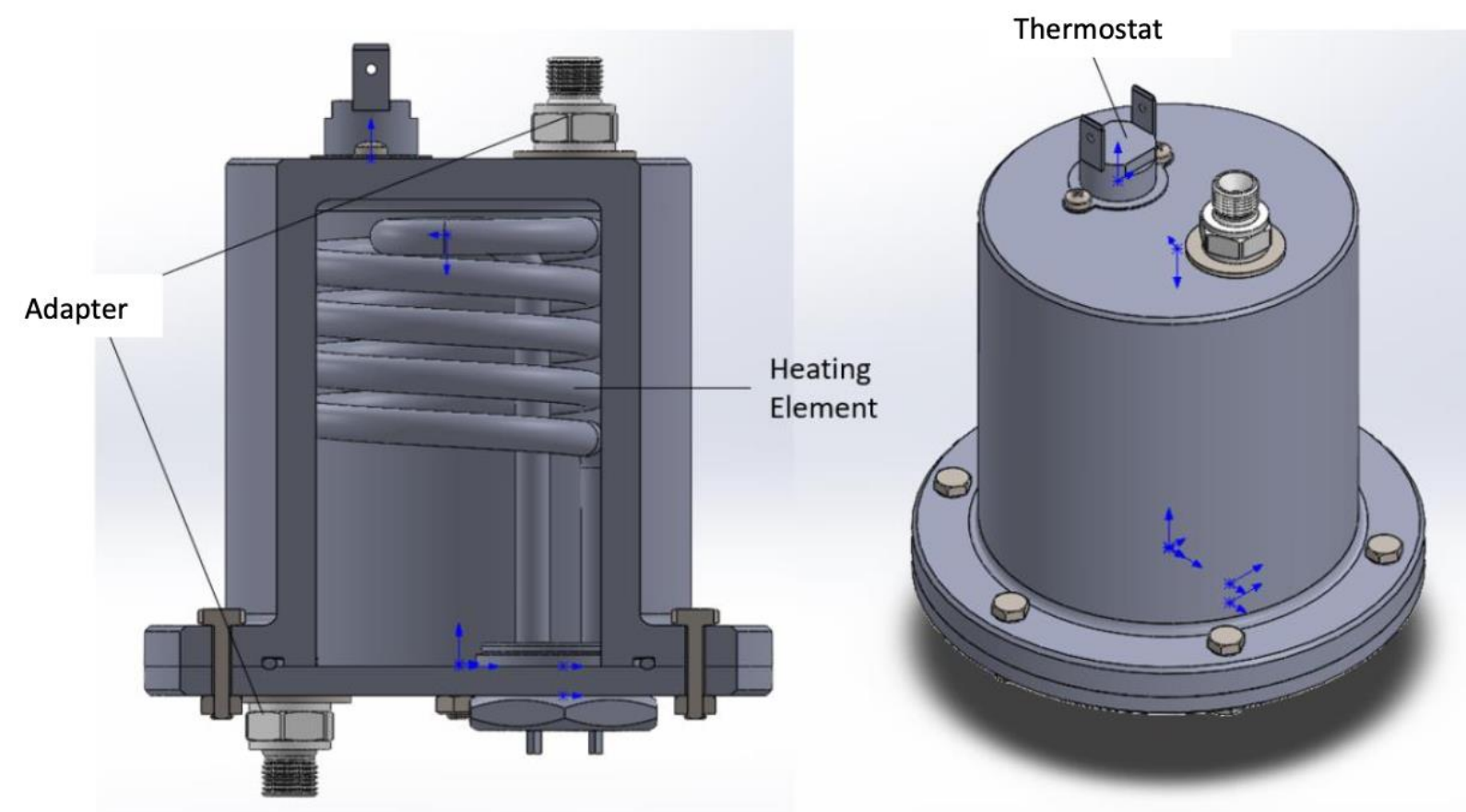
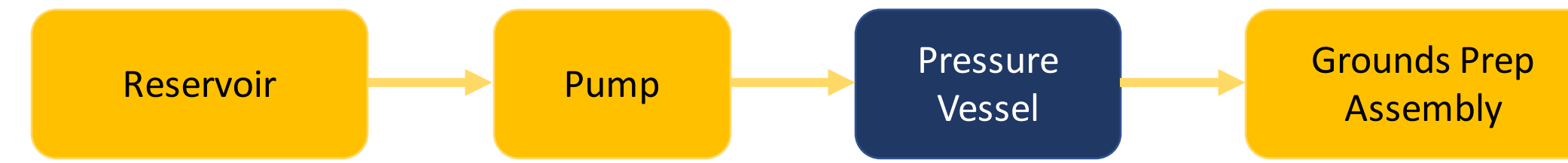


CAD MODEL



OVERALL MACHINE OPERATION



Path taken by the water through the machine; pump draws water from the reservoir, pressurises it to 9 bar, feeds it into our assembly which stores and heats it up to 85-90 °C, before it is forced through a coffee bed in the grounds prep assembly.

TEST 1 : LEAKPROOF TEST



Observation: No bubbles at the seals - Conclusion: proved to be leakproof

FINAL ASSEMBLY

The pressure vessel was designed to heat 200mL water to 90°C with 9 bar water pressure in 60s by a 1.1 kW heater. The thermostatic switch on the vessel top will switch the heater off automatically when the temperature rises to around 95°C.

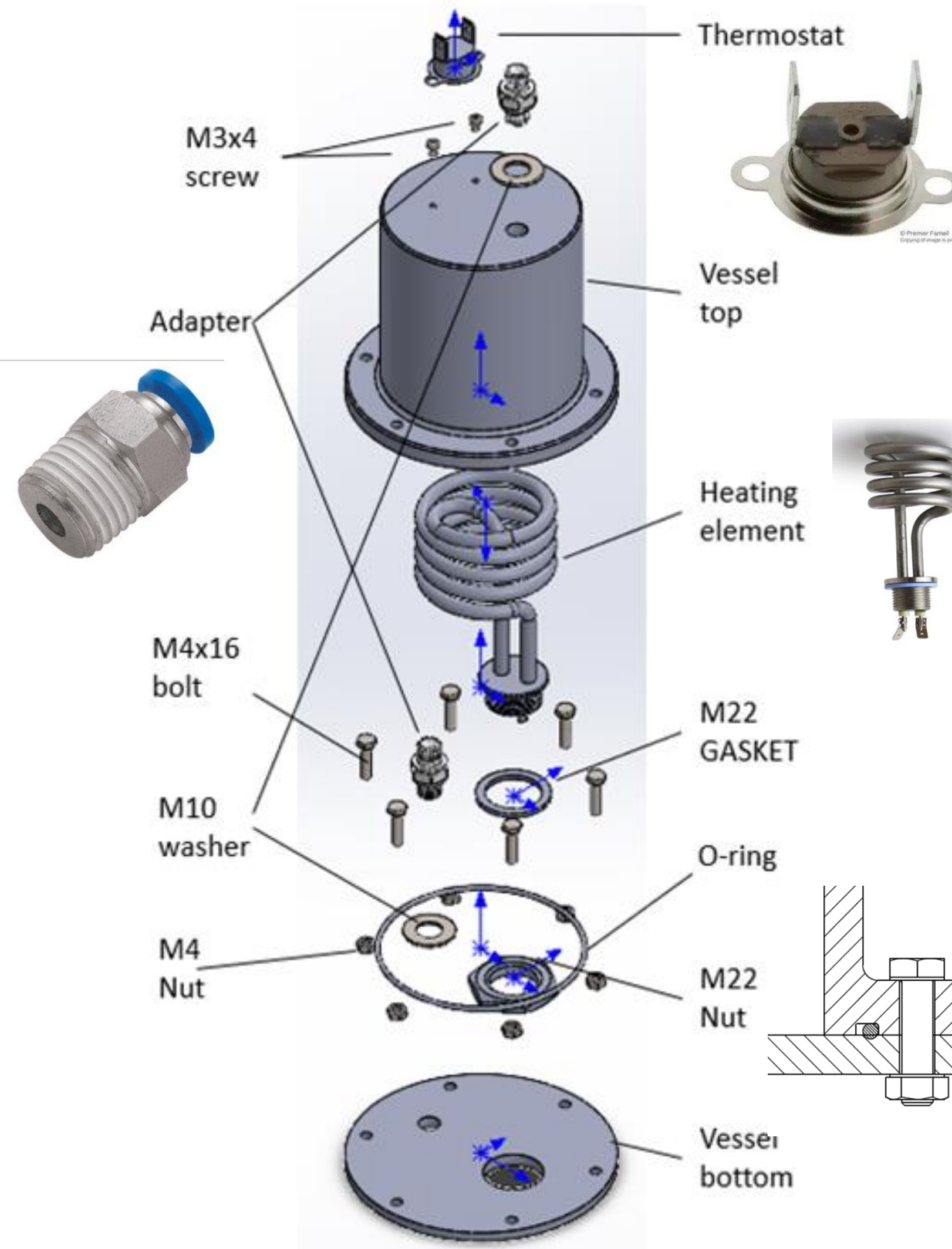


Assembled vessel with heating circuit removed



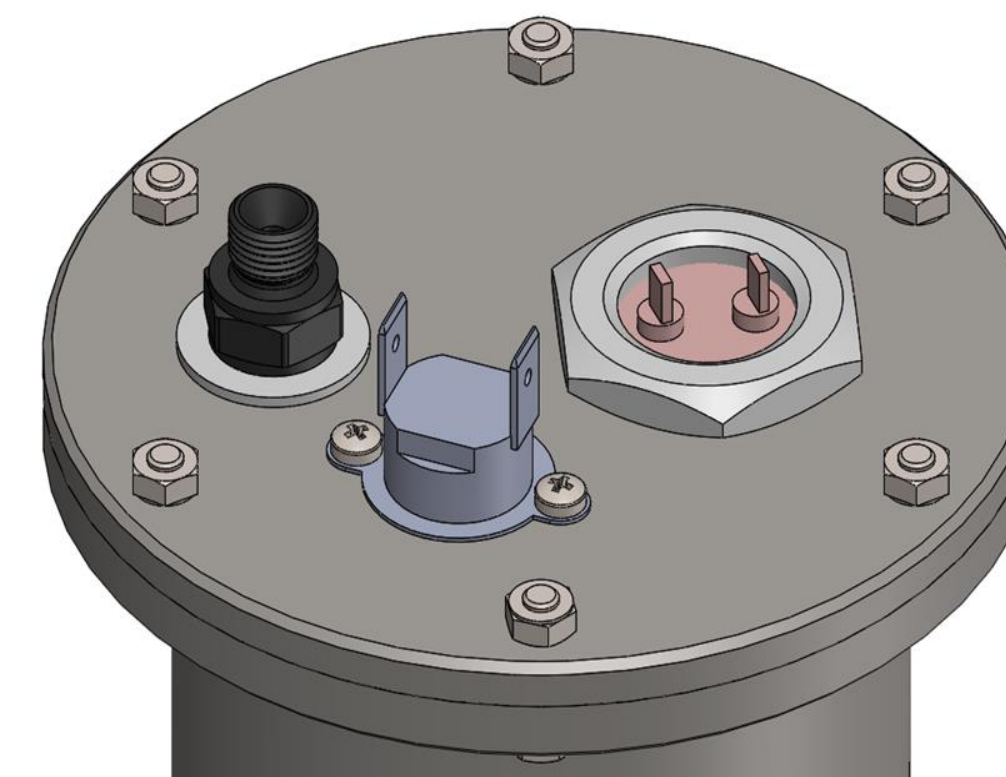
Assembly including all electronics

EXPLODED VIEW



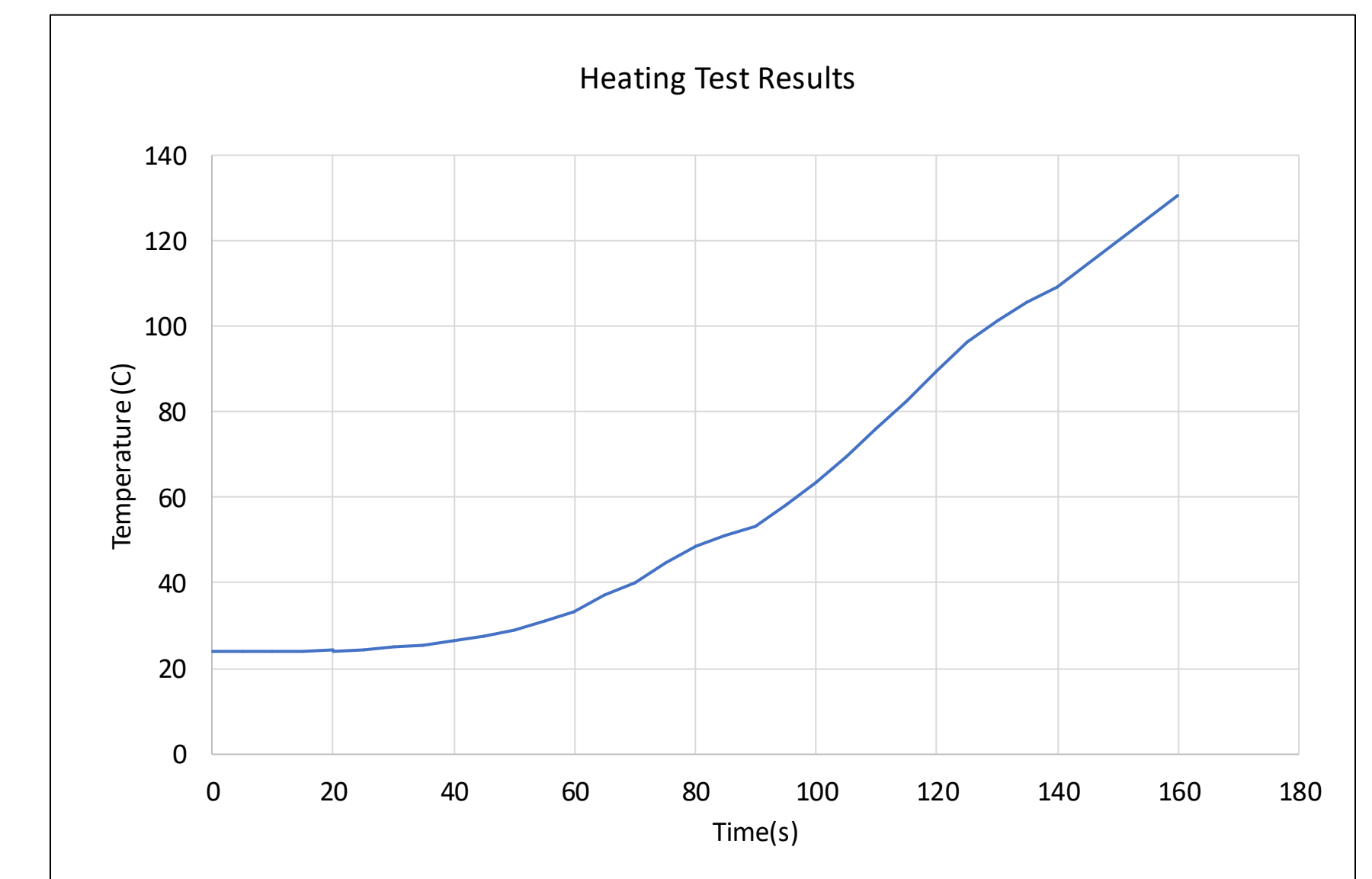
REDESIGN

A few design revisions are proposed which should fix the problems encountered during testing, and concerns raised during assembly.



1. Using a new thermostatic switch with switching temperature at 90°C.
2. Moving the thermostatic switch to the bottom plate.
3. Insulating the wires by covering them with heat shrink tubes.
4. Mounting the wires on the clamp.
5. Mounting the wires onto the mounting plate and covering them with cable protection guard.

TEST 2 : STATIC HEATING AT ATMOSPHERIC PRESSURE



Observations:

1. The water temperature did not rise to 90°C in 60s.
2. The water temperature did not stop rising after reaching 95°C but kept rising to 130°C.

Main reasons for failure:

1. The thermal inertia was underestimated.
2. The vessel might not be filled up with water, the temperature measured by the thermostatic switch is not the real temperature of water in vessel.
3. The thermostatic switch might have a delay before if cut off the circuit.