

CROPLANDS

OPERATORS MANUAL **QUANTUM MIST QM-420 SPRAYER**

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STOP

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



HT-OMQM420-A

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 48 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 (Quantum Mist) QM-420 range of sprayers.

In addition to this manual, the sprayer will be delivered with the General Safety Manual (GP-SAFE-A) and where applicable the Controller Manual and Micro Power Pack Manual (HT-OMMICRO-A). 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-OMQM420-A, was first published in January 2021.

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

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 Micro Power Pack, Pumps, PTO etc.

And properly understand:

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

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

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.

CROPLANDS

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

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information supplied.



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

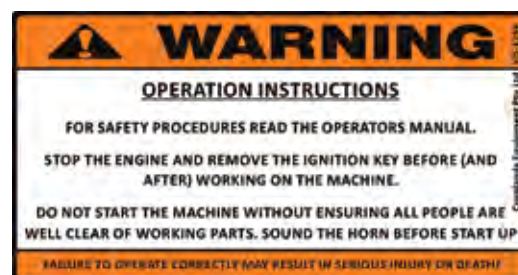
SAFETY SIGNS AND DECALS

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 - 127V



Part No: XD - 122V



Part No: XD - 194



Part No: XD - 195

SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & 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.



Photo 1

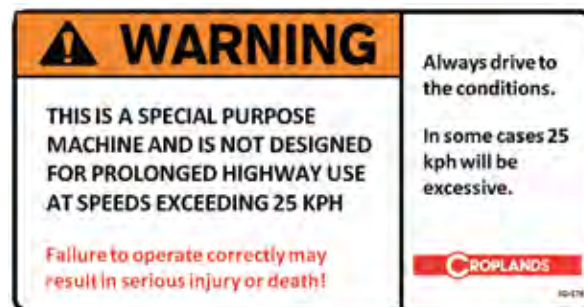
SHIPPING INFORMATION

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

Note serial number plate in the attached image.



Photo 2



WEIGHTS

The below is a general guide to standard model empty weights. For more detailed information consult the Croplands Customer Service team.

| | |
|------------------------------|-------|
| 600 Lt Linkage, 4 fans | = tba |
| 800 Lt Linkage, 4 fans | = tba |
| 1000 Lt Linkage, 4 fans | = tba |
| 1000 Lt Trailed, 4 fans | = tba |
| 1500 Lt Single row, 4 fans | = tba |
| 1500 Lt Single row, 6 fans | = tba |
| 2000 Lt Single row, 6 fans | = tba |
| 2000 Lt 2-Row, 8 fans | = tba |
| 2000 Lt 2-Row, 12 fans | = tba |
| 2000 Lt 3-Row, 12 fans | = tba |
| 3000 Lt Single row, 6 fans | = tba |
| 3000 Lt 2-Row, 8 fans | = tba |
| 3000 Lt 2-Row, 12 fans | = tba |
| 3000 Lt 3-Row, 12 fans | = tba |
| 3000 Lt 3-Row, 18 Fans + MPP | = tba |
| 4000 Lt 2-Row, 8 fans | = tba |
| 4000 Lt 2-Row, 12 fans | = tba |
| 4000 Lt 3-Row, 12 fans | = tba |
| 4000 Lt 3-Row, 18 Fans + MPP | = tba |

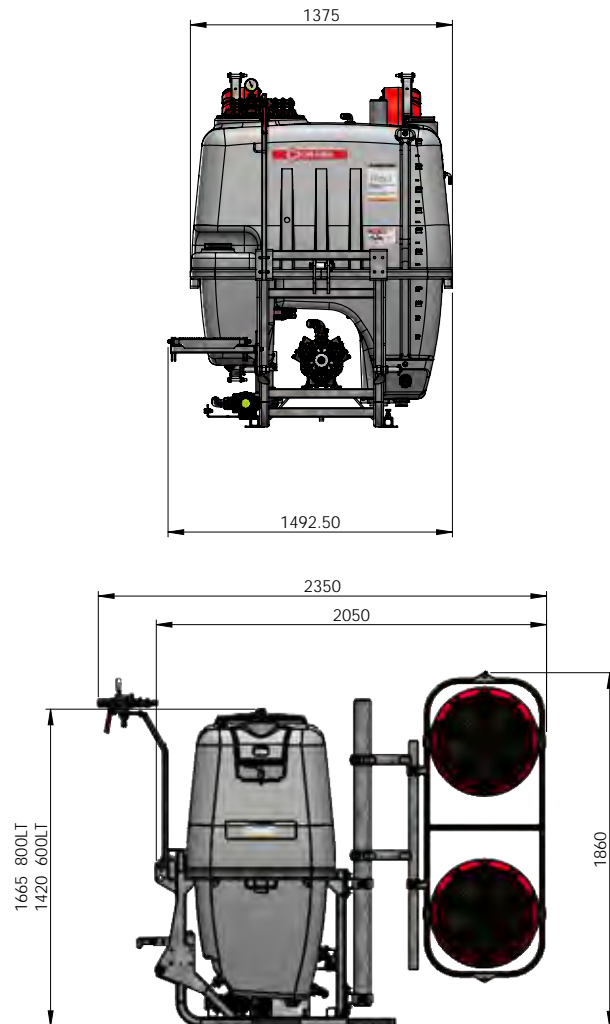
add 190kg +/-10kg for the standard Micro Power Pack (MPP)

add for Terracing tower option = tba

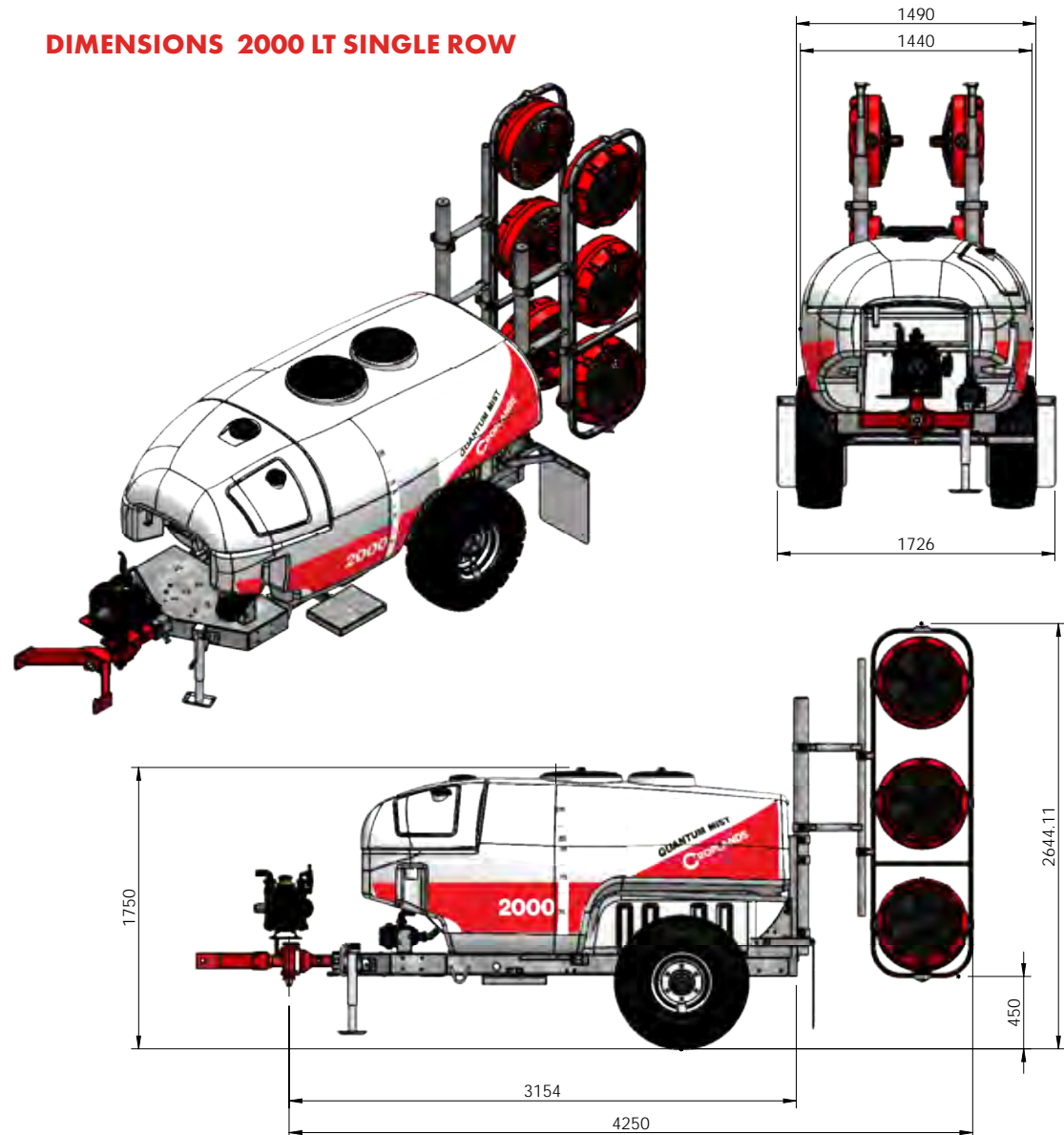
SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

DIMENSIONS 800 LT LINKAGE



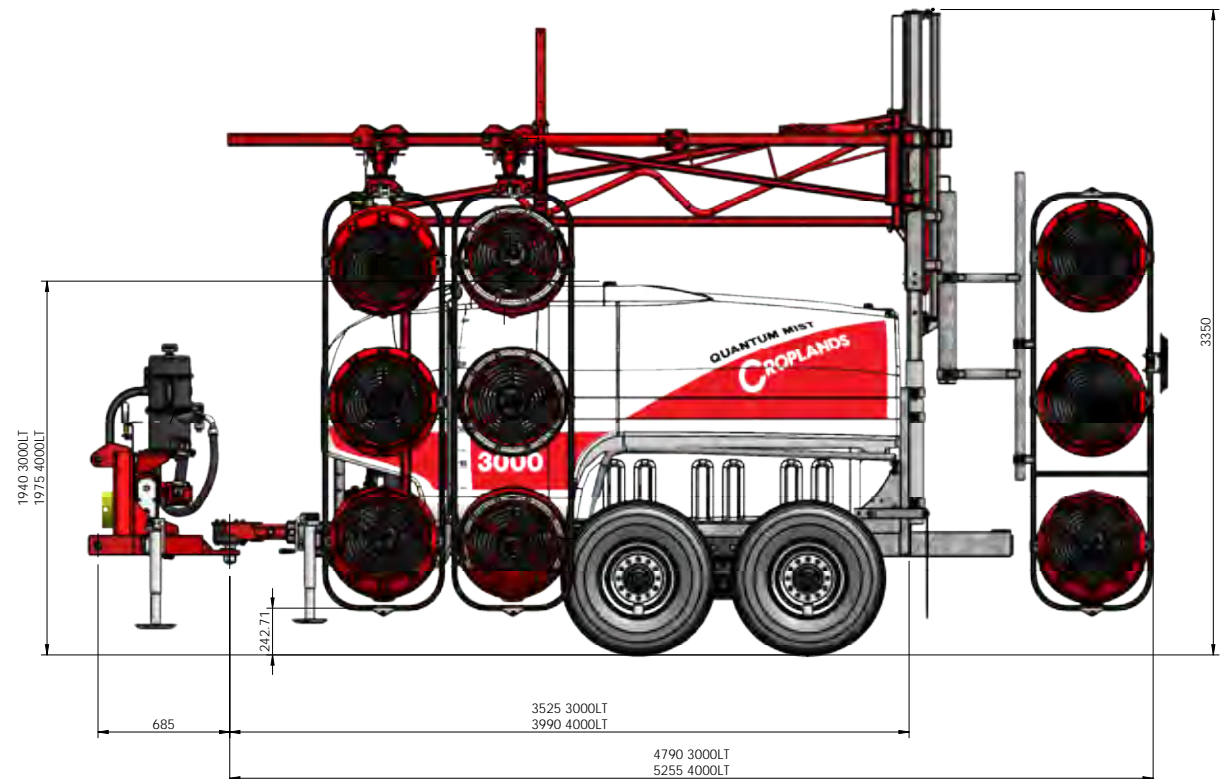
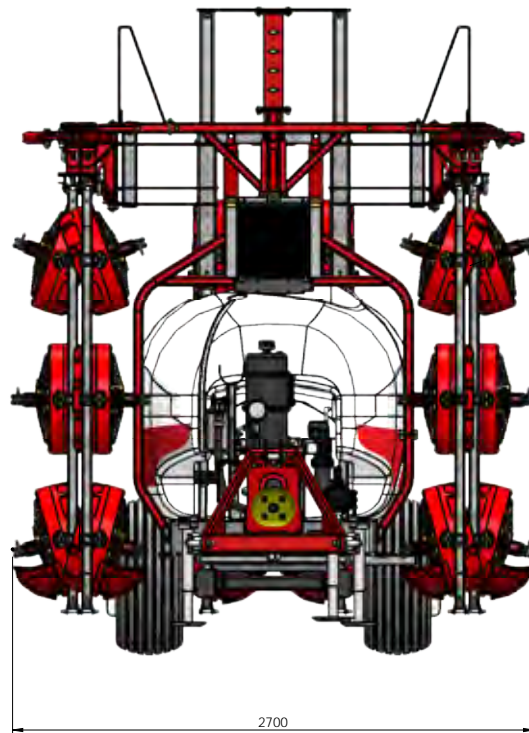
DIMENSIONS 2000 LT SINGLE ROW



SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

DIMENSIONS 3000 / 4000 LT 3-ROW TERRACING



SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

GENERAL SPECIFICATION

The QM-420 Sprayer is Croplands latest vineyard sprayer range to feature the patent pending QM-420 spray fans with dual spray rings. The sprayers are available in single row (linkage and trailed), double row and triple row configurations with optional Micro Power Pack.

The Quantum Mist™ system uses a combination of individual hydraulically driven spray fans with 5-blade fans to give the maximum possible spray coverage in grapes and dwarf tree crops.

The sprayers are available with a wide selection of options for booms, towers, and controllers.

For more detailed specification, see Section 4, Product Features / Familiarisation

Controls

A wide variety of controllers are available. Basic manual controls, standard electric controls & auto-rate controllers. A separate manual will be provided for your Spray controller option.

Tank Sizes

600, 800, 1000, 1500, 2000, 3000, and 4000 litre tank options are available and are constructed of impact-resistant polyethylene and UV stabilized. Each unit has a separate flushing tank with additional separate or integrated fresh water tank and a calibrated sight tube for filling level indication.

All main tanks drain completely via a large drain valve and sump.

Chemical Handling

Quick fill system and chemical suction probe standard on all trailed models.

Filtration

Lid-strainers & chemical mixing baskets are standard on all models.

Large suction filter, and self-cleaning pressure filter fitted.

Pumps

All QM-420 Sprayers are fitted with an Annovi Reverberi positive displacement diaphragm pumps with a capacity of 80 to 250 L/min - depending on the sprayer model.

A heavy-duty PTO shaft is supplied to drive the pump. This will be supplied specific to the sprayer model.

Hydraulic-driven pumps (in lieu of PTO) are installed when a Micro Power Pack is fitted to the sprayer.

Agitation

The agitation system is driven by the pump via twin super-flow venturi tank agitators & bypass agitation. Single agitator for the 1,500 model and linkage units.

Hydraulic System

Standard hydraulic oil supply is from the tractor hydraulics for fan operation, boom operations and optional pump operation.

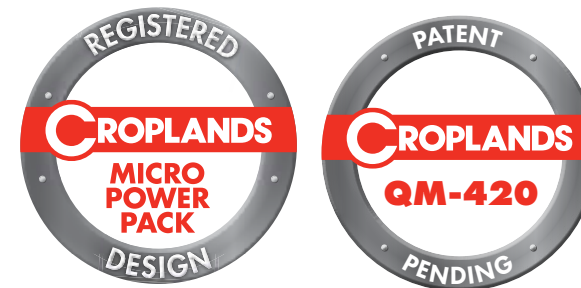
Optional (and highly recommended) is the Micro Power Pack for fan drive hydraulics.

The "standard" fan drive oil system uses a soft start/fan speed control manifold (with test ports for pressure and return) mounted at the front of the sprayer which then feeds a distribution block at the rear of the sprayer with separate hose circuits to the hydraulic driven fans.

The optional WindComp fan function uses a single manifold block which incorporates all the above functions in the one block at the rear of the sprayer.

All models with 6 or more fans are fitted with a hydraulic oil radiator with thermostat switching of an electric fan cooler.

Boom and tower control functions are separate hydraulic functions direct to tractor remotes.



Micro Power Pack

A compact, self-contained, independent hydraulic oil supply system incorporated into a 3 point linkage, self-steering drawbar. Driven by the tractor PTO shaft, the Micro Power Pack is available in a variety of pump configurations depending on Sprayer model specifications. See the separate manual for this option.

QM-420 Spray fans

The new QM-420 Spray Fans "Fans", comprised of a Polyethylene Rotomoulded cowling which includes mounting points on either side, into which there installed dual spray rings, front and rear safety guards and drive body & fan.

The 5-blade 420mm diameter fan has been designed for maximum air efficiency in the agricultural environment with excellent characteristics for canopy spraying.

The fans are hydraulically driven by a case drained 6.5cc or 9.8cc motor, driving via a double bearing "drive body" and shaft with well-proven rubber coupling to smoothly drive the fan.

SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

Nozzles

Each QM-420 spray fan comes with 2 spray rings with 5 nozzles per ring, for a total of 10 nozzles per fan. The nozzles are used in a 3 tier system, with low, medium, and high settings which are manually adjusted from the ground.

Standard nozzles are ALBUZ 80-degree ceramic hollow cone nozzles (brown and yellow). Alternative size nozzles may be selected at the time of order (e.g. yellow and orange).

The feed to all spray rings is fitted with a "non-drip" diaphragm check valve with an integral stop cock.

Spray rate capability for the Quantum Mist™ QM-420 Sprayer ranges from 150 to 2000+ L/ha.

Boom & Fan Frame

Rugged powder-coated, heavy-duty steel booms support the galvanised "fan frames" The spray fans are well protected within the galvanized fan frames.

The fans can be moved vertically and / or angle adjusted up or down to ensure optimum spray coverage.

Boom folding is controlled via tractor remotes.

Spray fans in the boom open position are at right angles to the sprayer. The fan (frames) can be manually rotated to be flat against the sprayer for transport.

Rear (inner) booms are manually adjusted.

All boom side fan frames feature a breakaway system.

2-Row and 3-Row

2-Row and 3-Row configurations use a common boom arm. Each set of (fan frame) fans can be manually adjusted for row width via a sliding carriage. Optional hydraulic row width adjustment enables adjusted from the tractor cab.



Chassis

Hot-dipped galvanised full-length heavy-duty chassis slide-out step & jockey stand.

Suspension

Walking beam tandem axle is fitted as standard on all 2 and 3-row sprayers. All trailed single row sprayers are fitted with a single fixed axle as standard.

Wheels & Tyres

11.5/80 x15.3 wheels with tubeless tyres are fitted as standard. Flotation tyres available as an option for most axle options.

Speed Sensors

Proximity sensors are used for Fan speed, Pump speed, and Wheel (travel) speed.

Self-Steer Drawbar

2-point hitch, self-steer drawbar is standard on all trailed QM-420 sprayers 3-point is standard on all 3,000 & 4,000 Lt models.

Tractor required

Power required at the PTO on flat terrain:

- Linkage models - approx. 40-50 HP.
- Single row trailed - approx. 50-70 HP
- 2-row trailed - approx. 70-90 HP.
- 3-row trailed - approx. 80 -110 HP

If not using a Micro Power Pack, hydraulic oil required will be dependent on sprayer model & configuration, ranging from 36 to 108 litres per minute at pressures up to a maximum of 2,750 psi.

Category 2 linkage connections required.

Factory Fitted Options

- Wide Tower – is recommended for use in row widths greater than 3.0 metres (3.3 - 3.75)
- Nozzles- Albuz 60-degree nozzles can be used in lieu of 80-degree.

SECTION 3

PRODUCT IDENTIFICATION, SHIPPING & SPECIFICATION

Options (not applicable to all models)

- HV4000 auto rate controller
- Bravo 180 auto rate controller
- WindComp (variable fan speed to left and right). This also includes the Opus A3 controller and dual fan speed sensors.
- Fan rpm sensors.
- Visio Multi-function display
- Electric fan speed control
- Atlas 100 GPS speed sensor
- Wide tower – a “standard” option when used in row spacing greater than 3.0 metres
- Terracing tower, including wide terracing tower option
- Hydraulic row width adjustment
- Flotation tyres (31 x 13.5 – 15”) – not compatible with the 2,000 Lt model
- Heavy-duty, 3-point self-steer drawbar (as shown).
- Micro Power Pack (standard on all 18 fan models) (includes 3-point drawbar as standard).
- Bio oil (for Micro Power Pack)
- Light kit
- Electric brakes
- Alternative nozzles, Albuz 60-degree or 40-degree nozzles can be used in lieu of 80-degree.
- NuPoint GPS tracking, mapping and data reporting system



Sprayer specifications are subject to change without prior notification.

SECTION 4

PRODUCT FEATURES / FAMILIARISATION

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SECTION 4

PRODUCT FEATURES / FAMILIARISATION

QUANTUM MIST QM-420 SPRAY "FAN"

Standard on all QM-420 models is the new extremely efficient 420 mm diameter "QM-420" fan and the "Fan Frame" mounting system.



Fan / Cap / Cover

The robust 5 bladed fan also features a separate moulded front cap designed to prevent the build-up of detritus so common in other fans, and the same cap, with the "knockout" removed, is used at the rear to further streamline the airflow.



Drive Body

The drive body differs from the "original" and very reliable QM-380 drive body in that it has a further 4 tapped holes to accept the rear cover. Note the rear cover (which is the same moulding as the front cap, with a knock out for the hydraulic motor) has positions for 5 screws, but only 4 screws are used. The "5th screw" position aligns with a casting cutaway for either a speed sensor or case drain connection (see photo above).

Cowl Orientation / Speed Sensor / Case drain

The cowl should always be mounted with the cutaway for speed sensor or case drain facing downwards (to enable drainage). The case drain is there for the unlikely event of blowing oil seals in the hydraulic motor.

Sprayers fitted with the optional Wind Compensation feature will use two speed sensors (left and right).

Note the rear guard needs to be removed to fit or access the speed sensor. Replace the guard once done.



Dual Spray Rings

The fan also features twin spray rings, with 5 nozzles per ring. This allows unprecedented control over spray coverage rates and droplet spectrums.

As supplied "standard", it's set up as a 3-tier system. The inner / smaller diameter spray ring is fitted with a smaller (brown) nozzle, and the outer / larger diameter spray ring is fitted with a larger (yellow) nozzles.

- Inner spray ring only is **Tier 1** / lowest volume rate.
- Outer spray ring only is **Tier 2** / medium volume rate.
- Both spray rings together are **Tier 3** / for high volume rate.

There are many other ways to use the dual ring system such as using one of the rings for special purpose nozzles.

See pages 30 & 31 for more information on Tiered plumbing.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

Hydraulic Drive

All QM-420 fans are driven by hydraulic motors built to a special heavy-duty specification and with case drain port. Most QM-420 models are fitted with 6.5 cc hydraulic motors. In some instances (if required) 9.8 cc motors are used.

Guards



The QM-420 must never be used without the front and rear guards installed.

Operational limits

The nominated maximum operating speed of the fan is 3,000 rpm. Normal delivered maximum operating speed of 2,500 rpm. Exceptions apply.

DANGER, Stay well away from rotating fans.

Whilst the front (downwind) side may appear to be the more dangerous side, it's the back side that holds greater danger as it can suddenly suck body parts or objects in.

Fan Frame Mounting

Each spray fan is mounted via dual M12 brass inserts moulded into each side of the cowling.

The normal spray fan mounting method is via special stainless-steel clamps into the "Fan Frame".



The bracket is reversible and can be used to adjust fan positioning (see more on page 50).

U-Bracket Mounting

As used on the 1000 Lt trailed sprayer and....

- where the QM-420 is being retrofitted to replace older QM-380 fans (now discontinued)
- the fan is being fitted to a "Classic" style sprayer which uses hook brackets rather than fan frames...

... the fan can be mounted via a fabricated, black powder-coated steel U-bracket (HP-319-8) to the HP-275C scissor action clamp.

Also requires the HP-275C-1 clamp plate.



Leaf Guard

A moulded leaf guard is fitted as standard to all bottom fans.

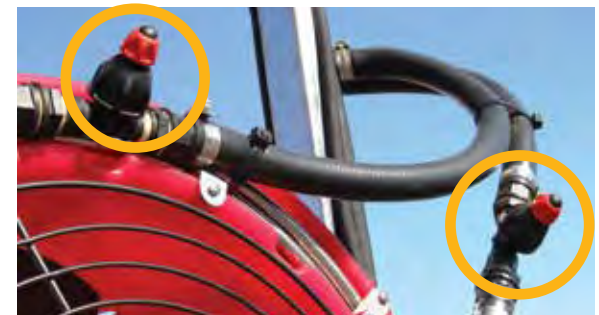


Check Valve/stop cock/drain

The feed to each spray ring is fitted with a "non-drip" diaphragm check valve with an integral stop cock which allows individual spray rings to be manually shut off as required.

Screw the red cap **in for stop**, out for normal diaphragm "non-drip".

Each spray ring has a draining/flush tap on the exit.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

FAN FRAMES, BOOM ARMS & TIE RODS



Fan Frames

Mounting the spray fans into the fan frames has many advantages, including the ability to specify the exact

positioning of fan heights and angles. The fans remain well protected and fixed until a change is required.

Up to 3 fans can be installed in each fan frame – with the lower fan also using a leaf guard.

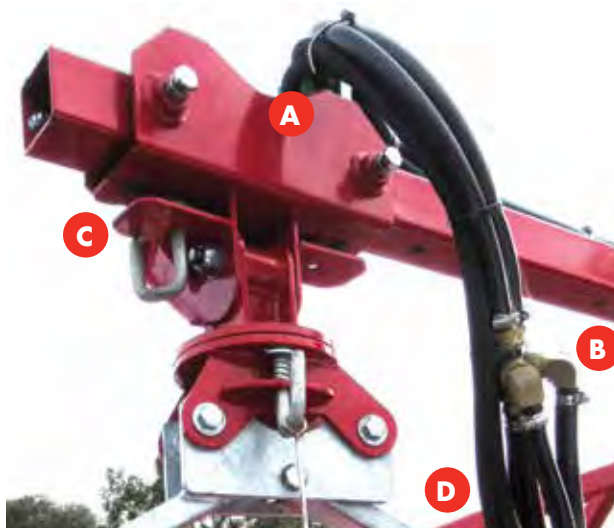
All outer row fan frames incorporate a breakaway system.

Detailed information regarding setting up and operating the fans (and booms) in Section 5.

Over-row Boom

Over row booms use a sliding carriage (A) connection to the fan frames and incorporate a breakaway system.

The outer underside of each boom arm has 3 holes (B) set at 300m intervals into which the sprung loaded pin (C) can be engaged. This sets the row width.



NOTE - If fitted with Optional Hydraulic outer row width adjustment the manual locking in is not used.

The optional hydraulic outer row width function does not require the slide locking mechanism.

The slide has several nylon buttons within the carriage to aid smooth operation. The buttons are adjustable to allow for wear – the buttons and adjustment bolt with lock nut can be seen in the photo below.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

Spray fans in the boom open position are at right angles to the sprayer. For parking, the fans can be manually rotated via the connection swivel (D) to one of 3 positions (nominally 74, 90 or 104 degrees) so that the fans can park flat against the sprayer for transport. The 3 positions can be seen in the last photo previous page.

3-Row sprayers use the same sliding carriage arrangement. Only the outermost carriage is locked into place with a tie rod connection between both slides. This ensures both frames remain sufficiently separated (when rotated for parking) and will move together when row width adjusted.



The optional hydraulic outer row width function also requires the tie rod between both slides to ensure both frames move together.

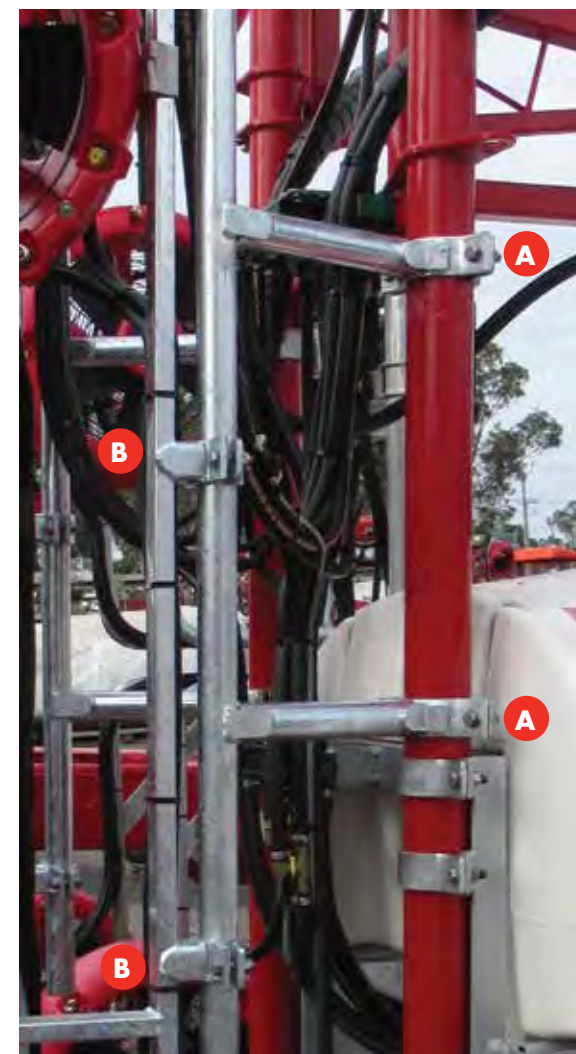
Single row/Rear Fans

Most models of the QM-420 Sprayers connect the rear fan frames to the main tower via a pair of "standoff" brackets and saddle clamps.

The standoff brackets can be moved in both height and rotation by loosening the saddle clamps at (A) and rotate the required width – retighten.



Then adjust the fan frames at (B) to spray to the required direction (normally square to the canopy).



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

Tower options

All boom arms connect to a Tower, of which there are multiple variations.

- Standard Tower (the standard tower is recommended for use in vineyards with row widths from 2.5 to 3.0 metres).
- Wide Tower, has an extra 400mm each side. The wide tower option (shown by yellow arrow) is recommended for use in vineyards with row widths from 3.3 -3.6 metres. This design reduces the boom arm length thus aiding more clearance for 3-row sprayers in the parked position.



- Tall Tower (400 higher and uses longer fan frames).
- Tall (wide) Tower.
- Terracing Tower. The terracing tower has 600mm of movement. Both the left and right sides can be moved independently. All fans on one side move at the same time.
- Wide Terracing Tower.
- Tall versions of both terracing towers are also available as special builds.



SECTION 4

PRODUCT FEATURES / FAMILIARISATION

BOOM CONTROLS/HYDRAULICS

All boom fold functions are (standard) via tractor hydraulic remotes.

However, a fully optioned sprayer will have too many boom functions for operation via the available tractor remotes. Tractor remotes #1 will often be for fan hydraulics.

Possible boom functions are (also see photo previous page):

- Left arm fold
- Right arm fold
- Left terracing lift
- Right terracing lift
- Left row width adjustment
- Right row width adjustment

If the diverter (HT-EDV option) is available where only one remote is available for 2 functions
Eg. say left and right fold, to flick between these operations.



If the diverter valve option is not sufficient, the only choice is to use the multi-function electric/hydraulic switch box to control boom functions via multi-function Cetop valve block at the rear of the sprayer.

Hydraulic Identification

All hydraulic hose circuits are identified as per below. Some exceptions apply for special builds.

(A) **Pressure** hoses to have **two colour bands**

(B) **Return** lines to have **one colour band**

Hydraulic hose identification

| | |
|---------------|------------------------------|
| BLUE | RIGHT FOLD |
| RED | LEFT FOLD OR ELEC/HYD |
| YELLOW | FANS |
| WHITE | PRODUCT PUMP |
| GREEN | AXLE/SPARE |



FAN HYDRAULIC SYSTEM

There are 2 different fan hydraulic systems available.

- The **Standard** conventional hydraulic system as used on Quantum Mist sprayers for many years, with several improvements, and ...
- The **"A3 WindComp"** system. The A3 system is only used on the QM-420 sprayers with the optional WindComp feature.



In both systems, the general fan motor plumbing is the same. The fan hydraulic motors are plumbed in series of 2, 3 or 4 fans per circuit. As well as pressure in and out, each motor is plumbed with a case drain, also plumbed in series. In some cases, each set of fans per fan frame is a separate circuit.

Oil returns from the fans go via the distribution block, then via the oil cooler (if fitted), and finally back to the tank (be it the tractor or power pack).

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The STANDARD “Classic” hydraulic system

The Standard fan drive hydraulic oil system uses a soft start/fan speed control manifold mounted at the front of the sprayer which then feeds a distribution block at the rear of the sprayer where the oil flow splits to separate hose circuits to drive the fans.

Fan speed is controlled via a manual control valve at the soft-start manifold or via an electric control valve as a function of the HV4000 or Bravo 180 controllers.

The A3 WindComp hydraulic system

WindComp (wind compensation/wind offset) is a feature made possible by a new hydraulic system. The fans facing left or right sides can be run independently of each other, at different speeds. This is ideal for combating cross winds or spraying in exposed/challenging conditions.



The optional A3 “WindComp” system uses a single manifold/distribution block mounted at the rear of the sprayer which incorporates all the fan functions.

Note **the laws of physics still apply**, if the maximum speed of the sprayer is 2,500 rpm on all fans, it's not possible to increase one side to 2,800 and leave the other at 2,500.

The WindComp feature is controlled by the A3 controller separate from any other controller functions.

Note the spray functions are independent of the WindComp system.



Oil Supply

There are three main options to supply hydraulic oil.

1. Oil supply from **Tractor hydraulics** only. This is the most economical system and is satisfactory for smaller sprayers (2-row 8 fans or 12 fans). However, very few tractors will have sufficient oil flow (and pressure) for the larger sprayers.
2. The preferred option is for oil supply via the PTO driven, **single pump, Micro Power Pack** (see separate manual), with the AR product (spray) pump driven via a separate tractor remote. This is the simplest most reliable and maximum performance setup. The most common pumps are 40, 48, 56, or 74cc. Pump size needs to be matched to fan requirements.
3. As above but using a **dual pump**, with the smaller pump driving the AR product (spray) pump. In some cases, this will limit maximum fan performance. The most common pump sizes are 56/24cc, 48/32cc, 48/24cc or 40/24cc.
Note the dual pump system will be discontinued in 2021.



Micro Power Pack

The Croplands Micro Power Pack is a compact, PTO driven, oil supply system to drive a hydraulic circuit(s) of up to 145 litres per minute (Lpm) of oil supply at pressures up to 200 bar (2,900 psi).

Mounted to a Heavy-duty 3 point linkage self-steer drawbar, with Heavy-duty gearbox and pump. A wide variety of pump sizes are available.

An automatic low oil level cut out, reduces the impact of any oil leaks - can be limited to just a few litres.

There is a separate manual for the Micro Power Pack, **HT-OMMICRO-A**, first published in November 2020.

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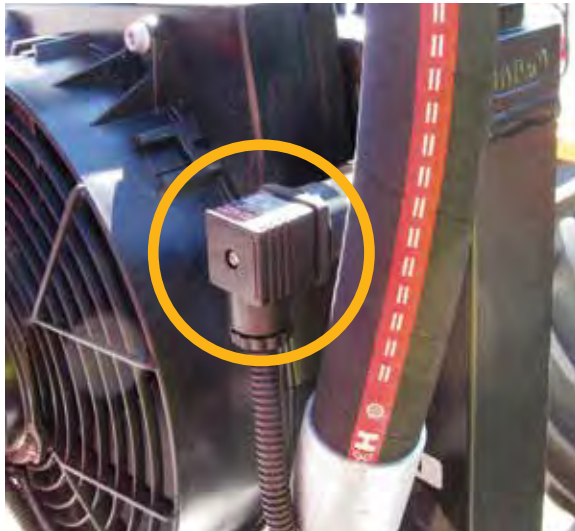


Oil Cooler

Most models with 6 or more fans are fitted with a hydraulic oil radiator with thermostat switching of an electric fan cooler.

The fan is thermostat controlled, switching in at around 50 degrees C.

The fan is powered via the controller loom, CHLOOM/AC.



SPRAY PUMP & SELF-STEER LINKAGE

AR Pump

QM-420 Sprayers are fitted with an Annovi Reverberi positive displacement diaphragm pumps with a capacity range of 80 to 250 L/min - depending on the sprayer model.

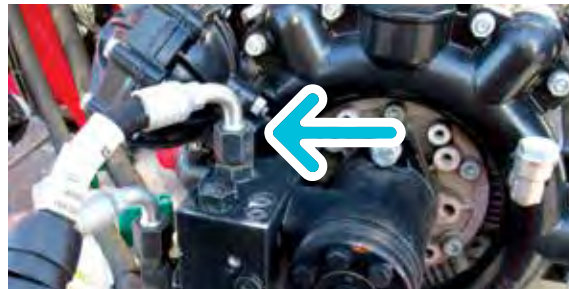
The pump can be driven by a PTO shaft or hydraulic motor.

When a Micro Power Pack is fitted to the sprayer, the AR pump must be driven by a hydraulic motor.

There are 2 options for driving this motor/AR pump.

1. Via the tractor remotes or alternatively
2. Via a secondary (dual) pump as a part of the Micro Power Pack - note this option will be discontinued in 2021.

Note the use of a separate manifold used to set and control the pump speed (blue arrow).



An 18 fan sprayer the pump needs to be connected to tractor hydraulics.

In sprayer models without a Micro Power Pack the AR pump is mounted to a 2 point or 3 point linkage self-steer drawbar and driven by a Heavy-duty PTO shaft. Both are versions shown here. (2-Point shown over page).

Linkage unit AR pumps are always driven by PTO shaft.

SAFETY Alert; Always be aware of the PTO shaft.



3-Point self-steer drawbar with AR pump

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2-Point self-steer drawbar with AR pump

SPRAY CONTROLLERS & CONNECTION

Quantum Mist 420 sprayers come equipped with a variety of spray controllers ranging from the most basic manual system (Linkage units) to auto rate controller with optional WindComp.

All sections (either manual or electrically controlled) are plumbed to a bank of manual section taps to enable manual selection of Tier 1, 2, or 3 spraying per section.



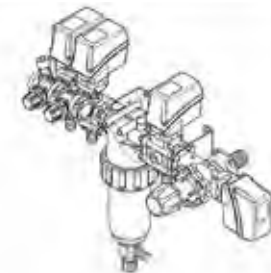
ARUCM-5

Manual controller (generally used on Linkage units). This unit has 5 sections - commonly just 4 are used. Manual pressure adjustment and a single dump lever.



HT-ARAG2

Basic electric left/right proportional shut-off with switch box and pressure adjustment (generally used on single row or Linkage units).



Bravo 180

An auto spray rate controller with up to 4 section control for the professional operator requiring GPS integration and data transfer via USB. Up to four-section control of motor valves or solenoids. Pre-set row width and application rates for simple, on-the-go adjustment. Multiple screen selections, programmable audio, and visual alarms, and up to 10 individual operating histories to keep the operator informed. L/ha or L/100m capability.

Optional fan speed control and tank level indicator.



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HV4000

Our most popular auto spray rate controller with up to 4 section control for the professional operator, providing up to four-section control of motor valves or solenoids. Pre-set row width and application rates for simple, on-the-go adjustment. Multiple screen selections, programmable audio, and visual alarms, and up to 10 individual operating histories to keep the operator informed. L/ha or L/100m capability.

Optional fan speed control.



A3 WindComp

WindComp controller for fan operations only. See earlier section re the fan hydraulic system. The A3 is not a spray rate controller, hence is usually supplied additionally to the Bravo or HV4000.



Looms & Connections

Sprayers using the UCM controller have no need for loom connections.

Sprayers using the HT-ARAG2 come supplied with appropriate electrical looms.

Sprayers fitted with auto rate controllers, HV4000 and Bravo180 are fitted with a variety of looms and connections depending on the spray options chosen.

- Main Power loom, MT90LOOM/PWR
- Main Sprayer loom, MT90LOOM/1D

Connecting to the main loom and controller can be

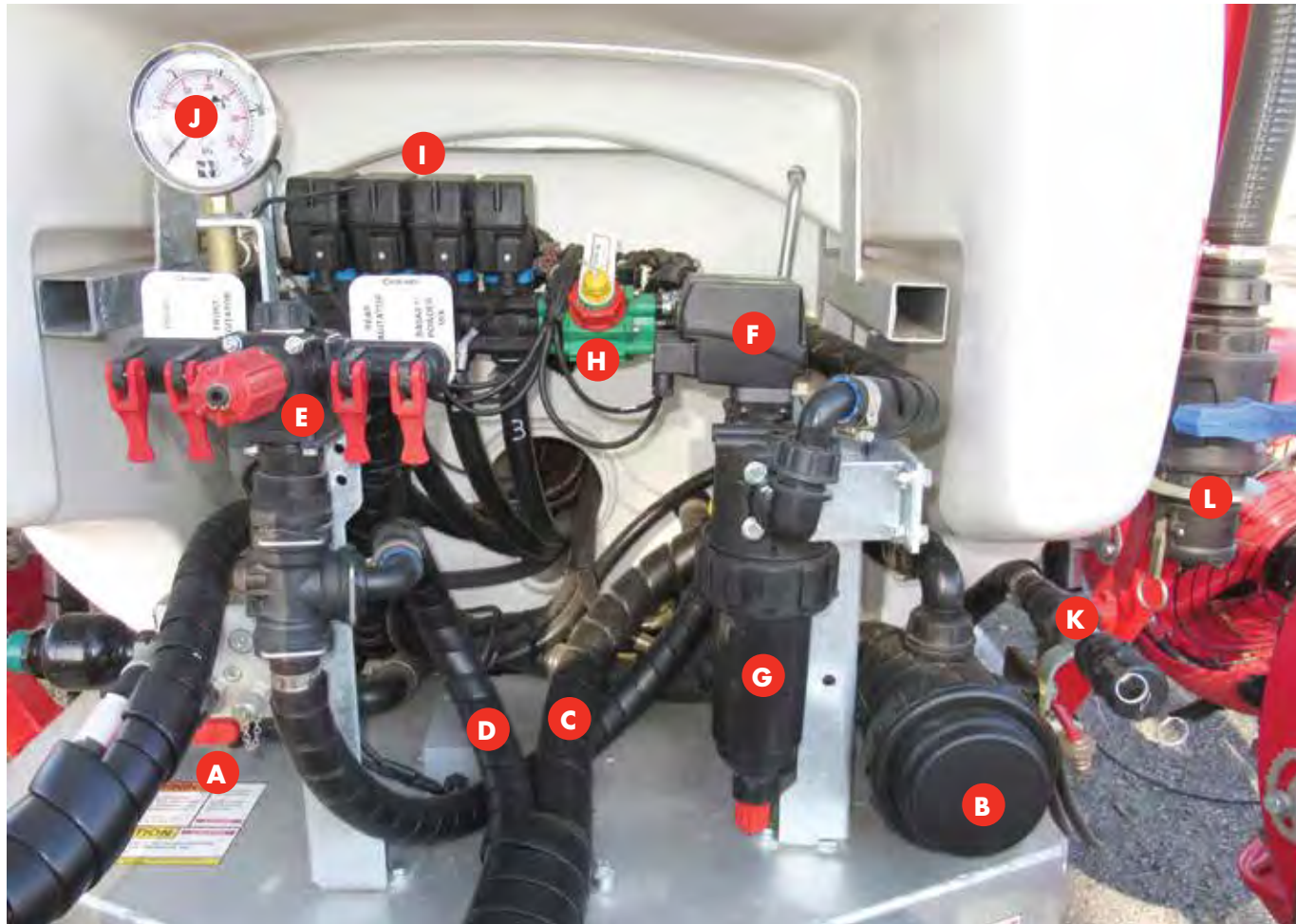
- Section valve loom MT90LOOM/1C2T (for 2 Section), or
- Section valve loom MT90LOOM/1C4T (for 4 Sections)

- Oil cooler (power)
- WindComp controller (power).
- Micro Power Pack (oil level switch/dump)
- Product (AR) Pump speed
- Speed sensor, Proximity or GPS
- Spray Dump
- Flow Meter
- Fan speed control
- Fan speed sensor (2 required for WindComp)
- Hydraulic (Fan) pressure (only when using WindComp)

See schematics diagrams and controller manuals for more detail.

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LIQUID SYSTEM OVERVIEW

"Front End" Spray Controls

The Liquid flow is

- A. **Tank selection** valve (shown to the right in the off position)
- B. From the selection valve to the **suction filter**
- C. The **Suction** hose going **to the pump** (in this example the pump (not shown) is mounted on the self-steer drawbar).



- D. **Pressure** hose coming **from the pump** to the ...
- E. **Pressure manifold**. This includes the **master pressure** adjustment (red knob) and flick switches to activate the **probe**, front & rear **agitators** and the **basket**/powder mix

- F. A **Dump** valve (blue band) (7 seconds) **proportional/servo valve** (grey band) (closest to camera) & then ...
- G. **Pressure filter**, onto the ...
- H. **Flow meter**
- I. **Section valves** – in this example are 4 sections. From here to the manual section taps are the rear



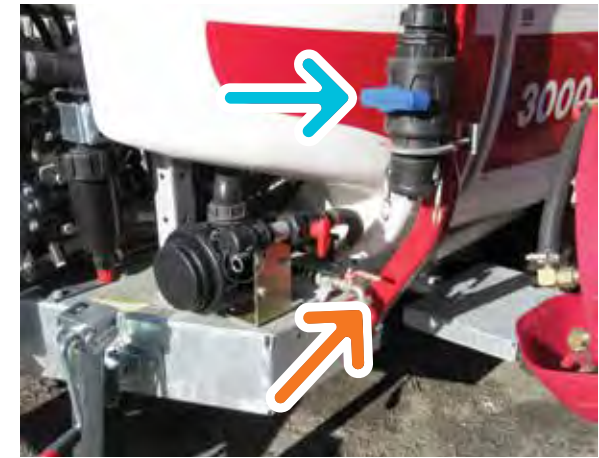
- J. **Pressure gauge**. The pressure is taken from the end of the section valve assembly.
- K. **Suction probe** connection.
- L. **Remote fill** connection.

TANKS & SUCTION PLUMBING

All models feature three tanks, Main (chemical), (fresh) Flushing, and (fresh) Handwash for easy operation, cleaning, and operator safety.

All Main tanks are equipped with large lid and basket filter. Plumbed to the filter basket is a Basket/Powder Mix function activated via a tap from the pressure manifold.

All Flushing and Handwash tank lids should be clearly labelled as WATER ONLY. Replacement labels are available under the part no. XD-127V.



All sprayers have a Handwash tap positioned near the main filter (**see orange arrow**).

Filling the Main tank can be via the basket or separate / remote fill tap and camlock (**see blue arrow**). On the 2000 model the Camlock is on top of the tank (**see the purple arrow**, photo on page 27).

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The fresh water Flushing tank on the 4000 model is incorporated into the main tank and has a separate lid (see green arrow). The handwash tank is at the rear of the tank (green circle). The 4000 Flushing tank can also be remote filled via camlock coupling mounted near the main filter.



4000 Flush camlock fill

The freshwater flushing tank on the 3000 model is a separate tank that fits below the main tank and is filled via



a fill tube accessed from inside the handwash tank at the rear of the sprayer (see red arrow).



The 2000 model features separate flushing and handwash tanks integrated into the design of the main tank (circled).



Main Tank Drain

All models have a main tank drain positioned near the step on the left hand side (blue circle).

Please dispose of any chemical in a safe and environmentally responsible manner.



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Tank Selection Valve

The tank selection valve has 3 x positions.

1. **SPRAY** - In this position the pump will draw liquid from the main chemical / product tank.
2. **FLUSH** - In this position the pump will draw fresh water from the auxiliary flush tank.
3. **OFF** - In this position ALL liquid is isolated from the pump. It is only recommended to use this position when pump is not operating i.e. Cleaning out suction filter.

If changing from SPRAY to FLUSH always turn off the pump before making the change.

Main Suction Filter

The main suction filter should be checked and cleaned on a regular basis.

Before opening the filter body, ensure the pump is not running & the Tank Selection Valve is in the OFF position.

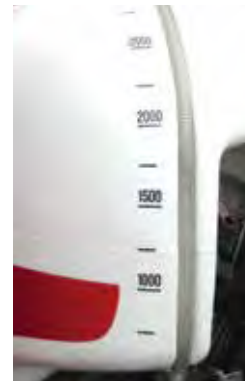
To be safe, always assume there is chemical present and take the appropriate safety measures.

Always wear gloves.



Sight Gauges

All main tanks are fitted with both a front (RH side) and side (LH Side) sight gauges. Inside of each clear sight hose is a white float which can be read against the tank markings to display the approximate volume remaining in the tank.

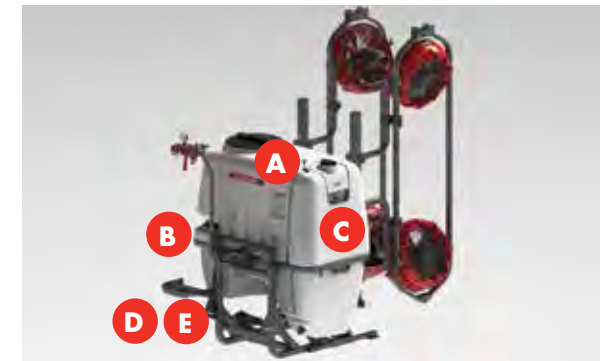


1000 Litre & Linkage tanks & fill

The 600, 800 and 1,000 Lt linkage models plus 1,000 litre Trailed sprayer models are equipped with

- A. Main tank with level indicator scale, large lid, filter basket, and drain tap.
 - o The Linkage tank "pull drain" is activated via a pull cord handle located on the top of the tank.
- B. Flushing tank
- C. Handwash tank
- D. Suction filter
- E. Tank selection valve

All tanks are filled individually via the lid.



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Photo 1

PUMP & PRESSURE PLUMBING

On the pressure output side of the AR pump flow goes to....

- A** Pressure Manifold where the maximum required pressure is set (central red knob), and 4 manual flick tap valves for ...

1. Probe
2. Front Agitator

3. Rear Agitator
 4. Basket/Powder Mix (optional for some versions)
- B** Servo Dump & Filter manifold which includes
- Dump valve **b1** (fast-acting – identified by blue band/not visible in photo above)
 - Pressure regulating/servo valve **b2** (slow-acting (7 seconds) – identified by a grey band (visible below **b2**))
 - Pressure filter



Photo 2

- C** And then onto the flow meter and the spray sections valves (2 sections in the example of photo 1)

The pressure gauge is mounted either at the front of the Micro Power Pack (see photo **D**), or on the RH side of the sprayer (as per photo 1) if not using a Micro Power Pack.

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The section valves (C) feed manual spray ring taps at the rear of the sprayer. Note in the 2 section example shown above there is independent feed to both the left and right sides and a blanking plate in the middle.



Photo 3

Flow Meter

All QM-420 Sprayers fitted with an optional auto rate controller are also fitted with a flow meter. As a part of the initial factory testing/calibration, a value (pulses per litre) will have been recorded and written on the body of the meter (shown here in blue) or the back of the serial number tag.

Refer to Section 5 for more information on how to operate these functions.

SECTION CONTROLS

All QM-420 sprayers are plumbed into spray sections, dependent on the sprayer model and spray controller (see pages 23 & 24).

- All Linkage and single row sprayers are plumbed 2 sections,
 1. left (section 1)
 2. right (section 2)
- All 2-row sprayers are plumbed 2 sections, as per single row,
 1. left (section 1)
 2. right (section 2)
- All 3-row sprayers are plumbed 4 sections, and the sections mirror the switching of the HV4000 controller.
 - > Section 1 is Left 1, inner rows
 - > Section 2 is Right 1, inner rows
 - > Section 3 is Left 2, outer/3rd row
 - > Section 4 is Right 2, outer/3rd row

To operate the sprayer the appropriate sections must be turned on, and the required spray ring (s) also turned on.



TIERED SPRAYING

Dual spray rings make it possible to achieve a greater application rate spectrum, more consistent spray pressures, reduces nozzle changes & helps to eliminate off-target spray drift via 3 Tier spraying.

- Tier 1/Low rates = Inner rings ON/Outer rings OFF.
- Tier 2/Medium rates = Inner rings OFF/Outer rings ON.
- Tier 3/High rates = Inner & Outer rings ON.

Note; QM-420 Sprayers are using the convention of:

- The smaller/inside spray ring uses the smaller nozzles.
- The larger/outer spray ring uses the bigger nozzles.

Note both rings use the same diameter stainless steel tube, it's the circumference of the ring that's smaller or larger.

Operators can select different nozzles to suit their requirements – it might be the same nozzle on every spray ring, or it might be a specialist nozzle on either of the spray rings.

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The photo shows inlet (top) and outlet (tap at the bottom) of the outer/larger diameter spray ring. The inner spray ring has similar connections on the opposite side.

Each spray ring can also be turned on or off via a manual (red/flick tap) valve located at the rear of the sprayer. Each tap will be labelled T1 or T2. A variety of different labels are used depending on the sprayer configuration.

Photo below shows a 4-section bank of taps. The top set of taps are ON, and the lower bank of taps are OFF.

| | |
|-------|----|
| FAN 3 | T2 |
| FAN 3 | T1 |
| FAN 2 | T2 |
| FAN 2 | T1 |
| FAN 1 | T2 |
| FAN 1 | T1 |



| | | | | | | | |
|----|----|----|----|----|----|----|----|
| T2 | T1 | T2 | T1 | T1 | T2 | T1 | T2 |
| LL | LL | L | L | R | R | RR | RR |



CHASSIS ETC

Hot-dipped galvanised full-length heavy-duty chassis with optional axle types, a choice of fixed or self-steer draw bar (Standard on all QM-420 trailed models), slide-out step & jockey stand.

Drawbar

The drawbar is supplied at its longest length. If required it can be shortened by 1 hole/110mm spacing.

Refer to pages 35 & 36 for more information re 2 or 3-point hitch, self-steer drawbars.

Jockey stand(s)

All trailed QM-420 Sprayers come fitted with an extendable Jockey Stand suitable for storage of the sprayer. If supplied with 3-point linkage, self-steer drawbar there will be a total of 3 jockey stands provided.

Linkage models have a slide-out parking legs for extra stability (standard on 1,000 Lt, optional on 600 & 800 Lt).

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Photo ?

Step

The step, as pictured is in the stored position. For access to the tank lids/fill Camlock (2000 model) etc, the step must be moved and secured into the extended position.

For the 4000 model, the lids are in a very difficult position to access via the step. For this model, and for access to any other parts of the sprayer not readily accessed from the ground, the operator should use an appropriate platform step..

Linkage models (see Page 33) have an optional pull out/ fold down step for the 600 or 800 Litres models and standard for the 1,000 Lt model.

Axle, Wheels & Tyres

All trailed single row sprayers are fitted with a single fixed axle as standard.

Walking beam tandem axle is fitted as standard on all 2 and 3 row sprayers.



For further identification of the axle, wheel, and tyre types see the Sprayer Specification Sheet that's included with every sprayer's Warranty & Pre-Delivery Booklet.

Wheel Speed Sensor

All trailed sprayers optioned with Auto-rate control are fitted (with exception of 1000 Lt), and optioned with an Auto-rate controller are fitted with a Speed Sensor – normally via a proximity sensor installed on the right-hand side, rear wheel. The sensor needs to be 5mm from the target, which in this case is the rear fan of the wheel studs on the back of the axle. The sensor is reading cm per pulse.

A GPS speed sensor (Atlas 100) can be fitted as an alternative option.

Pump Speed sensor

When required (hydraulically driven pump), the same sensor is used for the spray pump speed. The sensor is reading 1 pulse per revolution.



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LINKAGE

800 Litre Linkage QM-420 sprayer shown.

A. ARUCM5 controller.

B. Steps (folds away when not in use).

C. Slide-out parking legs (adjustable).

D. Frame "stand-off" brackets. Rotate for width adjustment.

E. Fan Frames



3-point Linkage

The 600 & 800 litre models have Cat II for the lower linkage arms, and Cat I for the top link with sleeve if your tractor has Cat II.

The 1000 litre AgriPak sprayer has a clevis-type Cat II & III hitch for the lower arms and Cat II for the top link.

All QM-420 Linkage models also come supplied with the Linkage manual, LP-OMLINK-B

Sprayer specifications are subject to change without prior notification.

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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

If not using a Micro Power Pack, ensure the tractor to be used has sufficient hydraulic oil flow at the required pressures (max 2,750 psi) to handle the tasks required. If in doubt consult the tractor dealer/manual.

The QM-420 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 2 or 3 point linkage, self-steer drawbar to the tractor
2. Connect the PTO shaft to the tractor and sprayer
3. Fit the hydraulic hoses to the tractor (if applicable)
4. Fit the controller (if applicable) and all other relevant connections to the tractor

The QM-420 Sprayer must be connected to a suitable tractor, making sure the drawbar and PTO shaft are fitted according to the supplied instructions.

Always park the sprayer in a horizontal position and on firm, level ground. Use wheel chock's if required.

Once the sprayer is connected to the tractor always ensure the stands are removed or folded to the horizontal before moving.



(1) Drawbar

All trailed QM-420 Sprayers are fitted standard with a self-tracking drawbar. The drawbar is supplied at it's longest length. If required it can be shortened by 1 hole/110mm spacing.

(2) Self-Steering Linkage Drawbars

The self-tracking drawbar is available in several versions ...

- 3 point linkage (as a part of the Micro Power Pack assembly) or with the product pump (see photo below), or



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- 2 point linkage with the product pump (see photo next column) as a part of the drawbar.

In this way, the PTO shaft is maintained in an optimum position for tight turning.

Follow the instructions below to connect the linkage self-tracking drawbar to the tractor:



- Ensure the sprayer chassis is horizontal (it may be up to approximately 3 degrees lower at the front).
- Connect the tractor linkage arms to the self-tracking drawbar linkage pins & fit the locking pin clips.
- (Micro Power Pack) Adjust the top/3rd link arm to ensure the Micro Power Pack's oil tank is sitting vertically in normal operating height.
- Ensure tractor sway bars are adjusted & locked into position.



(3) Fit the PTO Shaft

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 Quantum Mist™ after transit. Note 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 Quantum Mist™ 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 Quantum Mist ensuring the locking pin is correctly located.

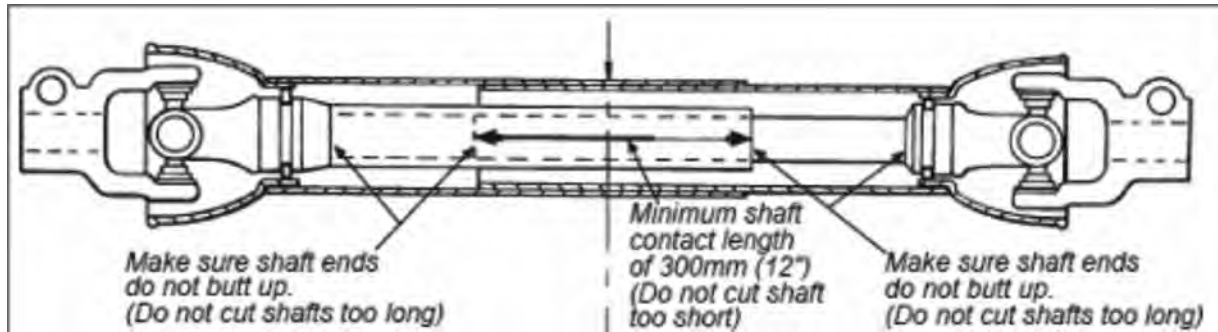
Cutting the PTO shaft to length requires knowledge of this procedure. If you have not carried out this procedure before, ensure your dealer carries out this important step.



- 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).

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(4) Connect the Hydraulic Hoses to the Tractor

It's important to correctly set-up the hydraulic supply for the tractor. Your dealer can oversee this procedure to ensure no damage or warranty issues will result from incorrect set-up. A small charge may be incurred for this procedure.

The number of connections to tractor remotes will vary with the model and options chosen.

- Hydraulics are required to drive the spray fans on all QM-420 sprayers, either via tractor remotes or via Micro Power Pack.
- For some models, depending on options chosen, tractor remotes are required to operate the hydraulically driven spray pump.
- All multiple row QM-420 sprayers will require a hydraulic connection for boom folding. Depending upon options chosen this might require ...
 - 2 sets of tractor remotes for left and right boom arms for independent control or

- 1 set of remotes using the electric/hydraulic diverter (HT-EDV option) for left and right, or ...
- 1 set of remotes to supply oil for a combination of multiple boom functions boom folding, terracing (if fitted) and/or row width adjustment (if fitted) operated via a hydraulic function box in the cab.

Note all Croplands sprayers use banded, colour coded hydraulic hoses. The pressure line is identified as 2 bands and the return line is always a single band.

Oil supply (and return) to fans is identified as **YELLOW**.

Oil supply to the product pump is identified as **WHITE** (not red as per photo top right).

For models without a Micro Power Pack, oil supply to the fans requires a 1/2" pressure line connection to tractor remote, and a 3/4" return, **DIRECT BACK-TO-TANK**.

- Decide on the best supply remote on your tractor to use for oil supply for the fan system. It's recommended to use a detentable rear remote with flow control.

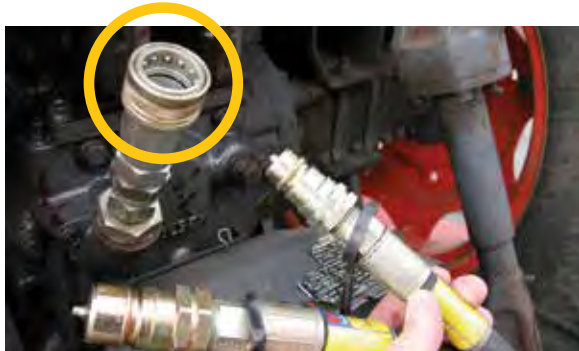


- Plug the 1/2" oil supply line coupling to your selected remote and ensure the hydraulic line does not foul your PTO or any working parts at the rear of the tractor. Allow sufficient slack in the hydraulic line for turning.
- Hook up the 3/4" return line to the tractor (direct back to tank). As with the pressure line, ensure there is sufficient slack & no interference with tractor working parts. NEVER connect the return line to the conventional return port.



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NOTE; Supplied with each unit (when required) is a $\frac{3}{4}$ " fitting for the tractor's return to tank port, as shown and circled in orange. This is to ensure there is no back-pressure on the oil return from the Quantum Mist sprayer. Ask your dealer to fit the $\frac{3}{4}$ " female return coupler direct back-to-tank.



NEVER connect the (fan) return line to the conventional return port, **MUST** always be connected to the "direct back to tank" port. **ALWAYS** double check that the return line is properly connected before engaging hydraulics. Failure to comply with this instruction can lead to catastrophic hydraulic failure.

For models using a hydraulically driven spray pump, (and not using a dual pump Micro Power Pack), connect the $\frac{1}{2}$ " pressure and return line hoses to the same set of tractor remote couplings.

Best practice is to set the pump rpm manifold to maximum (circled in blue) and adjust the tractor oil flow to give the pump speed required.

Pump speed is displayed on the HV4000 Controller, (if fitted). DO NOT exceed 540 rpm.

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HOOK-UP HV4000 AUTO RATE CONTROLLER

If ordered. Install/connect the HV4000 auto rate controller on a QM-420 sprayer without WindComp.

The controller has been fitted and adjusted at the factory but has been disconnected and packed for transit, along with the required power/connection looms and RAM mount.

Connect the main loom. Find a suitable position external of the cab for the 24 pin plug connection. It's recommended that the connection be orientated as per photo right, with the cable entry on the bottom side (to help prevent water ingress).

Normally this connection is positioned behind and external of the cab/somewhere near the hydraulic remotes. Route the loom into the cab and find the best position for the controller with the remaining length of the harness.



Fit the controller/console into the tractor cab in a convenient & safe location for the operator.

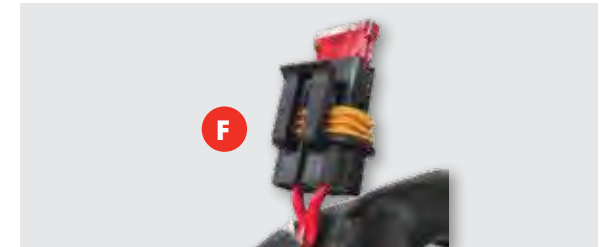
Ensure the wiring cannot interfere with the PTO shaft or any tractor functions.



The connection loom features

- A. Connection to the HV4000 controller
- B. Power connection

- C. Micro Power pack or spray pump speed – using in conjunction with another connection loom
- D. Speed - GPS (or can be any speed via pulse).
- E. Earthing lead – not generally used
- F. Fuse, 10 amps



- A. Connection to the HV4000 console via Con port 2. Refer to photo 1. Be careful to correctly align the pins before tightening.



photo 1

SECTION 5

PRE-OPERATION

- B. Power connection requires a connection to the power loom (supplied). Refer to photo 2.

It's highly recommended the power loom(s) are hard-wired at the battery rather than hooking up to cab connections. Only qualified persons should assemble/disassemble or service electrical components. The fuse is 10 amps.



photo 2

- C. The "green" 5 pin connector is used when the sprayer is fitted with a Micro Power Pack or spray pump speed and requires an extra loom (HV40LOOM/2A). Connect to CON 1 and CON 2 as shown in photo 4.

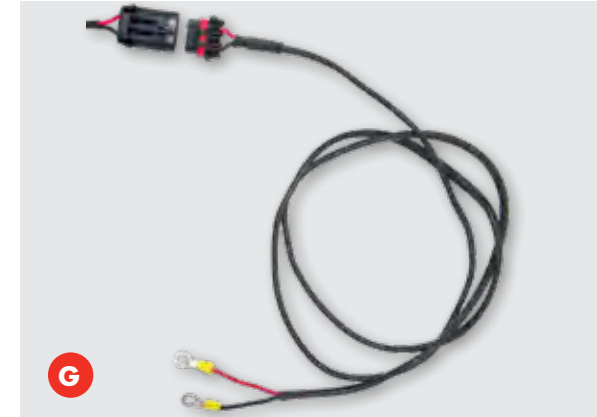


photo 4

- D. The "purple" 3 pin connector is used when GPS speed or an extra speed-related connection (pump speed etc) is required.



photo 5



- G. In addition to the main loom, is a power lead for the oil cooler fan (if fitted). Usually, this is connected to a power source in the cab.

Supplied with each HV4000 is a "RAM" Mount. This will normally be fitted by the tractor dealer as a part of the installation process.



SECTION 5

PRE-OPERATION

HOOK-UP WINDCOMP

If ordered.

Most QM-420 sprayers equipped with the WindComp feature will also use the above HV4000 auto rate controller PLUS in addition the OPUS A3 controller, for control of all fan speed functions. Note the fan speed function on the HV4000 is not activated.



Photo below shows the rear of the A3 controller, with loom connected and hardware suitable for RAM mounting.

Ensure the wiring cannot interfere with the PTO shaft or any tractor functions.

From the sprayer the primary connections are for the main connector (for HV4000), power for the oil cooler fan, and Deutsch connector for the A3 controller.

Photo below shows these 3 connections for a single row sprayer – note a multiple row sprayer with multiple boom functions plus power pack will have many more connections.

The main connecting loom between controller and sprayer has the following connections ...

- a) Power connecting. When using the HV4000 controller this section plugs (T's) into the HV4000/Power loom.
- b) Main connector to the A3 controller.
- c) Switch on/off.
- d) Connection to sprayer side loom.
- e) This connector is used in the factory to load or update software.



SECTION 5

PRE-OPERATION

HOOK-UP BRAVO 180

Connecting the Bravo 180 is similar to the HV4000 at the sprayer end – with different connections at the cab and controller.

It's highly recommended the power loom(s) are hard-wired at the battery rather than hooking up to cab connections. Only qualified persons should assemble/disassemble or service electrical components. The fuse is 10 amps.

Ensure the wiring cannot interfere with the PTO shaft or any tractor functions.



HOOK-UP BOOM SWITCH BOX

There are 2 options for booms switch boxes – diverter box or switch box.

In both cases power is sourced from in-cab - ensure the RED wire is attached to the positive terminal & the BLACK wire to negative.



Photo 1

LH/RH diverter box

Connect the loom from the diverter box to the appropriate loom from the sprayer.

Note photo 1 shows the complete loom from the control box plus power lead (top of photo) to the sprayer connection (middle of photo) to the booms. The sprayer will be delivered with the sprayer side already installed.

Secure the box in a convenient location in the tractor cab.

Ensure the wiring cannot interfere with the PTO shaft or any tractor functions.

Multiple function switch box

Connect the switch box to the sprayer via the connecting loom as shown.

Note photo 2 shows the switch box with in-cab power lead plus connector to the loom to bridge between cab and sprayer. The sprayer will be delivered with the sprayer side already installed.

Secure the box in a convenient location in the tractor cab.

Ensure the wiring cannot interfere with the PTO shaft or any tractor functions.



Photo 2

SECTION 5

PRE-OPERATION

HOOK-UP MICRO POWER PACK

If fitted, the Micro Power pack will already be connected to the sprayer side. Connection to HV4000 and Bravo 180 is described on previous pages.

When operating a HV4000 system - a low oil level in the pot will trigger the fans to stop and an oil level alert will show on the controller screen.

When operating a Bravo 180 system - a low oil level in the pot will trigger the fans to stop and low fan speed alarm will show on the controller screen.

When operating the sprayer without either the HV4000 or the Bravo 180 – a standalone on/off/alert loom and control box (CHLOOM-MICROCAB) are used.

When low oil level is triggered, the “dump” valve is activated in the hydraulic soft start manifold. See below right (circled in blue).



When low oil level is triggered, the “dump” valve is activated in the hydraulic soft start manifold (circled in blue).



LIGHT KIT

If fitted, connect the light kit (brake lights and indicators) to the tractor.

This option comes fitted with a “standard” 7 pin round plug. If an alternative plug is required, Croplands Technical Support can supply a wiring diagram.



CONFIRMING BOOM FUNCTIONALITY

With the hook up completed, the functions need to be tested before using the sprayer with chemicals.

Add some freshwater to all the tanks. Refer to the checklist at the end of this chapter on page 52.

Power up the tractor and engage the hydraulic system (via tractor remotes or PTO driven Micro Power Pack) - no need for full power at this stage – if using the PTO, set to 350rpm.

The below descriptions reference 2 set-ups.

- **MANUAL** controls/simplest functionality.
- **CONTROLLER**, Auto rate controller (HV4000) and boom function switch box.

SECTION 5

PRE-OPERATION

Left and Right Boom Arm



MANUAL; Use the tractor hydraulic levers to open and close the required boom arm.

Parked width can be adjusted via the parking brackets.

Note or tag the tractor remote connections (which remote/direction is for pressure to open or closed) for future hook-ups and consistency of use.

If using one set of remotes to control both left and right boom arms – the diverter switch box will be installed. Select either left or right before engaging the hydraulics.

CONTROLLER; Use the switch box to toggle the boom position from fully open and return to parked position.



Left and Right Terracing

The terracing slides have a visual height indicator to aid operation.



MANUAL; Use the tractor hydraulic levers to raise and lower the required terracing boom arm.

Note or tag the tractor remote connections (which remote/direction is for pressure lift or lower) for future hook-ups and consistency of use.

CONTROLLER; Use the switch box toggle to lift or lower the left or right-hand booms

SECTION 5

PRE-OPERATION



Left and Right Row Width Adjustment

Note the 2nd and 3rd-row fan frames are set at a fixed distance apart. See more details "setting up the booms" on page 49).

MANUAL; Use the tractor remotes to adjust the (fan) row width of each boom arm.

Note or tag the tractor remote connections (which remote is for left or right, in or out) for future hook-ups and consistency of use.

CONTROLLER; Use the switch box toggle the left or right-hand boom slides as required.



SECTION 5

PRE-OPERATION

CONFIRMING FAN FUNCTIONALITY

The fan system features a built-in 5 ~ 7 second "soft start/soft stop" system to protect the fans against excessive loads on start-up. The maximum allowed speed is 3,000 rpm although some models will have a lower maximum speed.



Photo 1

MANUAL; For the initial start-up use low tractor rpm (for tractor supplied hydraulics) or low PTO speed (for Micro Power Pack) and gradually increase speed as required. Use the tractor remotes to activate the fan hydraulic circuit.

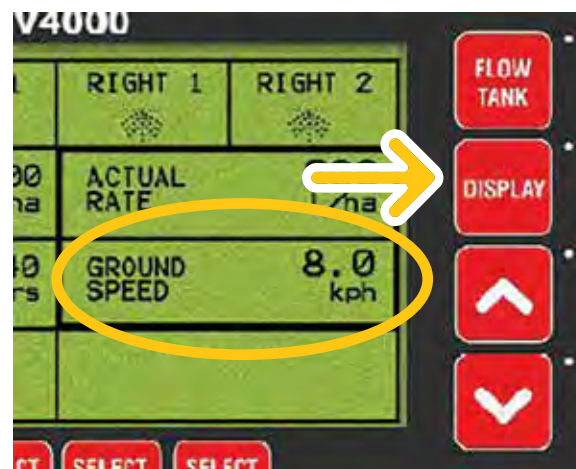
Adjust the fan speed via the manual speed control valve (ref photo 1), normally situated on the back face of the hydraulic soft start block.

From the factory, this valve will have been set at 2,500 rpm. Turn out for lower rpm and in for higher speeds. Check for full range of functionality and set for the intended use. Once rpm is set, engage the locking nut.

CONTROLLER – HV4000; The fans will not operate until the HV4000 controller is turned on and the fan speed function is activated. See page 47 of the HV4000 manual Continue to press the DISPLAY button until Fan speed shows. Use the arrow keys to adjust the fan speed.

For the initial start-up use low tractor rpm (for tractor supplied hydraulics) or low PTO speed (for Micro Power Pack) and gradually increase speed as required. Engage the tractor remotes (or PTO) to activate the fan hydraulic circuit.

Adjust the fan speed via the HV4000 controller. Check for a full range of functionality.



CONTROLLER – BRAVO 180; The fans will not operate until the BRAVO 180 controller is turned on and the fan speed function is activated.

See supplied (with the controller) information sheet.



For the initial start-up use low tractor rpm (for tractor supplied hydraulics) or low PTO speed (for Micro Power Pack) and gradually increase speed as required. Engage the tractor remotes (or PTO) to activate the fan hydraulic circuit.

Adjust the fan speed via the BRAVO180 controller. Check for a full range of functionality.

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PRE-OPERATION

CONTROLLER – WINDCOMP; The WindComp fan speed system operates independently of all other (rate) controllers. There is a power on/off switch for the system located on the wiring loom near the controller.

For the initial start-up use low tractor rpm (for tractor supplied hydraulics) or low PTO speed (for Micro Power Pack) and gradually increase speed as required. Engage the tractor remotes (or PTO) to activate the fan hydraulic circuit.

Adjust the fan speed via the A3 WindComp controller. Check for a full range of functionality.

Activating/Deactivating Fans: Press the button next to <Fan On/Off> to turn the fans On/Off. A red light next to <Fan On/Off> will be lit when the fans are activated.

Setting Fan Speed with no WindComp: When <Wind Comp %> is set to 0 (as shown above) adjusting <Fan Speed %> will adjust the fan speed for both the LH & RH facing fans and they will adjust evenly.

Turn the rotary dial until the yellow box is above <Fan Speed %>. Press the rotary dial in and the box will turn green. When the box is green the rotary dial can be turned to set a number between 0 & 100 with 100 being full fan speed.

It's best to adjust this number while the fans are activated as you will see the fan speeds change while turning the dial. Once the required fan speed is displayed, press the rotary dial in to set the speed. The box will turn yellow again.

Selecting WindComp Direction: On the screen, there will be an arrow pointing to <Left Wind> or <Right Wind> even if no WindComp is activated.

The wind comp direction can be changed by pressing the button next to the direction without the arrow. The direction with the arrow indicates which facing fans are going into the wind and will have the higher fan rpm if wind comp is activated.

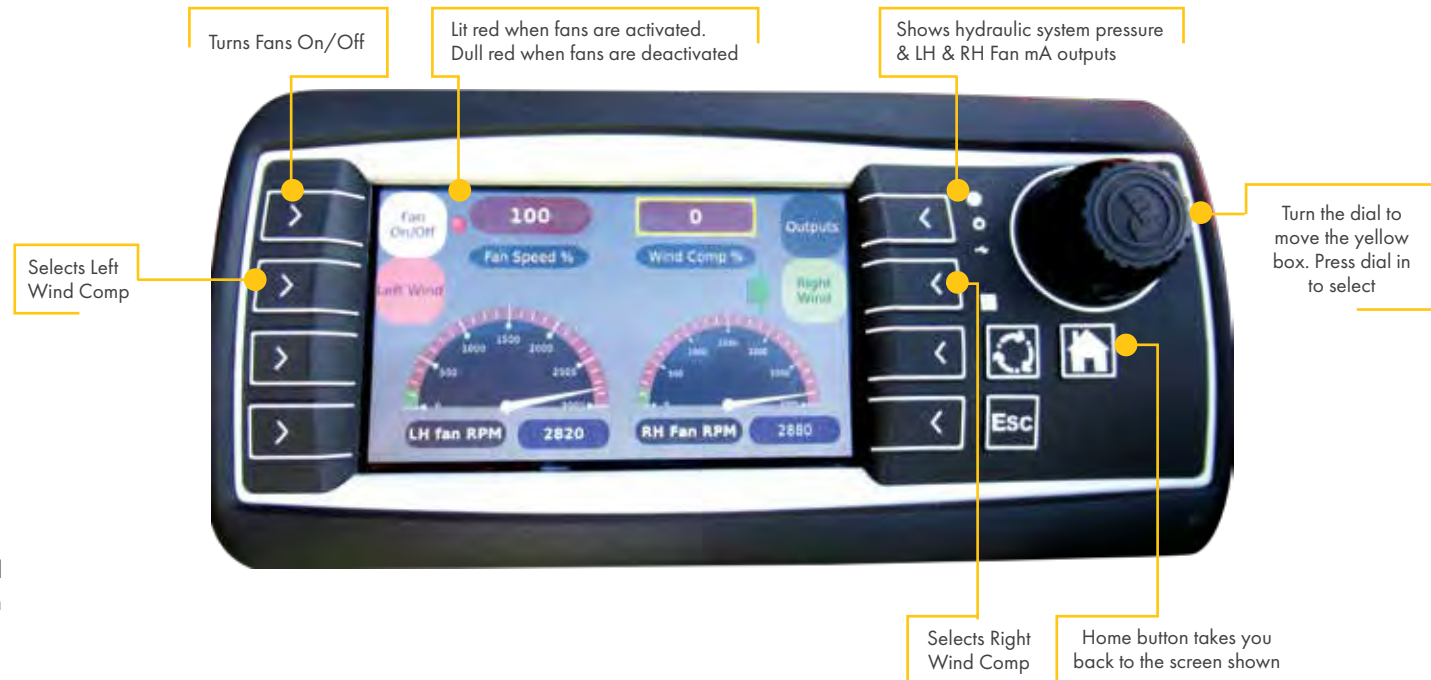
Setting Wind Comp: Turn the rotary dial until the yellow box is above <Wind Comp %>.

Press the rotary dial in and the box will turn green. When the box is green the rotary dial can be turned to set a number between 0 & 100 with 100 being the largest difference is fan speed between the LH & RH facing fans. It's best to adjust this number while the fans are activated

as you will see the fan speeds change while turning the dial.

Once the required fan speeds have been achieved, press the rotary dial in to set. The box will turn back to yellow. When <Fan Speed %> is set to 100 the wind comp will only decrease the fan speed for the side going with the wind. When <Fan Speed %> is set lower than 100 you will get an increase in fan speed to the side going into the wind and a decrease in fan speed to the side going with the wind.

Note: The fan speed will never increase more than 100%



SECTION 5

PRE-OPERATION



Photo 1

SET-UP SPRAY PRESSURE

Croplands recommends to set the maximum system pressure to be 10% above the chosen spray pressure which is normally an extra 0.5 - 0.8 bar.

If fitted with rate controller, the auto rate controller will make automatic pressure adjustments to control rate.

The pressure is set via the **central red knob** of the manual Pressure Regulator Valve (see photo 1).

The regulator will need to be adjusted from time to time as spray rates will vary throughout the year.

WARNING; To set and forget at a high pressure will put undue stress/wear and tear on the system. Maximum recommended pressure is 12 bar but 5 ~ 8 bar is the normal recommendation.

To set for the first time:

- Ensure that the nozzles fitted on the sprayer are applicable to your desired rate & recommended operating pressure.
- Wind the pressure control knob anticlockwise to ensure the sprayer starts up with limited pressure
- Ensure the tank valve is in the SPRAY position
- Start the tractor & ensure the electric control box or auto rate controller (if fitted) is turned ON.
- Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 430 and 540 rpm
- Engage both Front and rear Agitators
- Note: The fans do not have to be engaged during this process

- Activate spraying via the fitted (be it manual or auto rate) controller, with the required spray rates and with all relevant sections/fan Tier taps open. Wait 10 seconds for the system to settle, then
- Slowly wind the pressure control knob clockwise (if needing to increase pressure) until your required operating pressure is reached, and add a further 10% surplus pressure.
- Example - If the application rate is 500 L/ha and with your row width/nozzles & spraying speed the rate is achieved at 7 bar, you would set the maximum system pressure to 7.7 bar

Once done, leave the manifold setting (red knob) "as is" until a change of operating pressure is required.



SECTION 5

PRE-OPERATION

SET-UP THE BOOM/FAN POSITIONS

It is recommended that the setting up of the Quantum Mist QM-420 Sprayer boom and fan positions should be done in conjunction with a qualified specialist. (Croplands dealer, Croplands Representative, Agronomist or Spray manager).

The optimum set-up will vary significantly from vineyard to vineyard & stage of canopy growth.

Figure X shows a typical row width set-up for a sprayer operating in a 3.0 metre row width.

Main Boom Arm, Row Width Adjustment

For ease of use, it's suggested to take all measurements from the centre of the fan frame as shown in figures.

As a starting point, set the fan frames down the middle of the row. The fan face (guard) will be closer to the canopy by 70mm. The boom arm holes are set in increments of 300mm.

For 3 row sprayers (ref figure Y) where the minimum spacing between both fan frames is 675mm (as determined by the tie rod), set the middle point of the fans to be in the middle of the row.

1st Row/Rear Booms

Fan frames behind the sprayer are side-mounted and manually adjusted for row width via the "standoff's" which mount to the main tower.

Don't to forget to reset the fan frame orientation after changing the row (standoff) width (L).

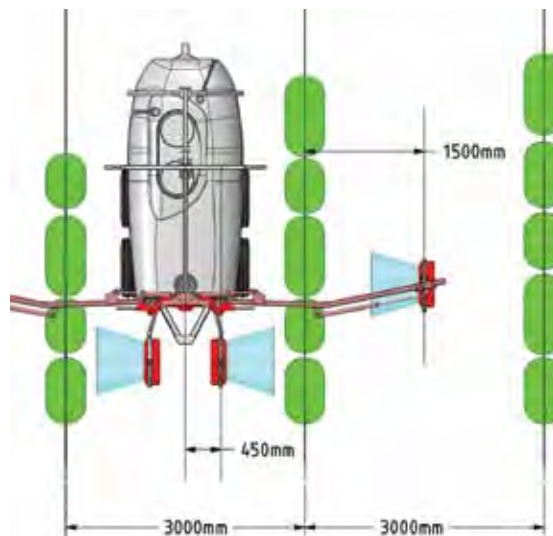


Figure X

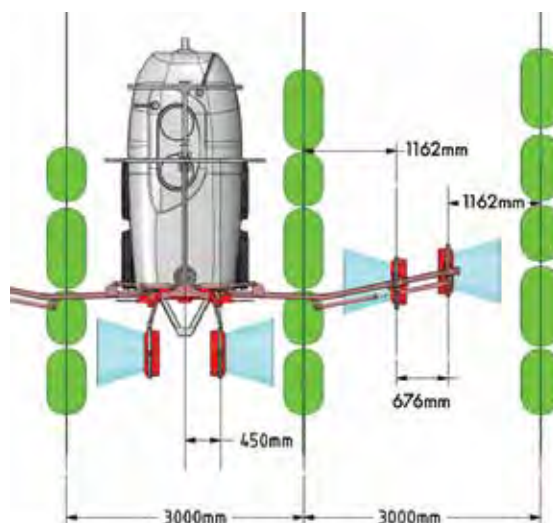


Figure Y



The positioning of the rear boom positions can impact fan performance ...

- Less than 800mm between fan frames may see some loss of overall effectiveness.
- Fans too close to the canopy may leave gaps in the coverage (unlikely with 3 fans per frame).
- 900mm between fan frames is considered the ideal starting point as it's well protected behind the sprayer, wide enough to have excellent fan "air" and generally an ideal distance to the canopy.

SECTION 5

PRE-OPERATION

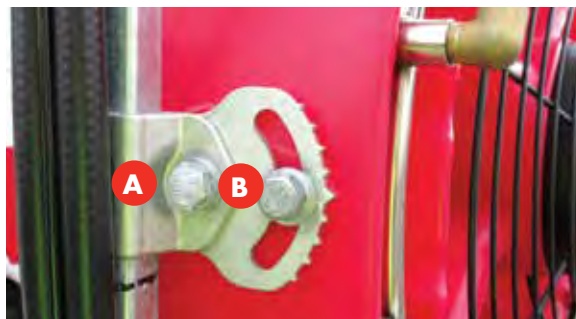
Positioning the Fans

For those setting up 3 fans per frame sprayer – congratulations, it's hard to miss the target, and far less critical on setup than 2 fans per frame.

The following fan positioning adjustments are available in order to maximise spray efficacy.

- Moving fans up and down within the frame to best position spray in relation to the canopy. Adjustment via loosening the fan clamps at position A.
- Angling fans up (common with bottom fans) straight ahead or down (common with top fans). Adjustment via loosening the fan clamps at position B.
- Rotating the fan frame to point the fans forwards (direction of travel) or to point backwards. This adjustment is made at the swivel head on page 49.
- The fan (fan frame) distance from the canopy is adjustable via boom slide positioning.

We recommend recording your boom & fan position settings. This data can be used to ensure consistent & repeatable outcomes going forward.



Fan Clamp - Reversed

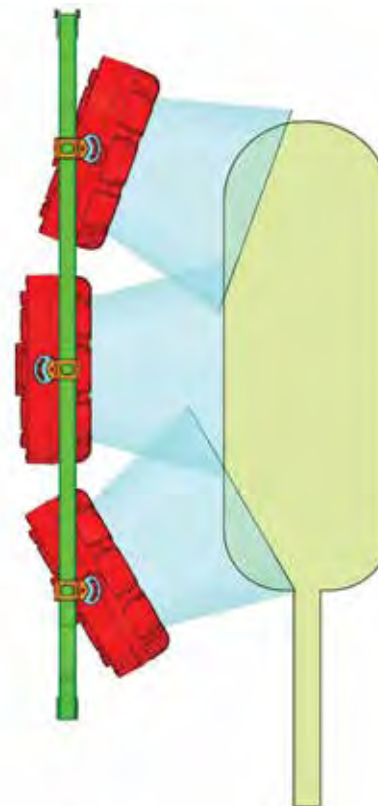
Fan Clamp

Note the stainless-steel fan mounting clamps have “teeth” set at every 10 degrees, and the gap between is 5 degrees. Total movement of 45 degrees up and down, either side of centre (larger “tooth”).

Both M12 bolts on both sides need to be loosened to enable adjustment of the fan position or angle. The cowling inserts are brass.

The “normal” fan position is with a minor portion of the fan sitting forward of the frame (hence better protected), as shown in the middle fan.

However,, the fan frame clamps can be installed “backwards” which will offset the fan 130mm closer to the canopy. This is an option for top and/or bottom fans (as shown here) which are usually angled downwards or upwards.



SECTION 5

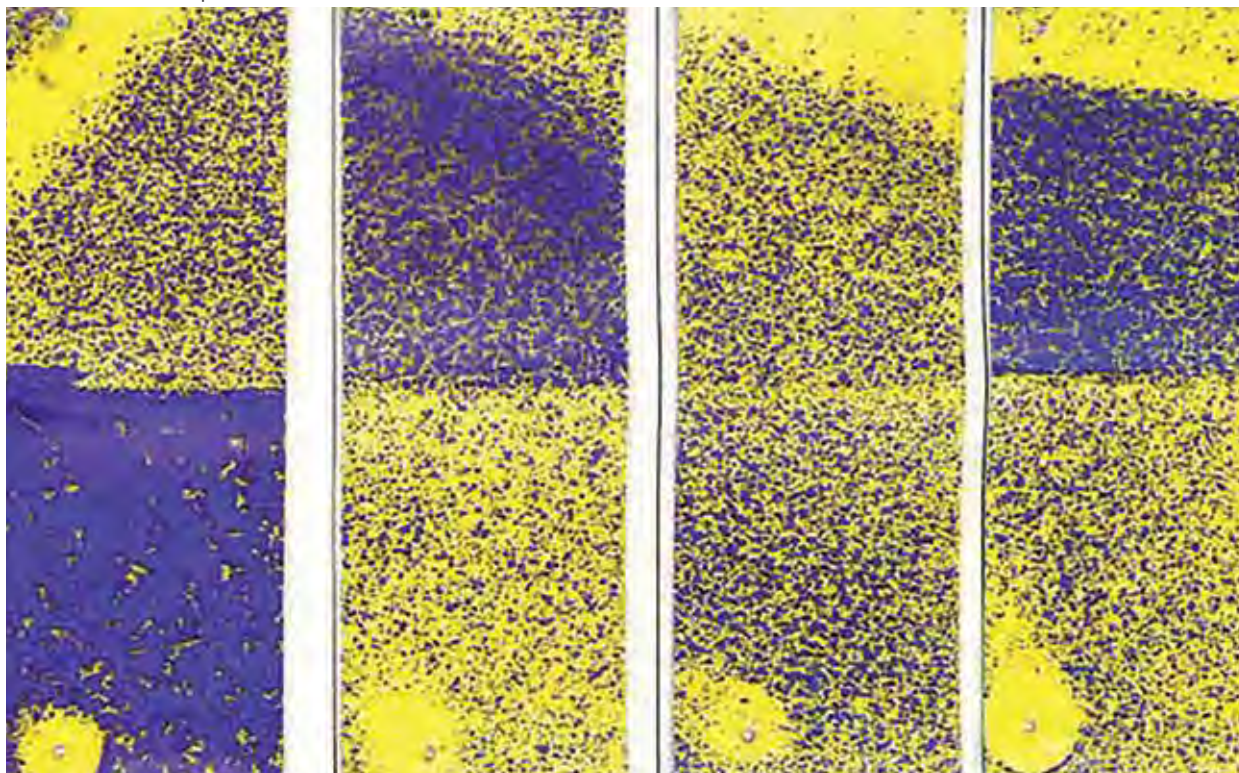
PRE-OPERATION

If this change is made – double-check clearances with the boom in the parked position.

Examples of Fan Configurations

Fan set-up is unique to each vineyard, canopy and spray task at hand. The following is for **EXAMPLE ONLY** based on prototype development done in Barossa Valley sprawl canopy Shiraz and similar.

Water sensitive papers are a great way to check and are available from Croplands.



The best 3 fan (per frame) setup was

- Fan frame square to the target
- Bottom fan angled upwards by 25 degrees
- Middle fan angled upwards by 10 degrees
- Top fan angled downwards by 20 degrees
- Fan speeds between 2100 and 2300 rpm were sufficient to get the job done.

The best 2 fan (per frame) setup was

- Fan Frame square to the target
- Fans approx. 1100mm apart (measured at the clamp centrelines)
- Both fans set to 20 degrees (bottom up 20, top down 20)
- Fan speeds were around 2500 ~ 2600 rpm

Back to back testing against QM-500 sprayers has been more than favourable.

The 3-fan frames x QM-420 being the most outstanding performer in all conditions tested.


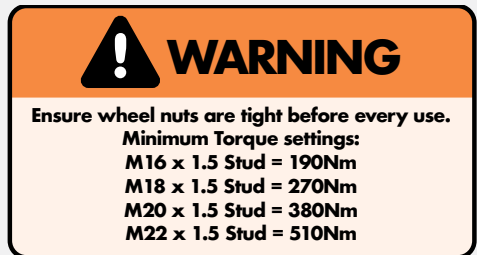
NOTE, the above examples are for information/training purposes only – and will vary depending upon local conditions and spray requirements.


SECTION 5

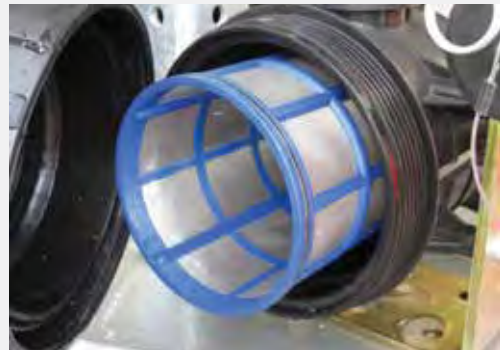
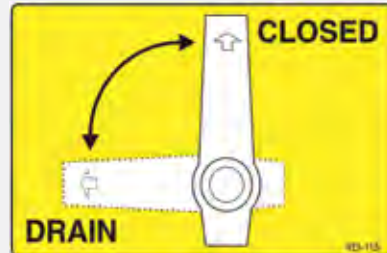
PRE-OPERATION

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 – jockey wheels stowed away. |
| | Wheel nuts (M18) checked for correct torque. |
| |  |
| | <p>Check tyre pressures are even from side to side. All tyres will have maximum rating listed on the tyre sidewall. From the factory, sprayers are delivered with 40 ~ 50 psi in each wheel (will vary from model to model).</p> |
| |  |

| | |
|--|---|
| | PTO connected, and safety guards correctly installed. |
| | Spray controller correctly connected and operational. |
| | Confirm the correct oil level in the Micro Power Pack (or tractor if no MPP). |
| |  |
| | 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. |

| | |
|--|--|
| | <p>Ensure fill, suction & pressure filters are clean. Be safety aware as some spillage is likely.</p> |
| |  |
| | Check that nothing is loose or damaged. |
| | Check the alignment of all booms & fans. |
| | <p>Check that all tanks and spray lines are clean and empty, and the drain tap is closed.</p> |
| |  |



SECTION 6

SPRAY OPERATIONS

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SPRAY OPERATIONS

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

Also, refer to the familiarisation section, pages 14 ~ 33.

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 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 the closed position to shut OFF liquid from the main tank.
- Some spillage is likely, therefore perform this operation in an appropriate place, and with safety clothing.



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

Cleaning the Pressure Filter

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

To clean the pressure line filter:

- **Always wear gloves**
- Completely stop all sprayer functions.
- Some spillage is possible, therefore perform this operation in an appropriate place, and with safety clothing.
- Open the valve at the bottom of the filter to ensure all pressure is removed from the filter.



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SPRAY OPERATIONS

- Remove the outer filter bowl, and then remove the filter and thoroughly clean it before re-assembly.



- Make sure the valve, at the bottom of the filter, is closed before continuing.

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. Clean the basket and replace the lid after filling.

Or ...

Fill via the separate Camlock fill (freshwater or chemical premix). Connect to the water source before opening the ball valve. Shown here in the off position.



Flushing Tank

Use FRESH WATER ONLY (preferably rainwater) in the flushing tank. Unscrew the lid and fill before spraying. Replace the lid after filling. 2000L model shown.

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.

For more information on the tank positions across the range see Section 4, pages 26 ~ 28.



SECTION 6

SPRAY OPERATIONS



SETTING SPRAYER PRESSURE

The regulator will need to be adjusted from time to time – early season with low spray application rates versus peak season with higher spray rates will require this regulator to be adjusted (see Set-up on page 48).

WARNING; To set and forget at a high pressure will put undue stress / wear and tear on the system - pressure regulating / servo valve. Maximum recommended pressure is 12 bar but 5-8 bar is the “normal” recommendation.



AGITATION

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

- Start the tractor.
- Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm
- The red flick taps need to be in the UP position. Shown here are both in the off position.

- Check to see that tank agitators are working via the tank lid To do this use the step provided (2000L model) or use a suitable platform to access the lid. Refer to page 32.
- If agitation causes too much foaming in the tank, turn off the front agitator, or introduce an anti-foaming additive.
- If chemical settles, due to a pump break down or other reasons, start up the sprayer after the fault has been rectified, then let the mixture in the tank agitate for a length of time to ensure thorough mixing of the chemical.

MIXING BASKET

A separate chemical mixing basket is provided in the main tank to allow the operator to add and mix chemicals to the main tank while it is filling.



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SPRAY OPERATIONS

To operate the mixing basket:

- Fill the main tank with the appropriate amount of water
- **Always wear gloves**
- Measure the chemical required for the tank mix and place the chemical (liquid, powder or granules) into the mixing basket & close the mixer lid. This process is best done in several smaller batches of chemical.
- Check the Tank Selection valve (located at the front of the sprayer) is open to SPRAY.
- Start the Tractor
- Make sure the electric or auto rate controller is NOT in Spray mode
- Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm
- Open (flick UP) both AGITATOR valves.
- Open (flick up) the mixing basket valve (**make sure the lid is closed**)



- Allow sufficient time for the chemical to mix into the tank. The actual time will vary depending upon the product used
- **Close the mixing basket valve** before next opening the lid.



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.

CHEMICAL PROBE

Alternative to the mixing basket (which is best used for powders and granules) is the chemical suction probe. Designed to suck liquid chemical, via a venturi system, straight from a drum or chemical container and into the main tank.

- **Always wear gloves**
- Connect the probe to the sprayer as pictured making sure the ball valve (as circled) is in the off position



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- Prepare the chemical source. **Be especially vigilant of chemical safety.**
- Start the Tractor
- Make sure the controller is NOT in Spray mode.
- Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm. Higher rpm will give better suction.
- Open (flick UP) the PROBE valve
- Place / hold the probe's tube into the chemical source (usually a drum of chemical).
- To suck chemical from the drum to tank, turn on the probe connection ball valve (circled in **yellow**, shown in the off position). Use the ball valve to control the suction. Turn to off when finished.
- Flush with / suck from a clean water source when finished.



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.

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

$$\text{Chemicals required (Litres)} = \frac{\text{Tank Volume (L)} \times \text{Recommended Chemical Rate (L/ha)}}{\text{Spray Application Rate (L/ha)}}$$

eg.
$$\frac{1500 \times 5 \div 400}{= 18.75 \text{ litres}}$$

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

$$\text{Tank Volume Required (Litres)} = \text{Area (ha)} \times \text{Spray Application Rate (L/ha)}$$

eg.
$$\frac{3.75 \times 400}{= 1500 \text{ litres}}$$



SECTION 6

SPRAY OPERATIONS

For **AREA COVERED** (ha),

$$= \frac{\text{Tank Volume (litres)} + \text{Spray Application Rate (l/ha)}}{100}$$

eg. $\frac{1500 \div 400}{100} = 3.75 \text{ Ha}$

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


$$\text{Chemicals Required (Litres)} = \frac{\text{Tank Volume (Litres)} \times \text{Recommended Chemical Rate (L/100 litres)}}{100}$$

eg. $\frac{1500 \times 3 \div 100}{100} = 45 \text{ litres}$

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



WARNING

SAFETY INSTRUCTIONS

1. Read your operators manual thoroughly before operating the sprayer.
2. Inspect hoses, connections and nozzles daily.
3. Clean filters regularly.
4. Always follow correct maintenance schedules outlined in operator's manuals.
5. Always read chemical manufacturers labels before use.
6. Always observe all warnings on chemical products.
7. Regularly check all nuts and bolts are tight.
8. Always wear rubber gloves and wash sprayer down before doing any repair or maintenance work.
9. Do not ride on sprayer when moving.
10. Keep clear of moving parts when sprayer is operating.
11. Always keep guards in place when sprayer is operating.
12. Be sure tank lid is closed before operating basket mixing facility.
13. Stand well clear of sprayer when operating.
14. Do not disconnect hoses, nozzles or filters while sprayer is operating.

**FAILURE TO FOLLOW THE ABOVE INSTRUCTIONS
MAY RESULT IN SERIOUS INJURY OR DEATH.**

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Once the pre-operation checklist on page 52 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 hence row width and any special instruction on boom / fan setup
- Operating speed (between 6- 8 Kph)
- Application rate (for example 500 L / Hectare)
- The nozzles to be used / which spray rings / Tier
- Spray pressures to be used (recommended between 5 ~ 8 bar)
- PTO and Spray pump rpm (recommended between 450 & 540)

Operating Pointers

- Always drive to the conditions taking into account the load, the terrain and the weather.
- In mixed terrain, spray the flat ground before spraying the hills.
- Before engaging any hydraulics for the first time, double check that the pressure return lines are properly connected.



DANGER

THERE IS A RISK OF ROLLOVER WHEN OPERATING ON SLOPES

- Slow down for slopes exceeding 10°
- Do not operate on slopes exceeding 15°
- Slow down when operating on irregular surfaces

FAILURE TO COMPLY WITH THESE PRECAUTIONS MAY RESULT IN DEATH OR INJURY



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SECTION 6

SPRAY OPERATIONS

- When preparing to spray in row for the first time, stop – open the boom and check that all row widths and alignments are correct. Check that all tank lids are closed and the Tank Selection Valve is in the SPRAY position. Double check the electric controls or auto rate controller settings (if fitted) – now ready to spray.

While spraying, continually ensure that:

- Recommended and PTO speed are correct
- Correct operating pressure is being maintained
- Ground speed is suitable, safe and constant
- Quantum Mist Spray fans are operating correctly and aimed toward the target foliage.

FLUSHING

Quantum Mist sprayers are equipped with a flushing tank for cleaning the sprayer when changing chemicals, and for flushing down at the end of the day.

To flush the Quantum Mist:

1. Ensure the site for flushing and cleaning the sprayer meets with environmental and statutory regulations
2. Open tank drain valve and drain the remaining spray mixture from the tank
3. Open the Tank Selection valve to the FLUSH position, as shown
 - Be aware that the flushing tanks may need to be refilled during the process
 - Note the 4000L sprayer has an additional flush system via a camlock connection.



4. Open the mixing basket valve
5. Open the agitator valves
6. Start the Tractor
7. Make sure the controller is NOT in Spray mode. Confirm that TIER 3 is selected to enable both spray rings to be flushed.
8. Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm.
9. All pumped liquid is now being passed through the dump valve back into the tank. The system is not pressurised and tank agitators are not working
10. Activate the controller SPRAY mode. This will pressurise the system and operate the tank agitators & basket rinse. IF auto rate controller, ensure system is in Manual mode, then activate to SPRAY mode.
11. Adjust to normal operating pressures.
12. Turn ON all spray sections.
 - a. Make sure the area around the fans is clear of bystanders.
 - b. Make sure the fans are downwind of the operator.
 - c. Check that all spray ring taps were activated.
13. After sufficient flushing, turn OFF the spray sections.
14. Turn on the fan Spray ring flushing taps (photo opposite shows the closed position).
15. Turn ON all spray sections to flush the remainder of the spray ring.
16. After sufficient flushing turn OFF all spray sections. Turn off spray ring drain taps.

SECTION 6

SPRAY OPERATIONS



Turn on spray ring flushing taps

17. Some water will have flowed back to the main tank due to the flushing actions and drained out of the tank through the drain outlet.
18. On completion of flushing, shut down all controls and disengage the PTO/ hydraulic drive.
19. Check and clean all filter screens as required.
20. Adjust all valves back to operating (non-flushing) mode,
 - a. Close mixing basket valve
 - b. Close tank drain valve
 - c. Open Tank Selection Valve to the main SPRAY tank
 - d. Open the agitator valves
21. Wash/hose down the outside of the sprayer.



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 ratified 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 flush the sprayer with water as outlined in the previous FLUSHING section. Then ...
2. Fill the spray tank with freshwater
3. Add cleaning agent into the mixer basket (use according to instructions)
4. Open the Tank Selection Valve to the SPRAY tank
5. Open mixing basket valve
6. Open the agitator valves
7. Start the Tractor
8. Make sure the controller / electric controls or auto rate controller is NOT in Spray mode. Ensure TIER 3 is selected to enable both spray rings to be flushed.
9. Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm.
10. Activate the controller SPRAY mode. This will pressurise the system and operate the tank agitators & basket rinse.
11. Adjust to normal operating pressures.

SECTION 6

SPRAY OPERATIONS

12. Turn ON all spray sections.
 - a. Make sure the area around the fans is clear of bystanders.
 - b. Make sure the fans are downwind of the operator.
 - c. Check that all spray ring taps were activated.
13. After sufficient flushing, turn OFF the spray sections.
14. If you require the cleaning agent to soak or stand for a period, turn the spray booms OFF and completely shut down the sprayer for the desired period
15. When soaking is completed, start the machine following steps to flush the tank and spray lines
16. On completion of flushing, shut down all controls and disengage the PTO/ hydraulic drive.
17. Open spray tank drain valve and allow cleaning mixture to drain from the tank
18. Delay the final flushing of the sprayer (again) with freshwater as outlined in the previous FLUSHING section, 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.
9. Start the pump by engaging the Tractor remote (Micro Power Pack version) or PTO. Set to operate at your required rpm, usually between 450 and 540 rpm.

Unhitching the Sprayer from the Tractor

Position the sprayer on level ground and chock the wheels so that sprayer does not roll when the sprayer (linkage arms) are disconnected.

Disconnect PTO shaft, hydraulic hoses, and electric controller looms (if applicable) from the tractor.

Attach and adjust all Jockey stands before removing the drawbar pin/detaching linkage arms.

Ensure all caps for the electrical (looms) and hydraulic hose fittings are utilised to help prevent water, dust & dirt ingress.

The photo is for a conventional sprayer towball hitch without linkage arm connections.



SECTION 7

SPRAYING INFORMATION

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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 QM-420 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.

Fully Automatic Spray Controller (HV4000/ Bravo 180)

Automatic spray controllers maintain the application rate (as set by the operator) when operated in the Auto position.

The controller monitors speed of travel (speed sensor) and flow rate (flow meter) and automatically adjusts flow rate (via a pressure regulating or servo valve) to maintain the correct application rate irrespective of speed variations within the limits of the nozzles used.

IMPORTANT:

- It should be remembered that the spray controller does not eliminate the necessity to measure and check the accuracy of nozzle spray patterns and outputs. These must be checked regularly to ensure correct and uniform application rates because nozzles wear with use.

SECTION 7

SPRAYING INFORMATION

- Flow meters used by the Quantum Mist QM-420 Sprayer need to be checked and calibrated on a regular basis.

The following page demonstrates how to maintain and check your Rapid-check flowmeter. It is recommended this is done regularly during the spraying season.



FLOWMETER CALIBRATION

If optioned with auto rate controller, as a part of the initial factory testing / calibration, a value (pulses per litre) will have been recorded and written on the body of the flow meter see example on page 30.

To check / improve the resolution of the flow meter calibration use the below method after having sprayed out a reasonable volume of liquid (the more sprayed the better the resolution);

- The current flow meter calibration number in the controller = X
- Take the total volume the controller says was sprayed and divided by the actual volume sprayed = Your new flow meter calibration.

- Then manually enter this number into the controller settings.

For example;

Current flow cal number (X) = 250. Controller says we have sprayed 4400L after having put 4000L in the tank.

$$250 \times 4400 = 1100000$$

$$1100000 / 4000 = 275 \text{ (new flow cal number)}$$

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.

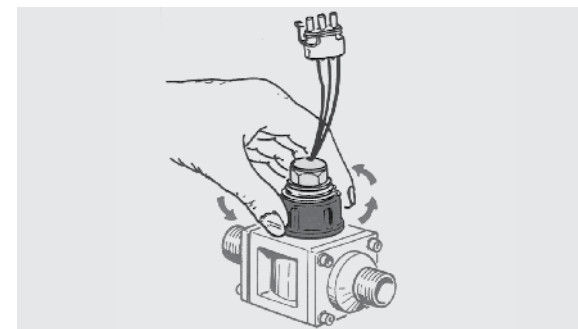
Install, calibrate and operate the spray controller according to the spray controller operators manual.

Inspections of the Flowmeter should be performed regularly.

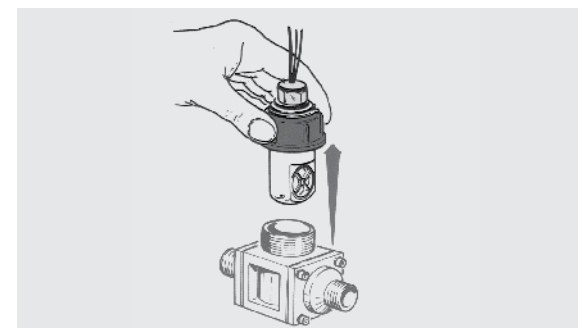
Daily Check & Maintenance of Flowmeter

This is to be performed every day after work is finished:

- Unscrew the assembly that holds the Rapid Check unit in the body.
- Remove the Rapid Check unit from the body.

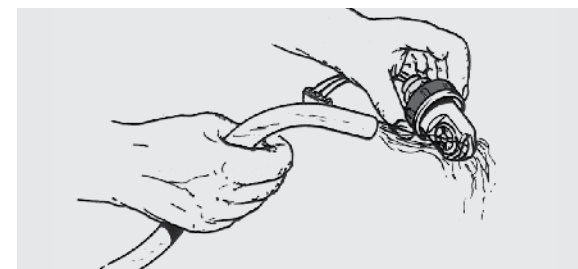


Unscrew the Rapid Check assembly



Remove the Rapid Check unit

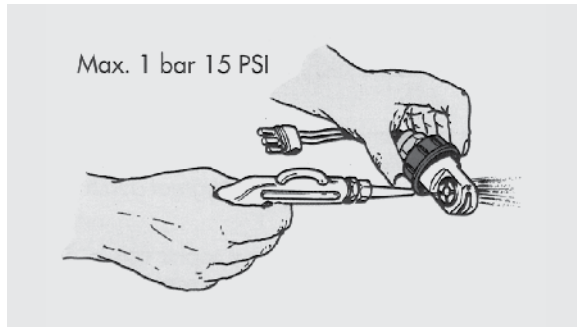
- Use clean water to wash any impurities out of the removable turbine unit.



Wash any impurities out of the removable turbine unit

SECTION 7

SPRAYING INFORMATION



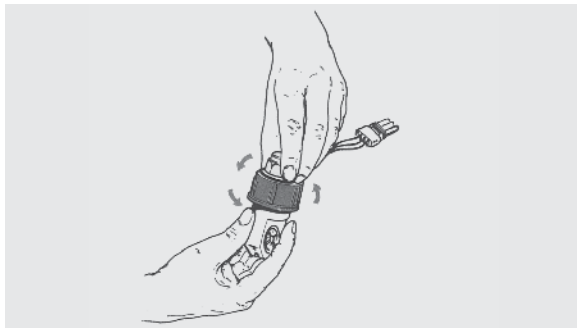
Use compressed air to check that the turbine unit rotates freely

4. Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).

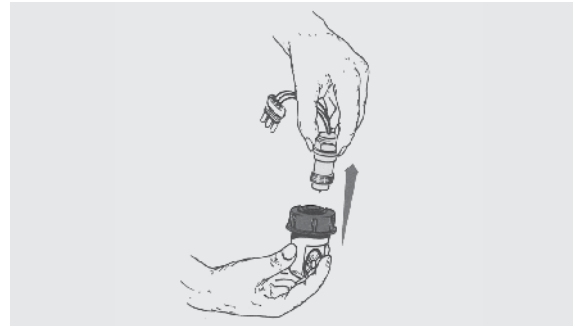
Every 50 Hours

Carry out the following procedure after every 50 hours of operation:

1. Unscrew the sensor.

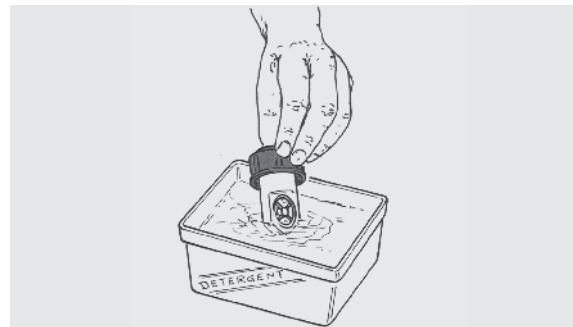


2. Separate the sensor from the Rapid Check unit.



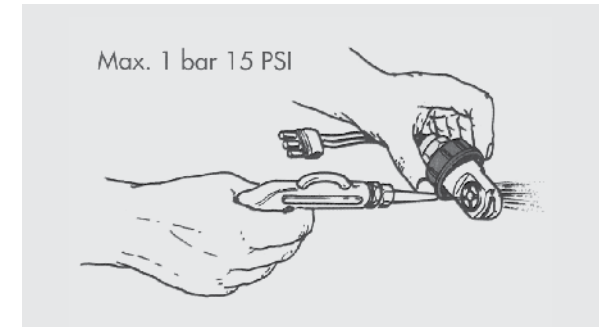
Separate the sensor from the Rapid Check unit

3. Place the Rapid Check unit in a detergent bath for a few hours.



Place the Rapid Check unit in a detergent bath

4. Remove the Rapid Check unit from detergent bath.
Use compressed air to verify that the turbine unit rotates freely (maximum air pressure 1 BAR [15 psi]).
If necessary, replace the Rapid Check unit with a new one.



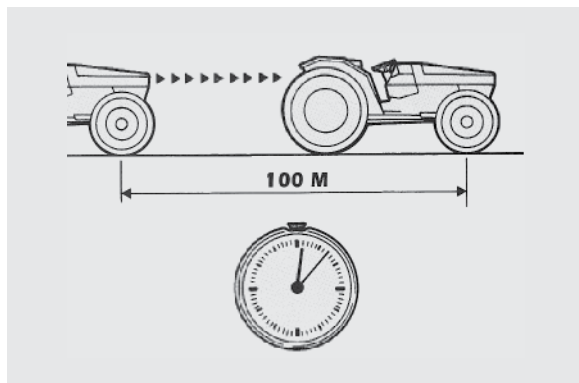
Use compressed air to check that the turbine unit rotates freely

SECTION 7

SPRAYING INFORMATION

STEP 2 - DETERMINING THE ACTUAL SPEED OF TRAVEL

If optioned with auto rate controller, your sprayer has been factory set with a calibration number. This should be fine tuned prior to commencement of spraying and checked by your dealer. This is done by traveling a known distance (usually 100 metres) and comparing the distance measured by the Spray Controller to the known distance. If there is a discrepancy, the Spray Controller Manual explains how to easily adjust the calibration number automatically.



To manual check the speed...

- Half fill the sprayer tank with water and mark out a test strip of 100 metres (simulating spraying conditions).
- 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. Don't forget Tier 1, Tier 2 and Tier 3 options.

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

Example A

A 2-row QM-420 Sprayer to spray vines – using 2 spray fans per Fan Frame, will give a total of 8 spray fans. Each spray fan has 2 spray rings - each with 5 nozzles per ring. That gives a combined total of 40 nozzles per (8 spray rings x 5) per Tier/80 nozzles (both spray sets of rings combined) to spray two rows per pass.

Example B

A 3-row QM-420 Sprayer to spray vines – using 3 spray fans per Fan Frame, will give a total of 18 spray fans. Each spray fan has 2 spray rings - each with 5 nozzles per ring. That gives a combined total of 90 nozzles per (18 spray rings x 5) per Tier/180 nozzles (both spray sets of rings combined) to spray two rows per pass.

The choice of nozzles (step 5 below) will influence decisions regarding the Sprayer's Tier configuration.

SECTION 7

SPRAYING INFORMATION

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 5 to 10 bar is considered ideal. Setting up the sprayer around a pressure of say 7 to 8 bar will allow lower pressures (say 5 or 6 bar) to be used in early season and higher pressure (say 9 or 10 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.

NOTE; when determining the optimum nozzles for both spray rings (Tiers 1 & 2), all calculations should be done at the same pressure.

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;

$$\begin{aligned} & \text{Litres/Minute/Nozzle} \\ & \text{(Litres per minute per nozzle)} \\ & = \frac{\text{Litres/Ha} \times \text{Km/hr} \div 600}{\text{total number of nozzles used} \\ & \quad \times \text{row spacing (m)} \\ & \quad \times \text{number of rows in one pass}} \end{aligned}$$

CROPLANDS

Quantum Mist ALBUZ Nozzle Selection Worksheet

Step 1:

Enter data in grey boxes

| Formula | |
|---|--|
| Target rate (L/ha) <input type="text" value="650"/> | Speed (km/hr) <input type="text" value="7.5"/> |
| Row spacing (m) <input type="text" value="3"/> | Number of rows <input type="text" value="1"/> |
| Number of nozzles <input type="text" value="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 |

NOTE; it's easiest to make the calculations based on each individual spray ring volume and then combine both rings. Always select nozzles from same pressure.

For example, using Example A from the previous pages

- Row spacing = 3.0m
- Number of rows = 2
- Number of nozzles = 40
- Speed = 7.5 kph
- Ideal pressure 7 ~ 8 bar
- Tier 1 target rate = 300 L/ha
- Tier 2 target rate = 450 L/ha
- Tier 3 target rate = 750 L/ha

Using the above formula

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 see the Croplands Optima buyers guide.

SECTION 7

SPRAYING INFORMATION

In the example on previous page 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.

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;

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. See steps 8 & 9.
- Insufficient output is a sign of blockages. See steps 8 & 9.

STEP 8 - CALCULATE THE ACTUAL APPLICATION RATE

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

SECTION 7

SPRAYING INFORMATION

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)

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

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) | | | | | | | | | | | | | | | | | | | | |
| | 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.

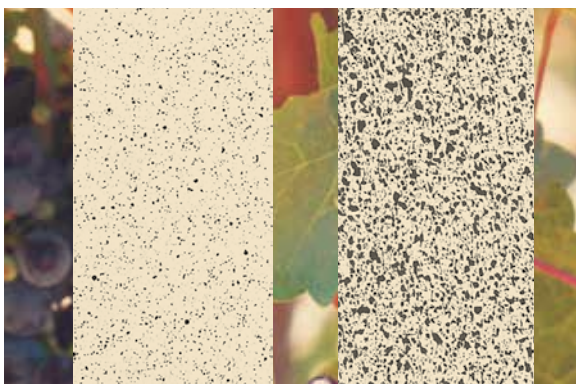
Example 1 (as per Tier 1 example)

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 – see Croplands Optima Buyers guide for further details.

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

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

For example;

$$\begin{aligned} & 2000 \text{ (litre tank)} \times 2.0 \text{ (chemical rate L/ha)} \\ & \div 50 \text{ (spray application rate L/ha)} \\ & = 80 \text{ litres of chemical} \end{aligned}$$

If chemical recommendation is given in water volume rates

Use the following formula:

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

For example;

$$\begin{aligned} & 2000 \text{ (litre tank)} \times 4 \text{ (chemical rate L/100 litres)} \\ & \div 100 = 80 \text{ litres of chemical} \end{aligned}$$

For tank volume required,

Use the following formula:

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

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 CANE NOZZLES

Features:

- Angle of 80° at 5 bar
- Easy dismantling for cleaning
- Hollow cone nozzle producing fin 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**

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

Once the flow rate per nozzle is known, select an appropriate nozzle size from the nozzle charts.

| | |
|------------------|--|
| 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.

| | |
|------------------|--|
| 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.

| | |
|------------------|--|
| 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.

| | |
|------------------|--|
| 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.

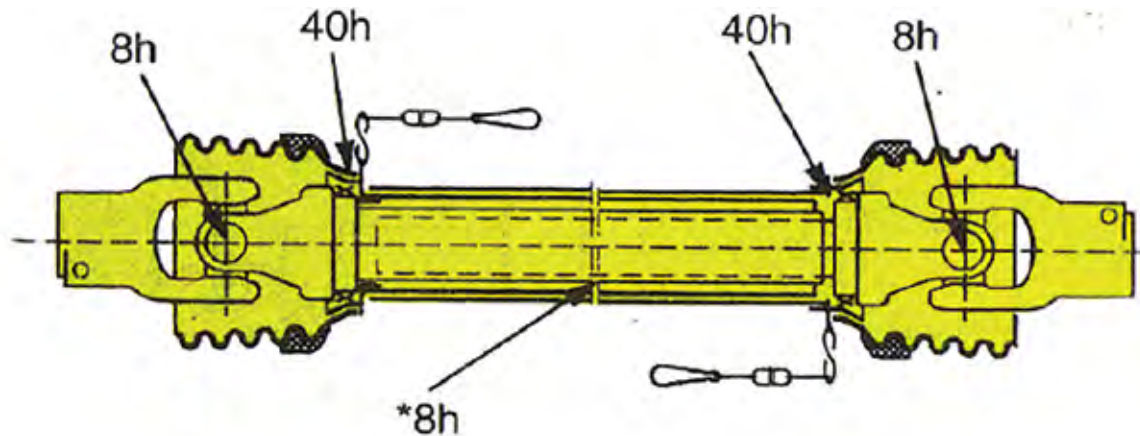
SECTION 8

LUBRICATION & MAINTENANCE

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| EVERY 200 HOURS | 79 |
| GREASE POINTS | 79 |
| DIAPHRAGM PUMPS | 80 |
| FILTERS | 81 |

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. Check tyre pressure (350kPa / 50 psi), and check wheel nuts.
4. Clean Rapid-check flowmeter (refer to page 66), if fitted.
5. 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.
6. Grease PTO inner tubes every 8 hours. To lubricate the inner tube, slide PTO shaft apart, clean the telescopic tubes, grease and reassemble.
7. Grease the PTO covers every 40 hours.
8. Ensure safety covers and safety chains are in place and in good working order
9. Grease self steer drawbar every 20 hours.
10. 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 pump manual for more information.
11. 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.
12. Grease all boom joints, height adjusting points and other grease points.

EVERY 200 HOURS

1. Lubricate quick release lock pins on PTO shaft.
2. Re-pack wheel bearings with grease.
3. Grease and check & adjust castellated nut both LH & RH of walking beam axle.
4. Grease all tank lid seals with vaseline.
5. Check to ensure agitators have not become blocked with sulphur/chemicals.
6. Inspect all hydraulic lines for wear points.
7. Check pump mounts.
8. Check fan RPM and oil pressure at test port.



GREASE POINTS

1. Swivel eye on drawbar, if fitted.
2. Wheel hubs, if fitted with grease nipples.

SECTION 8

LUBRICATION & MAINTENANCE



Grease the self steer ball assembly regularly

3. PTO shaft - all crosses (knuckles), both ends and sliding tubes. Refer to page 79 for frequency.



Grease wheel hubs



AR185 - 180l/min diaphragm pump

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 follows:

- Air pressure 70-100kPa (10-15psi) [Should be 10-20% 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.

SECTION 8

LUBRICATION & MAINTENANCE

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 to 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.
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 Quantum Mist 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.

SECTION 8

LUBRICATION & MAINTENANCE

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

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.



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.

In-line Pressure Filters

The in-line pressure filter should be cleaned regularly, or after each spray tank has been emptied.

To flush each filter, open and close the filter tap while system is pressurised.

The filter & bowl assembly will need to be disassembled for thorough cleaning.

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

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 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

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. Set at 210-280Kpa (30-40 psi). 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

RATE CONTROLLER PROBLEMS

| PROBLEM | PROBABLE CAUSE | REMEDY |
|--|---|--|
| Boom hydraulic functions not working when remote levers are used in the intended direction. | <ol style="list-style-type: none"> 1. Hydraulic return line (with a one way check valve) is connected to the wrong side of the tractor remotes. 2. If fitted, faulty or damaged electrical system (loom / plug / coil etc). | <p>Swap the supply and return hoses at the remotes. Clearly mark the hoses or remotes for future reference.</p> <p>Find the cause and replace as required</p> |
| Blown hydraulic hoses, motor seals or hydraulic cooler at startup | Excessive pressure due to dead heading the hydraulic system. Usually caused by not properly connecting the return hose to tank. See page 38 of this manual. | <p>ALWAYS double check that the return line coupling is fully engaged. Make sure all staff are trained on this aspect.</p> |
| Fan's won't run | <ol style="list-style-type: none"> 1. No oil supply 2. Faulty hose connection 3. Low oil level switch in Micro Power Pack 4. Normal oil level, won't start or switch off | <ol style="list-style-type: none"> 1. Check tractor oil levels or Micro Power Pack oil reservoir 2. Check all hydraulic supply connections 3. Check switch position - refer to Micro Power Pack manual 4. Check for (cracked) sunken float in the oil level switch |
| Unexpected shut down of the Micro Power Pack | Oil level too low causing unexpected shut down due to oil level changes when operating on uneven ground. | Add oil. Oil level should be as per page 11 of the Micro Power Pack manual. |
| Unexpected restart (after shutdown) of the Micro Power Pack | Incorrect low level oil level switch adjustment. After a low oil level shut down, the oil can (in some circumstances) flow back into the oil reservoir and hence trigger a restart. | Slide the oil level switch to the bottom of the switch and use sufficient oil to prevent unexpected shut down. See page 11 of the Micro Power Pack manual. |

SECTION 9

TROUBLESHOOTING

HYDRAULIC SYSTEM PROBLEMS

| PROBLEM | PROBABLE CAUSE | REMEDY |
|---------------------------------|---|--|
| Fan performance drop off | <ol style="list-style-type: none"> 1. Tractor oil supply (drop off due to wear and tear) 2. Worn hydraulic motor(s) 3. Fan drive body failure / bearing issues etc | <ol style="list-style-type: none"> 1. Check tractor oil performance (requires specialist equipment) 2. Replace hydraulic motor(s) 3. Replace the drive body |

After noticing a fan performance (rpm) drop off, troubleshooting requires isolating the problem. All fans are run in series, in circuits of 2, 3 or 4 fans (see the schematics in Section 10). Using a tachometer, check the relevant fan rpm's - note there will always be minor variations (+/- 15~30 rpm is normal).

- If all fans are down on performance then the problem is with the greater oil supply system.
- If the problem is confined to one or more fans of a fan hydraulic circuit, the problem is most likely to be in one or more of the individual fans or fan motors. Isolating the troublesome fan can be complicated as it's not always the slow running fan that's causing the problem - it might be a fan earlier in the series.
- Firstly confirm that it's not the fan drive body at fault by checking that the fans can spin freely. This will require the hydraulic motor to be removed from the drive body or the hydraulics to be disconnected from the motor (not recommended).
 - If the fan / drive body assembly can rotate freely without the hydraulic motor attached, then the issue is with the motor or hydraulics.
 - Assuming the fault is with the motor, and it's not a blown shaft seal (which will be an obvious oil leak before getting to this stage), the fault is likely to be internal damage or wear. Internal wear will show itself as oil leaking / flowing via the case drain.
 - The case drain hose is the smaller (1/4") of the 3 hoses connecting to the back of each hydraulic motor, and are coupled in series back to the distribution manifold. To isolate the problem will require checking the case drain flow from each fan motor. Normal flow (test at lower rpm) from a case drain port is more of a dribble, whereas a worn motor will be a constant flow. This test should only be done by someone skilled in hydraulics.

Note, a worn motor can often be detected by an increase in pressure at soft start manifold's (TT) test port (5 ~20 psi at operating speed & temperature is normal) - however this won't tell you which hydraulic fan circuit is causing the problem.



SECTION 9

TROUBLESHOOTING

DUMP VALVE OPERATION

Start with the controller in "Manual" mode, the master switch in the 'Hold" position, at least one section switch in the spray position and the pump running at operating RPM. There should be minimal to no spray pressure on the gauge. Put the master switch into the "Spray" position and the gauge pressure will increase and the sections open will start spraying. Put the master switch back into the "hold" position and the gauge pressure will decrease. If this works then the dump valve is operating correctly.

If there is gauge pressure when the master switch is in the Hold" position and no gauge pressure with the master switch is in the "Spray" position then the dump valve is working backwards. There will either be a setting in the controller to reverse this or the wiring at the dump valve can be reversed.

If no change in gauge pressure happens when changing the position of the master switch then the dump valve mustn't be operating. Below shows the voltage you should read at the dump valve to diagnose whether is it a faulty valve, wiring or controller.

Croplands use an Arag dump valve on the majority of their trailed/linkage sprayers. These come in two different styles and can be operated by 2 wire or 3 wire switching.





A8630001 & A8730001

Dump Valve Operation A8630001 & A8730001

2 Wire Operation



Closed/Spray Position

 = Positive +12V DC
 = Negative






Open/Dump Position

3 Wire Operation



Closed/Spray Position

 = Positive +12V DC
 = Negative
 = Positive +12V DC





Open/Dump Position

Dump Valve Operation - A8710502

2 Wire Operation



Closed/Spray Position

 = Positive +12V DC
 = Negative





Open/Dump Position

3 Wire Operation



Closed/Spray Position

 = Positive +12V DC
 = Negative
 = Positive +12V DC



Open/Dump Position



A8710502

SECTION 9

TROUBLESHOOTING

NO FLOW RATE

WHEN THE SPRAY CONTROLLER ISN'T READING FLOW, FOLLOW THESE STEPS TO DIAGNOSE THE ISSUE.

- Is the flow calibration number present/correct?

- Is the turbine/paddle spinning freely?

- Check the flow sensor for any visible signs of damage.

- Is 12 volts supplied to the flow sensor? Croplands wiring is Pin A = Signal, Pin B = Positive & Pin C = Negative.

You should read 12 volts on your multimeter between pins B & C when the controller thinks it's spraying and when possible check this with the sensor connected as some controllers lose their 12 volt supply when under load. If 12 volts is present move to the next step, if no 12 volts is present repeat the test at the next connector working back towards the tractor. Continue on until you find a bad cable or until you reach the back of the controller. Please note that Croplands MT90 series looms only power the flow meter when spraying with an MT90LOOM/6 relay box on Broadacre sprayers and a diode pack or relay box on the section valve loom on Horticultural sprayers. If the controller is not outputting 12 volts you can send it to Croplands to be repaired.

Croplands have loan controllers so you can continue spraying while your controller is being repaired.

- Enter a flow calibration of 1 pulse per litre and view the total volume screen on the controller.

The controller needs to be in "Manual" mode and have at least 1 section turned on so the sprayer would actually be spraying if the pump was engaged. Start at the cable connecting to the flow sensor. With a small jumper wire (or paper clip), bridge a connection between the Ground and Signal wires using a "bridge, no bridge" motion. Each time a bridging connection is made the total volume should increase on the controller, if this works replace the flow sensor and re-enter the correct flow calibration. If total volume does not increase, repeat at the next connector towards the controller.

Continue on until you find a bad cable or until you reach the back of the monitor. If the total volume does still not increase you can send the controller to Croplands to be repaired.

Croplands have loan controllers so you can continue spraying while your controller is being repaired.

SECTION 9

TROUBLESHOOTING

NO GROUND SPEED

WHEN THE SPRAY CONTROLLER ISN'T READING GROUND SPEED, FOLLOW THESE STEPS TO DIAGNOSE THE ISSUE.

-- Is the speed calibration number present/correct?

- Is the speed sensor mounted correctly? The sensor tip should be 5mm from the pickups.

- Check the speed sensor for any visible signs of damage.

-- Is 12 volts supplied to the speed sensor? Croplands wiring is Pin A = Signal, Pin B = Positive & Pin C = Negative.

You should read 12 volts on your multimeter between pins B & C and when possible check this with the sensor connected as some controllers lose their 12 volt supply when under load. If 12 volts is present move to the next step, if no 12 volts is present repeat the test at the next connector towards the controller. Continue on until you find a bad cable or until you reach the back of the controller. If the controller is not outputting 12 volts you can send it to Croplands to be repaired. Croplands have loan controllers so you can continue spraying while your controller is being repaired.

- Enter a speed calibration of 1cm per pulse and view the screen reading distance on the controller.

The controller should be in "Manual" mode and have at least 1 section turned on so the sprayer would actually be spraying if the pump was engaged. Start at the cable connecting to the speed sensor. With a small jumper wire (or paper clip), bridge a connection between the Ground and Signal wires using a "bridge, no bridge" motion. Each time a bridging connection is made the distance should increase on the controller, if this works replace the speed sensor and re-enter the correct speed calibration. If distance does not increase, repeat at the next connector towards the controller.

Continue on until you find a bad cable or until you reach the back of the controller. If the distance does still not increase you can send the controller to Croplands to be repaired. Croplands have loan controllers so you can continue spraying while your controller is being repaired.

HOW TO TEST A UP-402 PROXIMITY SPEED SENSOR

Power the speed sensor by supplying 12 volts to the Brown positive wire and an earth to the Blue ground wire. With your multimeter set to read DC voltage connect the multimeter's red terminal to the sensors signal wire and the multimeter's black terminal to the sensors ground wire. The multimeter will read 12 volts when no metal pickup is present and when a metal pickup is detected the multimeter will read 0 volts.

SECTION 9

TROUBLESHOOTING

SERVO VALVE OPERATION

With the controller in "Manual" mode, the master switch in the 'Spray' position, all section switches turned on and the pump running at operating RPM. Press and hold the increase rate button/switch and the pressure on the gauge should increase. Press and hold the decrease rate button/switch and the pressure on the gauge should decrease. The Servo valve will take between 7-10 seconds to go for opened to closed and vice versa. If this works then the servo valve is operating correctly.

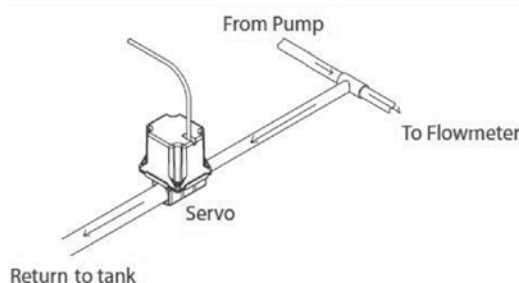
If the gauge pressure decreases while holding the increase button/switch and increases while holding the decrease button/switch then the servo valve is working backwards. There will either be a setting in the controller to change or the two wires at the servo valve can be reversed.

If no change in gauge pressure happens when the increase or decrease button/switch is held then the servo valve isn't operating. Below shows the voltage you should read at the servo valve to diagnose whether is it a faulty valve, wiring or controller.

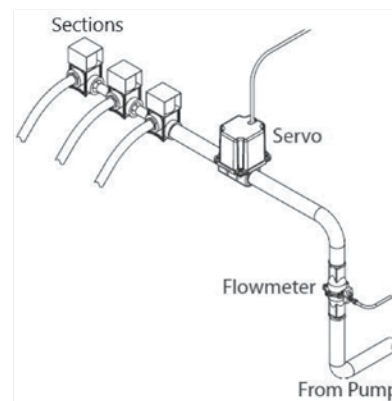
Croplands use an Arag servo valve on the majority of their trailed/linkage sprayers. These come in two different series called an 863 or 873 and can be plumbed in either an Bypass or In-line set up. The 873 series is generally fitted on centrifugal and diaphragm pumps with a flow rate of more than 250 litres per minute.

Servo Valve Operation A8630024S & A8730020S

Bypass Plumbing



In-line Plumbing



Bypass Plumbing



0 = Positive +12V DC
0 = Negative



In-line Plumbing



0 = Positive +12V DC
0 = Negative



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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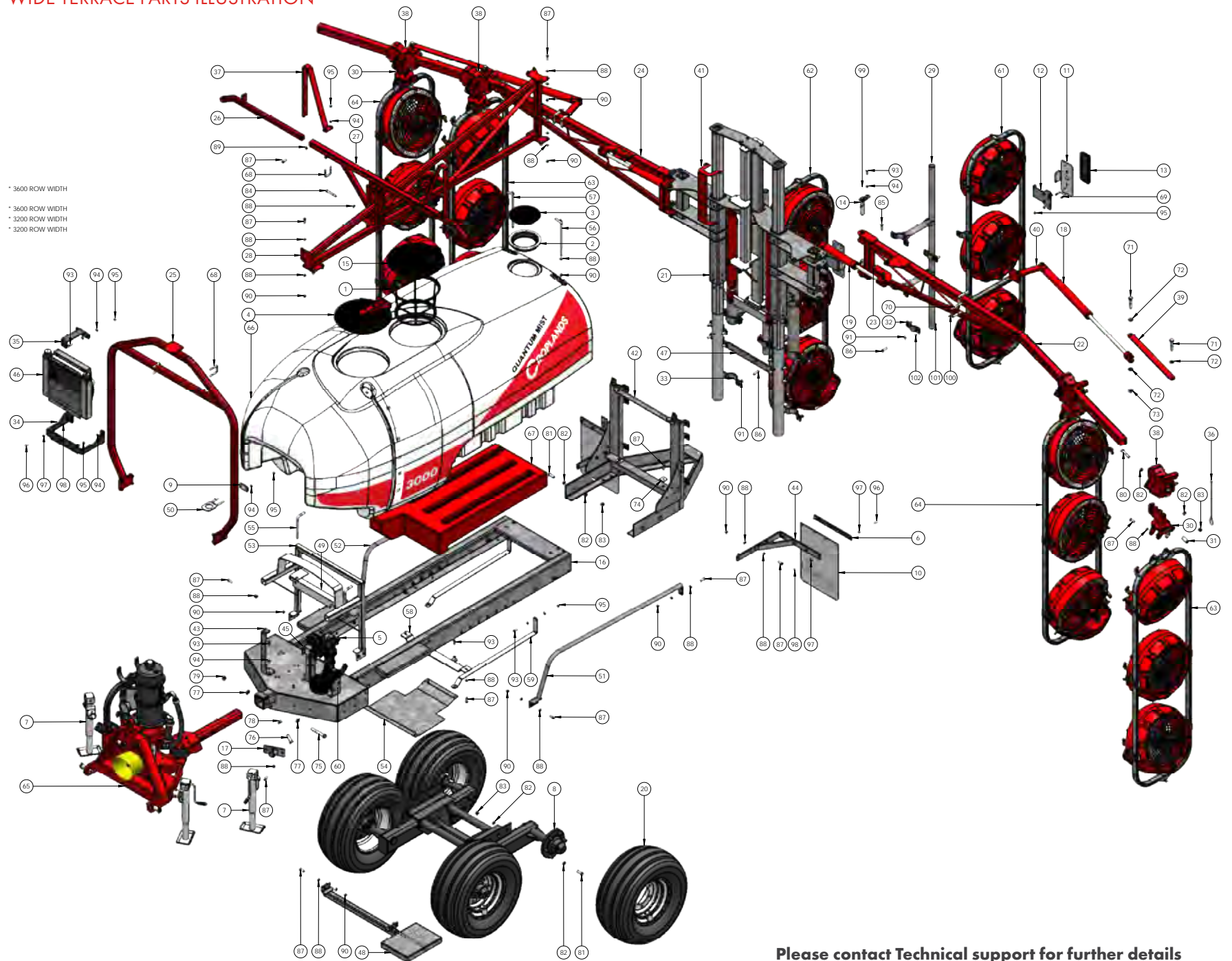
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ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

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3000LT QUANTUM MIST 420

QUANTUM MIST 3 ROW WIDE TERRACE PARTS ILLUSTRATION



Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

3000LT QUANTUM MIST 420

QUANTUM MIST 3 ROW WIDE TERRACE PARTS ILLUSTRATION

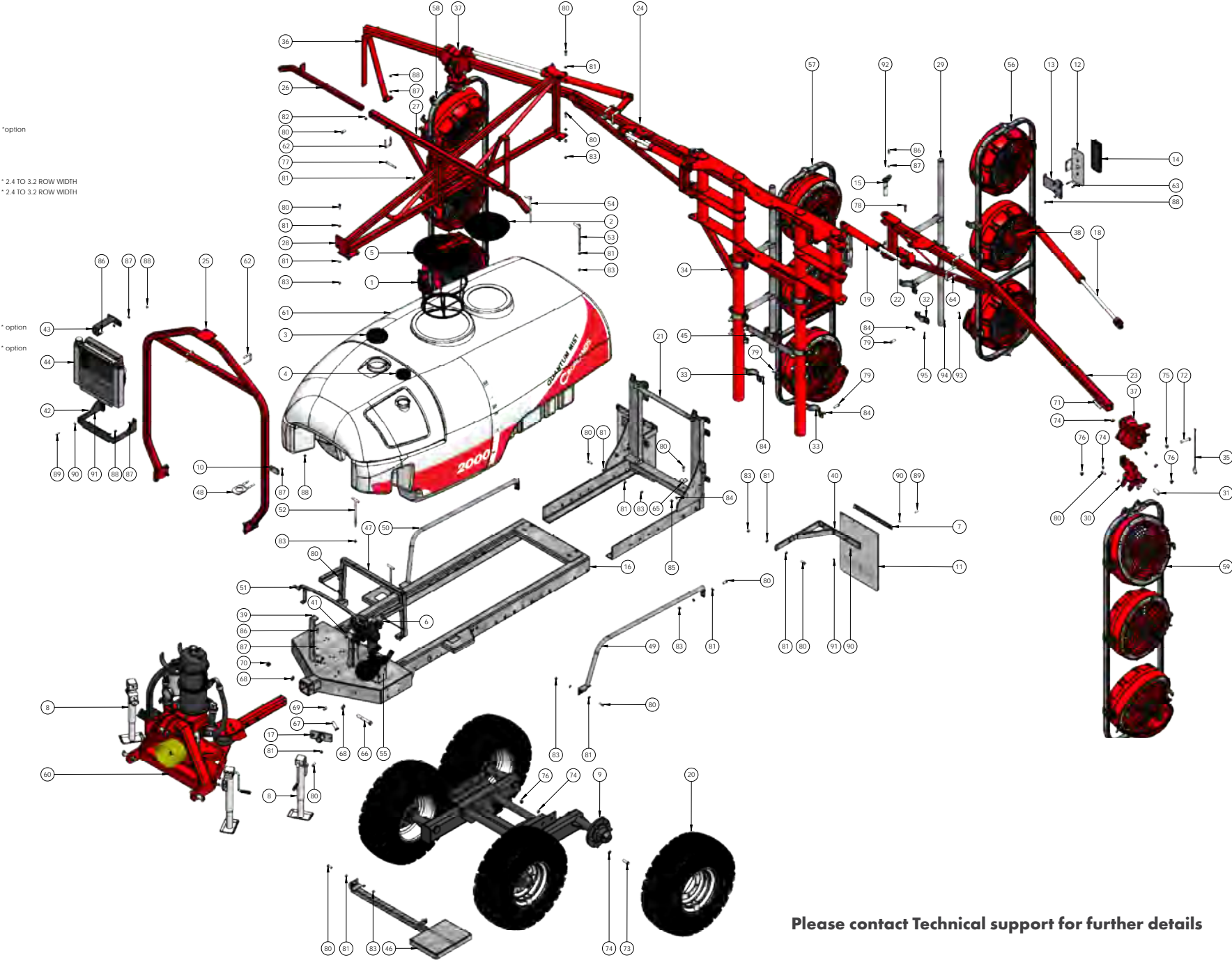
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|---------------|------------------------------------|--------|
| 1 | A300130 | FILTER BASKET LARGE 254MM DEEP | 1 |
| 2 | A350620 | LID RING WITH GASKET | 1 |
| 3 | A3522120 | LID ONLY 255MM CLOSED | 1 |
| 4 | A356060 | LID HINGE 455MM 180DEG | 1 |
| 5 | A463CCRO08A | VALVE ASSEMBLY SERVO DUMP & FILTER | 1 |
| 6 | BP-180 | MUDFLAP PLATE | 2 |
| 7 | BP-184A | JOCKEY STAND SHORT PINTO | 3 |
| 8 | BP-400W | WALKING BEAM AXLE 2000/3000 | 1 |
| 9 | BP-541 | PLATE FOR 50MM U-BOLT | 1 |
| 10 | BP-542 | MUDFLAP WHITE | 2 |
| 11 | BP-635 | MOUNT PLATE TAIL LIGHT | 2 |
| 12 | BP-635-1 | TAIL LIGHT EXTENSION BRACKET | 2 |
| 13 | BP-636 | LIGHT KIT WITH HARNESS | 2 |
| 14 | BP-700-9AA | PIN 30MM X 155MM HAYLITE | 4 |
| 15 | G8161000 | LID/RING KIT 455MM | 1 |
| 16 | HP3000ABA | CHASSIS 3000LT AIRBLAST HAYLITE | 1 |
| 17 | HP-006 | SPIGOT PLATE JACK STAND | 1 |
| 18 | HP-014 | HYDRAULIC CYLINDER 2.0 X 24" | 2 |
| 19 | HP-016 | HYDRAULIC CYLINDER 2.0 X 10 | 2 |
| 20 | HP-202V | WHEEL 31/13.5-15 HF1 RIB | 4 |
| 21 | HP-274E | TOWER WIDE TERRACE STANDARD | 1 |
| 22 | HP-274A-2G | BOOM ARM LH QM VER4 3000LT | 1 |
| 23 | HP-274A-2G-1 | ADAPTOR HINGE BOOM CYLINDER | 2 |
| 24 | HP-274A-3G | BOOM ARM RH QM VER4 3000LT | 1 |
| | HP-274A-2J | BOOM ARM QM420 LH | option |
| | HP-274A-3J | BOOM ARM QM420 RH | option |
| 25 | HP-274A-4B2 | FRONT BRACE QM 3000/4000 | 1 |
| 26 | HP-274A-5 | PARKING ARM | 2 |
| 27 | HP-274A-5-1 | PARKING BRACKET QM | 1 |
| 28 | HP-274A-6G | TOP BRACE QM 3000LT | 1 |
| 29 | HP-274A-9B | TUBE STANDOFF FAN FRAME QM420 | 2 |
| 30 | HP-274A-10B | SWIVEL DROPPER FAN FRAME QM420 | 4 |
| 31 | HP-274A-11 | STEEL BUSH QM | 4 |
| 32 | HP-274A-13G | CLAMP HALF SADDLE 45MM GALVED | 4 |
| 33 | HP-274A-14G | CLAMP HALF SADDLE 90MM GALV | 10 |
| 34 | HP-298-15A-1 | BRACKET OIL COOLER | 1 |
| 35 | HP-298-15A-2 | TOP SUPPORT BRACKET OIL COOLER | 1 |
| 36 | HP-274A-18 | ACTUATOR ROD SWIVEL BRACKET | 1 |
| 37 | HP-274B-5-2 | BOOM STOPPER TERRACE | 2 |
| 38 | HP-274B-12B | SWIVEL BRACKET V3 FOR ORORA | 4 |
| 39 | HP-274B-12B-1 | LINK BAR 675MM QM420 ORORA | 2 |
| 40 | HP-274B-18A | BRACKET CYLINDER ORORA QM420 | 2 |
| 41 | HP-274B-20 | LEVEL INDICATOR | 1 |
| 42 | HP-283E2 | SUB FRAME QM 3000LT VER 2 | 1 |
| 43 | HP-286A | BRACKET ECM 3000 QUANTUM MIST | 2 |

| | | | |
|----|-----------------|------------------------------------|-----|
| 44 | HP-288 | BRACKET MUDFLAP BP-400D | 2 |
| 45 | HP-289 | MANIFOLD BRACKET A463CCRO08A | 1 |
| 46 | HP-298-16A | OIL COOLER 12V AIR TYPE HYDAC | 1 |
| 47 | HP-318-09 | BRACKET SECTION VALVE MOUNT | 1 |
| 48 | HP-402A | RETRACTABLE STEP 2000LT | 1 |
| 49 | HP-432A | BRAGLIA VALVE BRACKET 3000LT | 1 |
| 50 | HP-434 | BRACKET DAM FILL 3000LT | 1 |
| 51 | HP-504LA | SIDE RAIL 3000LT LH | 1 |
| 52 | HP-504RA | SIDE RAIL 3000LT RH | 1 |
| 53 | HP-511 | FRONT TANK SUPPORT 3000LT | 1 |
| 54 | HP-512 | SUMP GUARD 3000LT | 1 |
| 55 | HP-514 | FRONT TIE DOWN ROD 3000LT | 2 |
| 56 | HP-515L | REAR LEFT TIE DOWN ROD 3000LT | 1 |
| 57 | HP-515R | REAR RIGHT TIE DOWN ROD 3000LT | 1 |
| 58 | HP-520 | CROSS RAIL BRACKET FLUSH TANK | 1 |
| 59 | HP-521 | SUPPORT STRAP FLUSH TANK | 2 |
| 60 | HP-947C-3 | SUCTION FILTER 1 1/2" | 1 |
| 61 | KH-5104AL | REAR FAN 3X420 LH 1/2" HOSE 6.5CC | 1 |
| 62 | KH-5104AR | REAR FAN 3X420 RH 1/2" HOSE 6.5CC | 1 |
| 63 | KH-5104L | FAN FRAME 3X420 LH 1/2" HOSE 6.5CC | 2 |
| 64 | KH-5104R | FAN FRAME 3X420 RH 1/2" HOSE 6.5CC | 2 |
| 65 | KH-6000-48A | FUSION MICRO POWERPACK ASSY 48CC | 1 |
| 66 | P3000AB-RAW | 4000LT TANK POLY AIRBLAST POLY | 1 |
| 67 | P3000AB-110RAW | FLUSH TANK 110LT 3000LT | 1 |
| 68 | XBMBB50 | U-BOLT 50MM X 10 | 4 |
| 69 | XBMBB50-50 | U BOLT 50MM X 50 X 3/8 THREAD | 4 |
| 70 | XBMBB65 | U-BOLT 65MM X 12 | 4 |
| 71 | 0.75X3.5UNCBOLT | 3/4" X 3.5" UNC BOLT HT ZP | 4 |
| 72 | 0.75FWASHER | 3/4" FLAT WASHER ZP | 8 |
| 73 | 0.75UNCNNUT | 3/4" UNC NYLOC NUT HT ZP | 4 |
| 74 | 50SQWASHER | 50MM SQUARE WASHER | 2 |
| 75 | M20X140BOLT | M20 X 140 HEX HEAD BOLT HT ZP | 1 |
| 76 | M20X60 | M20 X 60 SET SCREW HT ZP | 2 |
| 77 | M20FWASHER | M20 FLAT WASHER ZP | 2 |
| 78 | M20HNUT | M20 HALF NUT ZP | 2 |
| 79 | M20NNUT | M20 NYLOC NUT HT ZP | 1 |
| 80 | M16X100BOLT | M16 X 100 BOLT HT ZP | 4 |
| 81 | M16X50 | M16 X 50 HEX HEAD SET SCREW HT ZP | 12 |
| 82 | M16FWASHER | M16 FLAT WASHER ZP | 34 |
| 83 | M16NNUT | M16 NYLOC NUT HT ZP | 18 |
| 84 | M12X100BOLT | M12 X 100 HEX HEAD BOLT HT ZP | 2 |
| 85 | M12X50 | M12 X 50 SET SCREW HT ZP | 6 |
| 86 | M12X45SS | M12 X 45 SET SCREW S/S HT ZP | 28 |
| 87 | M12X35 | M12 X 35 SET SCREW HT ZP | 68 |
| 88 | M12FWASHER | M12 FLAT WASHER ZP | 152 |
| 89 | M12HNUT | M12 HEX NUT HT ZP | 4 |

| | | | |
|-----|-------------|--------------------------|----|
| 90 | M12NNUT | M12 NYLOC NUT HT ZP | 82 |
| 91 | M12SSFASHER | M12 S/S FLAT WASHER | 56 |
| 92 | M12SSNNUT | M12 S/S NYLOC NUT | 28 |
| 93 | M10X30 | M10 X 30 SET SCREW HT ZP | 16 |
| 94 | M10FWASHER | M10 FLAT WASHER ZP | 50 |
| 95 | M10NNUT | M10 NYLOC NUT HT ZP | 34 |
| 96 | M8X30 | M8 X 30 SET SCREW HT ZP | 13 |
| 97 | M8FWASHER | M8 FLAT WASHER ZP | 26 |
| 98 | M8NNUT | M8 NYLOC NUT HT ZP | 13 |
| 99 | M6GNIPPLE | M6 GREASE NIPPLE | 4 |
| 100 | M6X16 | M6 X 16 SET SCREW HT ZP | 4 |
| 101 | M6FWASHER | M6 FLAT WASHER ZP | 8 |
| 102 | M6NNUT | M6 NYLOC NUT HT ZP | 4 |

Please contact Technical support for further details

QUANTUM MIST 420
QUANTUM MIST 2 ROW WIDE TOWER PARTS ILLUSTRATION

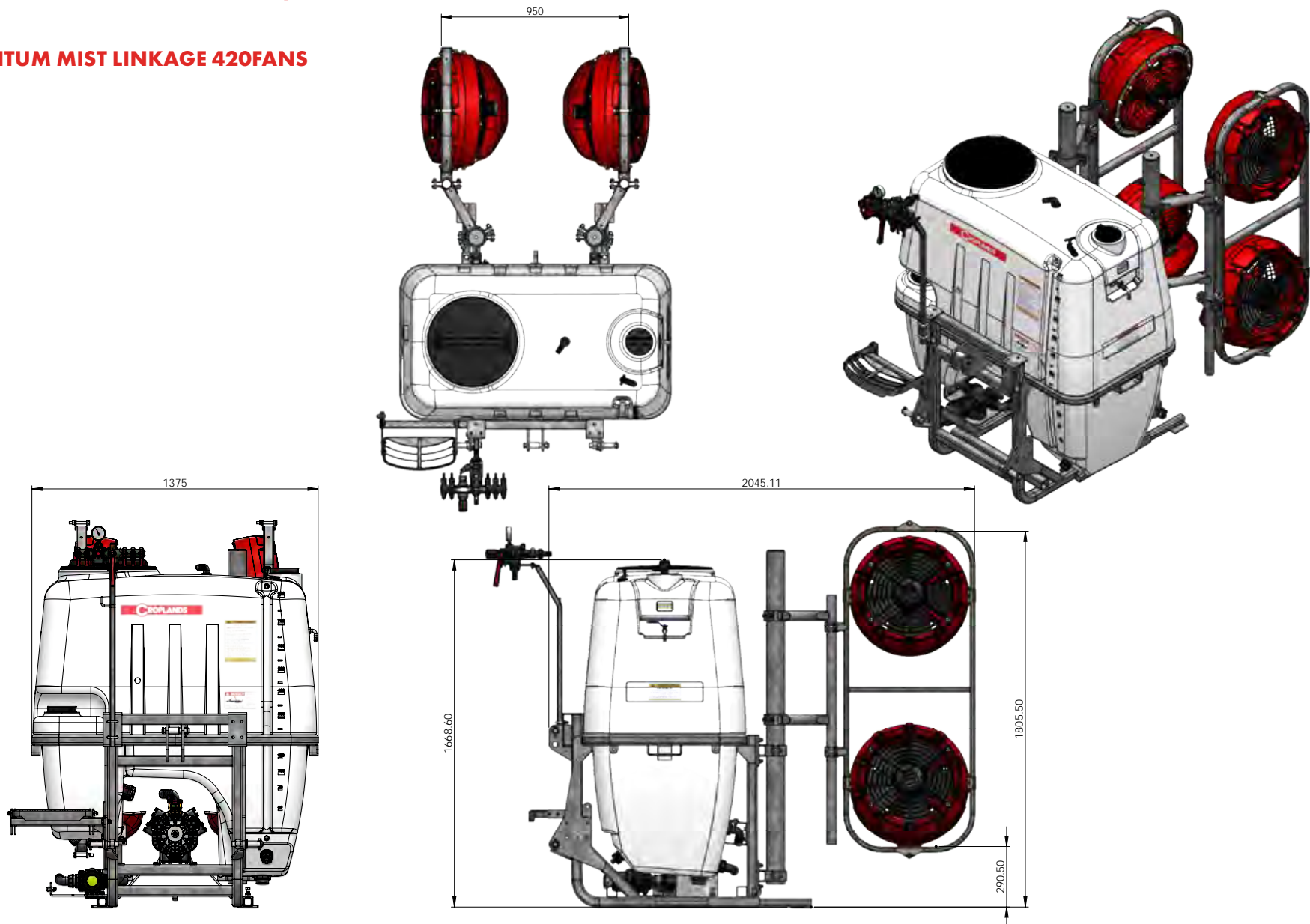


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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

800LT QUANTUM MIST LINKAGE 420FANS



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

800LT QUANTUM MIST LINKAGE 420FANS

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|-------------|--------------------------------|-----|
| 1 | AG10041 | O RING 1" | 1 |
| 2 | AG10061 | O RING 1 1/2" | 6 |
| 3 | AG40006 | FLAT SEAL 1 1/2" EPDM | 2 |
| 4 | ARUCM-5 | UCM 5WAY LESS FILTER #31830 | 1 |
| 5 | AR80LFP-C | PUMP AR80 POLY BP C+PC | 1 |
| 6 | A116425 | ELBOW 0.25 FOR FLY | 1 |
| 7 | A116640 | ELBOW 1 1/2" | 6 |
| 8 | A452107 | VALVE 2" ANTI POLLUTION DRAIN | 1 |
| 9 | A454236 | BALL VALVE POLY 1 1/2" 3 WAY | 1 |
| 10 | A314463 | FILTER 1 1/2" 50MM SH/THR SOV | 1 |
| 11 | A250060 | NIPPLE 1 1/2" | 2 |
| 12 | A200060 | FLY NUT 1 1/2" | 5 |
| 13 | A220060 | TANK OUTLET 1 1/2" | 2 |
| 14 | A205060 | BACK NUT 1 1/2" | 2 |
| 15 | AG40004 | FLAT SEAL 1" EPDM | 1 |
| 16 | A118426 | PIPE 1 X 1 SINGLE PIECE 90DEG | 1 |
| 17 | A3522000 | BREATHER FOR 355MM & 455MM LID | 2 |
| 18 | A300130 | FILTER BASKET LARGE 254MM DEEP | 1 |
| 19 | A5022042 | AGITATOR STRAIGHT #2 CERAMIC J | 1 |
| 20 | B0006 | BARE LINCH PIN 7/16" DIA | 3 |
| 21 | B0076 | TOP LINK PIN 3" X 7/16" S1040 | 1 |
| 22 | B0102 | IMPLEMENT PIN CAT 2 | 2 |
| 23 | B0519 | BUSH CAT 2-3 | 1 |
| 24 | B163.604.13 | ELBOW 1/2" C/W HEX NUT 1/2" | 1 |
| 25 | B165.1501.5 | BALL VALVE 1/2" X 1/2" RH | 1 |
| 26 | G8161000 | LID/RING KIT 455MM | 1 |
| 27 | HP-274A-13G | CLAMP HALF SADDLE 45MM GALVED | 4 |
| 28 | HP-274A-14G | CLAMP HALF SADDLE 90MM GALV | 8 |
| 29 | HP-274A-9C | TUBE STANDOFF ORCHARD LOWER | 2 |
| 30 | HP-275-2 | TOWER TUBE | 2 |

| | | | |
|----|------------|------------------------------------|----|
| 31 | HP-275-3 | CLAMP QM TOWER FARMATE LINKAGE | 4 |
| 32 | KH-510***L | FAN FRAME 2X420 LH 1/2" HOSE 6.5CC | 1 |
| 33 | KH-510***R | FAN FRAME 2X420 RH 1/2" HOSE 6.5CC | 1 |
| 34 | LP060 | FRAME 600LT AGRIPAK FARMATE | 1 |
| 35 | LP060-1 | FLUSH TANK BRACKET | 1 |
| 36 | LP060-5 | FOOT EXTENSION | 2 |
| 37 | LP060-7-2 | BOOM MOUNT 600LT | 4 |
| 38 | LP060-9 | LINKAGE STEP ASSEMBLY KIT | 1 |
| 39 | LP-121 | CONTROLLER BRACKET LINKAGE | 1 |
| 40 | P600-15L | TANK HAND WASH TO SUIT 600/800LT | 1 |
| 41 | P600-90L | 90LT FLUSH TANK TO SUIT 600/800LT | 1 |
| 42 | P800L | 800LT LINKAGE CHEMICAL TANK | 1 |
| 43 | XBMBB32 | U BOLT 32MM | 2 |
| 44 | M12X40 | M12 X 40 HEX HEAD SET SCREW HT ZP | 7 |
| 45 | M12X35 | M12 X 35 SET SCREW HT ZP | 2 |
| 46 | M12FWASHER | M12 FLAT WASHER ZP | 66 |
| 47 | M12HNUT | M12 HEX NUT HT ZP | 4 |
| 48 | M12NNUT | M12 NYLOC NUT HT ZP | 37 |
| 49 | M10FWASHER | M10 FLAT WASHER ZP | 16 |
| 50 | M10NNUT | M10 NYLOC NUT HT ZP | 10 |
| 51 | M10X30 | M10 X 30 SET SCREW HT ZP | 6 |
| 52 | M8X40BOLT | M8 X 40 HEX HEAD BOLT HT ZP | 3 |
| 53 | M12X45 | M12 X 45 SET SCREW HT ZP | 24 |
| 54 | M8X25 | M8 X 25 SET SCREW HT ZP | 2 |
| 55 | M8X20 | M8 X 20 SET SCREW HT ZP | 3 |
| 56 | M8FWASHER | M8 FLAT WASHER ZP | 10 |
| 57 | M8NNUT | M8 NYLOC NUT HT ZP | 2 |
| 58 | M8SWASHER | M8 SPRING WASHER ZP | 6 |

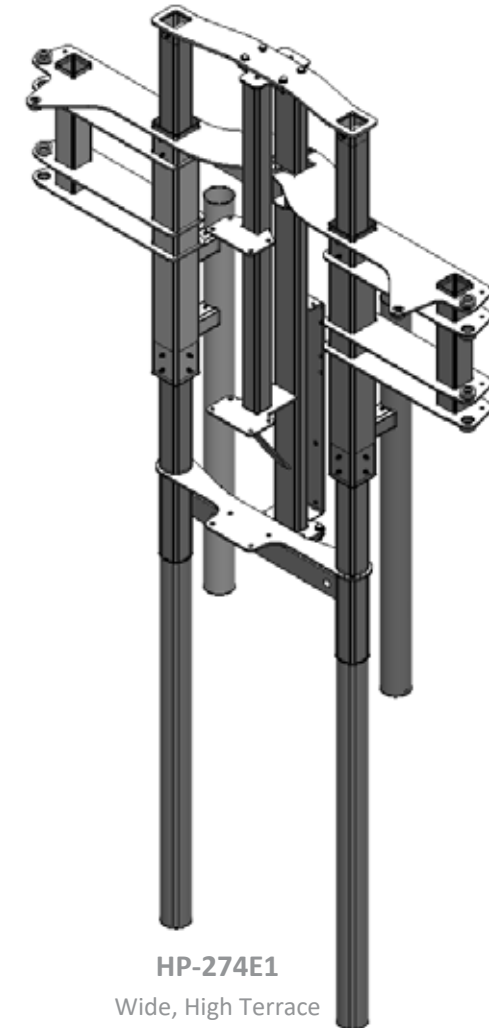
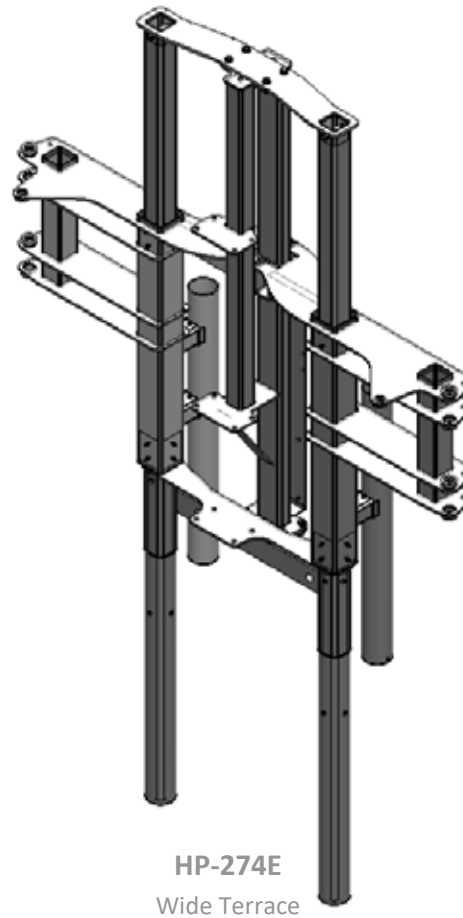
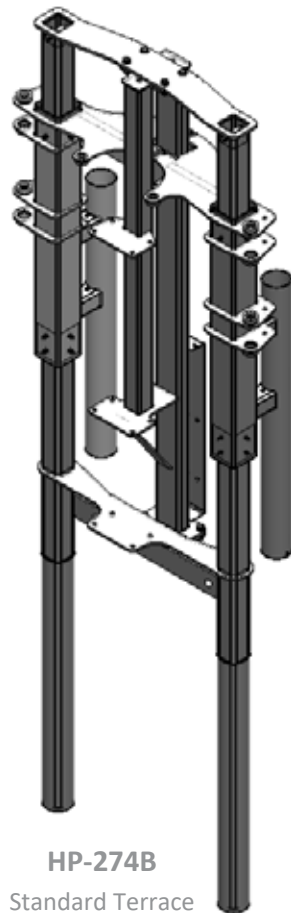
Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 SPRAYER TERRACING TOWER OPTIONS

Also see Standard Tower options



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.

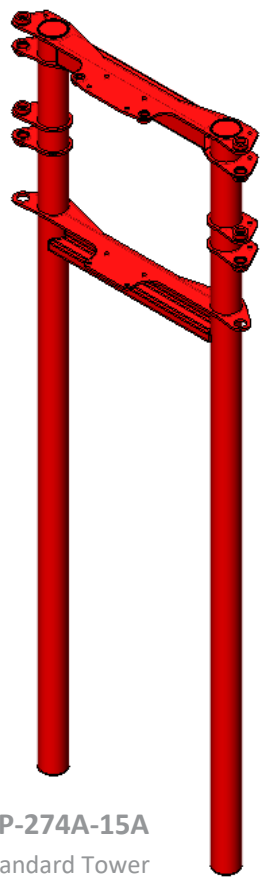
For further parts information refer to: www.croplands.com.au

SECTION 10

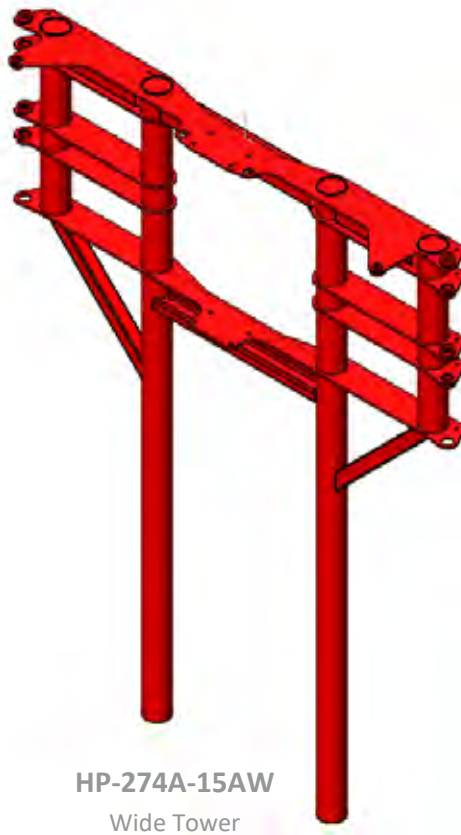
ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 SPRAYER TOWER OPTIONS

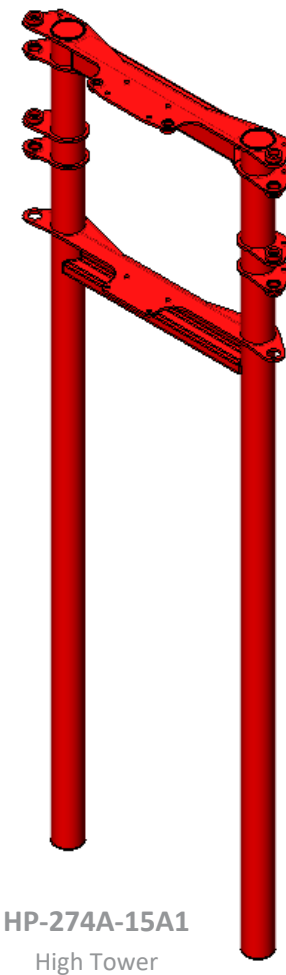
Not including Terracing options



HP-274A-15A
Standard Tower



HP-274A-15AW
Wide Tower



HP-274A-15A1
High Tower

NOTE

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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 BOOM ARM OPTIONS

NOTE

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Used with Standard and Wide Tower / Standard and Wide Terracing Tower options.

Left-hand = 2J, 2F, 2G and Right-hand = 3J, 3F & 3G. Images below are LH version, not to exact scale.

HP-274A-2J / 3J

For Narrow Row



HP-274A-2F / 3F

Up to 3.0 / 3.2 m Row



HP-274A-2G / 3G

For Wide Row



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 BOOM SLIDE AND SWIVEL HEAD

Boom Fan Frames connect too, and slide along the boom arm via the below components ...

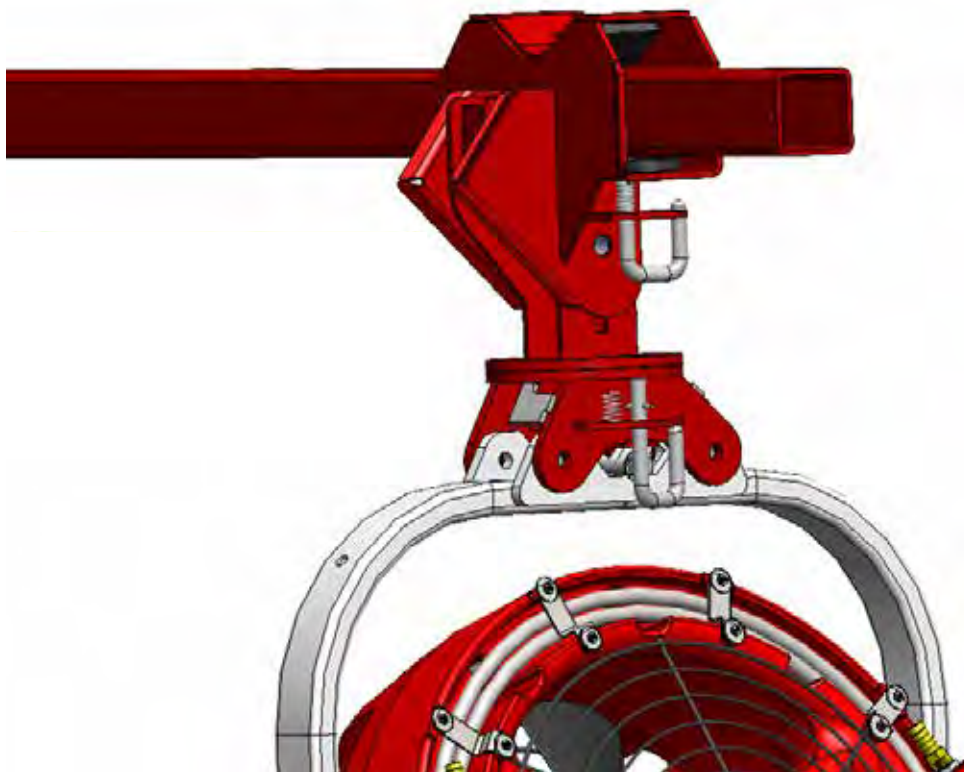
Note 3-row sprayers use a different slide, HP-274A-12B-1 + link bar, ram etc

NOTE

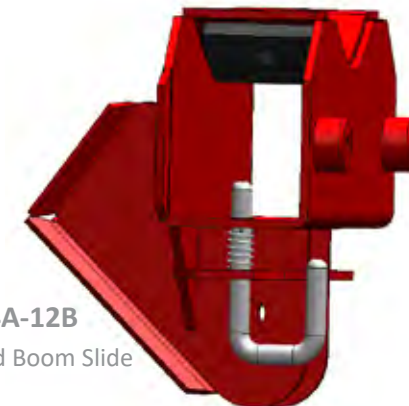
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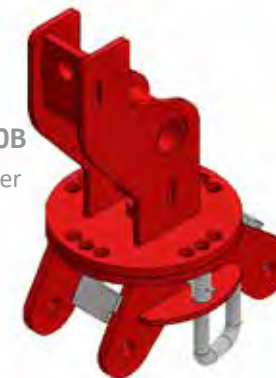
For further parts information refer to: www.croplands.com.au



HP-274A-12B
Standard Boom Slide



HP-274A-10B
Swivel Dropper



HP-274A-18
Actuator Rod
(1 per sprayer)



Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 (BOOM) FAN FRAME OPTIONS

Used with all QM-420 over-row sprayers, in conjunction with swivel dropper & slide.

These single piece frames replace the earlier 2-part versions, HP-322-01 and HP-322-02

See HP-322-03 / 04 & 04A for Fan Frames at the rear of the sprayer.

NOTE

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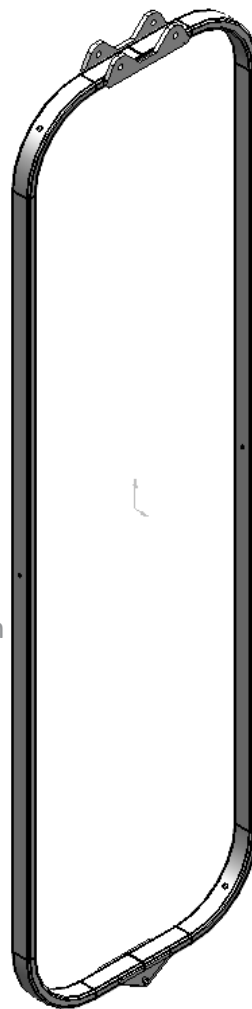
HP-322-05

Standard Length
(2120mm)



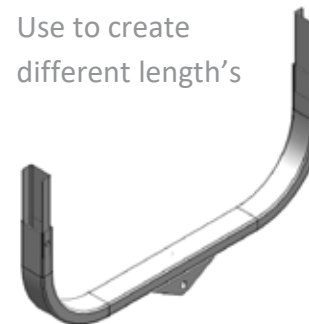
HP-322-05A

300mm Extension
(2400mm)



HP-322-01-1

Use to create
different length's



Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 (REAR) FAN FRAME OPTIONS

Used at the rear of all QM-420 over-row sprayers, in conjunction with HP-274A-98 Stand-Off's.

See HP-322-05 & 05A for Fan Frames used with sprayer boom arms.

Use HP-274A-13G half saddle clamps for attachment to Stand-Off.

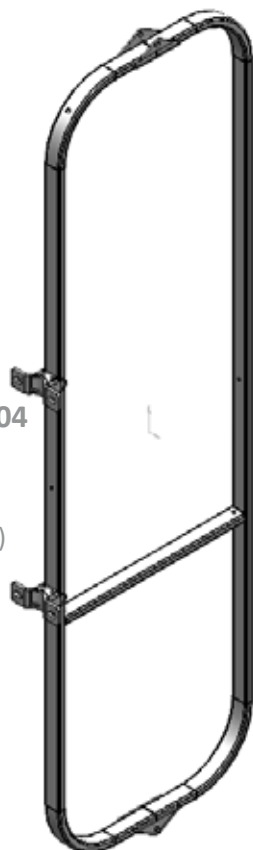
NOTE

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

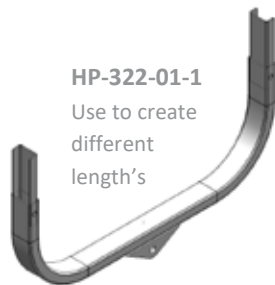
HP-322-04
Standard
Length
(2120mm)



HP-322-04A
300mm
Extension
(2400mm)



HP-322-01-1
Use to create
different
length's



HP-322-03
2-Fan version
for Linkage



HP-274A-98
Rear Fan Frame
Stand-Off

Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

KH-5104AL FAN FRAME ASSY, 3 X QM420

Left Hand Plumbing

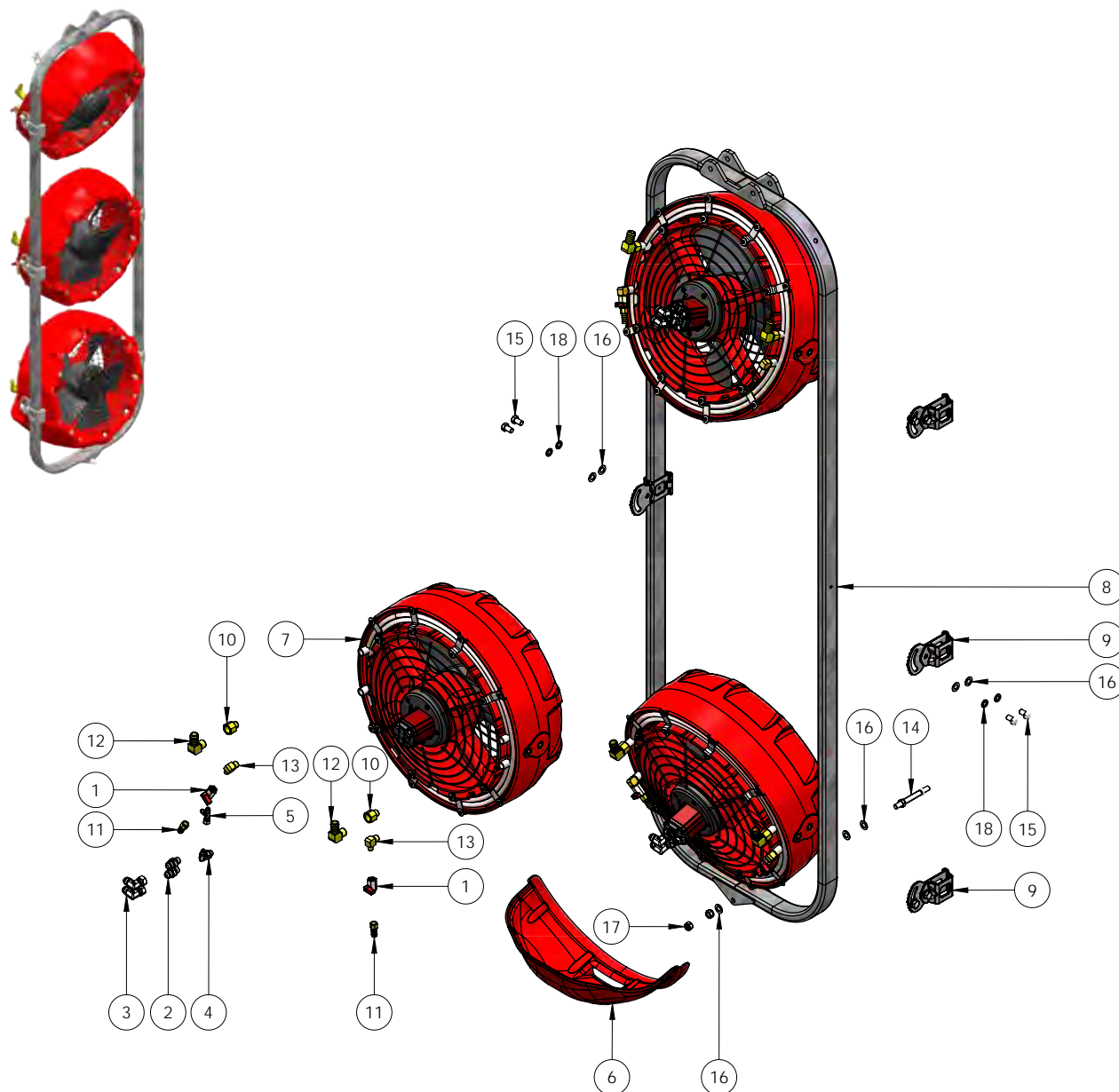
| ITEM NO. | PART NUMBER | DESCRIPTION | |
|----------|-------------|-----------------------------------|----|
| 1 | BALL14MF2M | BALL VALVE 1/4" M/F | 6 |
| 2 | HP-040 | NIPPLE 3/8" BSPPM X 3/4" JICM | 6 |
| 3 | HP-042 | ELBOW 3/4" JICM X 3/4" JICFM | 6 |
| 4 | HP-045 | ELBOW 1/4" BSPPM X 7/16" JICM | 3 |
| 5 | HP-089 | TEE 7/16" JICM/JICM/JICFM | 3 |
| 6 | HP-319-3-1 | LEAF GUARD QM420 | 1 |
| 7 | HP-319-31 | QM420 NO NOZZLES | 3 |
| 8 | HP-322-05 | FAN FRAME QM420 2-3FANS 2020MM | 1 |
| 9 | HP-324-420 | CLAMP QM420 FRAME | 6 |
| 10 | TFAD1238FM | ADAPTOR 1/2" BSPF X 3/8" BSPM | 6 |
| 11 | TFA1412F | TAIL BRASS 1/4" BSPF X 1/2" TAIL | 6 |
| 12 | TFEL1234 | ELBOW 1/2" BSPM X 3/4" TAIL | 6 |
| 13 | TFEL1438MM | ELBOW 1/4" BSPM X 3/8" BSPM | 6 |
| 14 | M12X90BOLT | M12 X 90 BOLT HT ZP | 2 |
| 15 | M12X20 | M12 X 20 HEX HEAD SET SCREW HT ZP | 12 |
| 16 | M12FWASHER | M12 FLAT WASHER ZP | 16 |
| 17 | M12NNUT | M12 NYLOC NUT HT ZP | 2 |
| 18 | M12SWASHER | M12 SPRING WASHER ZP | 12 |

NOTE

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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



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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

KH-5105AL

FAN FRAME ASSY, 2 X QM420

Left Hand plumbing

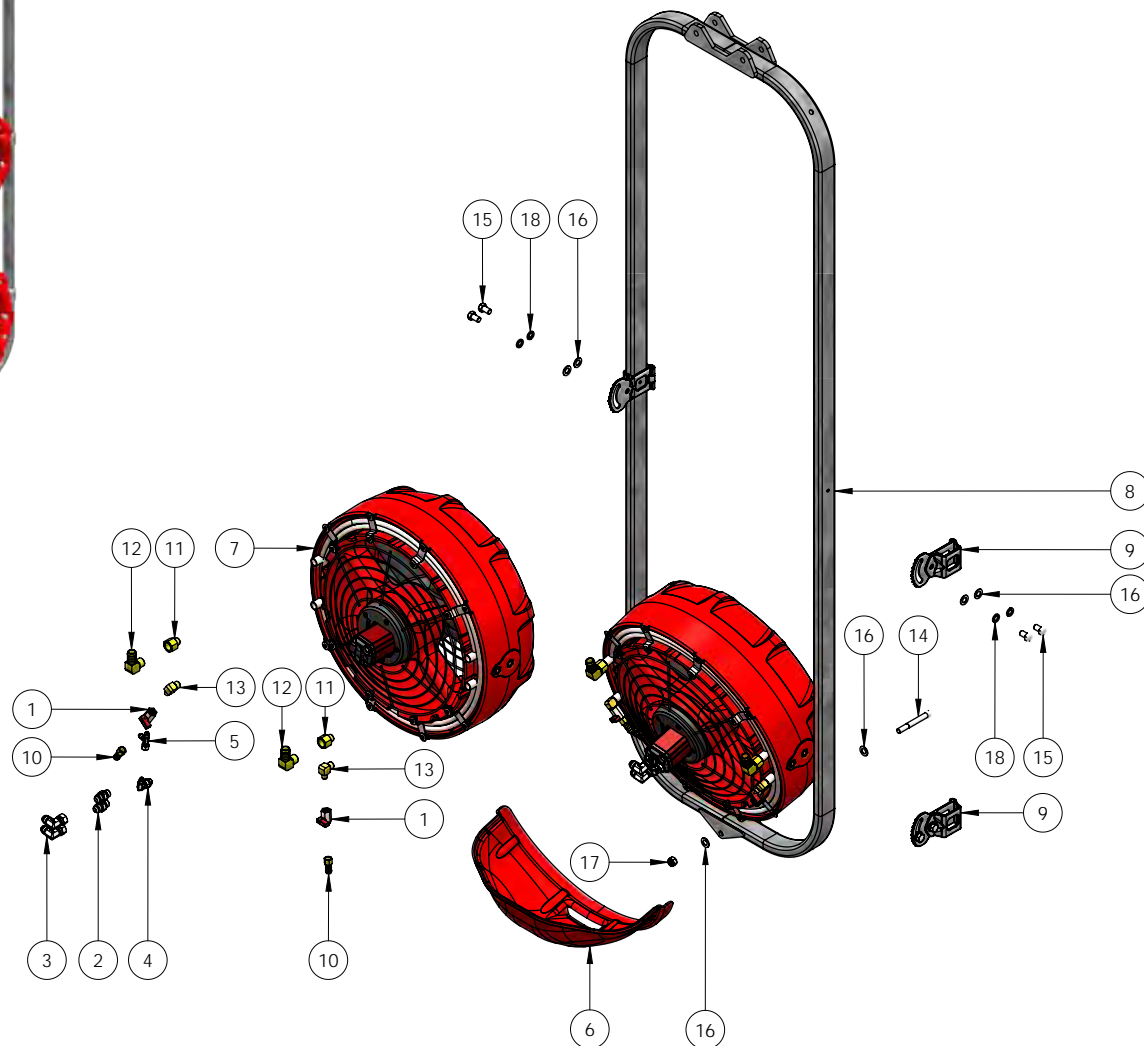
NOTE

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

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|-----------------------------------|------|
| 1 | BALL14MF2M | BALL VALVE 1/4" M/F | 4 |
| 2 | HP-040 | NIPPLE 3/8" BSPPM X 3/4" JICM | 4 |
| 3 | HP-042 | ELBOW 3/4" JICM X 3/4" JICFM | 4 |
| 4 | HP-045 | ELBOW 1/4" BSPPM X 7/16" JICM | 2 |
| 5 | HP-089 | TEE 7/16" JICM/JICM/JICFM | 2 |
| 6 | HP-319-3-1 | LEAF GUARD QM420 | 1 |
| 7 | HP-319-31 | QM420 NO NOZZLES | 2 |
| 8 | HP-322-05 | FAN FRAME QM420 2-3FANS 2020MM | 1 |
| 9 | HP-324-420 | CLAMP QM420 FRAME | 4 |
| 10 | TFA1412F | TAIL BRASS 1/4"BSPF X 1/2" TAIL | 4 |
| 11 | TFAD1238FM | ADAPTOR 1/2" BSPF X 3/8" BSPM | 4 |
| 12 | TFEL1234 | ELBOW 1/2" BSPM X 3/4" TAIL | 4 |
| 13 | TFEL1438MM | ELBOW 1/4" BSPM X 3/8" BSPM | 4 |
| 14 | M12X90BOLT | M12 X 90 BOLT HT ZP | 1 |
| 15 | M12X20 | M12 X 20 HEX HEAD SET SCREW HT ZP | 8 |
| 16 | M12FWASHER | M12 FLAT WASHER ZP | 10 |
| 17 | M12NNUT | M12 NYLOC NUT HT ZP | 1 |
| 18 | M12SWASHER | M12 SPRING WASHER ZP | 8 |



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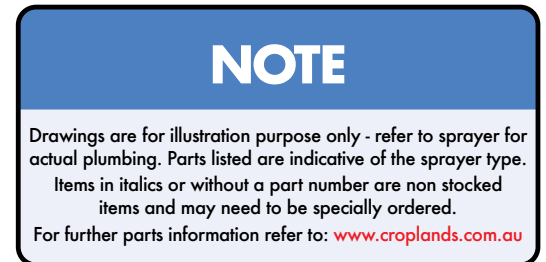
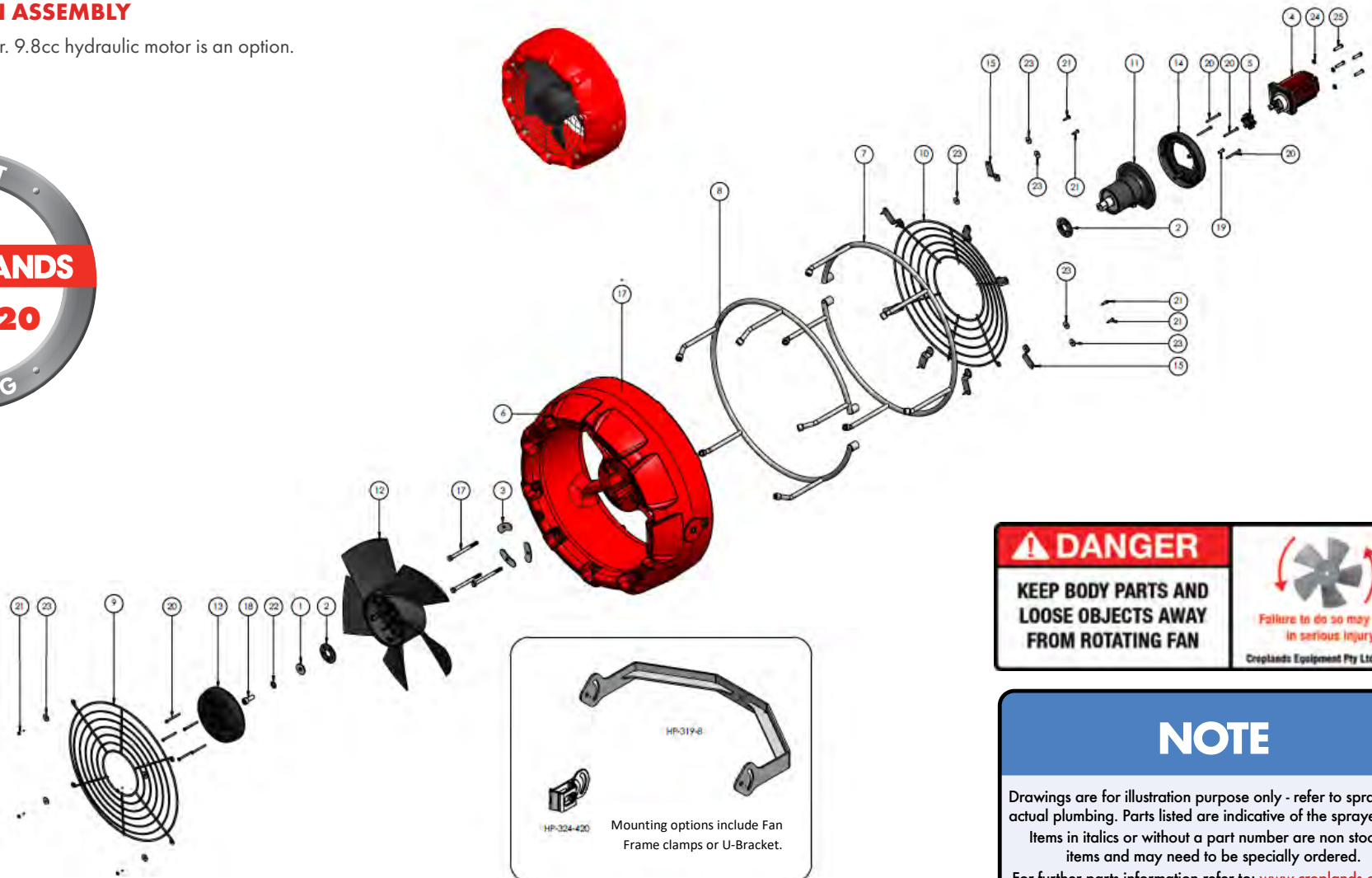
SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HP-319-31

QM-420 SPRAY FAN ASSEMBLY

Using 6.5cc hydraulic motor. 9.8cc hydraulic motor is an option.



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

| ITEM NO. | PART NUMBER | DESCRIPTION | |
|----------|----------------|---------------------------------------|----|
| 1 | HP-119-20 | WASHER 10X30 STAINLESS STEEL | 1 |
| 2 | HP-119-23 | HEP WASHER 5PIN X 2.4 | 2 |
| 3 | HP-219-18 | WASHER KIDNEY SHAPED S/S | 3 |
| 4 | HP-219M6.5CE-2 | HYDRAULIC MOTOR KIT ASSEMBLY 6.5CC | 1 |
| 5 | HP-219-1C | COUPLING INSERT SUIT CH48 | 1 |
| 6 | HP-319-3 | COWL QM420 | 1 |
| 7 | HP-319-5S | SPRAY RING QM420 INNER | 1 |
| 8 | HP-319-5L | SPRAY RING QM420 OUTER | 1 |
| 9 | HP-319-6 | GUARD FRONT QM420 | 1 |
| 10 | HP-319-7 | GUARD REAR QM420 | 1 |
| 11 | HP-319-9 | MAIN DRIVE BODY ASSEMBLY SERIES 2 HYD | 1 |
| 12 | HP-319-10 | FAN PROPELLER QM420 | 1 |
| 13 | HP-319-15 | COVER FRONT QM420 FAN | 1 |
| 14 | HP-319-15R | COVER REAR QM420 DRIVE BODY | 1 |
| 15 | HP-319-27 | CLAMP QM420 GUARD AND RING | 8 |
| 16 | XD-195 | LABEL FAN DANGER | 1 |
| 17 | M8X100SSBOLT | M8 X 100 S/S BOLT | 3 |
| 18 | M10X25SSHSCREW | M10 X 25 ALLEN HEAD SCREW HT ZP | 1 |
| 19 | M5X15SSSCREW | M5 X 15 S/S SCREW | 1 |
| 20 | M4X50SSSCREW | M4 X 50 S/S SCREW | 9 |
| 21 | M4.2X19SSSCREW | M4.2 X 19 S/S SCREW | 20 |
| 22 | M10SWASHER | M10 SPRING WASHER ZP | 1 |
| 23 | M4SSFWASHER | M4 FLAT WASHER S/S | 24 |
| 24 | M6SSSWASHER | M6 SPRING WASHER SS | 4 |
| 25 | M6X25SSSCREW | M6 X 25 HEX HEAD S/S SCREW | 4 |

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HP-319-9
QM-420 DRIVE BODY ASSY

Can also be used for QM-380, replacing HP-219-9 to 9D.

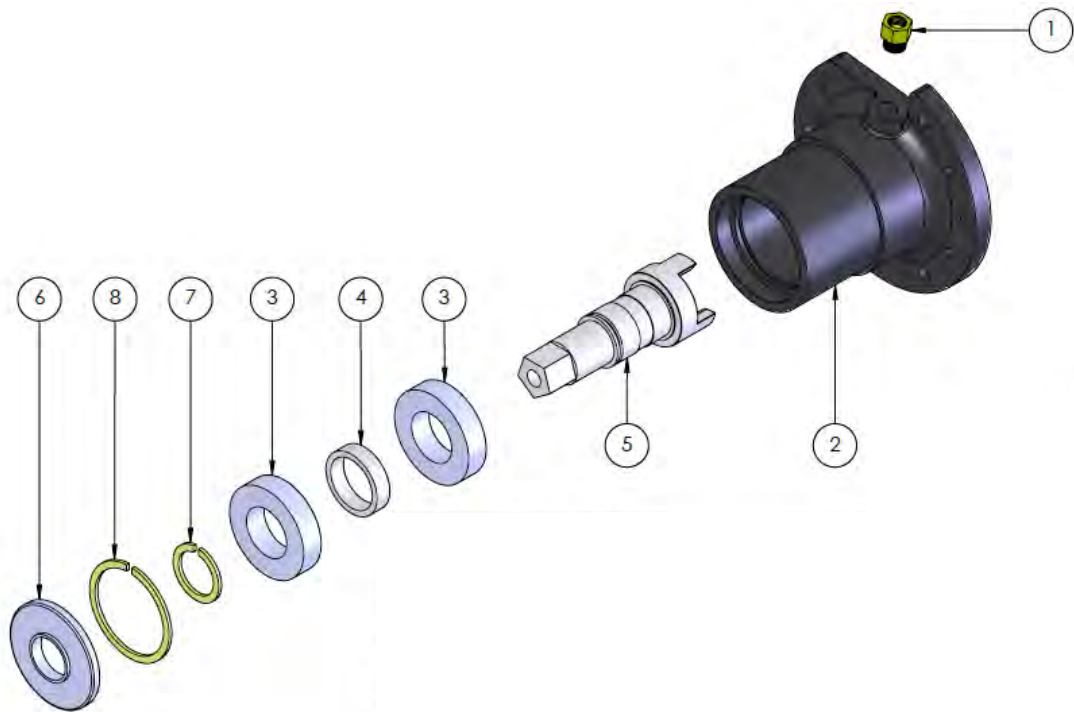
Note this Drive Body is sold as a stand-alone assembly and hence many of the parts are not stocked (bearings & circlips easily obtained from local bearing shop).

NOTE

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



| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|--------------------|---------------------------------------|------|
| 1 | HP-048 | ADAPTOR BRASS M12 X 1M-1/8" F | 1 |
| 2 | <i>HP-119-9-X4</i> | <i>DRIVE BODY CASTING QM380/QM420</i> | 1 |
| 3 | <i>HP-119-9-1</i> | <i>BEARING 6006 SKF 2RS</i> | 2 |
| 4 | <i>HP-119-9-2</i> | <i>BEARING SPACER</i> | 1 |
| 5 | <i>HP-119-9-5B</i> | <i>SHAFT QM380 HYD DRIVE</i> | 1 |
| 6 | <i>HP-119-14A</i> | <i>Z SEAL Z305F SS304 ASSEMBLY</i> | 1 |
| 7 | <i>CIRCLIP34</i> | <i>CIRCLIP 2MM THK</i> | 1 |
| 8 | <i>CIRCLIP59</i> | <i>CIRCLIP 2MM THK</i> | 1 |

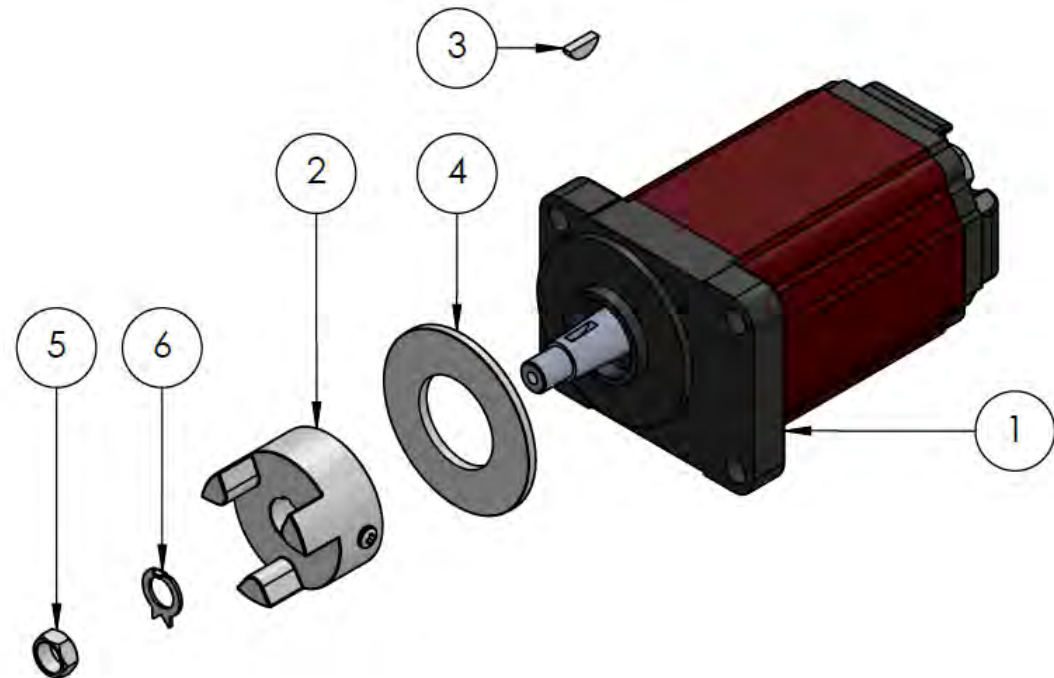
SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HP-219M6.5CE-2

HYD MOTOR 6.5CC INC SPIDER COUPLER

Very similar to the 9.8cc version, the only variation being the length of the red motor body, 60mm for 6.5cc.



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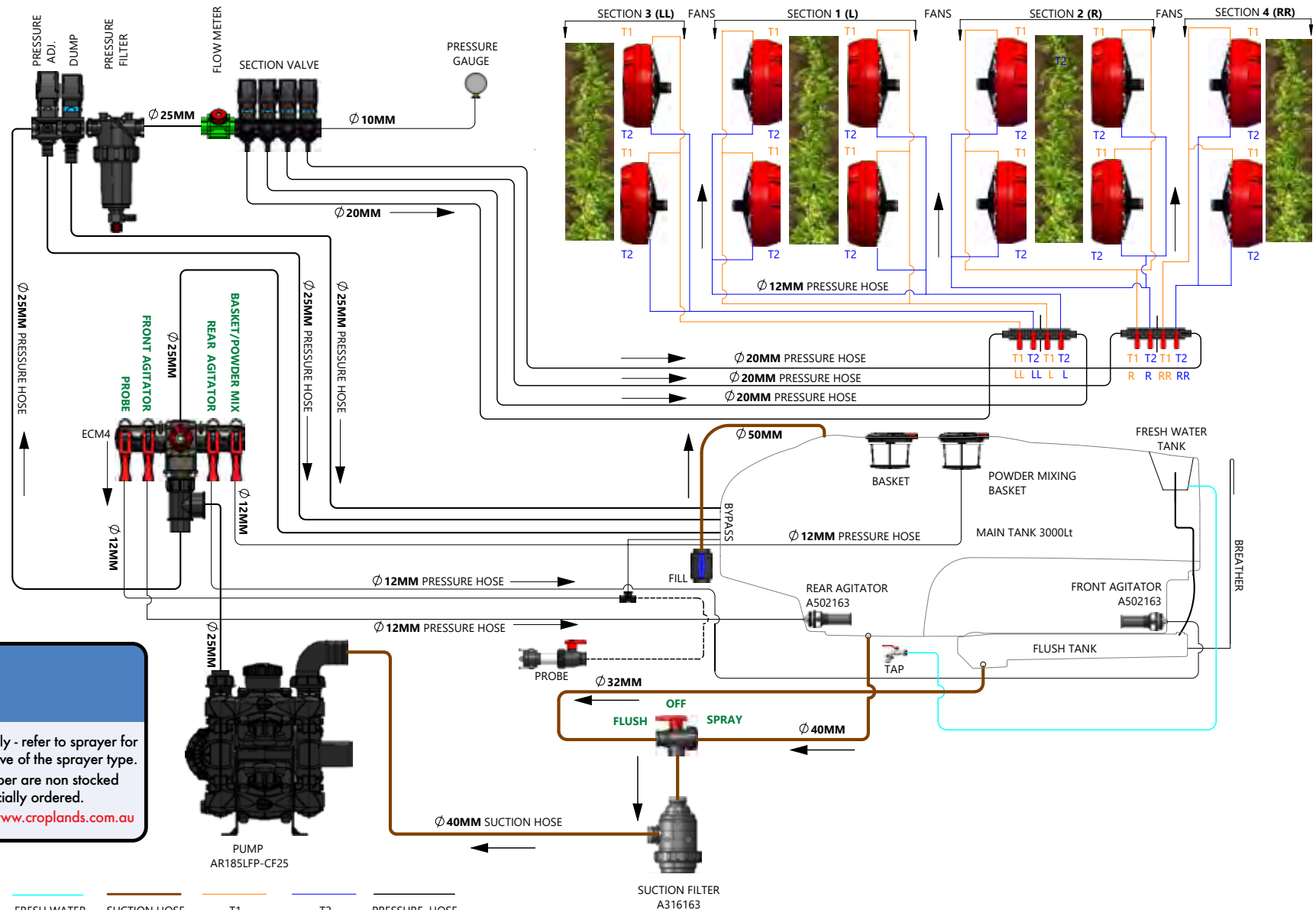
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|----------------------|-------------------------------|------|
| 1 | HP-219M6.5CE | HYDRAULIC MOTOR 6.5CC GRP 1.5 | 1 |
| 2 | HP-219-1A1 | COUPLING HALF GROUP 1.5 TAPER | 1 |
| 3 | HP-219-1D1 | WOODRUFF KEY | 1 |
| 4 | HP-219-4A | ALUMINIUM LOCATING RING 30MM | 1 |
| 5 | <i>M10FHHNUT</i> | <i>M10 FINE HALF HEX NUT</i> | 1 |
| 6 | <i>M10STARWASHER</i> | <i>M10 STAR WASHER</i> | 1 |

Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

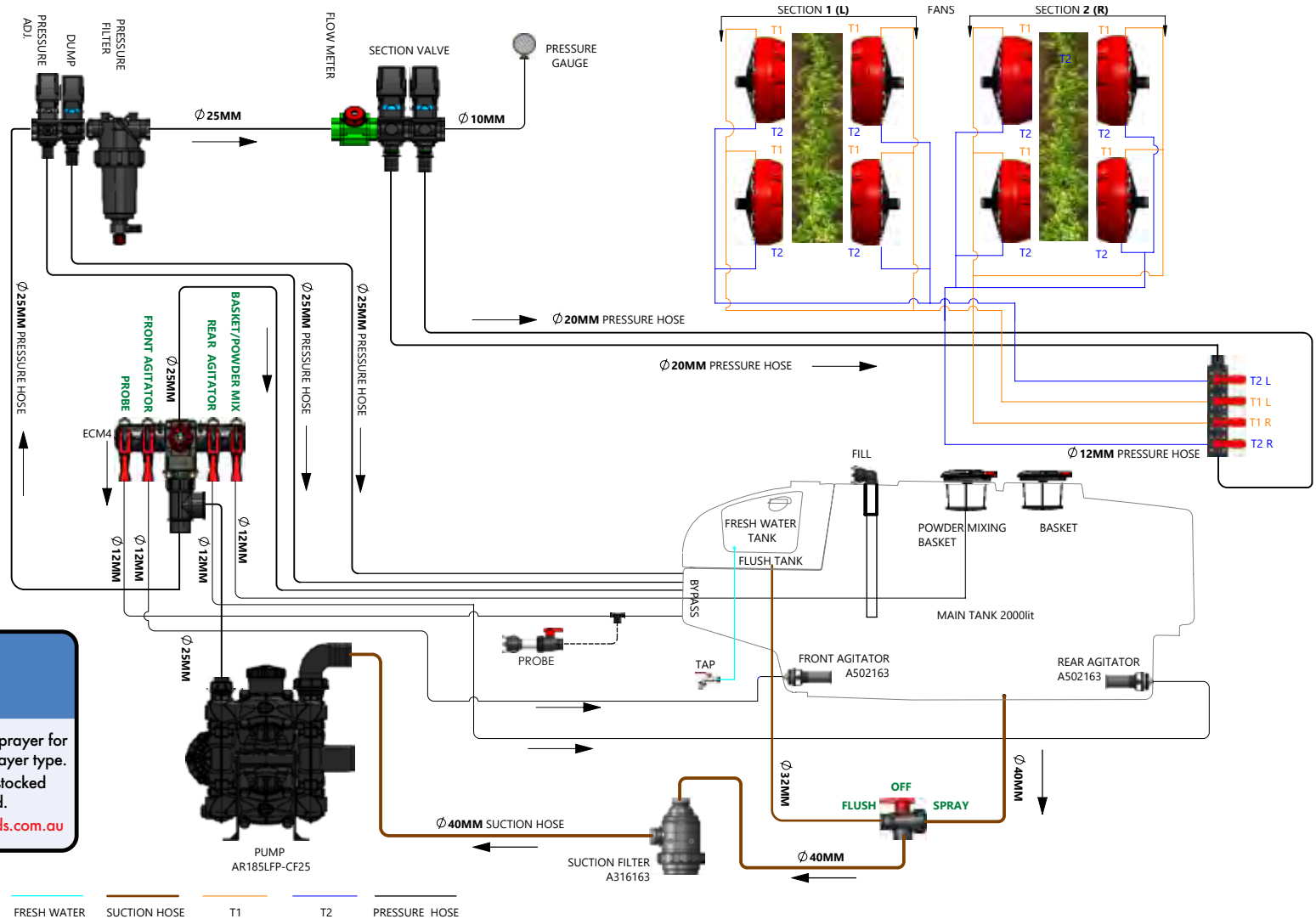
PLUMBING SCHEMATICS - 3 ROW 12 FANS



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HYDRAULIC SCHEMATICS – 2 ROW STANDARD



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

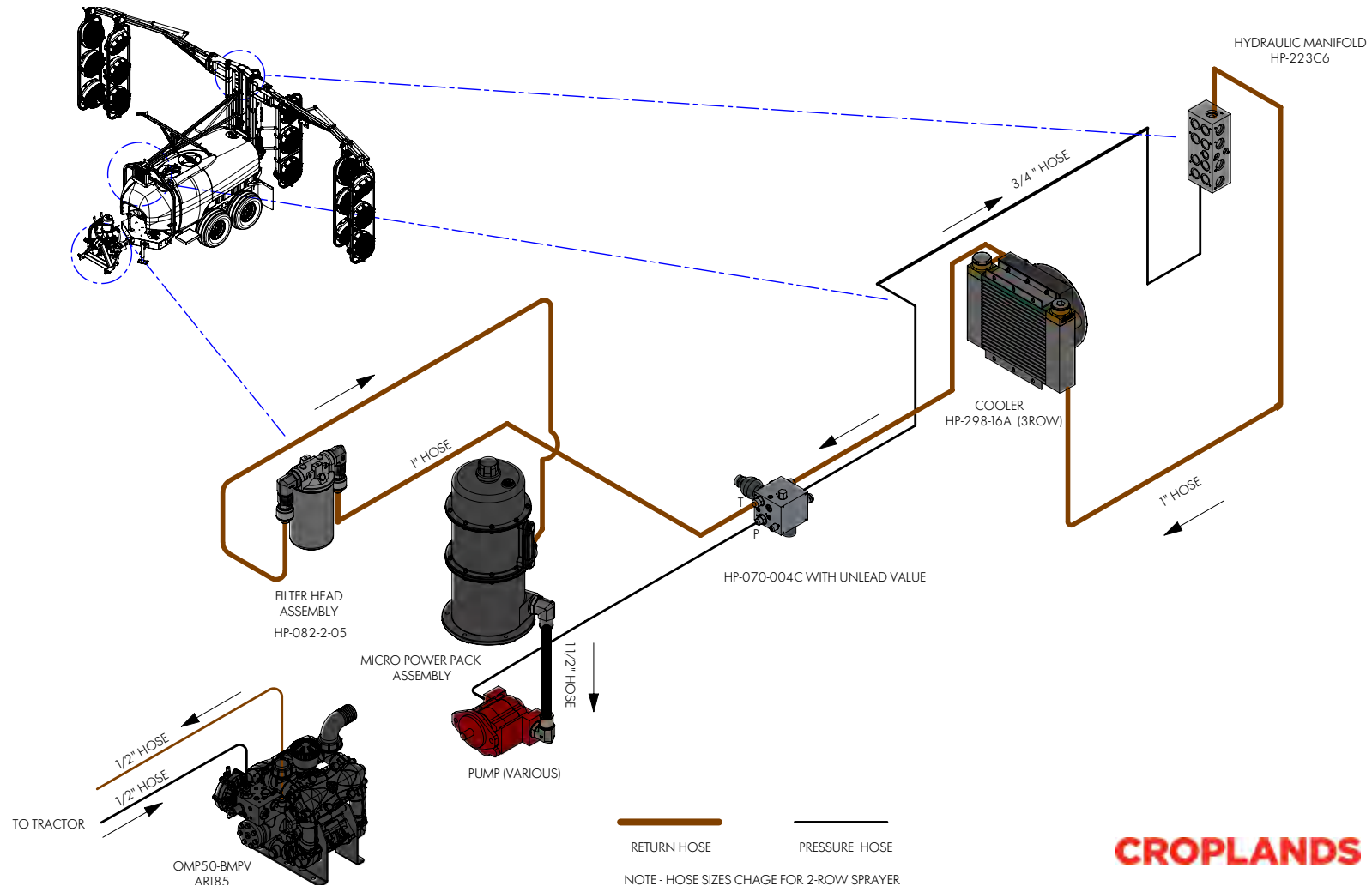
QM-420 STD MPP HYDRAULIC SUPPLY, 3 ROW, 18 FAN, REVO

NOTE

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CROPLANDS

**QM-420 STD HYDRAULIC FAN CIRCUIT, 3 ROW, 18 FAN, REVO,
NO WINDCOMP**

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

Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

HYDRAULIC SCHEMATICS

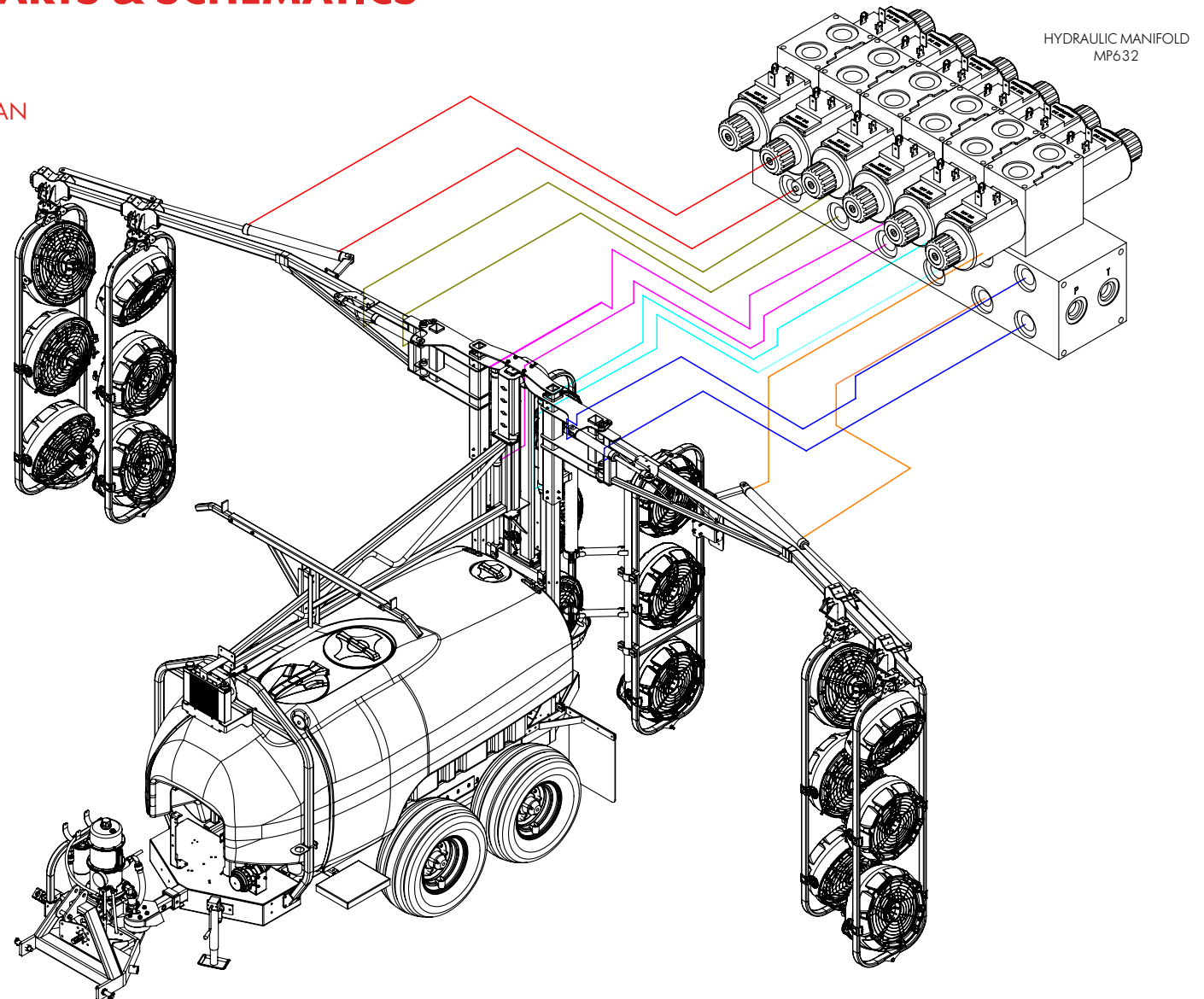
QM-420 BOOM & TERRACE CIRCUIT 3 ROW 18 FAN

NOTE

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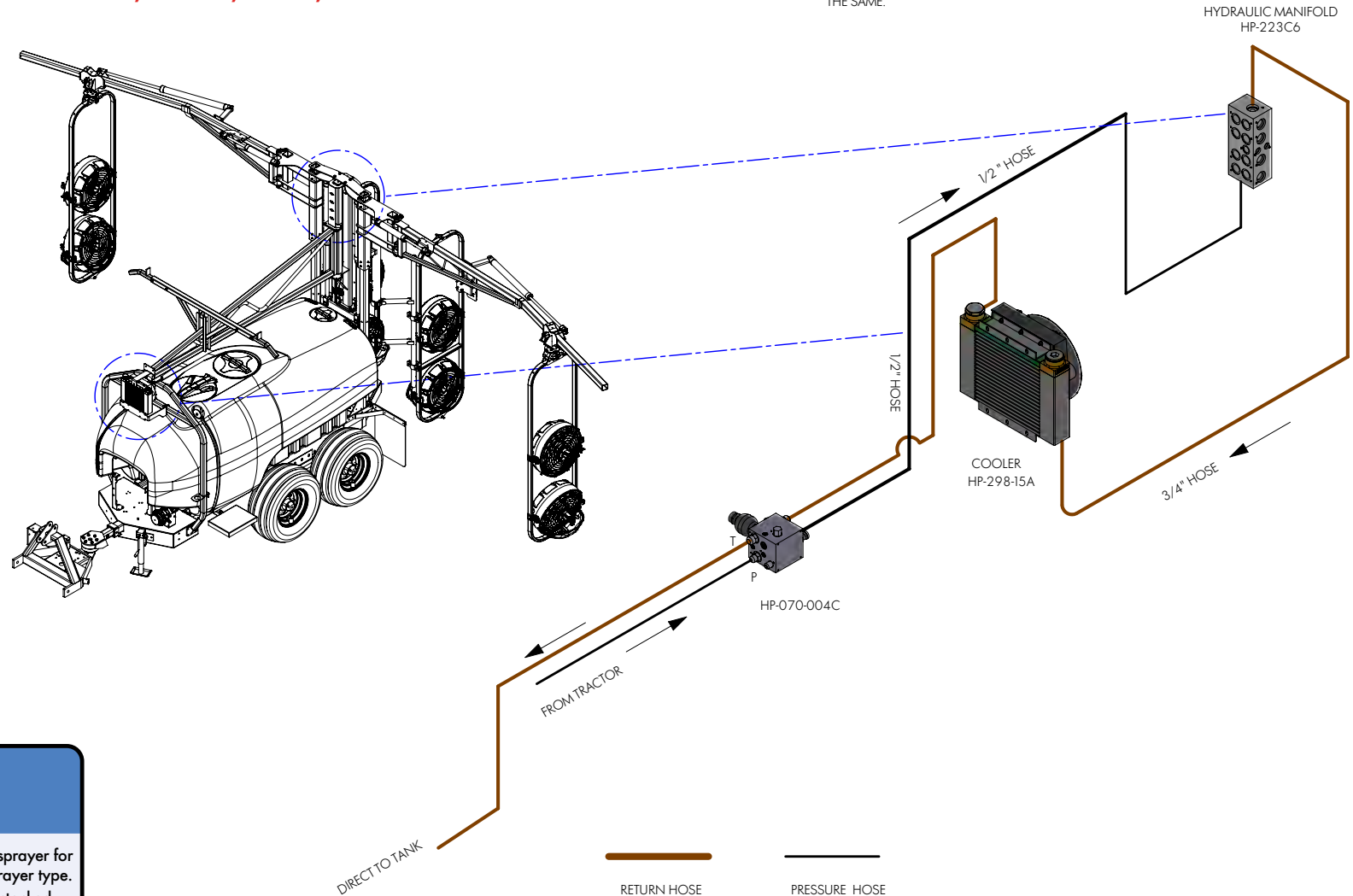


SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 STD TRACTOR HYDRAULIC SUPPLY, 2 ROW, 8 FAN, REVO

NOTE - MOUNTING ORIENTATION OF HYDRAULIC MANIFOLD MAY CHANGE WITH MACHINE TYPE BUT PORTS REMAIN THE SAME.



NOTE

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NOTE - HOSE SIZES CHANGE FOR 3-ROW SPRAYER

Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 STD HYDRAULIC FAN CIRCUIT, 9.8CC, 2 ROW, 8 FAN, REV0

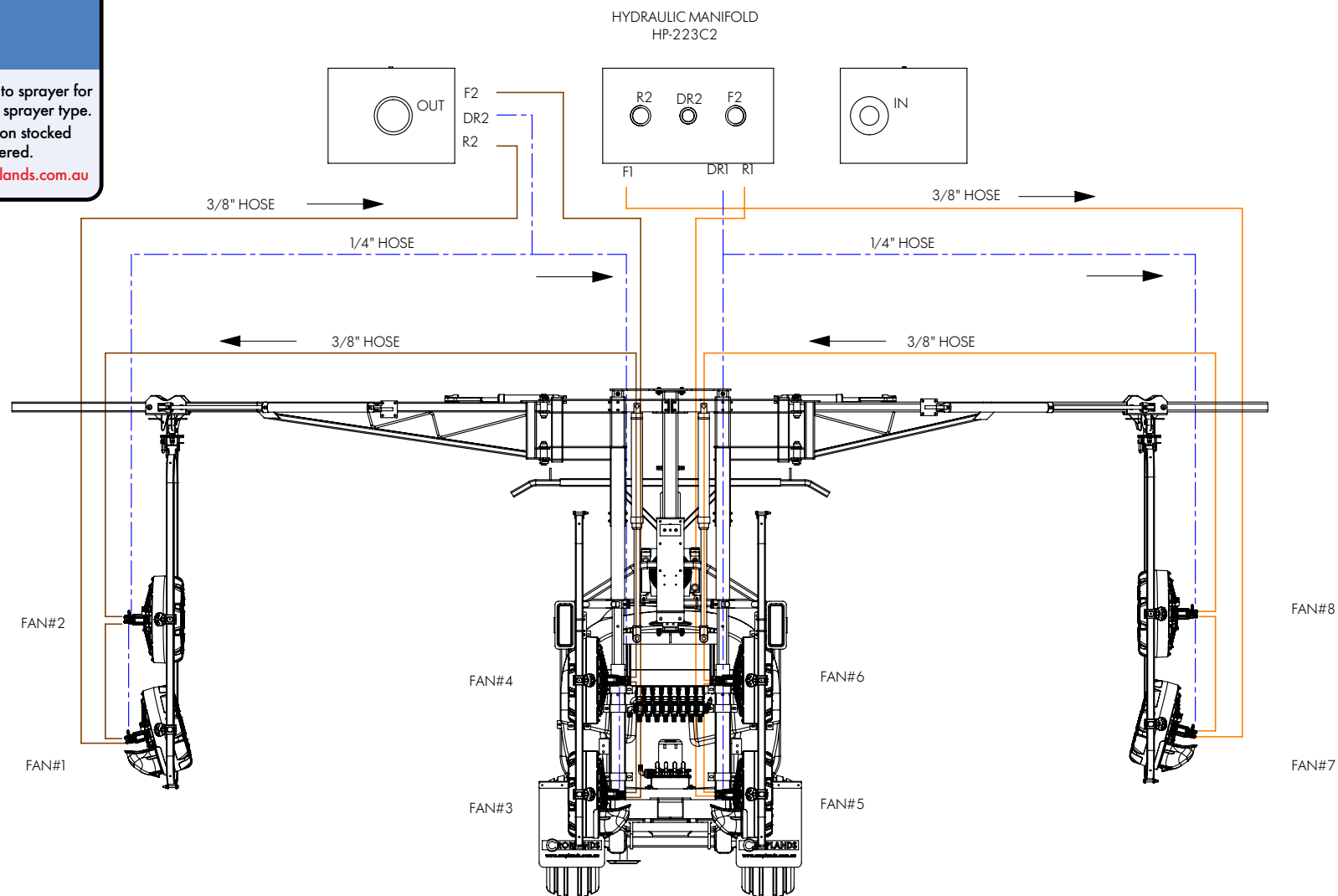
NOTE

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NOTE - MOUNTING ORIENTATION OF HYDRAULIC MANIFOLD MAY CHANGE WITH MACHINE TYPE BUT PORTS REMAIN THE SAME.



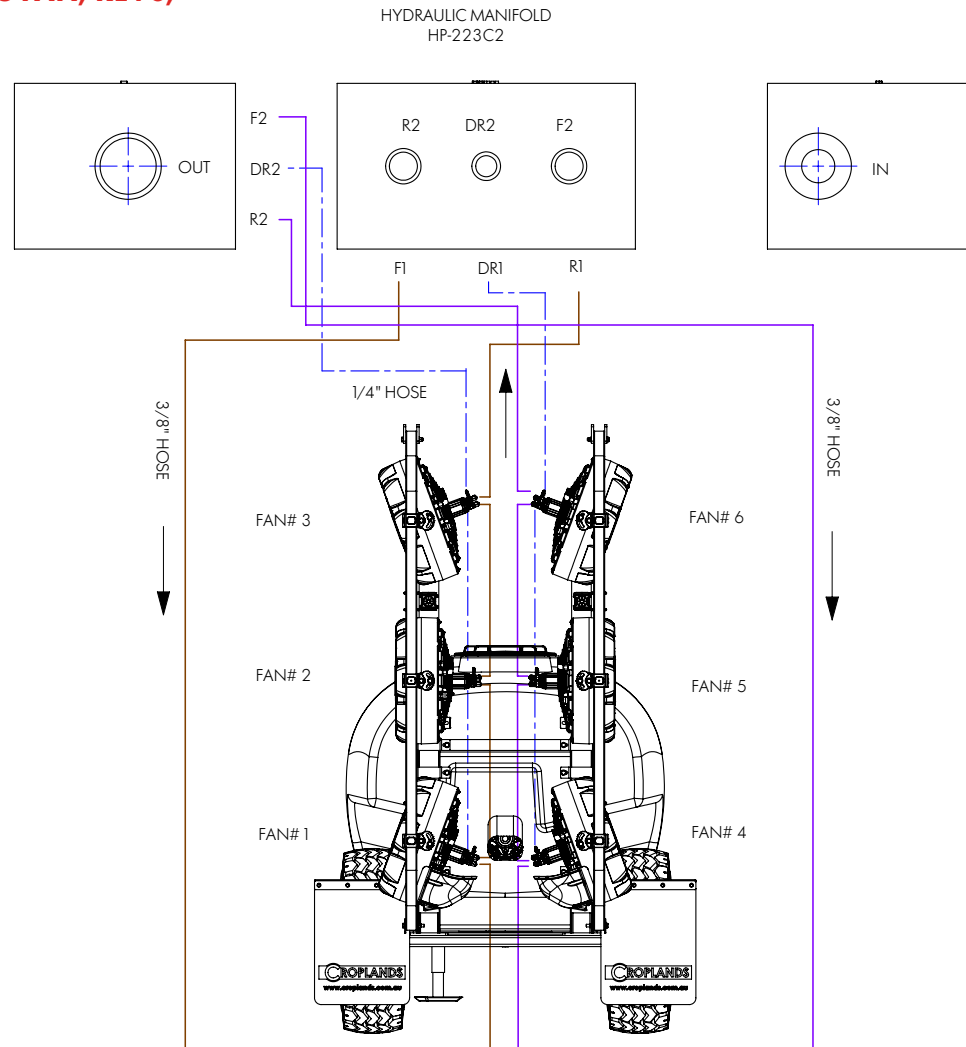
Please contact Technical support for further details

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 STD HYDRAULIC FAN CIRCUIT, 1 ROW, 6 FAN, REVO, NO WINDCOMP

NOTE - MOUNTING ORIENTATION OF HYDRAULIC MANIFOLD
MAY CHANGE WITH MACHINE TYPE BUT
PORTS REMAIN THE SAME.



NOTE

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Please contact Technical support for further details

QM-420 STD TRACTOR, HYDRAULIC SUPPLY, 1 ROW, 4 FAN, REV2

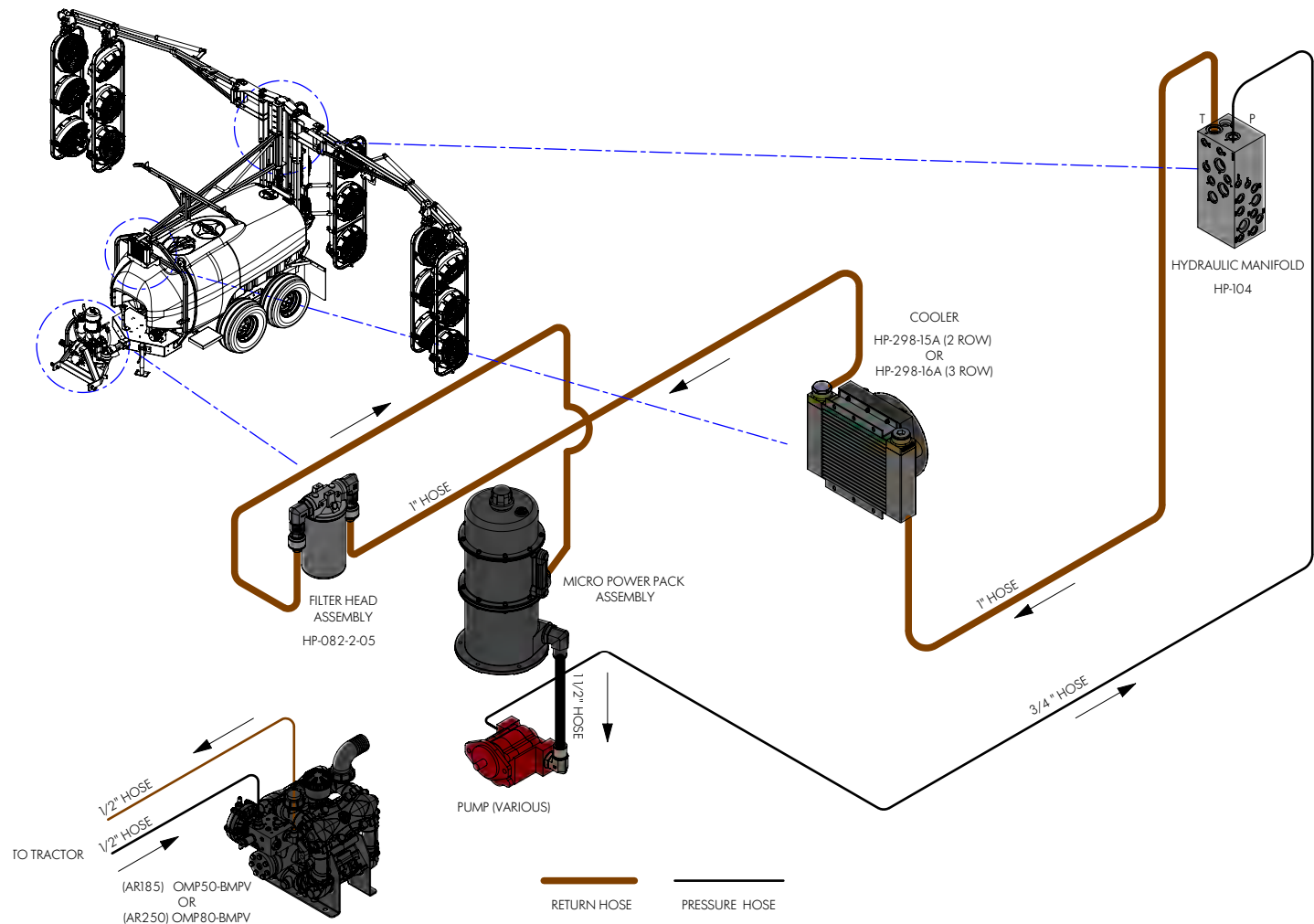


SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 WINDCOMP MPP HYDRAULIC SUPPLY SYSTEM, REV0

NOTE - MOUNTING ORIENTATION OF HYDRAULIC MANIFOLD MAY CHANGE WITH MACHINE TYPE BUT PORTS REMAIN THE SAME.



NOTE

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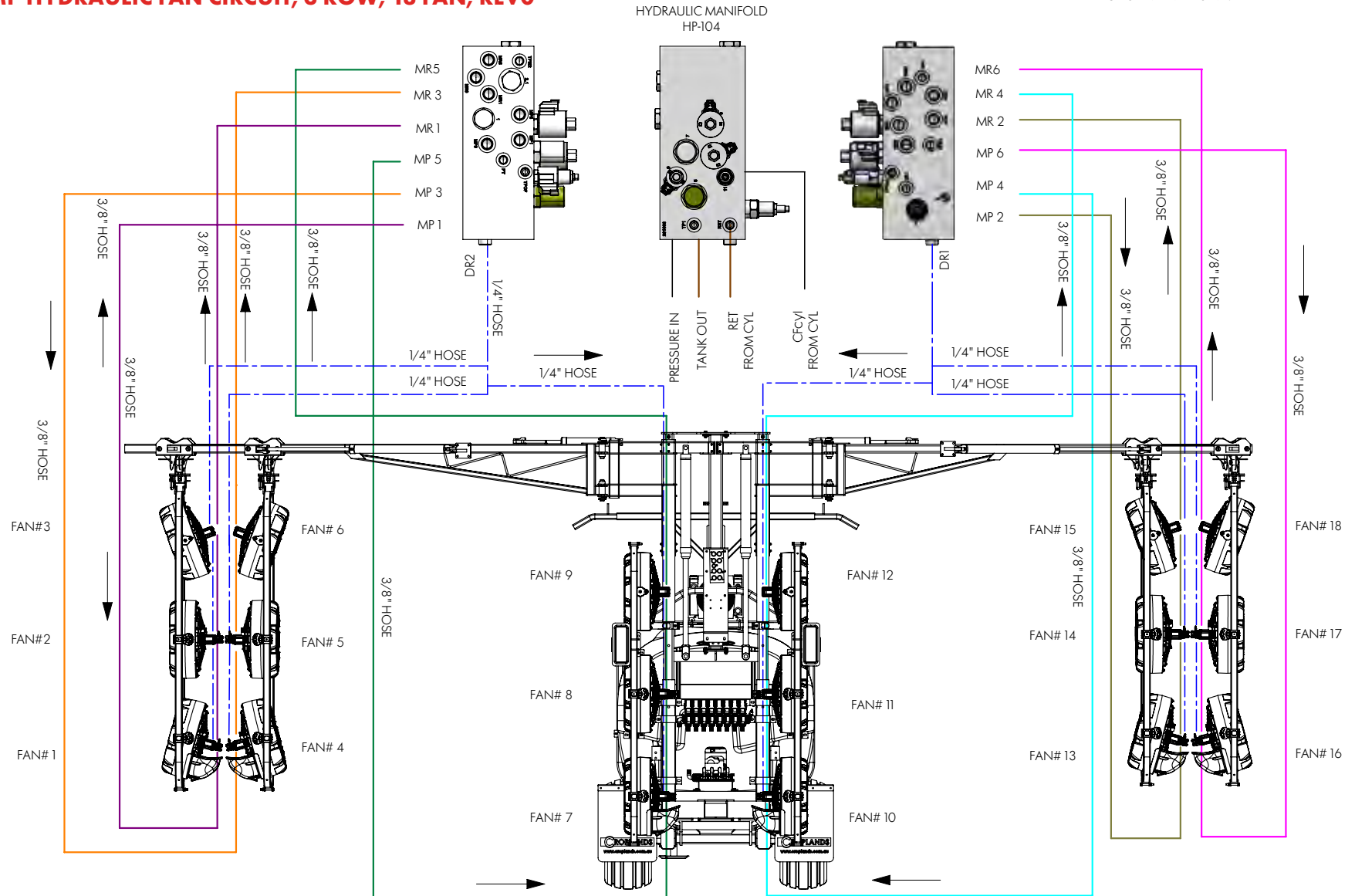
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SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 WINDCOMP HYDRAULIC FAN CIRCUIT, 3 ROW, 18 FAN, REVO

NOTE - MOUNTING ORIENTATION OF HYDRAULIC MANIFOLD
MAY CHANGE WITH MACHINE TYPE BUT
PORTS REMAIN THE SAME.



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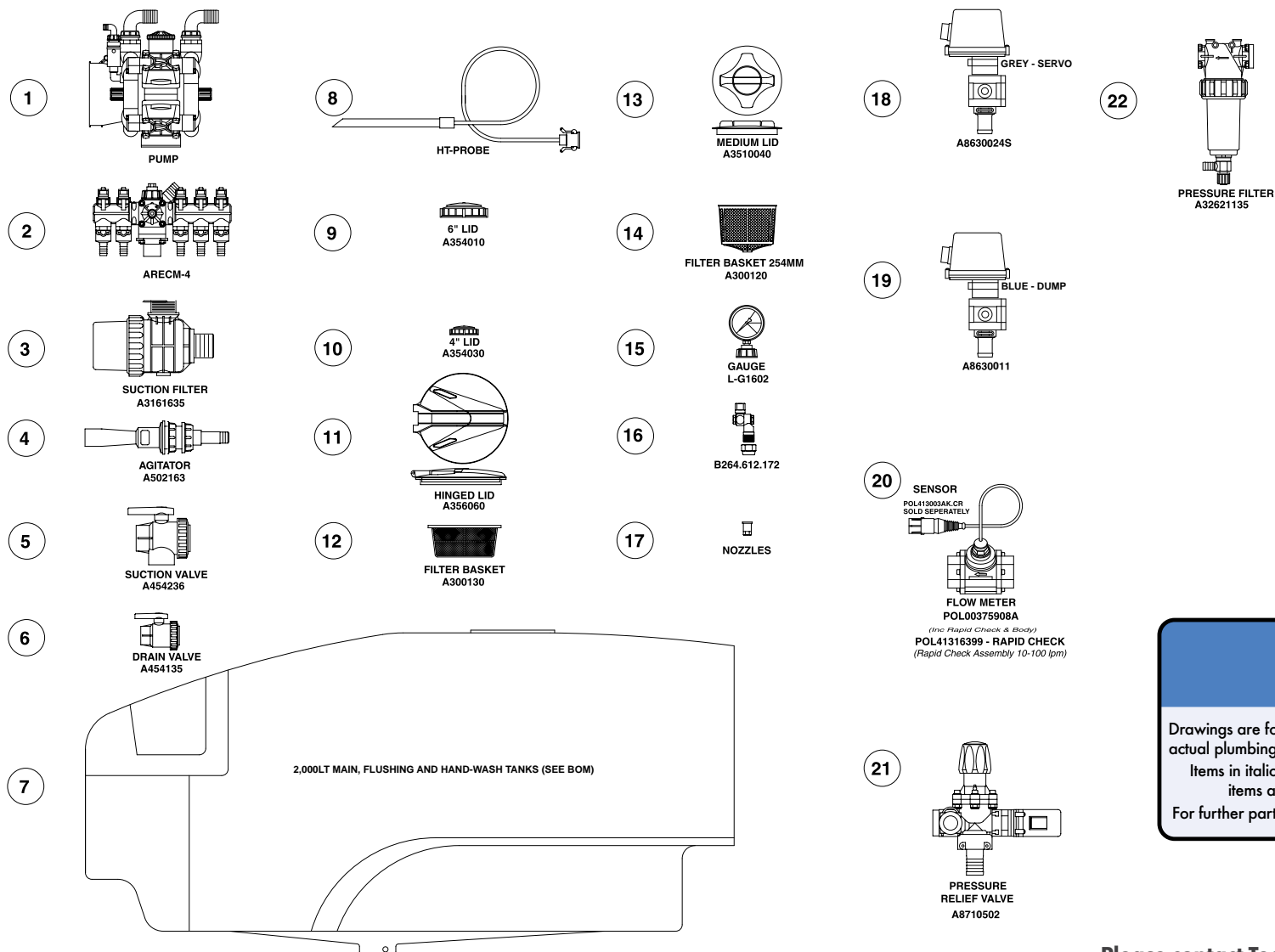
HV4000 SCHEMATICS



SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

LIQUID SYSTEM COMPONENTS



NOTE

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

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

LIQUID SYSTEM COMPONENTS

| POS | PART NO | DESCRIPTION | QTY |
|-----|-----------------|---------------------------------|-------|
| 1 | AR PUMP | AR PUMP (VARIOUS) | 1 |
| 2 | ARECM-4 | ECM 4 WAY LESS FILTER #30027 | 1 |
| 3 | A3161635 | FILTER 1 1/2" 50 MESH | 1 |
| 4 | A502163 | AGITATOR | 2 |
| 5 | A344236 | BALL VALVE POLY 1 1/2" 3 WAY | 1 |
| 6 | A454135 | BALL VALVE POLY 1 1/4" 2 WAY | 1 |
| 7 | P2000AB-RAW | TANK 2000LT POLY RAW AIRBLAST | 1 |
| 7a | P2000AAB-130RAW | 2000 HORT 130L FLUSH TANK | 1 |
| 7b | P2000AAB-15RAW | 2000 HORT 15L HANDWASH TANK | 1 |
| 8 | HT-PROBE | CHEMICAL SUCTION PROBE (option) | 1 |
| 9 | A354010 | LID 6" c/w BREATHER & SEAL | 1 |
| 10 | A354030 | LID 4" c/w BREATHER & SEAL | 1 |
| 11 | A356060 | LID, HINGED 180degrees 382mm | 1 |
| 12 | A300130 | FILTER BASKET 254mm DEEP | 1 |
| 13 | A3510040 | LID, MEDIUM 355mm | 1 |
| 14 | A300120 | FILTER BASKET 254mm DEEP | 1 |
| 15 | L-G1612 | GAUGE 100MM 2500KPA | 1 |
| 16 | B264.612.172 | SWIVEL NOZZLE SINGLE 1/4" BSPM | 8/fan |
| 17 | AZ-ATR-YW-80C | JET CONE ATR 80 DEG (YELLOW) | 4/fan |
| | AZ-ATR-BN-80C | JET CONE ATR 80 DEG (BROWN) | 4/fan |

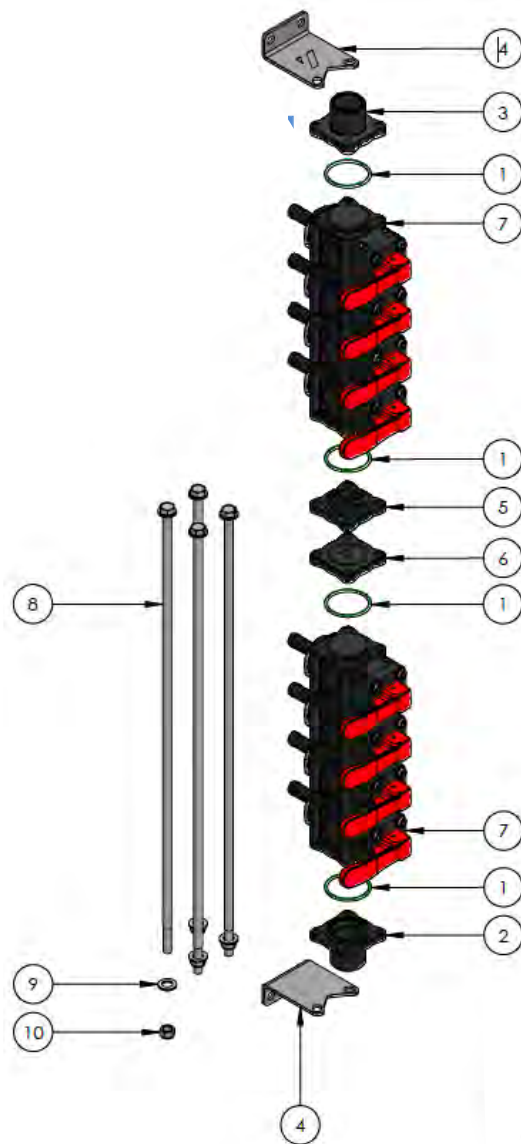
| POS | PART NO | DESCRIPTION | QTY |
|-----|--------------|---------------------------------|-----|
| 18 | A8630024S | PROPORTIONAL SERVO VALVE 7 SEC | 2 |
| 19 | A8630011 | DUMP/BOOM SHUT OFF VALVE 3 WIRE | 1 |
| 20 | POL00375908A | FLOW METER R/CHECK ZAFF | 1 |
| 21 | A8710502 | RELIEF & DUMP VALVE ASSEMBLY | 1 |
| 22 | A32621135 | FILTER S/F 80MESH FLANGED TYPE | 1 |

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

KH-5120 QM-420 MANUAL TAP MANIFOLD, 8 SECTION

As used on QM-420 Orchard Sprayers for Spray ring control.
4-section version used on QM-420 Trailed and Linkage Sprayers.



NOTE

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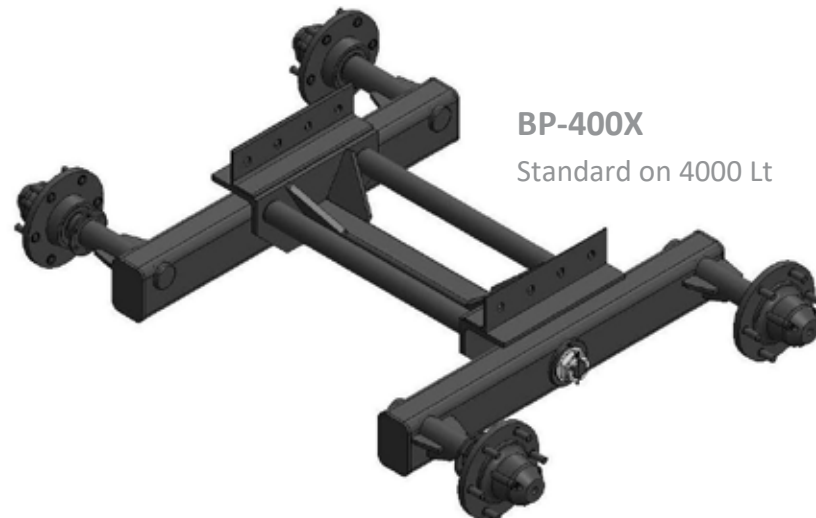
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|----------|-------------|----------------------------|------|
| 1 | AG10071V | O RING 2" VITON | 10 |
| 2 | A463000.040 | FLANGE 463 SERIES 1" BSP | 1 |
| 3 | A463000.140 | FLANGE FOR 463SER VALVE 1" | 1 |
| 4 | A463011.100 | VALVE MOUNTING BRACKET | 2 |
| 5 | A463011.110 | BLANK ADAPTOR | 1 |
| 6 | A463011.120 | CLOSED ADAPTOR | 1 |
| 7 | A463051 | VALVE MANUAL 13MM TAIL | 8 |
| 8 | M8X510ROD | M8 X 510LG THREADED ROD | 4 |
| 9 | M8FWASHER | M8 FLAT WASHER 2P | 8 |
| 10 | M8NNUT | M8 NYLOC NUT HT ZP | 4 |

SECTION 10

ASSEMBLY DRAWINGS, PARTS & SCHEMATICS

QM-420 TANDEM AXLE, WHEEL & TYRE OPTIONS

Not all options are available for all models



HP-200 (11.5/80 - 15.3") - Standard
Rolling dia = 840mm, Tread width = 290mm



HP-202V (31 x 13.5 - 15") - Optional
flotation tyre. Not compatible with 2000 Lt
Rolling dia = 810mm, Tread width = 345mm

NOTE

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on the Croplands website