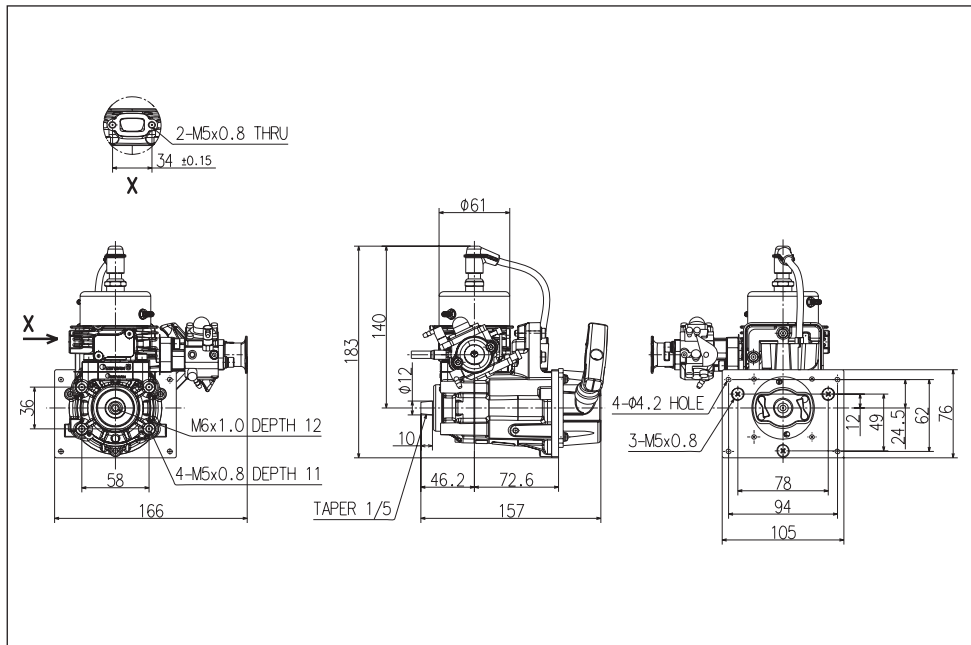


OWNER'S MANUAL

Model: G320PUM for radio control Boat
Model code: 967289101

⚠ WARNING ⚠

- This engine is designed for radio controlled boat use.
- When replacing parts, use only parts which have been certified by Zenoah.
- Zenoah assumes that no responsibility for this engine that is modified or used for any other applications.
- Purchaser has all responsibilities against any laws and regulations existing in the country, Zenoah is exempt from such laws and regulations.
- Read and completely understand this OWNER'S MANUAL before operating this engine.



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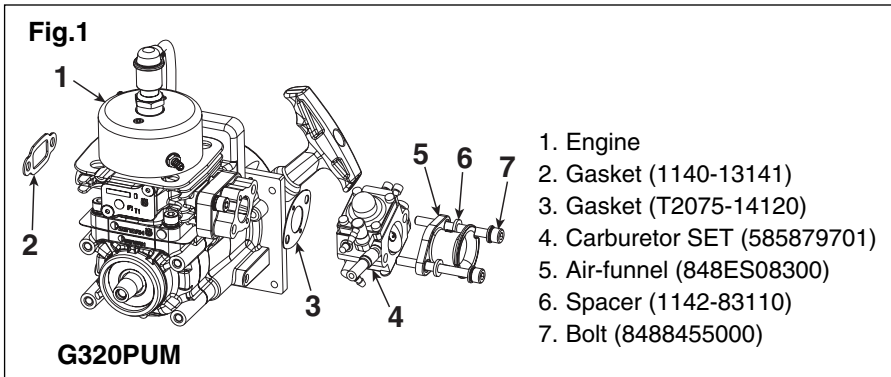
⚠ Safety Precautions ⚠

- This manual describes the engine. For its mounting and control, see the instruction manual provided by model boat manufacturer.
- This engine is designed for model boat use. If it is used for any other purpose, we cannot be responsible for its reliability, safety and any laws/regulations in the country.
- Use genuine parts for replacement.
- Check the rotor and screw-propeller every time. If it is damaged, replace it with a new one.
- If the screw-propeller hit something while the engine is in operation, immediately stop the engine and check it.
- Start the engine on a flat surface without pebble stones.
- Never modify the rotor.
- Check the rotor. If it is damaged, replace it with a new one.
- When mixing the fuel, or operating the engine, carry it out in a well-ventilated place.
- The fuel is toxic. Do not let it get into your eyes or mouth. Store it in a cool place, out of the reach of infants and children.
- To prevent electrification, never touch the high-tension wire of the spark plug during operation.
- The engine metal parts can burn your skin. Never touch the engine and muffler during operation or right after stopping the engine.
- Please wear clothing that facilitates your safety. Remove all scarves, overly long sleeves, neckties and like. Failure to do so could result in injury.

Engine Assembling

The carburetor and air-funnel are not assembled at factory.

Make sure that the assembling for such parts are done according to the Fig.1.



CAUTION

Make sure that gasket and carburetor are mounted as described in fig.1.
The engine does not start if carburetor is mounted upside down position.

Engine Mounting

Make sure that the engine is to be mounted according to the instruction manual provided by model boat manufacturer.

In case such instruction manual is not available, make sure that the engine should be mounted at least by 4 points both at engine's PTO side and recoil starter side.

[Note]

- 1) Be sure to set flat washers or metal plates on the reverse side of the mount to prevent bolts from sinking into the mount.
Be sure to check if the bolts are securely fastened.**
- 2) The fuel head between carburetor and the bottom of fuel tank must be less than 100 mm (4 inches)**

Screw-Propeller and Exhaust System

The exhaust system (e.g., muffler) is not equipped with this engine as standard. When you select the exhaust system, check the engine speed (rpm) when the maximum output is generated by using the exhaust system you are going to select. And then decide the appropriate screw-propeller that would meet such engine speed (rpm) that the exhaust system requires. In general, contact your boat manufacture to select appropriate screw-propeller and exhaust system.

Fueling System

- Mix gasoline (octane over 95) and high grade 2 cycle engine oil (mixing use type; JASO FC grade or ISO-L-EGC grade) at mixing ratio 25:1.
- The mixing ratio is according to the oil recommendation.

[NOTE]

1) Gasoline may contain maximum of 10% Ethanol (grain alcohol) or up to 15% MTBE (Methyl tertiary-butyl ether).

Gasoline containing Methanol (Wood Alcohol) is NOT approved.

2) Gasoline is very flammable. Avoid smoking and any fires near fuel.

3) To prevent all possible problems on fueling system, make sure to use the fuel filter which has more than 300 mesh or equivalent and gasoline proof rubber pipe or equivalent.

Incorrect fuel filter may cause engine trouble like fuel passage stuffing in carburetor, or piston surface scratching etc.

4) When fueling, make sure that no fuel touches the hot parts.

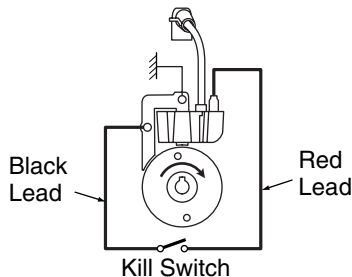
5) Assemble the fuel line so that it does not touch the hot parts. Also, check that there is no fuel leakage due to cracks, or hardening.

Starting

- How to start
 - a. Fill the fuel tank with the fuel.
 - b. Push the priming bulb upper the carburetor until fuel appears in the priming bulb.
 - c. Choke the engine and open the throttle valve approximately 1/4~1/3 of the full open position.
 - d. Quickly pull the starter cord when the initial combustion noise is heard.
 - e. When the initial combustion noise is heard, open the choke, set the throttle valve at the idle position or at the position slightly open from the idle position and quickly pull the starter cord a few more times. Then the engine starts.

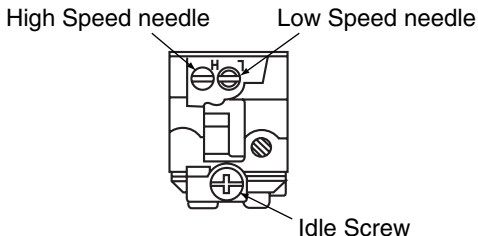
How to Stop The Engine

For stopping the engine, the red lead wire from the coil should be grounded to the engine body, or the throttle valve should be closed completely.



Carburetor Adjustment

The carburetor is provided with 3 adjust screws they may need a little adjustment depending on the temperature, atmospheric pressure (altitude), and an exhaust system, etc. of the area where the engine is used. Start the engine without making any adjustments. Make readjustments only when the engine shows any mal-running.



Standard opening at the beginning of each needle as follows;

H	L
$1 \frac{7}{8} \pm \frac{1}{4}$	$1 \frac{3}{8} \pm \frac{1}{4}$

Carburetor Adjustment

Idle Screw:

Turning this screw clockwise increases the idling R.P.M. Turning it counterclockwise decreases the idling R.P.M

Low Speed needle:

This is the fuel adjust screw (not the air screw). Turning this needle clockwise makes the mixture gas leaner and turning it counterclockwise makes it richer. Set this needle at a position which is 1/4 open from best mixture (maximum R.P.M.) position.

High Speed needle:

Turning this needle clockwise makes the mixture gas leaner and turning it counterclockwise richer. Set this needle at a position which is 1/8~1/4 open (counter clockwise) from the maximum R.P.M. position.

CAUTION

- 1. Do not tighten the High and Low Speed needles too firmly.**
- 2. When the unit has just started and the engine is not warm enough, there may be insufficient acceleration and the engine may be stopped. Be sure to perform idling before operation.**

Engine Break-In

No specific break-in is required.

The engine is gradually broken-in as it is used and the output is also gradually increased.

For checking the whole conditions of the boat, it may be better to operate the engine at slow RPM for 1/3 tank and mid-high RPM for 2/3 tank.

Operation

- The engine is already tuned up to get high performance, and needs correct maintenance to keep such high performance.
- The details of operating model boat shall be provided by model boat manufacturer.
- Always keep the engine well according to the Maintenance clause described in this owner's manual.

Maintenance

1) MAINTENANCE CHART

Items	Action	Before Use	Every 25 hours	Every 100 hours	Note
Leakage, Damage/Crack	Check	✓	✓	✓	
Idling Speed	Check/Adjust	✓	✓	✓	
Spark Plug(gap)	Check/Adjust		✓	✓	Replace if necessary
Cylinder(barrel)	Check/Cleaning		✓	✓	↑
Piston, Ring	Check/Cleaning		✓	✓	↑
Muffler & Bolt	Check/Cleaning	✓	✓	✓	↑
Bearings	Check/Cleaning		✓	✓	↑
Crank Shaft	Check/Alignment			✓	↑
Rotor	Check		✓	✓	↑
Water Jacket	Check/Leakage	✓	✓	✓	↑

Maintenance

2) SPECIFICATIONS AND TECHNICAL DATA

Items	Unit	G320PUM	Remarks
Bore x Stroke	mm	38 x 28	
Displacement	cm ³	31.8	
Effective Compression Ratio		9.7	
Carburetor	Type	Walbro WT	
	Venture(mm)	ø13.5	
Starting		Recoil Starter	
Ignition	Type	CDI	
	Timing	BTDC 30°/7000rpm	
Spark Plug	Standard	CMR7H	NGK
	Option(Hot Type)	CMR6H	↑
No load max Speed	rpm	20000	
Idling Speed	rpm	4000	
Max. Net Power	kW/rpm	3.31/14000	Without muffler
Max. Net Torque	N.m/rpm	2.35/10000	↑
Carburetor Standard Opening	H	1 7/8 ± 1/4	
	L	1 3/8 ± 1/4	

Maintenance

3) MAINTENANCE SPECIFICATIONS

	Items	G320PUM		Measuring Device	Remarks
		Standard	Limit		
Cylinder	Bore (mm)	ø38	Plating damaged	Eye Checking	
Piston	Diameter (mm)	ø37.97	ø37.87	Micro Meter	At the skirt end and the right angle to the piston pin.
	Piston Ring Groove width (mm)	1.01	1.11	Thickness Gauge	
	Piston Pin Hole (mm)	ø9.01	ø9.05	Cylinder Gauge	
	Clearance between Piston and Cylinder (mm)	0.03-0.06	0.15	Micro Meter Cylinder Gauge	
	Clearance between Groove and Piston Ring (mm)	0.02-0.04	0.1	Thickness Gauge	
Piston Ring	End Gap (mm)	0.1-0.3	0.5	Thickness Gauge	When inserted in a new cylinder.
	Width (mm)	0.98	0.93	Micro Meter	
	Piston Pin Diameter (mm)	ø9	ø8.98	Micro Meter	
	Connecting Rod Small end (mm)	ø12	ø12.05	Cylinder Gauge	
	Crankshaft Dia. at Main Bearing (mm)	ø12	ø11.98	Micro Meter	
	Eccentricity (mm)	—	0.07	Dial Gauge	
	Axial Play (mm)	—	0.5	Thickness Gauge	
	Main Bearing	—	Gritty orr Feels Flat Spot	—	

Maintenance

4) CARBURETOR

Items	Standard	Limit	Measuring Device	Remarks
Metering Lever set (mm)	1.65	± 0.16	Vanier	
Inlet Valve Opening Pressure (kg/cm ²)	1.3~2.3		Leak Tester	
Inlet Valve Closing Pressure (kg/cm ²)	0.7~1.7		Leak Tester	

5) IGNITION SYSTEM

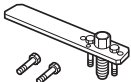
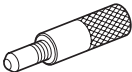
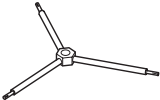
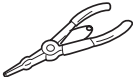

Items	Standard	Limit	Measuring Device	Remarks
Spark Plug Air Gap (mm)	0.6~0.7	0.7	Thickness Gauge	
Ignition Coil/Flywheel Air Gap (mm)	0.3	0.4	Thickness Gauge	
Coil Resistance (Ω)	1.76 k Ω	—	Volt Meter	Sparkplug Wire – Stop Core
	2.94 Ω	—		Stop Core – Coil Core
	1.46 k Ω	—		Coil Core – Sparkplug Wire

Maintenance

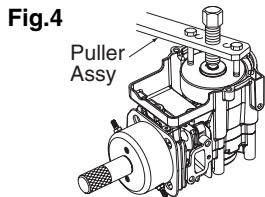
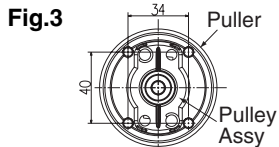
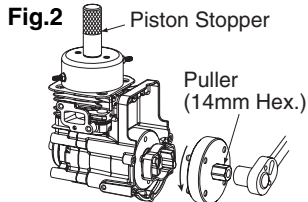
6) TIGHTENING TORQUE

Items	Screw Size	Standard (N·m)	Limit (N·m)	Remarks
Carburetor	M5 (P=0.8)	3.4	2.9~3.9	
Insulator	M5 (P=0.8)	4.4	3.9~4.9	Apply Three Bond TB1342H (Low Strength) or Equivalent
Pully Assy	M8 (P=1.0)	12.7	9.8~14.7	
Cylinder	M5 (P=0.8)	7.9	6.9~8.8	
Crankcase	M5 (P=0.8)	5.8	4.7~6.9	
Spark Plug	M10 (P=1.0)	10.8	8.8~12.8	
Muffler	M5 (P=0.8)	8.8	6.9~9.8	
Ignition Module	M5 (P=0.8)	6.4	4.9~7.8	
SO Coil	M4 (P=0.7)	1.8	1.5~2.0	
Recoil Starter	M4 (P=0.7)	1.8	1.5~2.0	
Water Jacket	M3 (P=0.5)	1.5	1.0~2.0	
Mount Plate	M5 (P=0.8)	3.9	3.4~4.4	
Cover, TR	M4 (P=0.7)	1.3	1.0~1.5	

Special Tools

	Part Name	Part No.	External Appearance	Usage
1	Puller Assy	577409701		To remove rotor.
2	Piston Stopper	4810-96220		To hold crankshaft when disassembling/assembling the rotor.
3	Hex Wrench	3304-97611		For socket screw of 4mm, 5mm and 6mm.
4	Snap Ring Pliers	5500-96110		To remove snap ring.
5	Puller	581965501		To remove pulley assy.

Service Guide



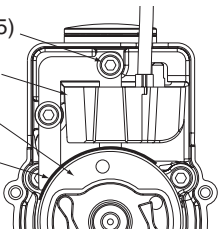
1. REMOVING ROTOR

- 1) Remove the spark plug, fit the piston stopper (P/N: 4810-96220) into the cylinder.
- 2) Remove the pulley assy by puller (P/N: 581965501) and ratchet. (Fig.2, Fig.3)
- 3) Remove the rotor using puller assy (P/N: 577409701). (Fig.4)

Service Guide

Fig.5

Bolt (M5)
Ignition
Module
Rotor
Plate

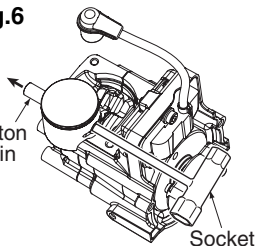


2. ASSEMBLING ROTOR / IGNITION MODULE (Fig.5)

- 1) Insert the 0.5mm plate in between the rotor magnet metal and the coil iron core.
- 2) Tighten bolts (M5x2) while pressing the ignition module toward rotor.
- 3) Remove the 0.5mm plate and confirm that the air gap is 0.5~0.6mm by thickness gage.

Fig.6

Piston
Pin

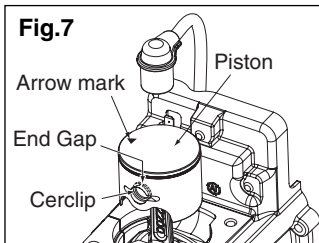


Socket

3. REMOVING PISTON PIN (Fig.6)

- 1) Remove snap rings from both sides of the piston pin.
- 2) Push the piston pin by socket.

Service Guide

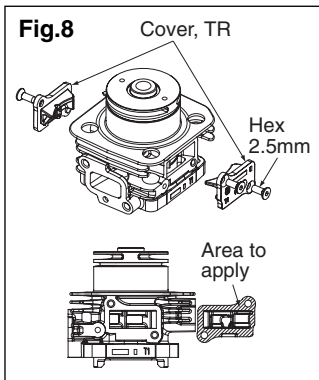


4. INSTALLING PISTON (Fig.7)

- 1) Make sure to point the arrow mark on the piston to the exhaust side.
- 2) Fit the circlip in the groove so as to face the end gap below.

CAUTION

Deformed circlip may come off during engine operation and damage the engine.



5. APPLY LIQUID GASKET (Fig.8)

Apply the liquid gasket (Three Bond TB1217F) when taking the Cover, TR on or off.

CAUTION

Apply a thin layer. Do not let the liquid gasket enter the cylinder. This could cause damage to the engine.

Trouble Shooting

1) ENGINE DOES NOT START

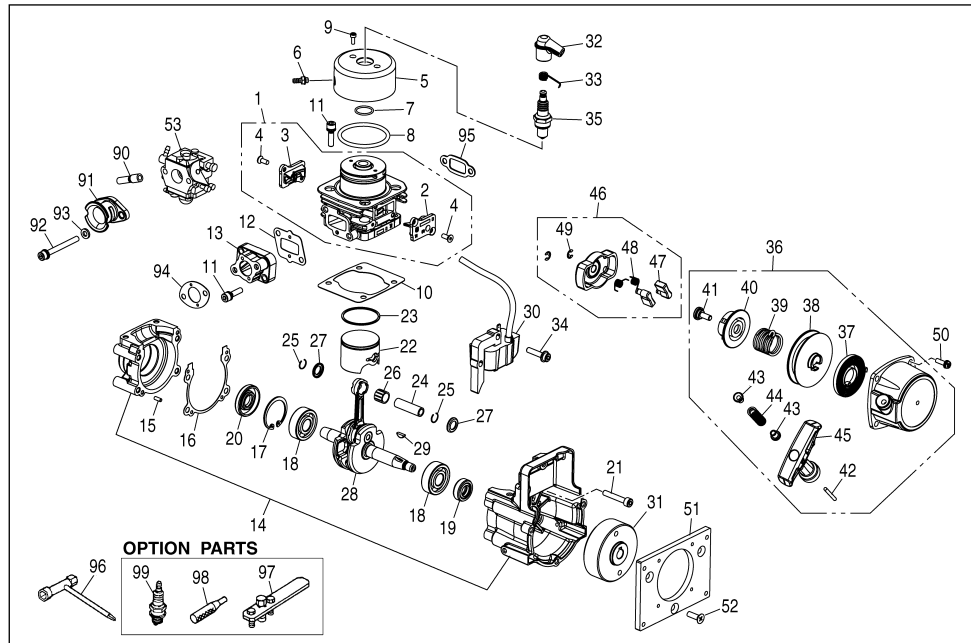
Description	Cause	Countermeasure
No spark in the spark plug		
Spark Plug	1. Wet spark, plug electrodes	Make them dry
	2. Carbon deposited on the electrodes	Cleaning
	3. Insulation failure by insulator damage	Exchange
	4. Improper spark gap	Adjust to 0.6~0.7mm
	5. Burn out of electrodes	Exchange
Magneto	1. Ignition coil inside failure	Exchange
	2. Damaged cable sheath or disconnected cable	Exchange or repair
Switch	1. Switch is OFF	ON the switch
	2. Switch failure	Exchange
	3. Primary wiring earthed	Repair
Sparks appear in the spark plug		
Compression & fueling is normal	1. Over sucking of fuel	Drain excess fuel
	2. Too rich fuel	Adjust carburetor
	3. Overflow	Carburetor adjust or exchange
	4. Clogging of air cleaner	Wash with mixed gasoline
	5. Faulty fuel	Change with proper fuel
Fueling normal but poor compression	1. Worn out cylinder, piston, or piston ring	Exchange
	2. Gas leakage from cylinder and crank case gasket	Apply liquid gasket and reassemble.
No fuel supply	1. Choked breather air hole	Cleaning
	2. Clogged carburetor	Cleaning
	3. Clogged fuel filter	Exchange fuel filter

Trouble Shooting

2) LACK OF POWER OR UNSTABLE RUNNING

Description	Cause	Countermeasure
	1. Air penetration from fuel pipe joints, etc	Secure connection
	2. Air penetration from intake tube joint or carburetor joint	Change gasket or tightening screws
	3. Water in fuel	Change with good fuel
	4. Piston start to seizure	Replace piston(and cylinder)
	5. Muffler choked with carbon	Cleaning
Overheating	1. Fuel too lean	Adjust carburetor
	2. Clogging of cylinder fin with dust	Cleaning
	3. Poor fuel quality	Exchange with proper fuel
	4. Carbon deposited in the combustion chamber	Cleaning
	5. Spark plug electrode red hot	Thoroughly clean, adjust spark gap [0.6~0.7(0.023~0.028in)]
Others	1. Dirty air cleaner	Wash with mixed gasoline
	2. Over loading	Reduce load
	3. Cover, TR leakage	Apply liquid gasket

Parts List G320PUM (967289101)



Parts List G320PUM (967289101)

KEY#	PART NUMBER	DESCRIPTION	Q'TY/ UNIT	REMARKS
1	585 87 83-01	CYLINDER-A	1	
2	585 72 72-01	• COVER, TR FLYWHEEL SIDE	1	
3	585 72 71-01	• COVER, TR CLUTCH SIDE	1	
4	585 81 59-01	• SCREW	4	M4x10L
5	585 87 85-01	JACKET	1	
6	07851-00515	JOINT	2	
7	58 58 786-01	O-RING	1	3.5x4.5
8	T2076-12320	O-RING	1	1.5x15.5
9	1160-12330	BOLT	2	M3x8L
10	585 22 48-01	GASKET, BASE	1	
11	3310-12281	BOLT	6	M5x20L
12	585 81 61-01	GASKET, INSULATOR	1	
13	585 72 70-01	INSULATOR	1	
14	585 74 00-01	CRANKCASE, COMP	1	
15	2629-21130	• PIN	3	
16	585 22 47-01	GASKET, CASE	1	
17	04065-03212	SNAP RING	1	
18	2850-21240	BEARING	2	
19	2169-21210	SEAL	1	
20	2630-43150	SEAL	1	
21	01252-30530	BOLT	4	M5x30L
22	585 22 50-01	PISTON	1	
23	585 22 51-01	PISTON RING	1	
24	8488B93200	PISTON PIN	1	
25	3310-41320	SNAP RING	2	
26	587 08 46-01	BEARING	1	
27	1650-41510	WASHER	2	
28	585 87 81-01	CRANKSHAFT, COMP	1	
29	1000-43240	KEY	1	
30	586 09 77-01	IGNITION MODULE	1	
31	1155-71110	ROTOR	1	
32	T2075-72210	CAP	1	
33	1400-72121	SPRING	1	

KEY#	PART NUMBER	DESCRIPTION	Q'TY/ UNIT	REMARKS
34	1850-12130	BOLT	2	M5x22L
35	3699-91867	SPARK PLUG	1	CMR7H
36	586 17 69-01	STARTER, RECOIL-A	1	
37	1850-75130	• SPRING, SPIRAL	1	
38	574 42 66-01	• REEL	1	
39	848E4075G0	• SPRING	1	
40	574 42 65-01	• PLATE, CAM	1	
41	848E4075E0	• SCREW	1	
42	587 08 91-01	• ROPE	1	
43	T2041-75431	• COLLAR	2	
44	T2041-75440	• SPRING	1	
45	T2041-75420	• KNOB	1	
46	587 03 20-01	PULLEY-A	1	
47	848E4075R0	• RATCHET	2	
48	848E4075S0	• SPRING	2	
49	848E4075T0	• E-RING	2	
50	8488441400	SCREW	4	M4x12L
51	587 03 19-01	PLATE, MOUNT	1	
52	0262-10516	SCREW	3	M5x16L
53	585 72 76-01	CARBURETOR-A	1	
90	1000-03030	TUBE	1	
91	848ES08300	FUNNEL	1	
92	8488455000	BOLT	2	M5x55L
93	1142-83110	SPACER	2	
94	T2075-14120	GASKET	1	
95	1140-13141	GASKET	1	
96	T3039-91310	SOCKET WRENCH	1	
97	577 40 97-01	PULLER-A	1	OP
98	4810-96220	STOPPER	1	OP
99	3699-91975	SPARK PLUG (NGK CMR6H)	1	OP

Parts List G320PUM (967289101)

KEY#	PART NUMBER	DESCRIPTION	Q'TY/ UNIT	REMARKS
53	585 72 76-01	CARBURETOR-A	1	
54	3306-81380	• SCREEN	1	
55	3080-81120	• COVER	1	
56	3310-81130	• SCREW	1	
57	330-481140	• GASKET	1	
58	1172-81150	• DIAPHRAGM	1	
59	1751-81470	• GASKET	1	
60	848HE081K0	• DIAPHRAGM	1	
61	T2070-81210	• BODY-A	1	
62	1751-81520	• COVER	1	
63	1751-81510	• PUMP	1	
64	2867-81270	• SPRING	1	
65	3356-81310	• VALVE inlet	1	
66	1480-81420	• PLUG welch	1	
67	3310-81230	• LEVER	1	
68	3310-81240	• SCREW	1	
69	3310-81250	• PIN	1	
70	2630-81330	• SCREW	1	
71	3350-81380	• SPRING	1	
72	T2070-81370	• SHAFT	1	
73	2670-81410	• SPRING throttle	1	
74	2880-81470	• SCREW	3	
75	3310-81340	• VALVE throttle	1	
76	1790-81440	• LEVER throttle	1	
77	1148-81390	• RING	1	
78	T2070-81460	• SHAFT choke	1	
79	2670-81450	• VALVE choke	1	
80	3350-81350	• SPRING	1	
81	3350-81220	• BALL	1	
82	1148-81530	• SCREW	4	
83	1491-81160	• SPRING	1	
84	T2070-81170	• NEEDLE low speed	1	
85	3080-81320	• SPRING	1	
86	T2070-81331	• NEEDLE high speed	1	
87	3304-81450	• SCREEN	1	
88	3304-81441	• RING	1	
89	3360-81440	• PLUG	1	

Warranty

WARRANTY TERMS

1) Scope of Application

This engine manufactured by Husqvarna Zenoah Co., Ltd. (herein after “Zenoah”). And sold to the user directly or through distributor/manufacturer, shall entitle to be covered by this warranty.

2) Limits of Warranty

Zenoah warrants that;

1. The quality disclosed in the specifications.
2. The engine which shall be considered defective by Zenoah, caused by material or production fault.

3) Limits of Compensation

1. Zenoah compensates such quality, material and production faults by repairing or replacing through distributor/manufacture.
2. Zenoah shall not compensate any other accompanied or benefit losses caused to user and distributor/manufacture by such faults and through repairing or replacing.

4) Term of Warranty

Three (3) months after purchased by end-user subject to 12 months from produced month.

5) Exempt from Warranty

Zenoah shall not warrant this engine even if the fault has been caused during the period of terms of Warranty, in case that.

1. Any faults, failures caused from neglect of proper operation and maintenance described in OWNER’S MANUAL.
2. Any modification not approved by Zenoah.
3. Normal abrasion and deterioration.
4. Consuming parts.
5. Using any parts which have not been certified by Zenoah.
6. Add-on or modified use.



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