LEONCINO 250

Work Shop Manual

Work Shop Manual

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All contents of this Manual are prepared in accordance with the latest product information. The illustrations and pictures in this Manual are for reference only and may differ from actual parts.

LIST OFABBREVIATIONS

A	Ampere	lb	lb
ABDC	After bottom dead center	m	Meter
AC	Alternating current	min	minutes
ATDC	After top dead center	N	Newton
BBDC	Before bottom dead center	Pa	Pascal
BDC	Bottom dead center	PS	Horsepower
BTDC	Before top dead center	psi	Pound per square inch
℃	Degrees Celsius	r	Revolution
DC	Direct current	rpm	Revolutions per minute
F	Farad	TDC	Top dead center
℉	Degree Fahrenheit	TIR	Total indicator reading
ft	Foot	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	Liter		

Benelli

Exhaust Emission Control Information

In order to protect our common environment, Zhejiang Qianjiang Motorcycle Co., Ltd. introduced a crankcase blow-by gas filtration system (1) and an exhaust emission control system (2) that meet the applicable regulations of the US Environmental Protection Agency and the California Air Resources Board. In addition, a fuel vapor recovery system (3) that complies with the applicable regulations of California Air Resources Board is installed for motorcycles sold only in California.

1. Crankcase blow-by gas filtration system

This system can prevent the crankcase gas from being discharged into the atmosphere. The crankcase gas passes through the oil separator and is forced into the intake side of the engine. When the engine is running, the gas is sent to the combustion chamber and then burned with the fuel and air sent by the fuel injection system.

2. Exhaust emission control system

This system can reduce the amount of pollutants emitted by the exhaust of this motorcycle into the atmosphere. The fuel injection system, ignition system and exhaust system of this motorcycle have been carefully designed and assembled to ensure high engine efficiency and low pollutant emissions.

The exhaust system of this motorcycle contains a catalytic converter system.

3. Fuel vapor recovery system

The fuel vapor in the fuel injection system is not discharged into the atmosphere, but is forced into the working engine and then burned. If the engine is not started, the steam will be stored in the canister. If it is a liquid fuel, it is sucked into the oil separator and then returned to the fuel tank.

The *Atmospheric Protection Act* is a federal law used to deal with the pollution of motor vehicles and contains the provisions commonly known as the “Regulations on the Modification of the *Atmospheric Protection Act*”.

"203(a) Prohibit conducting or abetting others from doing the followings:

(3) (A) Before the final purchaser purchases or receives any motorcycle or motorcycle engine, no one shall dismantle any parts mounted on the motorcycle or motorcycle engine in accordance with the provisions of this Manual or damage them; any manufacture or dealer shall not deliberately dismantle or damage any parts after selling or delivering any motorcycle or motorcycle engine to the final purchaser.

(3) (B) After the sale or delivery of any motorcycle or motorcycle engine to the final purchaser, any person engaged in the repair, maintenance, sale, leasing or trading of a motorcycle or motorcycle engine or a person operating a motorcycle fleet shall not dismantle any parts mounted on the motorcycle or motorcycle engine in accordance with the provisions of this Manual or damage them..."

Remarks

The meaning of “dismantling or damaging any component” is generally considered as follows:

1. Temporary removal of any part for maintenance or temporary failure to operate the part does not belong to “modification”.
2. The following cases belong to “modification”:
    a. Incorrectly adjust the components of vehicle, so that the exhaust gas exceeds the emission standards.
    b. Use replacement parts or accessories, thus affecting the performance or durability of motorcycle.
    c. Add parts or accessories, which makes the motorcycle out of standard.
    d. Permanently dismantle, disassemble or damage any parts of exhaust emission control system.

All dealers are advised to comply with the above provisions of federal law and any violators will be subject to civil penalties.

It is strictly forbidden to modify the noise control system

Federal law prohibits any one from conducting or abetting others to do the followings: (1) Any one dismantles any part of motorcycle and makes it unable to operate before the final purchaser purchases or receives any motorcycle or during the use of motorcycle, unless such parts need to be maintained, repaired or replaced; (2) any one continue to use the motorcycle after dismantling any part of motorcycle and making it unable to operate.

The following behaviors belong to “modification of motorcycle”:

- Replace the original exhaust system or silencer with parts that do not comply with federal regulations.
- Remove silencer or its internal components.
- Remove the air filter or its cover.
- Modify the muffler or air intake system by cutting, drilling or other means, to increase the noise level.

Contents

Exhaust Emission Control Information 2
It is strictly forbidden to modify the noise control system 3
Introduction 1
Chapter I Basic Information 2
- Maintenance instructions 3
  - Installation of battery 3
  - Sharp edge of part 3
  - Solvent 3
  - Cleaning the motorcycle before disassembly 4
  - Sorting out and cleaning the removed parts 4
  - Storing the removed parts 4
  - Check 4
  - Replacement part 5
  - Assembly sequence 5
  - Fastening sequence 5
  - Locking torque 5
  - Force 6
  - Gasket, O-ring 6
  - Liquid gasket, locking agent 6
  - Press fitting 6
  - Ball Bearing and Needle Bearing 7
  - Oil seal, grease seal 7
  - Circlip, cotter pin 7
  - Lubrication 8
  - Engine rotation direction 8
  - Wire 8
  - Cable connector check 8
    - 1. Disconnect 9
    - 2. Check 9
    - 3. Check 9
    - 4. Check 9
    - 5. Check 10
  - Cable arrangement 10
  - Tool 11
- Model information 12
  - China 12
  - Europe 13
  - Non-European 14
  - Important recognition 15
- Basic specifications 16
- General Technical Parameters 17
- Unit conversion table 21

Chapter II Regular Maintenance 22

Regular maintenance table 24
Torque and locking agent 26
Main locking torque specifications 26
Locking torque and related parameters of nuts, bolts and screws 30
Technical parameters 31
Regular maintenance procedures 34
Fuel injection system (EFI) 34
Check throttle control system 34
Check idle speed 35
Check fuel hose (fuel leak, hose rupture, hose installation) 35
Check fuel vapor recovery system (models in China, Europe and the US) 36
Cooling system 38
Check coolant level 38
Check radiator pipes (coolant leakage, radiator pipes damage, installation status of radiator pipes) 38
Engine cylinder head and cylinder head cover 39
Check valve clearance 39
Adjusting the valve clearance 40
Check whether the air inlet unit has been damaged 44
Clutch 45
Check whether the clutch control system is normal 45
Check the free stroke of clutch handle 45
Wheel/tire 46
Check the tire pressure 46
Check wheel / tire for wear 46
Check the wear of tread 46
Check whether the wheel bearing has been damaged 47
Final drive mechanism 48
Check the lubrication state of drive chain 48
Check whether the drive chain is slack 48
Adjust drive chain slackness 48
Check wheel alignment 50
Check the wear of drive chain 50
Check the wear of chain guide 51
Brake 52
Check brake hoses and brake lines for damage and ensure their installation status 52
Free stroke of front brake 52
Free stroke of rear brake 53
Check brake 53
Check brake fluid level 53
Inspection of wear of brake pad 54
Check brake light switch 55
Check the output voltage of speed sensor 55
Suspension system 57
Check front fork / rear shock absorber 57
Check the front fork shock absorber for oil leakage 57

Check the rear shock absorber for oil leakage 58
Steering system 59
Check steering clearance 59
Adjust the steering seat properly 59
Lubricate steering stem bearings 60
Electrical system 61
Check lights and switches 61
Check the headlight accuracy 65
Check the sidestand switch 66
Check emergency stop switch 67
Others 68
Lubricate frame parts 68
Check the tightness of bolts, nuts and fasteners 69
Replacement of part 71
Replacement of air filter element 71
Replacement of fuel hose 74
Replacement of coolant 75
Replacement of radiator hose 78
Replacement of oil 79
Replacement of brake hose 80
Replacement of rear brake hose 82
Replacement of brake fluid 83
Replacement of rubber parts of master cylinder 86
Replacement of rubber parts of caliper 88
Replacement of spark plug 92
Chapter III Electronic Fuel Injection (EFI) 93
Introduction to EFI 96
EFI system 97
EFI part position 99
Technical parameters 106
Fuel tank 108
Exploded view of fuel tank 108
Fuel vapor recovery system 110
Fuel tank 111
Disassemble fuel tank 111
Check the fuel tank 112
Install the fuel tank 112
Precautions for EFI overhaul 113
Precautions for EFI overhaul 113
ECU 115
Engine controller (MT05 ECU) 115
ECU appearance 115
ECU disassembly 115
ECU installation 115
Precautions for ECU 115
ECU power supply requirements 116

ECU temperature requirements 116
Fuel pump 117
Working principle of fuel pump 117
Appearance of fuel pump 117
Fuel pump composition 118
Fuel pump label and logo 118
Working environment of fuel pump 119
Maintenance process of fuel pump: 119
Safety protection: 119
Fault diagnosis of fuel pump assembly: 120
Disassembly of fuel pump assembly: 120
Installation of fuel pump assembly: 120
Fuel pressure release process: 121
Fuel leakage check process: 121
Notes for use: 121
Throttle body: 123
Working principle of throttle body: 123
Appearance of throttle body: 123
Technical parameters 124
Throttle body: 124
Throttle position sensor: 124
Idle air control valve: 124
Operating temperature of throttle 124
Disassembly of throttle body 124
Cleaning method of throttle 124
Installation of throttle body 124
Notes for the installation of throttle body 125
Notes for the use of throttle body 125
Fuel injector 126
Working principle of fuel injector 126
Appearance of fuel injector 126
Fuel injector seal 126
O-ring seal connected to oil rail or oil injection cap 127
O-ring seal connected to intake pipe end....127
List of recommended lubricants 127
Overvoltage impact of fuel injector 127
Temperature range of fuel injector: 127
Fuel contaminants of fuel injector 128
Fuel injector harness arrangement 128
Notes for use of fuel injector 128
Installation requirements for fuel injector.... 129
Replacement method of fuel injector 129
Replaceability of fuel injector 130
Blocking of fuel injector 130
Engine water temperature sensor 131
Working principles of engine water temperature sensor 131

Appearance of engine water temperature sensor 131
Installation requirements for engine water temperature sensor 131
Operating environment of engine water temperature sensor 131
Electrical environment of engine water temperature sensor 131
Cleaning of engine water temperature sensor 132
intake temperature sensor 133
Working principle of intake temperature sensor 133
Appearance of intake temperature sensor 133
Technical parameters 133
Pin position definition and function diagram 134
Installation position of intake temperature sensor 134
Cleaning 134
intake pressure sensor 135
Working principles of intake pressure sensor 135
Appearance of intake pressure sensor 135
Operating environment 135
Storage environment 135
Electrical environment 136
Pin definition 136
Position 136
Cleaning 136
Oxygen sensor 138
Working principle of oxygen sensor 138
Appearance of oxygen sensor 138
Technical parameters 138
Installation requirements 138
Oxygen sensor pin definition: 139
Characteristic curve 139
Requirements for fuel quality 140
Idle speed stepper motor 141
Working principle of idle speed stepper motor 141
Appearance of idle speed stepper motor 141
Pin definition 142
Characteristic parameters: 142
Cleaning 142
Canister solenoid valve (ECP) 143
Overview of working principle 143
Appearance 143
Pin of ECP solenoid valve 143
Technical parameters 143
Installation requirements 144
Fault Maintenance and Diagnosis Method of EFI System 145
Conduct diagnosis directly using the flashing fault lamp at meter 145
Diagnose fault using diagnostic apparatus 147
Check fault using diagnostic software PCHUD 148
Common troubleshooting methods for electronic fuel inject system 155

Maintenance tool 155
Engine working data flow displayed by diagnostic apparatus 155
Step I 155
Step II 155
Step III 156
Simple troubleshooting 156
Daily use and maintenance 156
Fault phenomenon-Start fault 156
Fault phenomenon—Start failure 158
Fault phenomenon—Instable idle speed 158
Fault phenomenon—idle speed too high or too low 158
Fault phenomenon—Instable idle speed with deceleration and flameout 158
Fault phenomenon— insufficient engine brake 158
Fault phenomenon—Slight burning phenomenon 158
Fault phenomenon—Fault lamp is on, but fault code is inconsistent with fault 158
Fault phenomenon—Extremely high fuel consumption 158
Chapter IV Cooling System 161
Exploded view of cooling system 162
Exploded view of water pump 164
Coolant flow diagram 165
Technical parameters 167
Coolant 168
Check coolant for deterioration 168
Check coolant level 168
Drain the coolant 168
Add the coolant 168
Detect pressure 168
Flush cooling system 168
Disassembly/installation of coolant reserve tank 169
Water pump 170
Disassembly of water pump 170
Installation of water pump 171
Check water pump impeller 171
Radiator 172
Disassembly of radiator and radiator fan 172
Installation of radiator and radiator fan 173
Inspection of Radiator 173
Inspection of radiator cover 175
Inspection of radiator filler 176
Thermostat 177
Disassembly of thermostat 177
Installation of thermostat 178
Inspection of thermostat 178
Hose and pipeline 180
Installation of hose 180
Check hose 180

Water temperature sensor 181
Disassembly / installation of water temperature sensor 181
Check water temperature sensor 181
Chapter V Engine 182
Lubrication system 184
Exploded view of oil pump 184
Oil flow diagram 186
Preparatory information 186
Technical parameters 187
Fuel pump 188
Disassembly of fuel pump 188
Inspection of fuel pump 189
Installation of fuel pump 190
Sub-assembly of cylinder head 191
Exploded view of cylinder head 191
Exploded view of camshaft and valve 193
Exploded view of timing drive mechanism 194
Preparatory information 195
Technical parameters 196
Special tools and sealants 197
Cylinder head 199
Disassembly of cylinder head 199
Valve decomposition 201
Inspection of combustion chamber 201
Inspection of the cylinder head joint surface 201
Inspection of intake and exhaust springs 202
Inspection of valve stem 202
Inspection of valve guide 203
Replacement of valve guide 203
Adjustment of valve seat ring 204
Installation of cylinder head 206
Tensioner 207
Function of tensioner 207
Disassembly of tensioner 207
Assembly of tensioner 207
Inspection of tensioner 207
Cylinder block and piston 208
Exploded view of cylinder body 208
Exploded view of piston / crankshaft 209
Preparatory information 210
Technical parameters 211
Inspection and replacement of cylinder block 212
Disassembly of cylinder block 212
Installation of cylinder 212
Inspection of cylinder block 213
Piston 213

Disassembly of piston 213
Installation of piston 214
Check the piston, piston pin and piston ring 215
Crankshaft connecting rod 218
Exploded view of crankshaft connecting rod 218
Preparatory information 220
Technical parameters 221
Crankshaft combination 222
Disassembly of crankshaft connecting rod combination 222
Assembly 222
Inspection 222
Balance shaft 223
Function of balancer shaft 223
Disassembly of balancer shaft 223
Assembly of balancer shaft 224
Inspection of balancer shaft 224
Clutch 225
Exploded view of clutch 225
Special tool 227
Disassembly of clutch 228
Disassembly of clutch 230
Installation of clutch 231
Inspection of clutch 231
Gearshift mechanism 232
Exploded view of gearshift mechanism 232
Disassembly of gearshift mechanism 235
Installation of gearshift mechanism 236
Inspection of gearshift mechanism 236
Disassembly of primary / auxiliary shaft component 236
Disassembly of primary / auxiliary shaft component 239
Inspection of primary / auxiliary shaft component 240
Chapter VI Finished Motorcycle 241
Wheel/tire 246
Exploded view of front wheel/tire 246
Exploded view of rear wheel/tire 247
Technical parameters 249
Special tool 250
Wheel (rim) 251
Disassembly of front wheel 251
Installation of front wheel 252
Disassembly of rear wheel 253
Installation of rear wheel 255
Inspection of wheel 255
Inspection of wheel axle 256
Adjustment of rim's balance 257
Adjustment / inspection of tire pressure 259

Inspection of tire 259
Disassembly of tire 259
Installation of tire 259
Hub bearing 262
Disassembly of hub bearing 262
Installation of hub bearing 262
Inspection of hub bearing 263
Hub bearing lubrication 263
Drive mechanism 264
Exploded view of drive mechanism 264
Technical parameters 266
Special tool 267
Drive chain 268
Inspection of slackness of drive chain 268
Inspection of slackness of drive chain 268
Inspection / adjustment of wheel alignment 268
Insppection of wear of drive chain 268
Drive chain lubrication 268
Disassembly of drive chain 268
Installation of drive chain 269
Sprocket, collar, collar bearing 271
Disassembly of rear sprocket 271
Installation of rear sprocket 271
Disassembly of collar bearing 272
Installation of collar bearing 272
Inspection of collar bearing 272
Lubrication of collar bearing 273
Inspection of damper of collar 273
Inspection of wear of drive chain 273
Check the deformation of rear sprocket 274
Brake 275
Exploded View of brake 275
Technical parameters 277
Special tool 278
Brake lever, brake pedal 279
Adjustment of position of brake lever 279
Adjustment of position of brake pedal 279
Adjustment of position of brake pedal 279
Disassembly of brake pedal 280
Installation of brake pedal 280
Caliper 282
Disassembly of front caliper 282
Disassembly of rear caliper 282
Installation of caliper 282
Disassembly of front caliper 283
Assembly of front caliper 283

Diassembly of rear caliper 283
Assembly of rear caliper 283
Inspection of fluid sea of caliper for damage 283
Inspection of dust seal of caliper for damage 284
Inspection of the caliper piston and brake cylinder for damage 284
Brake pad 285
Disassembly of front brake pad 285
Installation of front brake pad..... 285
Disassembly of rear brake pad 286
Installation of rear brake pad 286
Inspection of wear of brake pad 286
Master cylinder 287
Disassembly of front master cylinder 287
Installation of front master cylinder 288
Disassembly of rear master cylinder 289
Installation of rear master cylinder 289
Disassembly of front master cylinder 289
Disassembly of rear master cylinder 289
Assembly of master cylinder 289
Check the master cylinder (visual inspection) 289
Brake disc 289
Disassembly of front brake disc 290
Disassembly of rear brake disc 290
Installation of brake disc 291
Inspection of wear of brake disc..... 291
Inspection of deformation of brake disc 292
Brake fluid..... 292
Inspection of level of brake fluid..... 292
Replacement of brake fluid 292
Exhaust the air inside the brake line 292
Brake hose 293
Disassembly / installation of brake hose and brake line 293
Inspection of brake hoses and brake lines 293
Anti-lock brake system (ABS) 294
Part position 294
ABS system circuit diagram 295
Pin name..... 296
ABS overhaul 297
ABS diagnostic flow chart 301
Questions need to be asked for the rider 302
ABS hydraulic mechanism 310
Speed sensor 314
Suspension system 318
Exploded view of front suspension system 318
Exploded view of rear suspension system 320
Technical parameters..... 322

Special tool 323
Front shock absorber 324
Disassembly of front shock absorber 324
Installation of front shock absorber 324
Replacement of front shock absorber fluid 325
Disassembly of front shock absorber 328
Inspection of inner tube and outer tube 330
Inspection of dust seal 330
Inspection of spring tension 331
Rear shock absorber 332
Adjustment of pretightening force of spring 332
Disassembly of rear shock absorber 333
Assembly of rear shock absorber 334
Inspection of rear shock absorber 334
Rear swing arm 335
Disassembly of swing arm 335
Installation of swing arm 336
Disassembly of swing arm bearing 337
Installation of swing arm bearing 337
Inspection of swing arm bearing 338
Inspection of chain guide 338
Control system 339
Exploded view of control system 339
Special tool 341
Control system 342
Inspection of control system 342
Adjustment of control system 342
Handlebar 343
Disassembly of handlebar 343
Installation of handlebar 344
Steering stem 346
Disassembly of steering stem and steering stem bearing 346
Installation of steering stem and steering stem bearing 347
Lubrication of steering stem bearing 349
Inspection of deformation of steering stem 349
Frame 350
Exploded view of frame 350
Exploded view of left footpeg 352
Exploded view of right footpeg 354
Exploded view of muffler 356
Exploded view of front fender 358
Exploded view of rear fender 360
Exploded view of headlights and meters 362
Exploded view of fuel tank cover 363
Exploded view of seat cushions and covers 364
Exploded view of engine accessories 366

Seat cushion 367
Disassembly of seat cushion 367
Installation of seat cushion 367
Cover 368
Disassembly of left cover 368
Installation of left cover 368
Disassembly of right cover 368
Installation of right cover 369
Remove left cover of frame 369
Installation of left cover 369
Disassembly of right cover of frame 369
Installation of right cover 370
Side cover 371
Disassembly of side cover 371
Installation of side cover 371
Rear part of rear fender 372
Disassembly of rear part of rear fender 372
Installation of rear part of rear fender 372
Front fender 373
Disassembly of front fender 373
Installation of front fender 373
Fuel tank cover 374
Disassembly of fuel tank cover 374
Installation of Fuel Tank Cover 374
Frame 375
Disassembly of frame 375
Installation of frame 376
Inspection of frame 376
Sidestand 377
Disassembly of sidestand 377
Installation of sidestand 377
Left front footpeg 378
Disassembly of left front footpeg 378
Installation of left front footpeg 378
Left rear footpeg 379
Disassembly of left rear footpeg 379
Installation of left rear footpeg 379
Front right footpeg 380
Disassembly of front right footpeg 380
Installation of front right footpeg 380
Rear right footpeg 381
Disassembly of rear right footpeg 381
Installation of rear right footpeg 381
Muffler 382
Disassembly of muffler 382
Installation of muffler 384

Disassembly/installation of engine 385
Exploded View of disassembly/installation of engine 385
Disassembly of engine 387
Installation of engine 391
Chapter VII Electrical System 394
Precautions 397
Technical parameters 398
Special tool 339
Electrical wiring 400
Wiring check 400
Charging system 401
Charging system circuit diagram 401
Battery 402
Disassembly of battery 402
Installation of battery 402
Activation of battery 403
First charge 404
Inspection of charging state 406
Alternator 408
Disassembly of alternator 408
Inspection of alternator 409
Installation of alternator 409
Voltage regulator/rectifier 410
Disassembly of rectifier 410
Inspection of circuit at main wiring terminal 410
Inspection of rectifier 410
Installation of rectifier 411
Ignition system circuit diagram 412
Ignition system circuit diagram 412
Precautions for operation 412
Crankshaft sensor 413
Disassembly of crankshaft position sensor 413
Inspection of crankshaft position sensor 413
Ignition coil 414
Disassembly of ignition coil: 414
Inspection of ignition coil 414
Installation of ignition coil 414
Spark plug 415
Inspection of spark plug 415
Inspection 415
Inspection of IC igniter 416
ECU unit 416
Ignition system troubleshooting 417
Starter system 418
Starter system circuit diagram 418
Starter motor 419

Disassembly of starter motor 419
Inspection of starter motor 419
Inspection of brush 419
Cleaning and Inspection of commutator 420
Inspection of brush lead 420
Inspection of right end cover assembly 421
Installation of starter motor 421
Starter relay 422
Disassembly of starter relay 422
Inspection of action of starter relay 422
Installation of starter relay 422
Lighting system 423
Headlight 423
Disassembly of headlight relay controller 423
Inspection of headlight relay controller 423
Installation of headlight relay controller 423
Disassembly of headlight 424
Replacement of headlight bulb 425
Replacement of headlight bulb 425
Installation of headlight 425
Turn signal light 425
Disassembly of front turn signal light 425
Disassembly of rear turn signal light 426
Replacement of turn signal light bulb 426
Installation of turn signal light 426
Disassembly of flasher 426
Inspection of flasher 426
Installation of flasher 426
Taillight 427
Disassembly of taillight 427
Replacement of taillight bulb 427
Installation of taillight 427
License plate light 427
Disassembly of license plate light 427
Replacement of license plate light bulb 427
Installation of license plate light 427
Meter 428
Disassembly of meter 428
Installation of meter 428
Switch and sensor and other parts 429
Power lock switch 429
Disassembly of power lock 429
Inspection of power lock 429
Installation of power lock 429
Handlebar switch 430
Switch state (non-headlights are always on) 430

Switch state (headlights are always on) 431
Inspection of time for turning on brake light 432
Adjustment of time for turning on the brake light 432
Inspection of switch 432
Connection of rear brake light switch 432
Connection of sidestand switch....432
Speed sensor 433
Disassembly of speed sensor 433
Inspection of speed sensor 434
Installation of speed sensor 434
Oxygen sensor....435
Disassembly of oxygen sensor 435
Inspection of oxygen sensor 435
Installation of oxygen sensor 435
Fuel level sensor 436
Disassembly of fuel level sensor 436
Inspection of fuel level sensor 436
Installation of fuel level sensor 436
Horn 437
Disassembly of horn 437
Inspection of horn 437
Installation of horn 437
Fan....438
Disassembly of fan 438
Inspection of fan....438
Installation of fan 439
Water temperature switch 440
Disassembly of water temperature switch 440
Inspection of water temperature switch 440
Installation of water temperature switch 440
Relay and fuse box 441
Disassembly of relay and fuse box 441
Inspection of relay circuit 442
Inspection of relay circuit (disconnect battery) 442
Inspection of relay circuit (with battery) 442
Internal circuit of relay box 443
Fuse 445
Disassembly of fuse....445
Installation of fuse....446
Inspection of fuse 447
Chapter VIII Appendixes 448
Winding method of cables, wires and hoses 450
Arrangement of main cable: 451
Arrangement of brake pipe: 456
Other matters: 460
Troubleshooting guide 468

Diagnostic procedure for the fault that engine cannot be started or it is difficult to start the engine: 468
Starter motor does not work: 468
The starter motor is rotating, but the engine does not work:..... 468
The engine does not run: 468
Fuel does not flow: 468
No sparks; sparks are weak: 468
There is a problem with the fuel/air mixture:..... 469
Too low cylinder pressure: 469
It cannot run properly at a low speed: 469
Sparks are weak: 469
There is a problem with the fuel/air mixture: 469
Too low cylinder pressure: 469
Others: 470
It cannot run properly at a high speed or the power is insufficient: 470
Ignition is abnormal: 470
There is a problem with the fuel/air mixture: 470
The cylinder pressure is low: 470
There is a click sound: 470
Others: 471
The temperature is too high: 471
Ignition is abnormal: 471
The muffler is overheated: 471
There is a problem with the fuel/air mixture:..... 471
The cylinder pressure is high: 471
The output force of engine is insufficient: 471
Not properly lubricated..... : 471
The fuel cooler is abnormal: 471
Meter is abnormal: 471
The coolant is abnormal: 472
The components of cooling system are not working properly: 472
Overcooling: 472
Meter is abnormal: 472
The components of cooling system are not working properly: 472
The clutch is not working properly: 472
The clutch is slipping: 472
The clutch cannot be separated properly: 472
There is a problem with shifting:..... 472
It is unable to operate the gear smoothly; control pedal cannot be reset: 472
Jump 473
Excessive speed change: 473
The engine makes an unusual noise: 473
There is a click sound: 473
The piston makes a sound: 473
The valve makes noise: 473
The drive system makes an unusual noise: 473
Clutch makes a noise: 473

The drive device makes a noise: 474
The drive system makes a noise:..... 474
The engine makes an unusual noise:..... 474
The front fork makes a noise: 474
The rear shock absorber makes a noise: 474
The brake disc makes a noise: 474
Other noises: 474
Excessive exhaust gas: 474
White exhaust: 474
Black exhaust: 474
Brown exhaust: 474
Poor performance and / or stability: 474
It is difficult to rotate the handlebar: 474
The handlebars vibrate or shake severely: 474
The handlebar is placed on one side:..... 475
The damping effect is not ideal: 475
Brake is unable to work properly 475
Battery has failed: 475
Battery has run out: 475
Battery is overcharged: 475
Circuit Diagram 476

Preface

This Manual is designed for well-trained mechanics in well-equipped stores. However, the contents of this Manual are detailed and the basic information is perfect， so motorcycle owners can use this Manual to carry out basic maintenance and repair work. In order to carry out maintenance or repair of motorcycle smoothly, the operator must have the basic knowledge of mechanic and understand how to use the repair tools properly and know about workshop processes. If motorcycle owners are inexperienced or unable to ensure that they can properly adjust, maintain and repair the motorcycle, please ask a qualified mechanic to conduct the above operations.

In order to perform the above operations efficiently and to avoid serious errors, please read this Manual before operation, familiarize yourself with the relevant procedures, and then operate in a clean place. Do not use other temporary substitutes if you have special tools or equipment specified in this Manual. Only with the right tools can you ensure accurate measurement results. In addition, the safety of operation may be affected when alternative tools are used.

During the warranty period, it is recommended to perform repair and maintenance in strict accordance with this Maintenance Manual. If any motorcycle owner fails to perform maintenance or repair in accordance with this Manual, the motorcycle will not be warranted.

In order to maximize the service life of your motorcycle, please comply with the following requirements:

- Observe the Regular Maintenance Form in the Maintenance Manual;
- Careful observe and pay attention to regular maintenance and repair;
- Use the proper tools and original Benelli motorcycle parts. This Maintenance Manual describes the specific tools, meters, and test equipment required to repair a Benelli motorcycle. For the original parts used as spare parts, see the Parts Catalog.
- Operate in strict accordance with the procedures in this Manual, and do not take shortcuts.
- Remember to make detailed maintenance and repair records, including dates and new parts installed.

Instructions on how to use this manual

This Manual describes the systems of motorcycle in chapters. “Quick Guide” helps you know clearly about various systems of this motorcycle and quickly find the corresponding chapters. Each chapter has a comprehensive catalog.

For example, if you want to know the ignition coil, use “Quick Guide” to find the chapter “Electrical System”, and then find the section where “Ignition Coil” is located from the catalog on the first page of this chapter.

If you see the following warning and reminder signs, please be sure to pay attention to the above contents! Remember to operate safely!

⚠Warning
This warning sign is used to alert the operator to obey certain instructions or procedures, otherwise, personal injury or death may be caused.

Notes
This reminder sign is used to alert the operator to obey certain instructions or procedures, otherwise, devices may be damaged or destroyed.

In addition to “Warning” and “Notes”, this Manual also contains four other signs to help you distinguish between different information.

Remarks

○ This sign indicates some operational tips to make the operation more convenient and improve efficiency.

● This sign indicates a step or a work to be completed.

○ This sign indicates a substep or how to complete the work of this step. This sign may also be placed before a certain “remarks”.

★ This sign indicates the measures taken according to the test or inspection results in the previous steps.

An exploded view of system components is available behind the catalogs of most of chapters. These illustrations describe the parts that require specific locking torque, oil, grease or threading fasteners during installation.

Chapter I Basic Information

Contents

Maintenance instructions 3
- Installation of battery 3
- Sharp edge of part 3
- Solvent 3
- Cleaning the motorcycle before disassembly 4
- Sorting out and cleaning the removed parts 4
- Storing the removed parts 4
- Check 4
- Replacement part 5
- Assembly sequence 5
- Fastening sequence 5
- Locking torque 5
- Force 6
- Gasket, O-ring 6
- Liquid gasket, locking agent 6
- Press fitting 6
- Ball Bearing and Needle Bearing 7
- Oil seal, grease seal 7
- Circlip, cotter pin 7
- Lubrication 8
- Engine rotation direction 8
- Wire 8
- Cable connector check 8
  - 1. Disconnect 9
  - 2. Check 9
  - 3. Check 9
  - 4. Check 9
  - 5. Check 10
- Cable arrangement 10
- Tool 11

Model information 12
- China 12
- Europe 13
- Non-European 14
- Important recognition 15

Basic specifications 16

General Technical Parameters 17

Unit conversion table 21

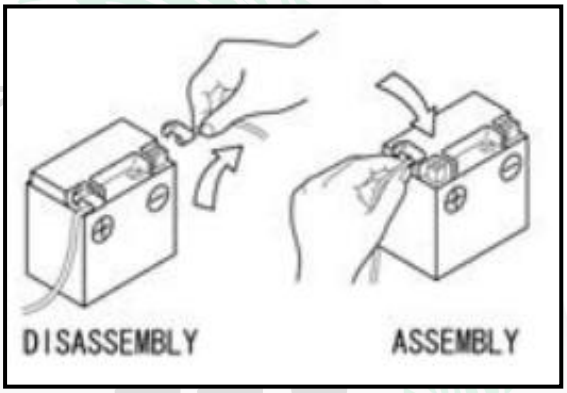
Maintenance instructions

Please read the following precautions before checking, disassembling or assembling the motorcycle. In order to facilitate the actual operations, each chapter is provided with remarks, illustrations, pictures, notes and detailed instructions as needed. This section describes the special considerations in the process of removing and reassembling or disassembling and reassembling common parts.

Pay special attention to the followings:

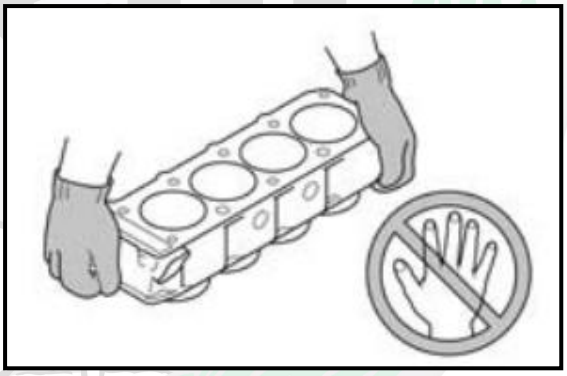
Installation of Battery

Disconnect the battery cable and battery before any operation on the motorcycle to prevent the engine from accidentally starting. Disconnect the negative wire (-) first, then disconnect the positive wire (+). After completing the operation, connect the positive wire (+) to the positive terminal (+) of the battery, then connect the negative wire (-) to the negative terminal (-).



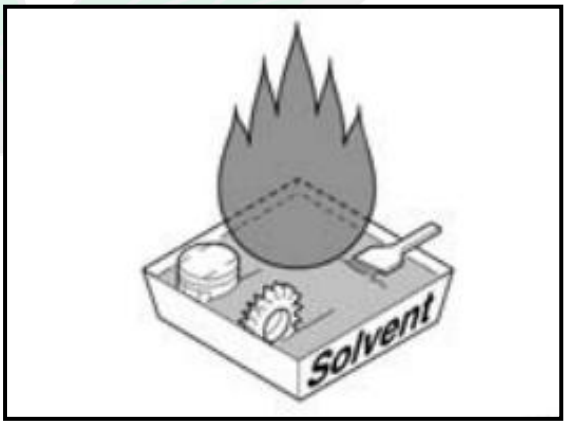
Sharp edge of part

To avoid scratching the hand with sharp edges, wear gloves when moving parts with large size or weight.



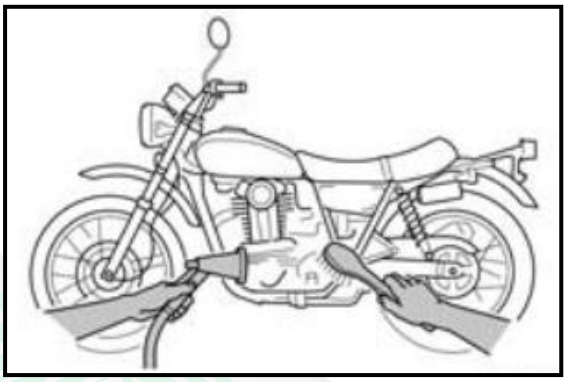
Vehicle

Use a solvent with a high flash point when cleaning parts. Use a solvent with a high flash point according to the instructions provided by the solvent manufacturer.



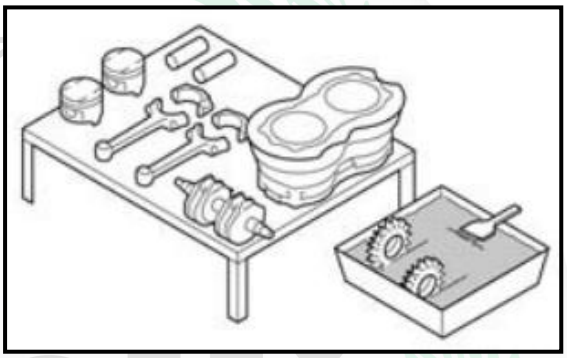
Cleaning the motorcycle before disassembly

Thoroughly clean the motorcycle before disassembly. If dust or other foreign matter enters the sealed part during the disassembly process, excessive wear may be caused and thus the performance of motorcycle may be reduced.



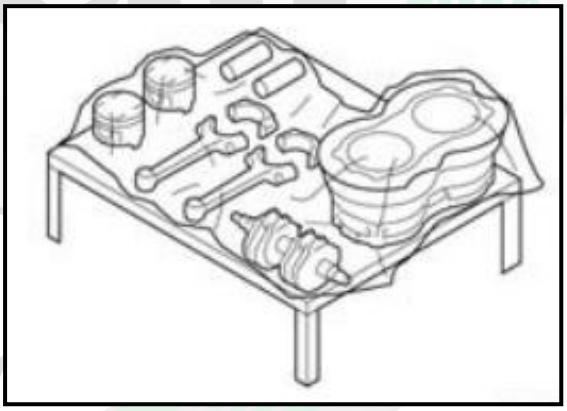
Sort out and clean the removed parts

The removed parts may be confused. Therefore, the removed parts should be arranged in the order of disassembly, and the parts should be cleaned and reinstalled.



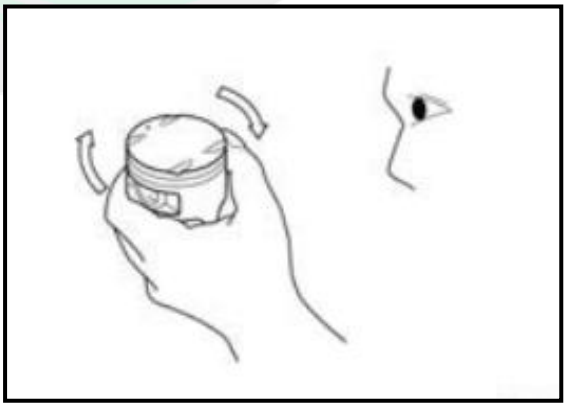
Store the removed parts

After cleaning all parts (including subassemblies), store the parts in a clean area. Cover the parts with a clean cloth or plastic film to prevent any foreign objects from falling into them before reassembly.



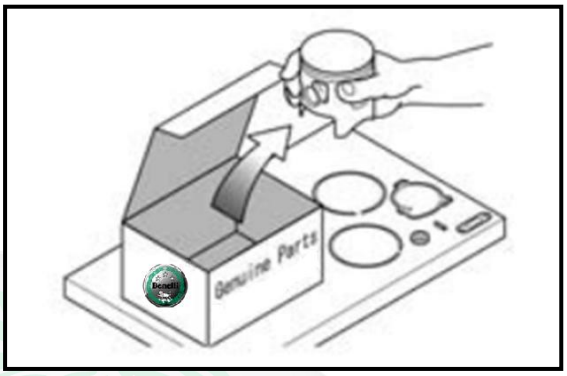
Check

Major accidents may be caused in case of using worn or damaged parts. Visually inspect the removed parts for corrosion, discoloration or other damage. The limits for the use of individual parts are detailed in the corresponding sections of this Manual. If any damage is found, or the part has exceeded the operating limit, the part must be replaced.



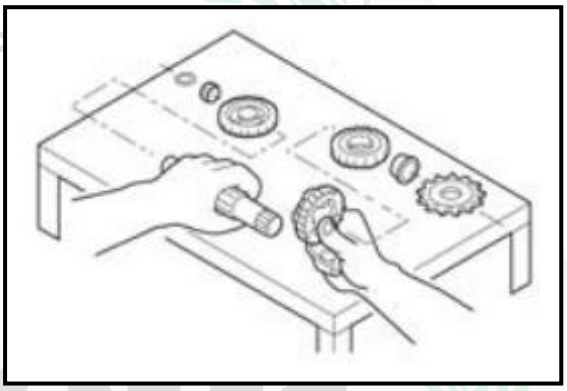
Replacement part

Replacement parts must be original Benelli parts or parts recommended by Benelli. Parts such as washers, O-rings, oil seals, grease seals, circlips or cotter pins must be replaced with new ones once removed.



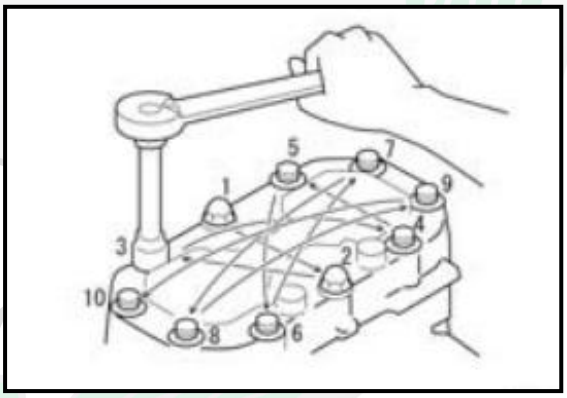
Assembly sequence

In most cases, the assembly sequence is the reverse of disassembly sequence, but if the Maintenance Manual describes the assembly sequence, it must be assembled in the order given.



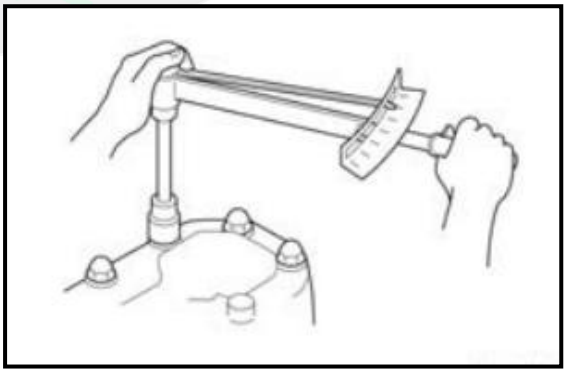
Fastening sequence

In general, when fixing parts with a few of bolts, nuts or screws, place the parts in the corresponding holes, then screw them in without applying torque, and then tighten them in the specified order to prevent warping or deformation which may result in part failure. Conversely, if you want to unscrew the bolt, nut or screw, first twist a quarter turn, loosen it, and then continue to unscrew it. If the tightening sequence is not specified, tighten the fasteners alternately in a diagonal way.



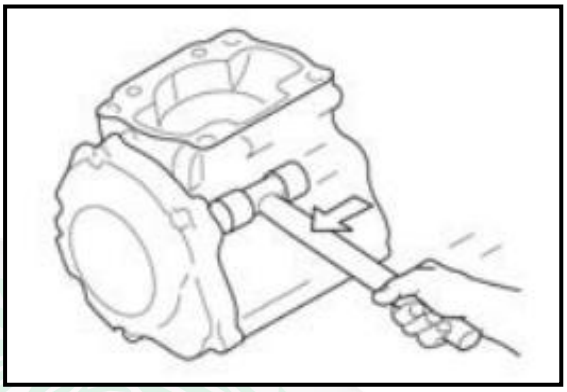
Locking torque

If you apply the wrong torque to a bolt, nut or screw, serious damages may be caused. Therefore, the fastener must be tightened to the specified torque with a high-quality torque wrench.



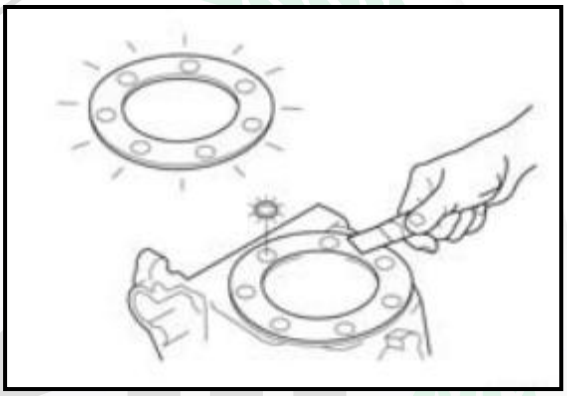
Force

Common sense and basic judgment are required during the process of removing and installing parts to prevent excessive force which may result in difficult maintenance or excessive maintenance costs. If necessary, use a pneumatic wrench to remove the screw with locking agent. If you need to hit the fastener, please use a mallet.



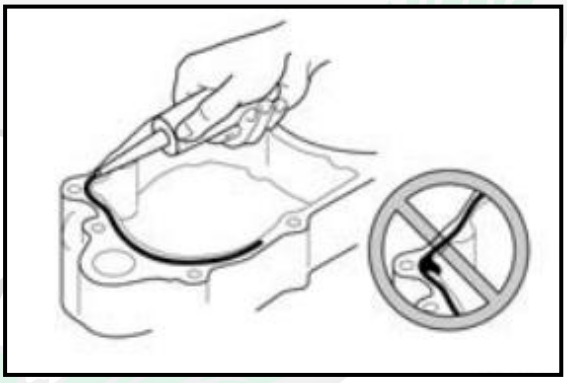
Gasket, O-ring

If the gasket or O-ring is hardened, shrunk or damaged after being removed, its sealing performance will be reduced. Remove the old gasket and thoroughly clean the sealing surface to prevent any gasket material or other materials from remaining on the sealing surface. A new gasket must be used for reinstallation and the used O-ring seal should be replaced.



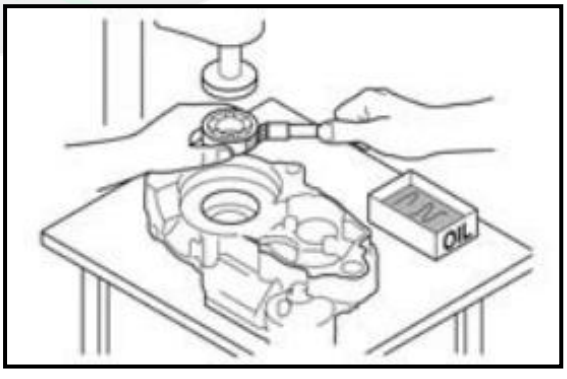
Liquid gasket, locking agent

If you need to use liquid gasket or locking agent, you must first clean the contact surface to avoid any oil residue on the contact surface before using the liquid gasket or locking agent. Do not use too much liquid gasket or locking agent, as excessive liquid gasket or locking agent may block the oil passage and cause serious damage.



Press fitting

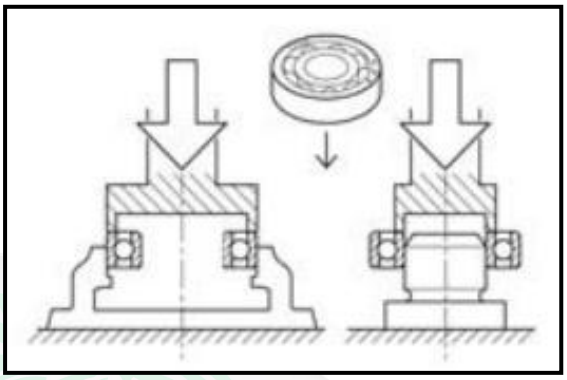
Parts such as bearings and oil seals must be pressed for proper fitting, so it is required to apply a small amount of oil to the contact area. It must be aligned with the contact area and slowly pressed into the part during installation.



Ball bearing and needle bearing

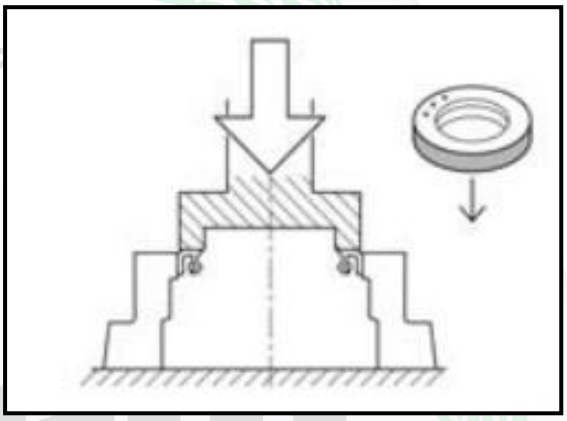
Do not remove the balls or needles in the bearing unless necessary. Once removed, it must be replaced with a new one. When pressing the bearing, pay attention to making the manufacturer and the size mark face outward. Apply force to the correct bearing race (as shown) and press the bearing into place.

If the force is applied to incorrect bearing race, the bearing may be damaged because of stress in the inner and outer races.

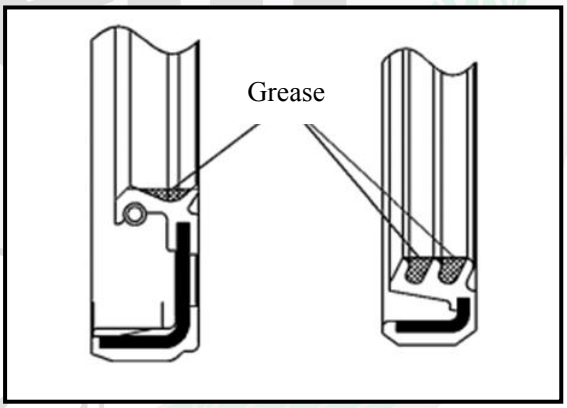


Oil seal, grease seal

Do not remove the compressed oil seal or grease seal if it is not necessary. Once removed, it must be replaced with a new one. When pressing the new oil seal, pay attention to making the manufacturer and the size mark face outward. Make sure the oil seal is in the proper position during installation.

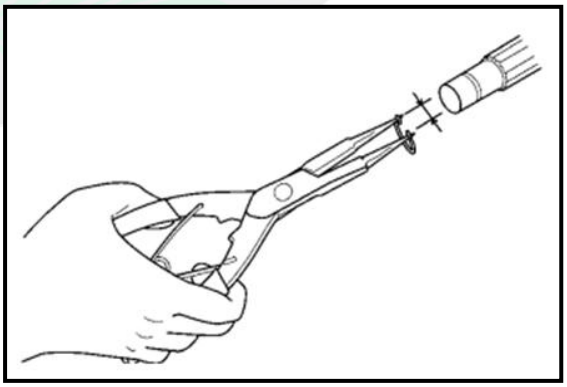


Apply a specified amount of grease to the edges of oil seal before installation.



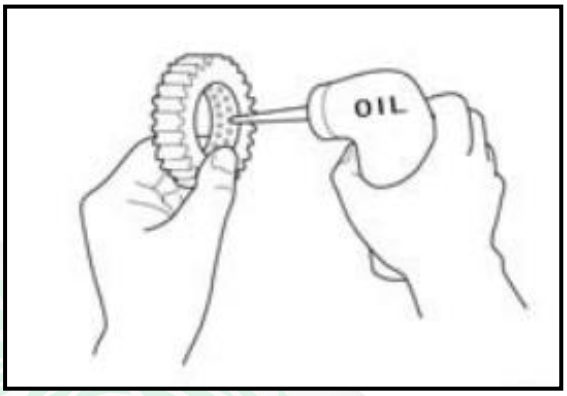
Circlip, cotter pin

Replace the removed circlip or cotter pin with a new one. In order to prevent deformation, the opening of circlip or cotter pin should not be too large during installation.



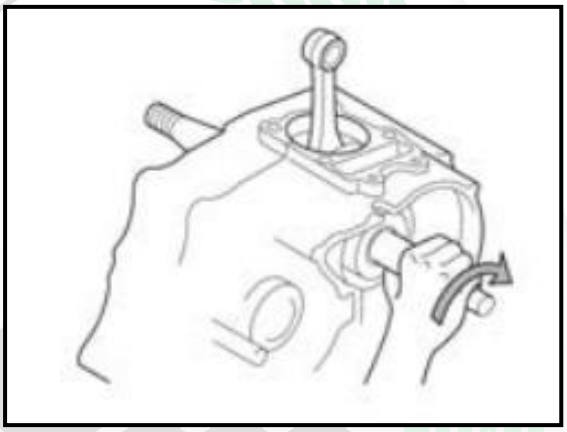
Lubrication

In order to minimize the wear during running-in period, it is necessary to lubricate the rotating or sliding parts. Inject the proper amount of lubricating oil or grease as specified, and each lubrication point will be given in this Manual.



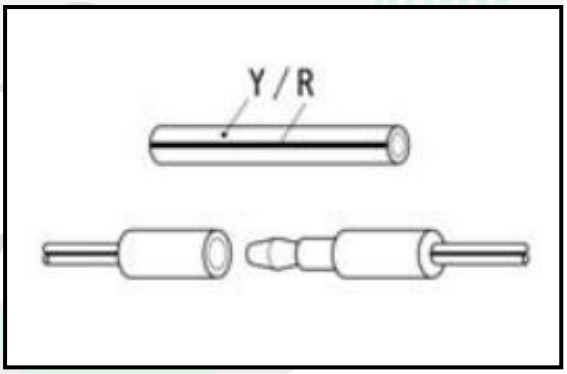
Engine rotation direction

When the crankshaft is rotated by hands, an incorrect direction of rotation may cause a misjudgment of relevant gap adjustment. So please rotate the crankshaft in the positive direction (clockwise from the output).



Wire

Two-color line: first the base color, then the color of stripe. Only the wires of the same color are allowed to be connected, except as noted.



Cable connector check

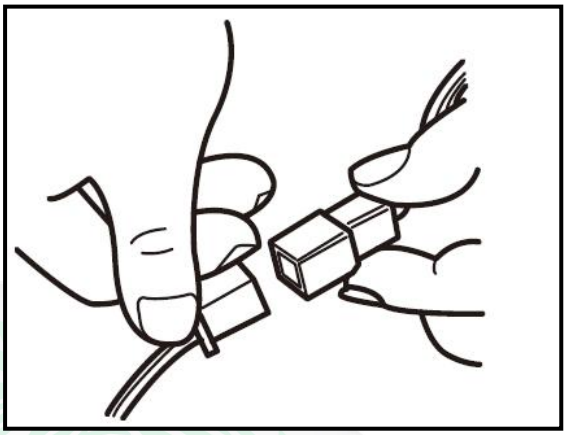
Make sure that there are no rust, moisture or other defects on the connector.

1. Disconnect

Wire

Connector

Joint



2. Check

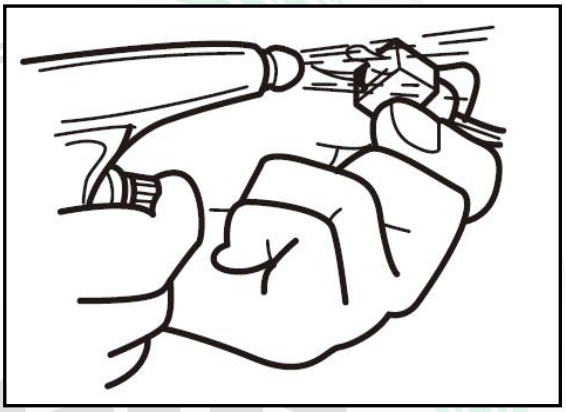
Wire

Connector

Joint

If there is moisture, use compressed air to dry.

If there is rust, connect the connected parts for several times or use a rust remover. Replace the seriously rusted parts timely.

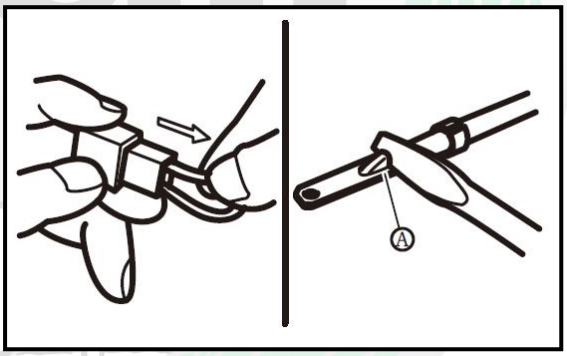


3. Check

All connectors

If any of the joints are loose, reconnect them properly.

Notes
If the “A” pin on the terminal is flat, please bend it.



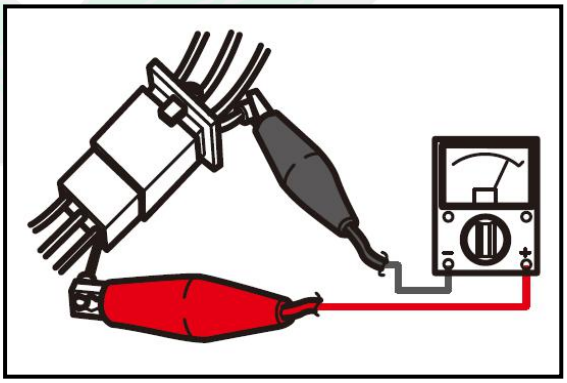
4. Check

Wire

Connector

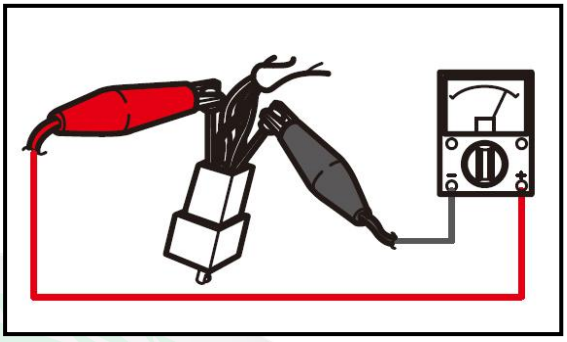
Joint

Notes
Make sure all joints are securely assembled.



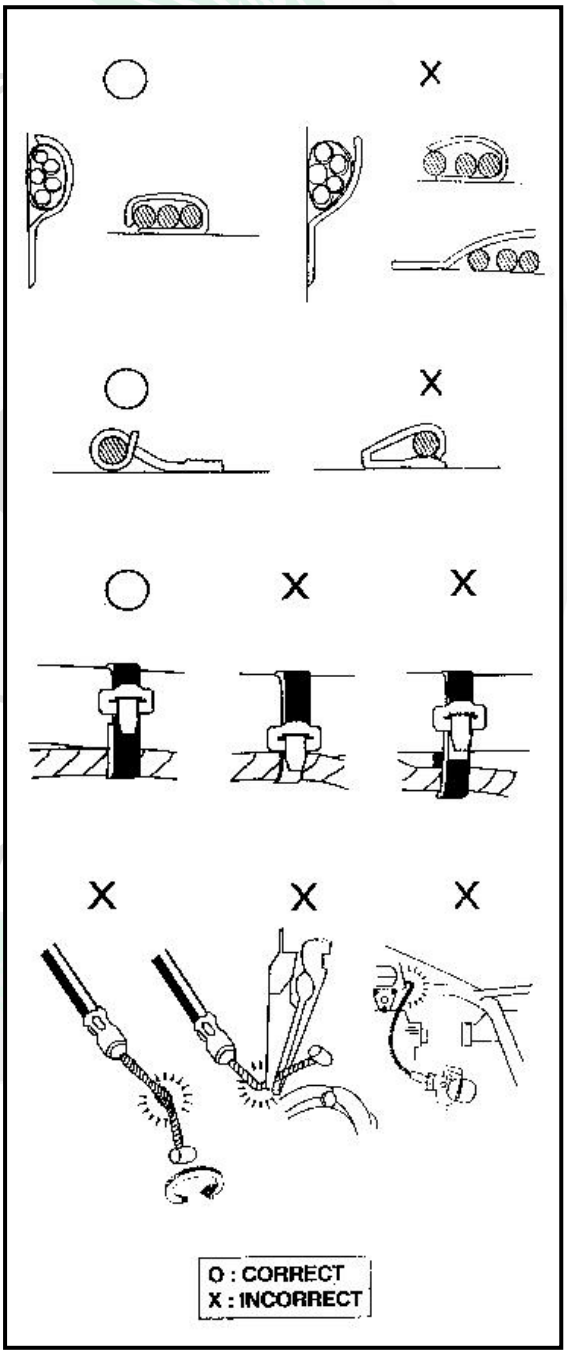
5. Check

Continuity (using a multimeter)



Notes
If there are no items that need to be checked, please clean the terminals. **When checking the wire sheath, follow Steps I to III** **For quick correction, please use the [Contact Reagent] available from most of parts stores.**

Cable arrangement



Loose cable is a potential safety hazard of electrical safety. Check the next cable after clamping the cable, to ensure electrical safety;

wire clips are not allowed to bend in the direction of the solder joint;

Bundle the cable at the designated location;

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

Cables are not allowed to be placed at the ends of bolts or screws;

Keep cables away from heat source or the position where the cable may be caught during movement;

Cables should not be kept too tight or loose when being placed along the faucet handle, and must not interfere with adjacent parts in any steering position;

Cables should be smoothly placed and must not be twisted or knotted;

Before connectors are mated, check whether the connector sheath is damaged and the connector is opened excessively;

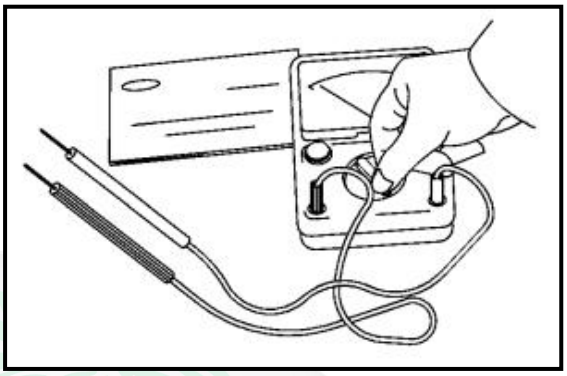
If the cable is at a sharp or corner, please protect it with tape or a hose;

After the cable is repaired, use tapes to securely bind the exposed area;

The control wire must not bend or twist. If the control line is damaged, inflexible operation may be caused;

Tools

In order to make the measurement accurate, it is necessary to use an accurate meter. Read the instructions provided by the manufacturer carefully before using the meter. Inaccurate measurements may affect the adjustment results.



Benelli

Model information

China

BJ250 left view

BJ250 right view

Europe

BJ250 (European regulation) left view

BJ250 (European regulation) right view

Non-European

BJ250 (non-European) left view

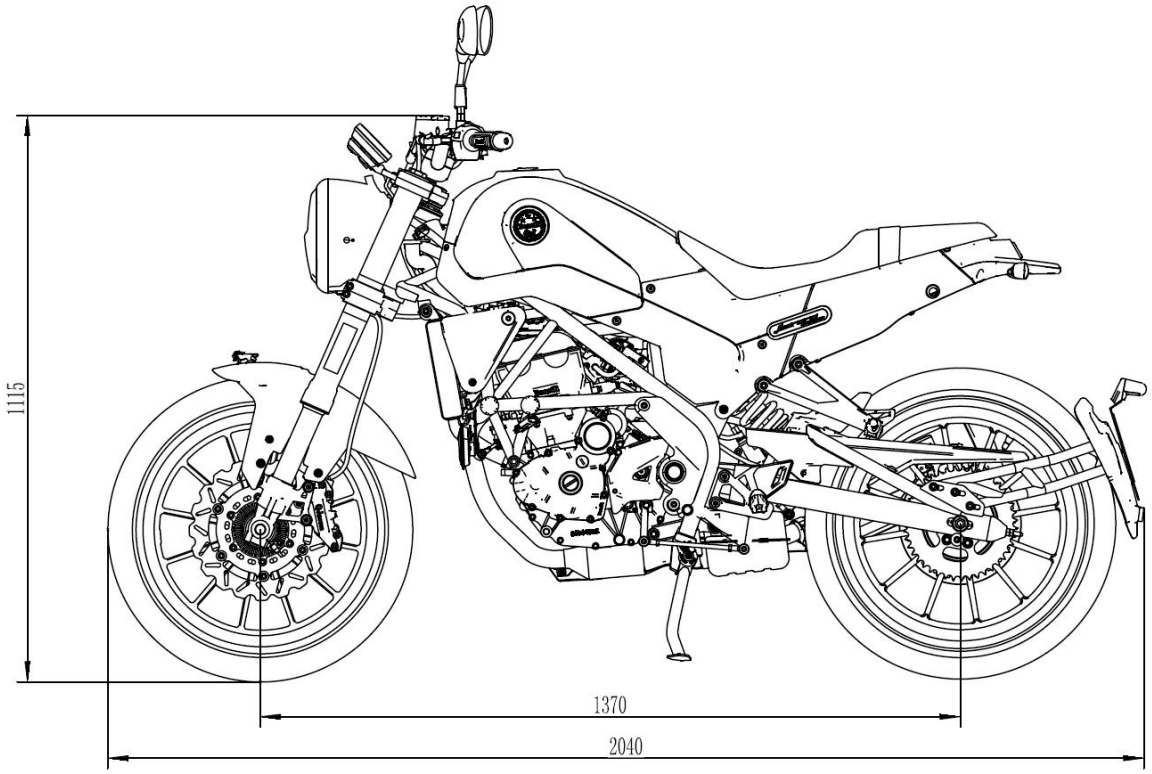
BJ250 (non-European) right view

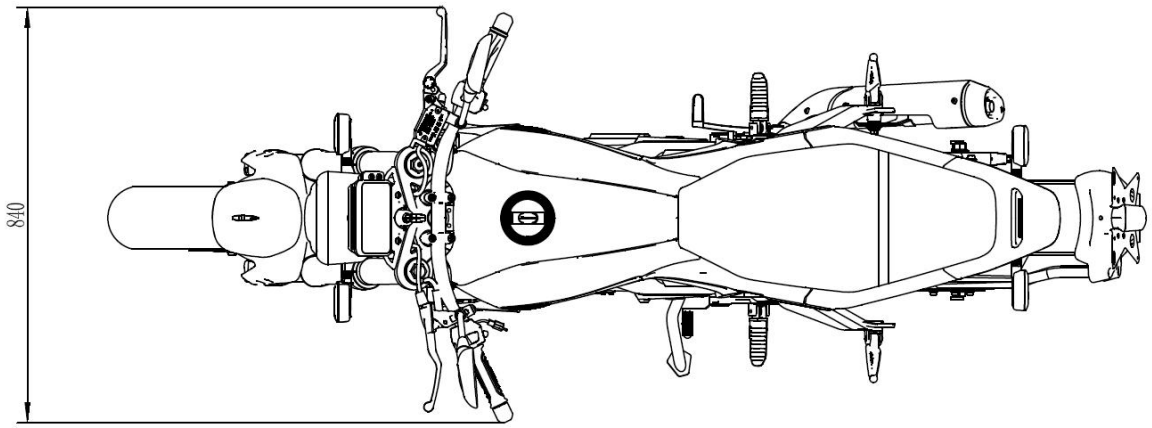
Important recognition

Frame number: China: *LBBPGN00?????????* European regulation: *ZBNN2900?????????*	Engine number: China: BJ178MM-D*□□□□□□□□* European regulation: BJ172MM-A*□□□□□□□□*

Basic specifications

Dimensions	
Full length	2040mm
Full width	840mm
Full height	1115mm
Wheel Base	1370mm





General Technical Parameters

Item	BJ250 (China), BJ250 (European regulation), BJ250 (non-European regulation)
Dimensions	
Length overall	2040mm
Total width	840mm
Total height	1115mm
Wheel Base	1370mm
Terrain clearance	170mm
Seat height	800mm
Curb weight:	
BJ250 (China)	164kg
BJ250 (European regulation)	164kg
BJ250 (non-European regulation)	164kg
Distribution of complete vehicle kerb mass in front axle	
BJ250 (China)	81kg
BJ250 (European regulation)	81kg
BJ250 (non-European regulation)	81kg
Distribution of complete vehicle kerb mass in rear axle	
BJ250 (China)	83kg
BJ250 (European regulation)	83kg
BJ250 (non-European regulation)	83kg
Maximum total mass	
BJ250 (China)	314kg
BJ250 (European regulation)	314kg
BJ250 (non-European regulation)	314kg
Distribution of maximum total mass in front axle	
BJ250 (China)	114kg
BJ250 (European regulation)	114kg
BJ250 (non-European regulation)	114kg
Distribution of maximum total mass in rear axle	
BJ250 (China)	200kg
BJ250 (European regulation)	200kg
BJ250 (non-European regulation)	200kg
Maximum technical carrying capacity of each axis	
Maximum technical carrying capacity of front axis	1117N
Maximum technical carrying capacity of rear axis	1960N
Maximum ramp starting capacity at maximum total mass	41 %
Fuel tank capacity	12.5±0.5L
Rated maximum load mass	150kg
performance	
Minimum Turning Radius	5m

General Technical Parameters

Item	BJ250 (China)	BJ250 (European regulation), BJ250 (non-European regulation)
Engine		
identity	Four-stroke, double overhead camshaft, single cylinder	
Cooling System	Liquid-cooled	
Bore and stroke	78.0×52.2mm	72×61.2 mm
Displacement	249.4ml	249ml
Compression ratio	12.1：1	11.2：1
Maximum horsepower	20.0kW/10500rpm	18.5kW/9000rpm
Maximum torque	20.5N·m/8500rpm	21.0N.m/7000rpm
Idle speed-rpm	1500±100r/min	1400±100rpm/min
Cylinder pressure	1.25MPa/1500rpm	
Fuel vaporization system	EFI (fuel injection)	
Starter System	Electric starter	
Ignition System	Battery and coil (full crystal ignition system)	
Ignition advance angle control	Electronic advance angle control (electronic igniter in the ECU)	
Ignition timing	10° BTDC @1 from 100 r/min (rpm)	
Spark plug	NGK CR8E	
Valve timing:		
Intake:		
Open valve	41°	
Close valve	71°	
Total time interval	292°	
Exhaust:		
Open valve	64°	
Close valve	34°	
Total time interval	278°	
Lubrication System	Pressure splash	
Motor oil:		
identity	API SE, SF or SG API SH, SJ or SL (with JASO MA, MA1 or MA2)	
Viscosity	SJ 10W-50 or SN 15W-50	
Capacity	1.2±0.05L (when replaced); 1.5±0.05L (when engine is disassembled completely)	
Air filter	Sponge	
Type	Immersion oil filter	
Element	paper	
Intake resistance	1.5±0.15KPa	
Muffler		
Type	Impedance composite (with fiber-absorbing materials)	
Catalytic converter (with/without)	With	
identity	Redox type	

General Technical Parameters

Item	BJ250 (China), BJ250 (European regulation), BJ250 (non-European regulation)
Drive mechanism	
Primary deceleration system:	
identity	Gear
Reduction ratio	3.043
Clutch type	Wet multi-piece
Transmission:	
identity	6-speed, constant-time meshing, reciprocating gear
Type (automatic / manual)	Manual
Transmission control mode (manual / foot-operated)	Foot-operated
Gear ratio:	
First	2.643
Second	1.833
Third	1.318
Fourth	1.040
Fifth	0.889
Sixth	0.786
Final drive system:	
Type:	Chain drive
Reduction ratio	3.462
Maximum design speed	129km/h
Climbing ability	≥20°
Frame	
identity	Cantilever back bone frame
Caster angle (dip angle)	23°
Tail	94 mm
Front tire:	
Type:	Vacuum tire
Size:	110/70-17 CORDIAL 110/70R17 METZELER (elephant brand)
Tire pressure	220±10kPa
Wheel type	12-spoke aluminum alloy
Rim size	17×MT3.50
Rim material	Aluminum alloy
Rear tire:	
identity	Vacuum tire
Dimensions	140/60-17 CORDIAL 150/60R17150/ METZELER (elephant brand)
Tire pressure	250±10kPa
Wheel type	12-spoke aluminum alloy
Rim size	17×MT4.00
Rim material	Aluminum alloy
Front suspension system:	
identity	Inverter, telescopic sleeve, oil damping shock absorber

General Technical Parameters

Item	BJ250 (China), BJ250 (European regulation), BJ250 (non-European regulation)
Total stroke	125mm
Rear suspension system:	
identity	Single cylinder, hydraulic spring, damping shock absorber
Total stroke	51mm
Steering mechanism	
Transmission type	Mechanical
Steering mechanism operation type	Handlebar type
Brake type:	
Front brake:	Single disc φ280mm
Operation method	Manual
Rear brake	Single disc φ240mm
Operation method	Foot-operated
Electrical equipment	
Battery:	
identity	Maintenance-free battery
Model	YTX7L-BS
Headlight:	
identity	Semi-hermetic reflected beam type
Light bulb:	
High-beam light	12V/LED
Low-beam light	12V/LED
Tail light / brake light	12V/LED
Turn signal light	12V/LED
Rear license plate light	12V/LED
Alternator:	
Type:	Three-phase alternator
Rated output power	12.8V//225W/5000rpm
Ignition coil:	
Type	Open magnetic circuit ignition coil
Primary/secondary resistor	4Ω/13.5KΩ
Primary/secondary voltage	12V/29KV
Spark plug:	
Model	CR8E
Type	Resistor type
Contact gap	0.7±0.1mm
ECU:	Delphi
Model	MT05
Operating voltage	12V
Adjustability	The procedure can be rewritten by an external communication interface

It is subject to change without notice and may not be applicable in every country.

Unit conversion table

Unit prefix:

Prefix	Sign:	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	×0.01
milli	m	×0.001
micro	μ	× 0.000001

Unit of mass:

kg ×2.205=lb

g × 0.03527 = oz

Unit of volume

L × 0.2642 = gallon (US)

L × 0.2200 = gallon (imp)

L × 1.057 = quart (US)

L × 0.8799 = quart (imp)

L × 2.113 = pint (US)

L × 1.816 = pint (imp)

mL × 0.03381 = ounce (US)

mL × 0.02816 = ounce (imp)

mL × 0.06102 = cubic inch

Mechanical unit:

N × 0.1020 = kg

N × 0.2248 = lb

kg ×9.807=N

kg ×2.205=lb

Length unit:

Km × 0.6214 = miles

m × 3.281 = miles

mm × 0.03937 =feet

Unit of torque:

N·m × 0.1020 = kgf·m

N·m × 0.7376 = ft·lb

N·m × 8.851 = in·lb

kgf·m × 9.807 = N·m

kgf·m × 7.233 = ft·lb

kgf·m × 86.80 = in·lb

Unit of pressure:

kPa × 0.01020 = kgf/cm²

kPa × 0.1450 = psi

kPa × 0.7501 = cmHg

kgf/cm² × 98.07 = kPa

kgf/cm² × 14.22 = psi

cmHg×1.333=kPa

Unit of speed:

km/h × 0.6214 = mph

Unit of power:

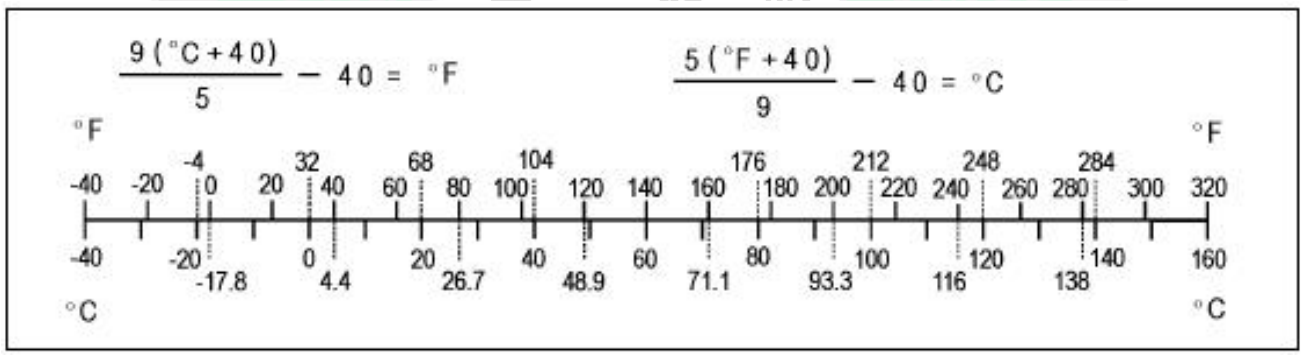
kW ×1.360=PS

kW ×1.341=HP

PS × 0.7355 = kW

PS × 0.9863 = HP

Unit of temperature:



Chapter II Regular Maintenance

Contents

Regular maintenance table 24
Torque and locking agent 26
Main locking torque specifications 26
Locking torque and related parameters of nuts, bolts and screws 30
Technical parameters 31
Regular maintenance procedures 34
Fuel injection system (EFI) 34
Check throttle control system 34
Check idle speed 35
Check fuel hose (fuel leak, hose rupture, hose installation) 35
Check fuel vapor recovery system (models in China, Europe and the US) 36
Cooling system 38
Check coolant level 38
Check radiator pipes (coolant leakage, radiator pipes damage, installation status of radiator pipes) 38
Engine cylinder head and cylinder head cover 39
Check valve clearance 39
Adjusting the valve clearance 40
Check whether the air inlet unit has been damaged 44
Clutch 45
Check whether the clutch control system is normal 45
Check the free stroke of clutch handle 45
Wheel/tire 46
Check the tire pressure 46
Check wheel / tire for wear 46
Check the wear of tread 46
Check whether the wheel bearing has been damaged 47
Final drive mechanism 48
Check the lubrication state of drive chain 48
Check whether the drive chain is slack 48
Adjust drive chain slackness 48
Check wheel alignment 50
Check the wear of drive chain 50
Check the wear of chain guide 51
Brake 52
Check brake hoses and brake lines for damage and ensure their installation status 52
Free stroke of front brake 52
Free stroke of rear brake 53
Check brake 53
Check brake fluid level 53
Inspection of wear of brake pad 54

Check brake light switch 55
Check the output voltage of speed sensor.... 55
Suspension system 57
Check front fork / rear shock absorber 57
Check the front fork shock absorber for oil leakage 57
Check the rear shock absorber for oil leakage 58
Steering system.... 59
Check steering clearance 59
Adjust the steering seat properly 59
Lubricate steering stem bearings 60
Electrical system 61
Check lights and switches 61
Check the headlight accuracy 65
Check the sidestand switch 66
Check emergency stop switch 67
Others 68
Lubricate frame parts 68
Check the tightness of bolts, nuts and fasteners.... 69
Replacement of part 71
Replacement of air filter element.... 71
Replacement of fuel hose 74
Replacement of coolant.... 75
Replacement of radiator hose 78
Replacement of oil 79
Replacement of brake hose 80
Replacement of rear brake hose 82
Replacement of brake fluid 83
Replacement of rubber parts of master cylinder 86
Replacement of rubber parts of caliper 88
Replacement of spark plug 92

Regular maintenance table

In order to keep the motorcycle in good running conditions, it must be regularly maintained according to the following table. **The first maintenance is very important, so it must not be ignored.**

Regular checklist

Item \ Frequency	Whichever is the earl ➡ Odometer reading × 1 000 km								Page
	Interval ⬇	1	6	12	18	24	30	36	
Fuel injection system									Page 103
Throttle control system (operation, smooth return, no resistance) - check	1 year	●		●		●		●	
Idle speed-check		●		●		●		●	
Fuel leak (fuel hoses and fuel hoses) - check	1 year	●		●		●		●	
Damage of fuel hoses and fuel hoses-check	1 year	●		●		●		●	
Installation state of fuel hoses and fuel hoses-check	1 year	●		●		●		●	
Function of evaporative emission control system -- check (CAL and SEA models)		●	●	●	●	●	●	●	
Cooling System									
Coolant level-check		●		●		●		●	
Coolant leakage (radiator hoses and radiating pipes) - check	1 year	●		●		●		●	
Damage of radiator hoses-check	1 year	●		●		●		●	
Installation state of radiator hoses-check	1 year	●		●		●		●	
Engine cylinder head and cylinder head cover									
Valve clearance -check: US, CA, AU models						●			
Valve clearance -check: Other models except US, CA, and AU models		Every 42000 km							
Damage of air induction system - check				●		●		●	
Clutch									
Clutch operating mechanism (running, disengaging, closing) - check		●		●		●		●	
Free stroke of clutch handle	1 year	●	●	●	●	●	●	●	
Wheel and tire									
Tire pressure - check	1 year			●		●		●	
Wheel/tire damage - check				●		●		●	
Wear and abnormal wear of tire tread - check				●		●		●	
Damage of wheel bearing - check	1 year			●		●		●	
Final drive mechanism									
Lubrication state of drive chain - check#	Every 600 km								
Looseness of drive chain - check #	Every 1000 km								
Wear of drive chain - check #				●		●		●	
Wear of chain guide - check				●		●		●	
Brake									
Brake fluid leak (brake hose) - check	1 year	●	●	●	●	●	●	●	
Brake hose damage - check	1 year	●	●	●	●	●	●	●	
Installation state of brake hose-check	1 year	●	●	●	●	●	●	●	
Brake operation (effectiveness, operation, no resistance) - check	1 year	●	●	●	●	●	●	●	
Brake fluid level - check	6 months	●	●	●	●	●	●	●	
Brake pad wear - check#			●	●	●	●	●	●	
Brake light switch operation - check		●	●	●	●	●	●	●	

Continued

Item \ Frequency	Whichever is the earl → Odometer reading × 1 000 km								Page
	Interval ↓	1	6	12	18	24	30	36	
Suspension system									
Operation of front fork / rear shock absorber (smooth damping and stroke) - check				●		●		●	
Oil leak of front fork / rear shock absorber - check	1 year			●		●		●	
Operation of swing arm - check				●		●		●	
Tie rod - check				●		●		●	
Steering system									
Steering clearance - check	1 year	●		●		●		●	
Steering rod bearing - lubrication	2 years					●			
Electrical System									
Operation of light and switch - check	1 year			●		●		●	
Headlight accuracy - check	1 year			●		●		●	
Operation of sidestand switch - check	1 year			●		●		●	
Operation of emergency stop switch - check	1 year			●		●		●	
Others									
Frame parts - lubrication	1 year			●		●		●	
Tightness of bolts and nuts - check		●		●		●		●	
Air filter element -clean#	Every 6000 KM								
Air filter element -Replace#	Every 12000 KM								
Fuel hose-replace	4 years						●		
Coolant-replace	3 years					●			
Radiator hose and O-ring - replace	3 years					●			
Clutch hose -- replace	4 years						●		
Clutch oil -- change	2 years				●		●		
Rubber parts for the master/slave cylinder of clutch - replace	4 years						●		
Oil - replace	1 year	●	●		●	●	●		
Oil filter - replace	1 year	●	●		●	●	●		
Brake hose - check	4 years						●		
Brake fluid - check	2 years			●			●		
Rubber parts for the master cylinder of clutch / brake caliper - replace	4 years						●		
Spark plug - replace			●		●	●	●	●	

#: If you use a motorcycle in a harsh environment such as dusty, humid and muddy environment, or frequently drive at high speed or start or stop, you should increase the maintenance frequency.

*： If the odometer reading exceeds this table, repeat the maintenance at the frequency interval specified in this Manual.

Torque and locking agent

Main locking torque specifications

The table below lists the locking torques for the primary fasteners that require locking agent or silicone sealants.

The letters in the "Remarks" column have the following meanings:

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

G: Apply grease.

L: Apply locking agent.

M: Apply the grease containing molybdenum disulfide.

MO: Apply the oil solvent containing molybdenum disulfide. (A mixture of engine oil and molybdenum disulfide-containing grease prepared in a weight ratio of 10:1)

R: Replace the part.

S: Observe the specified tightening sequence.

Si: Apply silicon grease.

SS: Apply silicone sealant.

Fastener	Torque		Remarks
	N·m	kgf·m	
Fuel Injection System (EFI)			
Air filter element cover bolt	6	0.70	
Air filter element bracket screw	6	0.70	
Camshaft position sensor bolt	10	1.0	
Crankshaft sensor bolt	5.9	0.60	
Pipe clamp bolt	2.0	0.20	
Fuel tank mounting bolt	10	1.0	
Fuel pump bolt	4	0.4	S
Inlet air pressure sensor bracket screw	10	1.0	
Oxygen sensor	25	2.5	
ECU bolt	3.9	0.40	L
Speed sensor bolt	3.9	0.40	L
Water temperature sensor	25	2.5	
Cooling System			
Radiator mounting bolt (lower)	10	1.0	
Radiator mounting bolt (upper)	10	1.0	
Radiator (water pipe) hose fastening screw	2.0	0.20	
Coolant reserve tank mounting bolt	10	1.0	
Coolant drain bolt	10	1.0	
Thermostat cover mounting bolt	10	1.0	
Water pump cover bolt	10	1.0	
Water temperature sensor	25	2.5	
Engine cylinder head and cylinder head cover			
Cylinder head cover bolt	10	1.0	L
Camshaft sprocket mounting bolt	15	1.5	L
Camshaft cover bolt	10	1.0	S
Camshaft chain guide bolt	12	1.2	S
Camshaft chain tensioner mounting bolt	10	1.0	
Cylinder head bolt (M11)	50	5.0	L(3)
Exhaust pipe mounting bolt	22	2.2	
Spark plug	25	2.5	

Continued

Fastener	Torque		Remarks
	N·m	kgf·m	
Clutch			
Clutch cover bolt	10	1.0	L(1)
Clutch wheel hub nut	120	12.0	R
Clutch spring bolt	10	1.0	
Engine lubrication system			
Engine oil drain bolt M12	30	3.0	
Stopper of oil filler	-	-	Tighten
fuel pump bolt using hands	10	1.0	
Fuel pump cover bolt	10	1.0	
Crankshaft/ drive mechanism			
Balancer shaft clamp nut M14	40	4.0	
Assembling bolt M6	12	1.2	S
Crankcase bolt	12	1.2	S
Flywheel locknut M25	100	10.0	
Driving gear locknut M20	80	8.0	
Shift positioner bolt M6	12	1.2	
Disassembly/Installation of Engine			
Front bracket bolt of engine (M10)	45	4.5	S
Front mounting bolt of engine (M10)	50	5.0	AL、S
Rear mounting bolt of engine (M10)	50	5.0	AL、S
Wheel/tire			
Front axle clamp nut	20	2.0	AL
Front wheel axle	107	10.7	
Rear wheel axle	150	15.0	
Rear wheel axle nut	150	15.0	
Final drive mechanism			
Upper stop block bolt of chain	10	1.0	L
Chain protective block bolt	10	1.0	L
Engine sprocket cover bolt	10	1.0	
Engine sprocket nut	125	12.5	MO
Rear sprocket nut	50	5.0	
Speed sensor bolt	3.9	0.4	L
Brake			
Purge valve	7.8	0.80	
Hollow bolt of brake hose	30	3.0	
Pivot bolt of brake lever	6	0.6	Si
Pivot bolt locknut of brake lever	6	0.6	
Brake pedal bolt	22	2.2	
Mounting bolt of front brake disc	12	1.2	L、S
Front brake light switch screw	1.2	0.12	
Mounting bolt of primary cylinder reservoir cap of front brake	1.2	0.12	
Front caliper assembly bolt	27	2.8	
Front caliper mounting bolt	22	2.2	
Purge valve of front master cylinder	7.8	0.80	
Clamp bolt of front master cylinder	12	1.2	S
Mounting bolt of rear brake disc	22	2.2	L、S
Rear caliper assembly bolt	22	2.2	

Continued

Fastener	Torque		Remarks
	N·m	kgf·m	
Rear caliper mounting bolt	22	2.2	
Rear primary cylinder mounting bolt	12	1.2	
Rear master cylinder push rod locknut	12	1.2	
Suspension system:			
Front axle clamp nut	20	2.0	AL
Front shock absorber clamp bolt (upper)	22	2.0	
Front shock absorber clamp bolt (lower)	22	3.1	AL
Top plug of front shock absorber	22	2.2	
Piston rod nut of front shock absorber	28	2.8	
Rear shock absorber bolt (upper)	45	4.5	
Rear shock absorber bolt (lower)	45	4.5	
Rear shock absorber nut (lower)	45	4.5	
Mounting nut of rear rocker arm axis	108	10.8	
Rear rocker arm shaft	108	10.8	
Steering system			
Steering stem clamp nut	2.5	0.25	AL
Steering stem locknut	24	2.4	AL
Clamp screw of upper bracket	25	2.5	
Handlebar positioning double-end stud mounting nut	45	4.5	AL
Handlebar bolt	25	2.5	L
Left switch clamp screw	3.5	0.35	
Right switch clamp screw	3.5	0.35	
Rear clamp bolt of left lever	10	1.0	
Pivot bolt of left lever	6	0.6	
Pivot bolt locknut of left lever	6	0.6	
Grip end bolt	10	1.0	
Frame			
Front seat cushion bolt	10	1.0	
Rear seat lock bolt	10	1.0	
Bolt of rear grab rail	22	2.2	
Mounting bolt of holder of rear fender bracket	10	1.0	
Mounting bolt of rear fender bracket	10	1.0	
Front left pedal bracket mounting bolt	45	4.5	
Shift rod mounting base bolt	10	1.0	
Shift rod assembly bolt	10	1.0	
Front right pedal bracket bolt	45	4.5	
Rear left pedal bracket bolt	25	2.5	
Rear right pedal bracket bolt	25	2.5	
Muffler cylinder mounting bolt	22	2.2	
Rear bolt of muffler cylinder	22	2.2	
Rear locknut of muffler cylinder	22	2.2	
Sidestand bolt	50	5.0	
Locknut of side stand bolt	45	4.5	
Sidestand flameout switch bolt	6	0.6	
Battery holder bolt	10	1.0	

Continued

Fastener	Torque		Remarks
	N·m	kgf·m	
Electrical System			
Alternator cover bolt	10	1.0	
Alternator wire holding plate	10	1.0	L
Alternator rotor bolt	100	10.0	S
Camshaft position sensor bolt	9.8	1.0	
Camshaft sensor bolt	5.9	0.60	L
Camshaft sensor cover bolt	9.8	1.0	L(1)
Grounding terminal bolt of engine	10	1.0	
Front brake light switch screw	1.2	0.12	
Front turn signal light mounting nut	6	0.6	
Fuel level sensor bolt	10	1.0	L
Lower bracket bolt of headlight	10	10	
Lower mounting bolt of headlight	10	1.0	
Left switch clamp screw	3.5	0.35	
License plate light cover mounting screw	0.90	0.09	
Oil pressure switch	15	1.5	SS
Oxygen sensor	25	2.5	
Rear turn signal light mounting nut	6	0.6	
Rectifier bolt	10	1.0	
Right switch clamp screw	3.5	0.36	
Sidestand flameout switch bolt	6	0.6	L
Speed sensor bolt	3.9	0.40	L
Starter relay bolt	10	0.6	L
Starter motor joint nut	6	0.6	
Bond strap bolt	10	0.6	
Starter motor mounting bolt	10	1.0	
Starter motor binding post locknut	6	0.6	

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Locking torque and related parameters of nuts, bolts and screws

The table below lists the basic torques for bolts and nuts (different thread diameters correspond to different locking torques). This table is only for the bolts and nuts that do not require specific torque values. All values in the table below apply to the threads cleaned with an anhydrous solvent.

Locking torques and related parameters of nuts

Nut	Basic locking torques	
	N·m	kgf·m
4	2.3	0.2
5	4.5	0.4
6	10	1.0
8	25	2.5
10	45	4.5
12	80	8.0
14	130	13.0
16	200	20.0
18	240	24.0
20	325	32.5

Locking torque and related parameters of bolts and screws

Bolt/screw	Basic locking torques					
	Grade 8.8		Grade 10.9		Grade 12.9	
	N.m	Kg.f·m	N.m	Kg.f·m	N.m	Kg.f·m
M4×0.7	3	0.3	4.2	0.4	5.2	0.5
M5×0.8	6	0.6	7.5	0.8	9	0.9
M6×1	10	1.0	13	1.3	16	1.6
M8×1.25	22	2.2	30	3.0	40	4.0
M8×1(*)	25	2.5	36	3.6	45	4.5
M10×1.5	45	4.5	65	6.5	80	8.0
M10×1.25(*)	50	5.0	70	7.0	85	8.5
M12×1.75	80	8.0	110	11.0	135	13.5
M12×1.5(*)	85	8.5	120	12.0	145	14.5
M12×1.25(*)	90	9.0	130	13.0	150	15.0
M14×2	130	13.0	185	18.5	220	22.0
M14×1.5(*)	150	15.0	205	20.5	245	24.5
M16×2	200	20.0	280	28.0	335	33.5
M16×1.5(*)	225	22.5	310	31.0	360	36.0
M18×2.5	265	26.5	370	37.0	450	45.0
M18×1.5(*)	320	32.0	450	45.0	550	55.0
M20×2.5	390	39.0	550	55.0	650	65.0
M20×1.5(*)	440	44.0	630	63.0	750	75.0
M22×2.5	540	54.0	750	75.0	900	90.0
M22×1.5(*)	600	60.0	850	85.0	1000	100.0
M24×3	670	67.0	950	95.0	1130	113.0
M24×2(*)	750	75.0	1050	105.0	1250	125.0
*: fine thread						

Technical parameters

Item	Normal	**usage restrictions**
Fuel Injection System (EFI)		
Free clearance of throttle grip	3~5mm	——
Idle speed	1400 ±100 r/min	——
Negative pressure value of throttle valve	50 ±3 kPa (at idle speed)	——
Air filter element	Sponge filter element	——
Cooling System		
Liquid coolant:		
(Recommended type	Permanent antifreezing agent (FD-2)	——
Color	Green	——
Mixture ratio	50% soft water, 50% coolant	——
Freezing point	–35°C	——
Boiling point	107°C	——
Total amount	1.2L	
Engine cylinder head and cylinder head cover		
Valve clearance:		
Vent valve	0.15 ~ 0.17 mm	——
Inlet valve	0.13 ~ 0.15 mm	——
Clutch		
Free clearance of clutch operating lever	10~20mm	——
Engine lubrication system		
Motor oil:		
identity	API SE, SF or SG API SH, SJ or SL, JASO MA	——
Viscosity	SAE 10W-50	——
Capacity	1.2±0.05L (when replaced); 1.5±0.05L (when engine is disassembled completely)	—— ——
Liquid level	Between the upper level line and the lower level line (idle or stand for 2-3 minutes after running)	——
Wheel/tire		
Tread depth		
Front tire	3.8 mm	1.6mm
Rear tire	4.8 mm	2.0mm
Tire pressure (after cooling of tire) :		
Front tire	220±10kPa	——
Rear tire	250±10kPa	——
Final drive mechanism		
Drive chain slackness	10~15 mm	——
Drive chain wear (length of 20 chain links)	317.5 ~ 318.2 mm	323 mm
Standard drive chain:		
Model	520HO	——
Chain link	118	——

Continued

Item	Normal	**usage restrictions**
Brake		
Brake fluid		
Class	DOT4	——
Front brake disc:		
External diameter of front brake disc	280mm	
Thickness of front brake disc	4mm	3.5mm
Rear brake disc:		
External diameter of rear brake disc	240mm	
Thickness of rear brake disc	5mm	4.5mm
Thickness of friction plate of brake pad		
Front brake pad	4.0 mm	3 mm
Rear brake pad	4.0 mm	3 mm
Brake light time setting:		
Front brake light	It will be on after pulling	——
Rear brake light	The light will be on after being pressed by about 10 mm of pedal stroke	——
Electrical System		
Spark plug:		
Model	NGK CR8E	——
Clearance	0.7±0.1 mm	——

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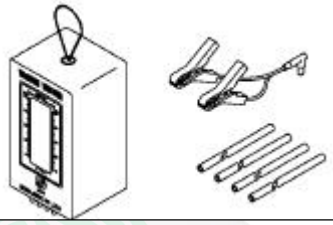
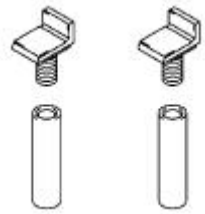
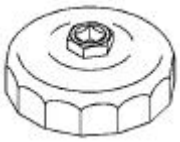
Special tools

The following special tools are required to perform complete and correct adjustments and assembly, and proper special tools shall be used to avoid damage caused by improper tools or non-professional techniques. The special tools you need to use may vary from country to country. When ordering tools, please refer to the following information to prevent errors.

Inner circlip pliers:	Negative pressure gauge:
	
Steering lever nut wrench: four-jaw 300-QCLM4-001	Steering lever nut wrench: seven-jaw 300-QCLM7-001
Jack:	Accessories of jack:
	
Oil filter wrench	
	

Fuel Injection System (EFI)

Check throttle control system

●Check the free clearance of throttle grip ①.

Free clearance of throttle grip

Standard: 3-5mm

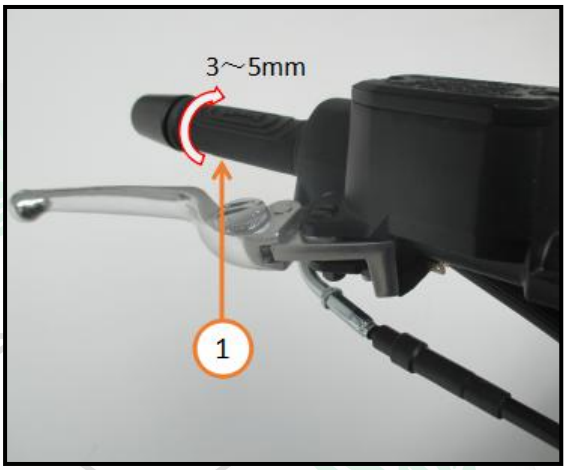
★ If the free clearance is not accurate, please adjust the throttle cable.

●Check that the throttle grip moves smoothly from fully open to closed, and the return spring allows the throttle to close completely and quickly, regardless of the steering position.

★ If the throttle grip cannot be reset normally, check the winding method of throttle cable, the free clearance of handle and the cable for damage. Then lubricate the throttle cable.

Make the engine run at idle speed, rotate the handlebar to the right and left to ensure that there is no change in the idle speed.

If the idle speed is increased, check the free clearance and winding method of the throttle cable.



★ If necessary, adjust the throttle cable [A] as follows:

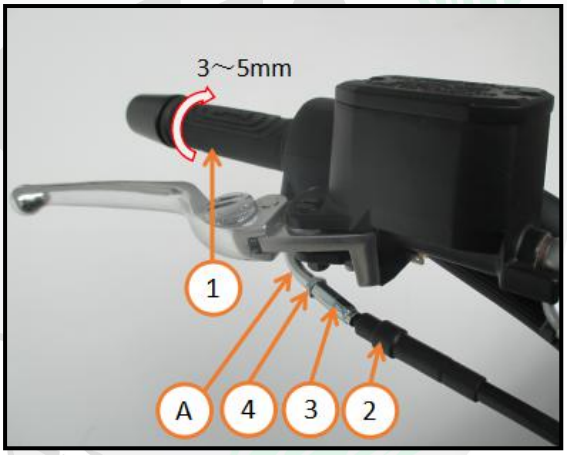
(1) Remove the dust cover of throttle cable ②.

(2) Loosen the locknut ④.

(3) Rotate the adjusting nut ③ until the free clearance of the throttle grip ① is 3 - 5 mm.

(4) Tighten the locknut ④.

After adjusting the free stroke, rotate the handlebar to the left and right to confirm whether the idle speed of engine has changed.



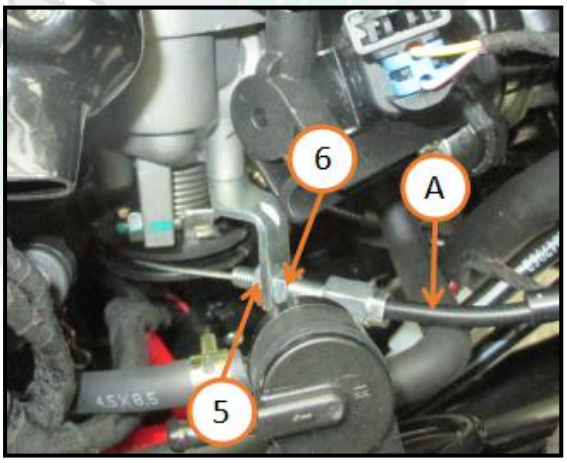
If the free clearance of throttle grip cannot be met after adjusting the upper end of throttle cable, adjust the lower end of throttle cable [A]. Adjust the throttle cable in the following steps:

(1) Loosen the locknut ⑥.

(3) Rotate the adjusting nut ⑤ to make the free clearance of throttle grip large enough, until the free clearance of the throttle grip is 3 - 5 mm.

(3) Tighten the locknut ⑥.

After adjusting the free stroke, rotate the handlebar to the left and right to confirm whether the idle speed of engine has changed.



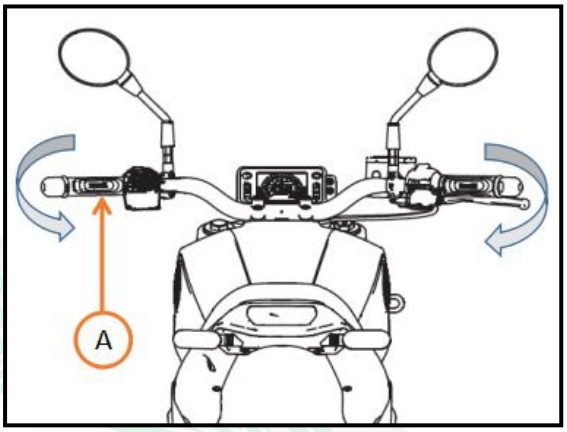
★ If the free clearance cannot be adjusted with the

adjuster, please replace throttle cable.

Check idle speed

● Start the engine and let it heat up completely.

● When the engine is idling, turn the handlebars to the sides [A].



★ If you can change the idle speed after turning the handlebar, it is indicated that the throttle cable is not adjusted or the winding method is incorrect or damaged. Be sure to correct the above problems before riding (see sections of Chapter "Appendix" for details: "Checking Throttle Control System" and "Winding Method of Cables, Wires and Hoses").

⚠ Warning

Riding when the cable is not properly adjusted, damaged or the winding method is incorrect, a safety accident may be caused.

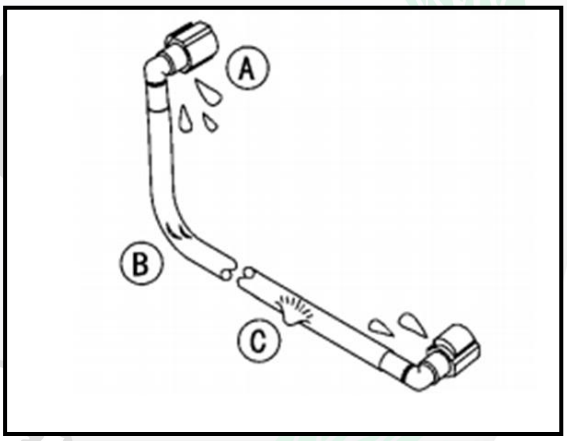
● Check idle speed

Idle speed

Standard: 1400 ±100 r/min

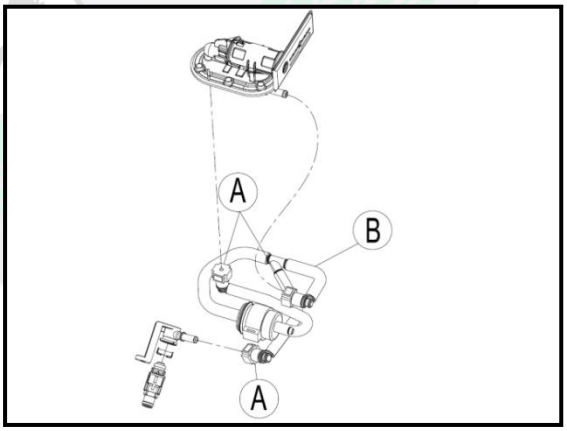
Check fuel hose (fuel leak, hose rupture, hose installation)

○ If the motorcycle is not handled properly, the high pressure inside the fuel hose may cause fuel leakage [A] or fuel hose rupture. Remove the fuel tank (see “Removal of Fuel Tank” in the chapter “Fuel Injection System (EFI)”) and check the fuel hose.



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

Check whether the winding method of hose complies with the relevant provisions of section "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".



★ If the hose is severely bent or cracked, it must be replaced.

Hose joint[A]

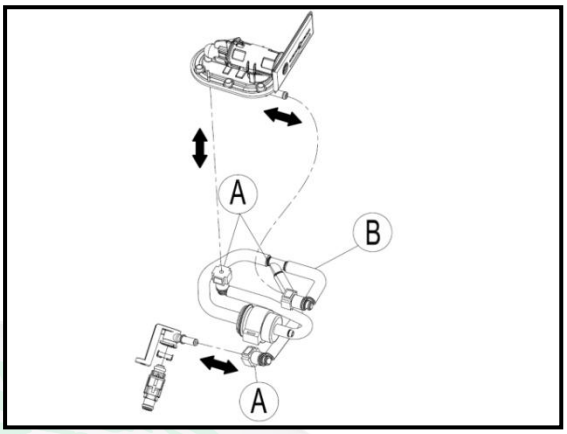
Fuel hose [B]

●Check whether the hose joint is connected firmly. . Push and pull the hose joint [A] back and forth twice to ensure that the hose joint has been firmly fixed.

★ If it is not secure, reinstall the hose joint.

Warning

Slide the joint to ensure that the hose joint has been properly installed on the fuel supply line, otherwise, the fuel may leak.



Check fuel vapor recovery system (models in China, Europe and the US)

●Check the canister solenoid valve as follows.

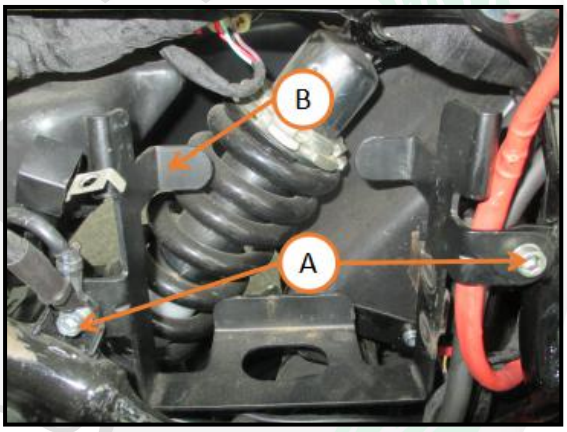
○ Remove the seat cushion (see "Frame" – "Removing Seat Cushion").

○ Remove the right guard (see "Frame" – "Removing Guard" for details).

Remove the battery (see "Battery" – "Removing Battery" for details).

○Remove the battery holder mounting screw [A].

Remove the battery holder [B].

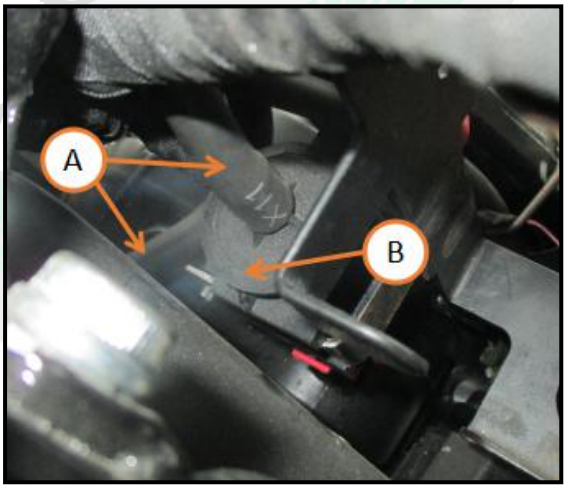


○Remove the hose [A] connected to the separator and remove the canister solenoid valve [B].

○ Check the canister solenoid valve for cracks and other damages.

★ If any, it must be replaced.

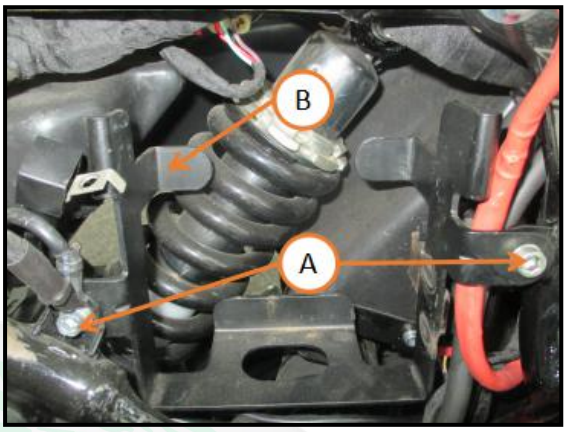
★ Check the canister solenoid valve (see "Canister Solenoid Valve" in the chapter "Fuel Injection System (EFI)")



●Check the canister as follows.

○Remove the battery holder mounting screw [A].

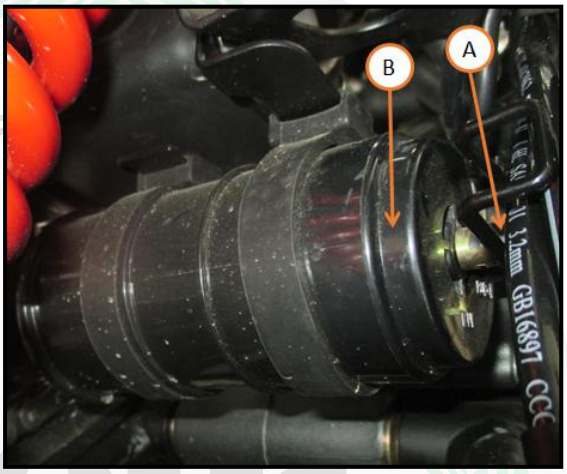
Remove the battery holder [B].



○Remove the canister [C] and remove the hose [1] connected to the canister.

○ Check the canister for cracks or other damages.

★ If any, it must be replaced.



Remarks
○ If the canister is used under normal conditions, the canister can be used normally during the service life of motorcycle without maintenance.

● Check the hose of fuel vapor recovery system as follows.

○ Check whether the hoses are connected firmly and clips are mounted properly.

○ Replace the hoses that have been cracked, corroded or damaged.

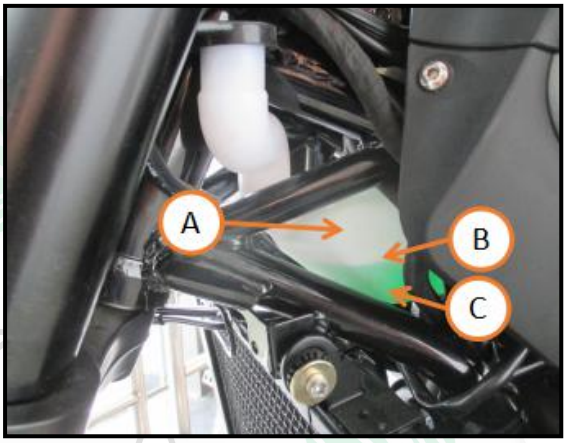
Install the negative pressure hose in accordance with section "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".

○ When installing the hose, avoid bending, twisting or warping the hose, and do not bend the hose as much as possible to avoid blocking evaporative emissions.

Cooling System

Inspection of cooling fluid level

Remarks
○Check the fluid level when the engine is cooled (to the indoor temperature or environment temperature).



●Put the motorcycle vertically (do not use the side stand) and check the coolant level of the expansion water tank [A].

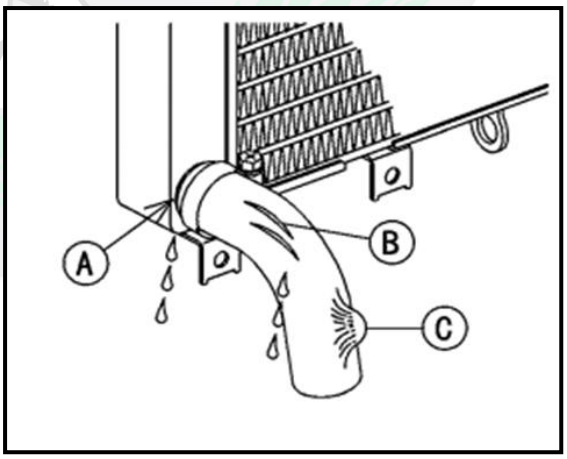
★ If the coolant level is below the "LOWER" fluid level line [C], unscrew the cover of expansion water tank and add the coolant until the fluid level reaches the "UPPER" fluid level line [B].

"UPPER": High

"LOWER": Low

Notes
When adding the coolant, the specified mixture of coolant and soft water needs to be added. If water is added separately, the coolant will be diluted to reduce the anti-corrosion performance. The diluted coolant will corrode the aluminum engine parts. In case of emergency, soft water can be added separately. But the correct mixing ratio must be restored within a few days. **If the coolant must be added frequently or the expansion water tank is completely dry, the leakage problems may occur in the cooling system. Check whether the leakage occurs in the cooling system, because the coolant will corrode the painted surface.** If the coolant is splashed on the frame, engine, wheel or other painted parts, rinse them with water immediately.

Check radiator pipes (coolant leakage, radiator pipes damage, installation status of radiator pipes)



○If the radiator pipe is not properly maintained, the high pressure inside the water pipe will cause the coolant leakage [A] or rupture of water pipe.

●Check whether the hose is corroded. After the hose is extruded, if the hose becomes hard, brittle or expanded, it indicated that the hose has been corroded.

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

●Check whether the hose is connected firmly and whether the clamp has been fastened correctly.

Locking torque of radiator (water) pipe fastening screw: 2.0 N•m

Engine cylinder head and cylinder head cover

Checking valve clearance;

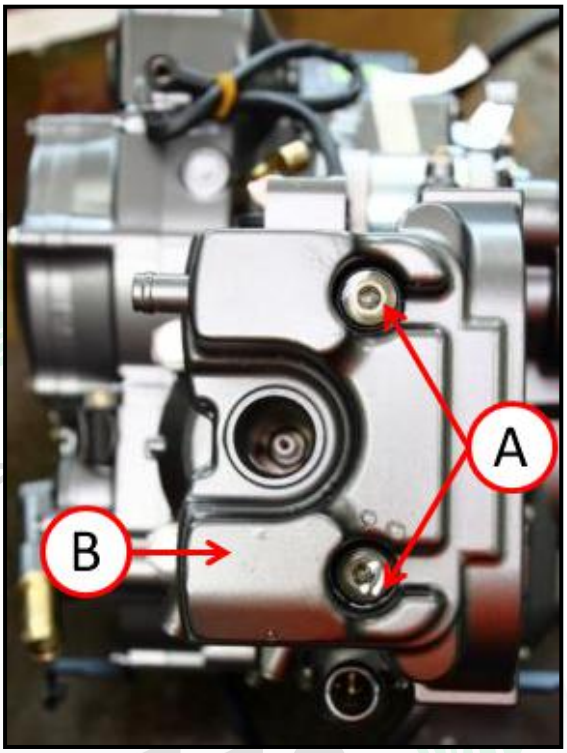
Remarks
○Check and adjust the valve clearance only when the engine is cooled (to the indoor temperature).

●Disassemble:

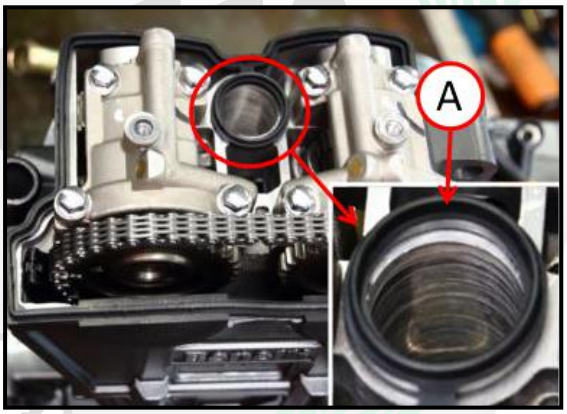
○ Remove the seat cushion (see “Frame” – “Removing Seat Cushion”).

Remove the fuel tank (see “Fuel Tank” – “Removing Fuel Tank”).

Remove the mounting screw [A] and remove the cylinder head cover [B].

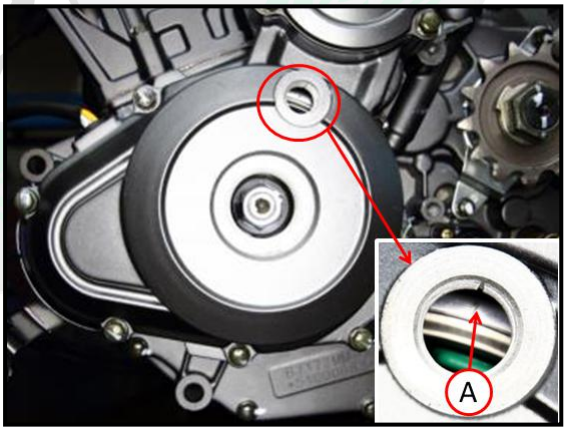


Notes
Please check the damaged or deformed rubber washer [A]. Especially around the spark plug. If damaged, replace it with a new rubber washer.

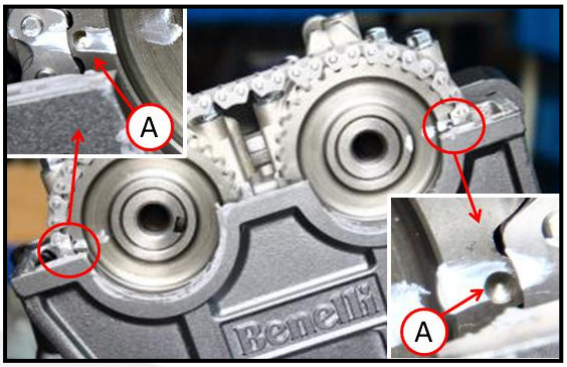


●Place the crankshaft on the piston TDC

○The TDC mark of flywheel is [A]

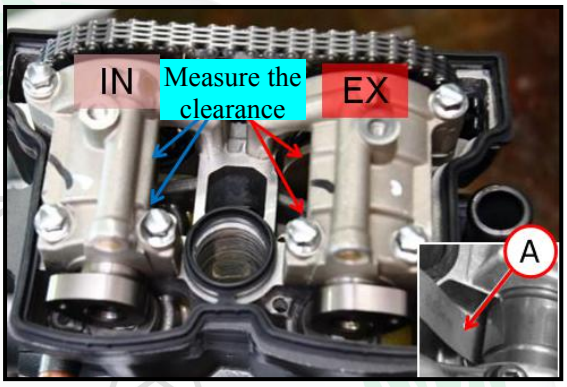


○ Timing mark: [A] (crankcase half part meshing surface)



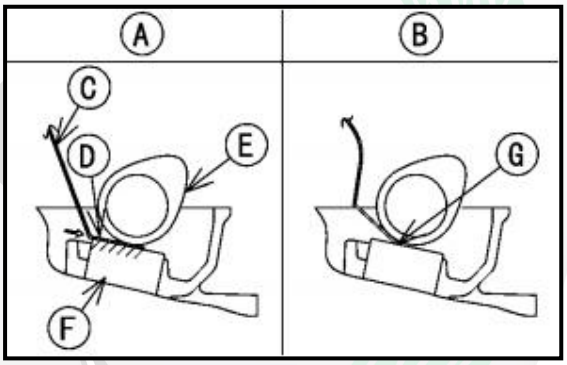
● When at the TDC position, measure the valve clearance between the cam and the valve tappet with a feeler gauge [A].

Notes
Please keep the feeler gauge horizontal to avoid being stuck due to misjudgment.



Valve clearance
Standard:
Intake valve: 0.13 - 0.15 mm
Exhaust valve: 0.15 - 0.17 mm

Notes
○ The thickness gauge shall be inserted horizontally on the valve tappet.



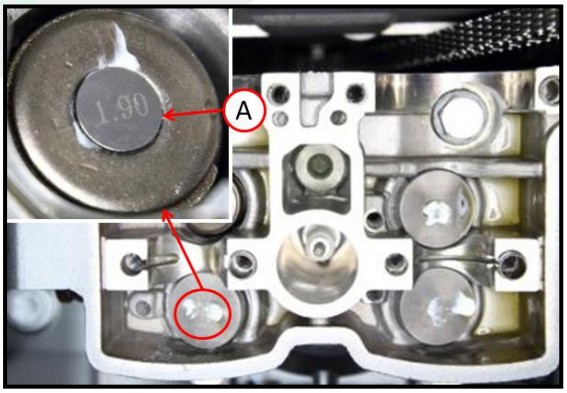
Appropriate: [A]
Inappropriate: [B]
Feeler gauge: [C]
Horizontally insert it: [D]
Cam: [E]
Valve tappet: [F]
The front end of feeler gauge is stuck on the valve tappet, which is the incorrect way: [G]

★ If the valve clearance is not within the specified range, first keep a record of the valve clearance and make adjustments.

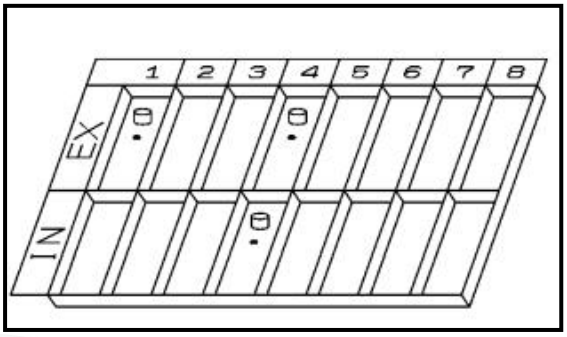
Adjustment of the valve clearance

● To change the valve clearance, remove the camshaft chain tensioner, camshaft and valve tappet. Replace the currently used valve shims with valve shims of different thicknesses.

Remarks
○ In order to install the valve tappet and the valve shim into the original positions, mark their positions before removing them.



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

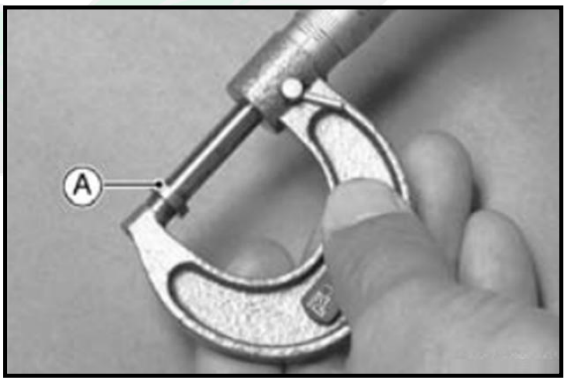


Adjust the valve shims:

Charset	Thickness
120246030000	Valve shim 1.600mm
120216030000	Valve shim 1.625mm
120226030000	Valve shim 1.650mm
120236030000	Valve shim 1.675mm
120256030000	Valve shim 1.700mm
120266030000	Valve shim 1.725mm
120276030000	Valve shim 1.750mm
120286030000	Valve shim 1.775mm
120296030000	Valve shim 1.800mm
120306030000	Valve shim 1.825mm
120316030000	Valve shim 1.850mm
120326030000	Valve shim 1.875mm
120336030000	Valve shim 1.900mm
120346030000	Valve shim 1.925mm
120356030000	Valve shim 1.950mm
120366030000	Valve shim 1.975mm
120376030000	Valve shim 2.000mm
120386030000	Valve shim 2.025mm
120396030000	Valve shim 2.050mm
120406030000	Valve shim 2.075mm
120416030000	Valve shim 2.100mm
120426030000	Valve shim 2.125mm
120436030000	Valve shim 2.150mm
120446030000	Valve shim 2.175mm
120456030000	Valve shim 2.200mm
120466030000	Valve shim 2.225mm
120476030000	Valve shim 2.250mm
120486030000	Valve shim 2.275mm

●Clean the dust or oil on the valve shim.

● Measure the thickness of the removed valve shim [A].



Exhaust valve clearance adjustment table

Valve Clearance Adjustment Table of Exhaust 0.15-0.17

	Examples of current valve shim																					
Thickness (mm)	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100	
Examples of valve clearance measurement valve (mm)	0.00-0.02	-	-	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950
	0.03-0.04	-	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975
	0.05-0.07	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000
	0.08-0.09	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025
	0.10-0.12	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050
	0.13-0.14	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075
	0.15-0.17	Valve clearance/without adjustment																				
	0.18-0.19	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100	
	0.20-0.22	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100		
	0.23-0.24	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100			
	0.25-0.27	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100				
	0.28-0.29	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100					
	0.30-0.32	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100						
	0.33-0.34	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100							
	0.35-0.37	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100								
	0.38-0.39	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100									
	0.40-0.42	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100										
	0.43-0.44	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100											
	0.45-0.47	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100												
	0.48-0.49	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100													
	0.50-0.52	1.950	1.975	2.000	2.025	2.050	2.075	2.100														
	0.53-0.54	1.975	2.000	2.025	2.050	2.075	2.100															
	0.55-0.57	2.000	2.025	2.050	2.075	2.100																
	0.58-0.59	2.025	2.050	2.075	2.100																	
	0.60-0.62	2.050	2.075	2.100																		
	0.63-0.64	2.075	2.100																			
	0.65	2.100																				

1. Measure the valve clearance (the engine has cooled).
2. Check the size of the current valve shim.
3. The vertical valve clearance corresponds to the current valve shim size of the rail.
4. The value in the space between the vertical column and the horizontal bar is the specified valve shim size. When the size of valve shims is equal to the value in the space, the size of valve clearance is just right.

   Example: The current valve shim thickness is 1.60 mm.

   The measured valve clearance is 0.23 mm.

   Replace the 1.60 mm washer with a 1.65 mm valve shim.
5. Re-measure the valve clearance and make adjustments if necessary.

Benelli

Inlet valve clearance adjustment table

Valve Clearance Adjustment Table of Inlet Valve 0.13-0.15

Examples of current valve shim

Examples of valve clearance measurement valve (mm)	Thickness (mm)	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100
	0.00	-	-	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950
	0.01-0.2	-	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975
	0.03-0.05	-	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000
	0.06-0.07	-	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025
	0.08-0.10	-	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050
	0.11-0.12	-	1.600	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075
	0.13-0.15	Valve clearance/without adjustment																				
	0.16-0.17	1.625	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100	
	0.18-0.20	1.650	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100		
	0.21-0.22	1.675	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100			
	0.23-0.25	1.700	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100				
	0.26-0.27	1.725	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100					
	0.28-0.30	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100						
	0.31-0.32	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100							
	0.33-0.35	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100								
	0.36-0.37	1.825	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100									
	0.38-0.40	1.850	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100										
	0.41-0.42	1.875	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100											
	0.43-0.45	1.900	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100												
	0.46-0.47	1.925	1.950	1.975	2.000	2.025	2.050	2.075	2.100													
	0.48-0.50	1.950	1.975	2.000	2.025	2.050	2.075	2.100														
	0.51-0.52	1.975	2.000	2.025	2.050	2.075	2.100															
	0.53-0.55	2.000	2.025	2.050	2.075	2.100																
	0.56-0.57	2.025	2.050	2.075	2.100																	
	0.58-0.60	2.050	2.075	2.100																		
	0.61-0.62	2.075	2.100																			
	0.63-0.65	2.100																				

1. Measure the valve clearance (the engine has cooled).
2. Check the size of the current valve shim.
3. The vertical valve clearance corresponds to the current valve shim size of the rail.
4. The value in the space between the vertical column and the horizontal bar is the specified valve shim size. When the size of valve shims is equal to the value in the space, the size of valve clearance is just right.

   Example: The current valve shim thickness is 1.85 mm.

   The measured valve clearance is 0.33 mm.

   Replace the 1.85 mm washer with a 2.05 mm valve shim.
5. Re-measure the valve clearance and make adjustments if necessary.

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Notes
Be sure to re-measure the valve clearance after selecting other valve shim in accordance with the above table. If the valve clearance is outside the specified range, use a supplementary washer.

○ If there is no valve clearance, use a valve shim that is several times smaller than that of the original one and then measure the valve clearance again.

●When installing the valve shim, make the marked side face the valve tappet. At this point, apply a little oil to the valve shims or valve tappets so that the valve shims are in place when the camshaft is installed.

Notes
Do not use multiple valve shim! In order to prevent the engine from being seriously damaged when the valve shims are popping up at a high speed. **Do not attempt to reduce the thickness of the valve shim when processing! In order to prevent the engine from being seriously damaged when the valve shim is broken.**

● Apply oil to the surface of valve tappet and then install the tappet.

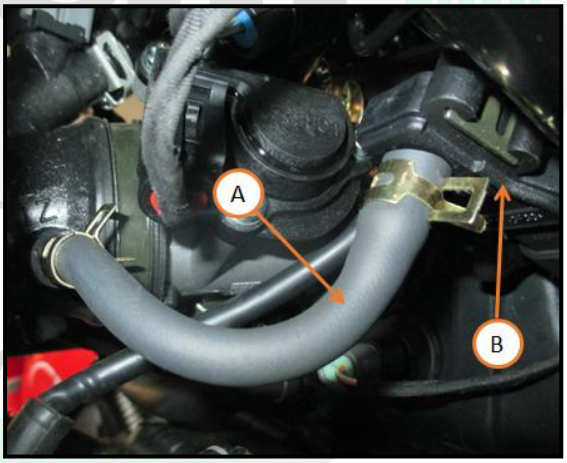
● Install the camshaft (see "Installing the Camshaft" in the chapter "Engine Cylinder Head and Cylinder Head Cover").

Re-check the valve clearance and make adjustments if necessary.

●Install the parts disassembled previously (see the corresponding chapters).

Check whether the air inlet unit has been damaged

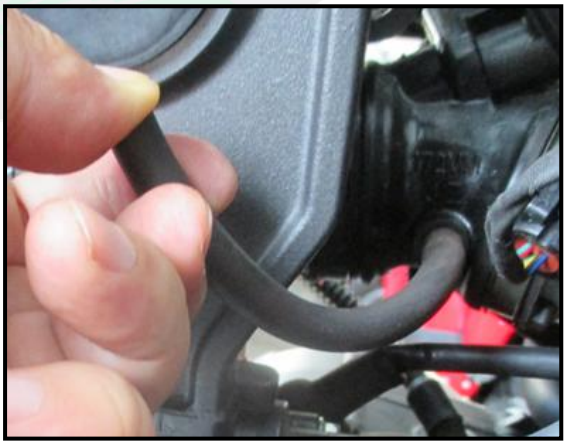
● Pull the intake pressure sensor and the engine intake port connecting pipe [A] out of the intake pressure sensor [B].



● Start the engine and make it run at idle speed.

● Press the end of the canister solenoid valve and the engine intake port using your fingers to feel the negative pressure pulse in the hose.

★ If you do not feel any negative pressure pulse, check the air intake device for air leakage.



Clutch

Check whether the clutch control system is normal

● Start the engine to ensure that the clutch does not slip and can be separated normally.

★ If the clutch is not normal, check the clutch system.

⚠Warning

If you need to run a motorcycle during the inspection, be sure to drive in a safe place.

Check the free stroke of clutch handle

Standard: 10-20mm.

★ If the free stroke is not accurate, please adjust the clutch cable.

• Check whether the clutch handle is able to move smoothly from full release to being griped, and the return spring can quickly close the clutch completely, regardless of the steering position.

★ If the clutch handle cannot be reset normally, check the winding method of clutch cable, the free clearance of handle and the cable for damage. Then lubricate the clutch cable.

Rotate the handle to the right and left to ensure that there is no change in the operation of clutch and the gear is working smoothly.

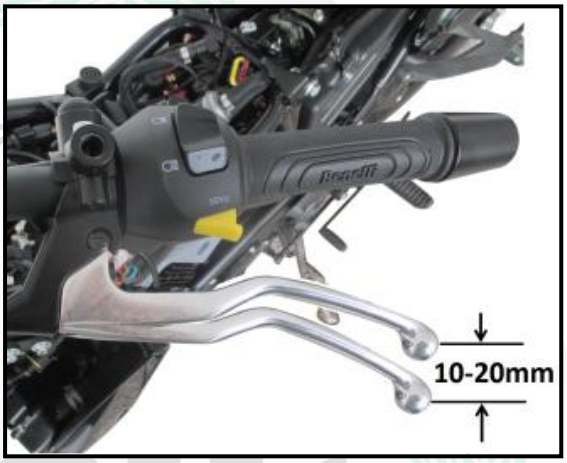
If the gear cannot work smoothly, check the free clearance and winding method of the clutch cable.

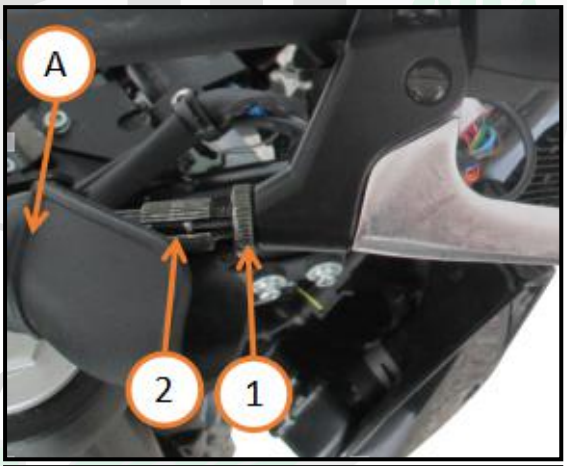
★ If necessary, adjust the throttle cable [A] as follows:

(1) Loosen the fastening nut [1] first.

(2) The adjustment device is screwed in or out [2] until the free stroke of the clutch handle meets the specified value of 10-20mm.

(3) Finally tighten the fastening nut [1].



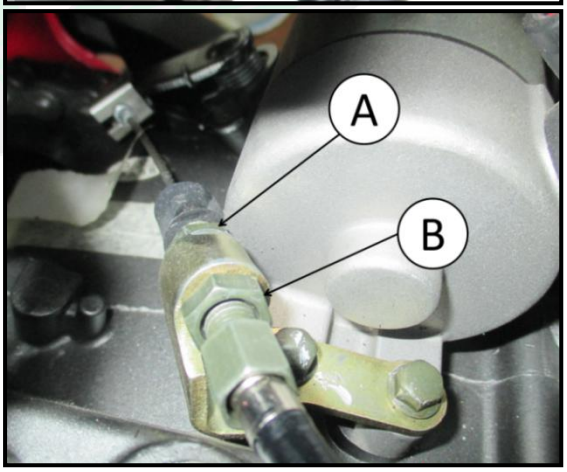


★If the handle end of clutch cable is adjusted to the limit position and cannot meet the requirements of free stroke, it is adjusted by the clutch cable and the locknut [A] and the adjusting nut [B] of the engine end.

(1) Loosen the fastening nut [A] first.

(2) The adjustment device is screwed in or out [B] until the free stroke of the clutch handle meets the specified value of 10-20mm.

(3) Finally tighten the fastening nut [A].



Wheel/tire

Check the tire pressure

●Remove the valve cap.

●When the tire is cooled (ie, the mileage traveled by the motorcycle for 3 hours before the measurement does not exceed 2Km), measure the tire pressure is with a barometer [A].

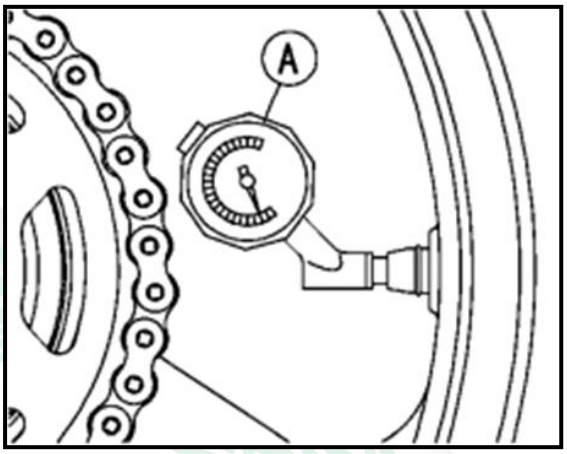
● Put the valve cap back.

★ If necessary, adjust the tire pressure according to the relevant specifications.

Tire pressure (when cooling the tire) :

Front wheel: 220±10kPa

Rear wheel: 250±10kPa



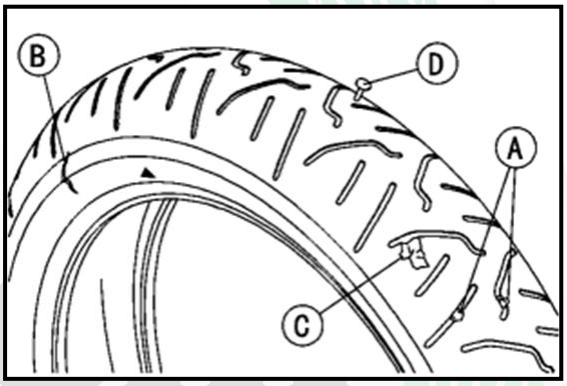
Check wheel / tire for wear

● Clean stones [A] or other foreign matter embedded in the tread.

• Visually inspect the tire for cracks [B], cuts [C] and nails [D] and replace the tire if necessary. If the tire expands or bulges, it is damaged internally and needs to be replaced.

• Visually inspect the wheel for cracks, cuts and dents.

★ If any damage is found, replace the wheel as appropriate.

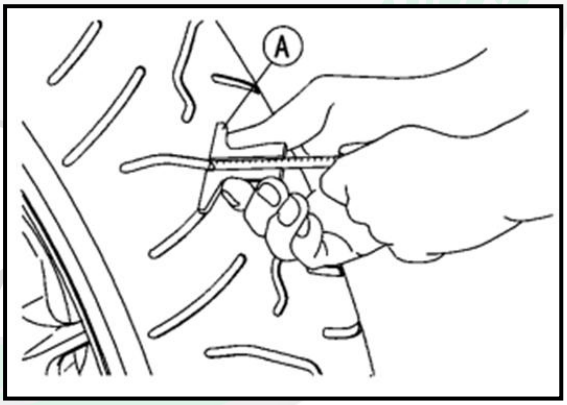


Check the wear of tread

● As the wear of tread becomes more and more serious, the tire is more likely to burst. It is estimated that 90% of tires are damaged during the last 10% of the tire's service life (90% wear). So the tires have been used until it is smoothed, which does not save money, but it may cause safety problems.

• Use a depth gauge [A] to measure the tread depth in the middle of the tread. Since the tires are unevenly worn, it is necessary to measure at different locations.

★ If any of the measured values is below the usage limit, the tires must be replaced (see "Removing/Installing the Tire" in the chapter "Wheels/Tires").



Tread depth

Standard:

Front wheel: 3.8 mm

Rear wheel: 4.8 mm

Usage restrictions:

Front wheel: 1.6 mm

Rear wheel: 2.0 mm

⚠ Warning

In order to ensure the safety and stability of the tires, the existing tires must be replaced with the recommended standard tires and the tires shall be inflated according to the standard air pressure.

Remarks
○ Most countries have specified the minimum depth for the tread: Please be sure to follow the provisions! ○ Check the wheels after the tires are replaced and thus balance them.

Check whether the wheel bearing has been damaged

★ Lift the front wheel from the ground with a jack (see “Removing/Installing the Tire” in the chapter “Wheels/Tires”).

● Turn the handle all the way to the right or left.

● Shake the wheel frame to both sides with both hands [A] and check the front wheel bearing for axial clearance.

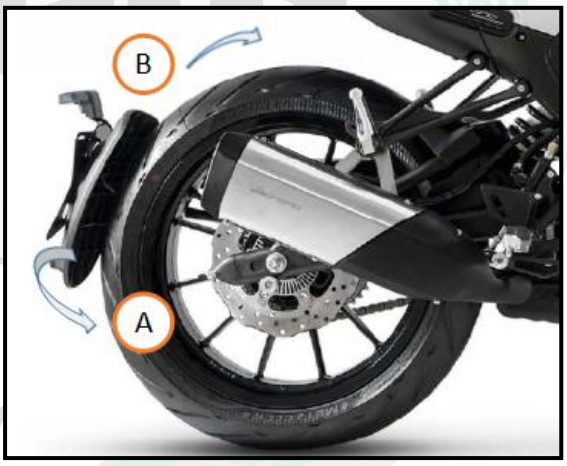
● Gently rotate the [B] front wheel to see whether the wheel can rotate smoothly, whether it is difficult to rotate, or whether there is abnormal resistance and noise.

★ If the wheel is found to be difficult to rotate with resistance or noise, remove the front wheel and inspect the wheel bearing (see “Removing Front Tire and Checking Hub Bearing” in the chapter “Wheels/Tires”).

★ Lift the rear wheel from the ground with a jack (see “Removing Rear Tire” in the chapter “Wheels/Tires”).

● Shake the wheel frame to both sides with both hands [A] and check the rear wheel bearing for axial clearance.

● Gently rotate the [B] rear wheel to see whether the wheel can rotate smoothly, whether it is difficult to rotate, or whether there is abnormal resistance and noise.



★ If the wheel is found to be difficult to rotate with resistance or noise, remove the rear wheel and inspect the wheel bearing (see “Removing Rear Tire and Checking Hub Bearing” in the chapter “Wheels/Tires”) and shaft sleeve (see "Checking Shaft Sleeve and Bearing" in the chapter "Final Drive Mechanism").

Final Drive Mechanism

Check the lubrication state of drive chain

● If there is no special lubricant, it is preferred to use heavy oil (eg SAE 90) instead of light oil, because heavy oil can be attached to the drive chain for a longer period of time and the lubrication effect is better.

● If the drive chain looks dirty, it must be cleaned before adding lubricant.

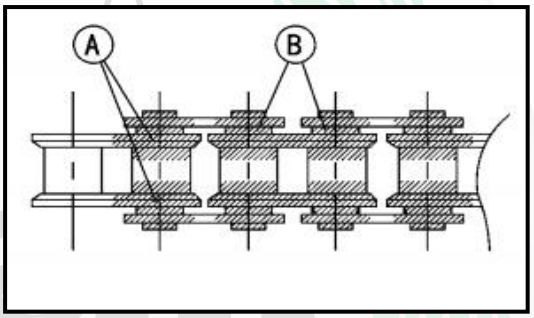
Notes
The lubricant of oil seal is sealed between the side plates and the rollers. Therefore, in order to avoid damage to the O-ring and reduce the amount of lubricant, please observe the following rules: **The O-ring of drive chain must be cleaned with kerosene or diesel. Other cleaning solvents (eg, gasoline or trichloroethylene) may corrode the O-ring and cause it to expand. Dry the drive chain with compressed air immediately after cleaning. Make sure to clean and dry the drive chain within 10 minutes.**

● Apply lubricant to both sides of the chain roller to allow it to seep into the chain rollers and bushings. Lubricate the O-ring to cover the surface of the O-ring.

● Wipe off excess oil.

Part to be lubricated: [A]

O-ring seal: [B]



Check whether the drive chain is slack

Remarks
○ Use a sidestand to support the motorcycle and check whether the drive chain is slack; or use a bracket to support the motorcycle and check whether the drive chain is slack. ○ If the drive chain is smudged, clean it first, and then dry and lubricate it.

● Check the wheel alignment (see "Checking wheel Alignment" for details).

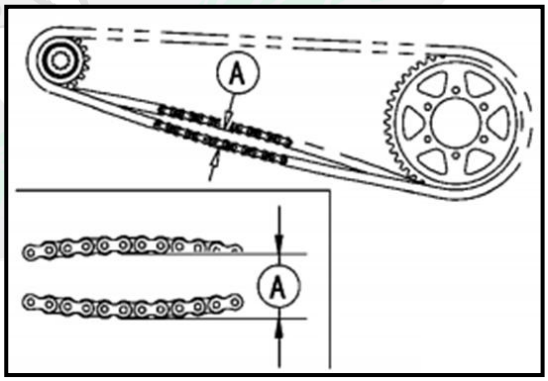
● Rotate the rear wheel to find the tightest position of drive chain.

● Measure the up and down swing of the chain between the front and rear sprockets (drive chain is slack) [A].

★ If the drive chain slackness is beyond the standard, please adjust it!

Drive chain slackness

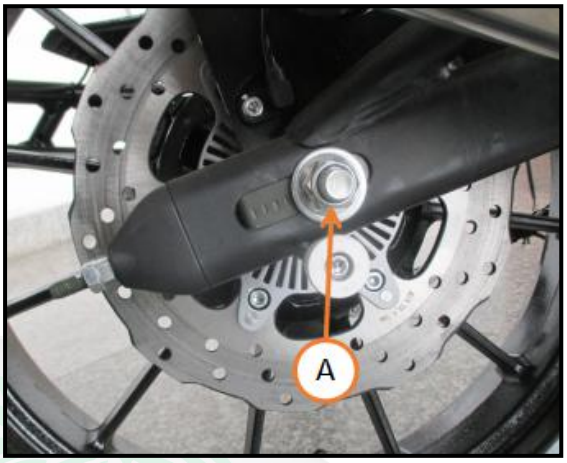
Standard: 20-35 mm



Adjust drive chain slackness

★ Lift the rear wheel from the ground with a jack (see “Removing Rear Tire” in the chapter “Wheels/Tires”).

●Loosen the rear wheel axle nut [A].

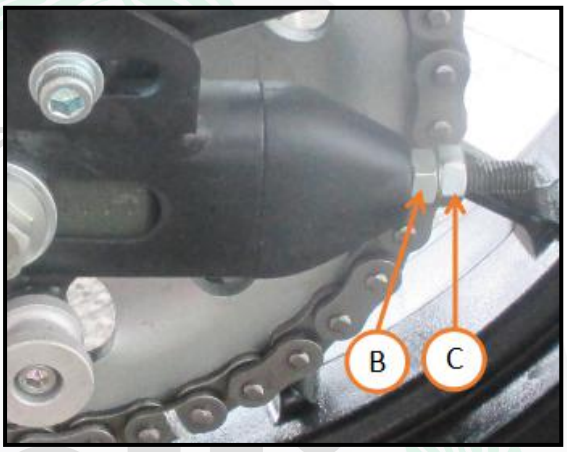


●Unscrew the left and right chain adjuster locknuts [C].

● Rotate the adjustment nuts of left and right chain adjusters [B] evenly until the slackness of drive chain is appropriate. In order to align the drive train and the wheel, the notch on the right wheel alignment indicator should correspond to the swing arm mark or position to which the notch on the left wheel alignment indicator is aligned.

★ If the drive chain is too loose, adjust the chain adjuster on the right and the chain adjuster on the left counterclockwise from the rear view of the vehicle and average it to the left and right sides.

★ If the drive chain is too tight, adjust the right chain adjuster and the left chain adjuster clockwise from the rear view of the vehicle to average the left and right sides, then kick the wheel forward.



Screw in	Increase the slackness
Screw out	Reduce the slackness

⚠Warning

If the wheels are not aligned, abnormal wear may be caused to the wheels and dangers may be caused when riding.

●Be sure to tighten the left and right chain adjuster locknuts [C].

● Tighten the axle nut.

Locking torque of rear axle nut: 150 N•m

● Rotate the wheel and measure the slackness of the drive chain again at the tightest point of the drive chain and re-adjust it if necessary.

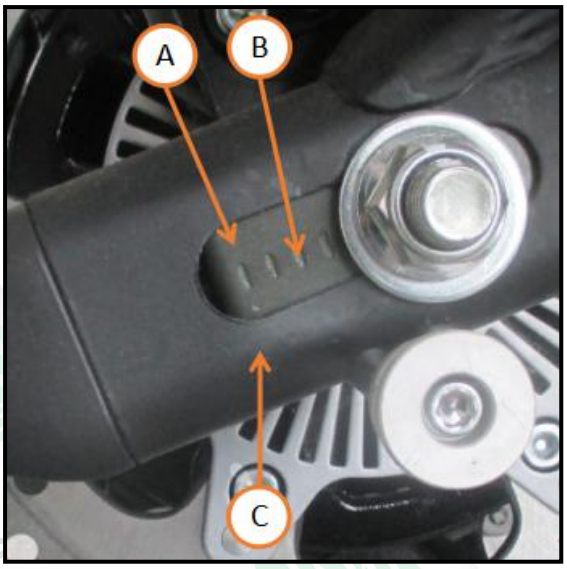
⚠Warning

If the rear axle nut is not tightened, dangers may be caused when riding.

Check wheel alignment

● Check whether the position of concave scale line [B] at the right chain adjuster [A] on the rear swing arm [C] matches the concave scale line of the left chain adjuster.

★ If misaligned, adjust the slackness of drive chain and align the wheel alignment (see "Adjustment of Slackness of Drive Chain" for details).



Remarks
○ You can also check the wheel alignment with a ruler or a rope.

⚠WARNING

If the wheels are not aligned, abnormal wear may be caused to the wheels and dangers may be caused when riding.

Check the wear of drive chain

● Remove the chain cover (see "Removing the Drive Chain" in the chapter "Final Drive Transmission" for details).

● Rotate the rear wheel to check for damaged rollers, loose split pins and chain links on the drive chain.

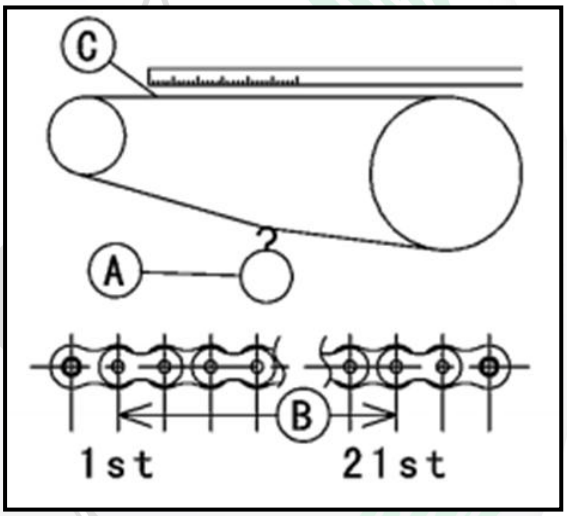
★ If any abnormality is found, the drive chain must be replaced.

● If the drive chain looks dirty, add lubricant.

●Hung a 10kg weight on the drive chain to tighten the drive chain.

●Measure the length of the 20 links [B] of the drive chain of the straight section [C] (from the center of the first cotter pin to the center of the 21st cotter pin). Since the drive chains are unevenly worn, it is necessary to measure at different locations.

★ If any of measurement values exceeds the usage restriction, the drive chain must be replaced. Meanwhile, replace the front sprocket and the rear sprocket.



Length of the 20 links of the drive chain
Standard: 317.5 - 318.2 mm
Operating limit: 323 mm

⚠Warning

If the drive chain wear exceeds the operating limit, the drive chain must be replaced or dangers may be caused when riding. If the drive chain breaks or falls off the sprocket, it may catch the engine sprocket or lock the rear wheel, which will seriously damage the motorcycle and make it out of control.

To ensure safety, a standard drive chain must be used. The standard drive chain is a no-link chain and must not be cut off during installation.

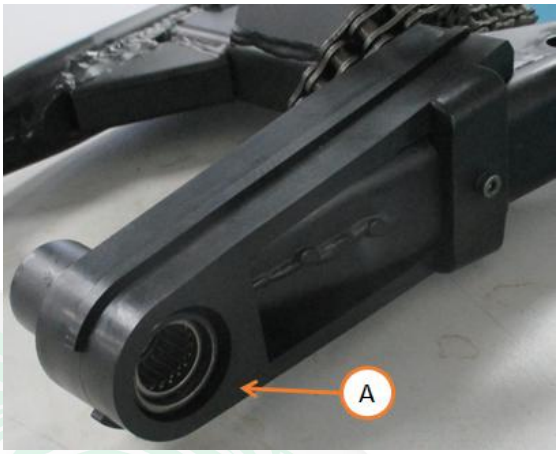
Standard drive chain
Model: 520HO
Link: 110 links

Check the wear of chain guide

● Remove the rear swing arm (see “Removing Rear Swing Arm” in the chapter “Suspension System”).

● Visually inspect the chain guide [A].

★ If the chain guide looks abnormally worn or damaged, it must be replaced.



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Brake

Check brake hoses and brake lines for damage and ensure their installation status

The precautions for models equipped with CBS are as follows:

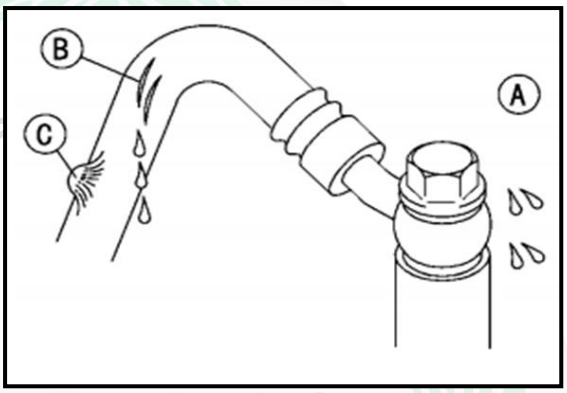
●Disassemble:

Fuel tank (see “Removal of Fuel Tank” in the chapter “Fuel Injection System (EFI)”),

battery (see “Removal of Battery” – “Electrical System”).

●Check brake hoses, brake lines and fittings for corrosion, cracks or leaks.

○If the brake hoses and brake lines are not properly serviced, the high pressure inside the brake lines may cause brake fluid to leak [A] or the brake hoses and the brake forming tubes to burst. When checking rubber hoses, bend and twist them. When checking rubber hoses, bend and twist them.



★If any cracks [B], swelling [C] or leaks are found on the brake hose or brake forming tube, they must be replaced.

●Tighten all hollow bolts of brake hose.

Locking torque for hollow bolt of brake hose: 25 N•m

Locking torque for connecting nut of brake hose: 18 N•m

●Check the winding method of brake hose.

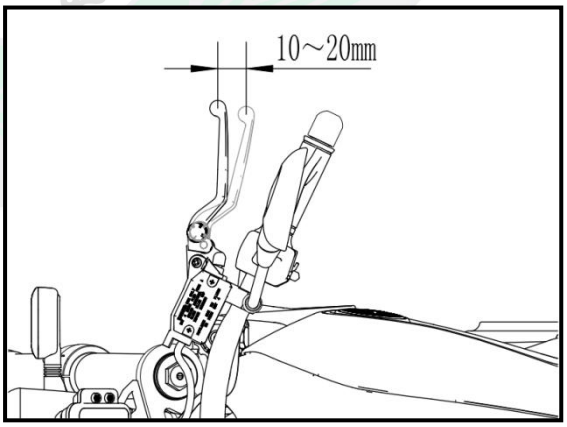
★ If the brake hoses and brake lines are not wound correctly, please arrange brake hoses and brake lines in accordance with the section "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".

Free stroke of front brake

●Measure at the tip of front brake lever

at the tip of brake lever.

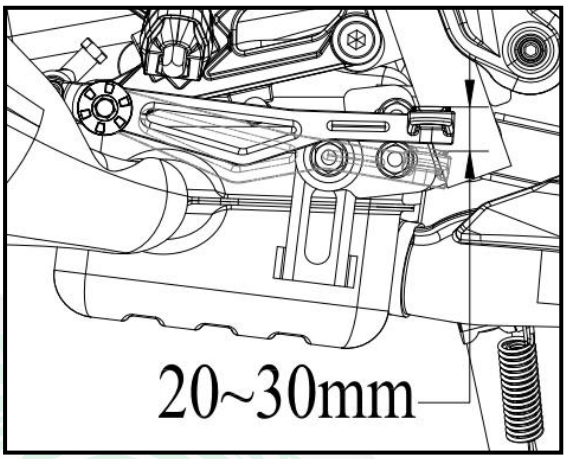
Free stroke: 10-20mm



Free stroke of rear brake

Measure the free stroke of brake pedal.

Free stroke: 20-30mm.



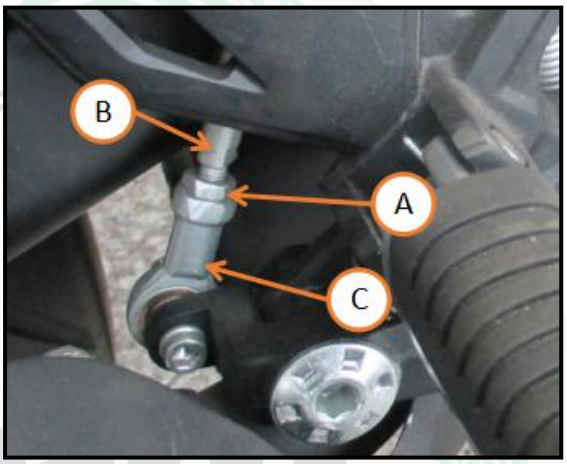
★Adjust if it does not meet the specified value.

○Adjust the free stroke of brake pedal.

1. First loosen the nut [A] on the joint [C].
2. (2) Screw in or out the ejector rob [B] to adjust the free stroke of brake pedal.

   If the ejector rob [B] is screwed in, the free stroke will be reduced;

   If the ejector rob [B] is screw out, the free stroke will be increased.
3. Tighten nut [A] until the free stroke meets specified values.
4. After adjustment, the brake dragging phenomenon shall be avoided.



Inspection of brake

● Check whether front brake and rear brake are normal when riding a motorcycle on a dry road.

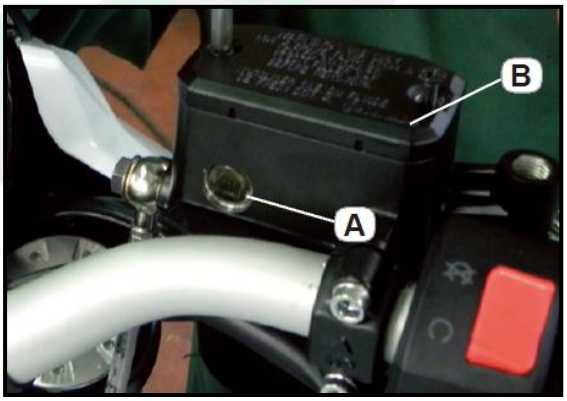
★ If the brake is abnormal, check the brake system.

⚠Warning
If you need to test-ride a motorcycle during the inspection, make sure to do it at a place under safe traffic conditions.

Inspection of brake fluid level

● Check whether the level of brake fluid in the front brake fluid pump [B] is higher than the lower limit of oil lens [A].

Remarks
○ When checking the brake fluid level, rotate the handle to make the fluid reservoir level.

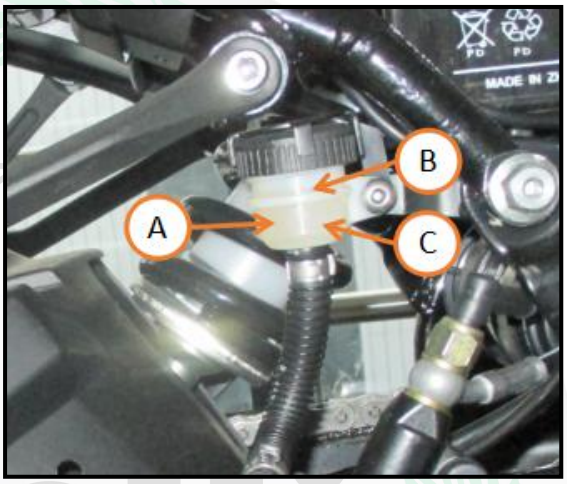


★ If the liquid level is below the lower limit, add brake fluid to the reservoir until the liquid level reaches the high liquid level line [A].

Remarks
○Brake fluid may damage the painted surface or plastic parts. *Therefore, apply absorbent paper around the pump and immediately clean the spilled brake fluid.*

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

● Check whether the brake fluid level in the rear brake fluid reservoir [A] is between the upper limit [B] and lower limit [C].



★ If the liquid level is below the lower limit, add brake fluid to the reservoir until the liquid level reaches the high liquid level line [C].

● Check the brake fluid diaphragm on the fluid reservoir. If there is any damage/wear, please replace the brake fluid diaphragm

Warning

If you need to add brake fluid but are not sure about the type and brand of brake fluid in the brake fluid reservoir, you must replace the brake fluid in the brake fluid tube. After replacing brake fluid, use only brake fluid of the same type and brand.

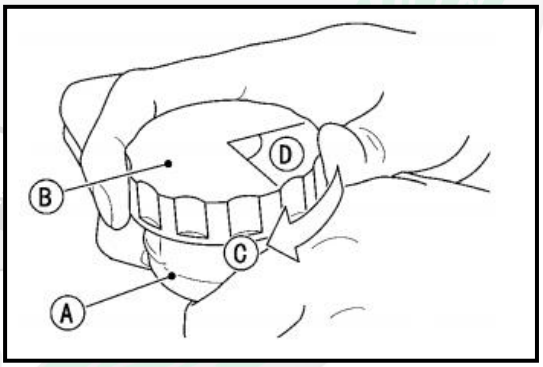
When adding brake fluid, be careful not to allow any water to enter the container. Water will significantly reduce the boiling point of the brake fluid, which will generate steam bubbles when heated, and thus lead to a reduction in brake system.

Recommended disc brake fluid

Grade: DOT4

●Properly install the cover of rear brake fluid reservoir according to the following procedures.

○ First, tighten the cover [B] of rear brake fluid reservoir with your hands clockwise [C] until you feel a little resistance, indicating that the cover has been fixed on the reservoir, then hold the reservoir [A] and rotate it by 1/6 turn [D].

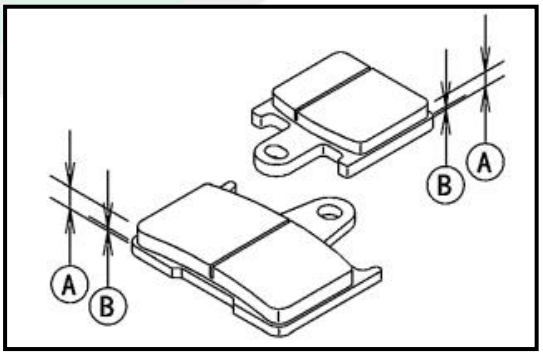


Inspection of wear of brake pad

●Remove the brake pads (see “Disassembly of front/rear wheel brake pad” in chapter “Brake” for details).

●Check the thickness of friction plate of brake pad inside the caliper [A].

★If the thickness of friction plate of any brake pad is lower than the operating limit [B], replace the two brake pads inside the caliper simultaneously.



Thickness of friction plate of brake pad

Standard:

Front wheel brake pad: 4.0 mm

Rear wheel brake pad: 4.0 mm

Operating limit: 3 mm

Inspection of brake light switch

●Open the main switch.

● When the brake lever is pulled by about 20 mm or the brake pedal is pressed by about 25mm, the brake light [A] is on.

★ If the brake light is off, check or replace the following parts:

Battery (see “Inspection of Charging” – “Electrical System”).

Brake light (see “Removal of Taillight / Brake Light” – “Electrical System”).

30 A main fuse and 10 A taillight fuse (see “Inspection of Fuse" – “Electrical System”);

Front brake light switch [A] (see “Inspection of Switch" – “Electrical System”);

Rear brake light switch (see “Inspection of Switch" – “Electrical System”);

Wire harness (see “Inspection of Line” – “Electrical System”).

Check the output voltage of speed sensor

● Check the input voltage before checking the output voltage (see "Inspection of the Input Voltage of Speed Sensor" for details).

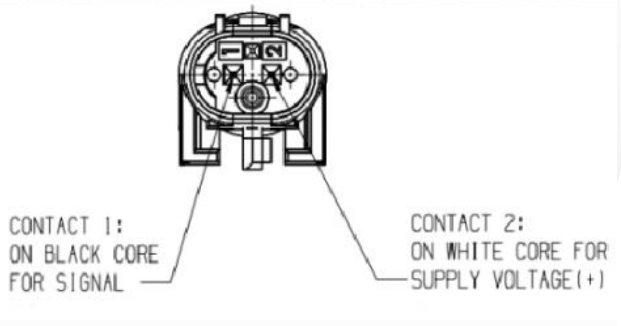
Remarks
○ The battery is fully charged.

●Close the main switch.

●Lift the rear wheel using a parking frame.

● Disconnect the speed sensor joint and connect the sensor cable adapter between the harness connector and the speed sensor joint.

● Connect the digital meter to the wire of the sensor cable adapter.



Output voltage of speed sensor

Connection to the sensor cable adapter:

Electric meter (+) → Y / W (sensor Y) wire [C]

Electric meter (-) → BK / BL (sensor BK) wire [D]

● Measure the output voltage with the engine off and the sensor line adapter bridged to the power supply.

●Open the main switch.

Output voltage of sensor

Standard: approximately equal to DC0.05-0.09V or DC4.5-4.9V

● Rotate the rear wheel by hands to see whether the output voltage is increased or reduced.

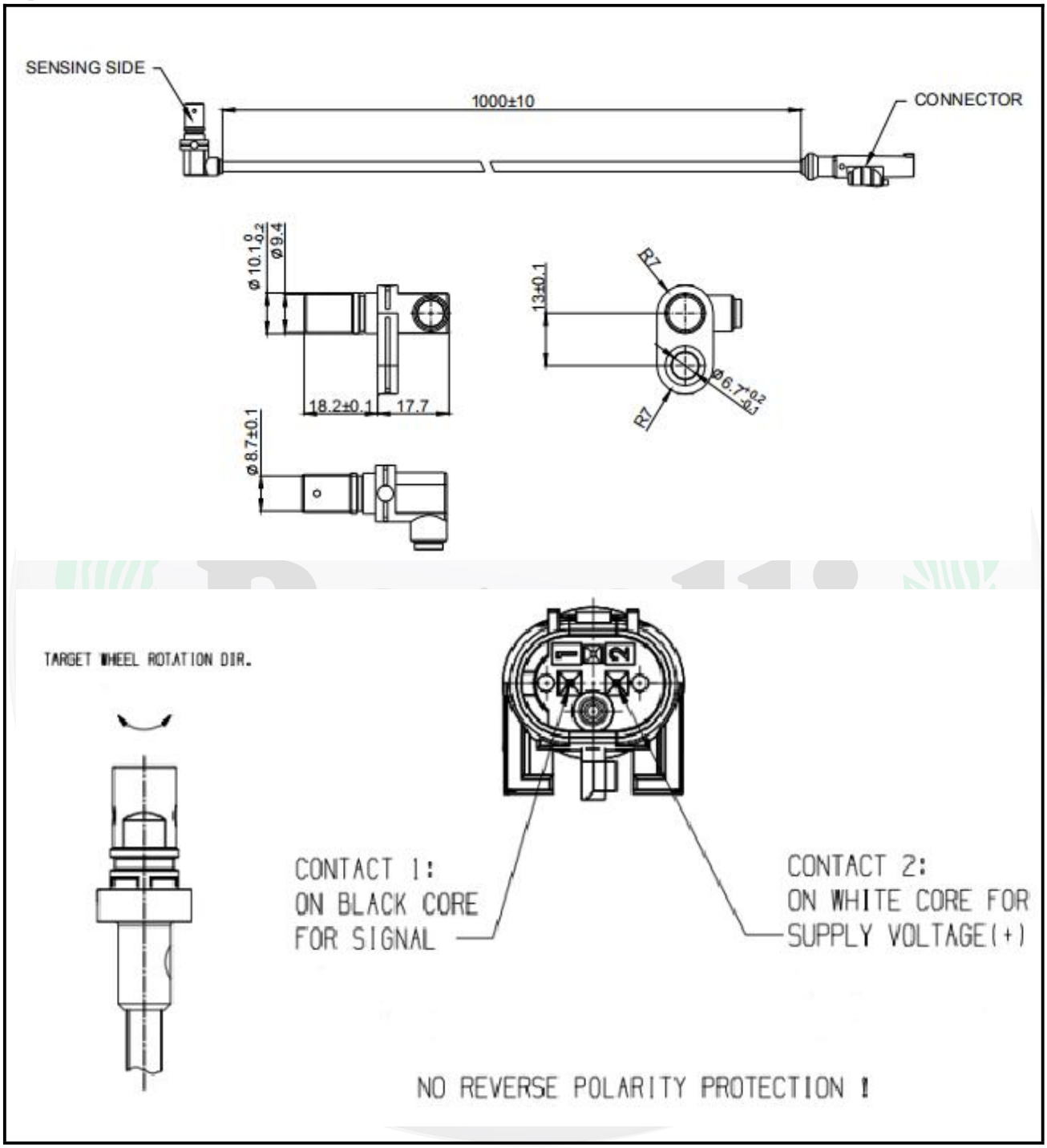
●Close the main switch.

★ If the reading is outside the above range, check the speed sensor (see “Inspection of Speed Sensor” in the chapter “Electrical System”) and ECU circuit (see

the wiring diagram in this section for details).

★ If there is no problem with the readings, speed sensor and wiring, replace the ECU (see "Removing/Installing ECU" for details).

Speed sensor (fault code: front: C0080, C0081, C0082, C0083: rear: C0100, C0101, C0102, C0103)



Suspension system:

Check front fork / rear shock absorber

● Shake the front fork up and down for four or five times to check whether the stroke of shock absorber is smooth.

★ If the front fork does not move smoothly or there is noise, check the oil level of the front fork shock absorber or the fork clamp (see “Replacing Front Fork Shock Absorber Oil” in the chapter “Suspension System”).

● Shake the seat cushion up and down for four or five times to check whether the stroke of shock absorber is smooth.

★ If the stroke of shock absorber is not smooth or there is noise, check whether the shock absorber oil leaks (see “Checking the Rear Shock Absorber for Oil Leakage”).

Check the front fork shock absorber for oil leakage

● Visually check whether the front fork shock absorber [A] for oil leakage.

★ Replace or repair any defective parts if necessary.

Check the rear shock absorber for oil leakage

● Visually check whether the rear shock absorber [A] for oil leakage.

★ In case of oil leakage, replace the shock absorber.

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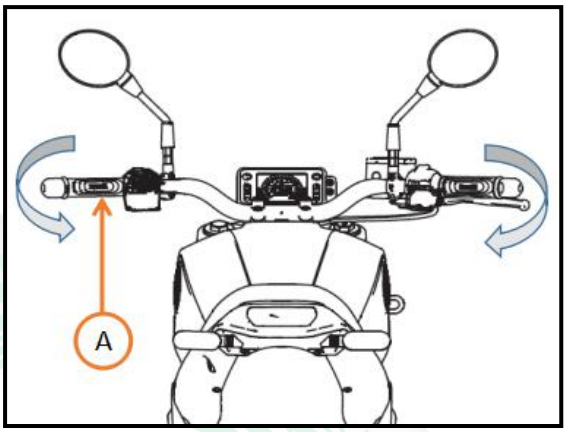
Steering system

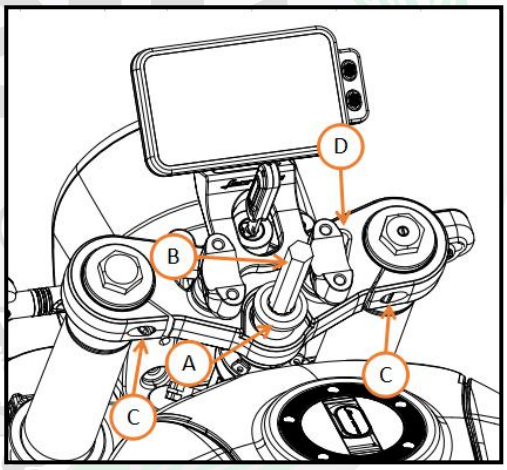
Check steering clearance



● Lift the front wheel from the ground with a jack.
Special tool—jack:
●When the front wheel is straight ahead and the front wheel is lifted off the ground, just push the left or right handle [A], the whole handle should be able to slide freely to the upper left and right steering limits by gravity.
★ If the entire handle cannot slide freely to the upper left and right steering limits, the steering system is too tight.
●Push the front fork and check whether there is a too large clearance in the steering system.
★ If it is too loose, the steering system is too loose.

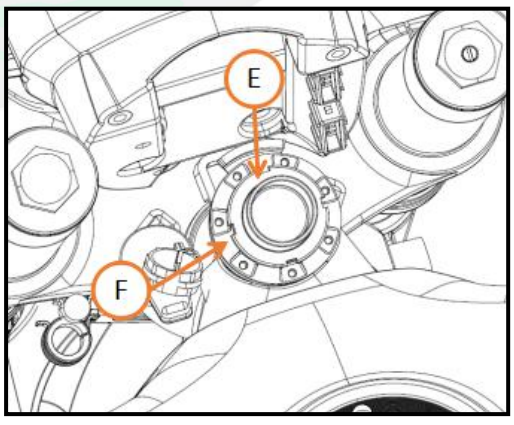
Remarks
○Cables and wires must be considered for connection as they may affect the movement of front fork. ○Make sure that the wires and cables are wound in the correct way. ○The state of bearing must be good, and the lubricating grease has been properly added, otherwise, the test result is invalid.

Adjust the steering seat properly



●Disassemble:
Handlebar (see "Removing Handlebar" in the chapter "Steering Gear");
Remove the steering column head bolt [A] with an Allen wrench [B];
Loosen the fastening bolt [C] of upper bracket[D] (release)
Remove the upper bracket [D]

Special tools code 343 pages.
Remove locknut of steering stem [E].
Special tools - steering stem nut wrench: four claws
●Adjust the locknut of steering stem [F].
★Tighten the steering stem locknut [F] to the torque of 30-35N•m
Special tools - steering stem nut wrench: seven claws
★ Rotate the steering stem to the left and right for 2-3 times. When rotating, it cannot be stuck and the bearing race cannot be loose.
★Loosen the locknut E by 1/4 turn and then tighten, use the relevant wrench to tighten the locknut F;
★Tighten the steering stem locknut [F] to the torque of 20-24N•m
●Install the locknut of steering stem [E].
Special tools - steering stem nut wrench: four claws



★Tighten the locknut [E] to the torque of 60N•m

Warning:
Do not fasten the locknut [E] too excessively.

● Check the looseness of steering seat

★ Make sure that the pillars are not loose, and horizontally rotate the front forks to the end of the stroke to ensure that there are no obstructions. If there are any blocking points, remove the lower bracket components and check the upper and lower steering bearings.

● Install the upper bracket.

● Install the steering stem head.

● Install the steering stem head bolts.

● Install the handlebar.

● Tighten:

Locking torque of steering stem head nut: 78 N•m

Upper bracket fastening bolt (C): 30 N·m

Handlebar fastening bolt: 20N•m

Check the steering gear again.

★ If the steering gear is still too tight or too loose, re-adjust it.

● Install the handlebar (see "Installing the Handlebar" in the chapter "Steering Gear").

Lubricate steering stem bearings

Remove the steering stem (see "Removing Steering Stem, Steering Stem Bearing" in the chapter "Steering Gear");

● Clean the ball bearings in the upper and lower holders using the solvent with a high flash point and wipe the outer races at the top and bottom. The outer race is pressed into the head section steering column. Clean grease and dust.

● Visually inspect the outer race and ball bearings.

★ If the bearing assembly appears to be worn or damaged, it must be replaced.

● Wrap the upper and lower ball bearings [A] in the holder with grease, and then apply a thin layer of grease to the outer races at the top and bottom.

Install the steering stem (see "Installing Steering Stem, Steering Stem Bearing" in the chapter "Steering Gear");

● Adjust the steering gear (see "Adjustment of Free Clearance of steering").

Electrical System

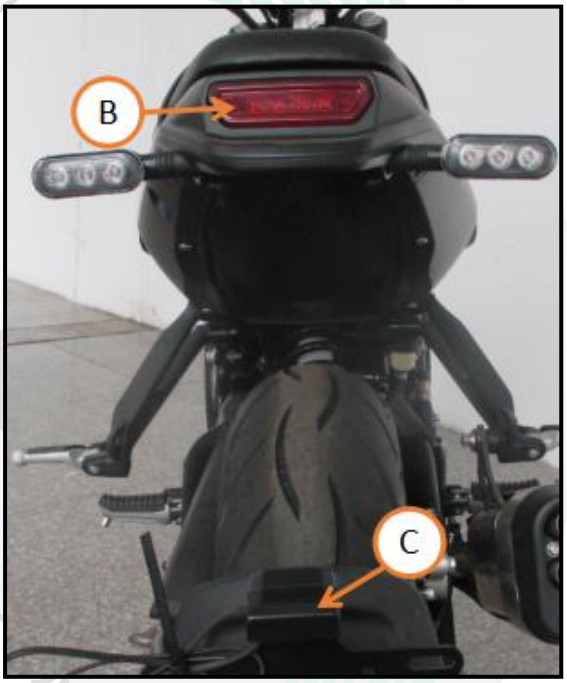
Check lights and switches

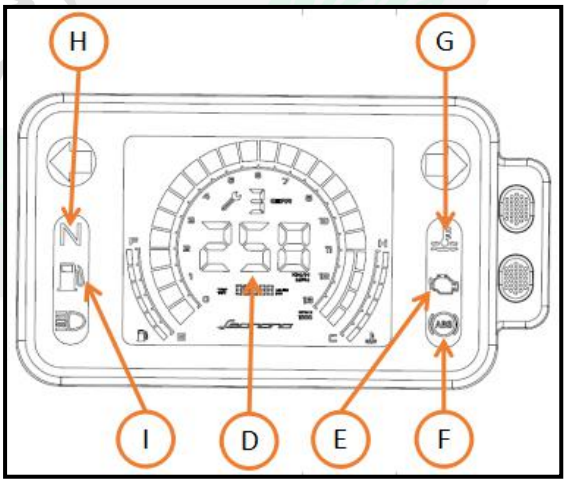
Step I

●Kee NO

●Various lights will be on in the order of the following table.

Position light (LED)[A]	On
Taillight (LED)[B]	On
License plate light (LED)[C]	On
Meter panel (LCD)[D]	On
Water temperature warning indicator light (LED)[E]	On
Fuel alarm indicator light (LED) [F]	On
Fault alarm indicator light (LED) [G]	On
Neutral position indicator light (LED) [H]	On
ABS indicator (LED) [I] (model with ABS)	On





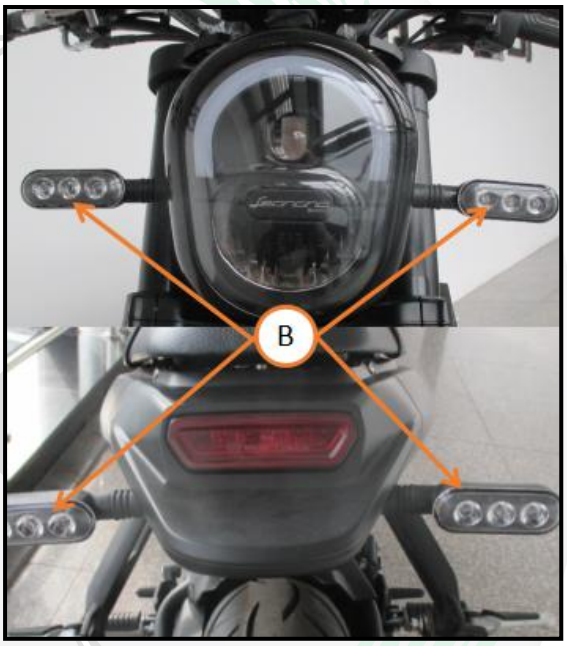
★If the light is out, check or replace the following parts:
Battery (see “Inspection of Charging” – “Electrical System”).
30 A main fuse and 10 A taillight fuse (see “Inspection of Fuse" – “Electrical System”);
Applicable bulbs (see “Wiring Diagrams” in the chapter “Electrical System”);
The head part of meter panel (LCD) (see "Checking the Meter Part" in the chapter "Electrical System");
The head part of water temperature alarm indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
The head part of fuel alarm indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
The head part of fault alarm indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
The head part of neutral position indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
The head part of ABS indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
The head part of ABS indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");
;ECU (see “Inspection of ECU Power Supply” in the chapter “Fuel Injection System (EFI)”);
Main switch (see “Inspection of Switch” – “Electrical System”).
Gear position switch (see "Inspection of Gear Position Switch" – “Electrical System”);
Wire harness (see “Inspection of Line” – “Electrical System”).
ABS indicator (LED) (model with ABS) [See "Checking the ABS Indicator (LED)" in the chapter "Brakes")
●Close the main switch.
●At this time, all lights should be turned off.
★ If the light does not go out, replace the main switch.

Step II

●Open the main switch.

● Turn on the turn signal light switch [A] (left or right).

●The left or right turn signal light (LED) (corresponding to the position of switch) (front and rear) will flash.



●The left/right turn indicator light (LED) [C] in the meter panel will flash.

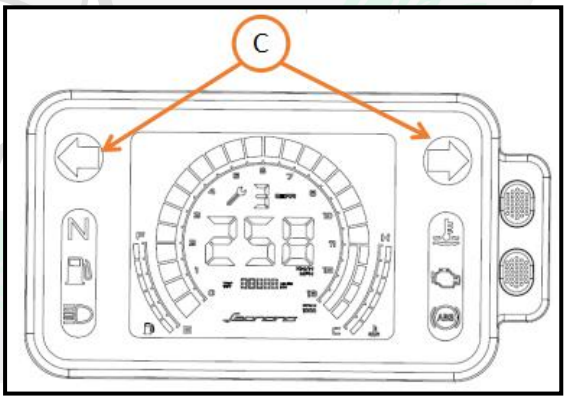
★ If the left or right turn signal light is out, check or replace the following parts:

Turn signal light (LED) (see “Replacing the Turn Signal Light” in the chapter “Electrical System”);

Turn signal indicator light (LED) (see "Checking the Head Part" in the chapter "Electrical System");

Turn signal light switch (see “Inspection of Switch" – “Electrical System”);

Wire harness (see “Inspection of Line” – “Electrical System”).



● Push back the turn signal switch.

●The turn signal light and turn signal indicator light (LED) are dimmed.

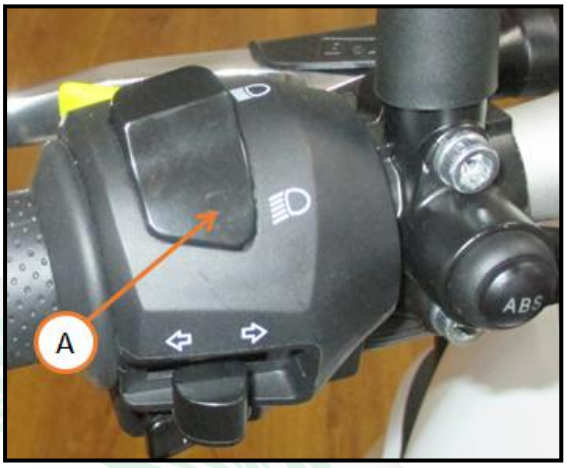
★ If the light is not dimmed, check or replace the following parts:

Turn signal light switch (see “Inspection of Switch" – “Electrical System”);

Step III

● Rotate the dimmer switch [A] to the position of low-beam light.

● Start the engine.



●The low-beam headlight [B] shall be on.

★If the low-beam headlight is out, check or replace the following parts:

Low-beam bulb of headlight (see “Replacing the Bulb of Headlight” in the chapter “Electrical System”);

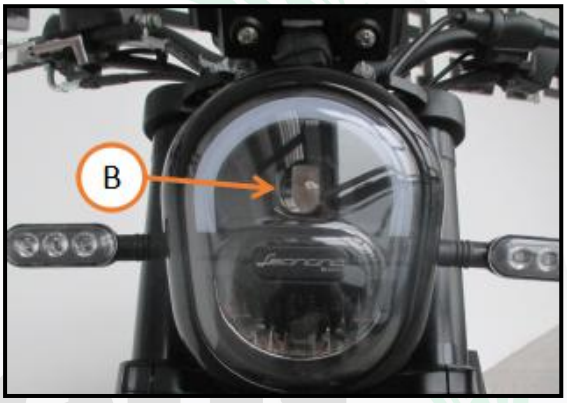
15A fuse of headlight (low-beam) (see “Inspection of Fuse" – “Electrical System”);

10 A fuse of headlight relay (see “Inspection of Fuse" – “Electrical System”);

Headlight circuit relay in relay box (see “Inspection of Relay Circuit" – “Electrical System”);

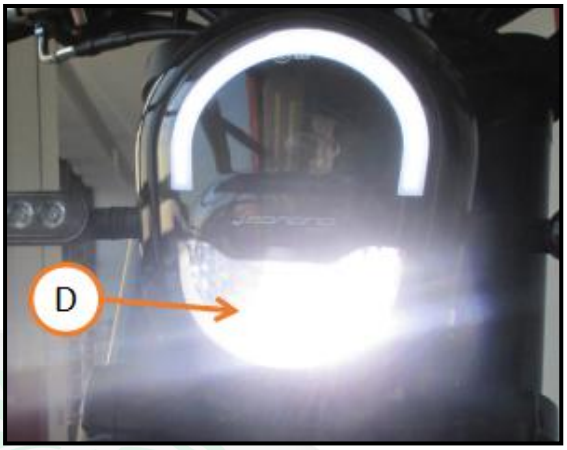
Headlight relay (low-beam) (see “Inspection of Headlight Relay" – “Electrical System”);

Wire harness (see “Inspection of Line” – “Electrical System”).

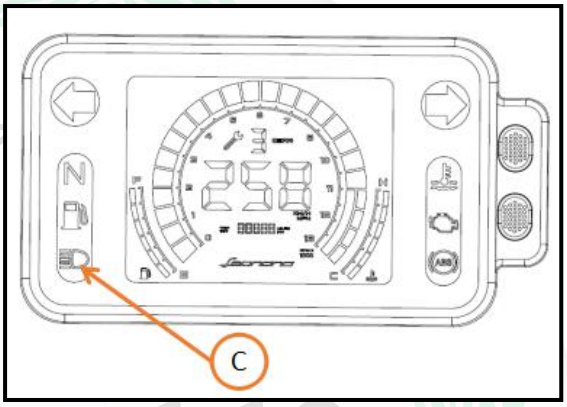


●Press the passing light switch [C] (model with passing light switch) or rotate the dimmer switch to the position of high-beam light.

●The high-beam headlight [D] shall be on.



●The high-beam indicator light (LED)[C] shall be on.



★ If the high-beam headlights and/or high-beam indicator light (LED) are out, check or replace the following parts:

High-beam bulb of headlight (see “Replacing the Bulb of Headlight” in the chapter “Electrical System”);

15A fuse of headlight (high-beam) (see “Inspection of Fuse" – “Electrical System”);

10 A fuse of headlight relay (see “Inspection of Fuse" – “Electrical System”);

Passing light switch button (model with passing light switch button) (see “Inspection of Switch” in the chapter “Electrical System”;

Dimmer switch (see “Inspection of Switch" – “Electrical System”);

Headlight circuit relay in relay box (see “Inspection of Relay Circuit" – “Electrical System”);

Headlight relay (high-beam) (see “Inspection of Headlight Relay" – “Electrical System”);

Wire harness (see “Inspection of Line” – “Electrical System”).

● Turn off the emergency stop switch.

● Low-beam and high-beam headlights should remain on.

★ If the headlights and high-beam indicator lights (LED) are out, check or replace the following parts:

Headlight circuit relay in relay box (see “Inspection of Relay Circuit" – “Electrical System”);

●Close the main switch.

●The headlight and high-beam indicator light (LED) shall be out.

Check the headlight accuracy

● Check the accuracy of headlight beam.

★ If the headlight beam is pointing to one side instead of pointing straight ahead, adjust the beam.

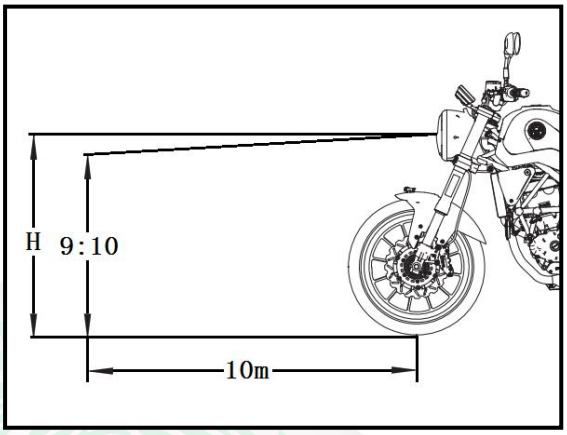
Correctly adjust the beam of headlights as follows:

Park the vehicle about 10 meters in front of the upright wall and park it on a completely flat surface. Fig. A

Ride on the motorcycle and sit in the rider position.

Make sure that the highest point of beam, such as on the wall, which is less than 1/10 of the horizontal axis of the headlights.

If the beam does not fall within these ranges, make adjustments to make it in the correct position.

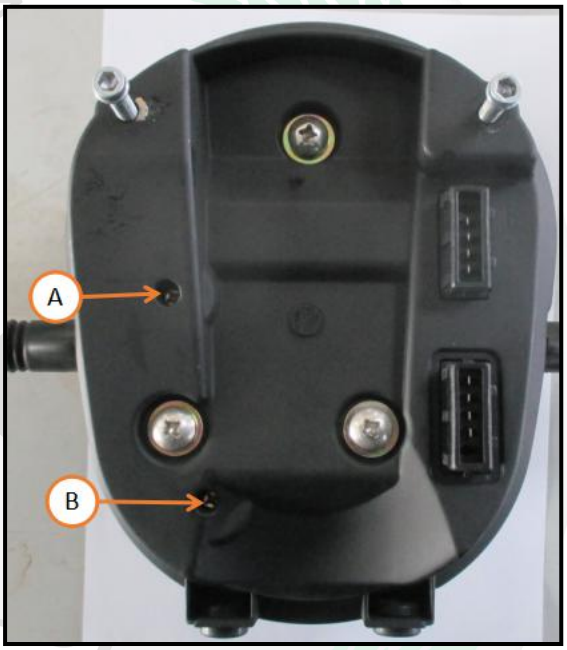


Adjustment of headlight beam

● Remove the inner cover (see “Removing the Inner Cover” in the chapter “Frame”).

● Screw in or out the low-beam adjustment screw [A] and the high-beam adjustment screw [B] inside the two headlights, until the beam is directly pointing to the front.

★ If the headlight beam is too low or too high, adjust the vertical beam.

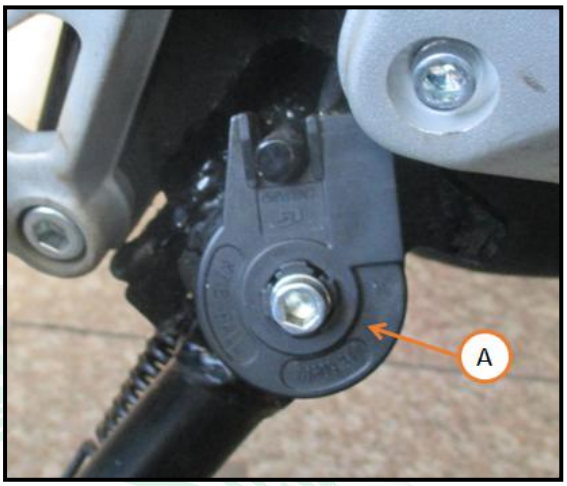


Low-beam rotating screw at the left [A] Rotate the screw counterclockwise to reduce the beam Rotate the screw clockwise to raise the beam High-beam rotating screw at the right [B] Rotate the screw counterclockwise to reduce the beam Rotate the screw clockwise to raise the beam

Remarks
○ When the motorcycle is supported by its wheels and someone is riding on the motorcycle, turn on the high-beam light, the brightest point should be slightly lower than the horizontal line. *Adjust the angle of the headlights according to local regulations.*

Check the sidestand flameout switch

●Check the sidestand switch [A] according to the table below.



Sidestand flameout switch

Sidestand	Gear position	Clutch operating lever	Engine start switch	Engine is running
Upper	Neutral	Release	Start	Continuous running
Upper	Neutral	Tightening	Start	Continuous running
Upper	Engage a gear	Release	Not started	Continuous running
Upper	Engage a gear	Tightening	Start	Continuous running
Lower	Neutral	Release	Start	Continuous running
Lower	Neutral	Tightening	Start	Continuous running
Lower	Engage a gear	Release	Not started	STOP
Lower	Engage a gear	Tightening	Not started	STOP

★ If the sidestand switch is abnormal, check or replace the following parts:
Battery (see “Inspection of Charging” – “Electrical System”).
30 A main fuse (see “Inspection of Fuse" – “Electrical System”);
30 A ECU fuse (see “Inspection of Fuse" – “Electrical System”);
10 A ignition fuse (see “Inspection of Fuse" – “Electrical System”);
Main switch (see “Inspection of Switch” – “Electrical System”).
Sidestand stop switch (see “Inspection of Switch" – “Electrical System”);
Emergency stop switch (see “Inspection of Switch" – “Electrical System”);
Start switch button (see “Inspection of Switch" – “Electrical System”);
Gear position switch (see "Inspection of Gear Position Switch" – “Electrical System”);
Starter relay (see “Inspection of Starter Relay" – “Electrical System”);
Relay box (see “Inspection of Relay Circuit" – “Electrical System”);
Starter circuit relay (high-beam) (see “Inspection of Headlight Relay" – “Electrical System”);
Wire harness (see “Inspection of Line” – “Electrical System”).
★ If the above parts are normal, replace the ECU.

Check emergency stop switch

Step I

●Open the main switch.

● Set to neutral.

● Rotate the emergency stop switch to the stop position [A].

●Press the starter button.

● At this point, the engine should not be started.

★If the engine has been started, check or replace the following parts:

Emergency stop switch (see “Inspection of Switch" – “Electrical System”);

Step II

●Open the main switch.

● Set to neutral.

● Rotate the emergency stop switch to the power supply position [A].

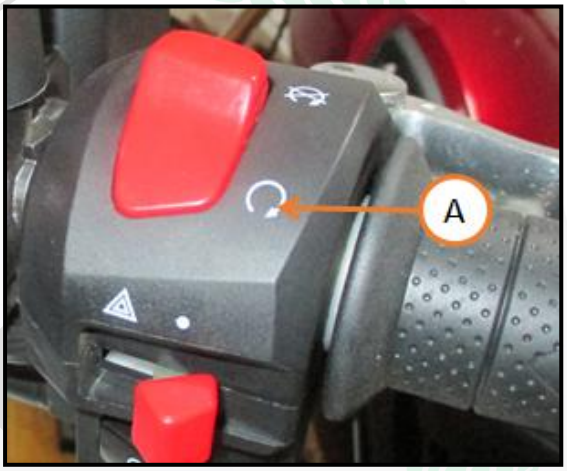
●Press the starter button to start the engine.

● Rotate the emergency stop switch to the Off position.

● The engine should stop running immediately.

★ If the engine does not stop, check or replace the following parts:

Emergency stop switch (see “Inspection of Switch" – “Electrical System”);



Others

Lubricate frame parts

● Before lubricating any parts, use a rust remover to remove the rust on the parts and wipe off grease, oil, dirt or grime.

● Lubricate the following positions with the specified lubricant.

Remarks
○ If you use a motorcycle in a humid or rainy day, especially if you use a high-pressure water spray to wash the motorcycle, you must lubricate the parts as follows.

Pivot shaft: lubricate it with grease

Brake handle

Brake pedal

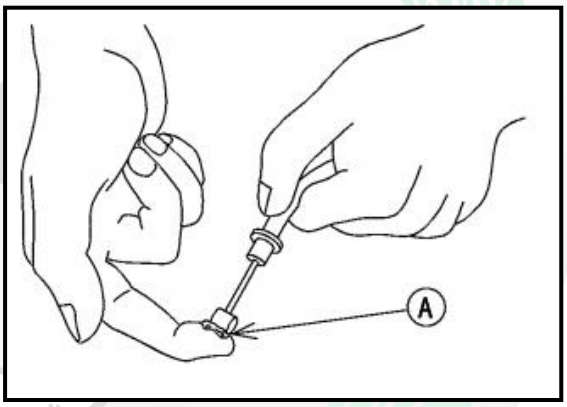
Clutch handle

Rear brake master cylinder pump connecting pin

Sidestand

Wire: lubricate it with grease

Wire rope of throttle cable [A]

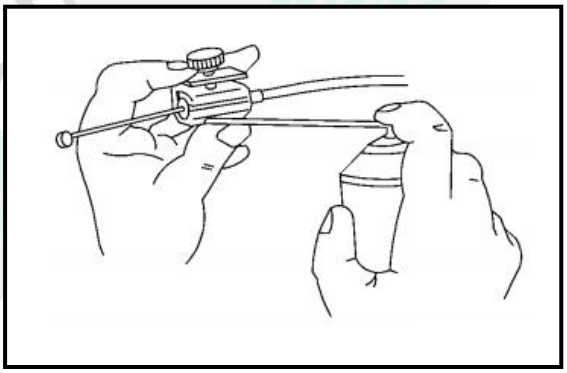


Cable: lubricate it with grease

Throttle cable

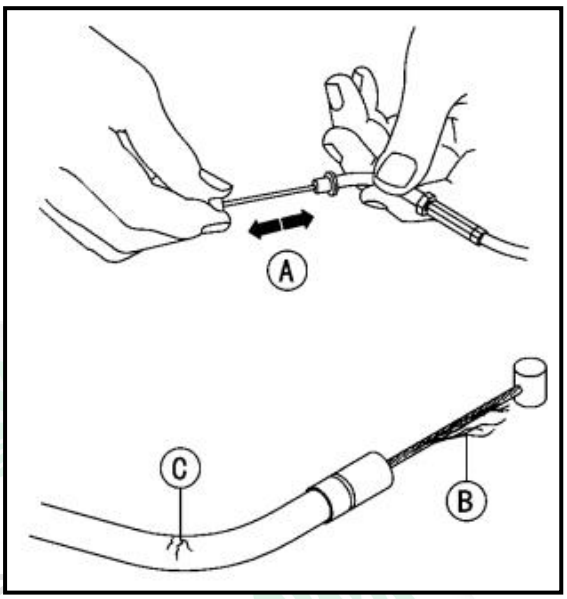
●Lubricate the cable by placing a rust inhibitor between the cable and the housing.

○ You can also purchase the spray lubricant on the market for the throttle cable.



● After disconnecting the two ends of the throttle cable, the cable inside should be free to move [A].

★ If the cable does not move smoothly after adding the lubricant, the cable is worn [B] or the throttle cable housing is cracked [C], the throttle cable must be replaced.



Check the tightness of bolts, nuts and fasteners

Check the tightness of bolts and nuts listed below. In addition, check whether all cotter pins are in the proper positions and in good conditions.

Remarks
○Check the tightness of engine fasteners when the engine is cooled (to the indoor temperature).

★ If the fasteners are loose, tighten them according to the specified tightening sequence and locking torque. See the corresponding chapters for the provisions on torque. If locking torque is not described in the corresponding chapters, refer to the *Standard Torque Table*. When tightening any one of the fasteners, first tighten it by 1/2 turn and then continue to tighten it.

★ If the cotter pin is broken, it must be replaced with a new one.

Bolts, nuts and fasteners to be checked

Engine:
Clutch lever pivot bolt locknut,
engine mounting bolt and nut,
engine bracket clamp bolt,
engine hanging board clamp bolt,
exhaust pipe flange clamp bolt,
muffler chamber clamp bolt,
Muffler cylinder mounting bolt
Shift rocker arm clamp bolt,

Wheel:
Front wheel axle,
clamp bolt of front wheel axle,
Rear wheel axle,
Rear wheel axle nut,

Brake:
Pivot bolt locknut of brake lever,
brake pedal bolt,
caliper mounting bolt,
clamp bolt of front master cylinder,
clamp bolt of rear master cylinder section,
Rear master cylinder mounting bolt:

Suspension system:
Upper bracket clamp bolt of front shock absorber,
lower bracket clamp bolt of front shock absorber,
upper bolt of rear shock absorber,
lower bolt of rear shock absorber,
rear swing arm shaft,
Nut of rear swing arm shaft,

Steering gear:
Handlebar holder bolt,
Handlebar holder clamp nut
Steering stem head clamp bolt;

Others:
Footpeg bracket bolt
Sidestand bolt

Replacement part

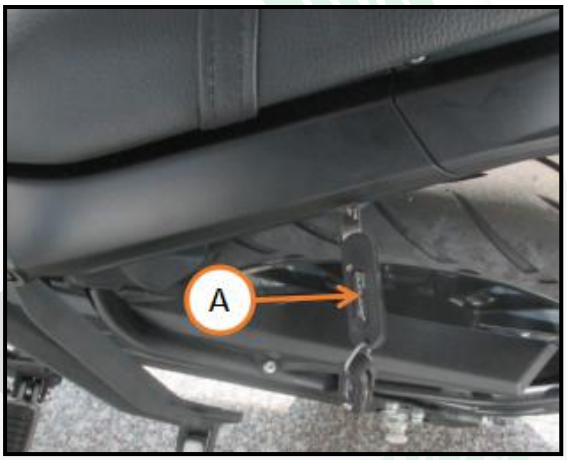
Replace of air filter element

Remarks
○ If the motorcycle is used in a dusty environment, the interval for replacing the air filter element is shorter than the recommended replacement interval. ○ Immediately replace the air filter element after riding on a rainy day or riding on a muddy road.

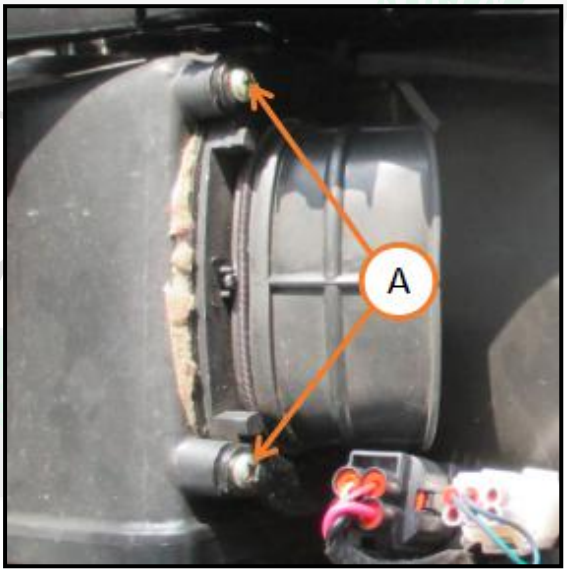
⚠Warning
If dirt or dust enters the throttle body assembly, the throttle may be blocked, thereby causing a safety hazard.

Notes
If dirt enters the engine, it may cause excessive wear to engine and even damage the engine.

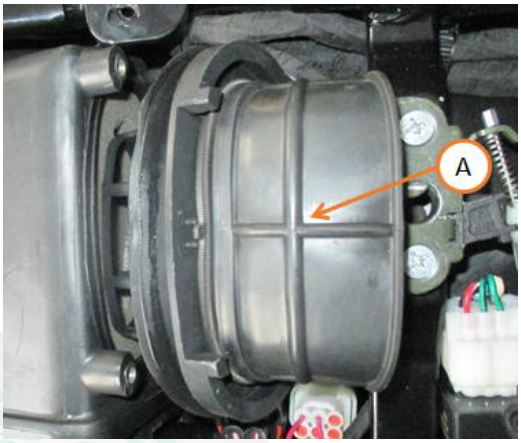
Open the seat cushion lock using the key [A].



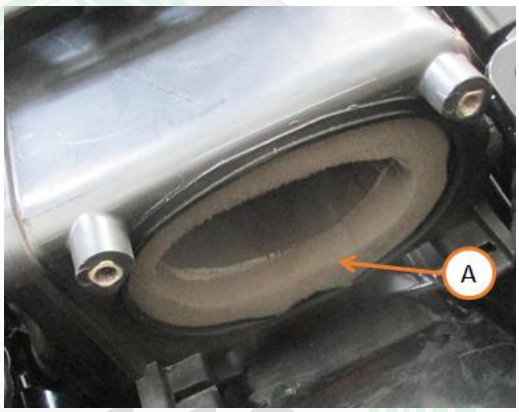
●Remove mounting screw [A]



●Remove the air filter inlet [A]



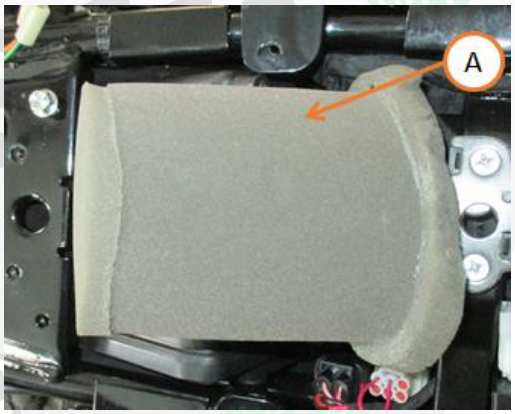
●Remove air filter element [A].



● check filter element [A]:

○Check whether the filter element is contaminated or damaged.

○If any, please replace it with a new one.



★ Cleaning:

○ Rinse the filter element softly and thoroughly with cleaner.

○Then apply the oil to the filter element and then squeeze out the redundant oil, ○so that the filter element is moist without oil dripping.

Remarks
○Do not use the gasoline so as not to cause fires. ○Do not distort or warp the filter element so as not to damage the foam materials.

● Install a new filter element.

Notes
Use the air cleaner element recommended by the seller. If other air filter elements are used, the engine may be damaged prematurely or its performance may be reduced.

●Install it in the reverse order of disassembly.

● Tighten:
Locking torque of screw at air filter element inlet: 5 N·m
● Install the removed parts.

Replacement of fuel hose

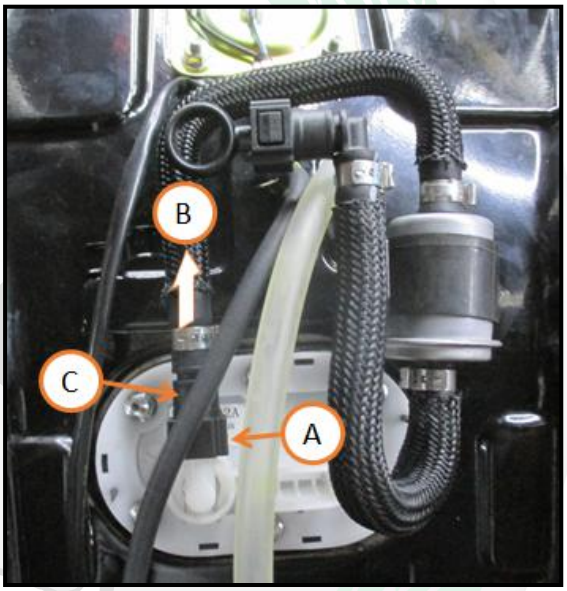
Remove the fuel tank (see “Removing Fuel Tank” - “Fuel Tank”).

● Remember to wrap the hose joint [A] with a piece of cloth.

●Press the joint lock claw [A].

● Pull the joint [C] in the direction shown in the figure [B].

● Remove the fuel hose components from the fuel tank.



⚠Warning

If some fuel spills, it must be thoroughly cleaned.

When the fuel hose is disconnected, the fuel may overflow from the fuel hose. Therefore, cover the hose joint with a clean workshop rag to prevent fuel from overflowing.

● When installing a new fuel hose, properly arrange the fuel hose (see section "Winding Method of Cables, Wires and Hoses" of Chapter "Appendix" for details).

● Insert the fuel hose joint directly into the fuel pump supply hose until the hose joint clicks.

● Push and pull the fuel hose joint back and forth twice to ensure that it has been locked and will not fall off.

⚠Warning

Ensure that the hose joint has been properly installed on the fuel supply line, otherwise, the fuel may leak.

★ If the fuel pipe joint is detached, reinstall it.

● Start the engine and check whether the fuel pipe is leaking.

Replacement of coolant

⚠ Warning

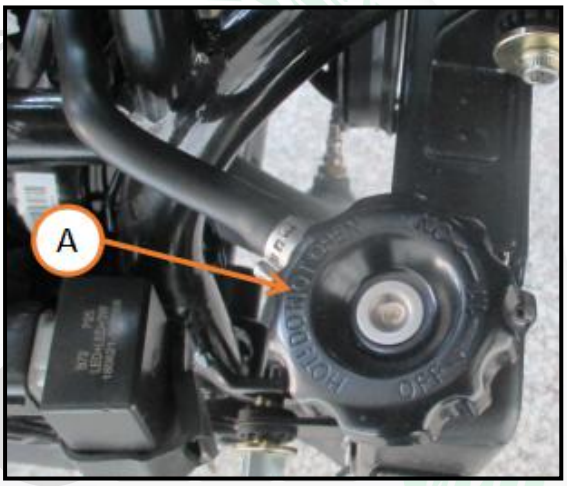
Do not remove the radiator cap or replace the coolant when the engine is still hot to avoid burns. Wait for the engine to cool before performing the above operation. If the coolant splashes on the tire, the tire may slip, which may cause a motorcycle accident or personal injury. Therefore, once any coolant splashes on the frame, engine or other painted parts, wipe/clean them immediately.

Since the coolant is harmful to the human body, it is forbidden to be drunk!

●Disassemble:

Radiator cap [A]

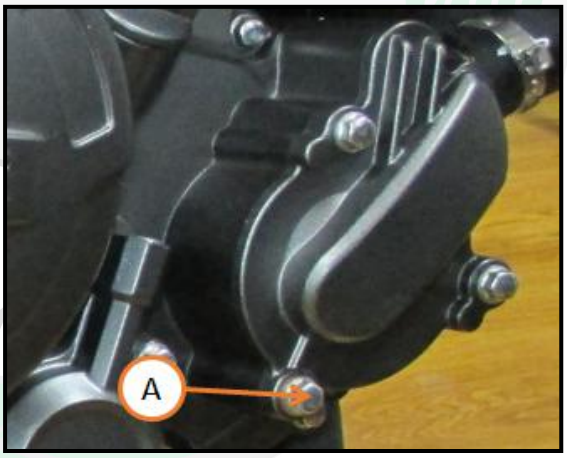
○ Remove the radiator cover in two steps: first turn the radiator cover counterclockwise to the first stop point, then continue to rotate in the same direction, and push it to remove the cover.



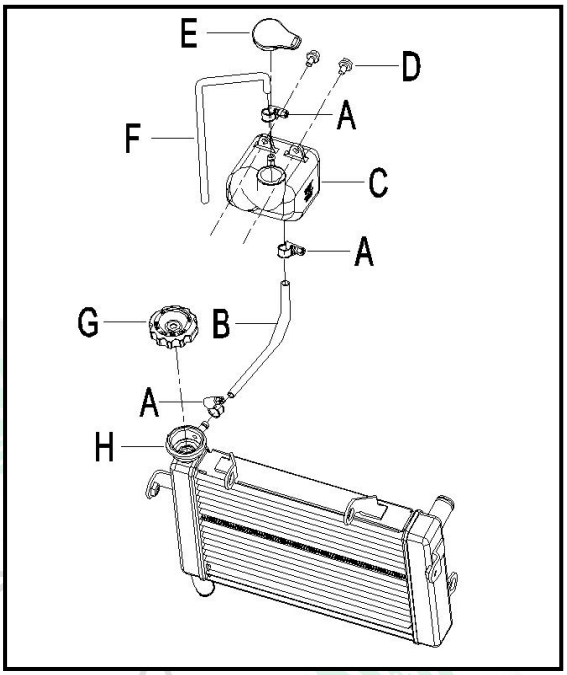
● Remove the right cowling (see "Removing Cowling" in the chapter "Frame").

● Place a container under the drain bolt [A] at the bottom of the pump cover.

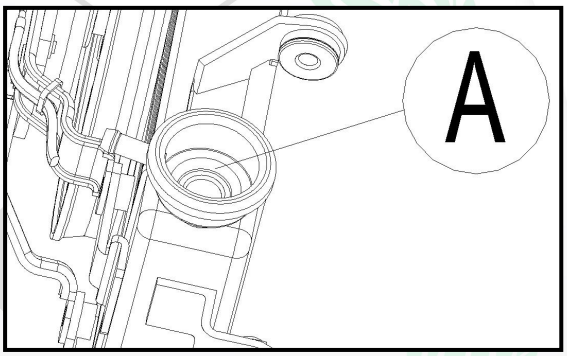
●Remove the drain bolt [A] and drain the radiator and the coolant inside the engine.



●Disassemble:
Clamp [A]
hose [B],
bolt [D],
expansion kettle [C],
overflow hose [F],
● Remove the cover [E] and pour the coolant into a container.



● Install the expansion kettle [C] and install the hose [B] and overflow hose [F] of the expansion kettle correctly.
● Tighten the bolt [D].
Locking torque of expansion kettle bolt: 9.8 N·m
● Tighten the drain bolts (with washers).
○Replace the gasket of drain bolt.
Locking torque of coolant drain bolt: 10 N·m



●Add coolant to the radiator until the liquid level reaches the filler neck [A] of the radiator, and then cover the radiator cap.

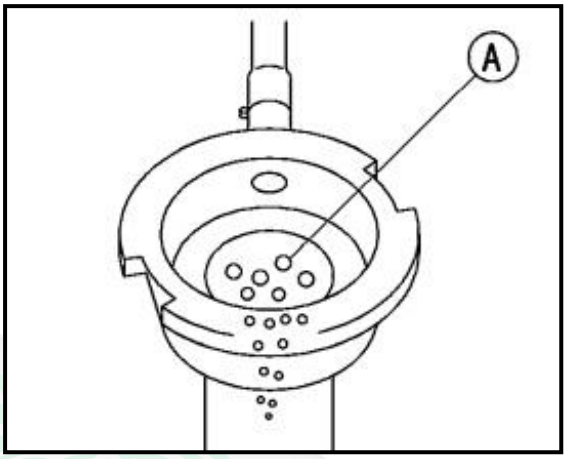
Remarks
○Pour the coolant slowly to remove the air from the engine and radiator.

●Pour the coolant until the level reaches the full liquid level of the reservoir and close the lid.

Notes
Use the coolant recommended by the dealer . Use other coolants that may damage the engine or reduce engine performance.

Notes
The antifreezing liquid in the cooling system must be soft water or distilled water. **If hard water is used in the cooling system, scale may deposit in the water pipe, thus greatly reducing the efficiency of cooling system.**

● Discharge the air from the radiator as follows:
Start the engine (the radiator cover has been removed) and keep the engine running between 3000 RPM and 4000 RPM until there is no air bubble in the coolant [A].



○Tap the radiator hose to remove air bubbles from the hose.

○Turn off the engine and add coolant until the liquid level reaches the filler neck of the radiator.

●Tighten the radiator cover.

●Start the engine and warm it up completely until the radiator fan rotates and then shut down the engine.

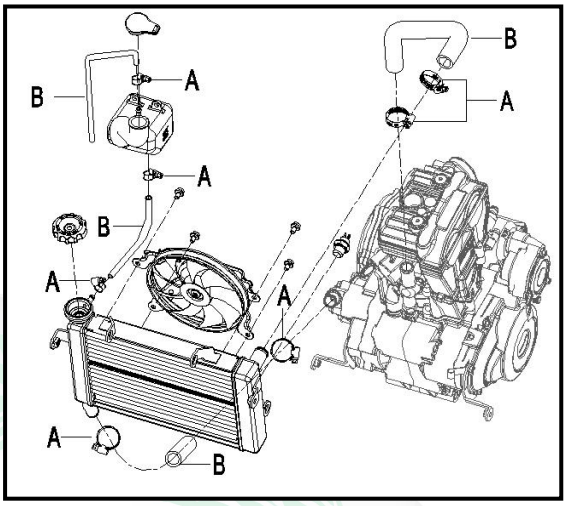
●After the engine has cooled, check the level of the coolant in the expansion kettle.

★If the coolant level is lower than the low level line, add coolant until the level reaches the highest level.

Notes
Do not exceed the maximum level line when adding coolant.

Benelli

Replacement of radiator hose



● Drain the coolant (see "Replacing Coolant" for details).

●Disassemble:

Engine cowling (see “Removing Engine Cowling” in chapter “Frame”),

Cover (see “Removing Middle Cover” in chapter “Frame”).

Clamp [A]

Inlet hose [B]

● Install a new hose and tighten the clamp.

Locking torque of radiator hose (water pipe) lock screw: 2.0 N·m

● Add the coolant (see "Replacing Coolant" for details).

● Check whether the cooling system is leaking.

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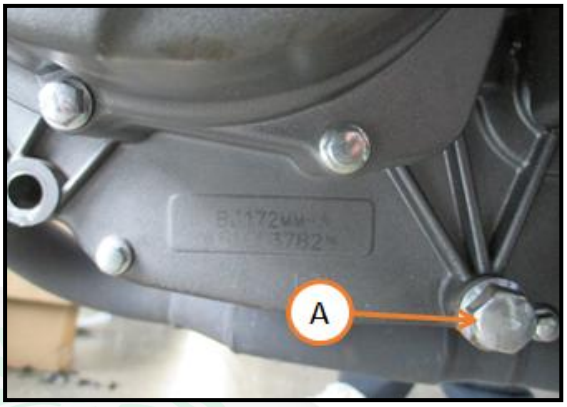
Replace oil

●After the engine is warmed up, place the motorcycle to make it perpendicular to the ground.

● Remove the oil drain bolt [A] to drain the oil.



○ Place a suitable container under the oil drain bolt [A] to collect the oil.

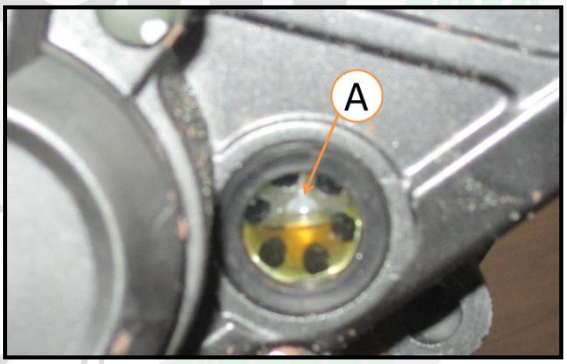
● Drain: Oil in the crankcase.

●Tighten the oil drain bolt.

Locking torque of oil drain bolt: 22 N•m

● Pour the specified amount of specified type of oil.

Notes
To ensure that the oil level is in the middle of oil immersion lens [A]



Recommended oil

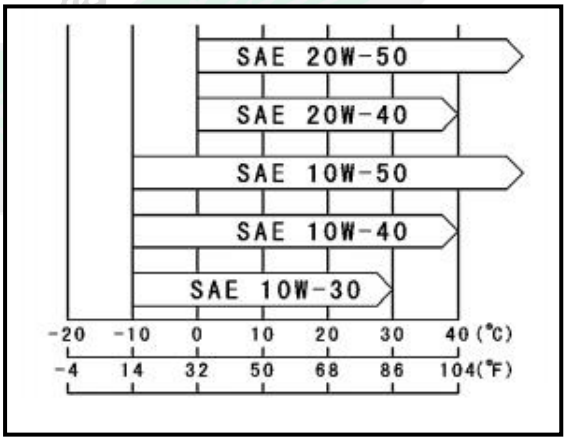
Model: API SE, SF or SG

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

Viscosity: SAE 10W-50

Capacity: 1.2 L (when replaced);

1.5 L (completely disassemble the engine)



Remarks
○ *Do not add any chemical additives to the oil! The oils that meet the above requirements are carefully formulated to provide adequate lubrication action to the engine and clutch.* ○ *Although oil with a viscosity of 10W-50 is recommended for most cases, it is also necessary to make corresponding changes according to the atmospheric conditions in the specific use area.*

Replacement of brake hose

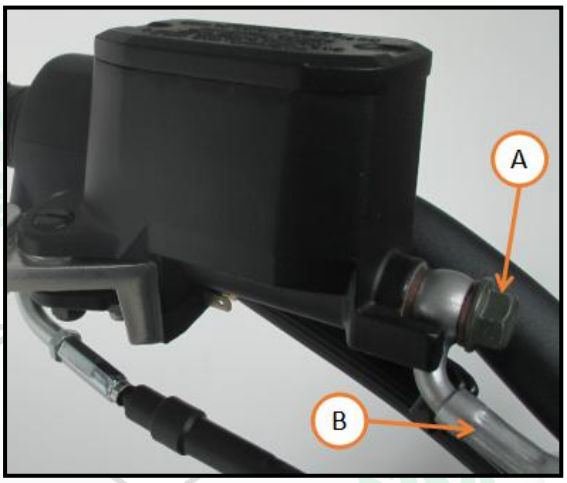
Notes
Brake fluid may quickly corrode the surface of painted part, so if the brake fluid spills on any plastic part, it must be thoroughly rinsed immediately.

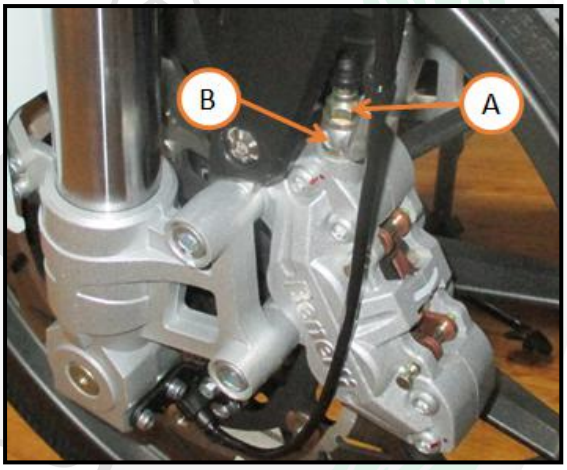
●Remove the hollow bolt of brake hose [A].

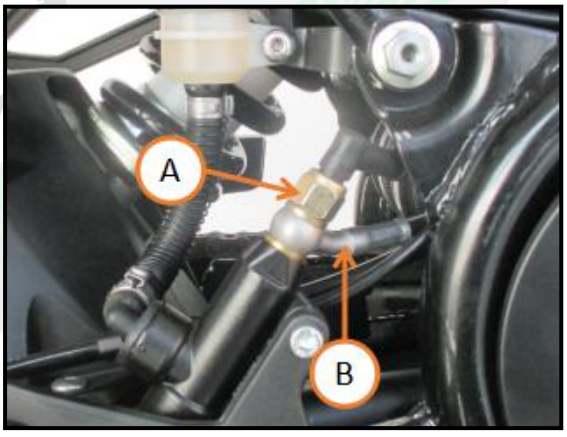
●When removing brake hose, be careful not to spill brake fluid on any painted part.

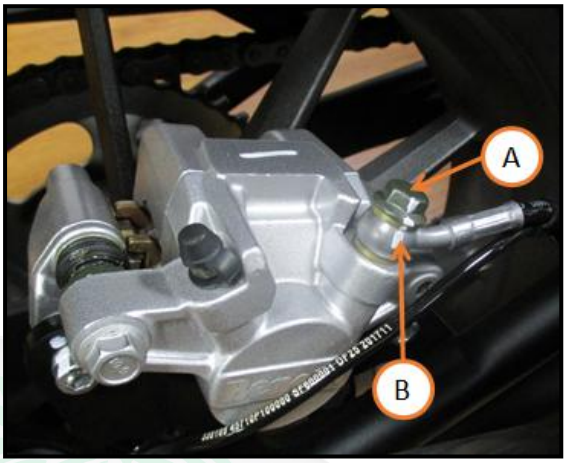
●When removing brake hose [B], temporarily fix the end of brake hose in a high place to minimize the loss of brake fluid.

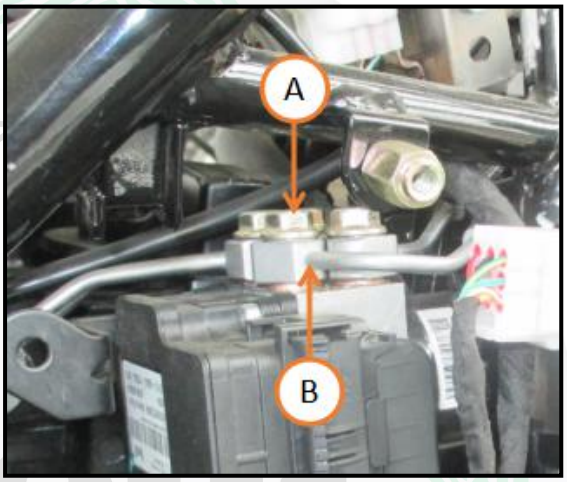
●If brake fluid overflows, clean it immediately.











●All sides of brake line fittings are equipped with washers. They needs to be replaced with new ones when installed.

● Tighten:

Locking torque for hollow bolt of brake hose: 25 N•m

● Avoid excessively bending, snarling, squeezing or twisting the brake hose when installing, and arrange the brake hose in accordance with the section "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".

●Fill the brake line with brake fluid after installing brake hose. (See “replacement of brake fluid” for details).

Replacement of rear brake hose

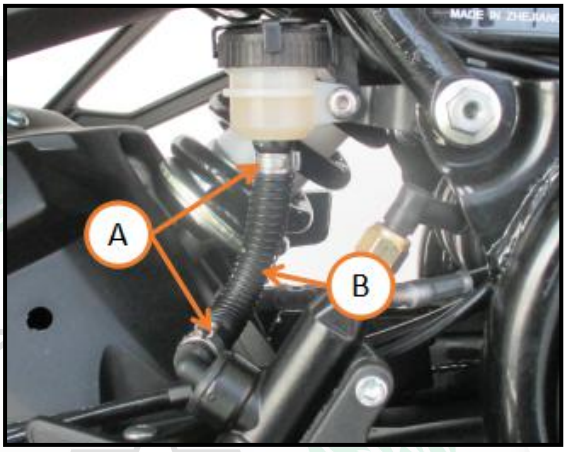
Notes
Brake fluid may quickly corrode the surface of painted part, so if the brake fluid spills on any plastic part, it must be thoroughly rinsed immediately.

Remove the rear brake hose clamp [A].

●When removing the rear brake hose, be careful not to spill brake fluid on any painted part.

●When removing the rear brake hose [B], temporarily fix the end of brake hose in a high place to minimize the loss of brake fluid.

●If brake fluid overflows, clean it immediately.



●The rear brake fuel hose needs to be replaced with new ones when installed.

● Avoid excessively bending, snarling, squeezing or twisting the brake hose when installing, and arrange the brake hose in accordance with the subsection "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".

●Fill the rear brake hose with brake fluid after installation. (See “replacement of brake fluid” for details).

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Replacement ofbrake fluid

●Park the motorcycle on a flat ground

Remarks
○Support the motorcycle with a parking rack and make sure that it is upright

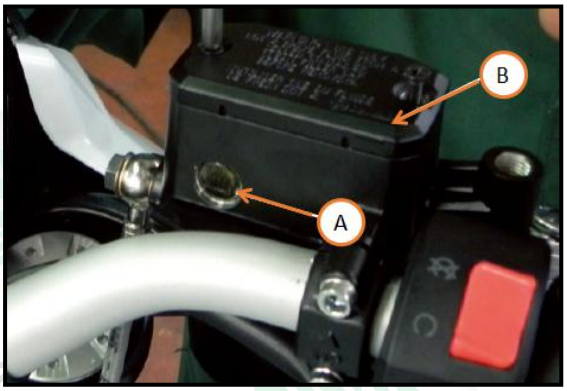
●Check brake fluid level

★ If it is lower than the minimum mark of oil immersion lens [A], add the recommended brake fluid to the correct level.

● Remove the brake fluid cylinder cover [B] from the brake pump

● Check the brake fluid cylinder diaphragm on the cylinder.

If there is any damage/wear, please replace the brake fluid cylinder diaphragm



Notes
Brake fluid may quickly corrode the surface of painted part, so if the brake fluid spills on any plastic part, it must be thoroughly rinsed immediately.

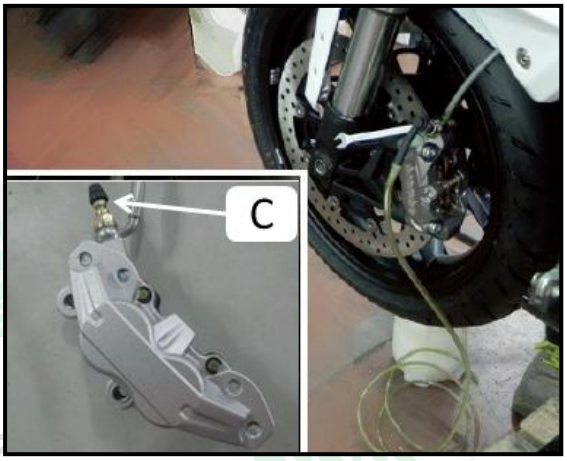
● Hold the brake handle and add brake fluid until the brake fluid level is above the oil immersion lens of master cylinder

WARNING
Use only the prescribed brake fluid. Other brake fluids may cause deterioration of rubber gasket, thus resulting in leakage and improper operation of brake system. **Use the same brand of brake fluid in the process of adding brake fluid. The mixture of different brake fluids may cause harmful chemical reactions and thus result in the reduction of brake system performance.** **When adding brake fluid, be careful not to allow any water to enter the container. Water will significantly reduce the boiling point of the brake fluid, which will generate steam bubbles when heated, and thus lead to a reduction in brake system.**

Remarks
○ The steps for replacing the front brake fluid are as follows. *The procedures for replacing the rear brake fluid are the same as the procedures for replacing the front brake fluid.*

●Replacement of brake fluid

1. With the main cylinder level, remove the brake fluid cylinder head.
2. Install the pipe on the front end of oil drain screw [C] and prepare the oil pan at the front end of hose.
3. Loosen the oil drain screws.
4. Operate the brakes for several times until the oil drain screw no longer discharges the brake fluid.
5. Tighten oil drain screw.
6. Inject the brake fluid above the lower limit.
7. Pull the brake handle to fill the brake fluid hose with brake fluid.
8. Slowly move the brake handle until no bubbles appear in the small holes in the brake cylinder and a force is felt at the the brake handle.
9. Release the air.



After the adjustment is completed, install it in the reverse order of disassembly.

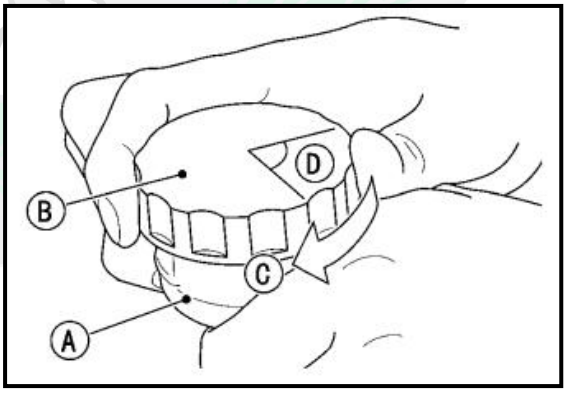
Remarks
○ Frequently check the brake fluid level of reservoir and replenish the new brake fluid as needed. If the brake fluid in the reservoir is used up during the replacement of brake fluid, the air in the brake hose must be drained.

● Remove the transparent plastic hose.

● Install the diaphragm and reservoir cap.

●Properly install the rear brake fluid reservoir cap according to the following procedures.

○ First, tighten the front / rear brake fluid reservoir cap [B] with your hands clockwise [C] until you feel a little resistance, indicating that the cap has been fixed on the reservoir of master cylinder of storage tank, then hold the brake fluid reservoir cap [A] and rotate it by 1/6 turn [D].



● Tighten:

Locking torque of fastening screw of front brake fluid reservoir cap: 1.2N·m

●Tighten the bleeder screw and install the rubber cover.

Locking torque of bleeder screw: 7.8 N·m

● After replacing the brake fluid, check whether the performance of brake is good, whether the braking is blocked, and whether the brake fluid leaks.

★ If necessary, blow out the air in the brake hose.

Assembly of master cylinder

● Before assembly, clean all parts with brake fluid or alcohol, including master cylinder.

Notes
Except brake pad and disc, other brake parts can only be cleaned with disc brake fluid, isopropyl alcohol or ethanol. Dot not clean the above parts with other liquid. Gasoline, oil or other gasoline distillates may corrode rubber parts. If oil spills onto any part, it will be difficult to clean thoroughly and eventually corrode the rubber parts inside the disc brake.

●Apply brake fluid to new parts and inner wall of brake cylinder.

●Be careful not to scratch the piston or the inner wall of brake cylinder.

●Apply silicon grease to the brake lever pivot bolt.

●Tighten the brake lever pivot bolt and locknut.

Locking torque of fastening screw of front brake fluid reservoir cap: 1.2N·m

Locking torque of front brake lever pivot bolt: 3.0 N·m;

Locking torque of locknut of front brake lever pivot bolt: 6 N·m;

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Replacement of rubber parts of caliper

Disassembly of front caliper

● Before removing the front caliper, first drain the front brake fluid.

●Loosen front caliper mounting bolt [A] and hollow bolt [B], and then gently remove them.

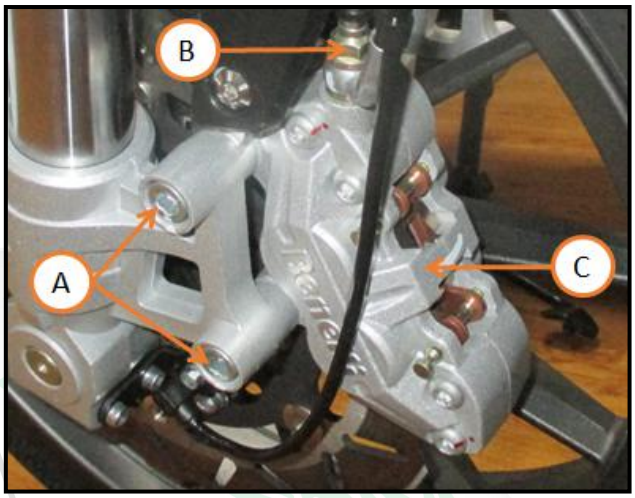
●Disassemble:

Front caliper [C] (see “Removing the Front Caliper” in the chapter “Brakes”),

Front brake pad (see “Removing the front brake plate” in the chapter “Brakes”),

Front caliper assembly bolt

O-Ring



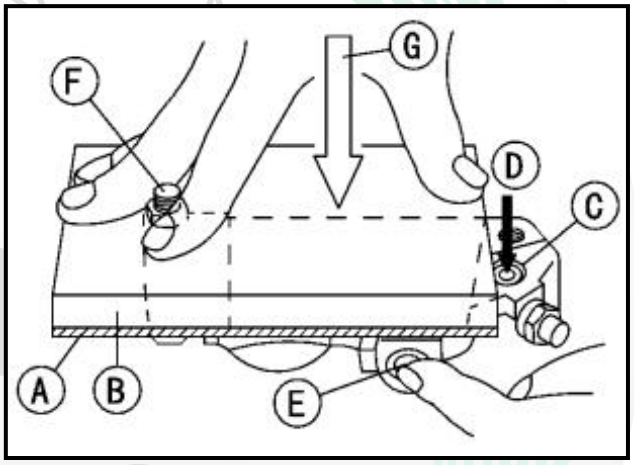
●Remove the piston with compressed air.

The method for removing piston is as follows:

○ Install a rubber gasket [A] and a wooden board [B] with a thickness of 10 mm (0.4 in.) or more in the middle of the caliper, and secure the rubber gasket and the wood board with the appropriate bolts and nuts, as shown in the figure. Open one of the oil ports [C].

○Inject the compressed air [D] into oil port slowly, until the piston touches the rubber gasket. If the caliper is half open, block the hose joint [E] during operation.

Press bolt [F] and nut: [G].



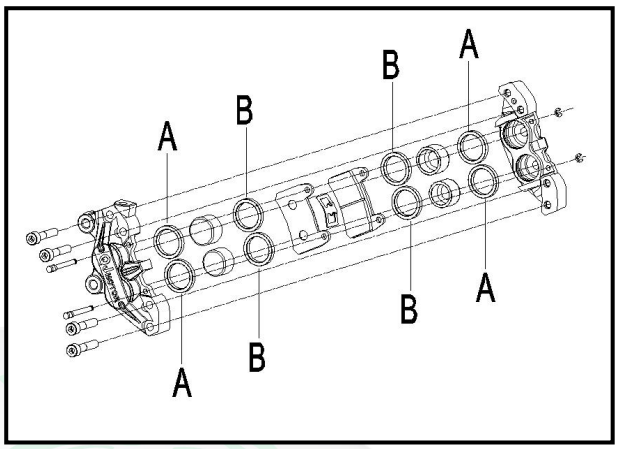
Warning

To avoid serious injuries, do not put your fingers or palms in front of the piston! Otherwise, the piston may crush your hands or your fingers when the compressed air is injected into the caliper.

○ Pull out the piston by hands.

● Remove the dust seal [A] and the oil seal [B].

• Repeat the above steps to remove the piston from the other side of caliper body.



Remarks
○If compressed air is not available, remove the piston from both calipers as follows (connect brake hose to caliper). ○ Prepare a container to hold the brake fluid. Front brake pad spring and brake pad (see "Removing the Front Brake Plate" in the chapter "Brakes"). ○ Press the brake lever until the piston is pushed out of the brake cylinder, and then remove the caliper.

Benelli

Assembly of front caliper

● Clean the caliper parts (except the brake pads).

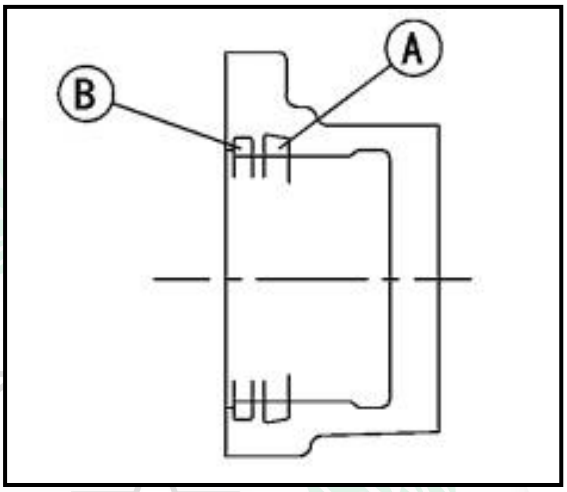
Notes
Parts must be cleaned with disc brake fluid, isopropyl alcohol or ethanol!

● Replace the oil seal [A] with a new one.

○ Add silicone grease to the oil seal and install it into the brake cylinder by hands.

● If the dust seal [B] is broken, replace it with a new one!

○ Add silicone grease to the dust seal and install it into the brake cylinder by hands.



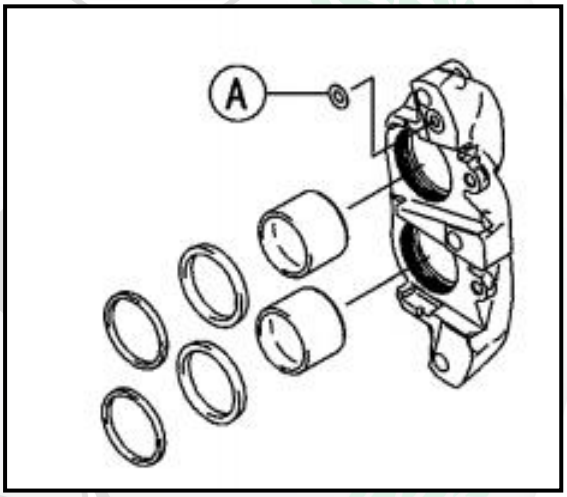
● Replace the O-ring [A].

● Apply brake fluid to the outside of piston and press it into the brake cylinder by hands.

● Remember to install an O-ring seal.

● Apply some thread fastening glue to the threads of the front caliper mounting bolts and tighten the bolts.

Locking torque of front caliper mounting bolt: 27 N·m

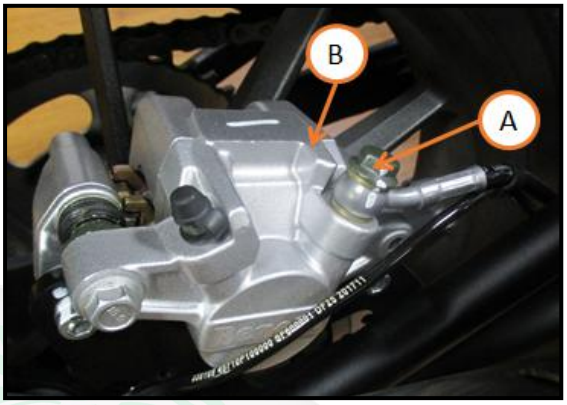


Install front brake pad (see “Removing front brake pad” in the chapter “Brakes”).

●Wipe the brake fluid splashed onto the caliper with a damp cloth.

Disassembly of rear caliper

●Loosen the hollow bolt of rear caliper [A], and then gently tighten them (Tighten them a little bit, and do not tighten too much).



●Disassemble:

Front caliper [B] (see "Removing the Rear Caliper" in the chapter "Brakes"),

Brake plate (see "Removing rear brake pad" in the chapter "Brakes"),

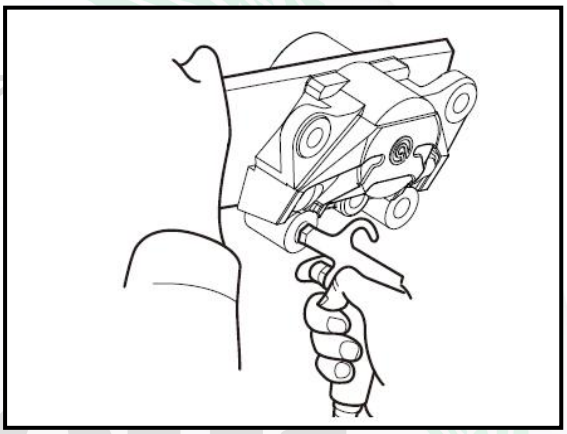
Rear caliper assembly bolt,

O-Ring

● Remove the piston on the caliper as follows.

● The method of removing the piston on the caliper is the same as the method of removing the front caliper.

● Use a piece of wood against the piston on the caliper, blow compressed air into the brake hose joint to squeeze the piston of caliper



Warning
To avoid serious injuries, do not put your fingers or palms behind the piston! Otherwise, the piston may crush your hands or your fingers when the compressed air is injected into the caliper.

●Disassemble:

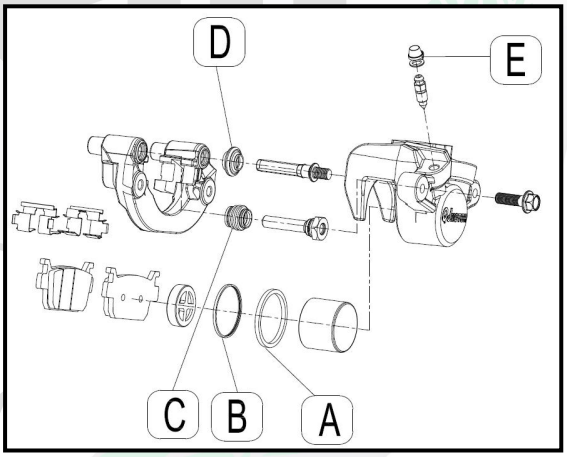
Oil seal [A],

Dust seal [B],

Guide post dust cover I [C],

Guide post dust cover II [D],

Dust cover of bleed screw [E]



Remarks
○If compressed air is not available, remove the piston from both calipers as follows (connect brake hose to caliper). ○ Prepare a container to hold the brake fluid. Front brake pad spring and brake pad (see "Removing rear brake pad" in the chapter "Brakes"). ○ Press the brake lever to remove the caliper piston.

Assembly of rear caliper

● Clean the caliper parts (except the brake pads).

Notes
Parts must be cleaned with disc brake fluid, isopropyl alcohol or ethanol!

● Install the bleed screw and bleed screw cap.

Locking torque of bleeder screw: 7.8 N·m

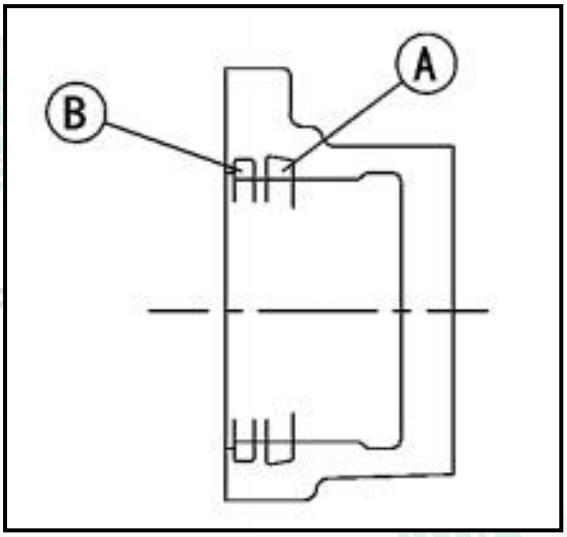
●Apply brake fluid to the inner wall of brake cylinder.

● Replace the oil seal [A] with a new one.

○ Add silicone grease to the oil seal and install it into the brake cylinder by hands.

● Replace the dust seal [B] with a new one.

● Apply brake fluid to the outside of piston and press it into the brake cylinder by hands.

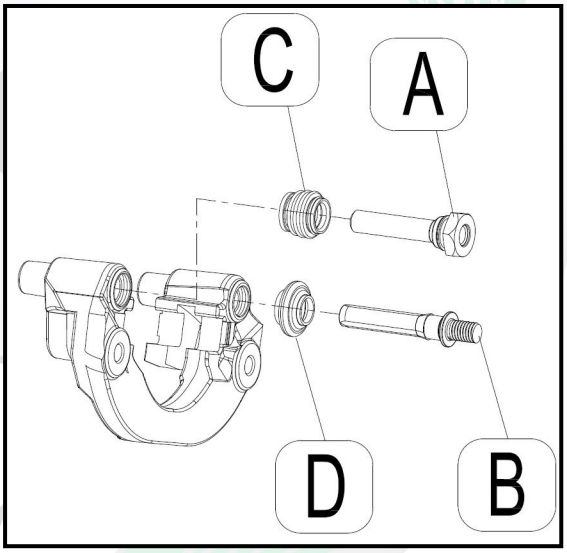


● Replace the guide post dust cover II [C] and the guide post dust cover II [D].

● Apply grease to the guide post dust cover I [C] and the guide post dust cover II [D], and install the guide post [A] and the guide post [B].

● Apply some thread fastening glue to the threads of the rear caliper mounting bolts and tighten the bolts.

Locking torque of rear caliper mounting bolt: 37 N·m



Install brake pad (see “Installing rear brake pad” in the chapter “Brakes”).

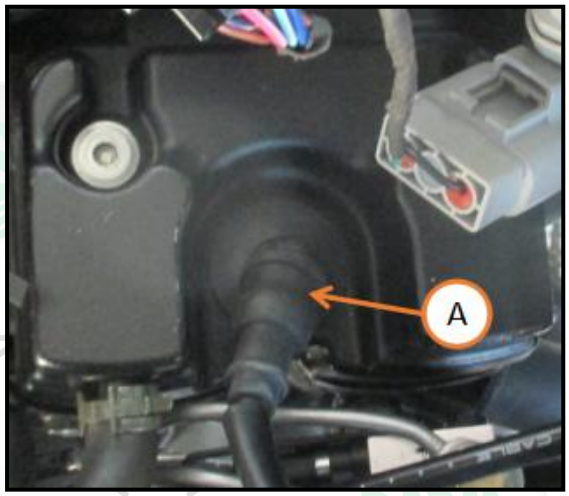
●Wipe the brake fluid splashed onto the caliper with a damp cloth.

Replace spark plug

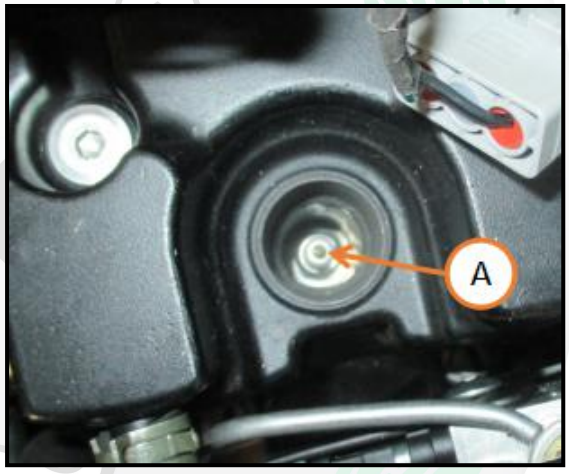
● Remove the fuel tank (see “Removal of Fuel Tank” in the chapter “Fuel Injection System”).

● Remove the ignition coil (see “Removal of Ignition Coil” – “Electrical System”).

Remove the spark plug cap [A].



●Remove the spark plug [A] vertically using special spark plug wrench



●Replace the spark plug with a new one.

Standard spark plug

Model: NGK CR8E

● Insert a new spark plug into the spark plug hole and then press the spark plug with your fingers.

●Tighten the spark plug [A] vertically using special spark plug wrench.

Notes
If the wrench is tilted while tightening the spark plug, the insulator of spark plug may break.

Locking torque of spark plug: 13 N·m

● Firmly fix the ignition coil.

○ Make sure that the fixed ignition coil is not easy to remove.

Chapter III Fuel Injection System (EFI)

Contents

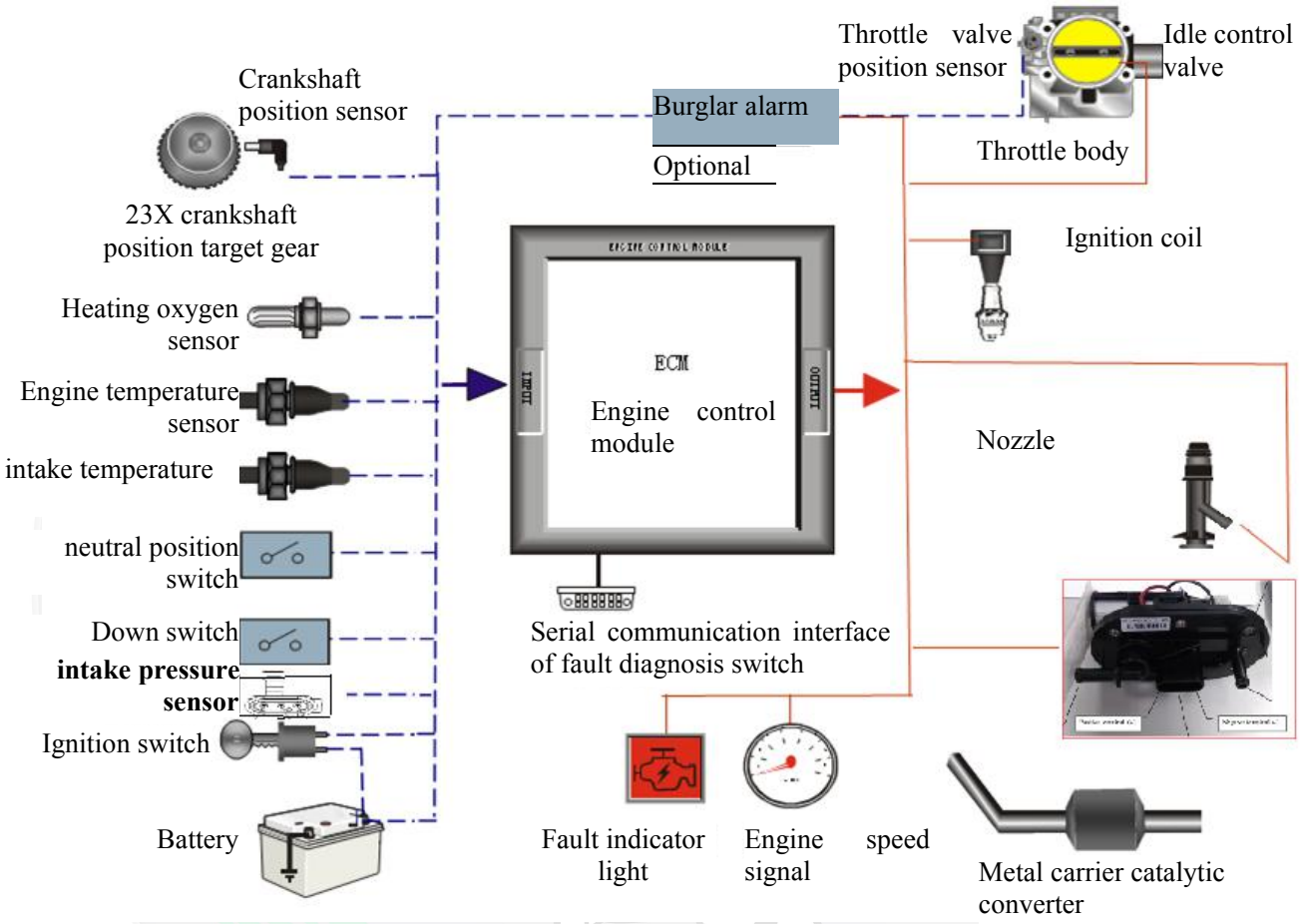
Introduction to EFI 96
EFI system 97
EFI part position 99
Technical parameters 106
Fuel tank 108
Exploded view of fuel tank 108
Fuel vapor recovery system 110
Fuel tank 111
Disassemble fuel tank 111
Check the fuel tank 112
Install the fuel tank 112
Precautions for EFI overhaul 113
Precautions for EFI overhaul 113
ECU 115
Engine controller (MT05 ECU) 115
ECU appearance 115
ECU disassembly 115
ECU installation 115
Precautions for ECU 115
ECU power supply requirements 116
ECU temperature requirements 116
Fuel pump 117
Working principle of fuel pump 117
Appearance of fuel pump 117
Fuel pump composition 118
Fuel pump label and logo 118
Working environment of fuel pump 119
Maintenance process of fuel pump: 119
Safety protection: 119
Fault diagnosis of fuel pump assembly: 120
Disassembly of fuel pump assembly: 120
Installation of fuel pump assembly: 120
Fuel pressure release process: 121
Fuel leakage check process: 121
Notes for use: 121
Throttle body: 123
Working principle of throttle body: 123
Appearance of throttle body: 123
Technical parameters 124
Throttle body: 124
Throttle position sensor: 124

Idle air control valve: 124
Operating temperature of throttle 124
Disassembly of throttle body 124
Cleaning method of throttle 124
Installation of throttle body 124
Notes for the installation of throttle body 125
Notes for the use of throttle body 125
Fuel injector 126
Working principle of fuel injector 126
Appearance of fuel injector 126
Fuel injector seal 126
O-ring seal connected to oil rail or oil injection cap 127
O-ring seal connected to intake pipe end....127
List of recommended lubricants 127
Overvoltage impact of fuel injector 127
Temperature range of fuel injector: 127
Fuel contaminants of fuel injector 128
Fuel injector harness arrangement 128
Notes for use of fuel injector 128
Installation requirements for fuel injector 129
Replacement method of fuel injector 129
Replaceability of fuel injector 130
Blocking of fuel injector 130
Engine water temperature sensor 131
Working principles of engine water temperature sensor 131
Appearance of engine water temperature sensor 131
Installation requirements for engine water temperature sensor 131
Operating environment of engine water temperature sensor 131
Electrical environment of engine water temperature sensor 131
Cleaning of engine water temperature sensor 132
intake temperature sensor 133
Working principle of intake temperature sensor 133
Appearance of intake temperature sensor 133
Technical parameters 133
Pin position definition and function diagram 134
Installation position of intake temperature sensor 134
Cleaning 134
intake pressure sensor 135
Working principles of intake pressure sensor 135
Appearance of intake pressure sensor 135
Operating environment 135
Storage environment 135
Electrical environment 136
Pin definition 136
Position 136
Cleaning 136

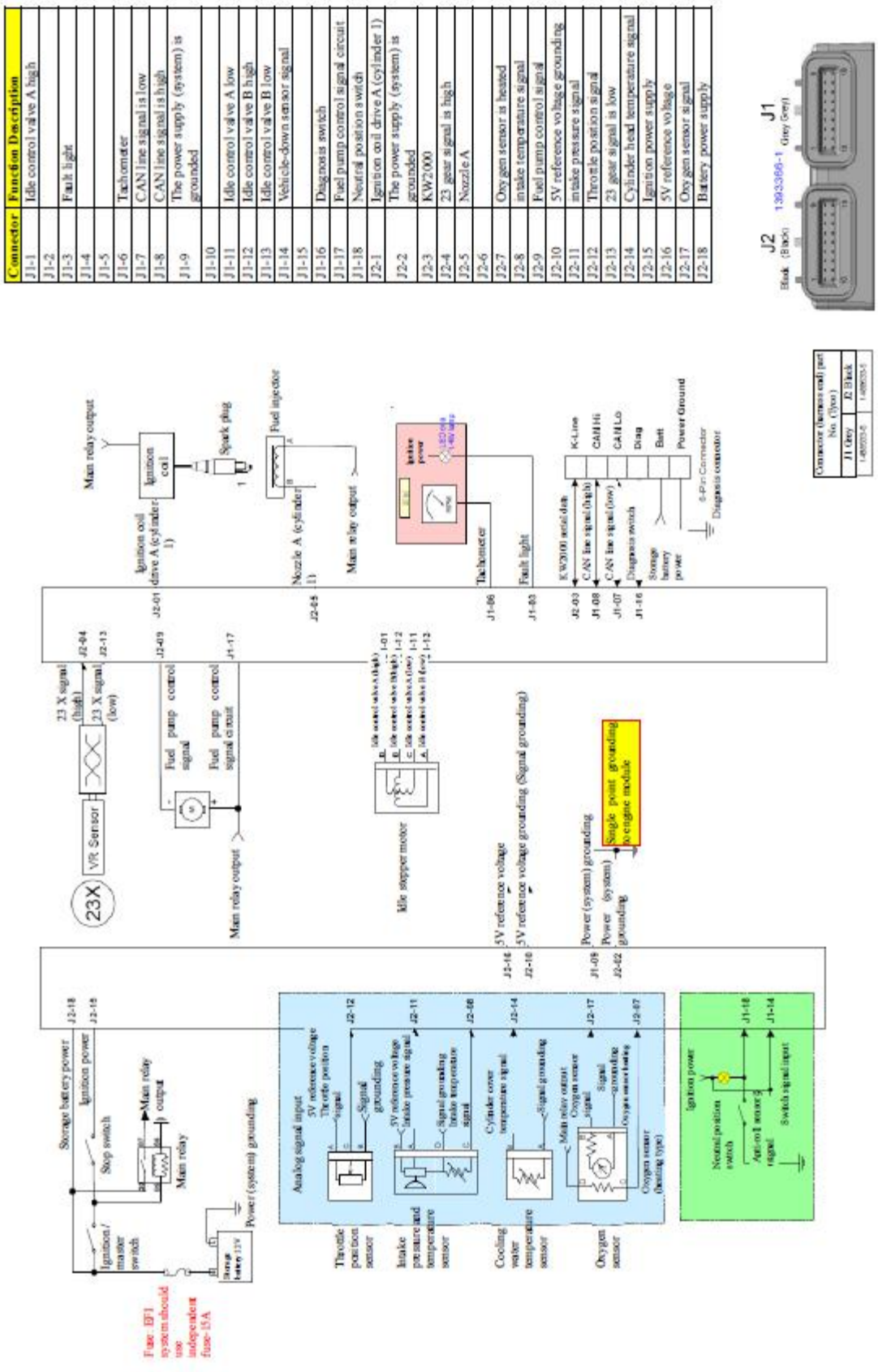
Oxygen sensor 138
Working principle of oxygen sensor 138
Appearance of oxygen sensor 138
Technical parameters 138
Installation requirements 138
Oxygen sensor pin definition: 139
Characteristic curve 139
Requirements for fuel quality 140
Idle speed stepper motor 141
Working principle of idle speed stepper motor 141
Appearance of idle speed stepper motor 141
Pin definition 142
Characteristic parameters: 142
Cleaning 142
Canister solenoid valve (ECP) 143
Overview of working principle 143
Appearance 143
Pin of ECP solenoid valve 143
Technical parameters 143
Installation requirements 144
Fault Maintenance and Diagnosis Method of EFI System 145
Conduct diagnosis directly using the flashing fault lamp at meter 145
Diagnose fault using diagnostic apparatus 147
Check fault using diagnostic software PCHUD 148
Common troubleshooting methods for electronic fuel inject system 155
Maintenance tool 155
Engine working data flow displayed by diagnostic apparatus 155
Step I 155
Step II 155
Step III 156
Simple troubleshooting 156
Daily use and maintenance 156
Fault phenomenon-Start fault 156
Fault phenomenon—Start failure with tempering 158
Fault phenomenon—Instable idle speed 158
Fault phenomenon—Too high or too low idle speed (idle speed is obviously inconsistent with target idle speed) 158
Fault phenomenon—Instable idle speed with deceleration and flameout 158
Fault phenomenon—Insufficient power of deceleration 158
Fault phenomenon—Slight burning phenomenon 158
Fault phenomenon—Fault lamp is on, but fault code is inconsistent with fault 158
Fault phenomenon—Extremely high fuel consumption 158

Introduction to EFI

This motorcycle adopts the small engine electronic injection system from Delphi Corporation. For this system, the closed-loop control is realized by an oxygen sensor and the oil injection and ignition are controlled. A three-way catalyst is used to carry out after treatment for the gas burnt by the engine to convert it into harmless gas and discharge it to the air. This system adopts the closed-loop control self-learning system which can effectively eliminate the manufacturing differences between the system and related mechanical parts, improve the overall consistency of the motorcycle and remove the errors caused due to wear and other factors after actual use.

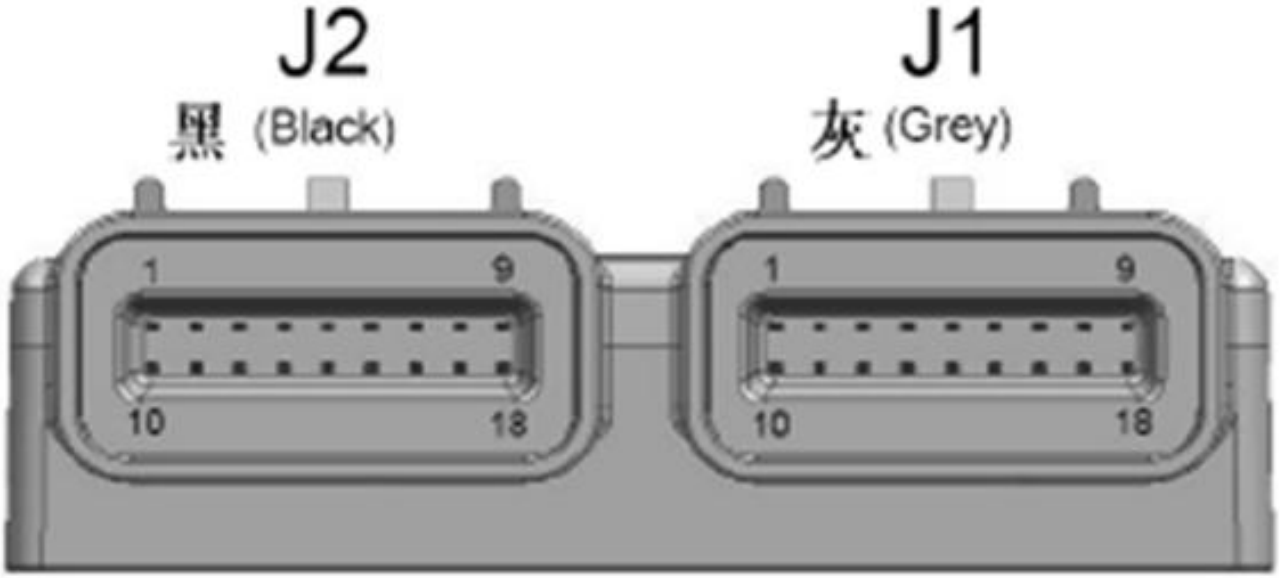


EFI system



Connector	Function Description
J1-1	Idle control valve A high
J1-2	
J1-3	Fault light
J1-4	
J1-5	
J1-6	Tachometer
J1-7	CAN line signal is low
J1-8	CAN line signal is high
J1-9	The power supply (system) is grounded
J1-10	
J1-11	Idle control valve A low
J1-12	Idle control valve B high
J1-13	Idle control valve B low
J1-14	Vehicle-down sensor signal
J1-15	
J1-16	Diagnosis switch
J1-17	Fuel pump control signal circuit
J1-18	Neutral position switch
J2-1	Ignition coil drive A (cylinder 1)
J2-2	The power supply (system) is grounded
J2-3	KW2000
J2-4	23 gear signal is high
J2-5	Nozzle A
J2-6	
J2-7	Oxygen sensor is heated
J2-8	intake temperature signal
J2-9	Fuel pump control signal
J2-10	5V reference voltage grounding
J2-11	intake pressure signal
J2-12	Throttle position signal
J2-13	23 gear signal is low
J2-14	Cylinder head temperature signal
J2-15	Ignition power supply
J2-16	5V reference voltage
J2-17	Oxygen sensor signal
J2-18	Battery power supply

Number of ECU connector

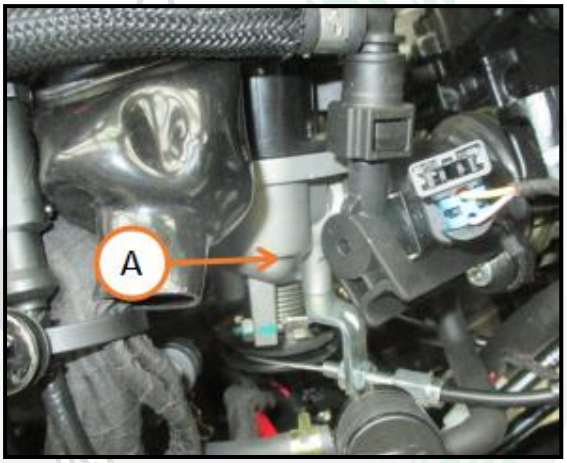


Connector	Function Description
J1-1	Idle control valve A high
J1-2	
J1-3	**Fault light**
J1-4	
J1-5	
J1-6	**Tachometer**
J1-7	CAN line signal is low
J1-8	CAN line signal is high
J1-9	The power supply (system) is grounded
J1-10	
J1-11	Idle control valve A low
J1-12	Idle control valve B high
J1-13	Idle control valve B low
J1-14	**Vehicle-down sensor signal**
J1-15	
J1-16	**Diagnosis switch**
J1-17	**Fuel pump control signal circuit**
J1-18	**Neutral position switch**
J2-1	Ignition coil drive A:
J2-2	The power supply (system) is grounded
J2-3	**KW2000**
J2-4	23 gear signal is high
J2-5	Nozzle A
J2-6	
J2-7	**Oxygen sensor is heated**
J2-8	**intake temperature signal**
J2-9	**Fuel pump control signal**
J2-10	5V reference voltage grounding
J2-11	**intake pressure signal**
J2-12	**Throttle position signal**
J2-13	23 gear signal is low
J2-14	**Cylinder head temperature signal**
J2-15	**Ignition power supply**
J2-16	5V reference voltage
J2-17	**Oxygen sensor signal**
J2-18	**Battery power supply**

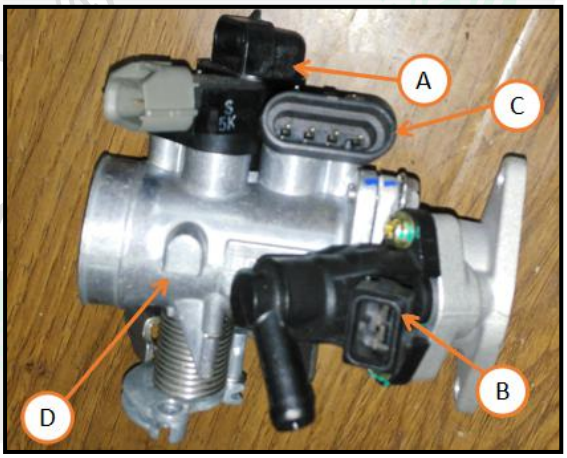
EFI part position

●ECU[A]

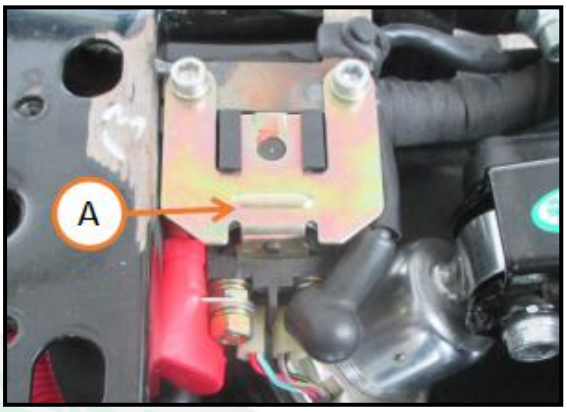
●Throttle body [A]



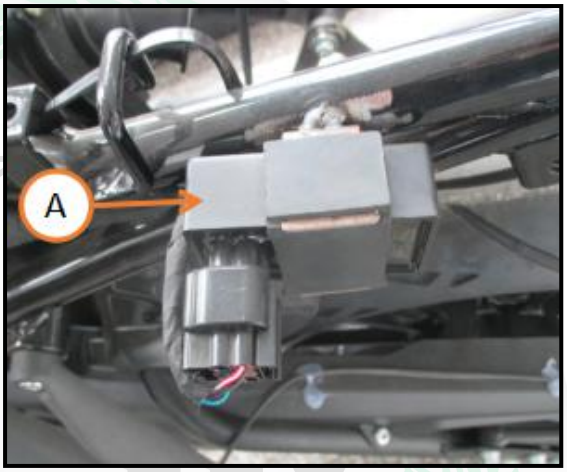
●Idle stepper motor [A]
●Injector [B]
●Throttle body position sensor [C]
●Throttle body [D]



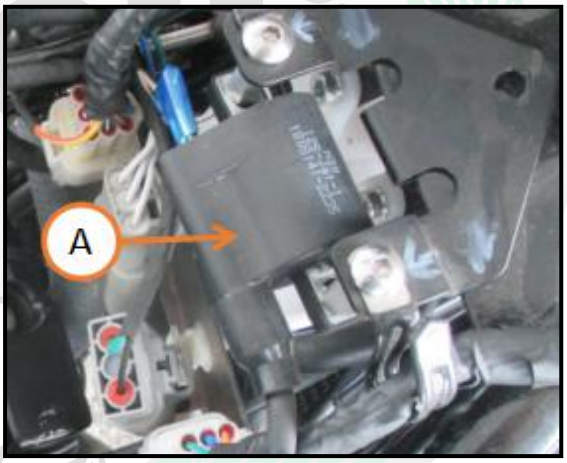
●Starter relay [A]



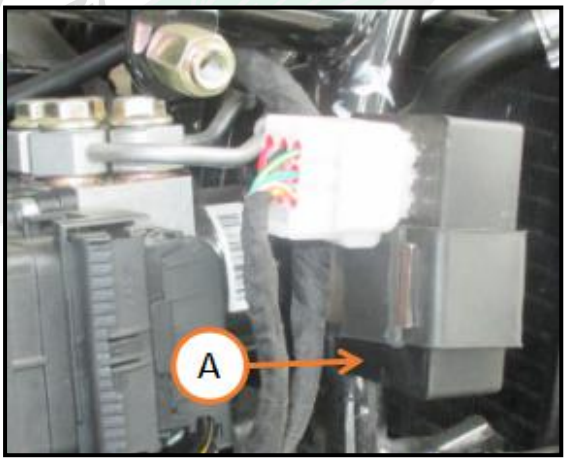
●Flasher [A]



●Ignition coil [A]

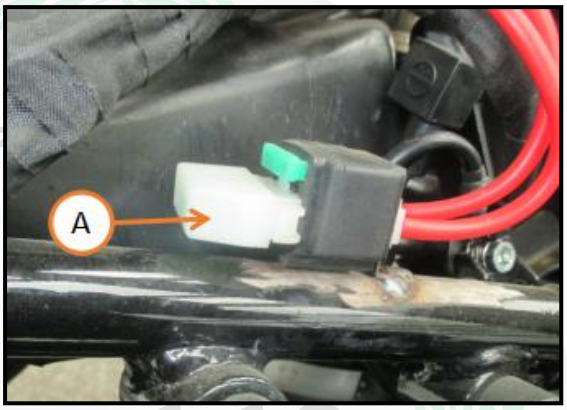


●Headlight relay controller [A]

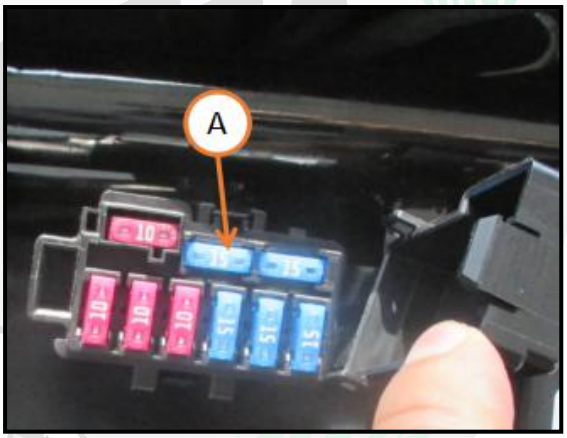


●Battery [A]

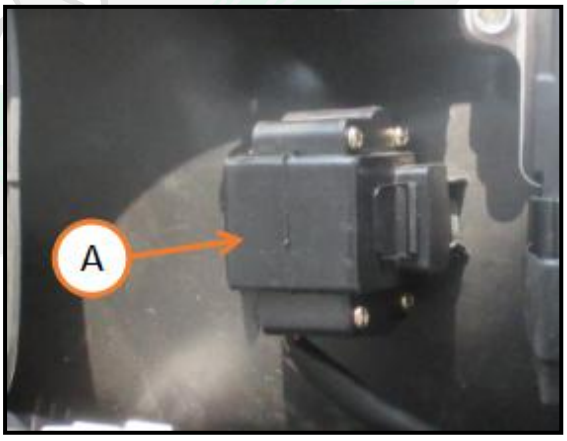
●Main fuse box [A]



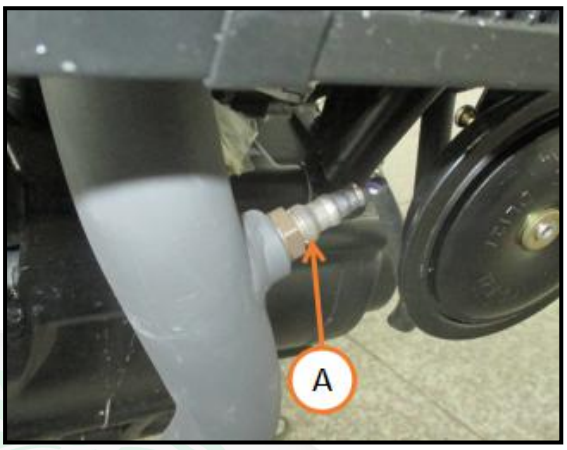
●Fuse box [A]



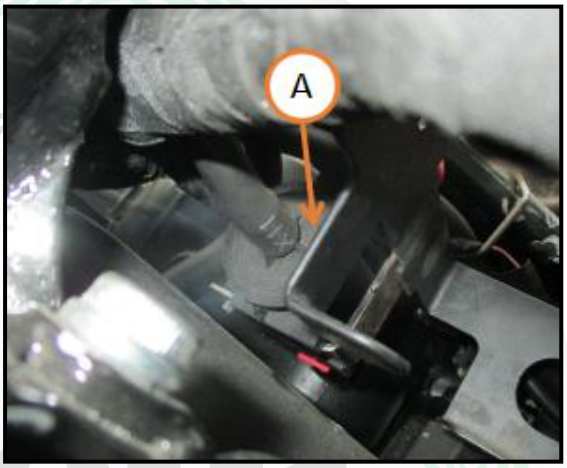
●Anti-flip relay [A]



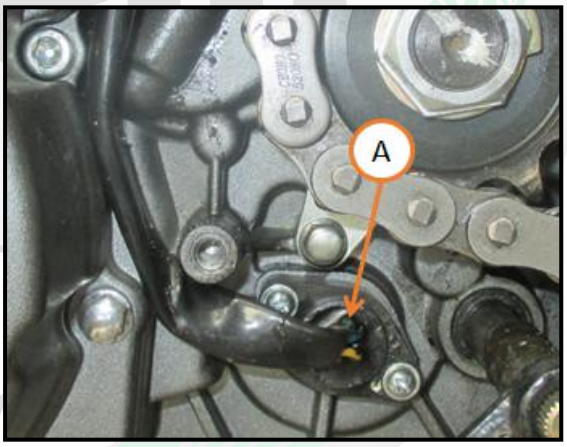
●Oxygen sensor [A]



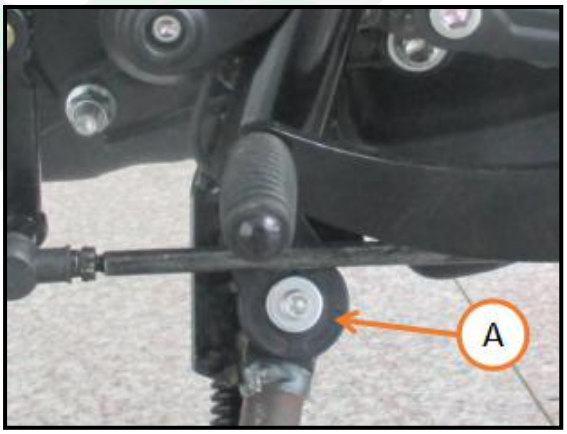
●Canister solenoid valve [A]



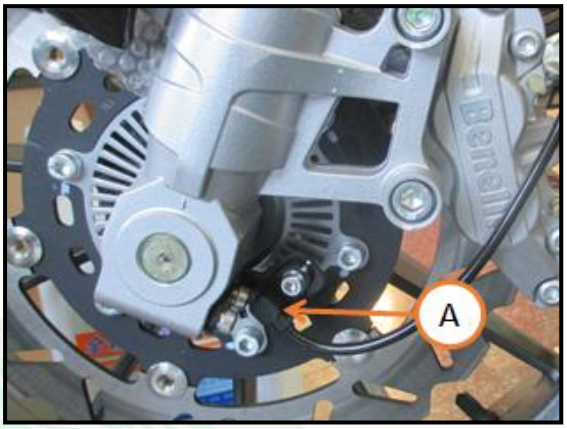
●Gear sensor [A]



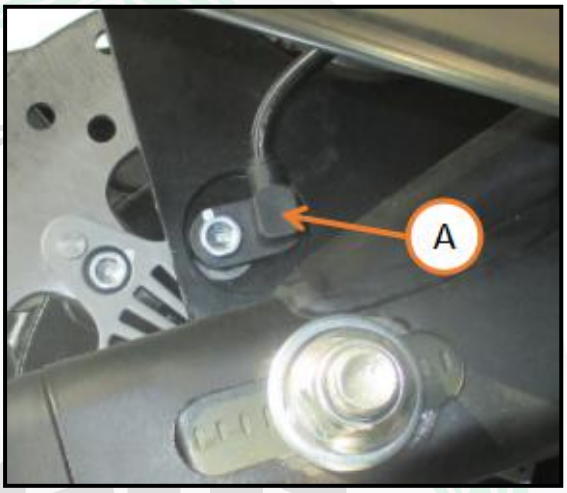
●Sidestand stop switch [A]



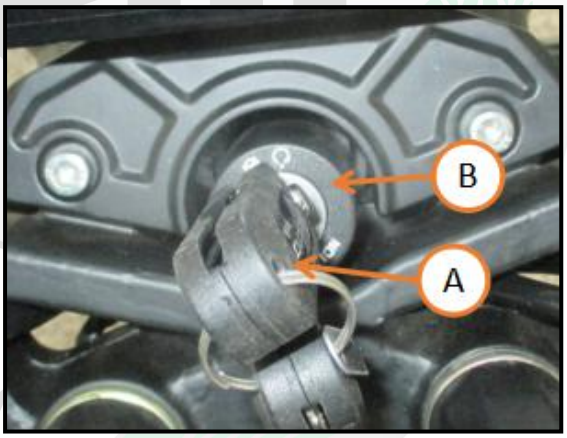
●Front speed sensor [A]



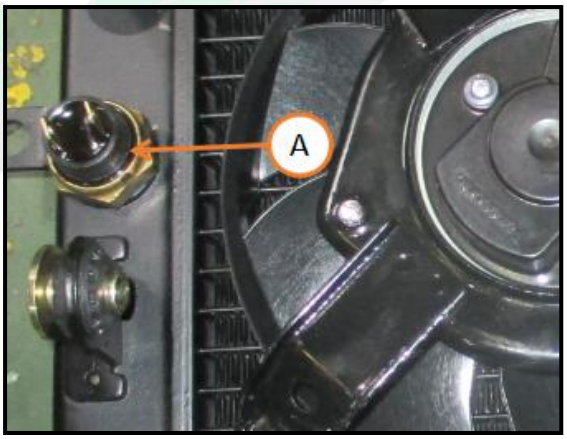
●Rear speed sensor [A]



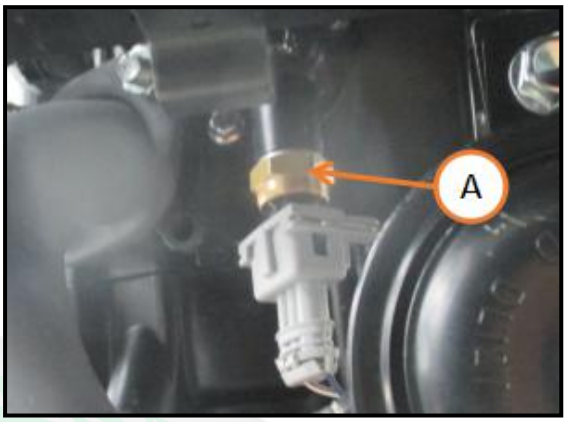
●Main switch key [A]
●Main switch [B]



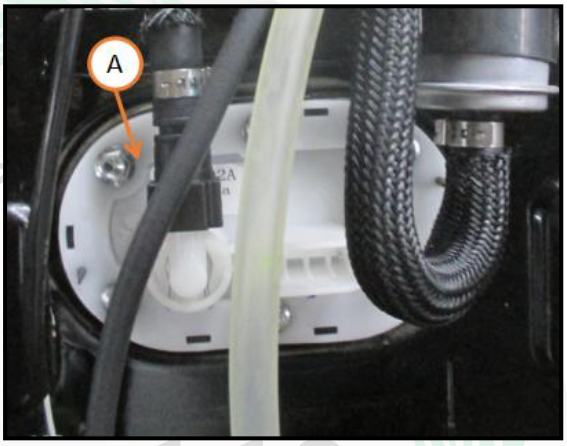
●Water temperature switch sensor [A]



●Water temperature sensor [A]

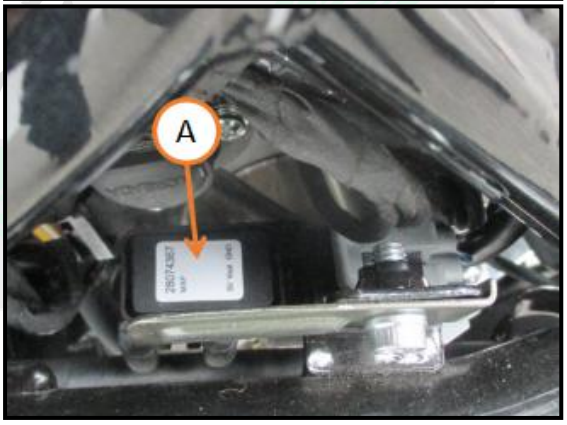


●Fuel pump [A]



●Intake air temperature sensor [A]

●Intake pressure sensor [A]

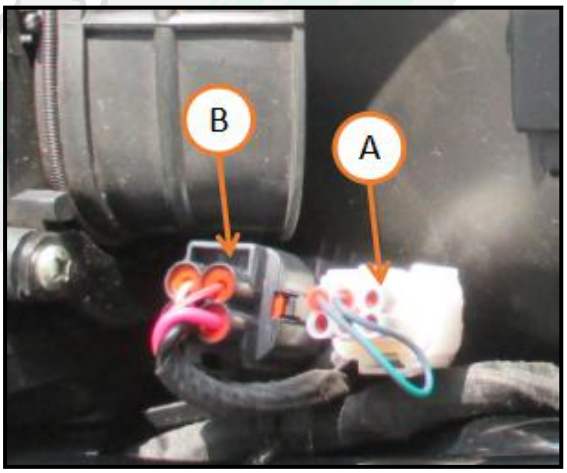


●ABS pump [A]

●Rectifier [A]

● Relay unit [A]

●OBD diagnostic interface [A]
●ABS diagnostic interface [B]



Technical parameters

Item	Normal
Electronic Fuel Injection System	
Idling	1400 ±100 r/min (rpm)
Throttle valve assembly:	
identity	Cylinder-shaped
Diameter	Φ34 mm
Negative pressure value of throttle valve	2.7 kPa
Bypass screw	——
ECU：	
Manufacturer	Delphi
identity	Electronic memory type with built-in IC igniter, sealed with resin
Available engine speed range	100 ~ 11 200 r/min (rpm)
Fuel pressure (high pressure hose):	250 kPa
Fuel pump:	
identity	Fuel tank built-in friction pump
Oil pump capacity	≥67 mL (2.3 US oz.) every 3 seconds
Fuel injector:	
Nozzle type	Fine atomization type,
Resistance:	≈11.7 - 12.3 Ω at 20°C (68°F)
Main throttle sensor:	
Input supply voltage	DC 4.75 ~ 5.25 V
Output supply voltage	DC 0.63 - 3.91 V (throttle opening is idle to fully open)
Resistance	4 ~ 6kΩ
Inlet air pressure sensor / atmospheric pressure sensor	
Input supply voltage	DC 4.75 ~ 5.25 V
Output supply voltage	DC 3.80 ~ 4.20 V [standard atmospheric pressure]
intake temperature sensor:	
ECU output voltage	≈2.80 - 2.97 V at 20°C (68°F)
Resistance	2.21-~ 2.69 kΩ at 20°C (68°F); ≈0.322 kΩ at 80°C (176°F)
Water temperature sensor:	
ECU output voltage	≈2.80 - 2.97 V at 20°C (68°F)
Speed sensor:	
Input supply voltage	DC 4.75 ~ 5.25 V
Output supply voltage	After the main switch is open, it is about DC 0.05 - 0.09 V or DC 4.5 - 4.9 V when the vehicle is stationary.
Motorcycle dump sensor:	
Actuation mode	Magnetic flux detection trigger
Actuation angle	When the side-tipping device is out of the range of 60 - 70°
Output voltage	Sensor arrow is up: 3.55 - 4.45 V Sensor tilt angle ≥ 60 - 70°: 0.65 - 1.35 V

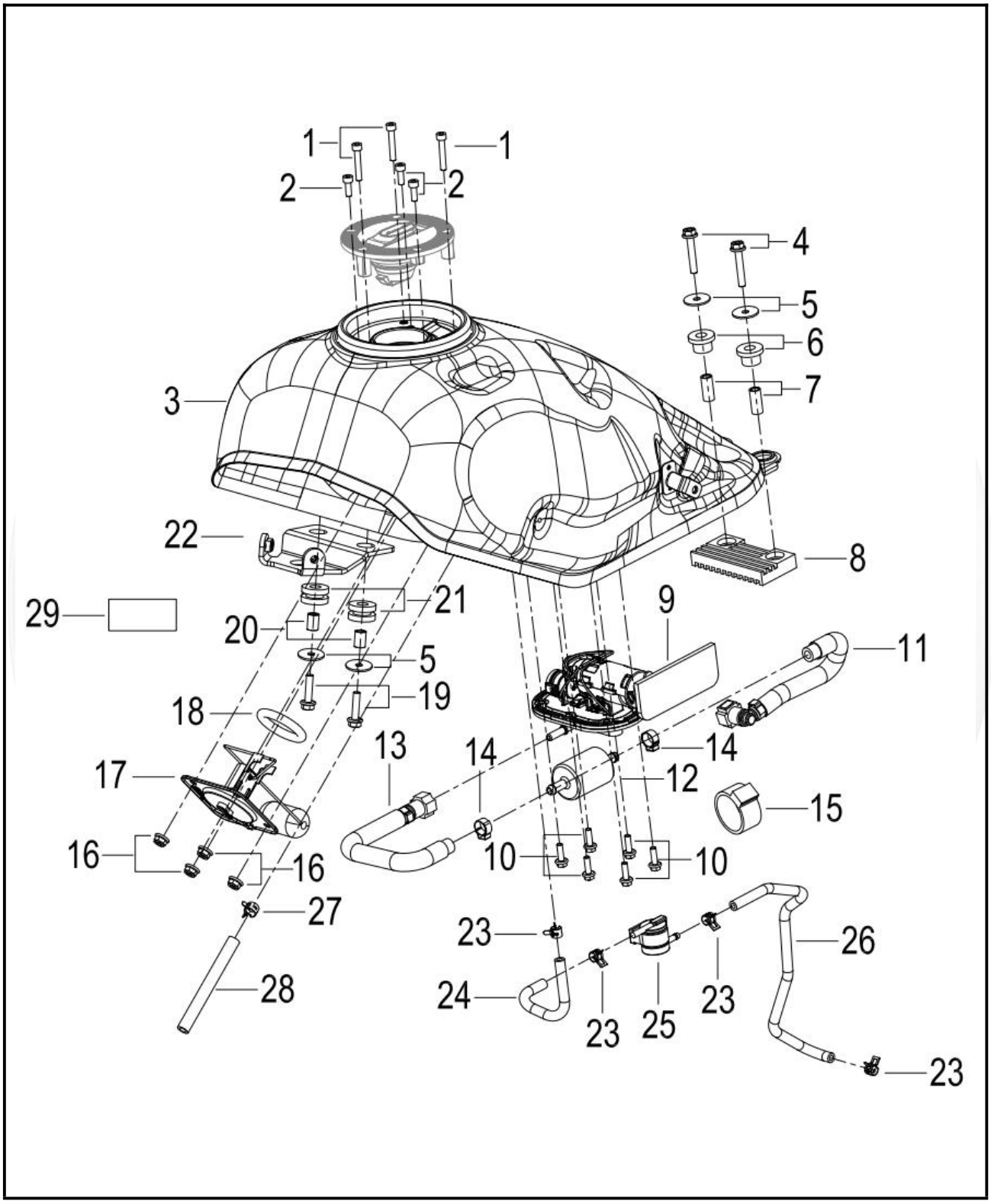
Continued

Item	Normal
Secondary throttle sensor:	
Input supply voltage	DC 4.75 ~ 5.25 V
Output supply voltage	DC 0.63 - 4.14 V (throttle opening is idle to fully open)
Resistance	4 ~ 6kΩ
Anti-theft device transceiver (model with anti-theft device transceiver):	
Resistance	≈0.6 ~ 0.9 Ω
Secondary throttle valve disc drive:	
Resistance	≈5 ~ 7 Ω
Input supply voltage	≈DC 10.5 ~ 12.5 V
Oxygen sensor (model with oxygen sensor):	
Output power supply voltage (peak value at the highest air-fuel ratio)	≥DC 0.8 V
Output power supply voltage (peak value at the lowest air-fuel ratio)	≤DC 0.24 V
Heating coil resistance	≈6.7 - 10.5 Ω at 20°C (68°F)
Controller area network cable:	
Resistance	The resistance of ECU connector is 114 - 126 Ω
Throttle handle and throttle cable	
Free clearance of throttle handle	3~5 mm
Air filter	
Element material	Wet-type sponge filter element

Benelli

Fuel tank

Exploded view of fuel tank



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Inner hexagon screw M5×30	3	6	0.6	
2	Inner hexagon screw M5×14	3	6	0.6	
3	Fuel tank assembly	1	—	—	
4	Hexagon bolt with flange M6×35	2	10	1.0	
5	Fuel tank mounting washer	4	—	—	
6	Rubber cover	2	—	—	
7	Fuel tank mounting shaft	2	—	—	
8	Mounting washer of fuel tank	1	—	—	
9	Fuel pump assembly	1	—	—	
10	Bolt M5×16	6	4	0.4	S
11	Fuse hose assembly 1	1	—	—	
12	Filter assembly	1	—	—	
13	Fuse hose assembly II	1	—	—	
14	Clamp 14.5-706R	2	—	—	
15	Filter jacket	1	—	—	
16	Hexagon flange nut M6	4	10	1.0	
17	Oil level sensor assembly	1	—	—	
18	Sensor rubber washer	1	—	—	R
19	Bolt M6×25	2	10	1.0	
20	Rubber washer liner tube	2	—	—	
21	Front mounting washer of fuel tank	2	—	—	
22	Front mounting seat of fuel tank	1	—	—	
23	Plate clamp φ8.5×8×0.6	4	—	—	
24	Check valve and fuel tank connecting pipe φ4.5×φ8.5	1	—	—	
25	Dump valve	1	—	—	
26	Check valve and canister connecting pipe φ4.5×φ8.5	1	—	—	
27	Plate clamp	1	—	—	
28	Fuel hose φ4.5×φ8.5	1	—	—	
29	Insulated tin foil paper of cover II	2	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

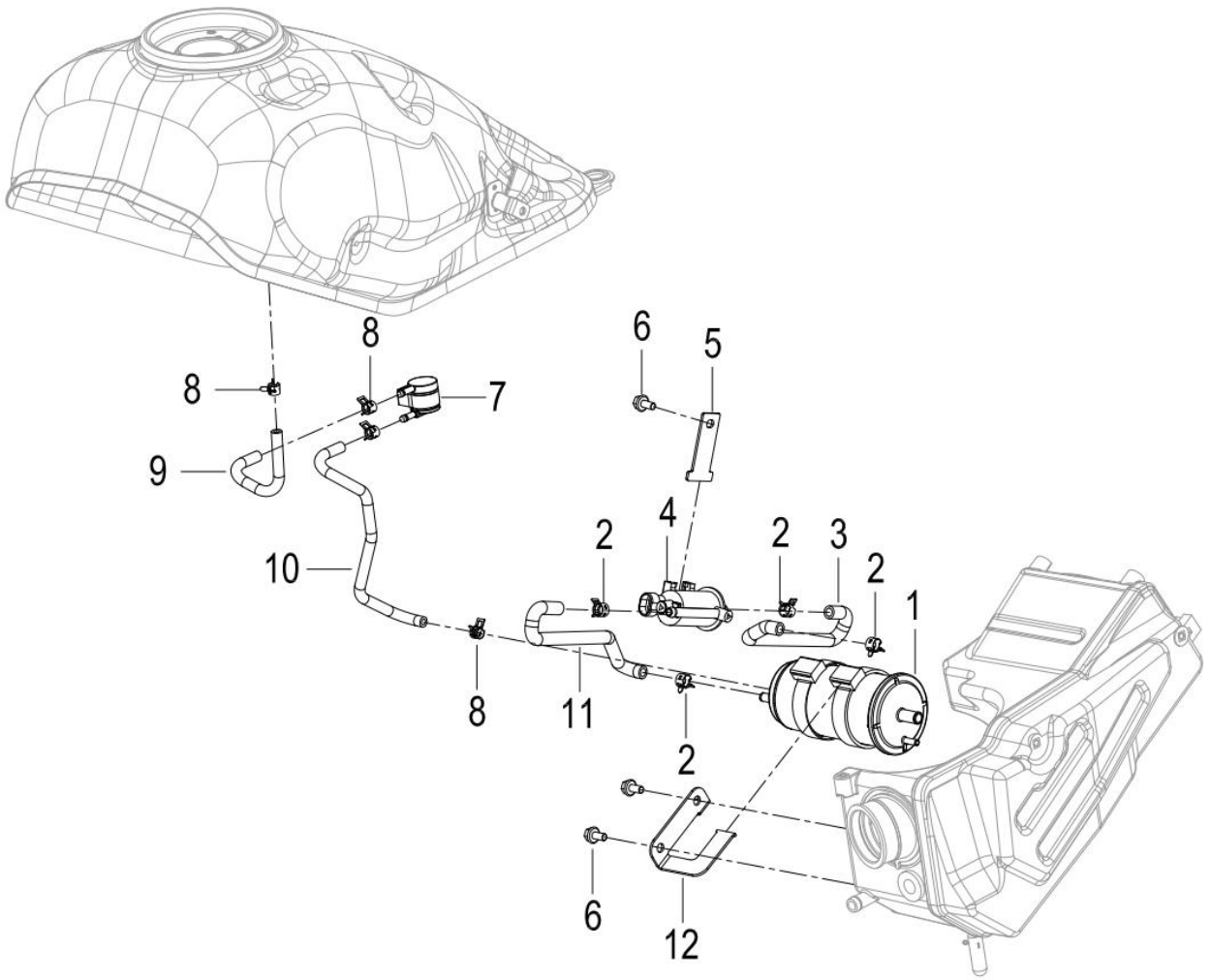
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Fuel vapor recovery system



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Canister assembly	1	—	—	
2	Plate clamp 10	4	—	—	
3	Connecting plate between canister solenoid valve and engine inlet port	1	—	—	
4	Canister solenoid valve	1	—	—	
5	Solenoid valve mounting bracket	1	—	—	
6	Hexagon bolt with flange M6×12	3	10	1.0	
7	Check valve components	2	—	—	
8	Plate clamp φ8.5×8×0.6	4	—	—	
9	Connecting plate between check valve and fuel tank	1	—	—	
10	Connecting plate between check valve and canister	1	—	—	
11	Connecting tube between canister solenoid valve and canister	6	—	—	
12	Canister mounting bracket	1	—	—	

Fuel tank

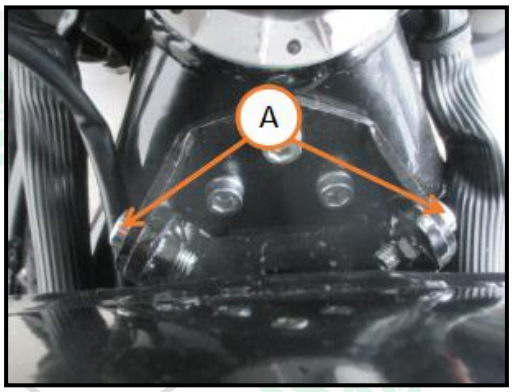
Disassemble fuel tank

●Remove the rear seat cushion (see "Replacing the Air Filter Element")

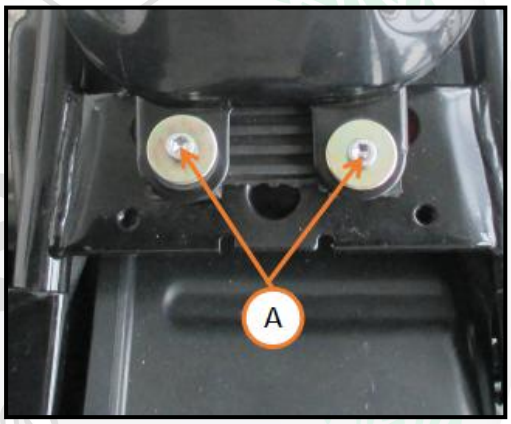
●Remove the front seat cushion (see "Replacing the Air Filter Element")

○ Remove the fuel tank cover (see “Frame” – “Fuel Tank Cover” for details).

●Remove the mounting bolt at the front of fuel tank [A]



●Remove the mounting bolt at the rear of fuel tank [A]



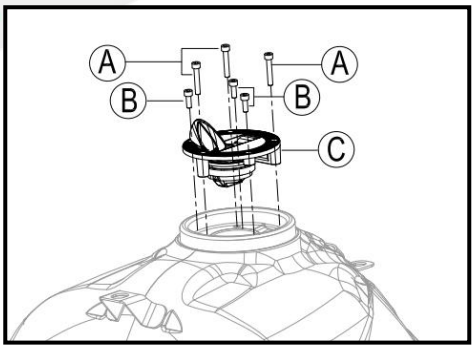
● Lift the fuel tank, unplug the oil pipe connected to the injector; unplug the connecting pipe between fuel tank and check valve

Note:
When unplugging the fuel hose connected to the throttler, be careful not to let the fuel flow out.

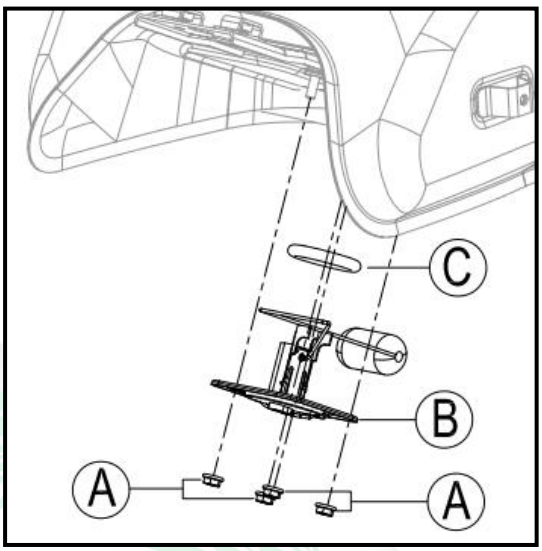
● Drain the fuel in the fuel tank into the container prepared in advance.

⚠Warning:
In the process of draining oil, it is forbidden to approach to the open flame to avoid causing fire.

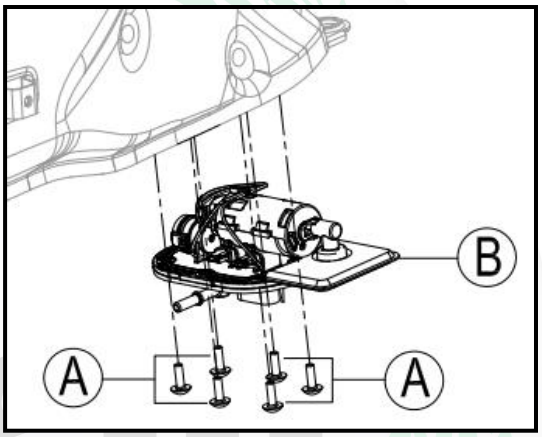
● Remove the screw [A] and the screw [B] and remove the fuel tank lock [C].



● Remove the four tightening nuts [A] and remove the fuel level sensor [B] and the fuel level sensor seal [C].
○Check sensor seal
★If the sensor seal is found to be broken or swelled, it must be replaced!

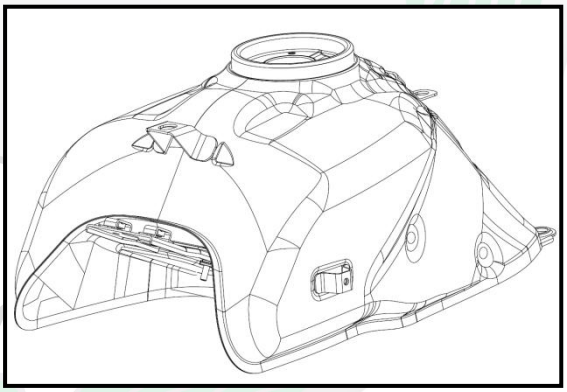


● Remove the six fastening bolts [A] and remove the fuel pump [B].
○Check the fuel pump seal
★If the fuel pump seal is found to be broken or swelled, it must be replaced!



Check the fuel tank

○ Check whether the inside of the fuel tank is rusted.
If the fuel tank is seriously rusted, please replace it.



Install the fuel tank

● Install the parts that have been removed before in the reverse order of disassembly.
Locking torque of fuel level sensor fastening nut: 10 N•m
Locking torque of fuel pump mounting bolt: 4 N•m
Locking torque of fuel tank lock decorative screw: 6 N•m
Locking torque of fuel tank lock mounting screw: 8 N•m
Locking torque of fuel pump mounting bolt: 10 N•m
Locking torque of front cover mounting holder mounting bolt of fuel tank: 10 N•m

Precautions for EFI overhaul

There are the following important precautions in the process of overhauling the EFI system.

○The power supply of this EFI system must be supplied by a 12V battery. Do not use any other battery as a power source for the EFI system.

○Do not connect the battery cable reversely. Otherwise, the ECU may be damaged.

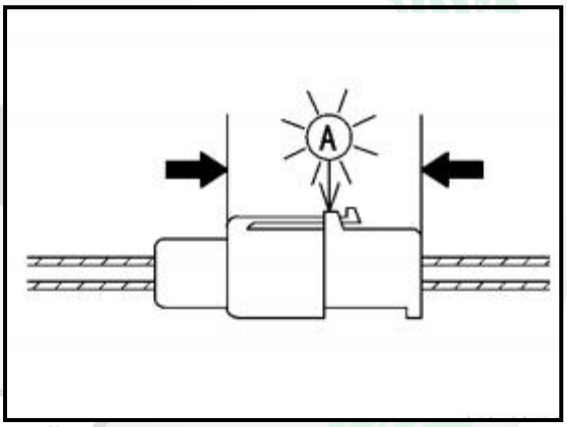
○ To avoid damage to EFI parts, do not disconnect the battery cable or any other electrical connectors while the main switch is in the "ON" position or while the engine is running.

○Be careful not to short-circuit the cable that directly connect the positive (+) electrode of the battery and the ground wire of the chassis.

○ Disconnect the connecting wire between battery and motorcycle during charging to avoid excessive voltage and damage to the ECU.

○ Turn off the main switch before disconnecting the EFI electrical connection, and then disconnect the battery (-) pin. Do not pull the wire and only pull the connector. Conversely, make sure that each EFI electrical connector has been properly connected before starting the engine.

○ Connect the connector adapter to the power supply with bridges properly.



○ Do not open the main switch if no EFI electrical connectors are connected. The ECU will remember the fault code.

○Do not spray water on electrical parts, EFI parts connectors, leads and electric wires!

○If the motorcycle is equipped with a transceiver, ensure that the operation of the EFI system is not affected by the radio waves emitted by the antenna. Run the engine at idle speed and check the operating status of system. The antenna shall be kept away from the ECU as far as possible.

○ Do not open the main switch if any fuel hose is disconnected. Otherwise, the fuel pump will run, thereby causing fuel to be ejected from the fuel hose.

○Do not operate when the fuel pump is completely dry to prevent the fuel pump from getting stuck.

○ Before disassembling the parts of the fuel injection system, blow off the dirt or dust on the outside of the parts with compressed air.

○ When any fuel hose is disconnected, fuel may be ejected due to residual pressure in the hose Therefore,

cover the hose joint with a clean rag to prevent fuel from overflowing.

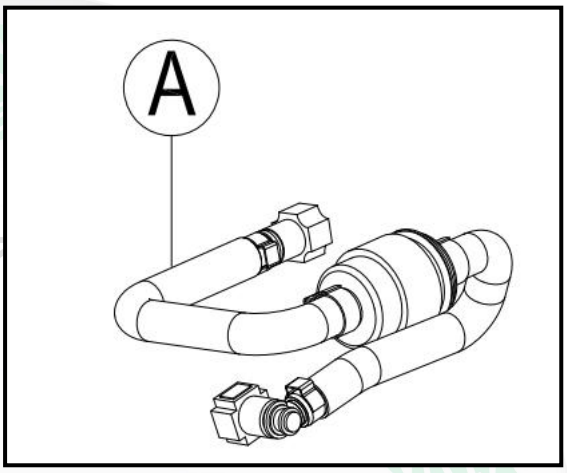
○ When installing the hose, avoid bending, twisting or warping the hose, and do not bend the hose as much as possible to avoid blocking the oil circuit.

Arrange the fuel hose in accordance with section "Winding Method of Cables, Wires and Hoses" of chapter "Appendix".

○ Do not add any fuel antifreeze chemicals to the fuel to avoid corroding the fuel injection system or causing deposits in the fuel injection system.

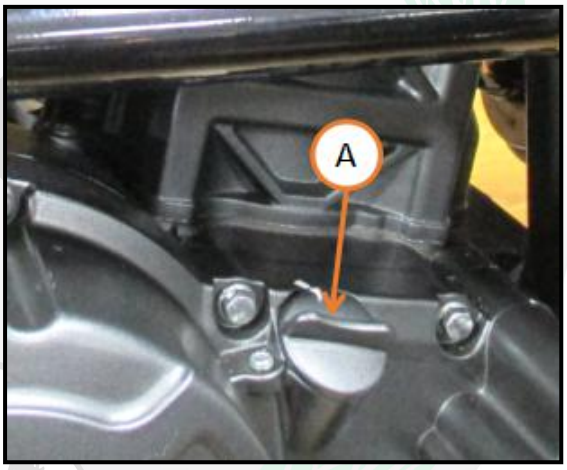
○ If the operation method is improper, the high pressure inside the fuel hose may cause fuel leakage [A] or fuel hose rupture. Bend and twist when inspecting the fuel hose.

★If the fuel hose is found to be broken or swelled, it must be replaced!



○ In order to maintain the correct mixing ratio of fuel and air (F/A), there must be no air intake leakage in the EFI system. Always tighten the filler plug [A] after adding the oil.

Locking torque of filler plug: tighten by hands.



ECU

Engine controller (MT05 ECU)

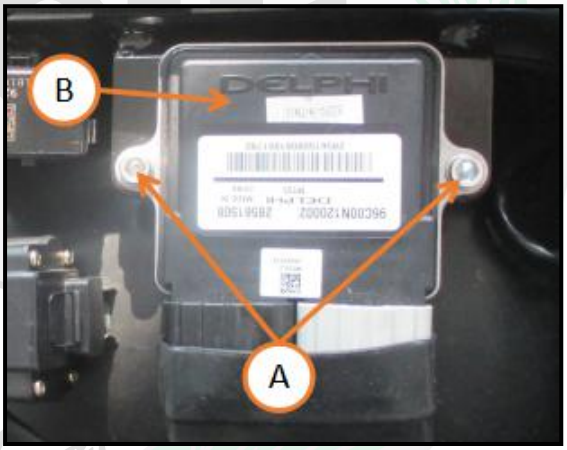
● The engine controller can detect the operating state of the engine in real time through various sensors. Ensure the original motorcycle emission and fuel economy while optimizing the driving performance of motorcycle under various working conditions through reasonable calculation and self-learning control output devices. The engine controller can also wake up the self-diagnosis when the system is faulty.

ECU appearance

● The upper part of MT05 engine controller housing is made of plastic and the bottom is made of aluminum alloy. The picture shows the front and back of MT05 controller.

ECU disassembly

●Disassembly of seat cushion
●Disassemble:
Bolt [A]
ECU[B]



ECU installation

Install it in the reverse order of disassembly.

Tightening bolt torque of ECU: 3.9N•m

⚠Warning
The mounting surface must be flat to prevent generating external force to the controller and thus making the circuit board bent.

Precautions for ECU

Precautions	Cause
Do not: Place the ECU near the exhaust pipe or engine	High temperatures may reduce the service life of ECU and even directly damage the ECU
Do not: place the ECU near water drops, engine oil or any liquid	ECU may be damaged by liquid
Do not: Allow mud or other contaminants to cover the ECU surface	Mud or other pollutants may cover the ECU and thus affect the heat dissipation
Do not: Connect the additional power voltage to the ECU	It may cause problems with ECU performance and even cause damage to the ECU
Do not: Wash the ECU with solvents or corrosive liquids.	It may cause damage to the ECU housing
Please: ensure that water or large amounts of moisture should not drip or adhere to the ECU connector	The ECU connector may be short-circuited, thus causing damage to the ECU
Please: Clean the ECU with a damp cloth and dry it	It can prevent ECU from being damaged

ECU Power Supply Requirements

- Power supply: If the battery voltage is greater than 6.3 volts, the ECU's power supply module can start the control chip, and this is automatically controlled by the ECU.
- Power range: The ECU can operate within the range of 9 to 16 volts of battery and ignition voltage.
- Shutdown: Shut down the ECU when its ignition voltage is below 6.2 volts. The ECU can enter the shutdown procedures and store important information in the ECU's memory.
- Restart: All outputs are set to a preset state during the restart process. The ECU can monitor itself in real time and automatically enter the restart when an internal error is detected. After restart, ECU will follow the normal procedures.
- Overvoltage: The ECU will not be permanently damaged if it is operated for 1 minute under the DC voltage of below 26V.
- Reverse voltage: The ECU will not be permanently damaged if it is operated for 1 minute under the DC inverse voltage of below 13V.

ECU temperature requirements

● Operating temperature: The ECU is able to work normally between minus 20 degrees Celsius and minus 85 degrees Celsius.

fuel pump

Working principle of fuel pump

● The fuel pump assembly can provide the fuel whose gasoline pressure meets the system requirements at 250Kpa. It is installed at the bottom of tank to provide the required fuel oil to engine through the connecting pipes.

●Fuel pump:

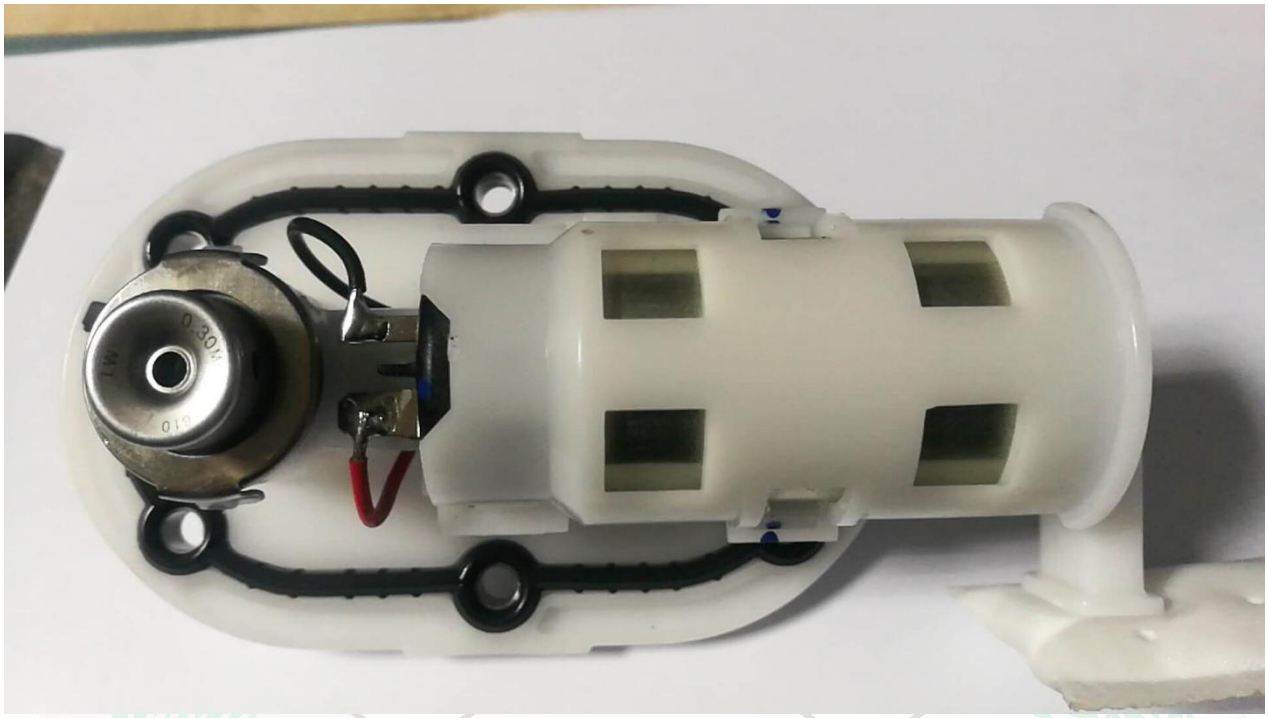
○ The electrical principle of electric fuel pump is that when the DC motor drives the turbine-type fuel pump to run, the fuel in the circumferential groove of turbine rotor will move at high speed along with the turbine rotor. Due to the action of high-speed centrifugal force, the fuel pressure at the outlet is increased, and at the same time, the high-speed rotating turbine generates a certain vacuum at the inlet of oil pump, so that the fuel is sucked from the inlet into the space of turbine blade. The differential pressure of fuel inlet and outlet may cause the fuel source to be continuously pumped to the outlet side and transmitted to the fuel line of system. The fuel transfer pressure generated by the fuel pump can be up to 250 - 400 kPa.

●Pressure regulating device:

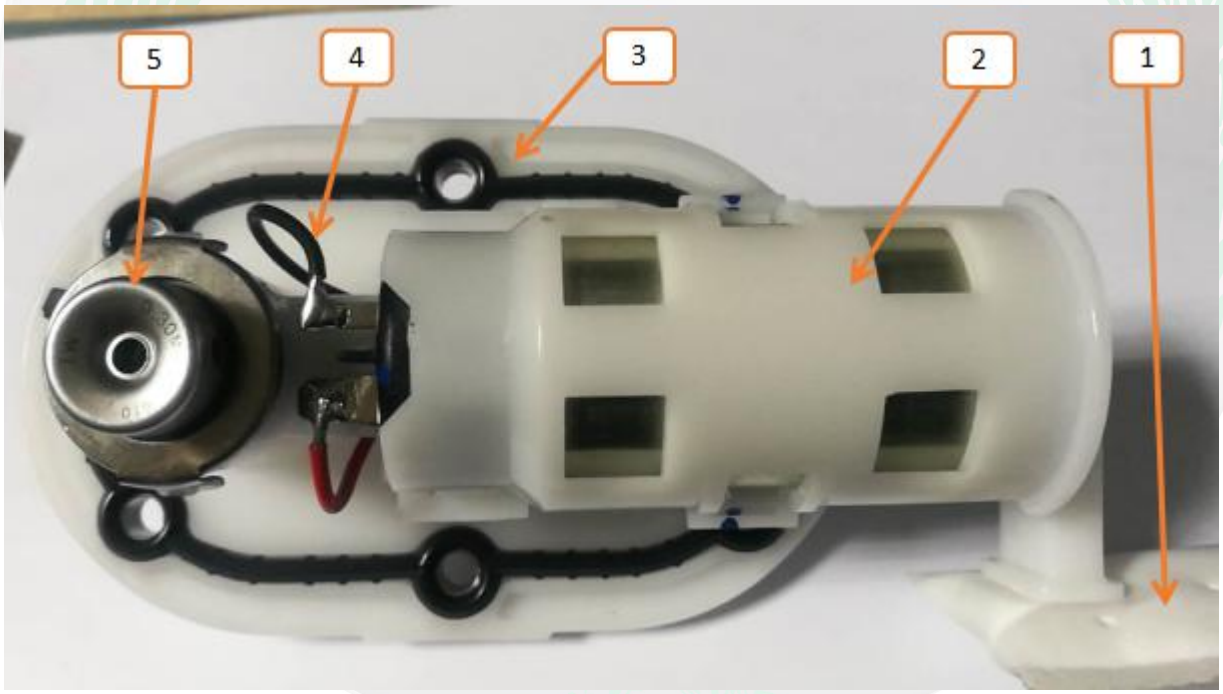
○It is mechanical diaphragm type, and can be used to make pressure regulation to fuel pump device, so as to achieve the constant fuel pressure required by the system.

Appearance of fuel pump:

Reverse side:



Fuel pump composition



1. Oil strainer
2. Fuel pump body
3. Sealing washer and fuel pump bracket
4. Fuel pump wiring harness
5. Pressure regulator

Fuel pump label and logo

● Oil pump assembly:

- The production batch and date are marked at

the fuel pump device and pressure regulator.

- Make it at fuel pump assembly installing plate in the form of label.

Fuel pump:

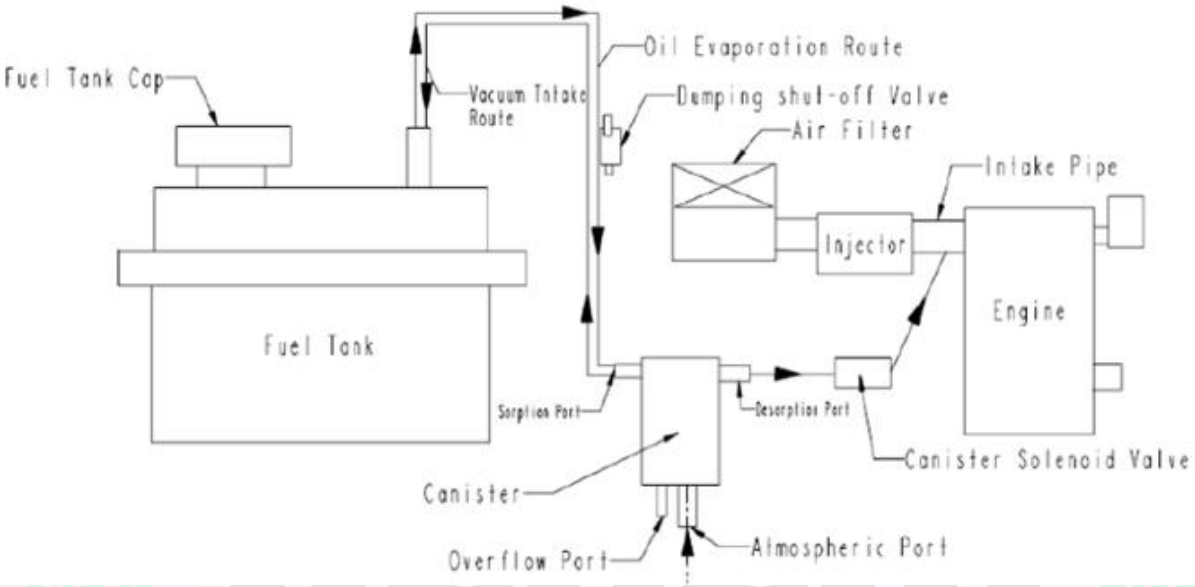
- make engraved mark at fuel pump.

Oil pressure regulator:

- make engraved mark at external housing.

Working environment of fuel pump

- The fuel pump assembly needs to be installed at the bottom of fuel tank according to the requirements.
- The general design of fuel tank is generally only for gasoline fuel. If the fuel contains ethanol, please contact the motorcycle manufacturer to confirm whether it can be used.
- Make sure that there is enough fuel in the fuel tank in the first operation of fuel pump assembly, and do not run it in the absence of oil.



Maintenance process of fuel pump:

Safety Protection:

●When conducting maintenance operation for fuel system, care should be taken to ensure personal safety.

- Disconnect the negative electrode of storage battery of motorcycle.
- Smoking is prohibited and a “no smoking” sign should be placed near the operating area.
- Ensure that there is a fire extinguishing device.
- The operating environment is well ventilated and away from open flames.
- Wear safety goggles.
- To release fuel vapors in the fuel tank, open tank cover and refit it.
- There is still a high pressure in the fuel line after the engine stops running, then oil may be injected after disassembling or releasing fuel line. Refer to “Fuel Pressure Release Process” in this section.
- A small amount of fuel may flow out after disassembling fuel line, in order to avoid the risk of occurrence, the blocking device at the fuel pipe should be used for blockage.
- After maintenance is completed, please ensure that the fuel line and clamp are properly installed.
- After maintenance is completed, check system oil leakage according to the provisions of “Fuel

Leakage Check Process".

- After maintenance is completed, please ensure that there is sufficient fuel in the fuel tank when the fuel pump is running.

Fault diagnosis of fuel pump assembly:

Step	Operation	Yes	No
1	After ignition key is started, fuel pump will run for 3 seconds.	If you can hear that the fuel pump is running, please go to Step IV directly.	If you cannot hear that the fuel pump is running, please conduct Step II.
2	Disconnect the connector of fuel pump, and check whether the supply voltage of fuel pump is within the range of 10-14V	Conduct Step III	Check the power supply circuit of fuel pump
3	Supply 12V DC current to fuel pump. Ensure that there is sufficient oil in the tank, to prevent dry running of fuel pump Is fuel pump running?	1. Check the circuit from fuel pump to ECU; 2. Check ECU	1. Check fuel pump harness 2. Check fuel pump
4	Check whether the front fuel supply pressure of nozzle is within the range of 220-270kpa when engine is in idle running.	Fuel pump assembly is running normally	Perform Step IV
5	Use the oil pressure gauge to test whether the fuel hose pressure is lower than 220kpa	1. Check whether there is leakage at fuel pipe joint 2. Check fuel pump 3. Check pressure regulator	1. Check whether the fuel filter is blocked 2. Check whether fuel pipe is bent and twisted 3. Check pressure regulator

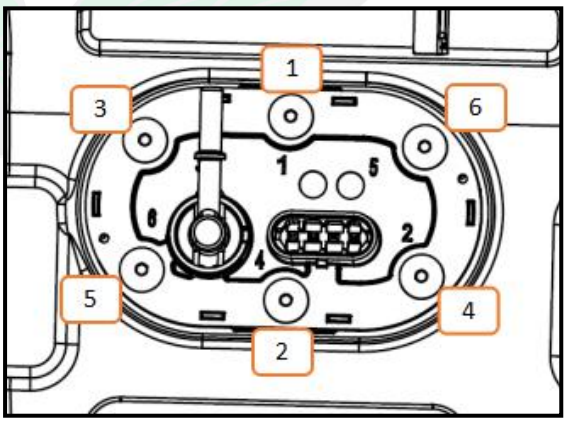
Disassembly of fuel pump assembly:

- Refer to "Fuel Pressure Release Process" to release the fuel pressure in the fuel line.
- Disconnect the negative electrode line of storage battery.
- Disconnect fuel pump assembly harness connector.
- Remove the remaining fuel from the fuel tank and store it in a suitable container, to ensure safety and reduce contamination.
- Remove the connecting fuel hose to fuel pump assembly using spring compressor assembly
- Remove the fuel tank from the motorcycle.
- Do not invert the fuel tank, to avoid tank scratches and bumps.
- Affect fuel pump assembly mounting bolt.
- Carefully remove the fuel pump assembly from the fuel tank
- Be careful to not damage fuel pump filter screen.

Installation of fuel pump assembly:

- Replace the sealing washer of fuel pump assembly (Used washer may lead to fuel leakage)
- Lightly support the fuel pump strainer and carefully put the fuel pump assembly into the tank. Avoid damaging the filter screen of fuel pump.

  Installation direction of fuel pump assembly: Arrange the installing screw holes of fuel pump assembly asymmetrically, and installed it in the specified direction. The pressure regulator should face the rear of fuel tank
  to ensure that the installing surface of fuel tank is clean and flat.



Tightening sequence of mounting screw

- Install mounting bolts on the fuel pump assembly cover plate and tighten them evenly in the order indicated in the following figure.
  Installing torque of screw: 3- 4 Nm
  The fuel pump assembly should be secured with special bolts. It should be tightened according to specified tightening order and torque during the installation. Over torque an incorrect tightening order may cause washer deformation and thus result in leakage.
- Install the fuel tank on the motorcycle.
- Connect fuel pipe and fix it with a suitable clamp.
- Connect the fuel pump harness connector.
- Check for leaks according to "Fuel Leakage Check Process" before the operation of engine.

Fuel pressure release process:

● Notes: Do not operate when the engine is in warning-up state.

After confirming that the engine is in cooling state, conduct the following fuel pressure release operation:

- The motorcycle is in "neutral" state.
- Disconnect the connector between fuel pump assembly harness and motorcycle harness.
- Turn on motor to start engine until the engine is automatically extinguished. Then continuously turn on and off the ignition key for 2-3 times, with an internal of 3 seconds each time.
- After completing the above operations, connect the fuel pump assembly harness connector.

Fuel leakage check process:

After performing any fuel system maintenance, perform fuel leakage check test.

- Fill the tank with sufficient fuel.
- Turn on ignition key for 3 seconds, and then turn off it for 15 seconds, repeat the above operations for 3-4 times, to establish the oil pressure in the fuel line.
- Check whether there is leakage in the parts of fuel system (fuel tank, connecting pipes, pipe joint, etc.).

Notes for Use:

Precautions	Cause
Do not: throw or touch fuel pump	It may cause damage to the internal of fuel pump
Do not: "dry run" fuel pump (there is no oil at fuel pump inlet and filter screen) **Please ensure that there is sufficient fuel in the tank**	It may cause damage to the internal of fuel pump
Do not: damage filter screen during the maintenance	Impurities may go into the fuel pump from damaged filter screen and thus damage the fuel pump body
Do not: disassemble the internal parts of fuel pump and pressure regulator **Do not:** regulate fuel pump and pressure regulator (except replacement)	"Three guarantees" will not be provided after disassembly without permission

Do not: lift fuel pump assembly through fuel pump assembly harness **Do not:** lift fuel pump harness in the direction vertical to fuel pump cover plate	Harness is damaged / the power supply of fuel pump is disconnected
Do not: use damaged pipe clamp	Pressure leakage/fuel leakage
Do not: use seriously damaged fuel pump filter screen or cut fuel pump assembly	Impurities may go into the fuel pump from damaged filter screen and thus damage the fuel pump body
Do not: pump oil from fuel tank using fuel pump	Fuel pump is not designed for this purpose
Do not: Install screws to fix other parts using fuel pump assembly	Affect fuel pump assembly installation
Do not: Damage fuel pump harness during the maintenance of fuel pump assembly	The terminal may be damaged and thus poor contact is caused / the power supply of fuel pump is disconnected
Do not: Contact fuel pump assembly when fuel pumping oil from the tank manually	Avoid damaging fuel pump assembly
Please: Ensure that the tank is not damaged during maintenance	Avoid oil leakage
Please: Only use "original" fuel pump assembly sealing washer	Fake washer may cause fuel leakage
Please: Use designated hose clamp	Ensure that there is no fuel leakage and seepage at pipe joint
Please: Fix fuel pump harness at motorcycle	Reduce shock
Please: Use standard fuel	The fuel with poor quality may damage the fuel pump too early
Please: Replace fuel filter within the specified time	Blocked filter may reduce fuel supply
Please: Use specified and qualified fuel filter	Unqualified filter may damage nozzle, oil pressure regulator and fuel pump
Please: Ensure to correctly arrange the ways of fuel pipes and not interfere with other parts	Incorrect ways and interference may damage fuel pipe
Please: Ensure that there is sufficient fuel in the tank (submerge fuel pump filter)	Avoid "running in dry state" of fuel pump
Please: During the pressure regulator maintenance, replace two O rings simultaneously	Ensure the correct pressure regulation curve of pressure regulator
Please: Take care to connect fuel pump assembly harness connector	Avoid damaging the terminal of connector
Please: Return any collided , damaged and suspicious parts and describe the problems	Ensure to quickly and correctly find the root cause of problem

ning:

- Because there is no gasoline in the fuel tank of new motorcycle at the beginning, a lot of air is generated at fuel pipe, so it needs to start it for several times to empty the air in the fuel line, and then the engine can work properly, which is normal. Motorcycle will be started easily in the future.
- Because gasoline can cool fuel pump, do not let fuel pump work little oil or no gasoline, which may burn fuel pump.

Throttle Body

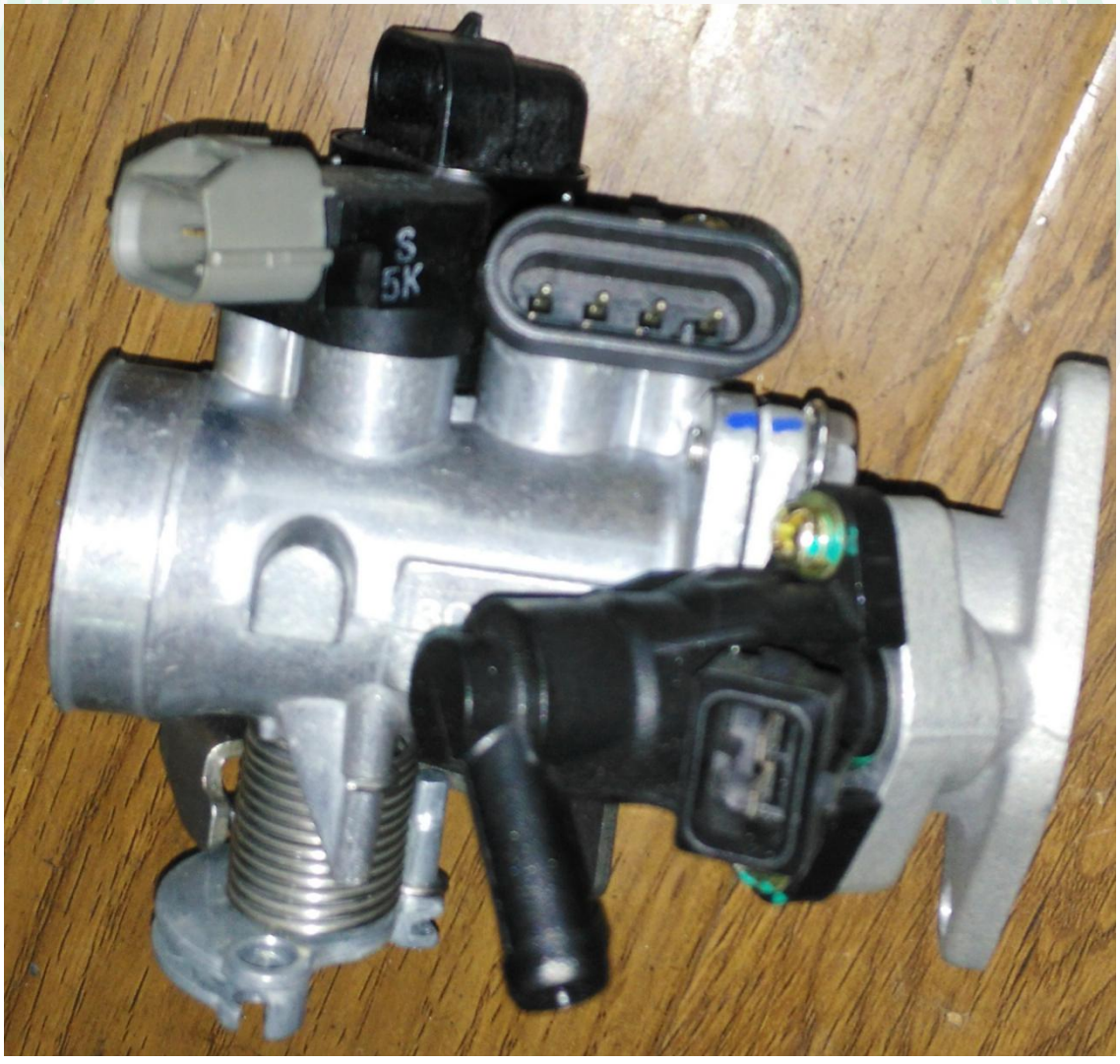
Working Principle of Throttle Body:

●The throttle body assembly is mainly composed of the following parts: main casting valve body, bearing, shaft and valve plate, return spring, throttle cable part, throttle position sensor system and by-pass flow control system. All of the above subsystems work together to meet the requirements for following functions:

- ✧ Intake flow control
- ✧ Control of air flow at idle speed
- ✧ Throttle position detection – provide throttle opening feedback signal for engine control system

The throttle body position sensor provides the ECU with a throttle opening; the stepper motor on the throttle body controls the engine idle speed to be maintained near the target idle speed required by the ECU;

Appearance of Throttle Body:



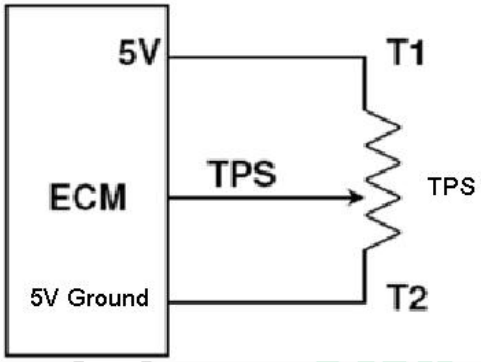
Technical parameters

Throttle Body:

- ✧ 34mm inner diameter: maximum flow: ≥50g/s @ 2.7kPa vacuum degree
- ✧ Throttle body starting torque:
  Idle state: 0.12±0.03Nm
  Fully open: 0.32±0.05Nm

Throttle position sensor:

- ✧ The reference voltage is 5±0.1VDC
- ✧ Resistance between T1 and T2: 3kΩ - 12kΩ.



Idle air control valve:

- Operating voltage: 7.5~14.2 VDC
- Winding resistance: 53Ω ± 10%
- Winding inductance: 33mH ± 20%

Operating temperature of throttle

Normal operating temperature: -30 ~120°C

Disassemble throttle body

- Disconnect the negative electrode line of storage battery.
- Disconnect the connectors on throttle position sensor, stepper motor, intake temperature/pressure sensor (if installed on the throttle body assembly)
- Disassemble the throttle cable
- Disassemble the connecting hose between the air filter and intake manifold

Cleaning Method of Throttle

●Clean throttle body using carburetor cleaner (3M product is recommended). Spray cleaner at the inner wall of throttle body, and gently remove dust and carbon deposit and other items using a brush. Be careful to prevent the bypass air duct from being blocked by dirt.

install throttle body

Note the followings for installing the throttle body:

- ✧ Adjust throttle wire
- ✧ Ensure that all moved parts have been installed properly, such as stepper motor assembly.
- ✧ Install the connecting screw properly

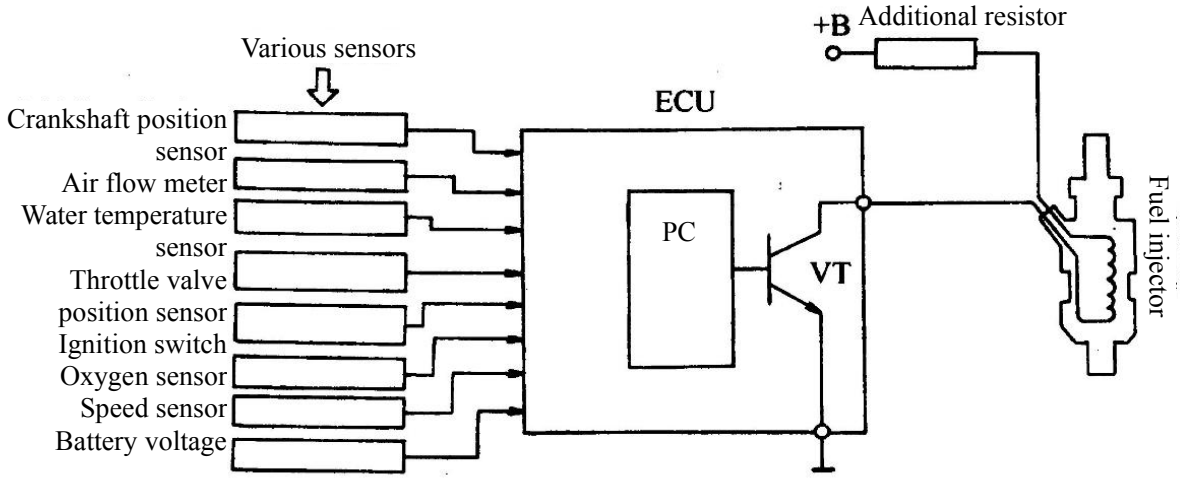
Notes for the Installation of Throttle Body

- ✧ Do not immerse the throttle position sensor in the liquid.
- ✧ Always use the throttle cable to open the valve plate.
- ✧ Do not insert tools or other items into the inside of the throttle body to maintain the opening of the valve plate. This may deform the valve plate or scratch the inner wall of throttle body. This damage may cause the valve to be extremely easy to open or difficult to open.

Notes for the Use of Throttle Body

Precautions	Cause
Please: be careful to install the connectors of all throttle body	Avoid damage to wiring terminal.
Please: avoid any liquid from entering throttle body	Make sure it works properly
Please: Take out one throttle from the part tray and install it every time	So as not to damage critical parts
Please: send the falling, damaged parts or parts with suspected problems, and label to specify the existing problems (only for the components within the scope of “three guarantees")	Quickly confirm the cause of problem
Do not: use any dropped or squeezed parts	May cause damage to the internal of parts
Do not: store or transport near salt water without protection	Corrosion may affect normal use
Do not: expose it to the environment before the completion of assembly (such as humid environment)	Corrosion may affect normal use
Do not: test under non-system operating voltage	It may cause damage
Do not: use additional fixtures	It may cause damage
Do not: remove the packaging so that the parts may touch each other	It may affect minimum air leakage or cause other damages
Do not: release the throttle completely from any position	It may cause damage
Do not: block the bypass channel by dust or small particles	It may affect idle speed stability
Do not: pick up, store or hold parts in a manner that might come into collision with other parts.	It may cause damage

Fuel injector



Working Principle of Fuel Injector:

● The injector is an actuator that injects the appropriate fuel into the engine inlet in a timely and accurate manner, and then inhales it into the combustion chamber and mix it with the oxygen in the filled fresh air for burning.
The fuel injector should be replaced with that with the same part number only.

Appearance of fuel injector

● The appearance of fuel injector is shown in the figure below.

Fuel injector seal

●As shown above, O-ring seal can ensure that leakage will not occur when fuel injector works within the range of -40°C -150°C (-40 -302°F), and it can resist various fuel additives (such as: ethyl alcohol). The following data is the existing sealing ring design.

O-ring Seal Connected to Oil Rail or Oil Injection Cap

●Size:

·Inner diameter: 6.35 mm

·Outer diameter: 14.85 mm

·Section thickness: 4.25 mm

●Materials

•Viton GLT (blue): applications at low temperature

• Viton A (black): applications other than low temperature

O-ring Seal Connected to Intake Pipe End

●Size:

·Inner diameter: 9.61 mm

·Outer diameter: 14.49 mm

·Section thickness: 2.44 mm

Materials:●

• Viton A (blue or brown)

List of recommended lubricants

●To facilitate the installation of fuel injector, lubricant should be applied at O-ring seal. The following table shows the list of usable lubricants. Tests show that the following lubricants do not have any impact on the fuel injector.

List of recommended lubricants		
Name of lubricant	**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

Overvoltage Impact of fuel injector

The fuel injector can run at the voltage of 26V and the working conditions of 100ms (pulse) and 200ms (one cycle time) for 1 minute at most (run with oil). It will not affect the flow rate, cause permanent damage to the solenoid coil or weaken the electromagnetic performance.

Temperature range of fuel injector:

●The standard injector operating temperature range is as follows. Within the qualified operating temperature range, the fuel injector flow is within the tolerance range and fault will not be caused. Meanwhile, in a reasonable operating environment, leakage, degradation or reduction of service life will not be

caused to fuel injector.

- ✧ Operating temperature range: - 30 ~ 125°C
- ✧ Extreme operating range (may cause some functional degradation): - 40 ~ 150°C
- ✧ Storage temperature: -60 ~ 60°C

Fuel contaminants of fuel injector

Although the fuel injector has a self-cleaning function, it is not a serviceable part, because it is designed to remove only the impurities with small diameter accumulated in the fuel line from the fuel filter to the injector. The impurities with large diameter may cause injector bonding, flow deviation and leakage and other faults, so fuel filter system is very important.

Fuel injector harness arrangement

- ✧ The injector harness should be located away from heat sources and the harness should be protected from external wear or damage.
- ✧ If not necessary, do not insert or remove the injector connector.
- ✧ There is no positive or negative electrode for the electrical connector of fuel injector.

Notes for Use of Fuel Injector

Precautions	Cause
Do not: Reuse the seal. If it needs to reuse it in special conditions, please carefully check whether the sealing ring is damaged before use.	Avoid leakage
Do not: Immerse the end of nozzle in the lubricant.	It may block spray hole.
Do not: Operate it without load in the case of no oil pressure	It may damage internal mechanical components.
Do not: Make water go into the fuel way during leakage inspection.	It may damage fuel injector.
Do not: Apply force to the head of fuel injector during installation	During the installation on nylon intake pipe, allow to apply force in the direction of 45 degrees
Do not: Strike fuel injector when installing it at intake pipe.	It may cause fuel injector and sealing ring.
Do not: Apply tension to connector.	It may cause intermittent power supply.
Do not: Use fuel injector that has fallen	It may be damaged.
Do not: Store fuel injector, fuel rail or engine that has been loaded into fuel injector in an unprotected environment.	External environment may damage the electronic and mechanical parts of fuel injector.
Do not: Take fuel injector as a handle when lifting assembly parts.	It may damage fuel injector.
Do not: make parts be in touch with each other during storage.	It may damage fuel injector.
Do not: Parts are in contact with each other during transportation.	Collision may be caused and thus fuel injector may be damaged.
Do not: Knock fuel injector for troubleshooting when an fault occurs.	It may damage fuel injector.
Do not: replace the original fuel injector with one with the part number not recommended.	It may seriously affect the performance of nozzle.
Please: Pay special attention to protect sealing ring from being cut by the installing seal during the installation of fuel injector.	Protect sealing ring.
Please: Use correct lubricant for installation, and immediately it into the installing hole after applying lubricating oil.	Protect sealing ring, to reduce pollution.
Please: Add tests for the fuel injector whose needle valve is stuck or cannot be mounted. (Apply the pulse to fuel injector for less than 5 seconds using 9-15 V voltage).	Confirm the fault form of fuel injector
Please: Before assembling fuel injector, make an oil-free leak test to confirm that the needle valve of fuel injector has been mounted.	It may prevent the needle valve of fuel injector from returning to the original position during the transportation and transfer process, thus resulting in fuel leakage
Please: Prevent liquid from damaging fuel injector	It may cause short circuit of solenoid coil
Please: Be careful to disassemble harness	It may cause damage of terminal
Please: Use recommended lubricant when installing connector.	It may cause corrosion to terminal
Please: Do not use the components that are dropped, damaged or whose materials have problem, and describe the problem using label.	Ensure to quickly find the root cause of fault.

Installation requirements for fuel injector

●During the installation and removal process, please strictly observe the following methods to avoid damage to the fuel injector body and electronic components.

- ✧ Lubrication: Apply a small amount of lubricant to the underside of the sealing ring. ISO 10 light mineral oil or equivalent product is recommended.
- ✧ When conditions allow, apply lubricant to the fuel injector seat, which is better than the effect of being applied the seal ring. So that the fuel injector contamination probability will be reduced to minimum.
- ✧ Do not allow the spray plate to come into contact with the lubricant, which may affect the injection quantity. Do not dip the top of the fuel injector to into the lubricant.
- ✧ All fuel injector sealing rings are factory assembled. In principle, the sealing seals should not be reused. Before reusing it in special conditions, please carefully check whether the sealing ring is damaged before use. Very small damage may cause leakage. Carefully insert the sealing ring into the installing seat during installation.
- ✧ When installing the fuel injector connector, take care not to damage the connector, and you can hear a click, indicating that it has been installed properly.
- ✧ Avoid unnecessary disassembly and assembly of connector.
- ✧ Harness should not be clamped too tightly, which may cause a short circuit.
- ✧ When installing the fuel injector connector, do not rotate the fuel injector. This may cause fuel injection target to shift.

Replacement Method of Fuel Injector

●The following is the disassembly and replacement method of fuel injector.

Note: The injector and the surrounding objects are very hot.

- ✧ Turn off the motorcycle.
- ✧ Cut off the negative electrode of storage battery, to avoid accidentally starting the engine.
- ✧ Remove the fuel injector connector.
- ✧ Release the fuel pressure.
- ✧ Remove the fuel pipe from the fuel injector.
- ✧ Remove the fuel injector from the throttle valve body.
- ✧ Remove the fuel injector retainer and carefully remove the fuel injector from the seat ring.
- ✧ Carefully clean the impurities at the injector contact surface, and be careful not to damage

the contact surface.

- ✧ Apply lubricant to the sealing rings on both ends of the new fuel injector.
- ✧ Carefully put the head of fuel injector into the intake pipe, and confirm that the installation direction is consistent with the original one.
- ✧ Press it in the fuel injector seat ring and secure the clamp.
- ✧ Install fuel injection hose.
- ✧ Insert the fuel injector connector.
- ✧ Power on the key, do not start the engine and check fuel injector for leakage.
- ✧ Start engine for running check.

Replaceability of fuel injector

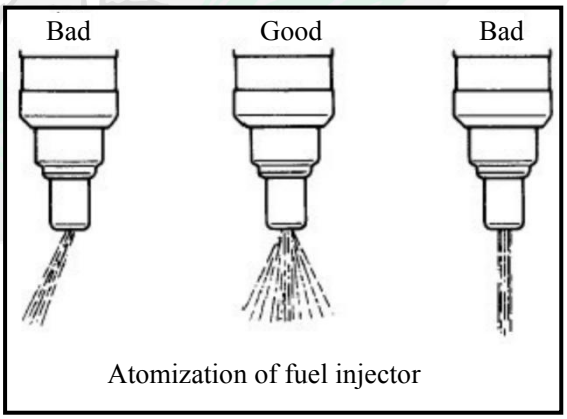
●The fuel injector should be replaced with that with the same part number only.

Blocking of Fuel Injector

●The accumulation of fuel impurities may cause flow offset and shorten fuel injector life. When the engine is standing, the heat of engine may produce fuel precipitation through the head of fuel injector, and the precipitation gathered in the injection hole may cause flow offset.

- ✧ Blockage may cause many problems, such as small flow, large friction and accumulation of impurities, and ultimately affect emissions and durability. Ultimately affect emissions and durability.
- ✧ Fuel and environmental factors may cause fuel crystallisation or fuel injector corrosion, which may also cause flow offset.
- ✧ Poor oxidation stability of fuel may cause precipitation, so please use high-quality gasoline.
- ✧ Add an appropriate amount of fuel cleaner to avoid precipitation.
- ✧ If fuel injector is blocked, please clean injector according to the following cleaning method.

- A filter is designed inside the fuel injector, but it is not a maintainable part, because its design function is to filter the accumulated impurities from the fuel filter in the oil line to the fuel injector only. Impurities can cause the cohesion, flow deviation, leakage and other faults of fuel injector, so the fuel filter is very significant.
- The fuel injector should be replaced with that with the same part number only.



Atomization of fuel injector

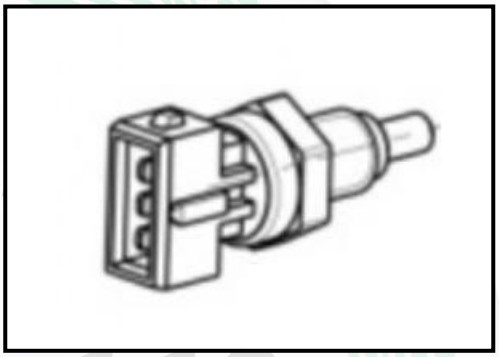
Engine water temperature sensor

Working principles of engine water temperature sensor

● The sensor is used for water-cooled engine to measure the temperature on the engine waterway and is mounted on the engine block. Within this sensor temperature range, its resistance may vary with engine temperature. Its characteristics are negative temperature coefficient resistance characteristic. It is an irreparable part.

Appearance of engine water temperature sensor

●The appearance of engine water temperature sensor is as shown in the figure below



Installation requirements for engine water temperature sensor

- ✧ Dynamic torque requirements: It should be assembled by hands to allow the thread to be correctly guided, and then tightened to the specified torque using a manual wrench.
- ✧ Static torque requirements: The torque required to disassemble the sensor from the engine should not exceed 200% of the assembly torque.

Assembly torque: 20～25N•m

Operating environment of engine water temperature sensor

- ✧ The sensor is mainly used for water-cooled engine
- ✧ Normal operating temperature range: -40 -135°C (continuous work)
- ✧ Relative humidity at working environment: 0 ~ 100%
- ✧ Typical operating pressure: at minimum installation torque, the sensor is capable of sealing the engine coolant at an actual pressure of 206.8 kPa (30 psi) and a temperature of 135°C.
- ✧ Extreme operating conditions: only 1 hour at maximum temperature of 150°C.

Electrical environment of engine water temperature sensor

- ✧ Typical working voltage: The reference voltage is 5±0.1VDC

Cleaning of engine water temperature sensor

- ✧ If necessary, the sensor can be cleaned with isopropyl alcohol and then air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the sensor.

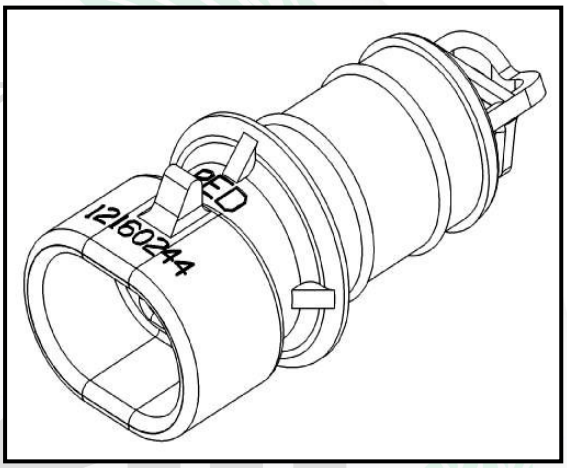
intake temperature sensor

Working principle of intake temperature sensor

●Within the sensor temperature range, the resistance will change with the temperature of engine and the temperature characteristic is the negative temperature coefficient resistance characteristic. It is an irreparable part.

Appearance of intake temperature sensor

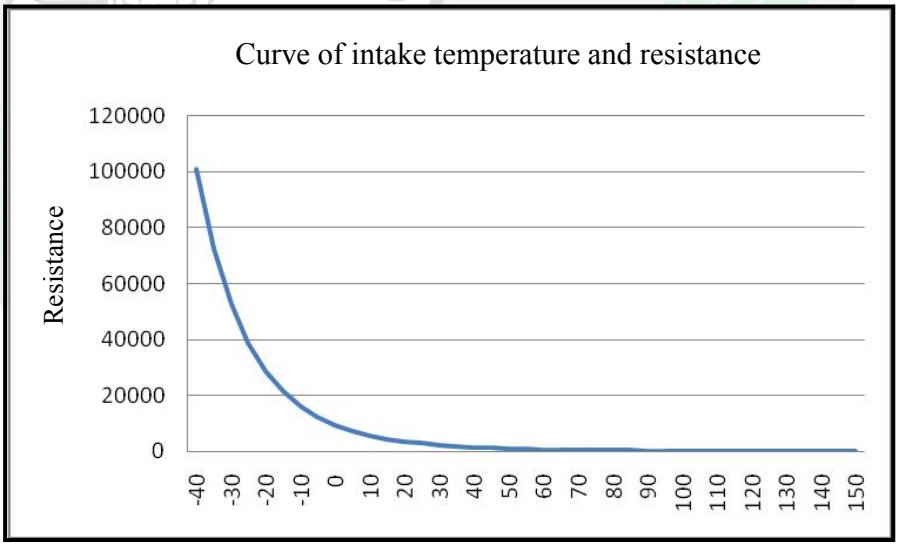
●The appearance of intake temperature sensor is as shown in the figure below



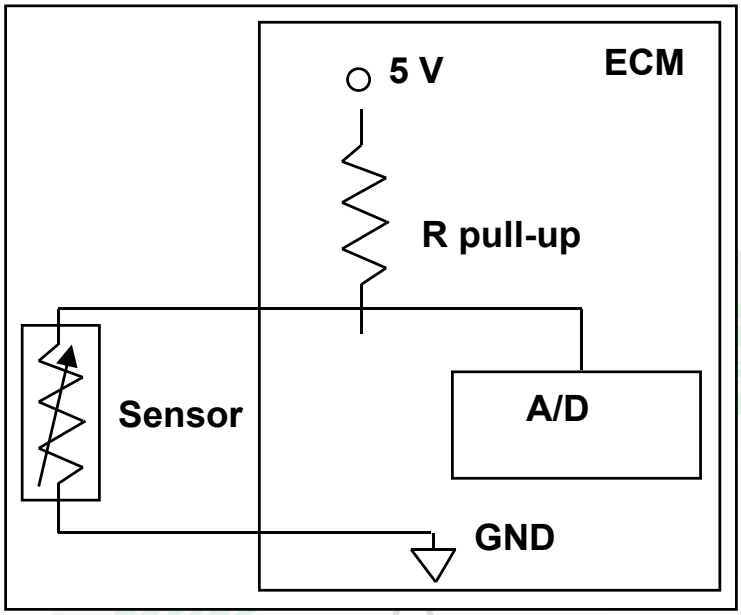
Technical parameters

- ✧ Operating voltage: 5DVC
- ✧ Response time: <15s
- ✧ Operating temperature: -40 ~150°C
- ✧ Relative humidity: 0 - 100% RH.

●Resistance measurement value and temperature curve:



Pin position definition and function diagram



● Use a multimeter to measure the resistance between the two pins of sensor. The table of specific temperature and resistance is shown below:

Measured temperature (degrees Celsius)	Resistance value (ohms)
0	9,399
5	7,263
10	5,658
15	4,441
20	3,511
25	2,795
30	2,240

Installation position of intake temperature sensor

●The intake air temperature sensor [A] is located on the air filter and can be pulled out with gloves.

Clean

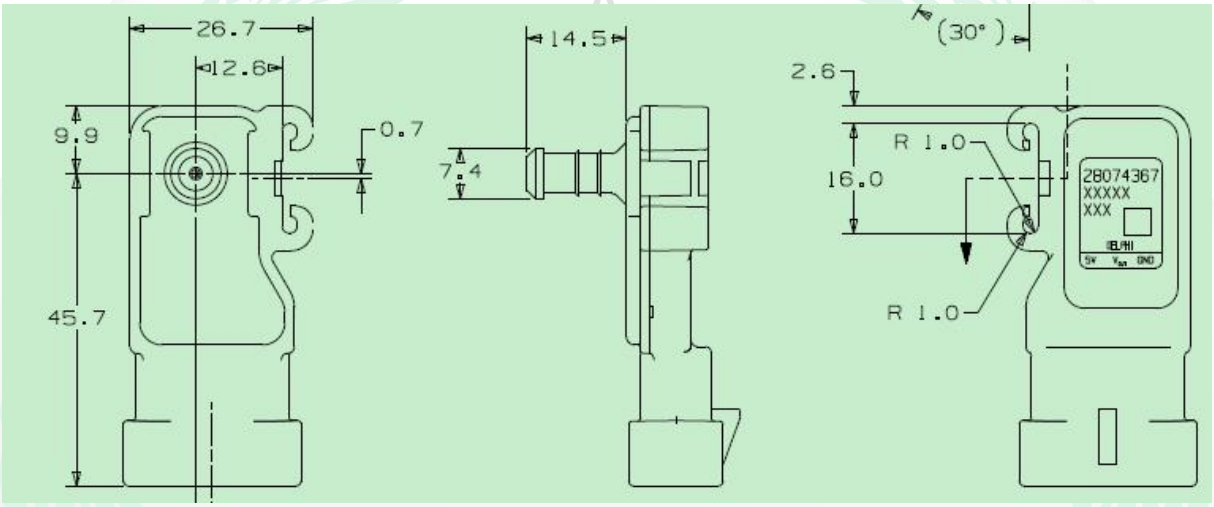
● If necessary, the sensor can be cleaned with isopropyl alcohol and air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the sensor.

Intake pressure sensor

Working principles of intake pressure sensor

●This sensor is used to measure the absolute pressure of air intake elbow, reflect the size of intake pressure according to the difference of resistance, and then calculate the intake volume in engine combustion chamber through indirect conversion, and it is also a non-serviceable part.

Appearance of intake pressure sensor



Operating environment

- ✧ Operating pressure range: 20~102kPa
- ✧ Operating temperature range: -40~105°C
- ✧ Relative humidity: 0 - 100% RH.
- ✧ Extreme operating conditions: only 2 hours at maximum temperature of 125°C.

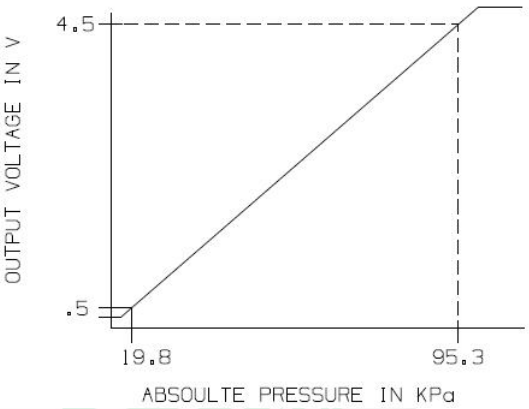
Storage environment

- ✧ Storage temperature: -50~150°C

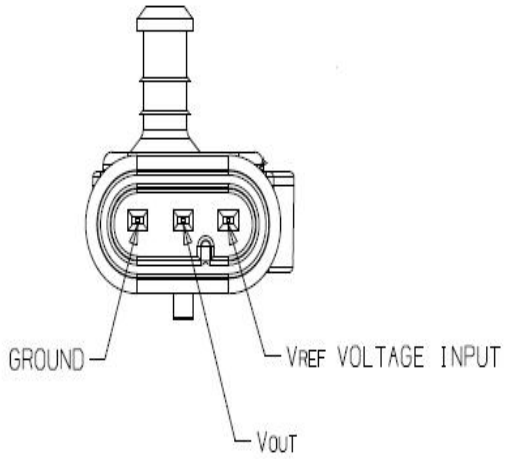
Electrical environment

●Typical voltage: The operating DC reference voltage of sensor circuit is 5 ± 0.1 V.

●Characteristic curve



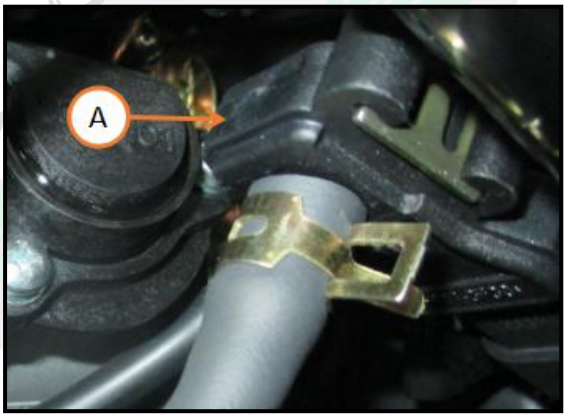
Pin definition



Location

●Intake pressure sensor is installed on the frame

●Intake pressure sensor [A]



Clean

● If necessary, the sensor can be cleaned with isopropyl alcohol and air dried. It should be soaked in isopropyl alcohol for not more than 1 minute, and sealing connector should be installed during cleaning to prevent cleaner from intruding into the sensor.

Oxygen sensor

Working principle of oxygen sensor

●Oxygen sensor can be used to detect the oxygen content in the waste gas of engine exhaust pipe for internal fuel closed loop control of ECU, thus maintaining engine combustion at the most reasonable state of air and fuel ratio (14.7).

Appearance of oxygen sensor

Technical parameters

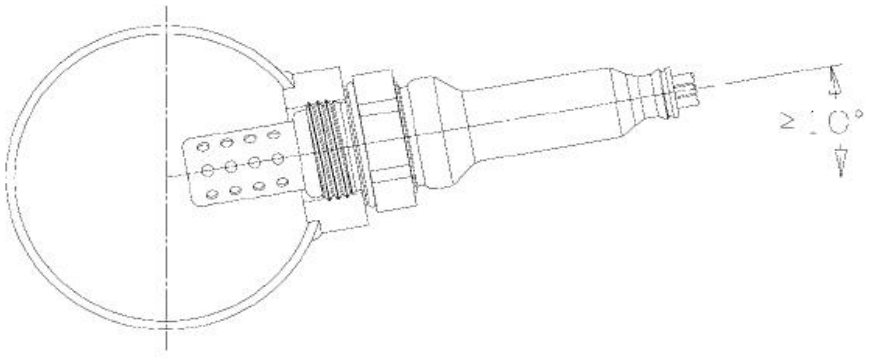
- ✧ Partially thick limit of air-fuel ratio: ＞ 750mVDC
- ✧ Partially thin limit of air-fuel ratio: ＜120 mVDC
- ✧ Power of oxygen sensor heater: 7.0W

(The above parameters are measured at engine bench, the working conditions: exhaust gas temperature: 450°C; duty cycle: 70%; 10Hz; voltage: 13.5V).

- ✧ The resistance of heater is: 9.6±1.5Ω (measured at 21°C)
- ✧ Operating temperature range: 260-850°C

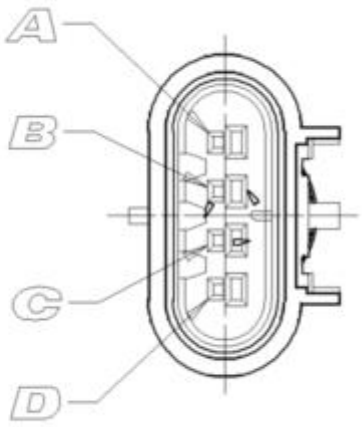
Installation requirements

- ✧ Installation angle (angle with the horizontal plane): ≥10 degrees

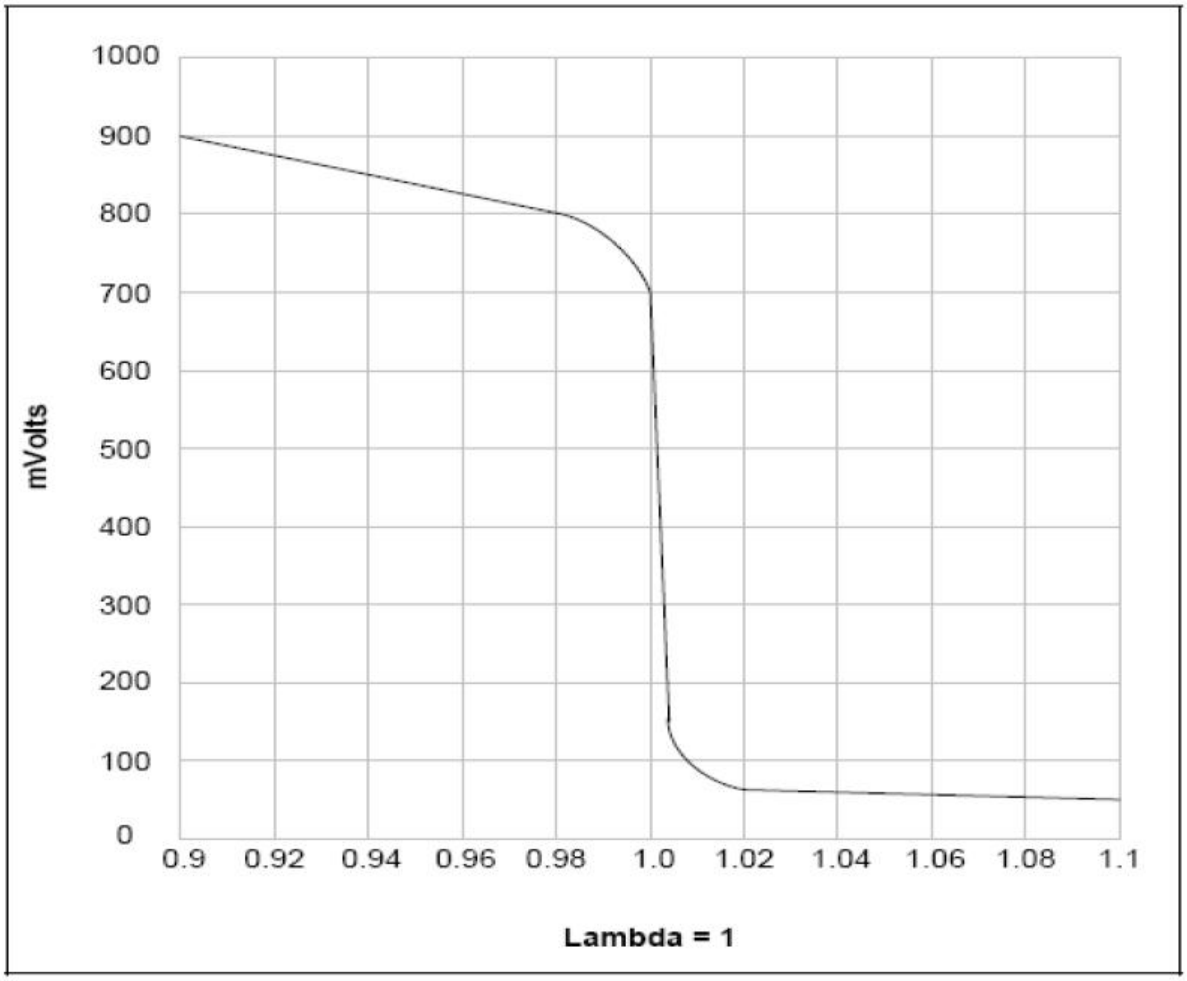


Oxygen sensor pin definition:

CONNECTOR PIN	WIRE COLOR	PIN AND WIRE CONNECTION
A	PURPLE	HEATER +
B	WHITE	HEATER -
C	GRAY	SENSOR (OUTPUT)
D	BLACK	SENSOR (GROUND)



Characteristic curve



The oxygen sensor is located on the exhaust manifold. Please remove the oxygen sensor connector and then remove the oxygen sensor using 13# open-end wrench. Be careful not to knot or twist the harness when disassembling.

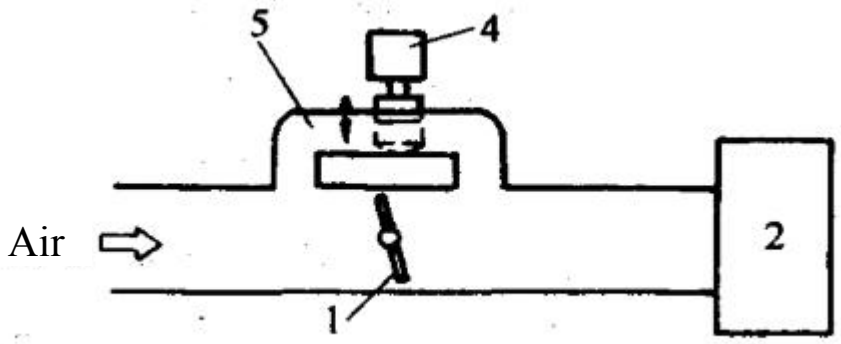
Requirements for fuel quality

- Pb≤0.005g/L
- P≤0.0002g/L
- S ≤ 0.04% (weight ratio) x
- MMT≤0.0085g/L
- Si≤4ppm

Idle speed stepper motor

Working principle of idle speed stepper motor

●The function of idle speed control valve is to control the flow area of bypass air duct of throttle body, so as to adjust the air volume of engine and control the idle speed of engine.

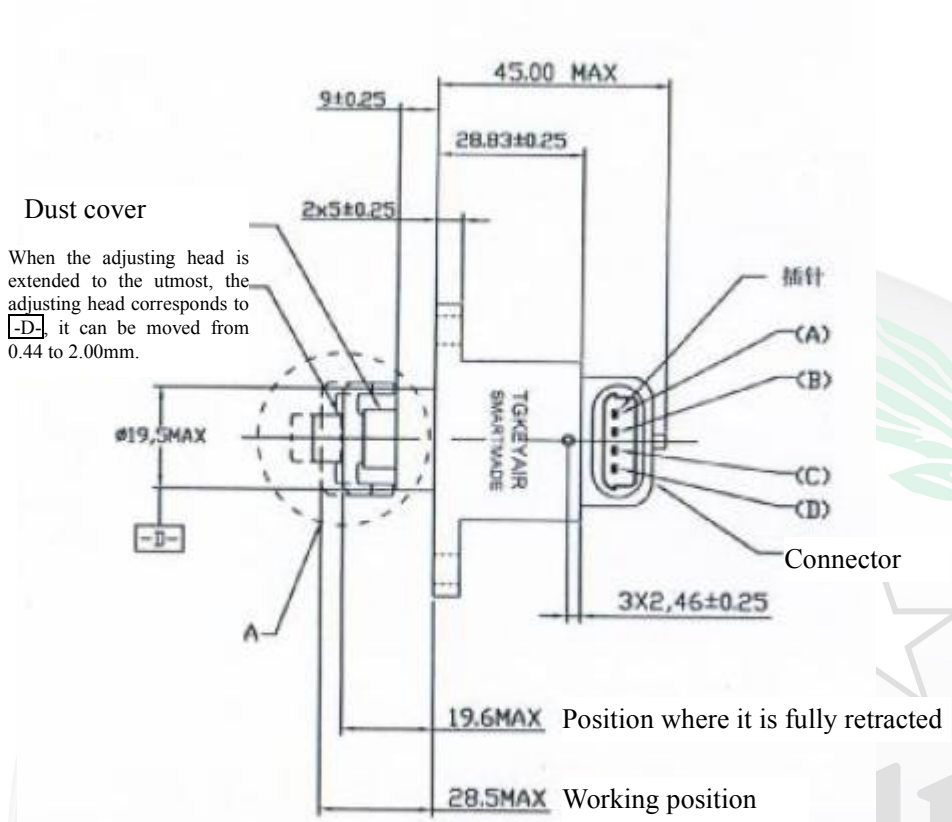


1. Valve; 2. Inlet manifold 4. Idle stepper motor 5. Bypass hole

Appearance of idle speed stepper motor

●The appearance of idle speed stepper motor is as shown in the figure below

Pin Definition



Characteristic parameters:

Rated voltage:	12Vdc
Maximum / minimum operating voltage:	7.5Vdc/14Vdc
Resistance per roll (@27°C):	53Ω±5.3
Minimum resistance (@-40°C):	35Ω
Inductance per roll (@25°C):	33.5mH±6(1kHz)
Stepping distance (step):	0.04167mm
Maximum stroke:	8.5mm(204 steps)
Operating temperature range:	-40°Cto125°C(150°C peak value)
Minimum storage temperature:	-40°C
Weight:	110 g

Clean

●The stepper motor assembly is integrated on the throttle valve body. When cleaning, first remove the stepper motor and clean it with a clean rag

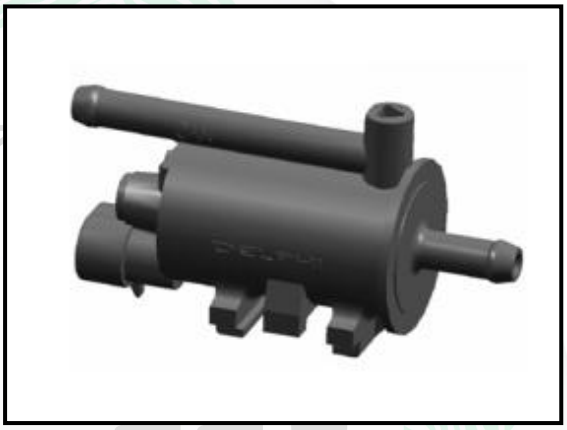
Canister solenoid valve (ECP)

Overview of working principle

● The canister solenoid valve is used to prevent the fuel vapor in the canister from entering the engine intake system and burning it in the engine. This can reduce fuel evaporative emissions.

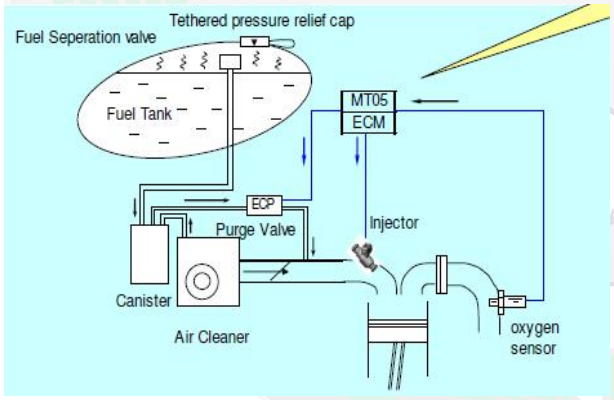
Appearance

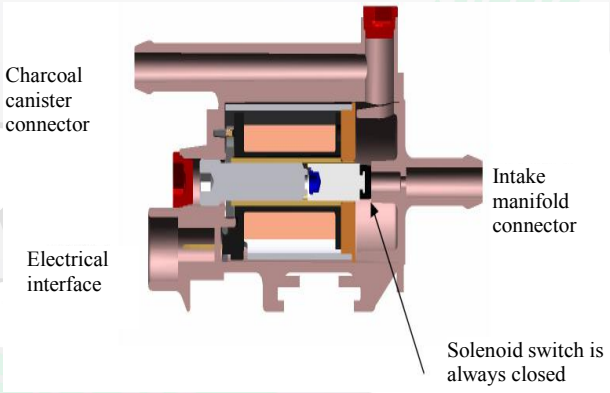
●The appearance of canister solenoid valve is as shown in the figure below:



Pin of ECP solenoid valve

The solenoid valve pin has no positive and negative electrode. The connection method is as follows:

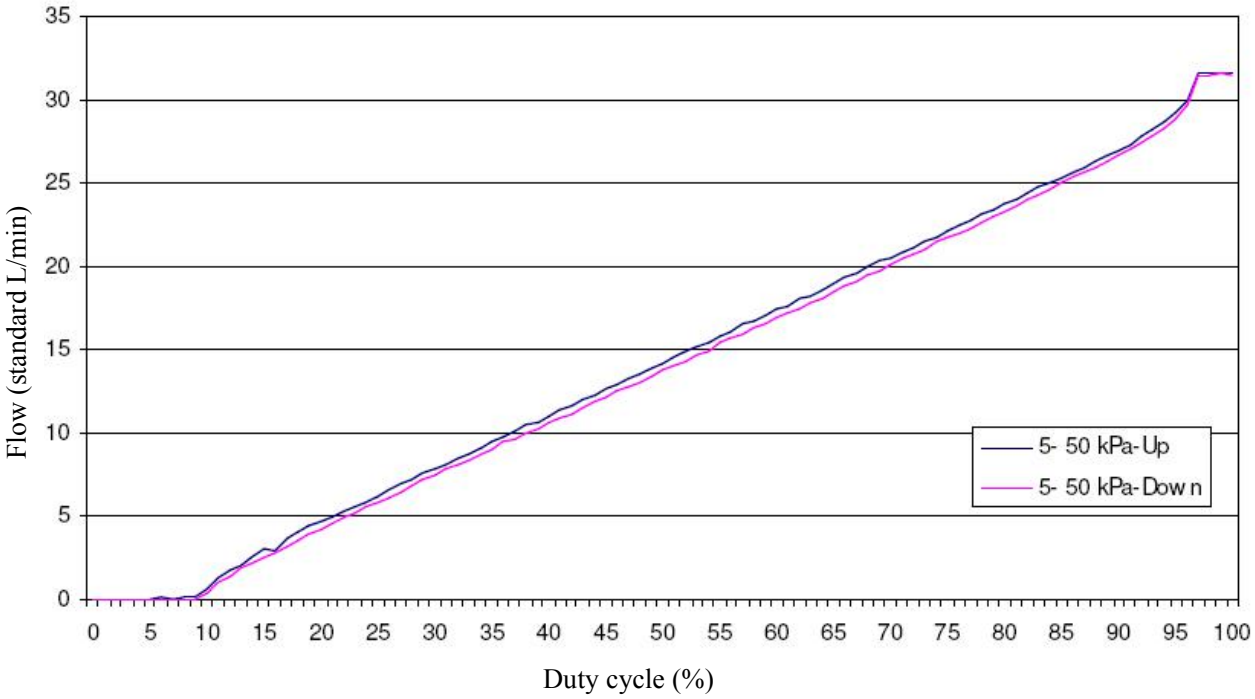




Technical parameters

- ✧ Normal operating voltage: 8~16V VDC
- ✧ Operating temperature range: -40~120°C
- ✧ Operating frequency: 16 Hz
- ✧ Maximum flow rate: 25-35L/min

The flow curve is shown in the figure below:



Installation requirements

- ✧ The canister solenoid valve should be installed horizontally on the motorcycle
- ✧ The canister solenoid valve should be installed close to the central axis of crankshaft to reduce vibration

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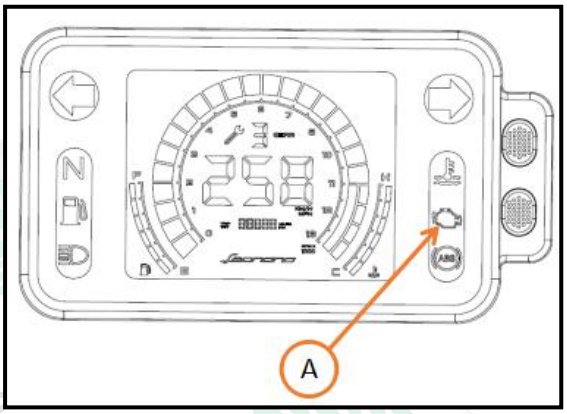
Fault Maintenance and Diagnosis Method of EFI System

Conduct diagnosis directly using the flashing fault lamp at meter



The fault light [A] is located on the meter panel with a mark below. Under normal circumstances, after the key is turned, if the fault light is on, it indicates that the electronic injection system is powered and it can work; if the fault light is off, it indicates that the electronic injection system circuit is disconnected, it will not work and the connection of positive and negative electrodes of fuse and battery should be checked. If the fault light is off after the engine is started, it indicates that there is no fault; on the contrary, if the fault light is still on after the engine is started, it indicates that the electronic injection system works abnormally and the fault should be removed if any.

In the case that a fault is confirmed, after opening and closing the key for 3 times, namely the operation of opening---closing--- opening---closing –opening key, the fault lamp will flash the flash code of corresponding fault. Then, corresponding fault can be identified through fault code table.

Of them, when using the method to read fault using fault lamp, the flash code rule is as follows: for example, the fault is the open circuit of intake pressure sensor or short circuit of signal terminal pin to the negative electrode of storage battery, the fault lamp will flash for 10 times to represent 0, flash for 1 time to represent 1 after 1.2 seconds, flash for 10 times to represent 0 after 1.2 seconds, flash for 7 times to represent 7 after 1.2 seconds, namely P0107. It can be seen that except that number 0 is represented by flashing for 10 times, numbers 1-9 correspond to the times of flashing. If there are other fault codes, such as fault P0201, there is fault in the fuel injector of cylinder 1. After flashing P0107, wait for 3.2 seconds, continue to flash P0201 fault code; if there is no other fault, it will flash P0107 and P0201 cyclically. Then, relevant faults can be queried according to fault code table.

When using PCHUD software, the software will report fault code using decimal numbers. In fault code table, there is an one-to-one correspondence relationship between decimal numbers and previous hexadecimal numbers, and thus corresponding faults may be found according to the correspondence relationship. For example, MULFCURR (current fault) = 263 in the software, it corresponds to P0107 in fault code table, namely intake pressure sensor fault.

●MT05 Table of fault codes

System or Component	DTC Description	DTC Number		Chinese translation of DTC
		HEX (diagnostic unit display)	DEC (software display)	
Manifold Absolute Pressure Sensor (MAP)	MAP Circuit Low Voltage or Open	107	263	intake pressure sensor voltage is low or open-circuited
	MAP Circuit High Voltage	108	264	intake pressure sensor voltage is high
Intake Air Temperature Sensor (IAT)	IAT Circuit Low Voltage	112	274	intake temperature sensor voltage is low
	IAT Circuit High Voltage or Open	113	275	intake temperature sensor voltage is high or open-circuited
Coolant/Oil Sensor	Coolant/Oil Temperature Sensor Circuit Low Voltage	117	279	Water temperature sensor voltage is low
	Coolant/Oil Temperature Sensor Circuit High Voltage or Open	118	280	Water temperature sensor voltage is high or open-circuited
Throttle Position Sensor (TPS)	TPS Circuit Low Voltage or Open	122	290	Throttle position sensor voltage is low or open-circuited
	TPS Circuit High Voltage	123	291	Throttle position sensor voltage is high
Oxygen Sensor	circuit Low Voltage	131	305	Oxygen sensor voltage is low
	Circuit High Voltage	132	306	Oxygen sensor voltage is high
Oxygen Sensor Heater	Heater Circuit High Voltage	31	49	Oxygen sensor heating coil voltage is high
	Heater Circuit Low Voltage	32	50	Oxygen sensor heating coil voltage is low
Fuel Injector A	Injector A Fault	201	513	Fuel injector coil fault
Fuel Pump Relay (FPR)	FPR Coil Circuit Low Voltage or Open	230	560	Fuel pump relay coil voltage is low or open-circuited
	FPR Coil Circuit High Voltage	232	562	Fuel pump relay coil voltage is high
Crankshaft Position Sensor (CKP)	CKP Sensor Noisy Signal	336	822	Trigger (crankshaft phase sensor) signal is confused
	CKP Sensor No Signal	337	823	No trigger (crankshaft phase sensor) signal
Ignition Coil A	Cylinder A Ignition Coil fault	351	849	Ignition coil fault
Idle Control System	Idle Speed Control Error	505	1285	Idle speed control error
System Voltage	System Voltage Low	562	1378	Battery voltage is low
	System Voltage High	563	1379	Battery voltage is high
MIL	MIL Circuit Malfunction	650	1616	Fault indicator light is out of order
Tachometer	Tachometer Circuit Low Voltage	1693	5779	The rotating speed output voltage is low
	Tachometer Circuit High Voltage	1694	5780	The rotating speed output voltage is high
Vehicle Speed Sensor	VSS No Signal	500	1280	There is no signal in speed sensor
Park Neutral Switch Diag	Park Neutral Switch Error	850	2128	Neutral position and clutch switch fault

CCP	CCP short to high	445	1093	Canister solenoid valve output voltage is high
	CCP short to low/open	444	1092	Canister solenoid valve output voltage is low
Rollover Sensor Diagnostic	Rollover Sensor malfunction/Triggered	1500	5376	Vehicle-down sensor signal
BLM_MaxAdapt	Several BLM value hit maximum	171	369	Long-term learning value of fuel is slightly high
BLM_MinAdapt	Several BLM value hit minimum	172	370	Long-term learning value of fuel
PESystLean	PE mode burned AFR keeps lean	174	372	Continue to be thin in power enrichment mode

Diagnose fault using diagnostic apparatus

●Diagnostic apparatus

●Operation method:

a) Find the 6-port diagnose interface at motorcycle;

b) Connect connecting wire and diagnostic apparatus interface;

c) Open the key for diagnosis;

⚠Warning

- ✧ The XCM-PT100X diagnostic apparatus is a high-precision instrument that should be protected from shock and vibration;
- ✧ If the apparatus is not working properly or the display is unstable after it is turned on for the first time, please disconnect the power cable and try again;
- ✧ Please ensure that the connector is always

fastened in the diagnostic connector;

- ✧ It is strictly forbidden to test the electrical signals that exceed the limit;
- ✧ It is strictly forbidden for the driver to operate the instrument during driving;
- ✧ Use and storage conditions:
  Environment temperature: 0~50 degrees Celsius
  Relative humidity: less than 90%

Check fault using diagnostic software PCHUD

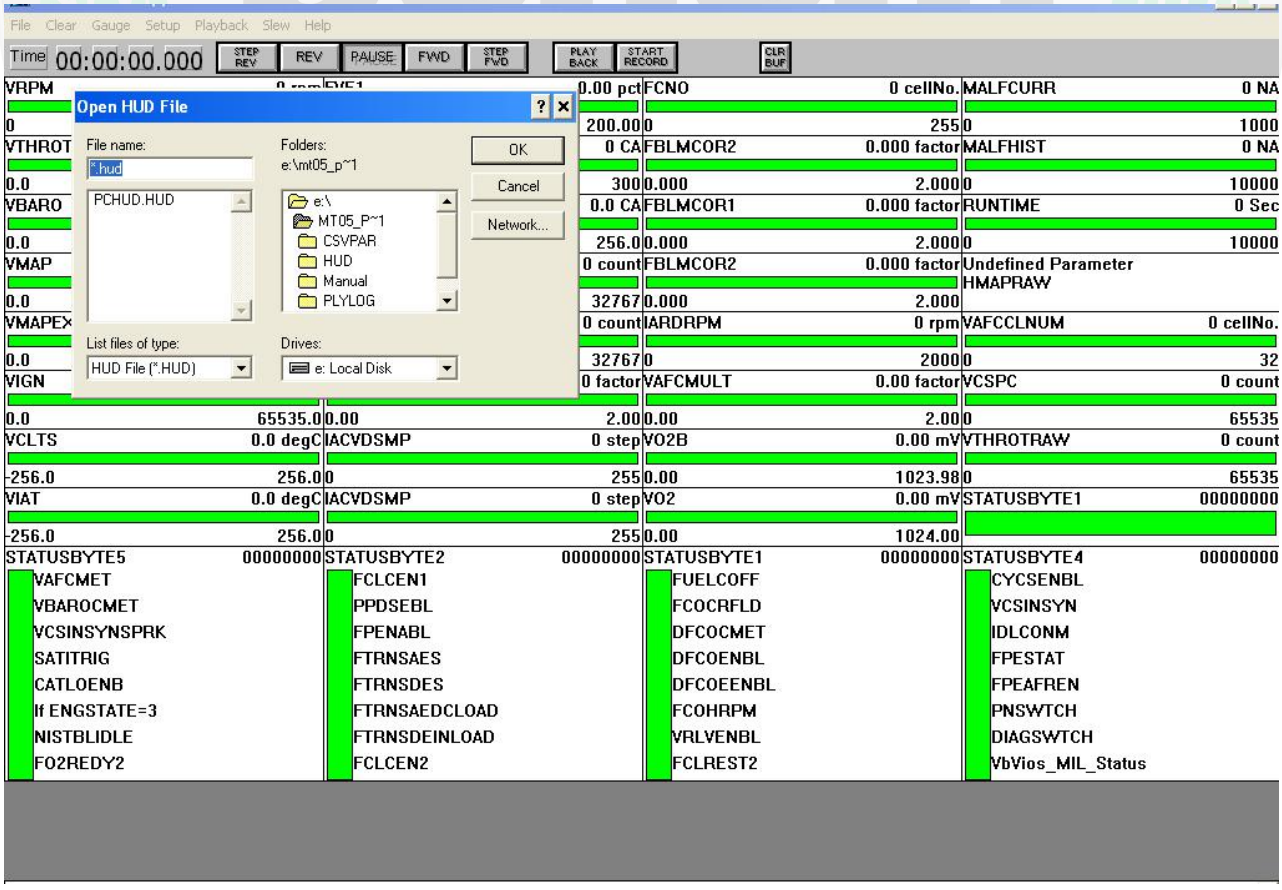
●PCHUD software is used to detect and record engine operating data, laptop should be connected to 6-port diagnostic port of motorcycle through K line before use, and the diagnosis port is below the rear seat cushion. Please note that the PCHUD system only supports 16Bit Microsoft Windows operating system or a very small number of 32bit Windows operating systems. It does not support 64bit systems such as Win7, Win8 or iOS. It is necessary to install K-line driver software on the notebook before use.

●Operating Instructions for PCHUD Software:

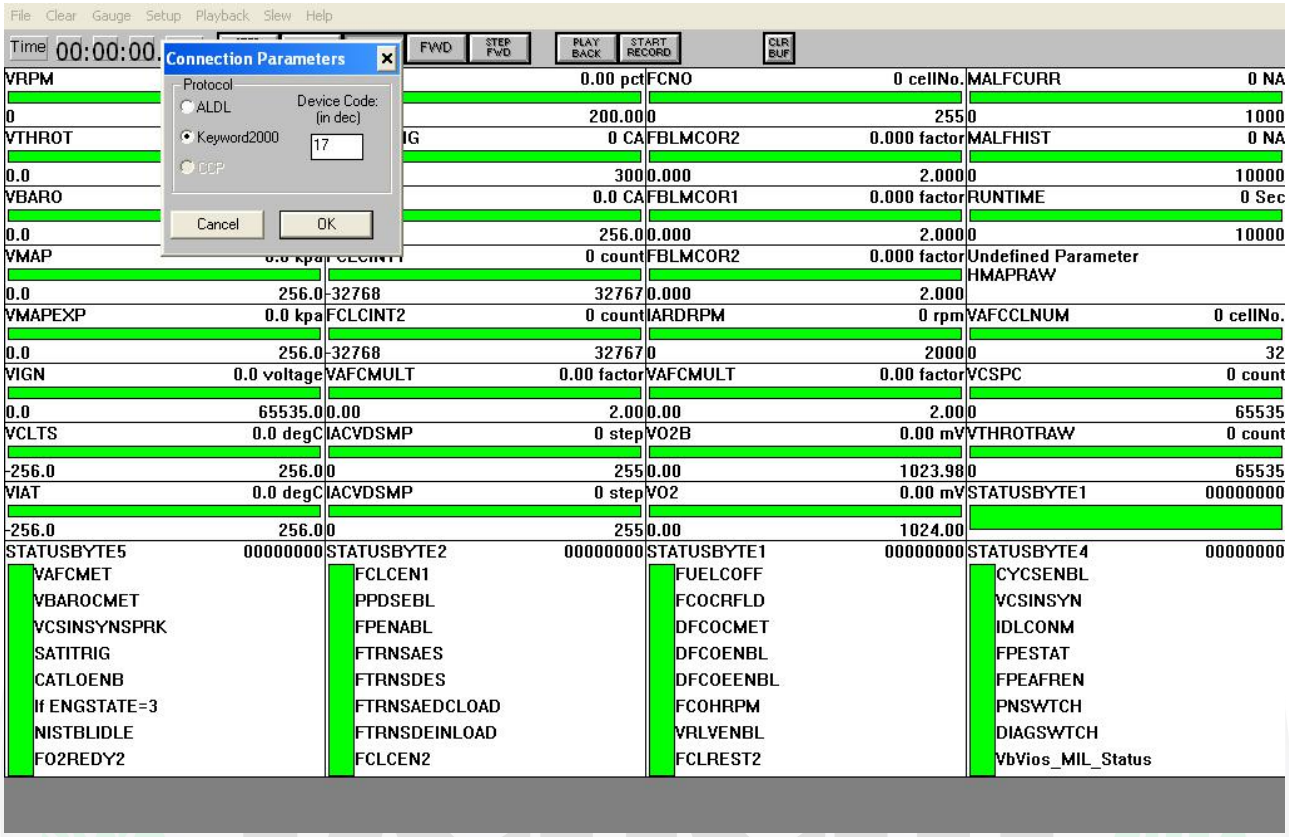
(1) Connect laptop and 6-hole diagnostic port of motorcycle using K line and open the key;

(2) Click “HUD.EXE” icon and start PCHUD software;

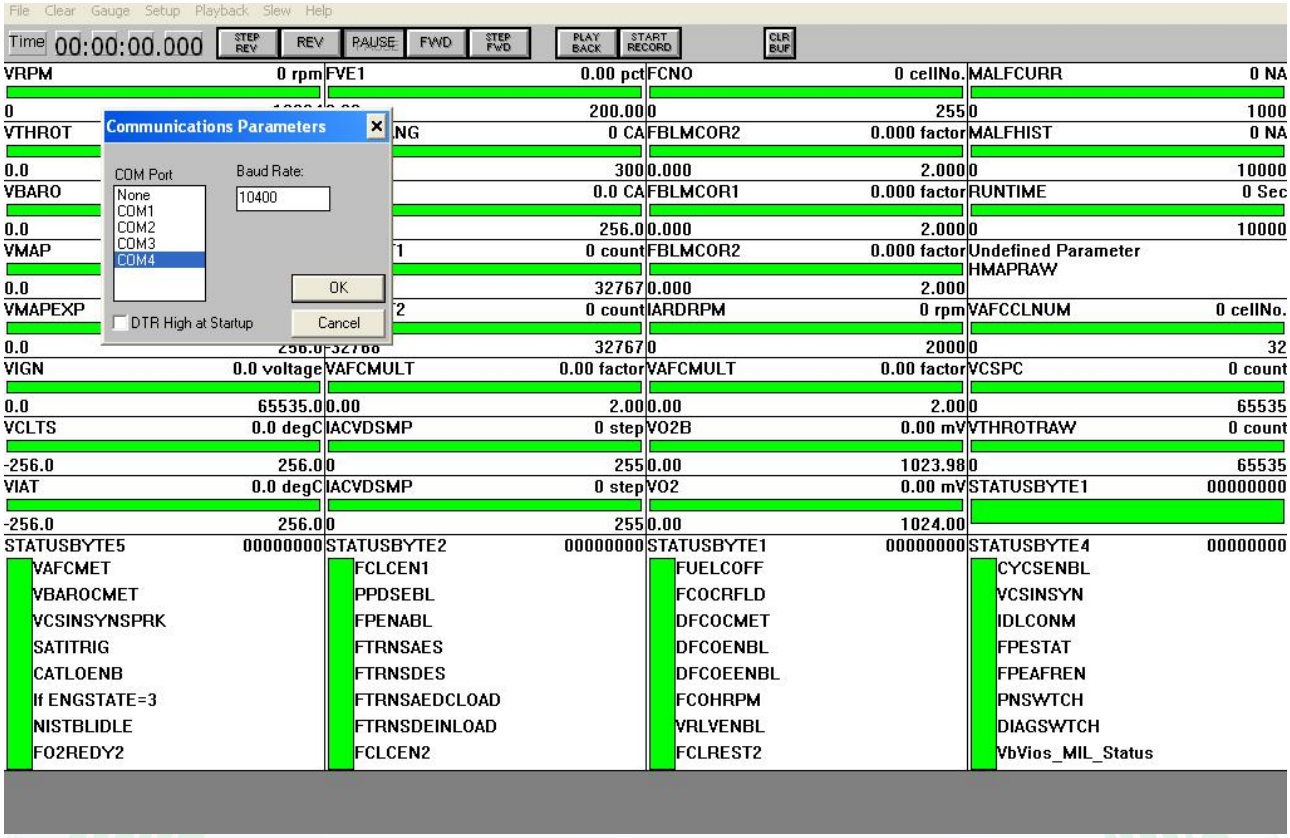
(3) Select “File” in the software interface, click “open” to select “PCHUD.HAD”, and then click “OK” for confirmation.



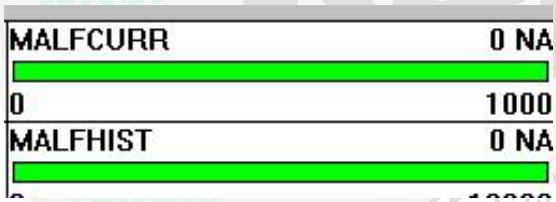
(4) Select “Parameter File” under “Setup”, click MT05common.par file, select “Comm protocol under “Setup”, select “Keyword2000” and then click OK, at the same time select 17 as the Device Code.



(5) If the software interface cannot display the real-time communications data, it needs to conduct the following work: check whether there is problem in COM port connection setting under “Setup”, generally set COM Port: 4. Baud Rate:10400, and do not select DTR High at startup



And then conduct normal communications, display the current fault code at MALFCURR, and display historical fault code at MALFHIST.



And then query the corresponding fault according to fault code table.

●PCHUD Software Parameter Interpretation:

VRPM	Engine speed	engine speed
VTHROT	Throttle opening	throttle position
VBARO	Atmospheric pressure	BARO
VMAP	Intake manifold pressure	manifold air pressure
VMAPEXP	Estimated value of intake manifold pressure	expect manifold air pressure
VIGN	Storage battery voltage	ignition key voltage
VCLTS	Temperature of cylinder temperature or coolant	cylinder temperature or coolant temperature
VIAT	Intake temperature	intake air temperature
STATUSBYTE5	Status flag 5	STATUSBYTE5
VAFCMET	Airflow learning conditions are met	airflow correction met
VBAROCMET	Atmospheric pressure updating conditions are met	Baro update met
VCSINSYNSPRK	Sequential ignition flag	sequential spark enable
SATITRIG	tip-in ignition angle correction conditions are met	tip-in Spark Advance retard trigger
CATLOENB	Catalyst work logic is enabled	catalyst light-off logic enable

IF ENGSTATE=3	Normal working flag position of engine	engine work in run state
NISTBLIDLE	The idle speed conditions for warming up machine are met	stable warm idle
FCNO	Long-term learning unit of intake efficiency	block learn memory cell
FBLMCOR1	Long-term learning value of cylinder	cylinder 1 block learn memory
FCLCINT1	Item I of closed loop learning	integral of close loop correction
FCLCMUL1	Correction of closed loop learning	close loop correction
IARDRPM	Rotating sped of desired idle speed	desired idle rpm
IARPMERR	Deviation of idle speed	idle rpm error
FPWVC1	Fuel injection pulse width of cylinder	base pulse width of cylinder 1
VO2	**Oxygen sensor signal**	Oxygen sensor signal
STATUSBYTE3	Status flag 3	STATUSBYTE3
FO2STAT1	Concentration mark of oxygen sensor of cylinder	cylinder 1 oxygen sensor signal rich lean state
FCLREST1	Correction and resetting mark of closed loop of cylinder	cylinder 1 close loop correction reset
FOSHTREN	Oxygen sensor heater is enabled	Oxygen sensor heater enable
FO2REDY1	Heating completion mark of oxygen sensor of cylinder	cylinder 1 Oxygen sensor ready
IF IACV MODE=0	Closed loop learning of idle speed stepper motor is enabled	idle airflow control valve close loop correction enable
IAMTRLOST	Lost step flag position of idle speed stepper motor	IACV lost
IACMVIHB	Flag position where the movement of idle speed stepper motor is disabled	IACV move disable
VIGNS	Ignition state flag position	ignition state
FVE1	Cylinder filling efficiency	cylinder 1 Volumetric efficiency
VMAPRANG	Intake pressure reading angle	MAP read angle
AFFNLAFR	Target air fuel ratio	target air fuel ratio
SAESTA	Ignition advance angle of cylinder	cylinder 1 Spark Advance
SAIDLDYN	Dynamic ignition angle at idle speed	idle dynamic Spark Advance
SPDWELL	Magnetizing time	dwell time
IAINTEGOFST	Airflow learning value of idle speed stepper motor	airflow integral of idle air control valve
IACVDSMP	Number of desired steps of idle speed stepper motor	desired position of idle air control valve
STATUSBYTE2	Status flag 2	STATUSBYTE2
FCLCEN1	Closed loop correction of cylinder is enabled	cylinder 1 close loop correction enable
PPDSEBL	Flag position where pilot injection is disabled	prime pulse disable
FPENABL	Flag position where fuel pump is enabled	fuel pump enable
FTRNSAES	Acceleration and enriching are enabled	acceleration enrich enter
FTRNSDES	Deceleration and thinning are enabled	deceleration enlean enter
FTRNSAEDCLOAD	Acceleration and enriching exit	acceleration enrich exit
FTRNSDEINLOAD	Deceleration and thinning exit	deceleration enlean exit

●**Diagnosis process:**

1.Insert the key on vehicle and do not start the motorcycle, please check:

Parameter	Check and Record	Min	Max	Description	Units
VIGN	□Norm □Abnormal	11.5	13	battery voltage	volt
VTHROT	□Norm □Abnormal	0	1	fully closed throttle position	percent
VTHROT	□Norm □Abnormal	98	100	fully open throttle position	percent
VTHROTRAW	□Norm □Abnormal	4000	9000	Absolutely throttle body voltage AD	None
VBARO	□Norm □Abnormal	98	103	atmospheric pressure	kpa
VIAT	□Norm □Abnormal	-15	40	intake air temperature	degC
VCLTS	□Norm □Abnormal	-15	40	cylinder temperature or coolant temperature	degC

2.Starting:

Parameter	Check and Record	Min	Max	Description	Units
Start	□Norm □Abnormal	-	-	-	-
TERRCNT	□Norm □Abnormal	0	0	Fly wheel tooth error counter	count
FUELCOFF	□Norm □Abnormal	0	0	fuel cut-off enable, the normal flag is white, if not blue	None
VRLVENBL	□Norm □Abnormal	0	0	Rollover sensor enable, normal is white, if not blue	None

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	□Norm □Abnormal	1300	1700	engine speed	rpm
VTHROT	□Norm □Abnormal	0	1	fully closed throttle position	percent
MALFCURR	□Norm □Abnormal	0	0	current MALF code	None
VBARO	□Norm	98	103	atmospheric pressure	kpa

	□Abnormal				
VMAP	□Norm □Abnormal	47	53	intake pressure measured value	kpa
VIGN	□Norm □Abnormal	12	16	battery voltage	volt
PNSWTCH	□Norm □Abnormal	0	0	Neutral and Clutch switch enable flag, blue is working	None
IACVDSMP	□Norm □Abnormal	10	60	stepping motor target value	step
vehicle speed	□Norm □Abnormal	0	0	vehicle speed	Km/h
FBLMCOR1	□Norm □Abnormal	0.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	□Norm □Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	□Norm □Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	□Norm □Abnormal	-15	15	cylinder 2 integral of close loop correction	count
FPWVC1	□Norm □Abnormal	1.5	2.6	base pulse width of cylinder 1	ms
FPWVC2	□Norm □Abnormal	1.5	2.6	base pulse width of cylinder 2	ms
VO2	□Norm □Abnormal	45	850	cylinder 1 oxygen sensor voltage	mv
VO2B	□Norm □Abnormal	45	850	cylinder 2 oxygen sensor voltage	mv

4. Run with stable speed

Parameter	Check and Record	Min	Max	Description	Units
MALFCURR	□Norm □Abnormal	0	0	current MALF code	None
VCLTS	□Norm □Abnormal	40	105	cylinder temperature or coolant temperature	degC
VIGN	□Norm □Abnormal	12	16	battery voltage	volt
vehicle speed	□Norm □Abnormal	0	220	vehicle speed	Km/h
FBLMCOR1	□Norm □Abnormal	0.75	1.15	cylinder 1 block learn memory	factor
FBLMCOR2	□Norm □Abnormal	0.75	1.15	cylinder 2 block learn memory	factor
FCLCINT1	□Norm □Abnormal	-15	15	cylinder 1 integral of lose loop correction	count
FCLCINT2	□Norm □Abnormal	-15	15	cylinder 2 integral of close loop correction	count
VO2	□Norm	45	850	cylinder 1 oxygen sensor voltage	mv

	□Abnormal				
VO2B	□Norm □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	□Norm □Abnormal	80	105	cylinder temperature or coolant temperature	degC
VIGN	□Norm □Abnormal	12	16	battery voltage	volt
VO2	□Norm □Abnormal	750	950	cylinder 1 oxygen sensor voltage	mv
VO2B	□Norm □Abnormal	750	950	cylinder 2 oxygen sensor voltage	mv

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Common troubleshooting methods for electronic fuel inject system

Maintenance tool

a) Disassembly and assembly of electronic control system components - common automotive mechanical parts removal tool

b) Electronic control system circuit and system electrical signal - digital multimeter (with buzzer)

c) Electric control system fault diagnosis and engine working condition detection

■ Electronic control system fault diagnostic apparatus (recommended)

■ Fault diagnosis software (PCHUD) and interface connection (conditional use)

d) Electronic control system fault code table (emergency use)

e) Fuel pressure gauge, range: 0-300kP

Engine working data flow displayed by diagnostic apparatus

Analyze and determine engine fault using the engine working data flow displayed by the diagnostic apparatus.

Step I

a) Engine harness and the vacuum pipeline—may affect the system to control air flow and fuel supply

b) Whether oxygen sensor is assembled in place—may affect the system to determine the air to fuel ratio

c) Engine fault indicator—may affect the system to give an alarm for fault

d) Storage battery voltage—determine whether the power of storage battery is sufficient

e) Determine whether coolant temperature sensor, intake temperature sensor, intake manifold absolute pressure sensor and oxygen sensor display value are normal

f) Working range of throttle position sensor—it cannot be fully opened or closed, which may affect engine power performance and some system functions

Step II

Check whether ECU power is turned off—the communications between diagnostic apparatus and system is interrupted after turning off key switch

Step III

a) Coolant temperature and coolant temperature cycle—predicts whether the thermostat is working properly

b) Storage battery voltage (14V) —Indicate whether the generator is working properly.

Too high: there may be fault in voltage regulator;

Too low: there may be improper connection of generator or generator fault

c) Intake manifold pressure—it can predict whether there is leakage in intake and valve clearance problems.

Valve clearance is too small: this value is too high, so engine power performance may be affected; in addition, due to too early opening of exhaust valve and increase in exhaust temperature, oxygen sensor and three-way catalytic converter service life may be significantly shortened;

Valve clearance is too large: it may cause low intake manifold pressure, and thus affect the system to determine the working state of engine, thus resulting in abnormal idle speed during warm-up of motorcycle.

In addition, if the exhaust system is blocked, for example: a foreign body exists in the outlet; the oil consumption is too high, thus blocking three-way catalytic converter; three-way catalytic converter is blocked due to internal damage, which will cause slightly high value.

d) Number of cycles of oxygen sensor value—the number of cycles is too small, indicating fault of oxygen sensor

Simple Troubleshooting

Please follow the following steps to repair EFI system. To repair fault in one step, the subsequent steps may be stopped. And then use diagnostic apparatus to conduct inspection and acceptance and clear fault code according to "Engine Working Data Flow Displayed by Diagnostic Apparatus".

When using diagnostic apparatus, the voltage of storage battery should not be lower than 8.5 V.

Daily Use and Maintenance

- Gasoline should be high quality without lead.
- ECU has a moisture-proof function, but high-pressure water gun should not be used to rinse its shell.
- The petrol filter should be changed every 18000km.
- Under normal conditions of use, clean the throttle body every 10,000 km or 1 year.

Fault phenomenon-Start Fault

a) Rotate ignition switch to "On" position, and check whether engine fault lamp is on.

If it is off:	◆ Check fuse and grounding wire ◆ Check whether ECU plug is connected firmly ◆ It is able to check whether this lamp and line is normal using the check function of diagnostic apparatus actuator ◆ Check and repair bulb and its line
It is be able to be on:	◆ Connect diagnostic apparatus to system diagnosis interface

b) Check whether diagnostic apparatus can be connected to system for communications

If not:	◆ Check fuse and grounding wire ◆ Check whether ECU plug is connected firmly ◆ Test whether diagnostic apparatus is working normally at another normal motorcycle
If yes:	◆ Remove the fault indicated by diagnostic apparatus

c) Check ignition system fault—whether normal ignition can be made for spark plug

If not:	◆ Check whether high-voltage line and spark plug are plugged firmly or damaged ◆ Use another ignition coil for assembly judgment ◆ Judge using ECU
If yes:	◆ Check whether high-voltage line is connected to ignition coil and spark plug properly

d) Check oil supply system fault

Check whether fuel pump is working—it is able to hear the sound that the fuel pump is working near the fuel tank when starting engine

Not work:	◆ Check whether fuel pump relay is working normally ◆ Check whether the connection and working of crankshaft position sensor is normal ◆ Judge using ECU ◆ Check fuel pump line	
Be able to work:	1) Check whether fuel supply pressure is greater than 220Kpa	
	2) Insufficient pressure:	◆ Check whether there is sufficient fuel in the fuel tank ◆ Check whether fuel filter needs to be replaced (note: replace the fuel filter special for electronic injection should be replaced once every 18000km) ◆ Check whether fuel supply pipe and fuel return pipe are damaged
	3) Normal pressure:	◆ Check whether there is any abnormality in nozzle control line ◆ Check whether nozzle needs to be cleaned

e) Confirm whether cylinder is submerged

If yes:	◆ After completely opening the throttle and turning on starting motor, there should be working sign in engine after several seconds

f) Check whether crankshaft position sensor clearance is too large

Fault phenomenon—Start failure with tempering

a) Check whether ignition coil is loosened;

b) Check whether timing gear ring is loosened.

Fault phenomenon—Instable idle speed

Idle control system:	Check whether the idle bypass bolt is loose
Oil supply system:	Check whether there is leakage in oil pipeline

Fault phenomenon—Too high or too low idle speed (idle speed is obviously inconsistent with target idle speed)

Too high idle speed:	◆ When the water temperature is lower than 68 degrees, the system will increase idle speed to accelerate warming-up process, which is normal phenomenon. Check the items according to the following items except that ◆ Adjust the negative pressure balance of cylinder before check ◆ Check whether valve clearance, especially exhaust valve clearance is too large
Too low idle speed:	◆ Check fuel quantity in fuel tank, fuel filter, fuel line pressure and nozzle ◆ Checking valve clearance and confirm whether it is too small

Fault phenomenon—Instable idle speed with deceleration and flameout

a) Checking valve clearance;

b) Check whether idle speed bypass hole and throttle body are too dirt.

Fault phenomenon—Insufficient power of deceleration

a) Check whether the parameters are normal at idle speed and high idle speed;

b) Check fuel quantity in the fuel tank and fuel filter;

c) Check whether exhaust system is blocked, for example: whether three-way catalytic converter is blocked by burning oil or damage;

d) Check fuel line pressure and nozzle;

e) Check whether fault lamp is on, and whether normal ignition can be conducted for only one cylinder.

Fault phenomenon—Slight burning phenomenon

Check whether the spark plug clearance meets specification of 0.7±0.1 mm

Fault phenomenon—Fault lamp is on, but fault code is inconsistent with fault

It may be caused due to instable connection of system grounding wire, reconnect the grounding wire, disconnect the power cable of battery for 3 minutes and then start the engine.

Fault phenomenon—Extremely high fuel consumption

a) Check whether the oxygen sensors of two cylinders are assembled in place; if it is in the loose state, the oxygen sensor may incorrectly judge that the combustion in the cylinder is thin, and then increase fuel, which may result in unusually high fuel consumption.

b) After confirming that the engine mechanical parts and oxygen sensor are in normal conditions, run the engine to observe the oxygen sensor reading. If the reading is always greater than 500 mV at normal water temperature, check whether there is leakage in fuel injector.

Precautions

- The vast majority of EFI parts cannot be repaired; after the confirmation of damaged parts, generally replacement is taken.
- When starting the engine, do not operate any mechanism (including the throttle, do not pull the throttle for start) on the engine.
- If engine fault lamp becomes on during the engine operation, cause must be checked and eliminated as soon as possible.
- Do not use leaded gasoline, because lead may damage the oxygen sensor and three-way catalytic converter.
- If oil consumption is abnormal, the problem should be resolved as soon as possible, because some of the substances in the oil may damage the oxygen sensor and three-way catalytic converter.

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- Valve clearance should not be too small, if the exhaust valve if is not adjusted properly, exhaust temperature may become too high and thus shorten the life of three-way catalytic converter.
- °At the temperature of below 10°C, if the vehicle and engine run at low speed for a long time, the exhaust pipe may have carbon deposition and become black, which is a normal phenomenon. It will be eliminated after a period of high-speed operation, or appropriate means should be taken to keep the engine coolant temperature within the specified temperature range.

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Sample of diagnostic table

Name of rider:	Registration number (license plate number):	**First registration year:**
Model:	**Engine number:**	**Frame number:**
Date of fault:		**Mileage:**

Environment where the fault occurs	
Weather	□ Sunny □ Cloudy □ Rainy □ Snowy □ General □ Others:
temperature	□Hot □Warm □Cold □Very cold □General □Others:
Frequency of fault	□Usual □Frequent □Only once
Road conditions	□Street □Road □Mountain road (□ Uphill, □ Downhill) □ Rugged road □ Gravel road
Altitude	□Normal □High altitude (about 1000 m or above)
The state of the motorcycle in the event of fault	
Alarm indicator light (LED)	□ After the main switch is turned on for about 3 seconds, the FI warning message and the FI warning sign (EFI system failure) are alternately displayed on the LCD.
	□ After the main switch is turned on for 3 seconds, the FI flashing burglar alarm system warning message and sign are displayed on the LCD screen (anti-burglar control system is faulty).
	□ After the main switch is turned on for 3 seconds, the alarm light will go out.
It is difficult to start	□The starter motor does not run.
	□ The starter motor rotates but the engine does not start.
	□ The starter motor and engine are not started.
	□Unable to supply oil (□ no fuel in the fuel tank, no running sound of fuel pump).
	□ Submerge cylinder (Do not open the throttle valve when starting to avoid submerging the cylinder).
	□The spark plug cannot work properly.
	□Other:
Flame-out of engine	□ It will flame out after start.
	□ It will flame out after turning on the throttle.
	□ It will flame out after turning off the throttle.
	□ It will flame out when moving the motorcycle.
	□ It will flame out after stopping the motorcycle.
	□ It will flame out when running at a constant speed.
	□Other:
It cannot run properly at a low speed	□ The idle speed is very low, □ the idle speed is very high, □ and the idle speed is unstable.
	□ The battery voltage is low (test after charging).
	□ The spark plug is loose (tighten the spark plug).
	□ The spark plug is dirty, broken or the gap is improper (corrected).
	□ Tempering.
	□Blasting.
	□It is sluggish when accelerating.
	□ The oil viscosity is too high.
	□ Brake drags.
	□Engine overheating
	□The clutch is slipping
	□Other:
The acceleration is sluggish	□ The spark plug is loose (tighten the spark plug).
	□ The spark plug is dirty, broken or the gap is improper (corrected).
	□ The spark plug model is improper (replace it).
	□ Deflagration (poor or improper oil quality, replace it using the gasoline with high-octane rating).
	□ Brake drags.
	□The clutch is slipping
	□Engine overheating
	□ There is a lot of oil.
	□ The oil viscosity is too high.
	□Other:

Chapter IV Cooling System

Contents

Exploded view of cooling system 163
Exploded view of water pump 165
Coolant flow diagram 166
Technical parameters 168
Coolant 169
- Check coolant for deterioration 169
- Check coolant level 169
- Drain the coolant 169
- Add the coolant 169
- Detect pressure 169
- Flush cooling system 169
- Disassembly/installation of coolant reserve tank 170

Water pump 171
- Disassembly of water pump 171
- Installation of water pump 172
- Check water pump impeller 172

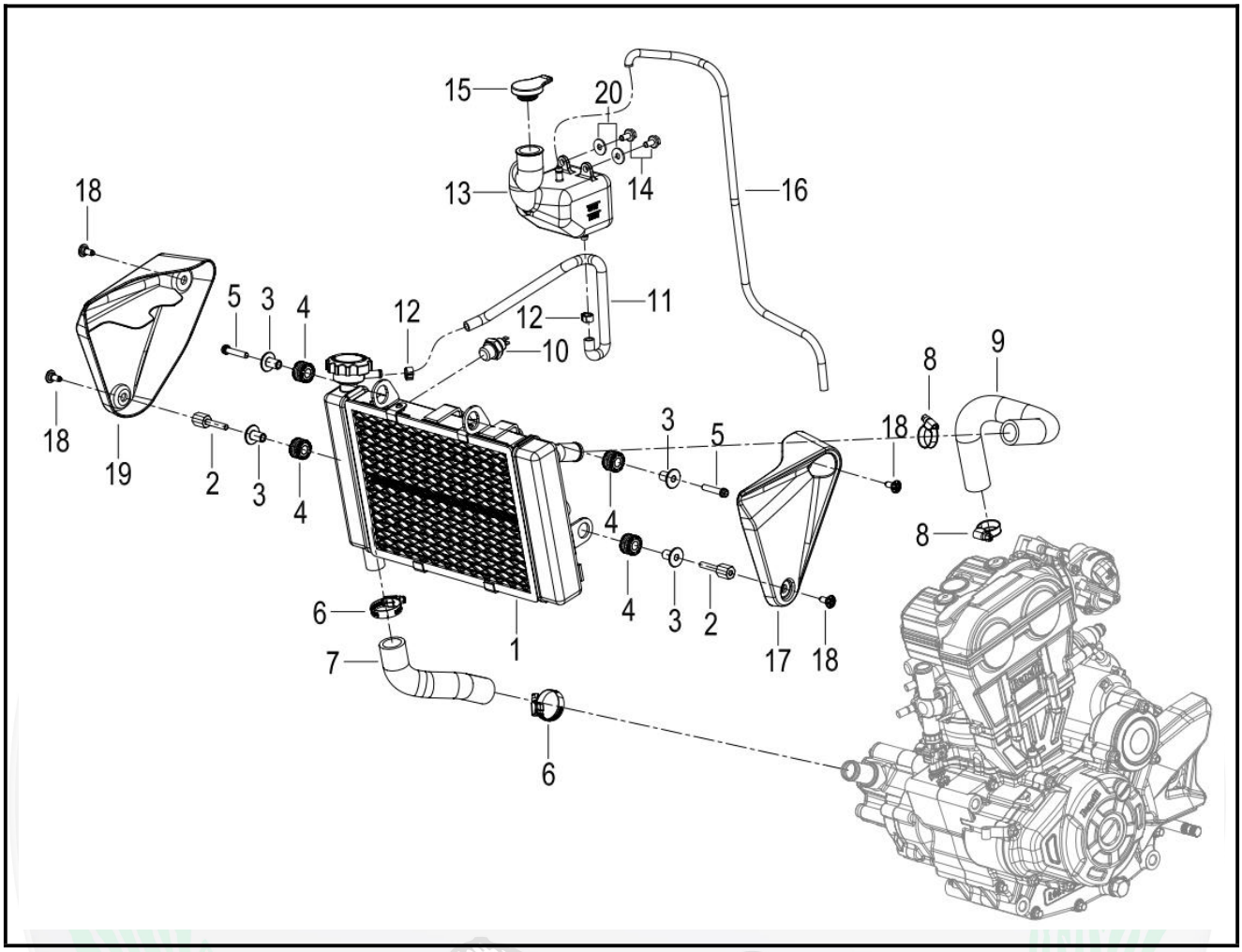
Radiator 173
- Disassembly of radiator and radiator fan 173
- Installation of radiator and radiator fan 174
- Inspection of radiator 174
- Inspection of radiator cover 176
- Inspection of radiator filler 177

Thermostat 178
- Disassembly of thermostat 178
- Installation of thermostat 179
- Inspection of thermostat 179

Hose and pipeline 181
- Installation of hose 181
- Inspection of hose 181

Water temperature sensor 182
- Disassembly / installation of water temperature sensor 182
- Inspection of water temperature sensor 182

Exploded view of cooling system



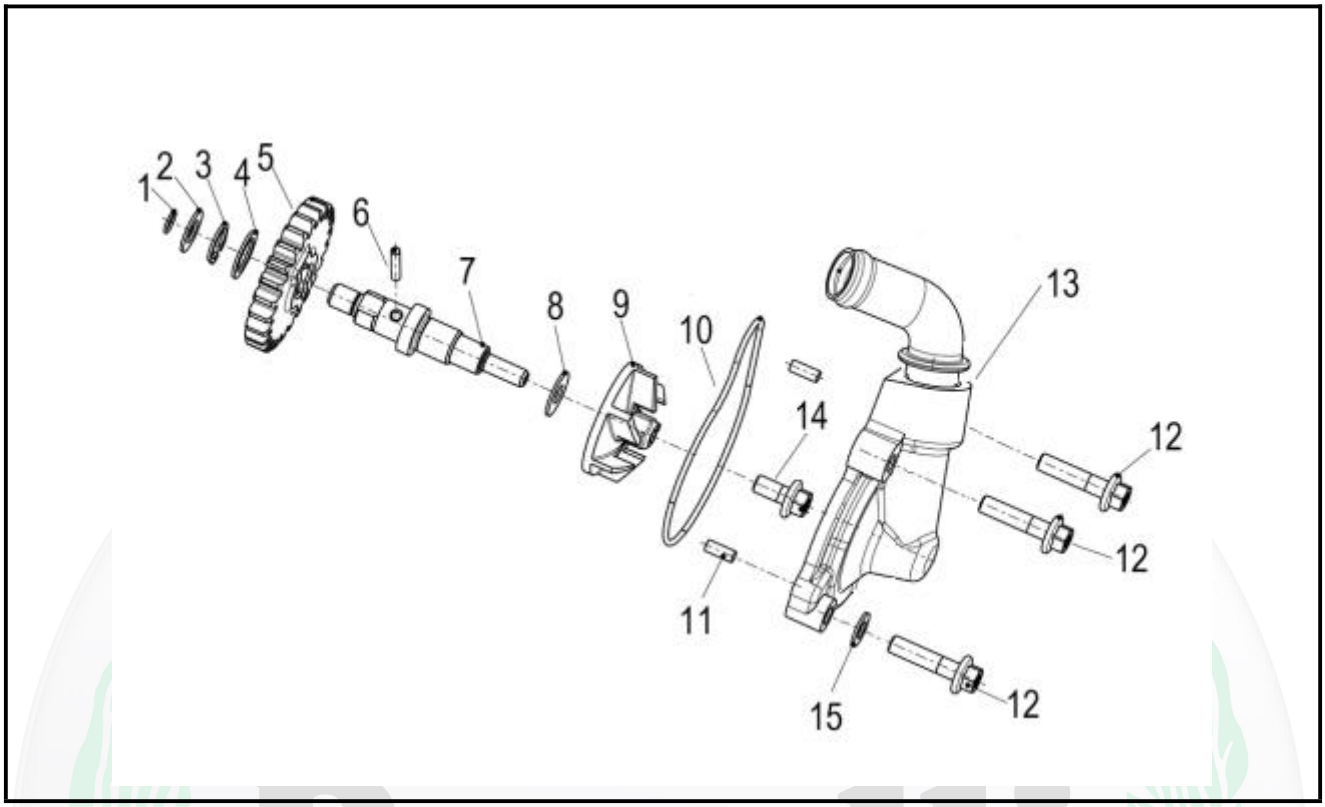
No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Radiator	1	—	—	
2	Hexagon steel bolt	2	10	1.0	
3	Collar	4	—	—	
4	Rubber pad	4	—	—	
5	Bolt M6×30	2	10	1.0	
6	Clamp 30-706R	2	—	—	
7	Engine inlet hose	1	—	—	
8	Clamp Φ27	2	—	—	
9	Outlet hose	1	—	—	
10	Outlet water temperature switch assembly	1	—	—	
11	Inlet hose of coolant reserve tank	1	—	—	
12	Clamp Φ10	2	—	—	
13	Expansion tank	1	—	—	
14	Hexagon bolt with flange M6×12/polished head	2	10	1.0	
15	Expansion cap	1	—	—	
16	Inlet hose of coolant reserve tank	1	—	—	
17	Cover of left water tank	1	—	—	
18	Screw M6×20	4	10	1.0	
19	Cover of right water tank	1	—	—	
20	Washer Φ6	2	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

Exploded view of water pump



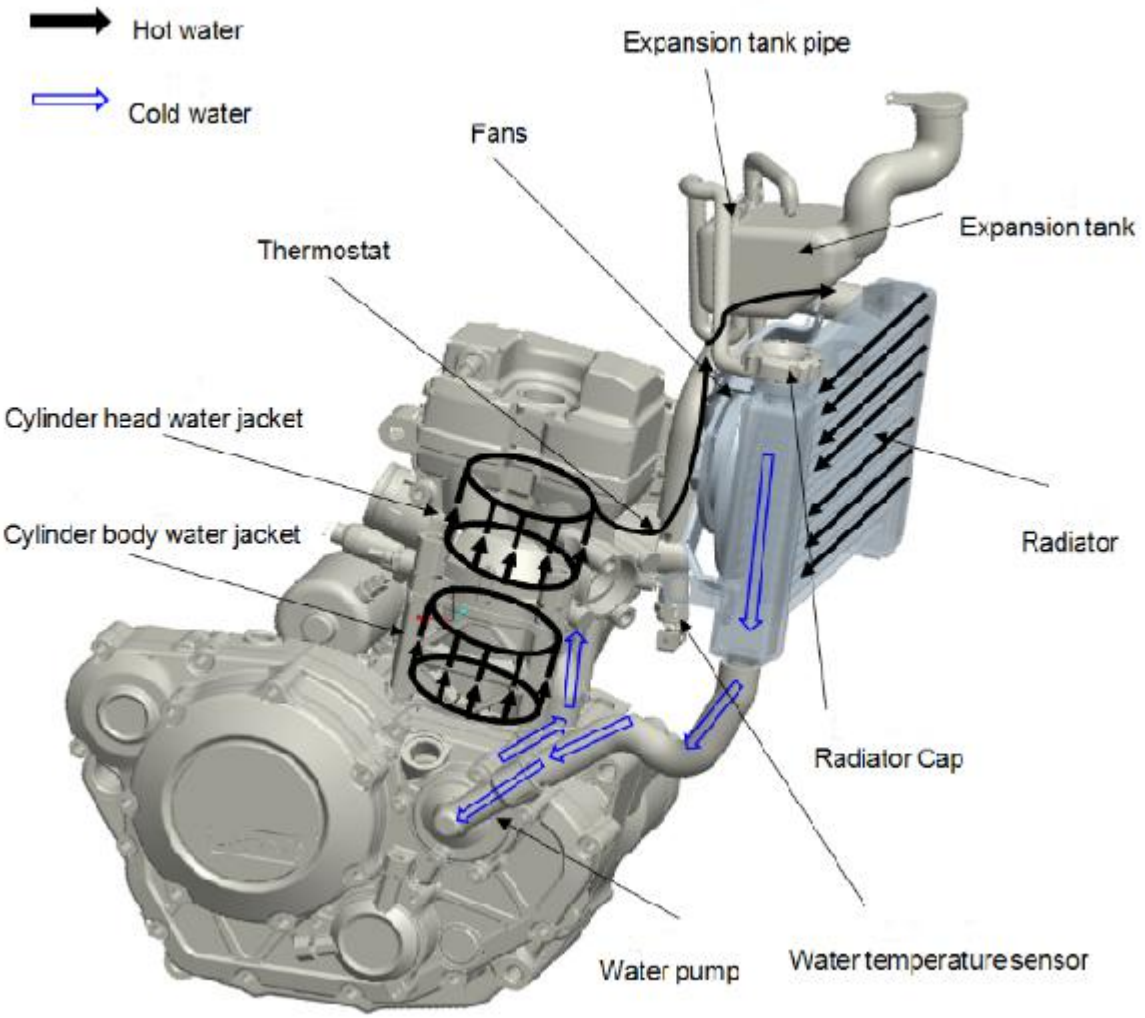
No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Retainer	1	—	—	
2	Washer	1	—	—	
3	Elastic retainer for shaft φ12	1	—	—	
4	Washer	1	—	—	
5	Plastic gear of pump gear	1	—	—	
6	Pin B3×22	1	—	—	
7	Water pump shaft	1	—	—	
8	Washer	1	—	—	
9	Water pump impeller	1	—	—	
10	Pump seal	1	—	—	
11	Pin	2	—	—	
12	Bolt M6×30	3	10	1.0	
13	Water pump cover	1	—	—	
14	Bolt M6×20	1	10	1.0	
15	Washer	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

Coolant flow diagram



Permanent antifreezing liquid is used as a coolant to prevent the cooling system from being rusted or corroded. Once the engine is started, the pump will begin to rotate and the coolant will begin to circulate.
The cooling system uses a paraffin-based thermostat that open as the temperature of the coolant changes. In order to maintain the coolant at the proper temperature, the thermostat constantly changes the valve opening. If the temperature of coolant is below 75°C, the thermostat closed to limit the flow of coolant through venting holes, thus allowing the engine to warm up faster. If the temperature of coolant is higher than 75°- 90°C, the thermostat open and the coolant will flow.

If the temperature of coolant exceeds 98°C, the radiator fan switch starts to work, thus causing the radiator fan to rotate. If the air flow is insufficient (such as when the motorcycle is running at low speed), the radiator fan will draw air through the radiator fins to accelerate the cooling effect of radiator. If the temperature of coolant is lower than 93°C, the radiator fan relay will be turned off and the radiator fan will stop rotating.

In this way, the cooling system controls the temperature of engine within a narrower range, and the engine can operate efficiently even if the load of engine changes.

This cooling system is pressurized through radiator cap to prevent the coolant from boiling and creating bubbles and causing too high temperature of engine. As the temperature of engine rises, the coolant in the radiator

and water jacket will expand. Excess coolant will flow through the radiator cap and hose, then to the auxiliary tank and is temporarily stored in the expansion tank. Conversely, as the temperature of engine drops, the coolant in the radiator and water jacket will shrink and the coolant stored in the expansion tank will flow back to the radiator.

There are two valves on the radiator cover. One is a pressure valve that controls the pressure in the cooling system while the engine is running. If the pressure exceeds 93 ~ 123 kPa, the pressure valve will be opened and the pressure in the expansion tank will be released. After the pressure is released, the pressure valve will be closed and the pressure will be maintained at 93 ~ 123 kPa. When the engine cools, another small valve (negative pressure valve) on the radiator cap will be opened. As the temperature of coolant decreases, the coolant will shrink, thus causing the system to form a vacuum. The negative pressure is turned on to allow the coolant to flow from the expansion tank to the radiator.

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Technical parameters

Item	Normal
Coolant prepared when delivering goods	
(Recommended) type	Permanent antifreezing liquid
Color	Green
Mixing ratio	50% soft water, 50% coolant
Freezing point	–35°C
Total amount	3.4L (full level of coolant reserve tank, including radiator and engine)
Radiator cover	
Release pressure	93 ~ 123 kPa
Thermostat	
Valve opening temperature	75~90°C
Valve head	≥7 mm at 75°C

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Cooling fluid

Check coolant for deterioration

●Visually inspect the coolant inside the reservoir.
★ If white cotton-like floats are observed, the aluminum parts inside the cooling system have been corroded. If the coolant is brown, the iron or steel parts are rusting. In either case, flush the cooling system.
★If the coolant smells, check the cooling system for leakage. Because exhaust gas may enter the cooling system.

Check coolant level

● See "Check Coolant Level" in chapter "Periodic Maintenance" for details.

Drain the coolant

● See "Replacing Coolant" in chapter "Periodic Maintenance" for details.

Add the coolant

● See "Replacing Coolant" in chapter "Periodic Maintenance" for details.

Detect pressure

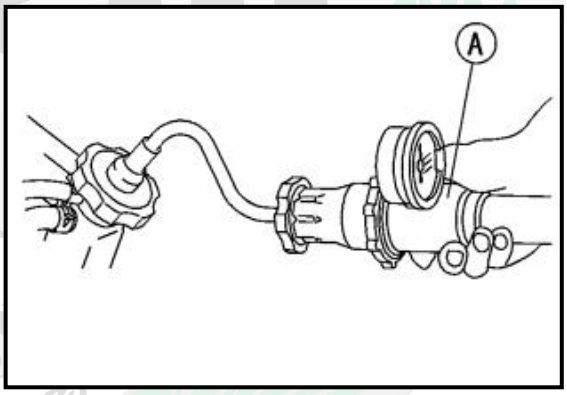
●Remove the radiator cap and install the cooling system pressure gauge [A] on the filler.

Remarks
○Dampen the sealing surface of the radiator cover with water or coolant to prevent pressure leakage.

●Gradually increase the pressure in the system until the pressure reaches 123 kPa

Notes
Do not exceed the designed maximum pressure of the system when testing pressure. The maximum pressure is equal to 123 kPa

● Observe the pressure gauge for at least 6 seconds.
★ If the pressure remains stable, the system is normal.
★If the pressure drops and no external problems are found, check the internal part for leakage. If a small amount of oil is found in the coolant, it indicates internal air leakage. Check cylinder head gasket and water pump.
●Remove the pressure gauge, replenish the coolant, and cover the radiator cap.



Flushing Cooling System

●At set intervals, rust, scale and calcium oxide may be deposited in the pipe chamber and the radiator in the cooling system. Once you find rust, scale and calcium oxide, flush the cooling system! Otherwise, the above deposits may block the water channel, thus greatly reducing the efficiency of the cooling system.

● Drain the coolant (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).
●Fill the cooling system with a mixture of fresh water and detergent.

Notes
Do not use the cleaners that can corrode aluminum engines and radiators! Please strictly observe the relevant regulations in the product manual provided by the manufacture!

●Heat the engine up and run it for about ten minutes at normal operating temperature conditions.
●Turn off the engine and drain the cooling system.
●Fill the cooling system with fresh water.
●Heat the engine up and drain the cooling system.
●Repeat the previous two steps again.
●Add permanent coolant to the cooling system and drain the air from the cooling system (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).

Disassembly/Installation of Coolant Reserve Tank

● Before replacing the coolant, remove the coolant reserve tank and then install it after replacement (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).

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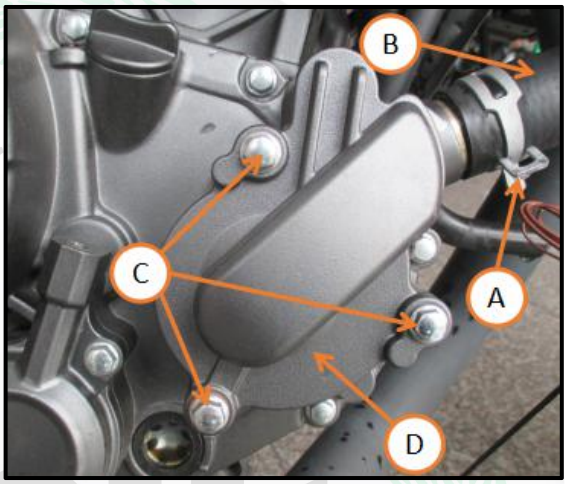
Water pump

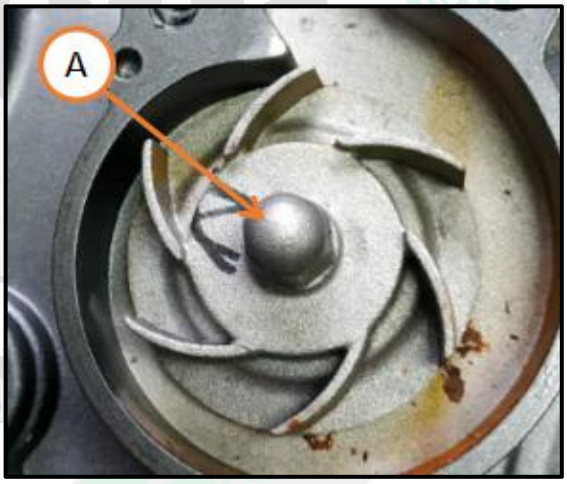
Disassembly of Water Pump

● Remove the bottom cover (see “Removing the Bottom Cover” in the chapter “Frame”).
● Drain the coolant (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).
● Drain the oil (see "Replacing Oil" in chapter "Periodic Maintenance" for details).
●Disassemble:
Hose clamp [A]
Inlet hose [B]
Water pump cover bolt [C]
Water pump cover [D]

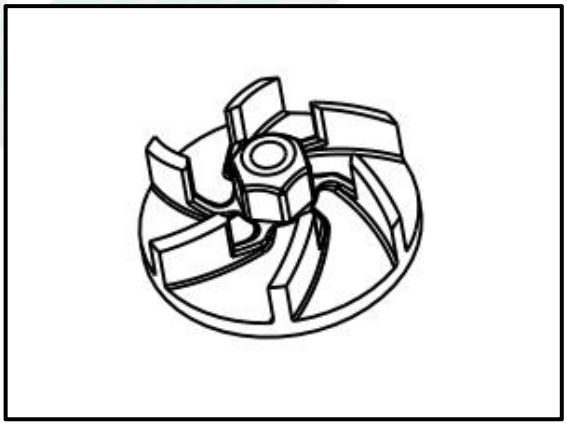
Note:
Need to be done while cooling the engine **When pulling out the hose, do not splash the coolant to the personnel.**



●Remove the impeller mounting bolt [A].



●Remove the impeller from the shaft [A].



Installation of Water Pump

● Replace the seal [A].

●Install the parts disassembled previously (see the corresponding chapters).

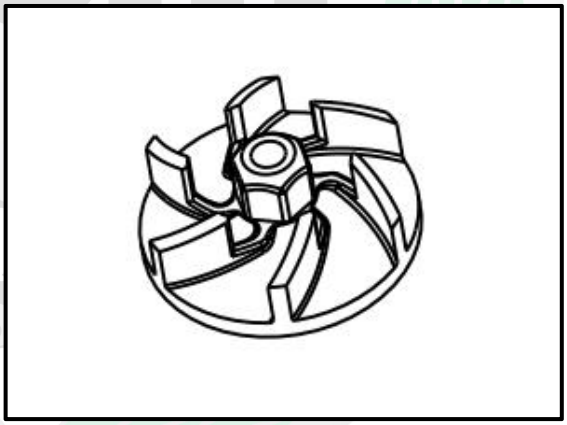
● Locking torque

Locking torque of water pump cover bolt: 9.8 N•m

Check water pump impeller

● Visually inspect the impeller of water pump.

★ If the impeller surface has been corroded or the blade is broken, replace the water pump assembly.



Radiator

Disassembly of Radiator and Radiator Fan

● Remove the radiator cowling (see “Removing Radiator Cowling” in the chapter “Frame”).

● Drain the coolant (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).

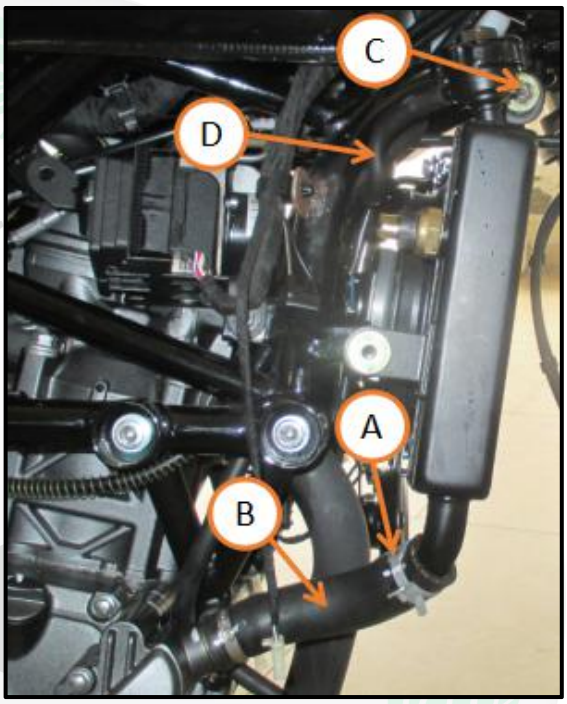
●Disassemble:

Engine outlet hose clamp [A],

Engine outlet hose [B],

Upper mounting bolt of radiator [C],

Hose of coolant reserve tank



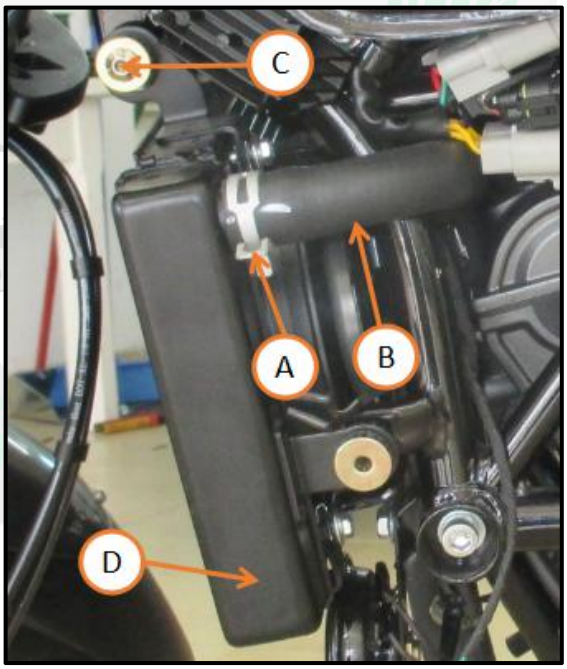
●Disassemble:

Engine inlet hose clamp [A],

Engine inlet hose [B],

Upper mounting bolt of radiator [C],

Radiator [D



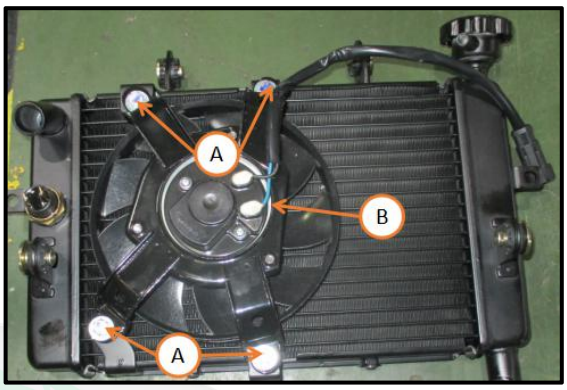
Notes
Do not touch the heat sink fins as this will damage the heat sink and reduce cooling efficiency.

● When removing the radiator, disconnect the radiator fan cable connector.

●Disassemble:

Radiator fan mounting bolt [A]

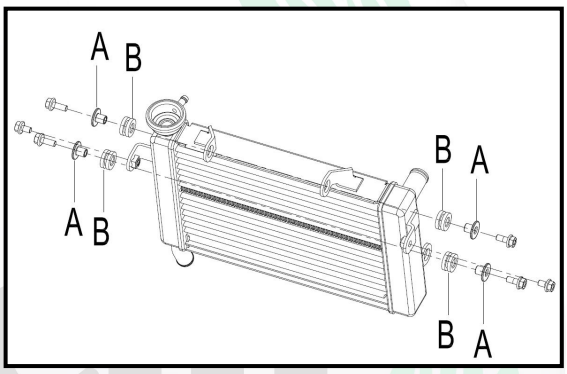
Radiator fan [B]



Assembly of Radiator and Radiator Fan

● Properly arrange the radiator fan motor lead (see section "Winding Method of Cables, Wires and Hoses" of Chapter "Appendix" for details).

● Install the radiator bracket bushing [A], cushion rubber bushing [B] and bolts, as shown in the figure below.



●Install the parts disassembled previously (see the corresponding chapters).

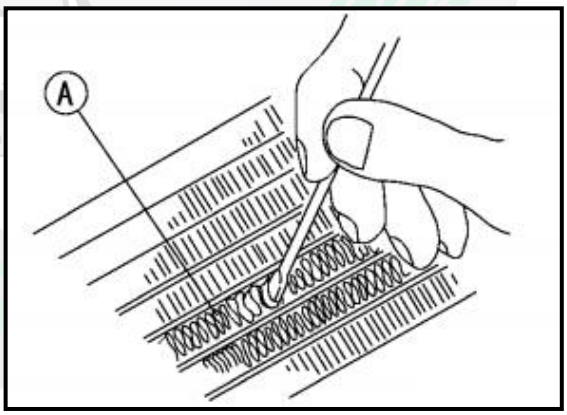
Inspection of Radiator

● Check radiator fins.

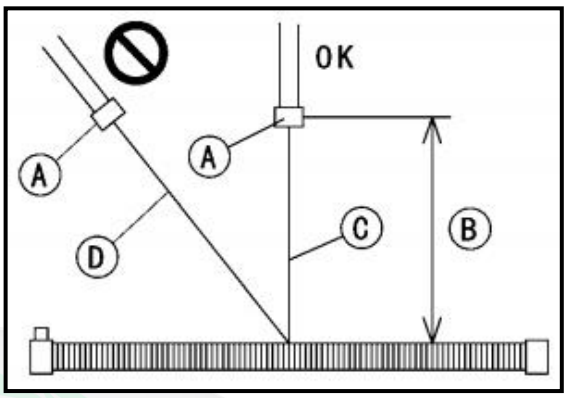
★If there are any obstacles that block the flow of air, please clean up!

★ If the radiator fin [A] is deformed, carefully straighten it.

★If the obstacle that cannot be removed or the radiator fin that cannot be repaired blocks the air passage of 20% or more of the radiator, you need to replace it with a new one.



Notes
In order to avoid damage to the radiator, the following precautions should be taken when cleaning the radiator with a steam cleaning device: **The steam gun [A] must be at a distance of 0.5 m [B] or more from the radiator fins.** **When holding the steam gun, make it vertical [C] (do not tilt [D]) on the surface of radiator fin.** **Use the steam gun according to the direction of the radiator fin heat sink.**



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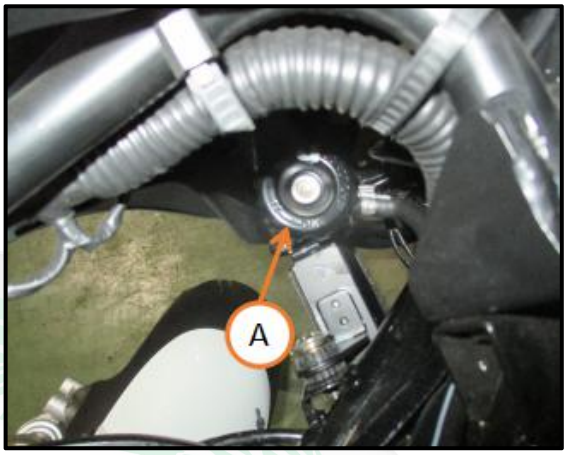
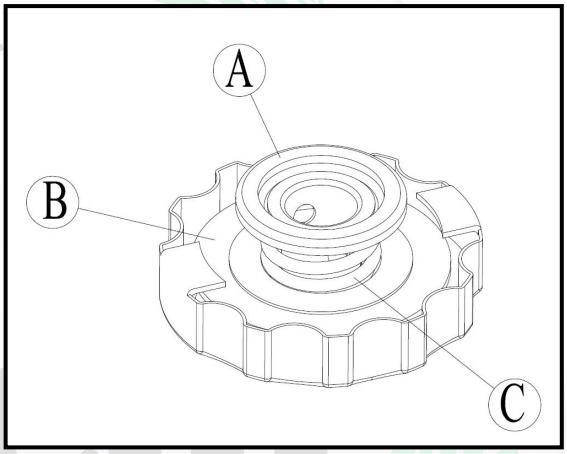
Inspection of radiator cover

●Disassemble:
Radiator cap [A]

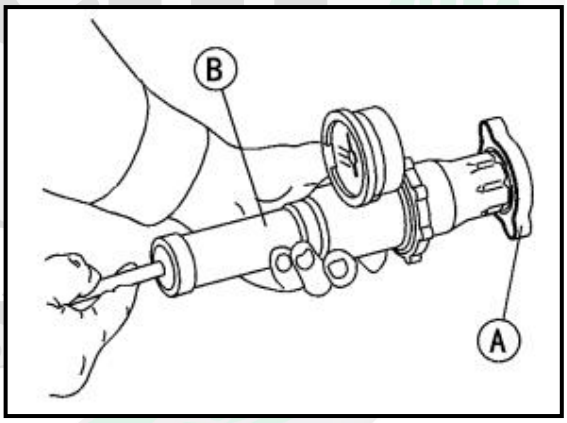


● Check the base [A], top [B] valve seal and valve spring [C].
★ If any of the above parts is broken or bend, you need to replace it with a new one.



● Mount the cover [A] on the pressure gauge of cooling system [B].

Remarks
○Dampen the sealing surface of the radiator cover with water or coolant to prevent pressure leakage.



●Observe the pressure gauge, pump up the pressure gauge, increase the pressure until the pressure relief valve opens: the pressure gauge pointer pops open. Stop pumping and immediately measure the pressure value when the air leaks. The pressure relief valve must be opened within the limits specified in the table below. In addition, the gauge pointer must remain in this range for at least 6 seconds.

Radiator cover release pressure
Standard: 93-123 kPa

★ If the radiator cap cannot maintain the specified pressure or maintain excessive pressure, you need to replace it with a new radiator cap

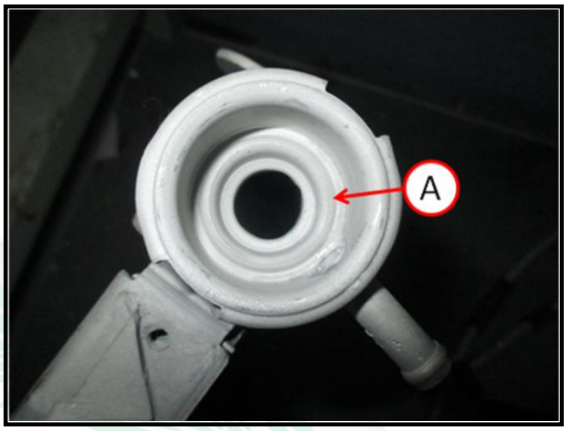
Inspection of Radiator Filler

●Disassemble:

Radiator cover

●Check the radiator water filler for damage.

●Check the top and bottom seals [A] inside the filler. The top and bottom seal sleeves must be smooth and clean to ensure proper operation of radiator cap.



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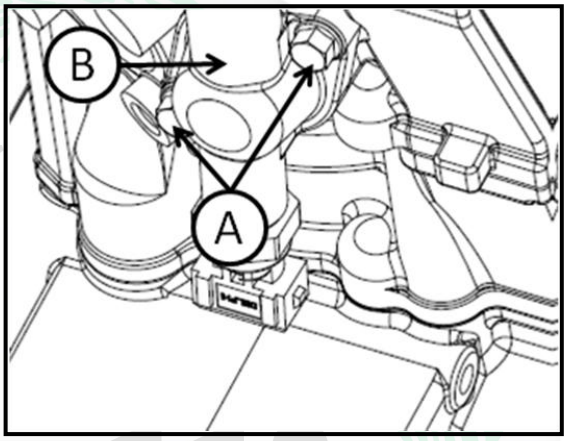
Thermostat

Disassembly of Thermostat

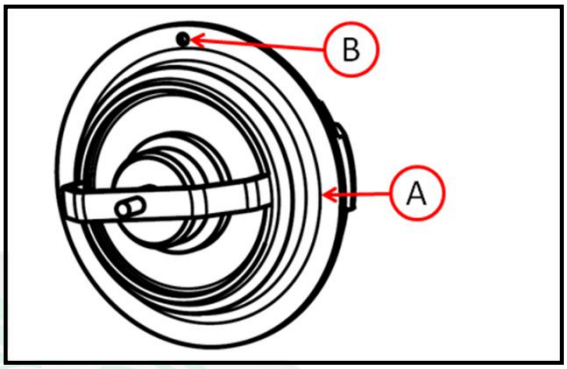
● Drain the coolant (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).
● Remove the radiator cowling (see “Removing Radiator Cowling” in the chapter “Frame”),
● Remove the radiator (see “Removing Radiator” in the chapter “Radiator”),
●Remove
Bolt [A],
Thermostat cover [B],



● Remove:
Thermostat [A]

Notes
Perform these steps while the engine is in the cooling state

Installation of Thermostat



●When installing the thermostat [A] into the housing, the exhaust valve hole [B] should be on the top.

●Install a new O-ring seal into the housing.

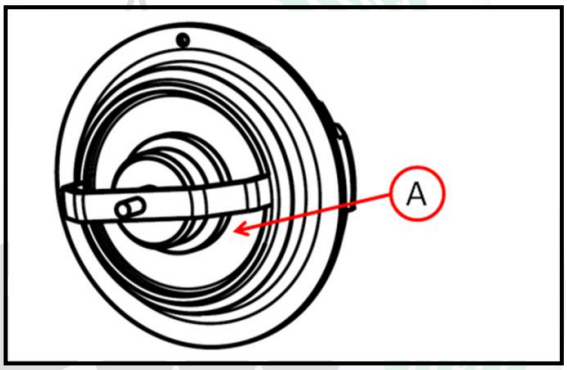
Lock torque of thermostat cover mounting bolt: 9.8 N·m

●Install the water pipe and tighten the lock screw.

Lock torque of radiator hose (water pipe) lock screw: 2.0 N·m

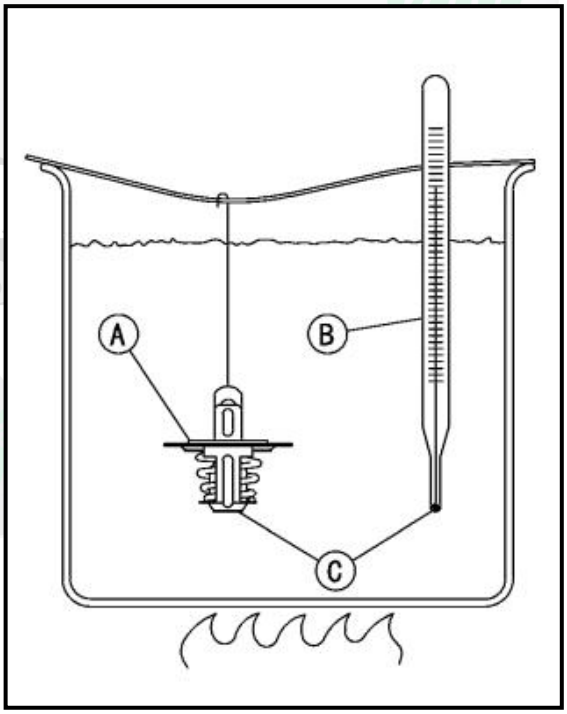
● Fill the radiator with coolant (see "Replacing Coolant" in chapter "Periodic Maintenance" for details).

Inspection of Thermostat



● Remove the thermostat (see “Disassembly of Thermostat” for details) and check the thermostatic control valve [A] under room temperature conditions.

★ If the valve is open, you need to replace it with a new one.



To measure the valve opening temperature, suspend the thermostat [A] in a container filled with water and raise the water temperature.

○The thermostat must be completely submerged in water and must not touch the inner wall or bottom of the container. A precise thermometer [B] is suspended in the container containing the water, and the immersion depth of part [C] used for sensing temperature of the thermometer is substantially the same as that of the part used for sensing temperature of thermostat. The thermometer should also not touch the inner wall or bottom of the container.

★When the temperature reaches 75°C, the thermostatic valve will open and the temperature will reach 90 °C. The thermostatic valve will open by at least 7 mm.

★ If the measurement result exceeds the specified temperature range, replace it with a new one.

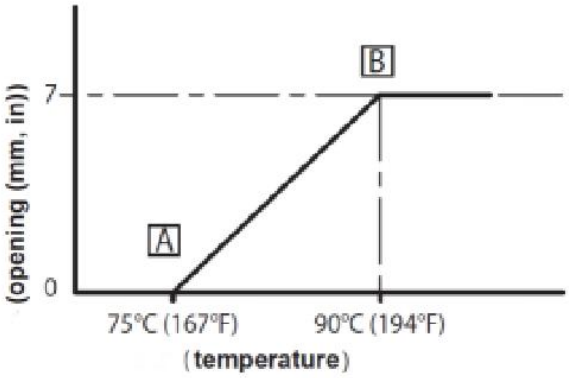
Thermostat valve opening temperature:

75°~ 90°C

Graph when the thermostat is turned on / off

A Completely closed

A Completely open



Notes
A damaged thermostat may cause the engine to be too hot or too cold.

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Hose and Pipeline

Installation of Hose

● Install hose and pipeline, and pay attention to the direction in which the hoses and pipeline are bent. Avoid substantial bending, kinking, squeezing or twisting.

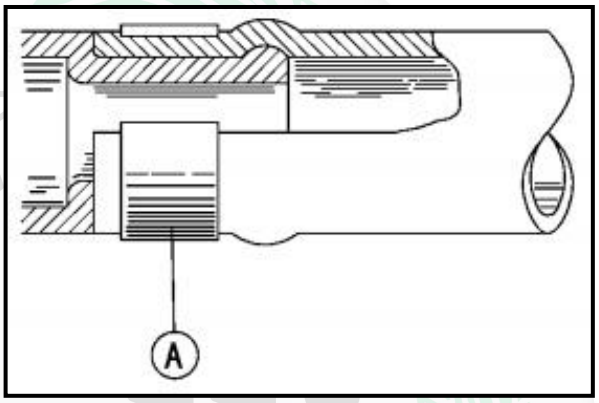
● Properly arrange the hose (see section "Routing of Cables, Wires and Hoses" of Chapter "Appendix" for details).

The clamp [A] should be as close as possible to the hose to prevent its end from tilting and prevent the hose from being loosened.

○Make sure that the lock screws are in the correct position to prevent the clamps from touching other parts.

The radiator hose (water pipe) clamp contacts other parts.

Locking torque of lock screw: 2.0 N·m



Check hose

● See "Inspection of Radiator Hose" in chapter "Periodic Maintenance" for details.

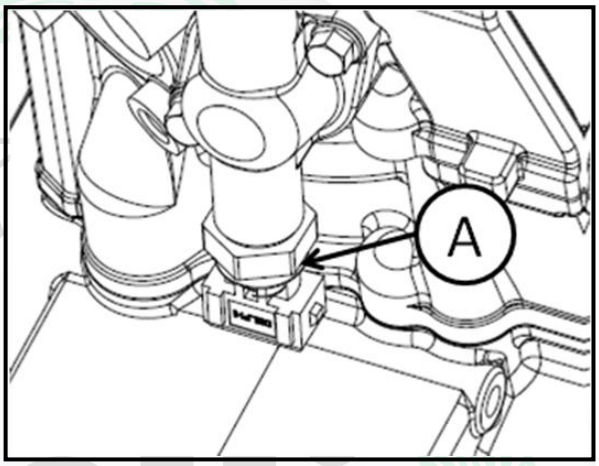
Water temperature sensor

Notes
Prevent the water temperature sensor from falling on hard surfaces, otherwise, the water temperature sensor may be damaged.

Disassembly / installation of water temperature sensor

● Remove the radiator (see “Removing Radiator” in the chapter “Radiator”).

● Remove the water temperature sensor [A]



●Install the parts disassembled previously (see the corresponding chapters).

Locking torque: 20-25 N·m

Check water temperature sensor

● See “Engine Water Temperature Sensor” in the chapter “Electronic Fuel Injection System (EFI)”.

Chapter V Engine

Contents

Lubrication system 184
- Exploded view of oil pump 184
- Oil flow diagram 186
- Preparatory information 186
- Technical parameters 187
- Oil pump 188
  - Disassembly of oil pump 188
  - Inspection of oil pump 189
  - Installation of oil pump 190

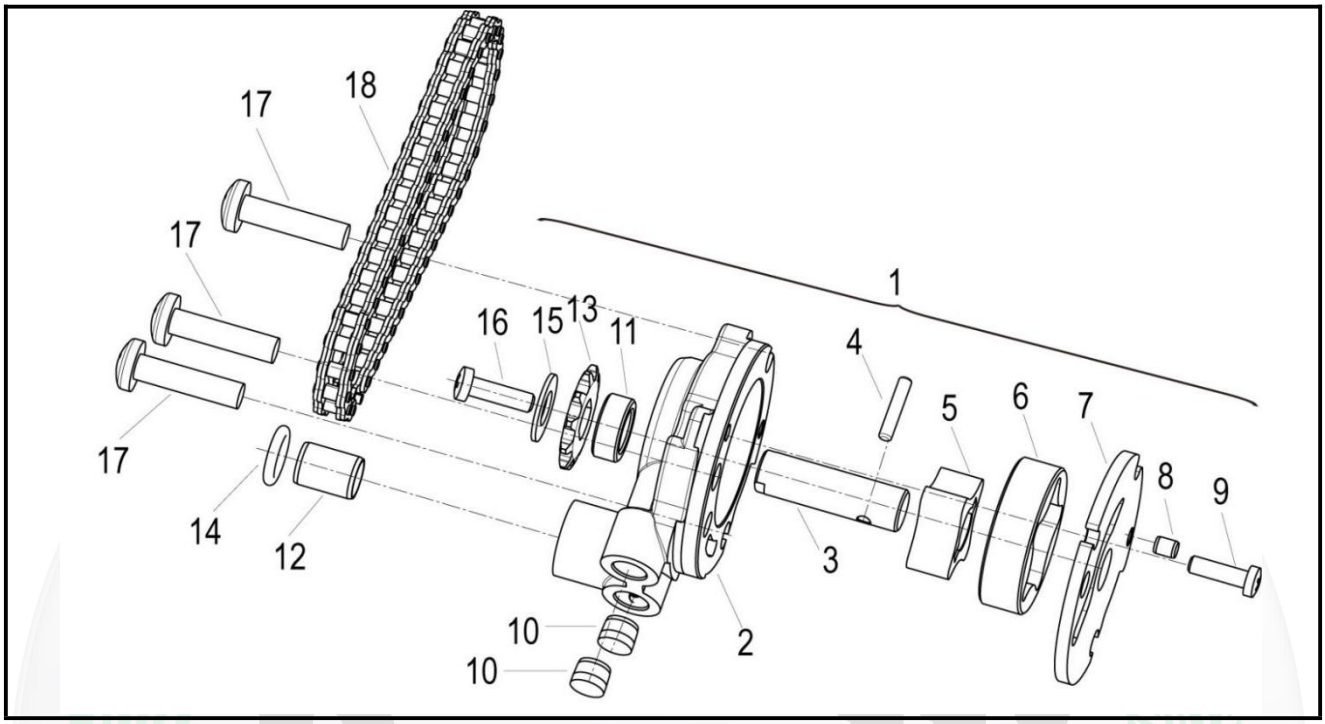
Sub-assembly of cylinder head 191
- Exploded view of cylinder head 191
- Exploded view of camshaft and valve 193
- Exploded view of timing drive mechanism 194
- Preparatory information 195
- Technical parameters 196
- Special tools and sealants 197
- Cylinder head 199
  - Disassembly of cylinder head 199
  - Valve decomposition 201
  - Inspection of combustion chamber 201
  - Inspection of the cylinder head joint surface 201
  - Inspection of intake and exhaust springs 202
  - Inspection of valve stem 202
  - Inspection of valve guide 203
  - Replacement of valve guide 203
  - Adjustment of valve seat ring 204
  - Installation of cylinder head 206
- Tensioner 207
  - Function of tensioner 207
  - Disassembly of tensioner 207
  - Assembly of tensioner 207
  - Inspection of tensioner 207

Cylinder block and piston 208
- Exploded view of cylinder body 208
- Exploded view of piston / crankshaft 209
- Preparatory information 210
- Technical parameters 211
- Inspection and replacement of cylinder block 212
  - Disassembly of cylinder block 212
  - Installation of cylinder 212
  - Inspection of cylinder block 213

Piston 213
Disassembly of piston 213
Installation of piston 214
Check the piston, piston pin and piston ring 215
Crankshaft connecting rod 218
Exploded view of crankshaft connecting rod 218
Preparatory information 220
Technical parameters 221
Crankshaft combination 222
Disassembly of crankshaft connecting rod combination 222
Assembly 222
Inspection 222
Balance shaft 223
Function of balancer shaft 223
Disassembly of balancer shaft 223
Assembly of balancer shaft 224
Inspection of balancer shaft 224
Clutch 225
Exploded view of clutch 225
Special tool 227
Disassembly of clutch 228
Disassembly of clutch 230
Installation of clutch 231
Inspection of clutch 231
Gearshift mechanism 232
Exploded view of gearshift mechanism 232
Disassembly of gearshift mechanism 235
Installation of gearshift mechanism 236
Inspection of gearshift mechanism 236
Disassembly of primary / auxiliary shaft component 236
Disassembly of primary / auxiliary shaft component 239
Inspection of primary / auxiliary shaft component 240

Lubrication System

Exploded view of oil pump



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Oil pump components	1	—	—	
2	Oil pump body	1	—	—	
3	Oil pump shaft	1	—	—	
4	Pin 3×16	1	—	—	
5	Inner rotor	1	—	—	
6	Outer rotor	1	—	—	
7	Oil pump cover	1	—	—	
8	Pin	1	—	—	
9	Cross recessed pan head screw M4×10	1	—	—	
10	Plug	2	—	—	
11	Collar	1	—	—	
12	Dowel pin	1	—	—	
13	Roller sprocket	1	—	—	
14	O-Ring	1	—	—	
15	Washer	1	—	—	
16	Bolt M5×10	1	7	0.7	
17	Screw M6×25	3	10	1.0	
18	Chain	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

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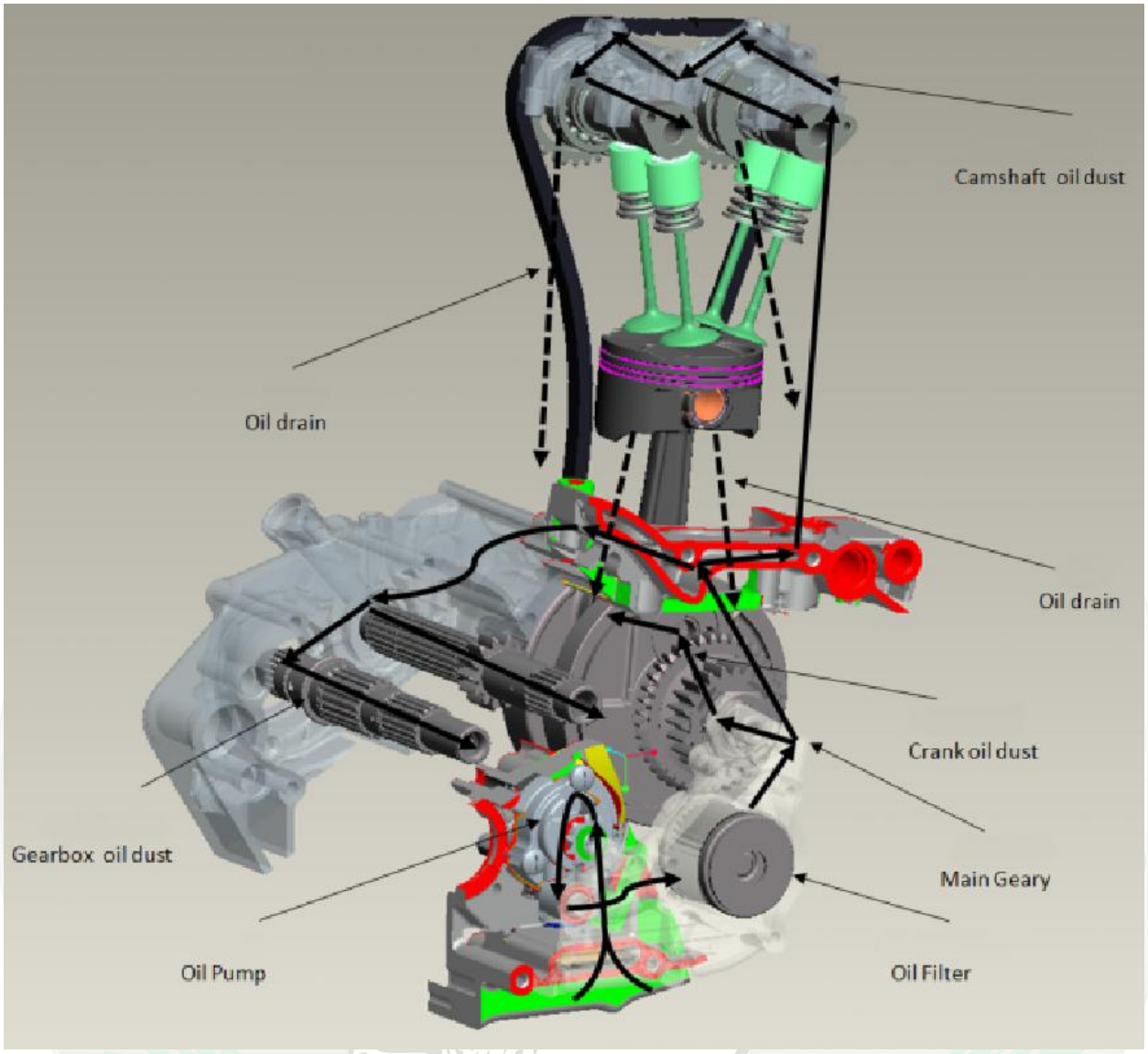
Oil flow diagram



Preparatory information

Action of Lubrication System:

The function of the lubricating system of engine is to provide lubricant to the friction surface of workpiece to make the dry surface friction become into the liquid friction between lubricant particles so as to reduce the wear of parts; cool the parts with high heat loads; absorb the impacts of bearing and other parts and reduce noise; increase the sealability between the piston ring and cylinder wall; clean and remove the impurities on the surfaces of parts.

Operation Precautions:

After disassembling oil pump, clean the parts carefully and blow the surfaces of parts using high-pressure oil.

During the disassembly of oil pump, do not drop the foreign body into the crankcase.

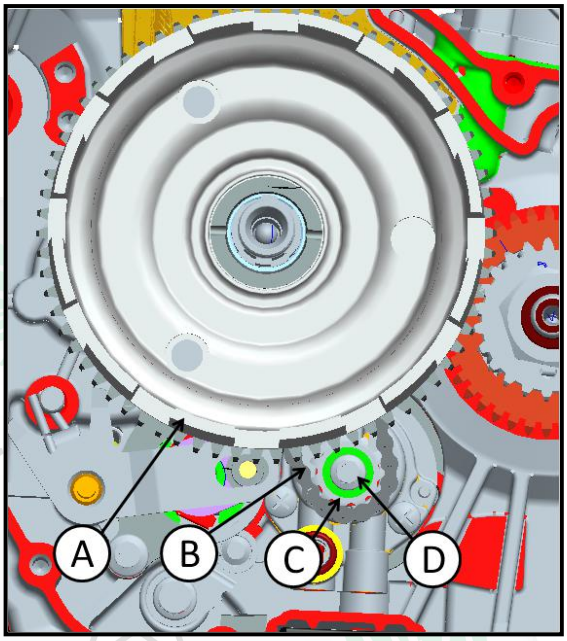
Technical parameters

Item	Normal	Allowable limit
Oil capacity:		
When replacing the oil	1.2±0.05L	—
When disassembling	1.5±0.05L	—
Oil pump rotor:		
Radial clearance between inner and outer rotors	0.05-0.13mm	0.15mm
Clearance between outer rotor and pump	0.10-0.16mm	0.2mm

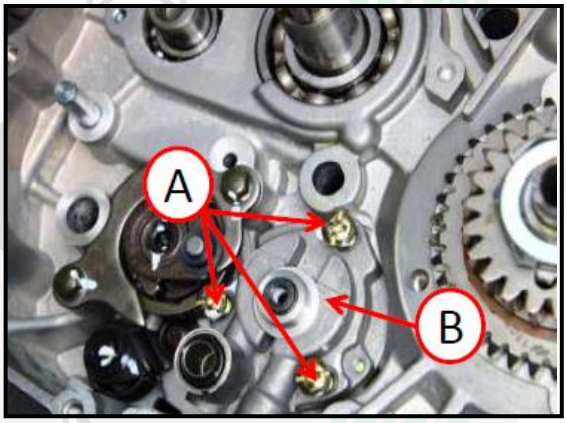
Oil pump

Disassembly of oil pump

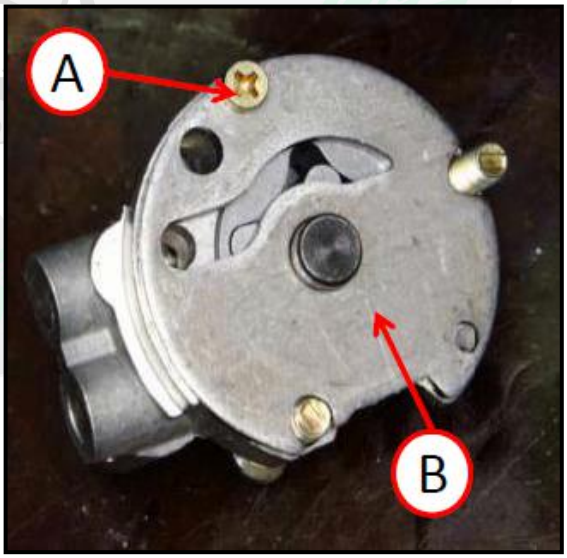
● Loosen the oil pump fixing screw [D], and remove the roller sprocket [D], oil pump chain [B] and clutch housing component [A] on the oil pump.



●Remove the screw [A].
●Remove oil pump [B].



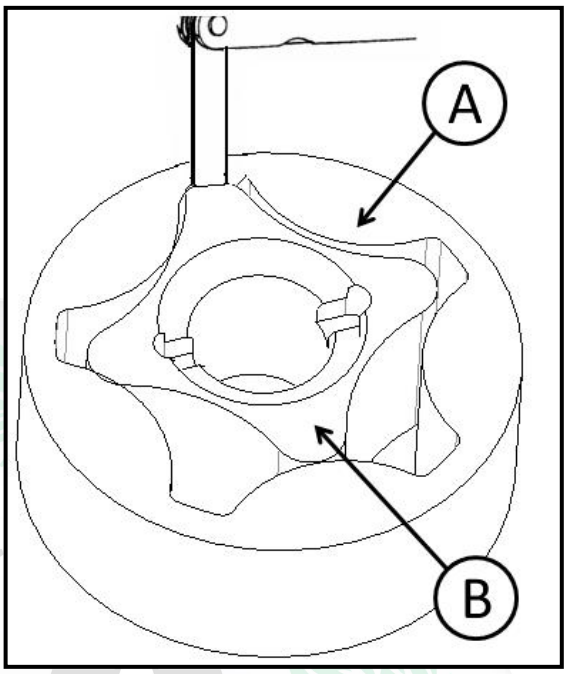
●Remove the screw [A], remove the oil pump seat [B] and disassemble oil pump.



Inspection of Oil Pump

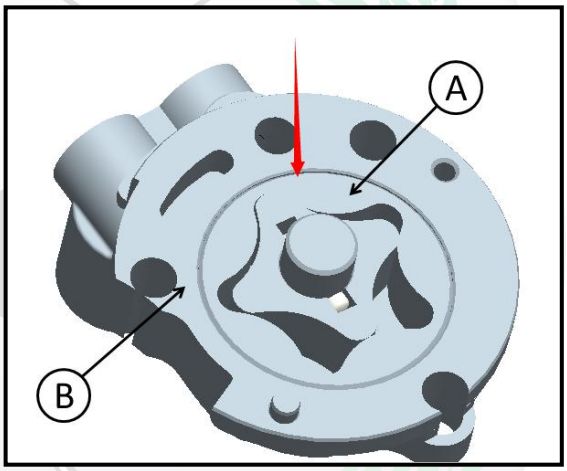
● Check the radial clearance between the outer rotor [A] and the inner rotor [B].

Allowable limit: 0.15mm.



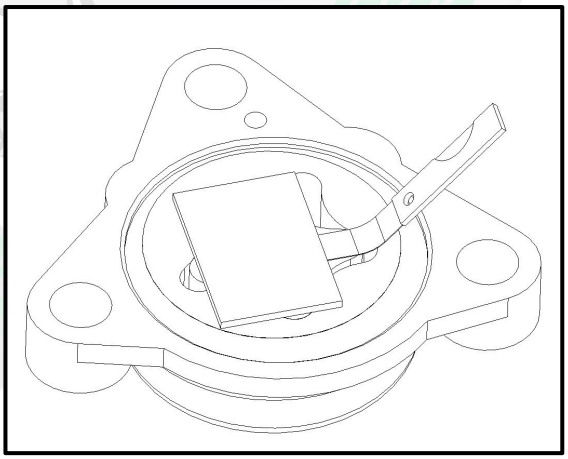
Check the clearance between external rotor [A] and oil pump cover [B].

Allowable limit: 0.20mm.



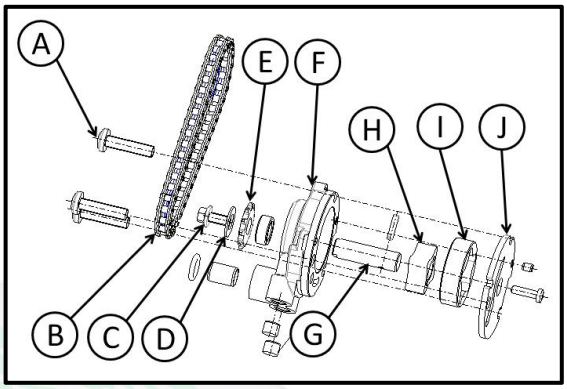
●Check the end clearance of rotor.

Allowable limit: 0.15mm.



Installation of oil pump

●The oil pump assembly is shown in the figure below



Screw [A]
Chain [B]
Screw [C]
Washer [D]
Roller sprocket [E]
Oil pump body [F]
Oil pump shaft [G]
Inner rotor [H]
Outer rotor [I]
Oil pump cover [J]

Note:
After assembly, the inner and outer rotors should be able to rotate flexibly without clamping stagnation.

●Install the parts disassembled previously (see the corresponding chapters).

Locking torque:

Roller sprocket mounting screw: 10N.m

Oil pump cover mounting screw: 10N.m

Oil pump mounting screw: 10N.m

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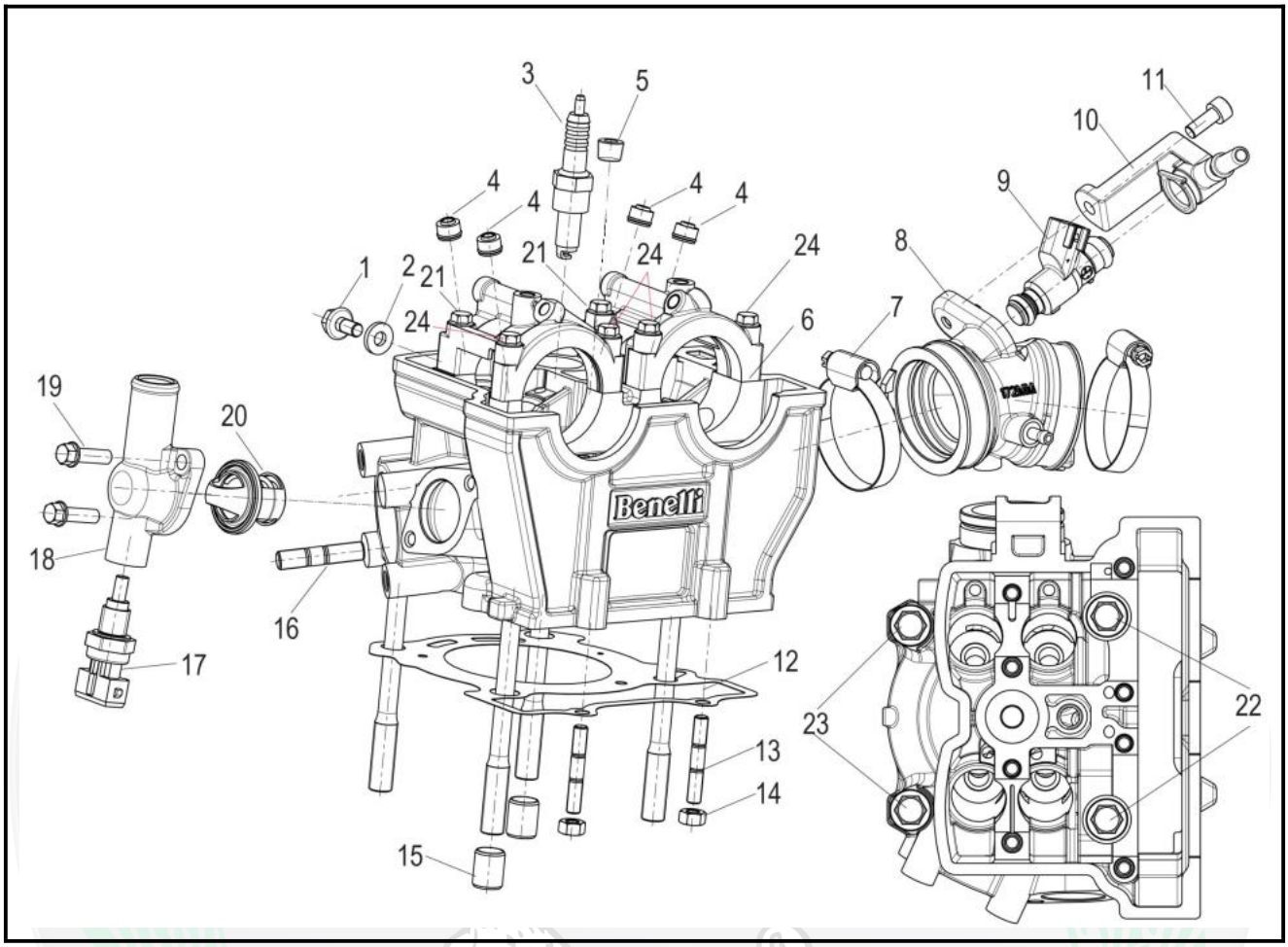
Sub-assembly of Cylinder Head

Exploded View of Cylinder Head



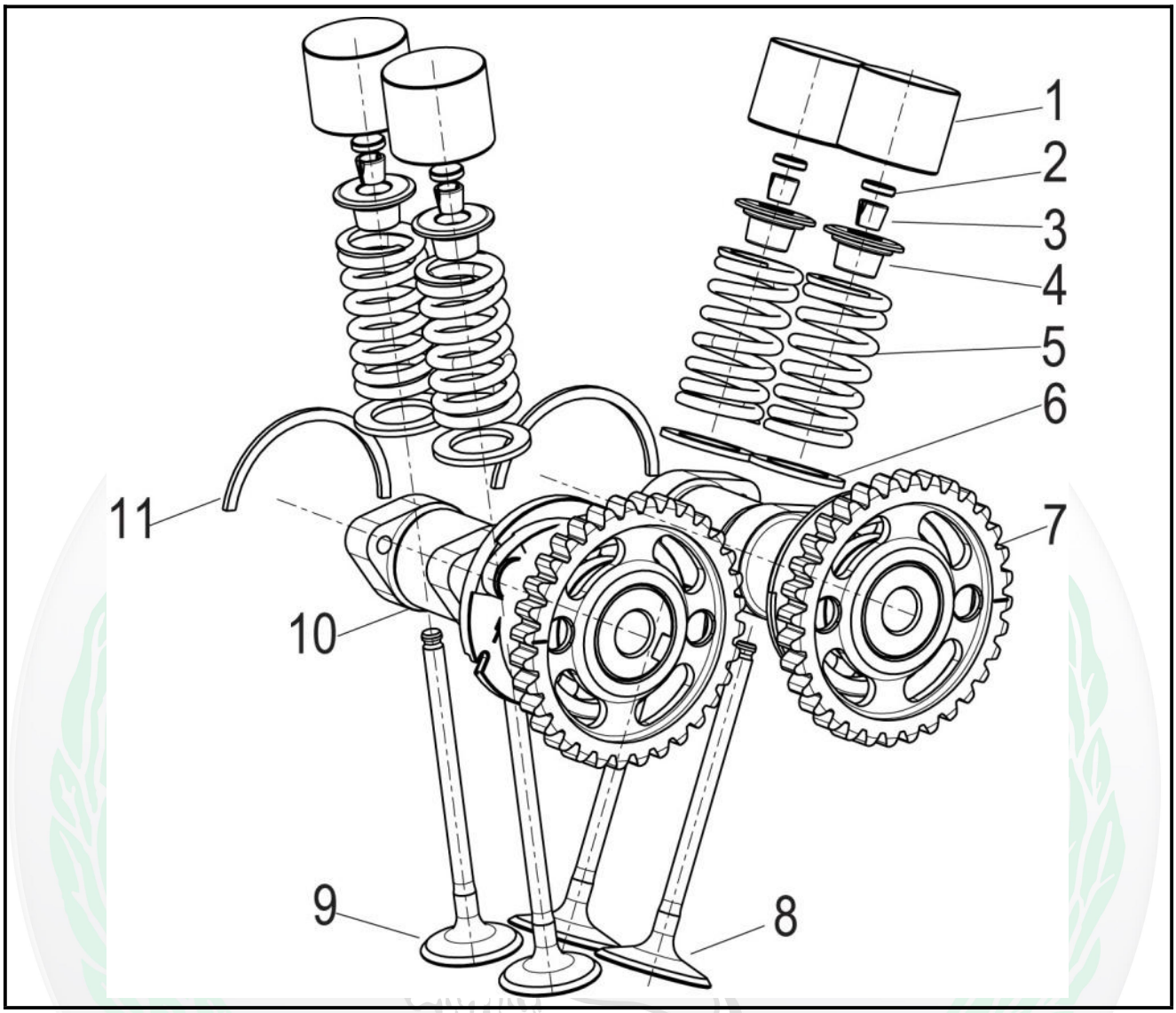
No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Bolt M6×12	1	10	1.0	
2	Washer 6.2×14×2.2	1	—	—	
3	Spark plug	1	—	—	
4	Valve stem seal	4	—	—	
5	Conical plug M10×1	1	—	—	
6	Cylinder head processing assembly	1	—	—	
7	Clamp assembly	2	—	—	
8	Intake tube components	1	—	—	
9	Fuel injector	1	—	—	
10	Fuel Injector seat	1	—	—	
11	Hexagon socket cap screw M6×25	1	10	1.0	
12	Cylinder head sealing components	1	—	—	
13	Stud M6×25	2	10	1.0	
14	Hexagon nut M6	2	10	1.0	
15	Dowel pin	2	—	—	
16	Stud	1	—	—	
17	Water temperature sensor	1	—	—	
18	Thermostat cover	1	—	—	
19	Hexagon bolt with flange M6×25	2	10	1.0	
20	Thermostat	1	—	—	
21	Bolt M6×40	4	10	1.0	
22	Cylinder head bolt component I	2	—	—	
23	Cylinder head bolt component I	2	—	—	
24	Bolt M6×40	4	10	1.0	

L: Apply locking agent.

R: Replace the part

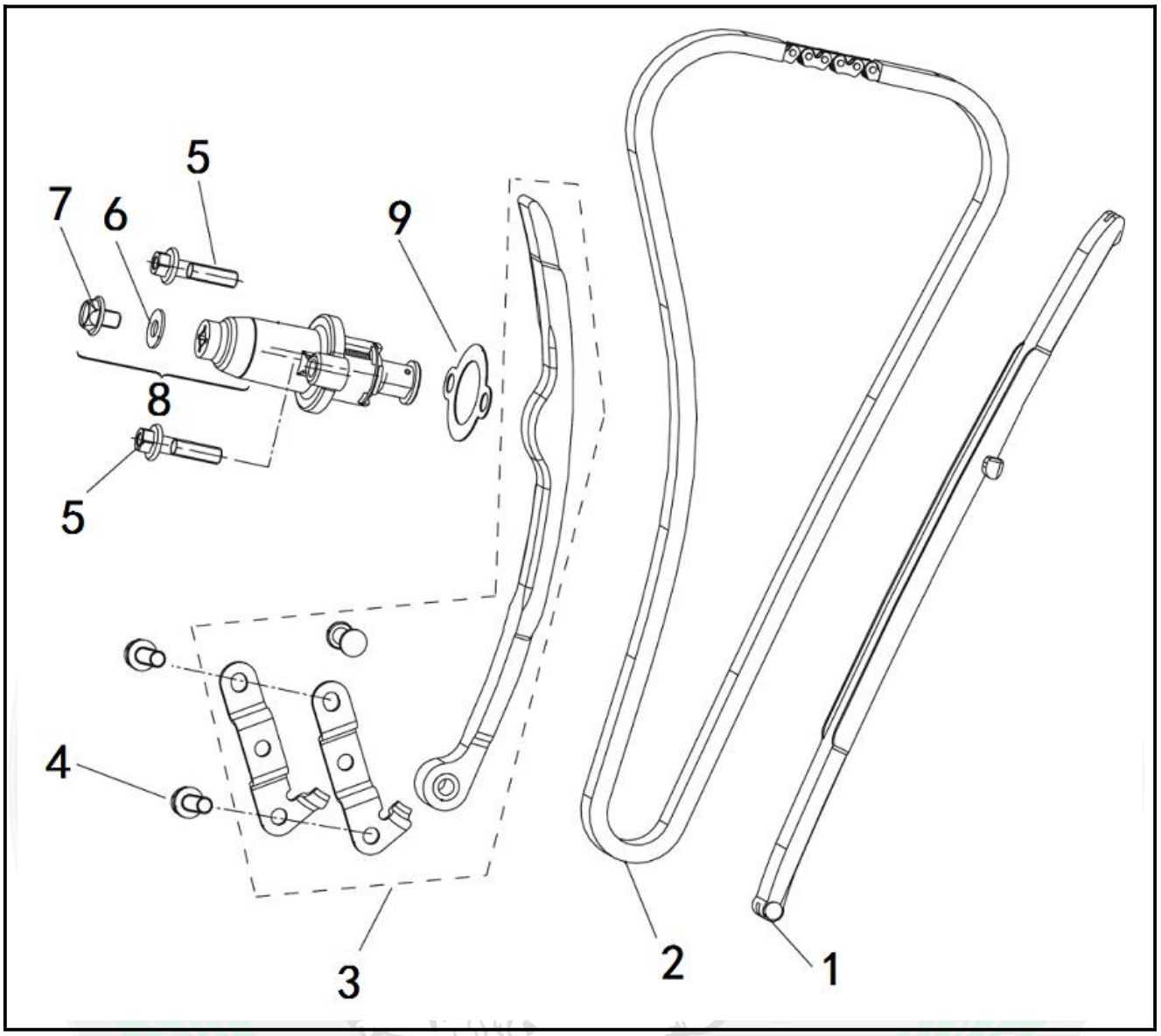
Si: Apply silicon grease.

Exploded view of camshaft and valve



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Lifter	4	—	—	
2	Valve shim	4	—	—	
3	Valve lock clamp	8	—	—	
4	Upper spring seat of valve	4	—	—	
5	Valve spring	4	—	—	
6	Valve lower spring seat [5]	4	—	—	
7	Inlet camshaft component	1	—	—	
8	Intake valve	2	—	—	
9	Exhaust valve	2	—	—	
10	Exhaust camshaft component	1	—	—	
11	Snap ring	2	—	—	

Exploded view of timing drive mechanism



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Auxiliary guide chain plate component	1	—	—	
2	Timing chain	1	—	—	
3	Primary guide chain plate component	1	—	—	
4	Bolt M6×14	2	10	1.0	
5	Bolt M6×25	2	10	1.0	
6	Washer	1	—	—	
7	Plug	1	—	—	
8	Camshaft chain regulator	1	—	—	
9	Washer	1	—	—	

Preparatory information

Function of Cylinder Head:

Cylinder head is used to seal the cylinder and it forms a combustion chamber with the piston to withstand the high temperature and high pressure gas. And it can also complete the intake and exhaust through the distribution mechanism.

Operation Precautions:

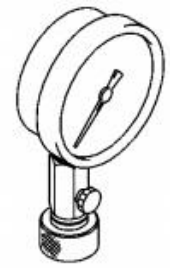
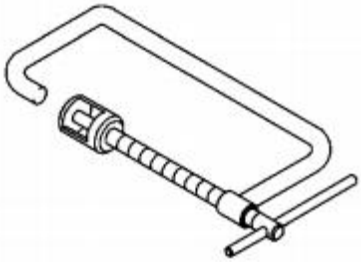
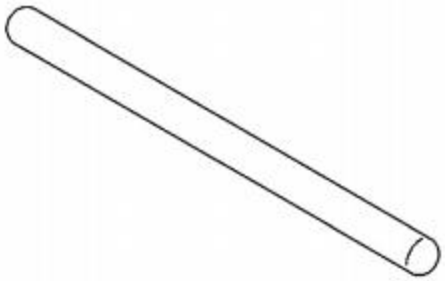
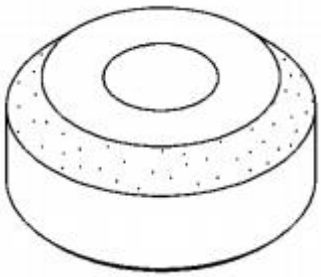
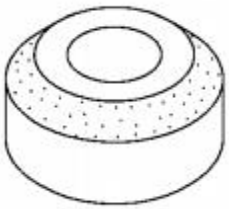
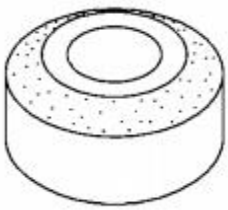
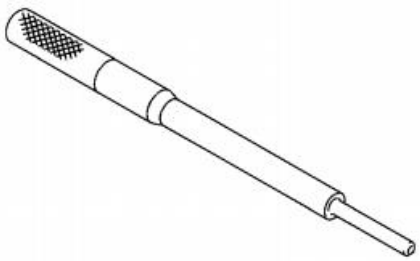
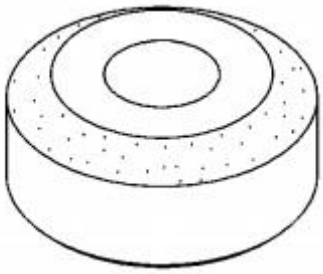
In order to ensure the sealing of cylinder head and cylinder block, the cylinder head withstands great bolt pretightening force. Tighten it by three times, 15NM for the first time, 30NM for the second time and 90 degrees for the third time

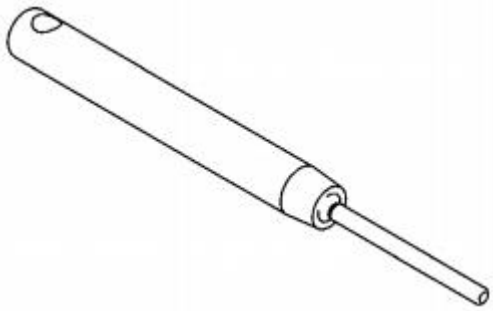
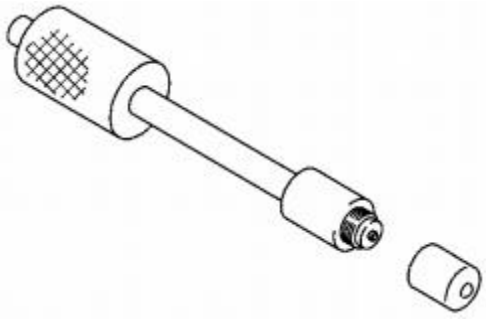
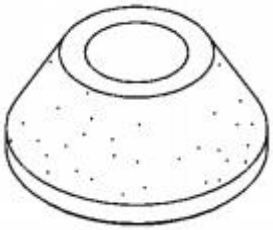
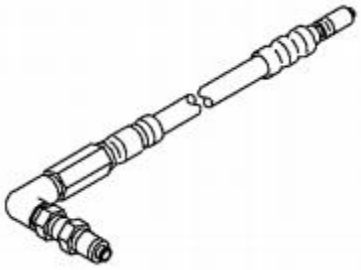
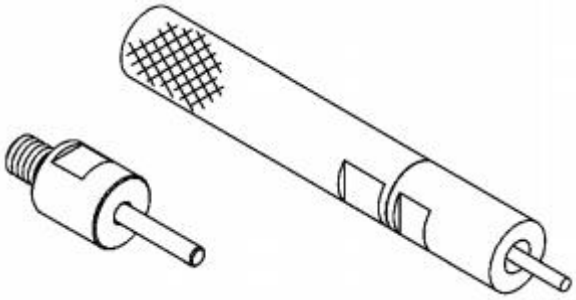
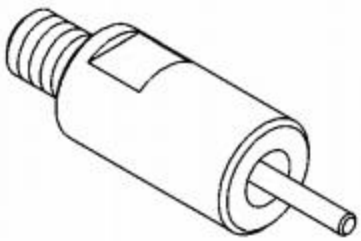
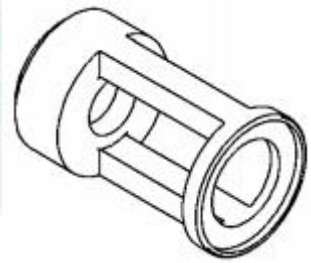
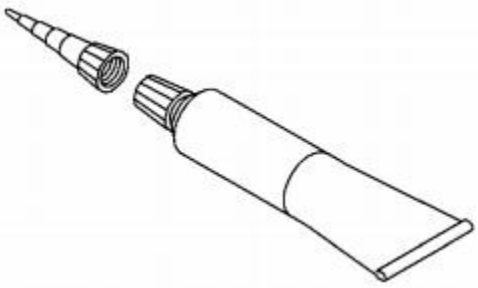
Before the inspection and measurement, all parts shall be cleaned and blown with high-pressure air.

Technical parameters

Item	Normal	Allowable limit
Planeness of cylinder head	0.03mm	0.05 mm
Valve and valve guide		
Valve clearance:		
Inlet	0.13-0.15 mm	—
Exhaust	0.15-0.17 mm	—
Outer diameter of valve stem		
Inlet	4.465-4.475 mm	4.455 mm
Exhaust	4.465-4.475 mm	4.455 mm
Inner diameter of valve guide:		
Inlet	4.5-4.512 mm	4.54 mm
Exhaust	4.5-4.512 mm	4.54 mm
Clearance between valve seam and valve guide:		
Inlet	0.025-0.047 mm	0.09 mm
Exhaust	0.025-0.047 mm	0.09 mm
Width of valve seat:		
Inlet	1-1.2 mm	1.5 mm
Exhaust	0.9-1.1 mm	1.4 mm
Valve spring		
Free length:		
Inlet	37 mm	36 mm
Exhaust	37 mm	36 mm
Camshaft		
Matching clearance between camshaft and cylinder head	0.04-0.074 mm	0.1 mm

Special tools and sealants

Pressure gauge 20 kgf/cm²;	Valve seat cutter 60°:
	
Valve spring compressor assembly:	**Valve seat holder bar:**
	
Valve seat cutter 45°:	Valve seat cutter 45°:
	
Valve seat cutter 32°:	**Valve guide arbor:**
	
Valve seat cutter 32°:	**Valve guide reamer:**
	

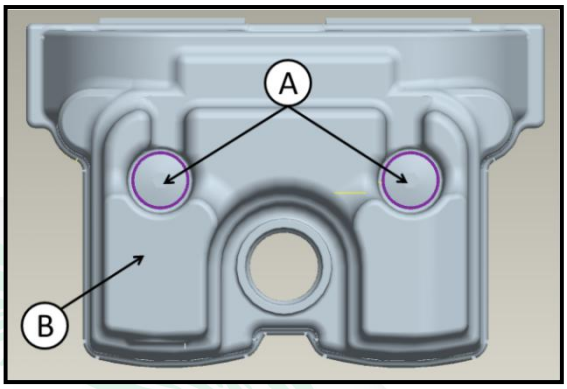
Valve seat cutter holder:	**Pressure gauge adapter:**
	
Valve seat cutter 60°:	L-shaped hose:
	
Valve guide driver:	Valve guide driver accessory E:
	
Valve spring compressor adapter:	Sealant **:**
	
Valve oil seal compaction tooling:	

Cylinder head

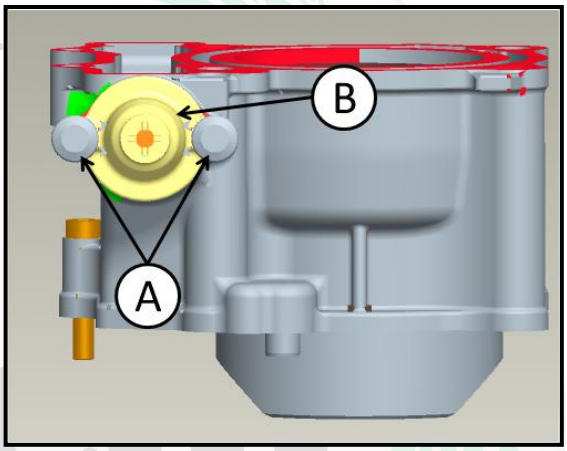
Disassembly of cylinder head

●Remove the ignition coil.

Loosen mounting bolt [A], and remove the washer and cylinder head cover [B].

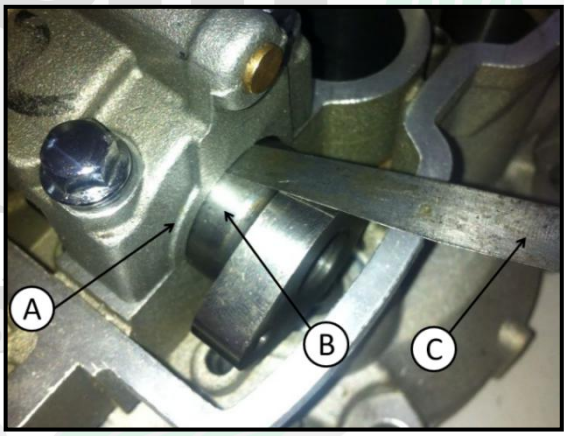


Loosen the mounting bolt [A] and remove the camshaft chain regulator [B].

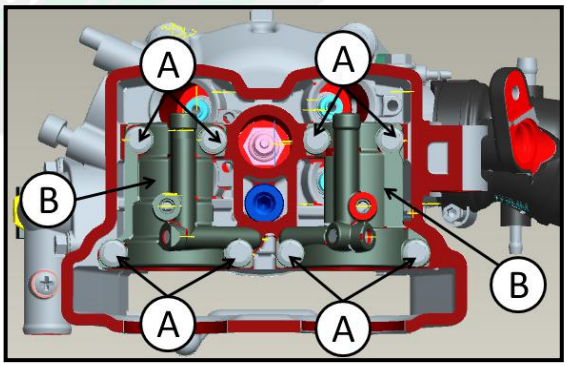


● Use the feeler gauge [C] to measure the fit clearance between the cylinder head [A] and the camshaft [B].

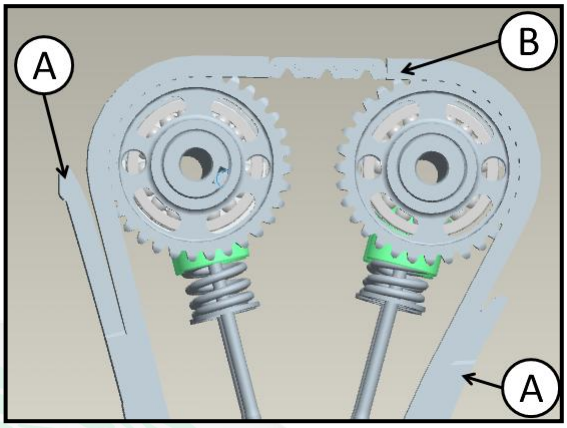
Allowable limit: 0.1mm.



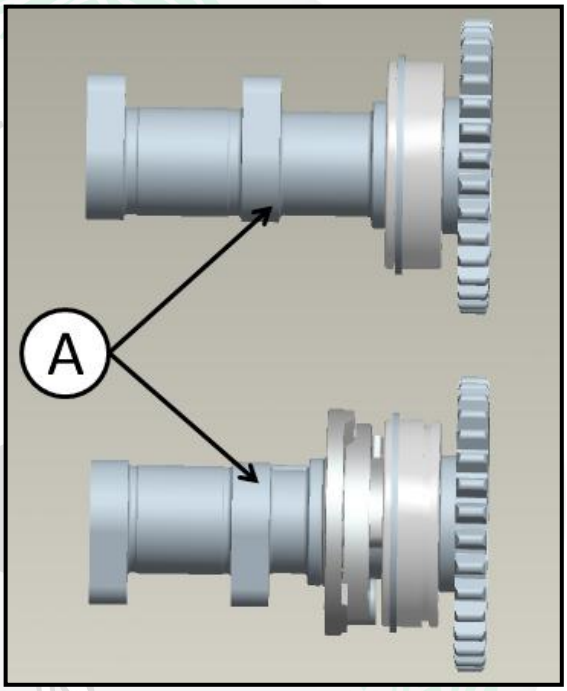
● Loosen the camshaft support lock screw [A], and remove the camshaft support [B] and the camshaft limit ring.



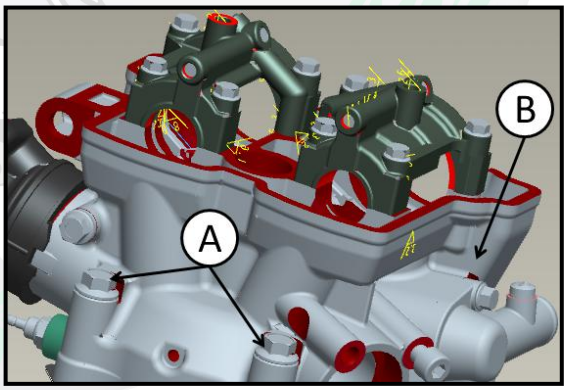
● Remove the guide chain plate, chain



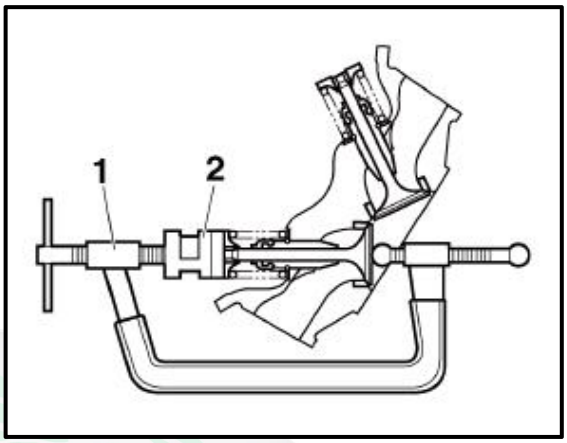
● Remove the camshaft.



● Loosen the cylinder head bolt [A].
● Remove the cylinder head [B].



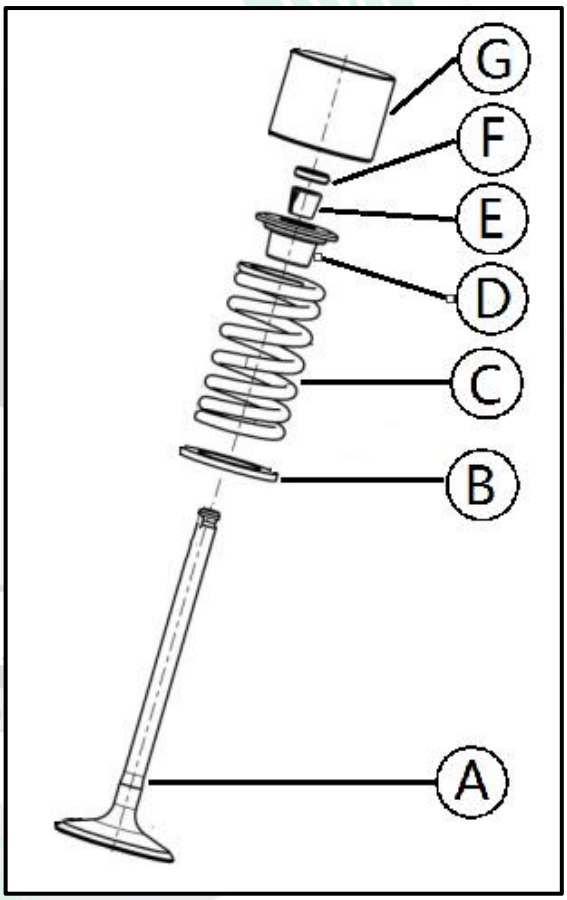
●Remove the top pillar, compress the valve spring with valve spring compression tool and remove valve cotter.



● Remove the valve adjustment washer, valve lock block, valve spring upper seat, valve spring, valve spring lower seat and valve.

Valve decomposition

Valve [A]
Valve lower spring seat [B]
Valve spring seat [C]
Valve upper spring seat [D]
Valve cotter [E]
Valve adjustment gasket [F]
Tappet [G]

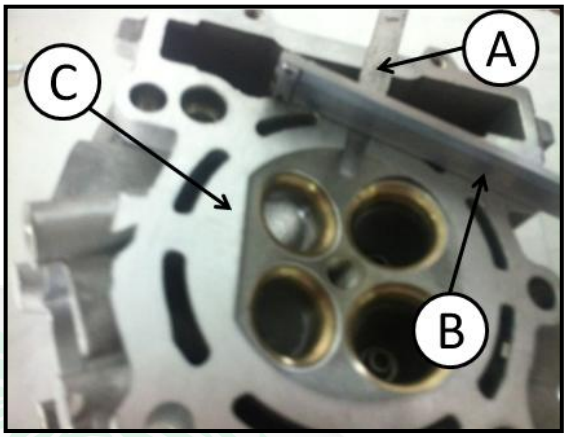


Inspection of combustion chamber

●Check the combustion chamber and clear the carbon deposits inside the combustion chamber.

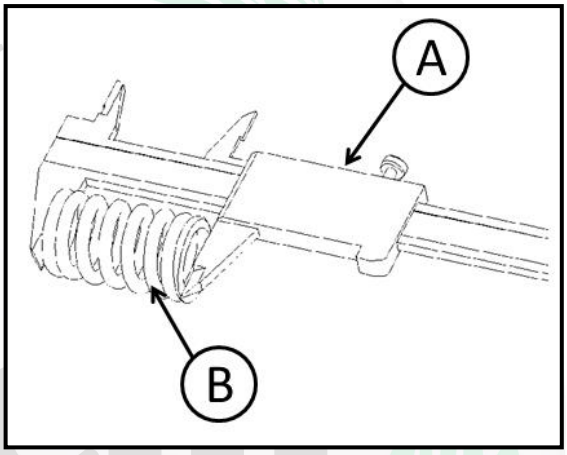
Inspection of cylinder head joint surface

● Measure the planeness of the cylinder head joint surface [C] with the test gauge [A] and the ruler [B].
Allowable limit: 0.05mm.
When the flatness of the cylinder head joint surface exceeds the use limit, place a fine sandpaper on the flat plate, make the cylinder head joint surface fit the sandpaper and sand the surface in 8 shape.

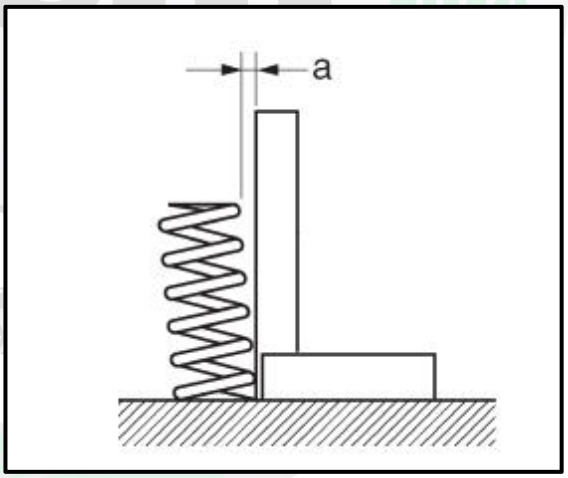


Inspection of intake and exhaust springs

● Use the caliper [A] to measure the free length of the valve inlet and exhaust springs [B].
Allowable limit: intake spring: 36mm.
Exhaust spring: 36mm.

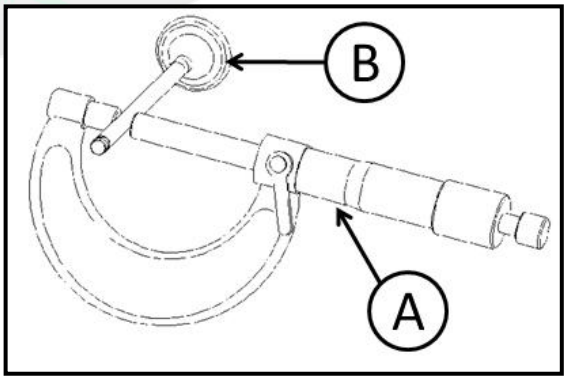


● Measure the gradient of inner / outer spring of valve [a].
Allowable limit: 1.6mm

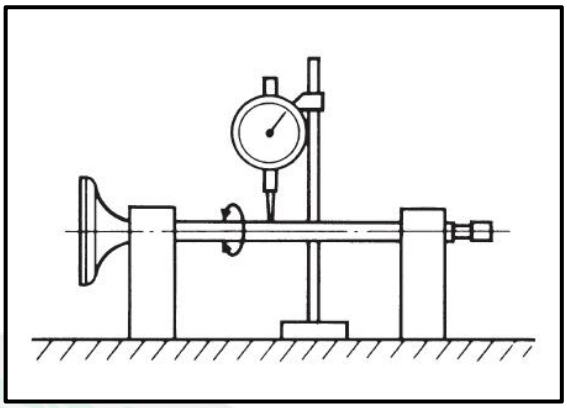


Inspection of valve stem

●Use the micrometer [A] to measure the outer diameter of the valve stem [B].
Allowable limit: Intake valve: 4.455mm.
Exhaust valve: 4.455mm.



Measure the run-out of valve stem
Allowable limit:0.04 mm

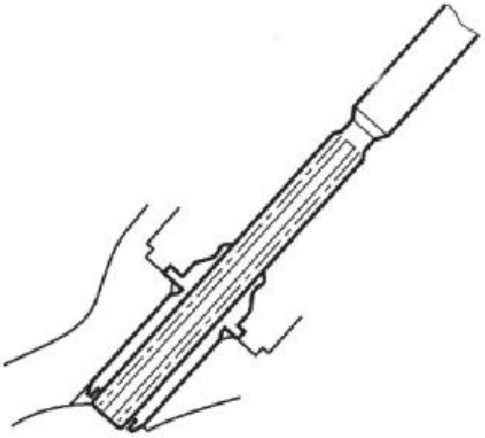


Inspection of valve guide

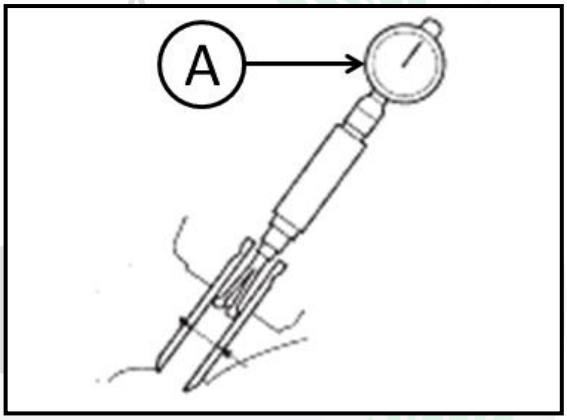
●Check the valve guide and remove the carbon deposits in the valve guide with a reamer before check.

Notes
Rotate the reamer clockwise and do not rotate the reamer counterclockwise.

Valve reamer



●Measure the inner diameter of each valve guide with a measuring tool [A].



Allowable limit:

Intake / exhaust: 4.54mm.

Allowable limit of clearance between valve and valve guide:

Intake valve: 0.09mm.

Exhaust valve: 0.09mm.

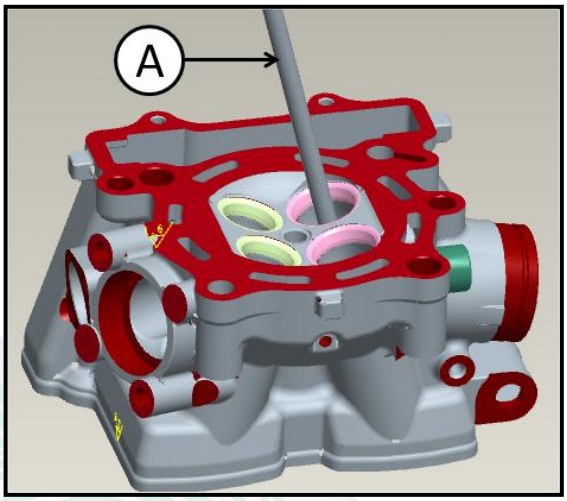
Replacement of Valve Guide

Notes
If the clearance between valve and valve guide exceeds the limit, replace the valve guide. After the valve guide is replaced, the valve seat ring surface must be finished.

●Put the valve guide in the freezing cavity of refrigerator to cool it for an hour.

●Use the electric furnace or oven to heat the cylinder head to 100-150℃.

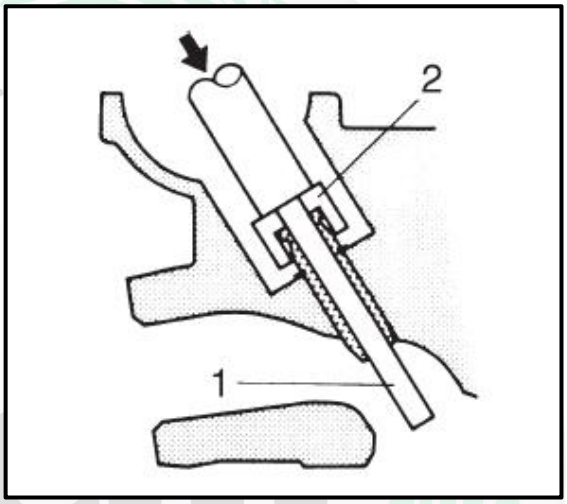
Fix the cylinder head and remove the valve guide from the upper side of cylinder head with the valve guide disassembly tool [A].



●Install the valve guide from the top of cylinder head.

○Install new valve guide using valve guide mounting tool [2] and guide using valve guide remover [1].

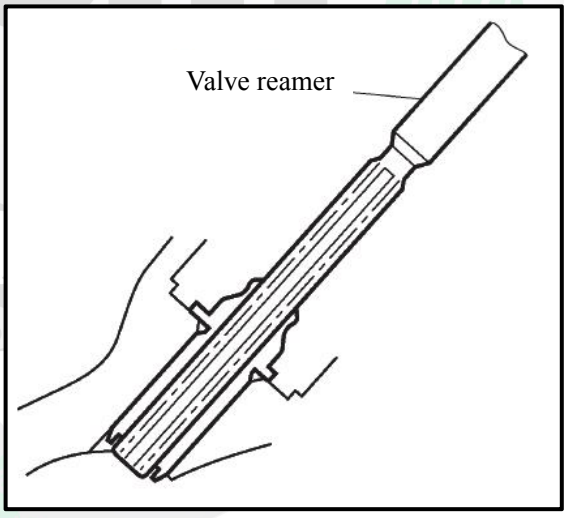
Note:
Do not damage the cylinder head when installing the valve guide.



After the valve guide is embedded, carry out the finishing by using the valve guide reamer.

Note:
Add an appropriate amount of cutting oil during cutting with a reamer. The reamer shall be rotated clockwise.

●Put a new O-ring on the new valve guide.



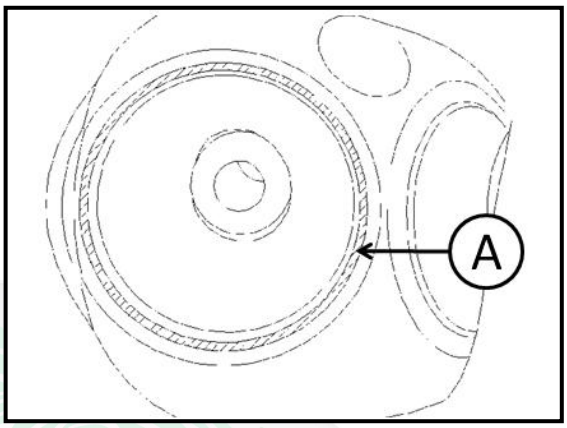
Adjustment of Valve Seat Ring

●Clean the carbon deposits in the combustion chamber and valve, and thoroughly rinse the intake and exhaust valves.

● Check the width of valve seat contact surface [A].

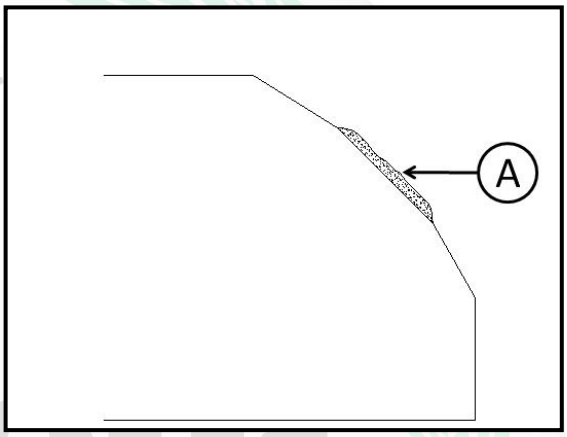
Allowable limit: 1.5mm for intake.

Exhaust valve: 1.4mm

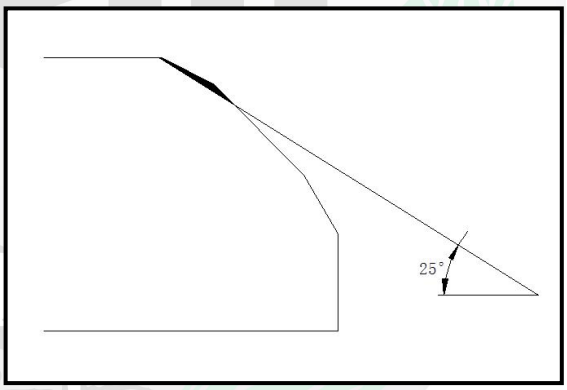


●Use a 45°cutter to remove the rough or uneven parts [A] on the surface of valve seat ring.

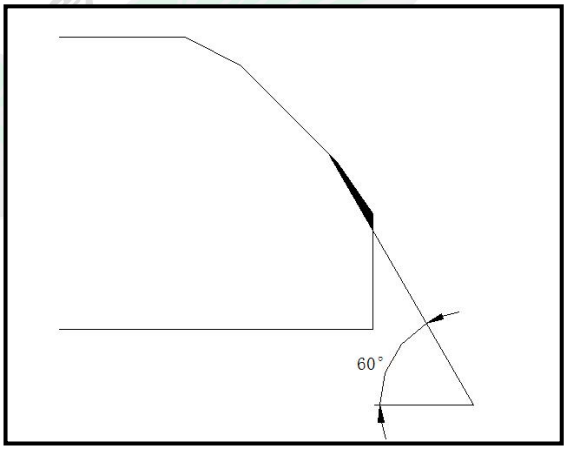
Notes
Apply a layer of transparent or Prussia blue coating to the valve seat ring. so that it can be seen more clearly.



●Remove 1/4 of outer end of valve seat ring with a 25° cutter.



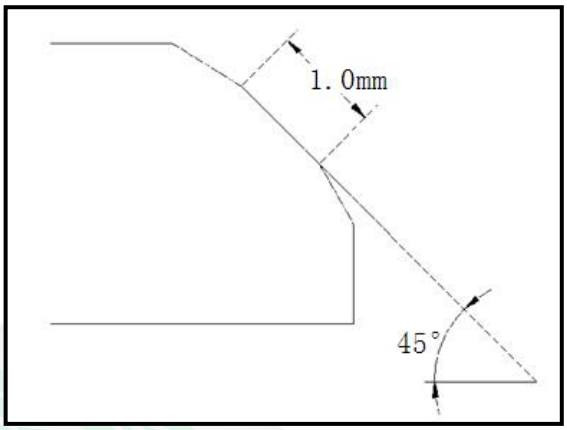
●Remove 1/4 of bottom of valve seat ring with a 60° cutter. Take the cutter and check the positions which have been disposed.



●Grind the valve seat ring with a 45° finishing cutter to reach an appropriate width. Make sure to remove all dents and uneven parts.

Standard valve seat ring width: intake: 1.0mm

exhaust valve: 1.0mm

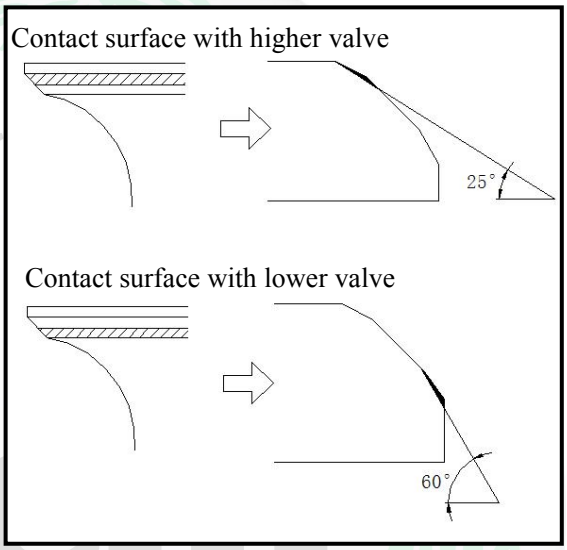


If the contacted position is in the too high part of valve, please lower the valve seat ring with a 25° flat cutter.

●If the contacted position is in the too low part of valve, raise the valve seat ring with a 60° internal cutter.

●Use the 45° finishing cutter to finish the valve seat ring again to make it meet the required specification.

●After the valve seat ring is grinded, apply polish to the valve surface and gently polish the valve.



Installation of Cylinder Head

●Installation shall be carried out in the order contrary to the disassembly order.

Precautions for Installation of Valve:

●When the valve is installed, apply appropriate amount of engine oil to the surface of the valve stem and then install the valve stem into the valve guide.

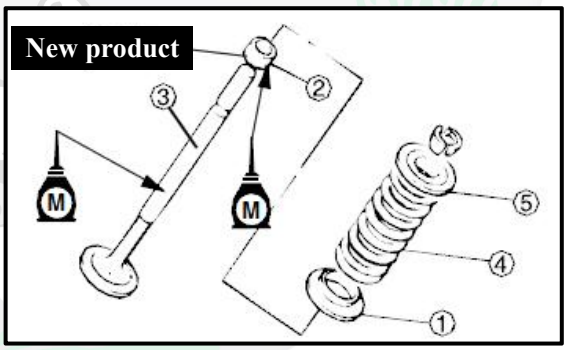
Valve spring retainer①

Valve oil seal②

Valve③

Valve spring④

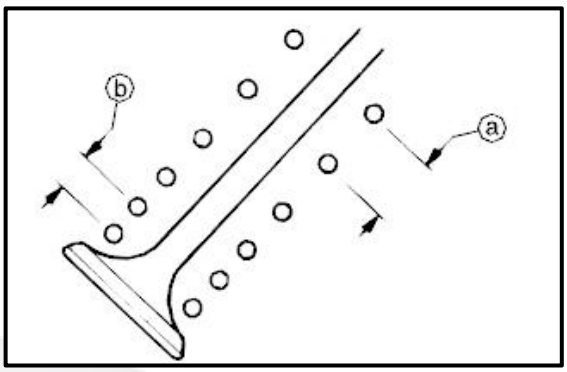
Spring plate⑤



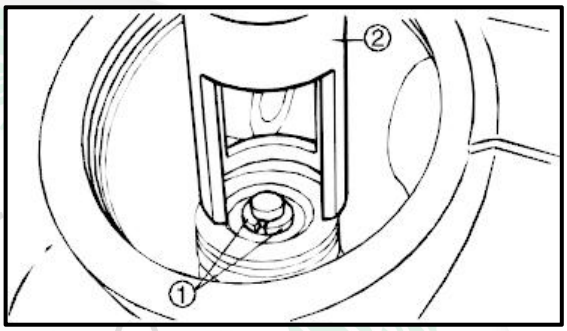
Note:

Before installation, check whether there are burrs at the end of the valve. If there are burrs at the end of the valve, polish the end of the valve stem with an oilstone.

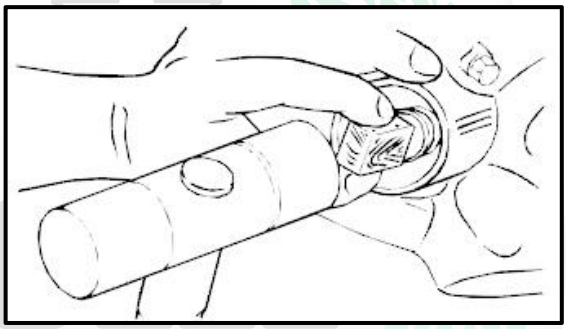
●When installing the valve spring, install the end of spring with smaller pitch toward the combustion chamber.



●Use the valve spring compression tool ② when installing the valve lock clip ①.



●Knock the valve lock plate gently with a soft hammer to fix it on the valve stem.



Note:
Do not knock the valve lock plate overly to avoid damaging the valve.

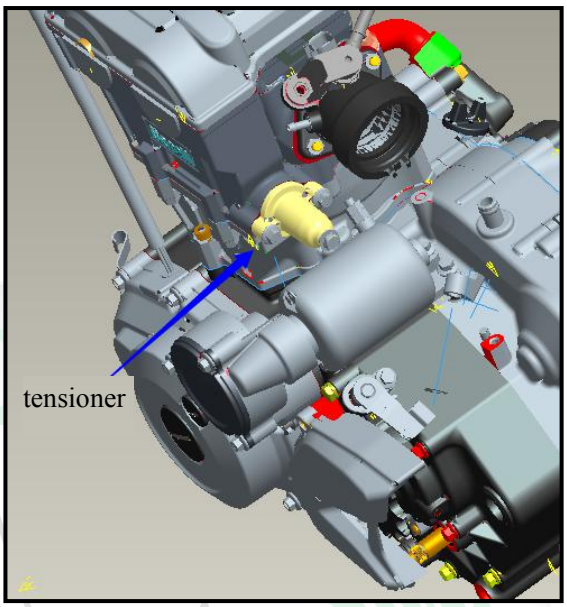
Tensioner

Function of tensioner

●A commonly used retaining device on a chain drive system, which is characterized in that the chain can maintain an appropriate tension during the transmission process, thereby prevent the belt from slipping, or prevent the synchronous belt from skipping, skidding and dragging, or prevent the chain from loosening, shedding, and reduce the wear of sprocket and chain.

Disassembly of Tensioner

● Open the screw at the tail of tensioner first, use the tensioner to rotate the tooling to retract the tensioner rack, and use the tool to clamp the tail groove, remove the fixing screw, and remove the tensioner.



Assembly of Tensioner

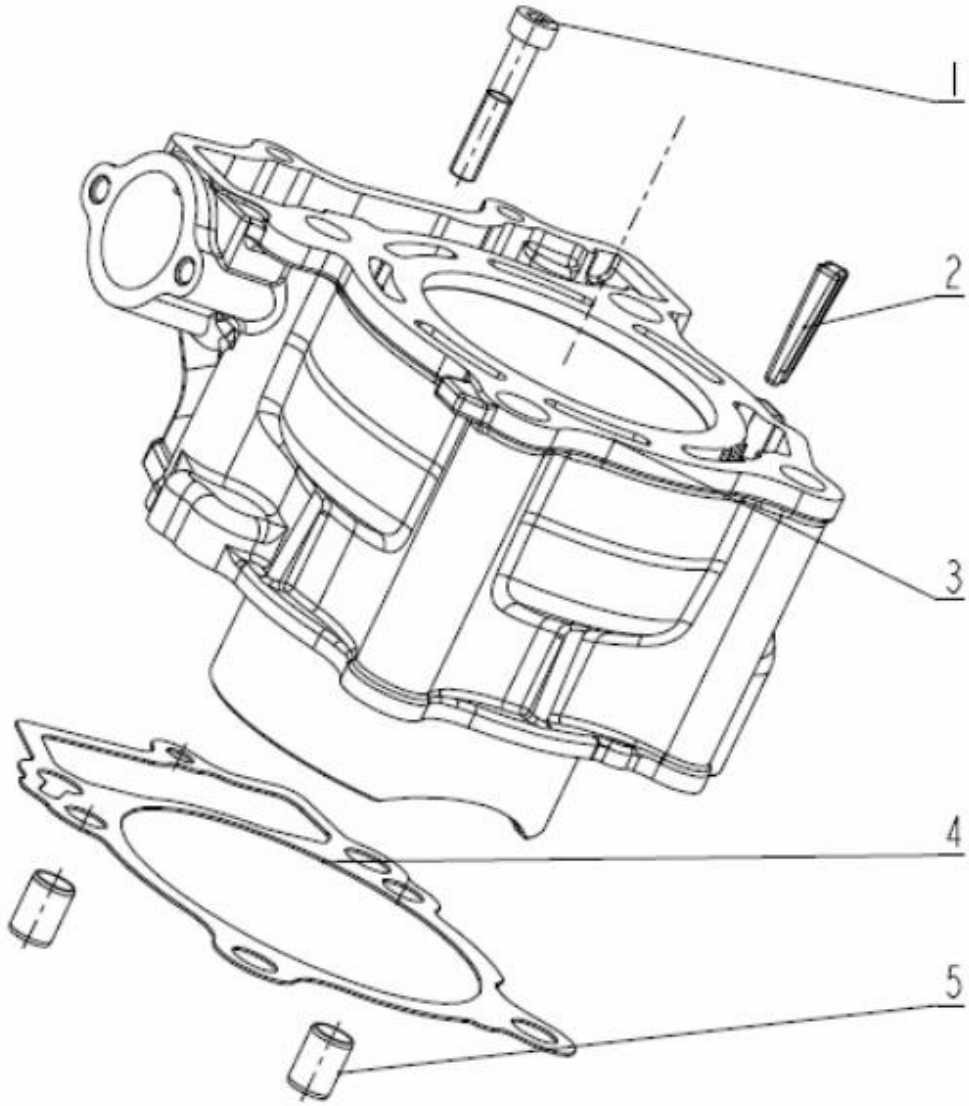
● Rotate the rack back when equipped with the tensioner. Fix it with the tooling clamp and then install it on the engine, tighten the fixing screws, slowly release the rotating tooling clamp, and adjust the tension of the tensioner. Do not pull it out directly. Rotate the engine crankshaft after aligning at the timing device and assembling it properly. Check the working conditions of chain. Do not tighten it too tight and too loose. There is no positioning phenomenon while timing.

Inspection of Tensioner

●Check whether the tensioner rack is obviously shaking. Use the tooling to screw in and out to check whether the rack is stuck.

Cylinder Block and Piston

Exploded View of Cylinder Body



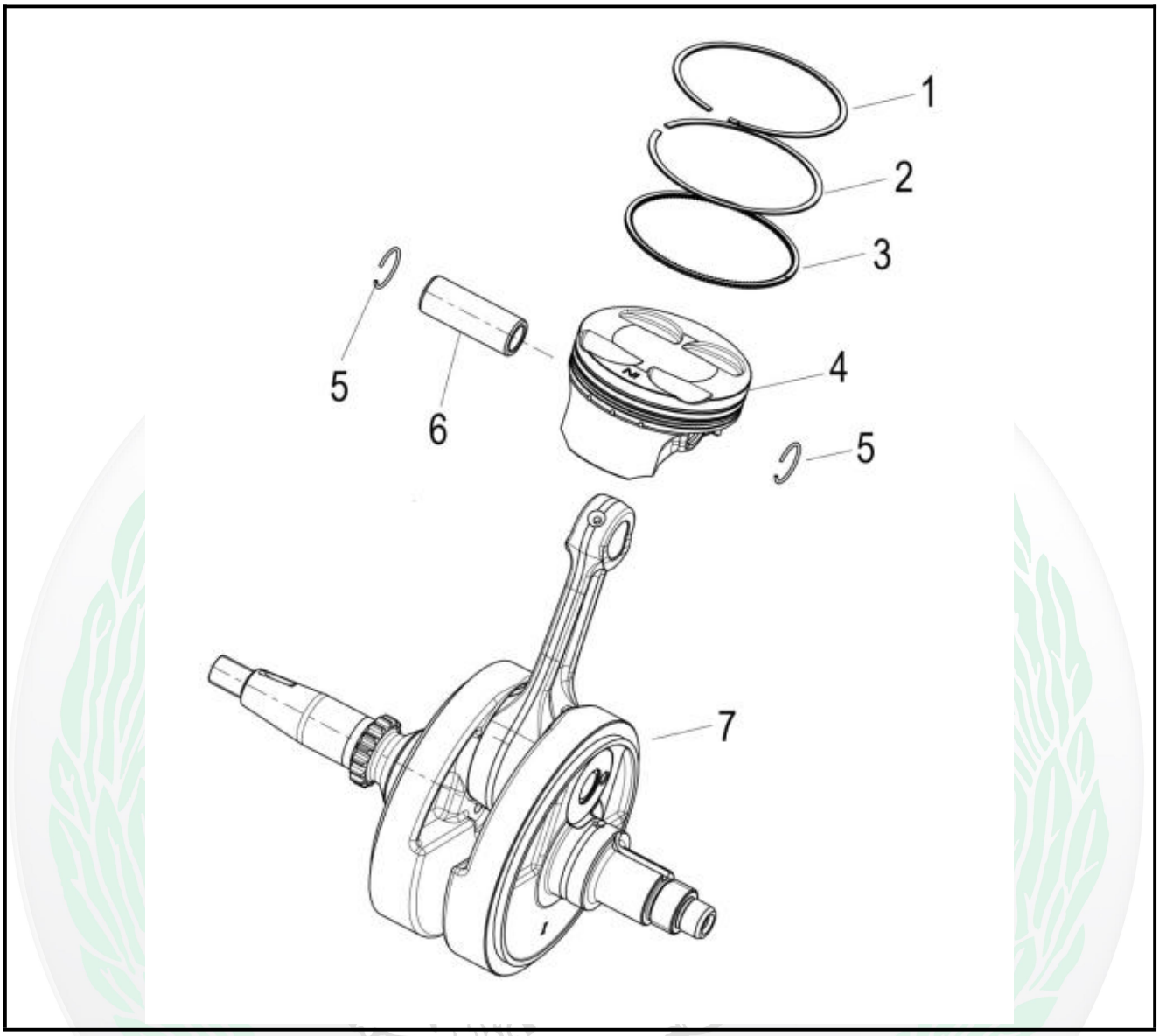
No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Bolt M6×35	1	10	1.0	
2	Rubber plug	1	—	—	
3	Cylinder block assembly	1	—	—	
4	Cylinder block washer	4	—	—	
5	Dowel pin	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

Exploded view of piston / crankshaft



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	First ring	1	—	—	
2	Second ring	1	—	—	
3	Oil ring	1	—	—	
4	Piston	1	—	—	
5	Piston pin retainer	1	—	—	
6	Piston pin	1	—	—	
7	Crankshaft components	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

Preparatory information

Function of cylinder block:

The cylinder block provides a space for gas compression, combustion and expansion and guides the movement of piston.

It can also transfer some heat in the cylinder to the surrounding cooling mediums.

Function of piston:

1. It can withstand the pressure generated by the combustion of combustible gas mixture in the cylinder and transmit the pressure to the connecting rod to drive the crankshaft to rotate.

2. Form a combustion chamber together with the cylinder head and other parts.

Function of Piston Ring:

The piston ring is a metal ring embedded into the interior of the piston groove. There are two types of piston rings: the compression ring and the oil ring. The compression ring can be used to seal the combustible mixture in the combustion chamber; the oil ring is used to scrape the excess oil from the cylinder. The piston ring is a metal elastic ring with a large outwardly expanding deformation that is fitted into the section and its corresponding annular groove. The reciprocating and rotationally moving piston ring can form a seal between the external circular surface of ring and cylinder as well as ring and the side of ring groove relying on the pressure difference of gas or liquid.

Operation Precautions:

Before the inspection and measurement, all parts shall be cleaned and blown with high-pressure air. There is no impurity or foreign matter.

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Technical parameters

Item	Standard value	Allowable limit
Cylinder:		
Inner diameter	72.000-72.015 mm	72.02 mm
Cylindricity	-	0.015 mm
Roundness	-	0.015 mm
Planeness	0.02 mm	0.08 mm
Piston:		
Outer diameter of piston (measurement point)	71.94-71.955 mm (8-11mm at the bottom of piston skirt)	71.93 mm
Inner diameter of piston pin hole	16.002-16.008 mm	16.02 mm
Outer diameter of piston pin	15.994-16.000 mm	15.99 mm
Clearance between piston and piston pin	0.002-0.014 mm	0.025 mm
Clearance between piston ring and ring groove		
First ring	0.03-0.07 mm	0.09 mm
Second ring	0.03-0.07 mm	0.09 mm
Piston ring joint clearance		
First ring	0.15-0.30 mm	0.4 mm
Second ring	0.20-0.35 mm	0.4 mm
Oil ring	0.20-0.70 mm	-
Connecting rod:		
Inner diameter of connecting rod small end	16.020-16.034 mm	16.04 mm
Clearance between connecting rod and piston pin	0.020-0.04 mm	0.05 mm

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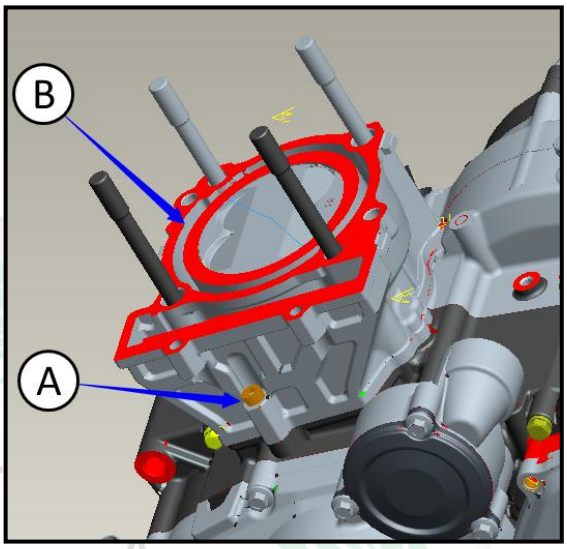
Inspection and replacement of cylinder block

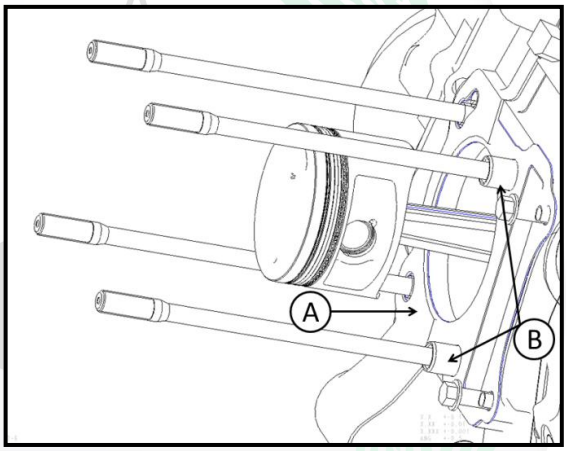
14.3 Disassembly of Cylinder Block

● Remove the parts above the cylinder head and loosen the cylinder block fixing bolt [A].

● Vertically remove the cylinder block [B].



●Remove
Gasket [A].
Dowel pin [B].

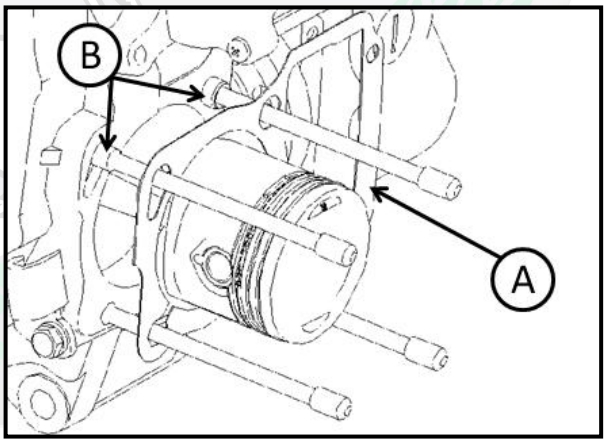


Installation of Cylinder

●Install the gasket [A] and dowel pin B] on the crankcase.

★ The gasket shall be prevented from folds and unevenness.

★ Do not allow misalignment. Apply a small amount of oil to the inside of cylinder block and put it on the piston. Shake the cylinder up and down and left and right to fully fit the piston into the cylinder block. Then press down it firmly into place. Install the cylinder head gasket.



●Apply oil to the inner wall of cylinder evenly.

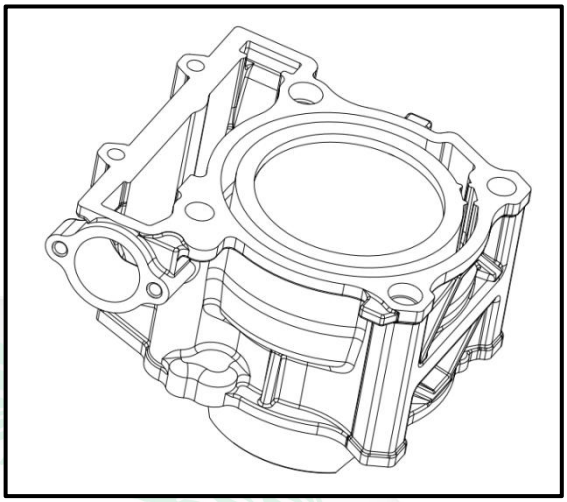
Install the piston ring into the cylinder carefully. The assembly should be conducted smoothly; if it is stuck, the installation should not be conducted with large force. Check whether the piston ring is misaligned.

Notes
Do not damage the piston ring. It can rotate flexibly after installation

Check cylinder block

●Check the wear situation of inner wall of cylinder. Check whether there is obvious scratch, bright concave and convex phenomena

★ If the wear is serious, please replace it.

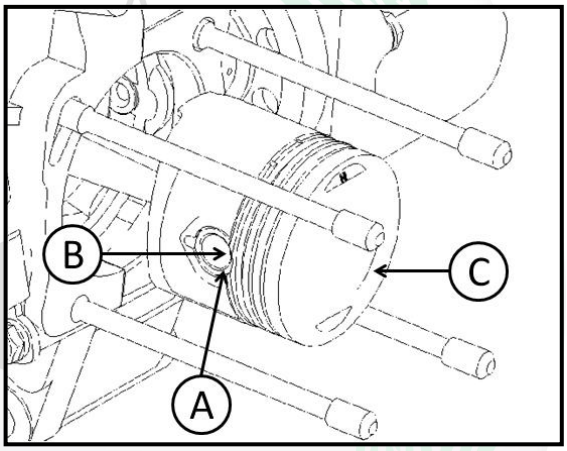


Piston

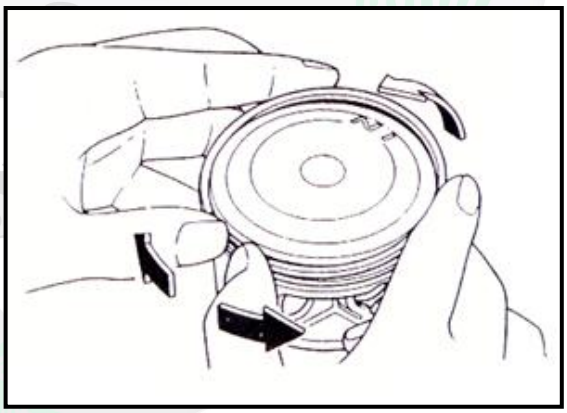
Disassembly of Piston

● Remove the piston pin retainer [A], take out the piston pin [B], and remove the piston [C].

Notes
During disassembly, do not drop the retainer into the crankcase.



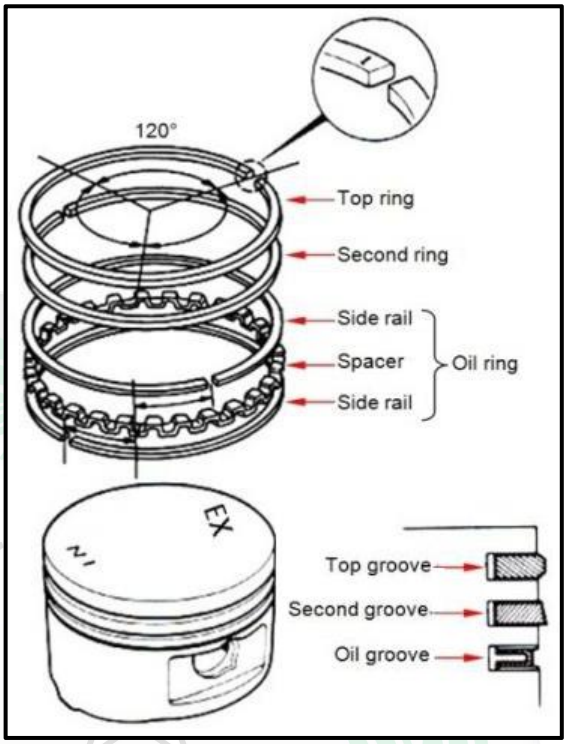
●Remove the piston ring.



Installation of Piston

●To replace the piston, it is necessary to select the cylinder and piston of the matching group for assembly, and also check the size requirements such as the clearance of cylinder.

●Apply oil to the piston ring and piston evenly, make the piston ring mark side up and install it properly. When assembling, the height between three piston rings is 120 degrees in the opening direction, and the two steel sheets of the combined oil ring are staggered by 30°.



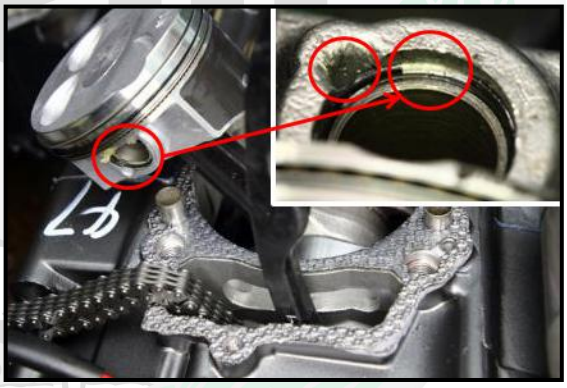
Notes
Do not scratch the piston and do not break the piston ring. **After the piston ring is installed, it can rotate freely in the piston ring groove.**

●Clean the washers attached to the crankcase before installing piston.

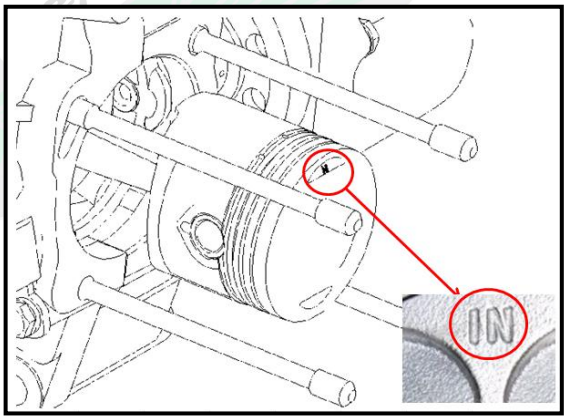
Notes
Foreign matters shall not fall into the crankcase.

●Install the piston, piston pin and piston pin retainer.

★ When assembling with a new piston pin retainer, the opening of retainer should not overlap with the dowel pin of piston pin.



Notes
Install the piston into the intake valve according to the "IN" mark at the top. **The piston pin retainer should completely fall into the piston retainer groove, without upside down edges.**

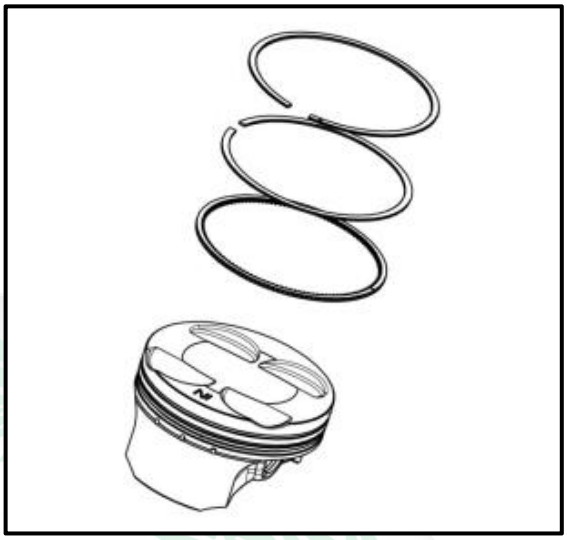


Check the piston, piston pin and piston ring

●Check the piston, piston pin and piston ring.

★ Clear the carbon deposits inside the piston ring groove.

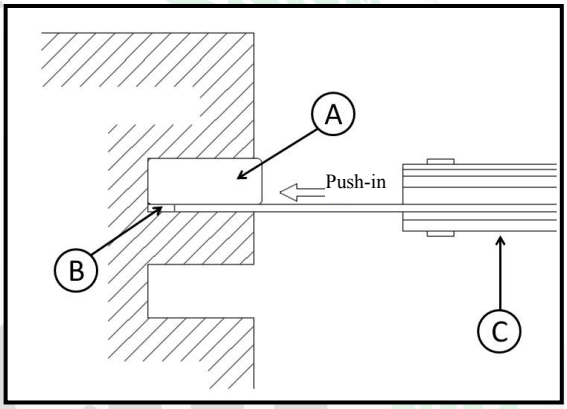
Notes
Do not break or damage the piston ring.



●Install the piston ring after cleaning. Push the piston ring to one side using hands, and measure the gap between the piston ring [A] and the piston ring groove [B] using the feeler gauge [C].

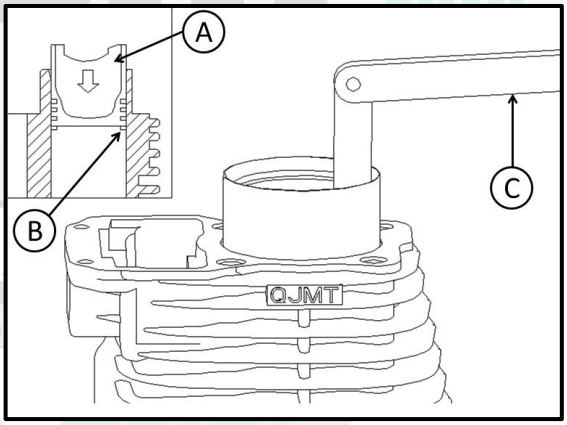
Allowable limit: top ring: 0.09mm.

Second ring: 0.09mm.



●Remove the piston ring and install the piston rings at the bottom of cylinder.

Notes
Press the piston ring [B] in the cylinder by using the piston head [A].



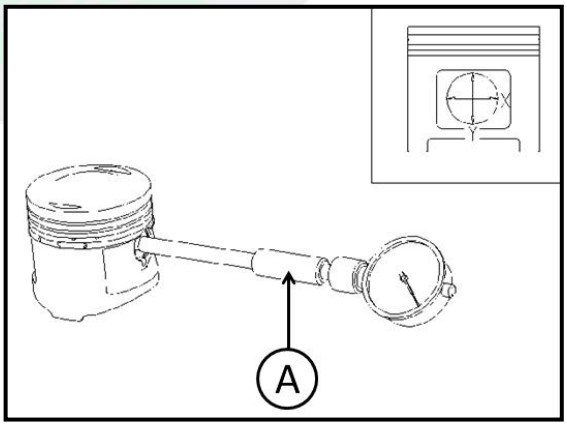
●Measure the piston ring joint clearance using the plug gauge [C].

Allowable limit: 0.4mm.

●Measure the inner diameter of piston pin hole using the measuring tool.

●Inner diameter of piston pin hole

Allowable limit: 16.02mm.

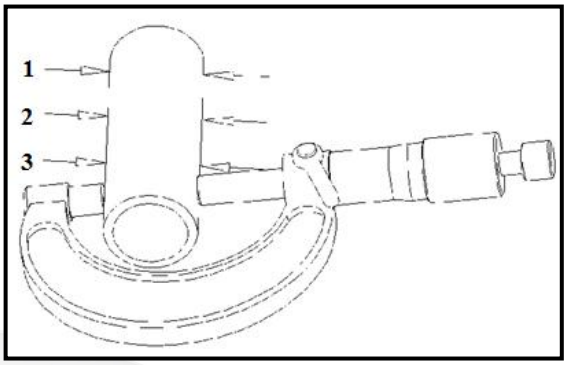


●Measure the outer diameter of piston pin.

Allowable limit: 15.99mm.

●Clearance between piston pin hole and piston pin.

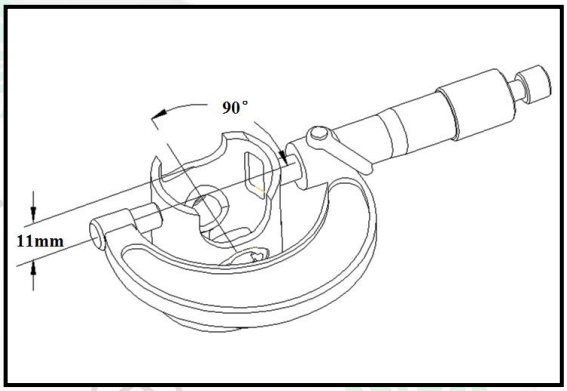
Allowable limit:- 0.025mm.



●Measure the outer diameter of piston pin.

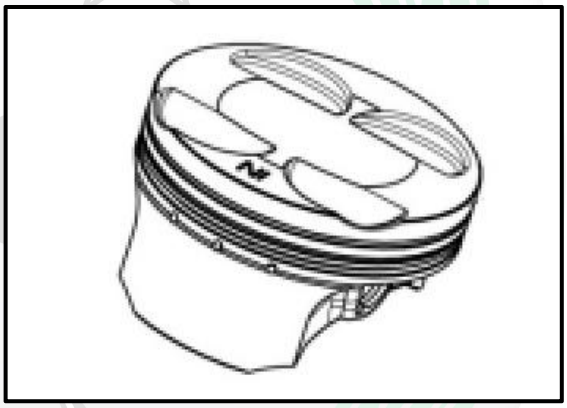
Notes
The measurement position forms an angle of 90 degrees with the piston pin and it is 8-11mm below the piston skirt part.

Allowable limit: 71.93 mm.



● Check the piston skirt and head for obvious scratches.

★ The piston will be considered as damaged if there are obvious deep scratches, bumps and top ablation.



●Measure the inner diameter of cylinder with a tester [A].

Notes
Measure the inner diameter of cylinder in the upper, middle and lower positions in the direction which forms a right angle (90 degrees) with the piston pin.

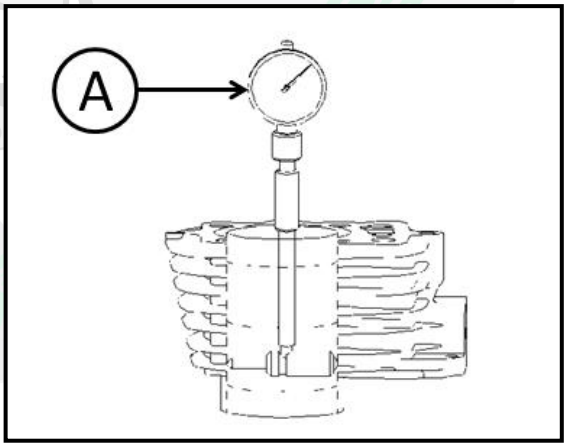
Allowable limit: 72.02 mm.

●Check the damage and wear on the inner wall of cylinder.

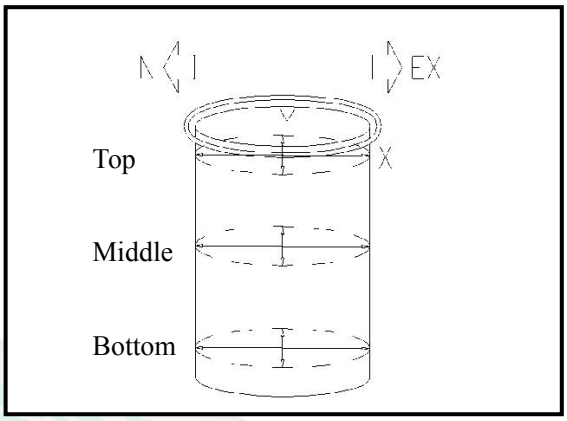
●Measure the clearance between cylinder and piston , whichever is the greater

● Need to be selected according to grouping requirements.

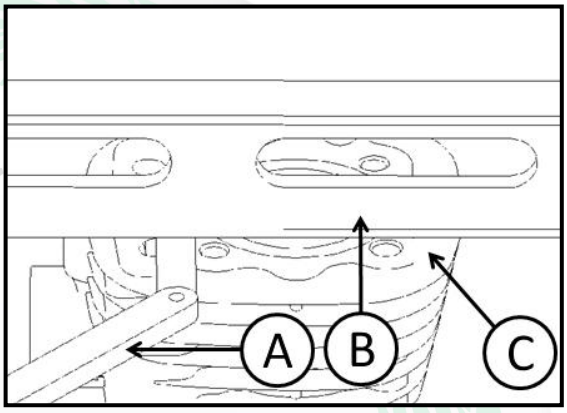
Allowable limit: 0.07mm.



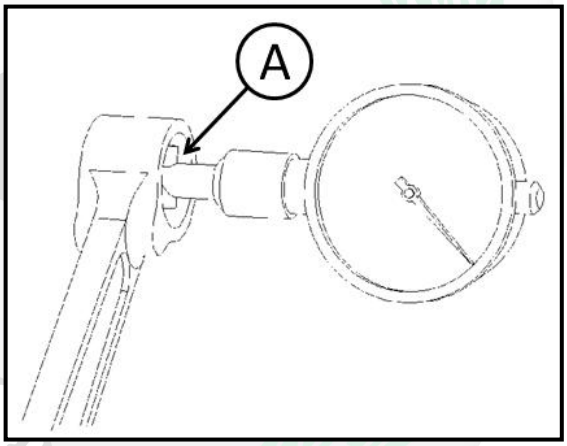
●Measure the roundness of inner wall of cylinder (inner diameter difference between X and Y directions).
Allowable limit: 0.015mm.
●Measure the cylindricity of inner wall of cylinder (inner diameter difference between X and Y directions in upper, middle and lower positions).
Allowable limit: 0.015mm.



●Measure the planeness of cylinder surface [C] using feeler gauge [A] and ruler [B].
Allowable limit: 0.08 mm.



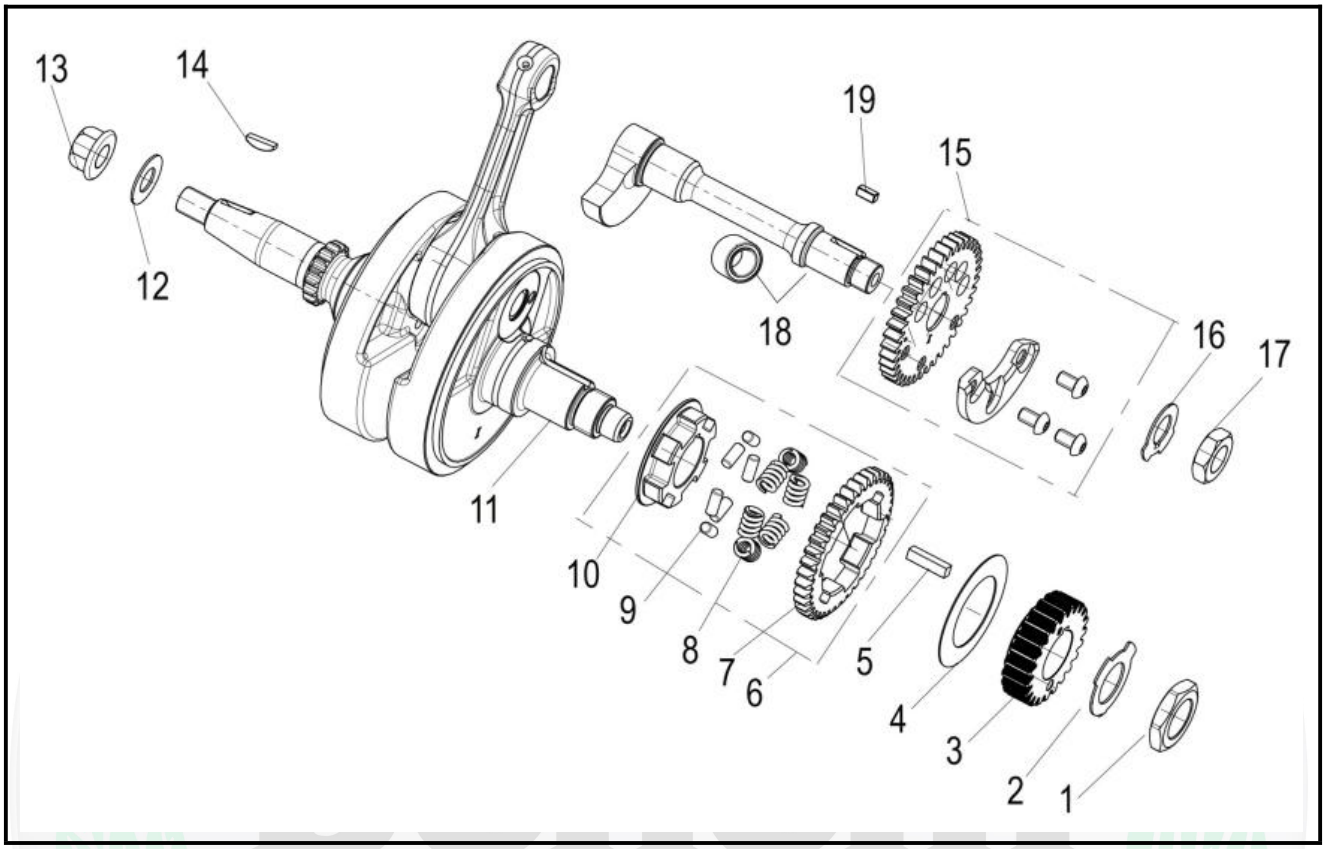
●Measure the inner diameter of small end of connecting rod [A].
Allowable limit: 16.04mm.



●If the above measurement exceeds the allowable limit rule, new parts need to be replaced. The new parts to be replaced need to be cleaned. The inside of the cylinder block should be coated with oil, piston pin and piston pin hole and the small hole of connecting rod should be coated with oil.

Crankshaft connecting rod

Exploded view of crankshaft connecting rod



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Hexagon nut M20×1.5	1	65	6.5	
2	Lock washer with double ears	1	—	—	
3	Clutch drive gear	1	—	—	
4	Belleville spring	1	—	—	
5	Straight key	1	—	—	
6	Balancer shaft gear components	1	—	—	
7	Balancer shaft drive gear	1	—	—	
8	Damping spring	6	—	—	
9	Damping block	6	—	—	
10	Balancer shaft collar	1	—	—	
11	Crankshaft components	1	—	—	
12	Washer	1	—	—	
13	Nut M12×1.25	1	70	7.0	
14	Woodruff key	1	—	—	
15	Balancer shaft driven gear components	1	—	—	
16	Lock washer with double ears	1	—	—	
17	Hexagon thin nut M14×1	1	60	6.0	
18	Balancer shaft combination	1	—	—	
19	Straight key	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

Preparatory information

Function of Crankshaft:

Convert the reciprocating motion of piston into a rotary motion and generate torque, and simultaneously drive the valve distributing mechanism and other auxiliary mechanisms, which are the carrier and power source for the timing sprocket, the drive gear, the bearing, the crank pin and other parts. As seen from the outside, the crankshaft consists of a crankshaft and a connecting rod. A combined crankshaft is used for this motorcycle. It is mainly composed of a crank, a connecting rod, a crank pin and needle bearing. Its crank pin is pressed into the crank wall with an interference fit. Meanwhile, the big ends of two rods pass through the crank pin. The crank is circular and has a large thickness in the direction opposite to the crank wall to balance the inertial force generated due to the rotation of balanced crankshaft. If the engine is overloaded or it is used for a long time, wear and deformation may be caused. Let us introduce the maintenance method of crankshaft connecting rod.

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Technical parameters

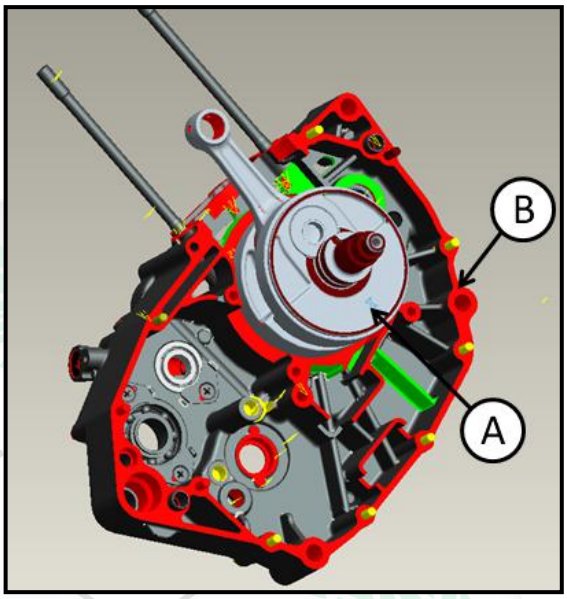
Item		Standard value	Allowable limit
Crankshaft components	Lateral clearance of big end of connecting rod	0.10-0.35 mm	0.5 mm
	Radial clearance of big end of connecting rod	0.012-0.024 mm	0.035 mm
	Run-out	0.03 mm	0.1 mm
	Crankshaft is disconnected	61.9~62 mm	-0.2 mm

13.6 Crankshaft Connecting Rod Combination

Disassembly of Crankshaft Connecting Rod Combination

●Open the assembling screw, remove the right case and the crankshaft and the other accessory parts on the case, and remove the crankshaft connecting rod combination [A] from the left crankcase [B].

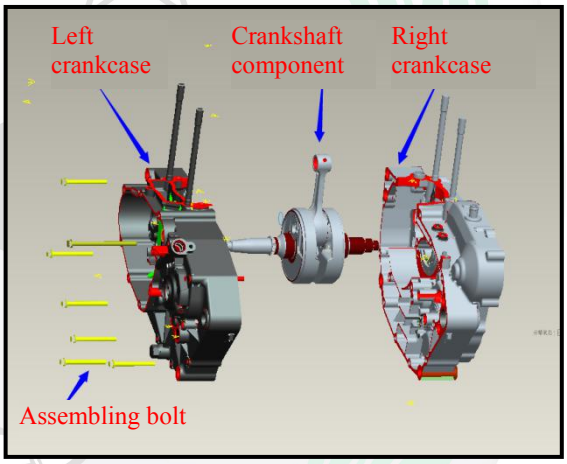
Notes
Do not damage assembling surface. Do not knock the crankshaft down with a slam, and please slowly knock the crankshaft using the same force.



Assembly

● Install the crankshaft into the crankcase and install the main and auxiliary shafts into the specified positions. Finally assemble the case.

Notes
Assemble the crankshaft in the reverse order of disassembly.

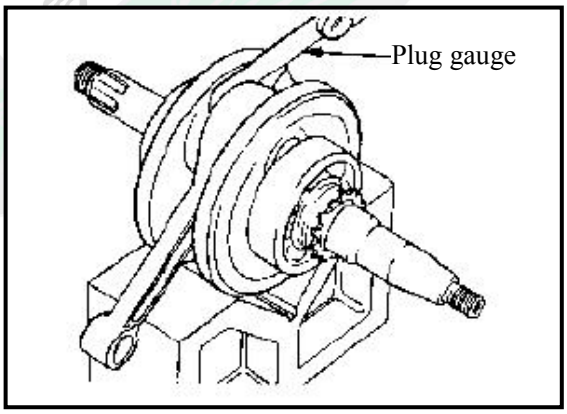


Check

● Measure the side clearance of connecting rod:

★ Put the crankshaft together with the bearing on the V-shaped iron, push the big end of connecting rod to one side by hand, and measure the left and right clearance of the big end of the connecting rod by using the plug gauge.

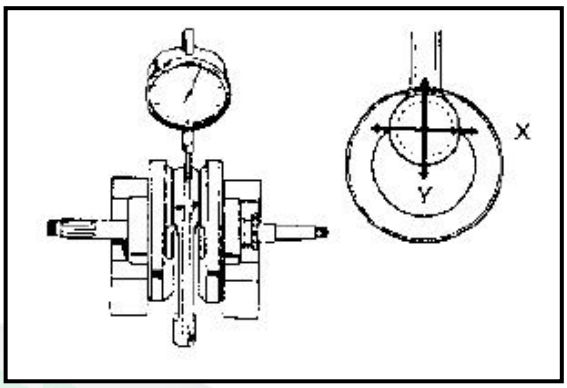
Allowable limit: 0.5mm.



●Measure the radial clearance of big end of connecting rod:

★ Fix a dial indicator at the connecting rod and measure the clearance of big end of connecting rod in X-Y direction. In addition, an inner diameter dial gauge is required to verify the inner diameter of small side of connecting rod.

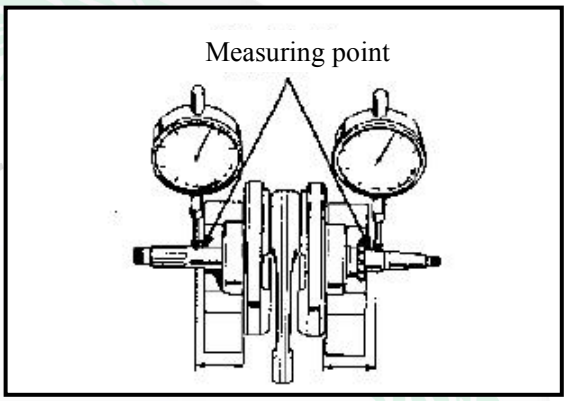
Allowable limit: 0.035 mm.



●Measure the run-out of crankshaft.

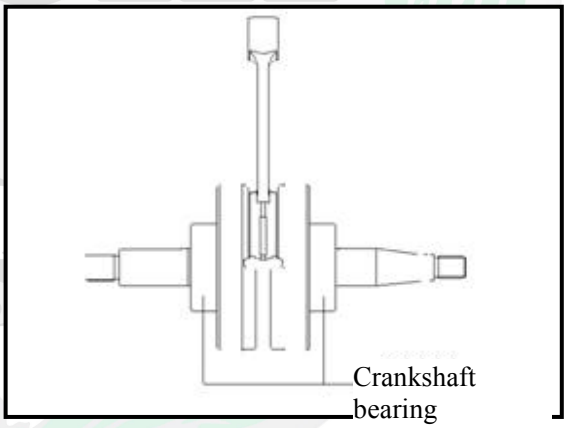
★ Fix the crankshaft together with the bearing on the V-shaped iron, and fix two dial gauges on the left and right crankshaft journals so that the dial indicator is perpendicular to the main journal. Then rotate the crankshaft to read the maximum and minimum readings of dial gauge. The difference between the two is used as the runout value of crankshaft. If the value exceeds the specified value, the crankshaft is bent and deformed, the bending direction should be ascertained and corrected.

Allowable limit: 0.1mm.



●Check whether the crankshaft bearing rotates with abnormal noise or whether it is loose. Check whether the big end of connecting rod is stuck or not, it becomes black or blue. Check the crankshaft journal for serious wear and tear and the crankshaft bearing for damage.

If there is abnormal noise or it is loose, replace the crankshaft assembly.



Balance shaft

Function of balancer shaft

The balancer shaft is used to balance the imbalance of engine, improve the stability of engine and improve the vibration comfort of engine.

Disassembly of balancer shaft

● Loosen the assembling screw, remove the right case and take balancer shaft combination from the left crankcase.

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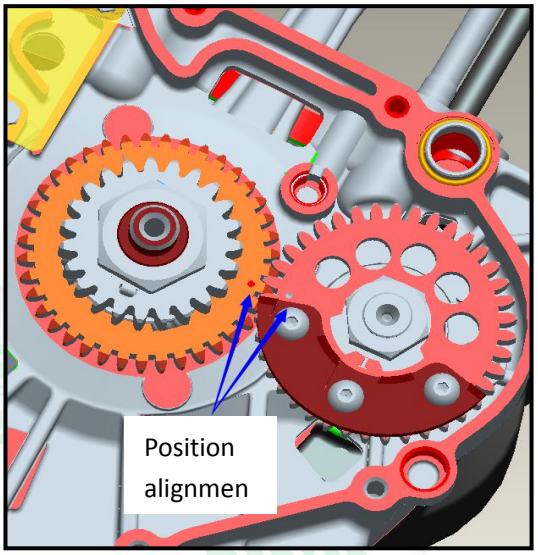
Assembly of balancer shaft

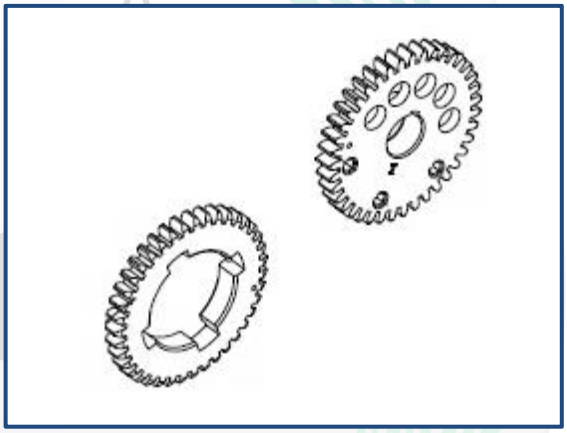
●Assemble the balancer shaft in the reverse order of disassembly.

● Pay attention to the position of the gear marks when assembling.

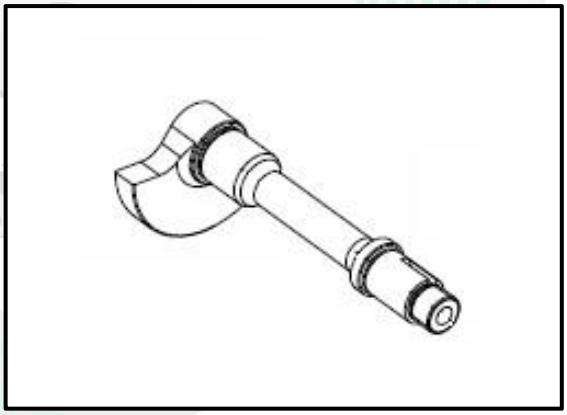


Inspection of balancer shaft

● Check the balancer shaft gear surface for wear and pitting.



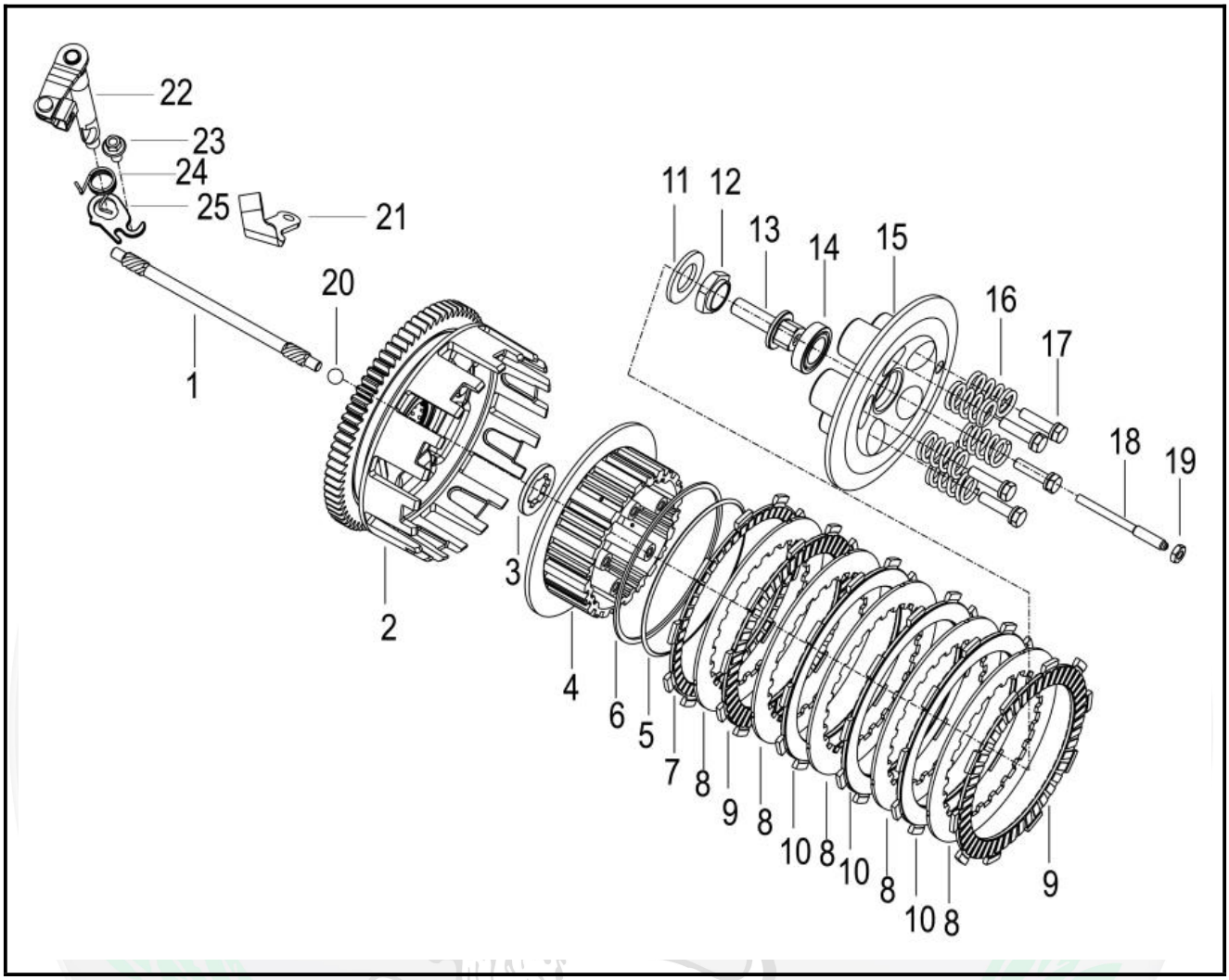
●Check whether the balancer shaft journal has become black or yellow due to obvious wear and tear.



● Check the runout of end of balancer shaft, the method of which is the same as that for detecting the crankshaft.

Clutch

Exploded view of clutch



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Clutch control rod	1	—	—	
2	Clutch housing	1	—	—	
3	Washer	1	—	—	
4	Clutch drum	2	—	—	
5	Steel disk	1	—	—	
6	Cup spring	1	—	—	
7	Garnished clutch plate I	5	—	—	
8	Steel driven clutch plate	2	—	—	
9	Garnished clutch plate II	3	—	—	
10	Garnished clutch plate	1	—	—	
11	Washer lock	1	—	—	
12	Nut flange	1	—	—	
13	Pin	1	—	—	
14	Ball bearing	1	—	—	
15	Disk pressure plate	5	—	—	
16	Spring	5	—	—	
17	Screw M6×25	1	—	—	
18	Pin	1	10	1.0	
19	Nut flange M6	1	—	—	
20	Steel ball	1	—	—	
21	Plate	1	—	—	
22	Disengagement lever	1	10	1.0	
23	Screw M6×12	1	—	—	
24	Inner spring	1	—	—	
25	Plate spring	1	—	—	

L: Apply locking agent.

R: Replace the part

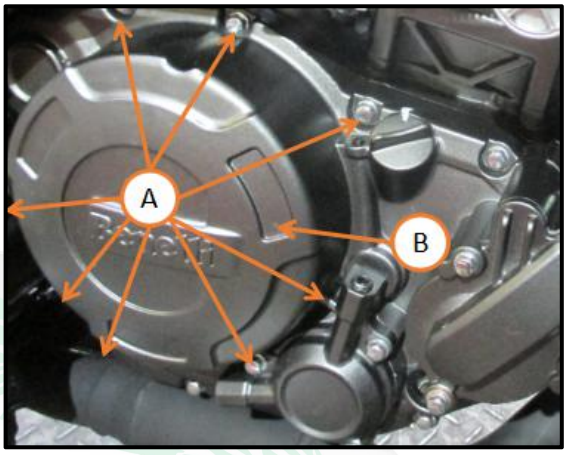
Si: Apply silicon grease.

Special tools

Clutch locking tool:	

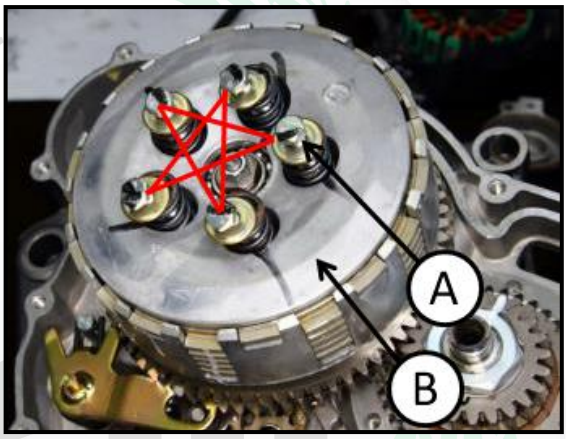
Disassembly of clutch

Remove the bolt [A] and open the clutch cover on the right crankcase [B]

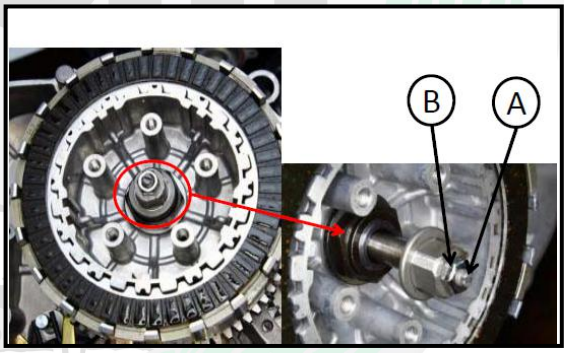


●Loosen the five bolts [A] of plate [B] in the way of diagonal cross.

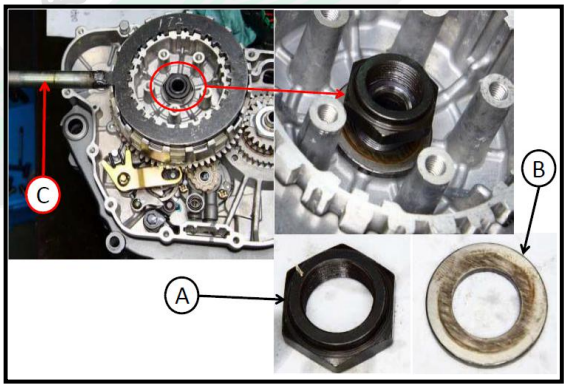
● Remove the plate, clutch spring and bearing block.



Remove the slotted head adjusting screw [A] and nut [B].

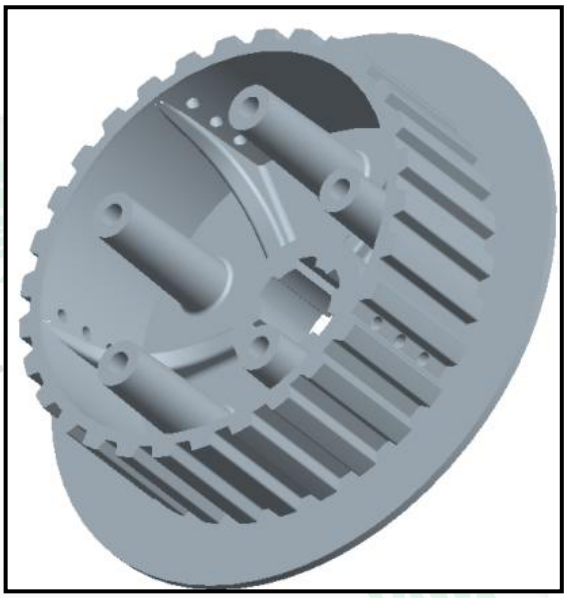


●Lock the clutch and remove the locknut and washer [B] using special tools [C].

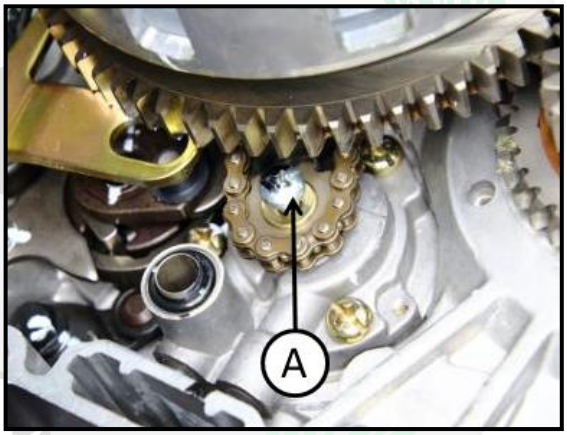


●Remove the driven plates end Friction plates and pads.

●Remove the clutch wheel hub.
●Remove the spline washer.

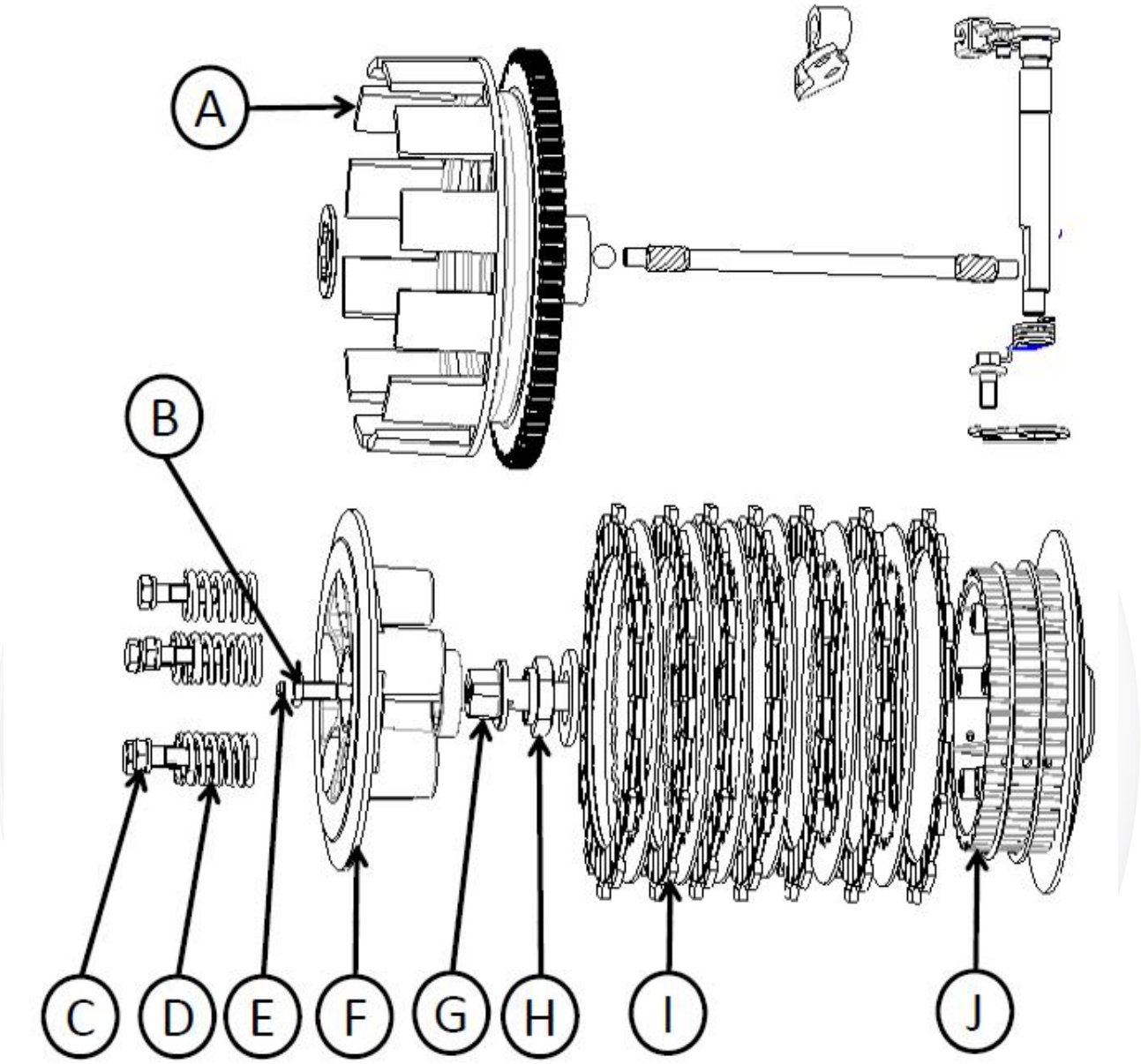


Remove the oil pump locking screw [A].



● Remove the oil pump sprocket, clutch housing component and chain.

Disassembly of Clutch



Clutch housing component [A]
Slotted head adjusting screw [B]
Bolt [C]
Clutch spring [D]
Nut [E]
Plate [F]
Bearing block [G]
Lock nut [H]
Friction plate or disks [I]
Clutch hub [J]

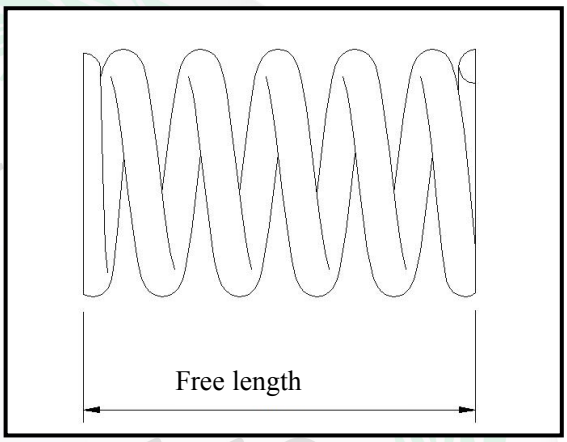
Installation of clutch

●Install the clutch in the reverse order of disassembly.

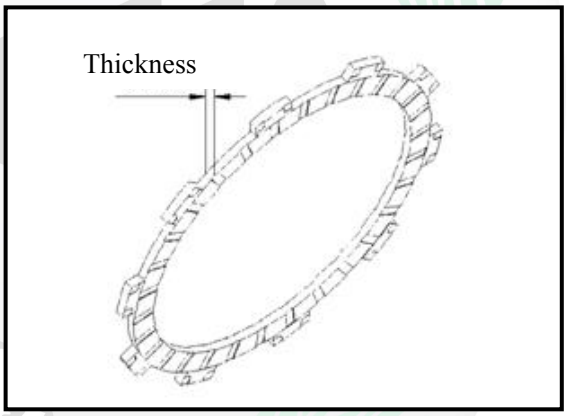
Inspection of clutch

●Check the housing groove of clutch for the trace of any burr or damage. If any, polish it using a file, and replace it when the polishing amount is too large.
Check the tooth shape of plate and clutch wheel hub for damage, if any, it should be replaced.

●Measure the free length of pressure spring.
Allowable limit I: Replace it if its length is less than 41mm.

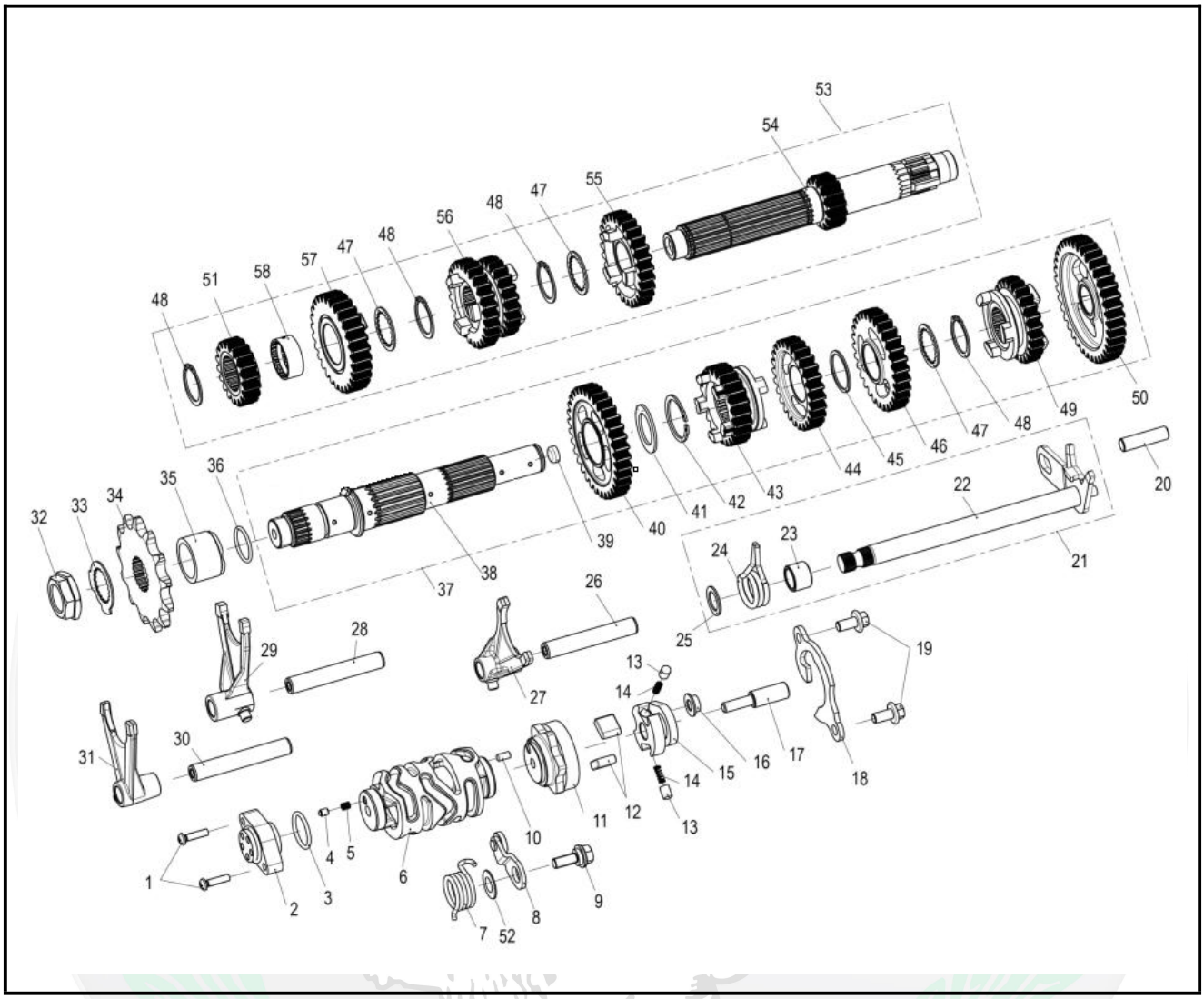


●Measure the thickness of friction plate with a vernier calipers.
Allowable limit I: Replace it if its thickness is less than 2.6mm.
Allowable limit II: Replace it if its length is less than 2.8mm.



Gearshift Mechanism

Exploded View of Gearshift Mechanism



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Screw M4×16	2	—	—	
2	Gear indicator	1	—	—	
3	O-Ring	1	—	—	
4	Shifting prod	1	—	—	
5	Prod spring	1	—	—	
6	Shift drum	1	—	—	
7	Return spring	1	—	—	
8	Stopper lever component	1	—	—	
9	Arm shaft of gear shift positioning roller	1	—	—	
10	Pin 4×9	1	—	—	
11	Star locking plate	1	—	—	
12	Separation block	2	—	—	
13	Separation block pin	2	—	—	
14	Pawl spring	2	—	—	
15	Separation seat	1	—	—	
16	Separation seat roller	1	—	—	
17	Star locking plate pin	1	—	—	
18	Star wheel plate	1	—	—	
19	Bolt M6×10	2	10	1.0	
20	Pivot	1	—	—	
21	Shift rod assembly	1	—	—	
22	Shift rod welding assembly	1	—	—	
23	Collar	1	—	—	
24	Return spring	1	—	—	
25	Washer 12x18x1	1	—	—	
26	Five-position shift fork shaft	1	—	—	
27	Five-position shift fork of auxiliary shaft	1	—	—	
28	Shift fork shaft of primary shaft	1	—	—	
29	Shift fork of primary shaft	1	—	—	
30	Six-position shift fork of auxiliary shaft	1	—	—	
31	Six-position shift fork of auxiliary shaft	1	—	—	
31	Six-position shift fork of auxiliary shaft	1	—	—	
32	Nut M18×1	1	60	6.0	
33	Spline washer	1	—	—	
34	Output sprocket	1	—	—	
35	Output sprocket collar	1	—	—	
36	O-ring seal 19×1.8	1	—	—	
37	Auxiliary shaft assembly	1	—	—	
37	Auxiliary shaft assembly	1	—	—	
38	Auxiliary shaft	1	—	—	
39	Plug	1	—	—	

40	Two-position gear of auxiliary shaft	1	—	—	
41	Washer	1	—	—	
42	Retainer for shaft	1	—	—	
43	Six-position gear of auxiliary shaft	1	—	—	
43	Six-position gear of auxiliary shaft	1	—	—	
44	Four-position gear of auxiliary shaft	1	—	—	
45	Washer	1	—	—	
46	Three-position gear of auxiliary shaft	1	—	—	
47	Spline washer	3	—	—	
48	Retainer for shaft	4	—	—	
49	Five-position gear of auxiliary shaft	1	—	—	
50	One-position gear component of auxiliary shaft	1	—	—	
51	Two-position gear of primary shaft	1	—	—	
52	Washer	1	—	—	
53	Primary Shaft Assembly	1	—	—	
54	Primary shaft	1	—	—	
55	Five-position gear of primary shaft	1	—	—	
56	Three and four-position gear of primary shaft	1	—	—	
57	Six-position gear of primary shaft	1	—	—	
58	Spline collar	1	—	—	

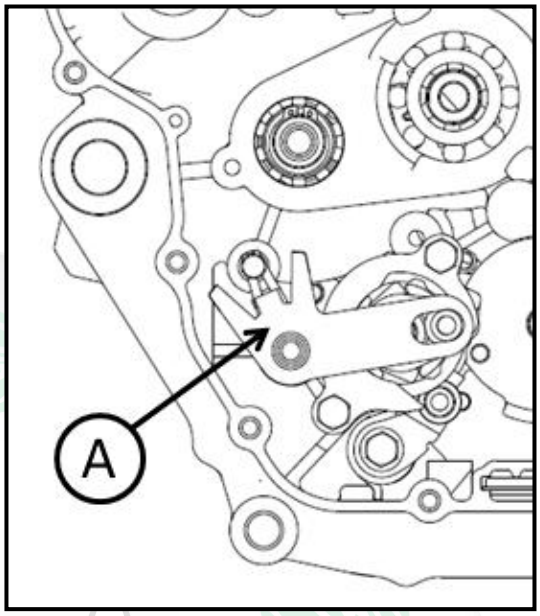
L: Apply locking agent.

R: Replace the part

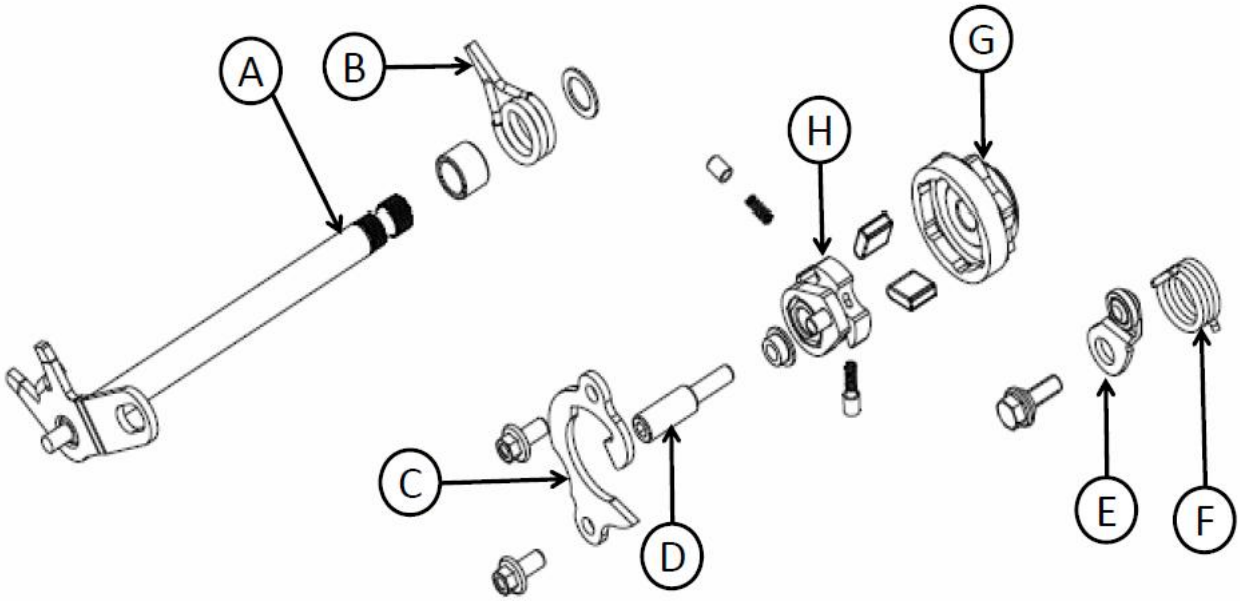
Si: Apply silicon grease.

Disassembly of Gearshift Mechanism

Remove the shift shaft component [A] and return spring.



●Remove the bolt and star wheel plate
●Remove the shift positioning roller arm shaft, the shift positioning roller arm component and the return spring
●Remove the star positioning plate dowel pin, separating seat and star positioning plate
● The removed parts are shown in the exploded view.



Shift rod component [A]
Return spring [B]
Star wheel plate [C]
Arm shaft of gear shift positioning roller [D]
Gear shift positioning roller arm component [E]
Return spring [F]

Star locking plate [G]
Separation seat [H]

Installation of Gearshift Mechanism

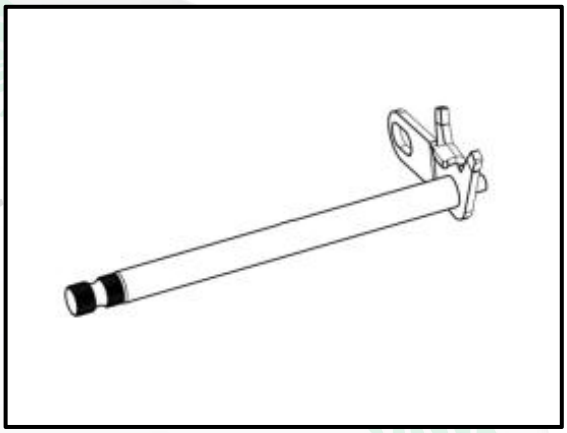
●Install the clutch in the reverse order of disassembly.

Inspection of Gearshift Mechanism

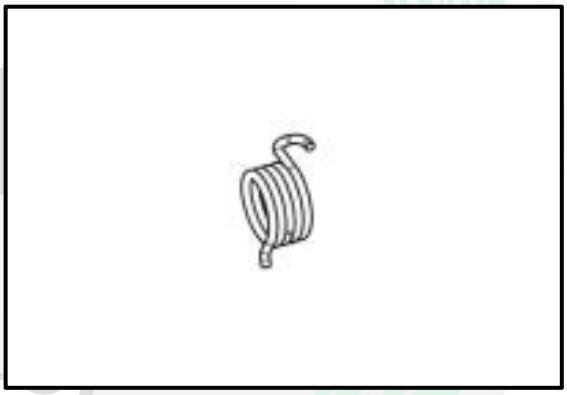
Before disassembly, the shift lever should be able to return flexibly without clamping;

● Check the wear of the shift lever component. If the wear is serious, replace the component.

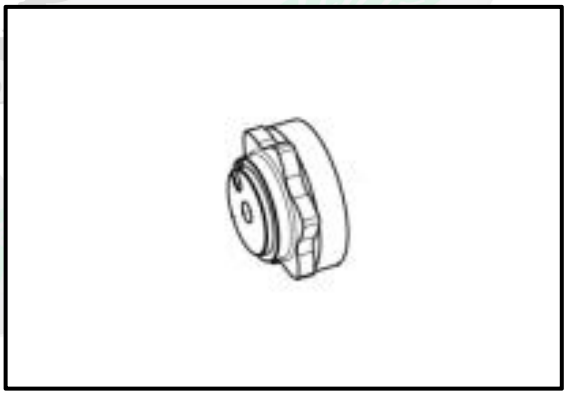
Check the shift shaft for bending; in case of overbending, replace it;



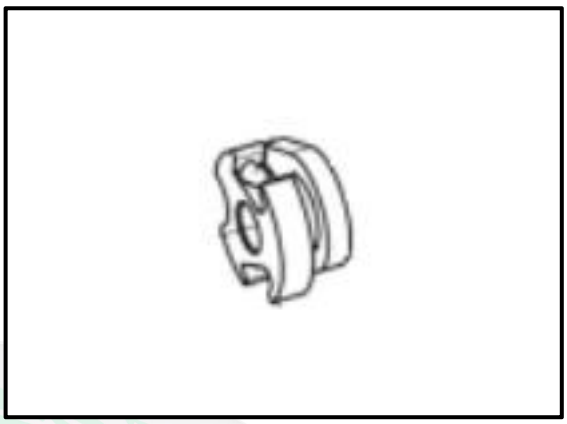
●Check whether the elasticity of return spring is weaken, and replace it if necessary;



● Check the wear of start-type positioning plate. If the wear is serious, replace it.



● Check the wear of separation seat. If the wear is serious, replace the component.



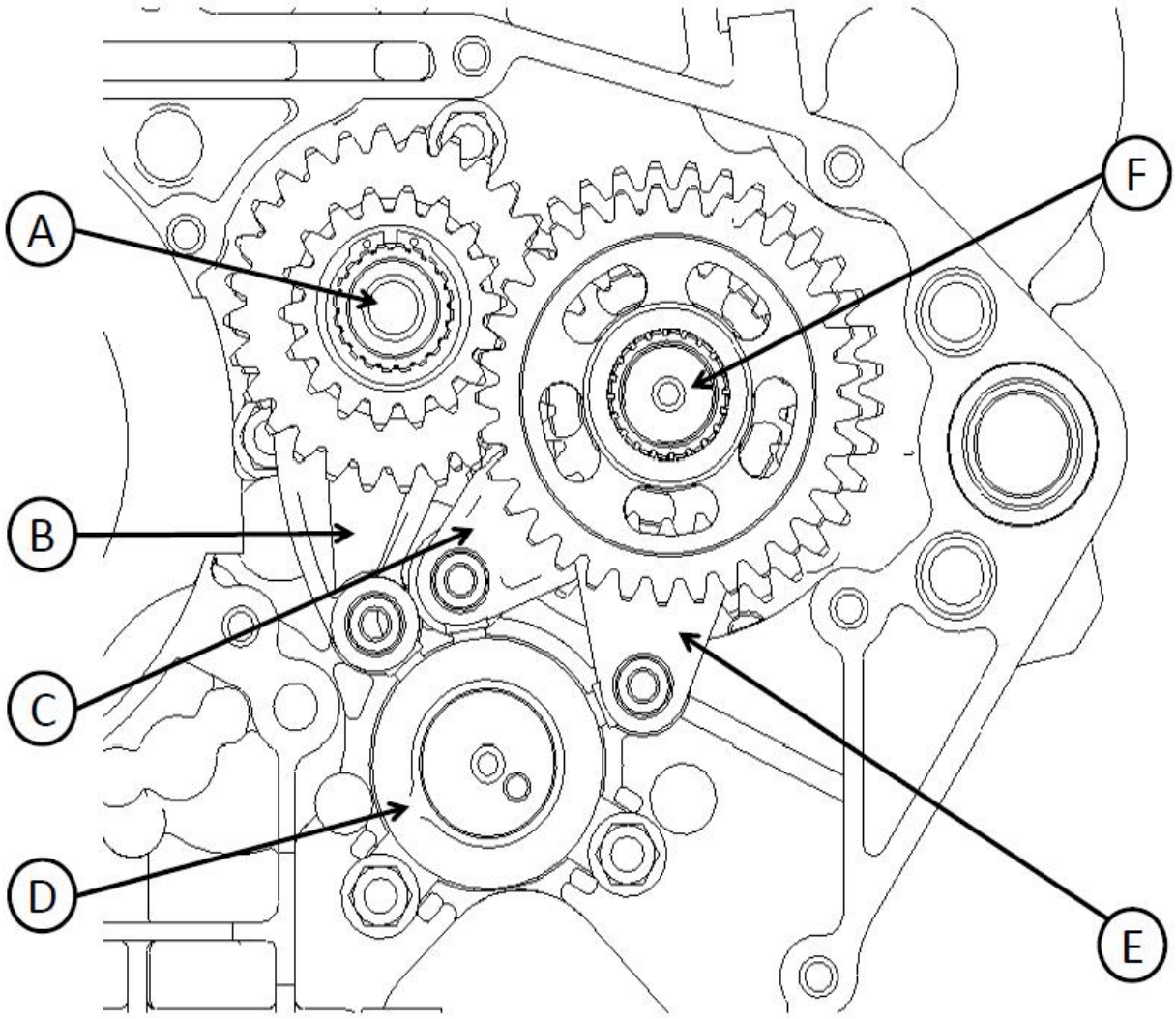
Disassembly of primary / auxiliary shaft component

●Loosen the assembling bolt.

●Separate the crankcase.

Notes
Do not damage washer and assembling surface.

●Remove the left case.



Primary shaft component[A]

Shift fork of primary shaft [B]

Five-position shift fork of auxiliary shaft [C]

Shift drum [D].

Six-position shift fork of auxiliary shaft [E]

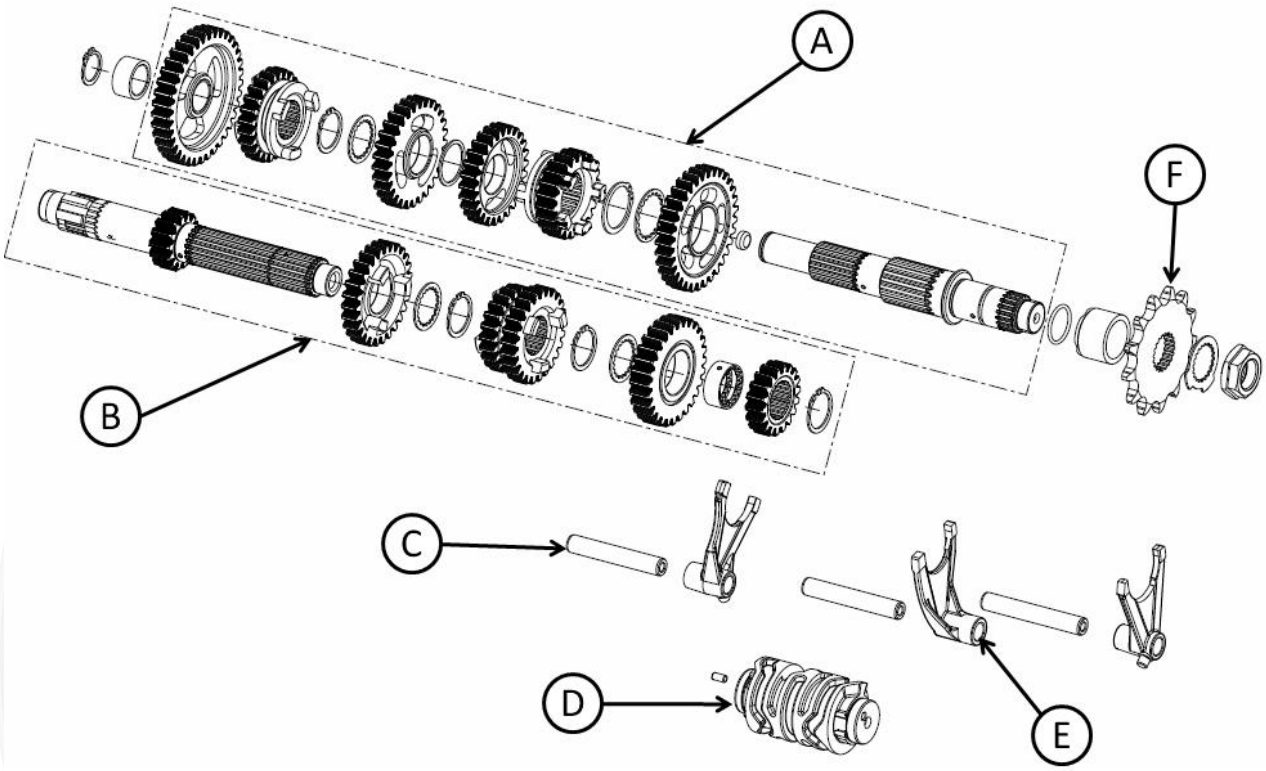
Auxiliary shaft component [A].

●Pull out the shift fork shaft

●Remove the shift fork

Pull out shift drum, primary shaft component, auxiliary shaft component

● The removed parts are shown in the exploded view.



Primary shaft component[A]

Auxiliary shaft component [B].

Shift fork shaft [C]

Shift drum [D].

Shift fork [E]

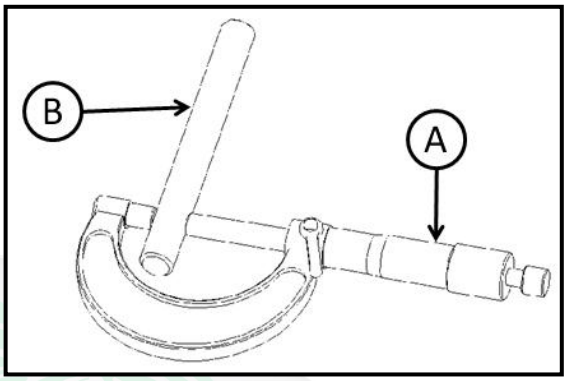
Output sprocket [F]

Disassembly of primary / auxiliary shaft component

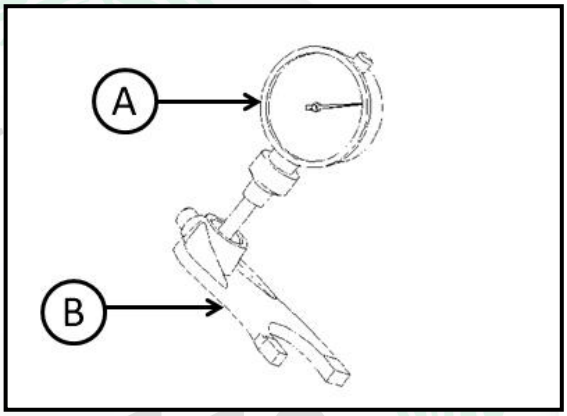
●Install the clutch in the reverse order of disassembly.

Inspection of primary / auxiliary shaft component

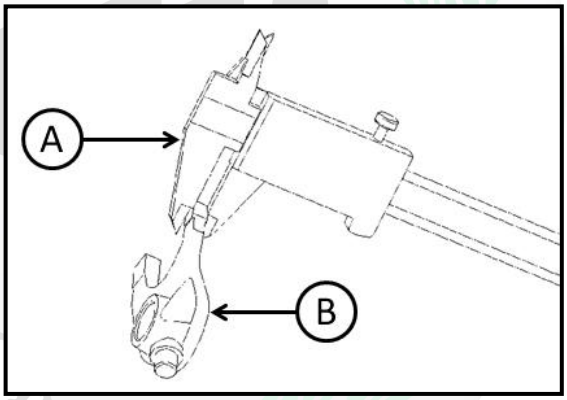
●Use the micrometer [A] to measure the outer diameter of shift fork shaft [B].
Allowable limit: 9.97 mm



●Use the measure instrument [A] to measure the inner diameter of shift fork [B] hole.
Allowable limit: 10.03mm

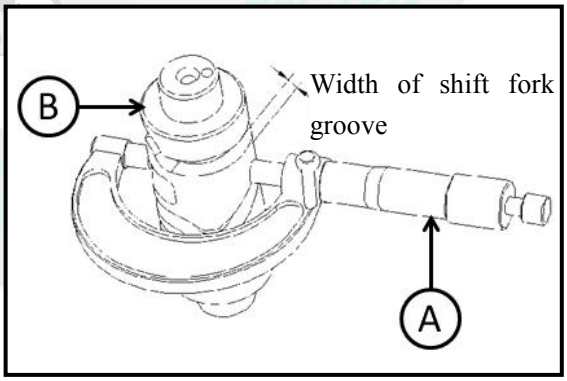


●Use the vernier calipers [A] to measure the thickness of shift fork [B].
Allowable limit: 4.7 mm.



●Use the micrometer [A] to measure the diameter of shift drum [B].
Allowable limit: 41.5mm

●Measure the width of shift fork groove with a vernier calipers
Allowable limit: 6.5mm



Chapter VI Finished Motorcycle

Contents

Wheel/tire 246
Exploded view of front wheel/tire 246
Exploded view of rear wheel/tire 247
Technical parameters 249
Special tool 250
Wheel (rim) 251
Disassembly of front wheel 251
Installation of front wheel 252
Disassembly of rear wheel 253
Installation of rear wheel 255
Inspection of wheel 255
Inspection of wheel axle 256
Adjustment of static balance of rim 257
Adjustment / inspection of tire pressure 259
Inspection of tire 259
Disassembly of tire 259
Installation of tire 259
Hub bearing 262
Disassembly of hub bearing 262
Installation of hub bearing 262
Inspection of hub bearing 263
Hub bearing lubrication 263
Drive mechanism 264
Exploded view of drive mechanism 264
Technical parameters 266
Special tool 267
Drive chain 268
Inspection of slackness of drive chain 268
Inspection of slackness of drive chain 268
Inspection / adjustment of wheel alignment 268
Insppection of wear of drive chain 268
Drive chain lubrication 268
Disassembly of drive chain 268
Installation of drive chain 269
Sprocket, collar, collar bearing 271
Disassembly of rear sprocket 271
Installation of rear sprocket 271
Disassembly of collar bearing 272
Installation of collar bearing 272
Inspection of collar bearing 272
Lubrication of collar bearing 273

Inspection of damper of collar 273
Inspection of wear of drive chain 273
Check the deformation of rear sprocket 274
Brake 275
Exploded View of brake 275
Technical parameters 277
Special tool 278
Brake lever, brake pedal 279
Adjustment of position of brake lever 279
Adjustment of position of brake pedal 279
Adjustment of position of brake pedal 279
Disassembly of brake pedal 280
Installation of brake pedal 280
Caliper 282
Disassembly of front caliper 282
Disassembly of rear caliper 282
Installation of caliper 282
Disassembly of front caliper 283
Assembly of front caliper 283
Diassembly of rear caliper 283
Assembly of rear caliper 283
Inspection of fluid sea of caliper for damage 283
Inspection of dust seal of caliper for damage 284
Inspection of the caliper piston and brake cylinder for damage 284
Brake pad 285
Disassembly of front brake pad 285
Installation of front brake pad 285
Disassembly of rear brake pad 286
Installation of rear brake pad 286
Inspection of wear of brake pad 286
Master cylinder 287
Disassembly of front master cylinder 287
Installation of front master cylinder 288
Disassembly of rear master cylinder 289
Installation of rear master cylinder 289
Disassembly of front master cylinder 289
Disassembly of rear master cylinder 289
Assembly of master cylinder 289
Check the master cylinder (visual inspection) 289
Brake disc 289
Disassembly of front brake disc 290
Disassembly of rear brake disc 290
Installation of brake disc 291
Inspection of wear of brake disc 291
Inspection of deformation of brake disc 292
Brake fluid 292

Inspection of level of brake fluid 292
Replacement of brake fluid 292
Exhaust the air inside the brake line 292
Brake hose 293
Disassembly / installation of brake hose and brake line 293
Inspection of brake hoses and brake lines 293
Anti-lock brake system (ABS)....294
Part position....294
ABS system circuit diagram 295
Pin name 296
ABS overhaul 297
ABS diagnostic flow chart 301
Questions need to be asked for the rider 302
ABS hydraulic mechanism 310
Speed sensor 314
Suspension system....318
Exploded view of front suspension system 318
Exploded view of rear suspension system 320
Technical parameters 322
Special tool 323
Front shock absorber 324
Disassembly of front shock absorber 324
Installation of front shock absorber 324
Replacement of front shock absorber fluid....325
Disassembly of front shock absorber 328
Inspection of inner tube and outer tube 330
Inspection of dust seal 330
Inspection of spring tension 331
Rear shock absorber 332
Adjustment of pretightening force of spring 332
Disassembly of rear shock absorber 333
Assembly of rear shock absorber 334
Inspection of rear shock absorber 334
Rear swing arm 335
Disassembly of swing arm 335
Installation of swing arm 336
Disassembly of swing arm bearing 337
Installation of swing arm bearing 337
Inspection of swing arm bearing 338
Inspection of chain guide 338
Control system 339
Exploded view of control system 339
Special tool 341
Control system 342
Inspection of control system 342
Adjustment of control system 342

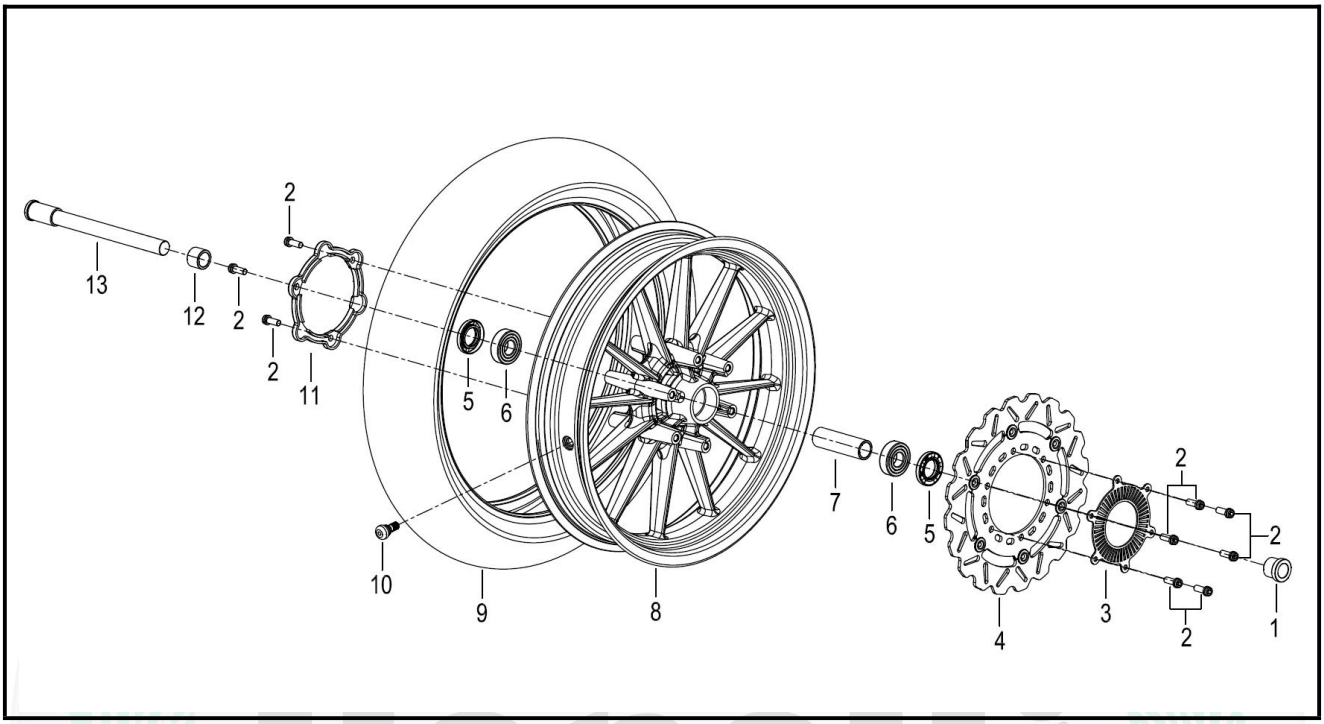
Handlebar 343
Disassembly of handlebar 343
Installation of handlebar 344
Steering stem 346
Disassembly of steering stem and steering stem bearing 346
Installation of steering stem and steering stem bearing 347
Lubrication of steering stem bearing 349
Inspection of deformation of steering stem 349
Frame 350
Exploded view of frame 350
Exploded view of left footpeg 352
Exploded view of right footpeg 354
Exploded view of muffler 356
Exploded view of front fender 358
Exploded view of rear fender 360
Exploded view of headlights and meters 362
Exploded view of fuel tank cover 363
Exploded view of seat cushions and covers 364
Exploded view of engine accessories 366
Seat cushion 367
Disassembly of seat cushion 367
Installation of seat cushion 367
Cover 368
Disassembly of left cover 368
Installation of left cover 368
Disassembly of right cover 368
Installation of right cover 369
Remove left cover of frame 369
Installation of left cover 369
Disassembly of right cover of frame 369
Installation of right cover 370
Side cover 371
Disassembly of side cover 371
Installation of side cover 371
Rear part of rear fender 372
Disassembly of rear part of rear fender 372
Installation of rear part of rear fender 372
Front fender 373
Disassembly of front fender 373
Installation of front fender 373
Fuel tank cover 374
Disassembly of fuel tank cover 374
Installation of Fuel Tank Cover 374
Frame 375
Disassembly of frame 375
Installation of frame 376

Inspection of frame 376
Sidestand 377
Disassembly of sidestand 377
Installation of sidestand 377
Left front footpeg 378
Disassembly of left front footpeg 378
Installation of left front footpeg 378
Left rear footpeg 379
Disassembly of left rear footpeg 379
Installation of left rear footpeg 379
Front right footpeg 380
Disassembly of front right footpeg 380
Installation of front right footpeg 380
Rear right footpeg 381
Disassembly of rear right footpeg 381
Installation of rear right footpeg 381
Muffler 382
Disassembly of muffler 382
Installation of muffler 384
Disassembly/installation of engine 385
Exploded View of disassembly/installation of engine 385
Disassembly of engine 387
Installation of engine 391

Benelli

Wheel/tire

Exploded view of front wheel/tire



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Front wheel left collar	1	—	—	Si
2	Bolt M10×1.25×20	9	22 #	2.2	L、S
3	Front wheel gear ring	1	—	—	
4	Front brake disc component	1	—	—	
5	Dust seal assembly	2	—	—	Si、R
6	Rolling bearing 6204-2RS	2	—	—	Si
7	Front wheel middle shaft sleeve	1	—	—	
8	Front rim	1	—	—	
9	Tubeless tire 110/70R17	1	—	—	
10	Air valve Z2-01-1/straight	1	—	—	R
11	Front rim cover	1	—	—	
12	Front wheel right collar	1	—	—	Si
13	Front wheel axle	1	107	10.7	

L: Apply locking agent.

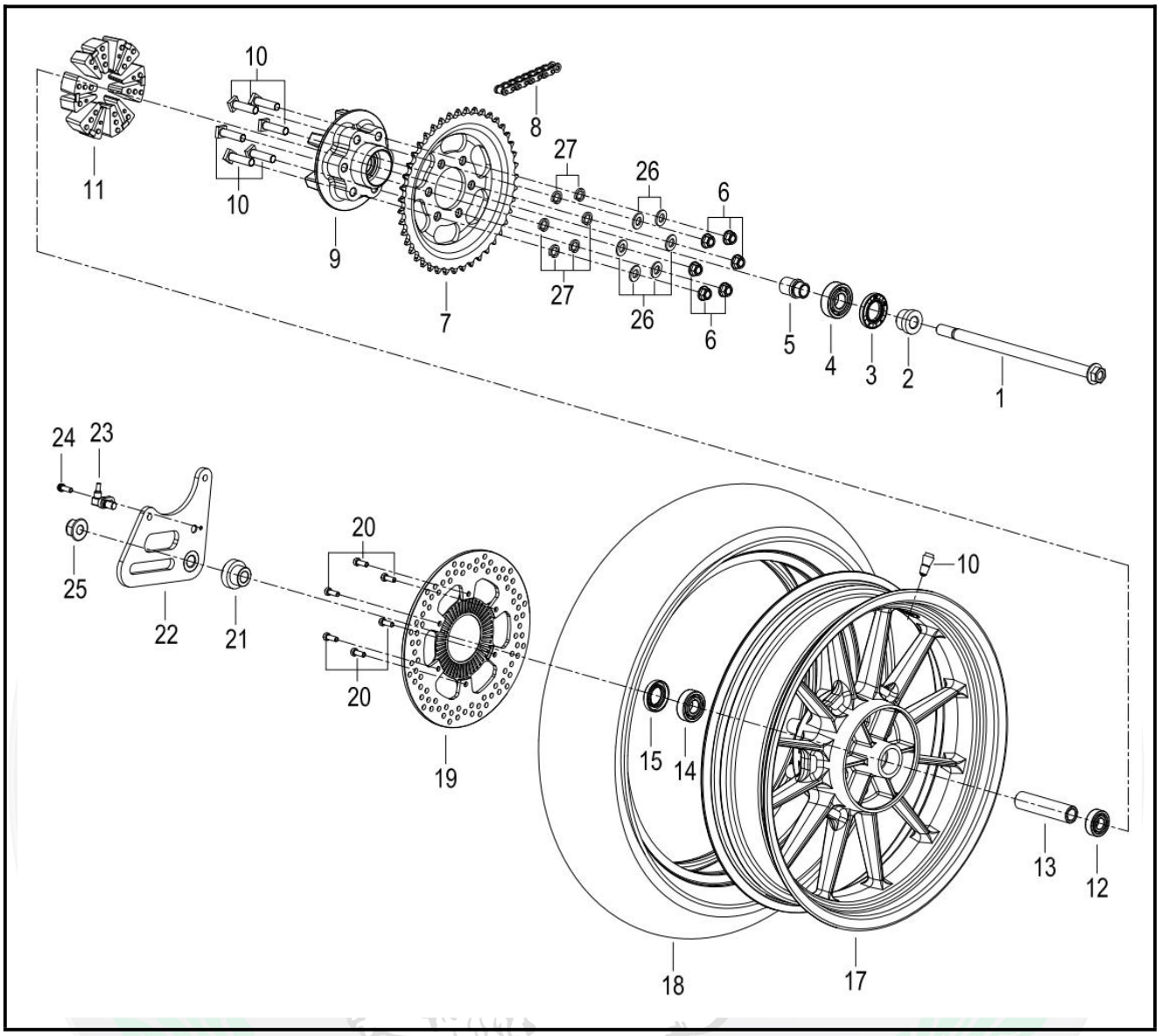
R: Replace the part

Si: Apply silicon grease.

S: Observe the specified tightening sequence.

Note: In the table #, the locking torque of the liquid brake disc side bolt is 22N·m, and there are no torque requirements for other three bolts.

Exploded view of rear wheel/tire



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Rear wheel axle	1	98	9.8	Si
2	Left collar of rear wheel	1	—	—	Si
3	Dust seal assembly	1	—	—	Si、R
4	Rolling bearing 6204-2RS	1	—	—	Si
5	Chain drive collar	1	—	—	Si
6	Self-locking nut M10×1.25	6	45	4.5	S
7	Sprocket / 43-gear	6	—	—	
8	Chain 520HO-1×110	6	—	—	
9	Sprocket hub	1	—	—	
10	Sprocket mounting bolt	1	45	4.5	
11	Rear wheel damper	1	—	—	
12	Rolling bearing 6202-2RS	6	—	—	Si
13	Bearing collar	6	—	—	
14	Rolling bearing 6302-2RS	1	—	—	Si
15	Front wheel right seal assembly	1	—	—	Si、R
16	Air valve	1	—	—	Si
17	Rear wheel rim	1	—	—	
18	Tubeless tire 150/60R17	1	—	—	
19	Rear brake disc component	1	—	—	
20	Brake disc mounting bolt M6×16	1	10	1.0	L、S
21	Collar II	1	—	—	
22	Rear brake bracket assembly	6	—	—	
23	Front wheel speed sensor	1	—	—	
24	Bolt M6×1×16	1	10	1.0	
25	Self-locking nut M14×1.5	1	98	9.8	
26	Washer 10	1	—	—	
27	Spring washer φ10	1	—	—	

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

S: Observe the specified tightening sequence.

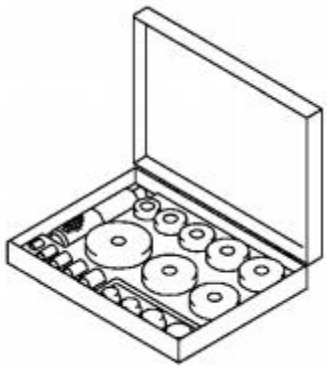
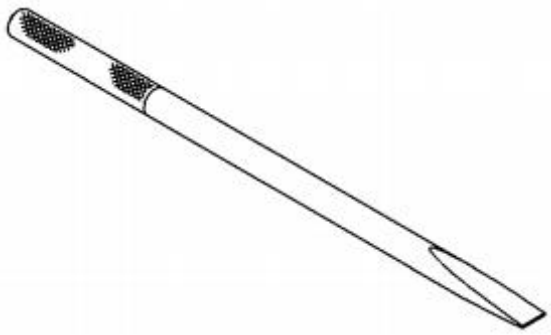
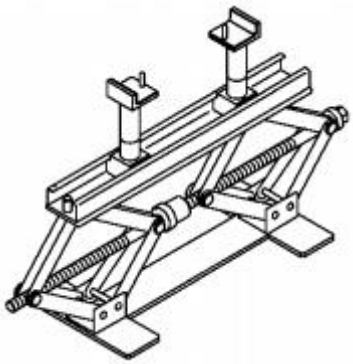
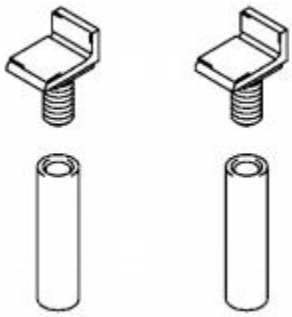
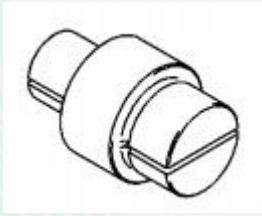
Technical parameters

Item	Normal	Allowable limit
Wheel (rim)		
Oscillating quantity of rim:		
Axial	≤TIR 0.5 mm	TIR 1.0 mm
Radial	≤TIR 0.8 mm	TIR 1.0 mm
Oscillating quantity of wheel axle:	≤TIR 0.03 mm	TIR 0.2 mm
Wheel balancer	≤10 g	——
Balance weight	5 g、10 g	——
Rim size:		
Front wheel	17×MT3.50	——
Rear wheel	17×MT4.00	——
Tire		
Tire pressure (when cooling tire) :		
Front wheel	220±10kPa	——
Rear wheel	250±10kPa	——
Tread depth:		
Front wheel	3.8 mm	1.6 mm
Rear wheel	4.8 mm	2.0 mm
Standard tire:	Manufacturer, model	**Specifications**
Front wheel	CORDIAL/CY156A/CCC/E4 75R-0005102	110/70-17
Rear wheel	CORDIAL/CY185A/CCC/E4 75R-0006820	140/60-17
Front wheel	METZELER /M/C/CCC/E3 75R-0056965/DOT	110/70R17 54H/radial-ply Tire
Rear wheel	METZELER /M/C/CCC/E3 75R-0056678/DOT	150/60R17 66H/radial-ply Tire

⚠Warning

Front and rear tires must be made by the same manufacturer!

Special tools

Bearing driver set:	Bearing puller shaft:
	
Jack:	Accessories of jack:
	
Bearing puller head	
	

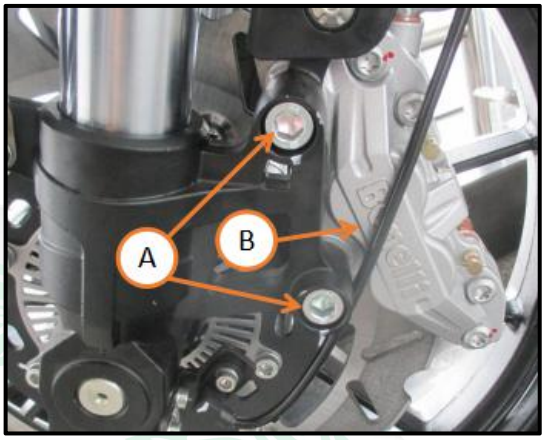
Wheel (rim)

Disassemble front wheel

●Disassemble:

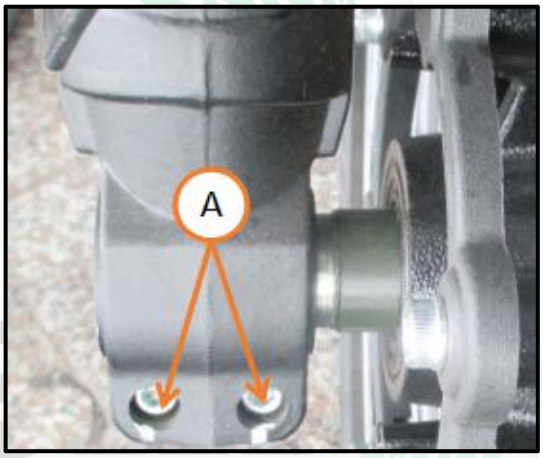
Front caliper mounting bolt [A]

Front caliper [B]

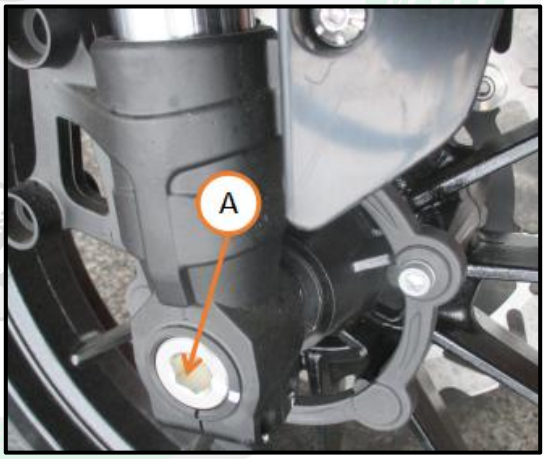


●Loosen:

Wheel axle mounting bolt [B](right)



Remove the front wheel axle [A]



● Lift the front wheel from the ground with a jack.

Special tool—jack and its accessories:

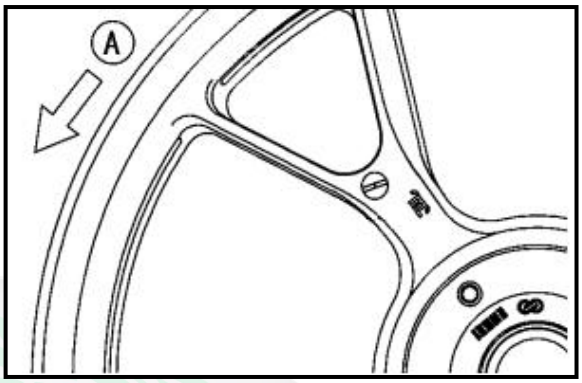
●Remove the front axle, pull out the front axle to the right, and separate the front wheel and front fork.

Notes
Do not place the motorcycle on the side, please make the wheel press against the brake disc, otherwise, the brake disc may be damaged or deformed. Place a wood block under the wheel to prevent the brake disc from touching the ground.

Install front wheel

Remarks
○ Direction of wheel rotation [A].

● Check the rotation of front wheel and install the front wheel.



● Apply high-temperature grease to the edge of oil seal [E].

● Put the left collar of front wheel [A] on the left side of hub.

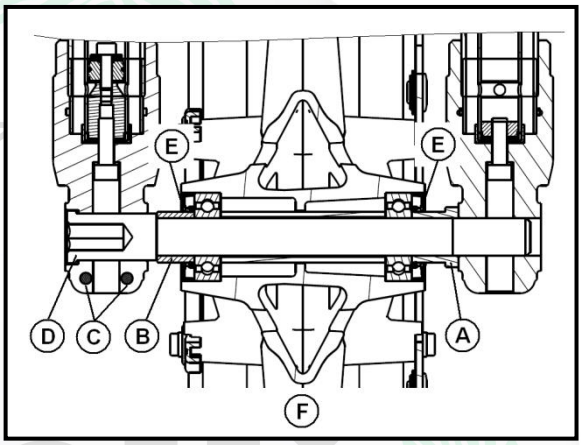
● Put the right collar of front wheel [B] on the right side of hub.

Remove the front wheel axle [D] from the right side.

●Tighten the front wheel axle [D]

Front wheel axle clamp screw [C]

Rear view from the front of motorcycle [F]



Locking torque of front wheel axle nut: 107 N·m

● Before tightening the wheel axle fastening screw at the bottom of front fork on the right front side, shake the front fork up and down for four or five times to align the bottom of right front fork with front axle.

Remarks
○ Put a stopper in front of the front wheel to prevent the motorcycle from shifting.

● First lock the wheel axle fastening screw at the bottom of right front fork.

Locking torque of front wheel axle fastening screw: 8 N·m

Remarks
○ Alternatively tighten the two fastening screws twice to ensure a uniform locking torque.

●Install the parts disassembled previously (see the corresponding chapters).

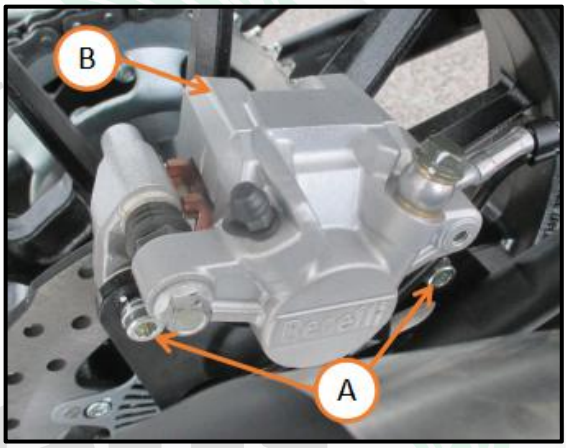
Check whether the front brake is normal (see “Periodic Maintenance” – “Checking whether the brake is able to work normally” for details)

⚠Warning
Grasp the brake lever until the brake pad is against the brake disc, thus allowing the brake lever to perform its normal function. Do not ride a motorcycle before completing the above operations! If the above operations are not completed, the brake may not work properly when used for the first time.

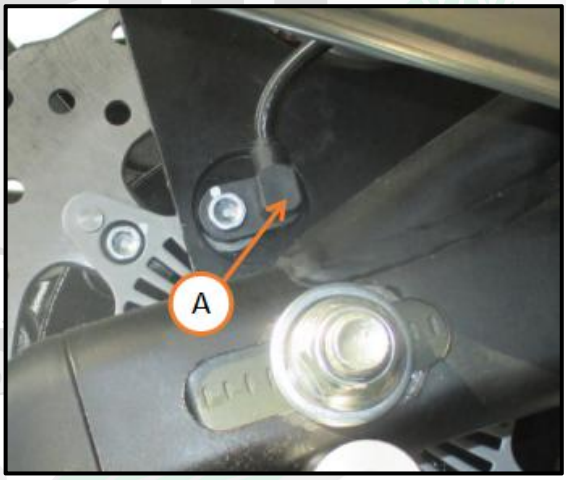
Disassemble rear wheel

● Lift the rear wheel from the ground with a rear stand [A].

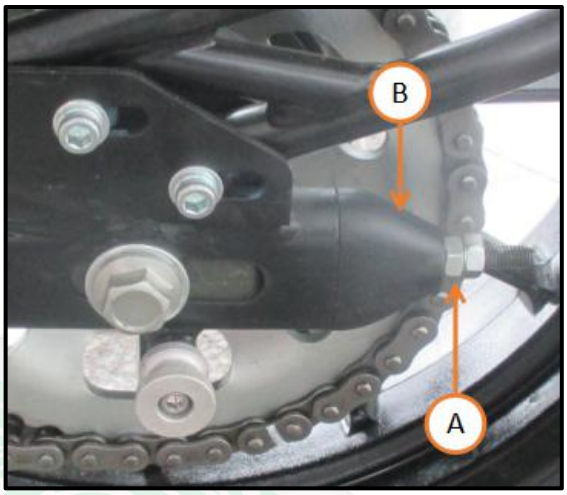
●Disassemble:
Rear caliper mounting bolt [A],
rear caliper [B]



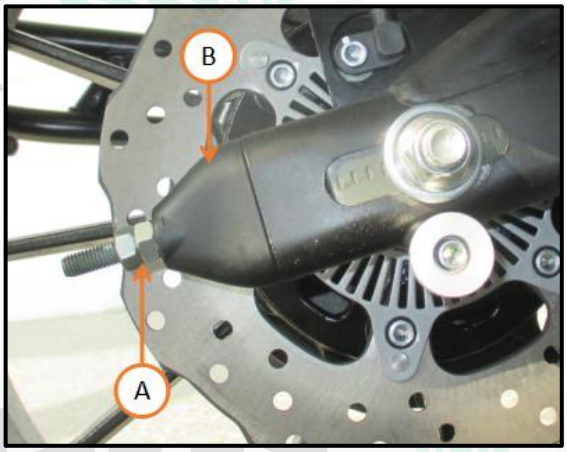
●Remove the rear wheel speed sensor from the caliper bracket [A]



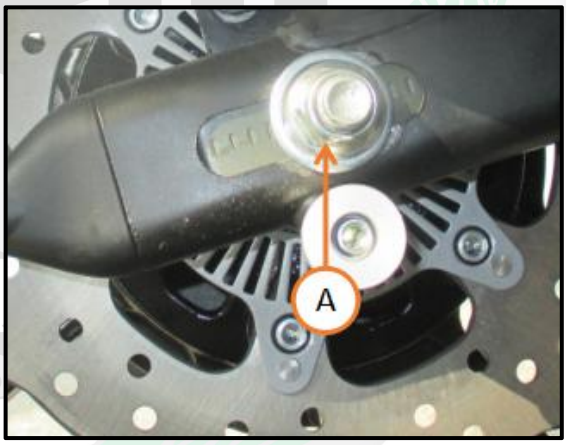
●Loosen:
Chain adjuster locknut [A]
Left chain adjuster [B]



●Loosen:
Chain adjuster locknut [A]
Right chain adjuster [B]

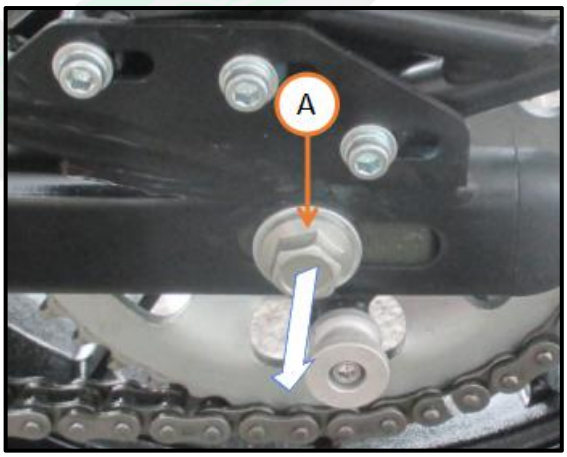


●Disassemble:
Rear wheel axle nut [A],



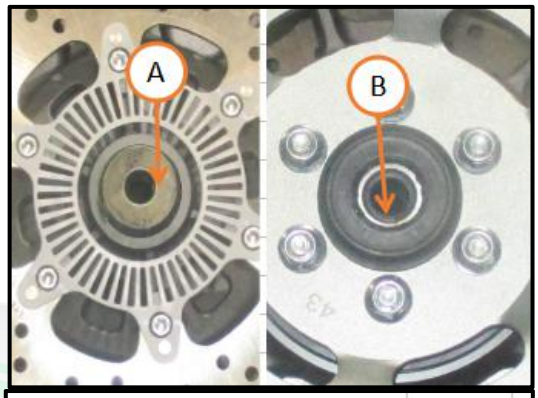
●Disassemble:
Rear wheel axle [A],
● Remove the drive chain of rear sprocket to the left
● Rotate the rear wheel backwards and remove it.

Notes
Do not place the wheel on the ground, please make the brake disc downward, otherwise, the brake disc may be damaged or deformed. Place a wood block under the wheel to prevent the brake disc from touching the ground.

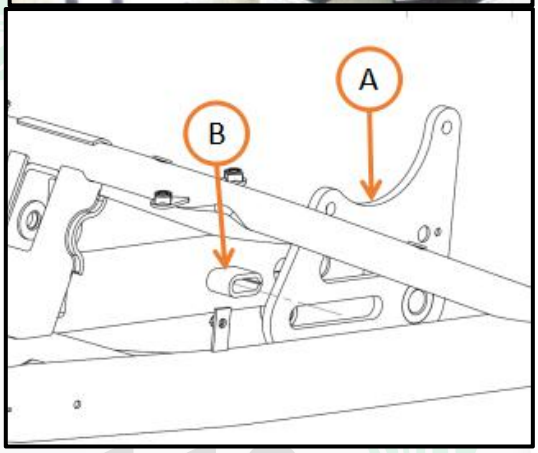


Installation of rear wheel

● Apply high-temperature grease to the edge of oil seal.
●Put the collar on both sides of the hub.
Collar at right side [A]
Collar at left side [B]



● Mount the drive chain to the rear sprocket.
● Attach the caliper bracket [A] to the swing arm stop block [B].
● Insert the rear axle from the left side of the wheel and tighten the rear axle nut.
Locking torque of rear axle nut: 150 N•m
● Adjust the slackness of the drive chain after installing the rear wheel (see "Periodic Maintenance" – "Checking the slackness of the drive chain").
● Install the rear caliper (see "Brake" – "Installing Caliper").
●Install rear wheel speed sensor.
Check whether the rear brake is normal (see "Periodic Maintenance" – "Checking whether the brake is able to work normally" for details)

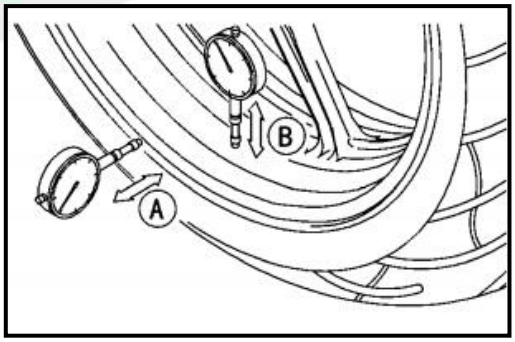


Warning

Stamp on the brake pedal until the brake pad is against the brake disc, thus allowing the brake pedal to perform its normal function. Do not ride a motorcycle before completing the above operations! If the above operations are not completed, the brake may not work properly when used for the first time.

Check wheel

● Lift the front /rear wheel from the ground.
Special tool—jack and its accessories:
●Gently rotate the wheel to check whether the wheel can run smoothly.
★ If the wheel does not rotate smoothly, replace the hub bearing (see "Removing/Installing the Hub Bearing" for details).
● Check for small cracks, dents, bends or deformations on the wheels.
★ If the wheel is damaged, please replace it!
● Remove the wheel and support the wheel and tire with the axle.
● Measure the axial oscillating quantity [A] and the radial oscillating quantity [B] of the rim with a dial gauge.
★ If the rim oscillating quantity is out of the operating limit, check the hub bearing (see "Checking the Hub Bearing" for details).
Rim oscillating quantity (in case of tire installed)
Standard:
Axial oscillating quantity ≤TIR 0.5 mm
Radial oscillating quantity ≤TIR 0.8 mm
Operating limit:



Axial oscillating quantity TIR 1.0 mm
Radial oscillating quantity TIR 1.0 mm

Warning

Do not repair damaged wheels! If the wheel is broken (except that the wheel bearing is broken), the wheel must be replaced to ensure safe riding on the motorcycle.

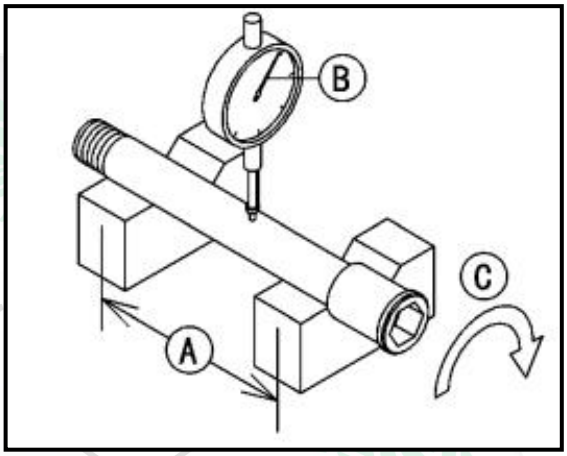
Check the axle

● Remove the front and rear wheel axles (see "Removing the front/rear wheels" for details).

● Visually inspect the front and rear axles for damage.

★ If the axle is damaged or bent, please replace it!

● Place the axle on two V-shaped blocks with a spacing of 100 mm [A] for the two V-shaped blocks. Place a dial gauge [B] in the middle of the two V-shaped blocks. Rotate the [C] axle to measure the oscillating quantity. The difference between the maximum and minimum readings of the dial gauge is the oscillating quantity of axle.



★ If the wheel axle oscillating quantity is out of the operating limit, please replace the axle!

Oscillating quantity of wheel axle/100 mm

Standard: ≤TIR 0.03 mm

Operating limit: TIR 0.2 mm

Benelli

Adjustment of static balance of rim

Notes
After replacing the tire, rim or both, adjust the static balance of rim. **When adjusting the rim static balance, the brake disc should be installed in place.**

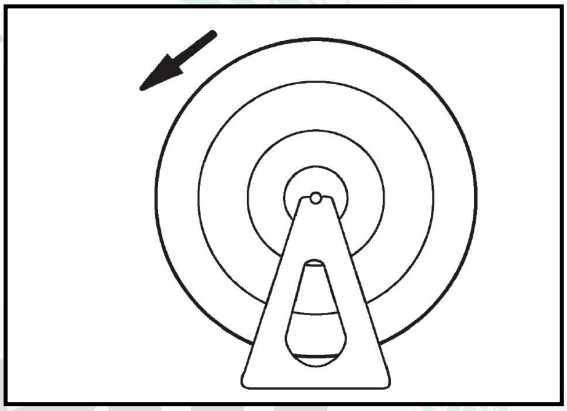
● Remove the front and rear wheel (see “Removing the front/rear wheels” for details).

●Remove the balance weight

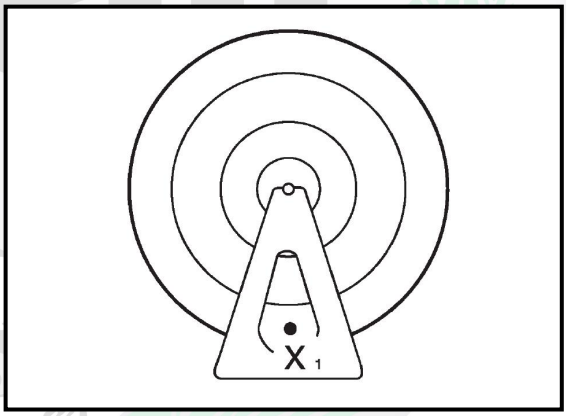
● Looking for the gravity point of rim

Notes
Place the front wheel on the appropriate balancing frame

a. Rotate the rim;

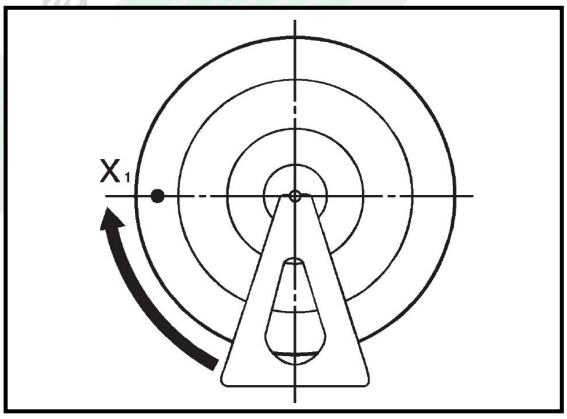


b. When the rim stops rotating, draw an “X_1” mark at the bottom of the front wheel;

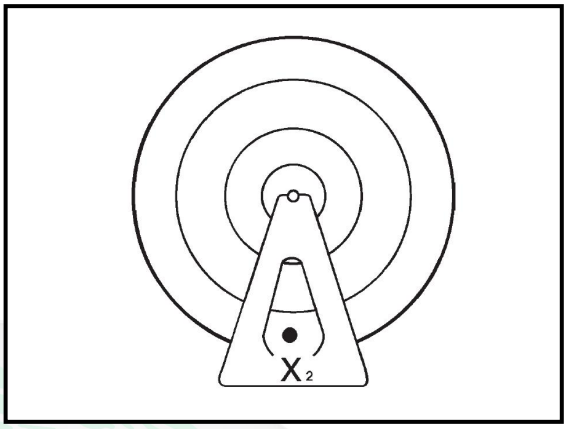


c. Rotate the front wheel by 90° to make the “X_1” mark at the position as shown below;

d. Release the rim;



e. When the rim stops rotating, draw an "X_2" mark at the bottom of the front wheel;

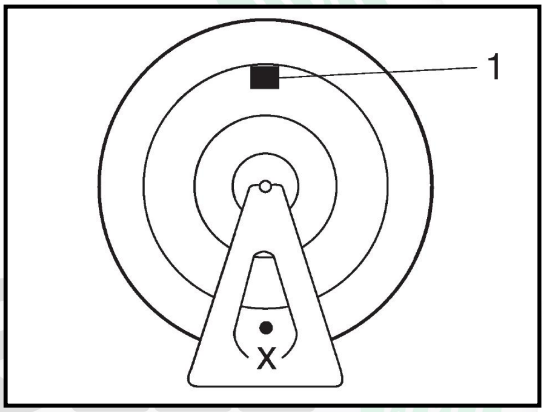


f. Repeat steps [c] to [e] for several times, until all mars fall at the same point;

g. The place where all the marks fall is the gravity point "X" of this rim;

●Adjust static balance

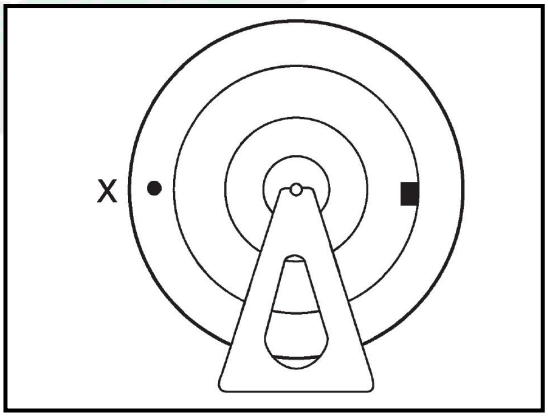
a. Load the weight "1" to the lower side of the hard point "X" on the rim.



Notes
Start with the lightest balance weight.

Remarks
○ Benelli dealers sell the balance weights of 5 and 10 grams respectively. An imbalance of less than 10 grams generally does not affect the driving stability of the motorcycle. ○ Do not use more than 9 balance weights (including 4 balance weights with a total weight of over 90 grams). If you need more than 9 balance weights to balance, please disassemble the wheel to find the cause of problem.

b. Rotate the rim by 90° to make the gravity point at the position as shown below.

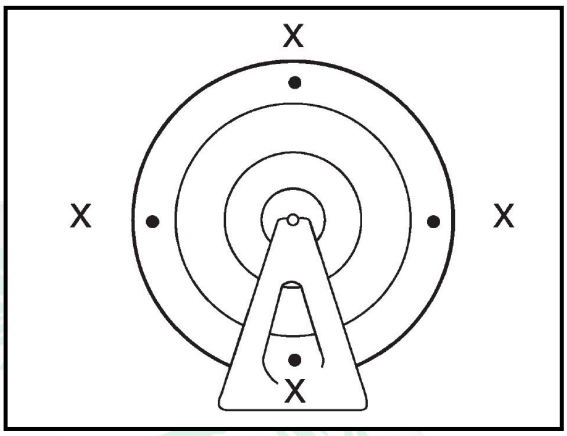


c. If the gravity point does not stop at that position, please load a heavy balance weight;

d. Repeat steps [b] and [c] until the rim is balanced.

●Check static balance

a. Rotate the rim to confirm that it will stop at each position shown. As shown in the figure



b. If the front wheels do not remain stationary at each position, rebalance it.

Adjustment / inspection of tire pressure

● See "Inspection of Tire Pressure" in chapter "Periodic Maintenance" for details.

Check tire

● See "Inspection of Wheel / Tire for Damage" in chapter "Periodic Maintenance" for details.

Disassemble tire

●Disassemble:

● Wheel (see “Removing the front/rear wheels” for details).

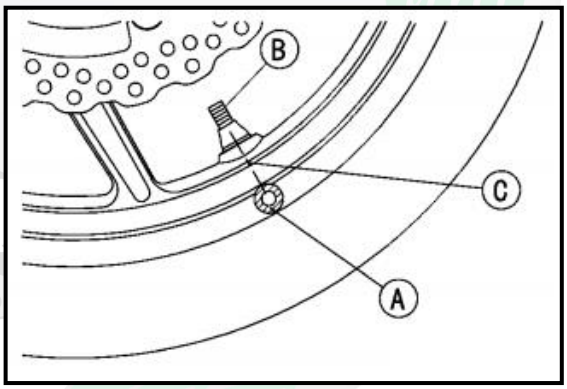
Valve core (air bleeding)

• To maintain wheel balanced, use chalk to mark the position of the valve stem on the tire so that the tire can be installed in its original position later.

Pink or yellow mark [A],

Valve core [B],

aligner [C]



● Apply soapy liquid or rubber lubricant to the bead and the rims on both sides to make it easier for the bead to slip out of the rim.

Notes
Never use oil or gasoline distillate as a lubricant because oil or gasoline distillate may corrode the tire.

● Use a tire changer to remove the tire from the rim.

Remarks
○ Since the tire is tightly fitted to the rim, it cannot be removed with a hand tool.

Mount tire

⚠Warning
Front and rear tires must be the products of the same manufacturer.

● Check the rim and tires and replace if necessary.

● Clean the sealing surface of the rim and the tire. If necessary, use a fine abrasive cloth to smooth the sealing surface of the rim.

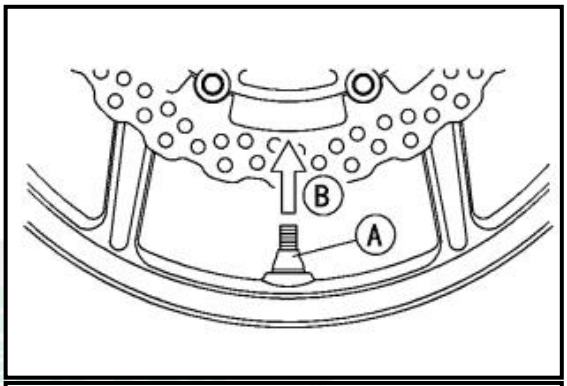
●Remove the valve core and throw it out.

Notes
The valve core must be replaced when changing tires! Do not reuse the valve core!

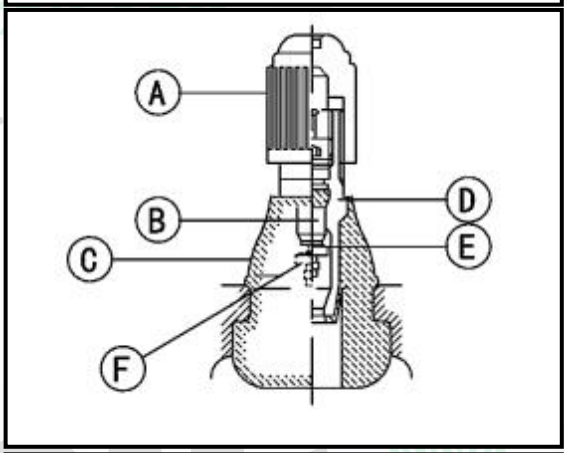
● Install a new valve core on the rim.

○Remove the valve core cover, apply the seal of valve core stem [A] with soap liquid or rubber lubricant, and pull out the valve core stem from the inside of the rim [B] to adjust the position of valve core stem.

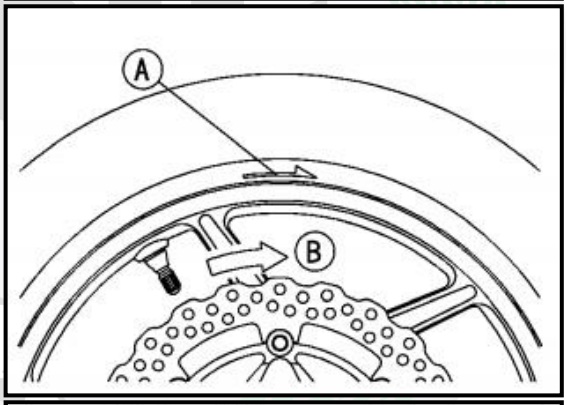
Notes
Never use oil or gasoline distillate as a lubricant for valve stem, because oil or gasoline distillate may corrode the tire.



○ The structure of valve is as shown in the figure.
Valve core cover [A],
Valve core [B],
valve stem seal [C],
valve stem [D],
valve core seat [E],
Open the valve core [F]



● Check the tire rotation marks on the front and rear tires and mount the tires on the corresponding rims.
Tire rotation mark [A]
Direction of rotation [B]

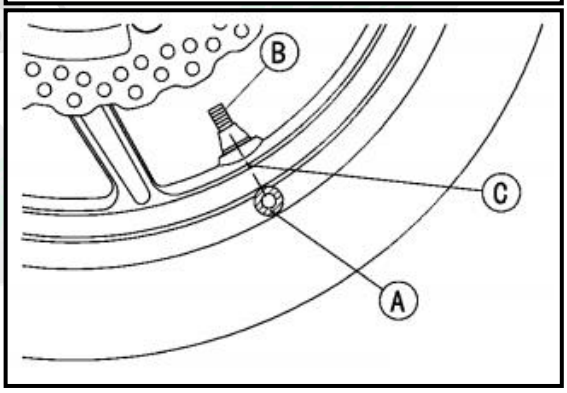


● Place the tire on the rim so that the valve core [A] is aligned with the balance mark on the tire [B] (marks made of chalk when removing the tire or yellow paint marks on the new tire).

● Mount the bead to the edge of the rim with a tire changer.

● Lubricate the bead and rim edge with soap or rubber lubricant when inflating the tire to mount the bead to the sealing surface of the rim.

• Align the bead with the rim and inject compressed air into the tire until the bead engages the sealing surface on the inside of the rim.



⚠Warning
Be sure to install the valve core when inflating the tire, and the pressure inside the tire does not exceed 400 kPa (4.0 kgf/cm2). Excessive inflation may result in a puncture, thus causing casualties.

● Check that the rim line [A] on both sides of the tire sidewall is parallel to the rim edge.

★ If the rim edge is not parallel to the rim line of the tire sidewall, remove the valve core.

● Apply lubricant to the edges and beads of the rim.

● Install a valve core and re-inflate the tire.

● Check the tire for leaks after installing the bead inside the rim.

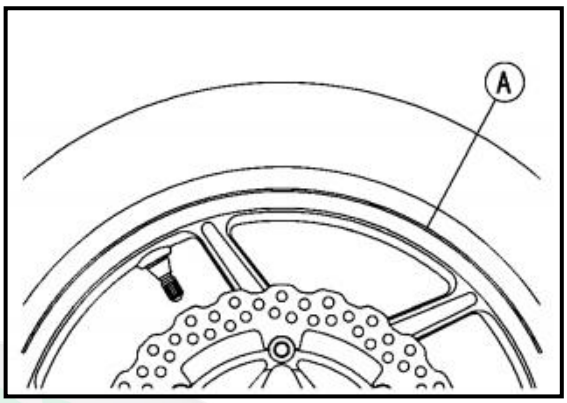
○ The air inflated to the tire should be slightly higher than the standard inflating volume.

○ Apply soap to the tires or soak the tires in the water. If there are air bubbles, the tires are leaking.

● Adjust the tire pressure according to the specified standard (for details, see “Periodic Inspection” – “Checking the Tire Pressure”).

●Install valve core.

● Adjust the static balance of wheel (see "Adjustment of static balance of rim" for details).



Repair tire

● Two methods are currently used to repair tubeless tires. One of them is called “temporary (external) maintenance”: the tire can be repaired without the need to remove it from the rim; the other is called “permanent (internal) maintenance”: the tire needs to be removed before repair.

● It is generally believed that permanent (internal) maintenance ensures that the tire is more durable and stable than temporary (external) maintenance. In addition, there is another advantage of permanent (internal) repair: in the process of thorough inspection, collateral damage that cannot be found by external inspection can be identified.

● In view of this, Benelli does not recommend temporary (external) repairs, only reasonable permanent (internal) repairs are recommended.

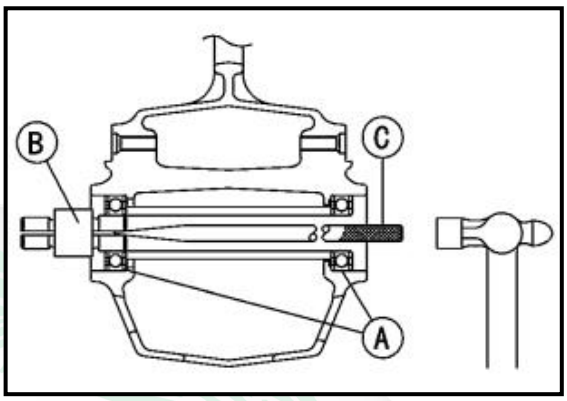
●The repair methods recommended by each manufacturer may be slightly different. To ensure safe ride, perform repairs using repair tools and materials recommended by the manufacturer.

Hub bearing

Disassemble hub bearing

● Remove the wheel (see “Removing the front/rear wheel” for details) and take out the following parts:
Collar,
Bushing (taken from the rear hub),
Oil Seal

● Remove the hub bearing [A] with the bearing puller.



Notes
Do not place the wheel on the ground, please make the brake disc downward, otherwise, the brake disc may be damaged or deformed. Place a stopper under the wheel to prevent the brake disc from touching the ground.

Special tools - bearing puller head φ25 × φ28
Bearing puller shaft φ13

Install hub bearing

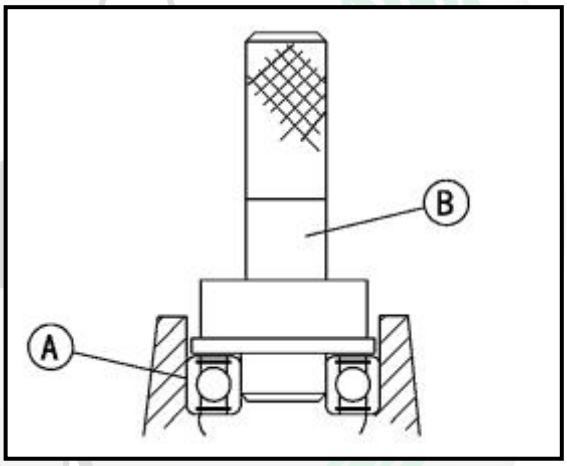
●Before installing the hub bearing, use compressed air to blow the dust or foreign matter away from the hub to avoid contaminating the bearing.

● Replace the bearing with a new one.

● Install the bearing with a full set of tools for bearing (do not touch the inner race of the bearing).

● Press the bearing [A] until it reaches the bottom.

Special tools- a full set of tools for bearing [B]

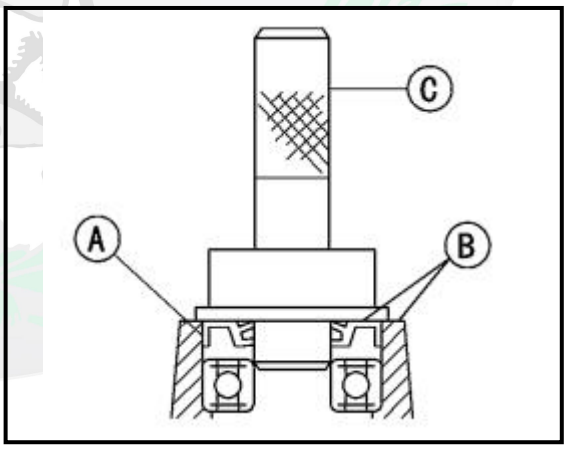


● Replace the oil seal with a new one.

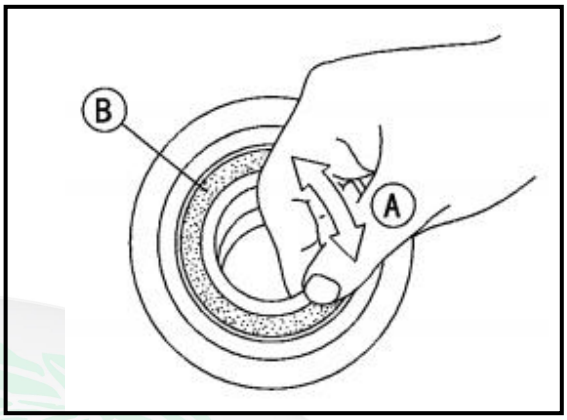
● Press the oil seal [A] so that the oil seal surface is flush with the end of the hole [B].

● Apply high-temperature grease to the edge of oil seal.

Special tools- a full set of tools for bearing [C]



Inspection of hub bearing



Since the error of hub bearing is extremely small, it is generally impossible to measure the clearance.

Remarks
○ Do not remove any bearings for inspection, as they must be replaced with new ones once removed.

● If you need to check whether there is an axial clearance in the bearing, whether it will get stuck or blocked when rotating, please rotate each bearing back and forth [A] in the hub!

★ If the bearing does not rotate smoothly, please replace it with a new one!

● Check whether the bearing seal [B] is damaged or leaking.

★ If the bearing seal is damaged or leaking, please replace it with a new one!

Hub bearing lubrication

Remarks
○ Since there is lubricant in the hub bearing and it is sealed, it is not necessary to lubricate the hub bearing.

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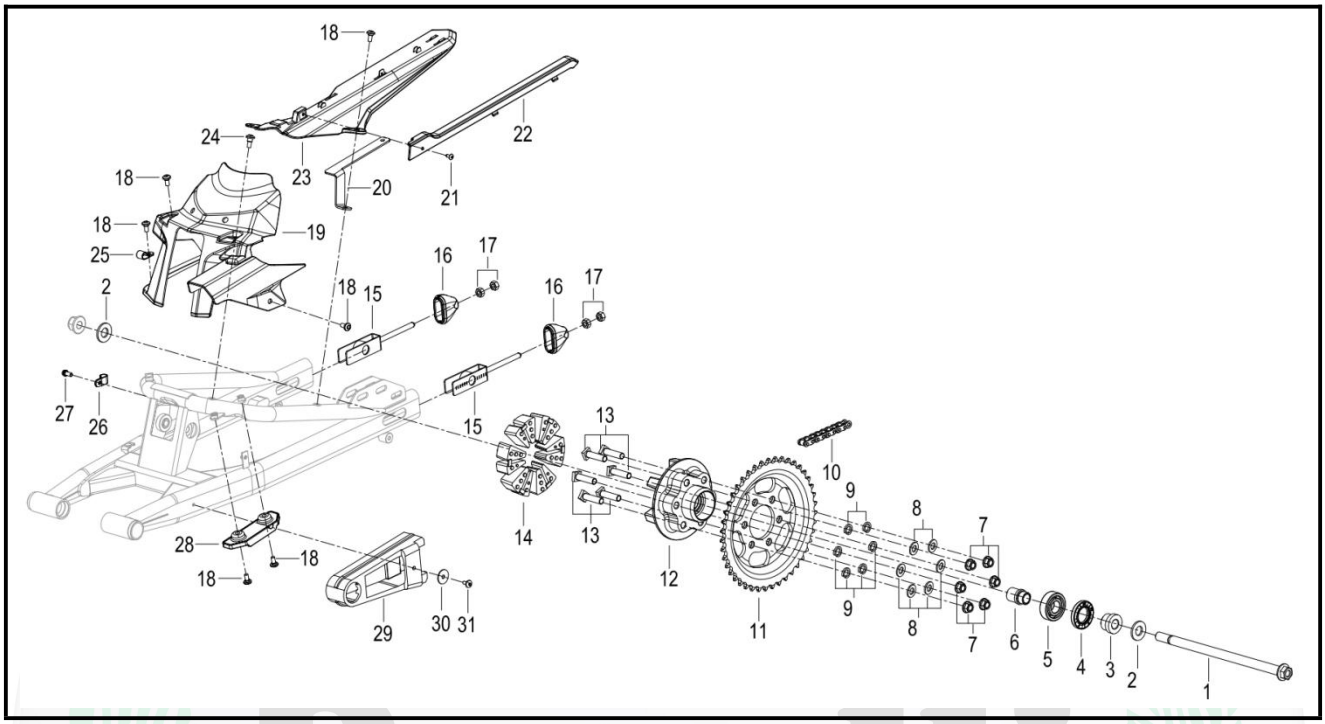
Transmission mechanism

Exploded view of drive mechanism



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No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Rear wheel axle	1	150	15.0	Si
2	Gasket 16	2	—	—	
3	Left collar of rear wheel	1	—	—	Si
4	Dust seal assembly	1	—	—	Si、R
5	Rolling bearing 6204-2RS	1	—	—	Si
6	Chain drive collar	1	—	—	Si
7	Self-locking nut M10×1.25	6	45	4.5	S
8	Washer 10	6	—	—	
9	Spring washer φ10	6	—	—	
10	Chain 520HO-1×108	1	—	—	
11	Sprocket / 43-gear	1	—	—	
12	Sprocket hub	1	—	—	
13	Sprocket mounting bolt	6	—	—	
14	Rear wheel damper	6	—	—	
15	Chain adjuster assembly	2	—	—	
16	Chain adjuster retainer	2	—	—	
17	Hexagon nut M8	4	22	2.2	
18	Inner hexagon screw M6	5	10	1.0	
19	Rear lower fender	1	—	—	
20	Chain guard mounting bracket	1	—	—	
21	Self-tapping screw ST4.2×13	1	—	—	
22	Drive chain cover	1	—	—	
23	Drive chain cover	1	—	—	
24	Pedal rubber mounting bolt	1	10	1.0	
25	Clutch clamp assembly	1	—	—	
26	Clutch clamp assembly	1	—	—	
27	Screw M6×12-8.8-ZG	1	10	1.0	
28	Upper stop block of chain	1	—	—	R
29	Chain protective block	1	—	—	R
30	Washer 5	1	—	—	
31	Cross recessed pan head screw M5×16	1	—	—	

G: Apply grease.

R: Replace the part

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

S: Observe the specified tightening sequence.

Technical parameters

Item	Normal	Lower operating limit
Drive chain		
Drive chain slackness	32 ~ 38 mm	——
Drive chain wear (length of 20 links)	317.5 ~ 318.2 mm	323 mm
Standard drive chain:		
Manufacturer		——
Model	520HO	——
Number of links	108	——
Sprocket		
Rear sprocket deformation	≤TIR 0.4 mm	TIR 0.5 mm

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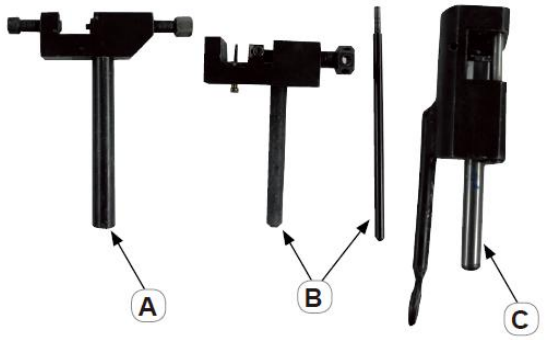
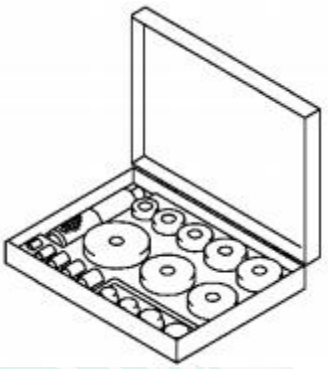
Special tools

Chain assembling and disassembling tool:	Bearing driver set:
	

Drive chain

Check the slackness of drive chain

● See "Inspection of Slackness of Drive Chain" in chapter "Periodic Maintenance" for details.

Inspection of slackness of drive chain

● See “Periodic Maintenance” – “Adjusting the Slackness of Drive Chain” for details.

Inspection / adjustment of wheel alignment

● See “Periodic Maintenance” –"Inspection of Wheel Alignment" for details.

Inspection of wear of drive chain

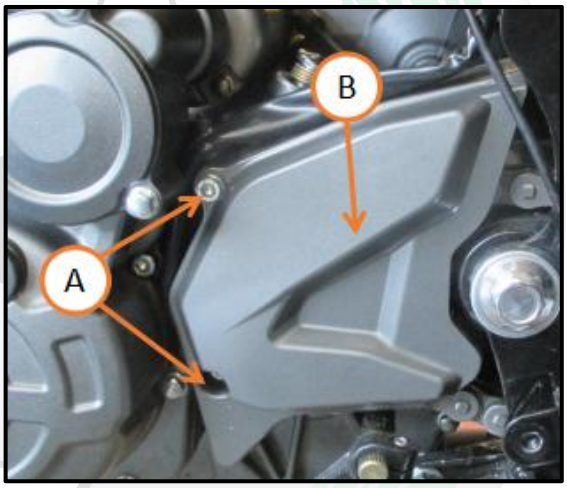
● See “Periodic Maintenance” – "Inspection of Wear of Drive Chain" for details.

Drive chain lubrication

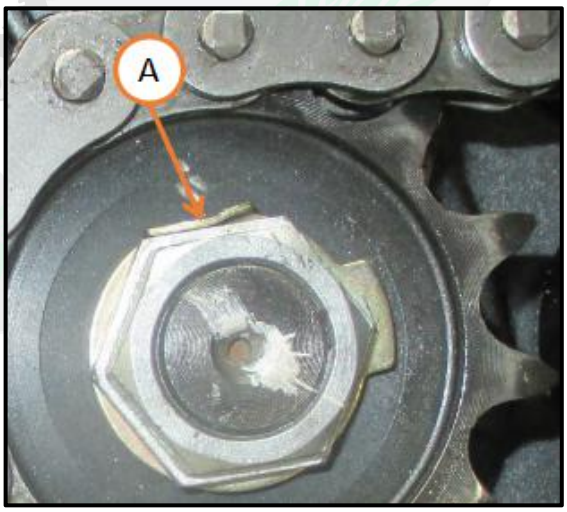
● See “Periodic Maintenance” –"Inspection of Lubrication of Drive Chain" for details.

Disassembly of drive chain

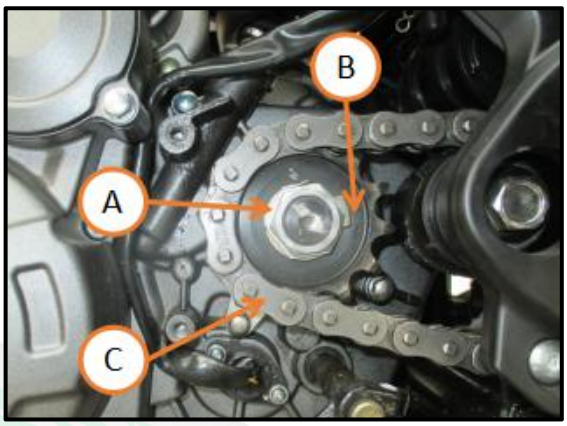
● Remove the drive chain cover screw [A] and the drive chain cover [B].



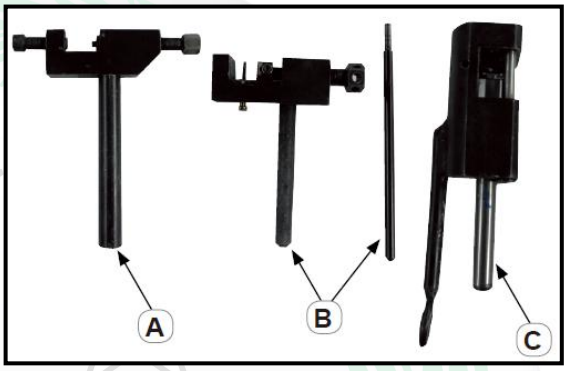
●Open the stop gasket [A] using slotted screwdriver



●Disassemble:
Drive sprocket lock bolt [A]
Drive sprocket of engine [B]

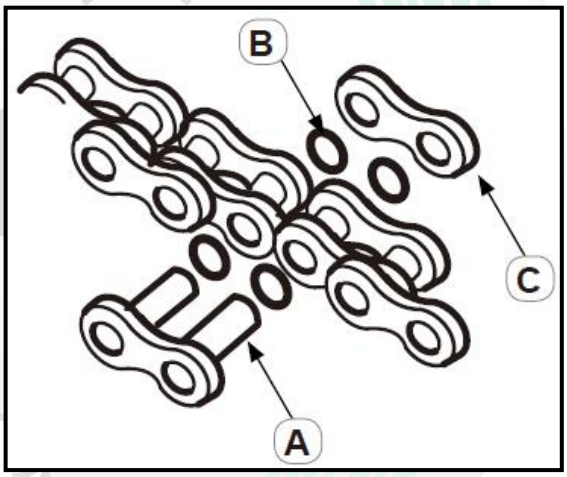


● Remove the drive chain [C]
● The drive chain used in this chain, the main link rod equipped with safety side panel.
● Type used according to the specifications of chain manufacturer and requirements.
● Use special tools. There are three tools for disassembling the main chain plate [A], assembling side plate [B] and fastening it to the pin on the side plate [C]



●Drive chain:
Main chain plate [A],
rubber O-ring [B],
Side panel of main chain plate [C],

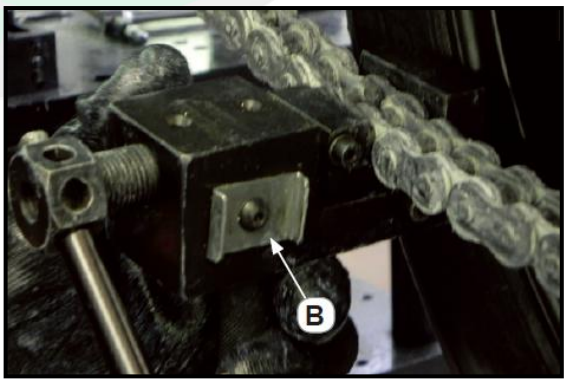
Remarks
○ Insert the main chain plate from the inside of the drive chain, and then assemble the side plates with the ID mark facing outward.



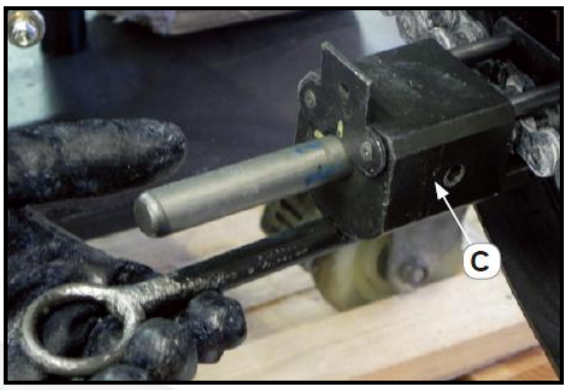
Do not use old chains, main chain plates, side panel of main chain plate or rubber O-rings.

Installation of drive chain

●Install:
Engine drive sprocket (see "Removing the Engine Drive Sprocket" for details)
Rear wheel (see “Wheel/Tire” – “Removing the Rear Wheel”)
●Installation of chain:
○ Press the side panel of main chain plate [B] against the main chain plate using the special tools.



○ Use a special tool to firmly mount the pin in the main chain plate [C],



Notes
The surface affected by the nailed main chain plate must have no openings. If there is an opening, replace the main chain plate, seal ring and side panel.

Remarks
○ Do not use a drive chain with a clip main chain plate.

●Install:
Drive chain cover
● Adjust the slackness of drive chain after installation (see “Periodic Maintenance” – “Adjusting the slackness of drive chain”).

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Sprocket, collar, collar bearing

Disassembly of rear sprocket

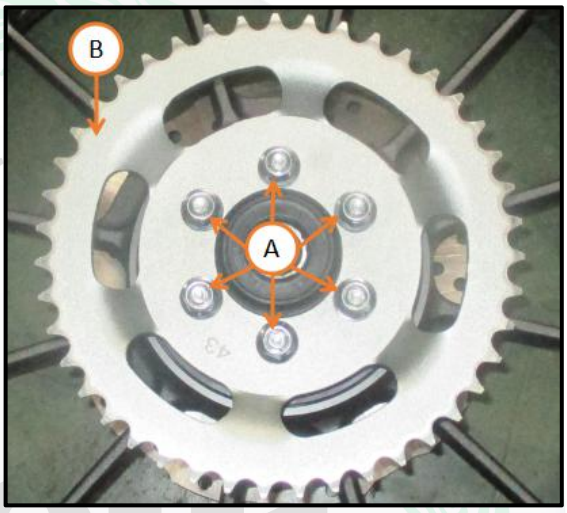
● Remove the rear wheel (see “Wheel/Tire” – “Removing the Rear Wheel”)

Notes
Do not place the wheel on the ground, please make the brake disc downward, otherwise, the brake disc may be damaged or deformed. Place a stopper under the wheel to prevent the brake disc from touching the ground.

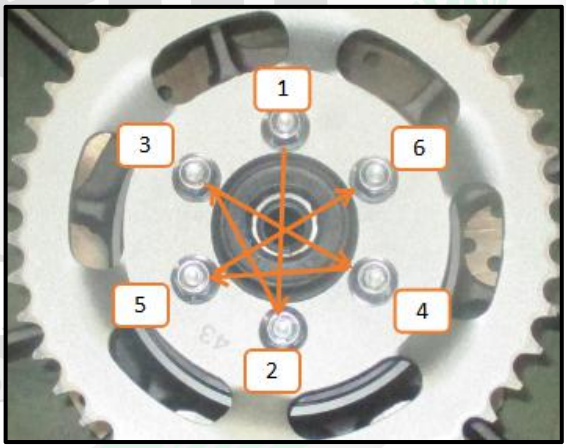
●Disassemble:

Rear sprocket nut [A],

Rear sprocket [B],

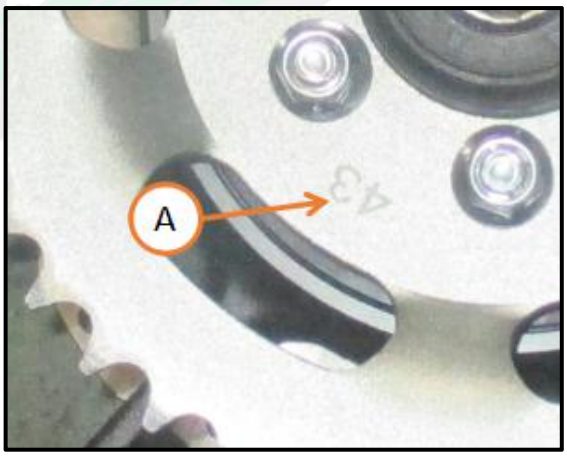


Note:
When disassembling the clamp nut of rear sprocket, follow the instructions on the right figure



Installation of rear sprocket

●When the sprocket is installed, the side with the tooth number mark [A] faces outward.

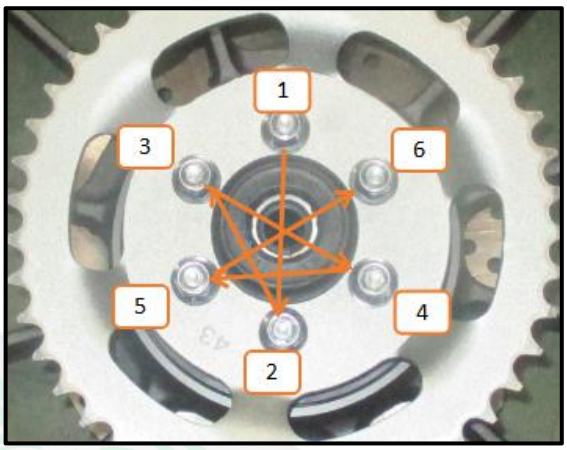


●Lock rear sprocket nut.

Locking torque of rear sprocket nut: 45 N•m

Note:
When installing the clamp nut of rear sprocket, follow the instructions on the right figure

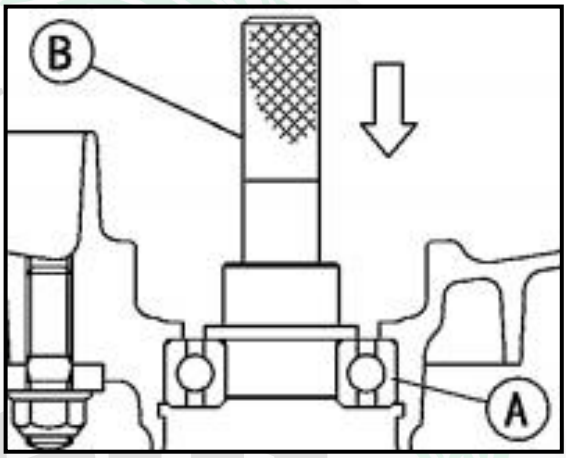
● Install the rear wheel (see "Wheel/Tire" – "Installing the Rear Wheel")



Disassemble collar bearing

● Knock out the bearing [A] from the other side of the wheel.

Special tools- a full set of tools for bearing:



Install collar bearing

● Replace the bearing with a new one.

● Press the bearing inward until it reaches the bottom.

Special tools- a full set of tools for bearing [B]:

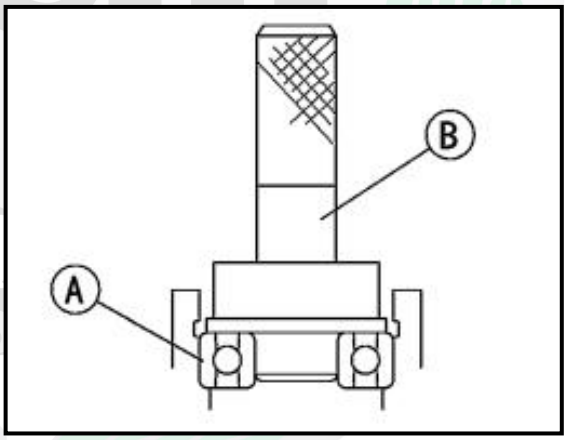
● Apply high-temperature grease to bearing.

● Replace the oil seal with a new one.

● when pressing the new oil seal, align the sealing surface with the end of hole.

● Apply high-temperature grease to the edge of oil seal.

Special tools- a full set of tools for bearing:



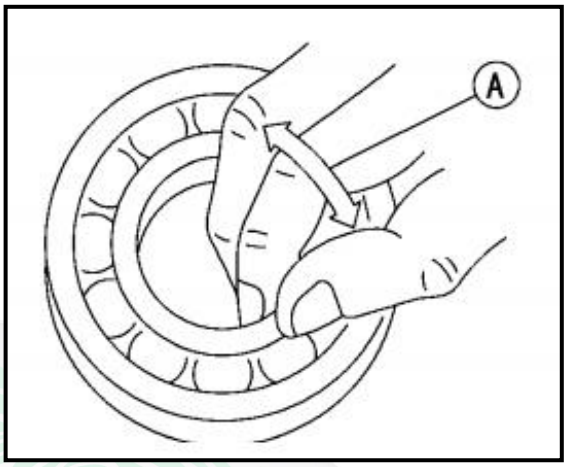
Check collar bearing

●Since the error of collar bearing is extremely small, it is generally impossible to measure the clearance.

Remarks
○ It is not required to remove any bearings for inspection, as they must be replaced with new ones once removed.

● If you need to check whether the bearing is able to rotate, whether it will get stuck when rotating, please rotate the bearing back and forth [A] in the collar!

★ If the bearing does not rotate smoothly, please replace it with a new one!



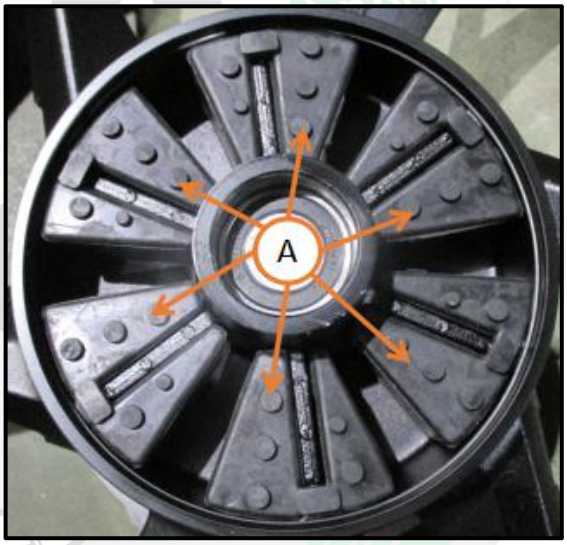
Lubricate collar bearing

● Apply high-quality bearing grease to the bearing. Rotate the bearing for several times by hands to ensure a uniform distribution of grease in the bearing.

Check the damper of collar

● Remove the collar of rear wheel and check the rubber damper [A].

● If the damper is damaged or corroded, please replace it!

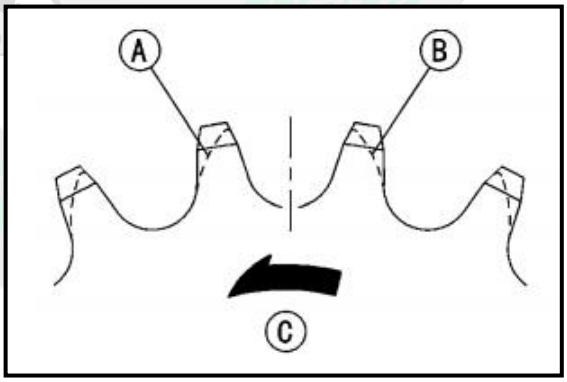


Check the wear of sprocket

●Visually inspect the wear of the engine and rear sprocket teeth.

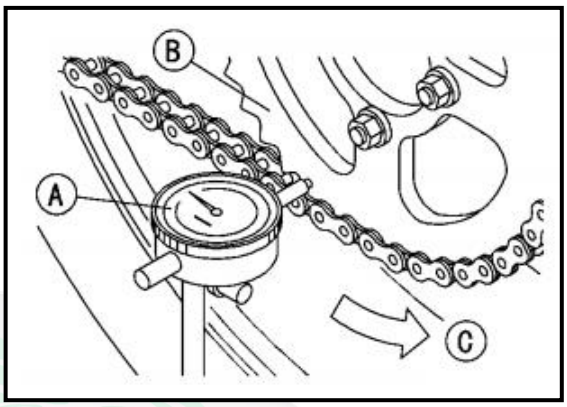
★ If the sprocket teeth wear is shown in the figure, please replace the sprocket and check the wear of the drive chain (see “Periodic Maintenance” – “Inspection of Wear of Drive Chain”).

Worn sprocket (engine drive sprocket) [A],
Worn sprocket (rear sprocket) [B],
Direction of rotation [C]



Remarks
○ If the sprocket needs to be replaced, the drive chain may also need to be replaced. Therefore, check the drive chain when replacing the sprocket.

Check the deformation of rear sprocket



● Use the rear stand to lift the rear wheel from the ground so that it can rotate smoothly.

● As shown in the figure, place a dial gauge [A] near the teeth [B] of rear sprocket. Rotate the rear wheel [C] to measure the oscillating quantity (deformation) of sprocket. The difference between the maximum and minimum readings of the dial gauge is the oscillating quantity (deformation) of sprocket.

★ If the oscillating quantity is out of the lower operating limit, please replace the rear sprocket!

Rear sprocket deformation

Standard: ≤TIR 0.4 mm

Upper operating limit: ≤TIR 0.4 mm

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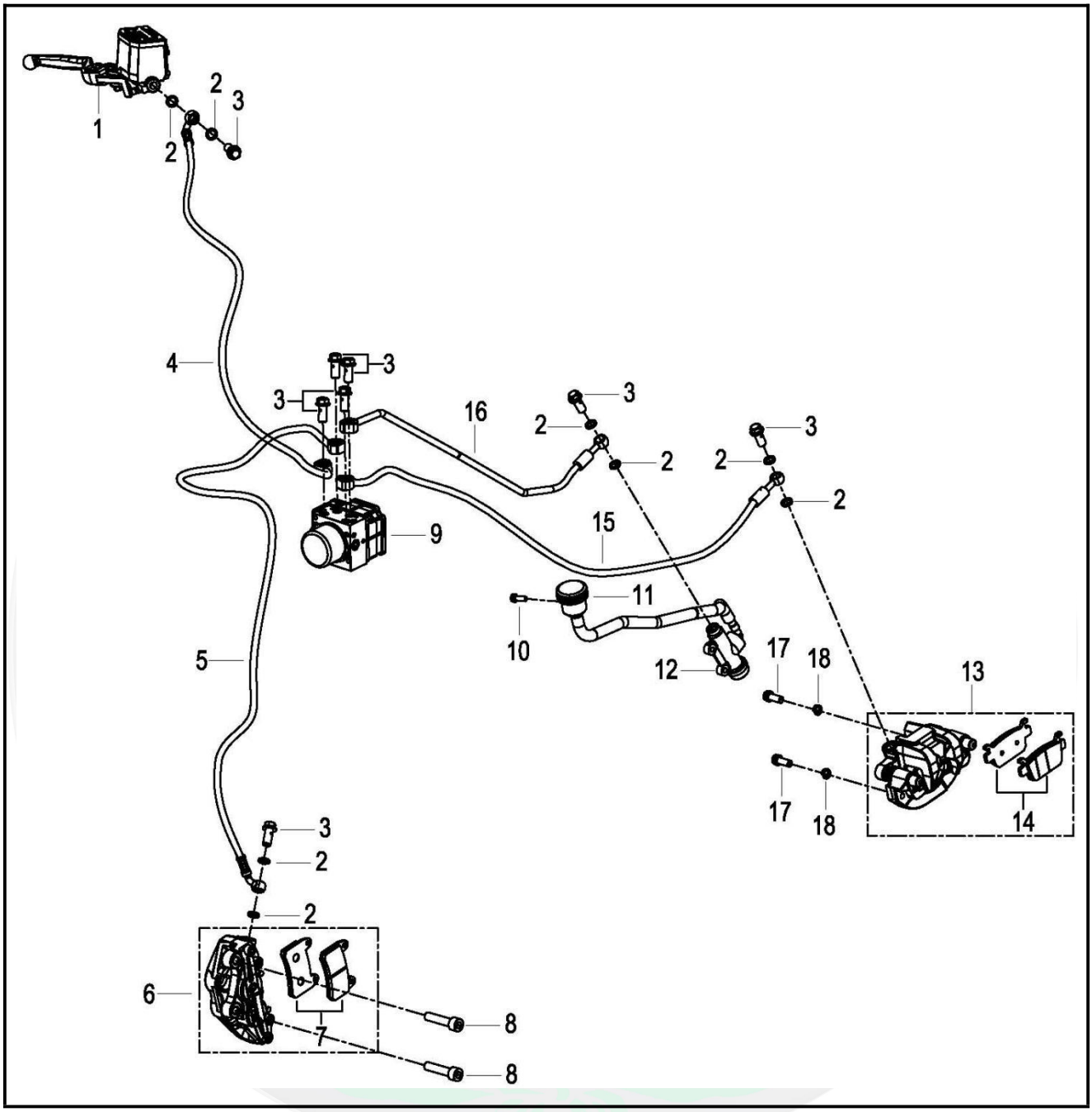
Brake

Exploded View of Brake



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Front fuel pump assembly	1	—	—	
2	Washer	8	—	—	R
3	Fuel hose mounting bolt	8	30	3.0	B
4	Front fluid brake fuel hose assembly I	1	—	—	
5	Front fluid brake fuel hose assembly II	1	—	—	
6	Front left brake cylinder assembly	1	—	—	
7	Brake pad assembly	1set	—	—	R
8	Inner hexagon screw M10×1.25×40	2	45	4.5	
9	Double channel ABS assembly	1	—	—	
10	Bolt M6×14	1	10	1.0	
11	Oil cup assembly	1	—	—	
12	Rear brake pump assembly	1	—	—	
13	Rear brake cylinder assembly	1	—	—	
14	Rear brake pads	1set	—	—	R
15	Rear fluid brake fuel hose assembly I	1	—	—	
16	Rear fluid brake fuel hose assembly II	1	—	—	
17	Bolt M10×1.25×20	2	22	2.2	
18	Spring washer 8	2	—	—	

B. Apply brake fluid.

G: Apply grease.

L: Apply locking agent.

R: Replace the part

Si: Apply silicon grease.

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Technical parameters

Item	Normal	Lower operating limit
Brake lever, brake pedal		
Brake lever position	4-way adjustable (for riders to choose)	——
Free clearance of brake lever	Nonadjustable	——
Free clearance of pedal	Adjustable	——
Pedal position	Approximately 45 mm below the top of footpeg	——
Brake pad		
Thickness of friction pad:		
Front brake pad	4.0 mm	2 mm
Rear brake pad	5.0 mm	2 mm
Brake disc		
Thickness:		
Front brake disc:	4.8 ~ 5.0mm	4.5 mm
Rear brake disc:	4.8 ~ 5.0 mm	4.5 mm
Oscillation	≤TIR 0.15 mm	TIR 0.3 mm
Brake fluid		
Class	DOT4	——

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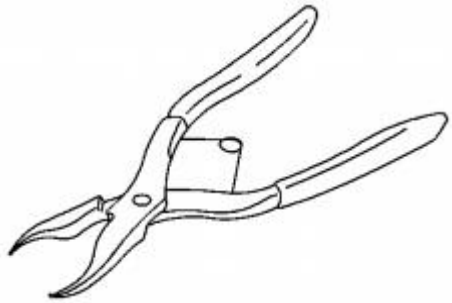
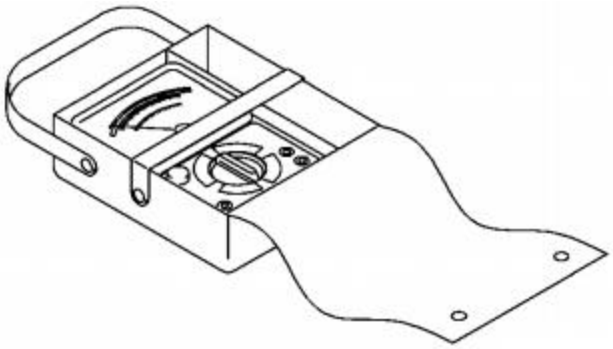
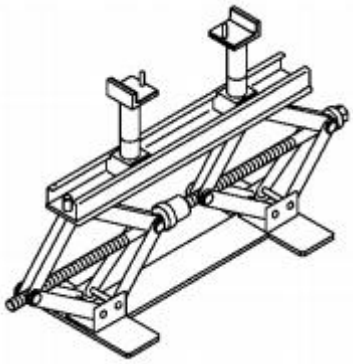
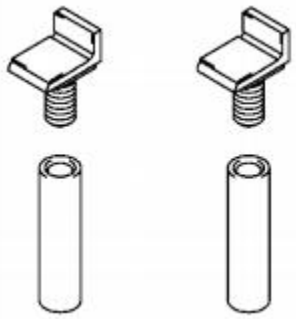
Special tools

Inner circlip pliers:	Multimeter:
	
Jack:	**Accessories of jack:**
	

Brake lever, brake pedal

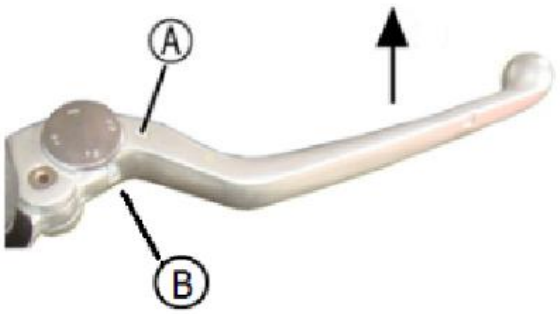
Adjustment of position of brake lever

●The brake lever adjuster has 4 positions so that the rider can adjust the position of the brake lever according to the size of his hand.

● Push the brake lever forward and rotate the adjuster [A] so that the number is aligned with the arrow mark [B] on the brake lever.

○ When the arrow mark is aligned with the number 4, the distance between the brake grip and the brake lever is the smallest; when the arrow mark is aligned with the number 1, the distance between the brake grip and the brake lever is the largest.

Before



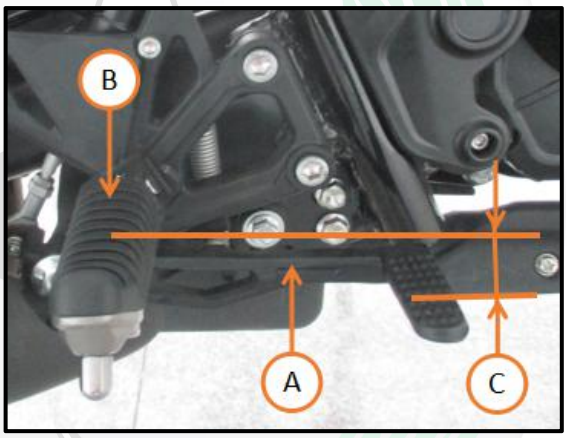
Inspection of position of brake pedal

● Check whether the brake pedal [A] is in the correct position.

Footpeg [B]

Pedal position [C]

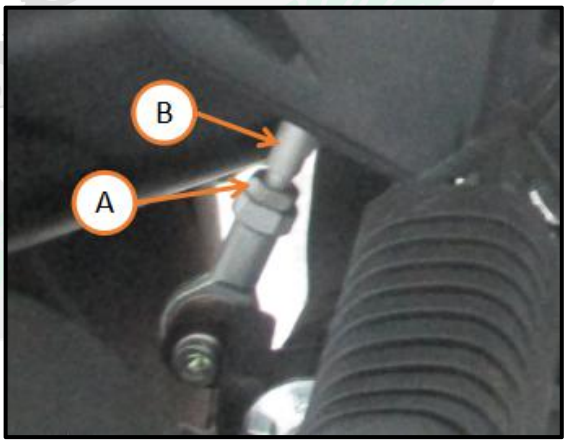
Standard: approximately 15 mm above the top of the footpeg



★ If the position of pedal is not correct, adjust the position of brake pedal.

Adjustment of position of brake pedal

Remarks
○ Generally, it is not necessary to adjust the position of the pedal, but if the push rod lock nut is removed, the position of the pedal must be adjusted.



● Loosen the lock nut [A] and rotate the push rod [B] to make the pedal n the correct position.

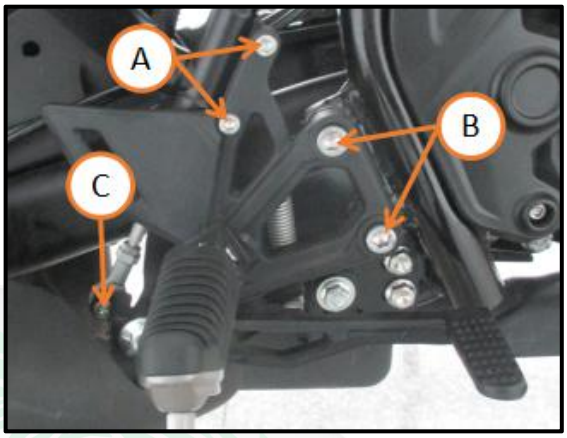
● Locking torque

Locking torque of push rod locknut of rear master cylinder: 10 N·m

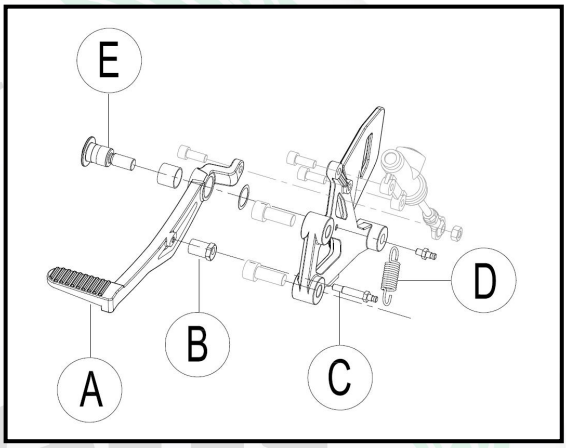
Check whether the brake light switch is normal (see “Periodic Maintenance” – “Checking whether the brake light switch is able to work normally” for details)

Disassembly of brake pedal

●Disassemble:
Rear master cylinder mounting bolt [A],
Right front footpeg bracket bolt [B]
Link mounting screw [C]

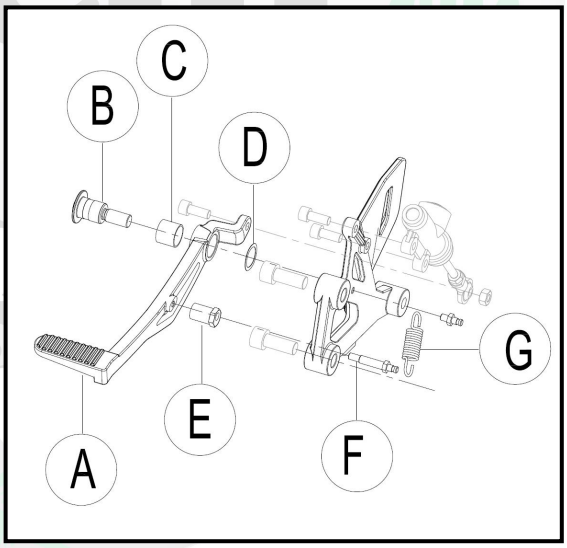


●Disassemble:
Brake pedal return spring [D]
Eccentric push rod [B],
lower spring pin [C],
● Remove the rear brake lever mounting screw [E] and take out the brake pedal [A].



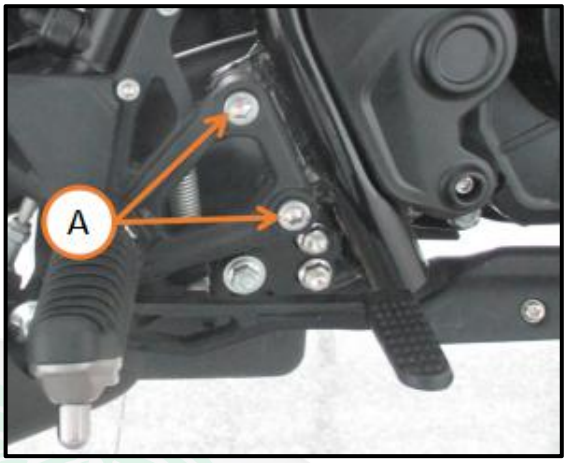
Installation of brake pedal

●Install:
Self-lubricating collar [C].
eccentric push rod [E],
lower spring pin [F]
Locking torque of lower spring pin: 3 N·m
● Apply grease to the rear brake pedal mounting screw [B]
●Install:
Brake pedal [A],
Washer [D].
Rear brake pedal mounting screw [B]
Locking torque of brake pedal bolt: 22 N•m
● Hang the lower end of the brake pedal return spring [D] on the lower spring pin.
● Hang the upper end of the brake pedal return spring [D] on the hook of pedal.



● Install the footpeg bracket on the right front side.

Locking torque of front footpeg bracket screw [A]: 40 N·m



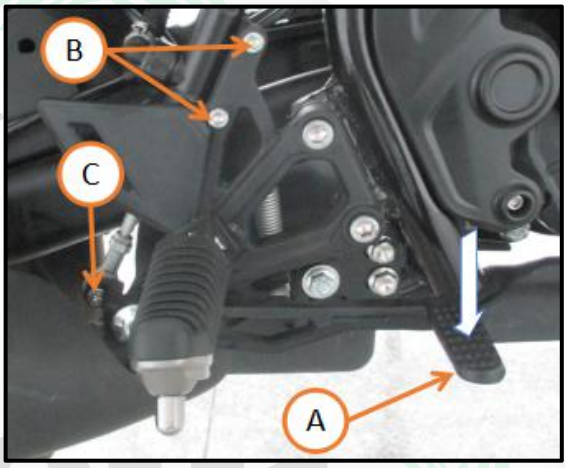
●Rear rear master cylinder mounting screw [B].

Locking torque of rear master cylinder mounting screw: 10 N·m

○Press the brake pedal [A], align the joint hole of master cylinder, and install the mounting screw [C] and nut.

Locking torque of joint mounting screw of rear master cylinder: 10 N·m

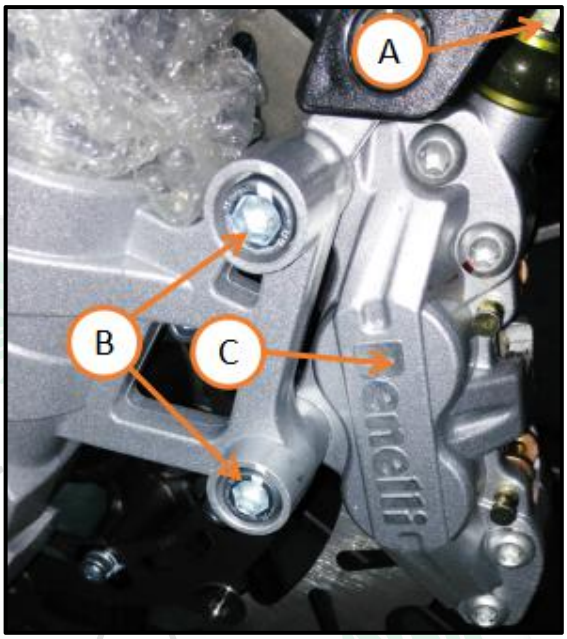
● Check the position of brake pedal (see "Checking the Position of Brake Pedal" for details).



Benelli

Caliper

Disassembly of front caliper



● Loosen the hollow bolt [C] at the lower end of the brake hose and tighten it slightly.
● Unscrew the caliper mounting bolt [B], separate the caliper [A] and the brake disc.

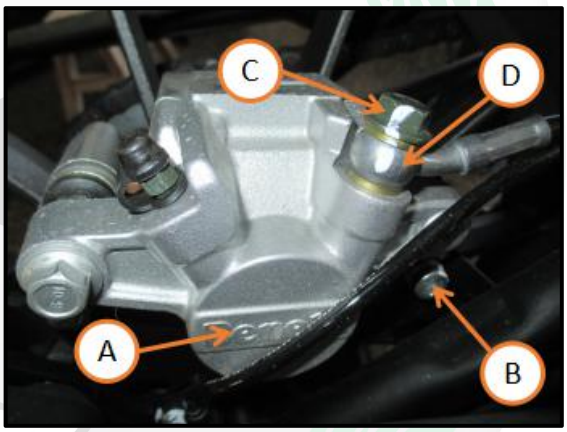
Notes
Do not remove the caliper mounting bolts. To remove the caliper, simply remove the caliper mounting bolts, as brake fluid may leak after removing the caliper mounting bolts.

● Remove the hollow bolt and the brake hose on the caliper [D]

Notes
If brake fluid spills out, rinse it immediately!

Remarks
○If you need to disassemble after removing the caliper and there is no compressed air available, please disassemble the caliper before removing the brake hose (see “Removing the Front Caliper” for details).

Disassembly of rear caliper



● Loosen the hollow bolt [C] at the lower end of the brake hose and tighten it slightly.
● Unscrew the caliper mounting bolt [B], separate the caliper [A] and the brake disc.

Notes
Do not remove the caliper mounting bolts. To remove the caliper, simply remove the caliper mounting bolts, as brake fluid may leak after removing the caliper mounting bolts.

● Remove the hollow bolt and the brake hose on the caliper [D]

Notes
If brake fluid spills out, rinse it immediately!

Remarks
○If you need to disassemble after removing the caliper and there is no compressed air available, please disassemble the caliper before removing the brake hose (see “Removing the Rear Caliper” for details).

Installation of caliper

● Install the caliper and the lower end of the brake hose.
○ Replace the gaskets on both sides of the hose joint with new ones.
● Locking torque
Locking torque of caliper mounting bolt:
Front caliper: 34 N·m
Rear caliper: 25 N·m
Hollow bolt of brake hose: 25 N•m
● Check the level in the brake fluid reservoir.
● Discharge the air inside the brake line (see “Exhausting the Air inside the Brake Line” for details).

● Check whether the performance of brake is normal and the brake fluid leaks.

Warning

Clench the brake lever or step on the brake pedal until the brake pad is against the brake disc, thus allowing the brake pedal or brake pedal to perform its normal function. Do not ride a motorcycle before completing the above operations! If the above operations are not completed, the brake lever or pedal may not work properly when used for the first time.

Disassembly of front caliper

● See "Periodic Maintenance" - "Replacing Rubber Parts of Caliper" for details).

Assembly of front caliper

● See "Periodic Maintenance" - "Replacing Rubber Parts of Caliper" for details).

Diassembly of rear caliper

● See "Periodic Maintenance" - "Replacing Rubber Parts of Caliper" for details).

Assembly of rear caliper

● See "Periodic Maintenance" - "Replacing Rubber Parts of Caliper" for details).

Inspection of fluid seal of caliper for leakage

●In order to maintain a gap between the brake pad and the brake disc, an oil seal (piston seal) [A] is placed around the piston. If the oil seal is damaged, the brake pads may be excessively worn and the brakes may fail, thus causing the temperature of the brake pad or brake fluid to rise.

● If any of the following conditions occur in the fluid seal, please replace it!

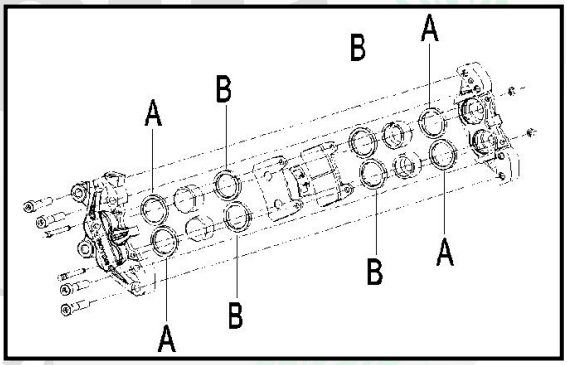
○ The brake fluid leaks around the brake pads.

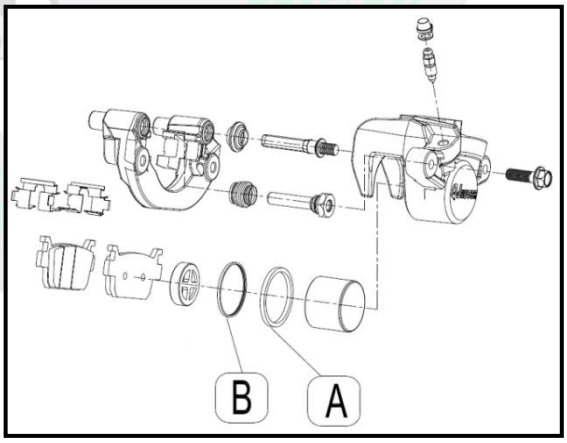
○The brake temperature is too high.

○ The wears of the inner and outer surfaces of brake pad vary greatly.

○ The oil seal and the piston are stuck together.

★ If you replace the oil seal, please replace the dust seal [B]. In addition, all oil seals must be replaced each time when the brake pads are replaced.





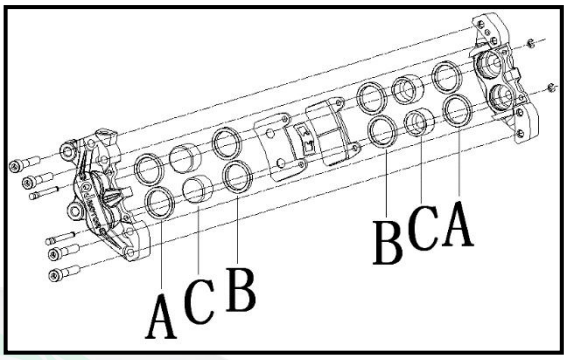
Inspection of dust seal of caliper for damage

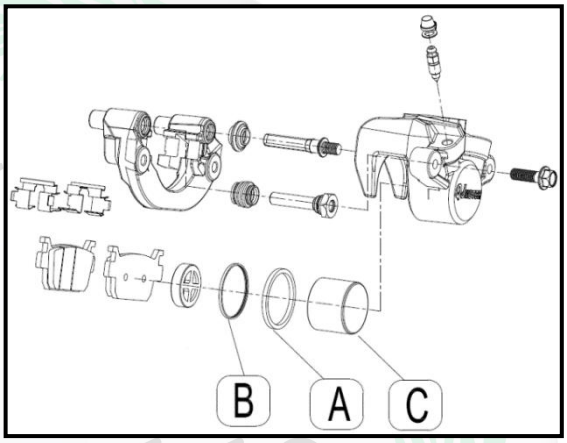
● Check the dust seal [B] for cracks, wear, expansion or other damage.

★ If any dust seal is damaged, please replace it with a new one!

Piston [C],

Oil seal [A]

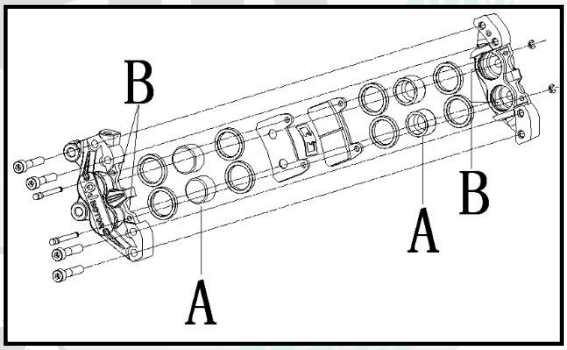


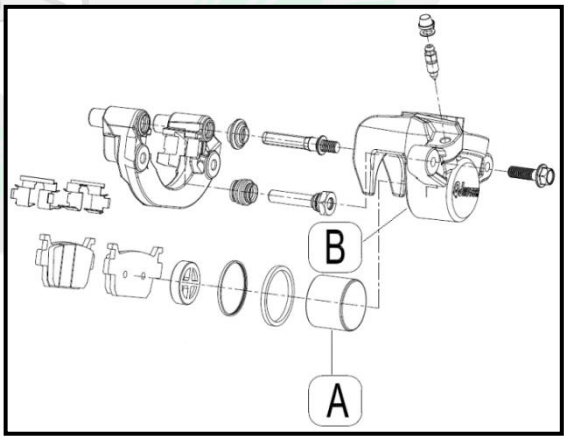


Inspection of the caliper piston and brake cylinder for damage

• Visually inspect the piston [A] and the brake cylinder surface [B].

★ If the brake cylinder and piston are severely worn or rusted, please replace the caliper!





Brake pad

Remove the front brake pad

●Disassemble front caliper

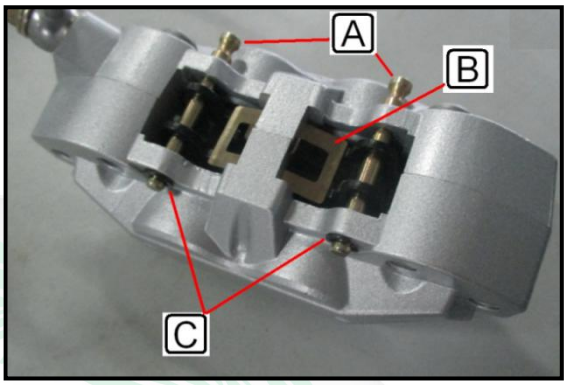
● Remove the mounting pin [A] of brake pad.

●Disassemble:

Mounting pin of brake pad [A],

Brake pad spring [B],

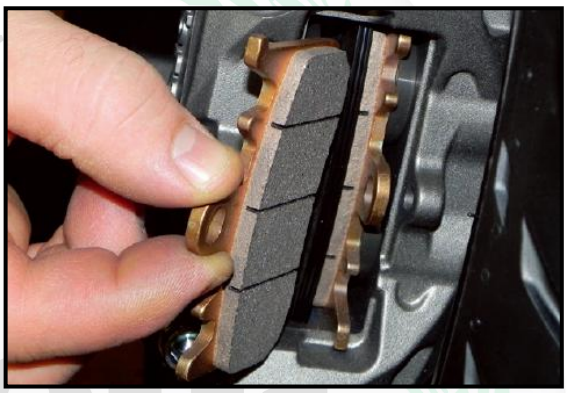
Mounting pin of brake pad [C],



Notes
When the pin A is pulled out, the safety spring B should be pressed

●Disassemble:

Front brake pad



Installation of front brake pad

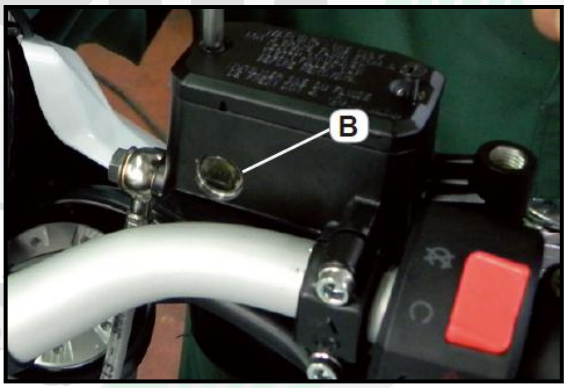
● Push the caliper piston by hand as far as possible.

●Install:

Install it in the reverse order of disassembly.

Check: brake fluid level [B]; if it is below the minimum score, add the recommended brake fluid to the correct level.

● Check: Brake lever operation; if the brake lever is soft or slight, exhaust the air in the brake circuit.

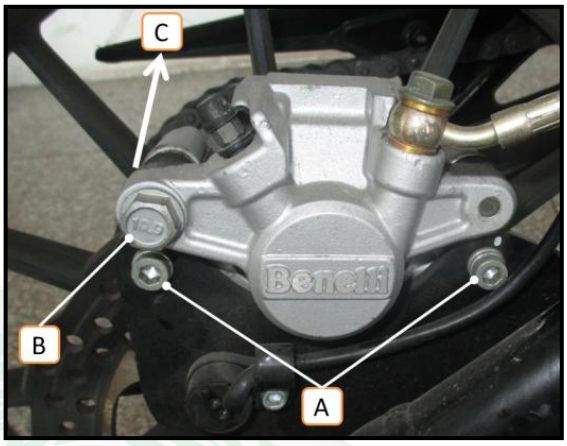


⚠Warning
Press the brake lever until the brake pad is against the brake disc, thus allowing the brake lever to perform its normal function. Do not ride a motorcycle before completing the above operations! If the above operations are not completed, the brake may not work properly when used for the first time.

Disassembly of Rear Brake Pad

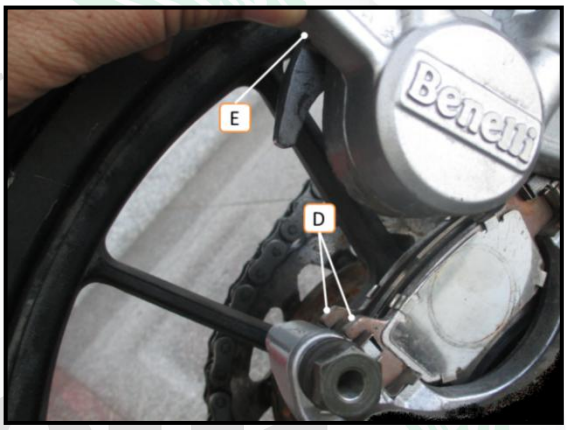
● Screw out the caliper mounting bolt [A]

● Remove the bolt [B] from the brake caliper and rotate the rear caliper [E] in the C direction.



●Disassemble:

Brake pad [D]



Installation of Rear Brake Pad

● Push the caliper piston by hand as far as possible.

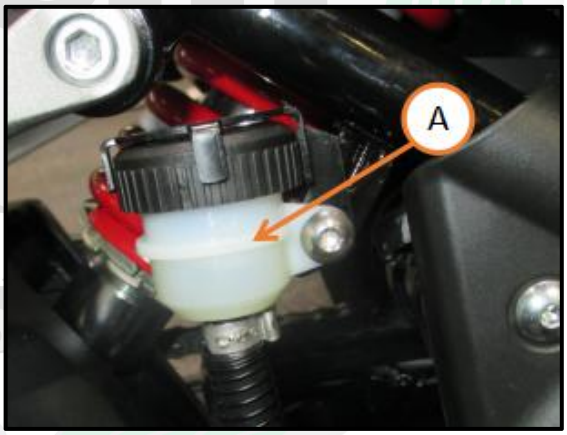
●Install:

Install it in the reverse order of disassembly.

● Install the caliper (see “Installing Caliper” for details).

●Check brake fluid level [A]; if it is below the minimum score, add the recommended brake fluid to the correct level.

● Check: Brake pedal operation; if the brake pedal is soft or slight, exhaust the air in the brake circuit.



Warning

Press the brake lever until the brake pad is against the brake disc, thus allowing the brake lever to perform its normal function. Do not ride a motorcycle before completing the above operations! If the above operations are not completed, the brake may not work properly when used for the first time.

Inspection of wear of brake pad

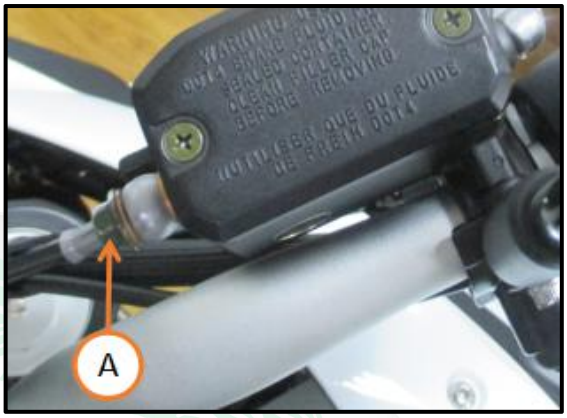
● See “Periodic Maintenance” – "Inspection of Wear of Brake Pad" for details.

Master cylinder

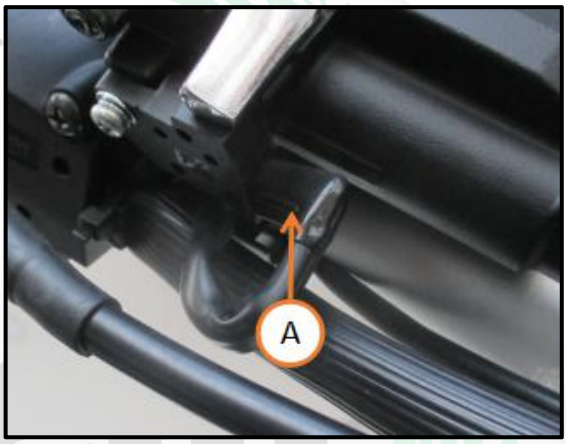
Disassemble front master cylinder

● Loosen the hollow bolt [A] at the lower end of the brake hose and tighten it slightly.

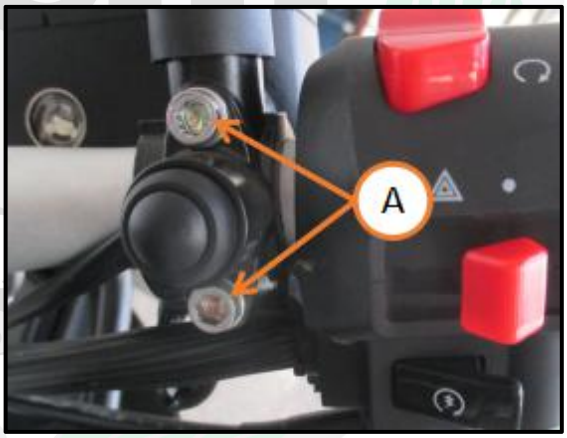
Notes
Do not remove the caliper mounting bolts. To remove the caliper, simply remove the caliper mounting bolts, as brake fluid may leak after removing the caliper mounting bolts.



●Disconnect the front brake light switch connector [A].



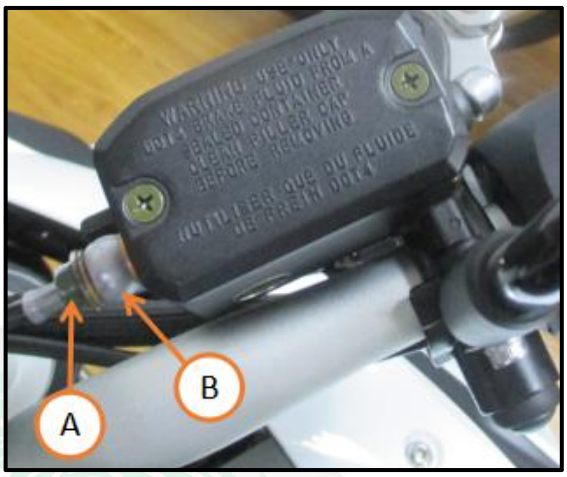
●Disconnect the front master cylinder mounting bolt [A].



● Remove the hollow bolt [A] and the brake hose on the caliper [B]

Notes
If brake fluid spills out, rinse it immediately!

● Remove the front master cylinder component.



●Disassemble:

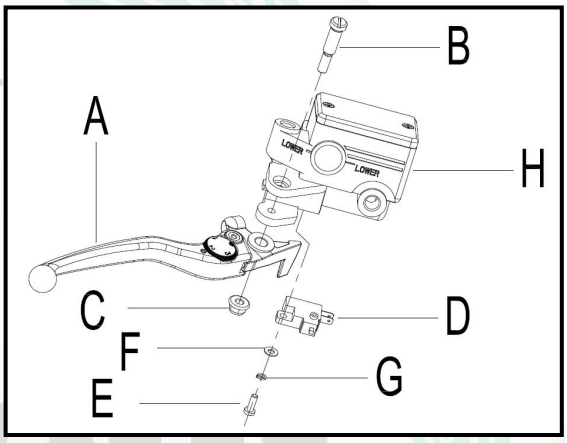
Brake handle pivot shaft bolt [B] and lock nut [C]

Brake lever [A],

Front brake light switch mounting screw [B], flat washer [F] and spring washer [G]

Front brake light switch [D]

Front master cylinder [H]



Installation of front master cylinder

●Install:

Install it in the reverse order of disassembly.

●Lock the upper clamp bolt [A] first, and then tighten the lower clamp bolt [B].

Locking torque of front master cylinder fastening bolt: 10 N·m

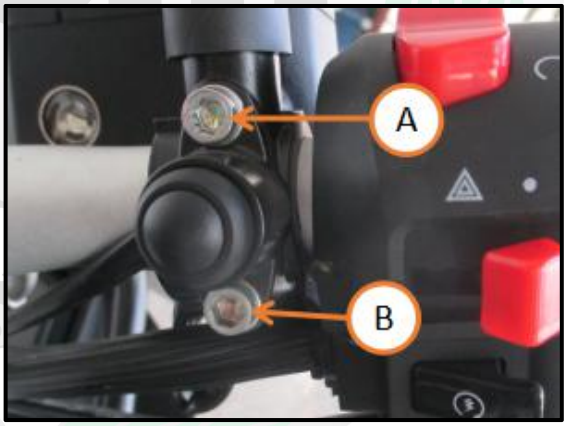
○ Replace the gaskets on both sides of the hose joint with new ones.

● Locking torque

Locking torque for hollow bolt of brake hose: 30 N•m

● Discharge the air inside the brake line (see "Exhausting the Air inside the Brake Line" for details).

● Check whether the performance of brake is normal and the brake fluid leaks.

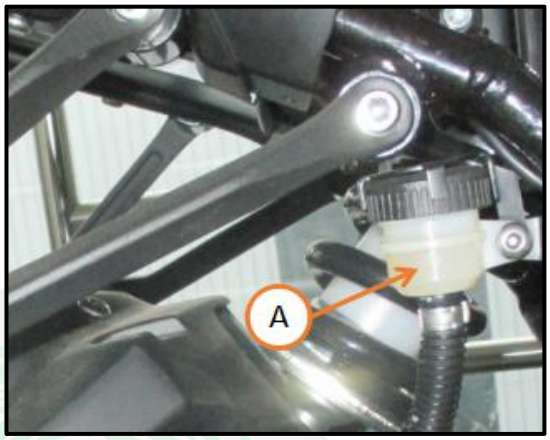


Disassembly of rear master cylinder

●Remove the reservoir [A]

● Discharge the brake fluid into a container.

Notes
If brake fluid spills out, rinse it immediately!



●Disassemble:

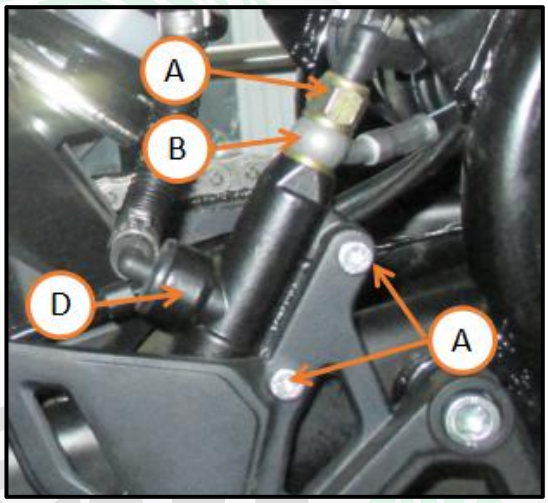
Rear brake light switch sensor [A]

Brake hose [B],

Oil pump mounting screw [C]

Rear master cylinder [D]

Notes
If brake fluid spills out, rinse it immediately!



Installation of rear master cylinder

○ Replace the gaskets on both sides of the hose joint with new ones.

●Install:

Install it in the reverse order of disassembly.

● Locking torque

Locking torque of rear master cylinder mounting screw: 10 N·m

Locking torque of rear brake light switch sensor: 10 N•m

● Discharge the air inside the brake line (see “Exhausting the Air inside the Brake Line” for details).

● Check whether the performance of brake is normal and the brake fluid leaks.

Disassembly of front master cylinder

● See "Periodic Maintenance" - "Replacing Rubber Parts of Master Cylinder" for details).

Disassembly of rear master cylinder

● See "Periodic Maintenance" - "Replacing Rubber Parts of Master Cylinder" for details).

Assembly of master cylinder

● See "Periodic Maintenance" - "Replacing Rubber Parts of Master Cylinder" for details).

Check the master cylinder (visual inspection)

● Remove the master cylinder (see “Disassembly of Front / Rear Master Cylinder” for details).

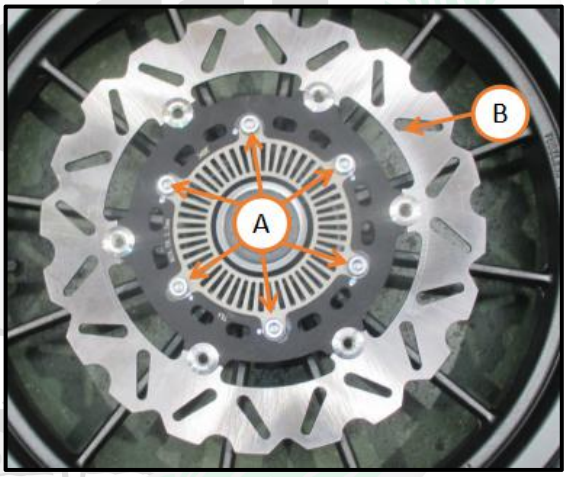
● Remove the front and rear master cylinders (see "Periodic Maintenance" - "Replacing Rubber Parts of

Master Cylinder" for details).
●Inspect the inner wall of each master cylinder and the outer surface of each piston for scratches, rust or dents.
★ If any master cylinder or piston is damaged, please replace them!
● Check the primary cup and secondary cup.
★ If the cup is worn, damaged, softened (corroded) or swelled, the entire piston (including cup) should be replaced.
★ If you find that brake fluid is leaking from the brake lever, replace the the entire piston (including cup)!
●Check the dust cover for damage.
★ If the dust cover is damaged, please replace it!
● Check whether the piston return spring is damaged.
★ If the piston return spring is damaged, please replace it!
● Check whether the relief port and supply port are blocked.
★ If the relief port is blocked, the brake pad may produce resistance to the brake disc. Clean all oil holes using the compressed air

Brake disc

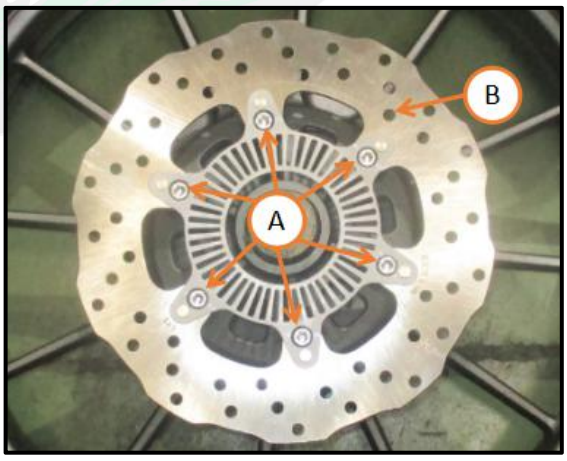
Disassembly of front brake disc

●Remove front wheel (see “Wheel/Tire” – “Removing Front / Rear Wheel”).
●Remove the mounting bolt [A] and remove the brake disc [B].
○Remove the sensor rotor.



Disassembly of rear brake disc

●Remove rear wheel (see “Wheel/Tire” – “Removing Front / Rear Wheel”).
●Remove the mounting bolt [A] and remove the brake disc [B].

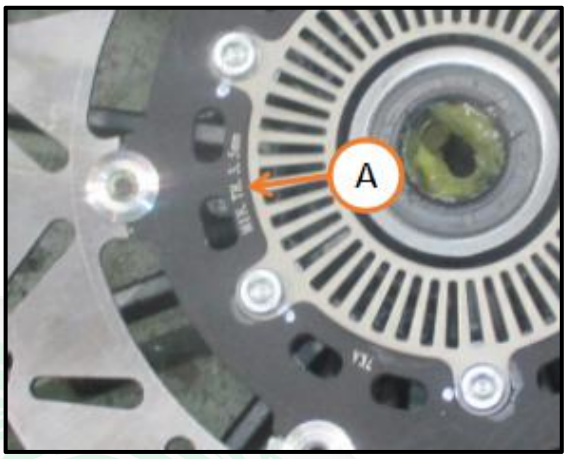


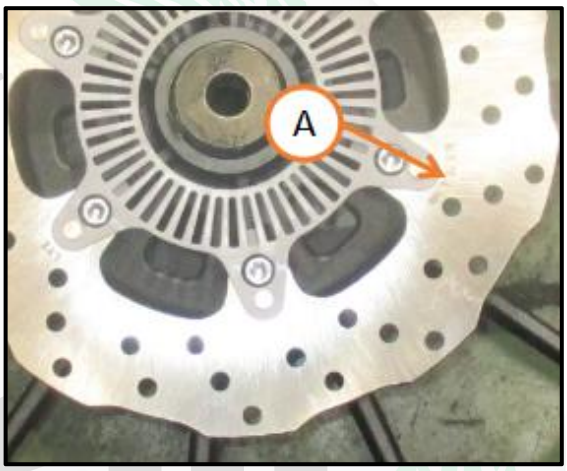
Installation of brake disc

● Mount the brake disc on the wheel with the marked side facing outward.

○ Mount the sensor rotor on the brake disc with the marked side [A] facing outward

● Apply locking agent to the threads of mounting bolts of front and rear brake discs.

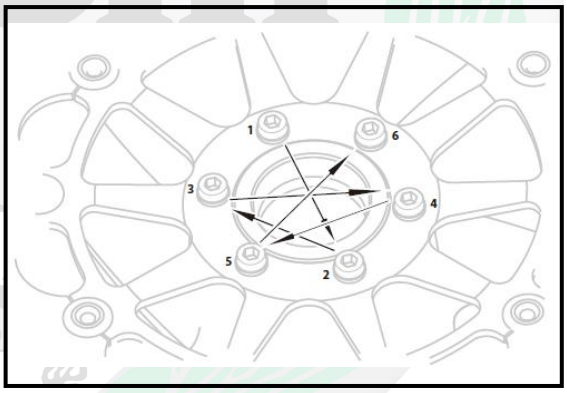




●Tighten the bolt to the brake disc in the form of a cross

● Locking torque

Locking torque of brake disc mounting bolt: 22 N·m



Inspection of wear of brake disc

● Measure the thickness of brake disc at the place where the brake disc is most severely worn.

★ If the wear of brake disc is out of the lower operating limit, please replace it!

Thickness of brake disc

Standard:

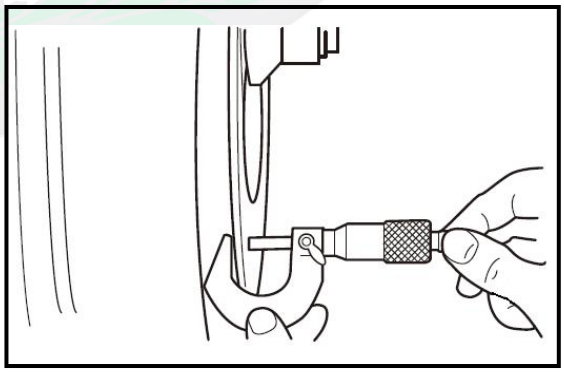
Front brake disc: 4.8 - 5.0 mm

Rear brake disc: 3.8 - 4.0 mm

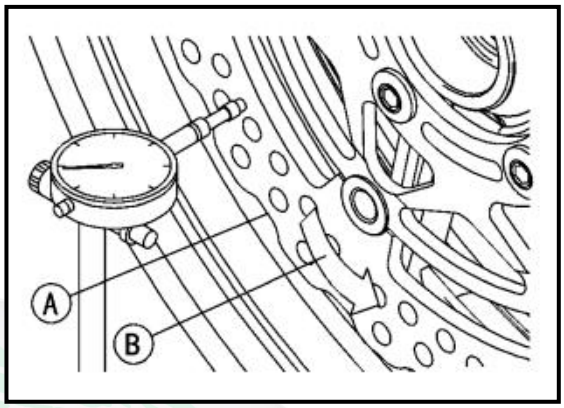
Lower operating limit:

Front brake disc: 4.5 mm

Rear brake disc: 3.5 mm



Inspection of deformation of brake disc



● Lift the front /rear wheel from the ground.

○ In order to facilitate the inspection of front brake disc, the handlebars can be completely rotated to one side.

● Rotate the [B] wheel by hand and place the dial gauge on the brake disc [A] (as shown in the figure) to measure the oscillating quantity of brake disc.

★ If the oscillating quantity of brake disc is out of the upper operating limit, please replace it!

Oscillating quantity of brake disc
Standard: ≤TIR 0.15 mm
Upper operating limit: TIR 0.3 mm

Brake fluid

Inspection of level of brake fluid

● See Periodic Maintenance" - "Inspection of Level of Brake Fluid".

Replacement of brake fluid

● See "Periodic Maintenance" - "Replacing Brake Fluid" for details.

Exhaust the air inside the brake line

The brake fluid has a very small compression factor, so almost all operations of brake lever or brake pedal are transmitted directly to the caliper, thus producing a braking effect. But the air is easy to compress. If air enters the brake line, part of the operations of brake lever or brake pedal will be used to compress the air, thus causing the brake lever or brake pedal to become soft and reducing braking performance.

⚠Warning
If the brake lever or brake pedal is soft after replacing the brake fluid or loosening the brake line joint, the air inside the brake line must be exhausted.

Remarks
○ The steps for exhausting the air from the rear brake line are as follows. *The steps of for exhausting the air from the front brake line are the same.*

Order of releasing the air

1. Remove the brake fluid cylinder head.
2. Remove the brake fluid cylinder diaphragm.
3. Install the pipe on the front end of oil drain screw and prepare the oil pan at the front end of hose.
4. After braking for a few times, press the brake lever and loosen the oil drain screw by about 1/2 turn, and then tighten it again.
5. Repeat the above operations until all bubbles are removed from the oil drain screw.
6. Install the brake fluid cylinder diaphragm
7. Install the brake fluid cylinder head

Remarks
○ The level of brake fluid must be checked frequently in the process of exhausting the air, and replenish the fluid as needed. *If the brake fluid in the*

reservoir is completely exhausted in the process of exhausting air, the exhaust operation must be repeated because the air may have entered the brake line.

○ To exhaust the air more thoroughly, tap the brake hose between the caliper and reservoir.

⚠Warning

The precautions for handling disc brakes are as follows:

1. It is forbidden to reuse brake fluid!
2. If the container containing the brake fluid is not sealed or has been opened for a long time, the brake fluid inside the container must not be used!
3. Do not mix brake fluids of different types or brands. This will reduce the boiling point of the brake fluid, resulting in brake failure or corrosion of rubber brake parts.
4. Do not open the reservoir cap for a long time to prevent the brake fluid from getting wet.
5. Do not replace brake fluid in rain or strong winds!
6. In addition to brake pads and brake discs, only disc brake fluid, isopropyl alcohol or alcohol can be used to clean the brake parts. Do not clean the above parts with any other liquid! Gasoline, oil or other gasoline distillates may corrode rubber parts. Gasoline, oil or other gasoline distillates may corrode rubber parts. If oil is splashed on any part, it will be difficult to completely clean and eventually corrode the rubber parts inside the disc brake.
7. When handling brake pads or brake discs, prevent any brake fluid or other oil from splashing on them. If you accidentally spill any brake fluid or other oil on the brake pads or discs, clean them using solvent with a high flash point! Do not use any solvents that may leave oily residues! If the brake fluid or oil cannot be completely removed from the brake pad, replace it with a new one!
8. The brake fluid may quickly corrode the surface of painted part, so if any brake fluid spills, it must be wiped!
9. The air in the brake line must be drained whenever the brake line connector or exhaust valve is opened!

Brake hose

Disassembly / installation of brake hose and brake line

● See "Periodic Maintenance" - "Replacement of Brake Hose and Brake Line" for details.

Inspection of Brake Hoses and Brake Lines

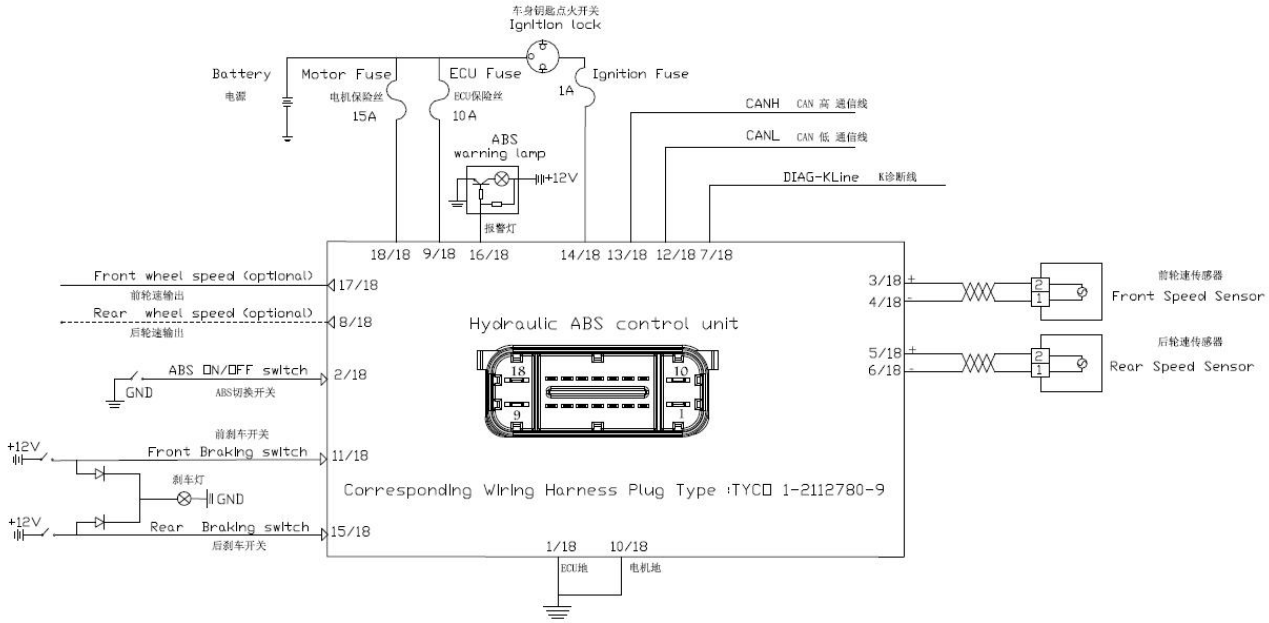
● See Periodic Maintenance" - "Inspection of Damage and Installation of Brake Hoses and Brake Lines".

Anti-lock brake system (ABS)

Part position

1. Front wheel speed sensor
2. Gear ring of front wheel speed sensor
3. Rear wheel speed sensor
4. Gear ring of rear wheel speed sensor
5. Check the ABS indicator (LED)
6. ABS hydraulic mechanism
7.ABS Qianjiang self-diagnosis system connector
8.ABS fuse box

ABS system circuit diagram



1. ABS Switch
2. Ignition Switch
3. Installation of Ground Wire
5. Ignition Fuse
6.ABS Fuse (40A)
7. Meter panel
8.ABS Diagnostic System Connector
9. Front Wheel Speed Sensor
10. Rear Wheel Speed Sensor

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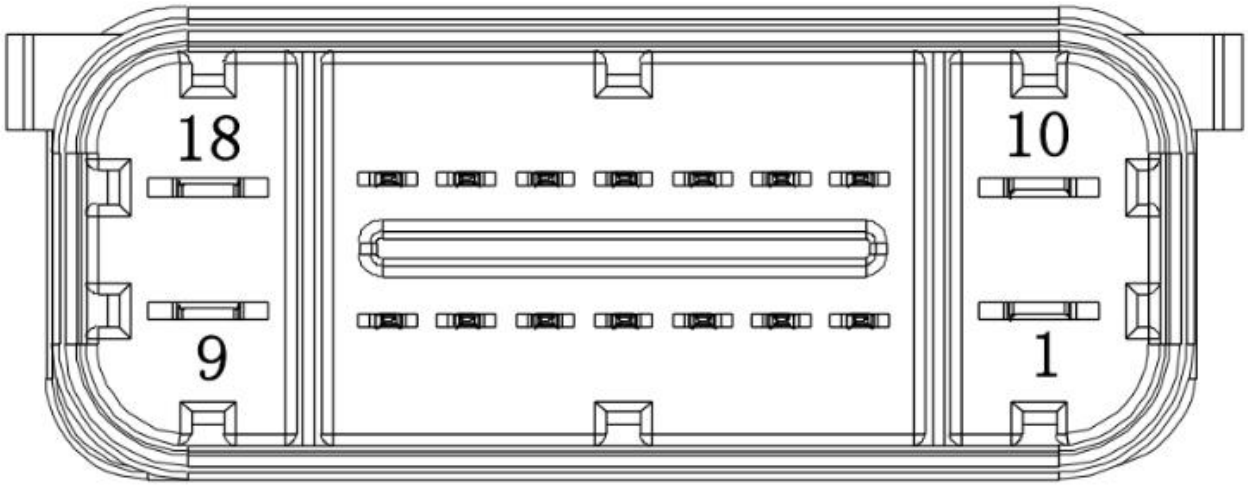
Pin name



Pin Number	Definition in Chinese and English	
1	ECU地	ECU GND
2	ABS状态切换	ABS OFF Switch
3	前轮速传感器供电	Front Wheel Speed Sensor Power
4	前轮速传感器信号	Front Wheel Speed Sensor Signal
5	后轮速传感器供电	Rear Wheel Speed Sensor Power
6	后轮速传感器信号	Rear Wheel Speed Sensor Signal
7	K线	K-Line
8	后轮速输出	Rear Wheel Speed Sensor Output
9	ECU供电	ECU Power Supply
10	电机地	Motor GND
11	前刹车	Front Brake Light Switch
12	CAN低线	CAN Low
13	CAN高线	CAN High
14	点火	Ignition
15	后刹车	Rear Brake Light Switch
16	ABS报警灯输出	ABS Warning Lamp Output
17	前轮速输出	Front Wheel Speed Sensor Output
18	电机供电	Motor Power Supply

ABS overhaul

Precautions for ABS overhaul

There are the following important precautions in the process of overhauling the ABS system.

○The power supply of this ABS system must be supplied by a 12V sealed battery. Do not use any other power source!

○Do not connect the battery cable reversely. Otherwise, the ABS hydraulic mechanism will be damaged.

○ To avoid damage to ABS parts, do not disconnect the battery cable or any other electrical connectors while the ignition switch is in the "ON" position or while the engine is running.

○Be careful not to short-circuit the wire that directly connect the positive (+) electrode of the battery and the ground wire of the chassis.

○If any ABS electrical connector is disconnected, do not turn the ignition switch to "ON"! The ABS hydraulic mechanism will remember the fault code.

○Do not spray water on electrical parts, ABS parts, joints, wires and electric wires!

○If the motorcycle is equipped with a transceiver, ensure that the operation of the ABS system is not affected by the radio waves emitted by the antenna. The antenna shall be as far away as possible from the ABS hydraulic mechanism.

○Turn the ignition switch to "OFF" before the ABS electrical connector is disconnected.

○Do not hit the ABS parts with a hammer or drop the ABS parts on a hard surface. Otherwise, the ABS parts will be damaged.

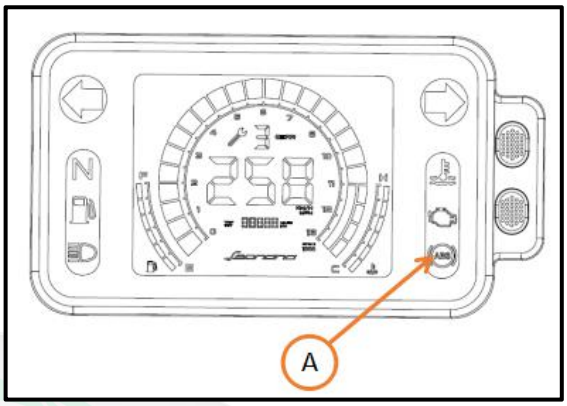
It is not allowed to disassemble the ABS parts! Even if it is found that the ABS parts are faulty, do not disassemble the ABS parts for repair. Please replace them directly!

ABS has many brake tubes and wires. And ABS can not detect the faults of traditional brake systems (wear of brake disc, uneven wear of brake pad and other mechanical faults). In order to prevent faults, please check whether the brake tube is properly connected, whether the electric wires are arranged correctly, and whether the brake performance is normal. Remember to check the brake fluid for leakage and completely discharge the air from the brake tube!

⚠Warning
If any brake tube connectors are loosened, including the coupling nut or bleeder screw of the ABS hydraulic mechanism, the air in the brake tube must be discharged.

Notes
If there is air in the brake tube, do not ride the motorcycle, otherwise the ABS will fail.

○If the tire pressure is incorrect and the other tires or wheels installed instead of those recommended by the manufacturer are deformed, the ABS indicator (LED) [A] will be on. If the indicator is on, please remove the faults and delete the fault code!



Warning

If the other tires are used instead of those recommended by the manufacturer, the ABS will fail and the braking distance will increase, resulting in a traffic accident for the rider. Therefore, this motorcycle must use the standard tires recommended by the manufacturer. If the other tires are used instead of those recommended by the manufacturer, the ABS will fail and the braking distance will increase, resulting in a traffic accident for the rider. Therefore, this motorcycle must use the standard tires recommended by the manufacturer.

○If the engine is started when the motorcycle is supported by the bracket and it is not in the neutral position, the ABS indicator (LED) will be on. If the indicator is on, turn the ignition switch to "OFF" and clear the fault code (front wheel speed sensor failure).

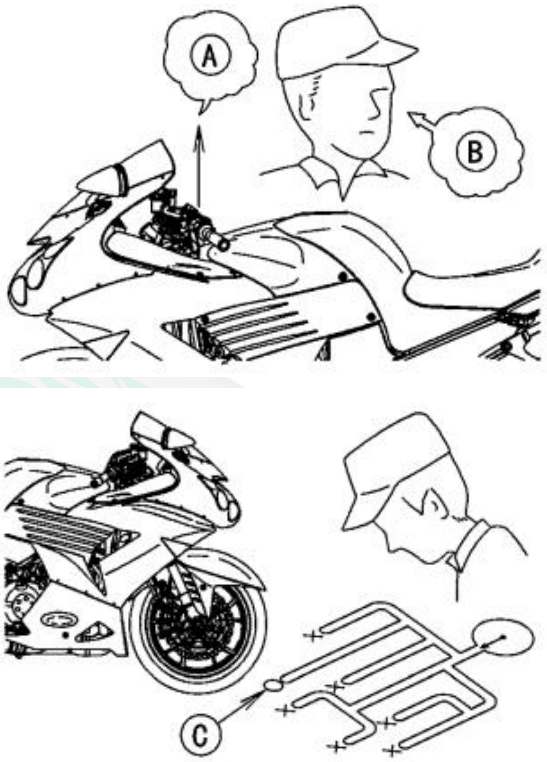
○ ABS will make noise when it is running, and the rider will feel the reaction force of the brake rod and brake pedal. This situation is normal and is intended to alert the rider that ABS is running normally. ○ ABS will make noise when it is running, and the rider will feel the reaction force of the brake rod and brake pedal. This situation is normal and is intended to alert the rider that ABS is running normally.

○ Once the ABS hydraulic mechanism detects a fault code, it will remember the fault code. Therefore, after the overhaul is completed, remember to delete the fault code! However, do not delete the fault code during troubleshooting. Please delete the fault code until all inspections and repairs have been completed to avoid the repeated entry of the previous fault code and unnecessary overhaul work.

○ All the fault codes stored in the ABS hydraulic mechanism must be deleted before the motorcycle is delivered to the customer. Ensure that the ABS indicator (LED) will be on by using the diagnosis features. In order to make the diagnosis accurate, make sure that the battery is fully charged. Try riding the motorcycle (driving speed: above 20km/h (12mph)) and observe whether the ABS indicator (LED) will be on. Finally, try riding the motorcycle (driving speed: above 30km/h (20mph)), slam the brake and observe whether the motorcycle can stop smoothly, and whether the ABS works normally (you can feel the reaction force of the brake pad and brake pedal). So far, the inspection process is finished.

Overview of ABS fault removal

If an error occurs to ABS, the ABS indicator (LED) will be on to alert the rider. In addition, the fault information will be stored in the memory of the ABS hydraulic mechanism. Therefore, after faults are removed, you must delete the fault code and start the diagnostic program to confirm that the signal output is normal. If the ABS fault indicator (LED) is constantly on, first thoroughly find out the background of the fault and then start the repair work. For example, ask the rider about the current situation [B] when the fault occurs and try to determine the cause of the fault [C]. Do not completely rely on the ABS self-diagnosis function, and combine common sense to remove faults. For example: Check whether the brake performance is normal, whether the brake fluid level is correct and whether the brake fluid leaks.



Under the following circumstances, the ABS indicator (LED) will be on even if ABS is running normally. At that time, please turn the ignition switch to "OFF" to turn off the indicator. If you ride the motorcycle again without deleting the fault code, the indicator will become on again.

○ The rider rides the motorcycle on the undulating road all the time.

○ When the motorcycle is supported by the bracket, the engine is started and is not in the neutral position, and the rear wheel is rotated.

○ The front wheel leaves the ground due to sudden acceleration.

○ ABS is suffered from severe electrical interference.

○ The tire pressure is abnormal. Please adjust the tire pressure!

○ The tires with different specifications from those of standard tires are used. Please replace them with standard tires!

○ The wheels are deformed. Please replace the wheels!

Most ABS fault removal work involves verifying whether the circuit is normal. The ABS parts have been assembled and adjusted by the manufacturer, so there is no need to disassemble or repair the ABS parts. However, the ABS hydraulic mechanism can be replaced if necessary.

The basic fault removal steps are shown below:

● Carry out the pre-diagnosis inspection (preliminary inspection).

● Determine the fault by using the self-diagnostic function.

● Check the joints of the ABS hydraulic mechanism and the circuits and connectors between the suspected faulty ABS parts with a multimeter.

Special tool: Multimeter:

● Visually check whether the electric wires are burnt or worn.

★ If any electric wires are damaged, please replace them!

● Disassemble each connector [A] and check whether the inside is corroded, dirty or damaged.

★ If any connector is corroded or contaminated, carefully clean it! If the connector is damaged, replace it!

● Check whether the circuit is normal.

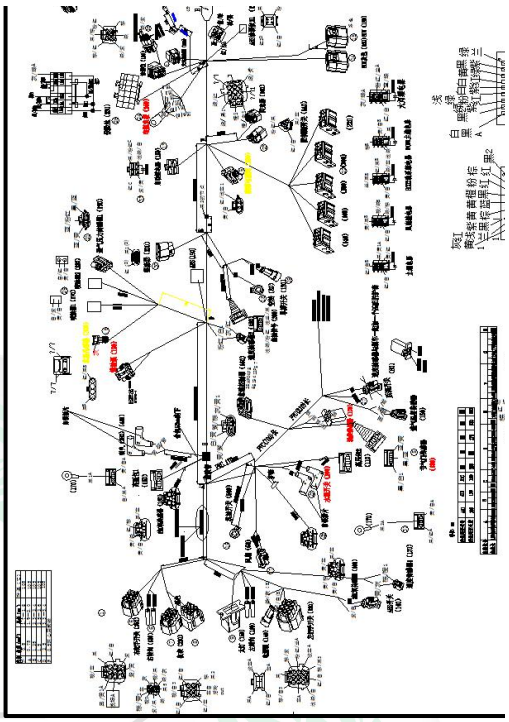
○ Find both ends of the wire that may fail by using the circuit diagram.

○ Connect the multimeter with both ends of the wire.

Special tool—multimeter:

○ Set the range of the multimeter to ×1Ω, and then read the reading of the multimeter.

★ If the reading of the multimeter is not 0Ω, it indicates that the wire is damaged. Replace the main cable [B] if necessary.



● Repeat the conduction detection of the circuit to reduce the number of the parts that may fail and then detect the ABS parts.

★ If the circuit and the connectors are normal, the next suspect object is the ABS parts, and they shall be detected one by one.

★ If it is found that any ABS part is abnormal, please replace it!

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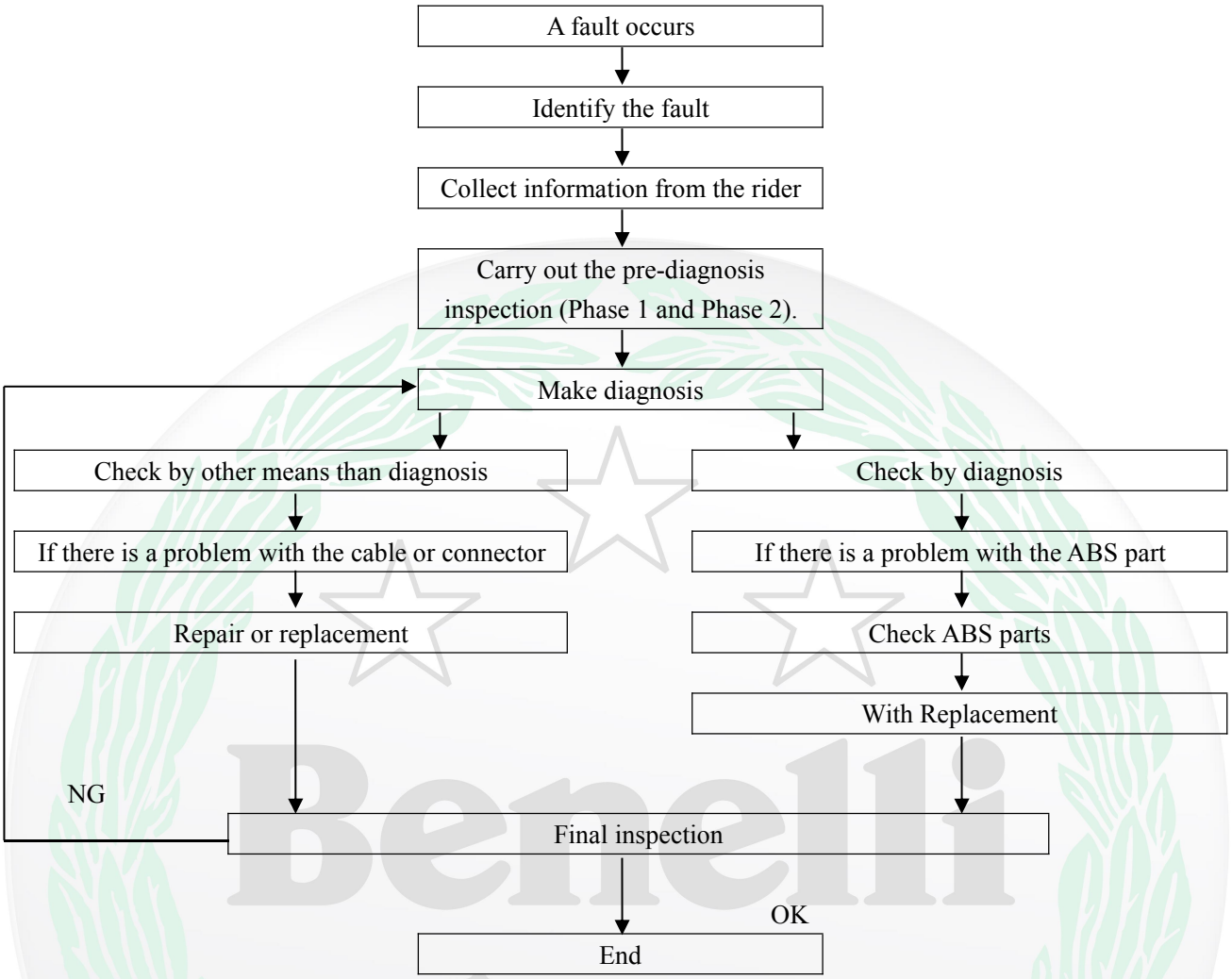
ABS diagnostic flow chart



Questions need to be asked for the rider

○ Each rider reacts differently to the fault, so it is necessary to confirm which problem the rider is experiencing.

○ By asking the rider, find out what went wrong and under what circumstances. Only by knowing clearly about the faults can you help yourself to reproduce the problem in the workshop.

○ Diagnostic tables can help you avoid ignoring any key points, so you must use a diagnostic table.

Sample of diagnostic table

<table>
<tr><td colspan="5">Name of rider:</td><td colspan="4">Registration number (license plate number):</td></tr>
<tr><td colspan="5">First registration year:</td><td colspan="4">Model:</td></tr>
<tr><td colspan="5">Engine number:</td><td colspan="4">Frame number</td></tr>
<tr><td colspan="5">Date of fault:</td><td colspan="4">-Frequency:</td></tr>
<tr><td colspan="5">Weather</td><td colspan="4">Mileage:</td></tr>
<tr><td rowspan="2">Pheno menon</td><td>□The brake lever vibrates or makes noise</td><td>□The indicator light is flashing</td><td rowspan="2">□Brake distance is too long</td><td>□The brake lever moves abnormally</td><td rowspan="2">□ABS failure</td><td rowspan="2">□ABS can run, but the indicator light is out</td><td rowspan="2">□ ABS runs too frequently</td></tr>
<tr><td>□The brake pedal vibrates or makes noise</td><td>□The indicator light is always on</td><td>□ The brake pedal is moving abnormally</td></tr>
<tr><td colspan="2">The state of engine in the event of a fault</td><td colspan="6">□ At startup
□ After startup
□Speed: ≥5000r/min</td></tr>
<tr><td colspan="2">Road conditions</td><td colspan="6">□The road surface is very slippery (□ snow road, gravel road, □ other)
□The road is undulating
□Other</td></tr>
<tr><td colspan="2">Driving conditions</td><td colspan="6">□Turn a corner at high speed
□ Driving speed ≥10km/h (6mph)
□ Driving speed ≥10km/h(6mph)
□ Parking
□Turn a corner</td></tr>
<tr><td colspan="2">Brake</td><td colspan="6">□ Gentle braking
□ Sudden braking</td></tr>
<tr><td colspan="2">Other conditions</td><td colspan="6">□The brake lever stroke is large
□ The pedal stroke is large</td></tr>
</table>

Carry out the pre-diagnosis inspection (Phase 1)

● Level in the brake fluid reservoir.	NG	Replenish brake fluid.
OK		
Check the brake fluid for leakage.	NG	Repair the brake line.
OK		
Check the function of the brake lever and brake pedal.	NG	Repair or replace the master cylinder.
OK		
Check the brake pads and brake discs.	NG	Replace the defective parts.
OK		
The front and rear wheels should be able to rotate smoothly without any braking resistance.	NG	Repair or replace the caliper.
OK		
The free clearance of the wheel bearing should not be too large. The bending amount of rear axle or the runout of brake disc should not be too large.	NG	Replace the wheel bearing or rear axle.

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Carry out the pre-diagnosis inspection (Phase 2)

Check the ABS indicator (LED).
○ Is the indicator light on after the ignition switch is turned "on"?

No (not be on) → Check power cables and meter panels

Yes

No (not flash) → Check the cable line, check whether the connector is plugged in properly, and check whether the front and rear wheel speed sensors are damaged.

Check whether the light is flashing after pressing and holding the ABS switch for 3-5 seconds.

Yes

No (not be on) → Check power cables and meter panels

○ Is the indicator light on after the ignition switch is turned "off" and then "on"?

Yes (on)

Drive for more than 1 minute (including 1 minute) at ≥6km/h (3.7mph)

↓

Is the indicator light off when the motorcycle is running?

Yes → ABS is normal

No

Make a diagnosis and find the fault code for repair or replacement. → Ask the rider whether the fault has occurred again.

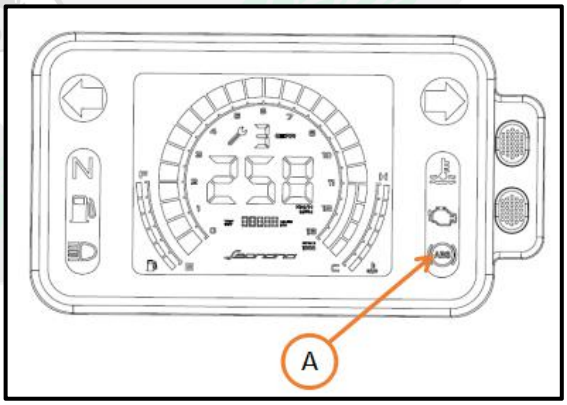
Overview of diagnosis

The ABS hydraulic mechanism will remember and store the fault code so that the service personnel can easily troubleshoot it. The fault code memory is directly powered by the battery and cannot be removed by the ignition switch.

The ABS hydraulic mechanism is able to remember all the fault codes (6 codes). If there are more fault codes, all the existing fault codes (6 codes) must be deleted before they can be stored in the ABS hydraulic mechanism. If there is no fault, the ABS indicator (LED) light will be on, indicating that "ABS is OK".

Self-diagnostic procedures

○If any fault occurs in ABS, the ABS indicator (LED) [A] will be on.



Remarks

○ A fully charged battery must be used for diagnostics, otherwise, the indicator light may flash very slowly or not flash.

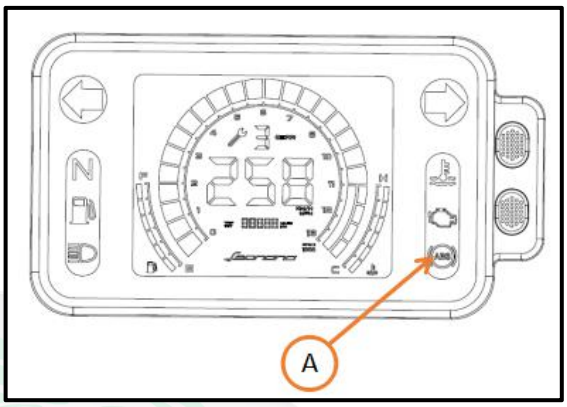
○The motorcycle is in a stopped state.

Check the ABS indicator (LED).

● Rotate the ignition switch to "ON".

★ If the ABS indicator light (LED) [A] is on for a while and automatically goes out, it is normal.

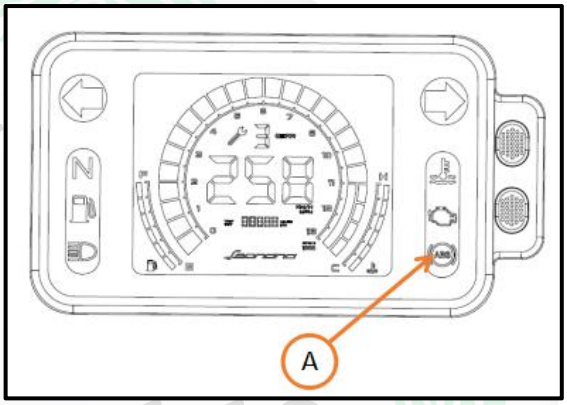
★ If the ABS indicator light (LED) is always on, skip to the following steps: “ABS indicator light (LED) is on (motorcycle is driving – no fault code)”.



● Rotate the ignition switch to "OFF".

★ If the ABS indicator light (LED) [A] is out, it is normal.

★ If the ABS indicator light (LED) is always on, skip to the following steps: “ABS indicator light (LED) is on (rotate the ignition switch to "OFF")”.



ABS indicator (LED) is on (rotate the ignition switch to "OFF")

● Conduct the Step I of test.

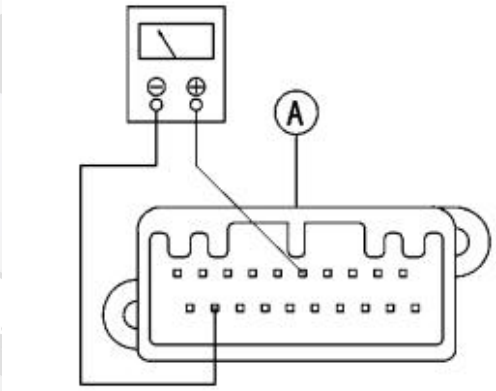
○ Check the pin voltage between the black/white lead terminal of the meter connector [A] and the ground wire.

Special tool—multimeter:

● Rotate the ignition switch to "ON".

Pin Voltage

Standard: about 10V



★ If the pin voltage is not within the specified range, perform the Step II.

★ If the pin voltage is correct, replace the meter.

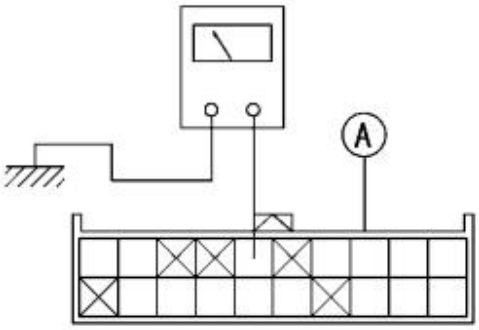
● Conduct the Step II of test.

○ Disconnect the meter connector.

○ Check the line between the black/white lead terminal of the connector at main cable side [A] and the ground wire.

★ If the line is normal, replace or repair the main cable.

★ If the line is abnormal, perform Step III.



● Conduct the Step III of test.

○ Disconnect the ABS hydraulic mechanism connector.

○ Check the line between the black/white lead terminal of connector at the main cable side [A] and the

black/white lead terminal of connector at the main cable side [B].

★ If the line is normal, replace the ABS hydraulic mechanism.

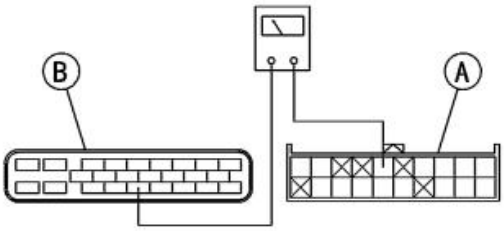
★ If the line is abnormal, replace or repair the main cable.

ABS indicator (LED) is on (motorcycle is driving - no fault code)

●Test

○ Disconnect the ABS hydraulic mechanism connector and meter connector.

○ Check the line between the black/white lead terminal of ABS connector at the main cable side [A] and the black/white lead terminal of wheel speed sensor connector at the main cable side [B].



Check the front/rear wheel speed sensor and gear ring for damage.

Check whether the ABS fuse on the cable is normal.

Special tool—multimeter:

★ If the line, front/rear wheel speed sensor and gear ring are normal, and the fuse is also normal, replace the ABS hydraulic mechanism.

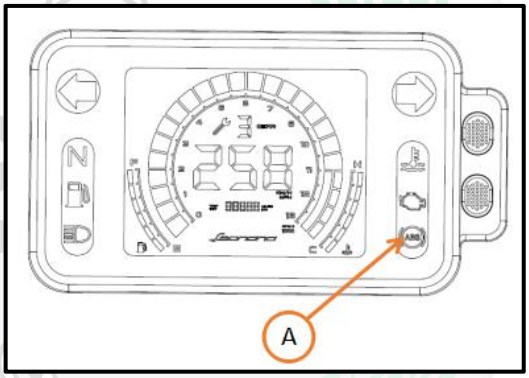
★ If the line, front/rear wheel speed sensor and gear ring, fuse are not normal, replace or repair them.

Battery terminal voltage

Standard: battery voltage ≥ 12V

★ If the battery terminal voltage is not within the specified range, replace the battery.

★ If the battery terminal voltage is normal, perform the next step.



The difference between front and rear wheel speeds is abnormal (fault code: front: C0084-C0088; rear: C0104-C0108)

● Conduct the Step I of test.

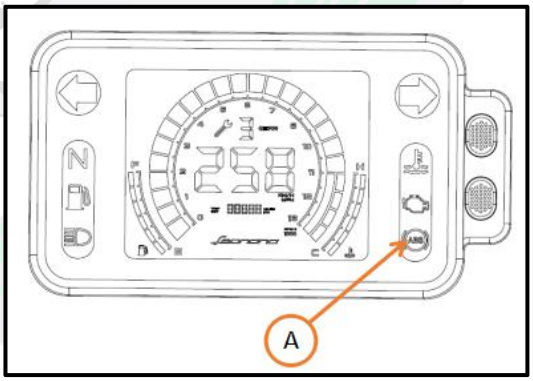
○Perform the following checks and repair defective parts.

The tire pressure is abnormal;

Non-recommended standard tires are installed on motorcycles (tire specifications are incorrect);

Deformation of wheel or tire;

the rotating teeth of sensor rotor are cracked or blocked by foreign matters.



★ If the above parts are normal, perform Step II.

● Conduct the Step II of test.

○ Recheck the fault code; delete the fault code and regain the fault code.

★ If the ABS indicator light (LED) [A] is on, the ECU fault code indicates that the ABS hydraulic mechanism is faulty. Therefore, the ABS should be replaced.

★ If the ABS indicator light (LED) is out, the ABS is normal (no fault code is stored; temporary fault).

Wheel speed sensor is open or shorted (front: C0080-C0083; rear: C0100-C0103)

○ Check whether the ABS sensor connector is loose or not inserted properly

○ Check whether the ABS sensor is damaged

★ If the wheel speed sensor is damaged, replace the wheel speed sensor.

Check the line of wheel speed sensor (fault code: front: C0080-C0083; rear: C0100-C0103)

● Conduct the Step I of test.

○ Disconnect the ABS hydraulic mechanism connector and the front wheel speed sensor connector.

○ Connect the two lead terminals of connector at the main cable side with a jumper and check the line between the two lead terminals of connector at the main cable side.

★ If the line is not normal, perform Step II.

★ If the line is abnormal, replace or repair the main cable.

● Conduct the Step II of test.

○ Connect the two lead terminals of connector at the main cable side with a jumper and check the line between the two lead terminals of connector at the main cable side.

★ If the line is normal, replace the front wheel speed sensor.

★ If the line is abnormal, replace or repair the main cable.

Relay fault (C0044-C0046)

★ Replace ABS.

ABS normally open valve solenoid circuit is open-circuited or the resistance is too large (front: C0121; rear: C0161)

★ Replace ABS.

ABS normally closed valve solenoid circuit is open-circuited or the resistance is too large (front: C0131; rear: C0171)

★ Replace ABS.

ABS voltage is too high, ABS voltage is too low (too high: C0053; too low: C0047, C0052)

Standard: battery voltage ≥ 12V

★ If the battery terminal voltage is not within the specified range, replace the battery or charge and discharge.

ABS pump or motor fault (C0070-C0074)

★ There is still a fault after ensuring the line is normal. Please replace the ABS.

Intermittent signal of wheel speed sensor (front: C0084-C0088; rear: C0104-C0108)

○ Check whether the clearance between the wheel speed sensor and the gear ring surface is between 0.5-1.2 mm.

○Check whether the wheel speed gear ring is deformed or any tooth is missing

★ If the clearance is not within the range, adjust the clearance

★ If wheel speed gear ring is damaged, replace wheel speed gear ring

ABS wheel speed difference is too high

○ Check whether the wheels or tires with different specifications have been replaced

○Check whether the tire is winded in situ

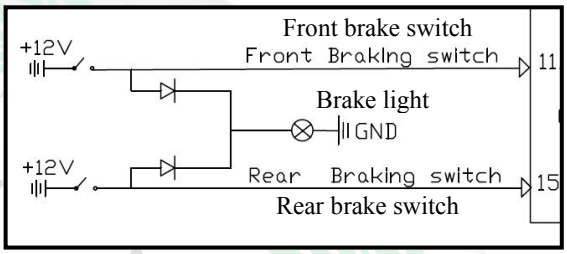
★Use the wheel and tires the same as the originals

★Please turn off the electric main switch after the tire is winded in situ, then open the main switch.

Brake diode breakdown (C0062)

○Check whether the diode of the main cable of the motorcycle body harness is intact

★ If the diode is damaged, replace it



Brake switch line fault (C0060-C0061)

○ABS function will not be affected. Please disconnect the ABS hydraulic mechanism connector and check the line between brake signal cable to the ABS connector.

★ If the line is normal, please repair the main cable.

★ Test it for several times; if the line is normal, please clear the fault code and retest the ABS.

ABS indicator light (LED) fault (C0210-C0213)

○ Disconnect the ABS hydraulic mechanism connector and check the line between ABS indicator cable to the ABS connector terminal.

★ If the line is abnormal, please repair the main cable.

★If the line is normal, please replace the meter panel and retest.

Speed output port fault (C0230-C0231)

○ Disconnect the ABS hydraulic mechanism connector and check the line between wheel speed output port to the ABS connector terminal.

★ If the line is abnormal, please repair the main cable.

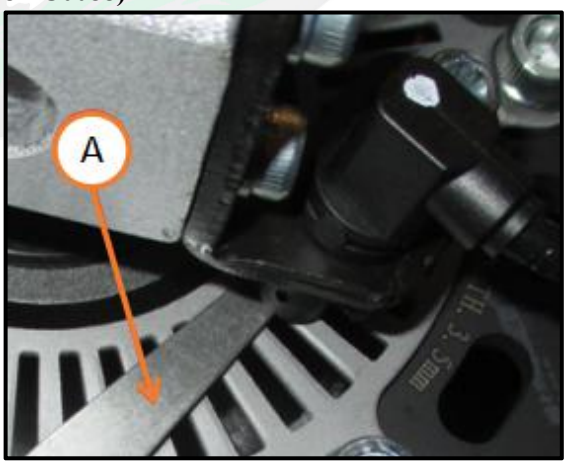
★If the line is normal, please replace the meter panel and retest.

Front wheel speed sensor signal is abnormal (fault code: C0084-C0088)

● Conduct the Step I of test.

○ Measure the clearance between the front wheel speed sensor and the sensor rotor.

Feeler gauge [A]



Clearance

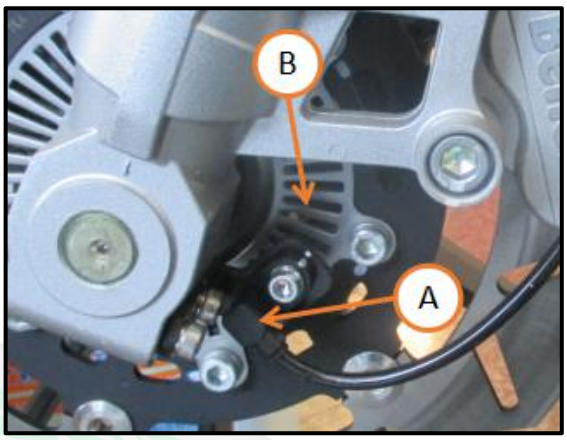
Standard: 0.5-1.2mm (0.02-0.047in.)

★ If the measured value is beyond the above standards, check each part for deformation or looseness and adjust accordingly.

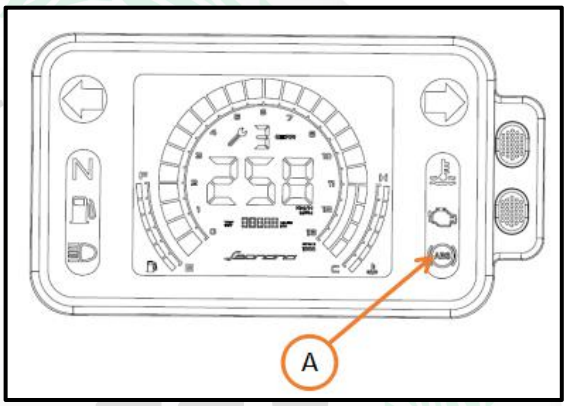
Re-measure the clearance.

★ If the measured value is normal, perform Step II.

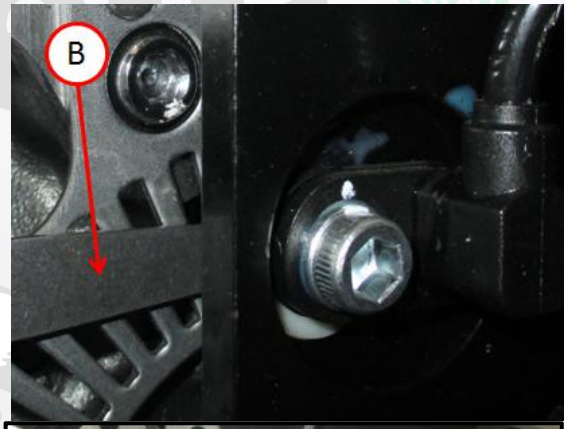
● Conduct the Step II of test.
○ Check whether there are iron filings or other magnetic deposits between the sensor [A] and the sensor gear ring [B], and whether the groove of sensor gear ring is clogged.
○ Check the installation of the sensor and observe whether it is loose.
○ Check the tip of the sensor and sensor gear ring for deformation or damage (eg, the teeth of the sensor gear ring are notched).
★ If the sensor and sensor gear ring are in poor conditions, clean the deposit on it and reinstall or replace the defective parts correctly.
★ If the above parts are normal, perform Step III.



● Conduct the Step III of test.
○ Recheck the fault code; delete the fault code, perform the pre-diagnosis check (Phase I and II), and re-read the fault code.
★ If the ABS indicator light (LED) [A] is on, the ECU fault code indicates that the ABS hydraulic mechanism is faulty. Therefore, the ABS hydraulic mechanism should be replaced.
★ If the ABS indicator light (LED) is out, the ABS is normal (no fault code is stored; temporary fault).

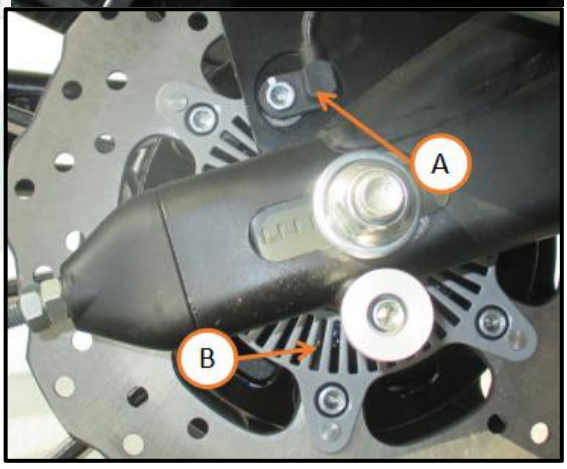


Rear wheel speed sensor signal is abnormal (fault code: C0104-C0108)
● Conduct the Step I of test.
○ Measure the clearance between the rear wheel speed sensor and the sensor gear ring.
Feeler gauge [A]
Clearance
Standard: 0.5-1.2mm (0.02-0.047in.)



★ If the measured value is beyond the above standards, check each part for deformation or looseness and adjust accordingly.
Re-measure the clearance.
★ If the measured value is normal, perform Step II.

● Conduct the Step II of test.
○ Check whether there are iron filings or other magnetic deposits between the sensor [A] and the sensor gear ring [B], and whether the groove of sensor gear ring is clogged.
○ Check the installation of the sensor and observe whether it is loose.
○ Check the tip of the sensor and sensor gear ring for deformation or damage (eg, the teeth of the sensor gear ring are notched).
★ If the sensor and sensor gear ring are in poor conditions, clean the deposit on it and reinstall or replace the defective parts correctly.
★ If the above parts are normal, perform Step III.

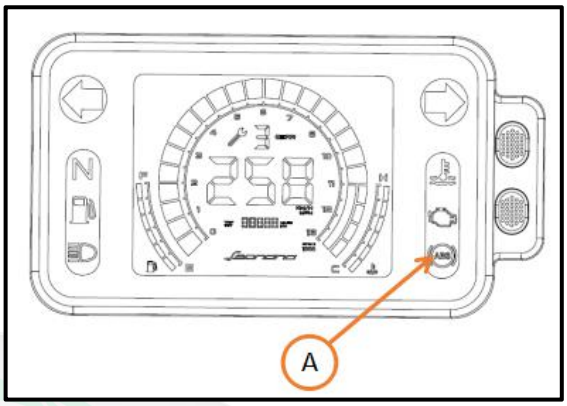


● Conduct the Step III of test.

○ Recheck the fault code; delete the fault code.

★ If the ABS indicator light (LED) [A] is on, the ECU fault code indicates that the ABS hydraulic mechanism is faulty. Therefore, the ABS hydraulic mechanism should be replaced.

★ If the ABS indicator light (LED) is out, the ABS is normal (no fault code is stored; temporary fault).



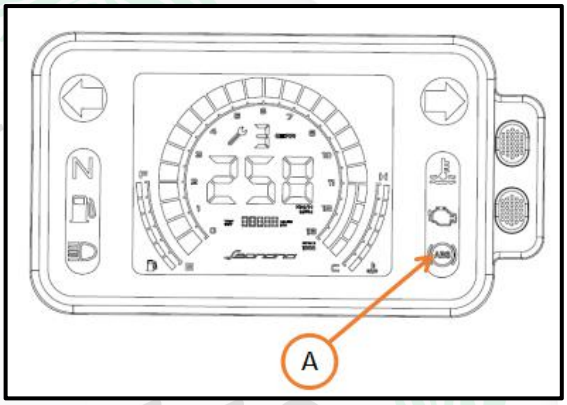
Check ECU (fault code: C0044-C0046)

● Conduct the Step I of test.

○ Recheck the fault code; delete the fault code, perform the pre-diagnosis check (Phase I and II), and re-gain the fault code.

★ If the ABS indicator light (LED) [A] is on, the ECU fault code indicates that the ABS hydraulic mechanism is faulty. Therefore, the ABS hydraulic mechanism should be replaced.

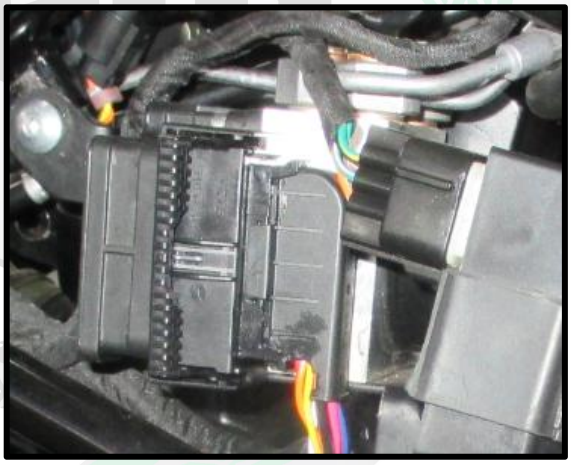
★ If the ABS indicator light (LED) is out, the ABS is normal (no fault code is stored; temporary fault).



ABS hydraulic system

Disassemble ABS hydraulic mechanism

Notes
The ABS hydraulic mechanism have been precisely set and adjusted before leaving the factory, so care must be taken during operation. Never use a hammer to strike it or drop it on a hard surface and prevent it from touching or be stuck to the mud.



● Discharge the brake fluid from the front brake line and the rear brake line.

○Press the brake lever and pedal to release the brake fluid through the bleed screw.

●Disassemble:

Fuel tank (see “Fuel Tank” – “Removing Fuel Tank”).

Right cover (see “Covering Parts” – “Removing Right Cover” for details).

battery (see “Electrical System” - “Removal of Battery”).

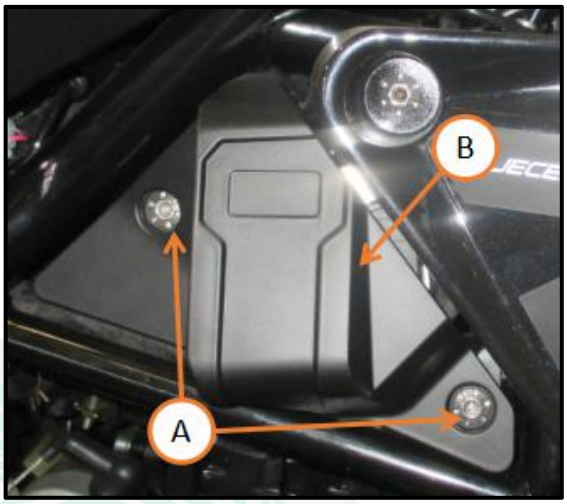
●Disassemble:

Bolt [A]

●ABS cover [B]

● Clean the ABS hydraulic mechanism.

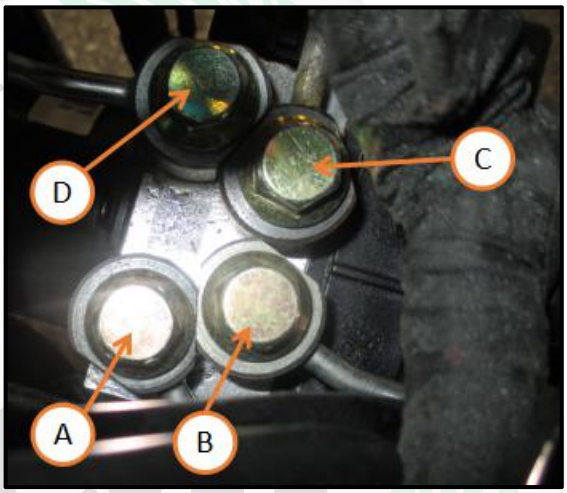
Notes
Clean all connectors on the ABS hydraulic mechanism and the rear master cylinder, as the dirt around the hollow bolts may contaminate the brake fluid during the removal/installation of brake line. **Before removing the brake hose, lay a rag around the ABS hydraulic mechanism to prevent the brake fluid from seeping into the parts.**



● Remove the brake line connecting bolts [A], [B], [C], [D].

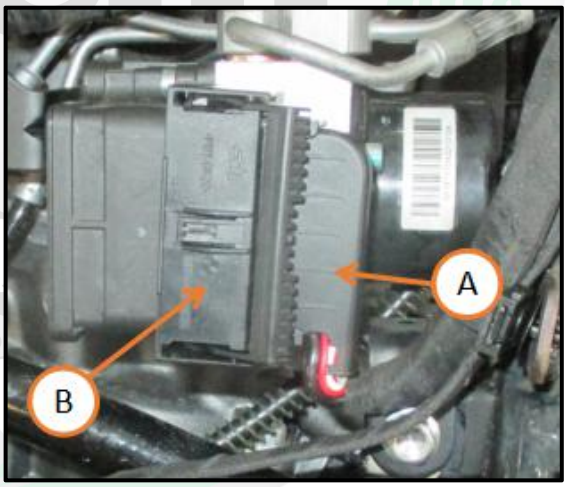
● Seal the opening of brake hose with a tape to prevent brake fluid from leaking or foreign matter from contaminating the brake fluid.

Notes
Brake fluid may quickly corrode the painted part, so if the brake fluid spills on any plastic part, it must be thoroughly rinsed immediately.



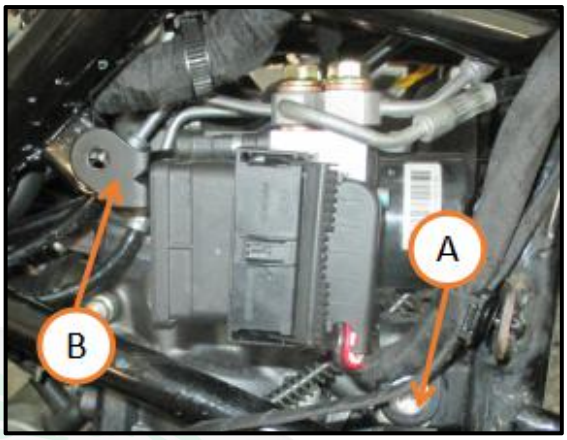
● Disconnect the connector [A].

○ Loosen the connector [B] by the method as shown on the right.



●Remove the bolt [A].

● Remove the ABS hydraulic mechanism and bracket [B].



●Remove the bolt and bracket.

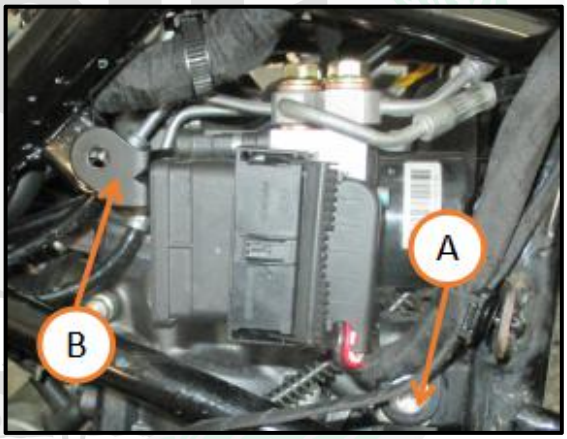
Notes
ABS hydraulic mechanism has been precisely set and adjusted before leaving the factory, so do not disassemble and repair the ABS hydraulic mechanism!

Install ABS hydraulic mechanism

● Install the ABS hydraulic mechanism on the bracket [B].

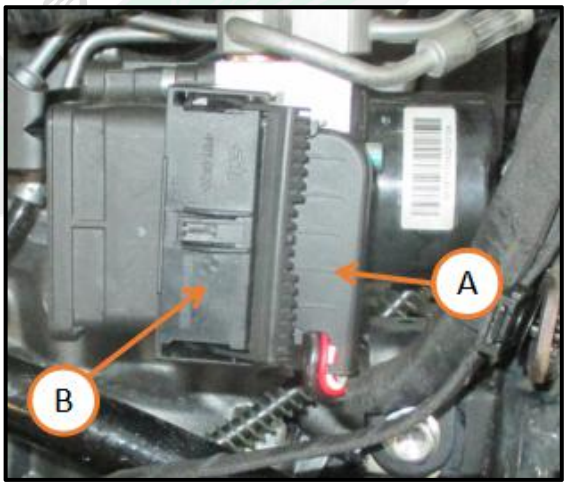
Notes
Brake fluid may quickly corrode the painted part, so if the brake fluid spills on any plastic part, it must be thoroughly rinsed immediately.

●Lock the bolt [A] to the frame.



● Arrange the wires correctly and securely fasten the connector [A].

○ Mount the joint [B] by the method as shown on the right.



● Install the brake line correctly, as shown in the figure.

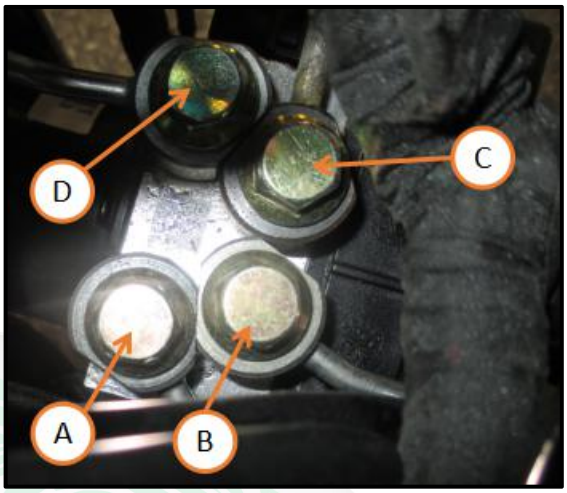
● Lock the brake line connecting bolts [A], [B], [C], [D].

Locking torque for connecting nut of brake line: 17 N•m

● Discharge the air inside the brake line (see "Exhausting the Air inside the Brake Line" for details).|

● Check whether the performance of brake is normal and the brake fluid leaks.

●Install the parts disassembled previously (see the corresponding chapters).

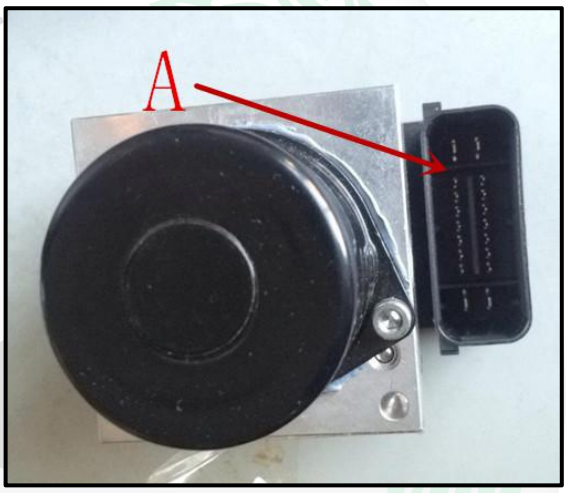


Check ABS hydraulic mechanism

● Remove the ABS hydraulic mechanism (see "Removing the ABS Hydraulic Mechanism" for details).

● Visually inspect ABS hydraulic mechanism.

★ If the ABS hydraulic mechanism is cracked or damaged, please replace it!



● Visually inspect the connector terminal [A].

★ If the ABS hydraulic mechanism or main cable is cracked, bent or damaged, please replace it!

★ If the ABS hydraulic mechanism connector is blocked by mud or dust, blow it off with compressed air.

Speed sensor

Remove front wheel speed sensor

Notes
Wheel speed sensors are precisely machined, so care must be taken during operation. Never use a hammer to strike it or drop it on a hard surface and prevent it from touching or be stuck to the mud. **Do not disassemble or repair the wheel speed sensor!**

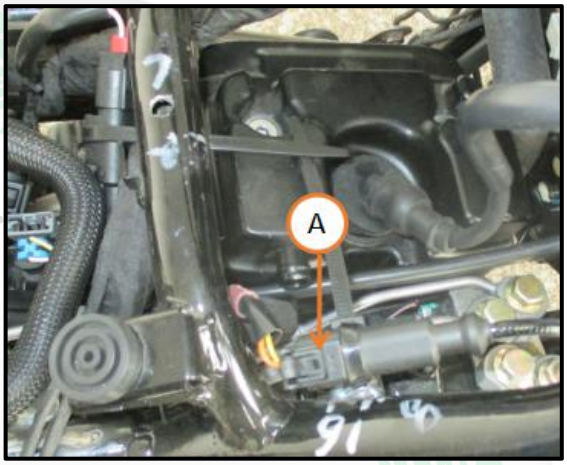
●Disassemble:

Seat cushion [see "Removing Seat Cushion" for details],

fuel tank [see "Removing Fuel Tank" for details],

Front wheel speed sensor connector [A]

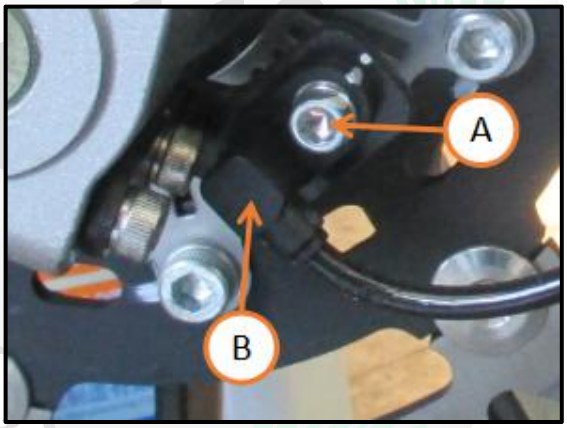
● Remove the connector.



●Disassemble:

Bolt [A]

Front wheel speed sensor [B]



Install front wheel speed sensor

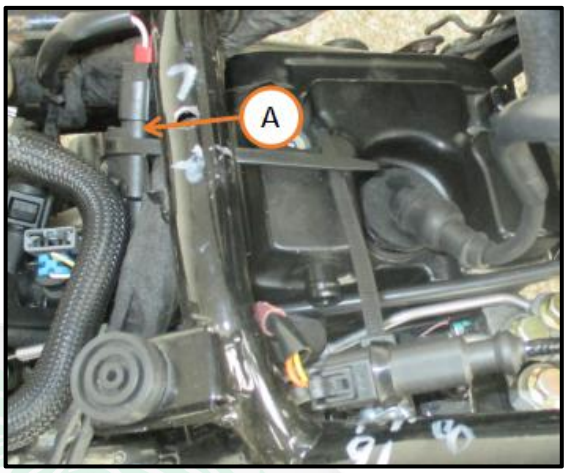
●Install it in the reverse order of disassembly.

● Properly arrange the wire (see "Appendix" - "Winding Method of Cables, Wires and Hoses" for details).

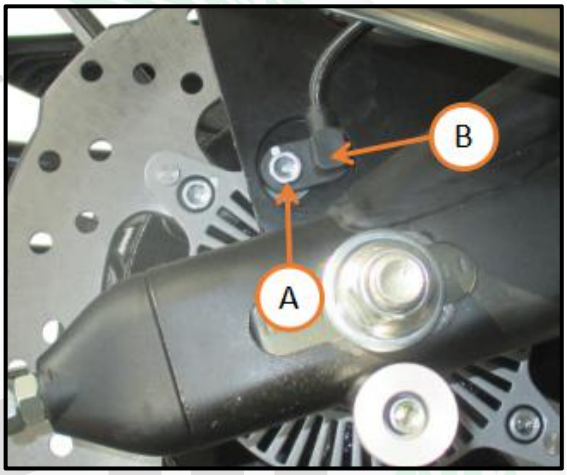
Remove rear wheel speed sensor

Notes
Wheel speed sensors are precisely machined, so care must be taken during operation. Never use a hammer to strike it or drop it on a hard surface and prevent it from touching or be stuck to the mud. **Do not disassemble or repair the wheel speed sensor!**

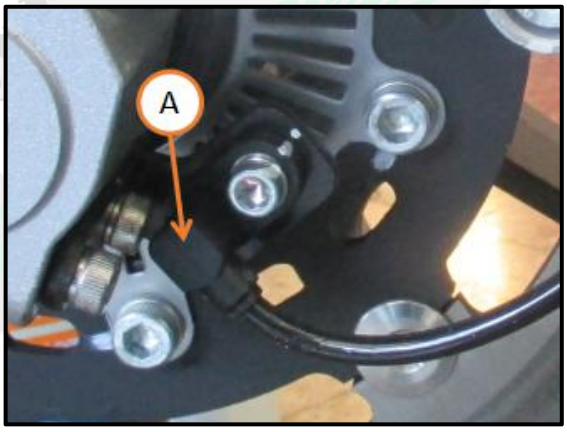
●Disassemble:
Seat cushion [see "Removing Seat Cushion" for details],
fuel tank [see "Removing Fuel Tank" for details],
Rear wheel speed sensor connector [A]
● Remove the connector.



●Disassemble:
Bolt [A],
Rear wheel speed sensor [B]



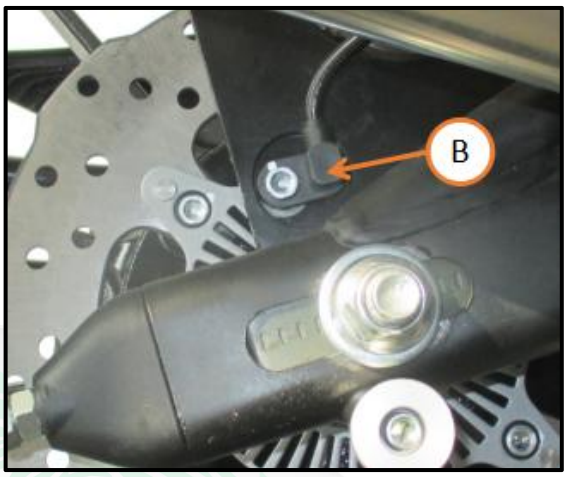
Install rear wheel speed sensor
●Install it in the reverse order of disassembly.
● Properly arrange the wire (see "Appendix" - "Winding Method of Cables, Wires and Hoses" for details).
Check front wheel speed sensor
●Remove the front wheel speed sensor [A] from the front fork.



●Remove the rear wheel speed sensor from the caliper bracket [B]

●Visually inspect wheel speed sensor.

★ If the wheel speed sensor is cracked, bent or damaged, please replace it!



Check the clearance of wheel speed sensor

★ Lift the front / rear wheel from the ground with a jack (see "Wheels/Tires" - "Removing Front / Rear Wheel").

●Slowly rotate the wheel and measure the clearance at several different points between the sensor and the sensor gear ring.

Feeler gauge [A]

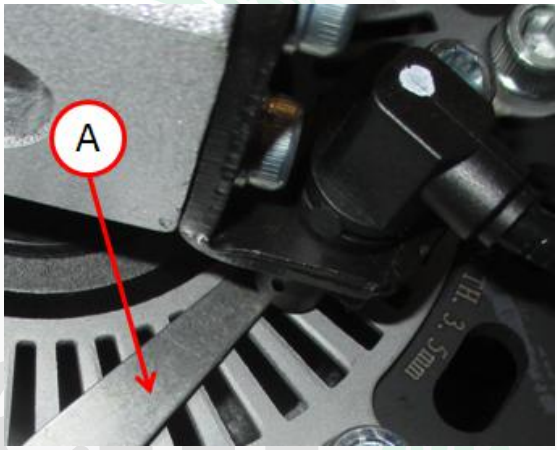
Feeler gauge [B]

Clearance

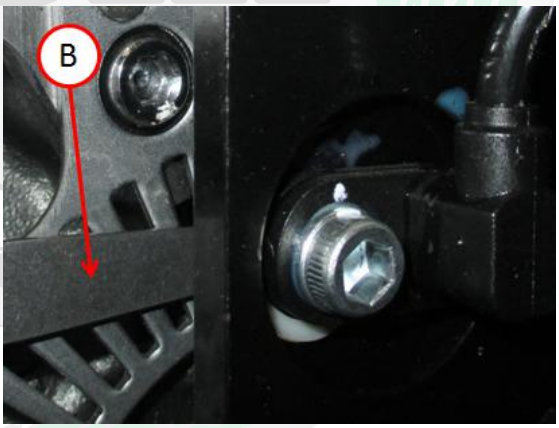
Standard:

Front wheel: 0.5-1.2mm

Rear wheel: 0.5-1.2mm



Remarks
○ Sensor clearance cannot be adjusted.



★ If the clearance is not within the specified range, check the hub bearing (see "Wheel/Tire" – "Checking Hub Bearing"), the installation and function of sensor (see "Checking Wheel Rotation Sensor" for details).

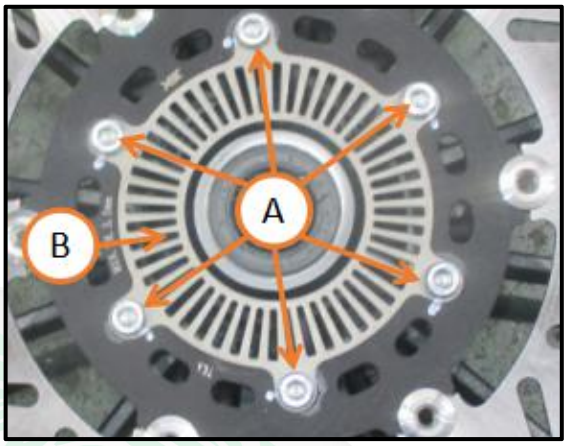
Check the gear ring of wheel speed sensor

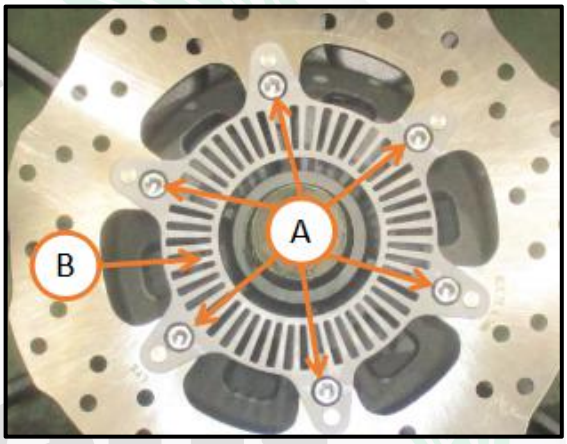
●Disassemble:

Wheel (see “Wheel/Tire” – “Removing Front / Rear Wheel”)

Brake plate mounting bolt [A],

Sensor gear ring [B]

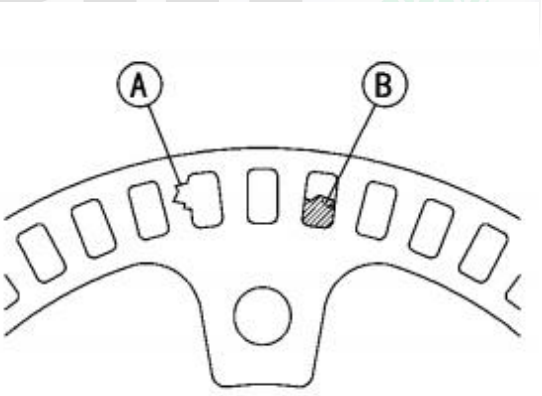


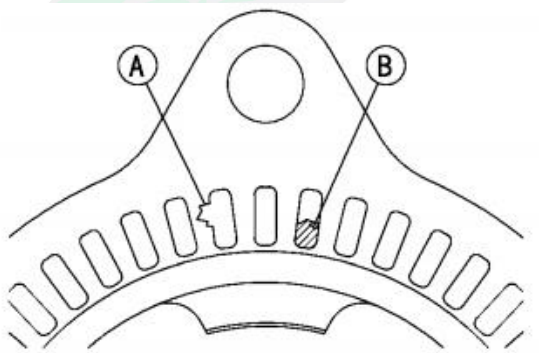


● Visually inspect the gear ring of wheel speed sensor.

★ If the rotor is deformed or damaged (there is a notch [A] on the rotating tooth), please replace it with a new one!

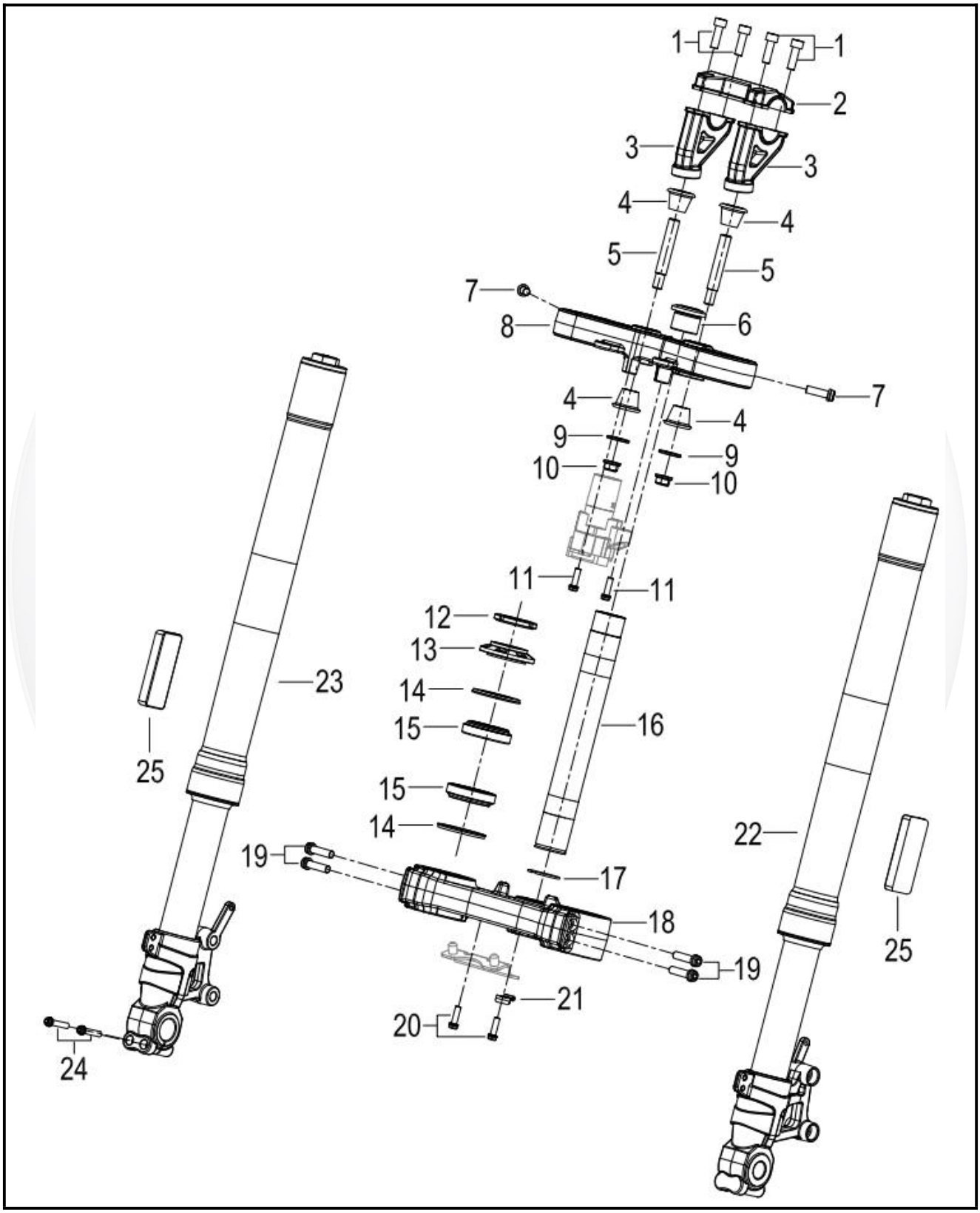
★ If there are iron filings or other magnetic deposits on the rotor [B], please clean!





Suspension system

Exploded view of front suspension system



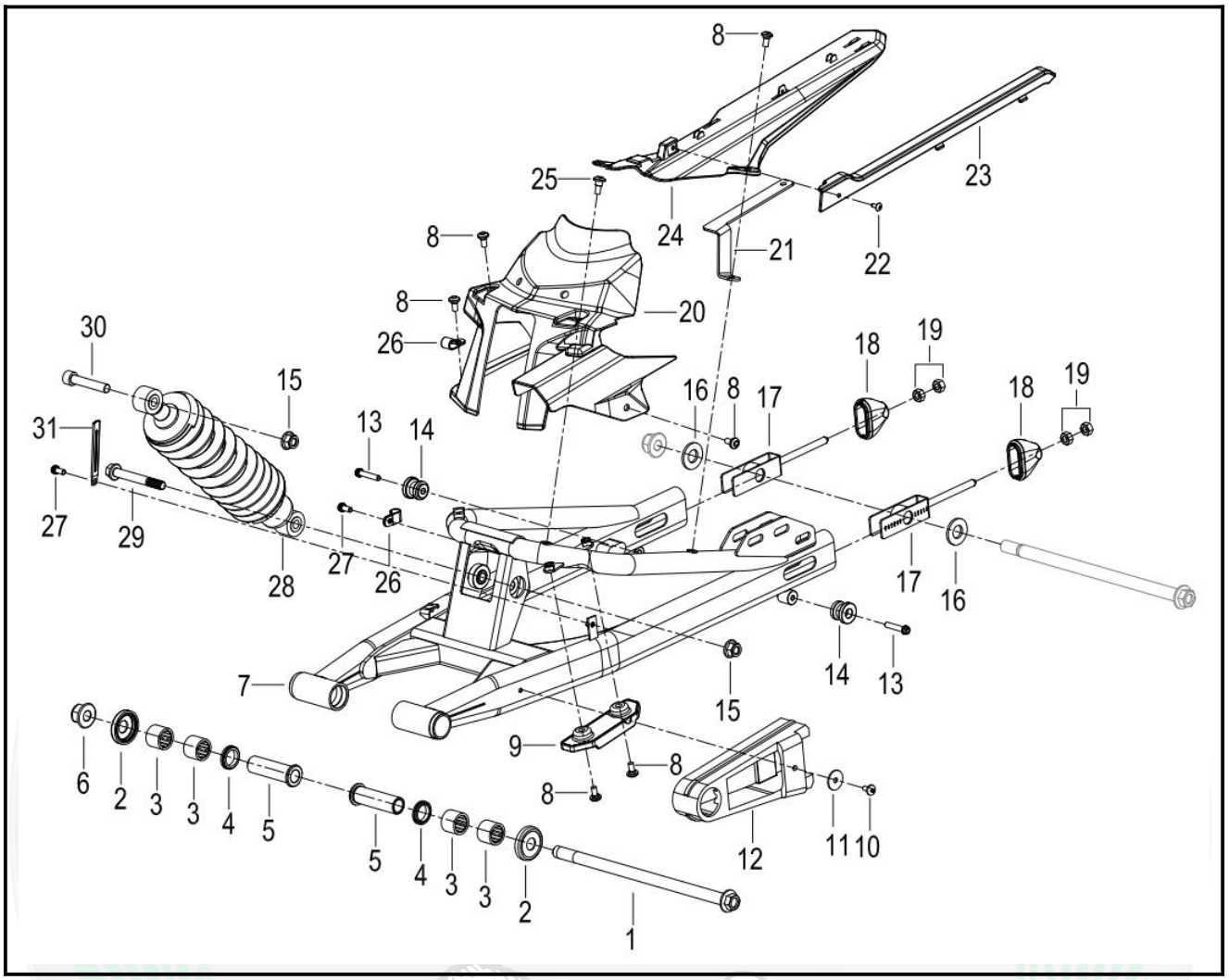
No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Hexagon socket cap screw M8×25	4	22	2.2	
2	Upper holder	2	—	—	
3	Lower handlebar holder	2			
4	Damper	4	—	—	
5	Handlebar positioning double-end stud	2	45	4.5	L
6	Clamp screw of upper bracket	1	78	7.8	
7	Bolt M8×25	2	22	2.2	
8	Upper bracket	1			
9	Handlebar positioning washer	2	—	—	
10	Self-locking nut M10×1.25	2	45	4.5	
11	Hexalobular socket pan head screw M6×20	2	22	2.2	
12	Clamp nut of upper bracket	1	23	2.3	
13	Clamp nut	1	2.5	0.25	
14	**Dust ring**	2	—	—	R
15	Steering bearing	2	—	—	R、G
16	Column	1	—	—	
17	Locking ring	1	—	—	R
18	Lower bracket	1	—	—	
19	Bolt M8×1.25×30	4	22	2.2	
20	Bolt M6×1×20	2	—	—	
21	ABS adapting limiting board	1	10	1.0	
22	Front left shock absorber assembly	1	—	—	
23	Front right shock absorber assembly	1	—	—	
24	Bolt M6×30	2	10	1.0	
25	Front reflector	2	—	—	

G: Apply grease.

L: Apply locking agent.

R: Replace the part

Exploded view of rear suspension system



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Rear rocker arm mounting shaft	1	108	10.8	G
2	Dust seal assembly	2	—	—	G、R
3	Needle bearing HK2020	4	—	—	G
4	Bearing oil seal	2	—	—	G、R
5	Rear swing arm collar	2	—	—	
6	Self-locking nut M14×1.5	1	108	10.8	
7	Rear rocker arm welding assembly	1	—	—	
8	Inner hexagon screw	6	10	1.0	
9	Upper stop block of chain	1	—	—	R
10	Stainless steel bolt M5×16	1	6	0.6	
11	Fuel tank mounting washer	1	—	—	
12	Chain protective block	1	—	—	R
13	Bolt M6×30	2	10	1.0	
14	Support sleeve	2	—	—	
15	Self-locking nut M10×1.25	2	45	4.5	
16	Washer	2	—	—	
17	Chain adjuster assembly	2	—	—	
18	Chain adjuster retainer	2	—	—	
19	Hexagon nut M8	4	22	2.2	
20	Rear lower fender	1	—	—	
21	Chain guard mounting bracket	1	—	—	
22	Self-tapping screw ST4.2×13	1	—	—	
23	Drive chain cover	1	—	—	
24	Drive chain cover	1	—	—	
25	Pedal rubber mounting bolt	1	10	1.0	
26	Clutch clamp assembly	2	—	—	
27	Screw M6×12-8.8-ZG	2	10	1.0	
28	Rear shock absorber assembly	1	—	—	
29	Lower mounting bolt of rear shock absorber	1	45	4.5	
30	Bolt M10×1.25×55	1	45	4.5	
31	Clamp assembly	1	—	—	

G: Apply grease.

L: Apply locking agent.

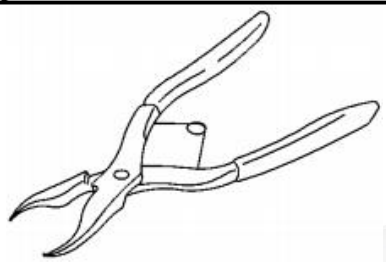
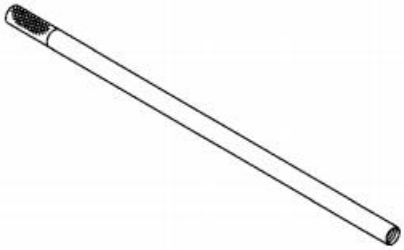
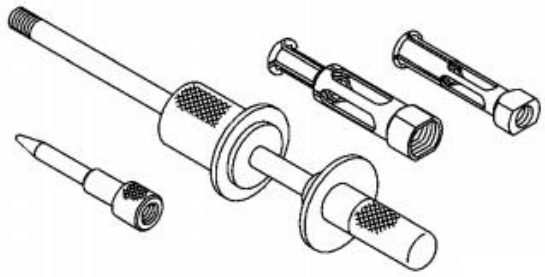
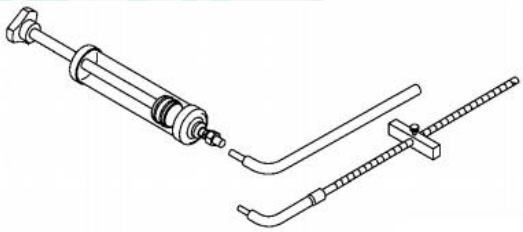
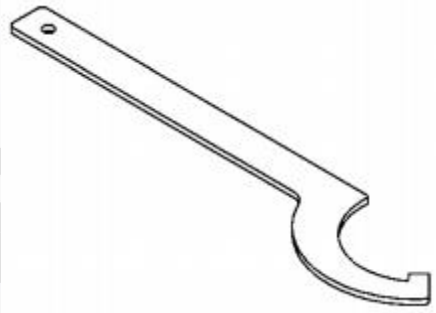
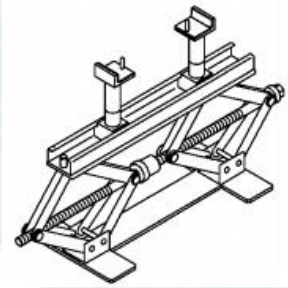
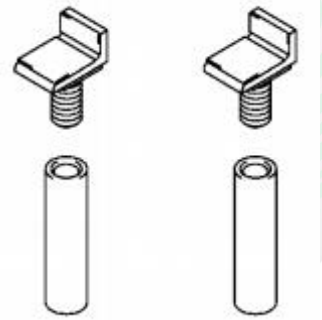
R: Replace the part

Technical parameters

Item	Normal
Front shock absorber (each)	
Diameter of inner tube of front shock absorber	φ41 mm
Air pressure	Atmospheric pressure (not adjustable)
Front shock absorber:	32# shock absorber oil
Viscosity	28.8~35.2
Oil quantity	390 ±5 ml (after disassembling and completely emptying)
Liquid of front shock absorber fluid:	80 ± 2 mm (fully compressed, without front shock absorber spring; top of inner tube)
Free length of front shock absorber spring	345±2 mm (lower operating limit: 343mm)
Rear shock absorber	
Spring preload setting:	Double nut adjustment
Normal	Spring length: 217.5 mm
Scope	Spring length: 225.5-217.5mm (from weak to strong)

Benelli

Special tools

Inner caliper:	Front shock absorber piston rod puller
	
Oil seal and bearing puller:	Front shock absorber level gauge:
	
Bearing driver set:	Hook wrench T=3.2 :
	
Jack:	**Accessories of jack:**
	

Front Shock Absorber

Disassembly of Front Shock Absorber

●Disassemble:

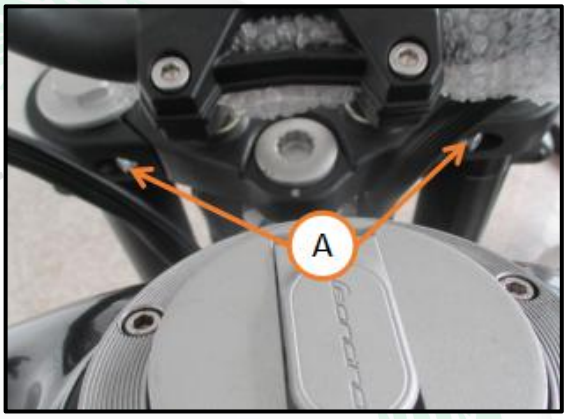
Front wheel (see “Wheel/Tire” – “Removing the Front Wheel”)

Front fender (see "Frame" - "Removing the Front Fender")

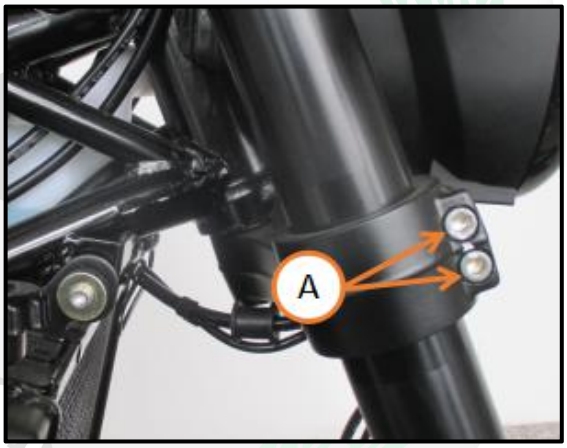
Front caliper (see “Brakes” - “Removing the Front Caliper”),

★ Before removing the front shock absorber mounting base, remove the front fork clamp bolt at the top [A]

Remarks
○ Remove the front fork clamp bolt and remove the top cover.



● Remove the front shock absorber clamp bolt [A] on the lower side.



●Rotate the front shock absorber mounting seat and remove it.

Installation of Front Shock Absorber

●When the front shock absorber is installed, the direction and position of the top [A] of the outer tube are as shown on the right.

1 mm [B]

● Locking torque

Front shock absorber clamp bolt (lower side): 22 N·m

Top cover of front shock absorber: 15-20 N·m

Front shock absorber clamp bolt (upper side): 22 N·m

Remarks
Lock the top cover before locking the front shock absorber clamp bolt on the upper side. ○ Alternatively tighten the two clamp screws twice to ensure a uniform locking torque.

●Install the parts disassembled previously (see the

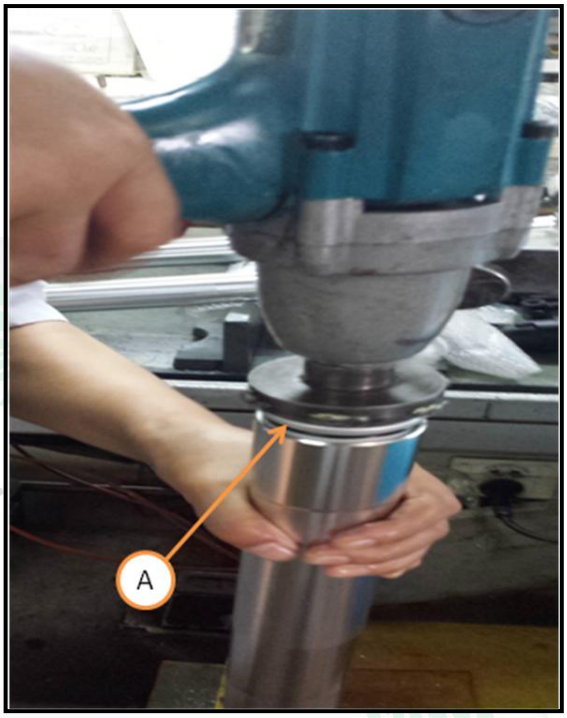
corresponding chapters).

Replacement of Front Shock Absorber Fluid

Remove the front shock absorber (see “Disassembly of Front Shock Absorber”).

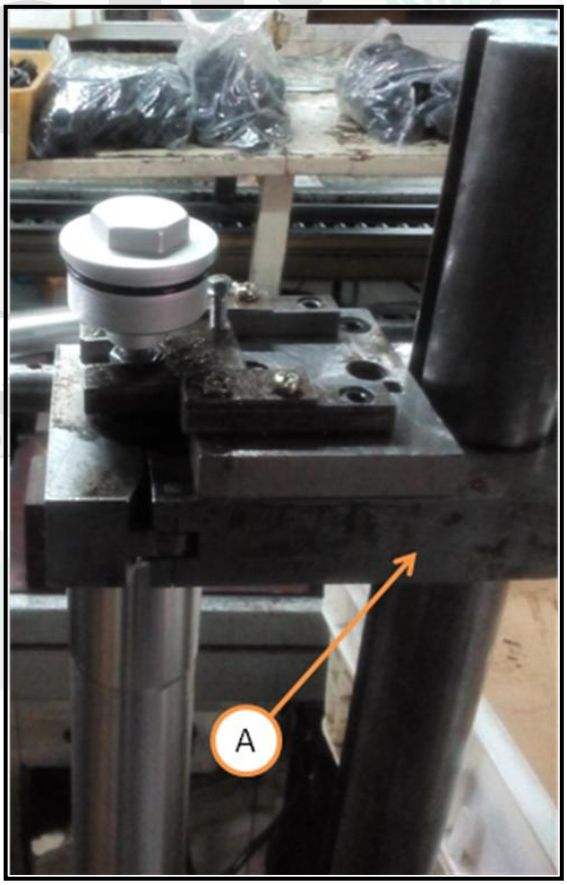
Clamp the lower end of inner tube with a vise.

Remove the head cover [A] from the outer tube.



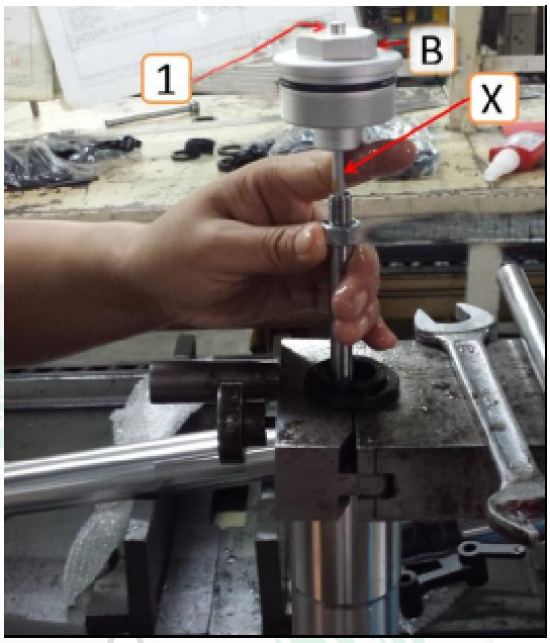
Install the fixing tool [A], as shown in the figure

Remarks
○The upper part protecting device shall not touch the inner tube when installing the fixing tool; pull up the outer tube, clamp the outer tube with the tool, and then lock the two bolts. *The outer tube plays a guiding role.*

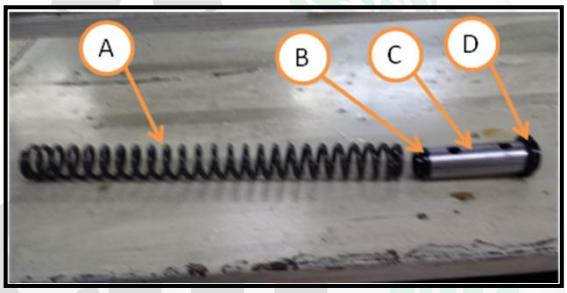


●After the spring is pressed with the special tool, disassemble the front shock absorber bolt [1] and nut [B] with a wrench

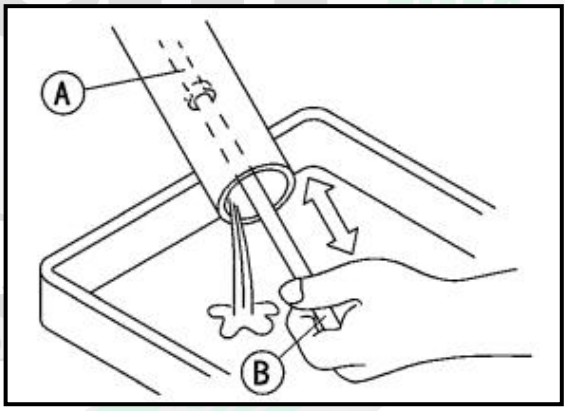
Remarks
○This is the right shock absorber. The left shock absorber bolt is not equipped with an adjustment lever (X). The removal method is the same.



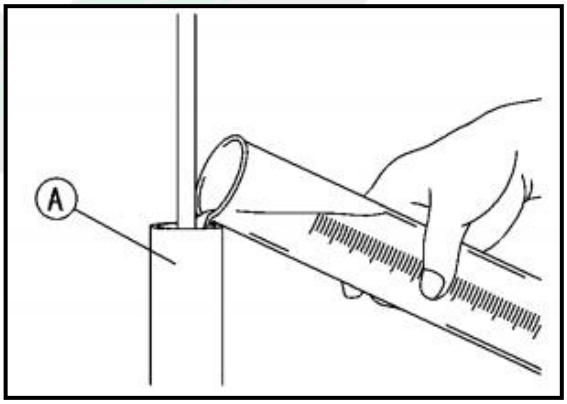
●Disassemble:
Shock absorber spring [A]
Spring seat [B]
Adjusting sleeve[C]
Damper and adjusting sleeve [D]



●Pour the shock absorber oil into a suitable container.
○Pull the piston rod up and down for at least ten times and pour out the shock absorber oil in the front shock absorber.
Special Tool—Shock Absorber Piston Rod Puller [B]:



●Hold the outer tube vertically and press the inner tube [A] and piston rod to the bottom.
●Pour the shock absorber oil of the specified model and specified quantity.
32# shock absorber fluid
Viscosity: 28.8-35.2 40℃
Oil quantity (each shock absorber): 390L
When the shock absorber oil is replaced: ≈300 mL
Oil quantity after it is disassembled and dried completely: 390 ±5 mL

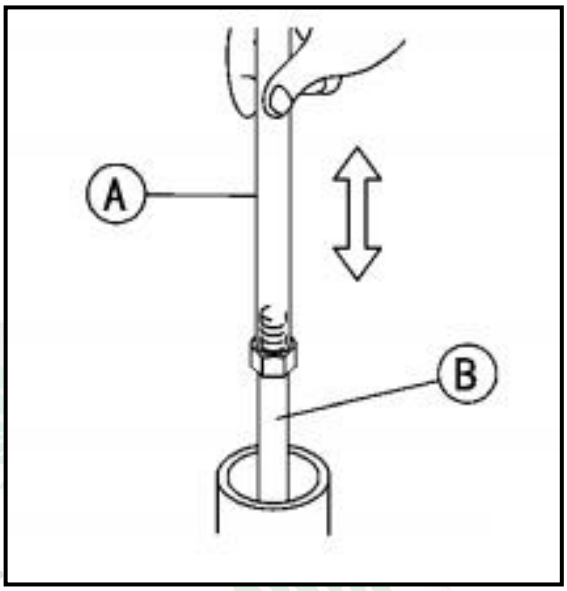


★If necessary, measure the oil level of shock absorber oil according to the following methods.

○It is best to use a three-jaw chuck oiling paper to wrap the inner tube and fix it vertically.

○Pull the piston rod [B] up and down for more than ten times by using the piston rod puller [A] to drain the air in the shock absorber oil thoroughly.

Special Tool—Shock Absorber Piston Rod Puller



○ Remove the piston rod puller.

○Wait for the fluid level to stabilize.

○When the shock absorber is compressed to the end and the piston rod is pushed to the bottom, insert the tape or ruler into the inner tube and measure the distance between the top of inner tube and the shock absorber fluid surface.

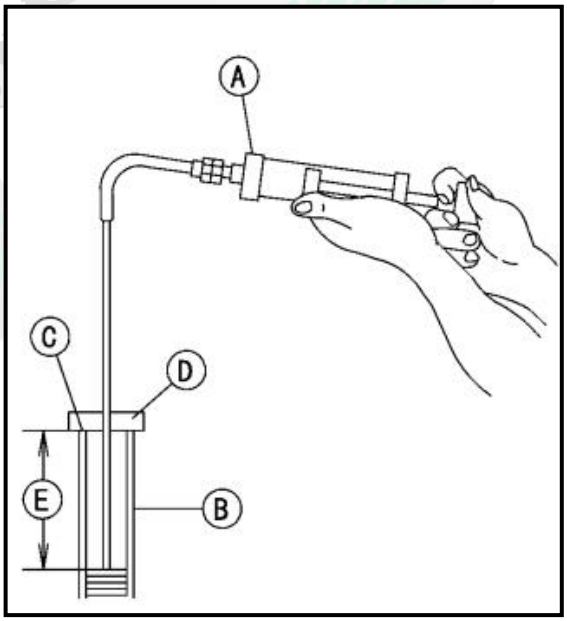
Fluid level (when the shock absorber is compressed to the end and shock absorber spring is taken out)

Standard: 80±2mm

(from the top of the inner tube)

Remarks
○ The level of shock absorber fluid can also be measured with the shock absorber fluid level gauge.

Special Tool—Shock Absorber Fluid Level Gauge [A]:



○When the shock absorber is compressed to the end and shock absorber spring is taken out, insert the pipette of shock absorber fluid level pipe into the inner pipe [B], and then place the limiting stopper on the top of the inner pipe [C].

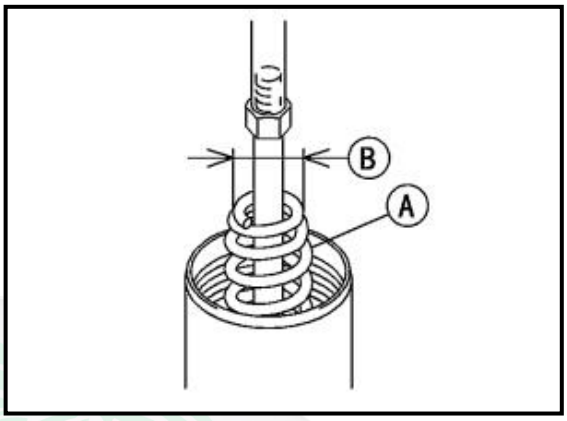
○ Make the scale of fuel level gauge limiting block [D] display the standard fluid level distance [E].

○ Pull the handle slowly and pump out the excess shock absorber fluid until the shock absorber fluid is no longer leaking.

★ If the shock absorber fluid is not pumped out, the shock absorber fluid inside the inner tube is insufficient. Pour enough shock absorber fluid and then pump excess shock absorber fluid as described above.

●Rotate the shock absorber piston rod puller to the end of piston rod.

Special Tool—Shock Absorber Piston Rod Puller:



●Pull the puller above the top of outer tube.

●Install the front shock absorber spring [A], and make the smaller end [B] face down.

●Install:

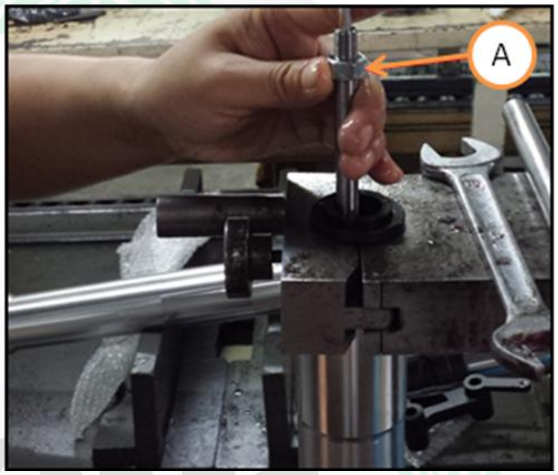
Adjusting sleeve,

Damper and other parts

Please replace with new parts!

●Fix the bolt at the top with a wrench and lock the piston rod nut [A].

Locking torque of piston rod nut: 18-20 N·m

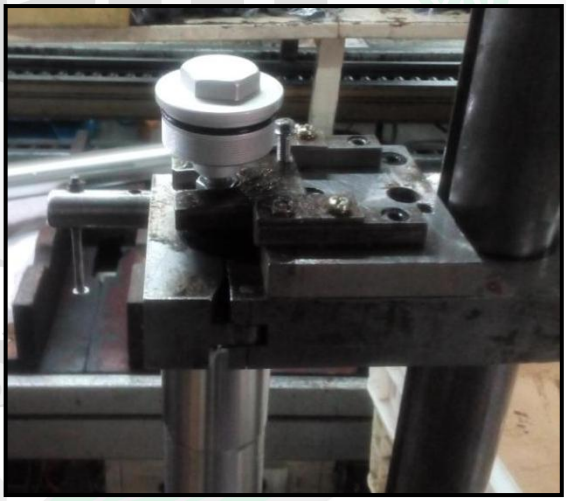


●Clamp the washer by using the holder and loosen the front shock absorber spring compressor nut.

●Remove the front shock absorber spring compressor.

●Pull up the outer tube and cover the outer tube with the bolt at the top.

●Install the front shock absorber (see “Installation of Front Shock Absorber”).

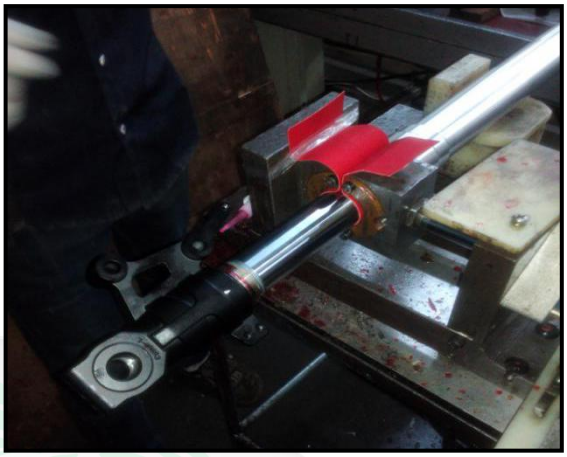


Disassembly of Front Shock Absorber

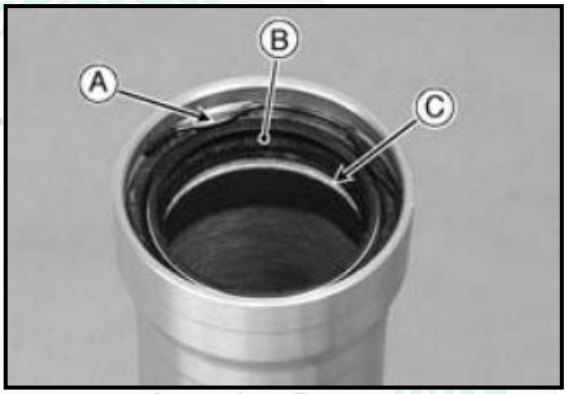
Remove the front shock absorber (see “Disassembly of Front Shock Absorber”).

●Discharge the shock absorber oil (see “Replacement of Shock Absorber Oil”).

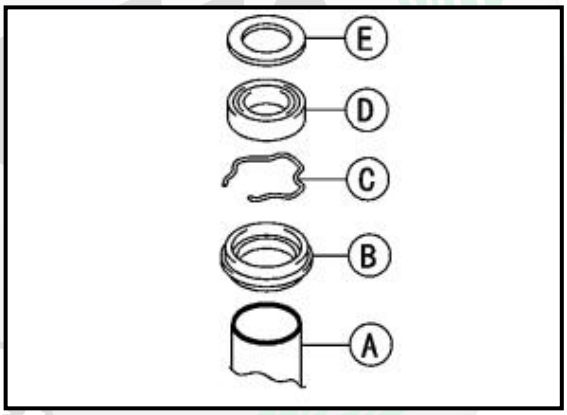
●Clamp the inner tube of shock absorber with the tool.
●Remove the mounting seat of shock absorber.



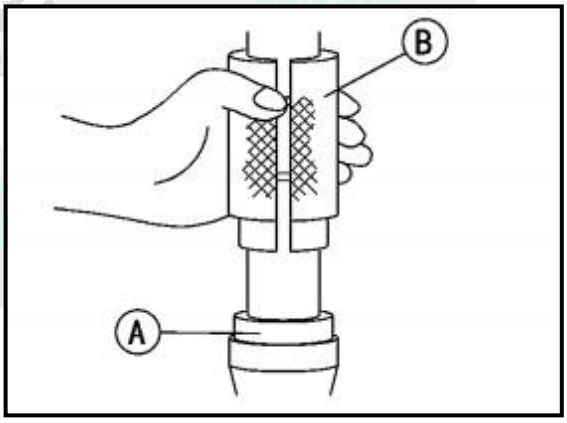
●Separate the outer tube and inner tube.
●Pull out the dust ring.
●Remove the retainer ring of outer tube [A].
●Remove oil seal [B] and washer [C].
●Replace the following parts with new ones:
Oil seal
Lock torque of hexagon bolt at the bottom of front shock absorber: 8-23 N•m



●Install the following parts on the inner tube [A].
Dust seal [B],
Retainer ring [C],
Oil seal [D],
Washer [E]



●Insert the inner tube into the outer tube.
●After the gasket is installed, install the oil seal [A] with the shock absorber oil seal installer [B].
Special Tool—Shock Absorber Fuel Seal Installer:
●Install the retainer ring and dust seal in the outer tube.
●Pour the shock absorber oil of the specified type (see "Replacement of Shock Absorber Oil").
●Install the disassembled damper component on the assembled inner and outer tubes.

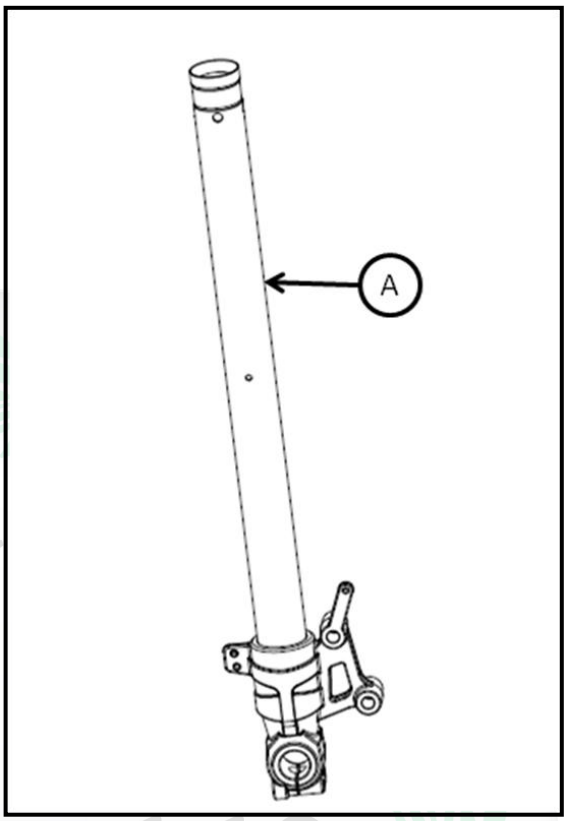


Inspection of inner tube and outer tube

●Visually check the inner tube [A] and replace it if there is any damage.

●If there are cracks or rust on the inner tube, the sharp edge and tilted part can be worn with a millstone. The sharp edges or raised parts will damage the oil seal.

★If the inner tube cannot be maintained, please replace it with a new one! The oil seal will be damaged after the inner tube is damaged, so the oil seal must be replaced when maintaining or replacing the inner tube.



Notes
If the inner tube is severely bent or wrinkled, please replace it! The strength of inner tube will be reduced when correcting the inner tube after excessive bending.

●Assemble the inner and outer tubes and pull the inner and outer tubes back and forth with hands to see whether the inner tube and outer tube can operate smoothly.

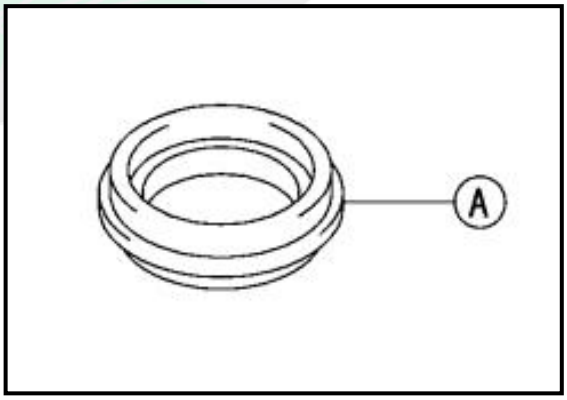
●If clamp stagnation is felt, the inner and outer tubes must be replaced.

⚠Warning
The straightened front shock absorber inner or outer tube will break down in the using process, which will cause accidents. Therefore, the seriously bent or damaged inner or outer tube must be replaced and the other pipe shall be checked carefully before use.

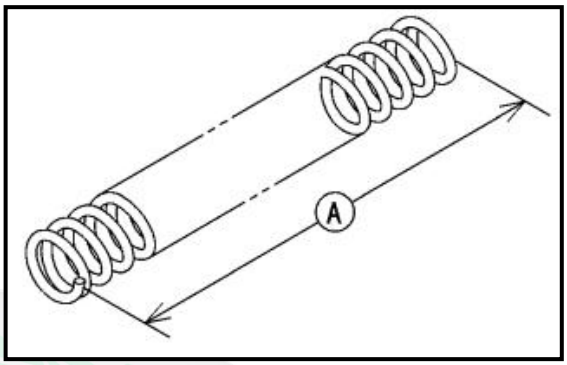
Inspection of Dust Seal

●Check whether the dust seal [A] is corroded or broken.

★If necessary, please replace the dust seal!



Inspection of Spring Tension



●The length of spring will be reduced after it is weakened, so the state of spring can be checked by checking its free length [A].

★If any shock absorber spring is shorter than the use limit, it must be replaced! If the length of new spring and the other shock absorber spring differs considerably, the other spring must be replaced at the same time so as to keep the balance of left and right shock absorbers to ensure the stability of motorcycle.

Free length of spring

Standard: 345mm

Operating limit: 343 mm

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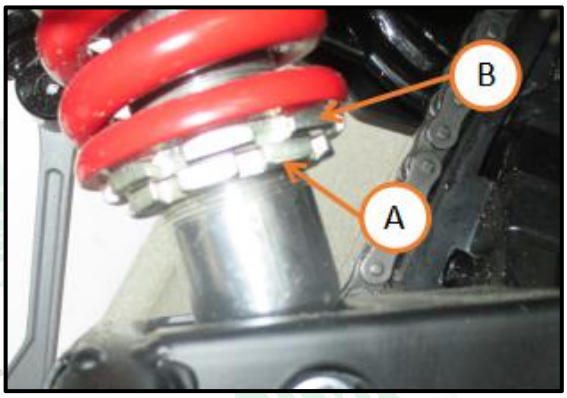
Rear shock absorber

Adjustment of pretightening force of spring

Remove the rear shock absorber from the frame (see "Removing the Rear Shock Absorber" for details).

● Loosen the locknut [A], rotate the adjusting nut [B] and then release the spring.

Special tool - hook wrench:



● Adjust the spring pretightening force, rotate the adjusting nut [B] to the proper position, and then tighten the locknut [A].

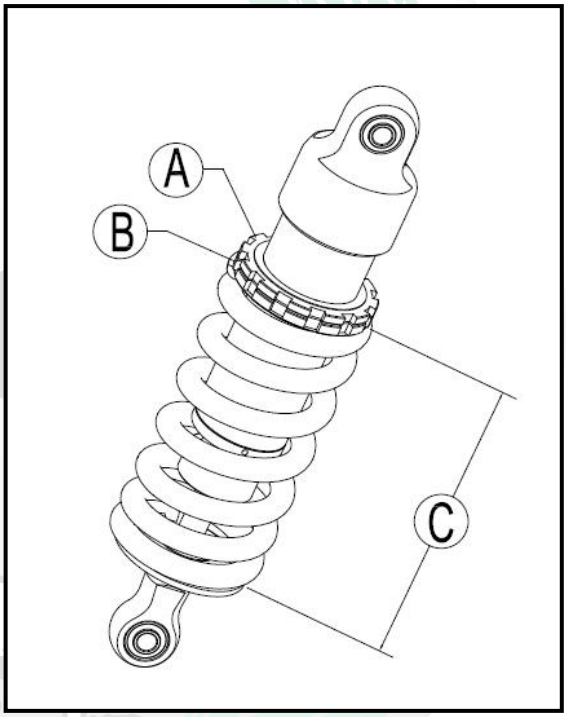
Spring length [C]

Setting of pretightening force of spring

Standard: spring length: 230 mm

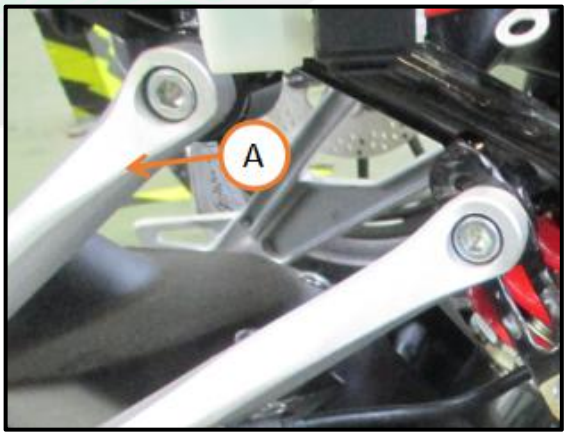
Applicable scope: spring length: 216.5-203.5 mm

○ Standard adjustment nut setting for the rider (without passengers or accessories) of ordinary body [weight of 68 kg (150 lb)]: the spring length is equal to 207.5-212.5mm.

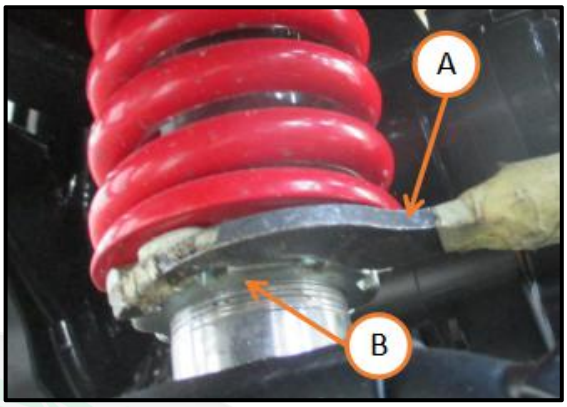


●Adjust the pretightening force of spring on the frame using rear shock absorber

● Remove the footpeg bracket [A] to easily rotate the hook wrench.



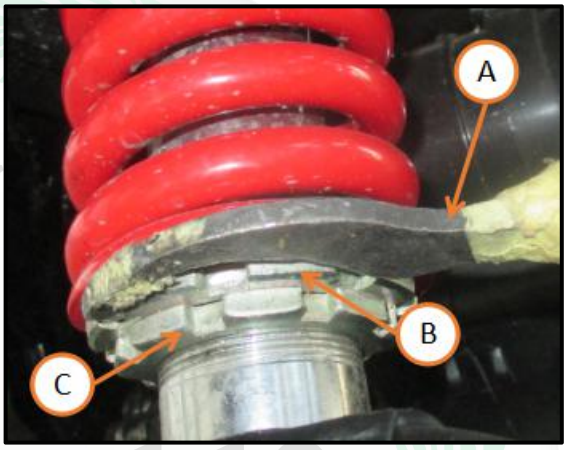
● To adjust the spring pretightening force, loosen the locknut [B] with a hook wrench [A] and rotate it into the proper position.



● Use the hook wrench [A] to rotate the adjusting nut [B] to the proper position, and then tighten the locknut [C] with the hook wrench [A] (the rear shock absorber is fixed on the frame).

Special tool - hook wrench

★ If you feel the spring is too soft or too hard, please adjust!



Adjustment of spring

Spring length	Damping force	insulated flange	Load	Road conditions	Speed
196mm ↑ ↓ 184mm	Weak ↑ ↓ Strong	Soft ↑ ↓ Hard	Soft ↑ ↓ Heavy	Good ↑ ↓ Bad	Low ↑ ↓ High

Disassembly of Rear Shock Absorber

●Disassemble:

Right cover (see “Frame” – “Removing Right Cover” for details).

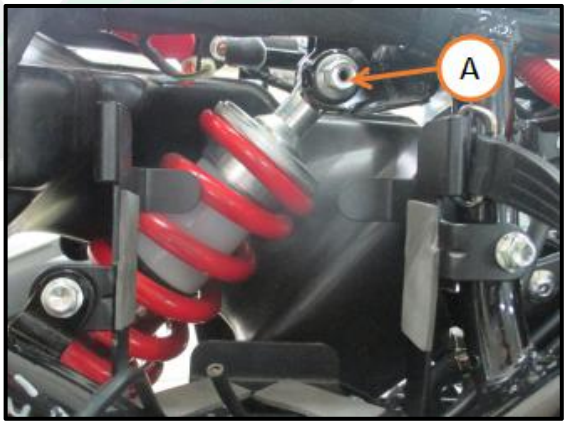
Rear lower fender (see “Rear Swing Arm” – “Removing the Rear Lower Fender”)

● Lift the rear wheel from the ground with a jack.

Special tool—jack:

Accessories of jack:

●Remove the rear shock absorber clamp bolt on the upper side [A]



●Remove the rear shock absorber clamp bolt on the lower side [A]

●Remove the shock absorber

Assembly of Rear Shock Absorber

●Install it in the reverse order of disassembly.

● Locking torque

Upper clamp bolt of rear shock absorber: 45 N·m

Lower clamp bolt of rear shock absorber: 45 N·m

Inspection of Rear Shock Absorber

●Remove the rear shock absorber (see "Removing the Rear Shock Absorber" for details).

● Visually check:

Whether the stroke is smooth;

Whether there is oil leakage;

Whether there is crack or dent

★ If the rear shock absorber is damaged, please replace it!

● Visually check rubber collar.

★ If the rubber collar is damaged, please replace it!

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Rear rocker arm

Disassembly of Swing Arm

● Lift the rear wheel from the ground with a jack.

Special tool—jack:

Accessories of jack:

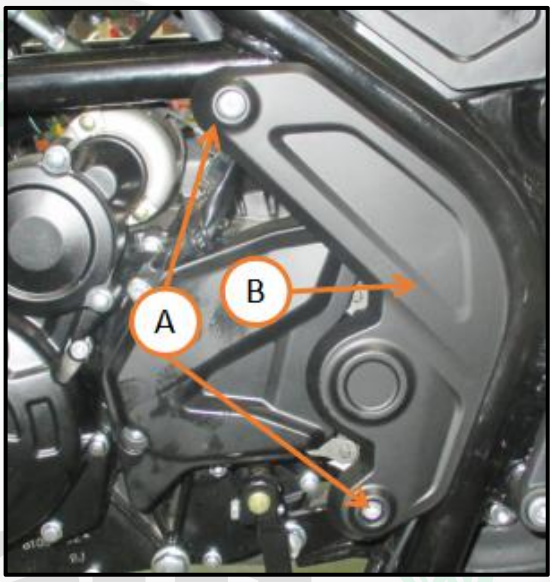
●Disassemble:

Rear wheel (see “Wheel/Tire” – “Removing the Rear Wheel”)

●Disassemble:

Bolt [A]

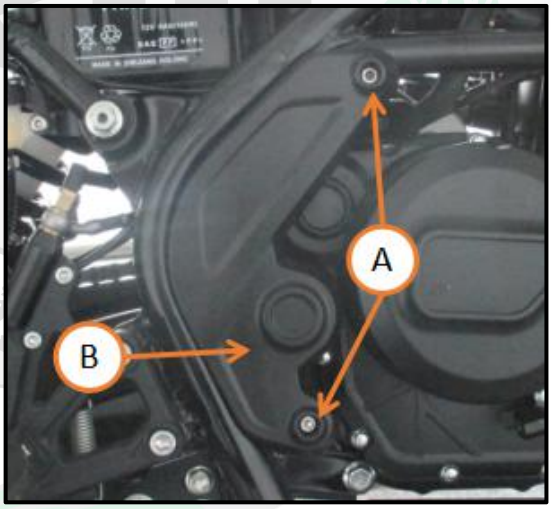
Left cover [B]



●Disassemble:

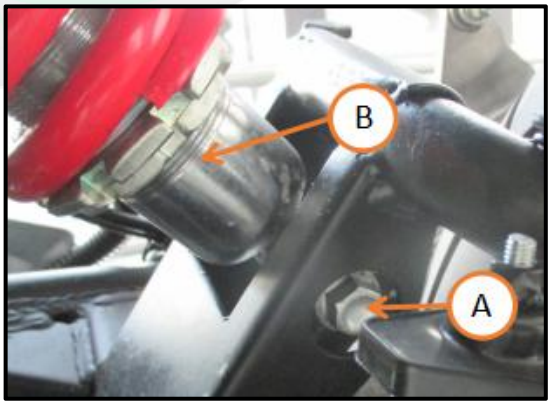
Bolt [A]

Right cover [B]

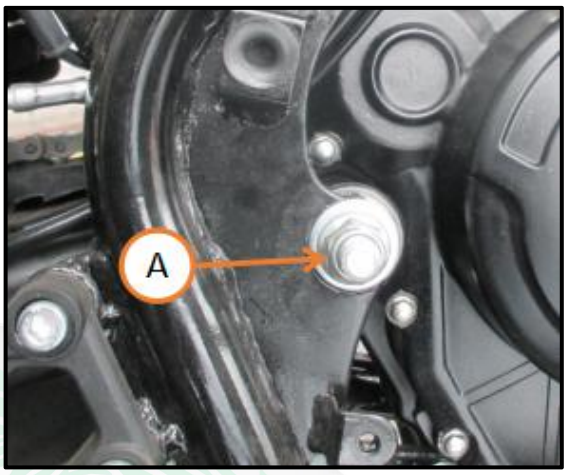


●Disassemble:

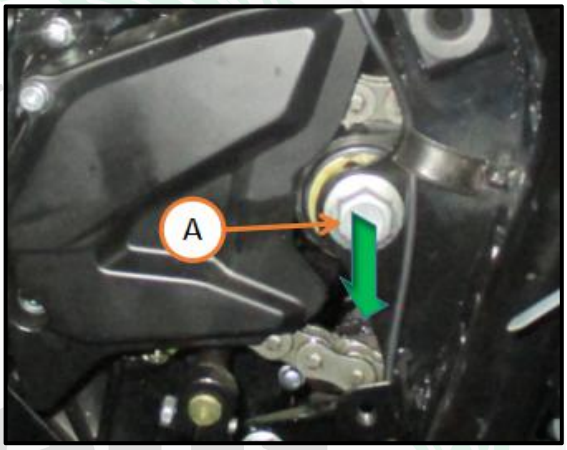
Clamp bolt [A] on the lower side of rear shock absorber [B] (see "Removing the Rear Shock Absorber" for details)



● Remove the lower swing arm mounting shaft nut [A].



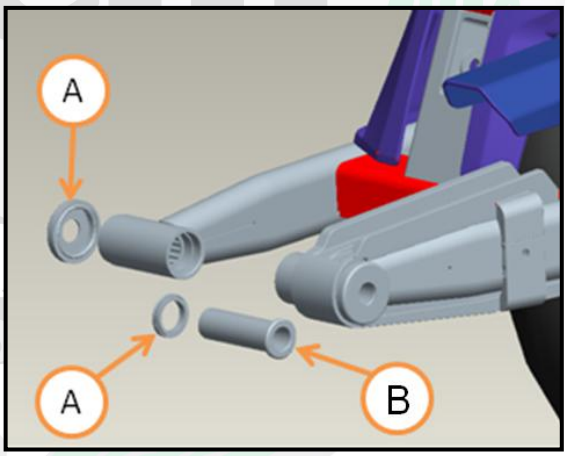
●Pull out the mounting shaft [A] from the right side of the motorcycle to the left side and remove the swing arm.



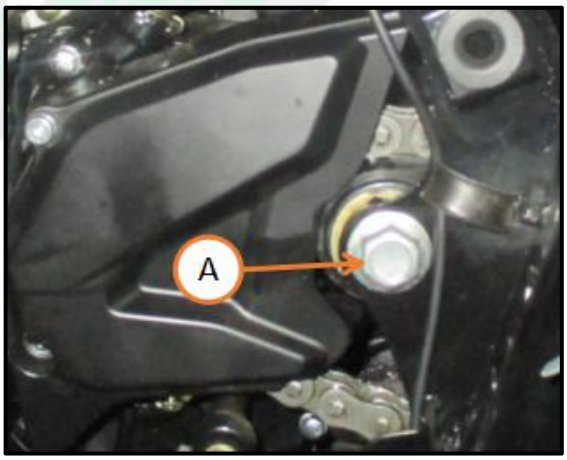
Installation of Swing Arm

● Apply a proper amount of grease to the edge of the oil seal [A].

●Install collar [B].



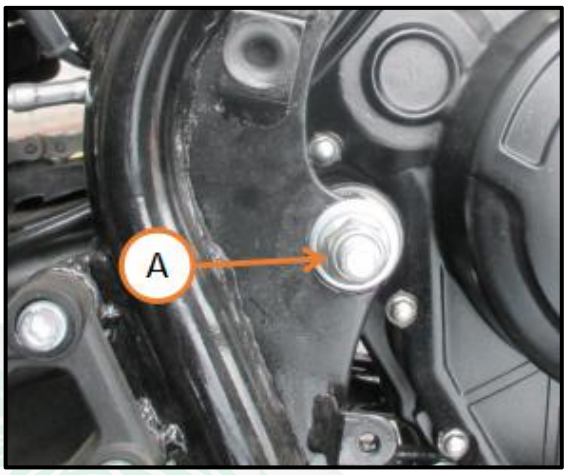
● Install the mounting shaft [A] into the frame from the left side.



●Lock the swing arm mounting shaft nut [A].

Locking torque of swing arm mounting shaft nut: 108 N·m

●Install the parts disassembled previously (see the corresponding chapters).



Disassembly of Swing Arm Bearing

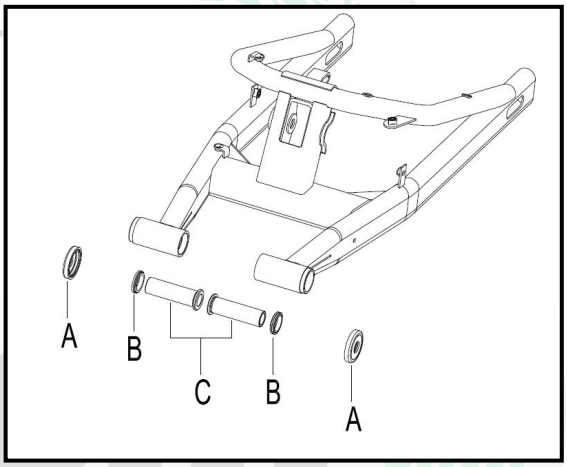
●Disassemble:

● Rear swing arm (see “Removing Rear Swing Arm”).

Dust seal [A],

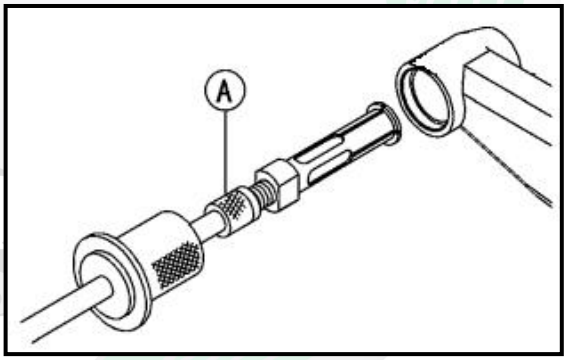
Oil seal [B],

Sleeve [C],



● Remove the needle bearing.

Special tool - oil seal and bearing puller [A]:



Installation of Swing Arm Bearing

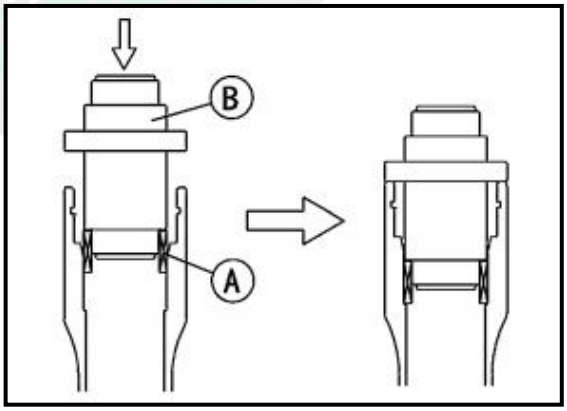
● Replace the needle bearing [A] with a new one.

● When installing the needle bearing, the manufacturer's mark should face outward.

Special tools- a full set of tools for bearing:

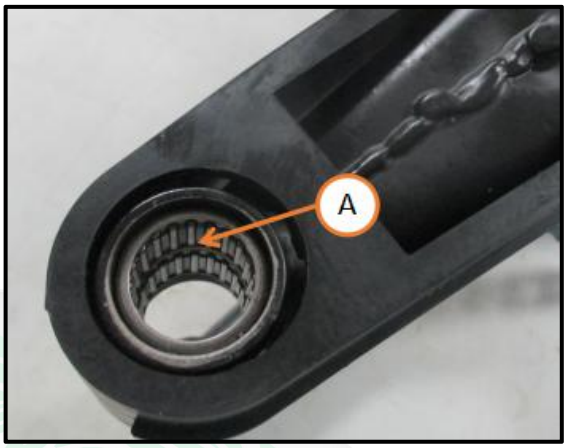
Needle roller bearing mounting tool [B]:

Gasket:



Check swing arm bearing

Notes
Do not remove the bearing for inspection, otherwise, the bearing may be damaged.



●Check the needle bearing [A] installed inside the swing arm.

○The wear of the roller inside the bearing is generally small, so it is difficult to measure the wearing capacity. Therefore, only the bearings can be visually inspected for wear, discoloration or other damage.

★ If there is any abnormal wear, discoloration or damage in the needle bearing, please replace it as a whole!

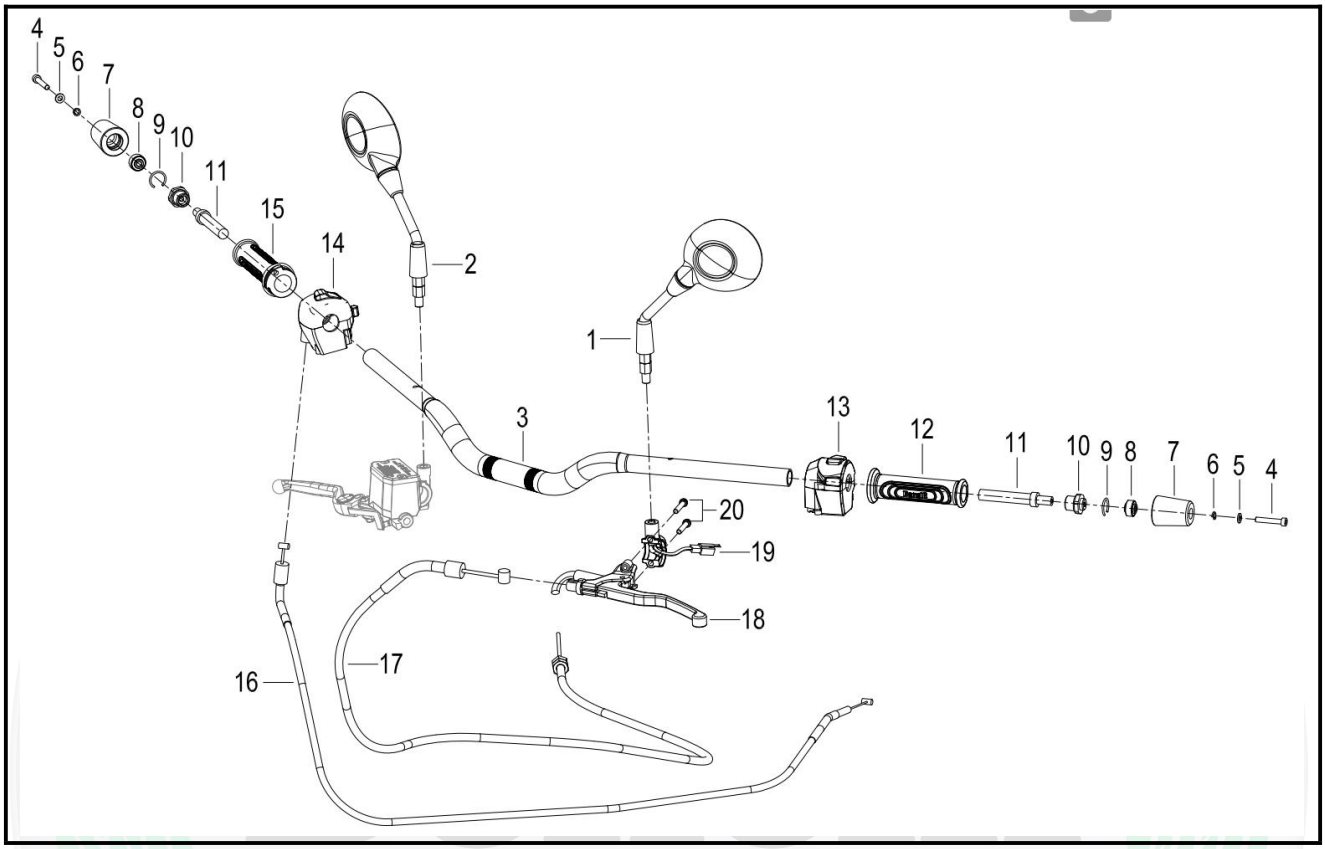
Check the chain guide

● See “Periodic Maintenance” – "Inspection of Wear of Chain Guide" for details.

Benelli

Control System

Exploded View of Control System



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Left rear view mirror assembly	1	—	—	
2	Right rear view mirror assembly	1	—	—	
3	Handlebar	1	—	—	
4	Screw M6×35	2	10	1.0	
5	Washer Φ6	2	—	—	
6	Spring washer 6	2	—	—	
7	Grip end	2	—	—	
8	Buffer collar	2			
9	Elastic collar for hole 20	2	—	—	
10	Grip end mounting base	2	—	—	
11	Grip end	2	—	—	
12	Left handlebar jacket	1	—	—	
13	Left combination switch	1	—	—	
14	Right combination switch	1	—	—	
15	Right grip assembly	1	—	—	
16	Throttle cable assembly	1	—	—	
17	Clutch cable assembly	1	—	—	
18	Left lever assembly	1	—	—	
19	ABS switch assembly (left)	1	—	—	
20	Bolt M6×30	2	10	1.0	

AD: Apply adhesive.

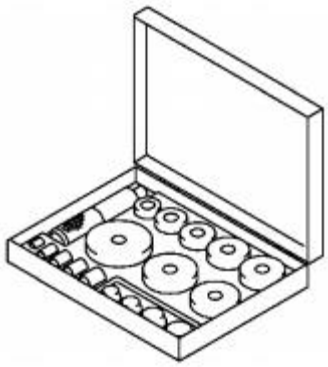
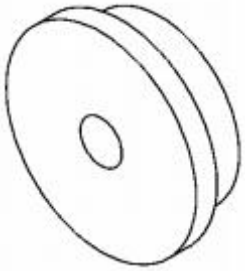
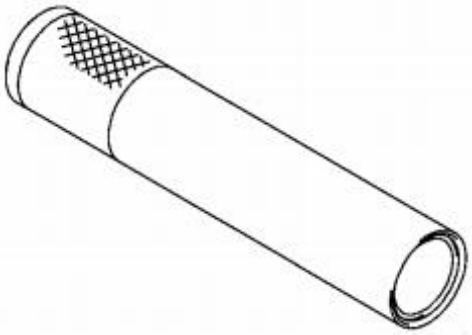
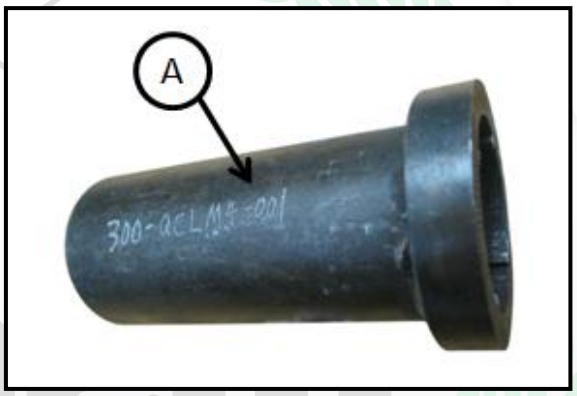
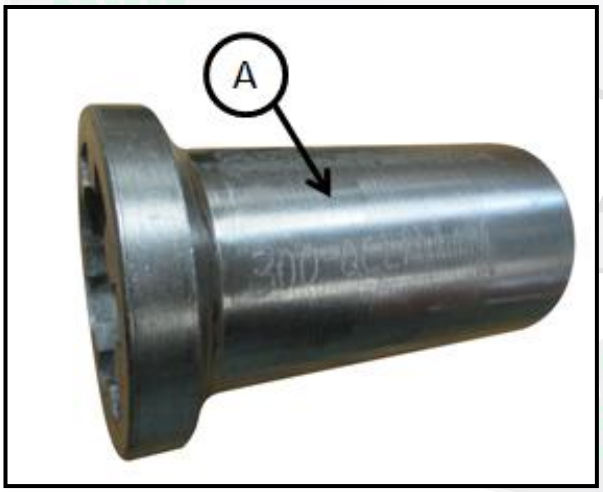
AL: Alternatively tighten the two clamp bolts twice to ensure a uniform locking torque.

G: Apply grease.

L: Apply locking agent.

R: Replace the part

Special tools

Bearing driver set:	Screwdriver for outer race of head tube:
	
Mounting tools for steering tube bearing: φ35.5:	**Four-jaw 300-QCLM4-001**
	
Seven-jaw 300-QCLM7-001	**Steering stem locknut wrench (four-claw) KST02BS01005**
	
Steering stem nut wrench (seven-claw) KST02BS01006	

Control System

Inspection of Control System

● See “Periodic Maintenance” –"Inspection of Clearance of Control System" for details.

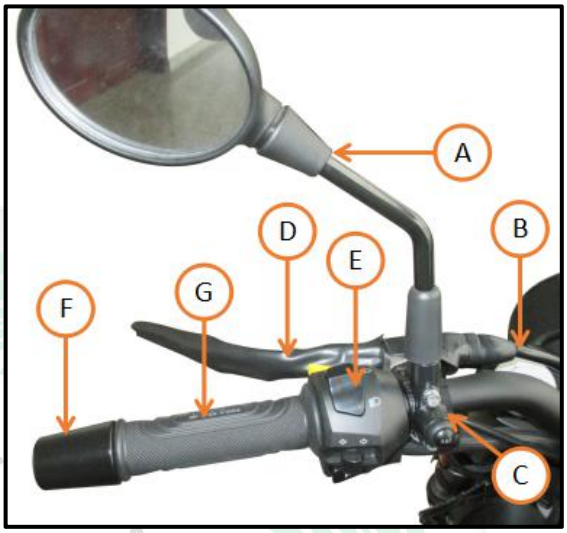
Adjustment of Control System

● See “Periodic Maintenance” –"Adjustment of Clearance of Control System" for details.

Handlebar

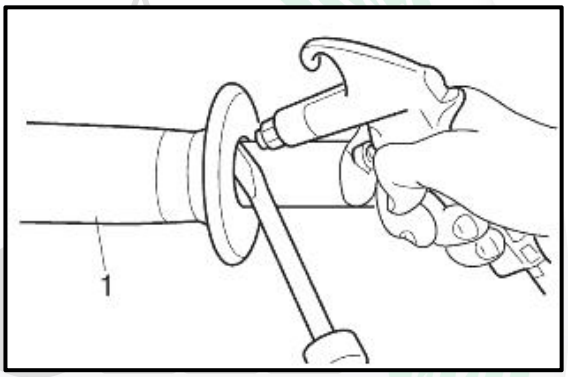
Disassembly of Handlebar

●Disassemble:
Left rearview mirror [A]
Clutch line [B]
Clutch handlebar lock bolt [C]
Clutch handlebar [D]
Left combination switch [E]
Handlebar grip end [F]
Left handlebar cover [A]

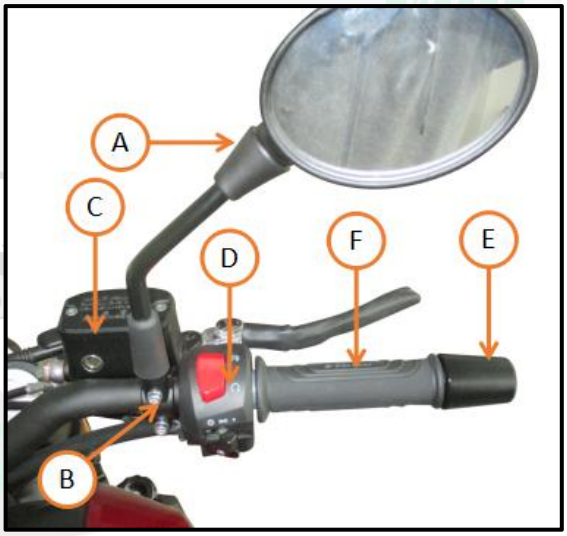


*Note:

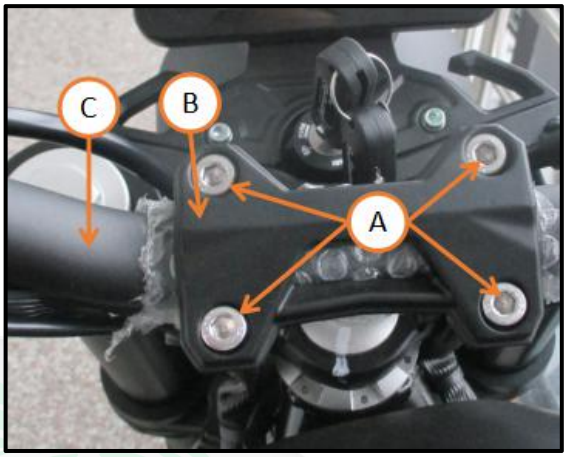
Compress the compressed air between the left handlebar and left handlebar grip [1] and slowly press the left handlebar grip.



●Disassemble:
Left rearview mirror [A]
Master cylinder lock bolt of front fluid brake [B]
Master cylinder of front fluid brake [C]
Right combination switch [D]
Handlebar grip end [E]
Throttle handlebar [F]



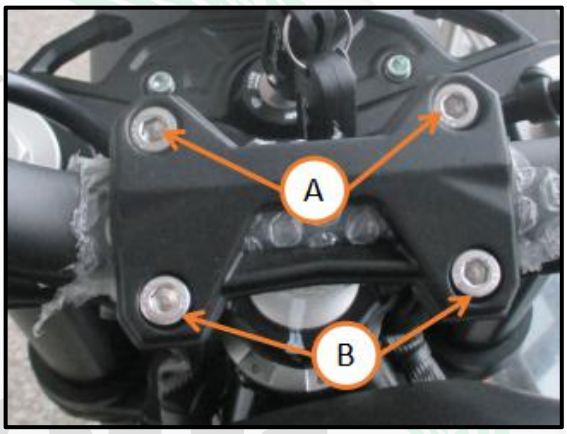
● Remove the bolt [A] of handlebar mounting bracket.
● Remove the mounting bracket [B] and the handlebar [C] in all directions.



Installation of handlebar

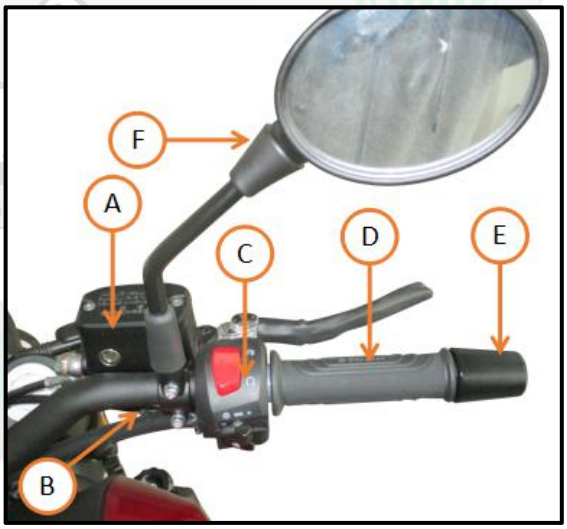
● Install the handlebar mounting bracket and handlebar on the upper bracket.
● Fasten the bolt of handlebar mounting bracket.

Remarks
○ First tighten the front handlebar mounting bracket bolt [A], then lock the other handlebar mounting bracket bolt [B]. ○ Alternatively tighten the two handlebar mounting bracket bolts twice to ensure a uniform locking torque.



Locking torque of handlebar mounting bracket bolt: 22 N·m

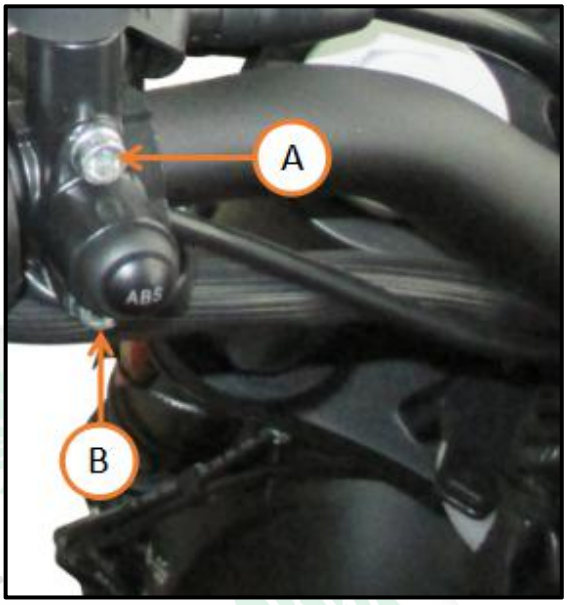
●Install:
Front fluid brake master cylinder (see “Master Cylinder” - “Installation of Front Master Cylinder”).
Right combination switch [C]
Throttle handlebar [D]
Throttle cable [B]
● Apply locking agent to the threads of handlebar grip end bolt, and then tighten the bolts.
●Install:
Grip end [E]
Right rearview mirror [F]



●Install:

Clutch handlebar.

Remarks
○ First tighten the upper handlebar mounting bracket bolt [A], then lock the other handlebar mounting bracket bolt [B].



●Install:

Left handlebar [A]

Left combination switch [B]

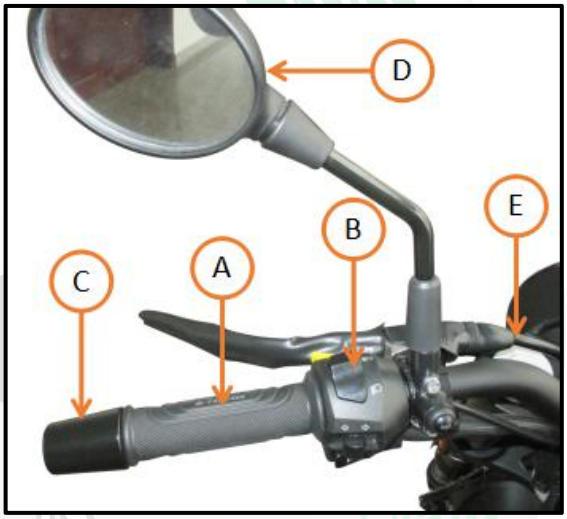
● Apply locking agent to the threads of handlebar grip end bolt, and then tighten the bolts.

●Install:

Grip end [C]

Left rearview mirror [D]

Clutch line [E]



Locking torque of combination switch fastening screw: 3.5 N·m

Steering stem

Disassembly of Steering Stem and Steering Stem Bearing

●Disassemble:

Handlebar (see "Removing Handlebar" for details);

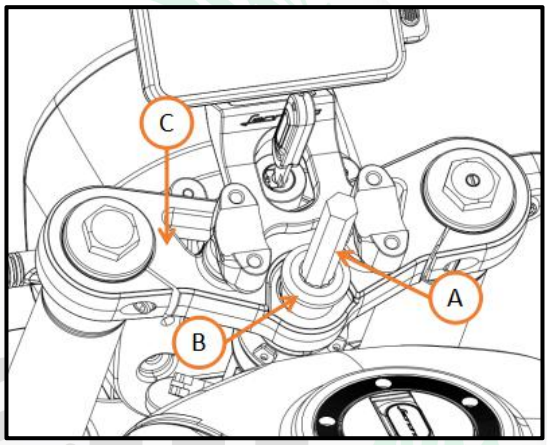
Cowling (see “Frame”-“Removing Cowling” for details),

Front wheel (see “Wheel/Tire” – “Removing the Front Wheel”)

Front fender (see "Frame" - "Removing the Front Fender")

Front shock absorber (see "Suspension System" - "Removing the Front Shock Absorber"),

● Remove the upper bracket locknut [B] with the Allen wrench [A], and then remove the upper bracket [C].

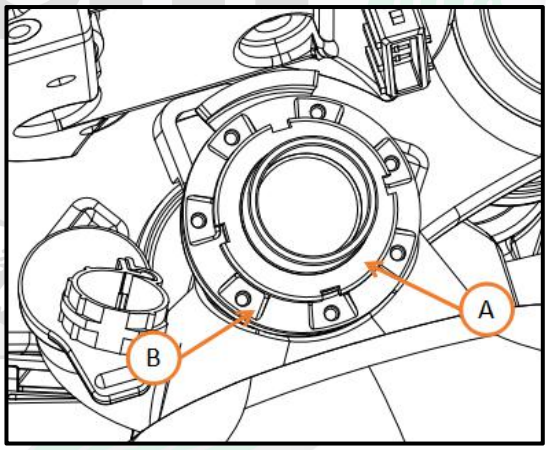


Remove locknut of steering stem [E].

Special tool - steering stem locknut wrench (four-claw):

●Remove nut of steering stem [E].

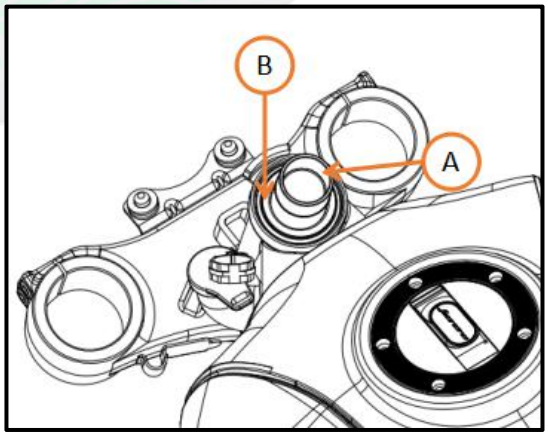
Special tool - steering stem nut wrench (seven-claw):



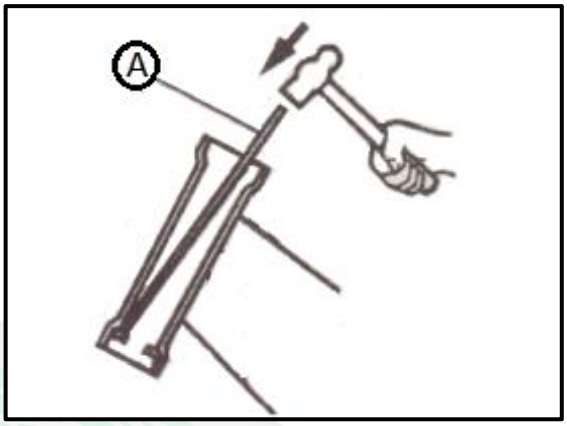
●Disassemble:

Steering stem [A],

Inner race of upper ball bearing [B] and ball bearing

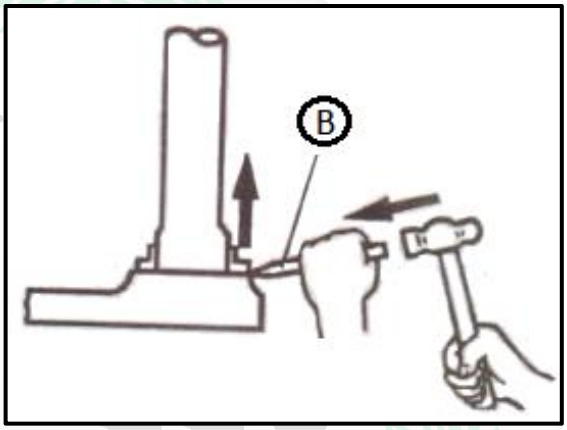


e●In order to remove the ball bearing outer race that is pressed into the head tube, it is necessary to insert a rod [A] into the inner cavity of the head tube, alternately tap the sides of ball bearing, and take out the outer race.



Remarks
○ If any of the upper and lower bearings of the steering stem is damaged, it is recommended to replace the upper and lower bearings (including the outer race of bearing) with new ones.

● Use a chisel [B] (purchasable) to remove the inner race of the lower ball bearing (and the oil seal of inner race) that is pressed onto the steering stem.



Installation of Steering Stem and Steering Stem Bearing

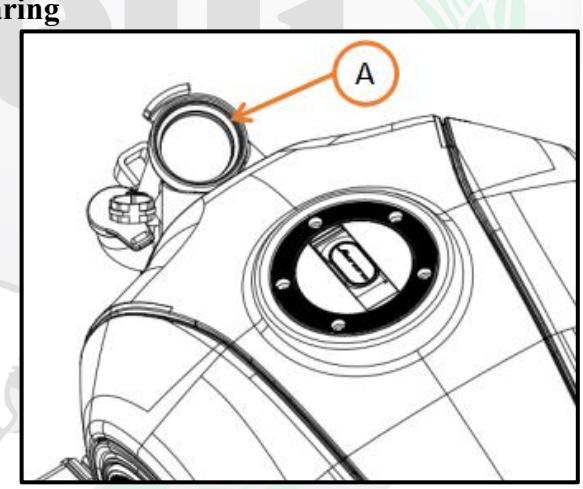
● Replace the outer race of bearing [A] with a new one.

● Install the steering stem and steering stem bearing into the head tube.

Special tool - special tooling for installing the outer race of head tube:

Bearing driver set:

● Apply grease to the outer race.

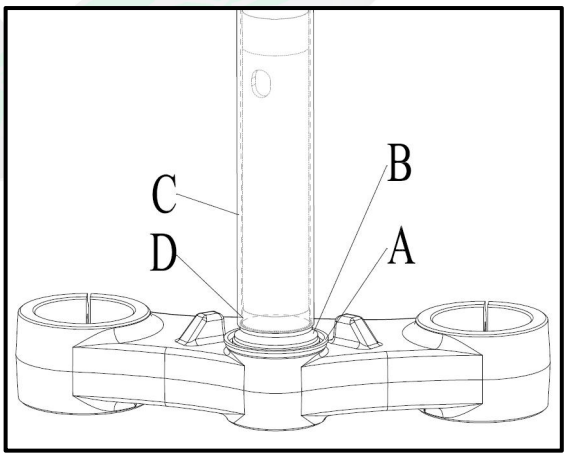


● Replace the inner race of bearing and oil seal with new ones.

●Apply grease to oil seal.

● Put the oil seal [A] on the steering stem, then install the inner race of lower ball bearing [B] and apply grease to the steering stem [D].

Special tool - special tooling for installing the steering tube bearing [C]:



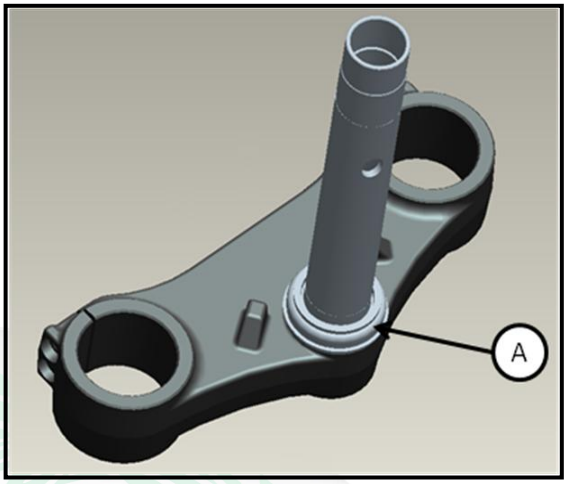
● Install the lower ball bearing [A] to the steering stem.

● Apply grease to the following parts.

Inner and outer races,

lower and upper ball bearings

○The lower ball bearing is the same as the upper ball bearing.

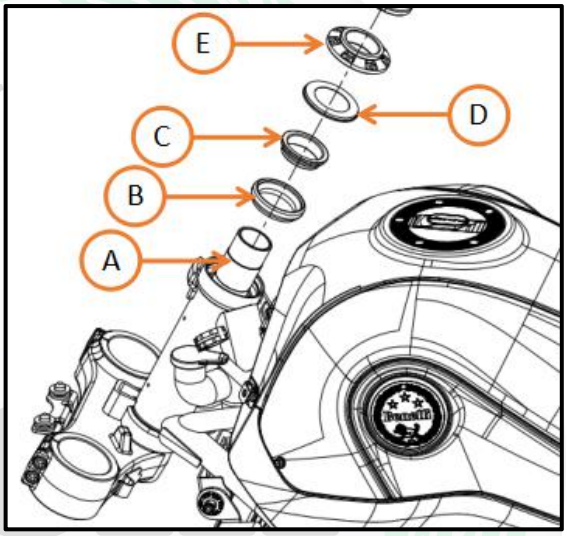


● Insert the steering stem [A] into the head tube, and then install the ball bearing [B] and the inner race [C].

●Install:

Washer [D]

Steering stem nut [E]

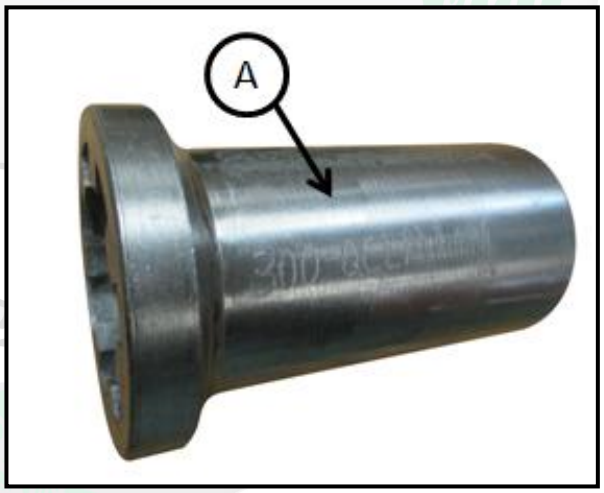


● Install the bearing to the appropriate position as follows.

○ First lock the steering stem nut according to the locking torque of 10 N·m, then loosen it by a small turn (less than one turn) to make the nut rotate slightly. Then use the steering stem nut wrench [A] to lock it according to the specified locking torque.

Special tool - steering stem nut wrench (seven-claw):

Locking torque of steering stem nut: 2.5 N•m

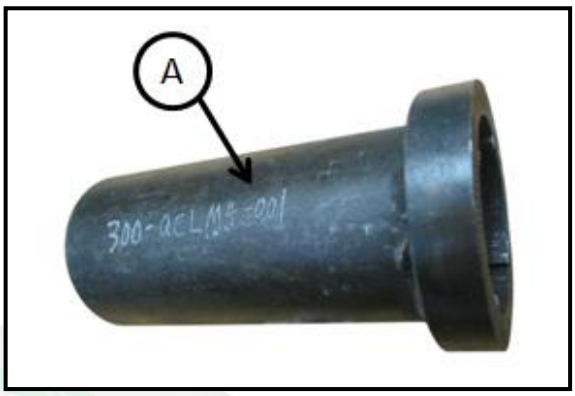


● Manually tighten the steering stem locknut until the locknut hits the steering stem nut.

● Tighten the steering stem locknut.

Special tool - steering stem nut wrench (four-claw):

Locking torque of steering stem nut: 23 N•m



●Install the upper plate and tighten the steering stem lock bolts.

●Install the front shock absorber (see "Suspension System" - “Installation of Front Shock Absorber”).

Remarks
○ First lock the front shock absorber lock bolt on the upper side, then lock the upper bracket locknut, and finally lock the front shock absorber lock bolt on the lower side. ○ Alternatively tighten the two front shock absorber lock bolts on the lower side twice to ensure a uniform locking torque.

Locking torque:

Front shock absorber lock bolt (upper side): 22 N·m

Upper bracket lock bolt: 78 N·m

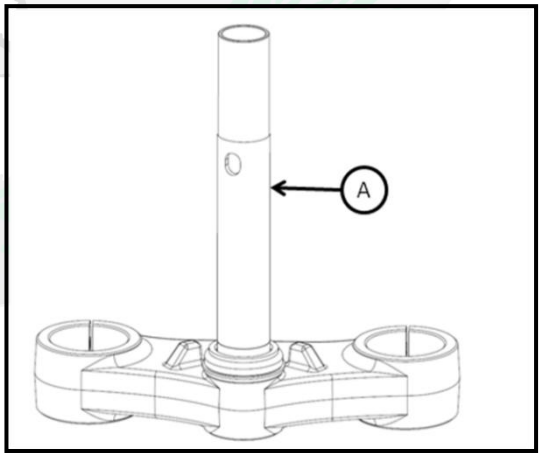
Front shock absorber lock bolt (lower side): 22 N·m

⚠Warning
Properly arrange the cable, wire harness and hose (see section "Winding Method of Cables, Wires and Hoses" of Chapter "Appendix" for details); otherwise, the handlebar may be unable to rotate normally.

●Install the parts disassembled previously (see the corresponding chapters).

Lubrication of Steering Stem Bearing

● See “Periodic Maintenance” –"Lubrication of Steering Stem Bearing" for details.



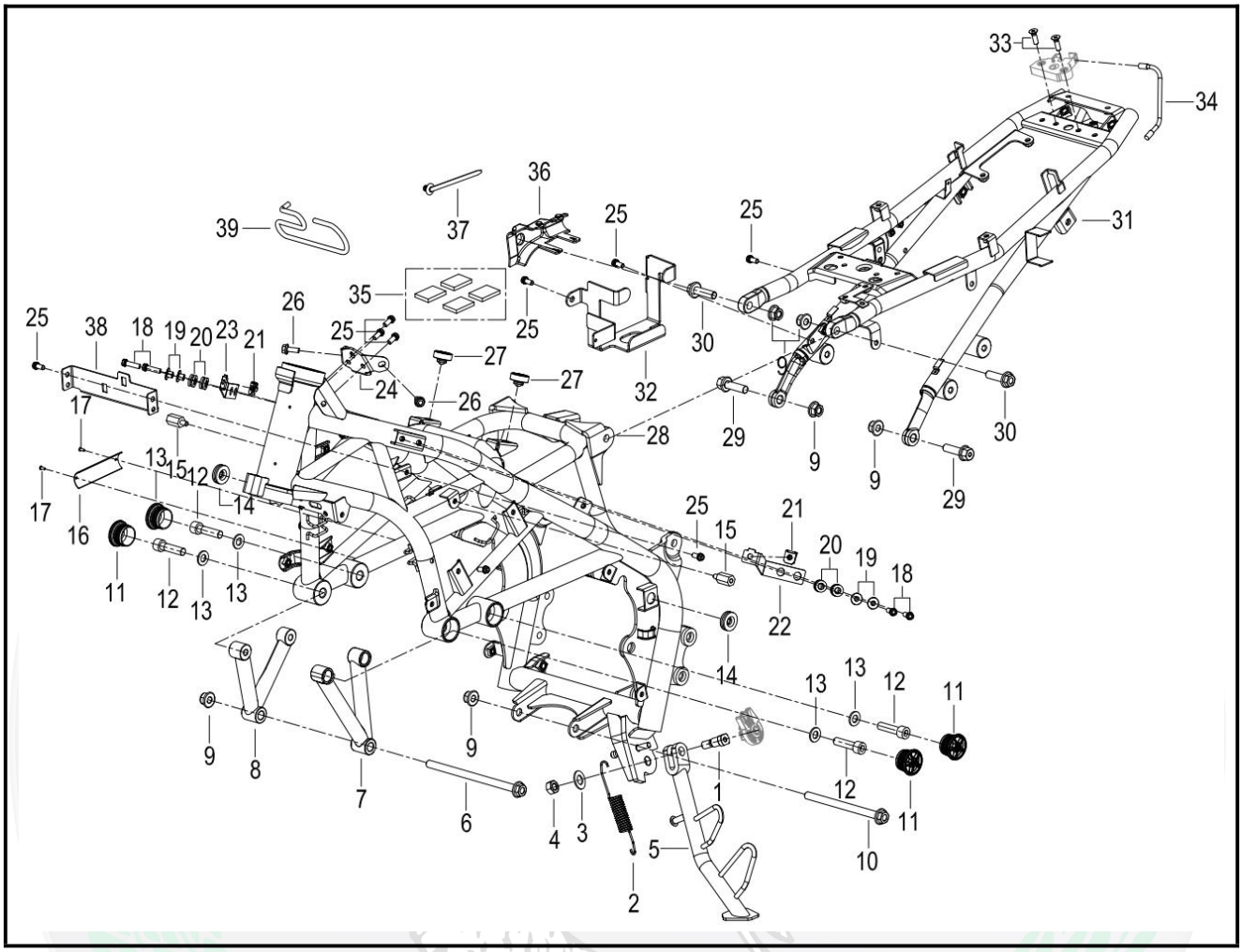
Inspection of Deformation of Steering Stem

● If the steering stem is removed or it cannot be adjusted for smooth rotation, check the straightness of steering stem!

★ If the steering stem [A] is bent, please replace it!

Frame

Exploded View of Frame



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Sidestand mounting bolt	1	45	4.5	AL
2	Sidestand spring	1	—	—	
3	Washer	1	—	—	
4	Nut M10×1.25	1	45	4.5	
5	Sidestand welding assembly	1	—	—	AL、S
6	Hexagon bolt with flange M10×1.25×165	1	45	4.5	AL、S
7	Front left bracket component of engine	1	—	—	AL、S
8	Front right bracket component of engine	1	—	—	
9	Self-locking nut M10×1.25	6	45	4.5	
10	Bolt M10×1.25×130	1	45	4.5	
11	Engine end cover	4	—	—	
12	Hexagon socket cap screw M10×40	4	40	4.0	AL、S
13	Washer 10	4	—	—	

14	Rubber washer of protector	2	—	—	
15	Taillight mounting bolt	2	10	1.0	
16	Nameplate of frame	1	—	—	
17	Self-plugging rivet 3.2×7	2	—	—	
18	Bolt M6×1×20	4	10	1.0	
19	Collar 7	4	—	—	
20	Rubber cover of front turn signal light bracket	4	—	—	
21	Clamp nut M5	2	—	—	
22	Left fuel tank cover mounting bracket	1	—	—	
23	Right fuel tank cover mounting bracket	1	—	—	
24	Fuel tank mounting bracket	1	—	—	
25	Screw M6×12-8.8-ZG	6	10	1.0	
26	Hexagon bolt with flange M6×16	2	10	1.0	
27	Buffering rubber ring of seat cushion	2	—	—	
28	Front frame welding component	1	—	—	
29	Double-end bolt of frame	2	45	4.5	AL
30	Bolt M10×1.25×35	2	45	4.5	AL
31	Rear frame welding component	1	—	—	
32	Battery holder component	1	—	—	
33	Screw M6×25	2	10	1.0	
34	Seat cable assembly	1	—	—	
35	Spongy cushion of rear lower fender I	4	—	—	
36	Anti-collision rubber	1	—	—	
37	Threaded buckle fastener	20	—	—	
38	Connector mounting seat	1	—	—	
39	Clamp	1	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

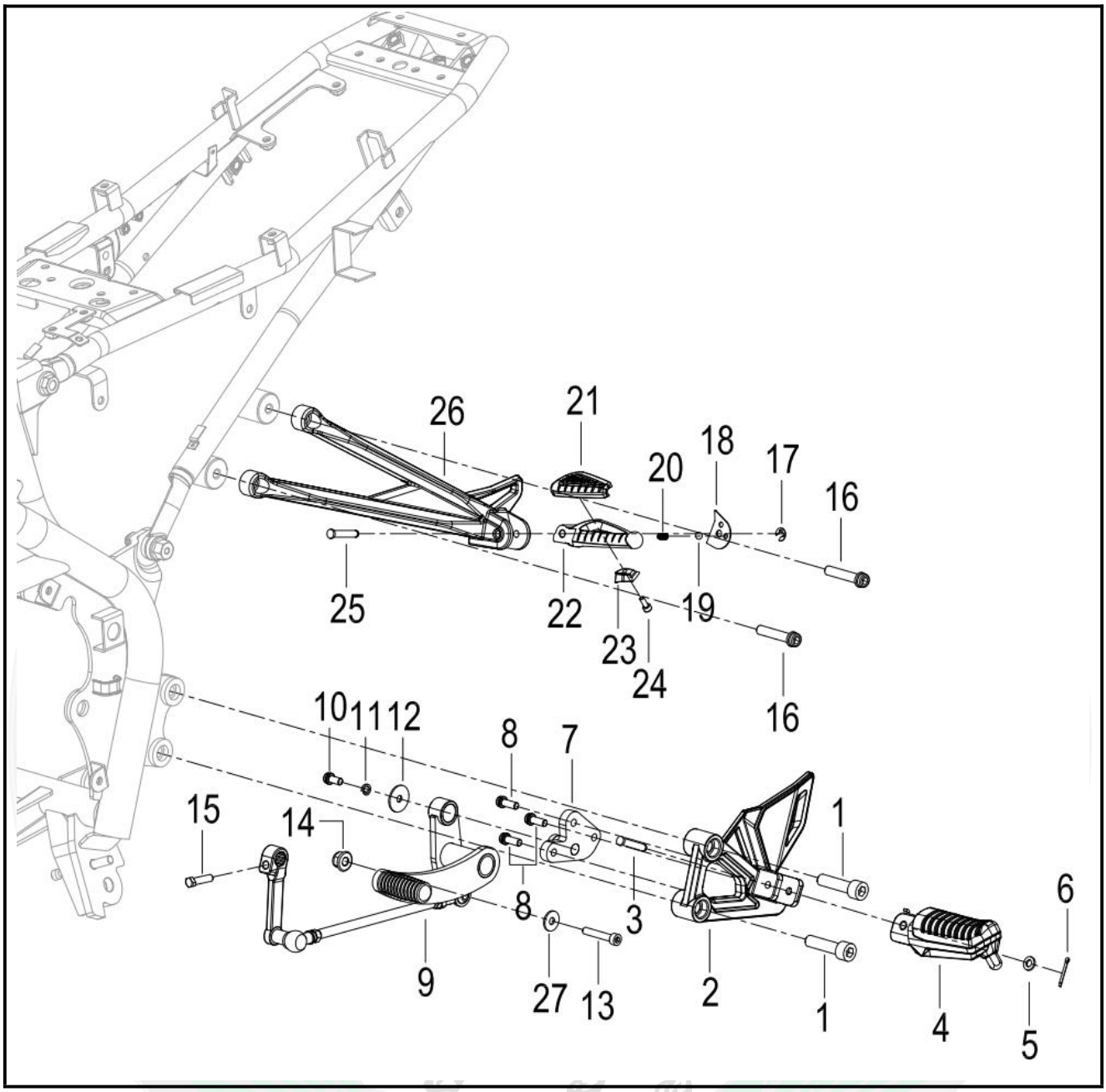
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Exploded view of left footpeg



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Hexagon socket cap screw M10×40	2	40	4.0	AL
2	Left front footpeg bracket	1	—	—	
3	Mounting pivot	1	—	—	
4	Left front pedal assembly	1	—	—	
5	Washer Φ6	1	—	—	
6	Split pin Φ2×18	1	—	—	
7	Welding component of shift pedal mounting base	1	—	—	
8	Bolt M6×1×16	3	10	1.0	
9	Shift pedal component	1	—	—	
10	Screw M6×12-8.8-ZG	1	10	1.0	
11	Spring washer 6	1	—	—	
12	Fuel tank mounting washer	1	—	—	
13	Bolt M6×30	1	10	1.0	
14	Self-locking nut M6	1	10	1.0	
15	Bolt M6×22	1	10	1.0	
16	Bolt M8×1.25×30	2	22	2.2	AL
17	Circlip φ5	1	—	—	
18	Pedal mounting bracket	1	—	—	
19	Pedal ball	1	—	—	
20	Front pedal spring	1	—	—	
21	Left pedal rubber	1	—	—	
22	Left rear pedal	1	—	—	
23	Left pedal rubber pad	1	—	—	
24	Screw M4×10	1	3	0.3	
25	Pedal mounting pin	1	—	—	
26	Left rear footpeg bracket	1	—	—	
27	Washer Φ6	1	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

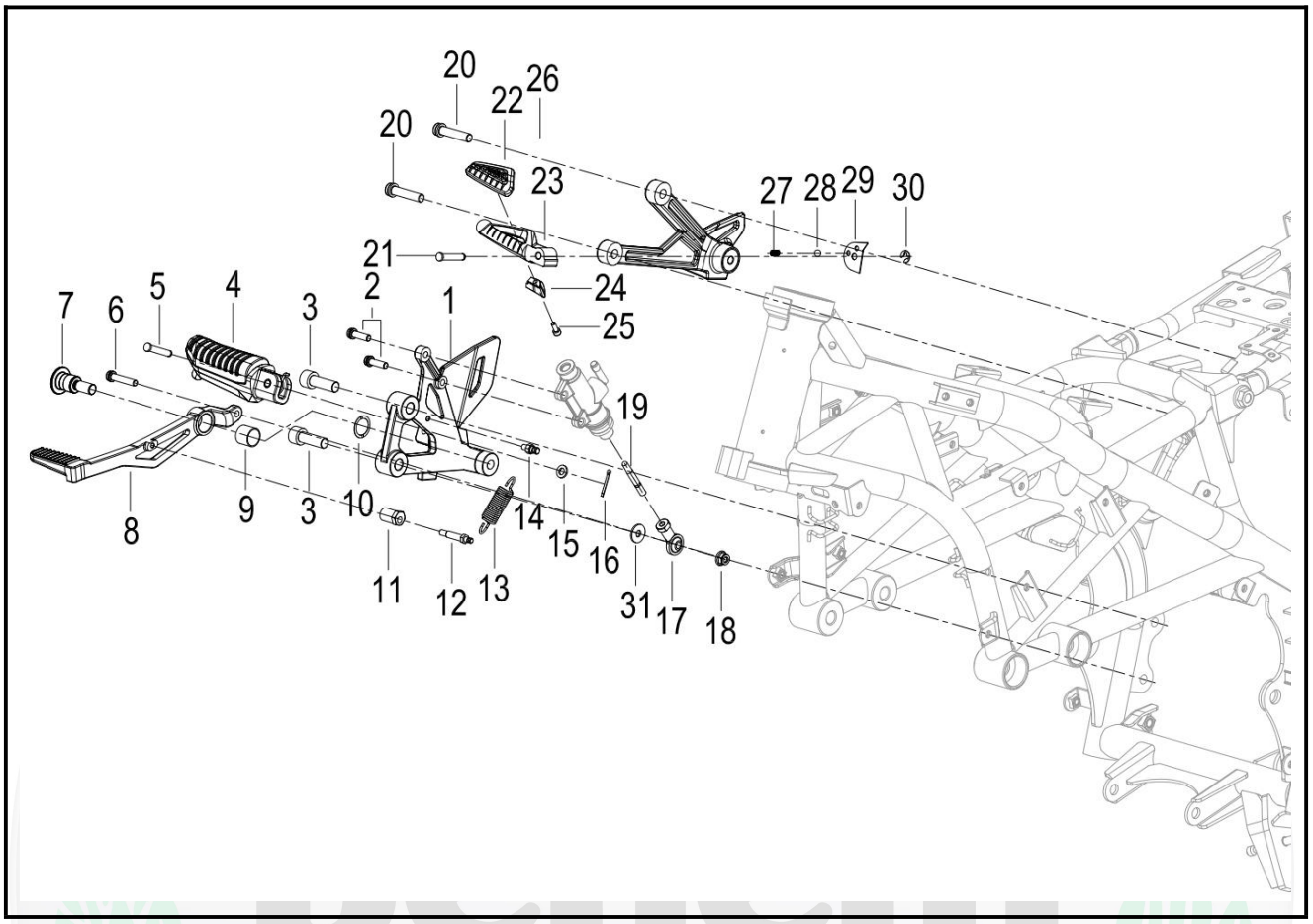
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Exploded view of right footpeg



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Right front footpeg bracket	1	—	—	
2	Bolt M6×1×20	2	10	1.0	
3	Inner hexagon screw M10×30	2	40	4.0	AL
4	Right front pedal assembly	1	—	—	
5	Mounting pivot	1	—	—	
6	Bolt M6×30	1	10	1.0	
7	Rear brake pedal mounting screw	1	25	2.5	G
8	Rear brake pedal	1	—	—	
9	Self-lubricating collar	1	—	—	
10	Washer	1	—	—	
11	Eccentric push rod	1	—	—	
12	Lower spring pin	1	10	1.0	
13	Brake pedal return spring	1	—	—	
14	Upper spring pin	1	10	1.0	
15	Washer Φ6	1	—	—	
16	Split pin Φ2×18	1	—	—	
17	Joint M6	1	10	1.0	
18	Self-locking nut M6	1	10	1.0	
19	Foot pump piston screw	1	10	1.0	
20	Bolt M8×1.25×30	2	22	2.2	
21	Pedal mounting pin	1	—	—	
22	Right pedal rubber	1	—	—	
23	Right rear pedal	1	—	—	
24	Right pedal rubber pad	1	—	—	
25	Screw M4×10	1	3	0.3	
26	Right rear footpeg bracket	1	—	—	
27	Front pedal spring	1	—	—	
28	Pedal ball	1	—	—	
29	Pedal mounting bracket	1	—	—	
30	Circlip φ5	1	—	—	
31	Washer Φ6	1	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

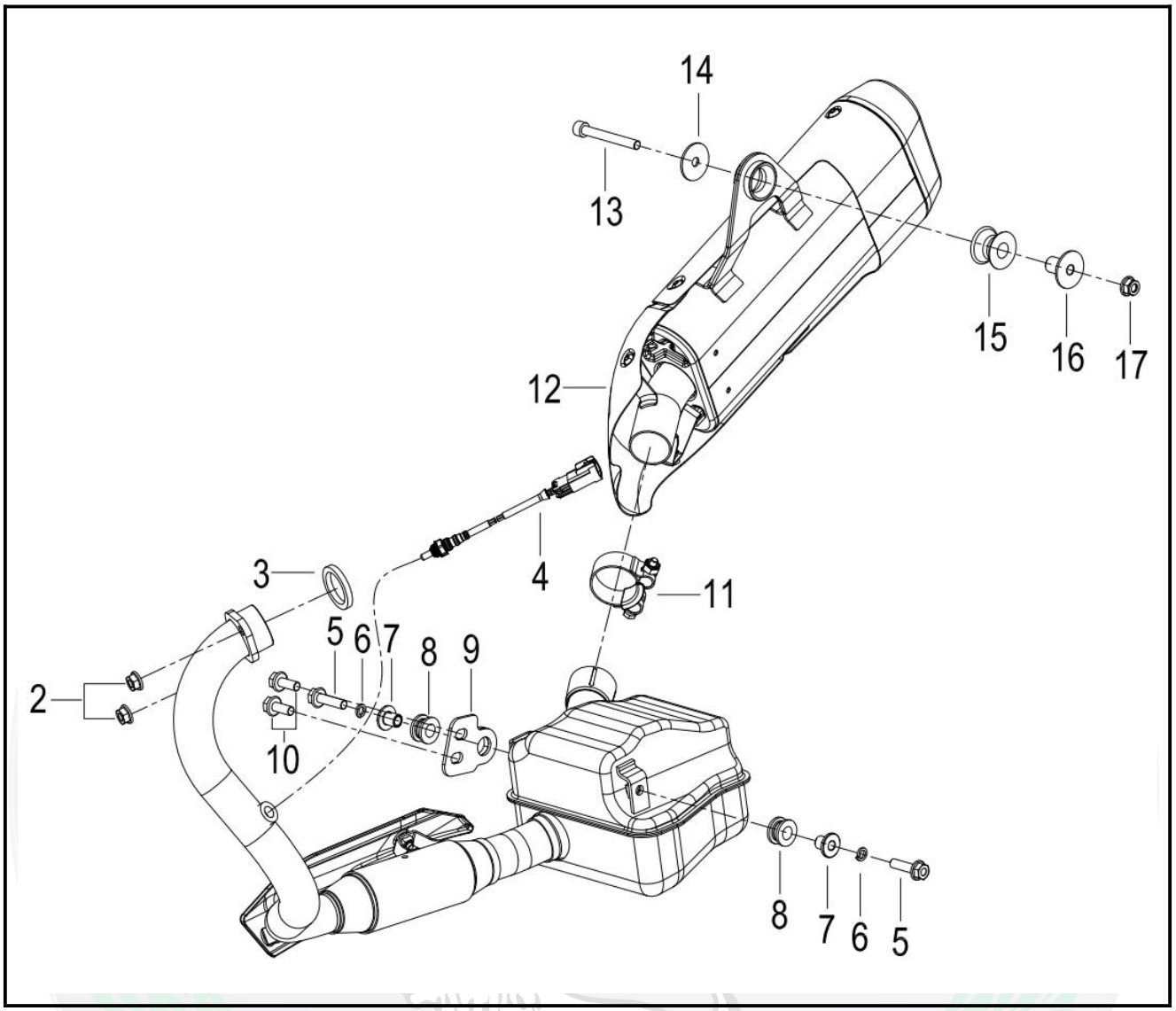
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Exploded View of Muffler



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Main cylinder assembly	1	—	—	
2	Hexagon nut with flange M8	2	22	2.2	
3	Exhaust pipe gasket assembly	1	—	—	
4	Oxygen sensor	1	—	—	
5	Bolt M8×25	2	22	2.2	
6	Spring washer 8	2	—	—	
7	Guard bush	2	—	—	
8	Rubber cover II	2	—	—	
9	Muffler mounting bracket	1	—	—	
10	Hexagon bolt with flange M8×16	2	22	2.2	
11	Clamp assembly	1	—	—	
12	Auxiliary cylinder assembly	1	—	—	
13	Hexagon socket cap screw M8×65	1	22	2.2	
14	Damping gasket of muffler	1	—	—	
15	Muffler rubber cover	1	—	—	
16	Damping collar of muffler	1	—	—	
17	Self-locking nut M8	1	22	2.2	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

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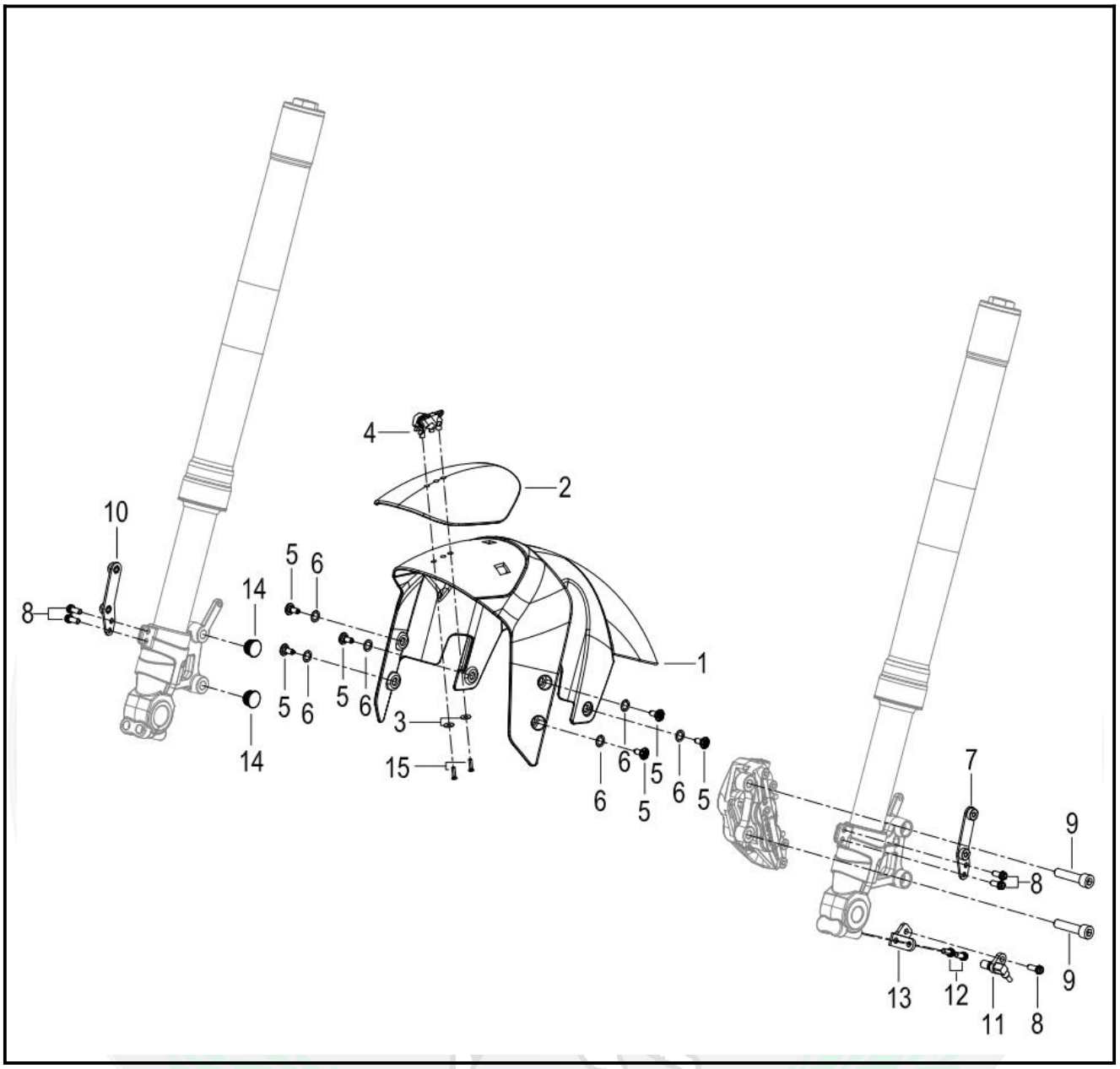
Exploded view of front fender



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Front fender	1	—	—	
2	Front small fender	1	—	—	
3	Gasket φ4	2	—	—	
4	Front fender label	1	—	—	
5	Screw M6×15.2	6	10	1.0	
6	Grey nylon	6	—	—	
7	Left mounting base of front fender	1	—	—	
8	Bolt M6×1×16	5	10	1.0	
9	Inner hexagon screw M10×1.25×40	2	45	4.5	AL
10	Right mounting base of front fender	1	—	—	
11	Front wheel speed sensor	1	—	—	
12	Screw M6×12-8.8-ZG	2	10	1.0	
13	ABS connecting block	1	—	—	
14	Front shock absorber mounting hole plug	2	—	—	
15	Screw M3×6	2	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

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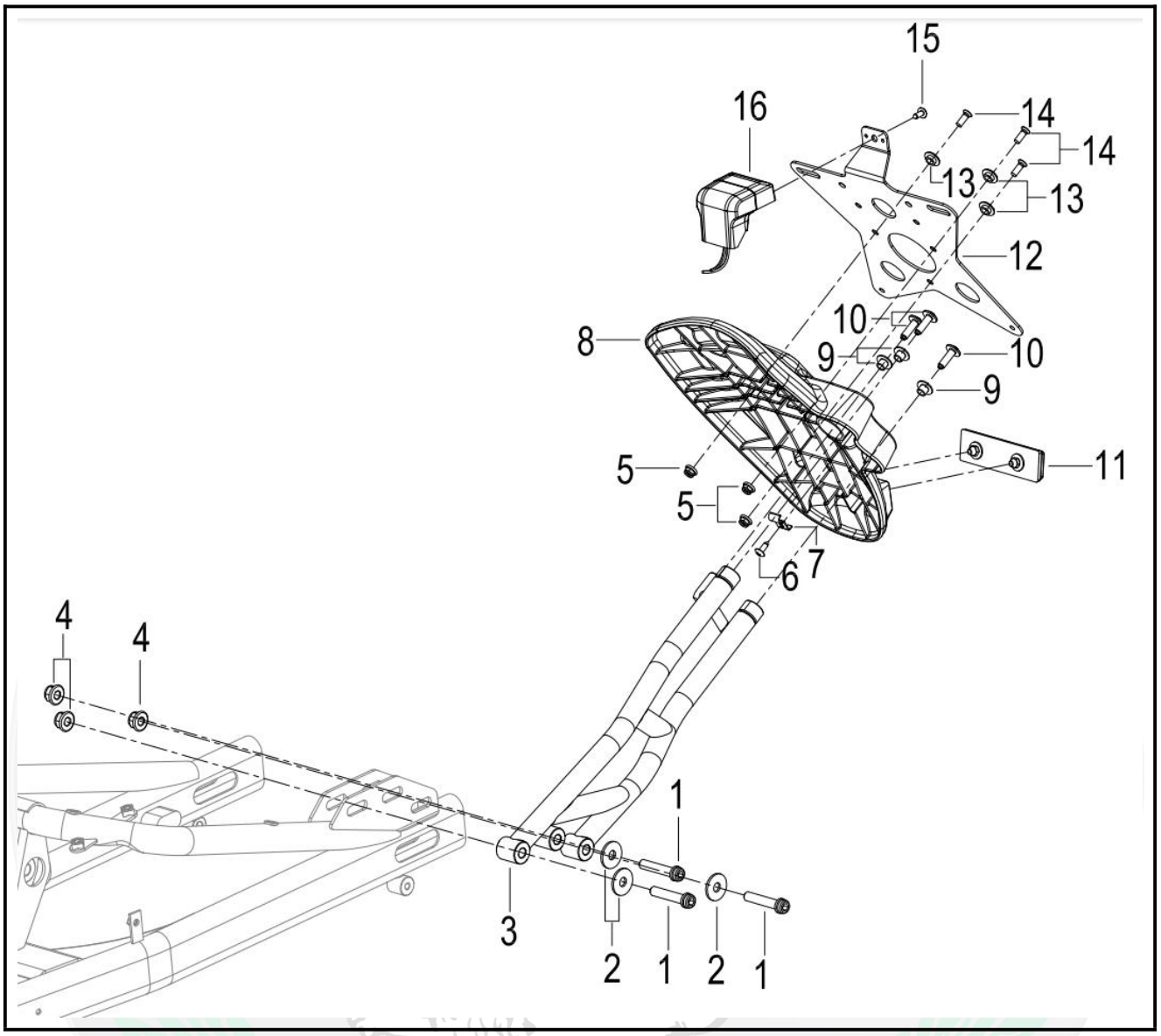
Exploded view of rear fender



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Bolt M8×1.25×40	3	22	22	
2	Washer φ8	3	—	—	
3	Rear fender bracket welding assembly	1	—	—	
4	Self-locking nut M8	3	22	22	
5	Self-locking nut M5	3	6	0.6	
6	Self-tapping screw ST4.2×13	1	—	—	
7	License plate light wire bracket	1	—	—	
8	Rear part of rear fender	1	—	—	
9	Collar H6	3	—	—	
10	Screw M6×20	3	10	1.0	
11	Rear reflector	1	—	—	
12	Rear license mounting plate	1	—	—	
13	T-type collar	3	—	—	
14	Screw M5×16	3	6	0.6	
15	Self-tapping screw ST4.2×16	1	—	—	
16	Rear license plate light	1	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

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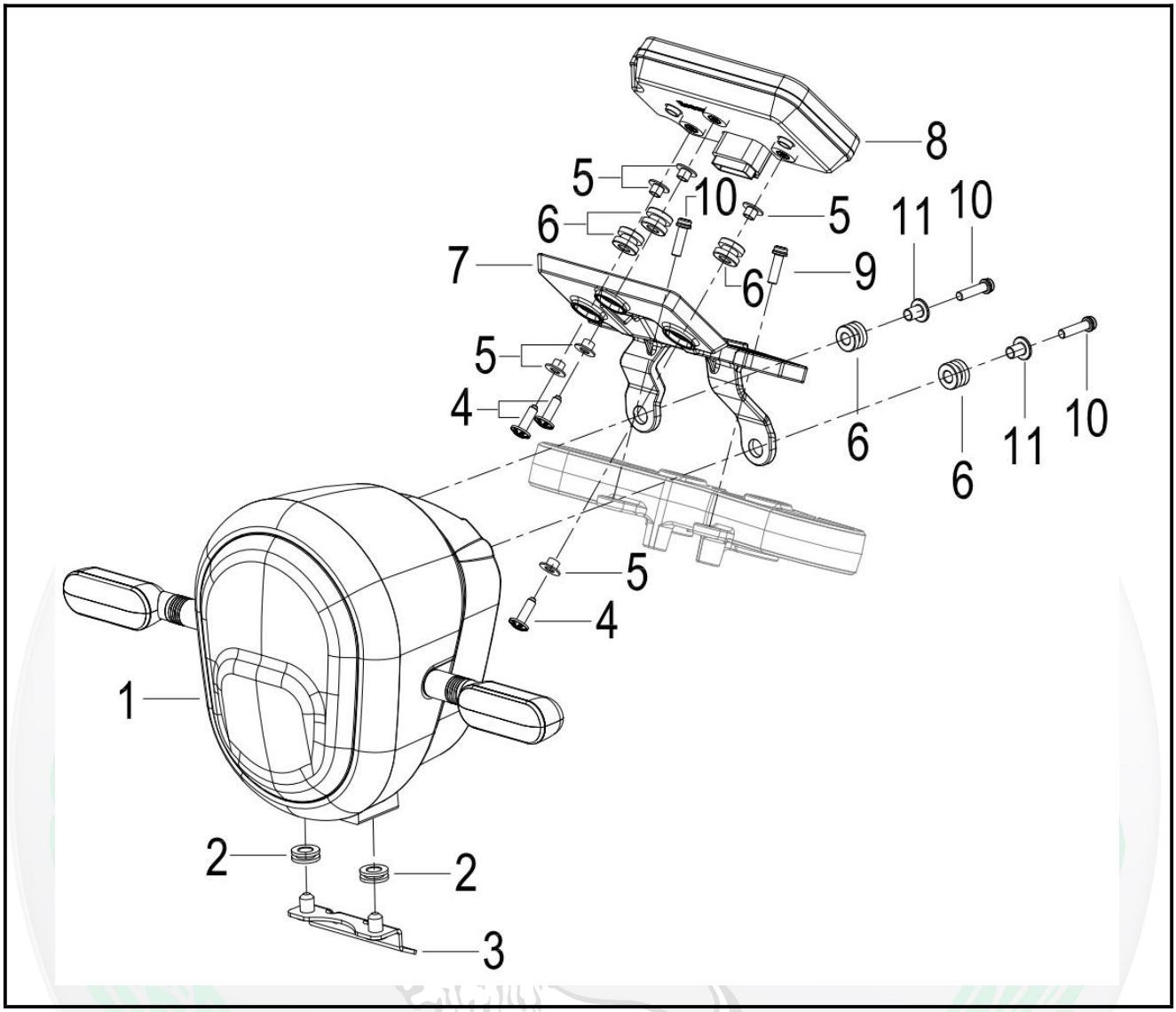
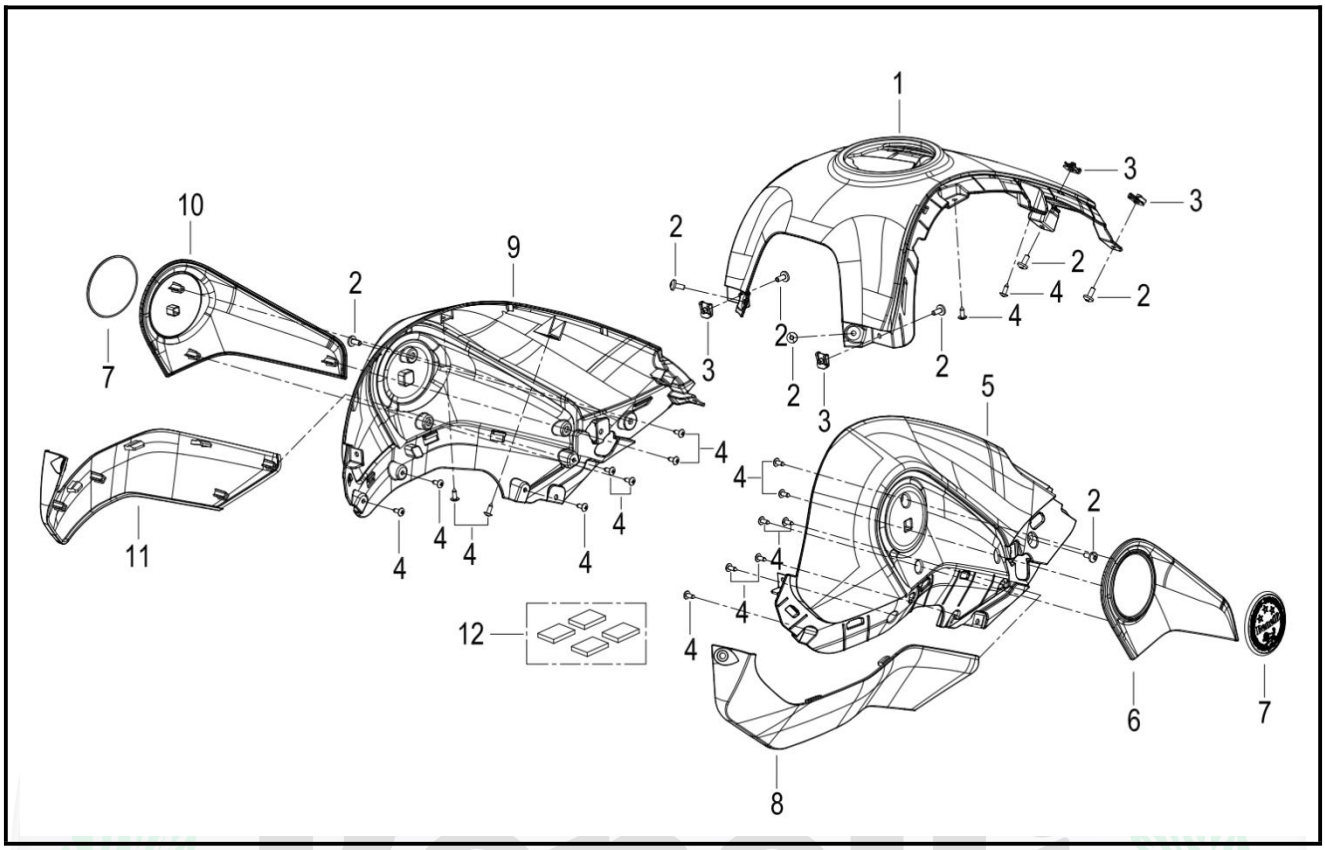
Exploded View of Headlights and Meters



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Headlight	1	—	—	
2	Rubber cover	2	—	—	
3	Lower bracket welding component of headlight	1	—	—	
4	Screw M6×20	3	1.0	1.0	
5	Collar H6	6	—	—	
6	Meter buffering rubber	5	—	—	
7	Meter support	1	—	—	
8	Meter assembly	1	—	—	
9	Bolt M6×1×20	2	1.0	1.0	
10	Screw M6×25-8.8-ZG	2	1.0	1.0	
11	Cowling collar	2	—	—	

Exploded View of Fuel Tank Cover



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Middle cover of tank	1	—	—	
2	Stainless steel bolt M5×12	8	6	0.6	
3	Clamp nut M5	4	—	—	
4	Left cover of fuel tank	18	—	—	
5	Stainless steel screw M6×25	1	10	1.0	
6	Headlight bushing	1	—	—	
7	Rubber washer of cover	2	—	—	R
8	Left lower cover of fuel tank	1	—	—	
9	Self-tapping screw ST4.2×13	1	—	—	
10	Rubber washer of protector	1	—	—	R
11	Right lower cover of fuel tank	1	—	—	
12	Right cover of fuel tank	4	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

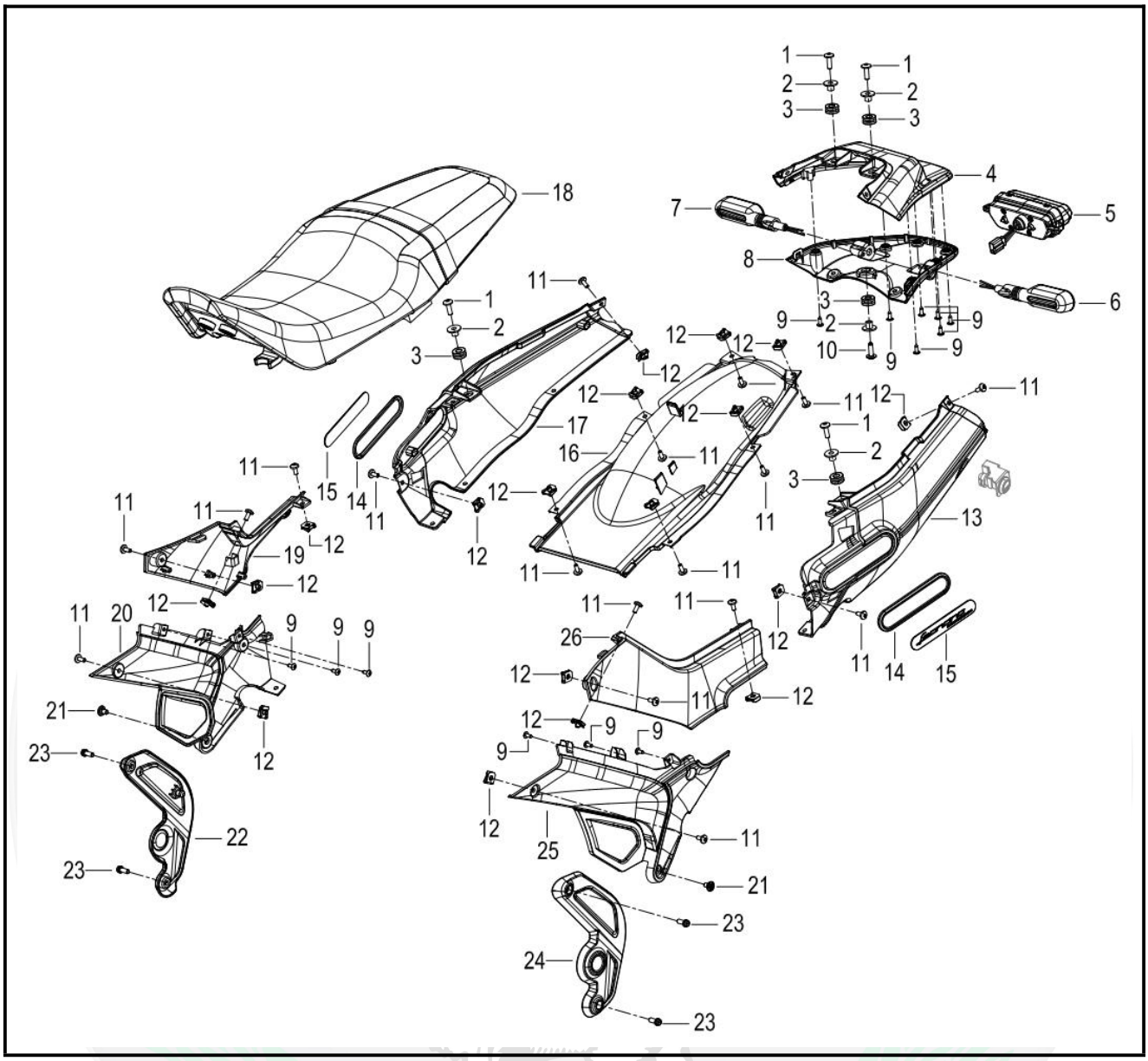
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Exploded View of Seat Cushions and Covers



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Bolt M6×19	4	—	—	
2	Headlight bushing	5	10	1.0	
3	Rubber washer of cover	5	—	—	
4	Taillight cover	1	—	—	
5	Taillight	1	10	1.0	
6	Rear left turn signal light	1	—	—	
7	Rear right turn signal light	1	6	0.6	
8	Rear fender	1	—	—	
9	Self-tapping screw ST4.2×13	13	—	—	
10	Screw M6×20	1	—	—	
11	Stainless steel bolt M5×12	18	—	—	
12	Clamp nut M5	18	10	1.0	
13	Left tail cover	1	—	—	
14	Left cover label bracket	2	—	—	
15	Double-sided adhesive of left cover label bracket	2	—	—	
16	Bottom cowling	1	—	—	
17	Right tail cover	1	—	—	
18	Seat assembly	1	—	—	
19	Right protector	1	—	—	
20	Right lower cover	1	—	—	
21	Windshield mounting screw	2	—	—	
22	Right frame cover	1	—	—	
23	Bolt M6×1×16	4	—	—	
24	Left frame cover	1	—	—	
25	Left lower cover	1	—	—	
26	Left protector	1	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

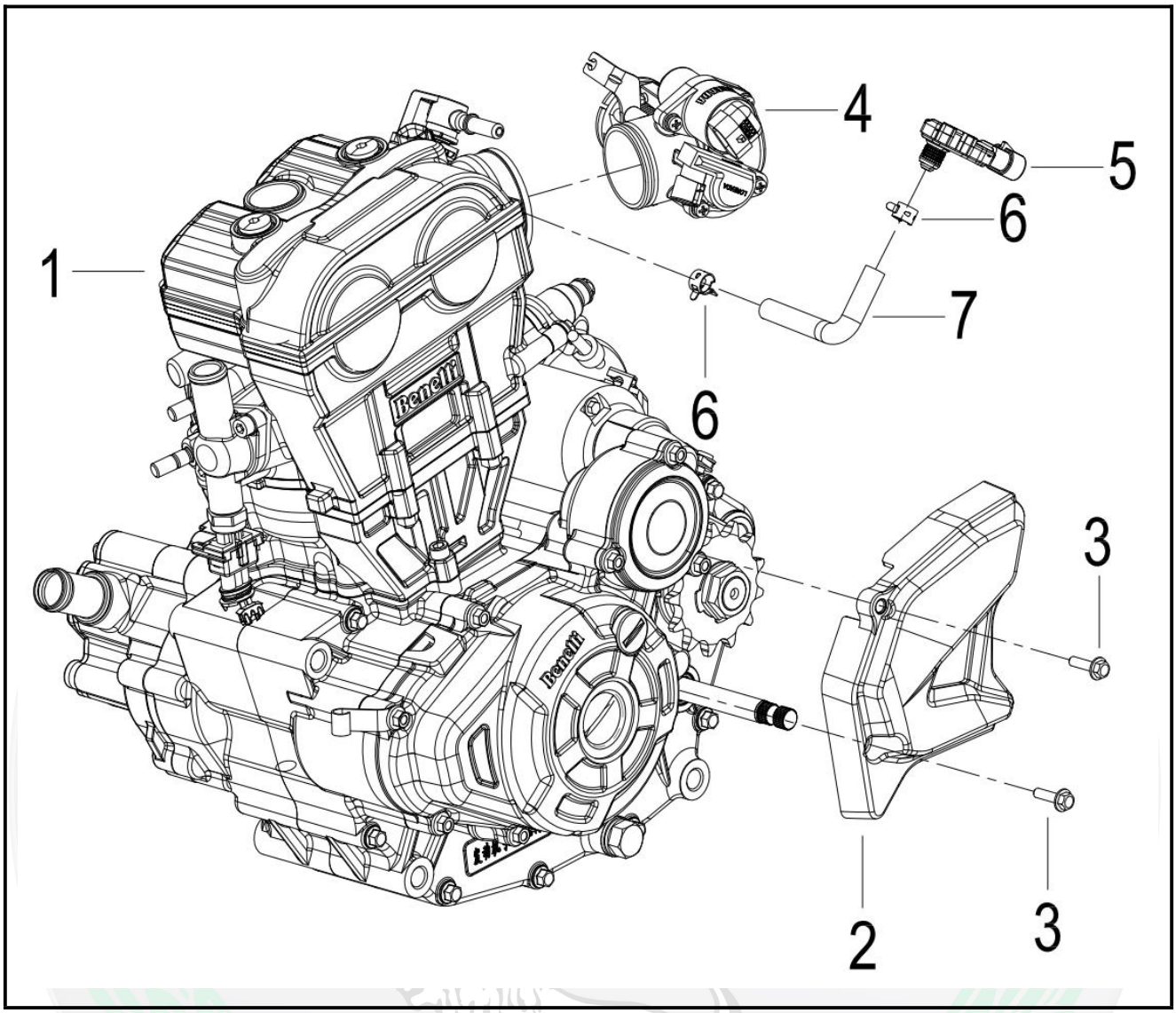
G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

Exploded View of Engine Accessories



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	**Engine**	1	—	—	
2	Left rear cover component	1	—	—	
3	Bolt M6×1×20	2	10	1.0	
4	Throttle valve subassembly	1	—	—	
5	intake pressure sensor	1	—	—	
6	Plate clamp	2	—	—	R
7	MAP pipe	1	—	—	

G: Apply grease.

L: Apply locking agent.

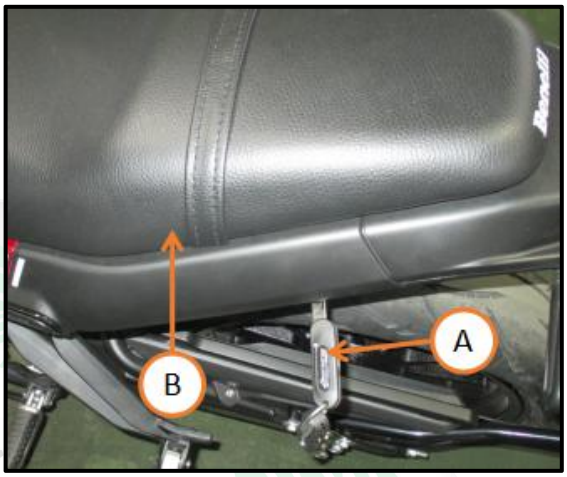
R: Replace the part.

Seat Cushion

Disassembly of seat cushion

● Insert the ignition switch key [A] into the seat cushion lock, rotate the key counterclockwise, and open the seat cushion lock.

●Remove the seat [B].



Installation of seat cushion

● Install the parts that have been removed before in the reverse order of disassembly.

●Press the back of seat cushion until you hear a click from the seat cushion lock seat.

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Cover

Disassembly of Left Cover

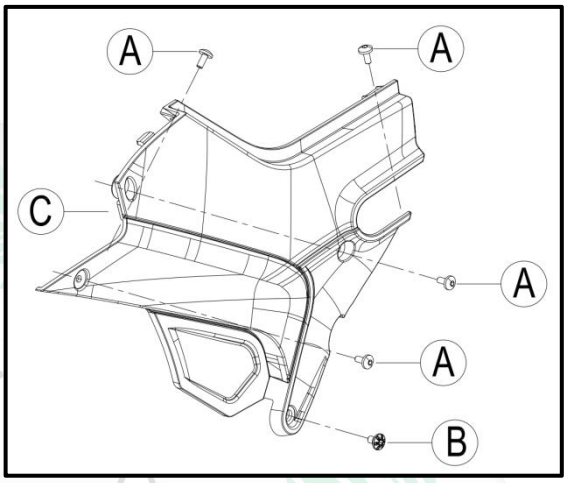
●Remove the seat cushion (see "Cushion" - "Removing Seat Cushion")

●Disassemble:

Stainless steel bolt M5×12 [A]

Windshield mounting screw M6×10[B]

Left cover component [C]

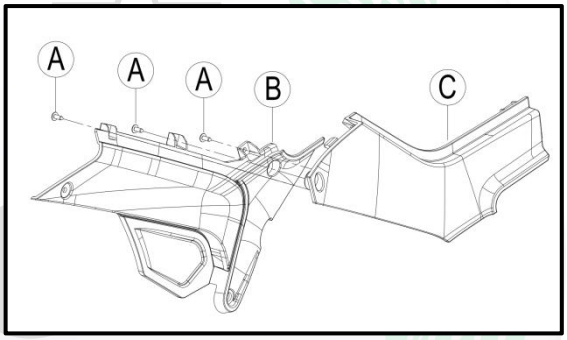


●Disassembly

Self-tapping screw ST4.2×13[A]

Left lower cover [B]

Left cover [C]



Installation of Left Cover

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque of left cover mounting screw [A]: 6 N·m

Locking torque of left cover mounting screw [B]: 10 N·m

Disassembly of Right Cover

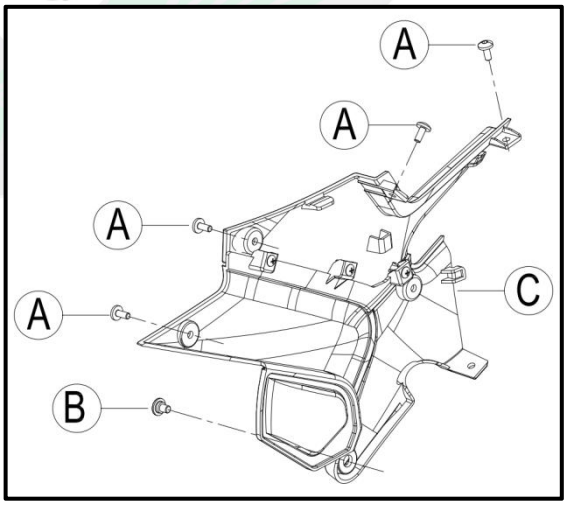
●Remove the seat cushion (see "Cushion" - "Removing Seat Cushion")

●Disassemble:

Stainless steel bolt M5×12 [A]

Windshield mounting screw M6×10[B]

Right cover component [C]

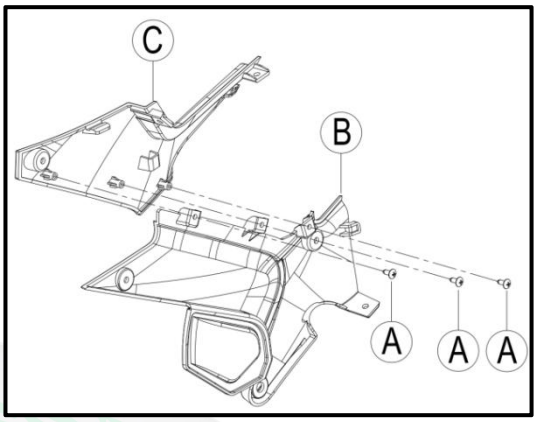


●Disassembly

Self-tapping screw ST4.2×13[A]

Right lower cover [B]

Right cover [C]



Installation of Right Cover

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque of right cover mounting screw [A]: 10 N·m

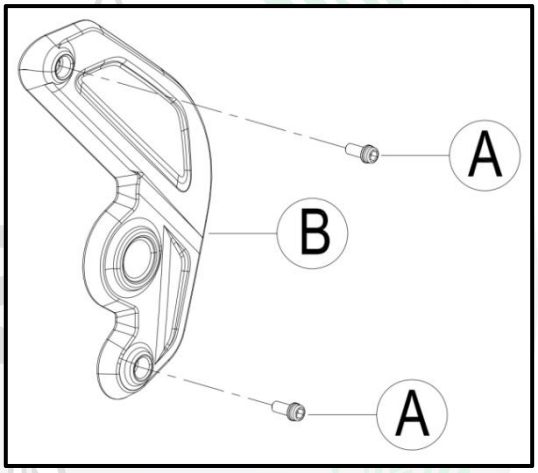
Locking torque of right cover mounting screw [B]: 6 N·m

Remove left cover of frame

●Disassemble:

Bolt M6×1×16[A]

Left cover of frame [B]



Installation of left cover

● Install the parts that have been removed before in the reverse order of disassembly.

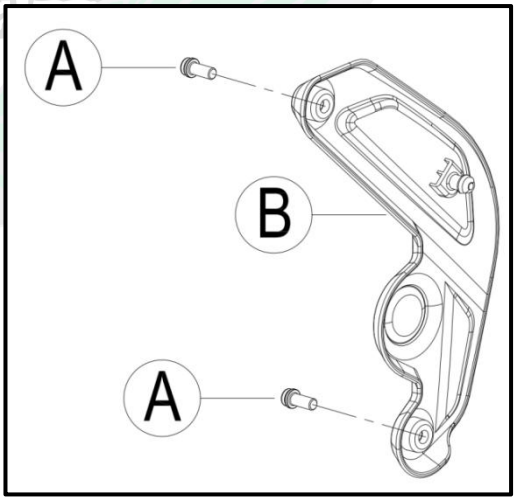
Locking torque of left cover mounting screw [A]: 10 N·m

Remove right cover of frame

●Disassemble:

Bolt M6×1×16[A]

Right cover of frame [B]



Installation of right cover

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque of right cover mounting screw [A]: 10 N·m

Locking torque of right cover mounting screw [B]: 10 N·m

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Side cover

Disassembly of side cover

●Remove the seat cushion (see "Cushion" - "Removing Seat Cushion")

● Remove the left cover (see "Left Cover" - "Remove Left Cover")

● Remove the right cover (see "Right Cover" - "Remove Right Cover")

●Disassemble:

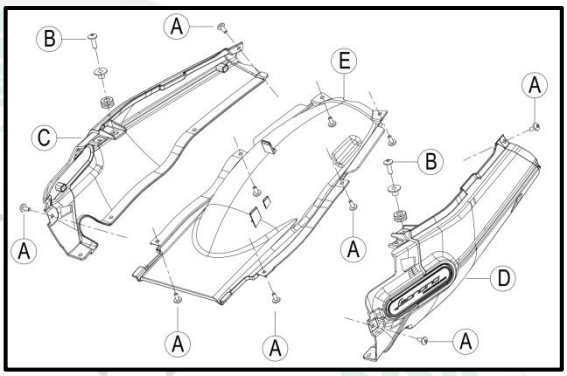
Stainless steel bolt M5×12 [A]

Bolt M6×19[B]

Right tail cover [C]

Left side cover [D]

Cowling [E]



●Disassemble:

Bolt M6×19[A]

Self-tapping screw ST4.2×13[B]

Screw M6×20 [C]

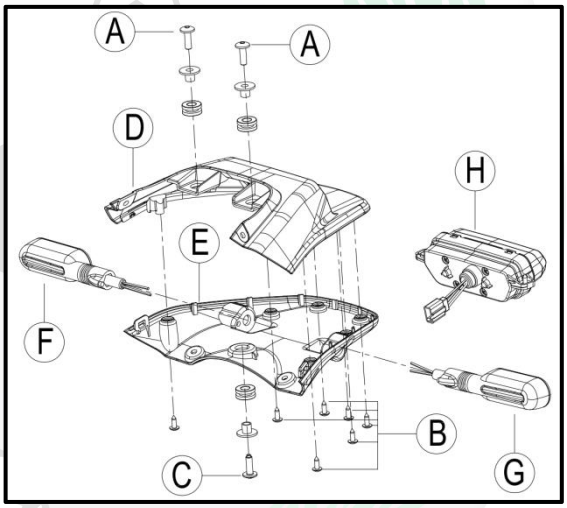
Taillight cover [D]

Rear fender [E]

Rear right turn signal light [F]

Rear left turn signal light [G]

Taillight [H]



Installation of Side Cover

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque of side cover mounting screw [A]: 6 N·m

Locking torque of side cover mounting screw [B]: 10 N·m

Locking torque of taillight cover mounting screw: 10 N·m

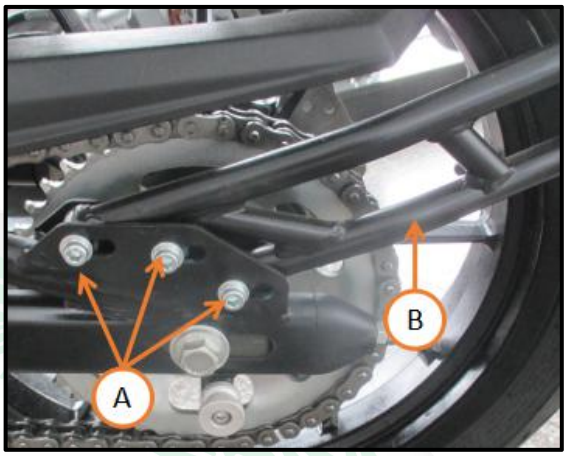
Locking torque of rear fender mounting screw: 10 N·m

Rear part of rear fender

Disassembly of rear part of rear fender

● Remove the screw [A] and remove the rear fender bracket [B] from the rear swing arm

●Unplug the rear license plate light connector



●Disassemble:

Self-tapping screw for mounting rear license plate light ST4.2×16[A]

Rear license plate light [B]

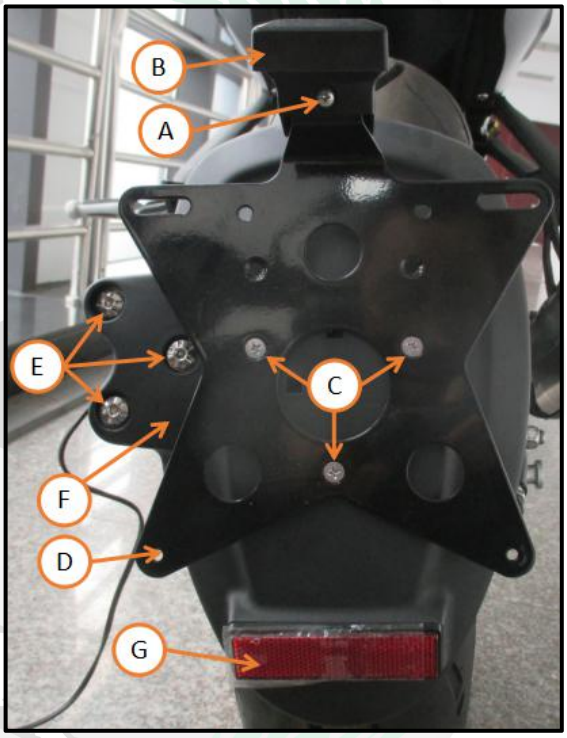
Rear license bracket mounting screw M5×16[C]

Rear license plate bracket [D]

Mounting screw at the rear part of rear fender M6×20[E]

Rear part of rear fender [F]

Rear reflector [G]



Installation of Rear Part of Rear Fender

● Install the parts that have been removed before in the reverse order of disassembly.

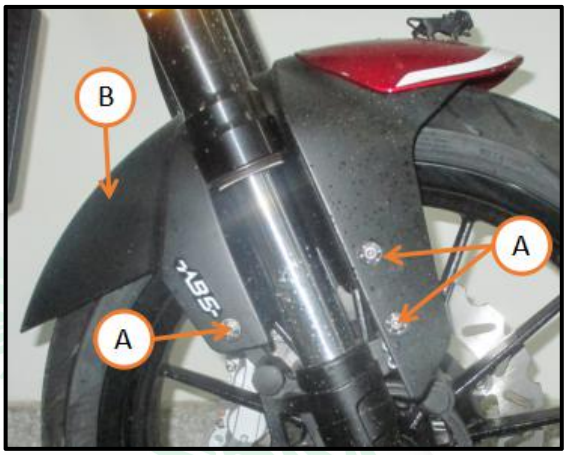
Torque of fastening screw of rear fender bracket: 22 N·m

Torque of mounting screw at the rear part of rear fender: 10 N·m

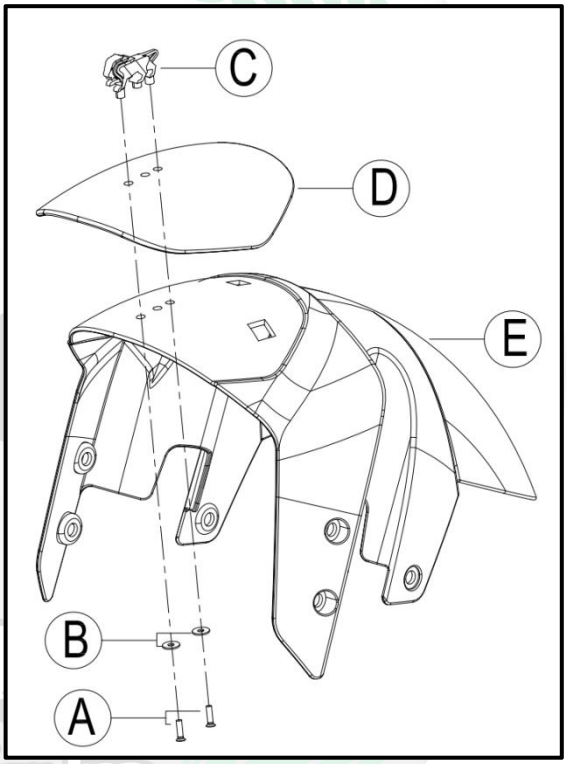
Front fender

Disassembly of Front Fender

● Remove the screw [A] and remove the front fender [B] from the front shock absorber



●Disassemble:
Screw M3×6 [A]
Gasket φ4 [B]
Front fender label [C]
Front small fender [D]
Front fender [E]



Installation of Front Fender

● Install the parts that have been removed before in the reverse order of disassembly.
Torque of fastening screw of front fender: 10 N·m

Tank cover

Disassembly of Fuel Tank Cover

●Remove the front seat cushion (see "Cushion" - "Removing Seat Cushion")

●Remove the left and right front panels (see “Front Large Cover and Left and Right Front Panels” – “Removing the Front Cover and Left and Right Front Panels”)

● Remove the left and right covers (see "Covers" - "Removing Left Cover" and "Removing Right Cover")

● Remove the fuel tank cover component [A].

Remove the mounting screw [A] and disassemble the fuel tank cover component [B].

Exploded view (see "Expanded View of Fuel Tank Cover" for details)

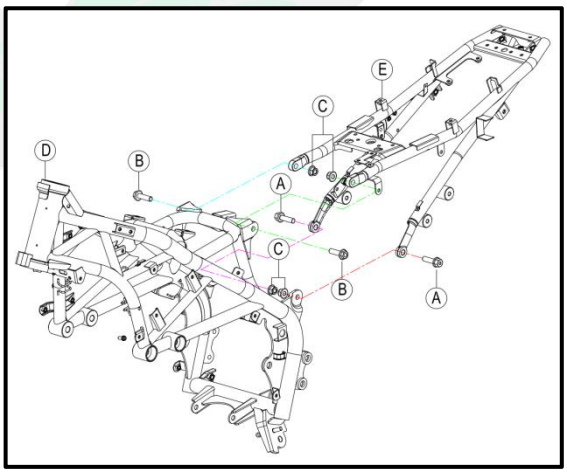
Installation of Fuel Tank Cover

● Install the parts that have been removed before in the reverse order of disassembly.

Frame

Disassembly of Frame

● Drain the oil (see "Periodic Maintenance" - "Replacing Oil" for details),
● Drain the coolant (see "Periodic Maintenance" -"Replacing Coolant" for details).
●Disassemble:
Seat cushion (see “Frame” – “Removing Seat Cushion”)
Rear shelf and side box bracket (see “Rear Shelf and Side Box Bracket” – “Removing Rear Shelf and Side Box Bracket” for details)
Fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details)
Cover (see “Covers” – “Removing Cover)
Side cover (see "Side Cover" - "Removing Side Cover")
Rear fender (see "Rear Fender" - "Removing Rear Fender")
Windshield and cowling (see "Windshield and Cowling" - "Removing Windshield and Cowling")
Front large cover and left and right front panels (see “Front Large Cover and Left and Right Front Panels” – “Removing the Front Cover and Left and Right Front Panels”)
Radiator (see “Radiator” - “Removing Radiator” for details).
Muffler (see “Muffler” – “Removing Muffler” for details)
Engine (see "Engine" - "Removing Engine" for details)
Brake (see "Front Calipers" - "Removing Front Calipers", "Rear Calipers" - "Removing Rear Calipers", "Front Master Cylinder" - "Removing Front Master Cylinder", "Rear Master Cylinder" - "Removing Rear Master Cylinder")
Rear wheel (see “Rear Wheel” – “Removing Rear Wheel”)
Front wheel (see “Front Wheel” – “Removing Front Wheel”)
Suspension system (see “Front Shock Absorber” – “Removing Front Shock Absorber”, “Rear Shock Absorber” – “Removing Rear Shock Absorber” for details)
Rear swing arm (see “Rear Swing Arm” - "Removing Rear Swing Arm" for details).
Sidestand (see "Sidestand" - "Removing Sidestand")
Front and rear footpegs (see "Front Left Footpeg" - "Removing Front Left Footpeg", "Front Right Footpeg" - "Removing Front Right Footpeg", "Rear Left Footpeg" - "Removing Rear Left Footpeg", "Rear Right Footpeg" - "Removing Rear Right Footpeg")
● Remove cables and other electrical components.
●Disassemble
Double-end bolt of frame [A]
Bolt M10×1.25×35[B]
Self-locking nut M10×1.25 [C]
Front frame welding component [D]
Rear frame welding component [E]



Installation of Frame

● Install the parts that have been removed before in the reverse order of disassembly (see the corresponding chapters).

Locking torque:

Locking torque of double-end bolt for connecting frame [A]: 45 N·m

Locking torque of bolt M10×1.25×35[B]: 45 N·m

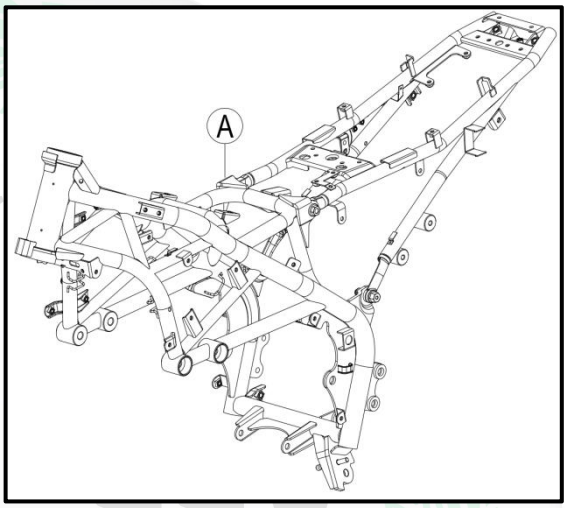
Inspection of Frame

● Visually check the frame [A] for cracks, dents, bends or deformations.

★ If the frame is damaged, please replace it!

⚠ Warning

A repaired frame may fail during use and thus cause an accident. Therefore, if there is any crack, dent, bend or deformation on the frame, please replace it!



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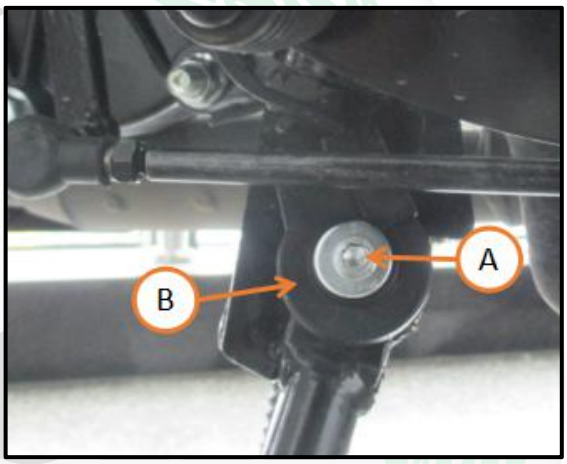
Sidestand

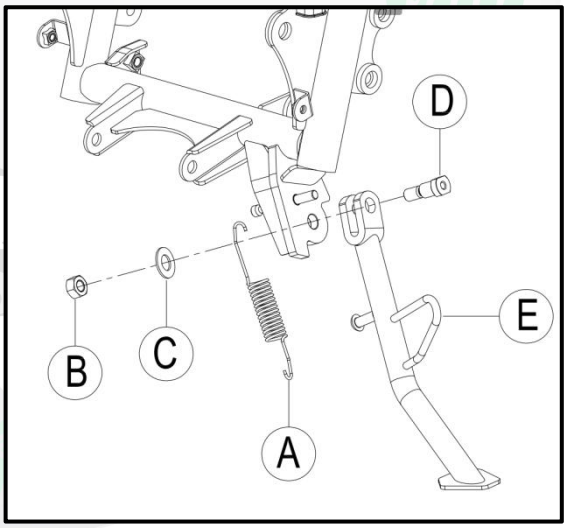
Disassembly of Sidestand

● Lift the rear wheel from the ground using a bracket.

●Remove the screw [A], and remove the sidestand stop switch [B].



●Disassemble:
Sidestand spring [A]
Nut [B]
Washer [C]
Sidestand spring [D]
Sidestand [E]



Installation of Sidestand

● Apply grease to the movable parts of sidestand [E].
● Apply locking agent to the threads of sidestand bolt [C].
● Tighten the bolt and lock it with the nut [B].
Locking torque:
Sidestand bolt [A]: 45 N·m
Locknut of sidestand bolt [B]: 45 N·m
● Install the spring [A] with the long one facing up.

Left Front Footpeg

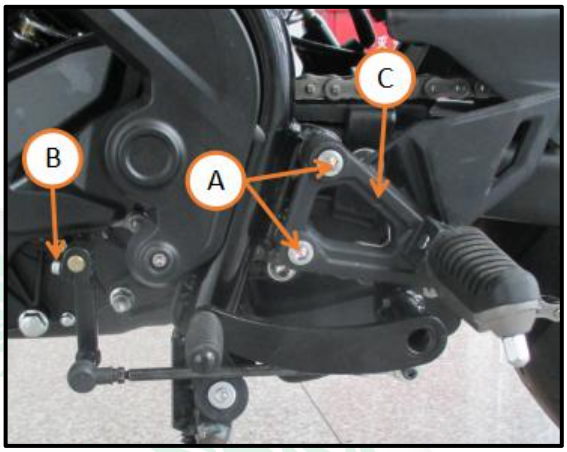
Disassembly of Left Front Footpeg

●Disassemble:

Hexagon socket cap screw M10×40[A]

Bolt M6×22[B]

Left front footpeg bracket [C]



●Disassemble

Shift pedal component [A]

Welding component of shift pedal mounting base [C]

Footpeg mounting pin [B]

Left front footpeg bracket [D]

Left front pedal component [E]

Footpeg mounting bushing [F]

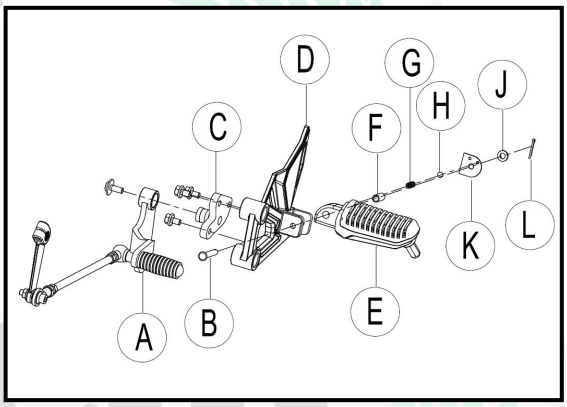
Front pedal spring [G]

Steel ball [H]

Pedal mounting bracket [K]

Washer [J]

Cotter pin [L]



Installation of Left Front Footpeg

●Add grease to the footpeg mounting bushing before installation.

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Shift pedal mounting bolt 10 N·m

Mounting bolt of shift pedal mounting base welding component: 10 N·m

Left front footpeg bracket mounting screw: 40 N·m

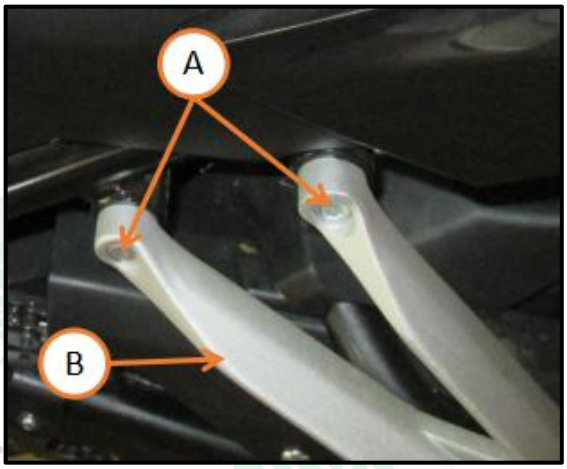
Left Rear Footpeg

Disassembly of Left Rear Footpeg

●Disassemble:

Screw [A]

Left rear footpeg bracket [B]



●Disassemble

Left rear footpeg bracket [A]

Clip [B]

Pedal mounting bracket [C]

Footpeg ball [D]

Footpeg spring [E]

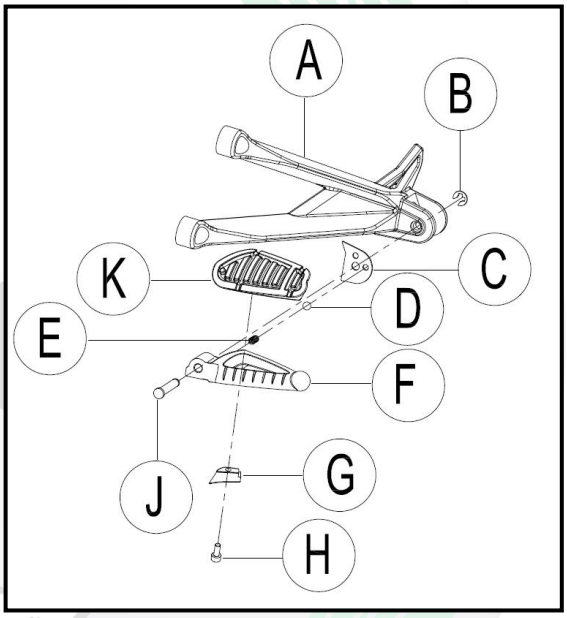
Left rear pedal [F]

Left pedal rubber pad [G]

Screw [H]

Footpeg mounting pin [J]

Left pedal rubber [K]



Installation of Left Rear Footpeg

●Add grease to the footpeg mounting pin before installation.

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Left rear footpeg bracket mounting screw: 22 N·m

Front Right Footpeg

Disassembly of Front Right Footpeg

● Remove the right front footpeg bracket (see “Brake” – “Removing Brake Pedal” for details)

●Disassemble

Right front footpeg bracket [A]

Footpeg mounting pin [B]

Right front pedal component [C]

Front pedal spring [D]

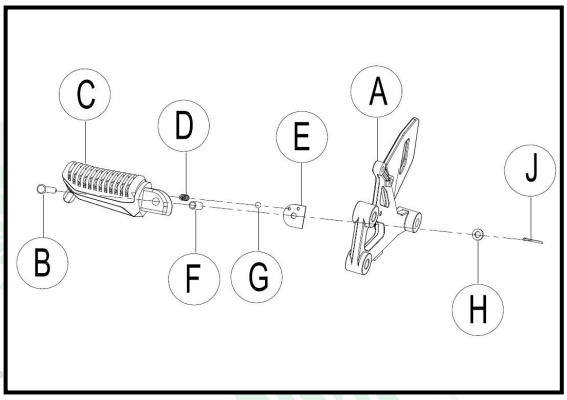
Pedal mounting bracket [E]

Footpeg mounting bushing [F]

Steel ball [G]

Washer [H]

Cotter pin [J]



Installation of Front Right Footpeg

●Add grease to the footpeg mounting bushing before installation.

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Right front footpeg bracket mounting screw: 22 N·m

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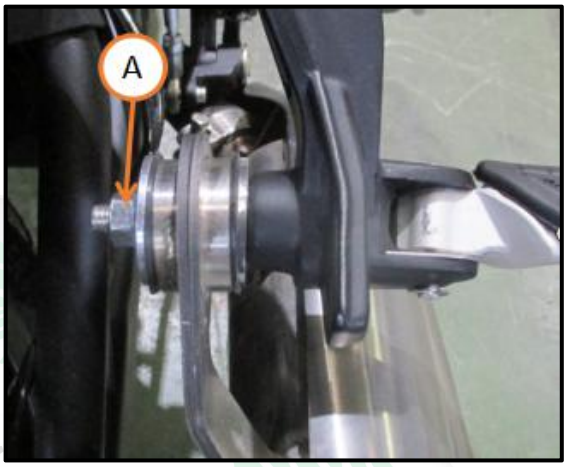
Rear Right Footpeg

Disassembly of Rear Right Footpeg

●Disassemble:

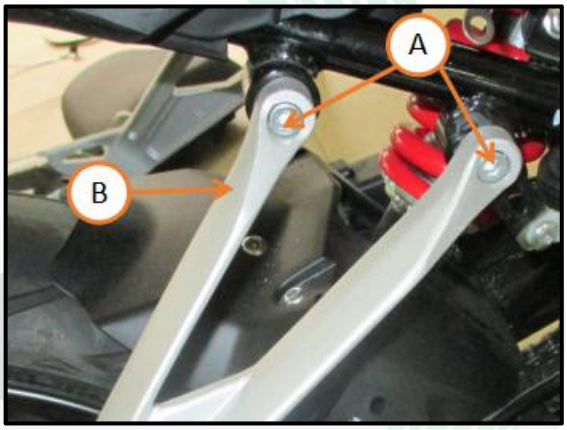
Nut [A]



●Disassemble:

Screw [A]

Right rear footpeg bracket [B]



●Disassemble

Right rear footpeg bracket [A]

Clip [B]

Pedal mounting bracket [C]

Footpeg ball [D]

Footpeg spring [E]

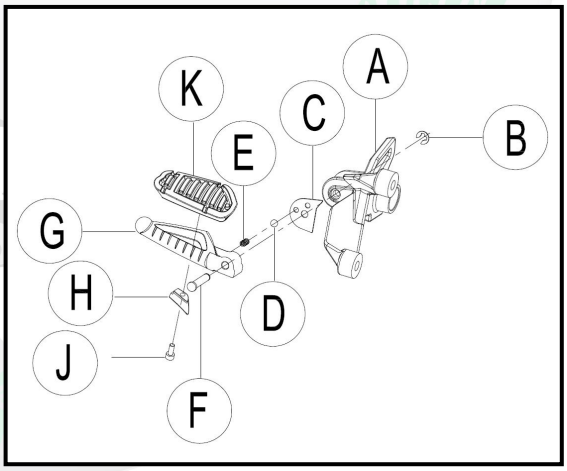
Left rear pedal [F]

Right pedal rubber pad [G]

Screw [H]

Footpeg mounting pin [J]

Left pedal rubber [K]



Installation of Rear Right Footpeg

●Add grease to the footpeg mounting pin before installation.

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Right rear footpeg bracket mounting screw: 22 N·m

Muffler barrel bracket mounting nut: 22 N•m

Muffler

Disassembly of muffler

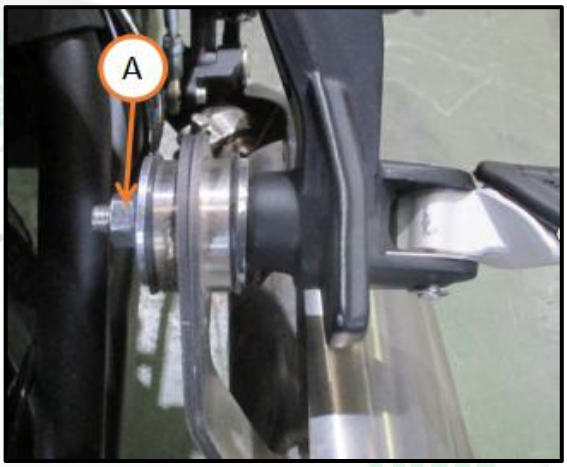
Warning

Do not remove the muffler while the engine is heated up, to avoid burns. Do not disassemble the muffler before it has cooled down.

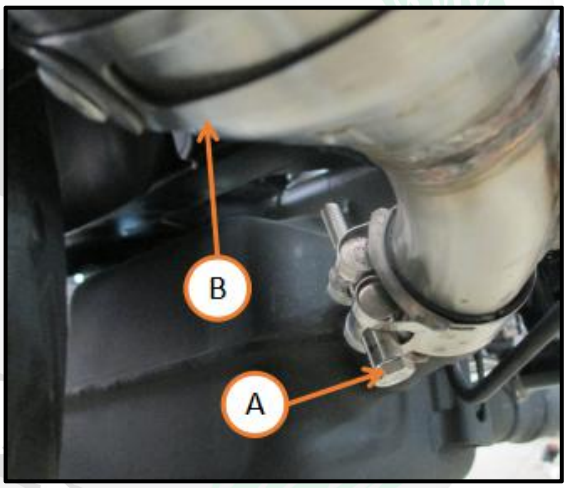
● Disconnect the oxygen sensor cable connector.

●Disassemble:

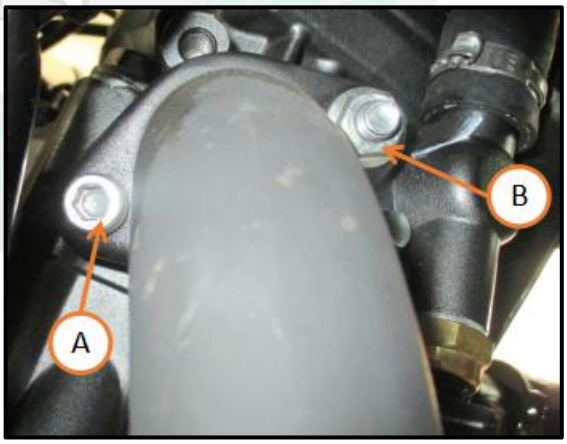
Nut [A]



● Loosen the clamp bolt [A] and remove the muffler barrel component [B].

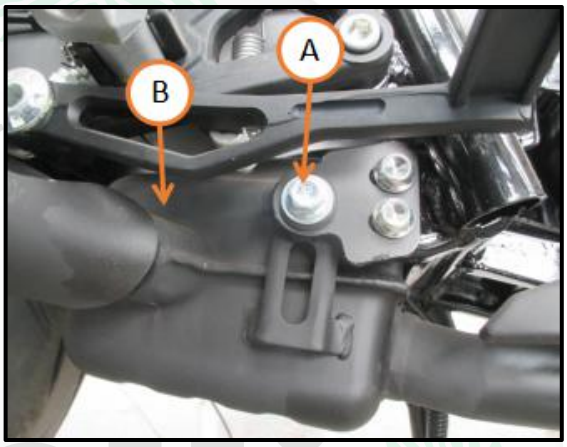


● Remove the front exhaust pipe retainer screw [A] and the mounting nut [B].



●Remove the exhaust pipe cavity on the left side and the frame mounting bolt [A]

●Remove the exhaust pipe cavity on the right side and the frame mounting bolt [A].
● Remove the muffler exhaust pipe component [B].

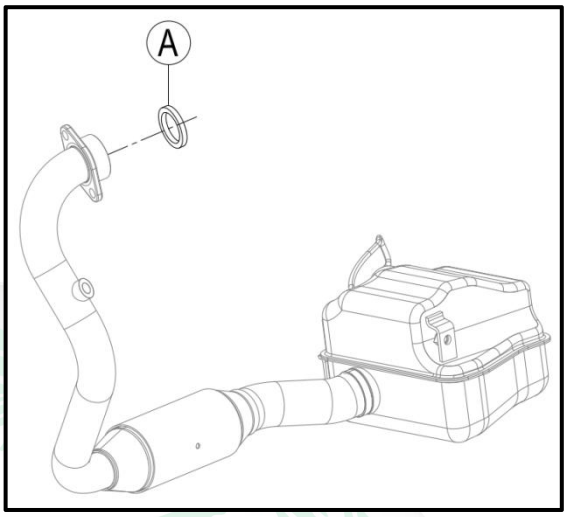


●Disassemble:
Oxygen sensor [A].

Installation of Muffler

● Install the parts that have been removed before in the reverse order of disassembly (see the corresponding chapters).

● Replace the exhaust pipe gasket [A] with a new one.



Locking torque:

Front exhaust pipe mounting screw: 22 N·m

Front exhaust pipe mounting nut: 22 N·m

Left and right mounting bolts of exhaust pipe cavity: 22 N·m

Rear mounting nut of muffler barrel: 22 N•m

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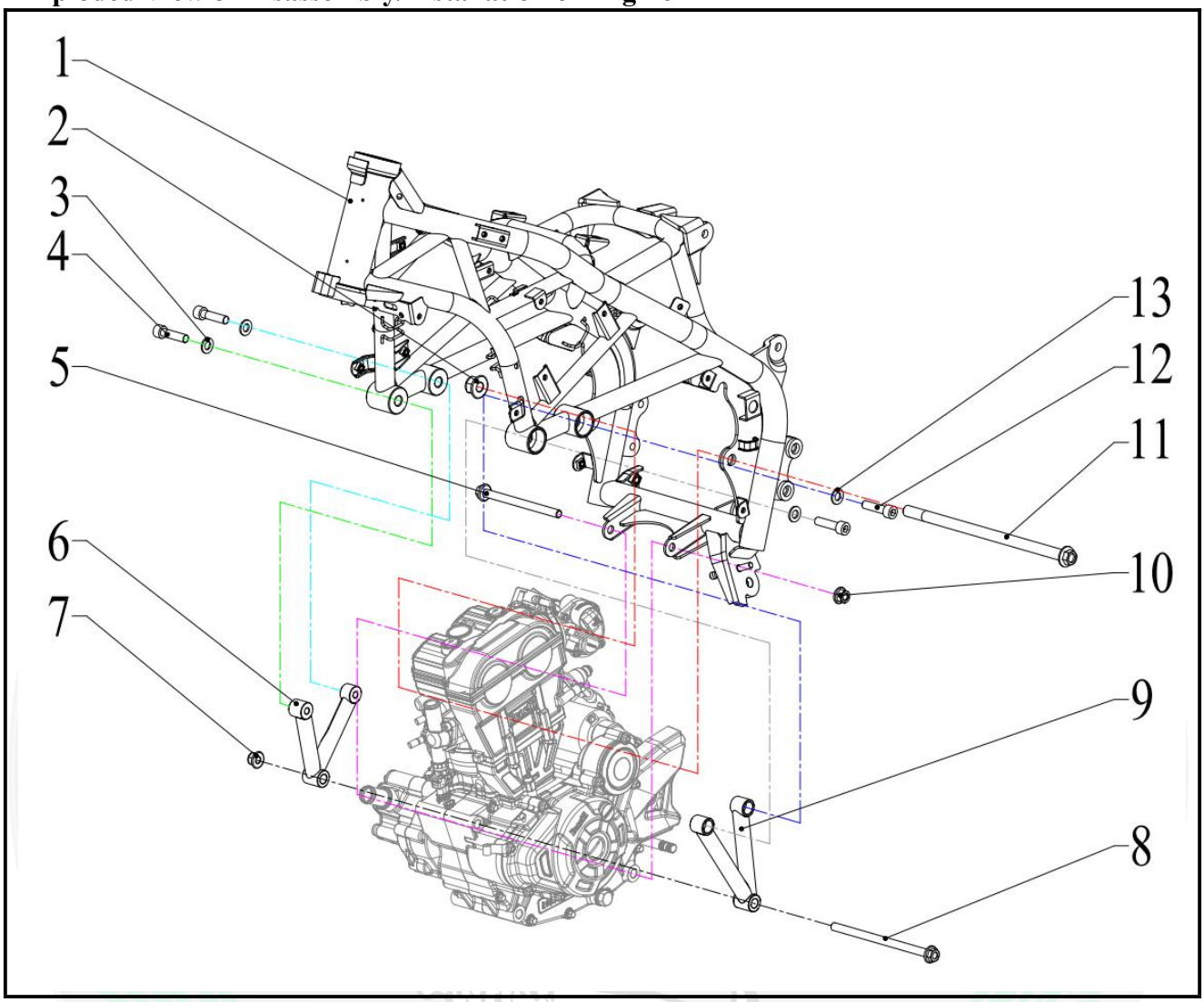
Disassembly/Installation of Engine

Exploded View of Disassembly/Installation of Engine



No	Name and specifications	Number of	Torque		Remarks
			N·m	kgf·m	
1	Front frame welding component	1	—	—	
2	Self-locking nut M14×1.5	1	108	10.8	
3	Washer 10	2	—	—	
4	Hexagon socket cap screw M10×40	2	40	4.0	AL、S
5	Bolt M10×1.25×130	1	45	4.5	AL、S
6	Front right bracket component of engine	1	—	—	
7	Nut M10×1.25	1	45	4.5	AL、S
8	Hexagon bolt with flange M10×1.25×165	1	45	4.5	AL、S
9	Front left bracket component of engine	1	—	—	
10	Nut M10×1.25	1	45	4.5	AL、S
11	Rear rocker arm mounting shaft	1	108	10.8	G
12	Hexagon socket cap screw M10×40	2	40	4.0	AL、S
13	Washer 10	2	—	—	

AL: Tighten the fastening bolts alternatively in accordance with the higher locking torque.

M: Apply the grease containing molybdenum disulfide.

G: Apply grease.

L: Apply locking agent.

R: Replace the part.

S: Observe the specified tightening sequence.

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Disassembly of Engine

●Support the rear part of rocker arm using a support [A].

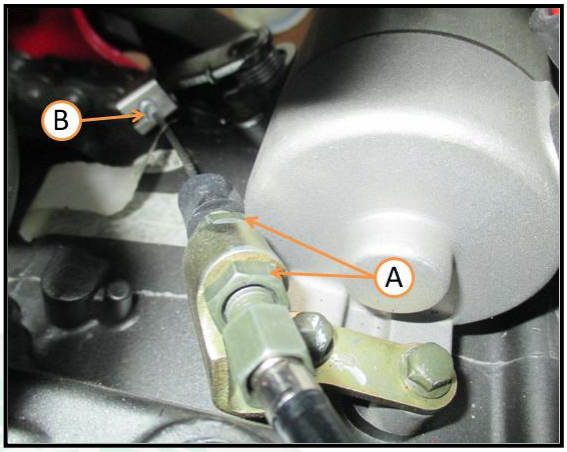
● Slowly grab the brake rod, and fasten it using a tire.

⚠Warning

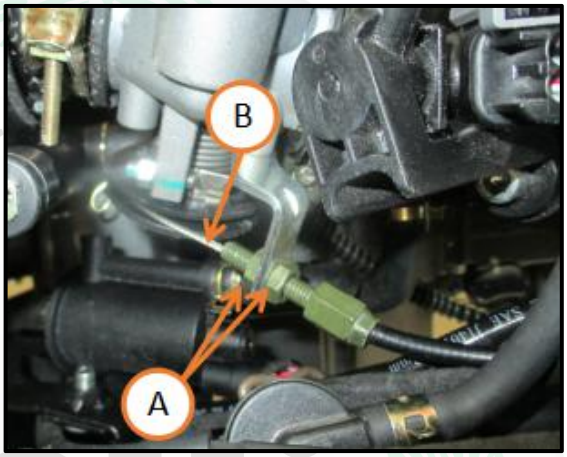
When disassemble the engine, the worker must grip the brake rod, otherwise, the motorcycle may topple and fall, thus causing accidents and resulting in personal injury.

● Drain the oil (see "Periodic Maintenance" - "Replacing Oil" for details),
● Drain the coolant (see "Periodic Maintenance" -"Replacing Coolant" for details).
●Disassemble:
●Seat cushion (see "Cushion" - "Removing Seat Cushion" for details),
cover (see “Frame” – “Removing Cover” for details).
front large cover and left and right front panels (see "Frame" - “Removing the Front Large Cover and Left and Right Front Panels” for details),
fuel tank (see “Electronic Fuel Injection System (EFI)” -“Removal of Fuel Tank” for details),
coolant reserve tank (see "Periodic Maintenance" - "Replacing Coolant" for details),
radiator (see “Cooling System” - “Removing Radiator and Radiator Fan” for details),
muffler (see “Frame” – “Removing Muffler” for details),
Drive chain (see "Drive" - "Removing Drive Chain")
●Support the engine with a suitable frame to keep the engine in balance.

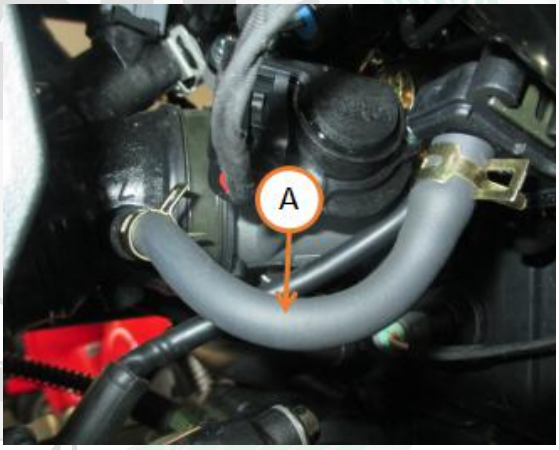
● Loosen the nut [A] and remove the clutch wire connector [B]



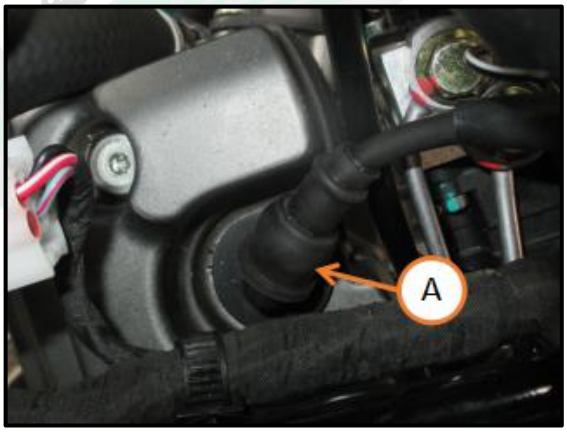
● Loosen the nut [A] and remove the throttle cable connector [B].



●Disconnect each air tube [A]

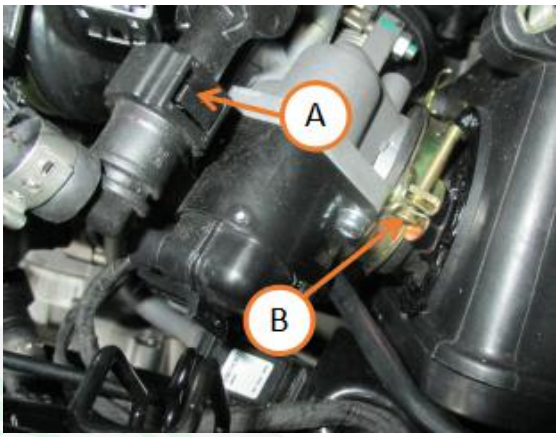


Remove the spark plug cap [A].

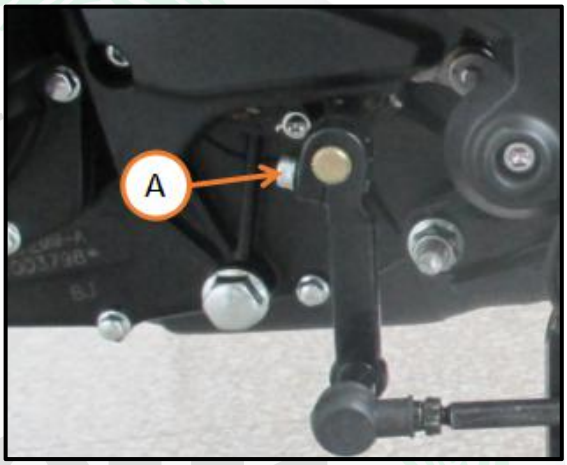


● Disconnect the fuel pipe joint [A] from the fuel injector.

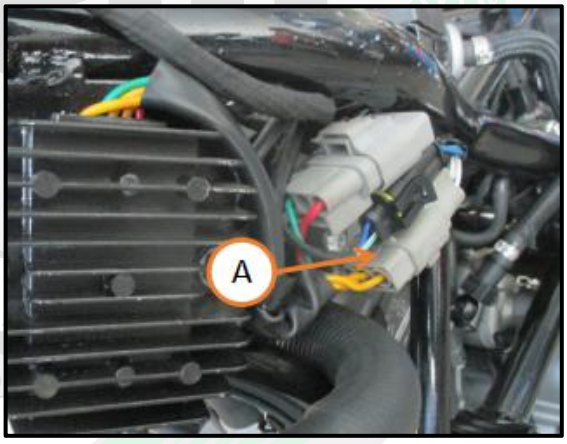
●Loosen the clamp between throttle and air filter [C]



● Remove the shift lever rocker arm mounting bolt [A] and remove the shift lever rocker arm.

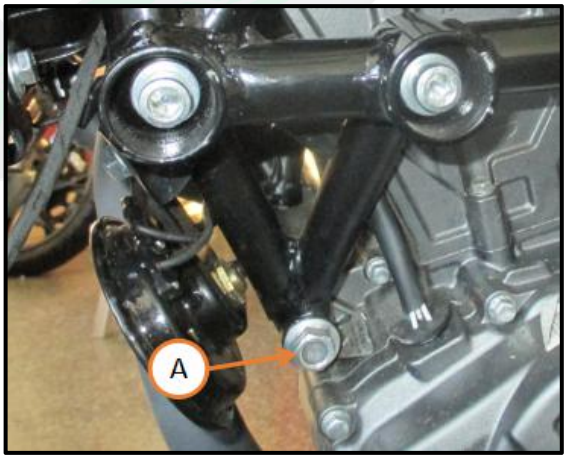


● Disconnect the connectors of each cable.

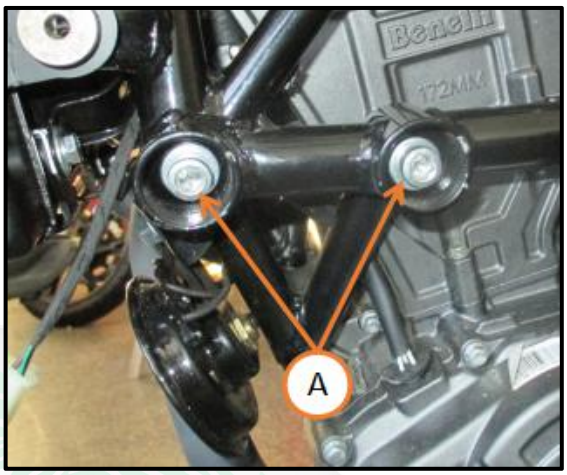


●Loosen:

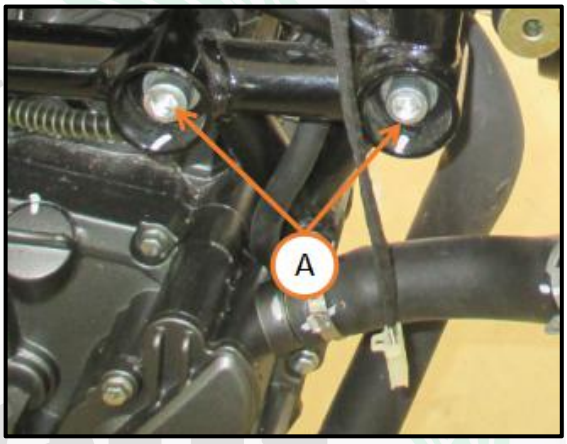
Front mounting bolt of engine [A].



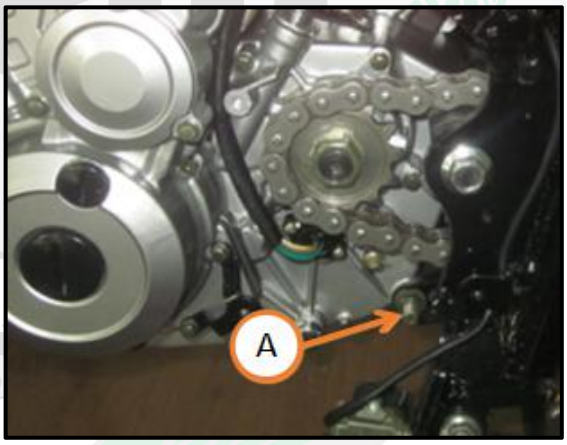
●Disassemble:
Front left bracket component mounting bolt of engine [A].



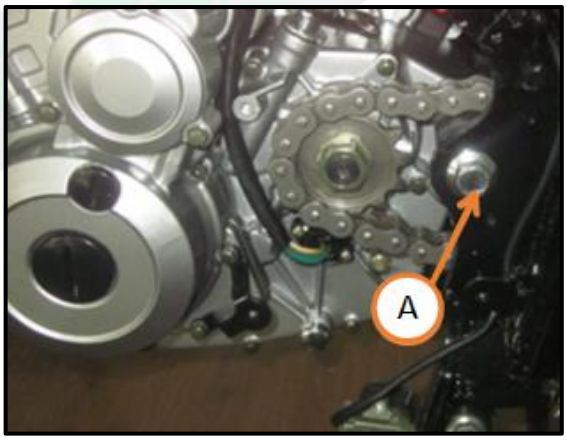
●Disassemble:
Front right bracket component mounting bolt of engine [A].



●Disassemble:
Remove the rear lower mounting bolt of engine [A].



●Disassemble:
Rear swing arm shaft [A].

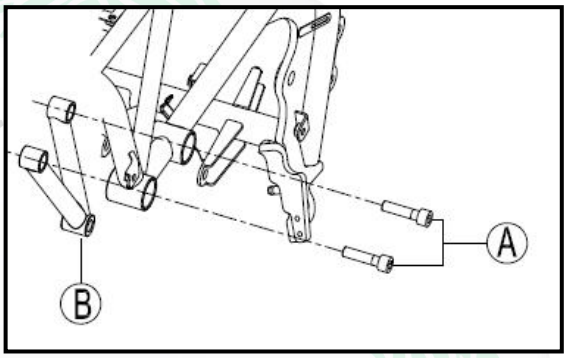


●Remove the engine with a frame.

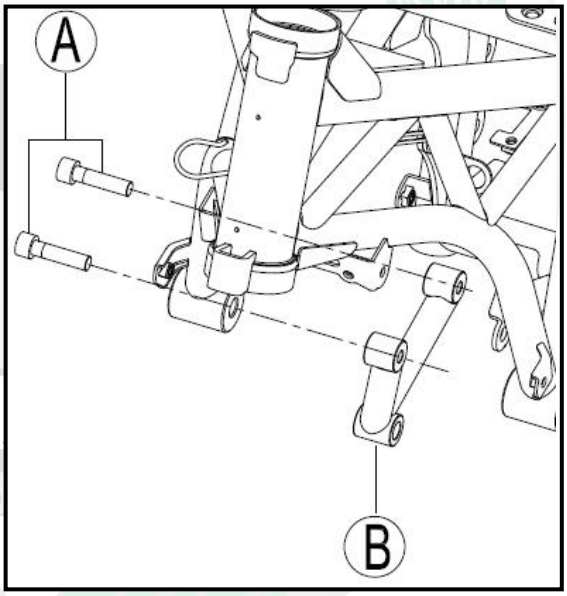
Installation of Engine

●Support the engine with a suitable frame.

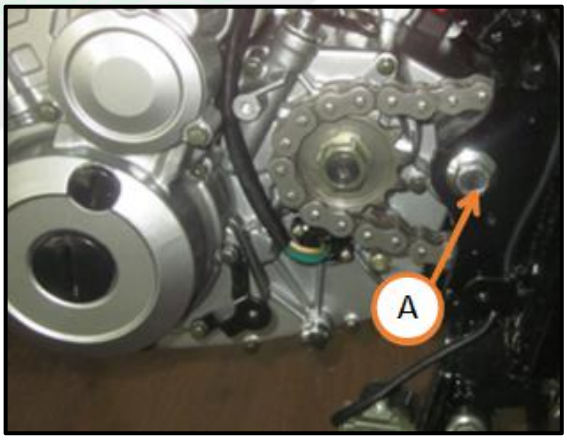
● Install the front left mounting bracket component [B] and do not tighten the screws [A] too tightly.



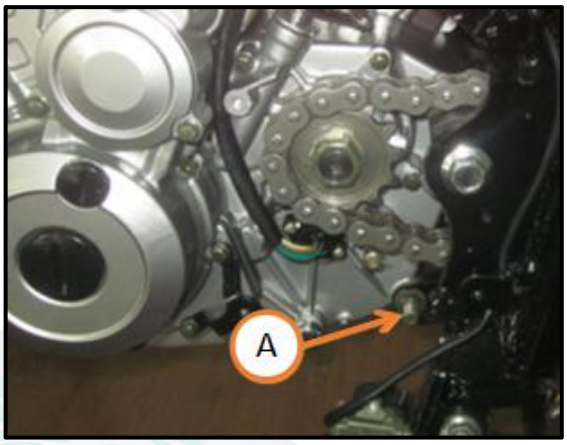
● Install the front right mounting bracket component [B] and do not tighten the screws [A] too tightly.



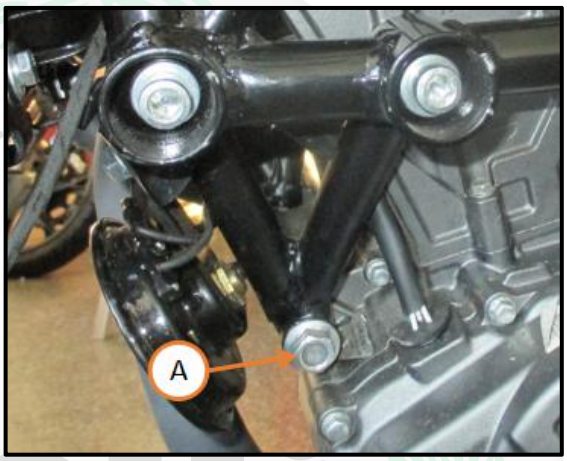
● Install rear swing arm shaft [A] and do not tighten it too tightly;



●Install the rear lower mounting bolt of engine [A], and do not tighten it too tightly;



●Install the front mounting bolt of engine [A], and do not tighten it too tightly;



●Tighten the bolts, screws or nuts as follows:
○Step I: Lock the rear swing arm shaft
○Step II: Lock the rear lower mounting bolt of engine
○Step III: Lock the front mounting bolt of engine
○Step IV: Lock the left engine bracket screw and the right engine bracket screw.
○Step V: Mark each fastening bolt, screw and nut that locked to the specified torque.

Remarks
○ Fasten the mounting bolts, screws or nuts in three steps

○Locking torque:
Rear swing arm shaft: 108 N·m
Rear lower mounting bolt of engine: 45 N·m
Front mounting bolt of engine: 45 N·m
Left bracket mounting screw of engine: 40 N·m
● Properly arrange the wire, cable and hose (see "Appendix" - "Winding Method of Cables, Wires and Hoses" for details).
●Install the parts disassembled previously (see the corresponding chapters).
●Adjustment:
○ Throttle cable (see “Periodic Maintenance” – “Checking Throttle Control System”),

● Drive chain (see “Periodic Maintenance” – “Inspection of Slackness of Drive Chain” for details)
● Fill the engine with oil (see "Periodic Maintenance" - "Replacing Oil" for details),
●Add coolant to the engine and drain the air from the cooling system (see "Periodic Maintenance" -"Replacing Coolant" for details).

Chapter VII Electrical System

Contents

Precautions 397
Technical parameters 398
Special too 339
Electrical wiring 400
- Wiring check 400

Charging system 401
- Charging system circuit diagram 401
- Battery 402
  - Disassembly of battery 402
  - Installation of battery 402
  - Activation of battery 403
  - First charge 404
  - Inspection of charging state 406
- Alternator 408
  - Disassembly of alternator 408
  - Inspection of alternator 409
  - Installation of alternator 409
- Voltage regulator/rectifier 410
  - Disassembly of rectifier 410
  - Inspection of circuit at main wiring terminal 410
  - Inspection of rectifier 410
  - Installation of rectifier 411

Ignition system circuit diagram 412
- Ignition system circuit diagram 412
- Precautions for operation 412
- Crankshaft sensor 413
  - Disassembly of crankshaft position sensor 413
  - Inspection of crankshaft position sensor 413
- Ignition coil 414
  - Disassembly of ignition coil: 414
  - Inspection of ignition coil 414
  - Installation of ignition coil 414
- Spark plug 415
  - Inspection of spark plug 415
  - Inspection 415
  - Inspection of IC igniter 416
- ECU unit 416
- Ignition system troubleshooting 417

Starter system 418
- Starter system circuit diagram 418
- Starter motor 419

Disassembly of starter motor 419
Inspection of starter motor 419
Inspection of brush 419
Cleaning and Inspection of commutator 420
Inspection of brush lead 420
Inspection of right end cover assembly 421
Installation of starter motor 421
Starter relay 422
Disassembly of starter relay 422
Inspection of action of starter relay 422
Installation of starter relay 422
Lighting system 423
Headlight 423
Disassembly of headlight relay controller 423
Inspection of headlight relay controller 423
Installation of headlight relay controller 423
Disassembly of headlight 424
Replacement of headlight bulb 425
Replacement of headlight bulb 425
Installation of headlight 425
Turn signal light 425
Disassembly of front turn signal light 425
Disassembly of rear turn signal light 426
Replacement of turn signal light bulb 426
Installation of turn signal light 426
Disassembly of flasher 426
Inspection of flasher 426
Installation of flasher 426
Taillight 427
Disassembly of taillight 427
Replacement of taillight bulb 427
Installation of taillight 427
License plate light 427
Disassembly of license plate light 427
Replacement of license plate light bulb 427
Installation of license plate light 427
Meter 428
Disassembly of meter 428
Installation of meter 428
Switch and sensor and other parts 429
Power lock switch 429
Disassembly of power lock 429
Inspection of power lock 429
Installation of power lock 429
Handlebar switch 430
Switch state (non-headlights are always on) 430

Switch state (headlights are always on) 431
Inspection of time for turning on brake light 432
Adjustment of time for turning on the brake light 432
Inspection of switch 432
Connection of rear brake light switch 432
Connection of sidestand switch 432
Speed sensor 433
Disassembly of speed sensor 433
Inspection of speed sensor 434
Installation of speed sensor 434
Oxygen sensor 435
Disassembly of oxygen sensor 435
Inspection of oxygen sensor 435
Installation of oxygen sensor 435
Fuel level sensor 436
Disassembly of fuel level sensor 436
Inspection of fuel level sensor 436
Installation of fuel level sensor 436
Horn 437
Disassembly of horn 437
Inspection of horn 437
Installation of horn 437
Fan 438
Disassembly of fan 438
Inspection of fan 438
Installation of fan 439
Water temperature switch 440
Disassembly of water temperature switch 440
Inspection of water temperature switch 440
Installation of water temperature switch 440
Relay and fuse box 441
Disassembly of relay and fuse box 441
Inspection of relay circuit 442
Inspection of relay circuit (disconnect battery) 442
Inspection of relay circuit (with battery) 442
Internal circuit of relay box 443
Fuse 445
Disassembly of fuse 445
Installation of fuse 446
Inspection of fuse 447

Precautions

There are the following important precautions in the process of overhauling the electrical system. Learn and follow all of the following rules.

○ Do not reverse the positive and negative terminals of battery, otherwise, the diodes of electrical components may be burned out.

○ Check the battery status before checking other parts of the electrical system. The battery must be fully charged before conducting accurate electrical system testing.

○The electrical components should be protected from severe impact by hammers, and are not allowed to fall on hard surfaces. This impact on electrical components may cause damage.

○To prevent damage to electrical components, do not disconnect the battery cable or any other electrical connections while the ignition switch is on or while the engine is running.

○ When the starter motor cannot rotate due to large current, do not press the start button all the time, otherwise, the current may burn out the starter motor coil.

○ Be careful not to short connect the cable between the positive terminal of battery and the ground wire of frame.

○Sometimes a fault may involve one project, and sometimes it may involve all projects. Do not replace the faulty part if the exact cause of fault is not found. If the fault is caused by other causes, it must be repaired or replaced immediately, otherwise, the new parts may be damaged again.

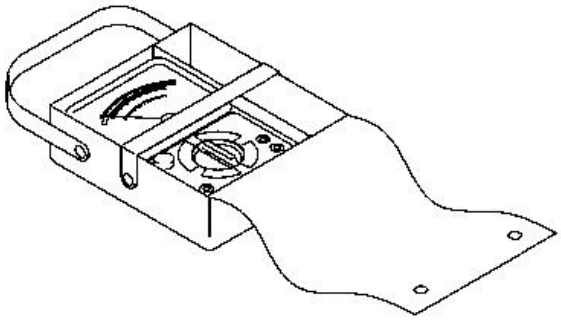
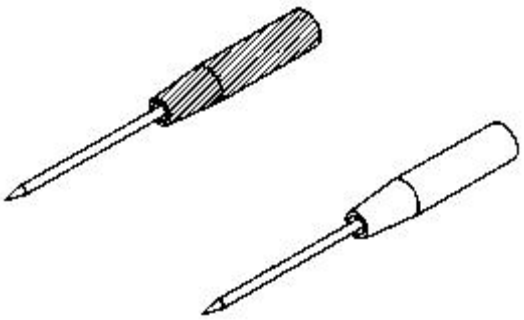
○ Ensure that all circuit connectors are clean and tight, and check the wires for signs of burnout or wear. Broken wires and poor contact may affect the operation of power system.

○Measure the coil and winding resistance after the component is cooled (at room temperature)

Technical parameters

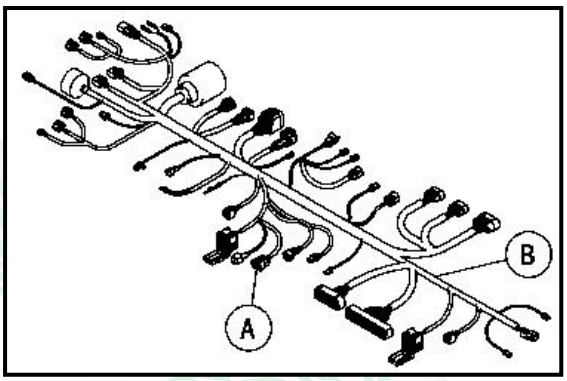
Item	Normal
Battery	
identity	Maintenance-free battery
Model	YTX7L-BS
Capacity	12 V 6 Ah
Voltage	12V
Charging System	
identity	Three-phase alternating current
Alternator output voltage	55V or higher at 5000 r/min (rpm)
Stator coil resistance	0.05 to 0.5 Ω (normal temperature of 20℃)
Charging voltage	14～15V
(Regulator / rectifier output voltage)	
Ignition System	
Crankshaft position sensor resistance	150±10Ω
Ignition coil:	
Primary coil resistance	0.58Ω±10%
Primary coil resistance	8.kΩ±15%
Primary maximum operating voltage	15V
Spark plug:	
identity	CR8E
Clearance	0.7±0.1 mm
Electric Starting System	
Starter motor:	
Brush length	10 mm (lifetime: 5.0 mm)
Commutator diameter	28 mm (lifetime: 27 mm)
Meter, gauge, indicating device	
Power voltage of speed sensor	About 12 V
Switch and Sensor	
Rear brake light switch actuation clearance	Turn it on after the pedal stroke is up to about 20mm
Engine oil pressure switch connector	Engine is stopped: ON
	Engine is running: OFF
Water temperature sensor resistance	In the text
Fuel level sensor component:	
Full fuel level	9 ～11 Q
Empty fuel level	213 ～219 Q

Special tool

Multimeter:	Needle meter probe:
	

Electrical wiring

Wiring check



● Visually check signs such as wire melting and wear.

★ If the wire is broken, the damaged wire must be replaced.

● Pull out each joint [A] to check for corrosion, dirt and damage.

★ If the joint is corroded or dirty, carefully clean it. If the connector is damaged, replace it.

● Check whether the circuit is normal.

○ Use the wiring diagram to find the power cable terminal that may be defective.

○ Connect the multimeter between the power cable terminals.

Special tool - multimeter:

○ Set the multimeter to the x 1Ω range and read the multimeter reading.

★ If the multimeter has no reading and display 0 Ω, there is a problem with the power cable. Replace the lead and main cable [B] if necessary.

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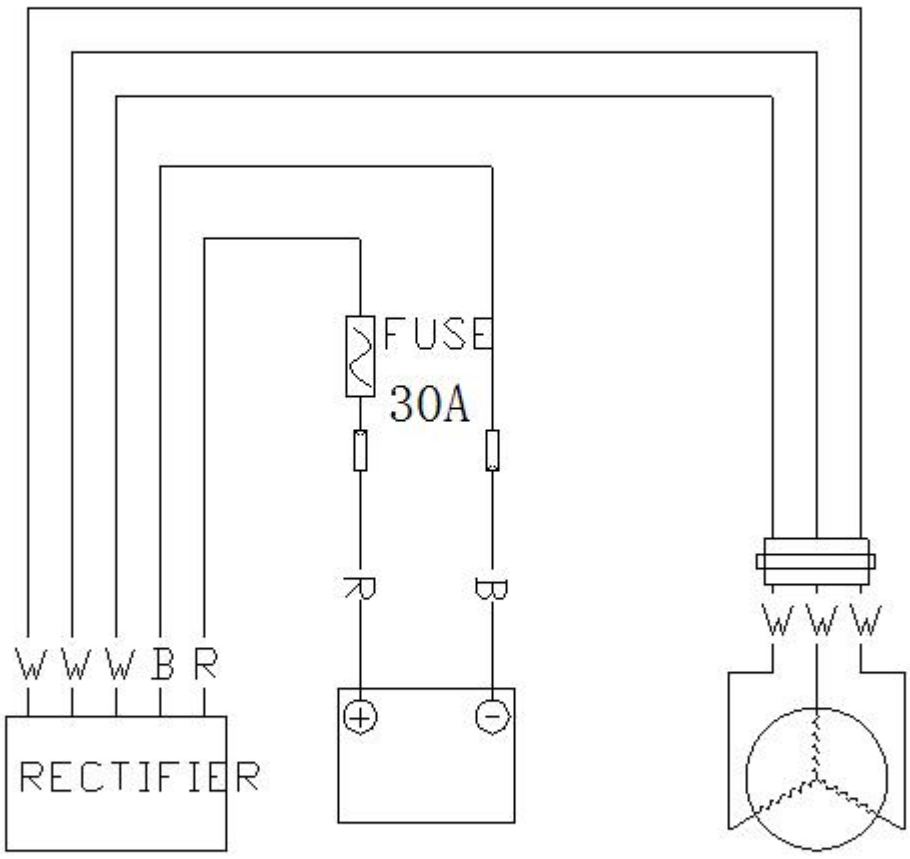
Charging System

Charging system circuit diagram



Charging system

Battery

Disassemble battery

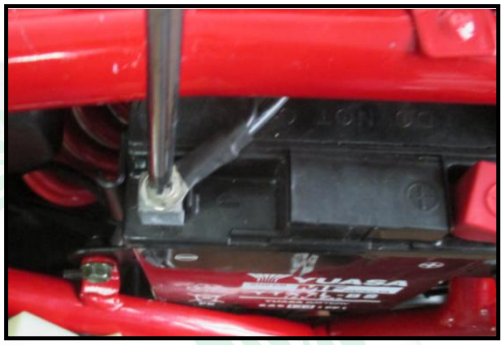
●Turn off the power lock

●Remove seat cushion (see "Frame" - "Removing Seat Cushion")

● Remove right cover (see “Frame” – “Removing Right Cover” for details).

● Remove the negative pole of battery

*Note
○ Make sure to disconnect the negative electrode (-) of cable first



● Remove the positive pole of battery

● Remove the battery strap [A].

● Take the battery [B] out of the battery holder.

Install battery

●Load the battery into the bracket

●Connect the negative pole (-) of cable to the battery

● Apply a thin layer of grease to the terminals to prevent corrosion

●Connect the positive pole (-) of cable to the battery

● Cover the (+) terminal block with the red cover [A]

● Install the battery cover on the battery and hook the strap

●Connect connector

●Connect the negative pole (-) of cable to the frame

● Install the parts that have been removed before in the reverse order of disassembly.

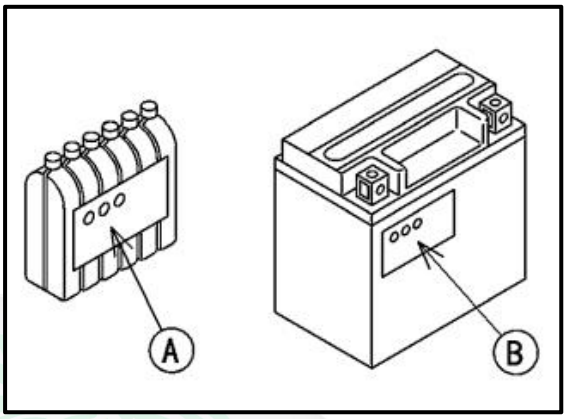
Activation of battery

●Fill the electrolyte

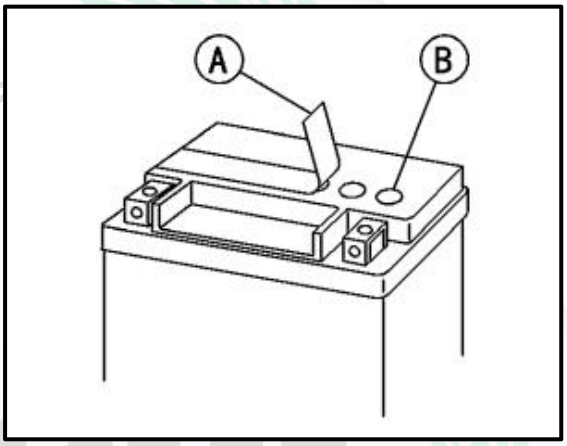
○ Make sure that the model number [A] marked on the electrolyte bottle matches the model number [B] of the battery. These models must be the same.

Battery model: YTX7L-BS

⚠Warning
Always use the same type of electrolyte as the one marked on the battery. Because of different battery types, the volume and density of the electrolyte used are different. This is to prevent overfilling the electrolyte and shorten battery life and battery performance.



⚠Warning
Do not tear the aluminum sealing piece [A] from the filling port [B] before use. **Ensure that a dedicated electrolyte storage container is used to ensure the correct volume of electrolyte is filled**



○ put the battery on the horizontal surface

○ Check the seal for peeling, cracks or holes

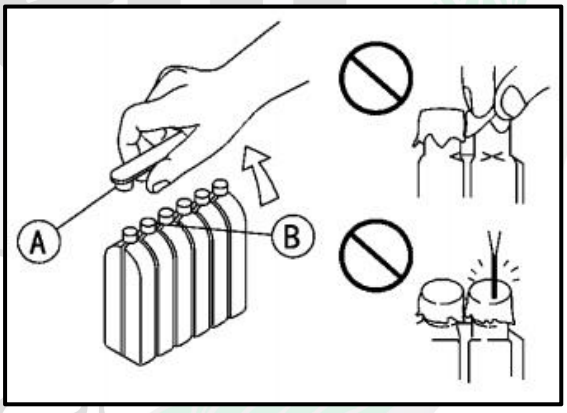
○Removing the sealing strips

*Note
○ The battery is vacuum sealed. *If the seal leaks air into the battery, the first charge may take longer.*

●Take out the electrolyte bottle from the plastic bag

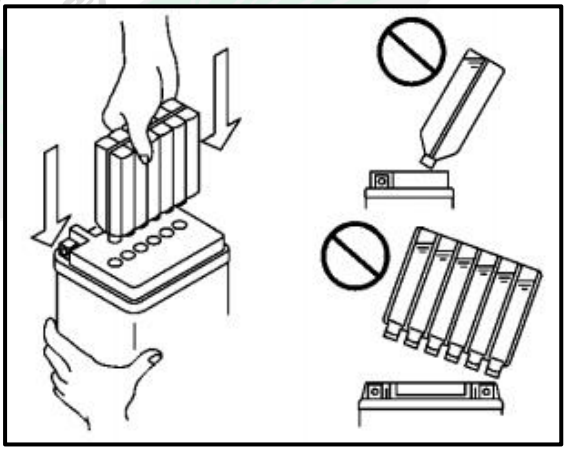
●Remove the strip cover [A] from the container and set it aside, and later use these to seal the battery later.

***Note**
Do not puncture or open the seal layer [B] of electrolyte bottle. *Do not attempt to separate a single reservoir.*

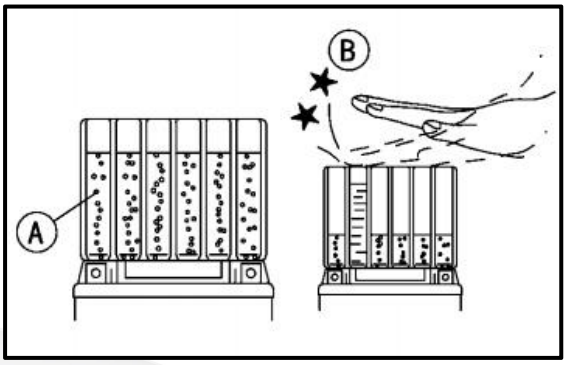


● Lay the electrolyte bottle down and place the six sealing slots into the filling port of battery. Keep the electrolyte bottle level and push down to puncture the seal of all six reservoirs. As the seal reservoir is inserted into the filling port, you will see bubbles rising in the reservoir.

***Note**
○ Do not tilt the electrolyte bottle



●Check the electrolyte flow



★ If there is no air bubble rising in the filling port [A], or if the electrolyte is not completely injected into the battery, tap the electrolyte bottle [B] for several times.

● Keep the electrolyte bottle in this position for 20 minutes or longer. Do not remove the container from the battery before it becomes empty. The normal operation of battery requires all the electrolyte in the container.

⚠Warning
If the electrolyte in the electrolyte bottle is not completely injected into the battery, the battery life may be shortened. It takes at least 20 minutes for the electrolyte to completely fill the battery. Do not remove the electrolyte bottle until then.

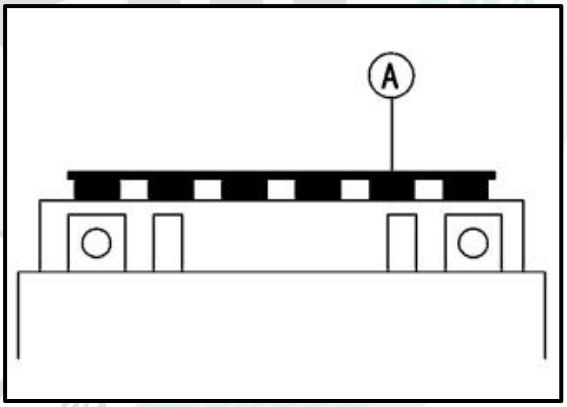
● Gently remove the electrolyte bottle from the battery

● Allow the battery to stand for 60 minutes before charging so that the electrolyte penetrates into the metal plate for optimum performance.

*Note
○ If the battery is charged immediately after filling, the battery life may be shortened. Allow the battery to stand for at least 60 minutes after filling.

First charge

● Gently cover the strip [A] cover on the filling port, do not press it completely

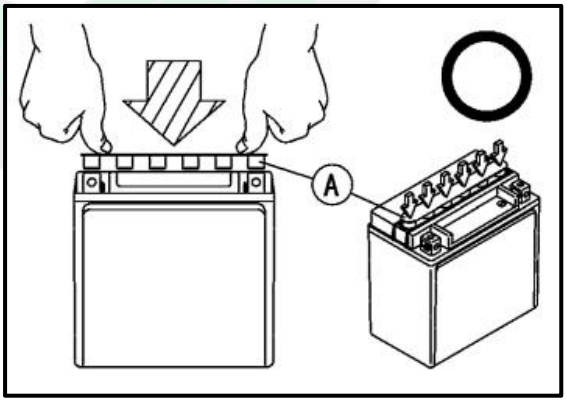


●The newly activated maintenance-free battery needs to be charged for the first time.

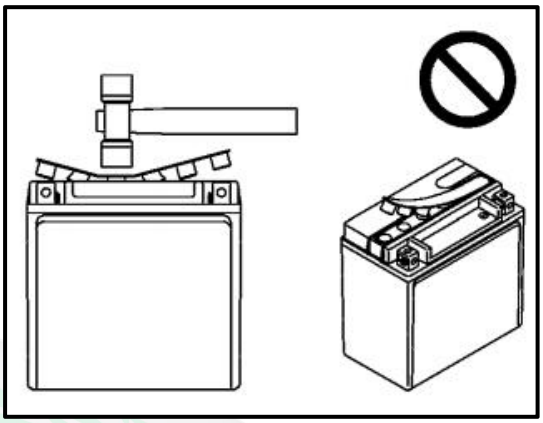
Standard charging: 0.9A x 5-10 hours

*Note
○ Charging rate depends on the storage time and temperature of battery and the type of charger used ○ After the first charge, allow the battery to stand for 30 minutes, then check the voltage with a voltmeter. If the voltage is less than 12.6V, repeat the charging cycle.

● After charging is completed, press firmly with both hands to make the strip cover [A] enter the battery (do not hit or beat). When properly installed, the strip cover will be flush with the top of battery.



⚠Warning
Once the strip cover is installed in the battery, do not move the lid or add water or electrolyte to the battery.



*Note
○ To ensure maximum battery life and increased customer satisfaction, it is recommended to perform a 15-second load test on the battery at the speed that is three times greater than the ampere-hour rate of battery. Recheck the voltage; if it is less than 12.6V, repeat the charge cycle and load test. If it is still below 12.6V, the battery is faulty.

Precautions

1) It is not required to replenish liquid

This battery does not require replenishing liquid and can be used before the end of its life under normal use. It is very dangerous to pry up the sealing cap and add water. Never do this.

2) Replenish power

If the engine fails to start, the horn sound is very weak and the lights are dim, which means that the battery has lost power. Replenish the power for 5-10 hours using the charging current specified in the instruction manual (see the section "Replenishment of Power").

If a fast charge is necessary, strictly follow the maximum charge current and time conditions indicated on the battery.

⚠ Warning
If the charge is replenished according to the method specified above, quality problems will not be caused to the battery under normal conditions. However, if the charging is not performed under the conditions described above, the performance of battery will be greatly degraded. Do not disassemble the seal cap during the period of replenishing the power. **If excessive gas is inadvertently generated due to overcharging, the safety valve will release gas to keep the battery normal.**

3) When you do not use a motorcycle for more than one month

Recharge the battery before storing it, then remove the negative cable. The power shall be replenished once a month during storage.

4) Battery life

If the engine still fails to start after the battery power has been replenished for several times, the battery has exceeded its service life. The battery needs to be replaced at this point (but first make sure there is no problem with the starting system of motorcycle).

⚠Warning

Keep the battery away from sparks and open flames during charging as the battery may release an explosive gas mixture containing hydrogen and oxygen. When using the battery charger, you need to connect the battery to the charger before turning on the charger.
This process can prevent causing sparks at the battery terminals and avoid igniting any battery gas.
There should be no fire source near the battery, otherwise, any locked terminals should not be loosened.
The electrolyte contains sulfuric acid. Be careful not to let it touch your skin or eyes. If case of skin or eye contact, rinse using a plenty of water. If the situation is serious, seek medical attention.

Exchange

Full play can be given to the performance of maintenance-free battery only when it is connected to a suitable vehicle electrical system. Therefore, the battery can be replaced with a maintenance-free battery when the motorcycle is originally equipped with a maintenance-free battery.

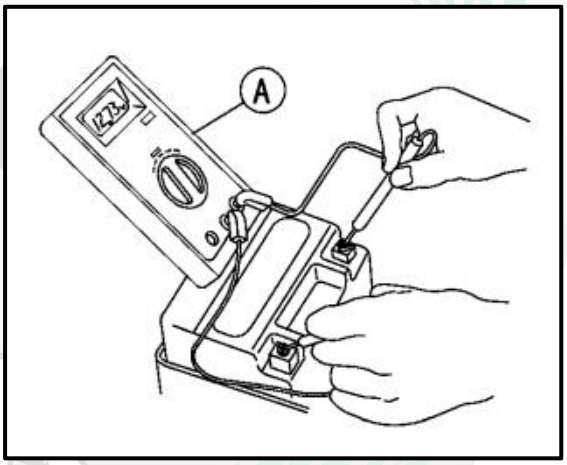
Inspection of charging state

● The battery can be inspected by measuring the battery terminal voltage using a voltmeter [A].

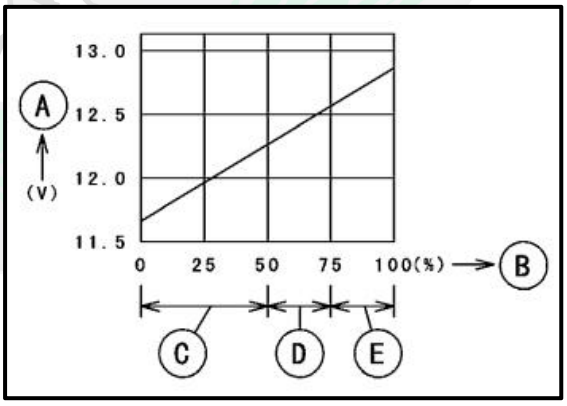
●Disassemble battery

●Measure the voltage between battery terminals.

*Note
○ Use a digital voltmeter that can read a decimal place to measure voltage



● If the reading is 12.6V or higher, there is no need to replenish the battery; however, if the reading is below the specified value, it is required to replenish the power.



Battery terminal voltage

Standard: 12.8V or above

Terminal voltage (V) [A]

Battery charging ratio (%) [B]

Need to replenish power [C]

Note [D]

Good [E]

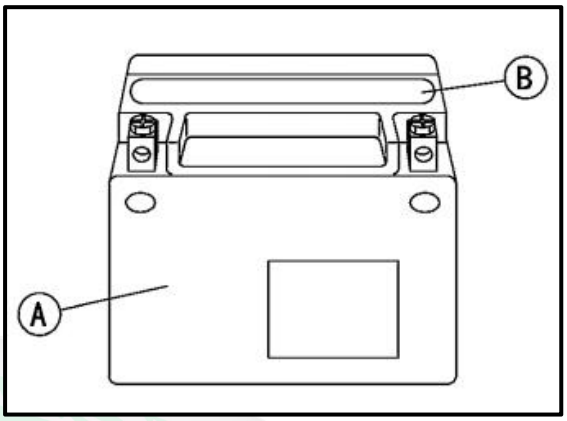
Replenish power

Remove the battery [A] (see battery removal section)

● Make sure to replenish the power based on the battery terminal voltage in the following way.

⚠Warning

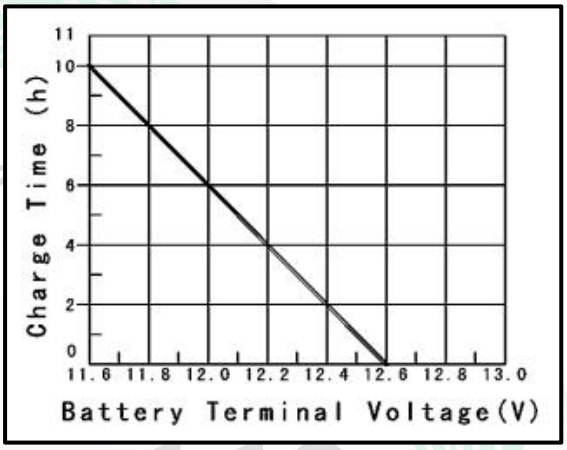
The battery is sealed. Do not remove the sealing cap [B] even while charging. Do not add water. Charging is performed according to the current and time described below.



Terminal voltage: between 11.5 and 12.6V

Standard charging: 0.9A × 5-10h (see the right figure)

Fast charging: 9A×1h



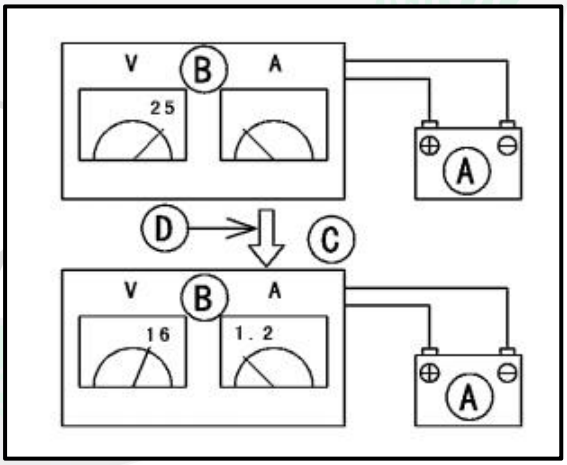
⚠Warning

Do not charge quickly if possible. If fast charging is unavoidable, standard charging will be performed later.

Terminal voltage: less than 11.5V

Charging method: 0.9A×20h

Notes
If the battery cannot be charged initially, the charging voltage shall be increased to 25V. After increasing the voltage, charge for no more than 5 minutes, then check whether current is flowing to the battery. *If the battery has received current, the voltage should be reduced back to the standard voltage and continue the operation in the ways as described in the battery packing.* If there is no current flowing to the battery after 5 minutes, please replace the battery.



Battery [A]

Battery charger [B]

Standard value [C]

Current begins to flow [D]

• Determine battery state after replenishing power

• After charging is completed, let the battery stand for 30 minutes and then determine the battery state by measuring the terminal voltage according to the following table.

Normal	**Judgment**
12.6V or above	Good
12.0-less than 12.6V	Undercharge→Recharge
Less than 12.0V	Unavailable→Replacement

● When the battery is inspected, it should be tested with a multimeter under the state of full charge.

●After the engine is warmed up, install the fully charged batteries.

●Connect a voltmeter between battery terminals.

●Start the engine, slowly increase the speed and measure the limit voltage.

Limit voltage/speed: 15V (5000rpm) (DC voltage)

●When the limit voltage is not within the specified value range, check the voltage regulator.

Alternator

*Note
○Check the alternator charging coil and operate at the engine.

Remove alternator

●Alternator power cable connector

● Place a suitable container under the magnet cover

● Loosen the left cover mounting bolt and remove the left cover and coil

● Pull the alternator power cable from the engine and bracket

●Remove stator coil:

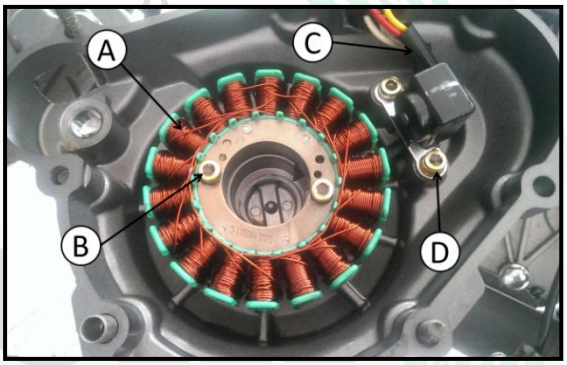
Alternator cover (see "Removing alternator cover)

Stator coil [A]

Stator coil bolt [B]

Alternator lead wire sleeve [C]

Bracket and bracket bolt [D]



●Remove the flywheel:

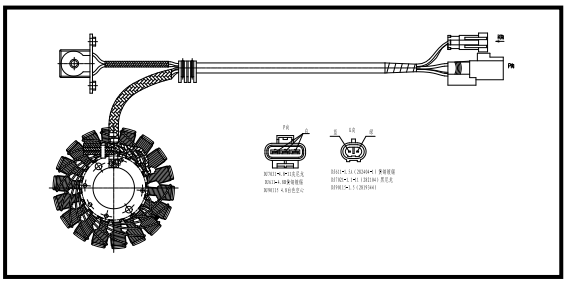
Remove alternator cover (see "Removing alternator cover)

Use the flywheel remover to remove the flywheel mounting bolts.

Remove it from the crankshaft using the flywheel puller

●Remove the flywheel

Check the alternator



● There are three types of alternator faults: short circuit, open circuit (wire is burnt out) or the magnetic property of rotor disappears. A short or open circuit of coil will result in low output or even no output. The disappearance of the magnetic property of rotor will result in a low output that may be caused by falling of alternator or hitting, or by being placed near the electromagnetic field, or simply because of aging.

● Turn off the ignition switch

●Remove alternator 3P connector.

●Use a multimeter to measure the impedance between the three black terminals of alternator.

Standard value: 0.05 - 0.5 Ω (normal temperature of 20℃)

★ If the resistance is greater than the above, or if any two power cord multimeters have no reading (infinite value), the stator line is broken and must be replaced. It the value is far below this resistance, the stator is shorted and must be replaced.

● Measure the resistance between each black power cord and the chassis ground wire using the maximum resistance range of the multimeter.

★ If the tester coil is used to test whether the engine body is conducting or not; if it is conductive, there is a short circuit between the coil and the engine, and the charging coil needs to be checked.

★ If the resistance of stator coil is normal, but the voltage check indicates that the alternator is faulty, it is possible that the rotor is magnetically weakened and the rotor must be replaced.

●Start the engine

○Run according to the revolutions per minute (rpm) given in Table 1.

○ Keep a record of voltage readings (total of 3 measurements)

Table 1 Output voltage of alternator

Tester range	Wiring		Reading at 5000 rpm
	Connect tester (+) to	Connect tester (-+) to	
750V AC	A black power cable	Another black power cable	55V or higher

★ If the value displayed on the output voltage is the value in the table, the alternator is operating normally.

★ If the reading is much lower than the value in the table, the alternator is faulty.

Install the alternator

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque of stator coil bolt: 10 N·m

Locking torque of bracket bolt: 5N·m

Locking torque of alternator cover bolt: 5N·m

Locking torque of flywheel mounting bolt: 100N·m

Voltage regulator/rectifier

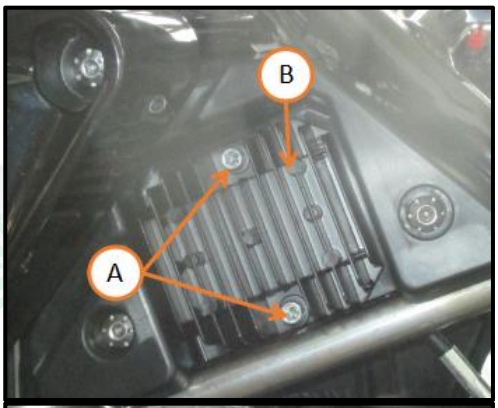
Remove rectifier

Remove fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details).

●Disassemble:

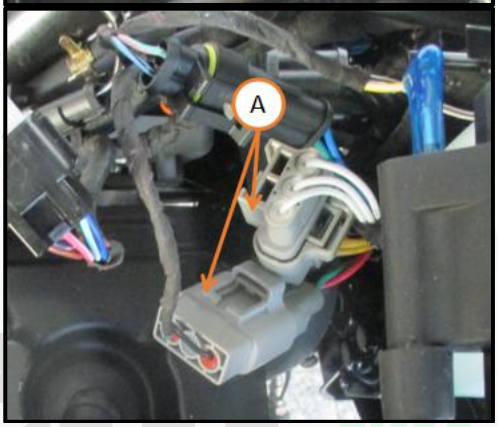
Bolt [A]

Voltage regulator/rectifier [B]



●Disassemble:

Joint [A]



Inspection of Circuit at Main Wiring Terminal

● Remove the body protector.

● Remove the 3P plug of the voltage and current regulator. Check the continuity between the main wiring terminals by the following method.

Check rectifier

1. Rotate the multimeter to: the position of diode;
2. Connect the black probe to the red terminal of regulator, and connect the red probe to the yellow terminals (yellow 1, yellow 2, yellow 3) of regulator respectively. The pointer gauge will display a certain value (within the range from 0.1 to 0.5V), otherwise, it indicates that regulator is damaged and needs to be replaced.
3. Connect the red probe to the green terminal of regulator port, and connect the black probe to the yellow terminals (yellow 1, yellow 2, yellow 3) of regulator respectively. The pointer gauge will display a certain value (within the range from 0.3 to 0.8V), otherwise, it indicates that regulator is damaged and needs to be replaced.

Install rectifier

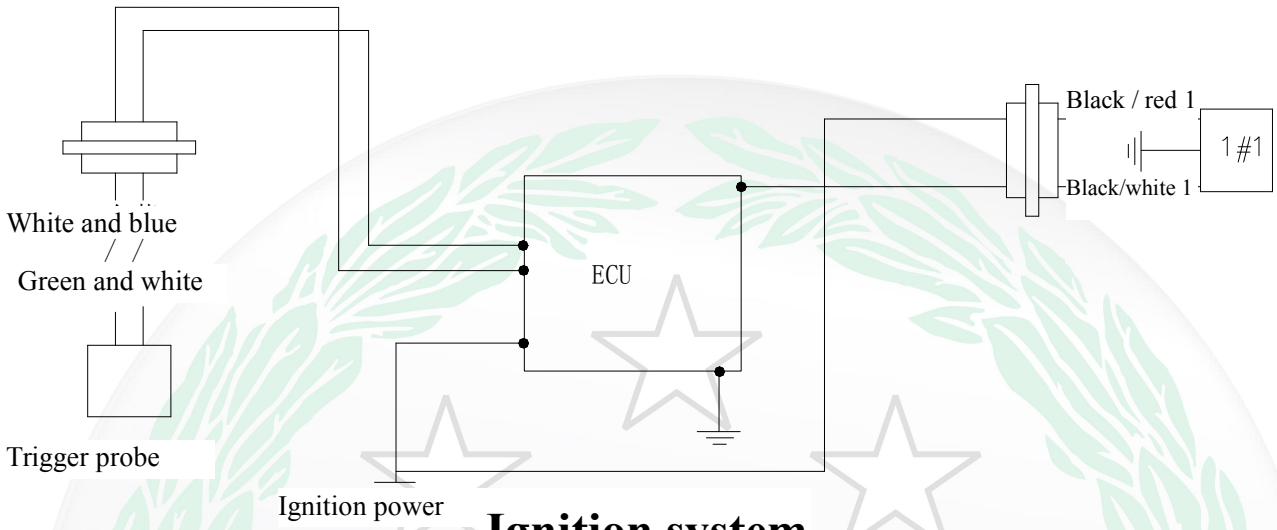
● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Voltage regulator mounting bolt: 10 N•m

Ignition System

Ignition system circuit diagram



Ignition system

Precautions for operation

1. Ignition system should be inspected step by step in the order of fault diagnosis table.
2. The ignition system is an electronic automatic angle feeding device and it has been solidified in the ECU group, so the ignition time does not need to be adjusted.
3. Ignition system should be inspected in the order of fault diagnosis table.
4. The main reason for ignition system fault is poor contact of connector, so first check whether the connectors are in poor contact.
5. Check whether the heat value of spark plug is appropriate, because improper spark plug may cause the engine to run unsmoothly or burn the spark plug.
6. Check the main switch according to the conduction table of switch part. (Attached)
7. Alternator and stator should be removed according to the disassembly instructions.

Warning
Ignition system may generate an extremely high voltage. Do not touch the spark plug or coil while the engine is running; otherwise, you may be exposed to a serious electric shock.

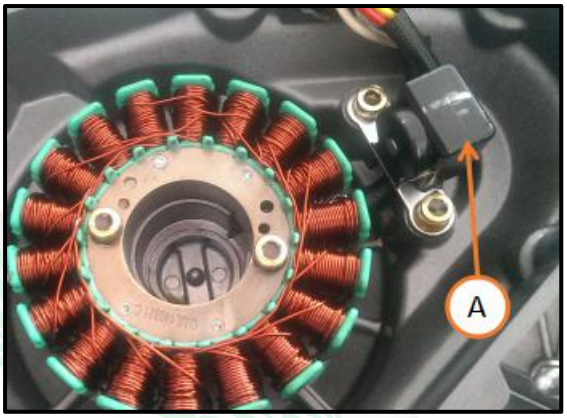
***Note**
Do not disconnect battery cable or any other electrical connections while the ignition is on or the engine is running. This is to prevent damage to ECU. Do not reverse the electrodes of battery. The side of negative electrode should be grounded. This is to prevent damage

to ECU.

Crankshaft sensor

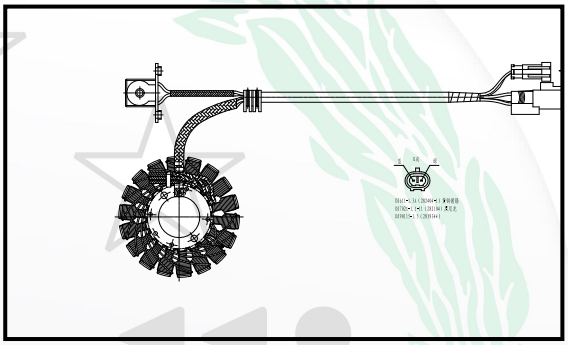
Remove crankshaft position sensor

●Crankshaft position sensor [A] cannot be disassembled separately, because it is integrated with alternator.



●Use the tester

*Note
The trigger can be checked on the engine.



Check crankshaft position sensor

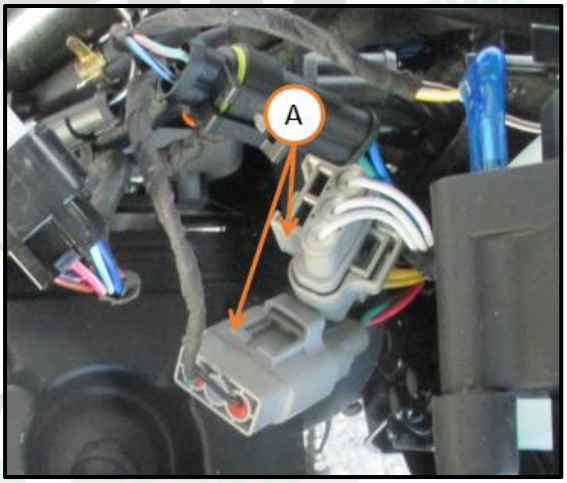
● Remove trigger wire connector [A].

● Measure the impedance values of red and yellow outgoing lines of engine.

Standard value: 150±10Ω (20°C)

★If the measured resistance value is higher than the specified value, the coil circuit is disconnected and needs to be replaced.

★If the resistance value is lower than the specified value, the coil is short-circuited and must be replaced.

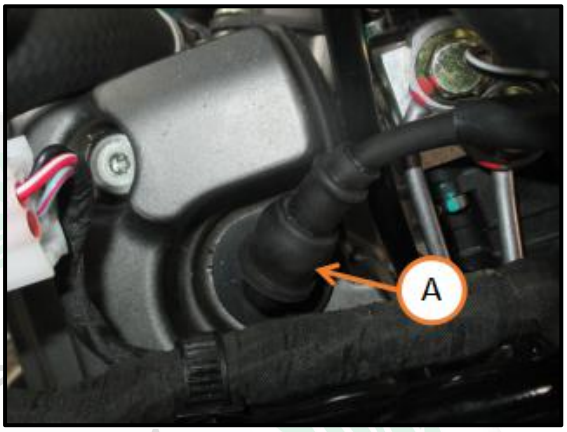


Ignition coil

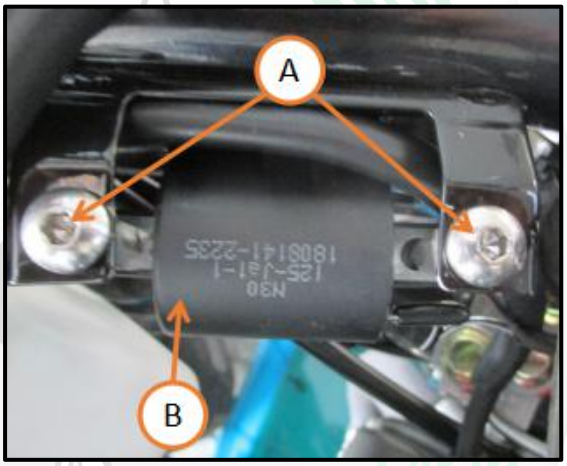
Remove ignition coil:

●Remove fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details).

Remove the spark plug cap [A].

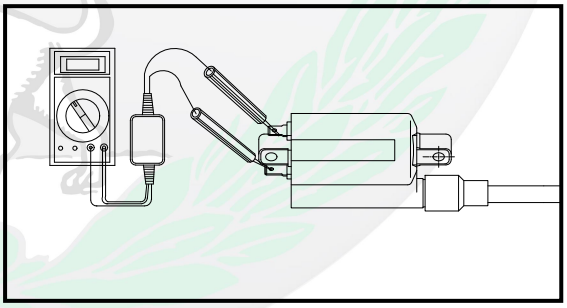


● Remove the screws [A] on the two mounting posts of ignition coil [B].



Check ignition coil

*Note
• When there is no spark in the spark plug, it is necessary to check whether the parts of wiring are loosened or in poor contact; *• There are many brands of multimeter, the internal impedances are different and the tested values are different.*



●Check the primary coil

●Measure the impedance among the terminals of primary coil.

Standard value: (4±0.4)Ω (20℃)

★The impedance value is good in the standard value.

★If the impedance value is “∞”, it indicates that the wire in the coil is disconnected and the ignition coil needs to be replaced.

Installation of ignition coil

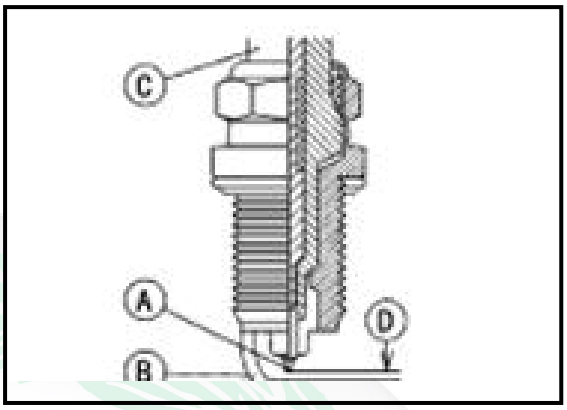
● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Ignition coil mounting bolt: 6 N•m

Spark plug

Inspection of spark plug



●Disassemble spark plug (see section "disassembly of spark plug")
●Visually inspect the spark plug
○If the center electrode of spark plug [A] and/or side electrode [A] is corroded or damaged, or insulated terminal [C] is broken, replace the spark plug
★If the spark plug is dirty or there is carbon deposit, replace the spark plug
○Use a wire feeler to measure the gap [D]
○If the gap is incorrect, replace the spark plug
Spark plug gap: 0.7±0.1mm
○Use standard spark plugs or their equivalents
Spark plug: CR8E

Check

●Start the engine according to the following conditions
First check
Condition:
Transmission gear → enter the first gear
Clutch handlebar→grip
Sidestand → upper
○ Turn on the ignition switch and press the start button
○ If the starting system circuit is normal, the starter motor will not rotate.
●If the engine is started, check the start and power-off switch, sidestand stop switch, gear switch and relay box.
●If the component state is normal, replace the ECU • Start the engine according to the following conditions:

Second inspection
Condition:
Gear position → neutral position
Clutch handle → release
Sidestand → lower
○ Turn on the ignition switch and press the start button
○ Then start the stater motor, but the premise should be that the starting system circuit is normal.
★ If the starter motor does not start, check the start switch, gear switch and relay box
★ If the parts are in normal conditions, replace the electronic control unit

Third inspection
●Check whether the engine can be safely turned off after performing the following operations
●Run the engine according to the following conditions
Condition:
Gear position → first gear
Clutch handle → release
Sidestand → up

● Place the sidestand on the ground, and shut down the engine

★ If any one is not shut off, check the gear switch, starting switch, sidestand stop switch and relay box

★ If the parts are in normal conditions, replace the electronic control unit

Check IC igniter

○ IC igniter is built into the electronic control unit.

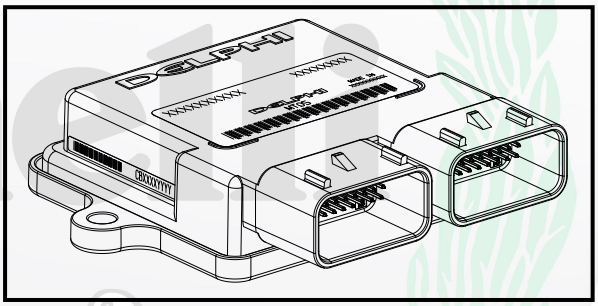
●Refer to the following items

1. Check the operation of related components of electrical starter safety circuit related component (see "Checking the operation of related components of electrical starter safety circuit")
2. Ignition system troubleshooting (see section "Ignition System")
3. Electric control unit voltage check (see section "Checking Electronic Control Unit Power" in chapter "EFI System (ECU)")

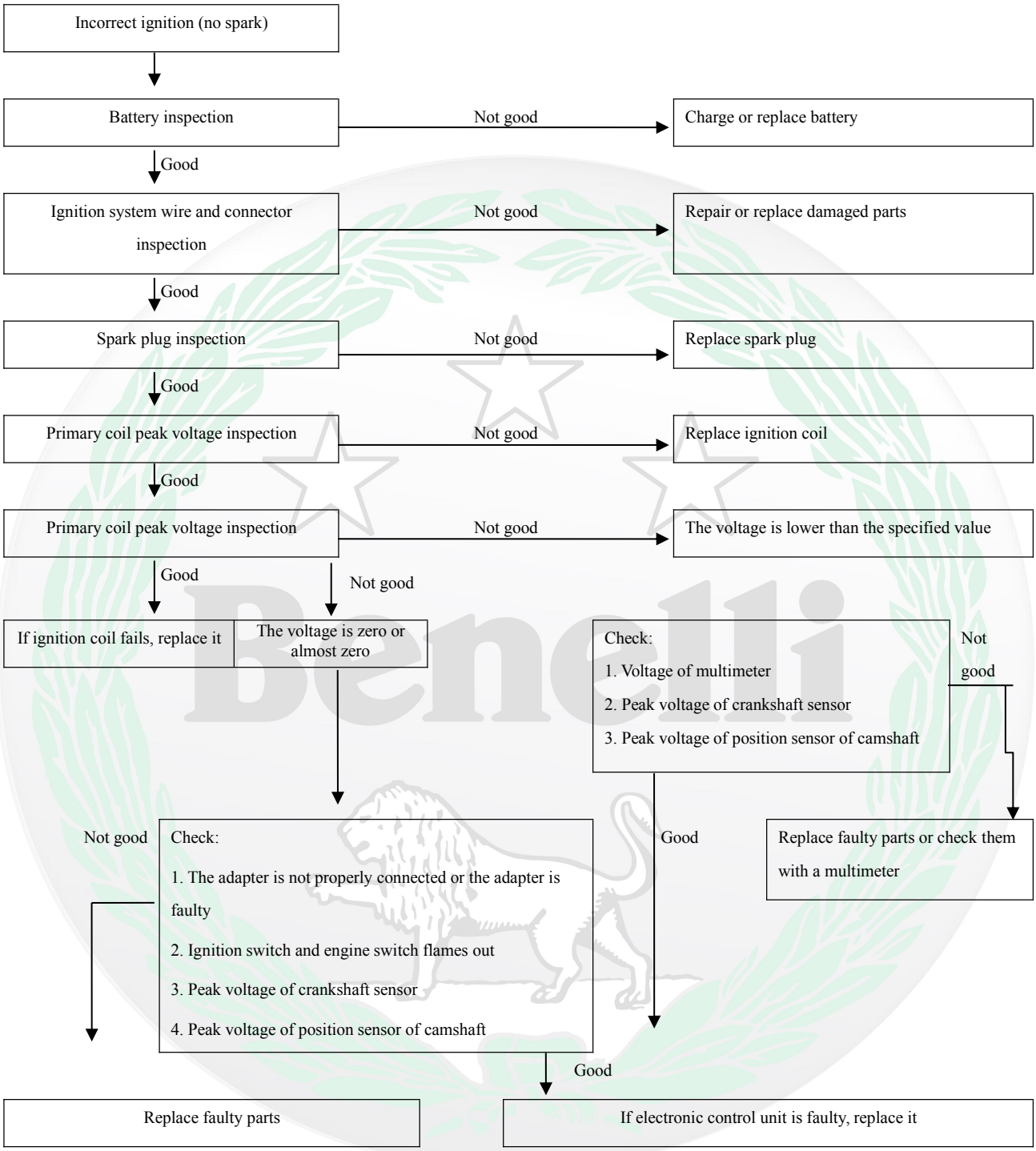
ECU unit

●System inspection

●Remove ECU and check the parts at wiring terminal related to ignition system. (See section “ECU” of electronic injection system for details)

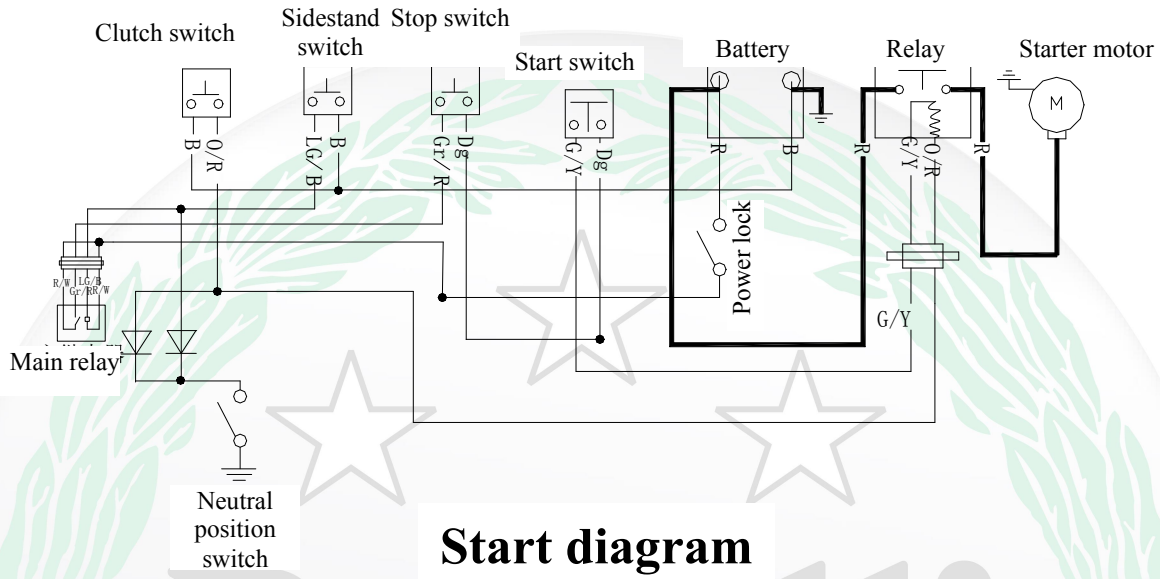


Ignition System Troubleshooting



Starter System

Starter system circuit diagram



Start diagram

Benelli

Starting Motor

*Note
Before disassembling starter motor, first turn off the main switch, remove the bond strap of battery, then turn on the power and check whether starter motor is running to confirm safety.

*Note
Do not tap the starter motor shaft or the body, otherwise, it may cause damage to the motor body.

Remove the starter motor

●Remove the starter motor cable terminal nut
●Remove the starter motor assembly bolt
● Pull out the starter motor from the left side

Check the starter motor

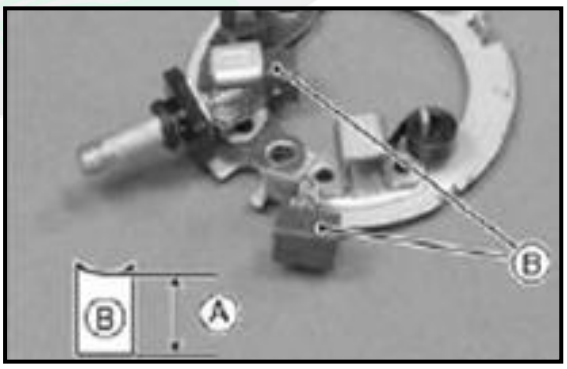
Run the starter motor according to the following conditions

Condition:

Gear position → neutral position
Clutch handle → release
Sidestand → lower

● Turn on the ignition switch and press the start button
○When the circuit of other starting system is normal, the starter motor does not start.
○ Then remove the starter motor and directly connect the positive and negative electrodes of battery. If it is running normally, it is the problem of engine
○ engine matching: if the motor is started before the system is running, it may be damaged.

Check the brush



●Measure the length [A] of each brush [B]

★If any brush has reached the operating limit, the brush plate assembly should be replaced.

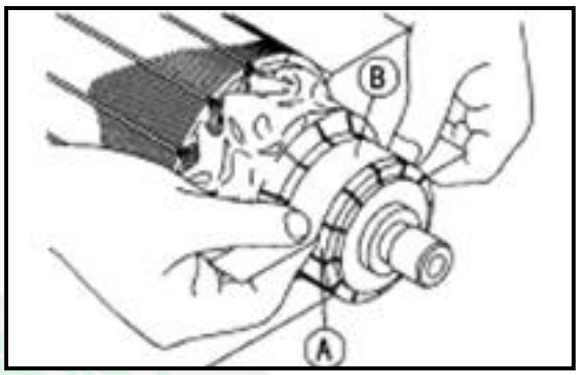
Starter motor brush length:

Standard: 10mm

Operating limit: 5.0 mm

Clean and check commutator

● If necessary, polish the commutator surface [A] with a fine mesh gauze [B] and clean the groove



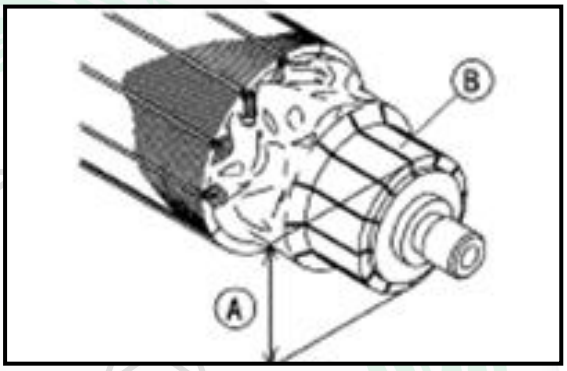
●Measure the diameter [A] of commutator [B]

★ If the diameter of the commutator is shorter than the operating limit, replace it with the new starter motor

Commutator diameter

Standard: 28mm

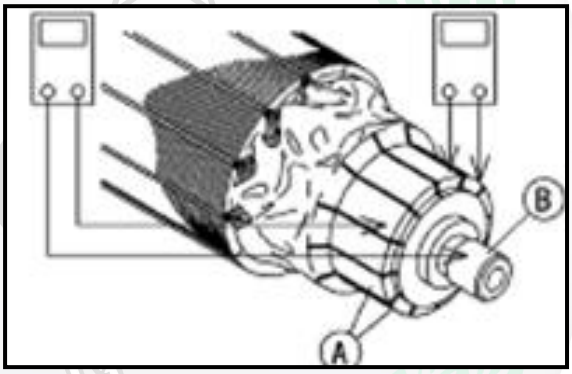
Operating limit: 27 mm



★ If the resistance between the two commutators is high or there is no reading, the coil is open circuited and the starter motor must be replaced.

● Use a multimeter to measure the resistance between the commutator [A] and the shaft [B]

★ If the reading is 0, the armature is short circuited and the starter motor must be replaced.



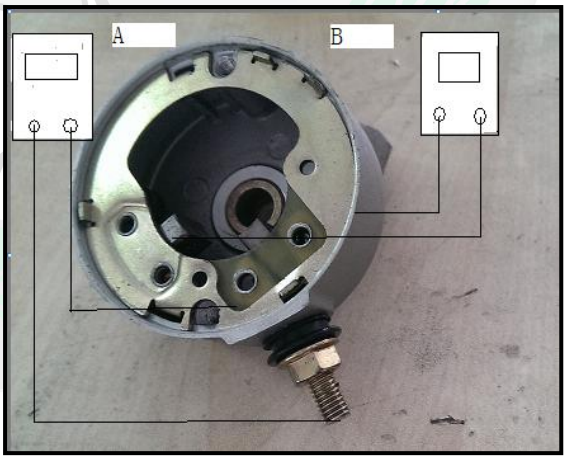
Check the brush lead

● Use a multimeter set to x 1Ω range to measure the resistance, as shown in the figure

Terminal bolt and positive brush [A]

Right end cover and negative brush [B]

★ If it is not close to zero ohms, the brush lead is open circuited It is required to replace the carbon brush plate assembly

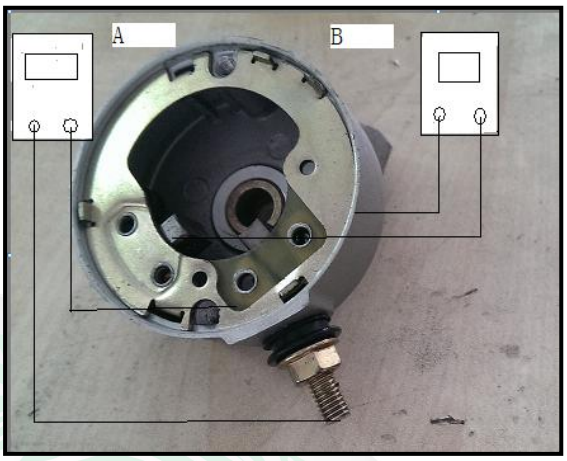


Check the right end cover assembly

● Use a multimeter set to the highest range to measure the resistance, as shown in the figure

Terminal and right end cover [A]

★ If there is any reading, the right end cover assembly is short circuited. Replace the right end cover assembly



Install the starter motor

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Starter motor mounting bolt: 10 N•m

Benelli

Starter relay

Remove starter relay

● Disconnect the starter motor cable from the starter relay [A] and the negative (-) cable of battery from the connector [A]

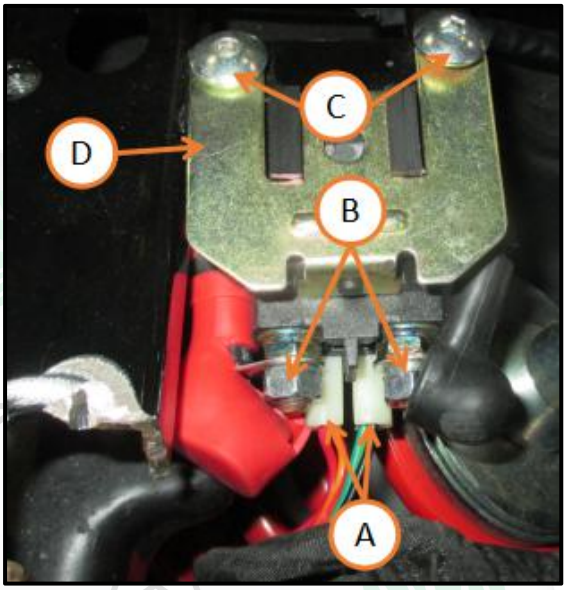
● Disconnect the starter motor cable from the starter relay [A] and the positive (+) cable of battery from the connector [B]

● Pull out the starter relay cable connector

●Disassemble:

Bolt [C]

Starter relay [D]



Inspection of action of starter relay

● Connect the multimeter and 12V battery to the starter relay, as shown in the figure

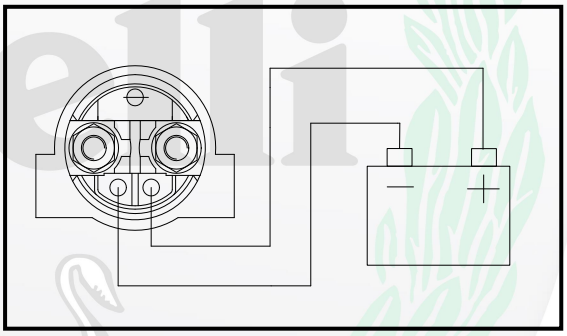
●If the relay does not work as specified, the relay is faulty and needs to be replaced.

Test relay

Tester range: x 1 Ω range

Standard: When the battery is connected 0Ω

When the battery is disconnected → ∞Ω



Install starter relay

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Starter relay mounting bolt: 10 N•m

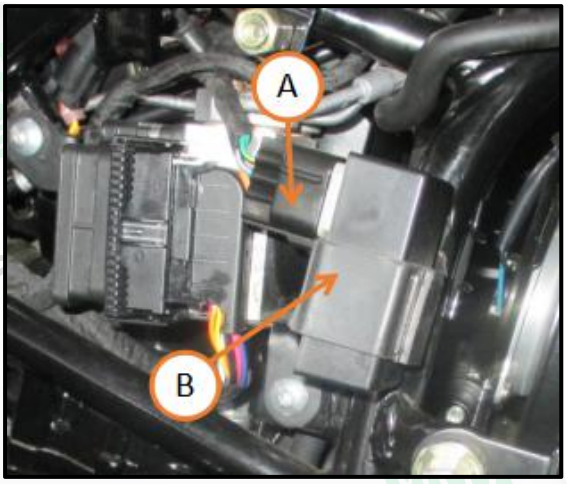
Lighting System

Headlight

Disassemble headlight relay controller

●Remove fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details).

● Disassemble the headlight relay controller and cable connector [A], and remove the headlight relay controller [B].



Check headlight relay controller

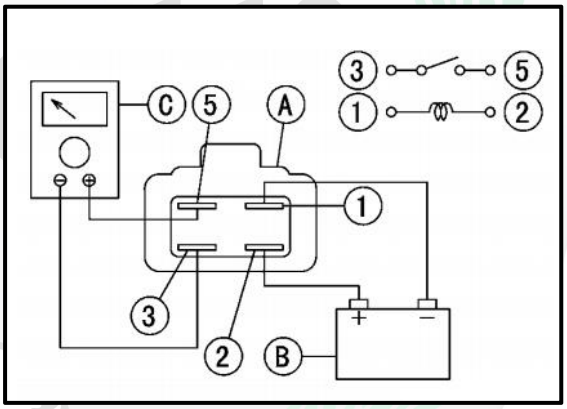
● Set the multimeter to the x 1Ω range and measure, as shown in the figure

Headlight relay controller [A]

12V battery [B]

Special tool - multimeter [C]:

★ If the tester reading is not the specified value, replace the headlight relay controller.



WARNING
Only multimeter can be used in the test. If you use a high resistance meter or a meter with a high capacity battery, the headlight relay controller may be damaged.

Test headlight relay controller

Standard: When the battery is connected 0Ω

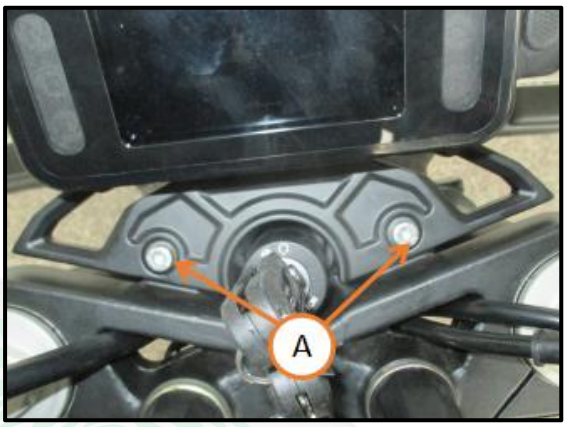
When the battery is disconnected → ∞Ω

Install headlight relay controller

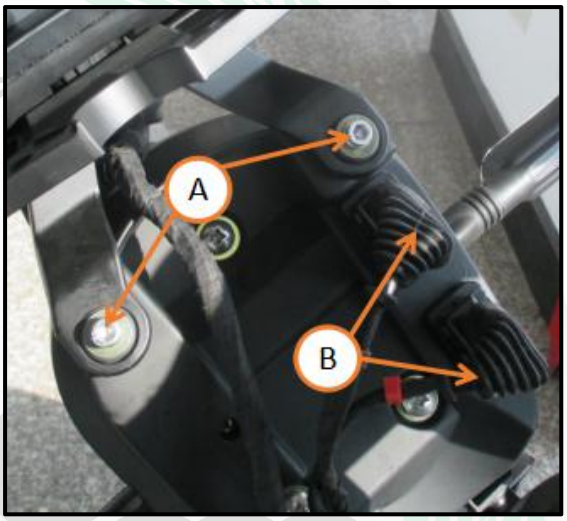
● Install the parts that have been removed before in the reverse order of disassembly.

Remove headlight

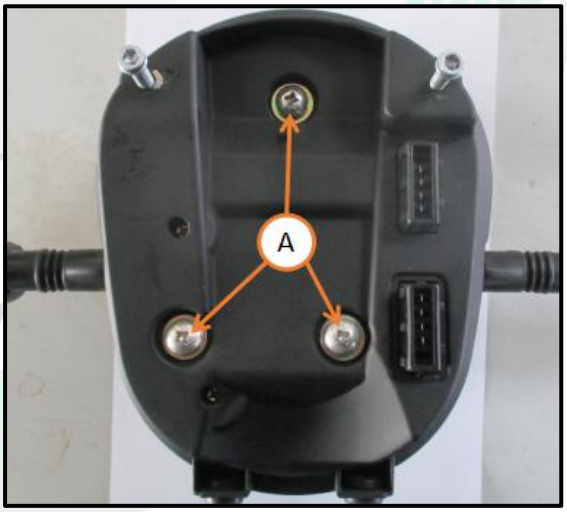
● Remove the meter bracket mounting bolt [A].



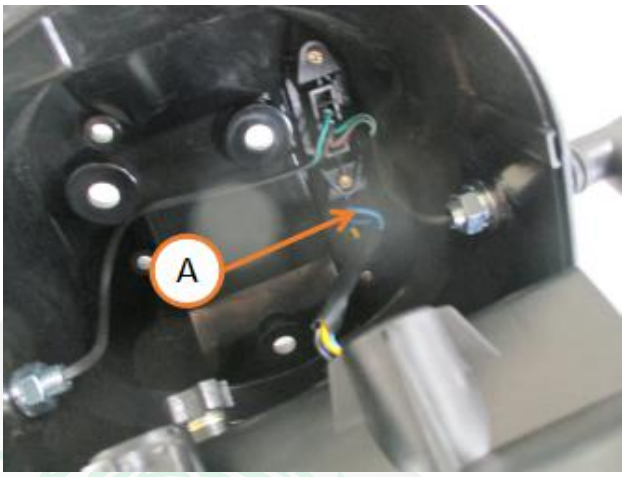
● Remove the headlight mounting bolt [A] and disconnect the headlight and cable connectors [B].



●Remove the rear cover mounting screw of headlight [A]



● Remove the headlight connector [A] and remove the headlight.



Replace headlight bulb

● The headlight source is an LED, and the headlight needs to be replaced as a whole.

Replacement of headlight bulb

● The headlight source is an LED, and the headlight needs to be replaced as a whole.

Install headlight

● Install the parts that have been removed before in the reverse order of disassembly.

● After installation, adjust the condensed Light of headlight (see “Periodic Maintenance" - "Checking Headlight Condensed Light” for details)

Locking torque:

Headlight mounting bolt: 10N·m

Meter bracket mounting bolt: 10 N·m

Turn signal light

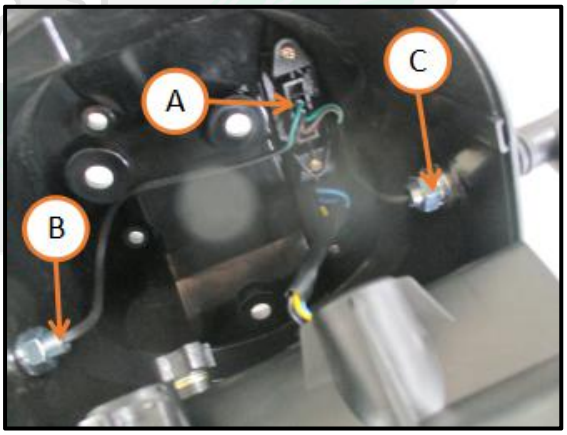
Remove front turn signal light

● Remove the headlight (see “Headlight” - “Removing the Headlight”).

●Remove front turn signal light connector connector [A]

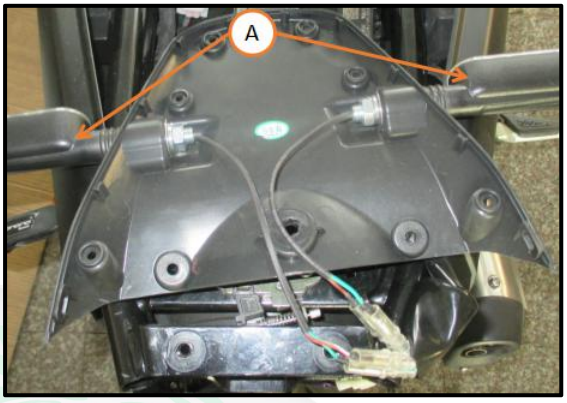
●Remove front right turn signal light

●Remove front left turn signal light



●Remove rear turn signal light

●Remove rear left and right turn signal lights [A] (see "Frame" - "Removing Tail Cover" for details).



Replacement of Turn Signal Light Bulb

● The front rear turn signal light source is an LED, and the turn signal light needs to be replaced as a whole.

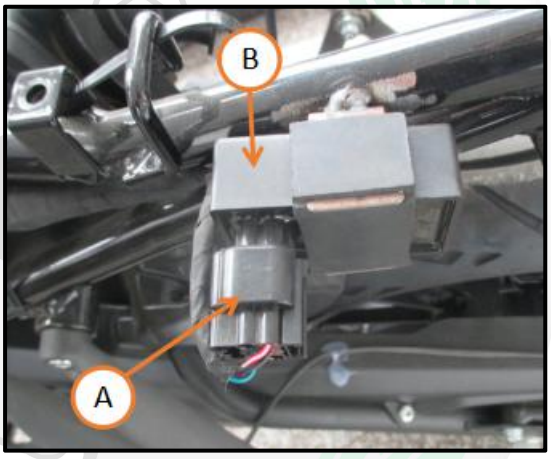
Install turn signal light

● Install the parts that have been removed before in the reverse order of disassembly.

Remove flasher

●Remove rear seat cushion (see "Frame" - "Removing Rear Seat Cushion")

●Remove the connector [A] between flasher and cable, and remove the flasher [B].

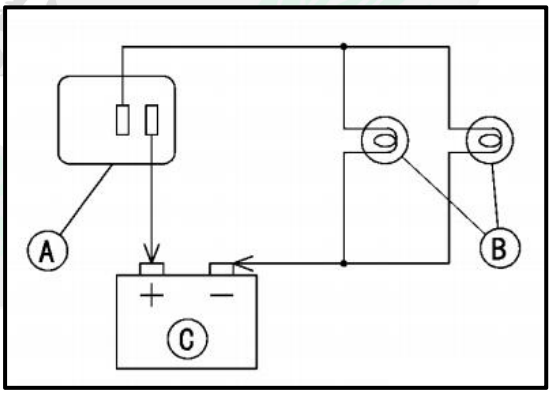


Check flasher

● Connect a 12V battery and install and connect the turn signal light as shown in the figure to calculate how many times the light has flashed within one minute.

Flasher [A]
Turn signal light [B]
12V battery [C]

★ If the light does not flash, replace the flasher



Test flasher

Load		Number of time the light has flashed (c/m*)
Quantity of turn signal lights	Watt (W)	
1**	21 or 23	140~250
2	42 or 46	75~95

*: cycle per minute

**: means that "one light is burned out"

Install flasher

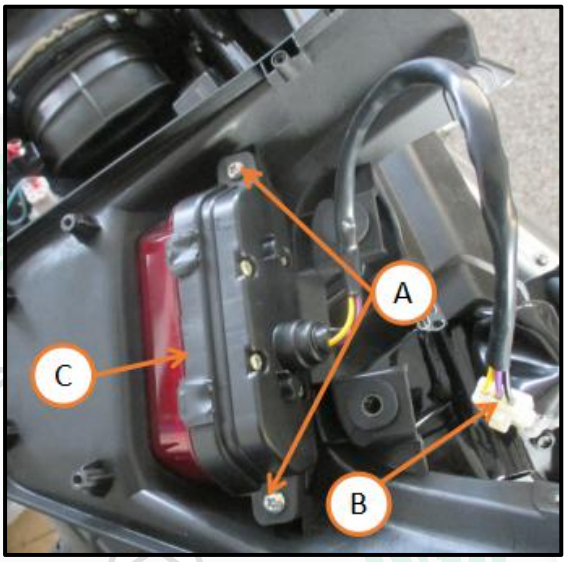
● Install the parts that have been removed before in the reverse order of disassembly.

Taillight

Remove taillight

●Remove side cover [A] (see "Frame" - "Removing Side Cover" for details).

● Remove the self-tapping screws [A], disconnect the taillight cable connector [B], and remove the taillight [C].



Replacement of taillight bulb

● The taillight source is an LED, and the taillight needs to be replaced as a whole.

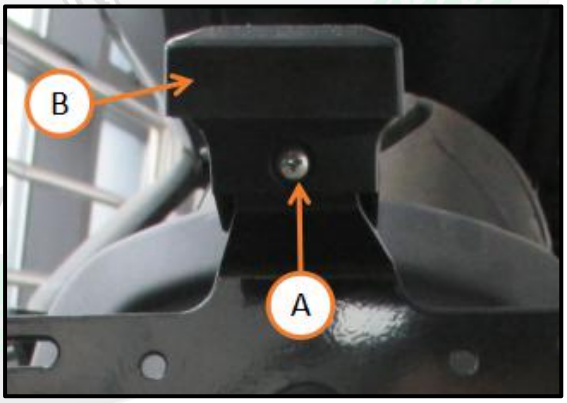
Install taillight

● Install the parts that have been removed before in the reverse order of disassembly.

License plate light

Remove license plate light

● Remove the self-tapping screws [A], disconnect the license plate light cable connector and remove the license plate light [B].



Replacement of license plate light bulb

● The license plate light source is an LED, and the license plate light needs to be replaced as a whole.

Install license plate light

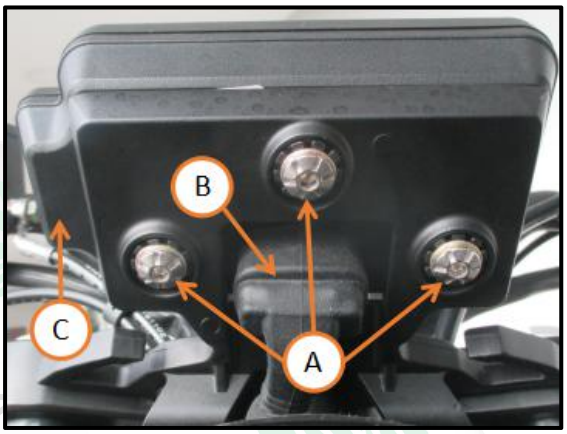
● Install the parts that have been removed before in the reverse order of disassembly.

Benelli

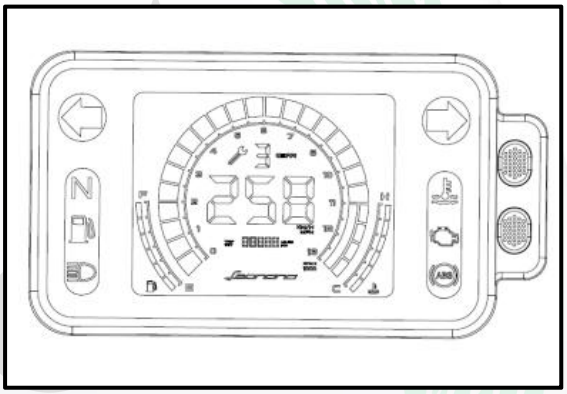
Gauge

Remove meter

●Remove the screw [A], disconnect the meter cable connector [B], and remove the meter [C].



●The meter of this motorcycle is liquid crystal. If the meter is faulty or damaged, please replace it as a whole.



Install meter

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

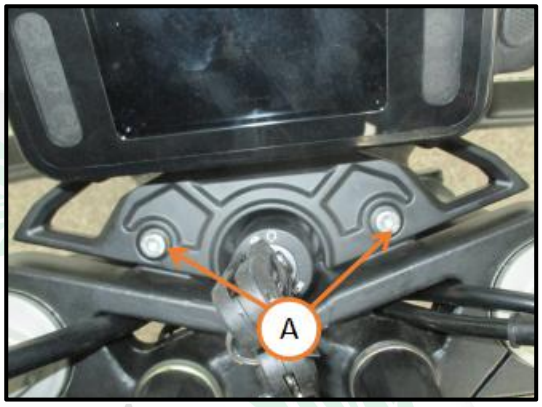
Meter mounting screw: 10 N·m

Switch and Sensor and Other Parts

Power lock switch

Remove power lock

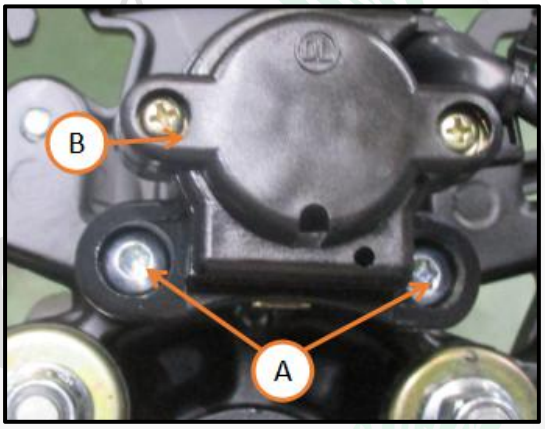
● Remove the meter bracket mounting bolt [A].



● Remove the power lock mounting screw [A]。

●Remove the main switch wire connector.

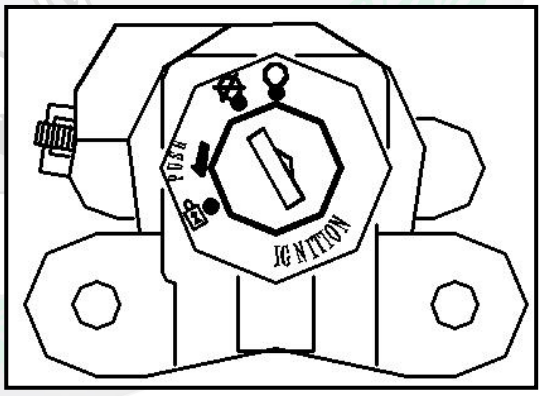
●Remove power lock.



Check power lock

●Check the conduction of connector terminal.

★ If it does not match the continuity meter, please replace the main switch



Schematic wiring diagram

Line color / Gear	Red	Red/white
	○——○	

Install the power lock

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Upper bracket cover mounting screw: 10 N·m

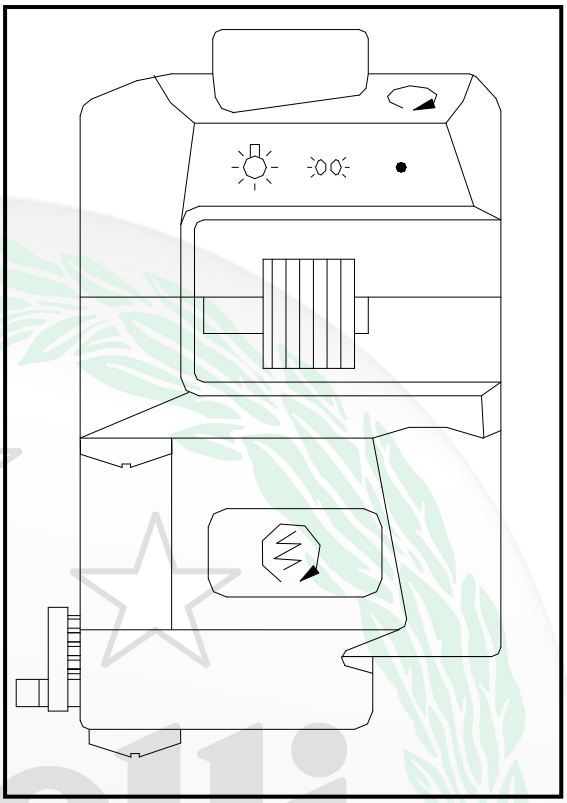
Power lock mounting screw: 10 N·m

Handlebar Switch

Switch state (non-headlights are always on)

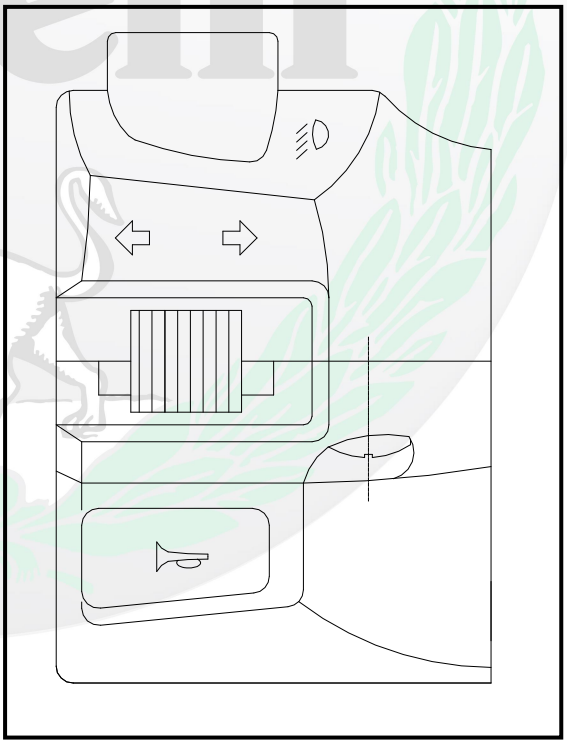
1. Light control switch
2. Stop switch
3. Starting switch

	Red /white	Orange / blue	Yellow / red		Blackish green	Green / yellow		blackish green	Red
	○	○	○		○	○			
	○	○						○	○
•									



4. Dimmer switch
5. Steering switch
6. Horn switch
7. Passing switch

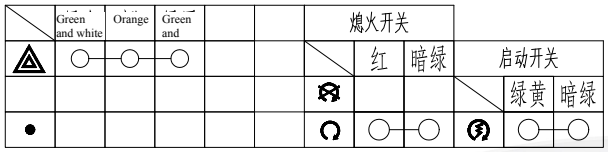
Dimmer switch					Steering switch				Horn button		
	Blue	Yellow / red	Light blue	Red / white		Green / black	Orange	Green /white		Red and	Brown
	○	○				○	○			○	○
PASS	○			○	•						
		○	○				○	○			

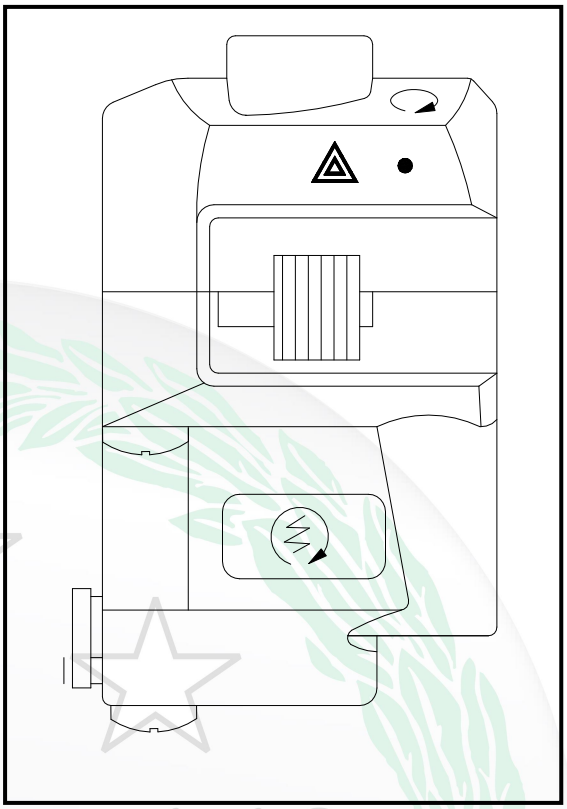


Benelli

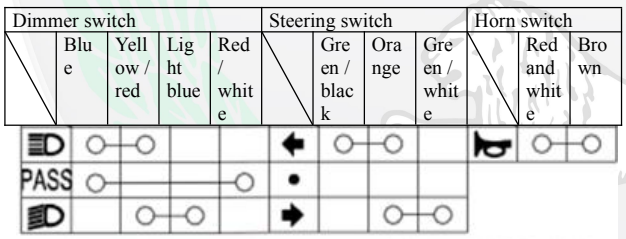
Switch state (headlights are always on)

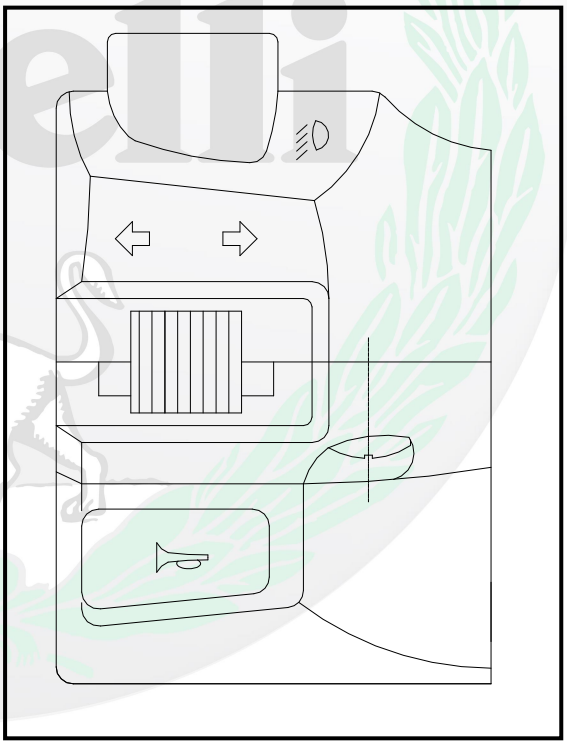
1. Warning switch
2. Stop switch
3. Starting switch





4. Dimmer switch
5. Steering switch
6. Horn switch
7. Passing switch





Inspection of time for turning on brake light

● Refer to the "Checking Brake Light Switch Operation" in the chapter "Periodic Maintenance".

Adjust the time for turning on the brake light

● Refer to the "Checking Brake Light Switch Operation" in the chapter "Periodic Maintenance".

Check switch

● Use a handheld multimeter to check whether only the switches in the table have been turned on

○ For the switch housing and main switch, refer to the table in the wiring diagram section

★ If the switch is open or shorted, repair or replace it with a new switch

Connect the rear brake light switch

Connect the rear brake light switch		
Color	BR	BL
When the brake pedal is pressed		
When the brake pedal is released		

Connect the sidestand switch

Connect the sidestand switch		
Color	BK	G
When the brake pedal is pressed		
When the brake pedal is released		

Speed sensor

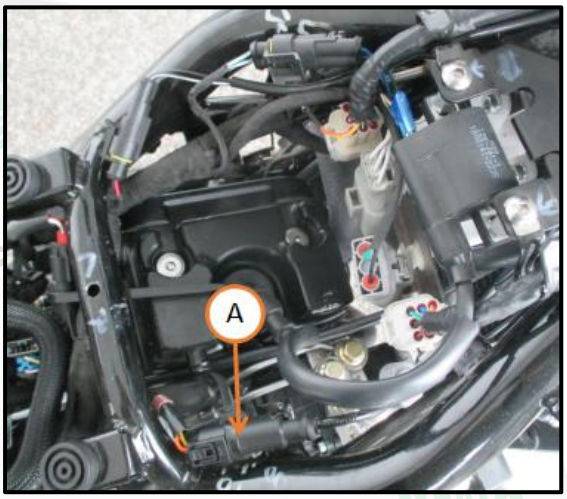
Remove speed sensor

Warning

Do not drop the sensor, especially on a hard surface. The shock of impact may cause damage to the sensor.

●Remove fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details).

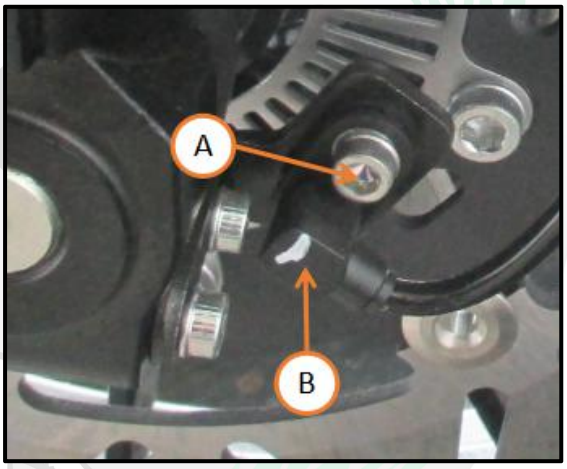
●Disconnect the front wheel speed sensor connector



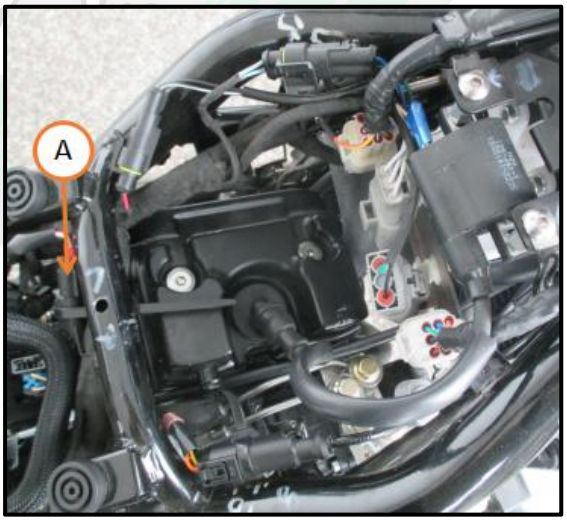
●Disassemble:

Bolt [A]

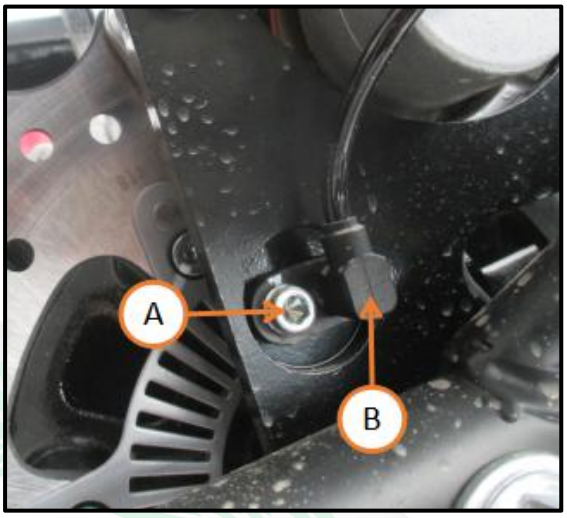
Front wheel speed sensor [B]



●Disconnect the rear wheel speed sensor connector



●Disassemble:
Bolt [A],
Rear wheel speed sensor [B]

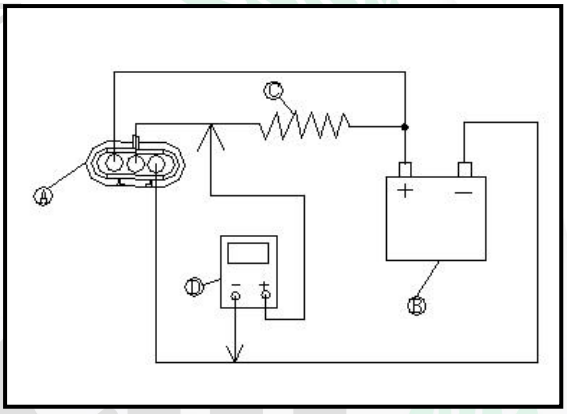


Check the speed sensor

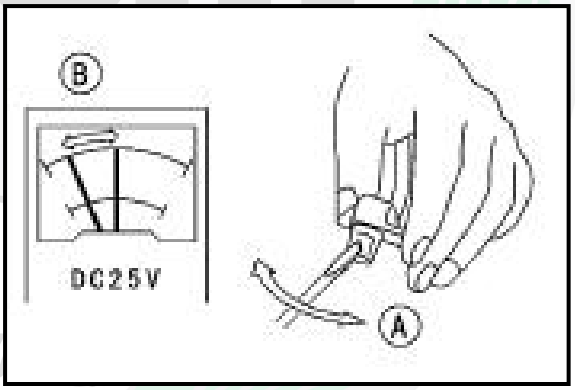
● Remove the speed sensor (see the "Removing Speed Sensor")

●Connect the speed sensor connector [A] and battery [B], 10kΩ resistor [C] and handheld multimeter [D], as shown in the figure

●Set the multimeter to the range of DC 20V (digital multimeter)



● Use a screwdriver to slide over the entire surface of speed sensor, and adjust the end voltage from the battery voltage value to about 0-1V



Install speed sensor

● Install the parts that have been removed before in the reverse order of disassembly.

Oxygen sensor

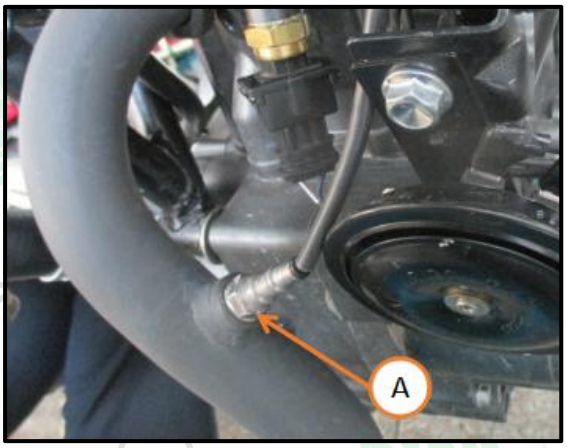
Remove oxygen sensor

Warning

Do not drop the sensor, especially on a hard surface. The shock of impact may cause damage to the sensor.

● Disconnect the oxygen sensor connector.

●Remove the oxygen sensor [A].



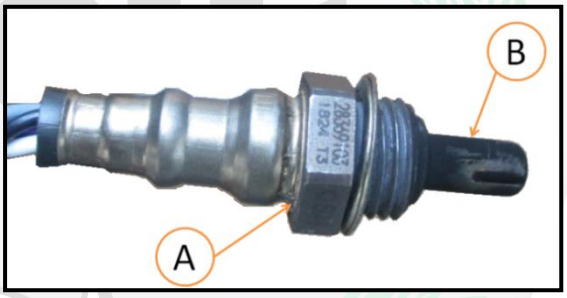
Check oxygen sensor

● See section “Checking Oxygen Sensor” in the chapter “Fuel System (EFI)”.

Install oxygen sensor

Warning

Do not drop the oxygen sensor [A], especially on a hard surface. The shock of impact may cause damage to the sensor. Do not touch the sensing part [B] of sensor to prevent it from being polluted with oil stains. Oil on your hands may affect sensor performance.



● Tighten:

Torque-oxygen sensor: 25 N·m

● Operate the oxygen sensor wires correctly (see section "Arrangement of Cables, Wires and Hoses" in Chapter "Appendixes")

Fuel level sensor

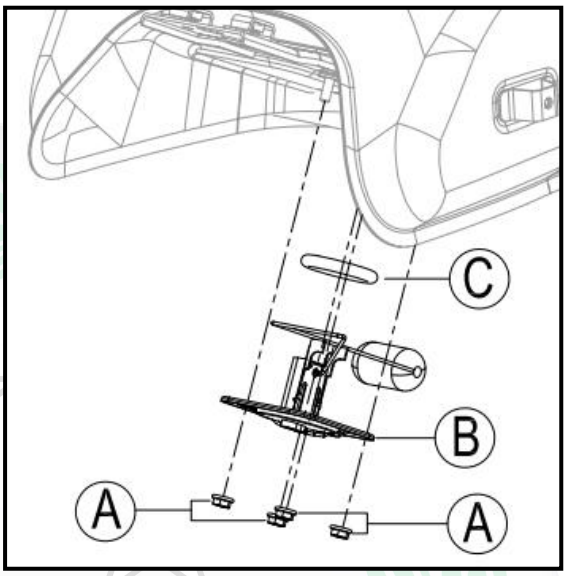
Remove fuel level sensor

●Remove fuel tank (see “Fuel Tank” – “Removing Fuel Tank” for details).

● Remove the four tightening nuts [A] and remove the fuel level sensor [B] and the fuel level sensor seal [C].

○Check sensor seal

★If the sensor seal is found to be broken or swelled, it must be replaced!



Check fuel level sensor

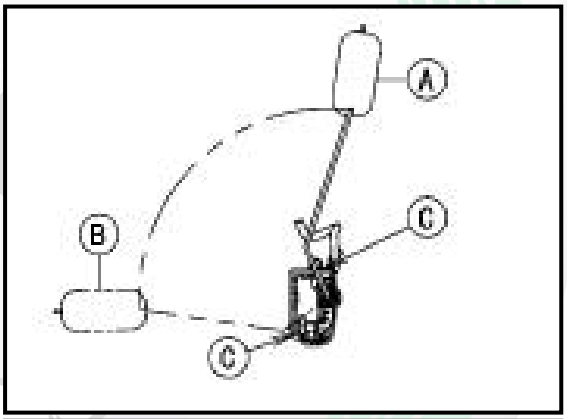
● Check whether the fuel sensor float is moving smoothly and not stuck. It should move downwards under its own weight.

★ If the float does not move smoothly, the sensor must be replaced.

When the float is in the position of "full" [A]

When the float is in the position of "empty" [B]

Floating arm stopper [C]

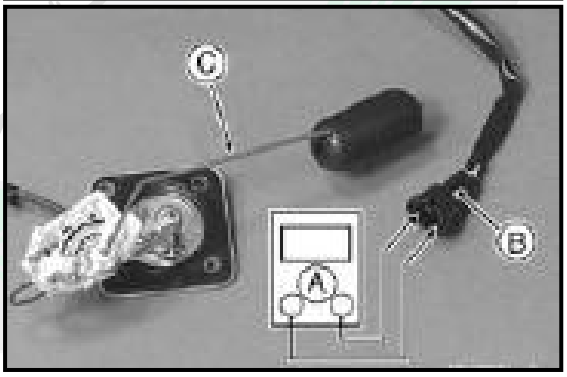


● Use the hand-held multimeter [A] to measure the resistance around the terminal of fuel level sensor connector [B].

Special tool - handheld multimeter:

Pointer adapter device:

★ If the multimeter reading does not meet the requirements, or does not change smoothly according to the up and down movement of the float, replace the sensor.



Fuel level sensor component

Standard: full fuel level [A]: 5-12Ω

Empty fuel level [B]: 96-103Ω

Installation of fuel level sensor

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

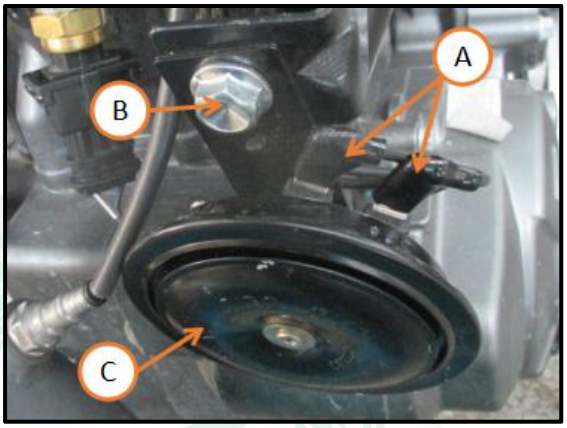
Fuel level sensor mounting nut: 10 N·m

Horn

Disassemble horn

Remove the horn wire.

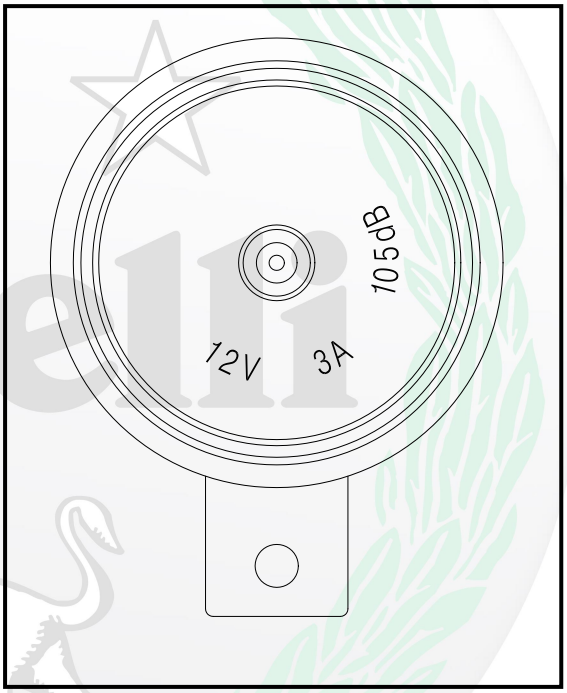
●Remove the horn mounting bolt [A] and remove the horn.



Check the horn

● The external horn is connected to the battery, and it is good if a sound is made.

Resistance: 1.4Ω



Install horn

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Horn mounting bolt: 22N·m

Fan

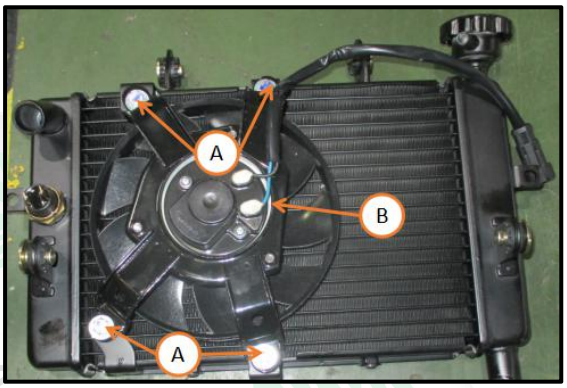
Remove the fan

●Remove radiator fan (see “Removing Radiator and Radiator Fan” in chapter "Radiator" for details),

●Disassemble:

Radiator fan mounting bolt [A]

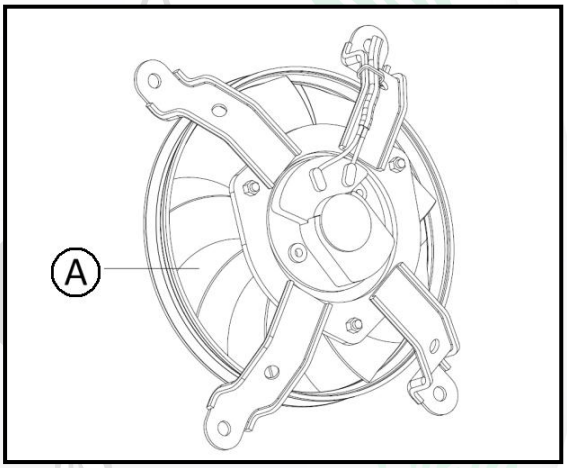
Radiator fan [B]



Check the fan

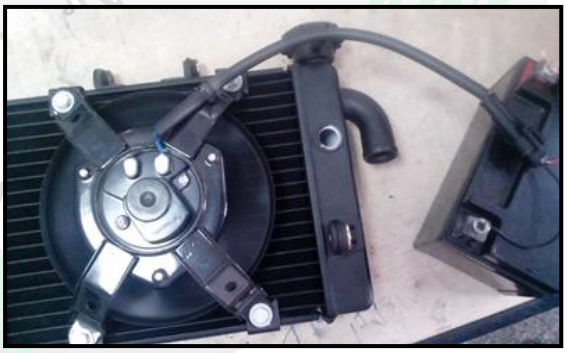
●Check the fan blades [A],

★ If fan blade is damaged, change the fan component



● First confirm whether the copper part inside the fan connector is loosened;

★ If not, connect the fan to the positive and negative electrodes of power supply separately, as shown on the right (the blue one is connected to positive electrode of battery, and black one is connected to the negative electrode of battery).

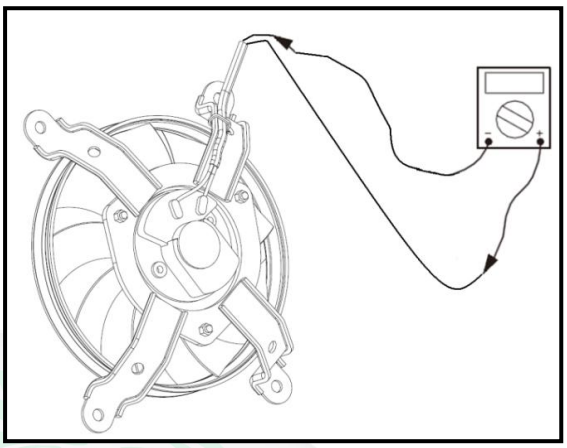


● Check whether the fan is rotating and the wind is blowing toward the mounting bracket. If it is not rotating, replace the fan;

★ If the direction of rotation is not correct, you need to change the harness connection position.

● Detect the fan motor using the "Ω" range of multimeter, as shown on the right

★ If “∞” is displayed, the motor is damaged and the fan component needs to be changed



Install the fan

● Install the parts that have been removed before in the reverse order of disassembly.

Locking torque:

Fan mounting bolt: 10 N•m

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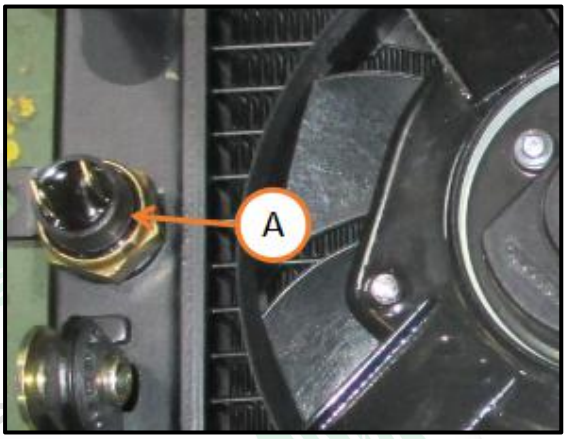
Water temperature switch

Remove the water temperature switch

● Remove right front cover (see “Frame” – “Removing Right Front Panel” for details).

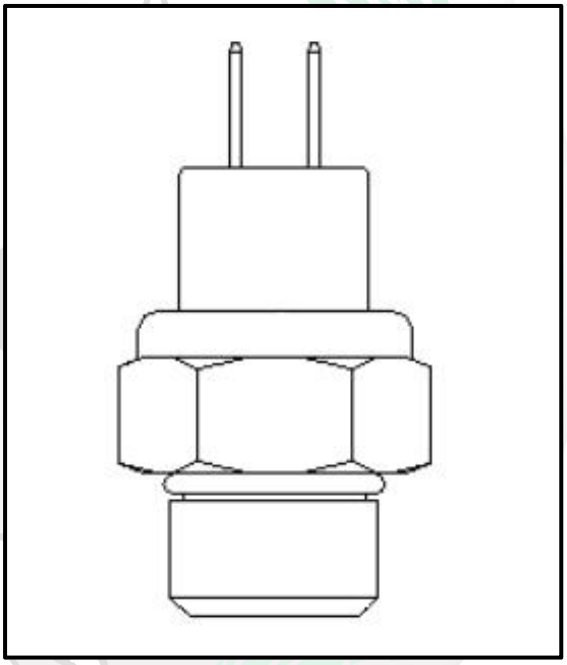
● Unplug the water temperature switch connector.

● Use an open-end wrench to remove the water temperature switch [A].



Check the water temperature switch

Conduction temperature: 98±4°C, 9°C≥ on temperature—off temperature≥3°C



Install the water temperature switch

● Install the parts that have been removed before in the reverse order of disassembly.

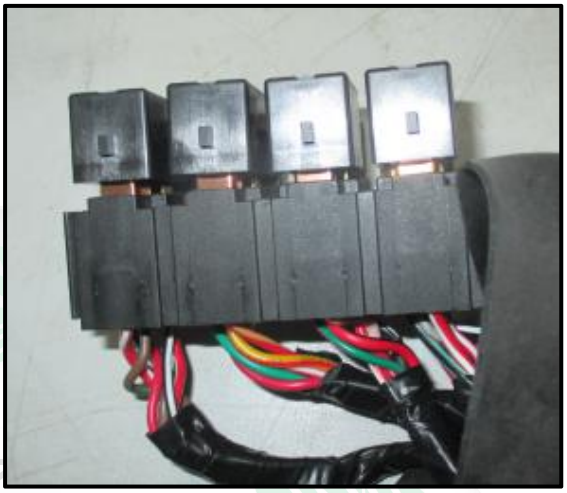
Locking torque:

Water temperature switch: 15 N·m

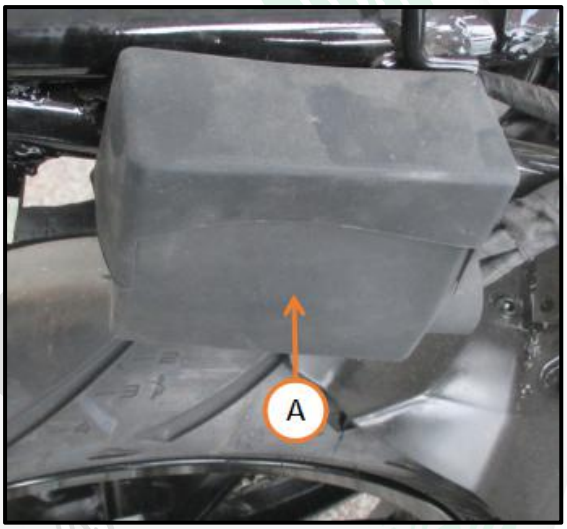
Relay and fuse box

Remove relay and fuse box

● The relay is directly on the wire harness.

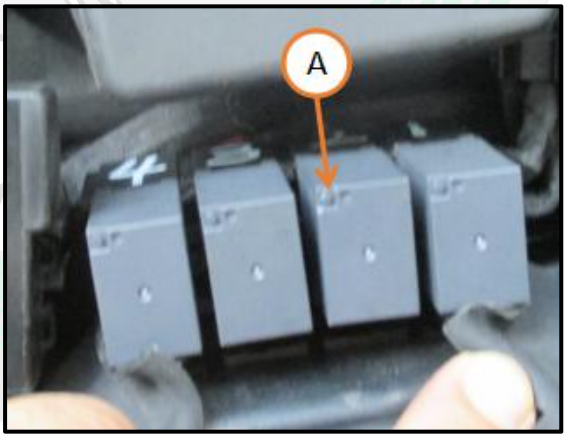


● The relay [A] is in the rear end cover area on the right side of the motorcycle.



●Open the upper cover when disassembling

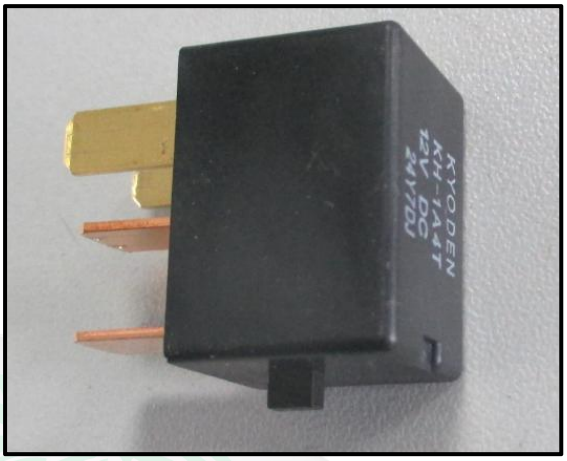
● Pull out No. 2 with relay [A]



● Unscrew the mounting bolts with five large socket head wrench

●Remove the relay

*Note
The relay is equipped with a diode. The relay diode cannot be removed



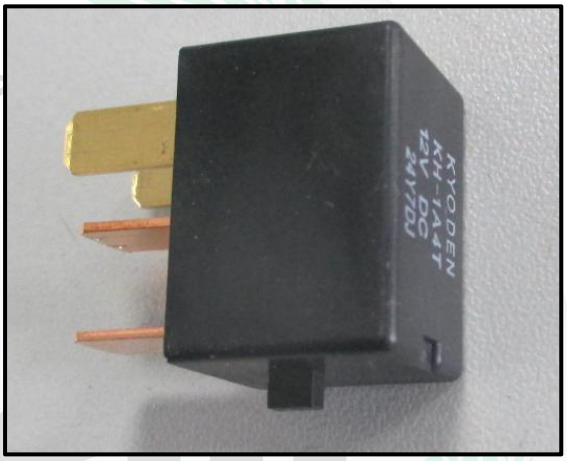
⚠Warning
Do not drop the sensor, especially on a hard surface. The shock on relay may cause damage to it.

Inspection of relay circuit:

● Disassemble the relay (see the section "Removing relay").

• Check the conductivity of the terminals with the following numbers by connecting a hand-held multimeter and a 12V battery to the relay (see the internal circuit of relay box in this section).

★ If the reading of multimeter does not meet the requirements, replace the relay box.



Check relay circuit (disconnect battery)

	Connect the multimeter	Reading of multimeter (Ω)
Fuel pump relay	3-4	∞
	1-2	Not ∞*
Main relay	7-8	∞
	5-6	Not ∞*
Light relay	11-12	∞
	9-10	NOT ∞*

*: Actual readings may vary depending on the handheld multimeter used.

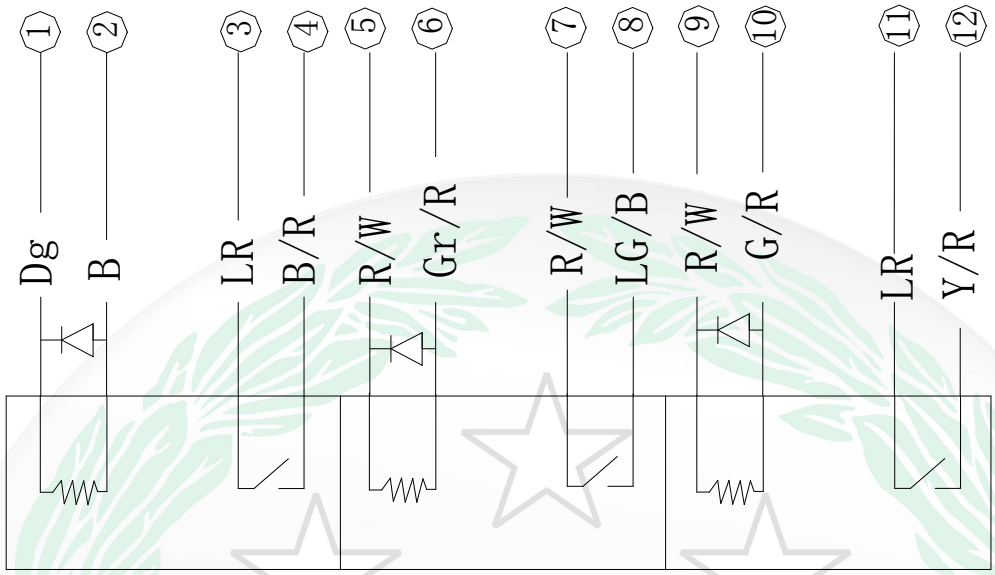
Check relay circuit (with battery)

	Battery connection (+) (-)	Connect the multimeter	Multimeter reading (Ω)
Fuel pump relay	1-2	3-4	0
Main relay	5-6	7-8	0
Light relay	9-10	11-12	0

(+): Connect the positive wire

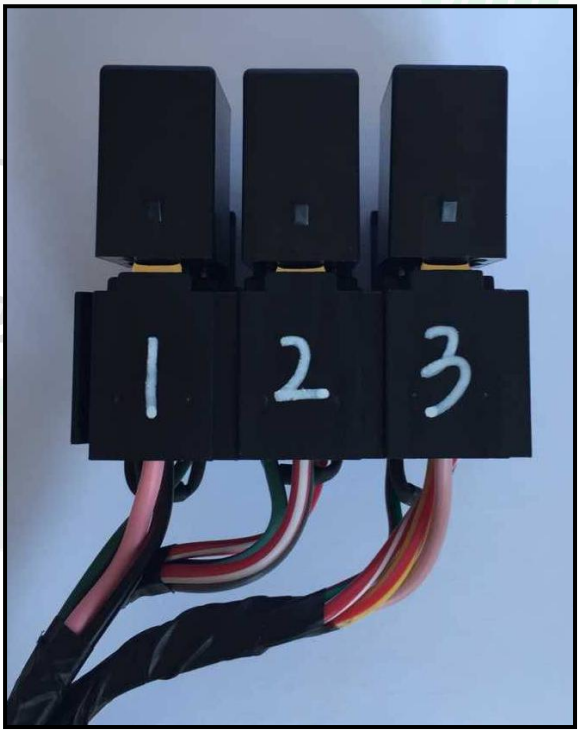
(-): connect the negative wire

Internal circuit of relay box



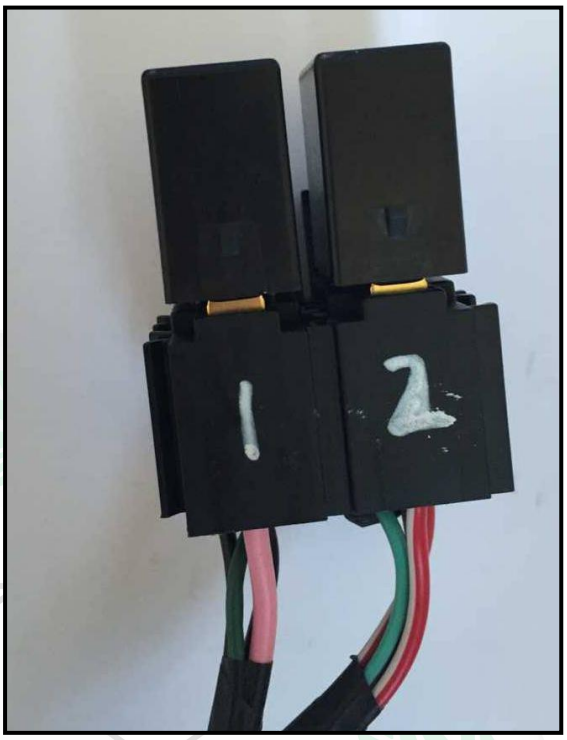
1 Fuel pump relay 2 Main relay 3 Light relay

● State 1: relay



● State 2: relay

●The headlights are not always on. The relay of the motorcycle does not contain the No. 3 relay in the state 1. Others are the same as the above-mentioned export inspection methods.



Benelli

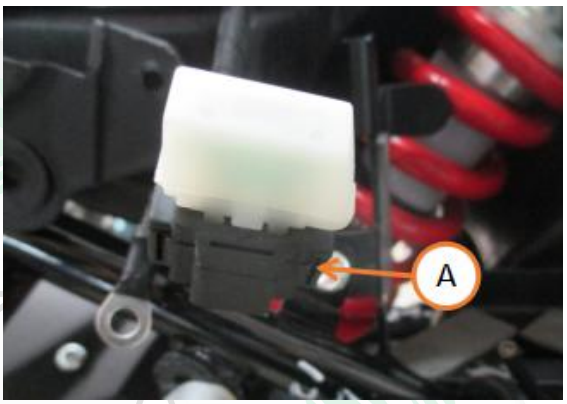
Fuse

Remove the fuse

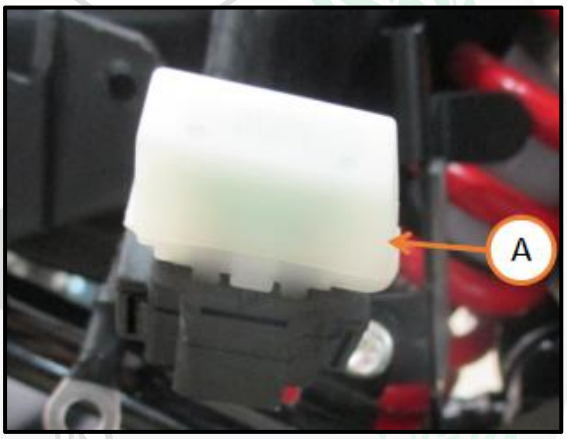
●Remove seat cushion (see "Frame" - "Removing Seat Cushion")

● Remove right cover (see “Frame” – “Removing Right Cover” for details).

● Main fuse [A]

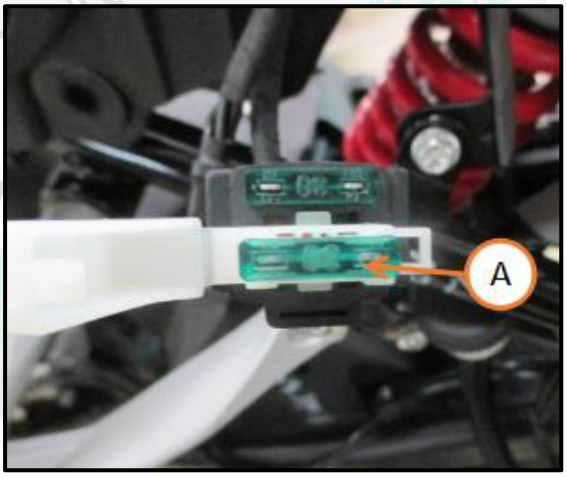


●Open the buckle [A] and lift the cover

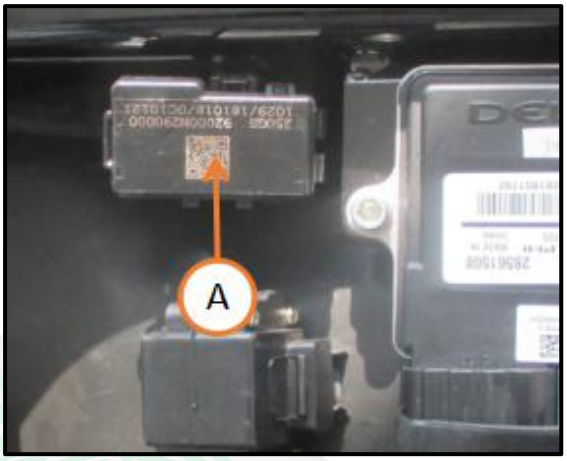


● Use a needle-nosed pliers to pull the main fuse [A] out of the fuse holder in a straight line

Fuse: 30A

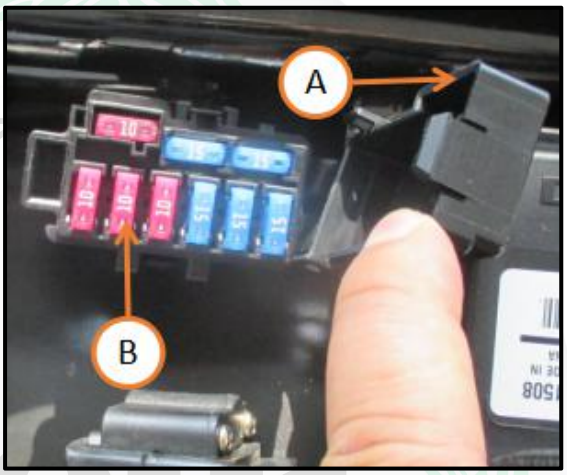


●Fuse box [A]



●Open the buckle and lift the cover [A] .

● Use a needle-nosed pliers to pull the main fuse [B] out of the fuse holder in a straight line



Fuse line, as shown in the right figure

A. Fuel pump: 15A (blue)

B. Fan: 15A (blue)

C. ECU: 15A (blue)

D. Empty: 10A (red)

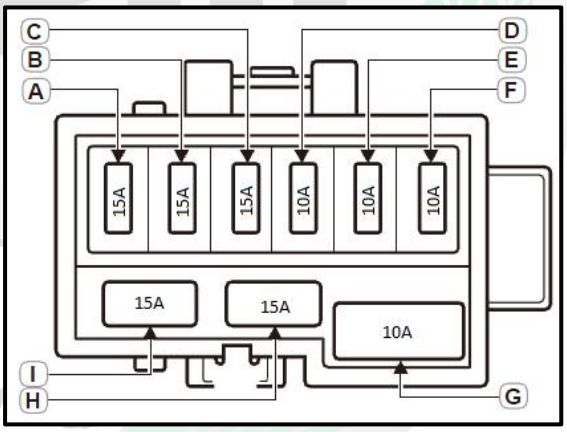
E. Power lock: 10A (red)

F. Empty: 10A (red)

G. Spare fuse 10A (red)

H. Spare fuse 15A (blue)

I. Spare fuse 15A (blue)



Installation of fuse

★ If the fuse fails during operation, check the electrical system to determine the cause and replace it with a one of suitable amperage

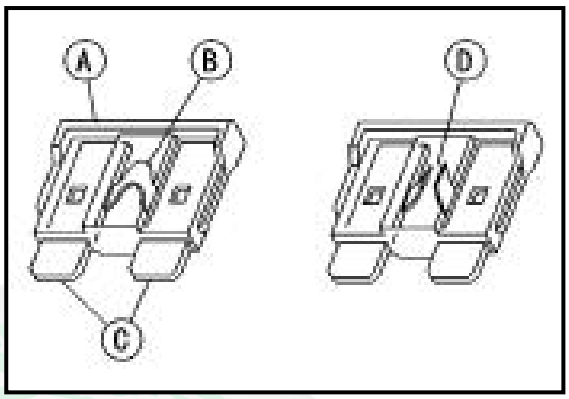
● Install the fuse box on the cover in the original position as specified.

Check the fuse

● Disassemble the fuse (see the section "Removing Fuse").

●Check the fuse parts

★ If the fuse is burnt out, replace it with a new one. Check the amperage of the affected circuit before replacing the blown fuse. If the amperage is equal to or greater than the rated current of the fuse, check the wiring and related components to check whether it is shorted.



Housing [A]

Fuse component [B]

Joint [C]

Blown fuse [D]

Notes
○If the battery is seriously undercharged, the fuse may be burnt out by a large current after starting the engine.

⚠Warning
When replacing the fuse, make sure that the new fuse matches the rated current of specified fuse in the circuit. If a fuse whose current is higher than the rated value is installed, damage may be caused to the line or components.

Chapter VIII Appendixes

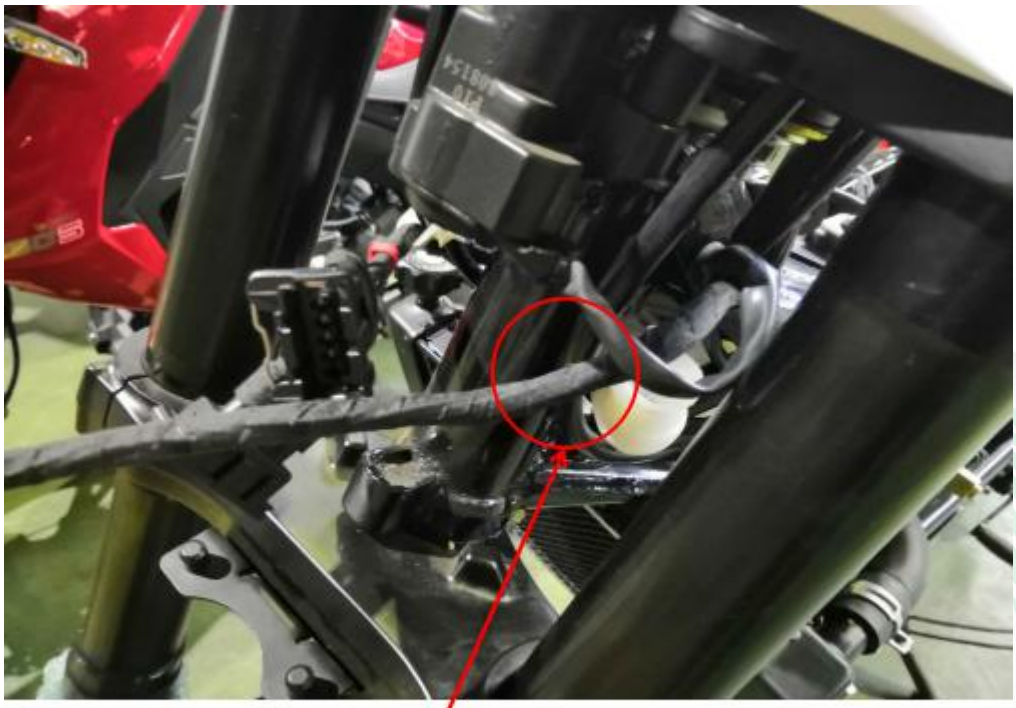
Contents

Winding method of cables, wires and hoses 450
Arrangement of main cable: 451
Arrangement of brake pipe: 456
Other matters: 460
Troubleshooting guide 468
Diagnostic procedure for the fault that engine cannot be started or it is difficult to start the engine: 468
Starter motor does not work: 468
The starter motor is rotating, but the engine does not work: 468
The engine does not run: 468
Fuel does not flow: 468
No sparks; sparks are weak: 468
There is a problem with the fuel/air mixture: 469
Too low cylinder pressure: 469
It cannot run properly at a low speed: 469
Sparks are weak: 469
There is a problem with the fuel/air mixture: 469
Too low cylinder pressure: 469
Others: 470
It cannot run properly at a high speed or the power is insufficient: 470
Ignition is abnormal: 470
There is a problem with the fuel/air mixture: 470
The cylinder pressure is low: 470
There is a click sound: 470
Others: 471
The temperature is too high: 471
Ignition is abnormal: 471
The muffler is overheated: 471
There is a problem with the fuel/air mixture: 471
The cylinder pressure is high: 471
The output force of engine is insufficient: 471
Not properly lubricated: 471
The fuel cooler is abnormal: 471
Meter is abnormal: 471
The coolant is abnormal: 472
The components of cooling system are not working properly: 472
Overcooling: 472
Meter is abnormal: 472
The components of cooling system are not working properly: 472
The clutch is not working properly: 472
The clutch is slipping: 472

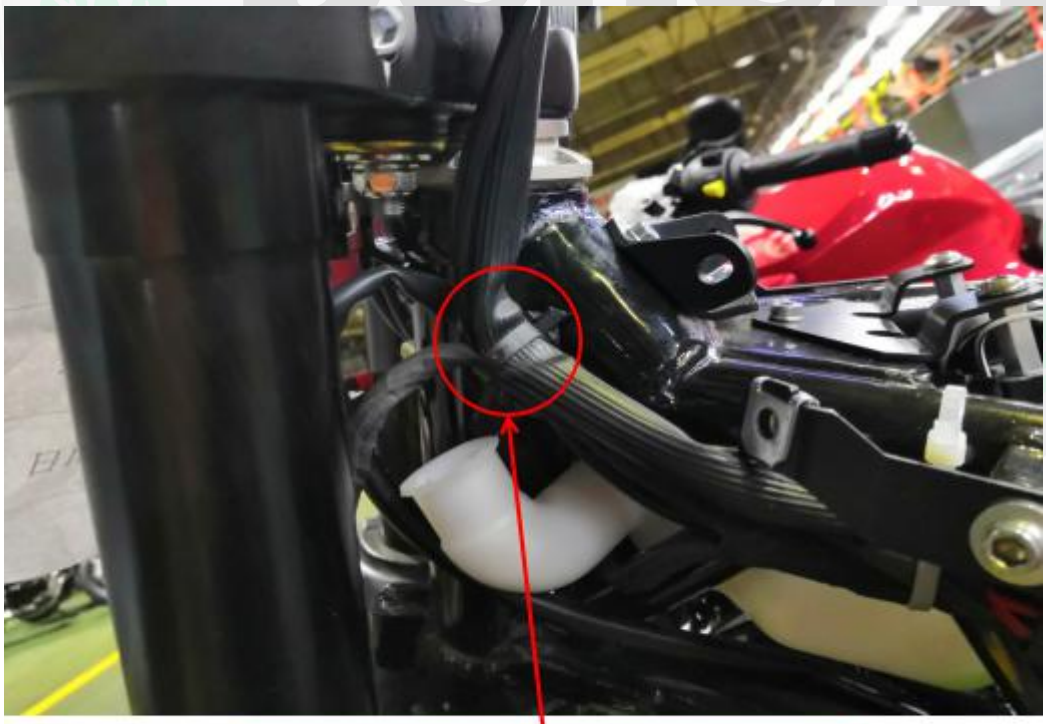
The clutch cannot be separated properly: 472
There is a problem with shifting:.... 472
It is unable to operate the gear smoothly; control pedal cannot be reset: 472
Jump 473
Excessive speed change: 473
The engine makes an unusual noise: 473
There is a click sound: 473
The piston makes a sound: 473
The valve makes noise: 473
The drive system makes an unusual noise: 473
Clutch makes a noise: 473
The drive device makes a noise: 474
The drive system makes a noise: 474
The engine makes an unusual noise: 474
The front fork makes a noise: 474
The rear shock absorber makes a noise: 474
The brake disc makes a noise: 474
Other noises: 474
Excessive exhaust gas: 474
White exhaust: 474
Black exhaust: 474
Brown exhaust: 474
Poor performance and / or stability: 474
It is difficult to rotate the handlebar: 474
The handlebars vibrate or shake severely: 474
The handlebar is placed on one side: 475
The damping effect is not ideal: 475
Brake is unable to work properly.... 475
Battery has failed:.... 475
Battery has run out: 475
Battery is overcharged: 475
Circuit Diagram 476

●**Winding method of cables, wires and hoses**

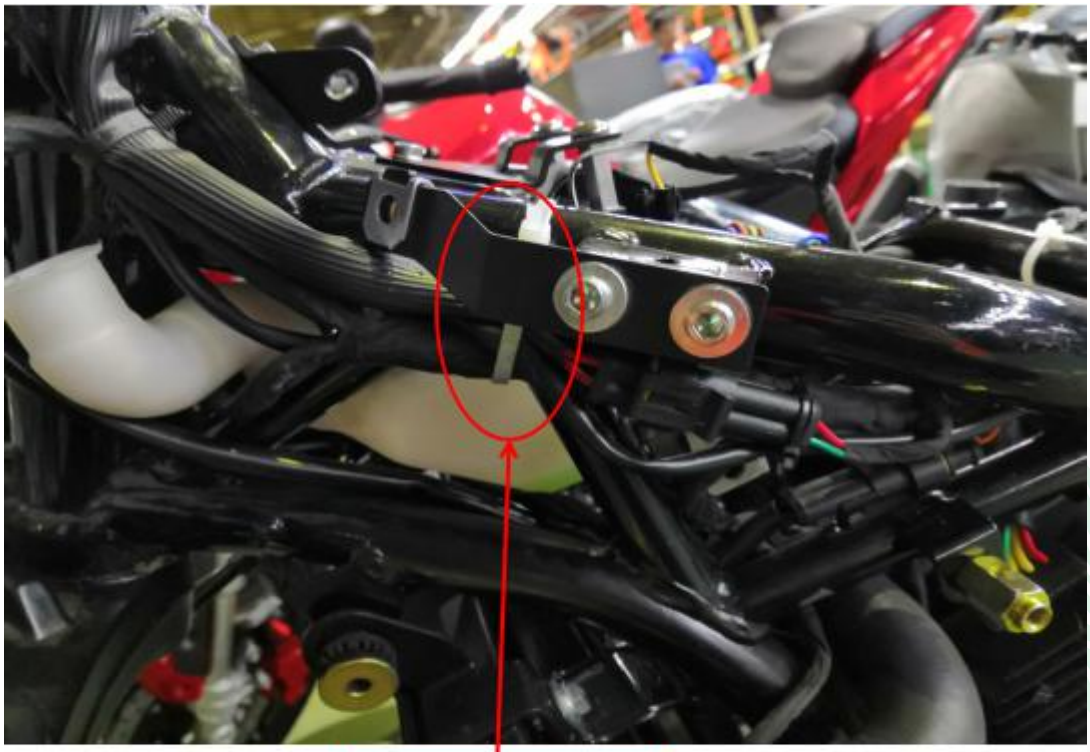
Arrangement of main cable:



Arrange the power cable, handlebar control wire and front headlight wire along the left side of frame support and bind it using wire clips coated with rubber

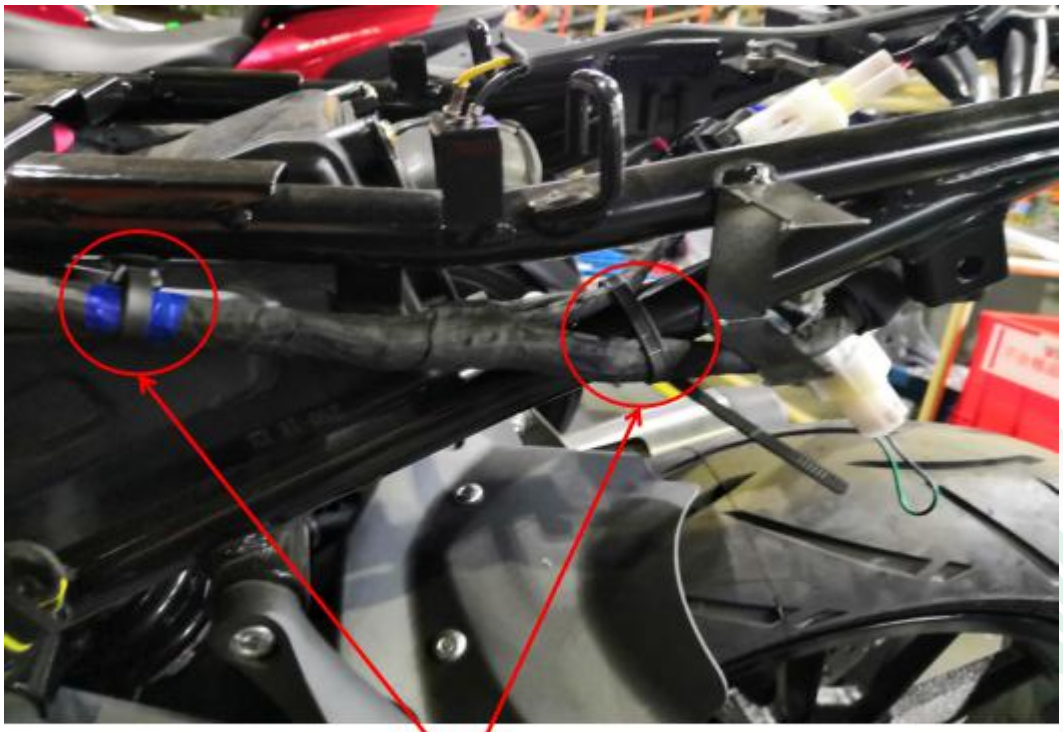


Arrange the power cable, handlebar control wire and front headlight wire along the left side of frame support and bind it using wire clips coated with rubber



Arrange the main cable and left handlebar control wire along the lower side of frame, and fix them using strapping tapes

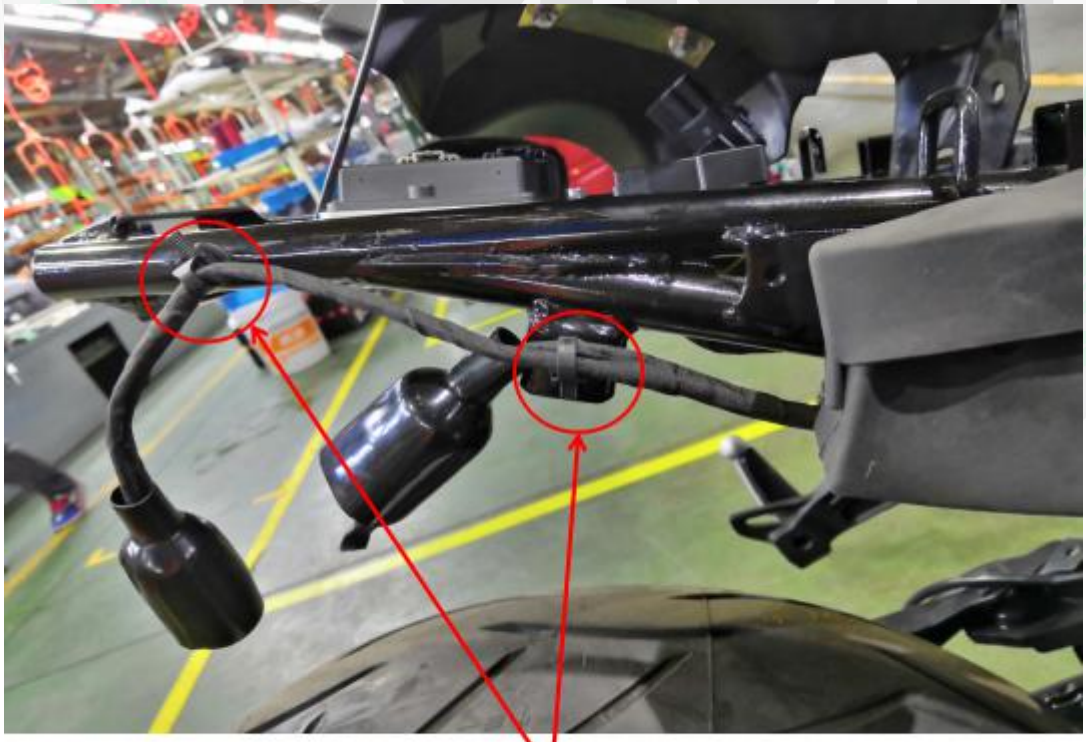
Pass the main cable through the lower side of rear frame (left)



Arrange the main cable along the rear frame and fix it using the wire clip coated with rubber on the frame

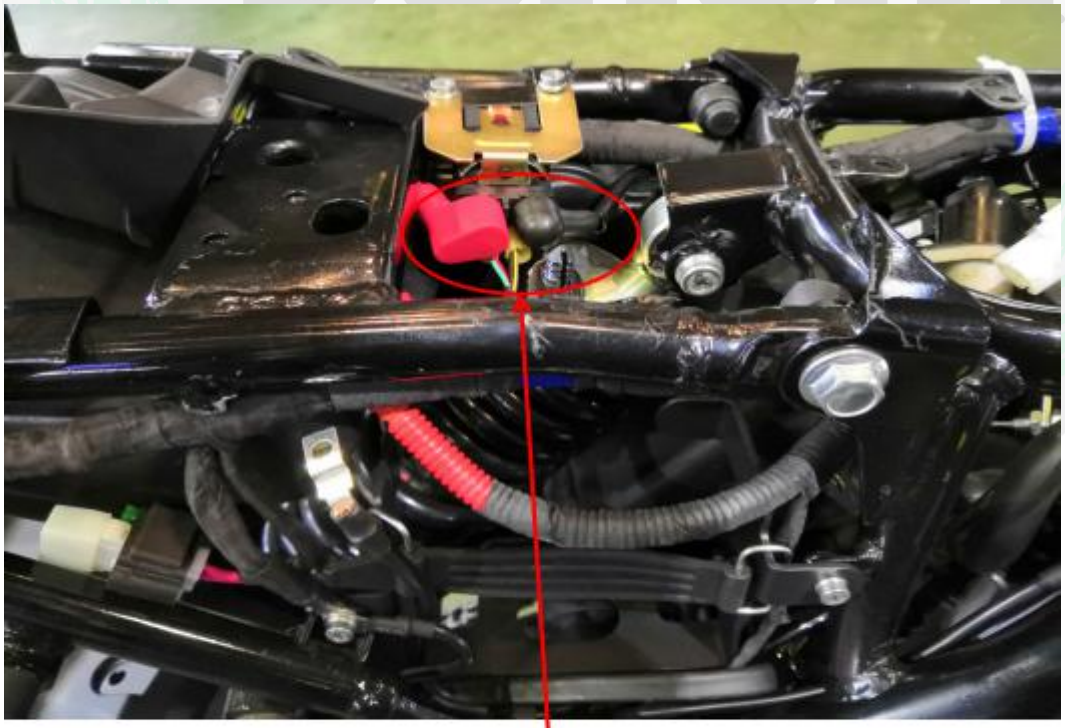
Arrange the main cable along the frame and fix it using the wire clip coated with rubber

Arrange bond strap and main cable



Arrange the main cable along the frame and fix it using the wire clip coated with rubber

Arrange the main cable along the frame and fix it using the wire clip coated with rubber on the frame

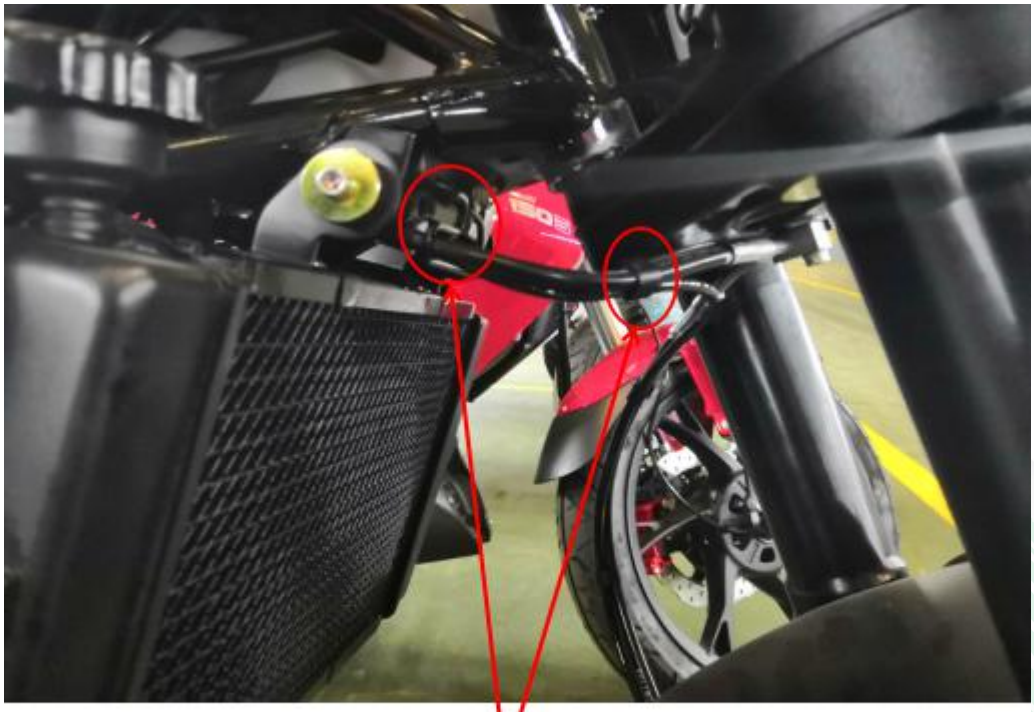


Arrange battery holder and relay

Arrangement of brake pipe:

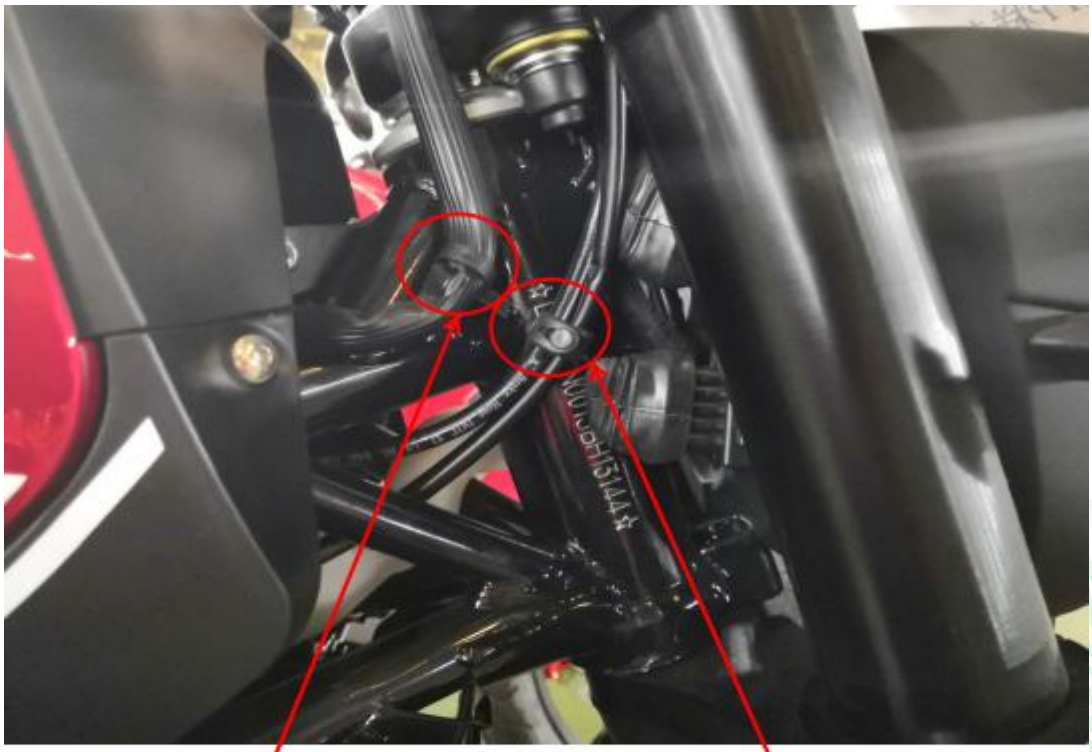
Arrange tachometer cable and front fluid brake hose and fix them using double wire clips

Fix the fluid brake hose at the lower side of lower bracket, fix the fuel hose and front tachometer cable using double wire clips and then pass them through the mounting clip on the upper side of water tank



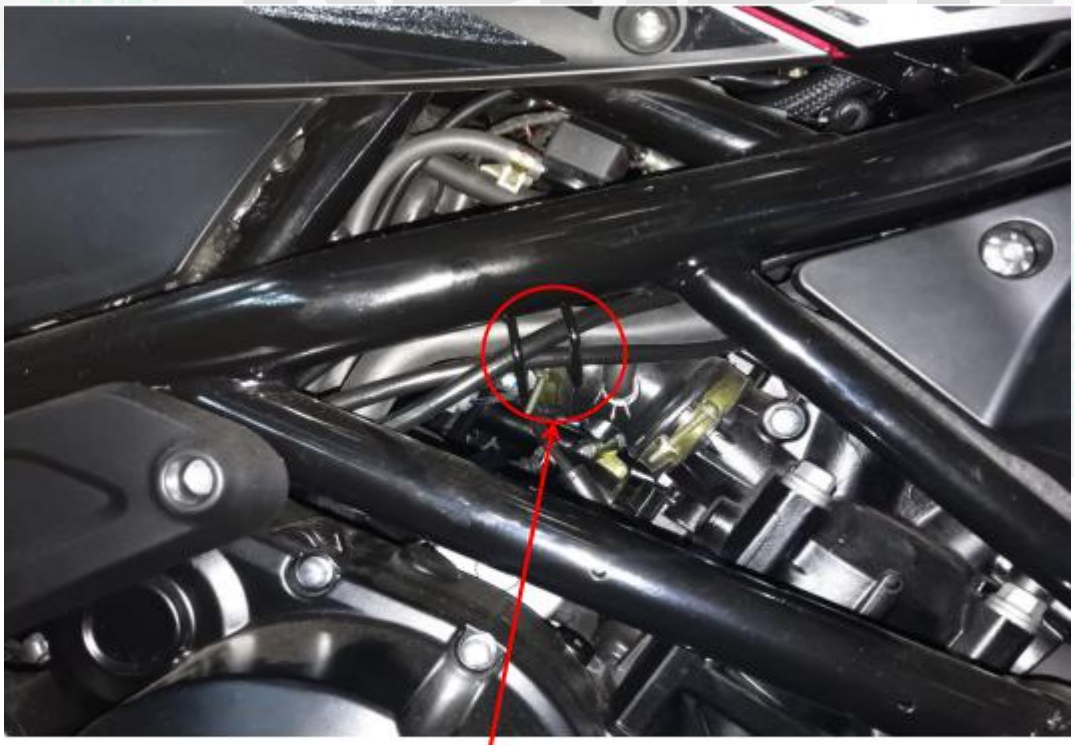
Fix the fluid brake hose at the lower side of lower bracket, fix the fuel hose and front tachometer cable using double wire clips and then pass them through the mounting clip on the upper side of water tank

Pass two fuel hoses through the lower bracket at the right



Arrange the right handlebar control wire along the support at the right side of frame and fix it using the wire clip coated with rubber

Pass two fuel hoses through the lower bracket at the right and then fix them using double wire clips



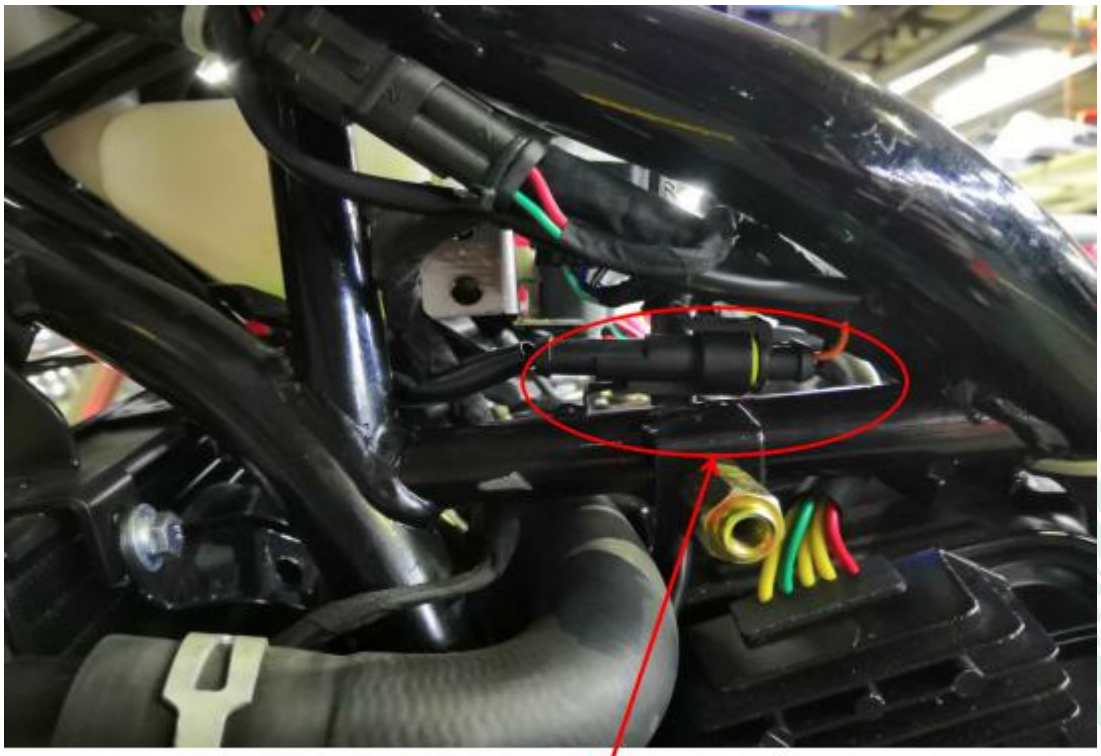
Arrange the rear fluid brake hose, rear tachometer cable and air filter inlet pipe along the frame and fix them in the fastener of frame

Arrange the brake plunger wire, brake hose and rear fluid brake hose along the workshop and fix them in the fastener of frame

Fix the rear fluid brake hose and rear tachometer cable on the wire clip of rear swing arm

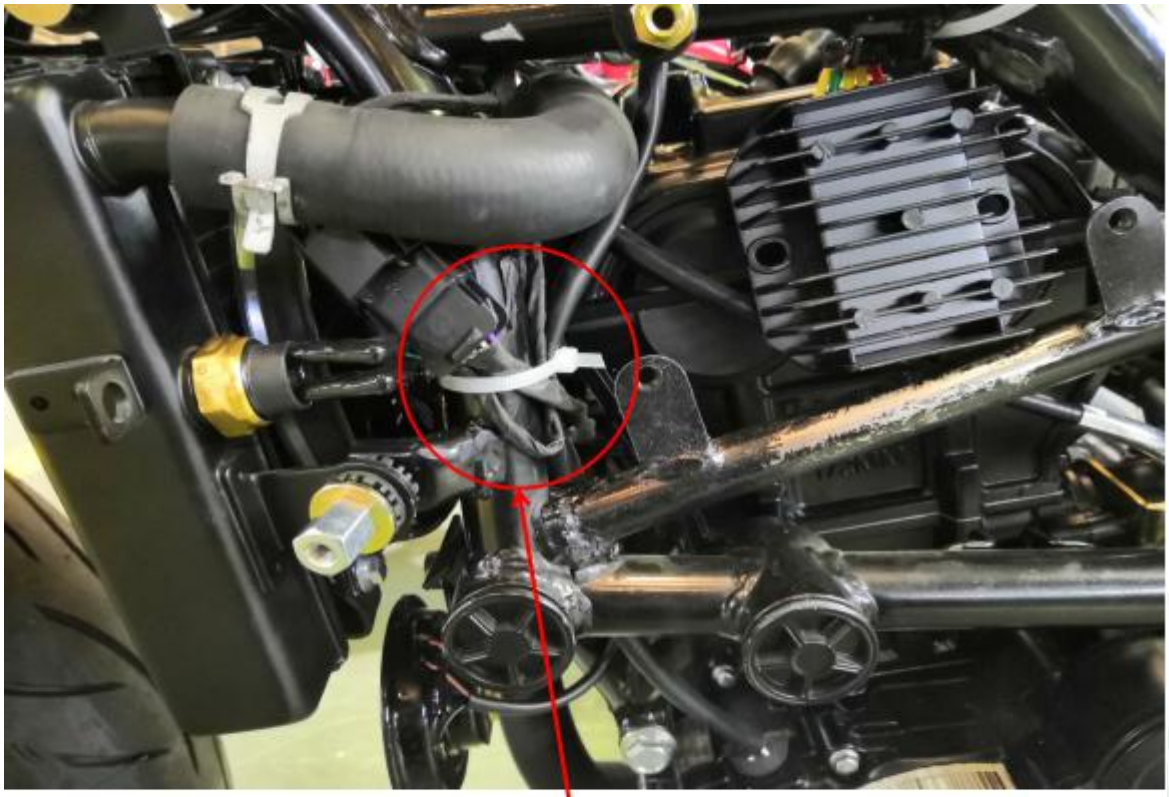
Fix the rear fluid brake hose, rear tachometer cable and rear license plate wire on the wire clip of rear swing arm

Other matters:



Arrange the water tank connector along the frame, and fix the connector on the frame pin

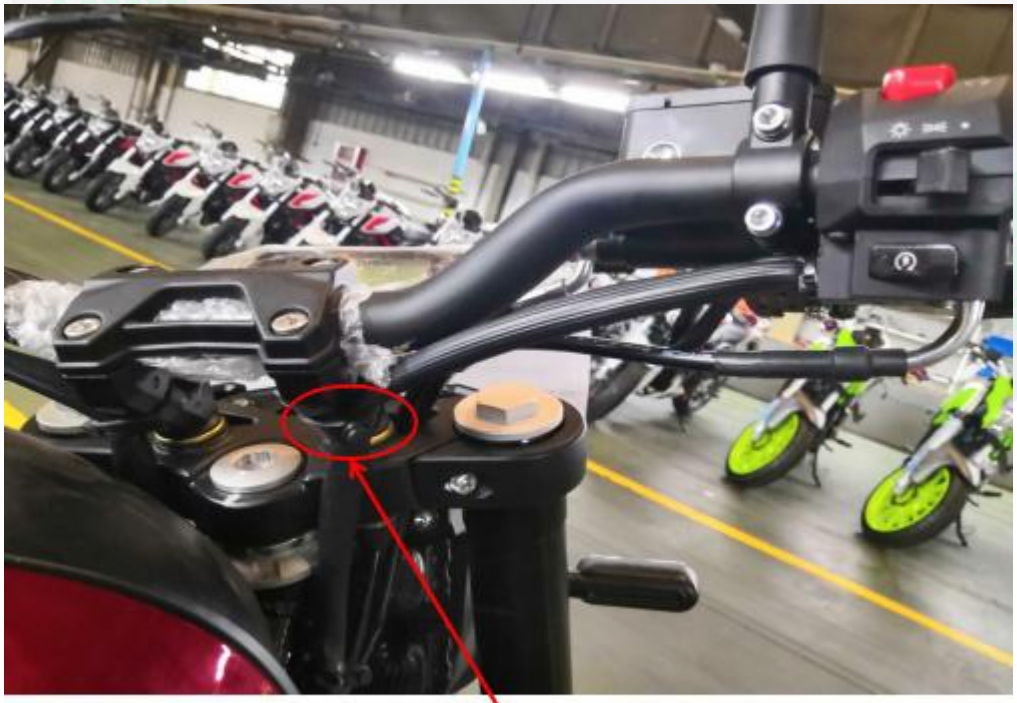
Arrange the horn wire along the lower side of frame and fix it using buckle fastener



Arrange oxygen sensor wire, horn wire, throttle wire and main cable along the lower side of frame, and fix them using buckle fasteners

Arrange the sidestand wire

Arrange the sidestand connector, power connector and main cable along the lower side of rear frame, and fix them using buckle fasteners

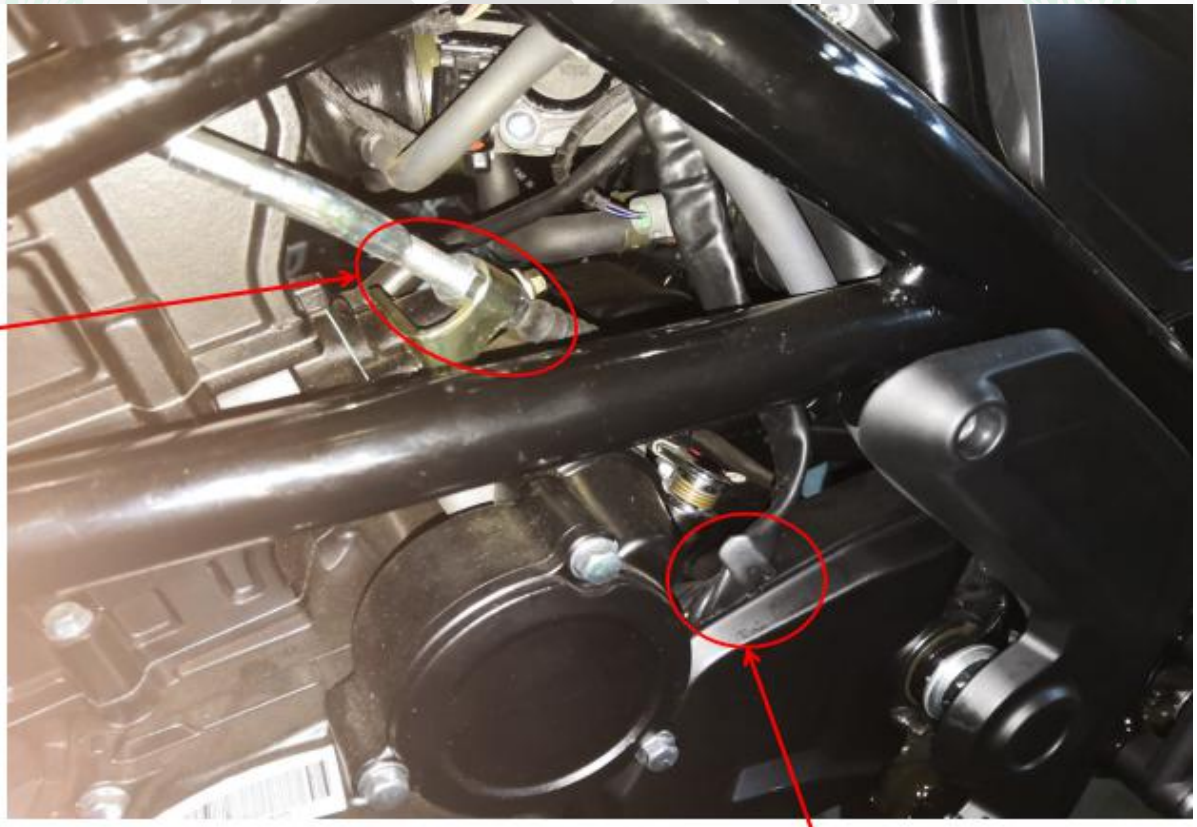


Arrange the right handlebar control wire along the handlebar and fix it using flexible wire clip

ABS connector and flasher connector

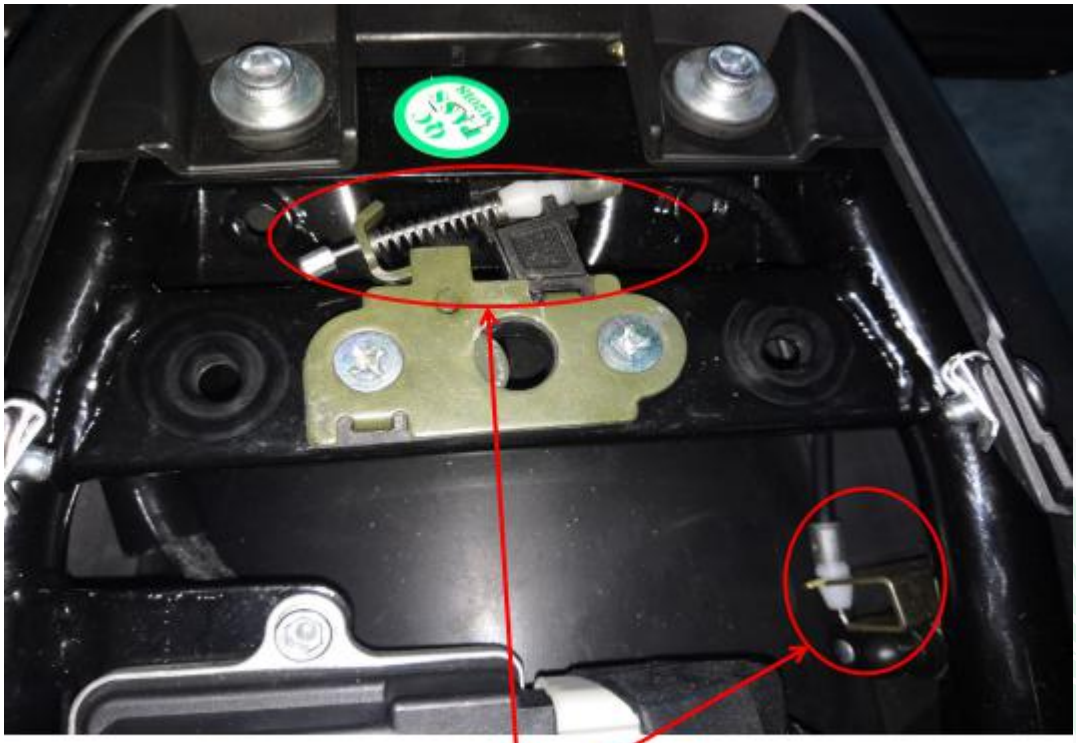
Arrange the rear license plate wire along the front end of rear swing arm and fix it using strapping tapes

Arrange the rear license plate wire along the chain guide and fix it using strapping tapes

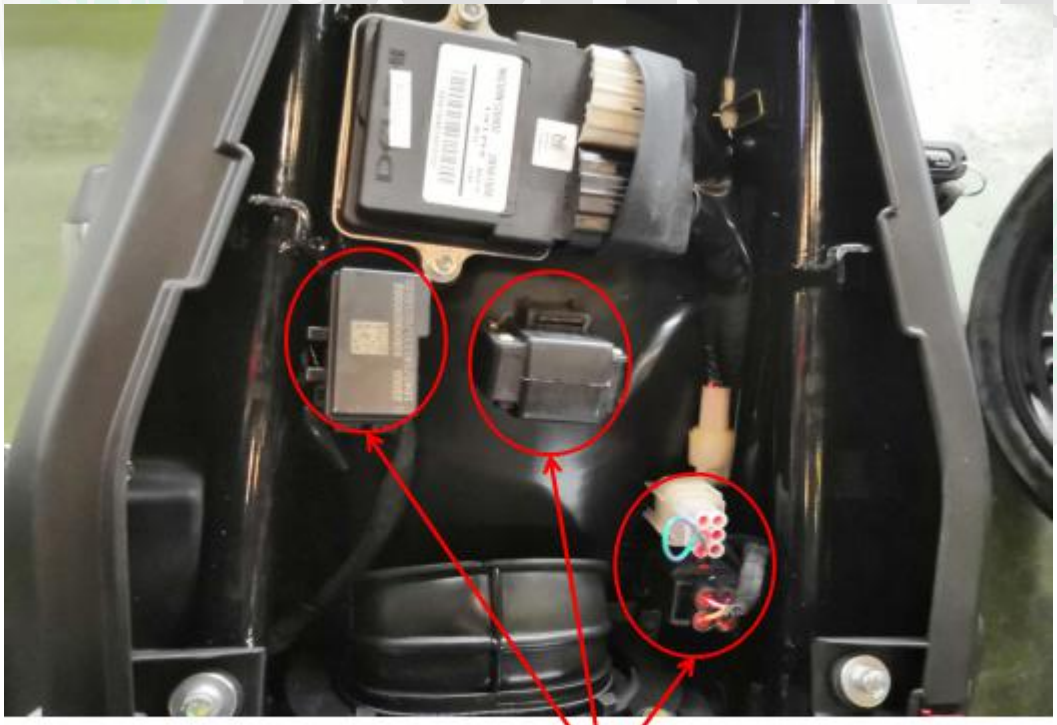


Clutch wire

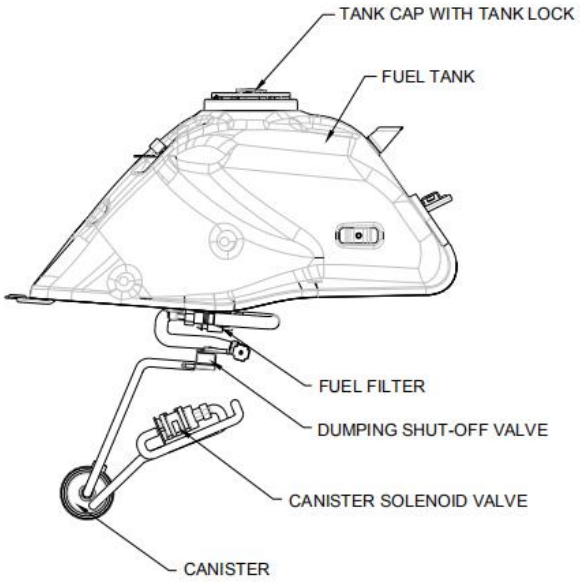
Arrange the power wire along the power cover and fix it using strapping tapes



Arrange seat lock control wire



Fix the fuse box, anti-roll relay, OBD diagnosis interface and AB diagnosis interface connector on the slot of rear fender



Connect canister to canister solenoid valve pipe: 5×9×150
Connect canister to down valve pipe: 4.5×8.5×300
Connect canister solenoid valve to engine inlet pipe: 5×9×100
MAP pipe: 4.5×8.5×100
Connect fuel tank to down valve pipe: 4.5×8.5×220
Connect coolant reserve tank to water fuel pipeline: 7×11×240

Troubleshooting Guide

Remarks

○ For most of the faults of EFI, see the chapter “EFI”.

○ This table is not exhaustive. It is not possible to list the possible causes of each problem. It can only be used as a basic guide to help solve some common problems.

Diagnostic procedure for the fault that engine cannot be started or it is difficult to start the engine:

Starter motor does not work:

The main switch or engine stop switch is not turned on;
The starter lock switch or the gear switch has failed;
The starter motor has failed;
Battery voltage is low;
The starter relay is in poor contact or cannot operate normally;
The contact of start button is poor;
The starting system circuit is shorted or open;
The main switch has failed;
The engine stop switch has failed;
30 A main fuse or main switch fuse is burnt out

The starter motor is rotating, but the engine does not work:

Motorcycle rollover sensor (EFI) is working;
The anti-theft control system has failed;
The overrunning clutch has failed;
The starting idler gear has failed.

The engine does not run:

The valve is seized;
The valve ejector rod is seized;
Cylinder and piston are seized;
Crankshaft is seized;
The small end of the connecting rod is seized;
The big end of the connecting rod is seized;
The drive gear or bearing is seized;
Camshaft is seized;
Starting idler gear is seized;
Balance shaft bearing is seized;

Fuel does not flow:

There is no fuel in the fuel tank;
The fuel pump has failed;
The tank vent is blocked;
Check whether the fuel filter is blocked;
Fuel hose is blocked

No sparks; sparks are weak:

Motorcycle rollover sensor (EFI) is detached;
The main switch is not rotated to "ON".
The engine stop switch is not rotated to "OFF";
The clutch handle is not pinched or the gear position is not in the neutral position;
Battery voltage is low;
The anti-theft control system has failed;
□The spark plug is dirty, broken or the gap is improper;
Spark plug is not applicable
Short circuit or poor contact of ignition coil;
The ignition coil has failed;
The engine control unit (ECU) has failed;
The camshaft position sensor has failed;
The gear switch, starting lock switch or sidestand switch has failed;
The crankshaft sensor has failed;
The main switch or engine stop switch is short circuited;
The starting system circuit is shorted or open;
Main fuse or main switch fuse is burnt out

There is a problem with the fuel/air mixture:
Bypass screw and / or idle adjustment screw is out of order;
Air duct is blocked;
Air filter is clogged, poorly sealed or missing;
The oil filling port cover, crankcase vent pipe or air filter drain pipe leaks;
Too low cylinder pressure:
The spark plug is loosened;
The cylinder head is not tightened;
The cylinder or piston is worn;
The piston ring is damaged (worn, weakened, damaged or stuck);
The clearance between piston ring and piston ring groove is too large;
The cylinder head gasket is damaged;
The cylinder head is deformed;
Valve spring is damaged or or its elasticity is poor;
There is no valve clearance;
The valve is not installed properly (valve bending, wear or carbon deposits on the valve seat)

It cannot run properly at a low speed:

Sparks are weak:
Battery voltage is low;
The anti-theft control system has failed;
The ignition coil has failed;
Short circuit or poor contact of ignition coil;
The spark plug is dirty, broken or the clearance is improper;
Spark plug is not applicable;
The engine control unit (ECU) has failed;
The camshaft position sensor has failed;
The crankshaft sensor has failed
There is a problem with the fuel/air mixture:
Bypass screw is not adjusted properly;
Air duct is blocked;
Exhaust pipe or vent hole is blocked;
The idle air way is blocked;
Air filter is clogged, leaking or missing;
The tank vent is blocked;
The fuel pump has failed;
Throttle valve assembly holder is loosened;
Breather pipe holder is loosened
The cylinder pressure is low:
The spark plug is loosened;
The cylinder head is not tightened firmly;
There is no valve clearance;
The cylinder or piston is worn;
The piston ring is damaged (worn, weakened, damaged or stuck);
The clearance between piston ring and piston ring groove is too large;
The cylinder head gasket is damaged;
The cylinder head is deformed;
Valve spring is damaged or or its elasticity is poor;
The valve is not installed properly (valve bending, wear or carbon deposits on the valve seat)
Camshaft or cam is worn
The main switch continues to run after being cut off:
The main switch has failed;
The engine stop switch has failed;
Fuel injector has failed;
The negative terminal (-) of battery or the engine control unit (ECU) ground wire is loosened;
There is carbon deposit on the valve seat;
Engine overheating
Others:
The engine control unit (ECU) has failed;
The negative pressure value of throttle valve is out of balance;

The oil viscosity is too high;
The drive system has failed;
Brake drags;
The clutch is slipping;
Engine overheating;
Air suction valve has failed;
Secondary air compensating valve has failed

It cannot run properly at a high speed or the power is insufficient:

Ignition is abnormal:
The spark plug is dirty, broken or not adjusted properly;
Spark plug is not applicable;
Short circuit or poor contact of ignition coil;
The ignition coil has failed
The engine control unit (ECU) has failed
There is a problem with the fuel/air mixture:
Air filter is clogged, poorly sealed or there is no air filter;
Vent pipe holder is loosened;
There is water or foreign matter in the fuel;
Throttle valve assembly holder is loosened;
Insufficient fuel supply to fuel injector;
The air duct of tank is blocked;
Fuel hose is blocked;
The fuel pump has failed;
The cylinder pressure is low:
The spark plug is loosened;
The cylinder head is not tightened firmly;
There is no valve clearance;
The cylinder or piston is worn;
The piston ring is poor (worn, weakened, damaged or stuck);
The clearance between piston ring and groove is too large;
The cylinder head gasket is damaged;
The cylinder head is deformed;
Valve spring is damaged or or its elasticity is poor;
The valve is not installed properly (valve bending, wear or carbon deposits on the contact surface)
There is a click sound:
There is carbon deposit in the combustion chamber;
The fuel is inferior or fuel type is not applicable;
Spark plug is not applicable;
The engine control unit (ECU) has failed
Others:
The throttle valve cannot be fully opened;
Brake drags;
The clutch is slipping;
Engine overheating;
The fuel level is too high;
The fuel viscosity is too high;
The drive system has failed;
Camshaft or cam is worn;
Air suction valve has failed;
Secondary air compensating valve has failed;
Catalyst is melted due to overheating of muffler

The temperature is too high:

Ignition is abnormal:
The spark plug is dirty, broken or not adjusted properly;
Spark plug is not applicable;
The engine control unit (ECU) has failed
The muffler is overheated:
For the Benelli emission control system, do not start the engine even if the cylinder does not ignite or is not running properly (must be repaired by the nearest maintenance point);
For the Benelli emission control system, if the battery has run out, do not start the motorcycle (connect the other fully charged battery with a jumper and then electrically start the engine);

For the Benelli emission control system, do not start the engine if the ignition is not normal due to dirty spark plugs or poor contact of ignition coil;
For the Benelli emission control system, when the main switch is turned "off", do not ride the motorcycle and taxi using inertia force (turn "on" the main switch and start the engine);
The engine control unit (ECU) has failed
There is a problem with the fuel/air mixture:
Throttle valve assembly holder is loosened;
Vent pipe holder is loosened;
Air filter is poorly sealed or there is no air filter;
The fuel filter is blocked
The cylinder pressure is high:
There is carbon deposit in the combustion chamber;
The output force of engine is insufficient:
The clutch is slipping;
The fuel level is too high;
The fuel viscosity is too high;
The drive system has failed;
Brake drags
Not properly lubricated:
The fuel level is too low;
The fuel is inferior or fuel type is not applicable;
The fuel cooler is abnormal:
The fuel cooler is blocked
Meter is abnormal:
The water thermometer is broken;
The water temperature sensor is broken
The coolant is abnormal:
The coolant level is too low;
The coolant is deteriorated;
Coolant mixing ratio is incorrect
The components of cooling system are not working properly:
The radiator is damaged;
The radiator is blocked;
The thermostat has failed;
The radiator cover has failed;
The radiator fan relay has failed;
The fan motor is damaged;
The fan blade is damaged;
The pump does not run;
Water pump impeller is damaged

Overcooling:

Meter is abnormal:
The water thermometer is broken;
Water temperature sensor is broken
The components of cooling system are not working properly:
The thermostat has failed;

The clutch is not working properly:

The clutch is slipping:
The friction pad is worn or deformed;
The steel sheet is worn or deformed;
Clutch spring is damaged or or its elasticity is poor;
The clutch housing is unevenly worn;
The master cylinder of clutch has failed;
The slave cylinder of clutch has failed;
The clutch cannot be separated properly:
The clutch pad is deformed or too rough;
Clutch spring is not pressed evenly;
Engine oil is deteriorated;
The fuel viscosity is too high;
The fuel level is too high;
The clutch housing is seized to the drive shaft;

The clutch housing nut is loosened;
The clutch housing spline is damaged;
The friction pad of clutch is not installed properly
The slave cylinder of clutch has failed;
Clutch oil is deteriored;
There is air in the clutch fuel tube;
The primary cup or the secondary cup of master cylinder of clutch is broken;
The inner wall of master cylinder of clutch is damaged;

There is a problem with shifting:

It is unable to operate the gear smoothly; control pedal cannot be reset:
The clutch cannot be separated:
The fork is bent or stuck;
The gear gear is stuck on the shaft;
Gear lever is blocked
The elasticity of shifting and resetting spring is poor or or it is damaged;
The pin of shifting and resetting spring is loosened;
The spring at the claw of shift connecting rod
is damaged;
The spring at the claw of shift connecting rod
is damaged;
The shift claw is damaged
Jump
The fork of shift fork is worn or bent;
Shift gear groove is worn;
The joint between the protrusion of the inner edge of gear and recess is worn;
The groove of shift drum is worn;
The elasticity of gear lever spring is poor or or it is damaged;
The guide pin of shift fork is worn;
Drive shaft, output shaft and/or gear spline is worn
Excessive speed change:
The elasticity of gear lever spring is poor or or it is damaged;
The spring at the claw of shift connecting rod
is damaged;

The engine makes an unusual noise:

There is a click sound:
The engine control unit (ECU) has failed;
There is carbon deposit in the combustion chamber;
The fuel is inferior or fuel type is not applicable;
Spark plug is not applicable;
Engine overheating
The piston makes a sound:
The clearance between the cylinder and the piston is too large;
The cylinder or piston is worn;
The connecting rod is bent;
The piston pin or its hole is worn;
The valve makes noise:
The valve clearance is incorrect;
Valve spring is damaged or or its elasticity is poor;
The camshaft bearing is worn;
The valve lifter is worn
Other noises:
The clearance at t he small end of connecting rod is too large;
The clearance at t he big end of connecting rod is too large;
The clearance between piston ring and piston ring groove is too large;
The piston ring is worn, damaged or stuck;
Piston ring groove is worn;
Piston is seized or damaged;
The cylinder head gasket is leaking;
The exhaust pipe of cylinder head connecting portion is leaking;
The crankshaft runout is too large;
The engine is loosened;

The crankcase bearing is worn;
The main gear is worn or notched;
Camshaft chain tensioner has failed;
The camshaft chain, sprocket or guide is worn;
Air suction valve is damaged;
Secondary air compensating valve is damaged;
The alternator rotor is loose;
The catalyst is melted due to overheating of muffler (Benelli emission pollution control system)

The drive system makes an unusual noise:

Clutch makes a noise:
The function of clutch shock absorber is weak or it is damaged;
The clearance between the clutch housing and the friction pad is too large;
The clutch housing is worn;
The outer friction pad is not installed properly
The drive device makes a noise:
The bearing is worn;
The drive gear is worn or notched;
Metal fragments are stuck on the rotating teeth of gear;
Insufficient oil;
The drive system makes a noise:
The chain is not properly adjusted;
Chain is worn;
The rear sprocket and/or the engine sprocket are worn;
The chain is not applied with sufficient lubricant;
The rear wheel is not adjusted evenly

The frame makes an unusual noise:

The front fork makes a noise:
The lubricant is insufficient or the film is too thin;
The elasticity of spring is poor or or it is damaged;
The rear shock absorber makes a noise:
The shock absorber is broken;
The brake disc makes a noise:
The brake pads are not installed correctly;
The surface of brake pad is polished;
The brake disc is deformed;
The caliper has failed;
Other noises:
Brackets, nuts, bolts and other parts are not properly installed or locked.

Excessive exhaust gas:

White exhaust:
Piston oil ring is worn;
The cylinder is worn;
Valve seal is damaged;
Valve guide is worn;
The fuel level is too high
Black exhaust:
The fuel filter is blocked
Brown exhaust:
Breather pipe clamp is loosened
Air filter is poorly sealed or there is no air filter;

Poor performance and / or stability:

It is difficult to rotate the handlebar:
The wires and cables are not wound in the correct way;
The hoses are not wound in the correct way;
The wires are not wound in the correct way;
The steering stem nut is too tight;
The steering stem bearing is broken;
The steering stem bearing is not applied with sufficient lubricant;
The steering stem is bent;
The tire pressure is too low

The handlebars vibrate or shake severely:
The tire is worn;
The main axis bearing of swing arm is worn;
The rim is deformed or unbalanced;
The wheel bearing is worn;
Handlebar holder bolt is loosened;
The steering stem nut is loosened;
The runout of front and rear axles is too large;
Engine mounting bolt is loosened;
The handlebar is placed on one side:
The frame is bent;
The wheels are not aligned properly;
The swing arm is bent or twisted;
The runout of main axis of swing arm is too large;
The steering stem is not adjusted properly;
The front fork is bent;
The oil level of left and right front shock absorber is uneven
The damping effect is not ideal:
(too hard)
Excessive front shock absorber oil;
The viscosity of front shock absorber oil is too high;
Rear shock absorber oil is too thick
The tire pressure is too high;
The front fork is bent;
(too soft)
The tire pressure is too low;
The font shock absorber oil is insufficient and / or leaking;
The viscosity of front shock absorber oil is too low;
Rear shock absorber oil is too thin
The front fork and rear shock absorber springs have poor elasticity;
Rear shock absorber is leaking
Brake is unable to work properly
There is air in the brake tube;
The friction pad or brake disc is worn;
The brake fluid is leaking;
The brake disc is deformed;
The friction pad is polluted;
The brake fluid is deteriorated;
The primary cup or the secondary cup of master cylinder is broken;
The inner wall of master cylinder is damaged

Battery has failed

Battery has run out:
Power is insufficient;
There is a problem with the battery (voltage is too low);
Poor contact of battery cable;
The load is too large (eg, the power of bulb is too large);
The main switch has failed;
The alternator has failed;
There is a problem with the line;
The regulator/rectifier has failed
Battery is overcharged:
The alternator has failed;
The regulator/rectifier has failed
There is a problem with battery;

Circuit Diagram