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## **USER MANUAL**

### **UM – 10 EN**

## **AIRCRAFT PROPELLER**

**Type: KW-20**  
**Model:**

**S/N : .....**



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## **2. List of Revised Pages**

Changes or revisions to this manual may only be made by the manufacturer.

Any change should be recorded in the table below.

New or revised text on a revised page will be marked by a black vertical line on the right side of the page. Date and number of the revision will be recorded on the bottom edge of the page.

<b>Revision</b>	<b>Date of issue</b>	<b>Revised pages</b>	<b>Date of insertion</b>	<b>Signature</b>
0	06. 10. 2023	New issue		

### **3. Introduction**

Read this manual carefully before putting the product into service to get basic information on operational safety.

If you do not understand the contents or if in doubt, always contact propeller manufacturer – Woodcomp Propellers s.r.o.

We wish you many a pleasant flight with Aleš KŘEMEN – WOODCOMP propellers.

### **4. Manufacturer**

#### **Woodcomp Propellers s.r.o.**

Odolena Voda, Dolínek, Vodolská 4,  
okres Praha-východ, PSČ 250 70

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### **5. Type Certificate Holder**

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## **6. Serial Number**

Please state the correct type designation and serial number of the propeller each time you contact the manufacturer.

These data are specified on the first page of this User Manual, on Warranty Certificate and on Product plate fixed on propeller blade No. 1

## **7. General Information**

KW-20 propellers are reliable and field tested in long lasting operation, however problems might occur as with any product.

Although it is impossible to eliminate all the risks involved just by reading the manual, they can be minimized by applying the information presented and using the propeller properly.

Information and descriptions in the manual are valid at the time of publication. Users of Aleš Křemen propellers may be informed of changes or mandatory measures by publication in the form of service bulletins at Woodcomp Propellers website (<http://www.woodcomp.cz>).

Illustrations in this manual are for information only and do not replace drawings in technical documentation.

Technical data are specified in SI metric system.

The manual may be translated from Czech to any other language, but the original Czech text will held decisive validity.

## **8. Operating Safety**

***This propeller is subject to approval by aviation authorities, and is always operated on users own risk!***

***Aerobatics and intentional spins with this propeller are prohibited!***

***Operation in icing conditions is not permitted!***

- ❖ Do not over speed the propeller to higher than maximum permitted rpm, with the exception of emergency procedures detailed in Sect. 14.10.
- ❖ Do not start the engine manually by the propeller.
- ❖ Pulling/pushing the aircraft using the propeller is only possible when holding the propeller root part closest to the hub.

- ❖ Before starting the engine, always check the condition of propeller and its mounting.
- ❖ Before starting the engine, always ensure that the propeller and its surroundings are clear.
- ❖ Record all data concerning propeller operation and repairs in the Propeller Log Book.
- ❖ Do not transport nor store the propeller standing on blade tips, even for short time!
- ❖ Do not store the propeller in extremely damp environment, and do not leave it outside in rain for extended periods.

## **9. Propeller Properties**

Hydromechanical propellers KW-20 are equipped by automatic rpm governor (Constant – Speed Propeller). This concept allows best possible use of engine power while offering much better comfort when using the propulsion unit.

The pilot selects optimum propeller speed by engine controls as usual. Activation of governor then ensures automatic control of engine throttle (or boost pressure) to keep propeller speed constant, regardless of changes in cruise speed, descent, turbulence, and flight manoeuvres, all without pilot's intervention. Maximum permissible rpm of propulsion unit will not be exceeded.

A plane with a propeller like this features a short takeoff run, high rate of climb to reach its flight level, low fuel consumption for the flying range or endurance demanded, and the possibility of a quick change to the maximum flight speed. The propeller also improves aircraft's service ceiling. A plane with this propeller performs better in glider towing as well.

Constant speed propeller protects the propulsion unit from damage caused by mishandling during operation.

KW-20 family propellers meet the requirements of standard airplane categories thanks to their control stability and quick reaction.



## **10. Technical Description**

KW-20 family of propellers are designed for aircraft with piston engines coupled with reducing gearbox.

Vrtule KW-20 propellers are constant speed propellers of hydro-mechanical design. In rest position (without oil pressure), propeller blades are set to minimum angle (pitch), secured by a mechanical stop.

Down pitching of blades is controlled by mass and aerodynamic effects acting on them and by means of an auxiliary screw spring in the propeller axis. Up pitching is controlled by increasing oil pressure in the propeller servomechanism, which keeps the system in equilibrium.

Control is exerted by hydraulic governor which increases oil pressure when the propeller speed goes up ("increase" type). Pressurised oil flows through propeller shaft axis into hydraulic servomechanism located in hub attachment. It consists of a cylinder, whose bottom end contacts propeller flange on the engine. Inside the cylinder, there is a piston and piston rod on which a swinging link is mounted, acting via brass stones on eccentric pins placed in blade root bushes. Blade angle down stop is located at the piston rod's front end.

The propeller hub itself and its load carrying parts are made of aluminum alloys.

Propeller blades are made of resonation fir wood core, connected to blade root by slashing and gluing. Blade roots are made of hardened wood. Blade surface is made of glass or carbon laminate, protected by gelcoat layer. This structure has exceptional mechanical parameters, low weight, great resistance and perfect look.

Blade root is precisely machined, inserted into duraluminum hub, and secured by steel screws with special thread. Blade outboard leading edges are protected against damage with a layer of cast polyurethane (PU), their inboard part (near the propeller centre) with a self-adhesive polyurethane tape

Blade root is fixed to the hub by nut with packing to prevent lubricant leak from the bearings, with PTFE ring and 40% bronze inset. Blade root is held in two axial needle-type bearings and supporting nut.

The blade tips are painted red to improve visibility when in motion.

Composite spinner is also a part of the propeller.

## 10.1. Product Label

### Hub

The hub is marked at the outer surface with self-adhesive label with propeller designation (see chapter 10.2) and serial number.

example:

**KW-20-A-H-2-0-0-F/  
R-171-031 S/N:39377**

### Blades

At the rear of each blade root there is self-adhesive label with the following data imprinted on it:

example:

**H 39377 A 10/2014 R**

H	- Blade for hydraulic propeller
39377	- Serial number of propeller
A	- Order of blade in set A, B, C
10/2014	- Date of blade manufacture – October / 2014
R	- Marking of propeller after inspection by manufacturer. Not present on new propeller.

## 10.2. Propeller Designation System

HUB / BLADES  
**KW – xx – ( ) – ( ) – ( ) – ( ) – ( ) – ( ) / ( ) – ( ) – ( )**  
 1 2 3 4 5 6 7 8 / 9 10 11

### Hub

- |          |  |   |
|----------|--|---|
| <b>1</b> | KW   | Propeller type  |
| <b>2</b> | No. of propeller model   |   |
| <b>3</b> | Code letter for propeller category:                                      | A - Automatic Propeller<br>F - Fixed Pitch Propeller<br>G - Ground Adjustable Propeller<br>V - Variable Pitch Propeller |
| <b>4</b> | Code letter for blade pitch change system:                               | H – Hydraulic<br>E – Electric<br>M – Mechanical   |
| <b>5</b> | Number of blades installed   |   |
| <b>6</b> | Code letter for feathering system:                                       | F – Feather position installed<br>0 – No feather position possible  |
| <b>7</b> | Code letter for reverse provision:                                       | R – Reverse position installed<br>0 – No reverse position possible  |
| <b>8</b> | Code letter for flange type listed in Aleš KRĚMEN Service Bulletin No. 4 |   |

### Blades

- |           |   |  |
|-----------|---|--|
| <b>9</b>  | Code letter for blade design and installation:  | R - Right-hand tractor<br>RP - Right-hand pusher<br>L - Left-hand tractor<br>LP - Left-hand pusher |
| <b>10</b> | Propeller diameter in v cm  |  |
| <b>11</b> | Blade type identification (contains design configuration and aerodynamic data) according to the certified hub/blade-combinations. |  |

## 11. Basic Performance Data

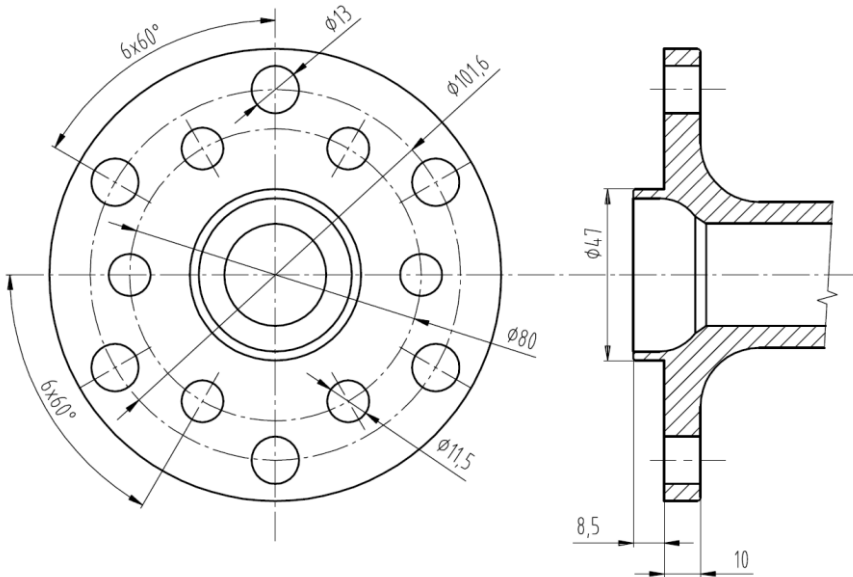
<b>Propeller model</b>	KW-20		
<b>Number of blades installed</b>	2		
<b>Blade type</b>	- 031 („W“)	- 033 („C“)	- 034 („B“)
<b>Diameter</b>	right: 1707 ± 4 mm left: 1683 ± 4 mm	1695 ± 4 mm	1715 ± 4 mm
<b>Min. angle setting</b>	5°		
<b>Max. angle setting</b>	50°		
<b>Max. engine power output-N<sub>max</sub></b>	115 HP		
<b>Max. propeller RPM - n<sub>max</sub></b>	2550 ot/min		
<b>Temperature Service Rate</b>	-25°C / +45°C		
<b>Moment of mass inertia</b>	0,4 kgm <sup>2</sup>		
<b>Mass of complete propeller</b>	cca 8 kg acc. to type of blades and spinner		
<b>Mass of Jihostroj governor</b>	0,90 kg		
<b>Lifetime</b>	Propeller lifetime is not specified if every mandatory periodical inspection are performed in specified intervals		

KW-20 has been tested in operation of aircraft equipped with ROTAX 912/914 engines  
ROTAX 912 and ROTAX 914 engines must be equipped for KW-20 propellers:

ROTAX engine version 3 is equipment for hydraulic constant speed use from factory.

- Reducing gearbox with governor drive,
- Propeller shaft supplying pressure oil to the propeller,
- Hydraulic governor, see Service Bulletin No. 03 as amended,
- Governor control from cockpit.

## 12. Connection of KW-20 Propeller to Engine



Dimensions correspond to ROTAX 912 engine flange—part number 837 282.  
Dia. 13 mm holes on dia. 101.6mm circles are used to attach KW-20 propeller.

### **13. Propeller Unit Adjustment**

Propeller unit consists of a propeller and a governor. Connection between the governor and pilot forms a part of aircraft fuselage, can differ in each particular case, and as such, is not detailed in this text.

**CAUTION!**

**Adjustment of propeller unit by persons not authorized by the manufacturer is strictly prohibited.**

Although the adjustment of propeller unit on aircraft is simple, improper modification of settings may be dangerous to propulsion unit and operating safety.

#### **13.1. Adjustment before First Flight**

This chapter discusses propulsion unit setting before first flight and/or after mounting of new propeller, or repair of the propeller or its governor.

The manufacturer supplies units already factory-adjusted and ready for installation on to aircraft and engines of serial production, which are well-known to the propeller unit manufacturer. In this case, simply fit the unit, bleed the air, and conduct pre-flight tests followed by test flight.

Propeller unit must be set correctly to work properly and to be “fail safe”. KW-20 propeller units, i.e. the propeller with the governor, are very reliable; however, regulations for higher category aircraft, according to which this propeller unit is built, require that a plane should be able to fly, albeit with limited flight envelope, even after the propeller control has been damaged. This effectively means that the plane must be able to keep flying in case its propeller remains fixed at the minimum pitch (take-off position) while the governor is off, if the propeller remains fixed at maximum pitch angle, and also when it becomes stuck in any in-between position.

The regulations also require that propeller unit must not require any pilot intervention (change of controls set before the takeoff) during takeoff and initial climb phases of the flight.

To meet these requirements, the propeller unit has a number of setting elements. All speed and angle settings are determined by the manufacturer. You should require these to be changed, always consult the issue with the manufacturer.

### **13.1.1. Propeller Governor Adjustment**

Governor maximum speed is the only setting to be made. Minimum governed speed is determined by governor design, and usually these are 50-60% of maximum speed. In case of failure of pilot-governor control link, the governor will set takeoff regime (minimum pitch) automatically.

#### Adjustment procedure:

1. Loosen propeller low pitch stop (self locking nut) by 2 turns, this moves piston rod deeper inside the propeller. This nut is located at front part of the hub, and as such it is accessible after removal of aerodynamic spinner.

This adjustment of the moment when propeller governor actually starts to reduce engine speed allows you to adjust lower maximum speed allowed by the governor.

2. Start the engine.

3. Slowly and carefully increase the power output of the engine by acting on the gas lever, while observing the engine rpm.

The engine speed will go up to 5730 to 5750rpm (ROTAX 912 engine). Speed increase should stop at this moment.

If the speed settles at lower rpm than given above, stop the engine and adjust the lever stop of the governor speed selector so as to extend the lever movement in the direction in which it is pulled by the return spring.

If the speed increases above this value, shorten the lever travel by adjusting the stop.

4. Repeat steps 2 and 3 until you reach desired maximum governed speed.

5. Secure governor speed selector lever stop.

### **13.1.2. Propeller Low Pitch Angle Stops Adjustment**

This adjustment is performed after governor adjustment (see Chapter 13.1.1 above) as follows:

1. Screw in propeller low pitch stop nut by 2 turns. (This moves piston rod out of the propeller.)

2. Check that the governor speed selector remains in the takeoff position, i.e. on the stop to which it is pulled by the return spring.

3. Start the engine.

4. Increase engine power output up to its maximum.

Rpm must increase smoothly, up to full throttle without governor intervention. At full throttle, rpm must be lower than the maximum allowed by propeller manufacturer. For instance, ROTAX 912 engine in planes climbing at lower speed (ca 80–90km/h) should

reach about 20rpm less than the governor setting. In planes climbing at higher speed (ca 110 - 120km/h), this engine should reach about 120 - 150rpm less.

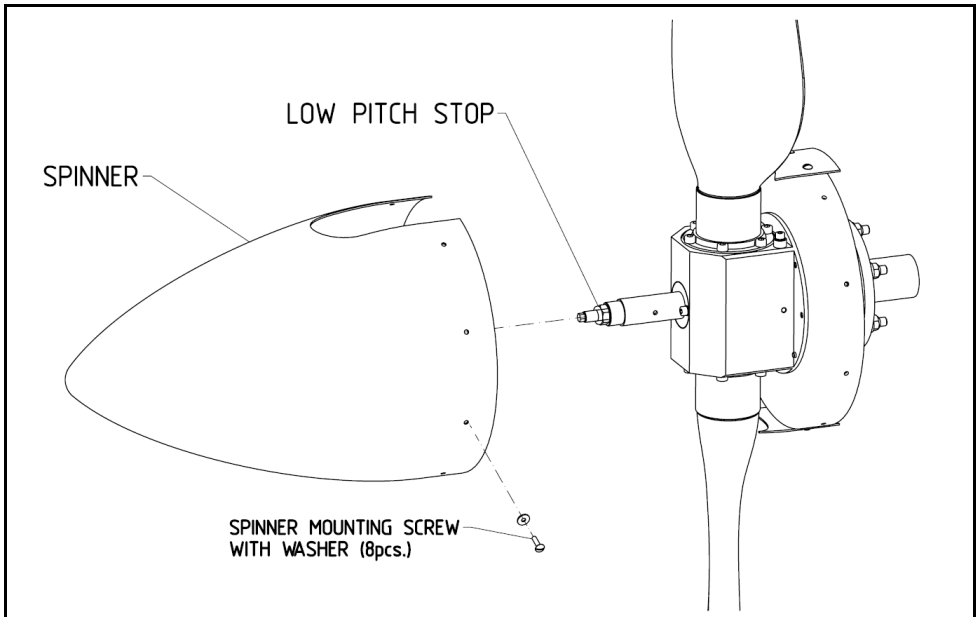
If you need lower rpm, tighten propeller down pitch stop nut. Loosen it to obtain higher setting.

5. Repeat steps 2 to 4 until you reach desired governed speed.

6. Install spinner back onto propeller. Position spinner so that red dot on spinner external surface meets red dot on backplate (withal blade No. 1). Fasten spinner using 8 screws and washers, with Loctite 243 applied.

**Remark:**

Propeller adjustment must be performed with clean propeller blades, as any soiling (e.g. insects) influences its aerodynamic properties, leading to misadjusted governor. Do not adjust the propeller at strong winds or gusts. It is not recommended to set the propeller at extreme temperatures.



Low pitch stop location



## **14. Operating Instruction**

### **14.1. Mounting propeller on engine**

1. Put a vessel beneath front part of engine to contain the oil which may escape from propeller reducer shaft or from propeller servo-system.
2. Check flange contact surfaces of reducer shaft and propeller and/or clean them to make them dry, clean and rust free.
3. Fit centring bushes (dia 13mm) into six flange holes at reduction gearbox side.
4. Put rubber sealing O-ring 46 x 2,5 P/N A-1015-01 onto 47mm centering piece. It is recommended to use new O-ring at each assembly.
5. Check that aerodynamic spinner holding plate is mounted on the propeller hub.
6. Mount propeller on flange and fix it using six self-locking nuts; torque the nuts to 22Nm.
7. Start the engine and perform engine test according to Chapter 14.2; observe the joints to ensure that oil is not leaking.
9. Mount spinner on the propeller and fix it with screws. Use new screws at each assembly.

### **14.2. Starting engine and performing engine test**

Always observe the following procedure:

1. Check propulsion unit according to its manufacturer's instructions.
2. Check propeller integrity.
3. Set speed selector to takeoff regime, i.e. to minimum pitch. This position of the speed selector corresponds to maximum rpm of propulsion unit.
4. Start the engine.

On starting the engine the propeller will achieve its idle speed. Observe engine warm-up instructions and gradually increase the speed using throttle lever. Propeller remains at the down blade pitch stop; the governor usually does not intervene. It may intervene if weather conditions differ considerably from standard and near engine's maximum power output. Under standard conditions ROTAX 912 engine will run at 5400 to 5500rpm depending on the plane type, with the governor limiting the speed at 5730 to 5750rpm.

### 5. Bleed the control system

If engine test is carried out after installation of new propeller, after oil change, or after a long period when the propeller was out of operation, it is necessary to bleed propeller control system. To carry out bleeding, set full throttle and set speed selector to maximum propeller speed (same position as when warming up engine). Then, move the selector gently toward lower propeller speed, i.e. toward higher pitch. When the propulsion unit speed decreases by 50–100rpm (without any manipulation with throttle lever), put the selector back to maximum speed position. Repeat these steps five times.

It is a serious mistake to decrease propeller speed further toward minimum value during this procedure, as the blade angle will become too high for this regime and the blades operate at too high pitch. The propeller will sustain this mishandling, but its life will be shortened.

Presence of air in the control system translates to “softness” of constant speed during flight, but this should cease soon and the propeller will finish bleeding on itself.

### 6. Verification of governor function

During engine test, which is part of normal operation of aircraft, it is not necessary to bleed the system. Checking the operation of control system will suffice. The method is the same as during bleeding; simply check the rpm dropping and recovering once.

## **14.3. Taxiing**

Leave the speed selector in takeoff position i.e. minimum pitch and maximum speed during taxiing. Control the aircraft speed using throttle lever or brakes, as necessary. Propeller speed will be controlled by throttle lever, with governor not intervening.

Constant speed propeller usually allows finer control of aircraft speed during taxiing, compared to fixed or ground adjustable propeller. However, higher rpm may be required to achieve the same ground speed; engine rpm will be higher, but actual power required will be lower.

## 14.4. Taking Off

Set full throttle and keep the speed selector in the takeoff position. As the plane gathers speed, during takeoff run and initial climb, propulsion unit rpm rise automatically till they reach maximum value set by the governor. Then the governor intervenes, keeping rpm constant.

After finishing the initial climb, it is advisable to go from the takeoff power output (limited to 5 minutes with ROTAX 912 engine) to maximum constant power (full throttle and 5500rpm for ROTAX 912 engine). The most convenient and safe transition to maximum constant power is to decrease engine speed using propeller speed selector, while keeping throttle fully open. On reaching required altitude, throttle down according to required air speed.

Any attempt to decrease engine rpm during flight by closing throttle is serious mistake, resulting from misunderstanding of how constant speed propeller works. On an engine fitted with a constant speed propeller, throttle lever actually controls propeller thrust, not rpm. Closing throttle during flight will reduce engine rpm near idle speed, where all propeller thrust is lost. Inexperienced pilot closing throttle during climb is in danger of getting into risky second regime of flight.

## 14.5. Horizontal Flight

Constant speed propeller offers the most economical operation in the horizontal flight – minimum fuel consumption for a given range or endurance. High flight speed can be obtained without overloading the engine load, and acoustically comfortable engine operating regime can be selected.

Calculation of propeller unit setting to achieve the most economical operation is complicated, requiring input of multiple performance characteristics of aircraft, engine, and propeller. However, virtually the same result can be obtained experimentally through test.

It is advisable to perform this test as follows:

1. At your preferred flight level, set throttle and speed selector to achieve normal flight regime (e.g. 4800 to 5500rpm); allow this regime to stabilize.
2. Use speed selector to achieve engine speed recommended by its manufacturer, e.g. 4300rpm, NOT TOUCHING the throttle lever.
3. Do not touch speed selector and adjust engine throttle to arrive at flight speed selected in step 1.

If propeller and engine load is too high after this adjustments (keep checking engine exhaust and oil temperature and pressure), reduce engine load by lowering propeller pitch (by setting governor control to 4800, 5200rpm and so on) and always correct

flight speed using throttle lever. If aircraft manufacturer recommends other procedure in aircraft operation manual, such procedure should prevail. In most flight regimes, lower engine rpm means lower fuel consumption per hour, and higher higher propulsion efficiency of propeller.

#### **14.6. Aircraft Manoeuvres and Turbulence**

The propulsion unit keeps set speed without pilot's intervention.

#### **14.7. Maximum Flight Speed**

Some aircraft do not achieve maximum horizontal flight speed at maximum propeller speed, but at full throttle and slightly reduced propeller speed. A suitable setting should be found according to procedure in Chapter 14.5.

The governor will protect the engine from over-speeding up to aircraft's never exceed speed plus a small safety margin ( $V_{NE}$ ).

#### **14.8. Landing**

During landing, speed selector must be set to takeoff position no later than after the final turn. This makes the recovery of speed and height easier in critical situation (wrong landing calculation, obstacle on runway). You need not be afraid of fast opening engine throttle from idling to maximum power, as the governor will protect the propulsion unit from overspeed.

#### **14.9. Stopping the Engine**

Before stopping the engine, set speed selector to takeoff position and keep it in this position when not airborne, too.

#### **14.10. Emergence Procedures**

KW-20 propellers are reliable, but as the possibility of failure can never be completely eliminated, all pilots must know correct procedures allowing safe completion of flight in case of a failure.

Propeller governor failure usually results in blocking of certain propeller pitch between the stops or at one of the stops. Propeller then effectively becomes fixed-pitch propeller. In this case, propulsion unit can only be controlled by throttle lever. The other type of failure includes loss of control stability due to e.g. impurities in oil entering the governor or the propeller. Depending on the position in which the blades have locked and depending on the flight regime, the pilot should act as follows:

##### **A) Propeller blades locked in small pitch range**

The failure is indicated by increased rpm at flight speed higher than the optimum speed of climb.

If this failure occurs before or during takeoff or initial climb, it will go unnoticed and takeoff will complete as usual. The pilot will notice this failure as the aircraft gains speed and the engine starts over-speeding.

It is necessary to reduce flight speed to aircraft's optimum speed of climb. At lower speeds, engine's entire performance envelope can be used.

If this failure occurs at high flight speed, the engine rpm may increase considerably. The pilot should react by quickly closing throttle, to idle position if possible, and wait for the speed to drop to optimum speed of climb, then open throttle again and continue flying at lower speed.

In both cases described above, slightly increased engine speed is tolerable for shorter period, as necessary.

***Continue flying to nearest location suitable for precautionary landing.***

### **B) Propeller blades locked in high pitch range**

The failure is indicated by reduced rpm which can only be compensated by opening engine throttle. Pilot should increase engine power and if flight level allows it, descend to increase flight speed. Gaining sufficient flight speed is absolute priority. Propulsion unit is capable of maintaining level flight in this condition, and slow climbing as well, at suitable speed. Consider your landing approach thoroughly, as "go around" may be impossible depending on many factors (wing equipment and/or landing gear in landing configuration).

***Continue flying to nearest location suitable for precautionary landing.***

### **C) Loss of control stability**

This failure is indicated by fluctuating speed of the propulsion unit. Speed control should be quickly set to maximum rpm position, and engine power reduced to value sufficient for safe completion of current manoeuvre. This will reduce governor's workload.

***Continue flying to nearest location suitable for precautionary landing.***

## **15. Transport, Handling, Storage**

### **15.1. Propeller Delivery**

Propeller is delivered complete, with cabling, controls, signaling, electric power brushes, propeller attachment hardware, and necessary documentation.

### **15.2. Handling**

Propeller must be handled very carefully, to prevent damage, including e.g. damage by impact.

When transporting disassembled propeller, blades must be protected by cloth pockets. For safer transport, we recommend to place propeller into solid box (cardboard, plywood). Complete propeller must be transported in horizontal position with the hub supported.

### **15.3. Storage**

During storage, blades must be protected by cloth pockets. Before long-term storage, we recommend to clean propeller body and blades with lukewarm water and detergent.

Complete propeller must be stored in horizontal position with the hub supported, or hanged by attachment holes.

Storage condition: temperature 5° to 25°C, relative humidity up to 80%.

**It is prohibited to store and/or transport the propeller standing on blade tips—even for short time!**

### **15.4. Transport**

Propeller is always delivered in special carton package, which may be used to return the propeller to manufacturer or authorized service centre for service inspections.

Note:

When sending propeller for overhaul, it may only be sent disassembled provided that disassembly was performed by authorized service centre.

### **15.5. Responsibility for Transport**

When standard packing recommended by the manufacturer is used to transport the propeller, the manufacturer bears responsibility for proper packing at manufacturing plant, up to acceptance of the package by the transport company, which takes over the responsibility afterwards.

Customer must always check that propeller packing is undamaged on receipt of the package from the transport company.

If packing is damaged on receipt, unpack the product in presence of the transport company representative, observe, record, and/or claim the damage.

## 16. Inspections

Mandatory inspections must be performed according to the following table:

Chap.	Operating hours	Type of inspection	Performed by
16.1	<b>Pre-flight inspection</b>		Pilot or designated mechanic/technician
16.2	<b>25hrs</b>	After the first 25 operating hours from each new installation to the engine	Pilot or designated mechanic/technician
16.3	<b>100hrs/1 year*</b>	See Chap. 16.3	Pilot or designated mechanic/technician
16.4	<b>700hrs/3 years*</b>	See Chap. 16.4	Propeller manufacturer or Authorized service center
16.5	<b>1400hrs/6 years*</b>	Overhaul, see Chap. 16.5	Propeller manufacturer or Authorized service center
18	<b>Exceptional</b>	See Chap. 18	Pilot or designated mechanic/technician, consult with the Propeller manufacturer or Authorized service center

\* Whichever occurs first

**CAUTION**  
**Periodic inspections must be recorded in Propeller Log Book.**

### 16.1. Pre-flight Inspection

Perform visual check before each flight:

- Tightening of all screws;
- Attachment of propeller to engine flange;
- Condition of blades, leading and trailing edges. Condition of blade roots at connection to propeller head;
- Condition of propeller spinner, attachment to propeller.

Defects, if discovered, must not exceed the scope detailed in Chapter 19.

On discovering unacceptable defects, stop using the propeller immediately and send the propeller for repair to manufacturer or authorized service center!



### **16.2. After first 25 operation hours or after each new installation**

Check tightening torque of flange nuts (22Nm). Use torque wrench with valid calibration.

### **16.3. After 100 operating hours**

After 100 operating hours:

- Perform all tasks described in Sect. 16.1.and 16.2.;
- Remove propeller spinner and perform visual check of all components.

### **16.4. Medium Repair**

Medium Repair is performed after 700 operating hours or 36 months after Overhaul– whichever occurs first.

Medium Repair may only be performed by manufacturer or authorized service centre.

### **16.5. Overhaul**

Overhaul is performed after 1400 operating hours or 72 months after Overhaul– whichever occurs first.

Overhaul may only be performed by manufacturer or authorized service centre.

**CAUTION**

**Without mandatory inspections being regularly performed,  
the propeller is not airworthy and must not be used.**

## **17. Airworthiness Limitations Sections**

No Airworthiness Limitations.

## **18. Special Inspections**

Special inspections are necessary when:

- When major damage to blade by impact of foreign object (stone, bird, hail, etc.) is detected
- In case of careless or prohibited handling;
- In case of overrevving the propeller by more than 200rpm;
- In case of lightning strike;
- In all cases of operating the propeller outside the conditions/ranges stated in this manual.

Special inspections may also be required when installing propeller on other engines than ROTAX 912/914.

**WARNING!**

**Damage to the propeller is more dangerous than damage to the engine!**

## **19. Repairs**

This chapter describes repairs of small damages which may be performed by the user. Description of damage and method of repair must be recorded in Propeller Log Book.

**WARNING!**

**More serious damage can only be repaired by the manufacturer  
or authorized service organization.**

### **19.1. Blade Repairs**

Only small dents and cuts on the blade surface or leading may be repaired. In case of any doubt about blade condition the manufacturer or authorized service station.

***Blade surface:***

Maximum permitted depth of damage to suction or pressure side of blade is 0.7mm. Surface area of single repaired spot must not exceed 0,5cm<sup>2</sup>

Maximum permitted depth of damage to trailing edge is 2mm, repaired locations must be farther than 80mm away from each other, and must not be longer than 15mm.

**Repair procedure:**

1. Clean and dry the location.
2. Use fine file or sandpaper to prepare the location.
3. Fill the location with epoxide.
4. Let cure and grind to blend with the surroundings.
5. Apply polyurethane paint to repaired location.

Hair-cracks on the blade surface are permitted if they are only in outer gelcoat layer. If they start growing quickly and penetrating into the fibreglass (or carbon) layers, stop using the propeller immediately and contact the manufacturer or authorised service station

Pay special attention on leading edge or trailing edge damage. Such damage may cause penetrating of moisture to wooden core and must be repaired as soon as possible.

***Polyurethane leading edge:***

Maximum permitted depth of damage to PU leading edge is 2mm, repaired locations must be farther than 80mm away from each other, and must not be longer than 15mm. No cracks on the leading edge are permitted. The leading edge must always fully adhere to blade along the entire length.

The repair may be done only by filling and sanding, to achieve smooth shape. Don't try to add any material to damaged areas.

### ***Stainless steel leading edge:***

Maximum permitted depth of damage to stainless leading edge is 1mm, damaged locations must be farther than 80mm away from each other and must not be longer than 5mm. No puncture or crack on is permitted, nowhere on the length of leading edge. The leading edge must fully adhere to blade, and no gap between stainless strip edge and blade surface is permitted.

No repairs of the stainless leading edge are permitted.

## **19.2. Repairs of Propeller Head and Metal Parts**

Repairs of propeller head and metal parts are strictly prohibited!!

## **19.3. Repairs of Propeller Spinner**

Only small surface cuts on outside surface not deeper than 0.5mm may be repaired.

### **Repair procedure:**

1. Clean and dry the location.
2. Use fine file or sandpaper to prepare the location.
3. Apply polyurethane paint to the dent/cut.

## **19.4. Replacement of Polyurethane Protective Tape**

### **Replacement procedure:**

1. Carefully remove old tape (slightly heat the tape using hairdryer).
2. Clean the surface from dust and oil. Do not use benzine or an organic solvent for this operation.
3. Prepare a mixture of 25% isopropylalcohol (or ethylalcohol) with 75% of water and a small drop of detergent.

**DO NOT USE SOAP!!**

4. Carefully remove backing tape from new foil, taking care not to touch/soil the glue surface.
7. Apply tape to prepared blade surface.
9. Use plastic spatula to force out air bubbles, or puncture the tape by a pin, and press out air using a roller or finger pressure. Do not use a blade or razor to cut the tape!!
11. Place the propeller into operation no sooner than after 24 hours from applying the tape, when the glue fully cures.

## 20. Troubleshooting

If you cannot solve a problem according to the following instructions, contact the manufacturer or authorised maintenance organisation.

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
Propeller vibrates	Propeller damaged	Check propeller and its accessories visually. Repair damage or contact manufacturer
	Wrong attachment of propeller	Check propeller-to-engine attachment and securing. If defect is found, reinstall propeller or contact manufacturer
	Unbalanced propeller	Dismantle, check balance or have the propeller balanced by manufacturer
	Defective engine	Follow instructions provided by engine manufacturer
Speed fluctuation	Presence of air in the control system	Bleed the control system according to chapter 14.2.5.
	Defective propeller	Contact propeller manufacturer
	Defective governor	Contact governor manufacturer
	Defective engine	Contact engine manufacturer
Oil leak between engine flange and propeller	Defective sealing ring	Change sealing ring according to chapter 14.1. 4.
Oil leak at other propeller parts	Defective propeller	Contact propeller manufacturer
When on ground, propeller does not return to small pitch angle or returns slowly	Passive forces of servo mechanism	If this only happens with propeller on ground without airplane forward motion, there is actually no problem. When the plane sets into motion, the blade setting moment will increase to a sufficient value. If this does not happen, contact the manufacturer.

## **21. Warranty Conditions**

### **21.1. Warranty Period**

The manufacturer accepts responsibility for faults of new and unused product for the period of 24 consecutive months from sale to original purchaser recorded in the Warranty Certificate, or for 100 operating hours, whichever occurs sooner.

After 25 operating hours, propeller must be presented to the manufacturer or to an authorized service centre for inspection, otherwise the warranty becomes void.

Actual operating hours must be recorded to Propeller Log Book and Aircraft Log Book.

No unauthorized or unprofessional modifications may be performed, otherwise the warranty becomes void.

The propeller must be operated according to manufacturer's instructions and provision of this User Manual.

### **21.2. Warranty Conditions**

The user must present the manufacturer with completed Propeller Log Book and stamped/signed Warranty Certificate, along with proper records of propeller installation and operation.

### **21.3. Responsibility**

The warranty does not cover possible secondary damages.

All legal relationships resulting from purchase of the propeller by the user, from services provided by the manufacturer during maintenance, and also all legal relationships resulting from propeller operation, especially those resulting from responsibility for propeller faults, responsibility for damages, and remuneration of property and other damages related to propeller operation, propeller accident, and related events, will be assessed according to Czech law, and will be decided according to it by applicable court in the Czech Republic.

### **21.4. Honoring the Claim**

Faulty product will be assessed by the manufacturer within the warranty period, and if claim is accepted, faulty parts will be replaced with new ones, with parts and work free of charge. Original replaced parts become property of the manufacturer.

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**WARRANTY CERTIFICATE**

**Manufacturer:**

**Woodcomp Propellers s.r.o.**  
Odolena Voda – Dolínek, Vodolská 4,  
Praha-východ, ZIP 250 70  
Czech Republic

**Propeller type:** KW-20

**Model:**

**Type Certificate:** ULL-08/2012

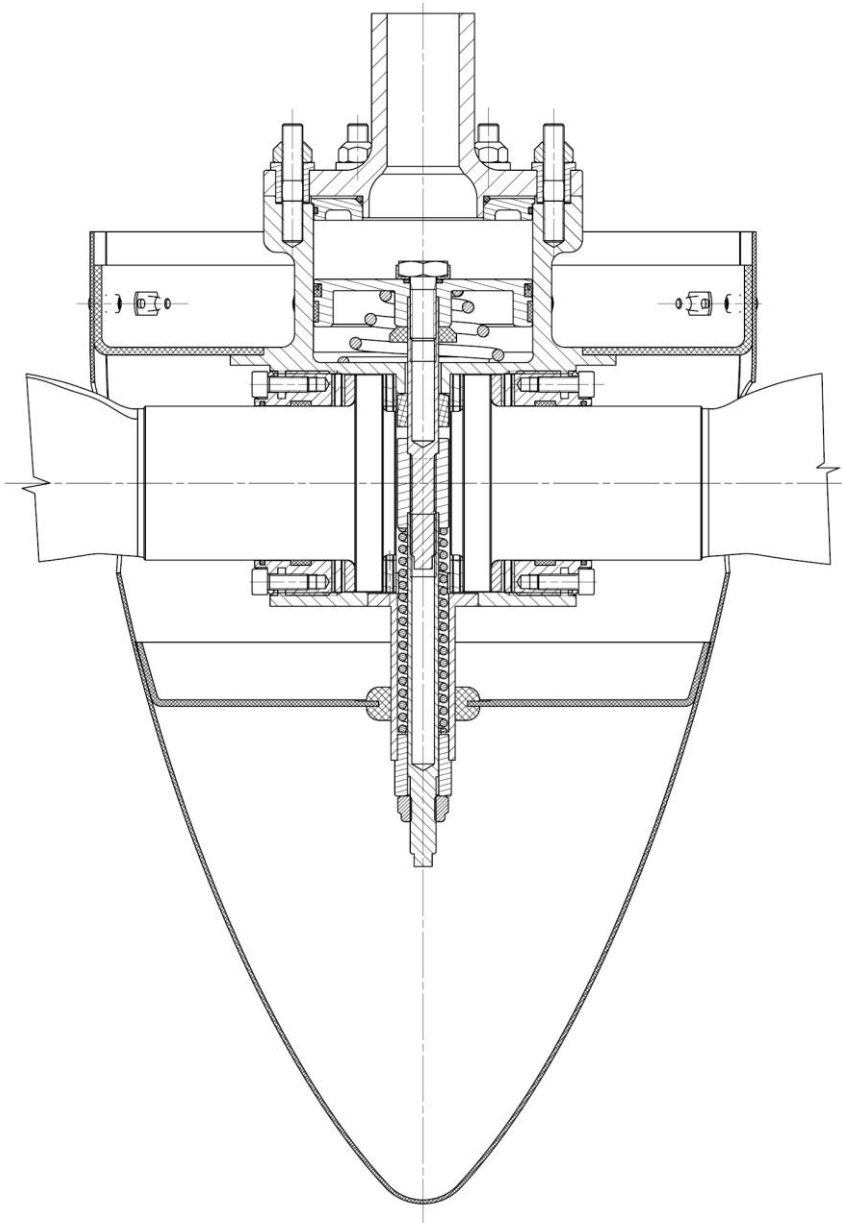
**Serial Number:** .....

**Date of Sale:** .....

**Supplier's Stamp and Signature:**

Product warranty is subject to warranty conditions listed in Chapter 21 of this User Manual.



**KW-20 PROPELLER**

**Propeller records: KW-20**

<b>Aircraft</b>	<b>Date</b>	<b>Hours in service operation</b>	<b>Total number of hours in service</b>	<b>Recorded by</b>