

CROPLANDS

OPERATORS MANUAL **CROPAIR 300/600**

WWW.CROPLANDS.COM.AU

STOP

BEFORE COMMENCING
operation, **ENSURE** you read
& understand this manual, its
contents, and any additional
information supplied.



INTRODUCTION

GENERAL MANAGER'S WELCOME



Sean Mulvaney
General Manager

Dear Customer

Congratulations on the purchase of your new Croplands Sprayer. Croplands have been in the business of building sprayer equipment since 1972. For over 49 years we have been supplying sprayers to farmers, contractors, growers and all our customers involved in growing crops and in the control of pests and diseases.

Croplands is a wholly owned subsidiary of Nufarm Ltd, the largest supplier of crop protection chemicals for Australasia, and one of the fastest growing global suppliers world-wide.

At Croplands, we pride ourselves on our commitment to supplying machinery that is at the forefront of the industry's needs. We believe we can back up our products and through

constant research and development, bring to you the best equipment you can find.

We welcome any feedback from you about our equipment.

On the back cover you will find our contact details, and locations where our staff can be reached during business hours. After hours, you can email us and expect a reply the following morning.

Please read this manual in its entirety before you operate your sprayer. This will ensure you have a trouble free start up.

We trust you will get years of good use from your Croplands Sprayer.

Yours Sincerely

Sean Mulvaney
General Manager

Croplands has taken steps to ensure this operator's manual is as current and as accurate as possible. Due to the ever-changing markets of cropping and farming, Croplands is constantly striving to be at the forefront of innovation and technology. While the information in this manual is considered accurate at the time of writing, Croplands reserves the right to change this information without notice. Croplands will not accept liability for any inaccuracy in this publication, or changes forthwith.

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SECTION 1

IMPORTANT INFORMATION

ABOUT THIS MANUAL

This manual provides assembly, setting up, operating and maintenance instructions for the Croplands Cropair range of sprayers.

In addition to this manual, the sprayer will be delivered with the Croplands General Safety Manual (GP-SAFE-A) and where applicable the controller, pump and PTO manuals.

For details not covered by the manuals, please contact Technical Support on 1300 650 724.

Some features and options explained in this manual may not be installed on your sprayer.

Please pass on this manual with the sprayer at the time of resale for usage by the new owner.

This manual, HT-OMCROPAIR-A, was first published in October 2021.

Check online as there may be more recent revisions of this manual. www.croplands.com.au

NOTE

To convey useful operating information.



WARNING

To stress potential dangers and the importance of personal safety.



CAUTION

To highlight potential injury or machinery damage.



DANGER

Probability of death or serious injury if an accident occurs

TERMINOLOGY

These terms/symbols used throughout this manual:

NOTE

This Note sign is in place to convey useful information and will help you to identify the best possible way to operate the machine.

CAUTION

This Caution sign shows the potential for incident. An incident may include damage to the machine itself, or possible injury to the operator.

WARNING

This warning sign shows the potential for risk or injury and highlights the need for steps to be taken to protect ones safety.

DANGER

This Danger sign will be used in areas where the highest risk is present. Always read the information on these signs and ensure you are taking steps to prevent risk or injury.

BEFORE OPERATING YOUR SPRAYER

Before attempting to use your sprayer, make sure you read all Operator Manuals for this sprayer including but not limited to:

This Operator's Manual, and all other supplied manuals for items such as Pump an PTO etc.

And properly understand:

- All Safety Issues.
- Assembly & Installation instructions.
- Calibration of the sprayer.
- Sprayer Operation.
- Sprayer Maintenance.

SECTION 1

IMPORTANT INFORMATION

WARRANTY POLICY

Each sprayer will be delivered with a Warranty & Pre-Delivery Booklet which includes:

- the Sprayer's unique serial number,
- the Sprayer's specification sheet,
- a pre-delivery checklist and
- outlines the Croplands Warranty policy.

Always contact your Croplands Dealer first and foremost for warranty matters.

NOTE

For full conditions of warranty and warranty policy, please see the Warranty & Pre-Delivery booklet provided with this sprayer.

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**SPRAYER SPECIFICATIONS
WARRANTY & PRE-DELIVERY
HORTICULTURE**

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GP-WARH-A | updated Jan 2021

SECTION 2

SAFETY

SAFETY FIRST

Please read and understand all supplied manuals, guides and safety decals before operating this sprayer. This includes the **Croplands Operators Safety Manual** – as pictured here.

This manual is available on the Croplands Web site, or for printed versions contact Croplands customer support and ask for part number GP-SAFE-A (or later version if available).



SECTION 2

SAFETY

SAFETY SIGNS AND DECALS

All signs and decals for sprayer safety and operation must be maintained in good order and replaced if damaged or missing. Most Croplands labels have a part number printed on the decal to aid identification and replacement.

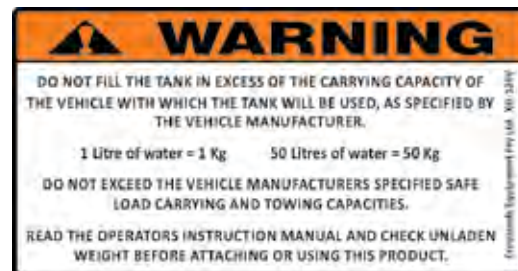
Some examples are shown below.



Part No: XD -123



Part No: XD -125V



Part No: XD -126V



Part No: XD -124V



Part No: XD-182



Part No: XD-175



Part No: XD-122V



Part No: XD -195

SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & GENERAL SPECIFICATION

PRODUCT IDENTIFICATION

Always use the serial number of the Sprayer when requesting service information or when ordering parts.

Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure for specific service operations.

The serial numbers of all controllers, pumps, etc should also be recorded for future reference.



SHIPPING INFORMATION

All provided tie-down points (and more) should be used to help secure the sprayer for transporting.

Weights

HL300/600	=	210 kg empty
	=	540 kg full / overflow
HL600/800	=	tba

GENERAL SPECIFICATION

The Croplands Cropair sprayers featuring Fieni Airblast fans, are available in 2 standard configurations to give the maximum possible spray coverage.

HL300/600

300L tank and frame, fitted with an ARVDR50 Controller as standard, AR503-APC high-pressure pump direct coupled to the fan, Fieni 620mm fan with 9 blades, single-speed gearbox, 3 angled options for pitch, requires 30hp, max spray width of 12m and 5.5m high. 5 nozzle spray rings either side. Nozzles to be selected at the time of ordering, either ATR's or Disc and Cores.

HL600/800

600L tank and frame, fitted with ARVDR50 Controller as standard, AR503-APC high-pressure pump direct coupled to the fan, Fieni 815mm fan with 9 blades, dual-speed

gearbox, 3 angled options for pitch, requires 45hp, max spray width of 14m and 6m high. 7 nozzle spray rings either side. Nozzles to be selected at the time of ordering, either ATR's or Disc and Cores.

Tractor requirements

Power required at the PTO on flat terrain:

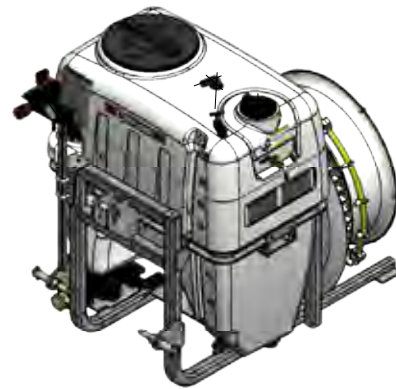
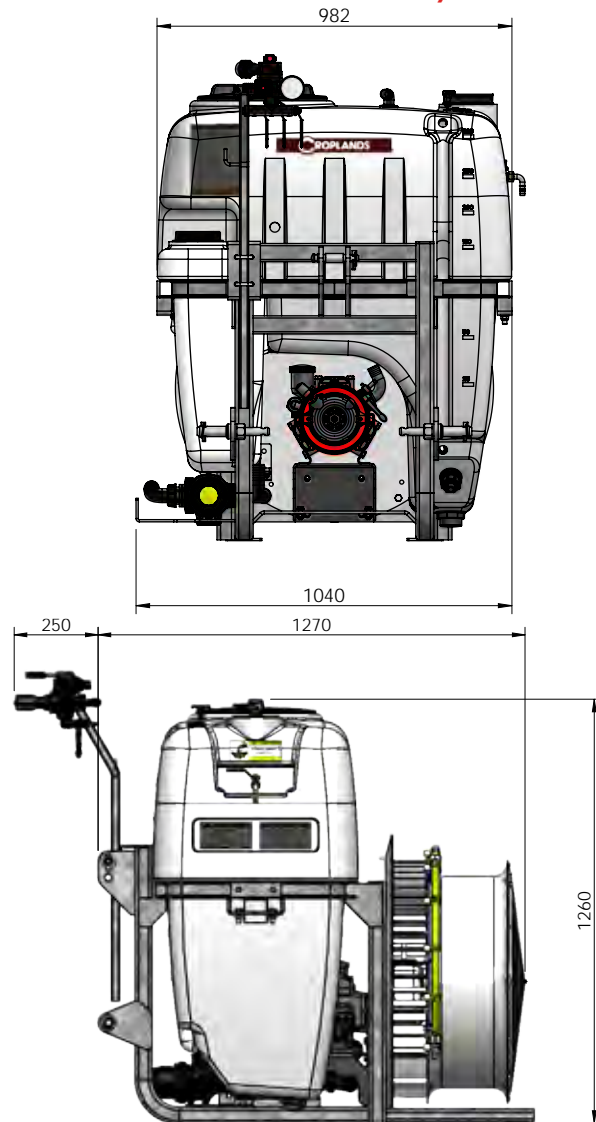
HL300/600	35 ~ 45 HP
HL600/800	50 ~ 60 HP

Category 2 or 3 linkage connections required.

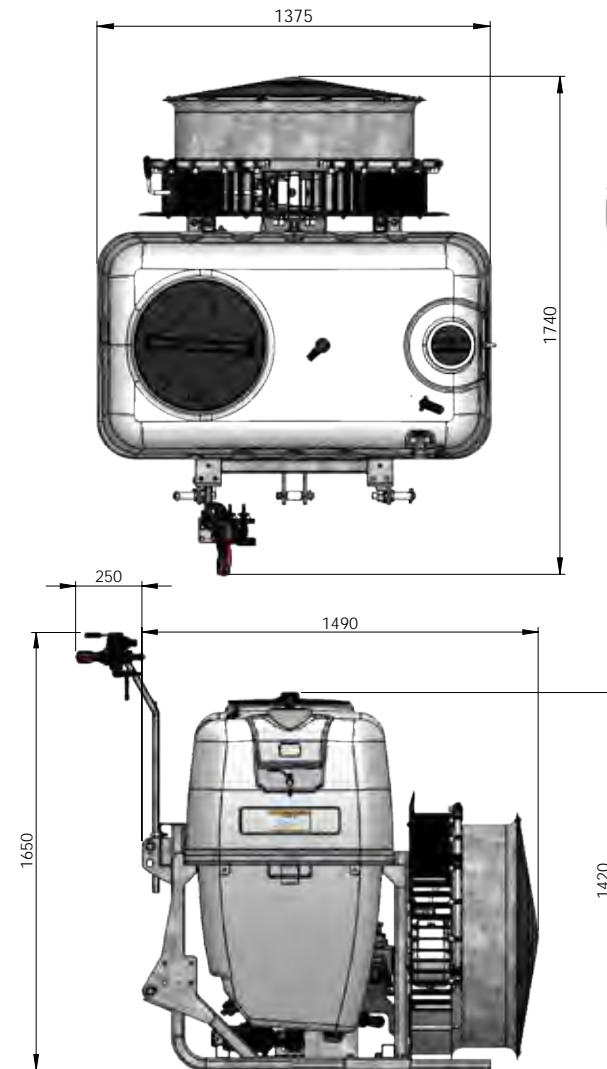
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PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

DIMENSIONS HL300/600



DIMENSIONS HL600/800



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

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SECTION 4

PRODUCT FEATURES / FAMILIARISATION



FIENI “AIRBLAST” FANS

HIGH PERFORMANCE “AIRBLAST” FANS

The Croplands, Cropair air-blast fans are engineered by Fieni, a global leader in agricultural fan design, manufacturing and innovation.

Croplands and Fieni have been collaborating since 1972, and together we set the standard for fan sprayer performance, efficiency, penetration and coverage.

Maximum PTO Speed

Maximum PTO speed is 540 rpm.

Check the tractor PTO RPM before operating the sprayer. More RPM at the PTO can cause damage to the sprayer unit and can be dangerous for the operator.

Fan Pitch

All Cropair Fieni fans have multiple pitch settings and are normally supplied in the middle position.

To maximise performance, the blade pitch can be adjusted to match the tractor's capability / chosen operating parameters such as PTO rpm.

Refer to pages 12, 14 & 26 for more information of changing pitch angles.

Fan Balance

The fan has been supplied balanced. Swapping blades and hub components around risks upsetting the balance. Do not operate with damaged fan blades.

If replacing a damaged blade, it's necessary to balance the fan.

Fan Safety Rules

Fan Guards

The sprayer unit is supplied complete with safety guards for both incoming and outlet air. The assembled guards need to prevent foreign bodies hitting the fan.

NEVER operate the sprayer without these guards in place.

From time to time the incoming air guard may become clogged with leaves etc. Always disengage the fan before removing clogged leaves etc from the guards.

The fan runs at high speed and are capable of ingesting loose objects or clothing or ejecting objects that have been ingested at high speed.

- DO NOT exceed maximum operating rpm (PTO = 540 rpm)
- STAY AWAY from the fan when the tractor is running.
- DO NOT stay in the working area (air inlet or spray outlet) of the sprayer unit.
- Always stay at a safe distance from the machine when it is working/running.

DO NOT remove or modify the installed protections and guards

SECTION 4

PRODUCT FEATURES / FAMILIARISATION

FIENI "AIRBLAST" SPRAY FANS

Fieni 616 mm Fan

The 300 Litre sprayer uses a Fieni VPL series, 9-bladed, 616 mm diameter, pitch adjustable blades driven via the single speed V1N gearbox. Running counter clockwise. No clutch.



Distribution



Y: 5.5 m
Z: 12 m

Capacity

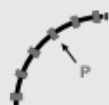


≥ 400 Lt



≥ 600 Lt

Nozzle Holder



5+5

Tractor



≥ 30 HP

Other

Noise @ 7,5 m 94.6 db
Weight 55 kg

The pitch adjustable fan can be set to the following blade angles ...

Blade inclination angle	Volume	Power
26° min	17,878 m ³ /h	9.8 HP
34° medium	22,015 m ³ /h	13.3 HP
42° max	26,200 m ³ /h	15.2 HP

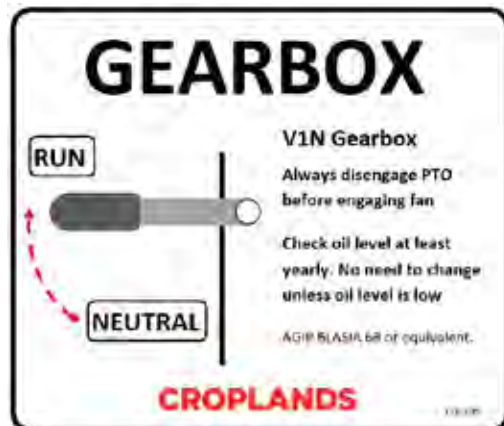
From the factory, the fans are always assembled and tested in the middle pitch setting.

SECTION 4

PRODUCT FEATURES / FAMILIARISATION

The 616mm fan is driven via the Fieni V1N single speed (plus neutral) gearbox, using a 1: 7.36 ratio, with no clutch.

The gearbox lever is used to select run (engaged gear) or neutral. Every unit is fitted with a gearbox information decal.



The 616mm fan uses 2 x nozzle rails (one left and one right) with 5 on/off roll-over nozzles per rail.

Maximum total of 10 nozzles.

Image below shows the 5 nozzles and the gearbox selection lever on the right-hand side.



The nozzle bodies are the twin roll-over type enabling one of 2 nozzles to be selected (pictured below are single ATR's nozzles installed), or an off position as shown below in the horizontal position.



Nozzles to be selected at the time of ordering, either ATR's or Disc and Cores.

Refer to Croplands Buyers Guide for more information on nozzles and nozzle choices.



SECTION 4

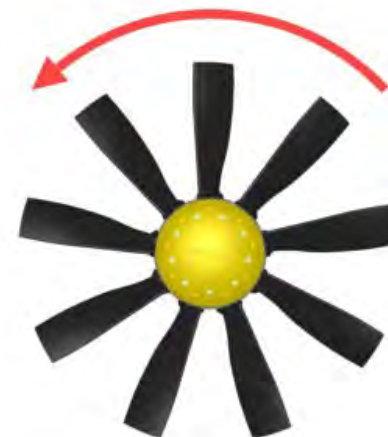
PRODUCT FEATURES / FAMILIARISATION

Fieni 815mm Fan

The 600 Litre sprayer uses a Fieni VPL series, 9-bladed, 815 mm diameter, pitch adjustable blades driven via the dual speed V2C-A gearbox. Running counter clockwise. No clutch.

The pitch adjustable fan can be set to the following blade angles

From the factory, the fans are always assembled and tested in the middle pitch setting.



Distribution



Y: 6 m
Z: 14 m

Capacity



≥ 800 Lt



≥ 1000 Lt

Nozzle Holder



7+7

Tractor



≥ 45 HP

Other

Noise @ 7,5 m 99.5 db
Weight 85 kg

The pitch adjustable fan can be set to the following blade angles ...

Blade inclination angle	Volume	Power
34° min	31,948 m ³ /h	17.5 HP
42° medium	36,800 m ³ /h	27.0 HP
50° max	39,200 m ³ /h	35.4 HP

From the factory, the fans are always assembled and tested in the middle pitch setting.

SECTION 4

PRODUCT FEATURES / FAMILIARISATION

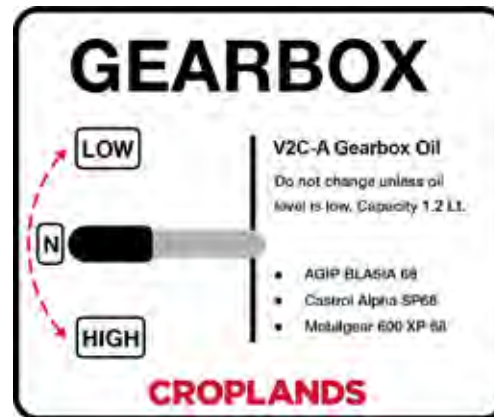


The 815 mm fan is driven via the Fieni V2C-A two single speed (plus neutral) gearbox, with no clutch.

The gearbox lever is used to select run (engage low or high gears) or neutral. Every unit is fitted with a gearbox information decal.

Gearbox specifications are:

PTO	540 rpm
Power	45 HP
Weight	5 kg
Ratio 1	1:3.50
Ratio 2	1:4.00



The 815mm fan uses 2 x nozzle rails (left and right) with 7 on/off roll-over nozzles per rail. Maximum total of 14 nozzles.

The nozzle bodies are the twin roll-over type enabling one of 2 nozzles to be selected (pictured below are single ATR's nozzles installed), or an off position as shown below in the horizontal position.

Nozzles to be selected at the time of ordering, either ATR's or Disc and Cores.

Refer to Croplands Buyers Guide for more information on nozzles and nozzle choices.

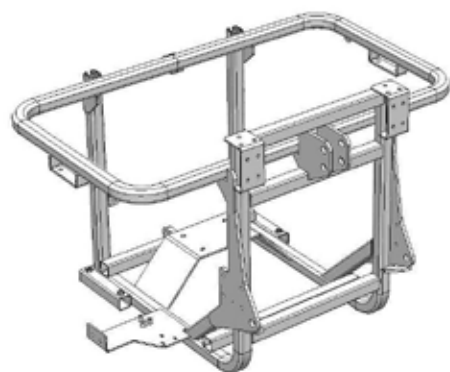


SECTION 4

PRODUCT FEATURES / FAMILIARISATION

CHASSIS / FRAME

Heavy-duty, hot-dipped galvanised frame.



The 600 Lt frame has an optional slide out rear parking legs.



LINKAGE CONNECTIONS

3-point hitch to suit Categories I and II tractor linkage connections.

Both models have Cat II for the lower linkage arms, and Cat I for the top link with a sleeve if your tractor has Cat II.



PUMP & PTO

All models are fitted with an Annovi Reverberi AR503-APC high pressure, positive displacement triple diaphragm pump with a capacity of 54 L/min.

Pump directly (through) coupled to the fan's gearbox.

A PTO shaft is supplied to drive the pump.

A separate pump manual is supplied with every unit.

TANKS, LIDS, SIGHT GAUGES, SUMP & DRAIN

The HL300/600 uses a 300 Litre Main tank, 40 Litre Flushing tank, and a 10 Litre Hand wash tank.



The HL600/800 uses a 600 Litre Main tank, 80 Litre Flushing tank, and a 15 Litre Hand wash tank.

All tanks are constructed of natural / translucent impact-resistant, UV stabilised polyethylene.

SECTION 4

PRODUCT FEATURES / FAMILIARISATION

THE MAIN TANKS FEATURE ...

- A large lid with a mixing basket. Fill is via the lid / basket only.



- Calibrated sight tube, with coloured float for level indication.



- A Pull Drain Valve is positioned at the base of the sump (blue arrow) for simple, fast and complete drainage.



THE FLUSHING TANKS

are accessed on the right-hand side of the sprayer. For use with freshwater only. Fill via the lid.



THE HAND-WASH TANKS

Dovetail into the main tank on the left-hand side of the sprayer. For use with freshwater only. Fill via the lid.

It's suggested to always keep some water in these tanks to prevent them from bouncing out in transit.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

Agitation

The agitation system is driven by the pump via single venturi tank agitator (**red arrow** on previous page) which can be turned on or off at the control manifold (refer to photo below), plus bypass agitation (**yellow arrow** on previous page) which is active at all times the pump is operating.



Shown in the off position

Filtration

- Lid-strainers / chemical mixing baskets are standard on all models. Refer to previous page.
- Large suction filter, featuring a shut-off valve which enables the filter to be cleaned even with a full tank (refer to red valve release knob in photos below).

Equipped with a 50 mesh filter screen.



Controls

- Tank selection ball valve (select Main or Flushing tanks).



- AR VDR50 2 way controller.

The controller features a very simple on / off lever combined with pressure adjustment knob and pressure gauge. Bypass line plumbed to tank for agitation.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

Pressure is adjusted by rotating the central red knob. Rotate clockwise to increase pressure.

Normal operating pressures are 8 ~ 15 bar.

Maximum recommended pressure is 20 bar.



3 individual outputs with shut-off taps for left spray ring, right spray ring and agitation.

Shown below with master switch on (far left) and all taps on (far right). No pressure shown as the pump is not running.



Factory fitted options

- I-S4021, electric in-cab controller with switch box. 2-section high-pressure electric valves for individual left/right shutoff, electric pressure regulating valve and a master on/off can all be operated from the switch box in the cab. Requires a reliable 12V power supply.

Comes with an 8-page manual.



- The 600 Lt Frame has optional Slide-out feet for extra stability when parked on the ground.



- The 600 Lt Frame has an optional Fold down step for access to the lid or



Sprayer specifications are subject to change without prior notification

SECTION 5

PRE-OPERATION

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SECTION 5

PRE-OPERATION

From arrival on farm, hook up and prepare the sprayer for operation.

SAFETY FIRST

Before progressing further,

- Read and understand the Safety Manual (part no. GP-SAFE-A) supplied with this sprayer.
- Read and understand this manual to better familiarise yourself with the sprayer.
- Ensure the tractor to be used to tow this sprayer is suitable to handle the loads. If in doubt consult the tractor dealer/manual.

HOOK UP

The Cropair Sprayer has been fully tested before leaving the Croplands factory. Some components will require further assembly after shipping from the factory/dealer;

1. Adjust and fit the 3-point linkage to the tractor
2. Connect the PTO shaft to the tractor
3. Fit the controller (if applicable).

Always park the sprayer in a horizontal position and on firm, level ground.

Connecting to the tractor

Croplands Cropair sprayers suit Categories I and II tractor linkage connections.

300 & 600 litre models have Cat II for the lower linkage arms, and Cat I for the top link with a sleeve if your tractor has Cat II.

Linkage connection

Lower the tractor linkage arms and attach the sprayer's lower hitch pins, using the suitable category for your setup. Fit the locking pin clips.

Lift the tractor linkage up to the level you wish to spray at. Now you can adjust the length of the top linkage arm to level the sprayer.

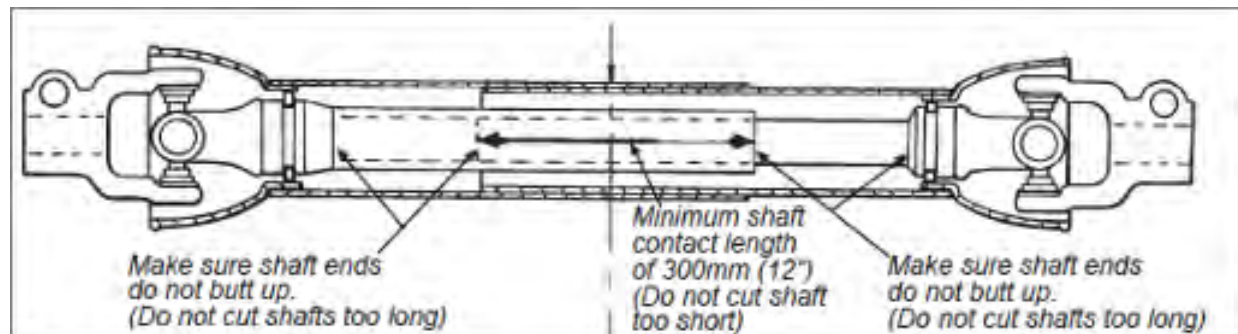


WARNING

Always ensure the tractor PTO is disengaged before attempting to hook up the PTO shaft!

NOTE

Your Croplands sprayer dealer is responsible for correctly setting and installing the supplied PTO shaft for the first time it is set up. This can involve cutting the shaft to length to ensure correct, safe operation.



SECTION 5

PRE-OPERATION

PTO Shaft – for new fitting

A new standard-length PTO shaft is supplied with the sprayer. In most cases, this will require cutting to a shorter length specific to the tractor & sprayer dimensions.

Follow the instructions below to fit the PTO shaft onto the sprayer after transit. For new installations, the dealer will oversee the fitting of the new shaft.

Also, refer to the PTO user manual that is supplied with every new PTO shaft.

- Remove the PTO shaft which is usually delivered strapped to the sprayer's frame. Check the PTO shaft has not been damaged in transit.
- Grease the universal joints, telescoping shafts & safety cover bushes.
- Measure and fit the PTO to the sprayer ensuring the locking pin is correctly located.

Cutting the PTO shaft to length requires knowledge of this procedure. If you have not carried out this procedure before, ensure your dealer carries out this important step.

- Before operating the drive shaft, be sure that all safety guards are in place & safety chains are securely fitted (refer to PTO Manual).
- Do not exceed the maximum RPM of the pump or gearbox (540 RPM).

Manual Controller

The standard manual controller has been fitted and adjusted at the factory. It is fully self-contained on the sprayer and requires no further hookup.

Electric Controller (optional)

The controller has been fitted and adjusted at the factory but has been disconnected and packed for transit.

Follow the controller's manual for instructions on connecting to a suitable (tractor) power source.

Find a suitable position on the tractor / within the cab for the control switchbox.



Nozzles

Check and / or fit the chosen nozzles to the unit.

For more information on nozzle availability, check out the Croplands Buyers Guide nozzle section or the Nufarm SprayWise Hort book (also refer to Section 7)

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NOZZLE SELECTION

DISCS & CORES

NOZZLES - DISCS AND CORES

NOZZLE	TYPE AND DESCRIPTION	SAMPLE ORDER CODE	TYPE	SIZE RANGE, MATERIAL	\$ (EX. GST)	\$ (INC. GST)	PROL. CAT.
	Disc and Core Jets: • Full and hollow cone spray patterns • Medium to fine droplets for use in air assisted situations • 5-20 bar recommended range						
AZ-AD4			Disc	• 1 to 7 • Pink ceramic	3.00	3.30	C
AZ-AC35			Core	• 13 to 56 • Pink ceramic	11.00	12.10	C

DISC AND CORE ALBUZ CERAMIC - FLOW RATES

		ORIFICE		L/MIN							ANGLES	
DISC SIZE	CORE SIZE	DIAMETER	3 BAR	4 BAR	5 BAR	6 BAR	10 BAR	15 BAR	20 BAR	10 BAR	20 BAR	
AD 1	AC 3	0.8	0.24	0.27	0.3	0.33	0.41	0.49	0.56	70°	80°	
AD 2	AC 10	1.00	0.31	0.36	0.39	0.42	0.53	0.64	0.73	70°	80°	
AD 3	AC 13	1.2	0.36	0.41	0.45	0.49	0.61	0.74	0.84	80°	90°	
AD 4	AC 13	1.56	0.45	0.52	0.57	0.62	0.76	0.93	1.06	90°	100°	
AD 5	AC 13	2	0.55	0.62	0.68	0.75	0.94	1.13	1.29	100°	100°	
AD 1	AC 23	0.8	0.28	0.32	0.35	0.38	0.48	0.57	0.65	80°	74°	
AD 2	AC 23	1.00	0.37	0.43	0.47	0.51	0.64	0.77	0.88	80°	74°	
AD 3	AC 23	1.2	0.44	0.51	0.56	0.61	0.76	0.92	1.04	84°	82°	
AD 4	AC 23	1.56	0.56	0.64	0.71	0.77	0.97	1.16	1.32	90°	88°	
AD 5	AC 23	2	0.72	0.82	0.91	0.99	1.24	1.49	1.7	90°	90°	
AD 6	AC 23	2.4	0.85	0.97	1.07	1.16	1.46	1.75	2	90°	100°	
AD 1	AC 25	0.8	0.41	0.46	0.51	0.55	0.7	0.84	0.95	80°	80°	
AD 2	AC 25	1.00	0.56	0.67	0.74	0.8	1.01	1.21	1.38	85°	88°	
AD 3	AC 25	1.2	0.72	0.81	0.9	0.98	1.23	1.48	1.68	87°	89°	
AD 4	AC 25	1.56	1.00	1.16	1.28	1.39	1.75	2.1	2.39	90°	90°	
AD 5	AC 25	2	1.41	1.6	1.77	1.95	2.42	2.9	3.3	92°	80°	
AD 6	AC 25	2.4	1.75	1.97	2.18	2.37	2.98	3.57	4.07	92°	80°	
AD 7	AC 25	2.8	2.07	2.36	2.61	2.83	3.57	4.36	4.97	90°	91°	
AD 1	AC 40	0.8	0.48	0.55	0.61	0.66	0.83	1	1.14	92°	80°	
AD 2	AC 40	1.00	0.75	0.85	0.92	1	1.26	1.51	1.72	90°	90°	
AD 3	AC 40	1.2	0.92	1.05	1.16	1.26	1.58	1.91	2.16	94°	90°	
AD 4	AC 40	1.56	1.35	1.54	1.7	1.85	2.32	2.79	3.17	94°	90°	
AD 5	AC 40	2	1.80	2.19	2.42	2.63	3.31	3.97	4.52	94°	90°	
AD 6	AC 40	2.4	2.46	2.79	3.09	3.36	4.22	5.07	5.77	92°	79°	
AD 7	AC 40	2.8	3.01	3.43	3.79	4.11	5.16	6.21	7.07	90°	80°	
AD 1	AC 40	0.8	0.55	0.62	0.68	0.75	0.94	1.13	1.29	23°	22°	
AD 2	AC 40	1.00	0.80	1.05	1.16	1.26	1.58	1.91	2.16	20°	20°	
AD 3	AC 40	1.2	1.2	1.37	1.51	1.64	2.08	2.46	2.82	20°	20°	
AD 4	AC 40	1.56	2.03	2.32	2.56	2.78	3.5	4.2	4.9	20°	20°	
AD 5	AC 40	2	3.11	3.54	3.91	4.24	5.34	6.41	7.3	20°	20°	
AD 6	AC 40	2.4	4.12	4.69	5.16	5.62	7.08	8.49	9.67	40°	40°	
AD 7	AC 40	3.200	5.49	6.40	7.10	7.66	10.16	12.43	14.33	30°	30°	
AD 1	AC 31	0.8	0.53	0.61	0.67	0.73	0.92	1.1	1.25	70°	80°	
AD 2	AC 31	1.00	0.82	0.95	1.05	1.12	1.41	1.69	1.92	87°	90°	
AD 3	AC 31	1.2	0.97	1.12	1.23	1.31	1.61	1.91	2.19	90°	90°	
AD 1	AC 35	0.8	0.53	0.61	0.67	0.73	0.92	1.1	1.25	70°	80°	
AD 2	AC 35	1.00	0.82	1.05	1.16	1.26	1.58	1.9	2.16	20°	30°	
AD 3	AC 35	1.2	1.28	1.46	1.61	1.75	2.24	2.64	3	44°	42°	
AD 4	AC 35	1.56	2.08	2.37	2.62	2.84	3.58	4.3	4.89	43°	77°	
AD 5	AC 35	2	2.62	2.98	3.3	3.58	4.51	5.41	6.19	33°	34°	
AD 6	AC 35	2.4	3.08	3.5	3.91	4.24	5.28	6.37	7.3	30°	30°	
AD 7	AC 35	2.8	3.58	4.06	4.46	4.81	5.98	7.15	8.14	42°	40°	
AD 1	AC 36	1.2	1.19	1.36	1.5	1.63	2.05	2.46	2.8	70°	80°	
AD 2	AC 36	1.56	2.05	2.33	2.58	2.8	3.52	4.23	4.81	30°	38°	
AD 3	AC 36	1.9	2.46	2.8	3.16	3.43	4.36	5.16	5.87	41°	40°	
AD 4	AC 36	2.3	3.01	3.43	3.85	4.19	5.28	6.37	7.3	30°	30°	
AD 5	AC 36	2.7	3.58	4.06	4.46	4.81	5.98	7.15	8.14	42°	40°	
AD 6	AC 36	3.1	4.12	4.69	5.16	5.62	7.08	8.49	9.67	30°	30°	
AD 7	AC 36	3.5	4.69	5.31	5.87	6.37	7.98	9.59	11.1	30°	30°	

NOZZLES & CAPS

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SECTION 5

PRE-OPERATION

CONFIRMING SPRAYER FUNCTIONALITY

After the sprayer is hooked up correctly to the tractor, it's advised that a freshwater test be done to check for leaks and to familiarise the operator(s) with the sprayer.

These checks have been conducted in the factory prior to shipping, however, there is a chance that transit could have loosened some fittings.

Running the machine with fresh water is a good safe way to calibrate, learn about the sprayer and set the sprayer to maximise results in the field.

1. Check that nothing is loose or damaged
2. Check all fittings are tight
3. Check pump oil levels (refer to pump manual for more detail)
4. Check PTO and fan guards are in place
5. Add some fresh water to all the tanks, with at least 100 litres in the main tank



6. Select the water source from MAIN tank.
7. Make sure the Fan (gearbox) is in the neutral position (refer to page 13 & 15).
8. Ensure all spray function controls are in the off position and with a low-pressure setting. Whilst the pressure has been set at the factory (normally 5 ~ 6 turns open), there is no guarantee it hasn't been altered. To be safe, turn the pressure knob out ½ of a turn.



9. Power up the tractor (brakes on) and engage the PTO - no need for full power at this stage, set to say 350rpm.



At this stage the pump will be drawing from the main tank and bypassing the pressure regulator / controller straight back to the tank via the return hose (yellow arrow).



10. To activate the spray controls, turn on the pressure manifold (main side lever down).

Adjust the red knob to change the pressure. The photo shows 8 bar which is ideal for start-up testing. Maximum = 20 bar.



SECTION 5

PRE-OPERATION

11. Cycle through all 3 taps for Left and Right Spray Rings plus the Agitator. All are shown below in the ON position. Check that all functions are operating correctly.



12. With all taps on, set the PTO speed to the intended operational speed (usually between 450 ~ 540 rpm) and adjust (red knob) the spray pressure to the intended spray pressure.

NOTE

It's useful to find the lowest rpm at which the PTO can operate and still deliver the chosen spray volume and pressure. Note that below this point there will not be any bypass flow back to the tank to aid with tank agitation. If the PTO speed is significantly above the minimum required there will be a risk of tank chemical foaming from excessive agitation.

Repeat the process while drawing fresh water from the Flushing tank.



Note this test should not be done with a full main tank as it can overflow the main tank.

After shutdown, check & clean the filter (refer to page 18).



CONFIRMING FAN FUNCTIONALITY

The maximum allowed PTO speed is 540 rpm

DO NOT engage or disengage the fan's gearbox whilst the PTO is engaged.

Always disengage the PTO before changing gear (Neutral or Run).

1. Check that nothing is loose or damaged
2. Check all fittings are tight
3. Check the gearbox oil level before starting



4. Check PTO and Fan guards are in place.
5. Engage the fan gearbox to "RUN".

NOTE

Whenever the fan is being run "dry", it's best to have fresh water running through the pump – with the pressure controller in the OFF position allowing water to bypass back to the tank.

SECTION 5

PRE-OPERATION

6. For the initial start-up use low tractor rpm and engage the PTO. Don't "drop the clutch".
7. Check and confirm the fan is running correctly, and only then, gradually increase rpm until the maximum of 540 PTO rpm is achieved.

Check for full range of functionality through the PTO / rpm range.

CONFIRM SPRAYING

Having previously confirmed the functionality of the pressure / spray manifold / controller, now is the time to run with all systems on.

- With the fan running, set the PTO to the intended operational speed.
- Turn on the controller and both spray rings. Confirm or adjust the pressure as required.
- Confirm everything is working correctly.



Note; the additional load of the fan running will require a different power setting from the tractor compared to the spray functionality testing.

Confirm the overall spray effectiveness for the intended purpose as the best results may require a fan blade angle adjustment.

Spraying should be done in consultation with the spray manager / agronomist / someone skilled in the art of spraying. The best setup might vary significantly from crop to crop, season to season, etc.

SHUT DOWN

Use the reverse order to shut down.

- Reduce engine power / slow PTO speed
- Turn off spray rings
- Turn off controller
- Disengage PTO
- Disengage fan gearbox (optional)
- Drain the main tank
- To avoid algae build up in the freshwater tanks, it is recommended these also be drained and refilled just prior to the next spraying job.

The unit is now ready to go spraying.



SECTION 5

PRE-OPERATION

ADJUSTING FAN BLADE ANGLES

FAN ADJUSTMENTS

The Fieni fans have 3-position, pitch (angle) adjustable blades. For example, the 600mm fan offers the below pitch angle settings.

Croplands Cropair units are assembled, tested, and delivered in the medium blade angle setting.

Blade inclination angle	Volume	Power
26° Min	17,878 m ³ /h	9.8 HP
34° Medium	22,015 m ³ /h	13.3 HP
42° Max	26,200 m ³ /h	15.2 HP

A steeper blade angle will deliver a faster more penetrating air stream (compared to a lower pitch angle) at the same rpm, but it will require more power to do. Any change of blade angle needs to consider tractor capabilities.

FAN PITCH ANGLE

All Cropair Fieni fans have multiple pitch settings and are normally supplied in the middle position.

To maximise performance, the blade pitch can be adjusted to match the tractor's capability / chosen operating parameters such as PTO rpm.

To increase the blade angle will increase air (spray) velocity and penetration, increase noise and increase tractor power requirements.

The reverse is true for reducing pitch angles.

Adjusting the pitch angles can be done on the sprayer.

- Disconnect the PTO drive.
- Remove the safety fan guard.
- Remove the hub cover.
- Loosen the fan hub bolts.
- It's now possible to move the blades. All blades need to be set to the same pitch angle.
- Re-tighten the fan hub bolts. Makes sure the hub is snugly fitting back together - if not, it's a sign that one or more of the fan blade splines are not correctly fitted.
- Re-attach the hub cover, and safety guards.

The fan has been supplied "balanced. Swapping blades and hub components around risks upsetting the balance.

Do not operate with damaged fan blades.

If replacing a damaged blade, it's necessary to balance the fan.

Replacing blades will require full disassembly.

Refer to Section 10, page 60, for Fieni Fan Assembly Instructions.

SECTION 5

PRE-OPERATION

USING OPTIONAL ELECTRIC CONTROLLER

For sprayers fitted with the optional Braglia I-S4021 electric (in-cab) controller / pressure manifold. The controller comes with a separate instruction manual.

The photo below shows the controller (installed on a 1,000 Lt trailed sprayer).



Connect the supplied control / switch to the tractor and sprayer ...

1. Connect to a suitable (tractor) power source
2. Connect to the controller manifold loom

Take care to route the wiring looms away from PTO shafts, linkage arms etc.



The control box unit has switch functions for ...

- 1) 3 position master on / off / off switch
- 2) 2 x section control on / off switches
- 3) pressure control toggle switch.

Set-up

Before start-up make sure all switches are in the off position. Engage PTO at low speed.



The master switch has 2 off positions.

The fully down OFF position (shown above) will draw power (light is on). The bypass (dump) valve is open and there will be no pressure.

The middle OFF position will draw no power, the pressure relief valve is active. With the PTO running, the pressure will show on the gauge.



Adjust the pressure via the toggle switch on the right-hand side of the control box.

The up position is ON. To activate spraying, flick either or both spray section switches to ON. Adjust the pressure to suit.


Always finish with the master switch in the middle position (to avoid a flat battery).


SECTION 5


PRE-OPERATION

PRE-OPERATION CHECKLIST

Before operating the sprayer, please check the following items.

	All chemical & safety guides have been read, understood and acted upon.
	Operator is familiar with all control functions.
	Secure sprayer connected to the tractor.
	PTO connected, and safety guards correctly installed.
	Spray controller correctly connected and operational.
	Check pump(s) oil levels.
	

	Confirm the spray pump operation.
	Manual pressure regulator is set.
	Check for wear and tear on all chemical and hydraulic hoses and wiring looms.
	Ensure all filters are clean.
	

	Be safety aware as some spillage is likely.
	Check that nothing is loose or damaged.
	Check the alignment of all fan nozzles.
	Check that all tanks and spray lines are clean and empty, and the drain tap is closed.
	

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SPRAY OPERATIONS

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SECTION 6

SPRAY OPERATIONS

The pre-operation and familiarisation tasks must be completed before commencing spray-operations.

SAFETY FIRST

Before progressing further,

- Read and understand the Safety Manual (part no. GP-SAFE-A) supplied with this sprayer.
- Read and understand this manual to better understand the sprayer.

FILTERS

Filters will ensure that no solids enter the system to block or damage the pump or spray nozzles.

- Always ensure the basket filter is in place when filling the main tank.
- All filters should be cleaned regularly, or after each spraying period. Wear protective clothing.
- If the filter screen is damaged, replace it with a new screen.

Cleaning the suction filter

The suction filter should be cleaned regularly or after each spray tank has been emptied.

To clean the filter:

- Always wear gloves
- Completely stop all sprayer functions.

- Place the Tank Selection valve in FLUSHING position to isolate chemical liquid from the main tank.



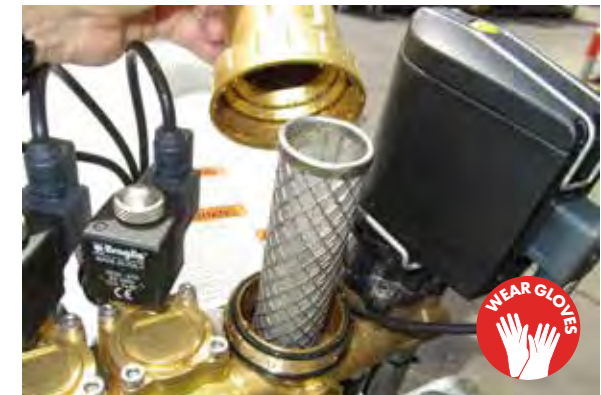
- Some spillage is likely, therefore perform this operation in an appropriate place, and with safety clothing.
- Unscrew the isolation valve from the end of the filter bowl.



- Remove the outer filter screw and bowl, and then remove the filter and thoroughly clean it.
- Check the condition of the O-Ring before reassembling the filter.
- Remember to turn the ball valve back to MAIN when finished.

Cleaning the Pressure Filter

The pressure filter (if fitted) should be cleaned regularly or after each spray tank has been emptied.



To clean the pressure line filter:

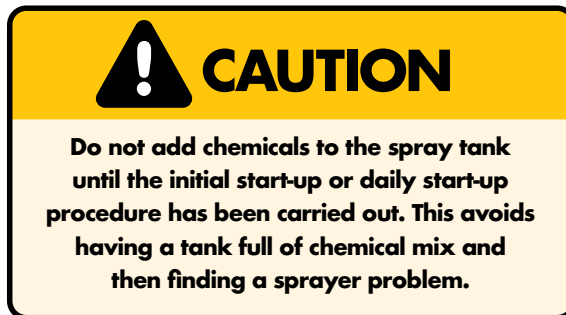
- **Always wear gloves.** Some spillage is possible, therefore perform this operation in an appropriate place, and with safety clothing.
- Completely stop all sprayer functions.
- Remove the outer filter bowl, remove the filter, and thoroughly clean before re-assembly.

SECTION 6

SPRAY OPERATIONS

FILLING THE SPRAYER

Use freshwater (preferably rainwater), free of suspended organic matter or clay as some chemicals are de-activated when they contact these materials. Ensure sufficient water quantity to allow correct product blending.



Main Tank

When filling the main tank (freshwater only), open the spray tank lid and fill the tank with the basket filter in place.

Refer to next page re adding chemical to the tank

Clean the basket and replace the lid after filling.



Flushing Tank

Use FRESH WATER ONLY (preferably rainwater) in the flushing tank.



Unscrew the lid and fill the tank before spraying. Replace the lid after filling.



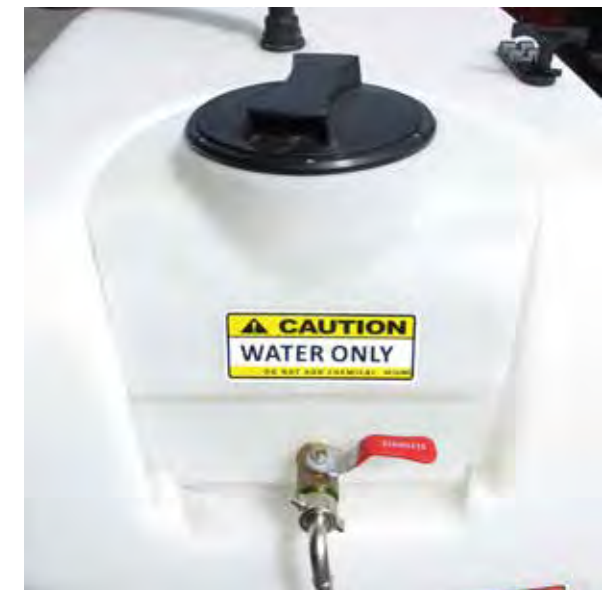
Always maintain the correct caution label at the fill point.

Hand-wash Tank

Fill the hand-wash tank with FRESH WATER ONLY from a source remote to any chemical source.

Replace the lid after filling.

Always maintain the correct caution label at the fill point.



SECTION 6

SPRAY OPERATIONS

ADDING CHEMICAL TO THE SPRAY TANK

The steps for adding chemicals to the tank are:

Step 1: Calculate the Amount of Chemical Required (Also refer to next Section)

To add the correct amount of chemical to a tank, it is necessary to calculate the amount of chemical required.

The method of calculating the amount of chemical required for the sprayer tank is dependent on the chemical rate recommendations. Use the information supplied on the chemical label to determine the tank mix concentration.

If you are unsure of the mix required, ALWAYS check with a qualified advisor or the supplier of the chemical you intend to use.

NOTE

IMPORTANT! Be sure to mix only enough spray mixture to cover the area required. Avoid wastage and problems of needless chemical disposal.

Step 2: Part Fill the Spray Tank with Water

Partly fill the sprayer tank with clean water.

Use freshwater (preferably rainwater), free of suspended organic matter or clay. Some chemicals are deactivated when they contact these materials. Ensure water quantity is sufficient to allow correct product blending.

Step 3: Measure & Pre-Mix the Chemical

Read and follow the instructions on the chemical manufacturer's label before mixing & adding chemicals to the spray tank.

Chemicals should be accurately measured and thoroughly premixed in a separate container before adding to the spray tank:

- Measure out the required liquid chemical in a graduated measuring cylinder or bucket.
- Add chemical to a small volume of water in a container and thoroughly mix the chemical

CAUTION

Always follow chemical label safety instructions. When handling chemicals always wear protective clothing ie. gloves, face mask, spray suit. Should chemical come in contact with skin immediately rinse off with water.

Step 4: Add the Chemical to the Tank



Always make sure the filling basket is in place when adding water or chemical to the tank.

To add the premixed chemical to the tank:

- Add the pre-mixed chemical to the tank, thoroughly rinsing the chemical pre-mix container and adding the rinse to the tank.

- Top up the tank with water to the required volume.
- Close the tank lid securely.



CAUTION

Should chemical come in contact with skin immediately rinse off with water. Always follow chemical label safety instructions.

Tank Agitation

When chemical is added to the tank, the pump and agitator(s) must be operating at all times to ensure chemical does not settle in the tank.

Check to see that tank agitation is correctly adjusted. If agitation causes too much foaming in the tank, partly close the agitator tap to reduce foaming.

If the chemical settles, through a pump break down or another reason, start up the sprayer after the fault has been rectified and let the mixture in the tank agitate for a length of time to ensure thorough mixing of the chemical.

SECTION 6

SPRAY OPERATIONS

CALCULATE WATER & CHEMICAL QUANTITIES

Before spraying it is necessary to calculate the exact quantities of water and chemical needed to spray the required area of orchard or vines.

- A. For **CHEMICAL required**, expressed in litres or kg per hectare (land area), use the following formula:

$$\begin{aligned} \text{Chemicals required (Litres)} = & \\ \frac{\text{Tank Volume (L)} \times \text{Recommended Chemical Rate (L/ha)}}{\div \text{Spray Application Rate (L/ha)}} & \\ \text{eg. } 600 \times 5 \div 400 = 7.5 \text{ litres} & \end{aligned}$$

- B. For tank **VOLUME OF MIXTURE required** to spray the selected area, use the following formula:

$$\begin{aligned} \text{Tank Volume Required (Litres)} = & \\ \frac{\text{Area (ha)} \times \text{Spray Application Rate (L/ha)}}{} & \\ \text{eg. } 1.5 \times 400 = 600 \text{ litres} & \end{aligned}$$

- C. For **AREA COVERED (ha)**,

$$\begin{aligned} \text{Tank Volume (L)} \div & \\ \text{Spray Application Rate (L/ha)} & \\ \text{eg. } 600 \div 400 = 1.5 \text{ ha} & \end{aligned}$$

- D. For **CHEMICAL RATES** expressed in Litres or kg per 100 litres of water (water volume), use the following formula:

$$\begin{aligned} \text{Chemicals Required (Litres)} = & \\ \frac{\text{Tank Volume (Litres)} \times \text{Recommended Chemical Rate (L/100 litres)}}{\div 100} & \\ \text{eg. } 600 \times 3 \div 100 = 18 \text{ litres} & \end{aligned}$$

NOTE

IMPORTANT: Be sure to mix only enough spray mixture to cover the area required. Avoid wastage and problems of needless chemical disposal.

PROCEED TO SPRAY

Once the pre-operation checklist on page 28 has been completed, and chemical mixture is in the tank, proceed to spray:

- Anyone operating this sprayer must be conversant with the Croplands Safety manual.
- Spray operations should be done in conjunction with an agronomist / spray manager / someone skilled in the art of spraying and operating machinery. The spray manager will have predetermined the job requirements, such as ...

- The block to be sprayed, and any special instructions relevant to that site.
- Operating speed (often around 6 Kph)
- Application rate (for example 400 L / ha)
- The type and number of nozzles to be used (often the top nozzles are turned off)
- Spray pressure to be used (often around 10 ~ 15 bar). Above 20 bar is not recommended
- PTO and Spray pump speed (normally between 450 & 540 rpm).

OPERATING POINTERS

- When preparing to spray in row for the first time, STOP, double-check that all tank lids are closed, and the Tank Selection Valve is in the MAIN tank / SPRAY position.
- When setting the pressure, it's important to make sure the pump is generating more pressure than required for just spraying to be assured there is enough pressure for bypass / agitation.
- Maintaining the nominated operating speed is important. If the nominated speed is 6 kph, a change to 4 or 8 kph will have a significant effect on the application rate.
- Always drive to the conditions taking into account the load, the terrain, and the weather.

SECTION 5

PRE-OPERATION

TANK AND EQUIPMENT CLEANING

If a cleaning agent is required (refer to the chemical label), as is often recommended when changing from one chemical group to another or as an end of season clean before storage.



Nufarm's Tank and Equipment Cleaner is a suitable cleaning agent. Note this product is available from Croplands Dealers under part code L-H9704.

Below is a guide procedure, but if in doubt, follow the instructions provided with the cleaner.

1. First, completely drain the main tank of all liquid.
2. Fill the flush tank. Flush the spray system with water ... run the sprayer as per normal with the tank selection valve set to FLUSHING tank.
3. Fill the spray tank with freshwater
4. Add cleaning agent into the mixer basket (use according to instructions)
5. Open the Tank Selection Valve to the MAIN / spray tank.
 - Make sure the area around the fan is clear of bystanders.
 - Make sure the fan is downwind of the operator.
6. Start the tractor
7. Make sure the controller is NOT in spray mode.
8. Start the pump by engaging the Tractor PTO. Set to "normal" operating rpm
9. Turn ON the controller, both spray lines, and the agitator. There should also be some flow through the bypass line (i.e. don't use low PTO speed).
10. Adjust to normal operating pressures.
11. After sufficient flushing, turn OFF the spray sections.
12. If the cleaning agent is required to soak or stand for a period, turn OFF the spray lines and completely shut down the sprayer for the desired period.
13. On completion of flushing, shut down all controls and disengage the PTO/ hydraulic drive.
14. Open the pull drain valve and allow the cleaning mixture to drain from the tank
15. Delay the final flushing of the sprayer (again) with freshwater until just before the sprayer is next used – that might be in 1 hour or 6 months away if the sprayer is going into storage for the offseason.

UNHITCHING THE SPRAYER FROM THE TRACTOR

Locate the sprayer on level ground and apply the brakes and / or block the wheels so that the Tractor does not roll when the sprayer is being disconnected.

Disconnect and stow the PTO shaft.

If fitted, disconnect the controller, power lead and signal loom. Cap the looms connections and stow the control box in a safe, dry place.

Detach the 3 linkage arms.

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SECTION 7

SPRAYING INFORMATION

Spraying should be done in conjunction with an agronomist / spray manager / someone skilled in the art of spraying. The best setup might vary significantly from crop to crop, season to season etc.

SPRAYWISE

It's highly recommended that all operators of this sprayer and spray program managers should be fully conversant with the information supplied in the **Nufarm SprayWise Horticultural Application Handbook** (refer photo) before undertaking spray operations.

The book includes chapters discussing re;

- Droplet Size
- Nozzle Types
- Dilute Spraying
- Concentrate Spraying
- Coverage & Assessment
- Selecting Nozzles
- Drift
- Weather
- Adjuvants
- Formulations & Mixing Order
- Cleaning
- Calibration
- Record Keeping
- And more

This book is supplied with every Sprayer, and is available from Croplands dealers, under the part number: SPRAYWISEHK.



CALIBRATION

Applying the correct amount of chemical to a crop is only possible if **the sprayer is calibrated, operated and maintained correctly.**

The variables of spray application (distance, time, working width, liquid, and chemical volumes) must be measured and controlled accurately to ensure chemicals are applied at the correct rate.

Proper calibration involves setting up the sprayer (nozzle selection, pressure, speed), calculating chemical and water rates, and measuring the performance of the sprayer itself. Only then can you be totally confident in applying chemicals correctly.

STEP 1 - ENSURE EQUIPMENT IS IN GOOD WORKING ORDER

Tank, pump, boom, filters and nozzles must be clean, free of leakages and functioning properly.

Follow the pre-operation checklist, maintenance and operating instructions in this manual.

STEP 2 - DETERMINING THE ACTUAL SPEED OF TRAVEL

To manually check the speed...

- a) Half fill the sprayer tank with water and mark out a test strip of 100 metres (simulating spraying conditions).

SECTION 7

SPRAYING INFORMATION

- b) Set the sprayer operating and record the time taken to travel 100 metres at your required spraying speed.
- c) Calculate the actual speed of travel using the formula:

For SPEED, km/hr = using the following formula:

$$\frac{\text{Distance (m)} \times 3.6}{\text{Time (sec)}}$$

eg. $100(\text{m}) \times 3.6 \div 48(\text{seconds})$

$$= 7.5\text{km/hr travel speed}$$

An alternative formula is:

$$\text{km/hr} = \text{Metres travelled in 1 minute}$$

STEP 3 - DETERMINE SPRAYING VOLUME REQUIRED

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

The spray volume requirement should be determined by / in conjunction with an agronomist / spray manager / someone skilled in the art of spraying.

The term "litres per hectare" must be related to foliage and not just to land area. The amount of liquid needed to effectively spray any given crop will vary greatly with:

- The type of crop
- Row spacing

- Width of canopy
- Height of canopy
- Stage of growth
- Density of foliage
- Type of leaf surface
- Type of fruit (single or bunched)
- Type of sprayer used

STEP 4 - DETERMINE SPRAYER CONFIGURATION

Once the volume of required spray volume per hectare is established, the next step in setting up the sprayer is to determine:

- The **number of row(s)** to be sprayed in one pass, and
- The **total number of nozzles** to be used on the sprayer.

Both these factors can vary with the model of sprayer used and other factors mentioned under step 3.

Example A

The HL600/800 model uses 7 rollover nozzles per side for a total of 14 nozzles. In some applications several of these nozzles might be turned off.

In other applications several of these nozzles might be fitted with a larger orifice in order to target a specific section of the canopy.

STEP 5 - DETERMINE THE IDEAL SPRAY PRESSURE

Before determining the correct nozzles, it's best to have an idea of the spray pressure required. As a general rule, a pressure of 10 to 15 bar is considered ideal. Setting up the sprayer around a pressure of say 12 bar will allow lower pressures (say 10 to 12 bar) to be used in early season and higher pressure (say 12 to 15 bar) for later season without having to change nozzles midseason. It will also offer some margin around travelling slower or faster than the chosen speed.

The advice provided above is general information only and operators should seek specialised advice from their agronomist/spray manager/someone skilled in the art of spraying.

STEP 6 - DETERMINE & SELECT CORRECT NOZZLES

Knowing actual travel speed, application rate required, number of rows to be sprayed in one pass, total number of nozzles to be used and ideal spray pressure, we can determine the nozzles required for the sprayer.

The calculation formulation is;

$$\frac{\text{Litres/Minute/Nozzle}}{(\text{Litres per minute per nozzle})}$$

$$= \frac{\text{Litres/Ha} \times \text{Km/hr} \div 600}{\text{total number of nozzles used} \times \text{row spacing (m)} \times \text{number of rows in one pass}}$$

SECTION 7

SPRAYING INFORMATION

CROPLANDS

Quantum Mist ALBUZ Nozzle Selection Worksheet

Step 1:

Enter data in grey boxes

Formula	
Target rate (L/ha)	650
Speed (km/hr)	7.5
Row spacing (m)	3
Number of rows	1
Number of nozzles	40
Total L/min =	24.375
L/min per nozzle	0.61

Step 2:

Select nozzles from chart

ALBUZ NOZZLE	PART NUMBER	MESH	5 Bar	6 Bar	7 Bar	8 Bar	9 Bar
WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36
LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48
BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64
YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97
ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32
RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83
GREY	AZ-ATR-GY-80C	50	1.5	1.63	1.76	1.87	1.98
GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35
BLACK	AZ-ATR-BK-80C	50	2	2.18	2.35	2.50	2.64
BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24

For example, using Example A from the previous pages

- Row spacing = 2.4m
- Number of rows = 1
- Number of nozzles = 14
- Speed = 6 kph
- Ideal pressure 12 bar
- Tier 1 target rate = ?? L/ha

Using the formula left....

300 (target rate) x **7.5** (speed) ÷ 600 ÷ **40** (number of nozzles) x **3.0** (row spacing) x **2** (no. of rows) = **0.56** Litres per minute per nozzle.

Once the flow rate per nozzle is known select the most appropriate nozzle from a flowrate chart for the nozzle being used. Flowrate charts are available from relevant nozzle suppliers. Croplands supplies and recommends the ALBUZ ATR Hollow Cone Nozzles for the Quantum Mist Sprayers.

Pictured left and overleaf are screenshots taken from a small spreadsheet program freely available from the Croplands Web Site or Croplands Customer Service titled "ALBUZ QM Nozzle Selection Worksheet" which makes it much quicker to calculate nozzle requirements. For more nozzles refer to the Croplands Optima buyers guide.

In the example left the **correct nozzle** for Tier 1 is the ALBUZ Brown operating at 7 Bar.

In the sample below, the **correct nozzle** for Tier 2 is the ALBUZ Yellow operating at 7 bar. Note the formula requires 0.84 L/min, and the nozzle flowchart shows 0.86 L/min. This nozzle with a marginal decrease in pressure will meet our requirements.

CROPLANDS

Quantum Mist ALBUZ Nozzle Selection Worksheet

Step 1:

Enter data in grey boxes

Formula	
Target rate (L/ha)	650
Speed (km/hr)	7.5
Row spacing (m)	3
Number of rows	1
Number of nozzles	40
Total L/min =	24.375
L/min per nozzle	0.61

Step 2:

Select nozzles from chart

ALBUZ NOZZLE	PART NUMBER	MESH	5 Bar	6 Bar	7 Bar	8 Bar	9 Bar
WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36
LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48
BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64
YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97
ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32
RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83
GREY	AZ-ATR-GY-80C	50	1.5	1.63	1.76	1.87	1.98
GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35
BLACK	AZ-ATR-BK-80C	50	2	2.18	2.35	2.50	2.64
BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24

Across the spraying season the variables (such as rates and speeds) may often change. With a well setup system small variations will be easily accommodated. Larger variations may require a change of nozzles.

SECTION 7

SPRAYING INFORMATION

STEP 7 - FIT & TEST SELECTED NOZZLES

The most important calibration is to test for the actual litres per hectare achieved through your sprayer.

- Use the following method to fit and test the selected nozzles:
- Fit selected nozzles to the sprayer.
- Fill your spray tank to maximum capacity & set the specified pump pressure and operate the sprayer for a short period to make sure all lines are full and nozzles are working properly (no blockages, leaks etc).
- Stop the sprayer and top up the tank with water to maximum capacity again.
- Operate the sprayer in the stationary position at the required pressure for not less than one minute.
- Measure how much water is required to refill the tank to the brim.
- Now, divide the volume measured by the time taken (minutes). The longer the test time the more accurate the figure.

The calculation formulation is;

$$\text{Output (L/min)} = \frac{\text{Output (litres)}}{\text{Time (minutes)}}$$

Example 1, testing Tier 1 of our examples above.

$$\frac{28.5 \text{ litres}}{1.25 \text{ minutes (75 seconds)}} = 22.8 \text{ litres/min.}$$

Which is slightly more than the target of 22.4L/min
(0.56 L/min per nozzle x 40 nozzles for 1.0 min)

Example 2, testing Tier 2 of our examples above.

$$\frac{42.1 \text{ litres}}{1.25 \text{ minutes (75 seconds)}} = 33.7 \text{ litres/min.}$$

(note 0.86 L/min per nozzle x 40 nozzles for
1.0 min = 34.4 L/min)

- Excessive output is a sign of worn nozzles. Refer to steps 8 & 9.
- Insufficient output is a sign of blockages. Refer to steps 8 & 9.

STEP 8 - CALCULATE THE ACTUAL APPLICATION RATE

Actual application rate is the objective of setting up and calibrating your sprayer.

To calculate actual application rate (litres per hectare), use the following formula:

$$\text{Application Rate (L/ha)} = \frac{\text{Total sprayer output (L/min)} \times 600 \div \text{speed (Km/hr)} \div \text{row spacing (m)}}{\div \text{number rows in one pass}}$$

Example 1 (as per Tier 1 example)

$$\frac{22.8 \text{ (L/min)} \times 600 \div 7.5 \text{ km/hr} \div 3 \text{ m (row spacing)}}{\div 2 \text{ (rows/pass)}} = 304 \text{ litres/ha}$$

Example 2 (as per Tier 2 example)

$$\frac{33.7 \text{ (L/min)} \times 600 \div 7.5 \text{ km/hr} \div 3 \text{ m (row spacing)}}{\div 2 \text{ (rows/pass)}} = 449 \text{ litres/ha}$$

SECTION 7

SPRAYING INFORMATION

STEP 9 - IF THE TESTED RATE IS UNSATISFACTORY

If your tested application rate does not meet your requirements, your options are:

A) In Auto mode - if the application rate is not being achieved:

- Operating pressure will be excessive if nozzles are too small or blocked or speed is too fast.
Likewise, if your pressure filter is blocked (even partially), you may experience excessive pressure at the pump.
Make adjustments accordingly.
- Operating pressure will fall if nozzles are too large or speed is too slow. Make adjustments accordingly.

B) In Manual mode - the Controller application rate can be altered by:

- Adjusting pressure up or down to increase or decrease rate of application (use +/- keys).
- Adjusting spraying speed up or down to decrease or increase rate of application.
- Changing to a different nozzle capacity.

Repeat necessary testing procedures and calculation of application rate if adjustments or changes are made.

LITRES PER 100 METRES / ROW

Many Auto Rate controllers have an option for Litres per 100 metres and is occasionally the unit of preference in some vineyard operations. It's a simpler formula as row width is not relevant.

The calculation requires volume and distance, such as 11 litres per 100 metres (of rows). The operator only needs to follow the chemical label rate for mixing concentrate per 100 L.

Litres / Hectare conversion to Litres/100m Table unit = L/100 m																						
Row Spacing (metres)																						
Litres/Hectare		2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.00
	250	5.0	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.0	7.3	7.5	7.8	8.0	8.3	8.5	8.8	9.0	9.3	9.5	9.8	10.0
	300	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0
	350	7.0	7.4	7.7	8.1	8.4	8.8	9.1	9.5	9.8	10.2	10.5	10.9	11.2	11.6	11.9	12.3	12.6	13.0	13.3	13.7	14.0
	400	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0	14.4	14.8	15.2	15.6	16.0
	450	9.0	9.5	9.9	10.4	10.8	11.3	11.7	12.2	12.6	13.1	13.5	14.0	14.4	14.9	15.3	15.8	16.2	16.7	17.1	17.6	18.0
	500	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0
	550	11.0	11.6	12.1	12.7	13.2	13.8	14.3	14.9	15.4	16.0	16.5	17.1	17.6	18.2	18.7	19.3	19.8	20	21	21	22
	600	12.0	12.6	13.2	13.8	14.4	15.0	15.6	16.2	16.8	17.4	18.0	18.6	19.2	19.8	20	21	22	22	23	23	24
	650	13.0	13.7	14.3	15.0	15.6	16.3	16.9	17.6	18.2	18.9	19.5	20	21	21	22	23	23	24	25	25	26
	700	14.0	14.7	15.4	16.1	16.8	17.5	18.2	18.9	19.6	20	21	22	22	23	24	25	25	26	27	27	28
	750	15.0	15.8	16.5	17.3	18.0	18.8	19.5	20	21	22	23	23	24	25	26	26	27	28	29	29	30
	800	16.0	16.8	17.6	18.4	19.2	20	21	22	22	23	24	25	26	26	27	28	29	30	30	31	32
	850	17.0	17.9	18.7	19.6	20	21	22	23	24	25	26	26	27	28	29	30	31	31	32	33	34
	900	18.0	18.9	19.8	21	22	23	23	24	25	26	27	28	29	30	31	32	32	33	34	35	36
	950	19.0	20	21	22	23	24	25	26	27	28	29	29	30	31	32	33	34	35	36	37	38
	1000	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	1100	22	23	24	25	26	28	29	30	31	32	33	34	35	36	37	39	40	41	42	43	44
	1200	24	25	26	28	29	30	31	32	34	35	36	37	38	40	41	42	43	44	46	47	48
	1300	26	27	29	30	31	33	34	35	36	38	39	40	42	43	44	46	47	48	49	51	52
	1400	28	29	31	32	34	35	36	38	39	41	42	43	45	46	48	49	50	52	53	55	56
	1500	30	32	33	35	36	38	39	41	42	44	45	47	48	50	51	53	54	56	57	59	60

SECTION 7

SPRAYING INFORMATION

Flowrate conversion charts are available in the Nufarm SprayWise Horticultural application handbook and the Croplands Optima spray range buyers guide.

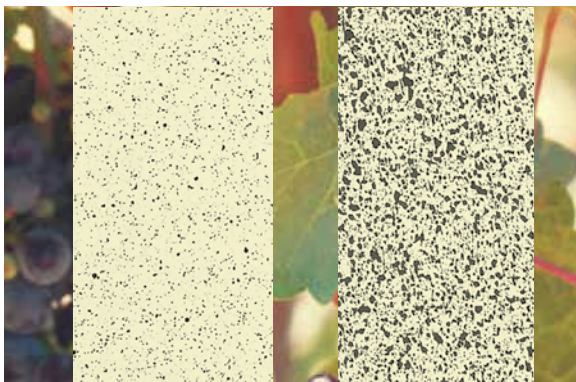
Example 1 (as per Tier 1 example)

Using the chart above, 300 Lt / ha x 3m rows correlates to 9 litres per 100 metres of row.

STEP 10 - COVERAGE ASSESSMENT

Operate your sprayer in the required orchard or vineyard to check the actual spray coverage achieved on foliage.

This is important because it is the only real measure you have of actual coverage and effective penetration of your sprayer.



Coverage checks can be done using:

- Water Sensitive Papers (as pictured) and available through Croplands dealers – refer to Croplands Optima Buyers guide for further details.

- Clay Markers as available through Croplands dealers – refer to Croplands Optima Buyers guide for further details.
- Fluorescent Dye system as available through Croplands dealers – refer to Croplands Optima Buyers guide for further details.

It is recommended to test the unit using water only as a test run, and again when applying your chemical mixture.

Ensure water sensitive papers are strategically placed on both upper and lower surfaces.

Spray testing, evaluation and adjustment to the sprayer (say fan positions) or spray settings (say nozzles, pressures and rates) should be done in conjunction with an agronomist / spray manager / someone skilled in the art of spraying. The best setup might vary significantly from crop to crop, season to season etc.

STEP 11 - ADD THE CORRECT AMOUNT OF CHEMICAL TO THE TANK

For land area rates (Litres or kg per hectare)

Use the following formula:

$$\text{Chemical required (Litres) = } \frac{\text{Tank volume (Litres) x recommended chemical rate (L/ha)}}{\div \text{ spray application rate (L/ha)}}$$

For example;

$$\frac{2000 \text{ (litre tank) x 2.0 (chemical rate L/ha)}}{\div 50 \text{ (spray application rate L/ha)}} = 80 \text{ litres of chemical}$$

If chemical recommendation is given in water volume rates

Use the following formula:

$$\text{Chemical required (Litres) = } \frac{\text{Tank volume (Litres) x recommended chemical rate (L/100 litres)}}{\div 100}$$

For example;

$$\frac{2000 \text{ (litre tank) x 4 (chemical rate L/100 litres)}}{\div 100} = 80 \text{ litres of chemical}$$

For tank volume required,

Use the following formula:

$$\text{Tank volume required (Litres) = } \text{Area (ha) x spray application rate (L/ha)}$$

SECTION 7

SPRAYING INFORMATION

For example;

20 (hectares) x 50 (application rate, L/ha)
= 1000 litres of spray tank capacity required

STEP 12 - RECORD ALL DATA FOR FUTURE REFERENCE

Record all your calibration data on the work sheets given at the end of this section.

Photocopy the work sheets to obtain the number of work sheets required.



ALBUZ-ATR HOLLOW CONE NOZZLES

Features:

- Angle of 80° at 5 bar
- Easy dismantling for cleaning
- Hollow cone nozzle producing fine droplets
- AlbuZ durable pink ceramic allows precision high pressure spraying
- Polished ceramics ensure perfect sealing and precise flow rate.

Applications:

- For fungicides and insecticides
- Recommended for orchards and vineyards.

	ALBUZ NOZZLE	PART NUMBER	MESH	5 BAR	6 BAR	7 BAR	8 BAR	9 BAR	10 BAR	11 BAR	12 BAR
	WHITE	AZ-ATR-WE-80C	100	0.27	0.29	0.32	0.34	0.36	0.38	0.39	0.41
	LILAC	AZ-ATR-LC-80C	50	0.36	0.39	0.42	0.45	0.48	0.50	0.52	0.55
CURRENT STANDARD	BROWN	AZ-ATR-BN-80C	50	0.48	0.52	0.56	0.60	0.64	0.67	0.70	0.73
CURRENT STANDARD	YELLOW	AZ-ATR-YW-80C	50	0.73	0.80	0.86	0.92	0.97	1.03	1.07	1.12
	ORANGE	AZ-ATR-OE-80C	50	0.99	1.08	1.17	1.24	1.32	1.39	1.45	1.51
	RED	AZ-ATR-RD-80C	50	1.38	1.51	1.62	1.73	1.83	1.92	2.01	2.09
	GREY	AZ-ATR-GY-80C	50	1.50	1.63	1.76	1.87	1.98	2.08	2.17	2.26
	GREEN	AZ-ATR-GN-80C	50	1.78	1.94	2.09	2.22	2.35	2.47	2.58	2.69
	BLACK	AZ-ATR-BK-80C	50	2.00	2.18	2.35	2.50	2.64	2.78	2.90	3.03
	BLUE	AZ-ATR-BE-80C	50	2.45	2.67	2.87	3.06	3.24	3.40	3.56	3.71

SECTION 7

SPRAYING INFORMATION

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

Step 2

Determine Actual Speed of Travel

Measure and mark a straight path of 100 metres (or more) of travelling conditions similar to the orchard or vine yard you are going to spray.

Half fill the spray tank & record the time (in seconds) to travel the measured distance.

Make sure that the tractor is travelling at spraying speed when you pass the start and finish marks and ensure the fan and pump are at operational speed.

If you have a hectare metre or automatic controller you need to check the speed calibration of the controller.

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Kilometres per Hour = Distance traveled (m) x 3.6

Step 3

Determine Spraying Volume Required

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

Use your own experience or a registered rate calibration consultant to determine effective volume in litres per hectare.

..... litres/ha

Step 4

Determine Sprayer Configuration

Number of row(s) to be sprayed in one pass

Total number of nozzles to be used:

Step 5

Determine & Select Nozzles

Determine nozzle flow rate required:

Litres/Minute/Nozzle

=

**Litres/Ha x Km/hr ÷ 600 ÷ Total
Number of Nozzles Used x Row
Spacing (m) x Number of Rows in
One Pass**

..... x ÷ 600 ÷ x x
= litres/minute/nozzle

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts [refer to pages 4.9-4.11].

Nozzle Selection

Step 6

Fit & Test Selected Nozzles

The most important calibration is to test for **actual litre per hectare**. Fill your spray tank to overflowing and run the sprayer for one minute, at the above operating settings, and record the total litres per minute used.

Output/min (l/min)

=

Output (litres) ÷ Time (minutes)

..... ÷ = litres/min

Step 7

Calculate the Actual Application Rate

To calculate actual application rate (litres per hectare), use the following formula::

Application Rate (l/ha)

=

**Total Sprayer Output (l/min) x 600
÷ Speed (Km/hr) ÷ Row Spacing (m)
÷ Number Rows in One Pass**

..... x 600 ÷ ÷ ÷
= litres/ha

Record your data:

Farm location	
Crop to be sprayed	
Canopy width (m)	
Canopy Height (m)	
Spray Volume litres/ha	
No. Rows in one pass	
No. of nozzles used	
Litres/minute/nozzle	
Nozzle pressure	
Nozzle type	
Nozzle size & colour	
Tested Output in l/min	
Actual Litres/Hectare	

Note: If your sprayer has a flow meter fitted, you should calibrate it regularly. The calibration setting on the tag is a factory setting only and needs to be regularly checked - taking into consideration changes in density and/or viscosity of the product to be sprayed.

SECTION 7

SPRAYING INFORMATION

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

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Determine Actual Speed of Travel

Measure and mark a straight path of 100 metres (or more) of travelling conditions similar to the orchard or vine yard you are going to spray.

Half fill the spray tank & record the time (in seconds) to travel the measured distance.

Make sure that the tractor is travelling at spraying speed when you pass the start and finish marks and ensure the fan and pump are at operational speed.

If you have a hectare metre or automatic controller you need to check the speed calibration of the controller.

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Kilometres per Hour = Distance traveled (m) x 3.6

Step 3

Determine Spraying Volume Required

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

Use your own experience or a registered rate calibration consultant to determine effective volume in litres per hectare.

..... litres/ha

Step 4

Determine Sprayer Configuration

Number of row(s) to be sprayed in one pass

Total number of nozzles to be used:

Step 5

Determine & Select Nozzles

Determine nozzle flow rate required:

Litres/Minute/Nozzle

=

**Litres/Ha x Km/hr ÷ 600 ÷ Total
Number of Nozzles Used x Row
Spacing (m) x Number of Rows in
One Pass**

..... x ÷ 600 ÷ x x
= litres/minute/nozzle

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts [refer to pages 4.9-4.11].

Nozzle Selection

Step 6

Fit & Test Selected Nozzles

The most important calibration is to test for **actual litre per hectare**. Fill your spray tank to overflowing and run the sprayer for one minute, at the above operating settings, and record the total litres per minute used.

Output/min (l/min)

=

Output (litres) ÷ Time (minutes)

..... ÷ = litres/min

Step 7

Calculate the Actual Application Rate

To calculate actual application rate (litres per hectare), use the following formula::

Application Rate (l/ha)

=

**Total Sprayer Output (l/min) x 600
÷ Speed (Km/hr) ÷ Row Spacing (m)
÷ Number Rows in One Pass**

..... x 600 ÷ ÷ ÷
= litres/ha

Record your data:

Farm location	
Crop to be sprayed	
Canopy width (m)	
Canopy Height (m)	
Spray Volume litres/ha	
No. Rows in one pass	
No. of nozzles used	
Litres/minute/nozzle	
Nozzle pressure	
Nozzle type	
Nozzle size & colour	
Tested Output in l/min	
Actual Litres/Hectare	

Note: If your sprayer has a flow meter fitted, you should calibrate it regularly. The calibration setting on the tag is a factory setting only and needs to be regularly checked - taking into consideration changes in density and/or viscosity of the product to be sprayed.

SECTION 7

SPRAYING INFORMATION

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

Step 2

Determine Actual Speed of Travel

Measure and mark a straight path of 100 metres (or more) of travelling conditions similar to the orchard or vine yard you are going to spray.

Half fill the spray tank & record the time (in seconds) to travel the measured distance.

Make sure that the tractor is travelling at spraying speed when you pass the start and finish marks and ensure the fan and pump are at operational speed.

If you have a hectare metre or automatic controller you need to check the speed calibration of the controller.

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Kilometres per Hour = Distance traveled (m) x 3.6

Step 3

Determine Spraying Volume Required

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

Use your own experience or a registered rate calibration consultant to determine effective volume in litres per hectare.

..... litres/ha

Step 4

Determine Sprayer Configuration

Number of row(s) to be sprayed in one pass	
Total number of nozzles to be used:	

Step 5

Determine & Select Nozzles

Determine nozzle flow rate required:

Litres/Minute/Nozzle

=

**Litres/Ha x Km/hr ÷ 600 ÷ Total
Number of Nozzles Used x Row
Spacing (m) x Number of Rows in
One Pass**

$$\boxed{} \times \boxed{} \div 600 \div \boxed{} \times \boxed{} \times \boxed{} \\ = \boxed{} \text{ litres/minute/nozzle}$$

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts [refer to pages 4.9-4.11].

Nozzle Selection	
------------------	--

Step 6

Fit & Test Selected Nozzles

The most important calibration is to test for **actual litre per hectare**. Fill your spray tank to overflowing and run the sprayer for one minute, at the above operating settings, and record the total litres per minute used.

Output/min (l/min)

=

Output (litres) ÷ Time (minutes)

$$\boxed{} \div \boxed{} = \boxed{} \text{ litres/min}$$

Step 7

Calculate the Actual Application Rate

To calculate actual application rate (litres per hectare), use the following formula::

Application Rate (l/ha)

=

**Total Sprayer Output (l/min) x 600
÷ Speed (Km/hr) ÷ Row Spacing (m)
÷ Number Rows in One Pass**

$$\boxed{} \times 600 \div \boxed{} \div \boxed{} \div \boxed{} \\ = \boxed{} \text{ litres/ha}$$

Record your data:

Farm location	
Crop to be sprayed	
Canopy width (m)	
Canopy Height (m)	
Spray Volume litres/ha	
No. Rows in one pass	
No. of nozzles used	
Litres/minute/nozzle	
Nozzle pressure	
Nozzle type	
Nozzle size & colour	
Tested Output in l/min	
Actual Litres/Hectare	

Note: If your sprayer has a flow meter fitted, you should calibrate it regularly. The calibration setting on the tag is a factory setting only and needs to be regularly checked - taking into consideration changes in density and/or viscosity of the product to be sprayed.

SECTION 7

SPRAYING INFORMATION

CALIBRATION WORK SHEET

Step 1

Check the Sprayer is in Good Working Order

Step 2

Determine Actual Speed of Travel

Measure and mark a straight path of 100 metres (or more) of travelling conditions similar to the orchard or vine yard you are going to spray.

Half fill the spray tank & record the time (in seconds) to travel the measured distance.

Make sure that the tractor is travelling at spraying speed when you pass the start and finish marks and ensure the fan and pump are at operational speed.

If you have a hectare metre or automatic controller you need to check the speed calibration of the controller.

Tractor model	
Gear	
Range	
Dual power	
Engine RPM	
Speed in Km/h	

Kilometres per Hour = Distance traveled (m) x 3.6

Step 3

Determine Spraying Volume Required

It is essential to determine the liquid volume per hectare required to effectively spray a crop without overspraying or underspraying.

Use your own experience or a registered rate calibration consultant to determine effective volume in litres per hectare.

..... litres/ha

Step 4

Determine Sprayer Configuration

Number of row(s) to be sprayed in one pass	
Total number of nozzles to be used:	

Step 5

Determine & Select Nozzles

Determine nozzle flow rate required:

Litres/Minute/Nozzle

=

**Litres/Ha x Km/hr ÷ 600 ÷ Total
Number of Nozzles Used x Row
Spacing (m) x Number of Rows in
One Pass**

$$\boxed{} \times \boxed{} \div 600 \div \boxed{} \times \boxed{} \times \boxed{} \\ = \boxed{} \text{ litres/minute/nozzle}$$

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts [refer to pages 4.9-4.11].

Nozzle Selection	
------------------	--

Step 6

Fit & Test Selected Nozzles

The most important calibration is to test for **actual litre per hectare**. Fill your spray tank to overflowing and run the sprayer for one minute, at the above operating settings, and record the total litres per minute used.

Output/min (l/min)

=

Output (litres) ÷ Time (minutes)

$$\boxed{} \div \boxed{} = \boxed{} \text{ litres/min}$$

Step 7

Calculate the Actual Application Rate

To calculate actual application rate (litres per hectare), use the following formula::

Application Rate (l/ha)

=

**Total Sprayer Output (l/min) x 600
÷ Speed (Km/hr) ÷ Row Spacing (m)
÷ Number Rows in One Pass**

$$\boxed{} \times 600 \div \boxed{} \div \boxed{} \div \boxed{} \\ = \boxed{} \text{ litres/ha}$$

Record your data:

Farm location	
Crop to be sprayed	
Canopy width (m)	
Canopy Height (m)	
Spray Volume litres/ha	
No. Rows in one pass	
No. of nozzles used	
Litres/minute/nozzle	
Nozzle pressure	
Nozzle type	
Nozzle size & colour	
Tested Output in l/min	
Actual Litres/Hectare	

Note: If your sprayer has a flow meter fitted, you should calibrate it regularly. The calibration setting on the tag is a factory setting only and needs to be regularly checked - taking into consideration changes in density and/or viscosity of the product to be sprayed.

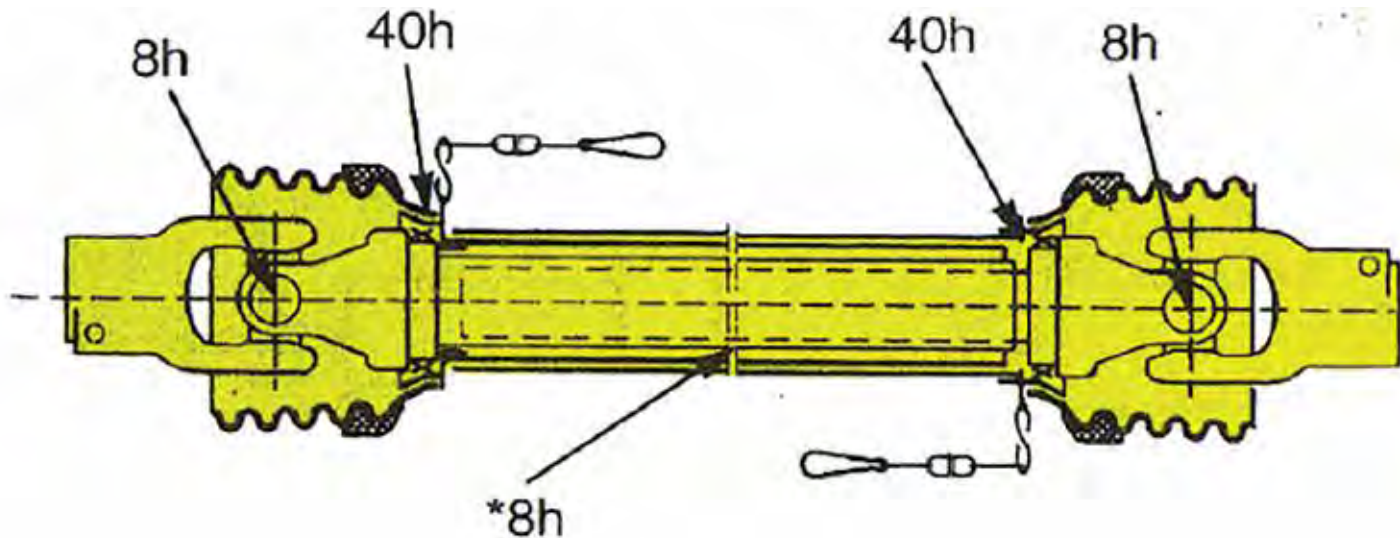
SECTION 8

LUBRICATION & MAINTENANCE

GREASING & SERVICE PROCEDURES	48
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SECTION 8

LUBRICATION & MAINTENANCE



Grease the PTO shaft as shown. * Pull shaft apart - apply grease to the inside of the outer telescopic profile.

GREASING & SERVICE PROCEDURES

1. Clean suction line filter after completion of each tank.
2. Clean pressure line filter regularly.
3. Grease tractor to sprayer PTO universal joints every 8 hours. Grease lightly until grease becomes firm in seals. Over greasing will break seals and allow dust and moisture to penetrate - increasing wear.
4. Grease PTO inner tubes every 8 hours. To lubricate the inner tube, slide PTO shaft apart, clean the telescopic tubes, grease and reassemble.
5. Grease the PTO covers every 40 hours.

6. Ensure safety covers and safety chains are in place and in good working order.
7. Check pump air chamber pressure on a regular basis. As a general guideline it should be 10%-20% of operating pressure (70-100 kPa [10-15 psi]). Refer to the pump manual for more information.
8. To ensure trouble free spraying, flush the sprayer with fresh water thoroughly each day, and before changing chemicals. Dispose of tank wash according to chemical manufacturers instructions.
9. Grease all boom joints, height adjusting points and other grease points.

EVERY 200 HOURS

1. Lubricate quick release lock pins on PTO shaft.
2. Grease all tank lid seals with vaseline.
3. Check to ensure agitators have not become blocked with sulphur/chemicals.
4. Check pump mounts.

SECTION 8

LUBRICATION & MAINTENANCE



AR503


DIAPHRAGM PUMPS

Diaphragm Pumps Maintenance

Annovi & Reverberi (A&R) pumps are of the piston-diaphragm type. All parts in contact with the spray liquid, which are subject to corrosion, are protected, making them ideal for spraying.

Daily Before Starting the Pump

1. Check that oil is visible in sight glass (half way up) and top up if necessary with good clean motor oil 20W/30 or 20W/40.
2. Clean all sprayer filters. Blocked or semi blocked filters place extra stress on diaphragms.
3. Start with zero pressure and the pump will self prime immediately and clear air locks in suction line.

**CAUTION**

Running a diaphragm pump faster than specified will not improve performance, but will damage and wear out moving parts. Warranty will be made void by speeds in excess of those indicated on the pump name plate.

Daily after Use

1. Flush pump with clean water.
2. Drain filters and clean. A high percentage of pump failures are due to blocked filters.

Every 50 Hours

Check surge chamber pressure and adjust as required.

- Air pressure is usually around 25% of operating pressure].

Vibration of the delivery hose usually indicates that the air pressure in the surge chamber is incorrect.

The main cause of surge chamber diaphragm fracture is low pressure in this chamber.

Surge chamber pressure can be checked with an ordinary tyre gauge.

The above pressure range is a guide to the correct pressure.

However, if difficulties recur, adjust the pressure until an even flow is obtained from the pump (no pulsing of liquid at operating RPM). The pressure is best increased with a bicycle pump, hand pump or foot pump.

Every 250 hours or Every Season - Whichever Comes Sooner

1. Change oil and refill with 20W/30 oil. Attention should be made to remove trapped air behind the diaphragms by rocking from side to side as instructed. It is also good practise run the pump for 10 minutes without pressure, and then, top up with oil before working the pump.

2. When changing the pump oil, check diaphragms and replace them if they are showing signs of wear.

Diaphragm valves should be replaced every 400 hours regardless of wear.

This is normally a pre-season maintenance procedure which can be done easily as no special tools are required.

You can avoid unnecessary down time in spraying seasons by carrying out preventative maintenance.

3. Also check inlet and outlet valves and replace if worn. Worn valves not only reduce the output of the pump, but may reduce the life of the diaphragms.

Excessive Diaphragm Failure

If you have excessive diaphragm failure check the following points. These will cause failure of diaphragms due to added stress or chemical attack.

1. Most Important - Pump not being flushed out daily with clean water after use.
2. Oil level too low allowing air between piston and diaphragm.
3. Air leaks in suction line.
4. Restricted suction line.

SECTION 8

LUBRICATION & MAINTENANCE

5. Restriction through suction filter.
6. Not cleaning suction filter regularly.
7. Worn suction and discharge valves.
8. Bypass line too small to carry full capacity of pump.
9. In cold climates - frozen suction/discharge lines or water remaining in the pump after flushing.
10. Incorrect air setting or no air in air chamber.
11. Agitator excessively restricting bypass from pump.
12. Diaphragm material construction incorrect for chemical or solution being pumped.
13. Chemicals containing toluene or other aggressive solvents may require viton diaphragms - particularly if the pump is not properly flushed after use.

Pre-Season Servicing

For thorough pre-season servicing - check all aspects of the sprayer and its operating components as outlined in the pre-delivery check list.

Pump Storage and Corrosion Protection

1. Warm Climates

If you operate in a warm climate with no chance of frost in the winter, you will not have any problems with frost damage.

If you are storing your sprayer between seasons, ensure your pump has been thoroughly flushed with clean water. A good idea is to run a mixture of 1% solution of summer mineral spraying oil through the pump and plumbing system. Summer spraying oil is water-soluble oil such as DC-Tron. This will coat and protect all internal pump parts. Ensure this mixture is flushed out before spraying commences in the new season.

2. Cold Climates

For prolonged storage, an anti-freeze mixture can be flushed through the pump. Ensure this is thoroughly flushed out prior to the commencement of spraying again.

If the pump is being stored overnight and a risk of freezing is imminent, drain all liquid from the pump and lines, including boom lines.

FILTERS

Filter Maintenance

Clean filters ensure that no solids enter the spraying system to block or damage pump or nozzles.

All filters should be cleaned regularly or after each spraying period.



The pump suction valve CLOSED to the main tank

Suction Filter

The suction filter should be cleaned regularly, or after each spray tank has been emptied. Also refer to page 18.

To clean the filter:

1. Completely stop all sprayer functions.
2. Place the tank selection valve in the closed position to shut off liquid from the main tank.
3. Remove the outer filter screw and bowl.



Remove the outer filter screw and bowl

4. Remove the filter screen & thoroughly clean it and other components before reassembling the filter.



Remove & clean the filter element & components

SECTION 8

LUBRICATION & MAINTENANCE

5. Carefully reassemble the filter, ensuring the screen O-Rings are in place, and then, tighten the outer filter screw so that the outer O-ring is properly sealed.



Reassemble and tighten the outer filter screw.

6. **Open the tank selection valve** to access liquid from the main tank, then check the filter is sealed correctly. If leaking, further tighten the outer screw until sealed. If this does not stop the leaking, check the alignment of the O-ring and/or the condition of the O-ring. Replace if necessary.
Vaseline is the best lubricant for filter seals.

Cleaning the Pressure Filter

The pressure filter (if fitted) should be cleaned regularly or after each spray tank has been emptied.

To clean the pressure line filter:

- **Always wear gloves.** Some spillage is possible, therefore perform this operation in an appropriate place, and with safety clothing.
- Completely stop all sprayer functions.
- Remove the outer filter bowl, remove the filter, and thoroughly clean before re-assembly.



Open & close the filter tap while system is pressurised

NOTE

Be careful not to damage or deform the mesh or O-ring while cleaning and refitting the suction filter.
If the filter screen or O-ring is damaged, replace the part.

CAUTION

Ensure the TANK SELECTION VALVE IS OPEN before starting the pump.
Starting the pump with the Tank Selection valve closed will seriously damage the suction valve and warranty will be made void.

For Major Servicing follow the pre-delivery Checklist that came with the sprayer.

SECTION 9

TROUBLESHOOTING

DIAPHRAGM PUMP PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
A. Pump does not draw or deliver liquid. Pressure gauge fluctuates badly	<ol style="list-style-type: none"> 1. The pump is sucking in air through suction line. 2. Air has not been entirely evacuated from the pump. 3. Blocked suction filter. 4. Damaged or worn suction valves. 	<ol style="list-style-type: none"> 1. Examine the suction hose and ensure it is firmly secured. 2. Rotate the pump with outlet hose and taps open. 3. Clean suction filter. 4. Replace suction valves.
B. Liquid flow is irregular (Also check items under A)	<ol style="list-style-type: none"> 1. The air in the air chamber of the pump is incorrectly set. 2. Diaphragm split. 3. Damaged or worn valves. 4. Foreign matter holding valves open. 	<ol style="list-style-type: none"> 1. Check pressure in air chamber of pump. See pump manual. 2. Replace diaphragm. 3. Replace valves. 4. Clean valves.
C. Pump delivers insufficient pressure	<ol style="list-style-type: none"> 1. Regulating valve: <ul style="list-style-type: none"> • Sticking open • Not set for pressure • Damaged or worn seat or spring 2. Cylinder diaphragm ruptured. 3. Pump valves blocked, worn or damaged. 4. Spray nozzles worn, missing or exceed pump capacity. 	<ol style="list-style-type: none"> 1. Fix the regulator: <ul style="list-style-type: none"> • Unstick the valves • Set the pressure • Replace the spring 2. Replace diaphragms. 3. Unblock valves and or replace. 4. Replace spray nozzles with appropriate size.
D. Output drops & pump is noisy	<ol style="list-style-type: none"> 1. Blocked suction lines or filter screen. 	<ol style="list-style-type: none"> 1. Check and clean as required.
E. Oil being discharged through delivery line or discoloured oil in sight glass of pump	<ol style="list-style-type: none"> 1. One or more diaphragms split or ruptured. 	<ol style="list-style-type: none"> 1. Immediately drain oil from pump and flush to remove all spray residues from sump. Remove pump heads & fit new diaphragms. Fill to correct level with motor oil 20W/30.

SECTION 9

TROUBLESHOOTING

DIAPHRAGM PUMP PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
SUCTION SIDE OF PUMP		
F. Suction hose vibration... / hunting	1. Air getting into suction.	1. Check suction lines for leaks.
G. Pump valves hammering	1. Suction tap partly turned off. 2. Suction strainer(s) blocked.	1. Seal all joints securely with tape or stag. Firm up clamps. 2. Check the suction filter is sealed.
H. No water flow in suction hose	1. Suction Tank Selection Valve turned off. 2. Suction strainer(s) blocked.	1. Turn valve fully on. 2. Clean filters.
DISCHARGE SIDE OF PUMP		
I. Manual regulator valve leaking from spindle	1. Split diaphragm or O-rings.	1. Remove 4 body set screws, replace diaphragm and O-rings.
J. Pressure gauge showing correct working pressure no pressure at nozzle	1. Burst discharge line. 2. Blocked discharge filter where fitted. 3. O-ring(s) jamming flow in discharge line. 4. Ants, wasps build nests in discharge line or nozzles.	1. Replace discharge line. 2. Clean discharge filter. 3. Clean discharge line of foreign materials. 4. Clean nozzles of foreign materials with tooth brush

SECTION 9

TROUBLESHOOTING

GENERAL SPRAYER PROBLEMS

PROBLEM	PROBABLE CAUSE	REMEDY
1. No spray when turned on	<ol style="list-style-type: none"> 1. Filter on the inlet side of the pump blocked. 2. Faulty pump. 3. Control valves not working 	<ol style="list-style-type: none"> 1. Dismantle, clean & re-assemble. 2. Change pump. 3. Check all motor valves and manual Pressure Regulating Valve.
2. Sprays for short time only	<ol style="list-style-type: none"> 1. Air inlet to tank blocked. 2. Filter on suction side of pump blocking or blocked. 	<ol style="list-style-type: none"> 1. Clean air vent. 2. Dismantle, clean & re-assemble the filter. If filter problem persists, clean out the tank & start again.
3. Spray is uneven around the spray-head	<ol style="list-style-type: none"> 1. Blocked nozzles. 2. Nozzle tips worn. 3. Different pressure at nozzles; wrong nozzles fitted. 	<ol style="list-style-type: none"> 1. Remove, clean & check. Check output & for streaks. 2. Check nozzle output, replace worn nozzles. 3. Remove a nozzle in each section & check that flow rate is the same. If different, check for blockages.
4. Pressure going up - output going down	<ol style="list-style-type: none"> 1. Blocked nozzles. 2. Pressure filter blocking. 	<ol style="list-style-type: none"> 1. Dismantle, clean & refit. Check pressure returns to normal. Check all filters and spray mixture. 2. Check & clean the pressure filter.
5. Pressure falling	<ol style="list-style-type: none"> 1. Filter on suction side blocked. 2. Nozzle tips worn. 3. Pressure gauge faulty. 4. Pump worn. 5. Worn manual PRV (pressure regulating valve) 	<ol style="list-style-type: none"> 1. Dismantle & clean the filter. 2. Check nozzle output, replace worn nozzles. 3. Check with new pressure gauge. 4. Repair or replace the pump. 5. Replace PRV
6. Spray pattern narrow or faltering	<ol style="list-style-type: none"> 1. Pressure too low. 2. Nozzles blocked or partially blocked. 	<ol style="list-style-type: none"> 1. Check that the correct nozzles are being used... check and clean.. 2. Check that the tank is not empty. If not, there is an air leak between the pump & tank or in the pump. Check plumbing & repair.
7. Foam in the tank	<ol style="list-style-type: none"> 1. Too much agitation. 	<ol style="list-style-type: none"> 1. Switch Off one or both agitators.

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

ALL PARTS INFORMATION is now listed on the Croplands website:

- Go to croplands.com.au
- Search in the Parts Information section linked to the home page.

NOTE

Drawings are for illustration purpose only - refer to sprayer for actual plumbing. Parts listed are indicative of the sprayer type.
Items in italics or without a part number are non stocked items and may need to be specially ordered.
For further parts information refer to: www.croplands.com.au

NOTE

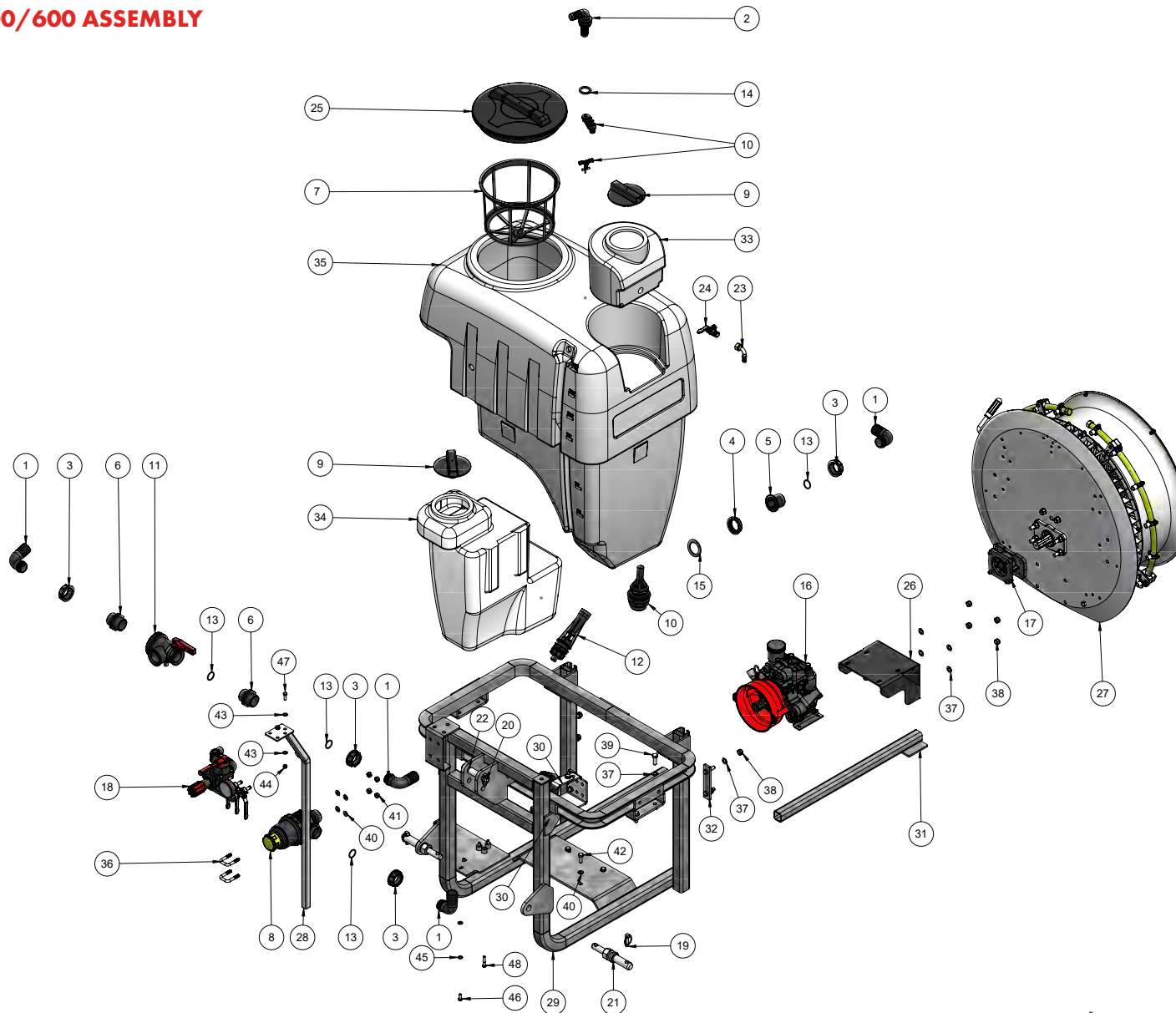
Contact Croplands Technical Support
for further information:
1300 650 724

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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HL300/600 ASSEMBLY



NOTE

Drawings are for illustration purpose only - refer to sprayer for actual plumbing. Parts listed are indicative of the sprayer type.

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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

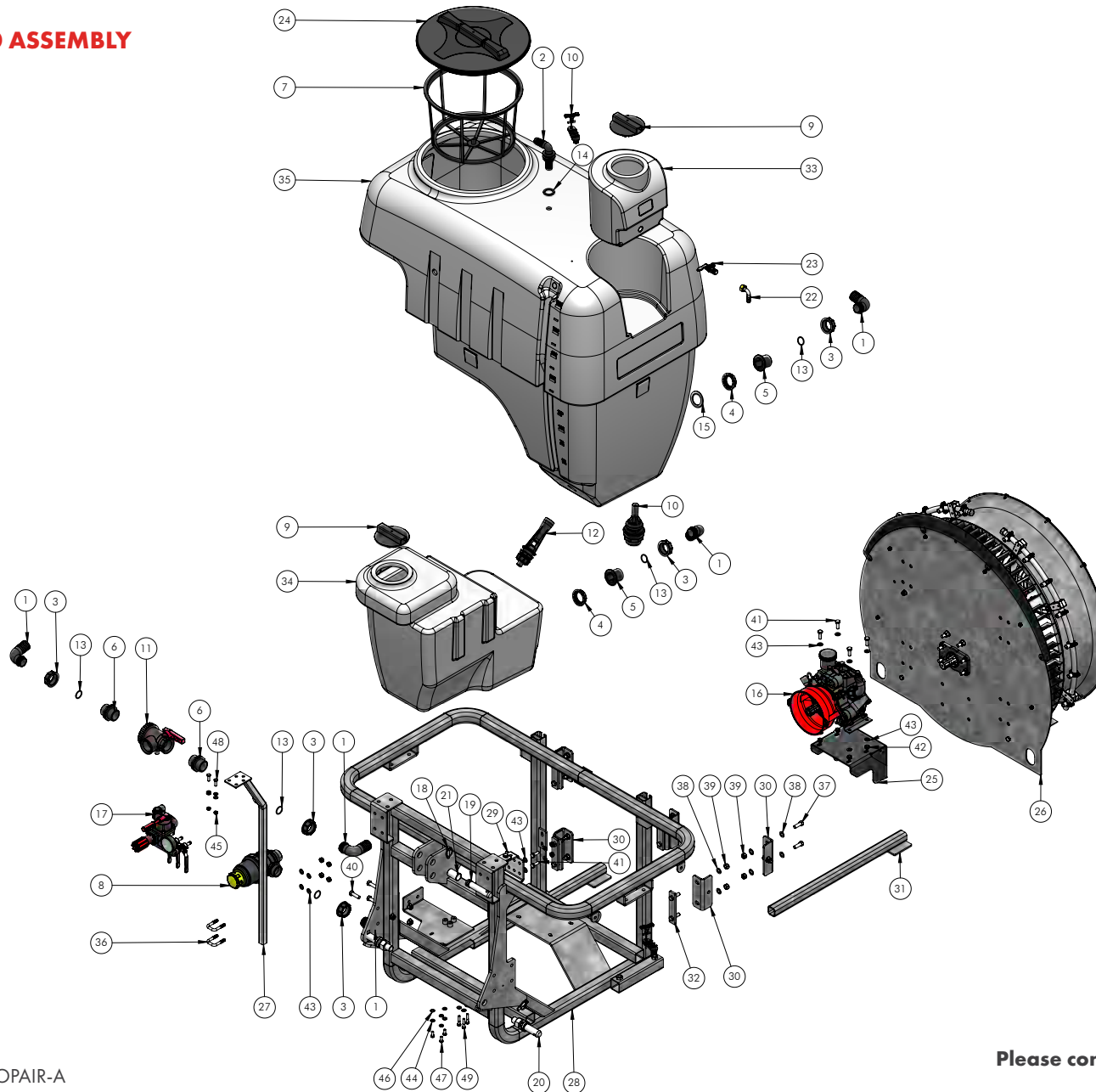
NO.	PART NUMBER	DESCRIPTION	QTY.
1	A116640	ELBOW 1 1/2"	5
2	A118426	PIPE 1 X 1 SINGLE PIECE 90DEG	1
3	A200060	FLY NUT 1 1/2"	5
4	A205060	BACK NUT 1 1/2"	2
5	A220060	TANK OUTLET 1 1/2"	2
6	A250060	NIPPLE 1 1/2"	2
7	A300120	FILTER BASKET MEDIUM 254MM DEEP	1
8	A314463	FILTER 1 1/2" 50MM SH/THR SOV	1
9	A3522000	BREATHER FOR 355MM & 455MM LID	2
10	A452107	VALVE 2" ANTI POLLUTION DRAIN	1
11	A454236	BALL VALVE POLY 1 1/2" 3 WAY	1
12	A5022042	AGITATOR STRAIGHT #2 CERAMIC J	1
13	AG10061	O RING 1 1/2"	5
14	AG40004	FLAT SEAL 1" EPDM	1
15	AG40006	FLAT SEAL 1 1/2" EPDM	2
16	AR503-APC	PUMP AR503APC/SP	1
17	AR5290	FLANGE (FIENI V1)	1
18	ARVDR50	CONTROLLER VDR50I 2 WAY	1
19	B0006	BARE LINCH PIN 7/16" DIA	3
20	B0075	TOP LINK PIN CAT 1 (MF35)	1
21	B0205	CAT 1-2 IMPLEMENT PIN 1" NUT	2
22	B0353	BUSH CONVERSION CAT 1 TO CAT 2	1
23	B163.604.13	ELBOW 1/2" C/W HEX NUT 1/2"	1
24	B165.1501.5	BALL VALVE 1/2" X 1/2" RH	1
25	G8155000	LID/RING KIT 355MM	1
26	HP-121	PUMP MOUNT BRKT 620 FAN AR503	1
27	KH-5013	FAN 600SV NO CLUTCH	1
28	LP-121	CONTROLLER BRACKET LINKAGE	1

NO.	PART NUMBER	DESCRIPTION	QTY.
29	LP030	FRAME 300LT AGRIPAK FARMATE	1
30	LP060-1	FLUSH TANK BRACKET	1
31	LP060-5	FOOT EXTENSION	2
32	LP060-7-2	BOOM MOUNT 600LT	2
33	P300-10L	10LT HAND WASH TANK TO SUIT 300LT	1
34	P300-45L	45LT FLUSH TANK TO SUIT 300LT LINKAGE	1
35	P300L	300LT LINKAGE CHEMICAL TANK	1
36	XBMBB32	U BOLT 32MM	2
37	M12FWASHER	M12 FLAT WASHER ZP	12
38	M12NNUT	M12 NYLOC NUT HT ZP	10
39	M12X35	M12 X 35 SET SCREW HT ZP	2
40	M10FWASHER	M10 FLAT WASHER ZP	16
41	M10NNUT	M10 NYLOC NUT HT ZP	10
42	M10X30	M10 X 30 SET SCREW HT ZP	6
43	M8FWASHER	M8 FLAT WASHER ZP	10
44	M8NNUT	M8 NYLOC NUT HT ZP	2
45	M8SWASHER	M8 SPRING WASHER ZP	6
46	M8X20	M8 X 20 SET SCREW HT ZP	3
47	M8X25	M8 X 25 SET SCREW HT ZP	2
48	M8X40BOLT	M8 X 40 HEX HEAD BOLT HT ZP	3

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HL600/800 ASSEMBLY



NOTE

Drawings are for illustration purpose only - refer to sprayer for actual plumbing. Parts listed are indicative of the sprayer type.

Items in *italics* or without a part number are non stocked items and may need to be specially ordered.

For further parts information refer to: www.croplands.com.au

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

NO.	PART NUMBER	DESCRIPTION	QTY.
1	A116640	ELBOW 1 1/2"	5
2	A118426	PIPE 1 X 1 SINGLE PIECE 90DEG	1
3	A200060	FLY NUT 1 1/2"	5
4	A205060	BACK NUT 1 1/2"	2
5	A220060	TANK OUTLET 1 1/2"	2
6	A250060	NIPPLE 1 1/2"	2
7	A300130	FILTER BASKET LARGE 254MM DEEP	1
8	A314463	FILTER 1 1/2" 50MM SH/THR SOV	1
9	A3522000	BREATHER FOR 355MM & 455MM LID	2
10	A452107	VALVE 2" ANTI POLLUTION DRAIN	1
11	A454236	BALL VALVE POLY 1 1/2" 3 WAY	1
12	A5022042	AGITATOR STRAIGHT #2 CERAMIC J	1
13	AG10061	O RING 1 1/2"	5
14	AG40004	FLAT SEAL 1" EPDM	1
15	AG40006	FLAT SEAL 1 1/2" EPDM	2
16	AR503-APC	PUMP AR503APC/SP	1
17	ARVDR50	CONTROLLER VDR50I 2 WAY	1
18	B0006	BARE LINCH PIN 7/16" DIA	3
19	B0076	TOP LINK PIN 3" X 7/16" S1040	1
20	B0102	IMPLEMENT PIN CAT 2	2
21	B0519	BUSH CAT 2-3	1
22	B163.604.13	ELBOW 1/2" C/W HEX NUT 1/2"	1
23	B165.1501.5	BALL VALVE 1/2" X 1/2" RH	1
24	G8161000	LID/RING KIT 455MM	1
25	HP-121	PUMP MOUNT BRKT 620 FAN AR503	1
26	KH-5026	FAN ASSY 815 GALV NO CLUTCH	1

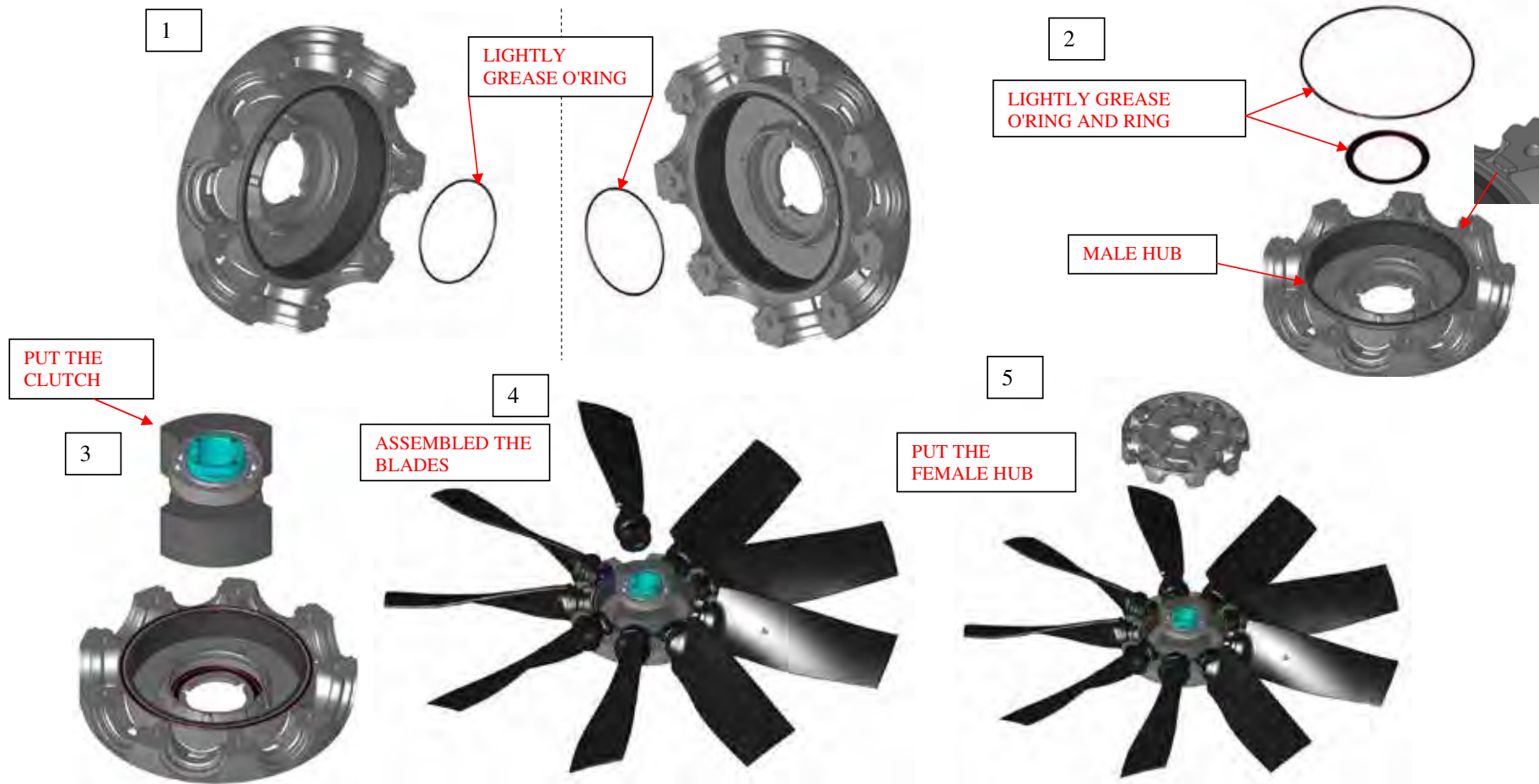
NO.	PART NUMBER	DESCRIPTION	QTY.
27	LP-121	CONTROLLER BRACKET LINKAGE	1
28	LP060	FRAME 600LT AGRIPAK FARMATE	1
29	LP060-1	FLUSH TANK BRACKET	1
30	LP060-2-2A	FAN BOLTING ANGLE	8
31	LP060-5	FOOT EXTENSION	2
32	LP060-7-2	BOOM MOUNT 600LT	4
33	P600-15L	TANK HAND WASH TO SUIT 600/800LT	1
34	P600-90L	90LT FLUSH TANK TO SUIT 600/800LT	1
35	P600L	600LT LINKAGE CHEMICAL TANK	1
36	XBMBB32	U BOLT 32MM	2
37	M12X35	M12 X 35 SET SCREW HT ZP	12
38	M12FWASHER	M12 FLAT WASHER ZP	38
39	M12NNUT	M12 NYLOC NUT HT ZP	23
40	M12X40	M12 X 40 HEX HEAD SET SCREW HT ZP	3
41	M10X30	M10 X 30 SET SCREW HT ZP	6
42	M10NNUT	M10 NYLOC NUT HT ZP	10
43	M10FWASHER	M10 FLAT WASHER ZP	16
44	M8FWASHER	M8 FLAT WASHER ZP	10
45	M8NNUT	M8 NYLOC NUT HT ZP	2
46	M8SWASHER	M8 SPRING WASHER ZP	6
47	M8X20	M8 X 20 SET SCREW HT ZP	3
48	M8X25	M8 X 25 SET SCREW HT ZP	2
49	M8X40BOLT	M8 X 40 HEX HEAD BOLT HT ZP	3

Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

FIENI FAN ASSEMBLY



CROPLANDS

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