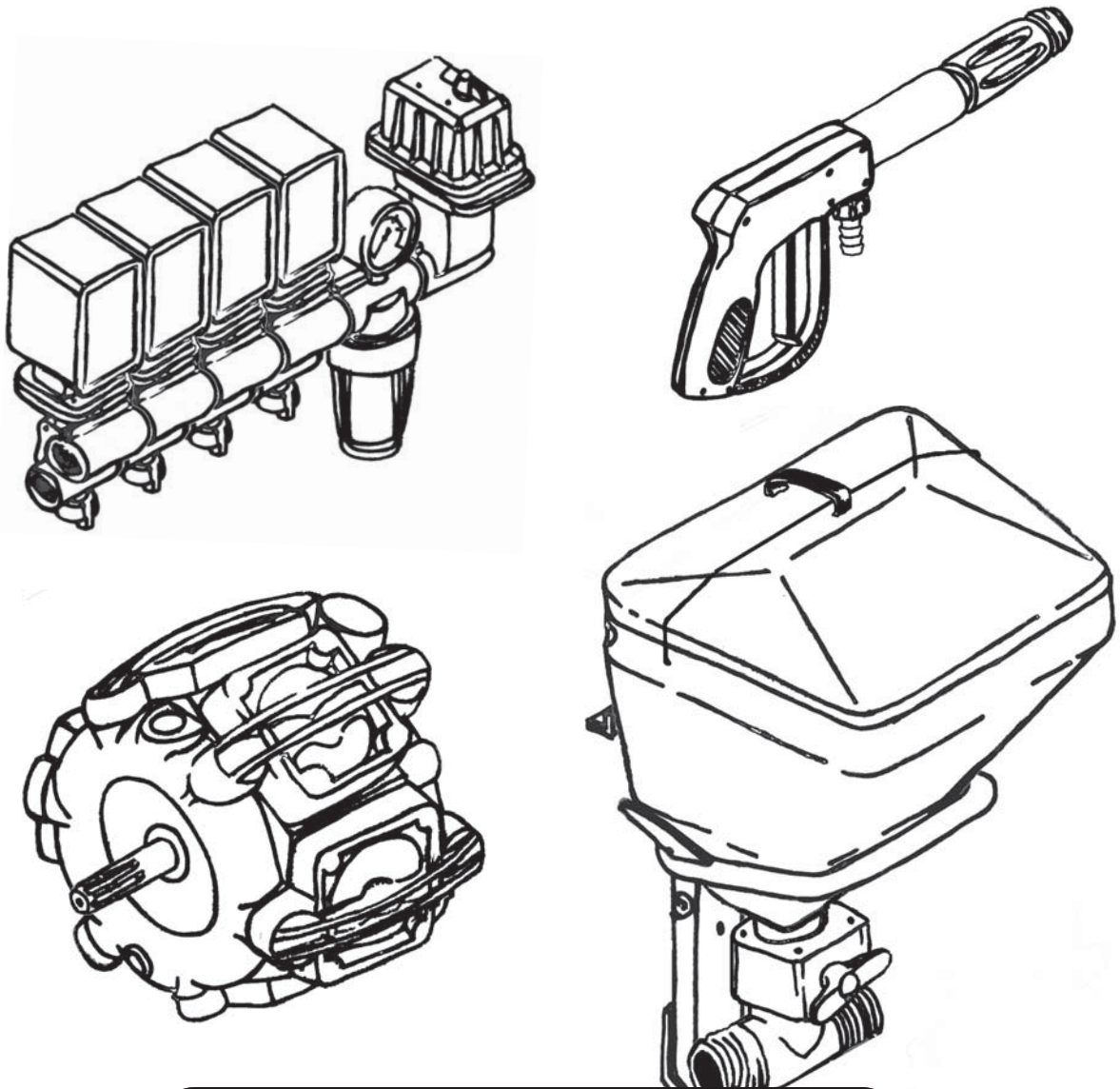


# HARDI® SPRAYERS



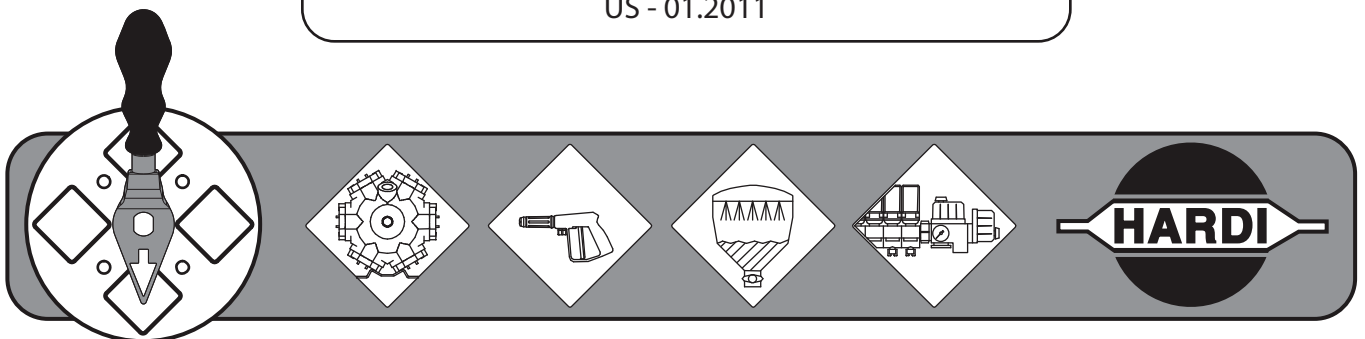
## RANGER

### 550

#### Instruction book

67022203 - Version 1.00

US - 01.2011





**RANGER**

**550**

**Instruction book**

67022203 - Version 1.00

US - 01.2011



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## Welcome letter

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Dear New HARDI® Owner,

Thank you for purchasing your new HARDI® product and welcome to the ever-increasing family of proud HARDI® owners.

HARDI® is the leading sprayer company in offering growers strong, reliable products made for the widest range of applications worldwide. Quality, reliability, and resale value make the HARDI® product line the preferred product line of customers both in North America as well as worldwide. Our guiding principle is to provide the highest level of customer satisfaction and long term value in the marketplace today. We have developed a very high level of customer loyalty in the marketplace which we are very proud of and strive every day to maintain and to continue to grow.

HARDI® is your specialist in spraying and we spend all of our time and keep all of our focus on spraying. We do not share our resources between other types of products or compromise on anything in providing the best quality sprayers to the market today. We can provide the latest in technology with our products if desired, or allow them to operate with the technology that you already use on other products in most cases. You get to decide that, and what best suits your needs. We feel that you, our customer, are the best suited to answer that question for your operation. Either way, you decide, and we will try and help make it happen for you.

Our broad spectrum of product offerings, from the ruggedly simple models we build to our highly sophisticated models, the built-in HARDI® strength and reliability ensures a low cost of ownership. HARDI® sprayers are all based on a functional design concept of being as simple to operate as possible and to meet our customers' requirements for all their application needs.

Please take the time to thoroughly read the Operator's Manual before using your equipment. You will find many helpful hints as well as important safety and operation information.

Some of the features on your HARDI® sprayer were suggested by growers. There is no substitute for "on farm" experience and we invite your comments and suggestions. If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer or service personnel for further explanation before using the equipment.

**For Product, Service or Warranty Information please contact your local HARDI® dealer.**

- Please use the HARDI® Customer Service number: 1-866-770-7063

- Or send your email to [CUSTSERV@hardi-us.com](mailto:CUSTSERV@hardi-us.com)

**HARDI® NORTH AMERICA INC.**

**Visit us online at: [www.hardi-us.com](http://www.hardi-us.com)**

1500 West 76th St.  
Davenport, Iowa 52806  
Phone: (563) 386-1730  
Fax: (563) 386-1280

Sincerely,

A handwritten signature in black ink, appearing to read "Wayne Buchberger". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Wayne Buchberger

President



### Operator safety



This symbol means DANGER. Be very alert as your safety is involved!



This symbol means WARNING. Be alert as your safety can be involved!



This symbol means ATTENTION. This guides to better, easier and safer operation of your sprayer!

---

### General info

Note the following recommended precautions and safe operating practices.



Read and understand this instruction book before using the equipment. It is equally important that other operators of this equipment read and understand this book.



Local law may demand that the operator is certified to use spray equipment. Adhere to the law.



Wear protective clothing.



Rinse and wash equipment after use and before servicing.



Never service or repair the equipment while it is operating.



Always replace all safety devices or shields immediately after servicing.



Do not eat, drink or smoke while spraying or working with contaminated equipment.



Wash and change clothes after spraying.  
Wash tools if they have become contaminated.



In case of poisoning, immediately seek medical advice. Remember to identify chemicals used.



Keep children away from the equipment.



If any portion of this instruction book remains unclear after reading it, contact your HARDI® dealer for further explanation before using the equipment.



Be careful not to hit people or surroundings when maneuvering the sprayer, especially when backing.



Slow down when driving in uneven terrain, as the machine might be in risk of turning over.



Pressure test with clean water prior to filling with chemicals.



Disconnect electrical power before servicing and depressurize equipment after use and before servicing.



Do not attempt to enter the tank.



Do not go under any part of the sprayer unless it is secured. The boom is secure when placed in the transport brackets.



If an arc welder is used on the equipment or anything connected to the equipment, disconnect power leads before welding. Remove all inflammable or explosive material from the area.

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## 2 - Safety notes

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### Local poison information center



If you live anywhere in the United States, the following toll free number will connect you to your Local Poison Information Center.

PHONE NO. 1 - 800 - 222 - 1222



If you live outside the United States, find the number for the poison control center in your phone book and write it in the space below:

PHONE NO. \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_



Keep a list, in the space provided below, of all the chemicals that you have in use.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

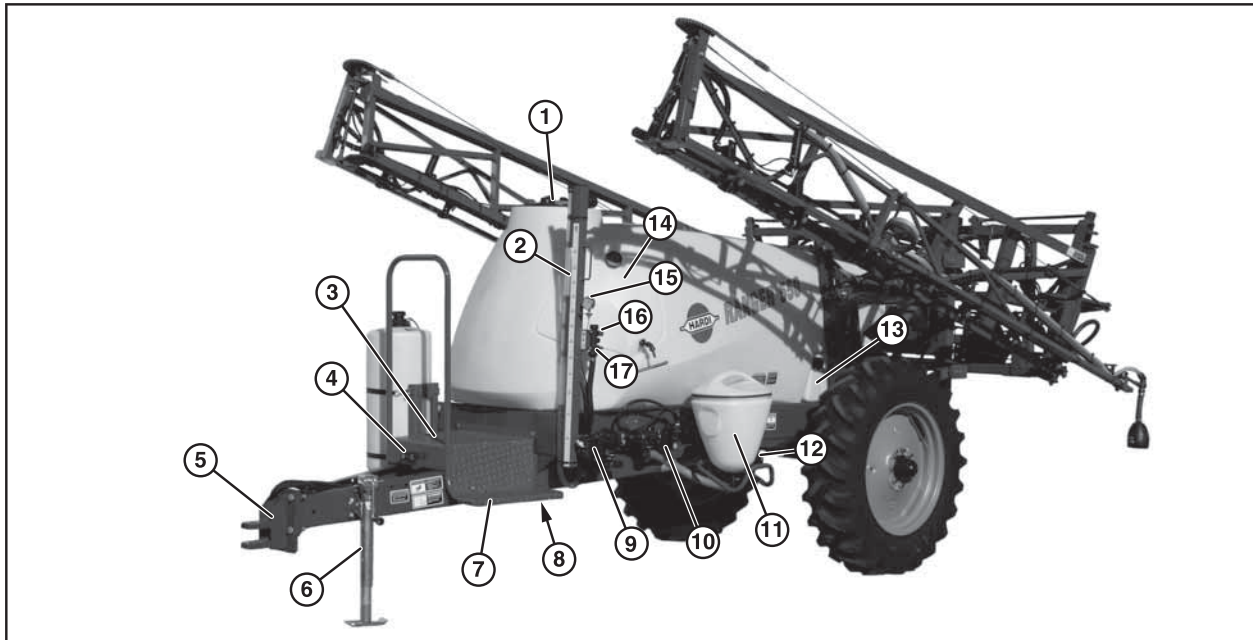
8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

### General info

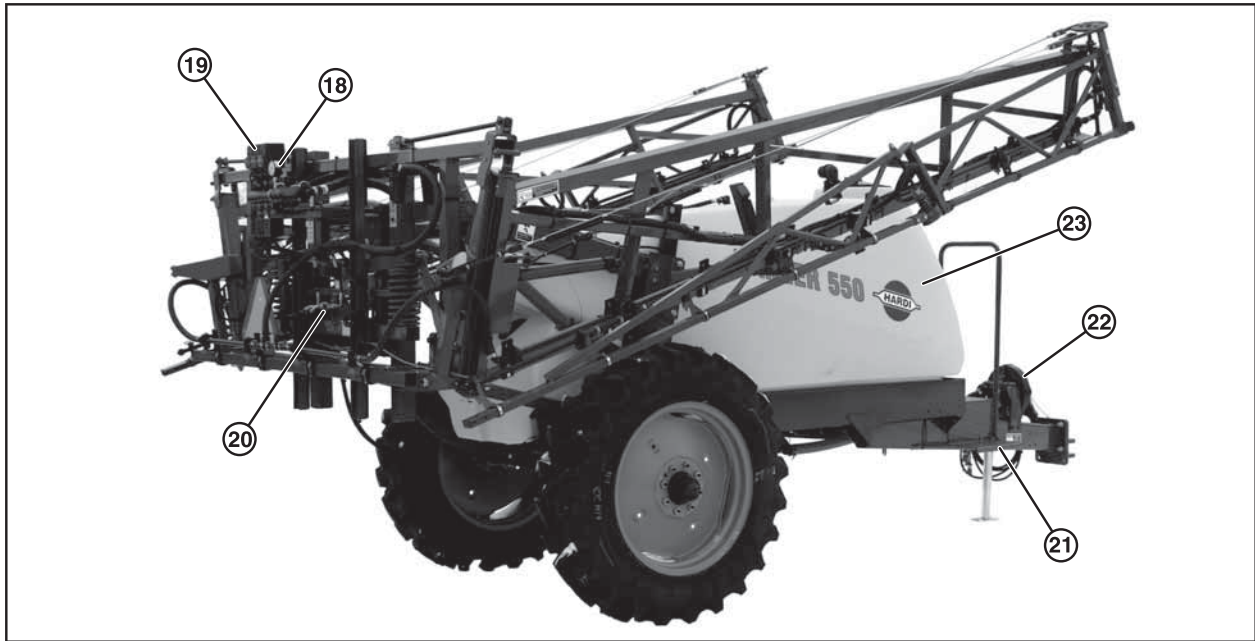
#### View



1. Main tank lid
2. Tank level indicator
3. Platform
4. Suction valve
5. Hitch
6. Support jack
7. Step
8. Pump (hydraulic pump location)
9. Pressure regulator
10. HARDI® FILLER valve (optional)
11. HARDI® FILLER (optional)
12. Quick Fill (optional)
13. Flush tank (optional)
14. Clean water tank
15. Remote system pressure gauge
16. Agitation valve
17. Tank rinse valve (optional)

### 3 - Description

#### View



18. System pressure gauge

19. Distribution valves

20. Hydraulic block

21. Step

22. Pump (PTO driven pump location)

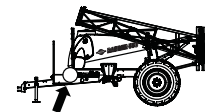
23. Main tank

#### Identification plates

An identification plate fitted on the frame indicates year (YY) and identification number (XXXXXX) of machine.



Frame, boom center frame and other main steel components have identification plates indicating type and part number. (not illustrated)



#### Roadworthiness

When driving on public roads and other areas where the highway code applies, or areas where there are special rules and regulations for marking and lights on implements, you should observe these and equip implements accordingly.



ATTENTION! Max. driving speed is 20 mph (32 km/h). Be aware that this may differ due to local law. Contact local authorities for information of max. driving speeds.

### **Sprayer use**

The HARDI® sprayer is for the application of crop protection chemicals and liquid fertilizers. The equipment must only be used for this purpose. It is not allowable to use the sprayer for other purposes. If no local law demands that the operator must be certified to use spray equipment, it is strongly recommended to be trained in correct plant protection and in safe handling of plant protection chemicals to avoid unnecessary risk for persons and the environment when doing your spray job.

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### **Frame**

Very strong and compact frame which also has a strong chemical and weather resistant electrostatic powder coat. Screws, nuts, etc. have been DELTA-MAGNI treated to be resistant to corrosion.

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### **Tank**

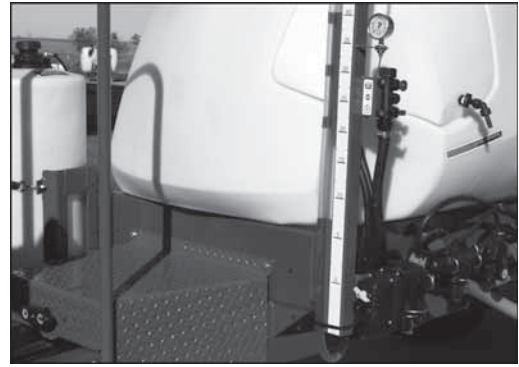
The main tank made of impact-proof, UV-resistant and chemical resistant polyethylene, has a purposeful design with no sharp corners for easy cleaning. Nominal contents 550 gal (2000 liters). A high visibility liquid tank contents indicator is placed behind the platform and is visible from the tractor cabin. The filling hole is placed so it can be accessed from the platform. This ensures an easy access for filling, cleaning of the tank, etc. The sprayer is also equipped with a clean water tank and optional flush tank.

## 3 - Description

### Liquid system

#### General info - valve system

All functions of the spray circuits are operated via the centrally located valve system with color coded pictorial symbols for easy operation.



#### Pump

Centrifugal pump, model 206 - hydraulic (Standard). Model 150 - PTO available, 540 r.p.m. (6 splines) or 1000 r.p.m. (21 splines).

#### Valves and symbols

The valves at the valve system are distinguished by colored identification discs on the function labels. Symbols corresponding to every possible function of use are located on the discs for easy identification and operation. A function is activated by turning the handle towards the desired function.



ATTENTION! If a MANIFOLD valve is too tight to operate - or too loose (= liquid leakage) - the valve needs to be serviced. Please see the section 'Maintenance' for further information.

#### Suction valve = Blue symbols

This valve is to select suction from main tank or from the flush tank. The handle is turned so the label for required function is directed to the indicator. If handle is turned to vertical position (indicator not pointing at a label) then the valve is closed.



Suction from main tank



Suction from flush tank  
(optional equipment)

#### Agitation & Tank rinse valves = White symbols

The top adjustable valve is used to control the amount of agitation.

The bottom ON/OFF valve is used for the optional tank rinse nozzle.

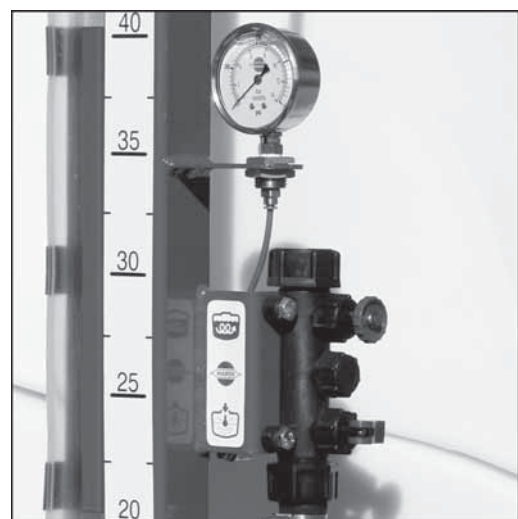
The middle valve location is available for optional accessories.



Agitation

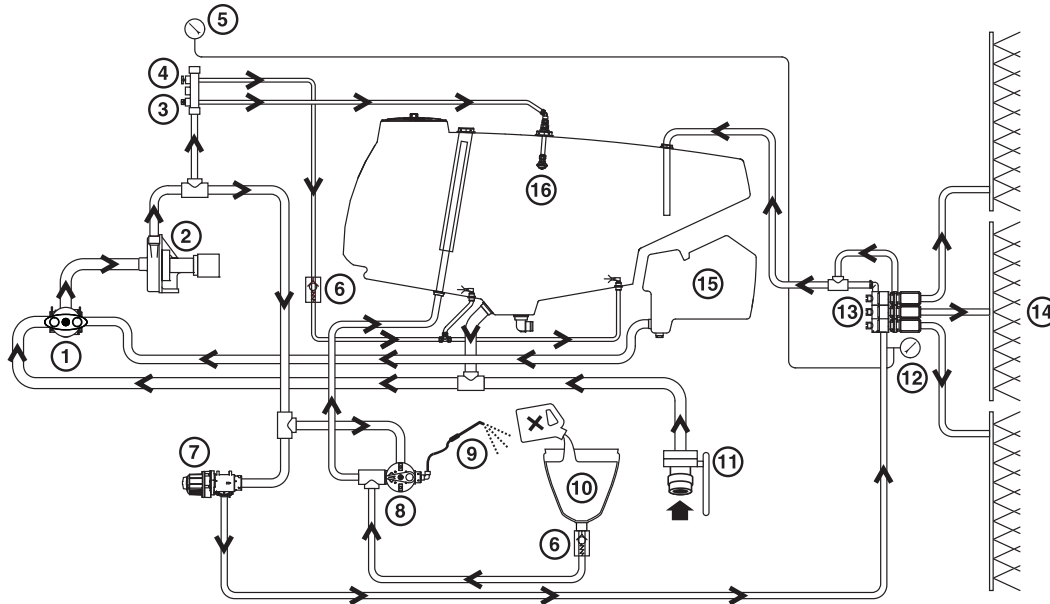


Tank rinse nozzle  
(optional equipment)





### Diagram - Centrifugal Liquid system



- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| 1. Suction valve                  | 9. HARDI® FILLER rinse (optional) |
| 2. Pump                           | 10. HARDI® FILLER (optional)      |
| 3. Tank rinse valve (optional)    | 11. Quick Fill (optional)         |
| 4. Agitation valve                | 12. System pressure gauge         |
| 5. Remote system pressure gauge   | 13. Boom section valves           |
| 6. Check valve                    | 14. Boom                          |
| 7. Pressure regulator             | 15. Flush tank (optional)         |
| 8. HARDI® FILLER valve (optional) | 16. Tank rinse nozzle (optional)  |

### Control unit

EVC - Electrical Valve Control. The ON/OFF is linked to the section valves, which results in a very quick response to ON/OFF. The operating unit is constructed of modules and is electrically controlled via a remote control box.

### Filters

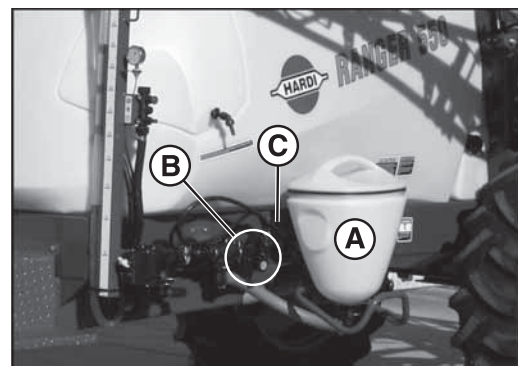
In-line pressure filters are fitted at each boom section.

All filters should always be in use and their function checked regularly. Pay attention to the correct combination of filter mesh size. The mesh size should always be less than the flow average of the nozzles in use.

### HARDI® FILLER

The HARDI® FILLER (A) is situated on the sprayer's left side, just behind the valve system. The valve (B) engages the HARDI® FILLER, used when mixing the chemicals. The rinsing wand (C) is used for rinsing the hopper or chemical container.

See section "Operation" for operating instructions.



## 3 - Description

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### Boom

---

#### Boom and terminology

The SPB boom is available in three different hydraulic system versions – all equipped with I.A.H. (Indirect Acting Hydraulics) and named:

1. SPB-HY

This type of boom is operated via the tractor hydraulics. This model features hydraulic lift cylinders for boom height adjustment and two cylinders for simultaneous boom wing fold and unfold.

2. SPB-HV

This type of boom has the same features as the above mentioned HY-model, but is provided with more advanced hydraulics. This model features hydraulic lift cylinders for boom height adjustment and two cylinders for individual boom wing fold and unfold. The SPB-HV hydraulics are controlled with an electrical hydraulic control box.

3. SPB-HZ

This type of boom has the same features as the above mentioned HV-model, but also has two boom wing tilt cylinders. This model features hydraulic lift cylinders for boom height adjustment, two tilt cylinders and two fold cylinders that give the ability to obtain individual boom wing tilt as well as individual boom wing fold. The SPB-HZ hydraulics are controlled with an electrical hydraulic control box.

Outer sections incorporate spring loaded breakaway and all booms have bi-fold wings.

The SPB boom is available in 45' & 60' working width.

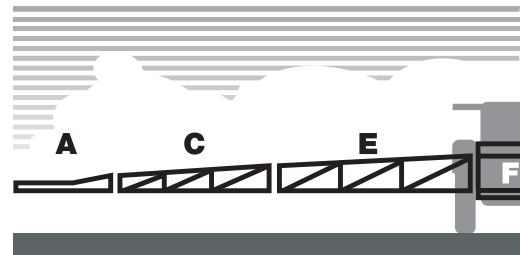
For bi-fold booms the terminology is as follows:

A - Breakaway section

C - Outer section

E - Inner section

F - Center section



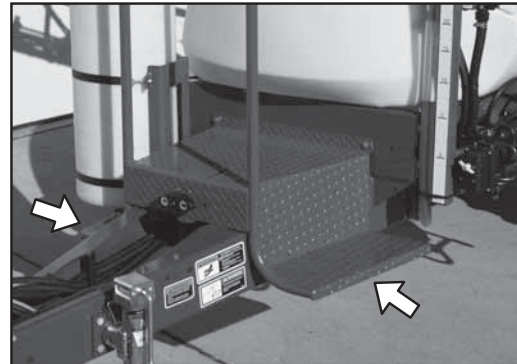
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### Equipment

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#### Steps

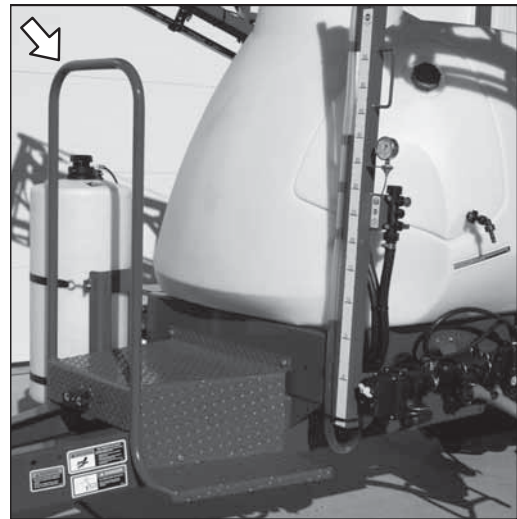
The platform steps are located on the left and right side of the sprayer frame to make it easier to climb up to the platform.



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#### Platform

The platform gives access to the clean water tank lid, the main tank lid and the optional foam marker tank lid.



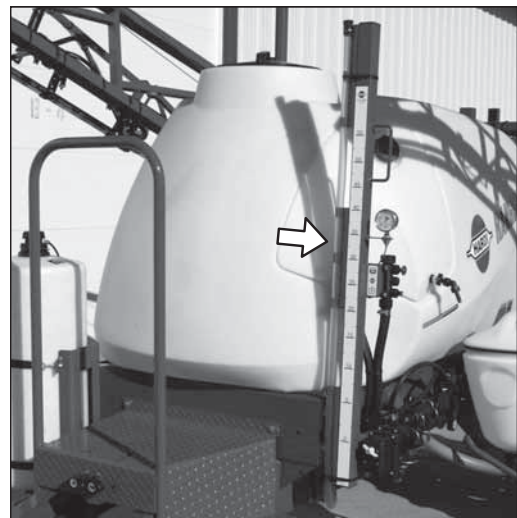
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#### Tank level indicator

The actual tank level in the main tank can be observed on the tank level indicator. The scale is displayed in US gallons or Liters.



ATTENTION! This tank level indicator displays the approximate tank contents. For more accurate tank contents, a fill-meter must be used.

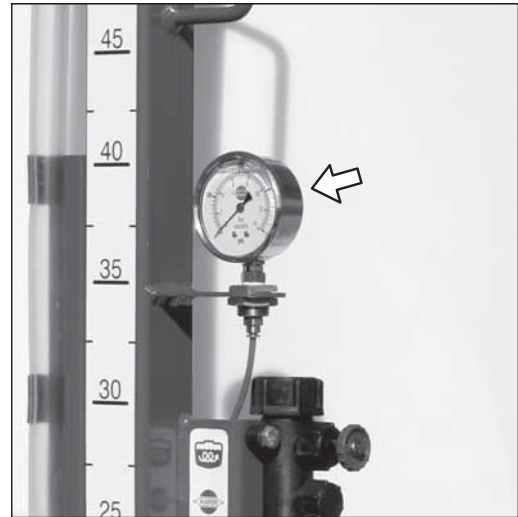


### 3 - Description

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#### Remote system pressure gauge

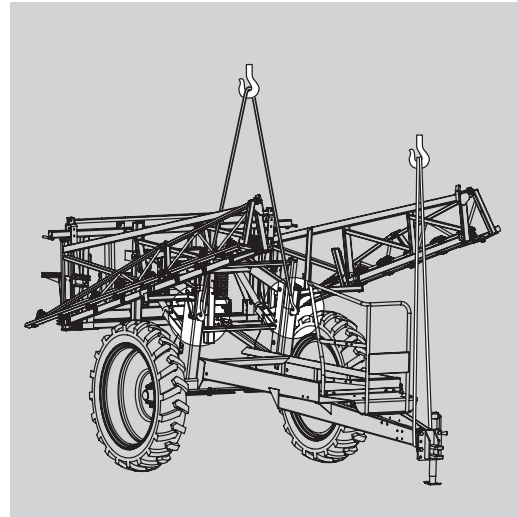
The remote system pressure gauge is located near the top of the tank level indicator on the platform. This gauge measures the system pressure near the boom distribution valves.



### General info

#### Unloading the sprayer from the truck

When unloading with an overhead lifting device, please observe the lifting points as shown in the picture, and make sure that the straps or belts used for lifting are strong enough.



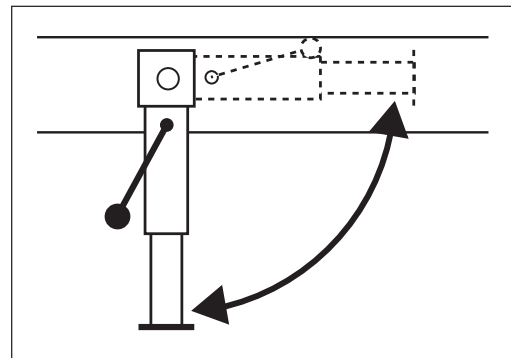
#### Before putting the sprayer into operation

Although the sprayer has been applied with a strong and protective surface treatment on steel parts, bolts etc. in the factory, it is recommended to apply a film of anticorrosion oil (e.g. CASTROL RUSTILLO or SHELL ENSIS FLUID) on all metal parts in order to avoid chemicals and fertilizers discoloring the enamel. If this is done before the sprayer is put into operation for the first time, it will always be easy to clean the sprayer and keep the enamel clean for many years. This treatment should be carried out every time the protection film is washed off.

#### Support jack

The support jack is stored in retracted position and secured by the linch pin when the sprayer is attached to the tractor.

To retract the support jack: Lift the jack, then pull the linch pin out and rotate the support jack into storage position. Replace linch pin to secure.



## 4 - Sprayer setup

### Mechanical connections

#### Hitch - Height adjustment

Adjusting the height of the hitch is obtained by removing the four bolts (A) and raising or lowering the hitch. Inverting the hitch will allow for a greater adjustment to suit tractor drawbar height and to keep the sprayer tank level.



#### Transmission shaft - Operator's safety

1. Always STOP ENGINE before attaching the transmission shaft to tractor P.T.O. - most tractor P.T.O. shafts can be rotated by hand to facilitate spline alignment, when engine is stopped.
2. When attaching the shaft, make sure that the snap lock is FULLY ENGAGED - push and pull shaft until it locks.
3. Always keep protection guards and chains intact and make sure that it covers all rotating parts, including CV-joints at each end of the shaft. Do not use without protection guard.
4. Do not touch or stand on the transmission shaft when it is rotating - safety distance: 5' (1.5 meter).
5. Prevent protection guards from rotating by attaching the chains allowing sufficient slack for turns.
6. Make sure that protection guards around tractor P.T.O. and implement shaft are intact.
7. Always STOP ENGINE and remove the ignition key before carrying out maintenance or repairs to the transmission shaft or implement.

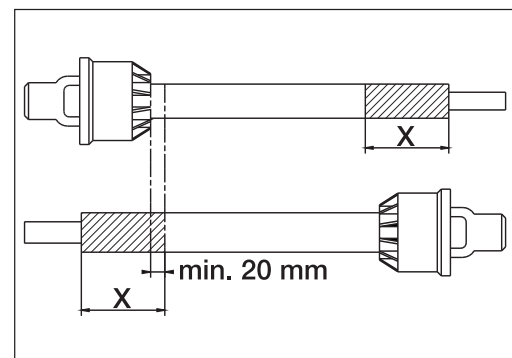


DANGER! ROTATING TRANSMISSION SHAFTS WITHOUT PROTECTION GUARDS ARE FATAL.

#### Transmission shaft - Installation

First installation of the transmission shaft is done in the following way:

1. Attach sprayer to tractor and set sprayer height in the position with shortest distance between the tractor and sprayer pump P.T.O. shafts.
2. Stop engine and remove ignition key.
3. If transmission shaft must be shortened, the shaft is pulled apart. Fit the two shaft parts at tractor and sprayer pump and measure how much it is necessary to shorten the shaft. Mark the protection guards.

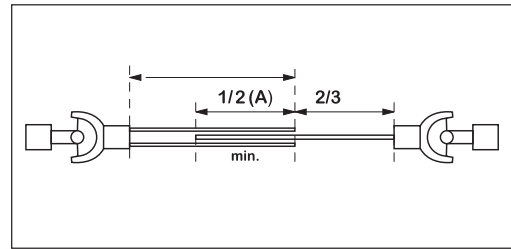


WARNING! The shaft must always have a minimum overlap. The size of this overlap depends on the pump model.

## 4 - Sprayer setup

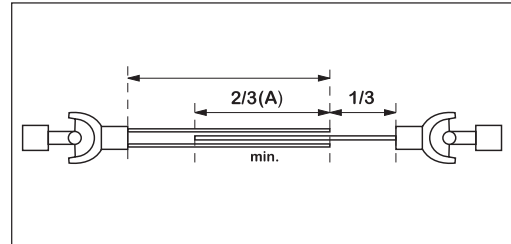
Pump with 6 splines/540 r.p.m.

The shaft must always have an overlap (A) of minimum 1/3 of the length.



Pump with 21 splines/1000 r.p.m.

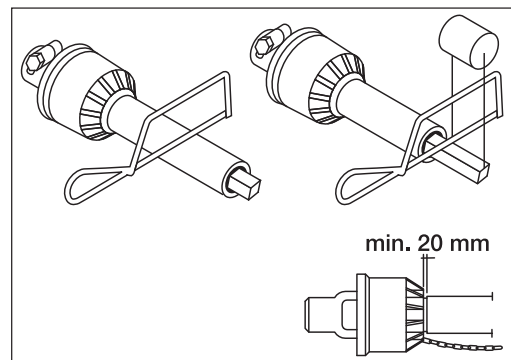
The shaft must always have an overlap (A) of minimum 2/3 of the length.



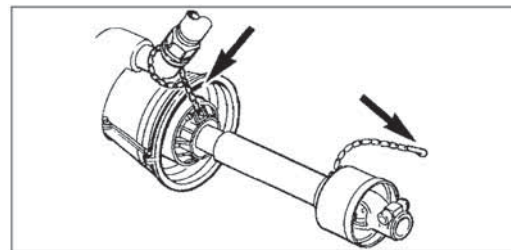
4. The two parts are shortened equally. Use a saw, and file the profiles afterwards to remove burrs.
5. Grease the profiles and assemble male and female parts again.
6. Fit the shaft to tractor P.T.O. and sprayer pump shaft.



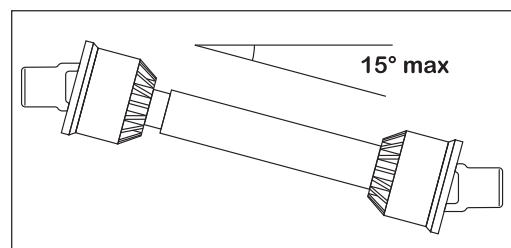
ATTENTION! Female part marked with a tractor towards tractor!



7. Fit the chains to prevent the protection guards from rotating with the shaft.



8. To ensure long life of the transmission shaft, try to avoid working angles greater than 15°.



## 4 - Sprayer setup

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### Hydraulic systems

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#### General info

Ensure that snap couplers are clean before connection!

After having operated the boom and the system has been filled with oil, check tractor's hydraulic oil level and top up if necessary.



**DANGER!** Test of the hydraulic system should be done very cautiously. There may be air trapped in the system which can cause violent movements of the boom.



**DANGER!** Hydraulic leaks: Never use your fingers to locate a leakage in any part of the hydraulic system. Due to high pressure, hydraulic oil may penetrate the skin.



**WARNING!** Due to the variation in tractor hydraulic systems and capacities, care should be exercised when initially operating the sprayer hydraulic cylinders. It is advisable to adjust the hydraulic flow control down to the minimum rate before operating the system. Adjust/increase the flow control after the system is bled of any air, if necessary.

---

#### Requirements - tractor (SPB-HY)

Connection requirements are:

- One single acting hydraulic outlet for the lift function of the spray boom.
- One double acting hydraulic outlet for the folding function of the sprayer.

Ensure that snap couplers are clean before connection!

The hydraulic system requires an oil flow of approximately 0.8 GPM (3 liters) and a minimum pressure of 1,950 PSI (130 bar).

---

#### Requirements - tractor (SPB-HV)

Connection requirements are:

- One double acting hydraulic outlet for the lift and folding function of the sprayer.

The hydraulic hoses are marked with colored tie straps to indicate direction of oil flow. Red tie strap = pressure. Green tie strap = Return to tank. The hoses must be hooked up to the correct outlet for the hydraulics to function properly (pressure hose to pressure outlet, return hose to tank outlet).

Ensure that snap couplers are clean before connection!

The hydraulic system requires an oil flow of approximately 0.8 GPM (3 liters) and a minimum pressure of 1,950 PSI (130 bar).

---

#### Requirements - tractor (SPB-HZ)

Connection requirements are:

- One double acting hydraulic outlet for the lift, tilt and folding function of the sprayer.

The hydraulic hoses are marked with colored tie straps to indicate direction of oil flow. Red tie strap = pressure. Green tie strap = Return to tank. The hoses must be hooked up to the correct outlet for the hydraulics to function properly (pressure hose to pressure outlet, return hose to tank outlet).

Ensure that snap couplers are clean before connection!

The hydraulic system requires an oil flow of approximately 0.8 GPM (3 liters) and a minimum pressure of 1,950 PSI (130 bar).

---

#### Requirements - Ace 206 Hydraulic pump

Refer to Ace instruction manual for hydraulic requirements and setup for the Ace 206 hydraulic driven Centrifugal pump.



## 4 - Sprayer setup

### Open center hydraulics (optional equipment)

The open center hydraulics block is needed if the tractor uses open center hydraulics and/or if load sensing will be used.

The valve (1) on the side of the block is factory set for open center hydraulics, but if closed center hydraulics will be used in combination with load sensing, then screw in the valve.

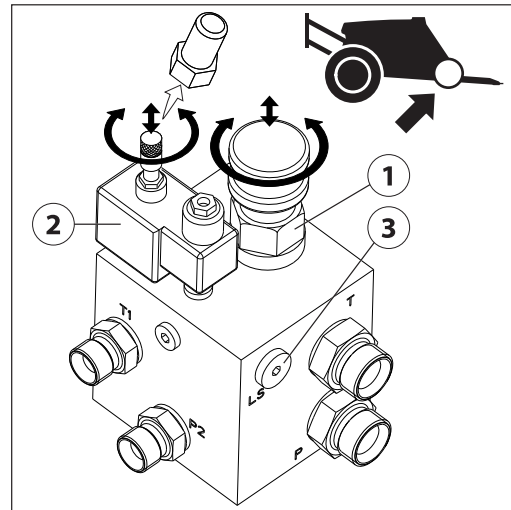
Certain tractor models are able to use Load Sensing without connecting an external sensing line. But if optimal sensing control pressure cannot be obtained, an external sensing line needs to be mounted (3). Please consult your tractor dealer for correct setup and correct connection.

Before operating the hydraulics, the valve should be adjusted according to the specific tractor model. If you have doubt about which type of hydraulic system your tractor is equipped with, please consult your tractor dealer.

Schedule with combinations of settings for flow element and circuit value:

| Valve no.         | 1   | 2    | 3 (LS port) |
|-------------------|-----|------|-------------|
| Open center       | out | out  | Not conn.   |
| Closed center     | in  | in   | Not conn.   |
| Load sensing (LS) | in  | out* | Connected   |

\*if tractor requires pressure relief then contact your tractor dealer for further advice.



**WARNING!** Always be sure to fully extract or retract the open/closed center selection valve (1). Failure to do so can result in damages to vital pump parts.



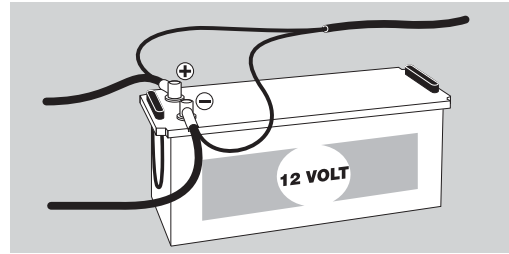
**WARNING!** It is of essential importance that connectors on sensing line are kept totally clean. Failure to do so can result in impurities entering the pump and thereby cause damages to vital pump parts.

## 4 - Sprayer setup

### Electrical connections

#### Power supply

Power requirement is 12V DC. Note polarity! The wires must be at least 10 awg. (4.0 mm<sup>2</sup>) to ensure a sufficient power supply. For the operating unit, the tractor circuit should have an 8 Amp fuse. The supplied power connector is standard on most newer tractors. If using a tractor with a different power connector, it is necessary to disassemble connector and attach the wires to the actual tractor connector.



#### Control boxes

Control boxes are fitted in the tractor cabin at a convenient place.

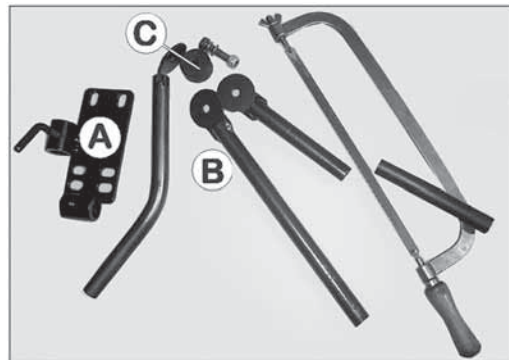


#### Installation of control unit brackets

The supplied tractor pillar bracket (A) has a hole spacing of 3.9 in. (100mm) and 4.7 in. (120mm). Check tractor instructions manual for information regarding attachment points.

Three tubes (B) are supplied. One, two or all three may be used. They can be bent and shortened. A spacer (C) is also supplied to allow further attachment possibilities. Find the best solution for your tractor or vehicle.

Tube (B) plate is staggered, so if correctly orientated, all boxes will line up.



#### Installation of control box - EVC control unit

Find a suitable place in the tractor's cabin. Best recommended placement is to the right of the driver seat and in combination with the Hydraulics control unit. It should be secured from movement.



**ATTENTION!** Tractor driver's seat is the intended working place during operation.



### **Road safety kit**

Connect plug for rear lights to the tractor's 7-pin socket, and check function of rear lights, stop lights and direction indicators on both sides before driving.

The wiring is in accordance with ISO 1724. See section in "Technical specifications".

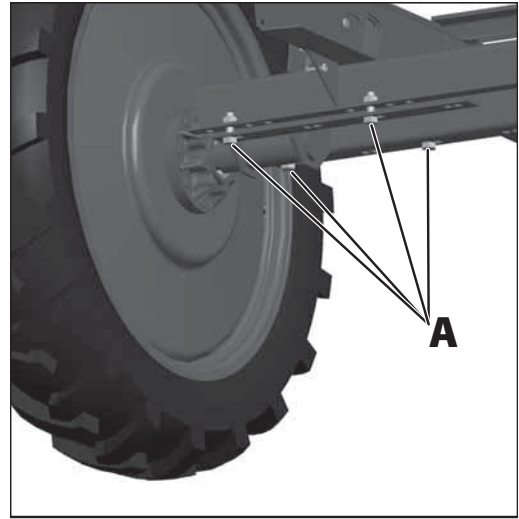
## 4 - Sprayer setup

### Track width, axles and wheels

#### Altering the track width

The track width of the RANGER can be adjusted from 60" to 90" in 2" increments as follows:

1. Measure the current track width (center RH tire to center LH tire). Each side must be extended or retracted half the desired alteration.
2. Attach the sprayer to tractor and engage tractor parking brake.
3. Place stop wedges in front of, and behind RH wheel. Jack up frame behind LH wheel, support and secure sprayer body.
4. Remove bolts (A) for LH axle insert.
5. Extend or retract the axle.
6. Replace bolts (A) and tighten to specified torque.
7. Repeat the procedure on RH wheel.
8. Check if the distance from center tire to center of rear frame is equal at RH and LH.
9. Retighten bolts and wheel bolts to specified torque after 8 hours of work.



**WARNING!** Securely support the sprayer during axle adjustments. Never attempt to adjust axles with liquid in the tank. Always block wheels on opposite side when adjusting axles.

#### Turning rim and rim plate

Track width cannot be altered by turning rim and rim plate. The rim plate can be fitted left or right. With an offset of :

+ 4.1"

-3.7"



## Boom

### Safety info

The boom must not be folded/unfolded while driving! Never use the folding/unfolding functions before sprayer has been stopped! Failure to do so will cause damage to the boom.



**DANGER!** Before unfolding the boom, it is important to connect the sprayer to the tractor to prevent overbalancing of the sprayer.



**DANGER!** When folding or unfolding the boom, make sure that no persons or objects are in the operating area of the boom.



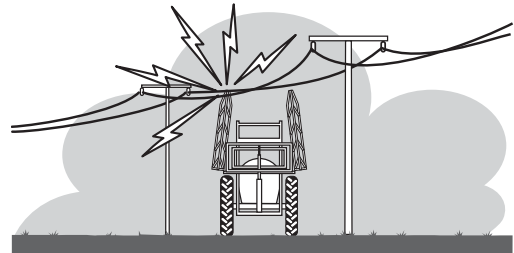
**DANGER!** Always follow the guidelines listed below when driving in areas with overhead power lines:

Never use the folding/unfolding functions in areas with overhead power lines.

Unintended boom movements can cause contact with overhead power lines.



**ATTENTION!** A label (ref. no. 10533003) is located on the sprayer's drawbar. This label must be visible to the operator when hooking up the sprayer.



### Maneuvering of the boom - HY version

The SPB booms with hydraulic HY-version are operated as follows:

1. Activate the single acting hydraulic outlet to raise the boom and release it from the transport brackets.
2. Activate the double acting hydraulic outlet to unfold the boom. Both wings will now unfold simultaneously.
3. When the boom is completely unfolded, it can be raised or lowered to the desired spray height by activating the single acting hydraulic outlet.
4. Before attempting to fold the boom back into transport position, it must be raised all the way to the top by activating the single acting outlet. This will enable the rear cylinder transport lock.
5. The boom is folded by activating the double acting outlet in the opposite direction that was used to unfold the boom. The boom can now be lowered into the transport brackets.
6. The rear cylinder transport lock will automatically engage when lowering the boom after it has been raised all the way to the top. To disengage the rear transport lock, simply raise the boom back up a few inches and then lower it again.



**WARNING!** Ensure that the rear cylinder transport lock is properly engaged before transport.



**WARNING!** The folding function must only be operated when the sprayer is stationary! Failure to do so will damage the boom.



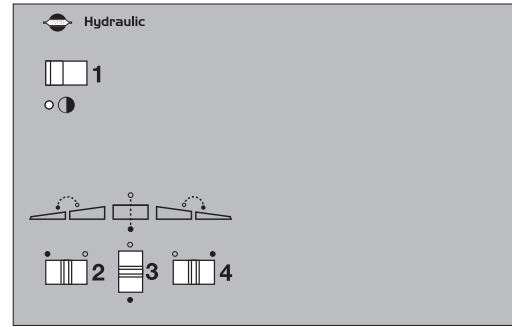
**ATTENTION!** Only unfold and fold the boom on level ground.

## 5 - Operation

### Maneuvering of the boom - HV version

The switches on the hydraulic control box control the following functions:

1. Power ON/OFF
2. Boom folding (left side)
3. Boom lift raise/lower
4. Boom folding (right side)



To unfold the boom, do the following:

1. Engage the tractor's double acting remote outlet lever and lock it in the engaged position.
2. Push switch (3) upwards to lift the boom clear of the transport brackets.
3. Push switch (2) to the left and (4) to the right to unfold both wings simultaneously.
4. If only one side of the boom is to be used for spraying, first unfold the boom completely. Then push switch (2) to the right or switch (3) to the left to fold the desired side back in.
5. When the boom is completely unfolded, it can be raised or lowered to the desired spray height by pushing switch (3) upwards or downwards.

To fold the boom, do the following:

6. Before attempting to fold the boom back into transport position, it must be raised all the way to the top by pushing switch (3) upwards. This will enable the rear cylinder transport locks.
7. Push switch (2) to the right and (4) to the left to fold the boom. The boom can now be lowered into the transport brackets.
8. The rear cylinder transport locks will automatically engage when lowering the boom after it has been raised all the way to the top. To disengage the rear transport lock, simply raise the boom back up a few inches and then lower it again.



**WARNING!** Ensure that the rear cylinder transport lock is properly engaged before transport.



**WARNING!** The folding function (switches 2 & 4) must only be operated when the sprayer is stationary! Failure to do so will damage the boom.



**ATTENTION!** Only unfold and fold the boom on level ground.



**ATTENTION!** The SPB-HV boom cannot be operated with tractor's hydraulic levers.

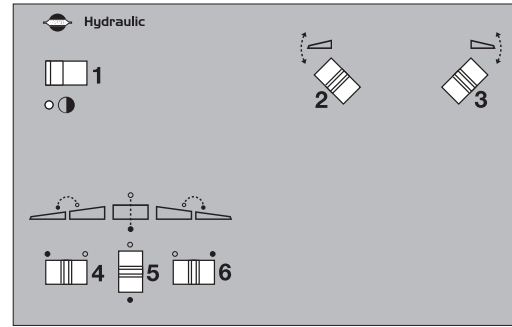


**ATTENTION!** It is not advisable to go directly from transport position to spray position with one side only. Both wings must first be completely unfolded and then one side folded back in.

### Maneuvering of the boom - HZ version

The switches on the hydraulic control box control the following functions:

1. Power ON/OFF
2. Boom tilt left
3. Boom tilt right
4. Boom folding (left side)
5. Boom lift raise/lower
6. Boom folding (right side)



To unfold the boom, do the following:

1. Engage the tractor's double acting remote outlet lever and lock it in the engaged position.
2. Push switch (5) upwards to lift the boom clear of the transport brackets.
3. Push switches (2) and (3) downwards to lower the individual tilt rams.
4. Push switch (4) to the left and (6) to the right to unfold both wings simultaneously.
5. If only one side of the boom is to be used for spraying, first unfold the boom completely. Then push switch (4) to the right or switch (6) to the left to fold the desired side back in.
6. When the boom is completely unfolded, it can be raised or lowered to the desired spray height by pushing switch (5) upwards or downwards.

To tilt the boom, do the following:

7. Push switch (2) and/or (4) up or down to tilt the left and/or right wings up or down.

To fold the boom, do the following:

8. Before attempting to fold the boom back into transport position, it must be raised all the way to the top by pushing switch (5) upwards. This will enable the rear cylinder transport locks.
9. Push switch (4) to the right and (6) to the left to fold the boom.
10. Push switches (2) and (3) upwards to raise the individual tilt rams. The boom can now be lowered into the transport brackets.
11. The rear cylinder transport locks will automatically engage when lowering the boom after it has been raised all the way to the top. To disengage the rear transport lock, simply raise the boom back up a few inches and then lower it again.



WARNING! Ensure that the rear cylinder transport lock is properly engaged before transport.



WARNING! The folding function (switches 4 & 6) must only be operated when the sprayer is stationary! Failure to do so will damage the boom.



WARNING! Never attempt to fold boom to transport position when wings are tilted. Always let wings down to horizontal position prior to folding.



WARNING! Never attempt to work on or around wing section when tilted up.



WARNING! Unexpected boom movements may occur if wings are tilted when folding.



WARNING! Never use tilt function when boom is folded into transport position.



ATTENTION! Only unfold and fold the boom on level ground.



ATTENTION! The SPB-HZ boom cannot be operated with tractor's hydraulic levers.



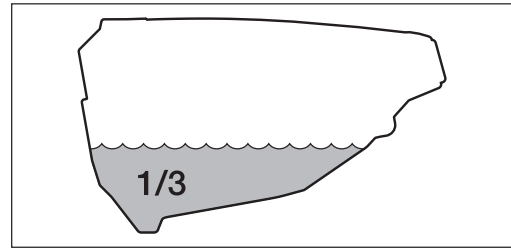
ATTENTION! It is not advisable to go directly from transport position to spray position with one side only. Both wings must first be completely unfolded and then one side folded back in.

## 5 - Operation

### Liquid system

#### Filling of water

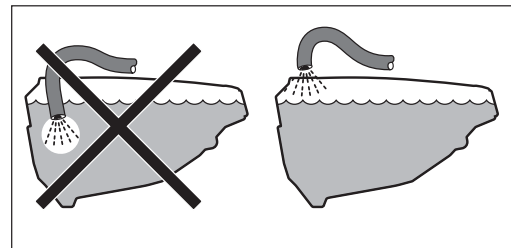
Tank should normally be filled 1/3 with water before adding chemicals. Always follow instructions given on the chemical container!



WARNING! If the sprayer is put aside with liquid in the main tank, all valves must be closed.

#### Filling through tank lid

Water is filled into the tank by removing the tank lid located at front of sprayer tank which is accessible from platform. It is recommended to use water as clean as possible for spraying purposes. Always fill water through the strainer basket to prevent foreign particles from entering the tank. An overhead tank can be used in order to obtain high filling capacity.

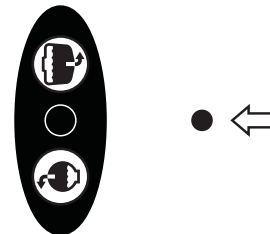


WARNING! Do not let the filling hose enter the tank. Keep it outside the tank, pointing towards the filling hole. If the hose is lowered into the tank and the water pressure drops at the water supply, chemicals may be siphoned back and contaminate the water supply lines and source.

#### Filling of main tank using Quick Fill (optional)

The main tank is filled using the Quick Fill as follows:

1. Turn Suction valve to "Off" (vertical) position.
2. Make sure Quick Fill valve is closed (Yellow handle "up").
3. Remove plug from Quick Fill coupler and connect filling hose from water supply (i.e. overhead fill tank).
4. Turn water supply "On" (so filling hose is pressurized).
5. Open Quick Fill valve (Yellow handle "out" in line with filling hose).
6. Fill tank to desired level. Keep an eye on the level indicator.
7. Close Quick Fill valve to discontinue filling process (Yellow handle "up").
8. Turn water supply "Off" and remove the filling hose.
9. Replace Quick Fill plug.



DANGER! Avoid contamination or personal injury. Do not open Quick Fill valve unless filling hose is connected. If Quick Fill valve is open, liquid can flow out of the main tank.



WARNING! Do not leave the sprayer while filling the tank. Keep an eye on the level indicator in order NOT to overfill the tank.



### Filling of clean water tank

A clean water tank is integrated into the front left corner of the main tank (behind the MANIFOLD system). It is accessed for filling at the sprayer's left side when entering the platform. Remove tank lid, fill with clean water and replace tank lid.

For use of water, turn the ball valve lever to open tap. The ball valve is located at the bottom of the clean water tank on sprayer's left side. The water from this tank is for hand washing, cleaning of clogged nozzles, etc. Only fill the clean water tank with clean water.

Capacity: 4.8 gal. (18 liters).

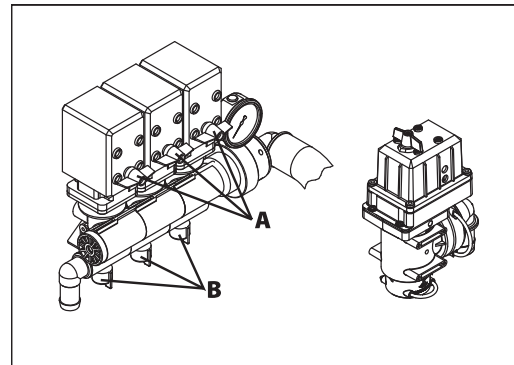


**WARNING!** Although the clean water tank is only filled with clean water, this water must never be used for drinking.

### Adjustment of EVC operating unit

Before spraying, adjust the EVC operating unit using clean water (without chemicals).

1. Choose the correct nozzle for the spray job. Make sure that all nozzles are the same type and capacity. See the "Spray Technique" book.
2. Make sure all distribution valves (A) are turned on.
3. Set pressure regulation valve to minimum pressure (activate pressure regulation switch "down" until emergency handle stops rotating).
4. Put the tractor in neutral and engage the pump. For belt driven pump, adjust the P.T.O. revolutions to the number of revolutions that will typically be used while spraying. Remember the number of revolutions on the P.T.O. must be kept between 300-600 r.p.m. (540 r.p.m. pump) or 650-1100 rpm (1000 r.p.m. pump). For hydraulic pump, see Ace Instruction manual for proper oil flow pressure.
5. Activate pressure regulation switch "up" until the required spraying pressure is shown on the pressure gauge.



Adjustment of pressure equalization:

1. Disconnect power to the control box to allow for manual operation of the boom distribution valves. Adjustments will be made one section at a time until all valves have been adjusted.
2. Note the pressure on the pressure gauge. This reading will be used throughout the adjustment.
3. Manually close one of the distribution valves by turning the green handle (A).
4. Turn the adjusting screw (B), under the valve just closed, until the pressure gauge again shows the same pressure as before (clockwise for higher pressure, counterclockwise for lower pressure).
5. Turn the distribution valve (A) back on.
6. Adjust the other sections of the distribution valve in the same way.



**ATTENTION!** HEREAFTER ADJUSTMENT OF PRESSURE EQUALIZATION WILL ONLY BE NEEDED WHEN:

1. YOU CHANGE TO NOZZLES WITH OTHER CAPACITIES
2. THE NOZZLE OUTPUT INCREASES AS THE NOZZLES WEAR

## 5 - Operation

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### Safety precautions - crop protection chemicals



WARNING! Always be careful when working with crop protection chemicals!



WARNING! Always wear correct protective clothing before handling chemicals!

Personal protection

Depending on chemical type, protective gear /equipment should be worn to avoid contact with the chemicals, e.g.:

- Gloves
- Waterproof boots
- Headgear
- Respirator
- Safety goggles
- Chemical resistant overall



WARNING! Protective clothing/equipment should be used when preparing the spray liquid, during the spray job and when cleaning the sprayer. Follow the chemical manufacturer's instructions given on the chemical label.



WARNING! It is always advisable to have clean water available, especially when filling the sprayer with the chemical.



WARNING! Always clean the sprayer carefully and immediately after use.



WARNING! Only mix chemicals in the tank according to directions given by the chemical manufacturer.



WARNING! Always clean the sprayer before changing to another chemical.

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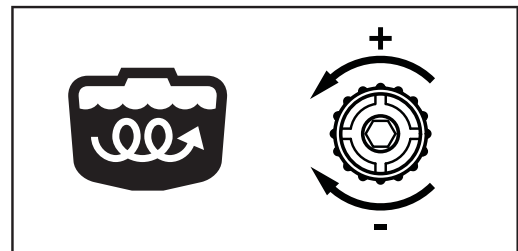
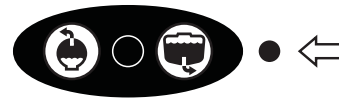
### Filling chemicals through tank lid

The chemicals are filled through the tank lid - Note instructions on the chemical container!



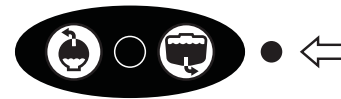
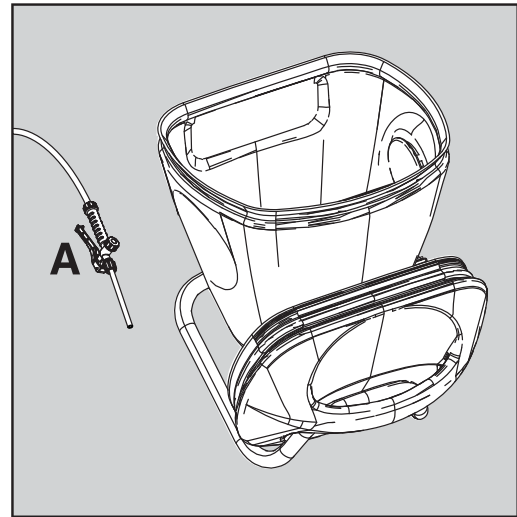
WARNING! Be careful not to slip or splash chemicals when carrying chemicals up to the tank lid!

1. Make sure the control unit is switched off.
2. Turn the Suction valve handle towards "Suction from main tank".  
Adjust the top Pressure Agitation valve - clockwise (in) for less agitation, counter-clockwise (out) for more agitation.
3. Engage pump and set to normal operating level.
4. Add the chemicals through the main tank hole.
5. When the spray liquid is well mixed, keep pump engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.



## Filling Liquid chemicals by HARDI® FILLER

1. Fill the main tank at least 1/3 with water (unless something else is stated on the chemical container label). See section "Filling of water".
2. Turn the Suction valve handle towards "Suction from main tank". Adjust the top Pressure Agitation valve - clockwise (in) for less agitation, counter-clockwise (out) for more agitation.
3. Check that HARDI® FILLER valve is in the "OFF" (vertical) position.
4. Engage pump and set to normal operating level.
5. Open FILLER lid.
6. Measure the correct quantity of chemical and fill it into the hopper.
7. Turn HARDI® FILLER valve to the "ON" (horizontal) position and the chemical is transferred to the main tank.
8. If the chemical container is empty, it can be rinsed with the rinsing wand. Place the rinsing wand inside the container and press the lever (A).
9. Place the rinsing wand inside the hopper and press the lever (A) to rinse the concentrated chemicals from the hopper.
10. Turn HARDI® FILLER valve to the "OFF" (vertical) position when the hopper is rinsed.
11. Close the FILLER lid.
12. When the spray liquid is well mixed, keep pump engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.



ATTENTION! The scale in the hopper can only be used if the sprayer is parked at level ground! It is recommended to use a measuring jug for best accuracy.



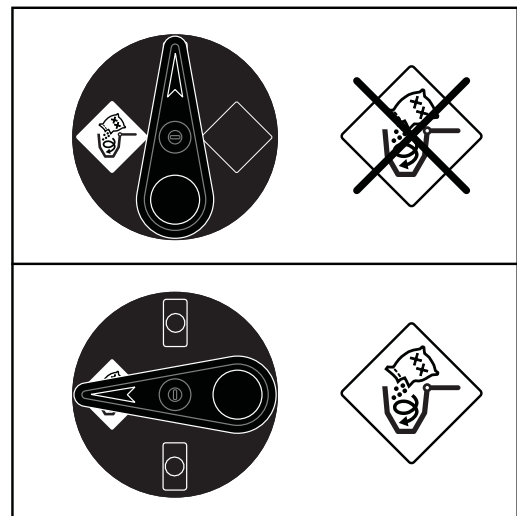
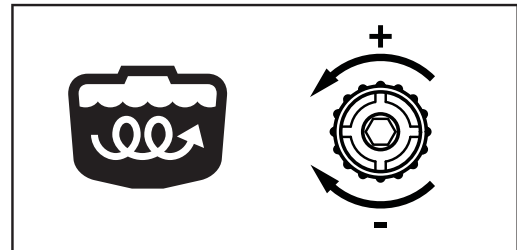
DANGER! Do not press rinsing wand lever (A) unless the nozzle is covered by a container or aimed inside the hopper to avoid spray liquid hitting the operator.



ATTENTION! Rinsing wand uses spray liquid to rinse concentrated chemicals from containers. Always rinse the chemical containers with clean water several times until they are clean before disposal.



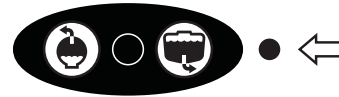
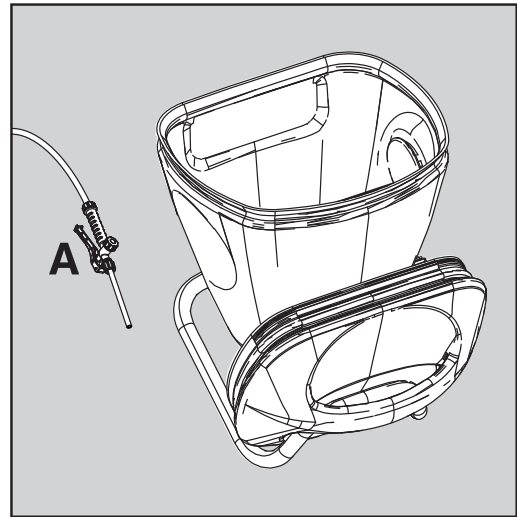
ATTENTION! The rinsing wand uses spray liquid for rinsing concentrated chemicals from the hopper. The FILLER must always be cleaned together with the rest of the sprayer when the spray job is done.





## 5 - Operation


### Filling Powder chemicals by HARDI® FILLER


1. Fill the main tank at least 1/2 with water (unless something else is stated on the chemical container label). See section "Filling of water".
2. Turn the Suction valve handle towards "Suction from main tank". Adjust the top Pressure Agitation valve - clockwise (in) for less agitation, counter-clockwise (out) for more agitation.
3. Engage pump and set to normal operating level.
4. Turn HARDI® FILLER valve to the "ON" (horizontal) position and open FILLER lid.
5. Measure the correct quantity of chemical and start filling it into the hopper. Place the rinsing wand inside the hopper and press the lever (A) to flush the chemical down.
6. If the chemical container is empty, it can be rinsed with the rinsing wand. Place the rinsing wand inside the container and press the lever (A).
7. Place the rinsing wand inside the hopper and press the lever (A) to rinse the concentrated chemicals from the hopper.
8. Turn HARDI® FILLER valve to the "OFF" (vertical) position when the hopper is rinsed.
9. Close the FILLER lid.
10. When the spray liquid is well mixed, keep pump engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.

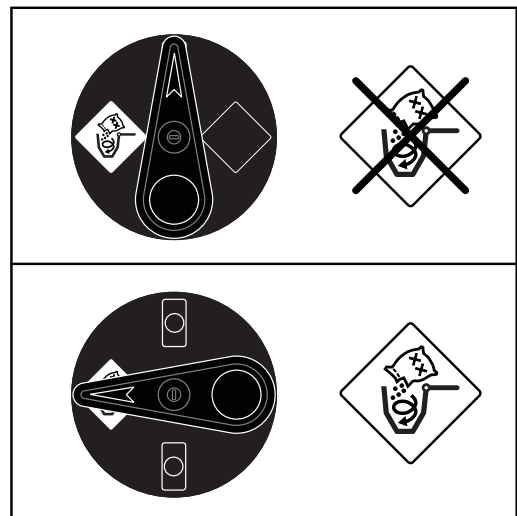
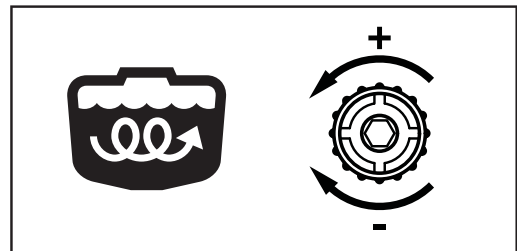


 **ATTENTION!** The scale in the hopper can only be used if the sprayer is parked at level ground! It is recommended to use a measuring jug for best accuracy.

 **DANGER!** Do not press rinsing wand lever unless the nozzle is covered by a container or aimed inside the hopper to avoid spray liquid hitting the operator.

 **ATTENTION!** Rinsing wand uses spray liquid to rinse concentrated chemicals from containers. Always rinse the chemical containers with clean water several times until they are clean before disposal.

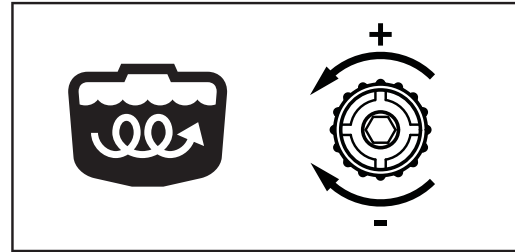
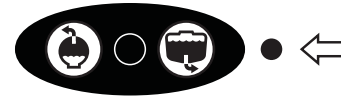
 **ATTENTION!** The rinsing wand uses spray liquid for rinsing concentrated chemicals from the hopper. The FILLER must always be cleaned together with the rest of the sprayer when the spray job is done.



### Agitation before re-starting spraying

If a spraying job has been interrupted for awhile, severe sedimentation can occur depending on chemicals being used. When re-starting spray job, it might be necessary to agitate sedimented material first.

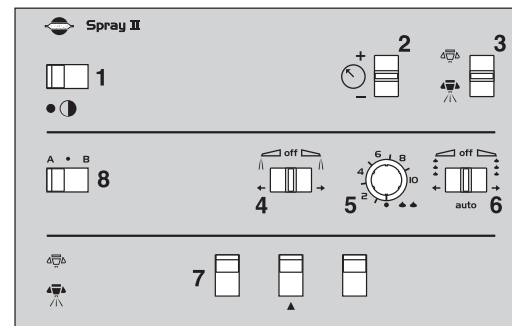
1. Make sure the control unit is switched off.
2. Turn the Suction valve handle towards "Suction from main tank".
3. Adjust the top Pressure Agitation valve - clockwise (in) for less agitation, counter-clockwise (out) for more agitation.
4. Engage pump and set to normal operating level.
5. Agitation will start and should be continued for at least 10 minutes.
6. Once the chemicals are mixed, spraying can resume.



### Operating the control unit while spraying

The switches on the spray control box control the following functions:

1. Power switch
2. Manual pressure regulation
3. Main ON/OFF
4. End nozzle (Left/OFF/Right)\*
5. Foam marker regulation\*
6. Foam marker (Left/OFF/Right)\*
7. Boom section valves
8. Valve function A-B\*

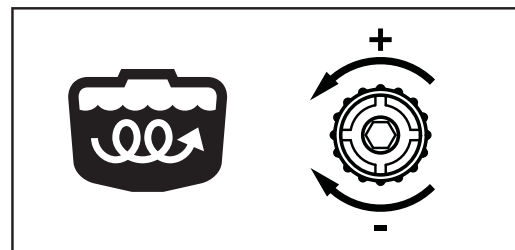
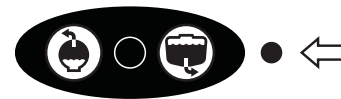


\*optional equipment

In order to close the entire boom, switch ON/OFF (3) to OFF position. This returns the pump output to the tank through the return system. The diaphragm Non-drip valves ensure instantaneous closing of all nozzles.

In order to close one or more sections of the boom, switch the relevant distribution valve (7) to OFF position. The pressure equalization ensures that the pressure does not rise in the sections which are to remain open.

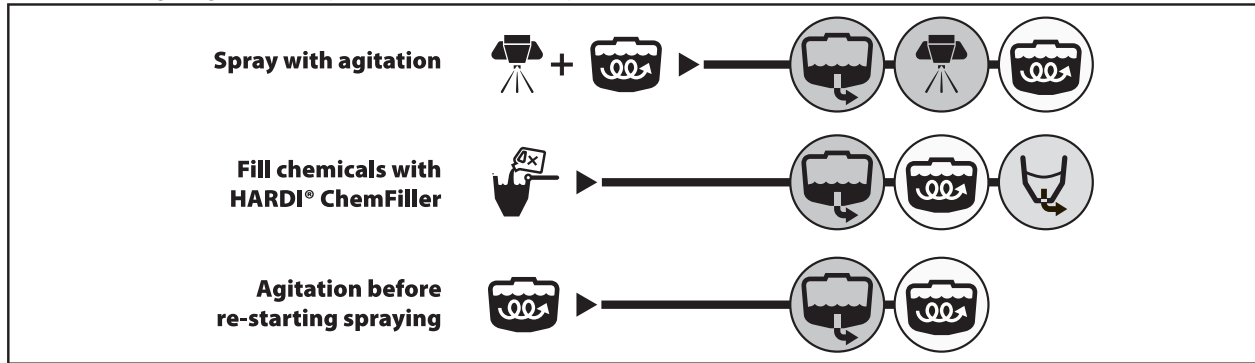
On the sprayer, the Suction valve should be turned towards "Suction from Main tank". Adjust the top Pressure Agitation valve - clockwise (in) for less agitation, counter-clockwise (out) for more agitation.



## 5 - Operation

### Quick reference - Operation

In the following diagram, valve positions for different options are described.



### Cleaning

---

#### General info

In order to derive full benefit from the sprayer for many years the following service and maintenance program should be followed.



ATTENTION! Always read the individual paragraphs. Read instructions for service/maintenance jobs carefully before starting on the job. If any portion remains unclear or requires facilities which are not available, then for safety reasons please leave the job to your HARDI® dealer's workshop.



ATTENTION!  
Clean sprayers are safe sprayers.  
Clean sprayers are ready for action.  
Clean sprayers cannot be damaged by pesticides and their solvents.

#### Guidelines

1. Read the whole chemical label. Take note of any particular instructions regarding recommended protective clothing, deactivating agents, etc. Read the detergent and deactivating agent labels. If cleaning procedures are given, follow them closely.
2. Be familiar with local legislation regarding disposal of pesticides washings, mandatory decontamination methods, etc. Contact the appropriate department, e.g. Dept. of Agriculture.
3. Pesticide washings can usually be sprayed out on a soakaway. This is an area of ground that is not used for cropping. You must avoid seepage or runoff of residue into streams, water courses, ditches, wells, springs, etc. The washings from the cleaning area must not enter sewers. Drainage must lead to an approved soakaway.
4. Cleaning starts with the calibration, as a well calibrated sprayer will ensure the minimal amount of remaining spray liquid.
5. It is good practice to clean the sprayer immediately after use and thereby render the sprayer safe and ready for the next pesticide application. This also prolongs the life of the components.
6. It is sometimes necessary to leave spray liquid in the tank for short periods, e.g. overnight, or until the weather becomes suitable for spraying again. Unauthorized persons and animals must not have access to the sprayer under these circumstances.
7. If the product applied is corrosive, it is recommended to coat all metal parts of the sprayer before and after use with a suitable rust inhibitor.

## 5 - Operation

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### Cleaning the tank and liquid system

1. Dilute remaining spray liquid in the tank with at least 10 parts of water and spray the liquid out in the field you have just sprayed.
2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Rinse and clean sprayer and tractor externally. Use detergent if necessary.
4. Remove in-line pressure filters and clean. Be careful not to damage the mesh. Replace filters when the sprayer is completely clean.
5. With the pump running, rinse the inside of the tank. Remember the tank roof. Rinse and operate all components and any equipment that has been in contact with the chemical. Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the field again or on the soakaway.
6. After spraying the liquid out, stop the pump and fill at least 1/5 of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, e.g. washing soda or Triple ammonia.
7. Start the pump and operate all controls enabling the liquid to come in contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label.
8. Drain the tank and let the pump run dry, only for a few seconds. Rinse inside of the tank, again letting the pump run dry.



ATTENTION! Do not run pump dry for longer than 3 seconds. Otherwise severe damage to the pump will occur.

9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them immediately.
10. Replace all the filters and nozzles and store the sprayer. If, from previous experiences, it is noted that the solvents in the pesticide are particularly aggressive, store the sprayer with the tank lid open.



ATTENTION! It is advisable to increase the forward speed (double if possible) and reduce the pressure to 20 psi (1.5 bar) when spraying diluted remaining liquid in the field just sprayed.



ATTENTION! If a cleaning procedure is given on the chemical label, follow it closely.



ATTENTION! If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.

---

### Cleaning and maintenance of filters

Clean filters ensure:

- Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.
- Nozzle blockages do not occur while spraying.



### Use of flush tank and rinsing nozzles

The incorporated flush tank can be used for two different purposes.

A. In-field diluting of remaining spray liquid residue in the spraying circuit for spraying the liquid in the field, before cleaning the sprayer. This cleaning procedure is divided in two main steps:

Cleaning of the liquid system:

1. Empty the sprayer as much as possible. Turn the top Pressure Agitation valve clockwise all the way in (no agitation) and spray until air comes out of all nozzles, only for a few seconds.



ATTENTION! Do not run pump dry for longer than 3 seconds. Otherwise severe damage to the pump will occur.

2. Turn Suction valve towards "Flush tank" and turn control unit "Off"
3. Engage and set the pump at approximately half of normal operating level.
4. When 1/2 of content in flush tank is used, turn Suction valve towards "Main tank" and operate all valves on the pressure side of the system, so all hoses and components are rinsed. If equipped with HARDI® FILLER, open HARDI® FILLER valve (horizontal position), open HARDI® FILLER lid and place the rinsing wand inside the hopper. Squeeze the lever until clean water comes out, then continue spraying to clean the hopper. Close the HARDI® FILLER lid and close the HARDI® FILLER valve (vertical position).
5. Turn Suction valve towards "Main tank" and spray liquid in the field you have just sprayed.

Cleaning of Main tank:

6. Turn the Suction valve towards "Flush tank" and open "Tank Rinsing" valve (below Pressure Agitation valve).
7. When another 1/4 of contents in flush tank are used, turn Suction valve towards "Main tank" and turn top Pressure Agitation valve clockwise all the way in (no agitation).
8. Spray liquid in the field you have just sprayed.
9. Repeat steps 6 - 8 one more time.

B. Flushing the pump, operating unit, spray lines, etc. in case of stop in spraying before main tank is empty (e.g. beginning rain etc.).

Cleaning of the liquid system before main tank is empty:

1. Turn Suction valve towards "Flush tank".
2. Turn the top Pressure Agitation valve clockwise all the way in (no agitation).
3. Make sure control unit is switched "On" with all distribution valves open (boom spraying position).
4. Engage the pump and spray water from Flush tank in the field until all nozzle tubes/nozzles are flushed with clean water.
5. Disengage pump again.



ATTENTION! The rinsing nozzles cannot always guarantee a 100% cleaning of the tank. Always clean manually with a brush afterwards, especially if crops sensitive to the chemical just sprayed are going to be sprayed afterwards!



ATTENTION! It is advisable to increase the forward speed (double if possible) and reduce the pressure to 20 psi (1.5 bar).



ATTENTION! If a cleaning procedure is given on the chemical label, follow it closely.



ATTENTION! When flushing the pump before main tank is empty (B - above), make sure all distribution valves are open and agitation is "Off" whenever the pump is running to prevent clean water from returning to the tank and diluting the contents.

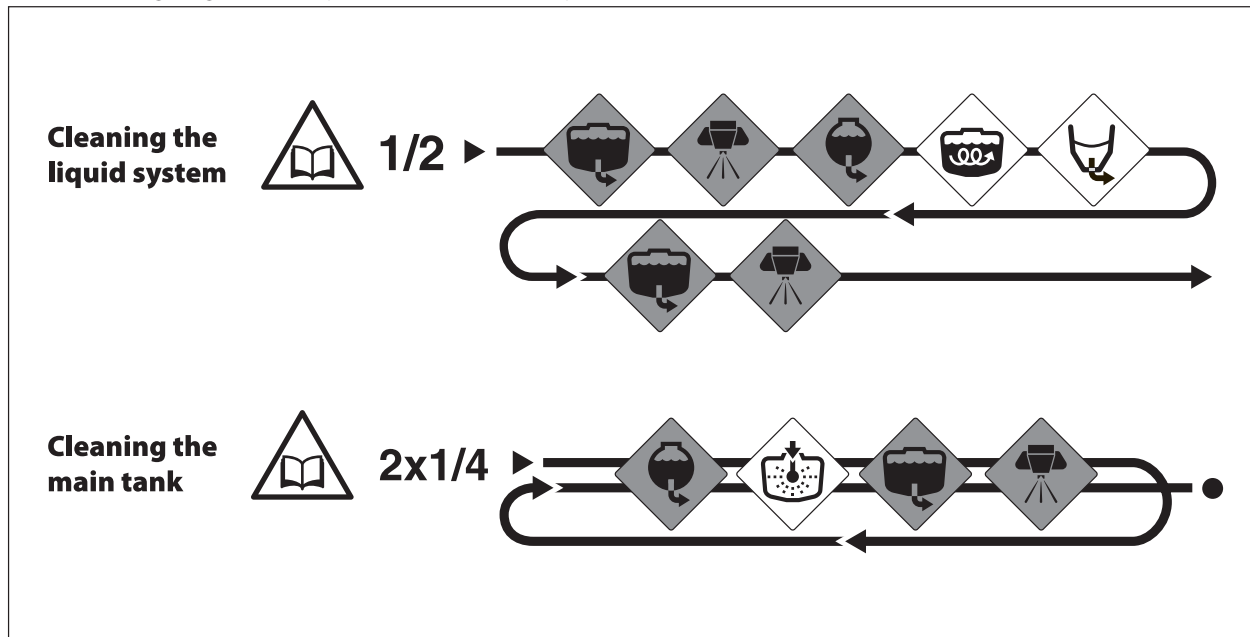


ATTENTION! If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.

## 5 - Operation

### Quick reference - Cleaning

In the following diagram, valve positions for different options are described.



### Technical residue

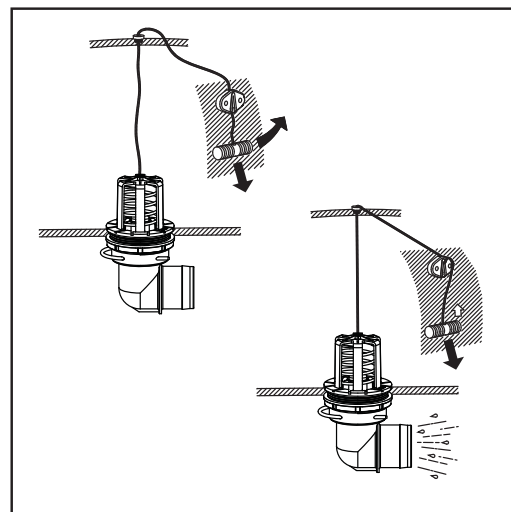
Inevitably a quantity of spray liquid will remain in the system. It cannot be sprayed properly on the crop, as the pump takes in air when the tank is about to be empty.

This Technical Residue is defined as the remaining liquid quantity in the system as the first clear pressure drop on the pressure gauge is read.

The residues in the tank should be diluted immediately in the relationship 1:10 with clean water and sprayed onto the crop just sprayed before cleaning the sprayer.

### Using the drain valve

The drain valve is located and operated from the left hand side of the sprayer near the boom transport bracket. Pull the string to open the drain valve. The valve is spring-loaded, but can be kept open by pulling the string upwards in the V-shaped slit. To release, pull the string downward and the valve will close automatically.



**Spray Technique - see separate book.**

**Optional extras - see separate books.**

## Lubrication

### General info

Always store lubricants clean, dry and cool - preferably at a constant temperature - to avoid contamination from dirt and condensed water. Keep oil filling jugs, hoppers and grease guns clean, and clean the lubricating points thoroughly before lubricating. Avoid skin contact with oil products for longer periods.

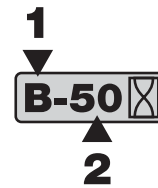
Always follow the shown direction concerning recommended quantity. If no recommended quantity is given, feed lubricator until new grease becomes visible.

Pictograms in lubrication & oiling plans tell the following:

1. Lubricant to be used (see "Recommended lubricants").
2. Operating hours before next lubrication.



ATTENTION! If the sprayer is cleaned with a high pressure cleaner, lubrication of the entire machine is recommended.



### Recommended lubricants



#### BALL BEARINGS:

Universal Lithium grease, NLGI No. 2  
SHELL RETINAX EP2  
CASTROL LMX GREASE



#### SLIDE BEARINGS:

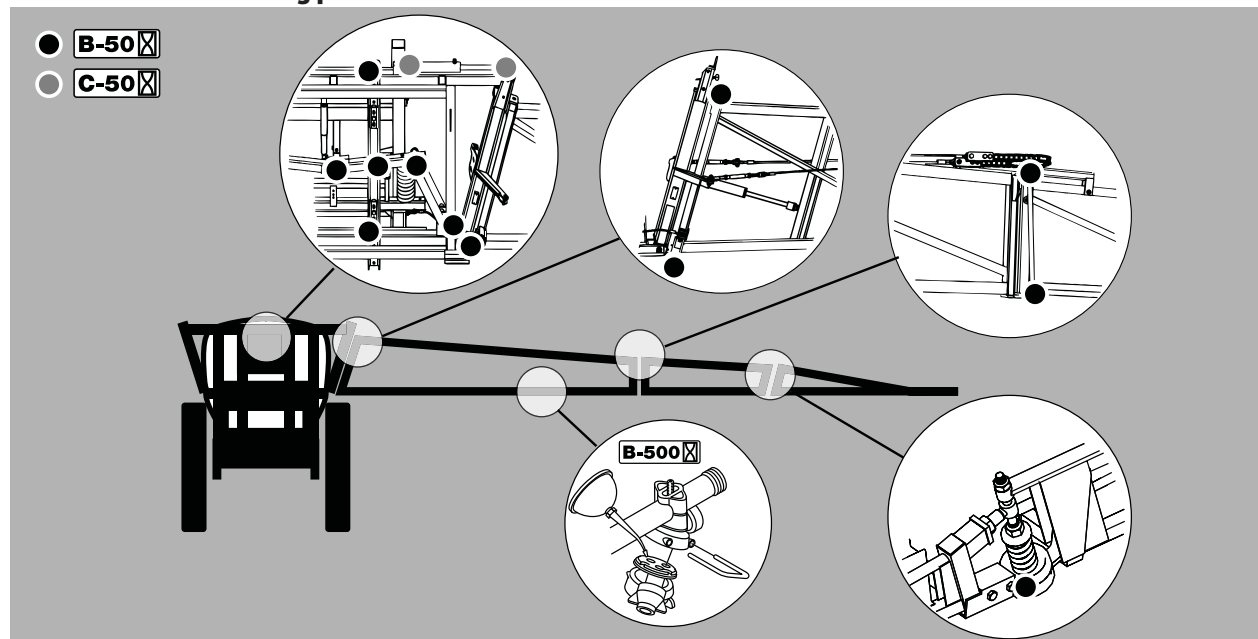
Lithium grease with Molybdenumdisulphide or graphite  
SHELL RETINAX HDM2  
CASTROL MOLYMAX



#### OIL LUB. POINTS:

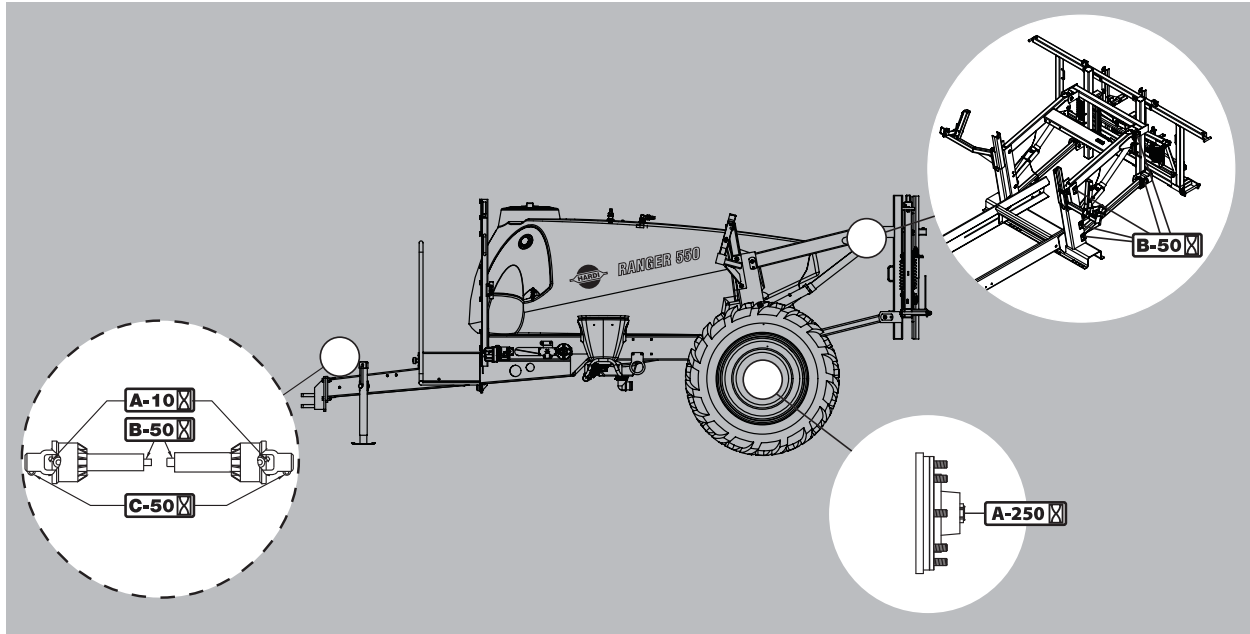
TOTAL Transmission TM  
SAE 80W/90  
Castrol EPX 80W/90  
SHELL Spirax 80W/90  
Mobil Mobilube 80W/90

### Boom lubrication & oiling plan



## 6 - Maintenance

### Trailer lubrication & oiling plan

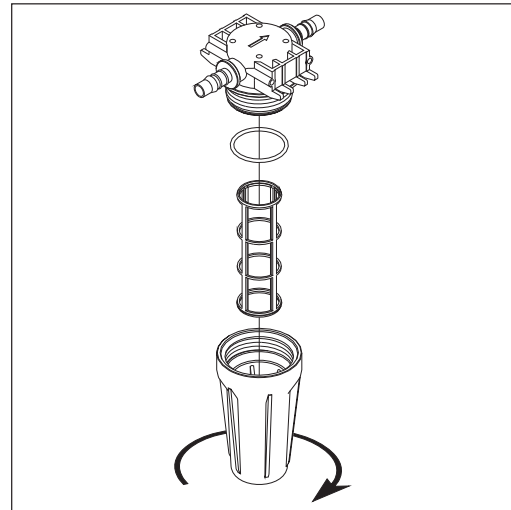


### Service and Maintenance intervals

#### 10 hours service - In-Line filter (optional equipment)

The boom is equipped with In-Line Filters. Unscrew the filter bowl to inspect and clean the filter. When reassembling the O-ring should be greased.

Alternative filter meshes are available. See section on Technical specifications - Filters and nozzles.



#### 10 hours service - Spraying circuit

Fill with clean water, operate all functions and check for leaks using higher spray pressure than normal. Check nozzle spray patterns visually using clean water.

#### 50 hours service - Transmission shaft

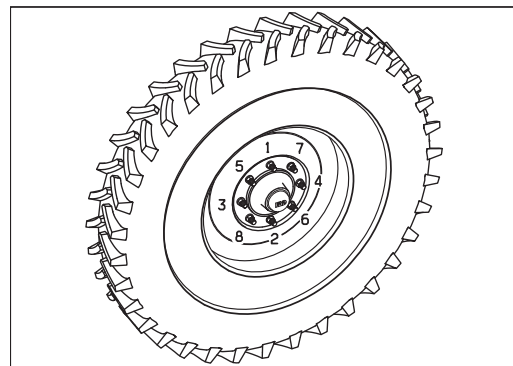
Check function and condition of the transmission shaft protection guard. Replace possible damaged parts.

#### 50 hours service - Wheel bolts and nuts

Tighten wheel bolts and nuts as follows with following torque wrench settings:

Wheel hub to rim plate: 160 Ft/lb (215 Nm)

Tightening sequence: See illustration and tighten in order of numbering.



#### 50 hours service - Tire pressure

Check the tire pressure according to the table in "Technical specifications".



**DANGER!** Never inflate tires more than to the pressure specified in the table. Over-inflated tires can explode and cause severe personal injuries! See the part "Occasional maintenance - Change of tire".



**WARNING!** If replacing tires, always use tires with min. load index as specified.

#### 250 hours service - Readjustment of the boom

See section "Occasional maintenance".

## 6 - Maintenance

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### 250 hours service - Hydraulic circuit

Check the hydraulic circuit for leaks and repair if any.



WARNING! Hoses for boom lifting device must be changed after every 5 years of use.

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### 250 hours service - Hoses and tubes

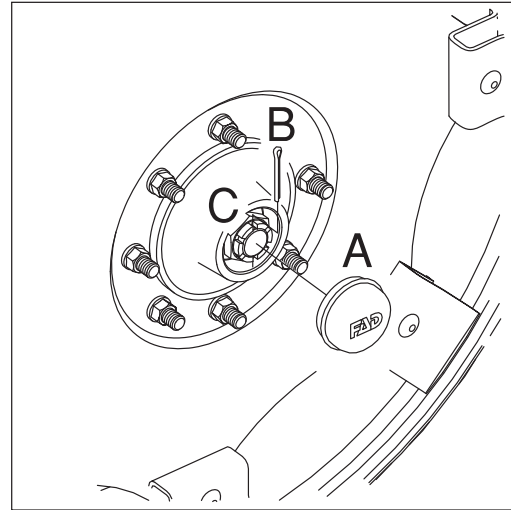
Check all hoses and tubes for possible damages and proper attachment. Replace damaged hoses or tubes.

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### 250 hours service - Wheel bearings

Check for play in the wheel bearings:

1. Place stop wedges in front of and behind LH wheel and jack up RH wheel.
2. Rock the RH wheel to discover possible play in the bearings.
3. If any play, support the wheel axle to prevent the trailer from falling down from the jack.
4. Remove hub cap (A) and cotter pin (B). Turn the wheel and tighten the castle nut (C) until a slight resistance in the wheel rotation is felt.
5. Loosen the castle nut until the first notch - horizontal or vertical is aligned with the cotter pin hole in the shaft.
6. Fit a new cotter pin and bend it.
7. Fill the hub cap with fresh grease and screw it on to the hub again.
8. Repeat the procedure on LH wheel.



### 1000 hours service - Transmission shaft

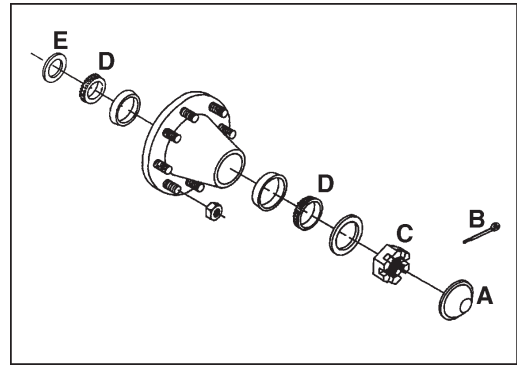
Change the protection tube nylon bearings as described under "Shield replacement on transmission shaft".

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### 1000 hours service - Wheel bearings

Check the condition of the bearings in the following way:

1. Place stop wedges in front of and behind LH wheel and jack up RH wheel.
2. Support the trailer with axle stands.
3. Remove the wheel.
4. Remove the hub cap (A), cotter pin (B) and castle nut (C).
5. Pull off the wheel hub assembly. Use a wheel puller if necessary.
6. Remove roller bearings (D), clean all parts in degreasing detergent and dry them. Replace if worn or damaged.
7. Fill the hub and bearings with fresh grease.
8. Assemble the hub and bearings using a new sealing ring (E).
9. Fit castle nut. Rotate hub and tighten castle nut until a slight rotation resistance is felt.
10. Loosen castle nut again until the first notch is aligned with the cotter pin hole in the shaft.
11. Fit a new cotter pin and bend it.
12. Fill the hub cap with fresh grease and carefully press it onto the hub.
13. Replace the wheel and tighten the wheel nuts (See "50 hours service - Wheel bolts and nuts" for torque settings).
14. Tighten again after 10 hours of work. Check the torque every day until it is stabilized.



**ATTENTION!** The shaft has a vertical and a horizontal cotter pin hole. Use the one first aligned with the notch when loosening the castle nut.



**WARNING!** If you do not feel totally confident changing wheel bearings, contact your HARDI® dealer's workshop.

## 6 - Maintenance

### Occasional maintenance

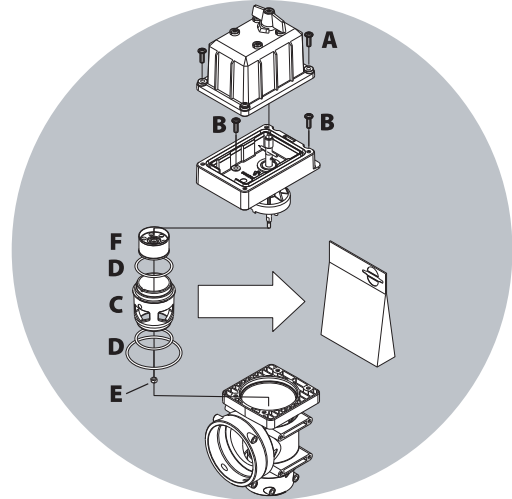
#### General info

The maintenance and replacement intervals for the following will depend very much on the conditions under which the sprayer will be operated and are therefore impossible to specify.

#### Cone check/replacement for pressure regulator

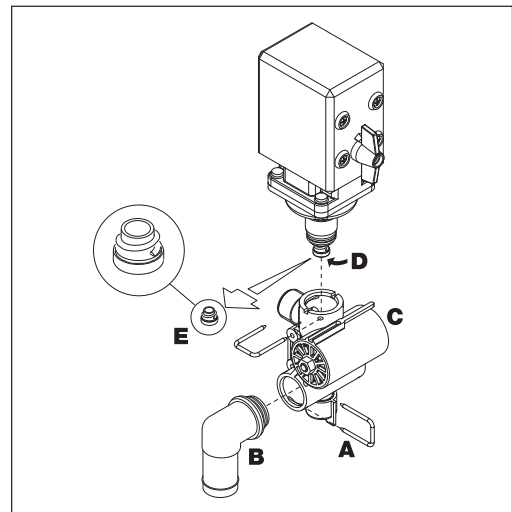
If it becomes difficult to build up sufficient pressure or if pressure fluctuations occur, it may be necessary to replace cone and cylinder. A spare parts kit can be ordered - contact your local dealer to service the unit.

1. Remove 4 x screws (A) and remove the housing.
2. Remove 4 x screws (B) and remove cone.
3. Loosen nut (C) in bottom of the cone.
4. Replace with parts from spare parts kit.
5. Reassemble in reverse order.



#### Cone check/replacement for EVC distribution valve

Periodically check the distribution valves for proper sealing. Do this by running the sprayer with clean water and open all distribution valves. Cautiously remove the clip (A) and pull out the hose (B) for the return line. When the housing is drained, there should be no liquid flow through the return line. If there is any leakage, the valve cone (E) must be changed. Remove the clip (C) and lift the motor housing off the valve housing. Then unscrew the screw (D) and replace the valve cone (E). Reassemble in reverse order.



#### Drain valve seal replacement

If the main tank drain valve leaks, the seal and seat can be changed the following way.



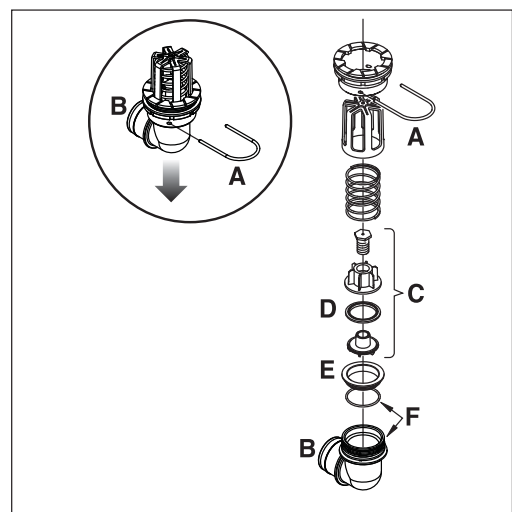
**DANGER!** Do not enter the inside of the tank - the parts can be changed from the outside of the tank!



**WARNING!** Use eye / face protection mask when dismantling the tank drain valve!



**ATTENTION!** Check function of valve with clean water before filling chemicals into the tank.

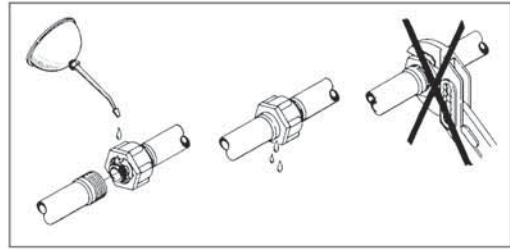




### Nozzle tubes and fittings

Poor seals are usually caused by:

- Missing O-rings or gaskets
- Damaged or incorrectly seated O-rings
- Dry or deformed O-rings or gaskets
- Foreign bodies



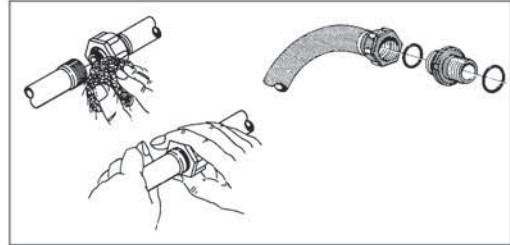
In case of leaks:

DO NOT overtighten. Disassemble, check condition and position of O-ring or gasket. Clean, lubricate and reassemble.

The O-ring must be lubricated ALL THE WAY ROUND before fitting on to the nozzle tube. Use non-mineral lubricant.

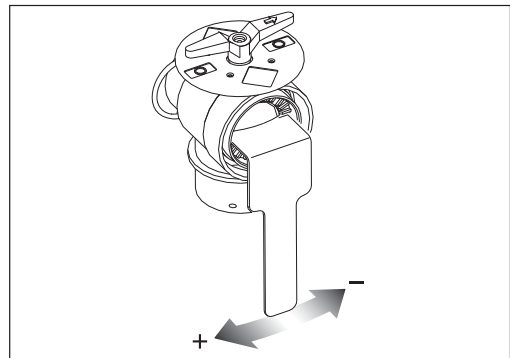
For AXIAL connections, a little mechanical leverage may be used.

For RADIAL connections only hand-tighten them.



### Adjustment of 3-way-valve

The MANIFOLD valve can be adjusted if it is too tight to operate - or if it is too loose (=liquid leakage). Correct setting is when the valve can be operated smoothly by one hand. Use a suitable tool and adjust the toothed ring inside the valve as shown on the drawing.



### Readjustment boom - general info

Before commencing adjustment jobs please go through this check list.

1. The sprayer must be well lubricated (see part about lubrication).
2. Connect the sprayer to the tractor.
3. Place tractor and sprayer on level ground (horizontal).
4. Unfold boom.
5. Set slanting angle to neutral position (horizontal).
6. Adjustment of hydraulic cylinders are done without pressure in the system.

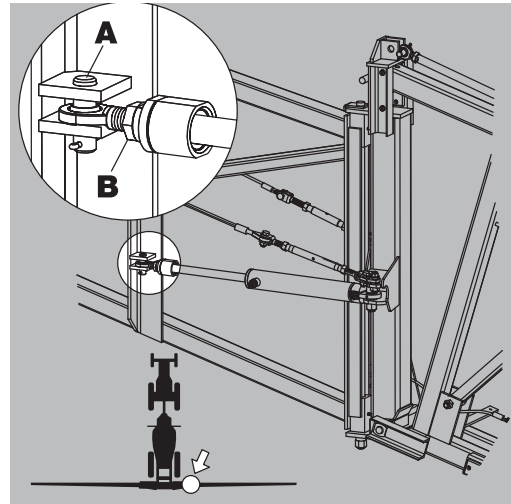


WARNING! Nobody is allowed to be under the boom while adjustment is carried out.

## 6 - Maintenance

### Alignment of center and inner wing sections

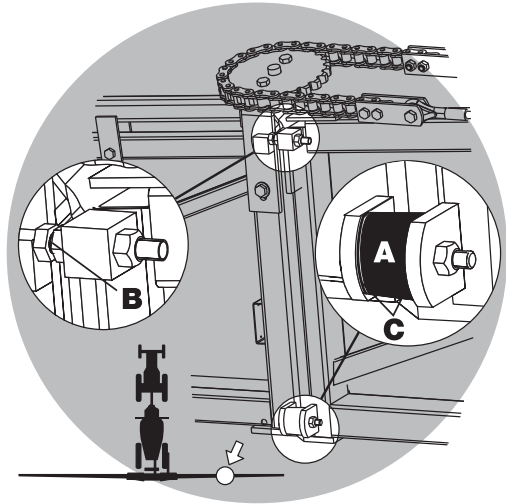
1. Unfold the boom and check alignment of the inner section with the center section.
2. If adjustment is necessary, relieve pressure from the cylinder by folding the boom a few inches.
3. Disconnect cylinder rod eye (A) from the inner section. Note that some cylinder rods have a machined flat which can be used for adjustments. If using this one for adjustment, leave the rod eye pinned to the boom.
4. Loosen jam nut (B) and adjust the length of the rod eye (A). IN = to move the boom forward OUT = to move the boom rearward
5. Tighten the jam nut (B) again. (Reattach the cylinder rod to the boom again, if it has been loosened).
6. Pressurize the cylinder to check boom alignment.



### Alignment of inner and outer wing sections

1. Unfold the boom and check that the boom wing is aligned. If adjustment is needed:
2. Remove rubber stop (A) from the inner section.
3. Adjust the position of the adjusting bolt (B) on the inner section so that the cap of the bolt head (B) contacts top stop plate on outer section with inner and outer sections aligned. Tighten it in this position.
4. Replace stop device (A).

Please note that the rubber stop (A) should be compressed  $1/8'' - 3/16''$  (3-5 mm). Therefore, check that the distance between the tabs (C) is a little less than the length of the rubber stop itself. The rubber stop may need to be spaced out with 1 or more flat washers in order to obtain correct compression. Tighten nut to hold it in place.



### Adjusting the front fold cable

The performance of the SPB boom while spraying depends very much on the front fold cable adjustment. A correctly adjusted cable will also control the movement of the outer section.



**WARNING!** The rear cable can snap and injure you or someone else if tensioned when the boom is unfolded. Always adjust the front cable first - with the boom unfolded and the rear cable last - with the boom folded in transport position.

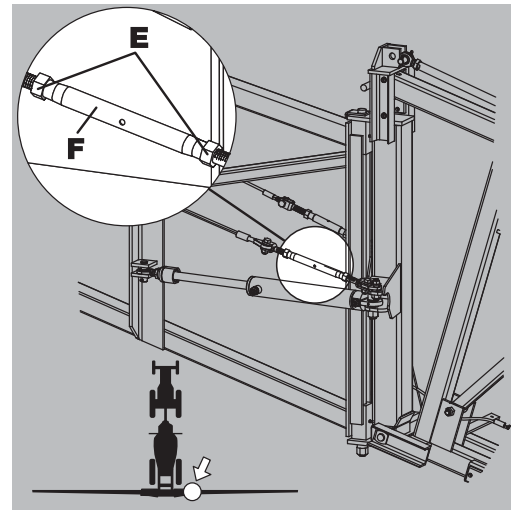
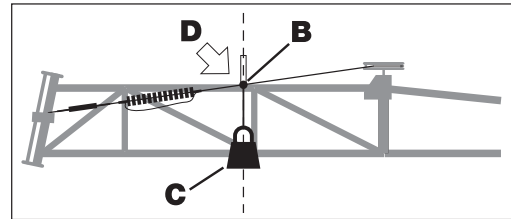
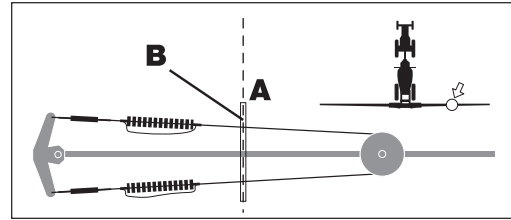
1. Unfold the boom.
2. Check security of turnbuckle anchors to its hinges.
3. Slide a straight edge (A) down the underside of the inner section until it contacts the front cable = contact point (B).
4. Suspend a 10 lb (4.5 kg) weight (C) from the straight edge-to-cable contact point (B) and check deflection by measuring the distance from the straightedge to the cable (D). Cable should deflect .25 - .50 in. (13-22 mm).

If adjustment is needed:

5. Loosen jam nuts (E) on the turnbuckle assembly and adjust turnbuckle (F) for proper cable deflection.
6. Tighten jam nuts (E) again and remove weight.



**WARNING!** Check boom alignment again. If front cable was tightened, the wing assembly will move a bit forward. If front cable was loosened, the wing assembly will move a bit rearward. Therefore, adjust fold cylinder, if necessary, as described in the section 'Alignment of center section and inner wing sections'.



### Breakaway section adjustment

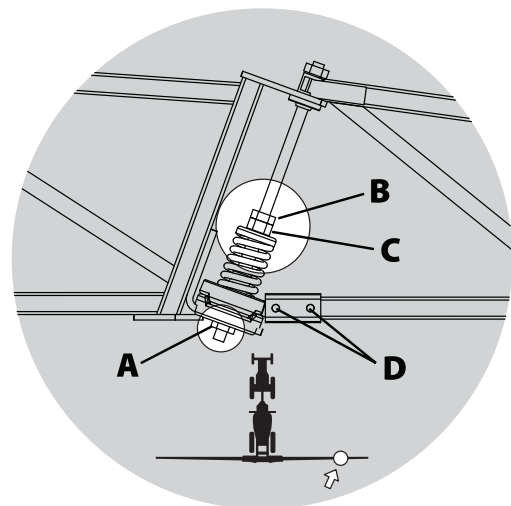
The function of the breakaway section is to prevent or reduce boom damage, should it strike an object or the ground.

Check that the lower nut (A) is fully tightened. The breakaway should release with a force of 18 lbs (80 N) at the extremity. Please note that the clutch must be well greased before adjustment is commenced.

To adjust, loosen jam nut (B). Tighten nut (C) to stiffen clutch action. Tighten jam nut (B) after adjustment.



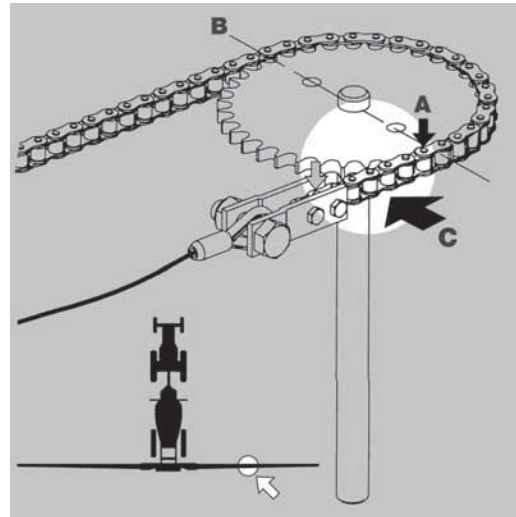
**ATTENTION!** Properly lubricate clutch assembly before adjusting the tension. Bolts (D) must be torqued to 40 Ft/lb (55 Nm) every 40 hours to prevent boom damage. Lubricate every 8 hours to ensure maximum performance and life.



## 6 - Maintenance

### Check/adjust sprocket timing

1. Unfold the boom and stand on its rear side.
2. Check that the pin connection (A) in the timing chain is aligned with the center line (B) between the sprocket. Note forward driving direction (C) - adjustment is done at rearside of the boom. (A) is the 7th pin connection on the chain.
3. To adjust timing, loosen turnbuckles on the front and rear cables until slack.
4. Line up the chain and sprocket as indicated in step 2 above.



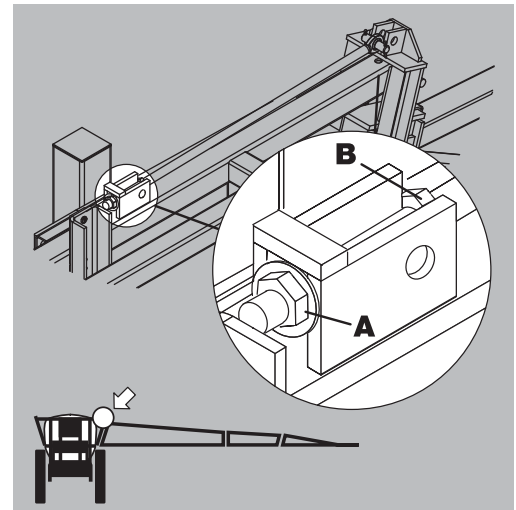
### Adjusting boom level to ground

Unfold the boom and check that the boom sections are parallel to the center frame and level to the ground. Adjust if necessary, as described below. Adjustment is carried out with the boom unfolded.

For SPB-HY/HV models the following procedure is used:

1. Loosen jam nut (A).
2. Adjust nut (B) - in or out - until boom wing is level to the ground.
3. Secure jam nut (A) again.

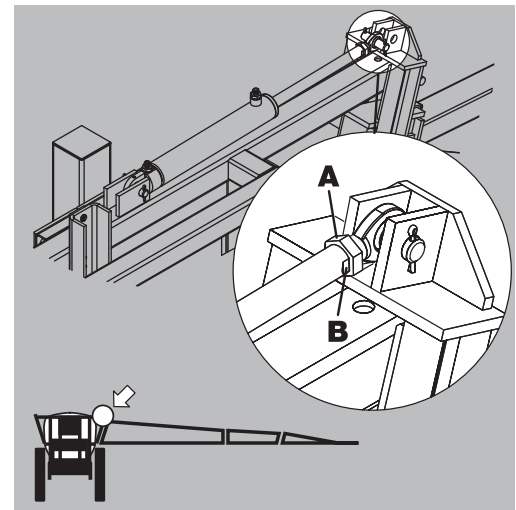
Same procedure applies to both sides.



For SPB-HZ models the following procedure is used:

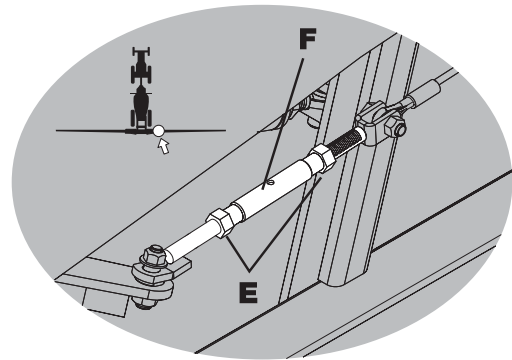
1. Ensure that cylinder is fully extended.
2. Loosen jam nut (A).
3. Apply an adjustable wrench to the machined surface at (B).
4. Turn the cylinder rod until boom is level to the ground.
5. Secure jam nut (A) again.

Same procedure applies to both sides.



### Adjusting rear cable

1. Raise boom to its highest position. Fold it to transport position with tilt cylinders fully extended. Make sure that fold cylinders are pressurized and that the boom is folded all the way in.
2. Ensure the boom transport brackets are in contact with the outer wing. Adjust if necessary.
3. Loosen the jam nuts (E) on the ends of turnbuckle (F). Adjust the turnbuckle (F) so that the outer section contacts the boom transport bracket.



Turn the turnbuckle another 4 complete turns.

4. Secure jam nuts (E) again.

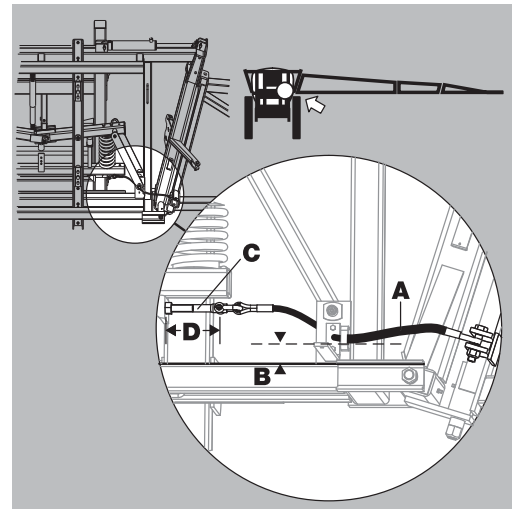


**WARNING!** The rear cable can snap and injure you or someone else if tensioned when the boom is unfolded. Always adjust the front cable first - with the boom unfolded and the rear cable last - with the boom folded in transport position.

### Adjusting center section cables

The center section cables keep the center frame in correct position during folding procedure or when spraying with one side raised and folded (SPB-HV/HZ only).

1. Fold the boom into transport position.
2. Check that the tilt cylinders are completely extended. Adjust if necessary (SPB-HZ only).
3. Check that center section cable (A) is routed over center section nozzle bracket (B).
4. Loosen jam nuts on the bolt assembly (C). This applies both boom wings.
5. Adjust the threaded bolt(s) (C). Alternate from side-to-side while making adjustments. As a guideline for adjustment, the distance (D) shown at the bolt assembly should be 4-5/16" (110 mm). Properly adjusted cables will be very tight and only deflect a small amount (fractions of an inch) when pulled by hand. Note that cables will be loose when the boom is unfolded.
6. Tighten jam nuts on the bolt assembly (C) again.
7. Unfold the boom and inspect that the center frame is correctly centered.



**ATTENTION!** Adjust both boom wings in one sequence. Adjust one cable a small amount at the time, and then the other cable, to equalize cable tension and maintain a level center frame.



**WARNING!** Never adjust the center cables without having folded the boom all the way into the transport position.

### Shock absorbers

If the shock absorbers lose their efficiency or start leaking oil, they should be replaced.

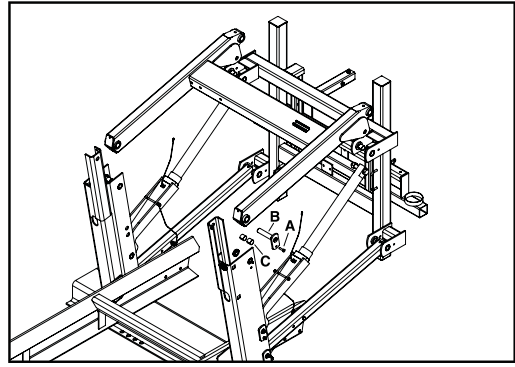
## 6 - Maintenance

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### Wear bushing replacement on boom lift

The wear bushings are inspected and replaced before they are worn through.

1. Connect the trailer to a tractor and unfold the booms to working position.
2. Lift the boom center frame with a lifting device and support it until the load is taken off the parallelogram arms.
3. The upper arms must be disconnected simultaneously.
4. Remove the screws (A), and pull out the pins (B) for the upper parallelogram arms and replace the wear bushings (C).
5. Replace the arms.
6. Repeat this procedure with each of the lower arms.
7. Grease all grease nipples.
8. Remove the lifting gear again.



### Change of tire

Should it be necessary to replace tires, it is recommended to leave this to a specialist and follow the mentioned rules.

1. Always clean and inspect the rim before mounting.
2. Always check that the rim diameter corresponds exactly to the rim diameter molded on the tire.
3. Always inspect inside of the tire for cuts, penetrating objects or other damages. Repairable damages should be repaired before installing the tube. Tires with unrepairable damages must never be used.
4. Also inspect inside of the tire for dirt or foreign bodies and remove it before installing the tube.
5. Always use tubes of recommended size and in good condition. When fitting new tires always fit new tubes.
6. Before mounting, always lubricate both tire beads and rim flange with approved lubricating agent or equivalent anticorrosion lubricant. Never use petroleum based greases and oils because they may damage the tire. Using the appropriate lubricant the tire will never slip on the rim.
7. Always use specialized tools as recommended by the tire supplier for mounting the tires.
8. Make sure that the tire is centered and the beads are perfectly seated on the rim. Otherwise danger of bead wire tear can occur.
9. Inflate the tire to 15-19 p.s.i. (100-130 kPa) then check whether both beds are seated perfectly on the rim. If any of the beads do not seat correctly, deflate the assembly and re-center the beads before starting inflation of the tire. If the beads are seated correctly on the rim at 15-19 p.s.i., inflate the tire to a maximum of 36 p.s.i. (250 kPa) until they seat perfectly on the rim.
10. Never exceed the maximum mounting pressure molded on the tire!
11. After mounting tires adjust inflation pressure to operation pressure recommended by the tire manufacturer.
12. Do not use tubes in tubeless tires.



**DANGER!** Non observance of mounting instructions will result in the bad seating of the tire on the rim and could cause the tire to burst leading to serious injury or death!



**DANGER!** Never mount or use damaged tires or rims! Use of damaged, ruptured, distorted, welded or brazed rim is not allowed!

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### Change of bulbs

1. Switch off the light.
2. Loosen the screws on the lamp and remove the cover or lens.
3. Remove the bulb.
4. Fit a new bulb, refit the cover and tighten the screws.



**ATTENTION!** If halogen bulbs are used, never touch the bulb with the fingers. Natural moisture in the skin will cause the bulb to burn out when the light is switched on. Always use a clean cloth or tissue when handling halogen bulbs.

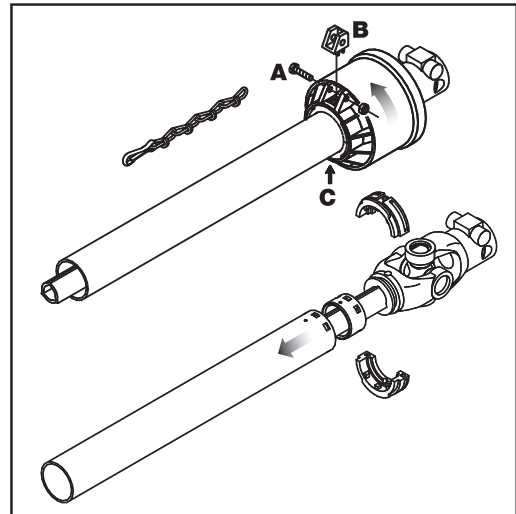
## 6 - Maintenance

### Shield replacement on transmission shaft

1. Remove bolt (A), lock (B) and grease nipple (C). Twist uni CV-joint cover 1/4 turn and pull it backwards.
2. Remove the synthetic bearings and protection tube.
3. Remove inner bush from protection tube.
4. Assemble again in reverse order, using new parts where necessary. Remember to fit chains again.
5. Grease bearings.
6. Repeat procedure to the opposite part of the transmission shaft.

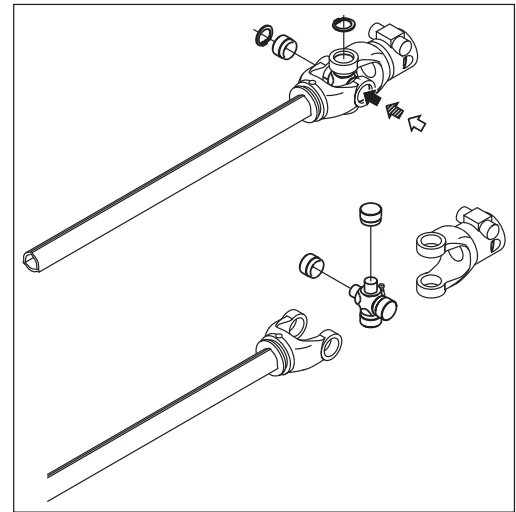


ATTENTION! Only use genuine HARDI® spare parts to service the transmission shaft.



### Replacement of transmission shaft cross journals.

1. Remove protection guard as described previously.
2. Remove Seeger circlip rings.
3. Press the cross journal sideways - use hammer and mandrel if necessary.
4. Remove needle bearing cups and cross journal can now be removed.
5. Carefully remove needle bearing cups from new cross journal and install it in reverse order. Before fitting the needle bearing cups again, check that needles is placed correctly. Avoid dust and dirt in the new bearings.
6. Repeat procedure to the opposite part of the transmission shaft.





### Off-season storage

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#### Off-season storage program

When the spraying season is over, you should devote some extra time to the sprayer. If chemical residue is left over in the sprayer for longer periods, it can reduce the life of the individual components. To preserve the sprayer intact and to protect the components, carry out following off-season storage program.

1. Clean the sprayer completely - inside and outside - as described under "Operation - Cleaning". Make sure that all valves, hoses and auxiliary equipment have been cleaned with detergent and flushed with clean water afterwards, so no chemical residue is left in the sprayer.
2. Replace possible damaged seals and repair possible leaks.
3. Empty the sprayer completely. Operate all valves and handles to drain as much water off the spraying circuit as possible. Let the pump run until air is coming out of all nozzles. Remember to drain the flush tank also.



**ATTENTION!** Do not run pump dry for longer than 3 seconds. Otherwise severe damage to the pump will occur.

4. Pour appr. 13 gal. (50 liters) anti-freeze mixture consisting of 1/3 automotive anti-freeze and 2/3 water into the tank.
5. Engage the pump and operate all valves and functions on the pressure side of the system (including chemical inductor if installed), allowing the anti-freeze mixture to be distributed around the entire circuit. Open the operating unit main on/off valve and distribution valves so the anti-freeze is sprayed through the nozzles as well. The anti-freeze will also prevent O-rings, seals, diaphragms etc. from drying out.
6. Lubricate all lubricating points according to the lubricating scheme - regardless of intervals stated.
7. When the sprayer is dry, remove rust from possible scratches or damages in the paint and touch up the paint.
8. Remove the glycerine-filled pressure gauges and store them frost free in vertical position.
9. Apply a thin layer of anti-corrosion oil (e.g. SHELL ENSIS FLUID, CASTROL RUSTILLO or similar) on all metal parts. Avoid oil on rubber parts, hoses and tires.
10. Fold the boom in transport position and relieve pressure from all hydraulic functions.
11. All electric plugs and sockets are to be stored in a dry plastic bag to protect them against damp, dirt and corrosion.
12. Remove the control boxes and computer display from the tractor, and store them dry and clean (in-house).
13. Wipe hydraulic snap-couplers clean and fit the dust caps.
14. Apply grease on all hydraulic ram piston rods which are not fully retracted in the barrel to protect against corrosion.
15. Chock up the wheels, to prevent moisture damage and deformation of the tires. Tire blacking can be applied to the tire walls to preserve the rubber.
16. To protect against dust the sprayer can be covered by a tarpaulin. Ensure ventilation to prevent condensation.

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#### Preparing the sprayer for use after storage

After a storage period the sprayer should be prepared for the next season the following way:

1. Remove the cover.
2. Remove the support from the wheel axle and adjust the tire pressure.
3. Wipe off the grease from hydraulic ram piston rods.
4. Fit the pressure gauges again. Seal with Teflon tape.
5. Connect the sprayer to the tractor including hydraulics and electric's.
6. Check all hydraulic and electric functions.
7. Empty the tank for remaining anti-freeze.
8. Rinse the entire liquid circuit on the sprayer with clean water.
9. Fill with clean water and check all functions.



### Operational problems

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#### General info

In cases where breakdowns have occurred, the same factors always seem to come into play:

1. Minor leaks on the suction side of the pump will reduce the pump capacity or stop the suction completely.
2. Clogged up pressure filters will result in increasing pressure at the pressure gauge but lower pressure at the nozzles.
3. Foreign bodies stuck in the pump valves with the result that these cannot close tightly against the valve seat. This reduces pump efficiency.
4. Poorly reassembled pumps will allow the pump to suck air resulting in reduced or no capacity.
5. Hydraulic components that are contaminated with dirt result in rapid wear to the hydraulic system.

Therefore ALWAYS check:

1. Pressure and nozzle filters are clean.
2. Hoses for leaks and cracks, paying particular attention to suction hoses.
3. Gaskets and O-rings are present and in good condition.
4. Pressure gauge is in good working order. Correct dosage depends on it.
5. Operating unit functions properly. Use clean water to check.
6. Hydraulic components are maintained clean.

## 7 - Fault finding

### Liquid system

| FAULT                              | PROBABLE CAUSE  | CONTROL/REMEDY  |
|------------------------------------|---|---|
| No spray from boom when turned on. | Air leak on suction line.<br>Air in system.<br>Pressure filters clogged.                          | Check suction hose and fittings.<br>Bleed air from centrifugal pump.<br>Clean filters.<br>Check for obstruction near tank sump elbow fitting.   |
| Lack of pressure.                  | Incorrect assembly.<br>Defective pressure gauge.  | Check for obstruction near tank sump elbow fitting.<br>Check for dirt at inlet of gauge.  |
| Pressure dropping.                 | Filters clogging.<br>Nozzles worn.<br>Tank is air tight.<br>Sucking air towards end of tank load. | Clean all filters. Fill with cleaner water. If using powders, make sure agitation is on.<br>Check flow rate and replace nozzles if it exceeds 10%.<br>Check vent in tank lid is clear.<br>Reduce pump speed.  |
| Pressure increasing.               | Pressure filters beginning to clog.   | Clean all filters.  |
| Formation of foam.                 | Air is being sucked into system.<br>Excessive liquid agitation.                                   | Check tightness/gaskets/O-rings of all fittings on suction side.<br>Reduce pump speed.<br>Ensure returns inside tank are present.<br>Use foam damping additive.   |
| Operating unit not functioning.    | Blown fuse(s).<br><br>Wrong polarity.<br>Valves not closing properly.<br><br>No power.            | Check mechanical function of microswitches. Use cleaning/lubricating agent if the switch does not operate freely.<br>Check motor. 450-500 milli-Amperes max. Change motor, if over.<br>Brown - pos. (+). Blue - neg. (-).<br>Check valve seals for obstructions.<br>Check microswitch plate position. Loosen screws holding plate 1/2 turn.<br>Wrong polarity. Check that brown is pos. (+), Blue is neg. (-).<br>Check print plate for dry solders or loose connections.<br>Check fuse holder are tight around fuse. |

## 7 - Fault finding

### Hydraulic system - HY model.

| FAULT                | PROBABLE CAUSE                                   | CONTROL/REMEDY   |
|----------------------|--|--|
| Boom slow/erratic.   | Air in system.                                   | Loosen ram connection and activate hydraulics until oil flow has no air in it (not whitish). |
|                      | Insufficient hydraulic pressure.                 | Check output pressure of tractor hydraulics. Minimum for sprayer is 2000 psi (130 bar).      |
|                      | Insufficient amount of oil in tractor reservoir. | Check and top if needed.   |
| Ram not functioning. | Restrictor blocked.                              | Secure boom. Dismantle and clean. Change hydraulic oil & filter.                             |

### Hydraulic system - HV/HZ model.

| FAULT   | PROBABLE CAUSE                                   | CONTROL/REMEDY   |
|---|--|--|
| No boom movements when activated.                       | Insufficient hydraulic pressure.                 | Check output pressure of tractor hydraulics. Minimum for sprayer is 2000 psi (130 bar).  |
|   | Insufficient amount of oil in tractor reservoir. | Check and top if needed.   |
|   | Blown fuse(s).                                   | Check / replace fuse in junction box.  |
|   | Bad / corroded electrical connections.           | Check / clean connections, multi plugs, etc.   |
|   | Insufficient power supply.                       | Voltage on activated solenoid valve must be more than 8 Volts. Use wires of at least 10 awg. (4mm <sup>2</sup> ) for power supply. |
|   | Defective relay / diodes in junction box.        | Check relays, diodes and soldering at PCB in junction box.   |
| Ram not functioning.                                    | Restrictor blocked.                              | Secure boom. Dismantle and clean. Change hydraulic oil & filter.   |
| Hydraulic system fold/tilt functions will not operate.  | Power supply.                                    | Check for proper 12V power supply.   |
| One function (fold or tilt) will not operate.           | Various.   | Check for defective switch(es).  |
|   |  | Check continuity of cables.  |
|   |  | Check for operation of applicable solenoid (coil not activating or plunger stuck).   |
|   |  | Check for short circuit in wiring junction box at rear of sprayer.   |
| Multiple hydraulic functions with one switch activated. | Various.   | Dirt in the restrictor port of the cylinder.   |
|   |  | Check for correct solenoid electric/hydraulic hook-up.   |
|   |  | Check for short circuit in wiring in the junction box at rear of sprayer.  |

## 7 - Fault finding

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### Mechanical problems

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#### Mechanical problems

| <b>FAULT</b>   | <b>PROBABLE CAUSE</b> | <b>CONTROL/REMEDY</b>  |
|--|-----------------------|--|
| Boom will not fold in or out.  | Cylinder.             | Adjust the fold cylinder.  |
| Boom will not fold completely.   | Cables.               | Check adjustment of center cables.   |
| Boom not aligned.  | Cables.               | Adjust and grease complete boom cables and stops.  |
| Boom will not stay in spraying position.                                 | Various.              | Check for hydraulic leaks through solenoid block.<br>Check for a solenoid that is stuck open.  |
| Wing to be kept folded swings out when unfolding other side of the boom. | Various.              | Boom must be completely unfolded - then fold out the desired boom wing.<br>Check for hydraulic leaks through solenoid block.<br>Check for a solenoid that is stuck open. |

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#### Emergency operation - Liquid system

In case of power failure it is possible to operate all functions of the operating unit manually. First disconnect the multi plug from the control box. Now manually turn the emergency control knobs.

The problem may be due to a blown fuse. A fuse is placed inside the box. Fuse type: Thermo

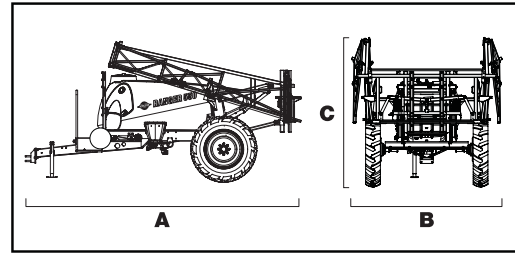
## 8 - Technical specifications

### Dimensions

#### Overall dimensions

| Ranger 550       | SPB Boom |
|------------------|----------|
| A - Total length | 17' 2"   |
| B - Total width  | 10' 0"   |
| C - Total height | 9' 4"    |

All measurements are in feet and inches.



#### Tank capacities

|                           |                           |
|---------------------------|---------------------------|
| Main tank capacity        | 550 gallons (2000 Liters) |
| Clean water tank capacity | 5 gallons (20 Liters)     |
| Flush tank capacity       | 63 gallons (240 Liters)   |
| Foam marker tank capacity | 15 gallons (57 Liters)    |

#### Weight

Ranger 550 :

|                       | Total | Drawbar | Axle | Per tire |
|-----------------------|-------|---------|------|----------|
| Unfolded empty        | 1574  | 39      | 1535 | 768      |
| Folded empty          | 1574  | 163     | 1411 | 705      |
| Unfolded full (water) | 4449  | 831     | 3618 | 1809     |
| Folded full (water)   | 4449  | 955     | 3494 | 1747     |

All measurements are approximate - in pounds (lbs)

#### Wheel and axle dimensions

| Wheel      | Min. track width | Max. track width | Clearance*   |
|------------|------------------|------------------|--------------|
| 12.4 x 28" | 60" (1520 mm)    | 90" (2250 mm)    | 24" (610 mm) |

\*under axle

## 8 - Technical specifications

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### Specifications

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#### Pump model ACE 206 hydraulic

Output will vary with PSI and usage.

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#### Pump model ACE 150 PTO drive

Output will vary with PSI and usage.

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#### Filters and nozzles

Filter gauze width

30 mesh: 0.58 mm

50 mesh: 0.30 mm

80 mesh: 0.18 mm

100 mesh: 0.15 mm

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#### Temperature and pressure ranges

Spray liquid:

Operating temperature range: 36° F to 104° F (2° to 40° C )

Max. pressure: 120 psi (8 bar)

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#### Tire pressure

| Tire size | Rec. inflation pressure in p.s.i. (bar) |
|-----------|---|
| 12.4 x 28 | 24 (1.65)                               |

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DANGER! Never inflate tires more than to the pressure specified in the table. Over-inflated tires can explode and cause severe personal injuries! See the part "Occasional maintenance - Change of tire".



### Materials and recycling

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#### Disposal of the sprayer

When the equipment has completed its working life, it must be thoroughly cleaned. The tank, hose and synthetic fittings can be incinerated at an authorized disposal plant. The metallic parts can be scrapped. Always follow local legislation regarding disposal.

Materials used:

Tanks: HDPE

Frame etc.: Steel

Pump: Cast iron

Hoses (suction): PVC

Hoses (pressure): EPDM

Valves: Glass reinforced PA Filters: PP

Nozzles: Unfilled POM

Fittings: Glass reinforced PA

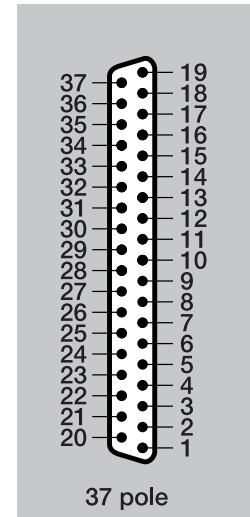
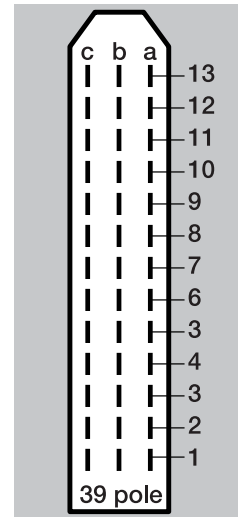
## 8 - Technical specifications

### Electrical connections

#### Electrical connections for SPRAY II

39 or 37 poled plug with cable.

| 39-pole  | 37-pole       | SPRAY II            |
|----------|---------------|---------------------|
| 1a       | 5             | S1+                 |
| 1b       | 6             | S1-                 |
| 1c       | 26            | End nozzle L        |
| 2a       | 7             | S2+                 |
| 2b       | 8             | S2-                 |
| 2c       | 25            | End nozzle R        |
| 3a       | 9             | S3+                 |
| 3b       | 10            | S3-                 |
| 3c       | 29            | +12V sensor         |
| 4a       | 11            | S4+                 |
| 4b       | 12            | 34-                 |
| 4c       | 4             | PWM 1TX             |
| 5a       | 14            | S5+                 |
| 5b       | 15            | S5-                 |
| 5c       | 27            | GND                 |
| 6a       | 16            | S6+                 |
| 6b       | 17            | S6-                 |
| 6c       | 13            | Optional 5 Reg.     |
| feedback |               |                     |
| 7a       | 18            | S7+                 |
| 7b       | 19            | S7-                 |
| 7c       | 33            | Option 1 4-20mA     |
| 8a       | 37            | S8+                 |
| 8b       | 36            | S8-                 |
| 8c       | 32            | Option 2 Frq        |
| 9a       | 35            | S9+/Air angle 0-5V  |
| 9b       | 34            | S9-/Fan speed 0-5V  |
| 9c       | not connected | Option 3/Tank gauge |
| 10a      | 21            | On/off+             |
| 10b      | 22            | On/off-             |
| 10c      | not connected | PWM Output option   |
| 11a      | 23            | Pressure+           |
| 11b      | 24            | Pressure-           |
| 11c      | 28            | Flow                |
| 12a      | 20            | Foam blob 0-5V      |
| 12b      | 1             | option 4 Rx         |
| 12c      | 31            | Speed               |
| 13a      | 3             | FM L                |
| 13b      | 2             | FM R                |
| 13c      | 30            | Gnd sensor          |

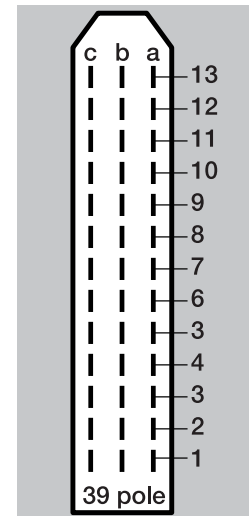
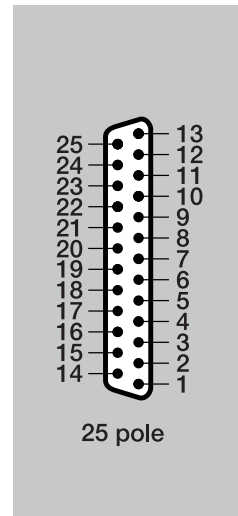


## 8 - Technical specifications

### Electrical connections for hydraulic control box

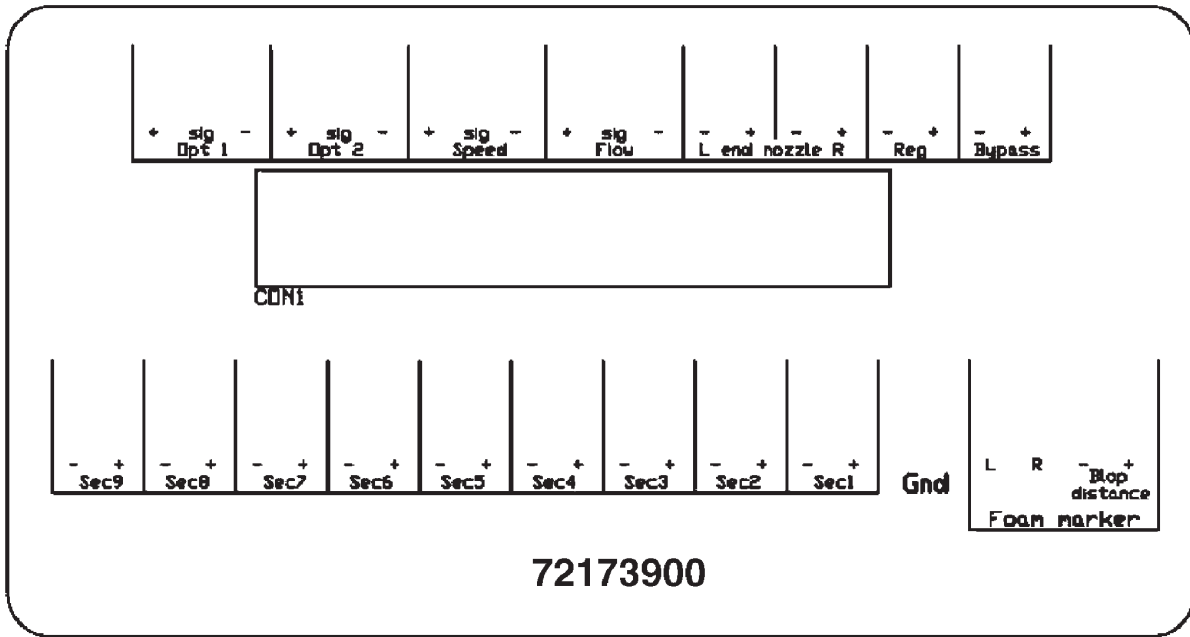
25 or 39 poled plug with cable.

| Wire color   | 25-pole  | 39-pole | Function      | PCB            |
|--------------|----------|---------|---------------|----------------|
| Red          | 13       | 2b      | Option H (hy) | Slant R down   |
| Brown/Blue   | 25       | 13a     | Option I (hy) | Slant L down   |
| White        | 1        | 9c      |               | Flow reverse   |
| Black        | 14       | 10c     |               | Flow forward   |
| White/Black  | 22       | 11b     | Tilt L up     |                |
| White/Red    | 21       | 2c      | Tilt L down   |                |
| White/Pink   | 19       | 1c      | Tilt R up     |                |
| White/Blue   | 20       | 5c      | Tilt R down   |                |
| White/Grey   | 18       | 13c     | Lift up       | Fold inner in  |
| White/Yellow | 17       | 12c     | Lift down     | Fold inner out |
| Brown/Red    | 23       | 7c      | Fold L out    |                |
| Brown/Yellow | 24       | 8c      | Fold L in     |                |
| Violet       | 15       | 9a      | Fold R out    |                |
| White/Green  | 16       | 9b      | Fold R in     |                |
| Pink/Brown   |          | 3b      | Option E      |                |
| Red/Blue     |          | 3a      | Option G      |                |
| Brown        | 7        | 1a      |               | Ground         |
| Green        | 8        | 1b      |               | Ground         |
| Yellow       | 9        | 3c      |               | Ground         |
| Grey         | 10       | 5a      |               | Ground         |
| Pink         | 11       | 5b      |               | Ground         |
| Blue         | 12       | 6c      |               | Ground         |
| Grey/Pink    | 2        | 4a      | Hy Bypass     | Pend Lock      |
| Brown/Green  | Not used |         |               |                |
| Grey/Brown   | Not used |         |               |                |



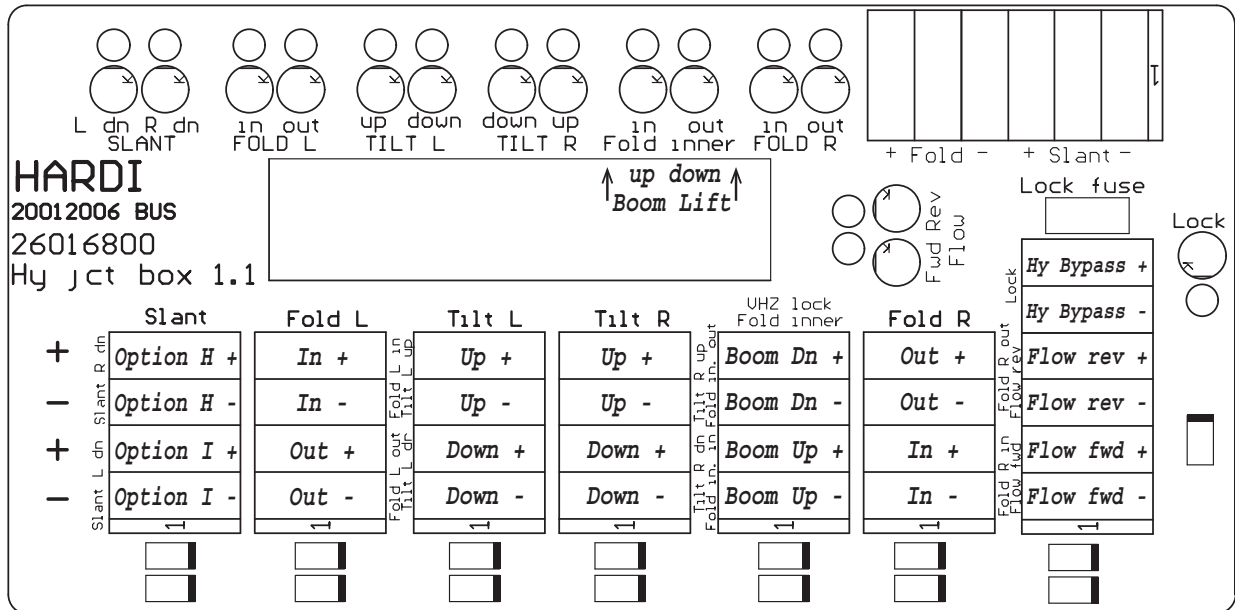
## 8 - Technical specifications


### EVC





When connecting an optional function, be aware that maximum current for every connector is 2 Amp. Total current for the whole connector box may not exceed 10 Amp.

### Hydraulic box



 ATTENTION: The "Fold inner" function printed on the circuit board is used for the "Boom Lift" function of the HV/HZ hydraulic circuits.

 ATTENTION: The "Lock" function printed on the circuit board is used for the "Hy Bypass" function of the HV/HZ hydraulic circuits.

 ATTENTION: The functions shown above in italics (i.e. "Boom Up") are not printed on the circuit board, but are shown for identification purposes.

## 8 - Technical specifications

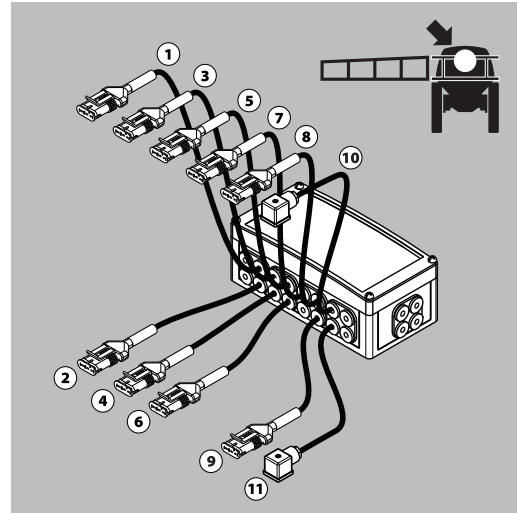
| <b>HC 2500</b> | <b>Function</b>          |     | <b>+</b> | <b>Sig.</b> | <b>-</b> |    |
|----------------|--------------------------|-----|----------|-------------|----------|----|
| Opt 1          | Pressure sensor          |     | Brn      | Blu         | -        |    |
| Opt 2          | RPM sensor               |     | Brn      | Blu         | Blk      |    |
| Speed          |                          |     | Brn      | Blu         | Blk      |    |
| Flow           |                          |     | Brn      | Blu         | Blk      |    |
| L end nozzle   | Pendulum lock at HAY/LPY |     | Brn      |             | Blu      |    |
| R end nozzle   | Pendulum lock at HAY/LPY |     | Brn      |             | Blu      |    |
| Reg (Yellow)   |                          |     | Brn      |             | Blu      |    |
| Bypass         | EC on/off                |     | Brn      |             | Blu      |    |
| Sec 9          |                          |     | x        |             | x        |    |
| Sec 8          | User defined A&B         |     | x        |             | x        |    |
| Sec 7          |                          |     | Brn      |             | Whi      |    |
| Sec 6          |                          |     | Yel      |             | Gre      |    |
| Sec 5          |                          |     | Brn      |             | Blu      |    |
| Sec 4          |                          |     | Brn      |             | Blu      |    |
| Sec 3          |                          |     | Brn      |             | Blu      |    |
| Sec 2          |                          |     | Brn      |             | Blu      |    |
| Sec 1          |                          |     | Brn      |             | Blu      |    |
|                |                          | Gnd | L        | R           | -        | +  |
| Foam marker    | No. 4 Not used           | Blk | Brn      | Red         |          | Or |

| <b>HC 5500</b> | <b>Function</b>          |     | <b>+</b> | <b>Sig.</b> | <b>-</b> |   |
|----------------|--------------------------|-----|----------|-------------|----------|---|
| Opt 1          | Pressure sensor          |     | Brn      | Blu         | -        |   |
| Opt 2          | RPM sensor or anemometer |     | Brn      | Blu         | Blk      |   |
| Speed          |                          |     | Brn      | Blu         | Blk      |   |
| Flow           |                          |     | Brn      | Blu         | Blk      |   |
| L end nozzle   | Pendulum lock at HAY/LPY |     | Brn      |             | Blu      |   |
| R end nozzle   | Pendulum lock at HAY/LPY |     | Brn      |             | Blu      |   |
| Reg (Yellow)   |                          |     | Brn      |             | Blu      |   |
| Bypass         | EC on/off                |     | Brn      |             | Blu      |   |
| Sec 9          | User defined A&B 2       |     | x        |             | x        |   |
| Sec 8          | User defined A&B 1       |     | x        |             | x        |   |
| Sec 7          | Twin speed               |     | Brn      |             | Whi      |   |
| Sec 6          | Twin angle               |     | Yel      |             | Gre      |   |
| Sec 5          |                          |     | Brn      |             | Blu      |   |
| Sec 4          |                          |     | Brn      |             | Blu      |   |
| Sec 3          |                          |     | Brn      |             | Blu      |   |
| Sec 2          |                          |     | Brn      |             | Blu      |   |
| Sec 1          |                          |     | Brn      |             | Blu      |   |
|                |                          | Gnd | L        | R           | -        | + |
| Foam marker    | No. 4 Not used           | 2   | 6        | 5           | 1        | 3 |

## 8 - Technical specifications

### Plug positions for HV/HZ hydraulics

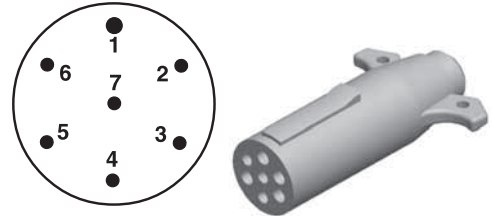
1. Fold left
2. Fold left
3. Tilt left down (HZ only)
4. Tilt left up (HZ only)
5. Tilt right down (HZ only)
6. Tilt right up (HZ only)
7. Boom lift
8. Fold right
9. Fold right
10. Flow reverse
11. Flow forward



### Road traffic lights

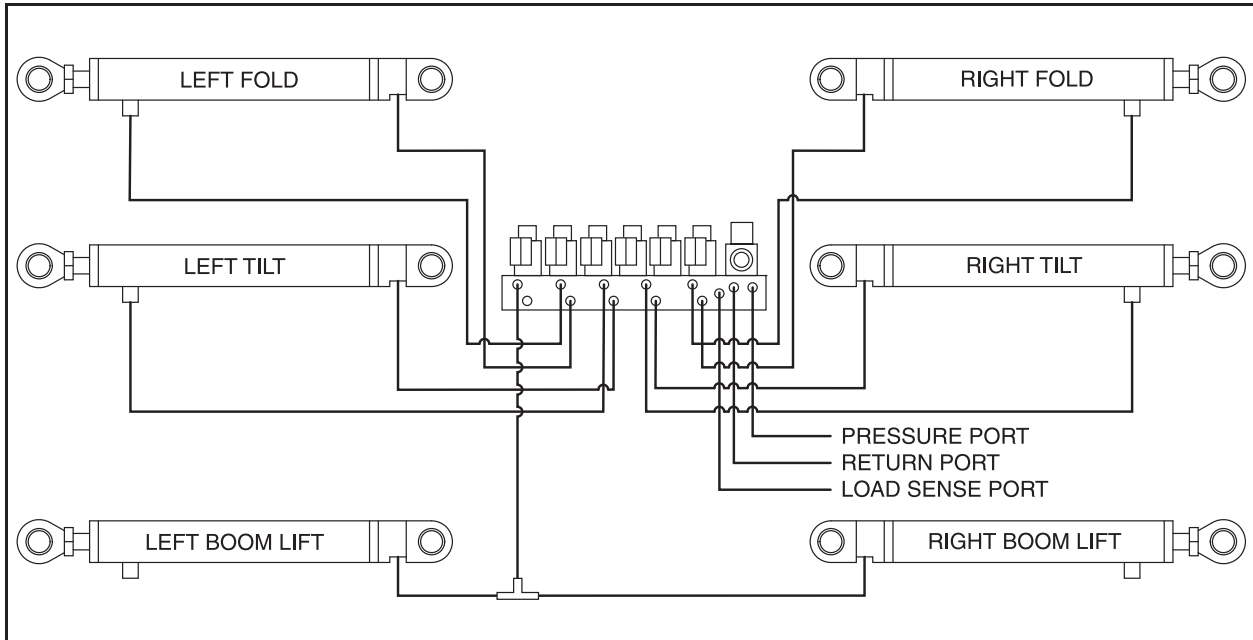
The wiring is in accordance with ANSI/ASAE S279.11.

| Position                        | Wire color |
|---------------------------------|------------|
| 1. Ground                       | White      |
| 2. Work lamps                   | Black      |
| 3. LH flashing & turn indicator | Yellow     |
| 4. Free                         | Red        |
| 5. RH flashing & turn indicator | Green      |
| 6. Free                         | Brown      |
| 7. Free                         | Blue       |

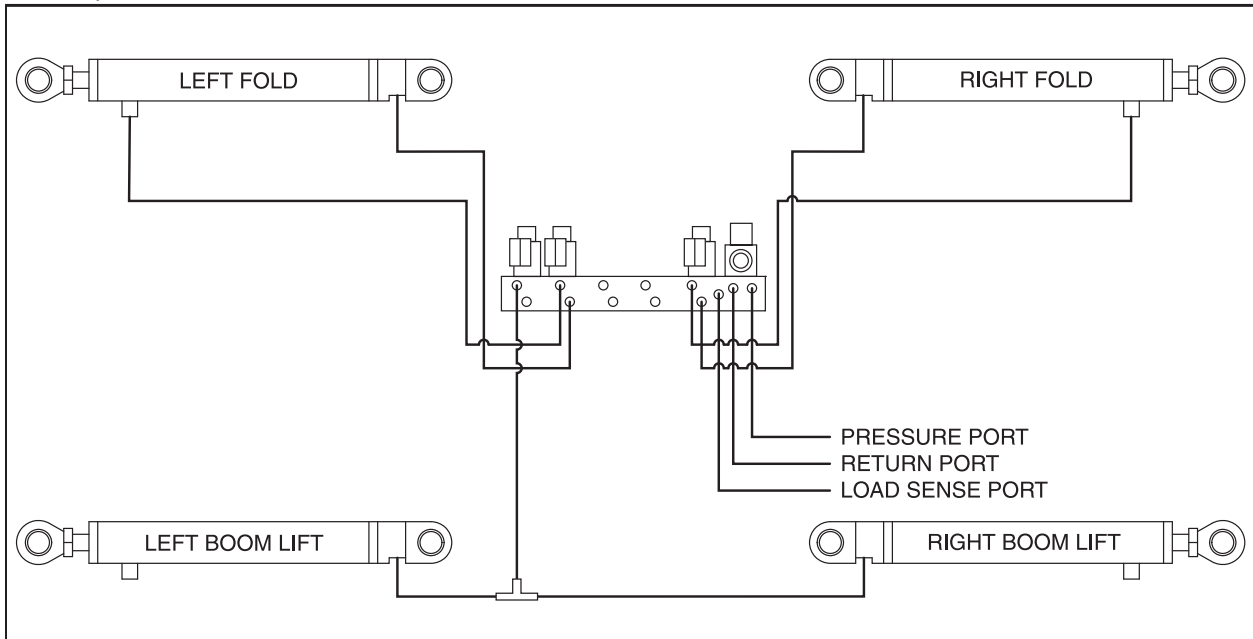


## Charts

### Boom hydraulics - HZ

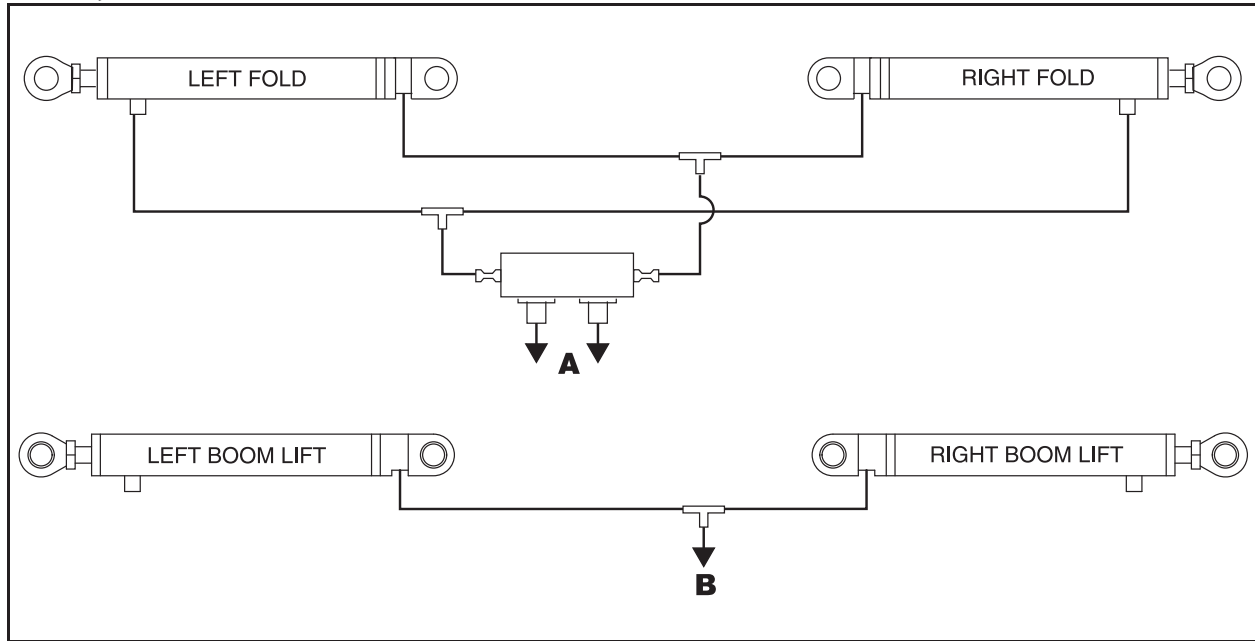


### Boom hydraulics - HV



## 8 - Technical specifications

### Boom hydraulics - HY



A - Double acting hydraulic outlet  
B - Single acting hydraulic outlet



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### Warranty policy and conditions

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HARDI® NORTH AMERICA INC. , 1500 West 76th Street, Davenport, Iowa, USA and 337 Sovereign Road, London, Ontario, Canada hereinafter called "HARDI®", offers the following limited warranty in accordance with the provisions below to each original retail purchaser of its own manufacturer, from an authorized HARDI® dealer that such equipment is at the time of delivery to such purchaser, free from defects in material and workmanship and that such equipment will be warranted for a period of one year from the time of delivery to the end user, providing the machine is used and serviced in accordance with the recommendations in the Operator's Manual and is operated under normal farm conditions.

1. This limited warranty is subject to the following exceptions:
  - a)Parts of the machine not manufactured by HARDI®, (i.e. engines, tires, tubes, electronic controls and other components or trade accessories, etc.) are not covered by this warranty but are subject to the warranty of the original manufacturer. Any claim falling into this category will be taken up with the manufacturer concerned.
  - b)This warranty will be withdrawn if any equipment has been used for purposes other than for which it was intended or if it has been misused, neglected, or damaged by accident, let out on hire or furnished by a rental agency. Nor can claims be accepted if parts other than those manufactured by HARDI® have been incorporated in any of our equipment. Further, HARDI® shall not be responsible for damage in transit or handling by any common carrier and under no circumstances within or without the warranty period will HARDI® be liable for damages of loss of use, or damages resulting from delay or any consequential damage.
2. We cannot be held responsible for loss of livestock, loss of crops, loss because of delays in harvesting or any other expense or loss incurred for labor, supplies, substitute machinery, rental for any other reason, or for injuries either to the owner or to a third party, nor can we be called upon to be responsible for labor charges, other than originally agreed, incurred in the removal or replacement of components.
3. The customer will be responsible for and bear the costs of:
  - a)Normal maintenance such as greasing, maintenance of oil levels, minor adjustments including the boom.
  - b)Transportation of any HARDI® product to and from where the warranty work is to be performed.
  - c)Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair unless otherwise dictated by state law.
  - d)Dealer traveling costs.
4. Parts defined as normal wearing items, (i.e. Pump Diaphragms, Valves, O-rings, Tires and V-belts) are not in any way covered under this warranty.
5. This warranty will not apply to any product which is altered or modified without the express written permission of the HARDI® Service and Engineering Departments and/or repaired by anyone other than an Authorized HARDI® Dealer.
6. Warranty is dependent upon the strict observance by the purchaser of the following provisions:
  - a)That this warranty may not be assigned or transferred to anyone.
  - b)That the Warranty Registration Certificate has been correctly completed by dealer and purchaser with their names and addresses, dated, signed and returned to the appropriate address as given on the Warranty Registration Certificate within 30 days of delivery to the purchaser.
  - c)That all safety instructions in the operator's manual shall be followed and all safety guards regularly inspected and replaced where necessary.
7. No warranty is given on second-hand products and none is implied.
8. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on polyethylene tanks (excluding fittings, lids and gaskets) to FIVE YEARS on field sprayers and TEN YEARS on Orchard and Vineyard sprayers. To qualify for this extended warranty, the tank must be drained and flushed with fresh water after each day's use. HARDI®'s liability is limited to replacement of defective parts FOB our plants in Davenport, IA and London, Ontario, Canada at no cost to the purchaser for the first twelve months after date of purchase; at 20% of the then current retail price during the second year; at 40% during the third year; at 60% during the fourth year; and at 80% during the fifth year. This extended warranty is subject, in each instance, to the tank being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.

## 9 - Warranty

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9. Subject to the following terms, conditions and contributions, HARDI® extends the warranty on HARDI® diaphragm pumps (excluding wearing parts such as diaphragms, valves and o-rings) to FIVE YEARS. To qualify for this extended warranty, the pump must be drained and flushed with fresh water after each day's use. HARDI®'s liability is limited to replacement of defective parts, FOB our plants in Davenport, IA and London, Ontario, Canada at no cost to the purchaser during the first twelve months after date of purchase; at 20% of the then current retail price during the second year; at 40% during the third year; at 60% during the fourth year; and at 80% during the fifth year. This five year extended warranty is subject, in each instance, to the pump being inspected and approved for replacement or repair by HARDI® personnel before HARDI® will accept any liability hereunder.
10. HARDI® reserves the right to incorporate any change in design in its products without obligation to make such changes on units previously manufactured.
11. The judgement of the HARDI® Service Department in all cases of claims under this warranty shall be final and conclusive and the purchaser agrees to accept its decisions on all questions as to defect and the repair or exchange of any part or parts.
12. No employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by the CEO in the Davenport office. Approval of warranty is the responsibility of the HARDI® Service Department.
13. Any warranty work performed which will exceed \$1000.00 MUST be approved IN ADVANCE by the Service Department. Warranty claims filed without prior approval will be returned.
14. ANY pump replacement MUST be approved by the HARDI® Service Department.
15. Claims under this policy MUST be filed with the HARDI® Service Department within thirty (30) days of when the work is performed or warranty shall be void unless prior arrangements are made.
16. Parts which are requested for return by the HARDI® Service Department must be returned prepaid within thirty (30) days for warranty settlement.
17. Warranty claims must be COMPLETELY filled out including part numbers and quantities or claims will be returned to the submitting dealer.

### DISCLAIMER OF FURTHER WARRANTY

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, EXCEPT AS SET FORTH ABOVE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCT CONTAINED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES (SUCH AS LOSS OF ANTICIPATED PROFITS) IN CONNECTION WITH THE RETAIL PURCHASER'S USE OF THE PRODUCT.



For Product, Service or Warranty Information:

- Please contact your local HARDI® dealer.

To contact HARDI® directly:

- Please use the HARDI® Customer Service number: 1-866-770-7063

- Or send your email to: [CUSTSERV@hardi-us.com](mailto:CUSTSERV@hardi-us.com)

Visit us online at: [www.hardi-us.com](http://www.hardi-us.com)

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