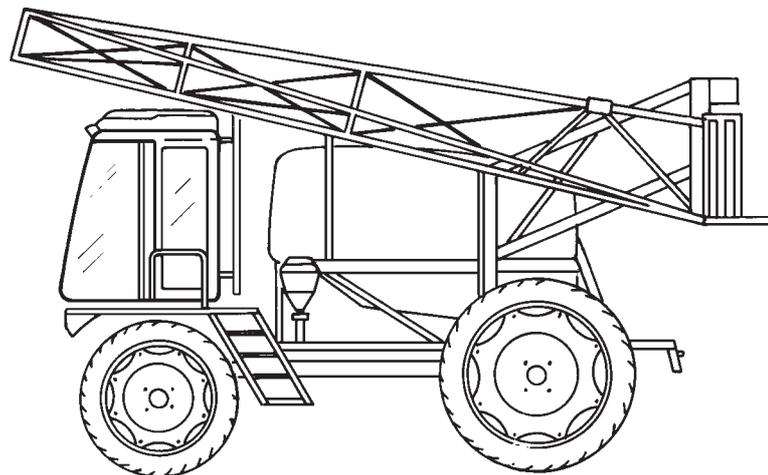




# **SPM - OLH**

## **Instruction book**



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**EC Declaration of Conformity**

**Manufacturer,**

HARDI INTERNATIONAL A/S  
 Helgeshøj Allé  
 DK 2630 Taastrup  
 DENMARK

**Importer,**

declare that the following product;

.....  
 .....

Adhere extra shipping package labels to inside cover.

**A.** was manufactured in conformity with the provisions in the COUNCIL DIRECTIVE of 14 June 1989 on mutual approximation of the laws of the Member States on the safety of machines (89/392/EEC as amended by directives 91/368/EEC and 93/368/EEC) with special reference to Annex 1 of the Directive on essential safety and health requirements in relation to the construction and manufacture of machines.

**B.** was manufactured in conformity with the standards current at that time that implements a harmonised standard in accordance with Article 5 (2) and other relevant standards.

Taastrup 1.3.99

Erik Holst  
 Managing Director  
 HARDI INTERNATIONAL A/S

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

As the instruction book covers all SPM-OLH 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.



**Operator safety**

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

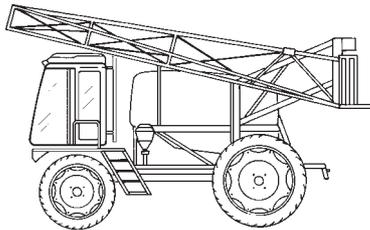
Note the following recommended precautions and safe operating practices.

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



## Description

The HARDI SPM-models are self-propelled sprayers consisting of a main chassis with 72 or 106 HP diesel engines, 4- or 8-speed gearboxes, and rear axles with hydraulically activated brakes in oil bath. The cabin is of a fully closed type with ventilation air, filtrated through carbon filters for driver's safety. The cab can be equipped with air-conditioning and heater/defroster is factory fitted optional extra. OLH 20, 21, 24 or 28 m fully hydraulic operated and pendulum suspended boom is standard.



The sprayer can be fitted with hydraulically operated front wheel assist (FWA) to ensure steering stability on hill sides and muddy conditions, just as a hydraulic operated differential lock is a factory fitted option.

The design of the diaphragm spray pump is simple, with easily accessible diaphragms and valves that ensures liquid does not contact the vital parts of the pump.

The EC operating unit consists of: on/off valve, pressure control valve, with built-in HARDI-MATIC, pressure gauge and distribution valves with pressure equalization.

HARDI-MATIC ensures a constant volume per ha of the liquid at varying speed in the same gear. The number of revolutions on diaphragm pump must be kept between 300-600 1/min.

HARDI TRONIC 2000 spray computer is standard, and keeps the spray job under surveillance. If the forward speed changes, the HARDI TRONIC will automatically adjust the spraying pressure accordingly.

With the self-cleaning filter, the impurities that exist in the spray liquid will by-pass the filter and be recirculated back to the tank via the return to tank.

The OLH spray boom is fully hydraulic folded and operated. Individual folding of right and left outer sections enables alternative spray widths. Individual boom tilt function for right and left side adapts boom height to sloping terrain. Slanting control for pendulum suspension compensates for driving on hillsides. All functions are controlled by Direct Acting Hydraulic system (D.A.H.) The outer sections incorporate spring loaded breakaways.

## Identification plates

An identification plate is fitted to the sprayers chassis at front right hand side (under the cabin). Pump, boom parts have ID-plates placed as shown. Please write the information given at these plates in this instruction book.

**IMPORTANT!** When ordering parts for the sprayer, inform your dealer of these, so the right model and version are described.

<b>HARDI</b> MADE IN DENMARK	
Type	<input type="text"/>
Serie	<input type="text"/>
977826	

HARDI INTERNATIONAL A/S HELGESHØJ ALLE 38. 2630 TÅSTRUP. DENMARK		Max. Speed <input type="text"/> km/h
	Empty <input type="text"/> kg	Max. p. circuit <input type="text"/> bar
	Max. Total <input type="text"/> kg	Max. p. hydr. <input type="text"/> bar
Type <input type="text"/>		977826

## Use of the sprayer

This Agricultural sprayer is designed for application of plant protection chemicals and liquid fertilizers at agricultural crops. The sprayer must be used for this purpose only. It is not allowed to use the sprayer for any other purposes.

Please observe rules reg. driver's licence for driving on public roads.

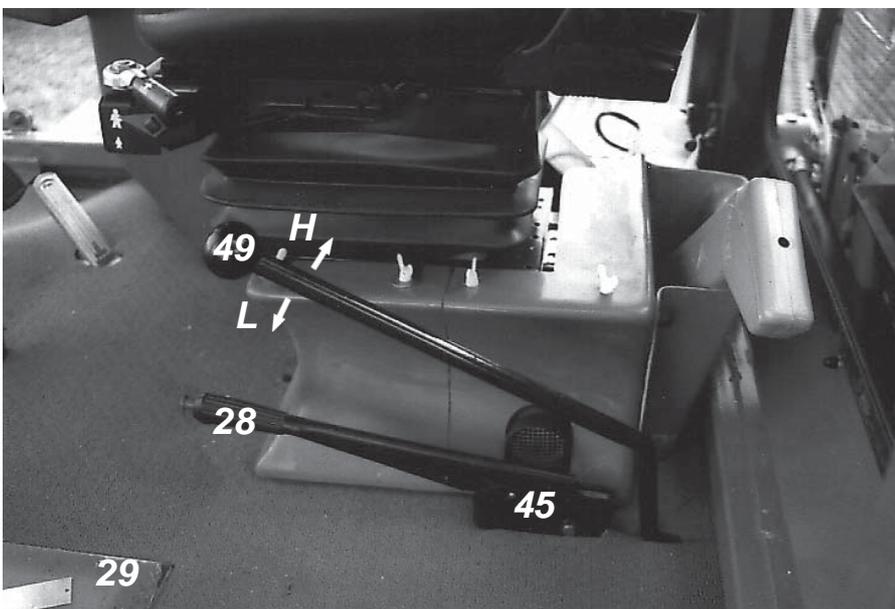
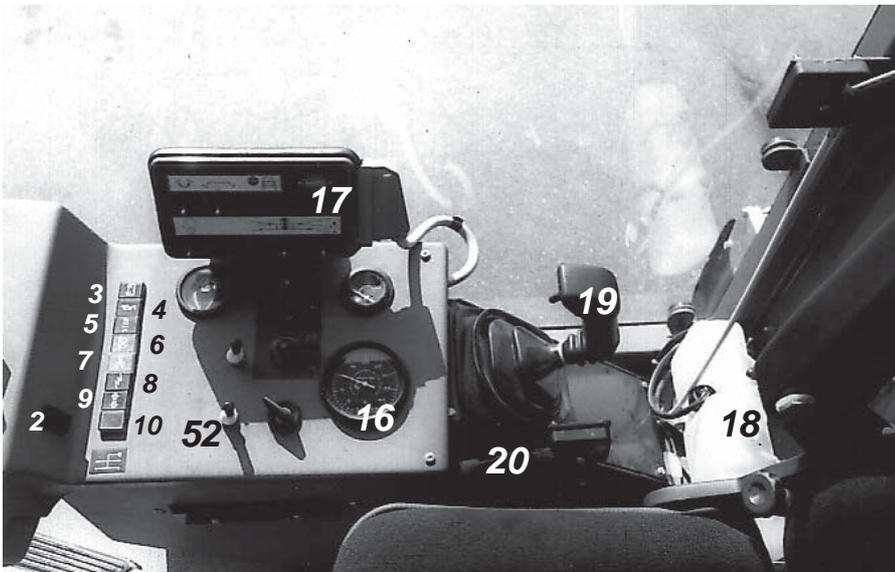
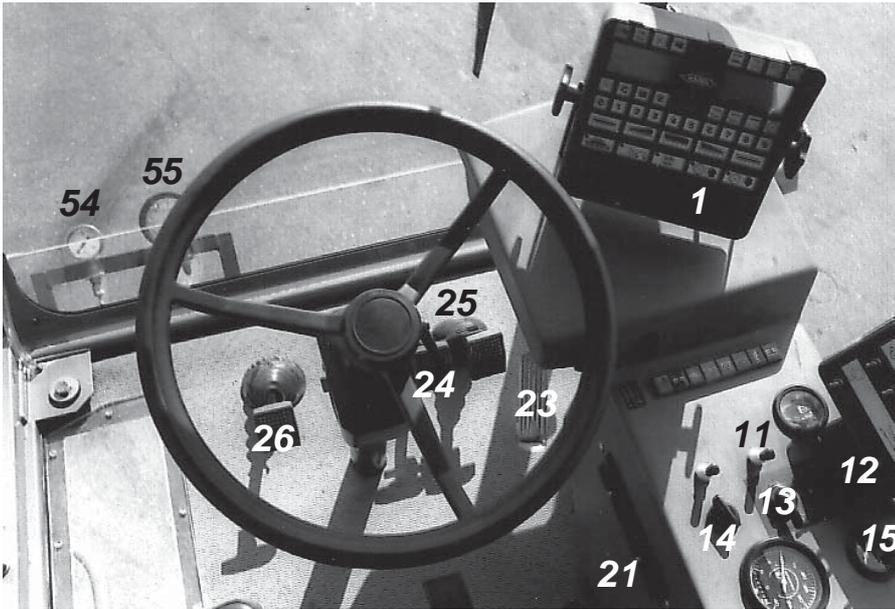
If no local rules of holding a sprayer operator's licence, it is strongly recommended to be educated in correct plant protection and safe handling of plant protection chemicals, in order to carry out spraying jobs without unnecessary risk for persons and environment.

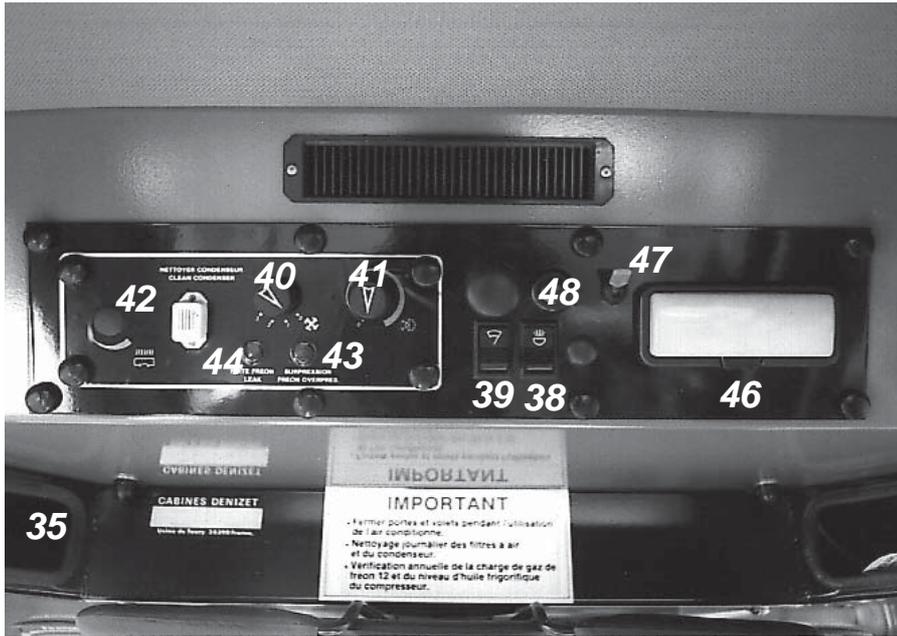


**Operating instructions**

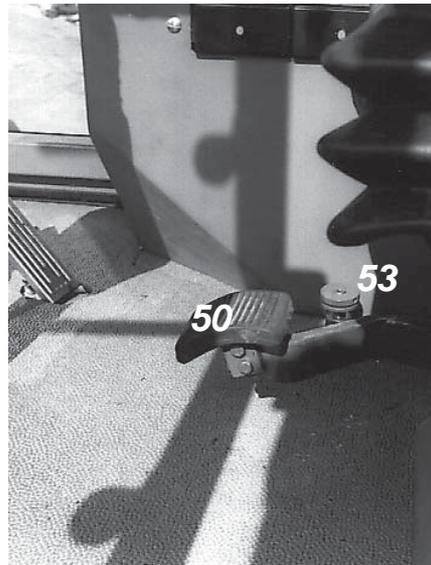
**Controls and switches**

1. HARDI TRONIC 2000
2. On/off switch for Powerbox 2000
3. Charging control lamp (alternator)
4. Engine oil pressure control lamp
5. STOP-warning for broken fan belts (106 HP only)
6. Engine pre-heating control lamp
7. Battery charge control lamp
8. Direction indicator control lamp
9. Diaphragm spraying pump control lamp
10. FWA control lamp
11. Diaphragm pump switch
12. Horn (push-down) and light switch (turn knob)
13. Direction indicators switch
- 13a. Hazard warning signal device
14. Key
15. Fuel level gauge
16. Revolution counter and hourmeter
17. Control box for boom functions
18. Reservoir for windscreen washer
19. Gear lever (4 speed forward + 1 reverse)
20. Engine throttle lever
21. Fuse boxes
22. Brake fluid reservoirs
23. Accelerator pedal
24. Brake pedals
25. Steering wheel adjustment
26. Clutch pedal
27. Drivers seat
28. Parking brake
29. Floor window
30. Door handle with key lock (not shown)
31. Slide cab door (not shown)
32. Battery main on/off switch (see page 6)
33. Spray tank level indicator (not shown)
34. External driving mirrors (not shown)
35. Glove compartment/radio.
36. Sun shade
37. Adjustable ventilation nozzles





- 38. Switch for working lights
- 39. Windscreen wiper switch, 2 speed
- 40. 3-step fan switch
- 41. Air conditioning temperature control
- 42. Warning buzzer for dirty air conditioning condenser
- 43. Warning lamp, freon overpressure in air conditioning circuit
- 44. Warning lamp, leak in air conditioning circuit
- 45. Cab heater
- 46. Cab interior light and switch
- 47. Rotating warning beacon switch
- 48. Windscreen washer switch
- 49. High-Low gear selector
- 50. Differential lock
- 51. Heater temperature control (not shown)
- 52. Switch for Front Wheel Assist FWA (if fitted)
- 53. Pressure adjustment for FWA (if fitted)
- 54. Pressure gauge, FWA oil pressure
- 55. Pressure gauge, spraying pressure
- 56. Main heater switch (not shown)





## Functions

1. **HARDI TRONIC 2000 DPE computer** - see separate instructions book.
2. **POWER BOX 2000 switch.** This switches on and off the POWER BOX 2000 interface box for HARDI TRONIC 2000. The EC-operating unit is controlled by the HARDI TRONIC 2000 through the POWER BOX 2000 interface.
3. **Charging control lamp (alternator).** This should go out immediately after start of engine. If this lights up during working, the battery is not being charged. Get alternator and electric wiring inspected a.s.a.p. **IMPORTANT!** if this control lamp lights (72 HP only), the fan belts must be inspected instantly. If fan belts are broken, no engine cooling takes place, which will cause severe engine damage!
4. **Engine oil pressure control lamp.** This lamp must go out immediately after engine start. If this lamp does not go out, or lights up when engine works, **STOP ENGINE IMMEDIATELY**, and check engine oil level - refill if necessary. If oil level is ok, we advise you not to restart engine before it has been inspected by DEUTZ SERVICE.
5. **STOP-warning**, broken fan belts (106 HP only). If this lamp comes on during working, the engine cooler fan belts are broken. Stop engine instantly and replace fan belts. If no engine cooling takes place, engine will be severely damaged!
6. **Engine pre-heating control lamp (if fitted).** In cold weather conditions, turn key to pos. 2 PRE-HEAT, and wait until this lamp comes on. Then turn key to pos. 3 START. Consult DEUTZ engine manual for further details.
7. **Battery control lamp.** This lamp indicates that main on/off switch is on, and 12V is present in the electrical circuit.
8. **Directional indicator control lamp.** (Right and left side) If a bulb is defective, the frequency will increase or the control lamp will not flash.
9. **Diaphragm spraying pump control lamp.** Lights up when diaphragm spraying pump is engaged.
10. **FWA control lamp.** This lamp is on when FWA is engaged.
11. **Switch for diaphragm pump.** For engage and disengage of diaphragm spraying pump.
12. **Lights and horn switch.** Turn knob to switch lights on and off:
  0. all lights off
  1. position lights on
  2. position lights and dipped beam head lamps on
  3. position lights and main beam head lamps on
 Depress knob to activate horn.
13. **Direction indicators switch.** Pushed towards right, indication to the right hand side. Pushed towards left, indication to the left hand side.
- 13a **Hazard warning signal devices (not shown).** Depress knob to switch on hazard warning signals on and off. Note local traffic regulations regarding use of this device.

## 14. Key.

P = not used

1 = Power at all electric circuits, warning lamps on.

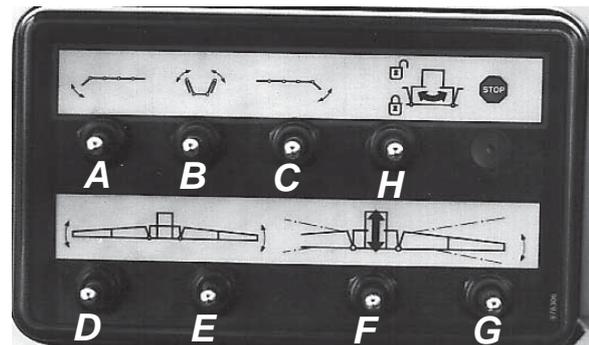
2 = Preheating of engine

3 = Engine start position

15. **Fuel level gauge.** Always refuel when gauge approaches „low“, and never run the vehicle dry.

16. **Revolution counter and hour meter.** Counts engine revolutions and working hours. All service and maintenance intervals are based on hour meter readings.

## 17. Control box for boom functions.



A: unfolding/folding of left outer section

B: unfolding/folding of inner sections

C: unfolding/folding of right outer section

D: Boom tilt, left side

E: Boom tilt, right side

F: Raising and lowering of boom

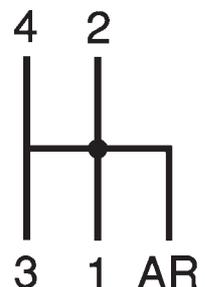
G: Slanting of boom

H: Pendulum locking device.

See chapter „Operating instructions“ before operating the boom.

18. **Reservoir for windscreen washer.** Use clean water or special antifreeze detergent for windcreens.

19. **Gear lever.** 4 speed + 1 reverse. Forward gears are all synchronized. 'See also chapter „specifications“ regarding speed chart.



20. **Engine throttle lever.** To be used for maintaining the correct engine revs and forward speed during filling and spraying.

21. **Fuse boxes.** See fuse diagram in section „Maintenance“.

22. **Brake fluid reservoirs.** The fluid level must be verified regularly and refilled with correct fluid if necessary (see section „Maintenance“).

23. **Accelerator pedal.** When driving onroad, the hand throttle lever is set at idle and the accelerator pedal is used instead.



**24. Brake pedals.** When in field, the brake pedals can be disconnected from each other, and used for assisting the steering when turning in field. If the front wheels will not make the machine turn, use the brake pedal to assist - right pedal when turning right and left pedal when turning left.



**CAUTION!** Before entering public road, the brake pedals must always be locked together in order to have same brake force at both wheels. If driving with separated brake pedals, hazardous situations or traffic accidents can happen!

**25. Steering wheel adjustment.** Adjust steering wheel to convenient position before driving. Turn lever counter clockwise to unlock steering wheel, set in right position, lock again by turning clock wise.

**26. Clutch pedal.** Before starting engine, always depress clutch pedal.

**27. Driver's seat.** The driver's seat can be adjusted according to drivers height and weight. To adjust the seat forward/backward, pull handle at seat front, right corner outwards and push seat forward or backwards.



To adjust seat to drivers weight, turn handle:

- Clockwise for more heavy
- Anticlockwise for more light

An indicator will show the relative setting.

The arm rests can be folded up to vertical position, when not in use.

**28. Parking brake.** The parking brake must always be activated when sprayer is parked, and before leaving the cab. Always activate parking brake firmly so it is not forgotten to be disengaged when driving again.

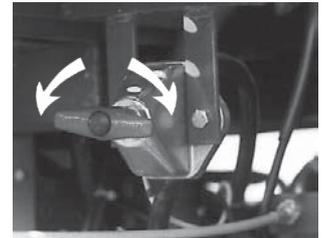
**29. Floor window.** Enables to see left front wheel from cab in order to obtain exact position in row crops and tramlines.

**30. Door handle with key lock.** Push button to open door. Turn key clockwise to lock - Turn key anticlockwise to unlock.

Always lock cab door when leaving the vehicle if it can be exposed to unauthorized admittance.

**31. Slide cab door.** To open and close cab door, it must be slided forward or backward.

**32. Battery main on/off switch.** This switch will connect or disconnect all power supply to vehicle except hazard warning lights (if fitted). Always switch off this switch when machine is not in use.



**33. Spray tank level indicator.** The indicator is moving upwards, as the spray tank is being emptied. Reading in litres.

**34. External driving mirrors.** Always check that driving mirrors are correctly adjusted before driving.

**35. Glove compartment/radio.** Two compartments, which can be used for storing personal effects. The size of hole suits for fitting a car radio.

**36. Sun shade.** The sun shade is a perforated curtain which enables a slight view through. Do not pull further down than necessary to avoid dazzling.

**37. Adjustable ventilation nozzles.** Can be adjusted by turning the nozzles, and flaps.

**38. Switch for working lamps.** Operating the roof mounted working lamps.

**39. Windscreen wiper switch.** 2-speed wiper. If windscreen is dirty, use plenty of fluid from windscreen washer before wiping to avoid scratches in the windscreen.

**Heating, ventilation, air conditioning.**

**40. Fan switch. 3-speed fan for ventilation.** Air in-take is at side of cab roof, and all fresh air is filtrated through dust and cabon filters so chemicals are not entering the cab.



**WARNING!** If spray chemicals can be smelled from fresh air nozzles, the carbon filters should be replaced imediately!

**41. Air conditioning temperature control.** This switches on the air conditioning, and regulates the temperature in the cab. The air conditioning does only work when fan switch is switched on.

1. Off
2. Cool
3. Cold

**Note:** When AC is used regularly, it keeps it well working and prevents the circuit from leaking freon. This keeps maintenance costs at a minimum and protects the environment.



**Warning:** It is recommended only to cool the air a few degrees - especially if you often change from being inside and outside the cabin.



**42. Warning buzzer for AC dirty condenser.**

This warning buzzer comes on when AC condenser (situated behind the cab) is clogged with dirt. Carefully clean the condenser with compressed air or water.

**43. Freon overpressure warning lamp.** If pressure in AC circuit gets too high this lamp comes on. Stop AC immediately and get the AC inspected by a skilled technician.

**44. Freon leakage from AC circuit.** If this lamp comes on, there is a loss of Freon from the AC. Stop the AC immediately and get the circuit inspected and repaired by an authorized technician.

**45. Cab heater (if fitted).** Eberspächer air heater for cab heating and windscreen demist/defrost is working on Diesel fuel from fuel tank.

The cab heater is working independently of the roof fresh air ventilation system. Combustion tube and exhaust pipe lead outside the cab, and the air to be heated is taken in cab (recirculation).

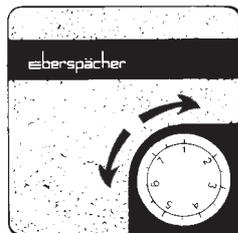
The main heater switch, 56, has 3 positions:

- 0. Off
- 1. Heating
- 2. Ventilation
- 3. Pilot lamp



The room thermostat, 51 (if fitted), works in conjunction with the main heater switch, 56. To adjust the temperature the thermostat knob is turned and set at the scale between 1 and 7.

- 1. low temperature (turn clockwise)
- 7. high temperature (turn anticlockwise)



To switch on the heater, first set thermostat knob at desired temperature. Then set main switch at pos. 1. and pilot lamp comes on. Adjust at thermostat if temperature is too hot or cold.

**NOTE!** The heater has a delay of approx. 5 secs. from being switched on, until it starts to heat. When the heater is switched off the heating stops instantly, and the blower continues for a while, until the heater has cooled down. Then it stops automatically.

**CAUTION!** Do not operate cab heater and air conditioning (if fitted) simultaneously.

- The heater must never be switched on while the fuel tank is being filled.
- The heater must not be operated in garages or indoors.

- When carrying out electric welding work on the vehicle, disconnect the positive pole from the battery and earth it in order to protect the control unit.
- Do not drive before all the windows are demisted and deiced.

For further details, consult the Eberspächer manual enclosed in the vehicle.

- 46. Cab interior light.** Push the button at the lamp to switch on and off
- 47. Rotating warning beacon switch.** This is recommended to use when driving on public roads. Note local regulations regarding use of rotating warning beacon.
- 48. Windscreen washer.** Press to wash windscreen with water/detergent.
- 49. High - Low gear selection lever.** Upwards=High Downwards=Low
- 50. Differential lock (if fitted).** When one wheel is spinning in field, the dif. lock pedal is activated. This will lock the differential, and the power will be distributed equally to both wheels.

**Caution!** To avoid damages of rear axle components, always activate diff. lock when machine stands still! Do not turn with diff lock activated! When traction is equal at both wheels again, diff. lock will automatically disengage.

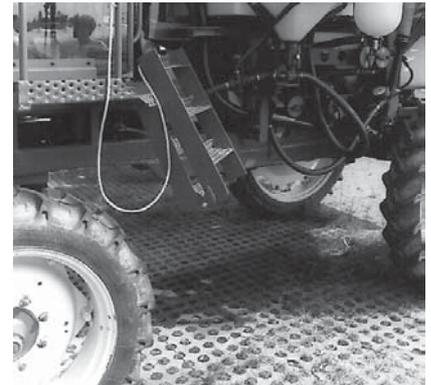
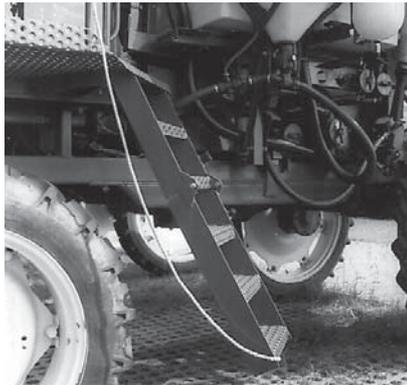
- 51. Heater temperature control (if fitted).** Set knob at desired temperature.
- 52. Switch for FWA.** Switches FWA on and off. Some versions have a 2nd switch at gear lever.
- 53. Pressure control, FWA.** Adjustment of working pressure at Front Wheel Assist - see section „Front Wheel Assist“.
- 54. Pressure gauge, FWA.** Indicates working pressure at in FWA hydraulic circuit. Normal pressure is between 20-175 bar.
- 55. Pressure gauge, Spraying pressure.** Indicates spraying pressure, measured at boom tubes.
- 56. Main heater switch.**



## Ladder

The ladder can be folded up during field work to avoid plants to get stuck in it.

During road transport, the ladder must always be folded up to keep it within the contour of the machine, and to prevent it from injuring persons or damaging vehicles.



## Track gauge

The track width is factory set at 1800 mm. This can be altered to 2000 mm by turning the rims and rim plates.

At models with FWA, the center of the wheel motors flange must never be more than **max. 20 mm** offset. Therefore the front wheel track width must not be altered by turning the rim plate, but only by fitting a spacer between front wheel motor and steering knuckle, to maintain max. offset 20 mm.



## Before start of engine

Before starting the engine, always ensure that:

- Parking brake is activated
- Gear lever(s) is in neutral position
- You have not overlooked a person carrying out service or repair jobs on the machine
- All protection guards are properly fitted.
- Main on/off valve at operating unit is switched off.

## Starting of engine

1. Switch on the main battery switch
2. Ensure that gear levers are in neutral, and parking brake is activated.
3. Set throttle at 1/4 of full speed.
4. Switch on key to pos. 1, and check warning lamps.
5. Check that on/off valve at EC-operating unit is switched off.
6. Turn key to start position. **N.B.:** If temperatures are below 0° turn key to pos. 2 and hold it there, until pre-heating control lamp lights (appx. 15 sec.) before turning the key to starting position 3, in order to pre-heat the engine. When engine starts let the key go back to pos. 1.
7. Set throttle to 1000 1/min. and let the engine warm up for 3 min. before driving, to ensure good lubrication.

## To stop the engine

1. Set gear levers in neutral position and apply parking brake.
2. Let the engine run idle (800-1000 rpm) for 5 min. to cool turbo and engine before stopping.
3. Stop engine by turning key to position 0
4. Switch off main battery switch. **Warning:** When parking, always ensure that the sprayer is out of reach of children or others who can get contaminated and injured by chemical residues left at, or in the sprayer!

## Driving with Front Wheel Assist, FWA (if fitted)

Your sprayer can be fitted with Hydraulic Front Wheel Assist in order to obtain better stability, steering and tracking, when working under difficult field conditions. When driving with Front Wheel Assist it is very important NOT to engage FWA when machine is driving.

Before activating the FWA, the machine must stand still with engine running idle.

**Important!** If FWA is activated during driving, a shock pressure can damage the hydraulic wheel motors.

**Note!** Do not have FWA engaged longer than necessary. When field conditions are not difficult and when driving on public roads, the FWA should be disengaged. If FWA is used continuously, it will cause overheating of hydraulic oil.

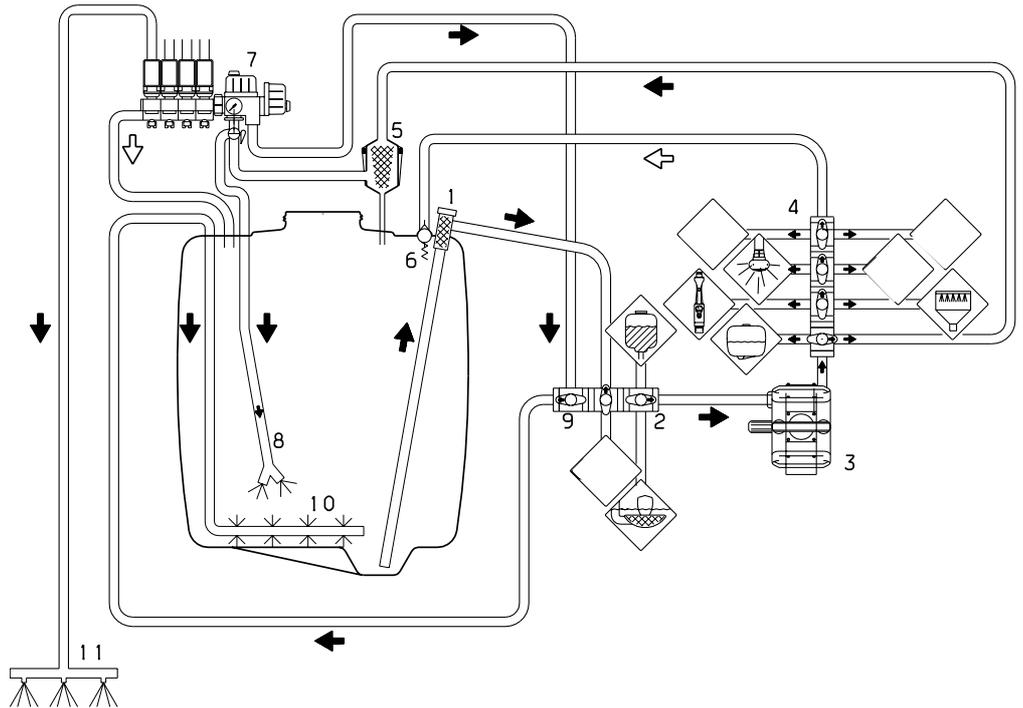


## Spraying Operating instructions

HARDI MANIFOLD SYSTEM  
Valves

### Operating diagram

1. Suction filter
2. Suction Manifold
3. Pump
4. Pressure manifold
5. Self-Cleaning Filter
6. Safety valve (operating pressure is 12 bar)
7. Operating unit with pressure gauge
8. Pressure agitator
9. Return to tank
10. Return agitator
11. Sprayer boom



## Description

The HARDI MANIFOLD SYSTEM makes the operation of the sprayer more safe and simple. The MANIFOLD SYSTEM is located at the left side of the sprayer permitting operation of all HARDI optional extras from this one position.

The basic system consists of one 3-way-valve on the suction side of the pump and a T-piece on the pressure side of the pump.

The modular system facilitates the addition of up to three optional extras on the suction side and seven extras on the pressure side. Furthermore the suction manifold can be fitted with a return valve which ensures better draining of the sprayer before cleaning.

### Symbols

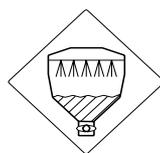
The pressure, suction and return valves are distinguished by coloured identification discs on the 3-way valves. Symbols corresponding to the optional extras are located on the discs for easy identification and operation.



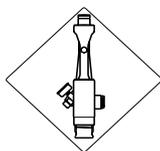
**Green disc = Pressure valve**



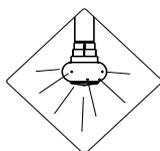
To Self-Cleaning Filter/  
operating unit



To HARDI  
FILLER



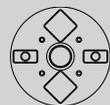
To Fast Filling  
Device



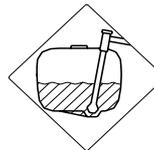
To Tank  
Flushing  
Nozzle



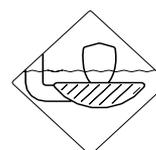
To main tank



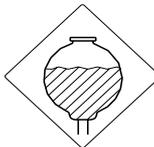
**Black disc = Suction valve**



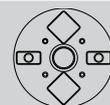
From main  
tank (suction  
filter)



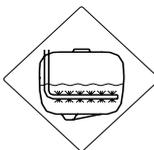
From Filling  
Device



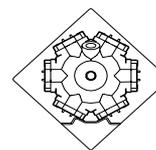
From Rinsing  
Tank



**Blue disc = Return valve**



Return from  
operating unit  
to agitation



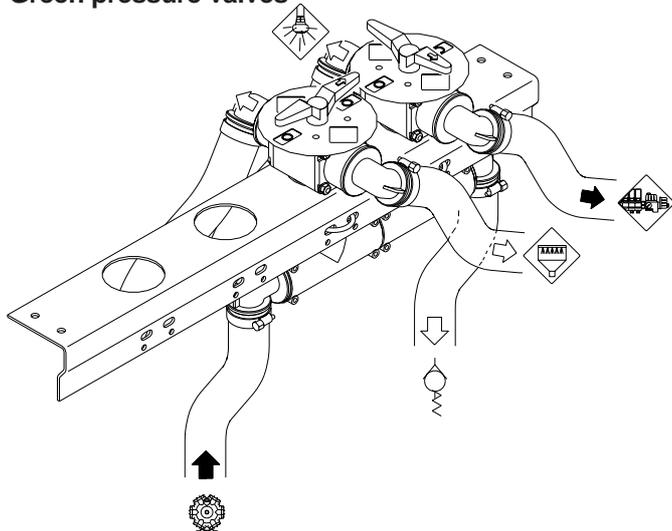
Return from  
operating unit  
to pump suction



**Operating instructions**

The green pressure valves and the black suction valves have 4 positions. Two positions are for options. The other two are marked "O" indicating the valve is closed. The blue return valve only has 2 positions. The arrow on the handle indicates which position is selected.

**Green pressure valves**

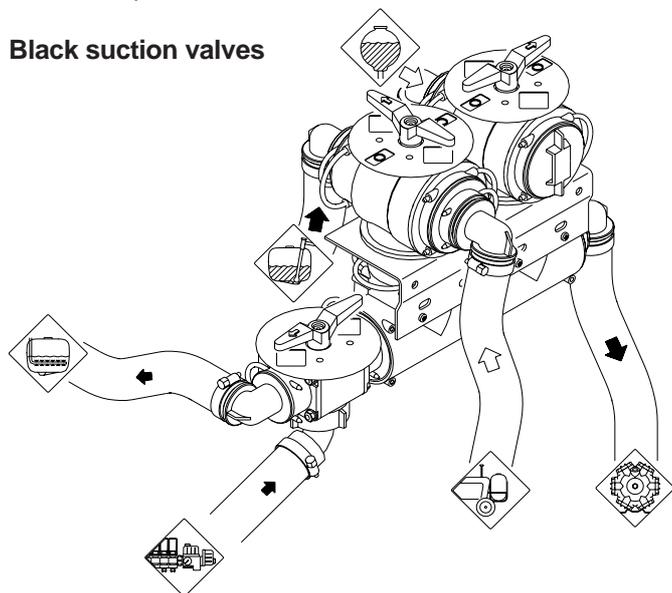


To select the optional equipment, the handle is turned so the arrow and thereby liquid is directed to the optional extra instead of the Self-Cleaning Filter/operating unit. When spraying is to resume, turn the handle so the Self-Cleaning filter/operating unit is selected.

If 2 or more valves are fitted, the arrow must point towards the optional extra you select. Remaining handles are turned to "O" (closed). When spraying is to resume, select the Self-Cleaning Filter/operating unit. The other handles are turned to "O".

If all the green pressure valves are closed the safety valve will open inside the tank.

**Black suction valves**



Turn the handle so the arrow points towards the selected optional equipment. The handle is turned back when you want to aspirate from the main tank. If 2 valves are fitted, eg. Filling device and Rinsing Tank, select optional extra and turn the other valve to "O" (closed). To resume aspiration from the main tank, the arrow must point towards the main tank. Remaining valve must be closed.

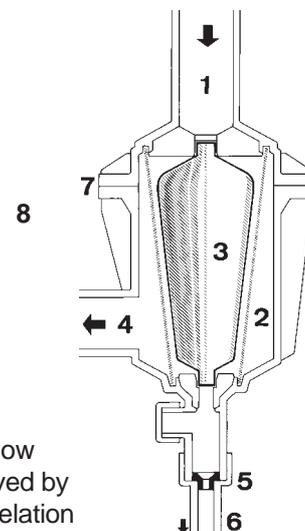
**Blue return valve**

Normally the liquid is directed to the tank return. When the tank is nearly empty, the handle is turned so the liquid is directed to the suction side of the pump instead of the tank return.

Se „Spray Technique“ manual.

**Self-Cleaning Filter  
Operating Diagram**

1. From pump
2. To safety valve (without MANIFOLD)
3. Double filter screen
4. Guide cone
5. To operating unit
6. Replaceable restrictor
7. Return to tank
8. Nut

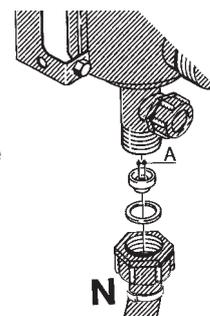


**Choice of restrictor**

It is important to have a large flow through the filter. This is achieved by choosing the restrictor size in relation to the liquid consumption of the spray boom.

4 restrictors are supplied. Use the green one (largest orifice) first.

The hose **N** is demounted at the self-cleaning filter, the restrictor is put in the hose and the hose is mounted again. If the required working pressure cannot be obtained, the restrictor is too large. Choose a smaller restrictor. Start with a black one, then a white and finally a red one.



When cleaning the filter remove hose **N** and the hose at the safety valve, and check there are no residues.

Standard filter size is 80 mesh. Sizes of 50 and 100 mesh are available and can be changed by opening the filter top, and replace the strainer. Check the O-rings before reassembling the filter and replace if damaged.

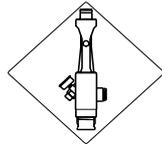
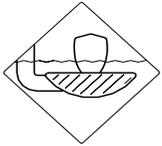
Before any spray job is done, the sprayer is to be calibrated - se booklet „Spray Technique“ attached to this manual.



**Filling of water**

Water can be filled into the main tank in following ways:

1. Filled through tank lid on top of the sprayer tank
2. Filled by diaphragm pump through suction side fitted filling device (optional extra) by normal pump capacity.
3. Filled by diaphragm pump through pressure side fitted, injector/venturi type Fast Filling Device (optional extra) by up to 3 times normal pump capacity.
4. Combination of 2 and 3.



The tank should normally be filled 2/3 with water, before adding the chemicals - always read instruction at chemical container!

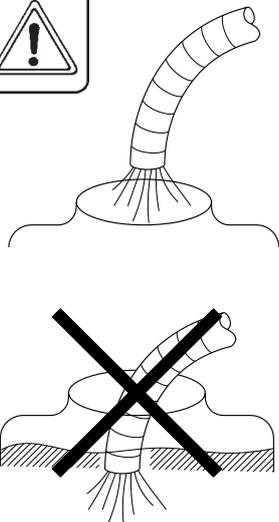
**Filling through tank lid.**

Remove tank lid and fill water through strainer to prevent rust or other particles to enter the tank.

An overhead tank can be used in order to obtain high filling capacity.



It is recommended to use as clean water as possible for spraying purposes.

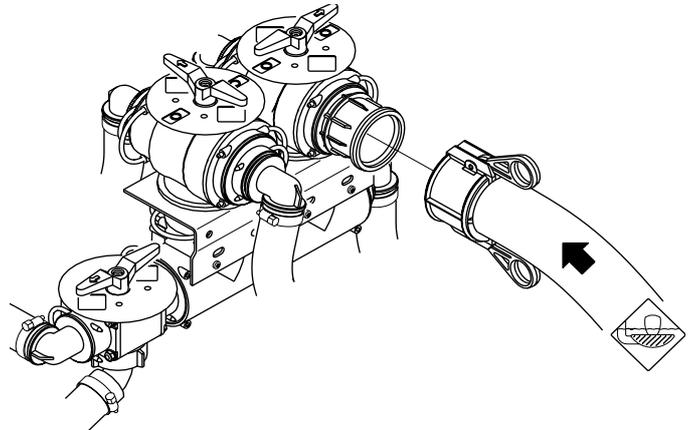


**WARNING! DO NOT LET FILLING HOSE ETC. ENTER THE TANK. KEEP IT OUTSIDE THE TANK, POINTING TOWARDS THE FILLING HOLE.**

IF THE HOSE IS LEAD TO THE BOTTOM OF THE TANK AND THE WATER PUMP AT THE WATER SUPPLY PLANT STOPS, CHEMICALS CAN BE SIPHONED BACK AND CONTAMINATE THE WATER SUPPLY LINES AND WELD.

**Suction Filling Device.**

The Suction Filling Device is operated as follows:



1. Connect suction hose to Suction Manifold.
2. Turn handle on Suction Manifold towards Filling Device. Engage diaphragm pump and set engine revs. at 2000 r/min.
3. The tank is now filled by water. Keep an eye on liquid level indicator.
4. Turn handle on Suction Manifold away from Filling Device to discontinue filling process.
7. Disconnect suction tube.

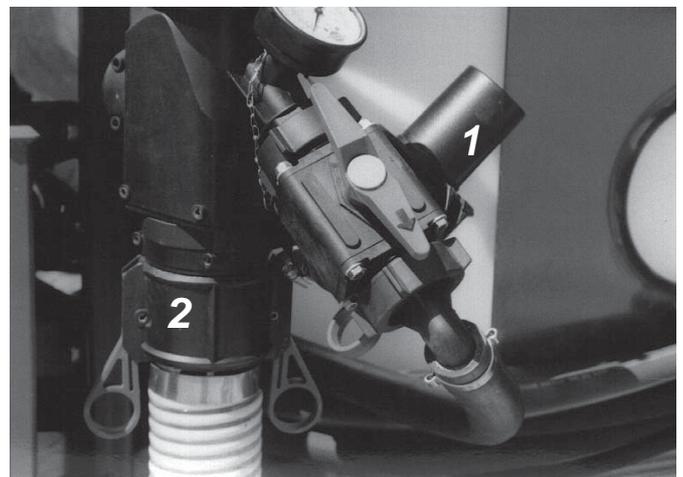
**NOTE!** Observe local legislation regarding use of Filling Device. In some areas it is prohibited to fill from open water reservoirs (lakes, rivers etc.). It is recommended only to fill from closed reservoirs (mobile water tanks etc.) to avoid contamination.

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

**Fast Filling Device**

The Fast Filling Device is operated as follows:

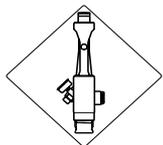
1. Ensure spray liquid tank contains at least 50 liters of water.





2. Remove cover (1) and connect suction hose (2).  
3. Turn handle on Pressure Manifold towards Fast Filler. With the engine at 1900 r/min, the pressure gauge should indicate about 10 bar.

4. If water is not seen in transfer tube, prime by turning valve.
5. Keep eye on liquid level indicator.
6. Turn handle on Pressure Manifold away from Fast Filler to discontinue filling process.



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

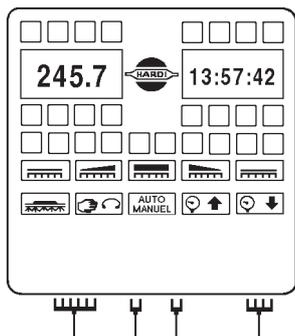
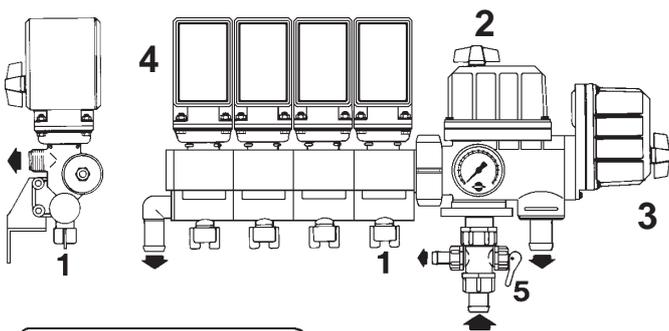
7. Disconnect suction tube (2) and replace cover.

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 refilling the tank and keep an eye at 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 at the sprayer during spraying, it can be contaminated by spray drift, which will be transferred to lake/river when filling!



## Adjustment of operating unit

1. Choose the right nozzle size by turning the TRIPLET nozzle bodies to a suitable nozzle for the spray purpose. Make sure that all nozzles are the same type and size.
2. Open or close lever **5** depending on whether pressure agitation is required. (Remember pressure agitation takes 5% to 10% of pump output).

3. Open main on/off valve **2** by pushing spraying position.

4. Open all distribution valves **4** to by pushing to spray position. A green indicator appears under the EC-motor when valve is in spray position.

to spray position. A green indicator appears under the EC-motor when valve is in spray position.

5. Open pressure adjustment valve by activating switch until green finger screw **3** stops rotating.

6. Put the sprayer in neutral and set the engine revolutions and thereby the number of revolutions of the pump corresponding to the intended travelling speed. Remember the number of revolutions on the engine must be kept between 1100-2100 r/min.

Adjust the pressure adjustment valve so that the pressure gauge indicates the recommended pressure.

### ADJUST THE PRESSURE EQUALIZATION SECTIONS AS FOLLOWS:

8. Note the pressure and place the first of the distribution valves **4** to position „off“.
9. Turn the corresponding adjusting screw **1** until the pressure gauge again shows the same pressure (turn the screw clockwise for higher pressure, anticlockwise for lower pressure).
10. Place the next distribution valves to position „off“, and adjust this one in the same way - one by one.

**NOTE:** HEREAFTER ADJUSTMENT OF PRESSURE EQUALIZATION WILL ONLY BE NEEDED IF YOU CHANGE TO NOZZLES WITH OTHER CAPACITIES.

11. Operating the control unit while driving:  
To close the entire boom, operate switch . This takes the pressure from the pump. The liquid will then return to the tank via the return system and serve as agitation. The diaphragm anti-drip valves ensure instantaneous closing of all nozzles. In order to close part of the boom, activate one of the distribution valve by the switch the section or sections to be closed. The pressure equalization device ensures that the pressure does not rise in the sections which remain open.



**Filling of chemicals**

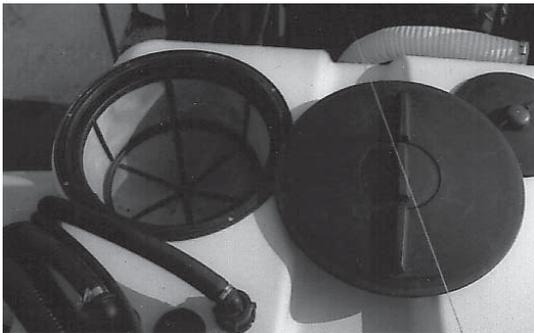
- Chemicals can be filled in the tank in 2 ways:  
 1. Through tank lid  
 2. By means of HARDI FILLER chemical filling device (optional extra in some countries).

**Filling through tank lid**

The chemicals are filled through the tank lid - Note instruction at chemical container!

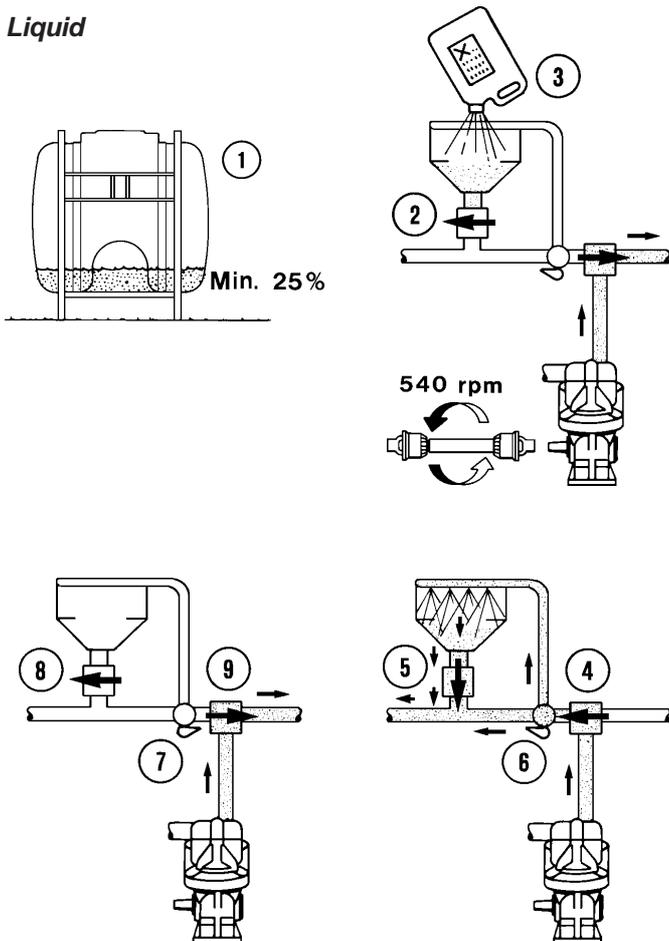


**Warning!** Be carefull not to slip or splash chemicals when carrying chemicals up to the tank lid!

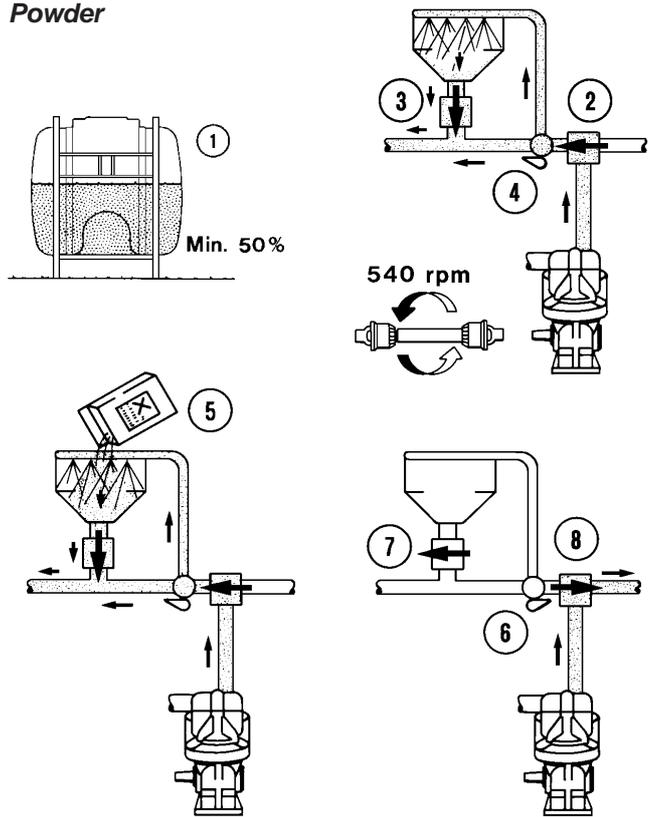


**Filling by HARDI FILLER**

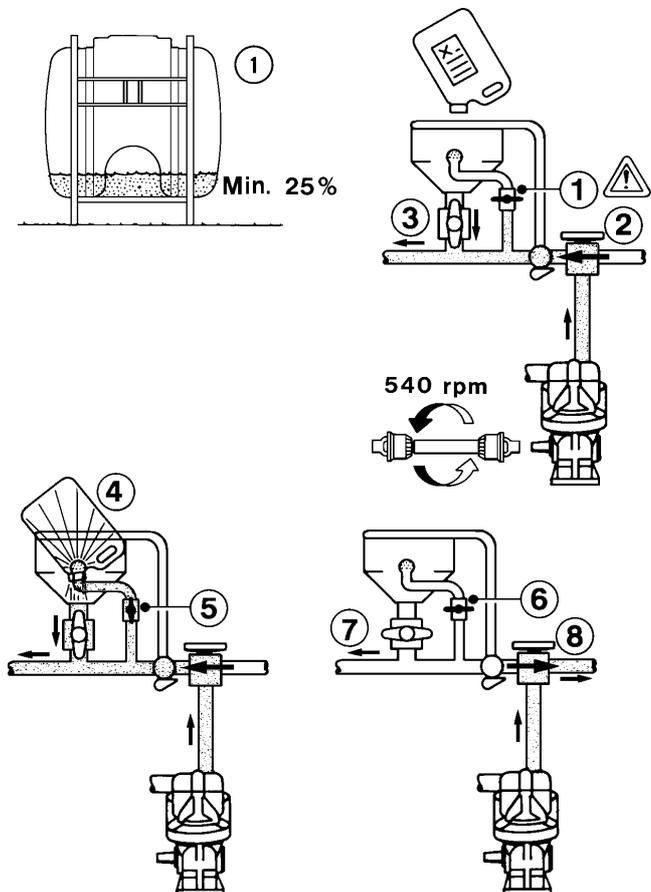
*Liquid*



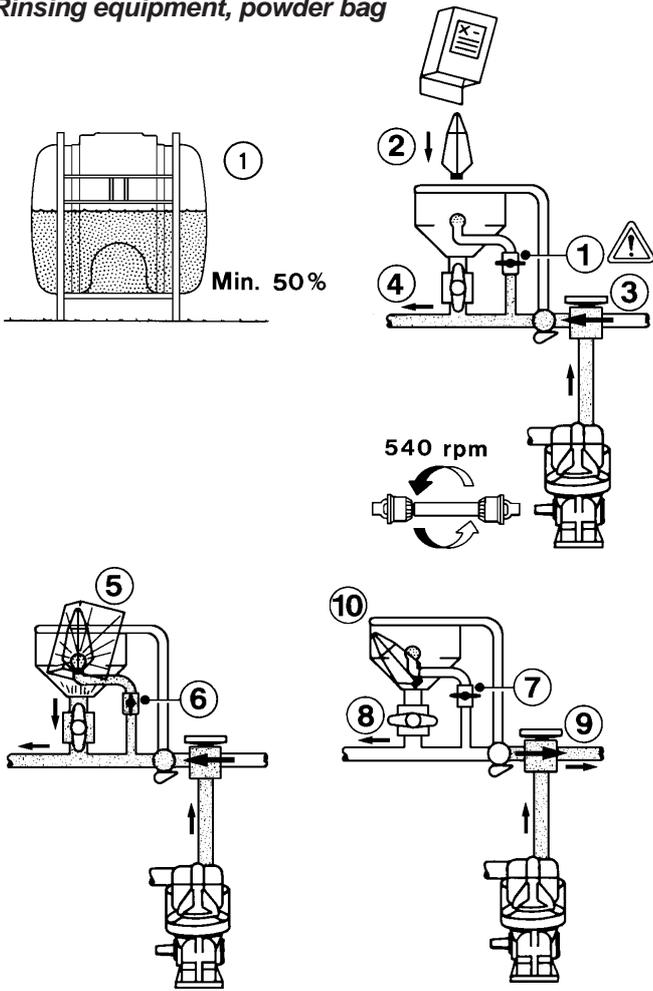
*Powder*



*Rinsing equipment, liquid container*



**Rinsing equipment, powder bag**



1. Turn suction valve towards rinsing tank.
2. Turn pressure valves towards rinsing nozzle (if fitted).
3. When rinsing tank is empty, turn back suction valve towards suction from main tank and operate all valves, so all hoses and components are rinsed.
4. Turn pressure valve back to EC-operating unit and spray liquid in the field you have just sprayed.

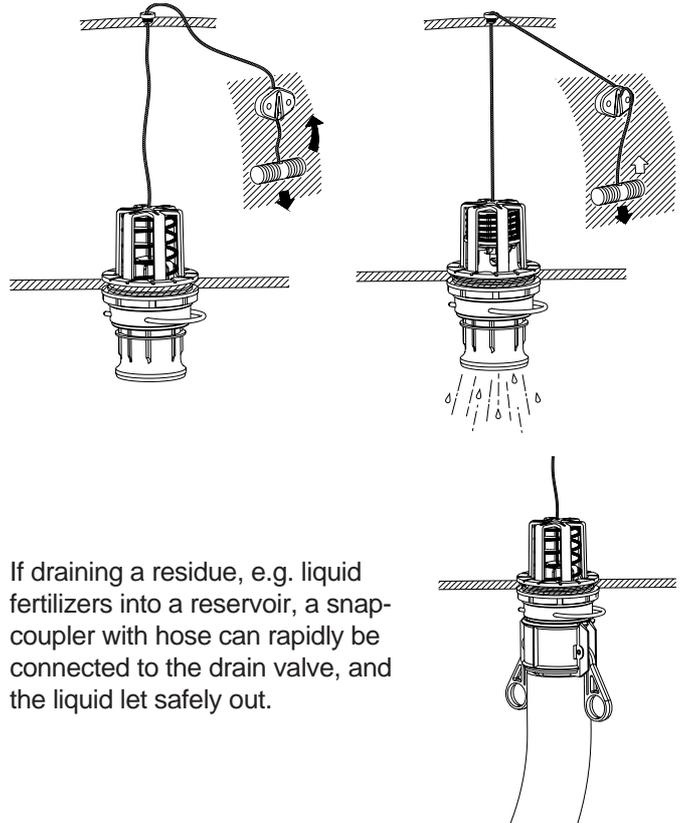
**B. Rinsing the pump, operating unit, spray lines etc. in case of stop in spraying before main tank is empty (e.g. beginning rain etc.).**

1. Turn suction valve towards rinsing tank
2. Turn blue return valve (if fitted) towards pump suction line
3. Spray water from rinsing tank out in the field until all nozzle tubes/nozzles are flushed with clean water.

**Operation of the tank drain valve**

Pull the string at left hand side of the tank to open the drain valve. The valve is spring-loaded but can be kept open by pulling the string out- and upwards in the V-shaped slit.

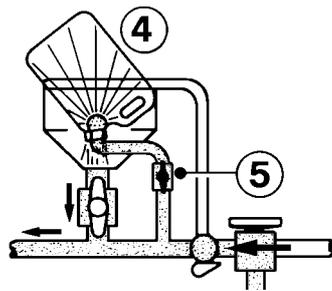
To release and close the drain valve again pull the string down-wards and let the valve will close automatically.



If draining a residue, e.g. liquid fertilizers into a reservoir, a snap-coupler with hose can rapidly be connected to the drain valve, and the liquid let safely out.

**Operation of rinsing equipment.**

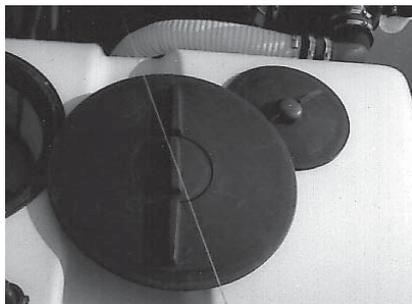
**WARNING:** The rinsing valve 5 must **not** be operated before the package is placed above the rinsing nozzle as jets from the nozzle can hit the operator.



**Operation of rinsing tank.**

The incorporated 150 l rinsing tank can be used for two purposes:

**A. In-field diluting of remaining spray liquid residues in the main tank for spraying the liquid in the field, before cleaning the sprayer.**

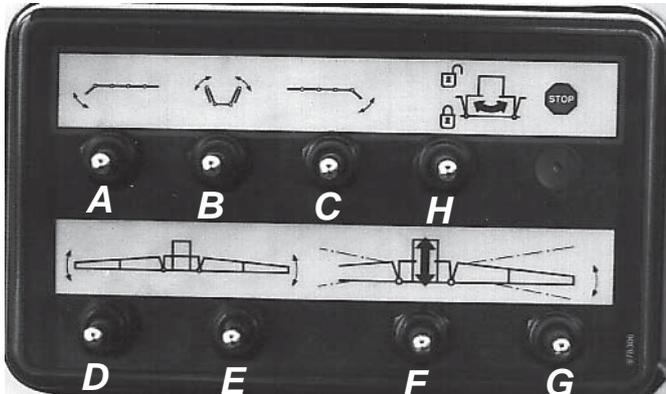


**Spray Technique** - see separate Spray Technique book.



### Operation of the boom

The boom unfolding/folding can be proceeded according to instructions below.



- A. Unfolding/folding of the left outer section
- B. Unfolding/folding of the inner sections
- C. Unfolding/folding of the right outer section
- D. Boom Tilt, left side
- E. Boom Tilt, right side
- F. Boom lift, up/down
- G. Slanting control, trapeze
- H. Pendulum locking device

### Unfolding of boom

**WARNING:** When unfolding and folding the boom, be aware of overhead high-voltage cables! Booms touching high-voltage cables are lethal!

To unfold the boom, please carry out following procedure:

1. Push **boom lift** switch **F** upwards to lift the boom clear of the rear transport brackets.
2. Lift the right and left boom parts by activating the **boom tilt** function, switch **D** and **E**
3. Push switch **B** to unfold the inner sections completely
4. Push switch **A** and **C** to unfold outer sections completely
5. Push switch **F** downwards to lower the boom to approximately 50 cm above crop or ground level.
6. Unlock the pendulum suspension by pushing switch **H** downwards.

**REMARK!** The 3 upper functions at the control box (folding functions) may only be operated when sprayer is standing still.

### Folding of boom

When folding the boom, please carry out following procedure:

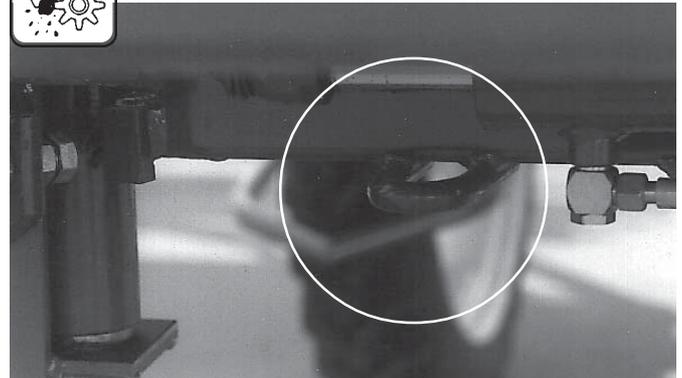
1. Lock pendulum locking device by pushing switch **H** upwards.
2. Raise boom lift **F** to upper position.
3. Check that trapeze slanting control is in level to middle position - if not correct by activating switch **G**.
4. Fold outer sections, **A** and **C**.
5. Lift up right and left hand side boom by activating right and left boom tilt, **D** and **E**.

6. Fold inner sections by activating switch **B**.
7. Lower right and left boom side until they touches the front transport brackets, by activating boom tilt **D** and **E**.

ENSURE THAT THE BOOMS ARE CLEAR FROM THE TRANSPORT BRACKETS BEFORE UNFOLDING IS PROCEEDED.



### Emergency situations



#### Towing eye

This eye can be used for towing the machine in case the machine is not able to propel itself.

If the machine is bogged in the field, the towing eye is not sufficient for pulling it free. The rope must be tied to the chassis and **precaution must be proceeded** not to damage the machine!

Be aware of local traffic regulations regarding towing on public roads.

#### Stop wedges (if fitted)

Two stop wedges can be fitted at the back of the sprayer. The wedges is recommended to be used when parking the sprayer at inclining grounds.

The wedges are removed from the brackets by pulling the handle upwards, and lift up the wedges.

#### Warning signal triangle

A reflecting warning triangle is placed in the cab behind the driver's seat.

In case of break-down of the machine on public roads, the triangle should be unfolded and placed 100 - 250 m behind the machine to warn, if it is parked inconveniently or dangerously to the traffic.

#### Starting by booster cables

Be careful when using booster cables to start vehicle with flat battery.

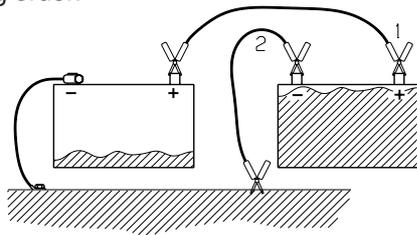
The risks are the same as described in section „Charge of battery“ - see this section.



**WARNING:** Use eye/face protection shield and gloves when working with batteries!

To avoid explosions it is important to connect booster cables in the following order:

1. Connect first cable to positive terminal at charged battery - then at positive terminal at discharged battery.
2. Connect second cable to negative terminal at charged battery.
3. Then connect second cable to FRAME (not negative terminal at battery!) at vehicle with discharged battery.



This to avoid sparks near the battery when connecting the last cable to terminal.



**Emergency operation of the boom**

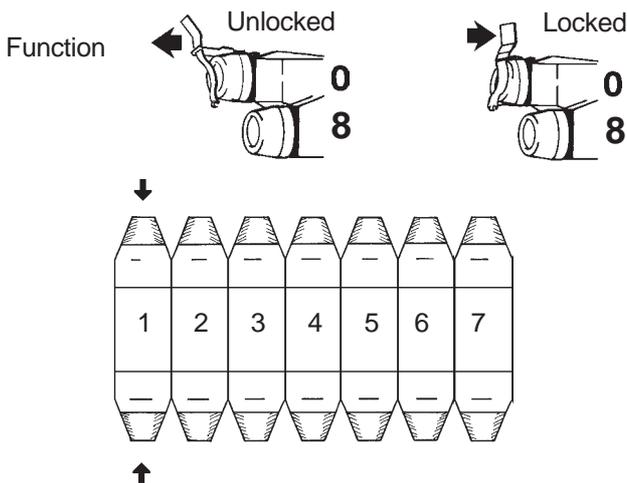
In case of power failure, the boom can be operated manually by pressing the individual buttons on the solenoid valves. This can be done when locking the distribution valve at right hand side of the vehicle.

Remove the protection box covering the solenoid valves at the boom center section.

The operation can now be made by pressing the individual buttons on the solenoid valves, referring to valve nos. at diagram.

Stay clear of folding boom!

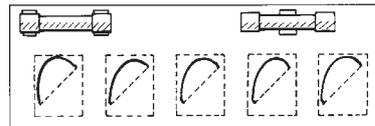
**Valve**



- 0 Pressed in and locked by clip
- 1 Boom outer section, left
- 2 Boom inner sections
- 3 Boom tilt, left
- 4 Boom tilt, right
- 5 Slanting control
- 6 Boom outer section, right
- 7 Pendulum lock
- 8 Raising/lowering of boom lift

Remember to unlock the valve 0 again.

The problem may be due to a blown fuse. One spare fuse is in the junction box.



Fuse type: T 10A 250V HARDI part no. : 261272

**EC operating unit**

In case of power failure it is necessary to emergency activate all functions of the operating unit manually. First disconnect the multiple plug from the EC operating unit. Now manually turn the emergency control knobs. The problem may be due to a blown fuse in the POWER BOX 2000.



**Maintenance**

**WARNING!** To avoid personal injuries

- Stop engine and switch off main power switch before servicing.
- Rinse and wash equipment before servicing.
- Depressurize equipment before servicing.
- Never service or repair the equipment whilst it is operating.
- Wash tools and instruments after having repaired the sprayer.
- 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.
- If lifting the machine with a jack, always use extra support to secure the machine. Remember to put wedges in front of and behind the wheels - parking brake or leaving in gear is insufficient.
- When carrying out repair jobs on hydraulic activated parts as boom lift, booms etc., always support or secure these parts against moving or falling down
- Hydraulic oil under pressure can penetrate the skin and cause gangrene - seek doctor immediately.
- Oil products can cause skin diseases by long term or repeatedly contact to skin!
- Do not slack or disconnect hoses at air conditioning circuit.
- In order to derive full benefit for many years from the sprayer, the following service intervals should be kept.

**Cleaning the Sprayer** - see Spray Technique book.

**NOTE:** If the sprayer is cleaned with a high pressure cleaner or it has been used to spray fertilizer, we recommend lubrication of the entire machine.



## Service and Maintenance chart, new machine

Maintenance jobs to be done further than normal.

Interval	Maintenance Job
After 10 h	Check hydraulic system incl. steering for leakages Check rear axle and wheel reducers for leakages Check gearbox(es) for leakages Check brake system for leakages Check air conditioning circuit for leakages Tighten bolts and nuts Tighten wheel nuts
After 50 h	Check engine for leaks (see Deutz manual) Change engine oil (see Deutz manual) Change engine oil filter (see Deutz manual) Change fuel filter (see Deutz manual) Change hydraulic oil filter cartridge Tighten bolts for engine support (see Deutz manual) Check condition and tension of V-belts (see Deutz manual) Check engine valve clearances (see Deutz manual)
After 125 h	Check hydraulic system incl. steering for leakages Change hydraulic oil filter cartridge Check rear axle and wheel reducers for leakages Check gearbox(es) for leakages Check brake system for leakages Check air conditioning circuit for leakages.
After 500 h	Change hydraulic oil Change brake fluid

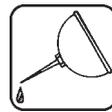
### Periodic Service and Maintenance chart

Interval	Maintenance Job
Every 10 h, or daily	Check engine oil level (see Deutz manual) Check brake fluid level Check hydraulic oil level Check/clean filters in spray circuit Check/clean engine's air filter (see Deutz manual) Lubricate according to scheme
Every 50 h, or weekly	Tighten wheel bolts and nuts Lubricate according to scheme Check battery's electrolyte level
Every 125 h, or monthly	Clean oil cooler Clean engine cooling system (see Deutz manual) Clean Air conditioning condenser (if fitted) Check battery connections Check clutch pedal play Check/re-adjust boom folding
Every 250 h, or annual Every 250 h, or twice a year	Change hydraulic oil filter *) Change engine oil (see Deutz manual *) Change engine oil filter (see Deutz manual *) Change cabin's carbon air filters **) Check condition and tension of engine V-belts (see Deutz manual) Check tension of air conditioning compressors V-belts Check Air Conditioning fluid level (sight glass **)
Every 500 h	Change oil in rear axle *) Change oil in wheel reducers *) Change oil in gear box(es) *) Change fuel filter (see Deutz manual *) Check/adjust valve clearance (106 HP only) (see Deutz manual) Check/tighten front wheel bearings

Every 1000 h	Change hydraulic oil *) Change brake fluid *) Check/adjust valve clearance (72 HP only) (see Deutz manual) Clean fuel feed pump strainer (106 HP only) (see Deutz manual) Check toothed timing belt (72 HP only) (see Deutz manual) Drain water from fuel tank Check brake disc wear
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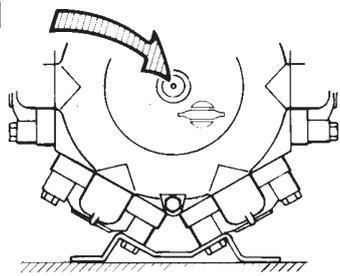
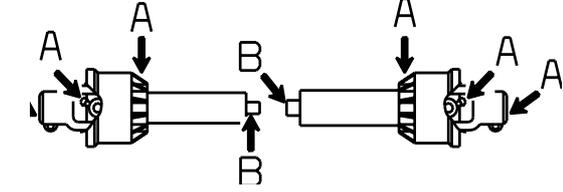
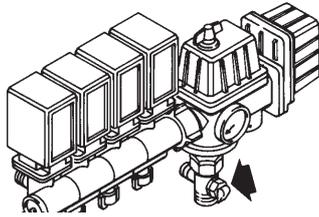
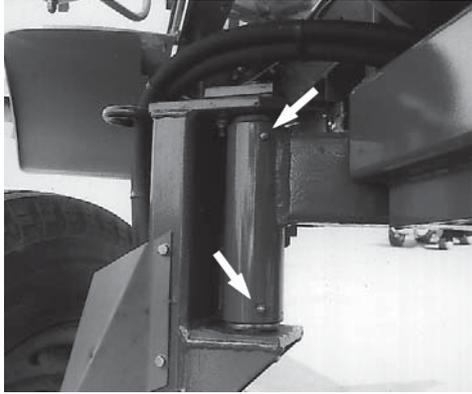
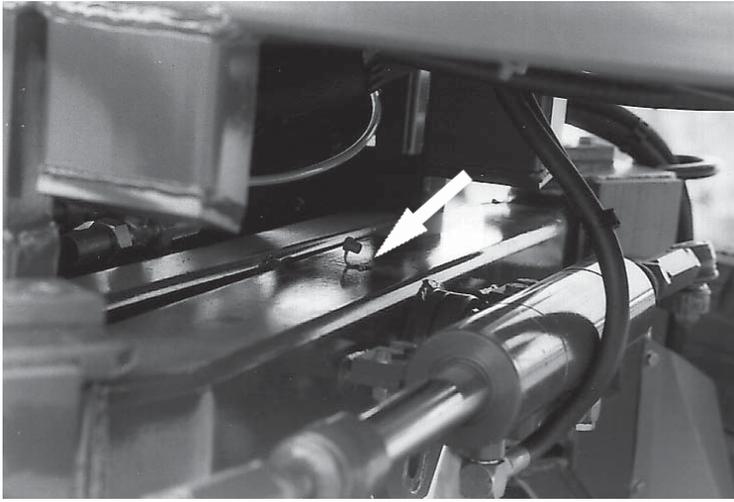
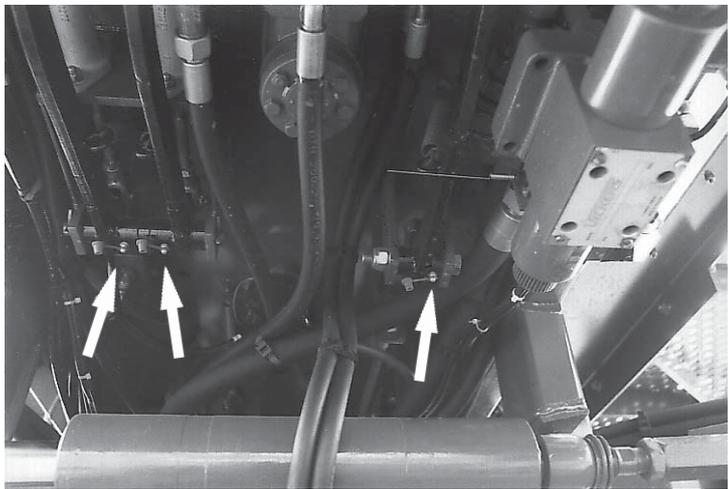
Every 3000 h	Check engine fuel injection nozzles (see Deutz manual)
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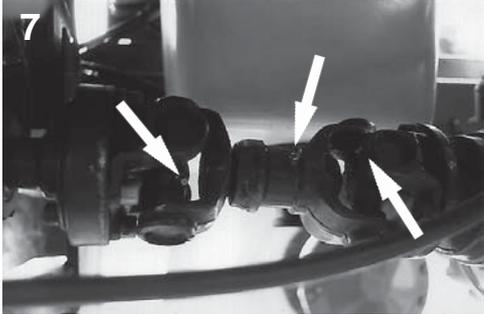
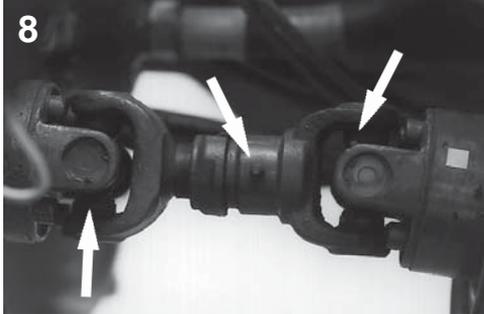
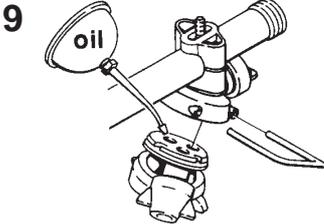
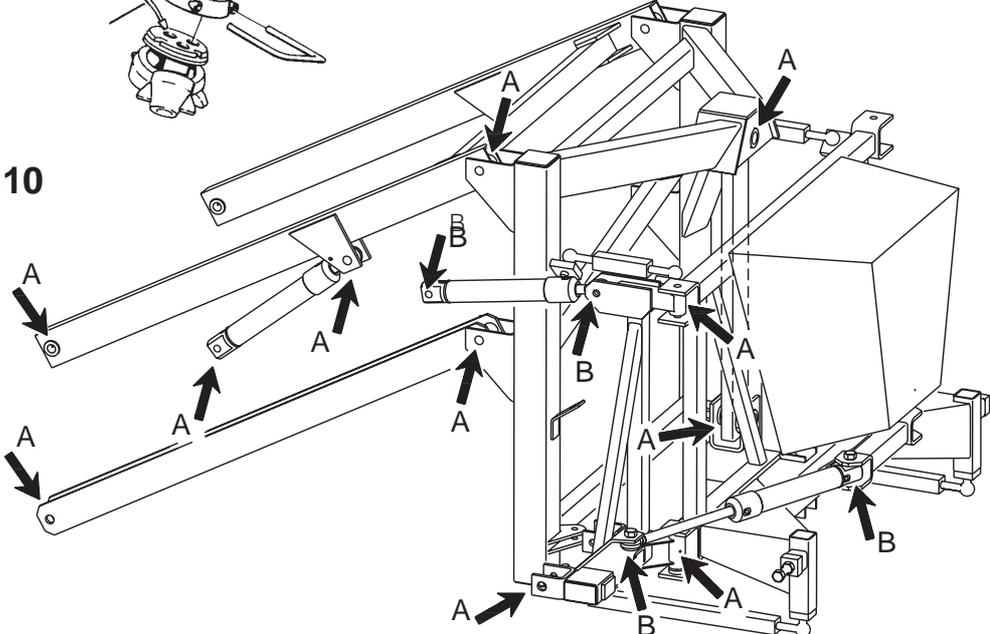
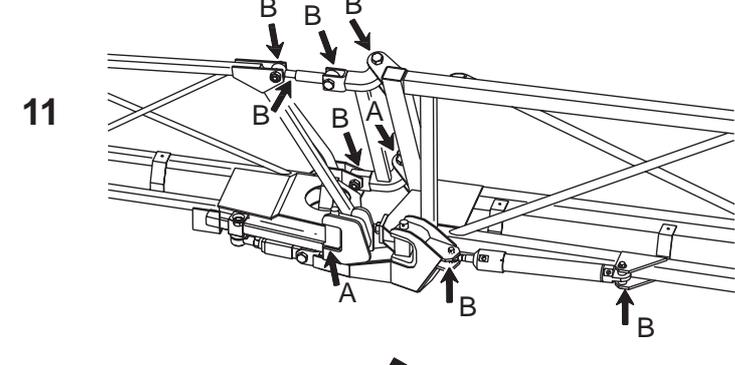
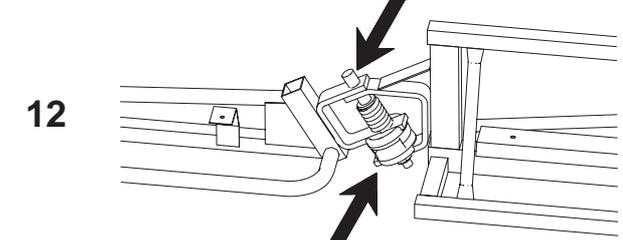
\*) = or at least once a year  
\*\*) = or at least twice a year



## Lubricants

Component	Lubricant
Engine	See instruction book for DEUTZ engine
Gearbox ROVER	TOTAL ATF 33 SHELL DONAX TF CASTROL TQF MOBIL ATF 210 TEXACO TEXMATIC UNIVERSAL ESSO ATF TYPE G BP AUTRAN G
Oil capacity:	1.8 litre
Rear Axle HURTH	MOBIL FLUID 422
Oil capacity:	7.0 litre
Wheel reducers	SAE 85 W 90, API GL 5 SHELL SPIRAX HD 80 W 90 TOTAL TRANSMISSION MP
Oil capacity:	1.3 litres (each)
Hydraulic System	HYDRAULIC OIL TYPE ISO HV46 TOTAL EQUIVIS ZS 46 SHELL TELLUS T 46 CASTROL HYPIN AWS/AWH 46
Oil capacity:	43 litres
Brakes	GM DEXRON II TOTAL FLUID ATX DEXRON SHELL DEXRON II TEXACO TEXAMATIC
Reduction gearbox (8-speed models only)	SAE 85 W 90, API GL 5 SHELL SPIRAX HD 80 W 90 TOTAL TRANSMISSION MP
Oil capacity:	1.5-2.0 litres
Grease points, ball bearings: ①	Universal Lithium grease, NLGI-No. 2 SHELL RETINAX A CASTROL LM GREASE
Slide bearings, Pivot pins: ②	Lithium grease with Molybdenumdisulphide and Graphite SHELL HD GREASE 221 CASTROL MOLYMAX
Oil lub. points:	Engine oil

POS.		① x	② x			
1		x		50	<b>1</b> 	
2		A	B	10 125	<b>2</b> 	
3	x				<b>3</b> 	
4			x	50	<b>4</b> 	
5			x	10	<b>5</b> 	
6			x	50	<b>6</b> 	

POS.	  ①  ②			
7	x	50		
8	x	50		
9	x	80		
10	B	10 10		
11	B	10 10		
12	x	50		

**Fuel and lubricants storage.**

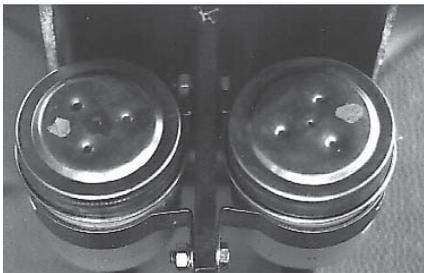
Always store fuel and lubricants clean, dry and cool - preferably by constant temperature - to avoid contamination by dirt and condensed water.

When having refilled the fuel storage tank, allow sedimentation of possible dirt, condensed water and sludge - wait a few hours before refilling sprayer fuel tank. Drain water and sludge from storage tank once a year, if possible.

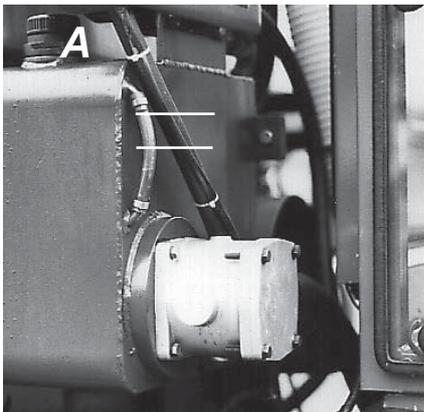
Keep oil filling jugs and hoppers clean.

**10 hours service and maintenance**

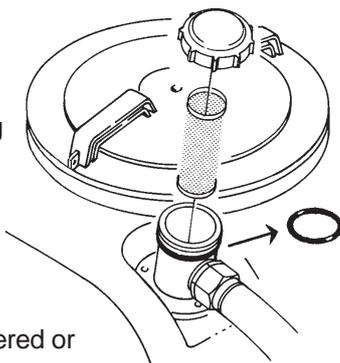
1. Check Engine oil level
2. Check/clean engine air filter
3. Brake fluid level. Fluid reservoirs must be full. Add if necessary. Reg. fluid quality - see lubrication chart.



4. Hydraulic oil level. Oil level must be in top 1/3 of sight tube. Add if necessary by unscrewing cap **A**. Clean area around cap thoroughly before removing the cap.



5. Suction filter  
The main filter protecting sprayer components is the suction filter at the top of the tank. Ensure the O-ring on filter housing is in good condition and lubricated.



Clean filters ensure: Sprayer components such as valves, diaphragms and operating unit are not hindered or damaged during operation.

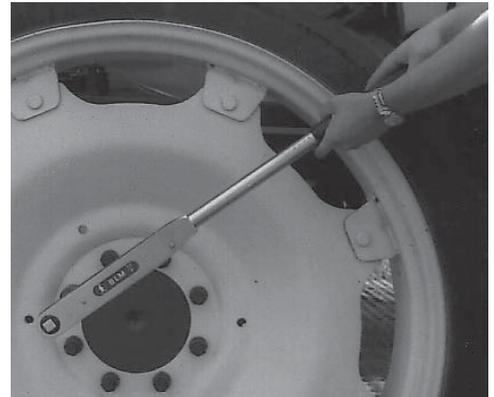
Nozzle blockages do not occur whilst spraying. Long life of pump. A blocked suction filter will resume in pump cavitation.

6. Nozzle filters  
Check and clean nozzle filters if necessary.
7. Lubricate according to scheme.

**50 hours Service**

Do all previous mentioned plus

1. Wheel bolts and nuts. Check wheel nut tension after the first 10 working hours, hereafter every 50 hours.



Bolts	Torque	
Front wheels (with FWA):	185	Nm
Front wheels (without FWA):	185	Nm
Rear wheels	290	Nm
Rim lugs/rim plate bolts	250	Nm

2. Battery  
Clean battery and check electrolyte level. The level must be 5-10 mm above the cells. If low, fill demineralized water until correct level is obtained.

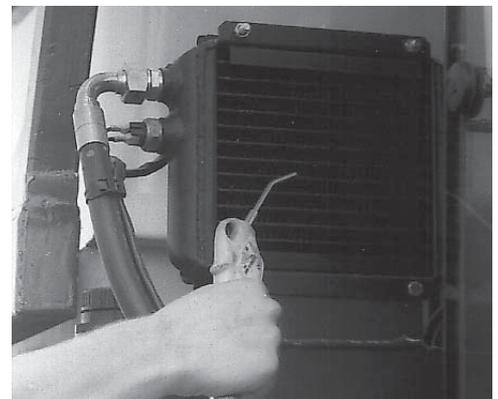


**Warning:** Do not smoke or use open fire when working with batteries. Explosive gases can be generated from batteries and cause serious injuries from fire or acid.

3. Lubricate according to scheme.

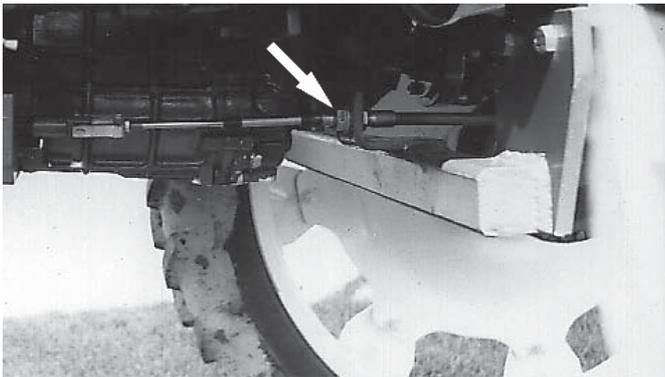
**125 hours Service**

1. Engine cooling system.  
Clean engine cooling system according to instructions from Deutz manual.



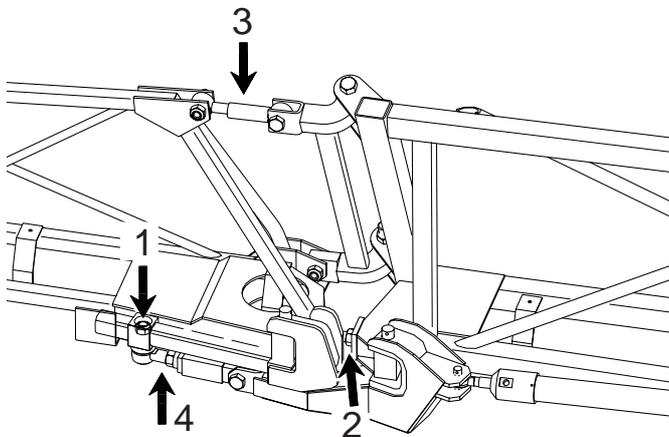
2. Oil cooler  
Clean oil cooler using compressed air or high pressure cleaner. Be careful not to damage cooler!

3. Air conditioning condenser (if fitted). Clean the air conditioning condenser carefully with compressed air or rinse with water.
4. Battery terminals. Clean battery and terminals. Tighten terminals at battery and starter motor if necessary. Apply grease to battery terminals.
5. Clutch pedal clearance. Clutch pedal must have a clearance of 25-35 mm. Adjust cable position if necessary.



6. Boom adjustment. When adjusting the boom, it must be in the working position. Sprayer must be on level ground.

**A. Adjustment of outer section folding**



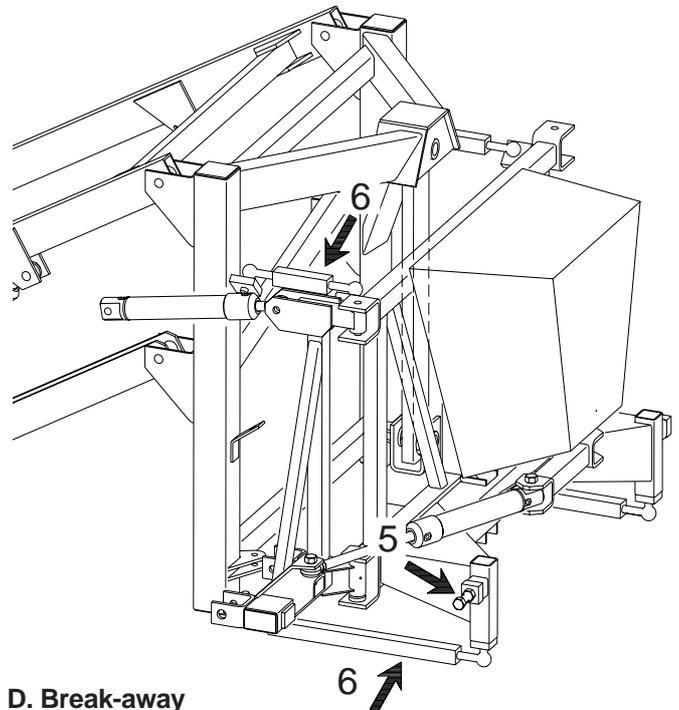
1. Boom must be unfolded to working position
2. Remove bolt 1 from ball joint rod
3. Adjust inner/outer section alignment at adjustment screw 2
4. Adjust inner/outer section alignment at adjustment screw 3
5. Adjust length of ball joint rod 4, until the bolt 1 fits - assemble the locking device again.
6. Remember to tighten all counter nuts.

**B. Adjustment of inner section folding**

1. Boom must be unfolded to working position
2. Adjust inner section/center section alignment at adjustment screw 5. Remember to tighten counter nut.

**C. Adjustment of pendulum suspension**

1. Boom must be unfolded to working position.
2. Remove the 4 stabilizing rods 6 by detaching the ball joints.
3. When the boom is hanging free, adjust the length of the stabilizing rods and attach the ball joints again.

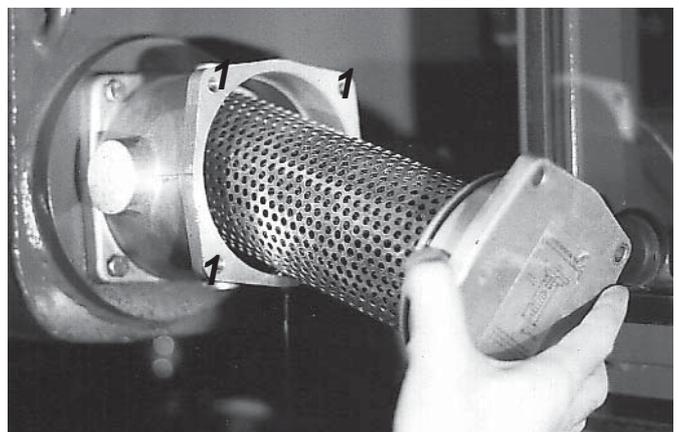


**D. Break-away**

The function of the breakaway is to prevent or reduce boom damage should it strike an object or the ground. The break-away can not be adjusted, but shall only be kept greased (see section „Lubrication“).

**250 hours service**

1. **Engine oil and oil filter.** Change engine oil and filter according to instructions in Deutz manual.
2. **Engine V-belts.** Check engine V-belts according to instruction given in Deutz manual.
3. **Hydraulic oil filter**
  - A. Remove the 4 screws, 1, from oil filter housing.
  - B. Remove filter housing cover carefully by screwdriver.



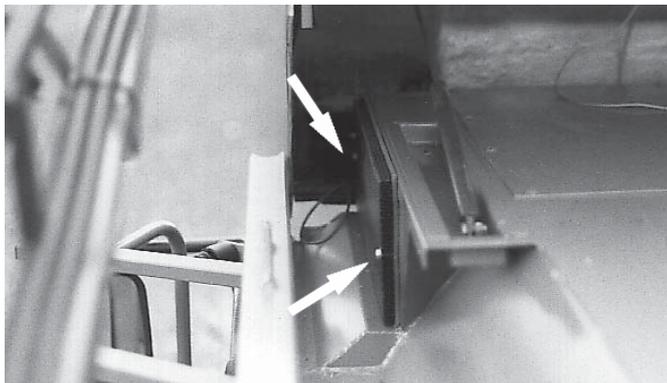
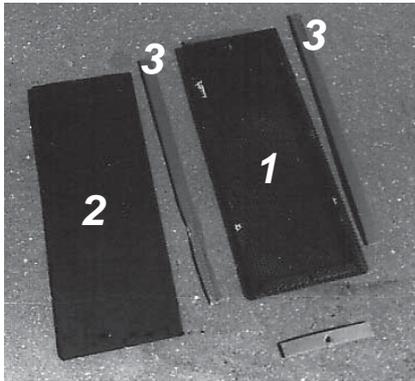
NOTE: When cover and filter are removed quickly, a built-in valve will prevent oil tank from being drained. Appx. 1½ l of oil will be wasted during filter change - retain waste in appropriate container.

- C. Fit new filter cartridge at the cover.
- D. Apply a little amount of oil to the O-ring **2**.
- E. Fit the cover with filter into the housing and tighten the 4 screws again.
- F. Check hydraulic oil level and fill up tank with fresh oil if necessary.



**4. Cabin carbon filters**

Open cab roof, remove carbon filters cover in both sides, replace carbon filters, assemble again. Ensure that gaskets are sealing properly.



**5. Air conditioning compressor V-belts tension**

Loosen counter nut **1** and adjust at nuts **2** until the V-belts for the compressor must be adjusted, so they can be pressed in 15 mm.



**6. Air Conditioning fluid level**

When starting the air conditioning, air bubbles must not appear in the sight glass after a few seconds.

If air bubbles are seen continuously, the circuit might be leaking. If loss of fluid is severe, the warning lamp „freon leak“ in cab ceiling should come on. Call a skilled technician to inspect, repair and refill circuit with fluid.



**WARNING!** Air conditioning circuit contains FREON 12 under pressure. Change of e.g. hoses, requires the circuit to be depressurized first and drained for freon. Do not try to repair air conditioning yourself - repairs require a skilled technician and special equipment.

Freon 12 has boiling point at -12°C and will cause frost-bite by contact with skin. If you get Freon on the skin, flush with clean water immediately and seek doctor if necessary.

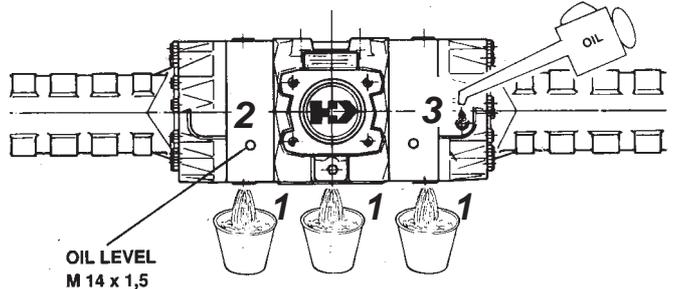
To protect the environment, get air conditioning repaired by first sign of leaks in the circuit.

**500 hours Service**

Change of oil is best done when machine has been working for at least 1 hour.

Always clean areas around filling, level and drain plugs before removing them, to avoid dirt getting into vital parts.

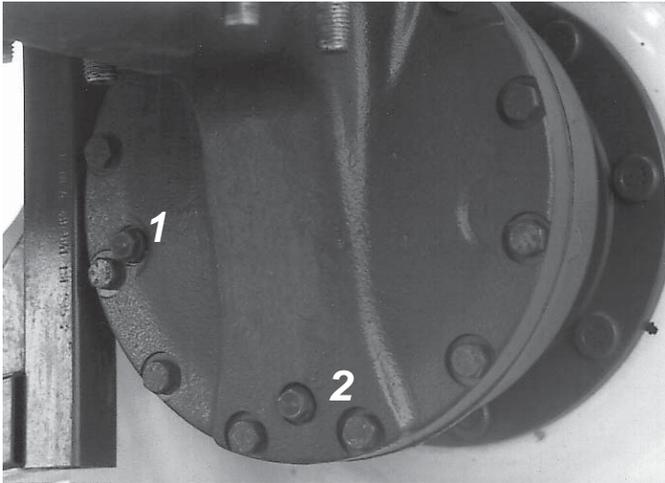
**1. Rear axle oil and brake disc thickness**



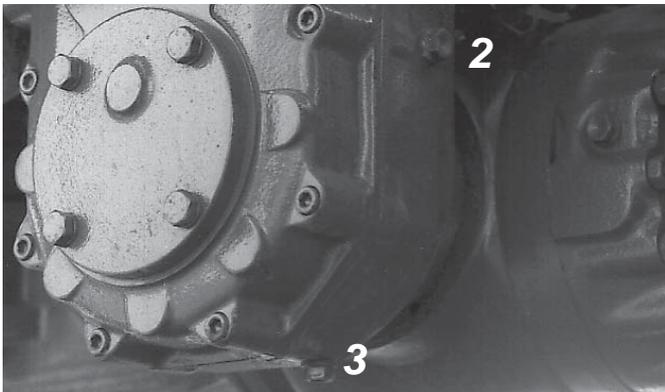
- A. Remove the 3 drain plugs, **1**, in bottom of the rear axle and drain rear axle oil into an appropriate container.
- B. Remove level plug **2** and filling plug **3**
- C. When axle is completely drained, fit the drain plugs **1** again.
- D. Fill rear axle with fresh oil till level reaches level hole.
- E. Fit level and filling plugs again and tighten them.

**2. Wheel reducers oil**

- A. Remove filling/level plug **1** and drain plug **2**, and drain oil from both wheel reducers into appropriate containers.
- B. When reducers are completely drained, fit and tighten drain plug again.
- C. Fill reducers up with fresh oil till it reaches level/filling hole.
- D. Fit level/filling plug again and tighten them.



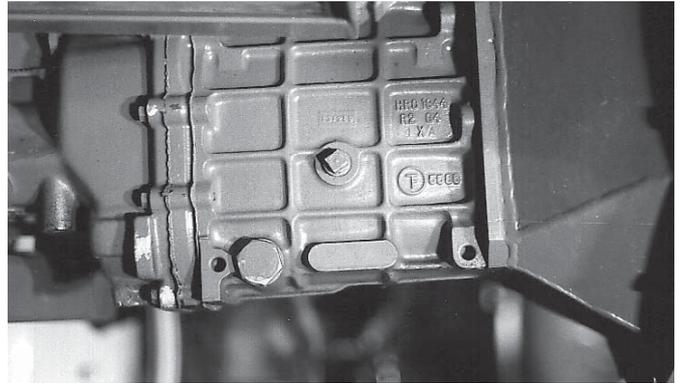
**3. Reduction gear box oil (8-speed models only)**



- A. Remove filling plug **1**, level plug **2**, and drain plug **3** and drain oil into appropriate container.
- B. When gearbox is completely drained, fit and tighten drain plug again.
- C. Fill gearbox with fresh oil, until it reaches the level hole.
- D. Fit and tighten level and filling plugs again.



**4. Gearbox oil**



- A. Remove filling/level plug **1** and drain plug **2**, and drain oil from the gearbox into appropriate container.
- B. When gearbox is completely drained, fit and tighten drain plug again.
- C. Fill gearbox with fresh oil till it reaches level/filling hole.
- D. Fit level/filling plug again and tighten it.

**5. Engine fuel filter.** Change fuel filter according to information given in Deutz manual.

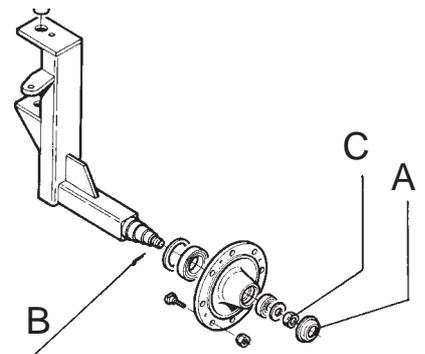
**6. Engine valve clearance (106 HP models only)**

Check and adjust if necessary the engine valve clearances according to instructions in Deutz manual.

**7. Front wheel bearings (models without FWA only)**

Check roller bearing slack. If necessary, adjust as follows;

- 1. Jack wheel up. It is best to remove the wheel.
- 2. Remove hub cap **A** and split pin **B**.
- 3. Shaft nut **C** is tightened until slight rotation resistance of hub is noted.
- 4. Now loosen shaft nut until first split pin hole is visible.
- 5. Insert split pin and replace hub cap.

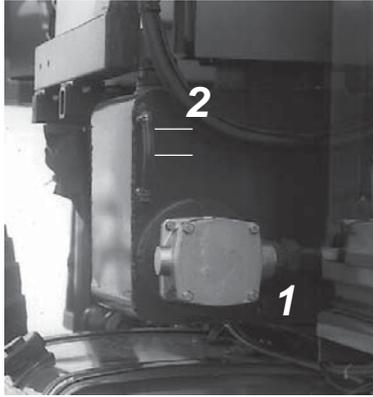


After 1000 hours or once a year, the axle bearings are greased.

**1000 hours service**

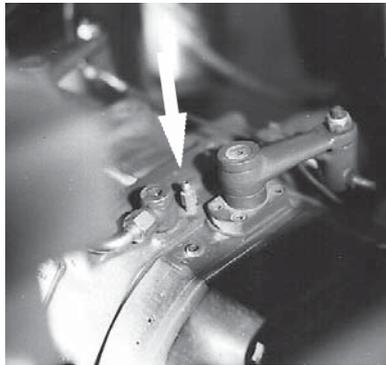
**1. Hydraulic oil**

- A. Remove drain plug **1** and filler cap **2**, and drain hydraulic tank into appropriate container
- B. Change hydraulic filter as described under 250 hours service.
- C. Fit and tighten drain plug again.
- D. Fill fresh oil till the level reaches the upper 1/3 of the sight tube.



**2. Brake Fluid**

- A. Fit drain hose to brake system bleed screws at rear axle, and place appropriate container underneath drain hose.
- B. Open bleed screws.
- C. Pump with brake pedals until reservoirs, main cylinders and brake lines are empty.
- D. Fill reservoirs with fresh fluid - see lubrication chart for correct type
- E. It is recommended to use a priming tool for priming the brakes. If no brake priming tool is available, the priming of brakes is a 2-man-job.



**Priming without tool:**

One person in cab to pump brake pedal, one at the back of machine to open and close the bleed screws. Prime one side at a time.

- A. Close bleed screw
- B. Pump brake pedal till pressure is felt, and keep the pedal down.
- C. Unscrew brake pipe at the end of main cylinder and let air/fluid out - brake pedal is still kept down - tighten brake pipe again.
- D. Repeat B again.
- E. Open bleed screw at rear axle and let air/fluid out - brake pedal is still kept down - close bleed screw again.
- F. Repeat B and E until all air is let out of the brake lines.

If you are in doubt - let your dealers work shop carry out this job.

**NOTE!** The brakes are hydraulically activated. Compensation for wear on discs takes place hydraulically. There must be 1 mm clearance between brake pedal activating rod and brake cylinder piston, to ensure full pressure relief in brake lines and thereby avoid overheated brakes.

**3. Engine valve clearance (72 HP models only).**

Check and adjust valve clearances according to instruction in Deutz manual.

**4. Fuel feed pump.** Clean fuel feed pump strainer - see Deutz manual

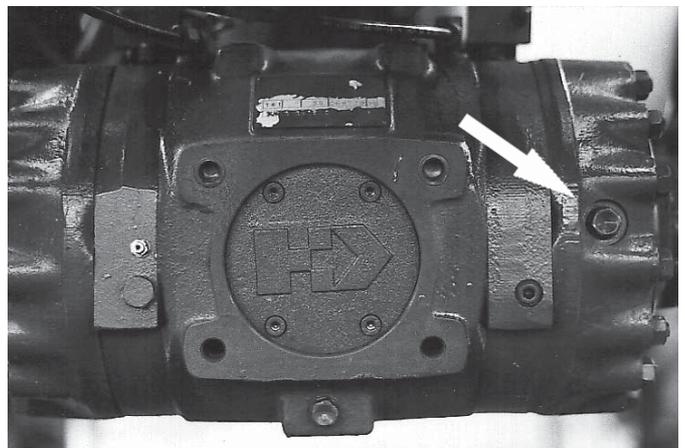
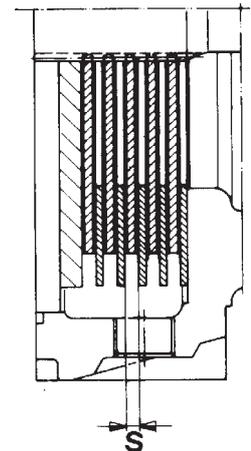
**5. Toothed timing belt (72 HP models only).**

Inspect the timing belt as described in the Deutz manual.

**6. Fuel tank is drained for water and sludge through the bottom drain plug.**

**7. Remove inspection plug and check brake disc wear.**

The discs must be min. 4.5 mm thick (S). If less, the brake discs must be replaced by new.



### 3000 hours Service

Fuel injection nozzles are to be checked by skilled technician - preferably by authorized Deutz garage.

### Occasional maintenance

These maintenance jobs are to be done once in a while, but intervals will vary a lot due to different working conditions.

### Recommended tyre pressure

The tyres should not run under-inflated. This only promotes instability and rapid wear.

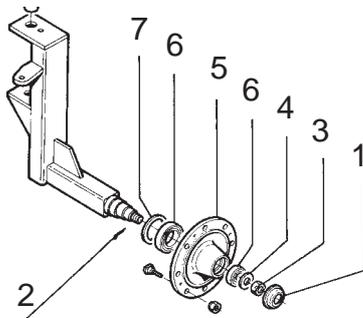
Tyre size	Min. Load Index	Max. tyre pressure bar(psi)	Recommended tyre pressure bar (psi)
9.5 x 32"	116A8	3.0 (44)	2.7 (39)
9.5 x 44"	136A8	4.4 (64)	3.9 (57)
9.5 x 48"	136A8	4.0 (58)	3.9 (57)
11.2 x 44"	136A8	4.0 (58)	3.5 (51)
12.4 x 46"	136A8	2.2 (32)	3.5 (51)
16.9 x 38"	136A8		1.6 (23)

The pressure is specified for a full loaded vehicle. When travelling on hard road surfaces with maximum load, do not exceed 25 km/h.

### Front wheel bearings (models without FWA)

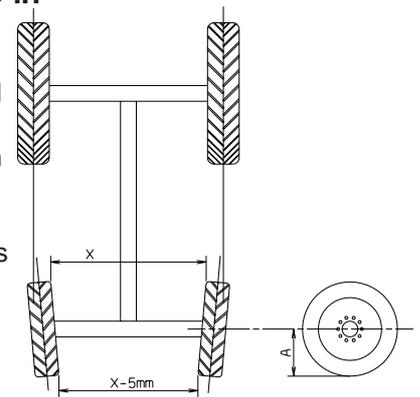
Jack up the front axle and rock front wheels to check for axial play in bearings. If any play is felt, the bearings must be dismantled and re-assembled with new grease and adjusted.

1. Remove hub cap, split pin, castel-nut and washer.
2. Pull off wheel hub and bearings.
3. Clean all parts in degreasing agent and dry them.
4. Check bearings for wear and discoloration - if worn, replace with new bearings.
5. Assemble wheel hub and bearings again, using a new sealing ring.
6. Fill hub and bearings with new grease.
7. Fit washer and castel nut again.
8. Rotate wheel and tighten the castel nut until a slight resistance in the wheel rotation is felt.
9. Slack castel nut again, until first notch is aligned with split pin hole in the shaft.
10. Fit a new split pin and bend it.
11. Fill hub cap with grease and fit it to the hub, pressing grease into the outer bearing.

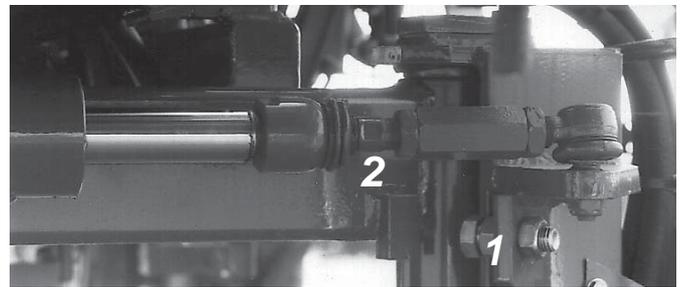


### Adjustment of toe-in

1. Set front wheels straight ahead.
2. Measure half wheel height **A** front and back and mark with a piece of chalk.
3. The distance between the wheels front should be 5 mm less than back.
4. Adjust length of connecting rods at steering ram if necessary to obtain correct toe-in.



### Adjustment of front wheel steering angle stop



1. Turn front wheels to RHS until steering ram is in end position.
2. Distance between bolt **1** and stopper **2** LHS must be 1-2 mm - use feeler gauge - adjust if necessary.
3. Repeat procedure for LHS.

### Charge of battery

To obtain a long life of the battery and ensure that the sprayer always is ready for use, the battery should be re-charged regularly. Charge the battery every 2nd month during winter storage, and every 3rd month during season.

**WARNING!** Before, during and after the charge process, highly flammable and explosive gases can be generated. If these gases are lighted, the battery can explode and cause severe personal injury by the explosion and battery acid! Follow instructions closely.

#### Safety precautions:

1. Service and maintenance jobs at batteries must always be carried out at good, ventilated areas to prevent concentration of explosive gases.
2. Always wear gloves and eye/face protection shield when working with batteries.
3. Do not smoke or use open fire nearby batteries. Avoid sparks by short-cuts or when connecting/disconnecting battery terminals.
4. In case of getting battery acid in contact with eyes and skin, rinse immediately with lots of clean water and seek doctor, if necessary.
5. Do not charge defective batteries.
6. Read instruction for battery charger before connecting it to the battery.

## Connecting of charger

1. Stop engine, and switch off main battery switch.
2. Clean battery and loosen cell caps to allow gases to evaporate (Not maintenance-free batteries).
3. Check electrolyte level. Fill with demineralized water till level reaches 5 mm above cells, if levels are low.
4. Connect battery charger terminal clips to battery terminals - **Note! Battery charger must be switched off and disconnected from power socket.** Make sure that + terminal is for +, and - terminal is for -. Positive is often red and negative is often black.
5. Check that battery charger is set for 12 V DC. Connect to power socket and switch on charger.
6. Do not overcharge maintenance-free batteries. Charge with few Amps and stop when battery is fully charged.

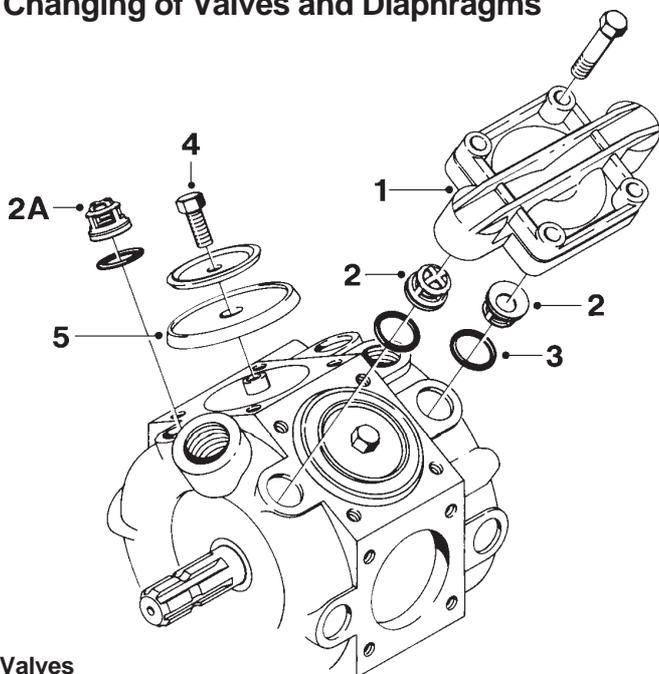
## Disconnecting of charger

1. Switch off charger at power source and disconnect plug.
2. Ventilate around the battery to make possible gases disappear, and fit cell caps.
3. Disconnect charger terminal clips from battery terminals.

## Air conditioning circuit

Get air conditioning circuit freon level and general condition inspected by a skilled technician once a year.

## Changing of Valves and Diaphragms



### Valves

Remove valve compartment **1**. Before changing the valves **2** note the orientation of the valves so that they are replaced correctly.

**Important:** Note valve with white flap **2A** is placed in the valve opening shown.

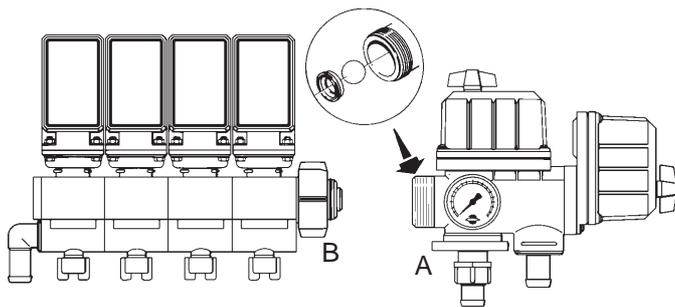
It is recommended to use new O-rings **3** when changing or checking the valves.

## Diaphragms

Remove valve compartment **1**. Remove bolt **4**. The diaphragm **5** may then be changed. If fluids have reached the crankcase, re-grease the pump thoroughly. Check also the drain hole at bottom of pump is not blocked.

## Changing of ball seat in operating unit

If problems with on/off valve occur (dripping nozzles when on/off valve is closed), the ball and ball seat should be checked for damages.



Remove the 2 bolts holding the on/off-pressure valve unit to the bracket **A**, unscrew the union nut **B** and pull the on/off-pressure valve away from the distribution valves.

Check the ball for sharp edges and scratches, and check the ball seat for cracks and wear - replace with new parts if necessary.

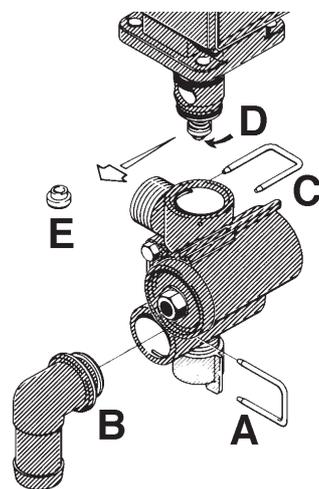
## Check of valve cone in distribution valves

Check the distribution valves for proper sealing once in a while. Run the sprayer with clean water, and open on/off and all distribution valves.

Remove the clip **A** and pull out the hose **B** for the constant pressure device. When the housing is drained, there must not flow any more liquid through the constant pressure device. If there is any leak, the valve cone must be changed.

Remove the clip **C** and pull the EC-motor off the valve housing.

Then unscrew the screw **D** and replace the valve cone **E**. Reassemble in opposite sequence.

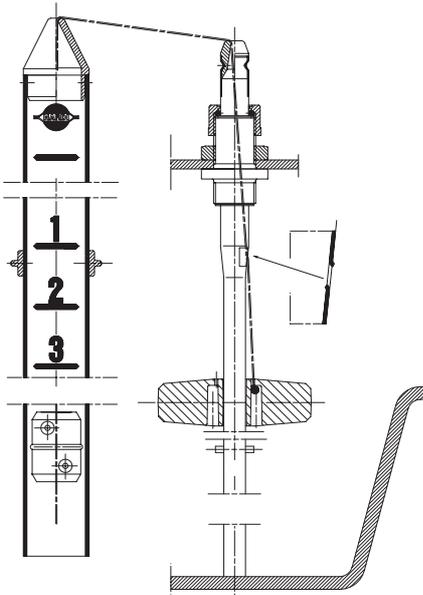


**Level indicator**

The level indicator reading should be checked regularly.

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

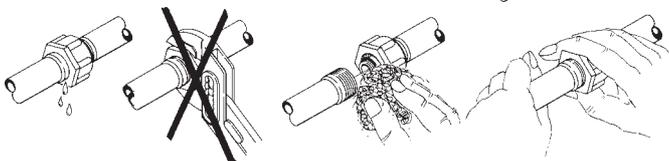
If any deviation is found, pull out the plug **B** loosen screws **C**, and adjust the length of the cord.



**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



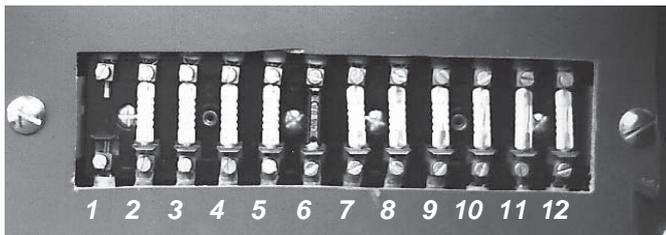
Therefore, in case of leaks: **DO NOT** overtighten, disassemble, check condition and position of O-ring or gasket, clean lubricate and reassemble.

For **radial** connections only hand tighten them. The O-ring must be greased **ALL THE WAY ROUND** before refitting.

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

**Electric fuses**

Fuse boxes (in-cab at lower dash board)



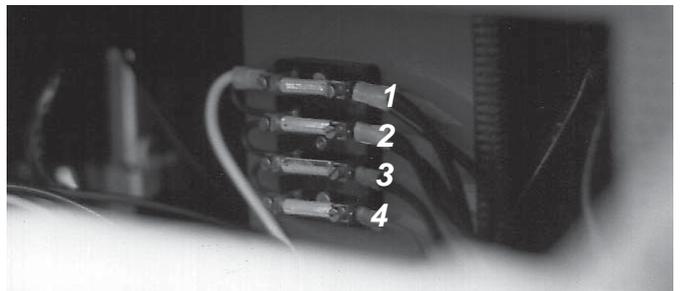
1. Boom hydraulics (D.A.H.) 30 Amp
2. Dash board 8 Amp
3. Fuel gauge 8 Amp
4. Hydr. solenoid valves, diaphragm pump 8 Amp

5. Hydr. oil cooler 8 Amp
6. Directional indicators 8 amp
7. Engine stop device 8 Amp
8. Engine pre-heating 8 Amp
9. Horn 16 Amp
10. Position lamps 8 Amp
11. Number plate lamp 8 Amp
12. Front main lamps 8 Amp

**Fuses fitted at battery terminal:**

1. Cab heater, 30 Amp
2. 12 V socket in cab, 30 Amp

Fuse box, cab roof (access through cab roof by removing LHS Carbon filter)



1. Cab fan, AC condenser fan, rotating warning beacon
2. Front working lamps, windscreen wiper
3. Windscreen washer
4. Radio

All 16 Amp.

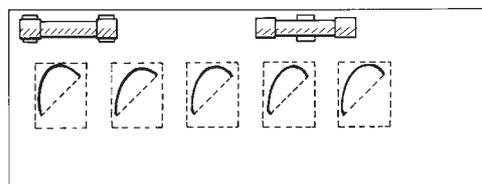
**Fuse, Junction box mid-chassis RHS (for D.A.H) (access by removing cover)**



To remove, press, twist ccw. 25 Amp.

**Fuse, D.A.H. Junction box (fitted at boom center section)**

10 Amp Slow-blow fuse for D.A.H. solenoid valves is located in top LHS corner of junction box.



## Adjustment of front main lamps

Adjust main lamps dipped beam to fall 1 % (1 cm pr. meter)

## Winter storage

When the spraying season is over you should devote some extra time to the sprayer before it is put away for the winter.

### Oil change

Change oil on the machine as described in section „maintenance“

### Engine

The engine requires special attention for winter storage regarding cleaning, oil change and preservation. See Deutz manual for further information regarding this subject.

### Tyres

Jack up the machine, so all wheels are lifted off the ground, and support it properly under the axles. This to prevent the tyres from being damaged during long time of storage.

### Battery

Check the battery according to instructions in section „Maintenance“, and re-charge it every 2nd month during the storage periode.

### Hoses

Check that none of the hoses are caught or have sharp bends.

A leaky hose can give an annoying delay in the middle of the spraying job. Therefore check all the hoses and change if there is any doubt about the durability.

### Paint

Some chemicals are very rough on paints. It is therefore well advised to remove rust, if any, and then touch up the paint.

### Tank

Check that no chemical residues are left from the last spraying. Chemical residues must not be left in the tank for a long time. It will reduce the life of the tank. See Spray Technique book- Cleaning Field Sprayers

### Transmission shaft

Check that the transmission shaft shields fullfill their security purpose, e.g. that shields and protective tubes are intact.

### Anti-freeze precaution

If the sprayer is not stored in a frost-proof place you should take the following precautions: Put at least 25 litres of 33% anti-freeze mixture (33% ethylene glycol + 67% water) in the tank and let the pump run a few minutes so that the entire system including nozzle tubes are filled. Remove the glycerine filled pressure gauges and store them frost free in vertical position. The anti-freeze solution also hinders the O-rings and gaskets from drying out.

## Operational problems

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

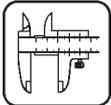
- Minor leaks on the suction side of the pump will reduce the pump capacity or stop the suction completely.
- A clogged suction filter will hinder or prevent suction so that the pump does not operate satisfactorily.
- Clogged up pressure filters will result in increasing pressure at the pressure gauge but lower pressure at the nozzles.
- Foreign bodies stuck in the pump valves with the result that these cannot close tightly against the valve seat. This reduces pump efficiency.
- Poorly reassembled pumps, especially diaphragm covers will allow the pump to suck air resulting in reduced or no capacity.
- 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 functions properly. Use clean water to check.
6. Hydraulic components are maintained clean.

<b>Fault</b>	<b>Probable cause</b>	<b>Control / remedy</b>	
<b>Liquid system</b>			
No spray from boom when turned on.	Air leak on suction.	Check if red suction lid / O-ring are 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. Agitation nozzles not fitted. Too little distance between yellow suction pipe and tank bottom.	
Lack of pressure.	Pump valves blocked or worn.	Check for obstructions and wear.	
	Defect pressure gauge.	Check for dirt at inlet of gauge.	
	Missing restrictors in S.C.-filter.	Put in suitable restrictor.	
	Pressure dropping.	Filters clogging. Clean all filters. Fill with cleaner water. If using powders, make sure agitation is on.	
Pressure dropping.	Nozzles worn.	Check flow rate and replace nozzles if it exceeds 10%.	
	Tank is airtight.	Check vent is clear.	
	Sucking air towards end of tank load.	Excessive agitation, turn off. Returns inside tank need relocation.	
	Pressure increasing.	Nozzle filters beginning to clog. Clean all filters.	
Pressure increasing.	Agitation nozzles clogged.	Check by turning agitation off / on.	
Formation of foam.	Air is being sucked into system.	Check tightness / gaskets / O-rings of all fittings on suction side.	
	Excessive liquid agitation.	Turn agitation off. Reduce pump r/min. Ensure return hoses inside tank are present. Use foam damping additive.	
		Liquid leaks from bottom of pump.	Damaged diaphragm. Replace. See „Changing of valves and diaphragms“.

<b>Fault</b>	<b>Probable cause</b>	<b>Control / remedy</b>
<b>Hydraulic system</b>		
No boom movements when activated	Blown fuse	Check fuse, replace
	Bad connections	Check all plugs and sockets, clean, replace corroded parts
	Defective relays	Check PCB in junction box, relays etc.
	No oil in tank	Fill to correct oil level
	Clogged restrictors	Dismantle and clean restrictors - change oil + filter
Boom lift raises to top position without being activated	Pressure and return line from pump to circulation block has been fitted opposite	Fit pressure and return hoses opposite
<b>FWA</b>		
FWA does not engage when switched on	Clogged restrictor in LS pilot line	Remove restrictor, clean, and reassemble.
	Electric fault in activating circuit	Check power supply at solenoid valve.
Noise from Load-Sensing pump when switched on	Pressure relief valve setting is too low, and is therefore „singing“	Adjust pressure relief valve to 190-200 bar
	Oil filter clogged	Change oil filter
	Insufficient oil supply air in hydraulic system	Check feed line
Working pressure too low	Low oil level	Check oil level, fill to correct level.
	Pressure relief valve setting is too low	Adjust relief valve setting
	Oil filter clogged	Change oil filter
Continuously noise from pump	Pump propeller shaft worn	Change cardan spiders in propeller shaft
	Pump damaged/worn *) Oil foaming	Get pump checked by skilled specialist **) Drain system, fill with correct quality
Oil too hot	FWA engaged too long time	Switch off FWA
	Oil cooler fan doesn't work	Check electric circuit/fuse and thermostat switch



## Technical specifications

### Measures (by standard wheel size):

Total length	6075 mm
Total width	3008 mm
Total height	4000 mm
Axle distance	2995 mm
Ground clearance	750 mm
Turning diameter, min.	1040 mm

### Weight

Total weight incl. driver, fuel and water	7375 kg
Empty weight	5030 kg

Front axle load, empty	2040 kg
Front axle load, total	2744 kg
Front axle load, max.	2800 kg

Rear axle load, empty	2990 kg
Rear axle load, total	4631 kg
Rear axle load, max.	4880 kg

### Driving speed

4-speed models (9.5 x 48" wheels):

Gear	Speed, km/h / Mph			
	Engine rpm			
	1000	1500	2000	2500
1.	3.6/2.3	5.5/3.4	7.3/4.5	9.1/5.6
2.	5.7/3.5	8.5/5.3	11.3/7.0	14.2/8.8
3.	8.7/5.4	13.0/8.0	17.3/10.7	21.6/13.4
4.	12.1/7.5	18.1/11.3	24.2/15.0	30.2/18.6
R.	3.5/2.2	5.3/3.3	7.1/4.4	8.8/5.5

8-speed models (L=Low, H=High)

Gear	Speed, km/h / Mph			
	Engine rpm			
	1000	1500	2000	2500
1.L	2.1/1.3	3.2/2.0	4.3/2.7	5.3/3.3
2.L	3.3/2.1	5.0/3.1	6.7/4.1	8.3/5.2
3.L	5.1/3.1	7.6/4.7	10.1/6.3	12.7/7.9
4.L	7.1/4.4	10.6/6.6	14.2/8.8	17.7/11.0
R.L	2.1/1.3	3.1/1.9	4.1/2.6	5.2/3.2
1.H	3.6/2.2	5.4/3.4	7.2/4.5	9.0/5.6
2.H	5.6/3.5	8.4/5.2	11.2/7.0	14.0/8.7
3.H	8.6/5.3	12.6/7.8	17.1/10.6	21.4/13.3
4.H	12.0/7.4	18.0/11.1	23.9/14.9	29.9/18.6
R.H	3.5/2.2	5.2/3.3	7.0/4.3	8.7/5.4

NOTE! All speeds are approximate values.

NOTE! In several countries, the max. speed is 25 km/h, and therefore the engine fuel injection pump has been adjusted and sealed by following max. rpm.:

Tyre size	4-speed models	8-speed models
	rpm	rpm
9.5 x 44	2220	2240
9.5 x 48	2080	2100
11.2 x 48	2000	2020
12.4 x 46	2010	2030
16.9 x 38	2100	2125

### Engine

Make: Deutz turbocharged, air-cooled diesel

HP output, HP(kW)

BF4L-1011:	72(53) at 2500 rpm
BF4L-913:	106(78) at 2500 rpm

### Fuel tank capacity

72 HP models:	90 l
106 HP models:	140 l

### Electrical system

Battery, voltage/capacity	12V/80Ah
Alternator:	14V AC/60 A

### Boom height :

Min.:	40 cm
Max.:	220 cm

### Front Wheel Assist

Min. oil pressure.	20 bar
Max. oil pressure:	200 bar
Working pressure:	adjustable, 20-175 bar
FWA power consumption, kW:	7 kW by 8 km/h
Max. torque on front wheels (by 175 bar and 9.5 x 32" wheels)	560 Nm

### Brakes

Type:	Disc brakes in oil bath
No. of discs:	5 pcs. either side
Min. thickness of discs:	4.5 mm

### Spray pump

Model:	462
Type:	Diaphragm pump
No. chambers:	6
Max. capacity, l/min.:	240
Max. pressure, bar	15

### MANIFOLD SYSTEM

Operating temperature range:	2° to 40° C.
Operating pressure for safety valve:	12 bar
Max. pressure on the pressure manifold:	20 bar
Max. pressure on the suction manifold:	7 bar

## Filters and nozzles

### Scrapping

When the machine has completed its working life, it must be scrapped according to current local legislation. At the time of scrapping - consult local authorities.

Spraying components should be treated as chemical waste.

## Pictorial symbols



Warning



Operational problems



Description



Cleaning



Operating



Service/adjustment



Function



Lubrication



Technical specifications



EC Declaration of Conformity

## Electric and hydraulic diagram

