

User Manual

EOS 100 - EOS 100 Booster - EOS 100 Booster ICI

Introduction

Thank you for having purchased an **EOS 100 / EOS 100 Booster / ICI** engine! It can proudly be said that most probably the EOS engine is the one with best weight to performance ratio on the market today. Extensive development done by enthusiastic engineers being pilots themselves together with the use of only highest quality materials and best workmanship of every single component have lead to this outstanding state-of-the-art product. EOS engines are made in Austria, assembled with care by experts.

- EOS engine - light weight and reliable power -

General Description

The **EOS 100 / EOS 100 Booster / ICI** is a one cylinder 2-stroke engine, forced air cooled, with Carbon housing, diaphragm carburetor, manual start, belt drive reduction, centrifugal clutch and chromium exhaust with Carbon silencer. It has been designed to fit the Paramotor, Xtralight single seat Paratrike, Nano Trike with Hanglider and various other special applications for Paraglider and Hanglider motorized flight craft.

Picture / Overview



EOS 100



EOS 100 Booster and ICI

(pictures may diversify due to small changes by continuous development)

Technical Data

EOS 100

| | |
|---|---|
| engine | one cylinder 2 stroke |
| displacement | 102cc |
| stroke | 45mm |
| bore | 54mm |
| compression ratio | 1:10,2 |
| gear ratio of belt drive | 1:3,5 |
| carburetor | membrane Walbro WG8-1 with choke |
| spark plug | NGK BR9HS (NGK B9HS) |
| power | 20,4HP (15KW) at 9200RPM |
| thrust | >50kg |
| starter | rope hand starter |
| cooling | fan cooling |
| average consumption | 2,8 - 3,2l/h |
| fuel inlet | Reed valve |
| air inlet | HIFLOW-SHOT air box |
| fuel recommendation | unleaded 98 Octane (min. 95 ROZ) |
| fuel mixture | 2% |
| 2-stroke oil | full synthetic, half synthetic |
| weight (w.o. exhaust) | 7,5kg |
| weight (with exhaust - all complete) | 9,672kg |
| exhaust | Chromium plated, Carbon silencer |
| max. build-in length | 21cm |
| dimensions | 57x34x25cm |
| propeller recommendation (rotation anti clockwise) | CT/E100125V1-2BW wood 2 blade or P&T Carbon 2 blade 125cm or 130cm |

EOS 100 Booster

| | |
|--------------|-----------------------|
| engine | one cylinder 2 stroke |
| displacement | 102cc |
| stroke | 45mm |
| bore | 54mm |

| | |
|---|---|
| compression ratio | 1:10,2 |
| gear ratio of belt drive | 1:3,5 |
| carburetor | membrane Walbro WG8-1 with choke |
| spark plug | NGK BR9HS (NGK B9HS) |
| power | 21,6HP (15,9KW) at 9500RPM |
| thrust | >55kg / >60kg 125cm / 130cm prop |
| starter | rope hand starter |
| cooling | fan cooling |
| average consumption | 3 - 3,5l/h |
| fuel inlet | membrane, fiber Reed valve 34mm |
| air inlet | HIFLOW-SHOT air box |
| fuel recommendation | unleaded 98 Octane (min. 95 ROZ) |
| fuel mixture | 2% |
| 2-stroke oil | full synthetic, half synthetic |
| weight (w.o. exhaust) | 7,5kg |
| weight (with exhaust - all complete) | 9,75kg |
| exhaust | Nickel plated, Carbon silencer |
| max. build-in length | 21cm |
| dimensions | 57x34x25cm |
| propeller recommendation (rotation anti clockwise) | CT/E100125V1-2BW wood 2 blade or P&T Carbon 2 blade 125cm or 130cm |

Differences between EOS 100 and EOS 100 Booster (ICI)

| | EOS 100 | EOS 100 Booster (ICI) |
|-----------------------|---------------------------------|-------------------------------|
| crankcase | cylinder port timing FN, silver | cylinder port timing FS, gold |
| exhaust assembly | standart | Yasuni |
| air intake Reed Valve | 35mm, metal blades | 40mm, fiber blades |
| airbox | standard | black colored |
| build in measurements | see sketch | see sketch |
| weight | see tech. data | see tech. data |
| power / thrust | see tech. data | see tech. data |

Build Engine to Frame

It varies depending on frame and craft design. But generally engine should be mounted by using the four attachment points of the main support bracket and using the four rubber dampeners which come along with the engine as standard supply.

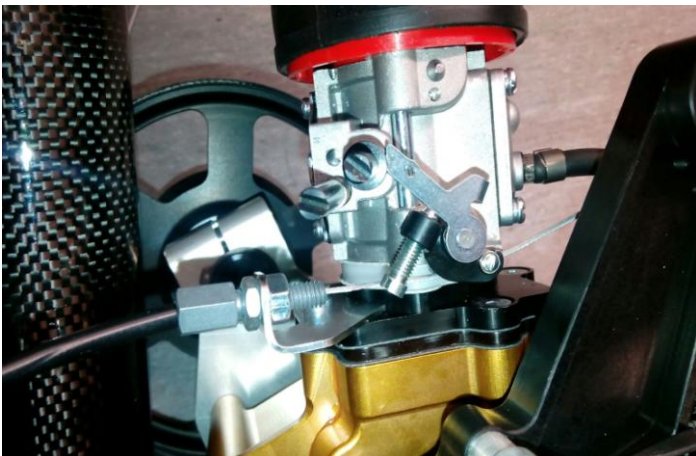
Connect engine ignition kill wires to throttle cable (see picture);



ignition (+)

ground (-)

Connect throttle cable to carburetor (see picture);



Important note! - connect fuel line with appropriate inner diameter 6mm (see picture), put tube over nipple only, no extra additional fitting needed. Check for a proper air-tight fit.



fuel line nipple

Place air box to carburetor adapter and well tighten connection with hose clamp while turning air inlet in direction of cylinder or further backwards (not facing to the propeller).

Starter rope to place in right position and with correct tension (see picture);



remove cable binding
after starter rope installation

Place propeller centering hub to drive wheel (see picture) when mounting the propeller;



Important note! - use the proper bolts (not coming with the engine) with proper lengths (metric M6, Inbus type with washer, min. 8.8 quality) where the thread of the bolt goes min. 15mm and max. 25mm into the thread of the drive wheel.

Propeller

Please use only appropriate propeller types fitting the engine's parameters. Despite of the diameter in use, the max. RPM should not go much higher and not much lower than the mentioned data in the tech. data listing. Wrong propellers may lead to damage of the engine and will for sure not grant the desired power and thrust. Therefore we recommend to use the propellers as per our accessories offers. The use of other / wrong type of propellers will result in invalidity of the warranty for the engine!

If a propeller gets damaged and out of balance causing the engine starting to shake and vibrate more then normal, we strongly advise to change it to new as serious damage may occur to engine and especially to engine mount, drive shaft and bearings.

Spark Plug

Install the appropriate spark plug type what comes along with the engine delivery.

Fuel, 2-stroke Oil and Fuel Mix

Use fuel with min. 95 ROZ (unleaded or leaded) or higher only.

Recommended 2-stroke oil quality is either half synthetic or full synthetic with the following specifications; API-TC (TSC-3); JASO FC or JASO FD

fuel mix

| | |
|---|-------------------------|
| run-in procedure, first 3 hours operation | approx. 2,5 - 3% / 1:33 |
| regular operation | 2% / 1:50 |

Please note! - every engine has been test run and carburetor settings have been pre-adjusted properly prior delivery.

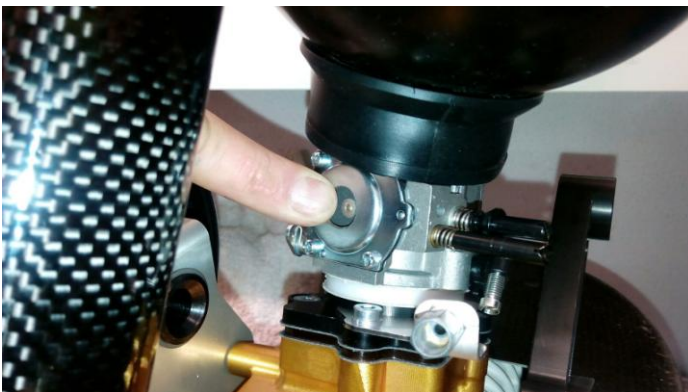
Starting the Engine

The carburetor is pre-adjusted right and the setting should work in general as it comes. Pump up fuel from tank to carburetor whilst same time you should press the membrane with your finger (see picture) to allow sufficient fuel flow into the carburetor's float chamber.

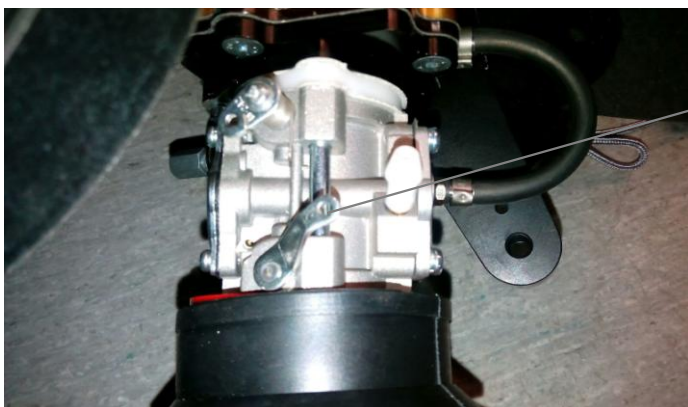
Important note! - never press the membrane with to much force.

Important note! - do not over-float the carburetor as in consequence the engine gets floated and then it will be very difficult to start it.

As a next step close/activate the choke (see picture). No throttle at all. Pull starter rope as many times as necessary until the engine fires the first time. As the next step open the choke again. Now operate the throttle about 20% and pull again starter rope as many times as necessary until the engine starts running, keep it running by operating the throttle accordingly.

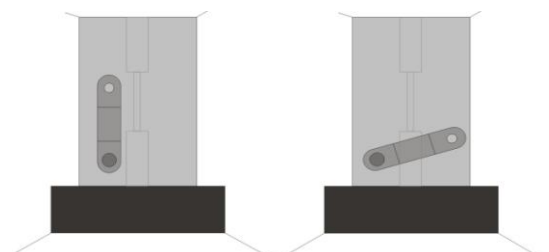


press membrane



choke lever

open position
closed/activated

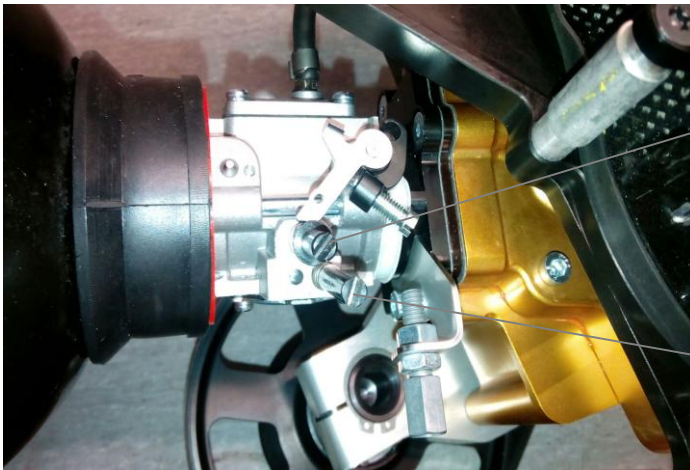


Stopping the Engine

Release throttle, press ignition kill switch. As an emergency procedure, if any failure with the ignition kill switch or wiring, close the air inlet of the air box with your hand and engine will stop quick. **Caution!** - well take care of the propeller.

Adjustment of the Carburetor

As mentioned before the carburetor is pre-adjusted when engine is delivered but in every different location the carburetor may need some small re-adjustment so that the engine runs properly at idle and at low RPM operations. For these adjustments we have two adjuster screws on the carburetor (see picture).



idle adjuster screw

low jet adjuster screw

Idle adjuster screw - for proper setting proceed as follows;

- start the engine and warm it up (run it for about 3 minutes operating the engine in different RPM's)
- release throttle and let the engine come down to idle. Set the idle adjuster screw to about 1.800 - 2.000 RPM (centrifugal clutch starts to operate at around 2.500 RPM).

Low jet adjuster screw - for proper setting proceed as follows;

- standard setting for this adjuster screw is 1,5 turns out (anticlockwise)
- turning in (clockwise) results in a more lean setting
- turning out (anticlockwise) results in a more rich setting

When is need to re-adjust the low jet adjuster screw?

- operate engine in middle range RPM, release throttle ...

| | |
|--|--|
| ... engine run comes down to idle quick and stays at proper idle | no adjustment needed |
| ... engine run comes down to idle quick but engine kills | to rich setting, turn in the adjuster screw |
| ... engine run comes down to idle to slow but then stays at idle (and/or idle run is unstable) | to lean setting, turn out the adjuster screw |

Make changes of the adjuster screw in 1/8 turn steps only and re-try procedure until finding the right setting.

Important note! - when engine is new, it is very difficult to find the right settings of both, idle adjuster screw and low jet adjuster screw. When engine is getting more and more used, the settings change and re-adjustment becomes necessary.

Please note! - depending on weather, air pressure, temperature, humidity and altitude engine may run different or not run properly at idle and/or at low RPM operations and small re-adjustment on the carburetor is necessary.

Clutch and Propeller

Even if the idle is set correct and RPM is low (under 2.500 RPM, or even under 2.000) and clutch is not engaged the propeller still may turn slowly. Particularly this happens when;

- engine is very new
- propeller is especially light weight

The reason is the friction of the bearings from the clutch bell, sitting on the turning crank shaft. The more the bearings get used and loosing friction, the lesser the propeller will turn at idle.

Break-in Procedure on a new engine

Every engine has undergone a run in procedure at the factory prior delivery. But operate the engine with care for the first 3 hours and do not operate it longer than half a minute at full throttle. Make the first flights by changing RPM runs frequently, never running the engine at the same RPM for a longer period of time.

Engine operation

Whenever you begin to operate the engine at a new time, well take care of;

- pre-flight check (according to the Paramotor unit or other aircraft manufacturer's advice)
- check for proper fuel quality and fuel mix
- never run the engine without propeller
- well warm up the engine before flight – **respect the propeller!**
- check before flight if warm engine running well in all RPM's – **respect the propeller!**
- check before flight if engine well running at idle with proper low RPM
- listen to any possible strange noise what may predict a fault whatsoever
- never run the engine under full power excessively

Have pleasant flights with your new EOS engine! - Fly safe and respect the propeller!

Maintenance

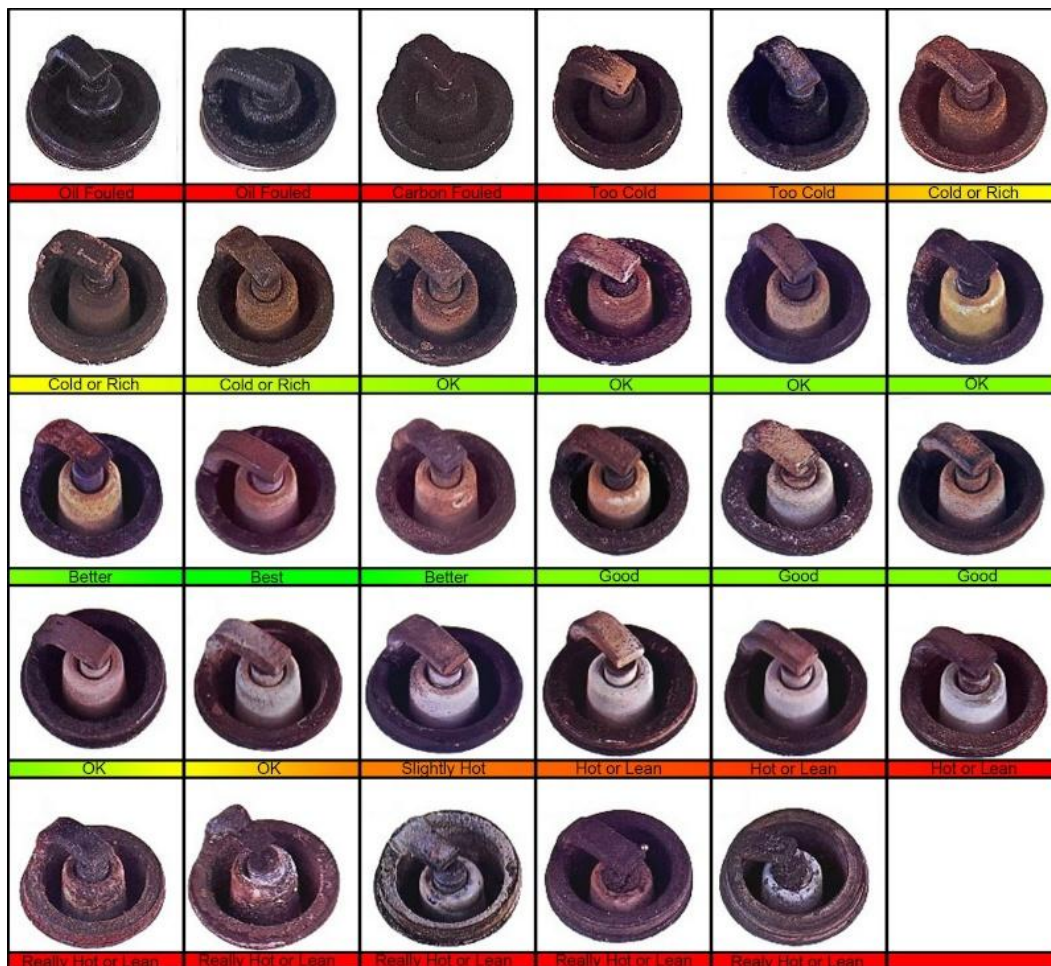
maintenance table

| | before every new use | after first 5 hours | every 25 hours | every 100 hours or every year | after 200 hours |
|---|----------------------|---------------------|----------------|-------------------------------|-----------------|
| rubber mounts | check | | | replace | |
| screws and nuts | check | | | | |
| throttle cable function | check | | | | |
| ignition kill switch function | check | | | | |
| fuel system | check | | | | |
| air box rubber fitting | check | | | replace | |
| drive belt | check | | replace | | |
| spark plug cap fitting | check | | | | |
| carburetion and combustion / spark plug image | | check | check | | |
| spark plug | | check | replace | | |
| muffler springs | | | replace | | |
| carburetor membranes and gaskets | | | check | replace | |
| starter rope / or complete starter | | | | replace | |
| fuel lines | | | | replace | |
| Reed valve | | | | replace | |
| exhaust silencer dampening material | | | | replace | |
| piston and rings | | | | | replace |
| crankshaft bearings | | | | | replace |

Combustion and Spark Plug Image

The way the spark plug looks like showing you the quality of combustion. With a correct combustion the engine is giving best performance and life span of the engine will be longest. Generally speaking, a too rich setting will never kill the engine but making it perform improperly, causing a rough run and making the engine shake in low and medium RPM's. Exhaust will smoke extensively and oil dropping out. In long term spark plug getting soiled making it fail and accumulation will effect piston and cylinder head. A too lean setting will result in increased abrasion of piston, rings and cylinder and giving insufficient lubrication to bearings. Engine temperature increases resulting in a generally too hot engine run and damages may occur soon. A far too lean running engine will fail quickly or even instantly (piston head surface getting burned and forming a hole, resulting in instant loss of compression and engine stops, or piston and rings start to scratch cylinder surface and seize).

The following pictures will help you to understand the correct combustion by showing the condition of the spark plug.



The EOS engine's standard setting is adjusted to rather a bit to rich run in order to have a safe engine run. The main adjustment is made by the selection of a proper main jet inserted into the carburetor. The low jet adjuster screw helping for a proper setting in low and medium RPM's but not changing the combustion temperature and condition under high and full RPM.

If the spark plug of your engine showing a far to rich or far to lean combustion;

- check for proper fuel/oil mix
- check your fuel lines and filter (no kink in fuel line, no leaking, no air coming into the line system, no air bubbles, no dirt in filter blocking fuel flow)
- check fuel tank vent (no vacuum)
- check if spark plug type is the right one
- check for correct setting of the low jet adjuster screw
- original air box with original air inlet installed to engine (tight fit of collar)
- choke not closed/activated (or partly closed)

If all above correct but still improper combustion, then there may be a general fail function of the carburetor. Change membranes and gaskets and eventually main fuel jet. If still improper combustion, consult with your dealer/Paramotor/aircraft manufacturer for assistance (or EOS engine if the agent cannot help).

Troubleshooting

| problem | possible reason | solution |
|-----------------------------------|--|--|
| the engine does not start | lack of fuel | add fuel |
| | fuel does not reach the carburetor | check the fuel lines, connections, filter, bulb pump, remove air inside the fuel system open tank ventilation valve |
| | flooded engine | remove spark plug, dry and clean it, pull starter several times (no throttle) and re-install spark plug |
| | no spark | replace spark plug, check spark plug cap fit, check wiring for possible short circuit |
| no idle run | sufficient fuel, fuel reached carburetor, no flooded engine, spark plug working - but still no start | follow advice in the beginning of the manual - in case of still no start - check carburetor for proper function and eventually replace membranes and gaskets |
| | improper setting of idle adjuster screw and/or low jet adjuster screw | follow advice in the beginning of the manual |
| no stable idle run | defective spark plug | replace |
| | wrong adjusted low jet | follow advice in the beginning of the manual |
| engine does not reach maximum RPM | air through the gaskets | tighten screws and bolts, eventually replace gaskets |
| | propeller does not fit engine parameters | replace by correct propeller |
| | defective spark plug | replace |
| | to oily fuel mix | replace by correct fuel |
| | failure in fuel system | check fuel lines for kink, check connection for air tightness (bubbles in the fuel lines), check filter, check if tank vent open |
| | defective carburetor | check function, check for dirt, possibly replace membranes and gaskets |
| | defective Reed valve | replace |

Main Torques Catalogue

- in NM (Newton meter)

| | |
|---------------|----|
| M4 bolt sizes | 8 |
| M5 bolt sizes | 12 |
| M6 bolt sizes | 14 |
| M7 bolt sizes | 16 |
| M8 bolt sizes | 22 |

Important note! - Any screw or bolt or nut what may get unscrewed, removed and re-installed needs to get secured – as a general advice – by screw glue Loctite 243 (blue).

Repairs

Any small repairs whatsoever what can be fixed by common sense and without expertise may be conducted by the owner. Any other repairs may need extensive knowledge about high performance 2-stroke engines and Paramotor engines in general (most mechanics for normal 2-stroke engines may not have the sufficient experience) and therefore we strongly recommend to consult with your dealer/Paramotor/aircraft manufacturer for assistance (or EOS engine if the agent cannot help).

Parts Lists

We refer to our web site www.eos-engine.com where the up-to-date lists can be found. In any case, consult with your agent for your spare part needs.

Storage of the Engine

If you would like to store away the engine for a longer period of time for proper preservation we recommend to do the following;

- empty the fuel tank and all fuel lines, also the carburetor
- remove the spark plug and fill in about a tea spoon quantity of pure 2-stroke oil
- slowly pull on the starter rope for several strokes/turns
- re-install the spark plug
- plug the hole of the exhaust / silencer
- plug the hole of the air inlet
- spray the engine outside with WD40 oil spray, you can spray all parts whatsoever (except do not spray the pulley and the drive wheel / inside of the belt area)
- store away at a dry(!) place
- cover engine with blanket

Warranty

EOS engine grants warranty for the period of 2 years onward the exact date the engine has been delivered out and left EOS engine Austria. The warranty includes engine, spare parts and labor involved for any upgrades and repairs. No refund for shipping forth and back.

Warranty is void under the following circumstances;

- any changes or modifications made which were not conducted by EOS engine
- use of non-genuine parts
- improper maintenance
- operation without propellers
- operation with not suitable propellers
- electrolysis and corrosion
- fire or crash or improper operation
- corrosion, rust, wear through entered water, sand, stones
- damages caused by maintenance through unqualified persons

Caution

Despite it is a high quality product, the EOS engine may fail any time due to any reason whatsoever, it is in the nature of 2-stroke engines in general that they can fail . Such failures may lead to emergency landings and in the following to serious injury or death. Therefore never fly your Paramotor / trike / aircraft whatsoever equipped with the EOS engine in regions and/or altitudes where safe landings with a sudden engine stop are not possible at any time, not hurting yourself or other persons, nor cause any damages to third parties.

The EOS engine is neither certified nor does it meet the requirements for certified aircraft

engines, it is not tested for safety and reliability according to airworthiness standards. It should only be used in not certified Paramotor devices, Experimental- or other non certified aircraft and only in such cases where sudden failures do not interfere safety. Aircraft equipped with this engine are only to be used under VFR daylight conditions. The engine is not designed for acrobatics.

The engine will be a part of a craft (Paramotor, Trike, special flying craft) only and the builder of the aircraft where the engine at the end is installed needs to take own responsibility for possible failures due to improper installation or not to the engine fitting components.

Inadvertence during the use of the engine with propeller may lead to serious injuries or death and at any time, during ground operation and/or flight operation, the user or pilot has to pay best possible attention being fully aware of the consequences what may result from improper operation of the engine and propeller.

For the sake of maximum safety we refer to the maintenance regulations and advice of both, the aircraft manufacturer where this engine is built in and the one valid for this engine.

Liability Disclaimer

EOS engine, the owners and all distributors will decline any claims from engine owner and/or engine user or from any related or effected third party for damages or injuries what may arise directly or indirectly by the use of the EOS 100 / EOS 100 engine. The owner and/or engine user accepts to take full responsibility by himself and declares to indemnify and hold harmless EOS engine, the owners and vendor.

We also refer to / please read the file; appendix_??_??_manual EOS 100_EOS 100 Booster - containing news and latest releases

manual version 1.3, June 2017
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