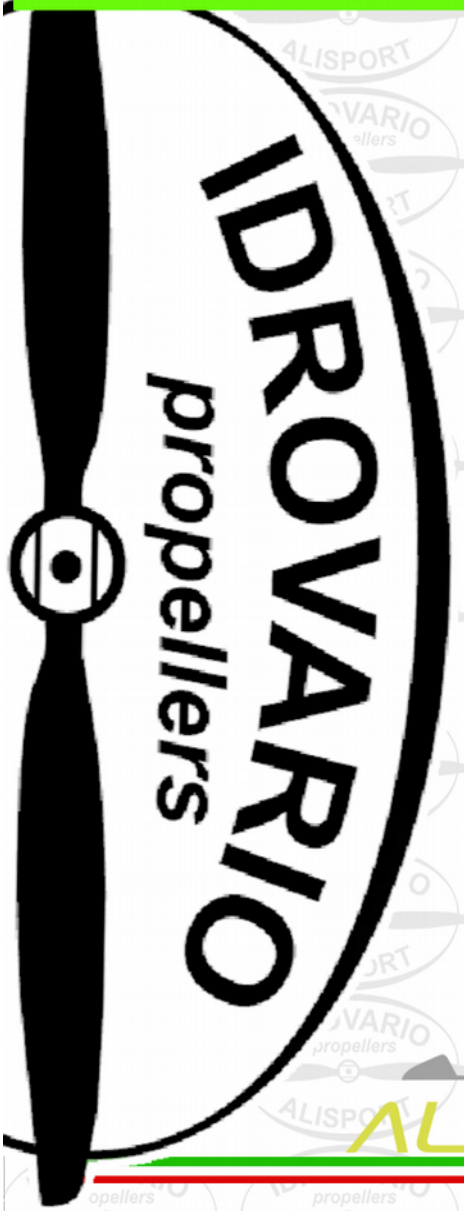
IDROVARIO PROPELLERS

TWOBLADED - THREEBLADED - FOURBLADED

IN FLIGHT VARIABLE PITCH PROPELLER



User Manual

installation

use

maintenance

ALISPORT

GENERAL INFORMATION

The present manual contains important information about the Idrovario system, to its installation and maintenance. The information in this manual can be changed and/or replaced without notice.
Alisport Srl (afterward Alisport) reserves the right to change, delete and update the information without obligation of notify to any person or organization of such changes.

WARRANTY LIMITS

The Alisport guarantees that its products are free from defects in materials and are warranted for 1 (one) year from the date of purchase.
During this period Alisport, at its sole opinion, will repair or replace the components that fail in normal use of the product. These repairs and replacements will be made at not charge to the customer limited to the components and to the labor costs, however the customer will be responsible for any transportation costs.
This warranty doesn't cover failures due to abuse, misuse, accident or unauthorized alterations or repairs.

Alisport doesn't assume any responsibility for damages due to unauthorized installation, alterations or repairs, abuse, misuse or accident.

To obtain warranty service is necessary inform Alisport or an his distributor providing total hours in service, pictures (if possible) and defects description.

Mandatory condition for the request of warranty is supply the "propeller logbook", filled in all sections, allowing to trace the product an in order to get installation data, maintenance status and the propeller total hours in service.

INTRODUCTION

The present manual contains important information for pilots, installers and mechanics about the maintenance and the safety of the Idrovario system.

WARNING – WARNING ***-*** *Note*

The following definitions are to apply to warnings, cautions and notes used in this manual:

WARNING: 	**MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION OF THE FLIGHT SAFETY.**

CAUTION:

MEANS THAT THE NON-OBSERVATION OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A MORE OR LESS LONG TERM DEGRADATION OF THE FLIGHT SAFETY.

Note:

Draws the attention to any special item not directly related to safety but which is important or unusual.

NOTICE TO THE AIRMEN

The pilots must be aware that this activity involves risks, although with appropriate precautions can be minimized, however, aren't completely eliminated.
This refers in particular to the propeller, in case of failure, can induce vibration so violent able to damage the aircraft and to force landings with unknown consequences that could be even serious.

The propeller work in an flow of air at high speed in combination with the vibration. The engine vibration and the centrifugal force generate significant structural stresses

WARNING:

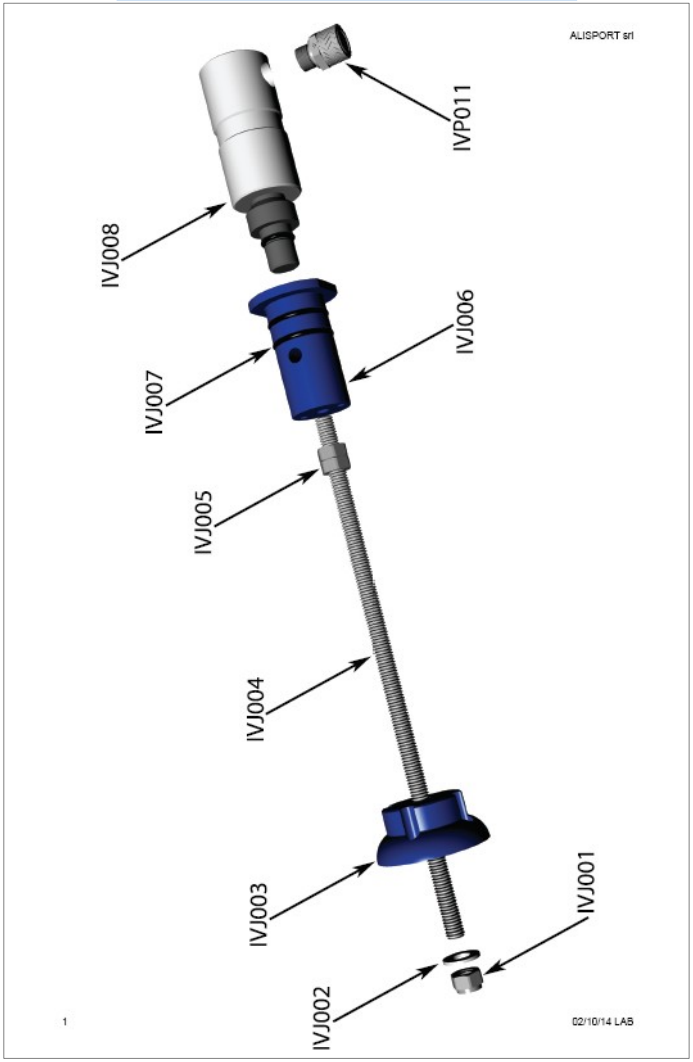
IT'S ESSENTIAL THAT THE PROPELLER MAINTENANCE AND CHECKS MUST BE PERFORMED MINUTELY, IN AGREEMENT WITH THE PROCEDURES IN THIS MANUAL. THE APPEAR OF UNUSUAL VIBRATION HIGHLIGHTS THE HIGHER ALARM LEVEL AND IT'S INDISPENSABLE IMMEDIATE CONTROL

PROPELLER TABLE

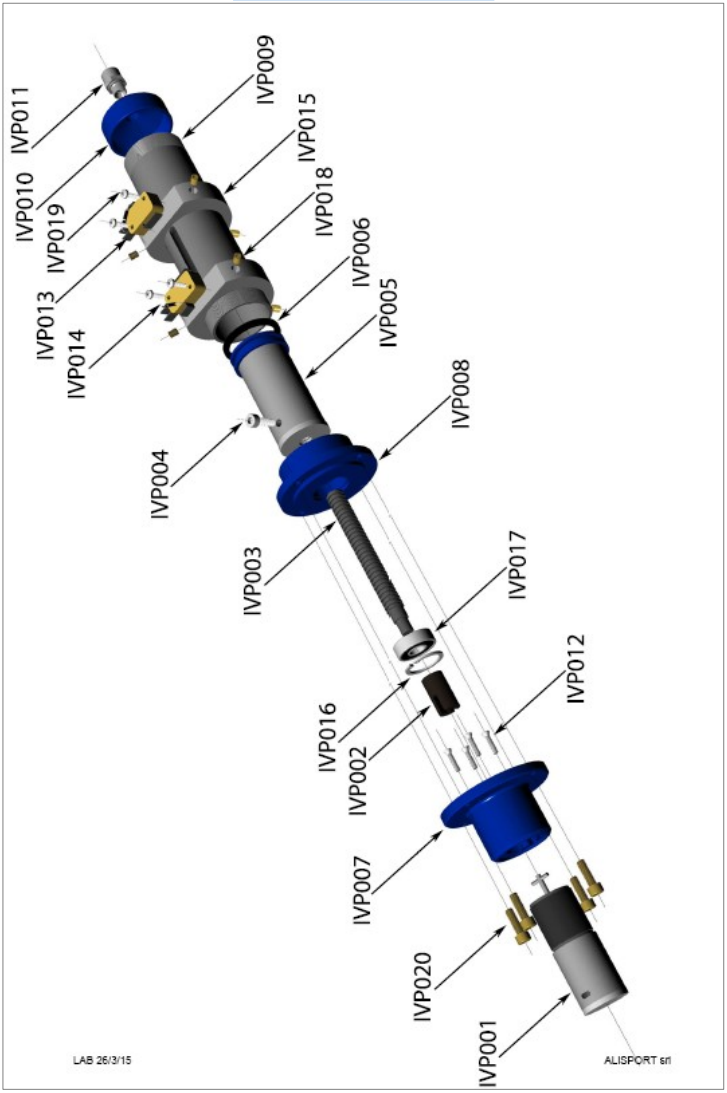
Model	Diameter [mm]	Weight* [kg]	[kg • cm^2]Polar momentum	Max RPM [RPM]	Max Engine Power [hp]	Direction of Rotation
TWOBLADED HS	1760	5.8	3260	2450	100/115	RH
TWOBLADED STD	1720	5.7	2940	2560	80	RH / LH
THREEBLADED STD	1760	7.9	4400	2560	80/100/115	RH / LH
TWOBLADED BB	1620	5.4	2000	2560	80	RH
THREEBLADED BB	1660	7.6	3370	2560	100	RH
FOURBLADED BB	1670	10	4600	2560	115	RH

* Weight without spinner and plate

HYDRAOULIC ROTARY JOINT

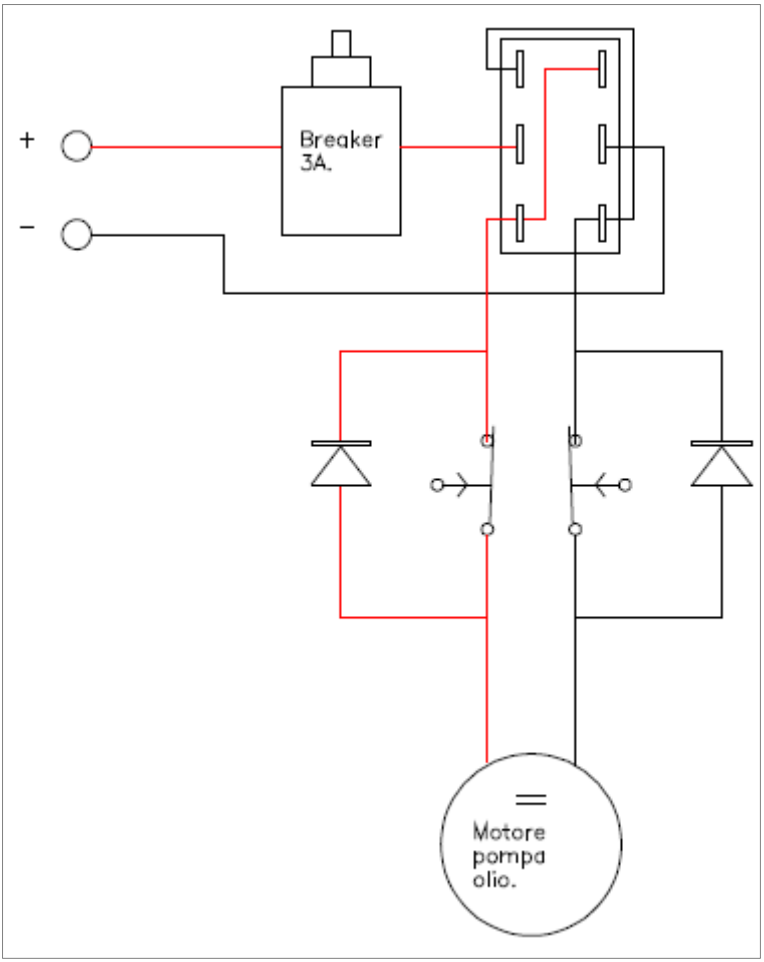


ELECTRIC PUMP



- available also in manual mode without motor -

ELECTRIC PUMP LINK SCHEME



INSTALLATION INSTRUCTIONS

WARNING:

REQUIREMENTS FOR A CORRECT INSTALLATION
CONTACT QUALIFIED INSTALLERS, MAKE SURE YOUR ENGINE IS SUITABLE FOR INSTALLATION OF A VARIABLE PITCH PROPELLER. IT'S ESSENTIAL THAT THE GEAR BOX IS EQUIPPED WITH A SLIPPING CLUTCH CALIBRATED IN FUNCTION OF THE PROPELLER WEIGHT AND MOMENTUM OF INERTIA.
USE ONLY HYDRAULIC OIL FOR AUTOMATIC TRANSMISSION (e.g. A.T.F.).

1. Replace the dragging bushing of the propeller flange with those supplied
2. Insert from the back part of the propeller shaft the rotating joint without the threaded rod, lubricated the O-Ring.
   Verify that the joint does not touch with any part of the engine hood
3. From the front of the gear box: insert the threaded rod and screw it until the two nuts placed at 10 mm from the end (IVJ005) will touch; insert the front cap (IVJ003), the washer (IVJ002) and at last put the self-blocking nut (IVJ001)

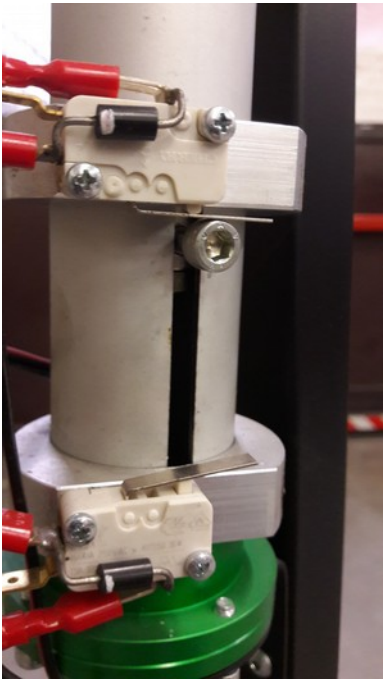
WARNING:

INSTALLED THE ROTARY JOINT DON'T START THE ENGINE WITH-OUT OIL IN THE PROPELLER CIRCUIT

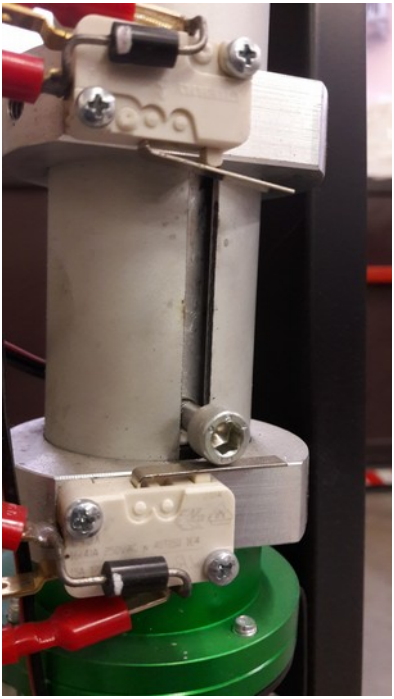
4. With supplied oil: lubricate the O-Ring placed on the bottom cap in the connecting part with the engine shaft flange, install the propeller, put the 12 washers and the 6 self-blocking nuts on the stud bolt, lock with the crisscross system and, without forcing, bring nuts stop against flange.
5. Lock the screw with torque wrench at 2,2 kgm
6. mark the screws with SEAL TORQUE: if cracked, highlights a loosening
7. install the pump (if electrohydraulic: make electri-cal connections and do a working test)

Note: *In this stage don't install the pipe in the joint.*

8. move the pump to maximum pitch position (piston all forward) and insert in the free end of the pipe, a bottle with spout filled with ATF oil



9. move the pump to minimum pitch position (piston all back) let the depression sucking oil from the bottle without let air enter.



10. Connect the free end of the pipe to the rotary joint.
11. As far as possible: hold the aircraft with the tail down so that the propeller is at the highest point to facilitate the escape of the air bubbles.
    The propeller vent must face upwards
12. move forward the piston of the pump until is possible to see the oil in the hub's vent hole
13. Reposition the bottle with oil in the vent hole and repeat the load as in step 9.

14. Perform the steps 12 and 13 until the circuit is filled with oil without air bubbles.
15. Close the vent hole and put down the aircraft on the ground.
16. **WITH ENGINE OFF**, power on the pump to verify the correct variation of the propeller pitch.

Note:

It's advisable repeat the operation from step 11 to 14 about 30 minutes apart to allow air, which may be present, to escape.
Then proceed to step 15.

WARNING:

BEFORE START UP AND FUNCTIONAL TEST MAKE THE FOLLOWING CHECKS

- there should be no moving parts that interfere with the fixed parts of the aircraft (spinner with motor hood surfaces, spinner with propeller or other parts not specifically mentioned)
- The propeller clearance (the minimum distances between propeller and the fixed parts and between propeller and the ground) measured with the aircraft in the worse condition of center of gravity and propeller pitch shall not be less than the following:
- **Propeller ground clearance: min 18 cm (7")** for tricycle landing gear aircraft with nose wheel, **min**

23 cm (9") for bicycle landing gear aircraft with tail wheel.

- **Radial clearance min 2,5 cm (1")** between the propeller tip and the aircraft structure, more clearance possible to avoid dangerous vibration.
- **Longitudinal clearance min 1,5 cm (½"):** between the propeller/spinner and the fixed part of aircraft
  Positive clearance: *Between the other rotating part propeller/spinner and the fixed part of aircraft (v. JAR & FAR223.925)*

WARNING:

IN CASE THE PROLLER IS INSTALLED FOR THE FIRST TIME CHECK THAT THE WEIGHT OF PROPELLER AND ALL ITS PARTS, DON'T EXCEED THE EXCURSION OF THE CENTER OF GRAVITY PROVIDED BY THE MANUFACTURER OF AIRCRAFT IN ANY LOAD CONDITIONS.

Note:

The measurement must be performed with the landing gear under static load and the aircraft in normal taxi attitude.
For standard landing gear aircraft (with air or oil landing gear shock absorber) there must be a clearance when in level flight attitude the critical tyre is completely deflated and critical landing leg is bottoming out.
For the aircraft with landing gear with leaf springs: there must be a positive

clearance with a deflection corresponding to 1,5 g

FUNCTIONAL TEST

The propeller is provided statically balanced to the test bench

1. Verify the installation was made correctly
2. Verify the movement area is free
3. Active parking brake and put chocks
4. Start engine and warm up
5. Verify the propeller is at minimum pitch
6. Test the engine at various power regimes and proceed as follow

Checking engine RPM indicator move the throttle to give power and check which of the following conditions occurs:

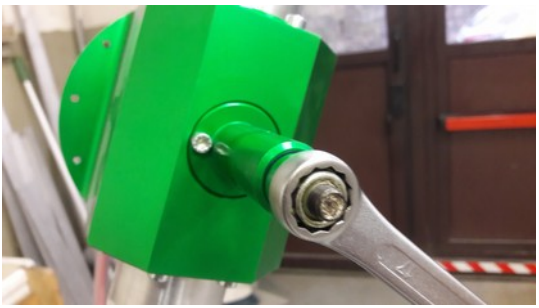
1. With the throttle at maximum you get maximum engine RPM allowed by the manufacturer.
2. Engine RPM at maximum allowed by the manufacturer, but the throttle is NOT at the full power position.
3. The throttle is at the full power position, but engine RPM are NOT the maximum allowed by the manufacturer.

Operations to be performed with the engine off and disconnected contacts

Situation 1: **Minimum pitch set correctly**

Situation 2; **Minimum pitch set too low:**
Screw the self-locking nut M10 on front of the propeller with a 17 mm wrench to increase propeller pitch.
We recommend screw ¼ turn at a time.
Do again the RPM test for every nut variation.

Situation 3: **Minimum set too high steps:**
Unscrew the self-locking nut M10 on front of the propeller with a 17 mm wrench a to reduce the propeller pitch.
We recommend screw ¼ turn at a time.
Do again the RPM test for every nut variation.



WARNING:

THE PROPELLER/ENGINE CONNECTION GENERATES VIBRATION THAT NEVER BE OVER 0.5 IPS (inches per second)

In any case it's always advisable make a dynamic balancing.

Note:

During the tests described before is important measuring the air temperature because can greatly affects the static thrust.

CAUTION:

BEFORE THE TEST FLIGHT INSTALL THE SPINNER (if needed).

CAUTION:

THE PRESENCE OF SMALL AIR BUBBLES IN THE CIRCUIT NOT COMPROMISE IN ANY WAY THE FLIGHT SAFETY, BUT AFFECT THE PITCH CHANGE SPEED AIR BUBBLES CAN BE REMOVED AS EXPLAINED AT PAGE 12

WARNING:

VERIFY THAT THE PROPELLER PITCH MOVEMENT IS COMPLETE BEFORE THAT THE AIRCRAFT STARTS THE SERVICE

SAFETY INSTRUCTIONS

Loss of warranty:

- Poor, inadequate or incorrect maintenance
- Maintenance by unauthorized personnel (Alisport or its distributors)
- Installation unplanned engines
- Failure to manufacturer's service bulletins (propeller, engine,gearbox, etc...)
- Prescriptions of the aeronautical authorities

WARNING:

IN CASE OF ACCIDENTAL IMPACTS AND/OR EXCEED THE MAXIMUM RPM, PROPELLER MUST BE SENT AT ALISPORT OR ITS DISTRIBUTORS FOR A TOTAL OVERHAUL.

CAUTION:

DON'T USE THE PROPELLER FOR TOWING THE AIRCRAFT. THIS CAN DAMAGE THE VARIABLE PITCH SYSTEM. AVOID AS FAR AS POSSIBLE TAXIING ON STONES OR HIGH/UNCUT GRASS. DON'T STAY AT SHORT DISTANCE BEHIND ANOTHER AIRCRAFT DURING TAXI. DON'T PERFORME THE EGINE TEST IN PRESENCE OF PUDDLES

MAINTENANCE

WARNING:

THE MAINTENANCE SCHEDULE IS EVERY 200 HOURS, THE MAINTENANCE MUST BE DONE BY ALISPORT OR ITS DISTRIBUTORS.

THE BLADES LIFE IS 1500 OPERATING HOURS

CAUTION:

AFTER THE TEST FLIGHT:
CHECK THE CORRECT TIGHTENING OF THE RETAINING RINGS OF THE BLADE THAT COULD BECOME LOOSE DUE TO THE MECHANICAL FORCE RECOVERY IN PAIRS.

MAINTENANCE SCHEDULE

	Description	PREFLIGHT	50h	100h 1 year*	**200h 3 years****
01	Prop visual check	X	X	X	**X**
02	Spinner/plate visual check about cracks	X	X	X	**X**
03	Blade surface, leading and trailing edge visual check for cracks	X	X	X	**X**
04	Hub and blades play check	X	X	X	**X**
05	Bolt tightening check		X	X	**X**
06	O-Ring replace				**X**
07	AXK 6085, Quad-ring, PTFE and springs replace				**X**
08	Air bubbles visual check in the oil pipe	X	X	X	**X**
09	Pump movement check			X	**X**
10	Electrical components check (such governor, electric pump...)			X	**X**
11	Electrical cables integrity check			X	**X**
12	Functional propeller check	X	X	X	**X**
13	Hydraulic Rotary Joint workbench test	**500h**			
14	Governor update, upgrade, funcional test	**As manufacturer prescritions**			

*: 100 h or 1 year which first occour

**: 200 h oor 3 years which first occour

BY ALISPORT OR ITS DISTRIBUTORS

TROUBLES AND RIMEDIES

The propeller changes pitch with delay
Check that there isn't air bubbles in the pipes or in the pump.
The air bubbles can be evacuated as described before.
This inconvenience does not generate immediate danger.

The propeller doesn't return to minimum pitch
If it occurs in the last part of the movement, it will be automatically solved after few flight hours.
Remember that the pitch actuation must be done with the engine running. If the matter isn't resolved, contact Alisport or one of our distributors.

Oil leakage in the hydraulic rotary joint installation area
First check if is at the joint pipe connection, in which case check the proper tightening of the clutch ring; If persist consult Alisport or one of our distributors.
If the leak is at the level of the junction with the shaft of the gearbox, it'll be necessary to remove the propeller, remove the joint and replace the O-Ring on the joint.
This inconvenience does not generate immediate danger.

Oil leakage in the junction area between the hub propeller and engine flange
If leakage occurs from the bleed screw, replace the gasket with a new piece, or failing, provide with Teflon tape.
If the leakage is in the engine flange conjunction with the propeller hub: remove the propeller, to be able to replace the two O-ring inside the bottom cap.

This inconvenience doesn't generate immediate dangers.

Loss of lubricant from the blade retaining blades
A small loss, especially in the first hours of use and near 200h of service is normal. But if become consistent, try to tighten the nuts that hold the blades; if the problem persists, contact Alisport or one of our distributors.
This inconvenience doesn't generate immediate dangers.

ALISPORT Srl – Idrovario Propellers
Via Confalonieri 22
23894Cremella (LC)
ITALIA

Tel. +39 039 9212128
Fax: +39 039 9212130
Mail: info@alisport.com

Web: www.alisport.com

REV 02_DANPAL10_2016