

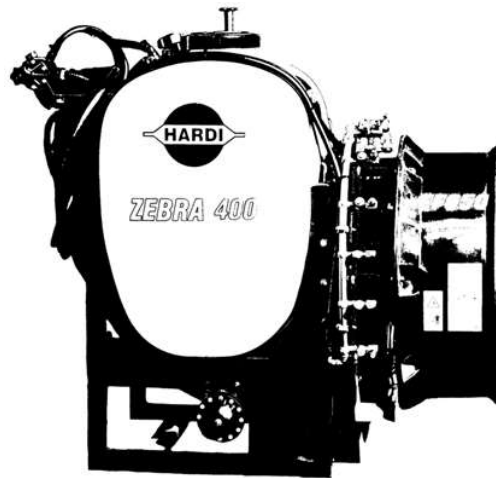
ZEBRA

Original

Instruction book

67026102-100, version 1.00

GB - 08.2015





Congratulations for choosing a HARDI crop protection product. The reliability and efficiency of this machine depend entirely on the care it receives. The first step is to carefully read and pay attention to this instruction book. It contains essential information on correctly using and ensuring a long useful life of this quality product.

As this instruction book includes all versions of the equipment, including all the different hydraulic boom and operating unit versions, please pay particular attention to the paragraphs dealing with your specific model.

This book should be read in conjunction with the 'Spraying Techniques' booklet.

The original instruction book is approved and published in English. All other languages are translations of the original. In the event of any conflicts, inaccuracies or deviations between the English original and other languages the English version shall prevail.

Since it is ILEMO HARDI S.A.U. policy to continually improve our products, we reserve the right to make changes in the design, accessories, specifications and maintenance instructions at any time and without notice.

ILEMO HARDI S.A.U. is exempt from any obligation as regards instruments purchased before or after such changes.

ILEMO HARDI S.A.U. cannot undertake any responsibility for possible omissions or inaccuracies in this publication, although it has done everything in its power to make this information as complete and correct as possible.

As this instruction book covers models, specifications or equipment that are only available in certain countries, please pay particular attention to the paragraphs dealing with your specific model.

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EC Declaration of Conformity



Manufacturer:

ILEMO HARDI S.A.U.

Poligono El Segre, 712, 713

25080 Lleida

SPAIN

declares the following product(s):

ZEBRA

- was manufactured in conformity with the applicable provisions of the Directive 2006/42/EC on machinery, and

- all the applicable provisions of the Council Directive 2004/108/EC (EMC)

Lleida, September 2012

A handwritten signature in black ink, appearing to read 'Josep M. Godia', written in a cursive style.

Josep Maria Godia

Managing Director

ILEMO HARDI S.A.U.

Operator safety

Symbols

These symbols are used throughout the book to designate where the reader needs to pay extra attention. The four symbols have following meaning.



This symbol means DANGER. Be very alert as your safety is involved!



This symbol means WARNING. Be alert as your safety can be involved!



This symbol means ATTENTION. This guides to better, easier and more safe operation of your mistblower!



This symbol means NOTE.

Precautions

Note the following recommended precautions and safe operating practices before using the mistblower.

General information



Read and fully understand this instruction book before using the equipment. It is also equally important that other operators of the equipment read and understand this book.

If you do not fully understand any part of this instruction book after reading it, please contact your HARDI dealer for further information before using the equipment.



Local law may demand that the operator be certified to use this spray equipment. Please comply with the law.



The tractor seat is the safest area when handling the equipment.



Wear protective clothing. Protective clothing may vary according the chemical product being used. Please comply with regulations.

Wash and change clothes after spraying. Clean the tools if they have become contaminated.



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

In the event of poisoning, immediately seek medical advice. Remember to identify the chemicals used.

Filling and spraying



Be careful not to hit persons or objects while manoeuvring the spraying equipment, especially when reversing.



Slow down when driving over uneven terrain as the machine could overturn.



Keep children away from the mistblower.












Do not attempt to enter the tank.



Do not climb under the mistblower unless it has been securely fastened. The boom is only secure when it is placed in the transport brackets.

2 - Safety notes


Service

-  Pressure test with clean water prior to filling with chemicals.
-  Never disconnect the hoses if the machine is in operation.
-  DANGER! Do not exceed the max. recommended r.p.m. at the P.T.O.
-  Rinse and wash out the equipment after use and before servicing.
-  Do not remove the hose if the machine is turned on. Always replace all safety devices or shields immediately after servicing.
-  Disconnect electrical power before servicing and depressurize equipment after use and before servicing
-  If an arc welder is used on the equipment or anything connected to the equipment, disconnect power leads before welding. Remove all inflammable or explosive material from the area.
-  Remove all inflammable or explosive materials from the area.
-  The External Cleaning Device should not be used if important parts of the equipment have been damaged, including safety devices, high pressure hoses, etc.

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.

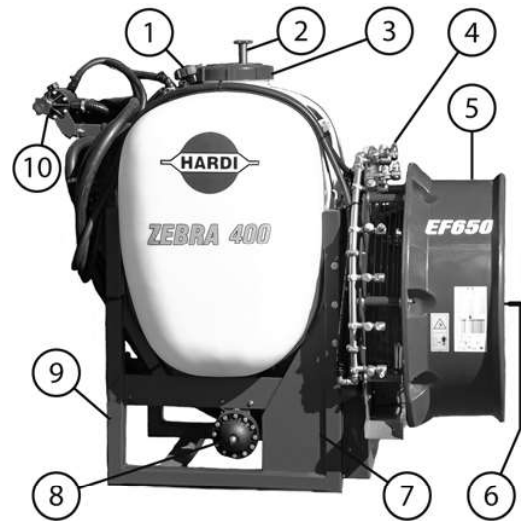
-  As a consequence of the great variety of options and equipment, only the most necessary technical data referring to air flow, power consumption and directions is mentioned. If you require information which is not mentioned in this manual, ask your nearest dealer for it.



General information

Overview

1. Suction filter
2. Drain valve
3. Main tank lid
4. Nozzle line
5. Fan housing
6. Fan clutch
7. Pump
8. Pulsation damper
9. 3-point quick hitch
10. Operating Unit (If SmartValve, placed beside position 8)



Use of the mistblower

The HARDI MERCURY mistblower is designed for applying crop protection chemicals. The equipment should only be used for this purpose. The mistblower must not be used for any other purpose.

If there are no special regulations requiring operators to be certified, you must have received the appropriate training on how to spray crops correctly and safely handling chemicals to avoid unnecessary risks to persons and the environment while spraying.




Road worthiness

When driving on public roads and other places where the road safety code or where there are other special rules and regulations for marking and lights on machinery, the machine must be equipped to comply with these regulations.

3 - Description

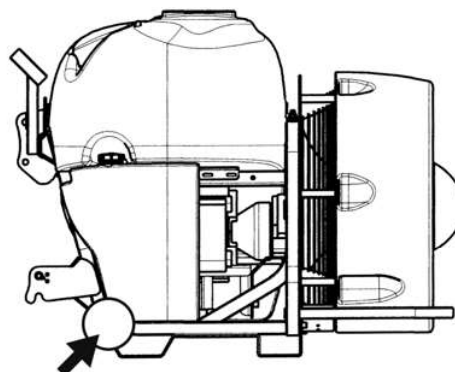
Identification plates

The identification plate is located on the front right-hand side of the machine and is riveted to the chassis. It indicates the make, model, serial number, and date of manufacture.

		MARCA	
	MODELO	N° SERIE	
ILEMO - HARDI SAU Pol. Ind. El Segre Parcela 711 - 712 - 713 Apartado 140 25080 Lleida (SPAIN) Tel. 973 - 208012 Telefax 973 - 208153			
MES	AÑO	N° HOMOLOGACION	

976851

The serial number is also engraved onto the chassis. The number is found above the identification plate, as indicated in the photograph. The serial number contains five digits.



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: 300, 400, 600 and 800 litres.

Liquid system

Safety valves

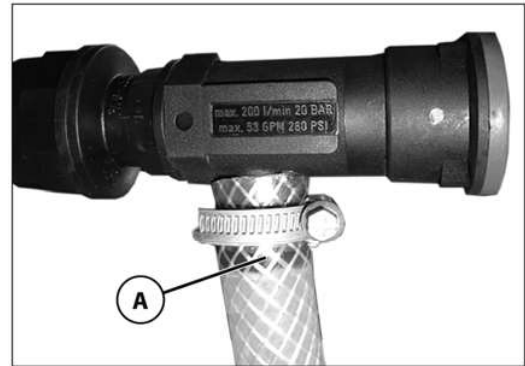
The safety valve protects the liquid circuit against over pressure in the event of failures or clogged lines.

If the spring-loaded safety valve opens the liquid is lead back to tank via hose (A).

The safety valve opens at 15 bar.



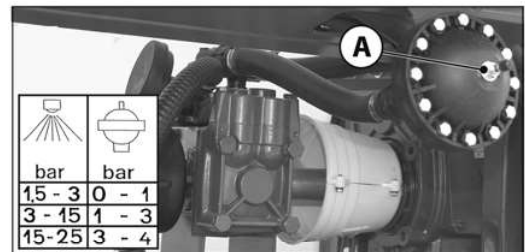
DANGER! Do not remove, bypass or block safety valve from the liquid circuit as this could put your safety at risk.



Pressure pulsation damper

The 321 pump is fitted with a pulsation damper on suction and pressure sides. The pressure side damper is pressurized. The dampers will reduce pulsations and secure an even flow from the pump.

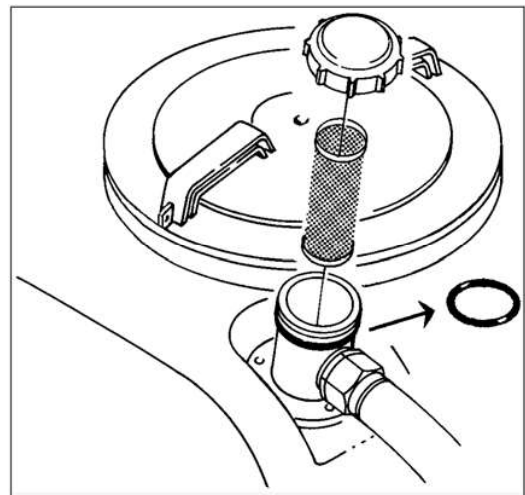
The pressure pulsation damper should be inflated to the pressure shown in the table on top of the pulsation damper (A).



Suction filter

Suction filter is located at the top of the tank.

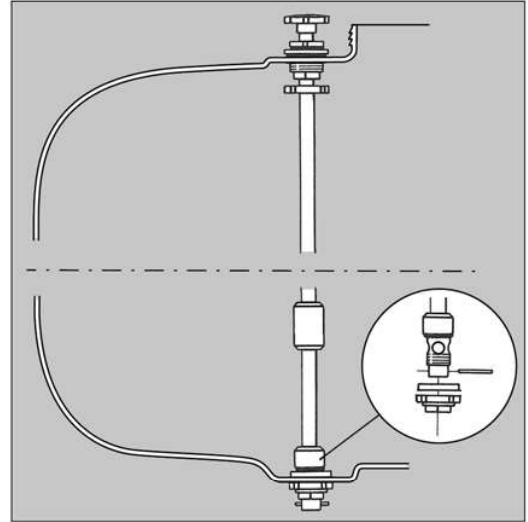
The filter screen can be checked by unscrewing the lid and pulling the filter up.



3 - Description

Tank drain valve

The tank drain valve is operated by the handle located on top of the tank.



Clean water tank (optional)

The water in this tank is for hand washing, for cleaning of clogged nozzles etc.

Only fill this tank with clean water from the tap.

The clean water tank is placed on the sprayer's left side.

Capacity: approximately 15 litres.



WARNING! Although the clean water tank is only filled with clean water, this water must NOT be used for drinking.



Diaphragm pump

Diaphragm pump is model 321/10 (max. 20 bar) with two diaphragms. It works at low pressure and is robustly built. Use only grease for lubrication. This type of pump is self-priming, works without oil and can run dry as long as necessary.

Piston pump

(Certain countries only)

The robust high-pressure piston pumps are fitted with a single-block crankcase with a large oil capacity for increased lubrication and cooling; a treated and rectified wrought-steel crankshaft; special cast conrods; horizontal reciprocating pistons; hydraulic vulcanized sealing rings; chemical-resistant synthetic plungers; individual cylinder heads and stainless-steel ball check valves. The pump is either UX/70 or UG/102.

Operating units

The mistblower can be equipped with following types of operating units:

- M70/2
- BS/2
- SV/2 w/ remote control.
- CA

They have two section valves which control the right and left sides. The section valves are remotely controlled from the tractor cabin.

The type of operating unit available may vary from country to country.

M70/2 operating unit

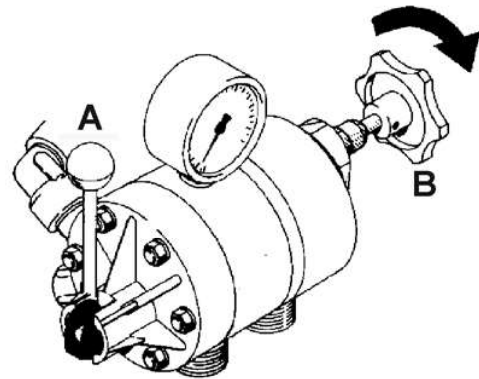
Manual operating unit including a main on/off valve, a pressure adjustment valve, a pressure gauge and two section valves for right and left spray lines.

Lever (A) is main on/off.

Red knob (B) is pressure adjustment valve.

Clockwise = increase.

Anti-clockwise = decrease.



SV/2 operating unit

(Certain countries only)

This high-pressure electric operating unit contains a manual pressure valve fitted to the machine and a electric control box for opening and closing the section valves from the tractor cabin.



BS/2 operating unit

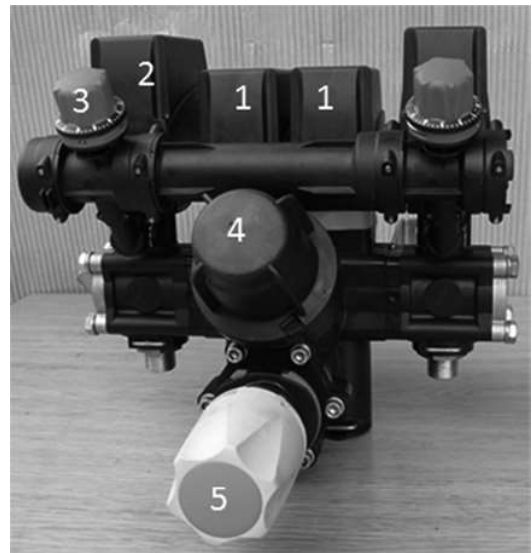
This high-pressure manual operating unit can be used with piston or diaphragm pumps. It contains a pressure gauge and a 5-position single-lever control.



3 - Description

CA operating unit

1. Section valves
2. Pressure equalisation device
3. Adjustment of pressure equalisation by turning left or right to increase or decrease pressure
4. Pressure filter
5. Pressure regulation, manual.



Electric section valves


Two electric solenoid valves are used to control spraying to RH or LH side. The valves are controlled by the operating box in the tractor cabin.




Air equipment

Axial fan – Technical information

The fans on HARDI ZEBRA mistblowers 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.

 DANGER! NEVER exceed 540 rpm at the tractor PTO. Exceeding 540 rpm may cause severe damages to the fan and lead to severe injuries or death!

 DANGER! Keep away from the air inlets and outlets while the fan is operating. Foreign objects may be expelled from the air outlet or a piece of cloth could be sucked into the air inlet. Risk of severe personal injury or death!


The air kits are the most dangerous part of the machine. Do not repair, change or modify any of the parts but leave this to your HARDI dealer. Any repair jobs on air kits in requires qualified technicians.




Protection grids

On all axial air kit models protection grids are fitted. They are fundamental for avoiding accidents and stopping foreign objects from entering the fan.


- A. Air inlet protection grid
- B. Air outlet protection grid


 DANGER! Use of the air kit without protection grids is not permitted.

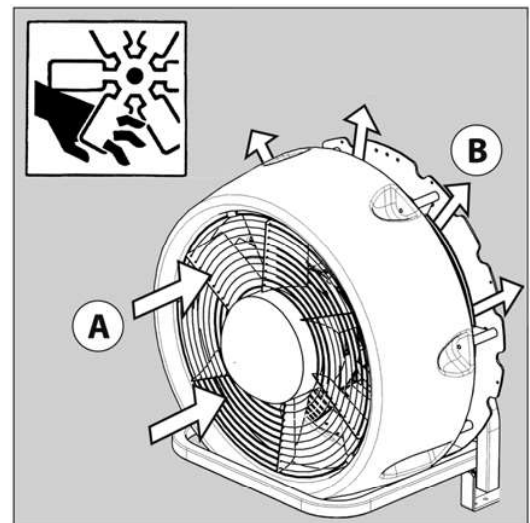
 DANGER! Do not take the protection grids off the equipment whilst it is in use.

 DANGER! Do not go near the fan when the equipment is in use if you are wearing light or loose clothing.

 DANGER! Never put foreign bodies inside the fan via the grid, regardless of whether it is in use or not.

 DANGER! Protect your hearing from fan noise by wearing EN 352-1:1992 homologated ear muffs or something similar.

 DANGER! If you were to notice vibrations or abnormal noise, switch off the fan immediately.



3 - Description

Engaging / Disengaging of the turbine fan

The fan is engaged and disengaged by the selector shown.

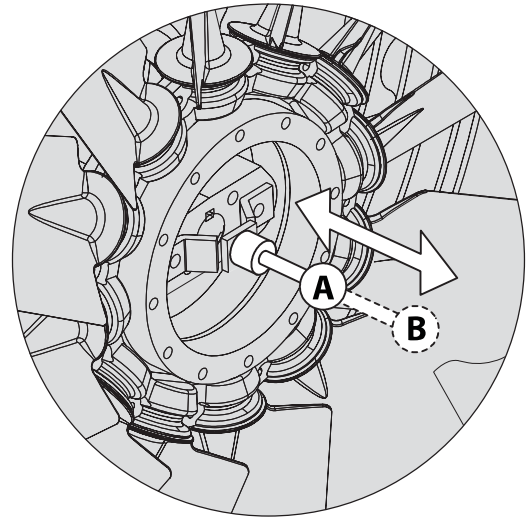
Always disengage the fan during transport between the farm or filling location and the orchard.



ATTENTION! when always engage or disengage the fan when the tractor PTO is stopped.



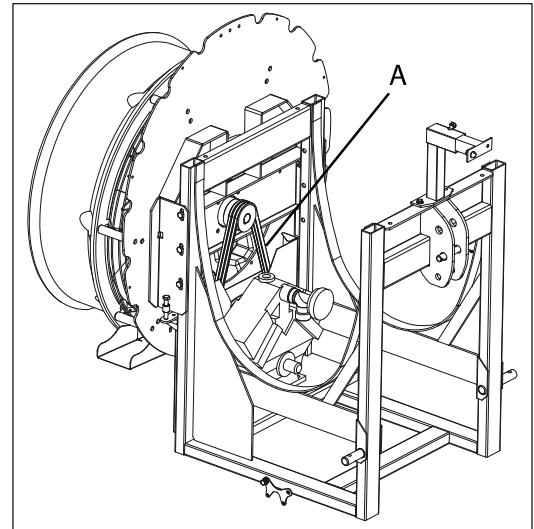
ATTENTION! Always engage the tractor PTO with the engine at idle for a smooth start of the fan.



Fan transmission

The fan is driven through the pump shaft directly by a single-speed V-belt transmission 8 (A).

Check the V-belt tension at every 100 working hours to ensure full performance. See the section "Maintenance".



Cannon spout

The ZEBRA is available in a configuration with a cannon spout. This allows for the entire volume to be directed in one direction. The spout is horizontally adjustable and can be turned to both sides.

The air outlet of the Cannon is ellipsoidal in order to create a large and powerful air stream in the upper part for blasting the spray mist a good distance. This secures a spray distance of 15-20 m horizontally.

A set of 9 nozzles split in 3+3+3 each has its individual non-drip valve as well as ON/OFF valve in the pressure manifold. This in combination with the vertical and horizontal adjustments enables the Cannon to be set and calibrated for any spray job.



Vine sprayer

The ZEBRA is available in a configuration with spouts for spraying vines.

The spouts can be easily orientated, so that efficient air and spray mist are applied on both sides of the vine plant.

Applying the precise dose is easily chosen by the manifold valves and pressure regulator.

Whenever mixing of spray liquid is done during transport, the turbine fan can be disengaged.

The spray boom has a total width of 4.5 meters, and it can be adjusted 0.5 meters in height.

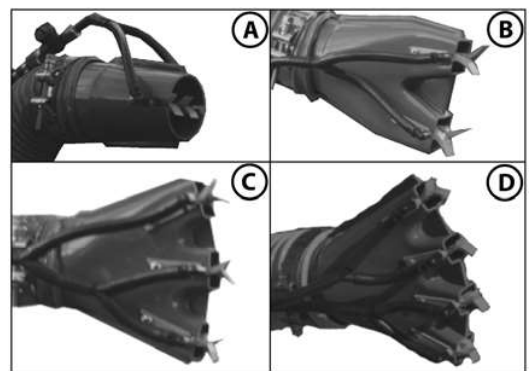


Pneumatic system

The pneumatic system operates on low pressure and produces a high air speed in the spout to break up the spray film and create a very fine turbulent mist. Via the atomizers in the spout, the mist is distributed uniformly in the shape of a fan.

Four types of spouts are available depending on boom type:

- A. Cannon with 1 outlet
- B. Spout with 2 outlets
- C. Spout with 3 outlets
- D. Spout with 4 outlets



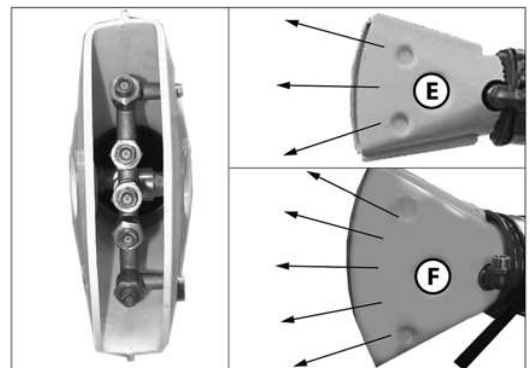
Ceramic discs are used to control the flow rate. This disc has two positions. If the disc is placed so the flow enters through its flat side, this will allow less to go through than if it enters through the cone-shaped side.

Hydro-pneumatic system

The hydro-pneumatic system operates on a medium to high pressure. This system takes advantage of the great amount of turbulence in the cone-shaped low-volume nozzle and distributes the spray liquid 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.

- E. Spout with 3 nozzles
- F. Spout with 5 nozzles



3 - Description

General information

Important Information

Before using the machinery, it is recommended that you read the instructions to obtain best results and avoid operational problems.

Unloading the mistblower from the truck

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



DANGER! Nobody must stand below or next to the machine during loading or unloading.



Before starting up for the first time

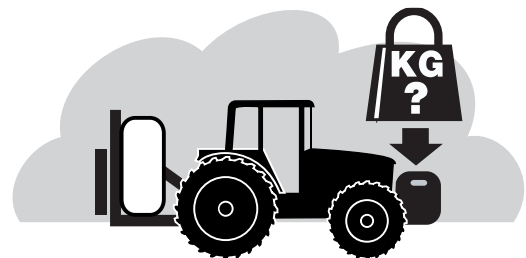
Although the surface of the metallic parts of the mist blower have been coated with a strong, protective product, we recommend you apply a layer of anti-corrosion oil (e.g. CASTROL RUSTILLO or SHELL ENSIS FLUID) to all metal parts to avoid chemical products discolouring the enamel, as well as to ease future cleaning.



ATTENTION! This treatment should be repeated whenever the protective film wears off.

Counterweights

Check if it is necessary to place a counterweight on the front of the tractor, to increase the stability and steering performance.



4 - Start up

Mechanical connections

Operator safety

1. Always STOP THE ENGINE before attaching the transmission shaft to the tractor P.T.O. - most tractor P.T.O. shafts can be rotated by hand to facilitate spline alignment, when the engine is stopped.
2. When attaching the shaft, make sure that the snap lock is FULLY ENGAGED - push and pull the shaft until it locks.
3. Always keep protection guards and chains intact and make sure that it covers all rotating parts, including CV-joints at each end of the shaft. Do not use without protection guard.
4. Do not touch or stand on the transmission shaft when it is rotating - safety distance: 1.5 meter. Also NEVER cross over a rotating P.T.O. shaft to reach the other side of the sprayer.
5. Prevent protection guards from rotating by attaching the chains allowing sufficient slack for turns.
6. Make sure that protection guards around the tractor P.T.O. and the implement shaft are intact.
7. Always STOP THE ENGINE and remove the ignition key before carrying out maintenance or repairs to the transmission shaft or implement.

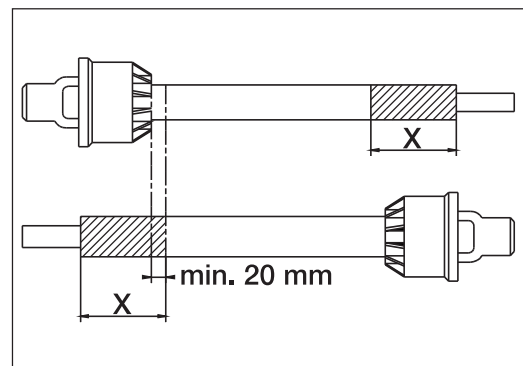


DANGER! ROTATING TRANSMISSION SHAFTS WITHOUT PROTECTION GUARDS ARE FATAL.

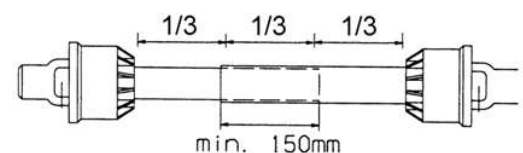
P.T.O. installation

Initial installation of the driveshaft may involve having to cut the axle to adapt it to the tractor to which it will be hitched. To hitch it for the first time, proceed as follows:

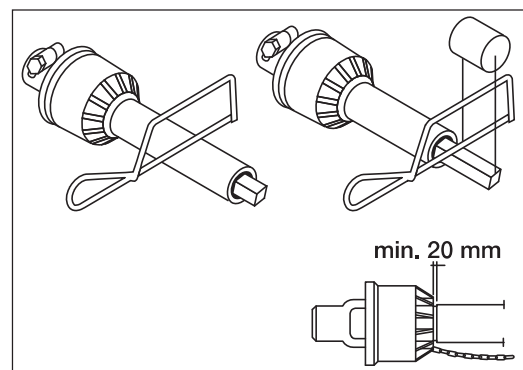
1. Attach the mistblower to the tractor in such a way that the distance between the PTO shaft and the mistblower pump is the shortest possible.
2. Stop the engine and remove the ignition key.
3. If the driveshaft needs to be shortened, pull the two parts of the shaft apart. Fit the two parts of the shaft, one to the tractor and the other to the mistblower crankshaft and measure out the length that needs to be removed. Mark the protection guards.



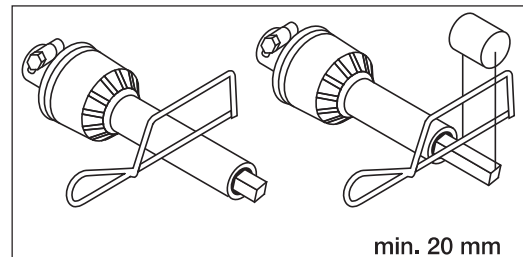
ATTENTION! The shafts must always have a minimum overlap of one third of their working length.



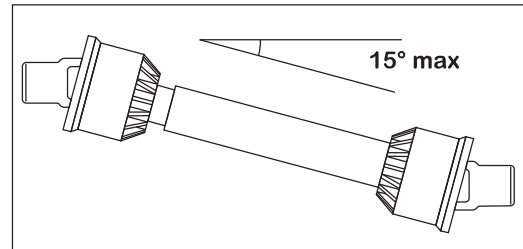
4. Cut both parts equally, using a saw. File the profiles afterwards to remove burrs.
5. Grease the profiles and reassemble male fitting and female fitting.
6. Fit the shaft to the tractor PTO and to the mistblower pump shaft.



- Place the input part towards the tractor. Fit the chains to prevent the protection guards from rotating with the shaft.



ATTENTION! To ensure long life of the driveshaft and prevent possible damage to the equipment, try to avoid working at angles of more than 15°.

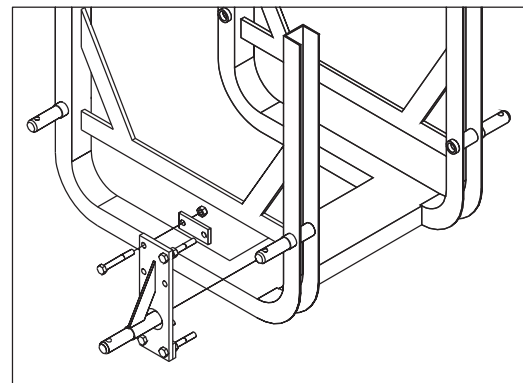


Connecting the mistblower

The mistblower is designed for three point suspension and is factory equipped with 22 mm pivots (category I).

Connect as follows:

- Connect the lower links ball ends of the tractor to the mistblower lower link pins.
- Fit the linch pins to secure the lower links.
- Attach the top link to tractor and mistblower and adjust it by hand. Secure with a linch pin.
- Lift the mistblower to working height.
- Adjust the top link until the equipment is completely perpendicular to the ground.



To detach the mistblower:

- Lower the tractor's lower links with the hydraulic lever until the equipment is touching the ground.
- Loosen and remove the top link pin.
- Remove the top link.
- Lower the lower links and completely detach the mistblower.
- Drive the tractor away slowly.



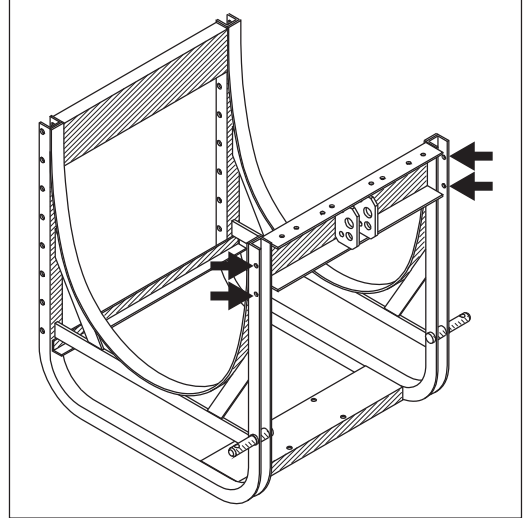
WARNING! The tractor's hydraulic lower links should be moved very gently to prevent damages or tipping over.

4 - Start up

Top link clevis for snap coupler (600 litre model only)

If required a top link clevis (ref. no. 637348) can be mounted on the frame of the NK 600 litre model to enable the snap coupler to be connected on the top link of the mistblower.

1. Loosen the 4 bolts which fix the top link to the tank frame.
2. Replace this top link with the adapter clevis and fasten it to the frame with the 4 bolts.



Electrical connections

General information

If your equipment includes an electrical component, please note the following information to correctly connect the equipment and to prevent problems when working.

The voltage required by the electrical components is 12 volts (V).

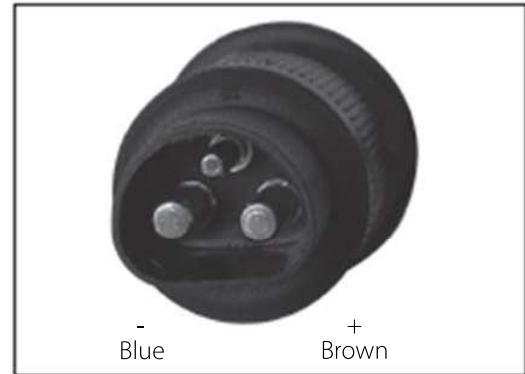
Before connecting any component, make sure that the polarity is correct.

Red wire = 12 V positive (+)

Black wire = negative (-)

The connectors assembled on the electric components comply with the standards for the majority of modern tractors.

If your tractor has another type of power supply connector, the supplied connector will need to be removed and adapted to the tractor connector.



Installing the basic electrical control box

Find a suitable location in the tractor cabin where the control box can be fitted and operated comfortably. It is recommended that you place it to the right of the driver's seat.



ATTENTION! The control box must be properly attached to prevent vibrations and damages.



The connector is an universal type with removable adaptor cap (A) and it should be able to be connected to any tractor.

As an emergency solution, remove the connector and splice the wires directly to the battery.



WARNING! Always remember: Red wire (+) Black wire (-)



NOTE! Always replace the spare fuse again so a new fuse is available for future use.



Liquid and Air Circuits

Filling/washing location requirements

When filling the mistblower with chemicals and water it is important to avoid spot contamination by spray chemicals in order to protect the subsoil water resources.

- A. If the mistblower is always filled at the same place, a special filling/washing location should be established. This should have a hard, liquid-impenetrable surface (e.g. concrete) securing against seepage and edges securing against run-off to the surrounding areas. The place should be drained to an adequate receptacle (e.g. slurry tank or similar).

Any spillage or washings should be retained and diluted in order to be distributed on a larger area to ensure minimal environmental impact and avoid build-up of larger chemical concentrations at one spot.

If no other requirements of distances exist, the following general recommendation of distance could be used. Not closer than:

- 1) 50 metres from public water supplies for drinking purposes,
 - 2) 25 metres from non-public water supplies for drinking purposes, treatment sumps and cesspools of drainage systems, and
 - 3) 50 metres from surface water (watercourses, lakes and coastal waters) and from nature reserves.
- B. Alternatively the mistblower can be filled in the field where the spraying is to take place. If so, choose a different location for each refilling.
- C. If no other requirements of distances exist, the filling should not be established closer than:
- 1) 300 metres from public or non-public water supplies for drinking purposes and
 - 2) 50 metres from surface water (watercourses, lakes and coastal waters), treatment sumps, cesspools of drainage systems, and nature reserves.



ATTENTION! Legislation and requirements vary from country to country. Always follow local legislation in force at any time.



NOTE! It is the responsibility of the mistblower owner/operator to comply with all relevant legislation. HARDI cannot undertake any responsibilities for incorrect operation and use.

Filters

Clean filters ensure:

- Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.
- Nozzle blockages do not occur whilst spraying.
- Long life of pump. A blocked suction filter will result in pump cavitation.

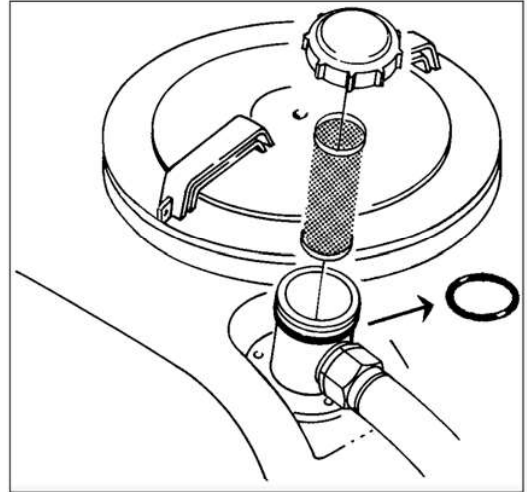
5 - Operation

Suction filter

The main filter protecting sprayer components is the suction filter at the top of the tank.

Check it regularly and clean if needed.

Ensure that the O-ring on the filter housing is in good condition and lubricated.

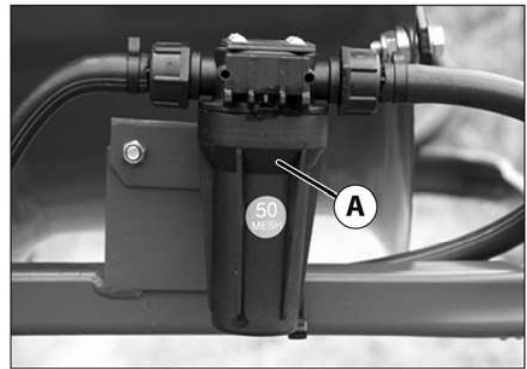


Pressure filter

Pressure filters will catch any remaining impurities and prevent nozzles clogging. To avoid blockage of those filters it is very important to check them regularly and clean them after each spray job to avoid chemical residues to deposit and block



WARNING! Wear appropriate personal protection when checking pressure filters. As a minimum gloves and face shield.



Diaphragm pumps

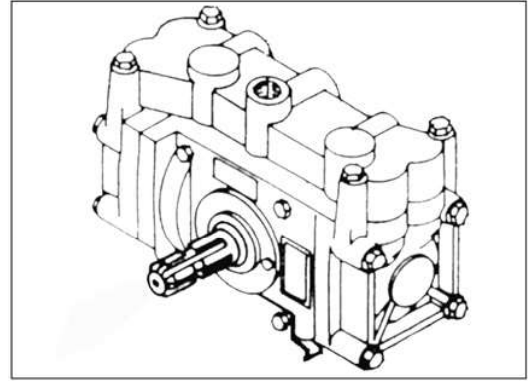
The maximum number of revolutions when in use is 540 r.p.m. It is self-priming and can be run dry. The pump is fitted with 2 diaphragms.



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



ATTENTION! See section "Maintenance" regarding lubrication intervals.



UX/70 and UG/102 piston pumps

This pump is a 3-cylinder piston pump. The max. number of revolutions when in use is 540 rpm.



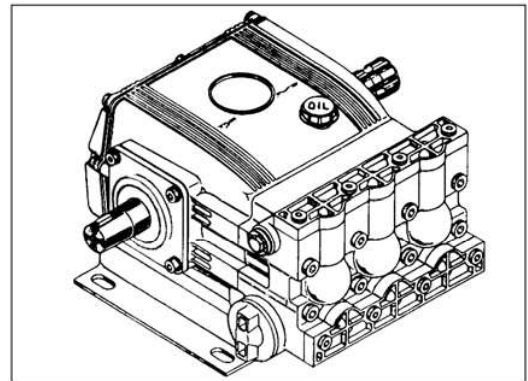
WARNING! Do NOT let piston pumps run dry for more than 30 seconds. If the pump is running dry for longer time the pistons and liners will overheat and be destroyed. Always prime the pump before use.



ATTENTION! Check oil level before start up. Also see the section "Maintenance" regarding oil change intervals.



NOTE! This pump model is used in certain countries only.



Filling the main tank

The tank is filled with water through the filling hole by removing the lid located on the top of the tank. The water used should be as clean as possible to obtain best results.

Fill the tank using the filter to prevent impurities from entering the tank. For greater filling capacity, an overhead tank can be used.

The tank should be filled to a third of its capacity with clean water before adding the chemical product. Always follow the instructions given on the product label!



ATTENTION! Always fill through the tank strainer to prevent impurities from entering the tank.



DANGER! Do not place the filling hose inside the tank. Keep it out of the tank at all times and only point it towards the filling hole. If the pressure hose were placed inside the tank and there was a drop in water supply pressure, the chemical product could be syphoned back and contaminate the water supply lines, plant and well.



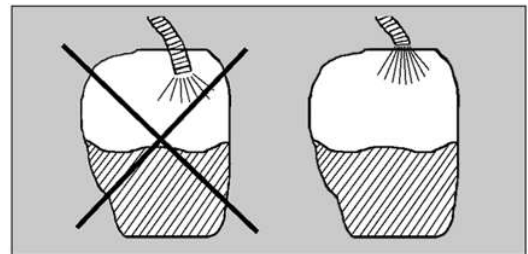
WARNING! If spray liquid is left in the tank, for safety reasons all valves must be shut.



ATTENTION! The water supply line should be provided with a check valve as additional safety precaution. Follow local legislation in force at any time.



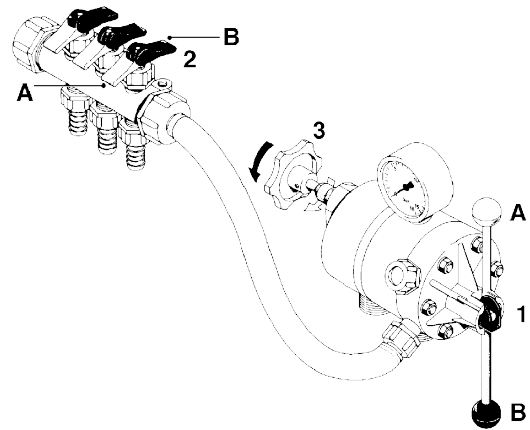
ATTENTION! The water supply should be provided with a meter to avoid spillage by over-filling. Follow local legislation in force at any time.



5 - Operation

Adjustment of operating unit M70

1. Turn main on/off handle (1) to off position A.
2. Set all hand levers on the distribution valve (2) to spraying position A.
3. Put the tractor in neutral and set the engine revolutions and thereby the number of revolutions of the pump corresponding to the intended travelling speed. Remember the number of revolutions on the P.T.O. must be kept between 300-600 r/min.
4. Turn main on/off handle (1) to spraying position B.
5. Now turn the pressure regulating valve (3) to until the required pressure is indicated on the pressure gauge.
6. Operating the control unit while driving: To close the entire boom, turn the handle (1) to position A. This takes the pressure off the pump. The liquid will then return to the tank via the return system.



The diaphragm anti-drip valves ensure instantaneous closing of all nozzles. In order to close part of the boom, move lever (2) of the distribution valve to position B (off position) for the section or sections to be closed. Note that the pressure will rise and readjustment will be necessary.

Adjustment of operating unit SV/2

This high-pressure electric operating unit can be assembled with piston or diaphragm pumps.

It consists of a manual pressure valve that has a pressure gauge. To raise the pressure, turn the red handle A clockwise. To lower it, turn it anti-clockwise.

The two section valves are remote controlled by two solenoid valves activated via a control box in the tractor cabin.



Adjustment of operating unit BS/2

This high-pressure manual operating unit can be used with piston or diaphragm pumps.

To raise the pressure, turn the black handle. To raise the pressure, turn the handle clockwise. To lower it, turn it anti-clockwise.

The direction of the flow can be selected with the control.

The different positions are embossed on the lever.

R = Free return

C = Agitation only

1 = One open spray zone + active agitation

2 = Two open spray zones + active agitation



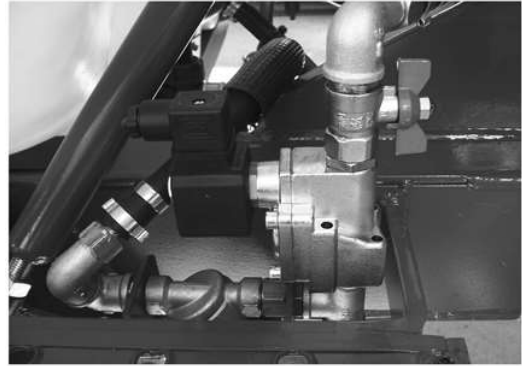
WARNING! As this operating unit is assembled on the tractor beside the operator, ensure that there is no leakage as otherwise your safety may be at risk.



Section valves

The solenoid valves are located at the back of the equipment, next to the pressure filter.

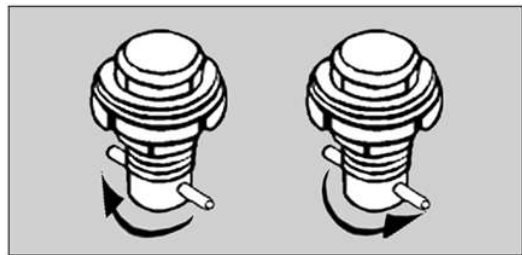
The sections are instantly opened and closed with these solenoid valves.



Draining the main tank

200 and 300 l tanks:

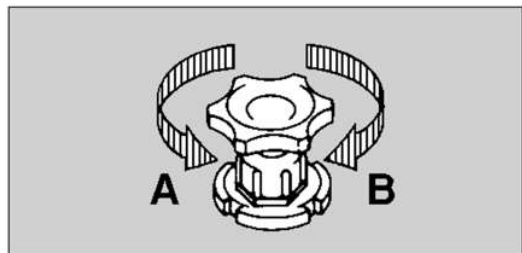
To empty the tank via the drain valve, turn the pin on the lower right-hand side of the auxiliary tank. To close it again, turn the pin again and the valve will close automatically.



400, 600 and 800 l tanks:

Top operated tank drain

- A. open
- B. Close

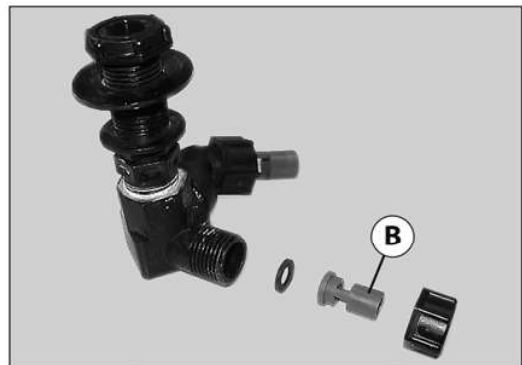


WARNING! Do not forget to use protective clothing and gloves when doing this.

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 to a uniform liquid.

The standard agitation has 2 mm venturi nozzles. The venturi nozzle (B) allows an efficient agitation of the main tank content.

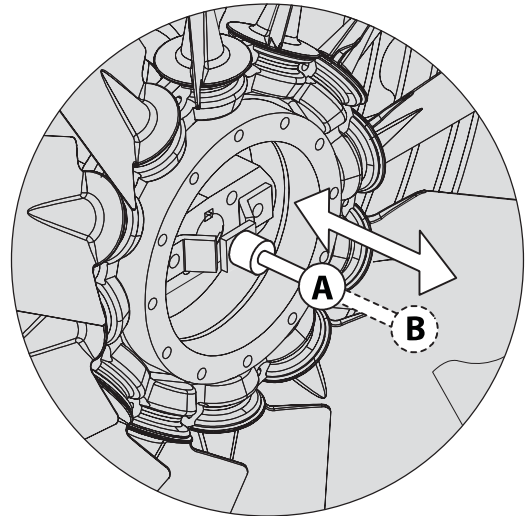


5 - Operation

Engaging the turbine fan

When you are going to work with a spray gun, or just need agitation in the main tank, the fan can be disengaged by the lever.

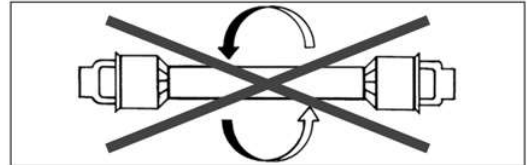
The lever is located behind the pump. When the lever (A) is in the centre position, the fan is disengaged.



ATTENTION! The PTO, pump and fan must stand completely still, before the fan is engaged or disengaged.



ATTENTION! To avoid shock loading the fan transmission, the tractor engine must run idle before engaging the PTO.



Nozzles

The standard nozzle can be closed individually by turning them 90°. When open the direction can be adjusted within a range of +/- 15°.

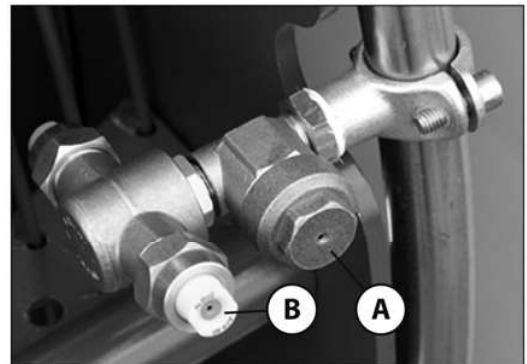
A non-drip valve (A) is fitted to avoid chemical spillage the sections are shut off.

The nozzle type (B) are a hollow cone nozzle, also known as ATR. They are colour-coded and the working range is 5-15 bar.

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



ATTENTION! It is not advisable to exceed 15 bar with ATR nozzles as the droplets would be too small, and the liquid will either evaporate under hot conditions or be lost due to wind drift.



Cleaning

General info

In order to derive full benefit from the sprayer for many years the following service and maintenance program should be followed.



ATTENTION! Always read the individual paragraphs. Read instructions for service/maintenance jobs carefully before starting on the job. If any portion remains unclear or requires facilities which are not available, then for safety reasons please leave the job to your HARDI dealer's workshop.



ATTENTION!

Clean sprayers are safe sprayers.

Clean sprayers are ready for action.

Clean sprayers cannot be damaged by pesticides and their solvents.

Guidelines

1. Read the whole chemical label. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given, follow them closely.
2. Be familiar with local legislation regarding disposal of pesticides washings, mandatory decontamination methods, etc. Contact the appropriate authority if you are in doubt.
3. Pesticide washings can usually be sprayed out on the field just sprayed or at a suitable cultivated area. Avoid emptying the washings at the same spot every time and keep sufficient distance to the water environment. You must prevent seepage or runoff of residue into streams, water courses, ditches, wells, springs, etc. The washings from the cleaning area must not enter sewers. Alternatively the washings can be retained in an appropriate receptacle, diluted and distributed over a larger cultivated area - see also Filling/washing location requirements on page 27.
4. Cleaning starts with the calibration, as a well calibrated sprayer will ensure the minimal amount of remaining spray liquid.
5. It is good practice to clean the sprayer immediately after use and thereby rendering the sprayer safe and ready for the next pesticide application. This also prolongs the life of the components. It is strongly advised to perform an internal cleaning of the sprayer when high concentration of acids or chloride are present in the active ingredients, or if the spray liquid is corrosive. For the best result use a cleaning agent recommended by Hardi, e.g. AllClearExtra.
6. It is sometimes necessary to leave spray liquid in the tank for short periods, e.g. overnight, or until the weather becomes suitable for spraying again. Unauthorized persons and animals must not have access to the sprayer under these circumstances.
7. If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor.
8. The sprayer must always be parked under roof to avoid rain washing off pesticides and build-up of spot contamination in the soil. If parked outside the sprayer should be parked on the filling/washing location in order to retain possible pesticides.

Cleaning and maintaining the filters

Clean filters ensure:

- Mistblower parts, such as the valves, diaphragms and operating units, are not blocked or damaged during use.
- Nozzles are not blocked during spraying.

The pump has a long service life. A clogged suction filter will result in pump cavitation. The main filter that protects the mistblower parts is the suction filter. Check it regularly.

5 - Operation

Cleaning the tank and liquid system

1. Dilute remaining spray liquid in the tank with at least 10 parts of water and spray the liquid out in the crop/orchard just sprayed.
2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Rinse and clean mistblower and tractor externally. Use detergent if necessary.
4. Remove tank and suction filters and clean. Be careful not to damage the mesh. Replace suction filter top. Replace filters when the mistblower is completely clean.
5. With the pump running, rinse the inside of the tank. Don't forget the tank roof. Rinse and operate all components and any equipment that have been in contact with the chemical. Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the field again or on the soakaway.
6. After spraying the liquid out, stop the pump and fill at least 1/5 of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, e.g. washing soda or Triple ammonia.
7. Start the pump and operate all controls enabling the liquid to come into contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
8. Drain the tank and let the pump run dry. Rinse inside of the tank, again letting the pump run dry.
9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them immediately.
10. Replace all the filters and nozzles and store the mistblower. If, from previous experiences, it is noted that the solvents in the pesticide are particularly aggressive, store the mistblower with the tank lid open.



ATTENTION! It is advisable to increase the forward speed (double, if possible) and reduce the pressure to 1.5 bar (20 psi) when spraying diluted remaining liquid in the field just sprayed.



ATTENTION! If a cleaning procedure is given on the chemical label, follow it closely.



ATTENTION! If the mistblower is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.

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.

Lubrication


General info

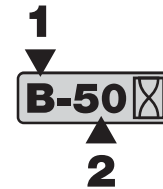
Always store lubricants clean, dry and cool - preferably at a constant temperature - to avoid contamination from dirt and condensed water. Keep oil filling jugs, hoppers and grease guns clean, and clean the lubricating points thoroughly before lubricating. Avoid skin contact with oil products for longer periods.

Always follow the quantity recommendations. If no quantity is recommended, feed lubricator till new grease becomes visible.

Pictograms in lubrication & oiling plans designate the following:

1. Lubricant to be used (see "Recommended lubricants").
2. Recommended intervals (hours).

 ATTENTION! If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.



Recommended lubricants



A BALL BEARINGS:
 Universal Lithium grease, NLGI No. 2
 SHELL RETINAX EP2
 CASTROL LMX grease



B SLIDE BEARINGS:
 Lithium grease enhanced with molybdenum or grafite disulphate
 SHELL RETINAX HDM2
 CASTROL MOLYMAX



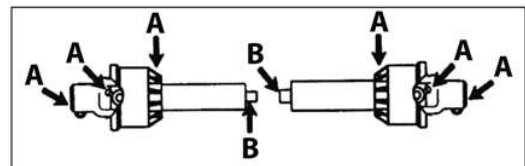
C OIL LUBRICATION:
 TOTAL Transmission TM
 SAE 80W/90
 Castrol EPX 80W/90
 SHELL Spirax 80W/90
 Mobil Mobilube 80W/90



D OIL LUBRICATION:
 SAE 30W
 SAE 20W/50

Transmission shaft

The universal joints and needle bearings should be lubricated with grease. At the points shown, you should do (A) every 8 working hours and the profile tubes (B) every 20 working hours.



6 - Maintenance

Service and maintenance intervals

General information

The maintenance and replacement intervals of the elements listed as follows will depend on the conditions under which the mistblower will be used, and hence impossible to assess.



WARNING! If you do not feel confident in carrying out some of the maintenance jobs described below, then contact your HARDI dealer's workshop for assistance.

Every 10 working hours

1. Clean the suction filter
 2. Clean the pressure filters
 3. Clean/inspect the nozzles
 4. Check for leaks in the liquid circuit
 5. Check for leaks on the suction circuit
-

Every 50 working hours

1. Carry out the checks mentioned above
 2. Check the pressure in the pressure pulsation damper
 3. Check/Grease the transmission shaft
 4. Check/grease the mechanical clutch
 5. Grease the diaphragm pump
 6. Check oil level on piston pumps
-

Every 100 working hours

1. Carry out the checks mentioned above
 2. Check/adjust the fan transmission V-belts tightness
-

Every 150 working hours

1. piston pump oil change
-

Every 1000 working hours

1. Carry out the checks mentioned above
 2. Inspect the transmission for proper functioning, ballance etc.
 3. Check the fluid circuit for tightness
 4. Inspect the pump for proper functioning
 5. Check the pressure gauge accuracy.
 6. Inspect the fan unit for damages and proper functioning.
-

Every 10 working hours – Suction filter

To service the suction filter, proceed as follows:

1. Unscrew the red cap anti clock-wise
2. Remove the filter screen and clean it with a soft brush and clean water.
3. Insert the filter screen again
4. check and clean the O-ring and cap
5. lubricate the O-ring with oil or grease if necessary
6. fit the cap again and tighten hand-tight



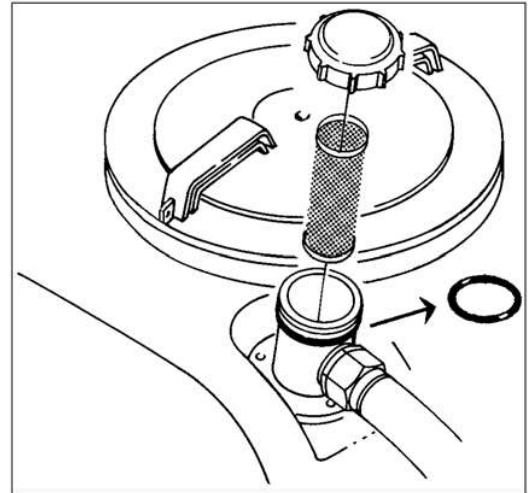
ATTENTION! Insufficiently maintained filters leads to numerous unwanted stops during a working day.



ATTENTION! Lubricate the seal lightly with oil or grease every time the filter is dismantled to ensure the seal will slide correctly in place and seal.



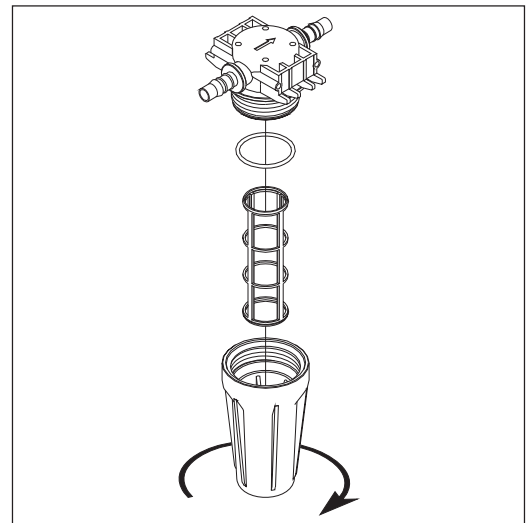
ATTENTION! A broken or leaking O-ring or sealing in the suction circuit leads to suction of false air and huge vibrations and pressure pulsations.



Every 10 hours of operation – Pressure filters

o remove the pressure filter, unscrew the filter housing to inspect and clean the filter. When you reassemble the filter, grease the o-ring.

There are different mesh sizes. See the section 'Technical specifications – Filters and nozzles'.



6 - Maintenance

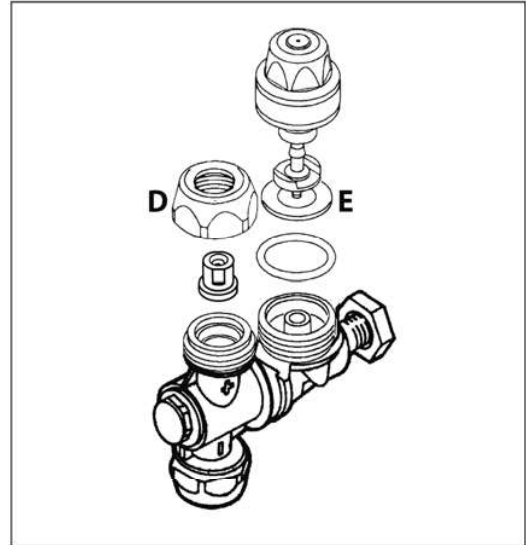
Every 10 working hours – Nozzles

To clean or replace the nozzles, use a spanner to undo the nut (D). Remove the nozzle and clean it with air, water or a toothbrush.



ATTENTION! Never use a piece of wire or a needle as this could cause irreparable damage to the nozzle.

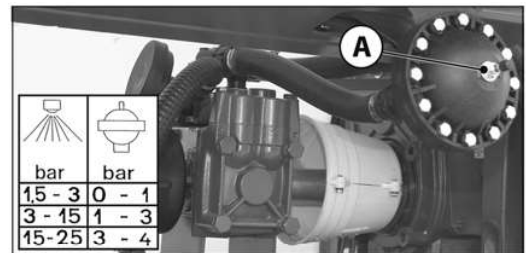
If any of the nozzles leak when closing the spray section valve, the non-drip diaphragm should be replaced (E). The nozzles should be replaced when their unit flow varies more than 10%. Worn or damaged nozzles may cause crop damages or insufficient results.



Every 50 working hours - Pressure pulsation damper

The 321 pump is fitted with a pulsation damper on suction and pressure sides. The pressure side damper is pressurized. The dampers will reduce pulsations and secure an even flow from the pump.

The pressure pulsation damper should be inflated to the pressure shown in the table on top of the pulsation damper (A).

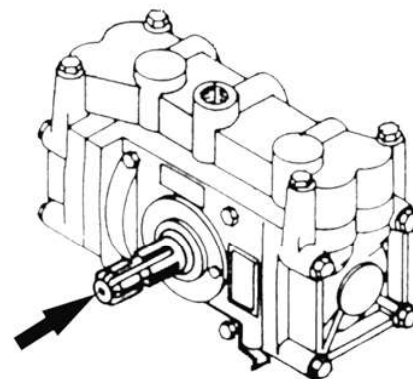


Every 50 working hours - Diaphragm pump

Grease the pump after every 50 working hours or once a month, through the grease nipple located at the crankshaft end. The grease is distributed through the crankshaft to ball bearings, connecting rods, etc.



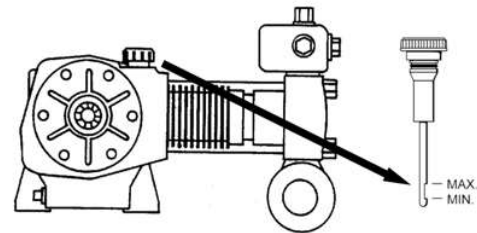
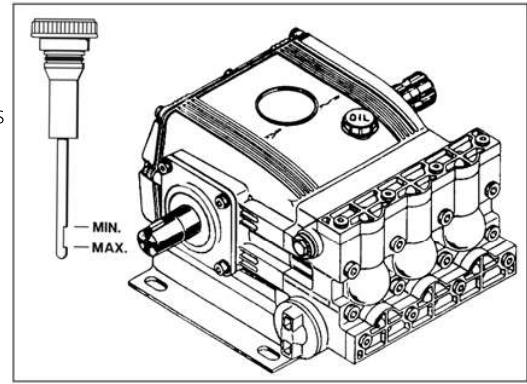
WARNING! A lack of grease in the pump could cause it to overheat and destroy moving parts.



Every 50 working hours - piston pumps

Check the oil level at regular intervals. This must be between the maximum and minimum marks on the dipstick. The factory always supplies a full pump.

Change the oil after the first 50 working hours. The subsequent changes should be carried out every 150 hours or once a year.



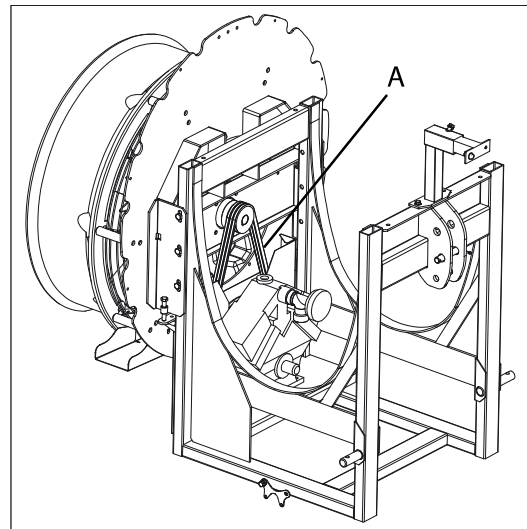
Every 100 working hours - V-belt adjustment

Check/adjust the V-belt (A) tightness as follows:

1. Loosen the 2 x 3 fan retaining bolts either side.
2. Loosen the counter nuts of the adjustment screw either side.
3. Adjust the V-belt tightness on the two adjustment screws either side, until the V-belt has obtained a suitable tightness. Tighten the bolts equally in both sides.
4. The V-belt should yield 10-15 mm by a force of 10 N (1 kg) halfway between the two pulleys.
5. Tighten the counter nuts again.
6. Tighten the 2 x 3 fan retaining bolts either side again.



ATTENTION! Over-tightening the V-belts will increase load, wear and tear on the pump and fan parts and bearings.



Every 150 working hours - Piston pump oil change

Change the oil after the first 50 working hours and then every 150 hours or once a year - whichever comes first.

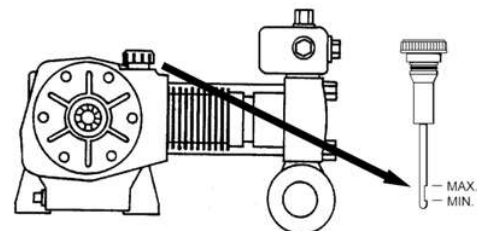
Run the pump until it has reached normal operating temperature before draining the oil



Clean the pump and area around dip stick, and drain plug before changing the oil

Fill with fresh oil to the level is between min. and max. on the dip stick.

Run the pump for a few minutes and verify the oil level again. Top up if necessary.



6 - Maintenance

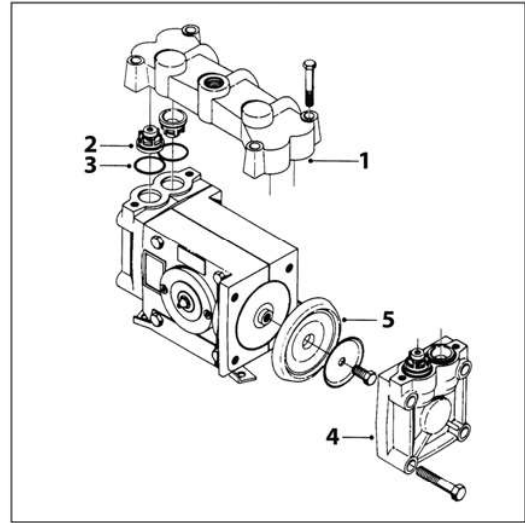
Occasional maintenance

Diaphragm pump

Replacement of valves and diaphragms. The procedure is similar for both 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 60 Nm.
6. Lubricate seals and fit the valves. Take care not to fit valves on upside-down.
7. Fit the diaphragm cover again. When the cover is placed on top of the diaphragm, and before the bolts are tightened, turn the crankshaft one turn to seat the diaphragm correctly in the cover

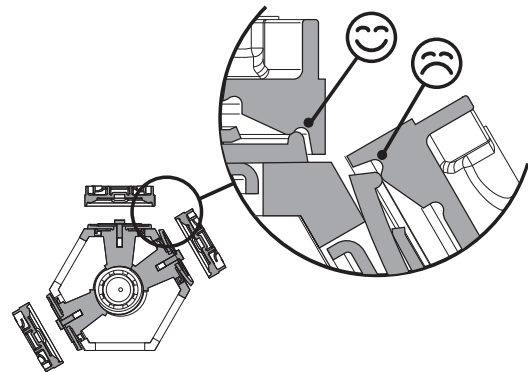


Torque settings for the 321 are:

Crankcase: 60 Nm / 44.4 lbft

Crankshaft: 70 Nm / 51.8 lbft

Diaphragm screws: 60 Nm / 44.4 lbft



Piston pump - Plunger tightness

When you detect a continuous leakage of liquid from the bottom of the pump cylinders, it may be necessary to replace the pump plungers due to wear.



ATTENTION! Before replacing them, be aware that the leather gives over time in the sleeve and dripping can occur. If this happens, tighten the leather tensor and the liquid will stop dripping.



Piston Pump - Plunger replacement

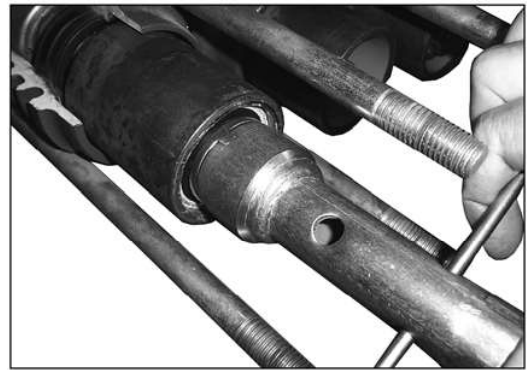
To replace the plungers, proceed as follows:

1. Remove the two top nuts of the pressure manifold and the six front nuts and remove the manifolds and the cylinder heads.
2. Spread grease or oil on the new sleeves and place the plunger inside.
3. On one side, the sleeves have a groove that should be facing the cylinder heads.
4. Couple the sleeves with the plunger in the piston.
5. Assemble the leather tensor. Tighten the tensing nut fully.
6. Stretch the leather by hand until reaching the limit and then turn it a quarter of a turn with key (if you have torque wrench, tighten the torque to 2.5 – 3 kg pressure - approximately 30 Nm).



ATTENTION! Before replacing it, be aware that the leather gives over time in the sleeve and dripping can occur. If this happens, tighten the leather tensor and the liquid will stop dripping.

7. Fit the cylinder heads and place the nuts without over-tightening them.
8. Grease the joints of the six valves before reassembling them.
9. Place the pressure valves on the cylinder heads and the suction valves on the lower chamber.



10. Fit the pressure and suction chambers, and tighten the nuts with a torque setting of 3.5 Nm. The tightening pressure is 30 Nm (3 kg).
11. Tighten all the other nuts simultaneously until the whole unit is tight and compact.



6 - Maintenance

Off season storage

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 filled 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.

Operational problems

General info

Operational incidents are frequently due to the same reasons:

1. A suction leakage reduces the pump pressure and may interrupt suction completely.
2. A clogged suction filter may damage suction or interrupt and prevent the pump from running normally.
3. A clogged pressure filter increases pressure in the fluid system in front of the pressure filter. This may blow the safety valve.
4. Clogged In-line or nozzle filters increase pressure in the pressure gauge but decrease pressure at the nozzles.
5. Impurities sucked by the pump may prevent the valves from closing correctly, thus reducing the pump flow.
6. A bad reassembly of the pump elements, especially the diaphragm covers, causes air intakes or leaks and reduces the pump flow.
7. A badly charged or faulty battery causes failures and misbehaviour in the electrical system.

Therefore ALWAYS check

1. Suction and pressure filters, as well as nozzles, are clean.
2. Hoses for leaks and cracks, paying particular attention to suction hoses.
3. Gaskets and O-rings are present and in good condition.
4. Pressure gauge is in good working order. Dosage accuracy depends on it.
5. Operating unit functions properly. Use clean water to check.
6. The good condition of the tractor battery and its connectors.

7 - Fault finding

Fluid circuit

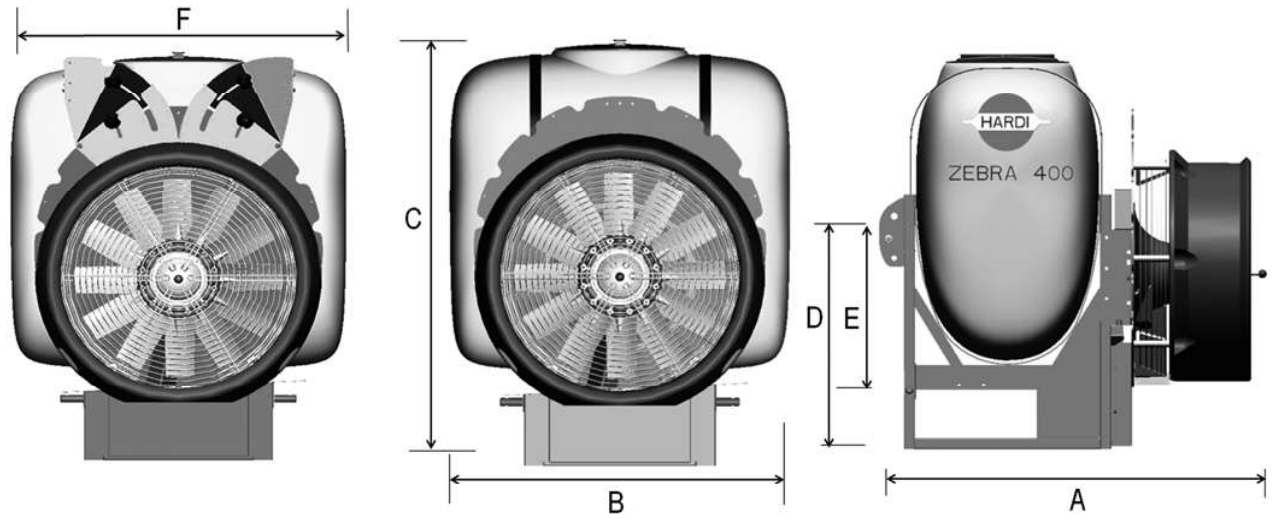
FAULT	PROBABLE CAUSE	POSSIBLE SOLUTION
On activating, the system doesn't spray	Air in the suction line.	Check the suction filter o-ring. Check the suction tube and fittings. Check the assembly of the pump crankcase covers and diaphragms.
	Air in the system.	Prime the pump by filling the hose with water
	Suction or pressure filters blocked.	Clean the filters Check the suction fitting and make sure that it is not too close to the outlet on the tank floor.
Loss of pressure	Incorrect assembly	The safety valve's spring is damaged. The suction fitting is blocked The suction filter is clogged
	Pump valves clogged or worn	Check for obstructions and wear
	Defective pressure gauge	Check for dirt in the intake
Pressure jumps	Filters clogged	Clean the filters. Clean with clean water. If powdered product is being used, check that agitation is on.
	Worn nozzles	Check that the air flow does not exceed 10%.
	Tank suction clogged	Check the suction tube
	Air suction	Reduce revolutions in the PTO
Increase in pressure	Pressure filters blocked	Clean the filters
Foam formed	Air in the circuit	Check the o-rings, gaskets, hoses and suction fittings
	Excessive agitation.	Reduce revolutions in the PTO Check the voltage of the safety valve of the self-cleaning filter Make sure that there is return to the tank Use anti-foaming agent
Leak of pump liquid	Diaphragms damaged	Replace
	Plungers damaged	Replace
The operating unit does not work	Fuse blown	Check the limit switches. Oil with lubricant if the limit switch does not make proper contact.
	Incorrect polarity	Control box: Red - pos (+) Black - neg (-). Solenoid valves: Brown - pos (+). Blue - neg. (-).
	The valves do not close correctly.	Check for obstructions in the valves Check the limit switches
	No power	Incorrect polarity. Brown is pos. (+), Blue is neg. (-) Check the electric board Check that the fuse box makes contact with the bracket.

Blower unit

FAULT	PROBABLE CAUSE	POSSIBLE SOLUTION
Excessive noise or vibrations in the blower unit	The fan is incorrectly counterbalanced	Balance the fan again
	The nuts that hold the air kit are loose.	Tighten the nuts.

Dimensions

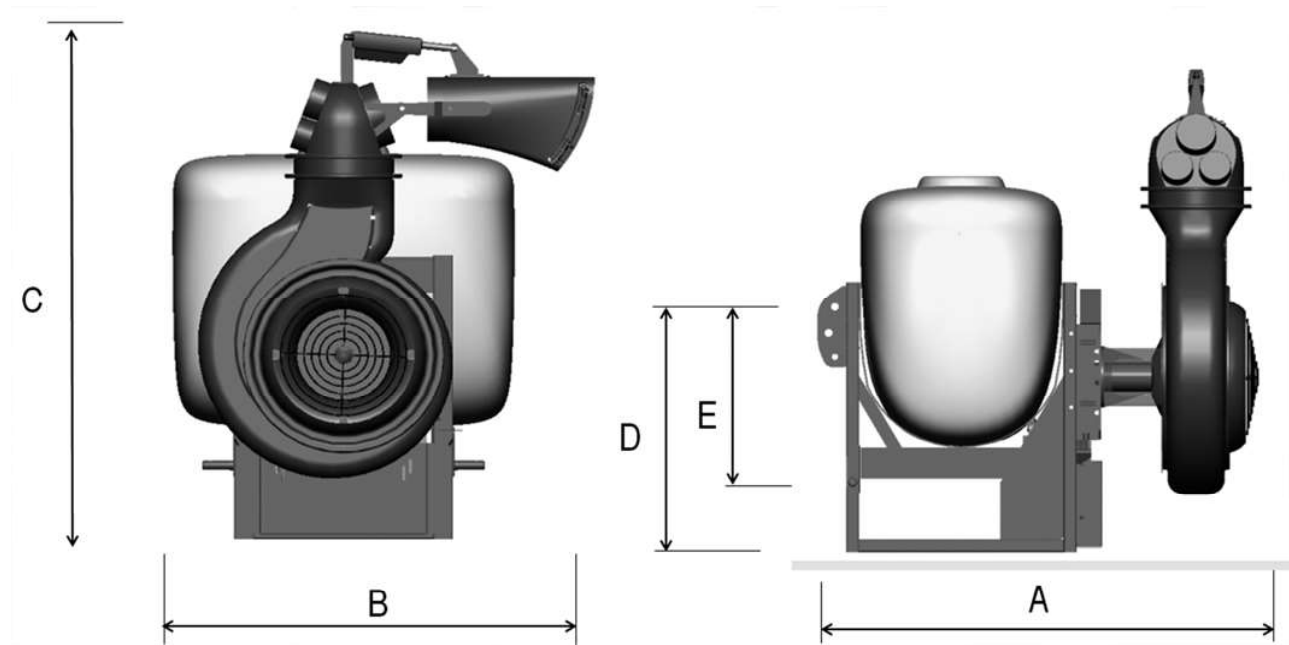
Overall dimensions - ZEBRA AXIAL



Capacity (litres)	300	400	600	800
A (mm)	1432	1432	1600	1600
B (mm)	901	1020	1200	1600
C (mm)	1222	1102	1554	1554
D (mm)	712	712	825	825
E (mm)	483	483	596	596
F (mm)	820	1020	1200	1600

8 - Technical specifications

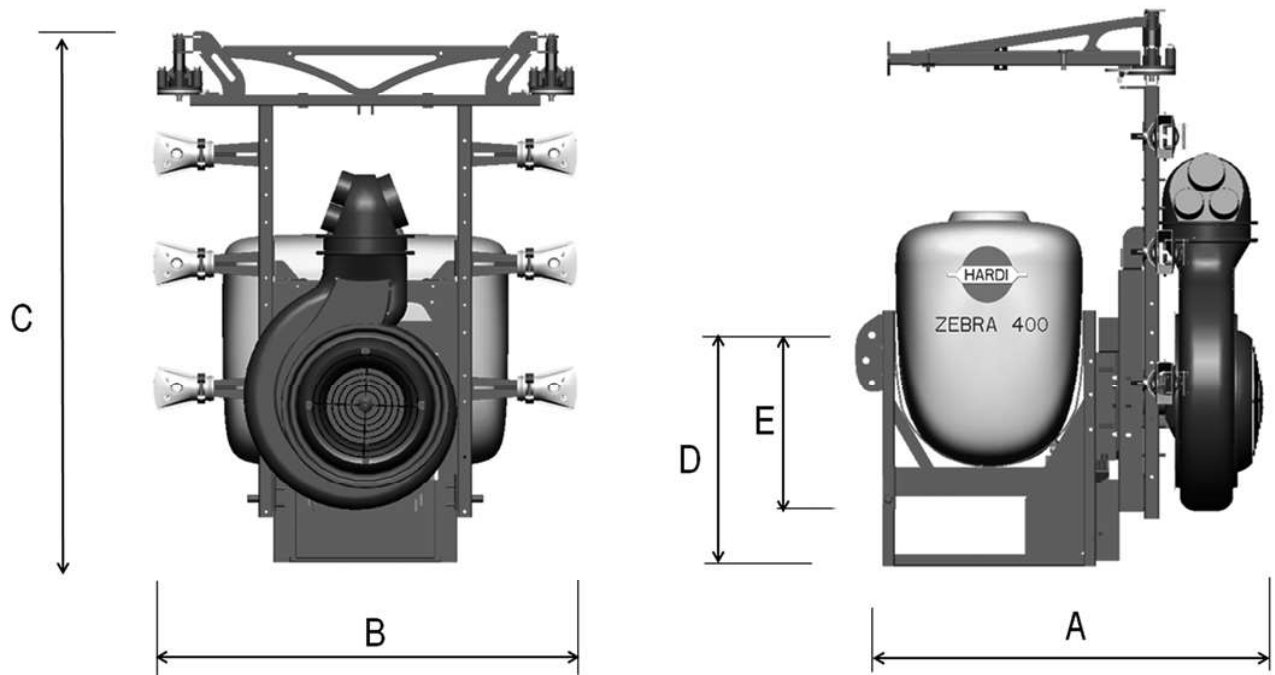
Overall dimensions - ZEBRA CANNON



Capacity (litres)	300	400	600	800
A (mm)	1350	1350	1400	1400
B (mm)	1250	1250	1250	1250
C (mm)	1555	1555	1555	1555
D (mm)	800	800	910	910
E (mm)	663	663	680	680

8 - Technical specifications

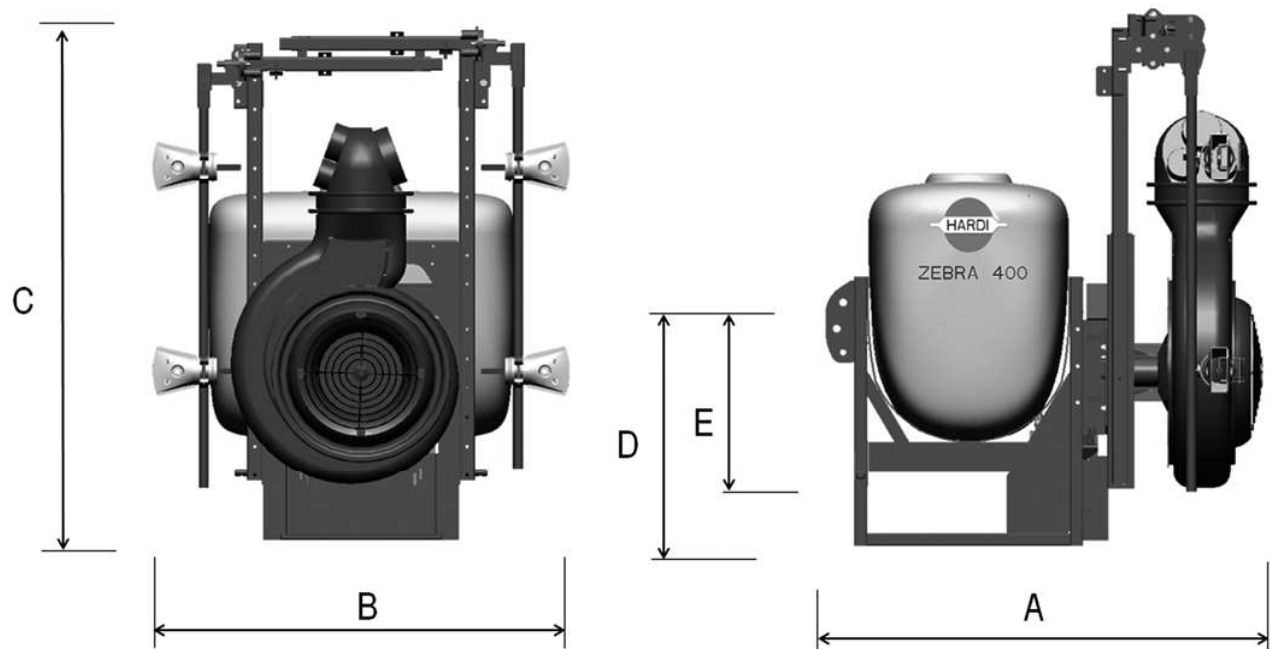
Overall dimensions - ZEBRA ATLAS



Capacity (litres)	300	400	600	800
A (mm)	1350	1350	1400	1400
B (mm)	1490	1490	1490	1490
C (mm)	1930	1930	1930	1930
D (mm)	800	800	910	910
E (mm)	663	663	680	680

8 - Technical specifications

Overall dimensions - ZEBRA LINER



Capacity (litres)	300	400	600	800
A (mm)	1350	1350	1400	1400
B (mm)	1250	1250	1250	1250
C (mm)	1555	1555	1555	1555
D (mm)	800	800	910	910
E (mm)	663	663	680	680

8 - Technical specifications

Weights

ZEBRA AXIAL

Capacity (litres)	300	400	600	800
Empty (kg)	210	230	260	280
Full (kg)	510	630	860	1080

ZEBRA CANNON

Capacity (litres)	300	400	600	800
Empty (kg)	200	220	320	345
Full (kg)	500	620	920	1145

ZEBRA ATLAS

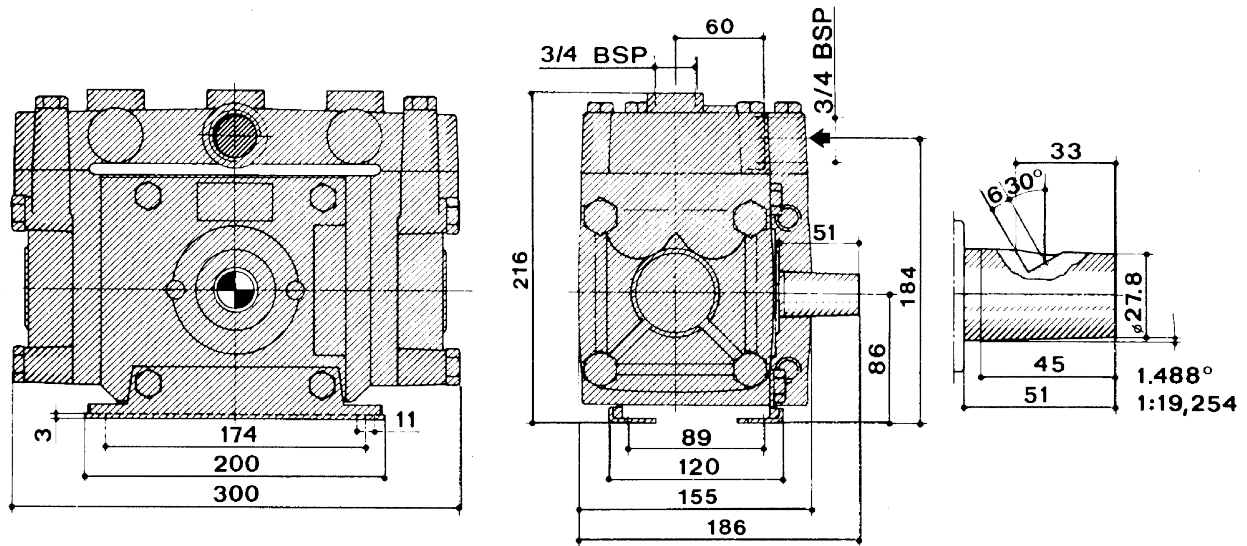
Capacity (litres)	300	400	600	800
Empty (kg)	230	250	340	365
Full (kg)	530	650	940	1165

ZEBRA LINER

Capacity (litres)	300	400	600	800
Empty (kg)	230	250	340	365
Full (kg)	530	650	940	1165

8 - Technical specifications

Diaphragm pump model 321/10



Model 321/10	Speed r/min											
	300		400		500		540		600		700	
bar	l/min	kW	l/min	kW	l/min	kW	l/min	kW	l/min	kW	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

Other Specifications

Axial air fan

Fan model	Fan diameter (mm)	Output (hp)	Belt drive (ratio)	Air flow (m3/h)
EF650	650	30	N / 3.5	25000
EF750	750	35	N / 3.5	30000
Turbine model	Fan diameter (mm)	Output (hp)	Belt drive (ratio)	Air flow (m3/h)
L540	540	14	N / 3.5	10000

Pump

Normal working speed: 540 rpm.

Speed limits: 300 - 650 rpm.

Piston and cup diameter : 50 mm

Max. pressure: 55 bar

Min. diameter for suction hose: 30 mm

Max. water pressure at inlet: 3 bar

Max. suction height: 2.2 bar

Hose suction length: 8 m

Max. water temperature: 55 °C

Oil capacity: 1.5 l

Oil type: SAE 20/30 HD (15W 40 is recommended for countries with temperatures above 20 °C).

Weight: 19 kg

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

Tanks: PE MD + UV resistant

Hoses: PVC or rubber

Valves: PA with carbon fibre

Fittings: PA

Fan: Wings PA with glass fibre and aluminium

Turbine: Galvanized iron

8 - Technical specifications

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.

Metallic parts can be taken to a scrap yard.



ATTENTION! Always in accordance with local legislation.

Conversion factors (SI to Imperial)

All units used in this instruction book are SI. In some cases, imperial units are used. Use these factors to convert between SI and Imperial units:

	SI unit	Imperial unit	Factor
Weight	kg	lb	x 2.205
Surface area	ha	acres	x 2.471
Length	cm	in	x 0.394
	m	ft	x 3.281
	m	yd	x 1.094
	km	mile	x 0.621
Speed	km/h	mile/h	x 0.621
	km/h	m/s	x 0.277
Volume/Surface area	l/ha	gal/acre	x 0.089
Volume	ml	fl. oz	x 0.0352
Torque	l	Imp. pt.	x 0.568
	l	gal	x 0.22
Pressure	bar	lb./inv (p.s.i.)	x 14.504
Temperature	°C	°F	(°C x 1.8) + 32
Power	kW	hp	x 1.341
Torque power	Nm	lb.ft.	x 0.74

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Spare Parts Information

To see updated spare part information, visit the Agroparts website on the internet.

Here all parts information can be accessed in the spare parts catalog:

1. Go to www.agroparts.com, register for free and log in.
2. Select "HARDI" in the menu on the left.
3. Select "Spare parts catalogue" and find your spare part.
4. Online ordering is also possible.
5. Contact your HARDI dealer for further information on spare parts.



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