HAYES SPRAYING

OPERATION MANUAL

# HYDRAULIC FOLDING TRAILED BOOMSPRAY

aussie built
AUSTRALIAN TOUGH
aussie owned

Hayes Spraying
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# INTRODUCTION

Congratulations on the purchase of your new Hayes Spraying Trailed Boomspray.

Hayes Spraying originally commenced operations in the early 1970's as a contract spraying & consulting business. By the late 1980's, demand for the tough and well designed spray equipment allowed Hayes Spraying to manufacture agricultural machinery full time.

Over the last 30 years, Hayes Spraying has built a name synonymous with reliable, robust and good value for money equipment. The products have proved themselves in the agricultural industry for many years & remain highly sought after due to their durability, performance & ability to be customised.

Today, Hayes Spraying has a state of the art workshop facility and a strong team of manufacturing and assembly specialists. The extent of knowledge and experience within the company ensures that your equipment is specifically designed to suit your requirements. Constant research and development ensures our product range meets the changing demands of farmers and conditions today and into the future.

Our boomsprays are used extensively throughout the QLD, NSW & VIC broadacre cropping areas. Our products have been exported to seven countries; mainly Africa, where they have stood up well to the rugged conditions.

The experienced sales and support team at Hayes Spraying offer outstanding after sales service; you can be guaranteed of superior assistance for years to come.

Our website is constantly improving and is an ideal tool for the operator to gain further information & assistance now and into the future. Keep up to date with Hayes Spraying at **www.hayesspraying.com.au**. Be sure to look into our wider range of agricultural equipment including three point linkage boomsprays, vehicle mounted boomsprays, shielded sprayers, tractor mounted tanks and the N-Buggy.

Thank you again for choosing Hayes Spraying. We hope that you are very pleased with the performance of your trailed boomspray and we welcome any feedback that you have about our product.

Kind regards,

Maurie & Jenny Hayes
Directors

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## WARRANTY POLICY

Hayes Spraying Pty Ltd, warrants to the original purchaser, that each new Hayes Spraying Pty Ltd boomspray, part or accessory will be free from defect in material or workmanship for twelve (12) months after the date of delivery.

During the warranty period, the Dealer or Hayes Spraying Pty Ltd shall repair or replace, at Hayes Spraying option, without charge for parts and labour any part of the Hayes Spraying Pty Ltd product, which fails because of defects in parts or workmanship.

Pumps, engines, controller's tyres and hoses are all warranted directly by the original manufacturer, pending that manufacturer's warranty approval.

This warranty does not cover damage resulting from misuse, neglect, alterations or normal wear and tear or outside of recommended operation procedures.

In no event shall the authorised dealer or Hayes Spraying Pty Ltd be liable for downtime expenses, loss of chemical, loss of machine use or other incidental damages.

Incorrect operating speeds will void warranty and compromise the life of your boomspray.

### Exclusions

At the discretion of Hayes Spraying Pty Ltd, the defective part must be returned to Hayes Spraying Pty Ltd at the owners cost.

Time for wash down, transportation costs or insurance costs for sprayers are not warranted. Travel and communication are not covered by warranty.

## WARRANTY REGISTRATION

**NOTE:** your details will not be passed on to a third party.
Please fill out warranty registration details and return to Hayes Spraying.

**SERIAL NUMBER:** _____

| | |
|---|---|
| Owners Name /s | |
| Trading Name | |
| Postal Address | |
| State | |
| Postcode | |
| Landline | |
| Mobile | |
| Fax | |
| Email | |
| District where boomspray is used? | |
| Would you like to receive newsletters or product information? | |

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**PLEASE ENSURE YOU ABIDE BY MAINTENANCE REQUIREMENTS LISTED IN MAINTENANCE SECTION.**

# SPECIFICATIONS

## APPROXIMATE DIMENSIONS

***NOTE***: Due to the nature of our booms being custom built, slight variations will occur in the dimensions used here as an example. Transport heights can vary depending on drawbar position in transit.

| **Tandem Axle Front Mounted Trailer** | | | | | | |
|---|---|---|---|---|---|---|
| **Boom** | **Wheel Track** | **Height** | **Length Inc. booms** | **Length Hitch to Jet rail** | **Width at widest point** | **Notes** |
| 24m | 2m | 3750mm | 8400mm | 8100mm | 3250mm | |
| 36m | 2m, 2.3m & 3m | 3750mm | 11400mm | 8400mm | 3450mm | |
| 48m | 2.3 & 3m | 3500mm | 15000mm | 9800mm | 4000mm | |
| **Floating Hitch Option (add)** | | | | | | |
| 6000L Tank | | 0mm | | | | |
| 7000L & 8000L Tank | | 500mm | | | | |
| 7000L & 8000L Tank 48m | | 0mm | | | | |

| **Single Axle Rear Mounted Trailer** | | | | | | |
|---|---|---|---|---|---|---|
| **Boom** | **Wheel Track** | **Height** | **Length Inc. booms** | **Length Hitch to Jet rail** | **Width at widest point** | **Notes** |
| 24m | 2.15m & 3m | 4000mm | 7500mm | 7500mm | 3250mm | |
| 36m | 2.15m & 3m | 4200mm | 9200mm | 7500mm | 3400mm | |

| **Single Axle Front Mounted Trailer** | | | | | | |
|---|---|---|---|---|---|---|
| **Boom** | **Wheel Track** | **Height** | **Length Inc. booms** | **Length Hitch to Jet rail** | **Width at widest point** | **Notes** |
| 24m | 2.15m & 3m | 3900mm | 7900mm | 7500mm | 3250mm | |
| 36m | 2.15m & 3m | 3900mm | 10900mm | 7500mm | 3400mm | |

# CUSTOMISED BOOMSPRAY DETAILS

**SERIAL NUMBER**

**BOOM MOUNT**

| | |
|---|---|
| Front Mount Tandem Axle | ☐ |
| Front Mount Single Axle | ☐ |
| Rear Mount Single Axle | ☐ |

**BOOM SIZE**

| | |
|---|---|
| 18m | ☐ |
| 24m | ☐ |
| 27m | ☐ |
| 30m | ☐ |
| 36m | ☐ |
| 48m | ☐ |
| Other | ☐ |

**TANK**

| | |
|---|---|
| 3000L | ☐ |
| 4500L | ☐ |
| 6000L | ☐ |
| 7000L | ☐ |
| 8000L | ☐ |

**WHEEL CENTRES**

| | |
|---|---|
| 2m | ☐ |
| 2.3m | ☐ |
| 3m | ☐ |

**WHEEL SIZE**

| | |
|---|---|
| Gooseneck 11 x 16 | ☐ |
| Single Axle 16.9 x 30 | ☐ |
| Tandem Axle 16.9 x 30 | ☐ |
| Tandem Axle 18.4 x 34 | ☐ |
| Single Axle 18.4 x 38 | ☐ |
| Single Axle 20.8 x 42 | ☐ |
| Other | ☐ |

**FLOATING HITCH** ☐

**CHEMICAL HOPPER** ☐

**BOOM SECTIONS**

| | |
|---|---|
| 3 | ☐ |
| 5 | ☐ |
| Other | ☐ |

**FENCELINE NOZZLES**

| | |
|---|---|
| Manual | ☐ |
| Electric | ☐ |

**SECOND SPRAY LINE** ☐

**TRIPLEX BODIES** ☐

**ON / OFF VALVES**

| | |
|---|---|
| Teejet B344BEC24-C 1” | ☐ |
| Teejet 430 Flowback | ☐ |
| Teejet 430 Two way | ☐ |
| Other | ☐ |

**REGULATING VALVE**

| | |
|---|---|
| Teejet B344BRL 24s 03 | ☐ |
| Teejet B344BRL 24s 06 | ☐ |
| Teejet B346BRL 25s 03 | ☐ |
| Teejet B246BRL 25s 06 | ☐ |
| Other | ☐ |

**FLOW METER**

| | |
|---|---|
| Teejet 801 1” | ☐ |
| Teejet 801 1.25” | ☐ |
| Other | ☐ |

**PUMP**

| | |
|---|---|
| 1.5” Cast 9303C-HM4C | ☐ |
| 1.5” S/S 9303S-HM4C | ☐ |
| 2” Cast 9306C-HM5C | ☐ |
| 2” S/S 9306S-HM5C | ☐ |
| 2” S/S with self-fill plumbing | ☐ |
| Other | ☐ |

**BOOM PLUG**

| | |
|---|---|
| 23 pin deutsch | ☐ |

**HYDRAULIC PLUG**

| | |
|---|---|
| 14 pin deutsch | ☐ |
| 14 pin + 14 pin reverse deutsch | ☐ |

# ADDITIONAL PRODUCT INFORMATION

**Paint**
Hayes Spraying products are painted with a chemical resistant two-pack paint. For touch ups, the closest colour is Wattyl Killrust Ocean Blue.

**Filter System**
Trailed boomsprays are plumbed with a three-point filtration system.

| Tank Basket | Inline Pressure Filters | Nozzle Strainer |
|---|---|---|
|  |  |  |

**Boom**
Hayes Spraying boom design is standard with the following features:

- Individual hydraulic boom tilt
- Shock dampened breakaway end sections
- Self-levelling
- Hydraulic accumulators
- Twin Chain Suspension

**Suspension**
Fully independent coil spring suspension allows for a no maintenance smooth ride.

**Chassis**
Fully welded RHS steel construction.

## IMPORTANT INFORMATION TO UNDERSTAND BEFORE USE

## OPERATOR RESPONSIBILITIES *Include but are not limited to:*

### Operator

- Read and understand the operator's manual before using the equipment. All other operators of the sprayer must also read and understand the operator manual.
- Local laws may require the operator to be licenced.
- Do not be under the influence of drugs or alcohol whilst operating boom equipment
- Read & follow the chemical label
- Do not eat, drink or smoke while working with spray equipment
- If poisoned, seek medical advice immediately and identify the chemicals being used.
- Be aware of power line locations
- Be aware of weather conditions

### Protective Clothing

- Wear protective clothing
- Wash and change clothing after spraying
- Keep protective clothing in good condition and replace as required

## SAFE CHEMICAL USE

#### The hazard

All agricultural chemicals and pesticides are biologically active. They can be dangerous to all living organisms including humans, fish, birds, bees and domestic animals and plants.

#### Method of pesticide entry

- Oral – by drinking and splashing into the mouth or by smoking or eating with contaminated hands. Cleaning nozzles by blowing through them with your mouth.
- Inhalation - by nose or mouth of spray drift and mist
- Dermal – absorption through the skin particularly with raw chemical or through cuts and abrasions or while perspiring.

#### Decontamination

- Change out of protective clothing after spraying and wash separately
- Wash thoroughly before eating or drinking
- Keep fresh water tank on sprayer full with clean water
- Replace respirator filters regularly
- Clean sprayer regularly & fix leaks
- Ensure cab filters are adequate for the job
- Always use the recommended type of protection clothing and equipment

**Operating the Boomspray Safely**

- Take notice of the safety warning labels on boomspray & replace when necessary
- Lower the boom fully or put locking pins in place if the boom needs to be raised
- Do not go under any equipment unless properly secured
- Keep the freshwater tank full with clean water only.
- Disconnect the power before servicing or welding
- Never repair or service equipment whilst operating
- Do not enter the spray tank
- Rinse, wash and depressurise equipment after use and before servicing or storage
- Inspect boomspray for faults, leaks and cracks to avoid contamination
- Ensure the boomspray locking pins and support jack are in the correct position
- Ensure bystanders are a safe distance away from sprayer when operating
- Be aware of the width of the machine especially when turning or moving around obstacles
- Boom tips move much faster while turning and may cause injury to equipment or bystanders
- Spray at speeds suitable to the ground conditions. Warranty will be void if operated at speeds exceeding those stated in this manual.
- Avoid sudden turns, stops and constant direction changes at high speeds.
- Do not ride on the boomspray.

## SAFETY DECALS

Take notice of the safety warning labels on the boomspray and replace when damaged. Replacement decals are readily available through spare parts.




# SLIDING HEIGHT ADJUSTMENT TOWER

## Locking Pins

Locking pins exist for the sliding height adjustment tower & the self-levelling system.

## Transporting & Maintenance Position

There are **two** locking pins for the tower / height adjustment located on the sides

1. Lift the tower all the way up.
2. Remove the locking pin from the vertical locking pin holder.
3. Insert the locking pin horizontally into the height adjustment tower.
4. Lower the tower down to rest on the locking pins.

## Spraying Position

To get the tower into the spraying position from the transport/ maintenance position:

1. Raise the tower off the locking pins.
2. Remove the locking pin from the horizontal locked position.
3. Insert the pin into the vertical locking pin holder.
4. Lower the tower to the desired height.
5. Never operate with the tower fully up or fully down. We require a minimum of 25mm travel for the accumulators to function properly.

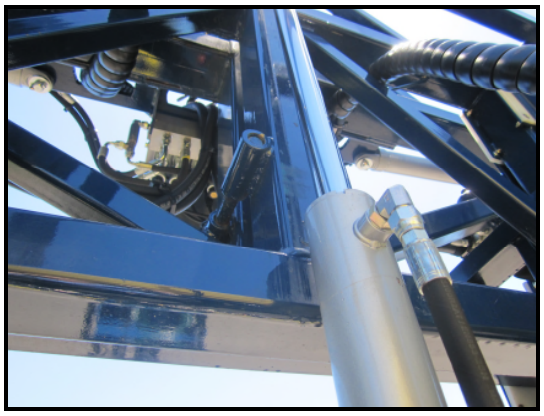
*NOTE: Major damage will result if you attempt to lower your tower before removing locking pins*

# SELF-LEVELLING ROCKING BAR

## Transporting & Maintenance Position

To lock the self-level function into place:

1. Unscrew the D Shackle pin and twist the locking pin handle to release from the D Shackle.
2. Make sure the spring-loaded locking pin is aligned with the bush.



NOTE: Above photos display transport & maintenance position

## Spraying Position

To unlock the self-level function for spraying:

1. Pull the spring-loaded locking pin out from the bush.
2. Twist the locking pin handle so that it locks in the D shackle.
3. Insert the D Shackle pin.

NOTE: Above photo displays spraying position.

# BOOMSPRAY OPERATION

## CONNECTING TO THE TRACTOR

### Check the Tractor Hydraulic Oil Level

The tractor needs to have an adequate level of hydraulic oil available for the boomsprays hydraulic functions to operate properly.

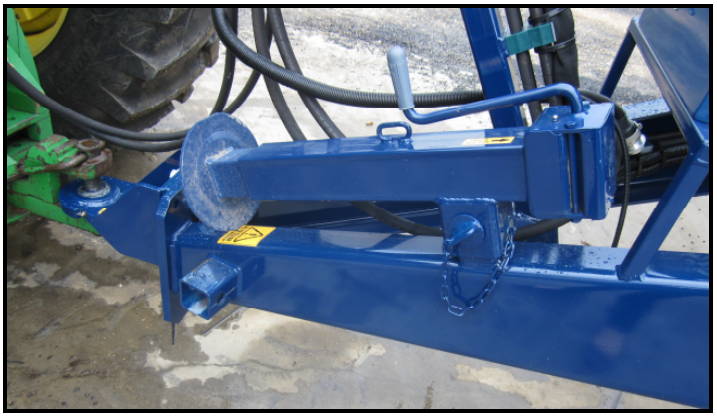
### Identify the Tractor Free Flow Return Port

The Hypro pump requires the return line to be plugged into the Free Flow Return or Dump Port of your tractor hydraulic system. You will need to identify this port and make sure all operators are aware of this requirement.

### Hooking Up

***All bystanders should be well away whilst the tractor is reversing onto the trailer drawbar.***

- Reverse the tractor onto the trailer drawbar.
- The support jack may have to be adjusted to suit the tractor hitch height.
- Lock the tractor drawbar pin into place.
- Attach the safety chain to the tractor.
- Wind up the support jack and remove from front supporting position lug.
- Attach the support jack to the spraying position lug on the top rail of the drawbar and lock in with the pin.



### Support Jack

The trailer support jack has two lug positions:

**Supporting Position**
Located on the left side of the drawbar side.

**Spraying Position**
Located on the top of the left side of the drawbar

## HYDRAULIC HOSES

The hydraulic hoses are fitted with crimp on JIC fittings.

### Hypro Pump Hydraulic Lines

The Hypro pump hydraulic lines are easily identified, as they are 1/2" hoses. There are two hydraulic lines for the Hypro.

1. Pressure Line – marked with spiral guard & can be fitted to any remote.
2. Return Line – is not marked and **MUST** be fitted to the dump port / free flow return.

### Hydraulic Folding Boomspray Functions

These hydraulic lines are 3/8” in size. The hydraulic lines can be connected to any pair of remote couplings on the tractor.

As Shown Below From Top to Bottom:

1. Pressure Line for Hypro – ½” hose & can fit to any remote.
2. Return Line for Hypro – ½” hose & must be fitted to free flow return port.
3. Hydraulic Boomspray Functions Line – 3/8” hose & can fit to any remote.
4. Hydraulic Boomspray Functions Line – 3/8” hose & can fit to any remote.

## CONNECTING DEUTSCH PLUGS

There are three deutsch plugs.

1. 23 pin with pins
2. 14 pin with pins
3. 14 pin with sockets (reverse).

## HYPRO HYDRAULIC DRIVE PUMP

*Hypro pumps cannot be run dry or the seal will be damaged. Shut pump down immediately when tank is empty or when pressure drops below 1 bar.*


1. **Connect the Hypro return line to the free flow return.**

It is critical it is not connected to a normal remote. You can identify the return line on the Hypro pump as it has TANK written above it.

2. **Connect the Hypro pressure line to the tractor remote.**

The pressure line is the ½" hose with spiral guard on it. You can identify the pressure line on the Hypro pump as it has PRESS written above it.

3. **Ensure the filters are clean – clean daily at least.**

4. **Set the main bypass / agitation ball valve at the pump.**

This should never be fully open or fully closed whilst spraying. For glyphosate, it should be approx ¼ turn open. The thickness of the chemical you are using will determine how far the valve should be open. Some products require more agitation; however, Glyphosate will foam with excessive agitation.

5. **Ensure bypass screw is screwed the entire way in.**

This ensures the pump has full flow of oil when used with closed centre hydraulics.

6. **Set the hydraulics to slow / low flow eg 25%**

7. **Turn on all boom sections.**

Turn spray controller on and set to manual to open regulator valve fully and turn all boom sections on.

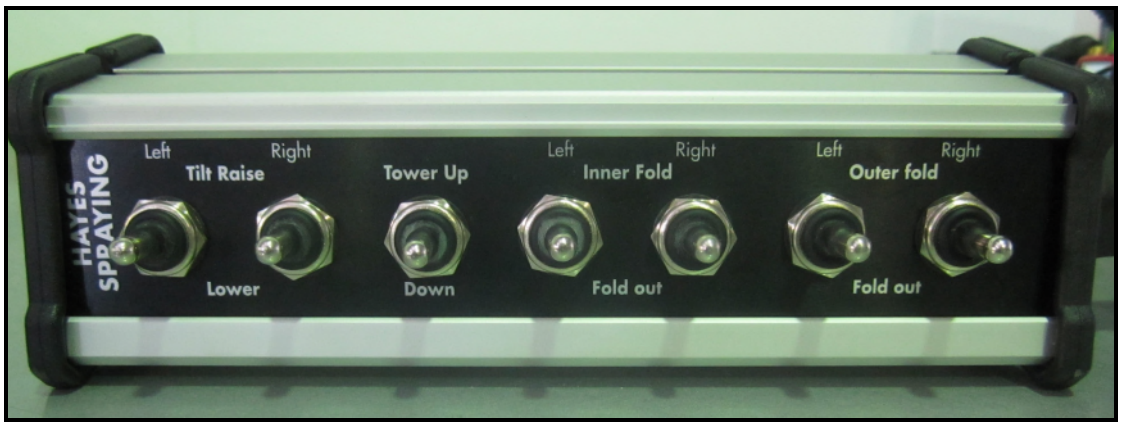
8. **Adjust hydraulic flow.**

Engage the Hypro hydraulics and increase hydraulic flow until the maximum spray pressure is achieved.
Do not exceed 5 bar pressure when nozzles are on
Do not exceed 6 bar pressure when nozzles are off

9. **Set Low Pressure Alarm (if installed)**

Close the regulator valve until 12 – 15psi is displayed on gauge. Adjust the pressure switch (located below & behind gauge) with screwdriver until alarm beeps at 1 bar / 12-15psi. Make sure master switch and boom section switches are on & check alarm by cycling pressure up and down.
The alarm serves to notify operator that the tank level is low and pump is starting to suck air.

# HYDRAULIC FOLDING BOOMS




## BOOM MUST BE STATIONARY WHEN BEING FOLDED/ UNFOLDED

### Folding Out

**STOP MOVING!**

1. First move the TILT RAISE switch for the side you are unfolding upwards to raise the booms off the carrier frame – make sure the bottom of the boom clears the top of the frame.
2. Then move the INNER FOLD switch for the side you are unfolding downwards until the section is unfolded.
3. Then do the same for the other side.
4. Do the same for the OUTER FOLD on both sides.
5. Unlock the self-levelling locking pin.
6. Tilt booms down to a level position.

### Folding In

**STOP MOVING!**

1. Tilt booms up to approximately 25-degree angle.
2. Lock the self-levelling locking pin into the locked position.
3. Move the OUTER FOLD switch upwards until the section is folded in for each side.
4. Move the INNER FOLD switch upwards making sure the bottom of the boom clears the cradle using the TILT RAISE switch until the section is folded in.
5. Use the TILT RAISE switch to lower the boom onto the cradle and into the travelling position.

***NOTE:***
If the booms have been tilted all the way up, you may find that the booms will not drop immediately. To enable the booms to drop, hold the TILT switch on for 5 seconds or until booms drop.

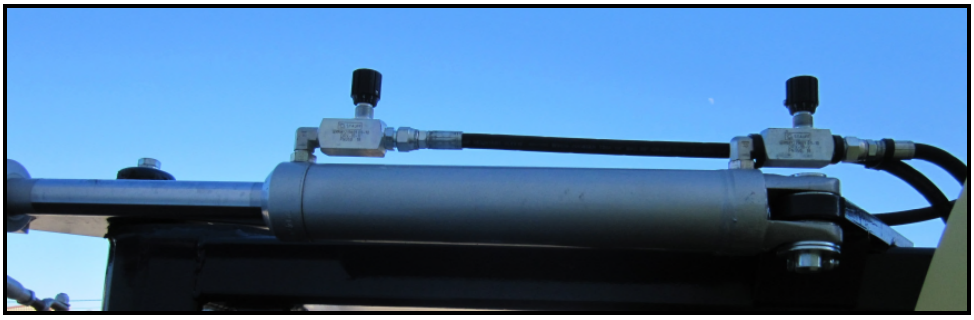
## Folding Opening & Closing Speed Adjustment

Hydraulic flow should be regulated so a constant fold or unfold is performed without the need for “pulsing” the controls, because the oil flow is too quick.

Adjust the flow of oil at the tractor first to fine tune opening and closing speeds. Tractors with an oil flow rate of 100L/min should be set at approx. 30%.

Needle valves are placed on each port of the cylinder to allow slow and constant folding and unfolding. The needle valves have been factory set, to open and close at a safe speed. If a fold function is operating too quickly, the flow can be adjusted by the needle valves located at each hydraulic cylinder.

The speed is controlled by the oil leaving the cylinder, not the oil entering.



## OPERATIONAL CAPACITIES

### Wing Tilt

Your booms are set at the correct operating position. Booms should sit low when ram is fully extended – not level. DO NOT adjust turnbuckle so boom sits level, as you will bend your boom.

When spraying, ensure at least 40mm hydraulic cylinder travel is available for wing tilt rams. Do not operate wing tilt rams bottomed out or fully extended.

**Do not adjust the wing tilt turnbuckles**. Booms must be allowed to drop below the level working height for operation to allow accumulators to properly dampen the boom ride.

The adjusting screw on the accumulator mount block is used to control the speed of the tilt hydraulic cylinder when lowering only.

Adjustment can be made with a 5/32 hex key.

To Slow Down – screw clockwise

To Speed Up – screw anticlockwise

**Minimum Boom Operating Height from Ground**

| BOOM WIDTH | MIN HEIGHT |
|---|---|
| 24m – 32m boom | 800mm |
| 36 – 48m boom | 1000mm |

***In undulating or rough terrain conditions, minimum operating height may vary accordingly.***

**Never operate at fully raised or fully lowered boom heights, ensure at least 40mm of your hydraulic cylinder travel is available to allow the hydraulic accumulators to work.**

**Maximum Operating Speed**

Incorrect operating speed will void warranty and compromise the life of your boomspray.

| BOOM WIDTH | GOOD CONDITIONS | ROUGH CONDITIONS |
|---|---|---|
| 24m | 18 k/hr | 16 k/hr |
| 36m | 17 k/hr | 15 k/hr |
| 48m | 15 k/hr | 13 k/hr |

Operating speeds may need to be further reduced by 20 – 40% when crossing contour banks, washouts, extremely rough conditions and when turning at the headland.

When using auto steer systems the boom should be aligned with the run prior to engaging the auto steer.

36 to 48m booms require skilled operators experienced with wide implements.

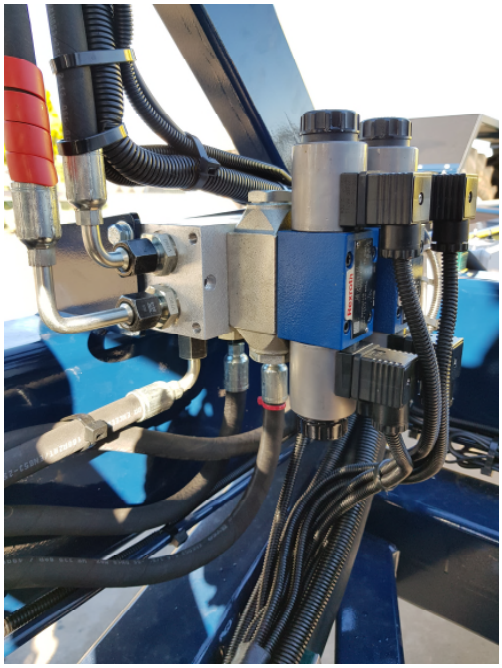
## Floating Hitch (Optional)

The floating hitch drawbar is fitted with hydraulic accumulators, which significantly improve the terrain ride whilst providing a smoother connection between the trailer and tractor. It is recommended for large tanks and when working in contoured terrain.

1. Adjust to the height where the trailer is level.
2. When spraying, the hitch will adjust according to weight distribution such as booms extended and the remaining tank volume.

## Default Factory Adjustment Setting

1. Have the tractor hydraulic oil at operating temperature.
2. Engage the hydraulic remote that activates all the fold, tilt and height adjustment functions.
3. Fully raise and lower the floating hitch three times minimum.
4. Fully raise the floating hitch
5. Loosen the lock nut on the adjusting screw on the counter balance valve, located on the two station hydraulic block.
6. Using a 5/32 hex key, loosen adjusting screw until the floating hitch starts to lower.
7. Tighten adjusting screw one full turn.
8. Lock up the lock nut.
9. It is normal for a small amount of oil to leak out the adjusting screw while performing this adjustment.
10. For 48M machines, you may need to turn the hex key a further ¼ to ½ turn if you find any downward creep in the floating hitch.
11. If at any time in operation you find the floating hitch creeps up, turn the hex screw anti clockwise up to ¼ turn.
12. If at any time in operation you find the floating hitch creeps down, turn the hex screw clockwise up to ¼ turn.



## HYDRAULIC LEVELLING SYSTEM (Optional)

The boom height levelling system has been specially designed to provide improved ground following particularly in contoured terrain.

The system is engaged via a dual electric/hydraulic control panel mounted in the cabin (LED illuminate when engaged).

In operation, the levelling system senses via boom mounted jockey wheels when a load is apparent and according takes weight off the boom tilt hydraulic cylinders hence making the boom become weightless (approx 40Kg). Jockey wheel pressure is recommended at 20 psi.

When engaged, the system will automatically lower to the preset height avoiding the need to make constant adjustments.

*Note:* When turning disengage leveller & tilt boom so the jockey wheels do not make contact with the ground. This prevents a sideways screwing effect of the wheel and any consequent boom stress.

## ADJUSTMENT

The pressure adjusting screw will require some minimal adjustment. If the boom tends to lay back on the chains when operating or falls too quickly to the ground when the control panel is engaged, the boom will be too heavy on the ground.

To adjust the boom height levelling system:

1. Have the tractor hydraulic oil at operating temperature.
2. Have the levelling control panel switches turned on
3. Loosen the lock nut on the block
4. Using the 5/32 hex key, turn clockwise until the boom lifts slightly off the ground
5. Turn anticlockwise until the boom slowly lowers to the ground
6. Lock up the lock nuts
7. Test the weight of the boom by manually lifting. You should feel approximately 20kg of weight to lift.

The boom will fall quicker when spray rig is moving. Do not worry if it only falls very slowly when stationary.

WARNING: Major damage will be incurred if:

- Using jockey wheels without the leveller being engaged.
- You allow the wheel to run too heavily on the ground (see adjustment above).
- You do not slow down as required when crossing contours & on rough terrain.

The automatic levelling system will only work properly with tractors that have a genuine pressure and flow compensated closed centre, variable flow systems with flow rates in excess of 100L/min.
Eg, JD6000, 7000 & 8000 series & Case Magnum range.

# PLUMBING FUNCTIONS

The following plumbing components that are on your trailer will depend on the plumbing options you have chosen.

## Main Fill Camlock & Ball Valve

The point at which you connect your loading hose to the boomspray.
Turn the ball valve ON when loading hose is connected.
Turn the ball valve OFF when loading hose is disconnected.

### Bypass / Agitation Tap

This tap should only ever be adjusted when you are setting up your Hypro or if you are changing to a chemical with differing viscosity. This tap should never be fully open or closed. Increased agitation is required for powdered and thick chemicals; reduced agitation is required for chemicals that will froth.

### Tank Fill

This line allows liquid to enter from the fill camlock into the tank.
Turn ON when filling tank.
Turn OFF when tank is full & ready to spray.

### Tank Suction

This line allows liquid to enter from the tank into the Hypro pump.
Turn OFF when filling tank.
Turn ON when ready to spray.
Turn OFF when flushing lines using clean water from Rinse Tank.
Turn ON when filling with a separate load pump.

### Spray Pressure

This line allows liquid from the manifold into the delivery line to the booms.
Turn OFF when cleaning filters.
Turn ON when ready to spray.

### Induction Probe

The induction probe allows you to load chemical from a standalone chemical hopper.
Turn ON to load chemical from bin. Turn OFF to spray.

**Hand wash**

The hand wash tap is connected to the 20L Clean Water Container. This container is isolated from all other plumbing to stop contamination.

**Wash-down**

The wash-down function allows you to use the trailer plumbing for washing down the trailer or for firefighting.
Turn OFF when spraying.
Turn ON to wash-down.
Turn ON tank suction

**Tank Wash Nozzle**

This is the nozzle in the main tank, which rinses the main tank with clean water from clean water loaded at the fill point or Rinse Tank if fitted (see Rinse Tank Plumbing).

**To Rinse Main Tank with Clean Water from External Loading Pump**

Connect loading hose to main fill point.
Turn OFF Tank Suction
Turn ON Tank Wash Nozzle

**To Flush Boom Lines with Clean Water from Main Fill Point Using External Loading Pump**

Connect loading hose to main fill point.
Turn OFF Tank Agitation.
Turn OFF Tank Suction.
Open regulating valve.
Turn on the (on/off) section valves.

**Rinse Tank Plumbing (Optional)**
**Rinse Tank Fill**

This allows water from the fill point into the Rinse Tank.
It is important that you always put clean water into your rinse tank. It is advisable to rinse the lines through with clean water before opening the rinse tank fill tap and fill this tank before loading chemical.
Turn ON to fill Rinse Tank.
Turn Off when ready to spray.

**Rinse Tank Suction**

This delivers clean water from rinse tank to the delivery line of the boomspray to rinse out the boom and the main tank.
Turn OFF when spraying.

**To Flush Boom Lines with Clean Water from Rinse Tank.**

Turn OFF Tank Suction.
Turn OFF Tank Agitation.
Turn ON Rinse Tank Suction.
Turn ON Pressure Spray.
Open regulating valve.
Turn on (on/off) section valves.

**To Rinse Main Tank with Clean Water from Rinse Tank**

Turn OFF Tank Suction.
Turn ON Rinse Tank Suction.
Turn ON Tank Wash Nozzle.

**Chemical Hopper Self Fill Plumbing (Optional)**

***NOTE: Do not spray with chemical loaded in your chemical hopper.***

**Hopper Fill**

Fills the chemical hopper with water to rinse the bin. You must have the lid closed.
Turn OFF to spray.

**Hopper Suction**

Loads the chemical into the main tank from the hopper once loaded.
Turn OFF to spray.

**Jet Agitation**

Agitates the chemical in the hopper. You must have the lid closed.
Turn OFF to spray.

**Drum Rinse**

Directs water into the drum rinse nozzles to allow you to rinse 20L drums.
Turn OFF to spray.

**Loading Chemical from Hopper into Main Tank**

Start loading the main tank with water as above.
Make sure rinse tank is filled prior to loading chemical into main tank. Ensure Rinse Tank Fill tap is OFF.
Fill hopper with chemical as desired.
Once full, turn ON jet agitation to agitate brew.
Turn ON Hopper Suction until hopper is empty.
Turn OFF Hopper Suction.
Repeat as required. When changing from one chemical to another, it is a good idea to rinse the hopper between in case of a reaction-causing chemical to go hard.
To rinse drums, turn ON Drum Rinse as required. Place drum over nozzle and push down to rinse.
To rinse hopper, turn ON Hopper Fill & rinse components.
Once rinsed; turn ON Hopper Suction.
Turn OFF when empty.
Always finish filling the main tank with clean water to flush the pump.

## DECONTAMINATION

You may need to decontaminate your boomspray when

- Changing from one chemical to another
- Changing from one crop type to another

- Flush all spray lines, agitation lines, delivery hoses, tanks, jugs, rinse bins and chemical hopper with clean water. Make sure you utilise the tank rinse nozzle for your main tank – see above.
- When soaking boomspray with rinsing solution, leave all ball valves turned half on to expose inner cavity to rinse.
- Flush again with recommended cleaner. Talk to your agronomist about the best cleaning agent & penetration time.
- Flush out cleaning agent with clean water.

# MAINTENANCE

## FILTERS

The filters are a critical part of your boomspray operation.

| Tank Basket | Inline Pressure Filters | Nozzle Strainer |
|---|---|---|
|  |  |  |

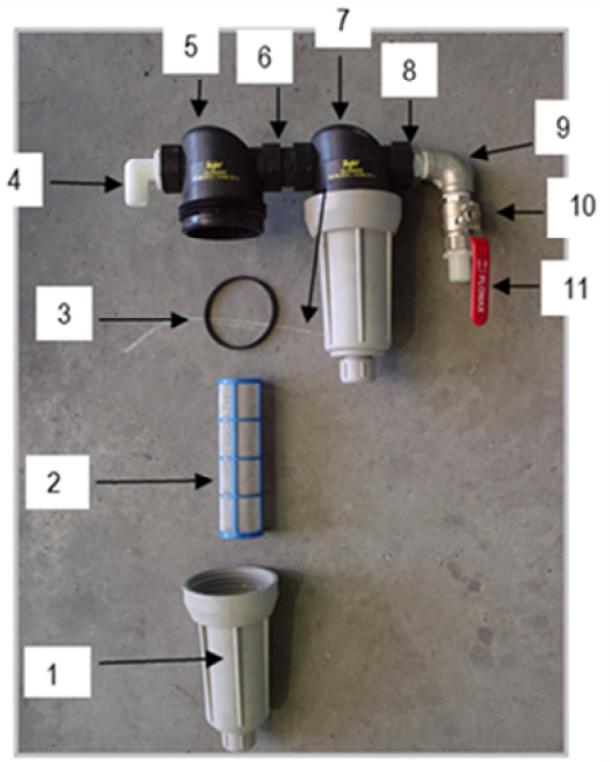
1. Check the tank basket for debris
2. Unscrew (clockwise) the bottom filter bowl of the inline pressure filters and remove. Use a toothbrush to clean the filter under running water. Reseat the filter into the filter bowl and screw back onto filter body. Take care not to cross thread the o-ring while reassembling or over tighten as it may crack.
3. If nozzle strainers are located in the nozzle bodies. Remove from nozzle body and clean with a toothbrush to remove build up.

| | |
|---|---|
| Flush the booms with water.<br>Isolate main tank by closing tank suction if you still have chemical left in spray tank before flushing booms. | **Every Day** |
| Drain any remaining spray mix from tank.<br>Fill tank with at least 200L water and open regulator valve fully.<br>Spray water through nozzles to flush.<br>Clean the outside of the boomspray. | **End of Spraying Session** |
| Flush as described previously.<br>Drain all water from system.<br>Drain water from pump.<br>Fill pump with a mix of 50% water and antifreeze.<br>Take particular care not to have any air in the pump. | **Long Term Storage** |

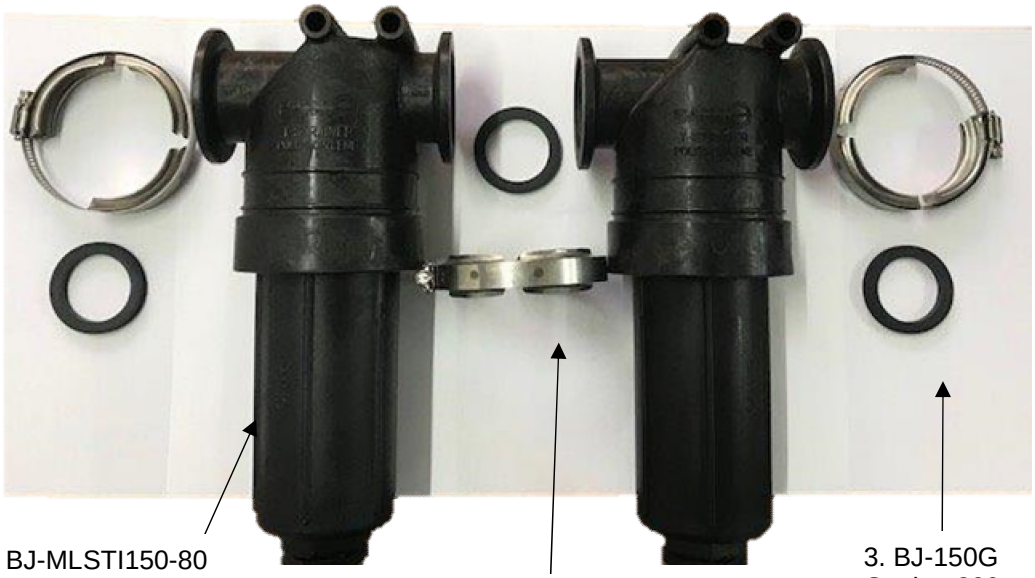
NOTE: See decontamination in Boomspray Operation Section

## FILTRATION SYSTEM

The filtration system is made up of 2 inline TeeJet strainer filters that are plumbed into the delivery line. The strainers come in various colours depicting the size screens. These screens should be cleaned regularly for optimum performance. If the filters are dirty it can affect the water rates and spray line pressures. We normally use 2 x blue 80 mesh screens for most applications.




1. SS-CP48654-PP Strainer Bowl Grey 126 Series 1-1/4 BSP
2. SS-CP15941-4 Strainer Screen 124NY 80 Mesh (now yellow)
3. SS-CP48656-EPDM Gasket for 126 Filter 1-1/4 &1-1/2
4. Nf-el1140 Nylon Elbow 1-1/4 BPSM x1 HB
5. SS-CPB63065-1-1 Strainer Head PP 126 Series 1-1/4 BSP
6. BP-SHN32 Poly Nipple BSP 1-1/4
7. SS-AAB126-5-80 Line Strainer 1-1/4 Complete
8. SF-SS2415 Bush Reducing S/Steel 1-1/4x1
9. SF-SS2511 Elbow S/Steel MF 1 BSP
10. BV-25MF Ball Valve Brass MF 1 BSP
11. NF-A1010 Nylon Fitting 1 Male x 1 HB



1. BJ-MLSTI150-80 Banjo Strainer 2 Flange T Body w/80MESH

2. BJ-FC200 Clamp 20 Series Banjo 2

3. BJ-150G Gasket 200 Series Banjo 2

## GREASING

The following grease points need greasing as per below.

| | | |
|---|---|---|
| First Fold Point<br><br>10 hrs | 2 grease points on each swivel on each boom arm. |  |
| Second Fold Point<br><br>10 hrs | 4 grease points on each boom arm |  |
| Swing arm & Self Level Pivot Point<br><br>10 hrs | Left Boom - 2 grease points – one for Swing arm and one for the Self Level Pivot Point.<br><br>Right Boom – 1 grease point for the Swing arm |  |
| Tow Hitch<br><br>10 hrs | One grease point for the swivel ball in tow hitch |  |
| Supporting Jack<br><br>100 hrs | One grease point for the supporting jack |  |

## OTHER MAINTENANCE

| | | |
|---|---|---|
| Drawbar Bolts | Check drawbar bolts & tighten | **First 50 hrs then every 200 hrs** |
| Wheel Nuts | Check wheel nuts & tighten. 297 ft. Lbs (404N.m) | **First 50 hrs then every 200 hrs** |
| Wheel Bearings | Check wheel bearings. | **First 50 hrs then every 200 hrs**<br><br>**If floatation tyres are fitted first 50 hrs then every 100 hrs.** |
| | Repack annually with grease or as required | **Repack annually or as required** |

### PAINTWORK

To protect the paintwork and presentation of your new boomspray it will require regular washing at the end of every spraying session.

When using hydrocarbon-based products (e.g. Ester, Treflan, and Avadex) a strict external method is required using clean water.

Do not allow dust to build up and turn to chemical impregnated mud. Any neat chemical spills onto paintwork will require immediate wash-down.

### TYRE PRESSURE

Tyre pressure guide is written on your tyre sidewall. Do not exceed maximum pressure stated on tyre.

As a guideline only, we have listed approximate pressures to use, but remember NEVER exceed maximum pressure stated on tyre.

| | |
|---|---|
| 16.9 x 30 | 18 psi to 35 psi |
| 18.4 x 34 | 18 psi |
| 20.8 x 42 | 23 psi |
| 600/65 x 30.5 | 29 psi to 47 psi |
| 650/65 x 30.5 | 28 psi |

# TROUBLESHOOTING

## UNDERSTAND YOUR AUTOMATIC CONTROLLER

The controller controls the application rate based upon the target application rate set before spraying such as 40L / Ha. The controller receives information from the flow meter and the speed sensor and tells the Regulating Valve to open or shut.

| | |
|---|---|
| Nozzle Size: | Set in Controller |
| Boom Width: | Set in Controller |
| Speed Sensor: | Measures speed & sends information to Controller |
| Flow Meter: | Measures L/Min & sends information to Controller |
| Regulating Valve: | Controlled by controller calculating variable information such as speed & flow.<br>L/Ha is too high – Reg Valve Closes<br>L/Ha is too low – Reg Valve Opens |

The controller will also monitor when spraying speed is too fast or slow for the controller to regulate the target rate given the nozzle and desired application rate.

You must use suitable nozzles for the application rate. Check the nozzle capacity information.

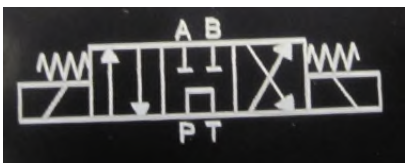
## UNDERSTAND THE HYDRAULICS

The hydraulic spool system on your boomspray has been fitted to suit your tractor depending on whether you have an open or closed centre system. The majority of systems use the closed system.

The electric solenoid spool valves are Rexroth brand with a J (closed) or G (open) CETOP3.


**Closed Centre Solenoid Spool Valve**

**Open Centre Solenoid Spool Valve**


Located between the hydraulic block and the solenoid valve there is a pilot operated check valve to prevent cylinder creep.

The hydraulic hoses are either 3/8” or 1/2” fitted with JIC fittings.

It is crucial that you identify the hydraulic hoses that control your Hypro pump. These are 1/2” hoses.

## COMMON ISSUES

Most problems can be found quickly by checking the following:

What does the monitor display?
Speed
Hectares
L/min

Can you spray in manual mode (+ & - buttons increase & decrease pressure)?
Can you manually adjust the pressure & flow?
Are the fuses good?
Check your controller settings are correct.
Check the filters are clean & briefly start pump to check flow.

| ISSUE | ITEMS TO CHECK |
|---|---|
| No Pressure | Check your filters<br>Check the Reg Valve has power<br>Check Reg Valve is opening & closing by either listening or watching.<br>Apply a separate 12v DC power source to Reg Valve wires. This will isolate the valve from the controller & cables.<br>Disconnect Reg Valve power for 30 secs as it has a reset fuse built in.<br>Check Reg Valve is working in the correct direction, if not reverse the polarity of red & black wires eg red to black.<br>If you remove the reg valve motor from shaft, make sure the paint pen marks on the shaft are aligned when in the off position. |
| No Speed | Check speed sensor connectors & cable for cuts or breaks.<br>Check speed sensor is plugged in.<br>Check you are getting a pulse in the signal wire.<br>Check pins in the deutsch plug are not pushed out.<br>For wheel sensors:<br>Check magnets are in place<br>Check the LED light in the end of the sensor when the magnet passes.<br>Check the sensor is the correct distance from the magnets 10—20mm |
| No Hectares | See above as for speed<br>Check width setting in controller |
| No L/Min | Check pump is pumping liquid<br>Check flow meter connectors and cable for cuts etc<br>Check flow meter is not stuck or restricted<br>Flush flow meter with clean water, it should spin freely when blown through.<br>Check pins in deutsch plug are not pushed out.<br>Teejet 801 Flow Meters:<br>Turn on spray controller; a green LED light should appear on the flow sensor to indicate power. An orange LED should also appear to indicate when flow is going out nozzles.<br>Check reg valve is working in the correct direction. |

| ISSUE | ITEMS TO CHECK |
|---|---|
| Tank Output Different To What Has Been Sprayed Out | If controller is saying too high—increase flow meter calibration by that %<br>If controller is saying too low—decrease flow meter calibration by that %<br>Default calibration for the Teejet 801 is 82—start with this number and adjust as above. |
| Cant Adjust Flow Manually | Check Reg Valve has power<br>Check Reg Valve is opening & closing by either listening or watching.<br>Apply separate 12v DC power source to reg valve wires. This will isolate from controller & cables.<br>Disconnect reg valve power for 30 secs as it has a reset fuse built in.<br>Reverse the polarity of red & black wires on reg valve eg red to black.<br>If you removed the reg valve motor from the shaft, make sure the paint marks are aligned when in the off position.<br>Check pins in deutsch plug are not pushed out. |
| Spraying Stops While In Auto Mode | Check flow meter is not stuck or stalled. The flow meter might be stalled due to reg valve shutting.<br>Check reg valve console settings are set to inline or throttling, not bypass. |
| Application Rate Oscillates | Check all controller values are correct.<br>Check Reg Valve motor is correctly aligned with the paint pen mark on the shaft of the reg valve (when aligned the motor should be in the off position).<br>Decrease the reg valve speed in the controller. |
| Application Rate Oscillates with only 1 section of boom on or when connected to a planter or shielded sprayer. | Teejet 801 flow meters wont regulate below 9.5L/min.<br>All low flow applications need to be done in manual mode. |
| Flow Drops Off Whilst Spraying | Check for blocked filters or delivery hose.<br>Check reg valve is opening & closing by watching or listening. |
| Tank 3/4 Empty & Cant Maintain Pressure | Check the agitation tap is not too far open causing frothing in the tank making the pump suck air & water. |
| Hypro Pump Runs For A Few Seconds Then Stops | Tractor hydraulics are on a timer, adjust to a continuous setting.<br>Case—set timer to 0.<br>JD—set time to C. |

| ISSUE | ITEMS TO CHECK |
|---|---|
| Not Regulating in Auto Mode | Ensure controller is in Auto Mode.<br>Check speed sensor<br>Check regulating valve<br>If you are using 1 or 2 sections and going slow, some flow meters will not operate below 9.5L/min. You might have to operate in manual mode. |
| Console wont turn on, it just clicks | Dead short in electrical cables<br>Disconnect sensor cables to isolate short. |
| Other Electrical Faults | Check 15 amp fuse at battery<br>Ball valves have an internal resettable fuse, disconnect all three wires for 30 sec<br>Check wiring harness for cuts or breaks.<br>Check pins in deutsch plugs<br>Make sure settings in controller are correct |
| Hydraulic Functions | Ensure hydraulics are connected to the correct port.<br>Ensure Hypro is connected to a free flow return.<br>Wiring plugs on solenoid valves (Hirschmann plug) can be swapped from one to another to determine if fault is hydraulic or electrical.<br>Check if power is getting to Hirschmann plug with a multimeter.<br>Check for a quiet click when solenoid is activated.<br>If solenoid is faulty, it can be swapped with another.<br>Hydraulic function can be activated manually by pushing a small screwdriver into the poppet on either end of spool valve in the middle of the cap. This will manually open or close the solenoid valve. |

# WIRING DIAGRAMS

## HYDRAULICS

### 14 pin Deutsch Plug for Tilt & Folds

Tractor Plug: HD 34-18-14 SN
Boom Plug: HD 36-18-14 PN

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| A | Left Tilt Up | Purple |
| B | Left Tilt Down | Dark Brown |
| C | Right Tilt Up | White / Red |
| D | Right Tilt Down | White / Blue |
| E | Left Inner Fold Out | Grey |
| F | Left Inner Fold In | Orange |
| G | Right Inner Fold Out | Blue |
| H | Right Inner Fold In | Red |
| J | Left Inner Fold Out | Green |
| K | Left Outer Fold In | Yellow |
| L | Right Outer Fold Out | White / Brown |
| M | Right Outer Fold In | White |
| N | Blank (12v switch wire for 6 pole switches if fitted) | Blank (White) |
| P | Earth | Black |

### 14 pin Deutsch Plug for Height Adjust Tower, Floating Hitch & Levelling

Tractor Plug: HD 34-18-14 PN
Boom Plug: HD 36-18-14 SN

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| A | Tower Height Up | White / Green |
| B | Tower Height Down | White / Yellow |
| C | Floating Hitch Up | Yellow / Green |
| D | Floating Hitch Down | Yellow / Black |
| E | Levelling Right On | White |
| F | Earth | Black |
| G | Levelling Left On | Yellow |
| H | Earth | Black |
| J | Back Jet rail Up | Pink |
| K | Back Jet rail Down | Blue |
| L | Blank | |
| M | Blank | |
| N | Blank | |
| P | Earth | Earth |

## ELECTRICAL

### Boom 23 Pin Deutsch Plug

Boom Plug: HD 36-24-23 PN
Pins: D0460-215-16141

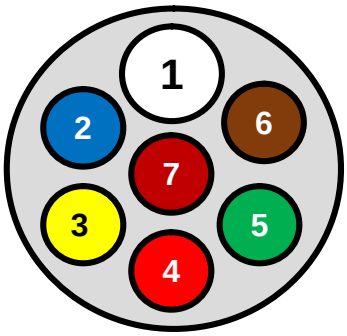
| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| A | Boom Section 1 | 3mm White |
| B | Boom Section 2 | 3mm Brown |
| C | Boom Section 3 | 3mm Green |
| D | Boom Section 4 | 3mm Yellow |
| E | Boom Section 5 | 3mm Grey |
| F | Boom Sections Earth - | 4mm Green |
| G | Regulator Valve | 3mm Brown |
| H | Regulator Valve | 3mm White |
| J | Boom Sections Power + | 4mm Red |
| K | Flow Meter | 3mm White / Red |
| L | Flow Meter Power + | 3mm Brown |
| M | Flow Meter Earth - | 3mm Green |
| N | Speed Sensor | 3mm White / Green |
| O | Speed Sensor Power + | 3mm Brown |
| P | Speed Sensor Earth - | 3mm Green |
| Q | Pressure Sensor | 3mm Black |
| R | Pressure Sensor | 3mm White |
| S | Blank | |
| T | Boom Section 9 | 3mm Purple |
| U | Boom Section 10 | 3mm Orange |
| V | Boom Section 6 | 3mm Pink |
| W | Boom Section 7 | 3mm Blue |
| X | Boom Section 8 | 3mm Yellow / Red |

**NOTE:**

- Boom Section Wires In Group of 12
- Regulator Valve Wires In Group of 2
- Flow Meter Wires In Group of 3
- Speed Sensor Wires in Group of 3
- Pressure Sensor Wires in Group of 2

**John Deere / Cave / New Holland 7 Pin Large Round Plug Light Layout**
Boom Plug: EC-82193

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| 1 | Earth Return | 5mm White |
| 2 | Work Lights | 3mm Blue |
| 3 | Left-hand Turn | 3mm Yellow |
| 4 | Breaks Lights | 3mm Red |
| 5 | Right-hand Turn | 3mm Green |
| 6 | Tail Lights | 3mm Brown |
| 7 | AUX Power | 5mm Red |




**For European tractors/plugs, check tractor manual or dealer.**

# CONTROLLER HARNESSES

**TEEJET 844E 23 pin Deutsch Plug**
Tractor Plug: HD 34-24-23 SN
Socket: D0462-209-16141

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| A | Boom Section 1 | 3mm White |
| B | Boom Section 2 | 3mm Brown |
| C | Boom Section 3 | 3mm Green |
| D | Boom Section 4 | 3mm Yellow |
| E | Boom Section 5 | 3mm Grey |
| F | Boom Sections Earth - | 4mm Green |
| G | Regulator Valve | 3mm Brown |
| H | Regulator Valve | 3mm White |
| J | Boom Sections Power + | 4mm Red |
| K | Flow Meter | 3mm White / Red |
| L | Flow Meter Power + | 3mm Brown |
| M | Flow Meter Earth - | 3mm Green |
| N | Speed Sensor | 3mm White / Green |
| O | Speed Sensor Power + | 3mm Brown |
| P | Speed Sensor Earth - | 3mm Green |
| Q | Pressure Sensor | 3mm Black |
| R | Pressure Sensor | 3mm White |
| S | Blank | |
| T | Boom Section 9 | 3mm Purple |
| U | Boom Section 10 | 3mm Orange |
| V | Boom Section 6 | 3mm Pink |
| W | Boom Section 7 | 3mm Blue |
| X | Boom Section 8 | 3mm Yellow / Red |

**NOTE:**

- Boom Section Wires In Group of 12
- Regulator Valve Wires In Group of 2
- Flow Meter Wires In Group of 3
- Speed Sensor Wires in Group of 3
- Pressure Sensor Wires in Group of 2

**TRIMBLE Ez Guide 500, CFX & FMX AMP Plug**
Main Connector: AMP 206037-1

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| 1 | GND | 4mm Green |
| 2 | Boom 2 | 3mm Brown |
| 3 | Inc. / Dec Reg Valve Open | 3mm Brown |
| 4 | Inc. / Dec Reg Valve Close | 3mm White |
| 5 | Boom 3 | 3mm Green |
| 6 | Boom 1 | 3mm White |
| 7 | Boom 4 | 3mm Yellow |
| 8 | Boom 5 | 3mm Grey |
| 9 | Boom 6 | 3mm Pink |
| 10 | Blank | |
| 11 | Flow Earth - | 3mm Green |
| 12 | Flow Power + | 3mm Brown |
| 13 | Flow Signal | 3mm White / Red |
| 14 | Blank | |
| 15 | Boom 7 | 3mm Blue |
| 16 | Positive + | 4mm Red |

Secondary Connector: AMP 206044-1

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| 1 | Boom 8 | 3mm Red / Yellow |
| 2 | Boom 9 | 3mm Purple |
| 3 | Boom 10 | 3mm Orange |
| 4 | Blank | |
| 5 | Blank | |
| 6 | Blank | |
| 7 | Blank | |
| 8 | Blank | |
| 9 | Blank | |
| 10 | Blank | |
| 11 | Blank | |
| 12 | Blank | |
| 13 | Blank | |
| 14 | Blank | |

## GREENSTAR

### 37 PIN AMP CONNECTOR – 2009 onwards

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| 1 | Valve Ground | 4mm Green |
| 4 | Boom Section 1 | 3mm White |
| 5 | Boom Section 2 | 3mm Brown |
| 6 | Boom Section 3 | 3mm Green |
| 7 | Boom Section 4 | 3mm Yellow |
| 8 | Boom Section 5 | 3mm Grey |
| 9 | Boom Section 6 | 3mm Pink |
| 10 | Boom Section 7 | 3mm Blue |
| 11 | Boom Section 8 | 3mm Yellow Red |
| 12 | Left Fence Line | 3mm Purple |
| 13 | Right Fence Line | 3mm Orange |
| 15 | Regulator Valve | 3mm White |
| 16 | Regulator Valve | 3mm Brown |
| 21 | Flowmeter Shield | 3mm Green |
| 28 | Flowmeter #1 Signal | 3mm White Red |
| 36 | Valve Power | 4mm Red |
| 37 | Flowmeter + | 3mm Brown |

### 31 PIN DEUTSCH PLUG– Older Type HDP26-24-31

| PIN | FUNCTION | WIRE COLOUR |
|---|---|---|
| 1 | Boom Section 1 | 3mm White |
| 2 | Boom Section 2 | 3mm Brown |
| 3 | Boom Section 3 | 3mm Green |
| 4 | Boom Section 4 | 3mm Yellow |
| 5 | Boom Section 5 | 3mm Grey |
| 6 | Boom Section 6 | 3mm Pink |
| 7 | Boom Section 7 | 3mm Blue |
| 8 | Boom Section 8 | 3mm Yellow Red |
| 9 | Left Fence Line | 3mm Purple |
| 10 | Right Fence Line | 3mm Orange |
| 15 | Regulator Valve | 3mm Brown |
| 16 | Regulator Valve | 3mm White |
| 23 | Flowmeter Earth | 3mm Green |
| 24 | Flowmeter Power + 5v dc | 3mm Brown |
| 25 | Flowmeter Signal | 3mm White Red |
| 27 | Boom Section Earth | 4mm Green |
| 28 | Boom Section Power + 12v dc | 4mm Red |

# ELECTRICAL COMPONENTS

## BALL VALVES

**TEEJET 344 Series 2-Way Electric Ball Valve**
Part No. SS-B344BEC-24-C

Circulation: 2005 onwards

**TEEJET 430 Series 2-Way Electric Ball Valve**
Part No. SS-430EC-2-D (Single Unit)
Part No. SS-435EC-2-D (5 Manifold)
Part No. SS-437EC-2-D (7 Manifold)

Circulation: 2010 onwards

**TEEJET 430 Series Flow Back Electric Ball Valve**
Part No. SS-435EC-3FB-D (5 Manifold)
Part No. SS-437EC-3FB-D (7 Manifold)

Circulation: 2010 onwards

## REGULATING VALVE

**TEEJET 344 Series Electric Regulating Valve**
Part No. SS-B344BRL-24S-03CGS

Circulation: 2005 onwards

When ordering make sure, you specify if you need 1” or 1.25”

## OTHER BOOMSPRAY COMPONENTS

**TEEJET Wheel Speed Sensor**
Part No. SS-38412 (Sensor Only)
Part No. SS-38416 (Single Magnet)


**TEEJET Flowmeter 801**
Part No. SS-57-10100

When ordering make sure, you specify if you need 1” or 1.25”

# TEEJET NOZZLE CAPACITY GUIDE

| | BAR | 1 Nozzle L/Min | L/ ha on 50cm Spacing | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4 km/h | 5 km/hr | 6 km/hr | 7 km/hr | 8 km/hr | 10 km/hr | 12 km/hr | 16 km/hr | 18 km/hr | 20 km/hr | 25 km/hr |
| Green 015 | 1.5 | 0.42 | 126 | 101 | 84.0 | 72.0 | 63.0 | 50.4 | 42.0 | 31.5 | 28.0 | 25.2 | 20.2 |
| | 2.0 | 0.48 | 144 | 115 | 96.0 | 82.3 | 72.0 | 57.6 | 48.0 | 36.0 | 32.0 | 28.8 | 23.0 |
| | 2.5 | 0.54 | 162 | 130 | 108 | 92.6 | 81.0 | 64.8 | 54.0 | 40.5 | 36.0 | 32.4 | 25.9 |
| | 3.0 | 0.59 | 177 | 142 | 118 | 101 | 88.5 | 70.8 | 59.0 | 44.3 | 39.3 | 35.4 | 28.3 |
| | 4.0 | 0.68 | 204 | 163 | 136 | 117 | 102 | 81.6 | 68.0 | 51.0 | 45.3 | 40.8 | 32.6 |
| | 5.0 | 0.76 | 228 | 182 | 152 | 130 | 114 | 91.2 | 76.0 | 57.0 | 50.7 | 45.6 | 36.5 |
| Yellow 02 | 1.5 | 0.56 | 168 | 134 | 112 | 96.0 | 84.0 | 67.2 | 56.0 | 42.0 | 37.3 | 33.6 | 26.9 |
| | 2.0 | 0.65 | 195 | 156 | 130 | 111 | 97.5 | 78.0 | 65.0 | 48.8 | 43.3 | 39.0 | 31.2 |
| | 2.5 | 0.72 | 216 | 173 | 144 | 123 | 108 | 86.4 | 72.0 | 54.0 | 48.0 | 43.2 | 34.6 |
| | 3.0 | 0.79 | 237 | 190 | 158 | 135 | 119 | 94.8 | 79.0 | 59.3 | 52.7 | 47.4 | 37.9 |
| | 4.0 | 0.91 | 273 | 218 | 182 | 156 | 137 | 109 | 91.0 | 68.3 | 60.7 | 54.6 | 43.7 |
| | 5.0 | 1.02 | 306 | 245 | 204 | 175 | 153 | 122 | 102 | 76.5 | 68.0 | 61.2 | 49.0 |
| Purple 025 | 1.5 | 0.70 | 210 | 168 | 140 | 120 | 105 | 84.0 | 70.0 | 52.5 | 46.7 | 42.0 | 33.6 |
| | 2.0 | 0.81 | 243 | 194 | 162 | 139 | 122 | 97.2 | 81.0 | 60.8 | 54.0 | 48.6 | 38.9 |
| | 2.5 | 0.90 | 270 | 216 | 180 | 154 | 135 | 108 | 90.0 | 67.5 | 60.0 | 54.0 | 43.2 |
| | 3.0 | 0.99 | 297 | 238 | 198 | 170 | 149 | 119 | 99.0 | 74.3 | 66.0 | 59.4 | 47.5 |
| | 4.0 | 1.14 | 342 | 274 | 228 | 195 | 171 | 137 | 114 | 85.5 | 76.0 | 68.4 | 54.7 |
| | 5.0 | 1.28 | 384 | 307 | 256 | 219 | 192 | 154 | 128 | 96.0 | 85.3 | 76.8 | 61.4 |
| Blue 03 | 1.5 | 0.83 | 249 | 199 | 166 | 142 | 125 | 99.6 | 83.0 | 62.3 | 55.3 | 49.8 | 39.8 |
| | 2.0 | 0.96 | 288 | 230 | 192 | 165 | 144 | 115 | 96.0 | 72.0 | 64.0 | 57.6 | 46.1 |
| | 2.5 | 1.08 | 324 | 259 | 216 | 185 | 162 | 130 | 108 | 81.0 | 72.0 | 64.8 | 51.8 |
| | 3.0 | 1.18 | 354 | 283 | 236 | 202 | 177 | 142 | 118 | 88.5 | 78.7 | 70.8 | 56.6 |
| | 4.0 | 1.36 | 408 | 326 | 272 | 233 | 204 | 163 | 136 | 102 | 90.7 | 81.6 | 65.3 |
| | 5.0 | 1.52 | 456 | 365 | 304 | 261 | 228 | 182 | 152 | 114 | 101 | 91.2 | 73.0 |
| Red 04 | 1.5 | 1.12 | 336 | 269 | 224 | 192 | 168 | 134 | 112 | 84.0 | 74.7 | 67.2 | 53.8 |
| | 2.0 | 1.29 | 387 | 310 | 258 | 221 | 194 | 155 | 129 | 96.8 | 86.0 | 77.4 | 61.9 |
| | 2.5 | 1.44 | 432 | 346 | 288 | 247 | 216 | 173 | 144 | 108 | 96.0 | 86.4 | 69.1 |
| | 3.0 | 1.58 | 474 | 379 | 316 | 271 | 237 | 190 | 158 | 119 | 105 | 119 | 105 |
| | 4.0 | 1.82 | 546 | 437 | 364 | 312 | 273 | 218 | 182 | 137 | 121 | 109 | 87.4 |
| | 5.0 | 2.04 | 612 | 490 | 408 | 350 | 306 | 245 | 204 | 153 | 136 | 122 | 97.9 |

## NOZZLE WEAR CALCULATOR

Check nozzles regularly or replace on an annual basis.

| Nozzle Capacity | Pressure at the nozzle (bar) | Flow at the nozzle (L/Min) | Replace Nozzles if L/Min is more than |
|---|---|---|---|
| 015 | 3.0 | 0.59 | 0.64 |
| 02 | 3.0 | 0.79 | 0.86 |
| 025 | 3.0 | 0.99 | 1.08 |
| 03 | 3.0 | 1.18 | 1.29 |
| 04 | 3.0 | 1.58 | 1.73 |

HYPRO®

# Series 9300 Hydraulically-Driven Centrifugal Pumps

**Form L-1526**
**1/10**

# Installation, Operation, Repair and Parts Manual

## Description

Hypro centrifugal pumps are designed for agricultural and industrial spraying and transfer of a variety of fluids: water, insecticides, herbicides, wettable powders, emulsives, liquid fertilizers, etc. Polypropylene centrifugal pumps may also be used to pump acid fertilizer, calcium chloride and other highly corrosive liquids such as sulfuric and phosphoric acids.

Hypro Series 9300 hydraulic motor-driven centrifugal pumps provide smooth performance. They can be conveniently mounted on the tractor or sprayer, becoming part of the vehicle's hydraulic system and freeing the PTO for other uses. The Hypro "close-coupled" design reduces the mounting space required, eliminating long shafts and couplers between the pump and motor.

**SERIES 9302C & 9302S**
**Cast Iron & Stainless Steel Centrifugal Pumps**

**Max. Flow Rate:** .....100 gpm
**Max. Pressure:** .....120 psi
**Ports:** .....1-1/4" NPT Inlet
.....1" NPT Outlet
**Hydraulic Ports:** .....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9303C & 9303S**
**Cast Iron & Stainless Steel Centrifugal Pumps**

**Max. Flow Rate:** .....147 gpm
**Max. Pressure:** .....145 psi
**Ports:** .....1-1/2" NPT Inlet
.....1-1/4" NPT Outlet
**Hydraulic Ports:** .....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9303P**
**Polypropylene Centrifugal Pumps**

**Max. Flow Rate:** .....113 gpm
**Max. Pressure:** .....125 psi
**Ports:** .....1-1/2" NPT Inlet
.....1-1/4" NPT Outlet
**Hydraulic Ports:** ....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9303C-SP**
**Cast Iron Centrifugal Pumps**

**Max. Flow Rate:** .....122 gpm
**Max. Pressure:** .....140 psi
**Ports:** .....1-1/2" NPT Inlet
.....1-1/4" NPT Outlet
**Hydraulic Ports:** .....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9304C**
**Cast Iron Centrifugal Pumps**

**Max. Flow Rate:** .....190 gpm
**Max. Pressure:** .....130 psi
**Ports:** .....2" NPT Inlet
.....1-1/2" NPT Outlet
**Hydraulic Ports:** ....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9305C-HM3C**
**Cast Iron Centrifugal Pumps**

**Max. Flow Rate:** .....190 gpm
**Max. Pressure:** .....180 psi
**Ports:** .....2" NPT Inlet
.....1-1/2" NPT Outlet
**Hydraulic Ports:** .....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9305C-HM3C-SP, -BSP**
**Cast Iron Centrifugal Pumps**

**Max. Flow Rate:** .....178 gpm
**Max. Pressure:** .....154 psi
**Ports:** .....2" NPT or BSP Inlet
.....2" NPT or BSP Outlet
**Hydraulic Ports:** .....1/2" NPT Inlet
.....1/2" NPT Tank

**SERIES 9306C & 9306S**
**Cast Iron & Stainless Steel Centrifugal Pumps**

**Max. Flow Rate:** .....214 gpm
**Max. Pressure:** .....150 psi
**Ports:** .....2" NPT Inlet
.....1-1/2" NPT Outlet
**Hydraulic Ports:** ....1/2" NPT Inlet
.....1/2" NPT Tank

## General Safety Information

**NOTE**

**Notes are used to notify of installation, operation, or maintenance information that is important but not safety related.**

**⚠ CAUTION**

**Caution is used to indicate the presence of a hazard, which will or may cause minor injury or property damage if the notice is ignored.**

**⚠ WARNING**

**Warning denotes that a potential hazard exists and indicates procedures that must be followed exactly to either eliminate or reduce the hazard, and to avoid serious personal injury, or prevent future safety problems with the product.**

**⚠ DANGER**

**Danger is used to indicate the presence of a hazard that will result in severe personal injury, death, or property damage if the notice is ignored.**

**⚠ DANGER**

**Do not pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in explosive atmospheres. The pump should be used only with liquids compatible with the pump component materials. Failure to follow this notice may result in severe personal injury and/or property damage and will void the product warranty.**

**⚠ CAUTION**

1. **Do not pump at pressures higher than the maximum recommended pressure.**
2. **Maximum liquid temperature is 140° F for Series 9300 centrifugal pumps.**
3. **Disconnect power before servicing.**
4. **Release all pressure within the system before servicing any component.**
5. **Drain all liquids from the system before servicing any component. Flush with water.**
6. **Secure the outlet lines before starting the pump. An unsecured line may whip, causing personal injury and/or property damage.**
7. **Check hose for weak or worn condition before each use. Make certain that all connections are tightly secured.**
8. **Periodically inspect the pump and the system components. Perform routine maintenance as required (See Repair Instructions).**
9. **Use only pipe, hose and fittings rated for the maximum psi rating of the pump.**
10. **Do not use these pumps for pumping water or other liquids for human or animal consumption.**

## Hazardous Substance Alert

**⚠ CAUTION**

1. **Always drain and flush pump before servicing or disassembling for any reason.**
2. **Always drain and flush pumps prior to returning unit for repair.**
3. **Never store pumps containing hazardous chemicals.**
4. **Before returning pump for service/repair, drain out all liquids and flush unit with neutralizing liquid. Then, drain the pump. Attach tag or include written notice certifying that this has been done. It is illegal to ship or transport any hazardous chemicals without United States Environmental Protection Agency Licensing.**

**⚠ DANGER**

**Never use your hand to check the condition of hydraulic lines or hoses. If hydraulic fluid penetrates the skin, get medical help immediately. Failure to get proper medical help may result in loss of limb or life. The safest way to check hydraulic lines or hoses is by holding a piece of cardboard next to the hydraulic line or hose.**

**⚠ WARNING**

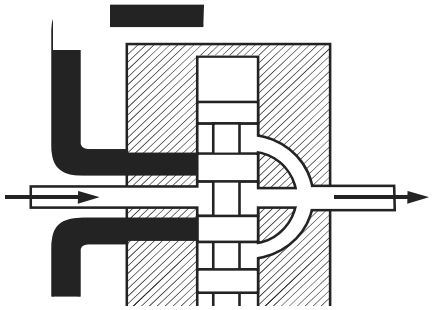
**The sound pressure level of the pump is 80dBA. Observe all safety precautions when operating the pump within close proximity for extended periods of time by wearing hearing protectors. Extended exposure to elevated sound levels will result in permanent loss of hearing acuteness, tinnitus, tiredness, stress, and other effects such as loss of balance and awareness.**

# General Information—Hydraulic Systems

### Hydraulic Pumps

Hydraulic pumps come in two basic types:

- **Constant displacement -** which will continue to put out its rated flow regardless of pressure, until the relief valve bypasses the flow.
- **Variable displacement -** which will produce only the flow needed by the implement until the total pump output is reached. If less than the full pump output is required, an automatic stroke control mechanism decreases the pump output to maintain a constant pressure and flow. The output varies according to demand.

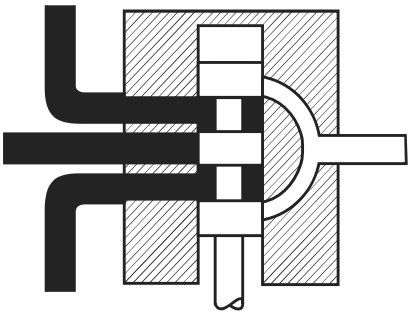


**Open Center Spool Valve In Neutral Position**

**Figure 1**

### Spool Valves

There are two basic types of spool valves used in conjunction with these pumps — Open and Closed Center. In the Open Center Valve (See Figure 1), the flow goes straight through the valve when in the neutral position. This type is used for constant displacement pumps where the flow should never be shut off.



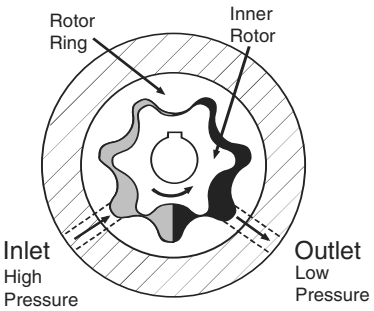
**Closed Center Spool Valve In Neutral Position**

**Figure 2**

The Closed Center Valve (See Figure 2) is used with variable displacement pumps. The flow is completely shut off in the neutral position, causing the pump stroke to adjust to zero flow. The flow stops, but the pump maintains a static pressure up to the valve.

### Hydraulic Motors

Figure 3 shows an internal gear motor (Gerotor) where pressure causes the cavities between the gears to expand on one side, developing torque. The Gerotor type of hydraulic motor is used on Hypro pumps for its superior performance characteristics, including cooler running and higher rpm capabilities.




**Gerotor-Type Hydraulic Motor**

**Figure 3**

### Three Systems

Fitting these components together and installing a motor, we have one of the three types of systems: Open Center, Closed Center (pressure compensated) and Closed Center Load Sensing (flow and pressure compensated).

### Open Center Systems

In an Open Center System, the hydraulic pump puts out a constant flow. If the pump puts out more oil than the motor can use, a portion of the oil must be bypassed around the motor. When the oil is bypassed around a loop and does no work, the energy put into it by the pump turns into heat. Therefore, the amount of oil bypassed should be kept to a minimum. Use the largest motor possible.

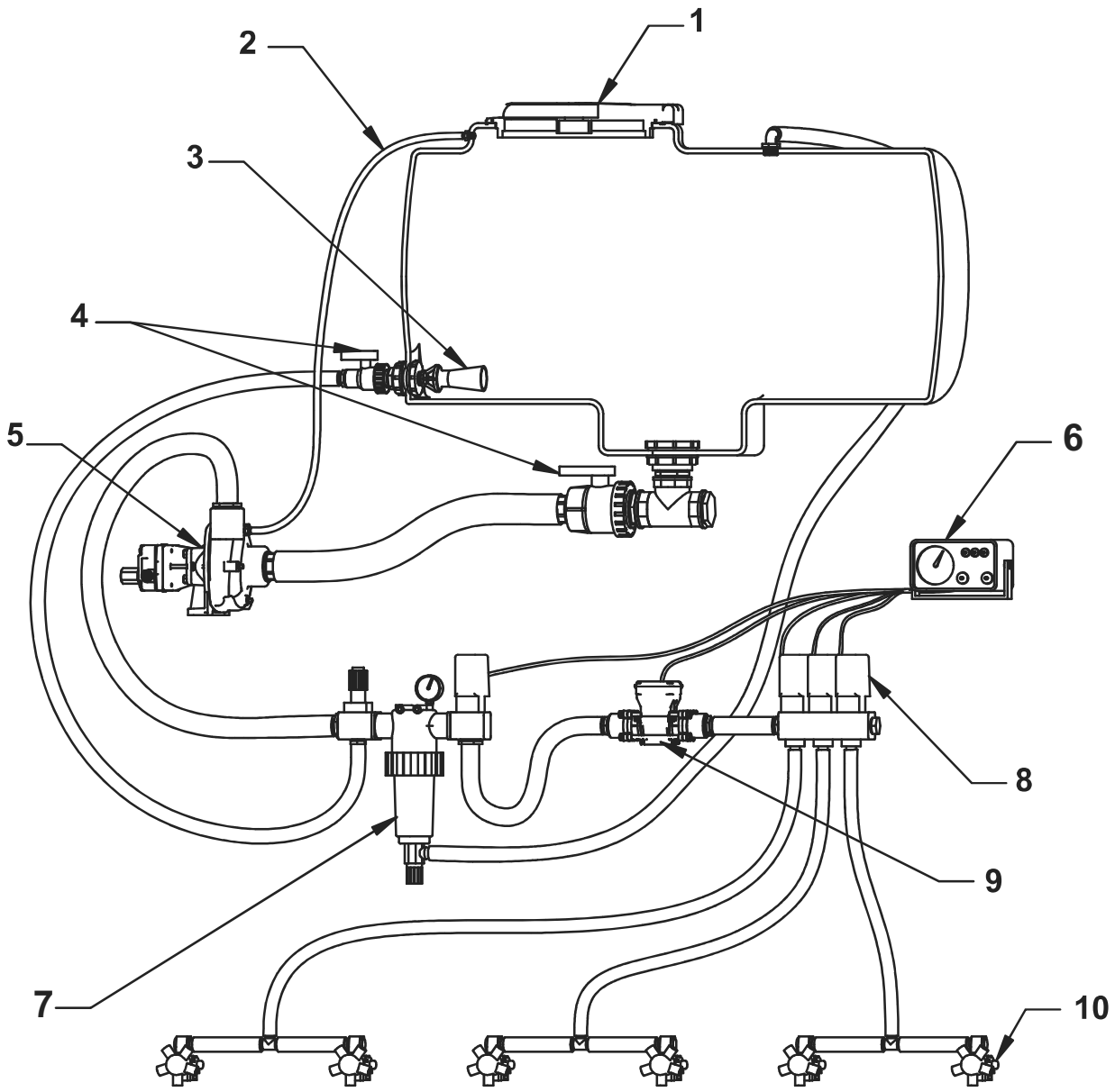
### Closed Center (Pressure-Compensated) Systems

The Closed Center Pressure-Compensated system has a variable displacement pump which will deliver flow at the necessary rate to maintain a specified pressure. It is desirable to equip implements with a motor of a low flow range that will cause the pump to operate between 1800 and 2100 psi [124 and 145 BAR]. A motor that requires a large volume to obtain the correct implement speed usually causes the hydraulic pump in a closed center system to operate at a lower pressure than desirable. This low pressure results in unnecessary flow and the generation of heat that lowers the lubricating quality of the oil and may damage transmission parts. Use the smallest motor possible.

### Closed Center Load Sensing Systems (Flow and Pressure-Compensating)

The Closed Center Flow-Compensated System is a variation of the pressure-compensated system, designed primarily for more efficient operation and the generation of less heat. It works on the principle of maintaining a constant pressure drop from the pump to the work port of the selector valve. Any variation in demand at the motor will cause a change in flow. The system senses this change in flow due to the change in pressure drop across the valve and causes the pump to compensate by varying the pump flow. No restrictor is used in the pressure line and no oil is bypassed.

# Plumbing Installation




**Centrifugal Plumbing Hook-up**

| REF. NO. | DESCRIPTION |
|---|---|
| 1 | Tank Lid |
| 2 | Vent Line #3430-0456 |
| 3 | Jet Agitator |
| 4 | Shut-off Ball Valves |
| 5 | Centrifugal Pump |
| 6 | Spray Control Console |
| 7 | Centrifugal Pump Control |
| 8 | Manifold Boom Valve |
| 9 | Electromagnetic Flowmeter |
| 10 | Compact Jet Turret Nozzle Body |

# Installation Instructions

**All Models — Open Center Systems**

Models include Tank Port Adapter with built-in Check Valve Assembly and Pressure Port Adapter.

**HM2C and HM4C Models Only — Closed Center and Small Open Center Systems.**

Models include Tank Port Adapter with built-in Check Valve Assembly and Pressure Port Adapter with three different size metering orifices for HM4C models. The orifices are not required for use with closed center systems with flow control, such as John Deere closed center systems. Also, do not use for small open center systems with a maximum flow of 8 gpm [30.28 lpm] for HM2C model; 10 gpm [37.85 lpm] for HM4C model. If necessary, the pressure port adapter may be used without a metering orifice installed in any closed center system. For best results, the pressure differential across the motor should be less than 2500 psi (170 bar).

**Preliminary to Mounting**

Consult the owners manual to determine the type and capacity of the hydraulic system. Make sure the hydraulic system is recommended to operate with a continuous load. Refer to the Pump Selection Guide to confirm you have the proper pump for your hydraulic system.

Check to see that the pump impeller can be turned by hand. (Turn the shaft clockwise using a deep socket wrench on the impeller nut.) If it cannot be turned, open the pump casing to look for obstructions. Clean out any corrosion build up where the casing fits over the eye of the impeller.

**Pump Inlet Line**

To achieve full capacity from the pump, the inlet line should be at least the same size as the inlet port on the pump. Reducing this line size will restrict the capabilities of the pump. The line must also be free of air leaks. Check all fittings and connections in the suction line for tightness. The introduction of air may affect the priming and pumping capabilities of the pump. Use good quality suction hose that will not be collapsed by suction.

For non self-priming models, the centrifugal pump should be mounted below the liquid level and as near to the liquid source as possible to allow for the shortest suction line practical. To achieve optimal performance, the suction line should slope down into the pump. Avoid rises and humps that could trap air in the line to the pump. The suction line and pump should be filled with liquid prior to starting the pump, and all discharge lines should be open.

**Pump Outlet Line**

The recommended orientation for the outlet port is pointing straight up. This allows liquid to stay in the pump while it is priming. The outlet line should be the same size as the pressure port on the pump to give the optimal flow. The line should have as few restrictions and elbows as possible to optimize the pump performance and reduce pressure drop from the pump to the spray tips.

**Priming the Pump**

**NOTE**

**The pump must not be run dry.**

Before starting the pump, the inlet line and pump must be filled with liquid and all discharge lines must be open. On self-priming models, only the pump chamber needs to be filled with liquid. The pump must not be run unless it is completely filled with liquid because there is a danger of damaging the mechanical seal, which depends on the liquid for its lubrication.

Non-self-priming models should be mounted below the level of the liquid. The suction line should slope down to the pump and be free of dips and bends. If this cannot be done, a foot valve should be installed in the end of the inlet line so that the line can be completely filled with liquid before starting the pump.

**For best priming results, the top vent plug should be removed from the pump casing. A vent line (1/4" [6.35 mm] tubing is sufficient) should be installed running back to the top of the tank.** This line prevents air lock and allows the pump to prime itself by bleeding off trapped air. The small stream of liquid that returns to the tank during operation is negligible. The discharge from this line should be positioned in the tank above the high liquid level. Self-priming models can be primed by removing the top vent plug and filling the priming chamber. The priming chamber will fill to the level of the inlet port. After use, the priming chamber should be flushed and drained to avoid chemical corrosion and damage from freezing. Drain by removing the lower drain plug.

**Controlling the Pump Flow**

The best way to control the flow is by incorporating two control valves in a pipe tee immediately after the strainer in the discharge line. This permits controlling agitation flow independently of nozzle flow.

In any centrifugal pump, it is the large volume of liquid which puts load on the drive. Use only the flow needed to develop the pressure required at the boom and to maintain adequate agitation. Hydraulic motor-driven centrifugal pumps are easily adjusted to the exact flow required, as explained in the Operating Instructions of this manual.

**Centrifugal Pump Control**

Hypro now offers many different components for spraying systems. The Hypro centrifugal pump control incorporates the electric flow control valve, a self-cleaning line strainer, a visual pressure gauge and a manual agitation control valve.

**Flow Control Valve**

A high-flow electric proportional valve allows for maximum flow control to the boom valves. It provides smooth, rapid control that can be controlled from either an electronic rate controller or switch box.

**Strainers**

The recommended placement of the strainer for a centrifugal pump is in the pump outlet line. This will eliminate any possible restriction that the strainer could

## Plumbing Installation

create if it were installed in the inlet line. Ensure that the proper strainer size and screen mesh are used to limit the pressure drop and achieve the best filtration. Line strainers can also be installed in the tank fill line to filter liquid as it is loaded into the tank as well as in the boom lines to further filter the solution prior to the spray tips. Tank baskets can also be used to filter material added through the tank lid.

**Agitation**

The centrifugal pump control contains a manual agitation control valve that can be adjusted to provide the right amount of flow to the jet agitators in the tank to ensure proper mixing within the tank.

**Flowmeter**

To eliminate the mechanical problems of a turbine flowmeter, we recommend that an electromagnetic flowmeter be used. These flowmeters have no moving parts to wear out and will provide a more consistent and accurate flow reading. They can be input into just about any electronic rate controller or switch box.

**Boom Section Valves**

For rapid response and reliability, we recommend electric plunger valves be used for boom control. The valves should be sized accordingly to minimize the pressure drop and maximize the flow rate. The boom tubing or hose should be sized accordingly to ensure that a pressure drop in the lines does not occur, causing inconsistent pressures at the nozzles.

**Nozzle Bodies**

Nozzle bodies with shut-off check valves are recommended to eliminate dripping from the spray tips when the boom valves are shut down.

**Hooking Up the Hydraulic Motor to the Tractor Hydraulic System**

Hypro Series 9300HMC hydraulic motor-driven pumps can be mounted on either the tractor or sprayer. When hooking up, make sure that no dirt or liquid gets into the hydraulic motor. **Keep all hydraulic connections clean.** Be sure to connect the hydraulic motor into the system correctly by putting the pressure line to the Pressure Port Adapter and return line to the Tank Port Adapter. The adapters on the hydraulic motor are sized to accommodate 1/2" NPT fittings on the pressure port and 3/4” NPT on the tank port. For maximum performance, the hydraulic lines should also be at least 1/2" [12.7 mm] in size for the pressure line and 3/4" [19.05 mm] for the tank line.

The tank (**OUT**) port adapter with a built-in check valve assembly will guard against reverse operation — allowing you to reverse oil flow to operate other equipment. **This adapter must not be removed.** On HM2C and HM4C model pumps, the pressure (**IN**) port adapter is a two-piece assembly consisting of an open (unrestricted) adapter with three orifices packed loose with the pump. (See the Operations Section.)

When using the HM2C or HM4C unit on any flow-compensated (load sensing) closed center system, or any small open center system with a maximum flow of 8 gpm [30.28 lpm] for HM2C or 10 gpm [37.85 lpm] for HM4C, the metering orifice should be removed from the pressure port adapter. When using these units on flow-compensated systems, connect to the motor priority circuit if your tractor has one.

Standard spool valves, which are found on all tractor hydraulic systems, may cause potentially damaging high peak pressures in the hydraulic system when closed because of abrupt shut-off of oil flow in both the supply and return lines. When shutting off the pump, move the selector to the **FLOAT** position to allow the centrifugal pump to come to a stop gradually.

**For further information regarding Hypro products, contact your local dealer or Hypro directly at www.hypropumps.com or by calling 1-800-424-9776.**

## Operation

**Open Center Systems— All Models**
**Adjusting Centrifugal Pump Output**

**NOTE**

HM1C, HM3C & HM5C motors have bypass screw fully closed from the factory. HM2C & HM4C motors have bypass screw set at 1-1/2 turns from fully closed from the factory.

1. Open the bypass adjustment screw 2-1/2 turns from fully closed. Turn the bypass screw in to achieve the flow for the desired gpm and psi.
2. Start the tractor. Leave the directional valve in the neutral position and allow hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.
3. Prime the centrifugal pump with all valves open (See the Installation Instructions and System Configuration Diagram).
4. Close the agitation line valve and keep the control valve and the boom shut-off valve open. Note the spray pressure.
5. Open the agitation line valve until you have desired circulation in the tank. Recheck the spray pressure. If it is too low, close down the agitation line valve until the desired spray pressure is reached. If the spray pressure is too high, throttle the centrifugal pump by closing down the control valve.

**Closed Center (Pressure-Compensated) — HM2C and HM4C Models Only**

On a pressure-compensated system, the amount of oil that is allowed to flow through the hydraulic motor is regulated by a metering orifice in the pressure port adapter. Three different sizes of orifices are supplied with the HM2C and HM4C model pumps to allow flexibility in the flow required for individual sprayer needs.

The smaller the orifice, the less hydraulic oil goes through the motor, so the pump will run slower and the flow of liquid pumped and the spray pressure will also be less. As the hydraulic oil flow is increased (by installing a larger orifice), the amount of liquid being pumped and the spray pressure is also increased.

**Installing and Removing Metering Orifice**

1. Shut off the hydraulic system.
2. Disconnect the line to the pressure port of the hydraulic motor.
3. Remove the adapter from the motor using a 1-1/16" wrench. Make sure the o-ring is on the metering orifice before installing into port adapter.
4. The orifice is removed or installed in the port adapter by tapping either in or out of the adapter.
   A. To remove — tap the orifice out from the small end of the adapter.
   B. To install — tap the orifice in from the large end of the adapter. The orifice is seated when a snap sound is heard.

**Adjusting Centrifugal Pump Output**

1. Open the bypass adjusting screw in the hydraulic motor three (**3**) turns.
2. Start the tractor and allow the hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.
3. Close and lock down the bypass adjusting screw in the hydraulic motor.
4. Prime the centrifugal pump with all valves open (See Installation Instructions and System Configuration Diagram).
5. Close the agitation line valve and the control valve; open the boom shut-off valve.
6. With the pump running, open the control valve until the pressure gauge indicates the desired spraying pressure.
7. Open the agitation line valve until sufficient agitation is observed. Then, if spray pressure drops, readjust the control valve to restore to the desired pressure.
8. If a sufficient boom pressure cannot be attained, install the #2 size orifice and repeat Steps **5** through **7**.
9. If a sufficient boom pressure still cannot be attained with the #2 size orifice, install the #3 size orifice and repeat Steps **5** through **7**.
10. If a sufficient boom pressure still cannot be attained with the #3 size orifice, remove the orifice and repeat Steps **5** through **7**.

**Closed Center (Load Sensing) — All Models**

Many tractors are being introduced with load sensing systems (also referred to as flow and pressure-compensated systems) which simplify system setup and eliminate many of the problems associated with using the wrong size pump motors on a given hydraulic system. Usually, any of Hypro's 9300HMC models may be used on this type of system, provided the hydraulic system produces sufficient oil flow for the hydraulic motor being used (Refer to the Pump Selection Guide).

This system maintains a constant flow of hydraulic oil for a given pressure drop. The flow is adjustable with a flow control valve installed in the hydraulic system (such as the Tortoise/Hare control on John Deere tractors). Because this system has adjustable flow, there is no need to bypass hydraulic oil as in an open center system, or to restrict the flow with orifices as in a closed center pressure-compensated system.

**Adjusting Centrifugal Pump Output**

1. Make sure the orifice from the pressure port adapter of the hydraulic motor has been removed (HM2C and HM4C models only).
2. Close and lock down the bypass adjusting screw in the hydraulic motor.
3. Set the tractor hydraulic flow control valve for minimum hydraulic oil flow to the remote outlet (Tortoise position).
4. Start the tractor and allow the hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.
5. Prime the centrifugal pump with all valves open (See the Installation Instructions and System Configuration Diagram).
6. Close the agitation line valve and open the control valve and the boom shut-off valve.
7. Slowly adjust the tractor hydraulic flow control valve until the desired boom pressure is attained.
8. Open the agitation line valve until sufficient agitation is observed. If spray pressure drops, readjust the tractor hydraulic flow control valve to restore it to the desired pressure.

**Flush Pump After Use**

One of the most common causes for faulty pump performance is gumming or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix this solution according to the manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

**To Prevent Corrosion**

After cleaning the pump as directed above, flush it with a permanent-type automobile antifreeze (Prestone®, Zerex®, etc.) containing a rust inhibitor. Use a 50% solution, half antifreeze and half water. A protective coating will remain on the inner pump surfaces. Save the excess antifreeze for the next application. Plug the ports to keep out air during storage. For short periods of idleness, noncorrosive liquids may be left in the pump, but air must be kept out. Plug the ports or the seal port connections.

# Repair Instructions

**Hypro Repair Tools:**
Tool Box No. 3010-0168 • 1/4" Allen Wrench No. 3020-0008
Support Bars (2) No. 3010-0064 • Port Brush No. 3010-0066
1/16" Allen Wrench No. 3020-0009 • Brush Holder No. 3010-0067 • Large Retaining Ring Pliers No. 3010-0084 • Small Retaining Ring Pliers No. 3010-0167

**Shop Tools Needed**
Bench Vice • Arbor Press • Air or Hand Drill • Small Knife
Metal Pipe - 1" dia. x 4" high (Bearing Seating Tool)
PVC Pipe - 3/4" dia. x 4" - 6" high (Seal Seating Tool)
12" Crescent Wrench • Two Flat Screwdrivers (approx. 10" long)
1/2", 9/16", 5/8" and 7/8" sockets • Hammer or Rubber Mallet
Small Screwdriver (recommended) • Large File (optional)
1/2" and 9/16" Box End Wrench • Lubricating Spray (WD-40 or LPS)
Small amount Hydraulic Oil • Cleaning Solvent Tank (recommended)

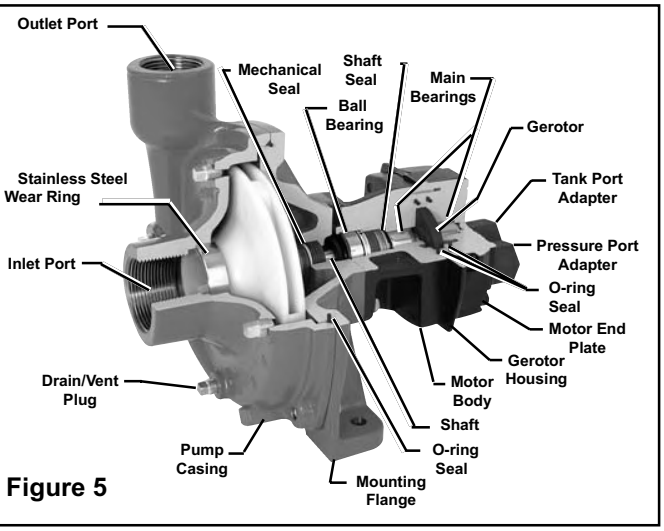


**Figure 5**

**Pump Housing Disassembly**

**NOTE**

**Instructions in italics describe procedures for the Series 9300P Polypropylene Centrifugal Pumps, when different than the cast iron pumps.**

1. Using a 9/16" box end wrench, remove the four Hex Head Bolts holding the Pump Casing to the Mounting Flange. (If necessary, tap Pump Casing Outlet Port with rubber mallet or hammer to separate.) [*Using a 1/2" wrench, remove the six bolts from the front. For the two bottom bolts securing the base, you will need to hold the two nuts with another 1/2" wrench. Also remove the 5/16" screw from the rear, near the outlet port.*]
2. To remove the Impeller Nut, insert a large screwdriver or file (at least 10" [254 mm] long) into Impeller Vanes to prevent Impeller from turning when loosening nut. Use a 5/8" socket wrench to remove the Impeller Nut by turning it counterclockwise (See Figure 6). [*Use 7/8" deep socket wrench to remove Plastic Seal Nut, then 9/16" deep socket to remove Metal Jam Nut and Washer.*]


**Figure 6**


**Figure 7**

3. Once nut [*and washer*] is removed, place a screwdriver on each side behind the Impeller and pry away from the Mounting Flange (See Figure 7). Remove Woodruff Key from the Shaft. Remove O-ring from the Mounting Flange.

**Pump Seal Removal**

1. Lightly lubricate the Shaft for easier removal of the Seal. Using two screwdrivers positioned opposite each other, pry the rotary portion of the Seal from the Shaft (See Figure 8).

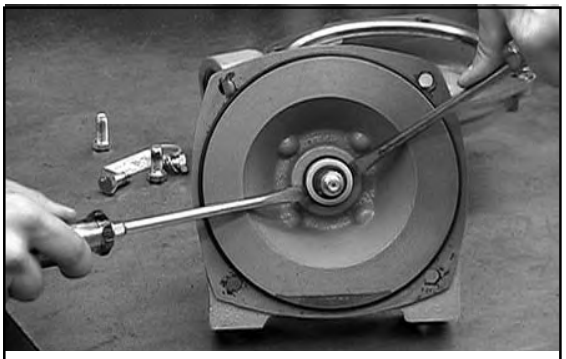


**Figure 8**

**NOTE**

**In the case of a severe pump seal leak, inspect the Shaft/Bearing Assembly in the hydraulic motor for possible contamination.**

2. Using a 1/2" box end wrench, remove the four bolts holding the Motor to the Mounting Flange. Remove Motor. [*Remove the Plastic Back Cover flange. Knock the Seal out from back with a hammer and screwdriver. Use a 1/2" socket wrench and 1/2" box end wrench to remove the Mounting Flange from the Hydraulic Motor.*]

3. Using a screwdriver and hammer, tap out the stationary portion of the Mechanical Seal from the motor side of the Mounting Flange. (If the motor is not removed, the seal can be pried out with a small screwdriver.)

**NOTE**

**The seal will be damaged by removal in this manner. A new seal must be used when pump is reassembled.**

**Clean-Up Of Pump Housing**

1. Using a circular bottle-type wire brush with air or hand drill, clean the Outlet Port, Inlet Port and the sealing areas of the o-ring on the Pump Casing and Mounting Flange. Using the port brush, clean the seal cavity in the Mounting Flange. [*The last step should not be performed on the 9300P.*]
2. After wire brush cleaning, it is recommended that the Pump Casing and Mounting Flange be further cleaned in a solvent tank to remove rust and corrosion particles.

**Seal Replacement/Pump Housing Reassembly**

**NOTE**

**If the hydraulic motor requires repair, proceed to Disassembly and Repair of the Hydraulic Motor in the next column.**

1. Lubricate the seal cavity in the Mounting Flange with WD-40®, LPS or equivalent. Do not lubricate the shaft.
2. Install the stationary portion of the Mechanical Seal by sliding over the Shaft with the ceramic side out.

**NOTE**

**Make sure both the seal cavity and seal are clean and lubricated.**

3. To seat the seal in the seal cavity, use a piece of 3/4" PVC pipe 4" to 6" [*101.6 to 152.4 mm*] in length. Lubricate sealing surface on seal after it is seated. Do not lubricate the shaft.
4. To install the rotary portion of the mechanical seal, place it over the shaft with the carbon side facing in, and press against the stationary portion (See Figure 9).
5. Install rubber gasket 1700-0100 over shaft against rotary portion of seal.

**Figure 9**

**NOTE**

**On Models 9305C-HM3C-SP, 9505C-HM3C-BS and 9305C-HM3C, install the washer on the shaft prior to installing the impeller nut.**

**⚠ CAUTION**

**The threads of the Plastic Seal Nut are fine and can be easily cross threaded. To prevent cross threading, turn the Plastic Seal Nut counterclockwise until area of thread engagement is detected; then turn the Plastic Seal Nut clockwise until it is secure. Do not over tighten the Plastic Seal Nut.**

6. Insert a Woodruff Key into the Shaft key slot; then place the Impeller on the Shaft and align it with the Key and press against the Mechanical Seal Assembly. Apply a blue thread locking compound to the Impeller Nut, and using a 5/8" socket wrench and using a screwdriver to hold the Impeller, install the Impeller Nut. [*On polypropylene models, insert the Woodruff Key into the Shaft key slot. Place the Impeller on the Shaft and align it with the Key; then press against the Mechanical Seal Assembly. Place the Metal Seal Washer on the Shaft. Apply a drop of blue thread locking compound on the Impeller Nut and secure the Impeller to the Shaft as described previously.*]
7. Install the o-ring on the mounting flange. Replace the o-ring if worn or damaged.
8. Place the pump casing on the mounting flange, insert and tighten the bolts.

**Disassembly and Repair of the Hydraulic Motor**

**NOTE**

**The work area and motor should be as clean as possible to prevent contamination of parts.**

**Figure 10**

**Figure 10a**

1. Remove the Mounting Flange from the motor body and place Hydraulic Motor in vise.
2. Remove Tank Port Adapter and Pressure Port Adapter with large crescent wrench or 1-1/16" and 1-3/8" box end wrench (See Figure 10).
3. Using a 9/16" box end wrench, loosen the nut on the Bypass Adjusting Screw (See Figure 10a).
4. Using a small screwdriver, remove the Bypass Adjusting Screw from the Motor. (This will remove the Screw, Nut, Washer and Thread-Seal Gasket.)
5. Using a 1/4" Allen wrench, remove the Socket Head Cap Screws from the Motor End Plate (See Figure 10).
6. If Motor End Plate will not lift off easily, use a small screwdriver to carefully pry apart the boss portion of the End Plate and Gerotor Housing until free (See Figure 11). If Gerotor Housing will not lift off easily, carefully pry

apart the boss area between the Gerotor Housing and the Motor Body. (It may be necessary to alternate sides when prying apart Motor sections.)

**Figure 11**

7. Remove both parts of the Gerotor.
8. On HM3C models, remove the Woodruff Key from the Shaft. On HM1C, HM2C and HM4C models, remove the Roll Pin from the Shaft.
9. Remove the o-ring from the Motor End Plate and Body with a flat instrument such as a knife blade.
10. Inspect Motor End Plate, Body and Gerotor Housing for wear and/or gouging. If gouging has occurred in both the Motor End Plate and Body, the motor is not repairable. If gouging has occurred in the Motor End Plate, Body or Gerotor Housing, the part that is worn must be replaced. If Gerotor Housing is damaged, Gerotor parts must also be replaced.

**To Remove the Shaft Assembly from the Motor Body**

1. Remove the Slinger Ring from the Motor Shaft.

**⚠WARNING**

**Special attention should be exercised when working with retaining rings. Always wear safety goggles when working with spring or tension loaded fasteners or devices.**

2. Using the large retaining ring pliers, remove the Retaining Ring next to the Ball Bearing in the Motor Body.

**NOTE**

**If bearing is binding against the retaining ring so that it cannot easily be removed, place the motor body (threaded portion of the shaft up) on arbor press. Using a piece of un-threaded metal pipe (1" dia. x 4" high [254. mm x 101.6 mm high]), slide over the shaft and gently press down with the arbor press just enough to relieve the pressure on the retaining ring.**

**Figure 12**

3. Place body in position on arbor press. Threaded portion of the Shaft should be inside the fixture. Press out shaft assembly with arbor press (See Figure 12).

**Hydraulic Motor Shaft Disassembly and Repair**

1. Remove Large Retaining Ring from Shaft with a screwdriver. Remove Thrust Bearing Assembly from Shaft (includes the Thrust Bearing and two Thrust Bearing Races) and the Seal Spacer.
2. Remove the Small Retaining Ring next to the Shaft Ball Bearing.
3. To remove the Bearing from the shaft, place the shaft (threaded end up) in the arbor press fixture. Place the two support bars provided in the repair kit opposite each other and between the seal on the shaft and the arbor press fixture. Using an arbor press, press the shaft through the Bearing, Seal Spacer and Seal (See Figure 13).
4. Inspect the sealing area of the shaft for wear. Inspect other Shaft Assembly Components for wear and replace if necessary.

**Figure 13**

5. While motor is completely disassembled, clean all parts in a solvent bath.

**Build Shaft Sub-Assembly**

1. To assemble the seal cartridge, remove the old seal from the cartridge by pressing it out. The cartridge is reused by assembling the new seal into cartridge, ensuring the new seal is pressed in with the lip seal on the opposite side as shown in Fig.1.

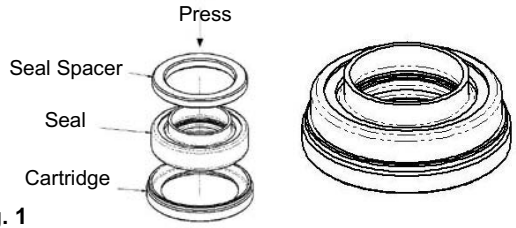



**Fig. 1**

**Important:** To prevent damage to the seal lip extending out, use seal spacer as shown to guard lip during assembly.

2. Install the large retaining ring onto large diameter end of shaft.
3. From the small, threaded end of the shaft, install the following parts in this order: thrust bearing race, thrust bearing, 2nd thrust bearing race.

**Note:** The thrust bearing and races should not be reused if they are showing any signs of wear.

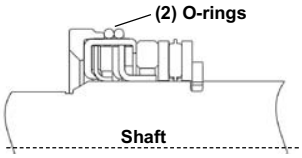
4. Install new type seal spacer (looks like a thick washer, approx .130 inch thick).
5. Before installing the new seal, its lip must be expanded to fit on the shaft. With the seal lip facing out, slide the seal over the threaded end of the shaft and gently push the seal onto the raised area of the shaft. Do not push the seal past the large retaining ring groove on the shaft.

6. Once the seal has been expanded, remove the seal from the shaft.
7. Install seal cartridge assembly: With seal lip facing the large end of the shaft, slide the seal cartridge assembly over the threaded end of the shaft and gently push into the raised area of the shaft. Align the seal lip to enter the center diameter of the seal spacer and push until seal body touches seal spacer.

**Important:** If the seal lip is longer than the seal spacer's width, please stop the assembly and review parts being used.

8. Assemble two o-rings on the outside body of the new seal cartridge assembly as shown in Fig 2. Install o-rings one at a time and do not roll over each other.

**Fig. 2**




9. Finished shaft sub-assembly should look like this:

10. Do not press, but place the shaft sub-assembly into the motor body with threaded end of shaft up. Lubricate the two o-rings with hydraulic or mineral oil before assembling.

**Figure 14**

### Install Shaft Sub-Assembly Into Motor Body

**Important:** Make sure the surface edge of the arbor press fixture is smooth and clean. An unthreaded piece of pipe (1" x 4" high) is needed to support the outer race of the seal cartridge sub-assembly and outer race of the ball bearing during assembly. Place this pipe over the shaft threaded end for assembly of the following steps.

1. Place the body on a support fixture in the arbor press. Using an unthreaded piece of pipe (1" dia. x 4" high), press the shaft subassembly down into the body until it bottoms out. This is a light press fit and should be done slow and easy.
2. Install the new ball bearing onto the threaded end of the shaft. Press down using the 1" x 4" pipe until the retaining ring can be installed in its groove in the bearing core of the motor body. Install the retaining ring.

**Figure 15**

3. Turn the motor body assembly over (threaded shaft end down) on the arbor press. Press the shaft down into its "final position" until the small retaining ring can be installed in the shaft next to the ball bearing.
4. Install small retaining ring on shaft.
5. Check shaft rotation at this point. It should rotate smoothly with only slight resistance from the seal lip pressure on the shaft. If you feel any gritty or sticking movement, return assembly to the arbor press and lightly press on the threaded end of the shaft to relieve press fit compression on the thrust bearing. **Note:** Don't over do this press. The objective is to move the small outer retaining ring installed in the previous step back to " touching only" the ball bearing inner race.

**Important:** If gritty or sticky movement persists, it's likely due to re-used parts or the body needle bearing is in need of replacement.

### Reassembly of Remaining Hydraulic Motor Parts

1. Place Motor Body in a vise with large end of shaft facing up.
2. Install the o-ring in the body.
3. Install the Roll Pin on the shaft. Place the Inner Gear of the Gerotor onto the shaft making sure Gerotor slot lines up with the key in the shaft.

**The Roll Pin can slide up behind the inner gear of the gerotor when the gear is installed. Make sure the key is visible in the slot after the gear is in place.**

4. Install the outer portion of the Gerotor, making sure the Gerotor is centered within the o-ring groove on the body.
5. Install the Gerotor Housing, making sure the pins in the Gerotor Housing line up with their respective holes in the body.

6. Lightly lubricate the area between the Inner and Outer Gerotor, the Outer Gerotor, and Gerotor Housing with hydraulic oil or mineral oil.

**Special attention should be exercised when working with retaining rings. Always wear safety goggles when working with spring or tension-loaded fasteners or devices.**

7. Install o-ring on the motor end plate.
8. Place end plate on gerotor housing, making sure holes in end plate line up with pins in the gerotor housing.
9. Install four Socket Head Cap Screws in Motor End Plate, and using a 1/4" Allen wrench, tighten Cap Screws alternately and evenly in a crisscross pattern to approximately 15 foot pounds [ 20 Nm] of torque.
10. Install the Thread Seal Gasket on the Bypass Adjusting Screw. Put the Gasket on from the slotted end and turn until four threads on the screw are showing. Install the Washer and the Nut. Install Bypass Adjusting Screw in the motor end plate.
    A. For closed center hydraulic systems, turn the Bypass Adjusting Screw in until it bottoms out in the End Plate. Tighten nut down with 9/16" box end wrench.
    B. For open center hydraulic systems, turn the Bypass Adjusting Screw in until it bottoms out in the End Plate; then turn back out 1½ full turns. Holding the Bypass Adjusting Screw with a screwdriver, tighten Nut. (Motor will then have to be readjusted to tractor system.)
11. Replace o-ring on both port adapters.
12. Install Pressure Port Adapter and Tank Port Adapter back onto the motor. (For ease of installation, tighten the Pressure Port Adapter first, then the Tank Port Adapter.)
13. Remove Hydraulic Motor from the vise. Turn shaft by hand to check for binding.
14. Install Slinger Ring over Motor Shaft.
15. Install Motor into Pump Mounting Flange. Insert four Hex Head Bolts; then alternately and evenly tighten them. [*For polypropylene models, secure the Hydraulic Motor to the Mounting Flange with four Hex Head Cap Screws and Nuts. The nuts should be visible when the assembly is complete*.]

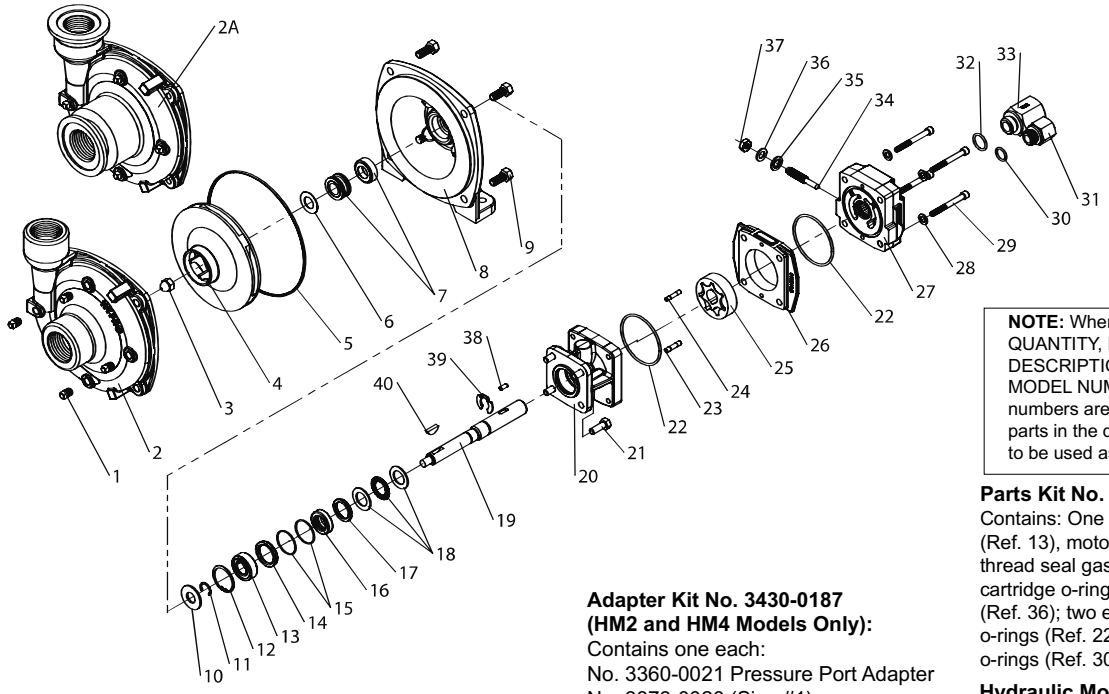
## Troubleshooting

If the proper Hydraulic Pump Unit has been selected according to Hypro recommendations, and the unit has been correctly plumbed into the hydraulic system, operation should be quite satisfactory. If spraying performance is unsatisfactory or hydraulic system heat is excessive etc., check the following troubleshooting guide for possible problems and solutions.

### Troubleshooting Guide

| Symptom | Probable Cause(s) | | Corrective Action(s) |
|---|---|---|---|
| Low discharge | Pump not primed. | — | Remove top most vent plug from face of pump and run pump to expel trapped air (see Installation Instructions). |
| | Air leaks in inlet line. | — | Check and reseal inlet fittings. |
| | Blocked or clogged line strainer. | — | Inspect strainer and clear any debris from screen. |
| | Impeller plugged. | — | Inspect and clear obstruction. |
| | Undersize inlet line or collapsed hose. | — | Suction line should be the same diameter as inlet port of pump or larger. |
| | Improperly sized hydraulic motor. | — | Refer to Pump Selection Guide to determine proper size hydraulic motor for your hydraulic system. |
| | Bypass Adjustment Screw not set properly. | — | Adjust bypass screw on side of hydraulic motor in until the desired output is attained. |
| | Eye of impeller rubbing on volute. | — | Remove volute (front cover) and inspect the impeller. If wear detected, sand the impeller eye O.D. with emery cloth. |
| Hydraulic system overheating | Improper hydraulic motor size. | — | Refer to Pump Selection Guide to determine proper size for your hydraulic system. |
| | Bypass Adjustment Screw set to bypass too much oil. | — | Close adjustment screw on side of hydraulic motor to lessen the amount of oil being bypassed. |
| | Improper metering orifice installed in pressure port. | — | Install proper size orifice. Refer to Installation section for proper sizing. |
| | Insufficient hydraulic hose size. | — | Check hydraulic hose size. Hose should be at least 1/2" [12.7 mm] on the pressure port and 3/4” [19.05mm] on the tank port. |

## All 9303C and 9303S Series Pumps




**NOTE:** When ordering parts, give QUANTITY, PART NUMBER, DESCRIPTION, and COMPLETE MODEL NUMBER. Reference numbers are used ONLY to identify parts in the drawing and are NOT to be used as order numbers.

**Parts Kit No. 3430-0748**
Contains: One each ball bearing (Ref. 13), motor shaft seal (Ref. 16), thread seal gasket (Ref. 35), two cartridge o-rings (Ref. 15) and washer (Ref. 36); two each motor housing o-rings (Ref. 22), and port adapter o-rings (Ref. 30 & 32).

**Hydraulic Motor Part Nos.**
2500-0081C (HM1C Models)
2500-0082C (HM2C Models)
2500-0083C (HM3C Models)
2500-0084C (HM4C Models)
2500-0085C (HM5C Models)

**Repair Parts Kit No. 3430-0332**
Contains: One o-ring (Ref. 5), one rubber gasket (Ref. 6), and one mechanical seal (Ref. 7).

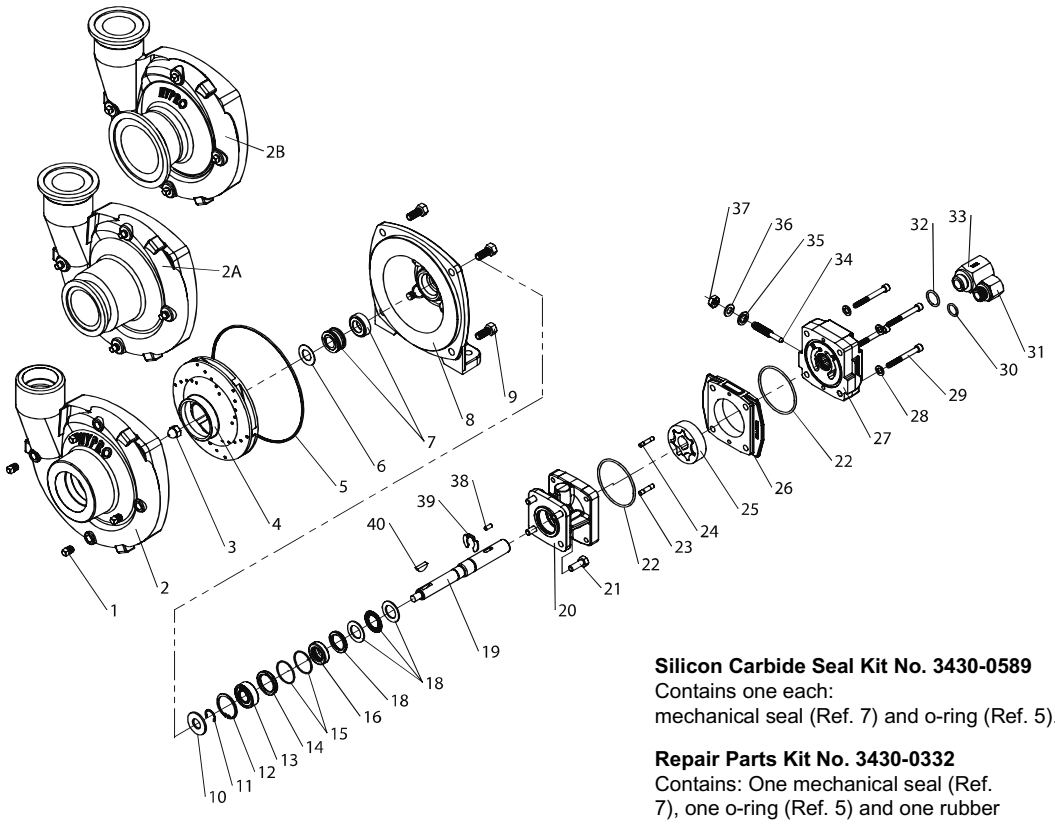
**Silicon Seal Kit No. 3430-0589**
Contains one each:
1720-0083 o-ring (Ref. 5)
and one mechanical seal (silicon carbide) (Ref.7).

**Adapter Kit No. 3430-0187 (HM2 and HM4 Models Only):**
Contains one each:
No. 3360-0021 Pressure Port Adapter
No. 3373-0020 (Size #1)
No. 3373-0021 (Size #2)
No. 3373-0022 (Size #3).
No. 1720-0108 Adapter O-ring and
No. 1720-0105 Orifice O-ring (Qty 3).

| Ref. No. | Qty. Req'd. | Part No. | Description |
|---|---|---|---|
| 1 | 4 | 2406-0007 | Drain/Vent Plug (9303C) |
| 1 | 4 | 2406-0016 | Drain/Vent Plug (9303S) |
| 2 | 1 | 0150-9000C | Pump Casing (Model 9303C) |
| 2 | 1 | 0150-9000S | Pump Casing (Model 9303S) |
| 2A | 1 | 0153-9000C | Pump Casing (Universal Flange Model C-U) |
| 3 | 1 | 2253-0002 | Impeller Nut (9303C) |
| 3 | 1 | 2253-0006 | Impeller Nut (9303S) |
| 4 | 1 | 0401-9100P | Impeller (Nylon Std. 9303C) |
| 4 | 1 | 0402-9100P | Impeller (Polypropylene Optional) (Std 9303S) |
| 5 | 1 | 1720-0083 | O-ring |
| 6 | 1 | 1700-0100 | Gasket |
| 7 | 1 | 2120-0009 | Mechanical Seal (Viton/Ceramic) (Std 9303C) |
| 7 | 1 | 3430-0589 | Mechanical Seal (Silicon Carbide) (Std 9303S) |
| 8 | 1 | 0750-9300C | Mounting Flange (9303C) |
| 8 | 1 | 0756-9300S | Mounting Flange (9303S) |
| 9 | 4 | 2210-0020 | Hex Head Cap Screw (9303C) |
| 9 | 4 | 2210-0125 | Hex Head Cap Screw (9303S) |
| 10 | 1 | 1410-0056 | Slinger Ring |
| 11 | 1 | 1810-0014 | Snap Ring |
| 12 | 1 | 1820-0013 | Retaining Ring |
| 13 | 1 | 2000-0010 | Ball Bearing |
| 14 | 1 | 1410-0131 | Cartridge, Front |
| 15 | 2 | 1720-0268 | O-ring |
| 16 | 1 | 2104-0010 | Lip Seal |
| 17 | 1 | 1410-0130 | Seal Spacer |
| 18 | 1 | 2029-0014 | Thrust Bearing Assembly |
| 19 | 1 | 0531-2500 | Shaft (HM2C/HM4C) |
| 19 | 1 | 0533-2500 | Shaft (HM1C/HM5C) |
| 19 | 1 | 0536-2500 | Shaft (HM3C) |
| 20 | 1 | 0150-2500C | Motor Body (includes needle bearing) |
| 21 | 4 | 2210-0005 | Hex Head Cap Screw |
| 22 | 2 | 1720-0110 | O-ring |
| 23 | 1 | 1600-0045 | Dowel Pin (HM2C / HM4C) |
| 23 | 1 | 1600-0044 | Dowel Pin (HM1C/HM5C) |
| 23 | 1 | 1600-0052 | Dowel Pin (HM3C) |

| Ref. No. | Qty. Req'd. | Part No. | Description |
|---|---|---|---|
| 24 | 1 | 1600-0042 | Dowel Pin (HM2C / HM4C) |
| 24 | 1 | 1600-0037 | Dowel Pin (HM1C/HM5C) |
| 24 | 1 | 1600-0068 | Dowel Pin (HM3C) |
| 25 | 1 | 3900-0022 | Gerotor (HM1C) |
| 25 | 1 | 3900-0023 | Gerotor (HM2C) |
| 25 | 1 | 3900-0024 | Gerotor (HM3C) |
| 25 | 1 | 3900-0025 | Gerotor (HM4C) |
| 25 | 1 | 3900-0048 | Gerotor (HM5C) |
| 26 | 1 | 0701-2500C1 | Gerotor Housing (HM2C Models) 1/4" wide |
| 26 | 1 | 0700-2500C1 | Gerotor Housing (HM1C Models) 1/2" wide |
| 26 | 1 | 0703-2500C1 | Gerotor Housing (HM4C Models) 5/16" wide |
| 26 | 1 | 0702-2500C1 | Gerotor Housing (HM3C Models) 1" wide |
| 26 | 1 | 0704-2500C1 | Gerotor Housing (HM5C Models) 5/8" wide |
| 27 | 1 | 0254-2500C2 | Motor End Plate (includes needle bearing) |
| 28 | 4 | 2270-0039 | Washer |
| 29 | 4 | 2220-0045 | Cap Screw (HM2C / HM4C Models) |
| 29 | 4 | 2220-0021 | Cap Screw (HM1C Models) |
| 29 | 4 | 2220-0044 | Cap Screw (HM3C Models) |
| 29 | 4 | 2220-0032 | Cap Screw (HM5C Models) |
| 30 | 1 | 1720-0108 | O-ring |
| 31 | 1 | 3360-0021A | Pressure Port Adapter (includes o-ring) |
| 32 | 1 | 1720-0262 | O-ring |
| 33 | 1 | 3320-0051A | Tank Port Adapter (includes o-ring) |
| 34 | 1 | 3220-0029 | Bypass Adjusting Screw |
| 35 | 1 | 1700-0047 | Gasket |
| 36 | 1 | 2270-0027 | Washer |
| 37 | 1 | 2250-0038 | Lock Nut |
| 38 | 1 | 1610-0032 | Roll Pin (HM2C / HM4C) |
| 38 | 1 | 1610-0031 | Roll Pin (HM1C / HM5C) |
| 38 | 1 | 1610-0055 | Roll Pin (HM3C) |
| 39 | 1 | 1810-0026 | Snap Ring |
| 40 | 1 | 1610-0012 | Woodruff Key (9303C) |
| 40 | 1 | 04432 | Woodruff Key (9303S) |

## All 9306C Series




**NOTE:** When ordering parts, give QUANTITY, PART NUMBER, DESCRIPTION, and COMPLETE MODEL NUMBER. Reference numbers are used ONLY to identify parts in the drawing and are NOT to be used as order numbers.

**Parts Kit No. 3430-0748**
Contains: One each ball bearing (Ref. 13), motor shaft seal (Ref. 16), thread seal gasket (Ref. 35), two cartridge o-rings (Ref. 15) and washer (Ref. 36); two each motor housing o-rings (Ref. 22), and port adapter o-rings (Ref. 30 & 32).

**Silicon Carbide Seal Kit No. 3430-0589**
Contains one each:
mechanical seal (Ref. 7) and o-ring (Ref. 5).

**Repair Parts Kit No. 3430-0332**
Contains: One mechanical seal (Ref. 7), one o-ring (Ref. 5) and one rubber gasket (Ref. 6).

**Hydraulic Motor Part Nos.**
2500-0081C (HM1C Models)
2500-0083C (HM3C Models)
2500-0085C (HM5C Models)

| Ref. No. | Qty. Req'd. | Part No. | Description |
|---|---|---|---|
| 1 | 4 | 2406-0007 | Drain/Vent Plug (9306C) |
| 1 | 4 | 2406-0016 | Drain/Vent Plug (9306S) |
| 2 | 1 | 0154-9200C1 | Pump Casing (9306C) |
| 2 | 1 | 0154-9200S1 | Pump Casing (9306S) |
| 2A | 1 | 0157-9200C | Pump Casing (Universal Flange 220x200) |
| 2B | 1 | 0158-9200C | Pump Casing (Universal Flange 300x220 Cast) |
| 2B | 1 | 0158-9200S | Pump Casing (Universal Flange 300x220 S.S.) |
| 3 | 1 | 2253-0002 | Impeller Nut (9306C) |
| 3 | 1 | 2253-0006 | Impeller Nut (9306S) |
| 4 | 1 | 0401-9200P2 | Impeller (Nylon Std. 9306C) |
| 4 | 1 | 0405-9100P2 | Impeller (Polypropylene Optional) (Std. 9306S) |
| 4 | 1 | 0407-9306P | Impeller (GTX Optional) |
| 5 | 1 | 1720-0083 | O-ring |
| 6 | 1 | 1700-0100 | Gasket |
| 7 | 1 | 2120-0009 | Mechanical Seal (Viton/Ceramic) (Std. 9306C) |
| 7 | 1 | 3430-0589 | Mechanical Seal (Silicon Carbide) (Std. 9306S) |
| 8 | 1 | 0750-9300C2 | Mounting Flange (9306C) |
| 8 | 1 | 0756-9300S | Mounting Flange (9306S) |
| 9 | 4 | 2210-0020 | Hex Head Cap Screw (9306C) |
| 9 | 4 | 2210-0125 | Hex Head Cap Screw (9306S) |
| 10 | 1 | 1410-0056 | Slinger Ring |
| 11 | 1 | 1810-0014 | Snap Ring |
| 12 | 1 | 1820-0013 | Retaining Ring |
| 13 | 1 | 2000-0010 | Ball Bearing |
| 14 | 1 | 1410-0131 | Cartridge, Front |
| 15 | 2 | 1720-0268 | O-ring |
| 16 | 1 | 2104-0010 | Lip Seal |
| 17 | 1 | 1410-0130 | Seal Spacer |
| 18 | 1 | 2029-0014 | Thrust Bearing Assembly |
| 19 | 1 | 0531-2500 | Shaft (HM2C/HM4C) |
| 19 | 1 | 0533-2500 | Shaft (HM1C/HM5C) |
| 19 | 1 | 0536-2500 | Shaft (HM3C) |
| 20 | 1 | 0150-2500C | Motor Body (includes needle bearing) |
| 21 | 4 | 2210-0005 | Hex Head Cap Screw |
| 22 | 2 | 1720-0110 | O-ring |

| Ref. No. | Qty. Req'd. | Part No. | Description |
|---|---|---|---|
| 23 | 1 | 1600-0045 | Dowel Pin (HM2C / HM4C) |
| 23 | 1 | 1600-0044 | Dowel Pin (HM1C/HM5C) |
| 23 | 1 | 1600-0052 | Dowel Pin (HM3C) |
| 24 | 1 | 1600-0042 | Dowel Pin (HM2C / HM4C) |
| 24 | 1 | 1600-0037 | Dowel Pin (HM1C/HM5C) |
| 24 | 1 | 1600-0068 | Dowel Pin (HM3C) |
| 25 | 1 | 3900-0022 | Gerotor (HM1C) |
| 25 | 1 | 3900-0023 | Gerotor (HM2C) |
| 25 | 1 | 3900-0024 | Gerotor (HM3C) |
| 25 | 1 | 3900-0025 | Gerotor (HM4C) |
| 25 | 1 | 3900-0048 | Gerotor (HM5C) |
| 26 | 1 | 0701-2500C1 | Gerotor Housing (HM2C Models) 1/4" wide |
| 26 | 1 | 0700-2500C1 | Gerotor Housing (HM1C Models) 1/2" wide |
| 26 | 1 | 0703-2500C1 | Gerotor Housing (HM4C Models) 5/16" wide |
| 26 | 1 | 0702-2500C1 | Gerotor Housing (HM3C Models) 1" wide |
| 26 | 1 | 0704-2500C1 | Gerotor Housing (HM5C Models) 5/8" wide |
| 27 | 1 | 0254-2500C2 | Motor End Plate (includes needle bearing) |
| 28 | 4 | 2270-0039 | Washer |
| 29 | 4 | 2220-0045 | Cap Screw (HM2C / HM4C Models) |
| 29 | 4 | 2220-0021 | Cap Screw (HM1C Models) |
| 29 | 4 | 2220-0044 | Cap Screw (HM3C Models) |
| 29 | 4 | 2220-0032 | Cap Screw (HM5C Models) |
| 30 | 1 | 1720-0108 | O-ring |
| 31 | 1 | 3360-0021A | Pressure Port Adapter (includes o-ring) |
| 32 | 1 | 1720-0262 | O-ring |
| 33 | 1 | 3320-0051A | Tank Port Adapter (includes o-ring) |
| 34 | 1 | 3220-0029 | Bypass Adjusting Screw |
| 35 | 1 | 1700-0047 | Gasket |
| 36 | 1 | 2270-0027 | Washer |
| 37 | 1 | 2250-0038 | Lock Nut |
| 38 | 1 | 1610-0032 | Roll Pin (HM2C / HM4C) |
| 38 | 1 | 1610-0031 | Roll Pin (HM1C / HM5C) |
| 38 | 1 | 1610-0055 | Roll Pin (HM3C) |
| 39 | 1 | 1810-0026 | Snap Ring |
| 40 | 1 | 1610-0012 | Woodruff Key (9306C) |
| 40 | 1 | 04432 | Woodruff Key (9306S) |

# 801 FLOW METER

## INSTALLATION, SPECIFICATION, AND WARRANTY INFORMATION

*Please read before installing this equipment. Failure to do so may void your warranty.*

### Installation

The 801 flow meter gives the best accuracy when there is a smooth, unobstructed flow through it. To minimize turbulance, there should be at least twelve inches of straight plumbing upstream from the flow meter and at least 6 inches of straight plumbing downstream from the flow meter. Mount the flow meter in a location that physically protects it from damage and allows liquid to drain away after the sprayer is flushed and secured at the end of the operating day. A straight, vertical section of the main boom supply line is the ideal location for the flow meter.

**Keep the flow meter from lying in a low section of the sprayer plumbing.** This is particularly important in cold weather when water might freeze in the flow meter and cause damage to the unit. It is also important when applying chemical suspensions which may settle out and stall the flow meter turbine if they cannot drain away.

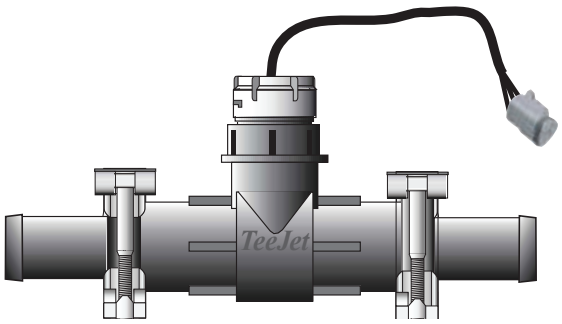
Before installing the flow meter insert, make sure there are no obstructions in the insert cavity. Clearance at the bottom of the cavity is very close and over tightening or compressing of foreign material in the cavity can cause damage to the flow meter body. Turn the insert in until it is hand tight.

Prior to each day's spraying, the flow meter should be inspected to ensure there are no leaks around the attachment fittings. At the end of the day, care should be taken to thoroughly flush the flow meter with clean water.

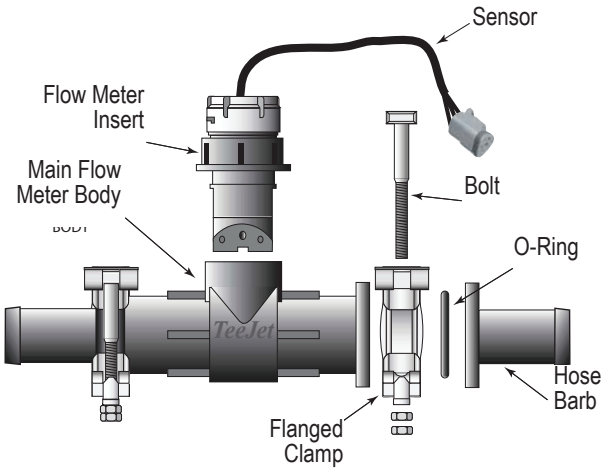
***Make sure no water or sediment is trapped in the flow meter***

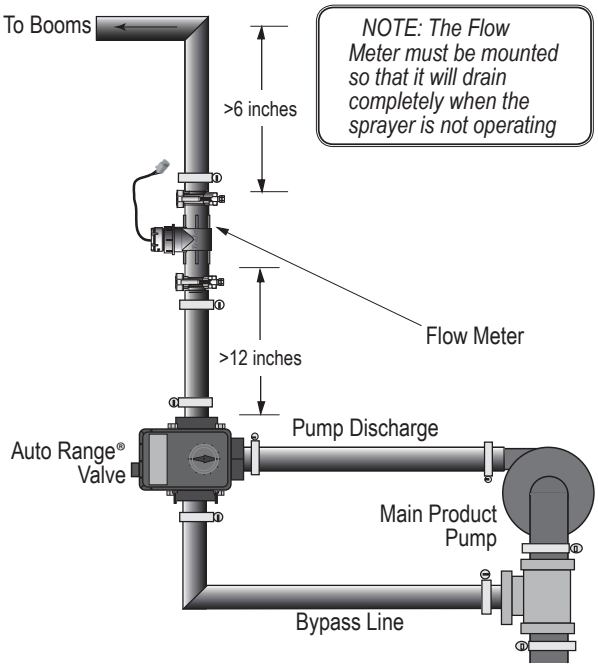
The impeller type flow meters supplied by TeeJet Technologies are inherently rugged. However, continued use over time will eventually wear the internal bearings and shafts until the meter becomes inaccurate. Replacement kits are available to repair the flow meters. Contact your TeeJet Technologies dealer for these parts.

801 FLOW METER




| Housing, Deutsch 3 Pos/Skts | | |
|---|---|---|
| Pin Out | Color | Function |
| A | Red | +12V |
| B | White | Signal |
| C | Black | Ground |



## Specifications

The 801 Flow Meter meets the following specifications:

| Measuring Data | |
|---|---|
| Linearity at recommened flow range | +/- 3.0% |
| Flow Range | 2-60 GPM (7.5-225 LPM)<br>(3-30 GPM recommened for max life) |
| Maximum Working Pressure | 300 PSI (20.7 Bar) |
| Pressure Drop | 10 GPM (37.85 LPM) - NA<br>20 GPM (75.71 LPM) - 3 PSI (0.21 Bar)<br>30 GPM (113.56 LPM) - 7.5 PSI (0.52 Bar)<br>40 GPM (151.42 LPM) - 12.5 PSI (0.86 Bar)<br>50 GPM (189.27 LPM) - 19.5 PSI (1.34 Bar)<br>60 GPM (227.12 LPM) - 29 PSI (2.0 Bar) |
| *Measuring range is partly dependent on the selected type and size of connectors.*<br>***The flow meter is bi-directional for mounting purposes.*** | |

| Electrical Data | |
|---|---|
| Sensor | Open collector NPN<br>50% square wave<br>10-300 Hz in operating range |
| Calibration Number (Approximate) | TeeJet Controller 82 pulses/liter, Mid-Tech 310 pulses/gallon |
| LED Indicators | Green-Power<br>Orange-Signal |

| Measuring Data | |
|---|---|
| Body & Insert | 30% glass filled polypropylene |
| Shaft | 410 hardened stainless steel |
| Turbine & Bearing Support | 20% talc filled polypropylene |
| Bearing | Sapphire |
| Bearing Housing | 303 stainless steel |

## Warranty

The warranty on this equipment may be affected for the following reasons:

- Improper installation
- Obvious abuse
- Lack of, or improper maintenance
- Employed in a manner inconsistent with its intended use
- Used with chemicals that are incompatible with the materials which this product is made of

(See “Warranty and Limitations” statement in your controller manual for other limitations)

This flow meter is manufactured using some or all of the following materials:

- 303 Stainless Steel
- 410 Stainless Steel
- Polypropylene

TeeJet Technologies does not recommend metering any product that reacts with these materials and damage resulting from the use of such products will not be covered under the warranty. Please contact your chemical supplier to verify that the chemicals you are using are compatible.

If you have any questions about installation or use, refer to the installation section of your manual or call your TeeJet Technologies dealer.

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