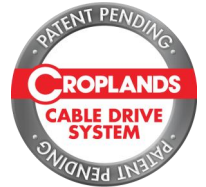




# Cable Drive System

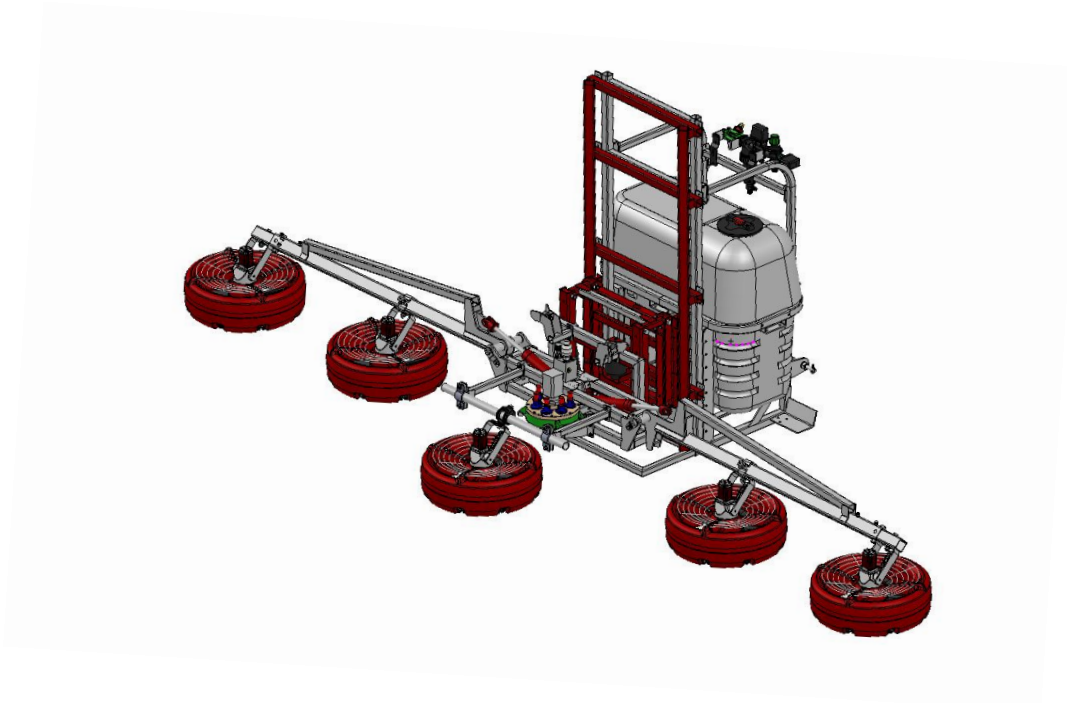
## Parts & Operators Manual



Hydraulic DG

Linkage, Horizon & Single Row Sprayers

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Manual Part Code : HT-POMCD2012A

## 1 : Introduction

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Croplands Equipment is a subsidiary of Nufarm Australia Ltd and operates as Croplands Equipment Pty Ltd in Australia and Croplands Equipment Ltd in New Zealand. Croplands are a leading importer, manufacturer and supplier of spraying equipment primarily to the New Zealand and Australian markets, with expanding sales into the USA and Europe. Established in 1972, Croplands is one of the four largest suppliers, with the largest range, of spraying equipment to the Australasian market.

This manual presumes the Croplands Cable Drive System (CD System) will be used in conjunction with an agricultural sprayer and does not include information for the chemical spraying operations of your sprayer – for that see the separate manual and safety information applicable to the sprayer operations.

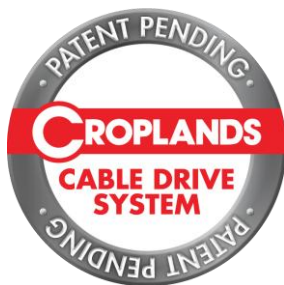
This system has been manufactured to a high standard for use in Agriculture, Horticulture and related industries, for operators / contractors big and small.

As the owner of a Croplands Cable Drive System, please read this manual thoroughly to fully familiarise yourself with all aspects of the safe and correct operation of this system. Maintenance information and useful tips have been noted so please use these to get the best from your product.

Should you need any support or advice on the set up and use of your Cable Drive System or Croplands sprayer, contact your local Croplands dealer or contact Croplands Customer Support.

Croplands Dealers are listed on [www.croplands.com.au](http://www.croplands.com.au) under “dealers” in the menu.

Croplands can be contacted in Australia on 1800 999 162, and in New Zealand on 0800 106 898.



No liability can be accepted for any inaccuracies or omissions in this publication, although due care has been taken to make it as complete and accurate as possible.

The information, illustrations and technical data were considered to be correct at the time of preparation.

In accordance with our policy of continuous development, Croplands Equipment Pty Ltd reserves the right to make changes at any time without notice.

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### 3 : About Your Warranty

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<p>Croplands Equipment Pty Ltd will honour any warranty repair in line with the policy outlined on the following page. The following information will assist you in understanding our warranty procedures.</p> <p>Any authorised Croplands Dealer or service outlet can perform warranty repairs, however we recommend that the Dealer or Reseller from whom you bought the machine carry out any such repairs.</p> <p>Most warranty repairs are handled routinely, but sometimes requests for repairs cannot be accepted under warranty. Normal wear and tear is not covered by warranty nor does warranty apply if a machine fails prematurely and that failure can be attributed to abuse or neglect.</p> <p>Whilst Croplands will abide by its warranty policy under all genuine circumstances, we must emphasise that such can only apply when our equipment has been used in applications for which it was designed and manufactured and that a reasonable degree of care and common sense has been exercised by the operator.</p>	<p><b>Warranty Repair Site</b></p> <p>The warranty provides for repairs to be carried out at the servicing dealer's normal place of business. An owner may elect to have repairs carried out at his own residence, but whilst Croplands will accept the actual repair cost of the failed component(s), the travelling costs will not be covered under warranty.</p> <p><b>Items Not Covered By Warranty</b></p> <p>The warranty does not allow for the cost of the following items.</p> <p><b><i>These are the responsibility of the owner.</i></b></p> <ol style="list-style-type: none"><li>1. Labour to travel to and from a breakdown or for any distance charges</li><li>2. Labour premiums that might apply for any repairs that are made outside the dealer's normal business hours</li><li>3. Transportation costs of the machine to and from the service outlet</li><li>4. Freight costs of the machine to and from the service outlet</li><li>5. Telephone or fax calls made by the owner in connection with the repairs</li></ol>
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### 4 : Warranty Policy

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Croplands Equipment Pty Ltd (trading as Croplands) warrants to its authorised Dealer, who in turn, warrants to the original purchaser (Owner) that each new Croplands' sprayer, part or accessory will be free from proven defects in material and workmanship for twelve (12) months from the date of delivery to the first Owner according to the conditions outlined. This warranty does not cover damages resulting from abuse, accidents, alterations, normal wear or failure to maintain or use the Croplands product with due care.

During the warranty period, the authorised Croplands Dealer shall repair or replace, at Croplands option, without charge for parts and labour any part of the Croplands product, which fails because of defects in material or workmanship. The Owner must provide the authorised Dealer with prompt written notice of the defect (within 14 days of its occurrence), and allow reasonable time for replacement or repair. Repair may, at Croplands option, include the replacement of parts with functionally equivalent reconditioned or new parts. Replacement parts will be warranted for the balance of the original warranty period or for ninety (90) days, whichever is longer. Croplands (at its option) may request failed parts to be returned to the factory. Any travel time of a service technician and/or transportation of the Croplands product to the authorised servicing Dealer for warranty work are the responsibility of the Owner.

#### **EXCLUSIVE EFFECT OF WARRANTY AND LIMITATION OF LIABILITY**

**THIS WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PURPOSE OR OTHER REPRESENTATIONS, WARRANTIES OR CONDITIONS, EXPRESSED OR IMPLIED. The remedies of the Owner set forth herein are exclusive. CROPLANDS neither assumes nor authorises any person to assume for it any other obligation or liability in connection with the sale of covered machines. Correction of defects, in the manner and for applicable period of time provided above, shall constitute fulfillment of all responsibilities of CROPLANDS to the Owner, and CROPLANDS shall not be liable for negligence under contract or in any manner with respect to such machines. IN NO EVENT SHALL THE OWNER BE ENTITLED TO RECOVER FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES SUCH AS BUT NOT LIMITED TO, LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE OR COST OF RENTAL OR REPLACEMENT EQUIPMENT.**



## 5 : Conditions of Warranty

1. The warranty is not transferable.
2. The Warranty Registration Form must be returned to Croplands by the Owner Operator within 14 days of taking delivery of the unit. Only when warranty registration is completed and returned, can Croplands fulfill all warranty obligations.
3. **Schedule of components and conditions not covered by warranty are:**

<b>Abuse</b>	Failure resulting from neglect, such as improper operation, lack of required maintenance or continued use of the equipment after the discovery of a defect which results in greater damage to the unit.
<b>Environmental Conditions and Application</b>	Deteriorated or failed components such as: O-rings, hoses, seals, electrical wiring and connections damaged by corrosive chemicals, dirt and sand, excessive heat or moisture. Owners should ensure the type and strength of chemicals used in the sprayer are compatible with the design of the unit. Warranty determination for these types of failures will be made by Croplands only after inspection of failed components. In most instances these will incur inspection charges and cost of replacement parts.
<b>Normal Wear</b>	Normal wear and consumable items such as: oils and lubricants, diaphragms, filter elements, flowmeters, clutches, fan belts, drive belts, pivot pins, paint, light bulbs and nozzles are considered to be normal wear items and are not warranted.
<b>Maintenance</b>	Component failure caused by not performing scheduled maintenance service such as: oils, grease, failure to clean tanks, pumps, filters, spray lines, nozzles or any other blocked components. Not tightening or replacing loose or missing bolts, nuts, fittings, shields and covers.
<b>Damage</b>	Damages or machine failure caused by carelessness or accidental damage, improper operation, excessive speed during travel and operation, inappropriate transportation or storage of the sprayer or attachment.
<b>Power Source</b>	Failures due to faulty or inadequate electrical sources of power. Owners who use their own 12 volt power source must make sure that it is suitable for operating the spraying equipment.
<b>Alterations</b>	Any unauthorised alteration, modification, attachments or unauthorised repairs to the Croplands sprayer or attachments. Written approval must be obtained from Croplands for any such items to maintain warranty.
<b>Removal &amp; Installation</b>	The time taken to remove and re-install a warranted part or component into other brands of sprayers will not be covered by Croplands warranty. Only parts and labour directly attributable to the repair of the Croplands unit is covered.
<b>Clean-up Time</b>	Croplands do not pay for cleaning the sprayer, parts, accessories or work area before or after the warranty repair. Clean-up time is affected primarily by the application or conditions in which the sprayer is operated and maintained. Since clean-up time can be so variable, cleaning time should be considered a customer expense.
<b>Transportation</b>	Warranty does not cover transportation or insurance costs for sprayers or other equipment needing repair or replacement of warranted components. Nor does it cover any freight or insurance costs in obtaining new parts or returning old parts to Croplands for inspection purposes.
<b>Costs</b>	Warranty does not cover time required to diagnose a warranty problem. Diagnostic time is affected greatly by the training and expertise of the technician employed to do the job. With proper training of service personnel, diagnostic time should be at a minimum.
<b>Diagnostic Time</b>	Croplands expects that Dealers will assign a well trained and proficient technician to handle any warranty repairs. Since Croplands is not in control of either of these responsibilities, we elect not to cover diagnostic time.
<b>Non-Genuine Parts</b>	Use of parts other than Croplands parts for repair of warranted parts will automatically negate any warranty. Warranted components must be replaced with genuine Croplands repair parts.
<b>Unauthorised Repairs</b>	Repairs by an unauthorised agent will automatically forfeit any warranty. An authorised Croplands Dealer must carry out warranty repairs.

## 6 : Pre Delivery Check List & Warranty Registration

**Warranty Policy:** The Warranty Registration Form must be returned to Croplands by the Owner Operator within 14 days of taking delivery of the unit. Only when warranty registration is completed and returned, can Croplands fulfill all warranty obligations. This **form must be completed and signed by both Owner and Dealer**, and a copy returned by the Dealer to Croplands. (Dealer and customer should keep a copy).

<b>OWNER NAME</b>		<b>DEALER NAME</b>	
<b>Address</b>		<b>Address</b>	
<b>Phone &amp; email</b>		<b>Phone &amp; email</b>	
<b>Signature of Owner</b>		<b>Signature of Dealer Representative</b>	
<b>Date Purchased:</b>		<b>Serial Number:</b> (if applicable)	
<i>Tick Each box to affirm completion</i>		<i>Tick Each box to affirm completion</i>	
<b><u>Operator manuals supplied:</u></b>		<b><u>Cable Connections (DG, T-Box, 90 deg, Straight):</u></b>	
- Parts & Operator Manual (this manual)		- All cables connected & secure	
- Sprayer Operators Manual (if applicable)		- All connections have Silicon Sleeves fitted	
<b><u>Distribution Gearbox &amp; Motor:</u></b>		<b><u>Flexible cables:</u></b>	
- Undamaged		- Undamaged	
- Oil visible in sight glass (or fill as required)		- Radius guides fitted (if applicable)	
- Hydraulic Motor fitted		- Cables within radius criteria & free to move	
- Hydraulic Control Manifold fitted			
- RPM control valve fitted ( <b>Manual or Electric ?</b> )		<b><u>Check Operations:</u></b>	
- Hydraulic hose fitted (1/2" pressure)		- Cables running freely & correct fan rotation	
- Hydraulic hose fitted (3/4" return line)		- Soft start is operational	
- No oil leaks		- RPM control is working (manual or electric)	

**Important:** By executing this Checklist / Warranty Certificate:

### 1. The Owner:

- (a) Agrees that all operators must read the Operator's Manual before using the Cable Drive System / Sprayer and follow all the procedures in the manual for the use of the Cable Drive System, and will exercise due care in the use of the system;
- (b) Agrees that Croplands' liability for any loss or damage suffered by the owner in connection with the owner's use of the Cable Drive System is limited to the cost of repair or replacement of the unit;
- (c) Agrees that the owner will bear any loss the owner suffers as a consequence of any failure by the owner to comply with 1(a);
- (d) Acknowledges that the owner is trained and is fully responsible for the safe and correct operation of the system;
- (e) Agrees that the owner will fully train any person who is required to operate the CD System / Sprayer, as to how to operate the unit in a safe and correct manner.

**2. The Dealer:** Undertakes that it has met the obligations of installation, service and warranty start up.

## 7 : Safety Information

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### **Safety must be an Integral Part of Chemical Farming Operations, Not Just an After Thought**

#### **Rules for Cable Drive Operation:**

- Always read your Cable Drive System's operator manual thoroughly before operating. Accidents occur every year because of careless use of farm chemicals and farm machinery. You can avoid these hazards by observing these safety instructions.
- Check the complete system, but in particular the hydraulic hose and flexible cable connections, prior to each use, for any loose connections, and any leaks. These precautions can prevent injury to personnel and damage to equipment.
- Always wear appropriate protective gloves when tightening connections. Damaged, loose or worn connections could result in operator being exposed to substances which could result in illness or faulty operation.
- Use only genuine Croplands parts for any necessary replacement. All parts are important to the equipment design. Homemade parts may look the same but could be dangerous in operation.
- Always replace warning decals when damaged and make certain operator understands proper safety practices.
- Do not disconnect any hydraulic components while the system is in operation. Always relieve system (hydraulic) pressures before doing any work on the machine. Disconnecting components while under pressure will result in uncontrolled spray discharge, which may be hazardous to humans.
- Do not disconnect any mechanical cable drive components while the system is in operation. This precaution can prevent injury to personnel and damage to equipment.
- Do not operate the cable drive system whilst at the same time folding sprayer boom arms. This precaution can prevent injury to personnel and damage to equipment.
- Keep unit under cover to prolong the life, and safe operation of all components.

**Failure to follow these instructions may result in serious injury or death!**

#### **Caution Decals**

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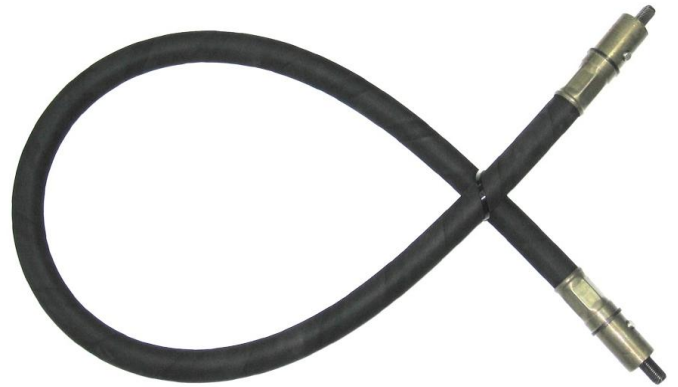
## 8 : Cable Drive Overview

### Cable Drive System - Basics

#### Simplicity

The Croplands Cable Drive System has been designed as an easy to understand, easy to install and easy to maintain system for powering the Croplands Quantum Mist (QM) spray heads.

**In essence, each Quantum Mist head is driven via a flexible cable shaft.**



#### Drive Unit

Using tractor hydraulics, a hydraulic motor (fitted with soft start & rpm control manifold) is used to power the 6 outlet Distribution Gearbox (DG) which drives the (up to 6) individual flexible cable shafts.

At the opposite end, the cable simply plugs into, and drives each spray head, via:

- ... Straight Connector (SC) (shown below right),
- ... T-Box (TB), or
- ... Right Angle Drive (RA) (shown below).



#### Cables

Flexible Drive Shaft (Cable) technology is well proven over many years, and is often used in the aviation, military and automotive industries.

The Croplands system uses a specially wound, high strength 12mm steel cable running in a heavy duty steel & rubber protective casing.

The cable connections use a very simple lock button. Rotational power is transmitted via the square ends which plug into the DG drive pinions & spray head connectors (T-Box, Right Angle or Straight Connectors).





## Overview

### Major Components (also see parts & specifications pages)

#### Sprayer Components

The Croplands Cable Drive System is easy to install, modular system for powering the Quantum Mist (QM) spray heads. It is adaptable to a wide range of sprayers. Simply mix and match the required components, changing cable lengths as required.

#### Quantum Mist Heads (QM-500 or QM-380).

**It is not recommended to retrofit an old spray head** – either replace with a new head or replace the main body assembly with a cable drive version.



#### Cables, Six different lengths

HP-071-125 or 150 or 175 or 200 or 250 or 300 cm  
(1.25 ~ 3.0 metres).

#### Silicon Sleeves, HP-070-526

**MUST be used on every cable connection ....**  
(for waterproofing).

#### Cable Radius Guides, HP-070-001 or 001A

#### Cable Joiner, HP-071-CJ1

- Used to join two cables, (as shown)



#### Distribution Gearbox, HP-072-DG55H (6 outlet, hydraulic drive. Gear ratio 1 : 5.5)

- Hydraulic Motor, OMR-8032
- Soft Start Manifold, HP-070-004 which incorporates a manual rpm control valve.

#### Spray Head Connector – Straight, HP-073-380 and HP-073-500 (This is the default connector)

#### Spray Head Connector – T Box, HP-074-380 (shown) and HP-074-500

#### Spray Head Connector – Right Angle, HP-075-380 and HP-075-500

#### Additional Options

- RPM Sensor, UP-402A. (Requires sprayer to be fitted with HV4000 or Digiblock).
- Electric speed control, HP-070-004-2. (Requires sprayer to be fitted with HV4000).
- Distribution Gearbox require a mounting bracket specific to each sprayer.

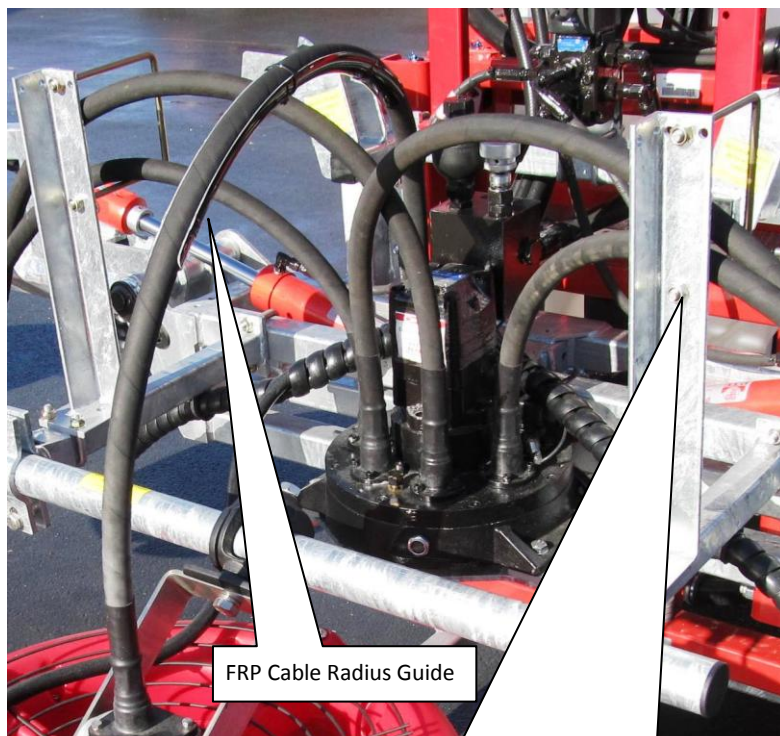


## Overview

### Sprayer Rigging

For optimal cable life it's very important the cables are routed in a manner that maintains generous radius bends. The minimum allowed radius is 240mm. For this reason it's best to rig each sprayer in a manner that uses the correct cable length – not too long or too short. The choice of connection at the spray head can also influence the cable selection. **Adjusting the head positions may require a change of cable length.**

The default choice is the “Straight” connector because it's the simplest, lightest, quietest and cheapest. The RA drive is a neat option for top & bottom or left & right fans. T-Boxes can also be used to drive (no more than) 2 spray heads in series.



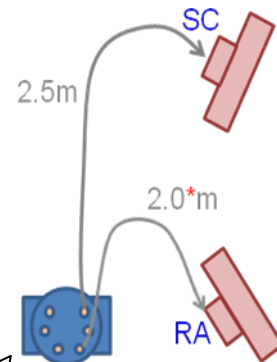
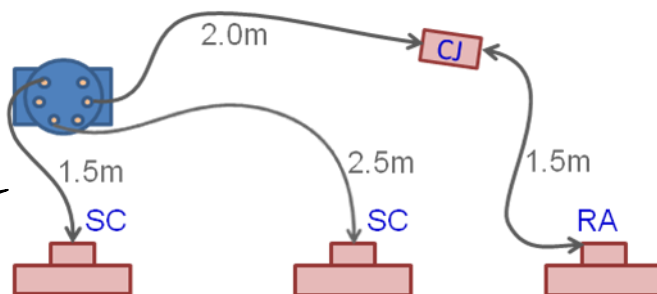
These brackets better support the cables weight and helps maintain the minimum cable radius. Also an aid to cable positioning when boom is folding.

It's important to **allow cables some freedom of movement**. Excessive heat and wear will result from securing cables into rigid positions.

Shown are some schematic examples of cable rigging for sprayers (only right hand side shown). There are many choices to suit differing applications.

Preferred option for Horizon 5 boom.

RA drive on outer heads is required if the boom is to be folded.  
See example below (Joiner is yet to be correctly mounted).



Preferred option for 4 head grape sprayer. RA drive on lower heads makes for “cleaner” rigging.

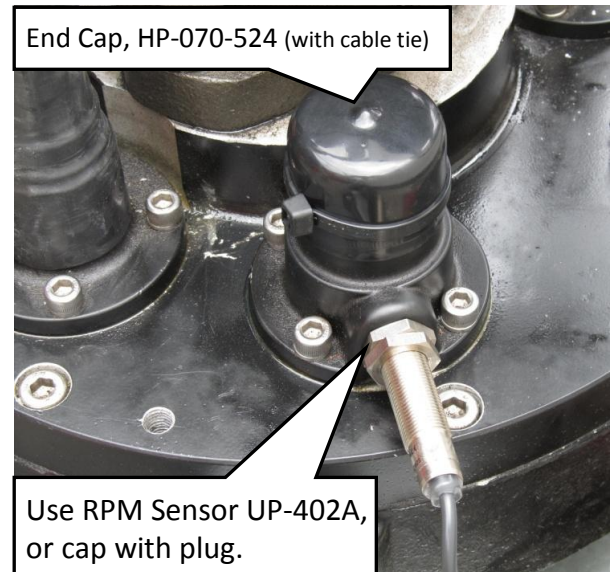


## 9 : Installation

### Distribution Gearbox, HP-072-DG55H

#### Components

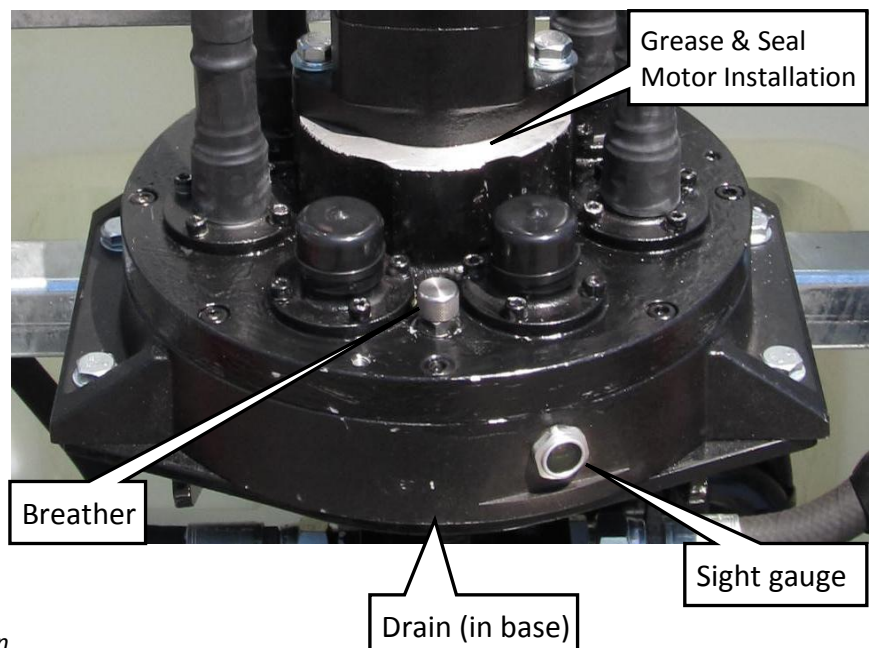
- The Distribution Gearbox (DG), HP-072-DG55H is the core component in the Cable Drive System.
- The following items are (occasionally) fitted to, or required for the DG.
  - OMR8032 (Hydraulic Motor)
  - HP-070-004 (Manifold – fitted to motor)
  - HP-070-524 (End Caps)
  - UP-402A (RPM Sensor) (or M12 x 1 plug)
  - Castrol EPX85W/140 (Oil)
  - Flexible Drive Cables .... as required
  - Mounting plate (sprayer specific)
  - M12 x 35 bolts + washers (2 pcs)
  - Loctite 515 sealant (not required is assembled)
  - Molykote P-74 (or equivalent)



#### Installation

- Check for oil. **In some instances** (due to shipping regulations) **the DG might come supplied without oil.**
  - Oil to use is Castrol EPX85W/140 or alternatives e.g. Mobil 85W140Plus.
  - With the correct amount of oil, about 225 ml, it shows as half full in the sight gauge window.
- Mount Hydraulic Motor to the DG (requires 2 @ M12 x 35 bolts). Don't forget the keyway.
  - In order to prevent rusting (& then seizure), always use liberal amounts of grease Molykote P-74 (or equivalent) on the motor & DG shafts and surrounding areas.
  - Always apply a smear of Loctite 515 Flange Sealant (or equivalent) to the mating faces, (must be watertight seal).
- Install RPM Sensor (if required). If not required, cap or plug this hole (M12 x 1 threaded).
- Mount the DG assembly to appropriate mounting plate (varies from sprayer to sprayer).
- Install cables as required. All cable connections must be well greased and sealed via Silicon Sleeve etc.

**See separate instructions for Flexible Drive Cable installation.**



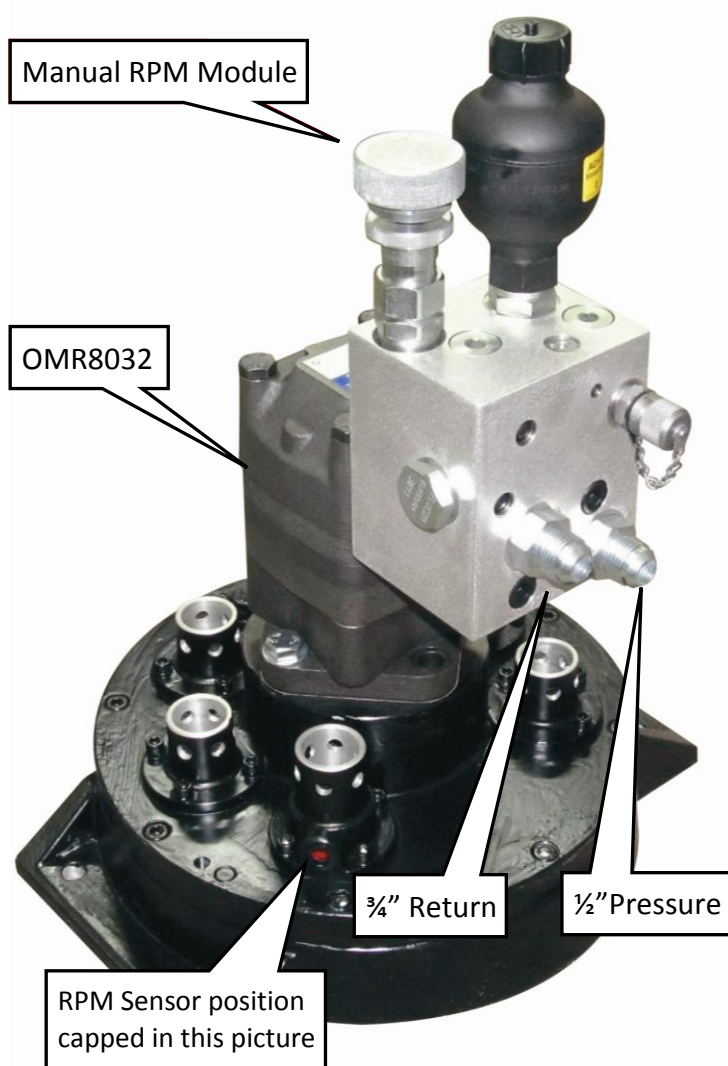
*Also see Lubrication & Maintenance information.*

## Installation

### Hydraulic Motor + Soft Start Manifold inc RPM Control

#### Components / Installation

- Powering the Distribution Gearbox is an 80cc hydraulic motor with 32mm shaft (OMR8032). Specially designed for long life, low rpm, high torque and smooth running. *Mount via M8 x 35mm bolts.*
- Controlling the hydraulic motor is the Soft Start Manifold (HP-070-004), which also incorporates a manual rpm control valve. *Requires M10 x 90 Cap head screws + washers.*
- Connecting the manifold to the tractor is via appropriate length hoses.
  - Connect  $\frac{1}{2}$ " pressure hose to P.
  - Connect  $\frac{3}{4}$ " return hose to T.
- The Distribution Gearbox features a one way clutch bearing; hence if the oil flow is incorrect (i.e hoses connected incorrectly), the fans will not turn.
- DG, motor, control manifold & fittings are coated in a black epoxy paint for improved corrosion protection (manifold not painted in this picture).
- **Optional :** Operators requiring an "in the tractor cab" rpm display can do so via two means – both require the installation of the UP-402A rpm sensor (see previous page).
  - The simplest method is to connect this sensor to the via the Arag Digiblock2 (part A467060L) (see separate manual for operating the Digiblock2).
  - For operators already using the Croplands HV4000 rate controller, rpm display can be configured as one of the readout options. (see separate manual for operating the HV4000).
- **Optional :** For operators who wish to control the rpm from the cab, via the Croplands HV4000 controller, can do so by replacing the manual rpm control valve with the HP-070-004-2 electric rpm control valve. The UP-402A rpm sensor is also required. (see separate manual for operating the HV4000).



Also see Lubrication & Maintenance information.

## Installation

### Hydraulic Connection to the Tractor



*3/4" female back-to-tank return fitting supplied with the Quantum Mist.*



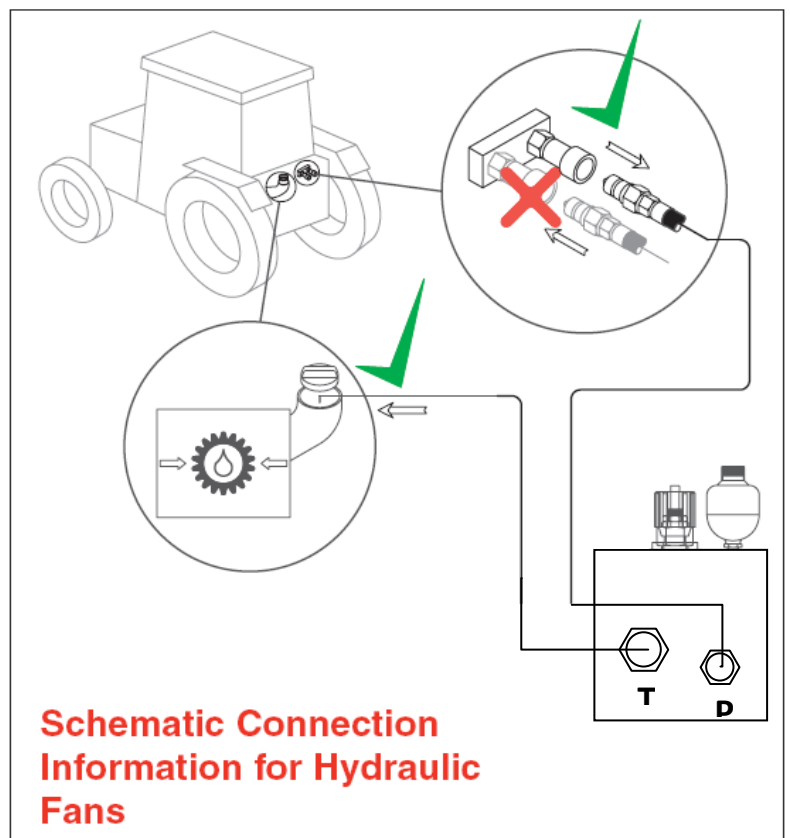
*Return fitting installed and ready for hook-up of the return line.*

It's important to correctly set up the hydraulic supply from the tractor. This includes the 3/4" return fitting supplied with your Cable Drive system (as a part of the hydraulic hose kit). This is the DIRECT BACK-TO-TANK fitting required to ensure there is no back-pressure on the oil return from the Cable Drive System. Check with your dealer to make sure this is carried out in a manner that will not create any warranty issues from incorrect set up. A small charge may be incurred for this procedure.

### **CAUTION**

Ensure all hydraulic connectors are clean prior to connection, otherwise damage to the hydraulic system may occur.

- Fit (or ask the dealer to fit) the 3/4" female return coupler direct back-to-tank.
- Decide on the best supply remote on your tractor to use for oil supply to the Cable Drive System.
- Plug the 1/2" oil supply line coupling to your selected tractor remote.
- Hook up the 3/4" return line to the tractor.
- Make certain all hydraulic lines have enough slack for turning or lifting operations, and ensure they are well clear of all tractor working parts – especially the PTO.





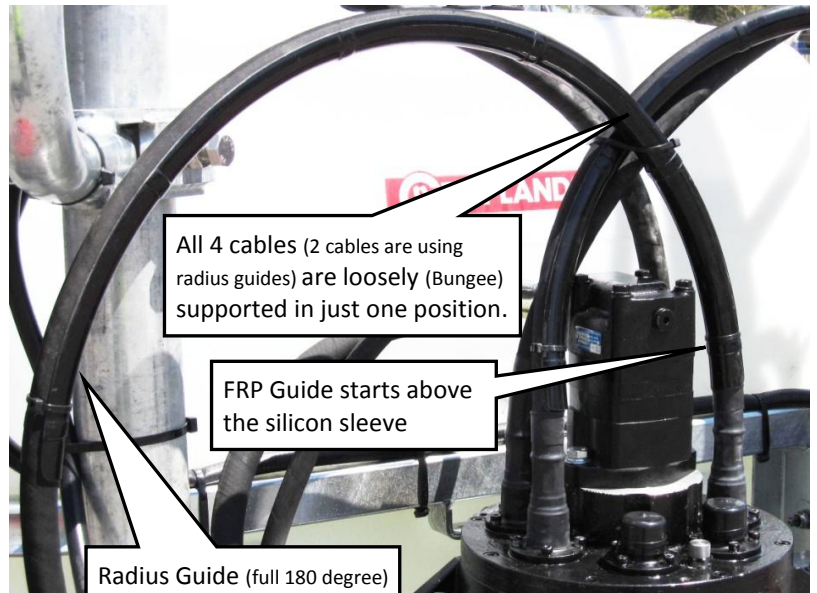
## Installation

### Cable Installation & Rigging

Always install a cable with smooth flowing curves ..... or straight lines.

**Minimum radius is 240mm.**

- Use the HP-070-001 fibreglass (FRP) Cable Radius Guide to support the cables. These guides are supplied as a 180 degree arc but can be cut to any required length.  
**Never** “clip” the fibreglass cable radius guide over the Silicon Sleeve at the cable connection ends (as this will damage the Silicon Sleeve).
- The 120 degree arc, HP-070-001A moulded polypropylene Cable Radius Guide has been developed for attachment over the Silicon Sleeves.



Be cautious of wherever cables exit the spray heads – it's very easy for the weight of the cable, or angle of the head, or contact with the fan support bracket etc to create an excessively tight radius / kink just past the connection.



The cables need to move around (even if slightly) to avoid wearing in the same place.

Whilst it's very tempting to neatly cable tie the cable into a permanent placement..... **don't do it !!!!**.

**Never rigidly fasten the complete cable to the structure.** Limit the number of tie downs to 2 per cable, ideally none. Where the cable needs to be located in a specific place, use P-Clamps rather than cable ties etc.



Also see Overview < Sprayer Rigging > plus Lubrication & Maintenance information.

## Installation

### Cable Installation & Waterproofing

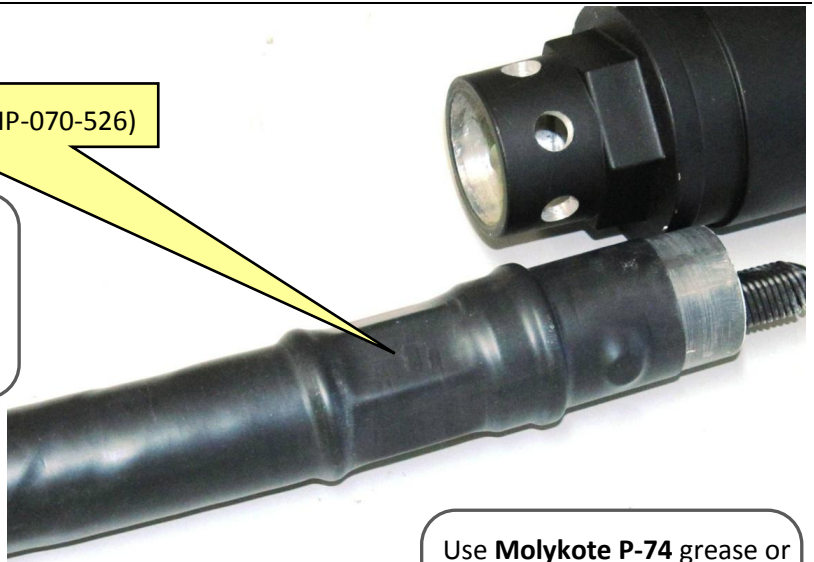
It's **VITAL** to make each connection waterproof.

Always protect each connection with a Silicon Sleeve(HP-070-526). And to **prevent rusting (& then seizure)**, always use liberal amounts of grease (such as Molykote P74) on the connecting components.

<b>CAUTION</b> Use specified sealants. Replace Silicon Sleeves (HP-070-526) if damaged	<b>ALL CABLE CONNECTIONS MUST BE WATERPROOF</b>
	<b>CROPLANDS</b> XD-143

**(1) Add Silicon Sleeve (HP-070-526)**

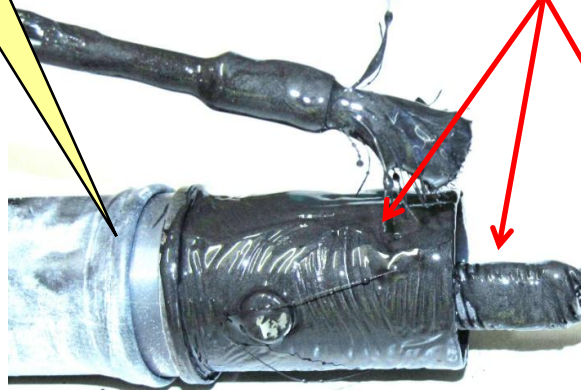
Use talcum powder as the "lubricant" to help slide the sleeve onto the cable. **Do not use soapy water or oils.**



**(2) Roll back sleeve**

Use **Molykote P-74** grease or Castrol SBX-2 grease, or Loctite Nickel Based Anti-seize .... or equivalents.

**(3) Add grease to these 3 areas.**



**(4) Assemble & pull / roll Silicon Sleeve back over the connection**





## Installation

### Straight Cable Connectors, QM-380 or 500

#### Components / Installation

- The Straight Cable Connectors are very simple to install. Cheap, simple & reliable.
- Straight cable connector castings are supplied with the appropriate adaptor components to fit either the QM-500 or the QM-380. The required adaptor components are different; hence there are different part codes.
  - HP-073-380 (for QM-380)
  - HP-073-500 (for QM-500)
- **It is VITAL that all connections are waterproof.**
  - Every Connector casting uses an O-ring on the flange.
  - Always apply a smear of Loctite 515 Flange Sealant (or equivalent) to the mating faces.
  - Always protect each cable connection with the (HP-070-526) Silicon Sleeve (see Cable info).
  - **In order to prevent rusting (& then seizure),** always use liberal amounts of grease Molykote P-74 (or equivalent) on the cable connecting components.



- For **QM-380** spray heads, the cable drive straight connector system can only be fitted QM-380 cable drive heads, connection is via a simple screw in adaptor. **NOTE, the adaptor thread is left handed** – must use Loctite 569 (or equivalent).

- For **QM-500** spray heads, the cable drive straight connector system can be fitted to any QM-500 head via is via a shaft adaptor (with keyway).
  - It is not recommended to retrofit older (used) QM-500 spray heads. Replacement bodies (HP-219-9E) are available for this purpose.



## Installation

### T-Box & Right Angle Box, QM-380 or 500

#### Components / Installation

- Both the T-Box or Right Angle drives are supplied with the appropriate adaptor components to fit either the QM-500 or the QM-380. The required adaptor components are different; hence there are different part codes.
  - HP-074-380 (T-Box for QM-380)
  - HP-074-500 (T-Box for QM-500)
  - HP-075-380 (RA drive for QM-380)
  - HP-075-500 (RA drive for QM-500)

- It is VITAL that all connections are waterproof.**

- Every Connector casting uses an O-ring on the flange.
- Always apply a smear of Loctite 515 Flange Sealant (or equivalent) to the mating faces.
- Always protect each cable connection with the (HP-070-526) Silicon Sleeve (see Cable info).
- **In order to prevent rusting (& then seizure),** always use liberal amounts of grease Molykote P-74 (or equivalent) on the cable connecting components.



- For QM-380 spray heads, the T-Box or RA drives can only be fitted to QM-380 Cable Drive heads. Connection via a simple screw in adaptor. **NOTE, the adaptor thread is left handed** – must use Loctite 569 (or equivalent).

- For QM-500 spray heads, the T-Box or RA drives can be fitted to all existing spray heads. To do this requires an adaptor plate and drive shaft adaptor (with keyway).
  - It is not recommended to retrofit older (used) QM-500 spray heads. Replacement bodies (HP-219-9E) are available for this purpose.



## Installation

### T-Box

- Generally the T-Box is used to combine the last 2 spray heads on a sprayer's boom arm, and often with a Right Angle box at the outermost spray head. This is a very neat configuration.
- Adaptor components are identical to the Right Angle drives.
- Do not use any more than 2 heads in series.
- The T-Box is directional – follow the arrow on the casting.



### Cable Joiner

#### Components / Installation

- Cable Joiner, HP-071-CJ1
  - Used to join 2 cables together to build a longer cable, e.g. joining 3.0m & 2.5m cables to create a 5.5m cable.
  - Very simple to install, simply plug each cable into the joiner.
  - Often the joiner is in a position that needs support, if so, ideally support in a manner that allows some movement (e.g. 67mm P-Clamp).

67mm P-Clamp with cable tie each side to prevent Joiner falling through clamp.



- **It is VITAL that all connections are waterproof.**



- Always protect each cable connection with the (HP-070-526) Silicon Sleeve.
- **In order to prevent rusting (& then seizure),** always use liberal amounts of grease Molykote P-74 (or equivalent) on the cable connecting components.



## 10 : Operating Instructions

### 1 : Connect the hydraulic hoses to the tractor.

- The larger (3/4") RETURN hose must be fitted to the 3/4" hydraulic fitting supplied and fed directly back to tank.
- The pressure line is the smaller diameter hydraulic hose with a (1/2") male hydraulic fitting on the end.
  - This is connected to the remote of your choice and is the main oil supply from the tractor.
- Make certain all hydraulic lines have enough slack for turning or lifting operations, and ensure they are well clear of all tractor working parts – especially the PTO.



### 2 : Checklist.

- ✓ Check the DG has sufficient **oil**.
- ✓ Check all cable connections have **silicon sleeves**.
- ✓ Check that all spare DG outlets have **caps** (and cable tied).
- ✓ Check **electric rpm control valve** (if fitted) is connected, and powered.
- ✓ Check the **rpm sensor** is correctly installed & connected – or plugged (if not fitted).
- ✓ Check **position of the heads** are as required for spraying. Adjust as required.
- ✓ Check that all cables are **free to move** (tied in no more than 2 places).
- ✓ Check that none of the cable **radius guides** are cutting into the silicon sleeves.
- ✓ Check that cables don't have excessively tight **bends** (240mm radius is minimum).

### **CAUTION**

Always connect & disconnect the 3/4" RETURN hose **FIRST**, otherwise damage to the hydraulic system may occur.

### 3 : Engage Power

- Engage the hydraulic remote lever in the cab that relates to the remote you are using for the CD hydraulic oil supply.
- The fans will start slowly and after about 5 seconds be up to full operational rpm (this is the soft start in operation).
- Run up slowly. Check all heads are turning & check operating rpm range. Check that operational rpm can be achieved (required rpm range will vary with fan size and different crops & canopies).
  - Adjust fan rpm via the manual rpm (screw down for increased rpm) or via HV4000 controller.
  - To achieve maximum fan rpm, ensure the tractor is operating at the recommended RPM to achieve the required flow / pressure from the tractor.



# Operating Instructions

## 4 : Daily operations

- Do not insulate the hydraulic motor, soft start manifold or distribution gearbox. These items require air circulation to operate at acceptable operating temperatures.
- Maximum recommended Cable Drive System and fan speed = 3,000 rpm.
- Normal (default) maximum rpm are set at: QM-380 is set for 2,600 rpm & QM-500 is set for 2,200 rpm. This will vary from application to application.
- Normal oil flow requirements at the above defaults, for 4 heads, are 32 ~ 38 L/Min at 1200 ~ 2000 psi.
- If the Cable Drive System is being operated on a foldable boom arm, do not fold the boom arm with the fans in use as in almost all cases the act of folding a boom arm will induce overly tight bends in the cable.

## Troubleshooting

The cable drive system is very simple, with little to go wrong, and if it does, it's very easy to diagnose or repair.

- If the fans fail to turn, check the hydraulic hose connections and oil supply. If this is OK the problem might be with the one way clutch bearing (which allows fan over-run when the system is shut down) in the Distribution Gearbox.
- If an individual fan isn't turning, check the cable ends are properly engaged. If this is OK, check the cable (see info box for reasons).

### Cable breakages will occur due to the following causes ....

- Seizure of the Quantum Mist head's bearings or seals.
- Seizure of the Right Angle / T-Box gears or bearings.
- Overly aggressive start-up (if the soft start accumulator fails).

**Avoid these, and the cables will last for ages** (the cables just don't break in day to day operations).

- If the rpm sensor isn't working – check the wiring looms and sensor installation (the sensor face must be set approximately 2mm from the DG drive pinion screw head).
- If when engaging the hydraulic power, the fans start instantly to full rpm, **stop** – and consult technical support. Possibly it's a failed pressure accumulator (rare, but can happen), and there is no soft start.

## Note re Cable Handling

- When handling cables, be very careful when disconnecting the lower end because this will risk "zebra striping" your clothes as the cable slides out. Worse still, if the cable falls onto something like a sandy soil the cable will then need cleaning & re-greasing before further use.

**TIP :** When disconnecting, always plug with end caps. This makes handling so much easier. Supplied with each system are several end caps (available as spare part HP-070-525).



## 11 : Lubrication & Maintenance

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### Maintenance Schedule

With proper installation, care and maintenance, the Cable Drive System should give hundreds, perhaps thousands of hours of reliable service. **However poor installation and maintenance will contribute to early failure.**

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#### Care

- Keep clean. Suggest applying Lanotec when new to make washing down easier.
- As with everything mechanical, the kinder the operator is to the equipment (i.e soft start & soft stop), the longer it will last.
- **Repair any problems as soon as they are found. Perform regular scheduled maintenance checks.**
- Remember – appropriate care and maintenance is also a condition of the warrantee.

#### Maintenance Schedule

Daily Operations	Check DG Oil Level, (sight gauge)	Check Silicon Sleeves / waterproofing	Check hydraulic system for leaks	Check all fans are turning
After 50 hours	First Distribution Gearbox (DG) Oil Change			
Every 200 hours or Yearly / as required	Change DG Oil	Re-grease Cables	Rotate cables to new lock position	Grease in Right Angle or T-Box

#### Maintenance Summary

- **Distribution Gearbox.**
  - Regularly check the condition of waterproofing (Flange sealing, Silicon Sleeves and any plugs or caps on gear outlets).
  - Regularly check for any oil leaks – check oil level on a daily basis.
  - Suggested maintenance is to (first) change the oil after 50 hours (running in), then yearly or more frequently (say every 200 hours) with heavy usage.
- **Hydraulics.**
  - Regularly check the condition of all hydraulic hoses and fittings for wear or leaks.
- **Cables.**
  - Regularly (at least every day the sprayer is being operated) check the condition of the Silicon Sleeves.
  - Cables should be greased at least once every year, more frequently with heavy usage. Always wipe off old grease before applying new.
  - As cables can develop a memory, and to avoid wearing in one place only (on the bends), the lifespan can be improved by regularly rotating the casing. Our dimple lock feature will allow rotating a cable by 60 degrees at a time.
- **T-Box & Right Angle Drive.**
  - Regularly check the condition of waterproofing (Flange sealing & Silicon Sleeves).
  - Apply 1 pump of grease (via grease nipple) per 200 hours of operation or as a minimum, once per year as a part of regular scheduled maintenance.

## Lubrication & Maintenance

### Sealants & Lubricants

- Always apply a smear of Loctite 515 Flange Sealant (or equivalent) to the mating faces.
- QM-380 spray head adaptor thread is left handed – must use Loctite 569 (or equivalent).
- **It is VITAL the Cable Connections are waterproof.**

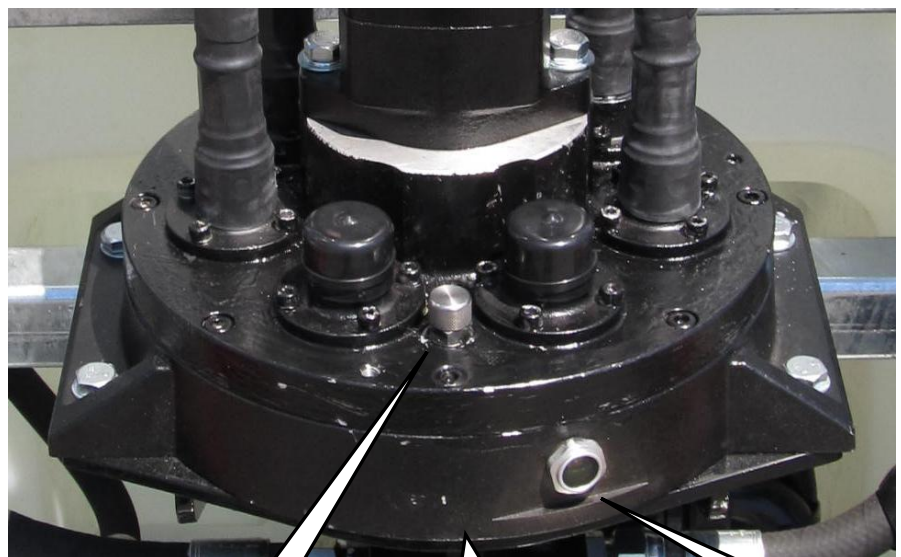
- Always protect each connection with the (HP-070-526) Silicon Sleeve.
- Always replace any damaged silicon sleeves.
- In order to prevent rusting (& then seizure), always use liberal amounts of grease on all steel ferrules & square drive ends. Use **SBX-2** grease or equivalents such as **Molykote P-74** or Loctite Nickel Based Anti-seize grease.



- **Cable lubrication is via Castrol SBX-2 grease.**
- The T-Box etc helical gear sets are greased with Castrol LMX or Mobil XPH-222 on assembly.
- Distribution Gearbox uses 225 ml (it shows as half full in the sight gauge window) of Castrol EPX85W/140 or alternatives such as Mobil 85W140 Plus.

### Distribution Gearbox

- Distribution Gearboxes come supplied with oil sight gauge, breather and drain plug (in the base).
- To fill, do so by removing the breather. It will take some time for the level to appear in the oil window.
- **In some instances the DG might come supplied without oil** (due to freight shipping regulations).
- Oil to use is Castrol EPX85W/140 or alternatives such as Mobil 85W140 Plus.
- With the correct amount of oil, about 225 ml, it shows as half full in the sight gauge window.
- Maintenance is to (first) change the oil after 50 hours (running in), then yearly or more frequently with heavy usage.





## Lubrication & Maintenance

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**Cables : HP-071-125 or 150 or 175 or 200 or 250 or 300 cm**

**NOTE : Damaged inner cables** (which are available as individual spare parts) **can be replaced assuming the outer casing is not excessively worn.**

- Replace any cable casing that has been damaged / kinked / crushed, as this will cause a severe wear point on the inner cable. This is a likely scenario is if the cable has been run over by a vehicle etc.
- Cable lubrication is via Castrol SBX-2 grease. Suggested maintenance is to grease each cable yearly, more frequently with heavy usage. Always wipe off old grease before applying new.
- As cables can develop a memory, and to avoid wearing in one place only (on the bends), the lifespan can be improved by regularly rotating the casing. Our dimple lock feature will allow cables to be clipped into 6 different holes, hence rotating a cable by 60 degrees at a time is quite possible.
- All steel ferrules & square drive ends should be lubricated with SBX-2 grease or equivalents such as Molykote P-74 or Loctite Nickel Based Anti-seize grease.
  - Always protect each connection with the (HP-070-526) Silicon Sleeve
  - Always replace any damaged silicon sleeves.
  - In order to prevent rusting (& then seizure), always use liberal amounts of grease on the connecting components.



### Cable Joiner

- The (sealed) internal shaft is lubricated with Castrol LMX or Mobil XPH-222 grease. The shaft incorporates a pair of sealed for life bearings. There's no need for further maintenance.
- All connections & square drive ends should be lubricated with SBX-2 grease or equivalents such as Molykote P-74 or Loctite Nickel Based Anti-seize grease
  - Always protect each connection with the (HP-070-526) Silicon Sleeve
  - Always replace any damaged silicon sleeves.
  - In order to prevent rusting (& then seizure), always use liberal amounts of grease on the connecting components.

## Lubrication & Maintenance

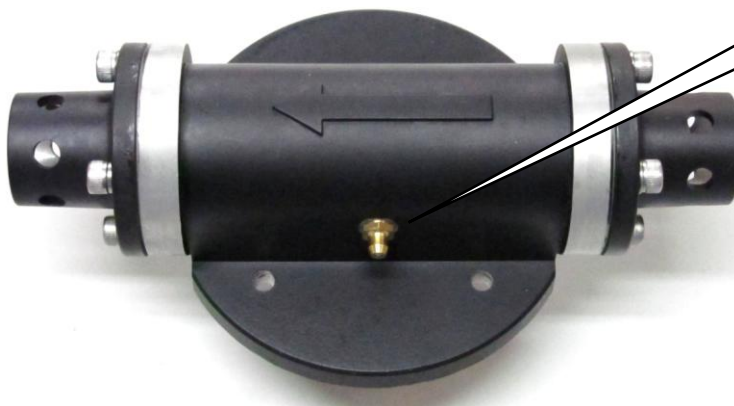
### Right Angle & T-Box Connectors

**NOTE : Replacement gears are not available as spare parts** – it is more cost effective to purchase a complete new unit (because helical gears & bearings need to be replaced together as a matched sets).

- All Right Angle & T-Box connectors use sealed for life bearings. There is no need for further (bearing) maintenance.
- The helical gear sets are greased (with Castrol LMX or Mobil XPH-222) on assembly. Apply 1 pump of grease (via grease nipple) per 200 hours of operation or per year as a part of regular maintenance.
  - Always protect each connection with the (HP-070-526) Silicon Sleeve.
  - Always replace any damaged silicon sleeves.
  - In order to prevent rusting (& then seizure), always use liberal amounts of grease (SBX-2 grease or equivalents such as Molykote P-74 or Loctite Nickel Based Anti-seize grease) on all connecting components.



Grease nipple positions

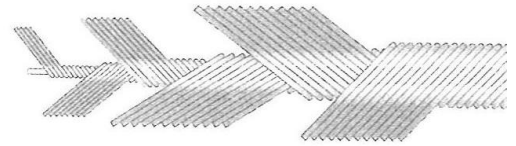


## 12 : Parts & Specifications

### Key Specifications

- Distribution Gearbox, gear ratio is 1 : 5.5
- System (output) rated to maximum of 3,000 rpm hence maximum recommended (hydraulic motor) input speed of 545 rpm
- Hydraulic Motor, M+S 80cc with 32mm keyway shaft, with SAE A (2 bolt) mounting and rated to maximum continuous 65 L/min flow @ 3,340 psi.
- “Normal” tractor oil flow requirements are 32 ~ 38 L/Min at 1200 ~ 2000 psi.
- Oils & lubricants : See Lubrication & Maintenance pages.
- **Flexible Drive Shafts.**
  - Made in Switzerland by a supplier to the aviation industry.
  - The 12mm steel drive cable is wound in multiple layers to suit required direction of rotation.
  - Each end of the drive cable is pressure formed into a 10.2mm square x 40mm long drive shaft. The squared end slides into the DG Pinion drive, fan shaft or adaptor. Couldn't be simpler.
  - The cable runs inside a 26mm Outer Casing, which comprises of a 16mm ID spiral steel core covered with a wire braid, then a neoprene “hose” which in turn is protected via an outer nylon wrap. Very rugged.
  - The casings terminates in a dimple lock (circled) ferrule at each end that plugs and clips into the cable connection castings. The casing + ferrule is 50mm shorter than the cable.
  - **Sizes available**, (weights for complete unit).

➤ 1.25 metre (part HP-071-125), 2.0 kg	(spare cable inner HP-071-125-1)
➤ 1.50 metre (part HP-071-150), 2.4kg	(spare cable inner HP-071-150-1)
➤ 1.75 metre (part HP-071-175), 2.8kg	(spare cable inner HP-071-175-1)
➤ 2.00 metre (part HP-071-200), 3.2kg	(spare cable inner HP-071-200-1)
➤ 2.50 metre (part HP-071-250), 3.8kg	(spare cable inner HP-071-250-1)
➤ 3.00 metre (part HP-071-300), 4.6kg	(spare cable inner HP-071-300-1)
- **Cable Joiner** is a non serviceable component, (no spare parts available), 0.5 kg
- **T-Box's** (2.0kg), **Right Angle Drives** (1.5kg) and **Straight Connectors** (0.5kg) are all non serviceable items, however the adaptor components, O-rings & connector casting are available as spares.
- **OMR8032** (Hydraulic motor) is a non serviceable component, (no spare parts available), 10 kg
- HP-070-004 (OMR8032 **Soft Start Manifold**) is a non serviceable item, however the RPM Valves and Pressure Accumulator are available as spares (see Tech Support).
- Hydraulic **Hose Kits** (from manifold to tractor) are available as spares (part HP-298C-2F (for a Linkage sprayer)).





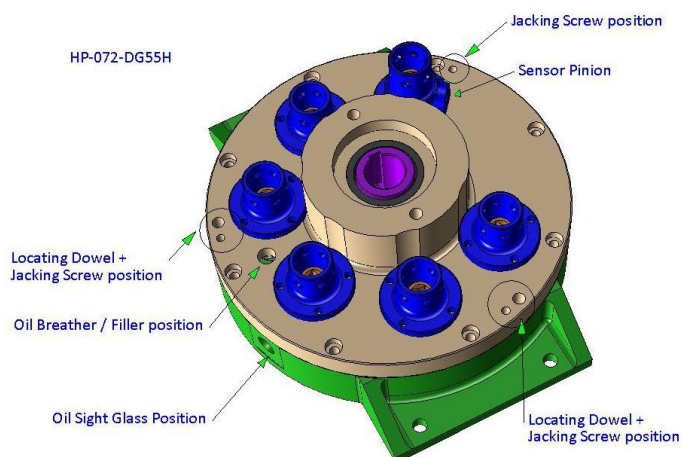
## Parts & Specifications

### Distribution Gearbox, HP-072-DG55H

Weight = 20 kg

Mounting = 320mm x 120mm for 12mm bolts.

To disassemble (after draining the oil). Remove the 8 x M8 screws holding both major castings together, and use 3 of these in the Jack Screw position to push the two halves apart. The internals are very simple.

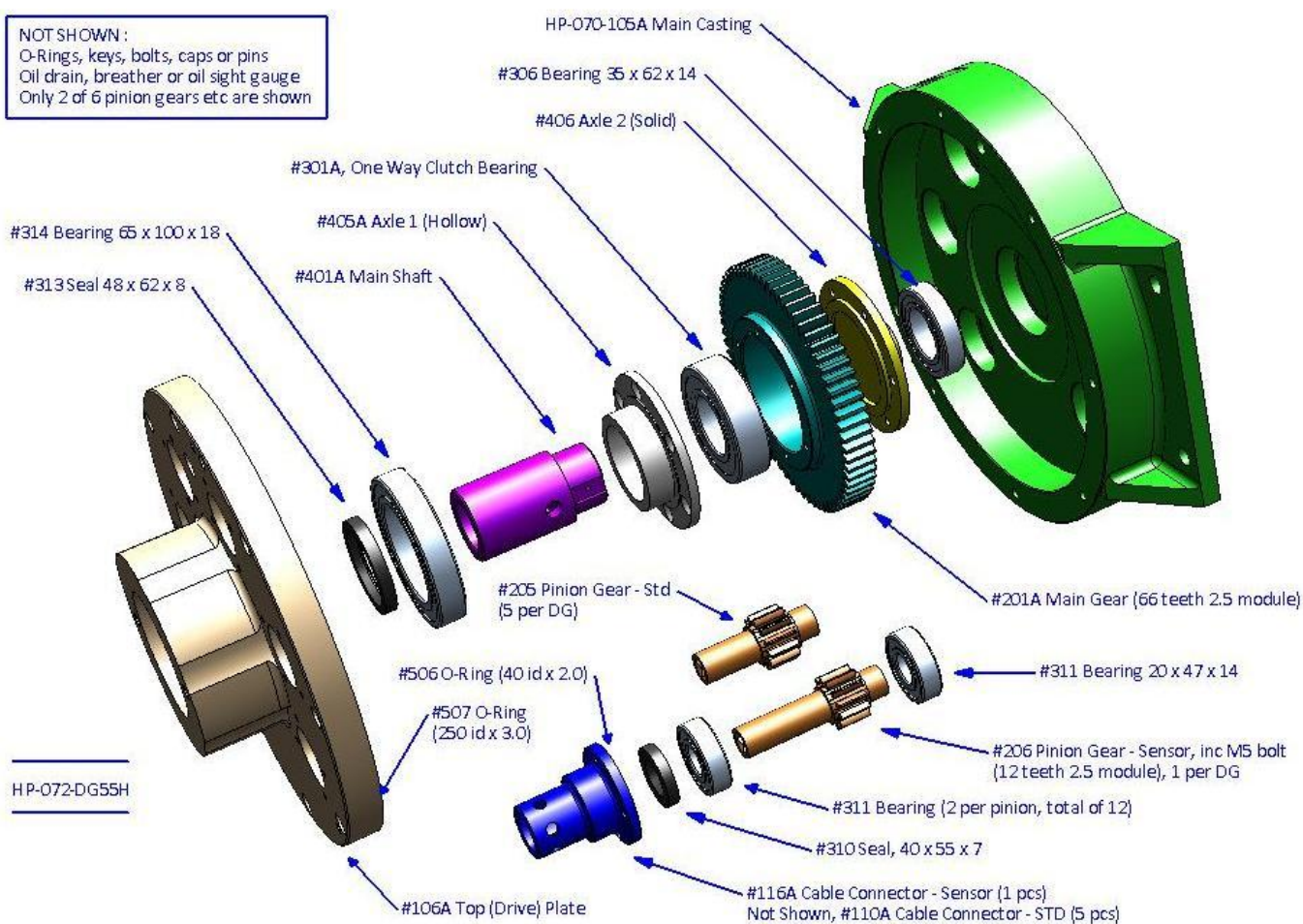


#### Note :

When assembling the DG, always be careful that the one way clutch bearing (HP-070-301A) is installed the correct way around (make a careful note when pulling apart the original). All screws (not shown below) holding the Main Gear assembly together (parts 406, 201A, 301A & 405A) **must** use Loctite 262 or equivalent.

If ever the gears are badly worn, they should **all** be replaced (making it cheaper to buy a new gearbox), and hence only the bearings and seals, connectors etc are considered as serviceable items.

NOT SHOWN :  
O-Rings, keys, bolts, caps or pins  
Oil drain, breather or oil sight gauge  
Only 2 of 6 pinion gears etc are shown



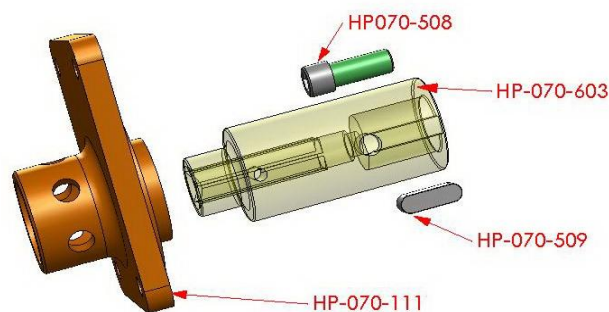
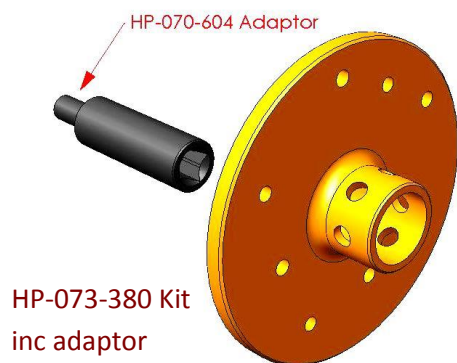
## Parts & Specifications

### Straight Connectors, Right Angle Connectors & T-Box Connectors

- These items are not serviceable items. Only the connector & adaptors are available as spare parts.
- Different adaptors are required for QM-380 vs QM-500 spray heads. Different adaptors are required for Straight Connectors vs Right Angle and T-Box.
- The Right Angle & T-Box feature helical cut gears for optimum strength, low noise & reliability.



- HP-073-380 (Straight connector for QM-380), includes adaptor HP-070-604
- HP-073-500 (Straight connector for QM-500), includes adaptor parts HP-070-603, 508 & 509



HP-073-500 Kit inc adaptor parts

- HP-074-380 (T-Box for QM-380), includes adaptor HP-070-602
- HP-074-500 (T-Box for QM-500), includes adaptor parts HP-070-600, 601 & 509
- HP-075-380 (RA drive for QM-380), includes adaptor HP-070-602
- HP-075-500 (RA drive for QM-500), includes adaptor HP-070-600, 601 & 509



Connectors HP-070-108 are available as spares

### Cable Joiner

- Joiner is not a serviceable

## Parts & Specifications

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### Hydraulic & Other Components



HP-070-004 Soft Start Control Block,  
inc manual (RPM) control valve



HP-070-004-2 Electric  
(RPM) Control Valve  
(12V)



OMR8032  
Hydraulic Motor



HP-070-526 Silicon Sleeves  
(dusted with talc)



HP-070-001A Cable Radius Guide  
(trim length to suit)

No picture available for Hydraulic Hose Kit

### 13 : Croplands Technical Service

1300 650 724

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Freecall 1800 999 162  
Freefax 1800 623 778

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