KIPOR

WUXI KIPOR POWER CO.,LTD

IG6000
IG6000h
Generator Service Manual

Kipor Power Systems August 1, 2011

Preface

This manual covers the construction, function and servicing procedure of the KIPOR KGE7000Ti single voltage generator and the dual voltage KGE6000Ti and IG6000 generator. This manual covers generator specifications, function, troubleshooting and repair.

Careful observance of the instructions contained in this manual will result in safe and quality service work.

All information, illustrations, directions and specifications included in this publication are based on the latest product information available at the time of printing.

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1. SPECIFICATIONS and DIAGRAMS

1.1 General Specifications

Dimensions and weights

Model	IG6000
Overall length- in. (mm)	31.6 (802)
Overall width- in. (mm)	19.4 (498)
Overall height- in. (mm)	24.6 (624)
Dry weight- lbs. (Kg)	213 (96.7)

Engine

Model	KG390GETi
Type	4-stroke,OHV, single cylinder
Displacement- cu.in. (cc)	23.7 (389)
Bore x stroke- in. (mm)	3.46 x 2.51 (88×64)
Maximum horsepower(KVA)	7.7/3600
Compression ratio	8.5:1
Cooling system	Forced air
Ignition system	Transistorized controlled ignition
Ignition timing	25°B.T.D.C
Spark plug	WR7DC
Carburetor	Horizontal float & fly type
Air cleaner	Dry replaceable element
Governor	Inverter module control
Lubrication system	Forced splash
Oil capacity- qt. (L)	1.2 (1.1)
Starting system	Electric starter
Stopping system	Electric ground
Fuel	Automotive unleaded gasoline

Generator

Model	KD70
Generator type	Multi pole rotation type
Generator structure	Self-ventilation drip-proof type
Excitation	Self-excitation (Magnet type)
Voltage regulation system	Pulse Width Modulation
Phase	Single phase
Rotating direction	Clockwise (Viewed from the generator)
Frequency regulation	AC-DC-AC conversion (Inverter type)

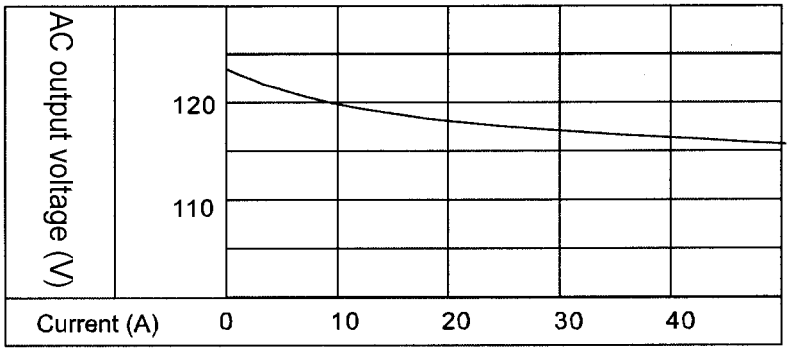
1.2 Generator Specifications

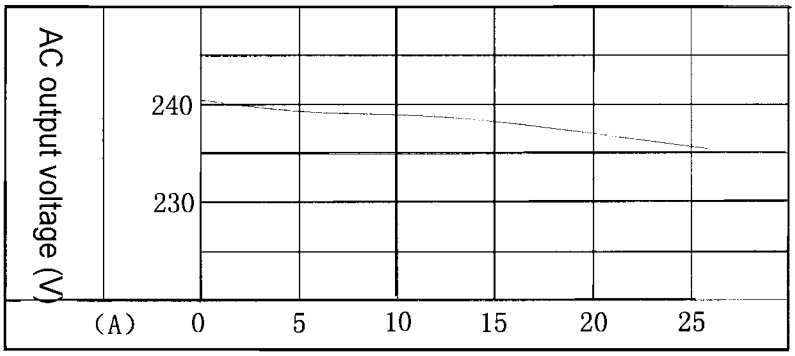
Model		IG6000
Maximum output（AC）		6.0 KVA
Rated output (AC)		5.5 KVA
Rated frequency (HZ)		60
Rated voltage（AC）		120/240
Maximum current (amp)		50/25
Rated current（amp）		45.8/22.9
Rated voltage（DC）		12V
Rated current（DC）		5A
Power factor		1.0
Voltage variation rate	Momentary	Max.10%
	Average	Max.1.5%
	Average time	Max. 3 seconds
Voltage stability		±1%
Frequency variation rate	Momentary	Max. 1%
	Average	Max. 1%
	Average time	Max. 1second
Frequency stability		±0.1%
Insulation resistance		Min. 10MΩ
AC circuit protector- Amps 120/240 VAC		51.7/25.8
DC circuit protector		7A
Fuel tank capacity- gal (L)		5.4 (20)
Operating hours at rated load		5.5
Noise level dB @23’ (7 m) no load-full load		65-75

1.3 PERFORMANCE CURVES

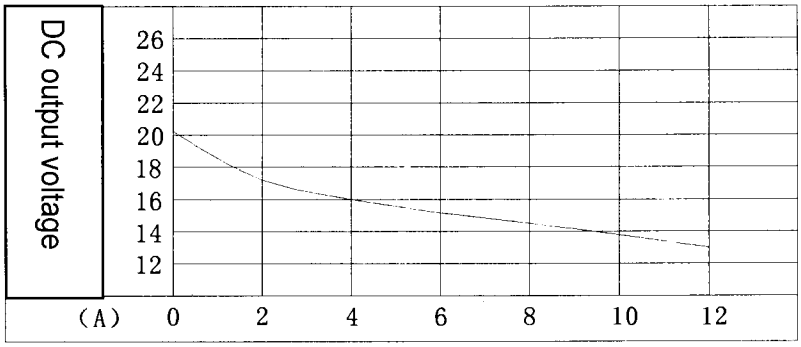
The curves show performance of the generator under average conditions. Performance may vary depending upon ambient temperature, altitude and humidity.

●AC External characteristic curves



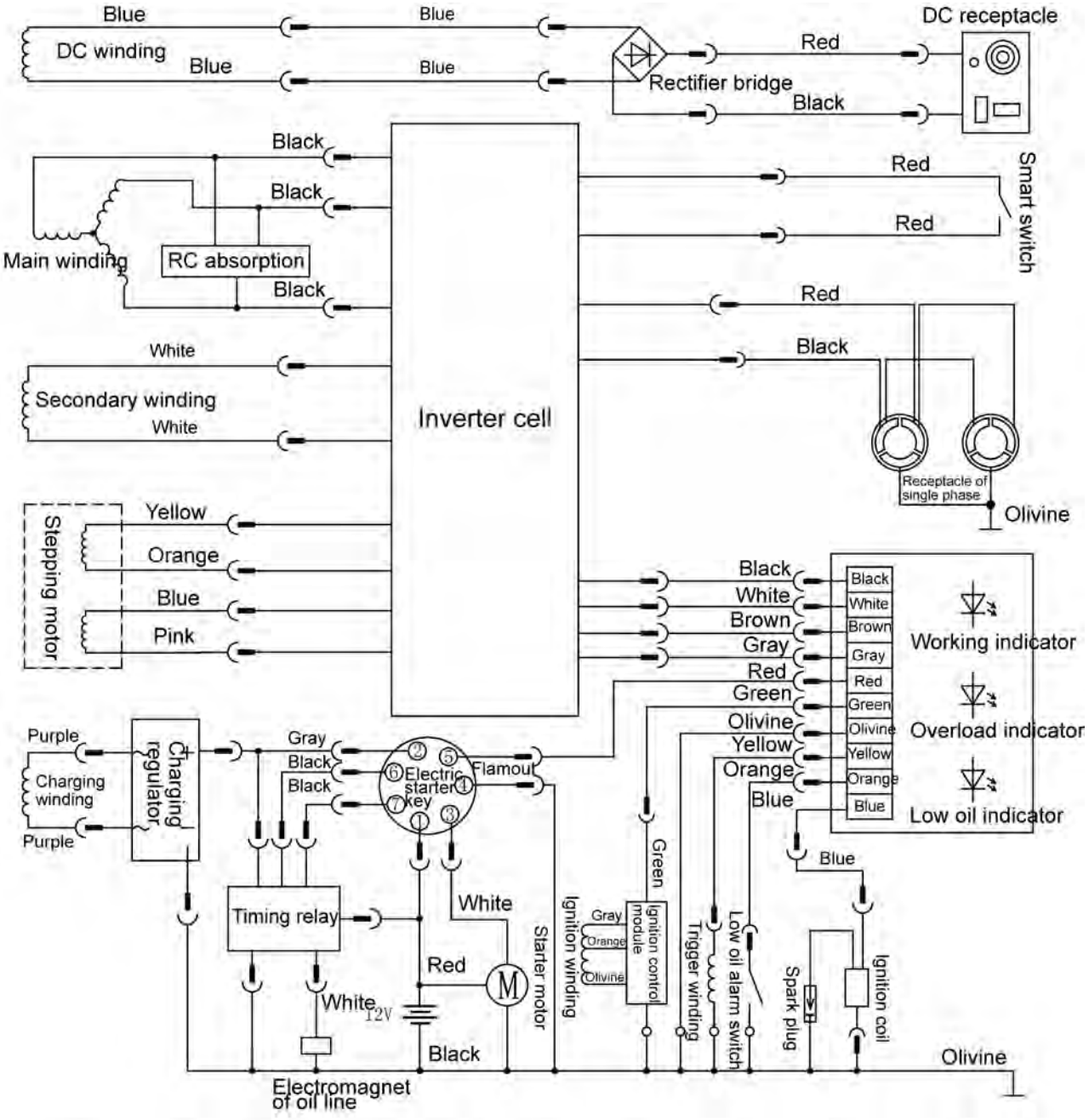


● DC External characteristic curves

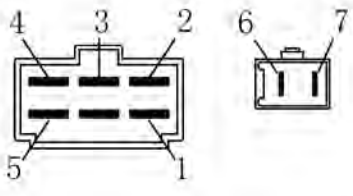


1.5 Wiring Diagram

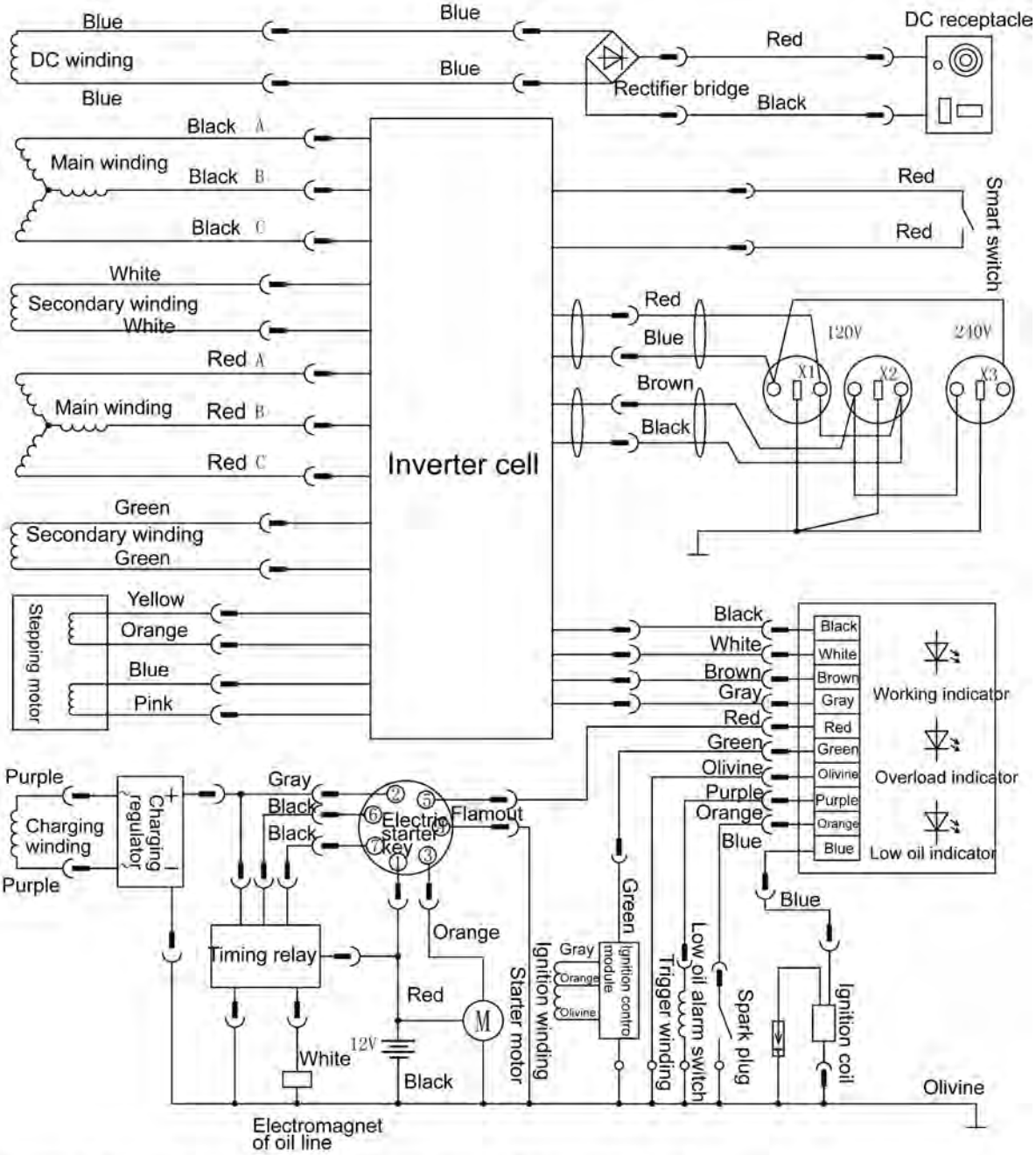
a. Single voltage output



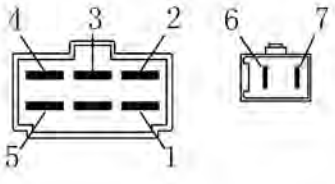
	①	②	③	④	⑤	⑥	⑦
OFF				●	●	●	●
ON	●	●					
START	●	●	●				



b. Double-voltage output



	①	②	③	④	⑤	⑥	⑦
OFF				●	●	●	●
ON	●	●					
START	●	●	●				



2. SERVICE and MAINTENANCE

2.1 The importance of proper servicing

Proper servicing is essential to the safety of the operator and the reliability of the generator. Any error or oversight made by the technician while servicing can easily result in faulty operation and/or damage to the equipment or injury to the operator.

⚠ Warning

Improper servicing can cause an unsafe condition that can lead to serious injury or death.
Follow the procedures and precautions in this shop manual carefully.

Some of the most important precautions are stated below. But we could not list all the potential danger, you should judge yourself if it need to do the maintenance task.

⚠ Warning

Could not follow the maintenance instruction and safety precautions can cause an unsafe condition that can lead to serious injury or death. Follow the procedures and precautions in this shop manual carefully.

2.2 Safety Precautions

Be sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and safety equipment. When performing maintenance or repairs, be especially careful of the following:

- Read the instructions before you begin, and be sure you have the tools and skills required to perform the tasks safely.

- Be sure that the engine is off before you begin any maintenance or repairs. This will reduce the possibility of several hazards:

- Carbon monoxide poisoning from engine exhaust.
- Run engine in the ventilated place whenever.
- Burns from hot parts.
-Touch the engine parts after it cooled.
- Injury from moving parts.

- Do not run the engine unless the instructions tell you to do so. Keep your hands and clothing away from rotating parts.

- To reduce the possibility of fire or explosion, exercise extreme caution when working around gasoline. Use only a nonflammable solvent, not gasoline, to clean parts. Keep cigarettes, sparks and flames away from all fuel-related parts.

2.3 Service Rules

- Use genuine KIPOR or KIPOR recommended parts and lubricants or their equivalents. Parts that do not meet KIPOR's design specifications may damage the engine and void the warranty.

- Use special tools designed for the product when specified.

- Always install new gaskets, O-rings, etc. when reassembling components.

- When tighten the bolt or nut, please from major diameter to minor diameter, from inside to outside. Tighten the bolt and nut to the specific torque in this way.

- Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.

- After reassembly, check all parts for proper installation and operation.

- Many screws used in this machine are self-tapping. Be aware that cross-threading or over tightening these screws will strip the threads and ruin the hole.

- Use only metric tools when servicing this engine. Metric bolts, nuts and screws are not interchangeable with non-metric fasteners. The use of incorrect tools and fasteners will damage the engine.

- Be sure to follow the mark and instruction of the book when use the tools.

■ Electrical Precautions

- Hold the connector body to disconnect the connector. Do not disconnect by pulling the wire harness. To disconnect the locking connector, be sure to unlock first, and then disconnect.

- Check the connector terminals for bend, excessive extrusion, missing terminals, or other abnormalities before connecting the connector.

- To connect, insert the connector as far as it goes. If the connector is a locking type, be sure that it is locked securely.

- Check the connector cover for breakage and check whether the connector female terminal is not opened excessively. Then, connect the connector securely. Check the connector terminal for rust. Remove the rust using an emery paper or equivalent material before connecting the connector.

- Set the harness clips in the specified places of the frame securely, and secure the wire harnesses.

- Clamp the cables securely.

- Clamp the wire harnesses securely so that they do not interfere with the rotating parts, moving parts and hot parts.

- Route and connect the wire harnesses properly. Be sure that the harnesses are not slack, twisted or pulled overly taut.

- Route the wire harnesses properly so that they do not contact sharp edges and corners and the end of the bolts and screws on the body.

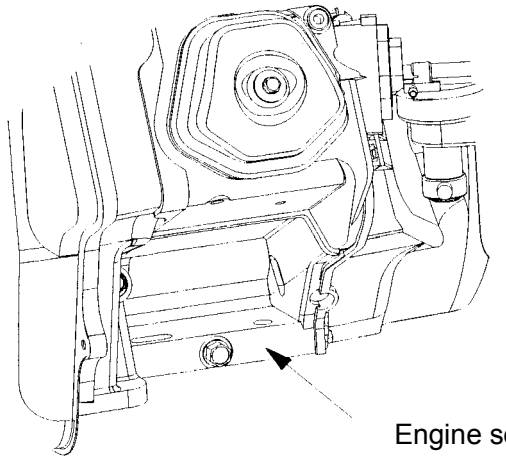
- If a wire harness must contact the end of the bolts or screws or sharp edges and corners, protect the contact part of the harness with a loom or by winding with electrical insulating tape. If the wire harness has a grommet, set the grommet securely.

- Take care not to pinch the wire harnesses during installation of a part. If a wire harness has damaged insulation, repair by winding with electrical insulating tape.

- When using an electrical tester like a volt/ohm meter or clamp on meter, read the manufacturer's operating instructions carefully before operating the tester. Be sure that the tester battery is fully charged and the meter is functioning properly

2.4 Serial Number and Bar Code Location

The engine serial number is stamped beside the engine oil drain plug. This number is used to identify the specific engine version.



Engine serial number

2.5 Maintenance standards of engine

Part	Item		Standard in. (mm)	Service limit
Engine	Max. speed under zero load (rpm)		≤3780rpm	——
	Cylinder pressure		0.55MPa/600rpm	——
Cylinder	Cylinder sleeve I.D.		88.015~88.035	88.17
Piston	Piston skirt O.D Pin bore I.D.		87.96~87.98 20.002~20.008	87.85 20.05
Piston pin	O.D		19.994~20.000	19.95
Piston ring	First ring/second ring	Height h	1.97~1.99	1.87
		Side gap t	0.02~0.06	0.15
		Closed gap	0.2~0.35	1.0
		Thickness t	3.9~4.1	3.7
	Oil ring	Height h	2.68~2.75	2.58
		Side gap t	0.055~0.14	0.20
		Closed gap	0.20~0.50	1.0
		Thickness t	2.9~3.3	2.8
Connecting rod	Small end I.D Big end I.D		20.007~20.020 36.015~36.025	20.09 36.09
Crankshaft	Crank pin O.D.		35.960~35.975	35.90
Valve	Valve clearance Valve rod OD Vessel I.D Seat width	Intake Exhaust Intake Exhaust Intake/Exhaust Intake/Exhaust	0.06±0.02 0.08±0.02 6.570~6.585 6.550~6.570 6.600~6.622 0.8~1.2	—— —— 6.50 6.50 6.68 2.0
Valve spring	Free Length	Intake/Exhaust	39	37.5
Cam wheel	Cam height I.D	Intake Exhaust	32.60~32.80 32.09~32.29	32.25 31.75
Camshaft	O.D		15.984~15.966	15.920
Valve tappet	O.D		8.96~8.98	8.87
Crankcase	Valve tappet ID Camshaft Bearing I.D.		9.000~9.015 16.000~16.018	9.06 16.05
Crankcase cover	Camshaft Bearing I.D.		16.000~16.018	16.05
Carburetor	Main metering jet Floater height Indicating bolt opening		1.02 13 2 ring	—
Spark plug	Clearance		0.7—0.8	—
Ignition coil	Resistance	Primary side Second side	0.8—1.3Ω 15—21kΩ	— —
Pulse coil (Trigger)	Air gap Resistance		.020~.030 (0.5～0.75) 80～130Ω	— —
Carburetor magnet valve	Resistance		6～8Ω	—

Alternator Maintenance Standards

Part	Item	Type	Standard（Ω）			Service limit
			120V/240V	120V	240V	
			Double-voltage	Single voltage		
Ignition winding I	Resistance	Orange－Yellow/Green	0.22~0.24			———
		Gray－orange	0.15~0.17			
External charging winding	Resistance	Blue－blue	0.03~0.04			———
Built-in charging winding	Resistance	Purple－Purple	0.12~0.16			———
Sub winding	Resistance	White－white (green－green)	0.08~0.12			———
Main winding	Resistance	Black－black (red－red)	0.45~0.60	0.09~0.10	0. 9~1.1	———

2.6 Fastening Torques

Item	Specification	Tightening torque	
		N.m	Kgf.m
Connecting rod bolt	M8	20~22	2.0~2.2
Cylinder cover bolt	M10×1.25×80	42~46	4.2~4.6
Spark plug	M14×1.25×19	20~30	2.0~3.0
Crankcase side cover	M8×30	20~23	2.0~2.3
Flywheel nut	M18×1.5	120~130	12.0~13.0
Rocker arm shaft bolt	M8×16	20~23	2.0~2.3
Adjusting nut of rocker arm shaft	M6×0.75	8~10	0.8~1.0
Standard torque	M5 bolt、nut	5~7	0.5~0.7
	M6 bolt、nut	8~10	0.8~1.0
	M8 bolt、nut	18~22	1.8~2.2
	M10 bolt、nut	35~45	3.5~4.5

Note: Use standard torque values for fasteners not listed in this table.

2.7 Troubleshooting

This section gives very general information regarding symptoms and possible causes. Refer to subsequent sections regarding testing and removal and replacement of specific components and systems. Engine overhaul is addressed in the IG6000 Engine shop manual.

a. General symptoms and possible causes

Engine does not start or hard starting	Fuel filter clogged	Clean
	Fuel hose clogged	Clean
	Fuel switch won't operate	Replace
	Carburetor defective	Clean and and adjust
	Ignition coil defective	Inspect and replace
	Spark plug defective	Inspect and replace
	Trigger defective or improper air gap	Inspect and replace
	Spark plug cap disconnected	Inspect and replace
	Oil alarm defective	Install securely
	Ignitor defective	Inspect and replace
	Ignition coil defective	Inspect and replace
	Opening set of smart throttle improper	In whole or semi location
	Timing relay defective	Inspect and replace
	Ignition winding control module defective	Inspect and replace
Engine speed does not stabilize	Carburetor faulty	Clean and adjust
	Throttle control stepping motor defective	Inspect and replace
	Inverter unit defective	Inspect and replace
	Valve clearance misadjusted	Readjust

b. Hard starting or no start

Check the fuel level in the tank	→no fuel	Add fuel and restart the engine
↓Sufficient fuel		
Check fuel switch is in ON position	→off	Turn on it and restart the engine
↓on		
Loosen the drain screw and check whether fuel reaches bowl and whether the fuel level is normal	→abnormal	Check the timing relay for damage and fuel system for blockage
↓normal		
Remove and check spark plug and check if electrode is wet or dry	→dry	Check each carburetor hole and nozzle for blockage
↓wet	→	Clean and dry the carburetor and observe choke action. if severe wet, check if any fuel leakage and if the floating valve is normal.
Attach the spark plug on plug cap, ground	→no spark	Perform the ignition system troubleshooting

the electrode on the cylinder head.; start the engine and check the spark conditions	or weak spark	
↓normal		
Install a compression gauge in the spark plug hole and restart the engine and check the cylinder compression.	→low cylinder compression	1. Check valve clearance; 2. check cylinder head gasket for leakage. 3. Check combustion chamber for excess carbon buildup. 4. check valve conical surface and valve seats. 5. check piston, piston rings and cylinder for worn.
↓normal compression (80 psi/.55 Mpa)		
Install the spark plug. Restart the engine according to the starting procedure.		

■ Cylinder compression check

1. Remove the spark plug cap and spark plug

2. Install a compression gauge in the spark plug hole. Pull the recoil starter rope several times with force and measure the cylinder compression.

Cylinder compression	0.55Mpa/600rpm

c. Ignition system troubleshooting

■ Fill oil to the specified location before inspecting

■ Please use the WR7DC spark plug

■Spark plug inspection

1. Remove spark plug

2. Attach the removed spark plug to the plug cap

3. Ground the negative electrode of the spark plug against the cylinder head or engine block and engage the electric starter and check to see if a spark jumps across the electrode.

⚠ Warning

■ Do not pull the recoil starter rope while touching the high tension wire with a wet hand. High voltage is generated which is dangerous.

■ Make sure no spilled fuel is anywhere on the engine and no fuel is on the spark plug before testing.

■ Keep sparks and any other combustible source away from the spark plug hole and engine metal case before installing and checking.

Measure the spark plug gap and perform the spark test. Standard gap: .028-.034 in. (0.7-0.8 mm)		
↓no spark		
Perform the spark test again using a new spark plug	→normal spark	Replace the spark plug
↓no spark		
Perform the spark test again using a new ignitor	→normal spark	Replace Ignitor
↓no spark		
Disconnect low oil alarm and perform the spark test.	→abnormal	Replace low oil alarm
↓no spark		
Check the ignition control module		Replace the ignition module
↓normal		
Check resistance of motor ignition winding	→abnormal	Replace the motor rotor
↓normal		
Check trigger air gap and trigger resistance	→abnormal	Adjust the air gap and/or replace the trigger
↓normal		
Check the ignition coil resistance and high voltage cable and insulation cap	→abnormal	Check the ignition coil
↓		
Check or replace wiring harness		

d. Engine oil level is low, but engine does not stop.

Drain out all engine oil, disconnect the low oil alarm wire and check if the outlet terminal is connected to ground	→not conductive	Replace the oil level alarm switch
↓conductive		
Connect the alarm wire, loosen ignition module receptacle and check if the orange wire is connected with the ground	→not conductive	Repair or replace wiring harness
↓conductive		
Replace ignition module		

e. Engine speed does not increase or is unstable

Check air filter element for clog	clogged	Clean air filter element
↓not clogged		
Check the valve clearance	→abnormal	Adjust the valve clearance
↓normal		
Remove the spark plug and check the electrodes for carbon and spark plug gap	→abnormal	Clean the spark plug and adjust the spark plug gap or replace new spark plug

↓normal		
Check each carburetor hole and main nozzle for blockage	→clogged	Disassemble and clean
↓not clogged		
Check the air intake paper gasket and the sealing of heat-insulation block of carburetor	→abnormal	Tighten the nuts securely, replace the gasket or heat-insulation block
↓normal		
Test the cylinder compression	→abnormal	1. Check the valve clearance 2. Check combustion chamber for excess carbon 3. Check the piston, piston ring and cylinder for wear and damage.
↓normal		
Perform the throttle control system troubleshooting		

f. Engine stops after starting (the smart throttle is in proper position)

Check the engine oil level and check if oil level alarm activates when rotation stops	→oil level alarm	Add oil and restart the engine
↓sufficient oil		
Check the fuel in fuel tank	→no fuel	Add fuel and restart the engine
↓sufficient fuel		
Check for operation of fuel switch and blockage in fuel filter	→clogged	Clean the fuel switch and filter
↓not clogged		
Check for blockage of fuel hoses	→clogged	Clean or replace the hoses
↓not clogged		
Turn the ignition switch to ON position, check the timing relay for output	→ has	Replace the timing relay
Check each carburetor hole and main nozzle for clogged	→clogged	Disassemble and clean
↓normal fuel flow		
Check the intake gasket and the sealing of carburetor heat-insulation block	→abnormal	Tighten the nuts securely, replace the gasket or heat-insulation block
↓normal		
Measure the cylinder compression	→abnormal	1. Check the valve clearance 2. Check if too much carbon in burning room 3. Check the piston, piston ring and cylinder for wear and damage.

↓normal

Check the trigger air gap	→abnormal	Readjust the clearance

↓normal

Perform throttle control system troubleshooting

g. Throttle control system troubleshooting

1). Engine speed is too high or too low

Check AC output	abnormal	Perform the generator troubleshooting flowing the instruction of “No or Low AC output”

↓normal

Check the stepping motor	→abnormal	Replace the stepping motor

↓normal

Replace the inverter unit

2). The engine speed does not increase when smart throttle is on and load is increased.

Check the AC output	→abnormal	Perform the generator troubleshooting flowing the instruction of “No or Low AC output”

↓normal

Check the stepping motor	→abnormal	Replace the stepping motor

↓normal

Check the smart throttle switch	→abnormal	Replace the smart throttle switch

↓normal

Check “Smart” switch connecting wire	→abnormal	Repair or replace the wire harness

↓normal

Replace the inverter unit

h. Low AC output

Is the overload indicator light ON?	→on	Disconnect the load, and restart the engine.

↓off

Is the engine speed normal? Smart switch operation: On: 2500±100rpm Off: 3600±100rpm	→abnormal	Perform the throttle control system troubleshooting

↓normal

Stop engine and check the AC receptacle	→abnormal	Replace the receptacle

↓normal

Check the AC output connector	→abnormal	Replace the connector

↓normal

Check voltage selector switch(only for double voltage selector output)	→abnormal	Replace selector switch

Disconnect the two 6P input connectors on the inverter unit. (6p for single voltage , 4p or 2p for double voltage) Disconnect spark plug cap or igniter connector, measure the AC voltage of main winding and sub. Winding when the stator motor is running. Measure one AC voltage of main winding or sub. Winding for double voltage unit. Black – black: 〉30V White – white: 〉1V Single voltage230/240V type: Black – black: 〉60V White – white: 〉1V Single voltage 120V type: Black – black: 〉30V White – white: 〉1V	→abnormal	1. Check the wiring of the stator leads in the harness. Repair or replace the harness. 2. Rotor internal magnetic weaken, replace the rotor.
↓normal (255 volts)		
Replace inverter unit		

i. No AC output

Is the engine speed normal?	abnormal	Perform the throttle control system troubleshooting
↓normal		
Check AC receptacles	→abnormal	Replace receptacles2.7.9
↓normal		
Check the rectifier	→abnormal	Replace the rectifier
↓normal		
Measure the resistance between two blue wire on the rectifier Resistance:0.03~0.04Ω	→abnormal	Check and repair the wire harness or replace the stator
↓normal		
Rotor losses excitation, replace the rotor		

j. Electric starter doesn't run.

Check the battery voltage	→abnormal	Replace the battery
↓normal		
Check ignition switch	→abnormal	Replace the ignition switch
↓normal		
Check the battery switch	→abnormal	Replace battery switch(sucking coil)
↓normal		
Check the starting motor	→abnormal	Replace the starting motor
↓normal		
Check and repair or replace main wire harness		

k. The battery doesn't charge.

Check ignition switch	→abnormal	Replace ignition switch
↓normal		
Check charging regulator	→abnormal	Replace the charging regulator
↓normal		
Measure resistance of charging coil winding Resistance: 0.12~0.16Ω:	→abnormal	Check and repair electric wire harness or replace stator.
↓		
Check and repair or replace wire harness		

3. INSPECTION AND ADJUSTMENT

3.1 MAINTENANCE SCHEDULE

Regular service period① Item perform at every indicated month or operating hour interval, whichever comes first / Project		Each use	Each month or every 10 hours	Every 3 months or every 50 hours	Every 6 months or every 100 hours	Every year or every 300 hours
Engine Oil	Check	●				
	Replace		●		●	
Air cleaner	Check	●				
	Replace			●②		
Spark plug	Clean-Adjust				●	
Spark Arrestor	Clean				●	
Valve clearance	Check-Adjust					●**
Fuel tank and filter	Clean					●**
Fuel line	Check	Every 2 years and replace if necessary③				

Note:

①Interval operating time in normal troubleshooting.

② When it is used in dusty place, filter should be cleaned every 10 hours or everyday.

③Maintenance should be carried out by the qualified technicians.

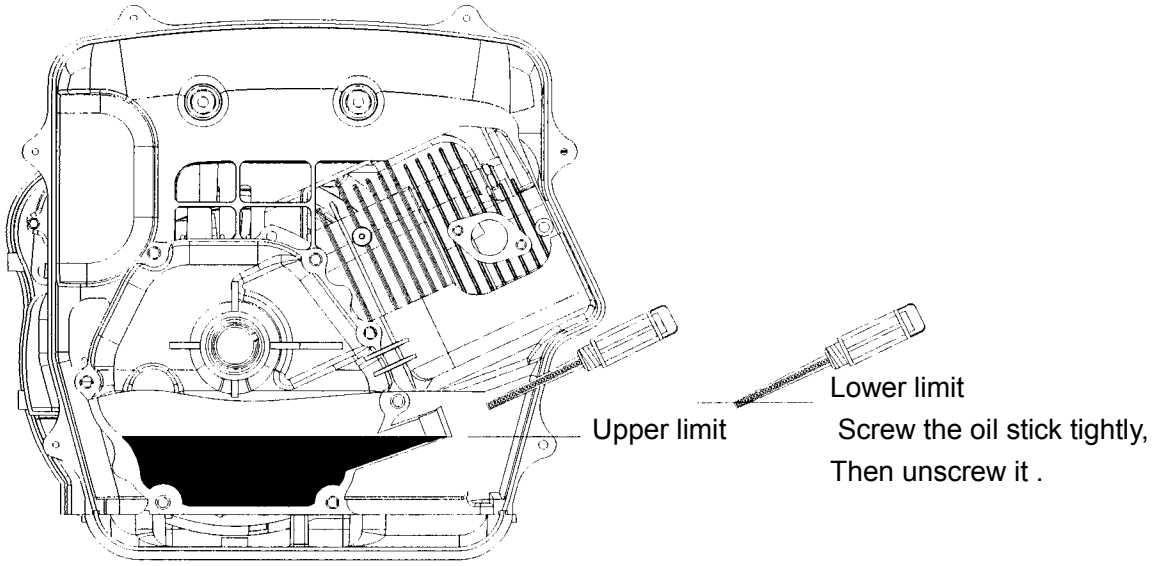
PLEASE READ KIPOR OPERATION MANUAL.

3.2 Engine oil

● Checking the oil level

Stop the engine and check the oil level, be sure to put the engine on a flat floor when checking.

（1）Remove the oil dipstick and check the level.



（2）If the oil level is low, add to the edge of the oil filler port (upper limit).

● **Engine oil change**

（1）Remove dipstick and oil drain bolt and drain out the used oil.

（2）Tighten the oil drain bolt securely.

（3）Pour the specified amount of fresh engine oil through the oil filler port.（Engine oil capacity : 1.2 qt (1.1L)

※ Recommended engine oil

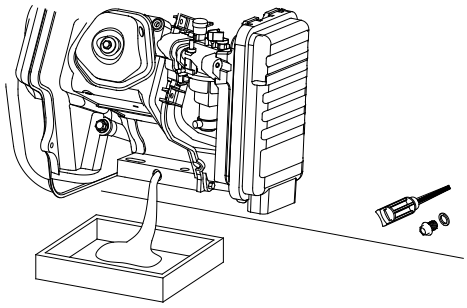
SE, SF engine oil classified by API or SAE10W-30 engine oil which same as SG grade.
Use SAE10W-30 engine oil when the temperature is below 10 ℃. Use SE, or SAE5W-30 engine oil which same as SG grade when the temperature is below -15 ℃.
Select the appropriate viscosity for the average temperature in your area.

（4）Check the oil level after refilling. Add the oil to the limit level.

（5）Tighten the dipstick.

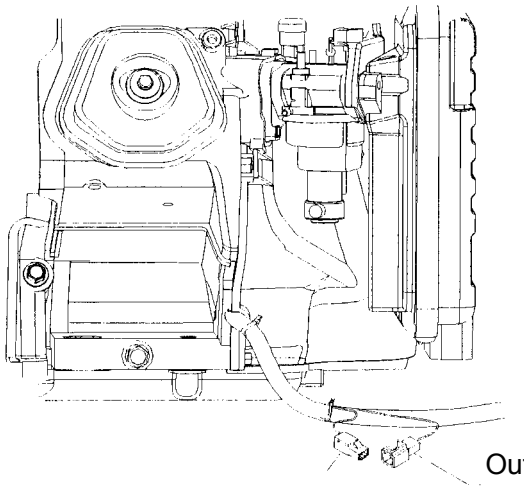
● Drain the used oil while the engine is warm. Warm oil drains quickly and completely.

● Please dispose of the used motor oil in a manner that is compatible with the environment. We suggest you take used oil in a sealed container to your local recycling center or service station for reclamation.



3.3 Low Oil alarm inspection

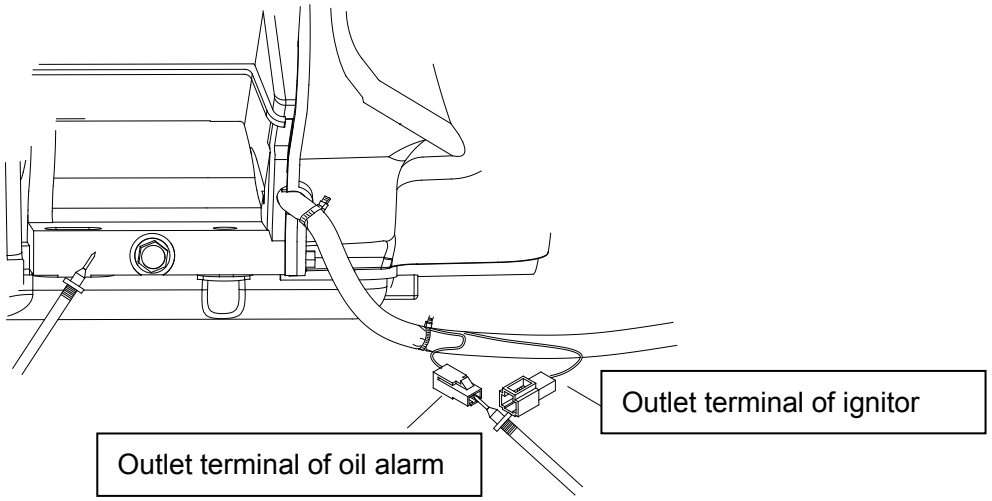
(1)Disconnect the orange oil alarm wire when the engine stops and ground the terminal specified in the diagram and confirm that the alarm light is on and the engine stops or won't restart.



Outlet terminal of ignitor

Outlet terminal of oil alarm　　Ground through engine cover

(2) Stop the engine and disconnect the orange wire of the low oil alarm after insuring that the engine oil is at the proper level. Test the conductivity between the end shown in the figure and the case of engine, No conductivity indicates a normal condition.



(3) Drain all the engine oil in the engine repeat the test. The switch is working properly if there is normal conductivity.

3.4 Air Cleaner

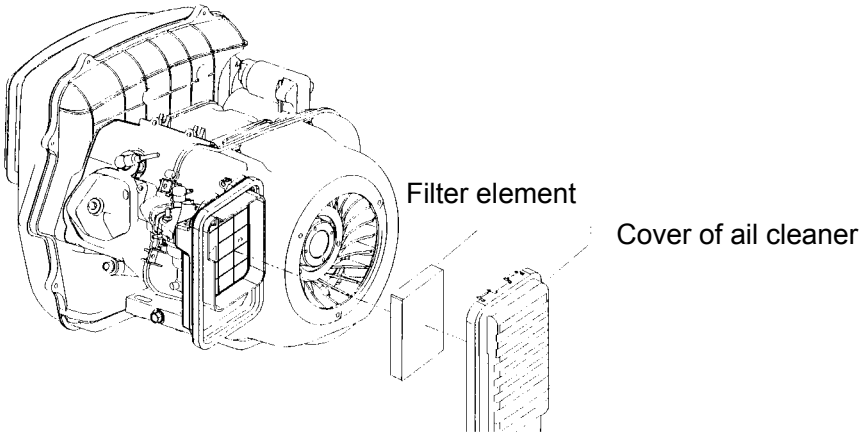
（1）Open the door of cabinet.

（2）Remove the air cleaner cover and remove the filter element.

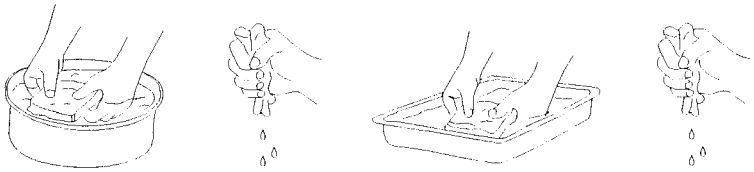
（3）Check the element for excessive dirt or damage. Replace as necessary

⚠ Attention !

●Excess oil will restrict air flow through the foam filter core and may smoke at the engine start.



Clean Twist to dry Dip into oil Squeeze out the excess oil



（4）Install the air cleaner element in the air cleaner case, close cabinet door.

⚠ Attention !

■Dirty air filter will affect the air into the carburetor, and reduce the engine work power. If the engine works in dirty place, please replace the air filter often.

■Don't operate the generator without the filter element in place or serious engine damage may result.

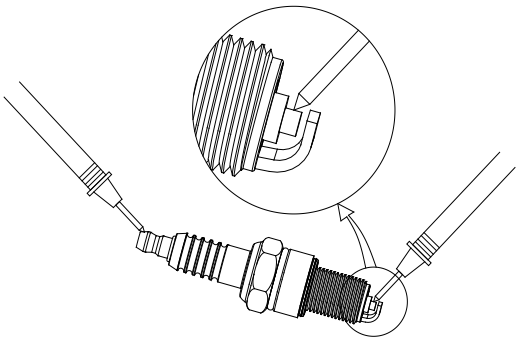
3.5 Spark plug inspection and adjustment:

（1）Remove the spark plug cap and remove the spark plug with plug sleeve

（2）Remove carbon on the electrodes of spark plug with a wiey brush and check sealing washer for damage.

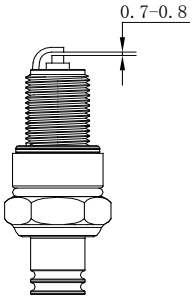
（3）Check the resistance value of spark plug and replace if the resistance value is not within the stated value.

Resistance value of spark plug	3~9KΩ



（4）Measure the plug gap with a wire-type feeler gauge. If the gap is not compatible with the standard, adjust by bending the side electrode.

Spark plug gap	.028-.034 in. (0.7~0.8 mm)
Standard spark plug	WR7DC



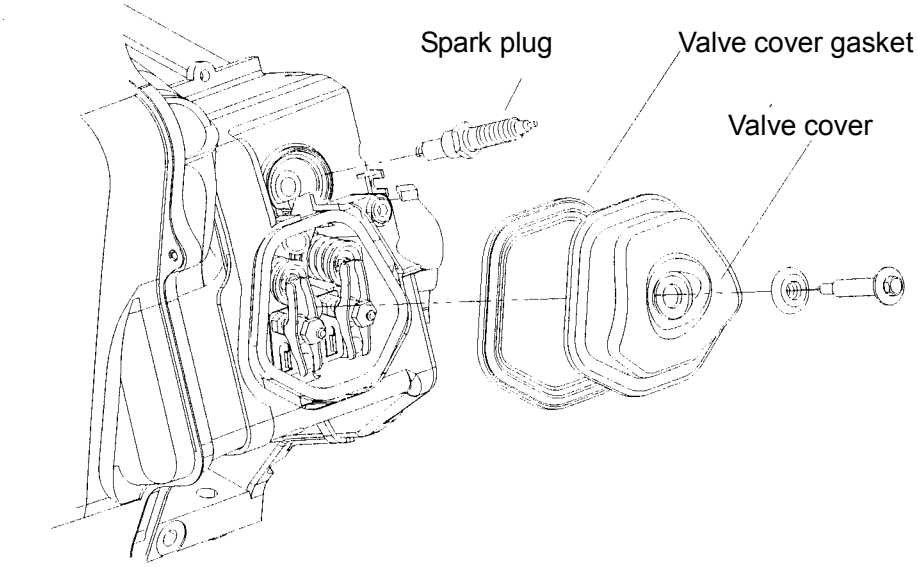
（5）Install the plug and tighten securely after adjustment, the specified torque is 20~30 N.

3.6 Valve clearance adjustment

⚠ Attention !

Valve adjustment should only be performed on a cool engine.

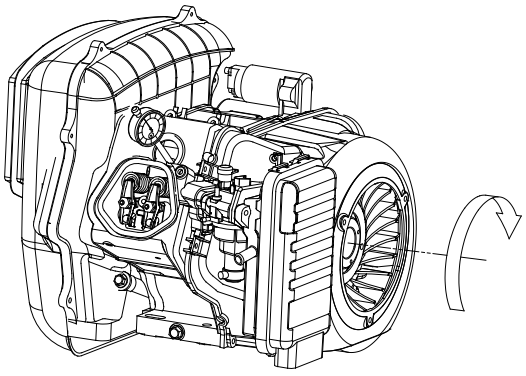
（1）Remove spark plug, valve cover bolt, valve cover and valve cover gasket.



（2）Insert a feeler gauge in the spark plug installation hole; Rotate the engine so the piston is at top dead center and both intake and exhaust valves are closed.

⚠ Attention !

If the spark plug is in the top position and intake valve is in the START position, please blow fan blade And let the spark plug in top position while the outlet valve is in the stop station.



3）Insert a feeler gauge between the rocker arm and the valve and measure the valve clearance.

Valve clearance	intake： 0.06 ± 0.02 mm exhaust：0.08 ± 0.02 mm

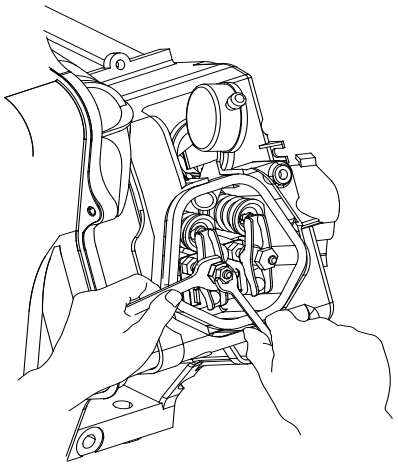
（4）If adjustment is necessary, proceed as follows:

a. lock the rocker lever adjustment screw and loosen the nut.

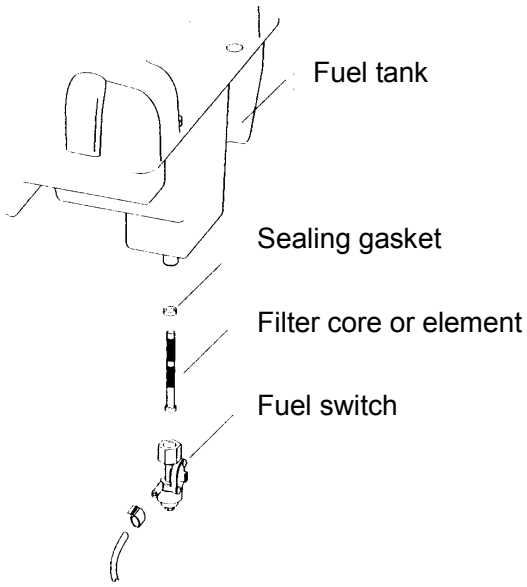
b. move the rocker lever adjustment screw until the correct clearance is achieved.

c. tighten the nut on the rocker arm adjustment screw.

d. recheck the clearance after adjustment.



3.7 Fuel switch and fuel filter cleaning



⚠ Attention !

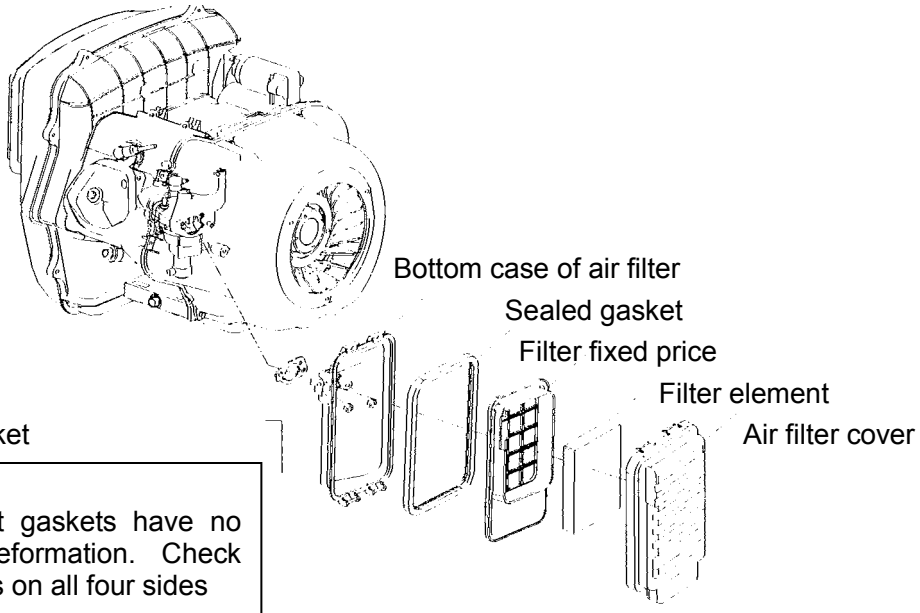
- Keep smoking materials and any open flames away during fuel system maintenance.
- Make sure that there is no leaking fuel after service.

（1）Drain the fuel from the tank then remove the fuel tank.
（2）Loosen the connection nut between fuel switch and tank and remove the filter core.
（3）Open the fuel switch to start cleaning and dry it with compressed air.
（4）Remove any clogged foreign material from the fuel filter core and check the fuel filter for damage.
（5）Install the sealing gasket, filter core, and fasten the connection nut between fuel switch and oil tank.

4. AIR CLEANER and MUFFLER

4.1 Air cleaner

● Disassemble and reassemble



Install:
Make sure that gaskets have no damage or deformation. Check sealing surfaces on all four sides

4.2 Muffler

● Disassembly and assembly

Muffler syphon

Assembly:
Clean the carbon inside muffler syphon using the brush before installing

Fireproofing cap

Assembly:
Clean the carbon using the brush before instal-ling

Exhaust pipe gasket

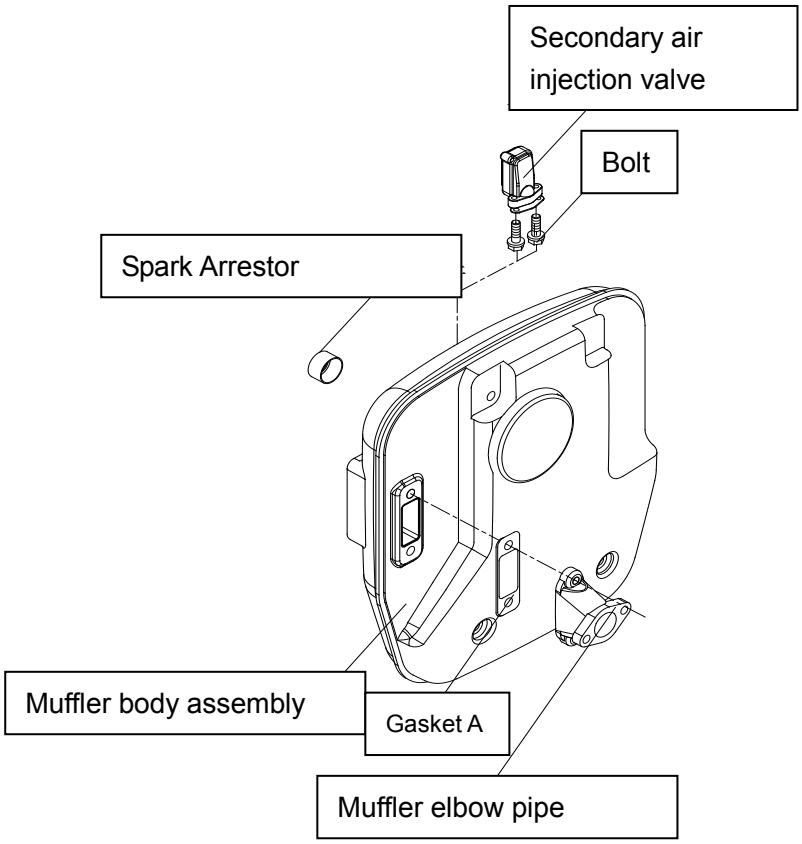
Muffler gasket

Muffler

Assembly:
Knock it to remove carbon in-side by using rubber hammer before installing.

Cover of muffler

4.3 Air outlet pipe, second gulp valve assembly

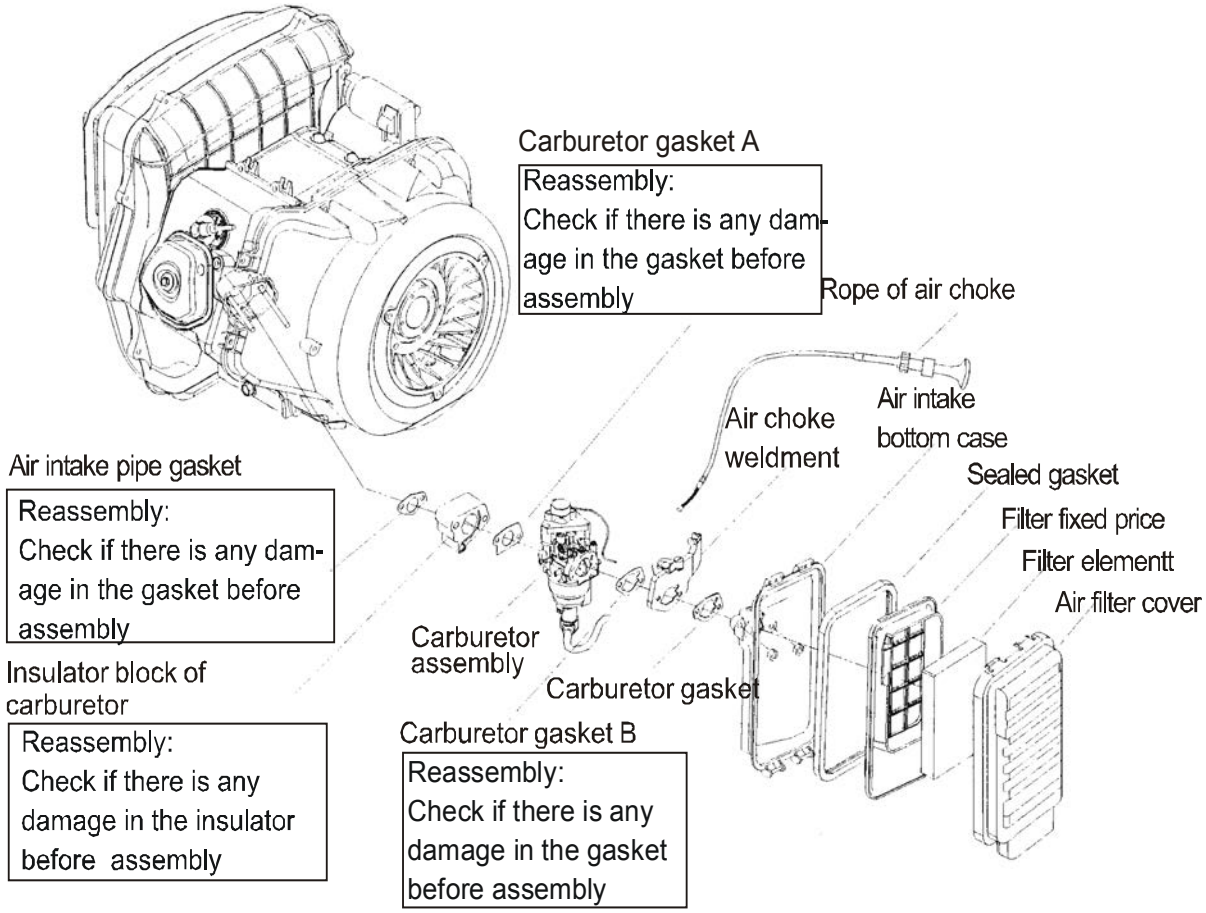


5. CARBURETOR

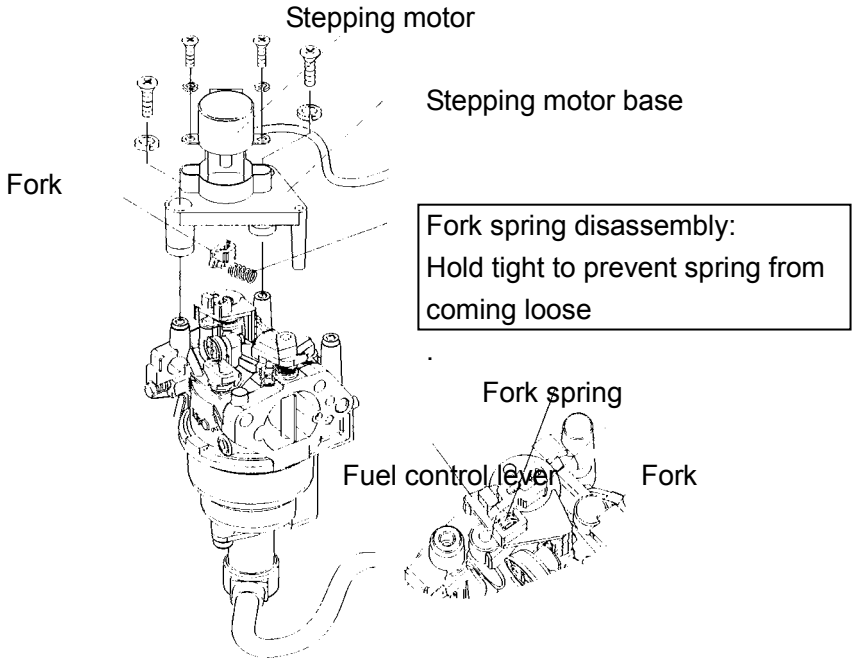
WARNING

- Loosen the gasoline drain bolts before disassembly to drain fuel in the carburetor.
- Smoking and any source of combustion are strictly forbidden in the process of disassembly.

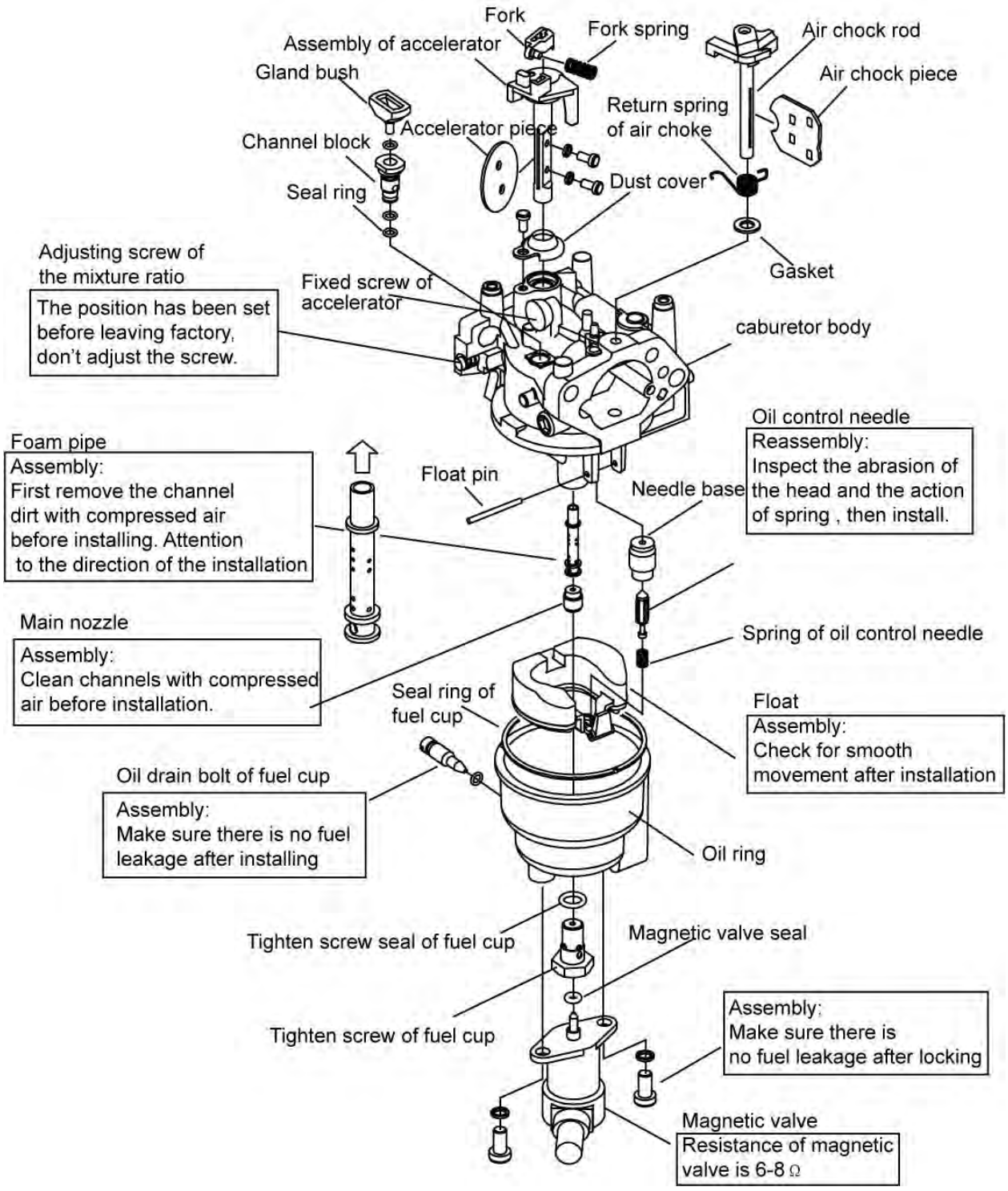
5.1 Disassembly and reassembly



● Disassembly and installation of stepping motor



Carburetor disassembly and reassembly



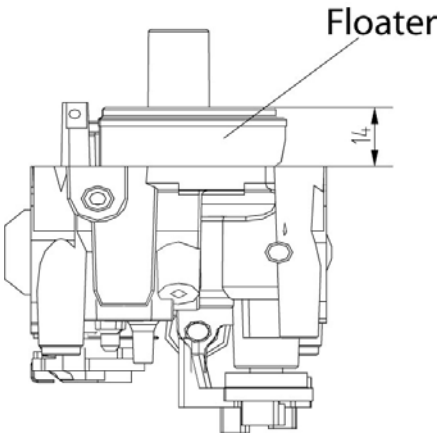
5.2 Stepping motor/ fuel shutoff solenoid

●Floater height

Place the carburetor as fig. and measure the size between floater and body.(floater height)

Specified height	14mm

If the floater height don't meet the specified height, please replace.



●Stepping motor

1）Measure the resistance of outlet terminals of stepping motor

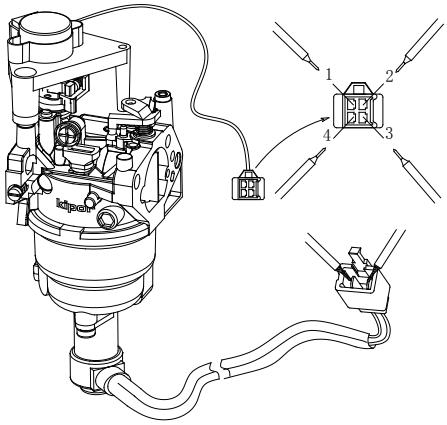
resistance value	1 and 3：50~55Ω
	2 and 4：50~55Ω

Replace the stepping motor if the resistance exceeds the standard.

2）Measure the resistance of fuel shutoff valve

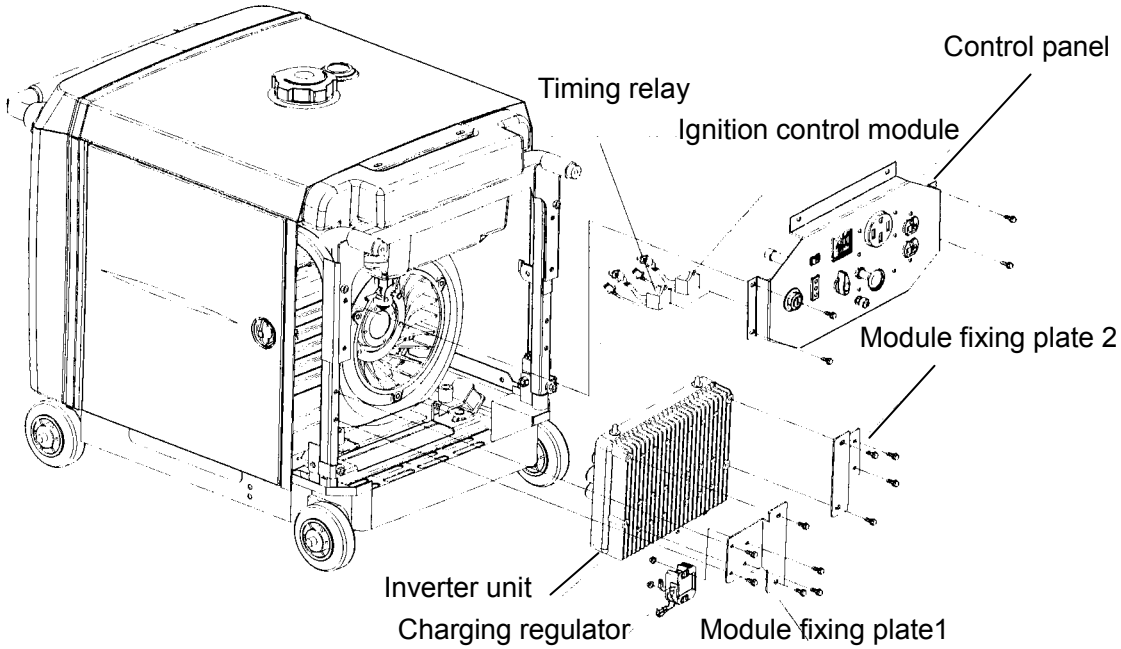
resistance value	6~8Ω

Replace the throttle electromagnetic valve if the resistance exceeds the standard value



6. CONTROL PANEL, CHARGING ADJUSTOR, TIMING RELAY, IGNITION CONTROL MODULE and INVERTER UNIT

6.1 Disassembly and assembly



6.2 Inspection

a. Control panel

AC Receptacle

Check for evidence of burning or contact damage. Replace if either condition exists.

DC Receptacle

Connect both terminals of the receptacle with a jumper wire and check if the receptacle is conductive with two meter leads inserted into the panel; if not conductive, press the “Reset” button on the receptacle panel and measure it again. If there is still no continuity, replace the DC receptacle.

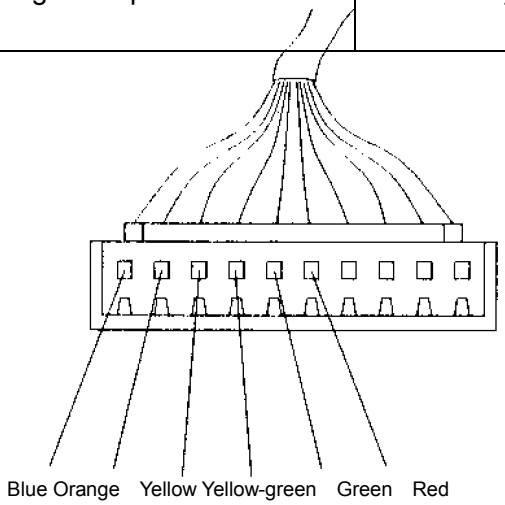
Smart Throttle Switch

The switch is conductive when “ON” and not conductive when “OFF”.

Ignition Module

Remove the 10P connector from the module and connect one meter lead to the cover and the other lead to the 10P connector and measure resistance.

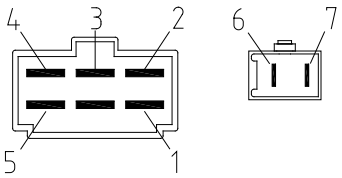
Color of wire	Circuit unit	Stipulated resistance
Blue	Primary coil of the ignition coil	0.8~1.3Ω
Orange	Low oil alarm	No continuity under normal oil level
Yellow	Coil of trigger head	80~130Ω
Yellow/Green	ground	Continuity
Green	Power coil winding of module	0.37~0.41Ω
Red	Engine stop switch	Continuity when “OFF” and no continuity when “ON”



Ignition Switch

Check for continuity of each group of contacts with the switch in the off, on, and start positions.

	①	②	③	④	⑤	⑥	⑦
OFF				●	●	●	●
ON	●	●					
START	●	●	●				



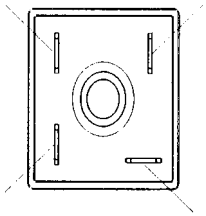
Bridge Rectifier

Measure the (positive voltage drop) of each leading feet of rectifier bridge with the diode checking (⊣▶⊢ ·))) function of the meter and the result should be compatible with the following standard.

Tester (+) / Tester (-)	1	2	3	4
1		Infinity	Infinity	Infinity
2	Continuity		Infinity	Infinity

3	Continuity	Continuity		Continuity
4	Continuity	Infinity	Infinity	

(1)Negative terminal (-) (2) AC terminal (~)



(3) AC terminal (~) (4)Negative terminal (+)

b. Charging Regulator

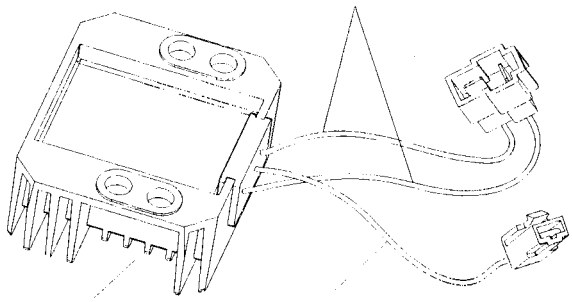
Loosen the positive battery cable when starting the engine and connect a DC current meter between the positive cable and positive terminal. The indicated current cannot exceed 1.5A. If there is no current present, replace the regulator

● Make sure the AC input voltage of charger is normal when check the charging regulator.

● Check the Cathode connection current of battery with DC meter when the battery wire is connected.

DC charging voltage	13~14V
DC charging current	＜1.5A

AC Input (blue)



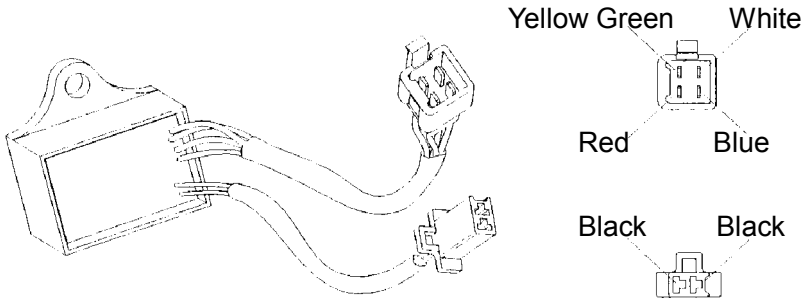
Shell grounding Output positive pole (red)

c. Timing relay

Put the ignition switch on the “OFF” position, connect a voltmeter to the white and yellow/green wires. Place the ignition switch in the “ON” position, hold on for 7 seconds and then place in the “OFF” position. A reading of 12V should be present for 7~12 seconds then the output should drop to 0 volts.

● Connect the sufficient battery before inspecting. On-line measurement can not be disconnected to the connectors.

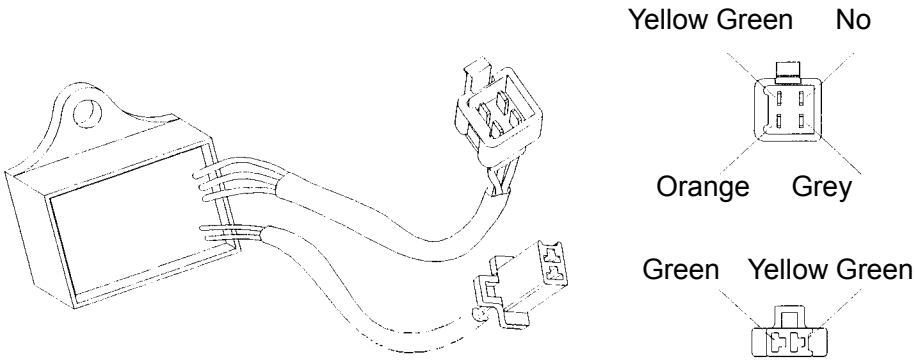
● Measure after the engine stopped more than one minute.



d. Ignition Control Relay

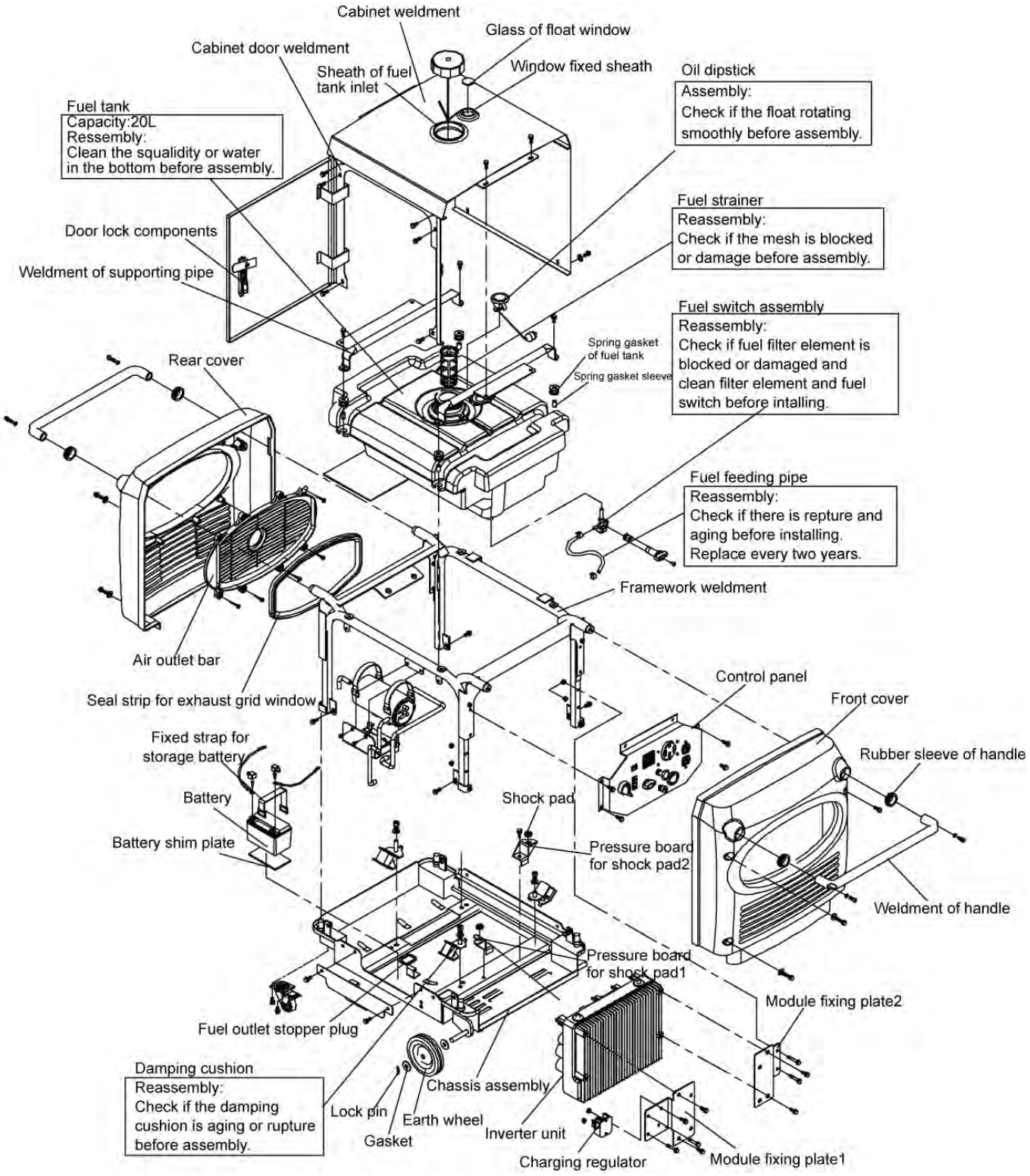
Start the engine, turn off the smart throttle and measure the voltage between green and yellow/green wires on the connection of the control module. Replace the ignition control module if the voltage exceeds stipulated voltage.

Ignition voltage (AC)	27~32V

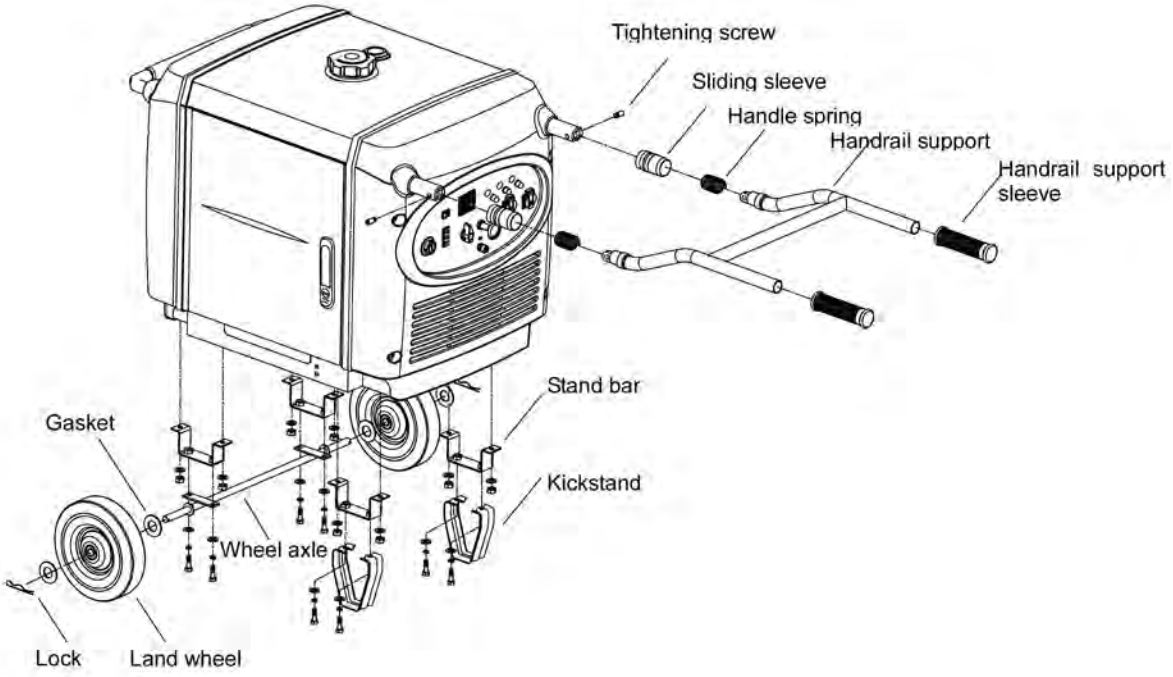


7. FRAME, HOUSING and FUEL TANK

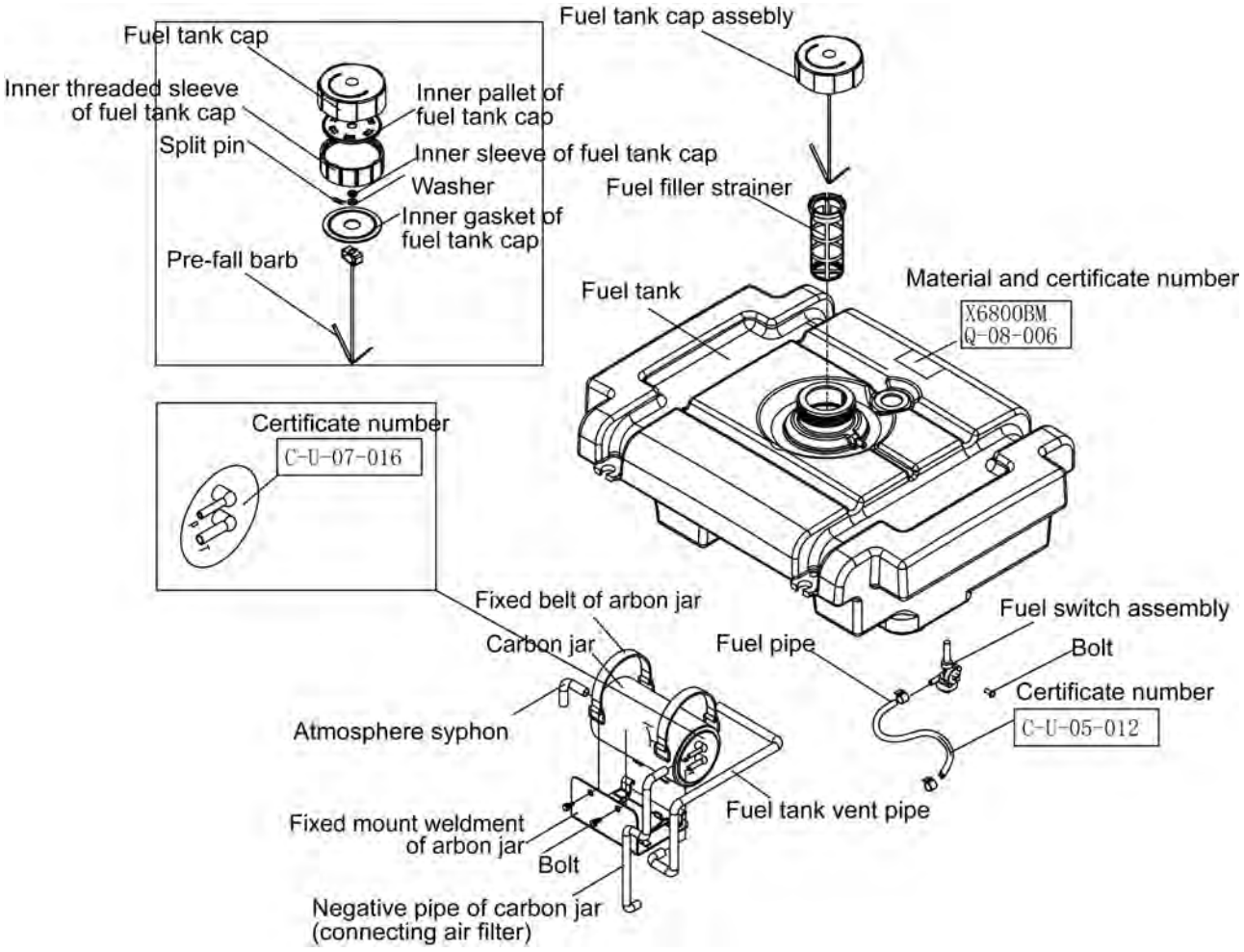
7.1 Disassembly and reassembly（IG6000）



7.2 IG6000h handle assembly



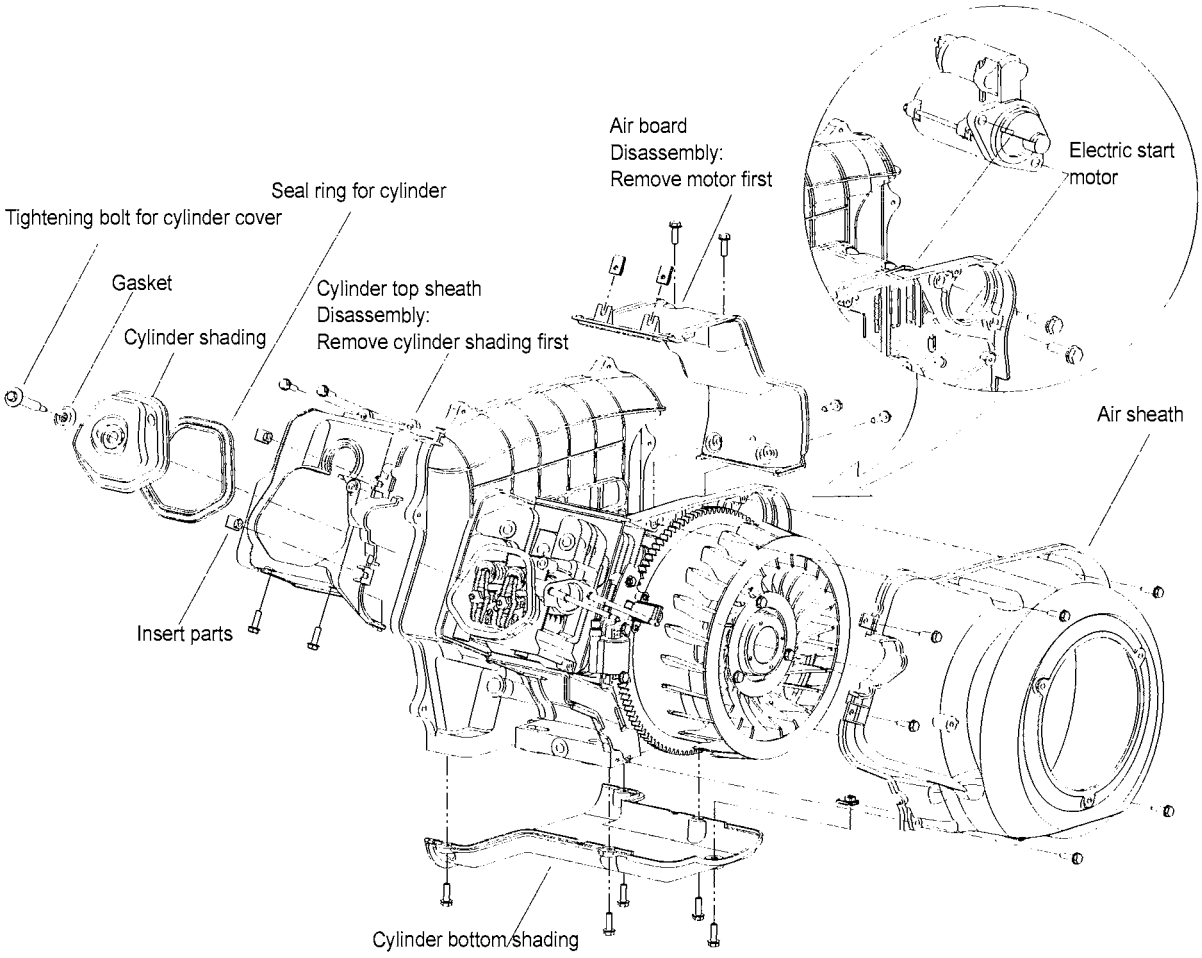
7.3 Vaporize control system



8. ALTERNATOR, IGNITION COIL, TRIGGER, FAN COVER

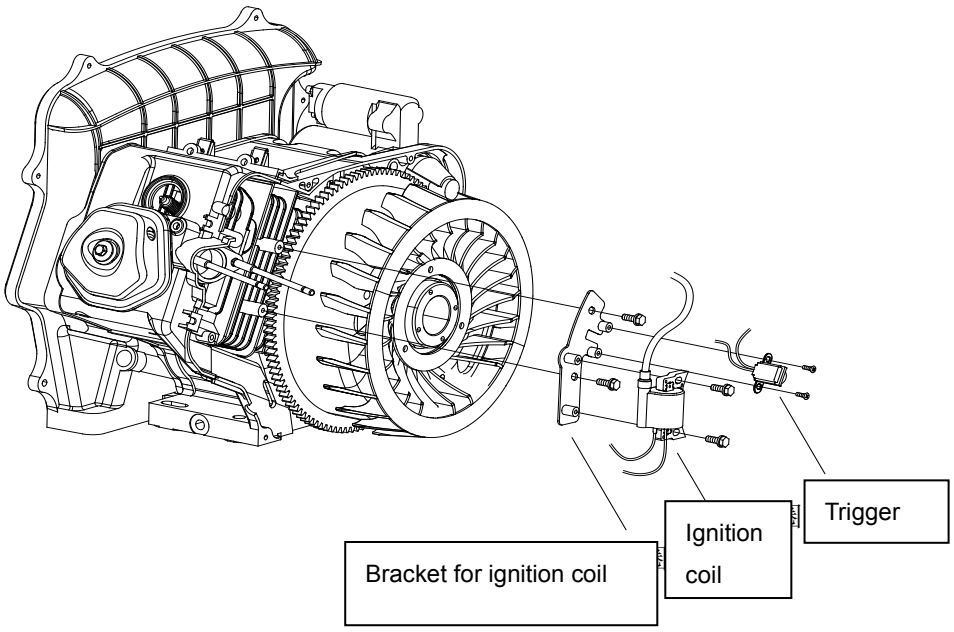
8.1 Component Identification

a. Disassembly and assembly



8.2 Ignition coil and trigger

a. Disassembly and reassembly

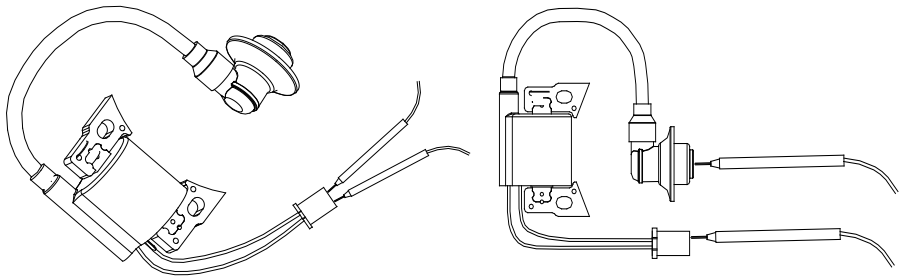


b. Inspection

(1) Ignition coil

● Insert each meter pen between the primary coil plug-in of ignition coil to measure primary resistance of ignition coil.

Primary resistance value	0.8~1.3Ω



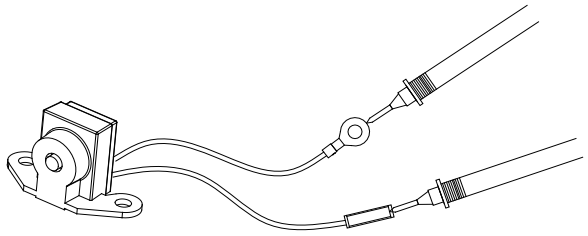
● Insert one ohmmeter lead to anyone primary coil plug-in of ignition coil and the other meter pen to spark plug cap to measure secondary resistance of the ignition coil.

Secondary resistance value	15~21KΩ

(2) Trigger

● Insert each meter pen to each trigger outgoing line to measure trigger resistance.

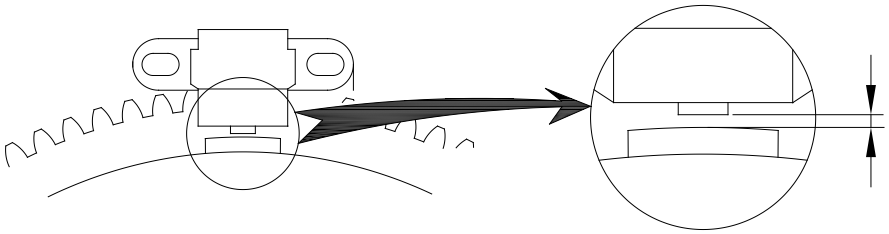
Trigger head resistance	80~130Ω



C. Adjustment

Adjust the clearance between the trigger head and rotor.

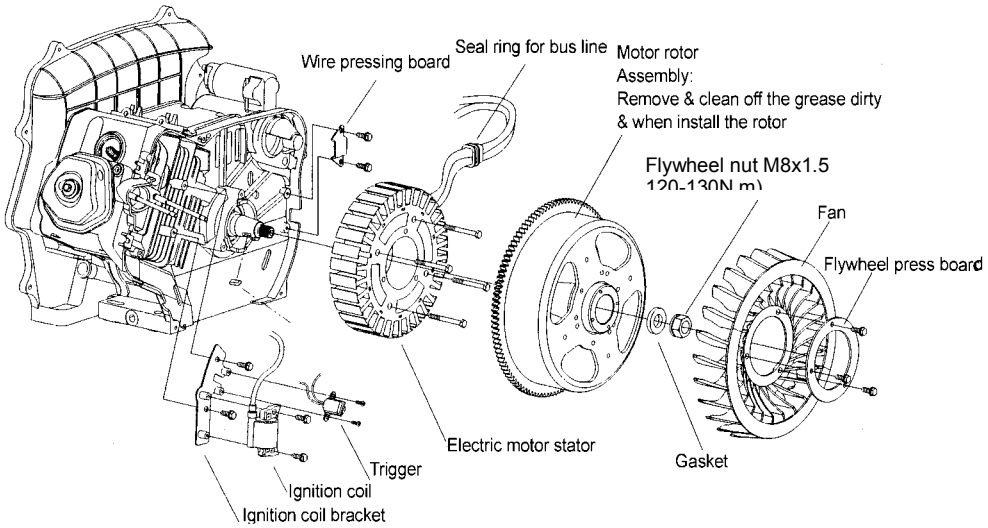
Trigger head clearance	.020-.029 in. (0.50~0.75 mm)



Insert the feeler gauge between the bulge on the trigger head and the rotor to measure clearance. Loosen the two bolts on the bracket to obtain the proper. When tightening, apply equal torque to both mounting bolts to prevent “cocking” the trigger to one side. Recheck the clearance after the adjustment has been made.

8.3 Alternator

a. Disassembly and reassembly



b. Inspection

(1) Ignition coil

Resistance value	Orange-Yellow/green	0.22~0.24Ω
	Gray-Orange	0.15~0.17Ω

(2) External charging coil

Measure the resistance between the two blue wires

Resistance value	0.03~0.04Ω

(3) Built-in charging coil

Measure the resistance between the two purple wires.

Resistance value	0.12~0.16Ω

(4) Sub winding coil

Measure the resistance between two white wires (or green depending on the date of manufacture).

Resistance value	0.08~0.12Ω

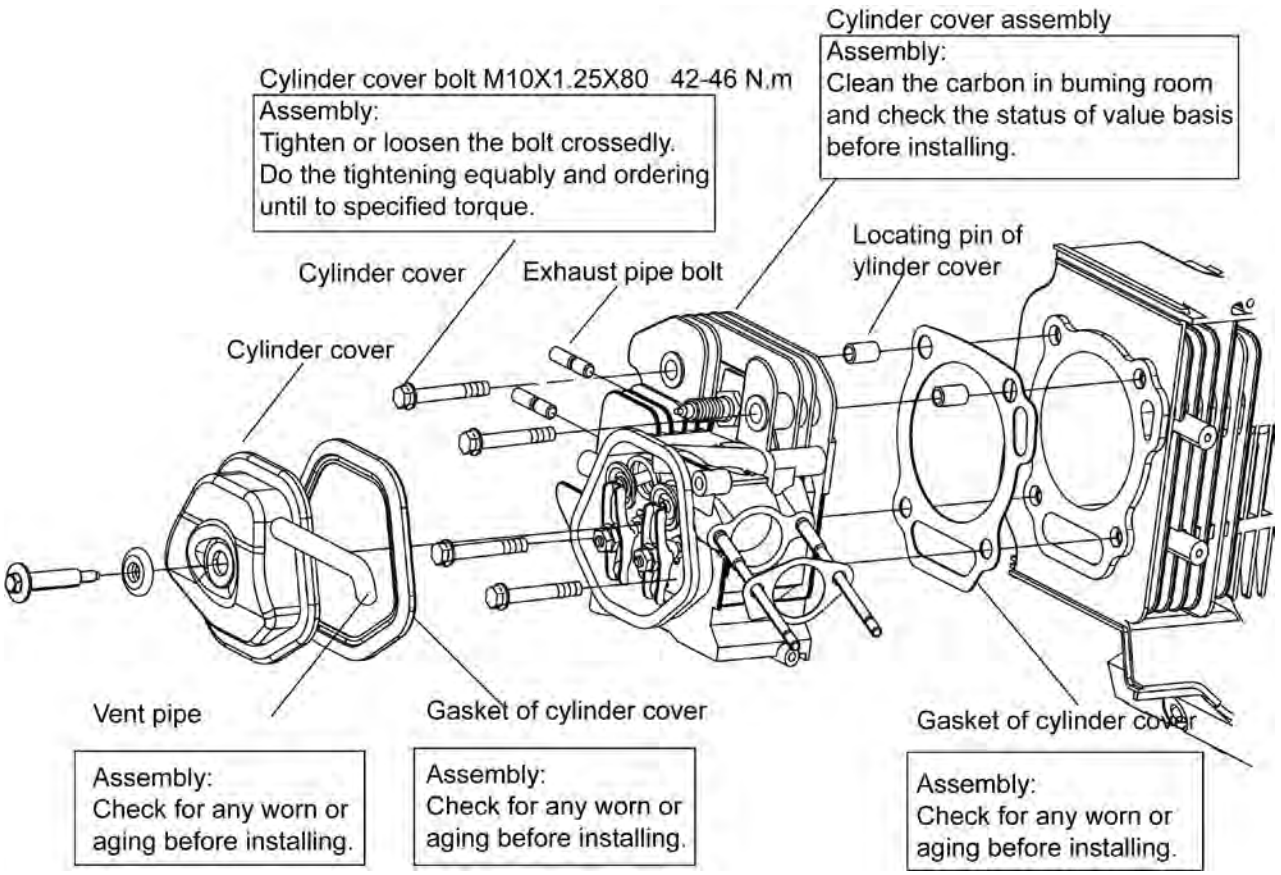
(5) Main winding

Measure the resistance between three wires in black(or red).

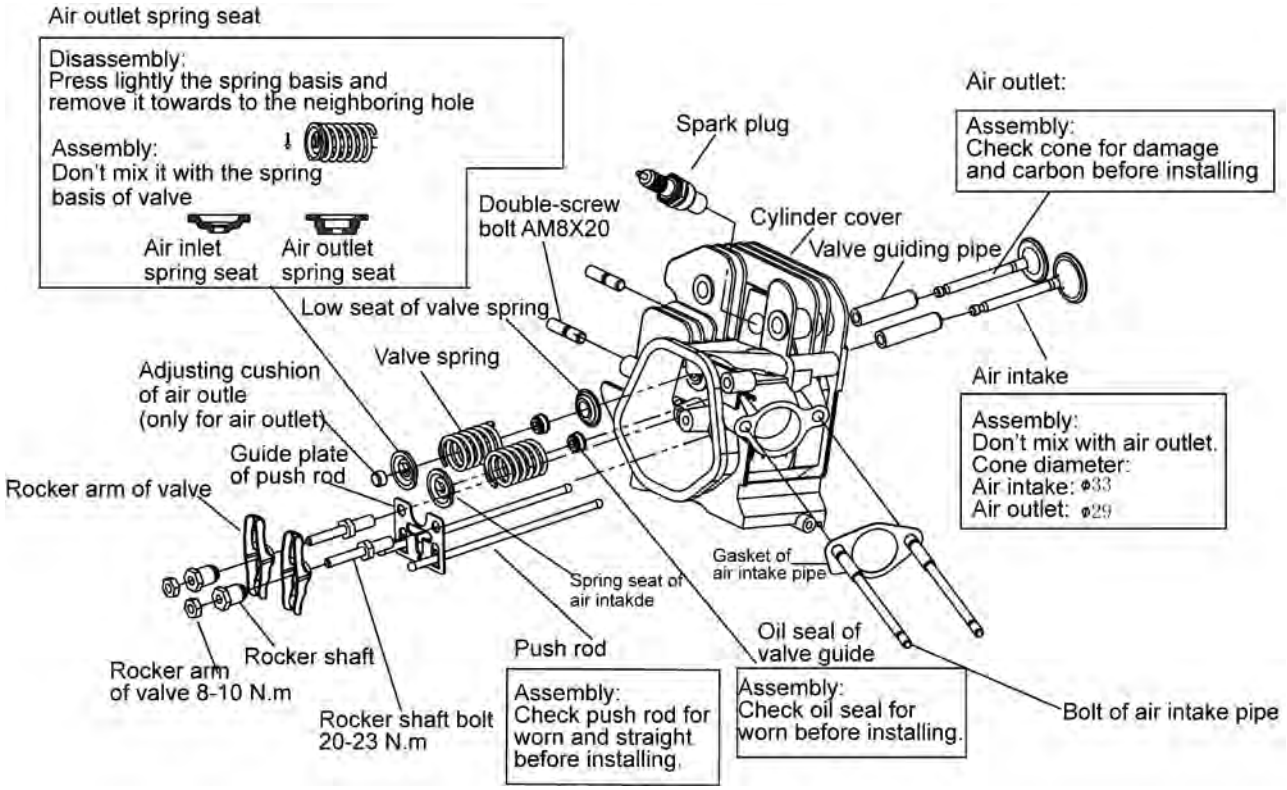
Resistance value	120/240V	120V	240V
	Double voltage	Single voltage	
	0.45~0.60Ω	0.09~0.10Ω	0.9~1.1Ω

9. CYLINDER COVER and VALVE

9.1 Disassembly and reassembly



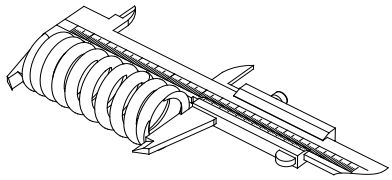
b.



9.2 Inspection

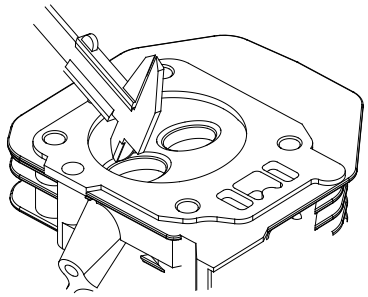
● Valve spring length

Standard(mm)	Service limit(mm)
39	37.5



●Valve seat width

Standard(mm)	Service limit(mm)
0.8-1.2	2.0

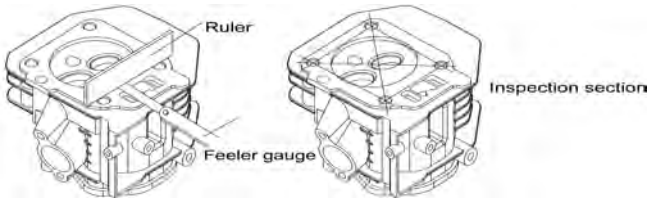


●Cylinder cover

Remove all accumulated carbon in burning room and the washer remains on cylinder cover, and then check for crack of spark plug holes, valve base and valve conduct pipe.

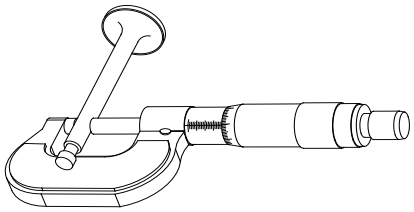
Check for distortion of cylinder cover with ruler and feeler gauge.

Service limit	If exceed 0.1mm, please replace



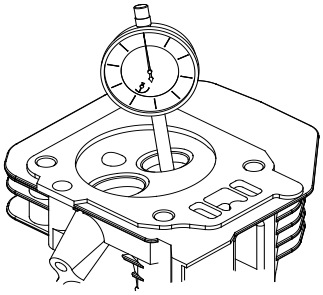
●External diameter of valve rod

	Standard （mm）	Service limit (mm)
Air intake	6.570~5.48	6.50
Air outlet	6.55~6.57	6.50



●Inner diameter of valve guiding pipe

	Standard （mm）	Service limit (mm)
Air intake/outlet	6.600-6.622	6.68



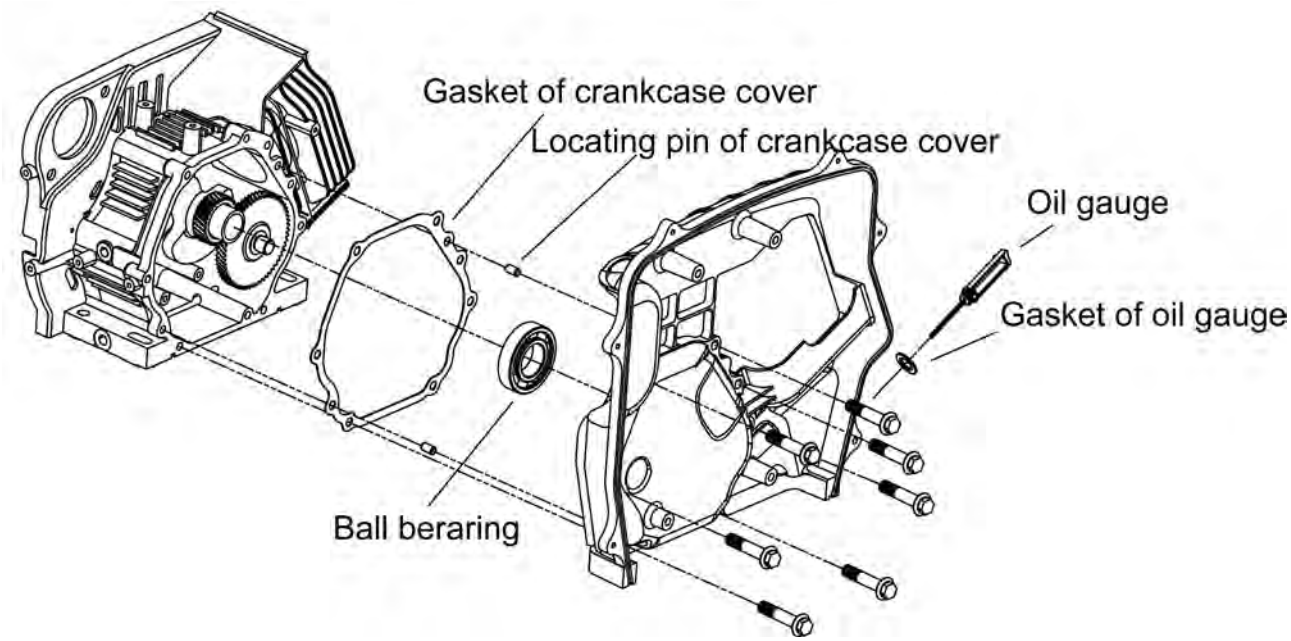
●Clearance between valve rod and valve guiding pipe

	Standard （mm）	Service limit (mm)
Air intake	0.015~0.052	0.11
Air outlet	0.030~0.072	0.13

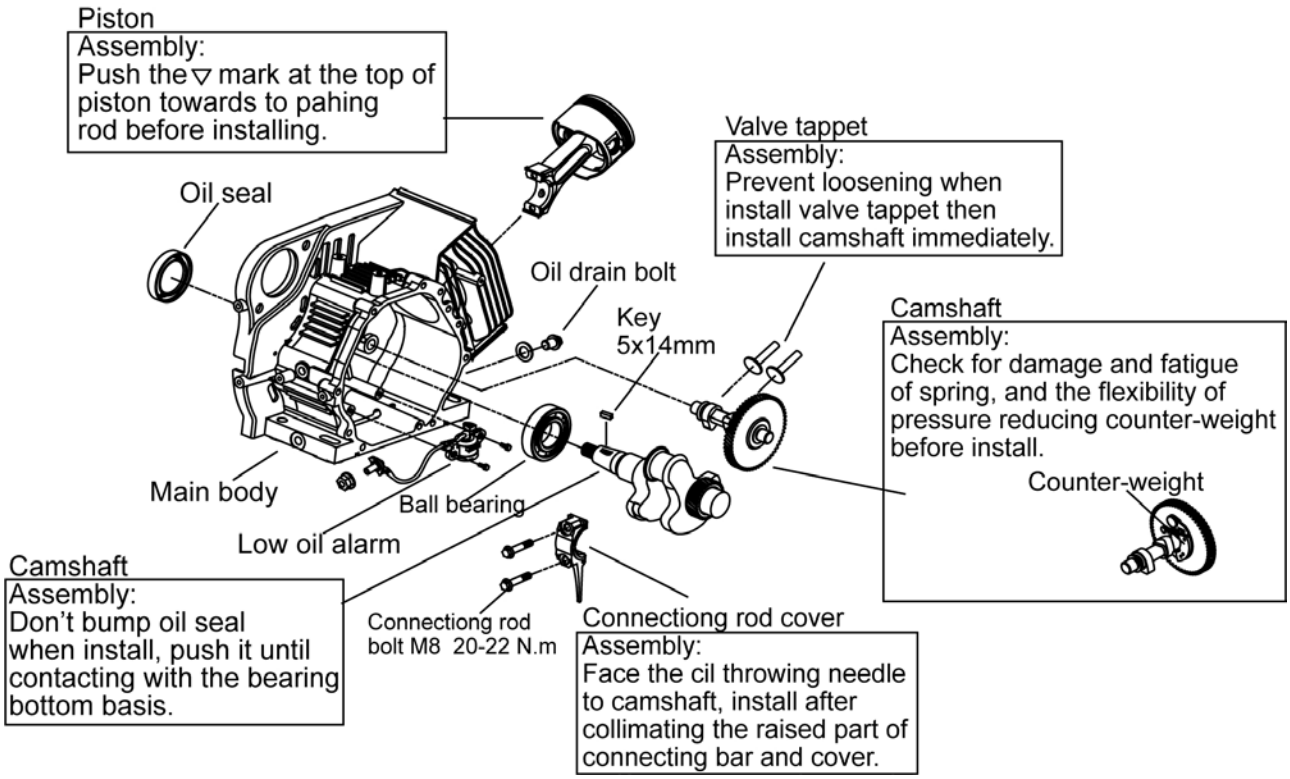
10. CRANKCASE COVER, CAMSHAFT, PISTON and CONNECTING ROD

10.1 Disassembly and reassembly

a. Crankcase cover

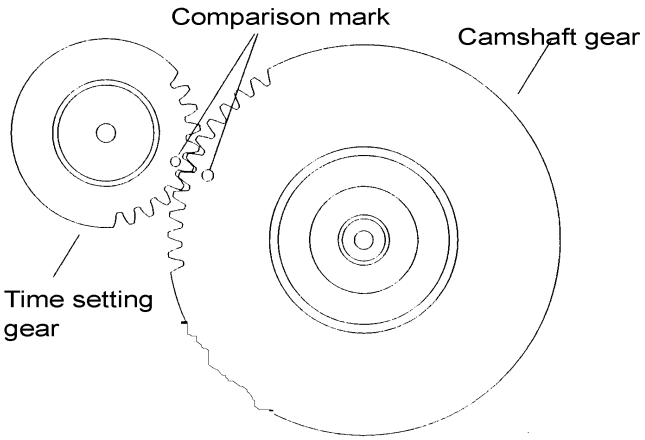


b. Crankshaft, camshaft and piston

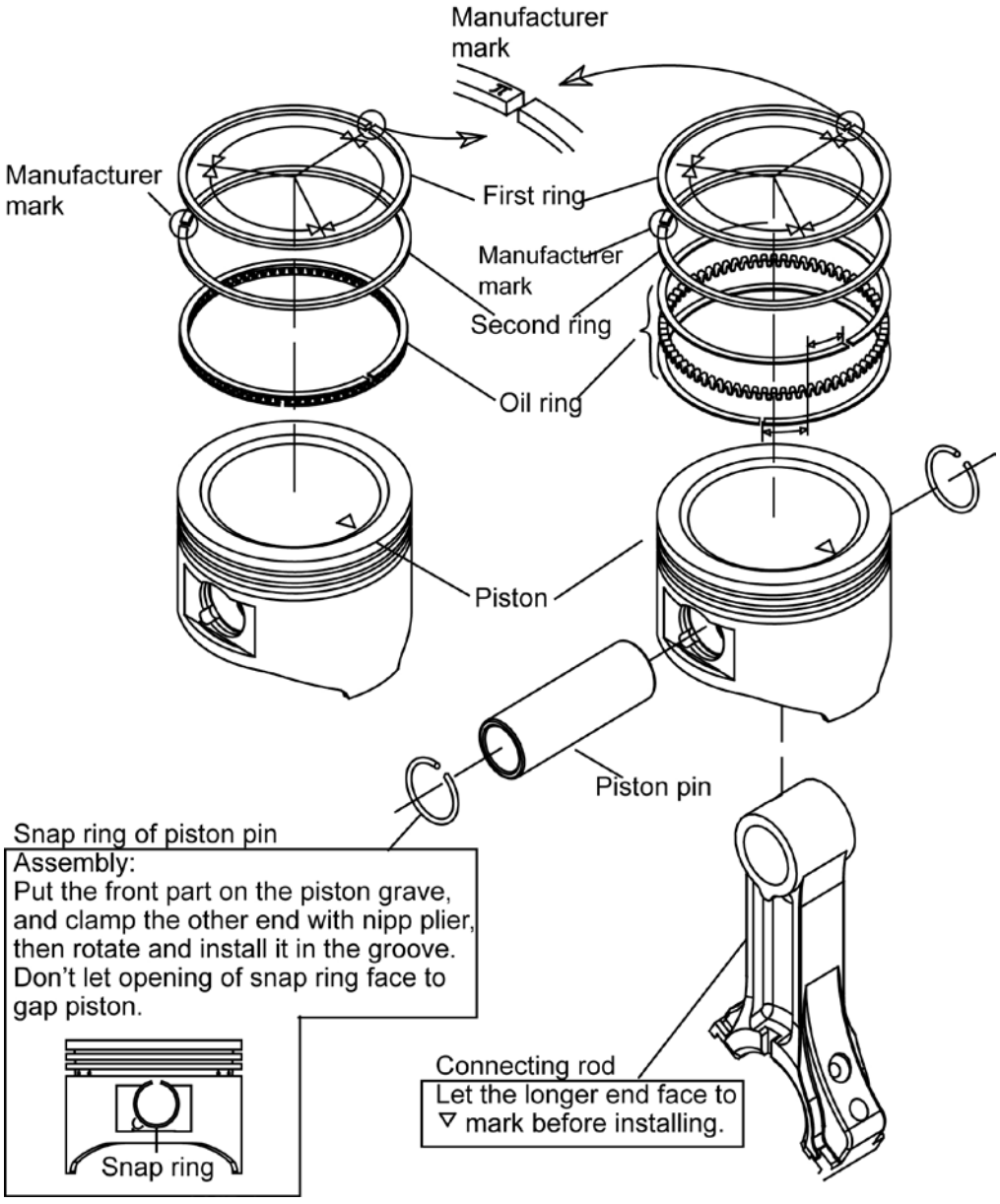


●Alignment of time setting marks

Align camshaft with comparison marks of time setting gear (small gear on camshaft) before installing.



c. Piston and connecting rod



Assemble of piston ring

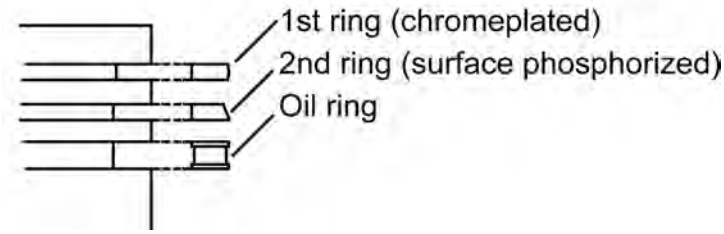
Caution

● Put the manufacturer mark facing up when installation;

● Pay attention to the installation positions of 1st and 2nd ring.

● Check if the piston ring can rotate freely after installing.

● All openings of piston ring should be kept away from the direction of piston pin with 120 degree angle.



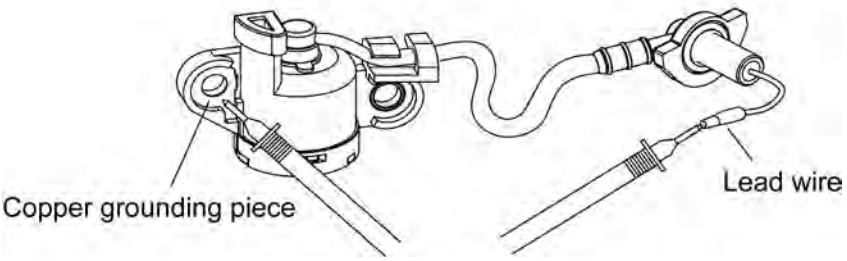
10.2 Inspection

Inspection of low oil alarm

(1）Lift the low oil alarm and measure the conductivity between lead wire and copper grounding piece using instrument.

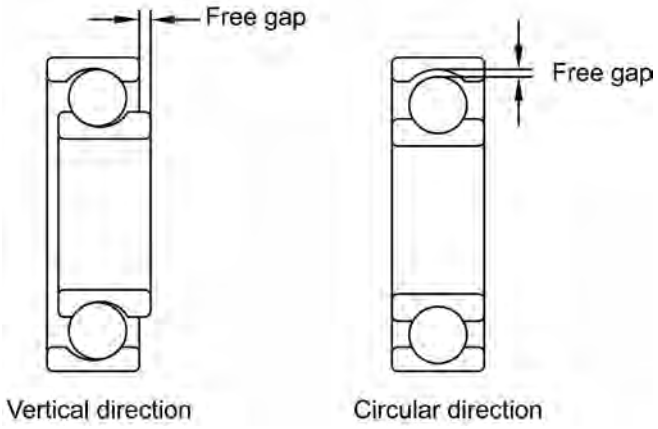
2）Convert the low oil alarm and measure again, it should be not conductive.

3）Dip the low oil alarm into engine oil in order to inspect float, and measure again, it should be not conductive.



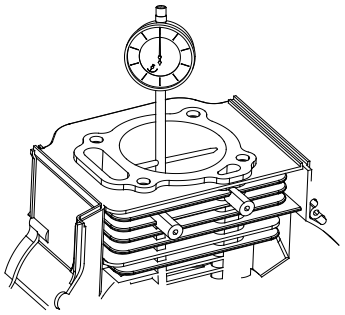
●Noise and moving of shaft

Clean and dry the shaft, rotate the shaft manually and check the free gap; if any noise or moving, replace the shaft.



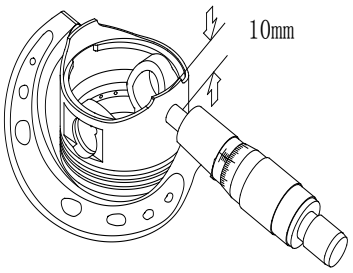
● **Inner diameter of cylinder**

Standard （mm）	Service limit (mm)
88.015~88.035	88.17



● **External diameter of the apron of piston**

Standard （mm）	Service limit (mm)
87.96-87.98	87.85

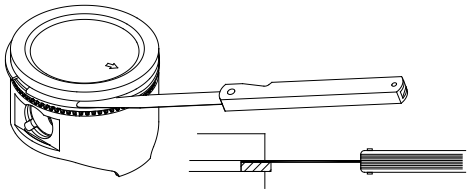


● **Clearance between piston and cylinder**

Standard （mm）	Service limit (mm)
0.045~0.065	0.120

● **Side clearance of piston**

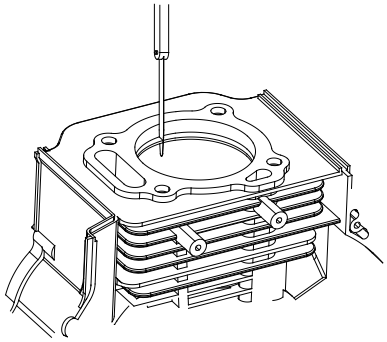
Standard （mm）	Service limit (mm)
0.045~0.060	0.150



● **Terminal clearance of piston ring**

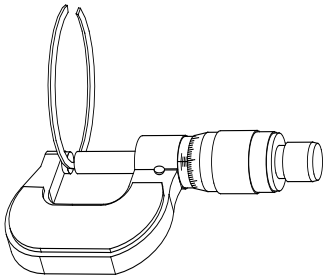
Fix the piston ring in cylinder using the top part of piston and measure the terminal clearance of piston.

Standard （mm）	Service limit (mm)
0.20~0.35	1.0



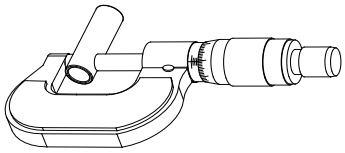
● **Height of piston ring**

	Standard （mm）	Service limit (mm)
The first ring/the second ring	1.97~1.99	1.87



● **External diameter of piston pin**

Standard （mm）	Service limit (mm)
19.994~20.000	19.950



● Internal diameter of piston pin hole

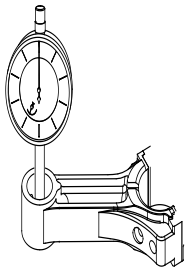
Standard （mm）	Service limit (mm)
20.002~20.008	20.050

● Clearance between piston pin and pin hole

Standard （mm）	Service limit (mm)
0.002~0.014	0.080

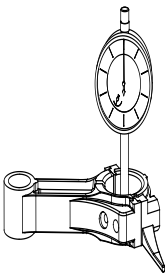
● Internal diameter of the small terminal of connecting rod

Standard （mm）	Service limit (mm)
20.007~20.020	20.090



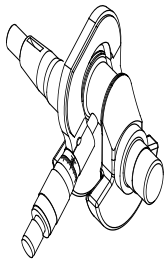
● Internal diameter of the large terminal of connecting rod

Standard （mm）	Service limit (mm)
36.015~36.025	36.090



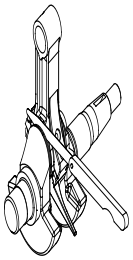
● **External diameter of crankshaft journal**

Standard （mm）	Service limit (mm)
25.960~35.975	35.900



● **Clearance of side face of big terminal of the connecting rod**

Standard （mm）	Service limit (mm)
1.05~1.25	1.5



●**Clearance of oil film of big terminal of connecting rod**

（1）Remove the engine oil on the surface of crankshaft journal.

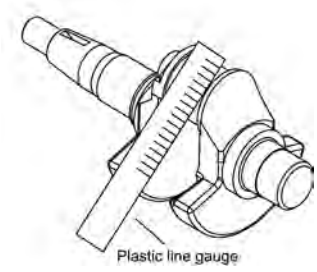
（2）Set plastic line gauge on the crankshaft journal, and install the connecting rod. Tighten the bolt according to stipulate torque. Pay attention not to rotate the crankshaft when tightening.

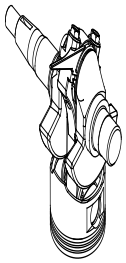
Tightening torque: 14~16N.m.

（3）Remove the connecting rod and measure the thickness of plastic line gauge.

（4）If clearance exceeds service limit, please replace the connecting rod, and then measure the clearance again. If the clearance still exceeds service limit after changing a new rod, please polish the crankshaft journal and use the connecting rod that is less than standard value.

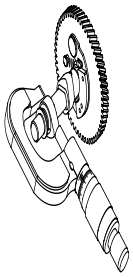
Standard （mm）	Service limit (mm)
0.046~0.060	0.120





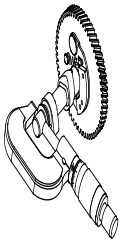
● Height of camshaft

	Standard （mm）	Service limit (mm)
Air intake	32.60~32.80	32.25
Air outlet	32.09~32.29	31.75



●External diameter of camshaft

Standard （mm）	Service limit (mm)
15.966~15.98	15.92



●Inner diameter of bearing of camshaft

Standard （mm）	Service limit (mm)
16.000~16.018	16.050