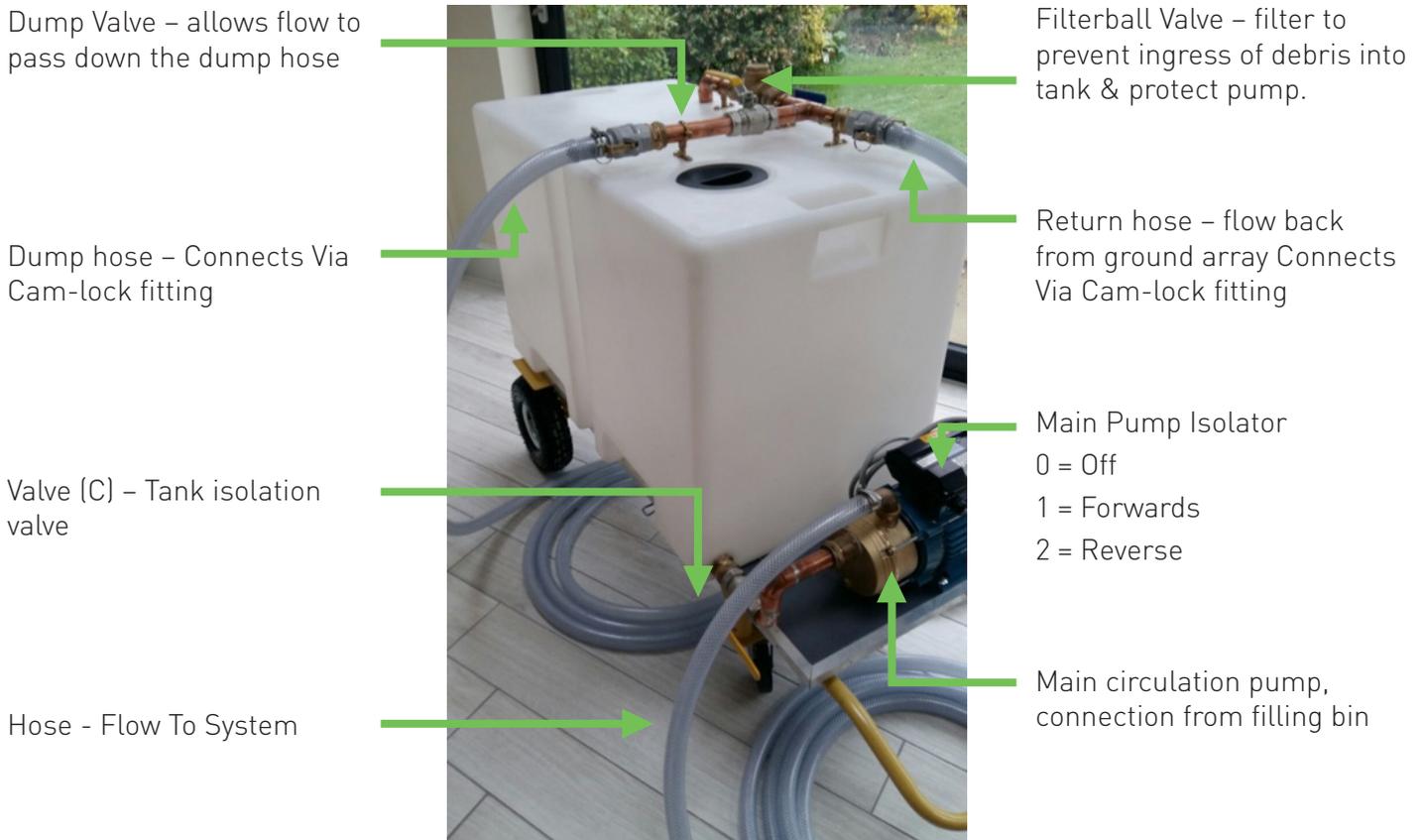




Spire Renewables Commercial Filling Bin Installation & User Manual

Congratulations on the purchase of your new Heat Pump Filling Bin.

Main components & connections for the Filling Bin are outlined in the photograph below:



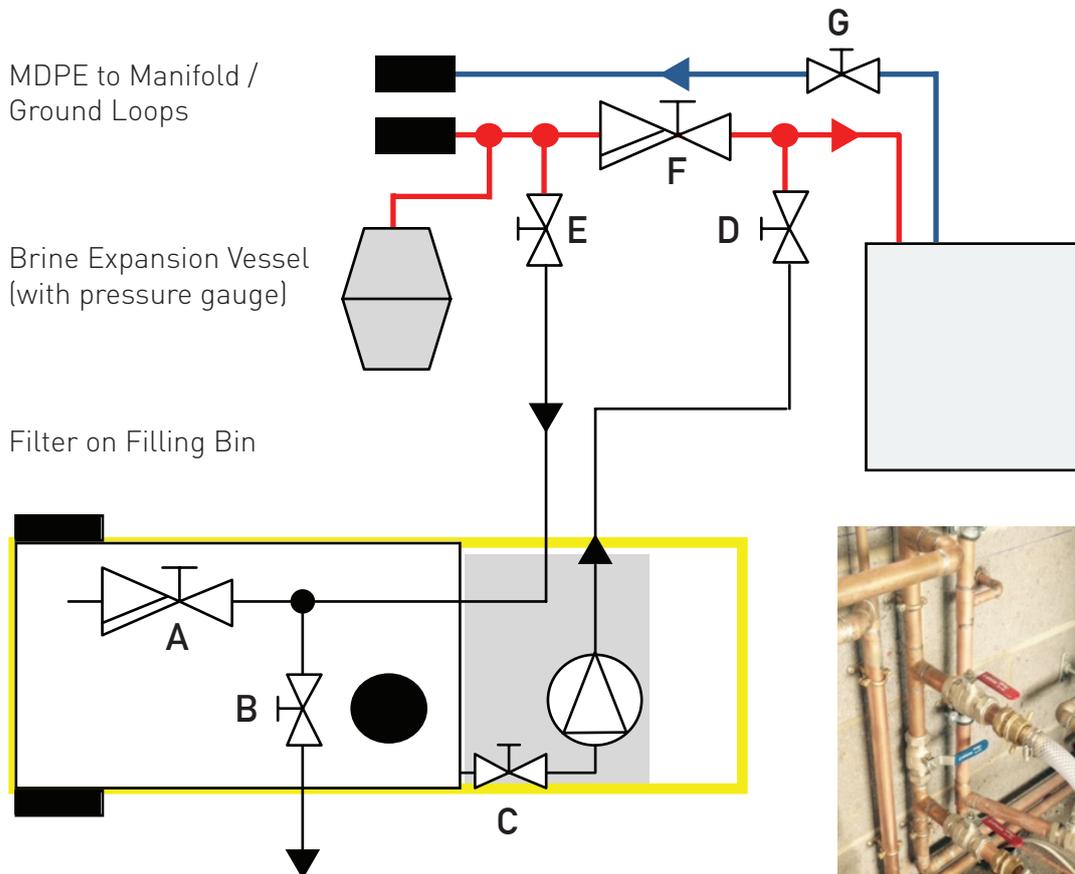
Important Warnings:

The filling bin pump is capable of generating up to 5 Bar (500kpa) static head if pumping against a dead end. Be very certain that the pump has an open loop to circulate against at all times when the pump is running. Failure to do this is at the operators own risk.

Will you please note the pump is designed to handle fuels and other high viscosity mixes but it is not designed to handle sediments. Damage to the impellers inside the pump will provide evidence of this and will invalidate the warranty.

Connecting the Filling bin into the ground array

In order to connect the filling bin to the ground array side of the heat pump you will need to construct a fill set. This is normally installed on the return pipework back to the heat pump from the ground array. It is assembled as follows:



Valve Key:

- A. Mechanical Strainer on top of Filling Bin
- B. Dump Valve
- C. Isolation Valve between Tank and Pump
- D. Flow From Filling Bin Connection Valve
- E. Return To Filling Bin Connection Valve
- F. Mechanical Strainer with isolator (e.g Marflow Filterball) or simple isolator if strainer elsewhere
- G. Heat Pump Flow Valve (Always Open)

Occasionally these fill sets are supplied as part of the kit that comes with the heat pump but more often than not they have to be constructed onsite. Fill sets are also often fitted supplied as part of the manifold however building one in the plant room can make filling substantially easier due to proximity to mains water & power supplies, working on made up ground etc.

Ensure the ground array is well vented with automatic air vents installed at high points in the plant room & manifold. If any part of the ground array forms a substantial high point then this too should be vented, to prevent a build-up of air reducing or blocking flow over time. Either the plant room or manifold pit should represent the high point of the whole array.

The Filling Process:

01. Connect the Filling Bin into the ground array as per the schematic on page 2. Ideally pressure test the ground array before filling starts (N.B It is easier to do with air, however, please be aware of the risks involved when working using compressed air in confined spaces). If water pressure testing is used then this process will still have to be followed as the ground array will have been cold filled so still contain air pockets.
02. Find a large volume cold water mains supply, then use it to fill the tank of the filling bin. Before doing this ensure the filling bin is in its final position ready for filling and connected as per above, once full with fluid it can be very hard to move. Ensure valve (C) is shut during this process if the hoses are not connected to valves (D) & (E).
03. Connect the dump hose to valve (B) and run it either to some form of soakaway or to a discharge container – please be aware of any hazards of discharging ethylene glycol into surface drainage or water bodies in large quantities.
04. Open all Automatic Air Vents on the system.
05. Shut Valves (A) and (F). All other valves should be opened. Ensure one loop (start at one side of the manifold and work your way across logically) is fully open to allow circulation across the system. Valve (F) remains shut throughout the entire filling process. Flow will initially pass via Valve (B) to the dump pipe once the pump is started as a large quantity of plastic swarf will be returned initially as the system fills (and this would otherwise block the filter) – **please ensure the dump hose is secure.**
06. Prime the pump by cracking the nut on the hose connection on top of the pump until water passes around the seal.
07. Start the pump to setting 1 – the water level will drop rapidly (the pump will drain the tank in under 4 minutes) so use the hose to refill the tank, stopping the pump if necessary. Ensure pump is correctly primed!! **If you stop the pump at any stage through the filling process, then valves (D) and (E) should be shut either simultaneously or immediately after to prevent ingress of air into the system.**
08. Once water is returned from the initial loop through the dump valve and the quality of the water becomes cleaner, then open valve (A) and shut Valve (B). The vast majority of debris comes back in this initial slug, thereafter the filter will pick up any debris before it enters the tank.
09. Keep circulating the loop until no air bubbles are visible in the transparent return hose. If any inhibitor (if working with Sentinel R500 Glycol for example) is required then add this at this point to the required dosage and leave to circulate thoroughly.
10. Once air is removed and any inhibitor is circulated, walk to the manifold and open the second loop, shutting the first loop as quickly as possible thereafter. Be sure to have an open loop at all times if the pump is left running.
11. Repeat until all loops are full of water, flushed of air and dosed properly with inhibitor. **NOTE** – As you get to the later loops gradually start to lower the water level in the tank (don't add as much mains cold). This will become clear why later on. You want about 25% of the tank full at most once you have finished filling the last loop with water & inhibitor.
12. Once Complete, stop the pump and shut valves (D) and (E) then thoroughly clean the filter on the filling bin (A) – use the guide found on page 5 for this. Replace the filter then re-open Valve (A). You may need to clean the filter several times during this process – the filter will need cleaning when the static pressure on the system starts to increase – use the pressure gauge on the expansion vessel to check if this is the case.
13. Again go back to the manifold, shut all loops bar the one you first started working on.

14. You should have sufficient glycol to achieve a 25% mix of the entire system. Above 33% is too much, and any less than 25% risks the system freezing during cold, dry winters.
15. Open Valves (D) & (E) then re-start the pump. Add the first drum of glycol, then place the empty tub securely under the end of the dump hose. Open Valve (B) then Shut Valve (A). Fill the empty drum with neat water and record how long it takes to fill. Once the drum is full then Open Valve A and Shut Valve B (ensuring it is in that order).
16. Multiply the time it took to fill the tank by 4 then you have an idea of how regularly you have to add the glycol to the tank in order to get an approximate 25% mix. Keep adding the glycol and dumping neat water from the system until you see the water come back from the system with a blue mix. Try and avoid dumping the mixed solution if possible, its far more economical to dump water.
17. Circulate for another 10 minutes until you have the solution well mixed and no bubbles are visible in the pipework. Check the concentration of the solution in the tank with a correctly calibrated refractometer, ensuring it is approximately 25%. Keep mixing & add more glycol if needed.
18. Switch to the second loop at the manifold, continue adding glycol at the same frequency as previously however only use the dump valve to reduce the volume of fluid in the tank once the clear water is returned from the system. Add an equal proportion of the glycol that is yet to be inserted into the system across all of the remaining loops.
19. Move to the third loop once the second loop shows no sign of air. Again keep dumping (where possible) neat water rather than mixed solution.
20. Again, as per previously try to lower the glycol/water level in the tank as much possible towards the later loops to minimise wastage. Be sure whilst doing this the pump does not run dry and suck in air otherwise the loop will again have to be re-filled. Try to keep 50-75 litres as a minimum in the tank.
21. Once all loops are full with glycol mix, open all of the 40mm loops and circulate, using the flow setters to balance flow down each loop. Ensure there is no air in the system. Check the mix several times a few minutes apart to check the concentration using a calibrated refractometer.
22. Finally, and with great care – shut valve (E) and pressurise the system using the circulation pump. Use the pressure gauge on the ground side expansion vessel to control the pressure in the system. Once the system pressure reaches 1.5 bar (normally within 3-5 seconds of shutting valve E) then shut Valve D and stop the pump simultaneously. IT IS VERY HELPFUL TO HAVE A SECOND PAIR OF HANDS DURING THIS PROCESS IN PARTICULAR
23. Disconnect the filling bin from Valves (D) & (E). Drain down the return hose and dump hose back into the tank.
24. Take some the empty drums and using the pump to fill them with the remaining mixed glycol solution left on site. Mark them clearly as mixed, then leave them onsite so an engineer can top up the glycol if there has been a leak.
25. Sluice out the inside of the tank and check the filter. Disconnect the hoses and pack away. Check to see if the system pressure is maintained and top up with mains cold if not (small volumes).

Filling Bin Warranty:

All major components of the filling bin (pump, trolley and tank) come with a 1 year return & replace warranty, valid unless the products have been mis-used or mis- handled.

Will you please send all returns to 24 Tyn y Parc Rd, Rhiwbina, CF14 6BN where they will be inspected and a replacement issued. Spire Renewables takes no responsibility of damage to the filter inside the filter ball valve or any of the pipework on/around the tank.

Replacement filters are available from Marflow Ltd.

Cleaning the Filter Ball Valve

01. Turn off using the red/ yellow isolator above the heat pump controller.

First switch off your Heat Pump

02. On the Filter Ball valve, turn handle to "OFF" position.



03. Adjust large pliers to maximum size and unscrew the filter inspection plug on top of the valve.



04. Remove filter inspection plug.



05. Place small pliers into the two bronze holes in the circular clip and pinch together to remove.



06. Remove and clean filter cage.



07. Reinsert filter and circular clip by using the same technique described in step 5.



08. Replace plug and tighten with large pliers before finally moving the handle back to the "ON" position.

