

AIR ASSISTED SPRAYERS

Rochä

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INTRODUCTION

CHAP1

By acquiring a ROCHA product you have made exactly the right choice and you will soon notice the remarkable reliability and sturdiness of our product.

We hope that the work of this equipment totally lives up to your expectations.

This manual has the objective of helping to better understand the operation of your sprayer.

The tips and standards set out have the purpose of getting the most out of the potential of your machine so that you can use it safely and with the greatest efficiency.

THIS MANUAL FORMS AN INTEGRAL PART OF THE MACHINE.

Name and Address of the Manufacturer:

Compliance Marking

Rochä
PULVERIZADORES ROCHA, LDA

Rua 1º de Maio 38- Milheiros
4471 - 909 MAIA
Telef. 22 9601793/4
Fax. 22 9600867



Model

Modelo - ELLEGANCE AP ALPHA

Tank Capacity

Cap.: 200

Bomba AR 503

Code

Cód.: 96002202

Series Number

Série.: 0068

Ano: 2006

Year of Manufacture

IDENTIFICATION OF MACHINE

CHAP2

The identification label placed on the machine chassis contains information which is essential for a correct recognition of the equipment.

This data is vital when you are making a request for technical interventions or accessories.

WARRANTY CONDITIONS

CHAP3

The products commercialised by PULVERIZADORES ROCHA are duly tested and controlled so as to reduce to the minimum the probabilities of the occurrence of any anomalies.

All the equipment has a warranty for the period of two years as from its date of acquisition. The components or parts on which deficient manufacture and/or assembly is observed shall be replaced rapidly and free-of-charge.

However, the costs inherent in labour and travel shall be debited.

It is mandatory to send the parts or accessories which are the object of a complaint so they can be analysed by our Technical Department.

The occurrence of the facts set out below constitutes grounds for the immediate loss of the warranty:

- 1.** The use of equipment under abnormal working conditions or coupled to engines / tractors / motocultivators with power levels different from those recommended in the respective technical documentation.

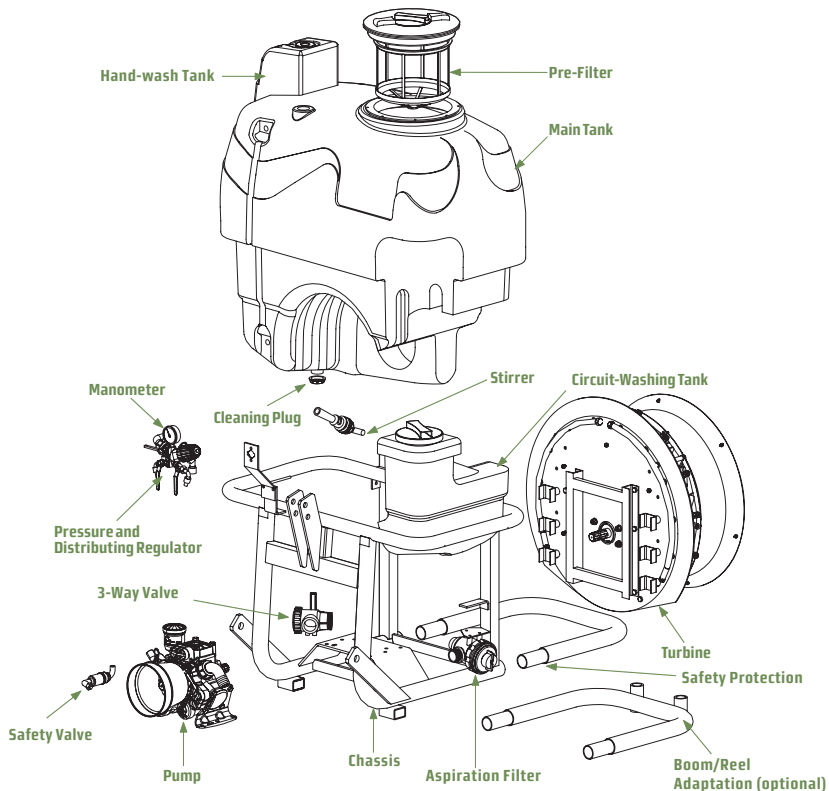
- 2.** The replacement of any components or parts with others which are not original.
- 3.** The making of any alterations to the equipment structure.
- 4.** Any repairs carried out during the warranty period without the knowledge and authorization of PULVERIZADORES ROCHA.

DESCRIPTION

CHAP4

By way of the different combinations of the spraying systems, ROCHA constructs various types of sprayers attempting to cover a wider strip of uses and performances.

To this end it is necessary to know their characteristics and classifications, setting out below a general description of the main components.



ROCHA sprayers are equipped with low, medium or high pressure pumps, semi-hydraulic membranes or pistons and remote control units with a valve for adjusting the working pressure, by-pass, manometer in glycerine bath and outlet valves.

As an option, volumetric controls which are manual or activated by electrovalves may be assembled and an electrical board assembled at the tractor driving position.

These pumps are activated by way of the cardan shaft from the power take-off (PTO) of the tractor (540 rpm).

The chassis is made of hot galvanised reinforced steel.

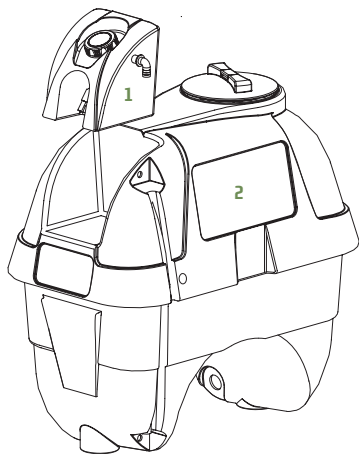
The aspiration filter is equipped with a closing valve and prepared for connection of suction self-filling.

Spray liquid stirrer by way of a pressure water jet which can be inspected from the exterior of the tank.

The main tank is rotomolded in high-density polyethylene, with an external spray liquid level complemented by supplementary tanks for cleaning by the operator and cleaning of the circuit (exclusive of the OMEGA line).

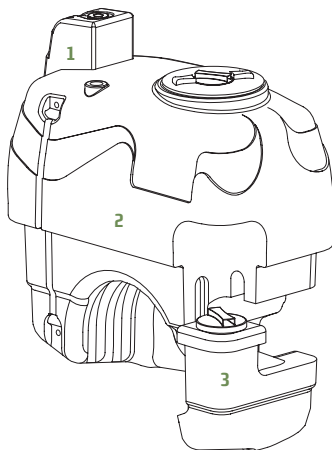
Each sprayer is fitted with a supplementary tank for clean water intended exclusively for the cleaning of parts of the body which have accidentally come into contact with the product used.

ALPHA LINE



- 1. - Supplementary clean water tank
- 2. - Main tank

OMEGA LINE



- 1. - Supplementary clean water tank
- 2. - Main tank
- 3. - Supplementary circuit-washing tank

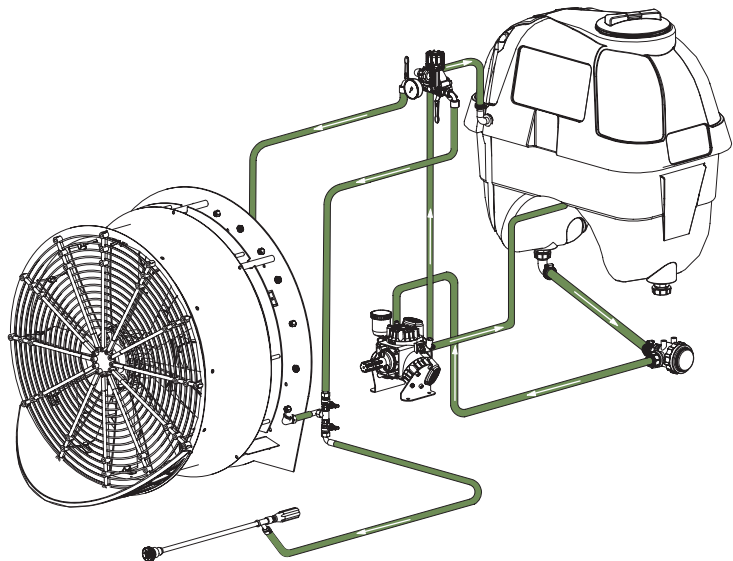
It may also be fitted with a supplementary tank for washing the aspiration and outlet circuit foreseen in Standard 907 (exclusive of the OMEGA line).

SUPPLEMENTARY CIRCUIT-WASHING TANK

The ROCHA transported jet sprayers are presented in two different lines:

OMEGA and ALPHA, perfectly adapted for the carrying out of phytosanitary treatments at all types of farms.

OMEGA sprayers have a supplementary tank inbuilt in the main one which is intended to carry out the cleaning of the most important and sensitive components of the machine, thereby allowing greater durability.



OPERATION

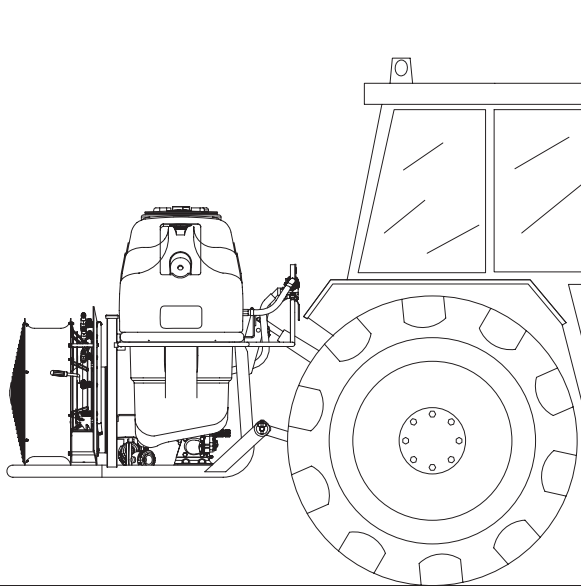
CHAP5

The air assisted sprayer is essentially intended for works carried out on vineyards and orchards.

The spray liquid contained in the tank falls by the action of gravity into the filter where, once the particles in suspension have been eliminated goes to the pump.

Once pumped, it enters the conduit connecting to the control unit regulating pressure where, in the compression chamber by the action of pressure of a helicoidal spring it meets resistance at the outlet and gains hydraulic pressure, thereby achieving greater or lesser pressure which should be controlled at the manometer.

Opening the distribution valves, the spray liquid under pressure moves to the nozzles applied in two semi-circles, placed at the ventilator air outlet. The rapid pressure drop brought about the entry of spray liquid in the atmosphere brings about its fragmentation into small drops which, on entering the draught, produced by the ventilator, shall be distributed and transported to the foliar mass.



COUPLING TO THE TRACTOR

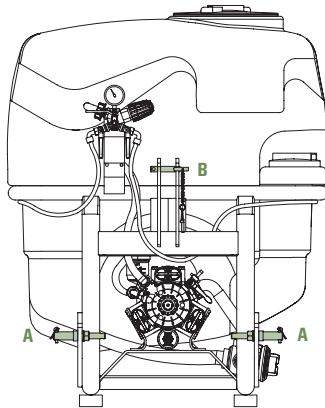
CHAP6

The ROCHA trailed jet sprayers, commonly known as turbine sprayers, are designed in such a way as to be easily coupled to the tractors.

To this end, we should respect some very important procedures:

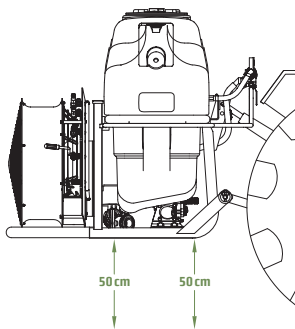
- 1.** The transmission cardan shafts supplied by ROCHA are standardised and accompanied by a user manual which should be read carefully.
- 2.** Its transmissible power shall be at least equal to that absorbed by the spray.

3. MACHINE COUPLING - COUPLABLE SPRAYERS

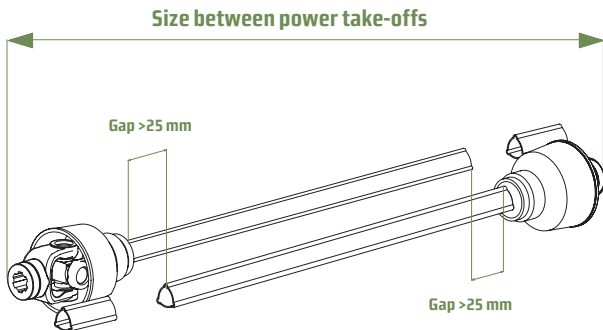


1. Enganche los brazos inferiores del hidráulico en las cabillas (A) del Pulverizador Enganche el brazo de tercer punto en la cabilla (B) del Pulverizador.
2. Coupling the third point arm to the pin (B) of the Sprayer .

3. Raise the machine until the cardan shaft is horizontal with the power take-off of the pump and tractor.



4. Place the semi-cardan shaft of the side of the machine and the semi-cardan shaft of the power take-off next to each other.
 - 4.1. If they are too long, cut the two tubes and the respective protections with a minimum gap of 25mm and maximum of 50 mm.
 - 4.2. Remove the filings deriving from cutting and lubricate the thinnest tube on the external side.

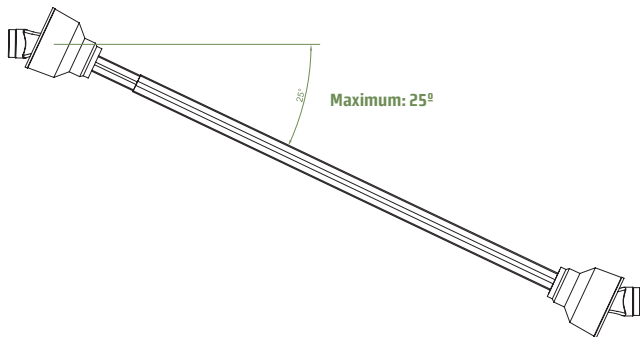


5. Affix the cardan shaft chains.
6. Adjust the gap of the lateral stabilisers of the tractor arms to the maximum of 50 mm.
7. Adjust the third point of the tractor so that the sprayer is perfectly vertical.
8. In the event of a coupled sprayer, check whether the weight of the machine at the maximum capacity can be borne by the tractor.



TAKE CARE!

The cardan shaft angle may never exceed 25° in motion.

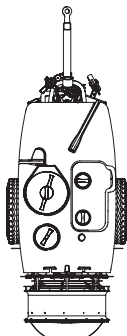


ATENCIÓN!

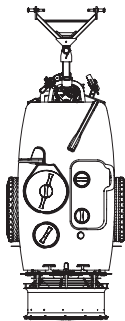
The coupling of the machine to the tractor shall be carried out by specialized staff and the use thereof is not recommended for inexperienced people or those aged under 18.

MACHINE COUPLING - TRAILABLE SPRAYERS

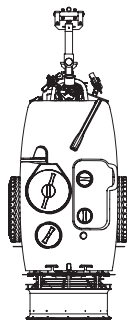
Fixed hitch



Rotating hitch
for coupling to the arms



Rotating hitch for
bell-mouthed coupling



ROCHA trailer sprayers are equipped as standard with a fixed hitch.

To meet the new driving requirements, we present the possibility of equipping the machine with two rotating hitch models:
Coupling to the arms and Bell-mouthed coupling of the tractor.

MACHINE COUPLING WITH FIXED HITCH

1. Place the hitch ring in the bell mouth with a pin or in the automatic coupling of the tractor.

2. Place the semi-cardan shaft on the machine side and the semi-cardan shaft of the PTO side alongside each other.
 - 2.1. If they are too long, cut the two tubes and the respective protections with a minimum gap of 25mm and maximum of 50 mm.
 - 2.2. Eliminate the filings deriving from the cutting and lubricate the thinnest tube of the
3. Affix the cardan chains.

ROTATING HITCH

The rotating hitches in combination with homokinetic cardan shifts allow curving with the PTO of the tractor in operation, without interrupting rotation. This combination allows angles to be carried out with a manoeuvre of 80°.

COUPLING OF THE MACHINE WITH ROTATING HITCH

1. The coupling process varies in line with the type of rotating hitch.
 - 1.1. Rotating hitch for coupling to the arms — Carries out the connection of the bearing bushings of the tractor arms (type I or II) to the spindles of the rotating hitch.
 - 1.2. Rotating hitch for bell mouth coupling — Place the coupling eyelet inside the tractor Bell mouth. Introduce the connection pin and then adjust the tuning screws, eliminating the gap.
-

2. Separate and place the semi-cardan shaft, along with the homokinetic joint, assembled alongside the pump and the fixed connection assembled alongside the tractor, placing the tubes side by side. If they are too long, cut the two tubes and the respective protections with a minimum gap of 50mm and a maximum of 100mm.
3. Eliminate the filings deriving from the cutting and lubricate the thinnest tube of the external side
4. Affix the cardan shaft chains.
5. Adjust the gap of the lateral stabilisers of the tractor arms to the maximum of 50 mm.

**TAKE CARE!**

For safety reasons, carry out a tractor rotation manoeuvre with the equipment in the maximum angle of the change in direction, verifying whether there is enough of a gap in the cardan shaft tubes.

**TAKE CARE!**

Lubricate the greasers placed at the rotation points with each use.

HOMOKINETIC CARDAN SHAFTS

The homokinetic cardan shafts are suitable for the transmission of rotation movement between two shafts with great angle shift.

Their interior centring system divides the working angles fairly, thereby ensuring the uniform transmission of the rotation.

Owing to its configuration, it is self-supported and allows angles of 80° in operation for short spaces of time.

There are two assembly possibilities for this cardan shaft model in line with the type of coupling equipping the sprayers.

- 1. COUPLING WITH FIXED HITCH - homokinetic joint assembled on the PTO of the tractor**
- 2. COUPLING WITH ROTATING HITCH - homokinetic joint assembled on the pump PTO.**

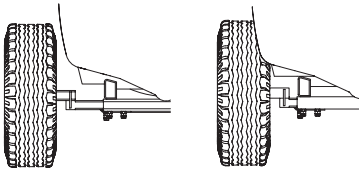
*Max. angle with the PTO in continuous operation - 25°

*Max. angle with the PTO in operation for a short time - $70/80^\circ$

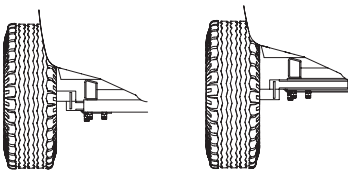
*Max. angle with the PTO at rest - 90°

The correct operation of the machine and safety of the operator involve respect for certain rules which we have set out below:

1. When circulating with the trailable sprayer full of water, the speed shall be reduced as the braking is not as efficient.
2. Take care when raising the sprayer too high in the tractor hydraulic system, as the cardan shaft may push against the coupling or chassis.
3. Check whether the width and height of the equipment conforms to the safety need of the operator, tractor, machine and relief of the site where it is going to work.



The shaft equipping the tractor is telescopic, so as to allow the width between the wheels to be altered.



We can also alter the height of the equipment, rotating the shaft 180°.

PREPARATION OF SPRAYER AND THE SPRAY LIQUIDS

CHAP7

It will be opportune to precede the first treatment of a test with clean water to check whether the sprayer is in smooth operation and also to acquire some practice in its use.

After carrying out the check, full 1/3 of the main tank with clean water and set the pump in motion with the pressure regulator in the PRESS position to achieve the stirring.

Products in liquid form may be directly added to the water.

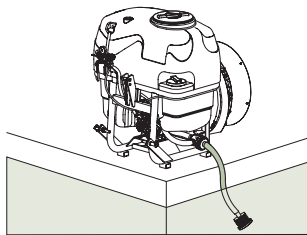
Powdered products shall be pre-mixed with water in a bucket until they become a liquid paste and only then added to the tank water.

SELF-FILLING

Self-filling systems can be classified into three categories and are intended for the filling of the tank (s) which go to make up the sprayer in lakes, rivers, wells etc.

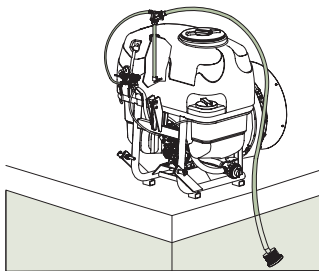
They are built in such a way as to avoid the possible contamination of the water by way of the reflux of the spray liquid, thus being fitted with flow reversal retention mechanisms.

AP 35 SUCTION SELF-FILLING BY MEANS OF FILTER



Carrying out the connection of a $\varnothing 35$ mm tube which is 5 metres long, endowed with a filter at the end by way of a solder joined to the threaded outlet where the opening and closing valve of the pump inlet valve is located. By way of the suction caused by the pump, the water raises via the interior of the oval aluminium tube as far as the interior of the tank.

AP35 SELF-FILLING ASSEMBLED AT THE SPRAY LIQUID TANK



Place around 10 litres of clean water inside the spray liquid tank. Assemble the self-filling unit inside the hole to be found on the upper part of the sprayer, connecting the solder of the pressure tube \varnothing 12mm at an outlet valve of the controls or at the back of the sprayer, placing the regulating control at a pressure of 25 bar, the “venturi” system shall bring about sufficient suction for the water to pass via the bottom filter and rise through the interior of the oval aluminium tube as far as the interior of the tank.

AP 40 MEDIUM FLOW RATE SELF-FILLING

Place around 10 litres of clean water inside the spray liquid tank, connecting the solder of the \varnothing 12mm pressure tube which accompanies the \varnothing 40mm tube to an outlet valve of the control or at the rear outlet of the sprayer, placing the regulating control at a pressure of 25 bar, the “venturi” system shall bring about sufficient suction for the water to pass through the bottom filter and rise via the interior oval aluminium tube to the interior of the tank.

AP 50 HIGH FLOW RATE SELF-FILLING

It maintains all the characteristics of the AP40, with the exception of the filling flow which increases in line with the conduit diameter.



TAKE CARE!

The greater for the PTO rotation, the higher the water flow and the shorter the filling time.

In the event of filling in rivers or dams with sand and other sediments at the bottom, a floating filter system shall be assembled (suction self-filling and AP35).

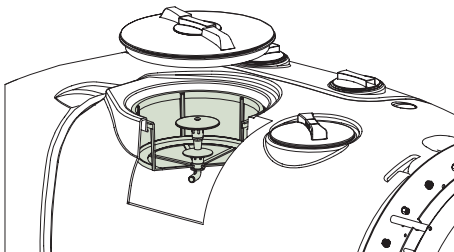
PRE-MIXER

ROCHA has as optional equipment a pre-mixer system for powdered products.

The pre-mixing devices for spray liquid can be classified in two categories, interior and exterior.

These mechanisms allow the rapid mixing to be carried out of powdered and liquid phytodrug products, optimizing their homogeneousness and preventing the operator and the atmosphere from suffering vapours, splashes and spillages.

INTERIOR PREMIXER

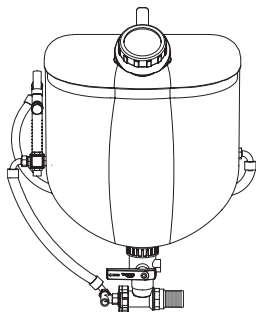


Applied in the spray liquid tank entry filter and connected to an opening valve placed directly in the pump.

It allows the sprayed water to carry out the mixture of the powder placed inside the entry filter until said powder has been totally diluted.

**TAKE CARE!**

After placing the powder into the entry filter, you should close the tank lid before opening the valve.

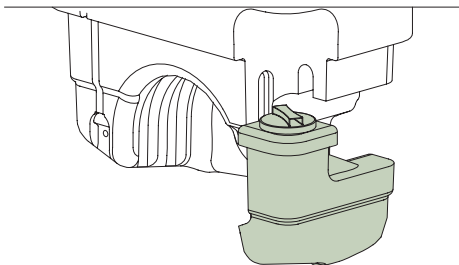
EXTERIOR PRE-MIXER

This consists of a tank where the operator shall deposit the phytodrug in powder or liquid.

After closing the respective lid, you should open the manual water entry valve for the mixture, waiting until it has been diluted. Subsequently, the spray liquid shall be sent to the interior of the main tank by opening another manual connection valve.

This equipment may be fitted with an accessory for the interior washing of the phytodrug products packages so that they are then punctured and sent to the collection and treatment site.

SUPPLEMENTARY CIRCUIT-WASHING TANK (OMEGA LINE)



This supplementary tank is usually built into the spray liquid tank and shall be supplied with clean water and is intended to carry out the cleaning of the main components of the machine: -Pump, Control, Piping and Jets.

To carry out this operation we should reverse the position of the manual 3-way valve so that the pump receives clean water and carries out the circulation, opening the turbine jets or drawbars.

This operation shall be carried out at the place where the treatment was carried out and the remnants of the spray liquid shall be sprayed on the plants treated, using a more rapid speed of the tractor.

CLEANING AND EMPTYING OF THE SPRAY LIQUID TANK

The cleaning and emptying of the spray liquid tank shall be carried out with great care so as to avoid the contamination of soils, water courses, people and animals.

The remnants of dirty water with spray liquid, deriving from this operation shall be collected at hermetic tanks so as to be reused.

SPRAYING BY TRANSPORTED JET

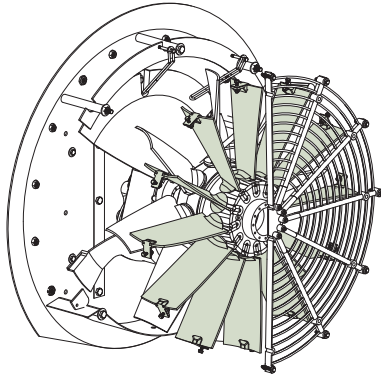
CHAP8

The transported jet sprayers differ from the jet sprayers essentially by dint of the existence of a ventilator which allows the transport of jet drops to be carried out to the crops, also affording greater penetration in the interior of the plants.

VENTILADORES

The ventilator models most used are the axial ones where the air flow is sprayed in parallel to the propeller rotation axis.

These ventilators vary in diameter, multiplier rotation box, number of propeller blades and their angle of inclination in line with the ventilation needs and type of crops.



Axial Ventilator with Pre-distributor in Aspiration

However, there are other types of ventilators such as centrifugal, radial and tangential, etc.

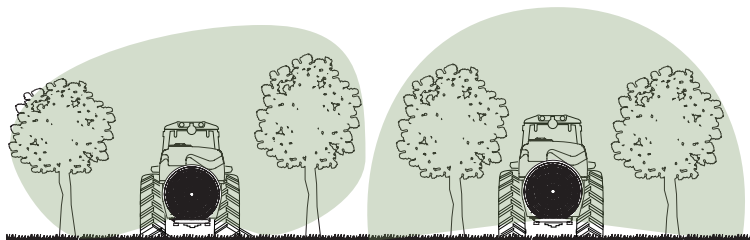
The ventilators are usually endowed with pre-distributors and air collectors which restrict its exit in line with the specific nature of its use.

The multiplier boxes used in this type of machines may be one gear plus neutral or two gears plus neutral.

The multiplication ratio is situated between 1:3.5 and 1:5.5.

The propeller blades are adjustable, allowing angles falling between 25° and 45° and consequently with a higher or lower air flow rate.

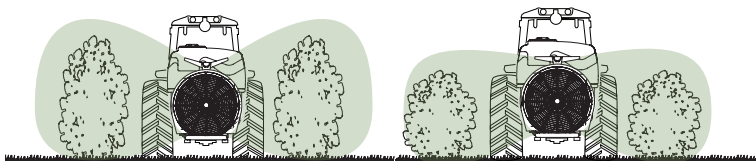
The ventilators may be equipped with pre-distributors of air in the aspiration or at the outlet, allowing the homogeneous distribution of the ventilation to both sides.



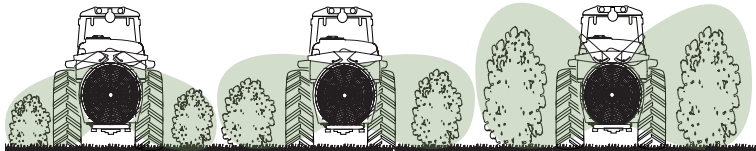
Standard Ventilator

**Ventilator Equipped with Pre-Distributor
(Air Deflector in Aspiration)**

In ground crops too an air collector commonly known as an “aileron” may also be assembled, adapted to the jet affixing circles with more or less complex forms and possibly with flexible conduits, thereby locating the air flow.

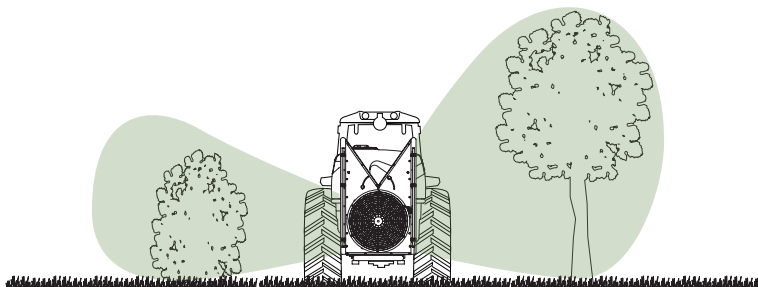


Type V Single Aileron



Bilateral Aileron

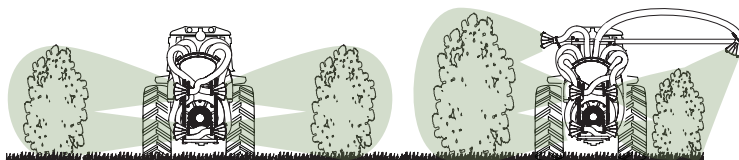
Achieving great efficiency in the transport of the drops, this type of sprayers is often used in orchards, essentially due to the large scale of the trees and vineyards, thus producing high air flow rates, it affords a better penetration of the liquid sprays in the interior of the vines.



Linear Ventilator

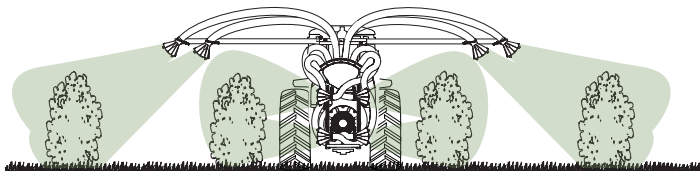
Producing thinner drops than the jet sprayers, they are very important for winter treatments and are versatile, allowing the application of bars for herbicides, insecticides or manual drawbars

However, there are other, more evolved spraying systems, such as Pneumatic units and atomisers.



4 Outlet Mittos

6 Outlet Mittos



6+2 Outlet Mittos

These systems afford lower flow rates, thinner drops but also capable of being dragged by the wind or drying during transport owing to the high temperatures.

The air conduction systems may be multiple, flexible and adjustable, seeking to provide a solution to the various demands.

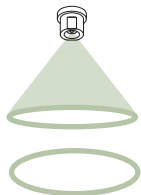
THIS EQUIPMENT IS VERY FREQUENTLY USED IN VITICULTURE AND AVAILABLE IN THE RANGE OF PRODUCTS COMMERCIALISED BY PULVERIZADORES ROCHA.

TYPES OF NOZZLES

Ceramic
Pad Nozzle



ATR Turbulence Nozzle



TVI Anti-drift Turbulence Nozzle



TYPES OF NOZZLES

CHAP9

The correct choice of nozzles obeys the following criteria:

1. Crop type.
2. Treatment type.
3. Weather conditions (winds).

ROCHA places at the disposal of its clients various types of turbulence nozzles, whereof we are highlighting the following:

- Ceramic Pad Nozzle - Equips all the standard sprayers. Carries out the distribution of particles and drop size of average quality. Working pressures falling between 10 and 30 bar.
- ATR nozzle - it is possible to assemble in all the transported jet sprayers of the ROCHA brand. Carries out the distribution of particles and drop size of high quality. Working pressures falling between 3 and 25 bar.
- TVI nozzle - it is possible to assemble in all the transported jet sprayers of the ROCHA brand. This innovative system facilitates the application of phytodrugs at place where there is wind of over 6 m/s and the consequent dragging of the droplets. Working pressures falling between 5 and 25 bar.

CALIBRATION

CHAP10

To calibrate a sprayer we should bear in mind the selection of the nozzles and the dose of the product recommended by the manufacturer.

The effectiveness of all the phyto-sanitary treatments largely depends on the thoroughness and accuracy with which they are applied.

For the practical, correct adjustment of the sprayer, due consideration shall be given to the following factors:

FACTORS	ABBREVIATION	MEASUREMENT UNITS
Volume of water to be applied by hectare	VA	L/H
Tractor speed	VT	KM/H
Working pressure	PT	BAR
Total flow rate per minute*	DT	L/MIN
Flow rate per jet	DJ	L/MIN
Space between crop lines	EL	M

* DT = DJ × total no. of jets

PRACTICAL CASE OF THE CALCULATION OF THE VOLUME SPRAYED PER HECTARE

Calculation formula for calculating the volume sprayed per hectare with atomisers

$$VA = \frac{600 \times DT}{VT \times EL}$$

Example:

- The orchard has 4 metres between crop lines.
- Tractor speed - 6 km/hour.
- The client has a sprayer equipped with a ventilator of D.620 with 10 porcelain nozzles with jet of 1,5 mm.
- The application is carried out with working pressure of 15 bar
Consulting the flow rate table on page 49 we can see that:
- DT=4.3 X 10 = 43 l/min.
- Based on our formula:

$$VA = \frac{600 \times 43}{6 \times 4} = 1.075 \text{ l/h}$$

CERAMIC TURBULENCE NOZZLES - ATR INJECTORS

VALUE - FLOW RATE (L/M)

Pressure BAR	Injector Colour									
	White	Purple	Brown	Yellow	Orange	Red	Grey	Green	Black	Blue
3	0,21	0,28	0,38	0,57	0,77	1,08	1,18	1,40	1,57	1,92
4	0,24	0,32	0,43	0,65	0,89	1,24	1,35	1,60	1,80	2,20
5	0,27	0,36	0,48	0,73	0,99	1,38	1,50	1,78	2,00	2,45
6	0,29	0,39	0,52	0,80	1,08	1,51	1,63	1,94	2,18	2,67
7	0,32	0,42	0,56	0,86	1,17	1,62	1,76	2,09	2,35	2,87
8	0,34	0,45	0,60	0,92	1,24	1,73	1,87	2,22	2,50	3,06
9	0,36	0,48	0,64	0,97	1,32	1,83	1,98	2,35	2,64	3,24
10	0,38	0,50	0,67	1,03	1,39	1,92	2,08	2,47	2,78	3,40
11	0,39	0,52	0,70	1,07	1,45	2,01	2,17	2,58	2,90	3,56
12	0,41	0,55	0,73	1,12	1,51	2,09	2,26	2,69	3,03	3,71
13	0,43	0,57	0,76	1,17	1,57	2,17	2,35	2,79	3,14	3,85
14	0,44	0,59	0,79	1,21	1,63	2,25	2,43	2,89	3,26	3,99
15	0,46	0,61	0,81	1,25	1,69	2,33	2,51	2,99	3,36	4,12
16	0,47	0,63	0,84	1,29	1,74	2,40	2,59	3,08	3,47	4,25
17	0,48	0,64	0,86	1,33	1,79	2,47	2,67	3,17	3,57	4,37
18	0,50	0,66	0,89	1,37	1,84	2,54	2,74	3,25	3,67	4,46
19	0,51	0,68	0,91	1,40	1,89	2,60	2,81	3,34	3,76	4,61
20	0,52	0,70	0,93	1,44	1,94	2,67	2,88	3,42	3,85	4,72
21	0,54	0,71	0,95	1,48	1,99	2,73	2,95	3,50	3,94	4,84
22	0,55	0,73	0,98	1,51	2,03	2,79	3,01	3,57	4,03	4,94
23	0,56	0,74	1,00	1,54	2,07	2,85	3,07	3,65	4,12	5,05
24	0,57	0,76	1,02	1,58	2,12	2,91	3,14	3,72	4,20	5,15
25	0,58	0,77	1,04	1,61	2,16	2,97	3,20	3,80	4,28	5,25

CERAMIC TURBULENCE PADS

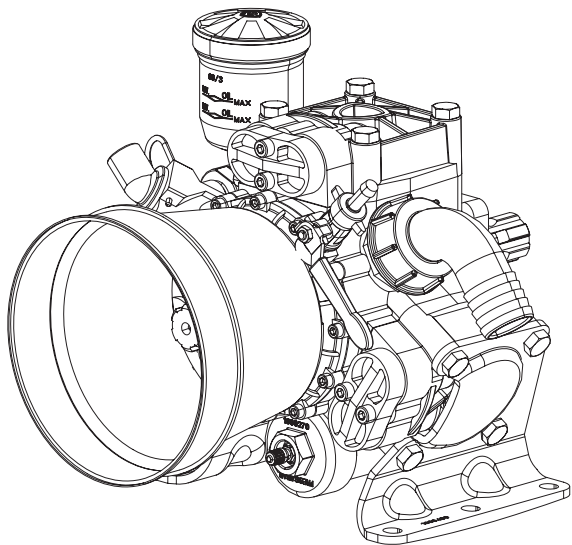
VALUE - FLOW RATE (L/M)

Pressure	Nozzle - MM				
BAR	1	1,2	1,5	1,8	2
5	1,1	1,5	2,4	4	5
8	1,3	1,7	2,9	4,6	5,6
10	1,5	2	3,3	5,1	6,3
12	1,7	2,3	3,8	5,6	6,9
15	1,9	2,7	4,3	6,3	7,7
18	2,1	3	4,8	6,9	8,5
20	2,3	3,2	5,1	7,2	8,8
25	2,5	3,6	5,6	8,2	10
30	2,8	3,9	6,2	8,9	11
40	3,3	4,8	7,5	10,8	13,4
50	3,8	5,6	8,8	12,6	15,5
60	4,3	6,3	10	14,2	17,6



TAKE CARE!

The tables above are vital for obtaining a thorough calculation of the treatment which you wish to carry out.



THE PUMP

CHAP11

MAINTENANCE AND USE



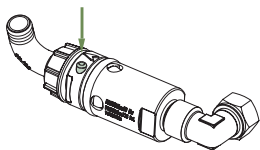
TAKE CARE!

Do not carry out maintenance with the machine in operation.

The pumps which equip the ROCHA sprayers are prepared for working with a maximum regime of 550 rpm.

The technical characteristics (flow rate, pressure) are indicated on the pump identification plate.

The low, medium and high pressure pumps are equipped with a sealed and calibrated safety valve.



The safety valve triggers when the maximum pressure admitted is exceeded, releasing a tin pin which shall be resituated after regulating the pressure according to the standards.

Some pump models are equipped with a compensator (pressure accumulator) whose air pressure in its interior shall be equal to 1/10 of the operating pressure.

Está terminantemente prohibido el uso de la bomba con los siguientes productos:

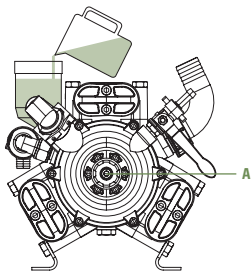
- 1— Liquids with temperatures of over 40°.
- 2— Inflammable liquids of any type.
- 3— Liquids containing solid or granulated products.
- 4— Food liquids for animals and people.
- 5— Gases of any kind.
- 6— Mixtures of non-compatible chemicals.
- 7— Fuel or lubricants of any kind.
- 8— Liquid manure with dense flocs.
- 9— Solvents or dilutants of any kind.
- 10— Varnishes of any kind or type.
- 11— All the products not recommended for the use of the sprayer.



TAKE CARE!

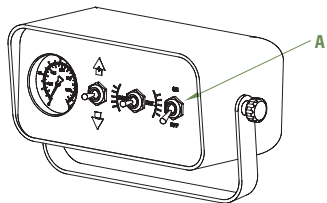
The pumps cannot work without water. They shall not be exposed to very low temperatures as there is the possibility of the formation of ice in their interior, leading to serious damages. They shall be cleaned after their use, it sufficing to this end to put them in operation with clean water for a few minutes.

The oil (SAE 20W / 40) shall be changed every 500 working hours and its level shall be controlled on a regular basis.

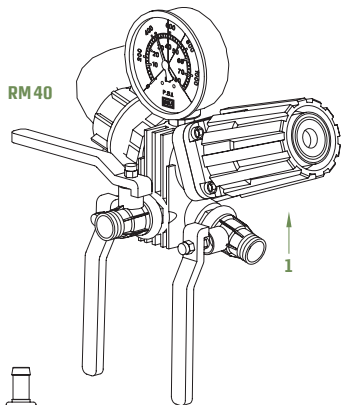


TAKE CARE!

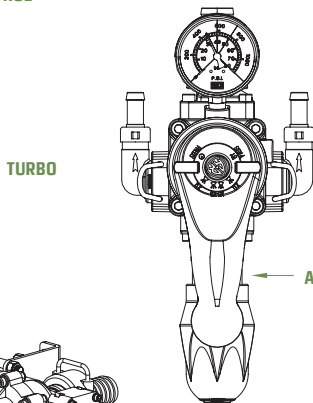
Rotate the shaft of pump(A) until the air comes out which can be found in its interior, adding more oil should it be necessary.



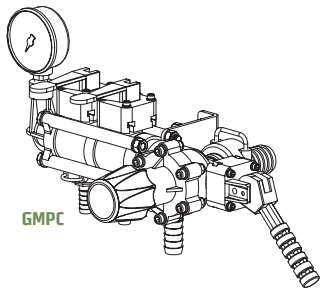
ELECTRICAL CONTROL



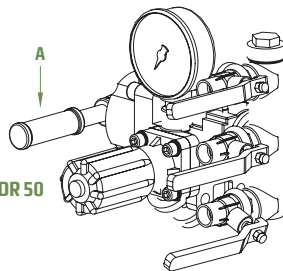
RM40



TURBO



GMPC



VDR 50

THE CONTROLS

CHAP12

MAINTENANCE

The controls regulating and distributing pressure are the “brain of the sprayer”, as they control all its operation. For this reason they shall always be in an optimum state of conservation and maintenance.

To this end, we should carry out the following operations:

1. Dismantle and lubricate with neutral lubricating grease all the mobile elements, O-rings and sealants at the end of each campaign.
2. Check whether the pressure indicating manometer is in perfect conditions.
3. Annually control the wear and tear of the valve and the housing unit.

OPERATION

1. After setting the pump in motion, turn the handle (1) or lift the lever (A) to the BY-PASS position, letting the pump run for a few seconds.

-
2. Rotate the handle or place the lever in the PRESS position.
 3. Rotate the pressure adjusting handle and check whether the manometer indicates the desired pressure.
 4. Open the outlet valves for the sectors and confirm the pressure reading on the manometer.

PROPORTIONAL CONTROL UNITS (volumetric)

REGULATION AND DISTRIBUTION

The proportional or volumetric control units are intended for works where the volume of water applied per hectare of land shall obey strict standards established previously by the manufacturers of agro-chemical products.

The designation “proportional” or “volumetric” establishes that the control, once correctly calibrated, shall automatically compensate the flow rate alterations brought about by the opening or closing of sectors in line with the need to alter the equipment working width.

To this end, they are endowed with independent flow discharge regulators for each boom sector, automatically discharging into the tank the volume of water not consumed owing to the closure of the nozzles placed in this sector, maintaining the working pressure constant so as to maintain the application volume.

CALIBRATION OF THE ELECTRICAL AND MANUAL DISTRIBUTION AND REGULATION CONTROLS (PROPORTIONAL)

ARG 2V / 3V / 5V

GMPC 2V / 3V

Having established the amount of product to be distributed per hectare, the type of nozzles, the speed of progress of the tractor and the respective working pressure, we would always recommend a placebo test with clean water before mixing the phytodrug.

1. Totally tighten the calibration regulators situated on the front of each sector valve.
2. Untighten the pressure regulating valve, open the sector valves and take the pump to the operating regime (+- 450 rpm at PTO) required to feed the nozzles.
3. Place the pressure / by-pass lever/ switch in the Press position and adjust the pressure, activating the respective regulator, with all the outlet valves for the sectors open, until a achieving a figure slightly greater than that established previously.

-
4. Commence calibration with a boom sector closing the respective valve. The pressure will increase. Then untighten the calibration regulator placed at the front of the valve until the pressure lowers to the pre-established value.
 5. Repeat the same operation for all the valves (2 or 3) until achieving the pressure established.

The calibration of the equipment has been carried out.

Opening or closing a sector a working pressure established shall be maintained. In this point, with the same speed and considering a variation in the rotation of the tractor, the quantity of liquid per hectare (volume) distributed shall be correct, always considering a variation of $\pm 10\%$ already foreseen in the preparation by the manufacturer of the phytodrugs.

To alter the working pressure, it suffices to act solely in the main pressure regulator without repeating the calibration.

CALIBRATION OF THE ELECTRICAL DISTRIBUTION AND MANUAL REGULATION CONTROLS (CONSTANT PRESSURE)

BRGR 204 2V/R 206 3V

1. Put the pump in the operating system (± 450 rpm in the PTO) required for the powering of the nozzles and adapted to the speed that we have established for carrying out the treatment.
-

2. Regulate the working pressure in the manual regulator placed in the electrovalve unit.
3. Activate the control box buttons to open the respective sectors.
4. Carry out the periodic cleaning of the filter.



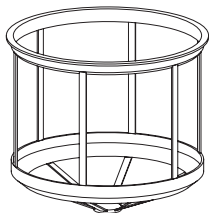
TAKE CARE!

When carrying out the cleaning of the equipment, do not dump the waste on the ground or into running water.

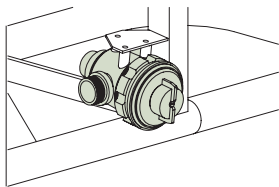
FILTERS

CHAP13

ROCHA sprayers are equipped with a pre-filter in the tank outlet and another with stainless steel 50 MESH immediately before the pump inlet.



Pre-Filter



Aspiration Filter

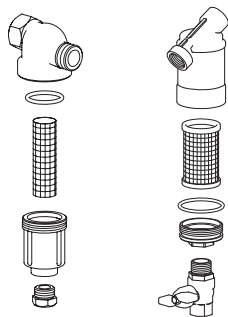
The aspiration filter shall be cleaned before each spraying.

To this end, proceed in the following manner:

1. Push and turn the yellow lid left, removing it from the unit.
 2. Once the water which was in the filter and piping comes out, unscrew the junction of the filter unit, separating it.
-

3. Remove the filter cartridge and rinse it in clean water until removing all the impurities.
4. Carry out the assembly of the filter, carrying out the reverse operation.

In the line filters of the bars or turbine sectors, dismantle the cartridges and rinse them in clean water until removing all the impurities.



Line Filters

SAFETY STANDARDS

CHAP14

WEATHER CONDITIONS

The success of treatment largely depends on the weather conditions before, during and after the application.

1. A high wind speed increases the risks of drifting and the loss of the product applied.
2. The wind speed acceptable for phytosanitary treatments is 6 m/s

APPLICATION PERIODS

The most favourable conditions for treatments occur during the morning. The poor wind speed and the high humidity index are ideal conditions for the use of minimum product doses.

USE OF THE PRODUCTS



TAKE CARE!

Read the labels and respective indications carefully.

-
1. Place the products out of the reach of the people and animals.
 2. Do not mix the products whose compatibility is not recognised by their supplier.
 3. Always use protection equipment such as gloves, masks, goggles etc.
 4. Do not eat, smoke or drink during the treatments.
 5. Respect the safety distance from residential and public centres, tanks or water courses.
 6. At the end of the treatments, it is important to see to the washing in clean water of the exterior and interior of the sprayer, as well as of all the clothing used in the treatments.
 7. Wash the recipients of the phytodrugs and once properly washed, deliver them to a collection centre.

SAFETY STICKERS

The machine shall be used with the greatest care. Stickers were placed which warn of the main dangers faced by the operator in the use of the equipment.

The stickers form an integral part of the equipment and should any of them disappear or become illegible, contact the dealer to see to their replacement.

MANDATORY SIGNS



READING
THE USER
MANUAL IS
MANDATORY



BODY
PROTECTION
MANDATORY



HAND
PROTECTION
MANDATORY



C10730071

HAND WASHING
MANDATORY



EAR
PROTECTION
MANDATORY



PROTECTION OF
RESPIRATORY PASSAGES
MANDATORY

PROHIBITION SIGNS



NOT DRINKING
WATER



NO
THOROUGHFARE



NO
SMOKING



C10730071

NO
ENTERING
THE TANK



NO REPAIRING,
CLEANING OR
LUBRICATING THIS
MACHINE IN
OPERATION



NO
REMOVING
MACHINE
PROTECTIONS

DANGER SIGNS



VARIOUS HAZARDS



MAX 540 RPM

DANGER OF
TWISTING, ROLLING
AND GETTING
TANGLED UP ON
TRANSMISSION



SODAR 40BAR 30BAR

MAXIMUM
PRESSURE OF
CIRCUIT - 50-40-30



MAX 550 RPM

FREQUENCY
AND DIRECTION
OF ROTATION

PROCEDURES TO BE FOLLOWED AFTER PROLONGED INACTIVITY

CHAP15

WINTER STORAGE

When the treatments period ends, the equipment, once properly cleaned and lubricated, shall be prepared for the winter.

Storage shall be carried out at a dry, aerated place.

Should there be the risk of sudden falls in temperature (less than 0° C), we should place anti-freeze liquid mixed with water in the proportion recommended by the supplier with a total quantity of 15 or 20 litres and connecting the PTO for a few minutes, making it circulate until filling the pump, the jets and the respective piping.

When putting the equipment back in operation at the treatment time, turn manually or with the aid of a tool the mobile parts, such as the shaft of the pump and ventilator, as well as the pressure regulation and distribution control levers.

This interval between treatment times is the time for carrying out routine maintenance or the major mechanical interventions.

CLEANING AFTER EACH USE OF THE EQUIPMENT

The phytodrug solutions may be dangerous and cause damage to the sprayer components so we should carry out the cleaning immediately after ending the application.

To this end we should adopt the following steps:

1. Dilute the remains of the product which are in the interior of the tank, with at least 5 times more quantity of water.
2. In the equipment fitted with circuit-washing tanks, this operation may be easily carried out, reversing the position of the three-way valve, thereby allowing the passage of clean water (10% of the nominal capacity of the tank) to the main tank by way of the pump via the return tube

3. Then spray this spray liquid in the area treated previously, reducing the working pressure to this end and increasing the speed of the tractor so as not to overdo product concentration.
4. Clean the equipment via the exterior and interior with abundant water and detergent, turning the PTO with the tractor in low rotation until the water has rinsed all the important components such as the pump, the control unit and the piping.
5. Dismantle the inlet filter, the line filters, the heads of the jets and clean them properly with water and detergent.
6. Dump all the waste deriving from the cleaning in a specific site for the receipt thereof or, alternatively, at the site treated previously, far from water lines and circulation areas for animals and people.
7. Assemble the filters and jets and keep the equipment with the main tank cover open.



TAKE CARE!

The spray liquid waste deposited inside the sprayer for long spaces of time shall cause corrosion to the components and require very expensive interventions.

PROBLEMS AND SOLUTIONS

CHAP17

Failure Detected	Possible Cause	Solution
<ul style="list-style-type: none"> The pump does not carry out the spray liquid suction The outflow of water is irregular Lack of pressure 	<ul style="list-style-type: none"> Aspiration obstructed Air leaks via the aspiration piping Valves obstructed with foreign bodies or worn 	<ul style="list-style-type: none"> Verify the piping connections Verify the o-rings of the valves and, where necessary, replace them
<ul style="list-style-type: none"> Insufficient working pressure Sudden pressure drop 	<ul style="list-style-type: none"> Control housing and valve worn or with the o-rings deteriorated 	<ul style="list-style-type: none"> Replace Replace
<ul style="list-style-type: none"> Pump noisy or with intermittent operation 	<ul style="list-style-type: none"> Admission obstructed Lack of air in the compensator 	<ul style="list-style-type: none"> Verify the admission circuit Verify the membrane pressure of the compensator
<ul style="list-style-type: none"> Water in the oil or oil in the water 	<ul style="list-style-type: none"> Pressure membranes burst 	<ul style="list-style-type: none"> Replace

PERIODIC MAINTENANCE CHAP17

OPERATIONS CARRIED OUT BY THE OPERATOR.				
OPERATION	DAILY	WEEKLY	MONTHLY	ANNUAL
Control oil level		■		
Control wear and tear of nozzles				■
Control pressure of compensator			■	
Cleaning and lubrication of jets		■		
Verify tightening of screws			■	
Treat corrosion points				■
Cleaning of filters and tank	■			

Operations carried out annually by specialized technicians.

- Verification of membranes and sealants.
- Change in oil annually or 500 hours.
- Control and lubrication of the control unit.
- Control and checking of the piping.

**TAKE CARE!**

Users who are concerned with economy, efficiency and profitability always check their sprayer prior to the start of the treatment station.

The replacement of any parts represents a minor expense compared with the cost of the products which are going to be applied.

For this reason, it is preferable to carry out the replacement of the parts at the start of the campaign rather than during the work.

