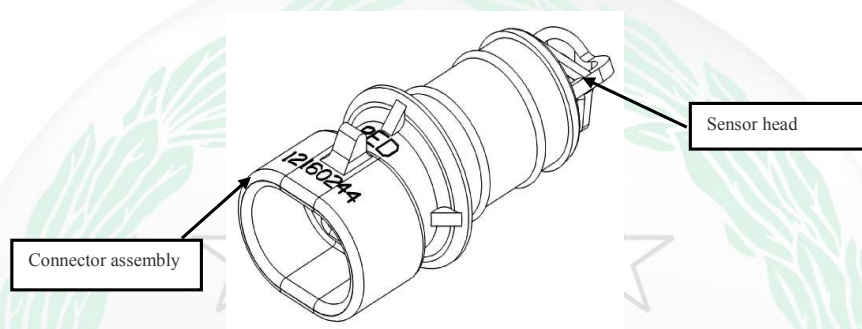
### Intake air temperature sensor

Operating principle of intake air temperature sensor

Within the sensor temperature range, the resistance will be varied along with different engine temperature. It is characterized of negative temperature coefficient resistor. It is a part that can not be maintained.

Appearance of intake air temperature sensor

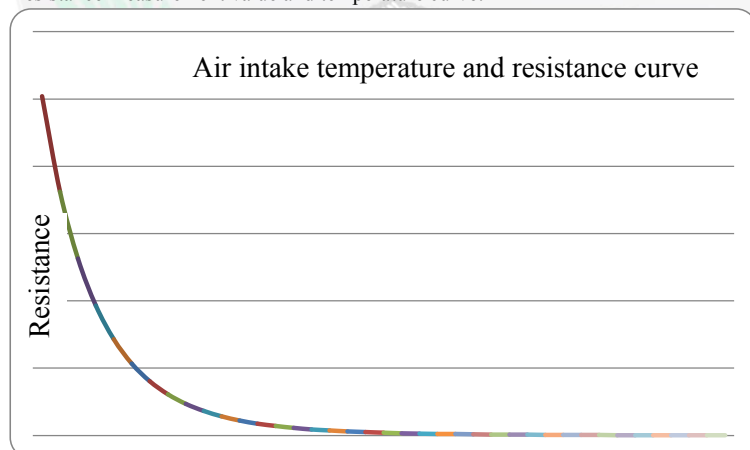
The appearance of intake air temperature sensor is as shown below



#### I. Technical parameters

- Working voltage: 5VDC
- Response time: <15s
- Operating temperature: -40 ~ 150°C
- Relative humidity: 0 to~100% RH.

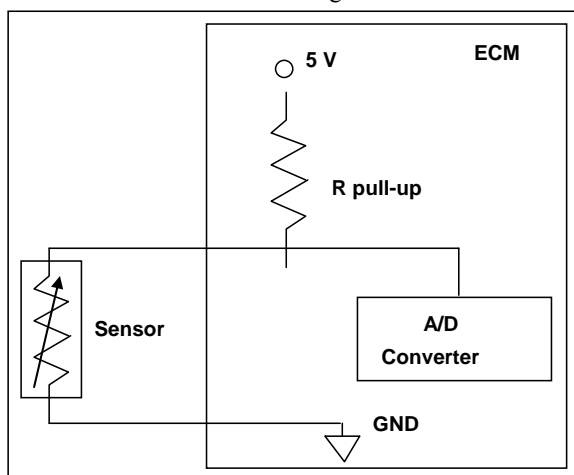
Resistance measurement value and temperature curve:



## Electro-jet system/intake air temperature sensor

### Intake air temperature sensor

Pin definition and functional diagram



Measure the resistance between two pins with a multimeter. The corresponding lists of specific temperature and resistance are as shown below:

Measured temperature (°C)	Resistance value (Ω)
0	9,399
5	7,263
10	5,658
15	4,441
20	3,511
25	2,795
30	2,240

Intake air temperature sensor is located at the air filter. It can be pulled out wearing gloves.

#### Cleaning

The sensor can be cleaned with isopropyl alcohol and then subject to air drying if necessary. Immerse with isopropyl alcohol for not more than 1 minute. Install necessary sealing connector to prevent cleaning solution invading to internal of the sensor.



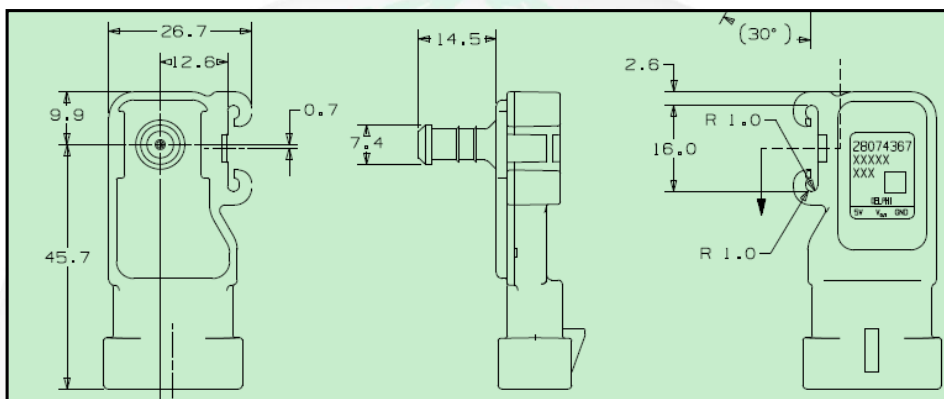
## Electro-jet system/Intake manifold pressure

### MAP

#### Operating principle of MAP

The sensor is to measure the absolute pressure of inlet elbow. It reflects the size of inlet pressure which can be converted to air intaking volume entering the combustion chamber of the engine. It is a part that can not be maintained as well.

#### Appearance of MAP



#### Working environment

- Working pressure range: 20~102kPa
- Operating temperature range: -40~105°C
- Relative humidity: 0 to~100% RH.
- Limit working environment: Only can work for two hours at the Max. temperature of 125°C.

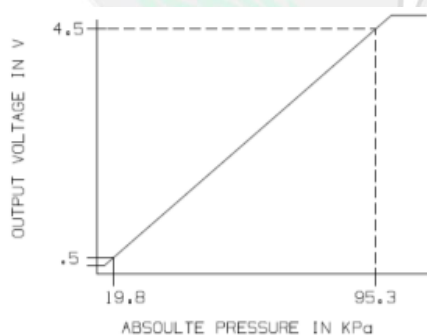
#### Storage environment

Storage temperature: -50°C~150°C

#### Electrical environment

Typical voltage: DC reference working voltage of sensor is  $5 \pm 0.1V$ .

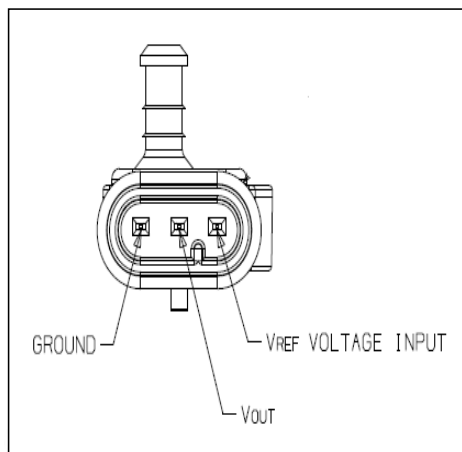
#### Characteristic curve



## Electro-jet system/Intake manifold pressure

### MAP

Definition of foot position



#### Position

MAP is integrated on throttle valve.

#### Cleaning

The sensor can be cleaned with isopropyl alcohol and then subject to air drying if necessary. Immerse with isopropyl alcohol for not more than 1 minute. Install necessary sealing connector to prevent cleaning solution invading to internal of the sensor.

## Electro-jet system/oxygen sensor

### Oxygen sensor

#### Operating principle of oxygen sensor

Oxygen sensor can be used to detect the oxygen content in flue gas discharged from engine exhaust pipe, to control internal fuel closed-loop of ECU, and to maintain engine combustion at the most reasonable air and gas ratio (14.7).

#### Appearance of oxygen sensor



#### I. Technical parameters

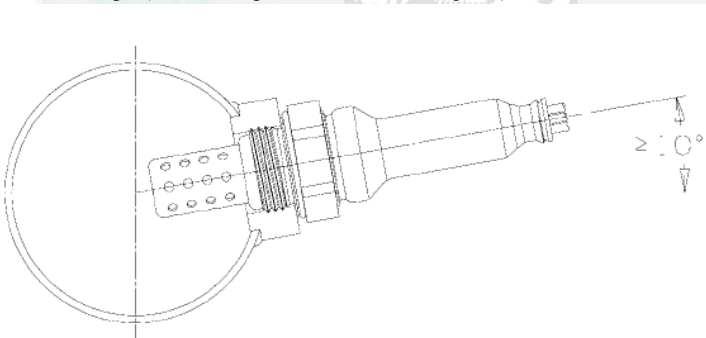
- Threshold value of air-fuel ratio:  $>750$  mVDC
- Dilute threshold of air-fuel ratio:  $<120$  mVDC
- Heating power of oxygen sensor: 7.0W

(The aforementioned parameters can be measured on engine pedestal. Working conditions: 450°C exhausted gas temperature, 70% duty ratio, 10Hz, 13.5V voltage).

- Heater resistance:  $9.6 \pm 1.5 \Omega$  (measured at 21°C)
- Operating temperature range: 260-850°C

#### Installation requirements

- Installation angle (included angle with the horizontal plane):  $\geq 10^\circ$

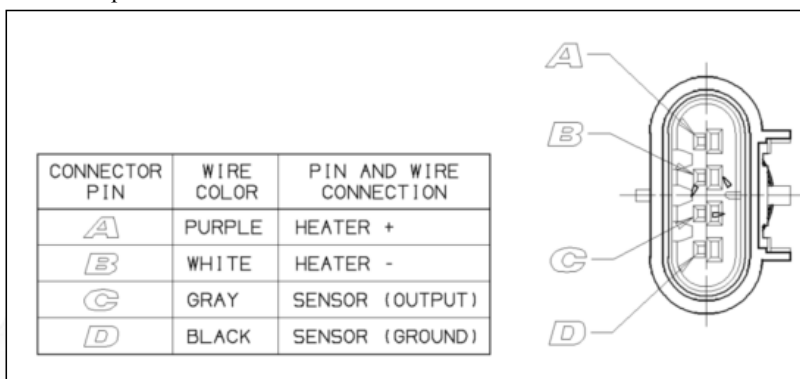


- Tightening torque: 40-60 Nm

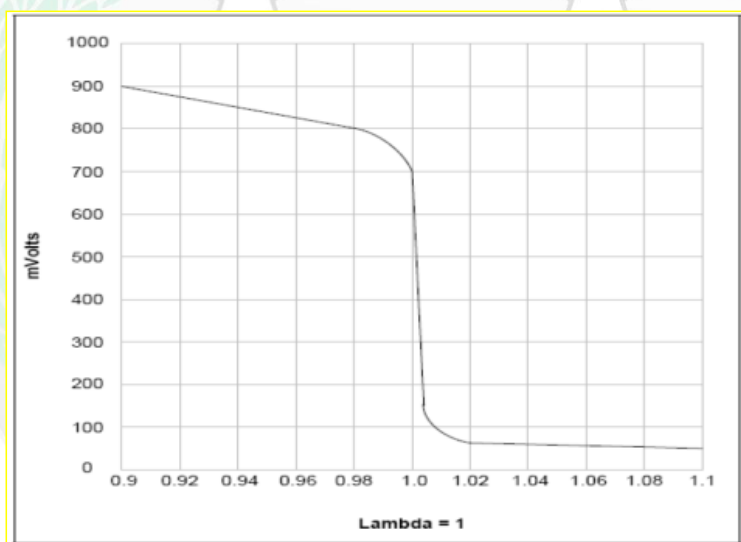
## Electro-jet system/oxygen sensor

### Oxygen sensor

Definition of foot position



Characteristic curve



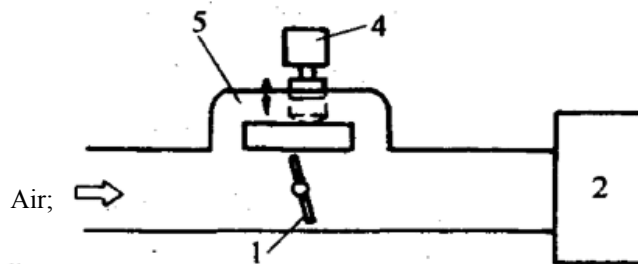
Oxygen sensor is located on the exhaust manifold. Please pull out the oxygen sensor connector first. Dismantle the oxygen sensor with a 13 open spanner. Do not tie off or twist the wiring harness at disassembly.

Fuel quality requirements

- $Pb \leq 0.005g/L$
- $P \leq 0.0002g/L$
- $S \leq 0.04\%$  (weight proportion)
- $MMT \leq 0.0085g/L$
- $Si \leq 4ppm$

## Electro-jet system/idle speed stepper motor

### Idle speed stepper motor

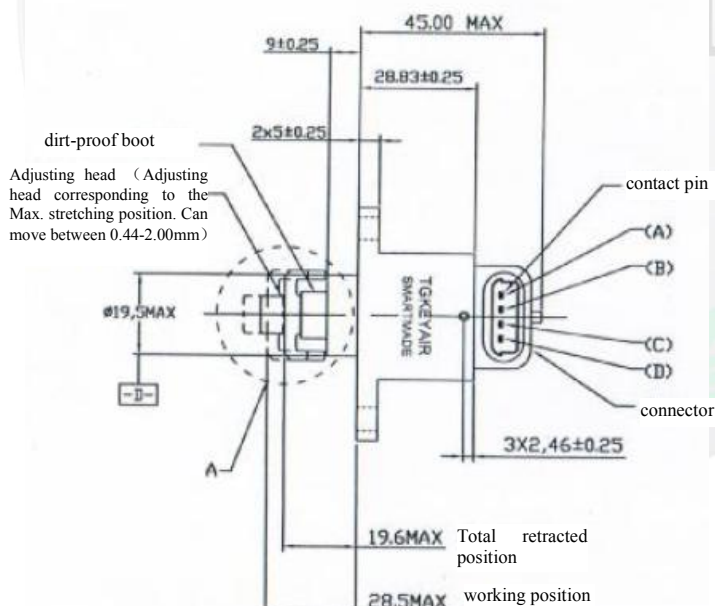


1. Air; 2. valve block; 3.intake manifold ;4.Idle speed stepper motor;  
5. by-pass port

### Operating principle of idle speed stepper motor

Idle speed control valve is to control the flow area of bypass bronchial thus to regulate the air amount of engine to realize engine idle speed control.

### Definition of pin





## Electro-jet system/idle speed stepper motor

### Idle speed stepper motor

Characteristic parameters:

Rated voltage:	12Vdc
Max./Min. working voltage	7.5Vdc/14Vdc
Each volume resistance (@27°C):	53Ω±5.3
Minimum resistance (@-40°C):	35Ω
Each coil inductance (@25°C):	33.5mH±6(1kHz)
Stepping distance (stride)	0.04167mm
Maximum stroke:	8.5mm (204 steps)
Operating temperature range:	-40°C to 125°C (150°C peak value)
Minimum storage temperature	-40°C
Weight	110g

The stepping motor is always integrated on the throttle valve. For cleaning, disassembly the stepping motor first, and then clean up with clean duster cloth.

Appearance of idle speed stepper motor



## Electro-jet system/ECP

### Canister solenoid valve

#### Operating principle description

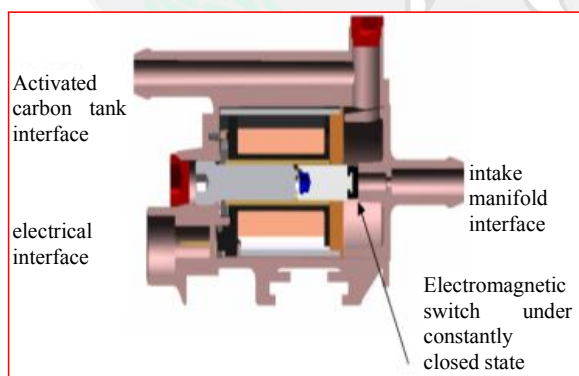
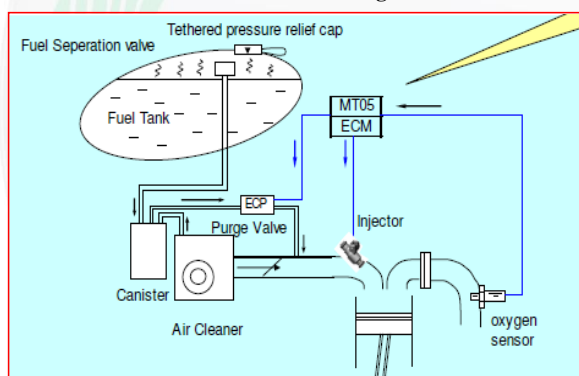
ECP controls the fuel vapor in canister to enter the engine air intake system to realize combustion in the engine. Thus the fuel evaporative emission can be reduced.

#### Appearance

The appearance of ECP is as shown below:



ECP solenoid valve pin can not be distinguished from positive and negative electrode. The connection method is as shown in the schematic diagram.



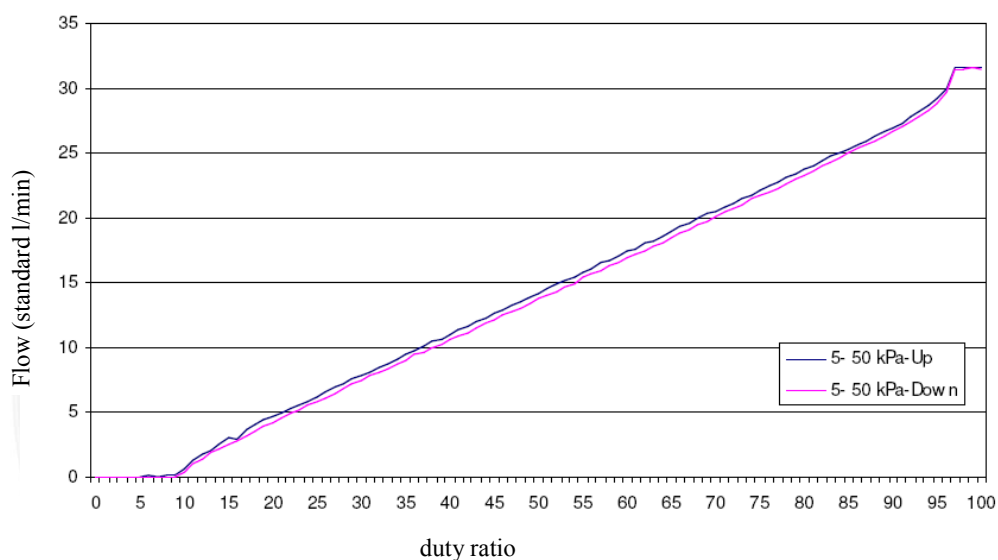
## Electro-jet system/ECP

### Canister solenoid valve

#### I. Technical parameters

- Normal working voltage: 8~16V VDC
- Operating temperature: -40~120°C
- Working frequency: 16 Hz
- Maximum flow rate: 25-35L/min

Flow curve is as shown in the Fig. below:



#### Installation requirements

- ECP shall be horizontally installed on motorcycle.
- ECP shall be installed close to the position of the center of rotation axis of the crankshaft thus to reduce vibration.



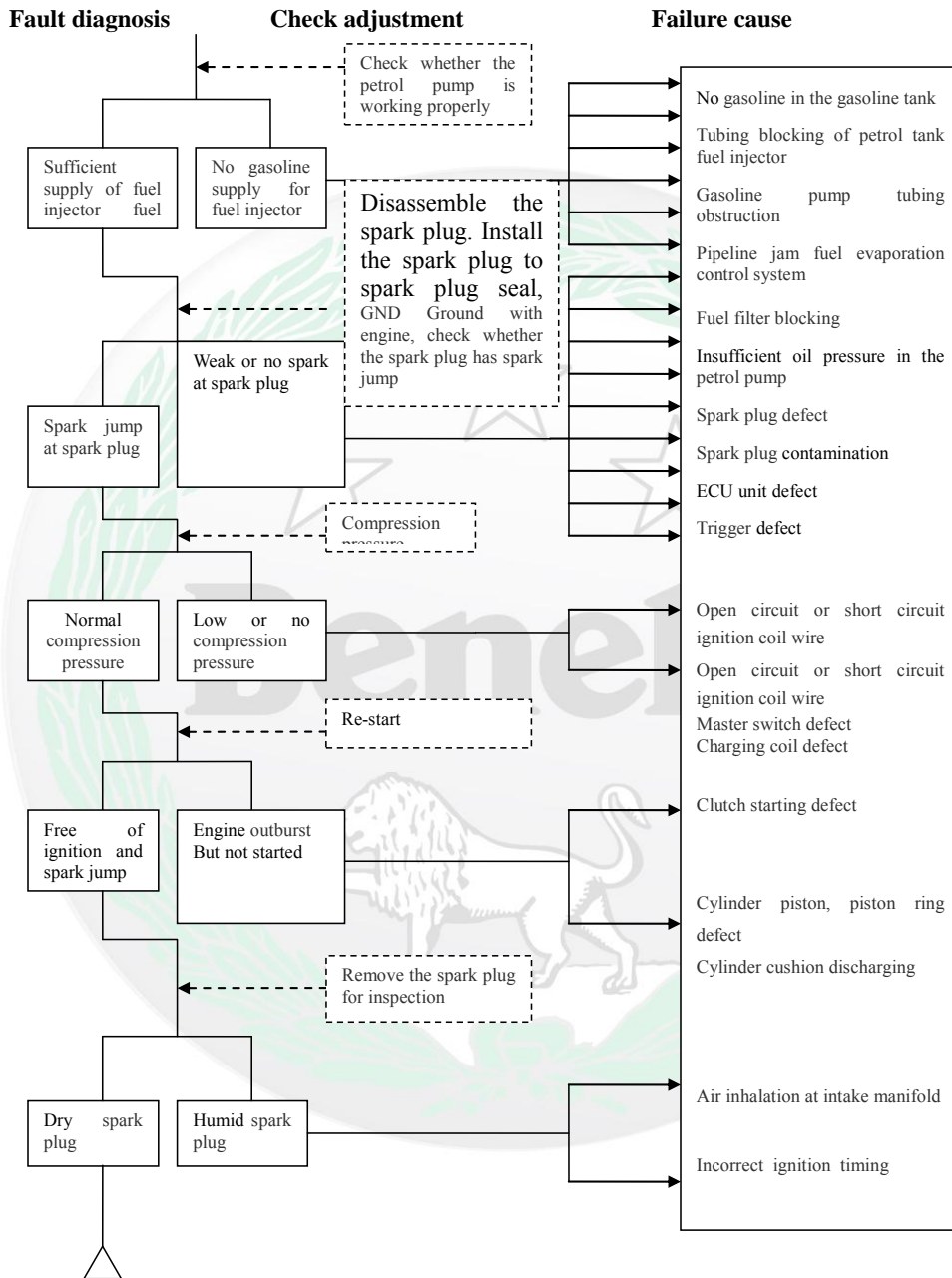
## Chapter IX Faults and Troubleshooting

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Poor rotation (High speed) .....	520
Charging defect (Over discharging or over charging of battery voltage) .....	521
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## Difficulty in starting or starting failure

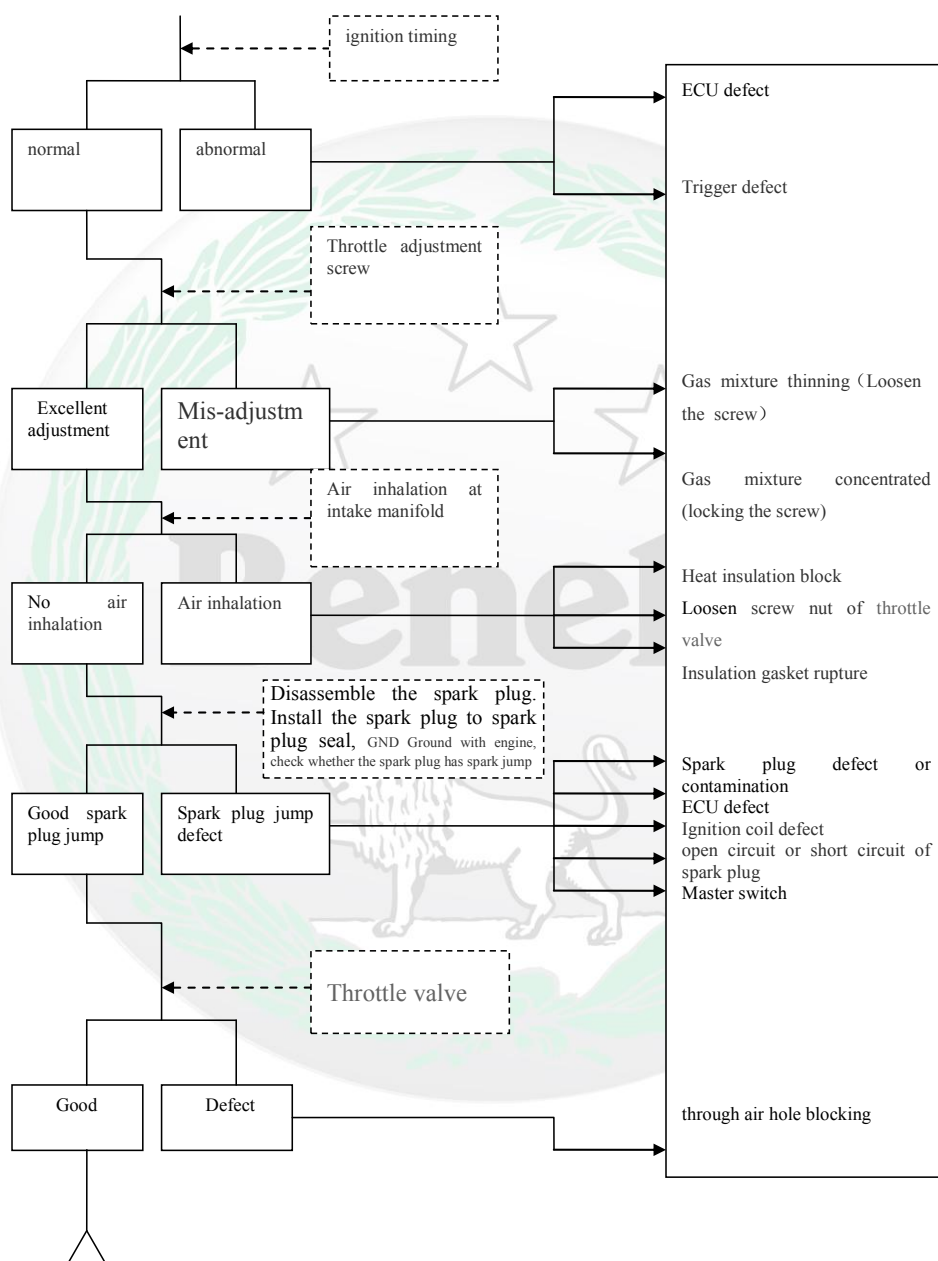


## Poor rotation (Especial at low speed)

### Fault diagnosis

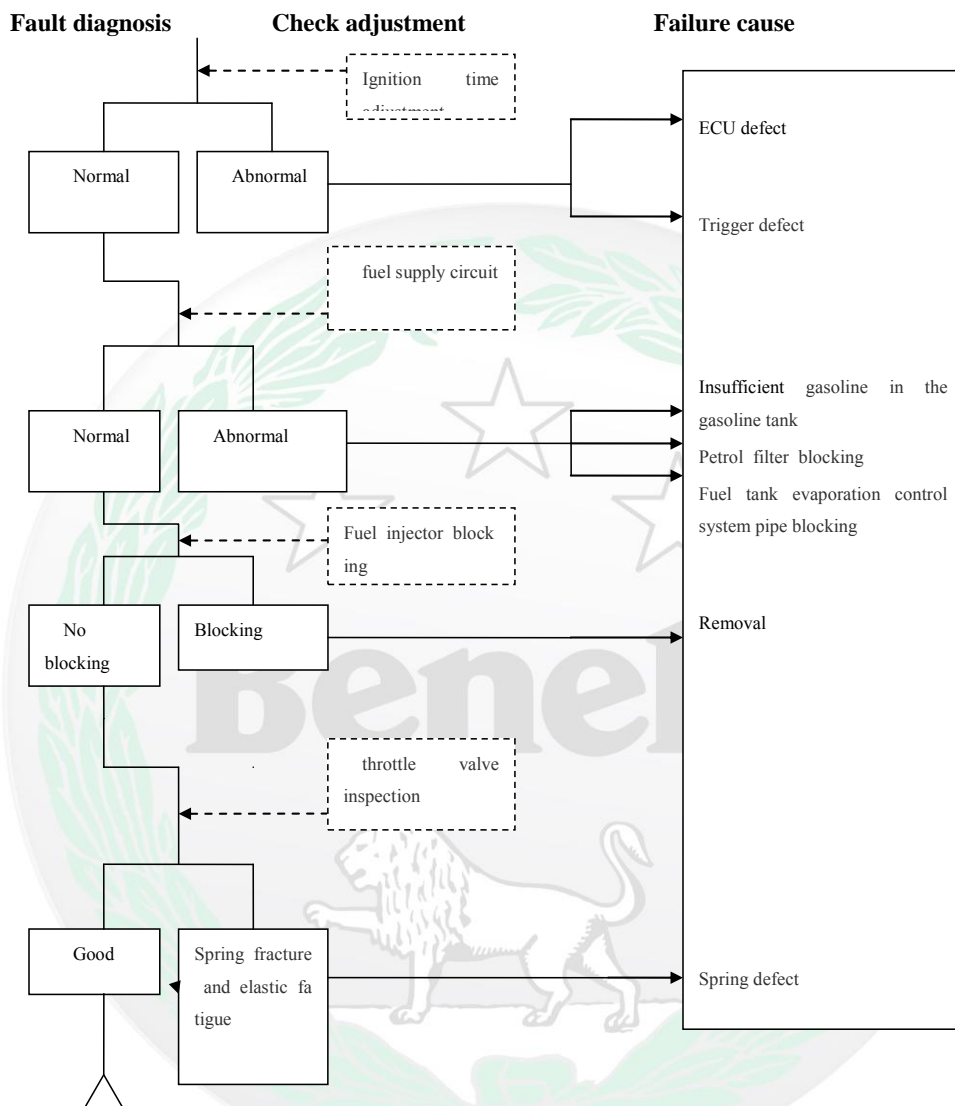
### Check adjustment

### Failure cause

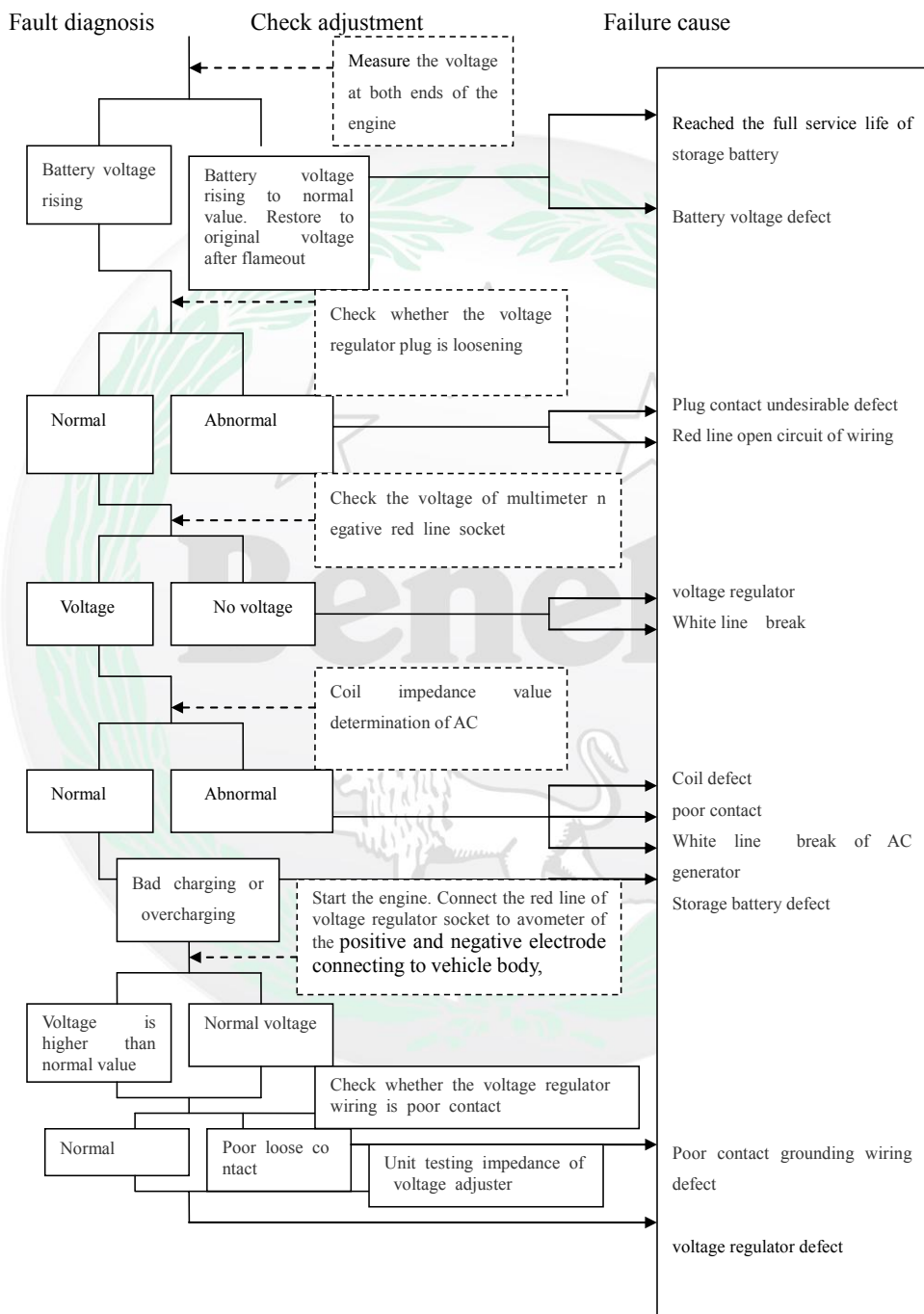




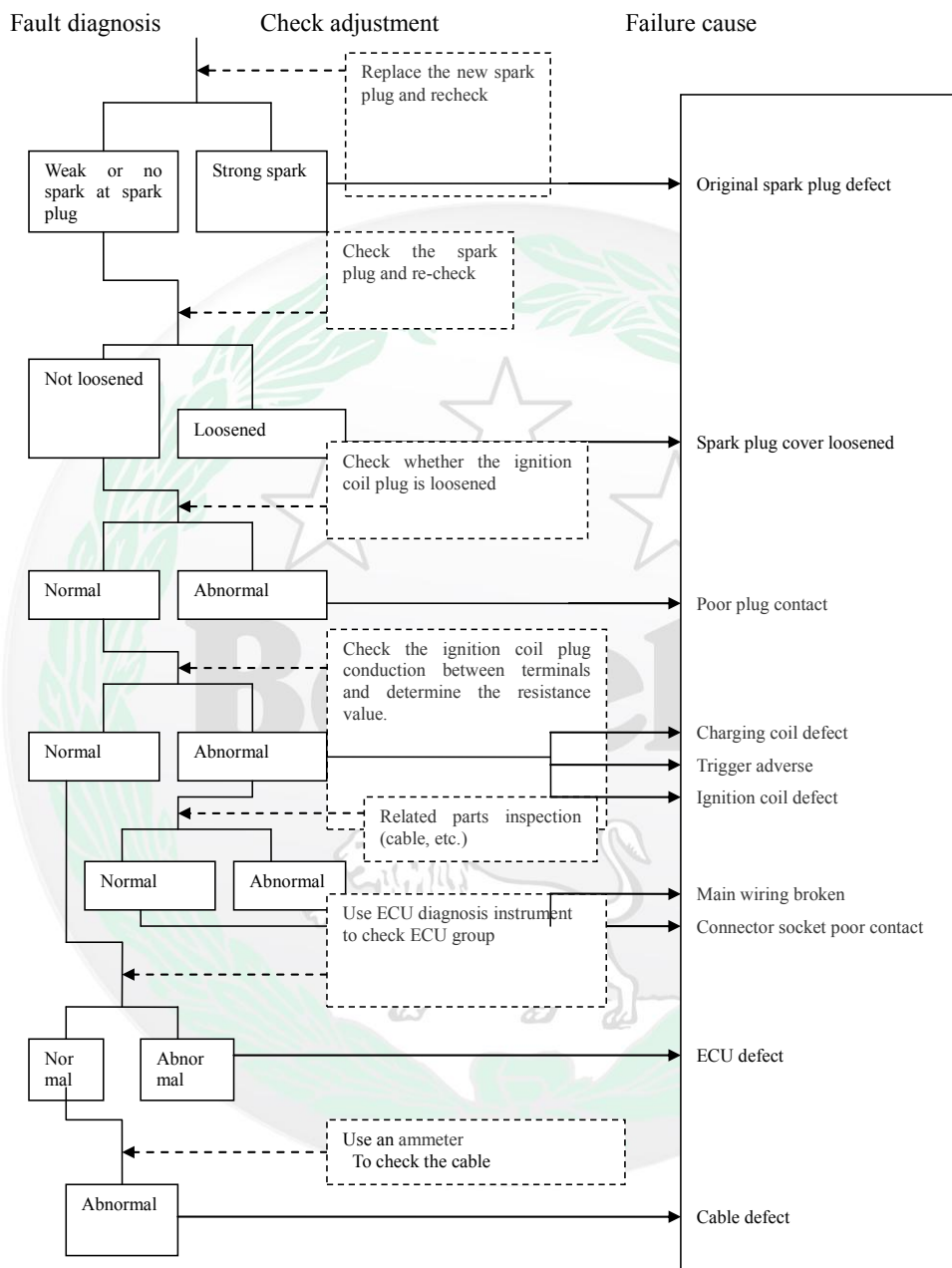
## Poor rotation (High speed)



## Charging defect (Over discharging or over charging of battery voltage)



## Spark plug jump



## Diagnosis breakdown maintenance of electro-jet system

### Fault indicating light of electro-jet system

Fault indicating light (FI) is located on instrument panel, made with a FI. Under normal circumstances, open the key and the fault indicating light will be constantly on. It indicates that the electro-jet system is under power supply state and it can work normally. When the fault indicating light is off, it indicates that the electro-jet system has no power and it will not work. It is necessary to check the fuse and positive and negative electrode connection status of rechargeable battery. After starting up the engine, the fault indicating light will be off which means that it is free of fault; on the contrary, if the fault indicating light is still constantly on, it indicates that the electro-jet system is not normal, and requires troubleshooting due to the malfunction.



## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

#### Directly use the fault indicating light flashing diagnosis (FI) on the instrument

Under the circumstance of fault, operate through three on/off operations, namely key on---key off---key on---key off---key on. The fault indicating light will flash the corresponding failure flash code. Find out the corresponding fault through fault code.

For reading the fault through fault indicating light, flash codes rules are as shown below: For example, for the fault of MAP disconnection or signal side pin or short circuit to negative electrode of rechargeable battery, after three on/off operations of the key, the fault indicating light will quickly flash for 10 times presenting 0. After an interval of 1.2s, it will quickly flash for one time presenting 1; after an interval of 1.2s, it will quickly flash for 10 time presenting 0; after an interval of 1.2s, it will quickly flash for 7 time presenting 7, namely P0107. It can be seen that except for 0 being presented by flashing for 10 times, the number from 1 to 9 is presented by the actual times of flashing. For other fault codes, such as P0.01, 1 means fuel injector failure. After flashing P0107, pending for 3.2s, flash P0201 fault code. If there is no other fault, it will flash P0107, P0201. And then correlative malfunction can be detected from the fault codes.

While using PCHUD software, the software will report the fault code by means of decimal numeral system. The decimal numeral system and the former hexadecimal are one-to-one correspondence. Corresponding fault can be detected according to the corresponding relation. For example, in the software MULFCURR (current malfunction)=263, is corresponding to P0107 in the fault codes list, namely MAP failure.



## Diagnosis breakdown maintenance of electro-jet system

### Methods to detect fault

#### MT05 fault codes list

System or Component	DTC Description	DTC Number		DTC Description in Chinese
		HEX(Diagnostic instrument display)	DEC(Software display)	
Manifold Absolute Pressure Sensor (MAP)	MAP Circuit Low Voltage or Open	107	263	进气压力传感器电压低或开路
	MAP Circuit High Voltage	108	264	进气压力传感器电压高
Intake Air Temperature Sensor (IAT)	IAT Circuit Low Voltage	112	274	进气温度传感器电压低
	IAT Circuit High Voltage or Open	113	275	进气温度传感器电压高或开路
Coolant/Oil Sensor	Coolant/Oil Temperature Sensor Circuit Low Voltage	117	279	水温传感器电压低
	Coolant/Oil Temperature Sensor Circuit High Voltage or Open	118	280	水温传感器电压高或开路
Throttle Position Sensor (TPS)	TPS Circuit Low Voltage or Open	122	290	节气门位置传感器电压低或开路
	TPS Circuit High Voltage	123	291	节气门位置传感器电压高
Oxygen Sensor	O2S 1 Circuit Low Voltage	131	305	1 缸氧传感器电压低
	O2S 1 Circuit High Voltage	132	306	1 缸氧传感器电压高
Oxygen Sensor Heater	O2S Heater Circuit High Voltage	31	49	1 缸氧传感器加热线圈电压高
	O2S Heater Circuit Low Voltage	32	50	1 缸氧传感器加热线圈电压低
Fuel Injector A	Injector A Fault	201	513	1 缸喷油器线圈故障
Fuel Injector B	Injector B Fault	202	514	2 缸喷油器线圈故障
Fuel Pump Relay (FPR)	FPR Coil Circuit Low Voltage or Open	230	560	油泵继电器线圈电压低或开路
	FPR Coil Circuit High Voltage	232	562	油泵继电器线圈电压高
Crankshaft Position Sensor (CKP)	CKP Sensor Noisy Signal	336	822	触发器（曲轴相位传感器）信号混乱
	CKP Sensor No Signal	337	823	触发器（曲轴相位传感器）无信号
Ignition Coil A	Cylinder A Ignition Coil fault	351	849	1 缸点火线圈故障
Ignition Coil B	Cylinder B Ignition Coil fault	352	850	2 缸点火线圈故障



## Diagnosis breakdown maintenance of electro-jet system

### Methods to detect fault

Continued

System or Component	DTC Description	DTC Number		DTC Description in Chinese
		HEX(Diagnostic instrument display)	DEC(Software display )	
Idle Control System	Idle Speed Control Error	505	1285	怠速控制错误
System Voltage	System Voltage Low	562	1378	电池电压低
	System Voltage High	563	1379	电池电压高
MIL	MIL Circuit Malfunction	650	1616	故障指示灯故障
Tachometer	Tachometer Circuit Low Voltage	1693	5779	转速输出电压低
	Tachometer Circuit High Voltage	1694	5780	转速输出电压高
Oxygen Sensor 2	O2S 2 Circuit Low Voltage	137	311	2 缸氧传感器电压低
	O2S 2 Circuit High Voltage	138	312	2 缸氧传感器电压高
Oxygen Sensor Heater 2	O2S Heater 2 Circuit High Voltage	38	56	2 缸氧传感器加热线圈电压高
	O2S Heater 2 Circuit Low Voltage	37	55	2 缸氧传感器加热线圈电压低
Vehicle Speed Sensor	VSS No Signal	500	1280	车速传感器无信号
Park Neutral Switch Diag	Park Neutral Switch Error	850	2128	空档、离合器开关故障
CCP	CCP short to high	445	1093	碳罐电磁阀输出电压高
	CCP short to low/open	444	1092	碳罐电磁阀输出电压低
Rollover Sensor Diagnostic	Rollover Sensor malfunction/Triggered	1500	5376	倾倒传感器故障
BLM_MaxAdapt	Several BLM value hit maximum	171	369	燃油长效学习值偏高
BLM_MinAdapt	Several BLM value hit minimum	172	370	燃油长效学习值偏低
PEsystLean	PE mode burned AFR keeps lean	174	372	功率加浓模式持续偏稀

## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

#### Use diagnostic apparatus on fault diagnosing



#### Operation methods:

- a) a)6-hole diagnose interface on motorcycle
- b) Connect the cable and diagnostic instrument interface
- c) Perform diagnosis after turn on the key

#### Warning

- XCM—PT100X diagnostic apparatus is highly sophisticated instrument which should be away from impact and vibration;
- At the first time of starting up, the instrument doesn't work normally nor show stably. Please disconnect the power cord and retry;
- Please make sure that connectors are always tightened in the diagnosis interface;
- It is strictly prohibited to use electrical signal exceeding the limiting value;
- It is strictly prohibited for drivers to use the instrument during driving process;
- Use and storage conditions:  
Ambient temperature: 0~50℃  
Relative humidity: lower than 90%

## Diagnosis breakdown maintenance of electro-jet system

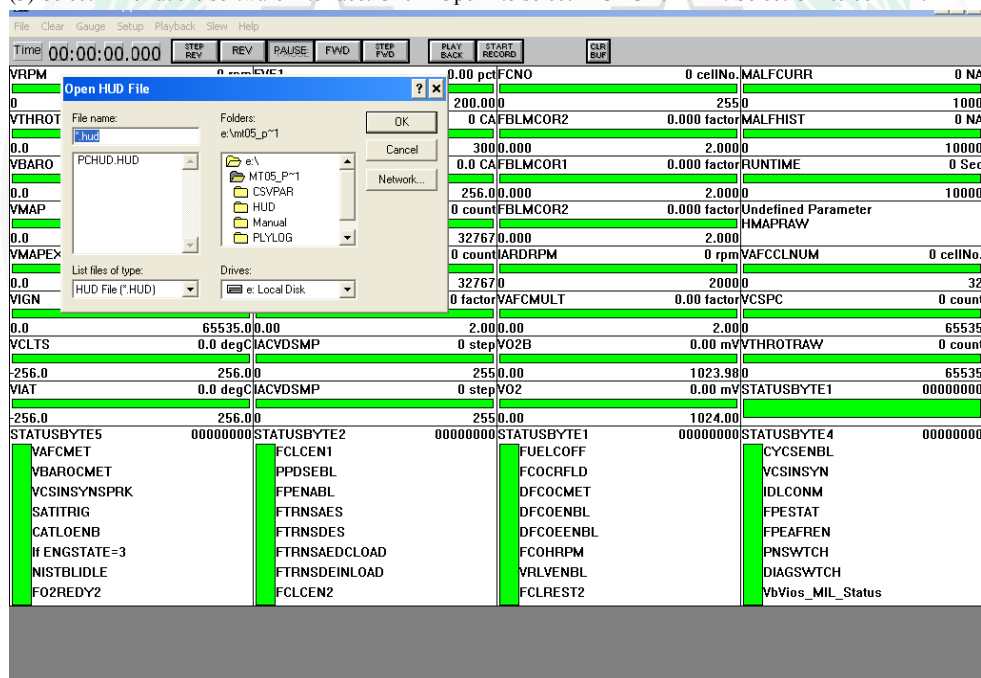
### Malfunction detection methods

#### Check the faults with diagnostic software PCHUD

PCHUD software is used to detect and record the engine operating data. Before using the software, connect the laptop to 6-hole diagnostic hole of motorcycle through K wire. The diagnostic hole is located below the rear cushion. Please note that PCHUD system only supports 16Bit software Windows operating system or very few 32bit Windows operating system. It doesn't support 64bit Win7, Win8 or iOS. Install K wire driver software at the notebook.

#### PCHUD software instruction:

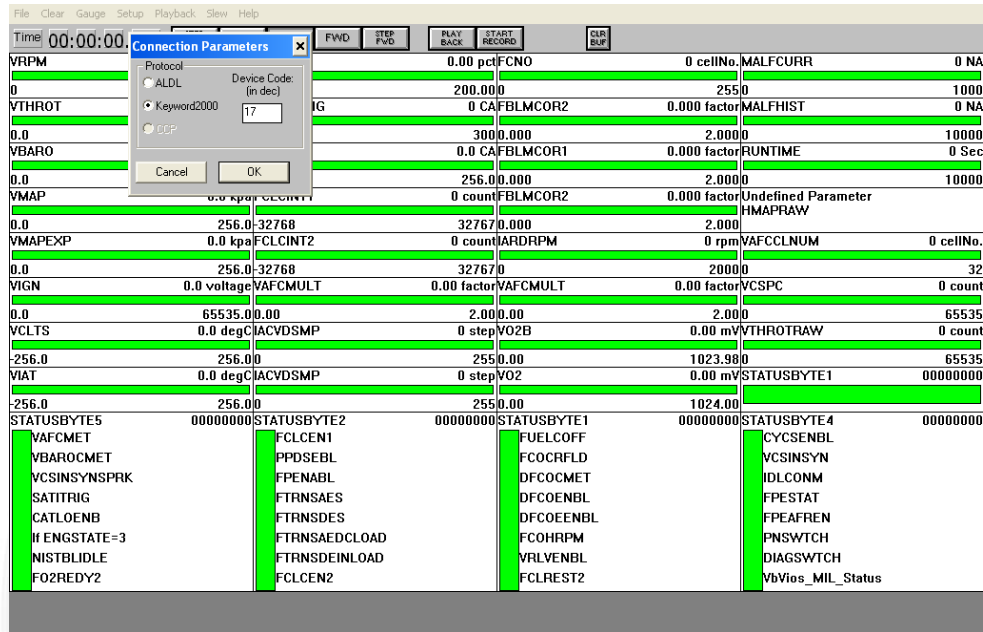
- (1) Connect the laptop to 6-hole diagnostic hole of motorcycle through K wire and turn on the key.
- (2) Double click "HUD.EXE" icon and start up PCHUD software.
- (3) Select "File" at the software interface. Click "Open" to select "PCHUD.HAD". Select OK to confirm.



- (4) Select "Parameter File" under "Setup". Click MT05common.par. Select "Comm protocol" under "Setup". Select "Keyword2000" and then click OK. Select 17 for Device Code.

## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods



Parameter	Unit	Value	Parameter	Unit	Value	Parameter	Unit	Value	Parameter	Unit	Value
VRPM	0.00 pct	FCNO	0 cellNo.	MALFCURR	0 NA						
0	200.000	2550	1000								
VTHROT	0.00	0 CAFBLMCR2	0.000 factor	MALFHIST	0 NA						
0.0	300.000	2.000	10000								
VBARO	0.0	0 CAFBLMCR1	0.000 factor	RUNTIME	0 Sec						
0.0	256.00.000	2.000	10000								
VMAP	0.000	0 count	FBLMCR2	0.000 factor	Undefined Parameter						
0.0	256.0	32768	32767	0.000	2.000						
VMAPEXP	0.0 kpa	FCLCINT2	0 count	IARDRPM	0 rpm	VAFCLNUM	0 cellNo.				
0.0	256.0	32768	32767	20000							
VIGN	0.0 voltage	VAFCMULT	0.00 factor	VAFCMULT	0.00 factor	VCSPC	0 count				
0.0	65535.00.00	2.00	0.00	2.000							
VCLTS	0.0 degC	IACVDSMP	0 step	VO2B	0.00 mV	VTHROTRAW	0 count				
-256.0	256.00	255.00	1023.98	0	65535						
VIAT	0.0 degC	IACVDSMP	0 step	VO2	0.00 mV	STATUSBYTE1	00000000				
-256.0	256.00	255.00	1024.00								
STATUSBYTE5	00000000	STATUSBYTE2	00000000	STATUSBYTE1	00000000	STATUSBYTE4	00000000				
VAFCMET		FCLCEN1		FUELCOFF		CYCSENB					
VBAROCMET		PPDESEBL		FCOCRFLD		VCSINSYN					
VCSINSYNPRK		FPENABL		DFCOCMET		IDLCNM					
SATITRIG		FTRNSAES		DFCOENBL		FPESTAT					
CATLOENB		FTRNSDES		DFCOEENBL		FPEAFREN					
H ENGSTATE=3		FTRNSAEDCLOAD		FCOHRPM		PNSWCH					
NISTBLIDLE		FTRNSDEINLOAD		VRLVENBL		DIAGSWCH					
FO2REDY2		FCLCEN2		FCLREST2		VbVios_MIL_Status					

(5)

If the software interface can't display real-time traffic data in the case of electricity, need to continue to conduct the following work. Check COM port to connect setup to find if there is any problem. Generally set COM Port: 4. Baud Rate: 10400. Do not select DTR High at startup.

File Clear Gauge Setup Playback Slew Help

Time: 00:00:00.000 [STEP REV] [PAUSE] [FWD] [STEP FWD] [PLAY BACK] [START RECORD] [CUR SET]

VRPM	0 rpm	FVE1	0.00 pct	FCNO	0 cellNo.	MALFCURR	0 NA
0	200.00	0 CAFBLMCOR2	0.000 factor	MALFHIST	0 NA		
VTHROT	0.0	3000.000	2.000	10000			
VBARO	0.0	0.0 CAFBLMCOR1	0.000 factor	RUNTIME	0 Sec		
0.0	256.00.000	2.000	10000				
VMAP	0.0	0 count	FBLMCOR2	0.000 factor	Undefined Parameter		
0.0	32767	0.000	2.000	HMAPRAW			
VMAPEXP	0.0	0 count	ARDRPM	0 rpm	VAFCCNUM	0 cellNo.	
0.0	290.00-32760	32767	0	2000	32		
VIGN	0.0 voltage	VAFCMULT	0.00 factor	VAFCMULT	0.00 factor	VCSPC	0 count
0.0	65535.00.00	2.00	0.00	2.00	65535		
VCLTS	0.0 deg	CACVDSMP	0 step	VO2B	0.00 mV	VTHROTRAW	0 count
-256.0	256.00	255.00	1023.98	65535			
VIAT	0.0 deg	CACVDSMP	0 step	VO2	0.00 mV	STATUSBYTE1	00000000
-256.0	256.00	255.00	1024.00				
STATUSBYTE5	00000000	STATUSBYTE2	00000000	STATUSBYTE1	00000000	STATUSBYTE4	00000000
VAFCMET	FCLCEN1	FUELCOFF	CYCSENBL				
VBAROCMET	PPDSEBL	FCOCRFLD	VCSINSYN				
VCSINSYNPRK	FPENABL	DFCOCMET	IDLCONM				
SATITRIG	FTRNSAES	DFCOENBL	FPSTAT				
CATLOENB	FTRNSDES	DFCOEENBL	FPEAFREN				
ENGSTATE=3	FTRNSAEDCLOAD	FCOHRPM	PNSWITCH				
NISTBLIDLE	FTRNSDEINLOAD	VRLVENBL	DIAGSWTCH				
F02REDY2	FCLCEN2	FCLREST2	VbVios_MIL_Status				

## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

Perform normal communication. Display current fault code at MALFCURR. Display the historical fault codes at MALFHIST.

MALFCURR	0 NA
0	1000
MALFHIST	0 NA
	10000

Check corresponding fault through fault codes list

## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

Parameters interpretation of PCHUD software:

Attention: Viewing from rear side of the engine, the left one is cylinder #1 and the right one is cylinder #2.

VRPM	发动机转速	engine speed
VTHROT	节气门开度	throttle position
VBARO	大气压力	BARO
VMAP	进气歧管压力	manifold air pressure
VMAPEXP	进气歧管压力估计值	expect manifold air pressure
VIGN	蓄电池电压	ignition key voltage
VCLTS	发动机缸温或者冷却水温	cylinder temperature or coolant temperature
VIAT	进气温度	intake air temperature
STATUSBYTE5	状态标志 5	STATUSBYTE5
VAFCMET	空气流量学习条件满足	airflow correction met
VBAROCMET	大气压力更新条件满足	Baro update met
VCSINSPRK	顺序点火标志	sequential spark enable
SATITRIG	tip-in 点火角修正条件满足	tip-in Spark Advance retard trigger
CATLOENB	触媒工作逻辑使能	catlyst light-off logic enable
IF ENGSTATE=3	发动机正常工作标志位	engine work in run state
NISTBLIDLE	暖机怠速条件满足	stable warm idle
FO2REDY2	2缸氧传感器加热完成标志位	O2 ready
FCNO	进气效率长效学习单元	block learn memory cell
FBLMCOR1	1缸长效学习值	cylinder 1 block learn memory
FCLCINT1	闭环学习 I 项	integral of close loop correction
FCLCMUL1	闭环学习修正量	close loop correction
IARDRPM	目标怠速转速	desired idle rpm
IARPMERR	怠速偏差	idle rpm error
FPWVC1	1缸喷油脉宽	base pulse width of cylinder 1
VO2	氧传感器信号	Oxygen sensor signal
STATUSBYTE3	状态标志 3	STATUSBYTE3
FO2STAT1	1缸氧传感器浓稀标志位	cylinder 1 oxygen sensor signal rich lean state
FCLREST1	1缸闭环修正重置标志位	cylinder 1 close loop correction reset
FOSHTREN	氧传感器加热使能	Oxygen sensor heater enable
FO2REDY1	1缸氧传感器加热完成标志位	cylinder 1 Oxygen sensor ready
IF IACV MODE=0	怠速步进电机闭环学习使能	idle airflow control valve close loop correction enable
IAMTRLOST	怠速步进电机丢步标志位	IACV lost
IACMVIHB	怠速步进电机禁止移动标	IACV move disable



	志位	
VIGNS	点火状态标志位	ignition state
FVE1	1 缸充气效率	cylinder 1 Volumetric efficiency
VMAPRANG	进气压力读取角度	MAP read angle
AFFNLAFR	目标空燃比	target air fuel ratio
SAESTA	1 缸点火提前角	cylinder 1 Spark Advance
SAIDL DYN	怠速动态点火角	idle dynamic Spark Advance
SPDWELL	充磁时间	dwel time
IAINTEGOFST	怠速步进电机气量学习值	airflow integral of idle air control valve
IACVDSMP	怠速步进电机目标步数	desired position of idld air control valve
STATUSBYTE2	状态标志 2	STATUSBYTE2
FCLCEN1	1 缸闭环修正使能	cylinder 1 close loop correction enable
PPDSEBL	预喷禁止标志位	prime pulse disable
FPENABL	油泵使能标志位	fuel pump enable
FTRNSAES	加速加浓使能	acceleration enrich enter
FTRNSDES	减速减稀使能	deceleration enlean enter
FTRNSAEDCLOAD	加速加浓退出	acceleration enrich exit
FTRNSDEINLOAD	减速减稀退出	deceleration enlean exit
FCLCEN2	2 缸闭环修正使能	cylinder 2 close loop correction enable

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## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

Diagnostic process:

1.Insert the key on vehicle and do not start the motorcycle, please check:

Parameter	Check and Record	Min	Max	Description	Units
VIGN	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	11.5	13	battery voltage	volt
VTHROT	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	1	fully closed throttle position	percent
VTHROT	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	98	100	fully open throttle position	percent
VTHROTRAW	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	4000	9000	Absolutely throttle body voltage AD	None
VBARO	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	98	103	atmospheric pressure	kpa
VIAT	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	40	intake air temperature	degC
VCLTS	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	40	cylinder temperature or coolant temperature	degC

2.Starting:

Parameter	Check and Record	Min	Max	Description	Units
Start	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-	-	-	-
TERRCNT	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	Fly wheel tooth error counter	count
FUELCOFF	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	fuel cut-off enable, the normal flag is white, if not blue	None
VRLVENBL	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	Rollover sensor enable, normal is white, if not blue	None

## Diagnosis breakdown maintenance of electro-jet system

### Malfunction detection methods

**3. Idle** The parameters can be checked 1 min for idle speed after vehicle starting. And then check the stability of EFI parameter after 3 minutes of long idle.

Parameter	Check and Record	Min	Max	Description	Units
VRPM	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	1300	1700	engine speed	rpm
VTHROT	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	1	fully closed throttle position	percent
MALFCURR	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	current MALF code	None
VBARO	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	98	103	atmospheric pressure	kpa
VMAP	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	47	53	intake pressure measured value	kpa
VIGN	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	12	16	battery voltage	volt
PNSWTCH	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	Neutral and Clutch switch enable flag, blue is working	None
IACVDSMP	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	10	60	stepping motor target value	step
vehicle speed	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	vehicle speed	Km/h
FBLMCOR1	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	15	cylinder 2 integral of close loop correction	count
FPWVC1	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	1.5	2.6	base pulse width of cylinder 1	ms
FPWVC2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	1.5	2.6	base pulse width of cylinder 2	ms
VO2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	45	850	cylinder 1 oxygen sensor voltage	mv
VO2B	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	45	850	cylinder 2 oxygen sensor voltage	mv

## Diagnosis breakdown maintenance of electro-jet system

### Malfuction detection methods

#### 4. Run with stable speed

Parameter	Check and Record	Min	Max	Description	Units
MALFCURR	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	0	current MALF code	None
VCLTS	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	40	105	cylinder temperature or coolant temperature	degC
VIGN	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	12	16	battery voltage	volt
vehicle speed	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0	220	vehicle speed	Km/h
FBLMCOR1	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	-15	15	cylinder 2 integral of close loop correction	count
VO2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	45	850	cylinder 1 oxygen sensor voltage	mv
VO2B	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	45	850	cylinder 2 oxygen sensor voltage	mv

#### 5. Top speed with full throttle(PE mode, power enrich)

PE mode:  $70\% < VTHROT < 100\%$ , in this situation, the value of oxygen sensor(VO2 VO2B) is around 800mv.

Parameter	Check and Record	Min	Max	Description	Units
VCLTS	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	80	105	cylinder temperature or coolant temperature	degC
VIGN	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	12	16	battery voltage	volt
VO2	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	750	950	cylinder 1 oxygen sensor voltage	mv
VO2B	<input type="checkbox"/> Norm <input type="checkbox"/> Abnormal	750	950	cylinder 2 oxygen sensor voltage	mv

## Common trouble shooting methods of electro-jet system

### Common failures

#### Repair kit

- a) Disassembly and assembly of electric control system components-Dismantlement tool of commonly used automobile mechanical parts
- b) Electronic control system circuit and system electrical signal - digital multimeter (with buzz)
- c) Fault diagnosis of electronic control system as well as engine working condition detection
  - Electronic control system fault diagnosis instrument (recommended)
  - Fault diagnosis software (PCHUD) and interface wiring (can be used when the condition is allowed)
- b) Electronic control system fault codes (emergency application)
- c) Fuel pressure gauge, measuring range 0~300kPa





## Common trouble shooting methods of electro-jet system

### Common failures

#### Engine working data flow indicated on the diagnostic apparatus

Analyze and determine engine failure according to the engine working data flow displayed by the diagnostic apparatus.

##### Step I

- a) Engine wiring harness and vacuum pipeline-May affect system control air flow and oil supply
- b) Whether oxygen sensor assembly is in place-Could affect the judgment of the system on the air-fuel ratio.
- c) Engine failure indicator light-Affect warning of the system on the fault
- d) Rechargeable battery voltage-Determine whether a battery power is sufficient
- e) Determine whether the displayed values of coolant temperature sensor, intake air temperature sensor, inlet manifold absolute pressure sensor and oxygen sensor are normal according to the experience.
- f) Working range of position sensor of throttle valve-Can not be fully open or closed. It may affect the engine power performance and partial system function.

##### Step II

Whether ECU power supply is closed off-Cut off the diagnostic instrument and system communication after turning off the key.

##### Step III

- a) Coolant temperature and coolant temperature cycle-indicate whether the thermostat is working correctly.
- b) Rechargeable battery voltage (14V)-Display whether the electric generator is working correctly.  
Excessive high: Possible voltage regulator fault  
Excessive low: Possible improper electric generator wiring or electric generator fault
- c) Manifold absolute pressure-It can indicate that intake of air leakage and valve clearance.  
Too low valve clearance: The value is too high. It can affect the dynamic property of engine due to exhaust valve, high temperature rising to greatly shorten the service life of oxygen sensor and three-way catalyst;  
The valve clearance is too high: It will cause too low of intake manifold pressure, affect the judgment on diagnosing of the working state of engine and cause idling.  
In addition, if the exhaust system is blocked, such as: foreign body existing in the exhaust passage, too high of oil consumption and blocking of ternary catalysts, as well as three-way catalyst internal broken; the value will be too high.
- d) Cycle index of oxygen sensor-Cycle number is too low which indicates oxygen sensor failure.

#### Simple troubleshooting methods

When fix the electro-jet system, please complete the following steps in order. If the failure can be fixed in the next step, suspend the subsequent steps. Use the diagnostic instrument. Perform inspection acceptance and clear the fault codes according to "Engine working data flow displayed by the diagnostic apparatus".

When use the diagnostic apparatus, the rechargeable battery voltage shall not be lower than 8.5V.

##### Daily use and maintenance

- Use #93 or #97 premium unleaded gasoline.
- ECU has moistureproof function. However, high pressure gun can not be used to wash the shell.
- Gasoline filter shall not be replaced once per every 18000km.
- Under the condition of normal use, clean the throttle valve once per every 10,000km or one year.



## Common trouble shooting methods of electro-jet system

### Common failures

Fault phenomenon—Can not be started up

a) Turn the ignition switch to "ON" to check whether the fault indicating light is on.

If not:	<ul style="list-style-type: none"> <li>◆ Check the fuse and grounding line</li> <li>◆ Check whether the ECU plug is fixed or not</li> <li>◆ Check whether the light and wire line is normal by using executing agency of diagnostic apparatus</li> <li>◆ Check and repair the light bulb and wiring</li> </ul>
If the light is on:	<ul style="list-style-type: none"> <li>◆ Connect the diagnostic apparatus to system diagnosis interface</li> </ul>

b) Check whether the diagnostic apparatus connects to system connection communication

If not:	<ul style="list-style-type: none"> <li>◆ Check the fuse and grounding line</li> <li>◆ Check whether the ECU plug is fixed or not</li> <li>◆ Check whether the diagnostic apparatus works normally on the normal vehicle.</li> </ul>
If yes:	<ul style="list-style-type: none"> <li>◆ Exclude the failures indicated by the diagnostic apparatus</li> </ul>

c) Check the ignition system fault-Check whether the spark plug can perform normal ignition

If not:	<ul style="list-style-type: none"> <li>◆ Check whether the high-tension cable and sparking plug are firmly or damaged.</li> <li>◆ Determine by using another ignition coil assemble</li> <li>◆ Determine by using ECU</li> </ul>
If yes:	<ul style="list-style-type: none"> <li>◆ Check whether the high-tension cable is correctly connected to ignition coil and sparking plug.</li> </ul>

d) Check oil supply system failure

Check whether the fuel pump is working-When the engine starts up, the sound of oil pump working can be heard around the fuel tank.

Not working:	<ul style="list-style-type: none"> <li>◆ Check whether the fuel pump relay is working correctly.</li> <li>◆ Check whether the position sensor of crankshaft is connected properly.</li> <li>◆ Determine by using ECU</li> <li>◆ Check oil pump wiring</li> </ul>
If it works:	<p>1)Whether the fuel supply pressure is greater than 220Kpa</p> <p>2)Insufficient pressure:</p> <ul style="list-style-type: none"> <li>◆ Check whether the fuel tank has sufficient oil.</li> <li>◆ Check whether the fuel filter should be replaced (Note: Special gasoline filter for electronic injection shall be replaced once per every 18,000km).</li> <li>◆ Check whether the fuel feed pipe and oil return pipe are damaged</li> </ul> <p>3)Normal pressure:</p> <ul style="list-style-type: none"> <li>◆ Check whether the nozzle control circuit is normal.</li> <li>◆ Check whether the nozzle should be cleaned or not</li> </ul>

a) Determine whether the cylinder is submerged

If yes:	<ul style="list-style-type: none"> <li>◆ Fully open the accelerator. Connect the starting motor. The engineer shall show work signs of the engine after a few seconds.</li> </ul>
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f)Check whether the clearance of position sensor crankshaft is big

## Common trouble shooting methods of electro-jet system

### Common failures

Fault phenomenon—Can not be started up, accompanying with tempering

- Check whether the ignition coil is loosening
- Check whether the timing ring is loosening

Fault phenomenon—Unstable idle speed

Idle speed control system:	Check whether the idle by-pass bolt is over screwed or under screwed. Generally two rings.
Oil supply system:	If there is oil leakage in oil pipeline.

Fault phenomenon—Idle speed too high or too low (obvious idling and nonconforming to target idle speed)

Idle speed is too high	<ul style="list-style-type: none"> <li>◆ When the water temperature is lower than 68°, the system will improve the idling speed to accelerate machine heating up process. In addition, check according to the following steps.</li> <li>◆ Check whether the idle by-pass is over screwed</li> <li>◆ Valve clearance, especially whether the exhaust valve clearance is too large.</li> </ul>
Idle speed is too high:	<ul style="list-style-type: none"> <li>◆ Check the fuel tank oil, fuel filter, oil pressure and nozzle</li> <li>◆ Check whether the idle by-pass is under screwed</li> <li>◆ Check whether the valve clearance is too small.</li> </ul>

Fault phenomenon—Unsteady idle speed accompanying with slowing down.

- Check the valve clearance
- Check whether the idle by-pass port and throttle body is too dirty

Fault phenomenon - Insufficient acceleration

- Whether the parameters of idle speed and high idle speed are normal;
- Check the fuel tank oil and fuel filter;
- Check whether the exhaust system is blocked, for example: whether the three-way catalyst is blocked due to engine oil burnout or breaking;
- Check oil pressure and nozzle.
- Check whether the fault indicating light is bright, and whether it is due to normal ignition of air cylinder.

Fault phenomenon—Slight fire phenomenon

Check whether the spark plug gap is in accordance with the specification 0.6~0.7mm

Fault phenomenon—Fault indicating light is on. The fault code is nonconforming to the fault.

It may be because of unclear system ground wire. Re-connect the grounding wire. Disconnect the rechargeable battery power line. Connect and re-start the engine three minutes later.

Fault phenomenon—The fuel consumption is too high.

- Check whether the oxygen sensor of two cylinders are installed properly. If it is under the loose state, oxygen sensor will wrongly determined as combustion thinning. Increase the fuel oil which will lead to extremely high fuel consumption.
- After confirming the engine mechanical components and oxygen sensor are normal, run the engine to observe the readings of oxygen sensor. Under normal water temperature, if the reading is always greater than 500mV, check whether the fuel spray nozzle is subject to oil leakage.

## Common trouble shooting methods of electro-jet system

### Common failures

#### Attention:

- Most of the electronic injection parts are unrepairable. After confirming the part is damaged, perform replacement processing.
- When start the engine, do not operate any mechanism on the engine (including accelerator. Do not pull the throttle).
- If the engine fault indicating light is lightened up in the process of engine operation, make sure to find out the cause and perform troubleshooting as soon as possible.
- Do not use leaded petrol. Lead will damage oxygen sensor and three-way catalyst.
- In case of abnormal oil consumption, settle the problem as soon as possible, some material in the engine oil will damage the oxygen sensor and 3-d catalysts.
- The valve clearance should not be too small. If the exhaust temperature is too high, it will shorten the service life of three-way catalyst.
- When the air temperature is lower than 10°C, and the whole vehicle and engine is running at low speed. The exhaust pipe may have carbon deposit and black oxide coating which belong to normal phenomenon. After running for a period of time at high speed, take appropriate means to keep the engine coolant temperature within specified temperature range.

## Chapter X Appendices

Wire wrapping method of cables, wires and hoses .....	542
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BJ300GS circuit diagram (EURO-STANDARD) .....	565



## Wire wrapping method of cables, wires and hoses

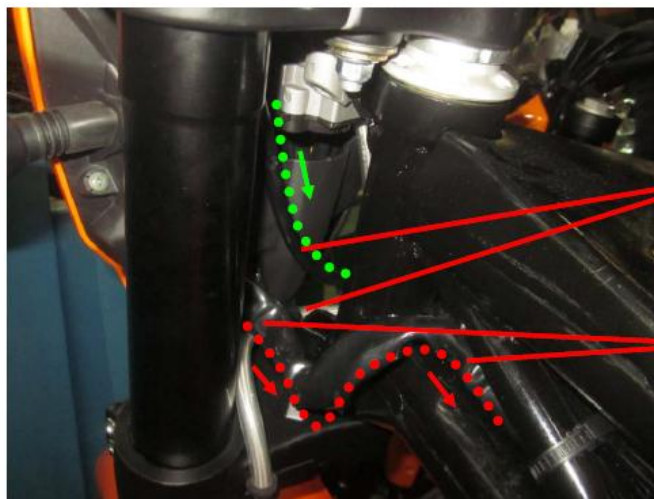
Wire wrapping method of cables, wires and hoses





## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses



Clutch wire and front hydraulic brake pipe is go through the head wire and rear side of front cap lamp installation plate. Pay attention no crossing between the two.

The main cable goes through the hydraulic brake wire. Enters from the rear side of the head wire, and access from the left side triangular notch.

One cable clamp increased at the throttle cable. Clamp the two cable clamps together. Pay attention to the sleeve is changed to be clamped at the rear wire.





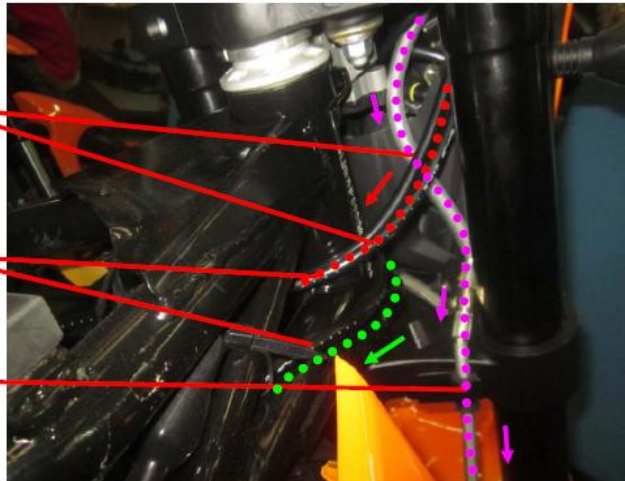
## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

**Throttle cable and front hydraulic brake wire go through the rear side of mount plate of the front hood downlight. The throttle cable goes through the rear side of the front hydraulic brake wire. Pay attention that the throttle cable is on the clutch wire.**

**Throttle cable and the clutch wire access to the vehicle frame from the rear side of head wire and right side of frame.**

**The sleeve of front hydraulic brake wire is pressed to the corresponding clamp to the lower joint plate.**



**The left switch wire unit is clamped with wire clamp. The connector part is placed to the front hood downlight**

## Wire wrapping method of cables, wires and hoses

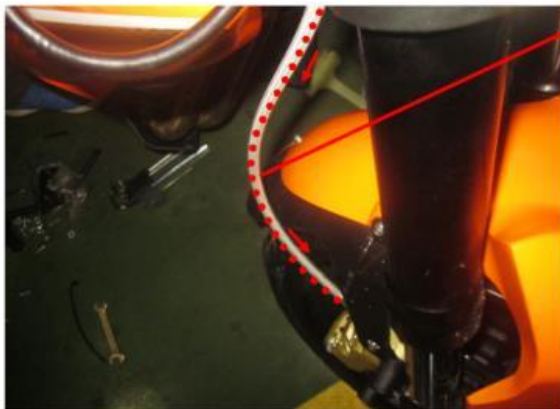
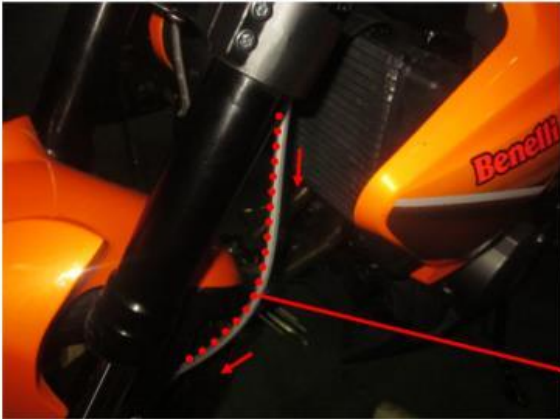
### Wire wrapping method of cables, wires and hoses

The left switch wire unit, headlight line and electric door lock line are clamped together with a clamp. The component part is placed to the headlight and cable. Pay attention that the electric door lock shall not be filled.



## Wire wrapping method of cables, wires and hoses

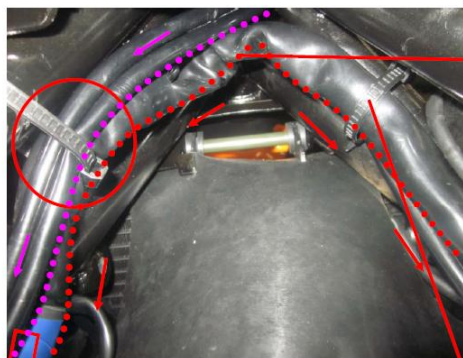
### Wire wrapping method of cables, wires and hoses



For lower part of front hydraulic brake wire layout, pay attention that it shall not contact with the front fender to avoid abrasion of the front hydraulic brake wire.

## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses



The main cable wire goes through the lower side of the **throttle cable**. Pay attention that the crossing part shall go through the air filter air inlet port.



Bind 200mm main cable, throttle cable into the vehicle frame: the main cable is clamped to the stand. The throttle cable goes through the external side.

Remove the binding band at this location



The wire of oxygen sensor, ignition coil wire and oil pressure sensor component are pulled to the rear side of water tank. After connecting to triangle hole, put the component cable into this place: bind the cable, component and sleeve with 250mm binding band to frame. The position is as shown below.



## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses



Bind the cable with 200mm binding band to frame. The position is as shown below.

Bind the cable and oil level sensor with 200mm binding band to frame.



Clamp the oxygen sensor wire and fuel oil pressure sensor with iron wire clip at the position as shown in the figure.



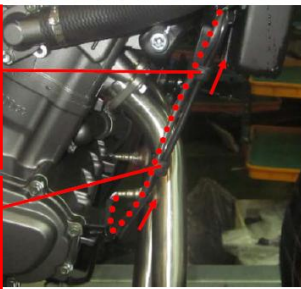
Pay attention that the oxygen sensor wire shall not be pulled too tightly.

Rubber binding band will bind the oxygen sensor wire and fuel oil pressure sensor wire to the rear side of the water tank.



Clamp the oxygen sensor wire and fuel oil pressure sensor with iron wire clip on the engine with the direction as shown in the figure.

Bind the oxygen sensor wire and fuel oil pressure sensor wire tightly with rubber binding band.



## Wire wrapping method of cables, wires and hoses

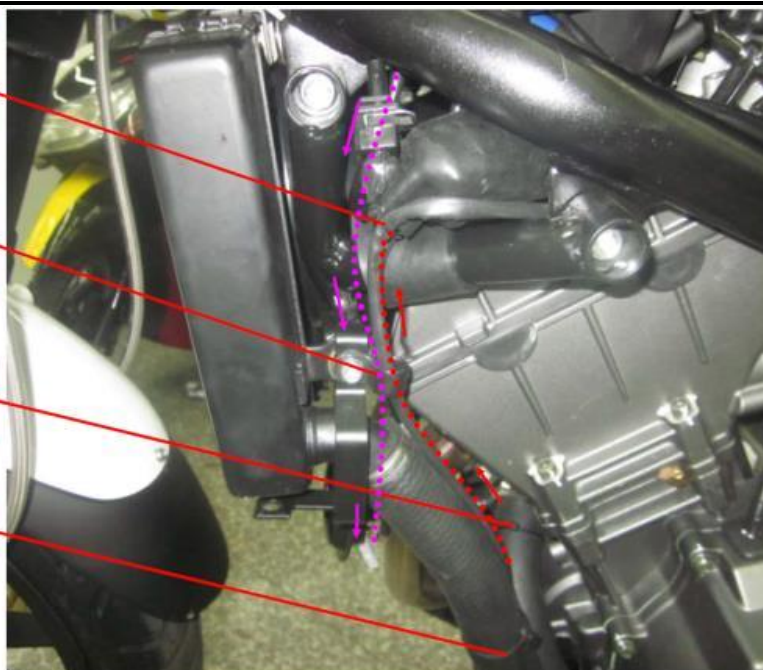
### Wire wrapping method of cables, wires and hoses

Bind the oxygen sensor wire, component sleeve end and high voltage component cable together with fine binding band. Pay attention to place the component and sleeve to the triangle hole. The high voltage component cable is in rubber.

The oxygen sensor goes through from this location. After the horn wire going through this clamp (as shown in imaginary line)

The oxygen sensor wire is to be clamped with rubber band. Avoid contacting with oxygen sensor wire and the engine.

Bind the rubber band to the water pipe. Pay attention to avoid oxidation.





## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

Wiring of right ignition coil wire etc. is at the rear side of the rubber to avoid the cables being agitated to water tank fan.



Wiring of left ignition coil wire etc. is at the rear side of the rubber to avoid the cables being agitated to water tank fan.



The right bond strap goes towards to right back; the right ignition coil wire points to right back; the two shall not contact water tank fan.



The left bond strap goes towards to left back; the right ignition coil wire points to left back; the two shall not contact water tank fan.

Connect the throttle cable to the engine. Attention: Connect the upper front side throttle cable to the upper side. The rear throttle cable connect to this place.



## Wire wrapping method of cables, wires and hoses

Wire wrapping method of cables, wires and hoses



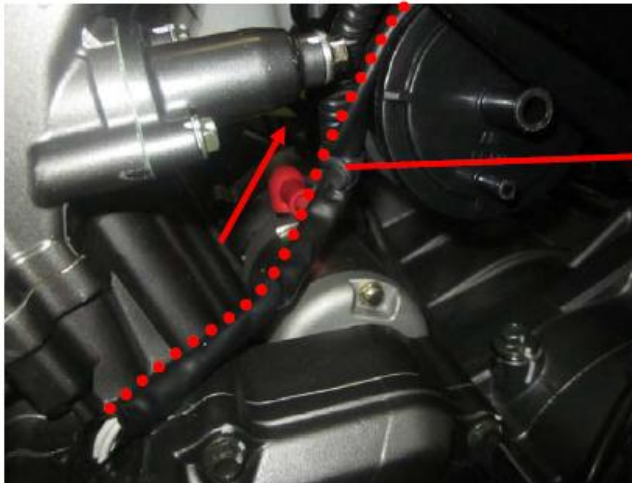
The main cable is wired to backside along with the upper left side of the frame. Pay attention to the rectifier.

Motor wire goes to inner side of the main cable. Attention: Not intertwine with other cable



## Wire wrapping method of cables, wires and hoses

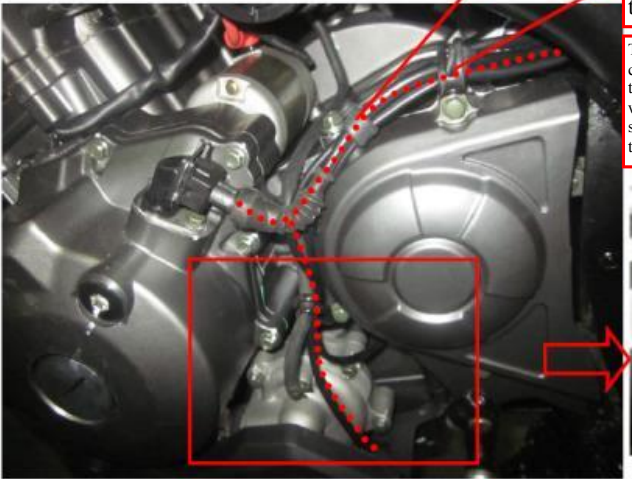
### Wire wrapping method of cables, wires and hoses



The cables at this point are bonded together. Attention: The wiring shall be in neat.

The cables at this point are bonded together by rubber band. Attention: The wiring shall be in neat.

Kick stand flow out switch and crankshaft signal wire etc. are clamped with iron wire clamp, the installation position of which is on the mounting screw of power cover towards the upper side of the vehicle.



The cables and pipelines are clamped with iron wire clamp, the installation position of which is on the mounting screw of power cover towards the front side of the vehicle.

Kick stand flow out switch wire goes through the inner side at the position as shown in the figure.



## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

The [positive pole](#) wire of the battery, frame [bond strap](#), Kick stand flow out switch wire and other component are bonded together tightly with 150mm binding band at the end.



The main cable are bonded together with 250mm binding band. Pay attention on the main cable shall be at rectifier and component upper side.







The installation position of bond strap is as shown in the figure. The position is above the main cable.

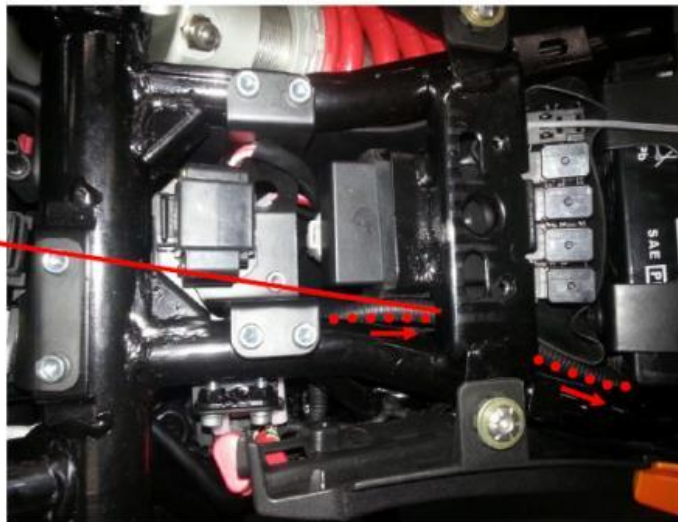
The positive pole wire of the battery is at inner side of the frame.



## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

The positive pole wire of the battery goes inside the frame, below the welding components.



The main cable is clamped with wire clamp.

The main cable is tightly clamped with wire clamp. The tail cable goes inside the frame passing the frame as shown in the figure.

The main cable is tightly clamped with wire clamp. The tail cable goes inside the frame passing the frame as shown in the figure.



## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses



The positive pole wire of the battery goes inside the frame passing the frame below the welding components



The seat cushion wire is clamped by iron wire clamp (do not use the tail cable at this position to clamp the wire). The wire clamp is as shown in the figure toward to the vehicle.



The positive pole wire of the battery is clamped by iron wire clamp. The wire clamp is as shown in the figure toward to the vehicle.



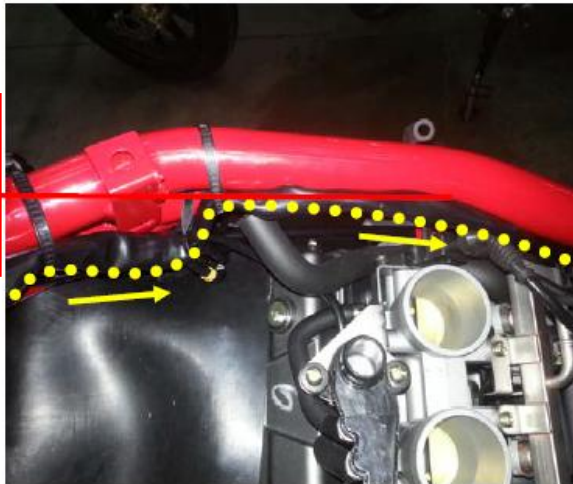
Attention: The water pipeline goes through the triangle hole from the frame.



## Wire wrapping method of cables, wires and hoses

Wire wrapping method of cables, wires and hoses

The cable at right side of the vehicle goes to backward along the right upper side of the frame



The binding band at this place is removed.

The clutch changes to go to upper side of the mounting bracket of resonance pot.



## Wire wrapping method of cables, wires and hoses

Wire wrapping method of cables, wires and hoses



Bind the velocity transducer and brake light wire with 200mm binding band.

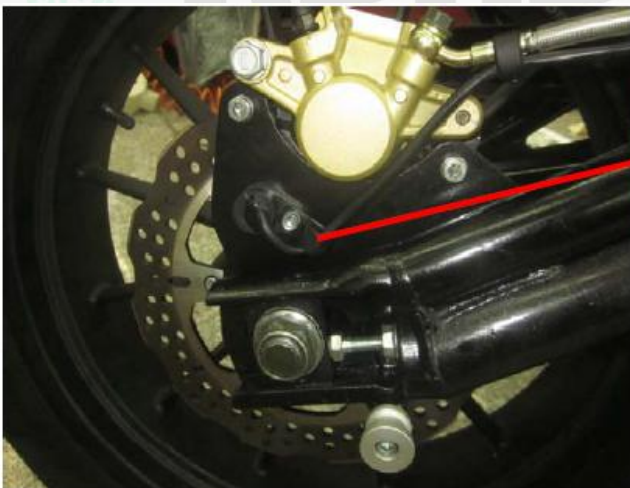


## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses



The rear hydraulic brake tube and **velocity transducer cable** are bonded together with rubber binding band. The velocity transducer cable is located at



The **velocity transducer cable** goes through the wire clamp. The wire clamp position is changed.



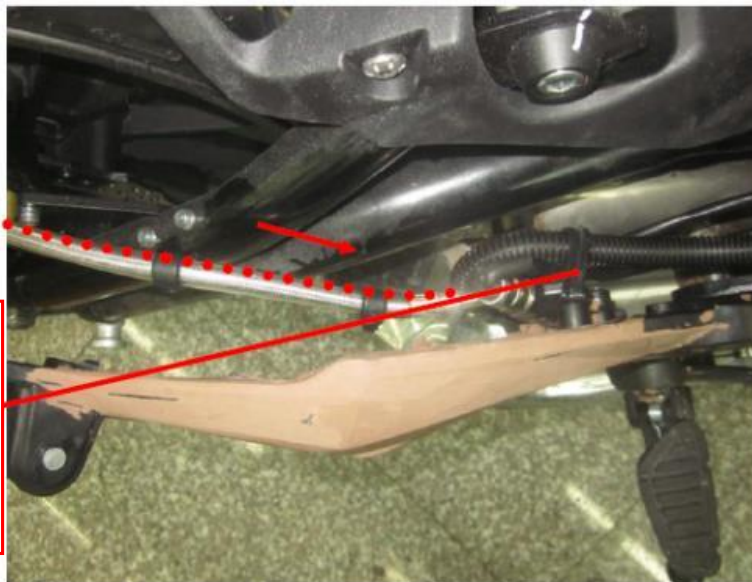
## Wire wrapping method of cables, wires and hoses

Wire wrapping method of cables, wires and hoses

Velocity transducer cable and brake light wire are below the frame.



The [oil cup](#) , oil tube, velocity transducer cable and brake light wire are clamped together by fine binding band. Pay attention not to





## Wire wrapping method of cables, wires and hoses

Wire wrapping method of cables, wires and hoses

The drain pipe of resonance pot is arranged beside the engine and front of the real wheel fork.

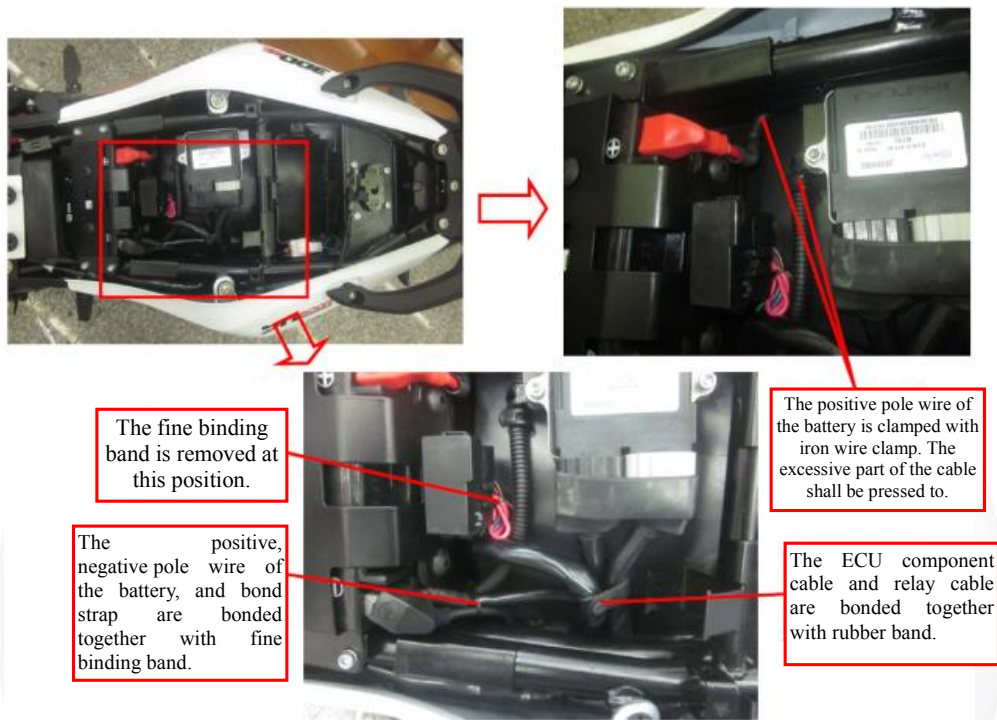


The drain pipe of fuel oil tank is arranged beside the engine and front of the real wheel fork.



## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

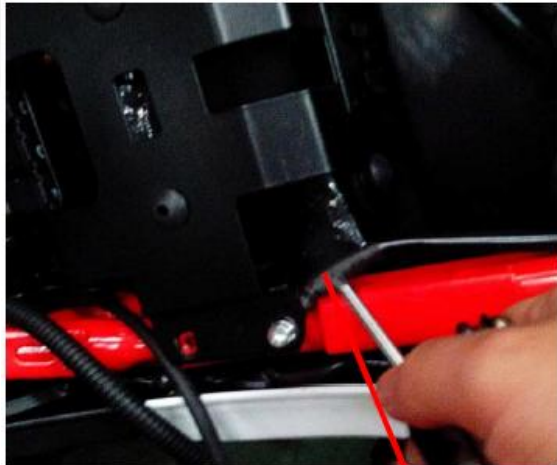


## Wire wrapping method of cables, wires and hoses

### Wire wrapping method of cables, wires and hoses

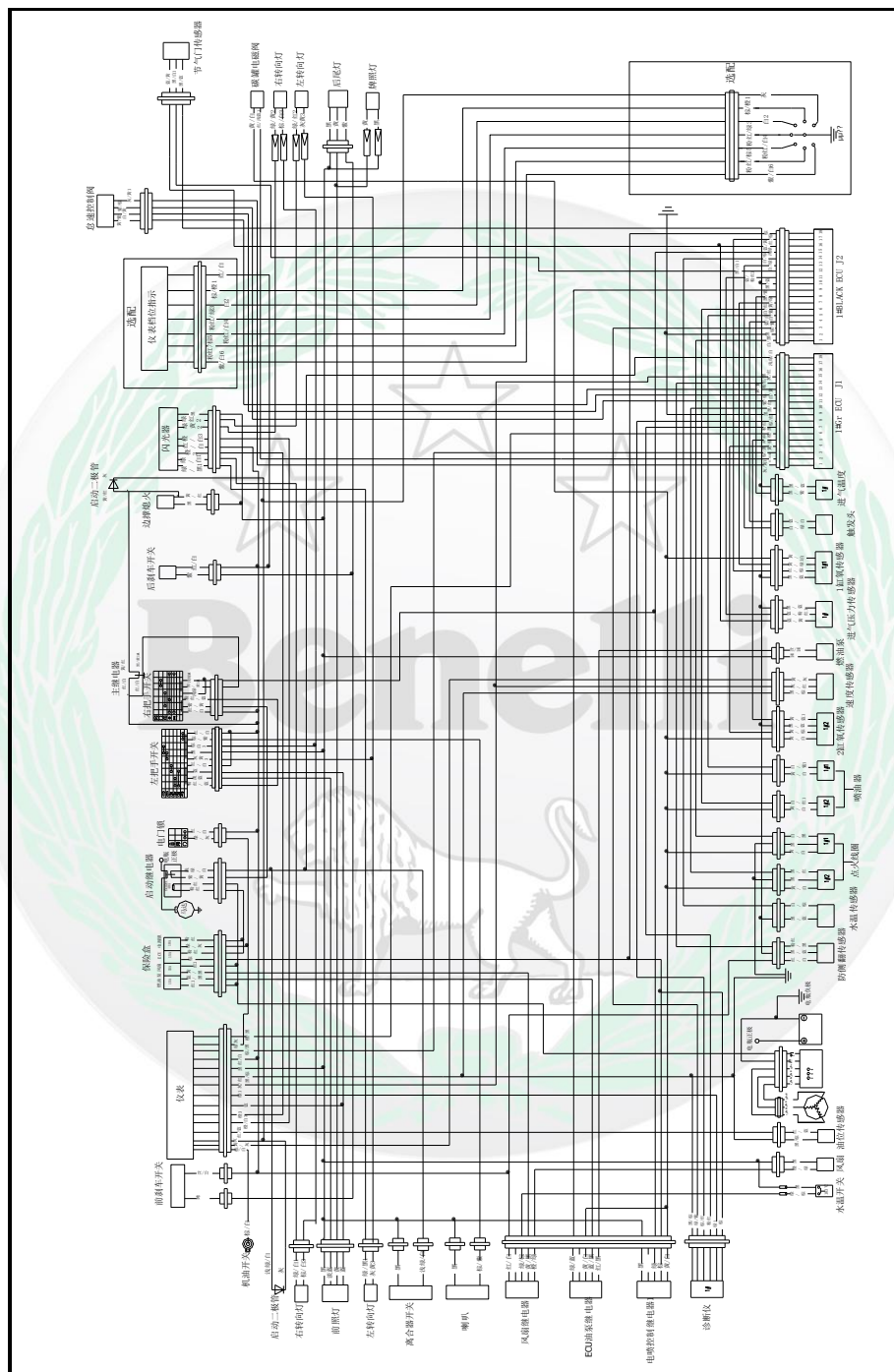


The cable bond strap of cable is changed to frame left side of the mounting screw of the battery bracket. Pay attention that arrange the bond strap first and than the battery bracket. Do not touch the frame.

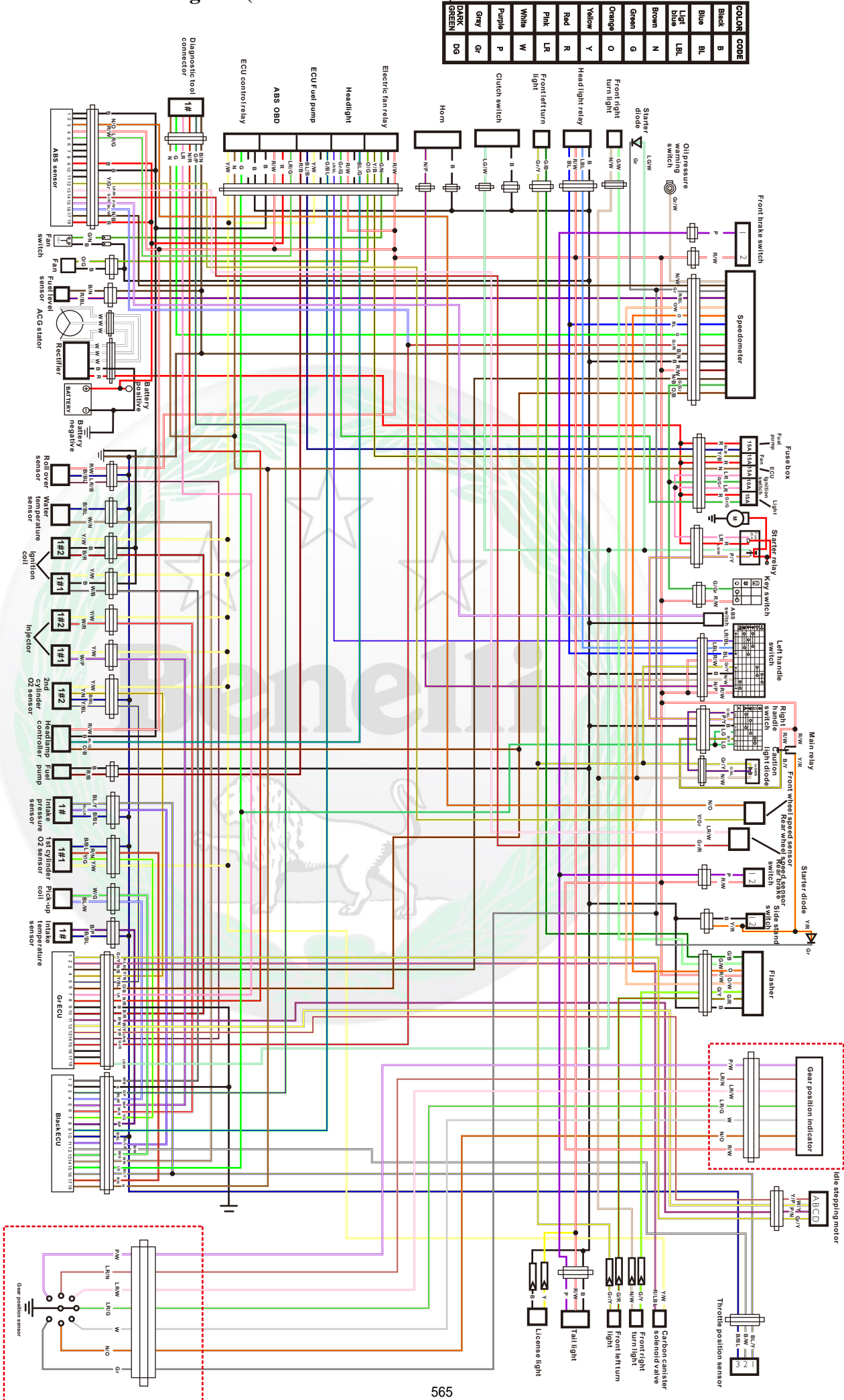


The bond strap angle is as shown in the figure.

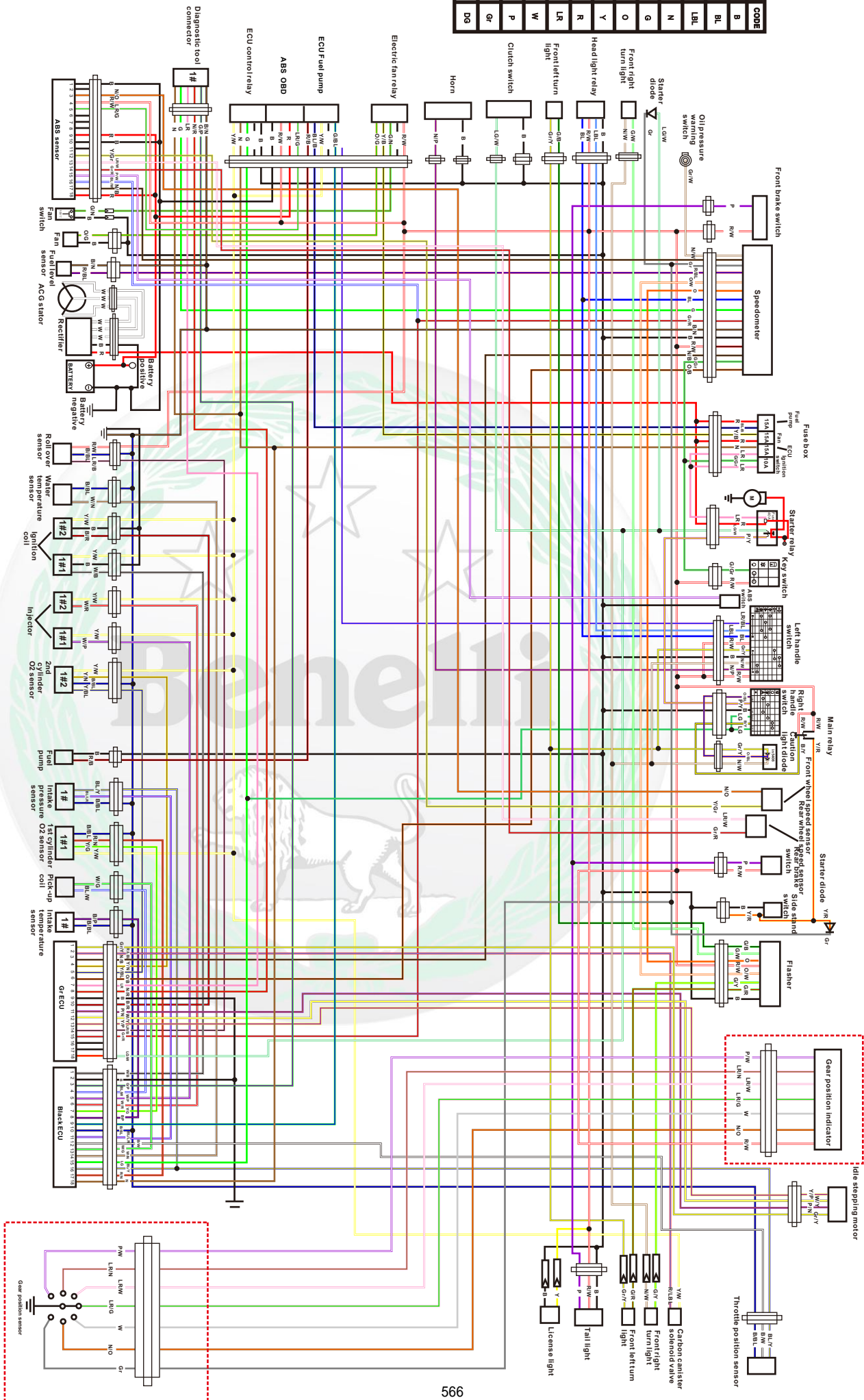
## BN302/TNT300 circuit diagram (sale in domestic market)



BN302/TNT300 circuit diagram (EURO-STANDARD)







COLOR	CODE
Black	B
Blue	BL
Light blue	LBL
Brown	N
Green	G
Orange	O
Yellow	Y
Red	R
Pink	LR
White	W
Purple	P
Gray	Gr
DARK GREEN	DG

