

ZENIT

Instruction book

67025002 - Version 1.0

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1 - EC Declaration

EC Declaration of conformity



Manufacturer:

ILEMO HARDI S.A.U.
Polígono Industrial El Segre
25080 - Lleida
ESPAÑA

IMPORTER:

declare that the following product;

A. complies with the provisions in the Directive 98/37/CE on machines as well as the national regulations that constitute its transposition..

B. complies with the current standards at the time of its manufacture, with the Annex IV of the Directive 98/37/CE and harmonised standards.

Lleida, May 2004

Josep Maria Godia Ribes
Technical Director
ILEMO-HARDI S.A.U.

Adhere extra shipping package labels to inside cover.

User safety



This symbol means DANGER. This is to warn you that your safety is at risk.



This symbol means CAUTION. This is to warn you that your safety is at risk.



This symbol means ATTENTION. It will help you to use the equipment more easily and safely.

Technical Information

Bear in mind the following safety warnings. CAUTION: Your safety is at risk.



Read this instruction manual carefully before using the machine.



Depending on the region, there may be a legislation which obliges the user to have a permit in order to be able to use the machine. Abide by that legislation.



The tractor P.T.O. should not exceed 540 rpm as there is grave danger that the air kit may explode.



Carry out a pressure test with clean water before using any type of chemical product.



Use appropriate protective clothing (gloves, helmet, waterproof clothing, etc.)



Clean and rinse the equipment after use and before inspection.



De-pressurize the equipment after use and before inspection.



Never inspect or repair the machine when on.



Disconnect the electrical circuit of the machine before inspection



Always put the safety mechanism back on immediately after inspection.



If a welding arch is used above the equipment, disconnect all the electrical mechanisms before starting to weld. Keep away from any explosive and inflammable matter.



Do not eat, drink or smoke whilst spraying or working with contaminated equipment.



Wash and change clothes after spraying.



Clean the tools used.



In case of poisoning, contact a doctor.

2 - Safety



Make sure children do not come near the equipment.



Keep away from the air inlet and outlet while the fan is on. Some objects (small stones, etc.) may be expelled by the fan.



This machine is meant for agricultural use only. Any other use should be approved of by the manufacturer or importer.

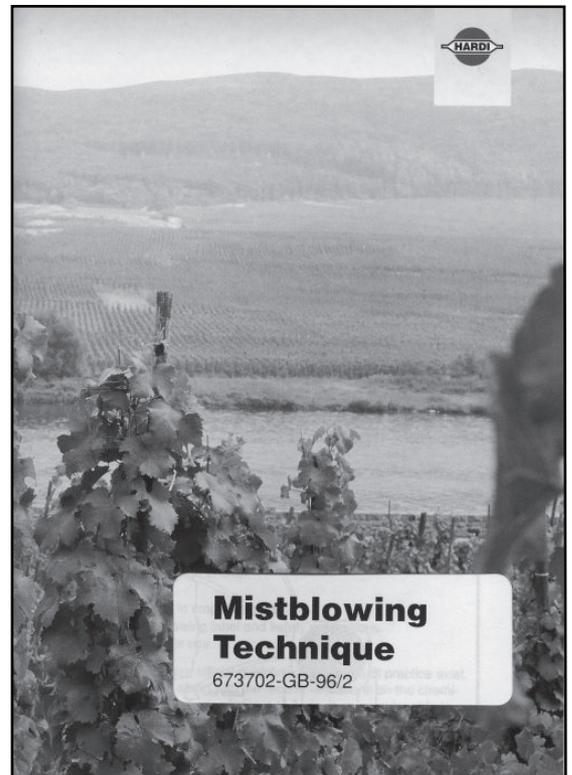


Do not open up the tank.

The safety and efficiency of this machine also depends on the way it is handled. The first step is to read carefully and pay attention to this instruction manual as it contains essential information for an efficient use and maintenance of this high quality product.

As this instruction manual includes all the HARDI ZENIT axial pneumatic and hydropneumatic models, please pay special attention to the paragraphs dealing with the one you have acquired.

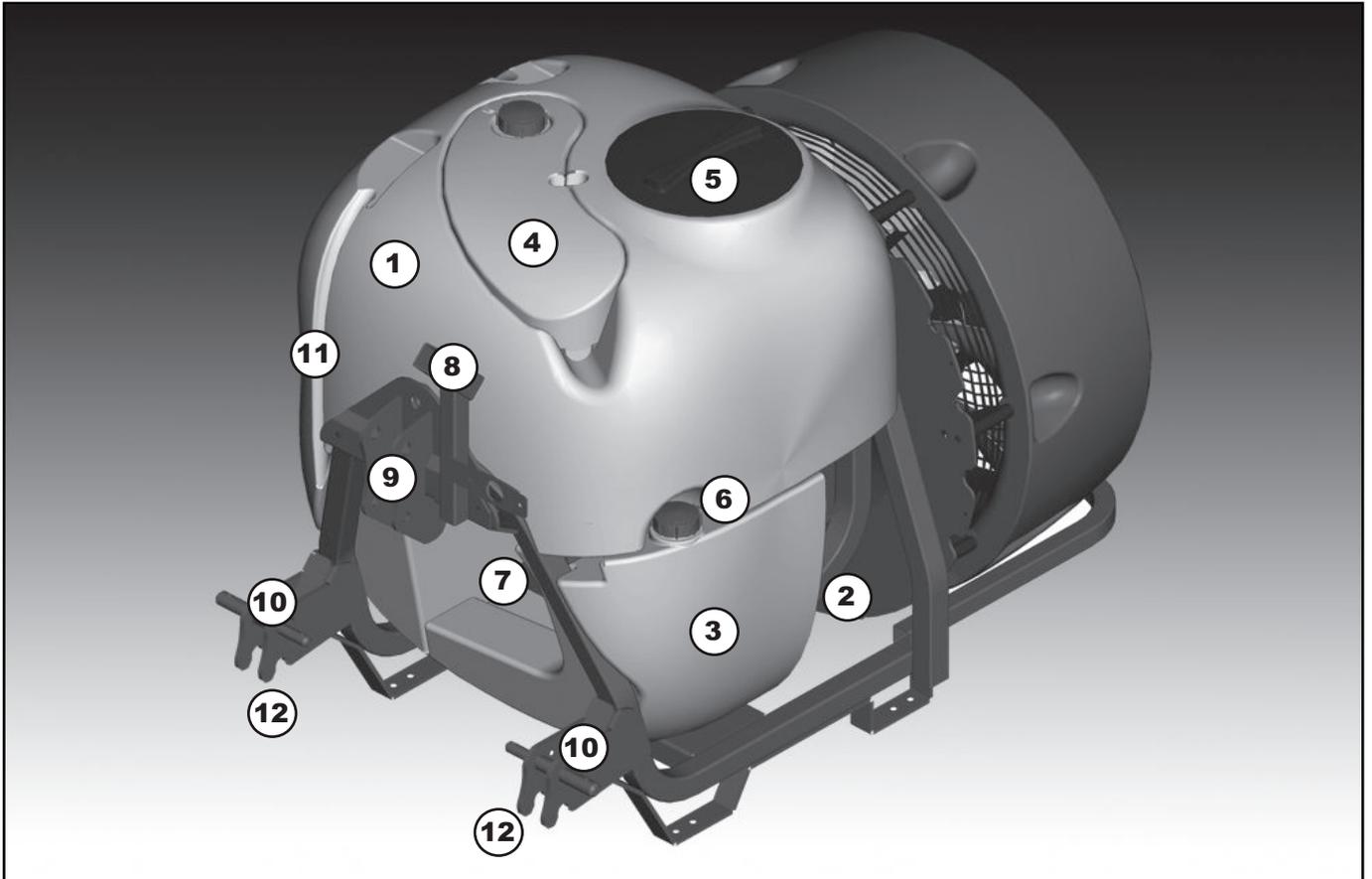
This manual should be read along with that of "Spraying Techniques" (provided with the equipment) so that you can obtain the best possible results.



As a consequence of the great variety of options and equipment, only the most necessary technical data referring to air flow, power consumption and directions is mentioned. If you require information which is not mentioned in this manual, ask your nearest distributor for it.

Technical Information

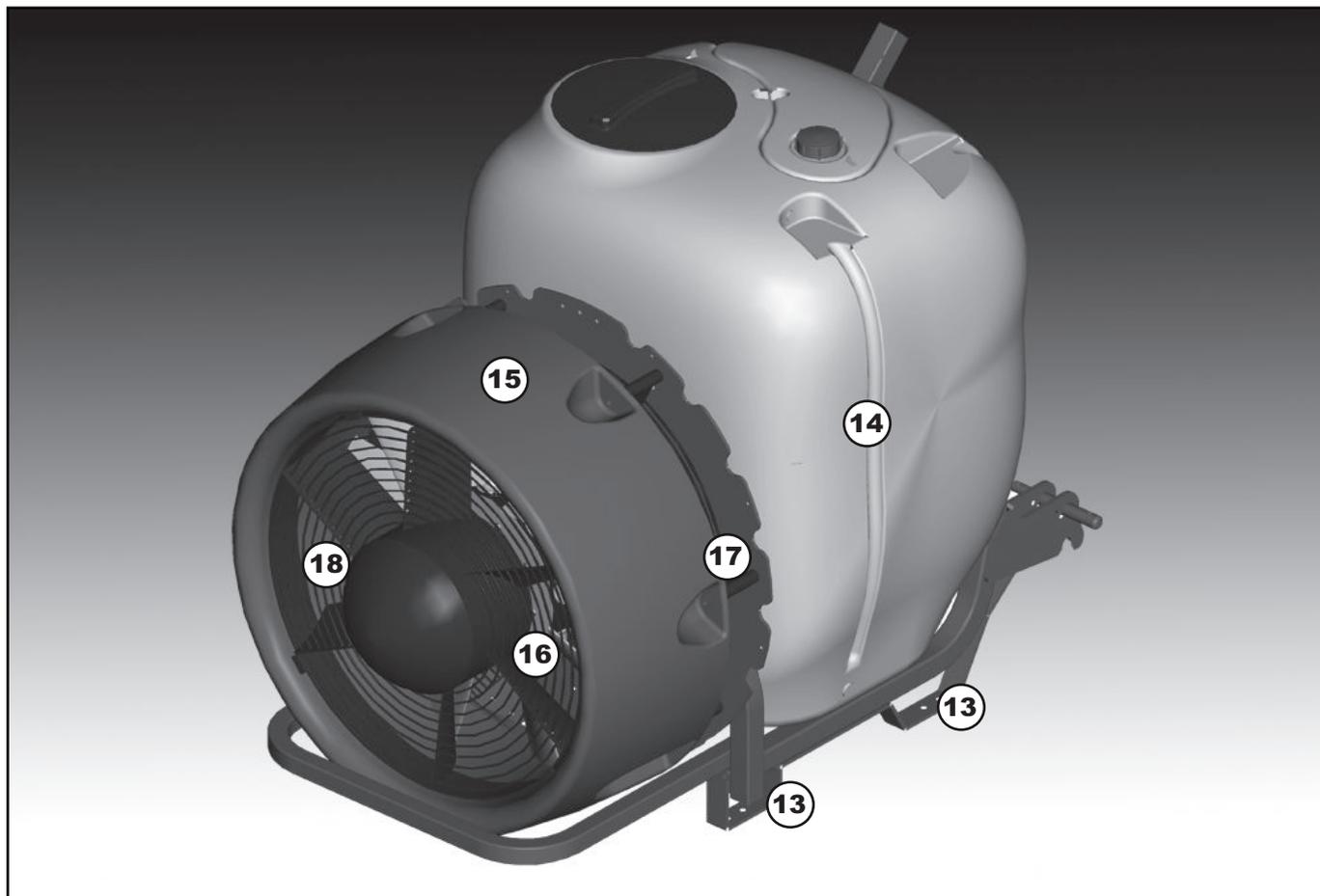
General view



- | | |
|---------------------|---------------------------|
| 1. Main tank | 7. Pump |
| 2. Suction filter | 8. Operating unit |
| 3. Rinse tank | 9. 3-point hitch |
| 4. Clean water tank | 10. Carried rod hitching |
| 5. Lid of main tank | 11. Front level indicator |
| 6. Rinse tank cap | 12. Quick hitch |

3 - Description

General view



13. Support legs

14. Side level indicator

15. Polyethylene fan housing

16. Air inlet grid

17. Air outlet grid

18. Fan

Use of the mist blower

The HARDI ZENIT mist blower is designed for applying chemical products used for crop protection, and liquid fertilizers. This equipment may only be used for this purpose. Use of the mist blower for other purposes is not allowed.

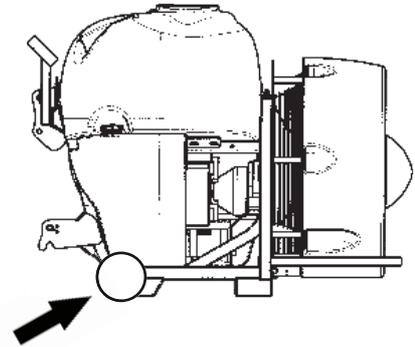
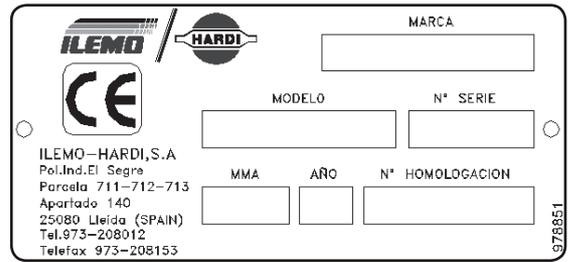
If there is no special legislation in your region which obliges the user to have a permit to use chemical products, it is recommended you know the basic techniques for their use to avoid the risk of contaminating both people and the environment.

3 - Description

Identification plates

The identification plate, which is on the left hand side and riveted onto the chassis, indicates the make, model, serial number and year of manufacture.

The serial number is stamped on the chassis, next to the identification plate.



Chassis

Manufactured with a tubular profile which provides great durability and resistance to breakages and vibrations. To protect it from corrosion, it is sanded down and covered with a layer of special paint that contains a polyurethane bi-component with anti-corrosion additives and protection against ultraviolet rays.

Tank

Made of medium-density polyethylene with ultraviolet filters, it has smooth, rounded surfaces that facilitate agitation and cleaning. Range of volumes: 400, 600 and 1,000 litres.

3 - Description

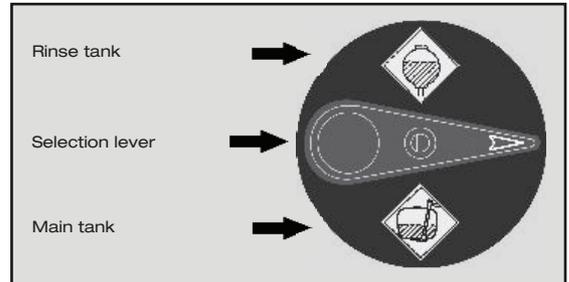
Liquid circuit

Technical information

All the liquid circuit functions are operated via the MANIFOLD system and the pressure collector. The use of pictorial symbols helps to clearly identify these functions.

The MANIFOLD System

Depending on the model, there may be a MANIFOLD valve. This is a three-way manual valve that allows you to select the tank from which the pump is to aspirate. It is black and is situated on the lower left-hand side of the blower, above the suction filter. Optionally, a blue return manifold valve can be fitted, which allows a return flow circuit to be set up. This valve is to be found at the front of the equipment, behind the operating unit.

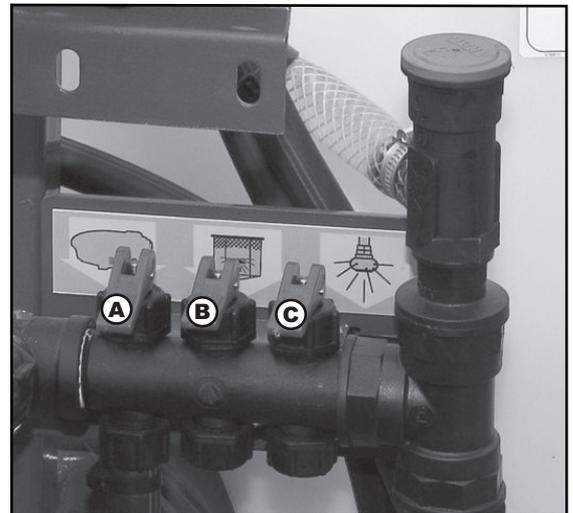


HLC Circuit

The pressure circuit is called HLC (Hardi Liquid Circuit), designed for diaphragm pump. The pressure collector is synthetic and delivers the flow to three different places.

The HLC pressure collector is fitted with three mechanical valves which allow the functions of the liquid circuit to be operated.

The first valve (A) sends the flow of water with pressure to the agitator. The second (B) activates the powder mixer so as to clean the filter at the entrance to the tank when powder has been loaded through it (remember to close the valve after use or this may cause a lack of pressure). The third valve (C) activates the rotary nozzle for cleaning inside the tank when it is cleaning the liquid circuit with clean water.



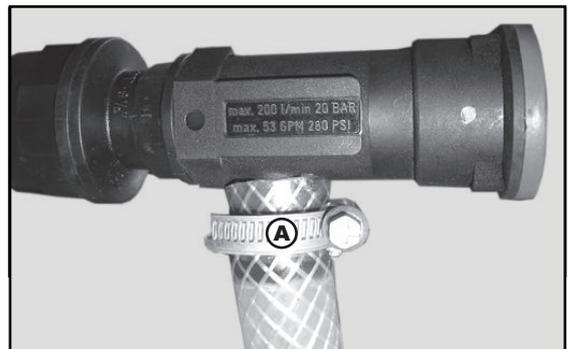
Each function is identified by a pictograph. (B and C are optionals)

Safety valve

The safety valve acts like a fuse when the circuit carries out an operation that causes a sudden increase in pressure.

This valve normally keeps the return manifold (A) in a closed position, by way of a spring and a washer. When the amount of pressure in the circuit is above the maximum allowed for the valve, this opens and allows the flow to return.

This valve is 15 bar.

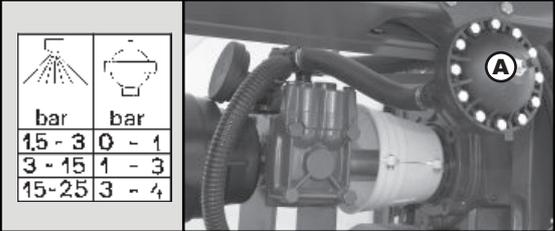


 Do not eliminate the safety valve from the liquid circuit as this could put your safety at risk.

3 - Description

Pressure damper

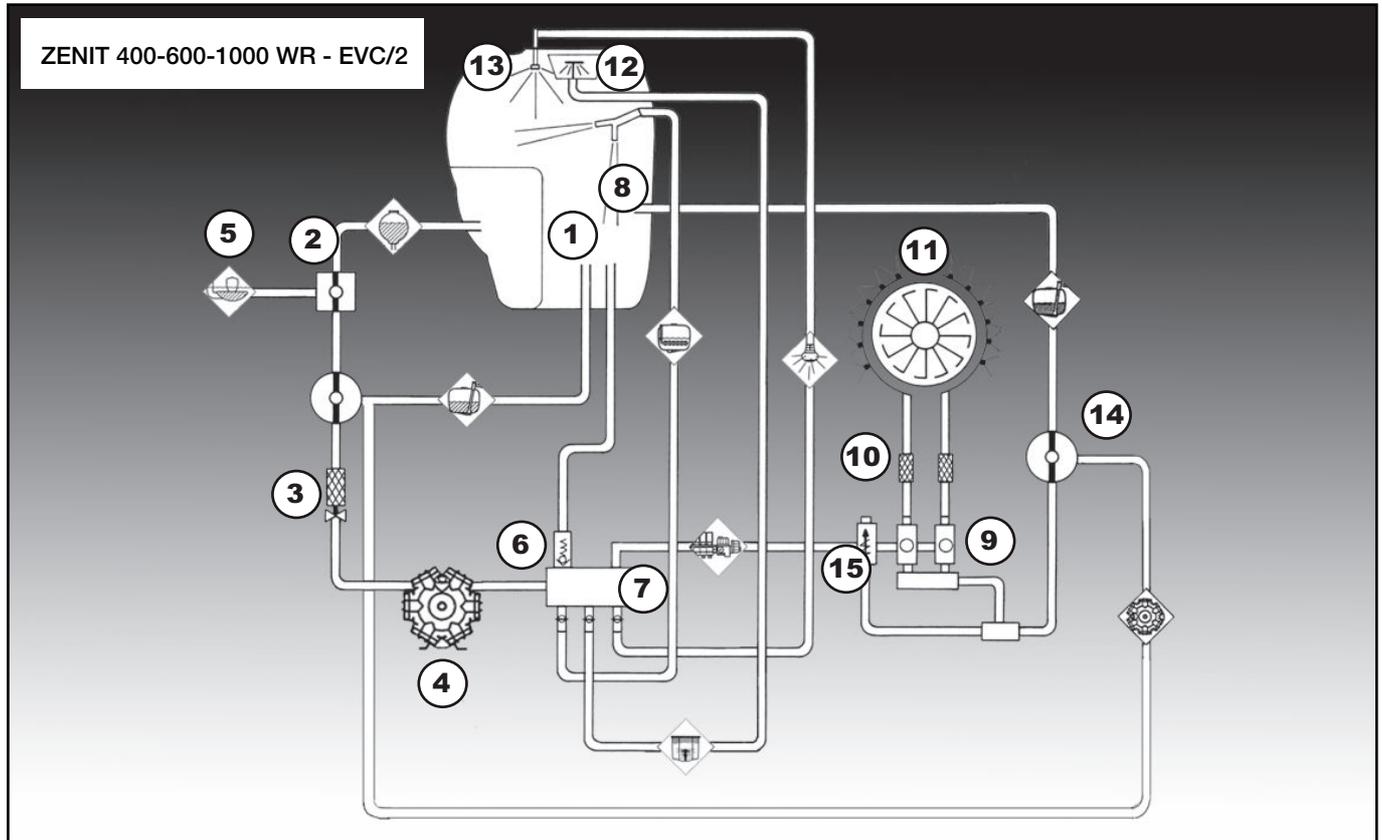
To avoid the hammering caused by pressure pulses in the liquid circuit, the 321 pumps are fitted with an pressure damper. The damper should be loaded at the pressure shown in the table on top of the pulsation damper **A**.



3 - Description

Diagrams of operating system

In the following the liquid circuit is illustrated. It is illustrated with an electrical operating unit and all the possible options.



- | | | |
|-----------------------------|------------------------|----------------------------------|
| 1- Main tank | 6- Safety valve | 11- Fan and nozzles |
| 2- Suction MANIFOLD (black) | 7- Pressure collector. | 12- Powder mixer |
| 3- Suction filter | 8- Agitation | 13- Nozzle for internal cleaning |
| 4- Pump | 9- Section valves | 14- Return Manifold (Blue) |
| 5- External filling | 10- Pressure filters | 15- Pressure regulator |

Circuit configuration can vary according to local legislation and standards, e.g. dump valve.

3 - Description

Operating

The fitted operating unit is the M70/2, BKC/2 or EVC/2.

M70/2

Manual operating unit, comprises a pressure valve that is fitted with a pressure gauge. By way of two valves, the right- and left-hand sections of the spray line open and close. With the lever **(A)** on the left the flow is shut off from the nozzles and the return manifold is opened up completely.

To start operation, one must increase the pressure using the red handle **(B)** to the left of the operating unit. Turn clockwise to increase pressure or anti-clockwise to decrease it. Check the pressure gauge to see when it is at the correct pressure level.



3 - Description

BKC/2

Manual operating unit that can be fitted in connection with the diaphragm pumps.

By way of two lever taps, the right- and left-hand sections of the spray line open and close.

Using a mechanical remote ON/OFF control, the flow is shut off from the nozzles and consequently the return manifold is opened or closed.



To start operation, one must increase the pressure using the red handle **A** situated in the centre of the operating unit next to the pressure gauge. Turn clockwise to increase pressure or anti-clockwise to decrease it. Check the pressure gauge to see when it is at the correct pressure level.

It is of utmost importance for the operating unit to be well adjusted. For this reason, before using the equipment for the first time, it is necessary to adjust the pressure equalisation valve.

During this procedure, the return manifold of each section is regulated, so that it returns the same amount of liquid to the tank as is expelled through all its nozzles when open.

This avoids variations in pressure when one or two sections are shut off.

The regulation procedure is the following:

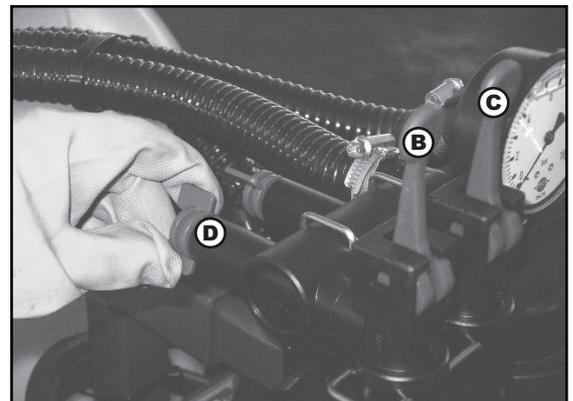
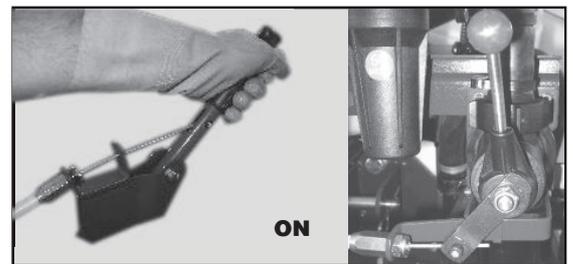
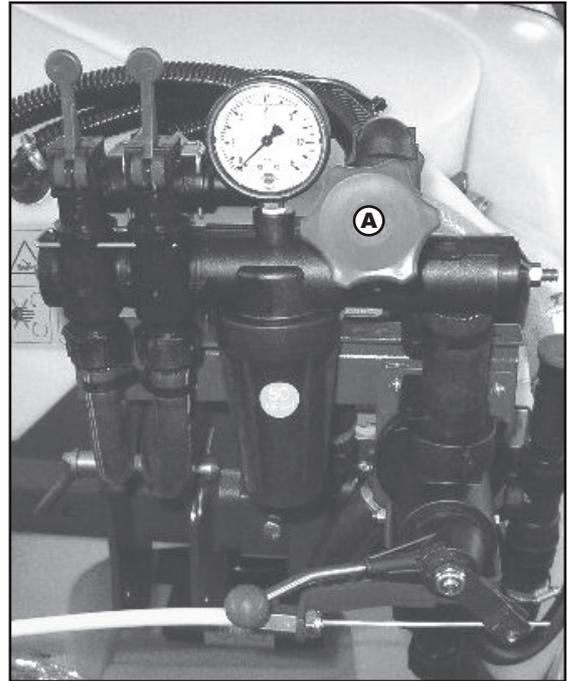
1. Open the two sections via the electrical control box.
2. Put the pressure at, for example, 3 bar.
3. Close one of the sections **B** or **C**.
4. With the valve **D** of the closed section, adjust the pressure until the pressure gauge indicates 3 bar.
5. Open the section again and repeat the operation with the other section.
6. Carry out a test by opening the two sections at the same time or one by one. If the operating unit is perfectly adjusted the pressure ought to be the same.



It is recommendable to carry out this adjustment at as near a pressure as that at which the equipment is going to operate.



Carry out this adjustment every so often as somebody may accidentally change the position of the pressure equalisation valve.



3 - Description

EVC/2

Electrical operating.

By way of an electrical control box fitted to the tractor, the switches that open or close the sections individually or together are activated. The control box is also fitted with another switch to increase or decrease pressure.

The functions of the control box are described below:

- (A) Switch to increase or decrease pressure.
- (B) Main On/Off Switch
- (C) Switch to open left-hand section.
- (D) Switch to open right-hand section.

Inside the box is the electronic circuit board and fuses for each motor. Inside the box there are two spare fuses.



It is of utmost importance for the operating unit to be well adjusted. For this reason, before using the equipment for the first time, it is necessary to adjust the pressure equalisation valve.

During this procedure, the return manifold of each section is regulated, so that it returns the same amount of liquid to the tank as is expelled through all its nozzles when open.

This avoids variations in pressure when one or two sections are shut off.

The regulation procedure is the following:

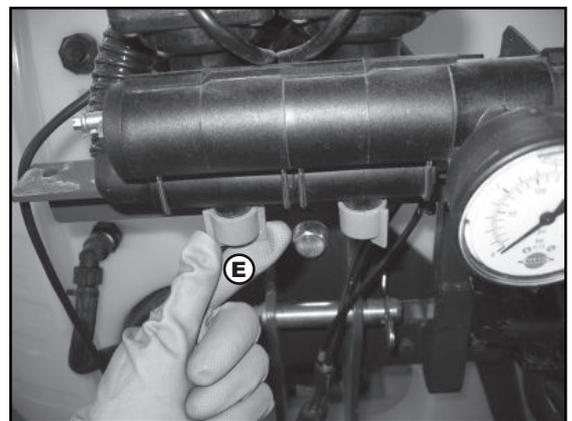
1. Open the two sections (C) and (D) on the electrical control box.
2. Put the pressure at, for example, 3 bar.
3. Close one of the sections.
4. With the pressure equalisation valve (E) of the closed section, adjust the pressure until the pressure gauge indicates 3 bar.
5. Open the section again and repeat the operation with the other section.
6. Carry out a test by opening the two sections at the same time or one by one. If the operating unit is perfectly adjusted the pressure ought to be the same.



It is recommendable to carry out this adjustment at as near a pressure as that at which the equipment is going to work.



Carry out this adjustment every so often as somebody may accidentally change the position of the pressure equalisation valve.



3 - Description

Air kit

Axial fan – Technical information

The fans on HARDI ZENIT mist blowers have been designed with composite blades and their aerodynamic design offer a higher quantity and better distribution of air, less noise and less power consumption. They are also fitted with a centrifugal clutch so as to start up and stop in a smooth way.

Flow levels go from 35,000 to 45,000 m³/h depending on the adjustments made to its components.

AXIAL AIR KITS			
Model fan	Fan	Flow m ³ /h	Gear Box
A750	750 mm	30.000	1 speed
AG750	750 mm	35.000	2 speeds
AG820	820 mm	45.000	2 speeds

All those measurements have been made in wing position 3. (See "Adjusting the fan")



The tractor P.T.O. should not exceed 540 rpm as there is grave danger that the air kit may explode.



Keep away from the air inlets and outlets while the fan is on. Some objects may be expelled from the air outlet or a piece of cloth could be sucked into the air inlet.

The air kits are the most dangerous part of the machine. Do not try to change any of the parts without consulting your nearest dealer beforehand. Handling air kits in order to change their characteristics should be done by qualified people.



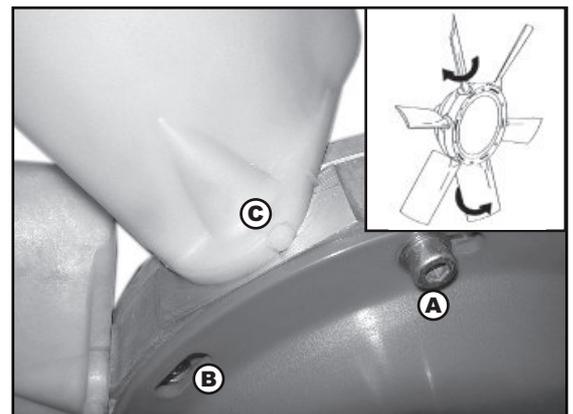
Adjusting the fan

The angle of the fan blades can be adjusted to 4 positions. They normally come in position 3.

Decreasing the angle of the blades (minimum angle, position 1) lessens the flow and decreases power consumption. By increasing the angle (maximum angle, position 4) the flow increases, but so does power consumption. In this way the mist blower can adapt both to the different applications as well as the power of the tractor.

To change the position of the angle of the fan blades you should follow these steps:

1. Take off the suction grid.
2. Loosen the Allen screws **(A)** without taking them out completely.
3. Loosen the Allen screws **(B)** holding the nut at the back of the fan.
4. With both hands on opposite blades, turn them to the position wanted between 1 and 4. All the blades should turn at the same time.
5. Finally, check all the blades are in the same position . **(C)**

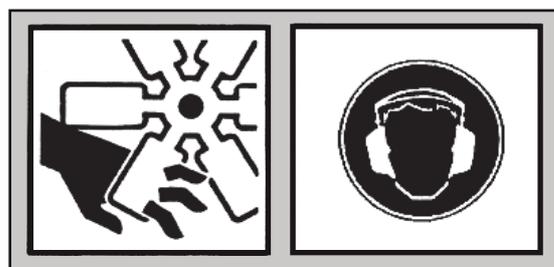
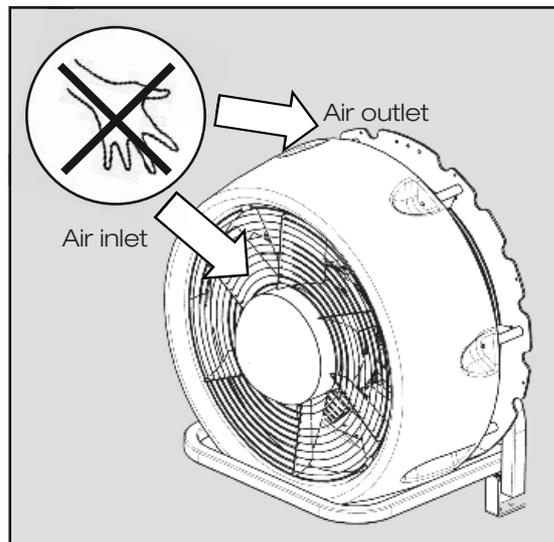


3 - Description

Protection grids

On all axial air kit models there are protection grids. They are fundamental for avoiding accidents and stopping foreign bodies from getting inside the fan.

-  Use of the air kit without protection grids is not permitted.
-  Do not take the protection grids off the equipment whilst it is in use.
-  Do not go near the fan when the equipment is in use if you are wearing light or loose clothing.
-  Never put foreign bodies inside the fan via the grid, regardless of whether it is in use or not.
-  Protect your ears from the sound the fan makes by wearing EN 352-1:1992 homologated ear muffs or something similar.
-  If you were to notice vibrations or hammering, switch off the fan immediately.



3 - Description

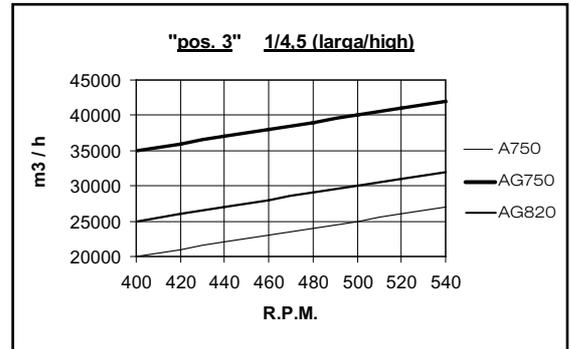
Air flow and power consumption

The following graphs show the air flow supplied by the fan and its power consumption. This result can be obtained using two possible blade positions, namely the 3rd and the 4th. See "Adjusting the fan"

Blades in position 3:

Flow

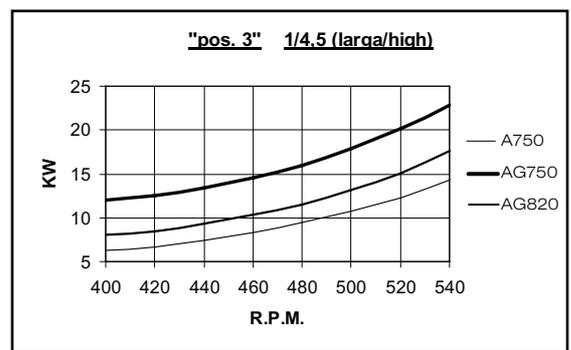
These results have been calculated when the fan is in top gear (high). To work out the results in first gear, decrease the values by 15%.



Blades in position 3:

Power consumption

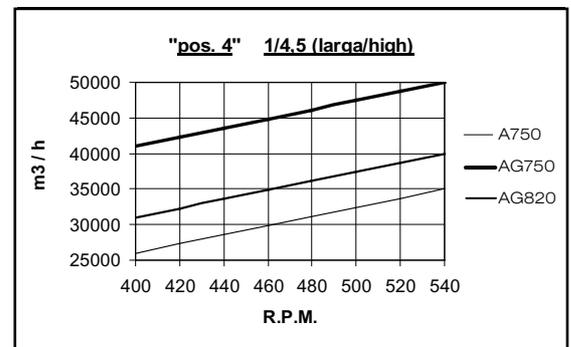
These results have been calculated when the fan is in top gear. To work out the results in first gear, decrease the values by 45%.



Blades in position 4:

Flow

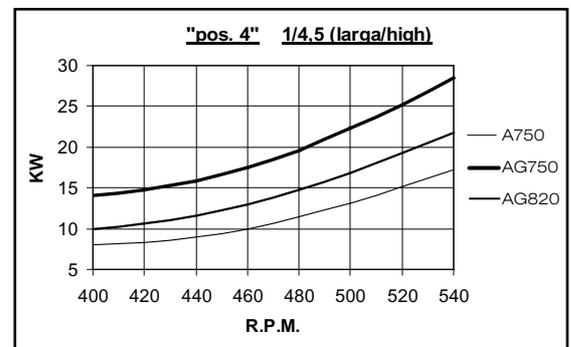
These results have been calculated when the fan is in top gear (high). To work out the results in first gear, decrease the values by 15%.



Blades in position 4:

Power consumption

These results have been calculated when the fan is in top gear. To work out the results in first gear, decrease the values by 45%.



3 - Description

Gear Box

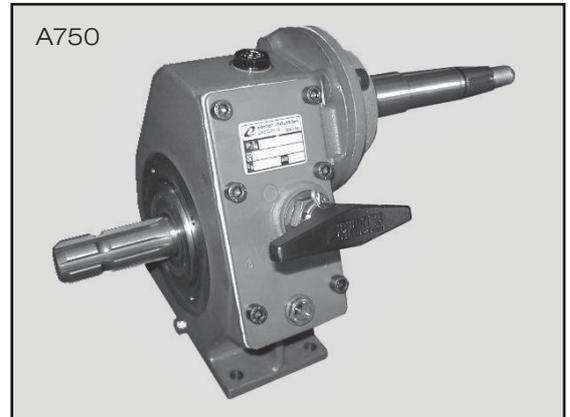
The gear box situated in the air kit is one of the mechanical elements which works the most. Axial air kits include two different models of gear box. Depending on the air kit installed in your machine, the gear box will be of a bigger or smaller size.

The gear box for the A750 air kits has one speed. The speed ratio is the following:

$$1\text{st speed} = 1 / 4.36$$

It holds 1 litre of oil for cooling and lubrication. The type of oil used is SAE 90, which is ideal for high temperatures.

See "Maintenance" for how frequently the equipment has to be checked.



The gear box for the AG750 and AG820 air kits has two speeds. The speed ratio is the following:

AG750

$$1\text{st speed} = 1 / 3.7$$

$$2\text{nd speed} = 1 / 4.$$

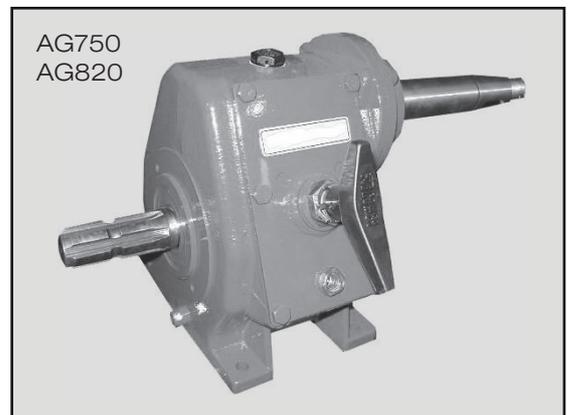
AG820

$$1\text{st speed} = 1 / 3.69$$

$$2\text{nd speed} = 1 / 4.36$$

It holds 1.3 litres of oil for cooling and lubrication. The type of oil used is SAE 90, which is ideal for high temperatures.

See "Maintenance" for how frequently the equipment has to be checked.



3 - Description

Centrifugal turbine - Technical information

The turbines on HARDI ZENIT mist blowers have been designed in galvanised steel and their aerodynamic design offers a higher quantity and better distribution of air, less noise and less power consumption. They are also fitted with a centrifugal clutch so as to start up and stop in a smooth way.

Flow levels go from 11,000 to 19,000 m³/h.

PNEUMATIC AIR KITS			
Model	Turbine	Flow m ³ /h	Gearbox
P540	540 mm	11.000	2 speeds
P540D	540 mm double	19.000	2 speeds



The tractor P.T.O. should not exceed 540 rpm as there is grave danger that the air kit may explode.



Keep away from the air inlets and outlets while the fan is in use. Some objects may be expelled from the air outlet or a piece of cloth could be sucked into the air inlet.

The air kits are the most dangerous part of the machine. Do not try to change any of the parts without consulting your nearest dealer beforehand. Handling air kits in order to change their characteristics should be done by qualified people.

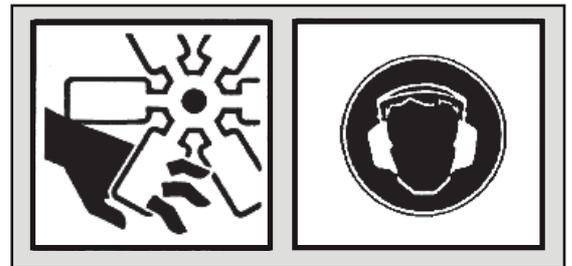
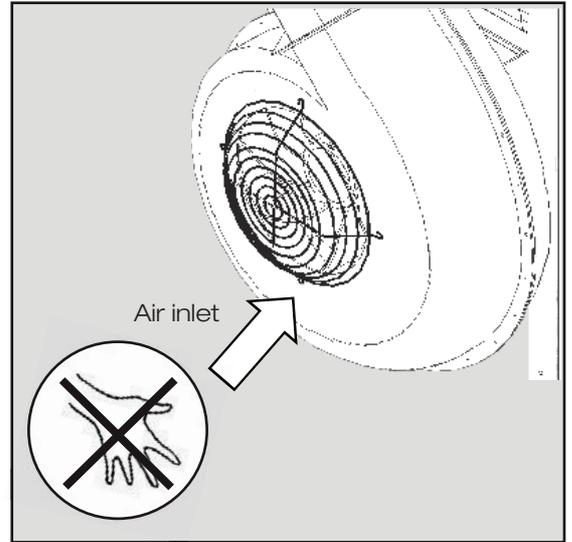


3 - Description

Protection grids

On all pneumatic air kit models there are protection grids. They are fundamental for avoiding accidents and stopping foreign bodies from getting inside the fan.

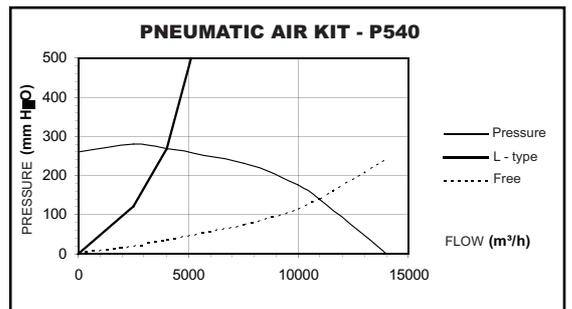
-  Use of the air kit without protection grids is not permitted.
-  Do not take the protection grids off the equipment whilst it is in use.
-  Do not go near the turbine when the equipment is in use if you are wearing light or loose clothing.
-  Never put foreign elements inside the turbine via the grid, regardless of whether it is in use or not.
-  Protect your ears from the sound the turbine makes by wearing EN 352-1:1992 homologated ear muffs or something similar.
-  If you were to notice vibrations or hammering, switch off the turbine immediately.



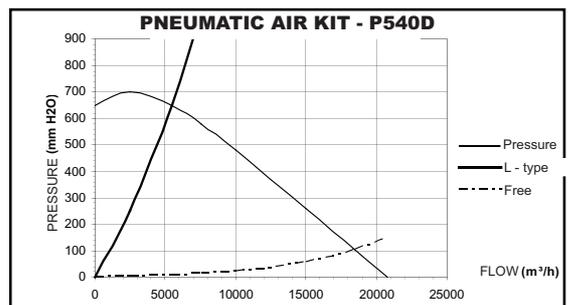
Air flow and pressure

The following graphs show the air flow and pressure supplied by the two turbine models.

These results have been calculated when the fan is in top gear. To work out the results in first gear, decrease the values by 15%.



These results have been calculated when the fan is in top gear. To work out the results in first gear, decrease the values by 45%.



3 - Descripción

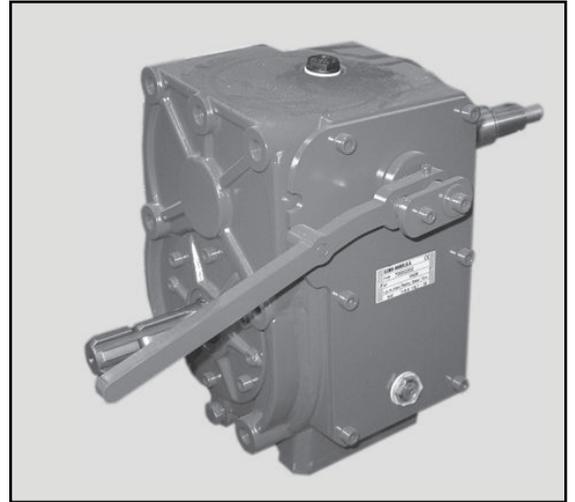
Gear Box

The gear box for the P540 air kits has two speeds. The speed ratio is the following:

1st speed = 1 / 6.6

It holds 1.75 litres of oil for cooling and lubrication. The type of oil used is SAE 90, which is ideal for high temperatures.

See "Maintenance" for how frequently the oil has to be changed.



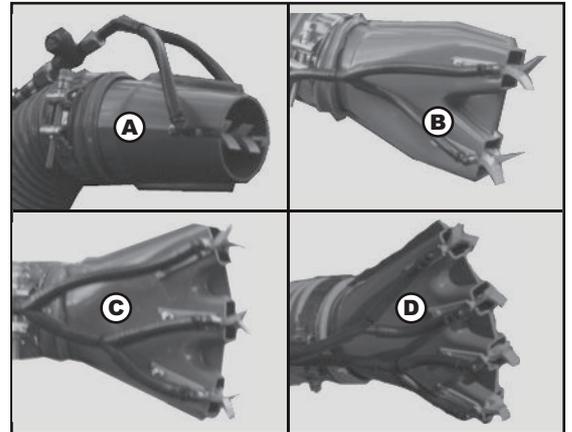
3 - Description

Pneumatic system

The pneumatic system is low pressure and it takes advantage of the high air speed in the spout so as to break up the spray film and create a very fine mist together with some turbulence. Via the atomizers in the spout, the mist is spread uniformly in the shape of a fan.

There are four types of spouts which combine with the type of boom and assembly you may have acquired with your piece of equipment.

- A** Cannon with one outlet
- B** Spout with 2 outlets
- C** Spout with 3 outlets
- D** Spout with 4 outlets



For this system ceramic discs are used to determine the flow rate. This type of disc has two positions. If the disc is placed so that the flow goes in through its flat side, this will allow less to go through than if it went through its cone-shaped side.

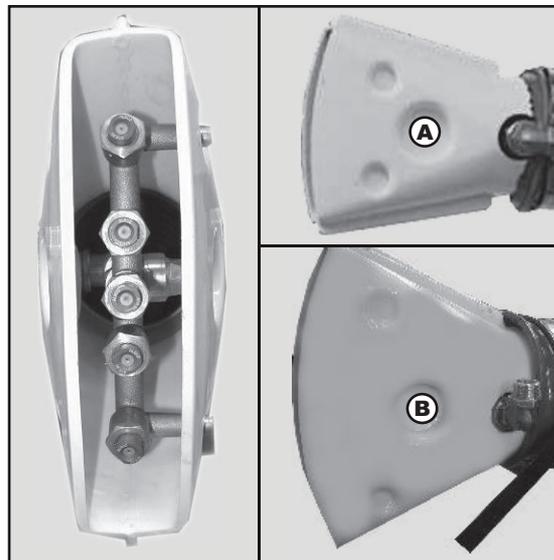
3 - Description

Hydro-pneumatic System

The hydro-pneumatic system is medium to high pressure. This system takes advantage of the great amount of turbulence in the cone-shaped low-volume nozzle and distributes the sprayed water correctly. The air gets to the spout at high speed and this spreads the water in the shape of a fan.

There are two types of spout, with three or five nozzles. These two spouts cannot be used together.

- A** Spout with 3 nozzles
- B** Spout with 5 nozzles



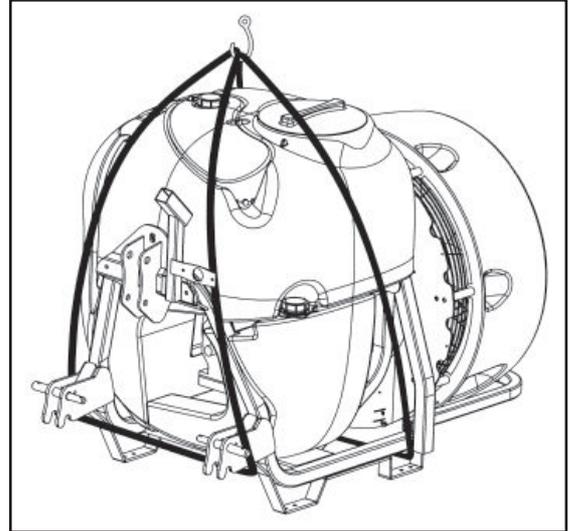
Technical Information

Important Information

Before using the machinery, you are recommended to read the instructions set out below to ensure there are no problems during use and you are able to carry out the treatment in the correct way.

Unloading the mist blower from the lorry

When loading or unloading the mist blower from a van or lorry by using a lever and pulley or a crane, use the suspension points shown on the diagram and make sure the straps or belts used are strong enough.



Before starting up for the first time

Although the surfaces of the metallic parts of the mist blower have been treated with a strong, protective product, we recommend you apply to all those parts a layer of anti-corrosion oil to stop chemical products discolouring the enamel, and help future cleaning.



This should be carried out whenever the protective layer wears off.

Storage wheels

On unhooking the equipment to exchange it for another or to store it away at the end of the season, a set of wheels could be installed below the chassis in order to be able to move it about easily.

These wheels enable you to push the equipment and then you can fit it into any space in the warehouse that otherwise would be difficult to get to by tractor.



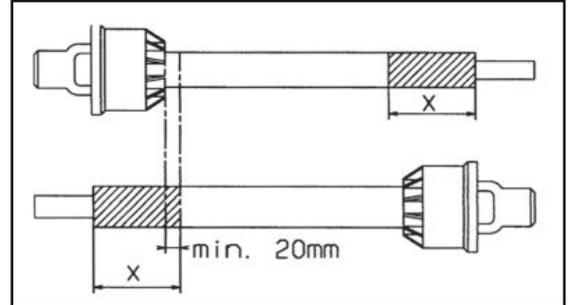
4 - Start up

Mechanical connections

Attaching the transmission shaft

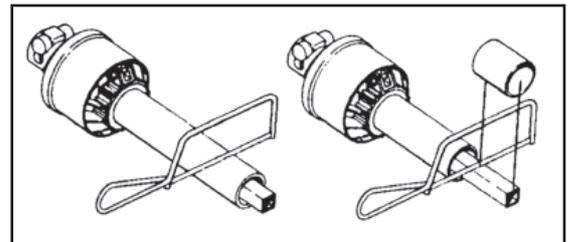
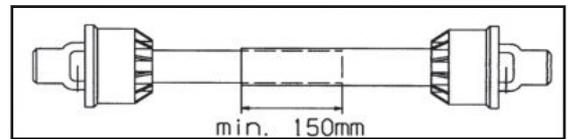
Putting the transmission shaft on for the first time may mean you will have to cut it to adapt it to the type of tractor it is going to be attached to. In order to carry this out follow the steps set out below.

1. Attach the mist blower to the tractor so that the tractor's PTO and the mist blower's pump are as near each other as possible.
2. Turn off the engine and take out the ignition key.
3. If the transmission shaft has to be cut, dismantle both parts of the shaft. Place one part of the shaft onto the tractor and the other onto the mist blower and measure the length that it has to be cut. Mark the protection grids.

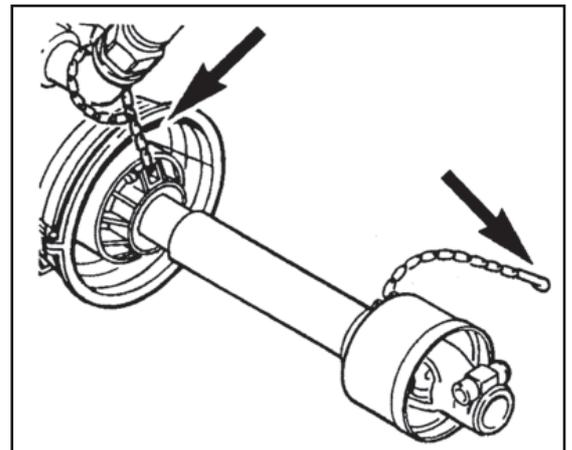


The shafts must always overlap at least 1/3 of their length.

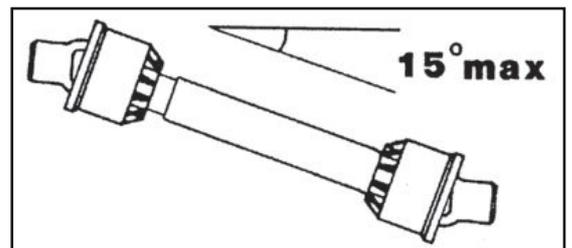
4. Both parts must be cut to the same size. Use a saw and then file the pipes down afterwards.
5. Grease the pipes and join the male and female pipe ends once more.
6. Fit the tractor's shaft to the mist blower's pump.



Place the female pipe end towards the tractor. Put the chains on so that the protection grids do not turn with the shaft.



7. In order to ensure that the transmission shaft will last for many years, avoid working at angles above 15°.



Hooking up the mist blower

Hooking up the mist blower

If your mist blower has a semi-automatic quick hitch, follow the steps set out below:

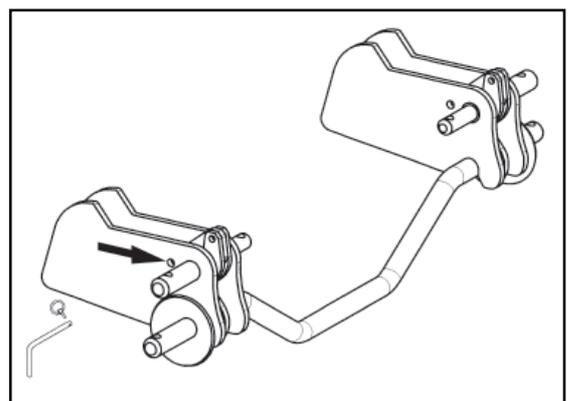
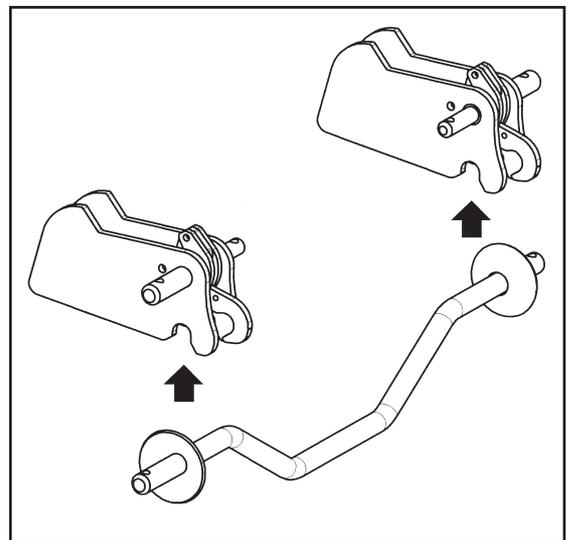
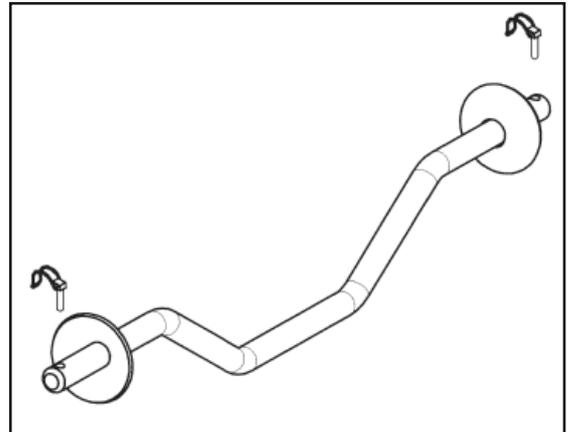
1. Place the quick hitch boom in the hydraulic arms of the tractor.
2. Place the bolts so that they ensure the boom cannot come out of the hydraulic arms.
3. Completely lower the boom with the tractor's hydraulic lever.
4. Reverse the tractor until it touches the chassis, placing this as near the middle as possible.
5. Attach the third point on the tractor to the chassis of the equipment and tighten it by hand.
6. Raise the tractor's hydraulic arms with the hydraulic lever until the boom fits perfectly into place.
7. When the boom is correctly attached, the two hooks will close automatically and the equipment will be fixed to the tractor.
8. Put the safety rivets of the semi-automatic quick hitch on to avoid the equipment from becoming detached during transportation or spraying.
9. Place the equipment at the height needed.
10. Tighten the third point until the equipment is completely perpendicular to the ground.

To detach the mist blower you should proceed in the following way:

1. Lower the tractor's hydraulic arms with the hydraulic lever until the equipment is touching the ground.
2. Pull the wire so that the clasps of the semi-automatic quick hitch release the boom.
3. Loosen the third point.
4. Pull out the rivet which is holding the third point so as to completely release the equipment.
5. Drive the tractor away slowly.



The tractor's hydraulic arms should be moved very smoothly so that the equipment does not become damaged or even knocked over.



4 - Start up

Hydraulic connections

Technical information

If your equipment includes any type of function that requires a hydraulic system for it to work, you should take into account the type and number of connections will be needed.

Necessary couplings

The following list shows the models that need hydraulic outlets on the tractor in order to make any movement or connection.

ZENIT B20 M

Central lifting cylinder (A) (if it is fitted) = 1 double acting outlet

ZENIT B20 HY

Central lifting cylinder (A) = 1 double acting outlet

Individual closing and opening boom cylinder (B) = 2 double acting outlets

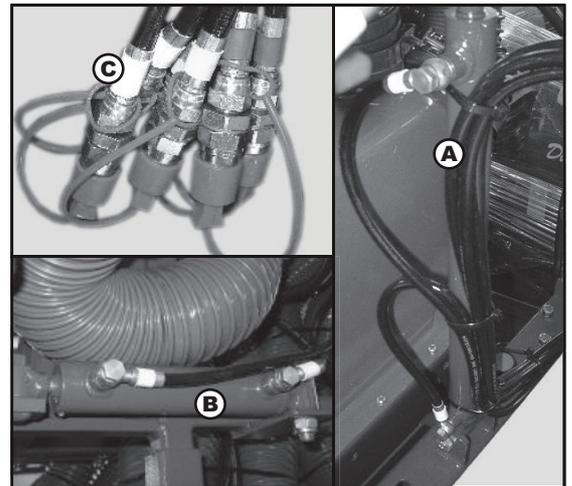
The quick couplings (C) are colour-coded to identify the various cylinders on the equipment.

For boom B20 HY there is an optional electro-hydraulic control kit with which it is possible to control all the boom's movements by means of a joystick that is fitted to the hydraulic lever. With this system only one double acting outlet is necessary.

CANNON L-M-T

Hydraulic engine 180° turn = 1 double acting outlet

Spout lifting cylinder = 1 double acting outlet



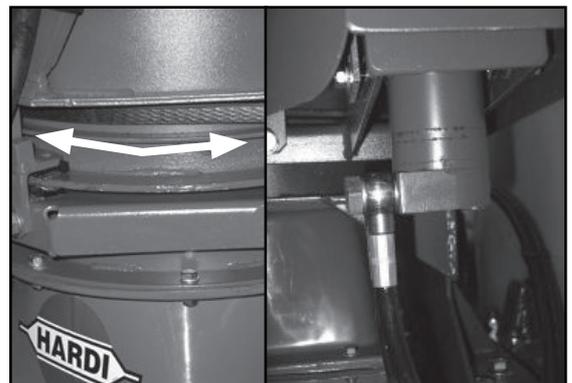
Hydraulic Movements of the CANNON model

The hydraulic movements are all the same for the three CANNON models.

The lifting cylinder is controlled via a double acting outlet on the tractor and allows the CANNON to go from a horizontal position to a vertical one of between -10 to 80°.



For a 180° rotation another double acting outlet will be necessary. This movement enables you to carry out the treatment on one side or the other of the CANNON, regardless of the direction the tractor is going in.



Electrical connections

Technical Information

If your equipment is fitted with an electrical component, you should take a few details into account so as to be able to connect it up correctly and avoid problems when the equipment is in use.

The voltage the electrical components require is 12 volts. Before connecting up any of them, make sure the polarity is correct.

Brown cable = 12V (+ positive)

Blue cable = (- negative)

The connectors on the electrical components are the same as those on the majority of most modern tractors. If you have a tractor with a different type of connector, it will be necessary to dismantle the current one and adapt it to that of the tractor.

Installing the basic electrical control box

Find a place in the tractor's cab where it is possible to put a control box so that you can work it in as comfortable a way as possible. The place we most recommend is to the right of the driver's seat.



The control box should be firmly attached to avoid bangs or excessive vibration.



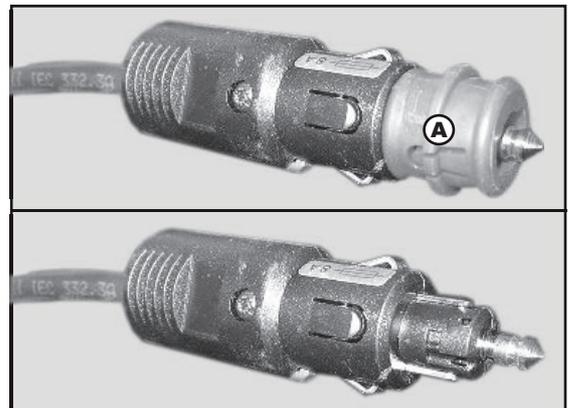
The type of connector is universal and you should be able to plug it into any tractor.

If you take off the end cap **(A)** you can also connect it to the conventional lighter socket.

As an emergency solution you can dismantle the connector and connect the cables directly to the battery.



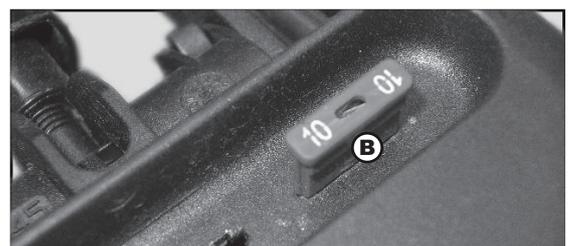
Always remember: Brown cable (+), blue cable (-).



The basic control box is fitted with a spare fuse so that you do not need to stop the blower if there is an electrical fault.



When you have used the spare fuse **(B)**, replace it straightaway. That way you can be sure that if a similar problem ever happens again, you will have the solution at hand.



4 - Start up

Installing the control box type Spray Box

If you have acquired the mist blower with HC2500, then it is equipped with the Spray Box.

Find a place in the tractor's cab where it is possible to put a control box so that you can work it in as comfortable a way as possible. The place we most recommend is to the right of the driver's seat.

 The control box should be firmly attached to avoid bangs or excessive vibration.

The type of connector **(A)** is universal and you should be able to plug it into any tractor.

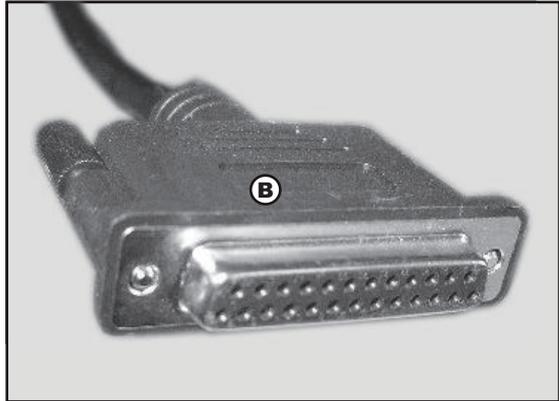
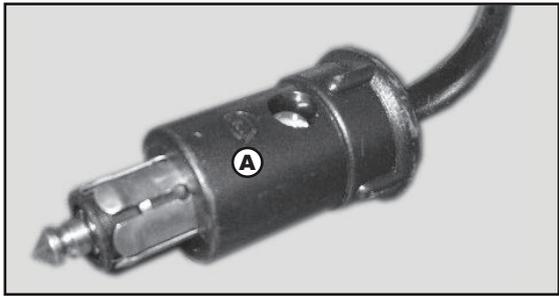
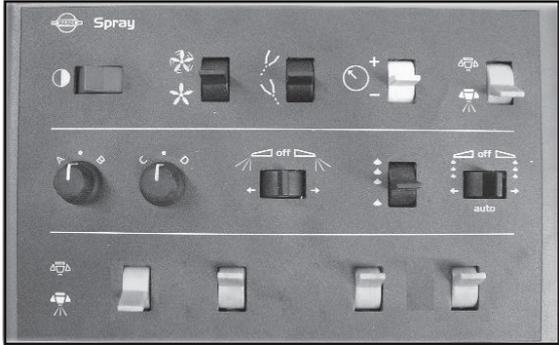
As an emergency solution you can dismantle the connector and connect the cables directly to the battery.

 Always remember: Brown cable (+), blue cable (-).

 The basic control box is fitted with an insulated fuse. When there is a short circuit, the fuse heats up and the box stops working. On cooling down, the box starts working again. This may take between 2 and 10 minutes, depending on the temperature reached by the fuse.

The 25-pin connector **(B)** which the Spray Box is fitted with can be used for plugging in the HC2500 computer.

If the Spray box is not used, protect it from getting dirty by putting a cover over it.



Booms

Technical Information

The ZENIT equipment fitted with pneumatic kits can be attached to three different types of booms. Each one of these booms can be adapted to several different spout combinations, depending on whether it is the pneumatic or hydro-pneumatic air system.

B11 - Fixed boom

This type of boom is for treating one complete row. The spouts are totally adjustable as far as height and inclination is concerned. Loosen the screws on the spout supports and adapt the height and width. In order to direct the spout to the area to be treated it can be rotated.

The three available spraying systems can be used with this.



B20 - Manual boom

This type of boom is for treating four row sides or two complete rows. The spouts are totally adaptable to the type of crop. Loosen the screws on the spout supports and adapt the height and width. In order to direct the spout to the area to be treated it can be rotated.

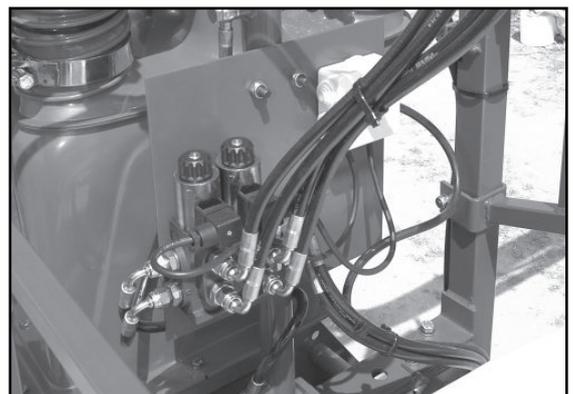
The left- and right-hand booms can be opened and closed manually. With the lifting cylinder (if it is fitted) it is possible to raise or lower the two booms at the same time.



B20 -Hydraulic boom

This type of boom is for treating four row sides or two complete rows. The spouts are totally adaptable to the type of crop. Loosen the screws on the spout supports and adapt the height and width. In order to direct the spout to the area to be treated it can be rotated.

The left- and right-hand booms can be opened and closed manually. With the lifting cylinder (if it is fitted) it is possible to completely raise or lower the two booms at the same time.



4 - Start up

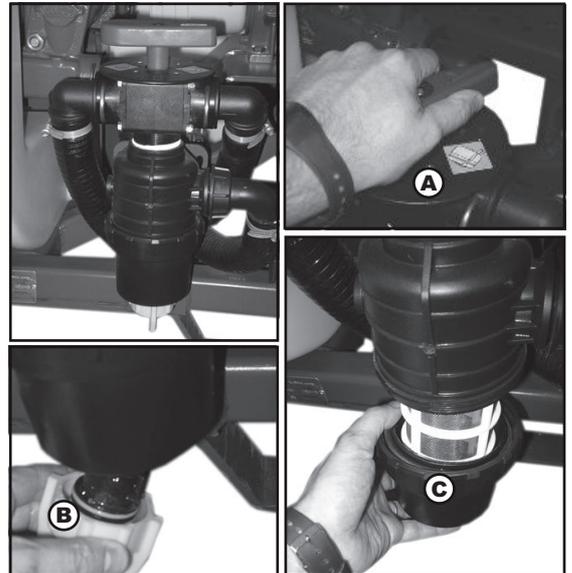
Liquid and Air Circuits

Suction Filter

This is on the bottom left-hand side of the equipment and is easily reachable. To clean the filter you should follow the steps below.

1. Close the three-way valve **(A)**.
2. Take out the closing valve **(B)** of the filter in order to empty what is inside.
3. Undo the filter housing **(C)** so as to be able to get to it.
4. Clean the filter and put it all back together again.

Cleaning the filter must be carried out at the end of each treatment, before the remaining liquid solidifies. In this way you will avoid problems of blockage or lack of suction occurring when you next use the machine.



Diaphragm pumps

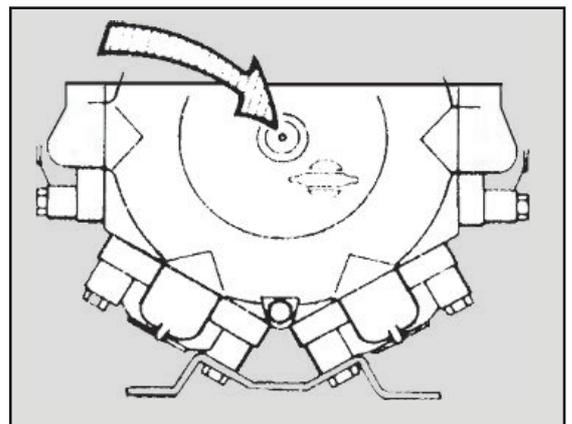
The maximum number of revolutions when in use is 540 rpm. It is self-priming and can be run dry. Depending on the model acquired, the pump is fitted with 2 or 6 diaphragms. The operating system is the same for both, but the one with 6 diaphragms provides more flow.



Be careful to make sure the pump is perfectly greased when it is to be used.



See "Maintenance" for how frequently the pump has to be checked.



5 - Operating

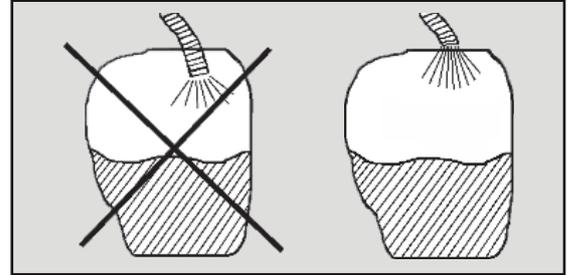
Tank

To put water in the main tank, take off the lid on top of the tank. We recommend you use as clean water as possible for spraying.

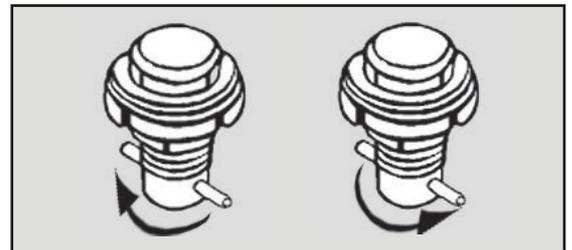


Always fill the tank with the upper filter in position to stop unwanted particles from going into the tank.

Do not put the water hose right into the tank. Keep it outside and simply aim inside. If the hose were to get inside the tank and the pressure from the water supply were to be reduced, the chemical products could siphon from the tank to the water source and contaminate the water there.



To empty the tank via the drainage valve, turn the pin on the lower right-hand side of the auxiliary tank. To close it again, turn the pin again and the valve will close automatically.



Do not forget to use protective clothing and gloves when doing this.

Pressure filters

Pressure filters stop allowing those impurities which have not been filtered out during suction from getting to the nozzles. To avoid blockage of those filters it is very important to check them from time to time and empty them at the end of every treatment so that the chemical product does not solidify and block them up.



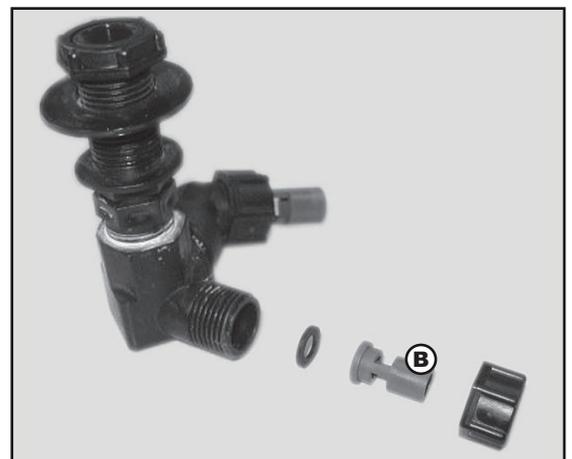
To completely empty the filter or clean it, take off the housing **A** using gloves.



Agitation

The dual-nozzle agitation system injects the chemical product at high pressure from the pump inside the tank creating a turbulence that mixes the product with the water for a uniform application.

The fitted agitator is the standard one, with two 2mm ventury nozzles **B**. The ventury nozzle allows the flow to come out of the main tank at high pressure.



5 - Operating

Clean water tank

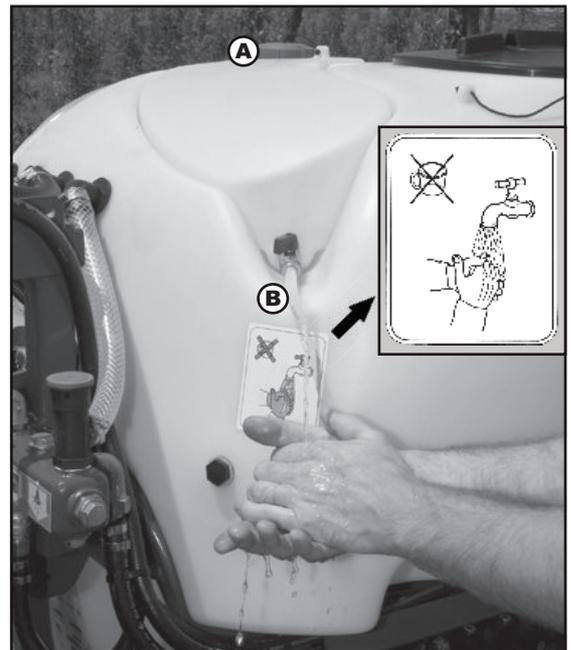
This tank has a capacity of 15 litres and is to be found at the top of the equipment. It can be used for washing gloves, nozzles or hands after having been in contact with a chemical product.

The cover **(A)** is on top of the tank and screws on and off.

The tap **(B)** where the water comes out of is attached to the tank itself on the left-hand side.



As the sticker shows, this water is not for drinking.



Powder mixer

Its only use is that of rinsing the strainer at the main tank's filling hole when we put in products in powder form that do not dissolve completely inside or which form lumps when they first come into contact with water.



After use, the powder mixer should be switched off, as it uses a lot of flow.



Gear Box

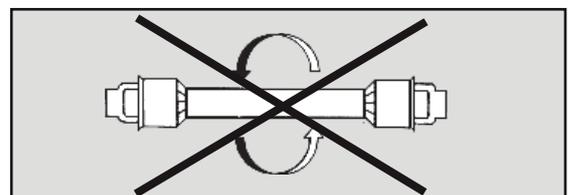
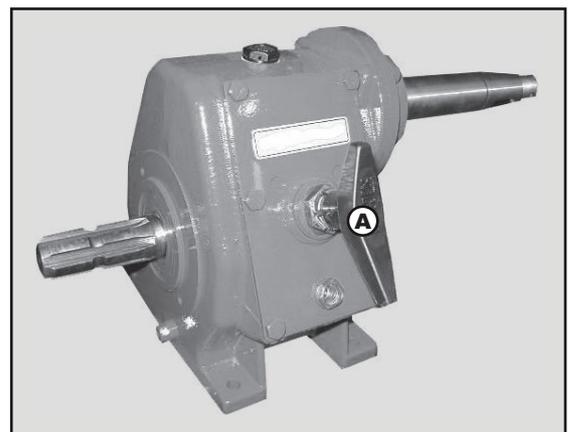
When you are going to work with spray guns or simply agitate liquid, it is not necessary for the fan to be on. Therefore it is advisable to put the gear box in neutral (off).

The gear box is behind the pump. When the gear lever **(A)** is in the middle position, the gear box is in neutral.

If you cannot get it into gear, it is because the pinion's sprockets touch those of the crown and cannot fit in properly. To engage the gear turn on the PTO again for a few seconds and then turn it off. After, try to put it into gear again.



Both the pump and the fan should be at a complete standstill when the state (speed) of the fan's gear box is changed.



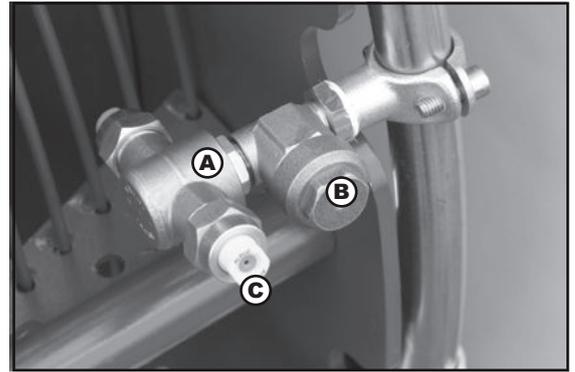
5 - Operating

Nozzles

The standard nozzle holders included in axial air kits are made of brass (A). They can be closed individually by turning them 90°. When open they have a range of +/- 15° to vary their inclination. They are fitted with a non-drip valve (B) to avoid loss of the chemical product that remains in the pipes (B) when the different sections are shut off.

The nozzles (C) are turbulence, they are also known as ATR. They are colour-coded and their pressure ranges go from 5 to 15 bar.

This type of nozzle can also be used with hydro-pneumatic equipment.



It is not advisable to go over 15 bar with ATR nozzles as the drops would be far too small, and the product could evaporate in high temperatures or be carried off by the breeze or wind.

The pneumatic equipment is fitted with ceramic calibrated discs. These discs have two possible positions, one being the cone-shaped part and the other the flat part. If the disc is placed so that the flow goes through the cone-shaped part, the nozzle will give out more flow than if it is placed the other way round.



The function of these nozzles in the pneumatic equipment is to control the amount of flow needed to break up the spray film. The pressure ranges of the pneumatic equipment go from 0 to 4 bar.

On CANNON models, there are three different types of spout. Model L is made of polyester and is only fitted on equipment with one turbine. It comprises 4 bi-jet holders with two nozzles each. As well as these nozzles, there are three adjustable ones outside the spout which means you can treat the nearby crops correctly.



Model T is made of metal and is fitted on equipment with two turbines. It comprises 7 bi-jet holders in the shape of a star that have three nozzles each. As well as these nozzles, there are three adjustable ones outside the spout which means you can treat the nearby crops correctly.



Model M is also made of metal and is fitted on equipment with two turbines. It comprises an outlet of 10 nozzles and there are two more with three nozzles each. You can adjust the direction in which the ends of the upper and lower spouts points.



Booms

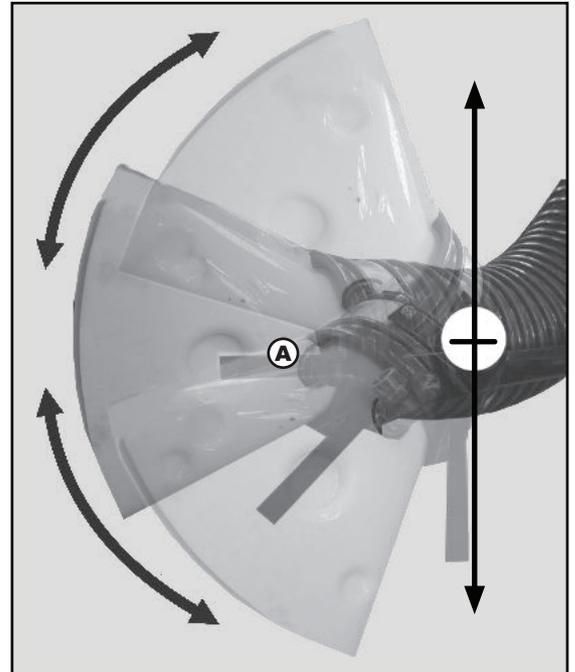
Technical Information

The ZENIT equipment that is fitted with pneumatic kits can be assembled on two different types of boom. To each of these booms several different combinations of air spouts can be adapted, depending on whether it is the pneumatic or hydro-pneumatic air system.

B11 -Fixed Boom

This boom type is for treating one complete row. The spouts are totally adjustable as far as height and inclination is concerned (A). The three spraying systems available can be adapted to this.

The spouts can be totally adapted to the type of crop, either for treatment in specific areas or a generalised treatment.



B20 -Manual and Hydraulic Boom

This type of boom is for treating four row sides. The spouts are totally adjustable as far as height and inclination is concerned. The three spraying systems available can be adapted to this.

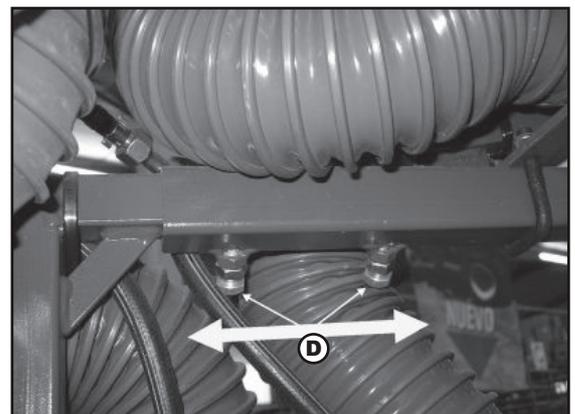
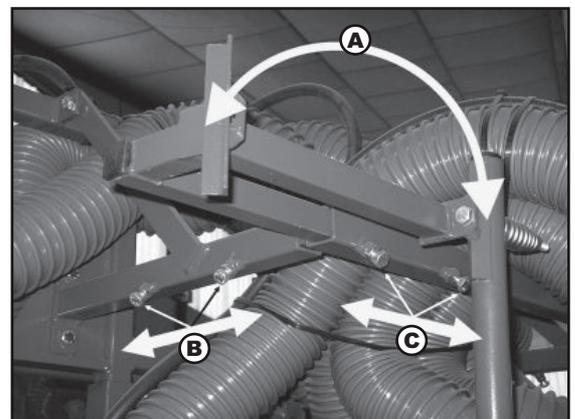
With regulating bracket (A) it is possible to place the spouts nearer or further away from the row, depending on how dense the crop type is.

With regulating bracket (B) it is possible to put all the spouts on the back backwards or forwards.

With regulating bracket (C) it is possible to place the spouts nearer or further away from the row, depending on how dense the crop type is.

The spouts can be totally adapted to the crop type, either for treatment in specific areas or a generalised treatment.

With regulating bracket (D) it is possible to place the external spouts nearer or further away from the row, depending on how dense the crop type is.



5 - Operating

Cleaning

Technical Information

In order for your mist blower to last for many years, it is recommended you follow a maintenance programme. As part of this maintenance it would be necessary to include a thorough cleaning.

To do this, your equipment should include a cleaning kit made up of a rinse tank and a multi-hole rotary nozzle inside the tank.

The tank is made of yellow polyethylene and its capacity is 10% that of the main tank, therefore 40 litres for a 400-litre tank, 60 for a 600-litre tank and 100 for a 1,000-litre one.

It is to be found on the lower left-hand side of the chassis and is totally independent from the main tank.

The lid (A) is on the left-hand side of the equipment and is easy to find because it is red. On the lid there is a tie which attaches it to the tank so that it does not get lost.

You should fill this tank up with a hose that does not belong to the equipment's liquid circuit, so as to avoid any sort of chemical product getting inside this tank.



To clean the tank, you should place the three-way valve situated above the suction filter in the clean water tank position.



The multi-hole rotary nozzle is inside the main tank.

The pressure that gets to this nozzle makes the head go round at high speed, thus the clean water comes out as dozens of jets that clean every nook and cranny of the tank.

To activate this multi-hole rotary nozzle for internal cleaning you should turn the tap situated on the pressure collector.



5 - Operating

Chemical measures

Always read the labels on the products, detergents and deactivating agents. Take into consideration those special instructions on protective clothing, deactivating agents, worker's safety rules, etc

Rules and regulations

Make sure you know the local safety laws referring to waste disposal, decontamination systems, etc. If you have any doubts, find out what the legislations for agriculture are in your region.

Cleaning and Dumping

Waste products should be dumped in a special site, not used for crops. You should make sure the liquid does not drain away into streams, wells, fountains, ponds, etc. You should not dispose of these products in the sewers.

The Mistblower

Cleanliness starts with calibration: a well-calibrated mist blower will only retain very little product at the end of a treatment.

It is necessary to clean the mist blower immediately after use to leave it ready for the next time and avoid contact with chemical products. In this way you will prolong the time its components last.

If it were necessary to leave a chemical product in the tank for a short period of time, you should make sure it is well out of the way of non-authorized people and animals.

If you use corrosive products, we recommend you grease the metallic parts of the equipment with a corrosion inhibitor product before and after use.



For your safety keep the mist blower clean. A clean mist blower is always ready for use. Clean mist blowers do not end up being damaged by pesticides and dissolvents.

Cleaning Procedure

To clean the outside of your mist blower correctly, it would be convenient to follow the steps below:

1. Dilute any remaining product in the tank by at least ten times the amount of water and spray over the trees which have already been treated. It is recommended you increase your forward speed (double it, if possible) and reduce pressure.
 2. Select and use the right protective clothing, like rubber gloves, face masks, rubber boots, etc. Select an appropriate detergent for cleaning and deactivating, if necessary.
 3. Clean the outside of the tractor and equipment with detergent.
 4. Clean the suction and pressure filters. Be careful not to damage the mesh.
 5. With the pump on, rinse the inside of the tank, do not forget the top part. Make all the components that have been in contact with the product work with water. Before opening up the nozzles, make sure you are in a area where there are crops or a special dump.
 6. Once all the liquid has come out, switch off the pump, fill half of the tank with water, and add detergent and/or a deactivating agent such as soda or ammonia.
 7. Start up the pump and switch on all the controls so that this liquid can go through all the components. Leave the nozzles till last.
 8. Empty the tank and run the pump dry. Switch off the pump when it is empty. Rinse the inside of the tank.
 9. Put the filters and nozzles back on and put the mist blower away. The dissolvents used in phytosanitary products are very aggressive. When you put the mist blower away, leave the lid to the tank open.
-

Unexpected interruptions

If you have to stop a treatment unexpectedly, due to bad weather for example, and there is still some liquid in the tank, we recommend you rinse the tank, operating unit and pipes.

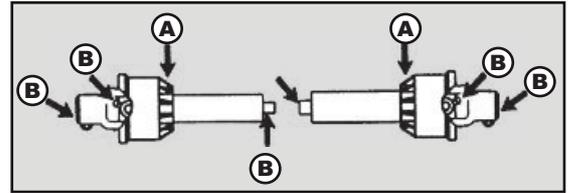
Close the nozzles and switch off the PTO. Close the suction filter valve and open the filter. Immediately put clean water down the suction hose which goes straight to the pump and open up the nozzles. Follow the procedure until clean water comes out of the nozzles. Stop the pump and put the suction filter back in place.

6 - Maintenance

Lubrication

Transmission shaft

The universal joints and ball bearings should be lubricated with grease. At the points shown (A), you should do it after every 8 hours of use and the pipes and shafts (B) after every 20 hours.



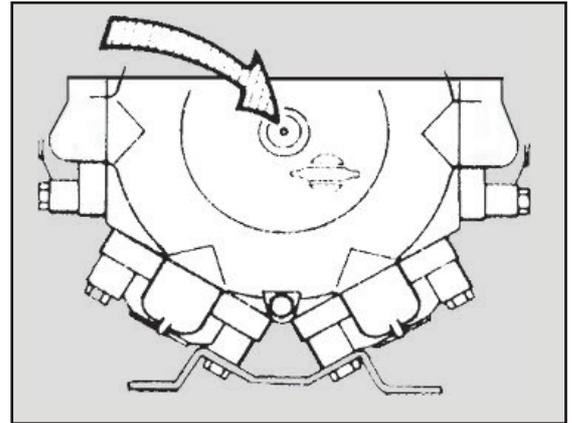
Diaphragm pump

Grease the pump after every 50 hours of use or once a month, using the grease gun found in the crankshaft. The grease goes along some internal channels in the crankshaft and reaches the ball bearings, connecting rods, etc.

On both the 321 and the 363 pump models, greasing is done in the same way.



A lack of grease in the pump could cause it to overheat and all its inside mobile parts could break.



Filters and fittings

Check the filters after every 50 hours of use. As well as checking whether the filter is clean, make sure the mesh is in perfect condition. If it is not, the filter will not be effective at all.



Not having filters in good condition leads to numerous unwanted stops during a working day.



Each time you dismantle a fitting to check the condition of the sealing or for any other reason, remember to lubricate the sealing with oil or grease to avoid it from getting twisted when putting the fitting back in place.



A broken O-ring or sealing in the suction circuit means the pump will suck in air and the circuit will be hit by very big variations in pressure and the hoses will shake.

6 - Maintenance

Diaphragm pump

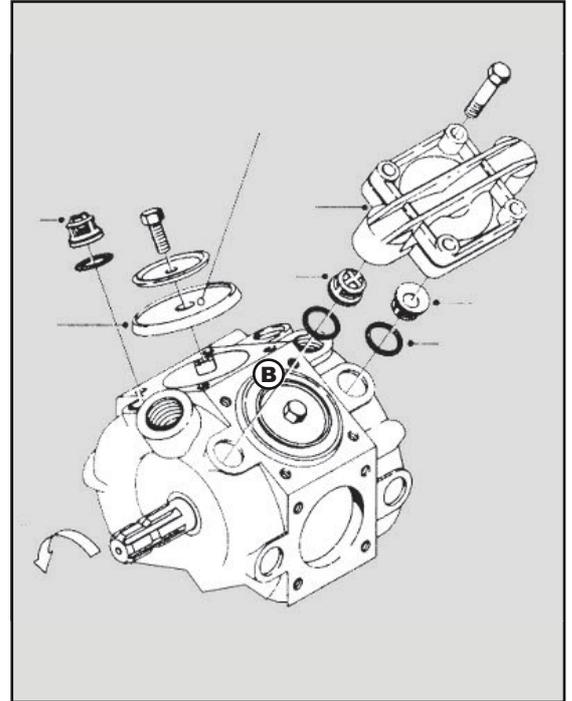
Method of replacing the diaphragms is very simple. The same procedure is followed for the two models 321 and 363 pump.

321 pump

- 1 - Dismantle the valve cover.
- 2 - Replace the valves and O-rings.
- 3 - Undo the bolt and replace the diaphragms.
- 4 - At this stage make sure that the diaphragms are fitted in the correct position. The part indicated must be facing outwards.
- 5 - Tight the screw which is supporting the diaphragm at the maximum with 6 Nm.
- 6 - Put grease and fit the valves. Take care not to fit valves on upside-down.
- 7 - Fit the crankcase again.

363 pump

- 1 - Dismantle the valve cover.
- 2 - Replace the valves and O-rings.
- 3 - Undo the bolt and replace the diaphragms.
- 4 - Remember to place the diaphragms with piece number upwards.
- 5 - Reassemble the pump placing the valves in the correct position.
- 6 - Put grease. Take care not to fit valves on upside-down.
- 7 - Fit the crankcase again.

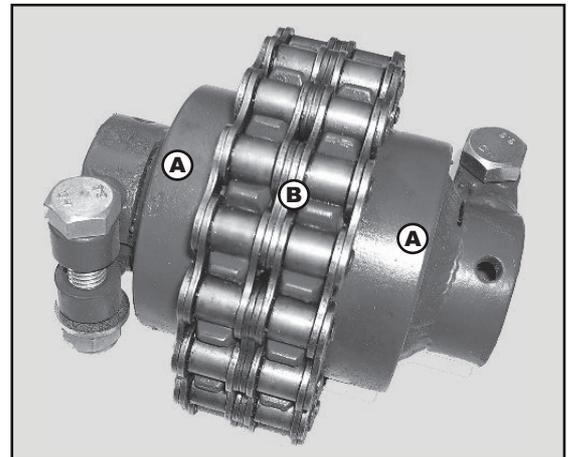


Bear in mind that there are two different types of valves on the upper crankcases which must be replaced in the same position.

Mechanical clutch

The function of the clutches is power transmission via the pump into the gearbox. Designed of two-pinions (A) and a double chain (B) which holds them together. The chain must be greased every 50 hours to avoid unnecessary wear and tear.

When the chain is worn, it is recommended to change all parts, as a new chain on worn pinions will be worn faster.



6 - Maintenance

Regular checks

After every 10 hours of use

1. Clean the suction filter
 2. Clean the pressure filters
 3. Clean the nozzles
 4. Check for leaks in the liquid circuit
 5. Check that no air can get into the suction circuit
-

After every 50 hours of use

1. Carry out the checks mentioned above
 2. Check the pressure in the pressure damper (if it is fitted)
 3. Check the transmission shaft
 4. Check the mechanical clutch
 5. Grease the diaphragm pump
-

After every 100 hours of use

1. Carry out the checks mentioned above
 2. Check the clasps on the equipment for attaching it to the tractor
-

After every 250 hours of use

1. Carry out the checks mentioned above
 2. Check the hydraulic hoses
 3. Change the oil in the gear box
-

After every 1.000 hours of use

1. Carry out the checks mentioned above
 2. Service check of the transmission
 3. Service check of the sealing
 4. Service check of the pump
 5. Service check of the gear box
 6. Check the pressure gauge
 7. Service check of the air kit
-

Lubrication

Winter storage

At the end of the season, some extra time should be dedicated to the equipment before storing it during the winter time.

It is recommended you store it in a place where it cannot be affected by freezing temperatures. Put at least 10 litres of anti-freeze covering 33% of the inside of the tank and turn the pump for a few minutes so that the entire circuit is impregnated by the solution.

As anti-freeze is an oily solution it also avoids the hoses and all the non-metallic parts from drying up during the period of time that the equipment will be out of use.

Preparing the equipment for use after storage

After storage, the equipment should be prepared well, thus guaranteeing it is in good condition for the new season. To do this correctly, follow the steps set out below:

1. Take off the protective canvas cover if you had put one on.
2. Fit the pressure gauge again. Change the old Teflon.
3. Connect the equipment up to the tractor, including the electric cables and hydraulic hoses.
4. Check the hydraulic functions.
5. Drain the remaining anti-freeze from the tank.
6. Completely rinse out the liquid circuit with clean water.
7. Fill the tank with clean water and check all its functions.

7 - Fault finding

Technical info

Before call to the Technical Service

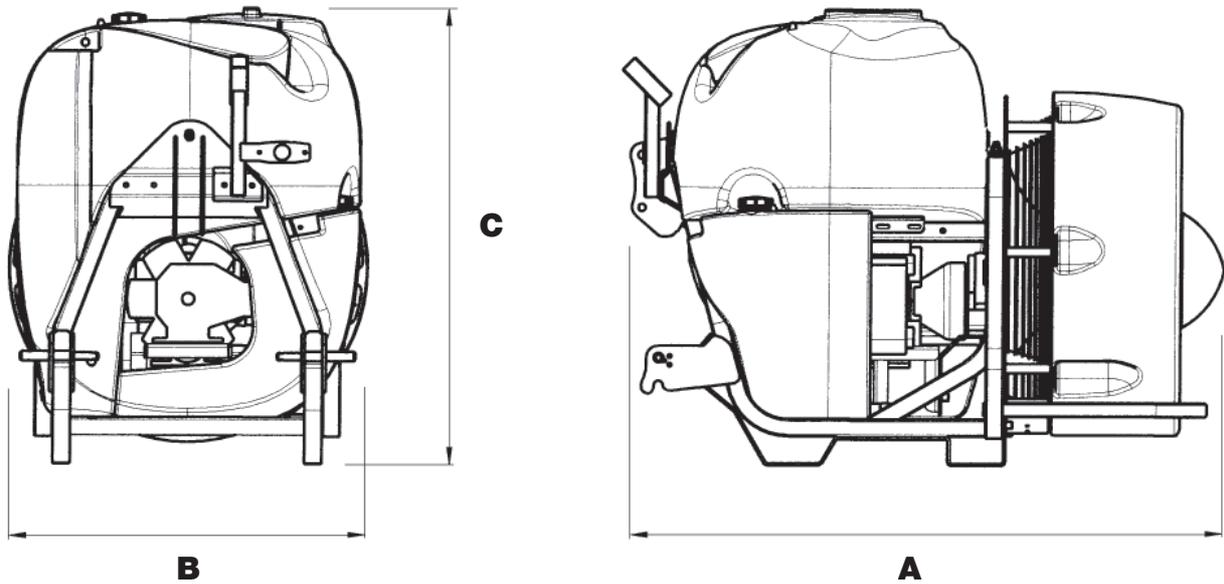
Cuando se detecte un problema de funcionamiento en el equipo, quizás no sea necesario avisar al Servicio Técnico y sea posible solucionarlo fácilmente. Para ello, es necesario prestar especial atención a la siguiente tabla:

In the case that...:	Could be...:	It's advisable...:
No liquid comes out of the nozzles.	Air in the system. Suction or pressure filters obstructed. Air in the suction system.	Fill the suction hose with the water for initial filling. Clean the filters. Check that the suction fitting is not obstructed or too near the bottom of the tank. Check the O-rings on the suction system. Some of them could be damaged. Check the suction hose and its fittings. Check the tighten of the valves crankcases on the suction collector.
Lack of pressure.	Incorrect assembly. Pump valve blocked or worn Pressure gauge defective or dirty.	The agitation restrictor is not fitted. Safety valve's spring does not close properly. The suction fitting inside the tank is obstructed. Check for possible blockage or wear. Check for obstruction of pressure gauge inlet.
Pressure drop.	Blocked filters. Worn nozzles. Air suction when emptying the tank.	Clean all filters. Fill with clean water and start up. If powdered product is being used, check that the agitation is on. Check the flow through every one and replace those that exceed it by 10%. Too much agitation. Disconnect the agitator to empty the tank
Pressure increases	Pressure filters are starting to block. Agitation nozzle is blocked.	Clean all filters. Check for blockage by opening or closing agitation
Foam production.	Air is entering the system. Excessive agitation.	Check for loose nuts, fittings, O-rings in the suction system. Close the agitation. Reduce the tractor r.p.m. Use anti-foaming agent.
Liquid is leaking for the bottom of the pump.	Damaged diaphragms or plungers.	See, "Maintenance" section.
The electrical control unit does not work.	A blown fuse. Incorrect polarity. The valves do not close properly. No power.	Check that the section's motor turns correctly on both side. Brown (+). Blue (-). In the lighter plug brown in the middle. Check the end points of each section and the diodes. Check that the fuse box is well placed and makes contact.
Excessive noise or vibrations in the blower unit.	The fan has lost its counter weight. The blower unit's nuts are broken or worn The blower unit's nuts are broken or worn.	Take the fan to be re-balanced. Consult your dealer. Tighten the nuts. Change the fan clutch.
Vibrations or noises in the gearbox.	The gear is not properly engaged. Worn tooth-wheels. Oil level below minimum.	Put the gear lever in the correct position. Replace the tooth-wheels. Fill to the indicated.

8 - Technical specifications

Dimensions

Axial y Pneumatic



ZENIT AXIAL			
Capacity (liters)	400	600	1000
A (mm)	1660	1660	1850
B (mm)	980	1200	1640
C (mm)	1275	1350	1440

ZENIT PNEUMATIC						
Capacidad (liters)	400		600		1000	
Boom type	B11	B20	B11	B20	B11	B20
A (mm)	1660	245	1660	245	1660	245
B (mm)	1950	195	1950	195	1950	195
C (mm)	1700	220	1700	220	1700	220

8 - Technical specifications

Weights

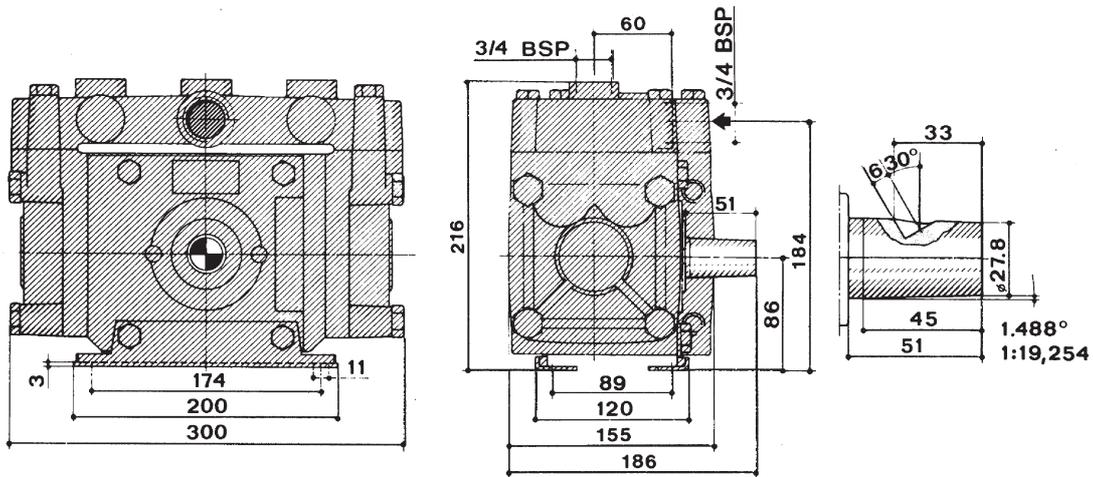
Axial y Pneumatic

ZENIT AXIAL			
Capacity (liters)	400	600	1000
Empty (kg)	365	375	430
Full (kg)	863	1113	1595

ZENIT PNEUMATIC						
Capacity (liters)	400		600		1000	
Boom type	B11	B20	B11	B20	B11	B20
Empty (kg)	380	460	390	470	445	625
Full (kg)	880	960	1130	1210	1610	1690

8 - Technical specifications

321/7 and 321/10 Diaphragm



321/7	r/min											
	300		400		500		540		600		700	
bar	l/min	kW										
0	26	0,2	36	0,3	45	0,4	48	0,6	54	0,7	62	0,7
5	24	0,5	32	0,7	41	1,0	44	1,0	48	1,4	55	1,4
10	23	1,0	31	1,2	39	1,6	42	1,7	47	2,2	53	2,2
15	23	1,5	31	2,0	38	2,2	41	2,3	46	3,0	52	3,0
20	22	2,3	30	2,6	38	3,2	41	3,2	45	3,7	50	3,7
25	22	3,0	30	3,3	37	3,6	40	4,0	44	4,8	50	4,8

Maximum pressure: 25 bar

Weight: 23,2 kg

Normal working revolutions: 540 r.p.m

321/10	r/min											
	300		400		500		540		600		700	
bar	l/min	kW										
0	39	0,3	52	0,4	65	0,5	70	0,6	78	0,7	91	0,8
5	39	0,3	52	0,5	65	0,6	70	0,6	78	0,7	91	0,8
10	39	0,7	52	0,9	65	1,1	70	1,2	78	1,4	91	1,6
15	39	1,0	52	1,4	65	1,7	70	1,8	78	2,0	91	2,4
20	39	1,4	52	1,8	65	2,3	70	2,4	78	2,7	91	3,2
25	39	1,7	52	2,3	65	2,8	70	3,0	78	3,4	91	4,0

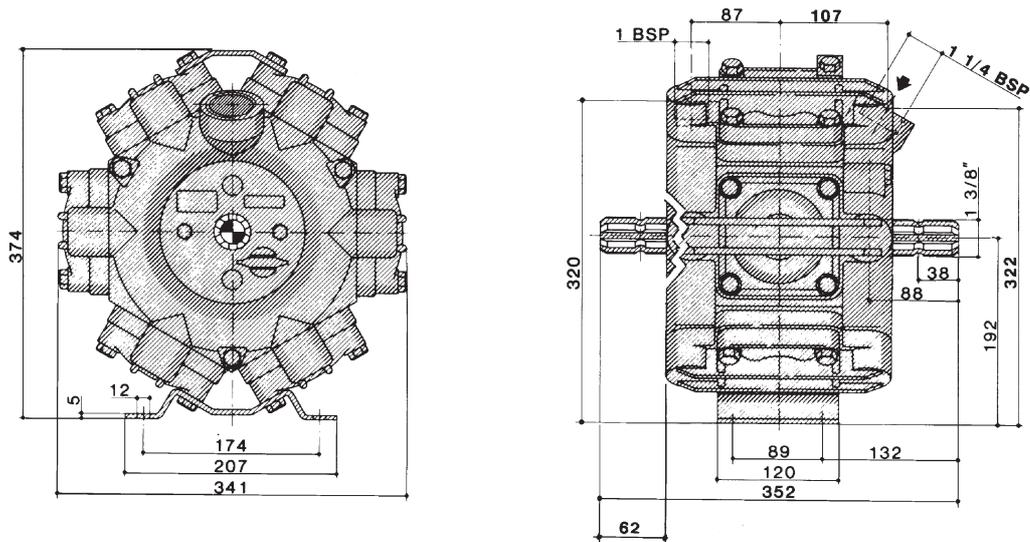
Maximum pressure: 25 bar

Weight: 23,9 kg

Normal working revolutions: 540 r.p.m

8 - Technical specifications

363/7 Diaphragm



363/7	r/min											
	300		400		500		540		600		700	
bar	l/min	kW										
0	78	0,90	104	1,20	131	1,60	140	1,60	156	1,90	183	2,20
2	76	1,00	102	1,30	128	1,70	136	1,80	152	2,00	177	2,30
4	74	1,30	98	1,50	125	1,90	133	2,10	147	2,40	170	2,80
6	73	1,40	97	1,80	121	2,30	130	2,50	144	2,90	167	3,50
10	71	1,80	95	2,40	117	3,10	127	3,40	141	3,80	164	4,60
15	70	2,40	92	3,20	115	3,90	124	4,40	137	5,00	161	5,90
20	68	2,90	90	3,90	113	4,80	122	5,40	135	5,90	158	7,00

Maximum pressure: 20 bar

Weight: 52,6 kg

Normal working revolutions: 540 r.p.m

8 - Technical specifications

General info

Filters

Suction: 35 mesh (0.6 mm)

Pressure: 50 mesh (0.3 mm)

Temperature and working pressure

Temperature from 2°C to 40°C (36°F a 104°F)

Maximum pressure in the suction MANIFOLD: 7 bar

Maximum pressure inside the MANIFOLD: 30 bar

Materials

Tankss: PE MD + UV resistant

Hoses: PVC or rubber

Válves: PA with carbon fibre

Fittings: PA

Fan: Wings PA with glass fibre and aluminium

Turbine: Galvanized iron

Recycling

When the mistblower has reached the end of its useful life its parts can be recycled.

The tank is 100% reusable at a plastic recycling plant. Hoses and synthetic fittings can be burnt. The aluminium parts of the fan can be taken to an aluminium recycling plant.

Metalic parts can be taken to a scrapyard.



Always in accordance with local legislation.

Conversion factors

	SI unit	Imperial unit	Factor
Weight	kg	lb	x 2.205
Surface	ha	acres	x 2.471
Length	cm	in	x 0.394
	m	ft	x 3.281
	m	yd	x 1.094
Speed	km	mile	x 0.621
	km/h	mile/h	x 0.621
	km/h	m/s	x 0.277
Volume/Surface	l/ha	gal/acre	x 0.089
Volume	ml	fl. oz	0x0352
	l	pt.	x 0.568
	l	gal	x 0.22
Pressure	bar	lb/in ² (p.s.i.)	x 14.504
Temperature	°C	°F	(°C x 1.8) + 32
Power	kW	hp	x 1.341
	kW	CV	x 1.360
Torque	Nm	lbft	x 0.74