7 SUMMARY

During this thesis, a Peltier element-based fridge was developed and analysed. To provide understanding of the benefits of TECs, research on different refrigeration methods was made. All the components were decided on, and 3D model in SOLIDWORKS created. When parts were purchased by the author, device was assembled and new solution was twice tested against the existing similar device. 30 W configuration of the device achieved best results as lower power helped to maintain quite high COP by decreasing temperature difference and current. Device developed was able to decrease temperature of 330 ml water vessel by 4.1 °C versus 5.2 °C of existing similar device during 1 hour timeframe, while being noticeably smaller in size.

As a result of the analysis that followed the experiments, potential points of device efficiency improvement were identified:

Peltier element quality should be inspected, as it was not performing according to its Voltage vs Current specifications mentioned by the supplier on the datasheet.

Insulation quality of the device should be inspected further, possibly via additional tools such as thermal vision sensor, to identify cold air leaks and prevent heat transfer from ambient environment to cooling chamber.

Other designs for hot side heatsink should be reviewed. Coming up with a better solution for heat dissipation would also greatly impact overall efficiency and cooling speed of the system.

Overall, as a result of thesis, a device is developed and performing similar to other solutions on the market using the same cooling principles. With some improvements it is possible to make it perform better to achieve rapid cooling of a small liquid vessel.