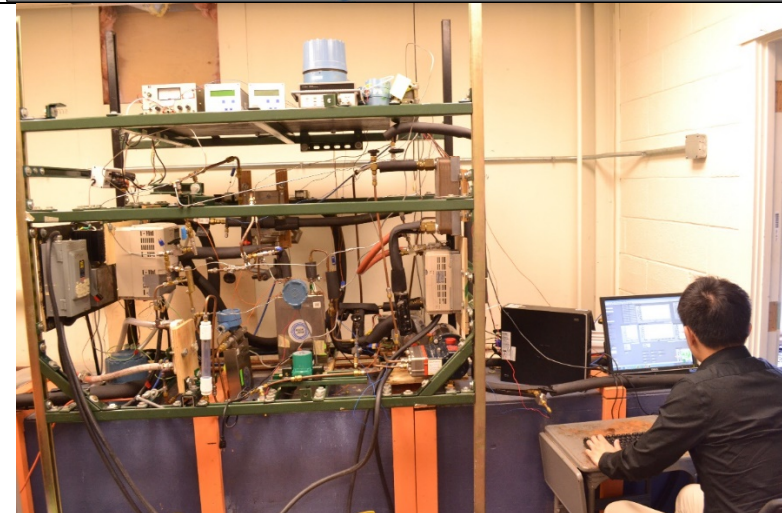
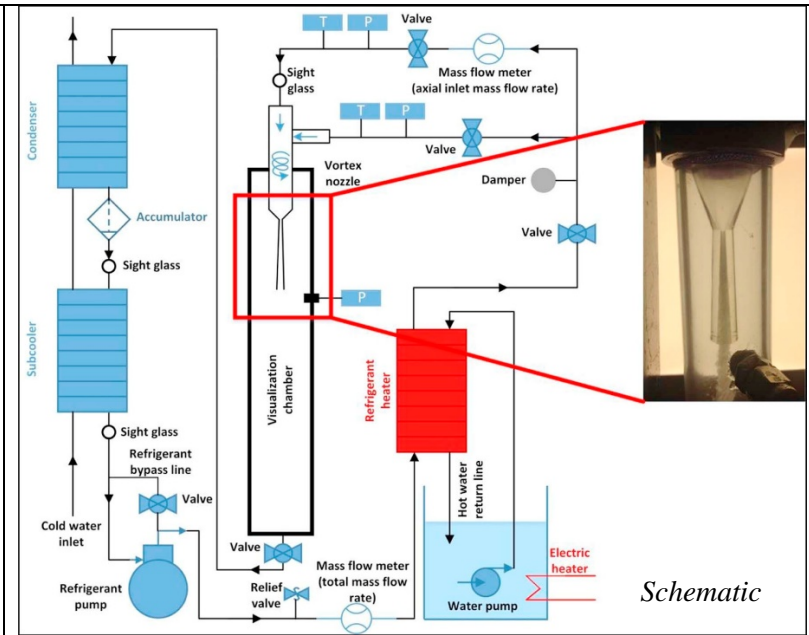


1. MEL 3417: Conditioned Refrigerant Flow Facility to Study Expansion Devices

- Purpose and capability: This pumped refrigerant loop is used to study a) different types of expansion valves and b) expansion work recovery devices for a wide range of low-pressure refrigerants. The facility allows for single and two-phase flow conditions at the test section inlet. Different expansion device inlet pressures can be achieved by adjusting the heating water temperature, pump speed, and inlet control valves. The expansion device outlet pressure can be adjusted by a valve installed downstream of the test section.
- Recent project: Development of vortex control, a novel method of controlling the restrictiveness of an expansion device without having to adjust its physical flow cross-section.
- Components: Plate-style evaporators and condensers, hermetically sealed gear pump (to eliminate problems with refrigerant leakage), diaphragm pump (to cover higher flow rate requirements), a sight glass installed upstream allows for visual investigation of flow field using a high-speed camera with maximum resolution of 512x512.
- Sensors and data acquisition: Coriolis-type mass flow meters, piezo-electric pressure transducers, ungrounded Type-T immersion thermocouples, high-speed flow visualization. An Agilent data logger records all relevant test data using LabVIEW software.
- Operating conditions: Typical test section inlet conditions range from 30 – 45 °C (temperature), 700 - 1500 kPa (pressure) and 25 g/s (refrigerant flow rate).
- Uncertainty: Thermocouples have ± 0.5 °C, pressure reading has ± 2 kPa, mass flow rate reading has ± 0.1 g/s and superheat/subcooling have ± 0.5 °C absolute uncertainty



Monitoring the test conditions through LabVIEW DAQ interface