
Use safety glasses when operating this equipment.

Wear gloves when working with the steam and condensate valves.

**Never leave this equipment operating unattended!**

**Startup:**
1. Open the building water valve (green pipe – blue handle globe valve).
2. Using glove, open the main steam valve located adjacent to the water valve.

**Draining the condensate:**
3. Connect the hose to the condensate drain pipe; place the other end of the hose in the floor drain.
4. Using gloves open the green condensate ball valve located next to the steam trap to drain the condensate to the floor drain. Alternatively you can drain the condensate into a bucket and dump it down the drain but it may take a while.
5. Once the condensate has been drained from the system and steam is flowing out of the hose / drain pipe, close the condensate drain valve and disconnect the hose.
6. Verify that the small red globe valve in line with the steam trap is open; this will allow the condensate from the steam trap to drain to the collection area.

**Setting the mixing tank valves:**
7. The mixing tank drain line includes three ball valves. One is mounted vertically directly under the mixing tank, this valve will normally be open, the other two valves, mounted horizontally – one yellow and one green - are located on either side of the coolant water system output line. The coolant water system output line takes the water flowing through the cooling circuit to drain or, by adjusting the drain valves the cooling water may be feed into the mixing vessel, filling it from the bottom of the vessel.

**Fill the mixing vessel:**
8. In the mixing tank drain line, close the horizontal yellow ball valve and open the green horizontal mixing tank ball valve.
9. Log onto the computer: user = administrator, password = password.
10. Double click on the Double Pipe icon located on the computer desktop.
11. Close the Event Log Viewer window and select Start Opto Control.
12. Open the coolant water valve 100%. The manual valve controls are located in the lower right hand section of the window.
13. Monitor the level of the mixing tank as it fills. Do not fill the tank above the fill line.
14. As the mixing tank approaches the fill line close the coolant valve using Opto control. The coolant flow may also be stopped by closing the main water line valve (blue handle globe valve).
15. Once the mixing tank is filled close the green horizontal ball valve in the drain line.

**Heating / pumping the process fluid:**
16. Open the green ball valve on the yellow pump output recycle pipe – not the drain line.
17. Verify that the green ball valve located just above the pump output flow meter is open. This valve should remain open at all times.
18. Open the process fluid valve 100% using Opto control.
19. Switch the pump on from the pump control breaker located on the wall next to the double pipe.
20. You should see flow indicated on the analog flow meter, this flow reading should also be displayed on the Opto display. The process fluid will flow from the pump, through the yellow pipe / heat exchanger and empty back into the mixing vessel.

**Regulating the flow of process fluid:**
21. Process fluid flow is controlled by regulating the amount of process fluid that is recycled back to the mixing tank. By closing the green ball valve in the yellow pump output recycle piping, 100% of the pump output will flow through the process fluid valve and heat exchanger. *Before closing the recycle ball valve verify that the process fluid valve is open 100% to avoid burning out the pump motor.*

**Running the cooling water:**
22. Verify that the Green horizontal ball valve in the mixing drain line is closed.
23. Open the yellow horizontal ball valve in the mixing drain line.
24. Verify that the coolant water main valve (green pipe – blue handle globe valve) is open.
25. Open the coolant valve from Opto control.
26. Verify that the coolant flow is reading on the analog meter and on the Opto display.
27. Coolant flow may be regulated by adjusting the coolant flow valve.

**Shutdown:**
28. Stop the pump.
29. Close the main water supply valve, (green pipe – blue handle globe valve).
30. Open all the ball valves in the drain line to drain the tank.
31. Using gloves close the main steam valve.
32. Verify that the condensate drain ball valve is closed.
33. Exit the Opto control software.
34. Save your data to a flash drive after each run.
35. Data is stored at C:\Data PID control Double Pipe.