



ASSEMBLY and MAINTENANCE MANUAL 3-BLADE PROPELLER for GEAR-DRIVE ENGINES DURANDAL / EXCALIBUR V20 range



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PROPELLER DESCRIPTION

Designation E-Props range for gear drive engines	DURANDAL : Clockwise CW rotation sense EXCALIBUR : Counterclockwise CCW rotation sense
Propeller type	3-blade, ground adjustable pitch model for gear-drive engines 4 or more cylinders in 4 strokes, reduction ratio > 2
13 diameters	145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205 cm
Weight	2 kg [dia 170 cm]
Material	100% Carbon + epoxy resin + Titanium leading edge protection
Moment of Inertia	2.300 kg.cm ² [dia 170 cm]
Max Torque	155 N.m per blade
Max Peripheral Mach	0,75
Max RPM at propeller	Depending on model (see the Propeller Identification Sheet)
Max pitch tolerance	Max 0,3° between blades
Accessories	Carbon spinners: 15 different models Carbon spacers: 38 different lengths
Manufacturing	Made in France (Sisteron) since 2008
Potential / MTBO	Illimité / 2.000 hours
Checking screw tightening	Every 100 h (200 h with Titanium screws) and/or every 6 months
Certification	ASTM F2506-13 (LSA)

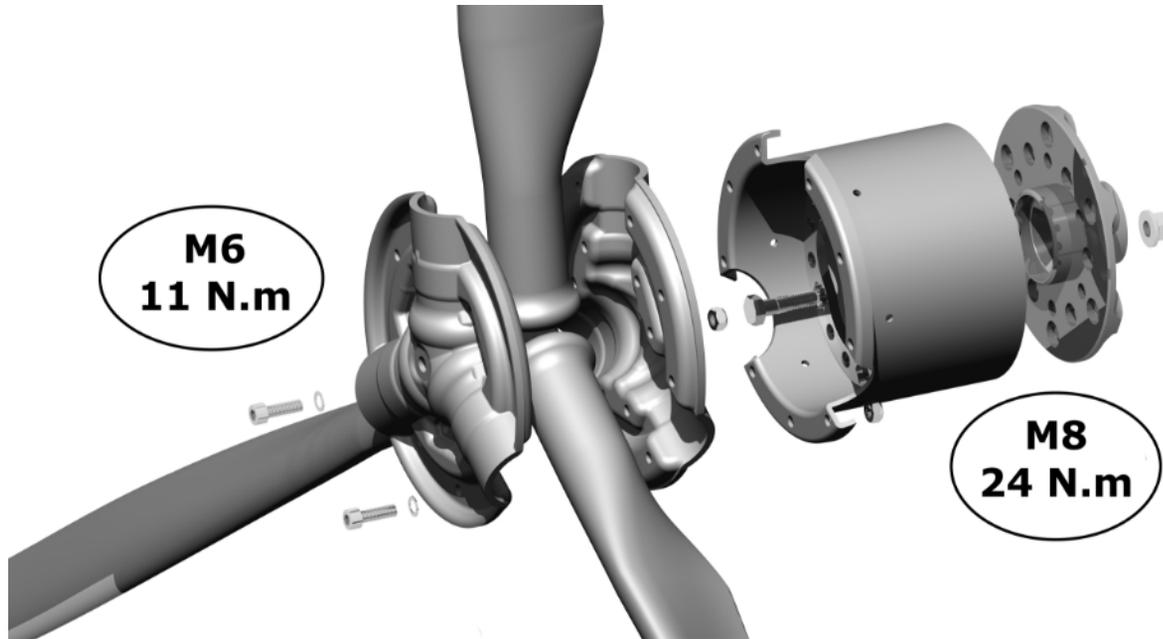
3-BLADE PROPELLER COMPOSITION

- x 3 blades in Carbon with Titanium leading edge protection
- x 1 hub composed of 2 carbon parts (HHU)
- x 1 carbon spacer to mount the propeller on the gearbox flange (ESU)
- x Screws & Bolts :
 - 6 screws M8 quality 10.9, length 30 mm, threading 22 mm
 - 6 Nylstop flange nuts M8 quality 10
 - 15 screws M6 quality 10.9, length 22 mm, fully threaded
 - 15 Nylstop nuts M6 quality 10
 - 15 special washers M6(option : Titanium screws)
- x Propeller spinner :
 - Carbon Spinner
 - Carbon Plate with 6 screws M4x12, 6 Nylstop nuts 4 mm and 6 washers
 - 9 stainless steel screws slotted head M5 x 16 mm

Tools required for the assembly and adjustment of the propeller :

- 13mm screwing sleeve
- 5mm hexagonal tip
- flat screwdriver
- cardan shaft and extension
- torque wrench (torques : 1.5 / 11 / 24 N.m)
- plastic mallet
- E-Props pitch adjustment tool

PROPELLER ASSEMBLY



M6
11 N.m

M8
24 N.m



Assemble the components: blades, hub, spacer, screws (spinner and plate, see below).

Assemble the propeller on the ground or on a work surface:

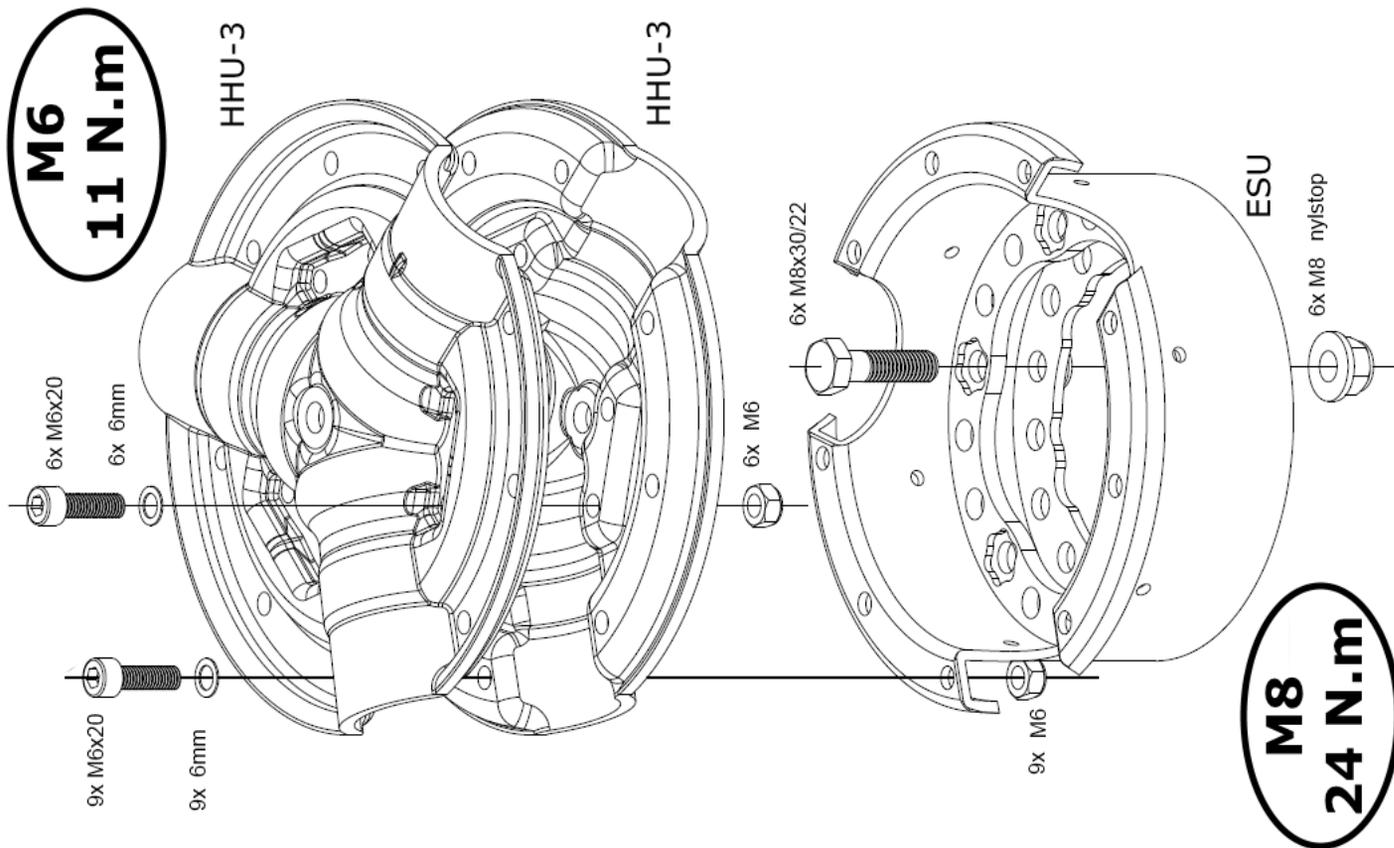
- x Locate the HHU half hub with the fixing nuts and place it underneath.
- x Put the blade feet in the half hub following the marking with the colored stickers.
- x Put the second half-hub HHU on top always following the colored stickers.
- x Tighten the 6 middle screws M6x22 without using force with the 5mm hexagonal bit.
- x Place the blades + hub assembly on the spacer (equipped with the spinner plate if necessary)
- x Approach the 9 external screws M6x22

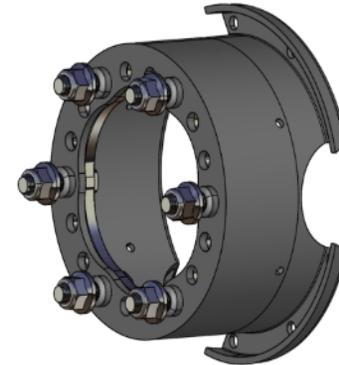
Once the propeller is assembled, screws not fully tightened, mount it on the gearbox flange:

- x Approach the 6 Nylstop flange nuts with a 13mm bushing (use a cardan joint and an extension to slide along the gearbox).
- x Take a torque wrench set at 24 N.m and tighten the 6 nuts to the right torque.

This operation is detailed in the video - "Assembly and adjustment of E-Props V20 series (Youtube E-Props channel - <https://youtu.be/xKAHdr3hmqE> or click on the following QR-code)" :







ESU with internal aluminium counterplate / Centering drive lugs integrated in the ESU



The assembly of E-Props propellers does not require Rotax drive lugs. The drive lugs are made of carbon, integrated in the hub of DURANDAL & EXCALIBUR V20 series propellers. Never cut them.

There should be no drive lugs on the gearbox flange.

If you have trouble removing them, E-Props offers a drive lugs extractor.

See article in the store and video on the Youtube channel E-Props =>



PROPELLER SETTINGS

Blade pitch recommended for your aircraft, its motor and gearbox => indicated on the **Identification Sheet** of your propeller (E-Props document given with the propeller - if you don't have it, consult our team).

Using the E-Props Pitch Adjustment Tool :

Digital propeller pitch adjustment tool (accuracy: +/- 0.1°), with a spirit level to position the blade horizontally and a hook to be clipped on the right or left. Measures the relative precision between the blades.

Do not redo the tare between the measurements of each blade, otherwise the initial reference of the tool will be lost.

Move the tool regularly while adjusting the blades to prevent the tool from turning off.

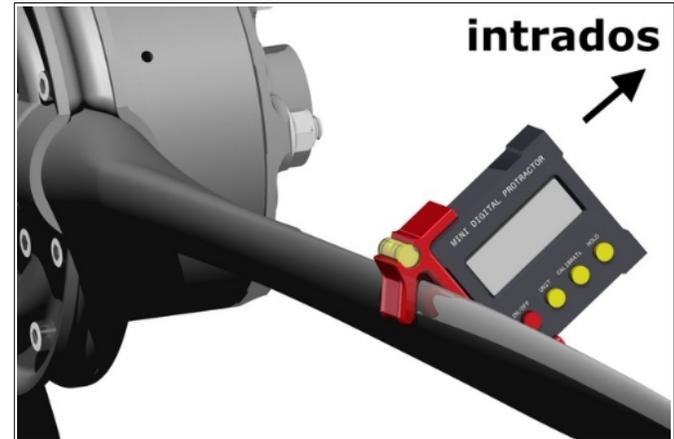
The displayed value may be slightly different between two measurements (when the tool is switched off in between).



Unit = degree



*Calibrate = tare (zero setting)
to be done on a flat part of the hub*



*place the hook on the leading edge of the blade,
on the intrados, on the Titanium leading edge
protection, just on the edge of the carbon*

Max. blade pitch tolerance: **0.3° between blades** (otherwise there may be vibrations)

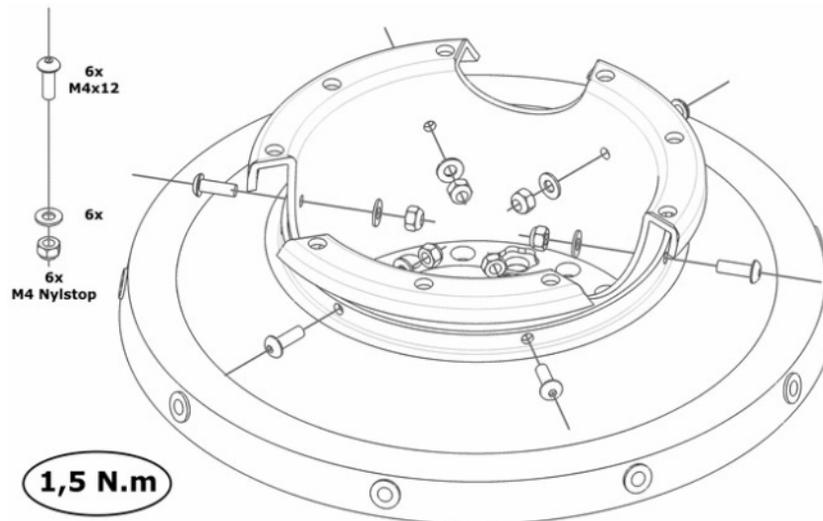
- Set the first blade to the correct pitch with the pitch adjustment tool. Refine with the plastic mallet.
- x Tighten the outer screws of the hub without forcing. Tightening the screw on the leading edge side first = the pitch will decrease slightly, thus achieving the desired precise pitch.
 - x Proceed to the next blade. Do not touch the already adjusted blade: take the next blade and rotate the propeller very gently, avoiding jerks, so that the blade setting is not changed until the screws are fully tightened.
 - x Tightening the hub screws to the torque: to be done progressively => first 6 N.m. Two rules: never make more than 1/4 turn on a screw and never exceed 6 N.m (release the torque wrench). Distribute the tightening of the screws evenly in a crosswise pattern.
 - x Check the pitch of all the blades, and if it has moved a little, repeat it if necessary.
 - x Same operation at 9 N.m, then at the final torque of 11 N.m
 - x Mount the spinner with the flat screwdriver. Approach the screws loosely during assembly, then tighten the screws to 1.5 N.m

This operation is detailed in the video - "Assembly and adjustment of E-Props V20 series (Youtube E-Props channel - <https://youtu.be/xKAHdr3hmqE> or click on the following QR-code)" :

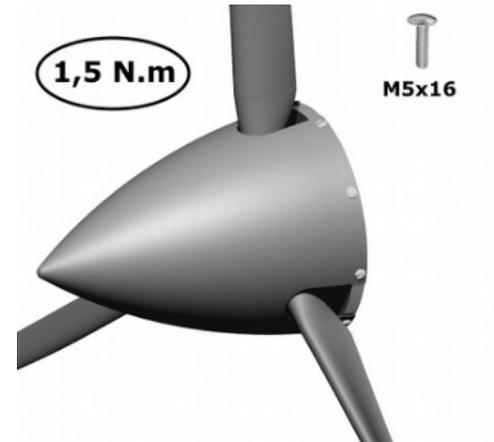


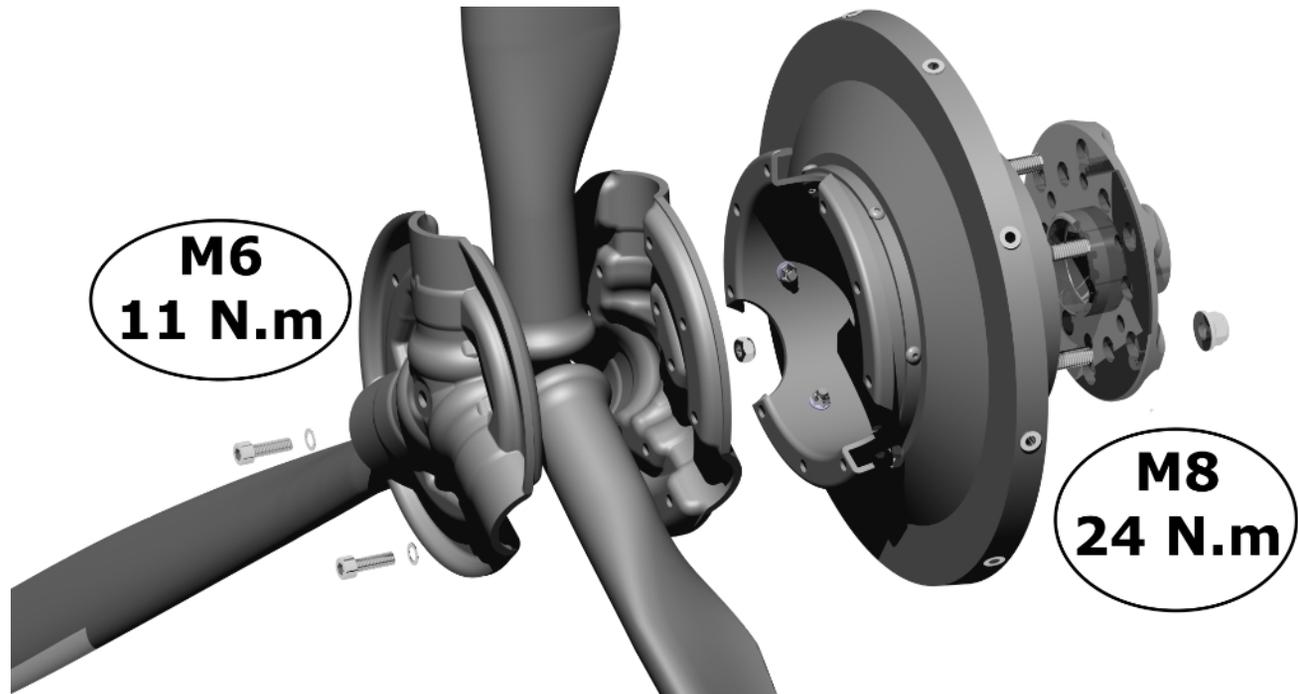
SPINNER ASSEMBLY

- 1/ Adjusting the correct pitch of the blades
- 2/ Only then mount the spinner, otherwise in some cases the unadjusted blades can touch the edge of the spinner.



Spinner mounting plate: mounts on ESU spacer





M6
11 N.m

M8
24 N.m

E-PROPS
screws
only

torque
wrench

~~oil
or
silicone~~

~~thread
lock
(ex :
Loctite)~~

PITCH ADJUSTMENT & PERFORMANCES

The pitch for which the E-Props propeller will give its best performance over the entire speed range of the aircraft is obtained at : **5500 rpm at full power in horizontal flight.**

Please note: this does not mean that you should always fly in cruise at 5500 rpm: it is just the right value to obtain the best propeller blade pitch setting.

Method to obtain the ideal pitch of your propeller on your aircraft :

- Adjust the pitch as recommended on your Propeller Identification Sheet.
- In flight, in calm weather, fly horizontally and measure the number of rpm when you put full power on: if you get about 5500 rpm (+/- 50 rpm), it's perfect.
- If not, adjust the pitch to get 5500 rpm at full power in horizontal flight. On Rotax 9 series engines, increasing the pitch by 0.6° reduces the engine speed in full throttle by 100 rpm. Example: in full throttle level, the engine is running at 5700 rpm, while the target is 5500 rpm. The difference is 2×100 rpm, i.e. the engine speed must be increased by $2 \times 0.6^\circ = 1.2^\circ$.

+ 100 rpm = pitch - $0,6^\circ$

- 100 rpm = pitch + $0,6^\circ$

With E-Props propellers, the rpm measurement is not done on the ground.

TIGHTENING / PITCH CONTROL

Tightening torque and blade pitch must be checked:

- **10 minutes** after the first assembly
- then after the **1st hour of flight**
- then **every 100 hours** (or **200 hours** with Titanium screws) and/or **every 6 months**

PROPELLER MAINTENANCE

Cleaning after each flight with a sponge: water + soap, window cleaner

Propeller potential: unlimited

MTBO (average time between overhauls at the manufacturer): 2000 hours

Tightening of screws and blade adjustment : every 100 hours (200h with Titanium screws) and/or every 6 months

Screw M6= 11 N.m

Screw M8= 24 N.m

PROPELLER TESTS

Propeller Tests Sheet (example)

Date :	QNH :
Aircraft :	Wind on ground :
Propeller :	T° :
Propeller's pitch :	Aircraft's weight :

Take-off distance (m)	
Rate of climb (ft/min)	

LEVEL FLIGHT SPEED (V_I)

ALTITUDE :

RPM	km/h

INSTRUCTIONS

The propeller is NOT an accessory.

Read carefully the manuals and instructions published by HELICES E-PROPS and strictly follow the instructions. Contact our team if you have any questions.

E-Props propellers comply with **ASTM F2506-13 (LSA)**. Their use on an aircraft is the sole responsibility of the aircraft owner. The user assumes the risks of using such propellers, and acknowledges that his engine/propeller assembly is subject to sudden stoppage.



- x DURANDAL and EXCALIBUR models: designed for engines equipped with a gearbox. It is strictly forbidden to mount these models of propellers on direct drive engines.
- x Never cut any E-Props parts: blades, hub, spacer, adapter, spinner, plate.
- x Always use the screws and bolts supplied by E-Props. The quality, length and threading of the screws are essential to ensure correct assembly and tightening.
- x Never cut and/or re-thread screws for aircraft use.
- x Use a calibrated torque wrench to apply the correct tightening torque.
- x Screw tightening torques depend on the quality and diameter of the screws. Incorrect tightening of the propeller fastening screws can be dangerous: follow the E-Props instructions.
- x Do not remove the labels on the E-Props parts.
- x Never change the balance of an E-Props propeller.

E-Props : Light is Right