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Manual
for Propeller Type
H50V

Propeller Type:

Propeller Serial No.:

Date of Sale:

Seal and Signature of Manufacturer:

Index

1 List of Modifications

Version (Date)	Chapter	Description	Name
Version 02/2009		First Edition	KUB
27.07.2011	1 List of Modifications 7 Maintenance → new 8 Maintenance	Insert the Chapter "List of Modifications" Paragraph	TKU
18.04.2012	5 Installation	Screw retaining device	TKU
28.08.2012	6 Setting up	Dimension	TKU

2 Description

HELIX propeller have been built since 1990 using composite materials such as carbon fibre, epoxy-resin, epoxy resin foam and aluminium.

This combination of materials provides:

- High Thrust
- Low Noise
- Durability

The pitch of the propeller can be adjusted prior to installation making it suitable for many engine configurations.

Figure 1: 2-blade, 3-blade and 4-blade propeller of type H50V

2.1 Blades

The propeller blades are made from several layers of woven glass and carbon fibre, reinforced with different sorts of glass and carbon fibre tapes. These are connected with a glass fibre reinforced expanding epoxy resin in “wet in wet procedure“ with each other. The internal power transmission decisive for the firmness between the top and underside of the sheet is therefore over the entire surface. From this construction method a good vibration damping as well as insensitiveness results with damages by external effect.

The leading edges are protected normally by a PU-adhesive-tape against water effect. Optionally a metallic edge protection of nickel cobalt can be applied for the protection.

Also optionally a lightweight construction with 3-D distance fabric is used instead of the construction method with expanding epoxy resin. A high stiffness and firmness guarantees this with at the same time low weight.

2.2 Hubs

The hub is milled from an aluminium block using a CNC process. This allows the weight of the hub to be minimised whilst the cylindrical design reduces aerodynamic drag. The hub has a hard anodised finish providing good corrosion resistance. Inside weight reducing drillings and blind holes are arranged and embedded. Optional are Adapter-center-discs for different engine-flanges available.

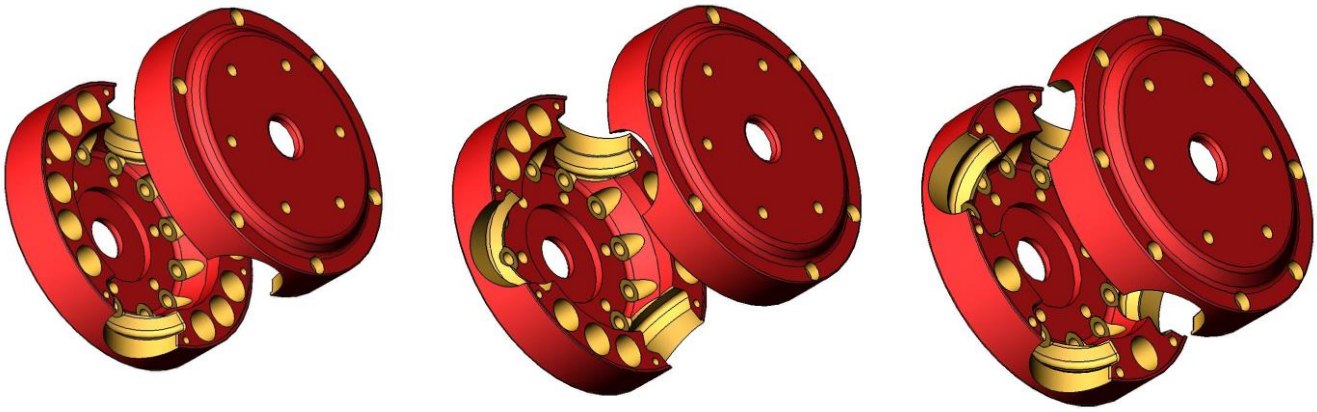


Figure 2: 2-Blade, 3-Blade and 4-blade hub

3 Specification of Propeller Type

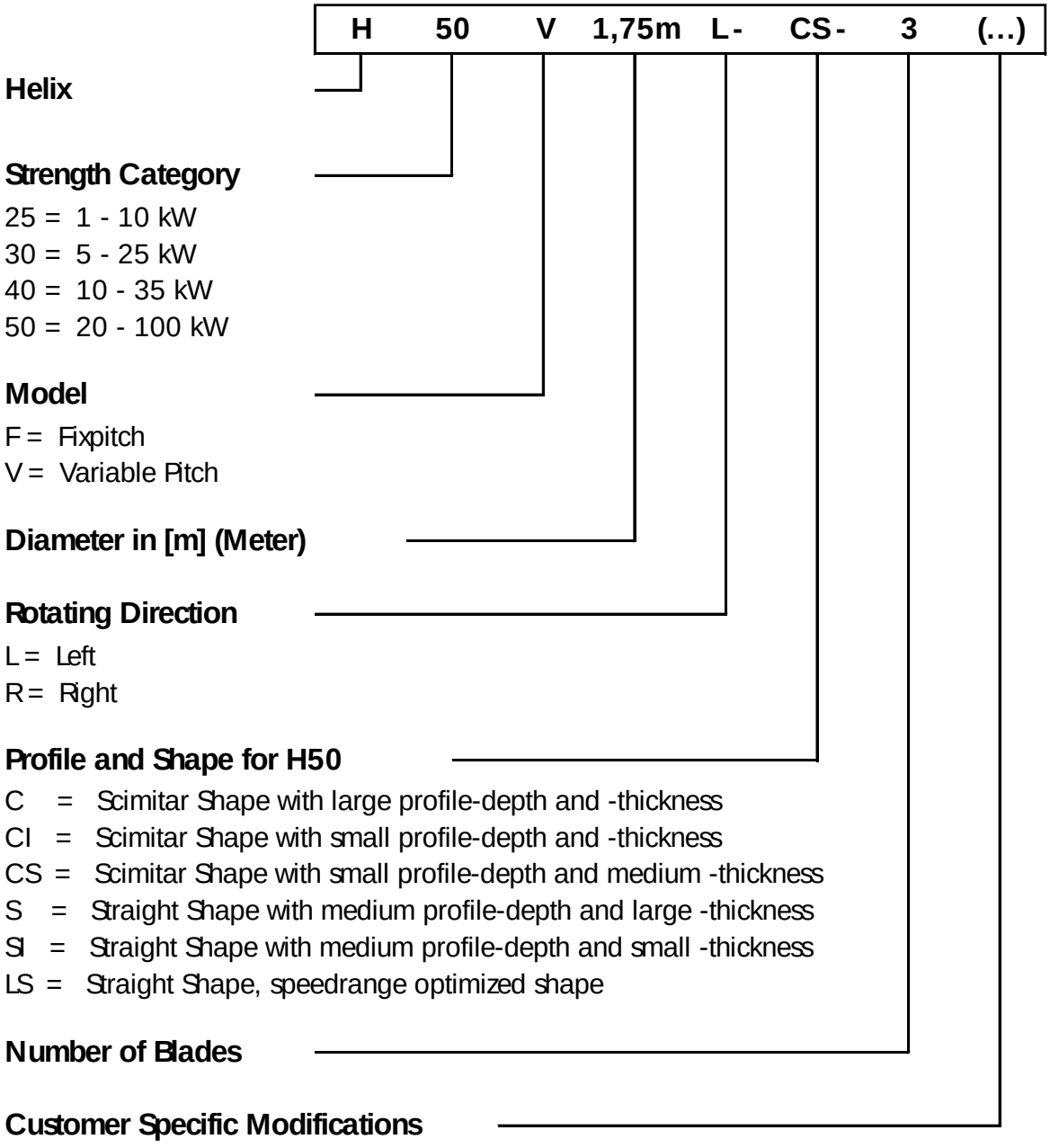


Table 1: Specification of the propeller type,
Structure of the Helix Propeller Name

4 Operating Limitations

HELIX Propellers are constructed for giving thrust to aircrafts with an engine output of between 1 and 100 kW using 2-stroke, 4-stroke, Wankel- or electric engine.

The operating limitations for the here described propeller types of **H50V** as 2-, 3- and 4-Blade-Version in clockwise and anti-clockwise rotation are for Diameters from 1,45m to 2,20m.

There is to distinguish:

For propeller types with **Profile C** and **S**:

- Maximum propeller-rpm: **2.500 U/min**
- Maximum engine power: **85 kW**

For propeller types with **Profile CI**, **CS**, **LS** and **SI**:

- Maximum propeller-rpm: **3.400 U/min**
- Maximum engine power: **85 kW**

Warning:

If the maximum operating values are exceeded the propeller, engine or gearbox may be damaged. If the propeller becomes damaged its balance will be affected which can cause failure of the engine mountings.

Before starting the engine, the pilot must ensure that the area around the propeller is free from debris to avoid any impacts on the blades by foreign objects.

The engine can only be hand started by qualified personnel. The hard edges of the propeller can cause, in case of rapid starting of the engine, as well as in repelling severe injuries.

5 Installation

- Both halves of the hub have stamped the same serial number on their side. At first check if the halves of the hub have the same serial number.
- Mount the blades in one half of the hub following their designation.
- Fit the other half of the hub ensuring that the letters stamped into the hub line up.
- Loosly tighten the M6 bolts securing the two halves of the hub together.
- Attach the propeller to the aircraft using the M8 bolts. Loosely tighten the bolts.
- Now the propeller is ready for adjustment. It is strongly recommended to do this on the aircraft because it achieves the highest precision.

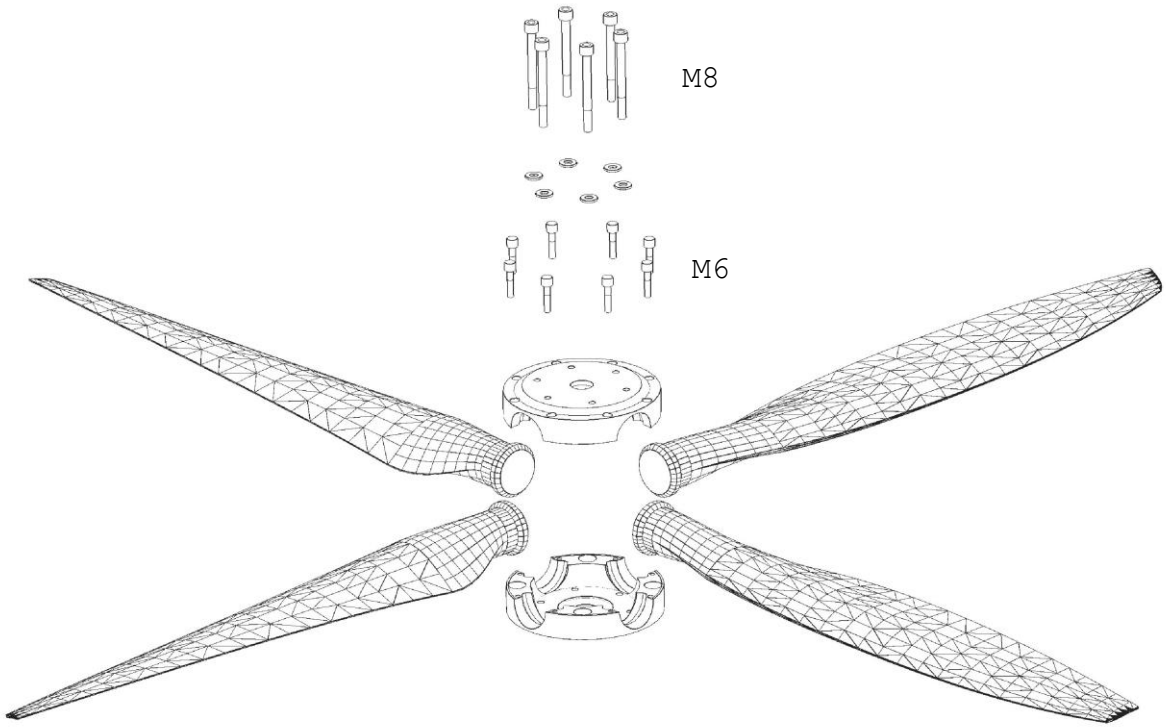
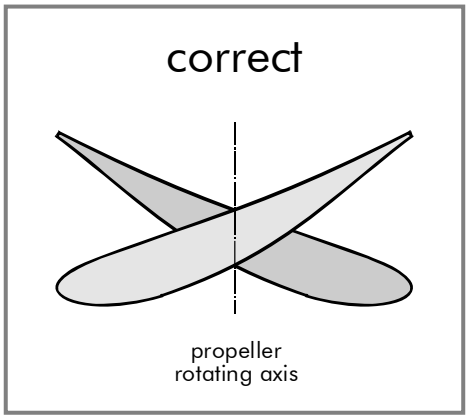
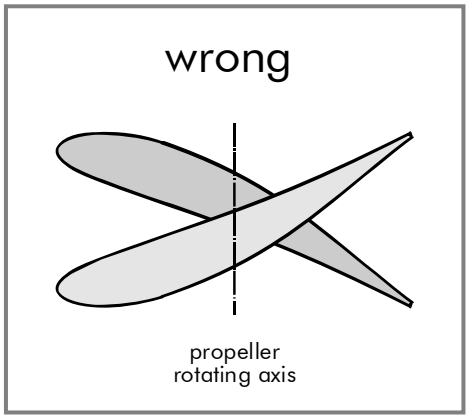


Figure 3: Composing of the Propeller

Attention: **At this point it has to be checked that the tailing edge of all blades is in right position in turning direction – backside aligned.** (Sketches 2 and 3)



Sketch 2: Correct position of the propeller blades



Sketch 3: Wrong position of the propeller blades

6 Setting Up

For the screws dimensioning generally applies:

Screw dimension and tightning torque are to be taken from the manual of the airplane manufacturer and to check.

The nominal tightening torque of retaining screws

- M8 – 8.8 amounts 23 Nm in suitable nuts
- M6 – 8.8 amounts 11 Nm in suitable nuts

The Propeller can be certainly pursued with a tightening torque in the range of

- 19 Nm to 25 Nm for M8 – 8.8 screws
- 8 Nm to 12 Nm for M6 – 8.8 screws

However, the necessary tightening torque for your present use case is influenced substantially by the really used screws and the thread located in the flange.

The observance of the selected tightening torque is to be guaranteed with suitable tools.

Adjustment occurs via an adjustment gauge. The appropriate adjusting angle is recommended by your dealer. This information does not substitute for thorough control via revolution counter. During static test a maximum engine speed has to be attained, which should be about 10% below rated speed. Only measurements during the flight can result in a final adjustment after corrections to the adjusting angle. The adjustment has to be made by a water-level. Your dealer advises the optional setting angle.

1. Turn the propeller blade into horizontal position.

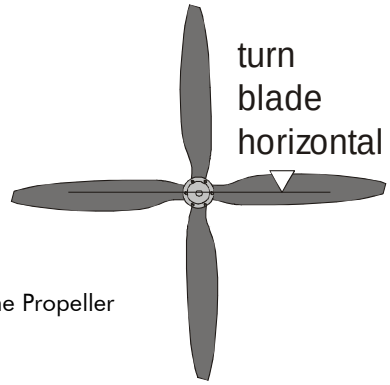


Figure 4: Align of the Propeller

2. The following alternatives can be chosen for setting up:
   A) The flange and the aircraft respectively has to be aligned horizontal and the wanted angle adjusted.
   B) The flange and the aircraft respectively has **not** to be aligned horizontal. Now the angle between the flange (aircraft) and the horizontal has to be allow for the setting up.

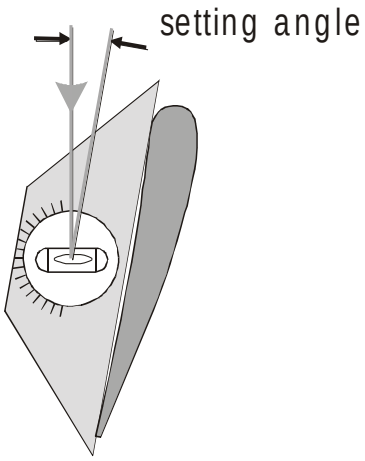


Figure 5: Adjust of the angle at the gauge

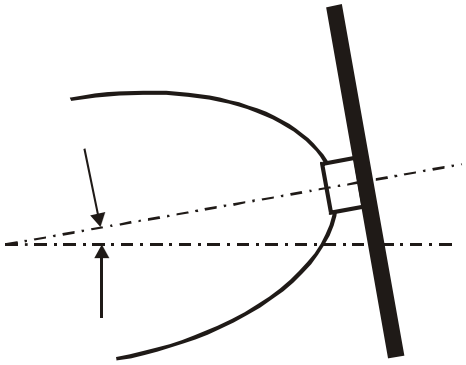


Figure 6: Motor-flange angel refering to the horizontal

3. Position the adjustment gauge 5 cm from the blade tip.

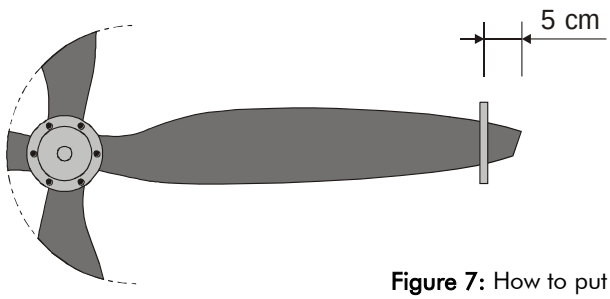


Figure 7: How to put the gauge on the blade

4. After loosen the M6-screws turn the blade to central position of the spirit level and tighten the screws loosly hand-screwed once again. Strongly bending to front and back simplifies the turning of the blade.
5. Repeat the adjusting procedure on all blades.
6. Control the adjustment of all blades again. Inexactness more than a half degree causes a to heavy aerodynamic unbalance.
7. Tighten the M8 bolt to a torque of 25 Nm cross-over.
8. Tighten the M6 bolt to a torque of 12 Nm cross-over.
9. As the screws interact repeat these both procedures.

After controlling the maximum ground engine speed the interim setting up is done for a test flight. Please note that possibly not the complete engine power is available or otherwise the engine can be overwind during faster flight.

Ensuring that the aircraft is restrained against forward motion, start the engine. Once the engine has reached its normal operating temperature, slowly open the throttle up to its full value. Observe the maximum engine r.p.m.. The maximum engine r.p.m. stated by the manufacturer should not be exceeded. With the aircraft at rest the engine r.p.m. should not exceed 95% of the manufacturers recommended maximum.

After 3 working hours the mounting of the propeller has to be checked and the screws retightened.

Generally, the following alternatives available to retain the screws:

- the preferred solution is to use a wire as bolt retaining device
- for propeller flanges with through holes self locking nuts can be used
- if the first alternatives are not possible e.g. loctite 243 can be used instead
- With engine flanges with through-hole threads no additional mother may be mounted at the screw end.

7 Pre-Flight Checks

Before every flight the following has to be checked:

- No tolerance of the propellertips
- All blades are fixed
- blades are not damaged and have no cracks
- Check bolts for tightness
- Wire lockings are in correct state

Slight resin-flakings by debris can be accepted, but should be repaired soon. This can be achieved by sparingly applying our special resin. If these checks are not satisfactory the operation has to be suspended immediately, and the propeller repaired.

Warning:

A propeller failure has more serious consequences than an engine failure! Due to damaged blades an unbalance can arise, which can cause the motor to be torn out of its bracing, thereby changing the proportions of the centre of gravity in such a way that a stable flight attitude cannot be maintained.

8 Maintenance

Certificated propellers are identified in the type label with a suitable Cert. Number.

These propeller are to be overtaken after 600 operating hours with the manufacturer. The maximum term amounts to 900 operating hours.

After flight operation the propeller is to be cleaned. This prevents the build up of dried grass, insects etc. on the blades. Cleaning of the blades should be carried out with a soft sponge using a weak detergent solution. If it seems necessary, the sheets can be treated now and then with autopolish.

If the position numbers on the blades do not exist any more, instructions can be loaded to the exact positioning of the single blades on www.helix-aircraft.de down.

9 Warranty

HELIX Carbon GmbH warrants the Propeller for two years from the date of purchase (according to German law). The warranty covers material defects but does not cover subsequent losses.