

Free Piston Stirling Heat Pump for deep freezers: Update and direction

Hide Norder , Harry Holland, Srinivas Vanapalli

University of Twente, The Netherlands

h.norder@utwente.nl

The demand in bio-banking for cryopreservation and deep freezers is increasing and the market is seeking sustainable and efficient solutions. The workhorse for deep freezers is currently a cascade vapour compression technology that uses HFC gases. At Twente we are exploring a Free Piston Stirling Heat pump that has an advantage of spanning a wide temperature range and cooling loads can be easily modulated. Our main goal is to reduce the size of the heat pump, therefore higher power density by increasing the operating frequency from 50 to 100 Hz. Size reduction will lead to less material usage and cost will reduce.

A test rig is designed and built to measure the COP of the heat pump. Initially we intend to measure the heat pump near ambient conditions, so that water can be used as a cooling fluid. In this poster presentation we will review the test rig, show preliminary results with a 50 Hz system and present the roadmap and expected challenges to realize a compact heat pump.