

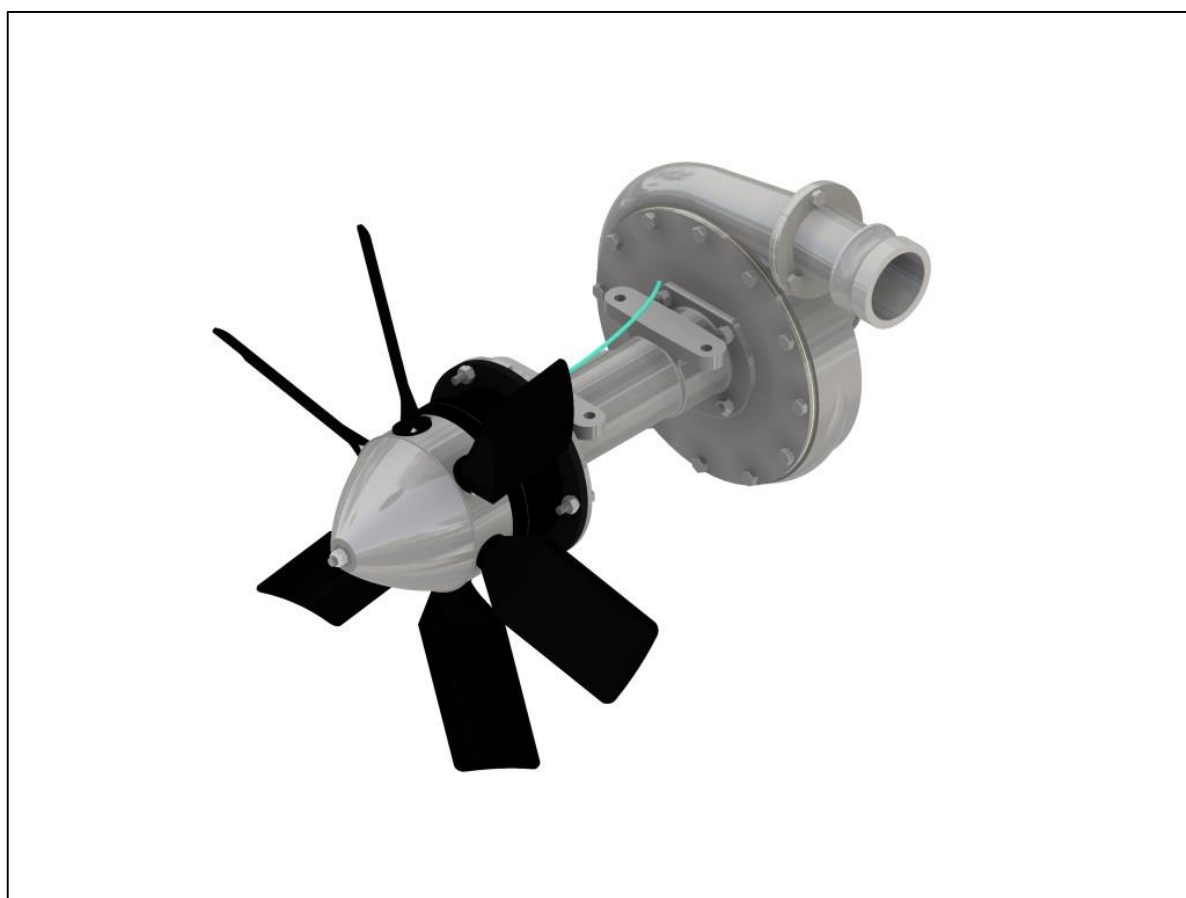


# TECHNICAL MANUAL

# SPRAY PUMP

AIR TRACTOR 402/502/602/802


THRUSH 510




## ZANONI EQUIPAMENTOS AGRÍCOLAS

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The ag aircraft spray pump is designed to centrifuge the product load contained in its hopper and sending it with pressure to the spray system. This occurs through the impact of the wind received by the fan blades during flight, moving the pump impeller through the shaft and thus generating the required pressure/flow. The spray pump maintains pressure in the system to ensure uniform flow and proper atomization.

The figures in this document are used only to facilitate the identification of Zanoni Equipamentos® spray pump's parts. For more information and details about the brand's products, visit the website [www.zanonequipamentos.com.br](http://www.zanonequipamentos.com.br) or contact the sales team and request the complete catalog.

This technical manual refers to the Zanoni spray pumps for Air Tractor 402/502 (Z50230E), Air Tractor 602/802 (Z80230EN) and Thrush (Z51030EN) aircraft. It shall be read thoroughly before any technical intervention.

## TECHNICAL SPECIFICATION

- Weight: 12,90 Kg (≅ 28,44 lbs.)
- Bearings: 6205 DDUC3;
- Mechanical Seal: 3/4" Viton, Silicon/Tungsten
- Electric consumption: 2 Amps;
- Pressure: 90psi (maximum).

All parts of the Zanoni Equipamentos® spray pump are presented in chapter 1 of this document. When ordering any replacement material, please provide the full part name, product number, and your equipment's serial number.

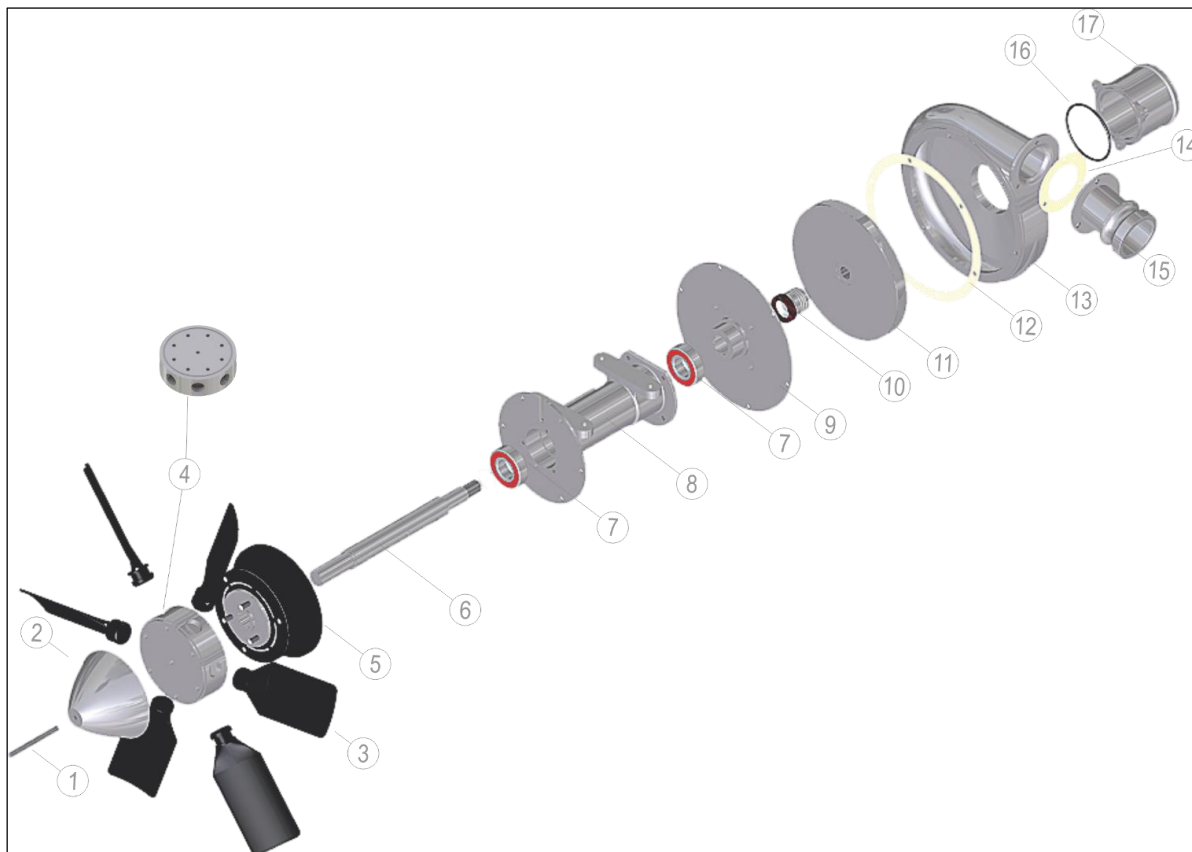


Figure 01: Zanoni Equipamentos® spray pump (exploded view - illustrative picture).

NUMBER	PN	DESCRIPTION
01	Z 20230E-09	SPINNING SCREW
02	Z 20230E-07	SPINNER
03	Z 20230E-03-03N	BLADE
04	Z 40230E-03	BLADE SUPPORT (6 FAN BLADES)
	Z 80230E-03	BLADE SUPPORT (8 FAN BLADES)
05	Z 80230E-04	BRAKE ASSEMBLY (FOR SPLINED SHAFT)
	Z 80230ES-04	BRAKE ASSEMBLY (FOR SQUARE-SHAPED SHAFT)
06	Z 40230E-06	SPLINED SHAFT
	Z 50230E-06	SQUARE-SHAPED SHAFT
07	Z 40230E-10	BEARING 6205
08	Z 50230E-01	BEARING HOUSING
09	Z 50230E-07	SEAL CUP ASSY
10	Z 20230E-11	SEAL 34" (GRAPHITE AND CERAMICS)
	Z 00231M-17	SEAL 34" (TUNGSTEN AND SILICON CARBIDE)
11	Z 50230E-05	IMPELLER
12	Z 50230E-21	GASKET
13	Z 50230E-02	IMPELLER HOUSING
14	Z 20230E-24	GASKET
15	Z 40230E-02-06	OUTLET (AT 402/502)
	Z 80230E-02-06	OUTLET (AT 602/802)
	Z 51030E	OUTLET (THRUSH 510)
16	Z 50230E-20	O'RING 151
17	Z 50230E-02-02	INLET (AT 402/502/602/802)
	Z 51030EN-02-01	INLET (THRUSH 510)

Table 01: Zanoni spray pump's parts.

## 2. SAFETY INSTRUCTIONS AND INFORMATION

Improper installation, operation or maintenance of the spray pump may cause permanent damage to the product and to other equipments. Therefore it must be handled by qualified persons.

For proper operation, the following safety instructions must be followed.

**Do not** use the equipment if its discharge and inlet piping are not attached to pump or if it is dry (with no liquid inside).

**Before** operating the spray pump, check if:

- pump and all other parts of the spray system are properly secured and adjusted;
- pump is clean and free of debris;
- shut-off and spray controls valves are open and free for flowing;
- piping is fully supported and correctly aligned to the pump;
- brake system is operating properly;
- fan blade placement is correct for the desired direction of rotation (and flow direction);
- grounding is adequate, remembering that the negative pole of the brake system (coil) is connected to the pump frame. The pump must be grounded to the airplane structure (in proper contact).

**Zanoni Equipamentos does not recommend the use of the pump brake during the operation for closing the spray system. We suggest to use the spray control valve for this purpose. This ensures agitation within the hopper, contributing to the homogenization of the spray load and preventing wear of the brake assembly.**

## 3. ADJUSTMENT OF BLADES

The fan blades have variable pitch and can be adjusted according to the pilot's need (figure 02). The greater the angle of attack, the greater the rotation of the blades and, consequently, the pump pressure will increase.

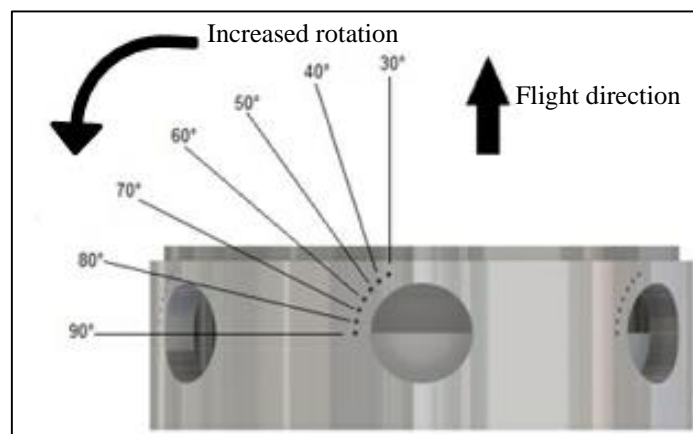


Figure 02: representation of fan blade adjustment.

## 4. MAINTENANCE

Zanoni Equipamentos® spray pumps are designed to have long and trouble-free life under various conditions. However, the following aspects should be considered:

- **CLEANING** – keep the pump clean as this facilitates repair, adjustment and inspection work;
- **SEAL ADJUSTMENTS** – This pump is manufactured with a mechanical seal to prevent liquids from passing between the rotary shaft (movable) and the bearing housing (fixed). External adjustment is not possible. When there is a leak (in the drain hole), the mechanical seal should be replaced. To prevent the spray pump from dry working, a condition that damages the seal, some liquid must always be left on the aircraft hopper, thus maintaining cooling in the seal system;
- **BEARINGS** – Particular care is required when removing and inserting bearings in any eventual replacement. Always use proper bearing installation and removal tools. It is always recommended to use the best quality bearings;
- **BRAKE ASSEMBLY** – Check its condition periodically;
- **FAN BLADES** – In the event of dryness or malfunction, the propeller blade should be replaced;
- **GASKETS** – Gaskets should be replaced every time the spray pump is disassembled in order to avoid leaks;
- **GREASING** – No external lubrication required.

NOTE: It is advisable to change the propeller blades every 12 months, due to fatigue and dryness.

## 5. DISASSEMBLY

The disassembled pump parts are illustrated and indicated in chapter 1 of this document, on page 03.

### 5.1 Required tools

To properly handle the pump, we recommend the use of the following tools. Be sure to have them on hand before beginning maintenance.

- Round steel bar, Ø6 x 70 mm;
- 3/4" Wrench;
- 7/16" Wrench;
- Screwdriver;
- 5/8" UNF Screw Nut;
- Appropriate gloves;
- Hydraulic press;
- Silicone;
- Vaseline;
- Thread seal tape;
- Grease.

### 5.2 Disassembly instructions

- a) Insert a round bar in the hole located in the center of the bearing housing, on the opposite side of the pump mount (figure 3). Withdraw the spinner using a 7/16 " wrench (figure 4).

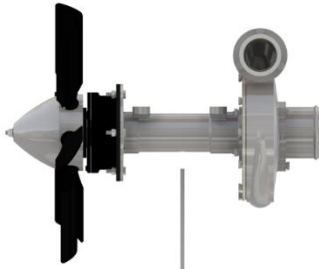


Figure 03: locking the shaft through the hole in the bearing housing.

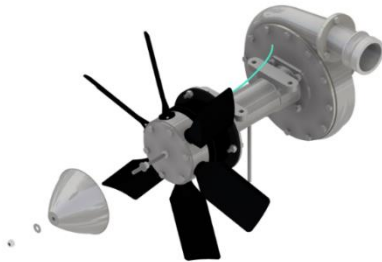


Figure 04: spinner withdrawal.

- b) Using the same wrench (7/16 ") remove the screws of the blade support to release the fan blades (figure 05). In order only to adjust the blades, loosen the screws and make the necessary adjustment. To remove the entire blade support, unscrew the 3 nuts that secure it to the brake assembly.
- c) To release the brake assembly, loosen the six 1/4" x 1" screws that secure it to the bearing housing (figure 06 and 07). Using a screwdriver, remove the three 3/16 " screws that secure the brake coil to the bearing housing (figure 08).

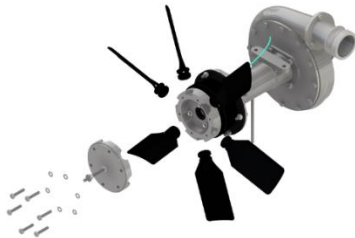


Figure 05: removing the screws of the blade support.



Figure 06: brake assembly release.

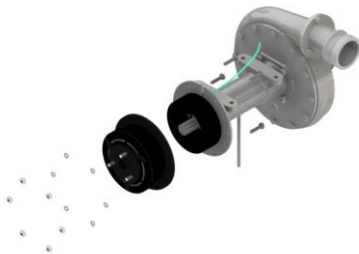


Figure 07: arrangement to unscrew the brake assembly.

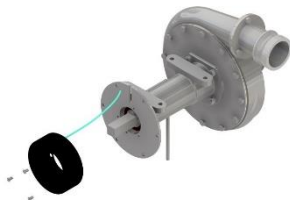


Figure 08: unscrewed brake assembly.

- d) For replacing only the O'Ring or the inlet and outlet gaskets, remove the screws that hold them, and replace the required item (figure 09).
- e) Remove the screws that attach the seal cup assy to the impeller housing with a 7/16" wrench (figure 10).

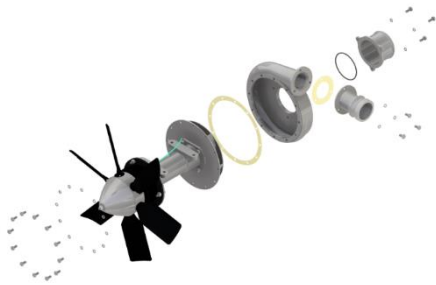


Figure 09: removal of nuts and screws to replace O'Ring and gaskets.



Figure 10: removal of screws from the seal cup assy.

- f) Lock the shaft through the bearing housing's hole with a round bar and, with a 7/16" wrench, remove the screw locking the impeller at the shaft end (figure 11). Then use a 3/4" wrench to remove the impeller by unscrewing it counterclockwise (figure 12);



Figure 11: removal of the screws that put the impeller housing and the bearing housing together.



Figure 12: impeller removal.

- g) Remove the larger part of the seal, which will be exposed (figure 13). Then, using a 7/16" wrench, loosen the four screws that secure the seal cup assy to the bearing housing (figure 14). Note that the smallest part of the seal will come out with the cup assy.

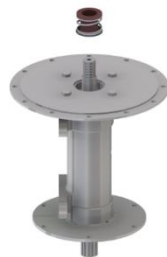


Figure 13: seal removal (larger part).



Figure 14: seal removal (smaller/fixed part).



- h) For protecting the shaft, thread a 5/8" UNF nut on its end where the impeller was attached (figure 15). With a hydraulic press, remove the shaft and the bearings, carefully applying pressure on the nut (Figure 16);



Figure 15: threaded nut for shaft protection.

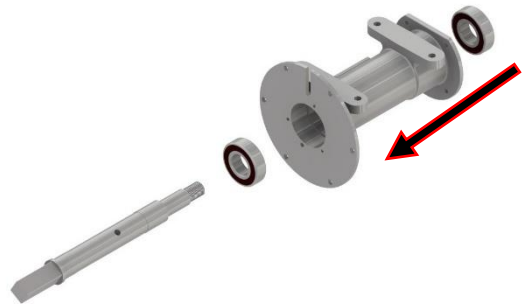


Figure 16: shaft and bearing removal.

## 6. SPARES KIT AND PARTS REPLACEMENT

Make sure you have the right products for parts replacement. Zanoni Equipamentos provides a complete spares kit (figure 17) for your spray pump. Contact us to order your kit..



Figure 17: spares kit for Zanoni spray pump.

After disassembling the spray pump, evaluate the condition of the bearings, of the spinning screw, and of the nuts and bolts in general. Replacement of these components is mandatory whenever any damage or excessive wear is observed. It is recommended to change the mechanical seal every time the wind pump is opened.

## 7. REASSEMBLY

- a) For best use, thoroughly clean all parts.
- b) With a hydraulic press, insert one of the bearings into the shaft and carefully press the bearing until it reaches the shaft stop (figure 18).



Figure 18: shaft-bearing positioning.

- c) Still with the hydraulic press, insert the other bearing directly into the bearing housing until it reaches the bottom stop. Note that the bearing must be inserted from the shorter side of bearing housing (figure 19).



Figure 19: bearing insertion into the bearing housing.



Figure 20: bearing inside the bearing housing.

- d) Again with the aid of the hydraulic press, place the shaft into the bearing housing, passing it through the bearing located inside, until they fit (figure 21). It is important to place a support on the bearing inside the bearing housing, so that it does not loosen.



Figure 21: shaft insertion into the bearing housing.



Figure 22: bearing housing-shaft-bearings adjusted.

- e) Using three 3/16" x 1/4" screws, attach the brake coil to the bearing housing, noting that the wires must be positioned on the opposite side to the shaft lock hole and to the drain hole (figure 23). Secure the remaining part of the brake assembly using lock washers to tighten the six 1/4" x 1" screws (figure 24). Before fixing it is necessary to rotate the pump several times so that the shaft can accommodate itself and then the screws must be placed in the proper place before the final tightening, rotating the pump again for better accommodation.



Figure 23: screwing the brake coil.



Figure 24: full set of brake assembly.

- f) Insert the blade support into the brake assembly's screws and secure it with lock washers and 1/4" nuts (figure 25). To aid in adjusting the nuts and bolts, insert a round bar into the shaft hole to lock the shaft (figure 26).



Figure 25: inserting the blade support.



Figure 26: travamento do eixo para auxílio no aperto das porcas.

- g) **Turn the pump upside down.** To facilitate the insertion of the mechanical seal into its housing in the seal cup assy, apply some vaseline in the Viton side and snap it into place. The tungsten portion should face **upwards** (figure 27).

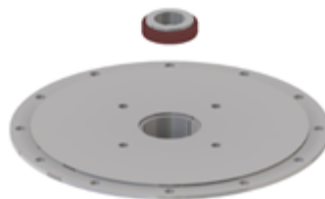


Figure 27: correct positioning for seal insertion.

- h) With the smallest part of the seal already installed, put teflon tape in the four 1/4" x 3/4" screws (up to their head) and use them to secure the seal cup assy to the bearing housing (figure 28). Then tighten the nuts and lockwashers to make sure the assembly is securely fastened. (figure 29).



Figure 28: attaching the seal cup assy to the bearing housing.



Figure 29: assembled set.

- i) On the other part of the seal (silicon surface) apply vaseline and snap it onto the seal cup assy, with the Viton part facing upwards (figures 30 and 31).

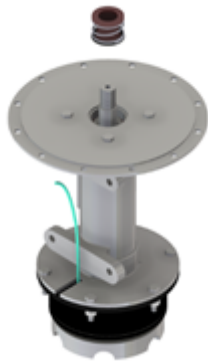


Figure 30: fitting the seal on the cup assy.



Figure 31: embedded seal.

Note: Take special care to keep the mechanical seal clean. Be aware that dirt particles, especially on its faces, cause breakage and undesirable leaks. Touch the seal only with appropriate gloves or with clean hands.

- j) Using a round bar, lock the shaft through the bearing housing hole, manually screw the impeller to the end and tighten it with a 3/4" wrench. Then, screw the 1/4" x 3/4" screws to lock and prevent the impeller from loosening (figure 32). For easing the work and to avoid unwanted friction, apply a little grease to the shaft end before threading it to the impeller.



Figure 32: manual impeller adjustment.



Figure 33: mounted impeller.

- k) Secure the impeller to the bearing housing, observing the position of the impeller housing outlet. Apply silicone to both parts before attaching the gasket, use teflon tape on the 1/4" x 1/2" screws and secure them with lock washers.
- l) To fasten the impeller housing inlet, put silicone through the holes of the inlet flange, insert the O'Ring into its housing and screw the inlet into the impeller housing (figure 34). Remember to put thread seal tape in the 1/4" x 5/8" screws and to use lock washers. Observe the correct position according to your aircraft before installing the inlet.
- m) With 1/4" x 1/2" screws and lock washers, fit the outlet into the impeller housing, applying silicone to both pieces before fitting the gasket. Observe the correct position before screwing.

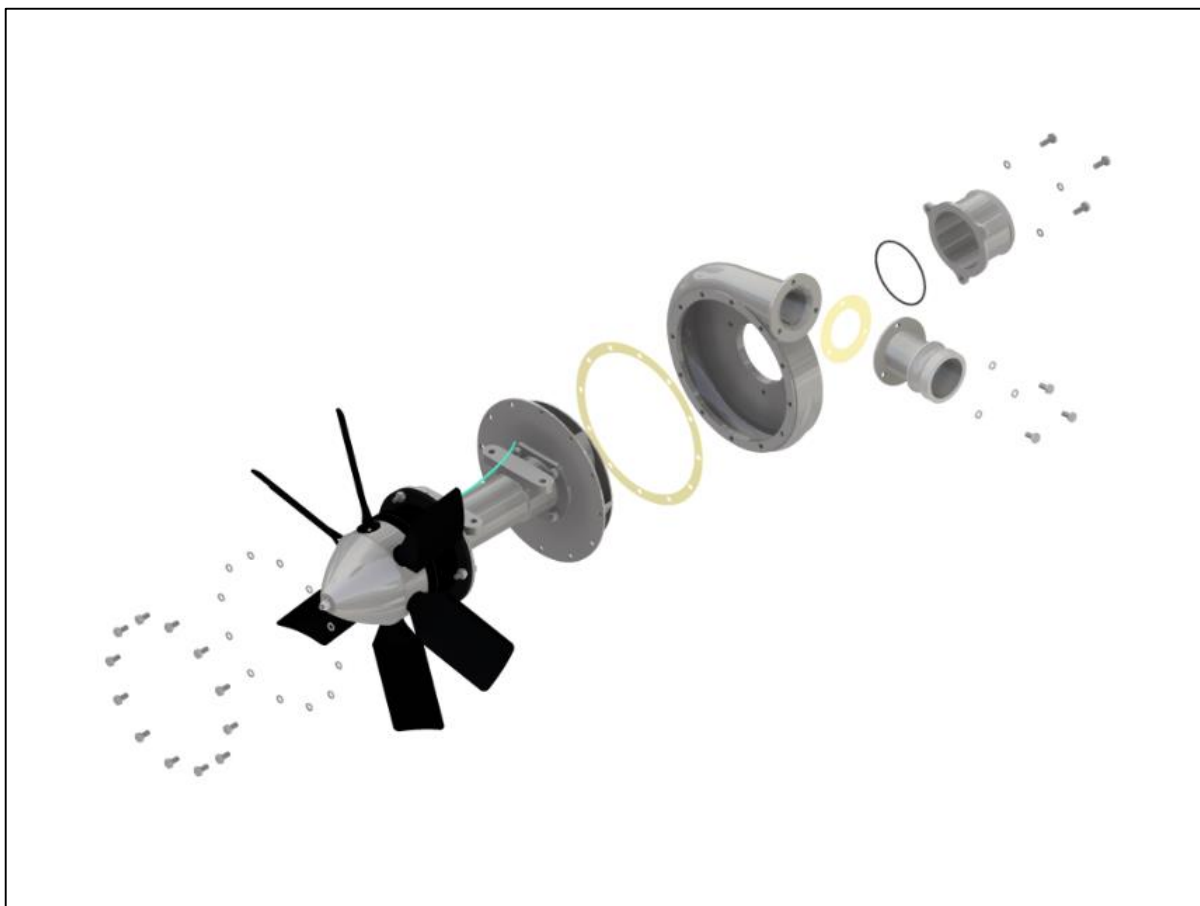


Figure 34: inlet and outlet attachment to the impeller housing.

- n) Using nuts, screws and washers, put the spinning screw on the blade support (figure 35). Check the proper height adjustment of the of the spinner's nut and washer, so that it is firmly supported to the blade support.



Figure 35: spinning screw positioning.

- o) Insert the fan blades (remembering that they have a variable pitch and can adjusted according to the existing marks in the blade support). Screw the blade support using 1/4" x 1 1/4" screws and flat washers (figure 36). The numbering of both parts of the blade support (cover and base) should be the same and aligned with each other (figure 37).



Figure 36: spinner lock.

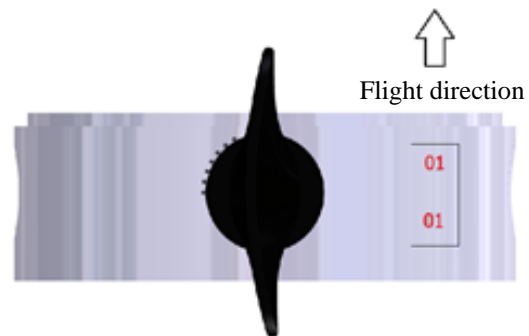


Figure 37: Alignment of the two parts of the blade support (cover and base).

- p) Rotate the propeller with your hand and make sure that the assembly rotates freely without any difficulty and noise. Next, close the spinner using a 1/4" washer (wide) and a 1/4" locknut.



Figure 38: mounted pump.

- q) Mount the pump on your aircraft support and finally test the brake on a 24V battery.

If you have questions or problems, please contact the company or its dealers.

