RT50ZB26-3.6Q/ RT80ZB26-3.6Q/ RT100ZB26-5.2Q

WATER PUMP SERVICE MANUAL

CHONGQING RATO POWER CO., LTD

This manual contains information how to routine maintain and how to do troubleshooting.

Keep this owner's manual handy, so you can refer to it at any time.

This service manual describes correct method of the maintaining this equipment. As a result of this disregard for our rules caused by person casualty and equipment damaged, our company does not assume any responsibility.

SAFETY MESSAGES

Your safety and the safety of others are very important. We have provided important safety messages in this manual and on the generator. Please read these messages carefully.

A safety message alerts you to potential hazards that could hurt you or others. Each safety message is preceded by a safety alert symbol ⚠ and one of three words: DANGER, WARNING, or CAUTION. These mean:

⚠DANGER **You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.**

⚠ WARNING **You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.**

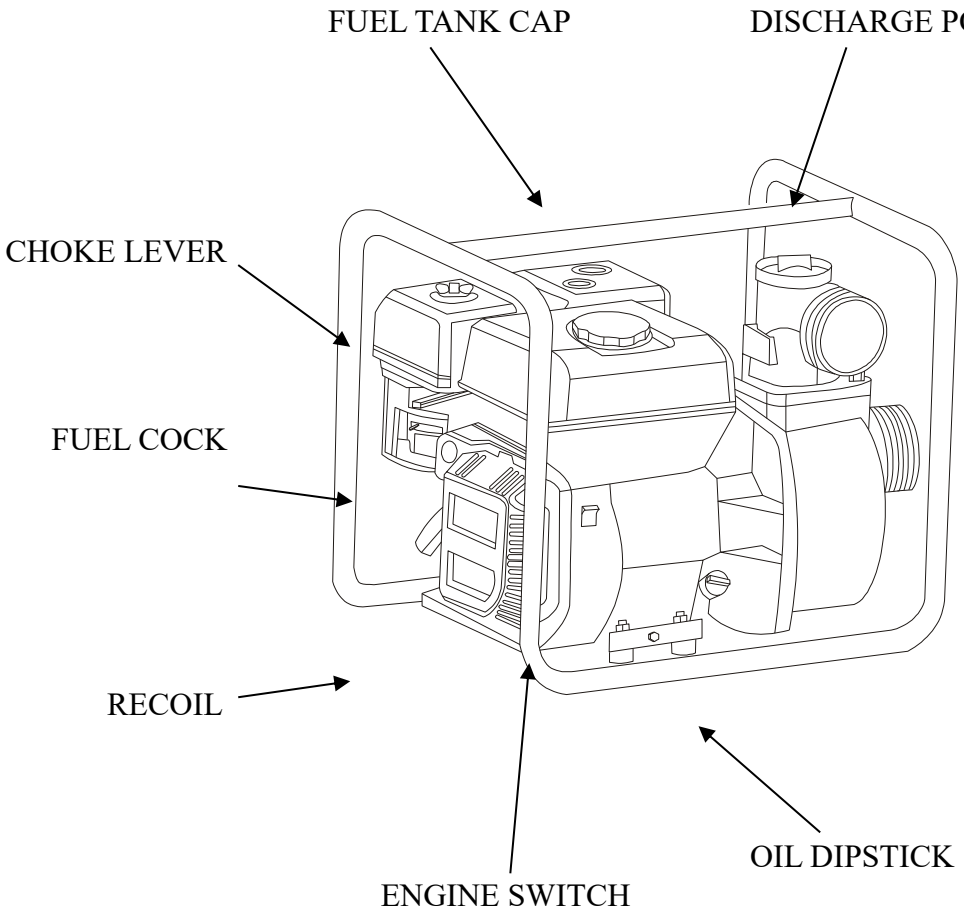
⚠ CAUTION **You CAN be HURT if you don't follow instructions.**

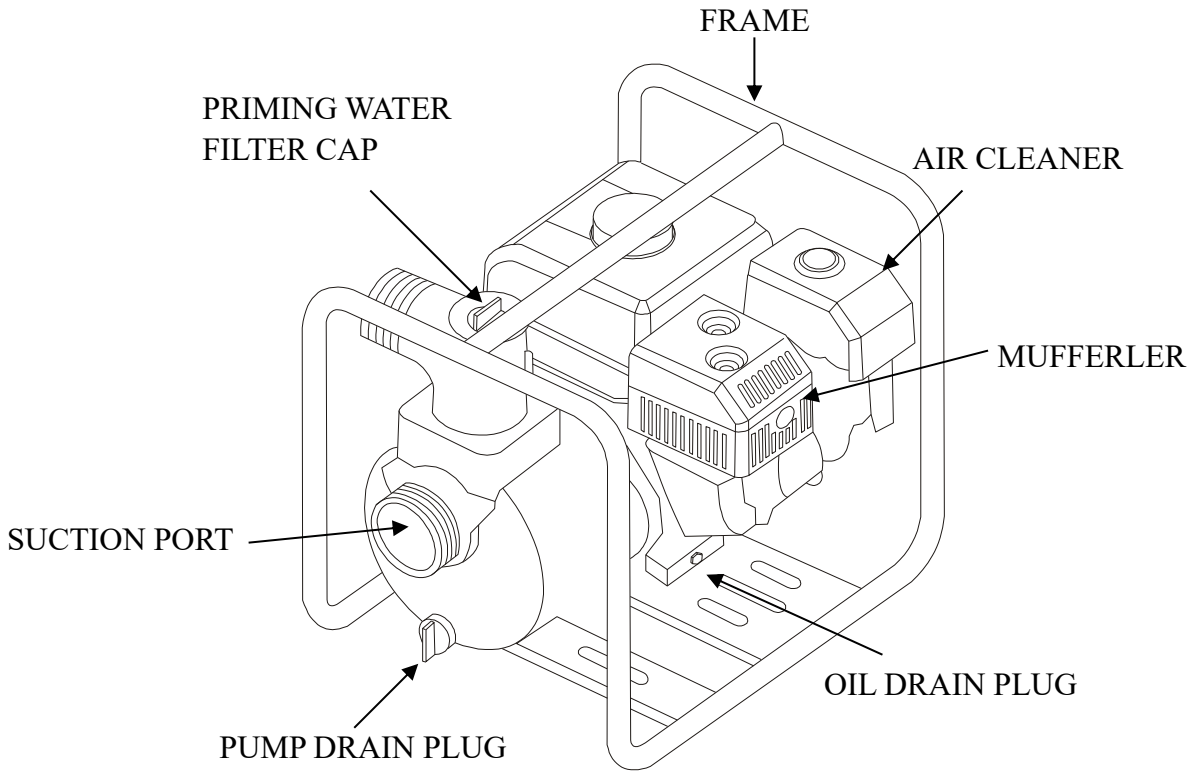
NOTICE **Your generator or other property could be damaged if you don't follow instructions.**

CONTENT

1. PREFACE

1-1 Component identification





1-2 Specifications

Engine specification

Model / Items	R200	R270
L×W×H	390×320×345mm	355×430×410mm
Dry Weight	16Kg	26 kg
Engine Type	4-stroke, OHV, single cylinder	
Displacement	196cm3	270cm3
Compression Ratio	8.5 ： 1	8.2 ： 1
Bore×Stroke	68×54mm	77×58mm
Maximum output Power	4.0kW /3,600rpm	5.8kW/3,600rpm
Maximum Torque	11N・m /2,500rpm	17N・m /2,500rpm
Cooling System	Forced Air-cooled	
Ignition System	Transistorized Magneto Ignition（TCI）	
Spark Plug	BPR6ES(NGK)，NHSP LD F7RTC，F7TC	
Lubrication System	Forced Splash	
PTO Shaft Rotation	counterclockwise	

1. PREFACE

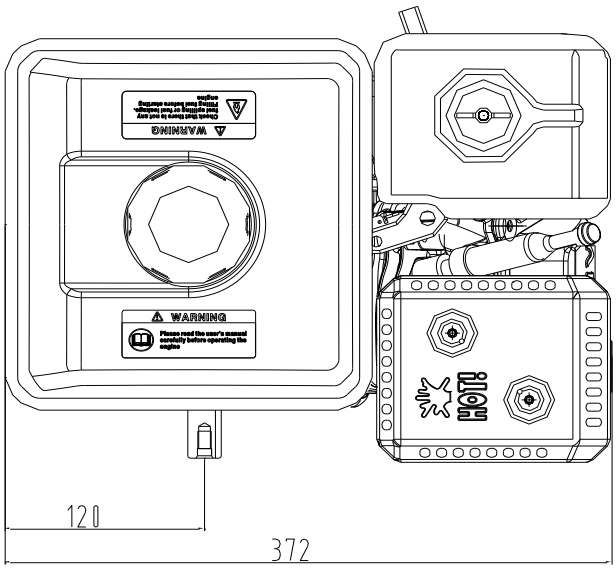
Water pump specification

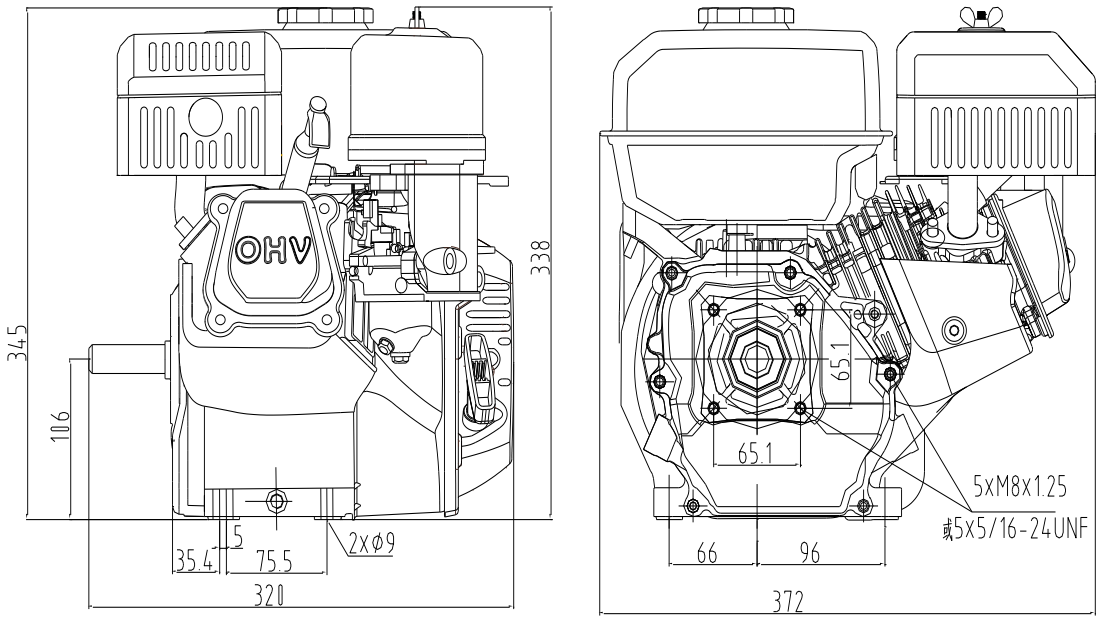
Items \ Model	RT50ZB26-3.6Q	RT80ZB26-3.6Q	RT100ZB26-5.2Q
Length (mm)	477	500	610
Width (mm)	395	395	430
Height (mm)	411	446	537
Dry weight (kg)	26.5	29	45
Suction port diameter	50 mm (2 in)	80 mm (3 in)	100 mm (4 in)
Discharge port diameter	50 mm (2 in)	80 mm (3 in)	100 mm (4 in)
Suction head(maximum) (m)	8	8	8
Total head(maximum)(m)	25	26	30
Discharge capacity(maximum) (m3/h)	36	60	96
Specified discharge capacity （m3/hrs）	20	40	60
Specified maximum head（m）	18	20	16
Specified suction head（m）	4	4	4
Self-priming time（s）	≤150	≤160	≤200
Critical net positive suction head(m)	≤3	≤4.5	≤4.5
Pumping efficiency (%)	36	53	46

2. DIMENSION AND TORQUE

2-1 Engine dimension

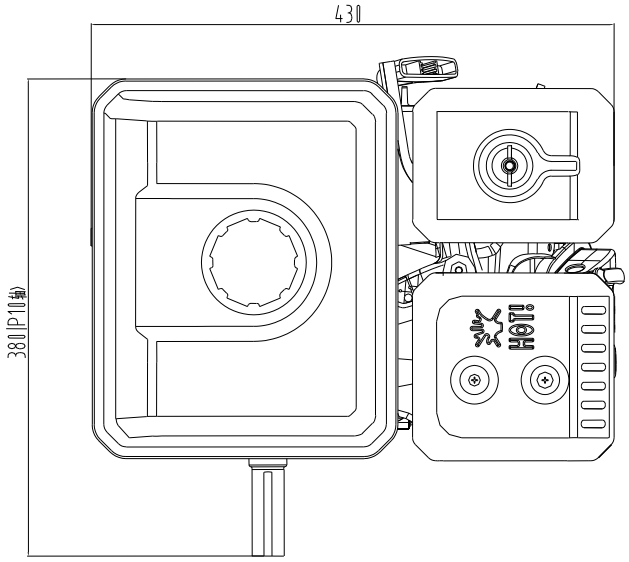
R200

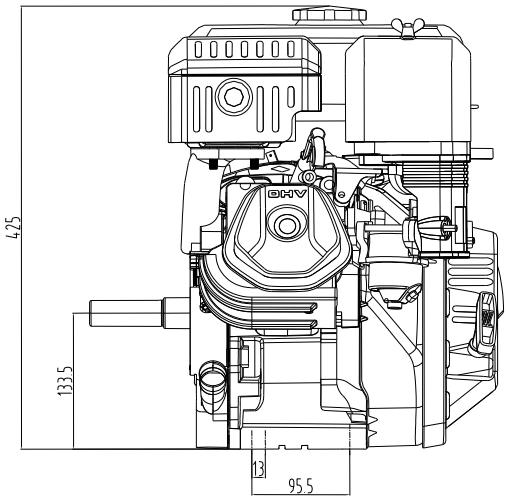


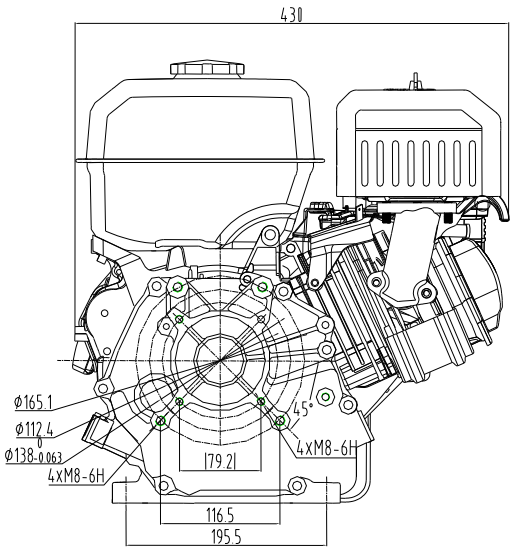


2.DIMENSION AND TORQUE

R270







PTO dimension figure：

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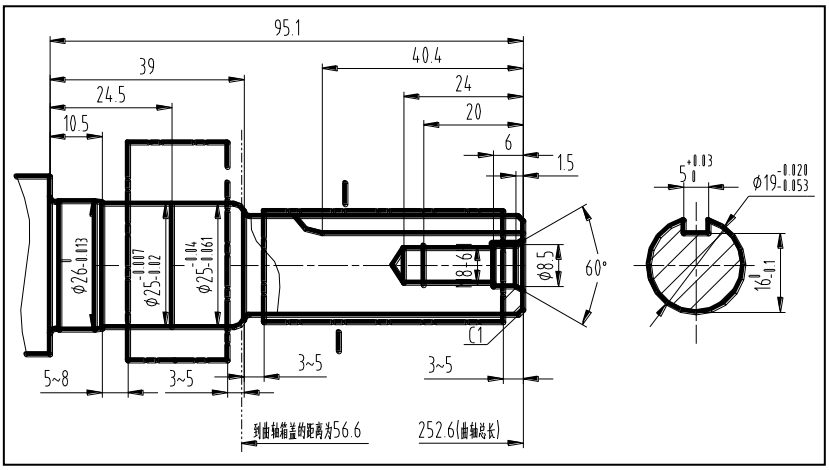
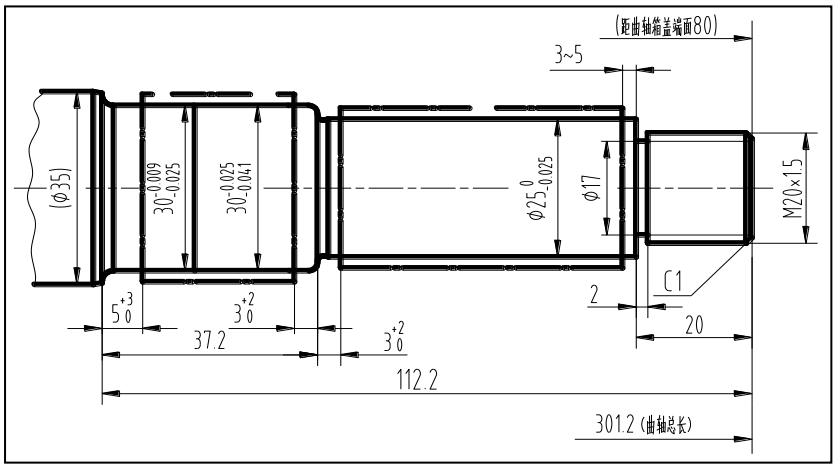
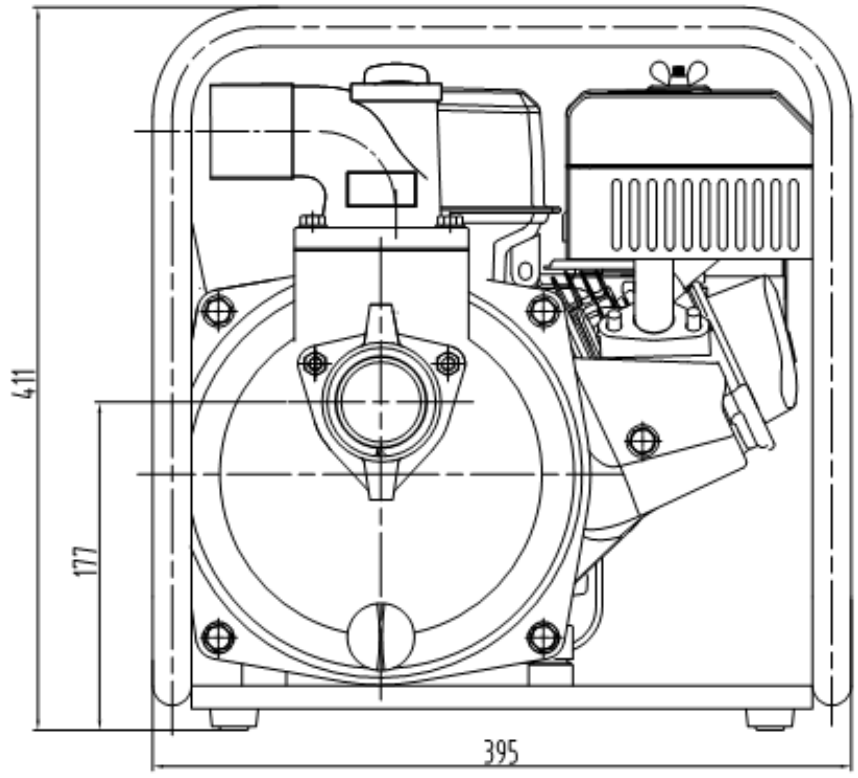
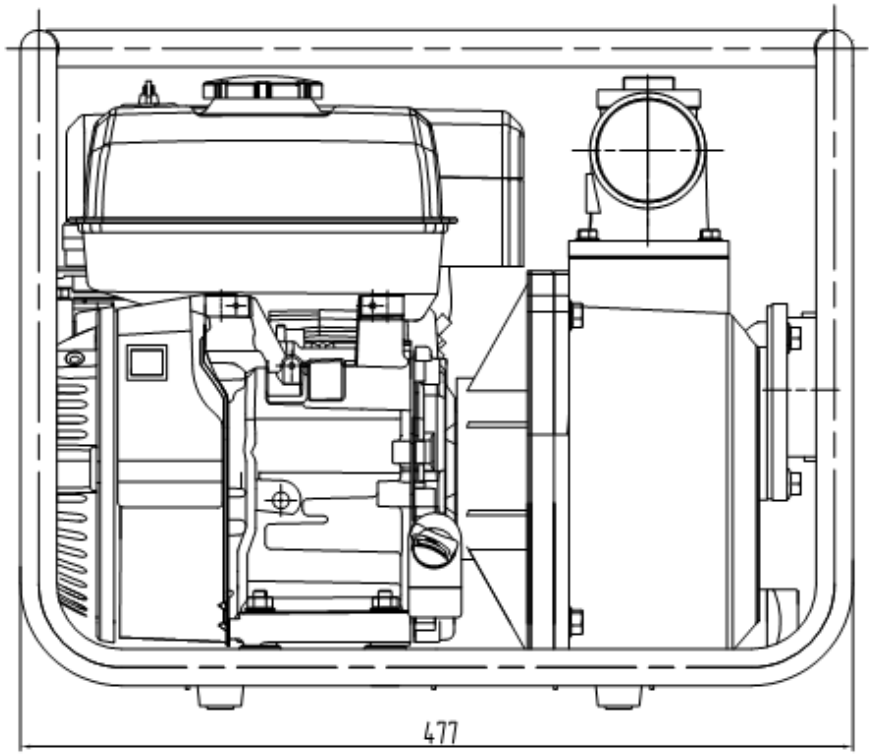
13301-Z040310	
13301-Z080310	

2-2 Water pump dimension

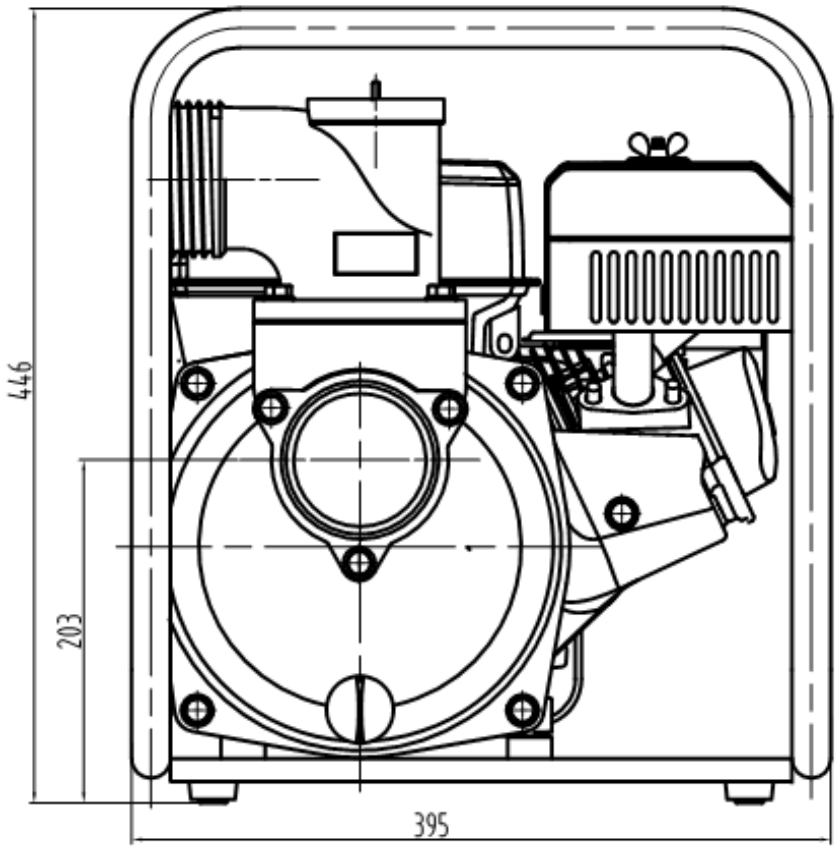
RT50ZB26-3.6Q

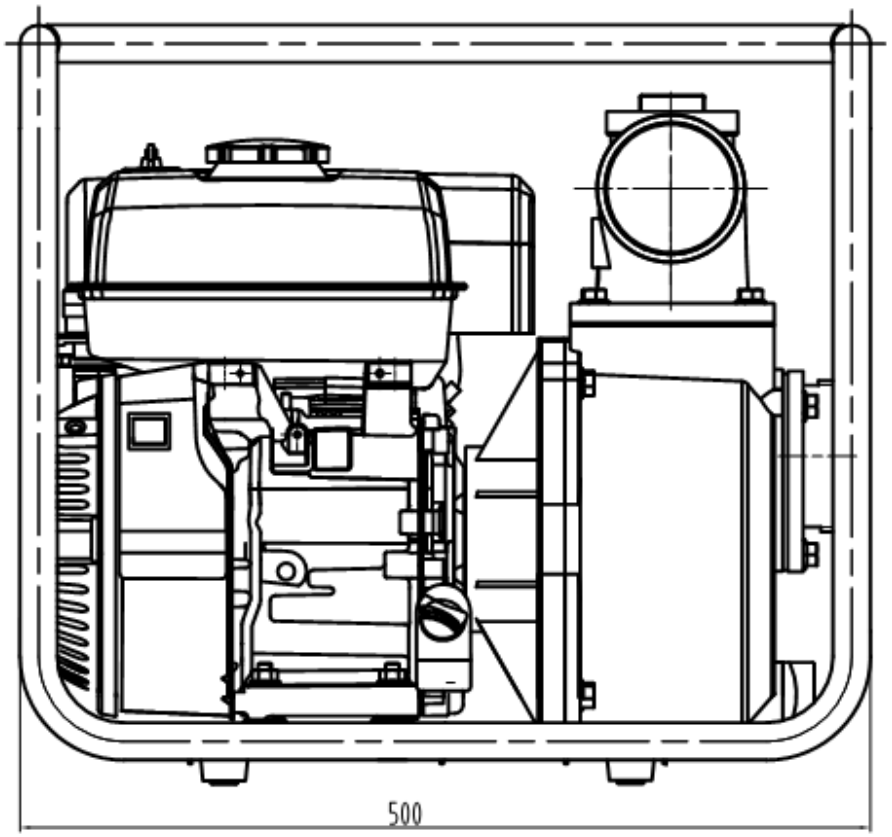




2.DIMENSION AND TORQUE

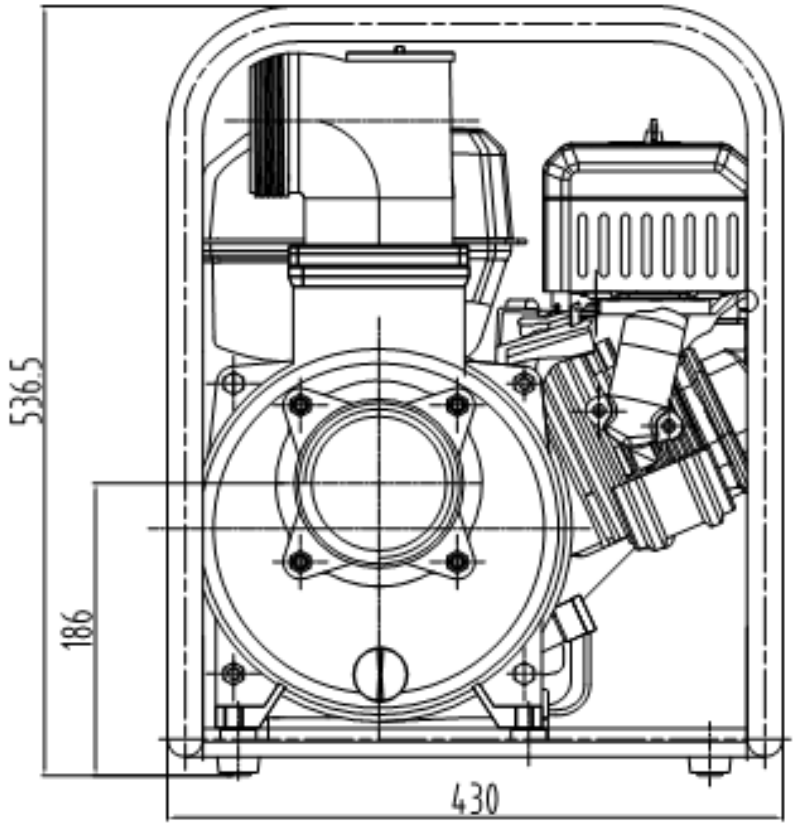
RT80ZB26-3.6Q

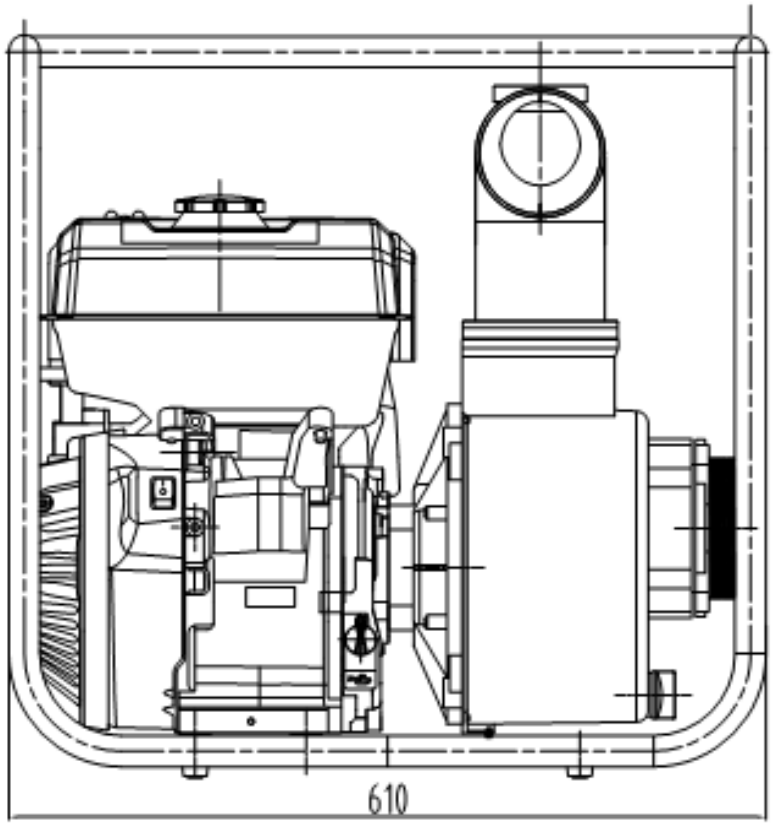




2.DIMENSION AND TORQUE

RT100ZB26-5.2Q





2-3 Torque value

R200 torque value

Items	Specifications	Torque valve	
		N • m	kg • m
Connection-rod bolt	M7 × 1.0	12	1.2
Cylinder head bolt	M8 × 1.25	24	2.4
Flywheel nut	M14 × 1.5（special）	70-80	7-8
Lock nut of rocker arm shaft	M8 × 1.25	24	2.4
Rocker arm stud	M10 × 1.25	10	1.0
Crankcase cover bolt	M10 × 1.25	2	0.2
Muffler assembling nut	M8 × 1.25	24	2.4
Air cleaner assembling nut	M6 × 1.0	9	0.9
Oil drain bolt	M10 × 1.25	18	1.8
Fuel tank assembling bolt, nut	M6 × 1.0	10	1.0

R270 torque value

Items	Specifications	Torque valve	
		N • m	kg • m
Connecting rod	M8 × 1.25	15	1.5
Cylinder head subassembly	M10 × 1.25	45	4.5
Flywheel subassembly	M16 × 1.5	95	9.5
Rocker shaft locking nut	M6 × 0.75	10	1.0
Rocker stud	M8 × 1.25	24	2.4
Crankcase cover	M8 × 1.25	28	2.8

2.DIMENSION AND TORQUE

RT50ZB26-3.6Q pump torque specification

Items	Specifications	Torque valve	
		N • m	kg • m
Frame	M8 × 1.25	24±2	2.4±2
Pump body	M8 × 1.25	24±2	2.4±2
Connecting tray	M8 × 1.25	20±2	2.0±2
Impeller	M8 × 1.25	20±2	2.0±2
Suction port	M8 × 1.25	10±2	1.0±2
Discharge port	M8 × 1.25	10±2	1.0±2
Plug	G3/4	7±1	0.7±1
Shock absorption seat	M6 × 1.0	8±2	0.8±1

RT80ZB26-3.6Q pump torque specification

Items	Specifications	Torque valve	
		N • m	kg • m
Frame	M8 × 1.25	24±2	2.4±2
Pump body	M10 × 1.25	26±2	2.6±2
Connecting tray	M8 × 1.25	20±2	2.0±2
Impeller	M8 × 1.25	20±2	2.0±2
Suction port	M8 × 1.25	10±2	1.0±2
Discharge port	M8 × 1.25	10±2	1.0±2
Plug	G3/4	7±1	0.7±1
Shock absorption seat	M6 × 1.0	8±2	0.8±1

RT100ZB26-5.2Q pump torque specification

Items	Specifications	Torque valve	
		N • m	kg-m
Water seat	M10×1.25	10±2	1.0±2
Frame	M10×1.25	28±2	2.8±2
Pump body	M10×1.25	26±2	2.6±2
Connecting tray	M8×1.25	20±2	2.0±2
Impeller	M20×1.25	10±2	1.0±2
Suction port	M10×1.25	10±2	1.0±2
Discharge port	M10×1.25	10±2	1.0±1
Plug	G3/4	7±1	0.7±1

3. MAINTENANCE

3-1 Maintenance schedule

Check time / Check item	Each use	First month or 20 Hrs. (3)	Every 3 months or 50 Hrs. (3)	Every 6 months or 100 Hrs. (3)	Every year or 300 Hrs. (3)
Oil Check	○				
Oil Replace		○		○	
Air cleaner element Check	○				
Air cleaner element Clean			○ ※		
Fuel strainer Clean				○	
Spark plug Clean Adjust				○	
Valve gap Check Adjust					○
Fuel tank, fuel element Clean					○
Check	Every 2 years				
Fuel tube Replace	Every 4 years				

※ Clean the air cleaner one time at each 10 hours or one time daily when used in dust areas.

3-2 Engine oil

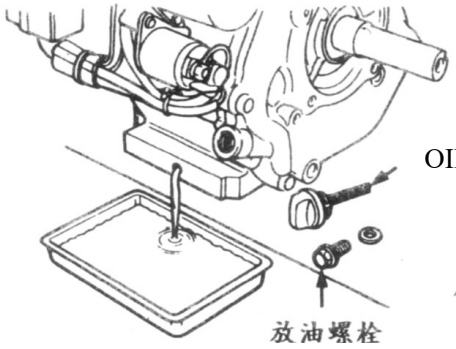
Engine oil

● Oil change

1）Dismount the oiling cover and oil Drain bolt to drain dirt oil.

2）Tighten the oil drain bolt

R200 torque：18—20N.m



R270 torque：24—26N.m

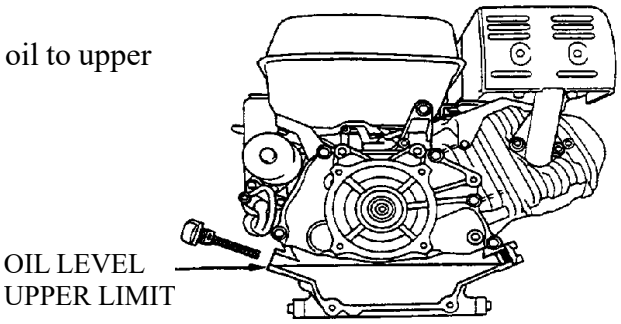
OIL DRAIN PLUG

3）Fill the clean oil from the filling port.

R200 Oil capacity	0.6L
R270 Oil capacity	1.1L

Recommended oil	General oil: SAE15W-40 SJ class or equivalent API classified SJ class's SAE10W-30 oil. ※In low temperature（temperature is 10℃ lower）,use（SAE10W-30）>。 ※In cold,（temperature is -15℃ lower）, use SAE5W-30，or equivalent API classified SJ class SAE5W-30 oil.

4）After filling, check oil level. If the oil is lack, add the oil to upper limit.



CAUTION: Run with insufficient engine oil may damage the engine severely.

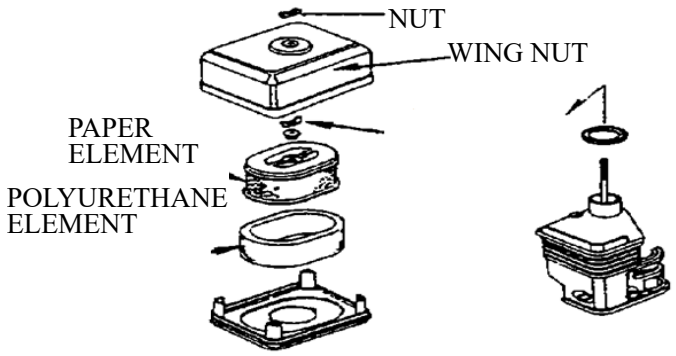
3-3 Air cleaner

Dual element type

1) Remove the nut, air cleaner cover and wing nut. Remove polyurethane and paper elements.

2) Clean polyurethane with detergent, then, blow it dry with compressed air or squeeze it dry. Dip the element in clean oil, then, forcefully squeeze it dry and install it back.

3) Tap the element lightly several times on hard surface to remove excess dirt or blow compressed air lightly from the inside out. If dirty, replace in time.

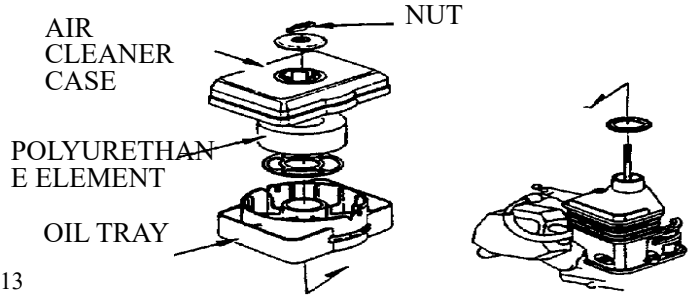


CAUTION: Polyurethane element containing too much oil will jam the strainer holes.

Oil bath type

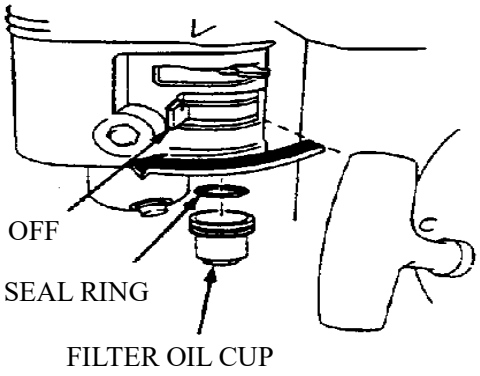
1）Clean the oil bottom case with cleaning oil and dry it.

2）Add the clean oil to specified level and install the oil bottom case back.



3) Clean the polyurethane element with cleaning oil, then blow with compressed air or squeeze. Dip the element in clean oil, then, forcefully squeeze and install it back.

3-4 Fuel oil cup cleaning



Caution

· Don't smoke in washing. · Be sure not to fuel leaking after tightening.

Turn the fuel cock to OFF position and tighten filter cup.

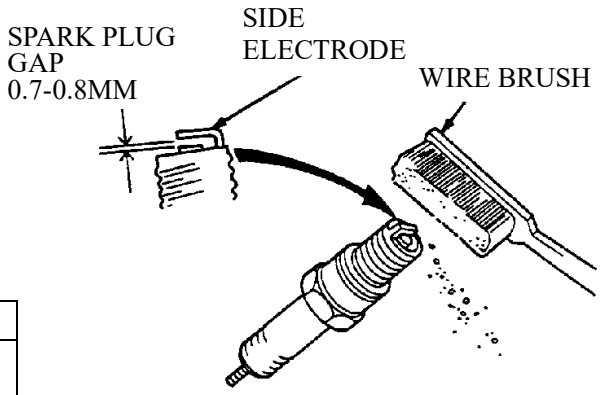
Torque：7N.m

3-5 spark plug cleaning and

Adjusting

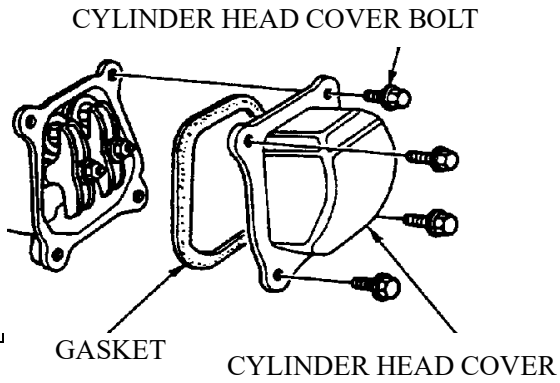
1) Remove carbon or other deposits with a stiff wire brush. Check gasket for damaged.

2) Measure plug gap between center electrode and side electrode with spark plug feeler. If necessary, adjust the gap by bending the side electrode.



Spark plug gap	0.7 - 0.8 mm
Standard spark plug	BP6ES (NGK) F7TC BPR6ES (NGK) ……anti-wave interference uses F7RTC ……anti-wave interference uses

3-6 Valve clearance adjustment



CAUTION :

Valve clearance adjustment must be per formed with the engine cold.

1) Remove the cylinder head cover bolt, head cover and gasket.

CAUTION :

Be careful not to oil leaking when dismounting cylinder head cover.

2) Set the piston at top dead center of the compression.

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

Valve clearance	IN：0.15 ± 0.02 mm EX：0.20 ± 0.02 mm

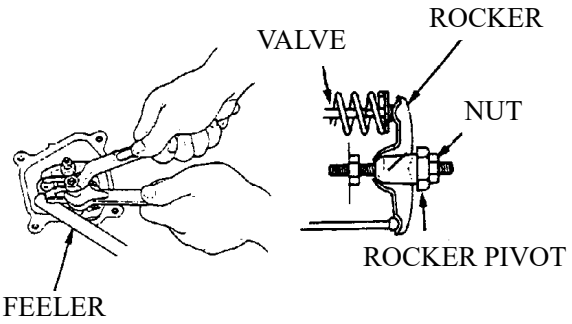
4) If adjustment is necessary, proceed as follows:

a． Hold the rocker arm pivot and loosen the rocker arm pivot lock nut

b．Turn the rocker arm pivot to obtain the specified clearance.

c． Fix the rocker pivot with spanner, then, tighten the locknut.

d． Recheck valve clearance after tightening the rocker arm lock nut.



Valve clearance increasing：Loosen
Valve clearance decreasing：Tighten

3-7 Governor

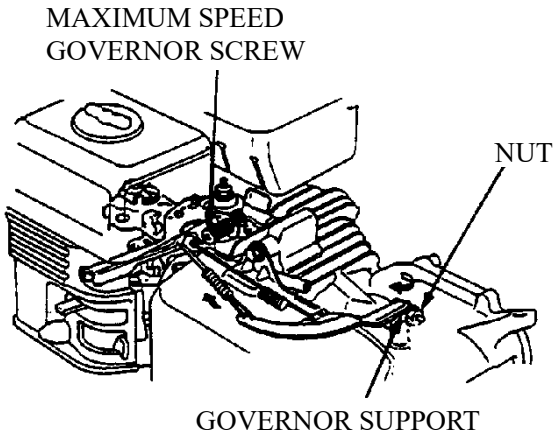
1) Remove the fuel tank.

2) Loosen the nut on the governor arm. Check the throttle for fully open. (turn to left to home position) .

3) Turn the governor support right to home position. (governor fully close position). Tighten the bolt and bolt.

4) Check the governor support and throttle for moving freely.

5) Assembling fuel tank



Start the engine, and rotate the maximum speed governor screw for adjusting maximum speed.

Maximum	3780±50rpm

4. DISASSEMBLING AND SERVICING

4-1 Troubleshooting

4-1-1 Starting Difficult

TROUBLE			CAUSE		REMEDY
Normal cylinder compression	Normal spark plug spark	Something wrong with the fuel system.	Fuel supply is not smooth or no fuel supply.	There is no enough fuel in fuel tank and fuel cock is closed.	Fill fuel, open fuel cock.
				Air vent in the fuel filler cap is clogged	Dredge air vent.
				Improper or clogged main oil flow hole.	Readjust or clean, blow to get through.
				Needle valve is not closed properly or start hole is clogged.	Dismantle needle valve and repair, clean, blow to get through.
				Float is damaged or sticking.	Repair float
			Fuel supply is normal.	Fuel is too filthy or deteriorated	Replace
				There is water in fuel.	Replace
				Too much fuel in engine	Drain extra fuel, dry up spark plug electrodes.
				Wrong fuel brand	Select proper fuel brand corresponding with the requirements.
	Normal fuel supply system.	Normal high – tension line spark.	Spark plug is in bad conditions	Too much carbon deposit and dirt around electrodes.	Clear away.
				Electrodes are burn damaged seriously or insulators damaged.	Replace spark plug.
				Improper electrodes gap.	Adjust to proper value.
		High-tension line no spark	Normal spark plug	High –tension line is damaged.	Replace
				Ignition coil is damaged.	Replace
				Magneto loses magnetism.	Replace
				Abnormal gap between the ignition coil and flywheel.	Adjust gap

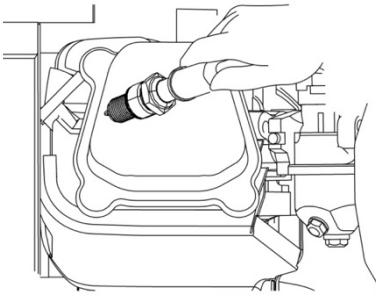
TROUBLE			CAUSE	REMEDY
Abnormal cylinder compression	Normal fuel supply system	Normal ignition system	Piston ring is worn to or even over its wear limit	Replace
			Piston ring is broken.	Replace
			Piston ring is sticking.	Clear up carbon fouling.
			Spark plug is not installed tighten or without a gasket.	Tighten with a gasket in.
			Air leakage between cylinder block and cylinder head.	Check cylinder gasket, and the flatness of the surface by which cylinder block contacting with cylinder head
				Tighten cylinder head bolts in stipulated order to stipulated torque.
			Air leakage in the valves	Check valve. Clearance and tightness, repair if necessary.

If still can't starting, have the engine to our authorized dealer for repairing.

Spark plug testing

WARNING:

- **When testing the spark plug, never hold the high- tension line of the spark plug with wet hand.**
- **Make sure there is no spilled fuel outside the engine and that the spark plug isn't dipped with fuel.**
- **To prevent fire, keep sparks far away from the spark plug mounting hole.**



Turn the fuel cock to "OFF) position, and drain the gasoline of the carburetor.

Remove the spark plug and spark plug cap.

Pull the recoil starter grip to drain the gas in the cylinder.

Install the spark plug cap.

Put the control lever to "low" position.

Pass negative pole (thread) of the spark plug through cylinder cover to connect grounding and pull the recoil starter grip to observe the spark.

- Unable starting engine when electric starting：

TROUBLE	CAUSE	REMEDY
1. Check the battery connection.	Connecting incorrect	Connect according to correct method
2. Check battery	Engine wrong, battery charged lack, battery long time suspension and pole pate vulcanized corrosion.	Check or replace the rectification bridge loop, then, charge with special charger, and replace battery.

3. Motor running abnormal	Motor, relay failure, wiring loosen off and starting switch failure.	Check and remove the starting electric appliance or replace damaged parts.

4-1-2 Power lack

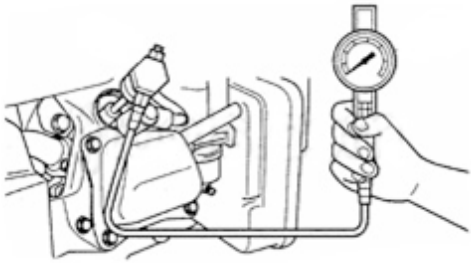
TROUBLE	CAUSE		REMEDY
When increasing throttle, speed increase slow or even decrease and stop running	Ignition system Fuel supply system	Air in fuel line or fuel line clogged	Exhaust air or dredge fuel line
		Main oil flow hole is not adjusted properly	Readjust
		In carburetor, needle valve hole and main oil flow hole clogged.	Clean and blow to get through
		Fuel cock is clogged up.	Clean, replace damaged part
		Too much carbon deposit in combusting chamber.	Clear away
		Air cleaner is clogged up.	Clean air cleaner filter element
		Intake pipe is leaking	Repair or replace
	Poor compression	Intake pipe is leaking	Repair or replace
		Piston or cylinder or piston ring is worn	Replace the worn
		Air leakage from the surface by which cylinder block contacting with cylinder head.	Replace cylinder gasket
		Too big or too small valve clearance.	Readjust

- **Compression pressure check**

Drain the oil of the fuel tank out.

Drain the gasoline by loosening the oil drain bolt of the carburetor.

Remove the spark plug cap and spark plug and install the cylinder pressure meter.



Forcibly pull the recoil starter several times and measure compression force（≥0.4MPa）

4-1-3 Speed unstable

TROUBLE	CAUSE	REMEDY
Knocking sound	Piston, cylinder or piston ring is worn excessively.	Replace the worn
	Piston pin and piston pin hole are worn excessively.	Replace piston or piston pin
	Tie rod small head is worn excessively.	Replace tie rod
	Roller bearing for crankshaft main shaft is worn.	Replace roller bearing
Abnormal combustion	Engine is too hot	Eliminate trouble
	Too much carbon deposit in combustion chamber	Clear away
	Improper gasoline brand or low gasoline quality	Replace with qualified gasoline
Spark lacking	There is water in float chamber	Clean
	improper spark plug electrodes clearance	Adjust
	Something wrong with induced coil, and so on	Check and replace damaged parts

4-1-4 WATER PUMP UNABLE DISCHARGE

NO WATER DISCHARGINE	CAUSE	REMEDY
1. Check water pump for water	No water	Fill water into water pump
2. Check suction tube	Suction tube Damaged or have hole	Replace suction tube.
	Strainer uncompletely immersed in water.	Set the suction tube end and strainer completely immersed in the water level.
	Air leaking at hose joint.	Screw down collar, and replace the gaskets if damaged.
	Strainer jammed	Remove the jammed matters.
3. Measure suction head and discharge head	Suction port keeping the water level too high, and discharge port keeping water pump too high.	Reposition water pump and adjust suction head and discharge head.

4. Check the engine	Engine power insufficient	Refer to “4-1-2 Power lack”

4-1-5 Exhaust gas color abnormal

TROUBLE	CAUSE	REMEDY
Black smoke	Piston, cylinder or piston ring is worn excessively.	Replace the worn
	Too much carbon deposit in combustion chamber	Clear away
	Too much carbon deposit in combustion chamber	Clear away
	Improper gasoline brand or low gasoline quality	Replace with qualified gasoline
	Air cleaner is clogged up.	Clean air cleaner filter element

4-1-6 Unable igniting

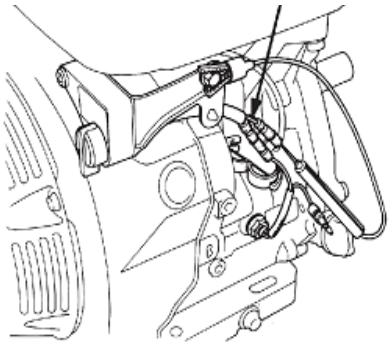
TROUBLE	CAUSE		REMEDY
Unable igniting	Fuel supply System	Fuel is finished	Refill fuel
		Carburetor is clogged	Check fuel line and dredge
		Float is leaking	Repair
		Needle valve is sticked	Dismantle float chamber and eliminate it
	Ignition system	Spark plug is punctured, or short-circuited by carbon deposit	Replace spark plug
		Side electrode of spark plug is dropped out	Replace spark plug
		High-tension wire is dropped out	Weld on
		Ignition coil is punctured or short-circuited	Replace ignition coil
		Parking wire is located on engine body	Find out meeting and insulate
	The other	Cylinder is seriously scored and valve dropped out	Repair or replace damaged parts

4-1-7 Oil alert system malfunction

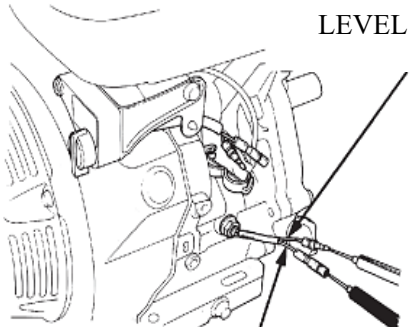
Check the oil alert system as following method:

1) Disconnect yellow lead of the engine and connect the engine to ground when the engine is running. Be sure alert lamp light up, the engine stop.
2) Disconnect oil level switch lead under the specified condition while the stop and check the continuity of the yellow and green leads, uncontinuity between yellow and green lead is normal.
3) Disconnect oil level switch lead after draining oil out while the stop and check the continuity of the yellow and green leads, continuity between yellow and green lead is normal.

YELLOW LEAD (ENGINE SWITCH)



YELLOW SWITCH (OIL LEVEL SWITCH)



GREEN LEAD (GROUNDING)

4-1-8 GASOLINE ENGINE IS OVERERHEAT

TROUBLE	CAUSE	REMEDY
Gasoline engine is overheat	Oil insufficient or wrong oil ratio in the gasoline	Refill engine oil
	Exhaust pipe blocked up	Clean exhaust pipe
	Shroud leaking	Repair damaged part
	Cooling fins blocked by foreign matter	Clear cooling fins
	Cooling fan is loosen and misfunction	Reinstall well
	Connection rod deformation to make piston and cylinder bushing side wear	Replace connection rod
	Cylinder or piston or piston ring is worn to make hunting between cylinder and crankcase	Replace the worn parts
	Improper adjustment of engine governor to produce speed high.	Readjust engine governor
	Crankshaft main bearing burnt out	Replace main bearing

4. DISASSEMBLING AND SERVICING

4-2 Preparation of servicing

4-2-1 Safety precautions

WARNING:

Indicate a possibility of invalid warranty and personal or equipment damage if instructions are not followed.

Please pay special attention to the following:

1. Strictly set the engine according to the regulated power on the nameplate. Do not overload, overrun the engine or run it with low load and at low speed in a long time.
2. Use regulated brand of gas and diesel. The fuel should be fully deposited and filtrated before use. Keep clean the fuel filler, change the oil periodically.
3. Periodically check the installation, connection and the degree of tightness of the fixed bolt. Tighten it if necessary.
4. Periodically clean the element of the air cleaner, change it when necessary.
5. The engine is air-cooled, so clean the radiator, wind cover and fan in time in order to make the engine cool normally.
6. The operator should be familiar with the working principle and structure of the gasoline engine, knowing how to make an emergent stop and the operation of all controlling parts. Anyone without training is forbidden to operate the engine. Keep periodical maintenance. Solve problems in time. Do not run the engine in spite of malfunction.
7. Running the engine in a well-ventilated place, keep it at least one meter away from building walls or other equipments, keep away from inflammables such as gasoline, matches and so on to avoid possibility of fire.
8. Refuel in a well-ventilated area with the engine stopped, and in places refueling or storing gasoline, no smoking and any flames or sparks.
9. Refuel the fuel tank not too full so as to avoid fuel's spilling out. If there is spilled fuel around, be sure to clean it thoroughly before starting.
10. Do not run the engine in airtight or ill-ventilated places.
11. The exhaust muffler is very hot during running the engine even after the engine stops. Never touch it, or you may get burns. Transport or store the engine with it cooling down entirely.
12. Safe warning label:

13. Please carefully read warning label before operating. Our company will not assume any responsibility, for person hurt, or equipment damaged caused by disregarding this warning label.

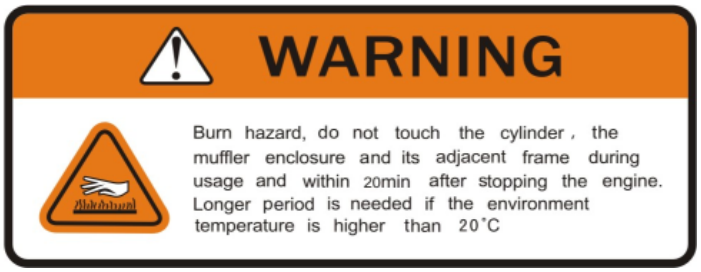
(Label is shown as following:)

1.Fuel label (88002-V010210)

2. Reading Owner's Manual label (88007-V010110)

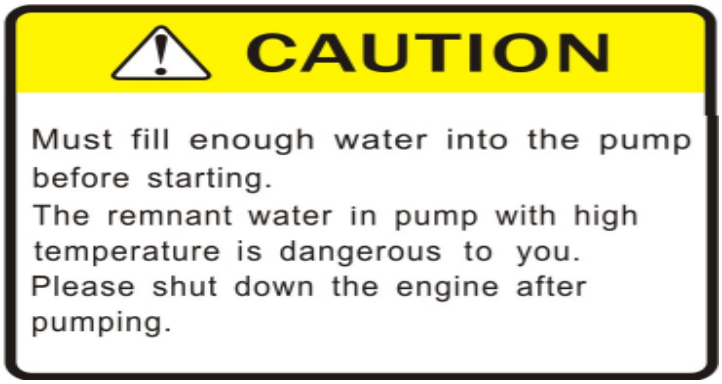
3. Warning label (88006-V010510)

4. High temperature label (88003-V010210)

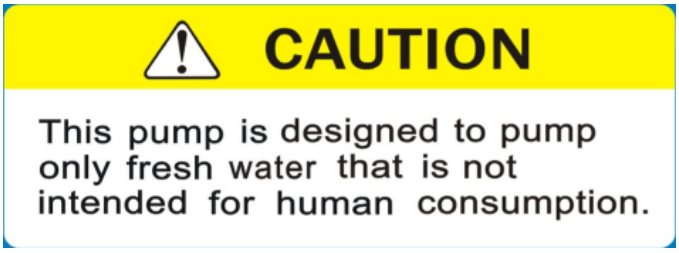


5. Warning label (88006-V010710)

6. Warning label (88006-V010810)



7. Warning label (88006-V010610)

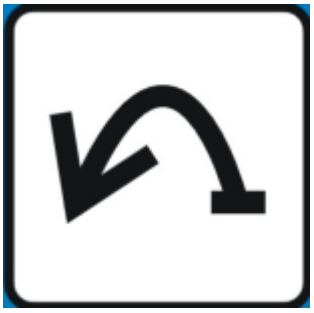


8. Crankshaft direction indicator label (88036-V010110)

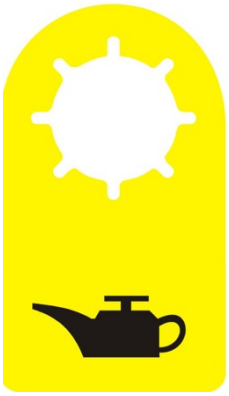
9. Throttle valve label (88028-Z010110)

10. Air cleaner maintenance label (88005-Z010110)

11. Impeller direction indicator label (88035-V010110)



12. Oil brand label (88031-Z010110)



13. Filling oil label (88027-V010110)

14. Specification label (88016-V010210/88016-V020210/88016-V030210)

RT50ZB26-3.6Q CE

Type	Centrifugal water pump
Net weight(kg)	25
Production Year	2008
Water Inlet Diameter(mm)	50
Water Outlet Diameter(mm)	50
Max.head(m)	25
Max.flow(m^3/h)	36
Max.suction(m)	8
Engine power(kW/min^{-1})	3.6/3600
Engine torque(N.m/min^{-1})	11/2500

RATO CHONGQING RATO POWER CO., LTD
Zone B, Shuangfu Industry Park,
Jiangjin District, Chongqing, China

RT80ZB26-3.6Q CE

Type	Centrifugal water pump
Net weight(kg)	27
Production Year	2008
Water Inlet Diameter(mm)	80
Water Outlet Diameter(mm)	80
Max.head(m)	26
Max.flow(m^3/h)	60
Max.suction(m):	8
Engine power(kW/min^{-1})	3.6/3600
Engine torque(N.m/min^{-1})	11/2500

RATO CHONGQING RATO POWER CO., LTD
Zone B, Shuangfu Industry Park,
Jiangjin District, Chongqing, China

RT100ZB26-5.2Q CE

Type	Centrifugal water pump
Net weight(kg)	43
Production Year	2008
Water Inlet Diameter(mm)	100
Water Outlet Diameter(mm)	100
Max.head(m)	30
Max.flow(m^3/h)	96
Max.suction(m)	8
Engine power(kW/min^{-1})	5.2/3600
Engine torque(N.m/min^{-1})	16.8/2500

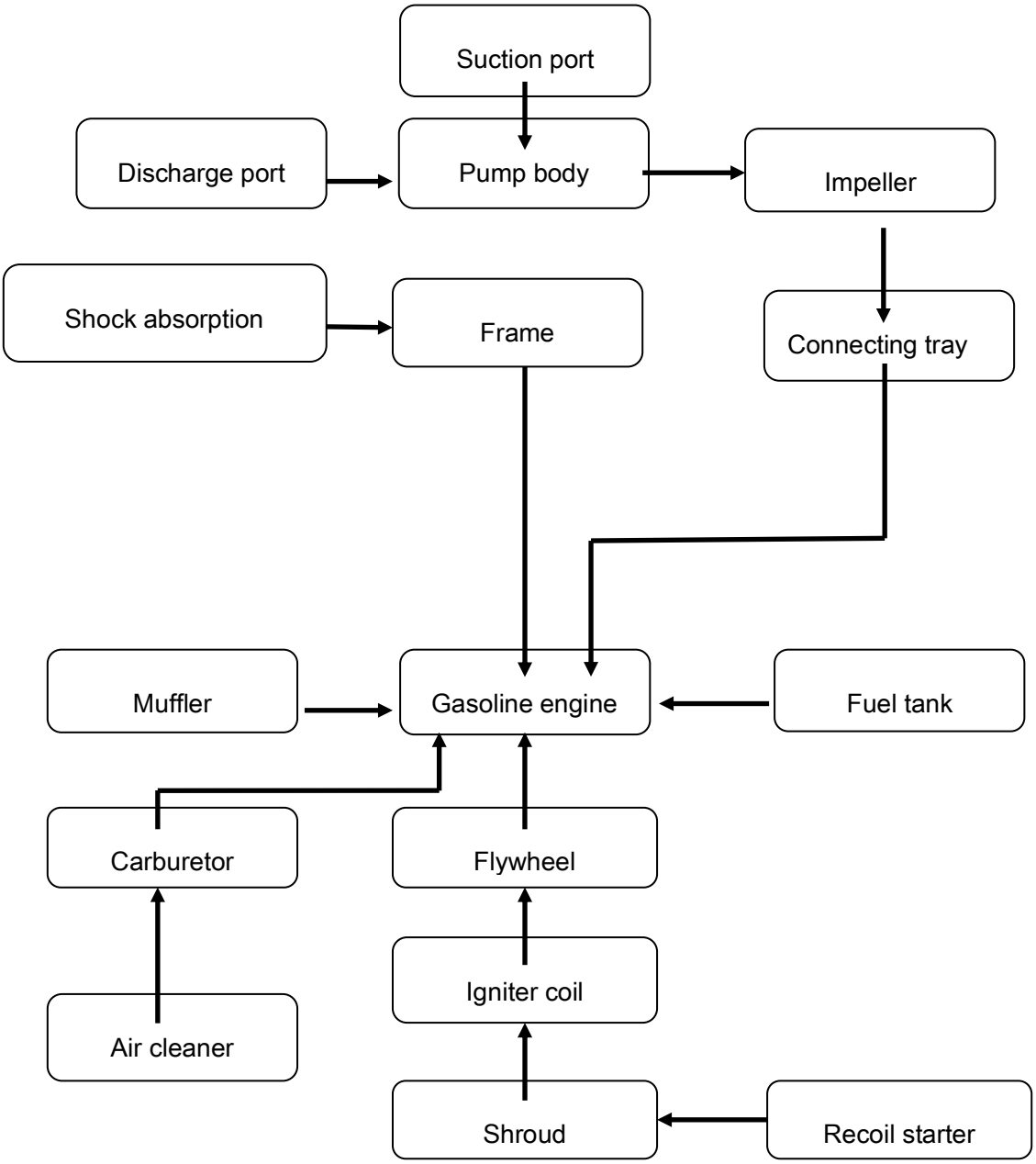
RATO CHONGQING RATO POWER CO., LTD
Zone B, Shuangfu Industry Park,
Jiangjin District, Chongqing, China

4. DISASSEMBLING AND SERVICING

4-2-2 Special tools

Tool name	Application note
1. Float lever gauge	Carburetor float level inspection.
2. Valve guide driver	Valve guide removal, installation.
3. Retainer assembler	Assembling ball bearing.
4. Assembler handle	Installing handle and bearing.
5. Inner retainer assembler	Assembling ball bearing and time.
6. Diamond lap 45^0	Rectifying valve seat surface.
7. Diamond lap 32^0	Rectifying valve seat surface.
8. Flywheel driver	Dismounting flywheel.
9. Bearing extractor	Dismounting flywheel.
10. Valve guide reamer	Fine reaming the guide inner hole.

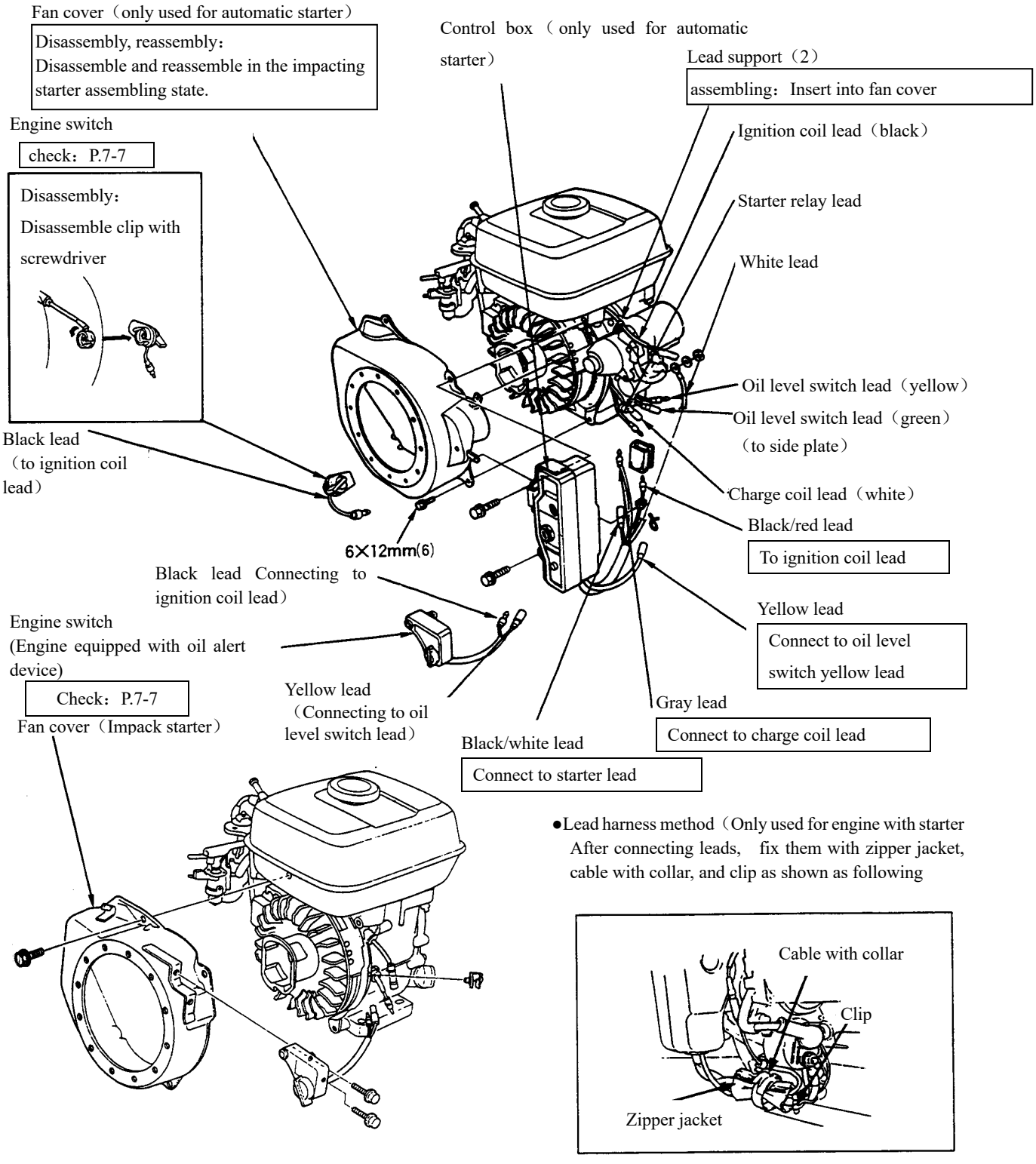
4-3 Dismounting chart



4. DISASSEMBLING AND SERVICING

4-4 Gasoline engine

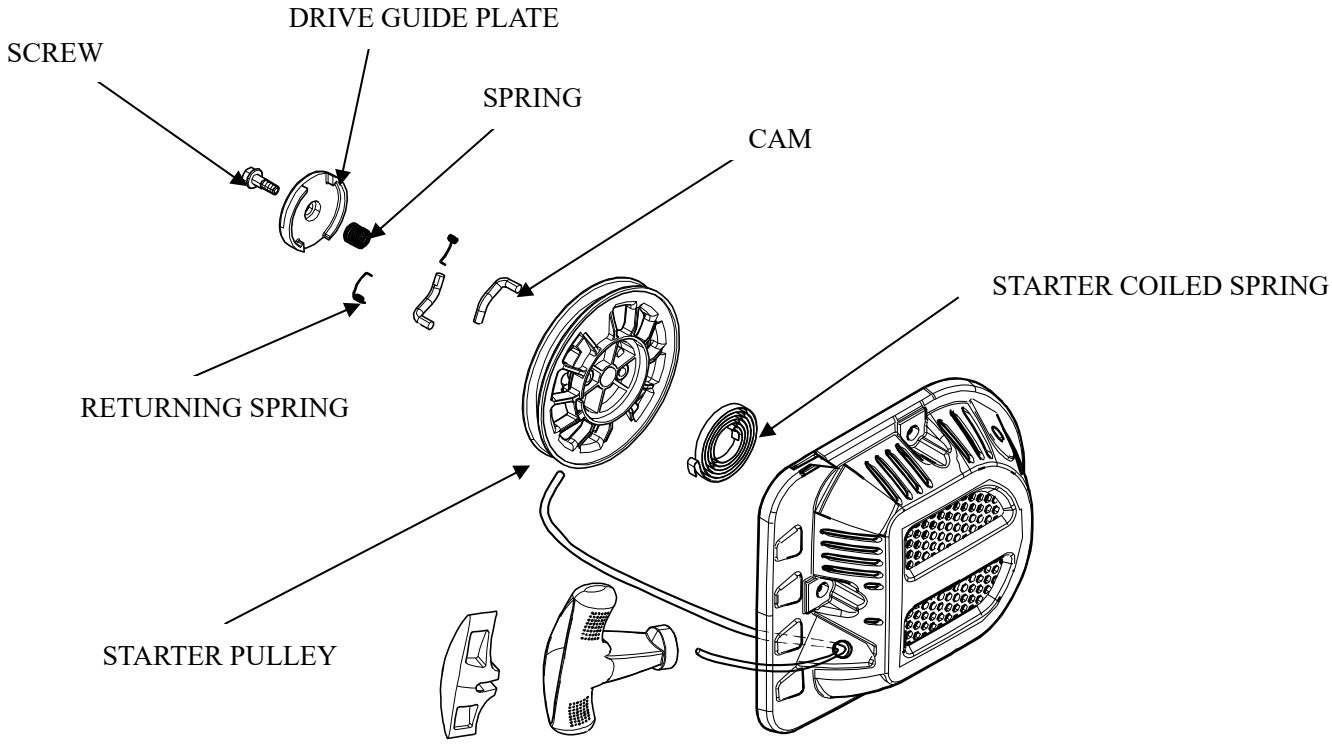
Disassembly, reassembly



●Lead harness method（Only used for engine with starter
After connecting leads, fix them with zipper jacket, cable with collar, and clip as shown as following

4. DISASSEMBLING AND SERVICING

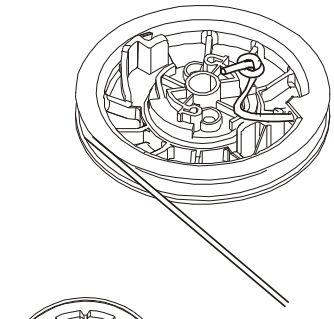
4-4-1 Recoil starter

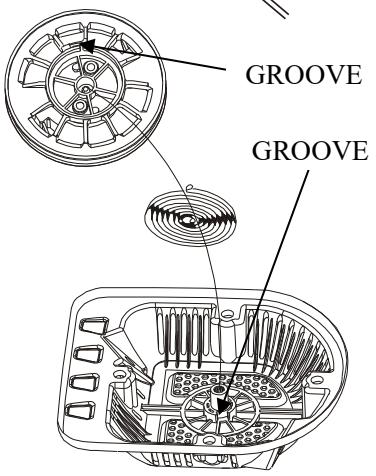


NOTICE:

Wear gloves and eye protection during disassembly, and take care not to allow the return spring to come out

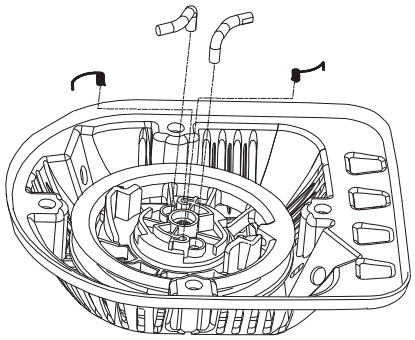
①Pass the recoil starter rope through the rope in the recoil starter pulley and make a figure-eight knot at the rope end.



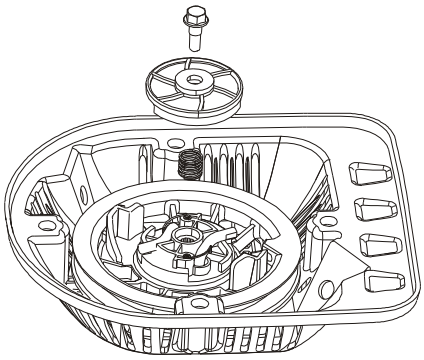


② Hang the side hook of the recoil starter spring in the groove of the recoil starter case, set the recoil starter spring into the case with counterclockwise rotating starter spring

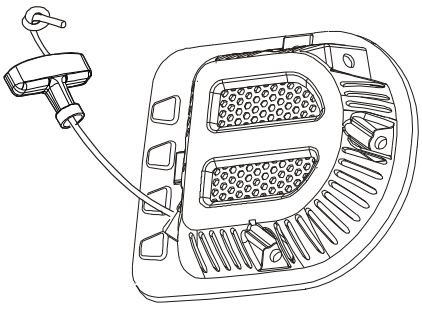
③. Set the recoil starter coiled spring outside hook into the groove of the recoil starter pulley.



④. Set the starter driving cam on the recoil starter pulley and install the return spring on the recoil starter pulley while hooking it on the side of the driving cam.



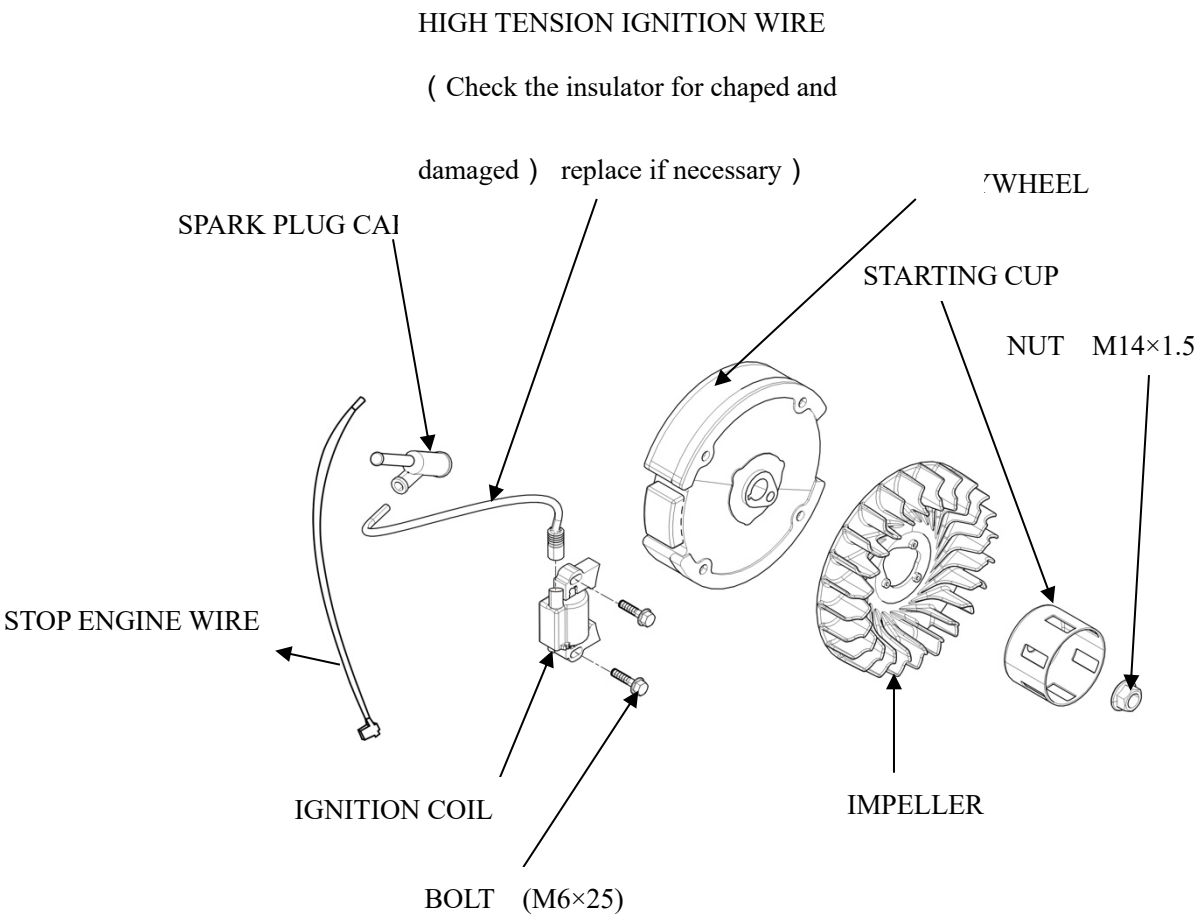
⑤. Install the spring, driving guide and fixing screw in order



⑥. Pass the recoil starter rope through the recoil starter case and recoil starter grip and make a figure-eight knot at the rope end.

⑦. Pull the recoil starter rope lightly to check the driving cam for function.

4-4-2 Flywheel

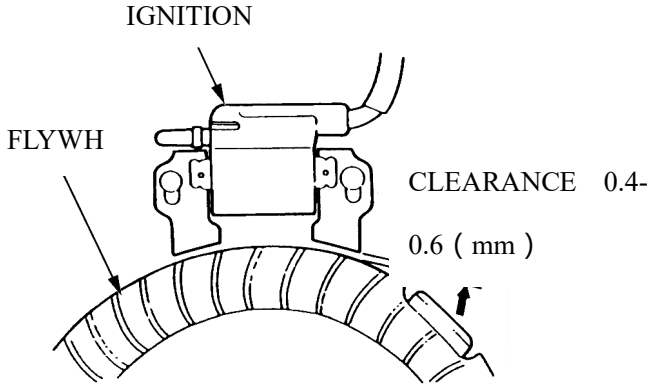


a) Remove the fuel tank, air cleaner, carburetor and recoil starter assy.

b) Measure the clearance between the ignition coil and flywheel with the feeler.

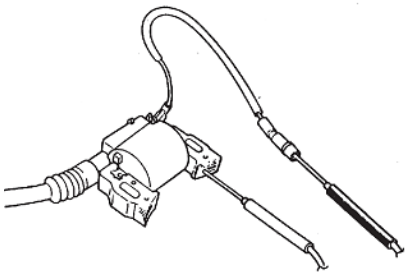
c) Adjust the clearance of the ignition and flywheel.

d) Adjusting method: Loosen the bolt and move the ignition coil up and down for adjusting the clearance, then, screw down the bolt.



Check the ignition coil

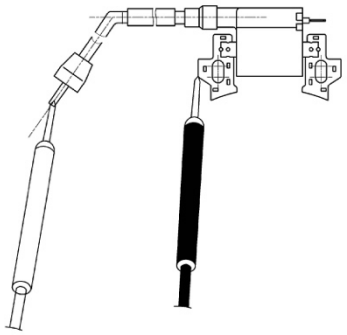
（primary side）



Measure the resistance of the primary coil by attaching one ohmmeter lead to the ignition coil's primary terminal while touching the other tester lead to the iron core

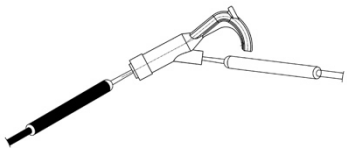
Primary side resistance value：1.0-1.5Ω(recommended value)

（Secondary side）



Measure the resistance of the secondary side of the coil with the spark plug cap removed, touching one test lead to the high-tension cord while touching the other tester lead to the coil's iron core.

Secondary side resistance value： 5-7kΩ(recommended value)

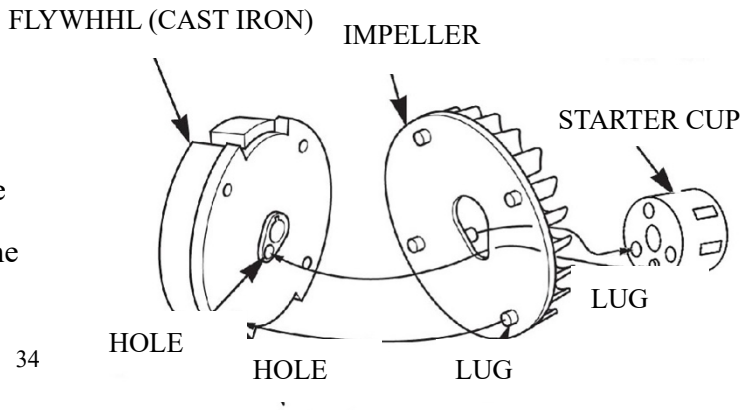


Measure the resistance of the spark plug cap by attaching one ohmmeter lead to the wire end of the plug cap while touching the other tester lead to the spark plug end.

Resistance value： 5kΩ±5%/10kΩ±5% (recommended value)

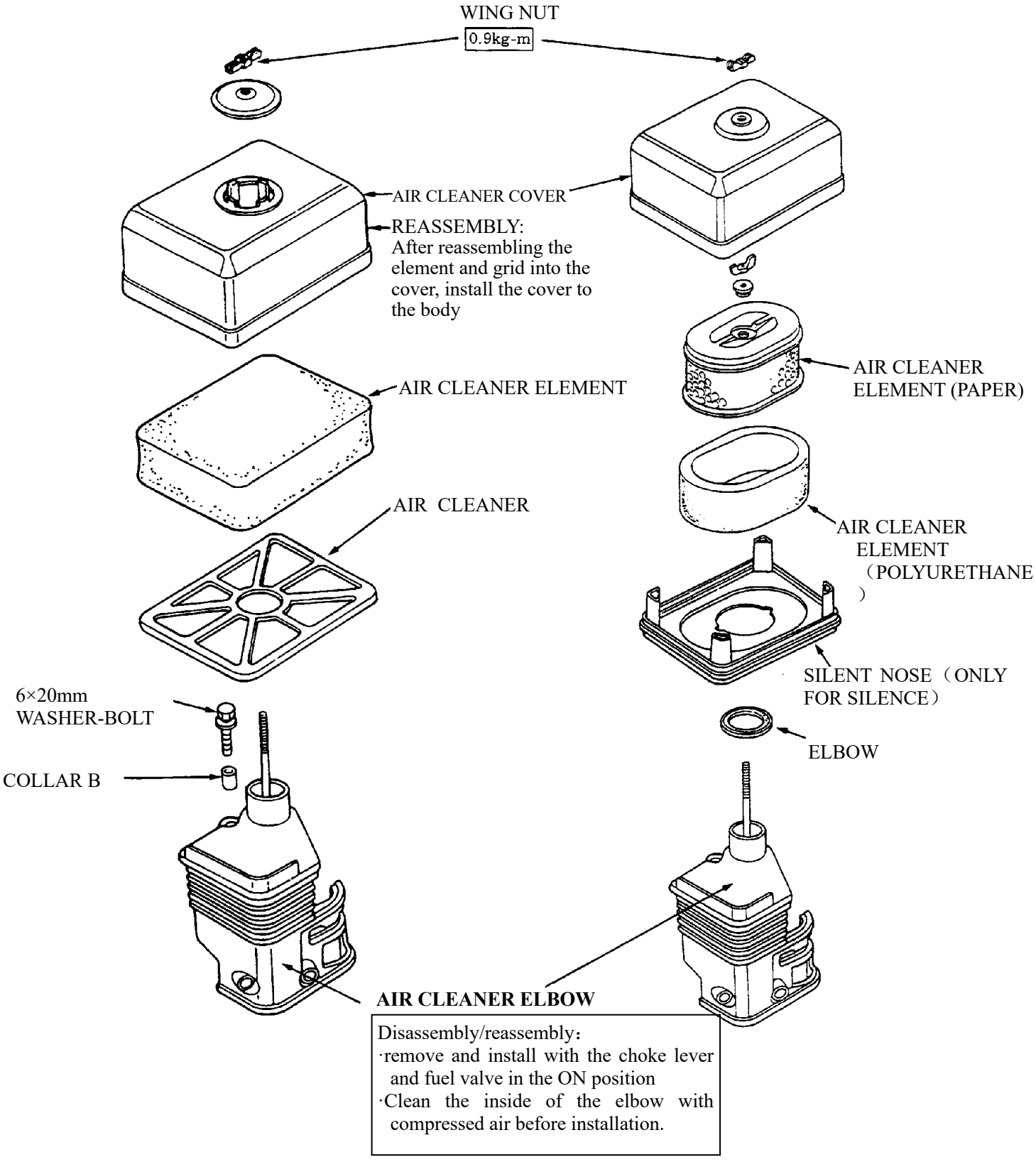
Flywheel (cast iron)

- Attach by aligning the four small holes in the flywheel.
- Attach by aligning the lug on the rear side of the starter cup with the small hole at the center of the flywheel.



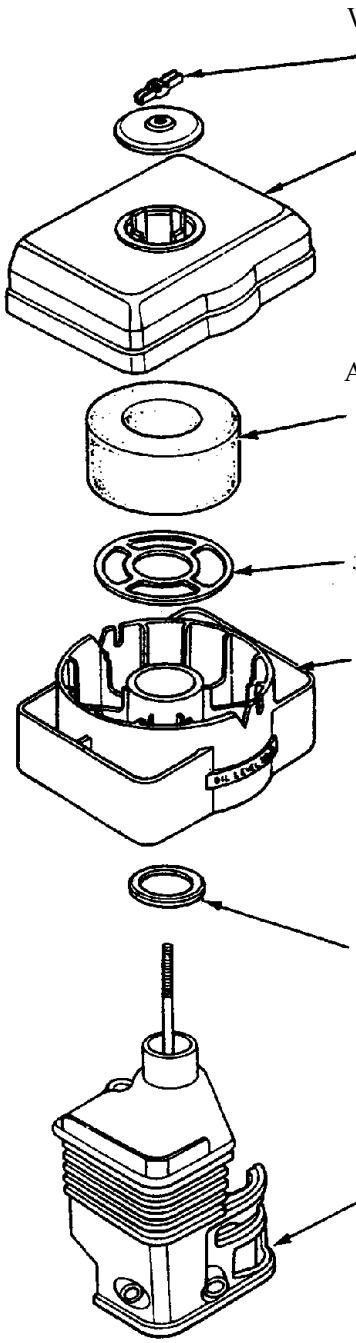
4. DISASSEMBLING AND SERVICING

4-4-3 Air cleaner



4. DISASSEMBLING AND SERVICING

Oil bath type



WING

0.9kg-m

AIR CLEANER COVER

AIR CLEANER ELEMENT
（POLYURETHANE）
Clean P.3-3

AIR CLEANER GRID

AIR CLEANER CASE

Oil capacity：60cc
reassembly：
after cleaning with solvent, fill with clean oil and install

ELBOW PACKING

COLLAR

AIR CLEANER ELBOW

Disassembly/reassembly：
·Remove and install with the choke lever to ON position and fuel cock to OFF position.
·Clean the inside of the elbow with compressed air before installation.

4. DISASSEMBLING AND SERVICING

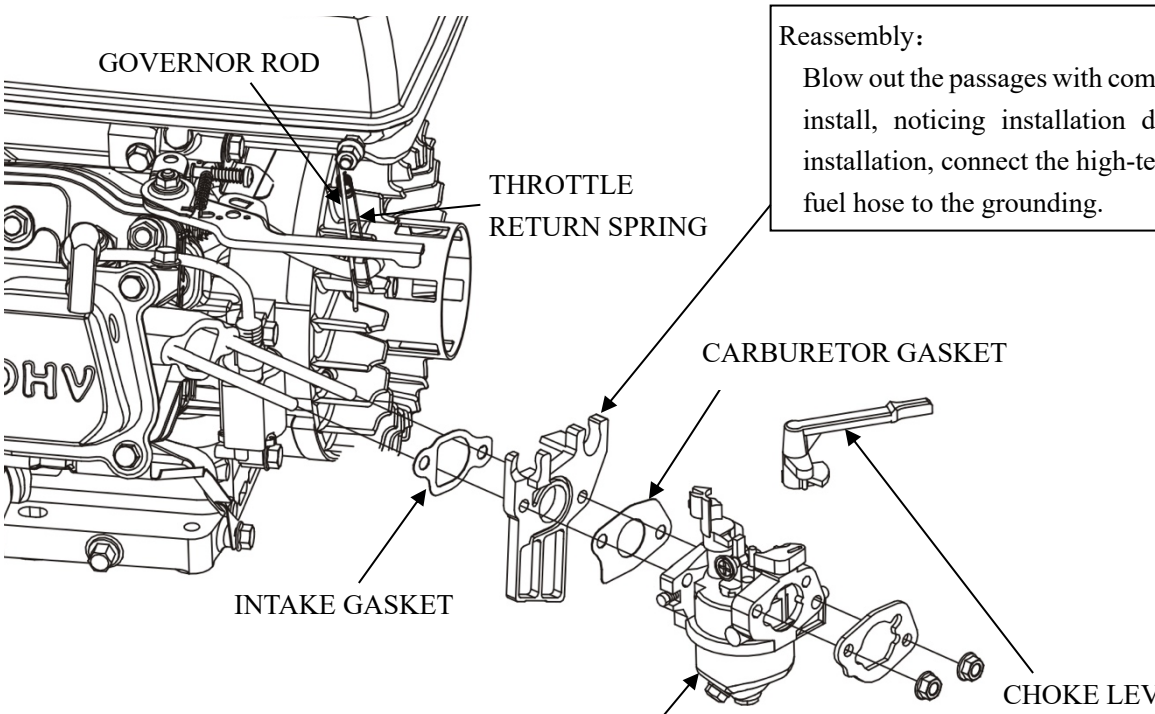
4-4-4 Carburetor

a . Disassembly/reassembly

CARBURETOR INSULATOR

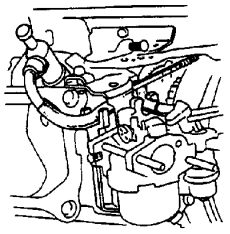
Reassembly：

Blow out the passages with compressed air and install, noticing installation direction. After installation, connect the high-tension wire and fuel hose to the grounding.



Reassembly：

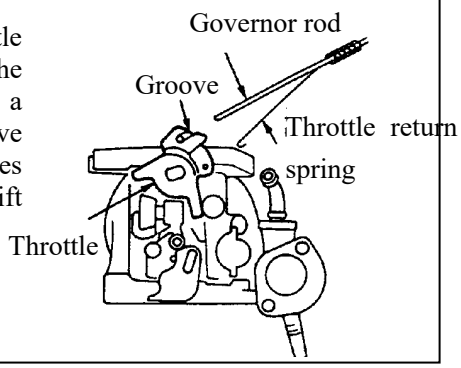
After pulling fuel hose from the carburetor, insert it into protruding shoulder of the choke lever, preventing oil leakage.



CARBURETOR ASSY.

Disassembly：

Unhook the throttle return spring. Pull the carburetor forward to a point where the groove in the throttle arm lines up with the rod. And lift the rod out of its hole.



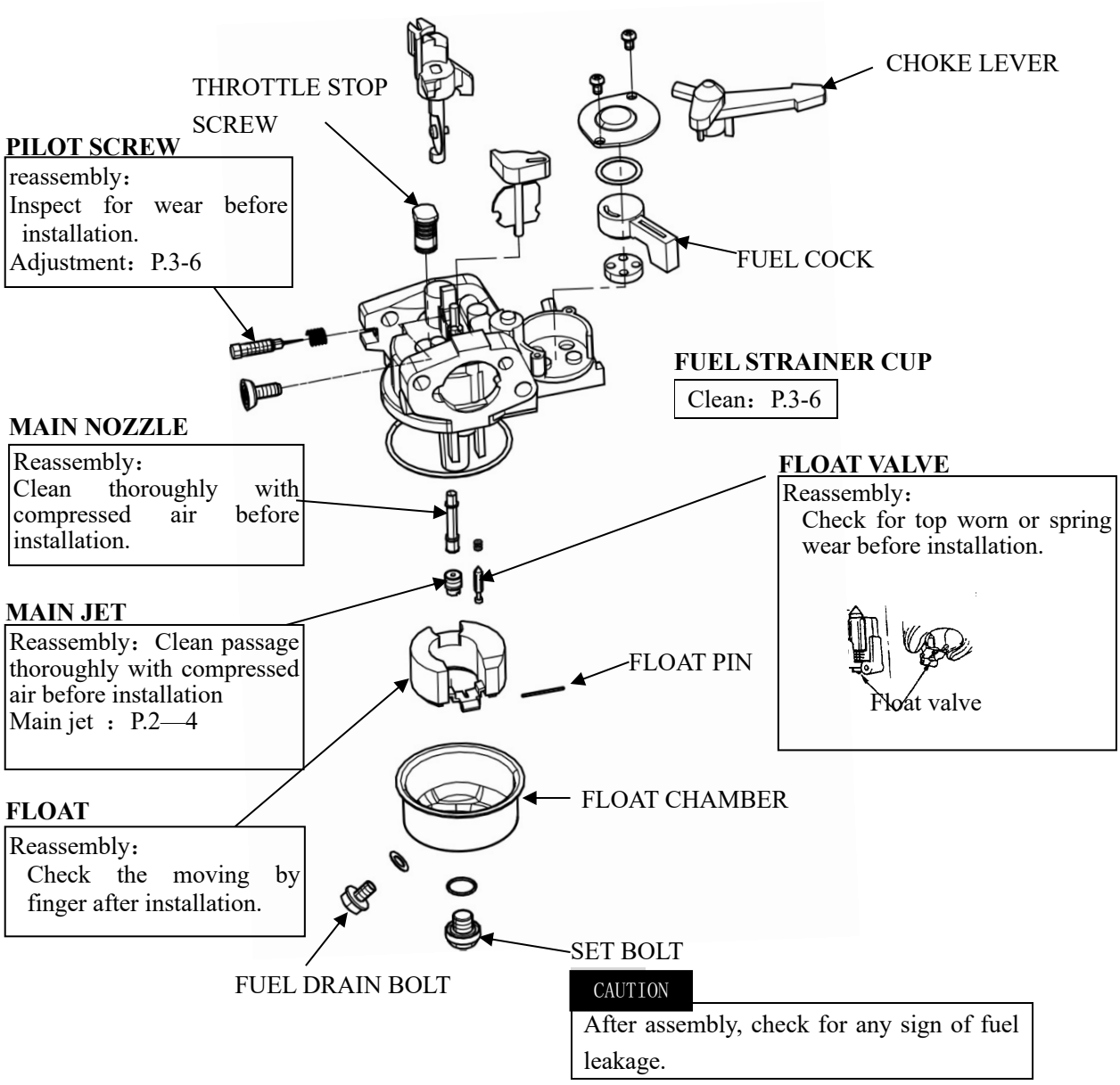
4. DISASSEMBLING AND SERVICING

b . Disassembly/reassembly

CAUTION

·Remove the drain bolt and drain the carburetor before disassembling

·Prohibit fire.



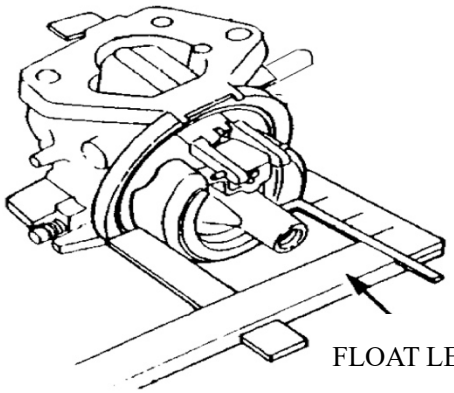
Inspection

●Float level height

Place the carburetor in the position as shown and push the float in by finger. and measure the distance between the float and case at the float valve bottom (float height).

Specified float height	13.7mm

If the float height is out of specification, replace the float valve and recheck the float height



FLOAT LEVEL GAUGE

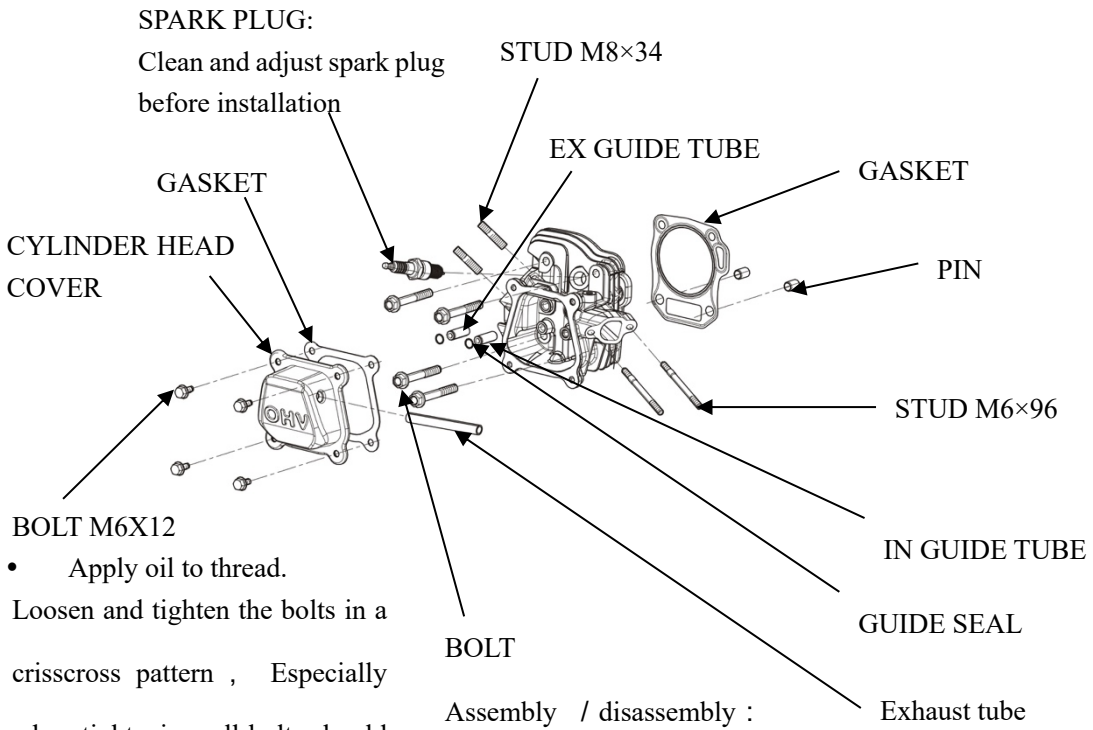
4. DISASSEMBLING AND SERVICING

4-4-5 Cylinder head /valve

1) Removal/ installation

① Remove the fuel tank ② Remove the air cleaner

③ Remove the recoil starter and shroud ④ Remove the carburetor and insulator



- Apply oil to thread.

Loosen and tighten the bolts in a crisscross pattern , Especially when tightening, all bolts should be tightened gradually and evenly up to specified torque.

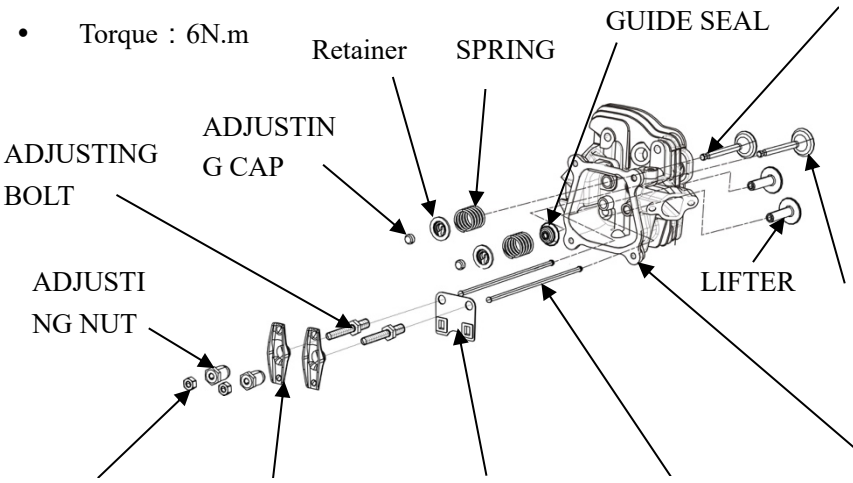
- Torque：6N.m

Assembly / disassembly：

Loosen and tighten the bolts in a crisscross pattern in 2 or 3 steps.

EXHAUST VALVE

Reassembly:
Before installation, remove carbon deposits and inspect the valve.



INTAKE VALVE

Reassembly：

Don’t interchange with the exhaust valve.

IN：２５mm

LOCKIN G NUT

ROCKER ARM
Reassembly:
Before installing check for wear on the surfaces

PUSH ROD GUIDE

PUSH ROD

Reassembly：

Check both ends for wear and the rod for straightness.
Be sure the rod ends are firmly seated in the lifters.

CYLINDER HEAD

Installation ：

Before installation, remove any carbon deposits from the

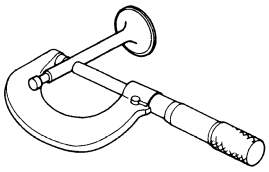
Valve spring retainer：

Push down on the valve spring and move the retainer to the side so that valve stem slips through the side hole

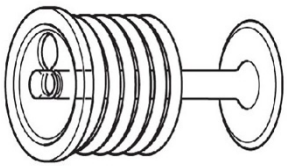
Do not remove the valve spring retainers while the cylinder head is attached to the cylinder, or the valves will drop into the cylinder.

2）Inspect/service/repair：

① Valve stem outside diameter



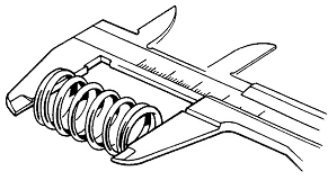
Inspect the valve stem outside diameter with the micrometer, if finding out of the standard or service limit, or if visually inspecting the burn and damaged on the valve face, please replace with new one.



Standard			Service limit	
R200	5.48mm（IN）	5.44mm（EX）	5.318mm（IN）	5.275mm（EX）
R270	6.575 mm（IN）	6.535 mm（EX）	6.44 mm（IN）	6.4 mm（EX）

③ Valve spring free length

Measure the free length of the valve Springs. If out of the standard or service limit. Please replace the spring

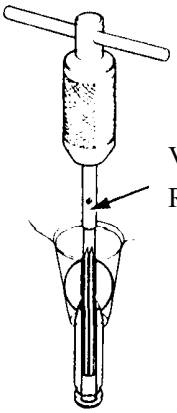


Standard	Service limit
34mm(R200)	32.5mm(R200)
39mm(R270)	37.5 mm(R270)

③ Valve guide

Inspect：

a) Inspect the valve guide for smooth, scratch and damaged in the inner surfac and matching between the valve guide and cylinder cover for fastness.



b) Using the valve guide reamer, ream the valve guides to remove any carbon deposits before measuring.

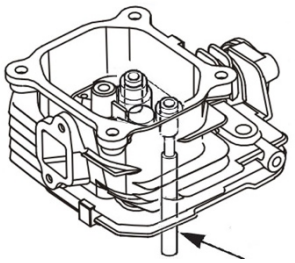
If the valve guide inside diameter is lower than standard or out of the service limit, replace the guide.

Standard	Service limit
5.50mm	5.572mm

Replacement:

a) Chill the replacement valve guides in the freezer section of a refrigerator for about an hour.

b) Drive the valve guide out of the combustion chamber side using valve guide driver.



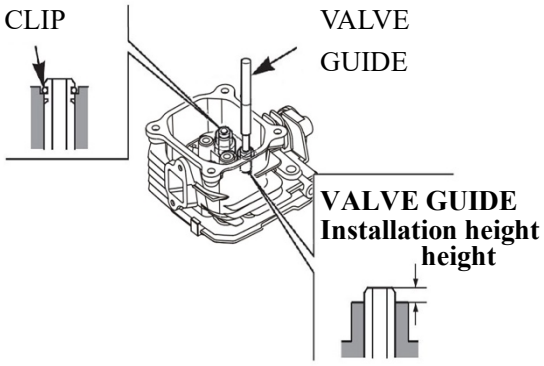
NOTICE: Be careful to avoid damaging the cylinder head when driving out the valve guides.

c) Install the new valve guides from the valve spring side of the cylinder head.

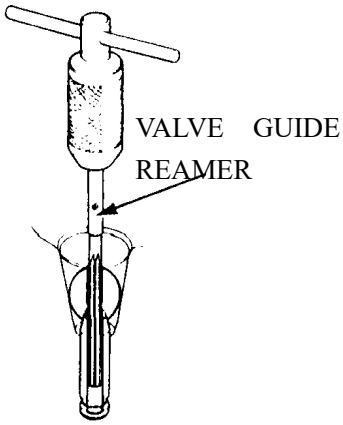
Exhaust side: Drive the exhaust valve guide until the clip is fully seated (as shown as fig.)

Intake side: Drive the intake valve guide to the specified height (measured from the top of the valve guide to the cylinder cover as shown as fig.)

d) After installation, inspect the valve guide for damage, if damaged, please replace.



Reamer：



For best results, be sure the cylinder head is at room temperature before reaming valve guides.

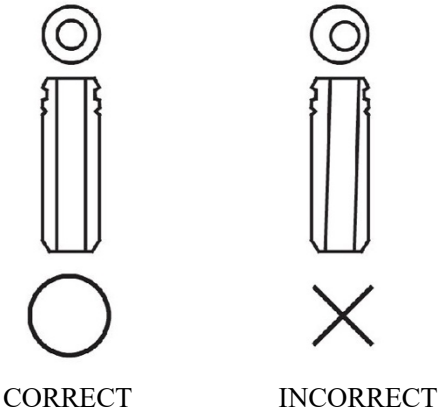
a) Coat the reamer and valve guide with cutting oil.

b) Rotate the reamer clockwise through the valve guide for the full length of the reamer. Continue to rotate the reamer clockwise while removing it from the valve guide.

Tools：Valve guide reamer

c) Thoroughly clean the cylinder head to remove any cutting residue.

d) Check the valve guide bore, it should be straight, round and centered in the valve guide, insert the valve and check operation. If the valve does not operate smoothly, the guide may have been bent during installation. Replace the valve guide if it is bent or damaged.



e) Check the valve stem-to-guide clearance

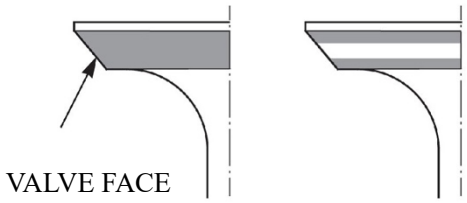
f) The valve stem-to-guide clearance：

g) The vale guide bore detract the valve stem outside diameter to get the clearance between the valve guide and valve stem.

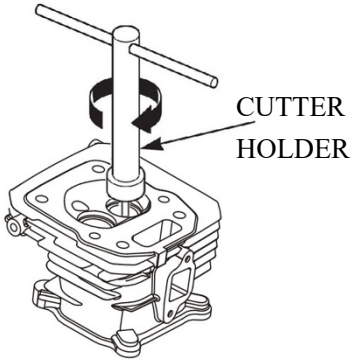
h) If the clearance is over the service limit, judge a new guide if it can make the clearance conforming to service limit, if conforming to, replace the guide and ream the guide, refinish the valve when replacing the valve guide.

④ Valve seat：

a) Thoroughly clean the combustion chambers and valve seats to remove carbon deposits. Apply a light coat of red lead powder or erasable color painting to the valve faces.



Insert the valves, and then press the valve Several times forcefully. Be sure the valve does not rotate on the seat. The transferred marking compound will show any area of the seat that is not concentric.

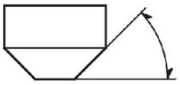


b) Using 45°cutter, remove enough material to produce a smooth and concentric seat.

c) Turn cutter clockwise, never counterclockwise.

d) Continue to turn the cutter as you lift it from the valve seat.

IN valve：32°



IN valve：45°

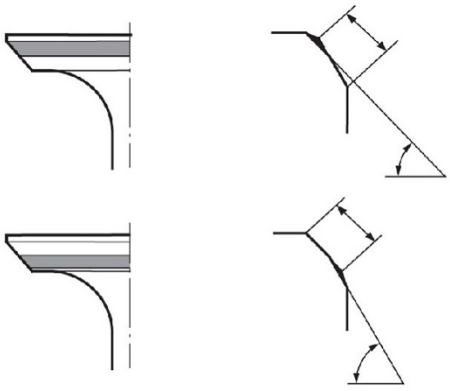
EX valve：45°

Tool：

Valve seat cutter

Use the 32°-45°cutters to narrow and adjust the valve seat so that it contacts the middle of the valve face. The 32° cutter removes material from the top edge (contact too high).

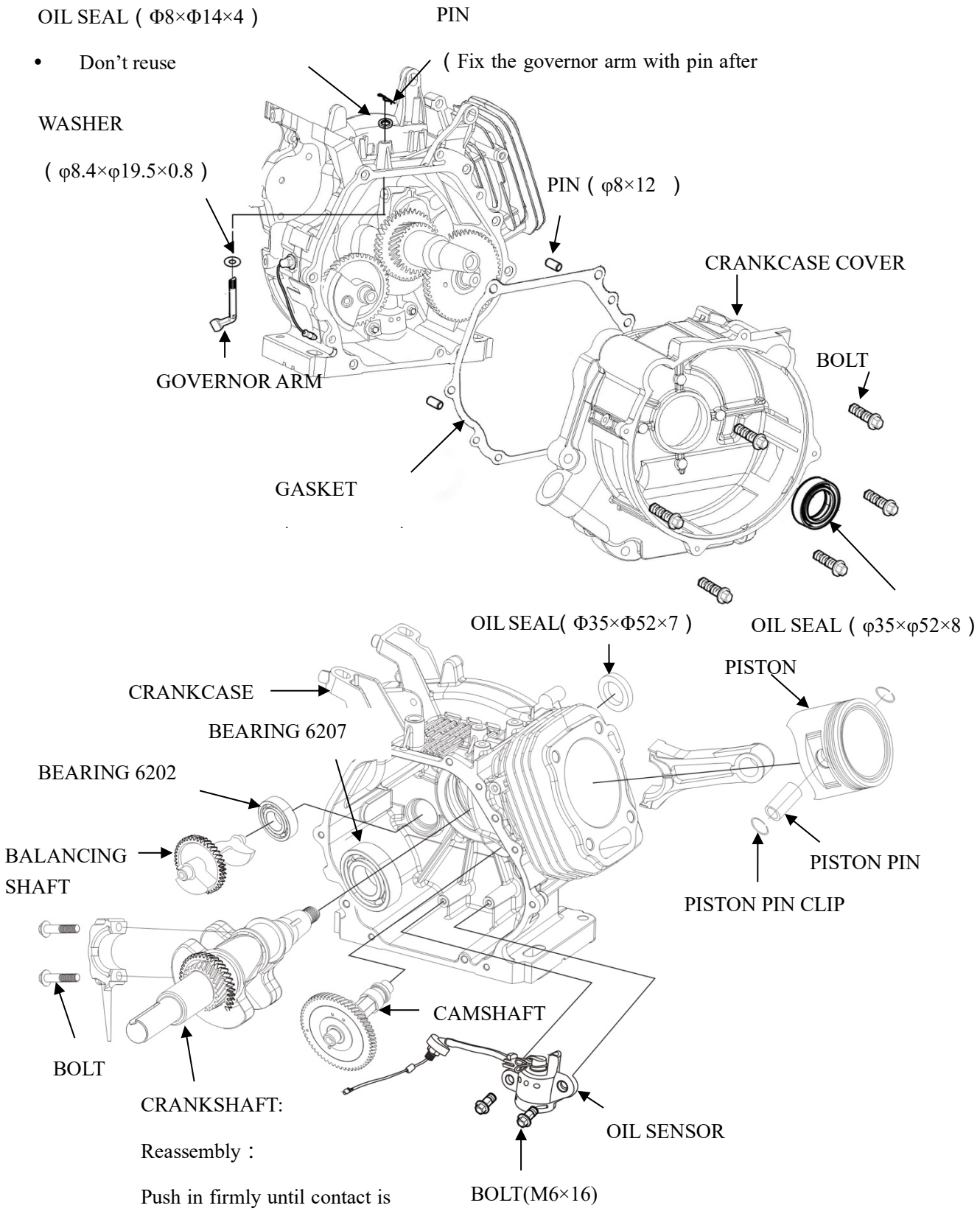
The 45°cutter removes material from the bottom edge (contact too low). Be sure that the width of the finished valve seat is within specification.



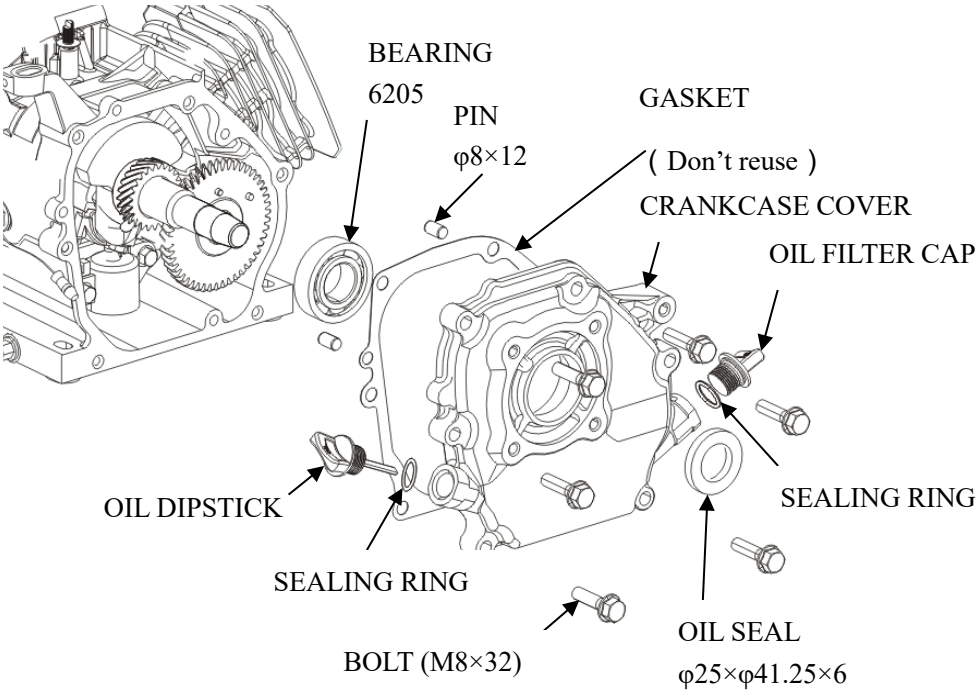
Standard	Service limit
0.8mm	2.0mm

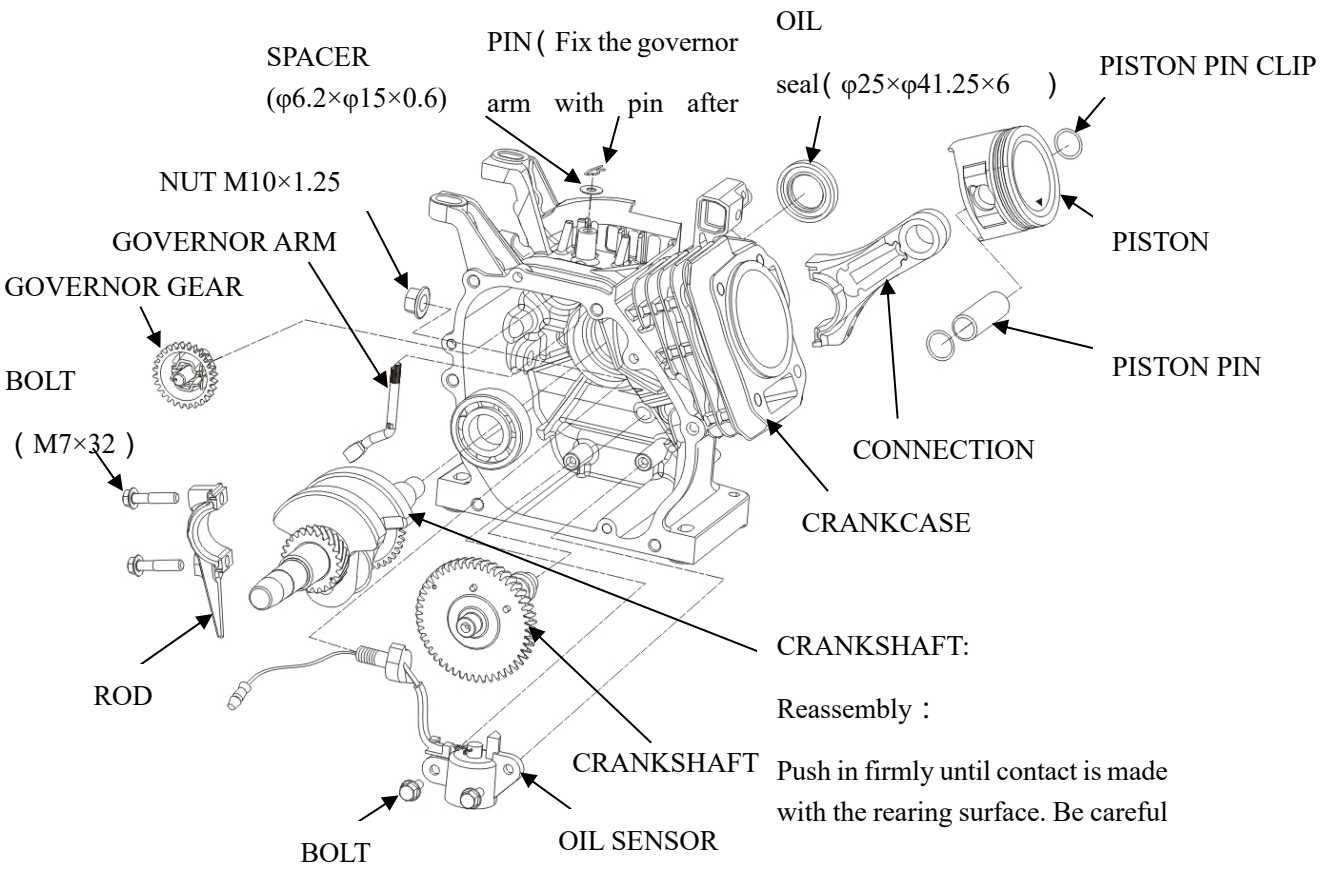
e) Make alight pass with the 45°cutter to remove any possible burrs at the edges of the seat.

4-4-6 Crankshaft/piston



4. DISASSEMBLING AND SERVICING



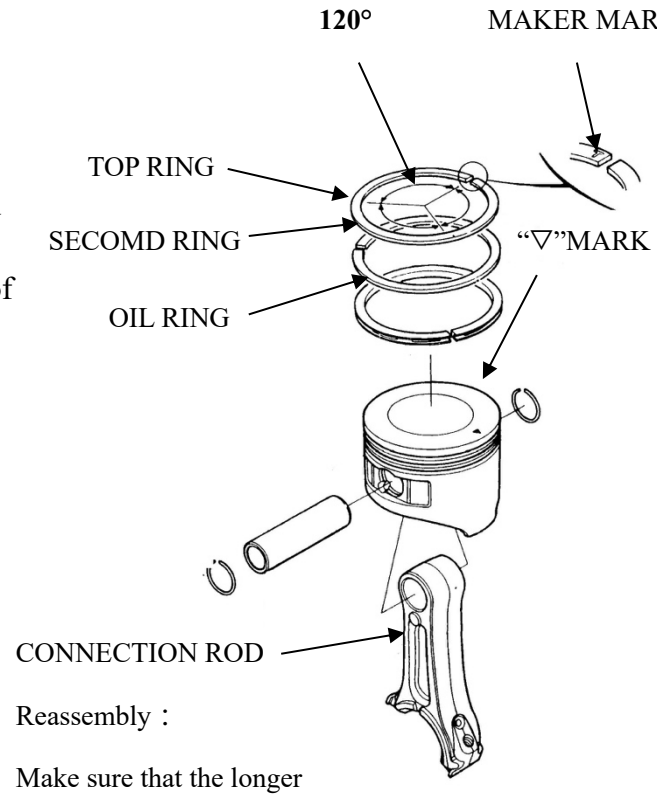


4. DISASSEMBLING AND SERVICING

① Disassembly：

a) Piston

• Install with the maker mark facing upward as shown.
• Do not interchange the top ring and the second ring (top ring with chrome plated)
• After assembly, check for smooth movement of the piston ring.
• Stagger the piston ring end gaps 120° apart.



Reassembly：

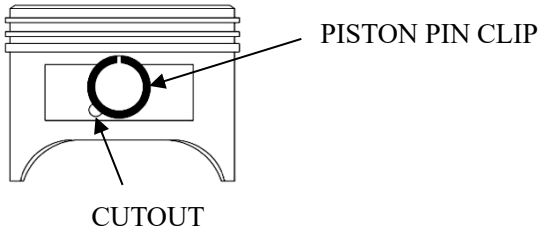
Make sure that the longer end marked is toward the piston head with the "▽"

② Reassembly：

a) Piston pin clip

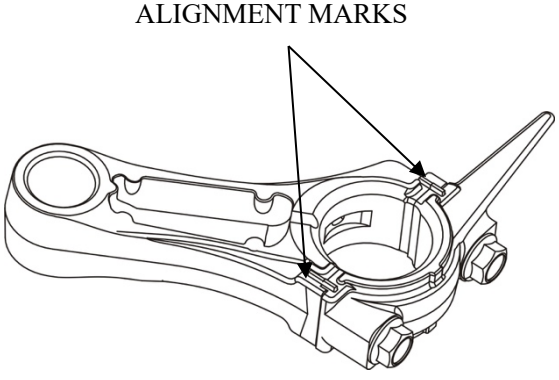
Install by setting front end of the clip in the piston groove, holding the other end with long nosed pliers, and rotating the clip in.

Do not align the end gap of the clip with the cutout in the piston pin bore.



b) Connecting rod cap

Install by aligning the alignment marks on the connecting rod cap.



③ Piston check

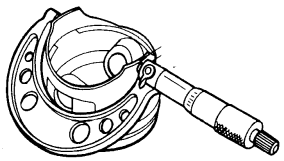
Check the piston and cylinder for contacting, and check the groove for defects, piston top for burn and cracks. If damaged, replace.

Clean the carbon deposit

Clean the deposit round the piston top and cylinder neck before checking, first soak the carbon deposit with kerosene, then, clean with meter scraper or metal brush.

a) Piston skirt O.D

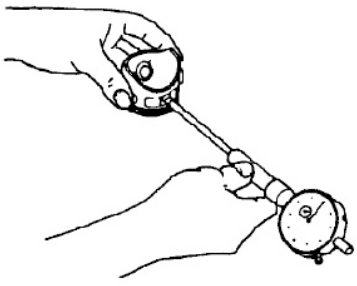
Measure the piston skirt O.D with outside micrometer, if out of the service limit, replace it.

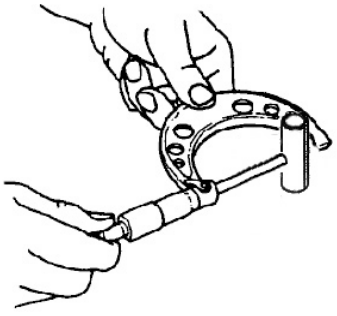


Standard	Service limit
67.985mm(R200)	67.845 mm(R200)
76.985mm(R270)	76.845mm(R270)

b) Piston pin bore to piston clearance

Separately measure the piston pin bore I.D and O.D with inside micrometer and outside micrometer. Then calculate clearance by measuring results. If out of the service limit, replace the piston pin and piston as necessary.





Standard	Service limit
0.002-0.008	0.06mm

c) Piston-cylinder clearance

Difference between cylinder maximum diameter and piston skirt should be considered as piston-cylinder clearance.

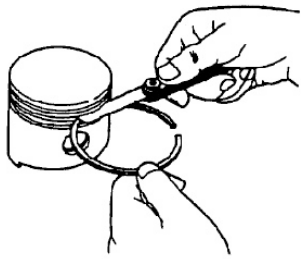
NOTICE: This clearance must be checked before and after repairing.

Check with piston converting in the cylinder and inserting feeler between piston skirt bearing face and wall, then pull the feeler out, if feeling resistance and smoothly out, the thickness of the feeler shall be considered as piston-cylinder clearance.

Standard	Service limit
0.015-0.05mm	0.12mm

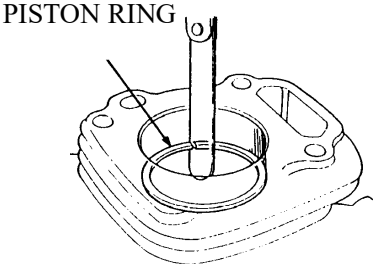
d) Piston ring side clearance

Check with placing each ring into each-self groove. The piston ring should be freely turned without loosening and sticking. Then measure with inserting feeler into clearance of the ring and upper and lower face.



Standard	Service limit
0.015-0.045mm	0.15mm

e) Piston ring end gap

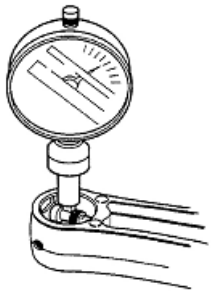


Flatly place the piston into the cylinder with pushing the piston head to working position.

Measure the opening clearance with feeler, that clearance not too big or not to small, too big can result in cylinder sealing performance poor while too small can result in piston expanded from heating and blocked in the cylinder, thus causing piston broken and “sticking”. If opening clearance is too small, file the opening with fine flat file. Often check in the cylinder when filing until the proper clearance is got.

	Standard	Service limit
First ring/second ring	0.2-0.4mm	1.0mm
Oil ring	0.15-0.35mm	1.0mm

④ Check connecting rod



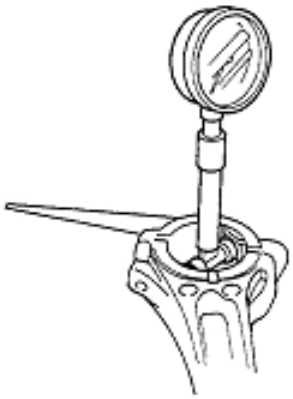
If connecting rod bending, twisting or big end shaft bush and small end outer ring movement or crack on one side, should be rejected and replaced with new one.

a) Check small end diameter

If out of the standard or exceed service limit, replace the connecting rod.

Standard	Service limit
18.002mm (R200)	18.07mm (R200)
18.002mm (R270)	18.07 mm (R270)

b) Check big end diameter

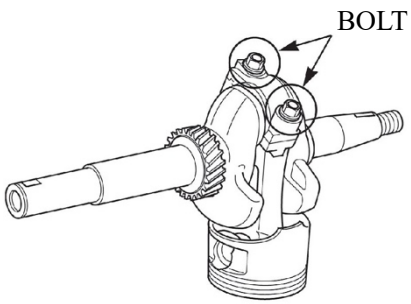


If out of the standard or exceed service limit, replace the connecting rod.

Standard	Service limit
30.02mm (R200)	30.066mm (R200)
33.025-33.039mm (R270)	33.07mm (R270)

c) Connecting rod big end oil clearance

- Wipe oil off the crank pin and connecting rod bearing mating surface.
- Set the plastic gauge on the crank pin, connecting rod and bolt to specified torque.

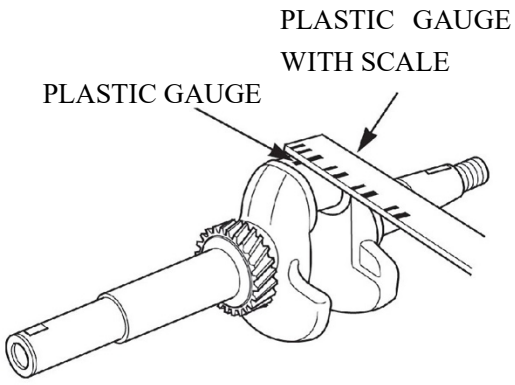


Torque： R200：12±1 N.m

R270：15±1 N.m

NOTICE: Place the plastic gauge axially.

- **Remove connecting rod and measure with plastic gauge.**
- If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance.



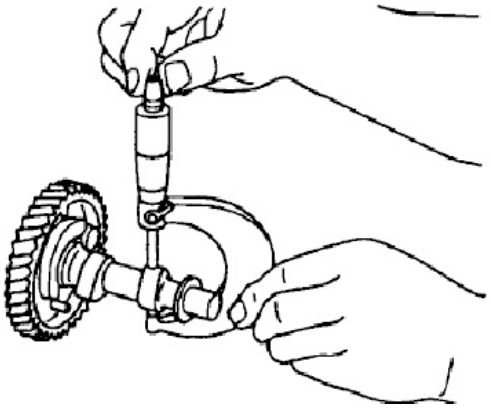
Standard	Service limit
0.040-0.063mm	0.12mm

⑤ Camshaft check

The camshaft is main driving part of the train valve mechanism, which controls the intake and exhaust valves opening and closing.

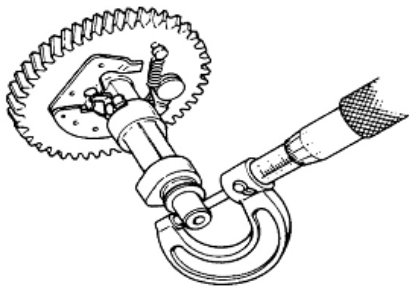
Feature: The shaft is equipped with cam and journal which can control intake and exhaust. When operating, camshaft operating face and lifter will be badly rubbed from periodically impacting and easily be damaged. So, the camshaft shall be wearable and lubrication well.

- Visually inspect camshaft face and camshaft height for damaged, and camshaft and bearing for loosening and wearing, replace as required.
- Check camshaft for height dimension. If out of the service limit, replace the camshaft.



	Standard	Service limit
IN lifter	27.7mm(R200) 32.04mm(R270)	27.45mmR200) 31.96mm(R270)
EX lifter	27.7 mm(R200) 31.76 mm(R270)	27.50 mm(R200) 31.68 mm(R270)

- Check outside diameter of the camshaft, if less than the service limit, replace the camshaft.



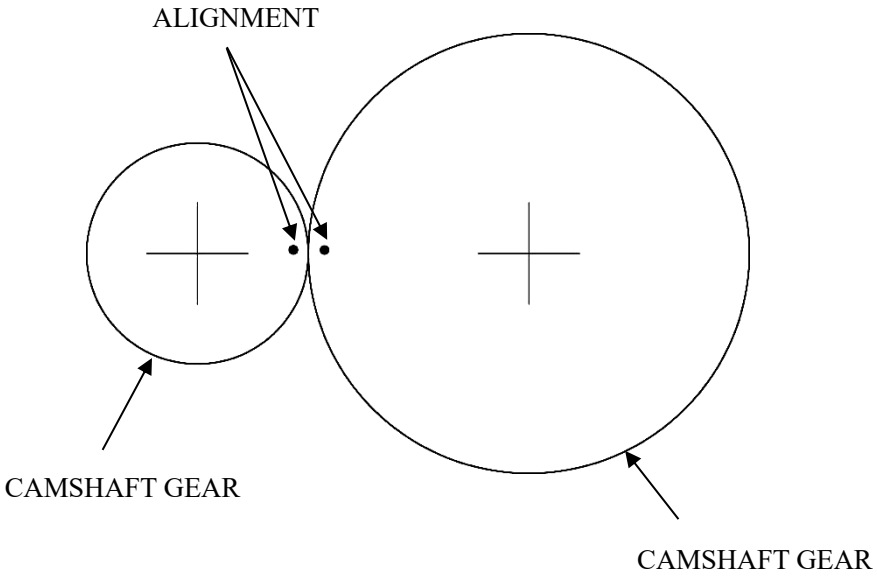
Standard	Service limit
13.984mm（R200）	13.916mm（R200）
15.966mm（R270）	15.92mm（R270）

Camshaft wearing cause and to engine performance influence：

Poor lubrication will result in camshaft abnormal wearing, such as, oil viscosity low, impurity too much, and recycling oil little can't let the camshaft surface forming complete oil film to make the camshaft surface seriously worn in the high speed rubbing stat. Second, installing precision problem, when the matching clearance of the camshaft journal and camshaft seat or bearing is out of the service limit, camshaft rotation precision will lower and contacting with the relative part produce deviation face to make abnormal wearing.

⑥Timing gear

a）Check timing gear for engagement clearance with aligning two side marks on the gear.



Timing gear will be damaged in gear worn, gear face peeling off, and gear teeth broken. The engagement clearance is bigger due to gear wearing, the noise is bigger.

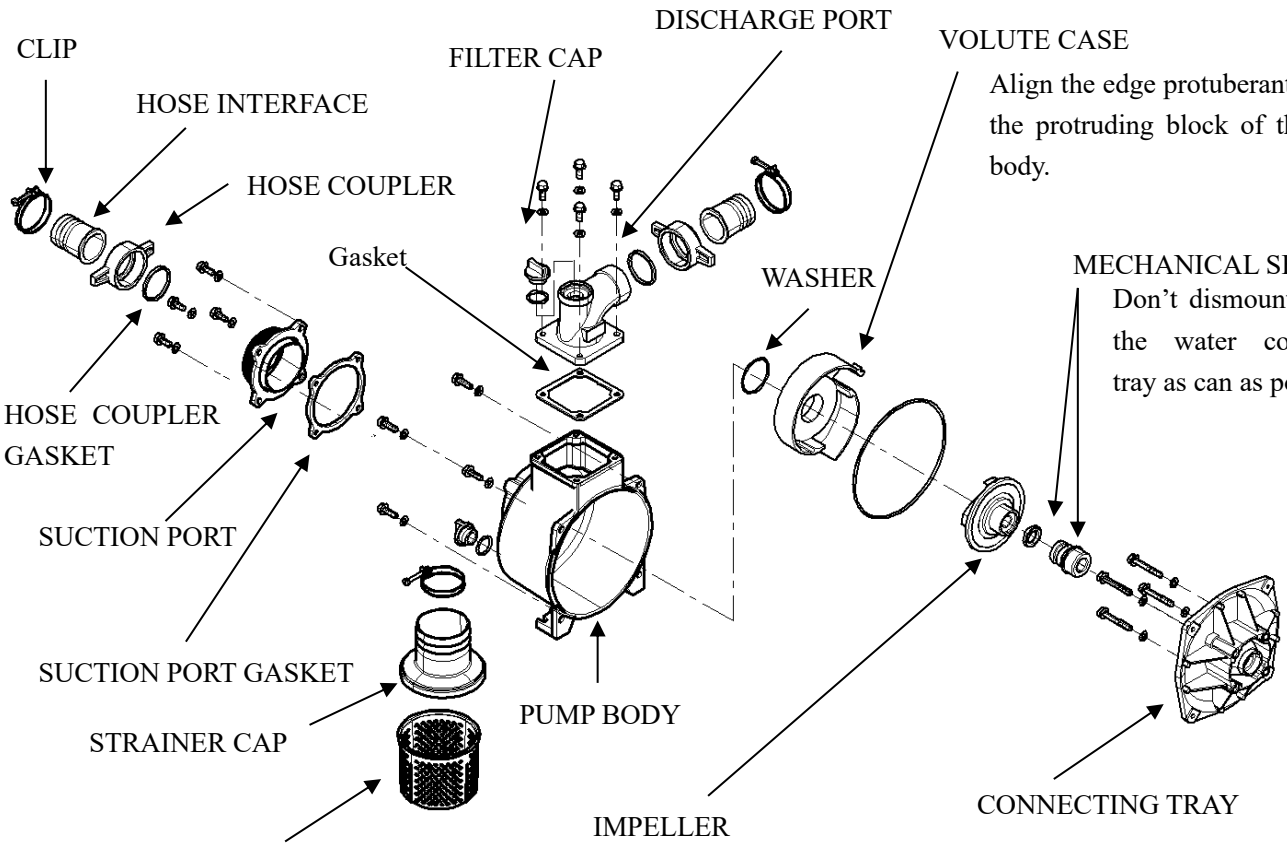
If the timing gear is damaged, please replace with new one.

4. DISASSEMBLING AND SERVICING

NOTICE: Please replace the gear with a new set to ensure the engaging face completely engage in.

4-5 Water pump

4-5-1 Pump body



Impeller clearance

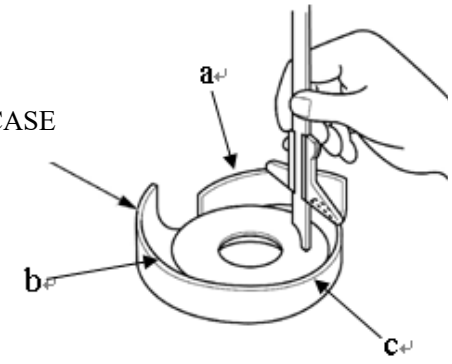
1. Remove the casing and volute case.

2. Measure the depth（A） of the

Volute case,，as shown on the right figure：

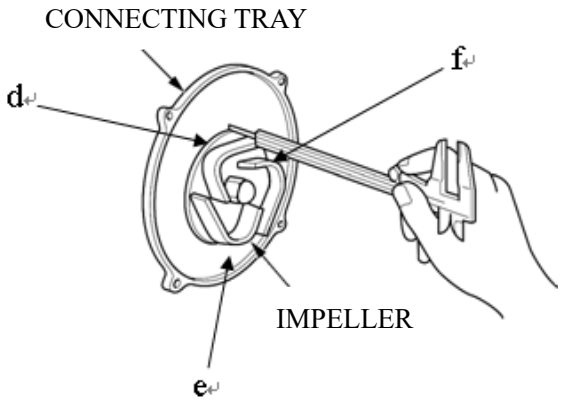
Measure a, b, c, three points, take average value of three points

VOLUTE CASE

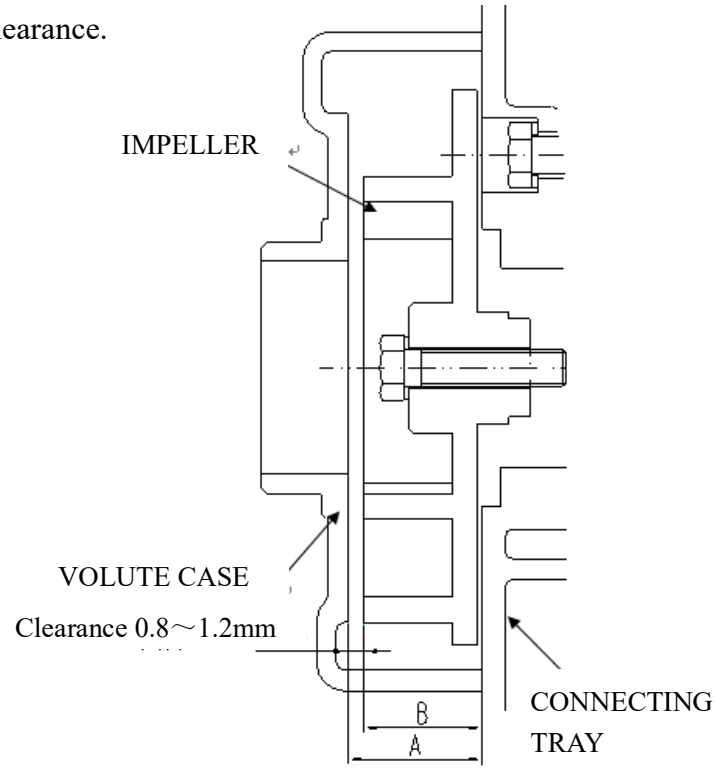


3. Measure the height (B) of the impeller vanes from the connecting tray, as shown on the right figure：

Measure d、e、f，three points, take average value of three points

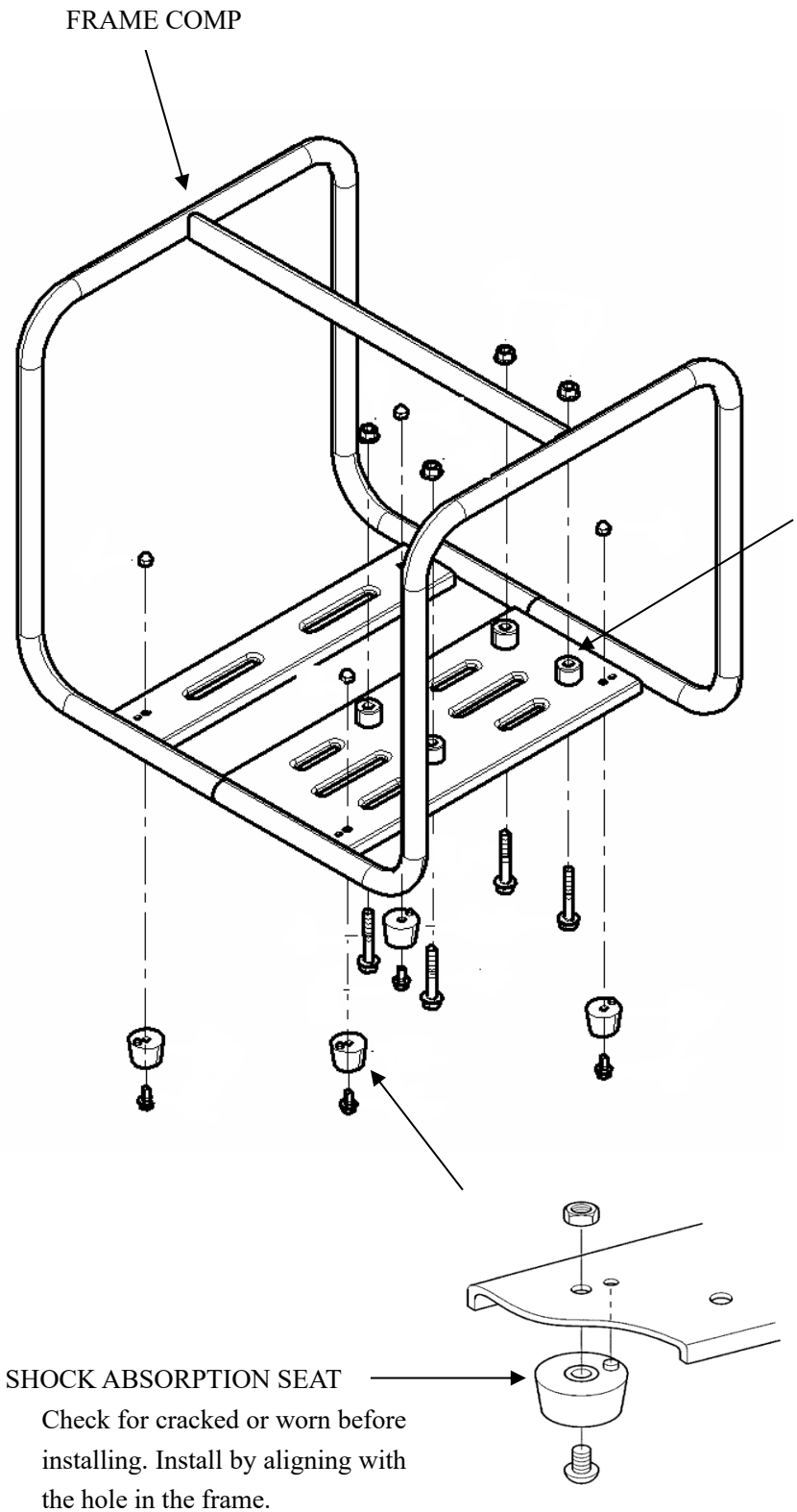


4. Volute depth (A) - impeller height (B) = impeller clearance.
Specified impeller clearance：0.8～1.2

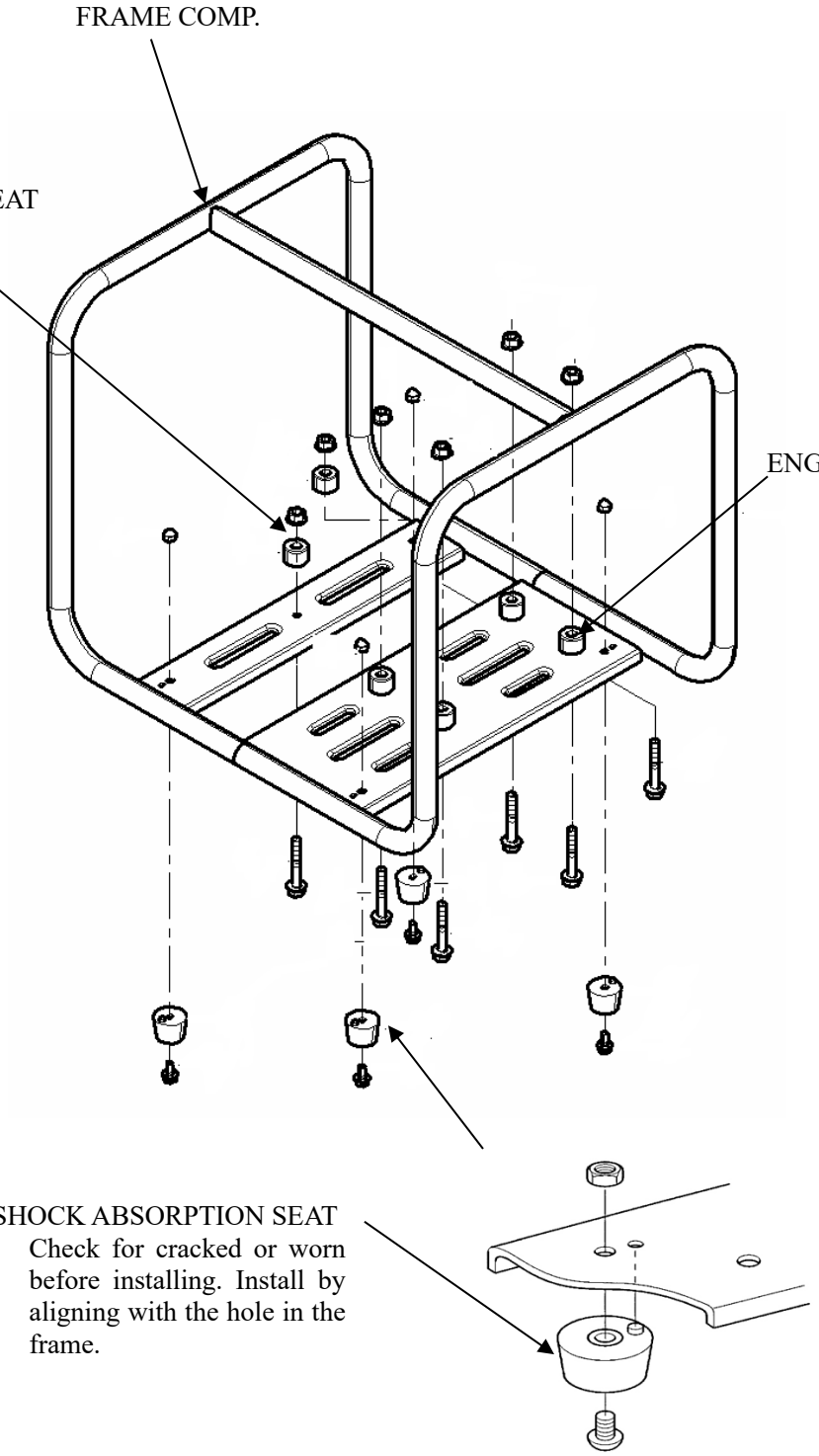


4-5-2 Frame

RT50ZB26-3.6Q/ RT80ZB26-3.6Q



RT100ZB26-5.2Q



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