

HARDI CIRCULATION SYSTEM

Description

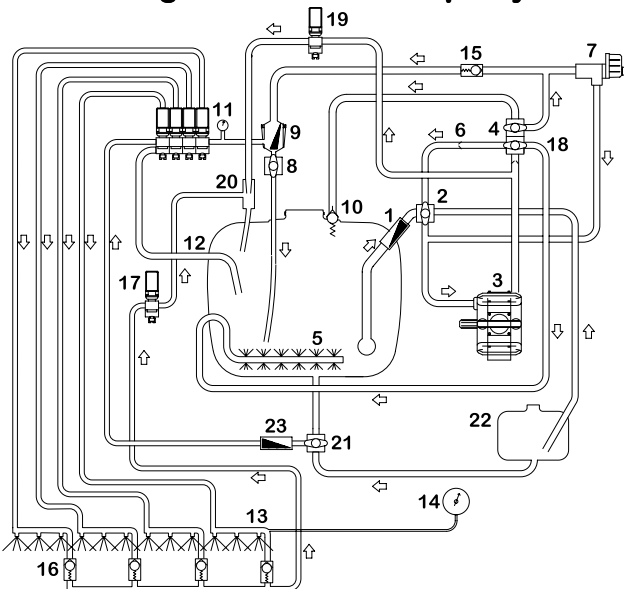
HARDI CIRCULATION SYSTEM: By the incorporation of an ejector and connecting the boom lines with tank and MANIFOLD, it enables the formation of a flow from tank (or rinse tank) through the boom lines when the sprayer is not spraying. The HARDI CIRCULATION SYSTEM provides the following features compared to a conventional sprayer: Instant spraying when starting since boom lines are primed prior to start, reduced risk of sedimentation in boom lines since there is a continuous flow, which creates a possibility to flush and clean the boom without spraying. This do not apply to the nozzles, as there are no flow in them when spraying is off.

Function

The sprayer can be equipped with HARDI CIRCULATION SYSTEM in combination with either a conventional liquid system or a High Capacity Fluid System (HCFS). The operation of the liquid system is identical for both systems.

At a sprayer with HARDI CIRCULATION SYSTEM, an extra valve connected with a circulation suction filter is added to the MANIFOLD system. The valve and filter are fitted to the right side of the MANIFOLD valves. This valve has three positions: circulation from main tank, circulation from rinse tank or circulation off (see signs on valve). When spraying is on, the sprayer functions are like a "normal" sprayer, but when distribution valves are turned off, valve no. 17 and 19 open (see function diagram) and allow a flow to the ejector (20) and from the distribution valves (11). Fluid through valve 19 comes from pump and is led into the ejector. This causes a vacuum in hoses through valve 17 allowing the fluid to be sucked from boom pipes through valve 17 and the ejector back into main tank.

Function diagram - conventional liquid system

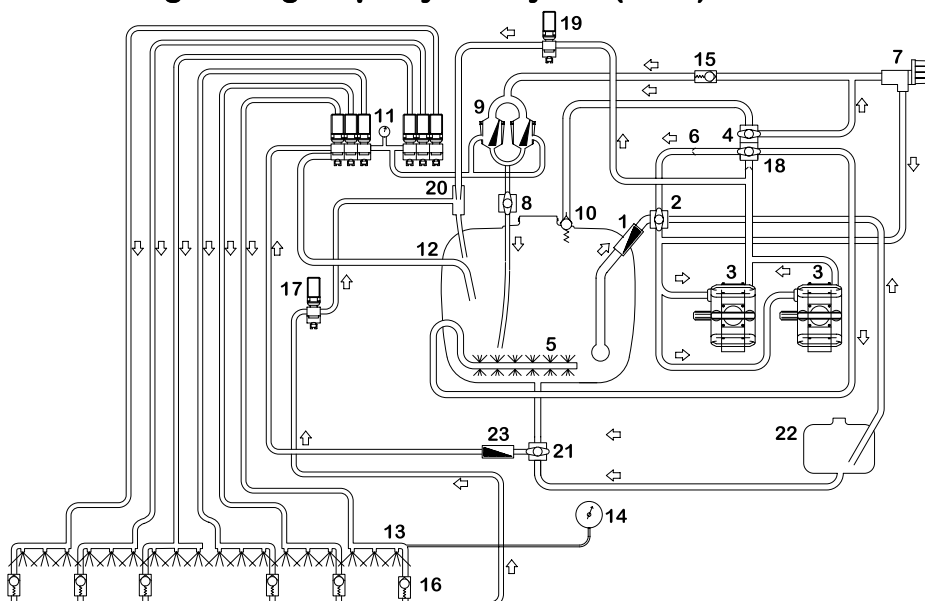


Detailed description on use of MANIFOLD system can be found in the instruction book for the specific sprayer.

NOTE! The new EVC section valve with an extra return flow channel is a pre-requisite for HARDI CIRCULATION SYSTEM.

Diagrams for standard EVC system and for High Capacity Fluid System (HCFS) with HARDI CIRCULATION SYSTEM are shown to the left and below.

Function diagram - High Capacity Fluid System (HCFS)



Numbers and their meaning

1. Suction filter
2. Suction manifold (black)
3. Pump / Double pump (HCFS)
4. Pressure manifold (green)
5. Agitation
6. Without agitation (pressure equalisation)
7. HARDI MATIC
8. Return line (Self-cleaning filter)
9. Self-Cleaning Filter
10. Safety valve
11. Distribution valves
12. Return from Pressure Equalisation
13. Sprayer boom
14. Pressure gauge
15. Non-return valve
16. Non-return valves
17. Circulation valve
18. Agitation valve
19. Ejector valve
20. Ejector
21. Circulation suction valve
22. Rinsing tank
23. Circulation filter

HARDI CIRCULATION SYSTEM

Operating

A sprayer with HARDI CIRCULATION SYSTEM is operated like other HARDI sprayers.

HARDI CIRCULATION SYSTEM has an extra valve in the Manifold system. This valve is used to choose between circulation from main tank or from rinsing tank. In a spraying situation the valve is set for suction from the main tank. The valve is set for suction from Rinsing tank in a cleaning situation. For further cleaning details, see paragraph "Use of rinsing tank and rinsing nozzles".

Cleaning the sprayer

1. Dilute remaining spray liquid in the tank with water corresponding to approximately $\frac{1}{4}$ of volume in Rinsing tank and spray the liquid out in the field that you have just sprayed - See paragraph "Use of rinsing tank and rinsing nozzles" point A, except paragraph 5, 7 and 11.

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

2. Select and use the appropriate protective clothing. Select detergent suitable for cleaning and suitable deactivating agents if necessary.
3. Rinse and clean sprayer and tractor externally. Use detergent if necessary.
4. Remove tank suction filters and clean. Be careful not to damage the mesh. Replace suction filter top. Replace filters when the sprayer is completely clean.
5. With the pump running, rinse the inside of the tank. Remember the tank roof. Rinse and operate all components and any equipment that has been in contact with the chemical.
Before opening the distribution valves and spraying the liquid out, decide whether this should be done in the field again or on an appropriate grass covered area near the farm.
6. After spraying the liquid out, stop the pump and fill at least $\frac{1}{5}$ of the tank with clean water. Note that some chemicals require the tank to be completely filled. Add appropriate detergent and/or deactivating agent, e.g. washing soda or Triple ammonia.








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

7. Start the pump and operate all controls enabling the liquid to come in contact with all the components. Leave the distribution valves until last. Some detergents and deactivating agents work best if left in the tank for a short period. Check the label. The Self-Cleaning Filter can be flushed by removing the by-pass hose from the bottom of the filter. Stop the pump and remove the hose. Start the pump for a few seconds to flush filter. Be careful not to lose the restrictor nozzle.
8. Drain the tank and let the pump run dry. Rinse inside of the tank with a large amount of clean water (~200 l), again letting the pump run dry.
9. Stop the pump. If the pesticides used have a tendency to block nozzles and filters, remove and clean them immediately. Also check for sediment on the pressure side of the safety valve for the Self-Cleaning Filter.

Use of rinsing tank and rinsing nozzles




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

- A.** In-field diluting of remaining spray liquid residue in the spraying circuit for spraying the liquid in the field before cleaning the sprayer.

1. Empty the sprayer as much as possible. Turn the green pressure valve towards "No Agitation" and spray till air comes out of all nozzles. 
2. Remove the tank filter basket. 
3. Set circulation system for suction from main tank. 
4. Engage and set the pump at approximately 300 r.p.m.
5. Turn black suction valve towards "Rinsing tank". 
6. Turn green pressure valves towards "Rinsing nozzle" (if fitted). Or else choose return to main tank. 
7. When rinsing water corresponding to approximately $\frac{1}{4}$ of volume in Rinsing tank is used, turn black suction valve towards "Suction from main tank". 
8. Operate all valves, so that all hoses and components are rinsed.
9. Let the circulation system run for about 2 minutes.
10. Turn green pressure valve back to "Operating unit" and spray liquid in the field you have just sprayed. Use low pressure (1.5 bar) and high speed. 
11. Repeat point 5-10 until the rinsing tank is empty.

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

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

1. Engage pump and set circulation system for suction from main tank. 
2. Open valve to "Operating unit" at pressure side of the Manifold system. 
3. Close Self-cleaning filter (yellow valve).
4. Turn blue suction valve for circulation system towards "Rinsing tank". 
5. When at least $\frac{1}{8}$ volume of clean water tank has been emptied out, then close circulation system at the blue suction valve.
6. Start spraying. Spray water from rinsing tank in the field until all nozzle tubes/nozzles have been flushed with clean water.
7. After 2 minutes or when Rinsing tank is empty, then disengage pump.
8. Open Self-cleaning filter again.



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