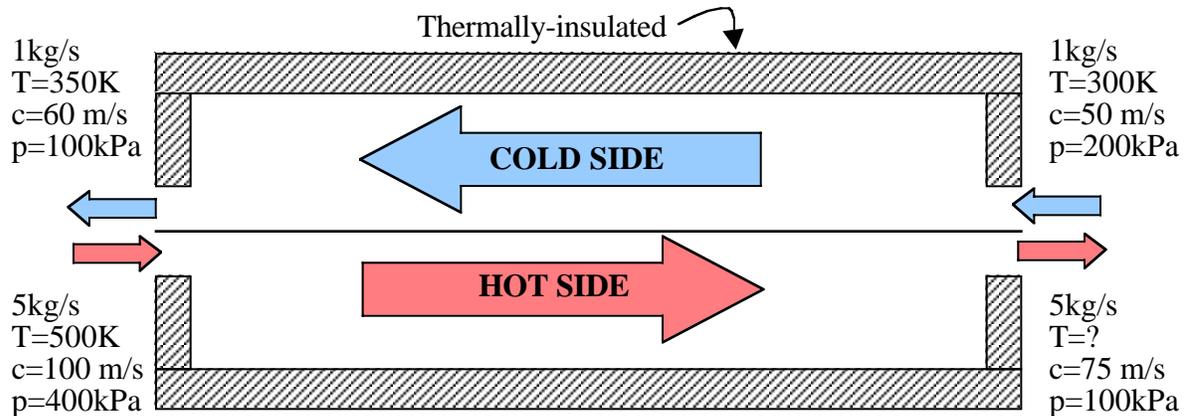


Problem T11 (Unified Thermodynamics)

A device called a heat exchanger is shown below. Assume that both the hot side flow and the cold side flow behave as ideal gases with $R=287 \text{ J/kg-K}$, $c_p=1003.5 \text{ J/kg-K}$, and $c_v = 716.5 \text{ J/kg-K}$.



- What is the temperature at the exit of the hot side flow? (LO# 4)
- This is a quote from *Thermodynamics for Engineers* by Wong, ©2000 by CRC Press. "No work is done in a heat exchanger." Do you agree or disagree and why? Please substantiate your argument with a calculation. (LO# 4)
- Is the process in this device reversible or irreversible and why? (Do not do a calculation; answer with a few sentences) (LO# 5)
- Describe the energy exchange processes in the device in terms of various forms of energy, heat and work. (LO# 2)