



**CARBON GROUND ADJUSTABLE PITCH PROPELLER  
OPERATION AND ASSEMBLING**

**MANUAL**

*Dear customer!*

*“DTpropeller” would like to thank you for choosing our product and guarantees its high quality and perfect operation provided the rules of operation and assembling to be complied*

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## 1. BASIC GUIDELINES

Before starting the assembling/setup/operation it's necessary to carefully read this manual

If there are any additional questions, please refer to manufacturer [office@dtpropeller.com](mailto:office@dtpropeller.com).

DTpropeller is not be responsible for any consequences resulting from the mishandling and/or malpractice of all the insrtuictions described in this manual.

Any information about this product and its specifications may be altered without prior notice.



The propeller, purchased according to specifications (power range, revolutions per minute, reduction gearbox) chosen by the client, can be operated only with the given engine. Usage of our propeller with any other engine is possible only with the DTpropeller written permission.

The DTpropeller propellers are intended for operating with paramotors, paratrikes, hang gliders, gyroplanes, drones. Operation of DTpropeller propellers on planes and other aircrafts has been prohibited. DTpropeller is not be responsible for any consequences resulting from the mishandling and/or improper compliance of operating rules.

Any rotating propeller is mortally dangerous. Please stand back from the rotating propeller's zone.

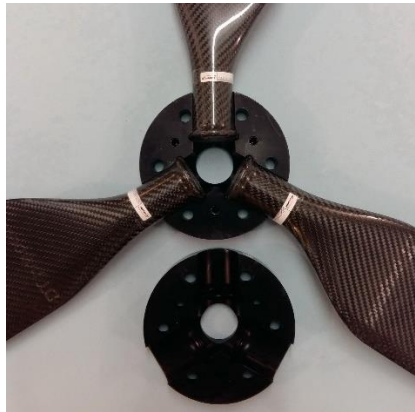
Don't touch even the non-rotating propeller because in may start working unexpectedly and cause the severe injury. During the aircraft's maintenance, always make sure that the ignition is off before rotating the propeller.

## 2. PACKAGE CONTENTS



1. Carbon blades
2. Propeller hub, anodized aluminium 7075T6
3. M6 screws for assembling the propeller hub
4. M8 screws for fixing the propeller

## 3. ASSEMBLING AND SETTING UP THE PROPELLER



Propeller hub consists of two parts; the lower one can be identified by presence of screw thread M6 for assembling the propeller hub.

Pusher propeller: set the blade necks onto the lower part of propeller hub slots/sockets in the manner that the blade's flat (working) surface would face you. Cover them with the upper part of propeller hub and clamp using M6 screws.

Tractor propeller: set the blade necks onto the lower part of propeller hub slot/socket in the manner that the blade's convex surface would face you. Cover them with the upper part of propeller hub and clamp using M6 screws.

**ATTENTION!**

- While mounting the propeller on the engine use the torque indicating wrench to control propeller bolt torquing force;
- Avoid placing the rubber, plastic etc. fillings between the engine pulley and propeller hub because it will result in the spontaneous unscrewing of clamping screws that causes the propeller destruction, other equipment and property damage, including third party property as well as a health hazard up to lethal outcome;
- Don't lubricate the blade necks and propeller hub slot/socket with oil, silicone etc., otherwise it may cause the spontaneous pitch change during the flight and, as a result, the vibration, propeller destruction and tragedy;
- Before testing the propeller with the engine to measure the maximum static rotations values, make sure that the tachometer is correct and calibrated. Following the malfunctioning tachometer indications causes the incorrect setting of the angle of attack that may induce the overrevving the propeller maximum rotations and, as a result, the propeller destruction, other equipment and property damage, including third party persons, as well as a health hazard up to lethal outcome.

#### 4. ADJUSTING THE ANGLE OF ATTACK USING THE SCALE



To adjust the angle of attack approximately you can follow the scale marks, which coat the blades as well as the marker on every hub slot/socket. The first scale mark corresponds to “zero grade” on the blade tip. Every next following mark equals to 2 grades.

The angles have to be set equally on all blades. The acceptable error's value should not exceed 0,3 grades.

In the case of the angle of attack's value unknown, start adjusting the angle with the scale mark 6. To do that, set the blades onto the hub slots/sockets and mount two parts of the hub with M6 screws. Fix the propeller on the engine's flange with M8 screws. Do not torque the screws too hard: blades should be fixed without loose but have a room enough to overtwist to adjust the angle of attack. Set the identical angles on all blades. Finally fix M6 screws and then M8 screws. To control all bolt torqueing force use the torque-indicating wrench.

Warm up the engine and gradually increase the engine rotations up to the throttle valve to be fully opened. If the tachometer's readings indicates the overrevving the engine's maximum rotations, increase the blades angle. If the engine did not achieve the maximum rotations, decrease the blades angle of attack.

To adjust necessary angle of attack it may require repeating afore-mentioned actions many times.

The angle is considered as set correctly if the engine with the throttle valve fully opened keeps and does not override the maximum rotations authorized by the engine manufacturer. Such settings make possible to achieve the maximum thrust required for the tandem-type flights, competitions or dynamic style fans. To extend the engine's life time and fuel saving it's recommended to adjust the angle of attack in the manner that the engine's maximum static rotations values were 5-10 percent lower than the engine maximum rotations values permitted by the manufacturer. **Keep in mind that such blade angle settings reduce the static thrust because only maximum rotations values permitted provide the engine with full thrust. Refer to the engine manufacturer's documentation.**

## 5. ADJUSTING THE ANGLE OF ATTACK USING THE ELECTRONIC PROTRACTOR OR SMARTPHONE



Set the blades onto the hub slots/sockets and mount two parts of the hub with M6 screws. Do not torque the screws too hard: blades should be fixed without loose but have a room enough to overtwist to adjust the angle of attack.

Now make sure that the ignition is switched off and mount the propeller on the engine fixing it with M8 screws in such force that the engine drive pulley hub and blades didn't loose but the blades rotates on its own axis without fastening. The hub blades gap may be checked if tailing the blade and moving it to and fro.

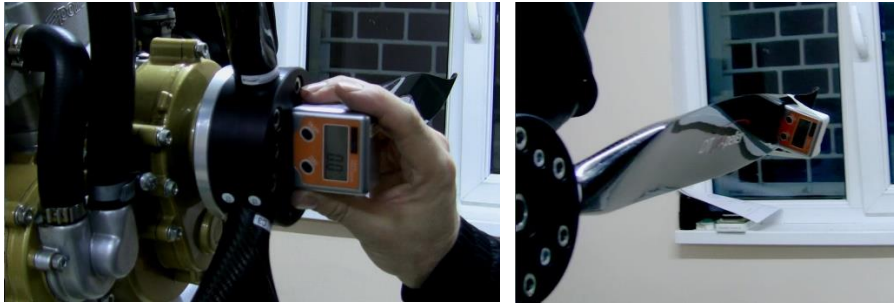
If the blade doesn't loose but rotates on its own axis without fastening, it's time to proceed to angles setting using the electronic protractor or smartphone.



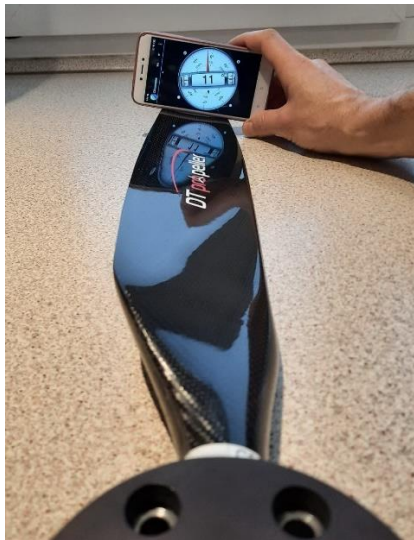
Measuring the angles using the electronic protractor or smartphone is performed on 75 percent of the propeller circle radius. For example, let the propeller diameter equal 150 cm. Then its radius equals  $150/2=75$  cm and 75 percent of this radius value equals  $(75\text{cm} \cdot 75\%) / 100 = 56,25$  cm. Measure 56,25 cm out of hub center and set the mark on the blade. Do the same with the other blades.

The blade for adjusting the pitch must be located in horizontal position. Put the electronic protractor or smartphone to the propeller hub and calibrate it by pushing «zero» button. Wait for a while up to displaying the “nulls”.





Then, with no changing in the protractor's position, put it to the 75 percent of the propeller circle radius mark and, for the reasons of convenience, fasten it tightly to the blade with masking tape. Set the necessary angle by turning over the blade. Repeat the same operation for other blades. The angles have to be set equally on all blades; otherwise, there will be the vibration during the propeller running. The acceptable error's value should not exceed 0,3 grades. The propeller's performance strictly depends on the accuracy of the blade angle of attack adjusting. Fix the M6 screws finally and then the M8 screws. Then fix the M6 screws again. To control all bolt torquing force use the torque indicating wrench.



## 6. PROPELLER BOLT TORQUEING FORCE

To clamp the M6 and M8 screws, use the 5 mm and 6 mm hex-nut wrenches respectively. The propeller bolt torquing force incorrectly applied may cause both the propeller destruction and more afore-mentioned heavy consequences. The excessive propeller bolt torquing force will cause the thread connection's break-off and the blade necks deformation resulting in the propeller destruction.

The weak propeller bolt torquing force will cause the spontaneous unscrewing of clamping screws and, as a result, the vibration and disbalance followed by the propeller destruction.

Use the torque-indicating wrench to control the propeller bolt torquing force.

**Clamp the screws gradually, without jerks in 3 steps**, increasing the torquing force by 30 percent in every next following step:

1. Torque the propeller hub M6 screws with the force 7-8 Nm.



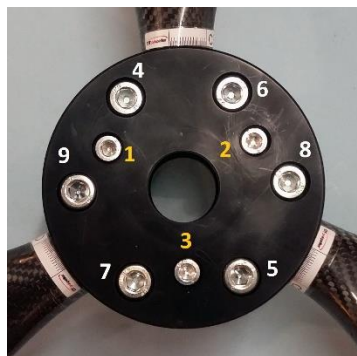
2. Torque the propeller mount screws onto the engine pulley.

*If the engine pulley is made of aluminum alloy, the torque value to be set for M8 screws is 14-15Nm; if the engine pulley is made of steel, the torque value to be set for M8 screws is 18-19Nm.*



3. Torque the propeller hub M6 screws with the force 7-8 Nm again.

*If skipping the step 3, it may cause the M6 screws unscrewing with all negative consequences.*



Scheme of the alternate screws clamping

Always check the bolt torquing force and the propeller blades angles every 15-20 minutes after the engine warm-up. The further bolt torquing force checking has to be performed on demand but at least after 50 hours of flying time or every 3 months.

After torqueing all the screws check the gap between 2 halves of the propeller hub. It's very important for the gap to be at least 1 mm. If the gap value is less, 2 halves of the propeller hub need to be polished on the grinder to achieve the correct gap. Otherwise, send them to the DTpropeller to perform this operation.

## **7. PROPELLER'S INSPECTION AND SERVICE**

Before every flight, inspect the propeller and its mountings. Check the gap between 2 halves of the propeller hub (the gap value has to be at least 1 mm), the presence of the hub blades loose and control the bolt torqueing force.

Always keep the propeller in cleanliness because the pollution negatively impacts the propeller blades working efficiency. In the case of presence of foreign solids (oil, insects etc.) on the blades, remove them with soft cleaning sponge wetted in the detergent solution or non-aggressive glass-cleaning agent. Then wipe the blades surface with dry soft cloth.