1.6KVA INVERTER GENERATOR
MAINTENANCE MANUAL

This maintenance manual contents regulations which should comply to in daily maintenance and trouble removal on generator.

Please make sure serviceman could read this manual anytime.

This maintenance manual describes the correct maintaining methods. Any personal injury or death or equipment damage, which because ignorance on these regulations, our company would remove the responsibility.

NOTICE：

SAFETY NOTICE

Your human safety and property are very important as well as others .Please ready following safety notice in this manual and on generator decals, each safety notice has a symbol ⚠.

⚠ 危险 Failure to follow this instruction could result in extreme severe injury.

⚠ 警告 Failure to follow this instruction might result in severe injury.

⚠ 小心 Failure to follow this instruction might result in injury.

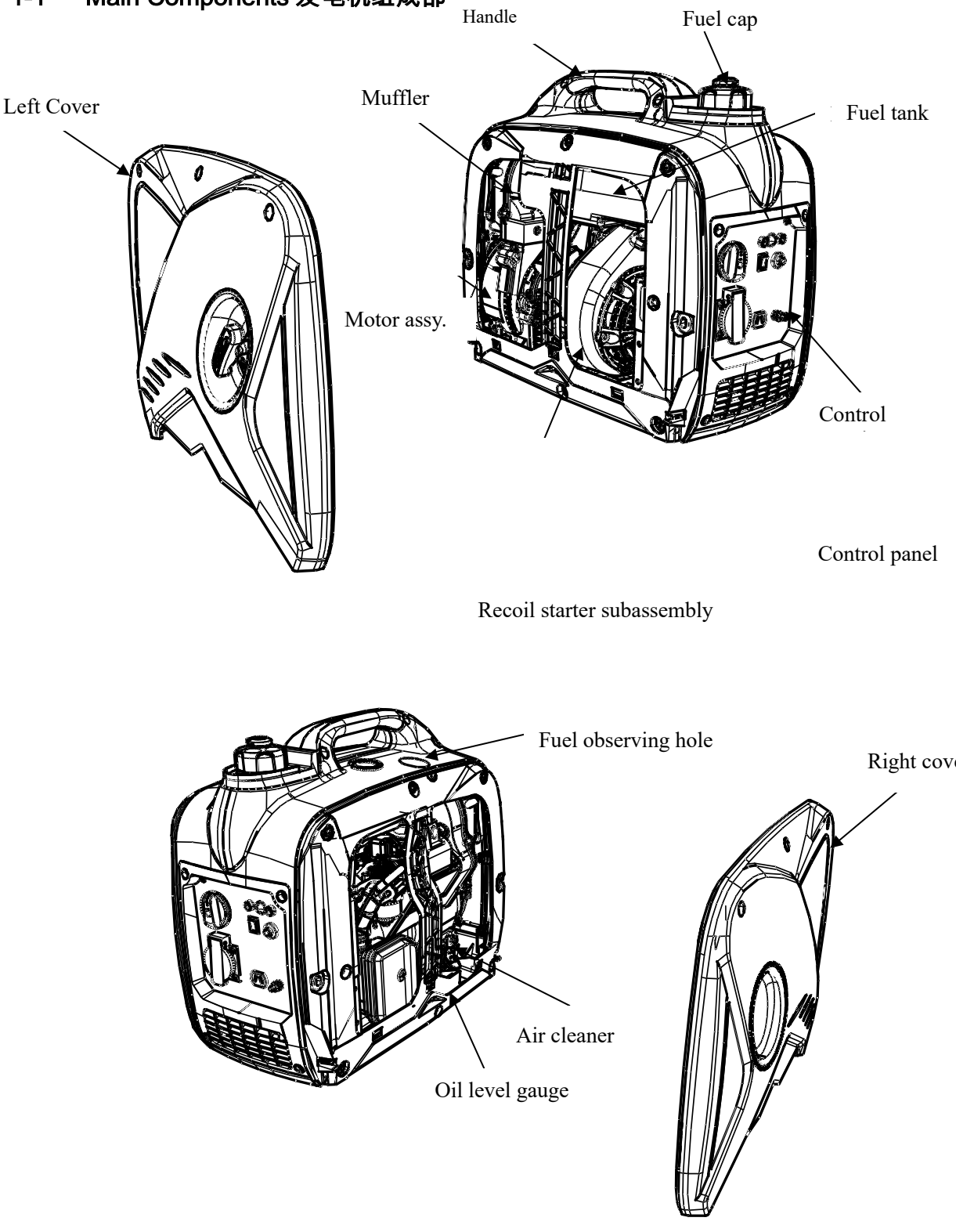
注 意 Failure to follow this instruction, your generator or other property would be damaged.

注 意 If no torque written, please refer to appendix -- Torque Table.

CONTENTS

GENERAL INFORMATION 第一部分 引言

1-1 Main Components 发电机组成部分



General parameter

Generator model		R2000iS/ R2000iSP
Motor	Type	Silent inverter generator
	Frequency /Hz	50Hz/60Hz
	Rated voltage /V	100V/120V/220V/230V/240V
	Max power /kVA	1.8
	Rated power /kVA	1.6
	Power Factor	1
	Waveform deviation factor/%	≤3%
	Noise (3/4 load)	65dB
	DC output / V-A	12V/8A
Engine	Engine model	R80-i
	Engine type	OHV
	Displacement /cc	79.7
	Fuel type	Gasoline
Engine	Fuel tank capacity /L	4L
	Rated load continuum running time /h	4
	Engine oil capacity /mL	380ml
	Spark plug model	TORCH-A5RTC
	Starting system	Recoil starter
Diameter	L*W*H /mm	498×290×459
Net weight /kg		22

Repair standard

Components	Items	Standard	Limitation
Gasoline engine	Max unload speed Cylinder pressure	5800 0.45Mpa at 600rpm	-- --
Cylinder	Inner diameter	48.6~48.615	48.655
Piston	Piston skirt outer diameter Piston-cylinder clearance Inner diameter of piston pin hole Piston pin outer diameter Clearance between Piston pin and piston pin hole	48.57~48.59 0.01~0.045 11.002~11.01 10.994~11 0.002~0.016	48.52 0.135 11.02 10.984 0.036
Piston ring set	Piston ring sets side-gap：first ring/second ring Piston ring sets close gap: first ring/second ring	0.015~0.05 -- -- -- 0.15~0.30	0.12 -- -- -- 0.6
Connecting rod	Inner diameter of smaller end Inner diameter of bigger end Oil clearance of bigger end Big-end side gap:	11.006~11.017 22~22.013 0.02~0.043 0.45~0.95	11.050 22.040 0.1 1.15
Crankshaft	Crank outer diameter	21.97~21.98	21.94
Valve	Valve clearance Intake / Exhaust Outer diameter of valve stem Inner diameter of intake valve guide Outer diameter of exhaust valve guide Exhaust / Intake Contact width of valve seat Spring free length	0.03~0.08 0.03~0.08 4~4.012 4~4.012 0.6~0.8 28.5	-- -- 4.060 4.060 2 27.5
Camshaft	Height of cam Intake Exhaust Journal outer diameter	20.54 20.54 11.965~11.99	20.24 20.24 --
Crankcase cover	Inner diameter of camshaft hole	12~12.018	12.048
Spark plug	Clearance	0.6-0.8	--
Cap of spark plug	Resistance	10kΩ	--

MAINTENANCE 第二部分 保养

Maintenance table 2-1 保养一览表

Regular maintenance contributes to safety, economic, no malfunction and environmental protection.

⚠ 警告 **Exhaust contents toxic carbon monoxide, please stop the engine before maintenance. If you have to implement the maintenance when generator running, please make sure the working area is draughty.**

Regular maintenance table:

Regular maintenance table		Each time	20h or the first month of begin to use (3).	50h or every 3 months (3)	100h or every 6 months (3)	300h or every year (3)
Engine oil	Check oil level	○				
	Replace		○		○	
Air cleaner	Check	○				
	Clear			○(1)		
Fuel cup	Clear				○	
Spark plug	Clear				○	Replace
Valve clearance	Re-adjust					○(2)
Cylinder head cover	Clear	Every 300h (2)				
Fuel tank and strainer	Clear	Every two years (2)				
Fuel hose	Replace	Every two years (2)				

(1) Please increase the maintenance frequency if generator used in dusty area.

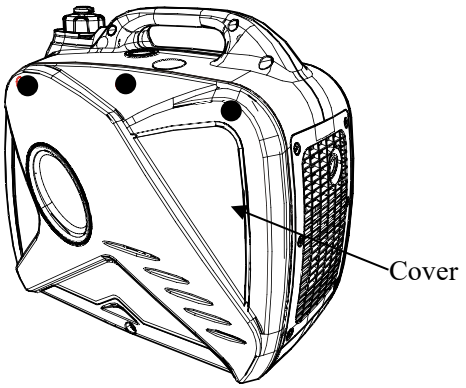
(2) These items should be maintained by franchised dealer.

(3) These items should be maintained in proper time interval as requested to insure generator's life.

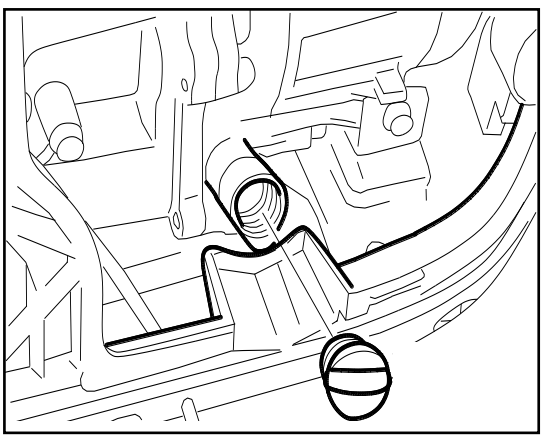
Oil 2-2 机油

1) Put generator on horizontal plane.

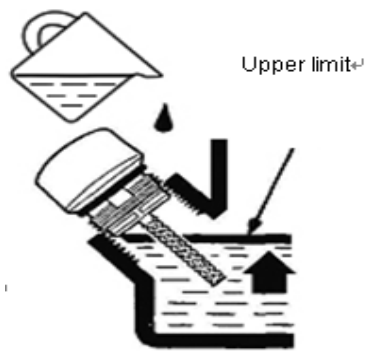
2) Loosen the bolts as marked, remove the cover. (Pull the cover back slightly and then pull it up)



3) Loosen the oil dipstick and empty the oil in crankcase.



4) Put generator on horizontal plane, adding new oil until to the upper limit. Tighten the oil dipstick.



5) Assemble the cover, tighten bolts.

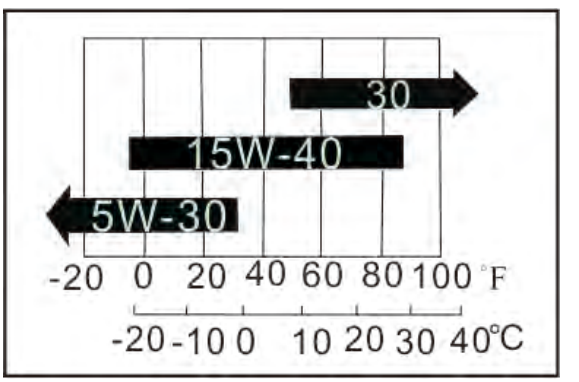
Note ：Every time before use generator, place it on horizontal plane, stop the engine and check oil level.

1.Take the oil dipstick and clean the oil.

2.Put dipstick in crankcase but tighten it and check the oil level.

3.If the oil level is low, please add recommended oil until the upper level.

Recommended engine oil:
SAE 15W -40
Recommended engine oil standard:
API Standard: SE or higher
Oil capacity: 0.38L



⚠ 小心 **If skin contacts to engine oil too frequently, this might result in skin cancer. Please clean the oil on your skin clearly with soap and water immediately.**

For environmental protection, please dispose the oil properly. We recommended that put oil in a sealed container and send it to relevant recycle bin. Do not throw oil into refuse dump or other place.

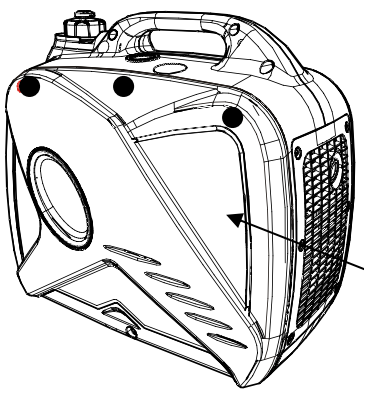
Air cleaner 2-3 空滤器

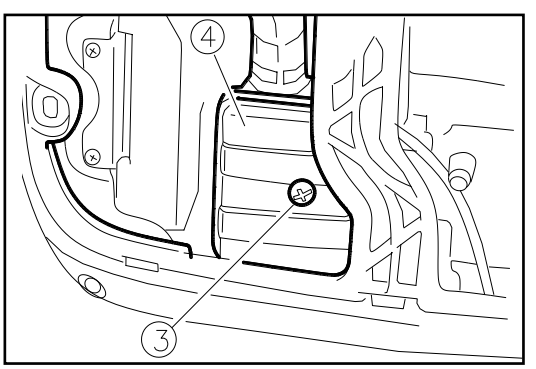
Dirty air cleaner will affect the air into carburetor. For reducing carburetor faulty, please maintain the air cleaner regularly (As maintenance table shows) and increase the maintenance frequency if generator used in dusty area.

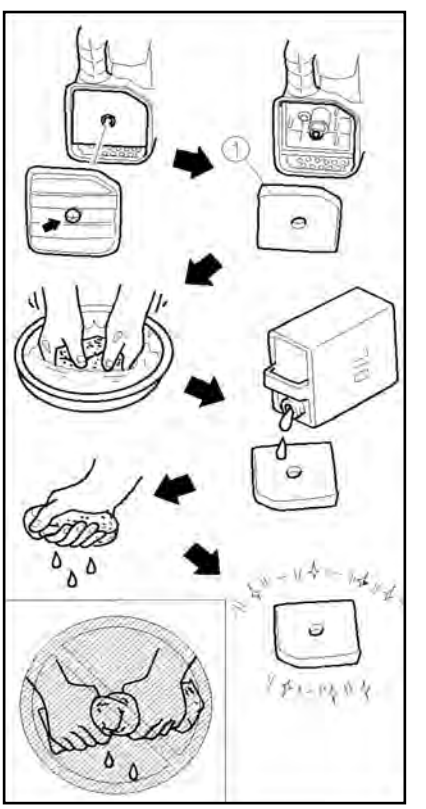
⚠ 警告 **Use gasoline or inflammable solvent to clean air cleaner element could result in fire or explosion. Please clean the element with soap water of uninflammable solvent.**

注 意 **Start the generator without air cleaner assembly is prohibited, which will increase engine abrasion.**

1) Loosen bolts as marked, remove cover, take the screw ③ remove air cleaner cover④.
2) Check air cleaner element make sure it is complete and clean.
3) If the element is dirty, please clean foam element with detergent, squeeze the water and then drop a drop of oil, squeeze the element.
4) Assemble the element and air cleaner cover.



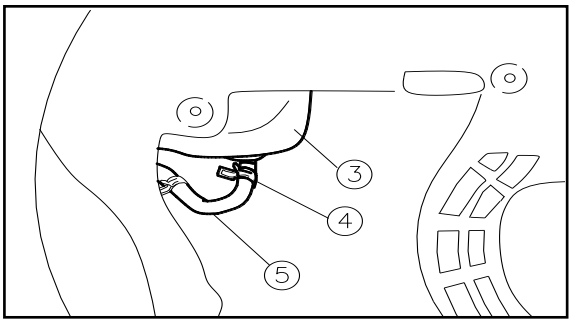


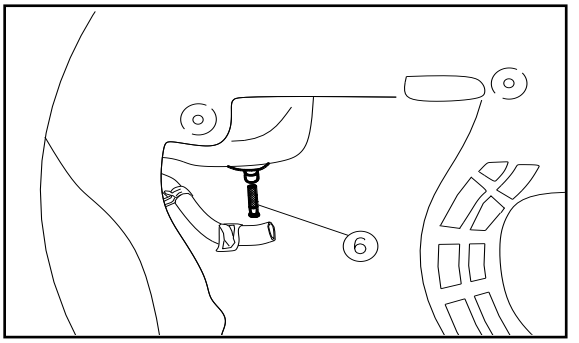


Clean fuel strainer 2-4 燃油滤清器的清理

Fuel strainer is designed for preventing dust into carburetor. If generator isn't used for a long time, please clean fuel strainer after empty fuel tank.

1) Remove the cover (refer to air cleaner maintenance step 1), empty fuel tank.
2) Squeeze clip④ , pull it down, and pull the fuel hose⑤ out, which connected to fuel tank.
3) Remove fuel strainer⑥.
4) Clean fuel strainer with gasoline.
5) Dry it and assemble it back.
6) Assemble fuel hose and clip back, open fuel switch, check if any fuel leakage on fuel strainer.
7) Assemble cover back.





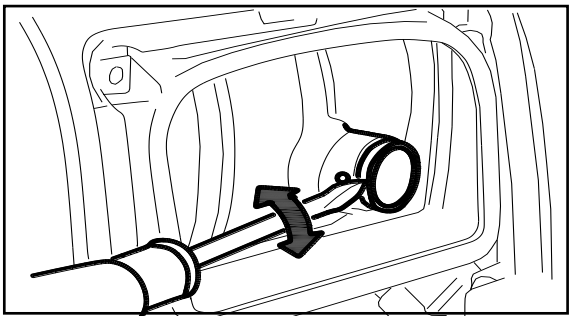
Spark arrestor 2-5 火花消除器

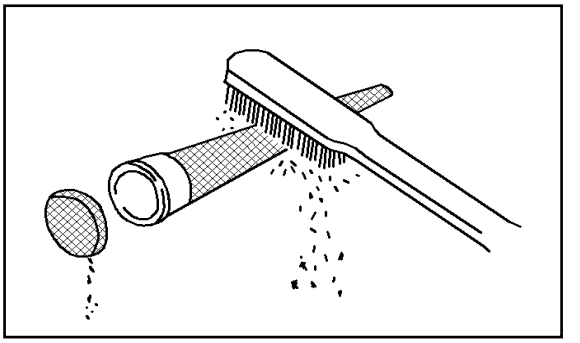
⚠ 警告 Gasoline is flammable and explosive. Smoking, open fire and spark are prohibited in working area.

⚠ 警告 After generator is reassembly, please check if any fuel leakage before starting the generator and make sure work area is dry.

⚠ 警告 Hyperthermal muffler could result in serious scale. Please maintain muffler after it cool-down.

In regard to clean spark arrestor, please refer to maintenance table. Remove spark arrestor after generator cool-down. If spark arrestor is damaged, please replace it. Clean the carbon deposition with wire brush. Assemble spark arrestor back, tighten it with screw.



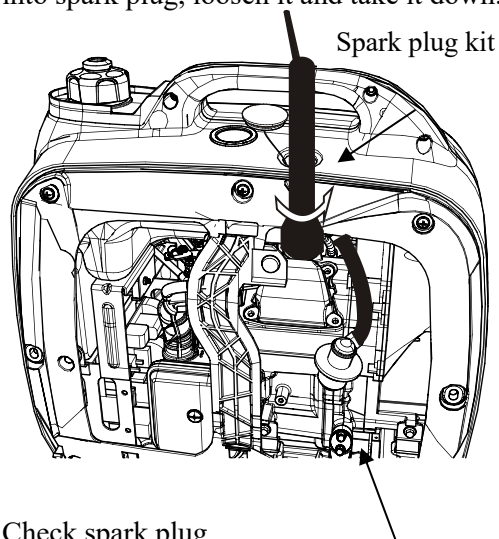


Spark arrestor 2-6 火花塞

Use incorrect model or caloricity of spark arrestor could decrease engine performance and damage it.

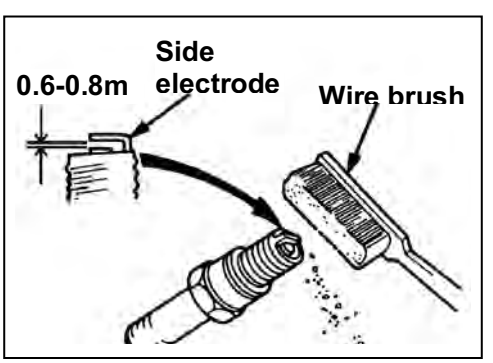
If keep engine running, spark plug and muffler would very hot. Please be careful and don't touch them.

1) Remove the cover (refer to air cleaner maintenance step 1), spark plug sleeve and cap.
2) Put spark plug kit(provide with generator) into spark plug, loosen it and take it down.



3) Check spark plug
   TORCH-A5RTC

   If electrode is damaged, insulator is broken, please replace it. If spark plug could be used, then clean the carbon deposition on it with wire brush.
4) Adjusting the gap of spark plug, you can bend the electrode slightly to keep the gap between 0.60-0.80 (mm)。



5) Check the spark plug retainer. When assemble spark plug, turn it in screw with hand to avoid improper assembly.
6) After put spark plug on retainer, press it tightly with spark plug wrench.

The torque of spark plug: 15 N*m

⚠ 小心 **Spark plug should be assembled properly and tightly, if not, it may damage the engine.**

⚠ 小心 **Please use recommended or the same standard spark plug. It is prohibited to use improper spark plug with improper caloricity.**

Valve clearance adjustment 2-7 气门间隙调整

There always be clearance between valve end and its transmitted parts, in case of contraction which would affect engine work. If the clearance is in excess, it would result in higher back-pressure and higher noise (abnormal noise from valve) and decrease engine performance. If the clearance is insufficient, it would make the valve can't be sealed totally, which might result in abnormal performance or burning the working surface of relevant parts of valve.

Generally, after 100h or 1 year using, you have to check the valve clearance and adjust it.

- Disassemble these parts in turn: spark plug cap, spark plug, cylinder head cover and gasket.
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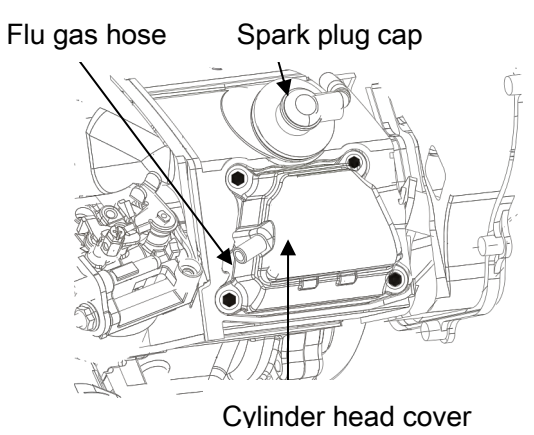
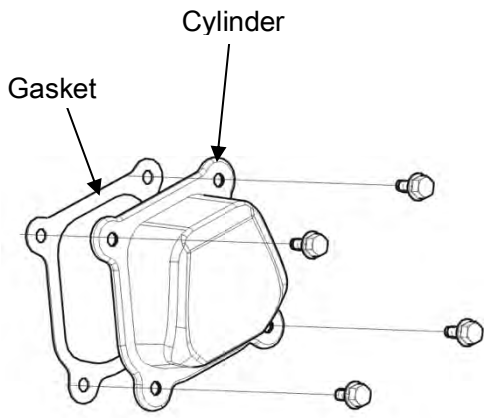
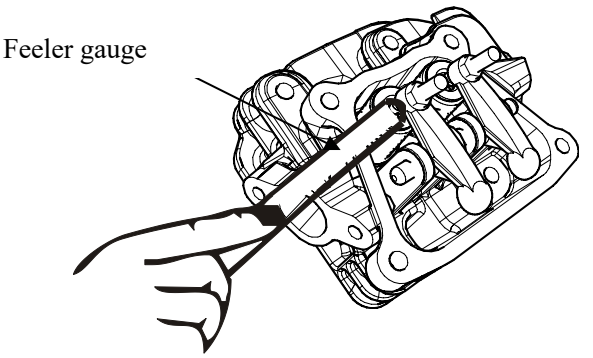




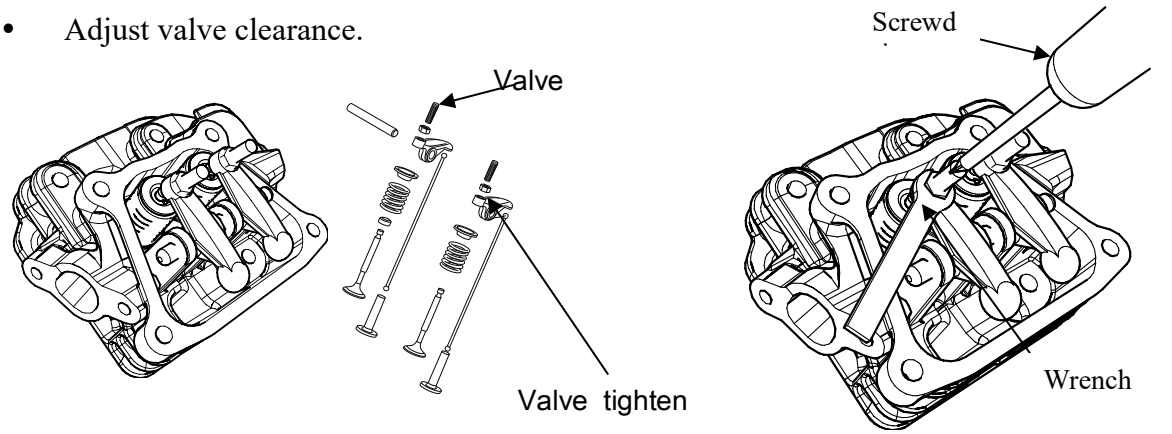
- Pull the starter coil to make the piston on the top dead center.
- Measure the clearance of valve.



- If the clearance is beyond the standard, please adjust it.

注 意 **Please measure the clearance after engine cool-down.**

- Adjust valve clearance.



Adjustment steps: loosen the tighten bolt, turn the adjustment nut to a proper position, and tighten the adjustment nut.

Valve clearance	Intake	0.03~0.08mm
	Exhaust	0.03~0.08mm

Adjust the bolt	Valve clearance
Tighten	Decrease
Loosen	Increase

注 意 **Excess valve clearance: Both valves open behind, which will decrease the time of air intake and exhaust, lower the opening height of valves, make engine has insufficient air intake and can't exhaust clearly, and result in power decrease. Besides, it will increase the hit between relevant parts of valve and increase parts abrasion.**

Insufficient valve clearance: In engine working, heat will expand parts which push valves away, and result in incomplete sealing of valve, power decrease and valve surface burning, even makes valves hit piston.

Part 3 Trouble determine and maintenance

3-1 Trouble determine

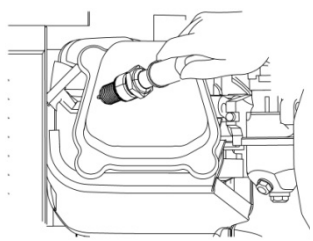
3-1-1 Start-up difficult

Phenomenon			Causes		Methods of elimination
Cylinder compression normal	Spark plug normal	Fuel system abnormal	Poor flow of oil or oil does not flow	No fuel oil in the oil tank	Add fuel oil
				The vent hole on the oil tank is blocked	Evacuate the blocking
				The main metering jet is improperly adjusted or blocked	Re-adjust or clean, blow open
				The needle valve hole is blocked	Dismantle the needle valve for repairing, cleaning and blowing
				The float is stuck or damaged	Repair the float
			oil blow fluently	Fuel is dirty or deterioration	replace oil
				oil mixed with water	replace oil
				Too much fuel in the cylinder	Discharge of oil, and dry the spark plug electrodes
				The fuel marking No. is wrong	use the correct label
	Fuel supply is normal	High voltage wire spark is normal	The spark plug bad	Electrode dirty, carbon deposition	Clearing away the dirt and carbon deposit
				Insulator damage, electrode severe ablation	replace spark plug
				The electrode gap is wrong	Adjust the electrode gap
		High voltage wire without spark	The spark plug normal	High voltage wire is damaged	Replace high voltage wire
				Ignition coil is damaged	Replace the motor stator
				Magnet demagnetization	replace the fly wheel
				The trigger is damaged	replace trigger

				The clearance between the ignition coil and the flywheel is abnormal	adjust the gap
phenomenon			Causes		Methods of elimination
Cylinder compression is bad	Fuel supply is normal	ignition system is normal		Piston ring wearing limit	Replace with new piston ring
				Piston ring break off	replace
				Cementation of the piston ring	Clear away the carbon deposit
				Spark plug gasket not installed or not tightened	Installed gasket and tighten it
				The junction surface of the cylinder body and cylinder cover	Check the unevenness of the cylinder cushion, cylinder body, and cylinder cover junction surface
					Tighten the bolts on the cylinder cover as per the torque required and in a certain sequence
				Air leakage of the valve	Check the valve clearance and the valve airtightness, and repair it when necessary

- If the generator still cannot be started, please send it to our authorized distributor for maintenance and repair.

Spark plug inspection



warning！

- **Ensure that there is no overflowing fuel oil outside the generator, and the sparkplug is not soaked by the fuel oil.**
- **To prevent fire, do not let the spark get close to the spark plug hole.**
- **When you test the spark plug, it is forbidden to use wet hands to hold the high voltage power lines of the spark plug.**
- Turn the fuel switch to "OFF" position and put away the carburetor petrol.
- Remove the spark plug cap and spark plugs.
- Pull the starter handle and let out of the unburned gas.
- Install the spark plug cap.
- Turn the switch to "ON" position

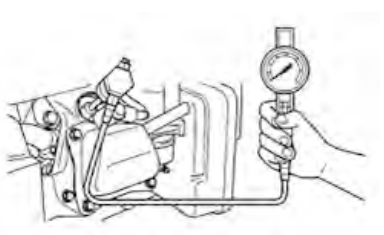
- Let spark plugs of the negative electrode (the threaded portion) through the cylinder head connected to ground, pull the starter handle spark and observed state.

3-1-2 Underpower

Phenomenon	Causes		Methods of elimination
The rotating speed increases slowly or even the rotating speed drops down or there is flameout when the accelerator is stepped on	Fuel oil supply system	There is air in the oil line or the oil line is blocked	Drain the air, clearing the oil line
		Improper adjustment of the main metering jet	Re-adjust the main metering jet
		The needle valve opening and the main metering jet in the carburetor are blocked	Cleaning, blowing open
		The switch of oil tank is blocked	Clean and replace the bad parts
		There is carbon deposit in the combustion chamber	Clear away the carbon deposit
		The air filter is blocked	Clean the filter element r
	Improper compression	The piston, cylinder and the piston ring are worn.	Replace the wearing parts
		There is air leakage in the junction surface of the cylinder body and the cylinder cover	Replace the cylinder cushion
		The valve clearance is too big (too small)	Re-adjust it
		The valve is not sealed tightly	Repair it

Inspection of the cylinder pressure.

- Drain the oil in the oil tank.
- Loosen the oil draining bolt of the carburetor and drain the gasoline.
- Dismantle the spark plug cap and the spark plug and install the cylinder pressure gauge on the spark plug hole.
- Pull the starter for several times and measure the cylinder pressure.



3-1-3 Unstable speed

Phenomenon	Causes	Methods of elimination
Tapping sound of the generator	The piston, cylinder and piston ring wear too seriously	Replace the wearing parts
	The piston pin and the pin hole wear too seriously	Replace the piston or the piston pin
	The small end of the connecting rod wears too seriously	Replace the connecting rod
Detonation	Overheat of the generator	Check the cause and eliminate it
	Carbon deposit in the combustion chamber	Clear away the carbon deposit
	The gasoline is unqualified	Replace with qualified gasoline
Failure of ignition of the generator	There is water in the float chamber	Clean the float chamber
	The electrode clearance of the spark plug is not correct	Adjust the electrode clearance
	Fault of the ignition coil	Check and replace the damaged parts

3-1-4 Failure of ignition

Phenomenon	Causes		Methods of elimination
Failure of ignition	Fuel supply series	The fuel oil is used up	Adding fuel oil
		The carburetor is blocked	Check the oil line and clearing out it.
		here is oil leakage in the float chamber.	Repair the float needle valve
		The needle valve is stuck.	Dismantle the float chamber and eliminate the fault.
	Ignition series	The sparking plug breakthrough, and there is short circuit of the carbon deposit	Replace the spark plug

		The side electrode of the spark plug falls off	Replace the spark plug, and eliminate the stuff that falls off
		The high-voltage cable falls off	replace it
		The ignition coil will breakthrough and cause short circuit	Replace the motor stator
		The stopping line falls on the machine	Find out the short circuit point and re-insulate it.
	Others	Serious cylinder scuff, the valve falls off	Repair and replace the damaged parts

3-1-5 Overheating of the generator

Phenomenon	Causes	Methods of elimination
Overheat of the generator	Insufficient engine oil	Add sufficient engine oil
	Blocking of the exhaust port	Clearing the exhaust port
	Air leakage of fan cover	Repairing the damaged place
	Blocking due to the sundries in the cooling fans	Clearing the cooling fans
	The deformation of the connecting rod will cause wearing of the piston and the cylinder hole.	Replacing the connecting rod
	The cylinder, piston and piston ring are worn	Replacing the wearing parts.
	Improper adjustment of the speed controller of the generator, which will cause that the rotation speed is too high.	Re-adjust the speed controller

3-1-6 Abnormal sound

Phenomenon	Causes	Methods of elimination
Tapping sound	The piston, cylinder and piston ring are worn.	Replacing the wearing parts.
	The connecting rod, the piston pin and the pin hole are damaged.	Replacing the wearing parts.
	The crankshaft main journal wear	Replace the bearing
	The piston ring will break off.	Replacing the piston ring
	the valve clearance is too big	Adjust the valve clearance

Metallic tapping sound at explosion	Too much combustion-chamber deposit	Clearing away the deposit
	The fuel marking No. is wrong	Replacing the fuel oil
	Overheat of the generator	Check the cause and eliminate it
Others	Improper adjustment of the valve clearance	Re-adjust the valve clearance
	The connection between the flywheel and the crankshaft is loosened	Reinstalling it

3-1-7 No DC output voltage

Phenomenon	Causes	Methods of elimination
No DC output voltage	Tripping breakers	Find out the cause of the overload and reset circuit breakers
	Diode fusing	Please send to company repair station
	The circuit connection errors or fall off	To pick up the Lines
	Rectifier is damaged and DC winding open circuit	replace the rectifier components、stators

3-1-8 Generator stator winding overheating

Over load	Operators must be stipulated in the generator to adjust load, to avoid overload
Generator air duct was blocked, core box of dust covered the surface of the coil is not easy to transfer heat	Regularly check and remove the generator internal obstruction and coverings, and often keep the air duct cleaning, maintain normal cooling conditions
Stator winding short circuit or grounding	Check whether the stator winding is short circuit, with a megger. check whether stator winding grounding, repair or replacement of winding for short circuit and grounding

3-1-9 Indicator flashes

1. Green light on: it means work, generator output;

2. Green light on, red light flashing: overload, generator output

3. Green light off, the red-light flash once, after the interval 3S flash repeat: represents the front end of generatrix voltage is too low, no generator output;

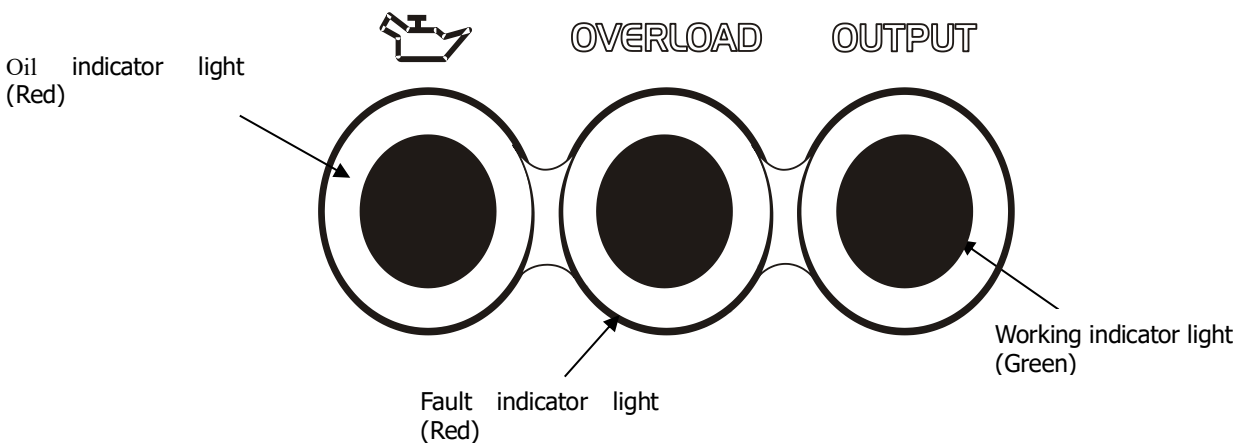
4. Green light off, the red-light flash twice, after the interval 3S repeat: represents engine speed is too low, no generator output;

5. Green light off, the red-light flash three times, after the interval 3S repeat: represents inverter temperature is too high, no generator output;

6. Green light off, the red-light flash five times, after the interval 3S repeat: represents the front end of generatrix voltage is too high, no generator output;

7. Green light off, the red-light flash six times, after the interval 3S repeat: represents output load is too high, no generator output;

Attention: Red light stand for fault indicator light, Green light stand for working indicator light



3-2 Preparation before maintenance

3-2-1 Safety factors

Warning！ If the following precautions are not observed, the warranty of generator will be invalid and generator may be damaged or people may be injured. Therefore, users should be especially careful of the following precautions before using generator:

1）Connecting the load strictly following manual on its rating plate; be sure not to run it overload or over-speed or under slow speed of revolution for a long time.

2）Using the fuel oil and engine oil of specified ratings, conduct sufficient sediment and filtering before using them. Refueling device should be kept clean and the engine oil should be changed regularly

3）Check if the fastening bolts on generator are tight enough regularly and tighten them in time

4）Clean air filter elements regularly and replace them when necessary.

5）The generator adopts forced air cooling so be sure to clean the sundries and dirt on its parts like cooling fin and wind scooper in time to ensure the normal cooling performance of generator

6）Operators should be familiar with the working principles and structure of the generator and know how to operate emergency stop buttons and all the control parts. Be sure to conduct regular maintenance and timely eliminate the faults found; it’s prohibited continuing to run the generator after faults happen to it.

7）Please be sure to keep the generator at least one meter from buildings and other equipment before operating it and keep good ventilation; Don’t put any inflammable (like gasoline and matches) beside the generator or close to the running generator to prevent the fire risk.

8）Refuel the generator at the place with good ventilation and with it standstill and no smoking, open fire or spark at the place or fuel oil warehouse.

9）Don’t overfill the oil tank and the fuel oil shouldn’t overflow; if it overflows, the overflowing oil must be cleaned thoroughly and volatilized before starting the generator

10）Don’t run the generator in a confined space or a place with terrible ventilation.

11）When the generator is running or just stopped for a short time, don’t touch the muffler to avoid being burned. In order to prevent burn or fire, don’t move or store the generator before it cools down.

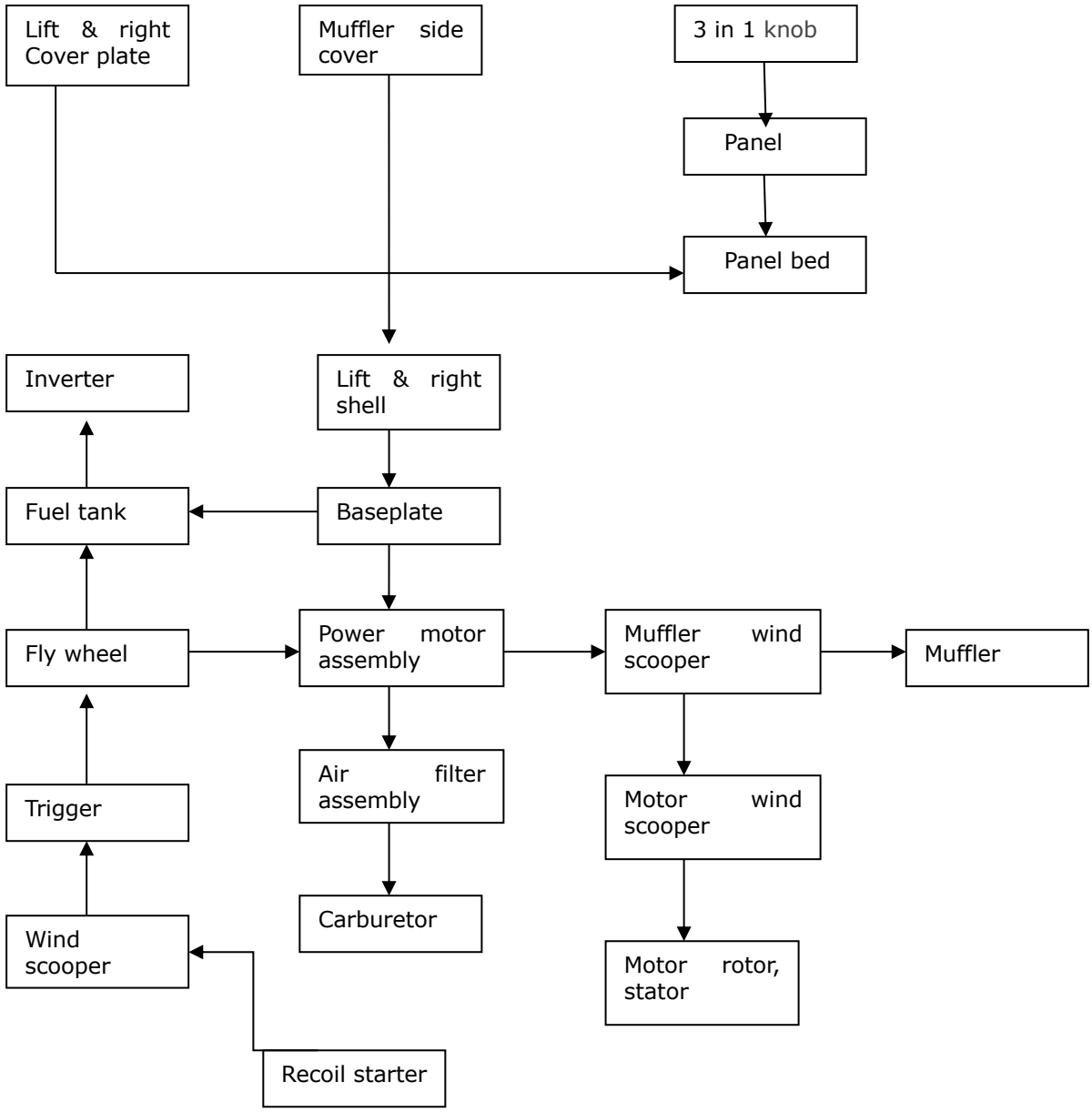
12）Safety Warning Label

- Please read the warning label carefully before using the generator; our company shall not be liable for the personal injuries or equipment damages caused by ignoring the warning label

3-2-2 Special Tools

Tool Name	Purpose and Remarks
1. Motor stop lock tooling	when motor tighten add torsion
2. Motor Puller	The removal of the motor
3. The valve adjusting tooling	adjust the valve clearance

3-3 Disassembly Diagram

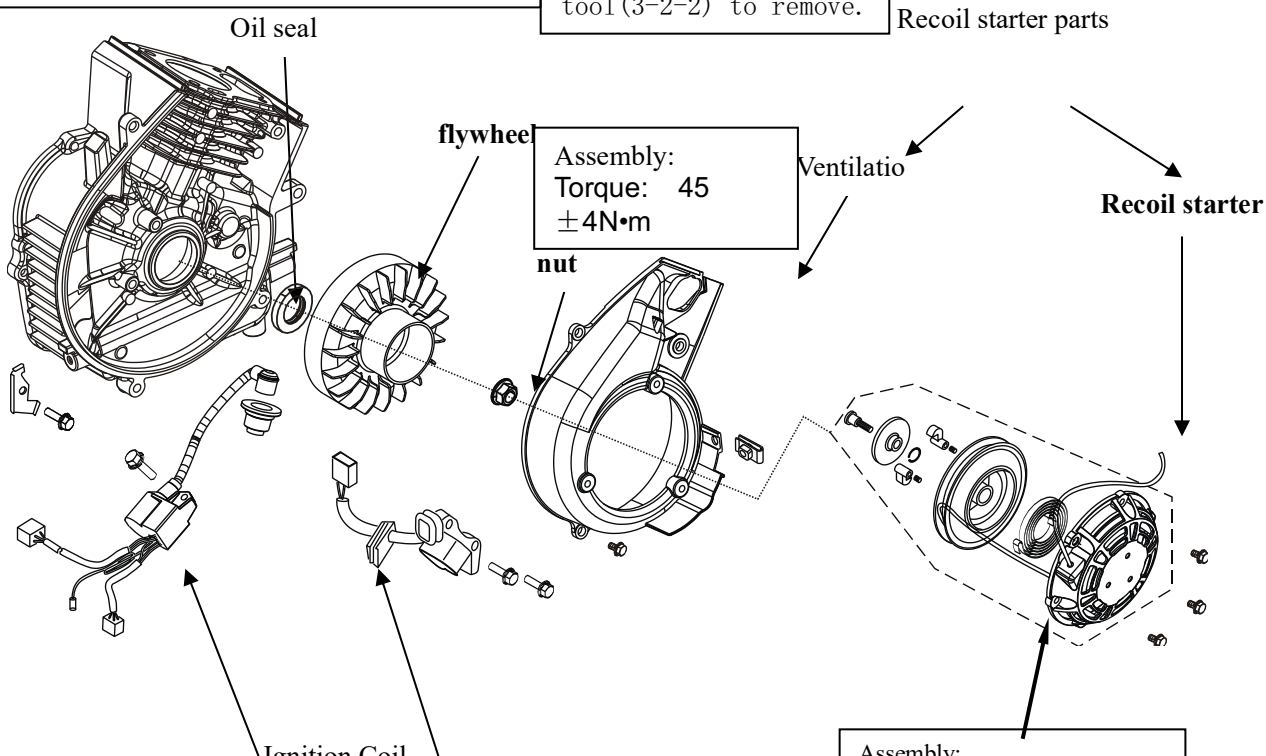


3-4 Engine

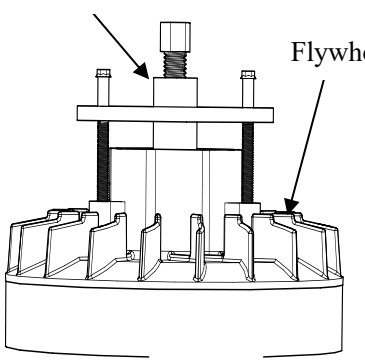
3-4-1Recoil Starter/flywheel/ Ignition Coil

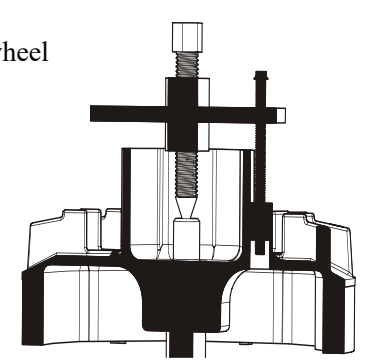
Disassembly: check whether the flange clearance is too large or other problems.Please update with new one if it happens.

Disassembly:
Should use a special tool(3-2-2) to remove.

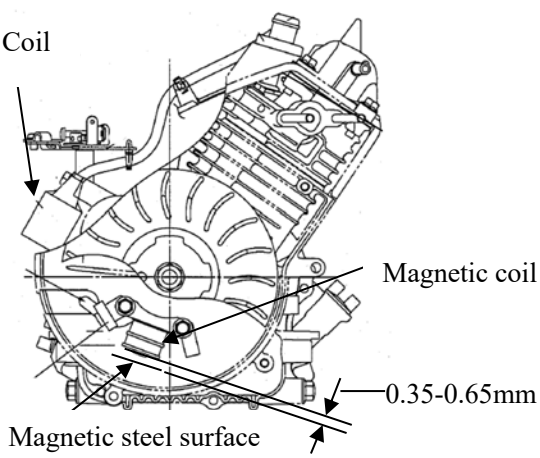


- Tool





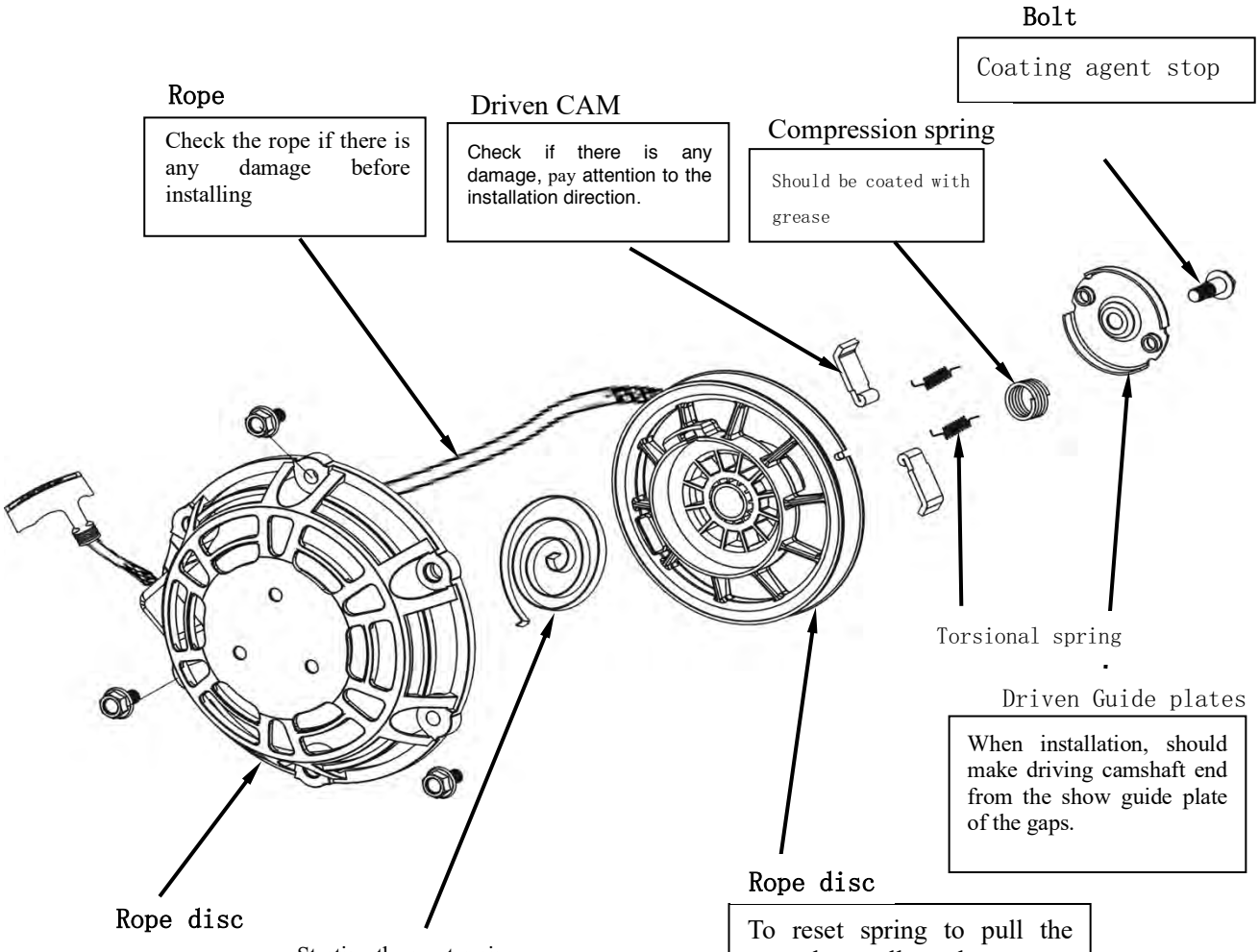
Ignition Coil



1) Recoil starter

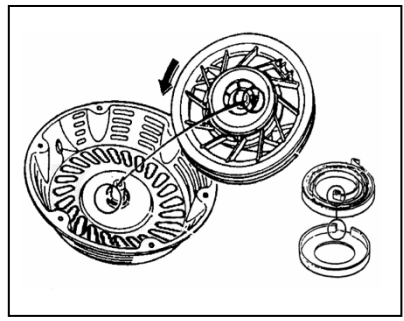
Note

- **Be careful when you disassembly, do not make the starter coil spring pop up, please take on the gloves when operating**
- **Be sure the rope without break or wear before installing.**

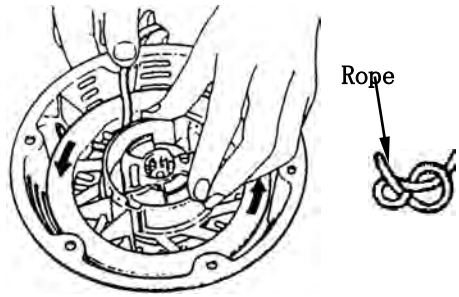


Installation Instructions

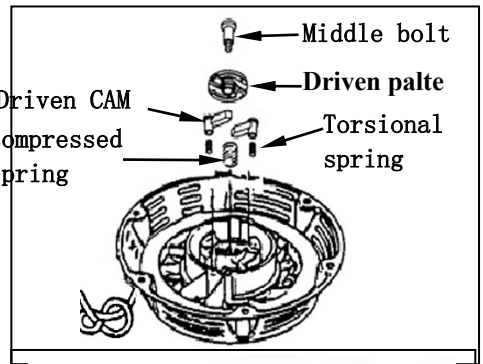
a. Put the reset spring in the seat cover, the hook on the outside of the reset spring should hang around the cover gaps and to align the rope groove, then assemble the seat cover to pull on the rope tray. With the starter cover card claws coating oil, then turning left when installing, just make the reset spring inside the hook in starting cover card claws.



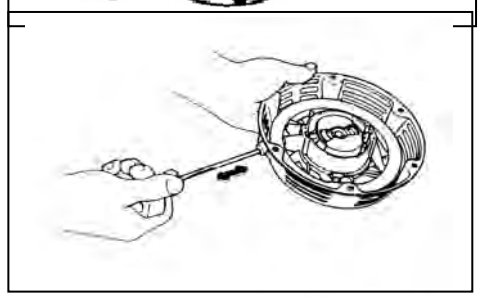
b. Knotting on the end of the rope, and then the other end of the rope pull hole some wear out. And then pull on the rope plate coil five laps in counterclockwise direction. Let the start rope through the starter cap hole, in the department to make a pull rope "8"Knot.



c. Install the driven CAM,Torsional, driven plate and middle bolt.



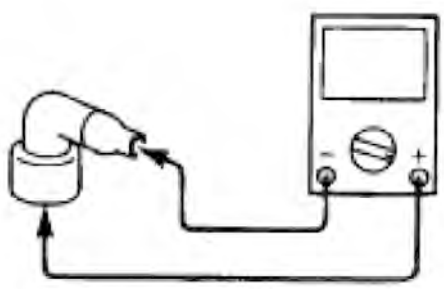
d. Pull the starter rope several times, check if the driven CAM return to status.



2) **Check the ignition coil**

Spark plug cap

Put the tester (follow the picture) with spark plug cap,



to test the spark plug cap's resistance value

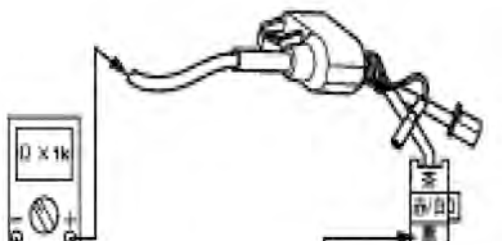
Spark plug cap resistance value:5Ω

Igniter

Put the tester terminal with the High-voltage wire coil and iron core, to test the

secondary side of the coil resistance.

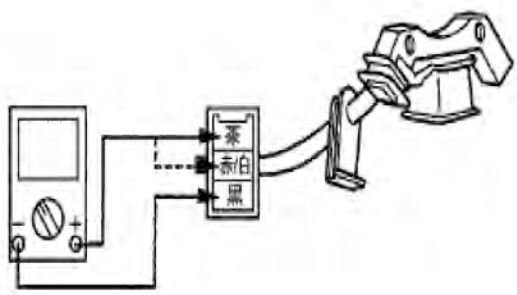
Secondary side of the coil resistance value: 3kΩ



Charge Coil

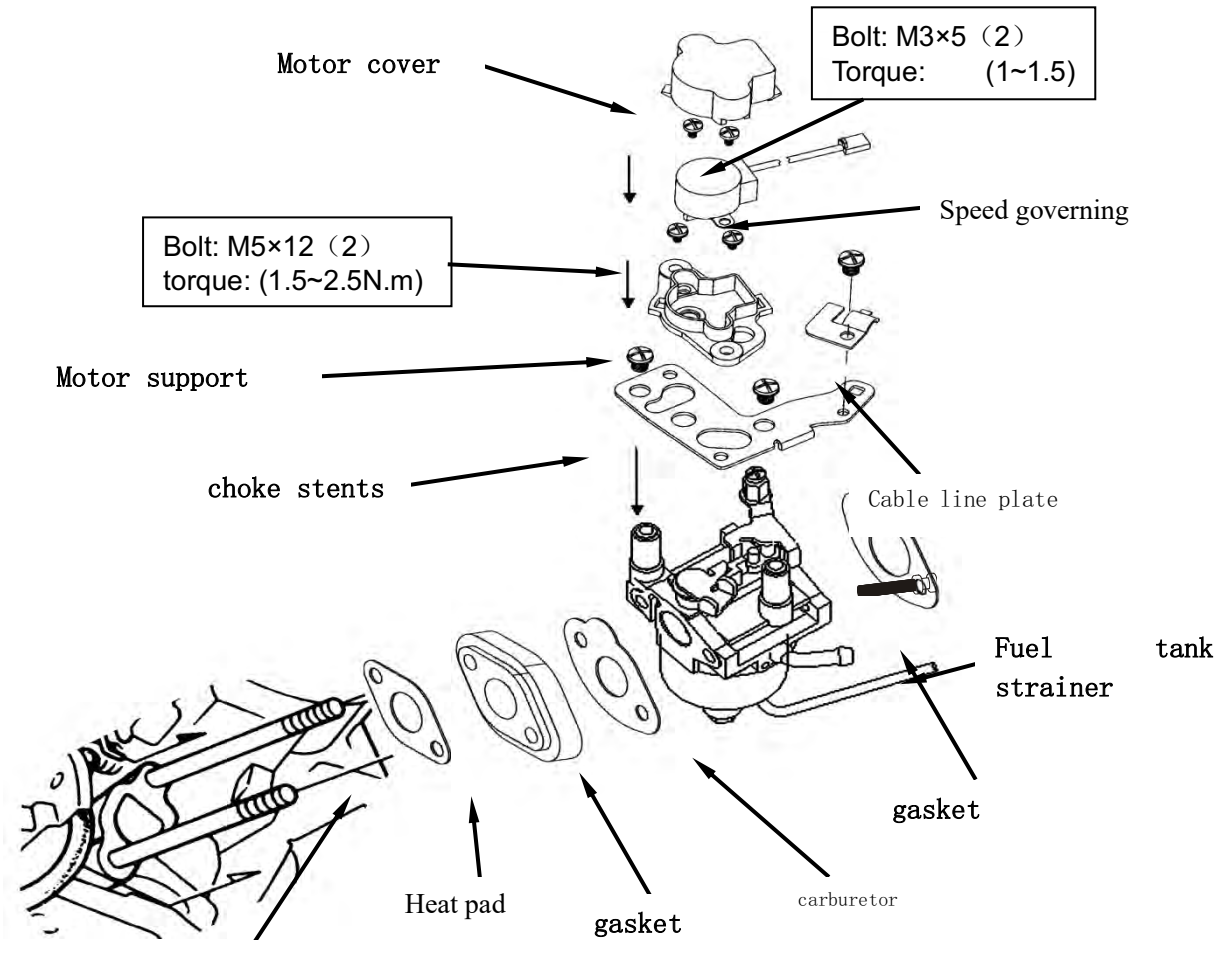
Put the tester (follow the picture) with charge coil, to test the charge coil resistance value.

Charge coil resistance value:350Ω



3-4-2 Carburetor

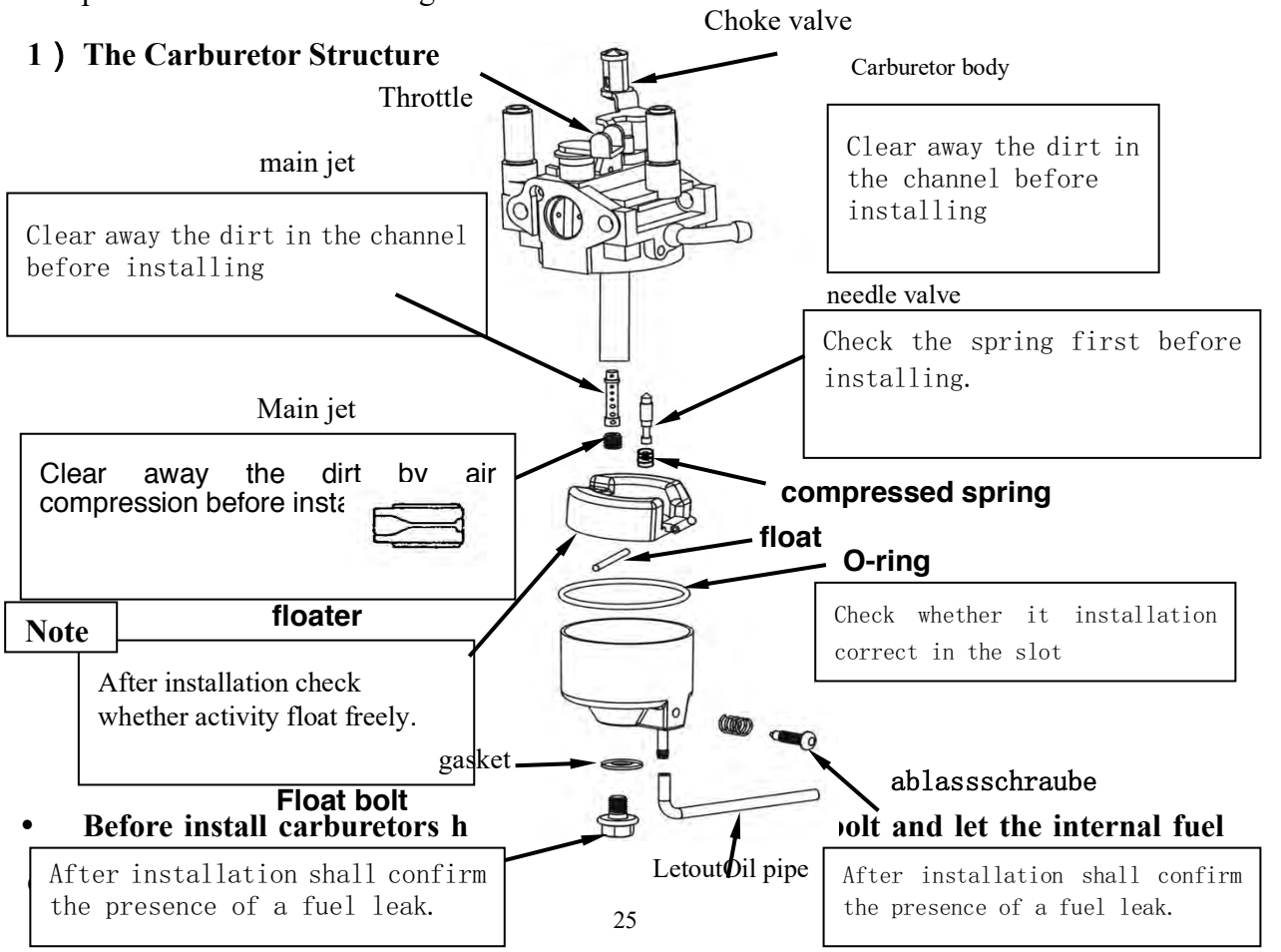
Disassemble the Carburetor



Gasoline is by the fuel tank through the fuel filter into the carburetor, fuel filter can filter out the impurities and the gasoline oxide of the tank. If the quality is flawed, there will be some impurities through fuel filter into the carburetor. At same time, gas contained can form gel ingredients after long time deposit will condense out of the colloid, attached to the carburetor parts (such as main orifice), oil and float on the surface .The air is through air filter into the carburetor, it based on the air intake resistance cannot be too big and other factors considering, filtration unit cannot too dense, so some tiny impurities in the air is still can into the carburetor

To clean the carburetor should be clean with specific area. Firstly, to wipe carburetor surface, the cleaning of internal parts can use special carburetor cleaner or industry .Except the impurities, should pay attention to clean the gasoline gum on the surface of the parts .The parts need with compressed air blowing off, cloth or paper will not be used to wipe ,in case of pollution again. Blocked poke holes should not use steel wire and other hard objects, it will protect carburetor performance by changing the aperture changes, and it can used or compressed air to clean out of gasoline.

1 ） The Carburetor Structure



- **No fire.**

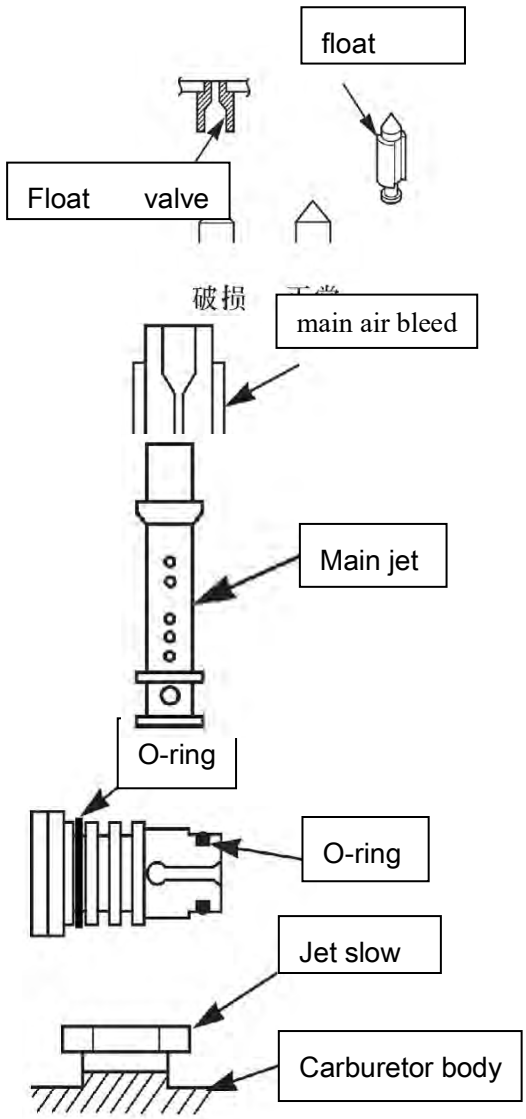
3) **Carburetor Installation**

a) Check the float valve and float valve seat before installation.

b) Use compressed air to clean before installation.

c) Use compressed air to clean before installation.

d) Use compressed air to clean and Lubricate o-ring before installation.

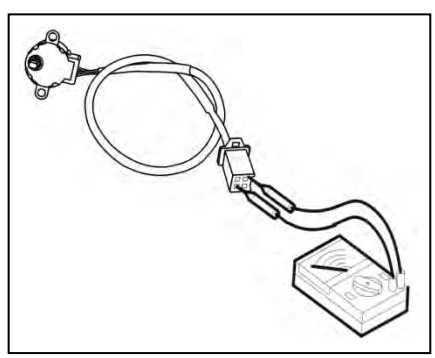


3-4-3 Speed control stepping motor

Check the motor socket within 2 resistance on the diagonal, resistance value: 50Ω±7%Ω

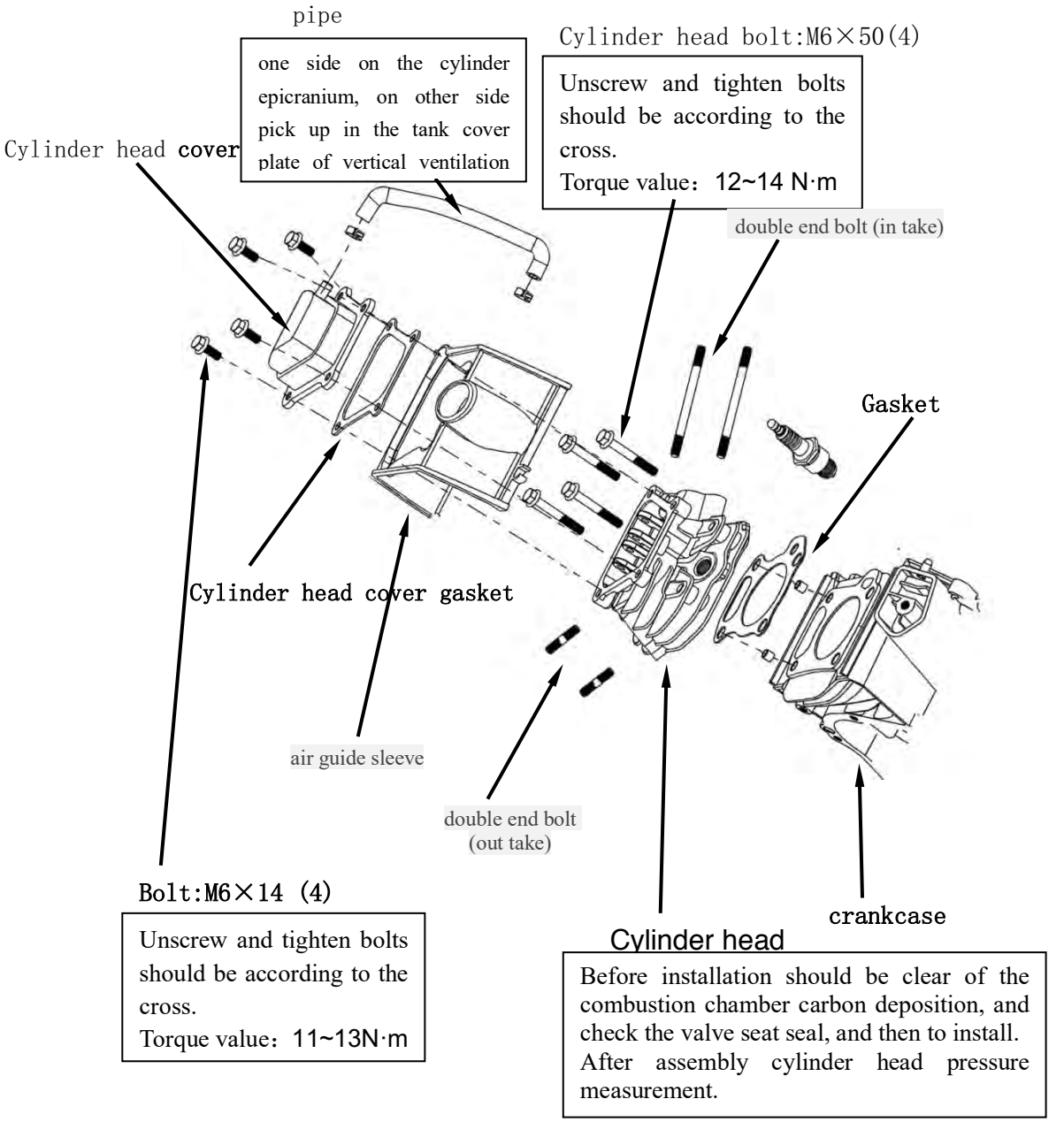
If it beyond the value,pls change a new motor

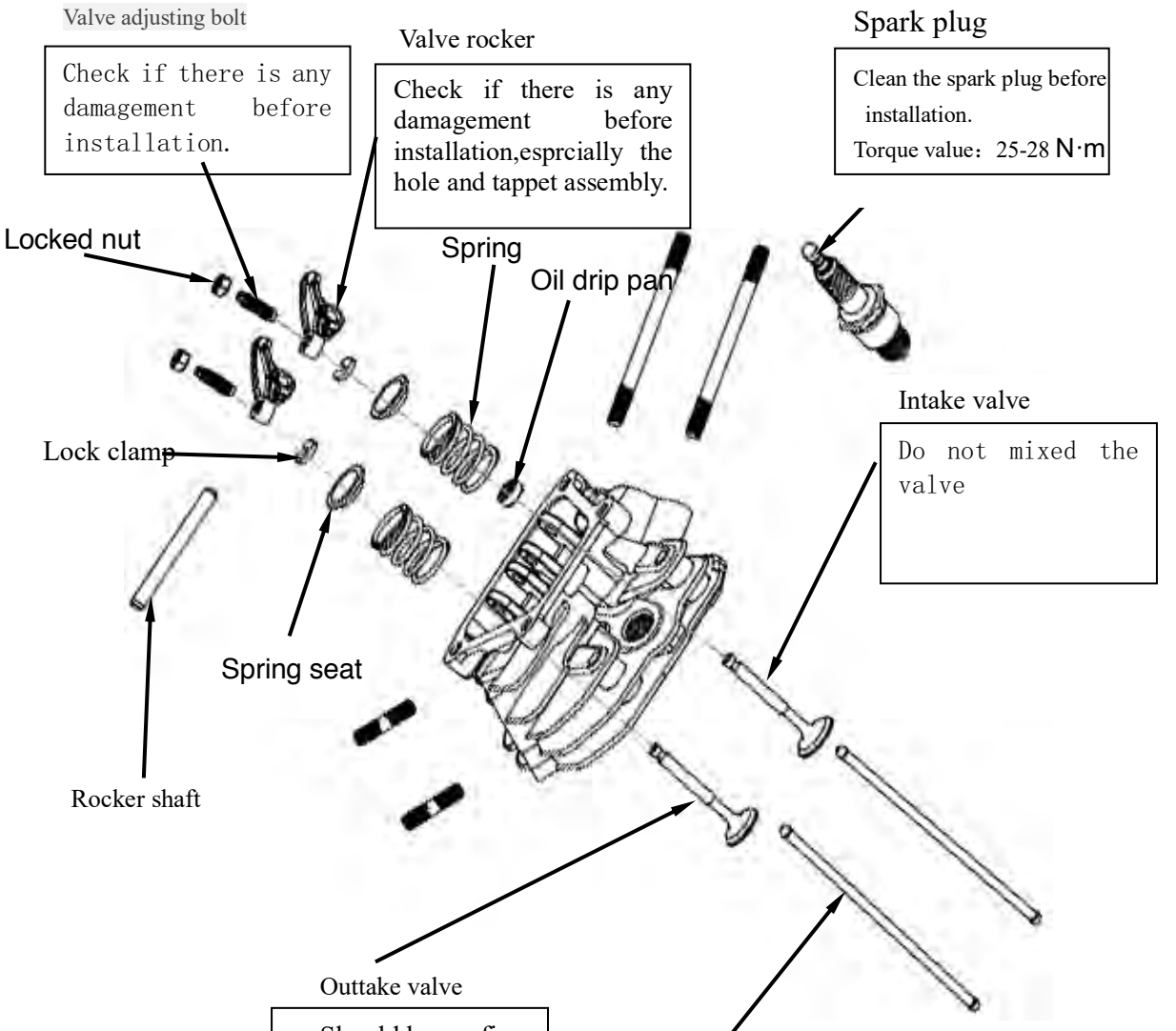
When the electric motor rotating parts center axis, it should not be a hairpin loose phenomenon. If it is, please change a new motor



3-4-4 Cyliner Head

1) Remove/Installation




Valve adjusting bolt
Check if there is any damagement before installation.
Valve rocker
Check if there is any damagement before installation,esprcially the hole and tappet assembly.
Spark plug
Clean the spark plug before installation.
Torque value：25-28 N·m
Locked nut
Spring
Oil drip pan
Intake valve
Do not mixed the valve
Lock clamp
Spring seat
Rocker shaft
Outtake valve
Should be confirm the valve is no damage before installation
tappet assembly
Should confirm no wear and tear on both ends, the lever body integrity first, and then through the cylinder head in the crankshaft box body tappet hole and put in place.

Valve spring seat：

Remove the front of valve rod from the middle of the spring seat hole.

Please noted that if the cylinder head installed on the cylinder, spring seat ring may be dropped in the crankcase.

2）Inspection/Maintenance/Repairing:

①Valve stem diameter

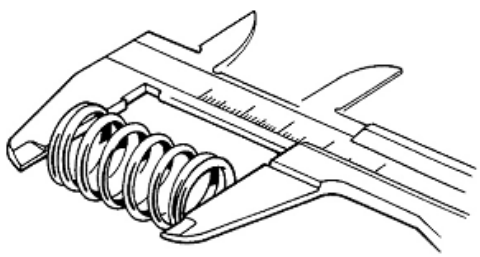
Using micrometer to check if the valve stem diameter is lower than the standard limit, visible to the naked eye, more maintenance gas appearance has ablation or crack. With above situations, you'd better to change with the new one.

Standard		Maintenance Limit	
3.97~3.985 mm（intake）	3.935~3.95 mm（outtake）	3.900 mm（intake）	3.88 mm（outtake）

②Valve spring length

Measure the valve spring length.

If lower than the standard or out of maintenance period, please use new one.

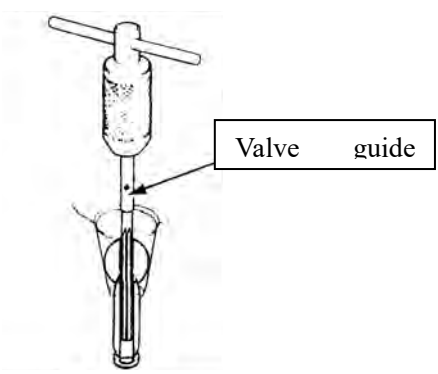


Standard	Maintenance Limit
28.5mm	27.5mm

③Valve guide pipe

Check：

a)check whether the valve guide pipe surface smooth or not, and without scratches and strain; valve guide pipe should cooperate well with the cylinder head.



b) Use the valve reamer to remove the carbon deposition before measuring inner diameter.

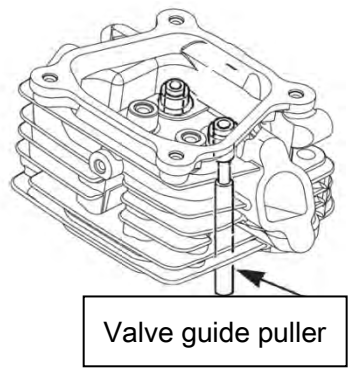
If lower than the standard or out of maintenance period, please use new one.

Standard	Maintenance Limit
4~4.012mm	4.060mm

Replacement:

a) To replace the valve guide into the freezer frozen 1 hour or so

b) **U**se the valve guide puller to remove the valve guide pipe from combustion chamber side.



Noted

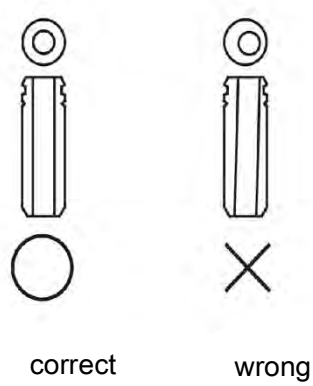
When remove the valve guide, do not damage the cylinder head.

c) Put the new valve guide pipe from the cylinder head valve spring

Exhaust valve side：

Knock the exhaust duct until the retaining ring in contact with the cylinder cover completely.

Intake valve side：Tapping into the valve guide until the prescribed height (measured from the top of the valve guide to the cylinder head surface)



d) After installation, please check whether there is any damage on valve guide pipe, if there are any damages, please use new one.

Reamer：

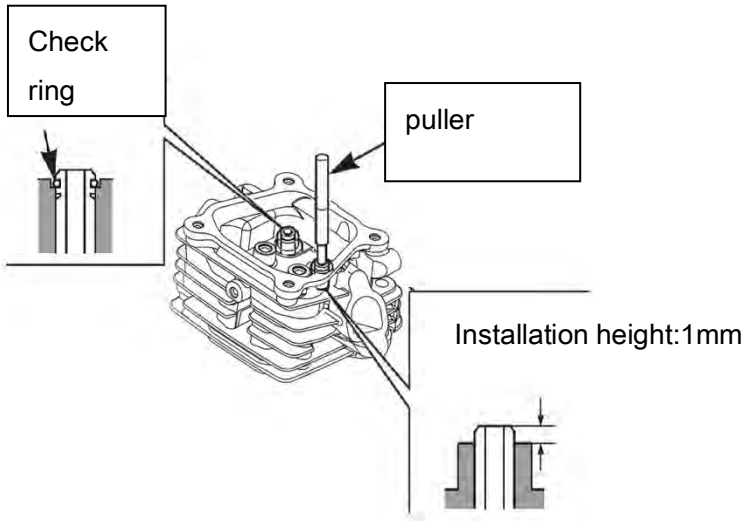
It is better to hinge the reamer with room temperature.

a) The valve reamer and valve tube coated with cutting oil. With the reamer screwing clockwise until all reamer screwing in the valve guide. Then according to clockwise pulled out the reamer from the valve guide pipe.

Tool：reamer

b) Thoroughly remove dirt and debris on the cylinder head.

c) Check valve guide hole, the hole should be located in the central and should be unobstructed. If not, the valve guide pipe may have been bent. With this bad situation, you should use a new one.



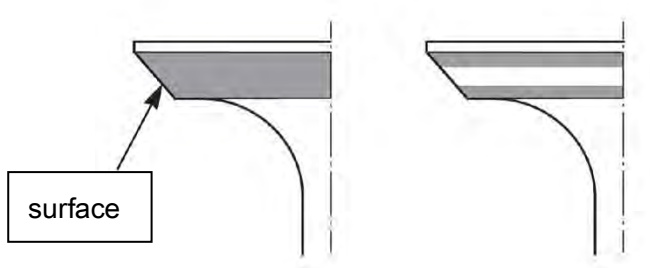
d) Check the clearance between the catheter and the valve stem.

e) Clearance between the valve stem and valve guide: the valve guide inner diameter minus the valve guide stem.

f) If the clearance between the valve stem and catheter values is out of maintenance limit, you should decide to replace a new catheter to clearance within the limit of maintenance, if so, replace the valve guide and stick ground valve guide. When replace the valve guide, you need rebuild the valve seat.

④Valve seat：

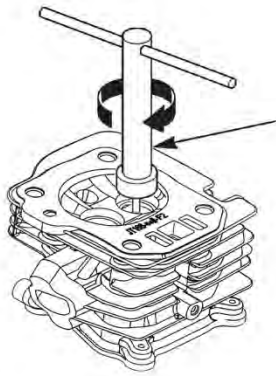
a) Completely clear the carbon deposition which on the combustion chamber and the valve seat, then smearing a thin layer of red lead powder, or other different wipe easily adhesion of the coating color.



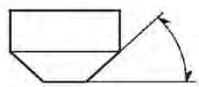
b) Insert valve and pushing valve a few times, but make sure do not rotate the valve on the valve seat. Developed coating valve seat, it shows that the closely with the valve; On the other hand, if it not,it suggests that different heart valve and valve seat.

c) With 45 ° mill to grind cutting, the valve seat to create a smooth concentric valve seat, only clockwise.

Tool： Valve grinding machine



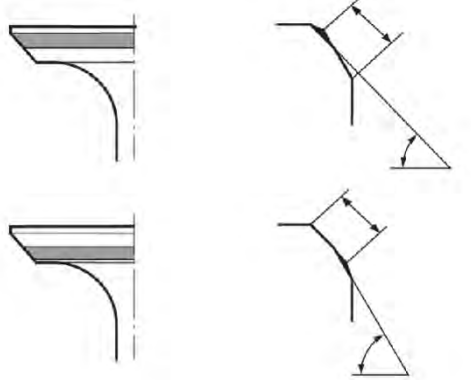
intake valve：32°
outtake valve：32°



intake valve：45°
outtake valve：45°

d) Using 32 ° to 45 ° mill to reduce and adjust the valve seat, to let it contact with the valve cone parts.

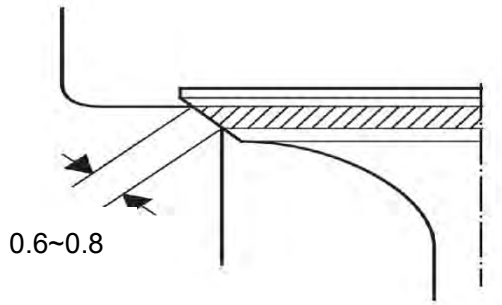
- Using 32 ° mill grinding valve seat at the top of the half edge (too high).
- Using 45 ° mill grind the valve at the bottom of the edge contact (too low).



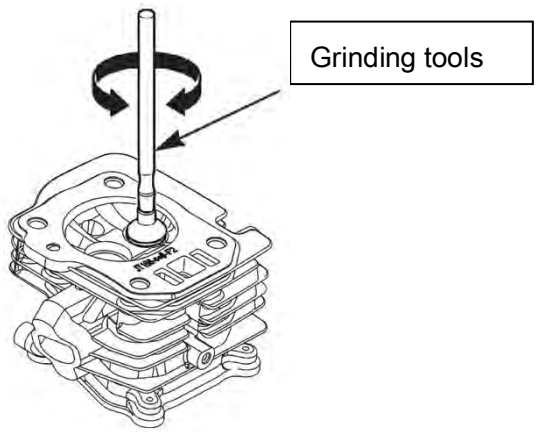
Standard	Maintenance limit
0.6~0.8mm	2mm

e) Using the 45 ° slight grinding mill to remove any burr on the edge of the valve seat.

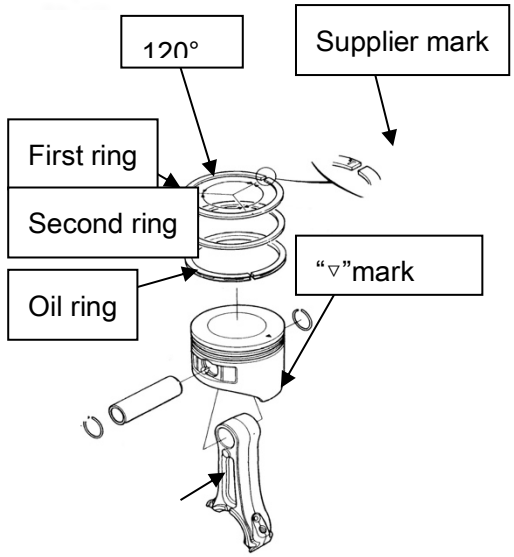
f) After rebuilt the valve seat, should be check the width of the valve seat. In the valve cone colorants, only insert valve and pushing valve a few times, but not sure that the valve on the valve seat. Valve seat's cone stained uniform coloring as shown, the valve and valve seat's cone good contacts



g) On the valve seat's cone daub abrasives, use valve grinding tool rotation to the valve seat to get up to speed.



h) Check valve clearance after installation.



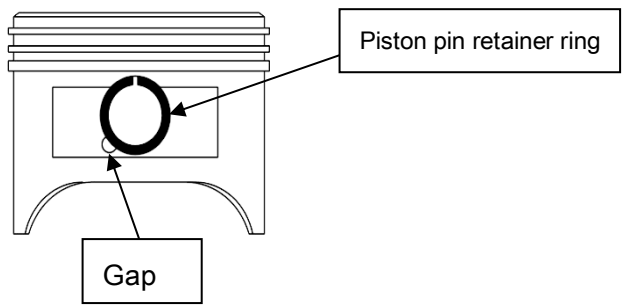
3-4-5 Crankshaft/Piston

① Installation

a) Piston

connecting rod: Toward the side of the big end of a long piston "del" tag, installed on the piston。

- Use supplier mark up during installation. Be careful not to put first ring confused with second ring (a ring with chrome plating)。
- After installation to confirm piston ring.
- Make each piston ring opening to avoid the direction of the piston pin, and 120 °.

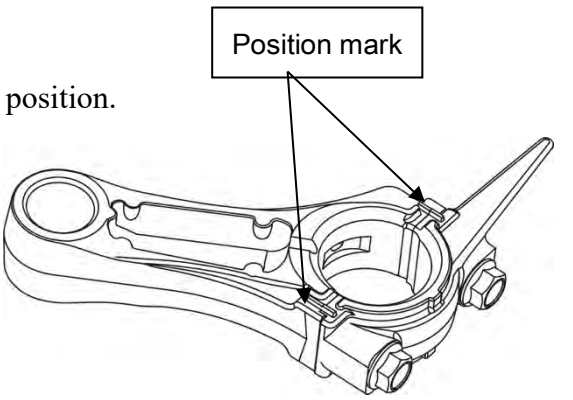


b) Piston pin retainer ring

Put the front at the piston groove, then using long nose pliers clamp at the other end, turning install it in the slot at the same time. But you should avoid the gap of the piston ring.

c) Connecting rod cover

When installation, you should put the edge of connecting rod and connecting rod at same position.



② Detection of piston

Check the contact situation, the piston and cylinder top ring groove defect, ablation and crack etc. If the damage is serious, you should use the new one.

Remove the carbon deposit

The carbon deposit located on the top of the piston and cylinder flowing edge part. You should be cleared away before testing carbon deposit. Firstly use kerosene wet saturated carbon deposit, and then be removed using a blunt knife or metal brush.

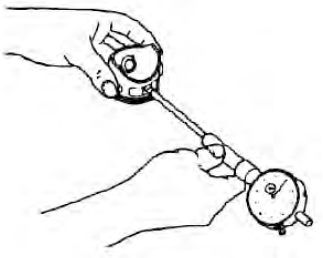
a) Piston skirt diameter

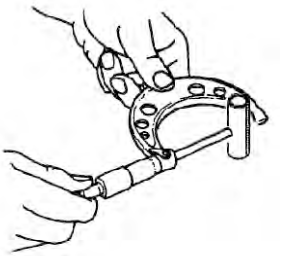
Piston skirt diameter is measured with outside micrometer, if it beyond the limit, it shall be replaced.

Standard	Using limit
48.57~48.59mm	48.655mm

b) The clearance of piston pin hole and piston pin

With inside diameter micrometer to measure the piston pin hole diameter, and outside micrometer to measure the piston pin outer diameter .Then calculated by the measured results. If it beyond the limit, you can change the piston or piston pin with your own need.





Standard	Using limit
11.002~11.01mm	11.02mm

b) Piston- Cylinder gap

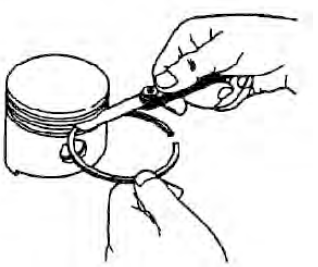
The biggest diameter of the cylinder minus the piston skirt diameter

Note

Be tested the gap before and after repairing.

When you checking, the inverted piston should be in the cylinder, put the appropriate thickness gauge on the pressure surface between the cylinder wall and piston skirt, and then take out feeler gauge, if you feel some certain resistance, but you also can smooth out, that is clearance between the piston and cylinder.

Standard	Using limit
0.01~0.045mm	0.135mm

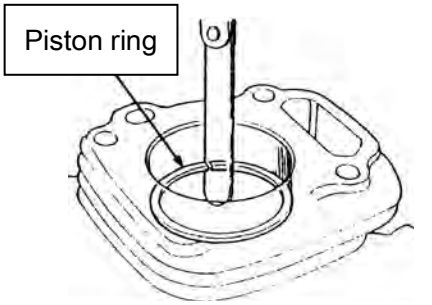


c) The gap of piston ring side

Piston ring should be free rotation, neither loose nor sluggish acerbity. Then insert ring and groove in the plane of the upper and lower clearance with a feeler gauge in the measurement

Standard	Using limit
0.015~0.05mm	0.12mm

e) Piston ring closure gap

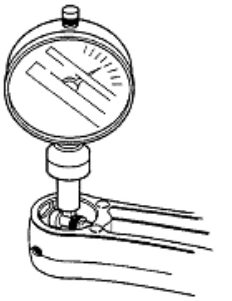


Put the piston ring into the cylinder, push the piston ring head to the work position, and then use the gauge to measure the opening gap .The gap should not too big nor too small .Too big ,it will make the cylinder sealing performance get poor ,when it starts, the piston ring will be expansion and stucked in the cylinder .If the ring opening gap is small , usable fine flat file filing .The file should be put inside the cylinder to check, until clearance is fitting.

	Standard	Using limit
First ring/Second ring	0.15~0.30mm	0.6mm

③ Detect the connecting rod

If the connecting rod bending, distortion, or cracking etc., you should the replacement of new parts.



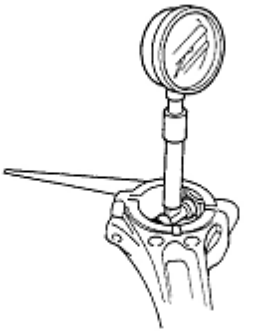
a) Detection of small diameter

If lower than the standard limit or out of using limit,

Replace with new one.

Standard	Using limit
11.006~11.017mm	11.050mm

b) Detection of big diameter



If lower than the standard limit or out of using limit,

Replace with new one.

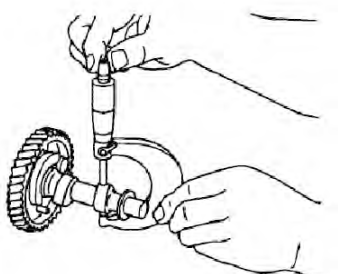
Standard	Using limit
22~22.013mm	22.04mm

④ The detection of the camshaft

Camshaft is gasoline engine driving parts, it controls the inlet and exhaust valve opened or closed according to certain rule.

Structure characteristics: satisfy the requirement of control inlet and exhaust shaft with CAM and supporting shaft neck. When the camshaft working, it bear the impact load of cyclical, camshaft face friction with the lifter, it is easy to wear or scratch. Therefore, camshaft should have good lubricity and wear-resisting.

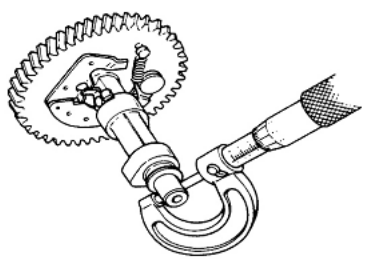
- Check the camshaft if there is any damage on the surface, the camshaft and bearing is loose, wear or tear .If it is ,you should replace all of them.



Check the height of the camshaft, when the height less than the maintenance period, you should replace the camshaft.

	Standard	Maintenance limit
Camshaft height intake	20.54mm	20.24mm
Camshaft height outtake	20.54mm	20.24mm

- Check the camshaft neck diameter, if it is less than the standard, you should replace camshaft



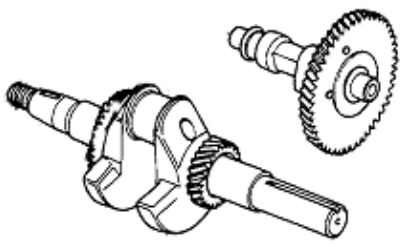
Standard	Maintenance limit
11.965~11.99mm	Using with the standard

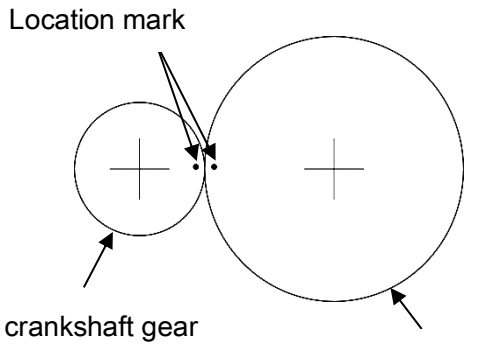
Wear reasons and affect for the engine performance:

Camshaft is wearing and tearing, the main reason is poor lubrication, such as low oil viscosity, impurities, small amount of circulating oil etc., cannot make the camshaft surface full oil film which lead to the camshaft with high speed dry friction state of the surface wear serious. The accuracy installation is the second reason. When the camshaft neck and camshaft bearing fitting clearance between super bad, camshaft rotating accuracy decreased, and the related parts of biased contact surface caused by abnormal wear.

⑤ Timing gear

Check the timing gear meshing clearance, it should keep on the involution marks location on both sides of the gear





Timing gear main wear by tooth wear, tooth surface spalling or coarse, f gear, gear tooth broken etc. Due to the tooth wear, the bigger the meshing clearance, the greater the noise.

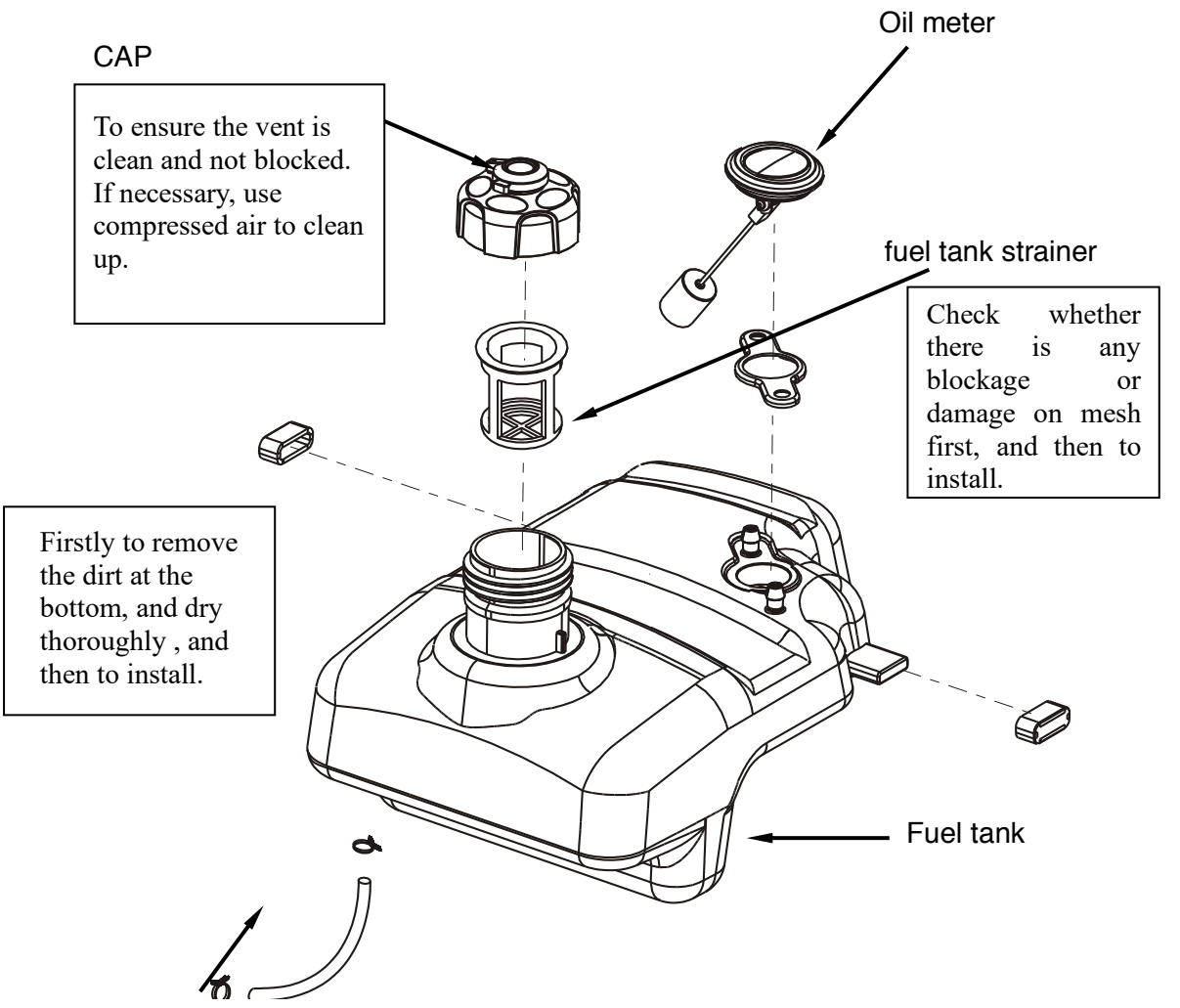
If the timing gear surface touch, lack of Angle, injury or damage, it should replace new one.

Note

It is best to replace the entire new parts, in order to match the meshing.

3-5 Generator

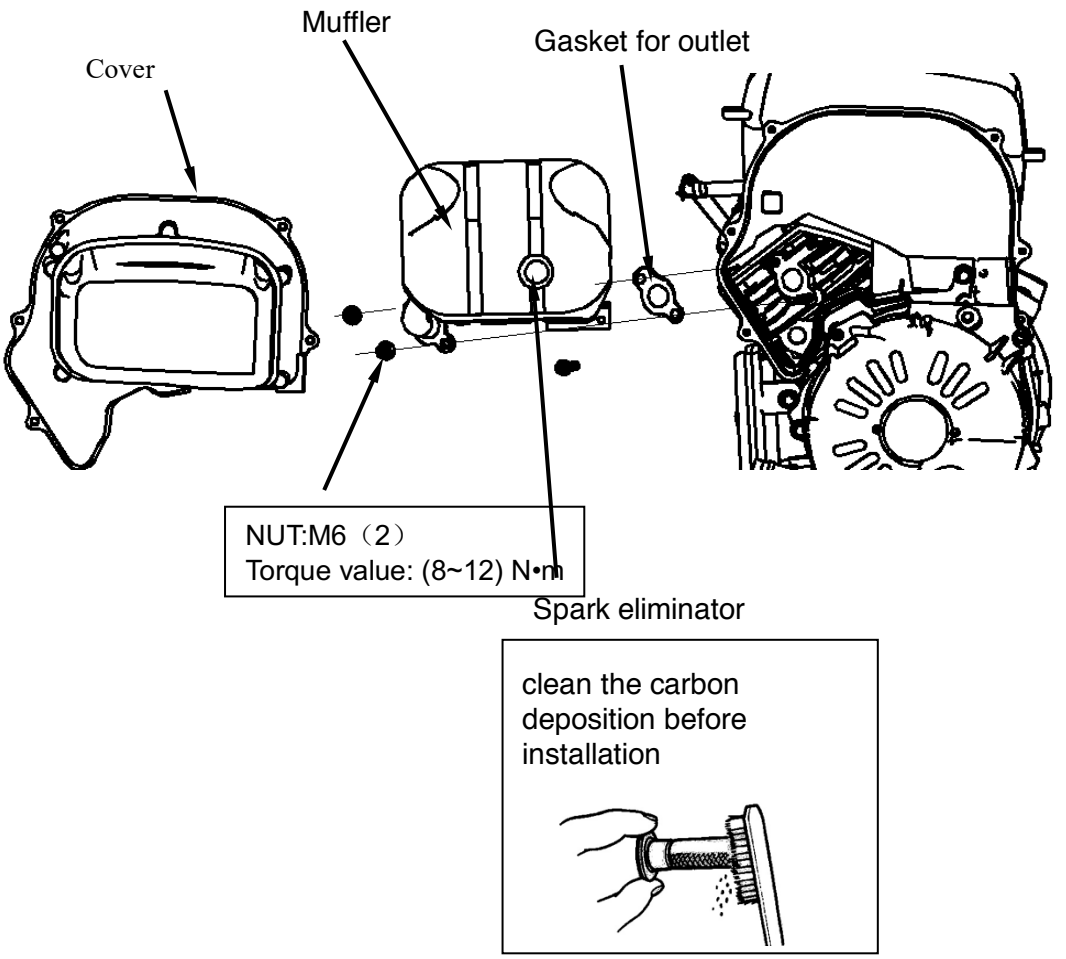
3-5-1 Fuel Tank



Note Installation attention

- Check whether there is any jam on vent oil before installation.
- Weather the fuel filter is blocked or damaged
- Weather the fuel hose is presence of aging and rupture.
- If have any problems, you should replace a new one before installation

3-5-2 Muffler



Note

Disassembly muffler as above picture

Muffler long-term use can cause carbon deposits, that can give the exhaust system a serious impact. In order to make sure exhaust system work better, we generally remove carbon deposits in muffler.

When removing carbon deposits in mufflers, plastic hammer is available to tap and use compressed air to remove

If the muffler reservoir drops, corrosion severely, so that the exhaust noise increases, should be replaced with new parts.

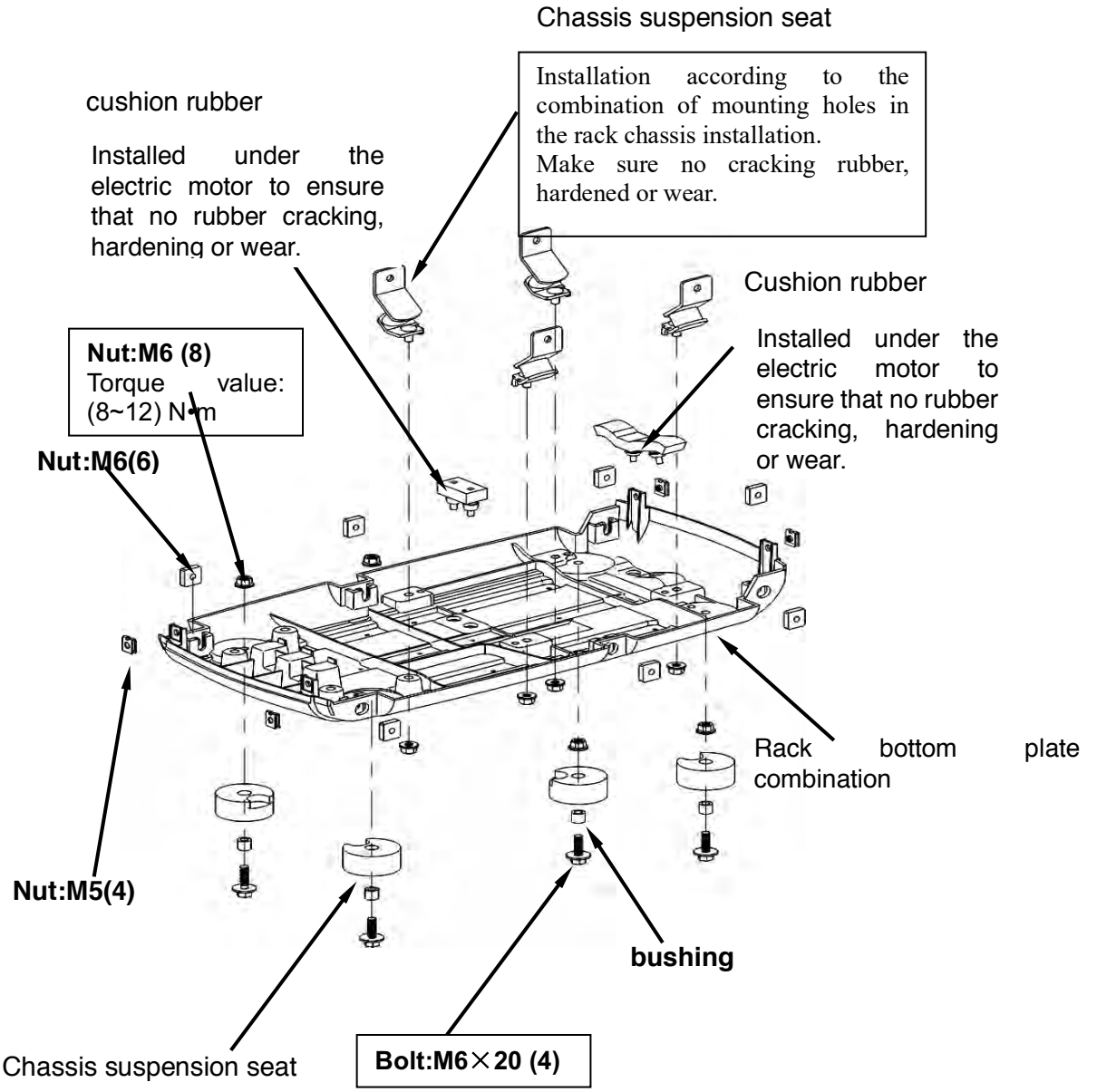
Note

Do not clean with iron wire, otherwise it may result in sound deadening material to fall out, thereby reducing the noise reduction performance. Muffler gasket cannot be reused.

Warning

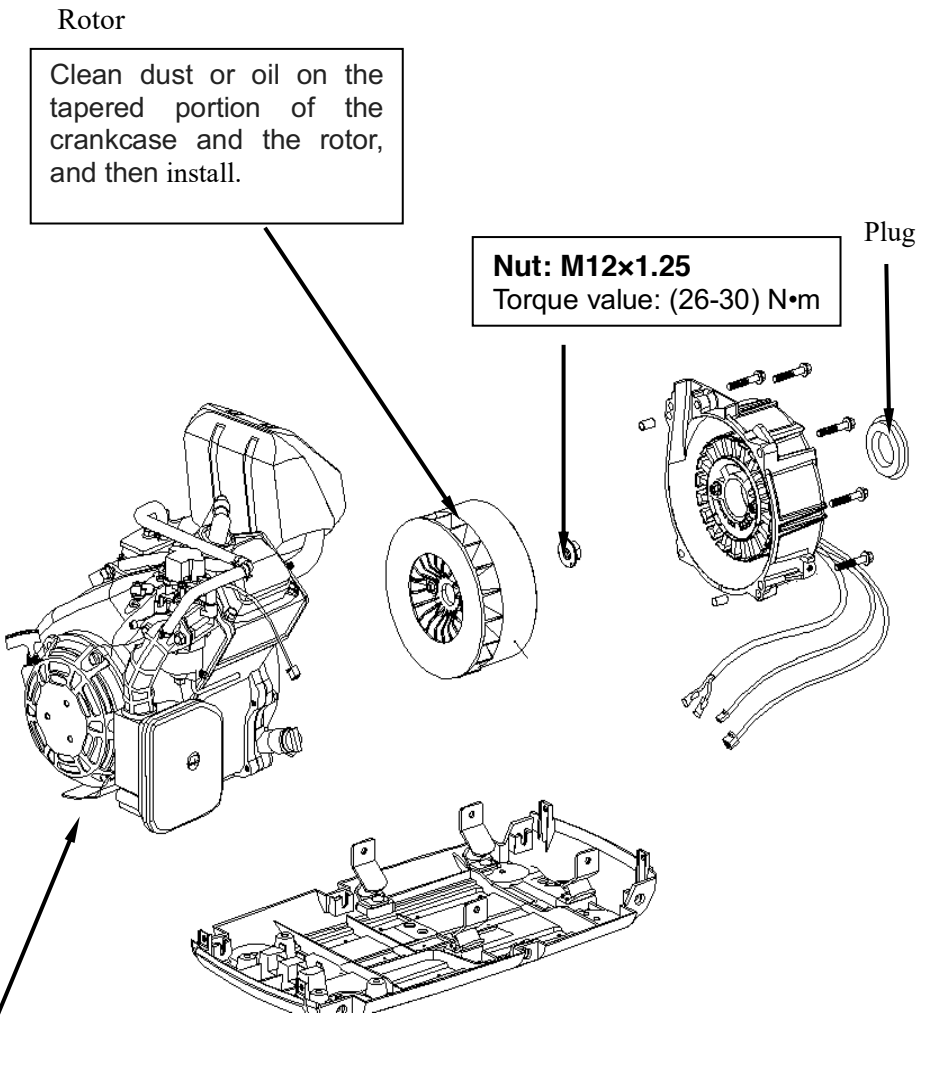
- **Muffler may very hot, keep the gasoline engine out of reach of passer and children.**
- **When the gasoline is running, do not place any flammable materials near the exhaust port.**

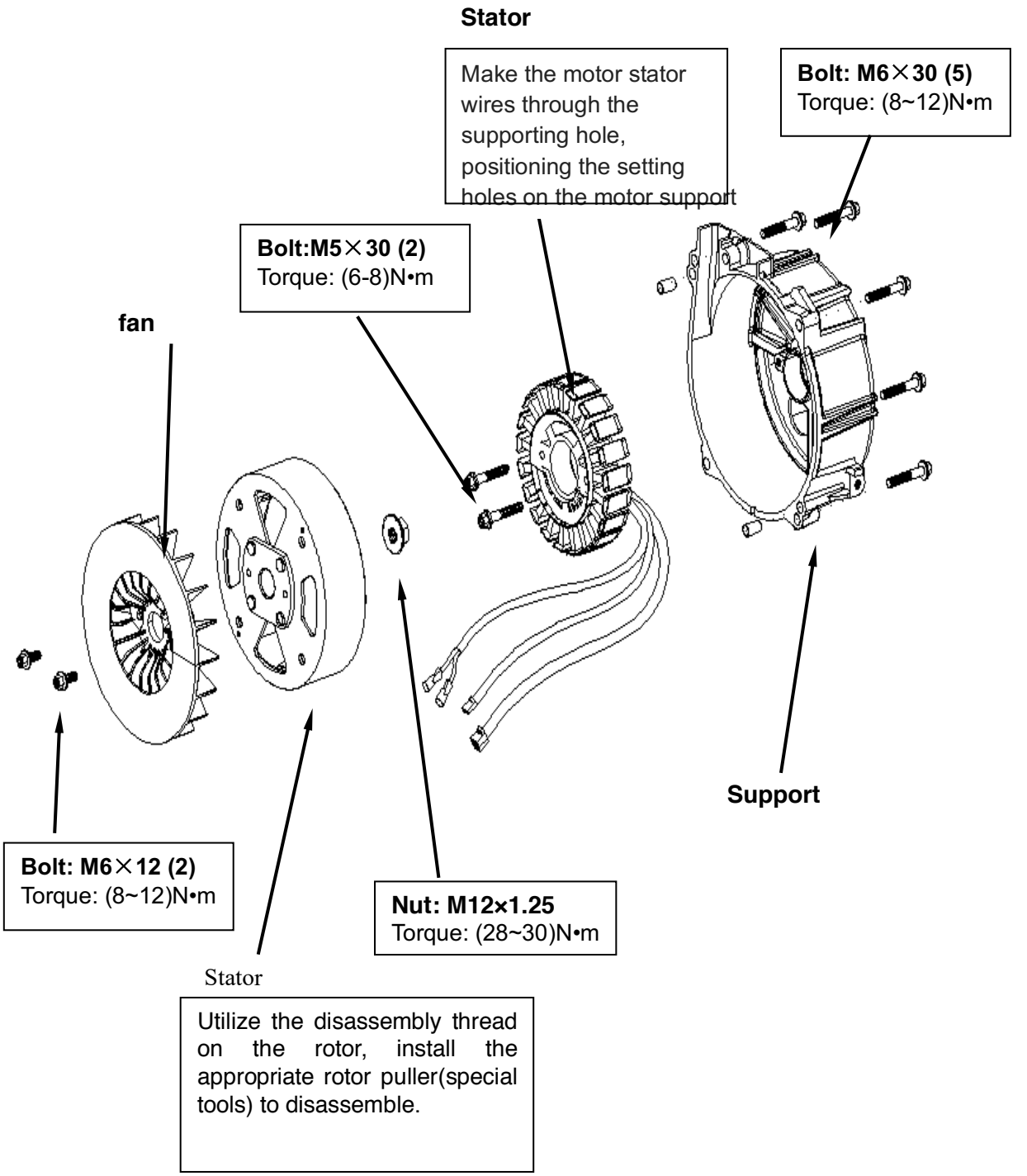
3-5-3 The chassis base composite



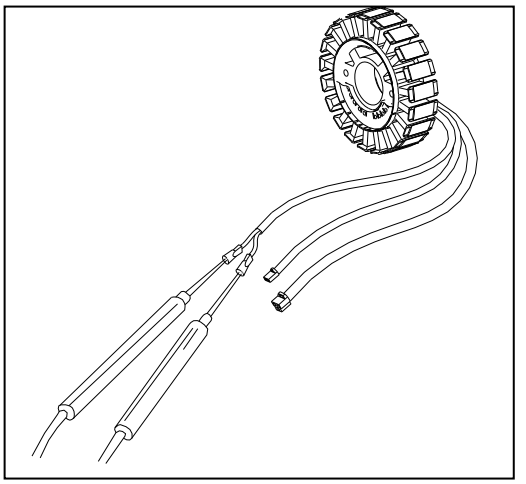
3-5-4 Motor parts

1) Disassembly and assembly：




Stator
Make the motor stator wires through the supporting hole, positioning the setting holes on the motor support
Bolt: M6×30 (5)
Torque: (8~12)N•m
Bolt:M5×30 (2)
Torque: (6-8)N•m
fan
Support
Bolt: M6×12 (2)
Torque: (8~12)N•m
Nut: M12×1.25
Torque: (28~30)N•m
Stator
Utilize the disassembly thread on the rotor, install the appropriate rotor puller(special tools) to disassemble.

2) Check



The main winding / winding power / DC winding.

No direct current output check whether the DC over current tripping, whether the DC socket is damaged. If damaged, replace the outlet.

No alternating current output check the AC outlet whether damage. If damaged, replace the outlet

Check whether the voltage between the electric motor stator and power windings. If there is voltage, replace the inverter. If there is no voltage, replace the stator

Note: To be careful when removing and installing the stator, to avoid damage winding wire and wire insulation.

Warning

Once the winding insulation resistance decreased, which means between the winding and the insulation has been damaged, if not promptly take measures to repair which would cause leakage, and endanger the people's and equipment safety. Learn for early winding insulation, be sure always measure the winding insulation resistance.

- **Winding insulation resistance against ground testing**

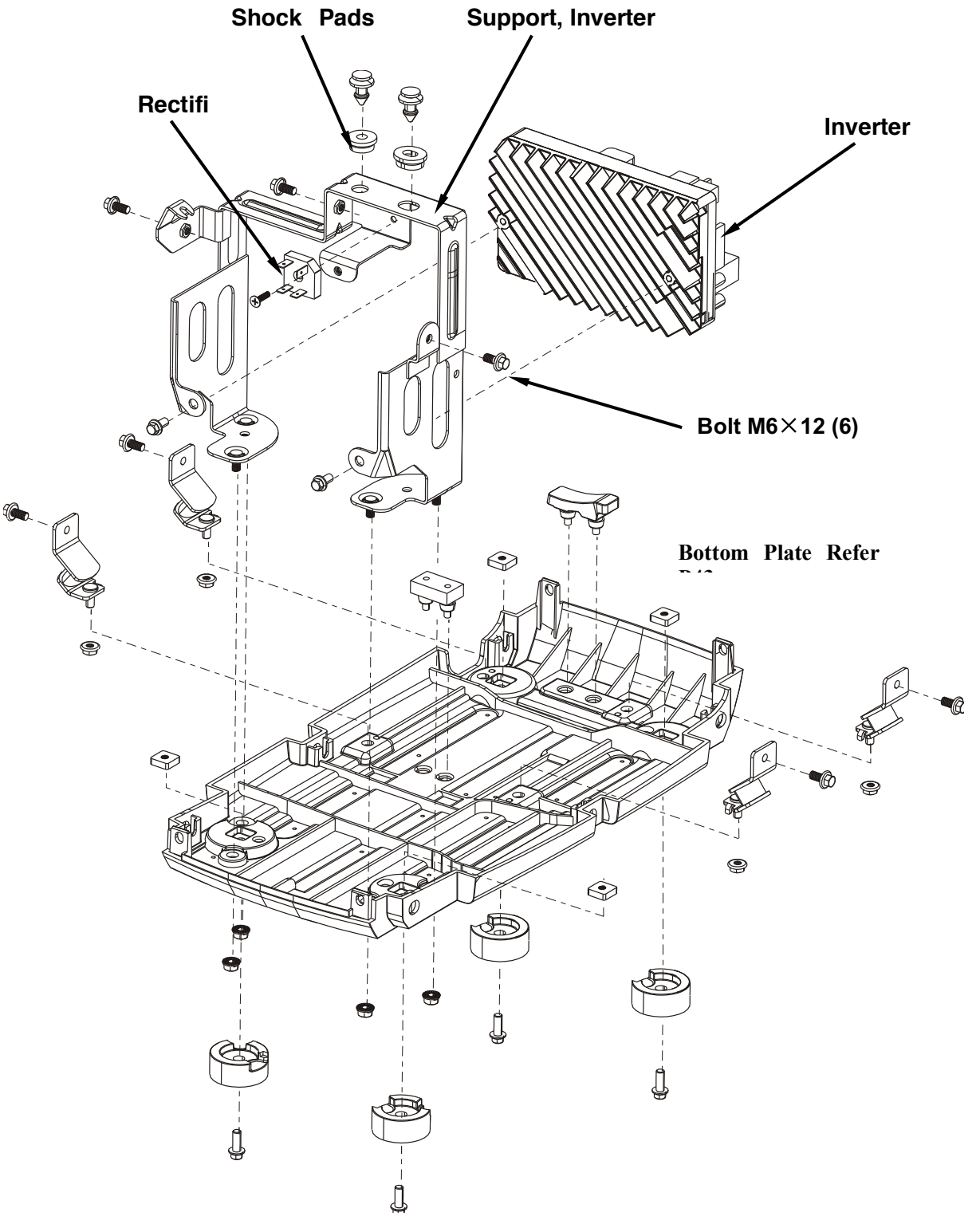
An any one of terminal of insulated wire winding connect to one terminal of test megger through insulation wire. And the other terminal connected to the core. Then handing megger from slow to fast. Hands along with yaw,when the hands steady which is the value indicated is the winding insulation resistance.

- **Generator windings circuit detection**

Using a multimeter electrical barrier test. Using multimeter red, black pen were exposed to both ends of the winding wire.If hands normal yaw, indicating that winding without disconnection.If the hands do not move, indicating that the tested winding can't get through, disconnection..

3-5-5 Inverter unit.

1) Removing and installing：



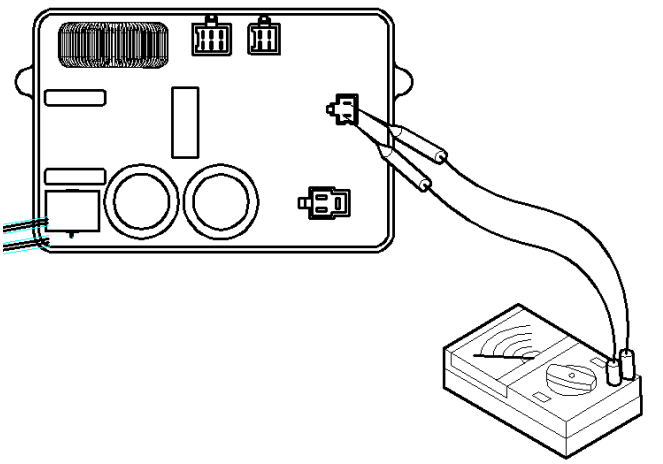
2) Checking

Invert Parts

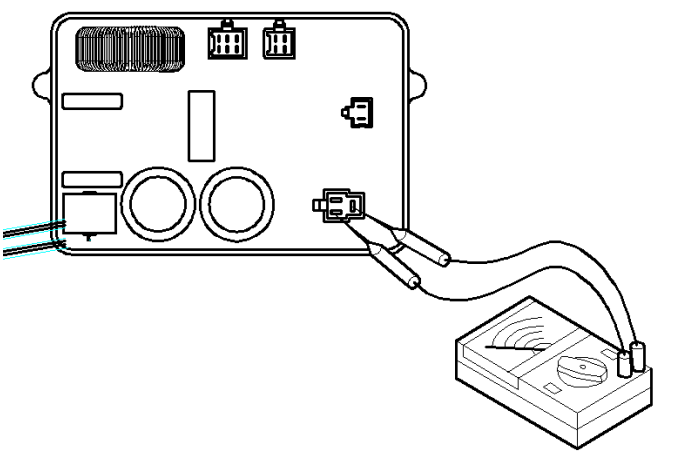
注 意	Inverters need to be detected in the generator operating state

Checking the wire on the inverter whether have color change. The upper inverter filled resin whether have blister-like projections. Checking all electrical components on the inverter, connectors and wiring no visible color change or damaged .

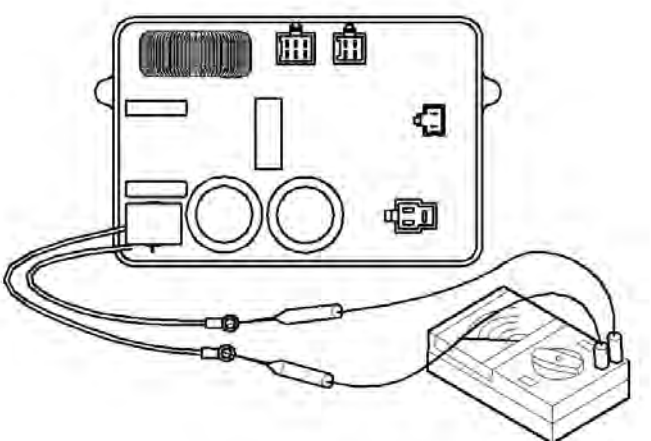
Input is Shorted Circuit (Low-voltage): Red Light. Green light off and no output. Using test megger (Low-voltage) detect low voltage socket, if the voltage is zero or below 5V, check the engine speed is normal or motor winding output voltage is too low.



Input is shorted circuit(three-phase): Red light, green light off and no output. Using test megger (High-voltage) detect high voltage socket if the voltage is zero or less than 150V, check the engine speed is normal or motor winding output voltage is too low.



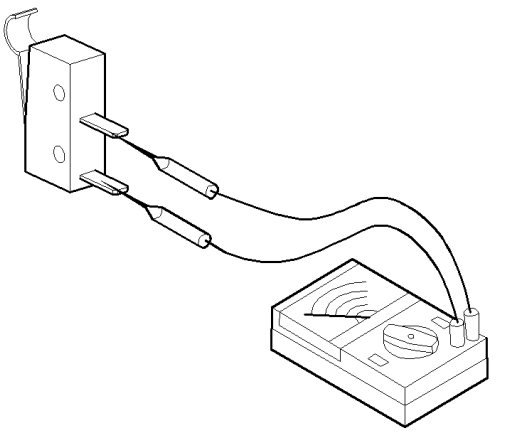
Output short Circuit: green light off, red light on. After disconnecting the output voltage of the inverter output. Using test megger Voltage detect detector profile, if the voltage is zero, replace the inverter.



Sensitive Switch

When spring is in the bounce state sheet, with an ohmmeter measure resistance between two output terminals. If the resistance is zero, replace the micro switch.

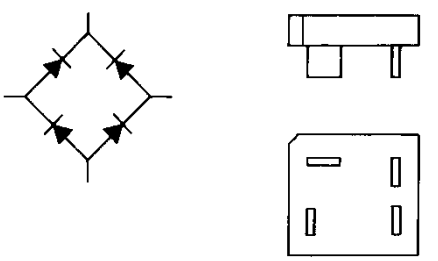
When the spring plate in a compressed state, with an ohmmeter measure resistance between two output terminals. If infinite resistance, replace the micro switch.



Rectifier

Rectifier bridge internal circuit as picture shown above. Multimeter to check each terminal of the rectifier bridge on/off

It's When the rectifier bridge instructions show on/off its instructions below normal.



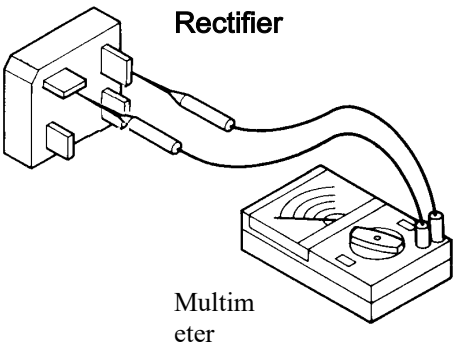
Tip 1: "Continuous" refers to a diode conducting special

Resistance

which is different from the short circuit when the check fails for any period,

Replacement of a bridge rectifier.

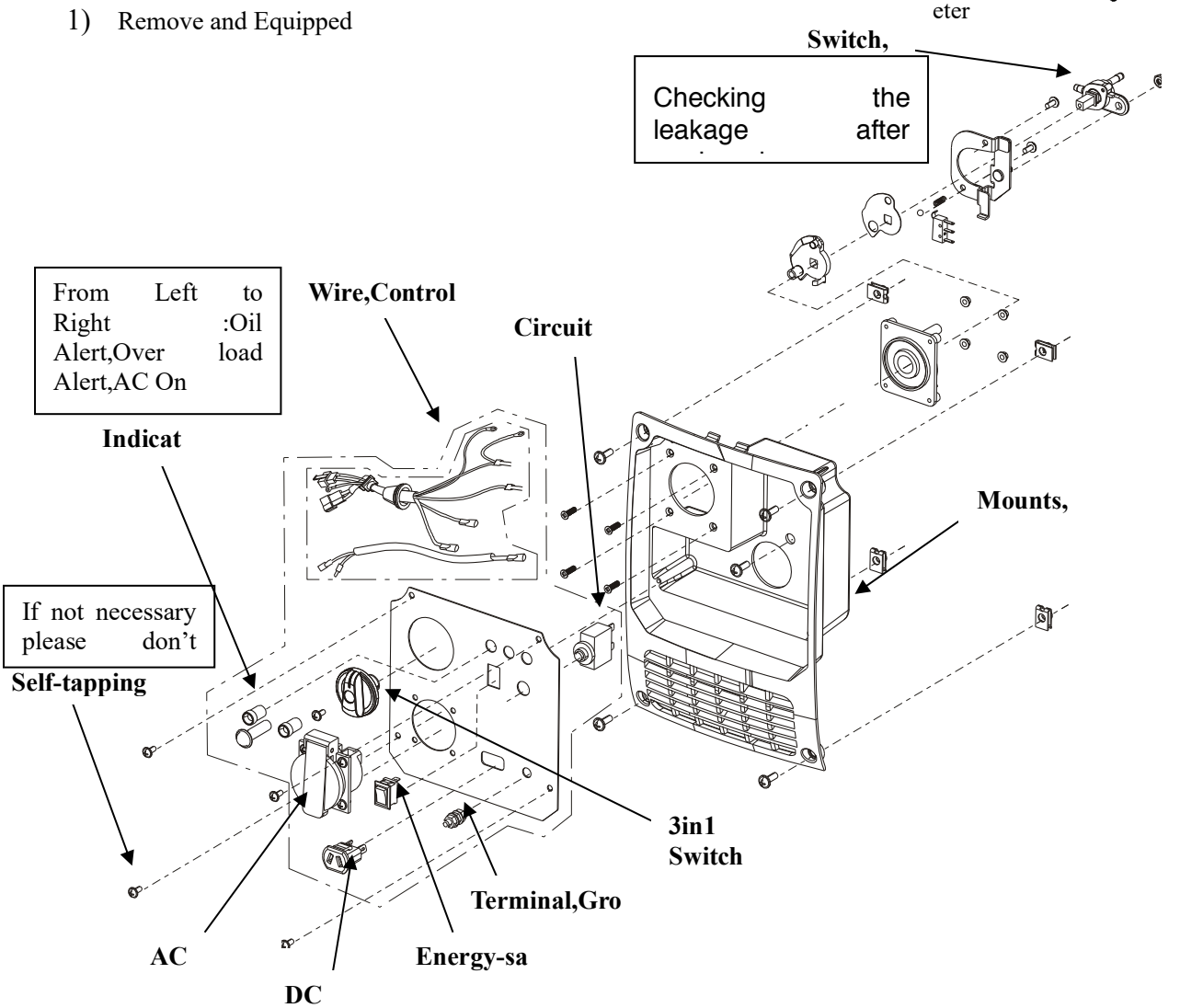
Multimeter		Red Pin ⊕ Test			
		Blue	**Blue**	**Red**	**Blackk**
Black Pin ⊖ Test	**Blue**		Off	Off	On
	Blue	Off		On	On
	Red	On	On		On
	Black	Off	Off	Off	



Multimeter

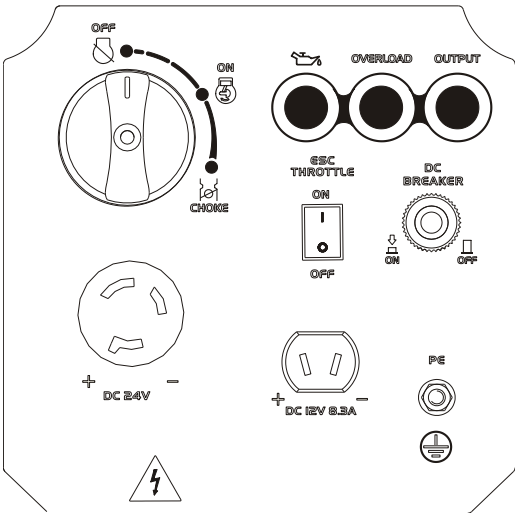
3-5-6 Control Panel Comporents

1) Remove and Equipped

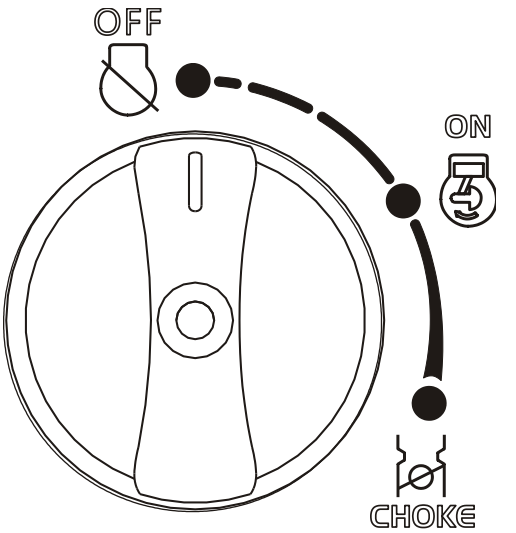


Checking

Combination Switch



When the combination switch in each position. Checking the ignition circuit, fuel switch, choke switch status



Close switch is "OFF", the ignition circuit is turned off, namely two micro switch output terminal is turned on, the ignition grounding; oil switch is turned off, the engine would not run.

When the combination switch is "ON", the ignition circuit is in working condition, that both the output terminals micro switch off; oil switch is turned on; the choke is fully open state, the engine can be run properly.

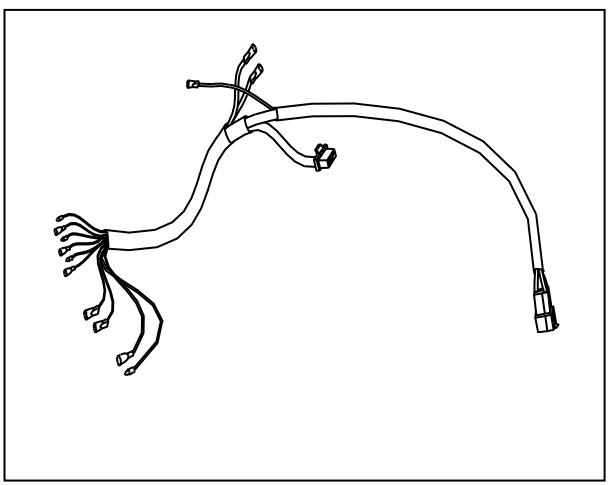
When the combination switch in the "CHOKE", the ignition circuit is in working condition, that two output terminals micro switch off; oil switch is turned on; the choke in the closed state.

When the switch is in the respective positions. The continuity between the switch terminals to be checked.

WIRE

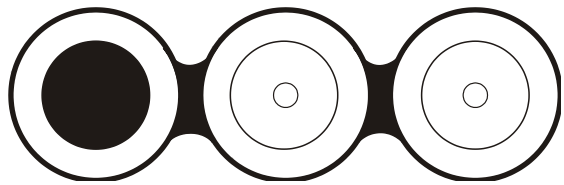
Removing the wire harness from the panel, rectifier and the inverter. Check wire insulation for any obvious damage. If it is damaged, replace the harness.

Using an ohmmeter check continuity of each wire, confirm that each wire is turned on. If infinite resistance, replace the harness.



NOTE: Use tongs when removing and tipping harness, to avoid damage to the wire and wire connectors with appropriate force.

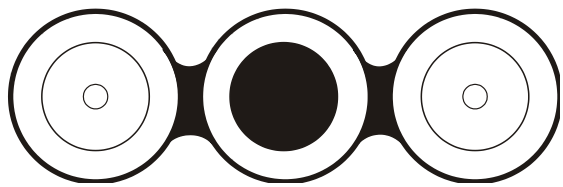
Oil Alert Indicator（Red）



When the crankcase oil drops below the safety line, oil protection system will automatically shut down the engine, and the oil warning indicator light; add oil to the engine oil level, engine can start again.

Tip: If the engine stall or not start rotating power switch knob to the "ON" position, then pull the handle to start,
If the oil warning light blinks for a few seconds, the engine oil capacity is insufficient, add oil and restart.
Check with ohmmeter indicator to confirm conduction, if infinite resistance, replace the lamp.

Fault indicator (red)



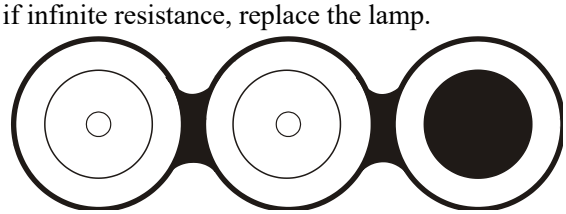
Fault indicator is on, the detected output of the generator is connected to the electrical equipment has been overloaded, resulting in a Inverter overheating, or AC in pressure. In this case, AC protection work to stop this generator, in order to protect the generator and electrical equipment connected. AC indicator (green) goes off and the fault indicator (red) lights up, but the engine will not stop running operation。

When the fault indicator lights up, and the unit when there is no output, please take the following countermeasures:

1. Turn off electrical equipment connected, stop the engine.
2. Turn off all the connected electrical equipment total power to the range of the rated output.
3. Check whether the cold air inlet blockage, there are problem related to the control means. If abnormal excluded immediately.
4. After checking, restart the engine.

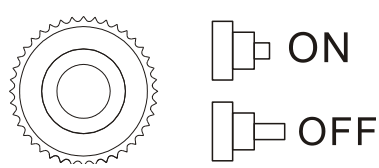
Tip: When using a high starting current electrical equipment (such as compressors, submersible pumps, etc.), beginning fault indicator may light a few seconds, but this is not mentioned above failures.
Check with ohmmeter indicator to confirm conduction, if infinite resistance, replace the lamp.

AC indicator (green)



Start the engine and normal output, AC indicator light up.
Check with ohmmeter indicator to confirm conduction, if infinite resistance, replace the lamp.

DC circuit breaker

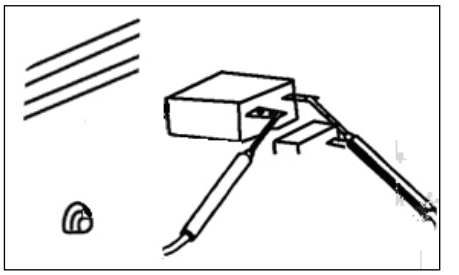


When connected to a generator of electronic equipment operation, if the current exceeds the rated current, the DC switch automatically go to "OFF" position. The generator operation

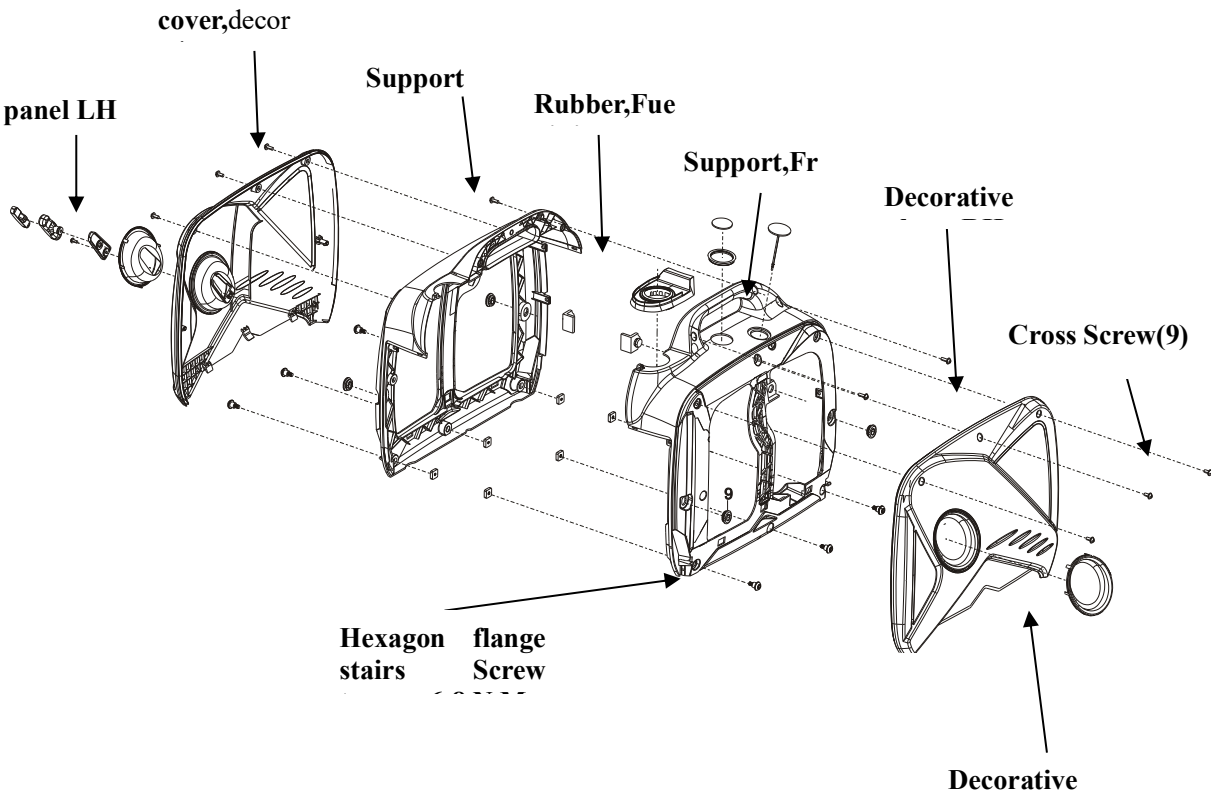
again, set the DC switch Press the "ON" position**.**

Checking continuity between the terminals of the DC circuit breaker with a multimeter.

The conduction should be on when the button of Circuit breaker is pressed。

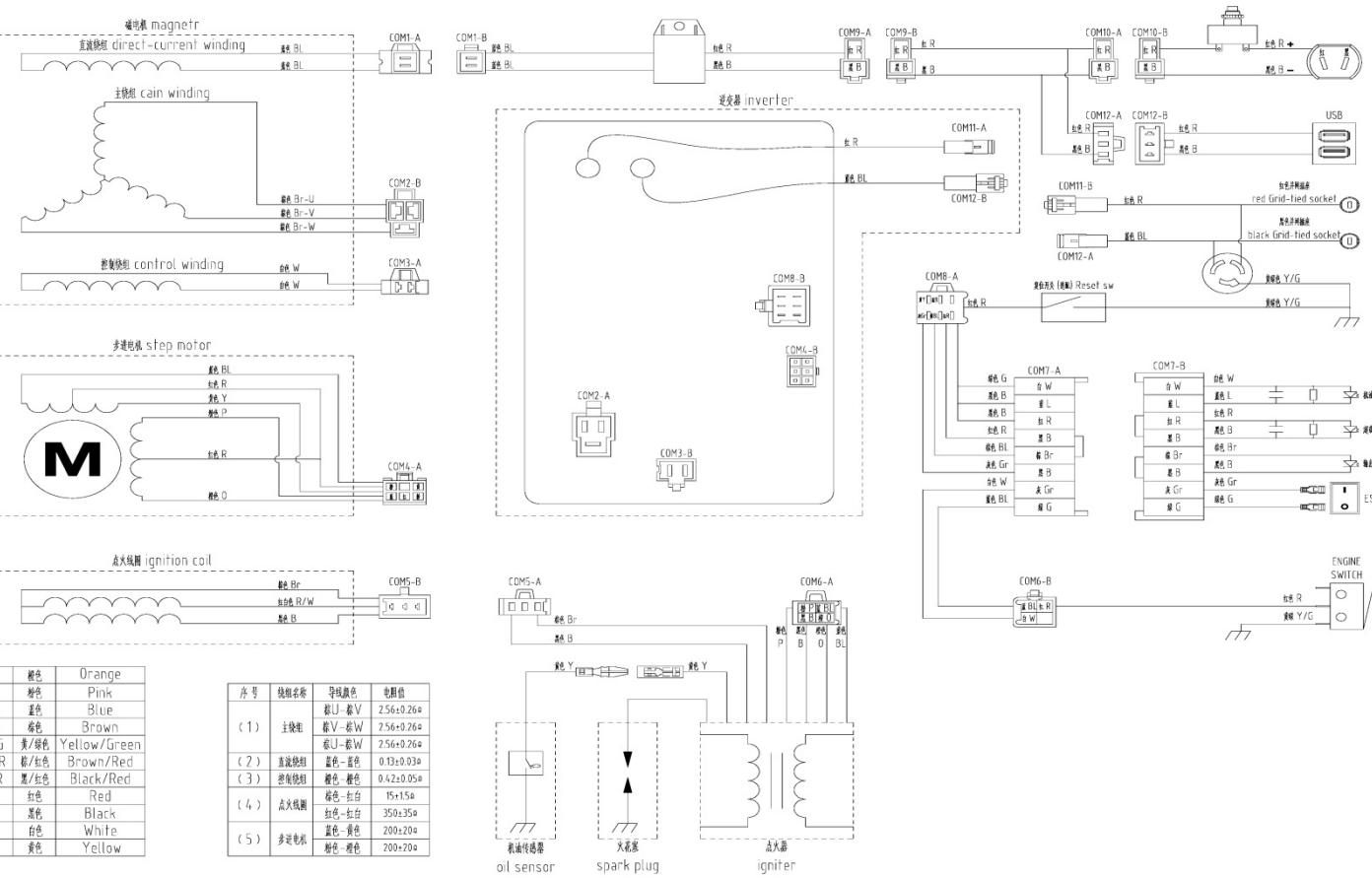


3-5-7 Exterior Assembly



ART Wiring diagram

agram



	Orange
粉色	Pink
蓝色	Blue
棕色	Brown
黄/绿色	Yellow/Green
棕/红色	Brown/Red
黑/红色	Black/Red
红色	Red
黑色	Black
白色	White
黄色	Yellow

序号	线组名称	导线颜色	电阻值
(1)	主线组	棕U-棕V	2.56±0.26Ω
		棕V-棕W	2.56±0.26Ω
		棕U-棕W	2.56±0.26Ω
(2)	直流线组	蓝色-蓝色	0.13±0.03Ω
(3)	控制线组	橙色-橙色	0.42±0.05Ω
(4)	点火线圈	绿色-红白	15±1.5Ω
(5)	步进电机	红色-红白	350±35Ω
		蓝色-黄色	200±20Ω
		粉色-橙色	200±20Ω

Attachment

Torque Sheet

Item No.	Items	Thread Size	Grade	Torque（N·m）
1	Shroud, Muffler	ST4.8×16	4.8-A	4±1
2	Starter rope guide plate combination	M5×12	4.8-A	4±1
3	Cover, RH LH（底板连接处）	M6×19（六角台阶螺栓）	8.8-B	9±1
4	Side cover, muffler	M5×16	4.8-A	4±1
5	Fuel switch combination	M6×12	8.8-B	10±2
6	Support, Invert	M6	8-A	9±1
7	Invert	M6×12	8.8-A	9±1
8	Control Panel Assy	ST4.2×16	4.8-A	3±1
9	Support, Control Panel	M6×12	8.8-A	9±1
10		M5×16	4.8-A	4±1
11	Cover, Decorative Plate, RH,LH	M5×12	4.8-A	3±1
12	Support, Fuel Switch	ST4.2×16	4.8-A	4±1
13	Rotater	M4×16	4.8-A	3±1
14	Cover, LH,RH（Rubber, Fuel injection）	ST4.2×16	4.8-A	3±1
15	Cover, LH,RH（Handle bar）	M5×16	4.8-A	3±1
16	Impeller	M6×10	8.8-A	9±1
17	Magnetic rotor housing combinations	M12×1.25	8-A	28±2
18	Rectifier	M4×16	4.8-A	4±1
19	Magnetic rotor housing combinations...	M5×35	5.8-A	6±1
20	Shroud, Alternator	M6×30	8.8-A	9±1
21	Absorber, Frame	M6×12	8.8-A	9±1
22		M6	8-A	9±1

23	Absorber, Frame	M6×14	8.8-A	4±1

Standard torque parameters

Fastening Parts	Thread Size	Torque（N·m）
SCREW,BOLT	5mm SCREW,BOLT	4.5-6
	6mm SCREW,BOLT	8-12
	8mm SCREW,BOLT	18-25
	10mm SCREW,BOLT	29-34
	12mm SCREW,BOLT	49-59
	4mm SCREW	1.5-2.6
	5mm SCREW	3.5-5
	6mm SCREW	7-11
	5mm Flange bolts	3.6-6.9
	6mm SCREW	7-11
	5mm Flange bolts	3.6-6.9
	6mm Flange bolts	10-14
	8mm Flange bolts	20-26
	10mm Flange bolts	35-45