

TECHNICAL LIST

	THOR 130
Polini Engine	2 stroke monocylinder
Cooling	Forced air
Bore for stroke	54 x 54
Displacement	125 cm ³
Power	21,5 HP at 8800 R.P.M.
Cylinder	Aluminum with Gilnilis coating
Compression ratio	12,5:1
Piston	Two chromium plated rings mm 1
Intake	Reed valve in the crankcase
Carburetor	Walbro / Polini PWK
Air filter	Air box
Ignition	Electronic and with battery charger possible
Battery charger prearrangement	Output power 80 W at 5500 RPM
Spark plug hood	5k Ω resistance
Fuel type	Lead free petrol with 2% synthetic oil
Gear reduction unit	Helical teeth in oil bath with 3,43 reduction ratio
Starting	Pull start with self winding cable Flash Starter
Clutch	Centrifugal in oil bath
Muffler	Expansion with oval silencer
Engine weight	13,8 Kg
Propeller rotation	Clockwise

TECHNICAL LIST

	THOR 200
Polini Engine	2 stroke monocylinder
Cooling	Forced air
Bore for stroke	64 x 60
Displacement	193 cm ³
Power	29 HP at 7400 R.P.M.
Cylinder	Aluminum with Gilnilis coating
Compression ratio	11,4:1
Piston	Two chromium plated rings mm 1
Intake	Reed valve in the crankcase
Carburetor	Polini PWK Ø 28 / Walbro
Air filter	Air box
Ignition	Electronic and with battery charger possible
Battery charger prearrangement	Output power 80 W at 5500 RPM
Spark plug hood	5k Ω resistance
Fuel type	Lead free petrol with 2% synthetic oil
Gear reduction unit	Helical teeth in oil bath with 2,8 reduction ratio
Clutch	Centrifugal in oil bath
Muffler	Expansion with oval silencer
Engine weight	17,5 Kg (18,5 with electric starter)
Propeller rotation	Clockwise

ENGLISH
INTRODUCTION

Congratulation for purchasing a Polini engine. By purchasing it you have become one of a large family of satisfied Polini products owners. Thor product has been designed to perform as competitively as possible. Read this use and maintenance manual carefully throughout before flying with your new engine. This manual contains important information that will help you to achieve the best satisfactions with the use of the Thor engine. To ensure care-free and satisfying usage you must get to know your new engine thoroughly and set it up correctly before you start using it.

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1- GENERAL ADVICES

Polini Motori and the distributor decline any and all responsibility whatsoever - either direct or indirect - for the use of the engine, above all in the case the engine is modified or manumitted by third parties. Polini Motori doesn't assume responsibility for damages caused by little servicing or wrong assembly, excluding the pieces from the warranty. Any technical modification may be introduced by the buyer, who assumes all the responsibilities for possible damages; spare parts for any modification are not under warranty. We advise you that any engine modification made by the buyer or the removal of original parts may make the engine dangerous to be used!

The user is invited to respect and follow what written in the use and maintenance manual for his own and third parties safety. When you use this engine you are making a very dangerous action, so you may have the maximum care before, during and after flying, in order to avoid serious accidents. We invite you to be careful to prevent accidents or damages and to keep always in mind that:

- the engine can't solve all the flight problems, so it is important to avoid dangerous maneuverings. One of the most common errors is to fly over zones where it is not allowed to land; you have always to take into consideration the possibility of engine failure or the need to make an emergency landing. It is forbid-

den to fly over built-up areas, urban centers, to drop things or liquids when flying.

- the lack of engine power can disturb the flight stability: the engine could stop suddenly and you may be obliged to make an emergency landing on a safety area.

Before using it, for your own and third parties safety, it is necessary to be sure that the weather conditions are good, or anyway adequate for a safety flight, in order not to compromise the good engine work. Rain or unfavorable weather conditions, besides being dangerous, could also damage the engine, prejudicing its normal working. It is not allowed to use the paramotor when raining or with strong wind. Only fly if the wind speed, its direction and the conditions grant a safety flight. It is important to check the weather forecasting for the hours close to the flight and to know the taking off and landing areas. **Because of the risks inherent to the paramotor use, and the flight, Polini doesn't give any warranty against accidents, breakings, injuries or death. To fly with a paramotor always needs great attention. Be aware that you fly at your risk. Before every use check the good condition of your paramotor. This engine is not covered by any responsibility insurance. By using it you automatically assume all the risks inherent the paramotor sport or the personal responsibility towards damages to yourself or to third parties, accidents, injuries or death.** We invite you to carefully read the instructions contained in this manual since they are helpful for a better knowledge of the products and the use itself and useful to prevent and contain the risks.

WARRANTY

All the Polini engines are manufactured with high quality materials which grant a product without defects, under the conditions that the buyer purchase the products from a Polini authorized dealer.

VALIDITY OF THE WARRANTY

The warranty is valid for a period of 12 months from the date of purchase. It is necessary to activate the warranty by filling the form out and keeping the payment slip or the invoice.

COVERAGE

The present warranty covers the engine damages caused by defective parts, in shape or materials, for projects not in conformity with the use indicated, wrong assembly by the manufacturer. The warranty includes spare parts only. Delivery costs are charged to the user.

The warranty doesn't cover damaged caused by:

- Engine modifications not approved by Polini;
- Wear and tear of the parts;
- Carelessness, lack of servicing, accidents, installations or wrong maintenance;
- Accidental falls or engine fall or of its components;

- Engine improper use or misusage;
- Assembly of parts or components not specified for the engine use;
- Engine overheating or stop after long usage, beyond the term indicated by Polini;
- Missing or irregular engine servicing as suggested by Polini, use of improper petrol or oils, presence of dirty parts or foreign bodies in the engine, even sucked;
- Engine overwork because overloaded;
- Engine or parts deterioration because of improperly storage;
- Faulty engine assembly, including the use of not original Polini parts or coming from third parties;
- Damages to the engine caused by foreign bodies;
- Servicing operated by person outside Polini or by not authorized people;
- Competition use of the engine.

Final user obligations

Claims shall be done by delivering the engine to a Polini authorized dealer. The user shall provide the original document that proves the purchasing or the warranty ticket authenticated by Polini or by its distributor. To keep the validity of the warranty the user shall carry out recurrent servicing according to the use and maintenance manual.

Limited liability

Pursuant to this warranty, Polini's obligations are limited to the defective parts reparation or, at its discretion, to change one or more parts, necessary to remedy every malfunctioning caused by defective materials or labor covered by the warranty. Polini or the distributor can't be held responsible for problems or damages to persons/things/animals during the engine life. **We remind you that this product is not certificated and it is only dedicated to experimental aircraft** and that it can break or suddenly stop working. No warranty or compensation are foreseen for damages caused to:

- persons/animals/things during the engine use
- persons/animals/things caused by a collide with the propeller or with parts detached from the engine
- frame, parts and/or propeller caused by the collide with parts coming out from the engine
- costs for rescue, shipping, phone or rent after the collide, problems or loss of time, or other indirect damages.

⚠ DANGER! This not-certified engine can suddenly stop working. The engine stop can require emergency landings causing injuries or death. The aircraft thrusts by this engine should fly in open spaces only or during the daylight. The buyer assumes all the risks for the use and he knows that by using it the engine can suddenly stop working. This product is not covered by products and public liability. Who flies with a paramotor or only switches it on assumes all the risks inherent to the

paragliding sport and all the responsibilities for damages to things or persons or death caused by the use of this product.

△ 2- FUEL

Thor 130/200 is a 2-stroke engine that needs oil/petrol mixture. Only use good lead-free petrol purchased by a petrol station with 98 octane. Add good 2% synthetic oil to the petrol. It is possible to use a 1,5% oil mixture with the following oils: MOTUL 800 - CASTROL 242 - BARDAL KXT - ELF 976 - ELF 909. **WARNING:** The nature of the carbon deposits on the cylinder head, spark plug and exhaust port give important information about the fuel mixture burning in your engine. Remember that mixes that contain too much oil do not extend the engine's life.

⚠ ATTENTION: petrol is extremely inflammable and explosive. Carry out these operations in a well ventilate place and with the engine switched off. Refrain from smoking and avoid all naked flames or sparks where petrol is being drained or where re-fuelling is being performed.

3- ENGINE STARTING

Start the engine only when all is in good conditions and perfectly working. Furthermore check that all the nuts are well tightened.

3.1 WALBRO CARBURATOR (Thor 130-200)

First cold starting: fill in the fuel system using the pump provided (carefully follow the instructions provided by the frame's manufacturer to find out it and use it in the correct way). To make this operation easier push softly with a finger the diaphragm through the hole indicated by the arrow in photo 1. Fill it in till the petrol reaches the carburettor. At that moment immediately stop; if you go on acting on the pump the petrol will leak causing the engine flooding.



WALBRO WG8 CARBURETOR (Thor 130 engine only): Move the starter level to the off position (photo 1); now hand the starter and start pulling the rope till it grows hard. Pull with strength without accelerating till the engine seems to start working (do not repeat this operation more than 3 times otherwise the engine may flood). Now move the starter lever to the on

position (photo 2) and act on the starting rope without accelerating. If the engine doesn't work with the first two attempts, try again accelerating gently.



3.2 24/28 PWK CARBURETOR

Fill in the fuel system till the petrol reaches the carburetor hole and then pump up three times (using the pump provided- Code 316.0016) to fill out the bowl. To start the engine pull upwards the black level placed in the upper side of the carburettor. Work the starter without accelerating till the engine start. Once it works switch it off, disconnect the starter and start the engine again slightly accelerating. For your safety only start the engine after your harness has been COMPLETELY fixed!

3.3 THOR 200 ENGINE STARTING WITH ELECTRIC STARTER

According to the carburettor model (Pwk or Walbro WB37) refer to section 3.1 and 3.2 to fill in the fuel system. For the model with electric starter the Polini throttle system has 3 buttons on the bottom part of the throttle device. To start both the engines push the black buttons together and slightly accelerate. For your safety only proceed with this operation after your harness has been COMPLETELY fixed!

ATTENTION: keep the switch in your hand during all the stages and be ready to work it in case of any anomaly. If necessary keep it pressed till the engine has completely stopped. Once the engine starts we suggest testing the right functioning of the kill switch button. After having checked it, start the engine again without accelerating and without using the starter. Now start the engine and leave it idle until it warms up to normal temperature.

4- RUNNING IN

Run your engine in as instructed below to ensure that the engine and transmission bed in correctly and to ensure continuous reliability in future. Once the engine starts, leave it idle until it warms up to normal temperature. We suggest running the engine 15 minutes at medium-low engine power output gently accelerating and with different intensity. Now we suggest checking the correct idling calibration.

During the first flights or for the first 20 litres of petrol we suggest not keeping the engine at the maximum rpm for too much time, considering that the 2-stroke engine doesn't stand to the constant rpm even if of medium power. We suggest varying the engine rpm. Check the carburetion after the first landing (section 6). Repeat the running in every time you change one of the following parts: piston, rings, cylinder, crankshaft or main bearings.

5- ENGINE SWITCING OFF

Switch the engine off by pressing the button till the complete stop (see the frame manufacturer's instructions to find the button position)

6- CARBURETION CHECK

For a complete carburetion check switch the engine off after having worked it for some minutes under load. Remove the spark plug; unscrew it by using the proper key and verify that the porcelain colour is light-brown. On the contrary, ask to an authorized dealer for the calibration.

7- CLEANING

Clean the engine when it is switched off and cold to avoid burns. Clean the engine with a soft cloth soaked with neutral cleansing and non-aggressive.

⚠ WARNING: Do not use acids that may damage the engine.

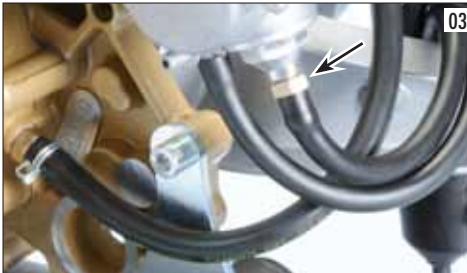
8-CARRIAGE

⚠ ATTENTION: Carry the engine only when cold. Follow the frame manufacturer's instructions for its carriage. Be careful of the petrol during the carriage; its leaking may cause a fire.

8.1 CARRIAGE OF THE ENGINE WITH PWK CARBURETOR

Pwk carburetor has a breather pipe studied to carry the engine when lying. To empty the carburettor unscrew half turn the breather brass nut (highlighted in photo 3 with an arrow) and wait till the fuel enters the tank. Close the brass connection again. Now the carburettor is empty and you can lay the engine ready to be carry.

⚠ ATTENTION: never unscrew more than half a turn the breather nut to avoid damaging the OR seal. Never close too hard.



9- ORDINARY SERVICING

ATTENTION: THE SERVICING OPERATIONS MUST BE DONE BY QUALIFIED PEOPLE ONLY. IF THE INSTRUCTIONS MENTIONED BELOW WILL RESULT NOT CLEAR, WE SUGGEST ASKING FOR SPECIALISTS BY POLINI MOTORI RETAILERS OR WHOLESALERS. FOLLOW CAREFULLY WHAT DESCRIBED BELOW.

Maintenances and servicing necessary for the best set up of your engine should be done regularly, or on all occasions before you start flying. All the tasks and adjustments described below can be done easily by following the instructions given in this manual. Refer to your POLINI MOTORI dealer for scheduled services and repairs, and insist that only original spare parts are used to replace worn or broken components. Refer to the servicing tables in sections 12 below for the frequency with which the various servicing operations must be performed.

9.1- REMOVE AND CLEAN THE AIR FILTER

Dirty air filter is one of the most common causes of poor engine performance.

Clean the filter periodically or change it. Remove the filter loosening the clamps, unscrew the 4 screws using a cross screwdriver, remove the filter cover and then the filter. Wash the filtering material with water and mild soap,

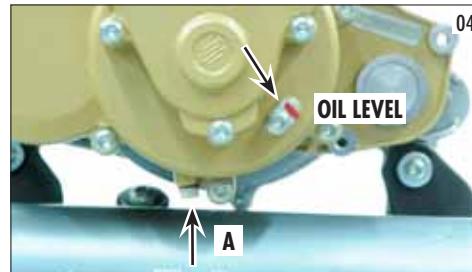
After rinsing and wringing the filter, moisten it with oil for filters. Clean filter box inside using a cloth and check the presence of foreign bodies. Now reassemble all the parts being careful to place correctly the 4 bars that maintain the filter in its position and screw the 4 screws again. Wash the filter for maximum 2-3 times, then replace it.

WARNING. If the filter becomes clogged with fine dust as well as normal dirt, replace it with a new one.

WARNING. Dirty air filters choke the engine and cause poor performance. Torn or broken filters can allow dirt to enter the engine and cause rapid deterioration of the piston rings, piston and barrel.

9.2- CHECKING OF THE GEAR OIL LEVEL

Operate when the engine is cold. Maintain the engine in vertical position and remove the oil level screw on the transmission crankcase. (photo 4). Check that the oil level reaches the lower edge of the level hole. If there is too much oil, let it flow out from the level hole until it stops flowing and collect the oil in a suitable container. If there is not enough oil, top up as required through the breather hole located at the top. After checking it, tighten the screws. Use ELF Moto Gear Oil 10 W 40 ANTI Clutch Slippage or Shell advance gear SAE 10 W 40 API GL-3



9.3 GEAR OIL REPLACEMENT

Change the oil when the engine is cold. Unscrew the screw on the lower side of the clutch/gear group. Collect the oil flowing out in a suitable container. Wait till the oil has completely flown out and, if necessary, tilt the engine to the side to make this operation easier. Tighten the screws. Unscrew the breather pipe in the top side of the crankcase and fill it out with:

(FOR Thor 130 ENGINE) 25cc of ELF MOTO GEAR OIL 10 W 40 ANTI CLUTCH SLIPPAGE. Place the connection/breather again.

(FOR THOR 200 ENGINE) 100cc of ELF MOTO GEAR OIL 10 W 40 ANTI CLUTCH SLIPPAGE. Place the connection/breather again.

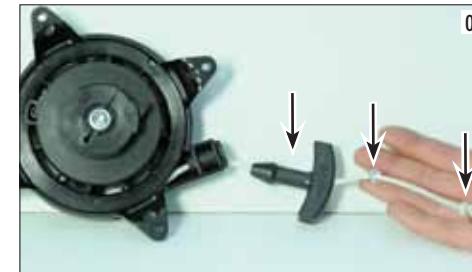
Another option is: Shell Advance Gear SAE 10 W 40 API GL-3
WARNING: Do not throw spent oil into the environment. Dispose of it correctly through authorised collection points.

9.4-STARTER ROPE REPLACEMENT

Remove the starter from the engine unscrewing the 4 screws (Photo 5).

Remove the handle rope. Be careful since the central wheel will turn till the complete spring discharge: keep it and discharge it slowly to avoid damages or possible injuries. Remove the central screw and its cover (photo 5.1).

Attention! Under the cover there are two teeth for the starter jaw (check their condition and if worn replace them); under them 2 small callipers. Be very careful not to lose these small parts. Prepare the new rope and tie a knot at the top. Remove the plastic wheel and the old rope.



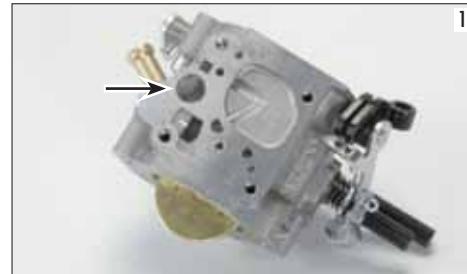
Thread the new rope in its hole (photo 6), wind the rope on the wheel (according to the entrance sense of the rope on the wheel) (Photo 7). Now insert the plastic wheel in its housing again, the spring, the teeth for the starter jaw and screw the cover again. Now go on by changing the return spring: take the head of the rope leaving 5-7 cm coming out the hole with "u" shape on the wheel side. Turn the wheel three times in anti clock wise sense till it stops in front of the exit hole on the aluminium case. Keeping the plastic wheel stopped make the rope go through the case hole. Insert the handle and the washer and tie a single knot as shown in photo 8.

Reassemble the starter in the engine and screw the 4 M5 screws with strength (see the tightening torque values table).



ATTENTION: The carburetor is made of many small and fragile parts. Be very careful during all the phases with particular attention to the idling and its springs; they both must not be touched.

Remove the lower cover by unscrewing the 4 screws (Photo 10), remove the diaphragm and the gasket, check that the inside part is clean in particular the metallic filter provided on the Walbro WG8 model only (Photo 11) and assemble it again using the new diaphragm and the new gasket. Reassemble the carburettor following the instructions in the opposite way, being very careful to place the gaskets in the right places.



10- HOW TO BEHAVE IN FLIGHT

Maximum acceleration is recommended only to take off (full power) or when really necessary!

In order to avoid a poor mixture from acceleration/ascension to level flight conditions, loosen the engine till a descending phase and then gradually accelerate again till achieving a level flight or a glide angle or a rise angle wished. In this way you will be sure to maintain firm and efficient the carburation, avoiding to be over rpm with a minimum valve/throttle opening.

Two stroke engines do not stand constant range for a long time too much. Take care of your engine by varying now and then the rpm range. In this way the engine will have constant performance and a good elasticity improving its working during the time.

10.1 TEMPERATURE THRESHOLDS

Your 130/200 Thor engine, according to the pilot weight and wind size, must have a flight temperature between 230° and 250° under sparkplug (these measures have been taken with Polini thermocouple tool – 928.830.002). This parameters may vary according to different factors: environment temperature, working height, wet, quality of the fuel used, anyway this temperature has not to exceed 265°/280 for short period. Furthermore it is important to say that carbon deposits caused by

a richer mixture may limit during the time the exceeding loss of heat, favouring high temperatures that can compromise the reliability of the engine. For these reasons we remind you to follow very carefully the section concerning the servicing.

11- ENGINE FITTING ON THE FRAME

The engine is supplied in a packaging and it is screwed on a cage to protect it during its carriage. Unscrew the 4 M8 screws that fix it and extract the engine. **KEEP THE PACKAGING AND ITS CAGE FOR POSSIBLE REPARATIONS UNDER WARRANTY. WARRANTY IS NOT ACCEPTED IF THE ENGINE IS NOT SHIPPED IN THE ORIGINAL PACKAGING.** The engine must be fixed on the frame using the 4 clamps with the silent-block and positioning some spacers (on the Thor 130 only) if the frame doesn't have the necessary space to fit the manual starter. Refer to the drawing for the engine fixing measures.

ATTENTION: The engine must be positioned as indicated in the picture. To assure a perfect lubrication, do not rotate it. Because of the overall dimensions during the carriage the filter is 180° rotated. Do not unscrew the clamp to rotate it to reach the original position. The filter has a hole at the top to be used to avoid its rotation when using. Place the clamp or a small cable (they are not provided with the engine) fixing them in a proper zone of the frame.

ATTENTION: the filter may rotate if you do not fix it and it could collide with the propeller, breaking it. This may be very dangerous for your safety.

11.1 FUEL SYSTEM

Prearrange the frame with a proper tank and its pump to make the fuel reach the carburettor. Connect the fuel pipe to the manifold on the carburettor, fix it using a clamp and verify that there is not air coming in.

11.2 ACCELERATOR

Fix the carburettor by using the proper accelerator support (not supplied). After assembling the accelerator, check that its travel is enough to reach the carburettor throttle valve opening and check that recovery is good in order to avoid the engine staying accelerated. Check the presence and the right supplementary spring installation (photo 12) provided with the Thor 130 with Walbro carburettor only. Connect the electrical wires of the throttle, one on the mass wire of the coil and the other on the + of the coil (female connector)



11.3 SPARK PLUG

Remove the spark plug and check that the gap between the spark plug electrodes is 0,9mm. Fit the spark plug hood inside the conveyor cap being careful to fit it completely. Now engage on the spark plug and enter the small rubber inside the hole in the plastic conveyor (photo 13). Spark plug type: NGK BR10EG



11.4 PROPELLER

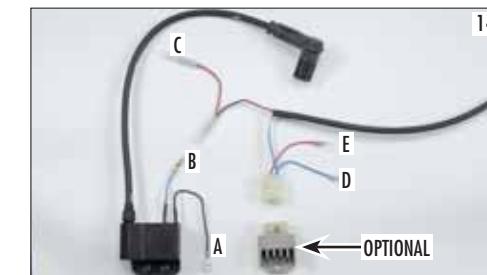
Use propellers by Polini Motori, both for Thor 130 and 200 . The use of a not proper propeller may compromise the engine working.

11.5 HOW TO CONNECT THE VOLTAGE REGULATOR (OPTIONAL)

Connect the voltage regulator to the connector. Connect the red cable (E) to the positive pole on a lead battery (photo 14).

WARNING. Use lead batteries only. The usage of other kind of batteries could provoke explosions or bursts.

Connect the negative pole of the battery to earth on the engine. During its working the voltage regulator, if connected in the right way, will give a 14,5 Vdc voltage on the battery.



12- SERVICING TABLE

At every use	Check the bolts and screws tightening Check the silent-block conditions
After the first 10 hours	Change the gear oil level Check carburation Check the spark plug electrode distance
Every 25 hours	Replace the spark plug Clean the air filter Replace the muffler springs
Every 50 hours	Change the gear oil Replace the silencer deadening material
Every 100 hours or every year	Replace the air filter Replace the starter rope Replace the diaphragm and clean it Replace the silent-block Replace the fuel system pipes Replace the reed valves
Every 100 hours	Check the piston and piston rings Replace the pin and rollers cage Decarbonise and clean the decompression hole Disassemble the reduction gear and check the clutch and bell wear
Every 200 hours	Replace the piston and piston rings Replace the reed valve
Every 400 hours	Replace all the bearings and seals Replace the crankshaft

STANDARD TIGHTENING TORQUE VALUES

	N.m	Kgf.m	Lbf.ft
5mm Bolts and nuts	6	0,6	4,44
6mm Bolts and nuts	10	1	7,40
8mm Bolts and nuts	25	2,5	18,50
10mm Bolts and nuts	45	4,5	33,30
12mm Bolts and nuts	55	5,5	40,70

13- PROBLEMS DIAGNOSTIC

	REASON	REMEDY
The engine doesn't start	Out of petrol Petrol doesn't reach the carburetor Old or wrong petrol Flooded engine Defective spark plug Blackened spark plug or wet Earthened switching off cable Spark plug hood Carburetor has problems No spark	Add petrol Check the fuel system circuit Empty the tank and the fuel system circuit and replace the petrol. Remove the spark plug, start the engine, dry or replace the spark plug. Replace it Clean and dry the spark plug or replace it Check the wiring Check it Clean and check it; eventually replace the diaphragm Check the ignition, coil and wiring
The engine doesn't idle	Dirty carburetor Out-of-adjustment screws Defective spark plug	Calibrate the carburetor Clean and check it; eventually replace the diaphragm Replace it
The engine doesn't reach the maximum rpm	Wrong carburetion The carburetor has problems The reed valve has problems Dirty air filter Dirty exhaust system	Calibrate the carburetor Clean and check it; eventually replace the diaphragm Replace the reeds or the whole reed valve Clean or replace it Clean or replace the deadening material
Engine revved up when idling	Out-of-adjustment screws Air through the gaskets	Calibrate the carburetor Replace the gaskets and seals

130	200	TIGHTENING TORQUE VALUE FOR ENGINE BOLTS AND SCREWS	M	N.m	Kgf.m	Lbf.ft	Locking compound
●		HEAD NUTS Thor 130	7	14	1,4	10,3	
●	●	HEAD NUTS THOR 200	6	12	1,2	8,8	
●	●	HEAD NUTS THOR 200	8	18	1,8	13,2	
●		CRANKSHAFT NUT - CLUTCH SIDE	12	60	6	44,4	
●	●	CRANKSHAFT NUT - IGNITION SIDE	10	40	4	29,5	
●	●	PROPELLER CENTRAL SCREW	10	40	4	29,5	LOCTITE 243
●	●	SPARK PLUG		20	2	14,8	
●	●	COUNTERSHAFTHAT THOR 200	12	60	6	44	
●	●	CLUTCH NUT THOR 200	20	80	8	59	
●	●	CRANKCASE SCREWS	6	8	0,8	5,9	
●	●	CARBURATOR LOCKING SCREWS	6	8	0,8	5,9	
●	●	INTAKE MANIFOLD LOCKING SCREWS	6	8	0,8	5,9	
●	●	MUFFLER STUDS NUTS	6	10	1	7,4	LOCTITE 270
●	●	SILENCER LOCKING SCREWS	8	15	1,5	11,1	LOCTITE 243
●	●	MUFFLER LOCKING SCREWS	8	15	1,5	11,1	LOCTITE 243

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