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National Reactor Innovation Center Developers Workshop

MAGNET / He-CTF

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MAGNET / He-CTF

Non-Nuclear Component and System Testing

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Microreactor **AG**ile **N**on-nuclear **E**xperimental **T**est bed / **He**lium **C**omponent **T**est **F**acility

- Examine thermal-hydraulic performance in a configurable environment
- Verify models with experimental data
- Test in a non-nuclear environment for post-testing examinations without activation/contamination concerns

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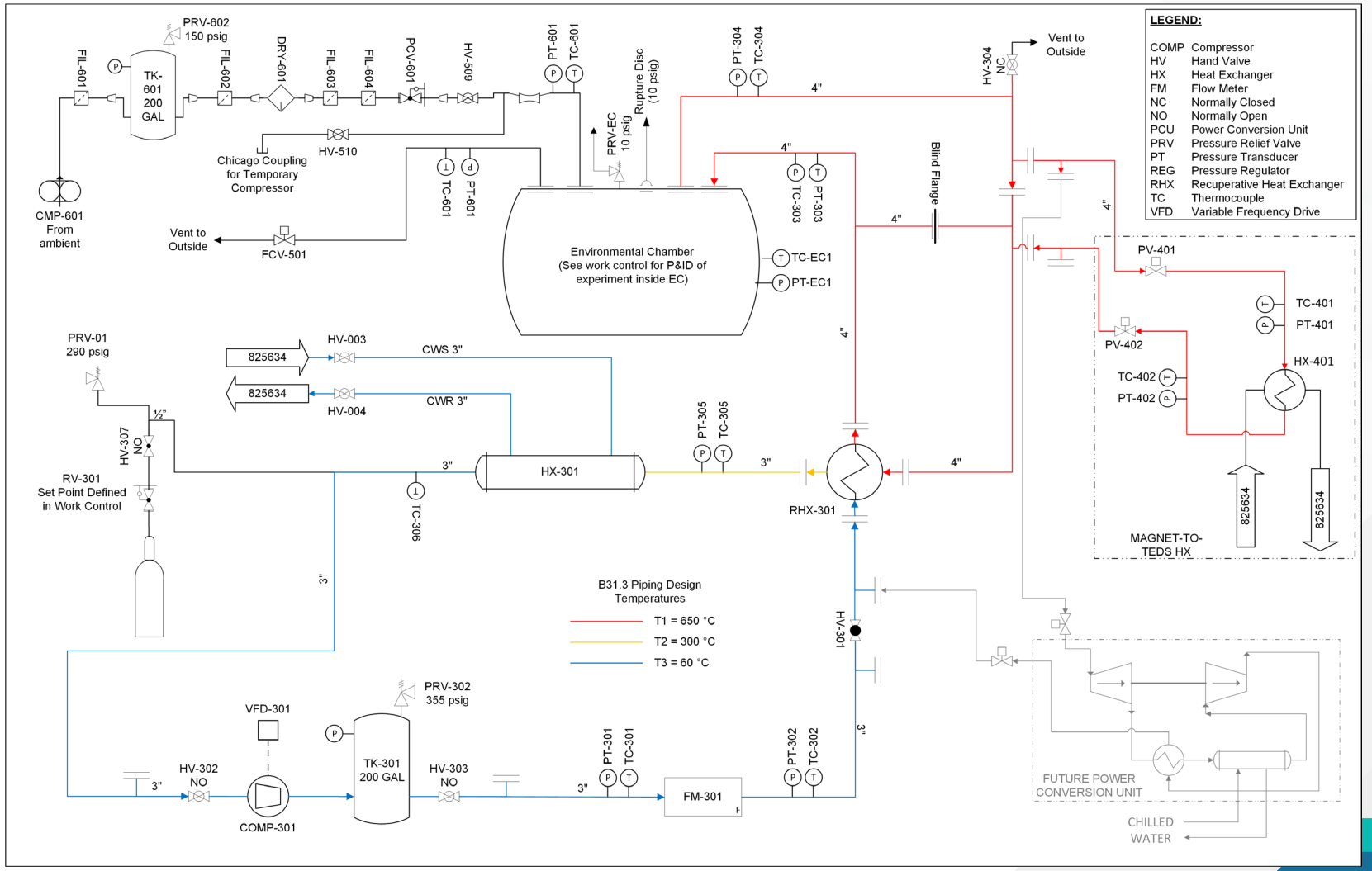
MAGNET / He-CTF Flow Diagram



Flow Diagram

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Features

Closed Loop Gas Cooling

- Reciprocating compressor
- Thermal mass flow meter (gas specific)
- Process heater for inlet temperature control
- Recuperator
- Chilled water cooler
- Integrated system operation options (e.g., gas-Brayton cycle, thermal storage)

Open Loop Air Cooling

- Variable speed screw compressor
- Venturi flow meter
- Flow and pressure control
- Process heater for inlet temperature control

Operating Envelope

Closed Loop Gas Cooling

- Nitrogen or Helium
- ≤ 650°C Test Article Tout
- ≤ 650°C Test Article Tin
- ≤ 20 bar(g)
- 1.86 x 10^{-2} m^3/s at 20 bar(g)
- 80 kW process gas heating
- 250 kW electric resistance heat

Open Loop Air Cooling

- 8.61 x 10^{-2} m^3/s at 1 bar(g)
- ≤ 650°C Texhaust
- 350°C Test Article Tin
- ≤ 10 bar(g)
- 80 kW process gas heating

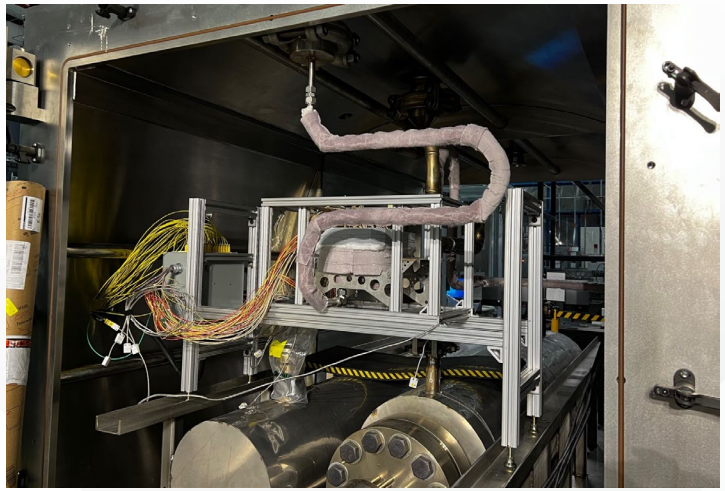
Testing

Heat Exchangers:

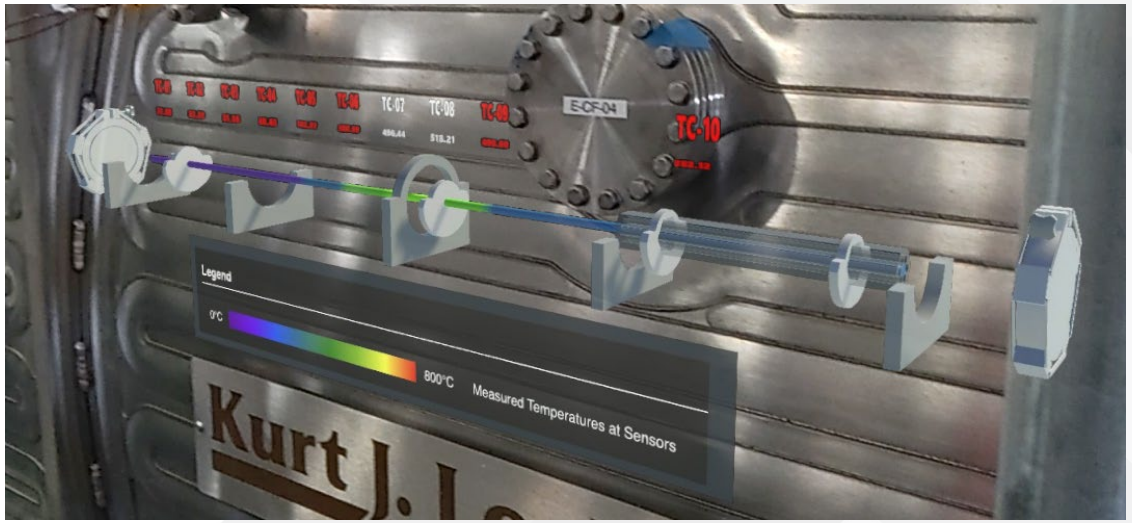
- Helium or Nitrogen to low-pressure air
- Flexible configuration
- 80 kW process heat for pre-heating both streams to prototypic conditions
- HX Testing Run to Date
  - Proprietary shell and tube HX
  - High performance, prototype CPHX (U-Wisconsin)

Core Segments:

- Cartridge heaters (208V/1Ø, 240V/3Ø, 480V/3Ø)
- Configurable, expandable data acquisition
- Demonstrated test capability with single heat pipe test with digital twin integration



HPIHX



Digital Twin Visualization of Single Heat Pipe Test

Thank you!

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