

# AIR BLAST SPRAYERS

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**Rochä**



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# INTRODUCTION

# CHAP1

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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**

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# IDENTIFICATION OF MACHINE

## CHAP2

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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.





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# WARRANTY CONDITIONS

# CHAP3

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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.

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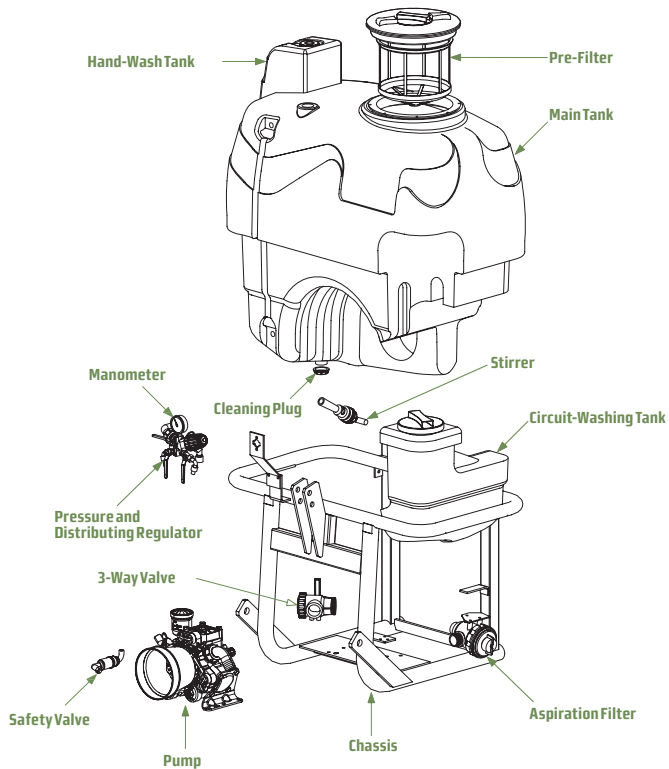
# DESCRIPTION

# CHAP4

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By way of the different combinations of the spraying systems, ROCHA constructs various types of sprayers attempting to cover a wider range 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).

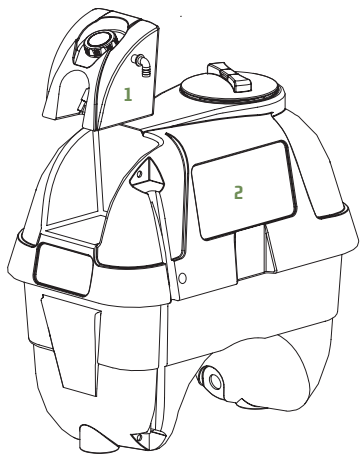
The chassis is made of reinforced steel with thermosettable polyester resin paintwork.

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.

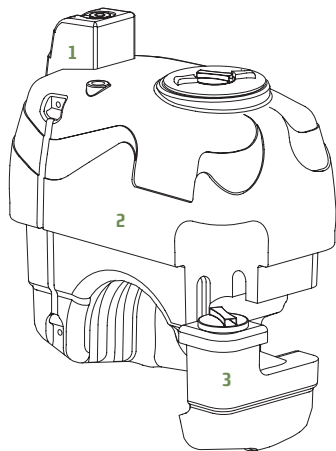
The main tank is rotomolded in high-density polyethylene, with an external spray liquid level complemented by supplementary tanks for cleaning by the operator and cleaning of the circuit (exclusive of the OMEGA line).

## 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

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

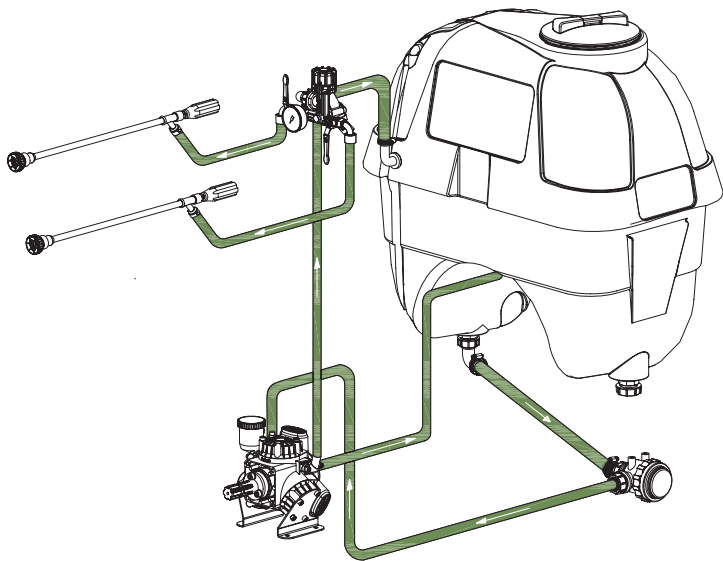
It may also be fitted with a supplementary tank for washing the aspiration and outlet circuit foreseen in Standard 907 (exclusive of the OMEGA line).

### **SUPPLEMENTARY CIRCUIT-WASHING TANK**

The ROCHA air blast 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 line 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.





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# OPERATION

# CHAP5

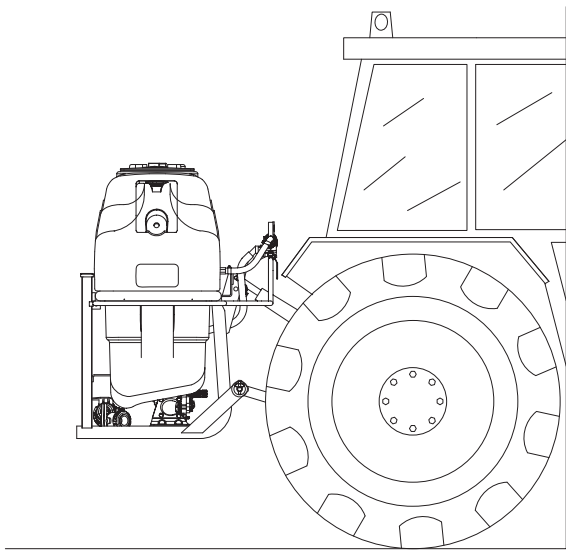
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The air blast sprayers is essentially intended for works carried out with manual drawbars or booms (ramps) for weed control or spraying.

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 nozzle. The rapid pressure drop brought about the entry of spray liquid in the atmosphere brings about its fragmentation into small drops which will cover the plant.



# COUPLING TO THE TRACTOR

## CHAP6

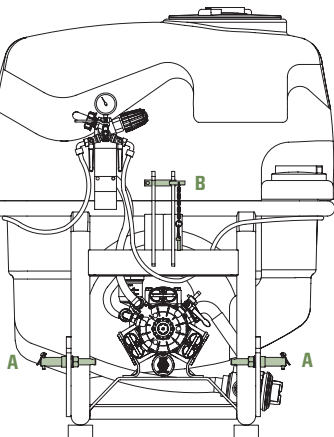
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The ROCHA air blast sprayers, commonly known as HP (high pressure) sprayers, are designed in such a way as to be easily coupled to the tractors.

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

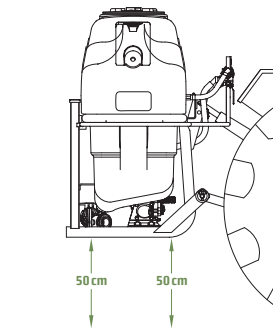
- 1.** The transmission cardan shafts supplied by ROCHA are standardised and accompanied by a user manual which should be read carefully.
- 2.** Their transmissible power shall be at least equal to that absorbed by the spray.

## MACHINE COUPLING - COUPLABLE SPRAYERS

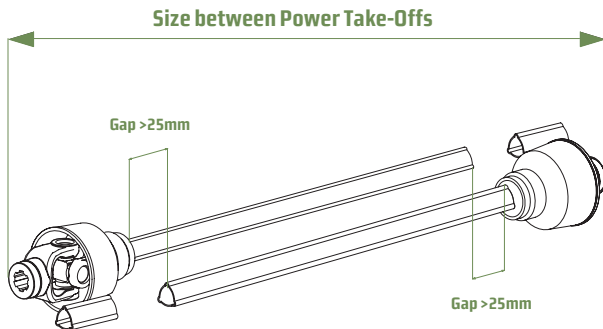


1. Coupling the lower arms of the hydraulic unit to the pins (A) of the Sprayer.
  2. Coupling the third point arm to the pin (B) of the Sprayer.
-

3. Raise the machine until the cardan shaft is horizontal with the power take-offs 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.

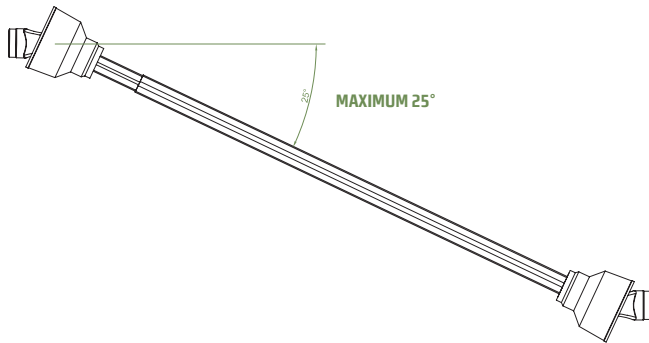


5. Affix the cardan shaft chains.
6. Adjust the gap of the lateral stabilisers of the tractor arms to the maximum of 50 mm.
7. Adjust the third point of the tractor so that the sprayer is perfectly vertical.
8. In the event of a coupled sprayer, check whether the weight of the machine at the maximum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



**TAKE CARE!**

The cardan shaft angle may never exceed  $25^{\circ}$  in motion.



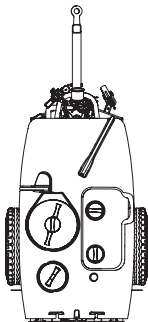
**TAKE CARE!**

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.

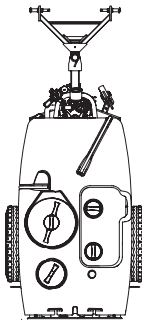
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## MACHINE COUPLING - TRAILABLE SPRAYERS

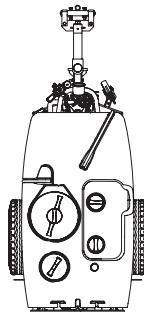
Fixed Hitch



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:

### 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 external side.
3. Affix the cardan chains.

### **ROTATING HITCH**

The Rotating Hitch 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°.

### **ENGATE DA MÁQUINA COM PUXO ROTATIVO**

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  $80^\circ$  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 COM 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 -  $25^\circ$

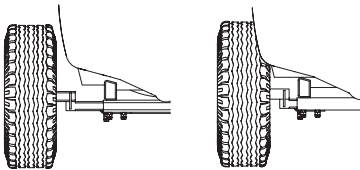
\*Max. angle with the PTO in operation for a short time -  $70/80^\circ$

\*Max. angle with the PTO at rest -  $90^\circ$

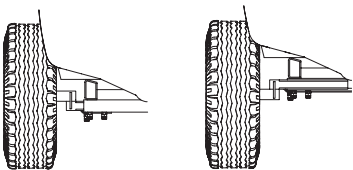
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The correct operation of the machine and safety of the operator involve respect for certain rules which we have set out below:

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

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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.

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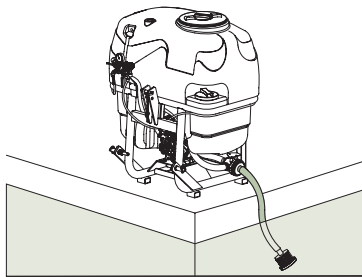
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## SELF-FILLING

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**

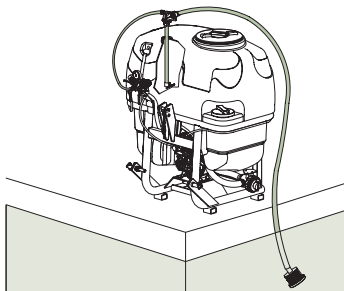


Carrying out the connection of a  $\varnothing$  35mm tube which is 5 metres long, endowed with a filter at the end by way of a solder joined to the threaded outlet where the opening

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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.

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### **AP 40 MEDIUM FLOW RATE SELF-FILLING**

Place around 10 litres of clean water inside the spray liquid tank, connecting the solder of the Ø 12mm pressure tube which accompanies the Ø 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).**



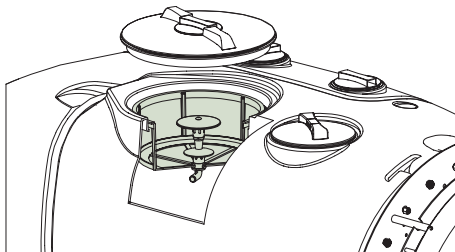
## PRE-MIXER

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

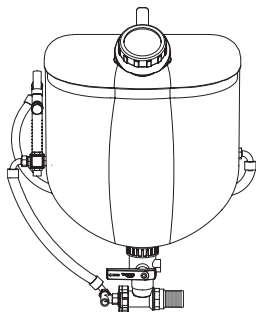


Applied in the spray liquid tank entry filter and connected to an opening valve placed directly in the pump.

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.

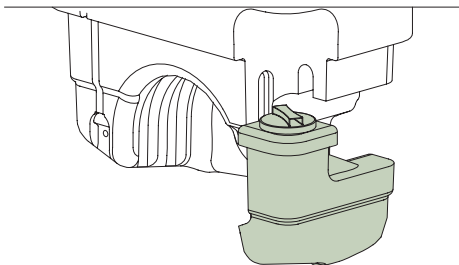
**EXTERIOR PRE-MIXER**

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 put out of action 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 gear 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.

# CALIBRATION

# CHAP8

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 UNIT
Volume of water to be applied by hectare	VA	l/ha
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
Space between jets	EJ	cm
Boom working width	LT	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 booms

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

### Calculation formula for calculating the volume sprayed per hectare with atomisers

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

#### Example:

- Tractor speed - 6 km/hour
- The client has a boom of 10 m with 20 jets
- The flow rate of each nozzle is 1.40 l/m;
- Hence, the total flow rate is  $DT = 1.4 \text{ l/m} \times 20 = 28 \text{ l/m}$
- Based on our formula:

$$VA = \frac{600 \times 28}{6 \times 10} = 280 \text{ l/ha}$$

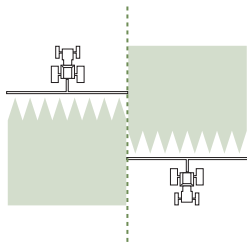
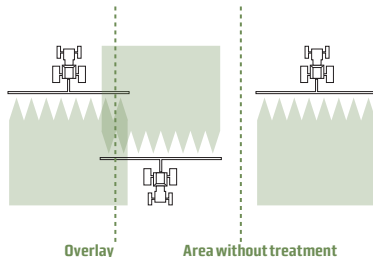
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# FORMS OF CALCULATION CHAP9

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The spraying/weed control booms may be assembled with various models of jets and nozzles of various types and flow rates.

To manage to obtain strict calculation of the treatment which it is intended to carry out, consult the formulas and tables attached.

**Correct****Incorrect**

**As regard spraying/weed control with boom, the correct marking of the thoroughfares is vital as only in this way is it possible to avoid further distributions in excess or by default.**

The marking of the parcels treated may be carried out in various ways:

1. Using piles, marker flags etc. These shall always be placed in such a way that they are visible from the opposite side.
2. Resorting to the use of foam markers.



**CERAMIC FAN NOZZLES - APE**

(Reference values for a distance between nozzles of 50 cm) Value – Flow Rate (l/ha)

Colour	Pressure	Flow rate	Tractor speed km/h								
			Nozzle	bar	l/m	4	6	8	10	12	14
Yellow	2	<b>0.49</b>	148	99	74	59	49	42	37	33	30
	2.5	<b>0.55</b>	166	111	83	66	55	47	42	37	33
	3	<b>0.61</b>	182	121	91	73	61	52	45	40	36
	3.5	<b>0.65</b>	196	131	98	79	65	56	49	44	39
	4	<b>0.70</b>	210	140	105	84	70	60	53	47	42
	4.5	<b>0.74</b>	223	148	111	89	74	64	56	49	45
	5	<b>0.78</b>	235	157	117	94	78	67	59	52	47
Orange	2	<b>0.69</b>	208	139	104	83	69	59	52	46	42
	2.5	<b>0.77</b>	232	155	116	93	77	66	58	52	46
	3	<b>0.85</b>	255	170	127	102	85	73	64	57	51
	3.5	<b>0.92</b>	275	183	138	110	92	79	69	61	55
	4	<b>0.98</b>	294	196	147	118	98	84	74	65	59
	4.5	<b>1.04</b>	312	208	156	125	104	89	78	69	62
	5	<b>1.10</b>	329	219	164	131	110	94	82	73	66
Red	2	<b>0.99</b>	297	198	148	119	99	85	74	66	59
	2.5	<b>1.11</b>	332	221	166	133	111	95	83	74	66
	3	<b>1.21</b>	364	242	182	145	121	104	91	81	73
	3.5	<b>1.31</b>	393	262	196	157	131	112	98	87	79
	4	<b>1.40</b>	420	280	210	168	140	120	105	93	84
	4.5	<b>1.48</b>	445	297	223	178	148	127	111	99	89
	5	<b>1.57</b>	470	313	235	188	157	134	117	104	94
Green	2	<b>1.40</b>	420	280	210	168	140	120	105	93	84
	2.5	<b>1.57</b>	470	313	235	188	157	134	117	104	94
	3	<b>1.71</b>	514	343	257	206	171	147	129	114	103
	3.5	<b>1.85</b>	556	370	278	222	185	159	139	123	111
	4	<b>1.98</b>	594	396	297	238	198	170	149	132	119
	4.5	<b>2.10</b>	630	420	315	252	210	180	158	140	126
	5	<b>2.21</b>	664	443	332	266	221	190	166	148	133

Colour	Pressure Nozzle	Flow rate bar	Tractor speed km/h								
			4	6	8	10	12	14	16	18	20
Turquoise	2	1.69	507	338	253	203	169	145	127	113	101
	2.5	1.89	567	378	283	227	189	162	142	126	113
	3	2.07	621	414	310	248	207	177	155	138	124
	3.5	2.24	671	447	335	268	224	192	168	149	134
	4	2.39	717	478	359	287	239	205	179	159	143
	4.5	2.53	760	507	380	304	253	217	190	169	152
	5	2.67	802	534	401	321	267	229	200	178	160
Blue	2	1.98	594	396	297	238	198	170	148	132	119
	2.5	2.21	664	443	332	266	221	190	166	148	133
	3	2.42	727	485	364	291	242	208	182	162	145
	3.5	2.62	786	524	394	314	262	224	196	175	157
	4	2.80	840	560	420	336	280	240	210	187	168
	4.5	2.97	891	594	445	356	297	255	223	198	178
	5	3.13	939	626	470	376	313	268	235	209	188
Grey	2	2.79	836	557	418	334	279	239	209	186	167
	2.5	3.11	934	623	467	374	311	267	234	208	187
	3	3.41	1024	682	512	409	341	292	256	227	205
	3.5	3.69	1106	737	553	442	369	316	276	246	221
	4	3.94	1182	788	591	473	394	338	296	263	236
	4.5	4.18	1254	836	627	501	418	358	313	279	251
	5	4.41	1322	881	661	529	441	378	330	294	264
Black	2	3.95	1184	789	592	473	395	338	296	263	237
	2.5	4.41	1323	882	662	529	441	378	331	294	265
	3	4.83	1450	966	725	580	483	414	362	322	290
	3.5	5.22	1566	1044	783	626	522	447	391	348	313
	4	5.58	1674	1116	837	670	558	478	419	372	335
	4.5	5.92	1776	1184	888	710	592	507	444	395	355
	5	6.24	1872	1248	936	749	624	535	468	416	374

Colour	Pressure	Flow rate	Tractor speed km/h								
			Nozzle	bar	l/m	4	6	8	10	12	14
Ivory	2	<b>5.61</b>	1684	1123	842	674	561	481	421	374	337
	2.5	<b>6.28</b>	1883	1255	942	753	628	538	471	418	377
	3	<b>6.88</b>	2063	1375	1031	825	688	589	516	458	413
	3.5	<b>7.43</b>	2228	1485	1114	891	743	637	557	495	446
	4	<b>7.94</b>	2382	1588	1191	953	794	681	596	529	476
	4.5	<b>8.42</b>	2526	1684	1263	1011	842	722	632	561	505
	5	<b>8.88</b>	2663	1775	1332	1065	888	761	666	592	533
White	2	<b>7.82</b>	2376	1584	1188	950	792	679	594	528	475
	2.5	<b>8.85</b>	2656	1771	1328	1063	885	759	664	590	531
	3	<b>9.70</b>	2910	1940	1455	1164	970	831	727	647	582
	3.5	<b>10.48</b>	3143	2095	1571	1257	1048	898	786	698	629
	4	<b>11.20</b>	3360	2240	1680	1344	1120	960	840	747	672
	4.5	<b>11.88</b>	3564	2376	1782	1426	1188	1018	891	792	713
	5	<b>12.52</b>	3757	2504	1878	1503	1252	1073	939	835	751

**CERAMIC TURBULENCE NOZZLES - ATR**

Value – flow rate (l/m)

Pressure bar	Nozzle 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 NOZZLES (PADS) - ATR**

VALUE - FLOW RATE (L/M)

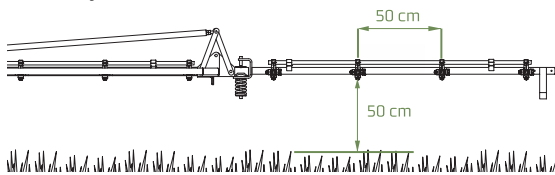
Pressure	Nozzle - mm				
bar	1	1,2	1,5	1,8	2
5	1,1	1,5	2,4	4	5
8	1,3	1,7	2,9	4,6	5,6
10	1,5	2	3,3	5,1	6,3
12	1,7	2,3	3,8	5,6	6,9
15	1,9	2,7	4,3	6,3	7,7
18	2,1	3	4,8	6,9	8,5
20	2,3	3,2	5,1	7,2	8,8
25	2,5	3,6	5,6	8,2	10
30	2,8	3,9	6,2	8,9	11
40	3,3	4,8	7,5	10,8	13,4
50	3,8	5,6	8,8	12,6	15,5
60	4,3	6,3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



# TREATMENT WITH BOOMS

## CHAP10

In treatments for soil or crops with horizontal booms, the height of the boom with regard to the soil or top of the crop shall be proportional to the spacing between jets.



With tree crops the vertical boom jets shall be adjustable and orientable in such a way as to allow the correct directioning of the spray liquid.

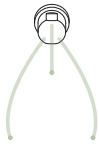


### TAKE CARE!

The transport and/or handling of some items of equipment to be used such as medium or large weed control booms may cause accidents owing to the accidental contact with lines carrying electrical current or owing to the impact with vehicles, animals and people.

## TYPES OF NOZZLES

**3-Wire Nozzles**



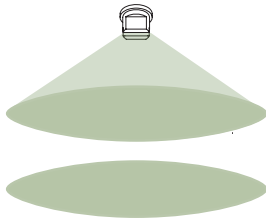
**Turbulence Nozzles**



**Ceramic Pad  
Nozzle**



**Flooding Nozzle**



**Fan Nozzle**





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# TYPES OF NOZZLES

# CHAP11

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The correct choice of nozzles obeys the following criteria:

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

**Insecticides and Fungicides** - Vine, Potato, Melon, Tomato etc.

Vertical or horizontal booms equipped with turbulence nozzles.  
Working pressures falling between 1 and 30 bar.

**Herbicides** - Maize, Wheat, Rye, etc.

Horizontal booms equipped with fan nozzles.  
Working pressures falling between 1 and 5 bar.

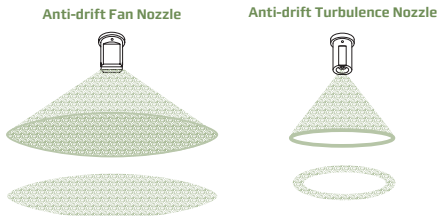
**Liquid Manures**

Vertical and horizontal booms equipped with fan, flooding or 3 wire nozzles.  
Working pressures falling between 1 and 5 bar.

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## NOZZLES WITH ANTI-DRIFT SYSTEM



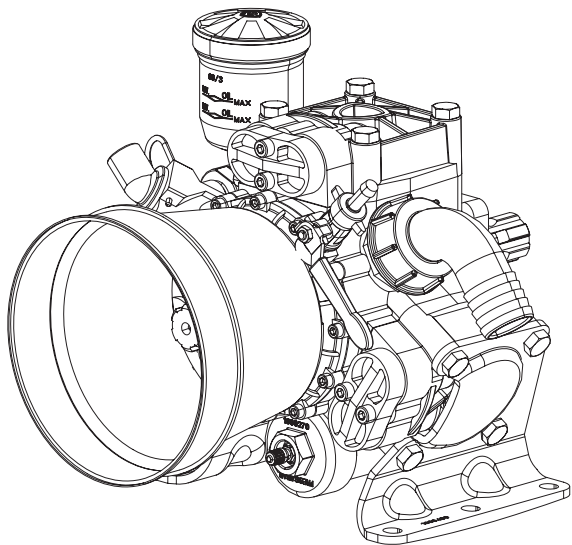
This innovative systems facilitates the application of phytodrugs at places where there is wind of over 6 m/s and the consequent dragging of droplets.

It consists of the aspiration of the atmospheric air by way of a “Venturi” suction system, then mixing it in an inner chamber, thereby producing large drops loaded with small air bubbles which “explode” into numerous droplets impacting the soil or plant and thereby avoiding drifting.



Applications with fan nozzles are carried out at pressures falling between 1 and 7 bar.

Applications with turbulence nozzles are carried out at pressures falling between 5 and 25 bar.



# PUMPS

# CHAP12

## MANUTENÇÃO E UTILIZAÇÃO



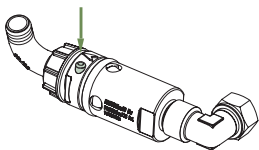
### TAKE CARE!

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.

**It is expressly forbidden to use the pump with the following products:**

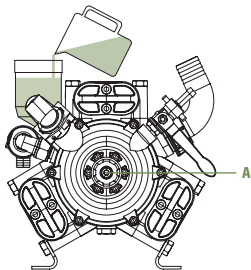
1. Liquids with temperatures of over 40°.
2. Inflammable liquids of any type.
3. Liquids containing solid or granulated products.
4. Food liquids for animals and people.
5. Gases of any kind.
6. Mixtures of non-compatible chemicals.
7. Fuel or lubricants of any kind.
8. Liquid manure with dense floes.
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.

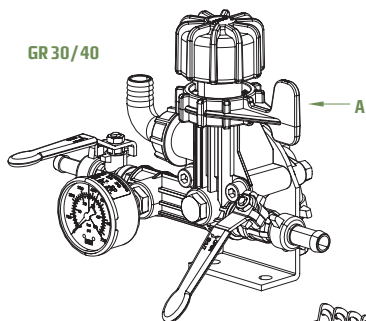
The oil (SAE 20W / 40) shall be changed every 500 working hours and its level shall be controlled on a regular basis.



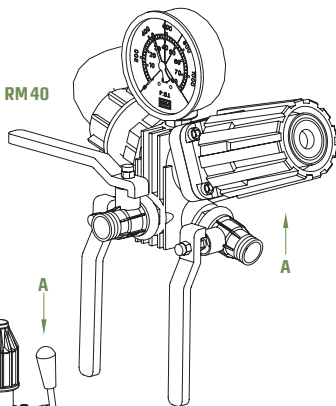
**TAKE CARE!**

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.

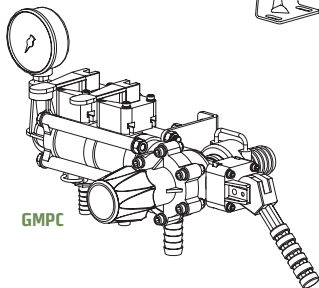
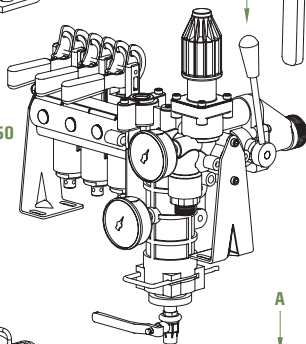
GR 30/40



RM 40

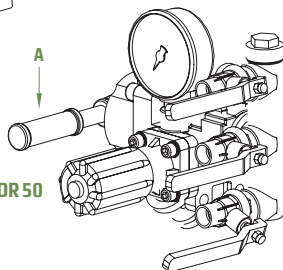


Reagal V50



GMPC

VDR 50





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# THE CONTROLS

# CHAP13

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## **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 boom sectors in line with the need to alter the spraying or weed control 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 REGAL CONTROL V50 – 3V/5V**

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 each sector valve.
2. Untighten the pressure regulating valve, open the sector valves, pushing the respective levers forward in the opposite position to the discharge solder which connects to the tank.
3. Place the pressure cancellation lever in the horizontal position and take the pump to the operating system (+- 450 rpm at the PTO) required for the powering of the boom nozzles and adapted to the speed which we have established to carry out the treatment.
4. Place the pressure / by-pass lever in the vertical position and adjust the pressure, activating the respective regulator, with all the outlet valves for the sectors open, until achieving that figure established previously.
5. If the control has a filter, the working pressure shall appear on the manometer thereof.

- 
6. Commence calibration with a boom sector, rotating 180° until the latter closes.

The pressure will increase.

Then untighten the calibration regulator placed on the valve, obliging the pressure to fall until the pressure lowers to the pre-established value.

Repeat the same operation for all the valves (3 or 5) until achieving the pressure established.

The calibration of the equipment has been carried out.

Opening or closing one or more sectors of the boom, this shall maintain the working pressure established in the sectors which have remained open.

### **CALIBRATION OF THE GMP - 2V/3V CONTROL**

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 system (+- 450 rpm at the PTO) required for the powering
-

of the boom nozzles and adapted to the speed which we have established to carry out the treatment.

3. Place the pressure / by-pass lever in the pressure position and adjust the pressure, tightening the respective regulator, with all the outlet valves for the sectors open, until attaining that figure established previously.
4. Commence calibration with a boom sector, closing the respective valve.

The pressure will increase.

Then untighten the calibration regulator placed on the front of the valve, obliging the pressure to fall until it lowers to the pre-established value.

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 one or more sectors of the boom, this shall maintain the working pressure established in the sectors which have remained open.

In this regard, at the same speed and considering a variation in the rotation of the tractor, the amount of liquid per hectare (volume) distributed shall be correct, always considering a variation of +-10% already considered in the preparation by the phytodrug manufacturer.

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To alter the working pressure, just press on the main pressure regulator without repeating the calibration.

**TAKE CARE!**

**The working pressure displayed on the manometer is not the same as that at the nozzle outlet.**

Any loss in load caused by the piping distances as far as the end of the boom shall require an increase in pressure on the regulator until the pressure on the nozzle is that desired.

ROCHA has at its disposal a pressured measurement system adapted to the nozzle holder.

Consulting the nozzle flow rate table we are using, we then need to check whether the discharge thereof is correct, using, to this end, a calibration recipient which is easy to acquire.

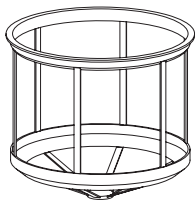
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# FILTERS

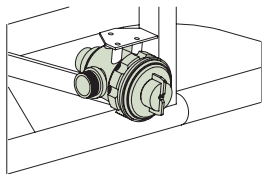
# CHAP14

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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

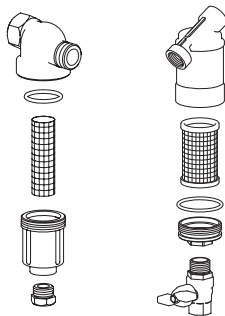
The aspiration filter shall be cleaned before each spraying

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 booms or turbine sectors, dismantle the cartridges and rinse them in clean water until removing all the impurities.



Line Filters



# SAFETY STANDARDS

# CHAP15

## 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.

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## MANDATORY SIGNS



READING  
THE USER MANUAL  
IS MANDATORY



BODY  
PROTECTION  
MANDATORY



HAND  
PROTECTION  
MANDATORY



C30730071

HAND  
WASHING  
MANDATORY



EAR  
PROTECTION  
MANDATORY



PROTECTION OF  
RESPIRATORY PASSAGES  
MANDATORY

## PROHIBITION SIGNS



NOT  
DRINKING WATER



NO  
THOROUGHFARE



NO  
SMOKING



C30730071

NO  
ENTERING  
THE TANK



NO REPAIRING,  
CLEANING OR LUBRICATING  
THIS MACHINE  
IN OPERATION



NO  
REMOVING  
MACHINE  
PROTECTIONS

## DANGER SIGNS



VARIOUS HAZARDS



DANGER OF TWISTING,  
ROLLING AND  
GETTING TANGLED UP  
ON TRANSMISSION



MAXIMUM PRESSURE  
OF CIRCUIT - 50-40-30



FREQUENCY AND  
DIRECTION OF ROTATION



# PROCEDURES TO BE FOLLOWED AFTER PROLONGED INACTIVITY

## CHAP16

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



# PERIODIC MAINTENANCE CHAP18

<b>OPERATIONS CARRIED OUT BY THE OPERATOR.</b>				
<b>OPERATION</b>	<b>DAILY</b>	<b>WEEKLY</b>	<b>MONTHLY</b>	<b>ANNUAL</b>
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				

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**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.**