

Safety instruction

READ THIS!

WARNING!

This engine is not toy. If misused or the safety precautions and instructions are not observed, may cause severe harm to you. TorqPro is not responsible for any loss, injury or damage resulting from the miss-use of its products.

You alone are responsible for the safety operation of your engine.

This engine can stop at any time, for a variety of reasons.

Do not fly your plane in such a way that may cause damage if the motor stops running.

- **Never operate the engine alone.**
- Read all instructions carefully before operating your motor.
- If you do not wish to be completely responsible for the injury or damage caused during the operation of the engine, do not operate it.
- Do not operate the motor indoors.
- When operating the engine, always stand behind the propeller. When operating the motor, please keep a distance away.
- Make sure the aircraft is safely secured when operating the engine, as it can create tremendous thrust
- Inspect motor mount bolts and firewall integrity before operating the motor.
- Anyone near the motor should use some form of eye protection during the operation of the motor.
- Ensure that spectators are at least 30 feet away when operating the motor.
- Ensure that the motor is turned before making any adjustments to it.
- Always use the correct length propeller bolts. Do not use spacers behind the propeller.
- Spinner cones must not touch the propeller.
- Thinner props may require using shorter prop bolts, especially if not using a spinner back plate. Make sure your prop bolts do not bottom out in the propeller hub.
- Tighten the propeller before every flight.
- Always remember to install an ignition kill switch in order to stop the motor.
- Adjust the carburetor linkage for the motor to stop when the carburetor is completely closed.
- Be ware of any sparks from electrical contacts such as fuel pumps, battery charger, etc. Smoking in the area of your fuel supply or motor is not allowed. Store fuel in approved containers and in well ventilated areas.
- Allow the motor to cool for a while before touching or fueling it.
- Flip the prop a few times after running the motor to discharge the ignition system.
- Do not the touch the ignition system as it develops extremely high voltage. Never use a damaged, modified, or repaired prop, or a prop that has struck the ground or any other object. Small damages that are difficult to spot could turn into disaster when the prop is operating at thousands of RPM.

Engine installation

- Mount the engine using high grade 1/4" or 6mm dia, bolts with washers and locking nuts on the rear of the firewall. Make sure your firewall is structurally sound. The crankshaft centerline is in the exact center of the rear mounting plate bolt pattern.
- The preferred method to mount the TP60 is for the engine to bolt directly to the firewall, with the carb

protruding through a hole in the firewall. This may require removing the firewall and extending the motor box and firewall to the proper dimension the lets the prop hub protrude from the cowl far enough to ensure clearance for the spinner back plate.

- Standoff mounts are not recommended and can damage the engines crankcase. Rigid, full contact mounting can reduce vibration. If the engine needs to be spaced off the firewall, we recommend making a full contact spacer by laminating aircraft plywood to the required thickness.
- The throttle arm is pre-tapped for a 2-56 linkage. Do not use a clevis type connector. Make sure the carburetor's idle set screw is removed or set so that the carb can be fully closed by the servo at low trim. Use a high quality servo for the throttle. A poor quality servo or linkage will not provide accurate and repeatable throttle settings. Don't use metal to metal linkages.
- You can un-hook the throttle return spring if the engine is not going to be bench run but **do not remove**.
- Do not attempt to remove the carb's choke or throttle butterfly shaft assemblies.
- The carburetor should have at least 1/2" (13mm) of clearance between the intake and the fire well or any other object that can restrict airflow into the carburetor. Make an opening in the firewall to clean the it if necessary.
- Since the cowl effects air flow and pressures, we recommend that the carburetor needles can be adjusted with the cowl on. To do this, small access holes can be made in the cowl for using a long narrow screw driver to adjust the needle valves. Short guide tubes can often be glued into the firewall or spacer mount to help guide the screw driver to the needles.
- A 24 oz(or longer) fuel tank is recommended. The tank must be vented. The carb has a strong pump, so the tank can mounted almost anywhere in the plane. Keep the fuel line away from any hot engine or exhaust components. The fuel line and tank stopper must be gas compatible. Do not use any silicone sealers on the fuel system. Gas can break it down and carry it into the carb.
- The inner diameter of fuel tubing should be same size or slightly larger than the carburetor's fuel inlet fitting's inner diameter. We use 1/8" Tygon tubing. Make sure all fuel line connections are secure. Small nylon zip ties work well to keep the fuel line on the metal fitting. Make sure the fuel line is secure and not touching the exhaust or cylinder fins. And inline fuel filter can be used. We highly recommend filtering the gas entering the fuel tank from your field container.
- Cooling is critical to motor performance and longevity. Allow as much cooling air as possible in through the front inlets of the cowl. Air must flow through the cylinder fins, not just inside the cowl, to properly cool the motor. Don't let the air take the easy way out! Make it go through the fins. Round cowls with large frontal openings need ducting to direct the air through the cylinder fins. Allow an outlet opening approximately 2 1/2 times larger than the intake at the bottom rear of the cowl for the hot air to escape. Without this outlet opening, air won't flow through the cowl.
- Air ducts can be made from thin plywood, balsa, fiberglass, or aluminum sheet to guide and force air from the front inlets to and through the cylinder fins.
- Keep components like the ignition system, fuel tank, fuel lines, receivers, etc, shielded from heat generated by canister and tuned pipe exhaust systems. Hot fuel tanks and fuel can cause frustrating tuning issues, and over heated electronic components can have intermittent problems or total failures.

Ignition system

- When making electrical connections to the ignition system, use the same gauge wire (or larger) as used on the red and black power leads on the ignition module, all the way to the battery pack. Keep wire length to a minimum. Heavy-duty plugs, as supplied on the ignition, or as used on electric cars and planes, are recommended.

- We highly recommend mounting the ignition on high density foam padding with Velcro strapping. Do not use sticky back Velcro or foam tape to mount the module. This can cause the case to crack in the area where the tape there the tape adheres to the module and void the warranty.
- The usage of a high quality switch such as JR's heavy-duty switch is recommended. Standard size R/C receiver switches are not recommended.
- Isolate the charge circuit from the ignition while charging the batteries.
- Do keep ignition components and wiring separated as much as possible, from your receiver, receiver battery, servos, airmix and switches.
- Do not use metal-metal linkages to operate the throttle.
- Use a 4.8 or 6 volt battery pack. The ignition can handle the higher peak voltage of these packs when fully charged. Highly voltage packs (Lithium, etc) can be used, but require a regulator. We recommend a regulator with a 5.5 or 6 volt output. Excessive voltage will damage the ignition system and will void the warranty. We suggest an 1800 mah or larger capacity pack. This size pack should be sufficient for 5 or more flights. If the voltage entering the ignition shows 5.5 volts or less, don't fly, re-charge.
- **Ensure that the polarity of the wires entering the connectors is correct when connecting the red pick-up sensor to the ignition module.** Unlike other ignitions, the TorqPro engine ignition is designed to spark only when the prop is flipped at a high speed. The ignition will not fire if the prop is not turned over at "starting" speed. This is to prevent the motor from firing accidentally. Unless you are having problems starting the motor, don't bother "testing" the ignition with the plug removed from the cylinder.
- When removing the spark plug caps, PULL STRAIGHT out on the caps. **Do not try pulling one the shielded ignition wires and do not use pliers!** To prevent radio interference, the spark plug caps must have a split retainer ring around the base to insure a tight fit.-DON'T FLY WITHOUT THEM!
- **Protect the shielded plug wires from rubbing against fiberglass or sharp edges of wood or metal.** Rubber grommets and plastic "spiral wrap" insulation from automotive or electronic supply stores work well. Holes in the braided shielding can emit R/F noise or loose connections (spark plug caps, connectors and switches).
- Timing is set at the factory and should not need further adjustments. Contact TorqPro if you have any questions regarding the timing.
- Only use NGK CM-6 spark plugs. Other plugs may not fit the plug caps firmly.
- Plug gap is .018" to .020"(.38 to .50 mm)
- Do not operate the ignition without a spark plug in the plug caps. It can cause permanent damage to the ignition coil.
- Radio range check should be conducted before flying. If there are "glitches", DO NOT FLY! Check for holes in the braided shielding, loose connection, or other radio issues.

Recommended Props

- Always check and tighten prop bolts before each flight! **Loose prop bolts allow prop movement, which will shear the bolts.**
- Always use the correct length prop bolts. If a spinner back plate is not used, the prop bolts may be too long and can bottom out in the hub before they fully tighten against the prop washer.
- The TP60 has a very wide power band. The "normal" peak operating rpm is 6,300 to 7,300 rpm. While special break-in props are not required, be careful to not overload the engine during break-in.

Recommended props are:

- Wood:22x10, 23x8, 23x10, 24x8, 24x10
- Mezlik Carbon: 23x8, 23x10, 24x10, 24x10 TH.
- Mezlik Carbon 3 blade” 21x12, 22x10
- A general rule of thumb for good flight performance is the larger and/or heavier the plane, the lighter the prop load to allow the engine to create more horse power. On a lighter/smaller/ cleaner airframe horsepower requirements are not as critical. You may enjoy the benefits of a larger prop disc for better down line braking, torque rolling, etc.
- Smaller diameter props with more pitch, especially 3 blades, can reduce tip speed and noise.
- Always use a drill guide to drill your props. We normally drill from the back side first, then again from the front to insure the screws don't bind in the holes.
- Always check the balance of your prop.
- For safety, we recommend painting the tips of your props (front and back) with a bright color, especially on black props.
- Never use a damaged or repaired prop, or a prop that has struck the ground or any other object. Damage that can be hard to see could turn into disaster when turning at thousands of RPM.

Fuel and Oil Mix

- Please use Premium pump gas, such as 91 to 93 octane.
- We suggest buying your fuel from “name brand” gas stations. The cheaper gas from some discount type outlets might caused problem.
- We recommend filtering your fuel between your fuel container and your plane's fuel tank. A high flow filter, or clunk/filter, between the tank and motor is also a good idea.
- Make sure the plane's tank is well vented and the fuel clunk moves freely.
- Use of any other fuel or additives such as nitro formulas, aviation gas, white gas, etc., can harm the motor and void the warranty.
- Do not use silicone sealers on the fuel system. Gas can break it down and carry it into the carb.
- We recommend high quality synthetic oil. We recommend are: Red-line Two Stroke Racing Oil(40 to 1), Motul 800 (50 to 1), an Stihl HP Ultra (50 to 1). These oils can be found at most motorcycles or chainsaw shops. An option for initial break-in, is to use a petroleum-based oil such as Lawn Boy Ashless 2 stroke oil mixed at 32 to 1. This can speed rung seating and limit the opportunity for blow by that can cause permanent damage. 2 gallons fuel/oil mix is sufficient. (Mix 2 gallons of premium gas with 8 oz of oil.) The rings can seat in correctly without using petroleum-based oil, but it will take longer.

Break-in phase

- The engine should run well from the beginning and improve as flight hours accumulate. We do not recommend breaking the engine in on a test stand. The stationary load and lack of air ducting can lead to engine over heating. Proceed with flying once the engine is tuned and running correctly. Engine break-in can be a slow process, taking place over many hours of flight time. Peak RPM will improve along with idle characteristics as run time accumulates.
- Special “break in only” props are not required. Preferably start with prop that allows peak RPM over 6,300 during the break-in process.

- The high needle can be set for optimum RPM or just slightly rich during break-in. Too rich will cause problems with excess residue and carbon build up. Adjust the needles as needed and give the engines a few test flights using a variety of throttle settings and engine loads. Avoid extended high rpm or extended hovering conditions for these first few flights. After a few test flights the needles may need adjustments as the engine settles in and when other things change such as different props, exhaust, weather, and altitude.

Starting

1. Always remember to wear a heavy leather glove to start the motor.
2. Check that the prop bolts are tight and the spinner is safely secured.
3. Ensure that the starting space is free of dirt, sand, gravel, or debris.
4. Check the throttle operation and position by turning on the radio system.
5. Ask someone (with proper eye protection) hold the plane firmly behind the wing.
6. Close the choke completely.
7. Open the throttle to approximately 1/4 position.
8. Turn on the ignition, ALWAYS BE PREPARED FOR THE MOTOR TO START ON ANY FLIP OF THE PROP, whether the ignition switch is switched on or off.
9. Give the prop a quick, firm, flip in the direction of counter clockwise. Follow through quickly as you flip the prop so that your hand is out of the propeller's path. Repeat the action until the motor fires or makes a sound "pop".
10. Open the choke
11. Set throttle to idle position. (carb butterfly plate slightly open)
12. Flip the prop again until the motor starts running.
13. Let the motor warm up for 15 to 20 seconds before advancing the throttle.

Needle Adjustments

- The needle farthest from the motor is the "High End" needle. The needle closest to motor is the "Low End" needle. Turning the needles in/clockwise "leans" the fuel mixture. Turning the needles out/counter-clockwise "richens" the fuel mixture.
- Setting will vary with altitude, temperature, humidity, fuel, carb variances, etc. A "general" starting point for the TP60 is: 1 1/8 open on the Low needle, 1 open on the High needle.
- Adjusting either needle can have a slight effect on the other. Example: Leaning the low needle can "slightly" lean the high rpm range.
- Adjust the High End needle to peak rpm. A tachometer can help, but remember that the RPM normally drops a little bit after every start due to residual heat build up. Don't lean the mixture any more than necessary. If the rpm steadily drops at full throttle or fades on long vertical maneuvers, the motor is too lean and is overheating.
- Adjust the Low End needle until you achieve a smooth idle and reliable transition to high throttle. Generally if the motor "stutters" or "coughs" in the mid range or when the throttle is advanced, the low end needle is too rich and possibly even the high needle. If the motor dies quickly, the low end is probably lean.
- Do not overly set the needles to protect the engine. Operating the motor overly rich will not only reduce its power, it can create other problems such as poor transition, pre-mature carbon build up, fouled plugs, excessive exhaust residue, sticking rings, airframe vibration, and overall rough running.

Trouble Shooting

Motor won't start:

- Check battery voltage (should be 5.0+volts) and all ignition connections, wiring and switches. Wires can break from vibration near connectors. Check and/or swap out regulator.
- Does the fuel move towards the carb when the prop is flipped? If not, check tank venting, clunk position, and fuel lines for leaks. Is the choke plate closing completely? Is the carb or carb mount loose causing an air leak? Air leaks on the engine usually show as fuel seepage.
- Is throttle set idle or slightly higher after motor "pops" and choke is opened?
- Make sure prop is flipped over with authority. The ignition will not be able to fire at low speed.
- If a lot of fuel drips from carb, the motor might be flooded. If so, remove and dry, or replace, the spark plug. Try starting again without using the choke. If engine doesn't fire after several flips, try choking again.

Other issues:

- RPM won't go over 3,500 to 4,000: The connector between the ignition module and ignition sensor may be plugged in backwards. Check the color of the wires leading into the connectors to make sure that the polarity is correct.
- Broken prop bolts: In order for bolts to shear, some type of side loading (shear) movement is usually required. If the bolts are tightened correctly, nothing moves and prop bolts will rarely break. It's a good idea to replace prop bolts routinely. Check prop bolts before each flight!
- Excessive vibration: Check that the low rpm needle setting is not too rich. Check prop and spinner balance and make sure that the ignition timing is correct. Check the firewall and motor box area of the aircraft for movement, poor fuel joints, etc. This area must be rigid! Some aircrafts on the market are lacking in this area and may require additional support such as glue and/or structure. Poor quality or contaminated fuel can cause rough running.
- Pink or purple colored cylinders: These colors indicate engine temperature is beyond the optimum at some point. Check that needle settings are not too lean, there are sufficient airflow for cooling, and oil/gas mixture is correct.
- Engine starts backwards: 2 stroke reed valve engines can generally run in either direction. Make sure the prop is flipped forcefully through the compression stroke. Without enough force, the prop may "bounce" off compression and run backwards.

Maintenance

- Being a high performance 2 stroke engine, some parts can be worn out quickly. Under normal operation, piston, needle bearings, spark plugs, etc. may need frequent non-warranty replacement to insure top performance. Other factors can also hasten the need for replacement parts such as ingested debris, exceedingly high temperatures due to improper lubrication, airflow, improper needle adjustments, etc.
- If the engine has been involved in a crash or severe prop strike, examine it closely for any signs of damage before operating it. Make sure nothing was ingested into the engine and check that the prop hub rotates freely and without any instability. Look for any signs of cracks in the case, especially near the motor mount area. Do not operate the ignition if the spark plug cap shows any form of damage. If there is a short inside the cap, it may cause severe damages to the ignition module.
- Screws can come loose! After a few flights, check that all screws are safely secured. Conduct routine checks that all screws are tightened to the correct torque rating. It is best to replace the red aluminum screws, rather than re-use it whenever they are removed. When an exhaust flange screw become loose,

the flange face and threaded holes can be damaged to the point where the header or muffler won't stay tight and the cylinder needs to be repaired or replaced.

Torque specifications

	Size	Torque specifications
Spark plug	CM-6, 10 mm	90 in. lbs.
Steel prop bolts	M5x 45mm	75 in. lbs./ wood props, 90 in. lbs/ carbon props.
Aluminum crankcase bolts	M5x 16mm	70 in. lbs.
Steel cylinder base bolts	M5x 16mm	95 in. lbs.
Aluminum carb mount bolts	M5x 75mm	50 in. lbs.

***Caution:** Do not over tighten the carb mounting bolts. Over tightening can distort and damage the injected molded reed valve parts and rubber gaskets.

- Use a 4m hex wrench for all M5 cap screws.
- For spinner mounting, the crankshaft extension is threaded for M5 screws. In this application(steel to steel) the 10-32 SAE screws supplied with most spinners will work fine in the M5 threaded hole. **Do not substitute 10-32 screws for any other on the engine!**
- Inspect the engine periodically for any signs of fuel seepage. This can indicate an air leak which can create a lean fuel/air ratio, which in turn can cause erratic running and engine damage. If tightening the appropriate screws does not cure the problem, contact Torqpro.
- After prolonged use, carbon deposits can build up on top of the piston and on the combustion dome of the cylinder. Great care must be taken when trying to remove these carbon deposits to avoid damaging the parts. Once an attempt to remove carbon has been made, the task must be completed, as any remaining carbon may be loosened and can dislodge while the engine is running. This can damage the engine and/or bridge the spark plug.
- If the engine is going to be stored for a long period of time, it is recommended to run a few minutes worth of non-ethanol fuel through the engine. This can help reduce the chance of corrosion from water associated with ethanol in gasoline. Often larger stations offer "race gas" or other high octane ethanol-free gas.

TP60 WARRANTY

**Your TP60 engine and ignition system covered with a 30h run times warranty
by Torqpro, starting from the date of purchase.**

- This warranty covers defects in workmanship and materials only.
- Do not disassemble the engine or ignition system. Improper disassembly or assembly of the motor ignition system will void the warranty on the item.
- Any modifications to the engine, or the ignition system, other than those authorized by Torqpro , will void this warranty.

This warranty does not cover the following:

- Damage caused by a crash
- Shipping expense to and from Torqpro for warranty service.
- Damage caused by improper handling, operation, or maintenance.
- Damage caused by using improper fuel or additives.
- Damage incurred during transit to Torqpro. **WRAP AND PACK ENGINE CAREFULLY!!**

NOTE: TORQPRO WILL NOT SHIP ANY WARRANTY REPLACEMENT ITEMS UNTIL THE POSSIBLY DEFECTIVE ITEMS IN QUESTION ARE RETURNED TO AND RECEIVED AND DEEMED DEFECTIVE BY TORQPRO.

Remember! This engine can stop at any time, for a variety of reasons. Do not fly your plane in a way that damage or harm will result if the engine stops running. Torqpro will not be responsible for damage caused in engine-out situations.

IF ANY PROBLEM PERSISTS, PLEASE CONTACT TORQPRO FIRST!