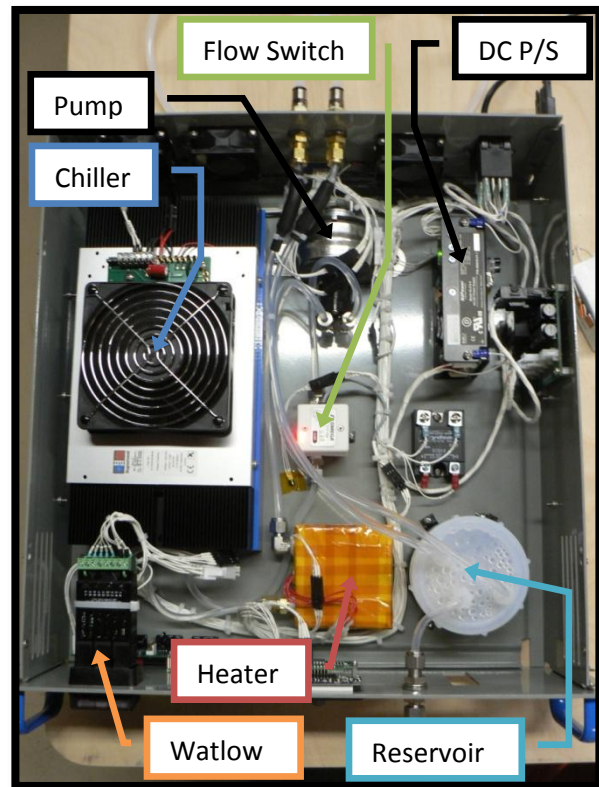


Liquid Thermostat

Overview

The primary components of the liquid thermostat are the chiller, heater, pump, DC power supply, flow switch, reservoir and the heater controller (Watlow). The combination of the Watlow and heater are what control the water temperature. The flow switch is used to turn off the chiller in the event that the water froze in the flow path. There are 5 temperature sensors in the chassis. Two are attached to the chiller to measure the cold and hot sides of the chiller. Two are attached at the water inlet and outlet to get approximate water temperatures and the last sensor is attached to the floor of the case to measure the interior temperature.



Panel Functions

Front Panel

Watlow PID Temperature Controller

The Watlow controller is used to set the water temperature in the system. Generally, this setting will be slightly higher than the actual output water temperature at the back of the case. The temperature value can be changed using the up/down arrow buttons. The target temperature is the smaller green numbers on the right side of the display. The current measured temperature is displayed in larger red numbers on the left side of the display. Adjust the target temperature as needed to achieve the required temperature at the external instrument. The system has been initially set to output water at approximately 20°C as indicated by the H₂O Out temperature sensor.



AC Voltage Selector Switch

This switch should be set to the AC line voltage being supplied to the back of the case (generally 120VAC in the US).

Pump Switch

The pump switch on the front panel can be set to *On*, *Off* or *Auto*. *On* is a manual override of the back panel control signal pins and will always have the pump running (don't run the pump dry or without water in the reservoir). *Auto* activates the back panel control signal pins which allow for external control of the switch. In any position, the LED for the pump switch will be on if the pump is being powered.

Chiller Switch

The Chiller switch on the front panel can be set to *On*, *Off* or *Auto*. *On* is a manual override of the back panel control signal pins and will always have the chiller running so long as water is flowing in the system. *Auto* activates the back panel control signal pins which allow for external control of the switch. In any position, the LED for the chiller switch will be on if the chiller is being powered. Note that the chiller won't run if the pump is turned off.

Aux Switches

The Aux switches on the front panel are for future use and are not currently functional.

Fill Port

The fill port on the front panel is a ¼" tube fitting from Swagelok.

Fill Window

Use to check the fill level of the reservoir.

Temperature Display

The temperature display and selector switch show the values from the 5 temperature sensors inside the case.

Back Panel

In/Out Tube Connectors

The tube fittings on the back panel are Push-to-Connect fittings for 8mm outer diameter tube.



Control Signals

The Control Signals plug outputs the following temperature signals

- Heater Temperature
- H₂O In Temperature
- H₂O Out Temperature
- Chiller Cold Side Temperature
- Chiller Hot Side Temperature
- Box Temperature

The Controls Signals plug also allows an external system to control the Pump and Chiller switches on the front panel with a DC signal. The specific signal levels and pin assignments are given in the back of this manual.

Power Plug

The power plug is a standard IEC receptacle with a fuse built into the housing.

Filling Instructions

Filling is accomplished by removing the fill port plug on the front panel and using the provided 1/4" Swagelok tube fitting and tube (or other appropriate fitting) to inject enough water to come to about 1/8th in. below the bottom of the reservoir cap. If the system is empty, you will need to fill the reservoir once, run the pump until the reservoir empties and then turn the pump off and refill the reservoir. Continue this process until the system has been filled and the reservoir is filled to about 1/8th in. below the reservoir cap. Don't run the pump with the reservoir empty. If the included syringe is being used to fill the reservoir, remember to pull back on the plunger before disconnecting the hose so that the small amount of pressure in the system doesn't spray water out the fill tube.

Draining Instructions

Draining is accomplished by running a tube from the Out port on the back panel into a container below the level of the system and letting the system drain until the reservoir and the water lines are mostly empty. This will remove enough water from the system to allow for maintenance and disconnection of the tube fittings as needed.

Temperature Adjustment

The temperature on the Watlow adjusts the water temperature in 0.1°C increments. Depending on the target water temperature for the instrument, it may need to be adjusted up or down. It has been initially set to give a temperature reading of approximately 20°C on the H₂O Out sensor. To adjust the target temperature, use the up and down arrow keys on the Watlow to change the target temperature value (green number) to the appropriate value.