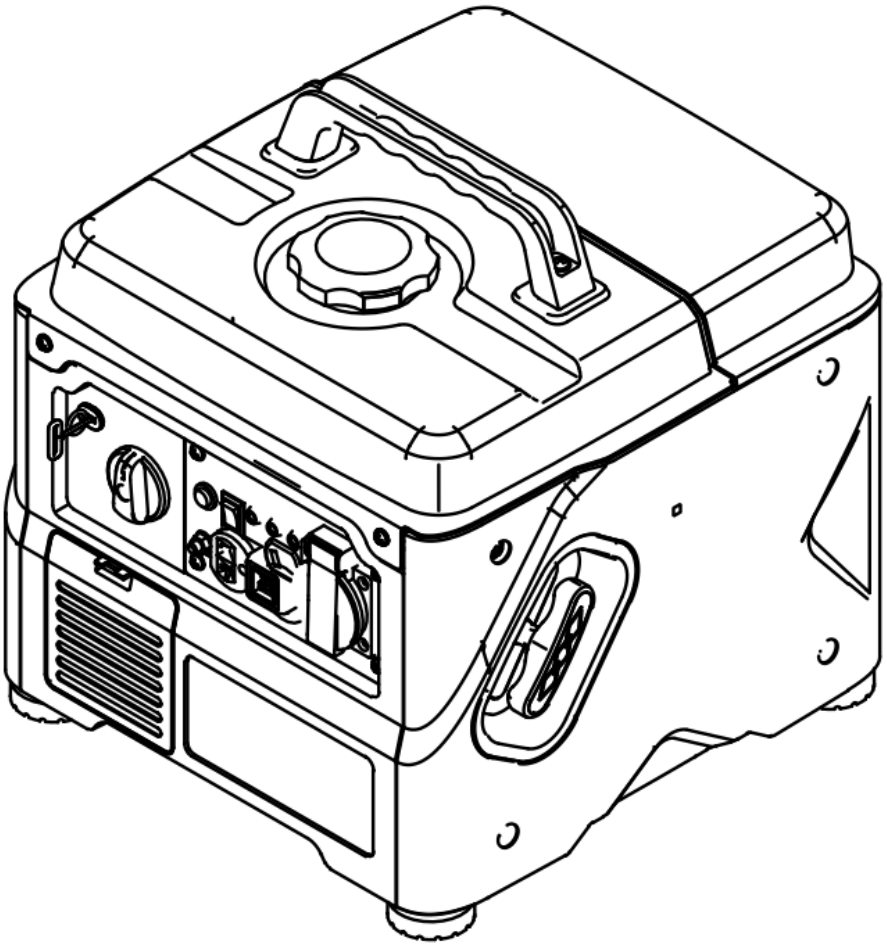
R1000I Maintenance Manual



Chongqing RATO Technology Co., Ltd.

This Manual contains the specifications to be in compliance with for routine service and maintenance as well as troubleshooting of general purpose generator.

Make sure that maintenance personnel of this equipment can refer to this Manual at any time.

This Manual describes correct methods to service this equipment. Our Company shall not bear liability for neither personal injury nor equipment damage caused by ignoring these regulations.

Note:

Safety Warning

Your personal and property security and that of others are very important. Please read carefully our three vital safety warnings written in the maintenance manual and in the decal of the generator, with the symbol preceding each one. Details are as follows:

⚠DANGER If you do not follow the instructions, you will be seriously injured.

⚠ WARNING Failure to follow instructions will most likely result in serious injury.

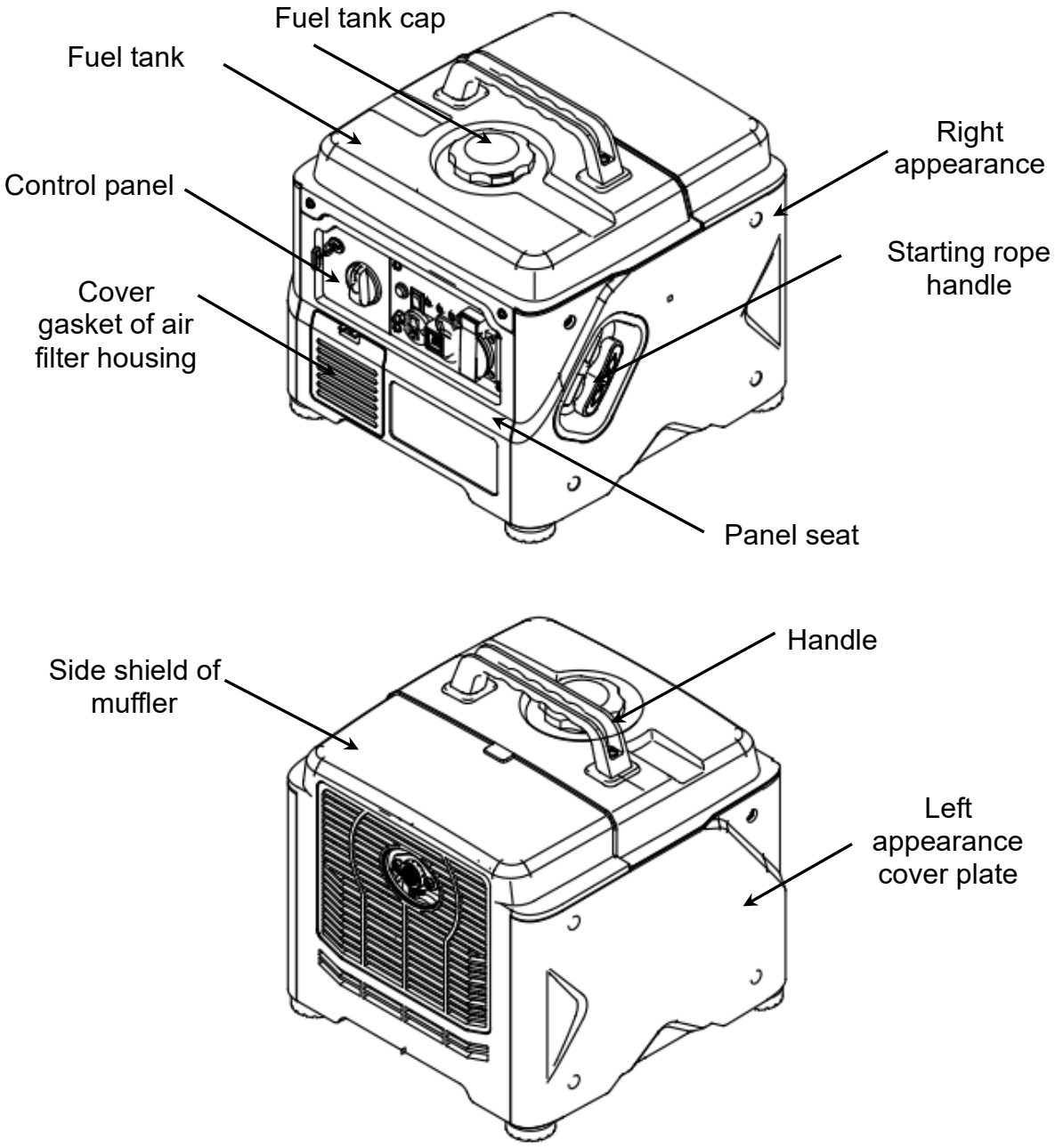
⚠ CAUTION If you do not follow the instructions, you may suffer from minor injury.

NOTICE

Failure to follow instructions may result in damage to your generator and other properties.

Part 1 Introduction

1-1 Components of general purpose generator



1-2 Parameter

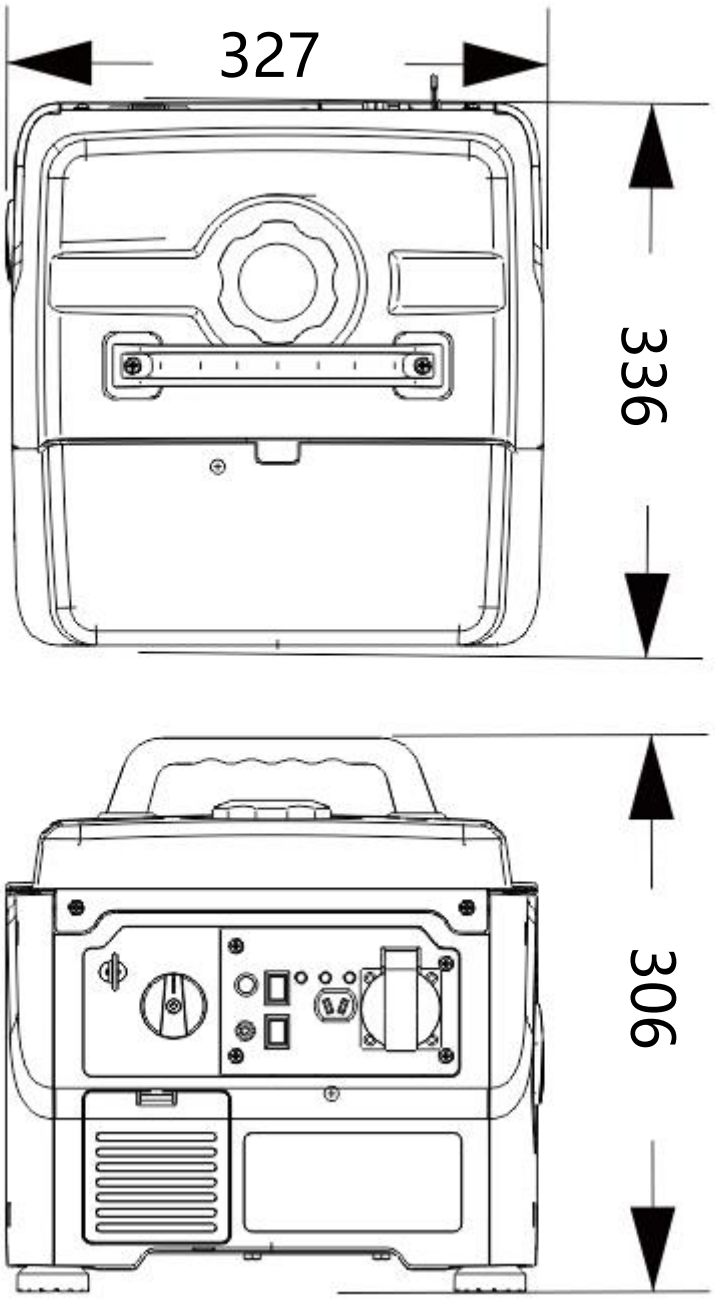
	Item	R1000i
Gasoline engine	Gasoline engine	R56-i
	Type of gasoline engine	Four-stroke, valve-on-the-side, single cylinder
	Displacement (cc)	56
	Ignition system	Capacitor discharge ignition (CDI)
	Volume of fuel tank (L)	2.8
	Continuous working period (hr)	3.5
	Engine oil capacity (L)	0.28
Generator	Voltage (DC) (V)	5
	Current (DC) (A)	1~2
	Rated frequency (Hz)	50HZ
	Rated voltage (V)	230V
	Rated output power (kW)	1.0
	Maximum output power (kW)	1.1
Generator set	Length (mm)	336
	Width (mm)	327
	Height (mm)	306
	Net weight (kg)	12.5
	Phase number	Single phase
General purpose modules	Air filter	●
	Muffler	●
	Fuel tank	●
	Fuel volume indicator	/
	Voltmeter	/
	Voltage regulator (AVR)	/
	Engine oil alarm system	●
	circuit breaker	/
	Accessories of electric starter	●

1- 3 Repair Standard

Parts	Item	Standard	Use limit
Gasoline engine	Maximum unoad speed	4800± 100	--
	Cylinder pressure	700~900Kpa/1400rpm	--
Cylinder	I.D. of cylinder	45~45.015	45.065
Piston	Piston skirt outer diameter	44.97~44.99	44.92
	Piston - cylinder clearance	0.01~0.045	0.13
	I.D. of piston pinhole	10.002~10.008	10.018
	O.D. of piston pin	9.994~10	9.984
	Piston pin - piston pinhole clearance	0.002~0.014	0.034
Piston ring	Piston ring set side-gap: first Ring/second ring	0.015~0.05	0.12
		--	--
		--	--
	Piston ring sets close gap:	0.1~0.25	0.55
	Ring 1/ Ring 2	0.1~0.25	0.55
Connecting rod	I.D. of small end	10.017~10.006	10.044
	I.D. of big end	15.0~15.011	15.05
	Oil clearance of bigger end	0.035~0.055	0.12
	Clearance of big end side	0.016~0.038	0.238
Crankshaft	O. D. of crank	14.973~14.984	14.943
Air valve	Valve clearance Intake / Exhaust	0.03~0.08	--
	O. D. of valve stem intake Intake	3.97~3.985	--
	Exhaust	3.935~3.95	5.560
	Exhaust Contact width of intake/exhaust valve seat	0.6~0.8	1.9
	Free length of spring	21.9	20.9
Camshaft	Cam Height Intake	16	15.7
	Exhaust	16	15.7
	O.D. of journal	9.965~9.99	--
Crankcase cover	I.D. of camshaft hole	10~10.018	10.048

Spark plug	Clearance	0.6-0.8	--
Spark plug cap	resistance	10kΩ	--

1-4 size



Part II Maintenance

2-1 Service List

Good maintenance and service is the best guarantee for safe, economical and zero-failure operation. It also contributes to environmental protection.

⚠ WARNING The exhaust gas of the generator contains toxic carbon monoxide, please stop the gasoline engine for maintenance. If you have to implement the maintenance when generator running, please make sure the working area is draughty.

Regular maintenance and service can ensure that the generator is working in good condition. The maintenance schedule is as follows:

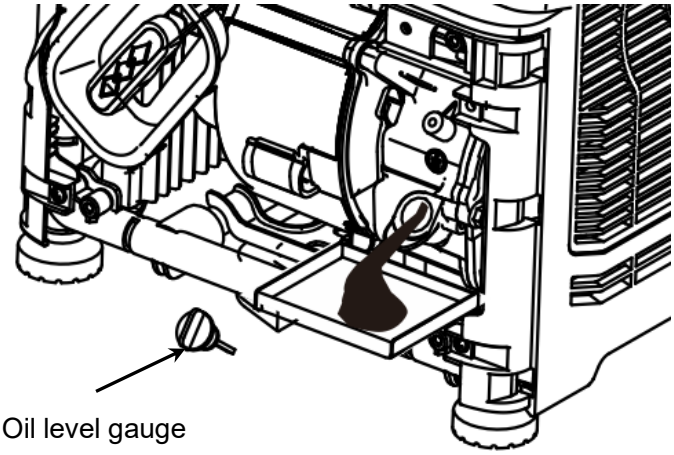
Regular maintenance schedule		Every time of use	20h or in the first month of initial use (3)	50h or every 3 months (3)	100h or every 6 months (3)	300h or every year (3)
Engine oil	Check oil level	○				
	Replace		○		○	
Air filter	Inspection	○				
	Clear			○(1)		
Fuel cup	Clear				○	
Spark plug	Clear				○	Replace
Valve clearance	Readjustment					○(2)
Cylinder head	Cleaning	Every 300 hours (2)				
Fuel tank and filter	Cleaning	Every 2 years (2)				
Fuel hose	Replace	Every 2 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

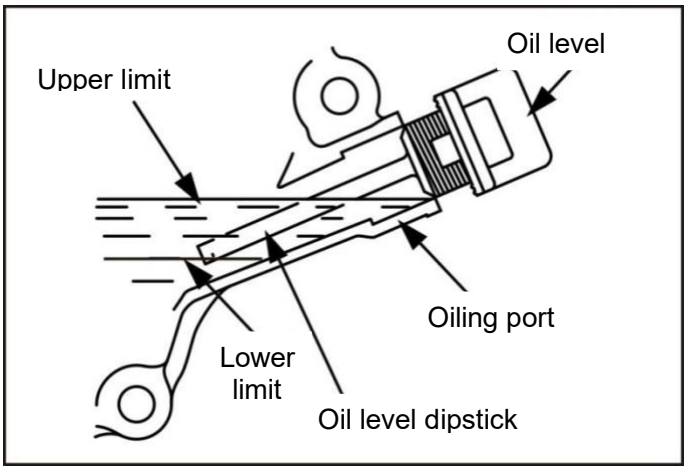
2-2 Service and Maintenance

2-2-1 Engine oil

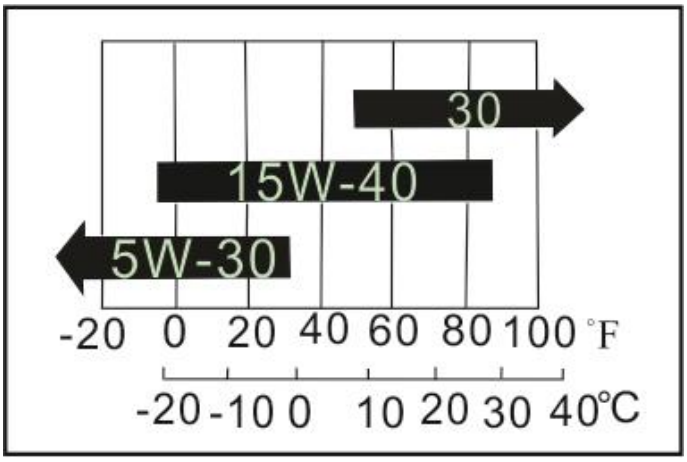
- After allowing gasoline engine to warm up (Startup gasoline engine to run at no-load for 10 minutes), let it stand for another 10 minutes, only that can ensure to drain engine oil quickly and completely.
  Remove oil dipstick.



Capacity of gasoline engine oil:



Recommended oil:
SAE 15W -40
Recommended oil grade
API standard SE level or higher



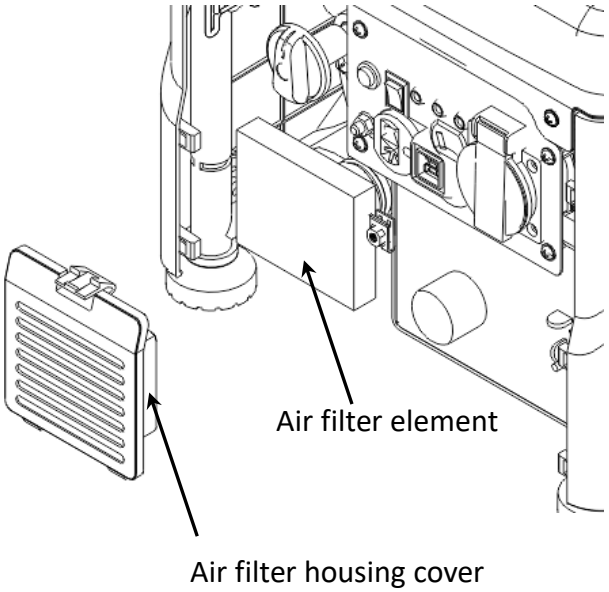
⚠ CAUTION

Long-term and frequent exposing engine oil may cause skin cancer. Although this is not inevitable, it is still recommended to avoid direct contact as far as possible, wash up the contacted skin with soap and water immediately and thoroughly upon such contact.

From the perspective of environmental protection, please properly dispose of the waste oil after use. We strongly recommend that you should: put the waste oil into a sealed container and take it to the local service station or waste oil recycling center. Remember: Do not throw it into the garbage or dump it on the ground or in the ditch.

2-2-2 Air filter

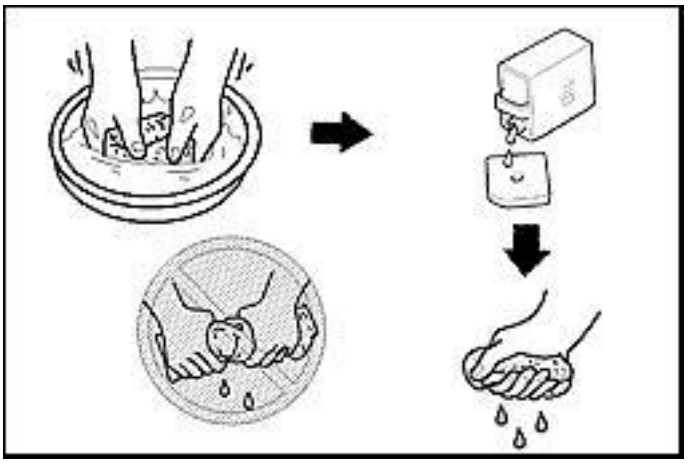
Getting dirty of air filter may prevent air from flowing into the carburetor. In order to prevent carburetor failure, the air filter shall be maintained regularly. (see 2-1 Maintenance List for the cycle, and see the figure below for the method). If being used in dusty environment, it shall be maintained more frequently.



⚠ WARNING Using gasoline or inflammable solvent to clean the filter element may cause fire or explosion. Use soapy water or a nonflammable solvent.

Open the cover of air filter housing. Inspect air filter element to ensure it is in good condition and clean.

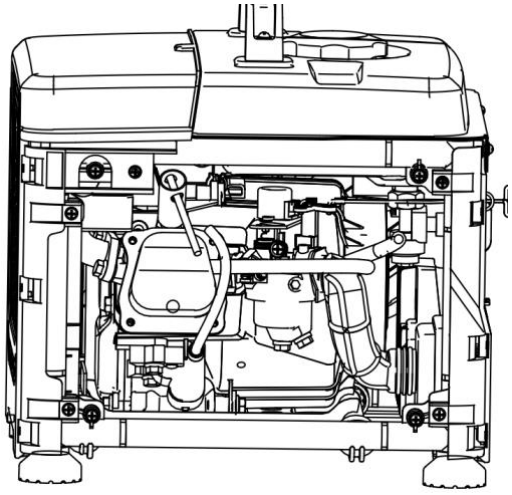
If the foam filter element is dirty, please clean it: Wash it in hot water containing household cleaner, or in non-flammable or high-flash point solvent; and then rinse with clean water, and then squeeze it clean. Then apply a few drops of oil and squeeze evenly.



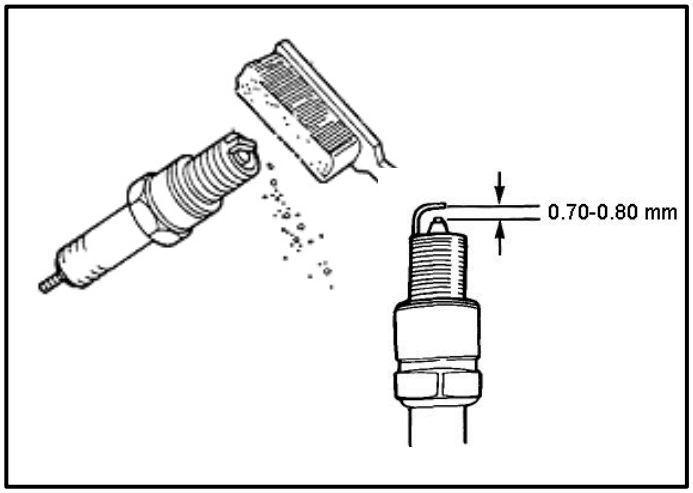
2-2-3 Spark plug

1. Remove the handle
2. Remove protective plate
3. Pull out spark plug cap

2. Visually inspect the insulator of spark plug for damage. If the insulator is damaged, replace it with a new one



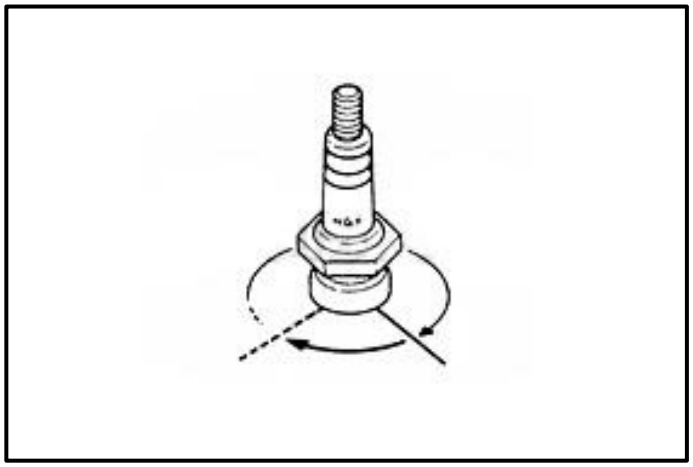
If the electrode has carbon deposition, clean it by wire brush.
Measure the gap of spark plug with a thickness gauge Proper gap shall be 0.70 ~ 0.80mm. If it is needed to be adjusted, please tap it (when the gap is too large) or gently pry the electrode up with a slotted screwdriver (when the gap is too small).



1. Inspect whether the gasket of spark plug is in good condition.
2. Mount the spark plug, and tighten it on cylinder head with a spark plug socket wrench, and mount the spark plug cap.

- If mounting a new spark plug, tighten the washer by additional 1/2 turns after pressing the gasket out.
- If you are reinstalling a used spark plug, tighten 1/8-1/4 turn after pressing the washer.

Torque value of spark plug: 22±2N.m



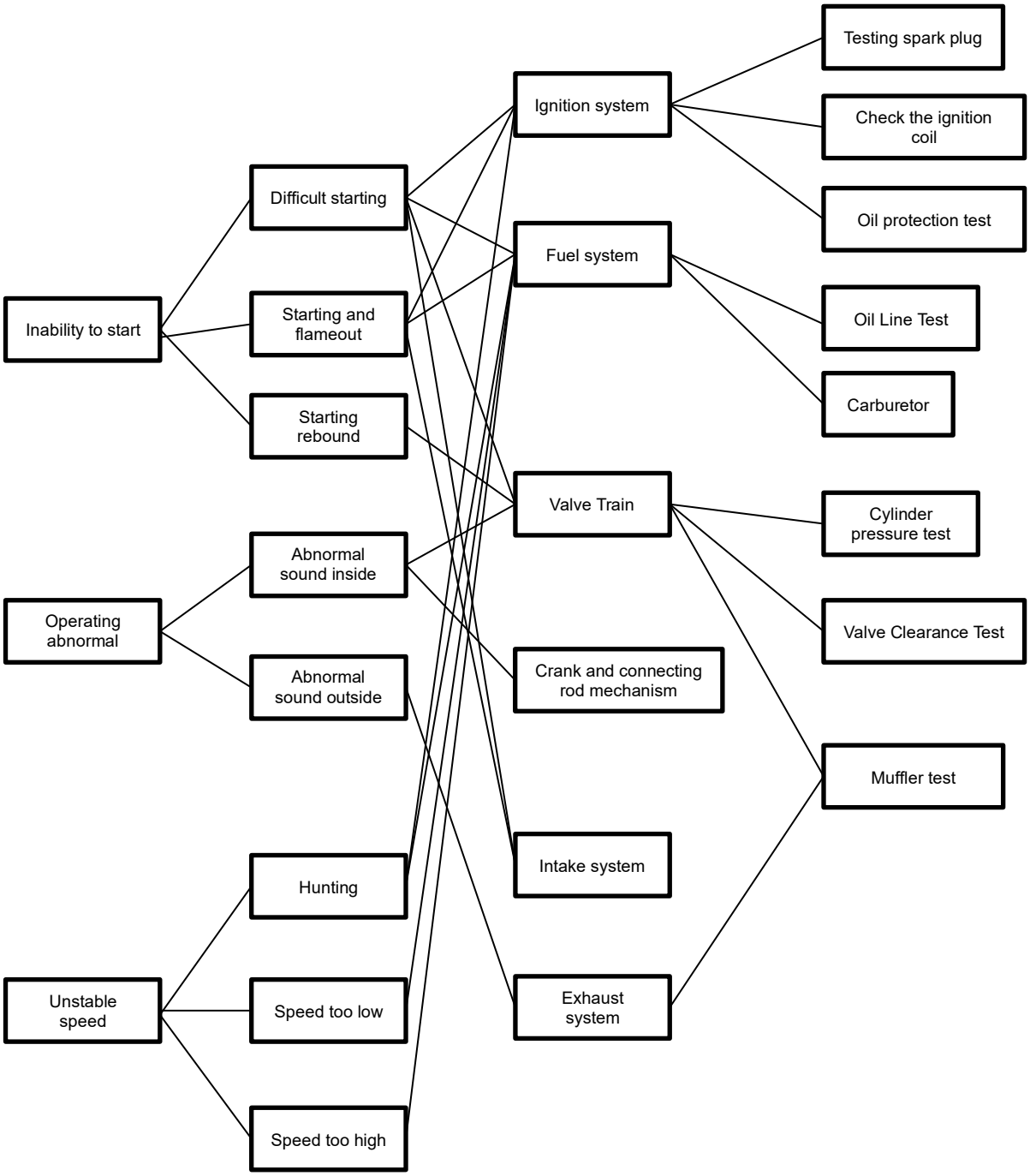
Part 3 Failure Determination and Repair Preparation

3-1 Safety Factors

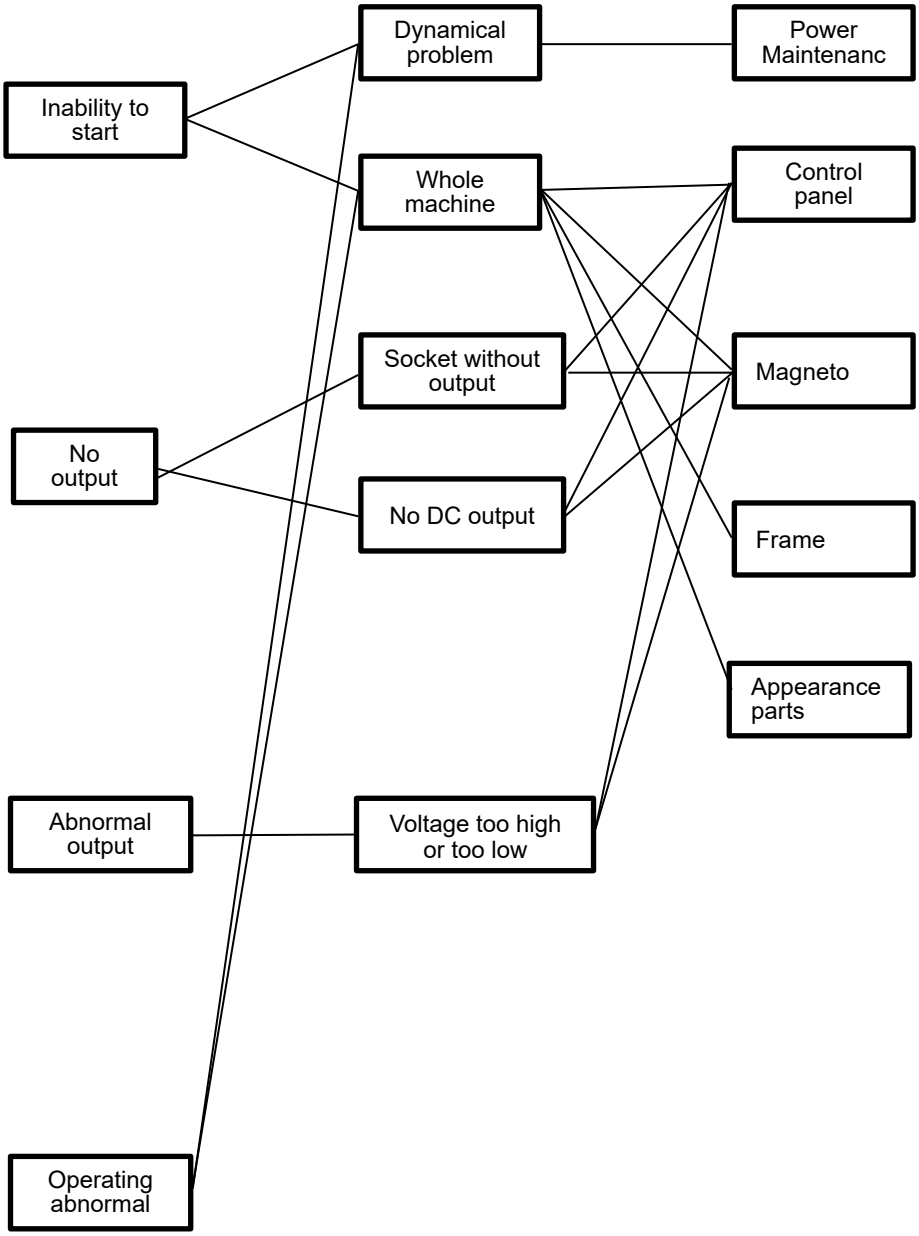
⚠ WARNING Failure to observe the following precautions will result in the invalidation of the warranty provided with the generator and may damage the generator or cause personal injury. Therefore, before using the generator, Operators should pay special attention to the following points:

1. It shall be matched strictly according to the power demarcated in the maintenance manual, and it is strictly forbidden to run under overload, over-speed or low speed for a long term.
2. Using the fuel oil and engine oil of specified ratings, conduct sufficient sediment and filtering before using them. Refueling appliance shall be maintained clean, and engine oil shall be replaced 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. This machine is a wind-cooled generator, 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 stop it in emergency and operate all the control components. 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 when operating it and keep good ventilation; do not 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 in the place where the generator is refueled or in the fuel storage place.
9. Do not overfill the oil tank and the fuel oil shall not overflow. If there is fuel overflowing, overflowed fuel must be cleaned thoroughly, and the generator shall not be started up until the fuel is volatilized off.
10. Do not operate the generator in a confined or poorly ventilated area.
11. When the generator is running or just stopped for a period of time, do not touch the muffler to avoid being burned. In order to prevent burn or fire, in order to avoid scalding or fire, the generator shall be transported or stored after cooling.
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.

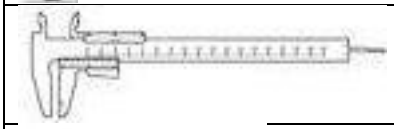
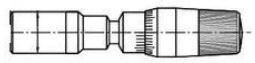
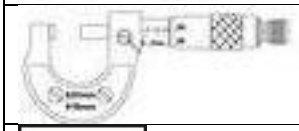
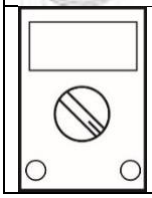
3-2 Fault Diagnosis



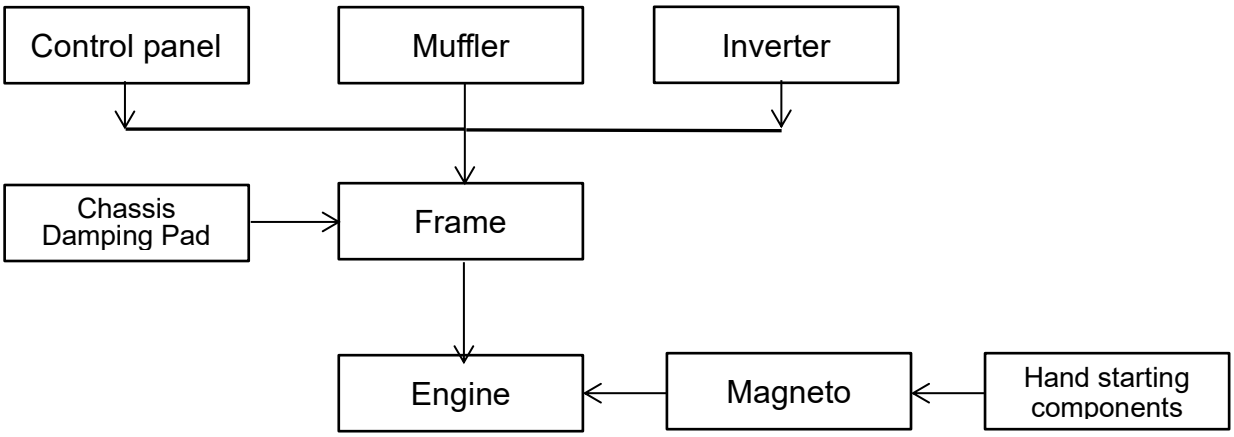
The condition of indicator light flashing when the inverter is alarming (error 2%):
The green indicator on indicates that it is working normally and there is output;
The green indicator on and red indicator flashing on indicates that it is overloaded and there is output;
Green light is off, and the red light flashes 1 time, and then flashes 1 time again after an interval of 3s, which indicates that the voltage at the front end of the bus is too low, and there is no output;
Green light is off, and red light flashes 2 times, and then flashes 2 times again after an interval of 3s, which indicates that the engine speed is too low, and there is no output;
Green indicator is off, red indicator flashes 3 times, and then flashes 3 times once again after an interval of 3s, which indicates that inverter temperature is height and the has no output;
Green light is off, red light flashes 5 times, and then flashes 5 times again after an interval of 3s, which indicates that the voltage at the front end of the bus is too high, and there is no output;
Green light is off, red light flashes 6 times, and then flashes 6 times again after an interval of 3s, which indicates after the overload is disconnected,


Dynamical problem
Power Maintenanc
Inability to start
Whole machine
Control panel
Socket without output
Magneto
No output
No DC output
Frame
Appearance parts
Abnormal output
Voltage too high or too low
Operating abnormal

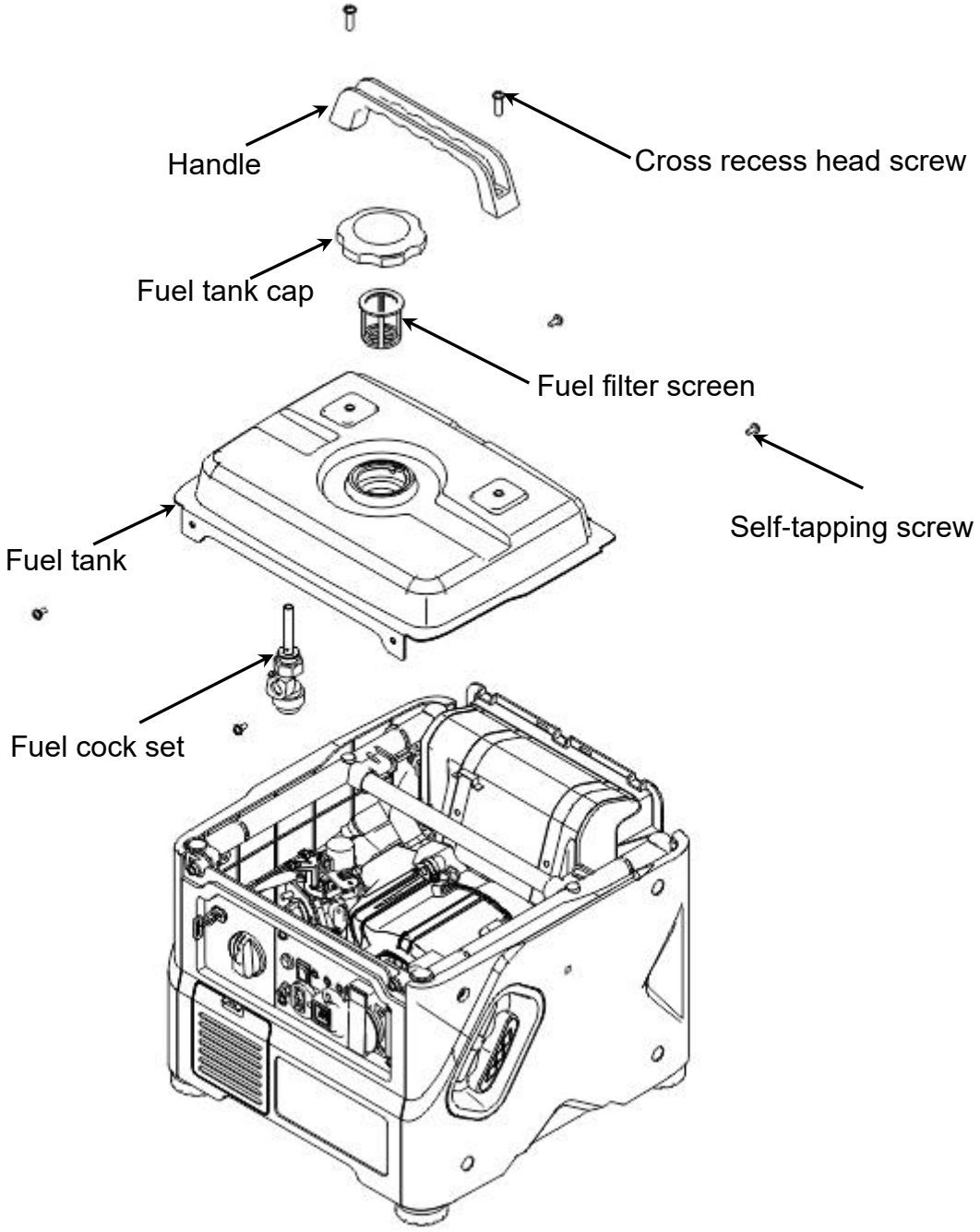
3-3 Maintenance Tools

Tool	Designation	Model	Use Position
	T-sleeve	5mm-12mm	
	Screwdriver	Flat and cross	
	clamp forceps	nose plier and Thumb forceps	
	Hammer		
	Vernier caliper	100MM	
	Inside micrometer	100MM	
	Outside micrometer	100MM	
	Multimeter		

3-4 Disassembly
3-4-1 Disassembly graph



Part 4 Maintenance
4-1 fuel tank/handle tube

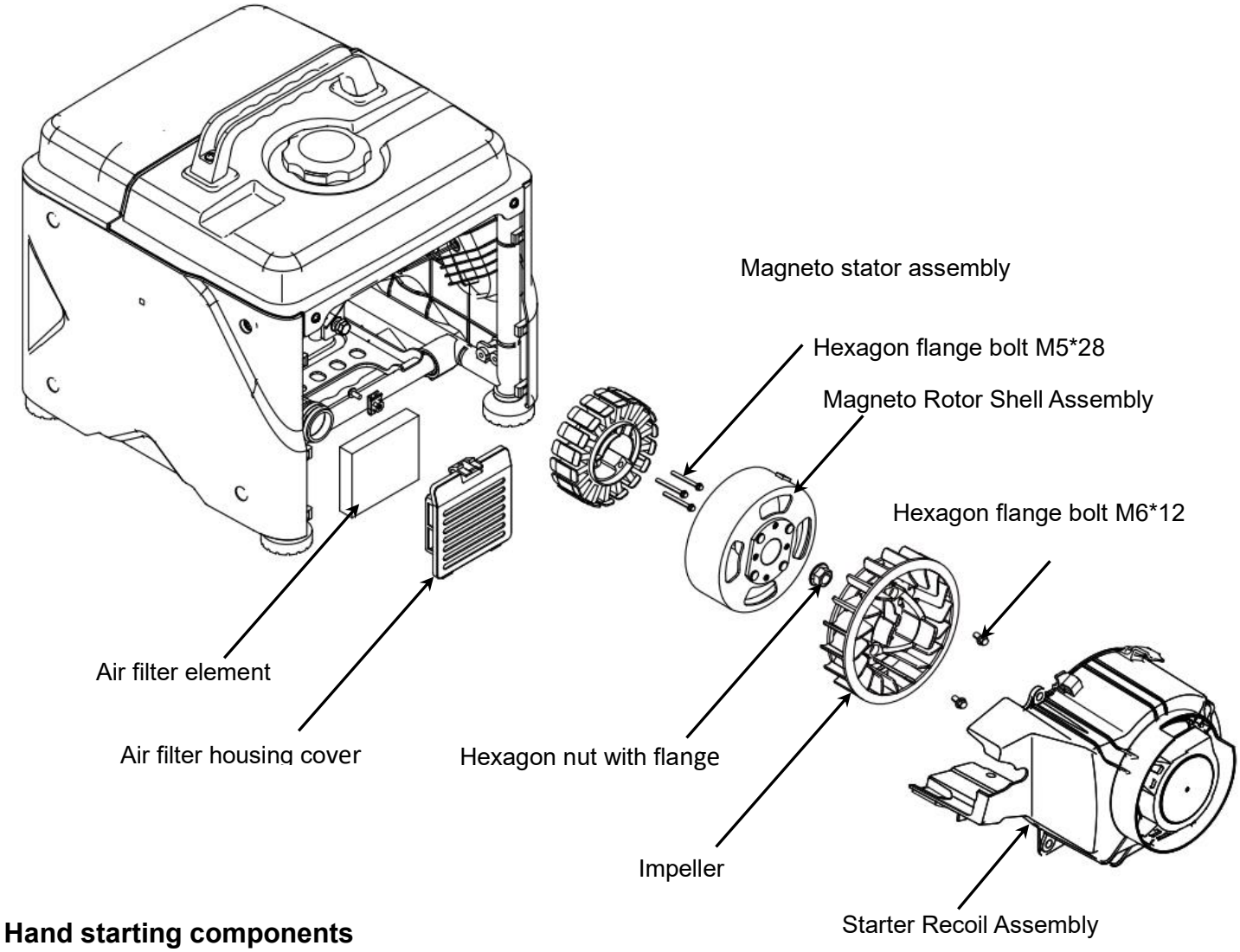


Fuel tank

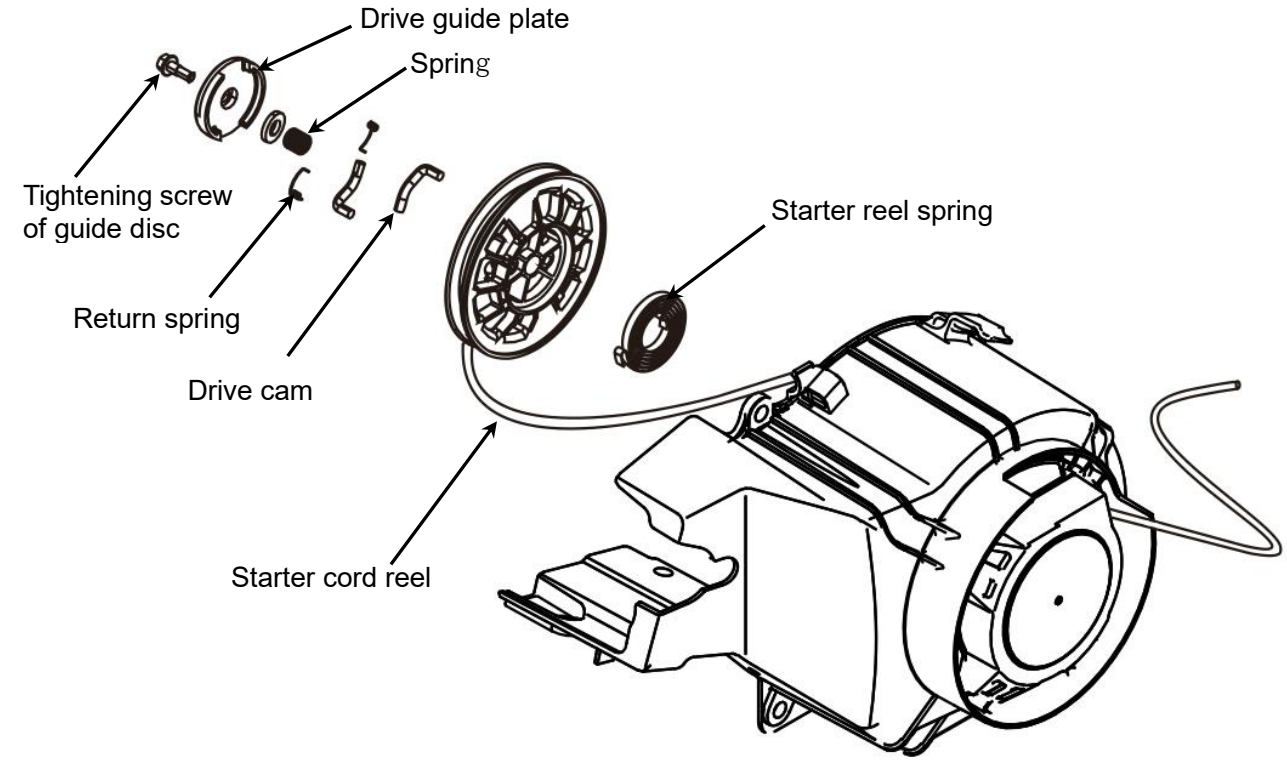
NOTICE **Mounting precautions**

- Before the Assembly, inspect first whether the vent hole of fuel tank cover is clogged.
- Whether the fuel filter is blocked or damaged.
- Whether the fuel hose is aged and cracked.
- If there is any problem, replace in time before the Assembly.

4-2 Hand starting components / motor /air filter

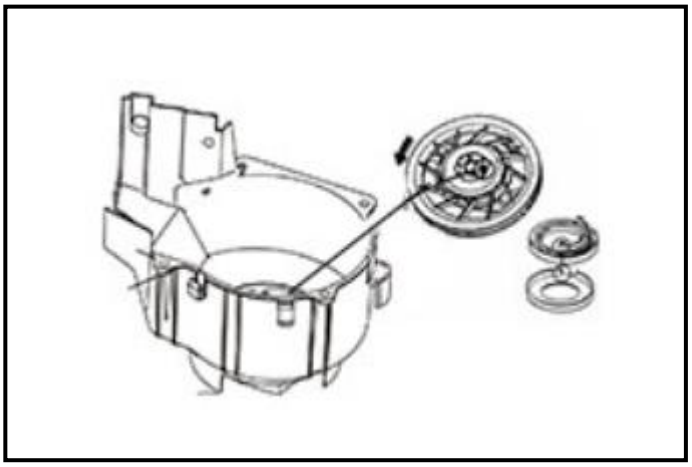


Hand starting components

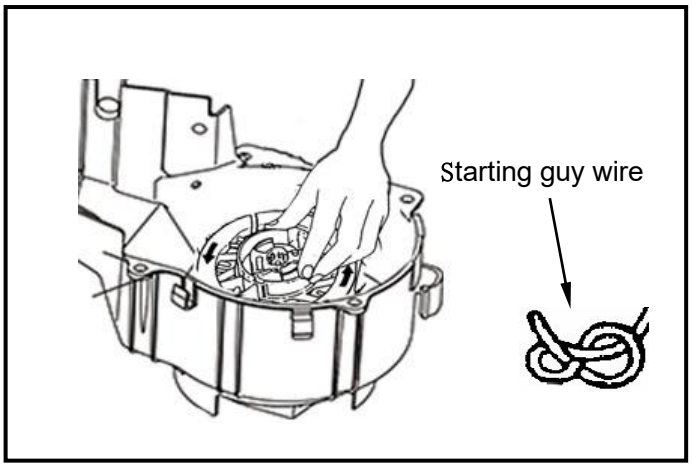


NOTICE When disassembling, be careful not to spring out the starter coil spring, and wear gloves when operating.

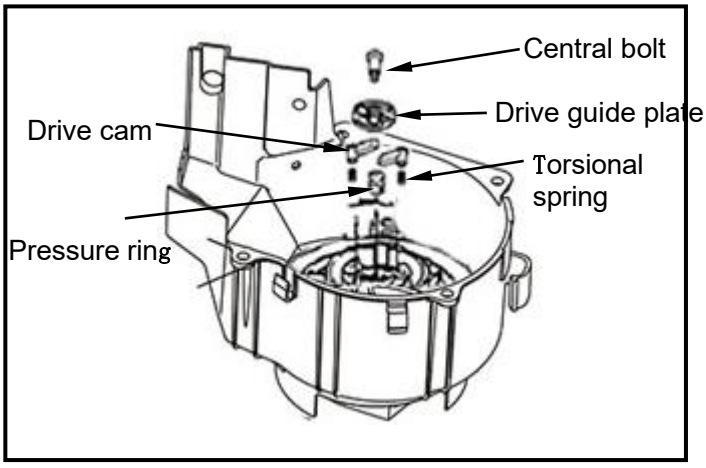
Put the reset spring into the seat ring cover, the hook
and aligned with the rope tray groove, then assemble the seat ring cover onto the pull rope tray. Apply grease on the claw of starter cover, mount while turning to the left, to make the hook inside reset spring hook onto the claw of starter cover.



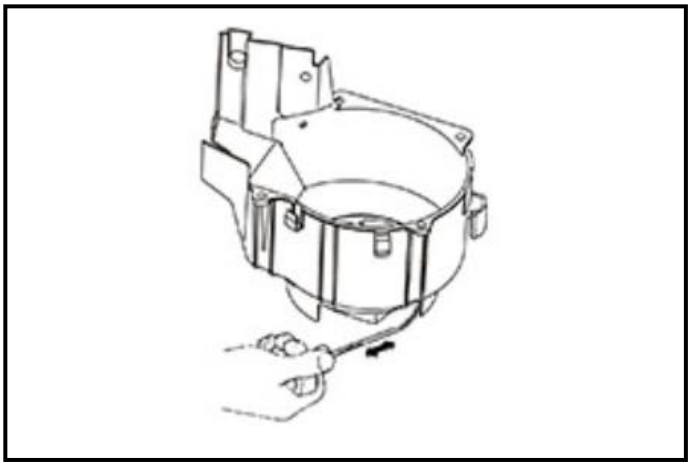
Tie a knot at one end of the pull rope, and then pull the other end from the pull rope hole of the pull rope tray,
Wear some. And then coil guy wire disc in counterclockwise direction for five circles.
Pass the starting pull rope through the hole of the starter cover, and tie a figure-8 knot at the end of the pull rope.



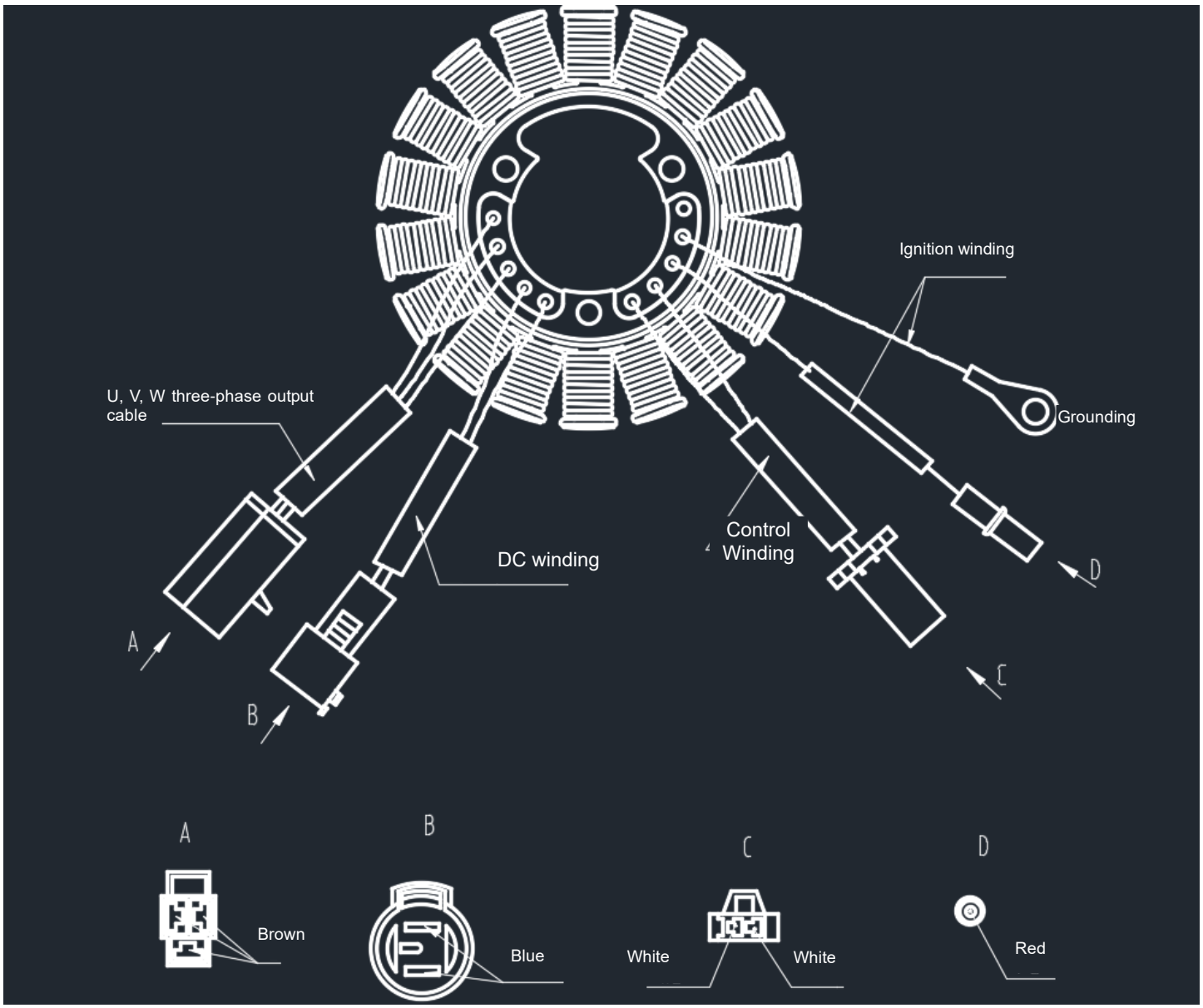
Install the drive cam, torsion spring, drive the guide plate, and tighten the central bolt.



Pull the starter to pull the rope several times and check the return position of the drive cam.



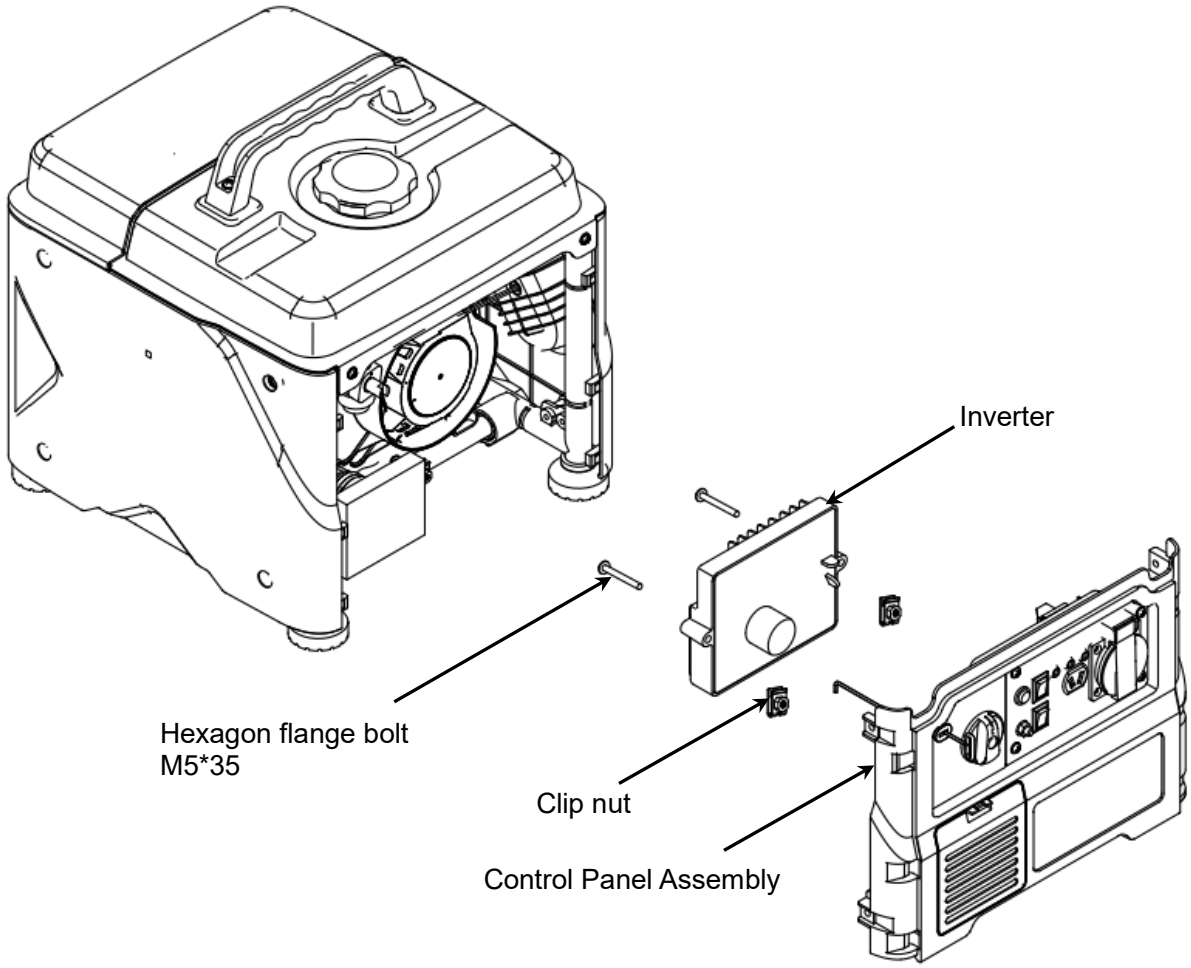
Testing of resistance value of motor winding

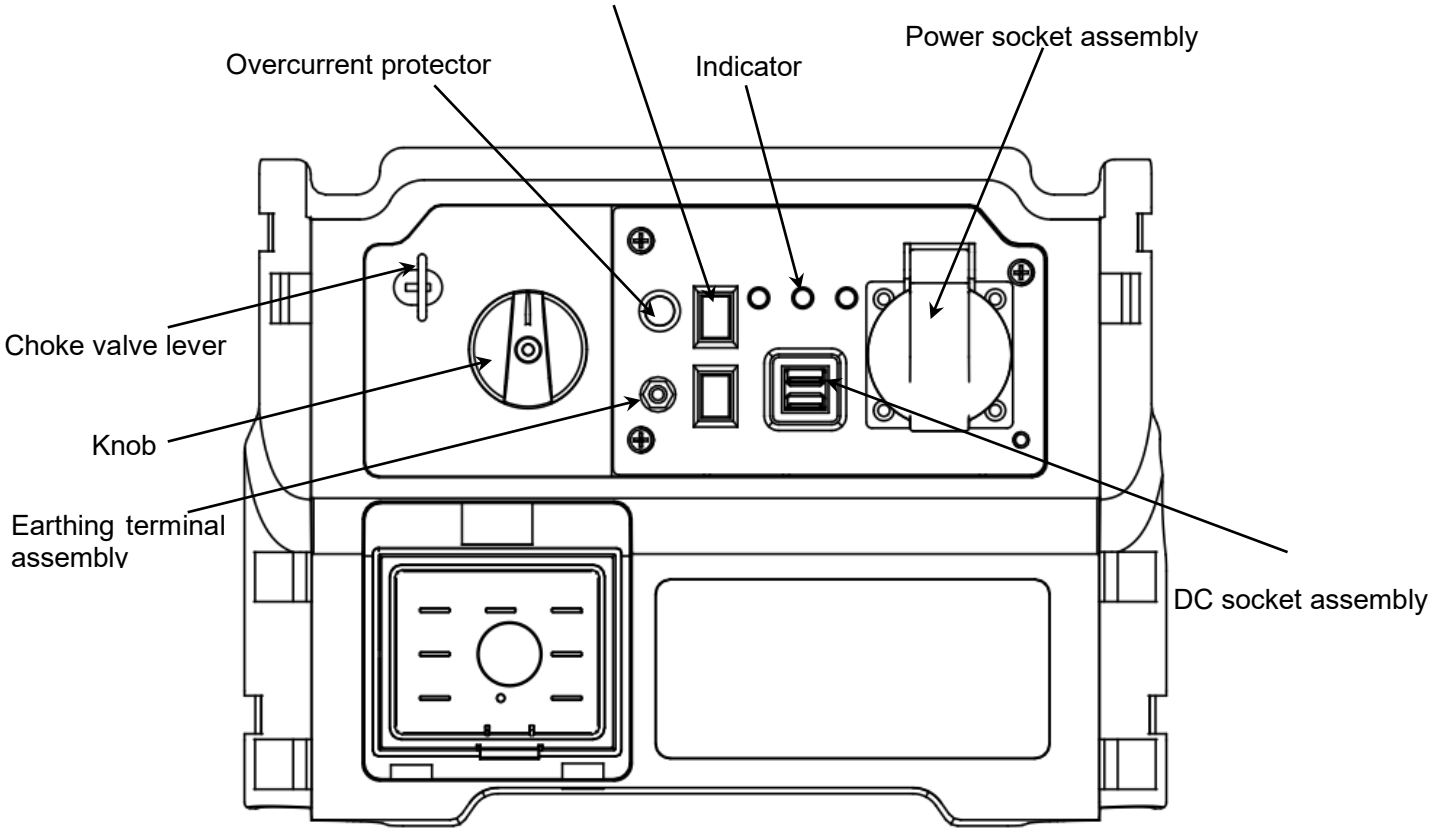


Resistance value

SN	Winding name	Wire color	Resistance value
1	Main winding	Brown - brown	(7.75±0.8)Ω
		Brown - brown	(7.75±0.8)Ω
		Brown - brown	(7.75±0.8)Ω
2	DC winding	Blue - blue	(0.16±0.02)Ω
3	Control Winding	White - white	(0.83±0.1)Ω
4	Ignition winding	Red - black	(1.90±0.20)Ω
5	Stepper motor	Red-yellow	80±5Ω
		Red- orange	80±5Ω
		Red- blue	80±5Ω
		Red- pink	80±5Ω

4-3 Control Panel / Air Filter





NOTICE

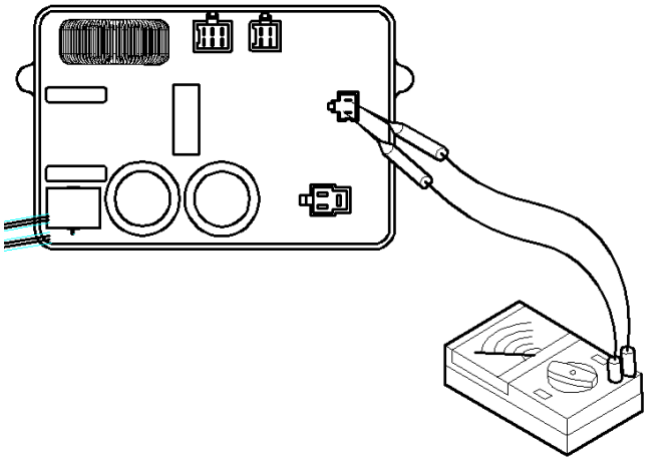
Control panel components shown in the figure above are only standardized model of our Company. The control panel will be adjusted slightly according to specific requirements. Therefore, your real generator may be a little different from the model shown in the figure above. Please do not disassemble it carelessly. It can be confirmed with <Electric Schematic Diagram> in attached page. If it still unable to be matched, please contact Technical Service Department of our Company to get the disassembly drawing matching your generator.

1. Frequency converter

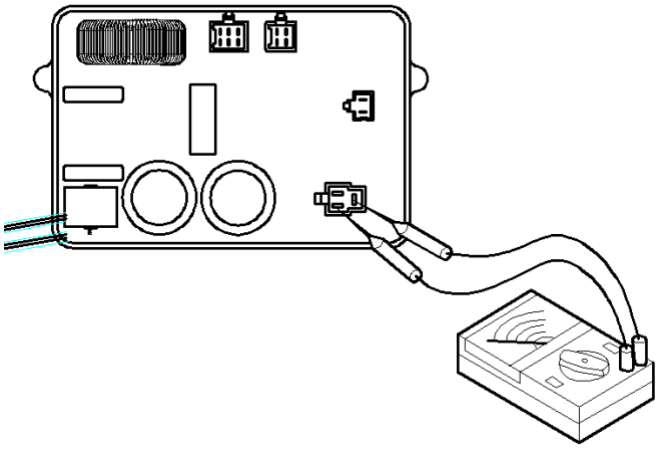
DANGER **Frequency converter Testion should be carried out under the working state of the generators, such operation should not be conducted except by professionals.**

- Check that there is no color change in the wires on the converter, no blister protrusions on the resin filled on the converter, and no visible color change or damage to all electrical components, connectors and wires on the converter.

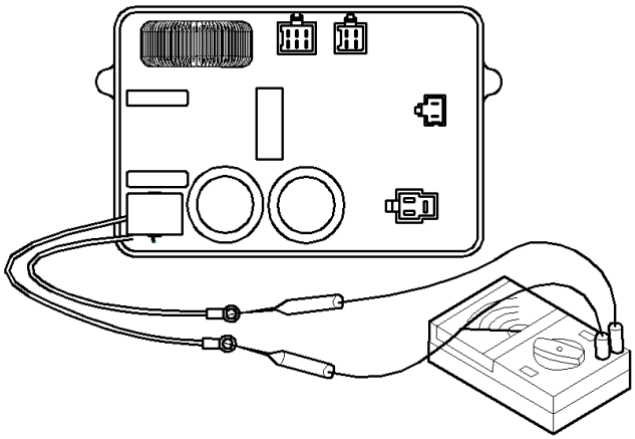
1) Input short circuit: red, green light off, no output. The voltage range tests of the low voltage connector, if the voltage is zero or less than 5V, it checks whether the engine speed is normal and the output voltage of this winding of the motor is too low.



2) Input short circuit: red, green light off, no output. The voltage range tests the high voltage connector, if the voltage is zero or less than 150V, it checks whether the engine speed is normal and the output voltage of this winding of the motor is too low.

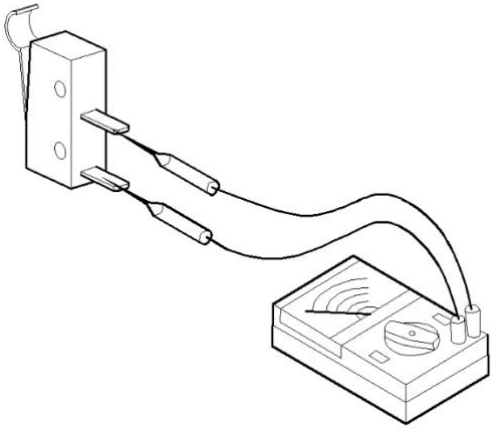


3) Output short circuit: green light off, red light always on. After the output is disconnected, test the output terminal of the converter with the voltage range, and if the voltage is zero, the converter is replaced.



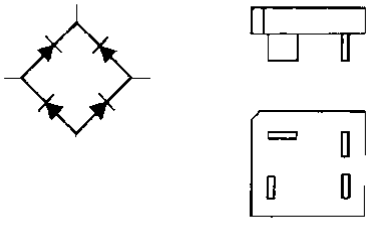
2. Microswitch

- Use an ohmmeter to measure the resistance between the two output terminals when the spring plates are in the sprung open position. If the resistance is zero, replace the micro-switch.
- Use an ohmmeter to measure the resistance between the two output terminals when the spring plate is pressed. If the resistance is infinite, replace the micro-switch.

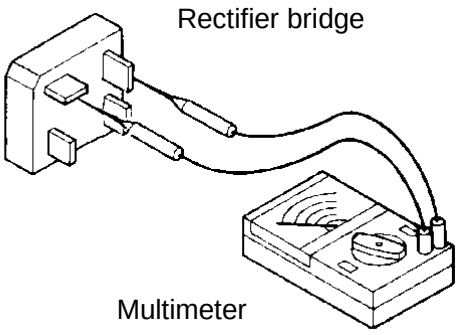


3. Rectifier bridge

- The internal circuit of the rectifier bridge is shown below. Use a multi-meter to check whether each terminal of the rectifier bridge is on or off



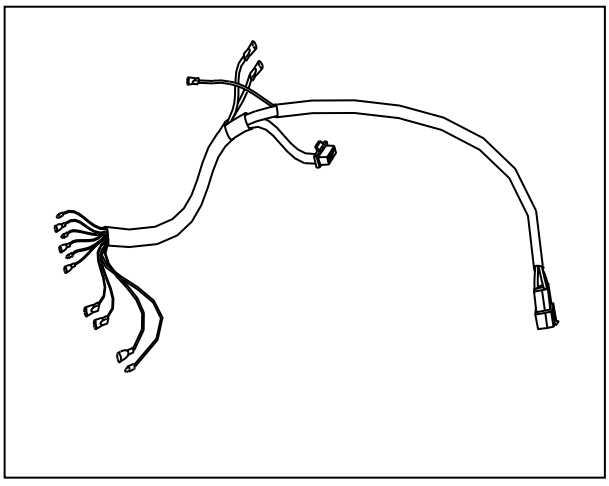
- When the rectifier bridge is on or off as shown below, it is normal.



Digital multi-meter		Through red ⊕ Needle test			
		Blue	**Blue**	**Red**	**Black**
Tested by black needle	**Blue**		Non-conduction	Non-conduction	Conduction
	Blue	Non-conduction		Conduction	Conduction
	Red	Conduction	Conduction		Conduction
	Black	Non-conduction	Non-conduction	Non-conduction	

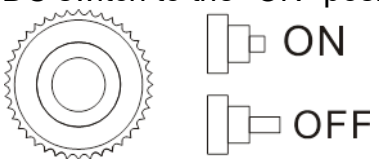
4. Control panel harness

- Remove wiring harness from the panel, rectifier bridge and frequency converter. Check the insulation of the wire for obvious damage. If it is damaged, replace the harness.
- Check the conductivity of each wire with an ohmmeter to confirm that each wire is conducted. If the resistance is infinite, replace the harness.
- Note: Use clamps when removing and attaching harnesses, and use appropriate force to avoid damage to wires and wire connectors.

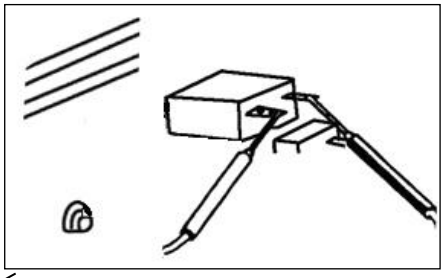


5. Breaker Protector

- When the electronic equipment connected to the generator is running, if the current exceeds the rated current, the DC switch automatically turns to the "OFF" position. When operating the generator again, press the DC switch to the "ON" position.

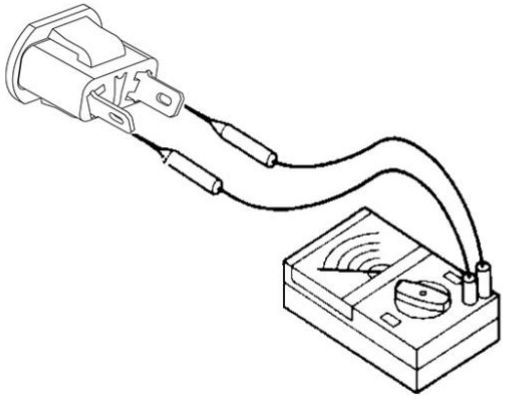


- Check the continuity between the DC circuit breaker terminals with a multimeter. The circuit breaker button should be turned on when pressed.



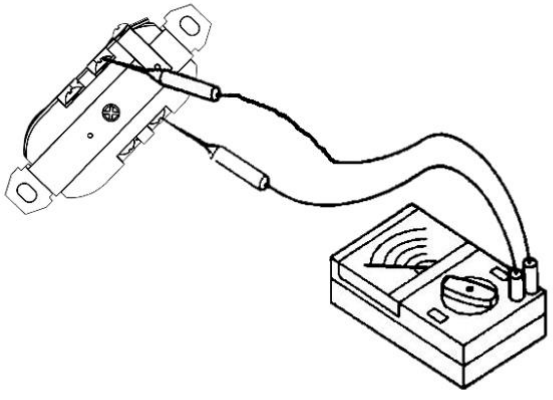
6. DC socket

- Generally there is no problem with DC socket. If there is no DC output, generally it's mainly to check the conduction, secondly to check if there is any breakage or not.



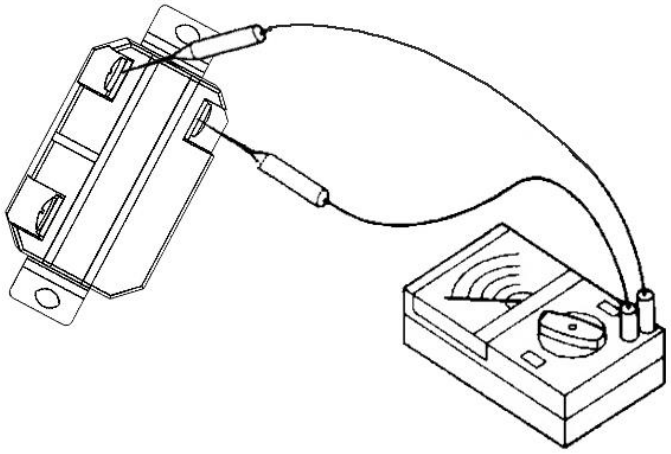
7. Duplex Socket

- Generally there is no problem with DC socket. If there is no DC output, generally it's mainly to check the conduction, secondly to check if there is any breakage or not.

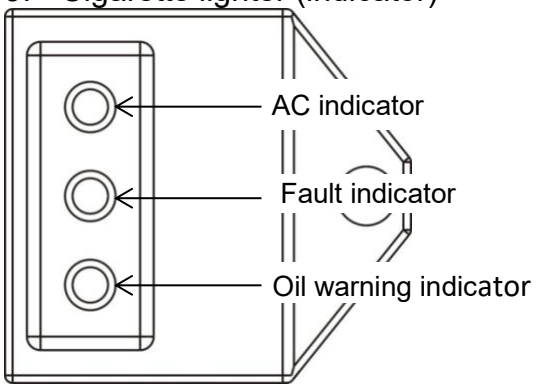


8. Anti-detaching Socket

- Generally there is no problem with DC socket. If there is no DC output, generally it's mainly to check the conduction, secondly to check if there is any breakage or not.

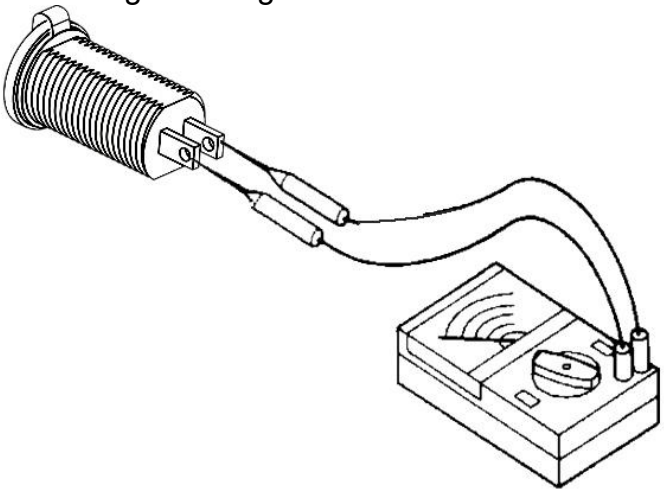


9. Cigarette lighter (indicator)



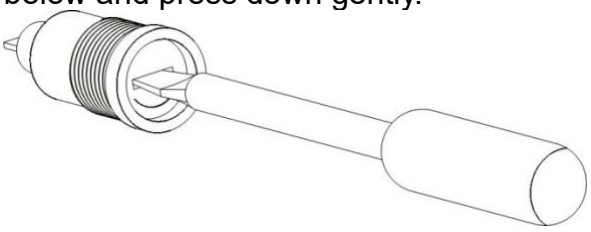
If the three lights are not on, please remove the cigarette lighter and observe whether there are blisters in the resin behind, resistance expansion and other issues. If the visual inspection is correct, please refer to the circuit diagram in the attached page for conduction test.

10. DC Cigarette Lighter

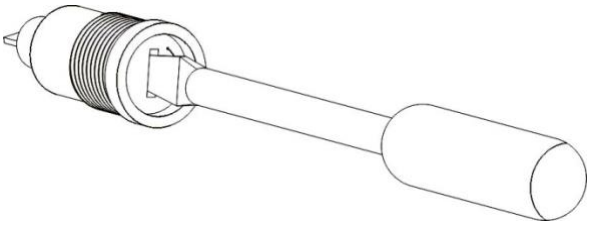


11. Fuse Assembly (optional)

Insert the screwdriver into the slot as shown below and press down gently.

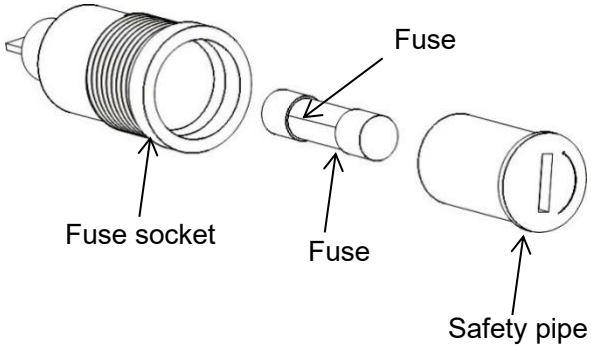


Rotate the fuse cover counterclockwise as shown below.

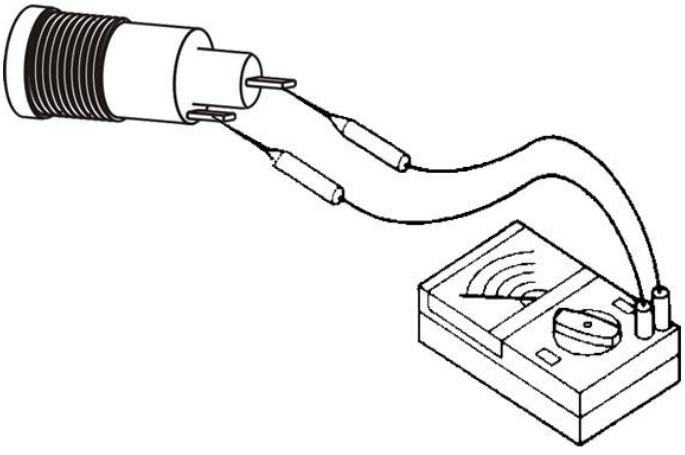


When the rotation reaches the limit, the fuse will pop up naturally.

- * After removing the fuse, observe whether the internal fuse is fused. If so, replace the fuse.



- If the fuse is not fused, please restore it according to the original steps. Check the fuse Assembly conductivity again.

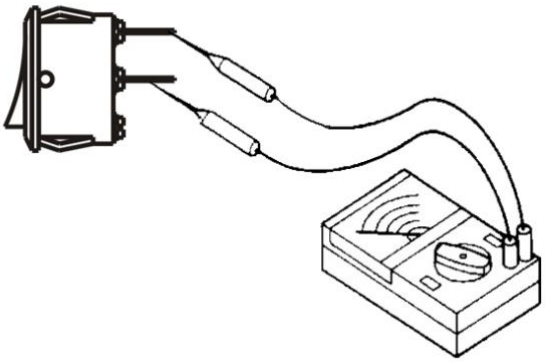


12. Switch Assembly

The switch Assembly is the general designation of the manual circuit breaker.

1) Energy-saving switch (boat-type switch such as power switch)

The following figure tests the switch for conduction in both states.

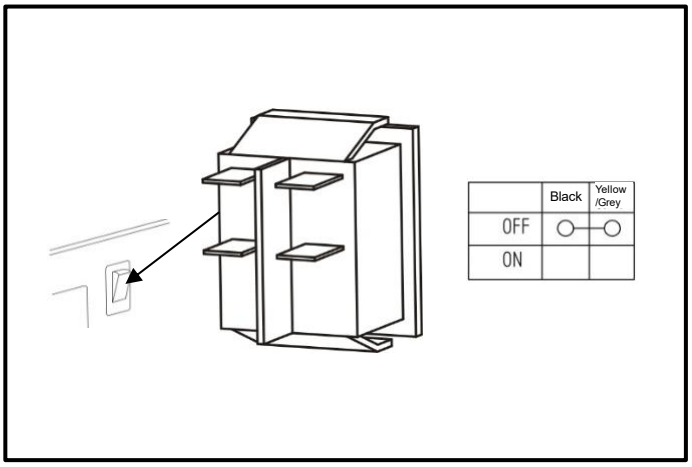


Non-conducted Conducted

If it does not conform to the above conductivity, please replace the switch Assembly.

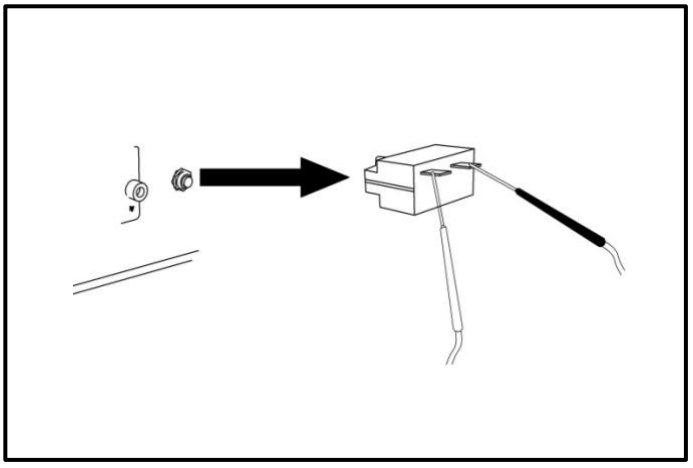
Gasoline engine switch

Remove the wire of switch terminal, to test the resistance of various terminals by ohmmeter as shown in the figure



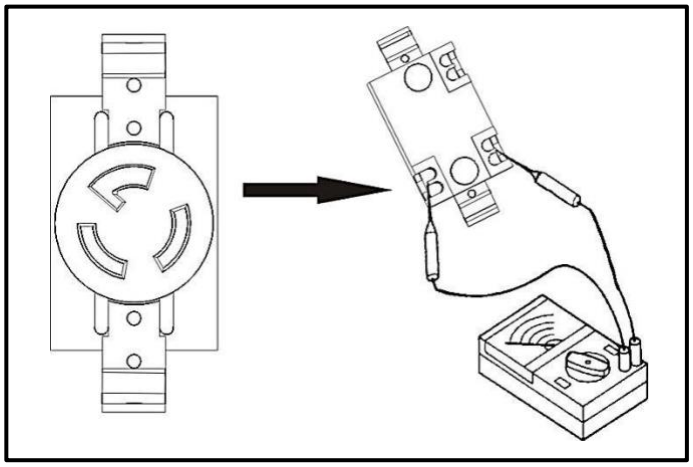
Breaker Protector

When the protector is pressed down, it shall be in conducting state.



Power outlet

Generally there is no problem with DC socket. If there is no DC output, generally it's mainly to check the conduction, secondly to check if there is any breakage or not.

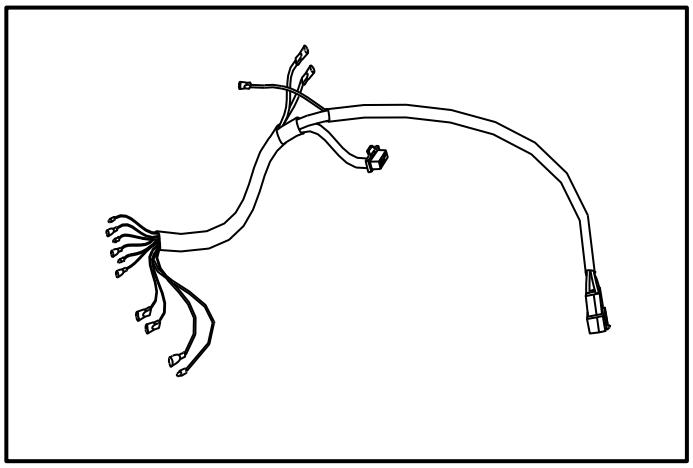


Control panel harness

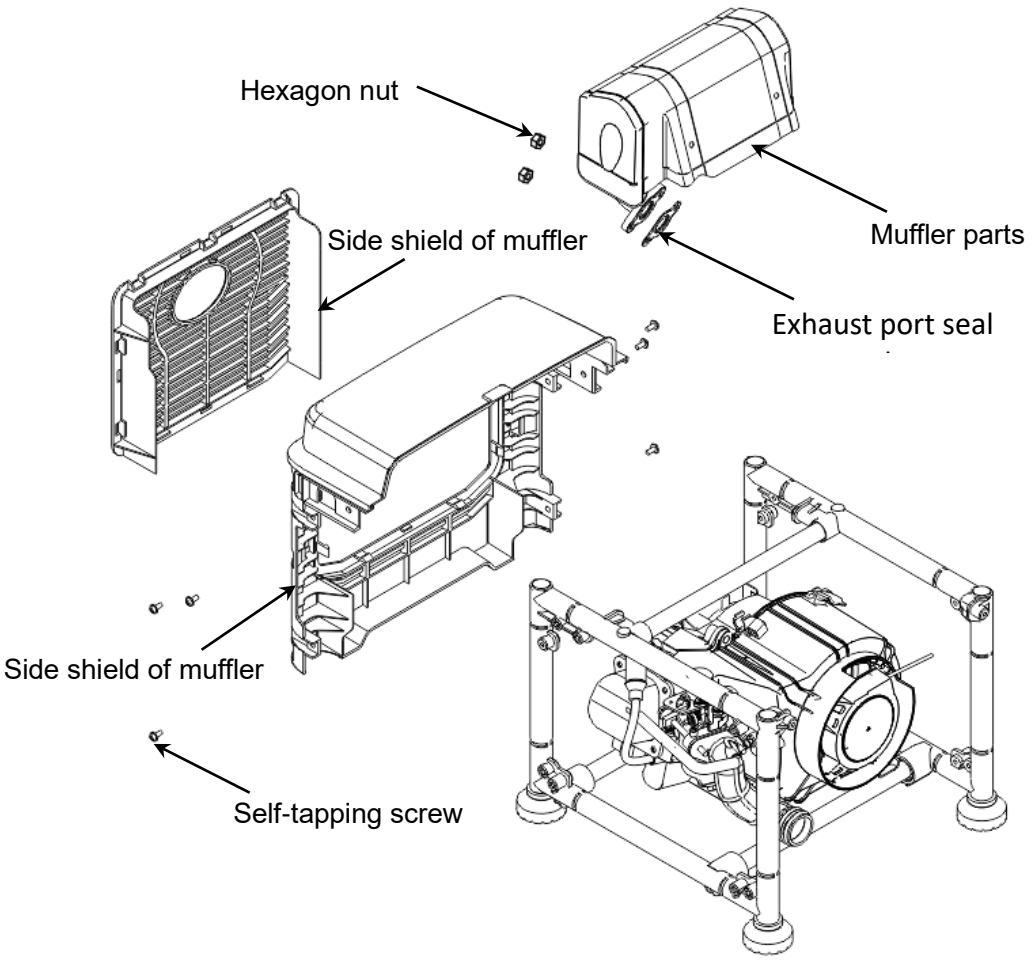
Remove wiring harness from the panel, rectifier bridge and frequency converter. Check the insulation of the wire for obvious damage. If it is damaged, replace the harness.

Check the conductivity of each wire with an ohmmeter to confirm that each wire is conducted. If the resistance is infinite, replace the harness.

Note: Use clamps when removing and attaching harnesses, and use appropriate force to avoid damage to wires and wire connectors.



4-4 Muffler



⚠ WARNING

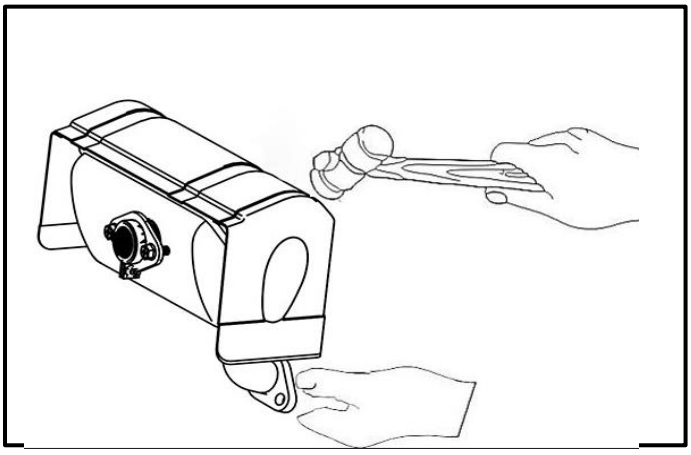
The muffler will heat, please set this gasoline engine in the place where passers and children are unable to reach.

When the gasoline engine is running, be sure not to place any combustible article near the exhaust port.

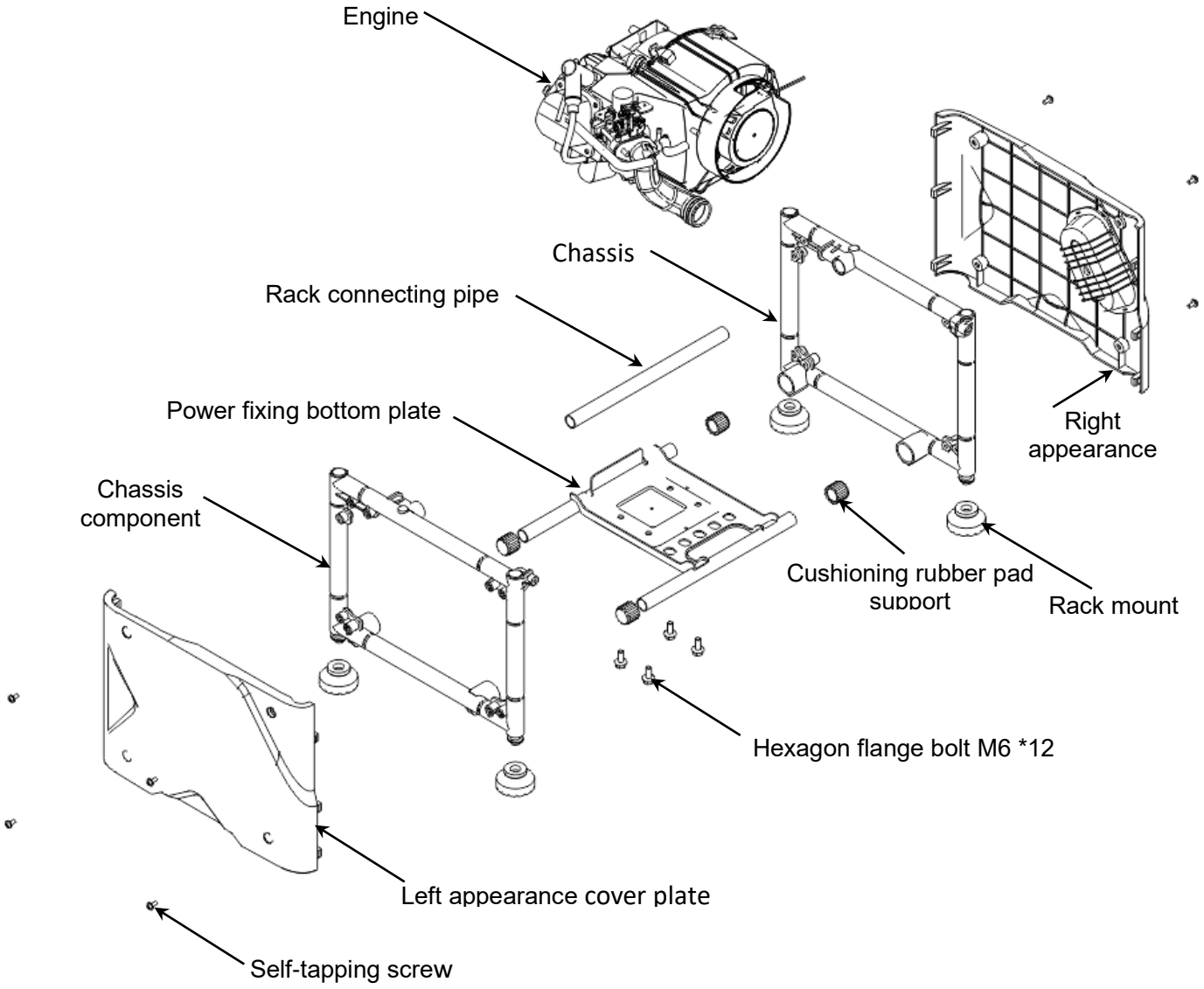
Decarburization of Muffler

During long-term use, the muffler will cause carbon deposition, which will cause serious impact to exhaust system. In order to make the exhaust system work better, we shall generally remove carbon deposition in the muffler.

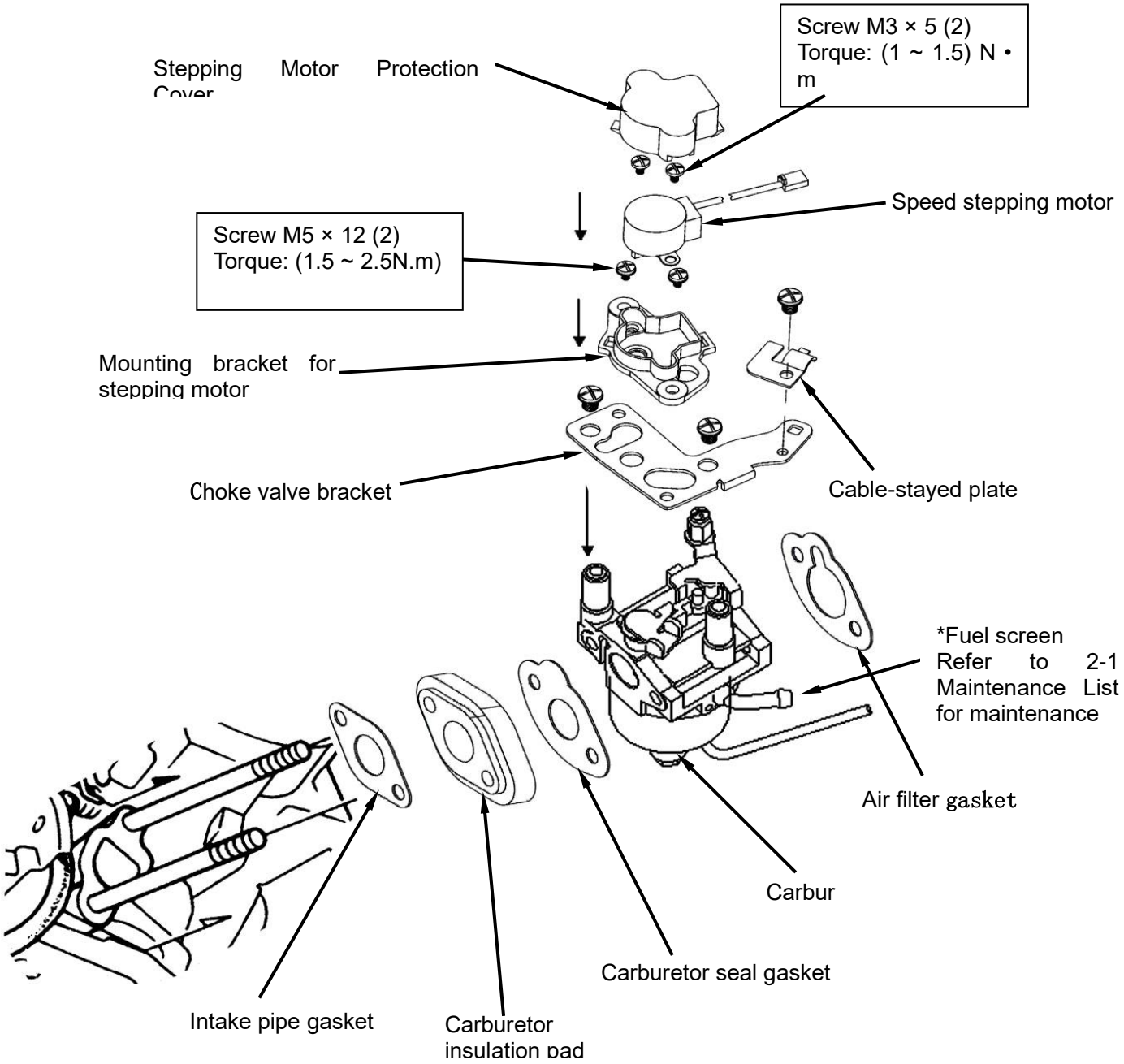
When removing carbon deposition inside the muffler, a plastic hammer can be used to lightly hit and compressed air can be used to blow carbon deposition away. If the muffler accumulates water droplets and corrodes seriously to increase exhaust noise, it shall be replaced with a new one. Do not use iron wire for cleaning, otherwise it may cause muffling material to fall out, thus reducing the muffling performance.

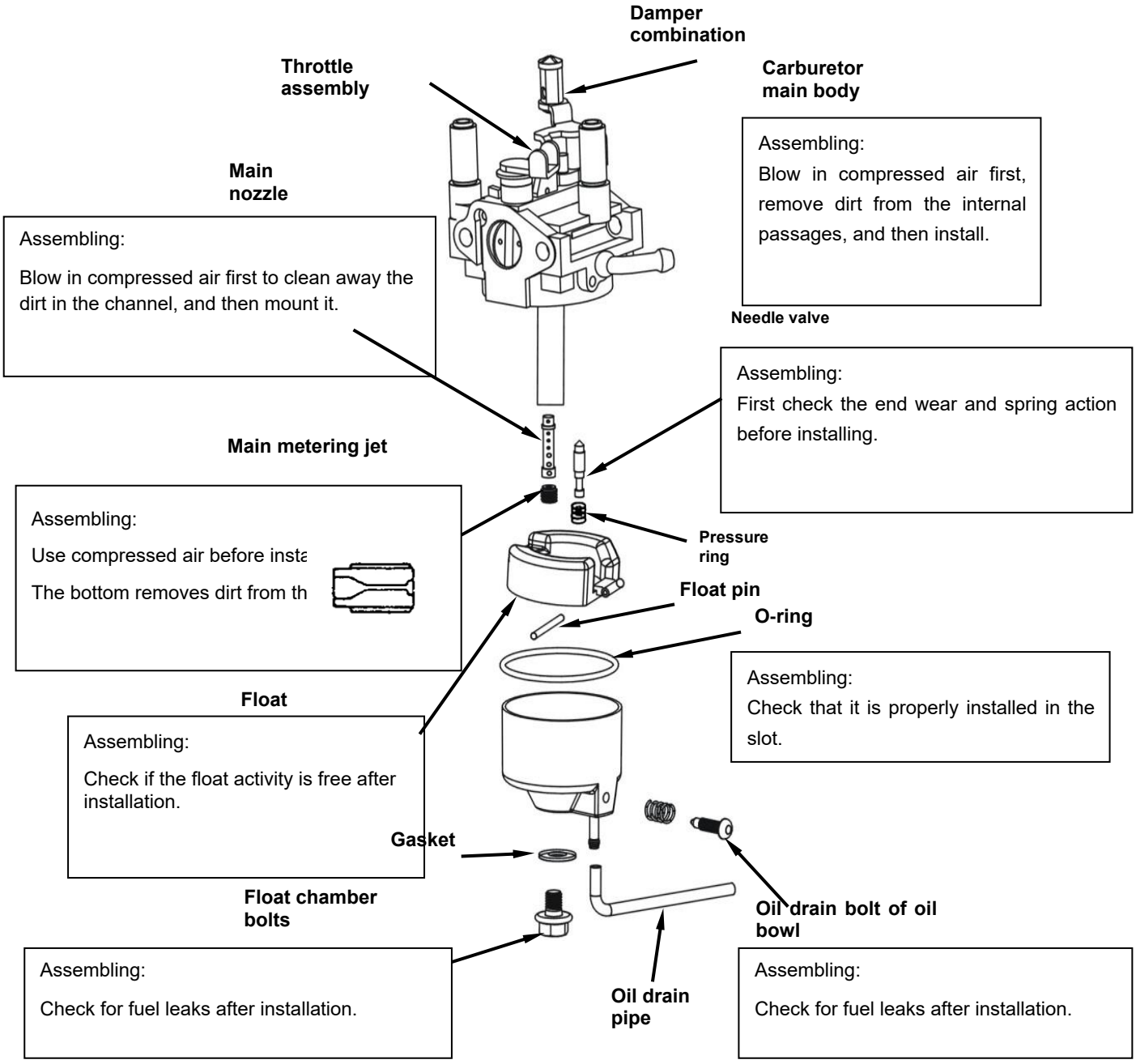


4-5 Power/Chassis



4-6 Carburetor





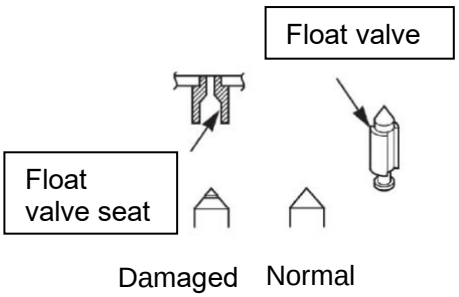
The carburetor shall be cleaned on a clean site. First wipe off outer surface of the carburetor, and internal parts can be cleaned with special carburetor cleaner or industrial gasoline. In addition to impurities, note cleaning gasoline gel on part surface. Clean the parts with compressed air blowing, cloth or paper that produces burrs shall not be used to wipe, in order to prevent re-pollution. It is forbidden to poke through clogged hole by hard object such as steel wire, to prevent hole diameter from changing to cause the change of carburetor performance, but it shall be washed off with gasoline or compressed air.

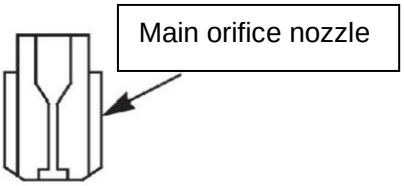
NOTICE

- **Before installing the carburetor, the oil drain bolt must be loosened and the fuel inside must be drained.**
- **No fire and smoke.**

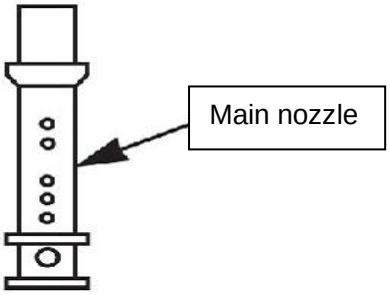
a) Assembly

Before assembly, inspect the float valve, float valve seat and float spring for wear.

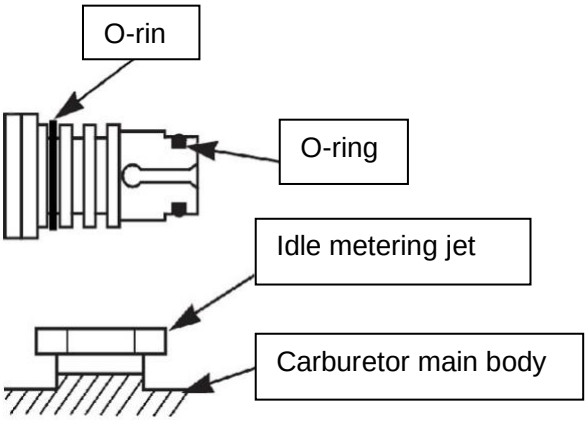




Thoroughly clean with compressed air before assembly.



Thoroughly clean with compressed air before assembly.



Thoroughly clean with compressed air prior to assembly, lightly lubricate the O-ring so that it can be
fitted into the carburetor easily.

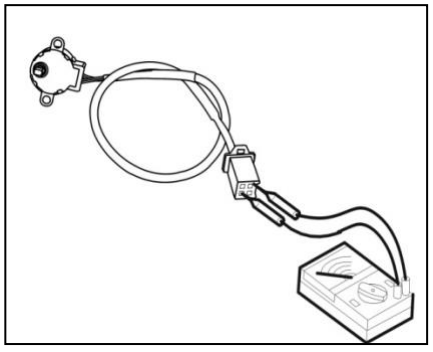
2. Speed stepping motor

Check the resistance on the 2 diagonal line in the stepping motor socket, and the resistance shall be 50 Ω ± 7% Ω

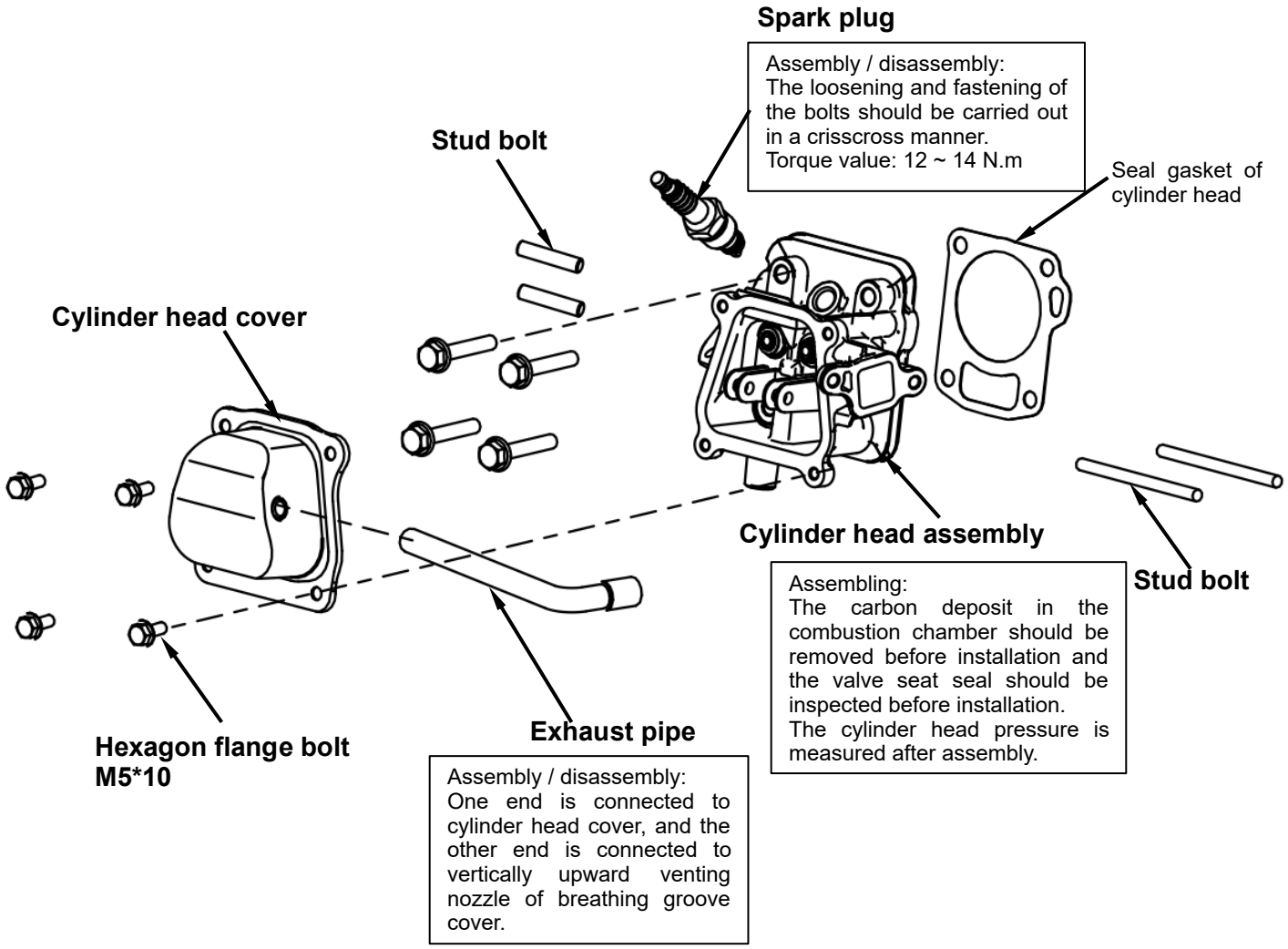
If out of range, the stepping motor should be replaced.

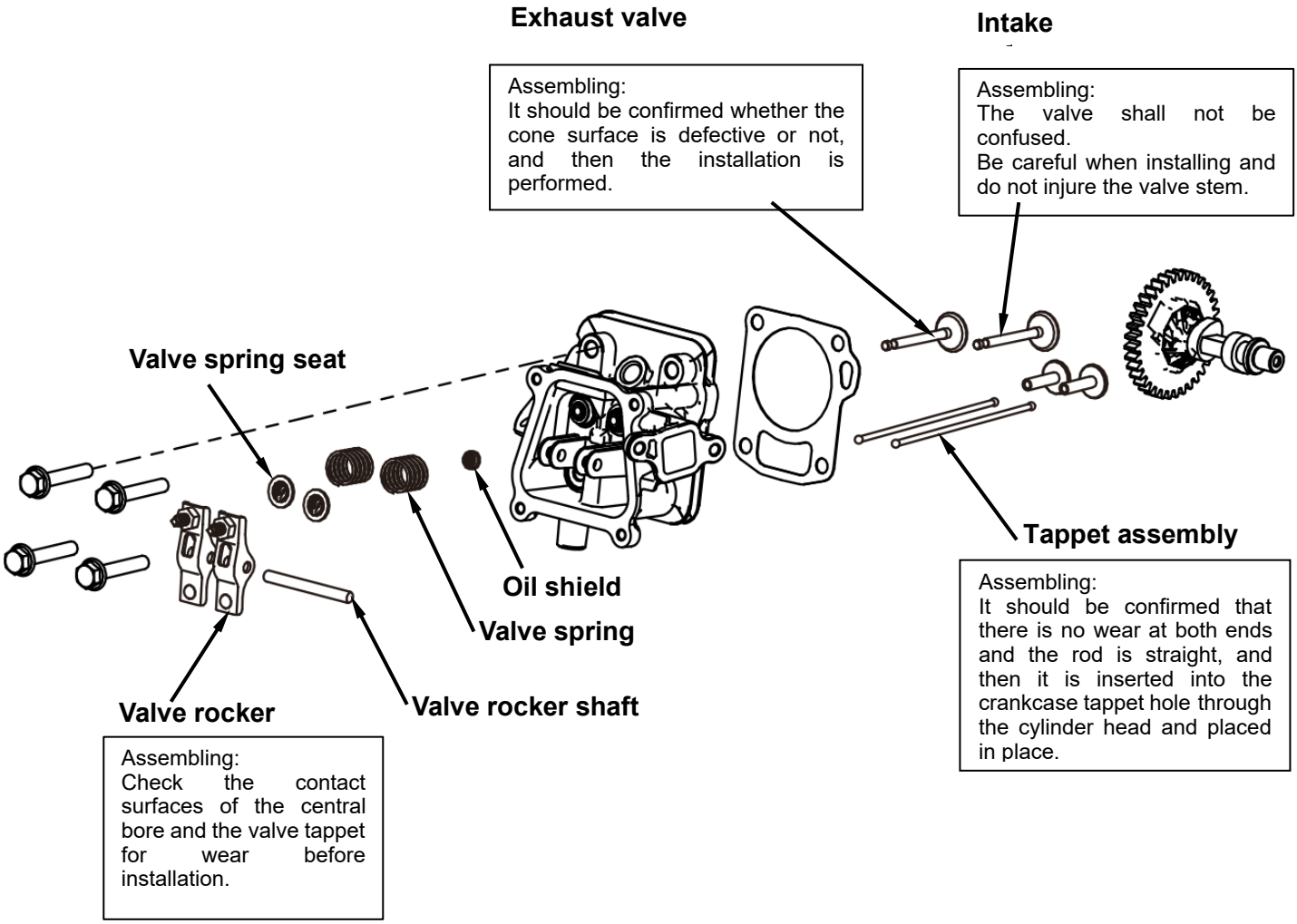
When the stepping motor is energized, the central shaft of the rotating component motor shall not

The card is issued, loose, and the stepper motor is replaced if the above problem is found.



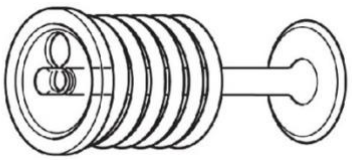
4-7 Cylinder head




Exhaust valve
Intake
Assembling:
It should be confirmed whether the cone surface is defective or not, and then the installation is performed.
Assembling:
The valve shall not be confused.
Be careful when installing and do not injure the valve stem.
Valve spring seat
Oil shield
Valve spring
Tappet assembly
Valve rocker
Valve rocker shaft
Assembling:
It should be confirmed that there is no wear at both ends and the rod is straight, and then it is inserted into the crankcase tappet hole through the cylinder head and placed in place.
Assembling:
Check the contact surfaces of the central bore and the valve tappet for wear before installation.

3. Valve spring seat ring

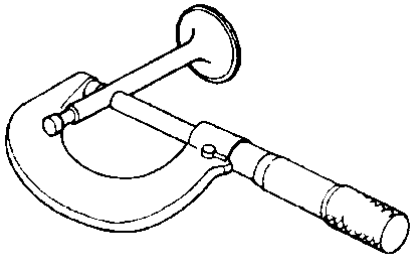
Slide the front end of the valve stem across the centerbore of the spring seat ring and remove it.
If the cylinder head is installed on the cylinder, the spring seat ring may fall into the crankcase body and care should be taken.



4. Air valve

Inspect outer diameter of valve stem with a micrometer, if the diameter is lower than the standard or exceeds maintenance limit, or there is any visible ablation or crack on valve surface by naked eye, it shall be replaced with new valve.

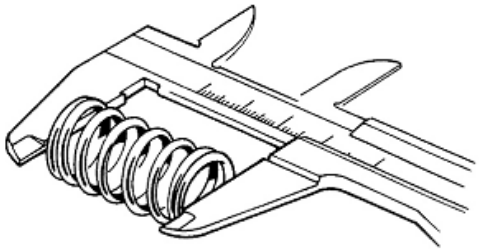
Standard		Maintenance limit	
See Table 1-3	See Table 1-3	See Table 1-3	See Table 1-3



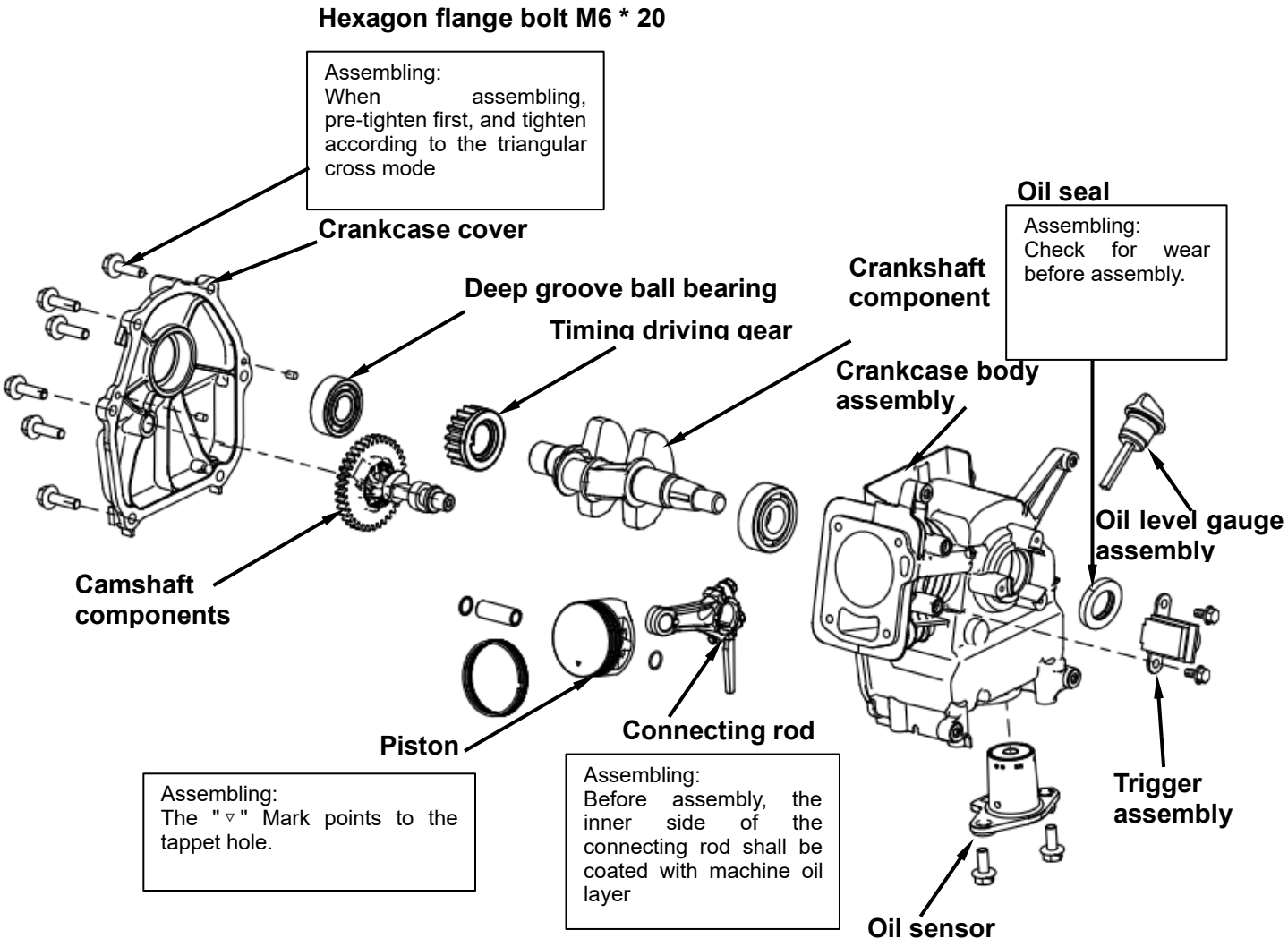
5. Valve spring

Measure the free length of the valve spring.
If it is below standard or exceeds the service limit, replace the spring.

Standard	Maintenance limit
See Table 1-3	See Table 1-3



4-8 Crank-link Mechanism / Valve Mechanism

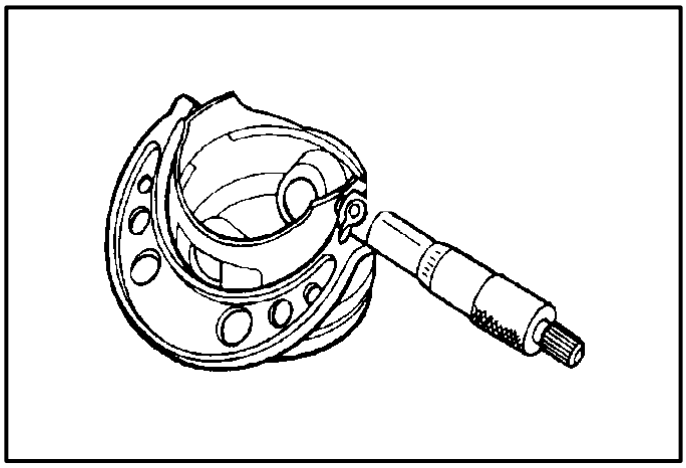


Piston

Piston skirt outer diameter

Measure the OD of the piston skirt with an OD micrometer, to replace it if it exceeds the service limit.

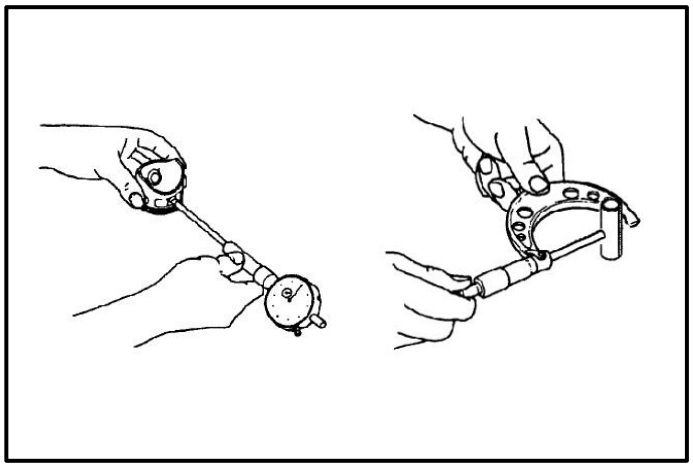
Standard	Use limit
See Table 1-3	See Table 1-3



The clearance of Piston Pin Hole and Piston Pin

Use the inside micrometer and the outside micrometer to measure the inner diameter of the piston pin seat hole and the outer diameter of the piston pin respectively. Then calculate its gap value based on measurement results. If the operating limit is exceeded, replace the piston or piston pin according to wear condition.

Standard	Use limit
See Table 1-3	See Table 1-3



Piston - cylinder clearance

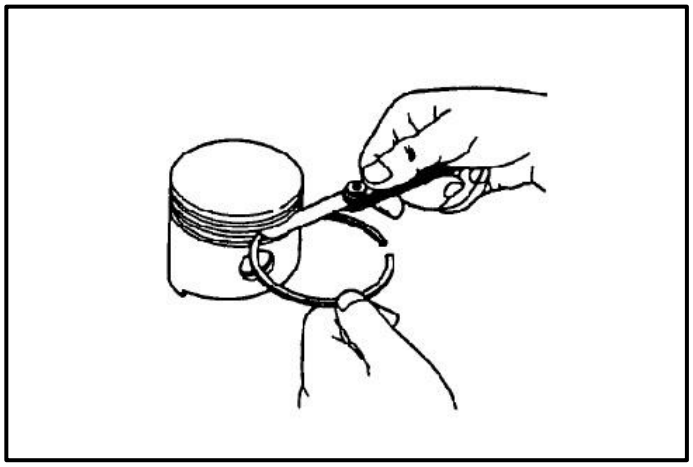
The difference between maximum diameter of the cylinder and the diameter of piston skirt is the piston-cylinder gap. When inspecting, put the piston upside down in the cylinder, put the thickness gauge of suitable thickness between the pressure-bearing face of piston skirt and the cylinder wall, and then draw out the thickness gauge. If feeling certain resistance, but it can be drawn out smoothly, the thickness of the gauge is the gap between the cylinder and the piston.

Standard	Use limit
See Table 1-3	See Table 1-3

Piston ring side clearance

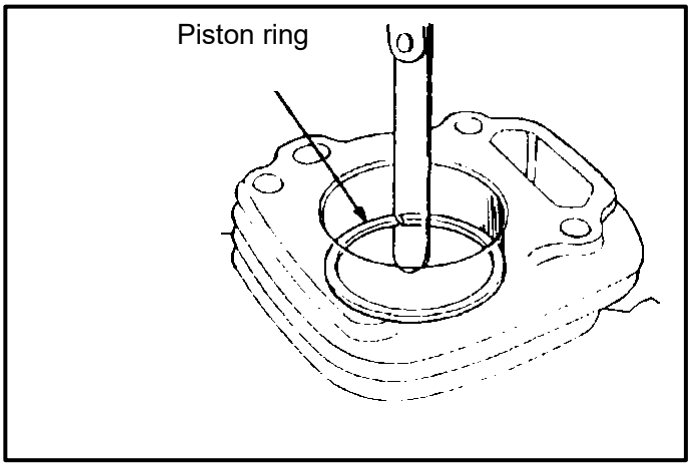
When checking, place each ring in its respective piston ring groove. Piston rings shall rotate freely, to be neither loose nor sluggish. Then insert the thickness gauge into the gap between upper and lower planes of the ring and the groove to measure.

Standard	Use limit
See Table 1-3	See Table 1-3



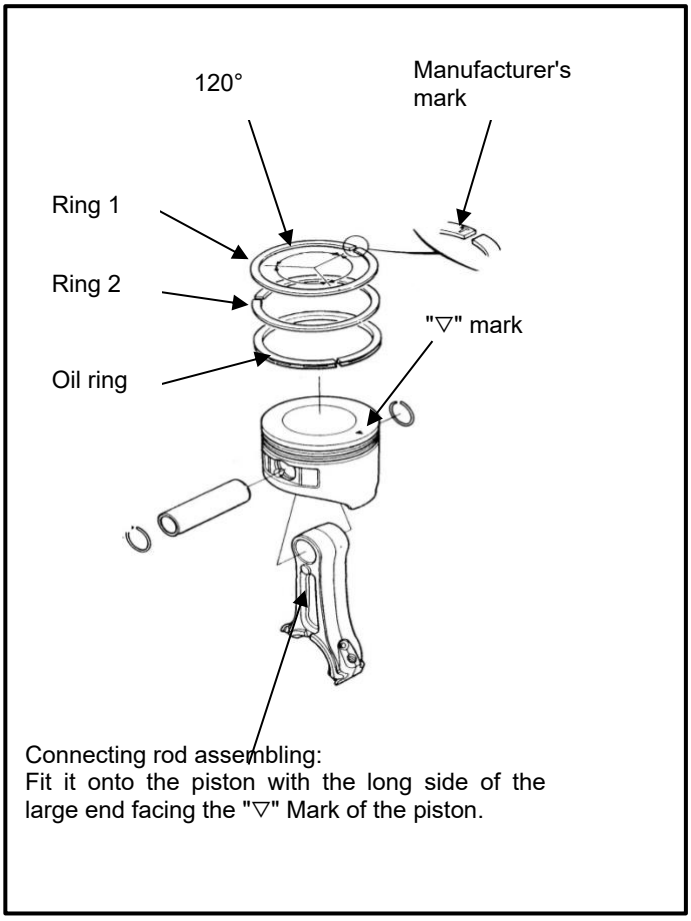
Closure clearance of piston ring
Place the piston ring horizontally into the cylinder, push the ring with the piston head to the working position, and then measure the opening gap with a thickness gauge. If the gap of the ring opening is small, the opening can be filed with a fine flat file. It shall be put into the cylinder for inspection while being filed, until the gap is appropriate.

	Standard	Use limit
Ring 1/ Ring 2	See Table 1-3	See Table 1-3
Oil ring	See Table 1-3	See Table 1-3



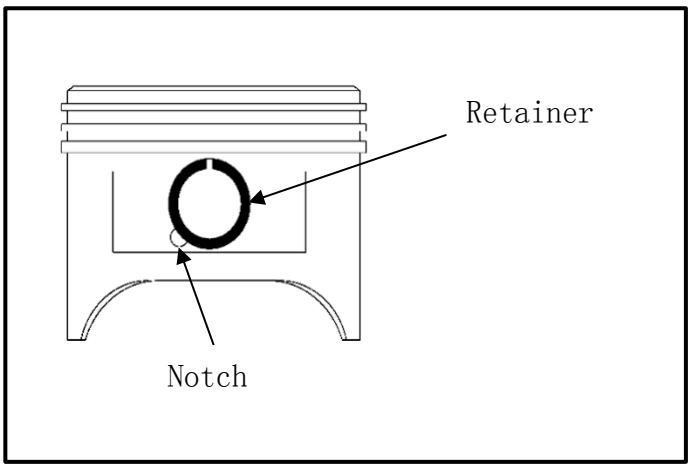
Install with manufacturer's mark facing up. Be careful not to confuse the first ring with the second ring (the first ring has chrome plating).

- Make sure that the piston ring moves freely after installation.
- Keep the opening of each piston ring to avoid the direction of piston pin, to scatter out at 120°.



Connecting rod assembling:
Fit it onto the piston with the long side of the large end facing the "▽" Mark of the piston.

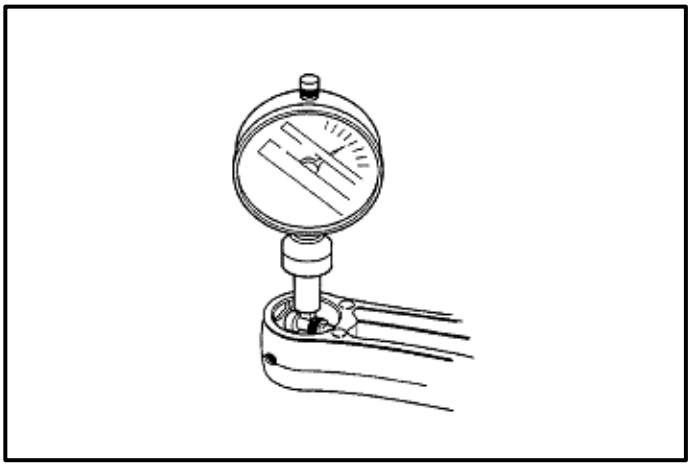
Retainer ring of piston pin
Jack the front end at the piston groove, to clamp the other end with a nose plier, and mount it in the groove while turning.
Make the opening of snap ring be away from the notch of piston.



Connecting rod
Measuring inner diameter of small end

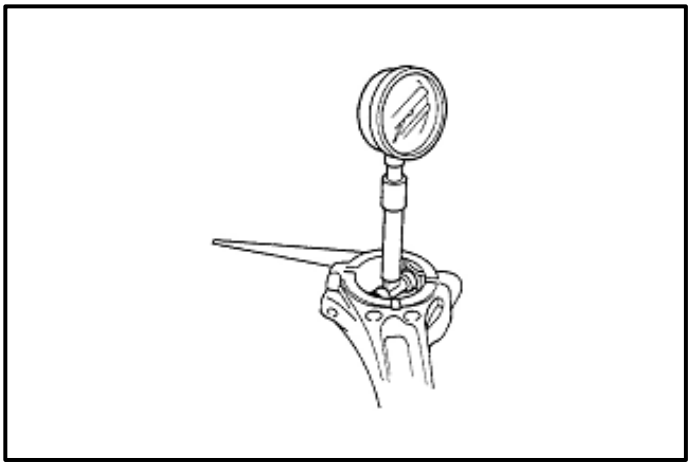
If it is below the criterion or exceeds the maintenance limit, replace the connecting rod.

Standard	Use limit
See Table 1-3	See Table 1-3

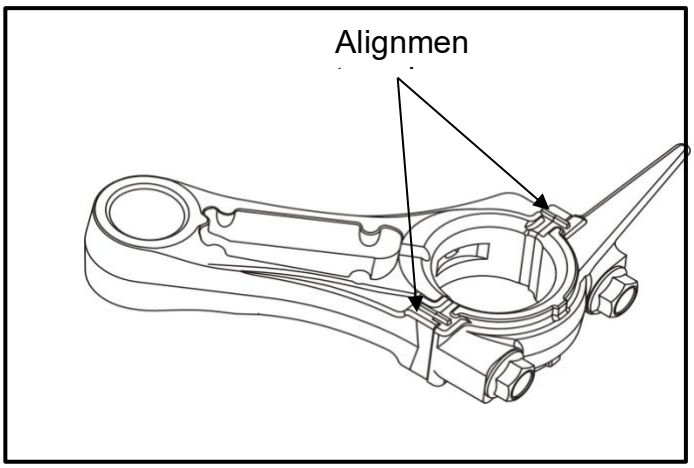


Test the I.D. of the big end
If it is below the criterion or exceeds the maintenance limit, replace the connecting rod.

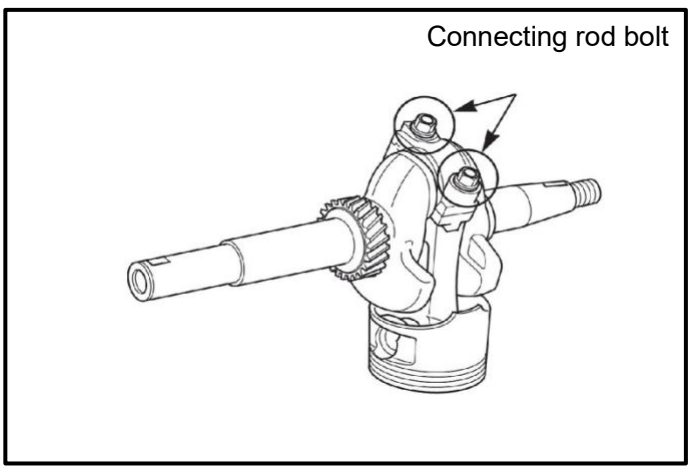
Standard	Use limit
See Table 1-3	See Table 1-3



Connecting rod cover
Align connecting rod with the edge of the connecting rod cover when installing.

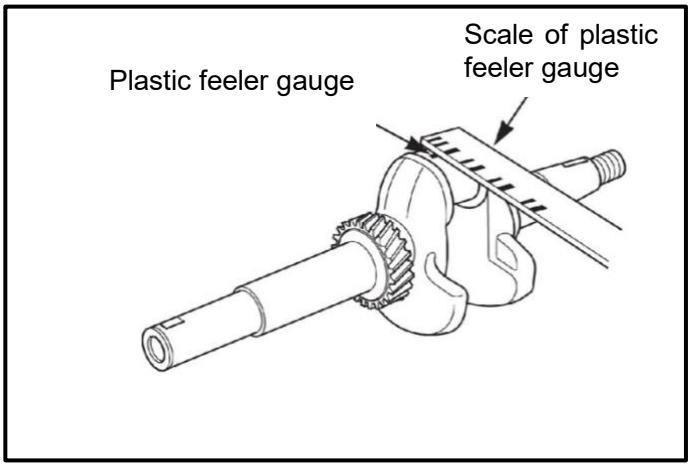


Big end clearance of oil film
 Wipe oil off surfaces of crankshaft pin and connecting rod bearing.
 Set a plastic feeler gauge outside the crankshaft pin, to mount the connecting rod, and tighten the bolt to specified torque.
Torque: RS100: 8±1 N.m



NOTICE **Radially place plastic feeler gauge**

- Remove connecting rod cap, to measure by plastic feeler gauge.
- If bearing bush clearance exceeds maintenance limit, the connecting rod shall be replaced and the clearance shall be measured again.

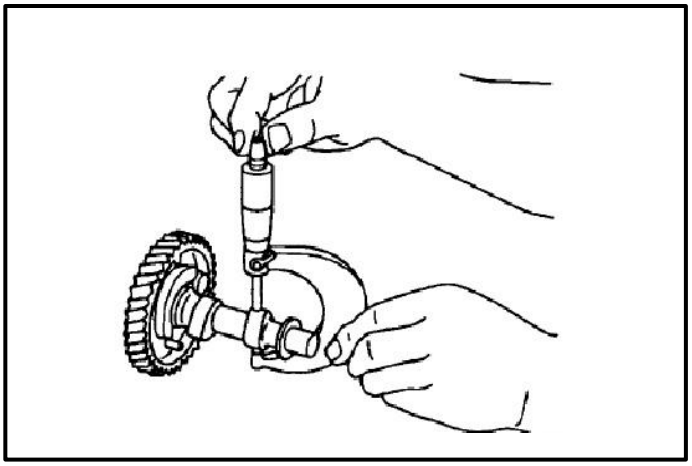


Camshaft

Inspect whether cam surface and cam height are damaged externally, and whether the camshaft and bearing are loose and worn, and if there are, replace whole set.

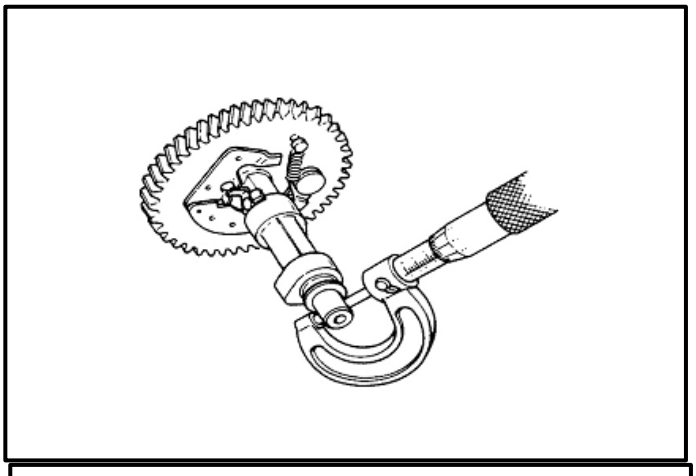
Check the height dimension of the cam. Replace the camshaft when the cam height dimension is less than the service limit.

	Standard	Maintenance limit
Intake lift range of the camshaft	See Table 1-3	See Table 1-3
Exhaust lift range of the camshaft	See Table 1-3	See Table 1-3



Inspect the OD of the camshaft and replace the camshaft when it is less than operating limit

Standard	Maintenance limit
See Table 1-3	See Table 1-3

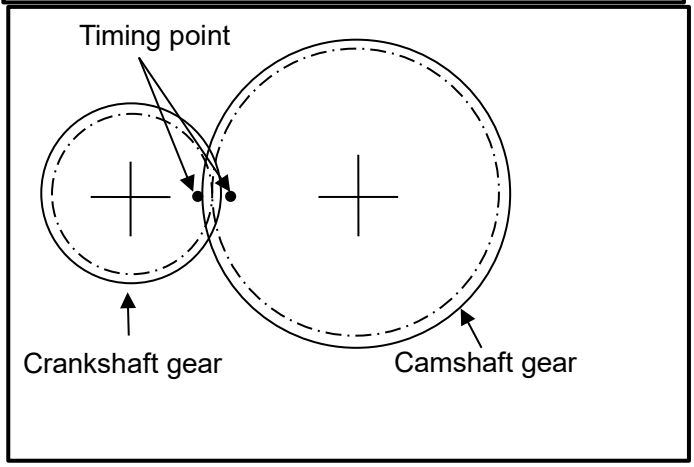


Timing gear

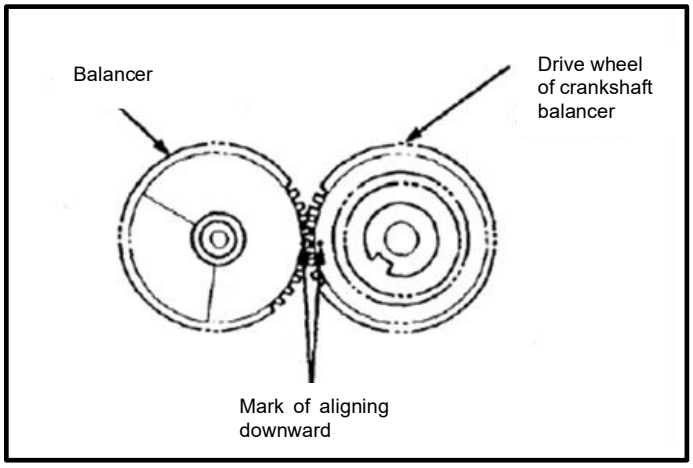
Check the meshing clearance of the timing gear and align the alignment marks of the gears on both sides.

NOTICE

When replacing new parts, it is better to replace the whole part to ensure that there is a more consistent meshing surface.

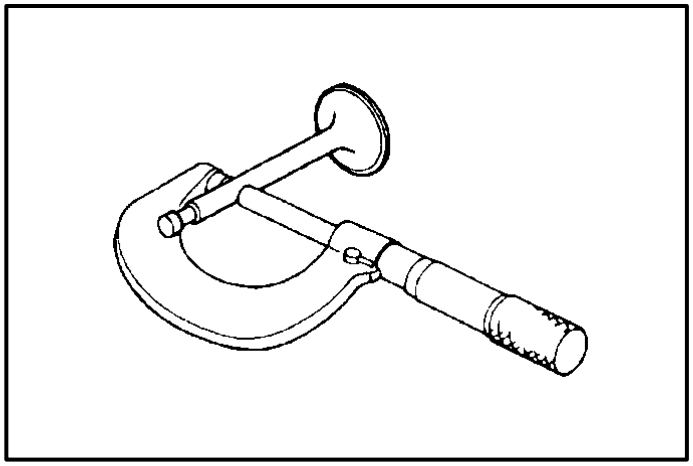


Align the crankshaft with balance shaft (R5000 and R8000)



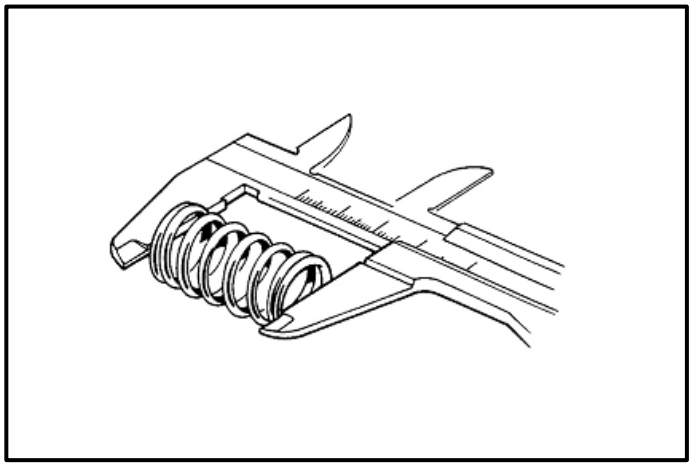
Main damage of timing gear is the wear of gear tooth, tooth face peeling or roughness, gear deflection, gear tooth breakage, etc. Due to the wear of gear teeth, the greater the meshing gap, the greater the noise.
If gear face of timing tooth is bumped damaged or damaged or rupture angle, it shall be replaced with a new one for any case.

NOTICE When replacing new parts, it is better to replace the whole part to ensure that there is a more consistent meshing surface.



Air valve
O.D. of valve tappet rod
Inspect O.D. of valve tappet rod by micrometer. If the diameter is below the standard or exceeds maintenance limit, or if there is any ablation or crack on the valve face visible to naked eye, a new valve shall be replaced.

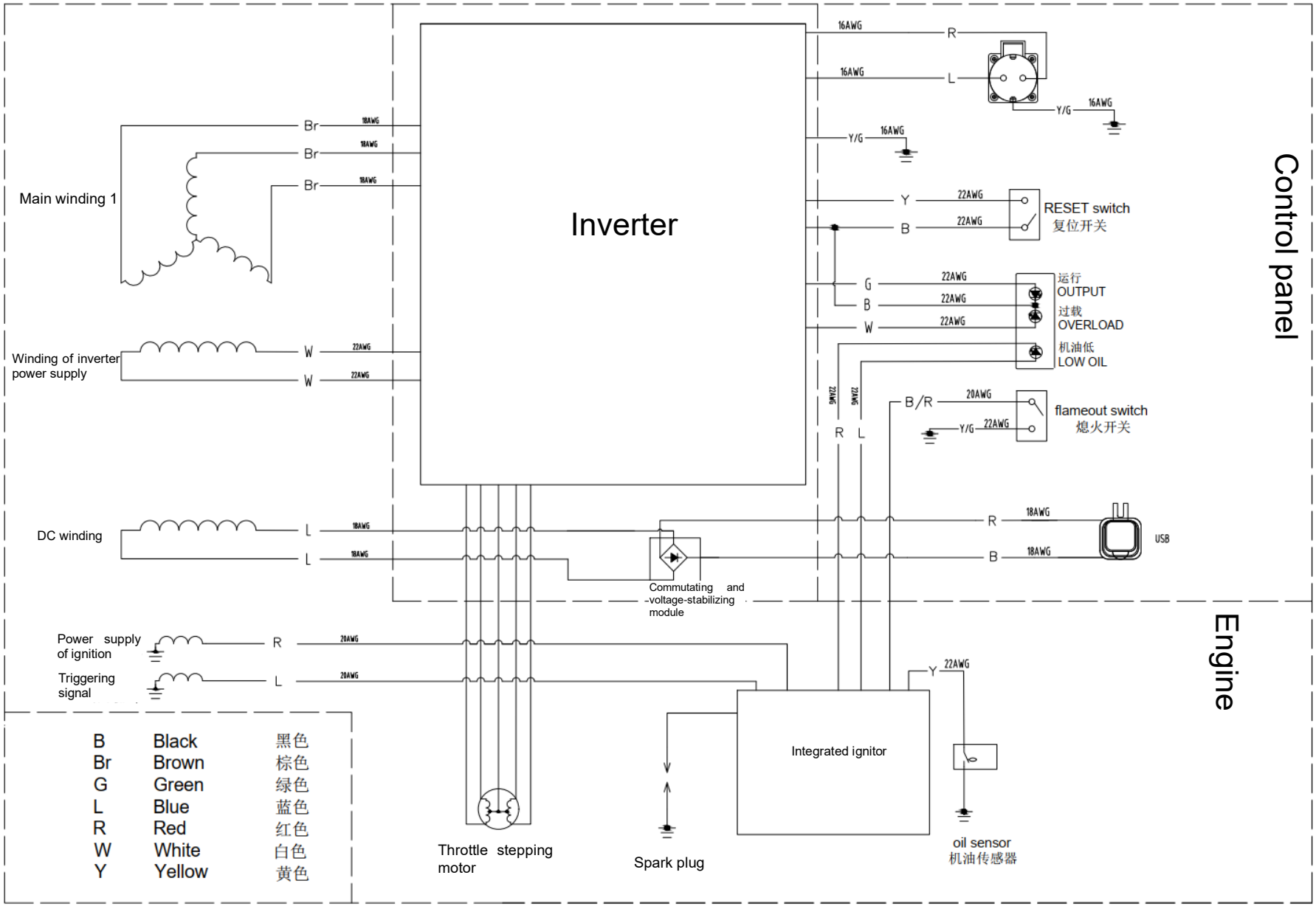
Standard		Maintenance limit	
See Table 1-3	See Table 1-3	See Table 1-3	See Table 1-3



Free length of valve spring
Measure the free length of the valve spring.
If it is below standard or exceeds the service limit, replace the spring.

Standard	Maintenance limit
See Table 1-3	See Table 1-3

Part V Attachments
5-1 Circuit Diagram



5-3 List of Vulnerable Parts

Part name	QTY	Remarks
Carburetor components	1	Common failure
Hand starting components	1	
Starting guy wire	1	
Spark plug	1	
Air filter element	1	
Governor gear assembly	1	
Governor bonnet	1	
Air intake gasket	1	
Carburetor seal gasket	1	
Air filter gasket	1	
Seal gasket of cylinder head cover	1	
Seal gasket of cylinder head	1	
Oil seal	2	
Seal gasket of crankcase	1	
Exhaust port seal gasket	1	
Ignition coil	1	Major failure
Piston	1	
Ring 1	1	
Ring 2	1	
Oil ring assembly	1	
Connecting rod	1	
Crankshaft component	1	
Intake valve	1	
Exhaust valve	1	
Oil shield	1	
Deep groove ball bearing	2	
Oil sensor	1	
Crankcase body assembly	1	Bad shipping
Oil dipstick assembly	1	
Air guide cover	1	
Voltage regulator	1	Common failure
Motor component	1	Major failure
Switch assembly	1	
Muffler parts	1	
Fuel tank	1	Bad shipping
Fuel tank cap	1	
Muffler housing	1	
Side shield of muffler	1	
Chassis component	1	
Control Panel Assembly	1	

5.4 Standard Torque

Fastening parts	Thread specification	Torque (N.m)
Bolt, nut	5 mm bolts, nuts	4.5-6
	6 mm bolts, nuts	8-12
	8 mm bolts, nuts	18-25
	10 mm bolts, nuts	29-34
	12 mm bolts, nuts	49-59
	4mm Screw	1.5-2.6
	5mm Screw	3.5-5
	6mm Screw	7-11
	5mm Flange Bolt	3.6-6.9
	6mm Screw	7-11
	5mm Flange Bolt	3.6-6.9
	6mm Flange Bolt	10-14
	8mm Flange Bolt	20-26
	10mm Flange Bolt	35-45

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