

# KIPOR

## KIPOR POWER PRODUCTS CO., LTD. GENERATOR SHOP MANUAL



IG2000

IG2000p

IG2000s

CG2000

# **PREFACE**

This manual covers the construction, function and servicing procedure of the KIPOR IG2000, IG2000P and CG2000 generators manufactured for the Coast Distribution System.

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

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

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# 1. SPECIFICATIONS

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## 1.1 SPECIFICATIONS

### Dimensions and weights

Model	IG2000/IG2000p/CG2000	IG2000s
Overall Length in (mm)	20.5 (520)	26.2 (665)
Overall Width in (mm)	11.8 (300)	11.8 (300)
Overall Height in (mm)	16.7 (425)	16.7 (425)
Net Weight lbs (kg)	48.4 (22)	52.8 (24)

### Engine

Model	KG158
Type	4-stroke,OVC, single cylinder, Gasoline engine
Displacement cu in (cc)	(105)
Horsepower/RPM	2.2/4500
Compression ratio	8.5:1
Cooling system	Forced air-cooled
Ignition system	T.C.I
Ignition timing	27°B.T.D.C
Spark plug	UR5
Carburetor	Float type, Horizontal, butterfly valve type
Air cleaner	Semi-dry type
Governor	Electronically controlled
Lubrication system	Forced splash
Oil capacity qt (L)	.35 (0.4)
Starting system	Recoil starter
Fuel used	Automotive unleaded gasoline 87 octane

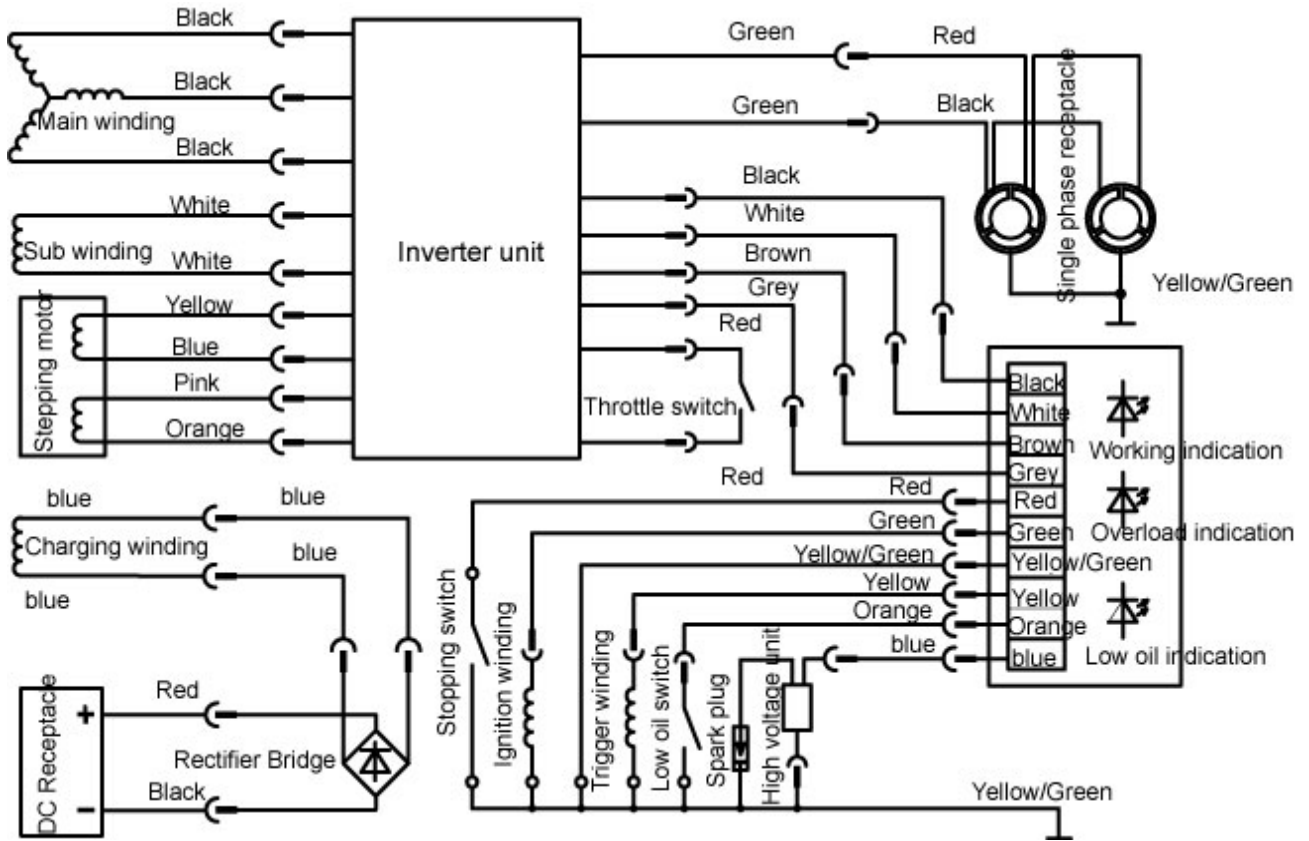
### Generator

Model	KD20 Inverter/KM20 Converter
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	Three phase
Rotating direction	Clockwise (Viewed from the generator)
Frequency regulation	AC-DC-AC conversion (Inverter type) AC-AC conversion (Converter type)

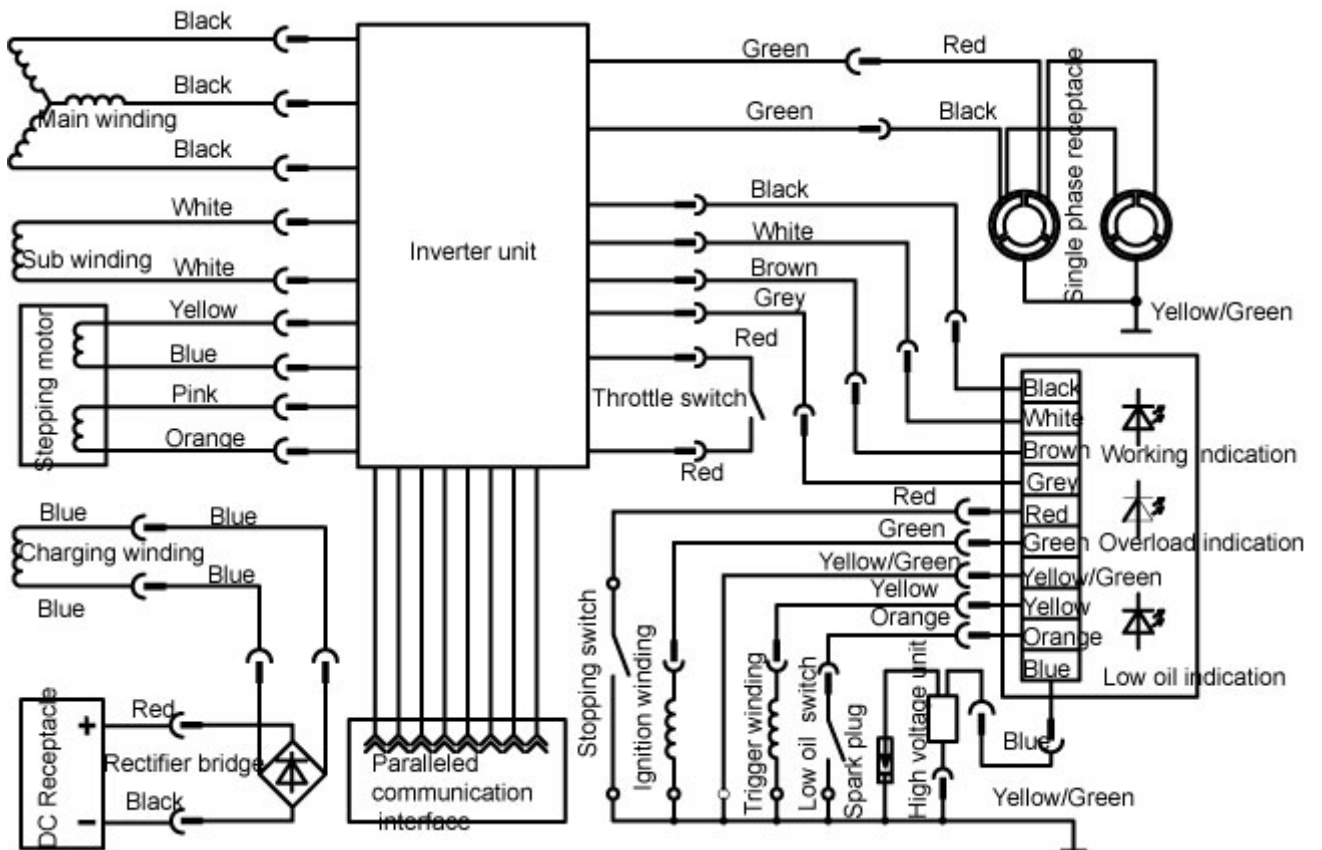
Model	All
Maximum output AC	2.0KVA
Rated output AC	1.6KVA
Rated output DC	100W
Rated frequency	60HZ
Rated voltage AC	120V
Rated voltage DC	12V
Rated current AC	13.3A
Rated current DC	8.3A
Power factor	1.0
Voltage variation rate	
Momentary	10% max
Average	1.5% max
Average time	3 sec max
Voltage stability	±1%
Frequency variation rate	
Momentary	1% max
Average	1% max
Average time	1 sec max
Frequency stability	±0.1%
Insulation resistance	10 MΩ min
AC circuit protector	17.9A @120V
DC circuit protector	10A
Fuel tank capacity gal (L)	.9 (3.5)
Operating hours (at rated load)	4
Noise level NL-FL @23' (7 m)	54-59

## 1.2 WIRING DIAGRAMS

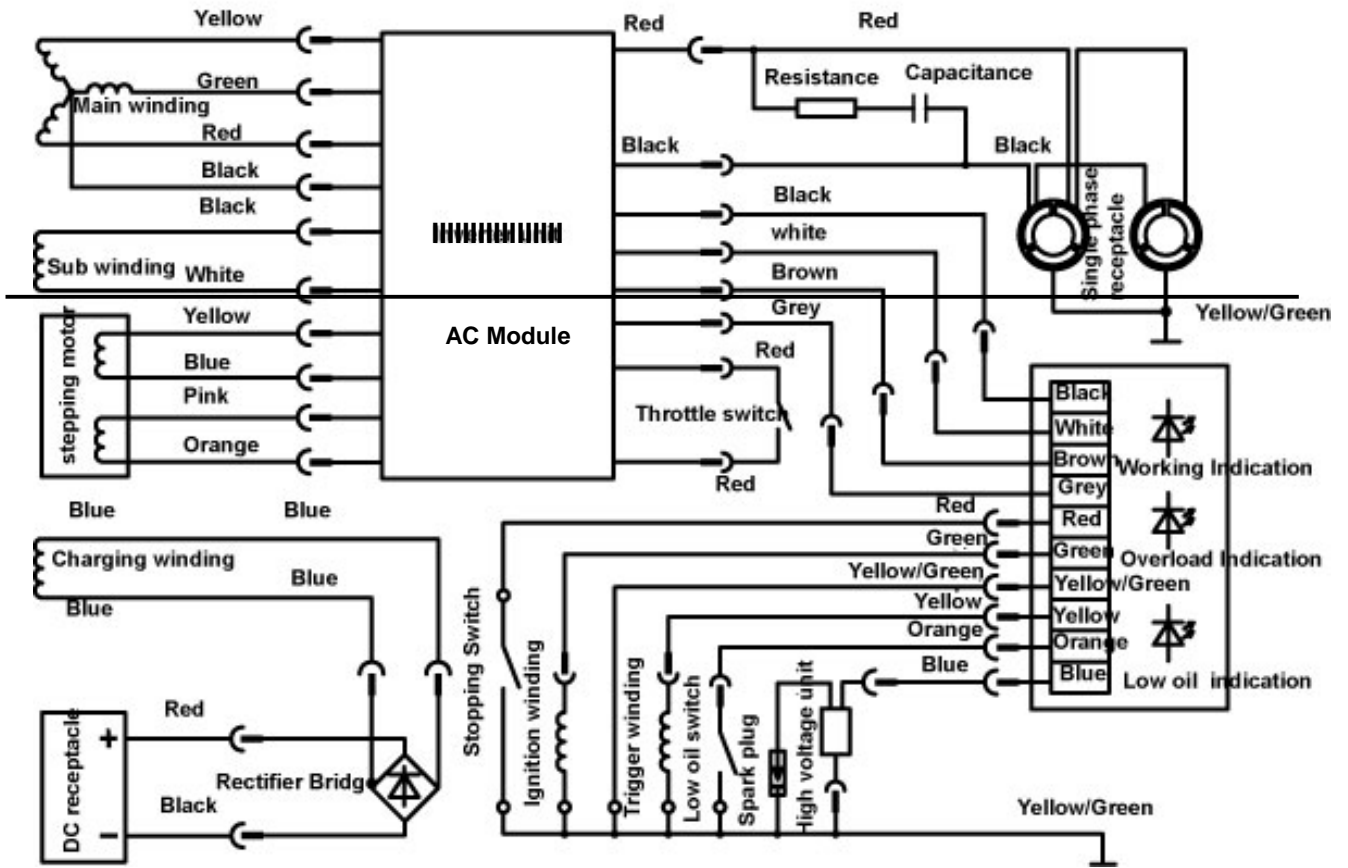
### IG2000/IG2000s



IG2000p



CG2000



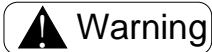


## 2. Service Information

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### 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.



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.

### 2.2 Important 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.
  - Burns from hot parts.
  - 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.
- Use the special tools designed for the product.
- Always install new gaskets, O-rings, etc. when reassembling components.
- 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.

## 2.4 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

## 2.5 Serial number and bar code identification and location

The generator serial number identifies your particular unit and is important when ordering parts and accessories. The bar code is used by your dealer and Coast Distribution for warranty administration.



The generator serial number is stamped on the engine block above the oil dipstick. The bar code label is placed on the bottom of the generator. It is additionally found on the inside cover of the operator's manual and on the carton.

## 2.6 Maintenance standards

### Engine

Part	Item		Standard	Service limit
Engine	Maximum speed without load		4300±100 rpm	—
Cylinder	Sleeve I.D.		2.283-2.284 in	2.287 in
			58.000-58.020 mm	58.105 mm
Piston	Skirt O.D		2.282-2.283 in	2.227 in
			57.960-57.980 mm	57.85 mm
	Pin bore I.D.		0.5118-0.5121 in	0.5137 in
			13.002-13.008 mm	13.05 mm
Piston pin	O.D		0.5116-0.5118 in	0.5098 in
			12.994—13.000 mm	12.95 mm
Piston ring	1st ring	Height	0.382-0.390 in	0.342 in
			0.97-0.99 mm	0.87 mm
		Ring side clearance	0.0008-0.00236 in	.00591 in
			0.02-0.06 mm	0.15 mm
		Ring end clearance	0.00591-0.00984 in	0.0394 in
			0.15-0.25 mm	1.0 mm
	Width	0.0768-0.0846 in	0.0689 in	
		1.95-2.15 mm	1.75mm	
	2nd ring	Height	0.046-0.047 in	0.042 in
			1.17-1.19 mm	1.07 mm
		Ring side clearance	0.0008-0.00236 in	.00591 in
			0.02-0.06 mm	0.15 mm
		Ring end clearance	0.00591-0.00984 in	0.0394 in
			0.15-0.25 mm	1.0 mm
	Width	0.094-0.102 in	0.087 in	
		2.4-2.6 mm	2.2 mm	
	Oil ring	Height	0.0728-0.078 in	0.0689 in
			1.85-1.98 mm	1.75 mm
		Ring side clearance	0.0011-0.0071 in	0.0094 in
			0.03-0.18 mm	0.24 mm
Ring end clearance		0.0078-0.0197 in	0.0394 in	
		0.20-0.50 mm	1.0 mm	
Width	0.0905-0.1063 in	0.0866 in		
	2.3-2.7 mm	2.2 mm		
Connecting rod	Small end I.D		0.5120-0.5125 in	0.5150 in
			13.006—13.017	13.08
	Big end I.D		0.9457-0.9462 in	0.9484 in
			24.020—24.033	24.09
Crankshaft	Crank pin O.D.		0.9436-.9441 in	0.9419 in
			23.967-23.980 mm	23.90 mm
Valves	Valve clearance	Intake	0.0039±.0008 in	---
			0.10±0.02 mm	---
		Exhaust	0.0059±.0008 in	---
			0.15±0.02 mm	---

	Stem O.D.	Intake	0.1561-0.1567 in 3.965—3.980 mm	0.1535 in 3.90 mm	
		Exhaust	0.1557-0.1563 in 3.955—3.970	0.1535 in 3.90	
	Guide I.D.	IN/EX	0.1575-0.1587 in 4.000—4.030 mm	0.1598 in 4.06 mm	
			Seat width	IN/EX	0.0276 in 0.7 mm
	Valve spring	Free length	IN/EX	1.039 in 26.4 mm	0.9803 in 24.9 mm
				Cam wheel	Cam height
Camshaft	O.D		0.3530-0.3533 in 8.966-8.975 mm	0.3512 in 8.92 mm	
	Camshaft bearing I.D.		0.3542-0.3549 in 9.000-9.015 mm	0.3557 in 9.035 mm	
	Rocker arm	I.D.(Rocker arm)	0.2362-0.2367 in 6.000-6.012 mm	0.2377 in 6.037 mm	
			O.D.(Rocker arm shaft)	0.2351-0.2354 in 5.972-5.980 mm	0.2348 in 5.965 mm
I.D.(Rocker arm shaft bearing)		0.2362-0.2367 in 6.000-6.012 mm	0.2378 in 6.037 mm		
		Spark plug	Gap		.0024-.0030 in 0.6—0.7 mm
Ignition coil	Resistance	Primary side	0.8—1.3 Ω	—	
		Secondary side	15 —21kΩ	—	
Pulse coil (Trigger)	Air gap		0.0197-0.0295 in 0.5-0.75 mm	— —	
	Resistance		80~130 Ω	—	

### Generator

Part	Item	Type	Standard (Ω)			
			IG series		CG series	
Ignition winding	Resistance	Green-Yellow/Green	0.40-0.55			
Outer charging winding	Resistance	Blue--Blue	0.12-0.15			
Sub winding	Resistance	White-White (IG) White-White (CG)	0.15-0.30			
Main winding	Resistance	Black—Black-Black (IG) Black-Yellow/Black-Green/Black-Red (CG)	1.35-1.75	5.0-5.5	0.18-0.21	0.65-0.90

## 2.7 Torque values

Item	Specification	Tightening torque	
		Ft-lbs	N·m
Connection rod bolt	M5X0.8X25	5.9-7.4	8-10
Spark plug	M10X1.0X13	8.8-11.0	12-15
Crankcase cover	M6X25	5.9-7.4	8-10
Flywheel nut	M12X1.25	51.6-59.0	70-80
Standard torque	M5 Bolt, nut	4.4-6.0	6-8
	M6 Bolt, nut	5.9-7.4	8-10
	M8 Bolt, nut	14.7-16.9	20-23

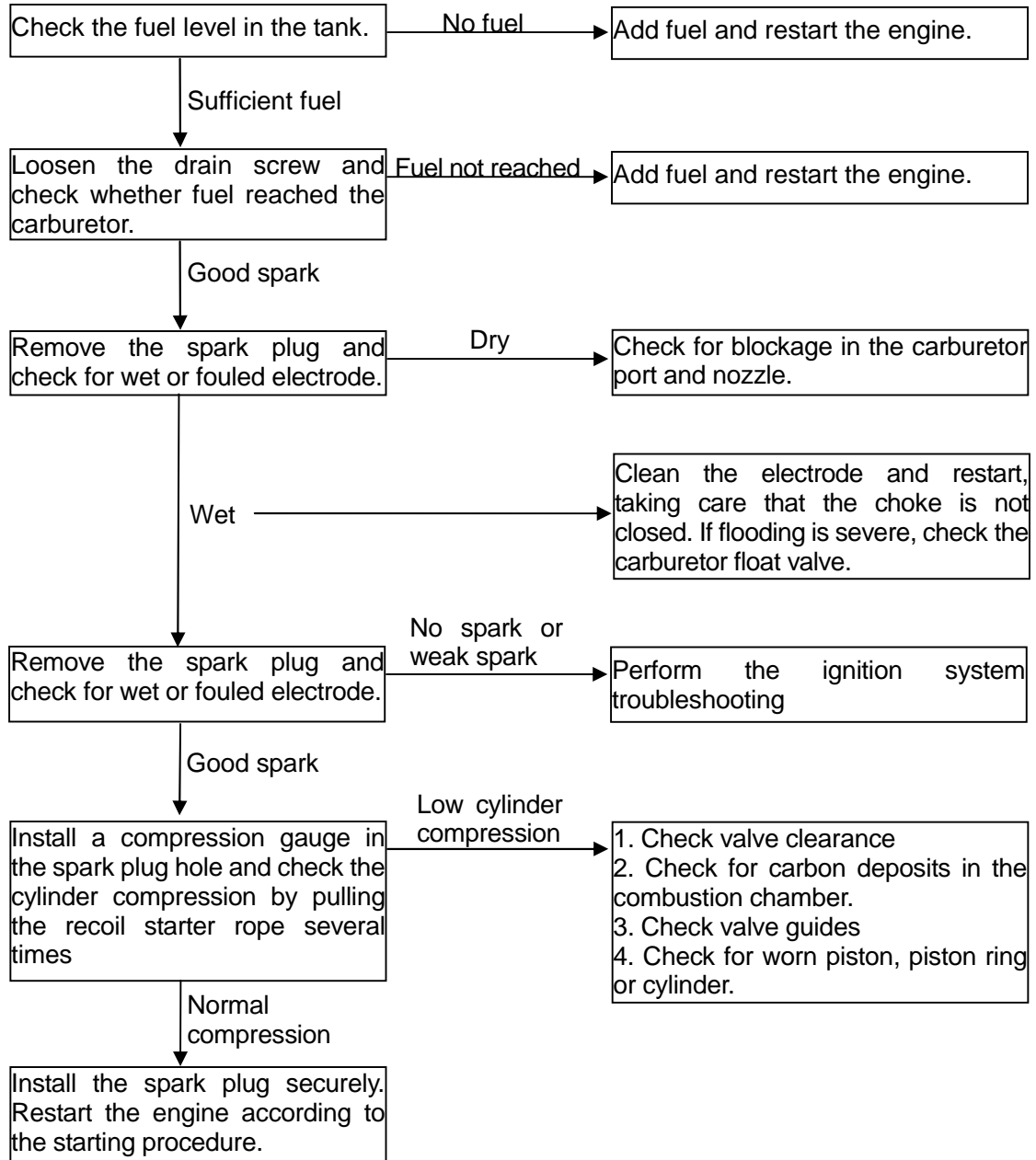
Note: Use standard torque values for fasteners that are not listed in this table.

## 3 Troubleshooting

### 3.1 General symptoms and possible causes

Engine does not start or hard starting	Fuel filter clogged	Clean
	Fuel tank tube clogged	Clean
	Fuel switch clogged	Clean
	Carburetor faulty	Readjust and clean
	Ignition coil faulty	Inspect and replace
	Spark plug faulty	Inspect and replace
	Trigger faulty or trigger clearance faulty	Inspect and replace
	Spark plug cap looses	Fix it securely
	Low oil alarm faulty	Inspect and replace
	Defective spark plug	Inspect and replace
	Ignition winding faulty	Inspect and replace
	Throttle opening fault	Set in fully closed or half close position
Engine speed does not stabilize, too high or too low	Carburetor fault	Inspect, clean or replace
	Throttle control motor (stepping motor) fault	Test and replace
	Inverter unit fault	Test and replace
	Valve clearance misadjusted	Readjust

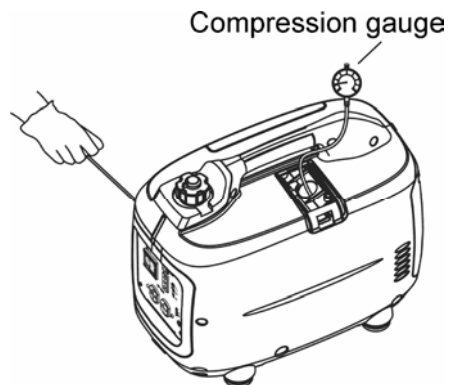
### 3.2 Hard starting



#### 3.2.1 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	65 psi (0.45Mpa) @ 800rpm
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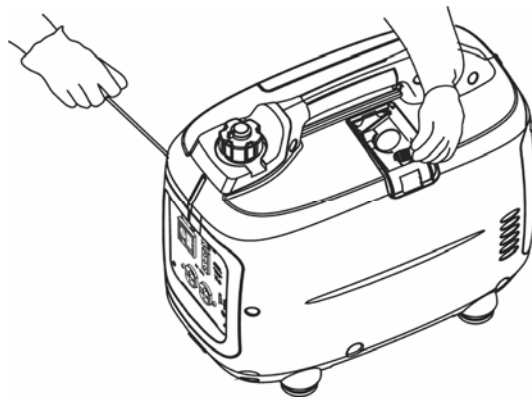


### 3.2.2 Spark test

- Fill in oil to the proper level.
- Check for the correct spark plug.
- Spark plug inspection:
  1. Disassemble spark plug
  2. Install spark plug onto spark plug cap.
  3. Set the oil switch to the "ON" position. Ground the negative (—) electrode (i.e. threaded part) of the spark plug against the engine shroud and pull the recoil starter rope to check the spark plug.
  4. Sparks should jump across the electrode gap.

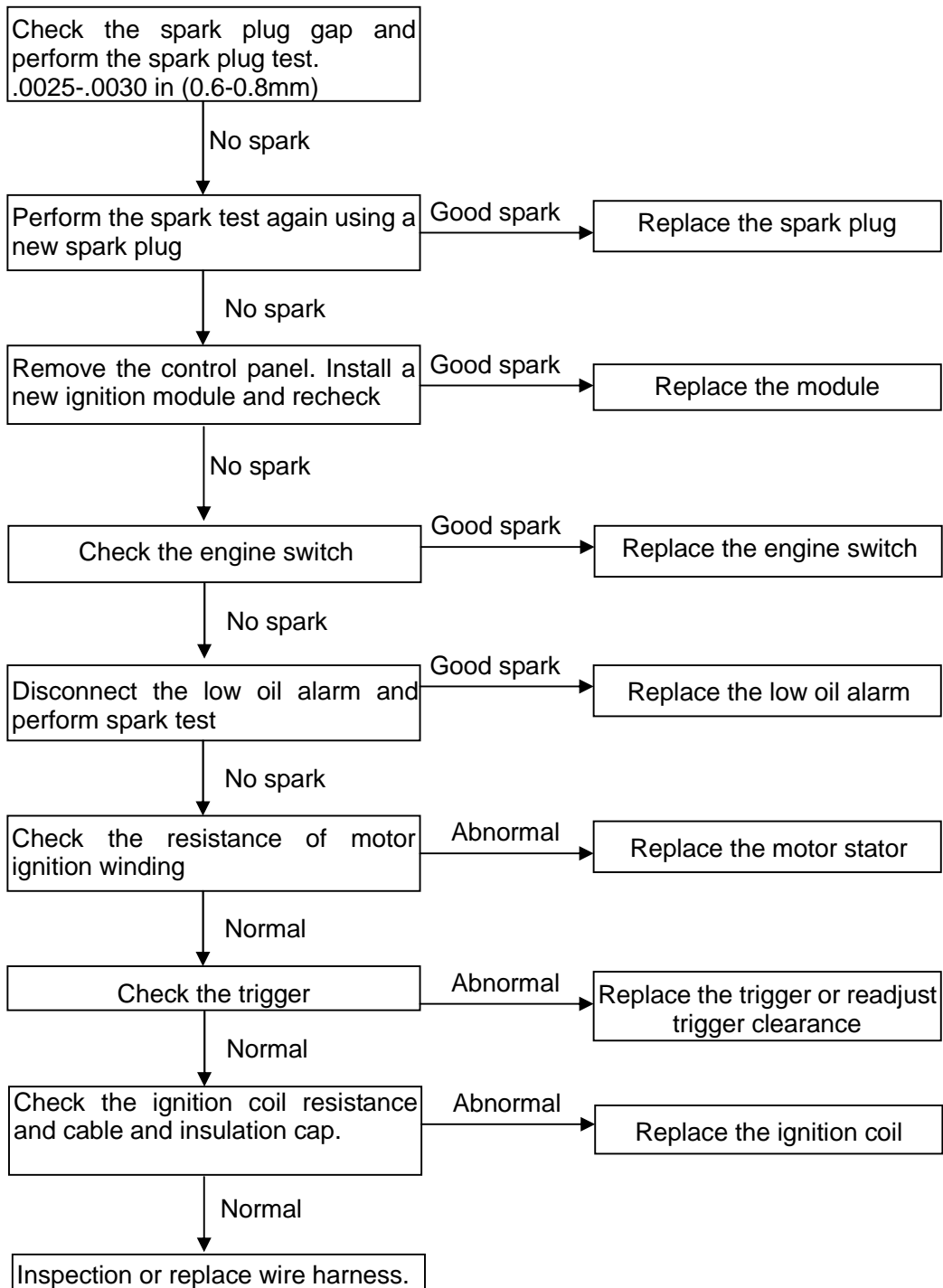


- Don't pull the recoil starter while touching the high tension wire with wet hands. High voltage is generated which is very dangerous.
- Drain the gasoline from the fuel tank and carburetor.
- Pull the recoil starter several times to expel unburned fuel from the cylinder with the engine switch OFF.

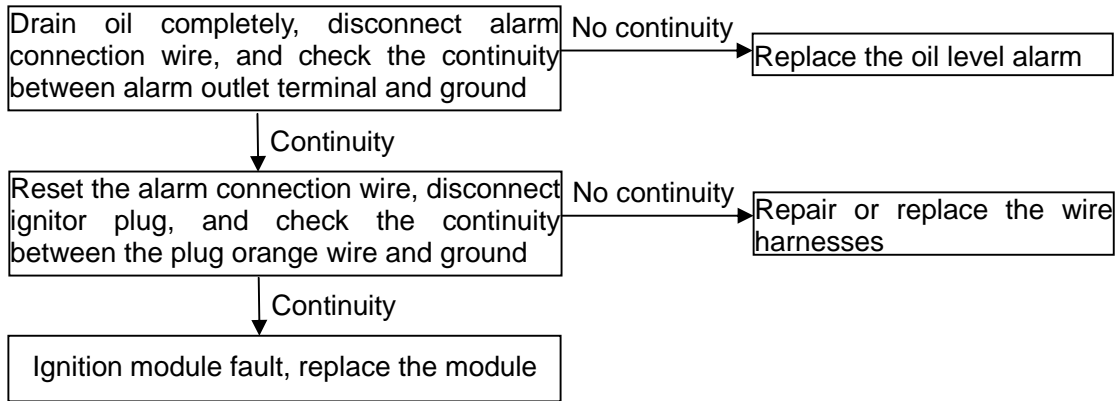




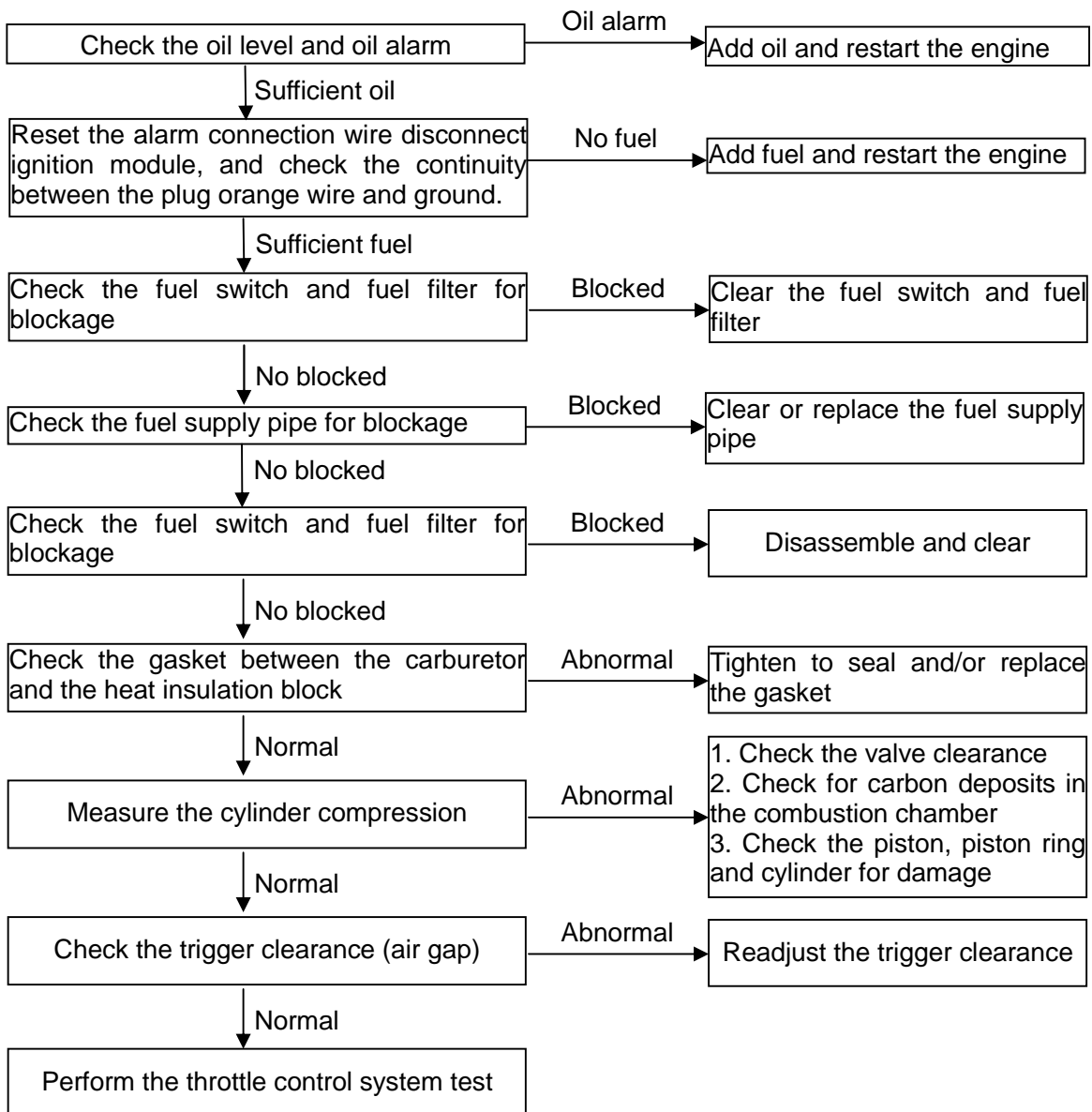
### 3.2 Hard Starting continued



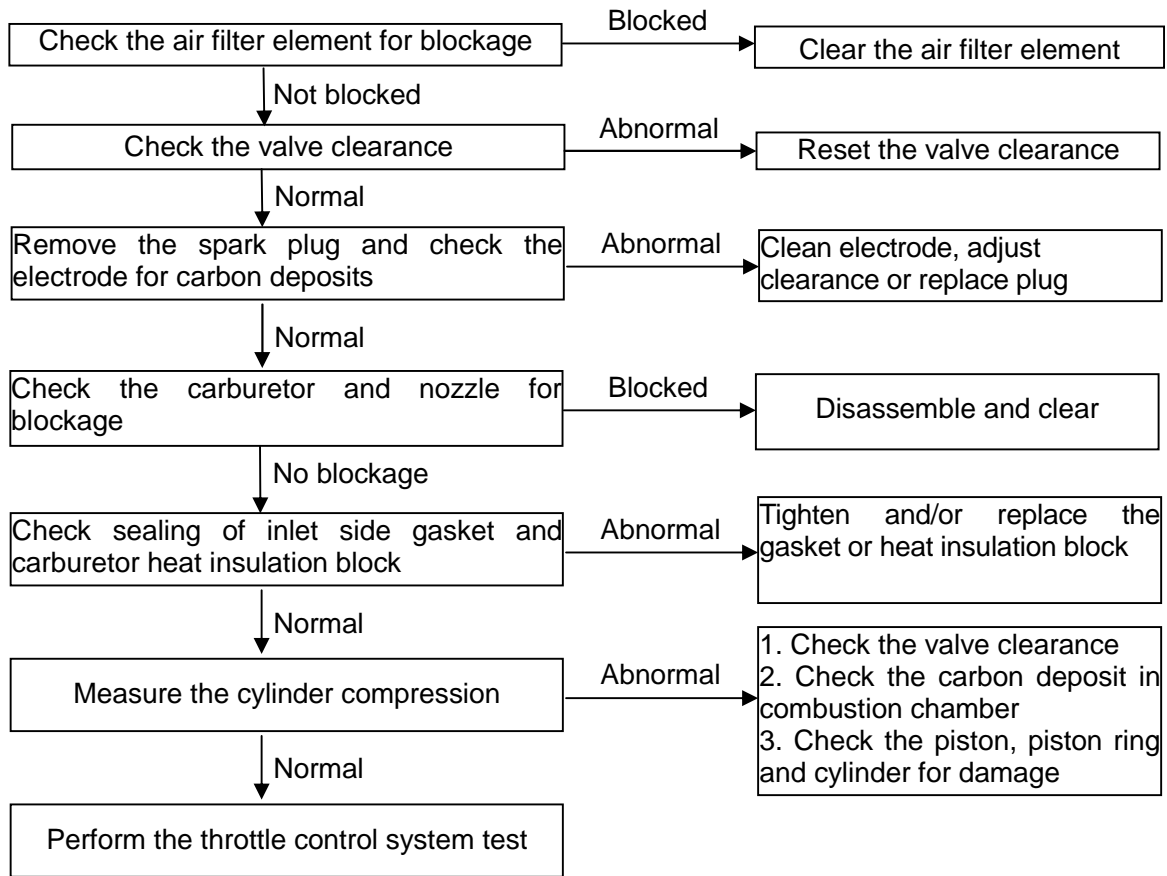
### 3.3 Defective oil alarm switch (Engine oil level is low, but engine does not stop)



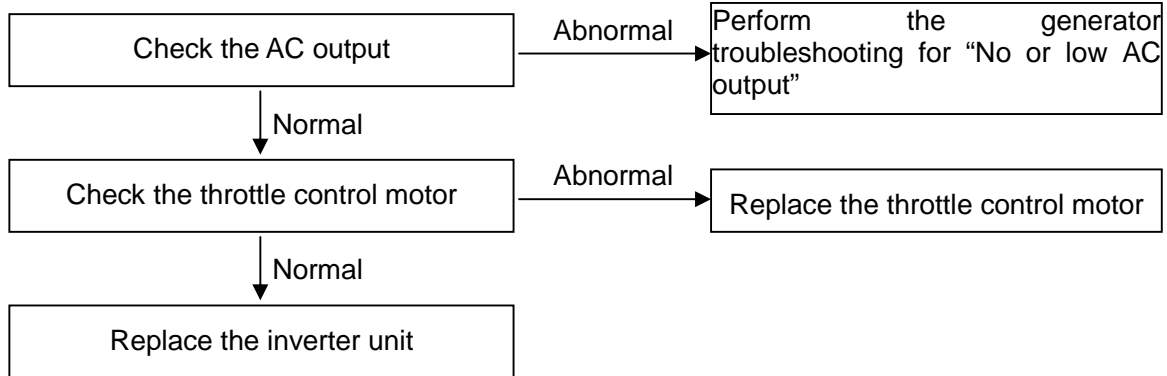
### 3.4 Engine stops running (Throttle is in the correct position)



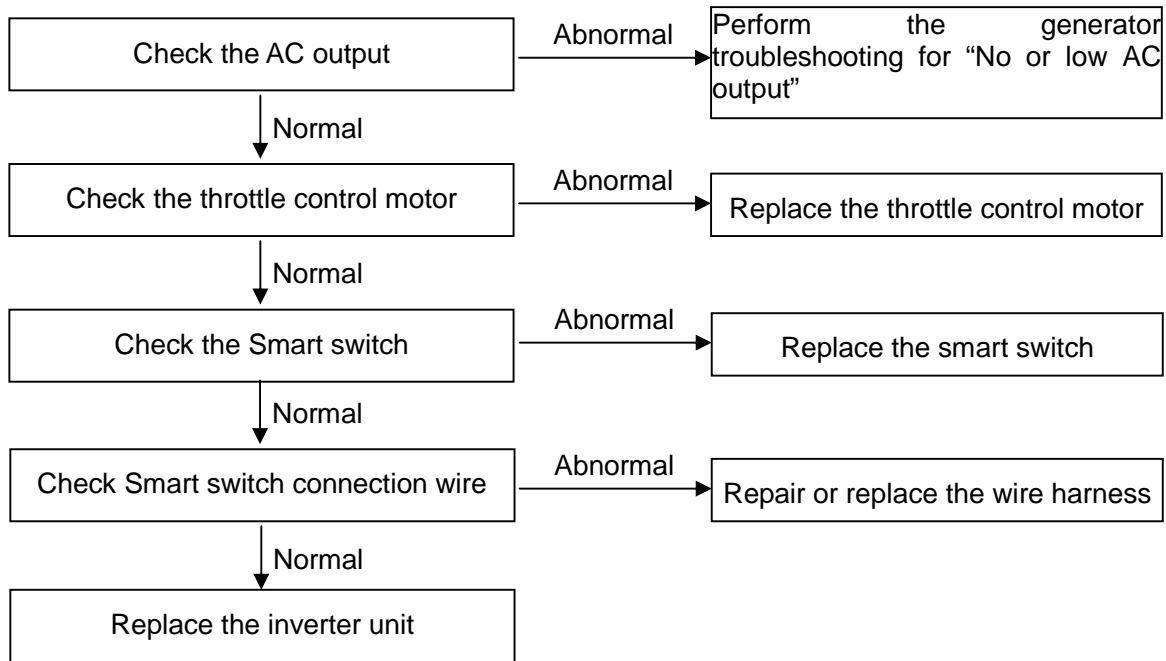
### 3.5 Engine speed can't increase or is unstable (choke is at the correct position)



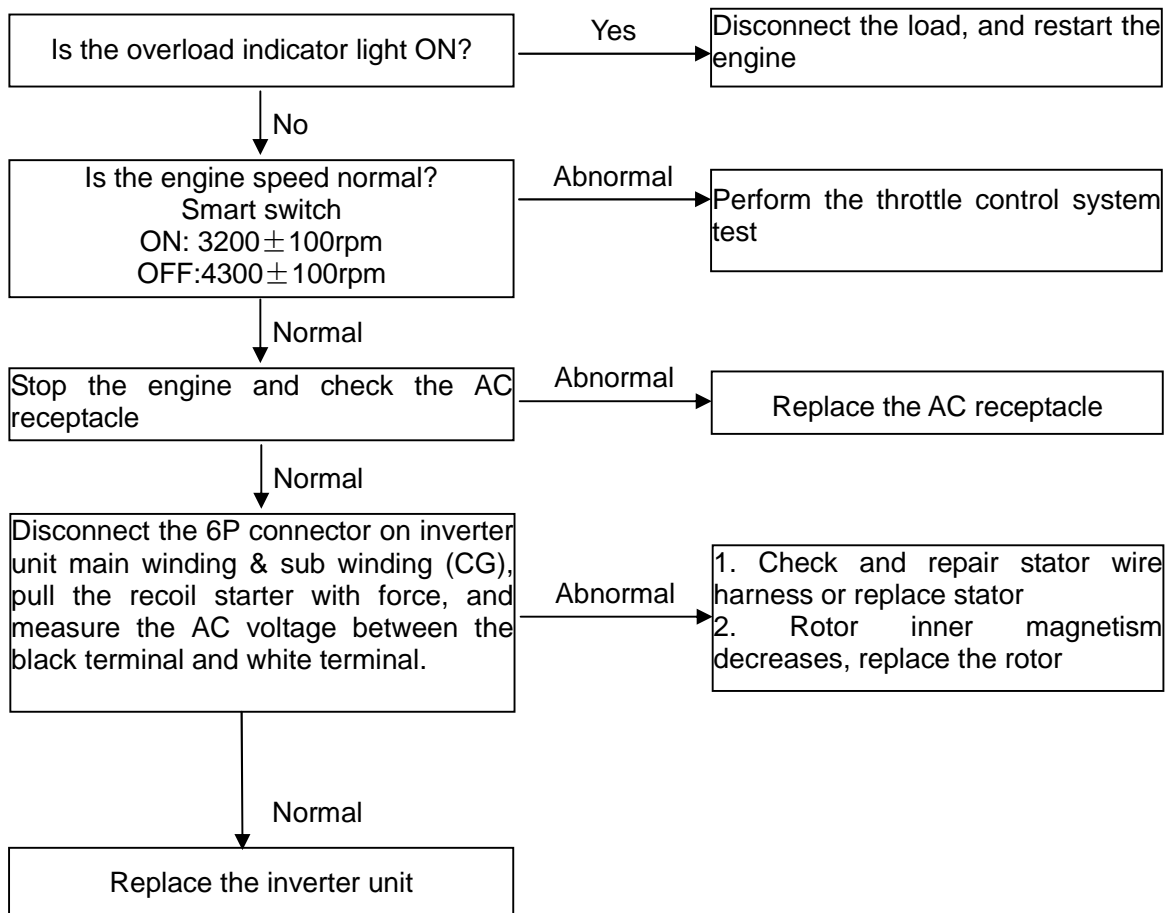
### 3.6 Engine speed too high or too low

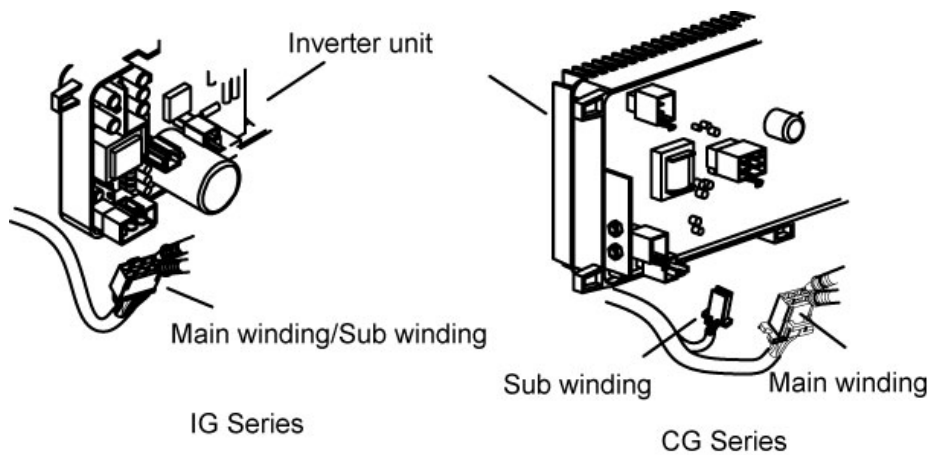


**3.7 Smart throttle doesn't work with zero load, engine speed doesn't increase with Smart throttle on and load connected.**



**3.8 No or low AC output (Inverter models)**

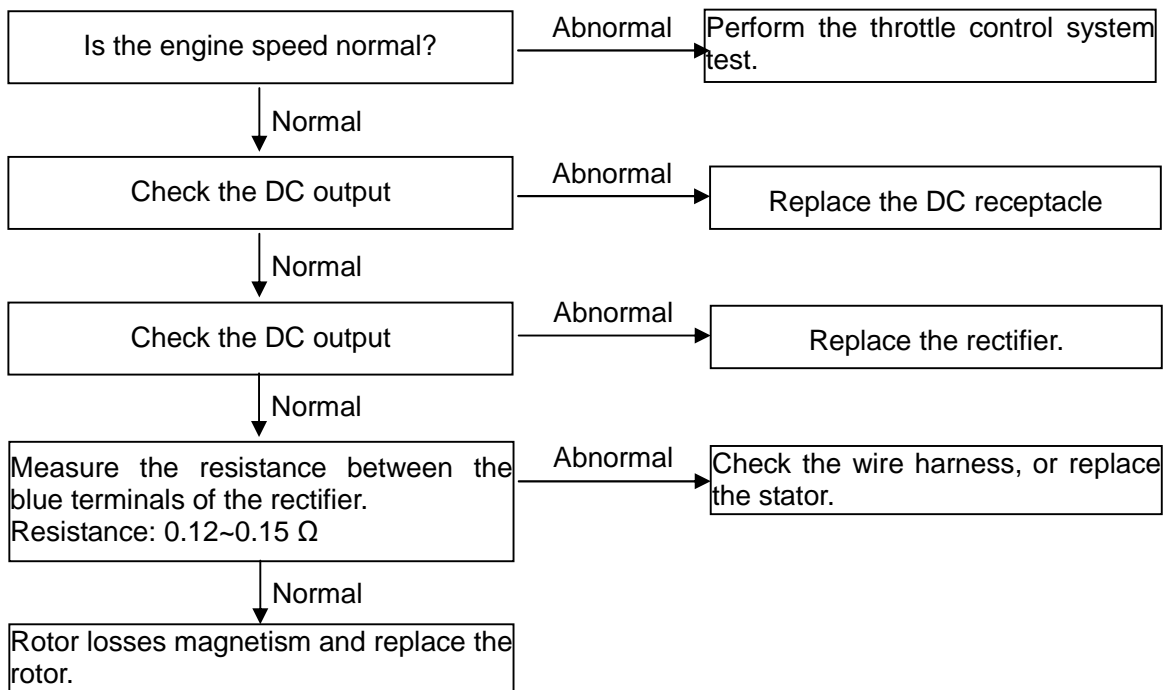


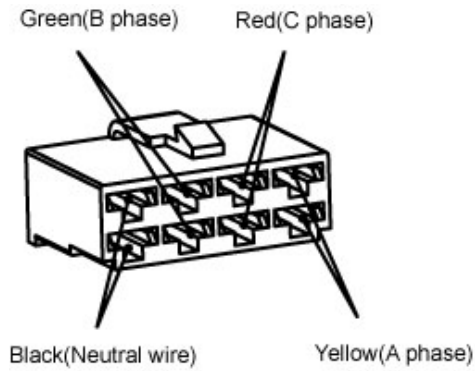


### Measure voltage

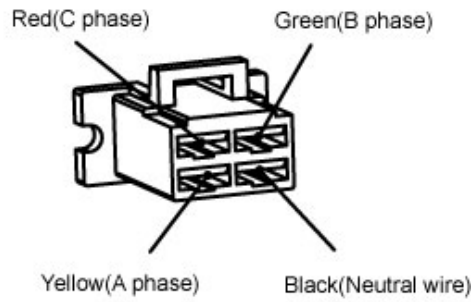
Model Item	IG series	CG series
		Phase wire color: Black-Black-Black Sub winding color: White-White
	120V	120V
Voltage between phase wires	>30V	>15V
Sub winding voltage	>1V	

### 3.9 No AC output (CG series)



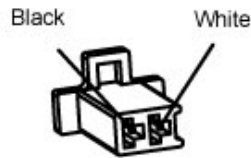


Engine type 120V



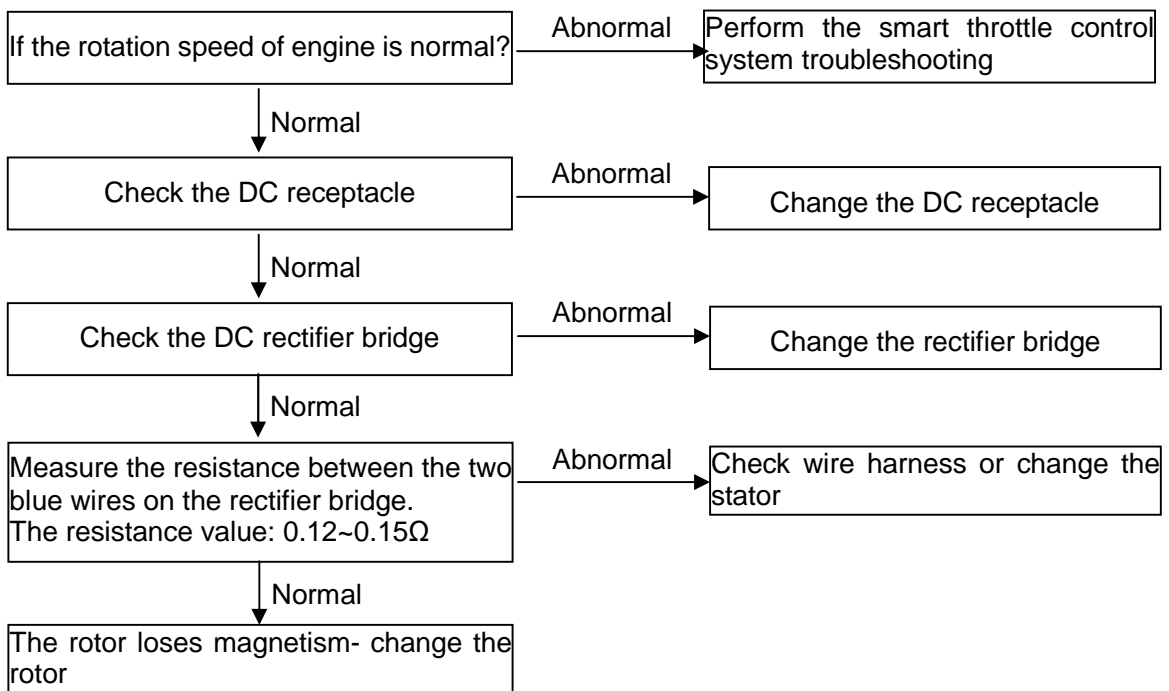
Engine type 230V/240V

Main winding phase sequence array



Sub winding

### 3.10 No DC output

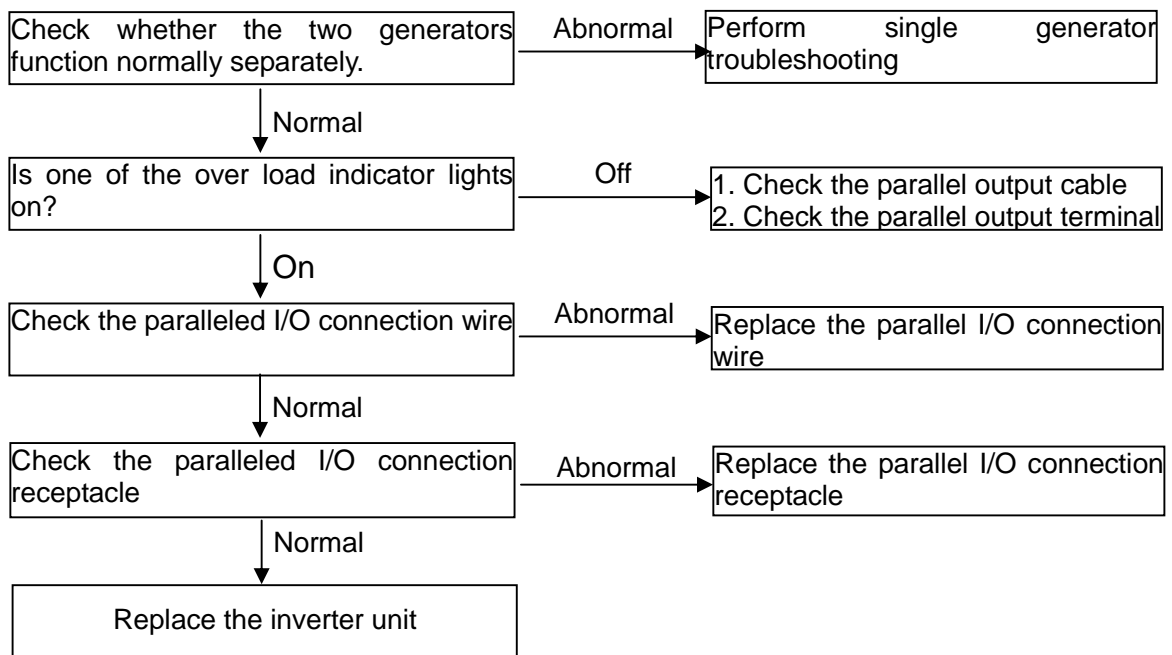


### 3.11 No parallel output

- Make sure that the two PARALLEL I/O connectors are connected correctly with the parallel cable.
- Make sure that the PARALLEL and OUTPUT connectors are inserted into the parallel cable and connected correctly.



- The parallel cable is only used for 2 generators of the same model. It can't be used for 3 or more generators.
- Use only a KIPOR parallel output cable and communication wire.  
Use the receptacle output of parallel cable box; don't use the receptacle of control panel.
- Do not disconnect the PARALLEL I/O connection cable and parallel output cable during parallel operation. Connect the PARALLEL I/O connection cable and parallel output cable before starting the engine. Don't disconnect the PARALLEL I/O connection cable and parallel output cable until operation has ceased.
- Do not use the output of one generator after stopping the other generator while the parallel cable is still connected.



## 4. Maintenance

### 4.1 Maintenance schedule

Regular service period*		Each use	First month or 20 Hrs.	Every 3 months or 50Hrs.	Every 6 months or 100 Hrs.	Every year or 300 Hrs.
Item perform at every indicated month or operating hour interval, whichever comes first						
Engine Oil	Check	●				
	Replace		●		●	
Air filter	Check	●				
	Clean			●**		
Spark plug	Clean-Adjust				●	
Spark arrestor	Clean-Adjust				●	
Valve clearance	Check-Adjust					●***
Fuel tank and filter	Clean					●***
Fuel line	Check	Every 2 year (Replace if necessary)				

Note:

\* For commercial use, operation hours are determined by proper maintenance.

\*\* Service more frequently when operating in dirty or dusty conditions

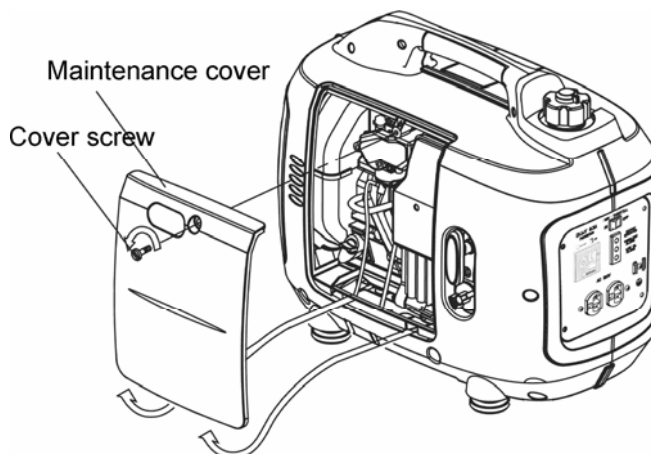
\*\*\* Service by authorized Kipor service personnel.

### 4.2 Engine oil

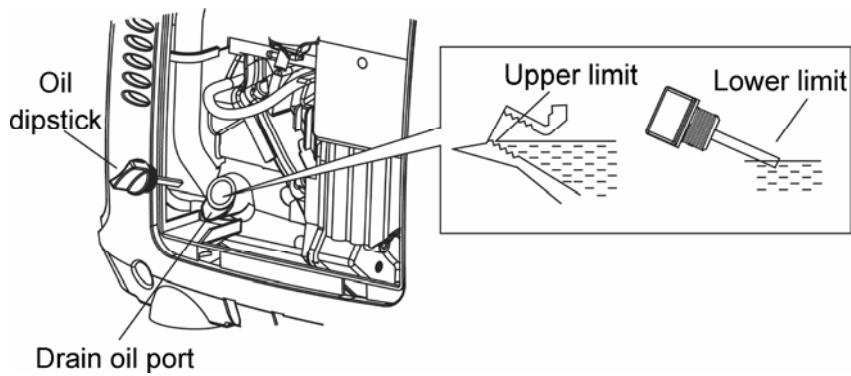
#### ■ Checking oil level

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

1. Loosen the screws of the maintenance cover and remove the cover.
2. Remove the oil filler cap and check for the oil level.





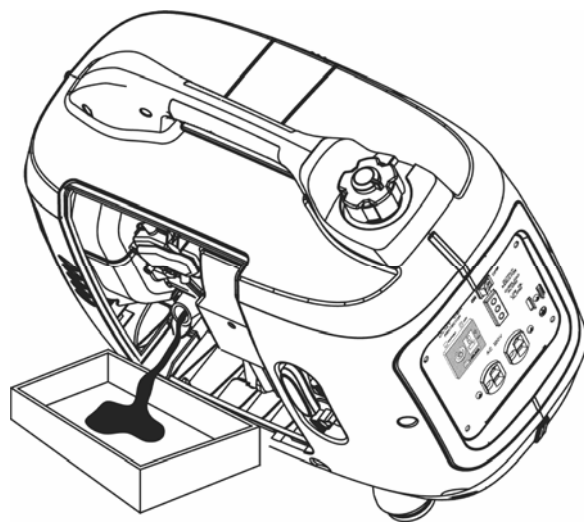


3. If the oil level is low, add to the edge of the oil filler port.

### ■ Replace the engine oil

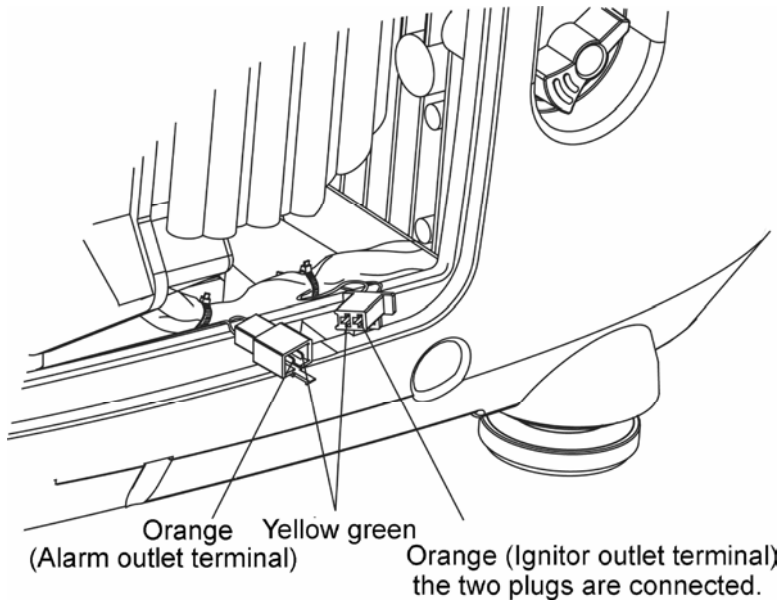
1. Remove the oil dipstick and oil drain bolt and drain out dirty oil.
2. Resecure the oil drain bolt tightly.
3. Refill with clean oil of the proper viscosity .
4. Check the oil level.
5. Tighten the oil dipstick.

■ Drain the used oil while the engine is warm. Warm oil drains quickly and completely. Be careful to avoid burns from hot oil.

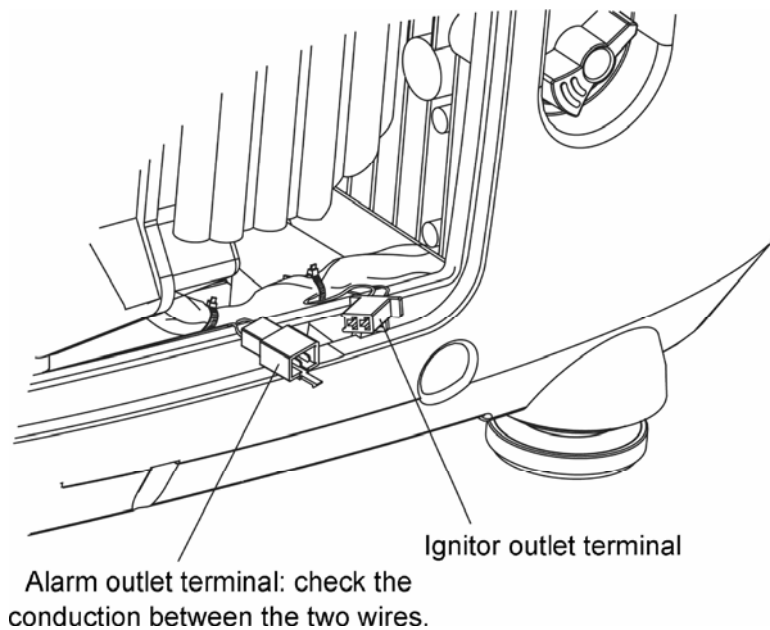


### 4.3 Checking low oil alarm

1. Disconnect oil alarm connector when the engine is still running, connect the two plugs, and be sure that oil alarm lights and engine stops.



2. Stop the engine, disconnect the oil alarm connector, check the connector continuity. No continuity is normal.



3. Drain the oil from the engine and check the continuity. Continuity is normal.

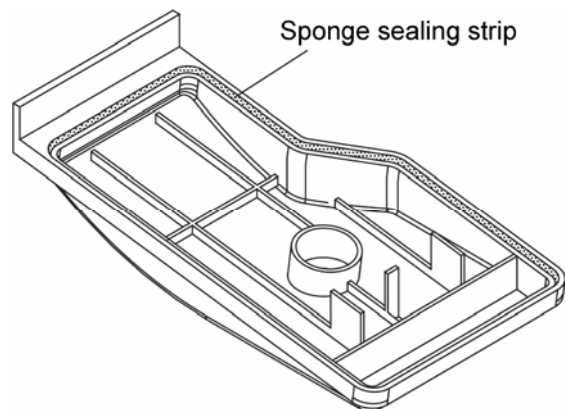
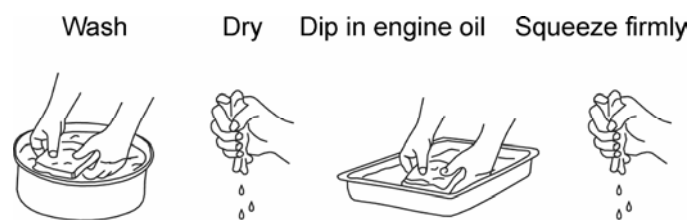
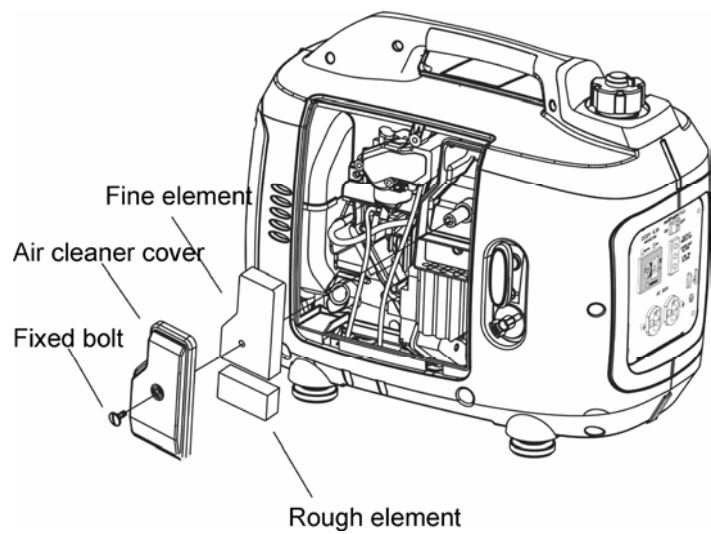
#### 4.4 Air cleaner

##### Inspection/Cleaning:

- 1) Loosen the cover screw and remove the maintenance cover.
- 2) Disengage the locking tab and remove the air cleaner cover.
- 3) Remove the elements from the air cleaner case.
- 4) Clean the elements in warm soapy water, rinse and allow to dry thoroughly.
- 5) Dip the elements in clean engine oil and squeeze out all the excess oil.

Excess oil will restrict air flow through the foam elements and smoking at engine start may result

- 6) Install the air cleaner element in the air cleaner case.
- 7) Install the air cleaner cover. Be sure that the air cleaner cover seals securely.
- 7) Reinstall the maintenance cover.



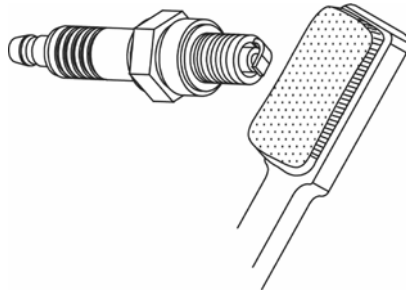
## Caution

- A dirty air cleaner will restrict air flow to the carburetor, reducing engine performance. If the engine is operated in dusty areas, clean the air cleaner more often than specified in the Maintenance Schedule.
- Never run the engine with no element or if the element is damaged. Serious engine damage will result.

### 4.5 Spark plug

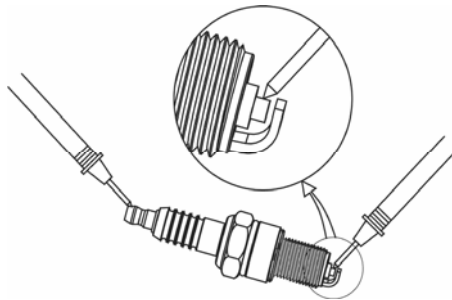
#### Inspection/Cleaning:

- 1) Remove the spark plug cap and remove the spark plug.
- 2) Remove carbon or other deposits with a plug cleaner or stiff wire brush. Check the sealing washer for damage.



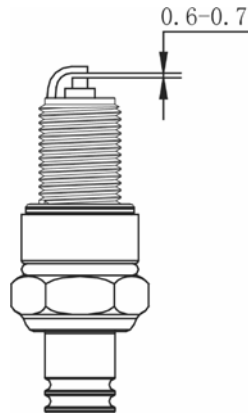
- 3) Measure the plug resistance; replace the spark plug if the value is not within limits.

Spark plug resistance	3~9K $\Omega$
-----------------------	---------------



- 4) Measure the plug gap with a feeler gauge. Adjust by bending the side electrode to achieve the specified value.

Spark plug clearance	.0024-.0030 in. (0.6~0.7 mm)
Standard spark plug	UR5



5). Install the plug finger tight to seat the washer, and then tighten with a plug wrench.

Torque valve is 8.85~11.1 ft lbs (12~15 N.m)

#### 4.6 Valve clearance

##### **Caution**

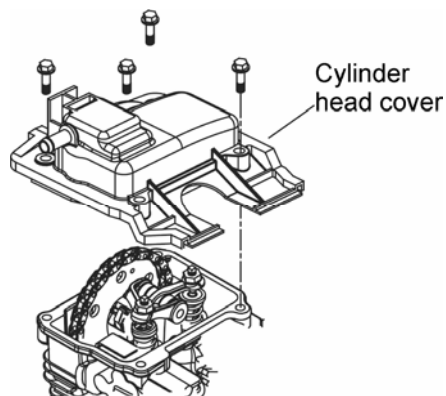
- Valve clearance inspection and adjustment must be performed with the engine cold.

##### **Inspection/Adjustment:**

1) Remove the following parts:

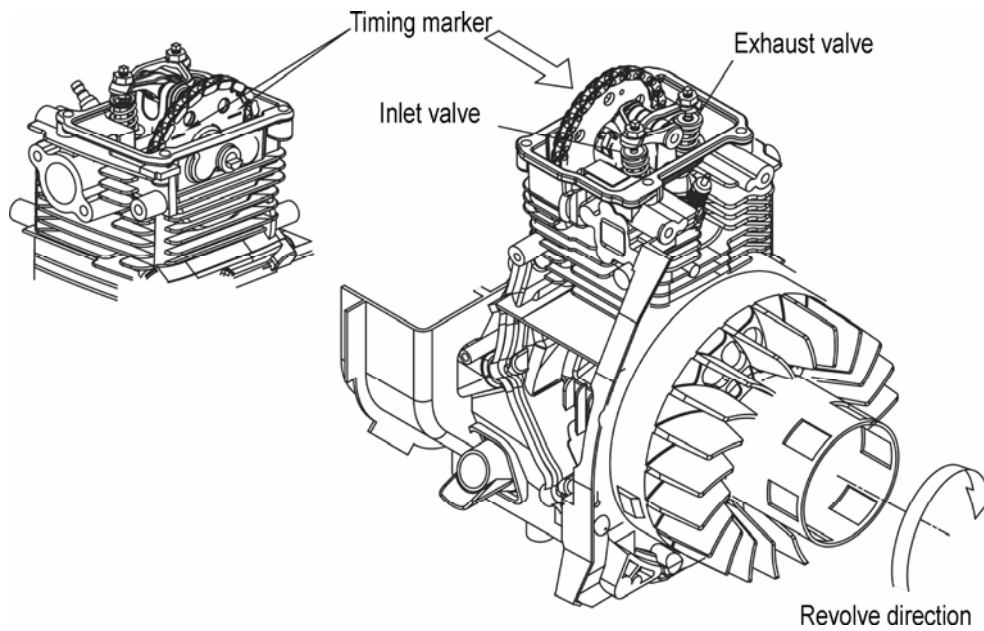
- Front cover, control panel
- Rear cover
- Right/left side covers
- Fuel tank
- Inverter unit, engine bed
- Recoil starter, fan cover
- Inlet/Exhaust side baffle

2) Remove the four bolts and disassemble the cylinder cover. Don't remove the cylinder cover with excessive force.



3) Turn the rotor to set the piston at top dead center of the compression stroke.

Timing line of camshaft driving chain should align with the cylinder head seal; check whether the intake and exhaust valves are closed.



**Caution**

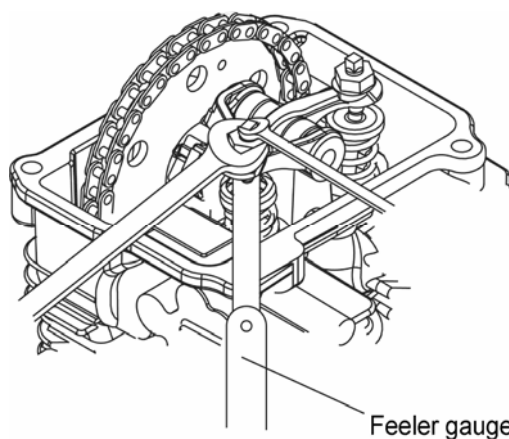
■ If the inlet valve is on, turn the rotor again to align the timing line with the cylinder head seal, and both the inlet and exhaust valve should be closed.

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

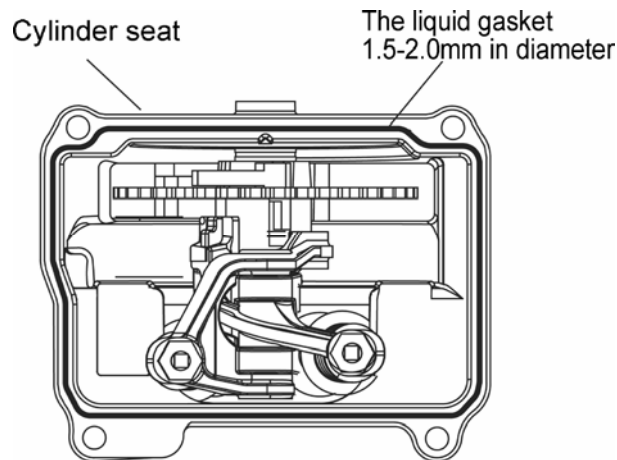
Valve clearance	IN	0.10±0.02mm
	EX	0.15±0.02mm

5) If adjustment is necessary, proceed as follows.

- a. Loosen the adjusting screw lock nut and adjust the valve clearance by turning the adjusting screw in or out.
- b. Secure the adjusting screw with a socket wrench and tighten the lock nut to the specified torque.
- c. After tightening the lock nut, check the valve clearance again.



6) Clean the liquid gasket of the cylinder block and cylinder head cover. Apply the liquid gasket (Three Bond 1207B or equivalent) to the cylinder block installation surface as shown.



7) Reassemble all parts in the reverse order of removal.

#### 4.7 Fuel tank/Fuel filter

##### **Caution**

■ Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Keep heat, sparks, and flame away. Wipe up spills immediately.

##### **Cleaning:**

1) Drain the fuel from the tank and carburetor, and then remove the following parts.

—Rear cover

—Front cover and control panel

—Right/Left side cover

2) Disconnect the fuel tube from the fuel tank, and remove the fuel filter.

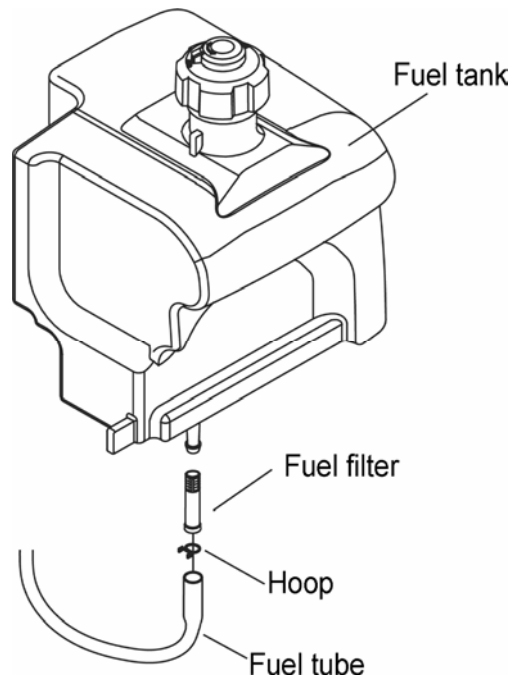
3) Remove the clogged foreign material from the fuel filter, and check the fuel filter for damage. Replace the fuel filter if necessary.

4) Remove the fuel tank and clean it with solvent and allow the fuel tank to dry thoroughly.

5) After cleaning, install the fuel tank and set the fuel filter in the tank. Connect the fuel tube.

6) Install the removed parts in the reverse order of removal.

7) Fill the fuel tank with gasoline and check the fuel tube for leakage.



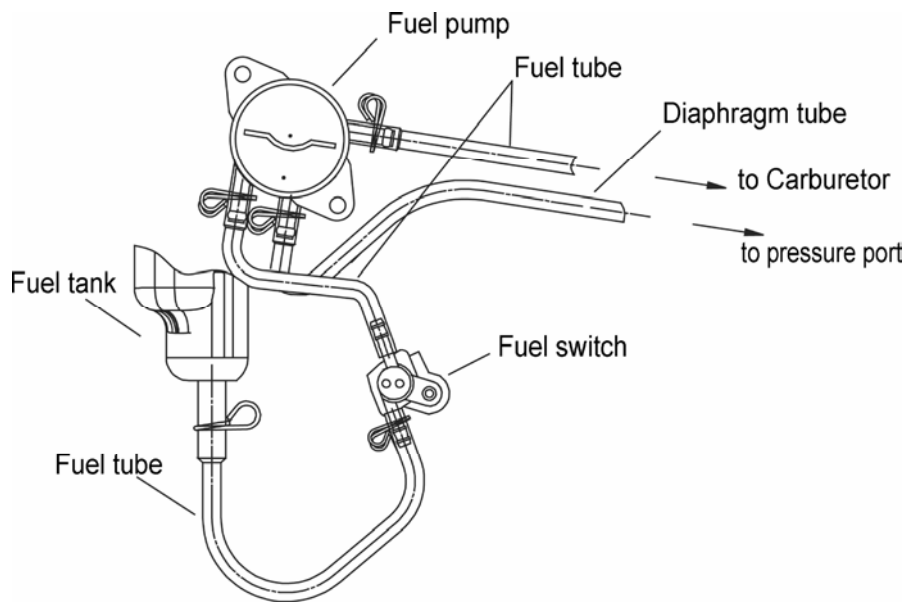
#### 4.8 Fuel tube/ Fuel pump

##### **Caution**

■ Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Keep heat, sparks, and flame away. Wipe up spills immediately.

- 1) Drain the fuel from the tank and carburetor, and then remove the following parts.
  - Rear cover
  - Front cover and control panel
  - Right/Left side cover
- 2) Check the fuel tube for deterioration, cracks and gasoline leakage. If there is any abnormality in the fuel line, replace it.
- 3) Check the diaphragm tube for deterioration, cracks and oil leakage. If there is any abnormality in the diaphragm tube, replace the tube.
- 4) Check to see whether water or foreign material has been accumulated in the fuel pump.  
If there is water or foreign material in the pump, replace the fuel pump.
- 5) Check the fuel switch and fuel duct, blow away the foreign matter with high compressed air with the fuel switch turned on.
- 6) After assembly, check for gasoline leakage from each part.





#### 4.9 Spark arrestor

##### **Caution**

■ Do any spark arrestor maintenance after the engine has cooled completely.

- (1) Remove the rear cover
- (2) Disassemble the spark arrestor from muffler
- (3) Remove the carbon from the spark arrestor steel net, check for damage, and replace if necessary.
- (4) Reinstall the parts in the reverse order of removal.



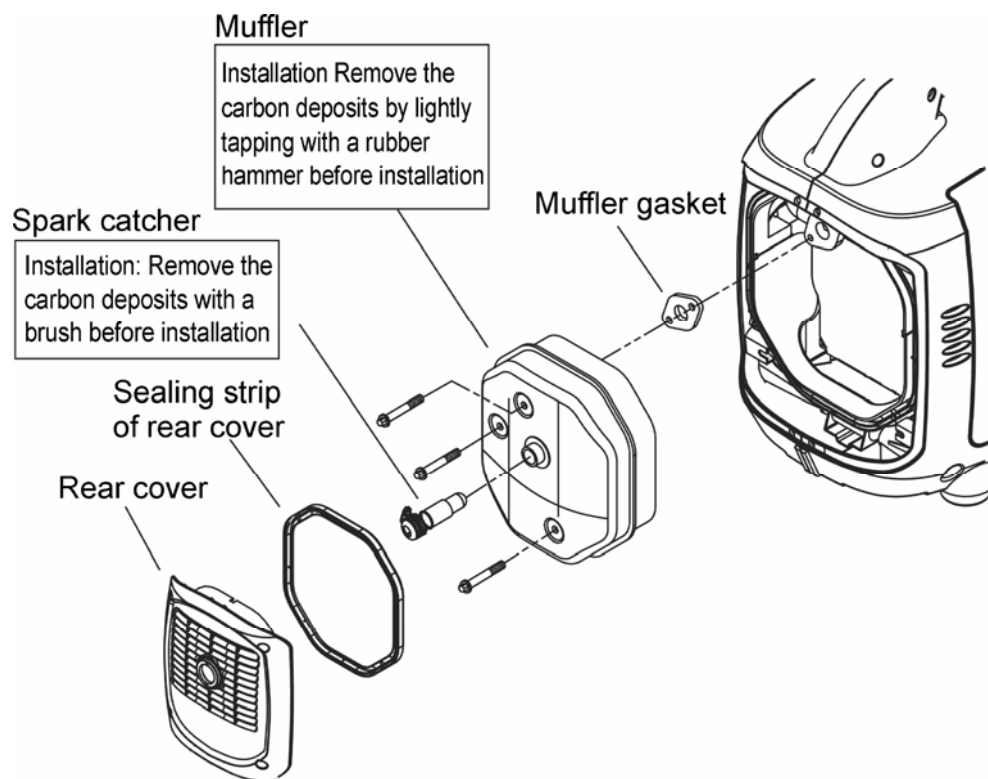
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## 5. Muffler

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### Caution

- Muffler removal/installation must be performed with the engine cold.
- Disassembly/Reassembly



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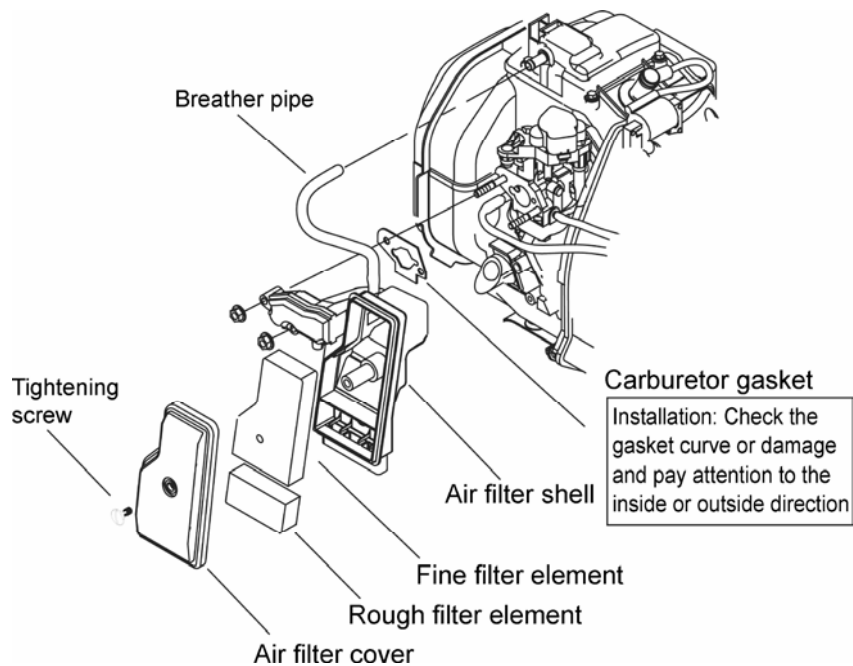
## 6. Air filter/Carburetor

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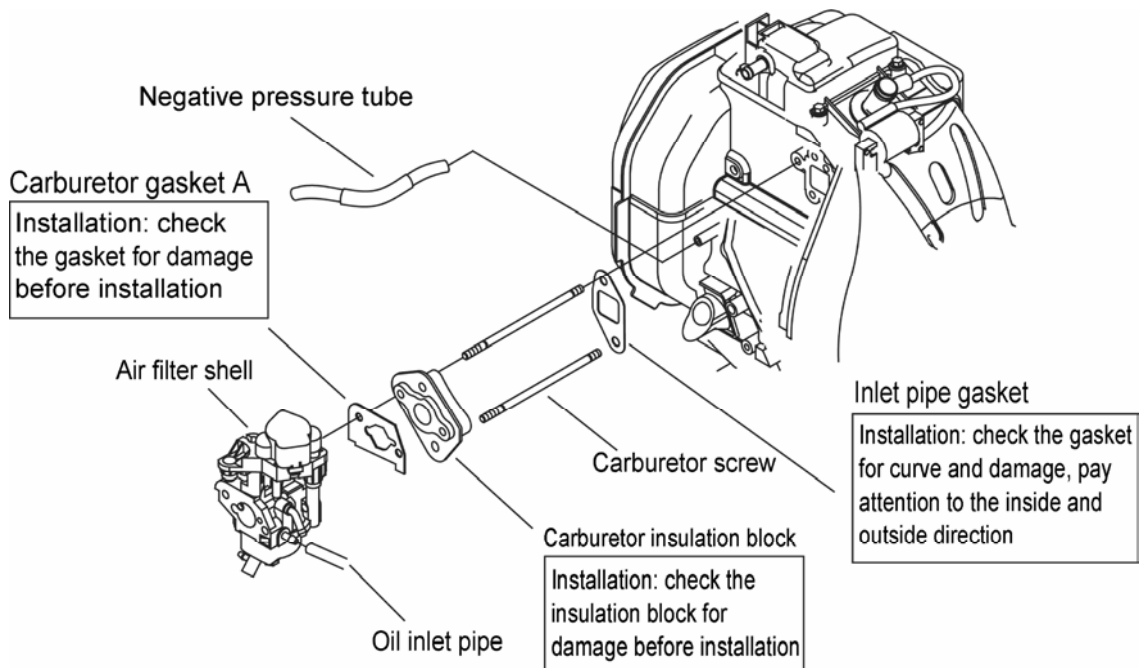
### Caution

- Loosen the drain oil bolt and drain out fuel before disassembly.
- Keep heat, flame and sparks away.

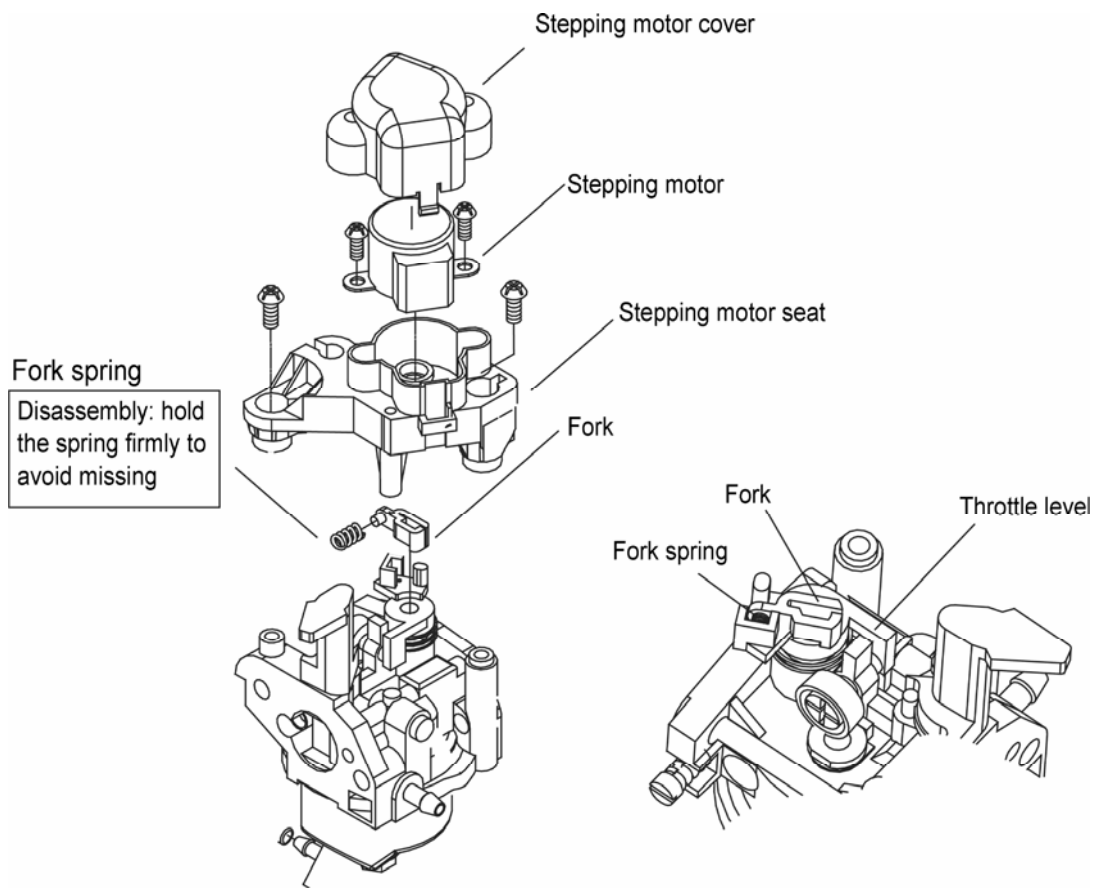
### 6.1 Disassembly/Installation of Air filter



### 6.2 Disassembly/Installation of Carburetor

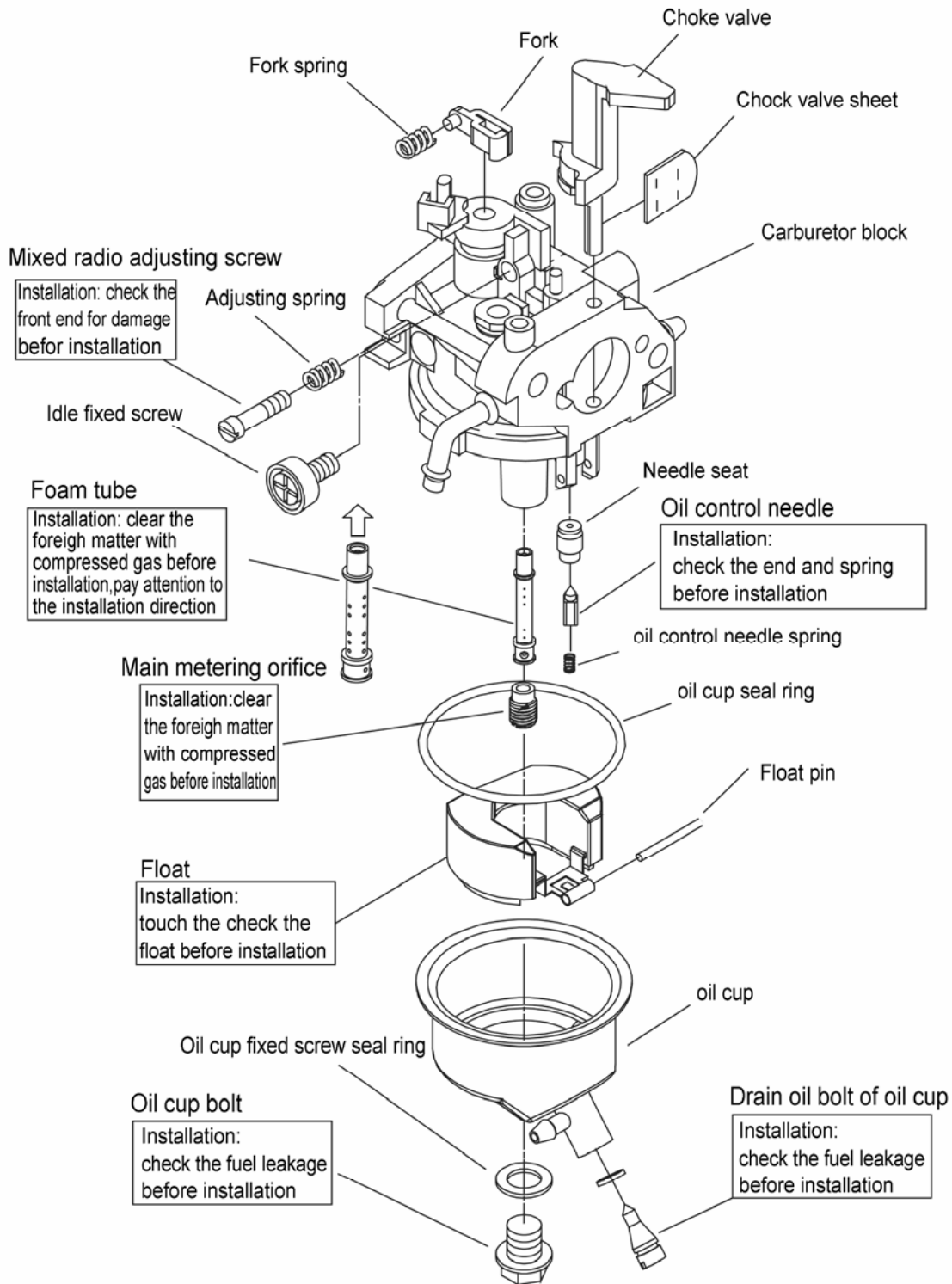


● Disassembly/Installation of Stepping motor



● **Disassembly/Installation of Carburetor**

**NOTE:** With the exception of changing the main jet, no adjustments, modifications, or other maintenance is permitted on EPA and CARB certified engines. This includes any Kipor generator ever sold in North America. This drawing is for information only. Neither Kipor nor The Coast Distribution System will supply any carburetor parts other than main jets.



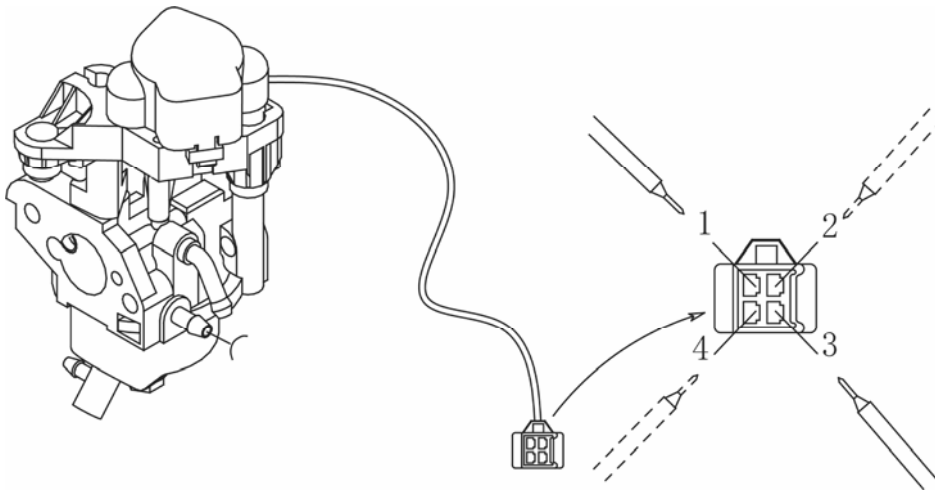
### 6.3 Inspection

- Stepping motor

Measure the resistance of stepping motor lead-out wire.

Standard resistance	Between 1 and 3: 45~55Ω
	Between 2 and 4: 45~55Ω

Replace the stepping motor if the resistance exceeds the above range.

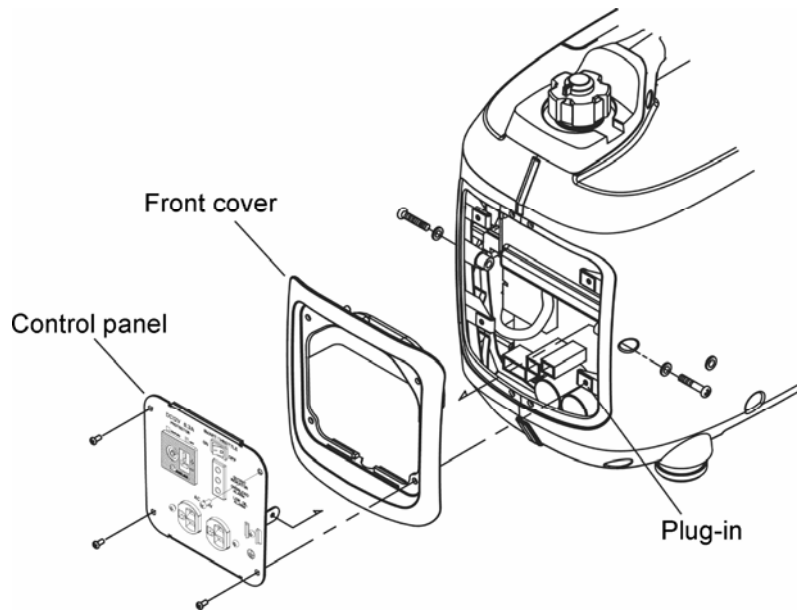


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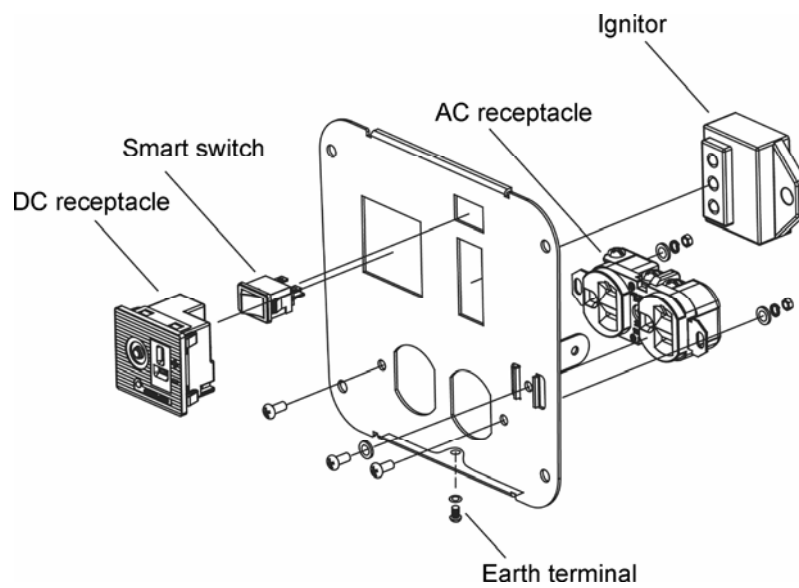
## 7. Control panel

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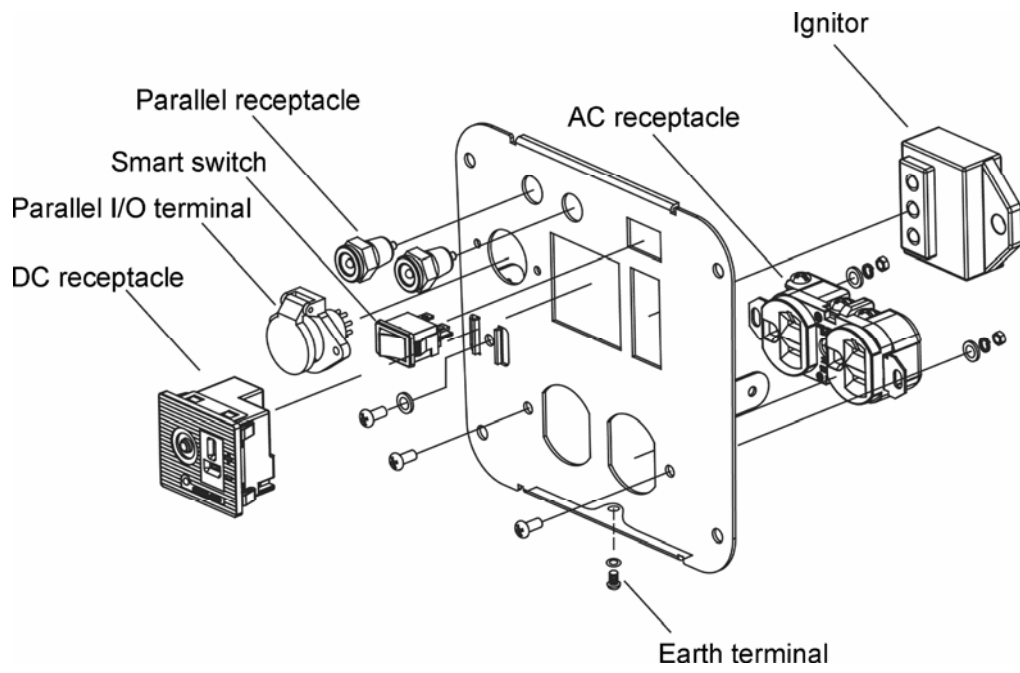
### 7.1 Removal/Installation



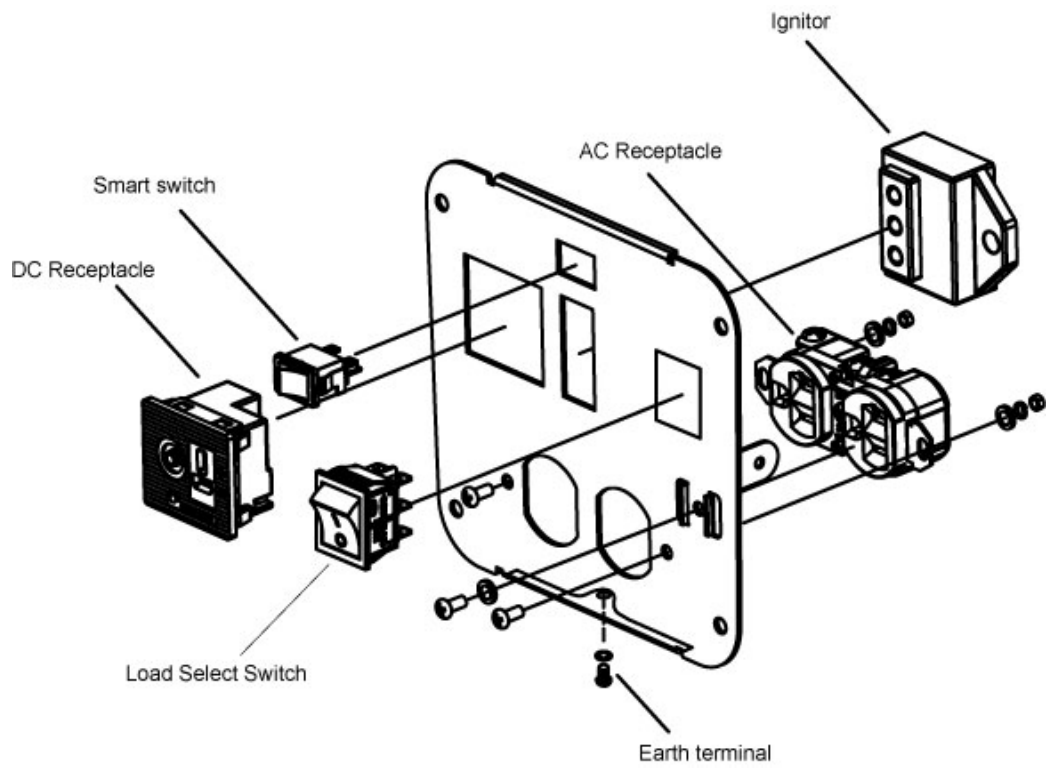
#### ● IG2000



● IG2000P



● CG2000





## 7.2 Inspection

### a. Control panel

#### ● AC receptacle

Check the electrode contact disk inside receptacle, if it is burnt replace it.

#### ● DC receptacle

Connect both terminals of the receptacle with a jumper wire to short. There must be continuity between the lead wire terminals with the circuit protector ON. Replace the DC receptacle if there is no continuity.

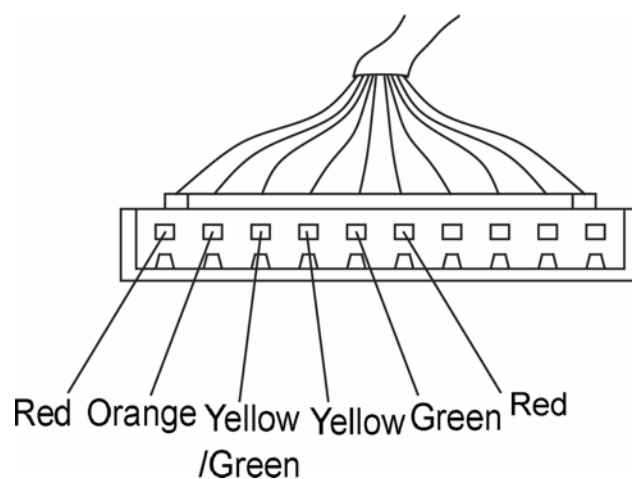
#### ● Smart switch/LOAD SELECT Switch (CG series)

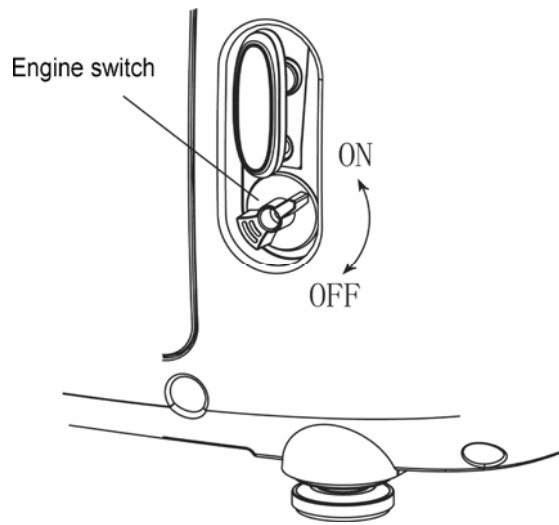
There should be continuity with the switch ON, and no continuity with the switch OFF.

#### ● Ignition Module

Pull off the 10P receptacle from module, measure the resistance by connecting one testing pen with the metal outer case of engine, and the other testing pen with the 10P connector.

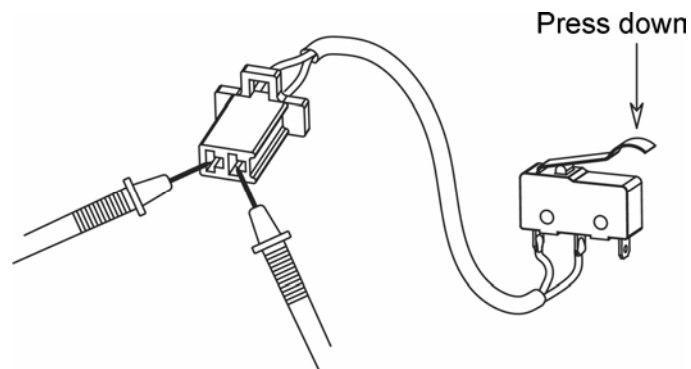
Color	Circuit unit	Standard resistance
Blue	Primary coil of the ignition coil	0.8-1.3Ω
Orange	Oil level alarm	There should be no continuity with correct oil level
Yellow	Trigger coil	80-130Ω
Yellow/Green	Ground wire	Continuity
Green	Ignitor unit power coil winding	0.26-0.28Ω
Red	Engine switch	There should be no continuity with the switch ON, continuity with the switch OFF





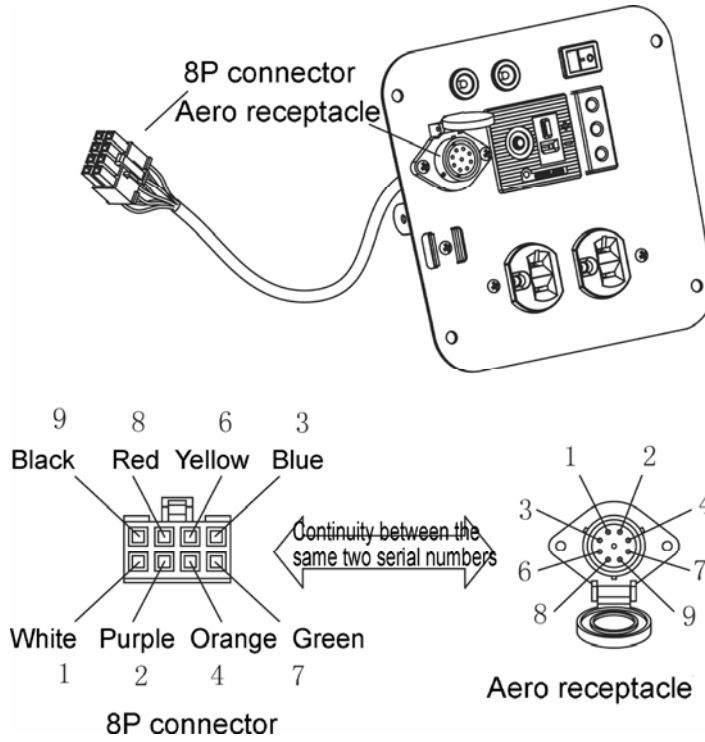
● **Engine switch**

Check the continuity of connector, there should be continuity if presses down the micro switch, otherwise, disconnect the switch.



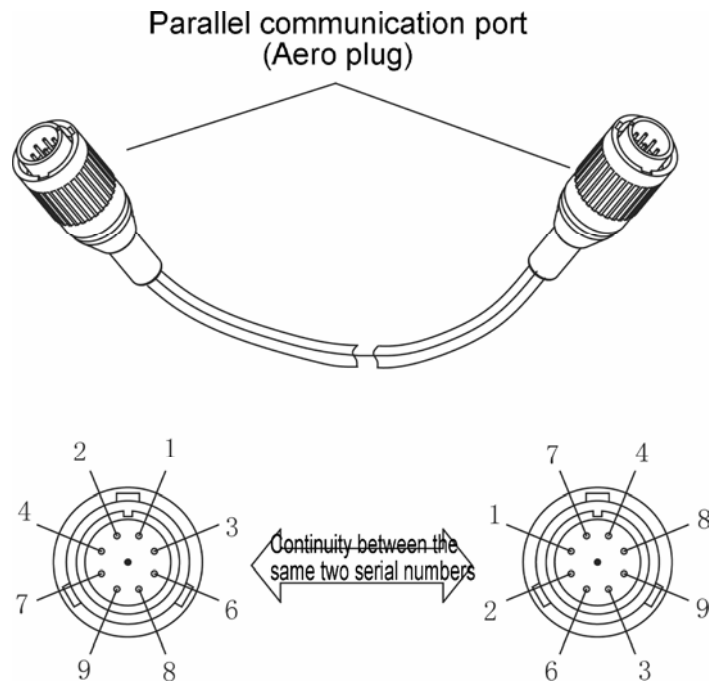
● **Aero receptacle (parallel I/O communication port)**

Check the continuity between connector and aero receptacle, there should be continuity between the two terminals with the same serial number.



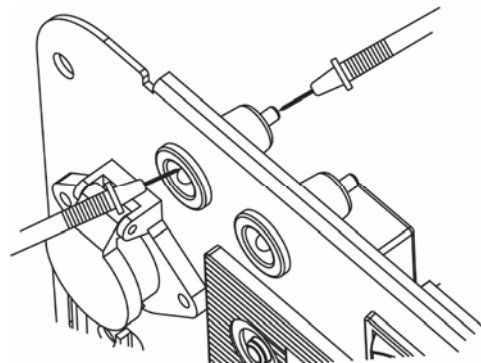
● **Aero plug (Parallel I/O communication data wire)**

Check the continuity of aero plugs, there should be continuity between two plugs with the same serial numbers.



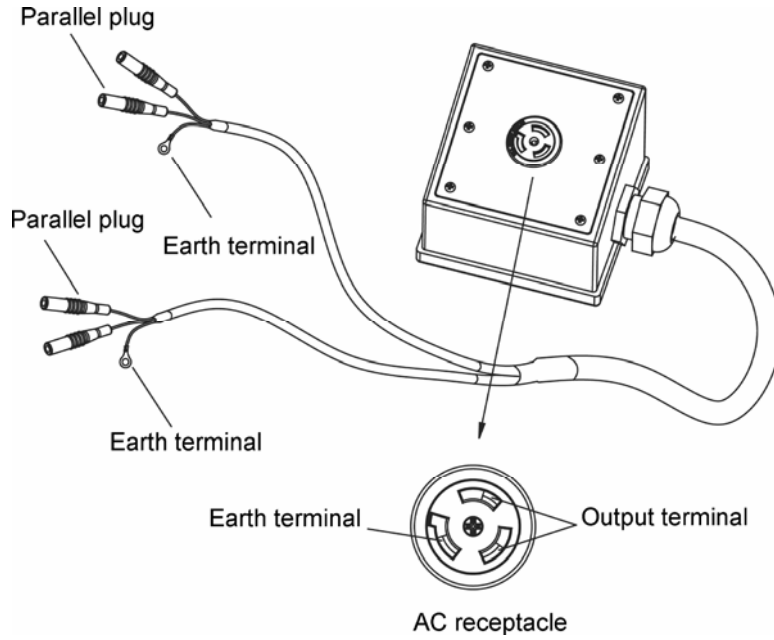
● **Parallel output receptacle**

Check the continuity between the two terminals of parallel output receptacle.



● **Parallel output cable**

1. Check the AC receptacle output terminal, there should be no continuity between two terminals.
2. Connect the AC receptacle output terminal with one lead, check the parallel plug; there should be continuity among the four plugs.
3. There should be continuity between the cable earth terminal and AC receptacle earth terminal.



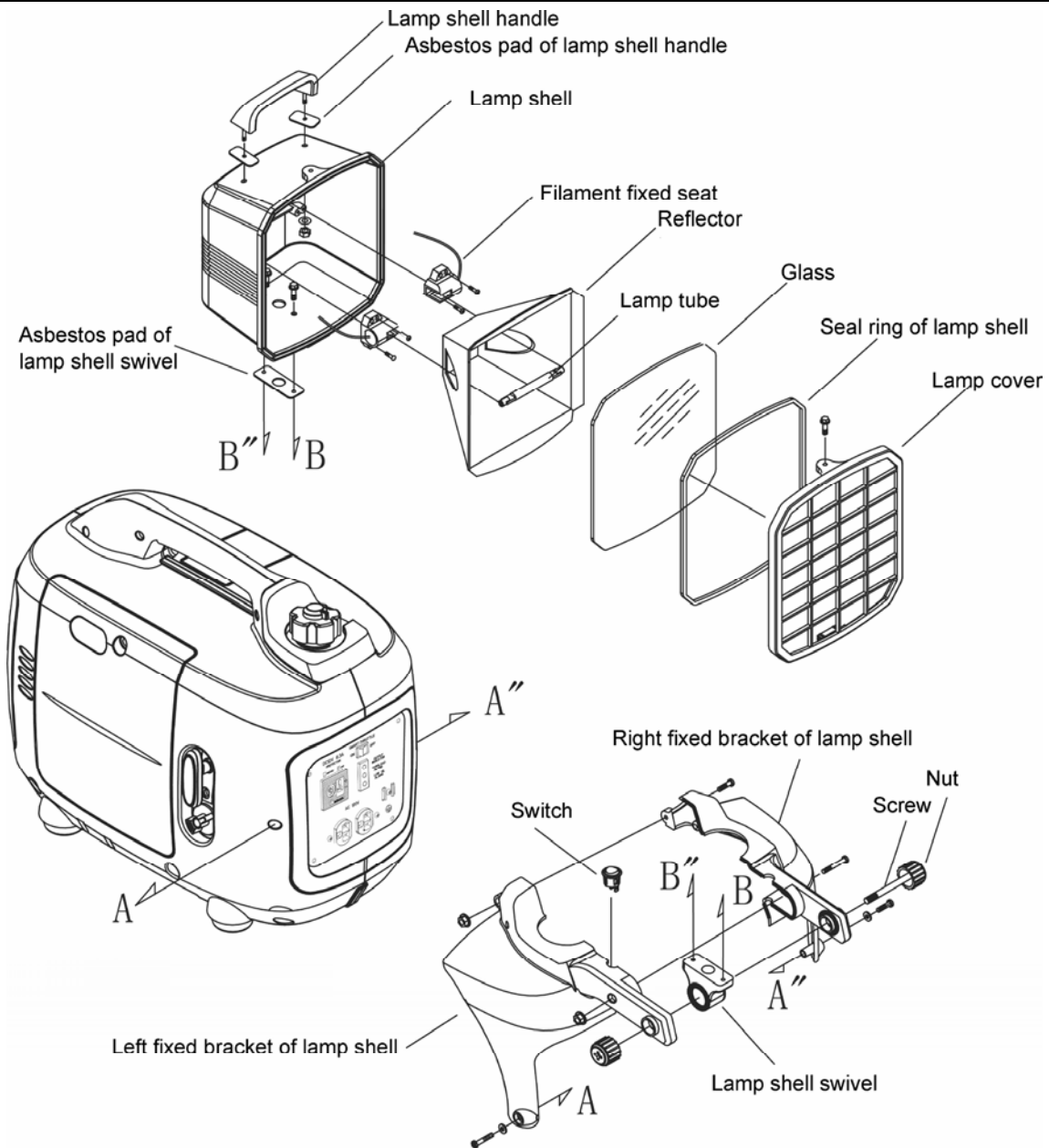
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## 8. Spotlight

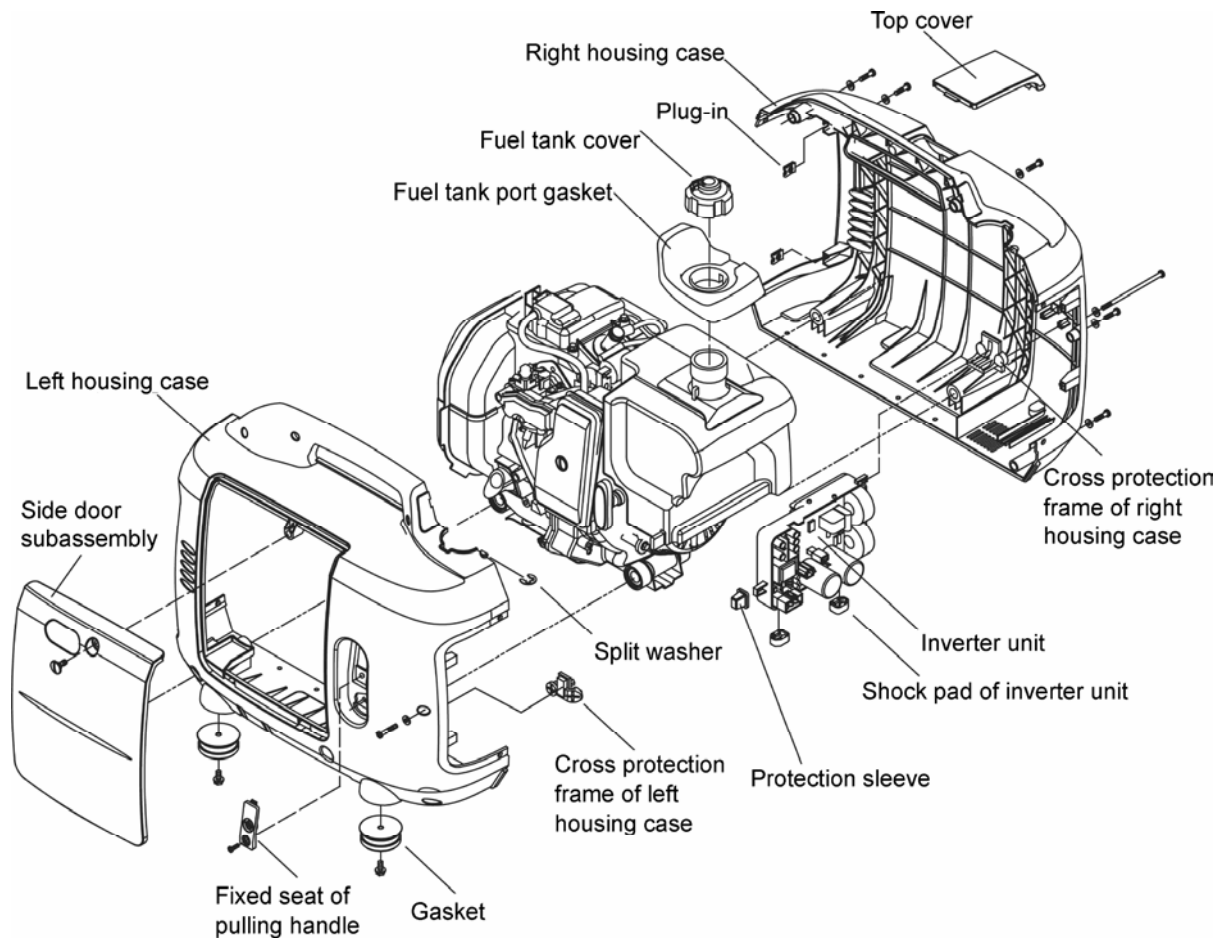
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### Caution

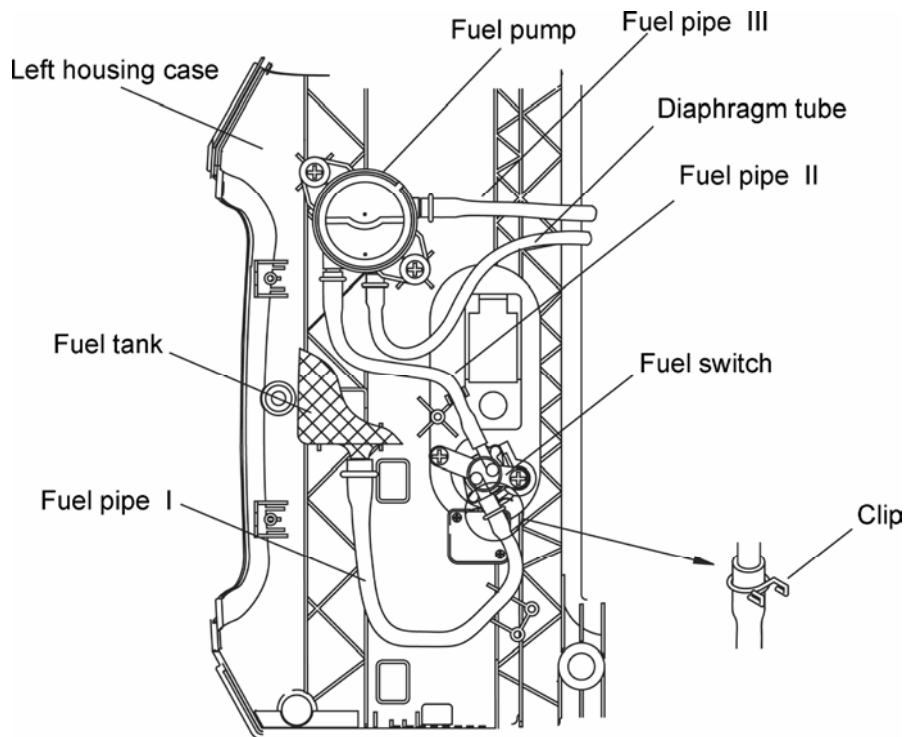
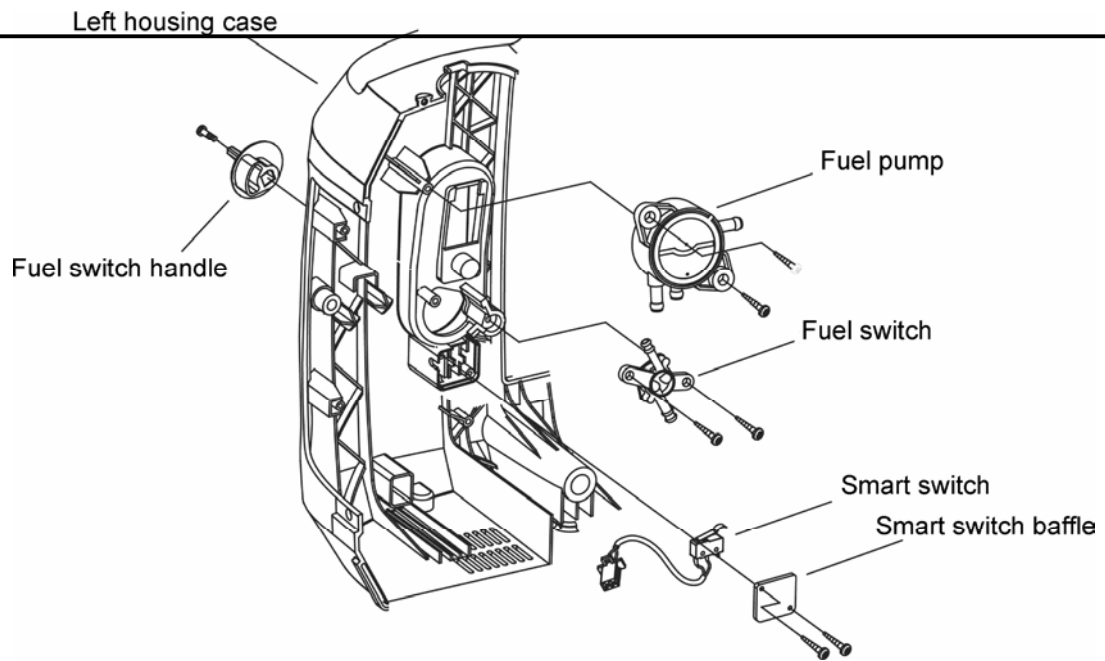
- Stop the engine and let the spotlight cool completely before disassembly.



## 9. Housing Assembly



● Left housing case

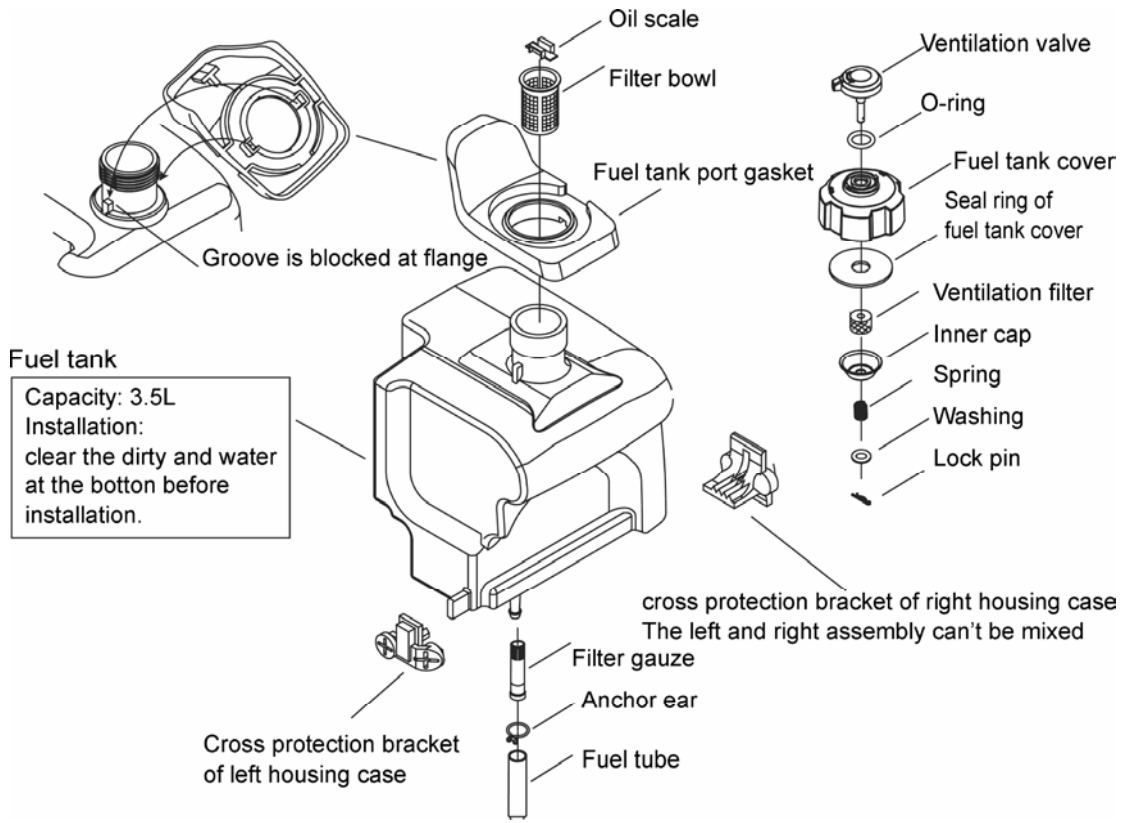




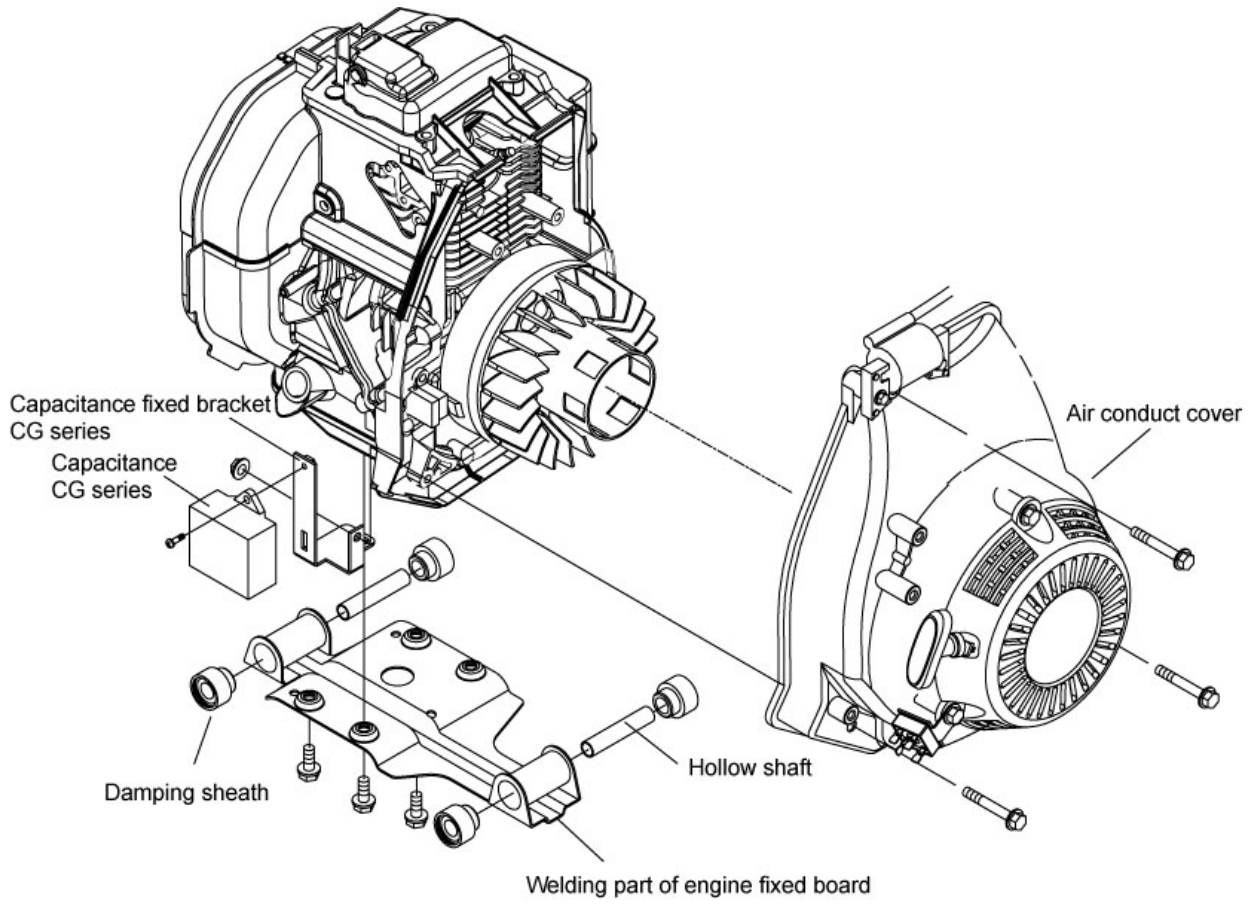
# 10. Fuel Tank

## Caution

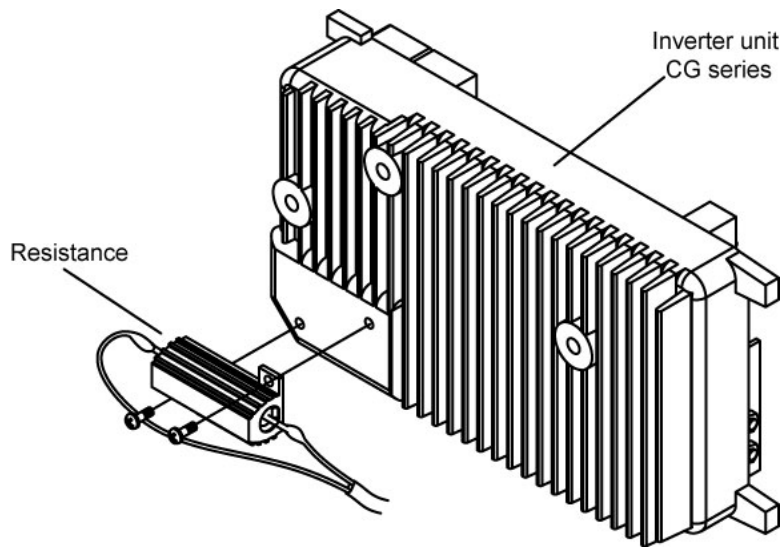
■ Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Keep heat, sparks, and flame away. Wipe up spills immediately. Loosen the drain screw to drain the carburetor thoroughly before removal.



## 11. Fan shield/Engine fixed plate



## 12. CG (Converter) Module



### Inspection

(1) Aluminum shell resistor (CG series)

Measure the resistance of aluminum shell resistor. Measuring error is  $\pm 5\%$ .

Model	120V	230V\240V
Resistance \consumption power	5 $\Omega$ 50W	10 $\Omega$ 50W



(2) Capacitor (CG series)

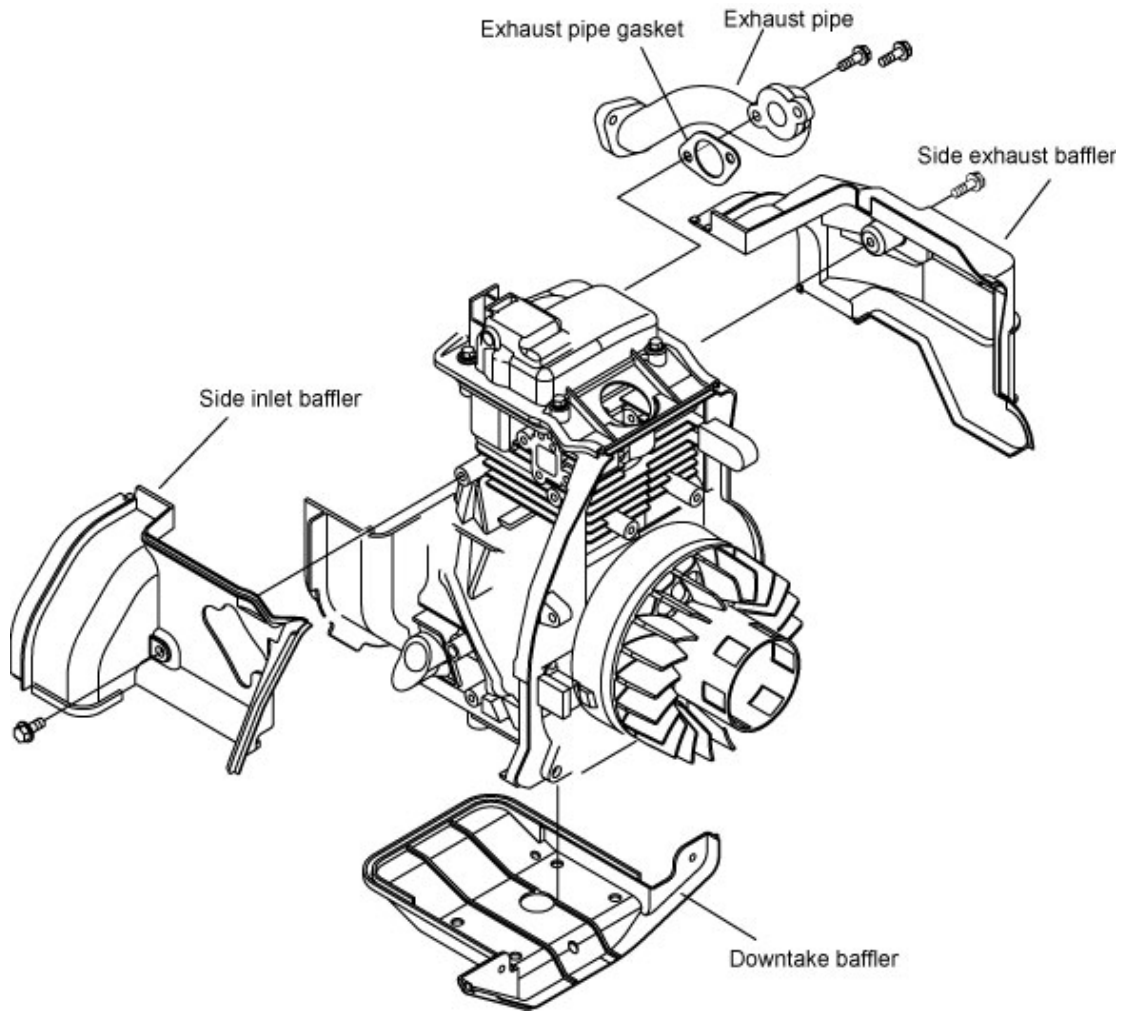
Measure the capacitance. Measuring error is  $\pm 5\%$ .

Model	120V	230V\240V
Capacity /pressure	40 $\mu$ F\250V	20 $\mu$ F\250V

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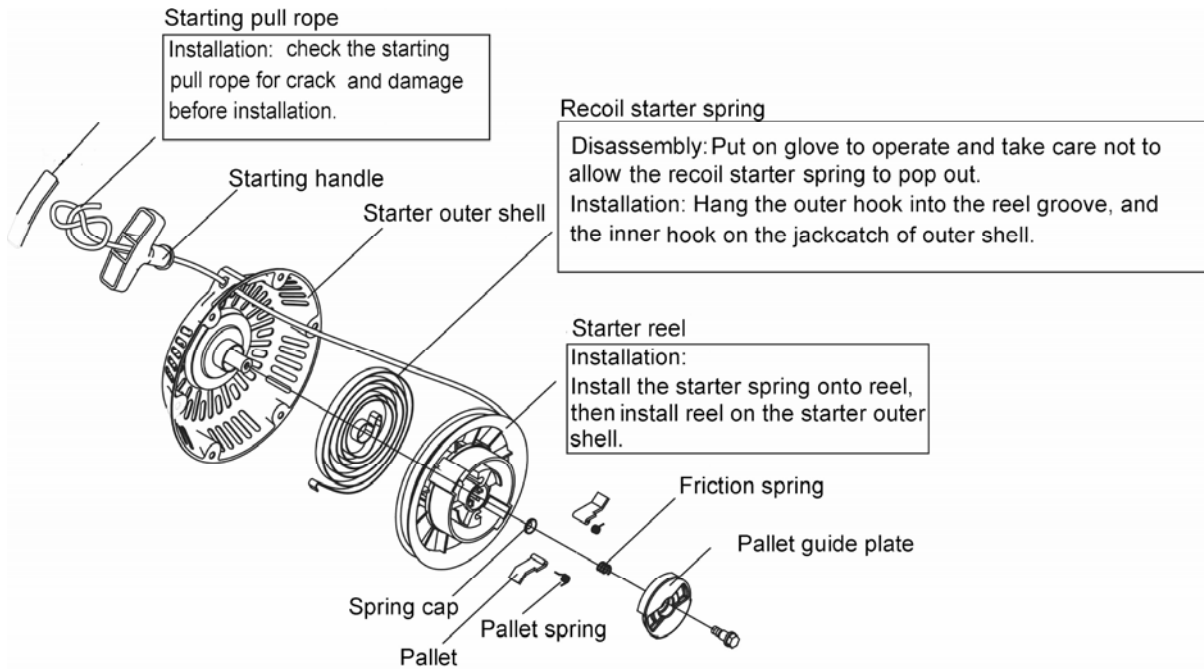
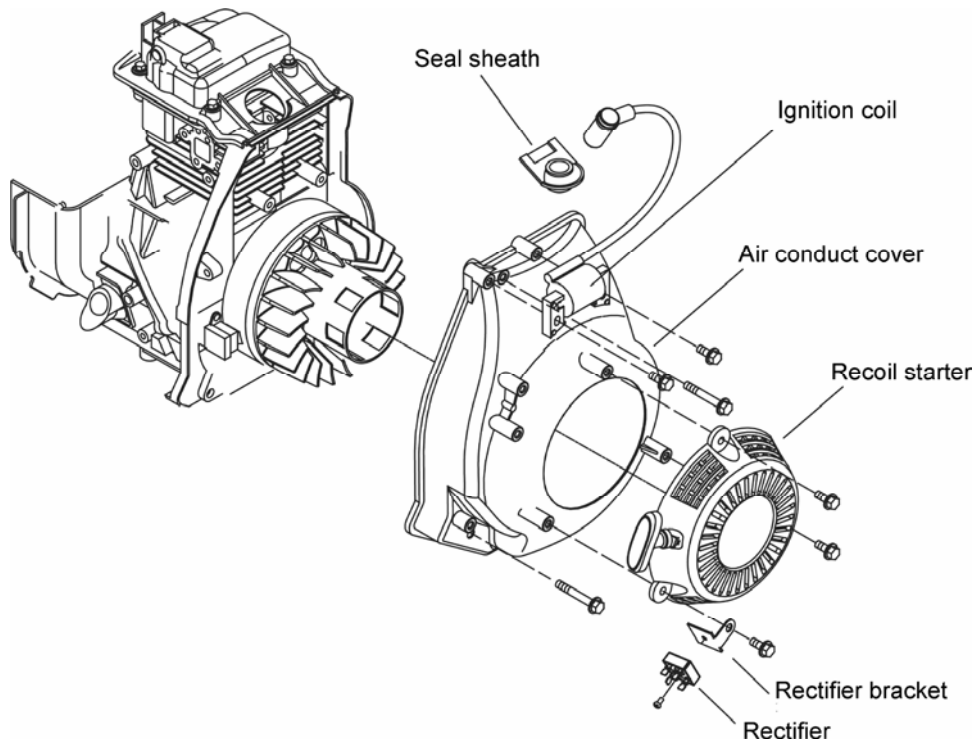
## 13. Guide Plate

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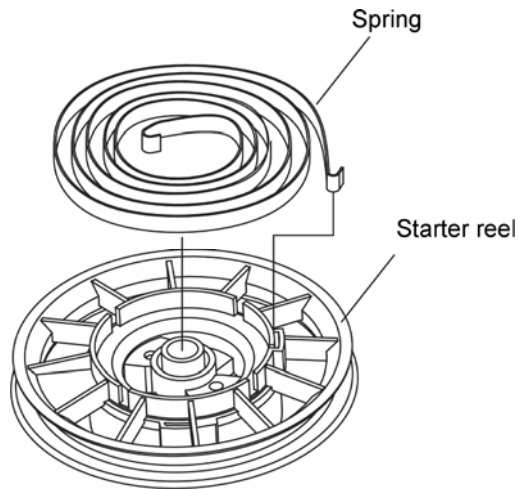
## 14. Recoil starter

### 14.1 Disassembly/Reassembly

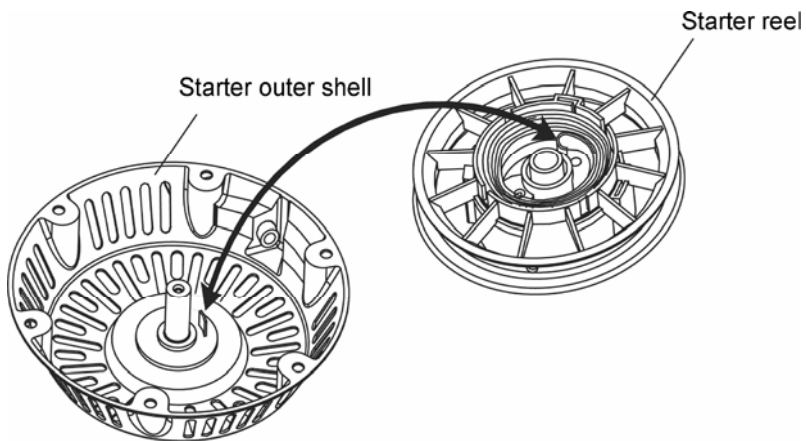


## 14.2 Installation of recoil starter

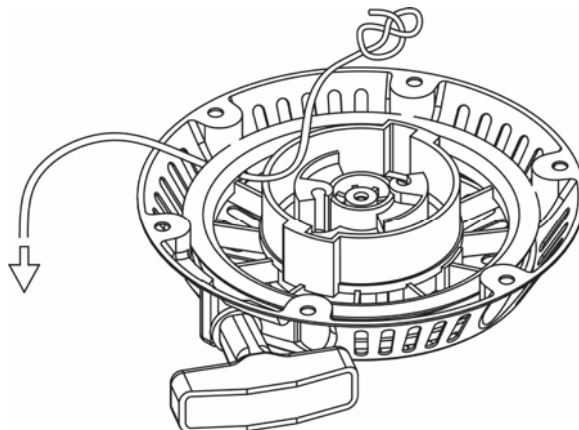
(1) Set the spring into the starter reel, and hang the spring outer hook inside the reel groove.



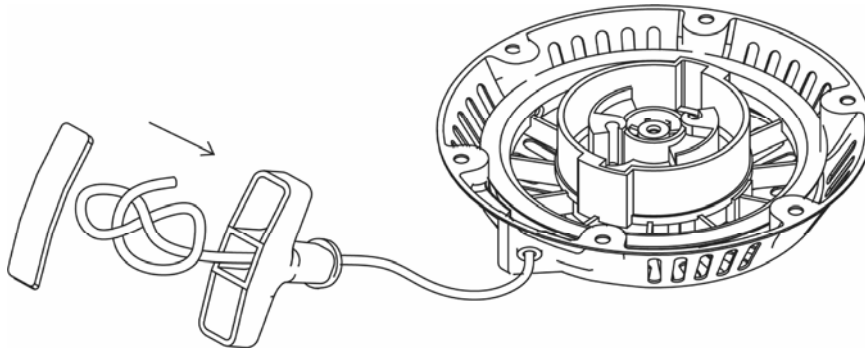
(2) Smear lubrication grease on the starter outer shell claw, install the starter reel. Revolve the reel anticlockwise to hang the spring inner hook on the starter outer shell claw.



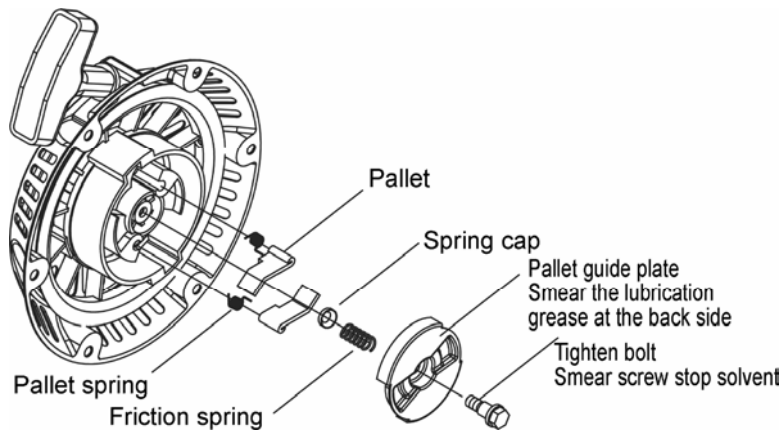
(3) Make a "8" knot at one end of the rope, pass the other end through the reel hole. Wind the reel anticlockwise 4 turns to fix the reel.



(4) Pull out rope thrum from starter outer shell hole completely, pass it through the handle and make a “8” knot, then turn off handle cover. Loosen the reel to rebound the spring, take care not to allow the reel pop out.



(5) Install the starter pallet and fix it with bolts.



(6) Pull the starter for several times, and check the ratchet wheel returning.

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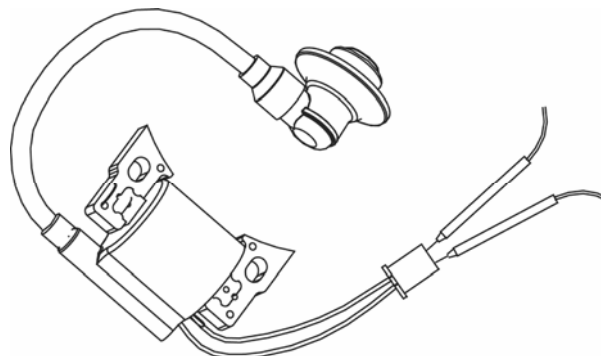
## 15. Ignition Coil and Rectifier

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### 15.1 Ignition Coil

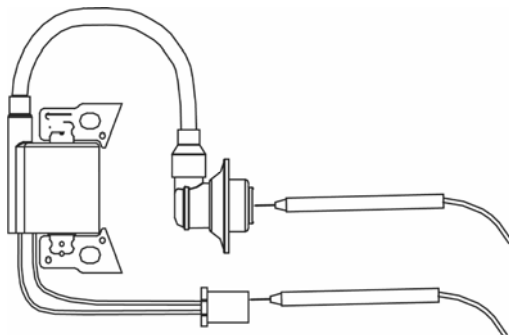
● Attach the two leads of tester to the primary coil plug of ignition coil, and measure the primary resistance..

Primary resistance	0.8—1.3Ω
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- Attach one lead of the tester to each terminal of primary coil plugs of ignition coil and the other lead to the spark plug cap, then measure the secondary resistance.

Secondary resistance	15—21kΩ
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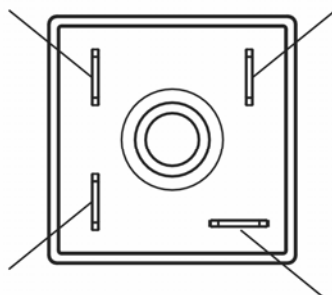


### 15.2 Rectifier

Measure the on or off (positive pressure fall) of rectifier with control potentiometer (▶+⋈), the measurement should accord with the standard as shown in the chart.

Positive Negative	1	2	3	4
1		OFF	OFF	OFF
2	ON		OFF	OFF
3	ON	ON		ON
4	ON	OFF	OFF	

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



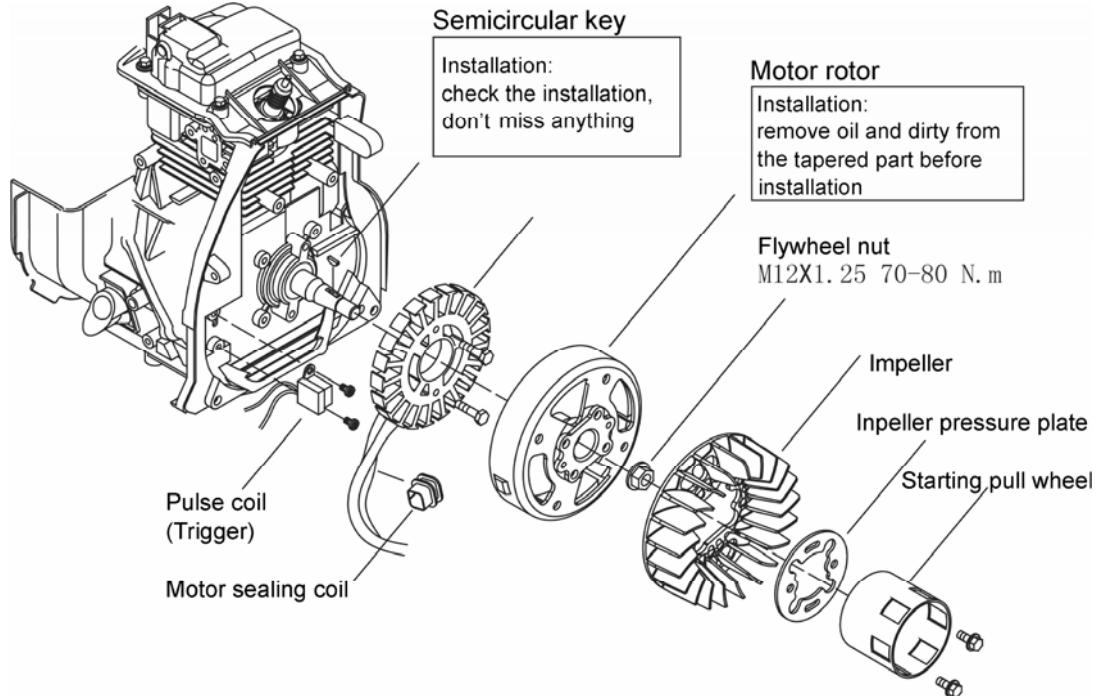
(4) AC pin (~)      (3) Positive pin (+)



## 16. Generator/ Trigger

### 16.1 Generator

#### Disassembly/Reassembly



### 16.2 Inspection

#### (1) Ignition winding

Measure the resistance between the green terminal and yellow/green terminal.

Resistance	0.40-0.55Ω
------------	------------

#### (2) Outer charging winding

Measure the resistance between the two blue terminals.

Resistance	0.12-0.15Ω
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#### (3) Sub winding

Measure the resistance between the two sub winding terminals.

Resistance (Ω)	IG series	CG series
	White-White	Black-White
	0.15~0.30	

#### (4) Main winding

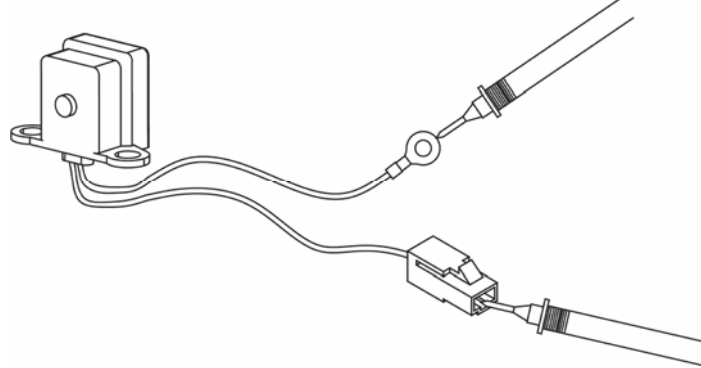
Measure the resistance among the main winding terminals.

Resist ance (Ω)	IG series		CG series	
	Black-Black-Black		Black-Yellow\Black-Gree n\Black-Red	
	120V	230/240V	120V	230/240V
	1.35~1.75	5.0~5.5	0.18~0.21	0.65~0.90

### (5) Trigger

Attach the two testers in the trigger, and measure its resistance.

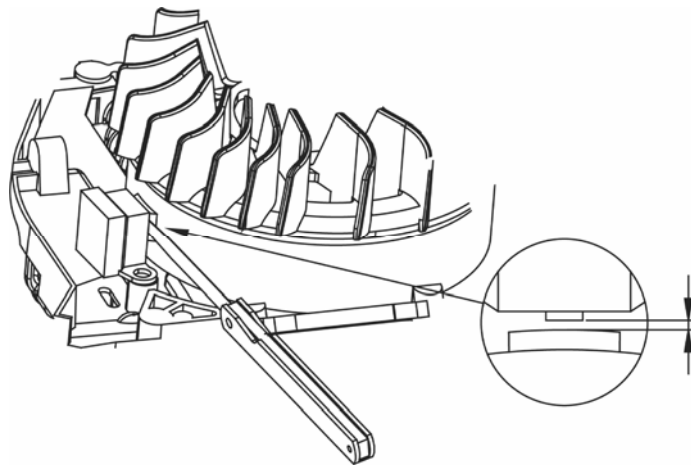
Trigger resistance	80-130Ω
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### 16.3 Adjustment

Adjust the clearance between trigger and the projection part of rotor.

Trigger clearance	0.020-0.029 in (0.50-0.75 mm)
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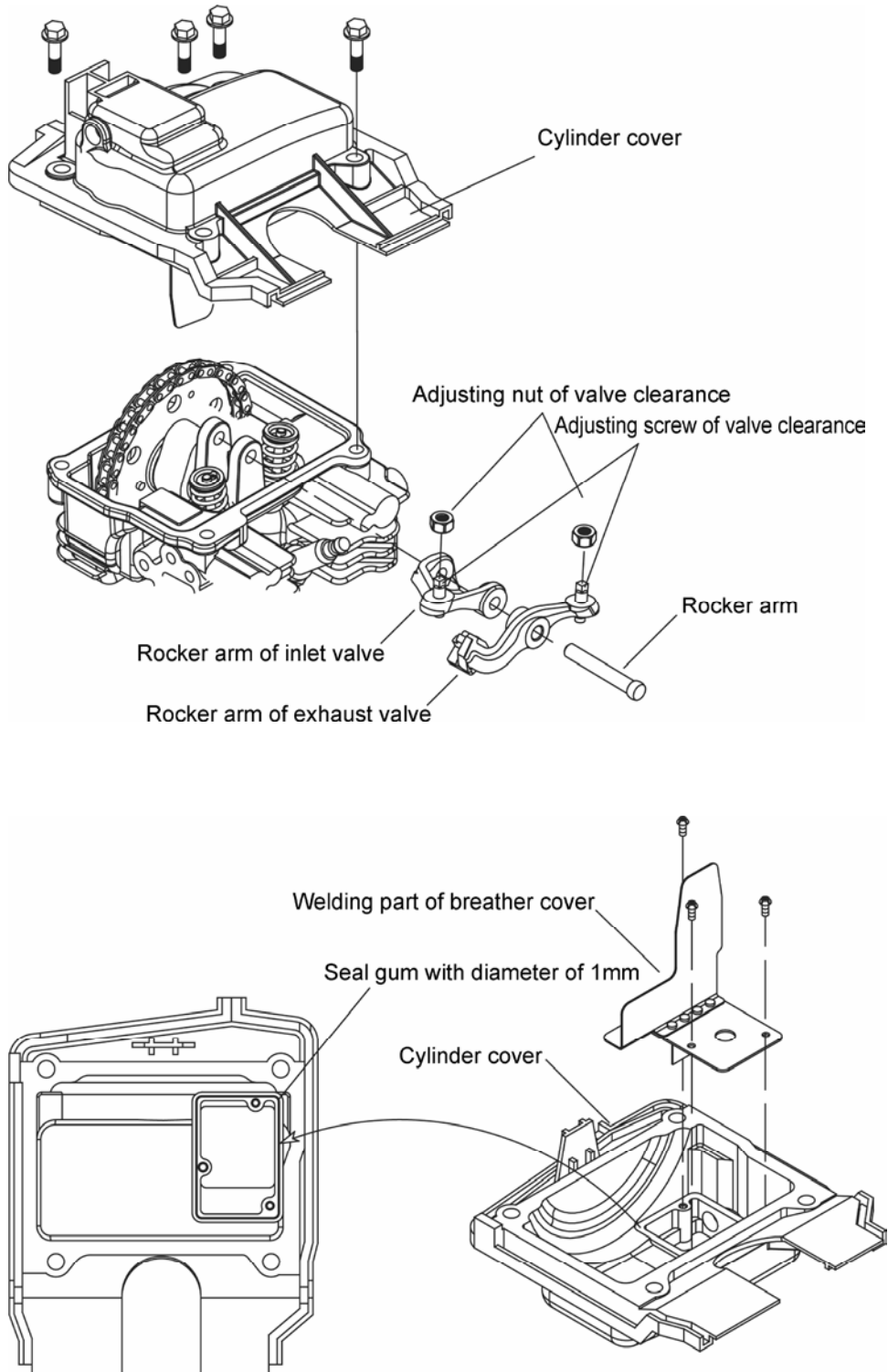
Insert a feeler gauge between the trigger and the projection part of the rotor; loosen the trigger fixed plate bolt to adjust the clearance slightly. Never move the plastic part of trigger, to avoid it separates from the fixed plate and damages the trigger.

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## 17. Cylinder cover/ Rocker arm assembly

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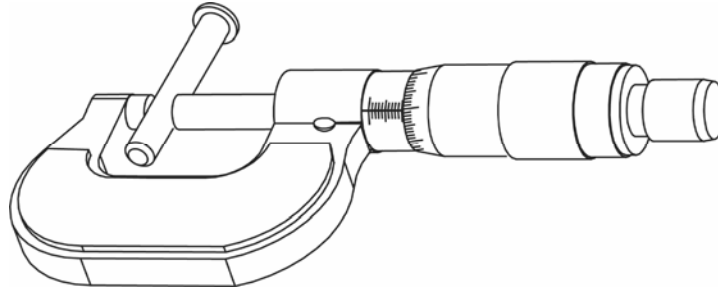
### 17.1 Disassembly/ Reassembly



## 17.2 Inspection

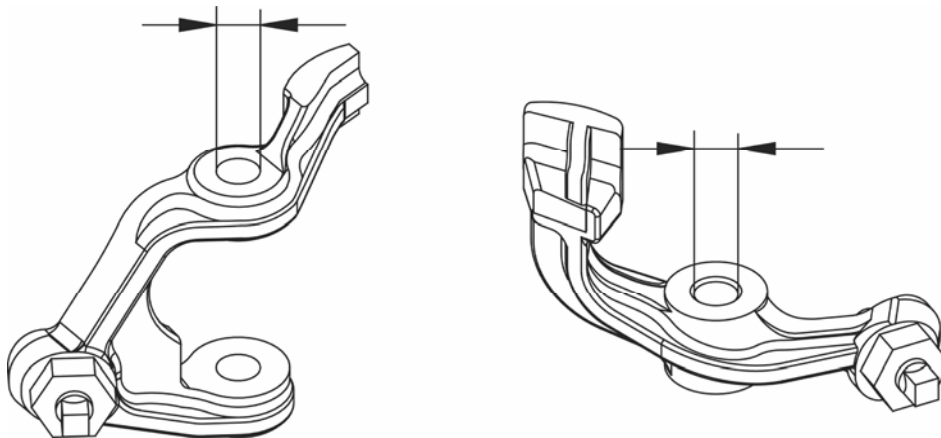
### ● Rocker arm outer diameter

Standard	Service limit
0.2351-0.2354 in (5.972-5.980 mm)	0.2348 in (5.965 mm)



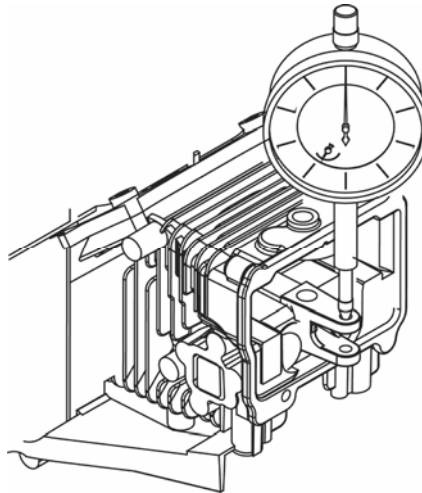
### ● Rocker arm inner diameter of inlet/exhaust valve

Standard(mm)	Service limit(mm)
0.236-0.237 in (6.000-6.012 mm)	0.238 in (6.037 mm)



### ● Inner diameter of rocker arm bearing

Standard(mm)	Service limit(mm)
0.236-0.237 in (6.000-6.012 mm)	0.238 in (6.037 mm)

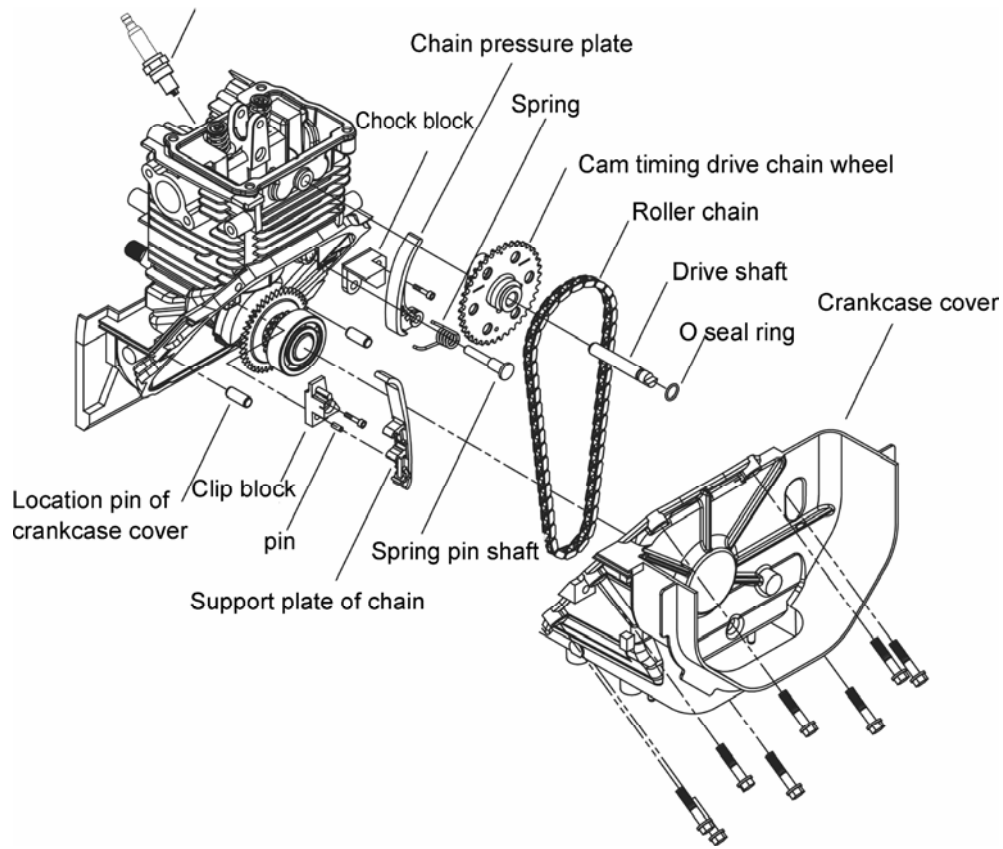


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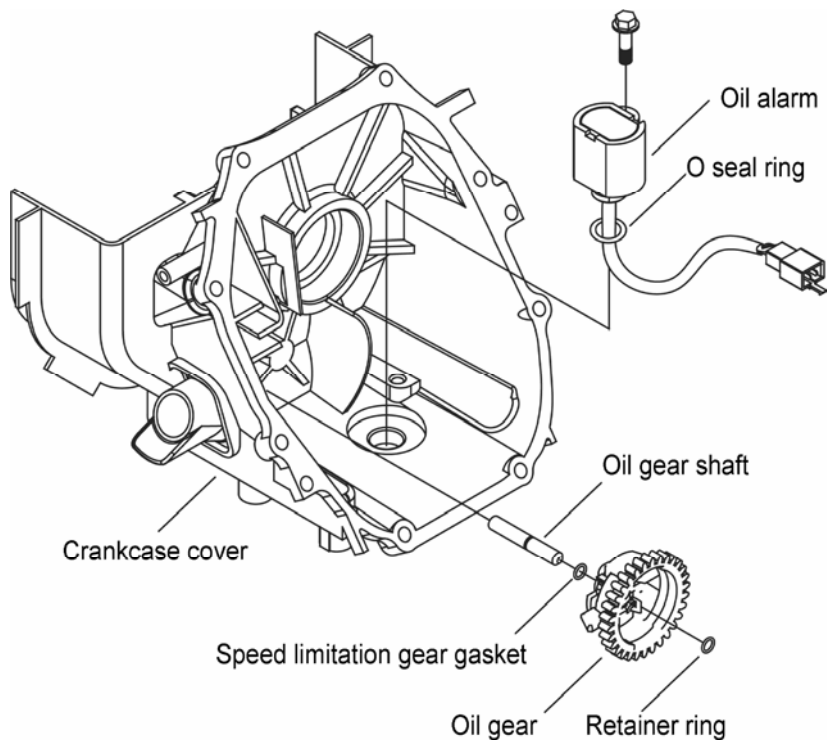
## 18. Crankcase cover/ Cam timing drive chain

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### 18.1 Disassembly



### 18.2 Crankcase cover

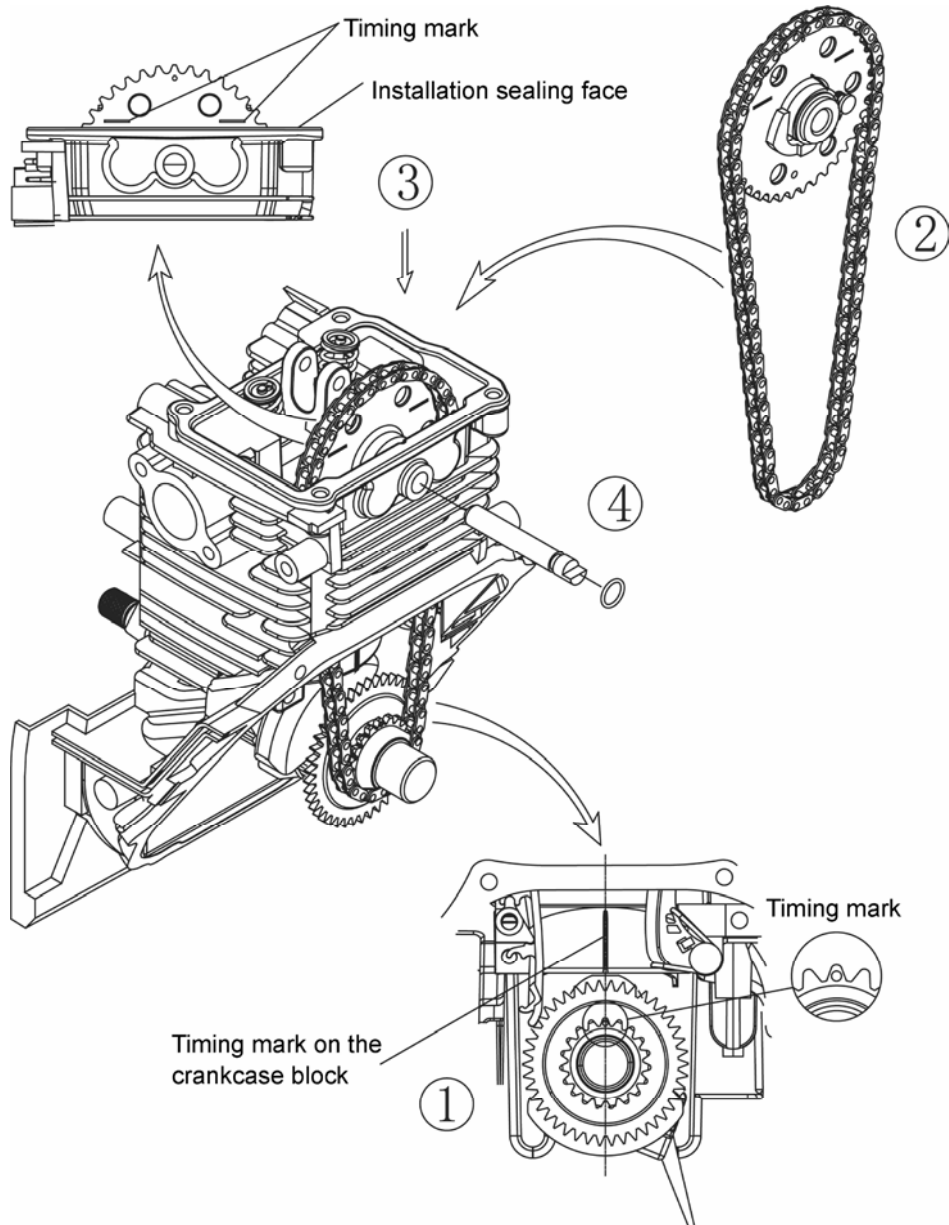


### 18.3 Reassembly of roller chain

1. Install the crankshaft, piston and connecting rod assembly on the cylinder block.
2. Revolve the crankshaft; align the timing mark of crankshaft timing shaft with the timing mark of crankcase. (Step 1)
3. Install the roller chain on the cam timing drive chain, orient the timing mark upward. (Step 2)
4. Insert the roller chain into the crankcase and set the end of roller chain to the crankshaft timing gear (Step 3). Straighten the chain to align the timing mark of cam timing drive chain with the cylinder head sealing face.

#### Caution

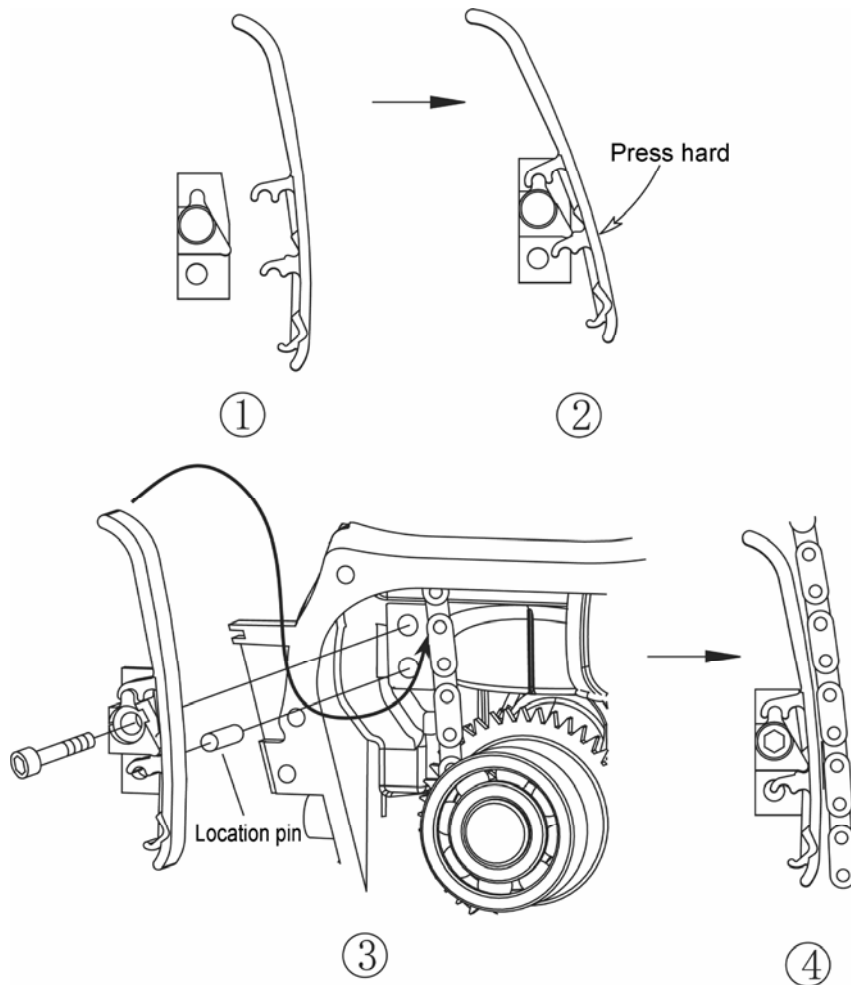
- Don't remove the timing mark of crankshaft timing gear during installation. If the timing mark of cam timing drive chain is not parallel with cylinder head sealing face, adjust the meshing of chain and cam.
5. Install the O-seal ring into the drive shaft, and then assemble the drive shaft (Step 4). Pay attention that the opening of drive shaft should face upward.
  6. Install chain pressure plate (Step 5).



## 18.4 Assembly of chain support plate/ pressure plate

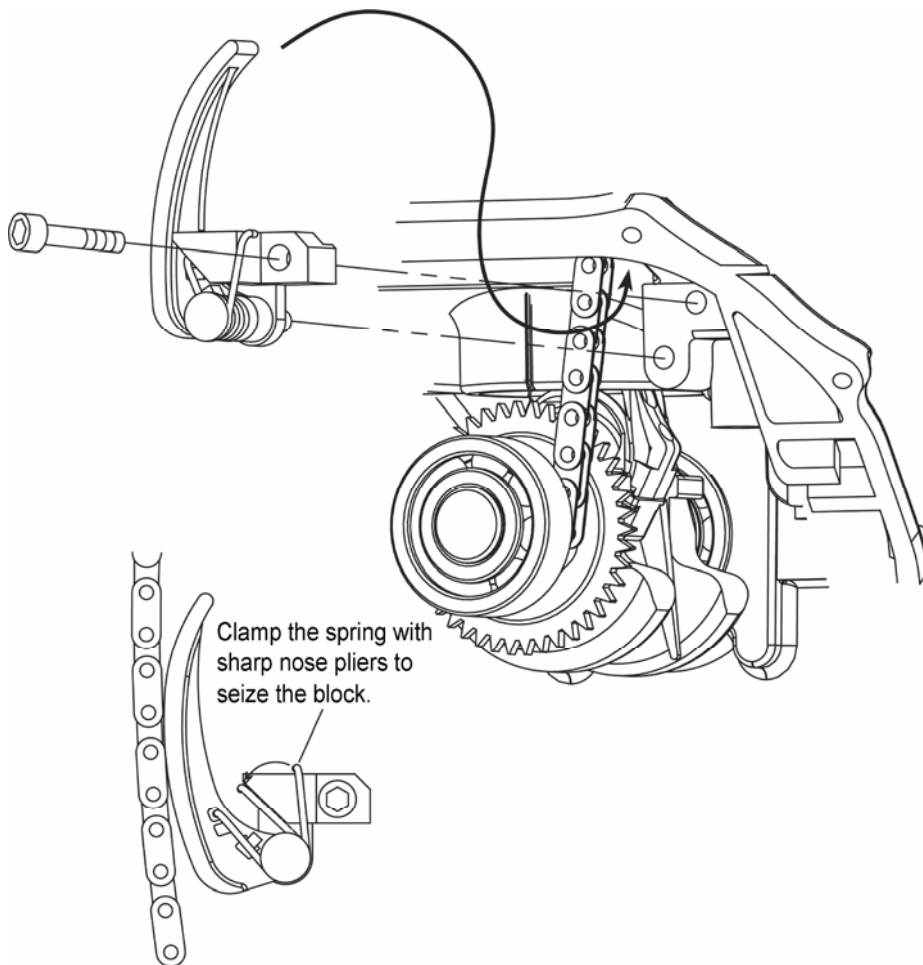
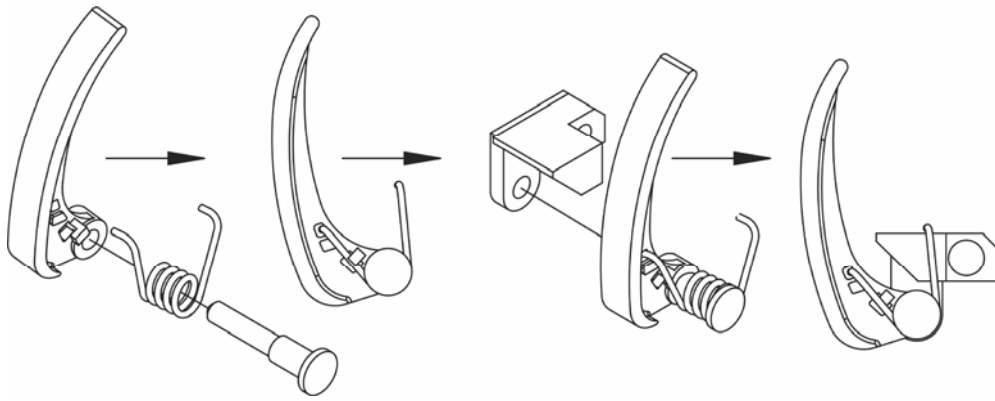
### ● Chain support plate

1. Put the upper groove of chain support plate into block; press the other end to lock the support plate fully.
2. Insert the location pin into cylinder block location hole and align then set the support plate and clip block into the cylinder block. Adjust the clip block location to align the clip bolt with the cylinder block bolt.
3. Install inner hexagonal bolt and tighten.



### ● Chain pressure plate

1. Install the spring pin shaft, spring and chain pressure plate per the illustration below.
2. Insert the spring into the block location hole and set the chain pressure plate into the cylinder block and spring into the location hole. Pay attention that the spring pin is fully inserted.
3. Adjust the block location to align the block bolt hole with the cylinder block bolt hole.
4. Install the inner hexagonal bolt and tighten it.
5. Hold the spring end to immobilize the block and knock the spring pin with a copper hammer.

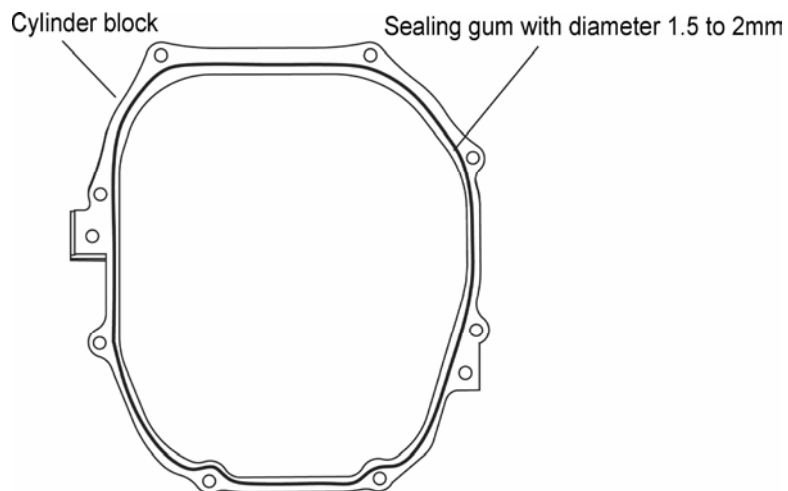


### 18.5 Assembly of crankcase cover

1. Remove any remaining gasket sealant on the cylinder block and crankcase cover.
2. Apply sealant on the cylinder block sealing face.
3. Reassemble the crankcase cover.



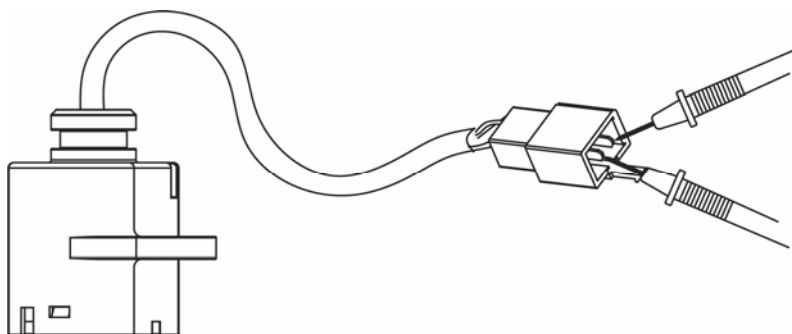
4. Tighten the crankcase cover bolt slowly to the prescribed torque.
5. Wait for 20 minutes after installation before refilling oil or starting the engine .



## 18.6 Inspection

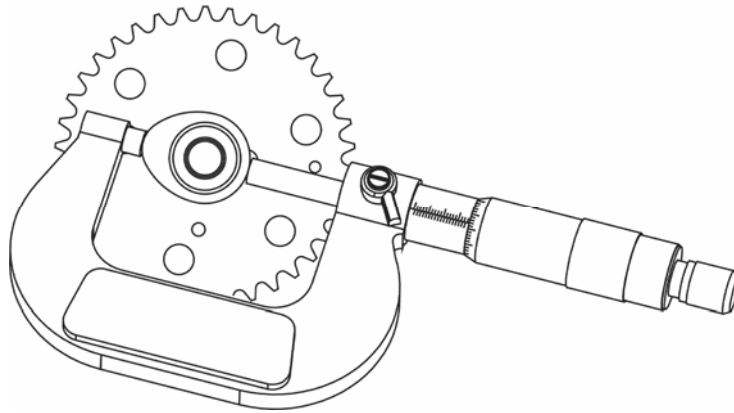
### 18.6.1 Inspection of the oil alarm

- (1) Stand the oil alarm on end, check the oil alarm output wire and copper ground wire- there should be no continuity.
- (2) Turn the oil alarm 180°- there should be continuity.
- (3) Immerse the oil alarm completely in oil to check the float- there should be no continuity.



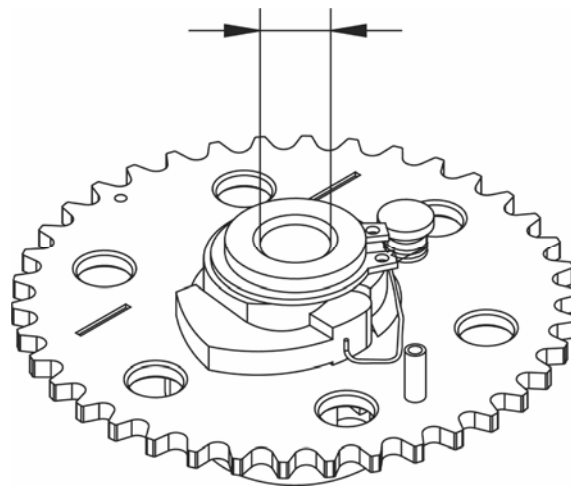
### 18.6.2 Cam height

Standard in (mm)	Service limit in (mm)
1.143-1.145 (29.026-29.086)	1.108 (28.15)



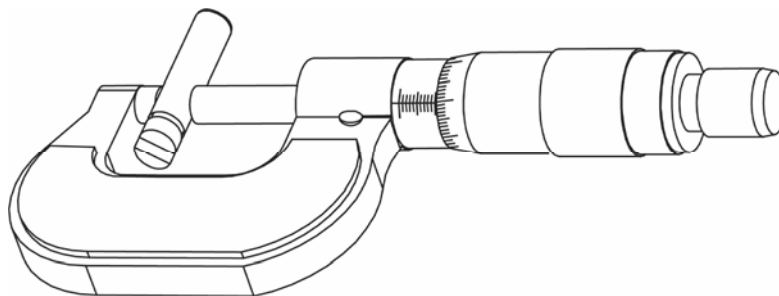
### 18.6.3 Cam inner diameter

Standard in (mm)	Service limit in (mm)
0.354-0.357 (9.000-9.015)	0.356 (9.035)



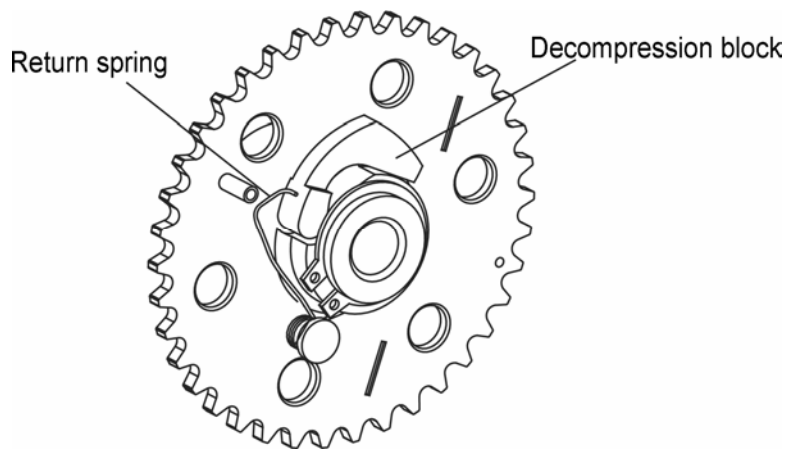
### 18.6.4 Camshaft outer diameter

Standard in (mm)	Service limit in (mm)
0.3529-0.3533 (8.966-8.975)	0.3512 (8.920)



● **Decompression block**

Check the return spring for damage and wear. .

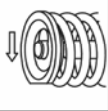
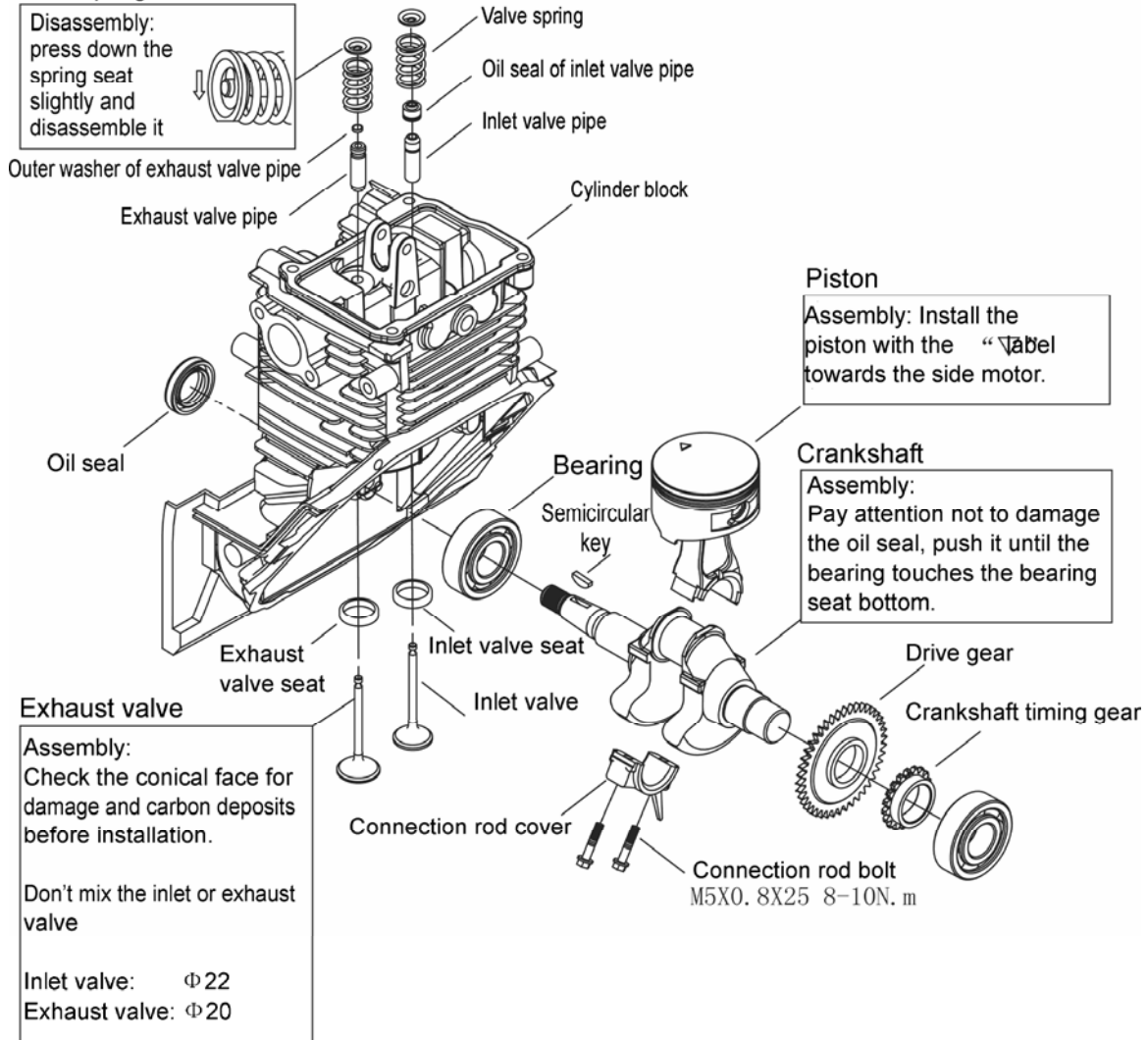



# 19. Crankshaft/ Piston

## 19.1 Disassembly/ Reassembly

### Valve spring seat

Disassembly:  
press down the  
spring seat  
slightly and  
disassemble it

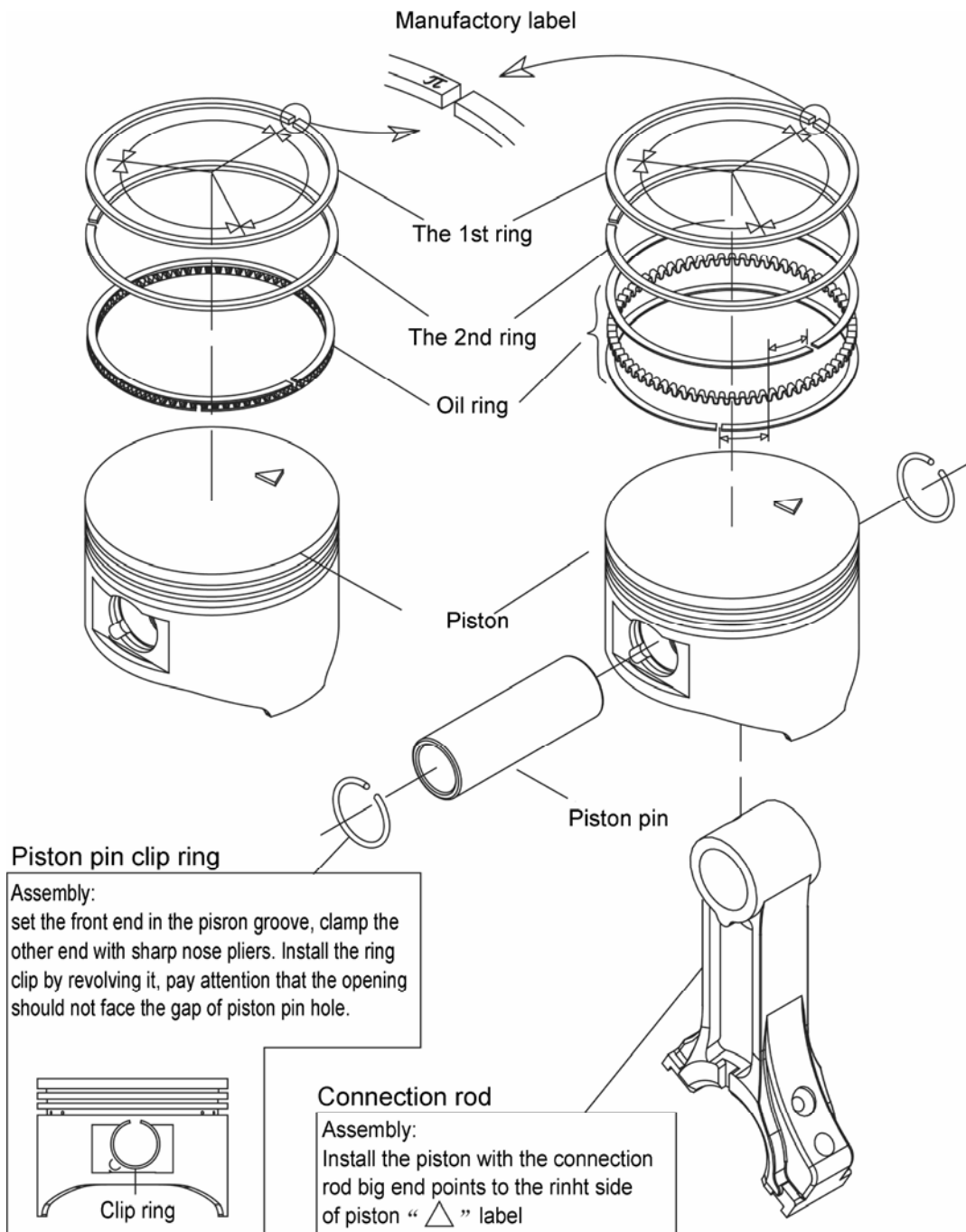



**Piston**  
Assembly: Install the piston with the “” towards the side motor.

**Crankshaft**  
Assembly:  
Pay attention not to damage the oil seal, push it until the bearing touches the bearing seat bottom.

**Exhaust valve**  
Assembly:  
Check the conical face for damage and carbon deposits before installation.  
Don't mix the inlet or exhaust valve  
Inlet valve:  $\Phi 22$   
Exhaust valve:  $\Phi 20$

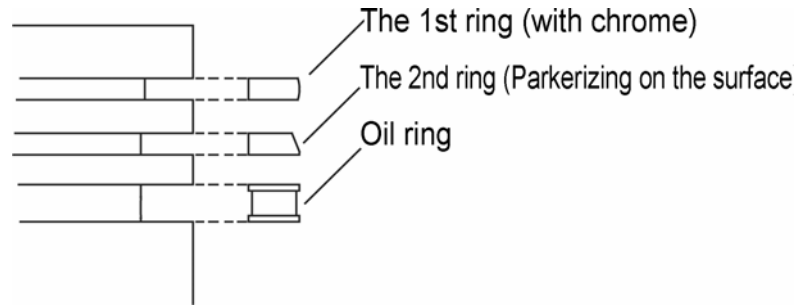
## 19.2 Piston



### Assembly of piston ring

#### Caution

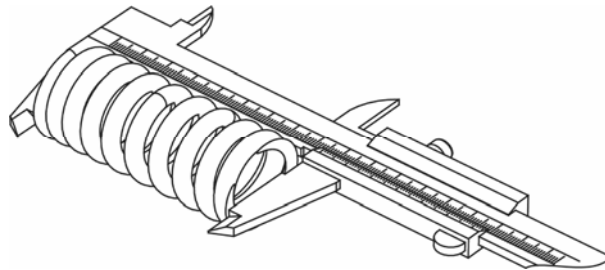
- Set the manufacture label upwards.
- Pay attention not to mix the location of the 1<sup>st</sup> and 2<sup>nd</sup> rings.
- Check the piston ring for flexibility after installation.
- Stagger each piston ring opening 120° .



### 19.3 Inspection

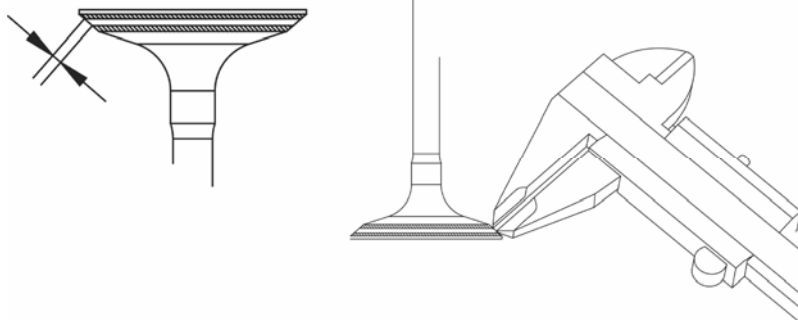
#### 19.3.1 Free length of valve spring

Standard in (mm)	Service limit in (mm)
1.039 (26.4)	0.980 (24.9)



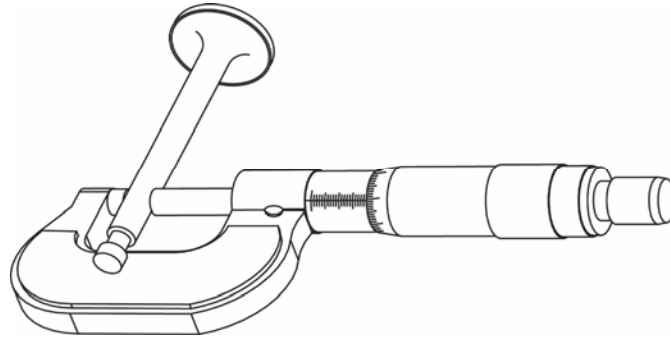
#### 19.3.2 Valve seat width

Standard(mm)	Service limit(mm)
0.028 (0.7)	0.071 (1.8)



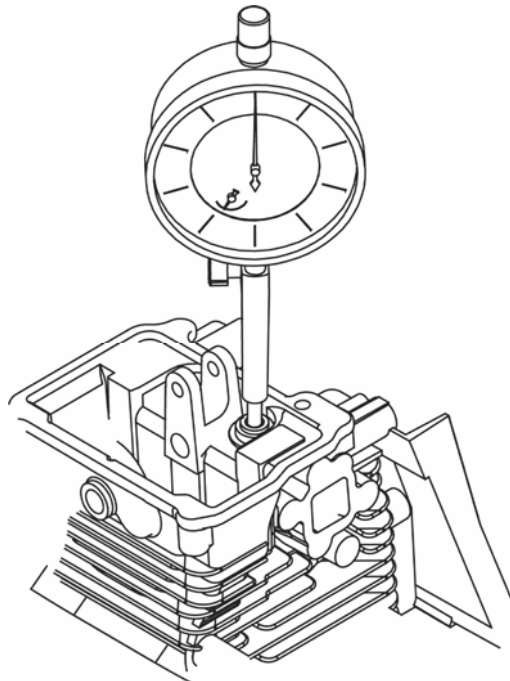
### 19.3.3 Valve rod outer diameter

	Standard in (mm)	Service limit in (mm)
Inlet valve	0.156-0.157 3.965-3.980	0.154 (3.90)
Exhaust valve	0.155-0.156 3.955-3.970	0.154 (3.90)



### 19.3.4 Valve guide inner diameter

	Standard in (mm)	Service limit in (mm)
Intake/Exhaust valve	0.157-0.158 (4.000-4.030)	0.159 (4.060)

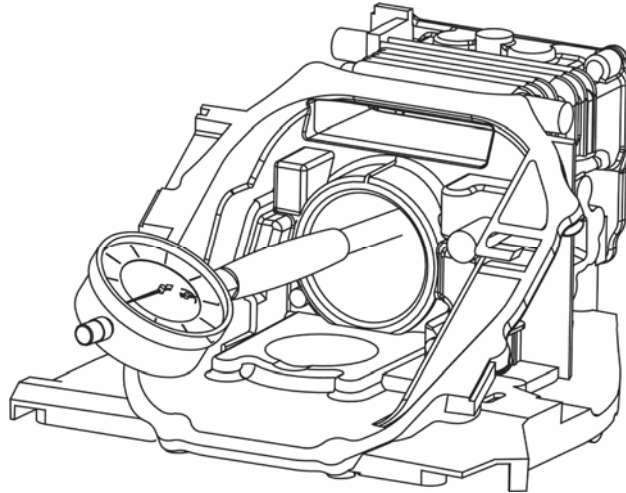


### 19.3.5 Clearance between valve stem and valve guide

	Standard(mm)	Service limit(mm)
Intake valve	0.0008-0.0026 (0.020-0.065)	0.0039 (0.10)
Exhaust valve	0.0012-0.0029 (0.030-0.075)	0.0047 (0.12)

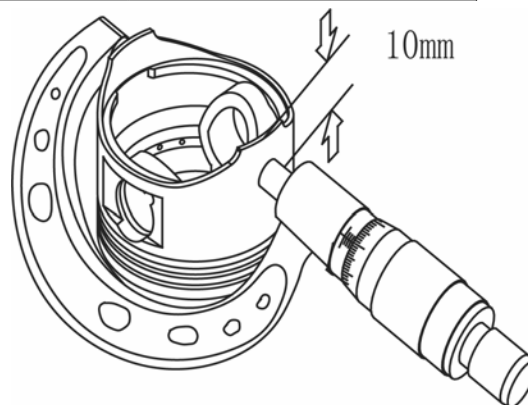
### 19.3.6 Cylinder inner diameter

Standard in (mm)	Service limit in (mm)
2.2835-2.2842 (58.000-58.020)	2.2876 (58.105)



### 19.3.7 Piston skirt outer diameter

Standard in (mm)	Service limit in (mm)
2.281-2.282 (57.960-57.980)	2.277 (57.850)



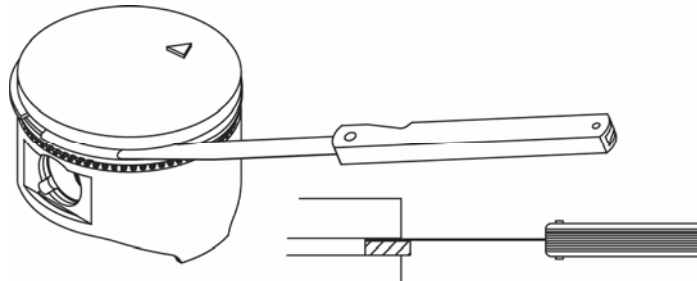
### 19.3.8 Clearance between piston and cylinder

Standard in (mm)	Service limit in (mm)
0.0008-0.0016 (0.020-0.042)	0.0047 (0.120)



### 19.3.9 Side clearance of piston ring

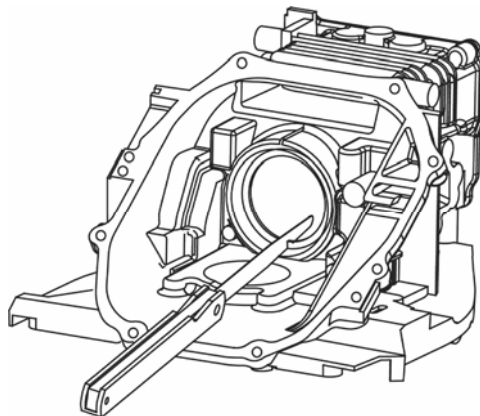
Standard in (mm)	Service limit in (mm)
0.0008-0.0024 (0.02-0.06)	0.0059 (0.15)



### 19.3.10 Piston ring end clearance

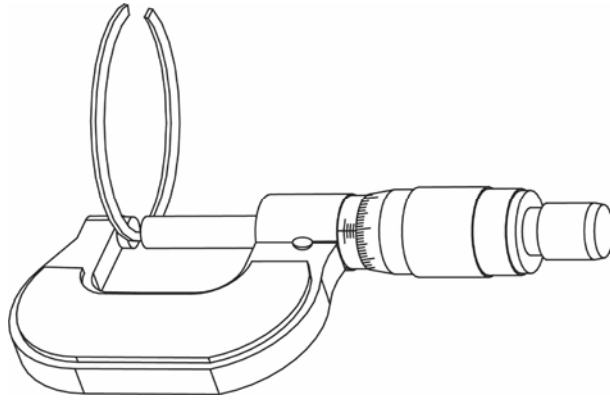
Locate the piston ring into cylinder with piston at top dead center, and measure the piston end clearance.

Standard in (mm)	Service limit in (mm)
0.0059-0.0098 (0.15-0.25)	0.0394 (1.0)



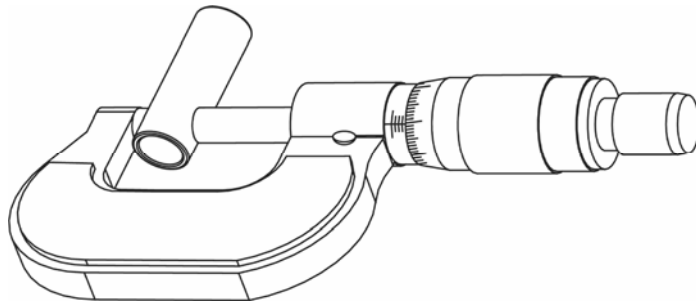
### 19.3.11 Piston ring height

	Standard in (mm)	Service limit in (mm)
The 1 <sup>st</sup> ring	0.038-0.039 (0.97-0.99)	0.034 (0.87)
The 2 <sup>nd</sup> ring	0.046-0.047 (1.17-1.19)	0.044 (1.107)



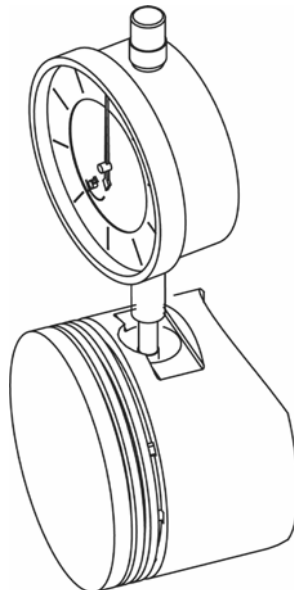
**19.3.12 Piston pin outer diameter**

Standard in (mm)	Service limit in (mm)
0.5115-0.5118 (12.994-13.000)	0.5098 (12.950)



**19.3.13 Piston pin hole inner diameter**

Standard in (mm)	Service limit in (mm)
0.5119-0.5121 (13.002-13.008)	0.5137 (13.050)

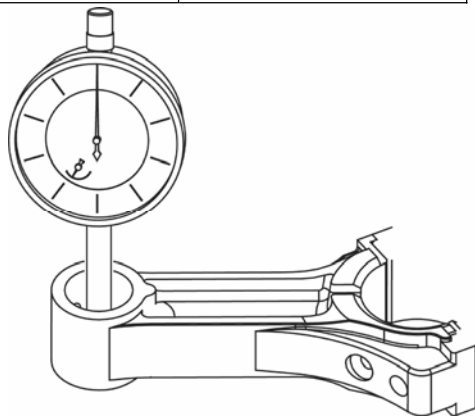


### 19.3.14 Clearance between piston pin and piston pin hole

Standard in (mm)	Service limit in (mm)
0.00008-0.00055 (0.002-0.014)	0.0031 (0.080)

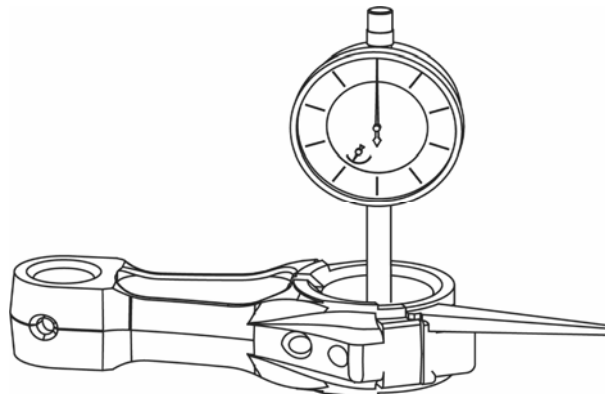
### 19.3.15 Connection rod small end inner diameter

Standard in (mm)	Service limit in (mm)
0.5120-0.5125 (13.006-13.017)	0.5150 (13.080)



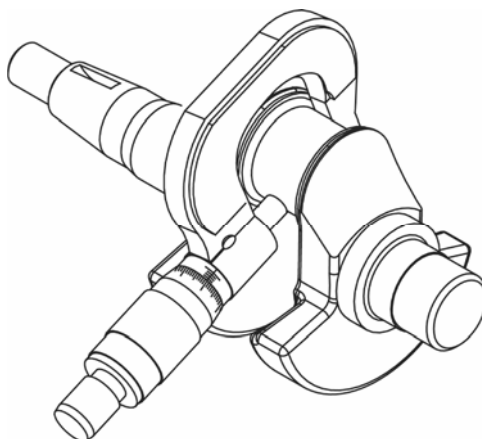
### 19.3.16 Connecting rod big end inner diameter

Standard in (mm)	Service limit in (mm)
0.9457-0.9462 (24.020-24.033)	0.9484 (24.090)



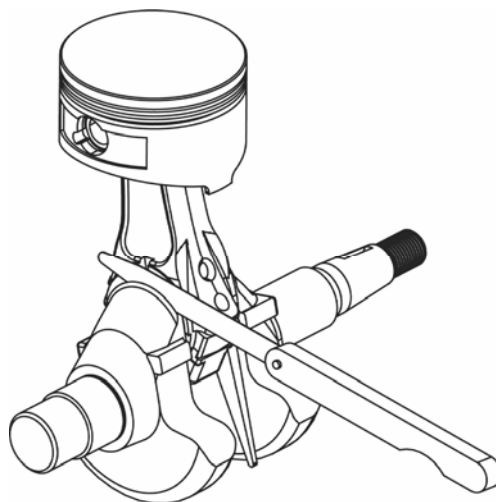
### 19.3.17 Crankshaft neck outer diameter

Standard in (mm)	Service limit in (mm)
0.9436-0.9441 (23.967-23.980)	0.9409 (23.900)



### 19.3.18 Connecting rod big end side clearance

Standard in (mm)	Service limit in (mm)
0.0039- 0.0157 (0.1-.0.4)	0.0315 (0.8)



### 19.3.18 Oil film clearance of connection rod big end

- (1) Wipe the oil from the surface of the crankshaft neck.
- (2) Set the plastic wire feeler at the crankshaft neck and install the connection rod. Tighten the bolt to the prescribed torque being careful not to rotate the crankshaft. The tightening torque is 8 to 10N.m.
- (3) Disassemble the connecting rod and measure the plastic wire feeler thickness.
- (4) Replace the connecting rod if the clearance exceeds the service limit and measure the clearance again. Grind the crankshaft neck if the new clearance still exceeds the service limit.

Standard in (mm)	Service limit in (mm)
0.0016-0.0026 (0.040-0.066)	0.0047 (0.120)

