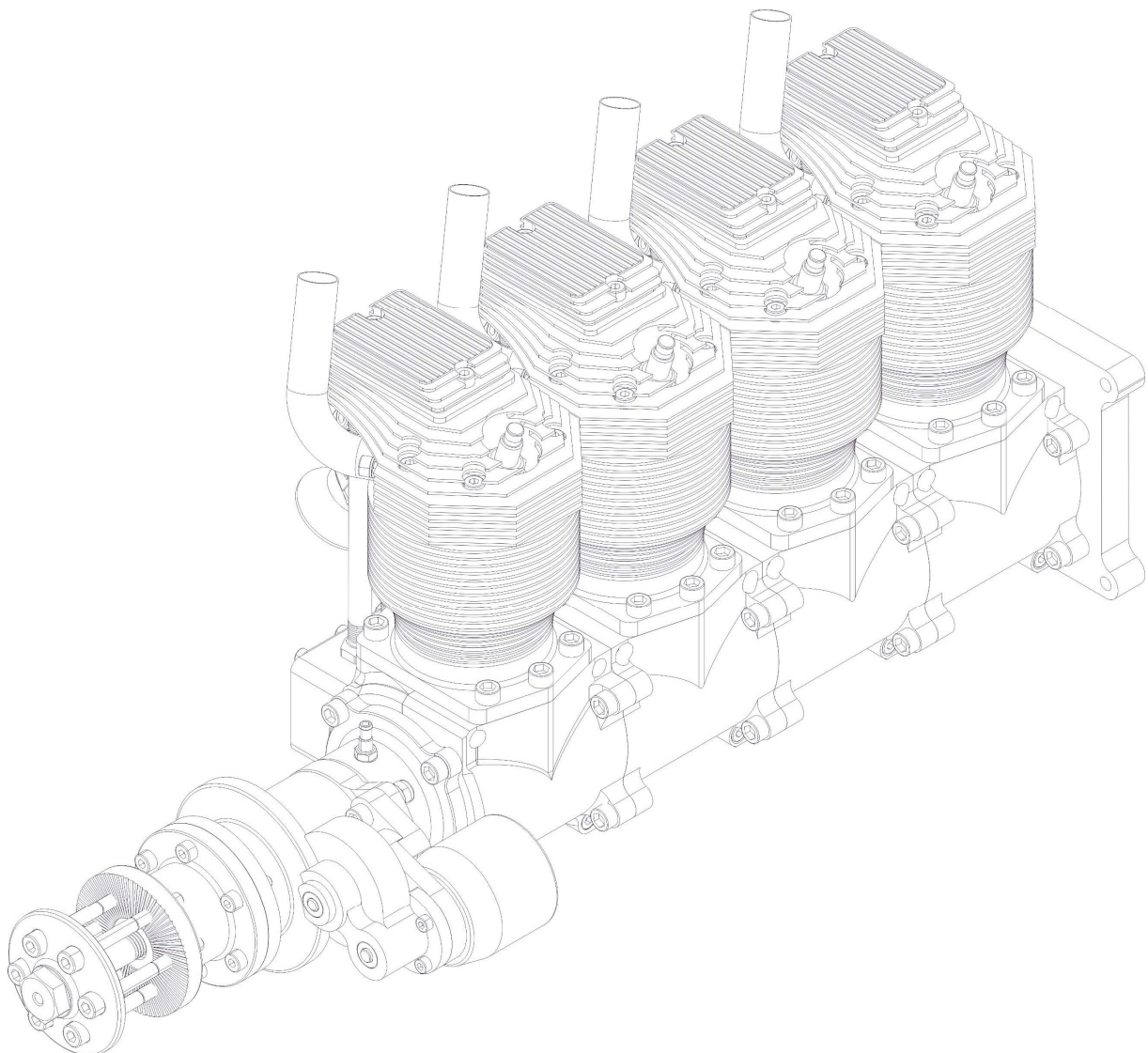


Manual

Version 1.0 - 03/2021



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1. General

Thank you for choosing a high-quality product from Ploberger Modelltechnik. Please read these instructions carefully and take special note of the chapters concerning safe operation. If you have any additional questions that are not covered by this manual, we are always happy to help. Our contact information can be found on our website <https://www.kolmengines.com/> and on the last page of this manual.

Appropriate use

Our products, especially the internal combustion engines, are designed especially for the use in remote controlled model aircraft and are intended exclusively for this purpose. Using our products in any other way than described may lead to damage of the product or personal injury.

Disclaimer

As we cannot control or influence the proper use of our products, we assume no liability for any kind of damage or injuries.

The warranty is void if damage is caused by modifications, disassembly of parts or use of third-party accessories.

In the event of unauthorized modifications or use of other than the recommended fuels or optional parts, the warranty expires automatically.

2. Installation

a) Engine installation

Four holes designed for M5 bolts are provided on the back of the crankcase for mounting the engine to the firewall. High quality bolts can be purchased from us. Proper engine mounting is essential for a safe and secure operation. Please always ensure that the engine is properly mounted, and that the bolts are secured.

Make sure you have a stable firewall to mount the engine to. Especially ARF models should always be carefully double checked in this area and reinforced if necessary. No matter which mounting method you choose, always make sure no movement between the firewall and the engine is possible.

When mounting our three and four cylinder inline engines and the four and six cylinder boxer engines, support on the front of the engine is required! We also recommend supporting the front of our two-cylinder inlines whenever possible. Mounting kits and plates are available as optional parts. Depending on the model and the space you may have in the cowl, there are different ways of supporting the engine. In Warbirds with lean cowls, it is often possible to glue a former/mount in the front of the cowl. When mounting a boxer engine, the common solution is to run a tube from the forward fuselage to create a support for the engine. If you are unsure and have no experience with mounting heavy multi cylinder engines, please contact us, we will be glad to assist you.

Without this support, the engine can start moving or oscillating during operation, which will lead to damage of the engine and/or the model.

Single cylinder engines and small boxers, that are mounted without support, must be mounted in a way, that absolutely no movement is possible.

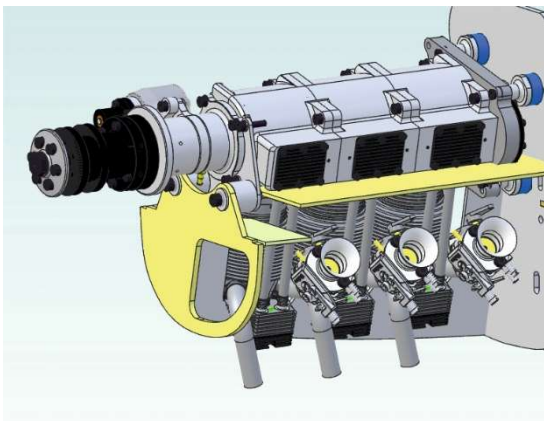


Figure 1

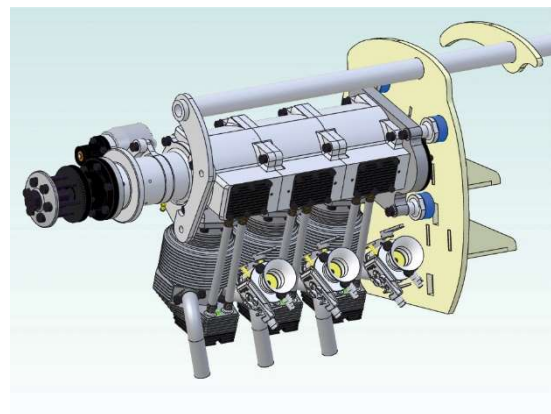


Figure 2

Figure 1 shows a former which is glued to the forward cowl. The engine is mounted to the former with an adapter plate bolted to the front of the crankcase. The rear engine mount is bolted to the firewall and the engine is ideally supported at the front and the back. This method is used in models like the CARF P-51 Mustang or similar Aircraft where the lower cowl is part of the fuselage. Figure 2 shows a different method by running a pipe through the firewall and supporting it with a second small former that provides a stable base for the front mount. This is a suitable method for models with a one-piece cowling that can be completely removed.

b) Tank and fuel line

The fuel tank capacity for a 4-stroke engine can be significantly smaller than for 2-strokes of a similar size. We recommend using at least a 500ml - 750ml fuel tank for engines with up to 2 carburetors and fuel tanks with at least 750ml - 1000ml capacity for engines with 3 or more carburetors. Always use a high-quality fuel system! This includes a clean tank, felt clunk, proper ventilation, etc. Tygon fuel lines are recommended, Festo lines starting from 4mm are also an option. When operating without a fuel pump or pressurized tank, the fuel line should not be too long, and the center of the tank should sit slightly above the carburetor level if possible. For multi-cylinder engines, we generally recommend the use of a fuel pump or a pressurized fuel tank.

c) Using a fuel pump

A fuel pump increases operational reliability and simplifies the adjustment of the carburetors. We recommend a geared pump like the "Emcotec Powerfuel RX" or the classic "Albinger fuel pump". Ideally, the fuel pump has a built-in return line and does not build up any surplus pressure in the carburetor.

d) Using a pressurized tank

As an alternative to an electric fuel pump, a pressure tank is a very good option. This System is cost-effective, simple, low-maintenance and not very error-prone. It does however lack the convenience of just switching on a fuel pump.

The setup is simple: Install a PET bottle with 2L or more in the fuselage and connect the bottle to the fuel tank at the highest point ensuring an airtight connection. Fuel up the model and then inflate the PET Bottle to approx. 0.3bar (approx. 4psi) using a hand pump. This puts the fuel tank under constant pressure and ensures an optimum fuel supply to the carburetors. A complete set for installing one of these systems is offered in our shop.

e) Silencer

We offer different kinds of silencers, all of which can be found in our online shop. If you need a special solution for your Model, "Zimmermann Schalldämpfer" specializes in making exhaust Systems for our engines and has years of experience in this field.

As a basic rule of thumb, always ensure that the outlet cross-sections are never smaller than the inlets. It is not necessary to install baffles in the expansion chamber. The volume of the collector itself is usually already sufficient to reduce the engine noise below that emitted by the propeller. You can always contact us or "Zimmermann Schalldämpfer" directly if in need of assistance.

f) Crankcase venting

All our engines have two nipples on the crankcase. These are used to vent the crankshaft housing. Both connections can simply be routed out of the model with a Tygon line to lead overpressure and leaking oil out of the cowl. Alternatively, they can be routed to a small oil collection cup, suitable cups are offered as an optional part in our shop. These two connectors may never be merged with a Y or T piece and the two nipples may never be connected with each other! This can lead to engine damage!

On some of our boxer engines the front nipple is connected to the carburetor. In this case only the rear one needs to be led out of the cowl or the oil collector.

g) Fuel

Please use special care when selecting fuel for your engine. Only use high-quality fuel and check the engine from time to time to see if there is any buildup of residue on the spark plug or valves.

ASPEN 2T (red canister) has proven itself as one of the best ready-mixed synthetic fuels over the past years. Similar products from other suppliers should not be used.

When using gasoline, always use high-quality high-octane gas such as Shell V-Power and mix them with very high-quality oils such as Stihl HP-Ultra. An oil/gas ratio of 1:50 is always to be used. Using a different ratio may lead to broken seals, reduced lubrication and a damaged engine. If you are unsure if the fuel you have chosen is right, please contact us before using them.

We are constantly working and testing to recommend new oil types. However, since we cannot test every possibility ourselves, we are always glad for customer feedback!

3. Electric starter

An absolute highlight is our electric on-board starter. This allows for a safe and comfortable starting procedure on our engines without any risk of injury. The starter consists of a high-quality Roxxy brushless motor designed to be used with 2-4S Lipo batteries.

The number of cells used depends on which engine you want to start and how "scale" you want the starting procedure to be. It is possible to start an IL150-3 with a 2S batterie as well as with a 3S pack. A BX155-2 should always use at least a 3S pack.

Our recommendation* is:

2S Lipo for EZ50& EZ77, IL100-2, IL150-3, BX120

3S Lipo for BX120, BX155, IL155-2, IL150-3, IL230

4S Lipo for BX240 and BX310

*these are recommendations. Depending on the engine-compression, there may be deviations. You can always add one cell to the recommendation, but the MAXIMUM is 4S!

Please note that not every ESC can be used for operation. Matching ESCs are offered in the shop as optional parts for your engine. Using an inappropriate ESC or an ESC with incorrect programming will lead to damage!

a) Connecting the starter

The starter motor, like every brushless motor, has 3 connectors that are connected to a suitable ESC. Make sure that you have sufficiently sized ESC and Battery according to our recommendations.

Not every controller is suitable for this task. Soft starts, brakes, etc. must be switched off. We offer a low-cost controller that has proven itself over the years. The cables can easily be extended using same gauge wires.

b) Accessories

Next to the simple ESC we also offer our ISB box. The ISB (Ignition Start Box) is a perfect addition to our electric starter. With it you can supply power to the ignition, ESC and pump with just one battery pack. An ignition switch is also integrated into the ISB but the most important feature is the automatic separation of the battery from the ESC as soon as the model is turned off. Without it the controller would constantly beep to report the loss of signal and drain the battery.

c) Maintenance

In itself, the starter is very low-maintenance. Just check from time to time that there is some grease on the large gear. If left dry it wears out very quickly. The reduction gearbox is very well lubricated from the factory. Always keep the brushless motor and gearbox clean to avoid excessive wear.

4. Cooling

Cooling the engine is essential for a long engine life and proper operation so please take time and great care when planning your engine cooling. Most important, air should always be directed specifically on or between the cylinders.

4-cylinder boxers and all in-line engines must be provided with cross-ventilation. The baffles should never be further away than 1mm from the cylinders. Any air that is further away does not provide any cooling effect.

If you have any questions on cooling, please feel free to contact us. In many forums and on Facebook there are various threads and groups, where we have described solutions and answered many questions on this topic and have supplied many pictures.

If your carburetors are located on the "warm" side of the cooling airflow, you should insulate them. Overheated carburetors can cause the engine to shut down.

Important:

Whenever possible, use sensors that enable in-flight monitoring. Temperatures measured on the ground or after landing often don't give you proper values or indications.

5. Ignition

Our ignitions are designed for operation with voltages between 6V to 7.4V (2S Lipo).

When used with a "Powerbox Sparkswitch Pro" it is also capable of telemetry. In addition, we have a lead for engine RPM. Under no circumstances should you connect power to this lead!!

Important for in-line engine ignitions:

When the RPM is too low, only the front cylinder has a spark. This is not a fault, the ignition only works correctly above a certain rpm value.

Attention! Never connect the ignition to a battery without first plugging all plug caps onto the spark plugs as this can lead to extensive damage of the ignition and is excluded from the warranty.

Detailed information can be found in the attached operating instructions of the ignition system.

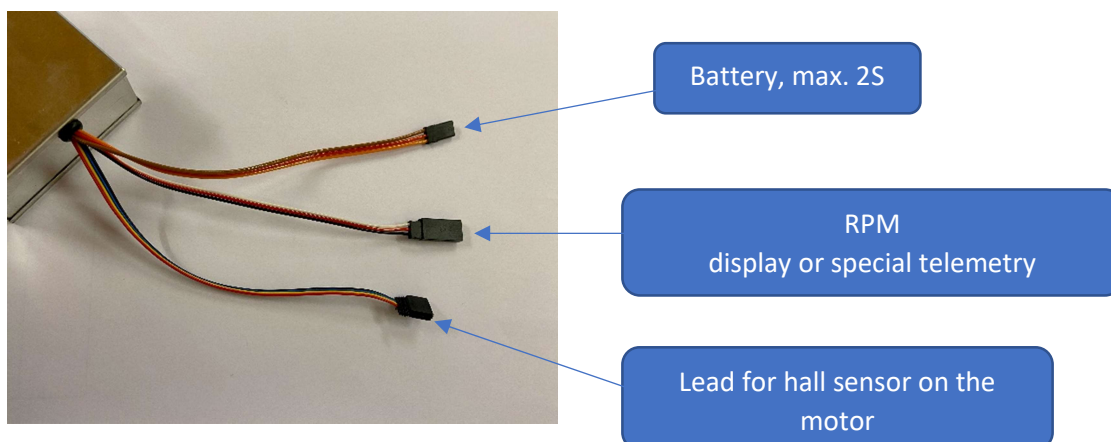


Figure 3 Connection

6. Propeller

1. Selection

Always choose a properly sized propeller for your engine! On 1- and 2-cylinder engines the rpm should not exceed 5000rpm on the ground. 3, 4 and 6-cylinder engines should not exceed 4500rpm on the ground.

Fast aircraft types like WW2 Warbirds and Racers require a lot of pitch. We are always happy to assist you in finding the right propeller for your engine.

A data sheet with propeller sizes and types can be found in the download area.

2. Assembly

Always take care when fitting the Propeller to the engine. Included with the engine are six M5 bolts in two different lengths. These lengths have proven to be appropriate for most propellers. If necessary, use longer bolts.

The prop-hub has M5 threads with a depth of about 12mm. When fastening the Propeller, ensure that the minimum bolt insertion is at least 8mm. A central M10x1,25 bolt is also supplied and is used for centering the propeller. This central bolt does not provide sufficient strength for operation, the six M5 bolts must always be used.

Always use the included pressure plate when attaching your propeller!

7. First start and break-in

All engines are tested and preset before leaving our factory. With these settings the engine will always start.

The engine will be completely broken in after about 20 to 30 flights. You can see how the engine increases in power and can be set a little leaner after this period of time.

At the end of the break in process the spark plugs must be replaced. This is noticeable by irregular idle, poor start-up properties and a silvery deposit on the spark plug.

For the first couple of flights, always go easy on the engine and keep an eye on the temperature!

For the first start:

- 1 Ignition ON, choke closed, throttle in idle position
- 2 Start until the motor fires
- 3 Open choke and try again

During the first starts it may take some time to find the correct idle position. Try different throttle positions until you are satisfied with the idle.

8. Carburetor setting

With the factory preset the engine will start. The preset is slightly rich, so you can start the engine with confidence and without fear of damage due to a too lean operation.

The factory setting of the carburetor needles is as follows: L=1 / H1,5 turns open. With this setting, your engine will always start, and it is a good starting point if you have lost track of your adjustments.

a) L Needle:

The engine can be adjusted to react very aggressively to throttle increases. The preset of the L needle is very rich and operation in flight sounds rough in the partial load range. However, it will not quit.

In order to achieve a clean mid-range, it is necessary to lean the L needle until the engine wants to quit when the throttle is rapidly increased from idle. Set this way the engine will run nicely in the mid-range but will have a lean idle. To help prevent the engine from stopping on sudden throttle increases, you can program a delay of 2-3 seconds for the throttle.

Finding the correct settings takes time and patience. Always change the needle settings in small steps so that the engine will not quit in a stressful situation. When flying, the setting should always be on the safe side!!

On multi-cylinder engines, it is not mandatory that all needles are set exactly the same. In fact, it will almost never be the case. This is usually a result of manufacturing tolerances within the carburetors. It is important that the engine runs well at all throttle settings on all cylinders. Especially at idle the settings of the L needles may differ slightly. Make sure that the throttle linkages of all carburetors run 100% parallel! This is set correctly at the factory but may need to be adjusted if the carburetors have been removed and re-installed.

b) H Needle:

The correct setting can only be set by "flying" you plane. You will never achieve the correct setting on the ground, because the engine will turn much higher RPMs in the air. Adjust the H needle leaner from flight to flight until the engine runs well at full throttle. To compare the setting of the individual cylinders, check the color of the spark plugs or the residue in the exhaust tubes. Dark deposits are rich, light deposits are lean, but what you are looking for is a nice tan color. Full power on our engines can only be achieved with a careful setup.

Be very careful when adjusting the carburetor needles. On engines with several carburetors, these are already set in tune to one another at the factory. If you are feeling unsure, proceed in small steps of 1/8 turns.

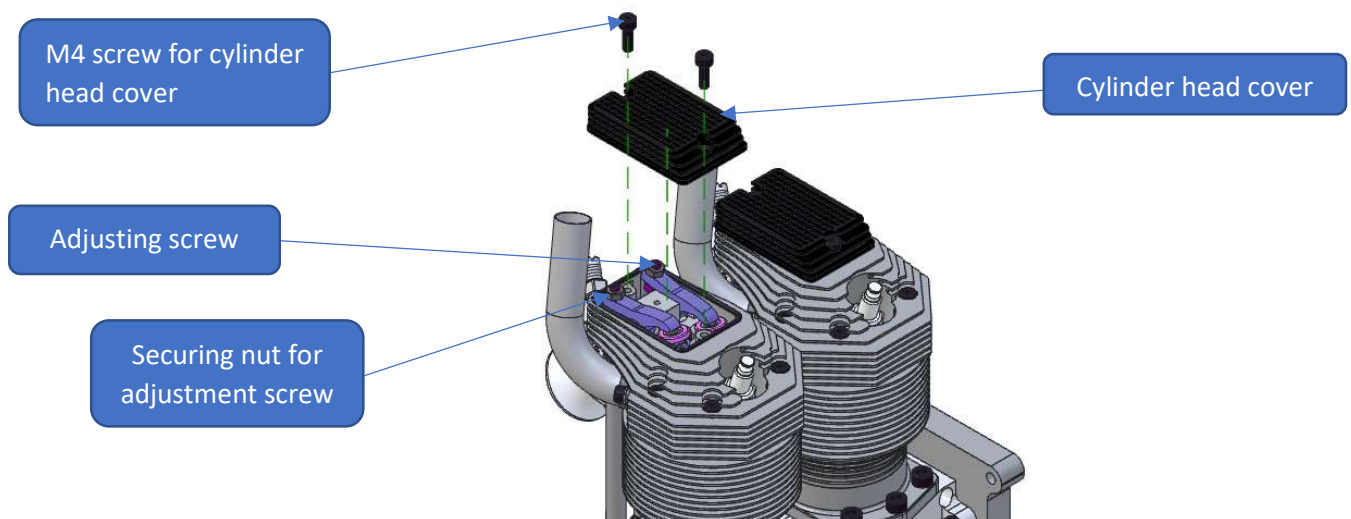
9. Maintenance

a) Valve clearance

The valve clearance is set to 1/10th mm on a warm engine. Especially in the break-in phase, the valve clearance should be checked more often. We recommend checking the clearance after every 5, 10 and 15 starts. In our experience, the valve play changes only slightly when the engine is broken-in but should still be checked on a regular basis.

Quick directions for valve clearance:

- (1) Remove the cylinder head cover
- (2) Loosen the nut using a ring wrench and loosen it from the adjustment screw
- (3) Set the valve clearance with a slotted screwdriver and check with a 0.1mm feeler gauge.
- (4) Tighten the nut. Often the adjustment screw has to be turned back a bit and tightened together with the nut.
Caution: Tighten the nut gently to avoid stripping the screw.
- (5) Check lubrication and, if necessary, apply a few drops of oil
- (6) Re-install the cylinder head covers. Carefully tighten the M4 screws! Tightening them too much will warp or break the covers and cause leakage.



c) Spark plug

The spark plugs must be replaced after break in.

This will be the case after about 20 and 30 starts. The engine be more difficult so start, throttle response will deteriorate and the idle will become rough. A silver residue can then be seen on the spark plug. Only use original NGK spark plugs (available from us)

In operation, the spark plugs should be a light brown/tan color. A darker coloration indicates a too rich setting or wrong engine oil. A grey coloring indicates a too lean setting.

On multi-cylinder engines, the correct adjustment of the carburetor H-needle can also be checked by looking at the color of the spark plugs.

10. Legal and GTC's

Warranty

The warranty applies for 2 years starting from the date of purchase for new products. This warranty only covers manufacturing defects. There is no coverage for damage due to misuse or crash damage. The warranty only covers the engine and its ignition. No other components are covered by the warranty. Associated damage to the airplane, radio system and any other component associated with the airplane also is not covered by this warranty. Warranty claims, replacements, and repairs are authorized exclusively by Ploberger Modelltechnik. Shipping costs are not covered by the warranty and are to be carried by the customer.

The date of purchase is the date on which you received the goods.

The serial number on the engine and ignition may not be damaged, altered or removed. The serial numbers are assigned to the buyer and stored with us.

Input power to the microprocessor ignition system must not exceed the maximum admissible supply voltage of 7.4 volts (2S Lipo). Mechanical damage to the cables, plugs and housings is also not covered by the warranty.

The engines may only be operated with the fuel mixture stated.

Contact:

If you have any further questions, we are always happy to help. Contact us using the following contact information:

Service, repair, and spare parts:

Mail: service@kolmengines.com

Tel: +43 664 1636845 Mon-Fri, 9:00-15:00 CET

Sales, installation, and urgent support

Mail: sales@kolmengines.com

Tel: +43 664 88743108 without guarantee

Other enquiries can be sent to office@ploberger-modelltechnik.at.

The shop can be found at www.ploberger-modelltechnik.at or shop.kolmengines.com