

# COMMANDER *classic*

## VHY/VHZ

### Instruction book

679053-GB-2003/09



We congratulate you for choosing a HARDI plant protection product. The reliability and efficiency of this product depend upon your care. The first step is to carefully read and pay attention to this instruction book. It contains essential information on the efficient use and long life of this quality product.

As this instruction book covers all COMMANDER Classic SPB models and all COMMANDER Classic SPC models, please pay attention to the paragraphs dealing with precisely your model.

This book is to be read in conjunction with the „Spray Technique“ book.

Illustrations, technical information and data in this book are to the best of our belief correct at the time of printing. As it is HARDI INTERNATIONAL A/S policy permanently to improve our products, we reserve the right to make changes in design, features, accessories, specifications and maintenance instructions at any time and without notice. HARDI INTERNATIONAL A/S is without any obligation in relation to implements purchased before or after such changes.

HARDI INTERNATIONAL A/S cannot undertake any responsibility for possible omissions or inaccuracies in this publication, although everything possible has been done to make it complete and correct.

As this instruction book covers more models and features or equipment, which are available in certain countries only, please pay attention to paragraphs dealing with precisely your model.

Published and printed by HARDI INTERNATIONAL A/S



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# CE Declaration

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## Declaration of Conformity

**Manufacturer,**

HARDI INTERNATIONAL A/S  
Helgeshøj Allé 38  
DK 2630 Taastrup  
DENMARK

**Importer,**

declare that the following product;

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A) is in conformity with the provisions in the COUNCIL DIRECTIVE of 1998 on mutual approximation of the laws of the Member States on the safety of machines (98/37/EC) as well as other directives (89/336/CEE, 73/23/CEE, 87/404/CEE and 97/23/EC).

B) is in conformity with the current harmonised standards as well as other relevant national technical standards and specifications.

Taastrup, September 2003

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Lars Bentsen  
Product Development Manager  
HARDI INTERNATIONAL A/S

Adhere extra shipping package labels in the  *Product Identification Certificate.*

# Safety notes

## Operator safety



Watch for this symbol. It means **WARNING, CAUTION, NOTE**. Your safety is involved so be alert!

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.**



**Pressure test with clean water prior to filling with chemicals.**



**Wear protective clothing.**



**Rinse and wash equipment after use and before servicing.**



**Depressurize equipment after use and before servicing.**



**Never service or repair the equipment while it is operating.**



**Disconnect electrical power before servicing.**



**Always replace all safety devices or shields immediately after servicing.**



**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.**



**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.**



**Do not attempt to enter the tank.**



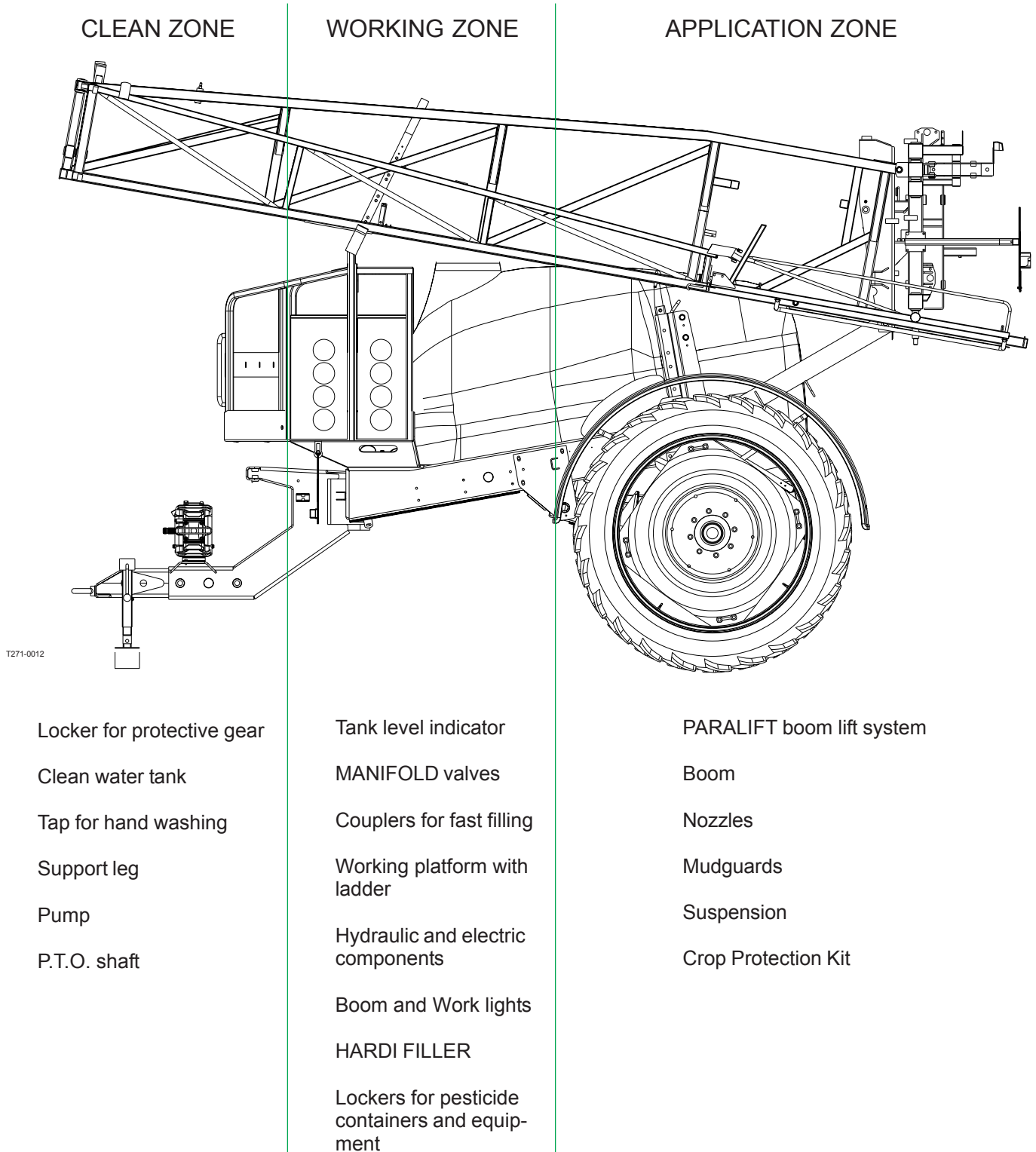
**Do not go under any part of the sprayer unless it is secured. The boom is secure when placed in the transport brackets.**

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

# Description

## COMMANDER classic

The COMMANDER classic is divided into three zones: a Clean zone, a Working zone and an Application zone, referring to the level of possible pesticide contamination.



Please note that some of the features are optional equipment

# Description

## Description

### Frame

Strong and compact frame with several options of drawbars and wheel sizes. The frame has a strong chemical and weather resistant electrostatic lacquer coat. Screws, nuts, etc. have been DELTA-MAGNI treated to be resistant to corrosion.

### Tank

UV-resistant Polyethylene in a suitable design with no sharp corners for easy agitation, emptying and cleaning. Nominal contents 2200 or 2800 l.

### Pump

Diaphragm pump with 6 diaphragms, model 363 or 463, depending on boom width, with easily accessible valves and diaphragms. Standard = 540 r.p.m. (6 splines) Optional = 1000 r.p.m. (21 splines).

### MANIFOLD SYSTEM

All functions of the spray circuits are operated via the centrally situated MANIFOLD valves with colour coded plates and pictorial symbols for easy operation.

### Operating unit

The system is based on EVC - Electrical Valve Control. The on/off is linked to the section valves, which is resulting in a very quick response to on/off.

The operating unit is constructed of modules and is electrically controlled via a remote control box.

The built-in HARDI-MATIC ensures a constant volume per hectare of the liquid (l/ha) at varying forward speed within the same gear when the number of P.T.O. revolutions are between 300-600 r.p.m. (pump 540 r.p.m) or 650-1100 r.p.m. (pump 1000 r.p.m.).

### Filters

With the self-cleaning filter the impurities that exist in the spray liquid will bypass the filter and be recirculated back to the tank via the return flow. Also suction filter and nozzle filters are standard. In-line pressure filters can be fitted as option.

### Boom

The sprayer can be fitted with VHY or VHZ boom. Both booms are supported by a trapeze which is fitted to the tank frame.

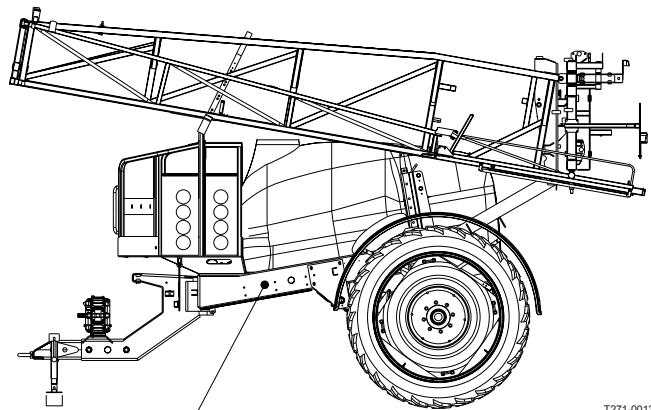
The trapeze helps the boom to stay horizontal when unfolded and it protects the boom against vibrations and shocks when driving on uneven ground. This ensures longer boom life and improves boom stability for better spray distribution.

Booms are available in 12, 12.5, 15, 16 and 18 m

working width. Alternative boom widths are possible for the VHZ model. All booms are provided with spring loaded breakaway.

### Identification plates

An identification plate fitted on the frame indicates producer name, model, own weight, max. weight, max. pressure of the hydraulic system, and max. pressure of the spray liquid system. Frame, boom centre frame, and inner/outer sections also have identification plates indicating boom type and part number of spare parts. If ordering spare parts, inform your dealer of these, so the right model and version are described.



T271-0013

HARDI INTERNATIONAL A/S			
HELGESHØJ ALLE 38, DK-2630 TÅSTRUP, DENMARK			
Fabrikat, Make, Marke, Marca: HARDI			
Type, Typ, Type: CM 2			
Serie nr., Serial No., Fz-fabrik-nr., No. Série, Num. Série: _____			
Faktisk producer, Production Year, Baujahr, An. Fabricación, Año Fabricación: _____			
Kapacitet, Capacity, Kapazität, Capacidad, Capacidade: L _____			
Information: _____			
Sprotniveau, Draiver Level, Scissors, Charge Fibre, Pression del Trieno: _____			
Egenvægt, Unladen Weight, Leertgewicht, P.V., Peso Próprio: _____			
Nettovekt	Løst tross	Max. tillat. vekt, max. adm. vekt	Max. tillat. tryk
Chassise og motor	Chassise og motor	Chassise og motor	Chassise og motor
220/95 R44	134 kg	6500 kg	6510 kg
230/95 R44	135 kg	6700 kg	6710 kg
240/95 R44	140 kg	6900 kg	6910 kg
250/95 R44	142 kg	7100 kg	7110 kg
12, 000	145 kg	6300 kg	6310 kg

HARDI INTERNATIONAL A/S	
HELGESHØJ ALLE 38, DK-2630, DENMARK	
Model:	
Serial no.:	
Technical specifications: see the Users Instruction Manual	

HARDI INTERNATIONAL A/S	
HELGESHØJ ALLE 38, 2630 TÅSTRUP, DENMARK	
Type	637671
Zul. Gesamtgewicht	6500 kg
Zul. Stützlast	1350 kg
Max. Geschwindigkeit	25 km/h
D-Wert: [24, 9] kN	

(Certain countries only)

# Description

## Sprayer use

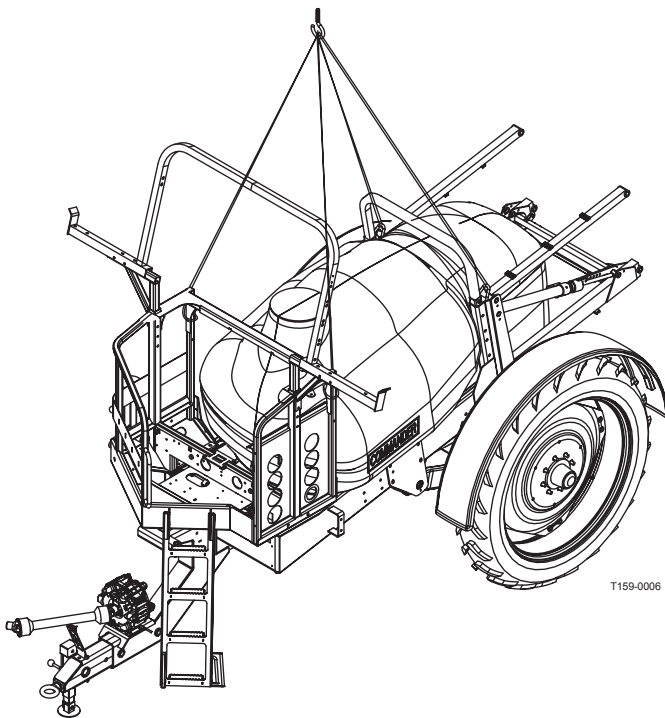
The HARDI COMMANDER sprayer is for the application of crop protection chemicals and liquid fertilisers.

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 the 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 the spray job.

## Unloading the sprayer from the truck

For the unloading of the sprayer a crane or a fork lift is needed. When loading with a crane please observe the lifting points as shown on the illustration, 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 factories, 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 fertilisers discolouring 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 shiny for many years.

This treatment should be carried out every time the protection film is washed off.



# Sprayer setup

## Connecting the sprayer

### Drawbars

Mounted on the chassis in a centre pivot, the drawbar can be either standard fixed or optionally steered. Steering can be hydraulically operated or it can be automatically controlled (AUTO TRACK).

### Overview - Drawbar systems

COMMANDER	FIXED DRAWBAR	STEERING DRAWBAR	AUTO TRACK	SELF TRACK
2200/2800	Yes	Yes	Yes	Yes

035 classic

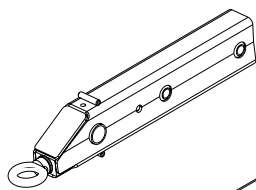
Following drawbar extensions are available. The drawbar extensions are available - steering or fixed - for both high and low tractor hitch points. Each drawbar is available in a long or a short version.

### Overview - Drawbar extensions

Drawbar extensions	COMMANDER 2200/2800
Swivel type Ø36	Yes
Hitch Ø50 (ISO 5692)	Yes
High hitch	Yes
All drawbars are available in a long and a short version	

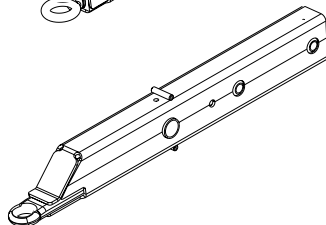
034 classic

Swivel type



T251-0026

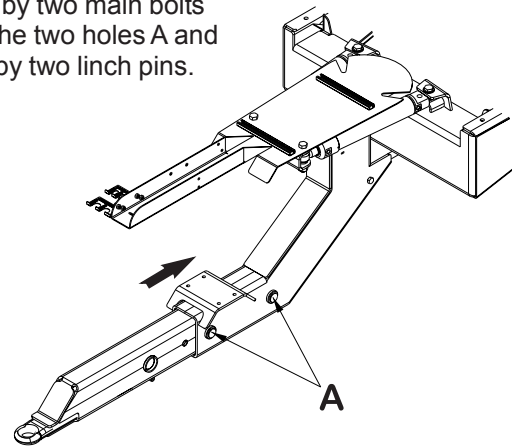
Hitch (ISO 5692)



High hitch

### Mounting the drawbar extension

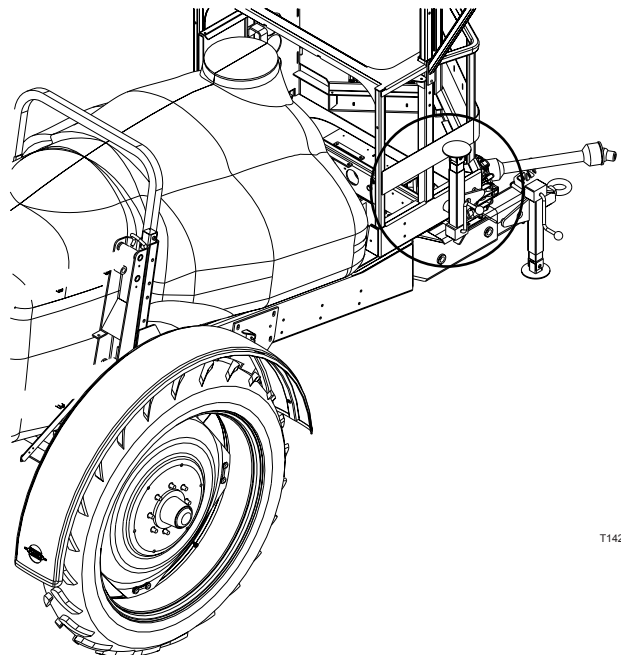
The extension piece is inserted into the opening of the drawbar, fastened by two main bolts through the two holes A and secured by two linch pins.



T251-0024

### Support leg

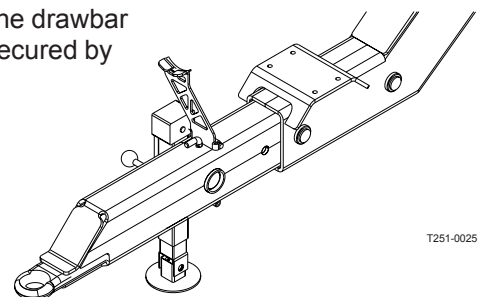
The support leg is stored in the bracket on the sprayer's right side when the sprayer is attached to the tractor.



T142-0034

To remove the support leg: Lift the leg, remove the linch pin and pull out the support leg.

The support leg can then be mounted to the drawbar extension and secured by linch pin.

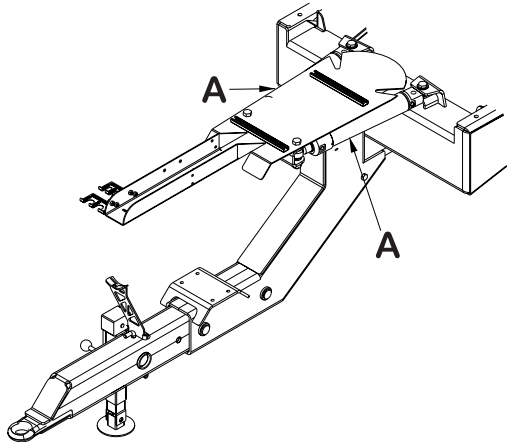


T251-0025

# Sprayer setup

## Fixed drawbar

Make sure the drawbar points straight ahead from its position on the trailer. If not, the two turn buckles **A** can be adjusted till the drawbar is centred.



## STEERING drawbar

### Transport lock (if fitted)

The transport lock is a safeguard that will keep the drawbar in a centred position in case of hydraulic leakage during transport on public roads.

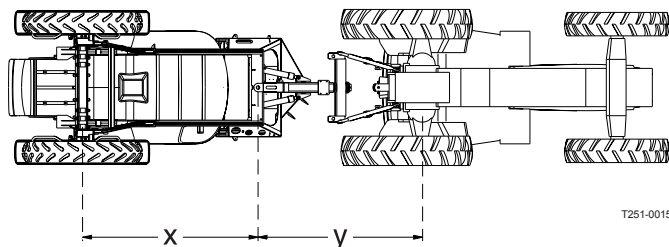
The transport lock is fixed by linch pins.

If necessary, the transport lock can be adjusted by turning the turnbuckle.

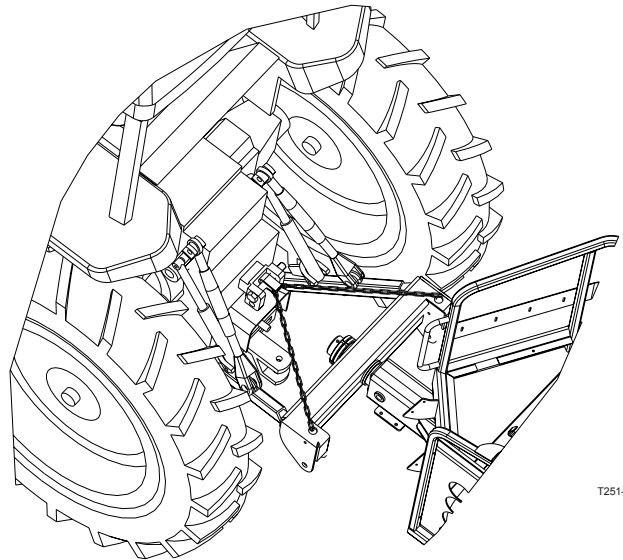
## SELF TRACK for COMMANDER 2200/2800

SELF TRACK is connected as follows:

1. Attach the tractor lower links in the two mountings of the SELF TRACK. Adjust the length of the drawbar if necessary - to obtain the best tracking, choose the setting where the distance  $X$  is equal to distance  $Y$ . Secure with linch pins.



2. Attach safety chains to top link clevis. The chain will prevent the transmission shaft from being damaged if the lift arms are lowered too far. Adjust the chain length so the chains are tight when the tractor P.T.O. and pump shaft are in a horizontal line.



**NOTE!** If possible, lock the tractor hydraulic lever when the lift arms are in the correct position to avoid the sprayer weight resting on the stabiliser chains.

3. Tighten the lift arm stabiliser chains.



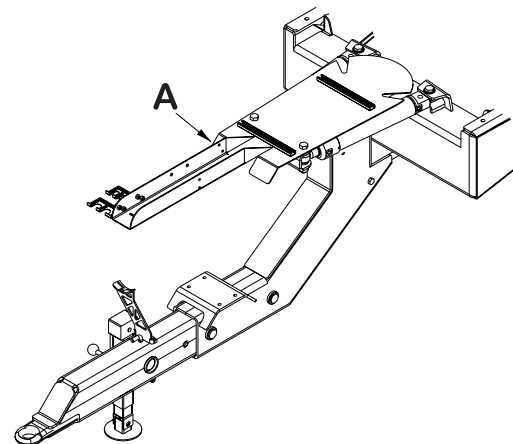
**WARNING!** Do not stand in the area around the drawbar during manoeuvring.

## AUTO TRACK

Please refer to separate instruction book.

## Hose package support

To prevent hoses and wiring from being damaged by the tractor wheels, all hoses, cables and wires are held by the hose bracket **A** fitted to the drawbar.



Check that the length of the hoses and cables are sufficient by tight turns.

# Sprayer setup

## Transmission shaft

### Operator safety

To avoid accidents and personal injuries, note the following recommended precautions and safe operation practices.

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.



**WARNING!** ROTATING TRANSMISSION SHAFTS WITHOUT PROTECTION GUARDS ARE FATAL.

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: 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.

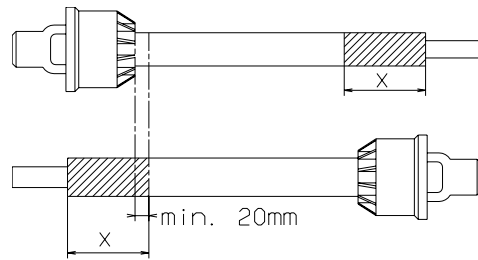
### Installation of transmission shaft

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.

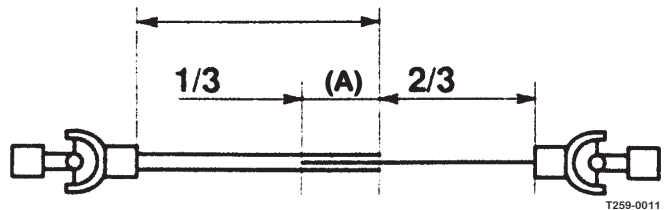
Mark the protection guards.



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

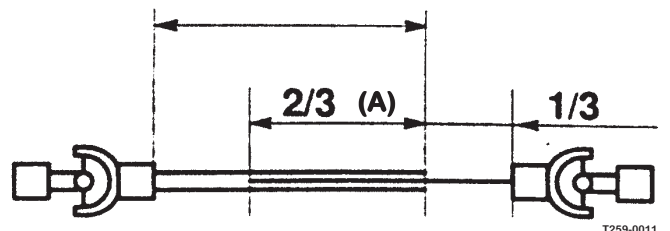
#### Pump with 6 splines/540 r.p.m.

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

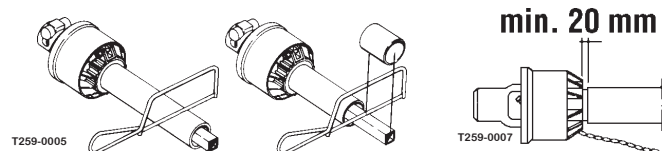


#### Pump with 21 splines/1000 r.p.m.

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.

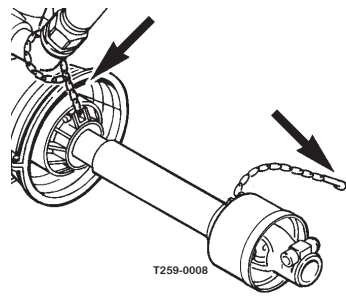


5. Grease the profiles and assemble male and female parts again.
6. Fit the shaft to tractor P.T.O. and sprayer pump shaft.

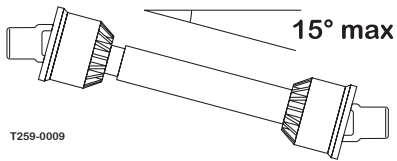
**NOTE!** Female part marked with a tractor towards tractor!

# Sprayer setup

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°.



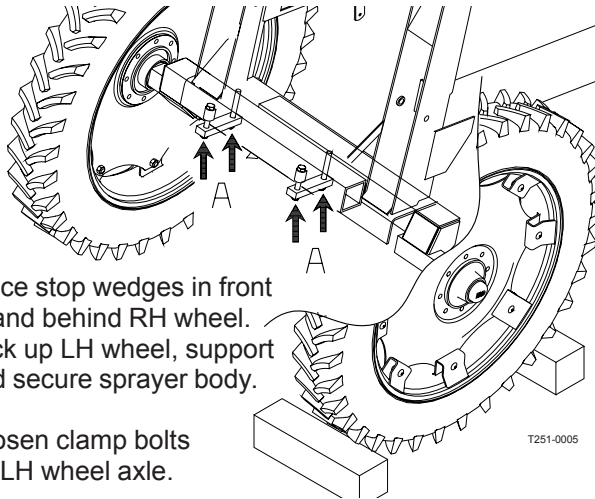
# Sprayer setup

## Track gauge

### Altering the track gauge

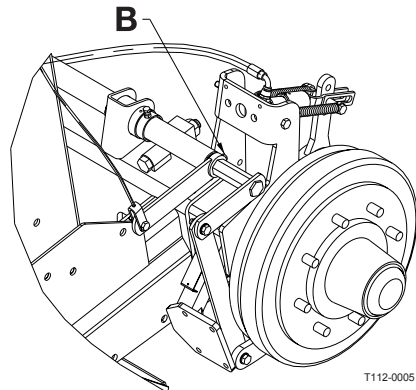
The track gauge of the COMMANDER can be altered stepless as follows,

1. Measure the current track gauge (centre RH tyre to centre LH tyre). Each side must be extended or retracted half the desired alteration.
2. Attach the sprayer to tractor and engage tractor parking brake.

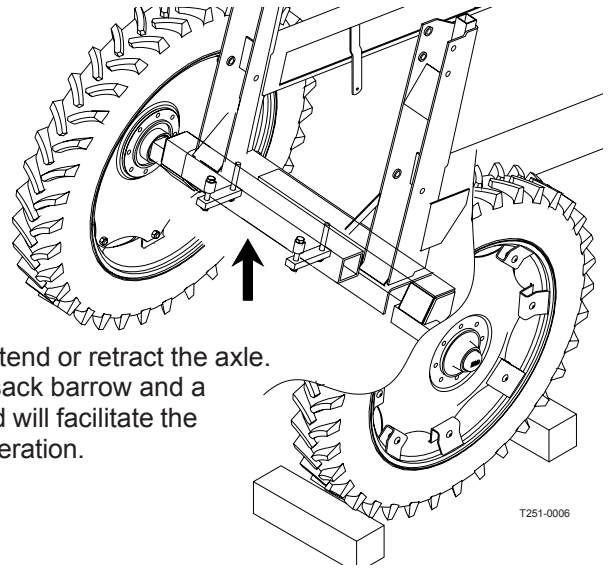


3. Place stop wedges in front of and behind RH wheel. Jack up LH wheel, support and secure sprayer body.
4. Loosen clamp bolts for LH wheel axle.
5. Loosen the nut **B** on the brake operating arm. Extend/retract this arm according to the adjustment of the axle.

**COMMANDER**  
without suspension



6. Extend or retract the axle. A sack barrow and a rod will facilitate the operation.



7. If the rim position must be changed (described later in this chapter) do this first and fine adjust by extending or retracting the axles. Remember to tighten the wheel nuts to the specified torque:

Rim plate to rim:	280 + 30 Nm (207 + 22 lbft)
Rim plate to hub:	490 Nm (288 lbft)

8. Tighten the clamp bolts to a torque of:

280 Nm (207 lb.ft) for 2200/2800
390 Nm (289 lbft) for 3200/4200.

9. Tighten nut **B** again.

**IMPORTANT!** Place the jack under the axle and lift the wheel to remove load from the clamps before tightening the clamp bolts to the specified torque.

10. Repeat the procedure on RH wheel.
11. Check the distance from centre tyre to centre of tank frame is equal at RH and LH.
12. Retighten clamp bolts and wheel bolts to specified torque after 8 hours of work.

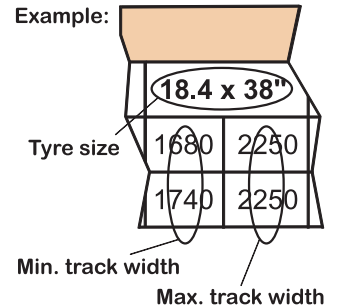
# Sprayer setup

## Adjustment ranges - track width

The maximum track width for all models is **2250 mm**.

The minimum track width depends on the parameters in the charts beneath and whether the sprayer is equipped with suspended axle - or not. Please refer to the following charts (all figures in mm).

See example for explanation on how to read the charts.



## Track width - Sprayers without suspension

<b>CM plus 2200</b>	<b>Tyre size</b>													
Sprayer with:	<b>9.5 x 44"</b>		<b>9.5 x 48"</b>		<b>11.2 x 44"</b>		<b>11.2 x 48"</b>		<b>12.4 x 46"</b>		<b>18.4 x 38"</b>		<b>20.8 x 38"</b>	
<b>Flange hub</b>	1500	2250	1500	2250	1500	2250	1500	2250	1500	2250	1680	2250	1720	2250
<b>Mudguards</b>	1500	2250	1520	2250	1520	2250	1520	2250	1520	2250	1740	2250	1740	2250

050404 chart1

<b>CM plus 2800</b>	<b>Tyre size</b>													
Sprayer with:	<b>9.5 x 44"</b>		<b>9.5 x 48"</b>		<b>11.2 x 44"</b>		<b>11.2 x 48"</b>		<b>12.4 x 46"</b>		<b>18.4 x 38"</b>		<b>20.8 x 38"</b>	
<b>Flange hub</b>	1500	2250	1500	2250	1500	2250	1500	2250	1500	2250	1680	2250	1720	2250
<b>Mudguards</b>	1500	2250	1520	2250	1520	2250	1520	2250	1520	2250	1740	2250	1740	2250

050404 chart2

It is not permitted to fit dual wheels!

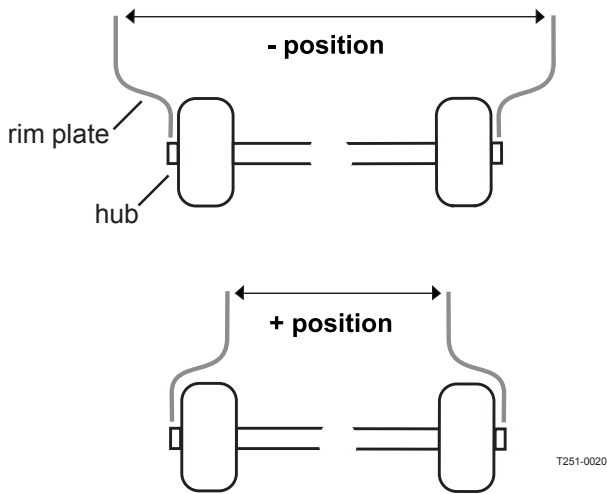
**IMPORTANT!** On TRACKER models a minimum track width of 1800 mm is strongly recommended to ensure stability and to avoid the sprayer from tipping over.

**NOTE!** The wider the track width is, the better is the stability of the sprayer and boom.

# Sprayer setup

## Turning rim and rim plate

Track gauge can be altered by turning rim and rim plate, positions referred to as '+' or '-' position.



## Permitted rim positions

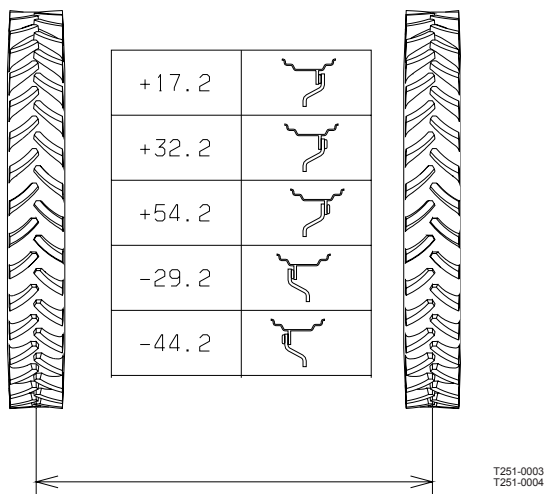


**WARNING!** When altering track gauge by turning rims and rim plates the maximum permitted offset between centre wheel and hub flange must be observed:

Max offset, hub flange and centre rim:

COMMANDER model	Min. rim offset	Max. rim offset
2200/2800	- 45	+ 55

## Overview



**IMPORTANT!** Tyre sizes **18.4 x 38"** and **20.8 x 38"** are not permitted in any "+ position", only use the "- positions".

# Sprayer setup

## Hydraulics

### Requirements - tractor (VHY model)

Connection requirements are

- one single-acting outlet to raise and lower the boom
- one double-acting outlet to fold and unfold the boom
- one double-acting outlet for hydraulic slanting control (optional equipment)

### Requirements - tractor (VHZ model)

Connection requirements are

- one single-acting outlet to raise and lower the boom
- one double-acting outlet for the electro-hydraulic operation of the boom functions.
- one double-acting outlet for hydraulic slanting control (optional equipment)

## General information

Ensure that snap couplers are clean before connection!

**NOTE!** The hydraulic system requires a minimum oil pressure of 100 bar and an oil capacity of approx. 2 litres.

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

## Safety information



**WARNING!** 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.



**WARNING!** 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.

## Control boxes and power supply

### Control boxes

Control boxes are fitted in the tractor cabin at a convenient place. Tapping screws can be used for mounting.



### Power supply

Power requirement is 12V DC. Note polarity! The wires must have a cross sectional area of at least 4.0 mm to ensure a sufficient power supply. For the EVC operating unit the tractor circuit should have an 8 Amp fuse

Control box	Polarity (wire colour)		Fuse (Amp)
	Positive +	Negative -	
EVC control unit	Brown	Blue	8
VHZ control box	X	X	X



# Sprayer setup

## Brakes

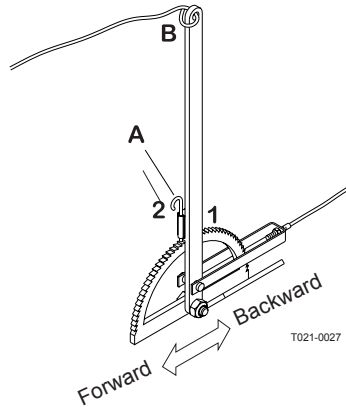
### Emergency and parking brake (if fitted)

The parking brake lever has two function modes, which are determined by the small pawl control clip (A).

To change between the two modes, turn the clip.

Pos. 1: The pawl control clip must point away from the pawl.

Pos. 2: The pawl control clip must rest against the pawl.



### To disengage the parking brake:

1. Set pawl control clip in pos. 1.
2. Pull the lever a little forward to release the pawl from the ratchet and then push the lever fully backwards.

### To engage the parking brake:

1. Set pawl control clip in pos. 2.
2. Pull the lever firmly forwards until parking brake is fully engaged.

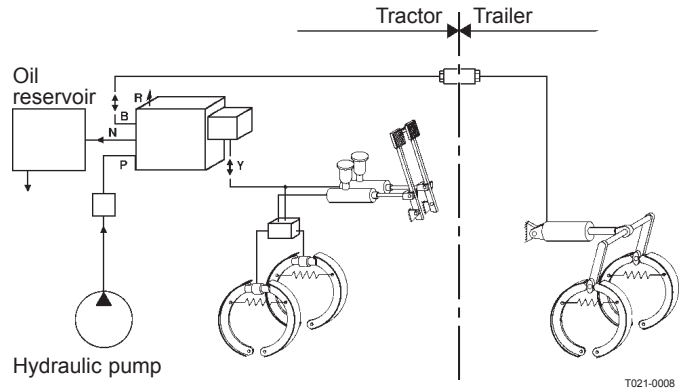
### Emergency brake

1. Set pawl clip in pos. 2.
2. Attach the rope from the hole in top of the handbrake lever (B) to e.g. the tractor top link attaching point. If the sprayer is accidentally unhooked during transport the rope will apply the parking brake before the rope breaks.

**IMPORTANT!** To ensure safe engagement and to avoid damages to the parking brake use rope with an ultimate stress between 690 N (155 lb.) and 785 N (176 lb.).

### Hydraulic activated brakes (if fitted)

This requires a special trailer brake valve attached to the tractor hydraulic and brake system. Connect the snap coupler to the tractor brake outlet. When the tractor brakes are applied, the trailer brakes will work proportionally to the tractor brakes, and ensure safe and effective braking.



**WARNING!** Do not connect the brakes directly to the tractor hydraulics without the brake valve. The trailer brake power cannot be controlled, and braking will therefore be hazardous.

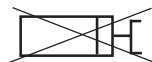
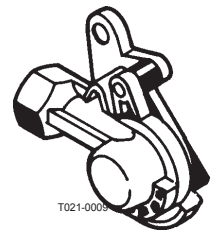
**IMPORTANT!** Max. oil pressure is 150 bar (2175 p.s.i.) in the brake line.

Relieve parking brake before driving.

### Air activated brakes (if fitted)

This system requires a tractor with compressor and air brake system with out-let(s) for trailer brakes.

**IMPORTANT!** The load apportioning valve must be set at the position corresponding to the load on the trailer, for obtaining optimal air pressure to the trailer brakes.



= Relieved



= Half full tank



= Empty tank

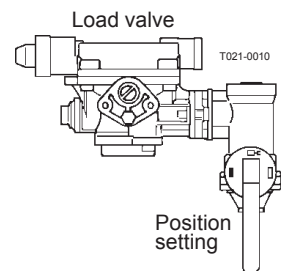


= Full tank



**WARNING!** Driving with wrong load apportioning valve setting, will make the brakes under- or over-apply, which can cause hazardous situations.

**NOTE!** If the air hose(s) are disconnected with air in the brake air tank, control pressure will be dumped and the brakes will engage fully. If the sprayer must be moved with air in the tank and without the air hose(s) connected to the tractor, the load apportioning valve must be set at "relieved" to disengage the brakes. Remember to reset the handle to brake position again afterwards. When parking the sprayer, always engage the parking brake, as the air brakes will only be engaged as long as there is air in the tank! Cover the couplings with the dust flaps when hoses are disconnected.



# Sprayer setup

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## **Single-line brakes (if fitted)**

Flip the snap coupler protection flap away and connect the brake system snap coupler to the tractor outlet (black) and let the compressor fill the sprayer's air reservoir.

Check brake circuit for leaks.

## **Dual-line brakes (if fitted)**

Flip the snap coupler protection flaps away and connect the two snap couplers for supply and control to the tractor outlets, and check brake circuits for leaks.

The couplers are colour coded and secured against incorrect attachment:

Red = Supply line (RH)

Yellow = Control line (LH)

Relieve parking brake before driving

# Sprayer setup

## Counter weight (TRACKER models only)

To improve stability on TRACKER models, extra weight can be added by means of liquid-filled tyres.

The standard tyre valve is an universal air-water valve.

The tyres can be filled with liquid to max. 75% of their total volume. The table below indicates the 75% volume.

Tyre size	Max. litres of liquid per tyre
9.5 x 44"	101
9.5 x 48"	108
11.2 x 44"	133
11.2 x 48"	144
12.4 x 46"	178
16.9 x 38"	285
18.4 x 38"	390
20.8 x 38"	466

1 litre = 0.264 US Gal. 1 litre = 0.22 Imp. Gal.

Use a mixture of water and  $\text{CaCl}_2$  to avoid frost damage as described in table below:

$\text{CaCl}_2$ per litre water	Protection to
200 g (7.1 oz)	-15°C (30.6°F)
300 g (10.6 oz)	-25°C (12.6°F)
435 g (15.4 oz)	-35°C (-5.4°F)

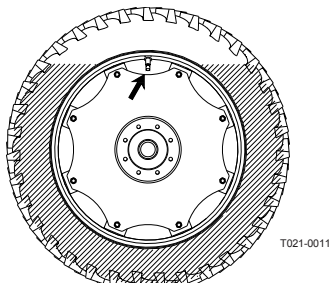


**WARNING!** It is very important that the  $\text{CaCl}_2$  is added to the water and agitated until it is fully dissolved. Never pour water on to  $\text{CaCl}_2$ ! If you get  $\text{CaCl}_2$  in the eyes, flush instantly with cold water for at least 5 minutes and seek medical advice afterwards.

**IMPORTANT!** The tyres must be liquid filled to max. 75 % of total tyre volume. Fill only the qty. of liquid necessary to obtain sufficient stability of the sprayer. Do not fill liquid and  $\text{CaCl}_2$  mixture in tyres without tubes!

To fill the tyres:

- Jack up the wheel and rotate wheel till the valve is positioned at "12 o'clock".
- Remove the valve body and fill liquid until it reaches the valve.
- When surplus liquid is drained through the valve stem fit the valve body again.
- Adjust tyre pressure and lower the wheel. (Please refer to table for correct tyre pressure).



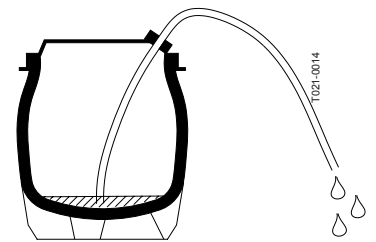
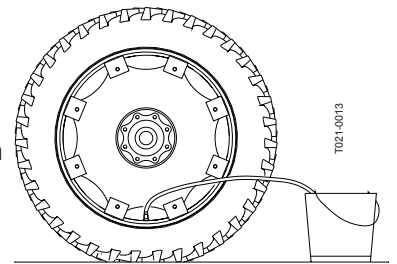
## Recommended tyre pressure:

Tyre size RC 95	Recommended inflation pressure in bar (p.s.i.)	Minimum Load Index A8/A2
230/95 R44	3.6 (52)	134/145
230/95 R48	3.6 (52)	136/147
270/95 R44	3.6 (52)	140/151
270/95 R48	3.6 (52)	142/153
300/95 R46	3.6 (52)	147/158
420/85 R38	1.6 (23)	141/152
520/70 R38	1.6 (23)	147/144
580/70 R38	1.2 (18)	154/151

**NOTE!** When filling the tyres the valve should be positioned at 12 o'clock and when adjusting the tyre pressure, the valve should be positioned at 6 o'clock.

To empty the tyres:

- Rotate wheel till the valve is positioned at "6 o'clock."
- Remove the valve body and let out the liquid. Retain liquid in an appropriate container.
- To empty the tyre completely the tyre is inflated and a thin drain tube is lead to the bottom of the tyre. The air pressure will now empty the remaining liquid.
- Remove the drain tube, fit the valve and inflate the tyre to specified pressure. See the table "Tyre pressure".



**NOTE!** Disposal of  $\text{CaCl}_2$  has to take place according to local legislation.

# Sprayer setup

## Transport

### 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, observe these and equip implements accordingly.

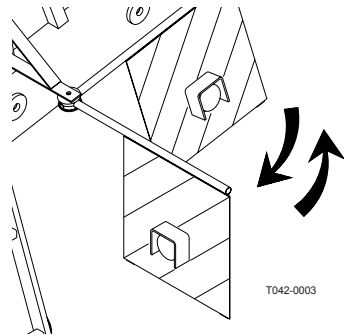
**NOTE!** Max. driving speed is 25 km/h for models *without* brakes and 40 km/h for models equipped *with* brakes.

### Rear lights (if fitted)

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.

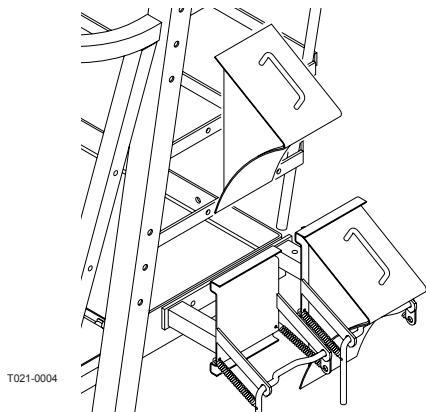
The wiring is in accordance with ISO 1724. See section on Technical specifications.

Before transport on public roads the front warning boards with position lamps must be folded out (fitted in certain countries only).



### Stop wedges (if fitted)

Before driving, remove the stop wedges and place them in the storage brackets.



# Sprayer setup

## Driving Technique

### STEER TRACK and SELF TRACK

A trailer with articulating drawbar (TRACKER) behaves differently than a normal trailer.

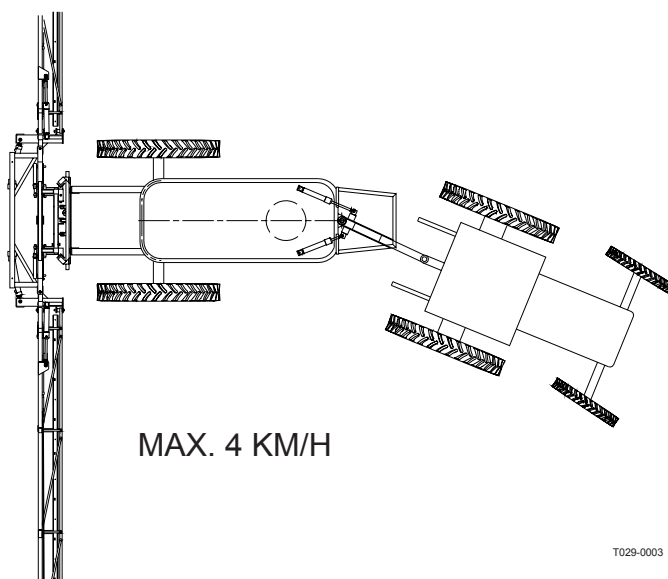
In tracking position the vehicle centre of gravity is displaced further more compared to the vehicle centre line of a normal trailer.

Compared to a conventional trailer a TRACKER has decreased stability when turning, especially when turning on hillsides.

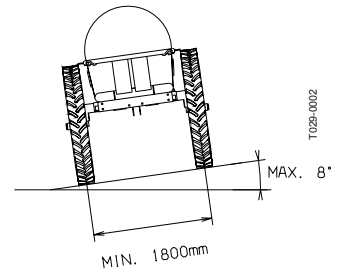
To avoid overbalancing, pay attention to these guide-lines:

1. Avoid sudden, tight turns
2. Slow down before entering a curve or turning, and drive with a constant, low speed during the turn.
3. Never slow down too fast, never brake heavily and never stop suddenly in a curve, or when turning on a hillside, when the sprayer is articulated.
4. Be careful when turning on uneven ground
5. Set the track gauge as wide as possible
6. The proper function of the hydraulic damping is essential to obtain good stability
7. Keep stabiliser chains on the tractor's liftarms tight
8. For safety reasons, the following limitations are set for TRACKERS (with unfolded booms):

Speed by turning, max.	4 km/h (2.5 m.p.h.)
Ground inclination by turning, max.	8°
Track gauge, min.	Please see the part "Track gauge"



**NOTE!** HARDI cannot undertake any responsibility for any damages caused by the sprayer tipping over.



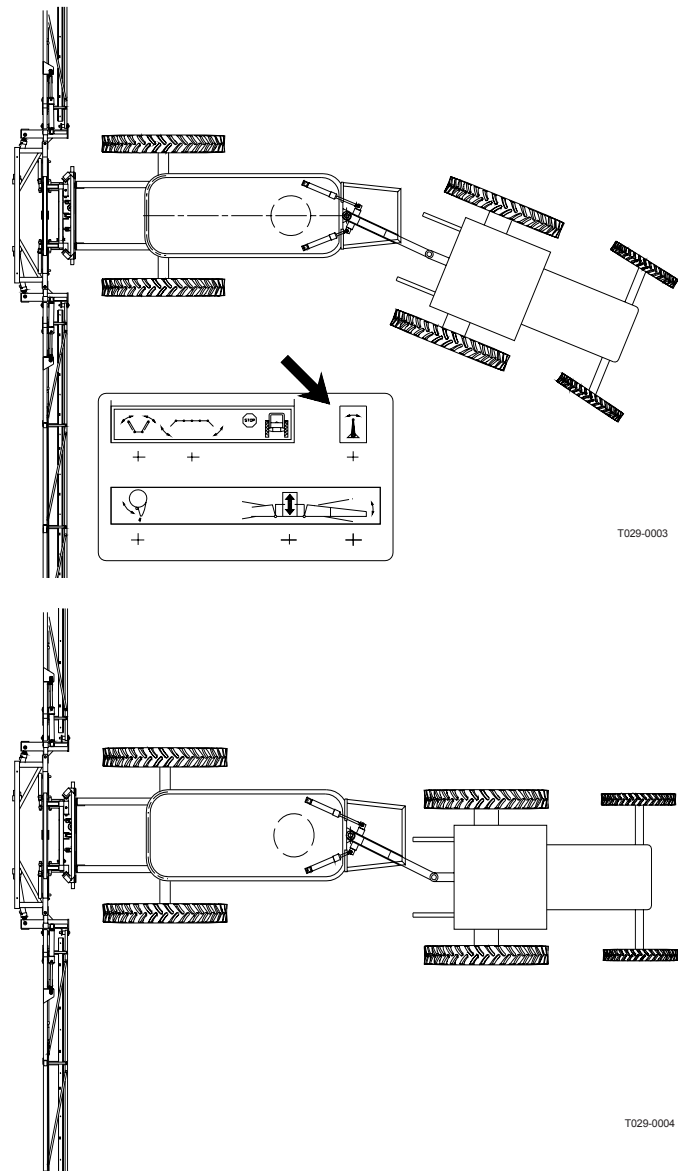
### STEER TRACK (certain models only)

(If the sprayer is equipped with HARDI NOVA, please see separate instruction book).

The articulating drawbar on STEER TRACK is to be operated manually via the D.A.H.

The switch on the D.A.H. control box is pushed side-wards to articulate the drawbar.

This is used when turning or as track correction when driving on slopes.



# Sprayer setup

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## **SELF TRACK**

The SELF TRACK is always in tracking mode.

The SELF TRACK drawbar will always articulate when the tractor is turning and follow the tractor rear wheels.

The SELF TRACK drawbar is hydraulically damped to obtain stable trailing.



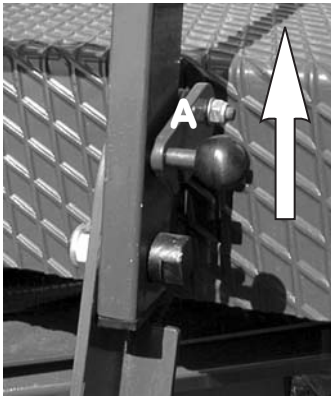
**WARNING!** Always drive the SELF TRACK very carefully on public roads, and be aware of the sprayer's behaviour. Slow down before turning, to avoid the vehicle from tipping over.

## **AUTO TRACK**

Please see separate instruction book.

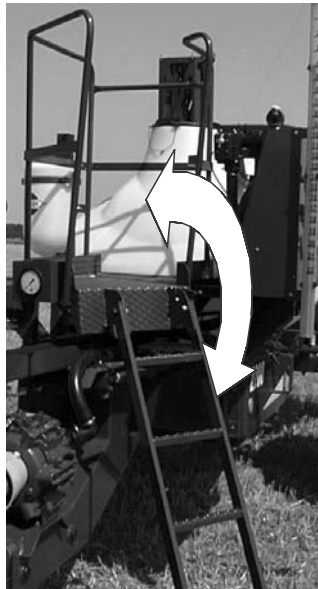
# Sprayer setup

## Equipment - Standard and Additional Ladder



**Down:** Pull the handle (A) to disengage the locking device and tilt ladder down.

**Up:** Tilt the ladder up and it will lock automatically when it is fully unfolded.

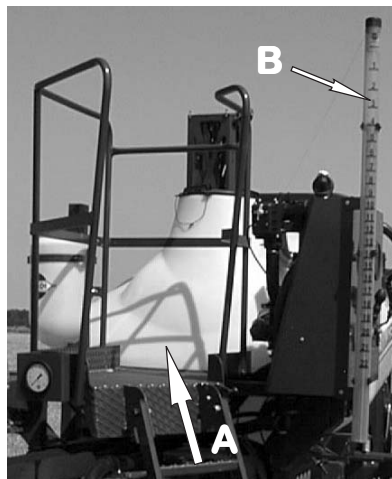


**NOTE!** Always unfold the ladder before driving.

## Platform

Access to the platform is possible via the ladder (A).

The platform gives access to the clean water tank lid, the main tank lid, the top mounted suction filter and the self-cleaning filter, which is situated on the backside of the MANIFOLD system.



## Tank level indicator

A guidance of the actual tank level in the main tank can be observed on the tank level indicator (B). The scale is displayed in litres or Imp. gal/US gal. (certain countries).

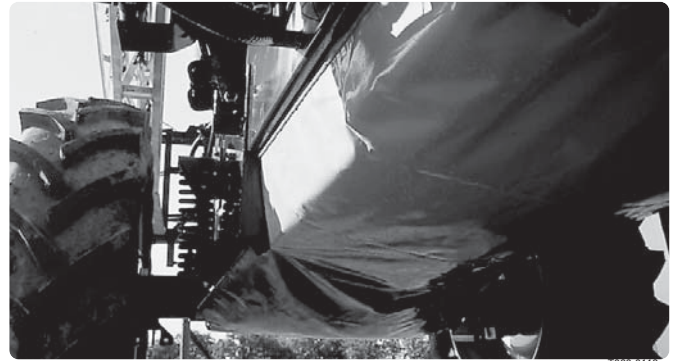
**NOTE!** If extra high accuracy are needed HARDI FILLMETER can be fitted as optional equipment.

## Crop protection Kit (if fitted)

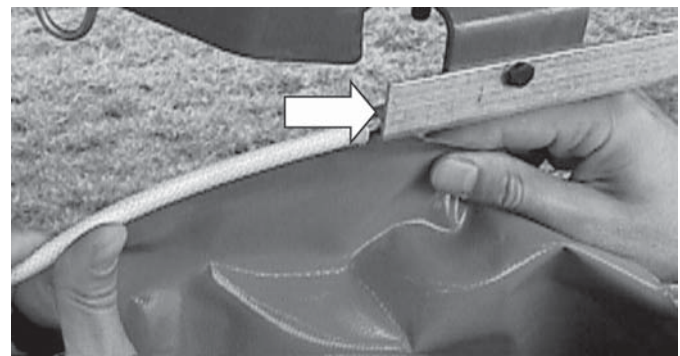
The kit consists of sheet, straw dividers and wheel brake covers.

### Sheet

The PVC sheet is fitted underneath the trailer and covers the undercarriage of the chassis



The sheet is lead through guiding rails fastened on both sides of the trailer.



# Sprayer setup

Each cutout in the shield is then fastened with a matching locking device, which are mounted along the lower part of the sprayer.



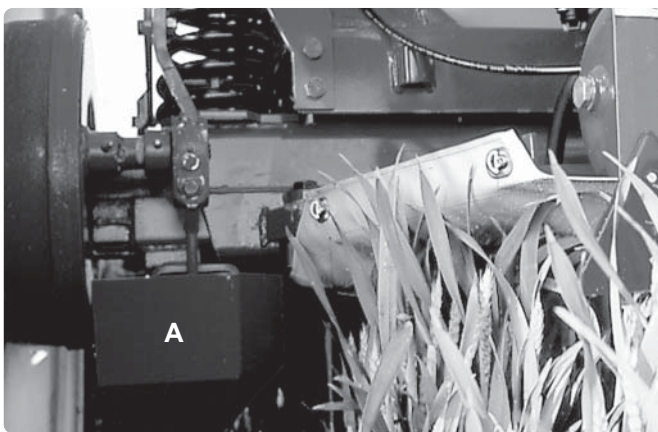
## Strawdividers

A strawdivider can be fitted on each trailer wheel.



## Wheel brake covers

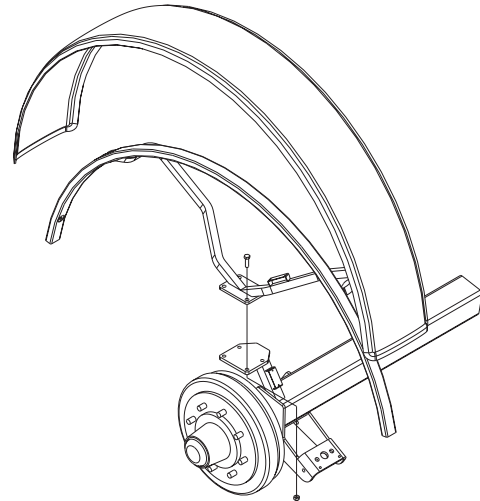
A wheel brake cover **A** can be mounted in order to cover the brake.



## Mudguards (if fitted)



Mudguards can be fitted on the trailer wheels by means of a supporting frame which is bolted to a mounting on the wheel axle.



Mudguards are available for all wheel configurations.



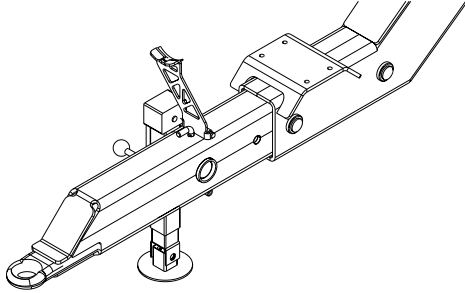
# Sprayer setup

## Disconnecting the sprayer

Always clean the sprayer - inside and outside - before disconnecting and parking it.

### Support leg

Before disconnecting from the tractor, make sure the support leg is properly fitted and secured by linch pin.



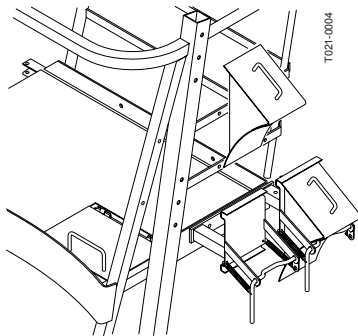
The support leg is stored in the bracket on the right side of the trailer when the sprayer is attached to the tractor. To remove the support leg: Lift the leg, remove the linch pin and pull out the support leg.



**WARNING!** To prevent the sprayer from tipping over, do not disconnect the sprayer from the tractor with the booms unfolded unless the boom is supported!

Always engage the parking brake (if fitted).

If no parking brake is fitted, or if local regulations requires so, place stop wedges in front of and behind the wheels.



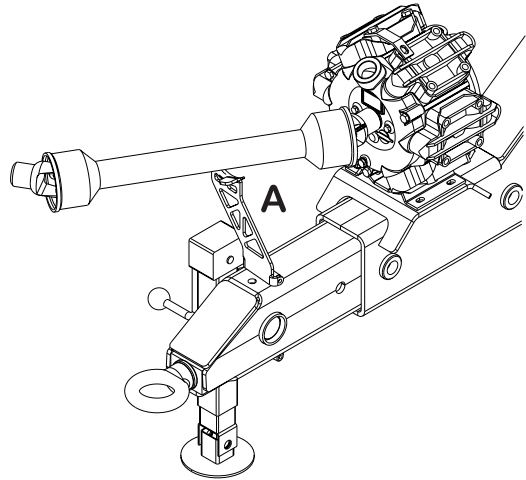
Remember to disconnect all hoses and cables from the tractor.



**WARNING!** If the sprayer is parked unattended avoid unauthorised persons, children and animals from having access to the sprayer.

## Transmission shaft support

The transmission shaft rests on the bracket **A** when not in use (Low hitch models).



At High hitch models the transmission shaft is placed in the hook underneath the drawbar when not in use.

# Operation

## Operating the boom

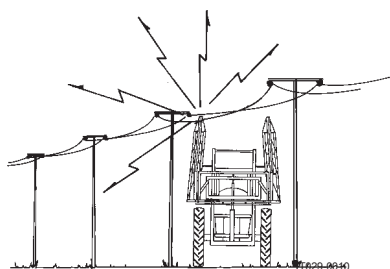
### Safety information



**WARNING!** 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.

**NOTE!** A label (ref. no. 978448) follows the sprayer. This label must be placed in the cabin at a place visible from the operator's seat.

### General information

Following operations are carried out by the tractor's hydraulic control lever(s)

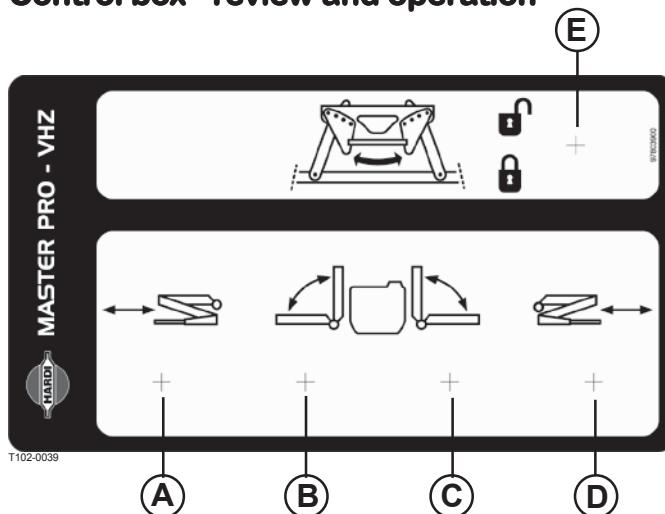
- Raising/lowering of the boom
- Folding/unfolding the boom (VHY only)
- Slanting control (optional equipment)

### Manoeuvring of the VHY boom

The VHY boom is solely controlled by the tractor's hydraulic control levers.

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

### Manoeuvring of the VHZ boom Control box - review and operation



- A**- Unfold/fold left outer section
- B**- Unfold/fold left intermediate section
- C**- Unfold/fold right intermediate section
- D**- Unfold/fold right outer section
- E**- Lock/unlock trapeze

**NOTE!** If boom isn't symmetrically unfolded (e.g. when using alternative boom widths) the trapeze must be locked during driving. Failure to do so will damage the boom!

### How to unfold the boom

1. Activate hydraulic control lever
2. Raise boom half-way to the top (minimum)
3. Push switches **(B)** and **(C)** downwards to unfold intermediate sections.
4. Push switches **(A)** and **(D)** outwards to unfold outer sections.
5. When boom wings are completely unfolded, push switch **(E)** upwards for 2 seconds to unlock trapeze.
6. Lower boom to desired working height.

### Tilt control

Use switches **(B)** or **(C)** for single-sided tilt of boom wing.



**WARNING!** Do not tilt boom to vertical without folding. Neither during normal folding procedure. This may cause damage to the boom.

### How to fold the boom

1. Activate hydraulic control lever.
2. Set slanting position at midway (if fitted).
3. Push switch **(E)** downwards for 2 seconds to lock trapeze.
4. Raise boom half-way to the top (minimum).
5. Push switches **(A)** and **(D)** inwards to fold outer sections.
6. Push switches **(B)** and **(C)** upwards to fold intermediate sections.
7. Lower the boom completely.

# Operation

## Alternative boom widths

### Single-sided folding

1. Activate hydraulic control lever.
2. Raise boom half-way to the top (minimum).
3. Unfold either right or left intermediate section.
4. Unfold either right or left outer section.

**NOTE! Do not unlock trapeze!**

5. Lower boom to desired working height.

### No folding of outer sections - '16-12' kit (optional equipment)

To disable folding of outer sections this kit is fitted to the outer cylinders of the boom wings.

Picture **B** shows unfolded boom with '16-12' kit.

Picture **C** shows '16-12' kit mounted to boom wing with tap for ON/OFF position.



# Operation

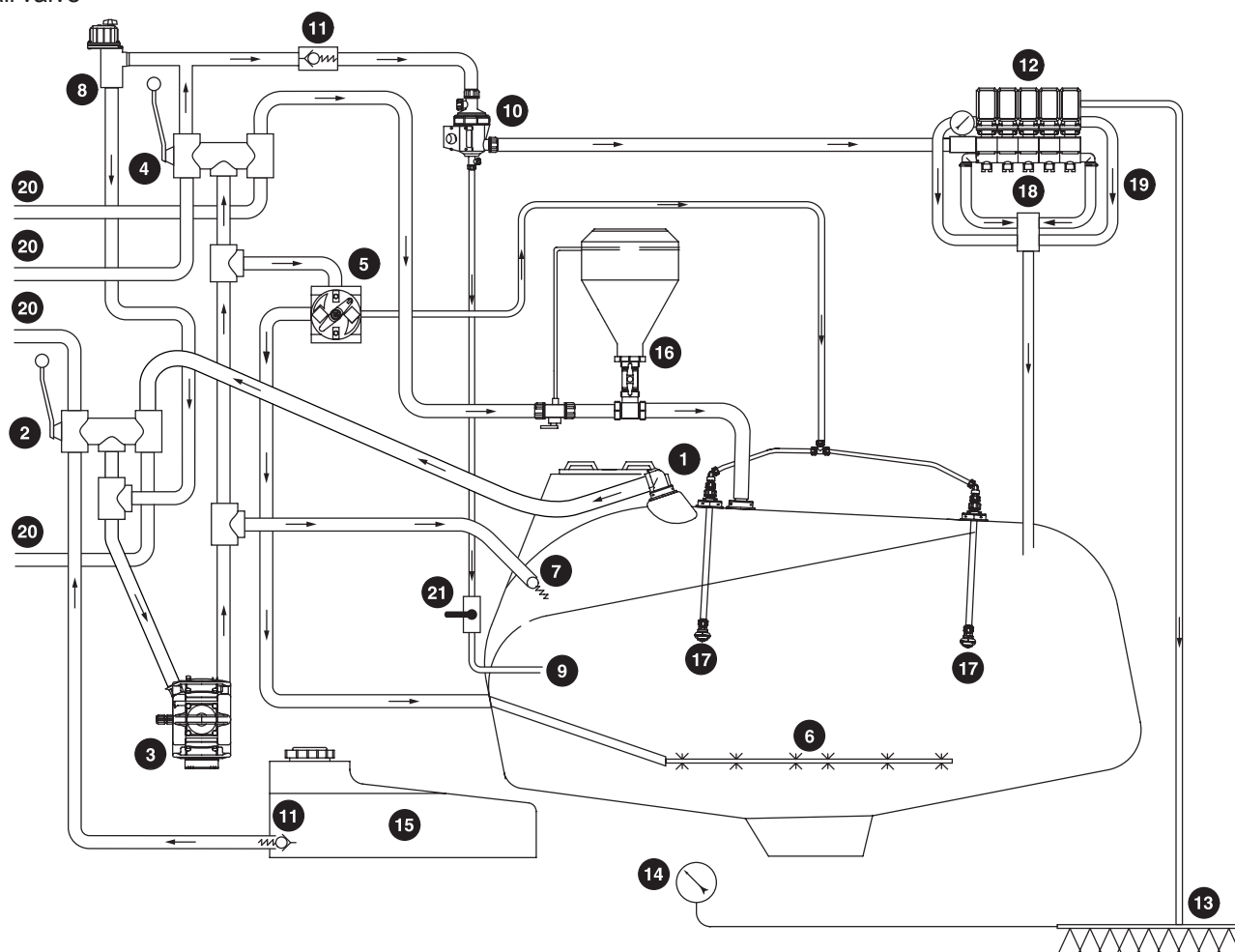
## Operating the liquid system SMART VALVE SYSTEM

The SMART VALVE SYSTEM is located at the left side of the sprayer and permits operation of the liquid system from one position. Below is a principal sketch of the liquid system.

### Conventional liquid system

#### Function diagram

1. Suction filter
2. Suction manifold
3. Pump
4. Pressure manifold
5. Agitation/Rinsing valve
6. Agitation tube
7. Safety valve
8. HARDI-MATIC
9. Self-cleaning filter return
10. Self-cleaning filter
11. Check valve
12. Boom section valves
13. Boom
14. Boom pressure gauge
15. Flush tank
16. HARDI chemical inductor
17. Tank rinse nozzles
18. Pressure equalization return
19. Boom Tube Pressure relief
20. Options
21. Ball valve



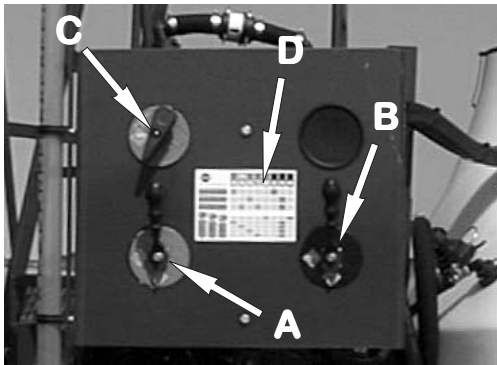
# Operation

## Use of MANIFOLD valve system

The following pictograms and colours are used for visualizing the functions of the MANIFOLD valves:

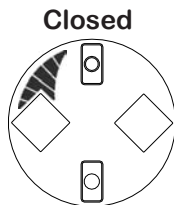
- Green disc (A) = Pressure Smart Valve
- Black disc (B) = Suction Smart Valve
- Upper green disc (C) = Agitation/Rinsing valve

Same colour references are used at the MANIFOLD Quick Reference (D)

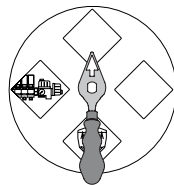


On the Agitation/Rinsing valve a function is activated/opened by turning the handle towards the desired function

Function open



On the Smart Valve a function is activated/opened by turning the handle towards the desired function. If the lever points at an unused position, then the Smart Valve will be closed.



## To operate the spraying functions:

- Turn the handle on a green pressure valve towards the desired function
- Turn the handle on a black suction valve towards the desired function

**NOTE!** If a MANIFOLD valve is too tight to operate - or if it is too loose (= liquid leakage), the valve needs to be serviced. Please see the part "Occasional maintenance - Adjustment of 3-way-valve" for further information. Correct setting is when the valve can be operated smoothly by one hand

### Electric operated MANIFOLD valves (if fitted)

One or more MANIFOLD valve(s) can be electrically operated via a control box in the tractor cab. These can only be operated manually when the power to the valve motor is disconnected first.



**IMPORTANT!** If the sprayer is put aside with liquid in the main tank all MANIFOLD valves must be closed.

Pictograms - Black disc (suction)	
Suction from main tank	
Rinsing tank	
Filling device	

Pictograms - Green disc (pressure)	
Self-cleaning filter / Operating unit	
Fast filling device	
HARDI FILLER	
Agitation *	
Tank flushing nozzle	
To main tank	
Spray gun	

### \*Agitation

Normally, Agitation should be on but please refer to the following rules of thumb:

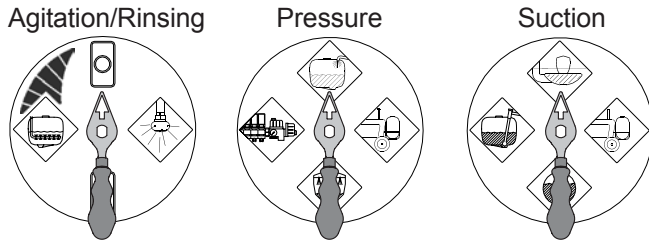
1. Close agitation if a high level of effervescence occurs in order to reduce the amount of foam.
2. Choose "Agitation" when using powder chemicals in order to avoid sedimentation. 
3. Close the valve if spraying with a high volume and it is impossible to achieve sufficient pressure or if a high level of effervescence occurs in order to reduce the amount of foam. 

The valves and functions may vary from machine to machine depending on optional equipment fitted.

# Operation

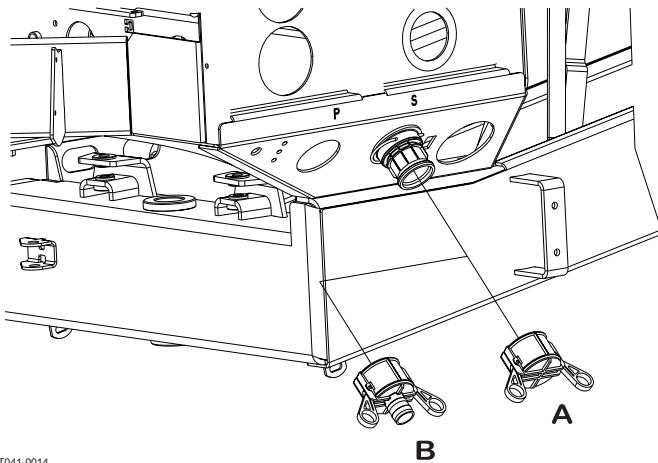
## Filling with Suction Filling Device (if fitted)

### Grip positions:



**WARNING!** Avoid contamination or personal injury. Do not open suction valve towards Suction Filling Device unless pump is running and filling hose is connected. If this valve is opened without pump running, liquid will stream out of the MANIFOLD.

The Suction Filling Device is operated as follows:



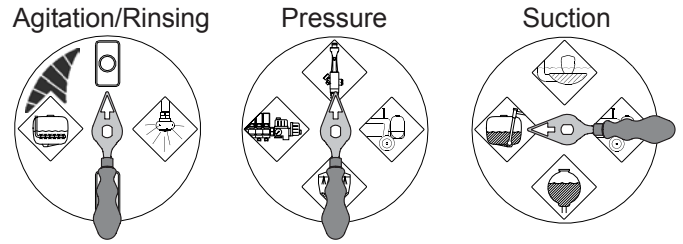
1. Remove cover **A**, and connect suction hose **B** to Suction Manifold.
2. Engage diaphragm pump and set P.T.O. revolutions at 540 r/min or 1000 r/min (depending on pump model)
3. Turn handle on Suction Manifold towards Filling Device.
4. The tank is now filled with water. Keep an eye on the liquid level indicator.
5. Turn handle on Suction Manifold away from Filling Device to discontinue filling process. Then disengage pump.
6. Disconnect suction tube **B** and replace cover.

**NOTE!** Observe local legislation regarding use of Filling Device. In some areas it is prohibited to fill from open water reservoirs (lakes, rivers etc.). It is recommended only to fill from closed reservoirs (mobile water tanks etc.) to avoid contamination.

**WARNING!** If suction hose/filter is carried on the sprayer during spraying, it can be contaminated by spray drift which will be transferred to lake/river when filling!

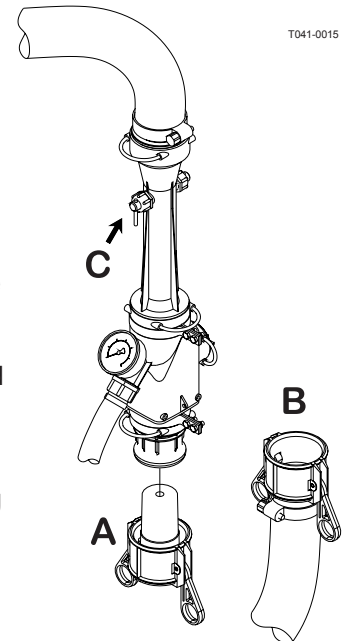
## Filling with Fast Filling Device (if fitted)

### Grip positions:



The Fast Filling Device is operated as follows:

1. Ensure spray liquid tank contains at least 50 litres of water.
2. Remove cover (**A**) and connect suction hose (**B**).
3. Turn handle on Pressure Manifold towards Fast Filler. With the P.T.O. at 540 r/min or 1000 r/min (depending on pump model), the pressure gauge should indicate about 10 bar.
4. If water is not seen in the transfer tube, prime by turning valve (**C**).
5. Keep an eye on the liquid level indicator.
6. Turn handle on Pressure Manifold away from Fast Filler to discontinue filling process.



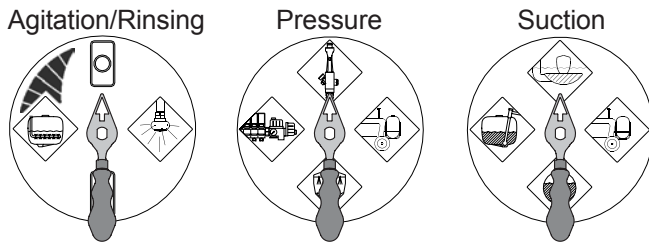
**NOTE!** Turn handle towards -operating unit **before** turning away from Fast Filler in order to avoid peak pressure blowing the safety valve!

7. Disconnect suction tube (**B**) and replace cover.

# Operation

## Filling device and Fast filling device used simultaneously (if fitted)

### Grip positions:



The Filling Device and the Fast Filling Device can be used simultaneously - this gives even bigger filling capacity.



**WARNING!** Do not leave the sprayer whilst filling the tank, and keep an eye on the level gauge in order **NOT** to overfill the tank!

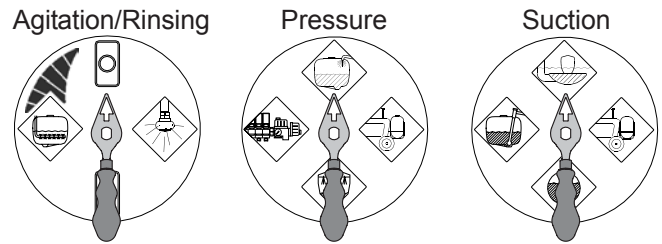
**NOTE!** Observe local legislation regarding use of Filling Device. In some areas it is prohibited to fill from open water reservoirs (lakes, rivers etc.). It is recommended only to fill from closed reservoirs (mobile water tanks etc.) to avoid contamination.



**WARNING!** If suction hose/filter is carried on the sprayer during spraying, it can be contaminated by spray drift, which will be transferred to lake/river when filling!

## Use of Quick coupler for external filling

### Grip positions:



The quick coupler is operated as follows

1. Fit the external water hose to the quick coupler on the trailer.
2. Close self-cleaning filter.
3. Turn handle on Pressure Manifold towards Main tank.
4. Turn handle on Suction Manifold towards Filling device.
5. Depending on the chemical in question, the Pressure Manifold can be set on "Agitation". If no agitation is needed, this valve must be closed.
6. Engage the P.T.O. and start the pump.



**WARNING!** Do not leave the sprayer whilst refilling the tank, and keep an eye on the level gauge in order **NOT** to overfill the tank!

# Operation

## Filling of chemicals

Chemicals can be filled in the tank in two ways:

1. Through tank lid.
2. By means of HARDI FILLER chemical filling device.

### 1. Filling through tank lid

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

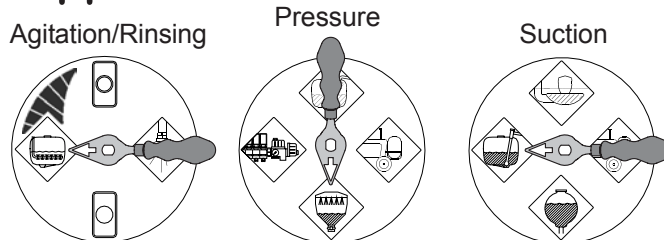


**WARNING!** Be careful not to slip or splash chemicals when carrying chemicals up to the tank lid!

1. Make sure the EVC is switched off.
2. Set the MANIFOLD valves to correct position. Black valve "Suction from main tank", upper green valve towards "Agitation".
3. Engage the pump and set P.T.O. revolutions to 540 r/min or 1000 r/min (depending on pump model).
4. Add the chemicals through the main tank hole.
5. When the spray liquid is well mixed, turn handle on the Smart Valve towards "Spraying" position. Keep P.T.O. engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.

## Filling by HARDI FILLER chemical inductor

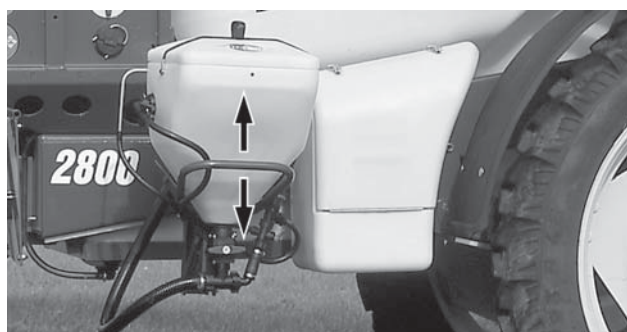
### Grip positions:



To get access to the HARDI FILLER, grab the handle and drag the HARDI FILLER the whole way down. Due to the spring loaded suspension, it will stay in this position. After use, it is pushed the whole way up again.

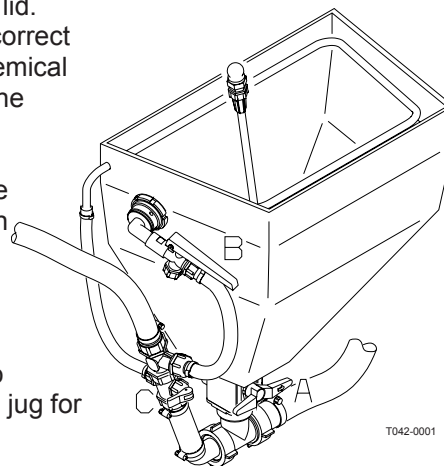
### Filling of Liquid chemicals

1. Fill the main tank at least  $\frac{1}{3}$  with water (unless something else is stated on the chemical container label). See section "Filling of water".
2. Turn the handle at the Suction Manifold towards "Main tank". Turn green Smart Valve towards "HARDI FILLER" and the upper green valve towards agitation. Close remaining valves.
3. Check that bottom valve **A** at the FILLER is closed.



4. Engage the pump and set P.T.O. speed at 540 r/min or 1000 r/min (depending on pump model).
5. Open FILLER lid.
6. Measure the correct quantity of chemical and fill it into the hopper.

**NOTE!** 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.





# Operation

- Open the bottom valve **A** and the chemical is transferred to the main tank.
- If the chemical container is empty it can be rinsed by the container rinsing device (if fitted). Place the container over the multi-hole nozzle and press the lever **B**.



**WARNING!** Do not press lever **B** unless the multi-hole nozzle is covered by a container to avoid spray liquid hitting the operator.

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

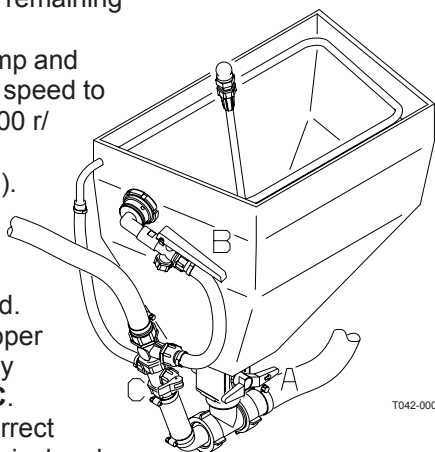
- Engage the hopper rinsing device by opening valve **C**.
- Close valve **C** again when the hopper is rinsed.

**IMPORTANT!** The hopper rinsing device is using spray liquid for rinsing the hopper for concentrated chemical! The FILLER must always be cleaned together with the rest of the sprayer when the spray job is done.

- Close valve **A** and the FILLER lid again.
- When the spray liquid is well mixed, turn handle on the Pressure Smart Valve towards “Spraying” position. Keep P.T.O. engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.

## Filling of Powder chemicals

- Fill the main tank at least  $\frac{1}{2}$  with water (unless something else is stated on the chemical container label). See section “Filling of water”.
- Turn the handle at the Suction Manifold towards “Main tank” and upper green valve towards “Agitation”. Turn the handle at the Smart Valve towards “HARDI FILLER”. Close remaining valves.
- Engage the pump and increase P.T.O. speed to 540 r/min or 1000 r/min (depending on pump model).
- Open the bottom valve **A** at the FILLER. Open FILLER lid.
- Engage the hopper rinsing device by opening valve **C**.
- Measure the correct quantity of chemical and sprinkle it into the hopper as fast as the rinsing device can flush it down.
- If the chemical container is empty it can be rinsed by the container rinsing device (if fitted). Fit the bag bracket and place the powder bag over the multi-hole nozzle and press the lever **B**.



**WARNING!** Do not press lever **B** unless the multi-hole nozzle is covered by a container to avoid spray liquid hitting the operator.

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

- Close valve **C** again when the hopper is rinsed.

**IMPORTANT!** The hopper rinsing device is using spray liquid to rinse the hopper for concentrated chemical. The FILLER must always be cleaned together with the rest of the sprayer when the spray job is done.

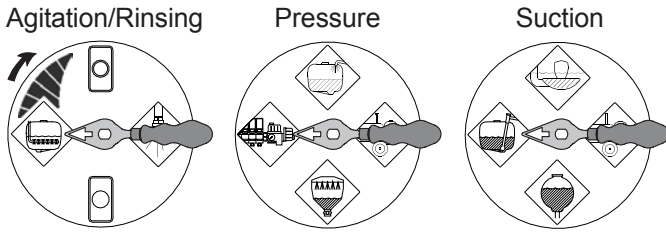
- Close valve **A** and the FILLER lid again.

- When the spray liquid is well mixed, turn handle on the Pressure Smart Valve towards “Spraying” position. Keep P.T.O. engaged so the spray liquid is continuously agitated until it has been sprayed on the crop.

# Operation

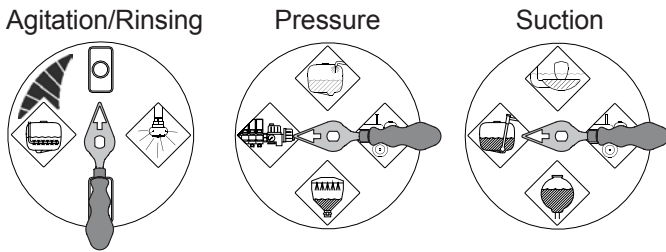
## Spraying

### Grip positions while spraying with agitation:



Use Adjustable Agitation to adjust the needed amount of agitation related to selected spraying volume.

### Grip positions while spraying without agitation:



**Spray Technique - see separate book**

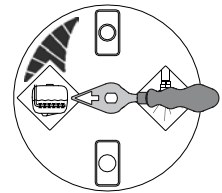
## Use of Adjustable Agitation Valve

The valve is marked with arrows on the green disc that indicates the amount of liquid that passes through the valve. If handle is turned to a position near the tip of the arrow, then only a small amount of liquid is allowed to pass the valve. Otherwise, if handle is turned to a position in the wide end of the arrow, it means that a larger amount is passing the valve.

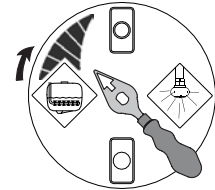
This gives the possibility to continuously adjust how large amount of fluid from the pump is used for agitation in the tank and for spraying.

Examples on handle positions at different agitation quantities:

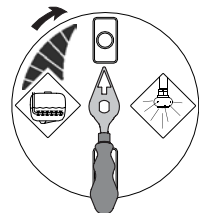
1. Handle is in same position as (open) agitation position at the original valve. Agitation quantity is 100%.



2. Handle is positioned at the middle of the arrow (in agitation side of the disk). Agitation quantity is 50%.



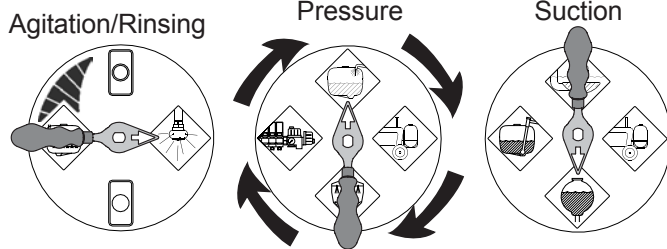
3. Handle is positioned in closed position. Agitation quantity is 0%.



# Operation





## Use of rinsing tank and rinsing nozzles (if fitted)

### Grip positions:





The incorporated rinsing 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.

1. Empty the sprayer as much as possible. Close the upper green pressure valve (no agitation) and spray till air comes out of all nozzles.
2. Turn black suction valve towards "Rinsing tank". 
3. Turn upper green pressure valve towards "Rinsing nozzle" (if fitted). 
4. Engage and set the pump at approximately 300 r.p.m.
5. When rinsing water corresponding to approximately 1/3 of rinsing tank content is used, turn black suction valve towards "Suction from main tank" and operate all valves, so all hoses and components are rinsed. 
6. Turn green Smart Valve back to "Operating unit" and spray liquid in the field you have just sprayed. 
7. Repeat point 3-7 until the rinsing tank is empty.

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

1. Close Self-cleaning filter (Ballofix). 
2. Turn black suction valve towards "Rinsing tank".
3. Close upper green pressure valve (no agitation).
4. Engage the pump and spray water from rinsing tank in the field until all nozzle tubes/nozzles are flushed with clean water.
5. Disengage pump again.
6. Open Self-cleaning filter again.

 **WARNING!** 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!

## Safety precautions


 Always be careful when working with crop protection chemicals!


### Personal protection


Dependant on which type of chemical used, the following protective clothing/equipment should be used:


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


This equipment should be worn to avoid contact with the chemicals.

 Protective clothing/equipment should be used when preparing the spray liquid, during the spraying work and when cleaning the sprayer. Also follow the recommendations on the chemical label.

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

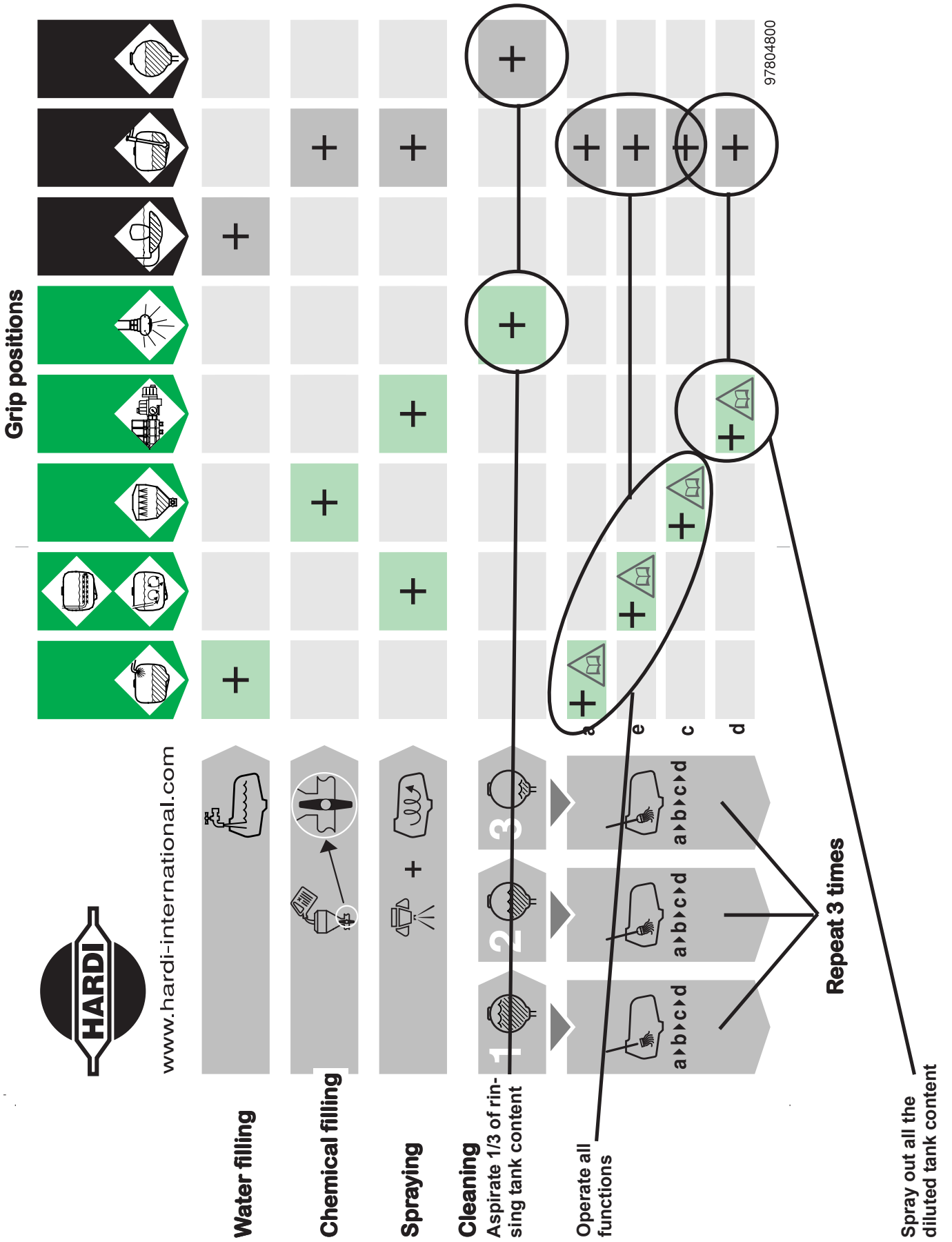
 Always clean the sprayer carefully and immediately after use.

 Do not mix different chemicals in the tank.

 Always clean the sprayer before changing to another chemical.

# Operation

## MANIFOLD Quick Reference



# Maintenance

## Maintenance - rules of thumb

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

**IMPORTANT!** 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.

## Cleaning the sprayer

### 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 rendering 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. Unauthorised 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.

### Remember:

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

## Cleaning the tank

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 - See paragraph "Use of rinsing tank and rinsing nozzles".

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

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 tank and suction filters and clean. Be careful not to damage the mesh. Replace suction filter top. 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  $\frac{1}{5}$  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.
- NOTE!** If a cleaning procedure is given on the chemical label, follow it closely.
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. The Self-Cleaning Filter can be flushed by removing the bypass hose from the bottom of the filter. Stop the pump and remove the hose. Start the pump for a few seconds to flush filter. Be careful not to lose the restrictor nozzle.
  8. Drain the tank and let the pump run dry. Rinse inside of the tank, again letting the pump run dry.
  9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them immediately. Also check for sediment on the pressure side of the safety valve for the Self-Cleaning Filter.

# Maintenance

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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.

**NOTE!** 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 whilst spraying.
- Long life of the pump. A blocked suction filter will result in pump cavitation.

The main filter protecting sprayer components is the suction filter at the top of the tank. Check it regularly.




# Maintenance

## Lubrication

### About lubricants

- 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.
- **NOTE!** If the sprayer is cleaned with a high pressure cleaner or fertiliser has been used, lubrication of all sections is recommended.

### Recommended lubricants

Lubricating points			Lubricant
Ball bearings		<b>A</b>	Universal Lithium grease, NLGI No. 2 SHELL RETINAX EP2 CASTROL LMX GREASE
Slide bearings		<b>B</b>	Lithium grease with Molybdenumdisulphide or graphite SHELL RETINAX HDM2 CASTROL MOLYMAX
Oil lubricating points		<b>C</b>	TOTAL Transmission TM SAE 80W/90 CASTROL EPX 80/W90 SHELL SPIRAX 80W/90 MOBIL MOBILUBE 80W/90

044

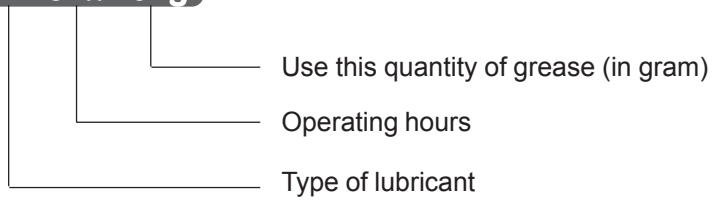
#### \*) Guidelines - greasing

- Follow the shown direction concerning recommended quantity.
- If no recommended quantity is given, feed lubricator till new grease becomes visible.

# Maintenance

## Lubrication & oiling plan

**B - 50h - 30g**



**5** — Position on the sprayer



- 1
- 2
- 3
- 4
- 5

- 11
- 10
- 9
- 8
- 7

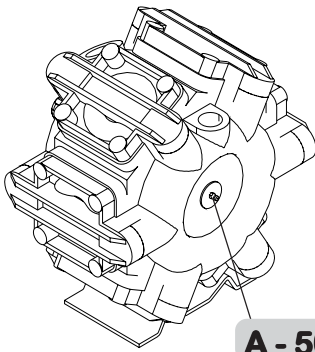


- 12



# Maintenance

1

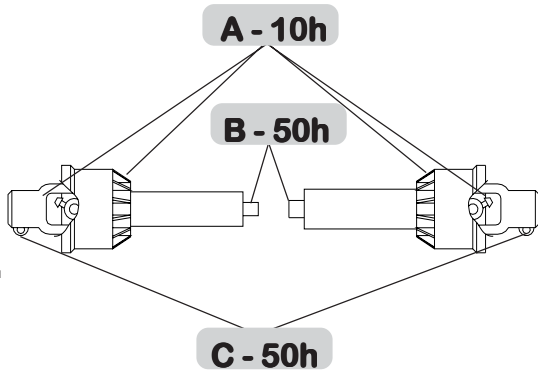


T201-0001

**A - 50h - 40g/50g\***

\* Pump model 363 = 40g  
Pump model 463 = 50g

2



T226-0001

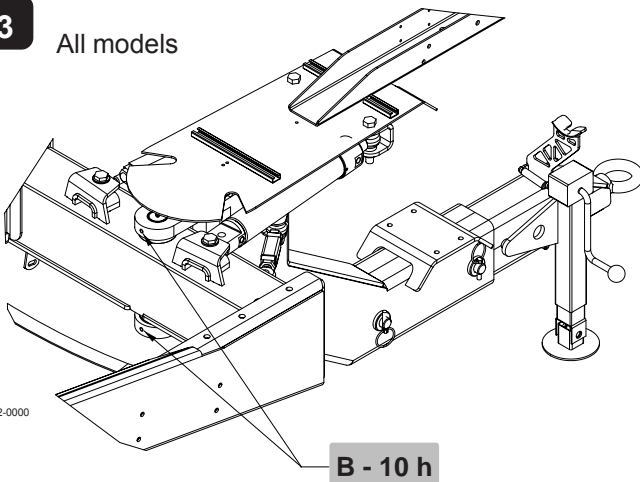
**A - 10h**

**B - 50h**

**C - 50h**

3

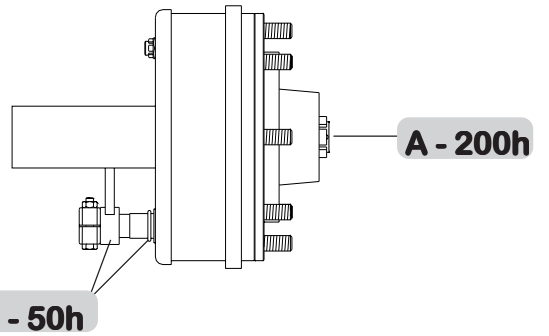
All models



T222-0000

**B - 10 h**

4

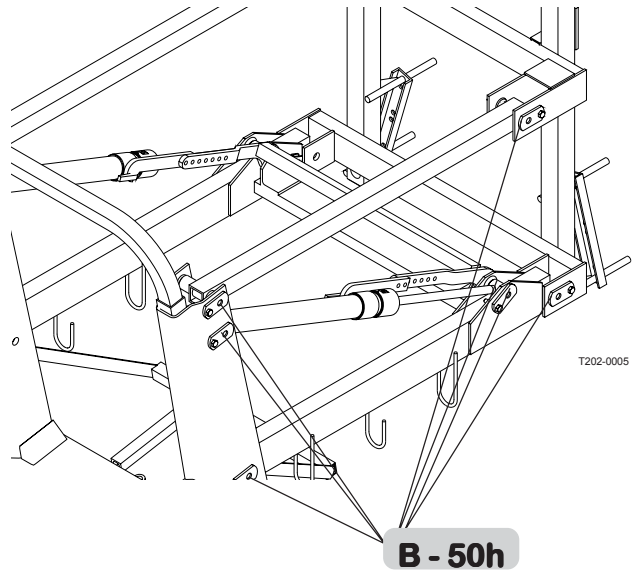


T202-0008

**A - 200h**

**C - 50h**

5

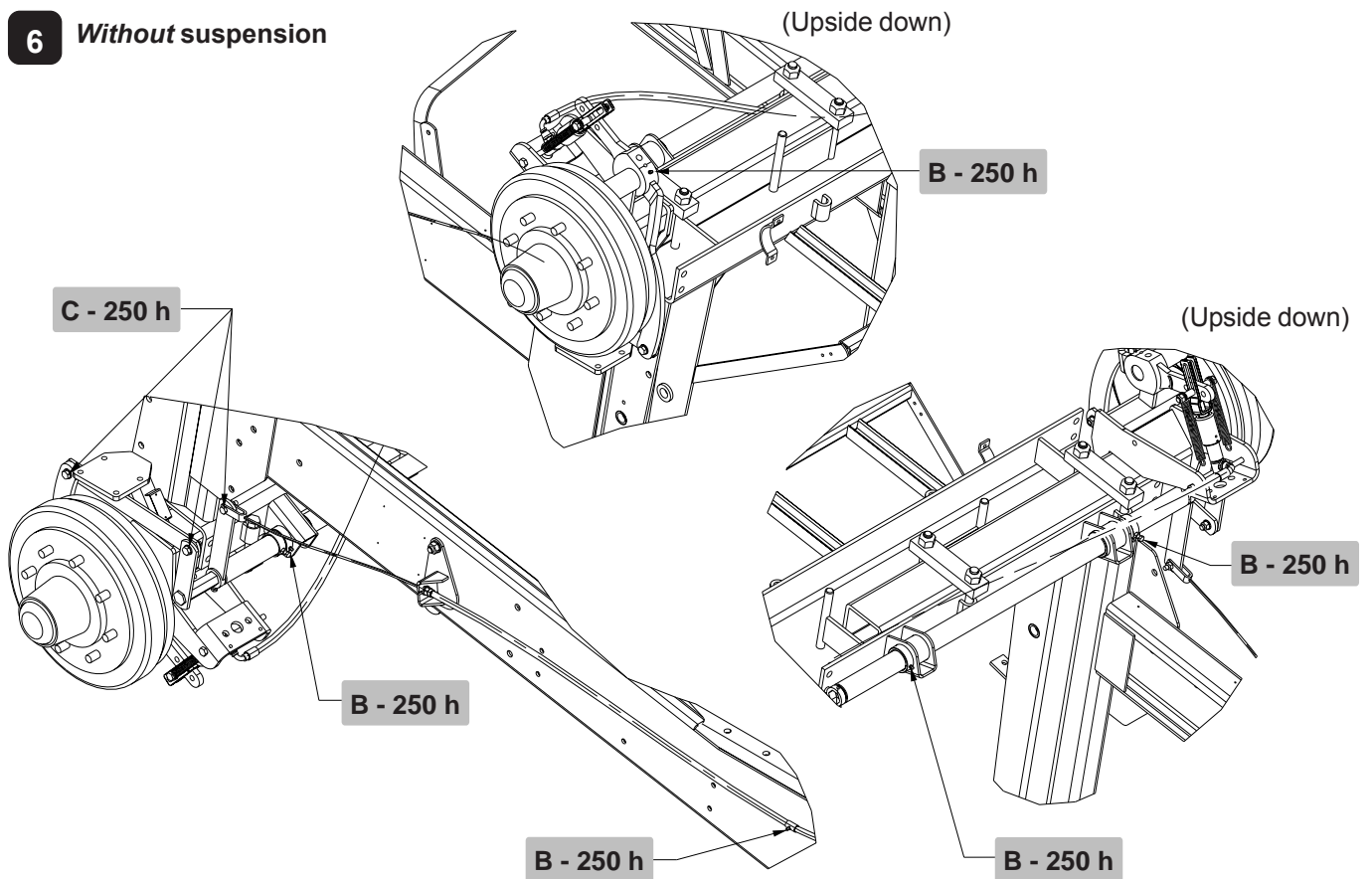


T202-0005

**B - 50h**

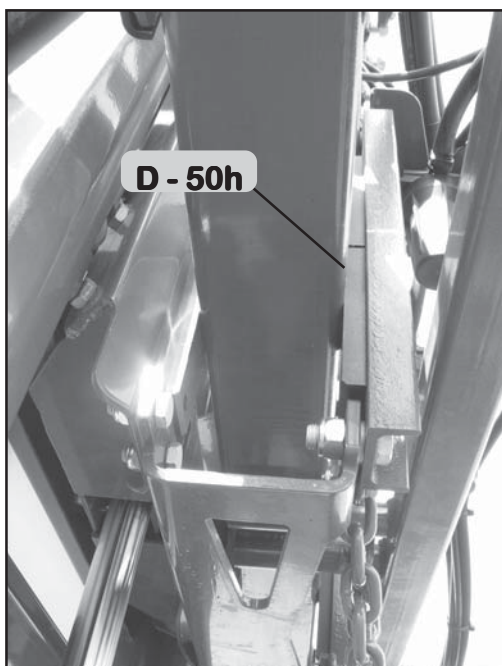
# Maintenance

## 6 Without suspension



T219-0009GB

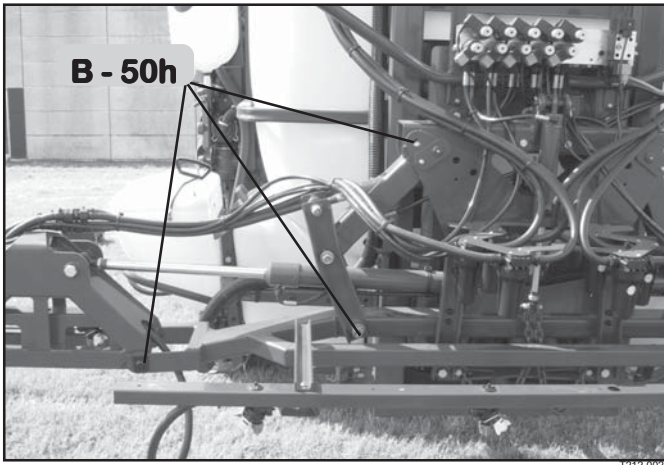
## 7



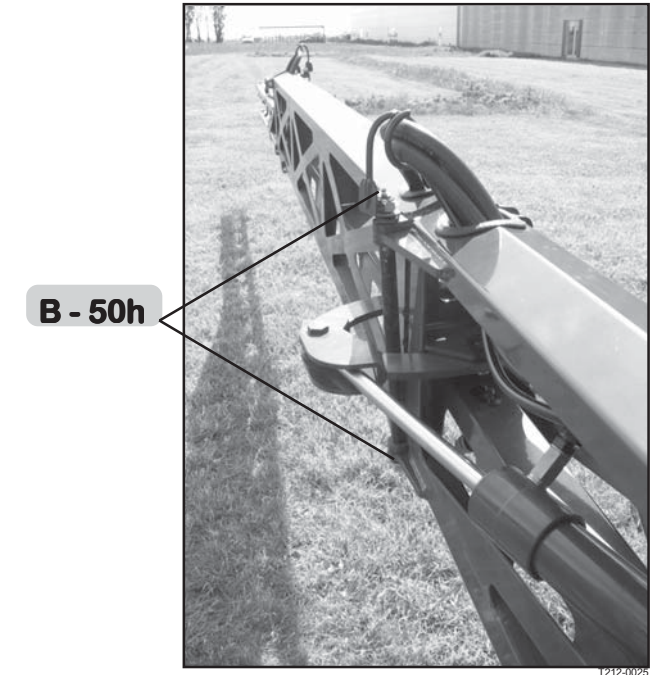
T212-0028

# Maintenance

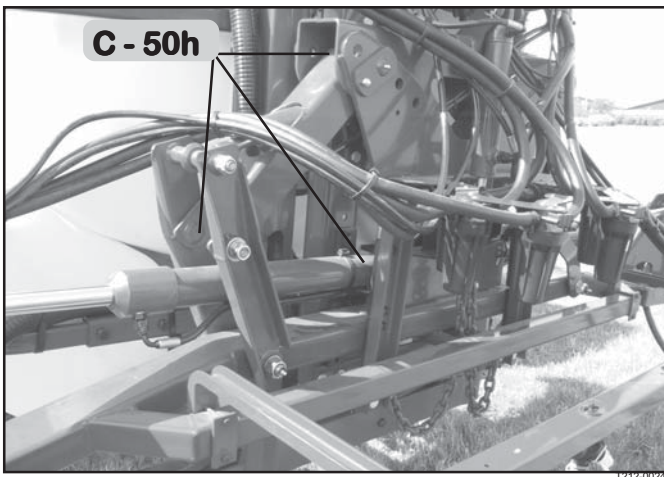
8



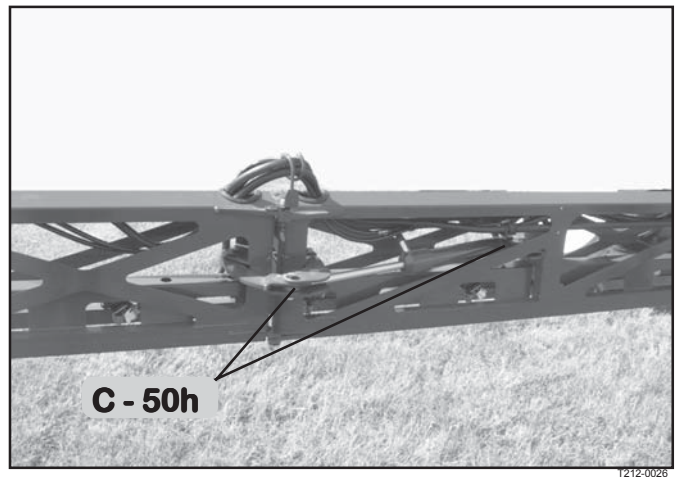
9



8

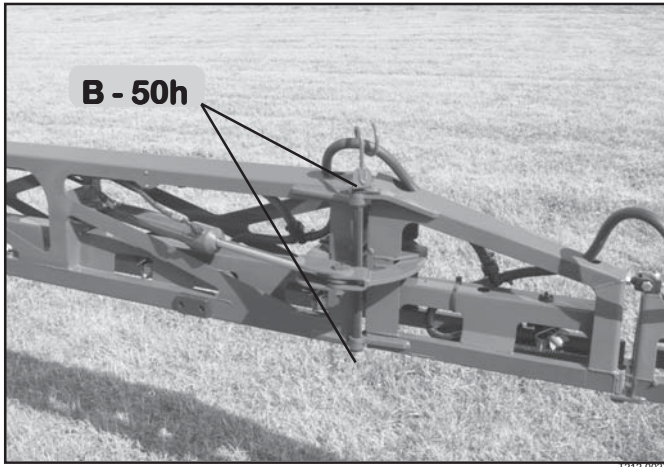


9



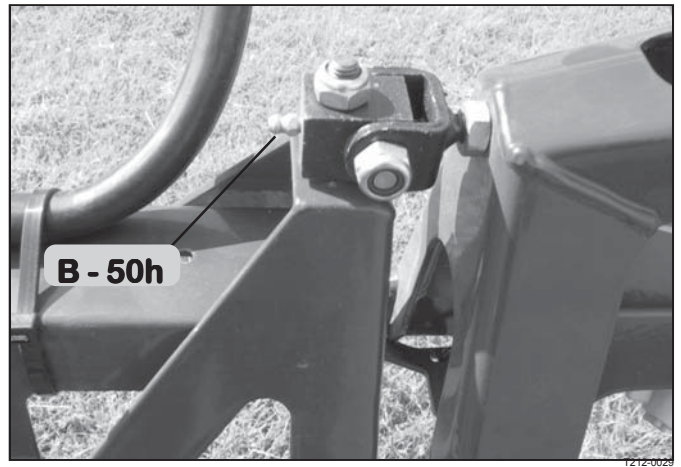
# Maintenance

10



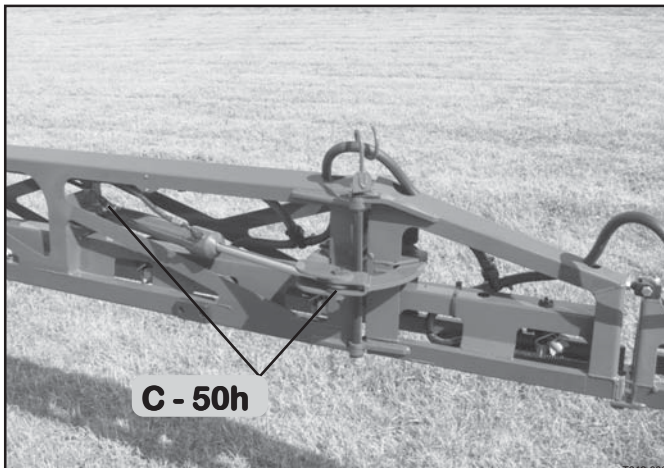
T212-0027

11



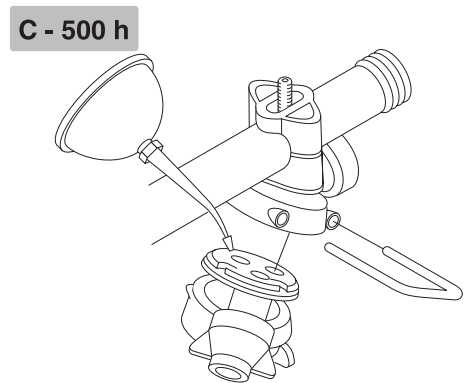
T212-0028

10



T212-0027

12



T219-0003

# Maintenance

## Service and Maintenance intervals

### 10 hours service

1. Suction filter, clean
2. Self-cleaning filter, check and clean gauze if necessary
3. In-line filters, clean
4. Nozzle filters, clean
5. Spraying circuit, check for leaks
6. Brakes Air tank, drain
7. Brakes, check

### 50 hours service

Do all previous mentioned +

1. Wheel bolts and nuts, tighten
2. Air brakes, check
3. Expansion bottle (SELF TRACK only), check air pressure
4. Tyre pressure, check
5. Transmission shaft, check

### 100 hours service

Do all previous mentioned +

1. Fixed drawbar, check/adjust
2. Retighten bolts

### 250 hours service

Do all previous mentioned +

1. Wheel bearings, check
2. Parking brake, inspect
3. Wheel brake, adjust
4. Air brake filters, clean
5. Hydraulic brakes, inspect
6. Hydraulic circuit, check
7. Expansion bottle (SELF TRACK only), check oil level
8. Hoses and tubes, check
9. Readjustment of the boom

### 1000 hours service or yearly, whichever comes first

Do all previous mentioned +

1. Wheel bearings and brakes, check
2. Transmission shaft, change parts
3. Change of bearings - centre and inner section

# Maintenance

## Occasional maintenance

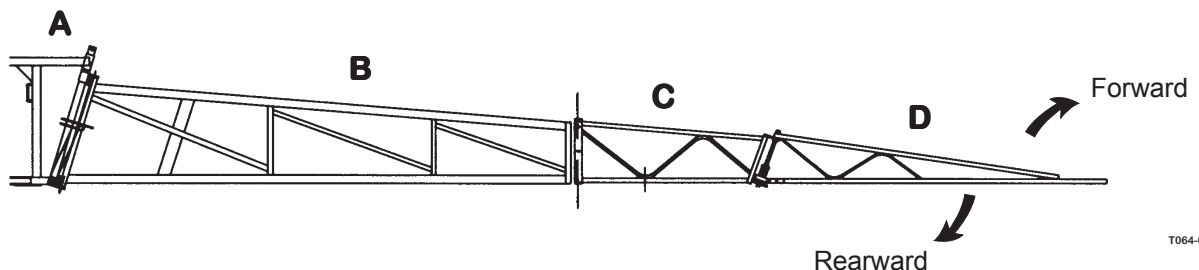
- Pump valves and diaphragms renewal
- Cone check/renewal, EVC operating unit
- Cone check/renewal, EVC distribution valve
- Wear bush renewal, boom lift
- Wear bush renewal, drawbar
- Venting the hydraulic damping system (SELF TRACK)
- TRACKER damper pressure setting (SELF TRACK)
- Shock absorbers, inspect
- Level indicator adjustment
- Cord renewal, level indicator
- Seal renewal, drain valve
- Nozzle tubes and fittings
- Replacement of transmission shaft protection guards
- Replacement of transmission shaft cross journals
- Adjustment of 3-way-valve
- Change of bulbs
- Adjustment of slanting control indicator cable
- Change of tyres
- Adjustment of breakaway device
- Yaw dampers
- Rubber dampers



**Always check that all lock nuts are tight after adjustment**

## Glossary

The text in the following part refers to adjustments performed in the folds between the different boom sections. An overview of the names of the sections is shown here:



- A:** Centre section
- B:** Inner section
- C:** Outer section
- D:** Breakaway section

T064-0100

# Maintenance

## 10 hours service

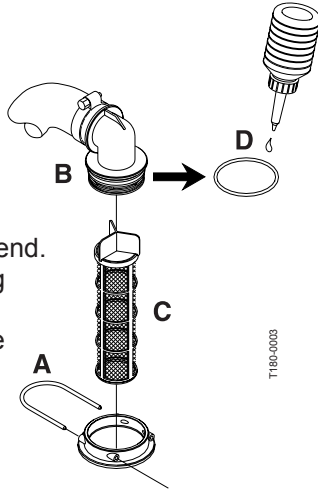
### 1. Suction filter

To service the suction filter:

1. Pull out the steel clip **A**.
2. Lift the suction hose fitting **B** from housing.
3. Filter guide and filter **C** can now be removed.

To reassemble:

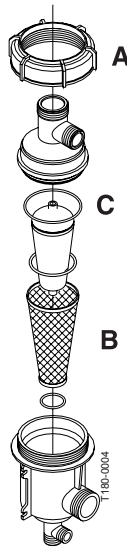
4. Press the guide onto filter end.
5. Place the filter into housing with guide facing up.
6. Ensure the O-ring **D** on the hose fitting is in good condition and lubricated.
7. Refit the suction hose **B** and steel clip **A**.



T180-0003

### 2. Self-Cleaning Filter

1. Unscrew nut **A** and open filter.
2. Check filter gauze **B**, clean if necessary
3. Lubricate O-ring **C**
4. Assemble filter again.

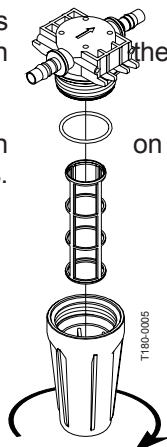


T180-0004

### 3. In-Line filter (if fitted)

If the boom is equipped with In-Line Filters unscrew the filter bowl to inspect and clean the filter.

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



T180-0005

### 4. Nozzle filters

Check and clean.



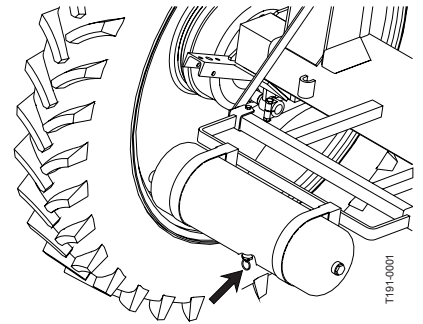
T180-0006

### 5. 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.

### 6. Brakes Air tank

Drain the air tank for condensed water at the drain valve.



T181-0001

### 7. Brakes

Apply brake pedal and check function of trailer brakes.

# Maintenance

## 50 hours service

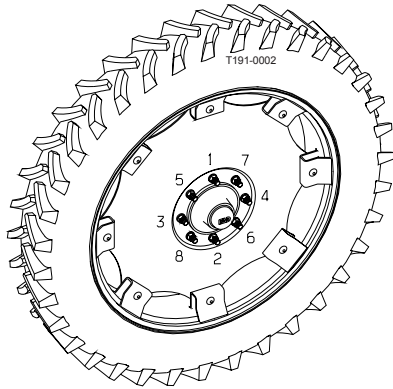
### 1. Wheel bolts and nuts

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

Wheel hub to rim plate: 490 Nm (362 lbft)

Rim plate to rim: 280 + 30 Nm (207 + 22 lbft)

Tightening sequence: See illustration (1-8).



### 2. Air brakes

The air brakes are checked for leaks by following procedure:

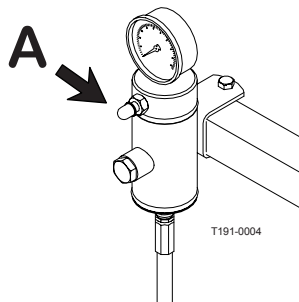
1. Connect the snap-couplers to the tractor and fill the trailer air tanks.
2. Check for leaks with brakes released.
3. Apply the brake up to full pressure.
4. Check for leaks with brakes applied.

### 3. Expansion bottle (SELF TRACK only)

Check air pressure in the expansion tank for the hydraulic damping at the pressure gauge.

Fill through valve **A** if necessary.

Air pressure: 5 bar (73 p.s.i.)



### 4. Transmission shaft

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

## 5. Tyre pressure

Check the tyre pressure according to the table below.

Tyre size RC 95	Recommended inflation pressure in bar (p.s.i.)	Minimum Load Index A8/A2
230/95 R44	3.6 (52)	134/145
230/95 R48	3.6 (52)	136/147
270/95 R44	3.6 (52)	140/151
270/95 R48	3.6 (52)	142/153
300/95 R46	3.6 (52)	147/158
420/85 R38	1.6 (23)	141/152
520/70 R38	1.6 (23)	147/144
580/70 R38	1.2 (18)	154/151

002

**IMPORTANT!** If renewing tyres always use tyres with min. load index as specified in the table.



**WARNING!** Never inflate tyres more than to the pressure specified in the table. Over-inflated tyres can explode and cause severe personal injuries! See the part *Occasional Maintenance - Change of tyre*.



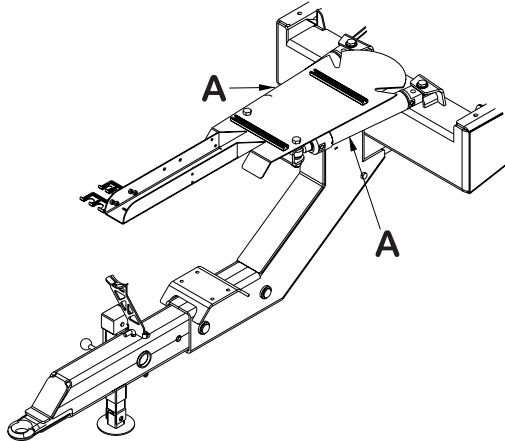
# Maintenance

## 100 hours service

### 1. Check/adjust drawbar (Fixed drawbar only)

If too much play is found in the lateral movements of the drawbar it must be adjusted.

Regulate on the turnbuckles **A** on each side in order to adjust and centre the drawbar.



T251-0022

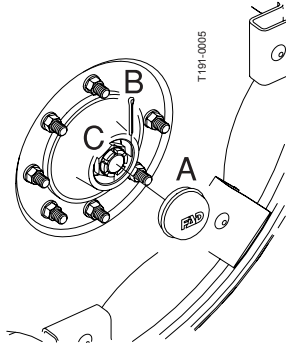
# Maintenance

## 250 hours service

### 1. 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 castellated nut **C** until a slight resistance in the wheel rotation is felt.
5. Loosen the castellated 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 press it on to the hub again.
8. Repeat the procedure on LH wheel.



### 2. Inspect parking brake

Inspect the following:

#### The parking brake lever:

If it can be pulled further backwards than 90° (midway), using a traction of approximate 25 kg., the cable needs to be adjusted.

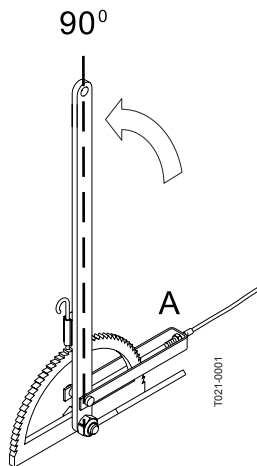
#### The parking brake cable:

When the parking brake is relieved, the cable must be limp; otherwise it needs to be adjusted.

Correct length: When the brake is relieved the cable must be tight and yet not stretched.

Lengthening/shortening of the parking brake cable is carried out by adjusting the nut **A**.

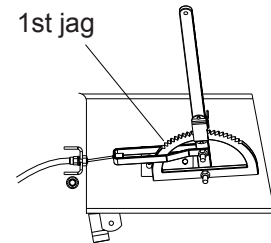
Inspect the parking brake cables for possible wear or damages. Replace worn or damaged parts.



### 3. Brake adjustment

Lift the back of the COMMANDER from the ground. It is recommended to use two lifting jacks, placed underneath the axle. Make sure the COMMANDER is stable and secured before carrying out any adjustments.

1. Place the handbrake in the first jag. (Please refer to illustration).

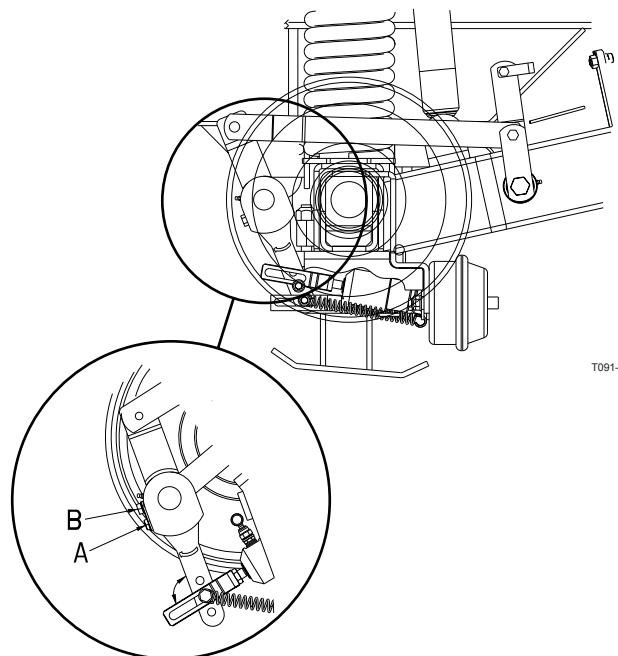


**NOTE!** The following adjustment must be carried out simultaneously on both brakes. Therefore, alternately adjust on both LH brake and RH brake.

2. Loosen nut **B**, lift and flip the small lock plate aside.
3. Adjust the nut **A** clockwise. Turn the nut 90° (1/4 turn) at a time - alternately on both LH and RH brake.

After each 1/4 turn:

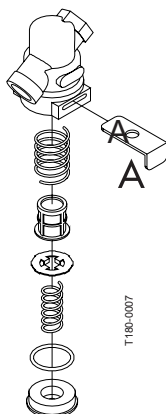
Check the hub by rotating it. Continue adjustment till resistance occurs. This adjustment is completed, when each hub is strained.



# Maintenance

## 4. Air brake filters (if fitted)

1. Clean the area around air filter(s) and disconnect air hose from the tractor.
2. Hold one hand under the filter housing, and pull out the retainer clip **A**. The filter cartridge assembly will be pushed out by the springs inside the filter housing.
3. Clean the filter cartridge. Use water and an appropriate detergent or compressed air.
4. Dry the parts and reinstall in the order shown. The O-ring should be lightly lubricated with silicone grease before installation.



## 9. Readjustment of the boom

Please see next page.

## 5. Hydraulic brakes

Apply brakes to full pressure and inspect brake lines for damages or leaks. Replace damaged parts.

**IMPORTANT!** If the hydraulic brake lines have been dismantled the circuit must be primed afterwards:

1. Loosen brake hose at both brake cylinders.
2. Apply brake until oil without air bubbles come out.
3. Tighten brake hose before relieving the brake again.

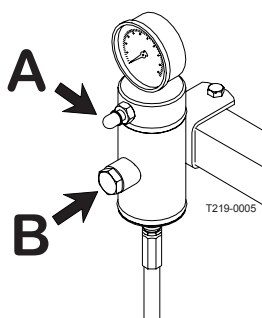
## 6. Hydraulic circuit

Check the hydraulic circuit for leaks and repair if any.

## 7. Expansion bottle (SELF TRACK only)

Check the oil level:

1. Depressurize the expansion bottle through valve **A** first.
2. Remove the level plug **B** and check that the oil level is reaching the level hole. Add if the level is low.
3. Tighten the plug again and inflate the bottle to 5 bar air pressure.



## 8. Hoses and tubes

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

# Maintenance

## Readjustment of the boom

Before commencing adjustment of the sprayer, please go through this check list.

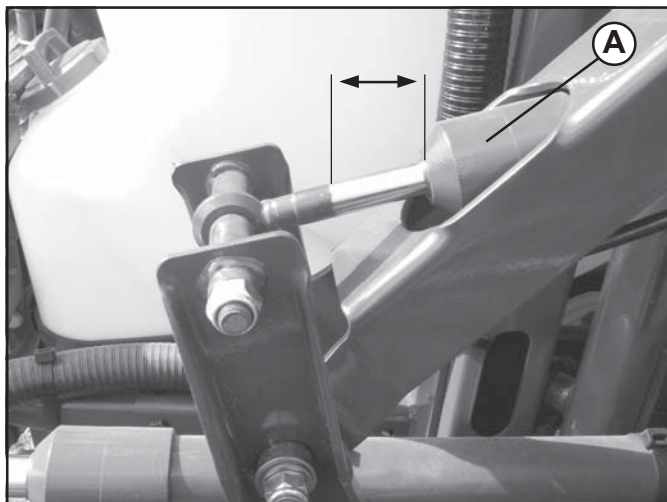
1. Connect the sprayer to the tractor.
2. Place tractor and sprayer on level ground (horizontal)
3. Unfold the boom.



**WARNING!** Nobody is allowed to be under the boom whilst adjustment is carried out!

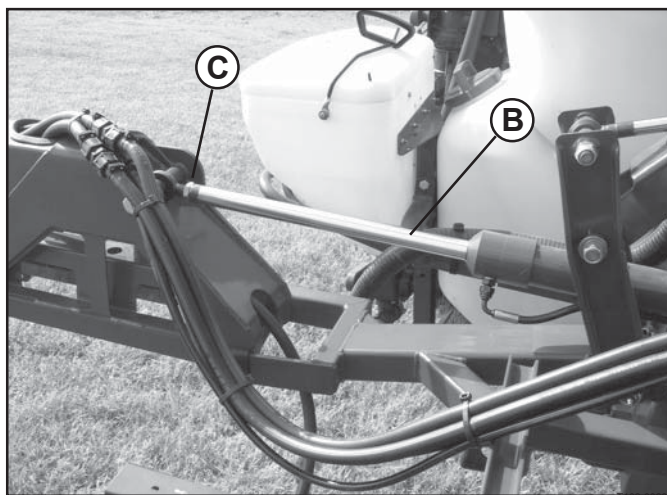
## Intermediate section

Before commencing this job make sure that the centre part is completely horizontal = 71,7 mm exposed piston rod at the slanting cylinder (A) (if fitted).



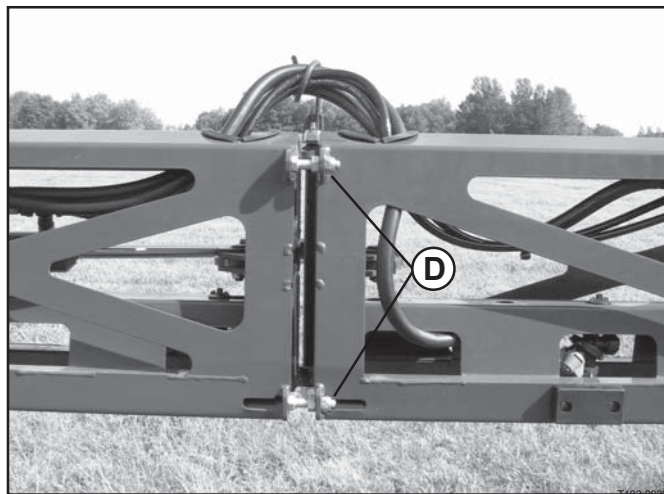
Boom wing should be horizontal. If not, align boom wing by means of axle (B). See below.

1. Loosen nut (C).
2. Rotate axle (B) till boom wing is horizontal.
3. Fasten (C) again.

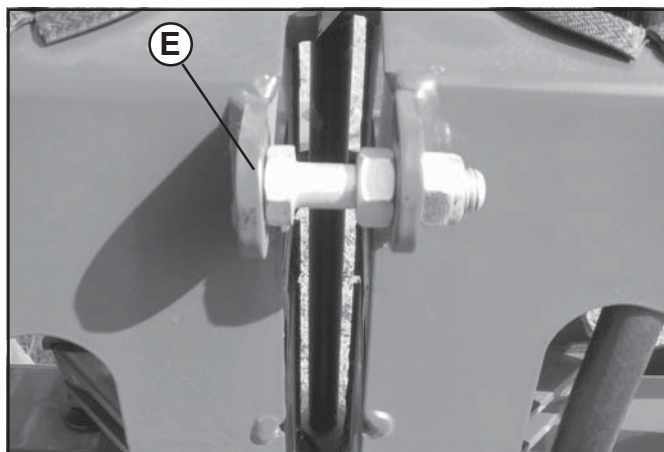


## Large outer section (1)

1. Loosen the two bolts (D).

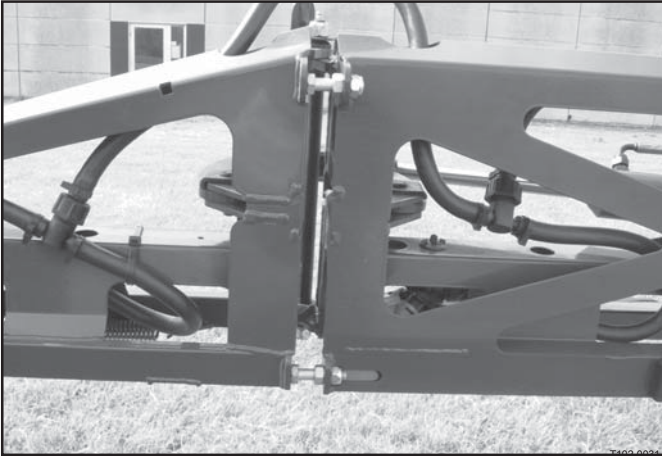


2. Align the boom by means of the control box (VHZ models) or the hydraulic control lever (VHY models).
3. When boom is aligned, bring the bolts (A) into correct position = the head of the bolt should just touch the small iron work (E).



# Maintenance

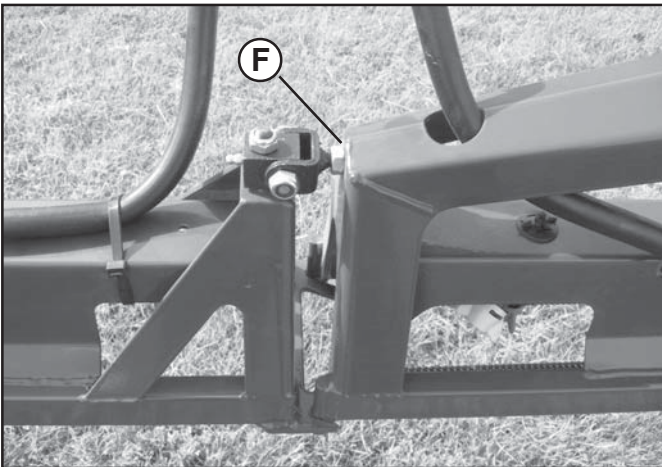
## Short outer section (2)



Adjustment is carried out as described above in the section 'Large outer section'.

## Breakaway section

The height of this section should be adjusted if it hangs down compared to the rest of the wing. Align section by means of bolted joint **F**.



## Centre part - setting of trapeze

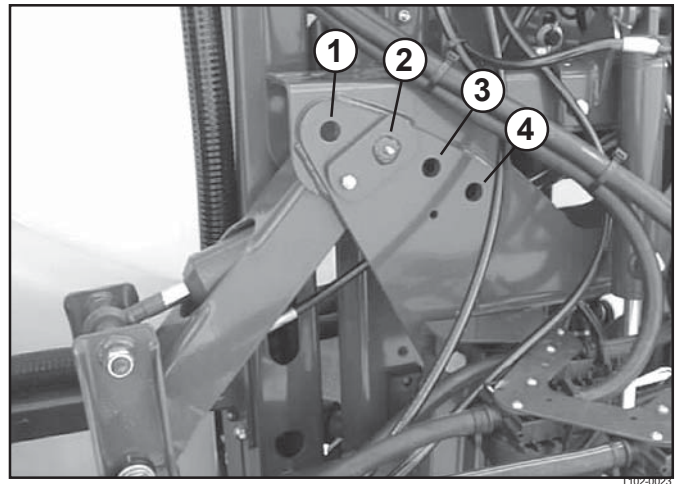
In order to alter the behaviour of the boom the trapeze has 4 settings.

Setting 1: For use on uneven ground with many obstacles.

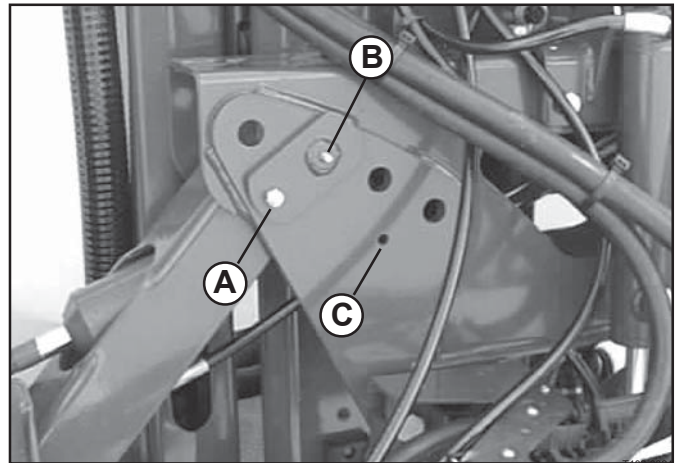
Setting 2: All-round standard setting (Factory setting)

Setting 3: Slightly slower moving trapeze. Good at following slopes, but less compensating for obstacles.

Setting 4: Very slow moving trapeze. For use on even ground and slopes where there are no obstacles.



## How to alter the setting



1. Unfold and support the boom.
2. Loosen bolt from locking hole (A).
3. Remove pin + mounting (B).
4. Place (B) in new setting position (1-4).
5. Fasten bolt in locking hole (A) again.

**NOTE!** To change from pos. 1 or 2 to pos. 3 or 4 - or vice versa - the pin + mounting (B) must be fastened by the bolt in the opposite hole. In this case = C.

Carry out similar adjustments to both sides of trapeze.

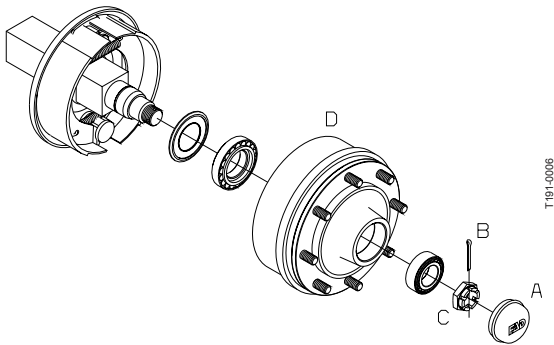
# Maintenance

## 1000 hours service

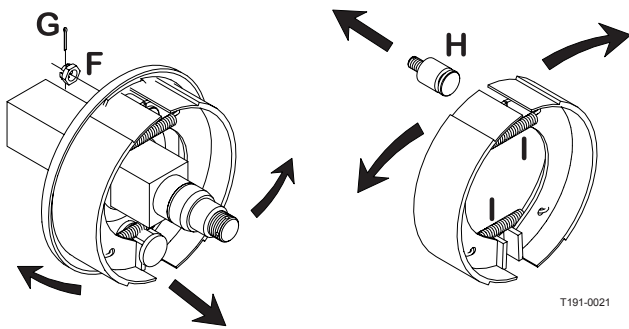
### 1. Wheel bearings and brakes

Check the condition of the bearings and brake wear parts 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 and brake drum assembly. Use a wheel puller if necessary.
6. Vacuum clean the brake drum **D** for brake dust or rinse with water.



**WARNING!** Brake dust can cause severe health injuries! Avoid inhalation of brake dust! Use respirator when servicing the brakes. Do not clean brakes with compressed air! Use vacuum cleaner or rinse with water to avoid brake dust being blown around.



7. Rinse the remaining parts on the brake carrier plate with water and dry them.
8. Remove roller bearings **E**, clean all parts in degreasing detergent and dry them.
9. Check the brake drum diameter and lining thickness - renew if worn.

Max. wear rates on brake components, mm (in)		
Model	2200/2800	3200/4200
Max. drum diameter	A 302 (11.8897)	402 (15.8388)
Min. lining thickness	B 2.0 (0.07874)	4.0 (0.15748)

**IMPORTANT!** The specified min. thickness is the absolute minimum which must never be exceeded. Renew the parts if they would reach the above dimensions before next service inspection.

**IMPORTANT!** Renewal of brake linings or brake drums must be done both sides at the same time.

**NOTE!** If the brake drum must be removed from the hub, a hydraulic press is required to press the wheel studs out.

10. Remove the clevis pin between the air diaphragm cylinder and brake cam lever.
11. Remove the cotterpin **G** and nut **F**, the brake shoe anchor bolt **H** and slide the brake shoes over the cam. Twist the pair of brake shoes to remove the shoe return springs **I**. Replace brake shoes if the linings are worn.
12. Apply a small qty. of copper paste on moving parts and assemble the brake shoes and shoe return springs again.



**WARNING!** Do not get oil, grease or copper paste in contact with the brake linings and drums.

13. Fit the shoe assembly with the anchor bolt first. Then pull the shoes away from each other and slide them over the cam afterwards. Tighten the anchor bolt castellated nut again and fit a new cotter pin.
14. Check roller bearings for discoloration and wear - renew if worn or damaged.
15. Assemble the hub and bearings using a new sealing ring **J**.
16. Fill the hub and bearings with fresh grease before fitting it to the shaft.
17. Fit the castellated nut. Rotate the hub and tighten the castellated nut until a slight rotation resistance is felt.
18. Loosen the castellated nut again until the first notch is aligned with the cotter pin hole in the shaft.

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

19. Fit a new cotter pin and bend it.
20. Fill the hub cap with fresh grease and carefully press it on to the hub.
21. Adjust the brakes as described in "200 hours service".
22. Fit the wheel again and tighten the wheel nuts. See section "50 hours service" regarding torque wrench setting. Tighten all bolts to half the specified torque first, then to the full specified torque.
23. Tighten again after 10 hours of work. Check the torque every day until it is stabilised.



**WARNING!** If you do not feel totally confident changing wheel bearings or brake shoes contact your HARDI dealers workshop.

# Maintenance

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## **2. Transmission shaft**

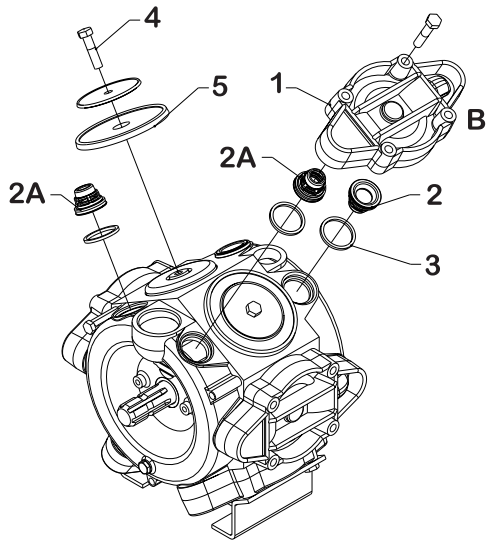
Change the protection tube nylon bearings as described under “Replacement of transmission shaft protection tubes” in the part *Occasional Maintenance*.

# Maintenance

## Occasional maintenance

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

### Pump valves and diaphragms renewal



T261-0001

Diaphragm pump overhaul kit (valves, seals, diaphragms etc.)

Pump model	HARDI part No.
363	750342
463	750343

#### Valves

Remove valve cover 1 before changing the valves 2 - note their orientation so they are replaced correctly!

**NOTE!** A special valve with white flap 2A is used at the two upperside inlets. It has to be placed in the valve openings as shown. All others are the type with black flap.

It is recommended to use new gaskets 3 when changing or checking the valves.

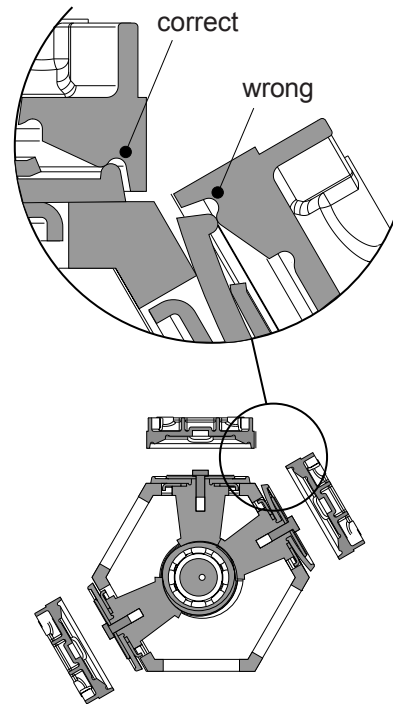
#### Diaphragms

Remove the diaphragm cover 4. The diaphragm 5 may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Also check that the drain hole at the bottom of the pump is not blocked. Reassemble with the following torque setting.

Pump model	Diaphragm cover Nm	Diaphragm bolt Nm
463	90	90
463	90	90

1 Nm = 0.74 lbf

**IMPORTANT!** Before tightening the 4 bolts for the diaphragm cover B the diaphragm must be positioned between centre and top to ensure correct sealing between diaphragm pumphousing and diaphragm cover. Turn crank shaft if necessary.

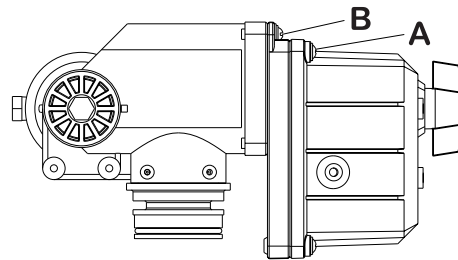


T192-0005

### Cone check/renewal EVC operating unit

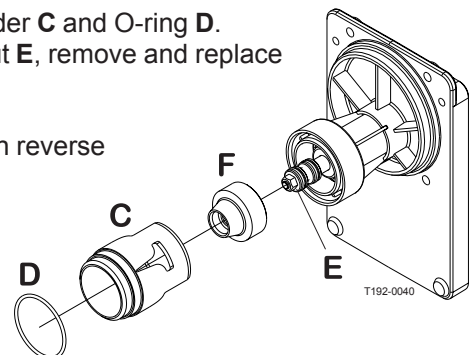
If it becomes difficult to build up sufficient pressure or if pressure fluctuations occur, it may be necessary to renew cone and cylinder. A HARDI kit is available for this purpose. Ref. no. 741293.

1. Remove 4 x screws A and remove the housing.
2. Remove 4 x screws B.



T192-0039

3. Replace cylinder C and O-ring D.
4. Loosen the nut E, remove and replace the cone F.
5. Reassemble in reverse order.



T192-0040



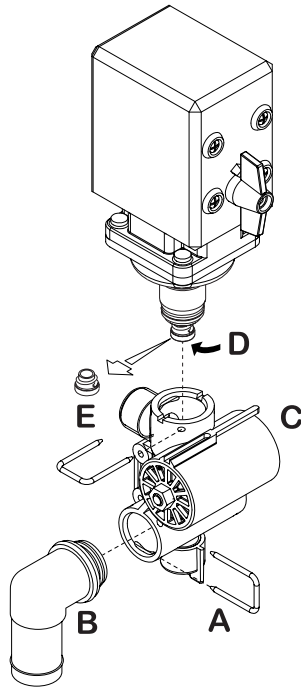
# Maintenance

## Cone check/renewal, 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.

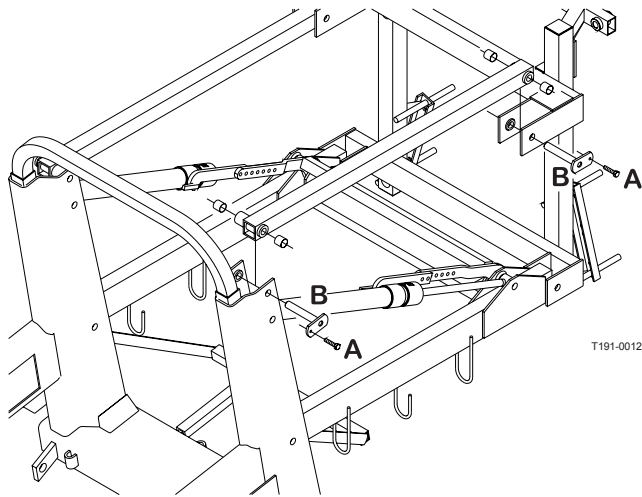
Cautiously remove the clip **A** and pull out the hose **B** for the pressure equalisation device. When the housing is drained, there should be no liquid flow through the pressure equalisation device. If there is any leakage, the valve cone **E** must be changed.

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.



## Wear bushing renewal, boom lift

The wear bushes are inspected and renewed before they are worn through.

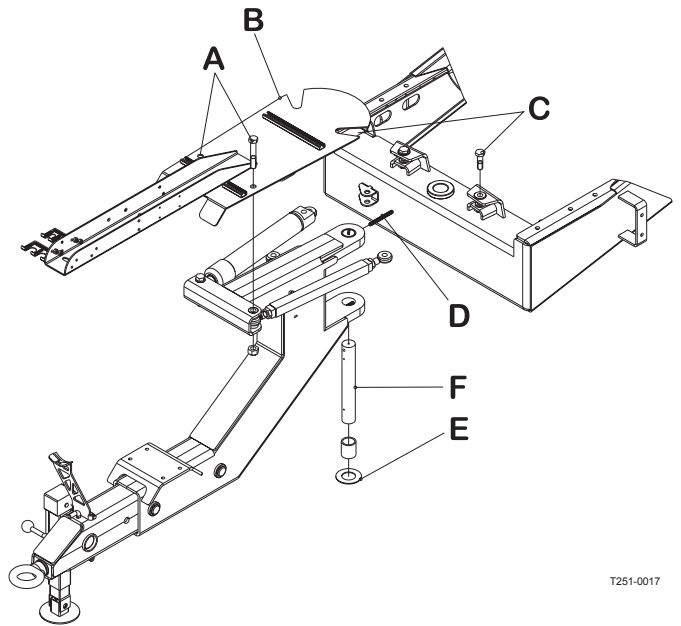


1. Connect the trailer to a tractor and unfold the booms to working position.
2. Lift the boom centre frame with a lifting device and support it until the load is taken off the parallelogram arms.
3. Remove the screws **A**, and pull out the pins **B** at one of the upper parallelogram arms and renew the wear bushes.
4. Refit the arm.
5. Repeat this on the other upper arm.

6. The lower arms must be disconnected simultaneously.
7. Grease all grease nipples.
8. Remove the lifting gear again.

## Wear bushing renewal, drawbar (all TRACKER models)

If too much play is found in the drawbar the wear bushes must be renewed.



T251-0017

1. Place stop wedges in front of and behind both wheels.
2. Jack up the frame and support it properly.
3. If *not* a SELF TRACK model: Remove the drawbar extension to reduce the weight of the drawbar.
4. Loosen the two bolts **A** and support the bracket **B** in order to keep it in a level position (e.g. by a rope fastened to the platform railing).
5. Without dismantling the hydraulic system the hydraulic rams are removed from the drawbar by loosening the nuts **C**.
6. Support the drawbar and remove the two pin bolts **D**, the washer **E** and the pin **F**.
7. Move the drawbar to the side and support it.
8. Press out the worn bushes and fit new ones.
9. Assemble again in reverse order.
10. Grease through grease nipples.
11. Fit the extension piece in the drawbar again and place the sprayer on the support leg.
12. Remove jack and wedges.

# Maintenance

## Venting the hydraulic damping system (SELF TRACK only)

The following venting procedure requires a special venting kit, HARDI ref. no. 720725.

1. Place the trailer on the support leg so that the yoke goes free from the tractor and the rams can work freely.
2. Relieve the pressure in the expansion tank and remove the hydraulic hose.

**NOTE!** Plug the hose. If this is neglected, the pressure gauge may be damaged.

3. Fit the two test hoses in the pressure gauge outlets on the rams (at the rear of the track system).
4. Move the track system from one side to the other approx. 10 times (full swing).
5. Loosen the plug very carefully in order to leak the air out of the system.
6. Fit the hydraulic hose on the expansion tank.
7. Remove the level plug and using the tractor hydraulics, cautiously fill oil in the expansion tank until it reaches the level plug.
8. Fit the level plug and fill the expansion tank to an air pressure of 5 bar.
9. Fit the 0-400 bar pressure gauge on the pressure gauge outlet at the ram. Adjust the excess-pressure valve to approx. 40 bar.

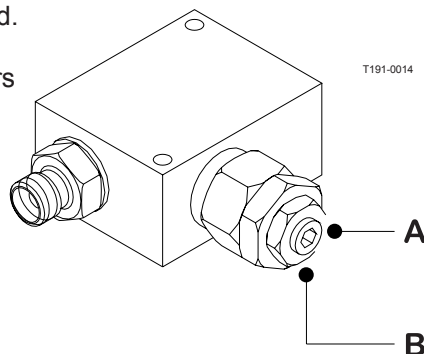
On flat ground it is possible to work with a lower opening pressure. This gives a more sensible reaction but it also results in the fact that the trailer can swing when driving on hilly ground and when swinging at high speed.

## TRACKER damping pressure setting (SELF TRACK only)

The hydraulic pressure relief valves in the TRACKER's damping system is factory set to open at 40 bar (580 p.s.i.) which is adequate for most conditions.

If the damping seems too "soft" or too "hard", the settings can be adjusted.

Connect manometers to the Minimesh couplings and control if pressure is equal for both sides.



**A** = Adjusting screw  
**B** = Self-locking nut

**NOTE!** Too low pressure will result in a swaying trailer. Too high pressure will influence on the ability to turn with the tractor.

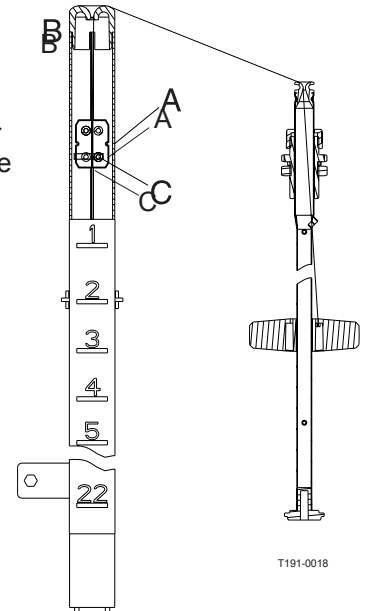
## Shock absorbers

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

## Level indicator adjustment

The level indicator reading should be checked regularly.

When the tank is empty, the float should lie on the stop pin, of the rod, and the O-ring on the indicator should be positioned at the top position line **A**.



If any deviation is found, pull out the plug **B**, loosen screws **C**, and adjust the length of the cord.

## Cord renewal, level indicator

If the cord on the level indicator has to be changed, the float guide pole is removed:

1. Remove the tank drain valve (see paragraph "Main tank drain valve") and loosen the fitting holding the pole in position.
2. Pull the pole down through the drain valve hole till it is free in the top of the tank.
3. The pole can now be taken out of the tank through the filling hole.



**DANGER!** Do not attempt to enter the tank - the float pole can be removed from outside the tank!

## Seal renewal, drain valve

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 underneath the tank!

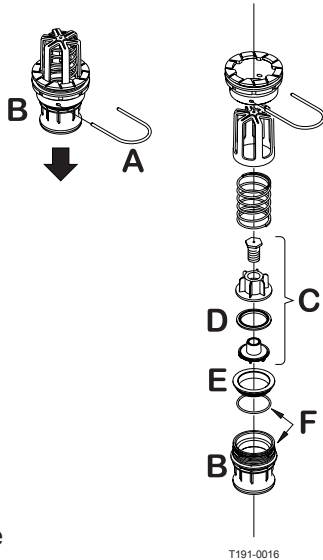


**WARNING!** Use eye / face protection mask when dismantling the tank drain valve!

1. Make sure the tank is empty and clean.
2. The valve must be closed and the string loose.

# Maintenance

3. Pull out the clip **A** and pull down connecting piece **B**. The entire valve assembly can now be pulled out.
4. Check cord and valve flap assembly **C** for wear, replace seal **D** and assemble again.
5. Assemble the valve assembly again using a new valve seat **E**. Lubricate O-rings **F** before assembly.
6. Fit clip **A** again.



T191-0016

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

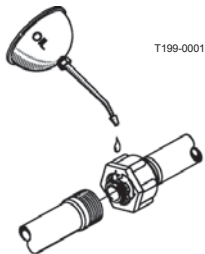
## Nozzle tubes and fittings

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

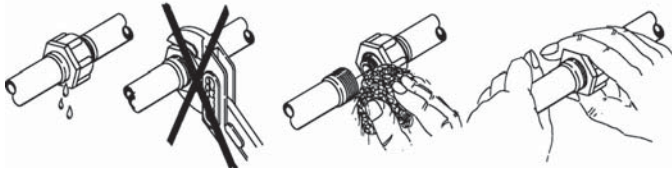
In case of leaks:

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



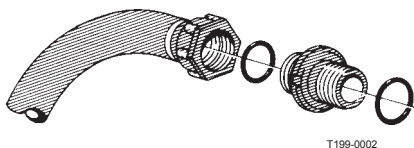
T199-0001

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



For **RADIAL** connections only hand-tighten them.

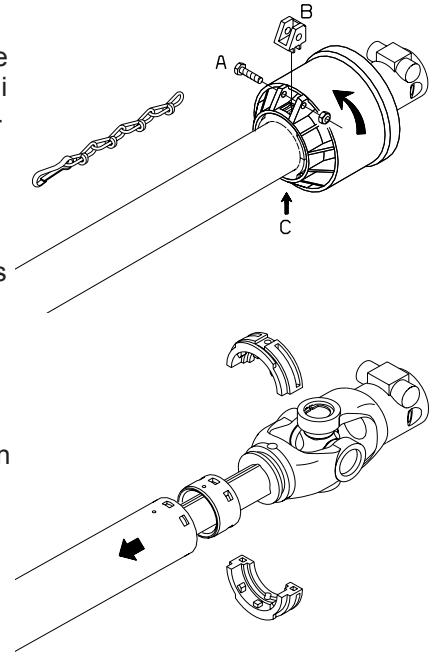
For **AXIAL** connections, a little mechanical leverage may be used.



T199-0002

## Replacement of transmission shaft protection guards

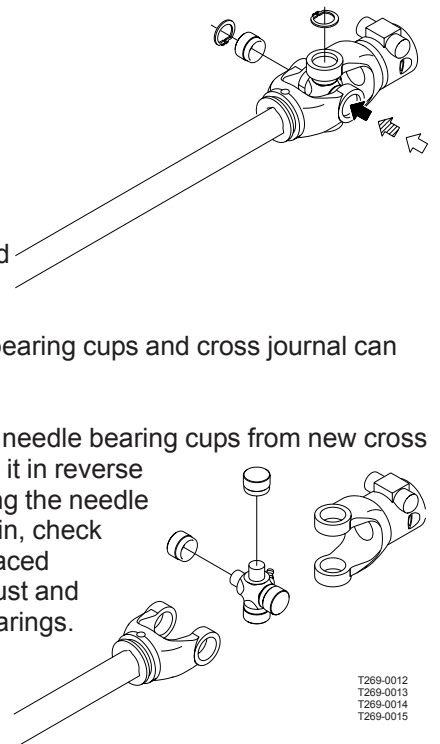
1. Remove bolt **A**, lock **B** and grease nipple **C**. Twist uni CV-joint cover 1/4 turn and pull it backwards.
2. Remove the synthetic bearings and protection tube.
- 2a. Remove inner bush from protection tube.
3. Assemble again in reverse order, using new parts where necessary. Remember to fit chains again.
4. Grease bearings.



**NOTE!** 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.



T269-0012  
T269-0013  
T269-0014  
T269-0015

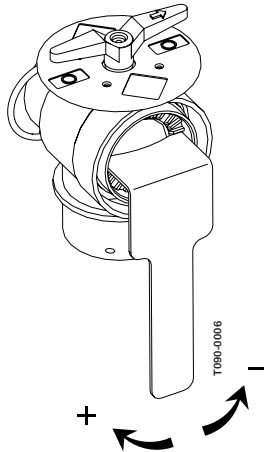
# Maintenance

## 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.



## Change of bulbs

### Overview of bulbs used.

Rear combi lamp, HELLA		
Function	Bulb type (DIN)	Volt / Watt
Rear lamp	R5W	12V / 5W
Stop lamp	P21W	12V / 21W
Direction indicator	P21W	12V / 21W
Rear combi lamp, GEKA (with warning boards)		
Function	Bulb type (DIN)	Volt / Watt
Rear lamp	R5W	12V / 5W
Stop lamp	P21W	12V / 21W
Direction indicator	P21W	12V / 21W
Position lamp, front	(GEKA)	12V / 5W
Boom and work lamps		
Function	Bulb type (DIN)	Volt / Watt
Boom lamp	H3	12V / 55W
Working lamp	124 98	12V / 21W
Number plate lamp, HELLA		
Function	Bulb type (DIN)	Volt / Watt
Number plate lamp	R10W	12V / 10W
Side marking combi lamp		
Prise out the lens carefully from the rubber housing to remove the bulb.		
Function	Bulb type (DIN)	Volt / Watt
Side marking combi lamp white, red yellow	R5W	12V / 5W

## To change a bulb

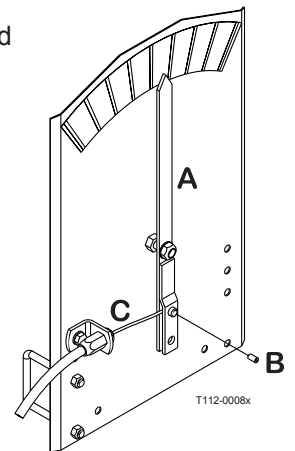
1. Switch off the light
2. Loosen the screws on the lamp and remove the cover or lens.
3. Remove the bulb
4. Fit a new bulb, refit the cover and tighten the screws.

**NOTE!** 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.

## Adjustment of slanting indicator (if fitted)

If the position of the pointer on the indicator does not correspond to the actual boom position, the pointer **A** can be adjusted.

1. Loosen the small bolt **B** sufficiently to allow the wire **C** to be adjusted.
2. Place the pointer **A** in correct position and fasten bolt **B** against the wire **C** again.



# Maintenance

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## Change of tyre

Should it be necessary to replace tyres, 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 moulded on the tyre.
3. Always inspect inside of the tyre for cuts, penetrating objects or other damages. Repairable damages should be repaired before installing the tube. Tyres with unrepairable damages must never be used.
4. Also inspect inside of the tyre 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 tyres always fit new tubes.
6. Before mounting, always lubricate both tyre beads and rim flange with approved lubricating agent or equivalent anti-corrosion lubricant. Never use petroleum based greases and oils because they may damage the tyre. Using the appropriate lubricant the tyre will never slip on the rim.
7. Always use specialised tools as recommended by the tyre supplier for mounting the tyres.
8. Make sure that the tyre is centred and the beads are perfectly seated on the rim. Otherwise danger of bead wire tear can occur.
9. Inflate the tyre to 100-130 kPa (14.5-19 p.s.i.) then check whether both beads are seated perfectly on the rim. If any of the beads do not seat correctly, deflate the assembly and re-centre the beads before starting inflation of the tyre. If the beads are seated correctly on the rim at 100-130 kPa inflate the tyre to a maximum of 250 kPa (36 p.s.i.) until they seat perfectly on the rim.
10. Never exceed the maximum mounting pressure moulded on the tyre!
11. After mounting tyres adjust inflation pressure to operation pressure recommended by the tyre manufacturer.
12. Do not use tubes in tubeless tyres.



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



**WARNING!** Never mount or use damaged tyres or rims!

Use of damaged, ruptured, distorted, welded or brazed rim is not allowed!

# Maintenance

## Off-season storage

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.

## Off-season storage program

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 "Cleaning of the sprayer". 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. Renew possible damaged seals and repair possible leaks.
3. Empty the sprayer completely and let the pump work for a few minutes. 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 rinsing tank also.
4. Pour appr. 50 litre (11 Imp.gal) 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 MANIFOLD, operating unit, FILLER etc. 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 tyres.
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 the HARDI PILOT control box + 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 tyres. Tyre blacking can be applied to the tyre walls to preserve the rubber.
16. Drain air brake tank for condensed water.
17. To protect against dust the sprayer can be covered by a tarpaulin. Ensure ventilation to prevent condensation.

## 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 tyre 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.
10. Check function of brakes. Please note that brake power will be reduced until the rust are worn off the drums. Always brake lightly until the drums are clean.

# Fault-finding

## Operational problems

In cases where breakdowns have occurred, the same factors always seem to be in question:

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

Therefore ALWAYS check:

1. Suction, 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 works properly. Use clean water to check.
6. Hydraulic components are maintained clean.

## TRACKER damping system

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
Sprayer trails unstable	Air pockets in the hydraulic circuit	Prime hydraulic circuit
	Hydraulic circuit leaking	Repair leak, prime
	Pressure relief valve(s) set too low	Adjust pressure relief valves
Rear hydraulic rams are too tight and vehicle continues straight ahead when trying to turn	Insufficient counter weight on front of tractor	Ad ballast on front of tractor
	Pressure relief valve set too high	Adjust pressure relief valves

# Fault-finding

## Liquid system

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
No spray from boom when turned on.	Air leak on suction line.	Check if suction filter O-ring is sealing. Check suction tube and fittings. Check tightness of pump diaphragm and valve covers.
	Air in system.	Fill suction hose with water for initial prime.
	Suction / pressure filters clogged.	Clean filters. Check yellow suction pipe is not obstructed or placed too near the tank bottom.
Lack of pressure.	Incorrect assembly.	Restrictor nozzle in Self-Cleaning Filter not fitted. Safety valve spring for Self-Cleaning Filter not tight. Too little distance between yellow suction pipe and tank bottom.
	Pump valves blocked or worn.	Check for obstructions and wear.
	Defect pressure gauge.	Check for dirt at inlet of gauge.
Pressure dropping.	Filters clogging.	Clean all filters. Fill with cleaner water. If using powders, make sure agitation is on.
	Nozzles worn.	Check flow rate and replace nozzles if it exceeds 10%.
	Tank is air tight.	Check vent is clear.
	Sucking air towards end of tank load.	Lower pump r.p.m.
Pressure increasing	Pressure filters beginning to clog.	Clean all filters.
Formation of foam.	Air is being sucked into system.	Check tightness / gaskets / O-rings of all fittings on suction side.
	Excessive liquid agitation.	Reduce pump r/min. Check safety valve for Self-Cleaning Filter is tight. Ensure returns inside tank are present. Use foam damping additive.
Liquid leaks from bottom of pump.	Damaged diaphragm.	Replace. See Changing of valves and diaphragms.



# Fault-finding

## Hydraulic system

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
Boom slow/eradic.	Air in system	Loosen ram connection and activate hydraulics until oil flow has no air in it (not whitish).
	Regulation valve incorrectly set	Open or close until desired speed is achieved (clockwise = less speed).  Remember oil must be at operating temperature.
	Insufficient hydraulic pressure	Check output pressure of tractor hydraulics. Minimum for sprayer is 130 bar.
	Insufficient amount of oil in tractor reservoir	Check and top up if needed.
Ram not functioning.	Restrictor or regulation valve blocked	Secure boom with "S" hook. Dismantle and clean.
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(s). 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. Dirt in the restrictor port of the cylinder.
Multiple hydraulic functions with one switch activated	Various	Check for correct solenoid electric/hydraulic hook-up. Check for short circuit in wiring in the junction box at rear of sprayer.

# Fault-finding

## EVC Operating unit

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
Operating unit not functioning	Blown fuse(s).	Check mechanical function of microswitches. Use cleaning/lubricating agent if the switch does not operate freely.  Check motor. 450-500 milli-Amperes max. Change motor, if over.
	Wrong polarity.	Brown - pos. (+). Blue - neg. (-).
	Valves not closing properly.	Check valve seals for obstructions.  Check microswitch plate position. Loosen screws holding plate a $\frac{1}{2}$ turn.
	No power.	Wrong polarity. Check that brown is pos. (+), Blue is neg. (-).  Check print plate for dry solders or loose connections.  Check fuse holder are tight around fuse.

## Mechanical problems

FAULT	PROBABLE CAUSE	CONTROL/REMEDY
Boom will not fold in or out	Cylinder	Adjust the fold cylinder
Boom will not stay in spraying position	Various	Check for hydraulic leaks through solenoid block. 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. Check for hydraulic leaks through solenoid block. Check for a solenoid that is stuck open.

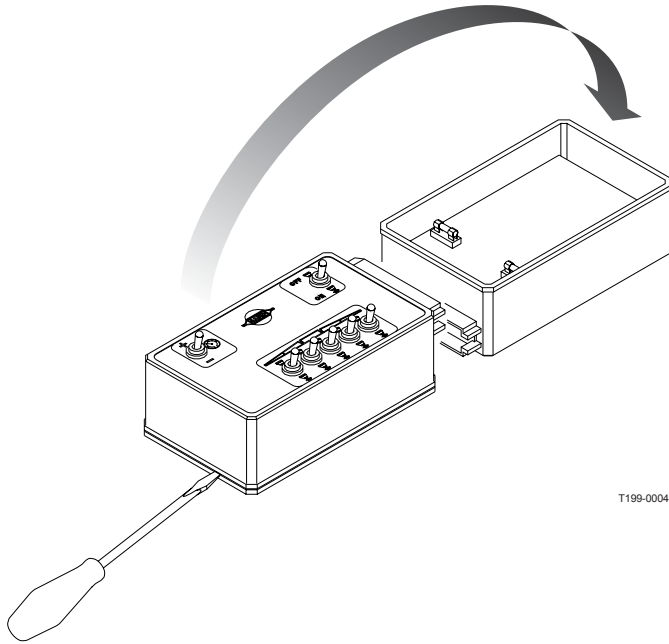
# Emergency operation

## EC operating unit

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. An extra fuse is placed inside the box.

Fuse type: 6.3 A

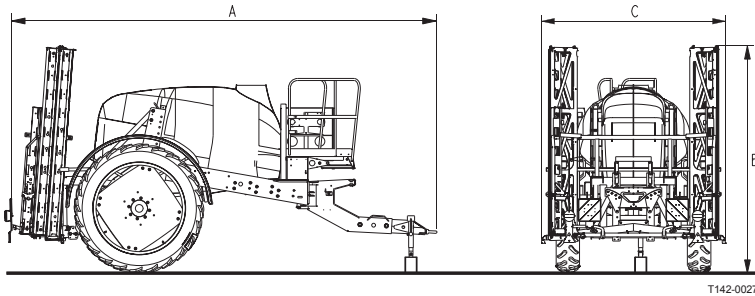


T199-0004

# Technical specifications

## Technical specifications

### Overall dimensions



CM Classic 2200/2800 VHY/VHZ			
Boom width (m)	A (mm)	B (mm)	C (mm)
12	5750	≤ 3305	2450
12.5	5750	≤ 3305	2450
15	5750	≤ 3305	2450
16	5750	≤ 3305	2450
18	5750	≤ 3305	2450

All measurements are in mm

### Weight, VHY/VHZ

CM Classic 2200 VHY/VHZ						
Boom width (m)	Empty			Full		Total weight (kg)
	Axle load (kg)	Drawbar load (kg)	Own weight (kg)	Axle load (kg)	Drawbar load (kg)	
12						
12.5						
15						
16						
18						

Please refer to note 1

CM Classic 2800 VHY/VHZ						
Boom width (m)	Empty			Full		Total weight (kg)
	Axle load (kg)	Drawbar load (kg)	Own weight (kg)	Axle load (kg)	Drawbar load (kg)	
12						
12.5						
15						
16						
18						

Please refer to note 1

#### Note 1:

All weights are approximate values and are based on machines equipped with rinsing tank, clean water tank and HARDI FILLER.

For SELF TRACK models the values in above tables must be increased:

+ 100 kg on Drawbar and Total weights

#### Ground clearance (under axle):

COMMANDER 2200/2800: appr. 700 mm

COMMANDER 3200/4200: appr. 700 mm

# Technical specifications

## Pump capacity

### Pump 363/10.0 (540 r.p.m.)

Rotation per min.	200	300	400	500	540	600
bar	Capacity l/min					
0	73	107	141	178	194	211
2	72	105	140	175	189	207
4	71	103	139	172	186	205
6	70	102	138	169	184	203
10	68	100	135	166	182	200
15	66	98	132	164	178	197
Max. pressure: 15 bar		Weight: 52.5 kg		Suction height: 0.0 m		

### Pump 363/5.5 (1000 r.p.m.)

Rotation per min.	200	300	400	500	600	700	800	900	1000
bar	Capacity l/min								
0	-	61	82	103	123	144	164	186	201
2	-	59	79	100	119	140	160	179	191
4	-	58	78	98	117	138	155	176	188
6	-	57	76	96	115	134	153	173	186
10	-	55	74	94	112	130	148	168	180
15	-	53	72	89	108	126	144	163	174
Max. pressure: 15 bar			Weight: 52.6 kg			Suction height: 0.0 m			

### Pump 463/10.0 (540 r.p.m.)

Rotation per min.	200	300	400	500	540	600
bar	Capacity l/min					
0	109	156	207	257	276	305
2	103	152	202	252	270	299
4	101	149	198	246	265	295
6	99	146	195	242	263	289
10	94	142	192	236	256	282
15	91	136	184	230	248	276
Max. pressure: 15 bar		Weight: 66.5 kg		Suction height: 0.0 m		

### Pump 463/5.5 (1000 r.p.m.)

Rotation per min.	200	300	400	500	600	700	800	900	1000
bar	Capacity l/min								
0	61	89	119	148	178	206	233	273	305
2	56	84	113	140	168	197	222	252	278
4	54	82	108	137	162	190	216	244	273
6	52	78	105	131	158	185	211	239	269
10	49	74	100	126	151	178	202	229	257
15	46	70	95	120	145	171	195	219	246
Max. pressure: 15 bar			Weight: 66.5 kg			Suction height: 0.0 m			

### Pump 463/12.0 (540 r.p.m.)

Rotation per min.	300	400	500	540	600	700
bar	Capacity l/min					
0	182	240	298	322	358	390
2	178	237	292	317	350	386
4	175	233	288	314	345	382
6	172	230	284	308	340	378
10	168	223	280	302	333	372
15	163	218	273	295	326	364
Max. pressure: 15 bar		Weight: 66,7 kg		Suction height: 0.0 m		

Chart GB 463 12.0

### Pump 463/6.5 (1000 r.p.m.)

Rotation per min.n	200	300	400	500	600	700	800	900	1000
bar	Capacity l/min								
0	70	102	137	170	203	236	271	309	338
2	66	96	130	162	193	225	256	288	312
4	63	93	126	158	187	219	248	282	306
6	61	90	122	153	184	214	243	276	300
10	58	85	116	147	176	205	234	267	290
15	54	80	110	140	169	197	226	258	280
Max. pressure: 15 bar			Weight: 66,7 kg			Suction height: 0.0 m			

Chart GB 463 6.5

# Technical specifications

## 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

## Temperature and pressure ranges

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

Operating pressure for safety valve:  
15 bar (220 psi)

Max. pressure on the pressure manifold:  
20 bar (290 psi)

Max. pressure on the suction manifold:  
7 bar (100 psi)

## Brakes

Max. wear rates on brake components, mm (in):

	2200/2800	3200/4200
Max. drum diameter A	302 (11.8897)	402 (15.8388)
Min. lining thickness B	2.0 (0.07874)	4.0 (0.15748)

### Hydraulic brakes

Max. hydraulic pressure: 150 bar (2176 p.s.i.)

### Air brakes, single line:

Air pressure, relieved brakes: 5.3 - 5.6 bar  
Air pressure drop to activate: 0.8 - 1.3 bar

### Air brakes, dual line

Load apportioning valve pressure settings:

Relieved: 0 bar  
Empty: 1.6 bar (23.2 p.s.i.)  
Half: 3.4 bar (49.3 p.s.i.)  
Full: Air tank pressure

## Materials and recycling

Tank: HDPE  
Hoses: PVC  
Valves: mainly glass-filled PA.  
Fittings: PA

### 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 authorised disposal plant. The metallic parts can be scrapped. Always follow local legislation regarding disposal.

## Conversion factors, SI to Imperial units

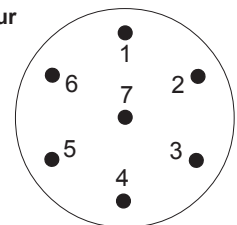
All units used in this manual are SI units. In some occasions Imperial units are used. Use following factors to convert SI units to Imperial units:

	SI unit	Imperial unit	Factor
Weight	kg	lb.	x 2.205
	ha	acres	x 2.471
	cm	in	x 0.394
	m	ft	x 3.281
	m	yd	x 1.094
Velocity	km	mile	x 0.621
	km/h	mile/h	x 0.621
	km/h	m/s	x 0.277
Quantities/area	l/ha	gal (Imp.) /acre	x 0.089
	ml	fl. oz (Imp.)	x 0.0352
Volume	l	Imp. pt.	x 0.568
	l	gal (Imp.)	x 0.22
	bar	lb./in <sup>2</sup> (p.s.i.)	x 14.504
Pressure	bar		
Temperature	°C	°F	(°C x 1.8) + 32
Power	kW	hp	x 1.341
Torque	Nm	lbft	x 0.74

## Electrical connections

### Rear lights

Position	Wire colour
1. LH direction indicator	Yellow
2. Free	Blue
3. Frame	White
4. RH direction indicator	Green
5. RH rear position lamp	Brown
6. Stop lamps	Red
7. LH rear position lamp	Black



The wiring is in accordance with ISO 1724.

# Technical specifications

## Electrical connections for EVC operating unit

20 poled plug with cable

Number of distribution valve											
8	7	6 & 5	4	3 & 2		2 & 3	4	5 & 6	7	8	
Wire number or colour code											
8										G/Y	
9	9	13	9	9		10	10	14	10	10	
	8	G/Y	G/Y	G/Y		11	11	15	G/Y		
7	7									17	17
6	6	1	1				2	2	16	16	
5	5	3	3	1			2	4	4	15	15
4	4	5		3			4		6	14	14
3	3	7	5	5			6	6	8	13	13
2	2	9	7					8	10	12	12
1	1	11							12	11	11

G/Y = green/yellow

## EVC

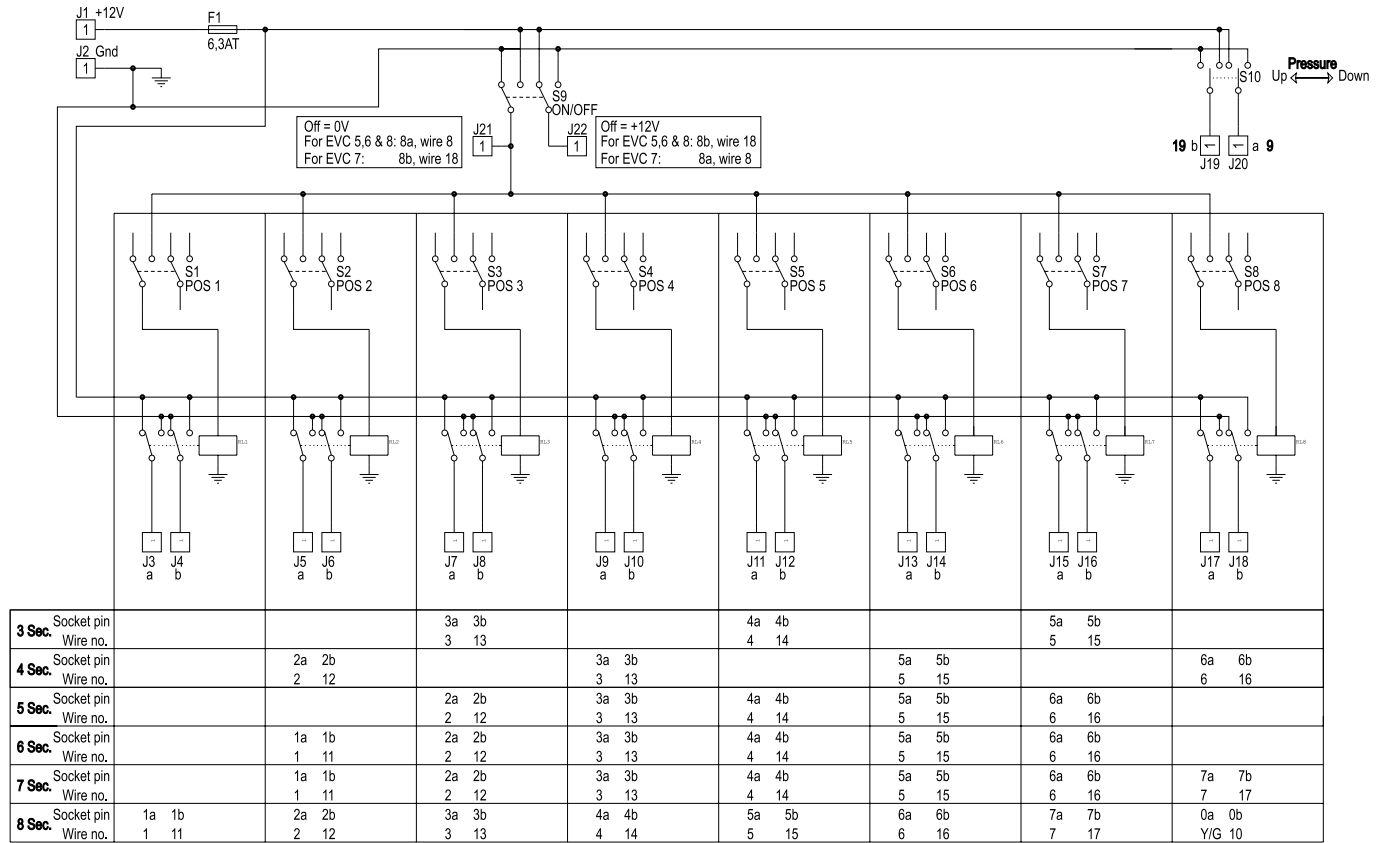
Number of distribution valves				
	2/3/4	5/6	7	8
Valve	Wire number or color code			
V1	1-2	1-2	1-11	1-11
V2	3-4	3-4	2-12	2-12
V3	5-6	5-6	3-13	3-13
V4	7-8	7-8	4-14	4-14
V5		9-10	5-15	5-15
V6		11-12	6-16	6-16
V7			7-17	7-17
REG	9-10	13-14	9-10	9-10
V8	?	?	?	8-G/Y

G/Y = Green/Yellow

The EVC operating unit fulfils the EC noise reduction standards.

# Technical specifications

## Electrical chart (EVC)



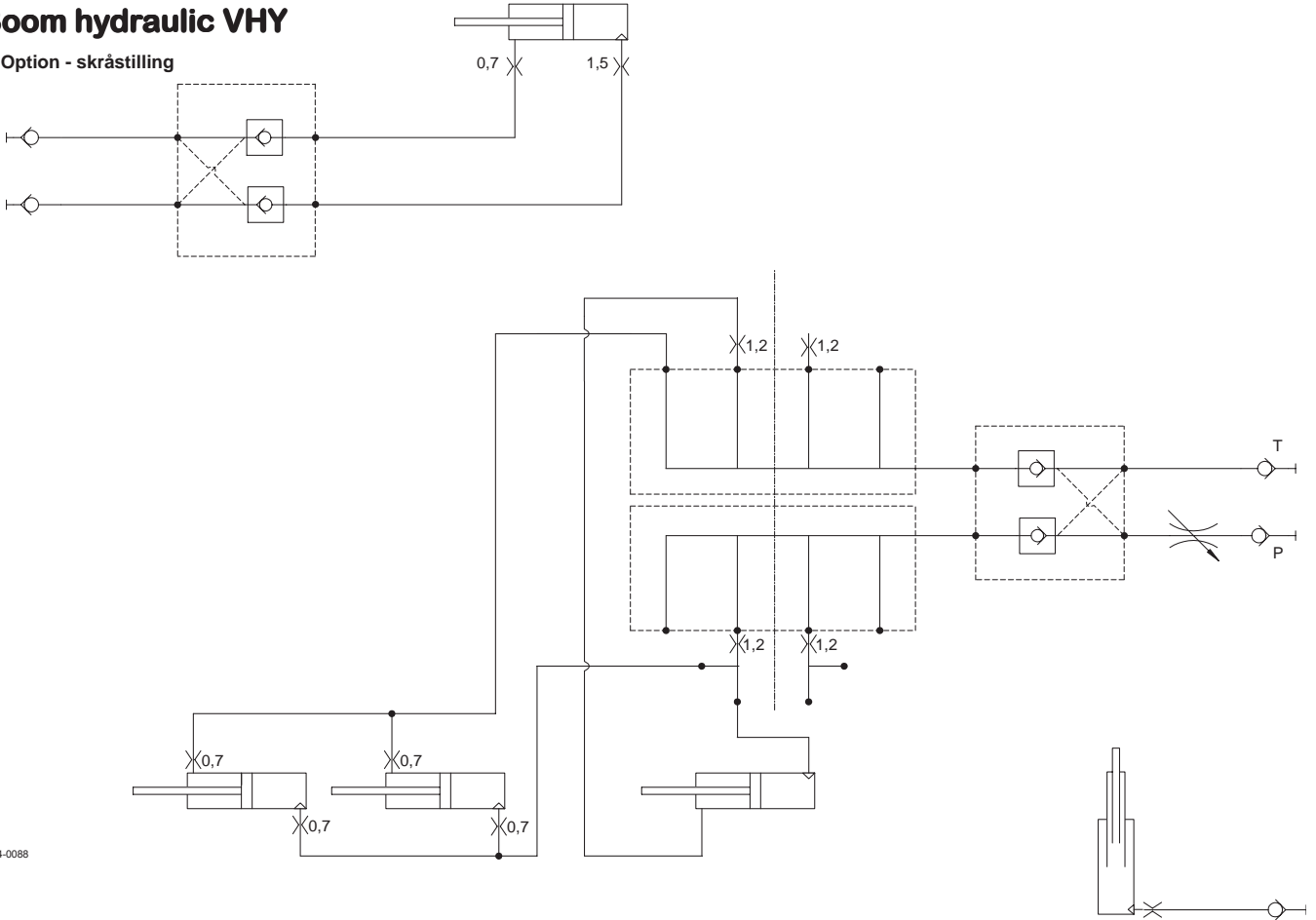
3-8 SECTION EVC CONTROL BOX  
T192-0038



# Technical specifications

## Boom hydraulic VHY

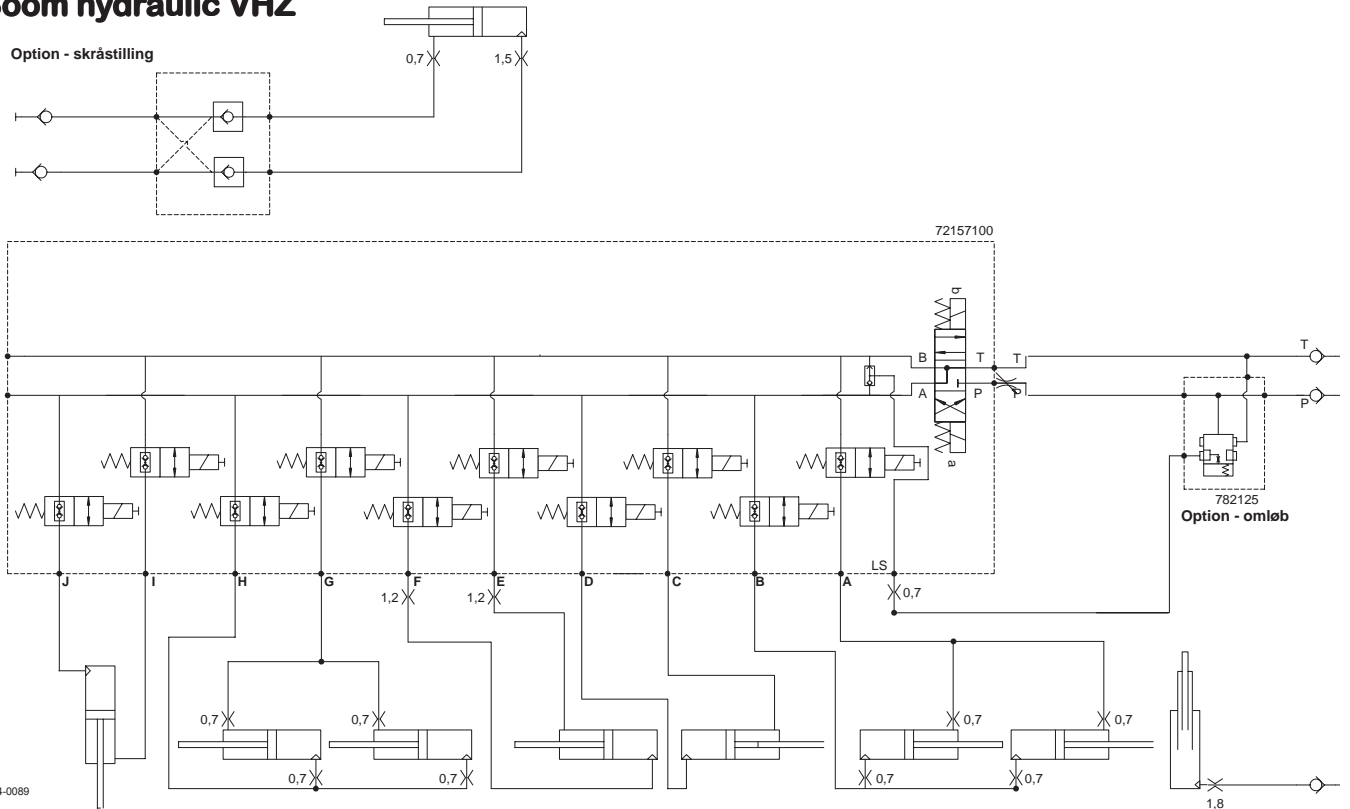
Option - skråstilling



T054-0088

## Boom hydraulic VHZ

Option - skråstilling



T054-0089

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**Notes:**