Update: ChillerCtrl.py

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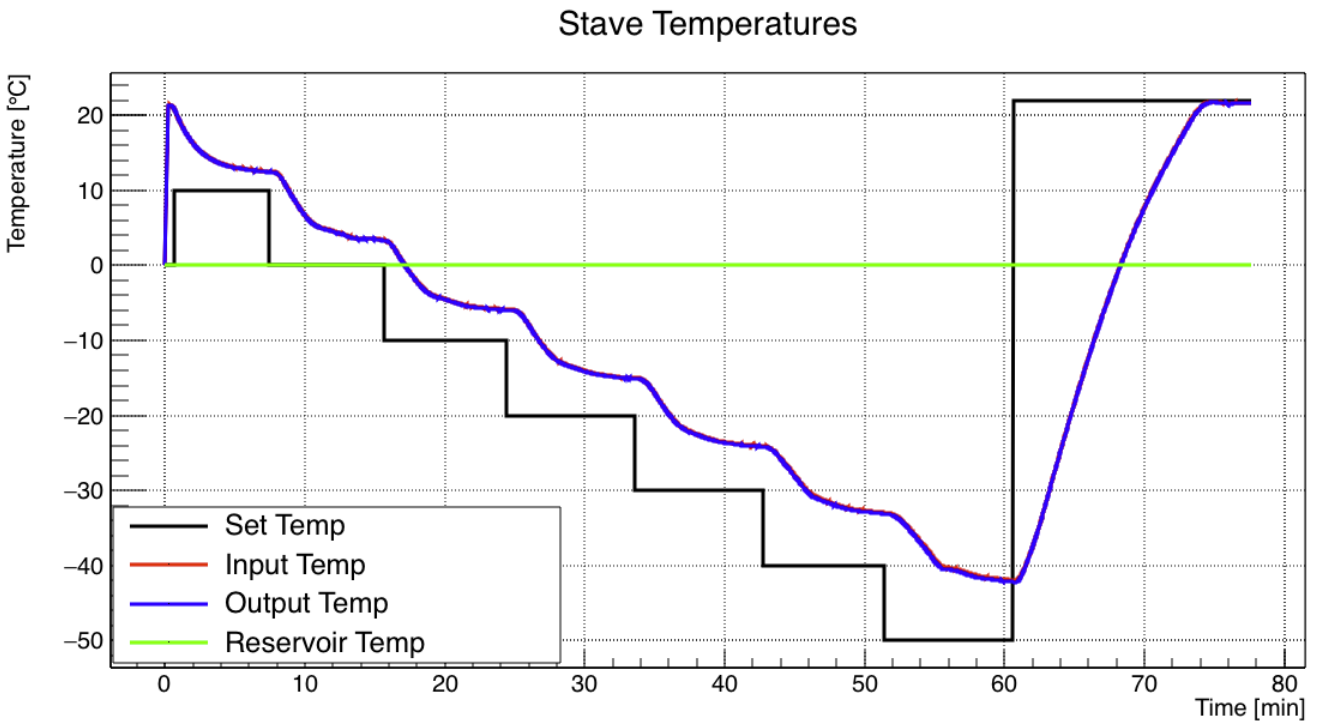
ISU WEEKLY MEETING
SEPTEMBER 6, 2018

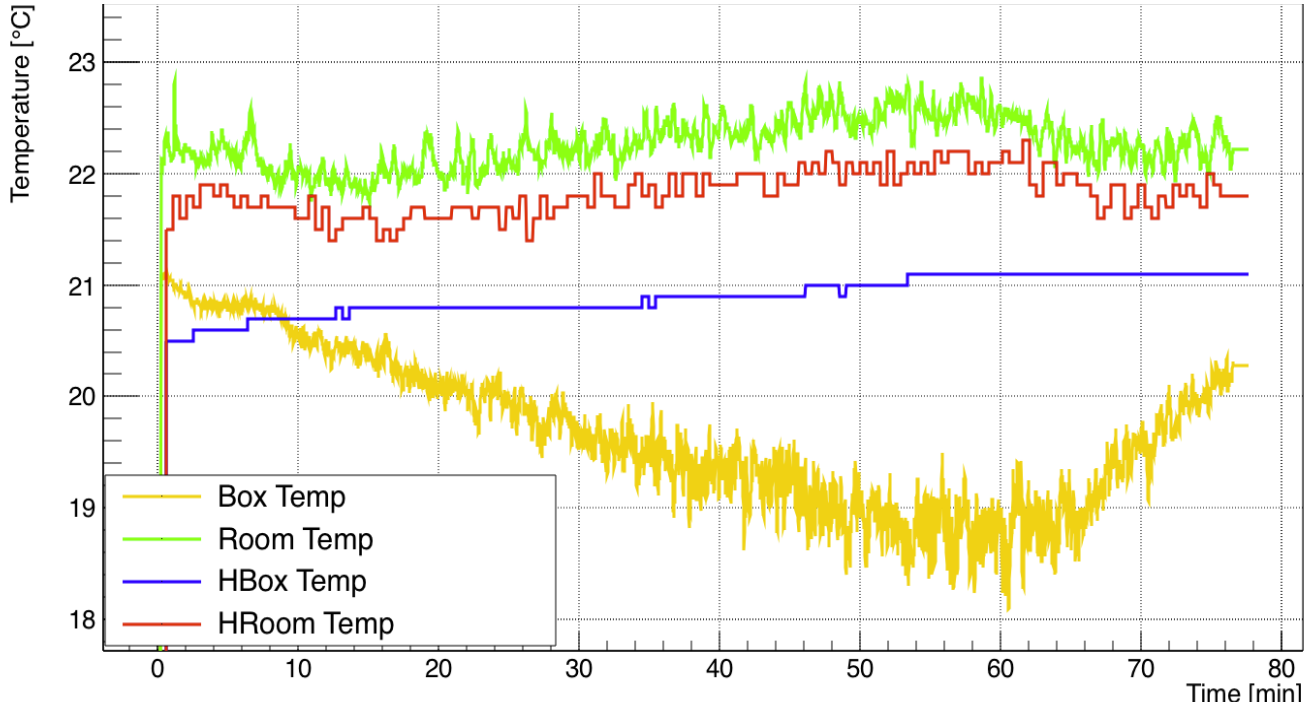
Since Last Time

- ChillerCtrl.py updates
  - How to go to set temperature
    1. Check every minute to see if fluid temp in reservoir is within 1C of set temperature (Originally this was waiting 4 minutes)
    2. Check to see if fluid temp slope is less than 0.1C/min
  - Remaining problems
    - Humidity wait in routine mode screws up the routine
    - Flow meter measurements from fit are only valid in a small region of measured flow and are not valid at low voltage (< 0.7V).
    - RPS to Flow auto adjust?
- ChillerCtrl.py tests: 10C drops to -50C and one drop to -50C all with N2 on
  - Small pipe(Did not have TRes logging yet)
  - Stave(Did not have all info added into logs)

Pipe Incremented

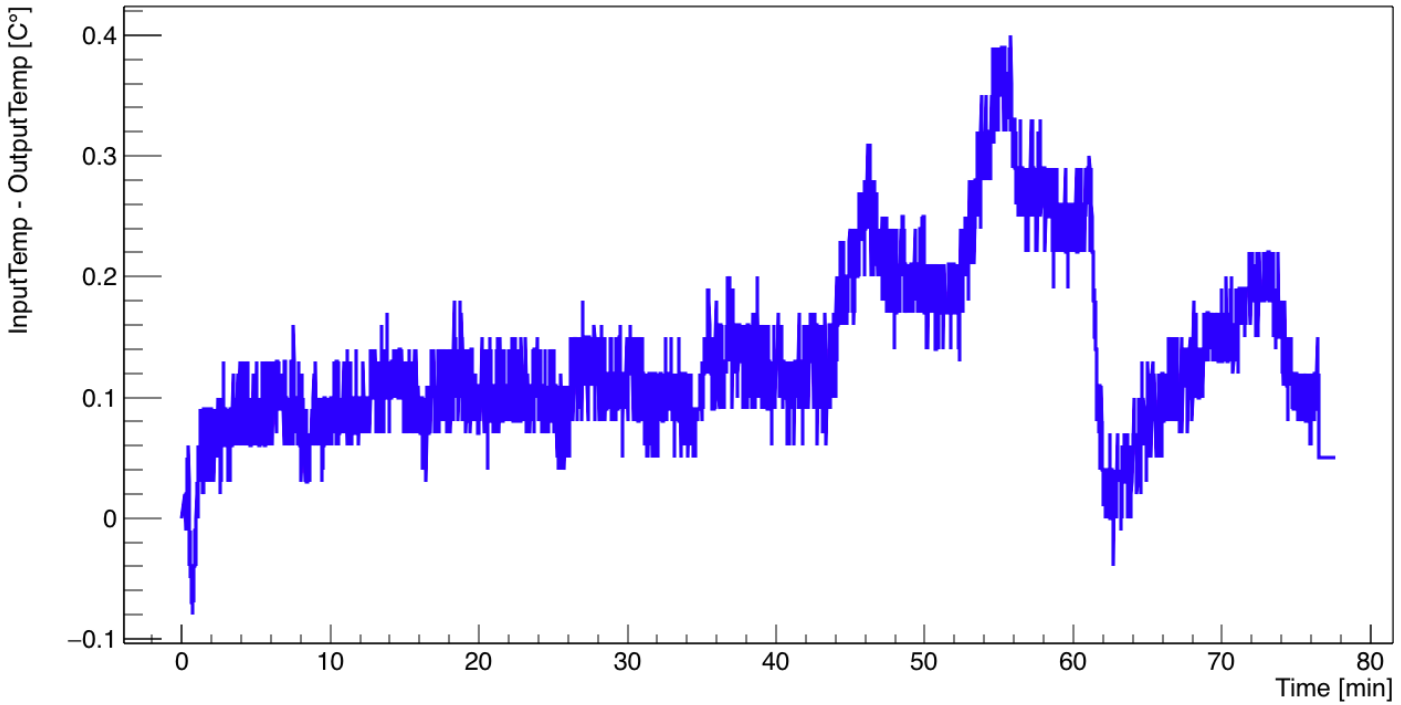
- Missing Reservoir Temperature data
- The box temps are quite different. The nitrogen blowing on the pipe cools off the air near the probe close to the pipe
- The room temps only have a 0.4C offset otherwise they follow same trend

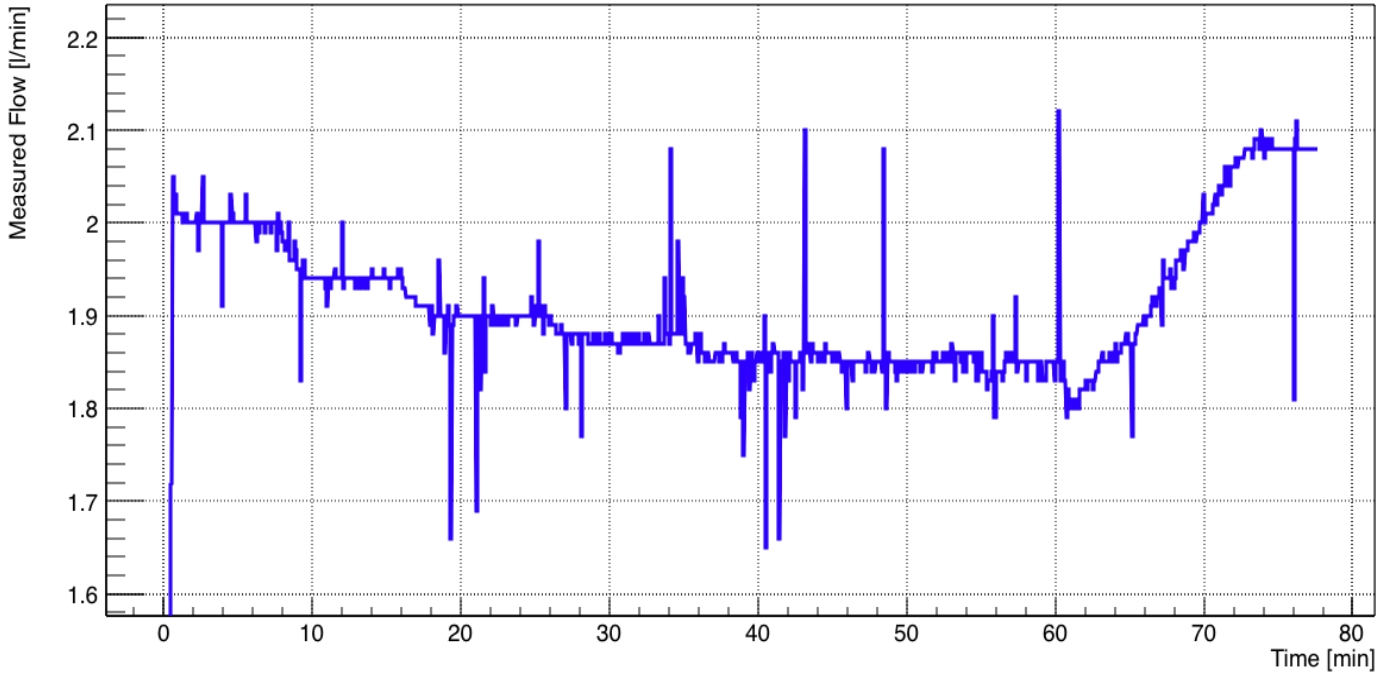




Pipe Incremented

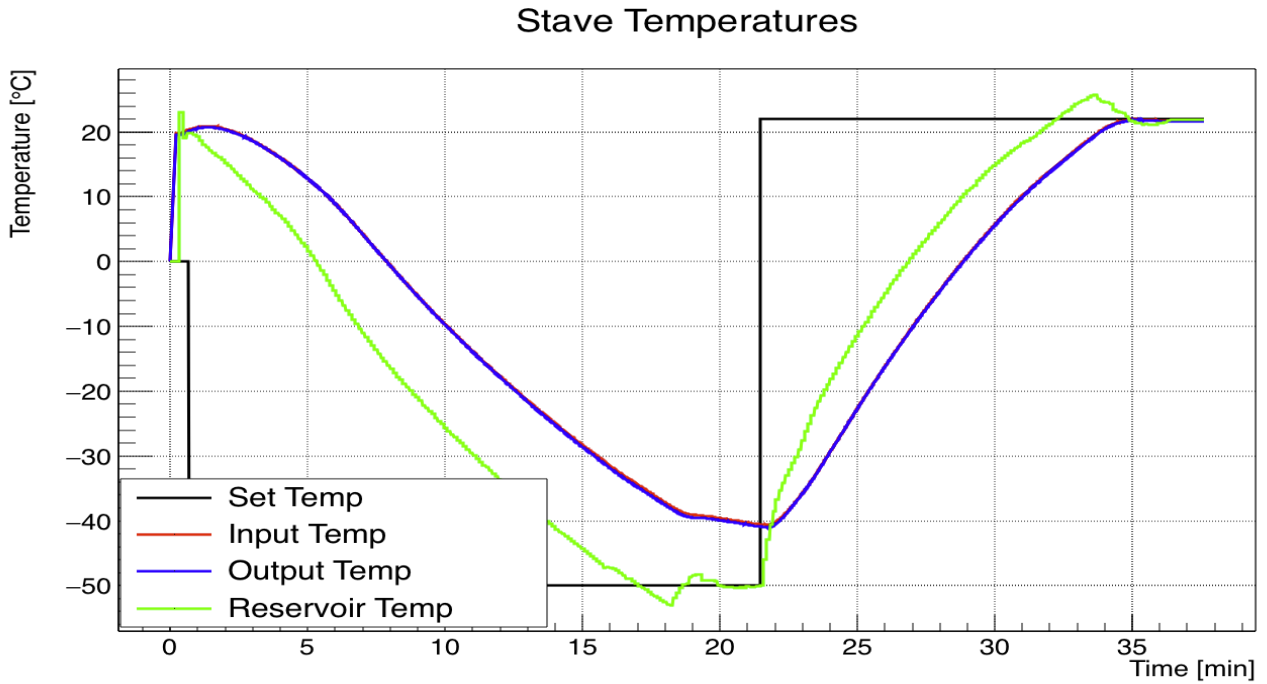
- The temperature difference between inlet and outlet has a problem.
  - This should be mostly negative except when heating in which it should be a positive value…
  - The plugs were backwards… Ugh (This is common throughout)
- Flow rate seems to have some interesting bumps…

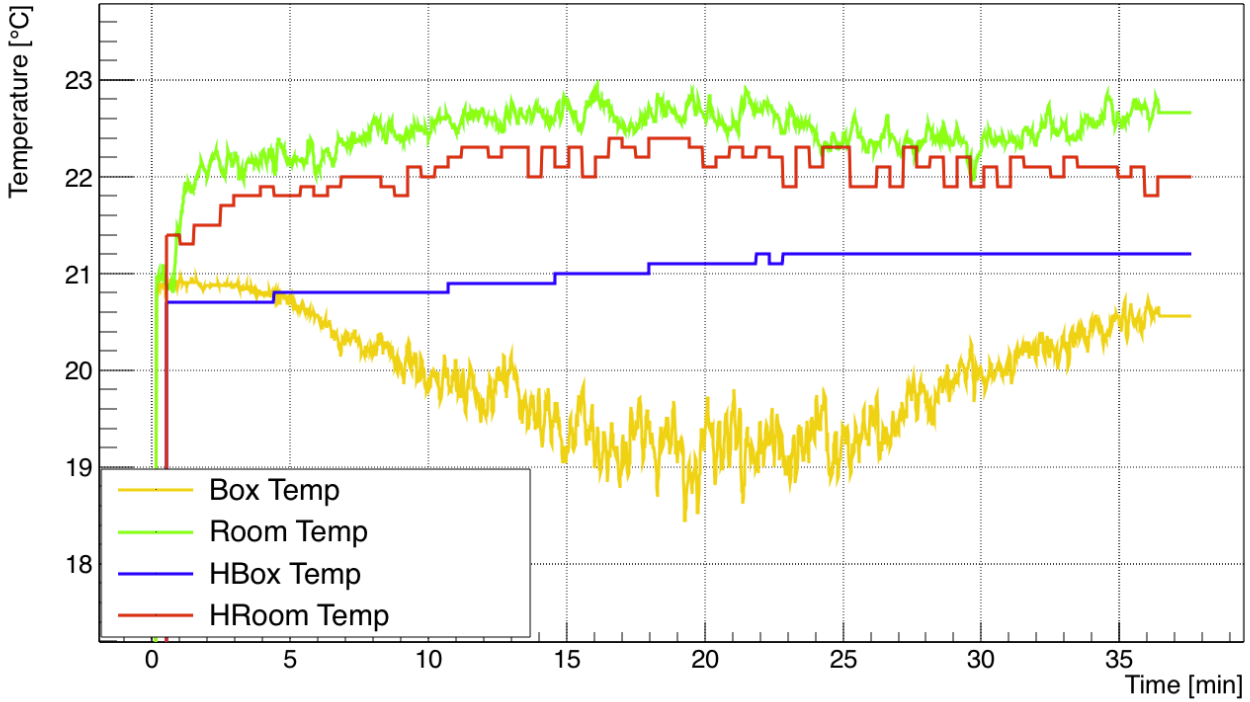




Pipe Jump

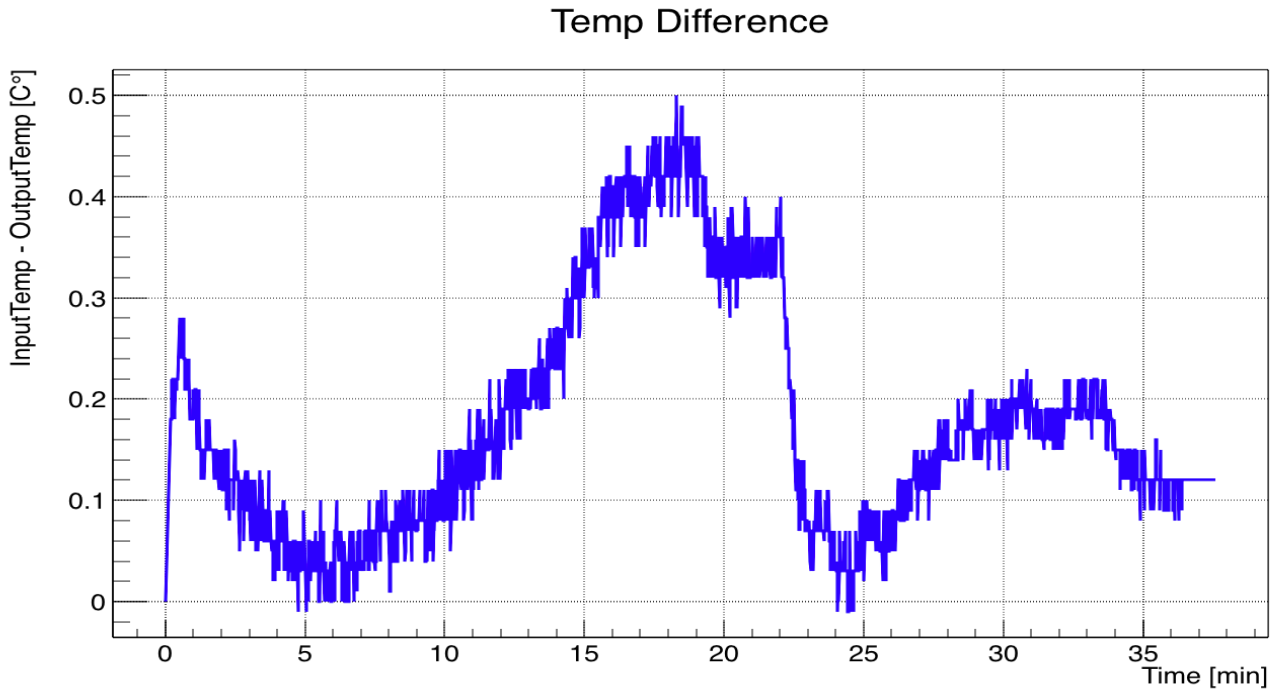
- Can see how nicely the reservoir goes to the set temperature.
  - It over shoots the set temperature and oscillates toward the set value
- Again the box temperatures show different shapes

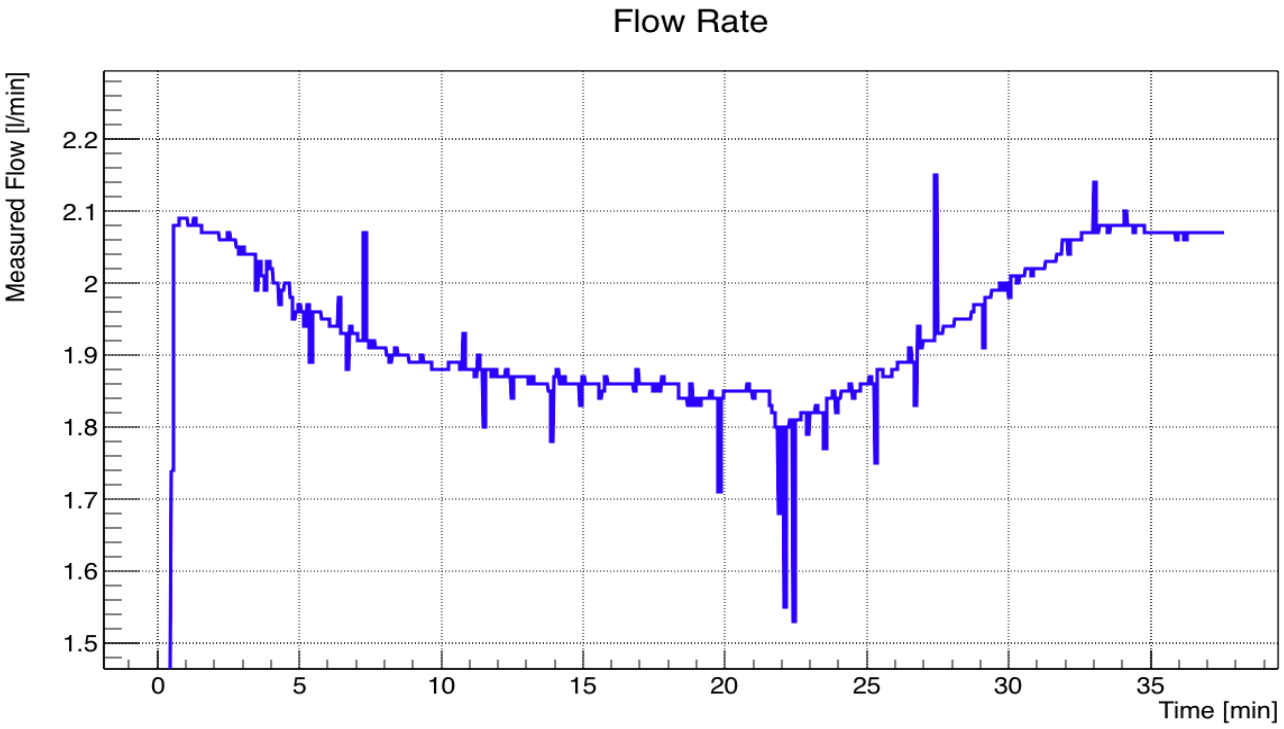




Pipe Jump

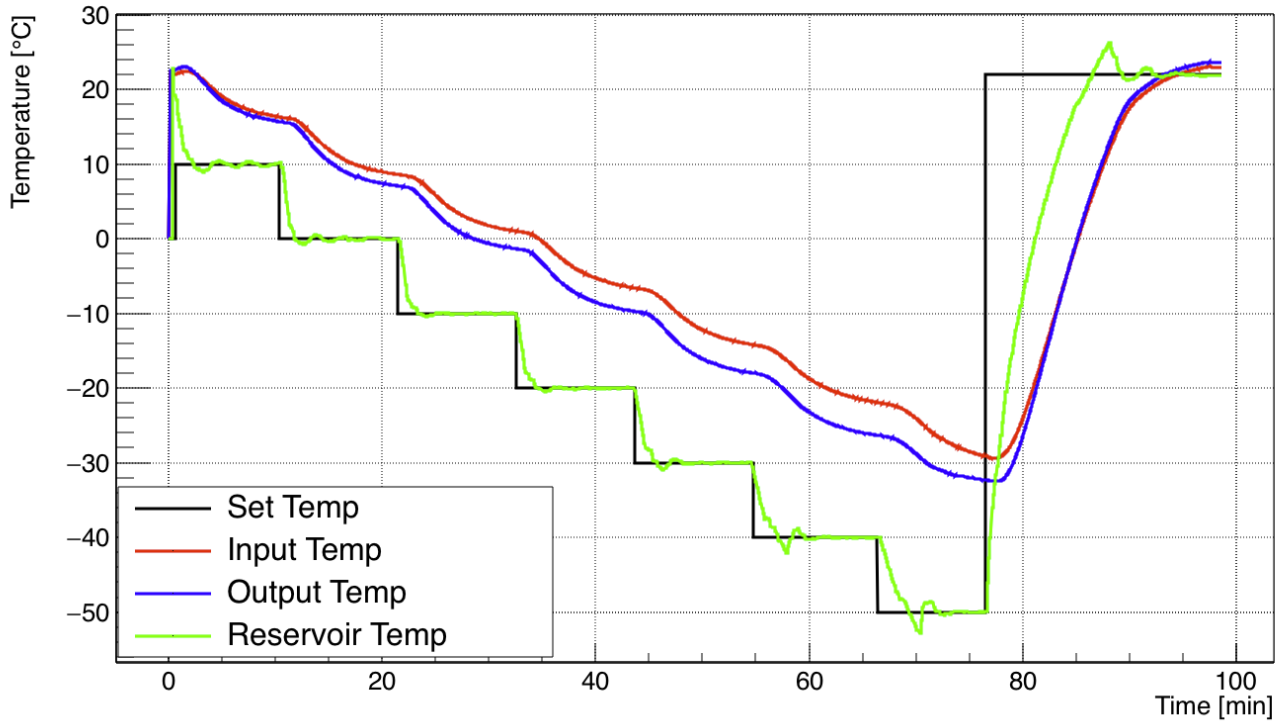
- Again see same issue with Tdiff. Just due to backwards temperature probes
- Flow rate is smoother except for a few points

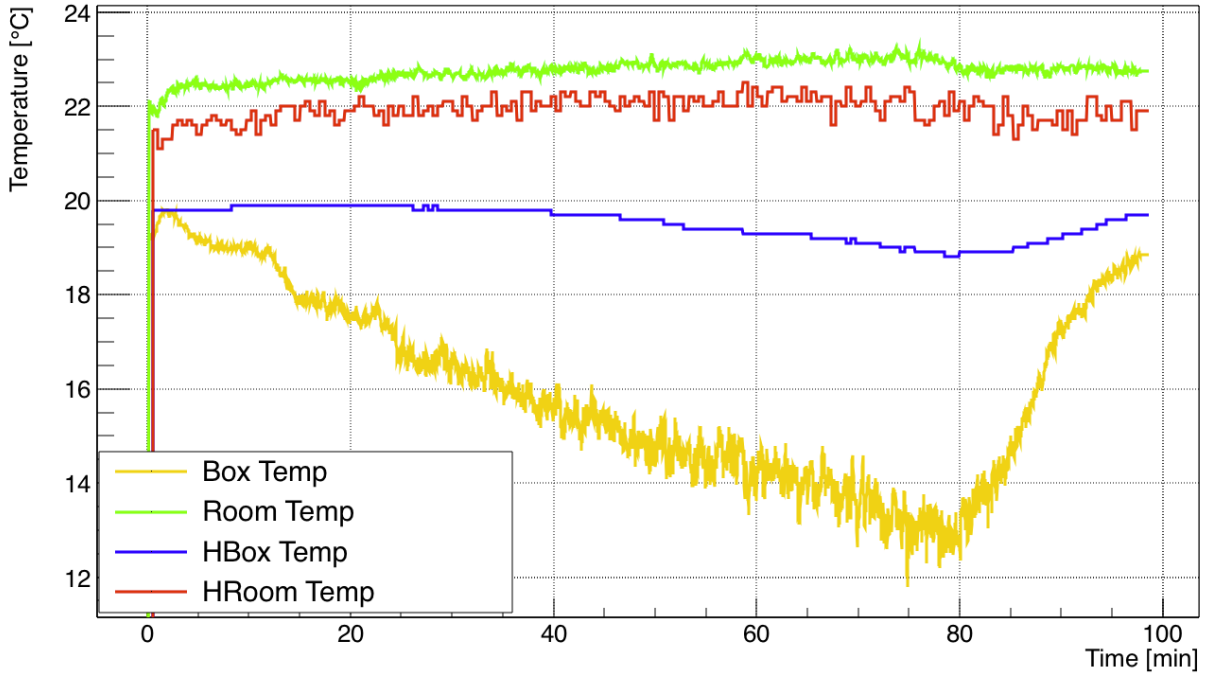




Stave Incremented

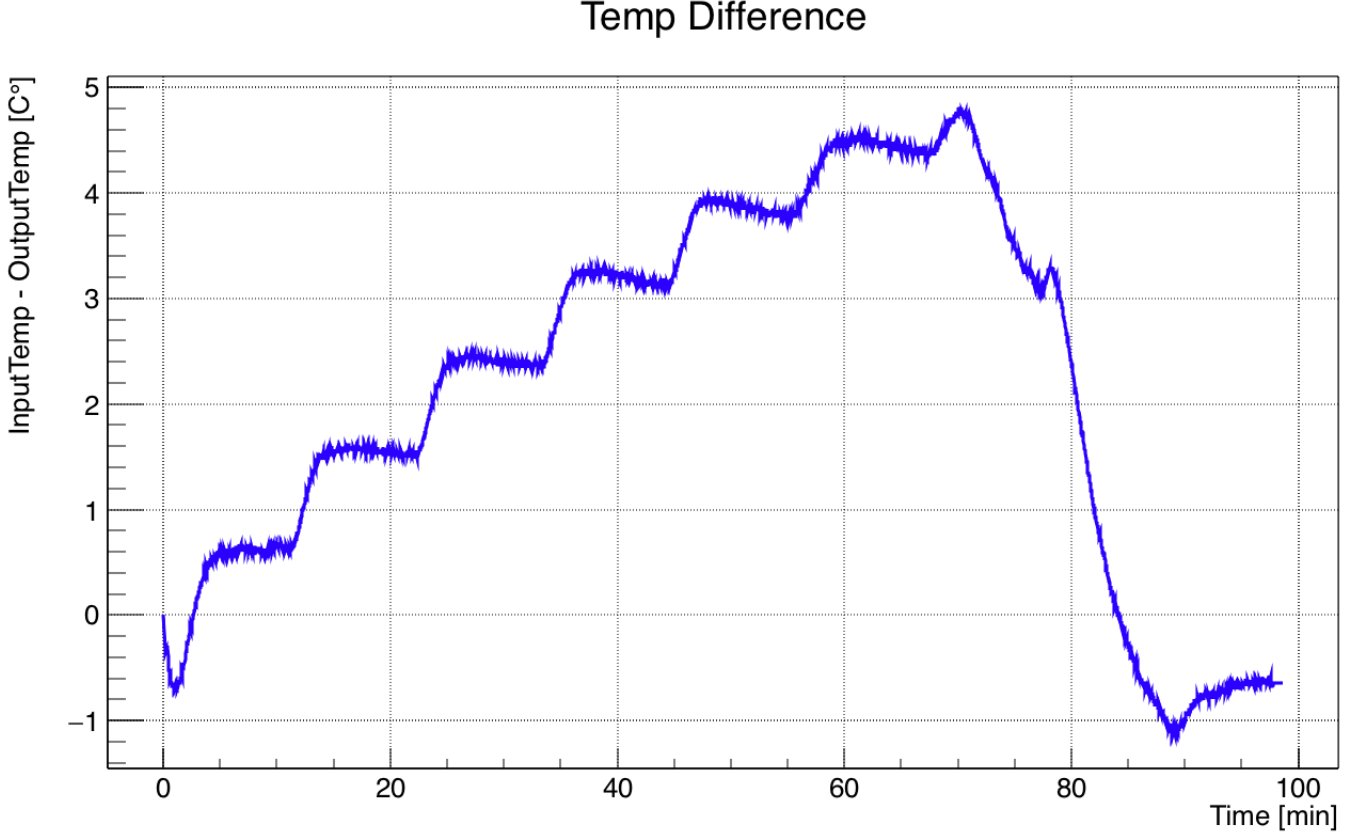
- You can see the stepping quite well in the reservoir fitting to the set temperature
- Room Temperatures are similar
- See cooling effecting the box temperature more near the end

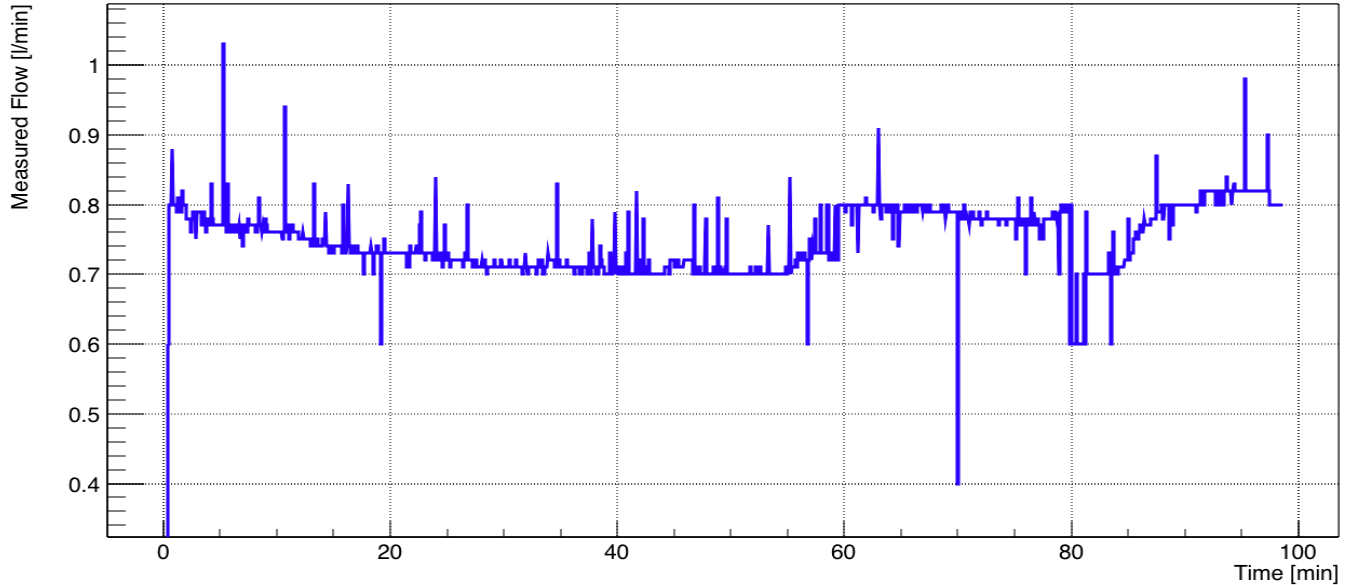




Stave Incremented

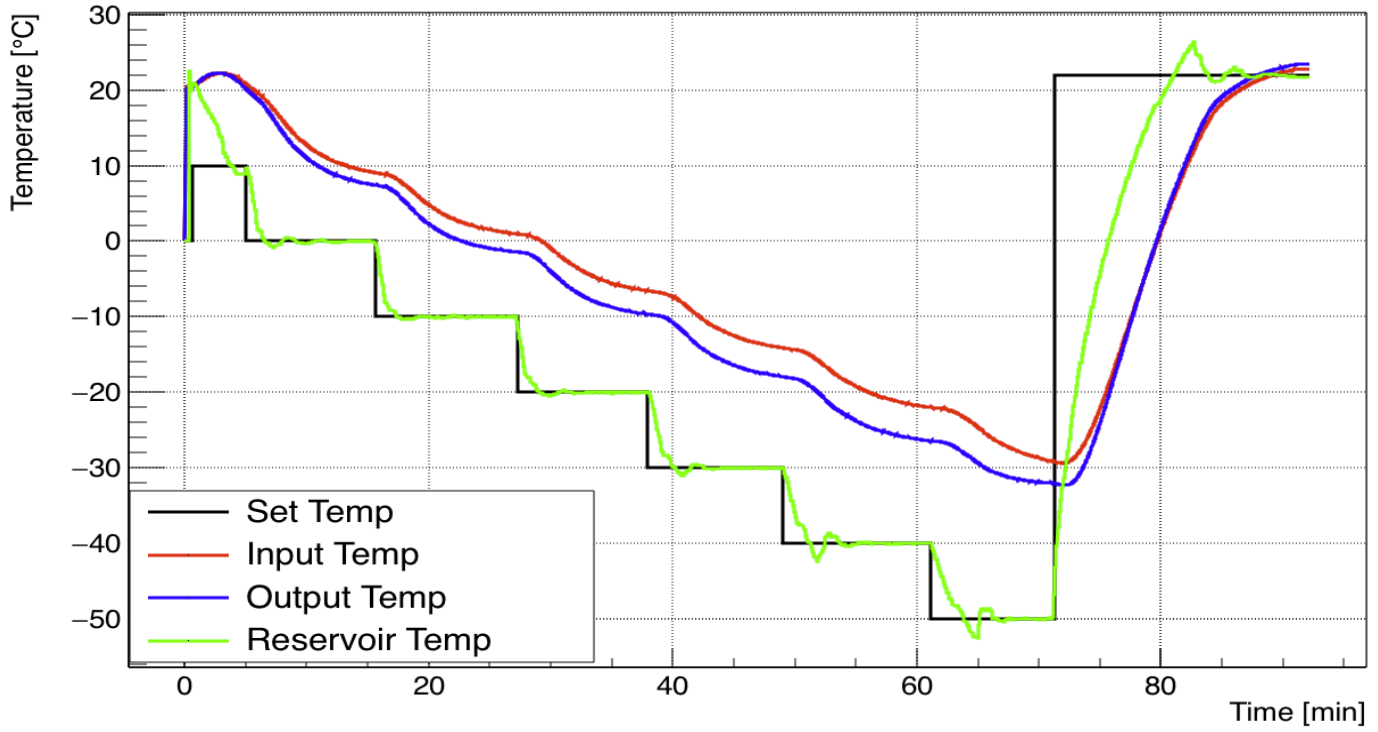
- There seems to be a problem with the flow measurements
  - The flow formula is only valid for a small amount of measured voltages (~0.7-1.5 V)
  - A secondary linear formula was used if below 0.7 V. These values are only calculated with a precision of 0.1

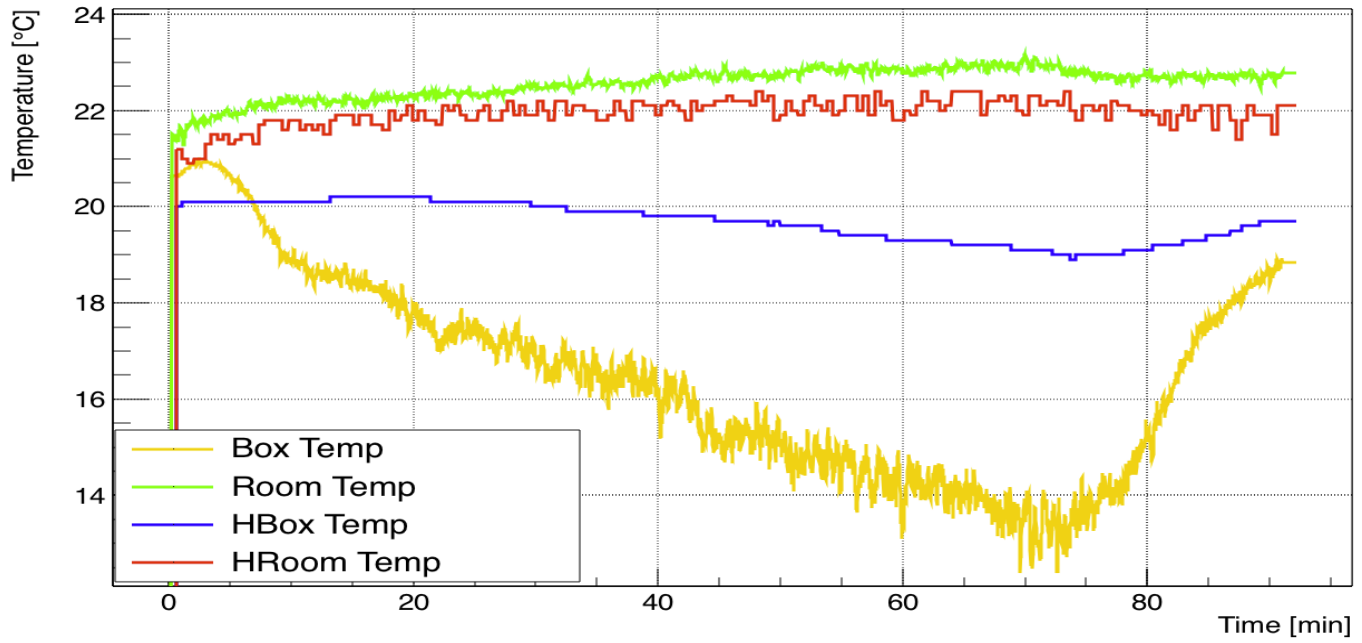




Stave Alt

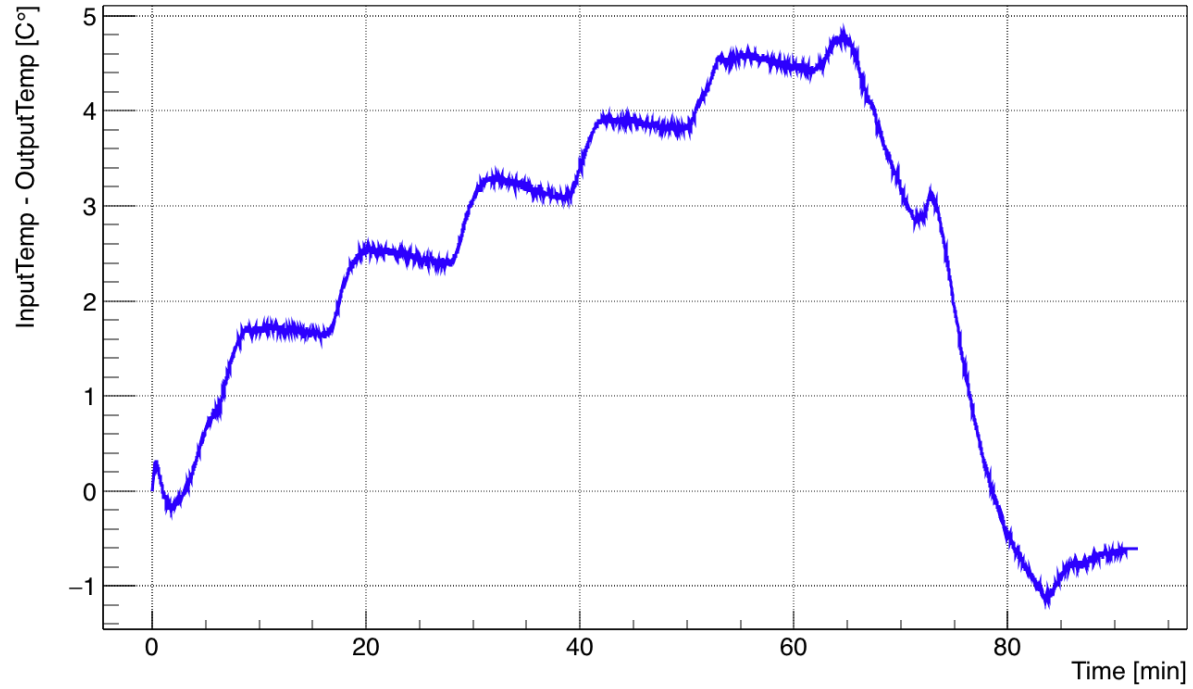
- Similar to 4 min wait profiles

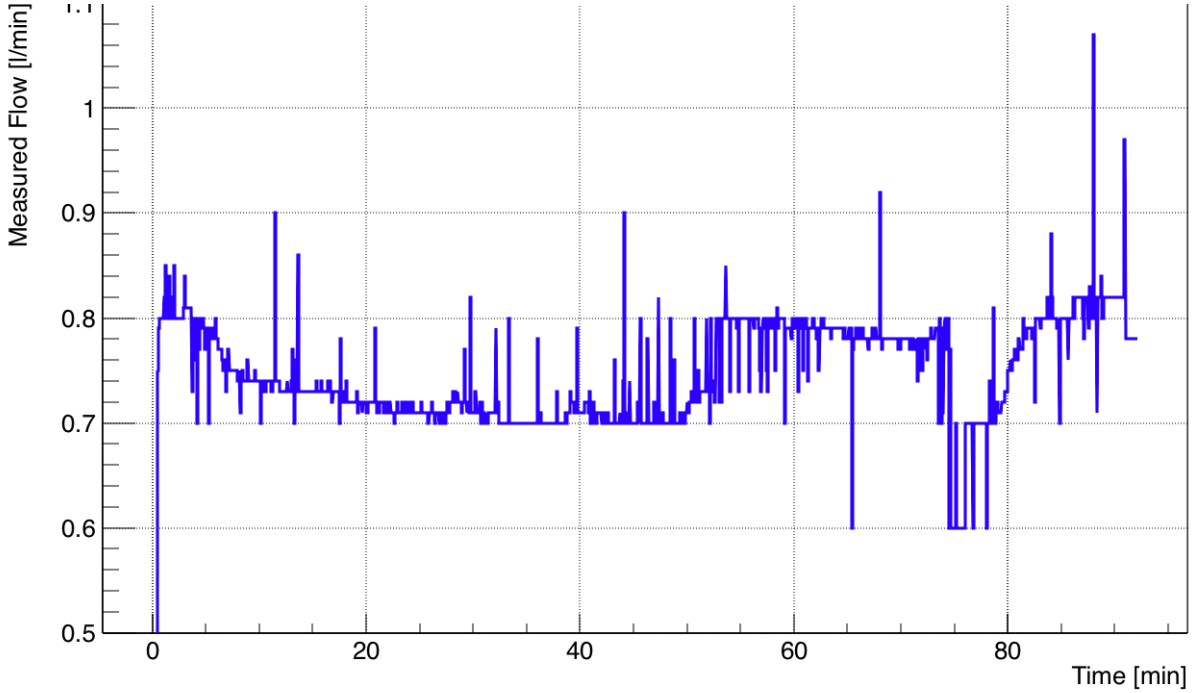




Stave Alt

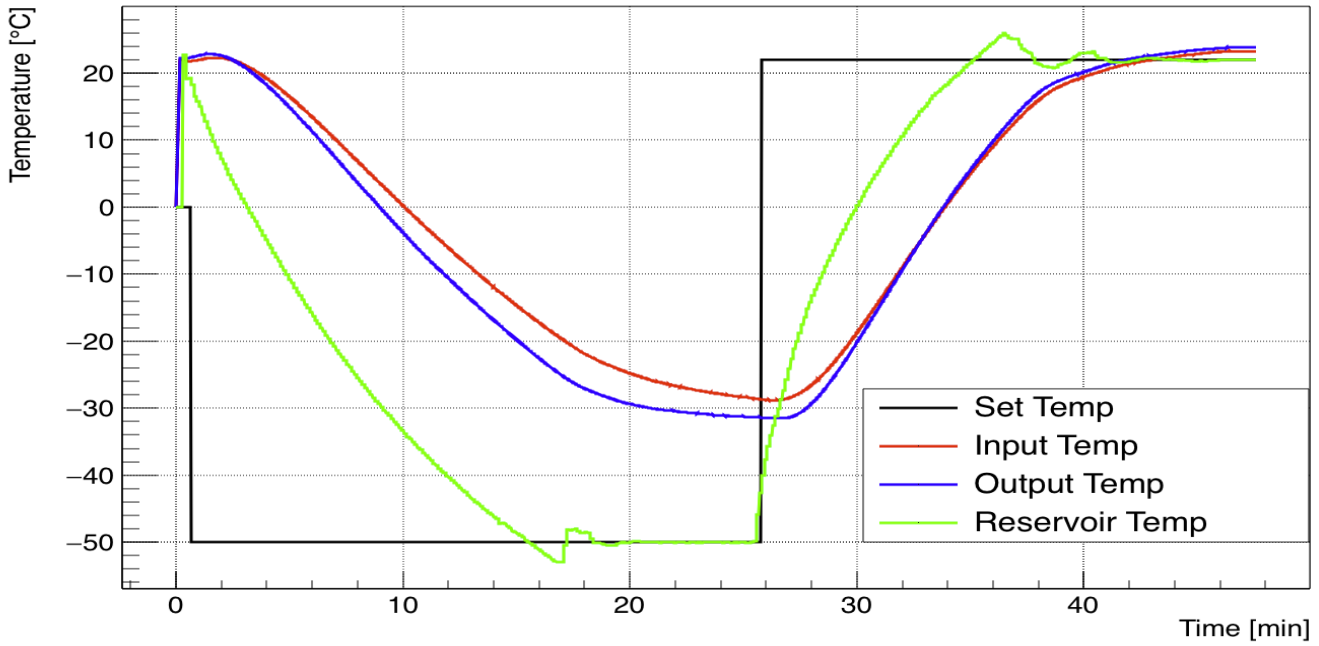
- Very similar to the 4 min wait time

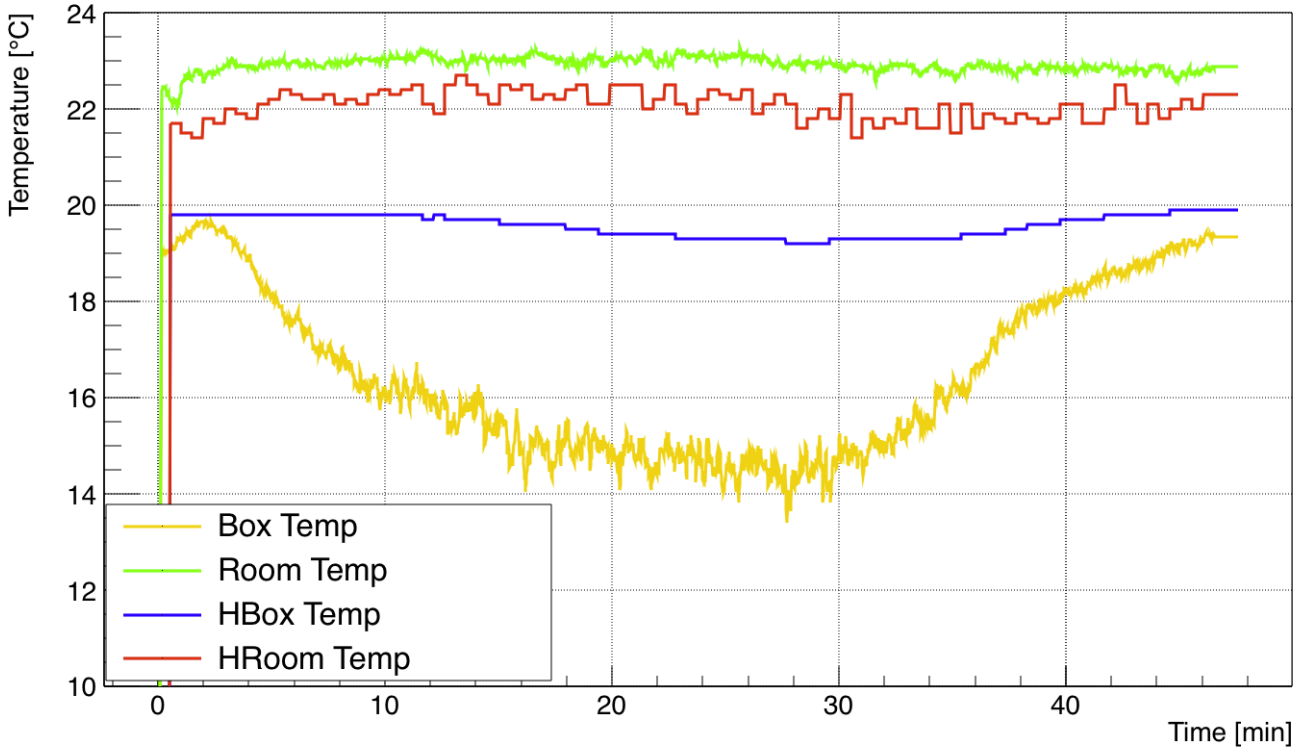




Stave Jump

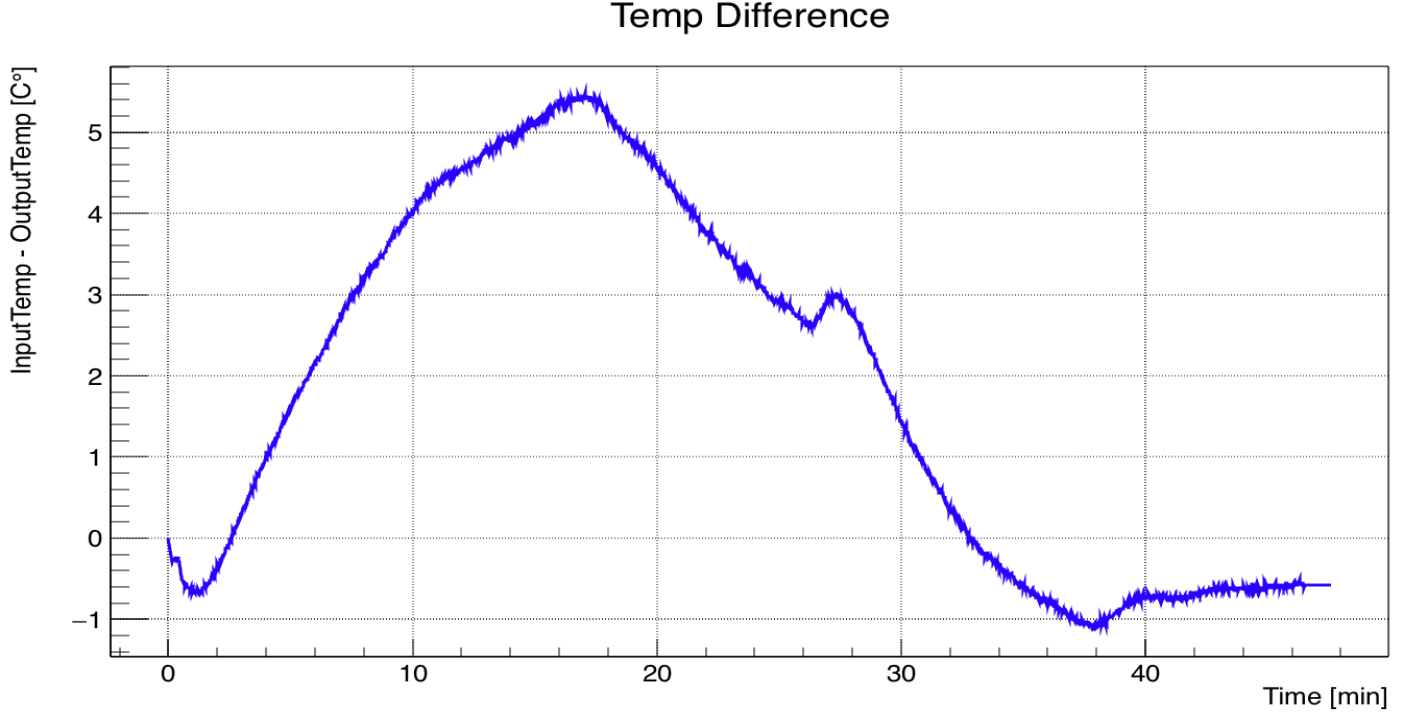
- The reservoir gets to the set temperature quite fast

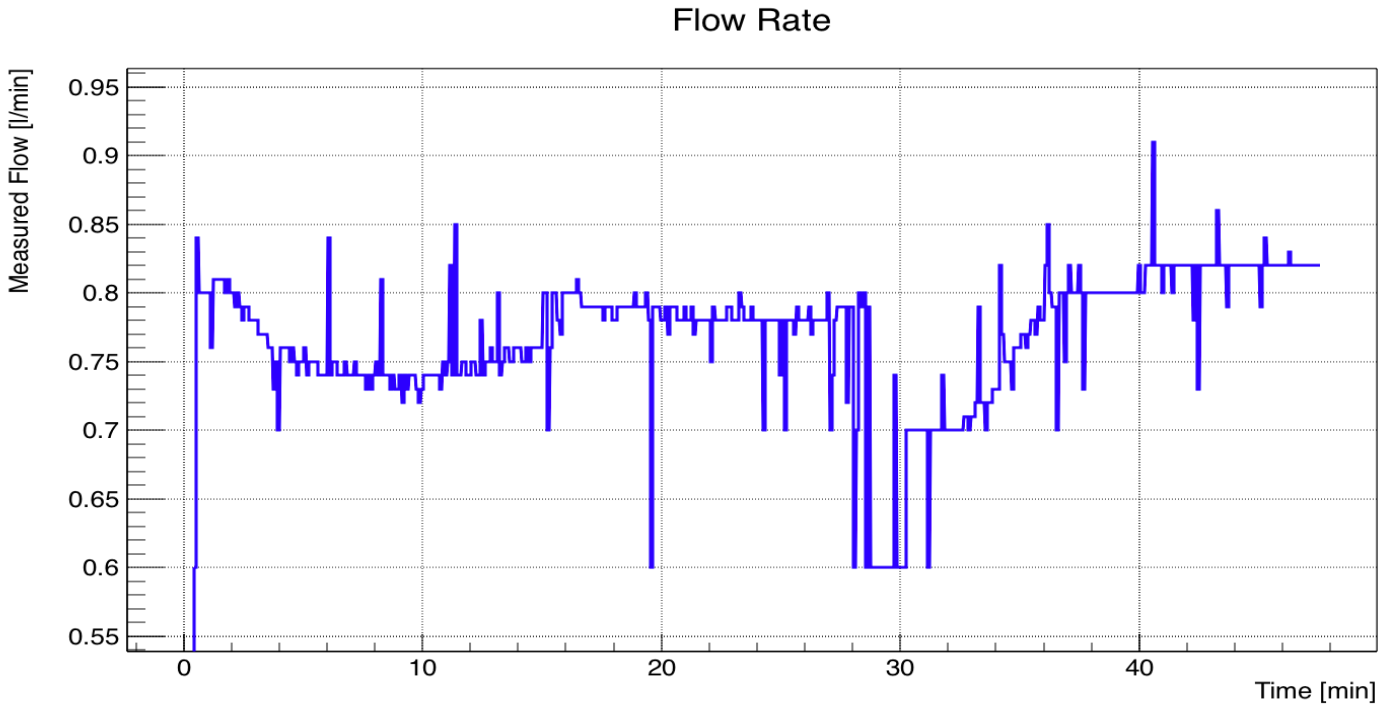




Stave Jump

- See two peaks
  - 1. When the reservoir has come to the set temperature
  - 2. When the system starts to heat
- Flow rate changes are not what expected…
  - Expect the flow rate to decrease the colder the fluid gets
  - See largest decrease right after system starts heating up



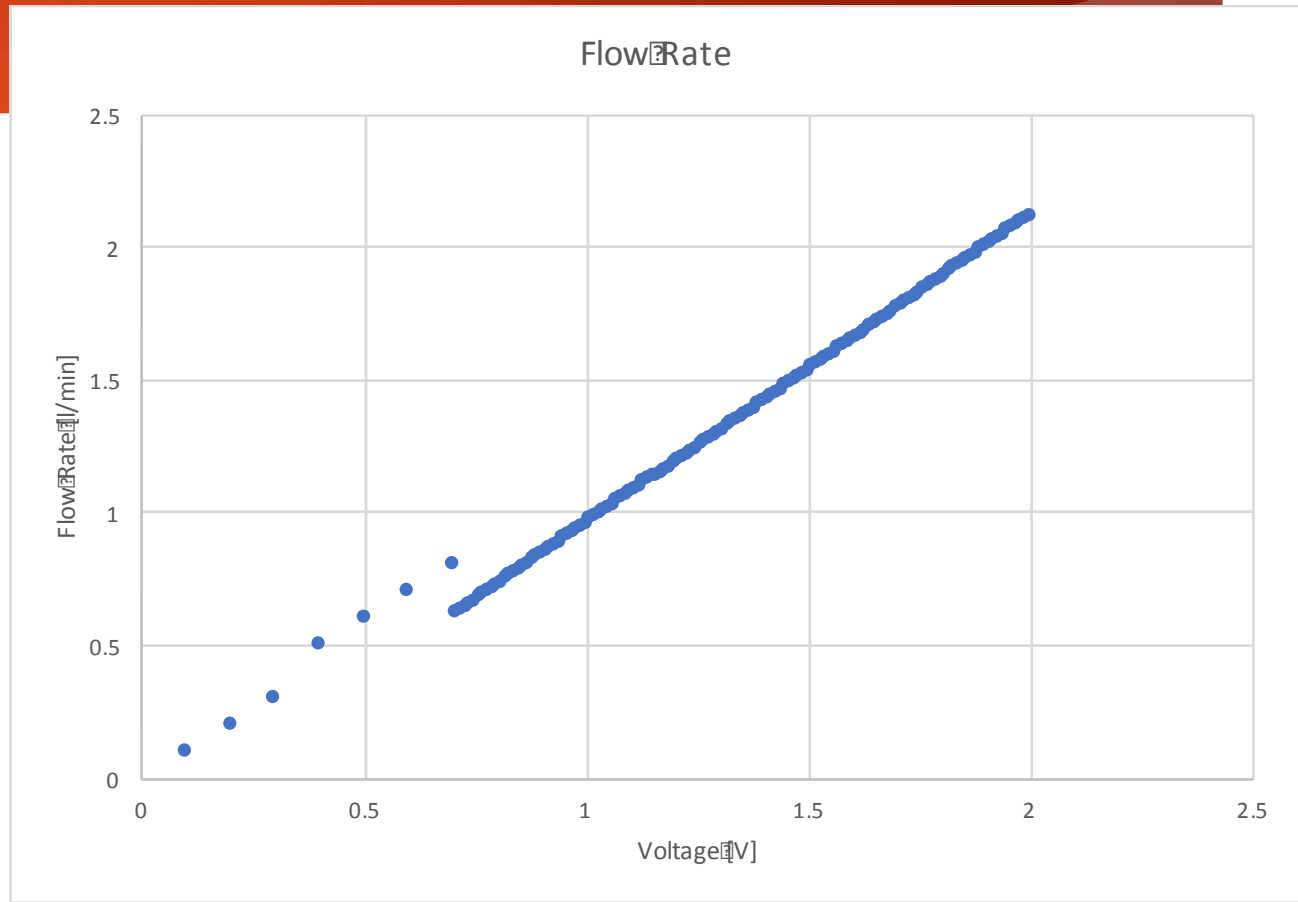


Notable Differences

	Temp Min [C]	Run Time [min]	Temp Set [C]	Code Diff.
Pipe Step	-42.1	77.6	10,0,-10,-20,-30,-40,-50	No TRes, Wait 4 min
Pipe Jump	-40.9	37.6	-50	Wait 4 min
Stave Step	-30.9	98.6	10,0,-10,-20,-30,-40,-50	Wait 4 min
Stave Jump	-30.2	47.6	-50	Wait 4 min
Stave Step Alt	-30.8	92.2	10,0,-10,-20,-30,-40,-50	Tres = Tset +/- 1C

Conclusions

- Definite improvements with new chiller control code
- Cool to see Temp difference structures that correspond to the stages of cooling
- Need to fix flow calculation.
  - Look at voltage as a function of flow rate to understand at lower and higher values
  - Use a better formula. It was not checked for smoothness when it was put together…



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