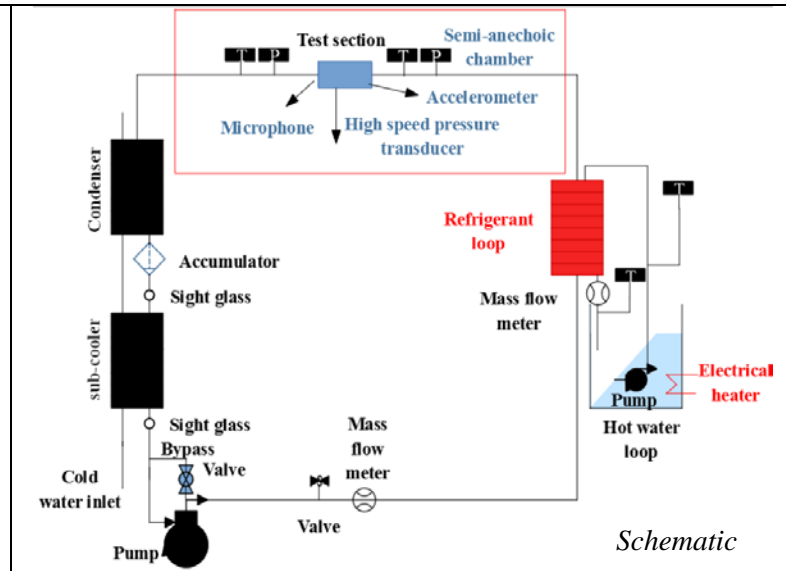


2. MEL 3417: Quantification of Flow-Induced Noise

- Purpose: This facility is used to quantify flow-induced noise in HVAC&R components, such as capillary tubes, expansion valves, ejectors, evaporators, etc.
- Capability: The setup is located inside a semi-anechoic chamber having dimensions of 3.5 m (W) x 4 m (L) x 3 m (H). The specialty of this facility is the combined approach of noise quantification and flow visualization with the help of transparent test sections. For tests with air-side evaporators the heat exchanger can be submerged directly into hot water which provides more accurate noise results as blower noise can be eliminated.
- Recent project: Study of relationship between flow regimes and flow-induced noise using simultaneous measurements of flow regimes and flow-induced noise.
- Sensors: Precision B&K microphones measure the sound pressure, accelerometers and highly dynamic pressure transducers provide noise measurement. High speed cameras provide flow regime measurements.
- Data acquisition: LabVIEW is used to record the high-speed sound data. The sampling rate for the different noise measuring techniques is 44.2 kHz, well above the threshold of the audible range of the human ear. Sampling rates above 40 kHz allow for FFT analysis without loss of information when transforming the recorded signals from the time to the frequency domain. MATLAB is utilized for post processing
- Operating conditions: The setup covers test pressures from 600 kPa to 1200 kPa when R134a is used as the refrigerant (both refrigerant and pressure range can be modified), and the TXV inlet fluid can be either subcooled or two-phase with a vapor quality of up to 0.7.



Setting up an experiment to study flow induced noise in automotive air conditioning systems