

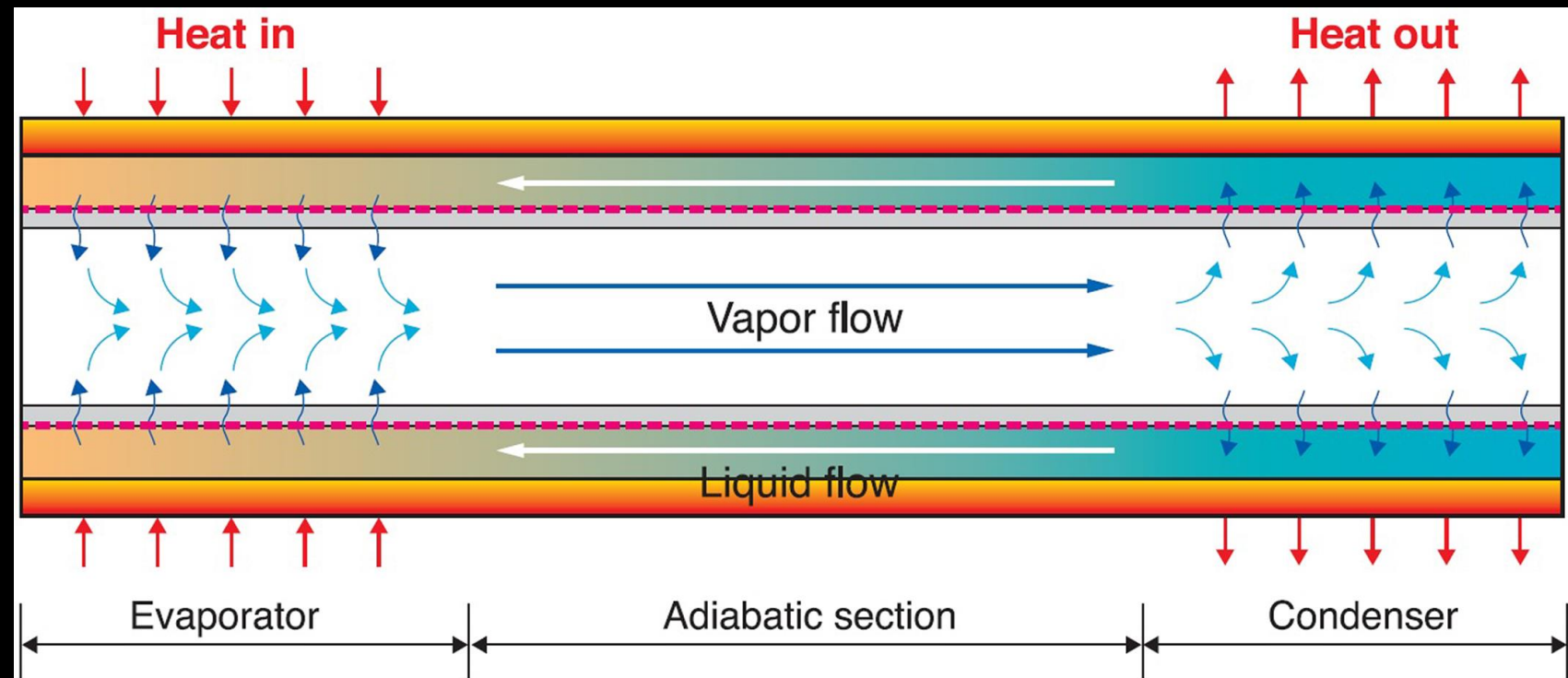
HEAT PIPE EXPERIMENT

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WHAT IS A HEAT PIPE?

- Heat Transfer device
- Applications
 - Electronics
 - HVAC



OBJECTIVES

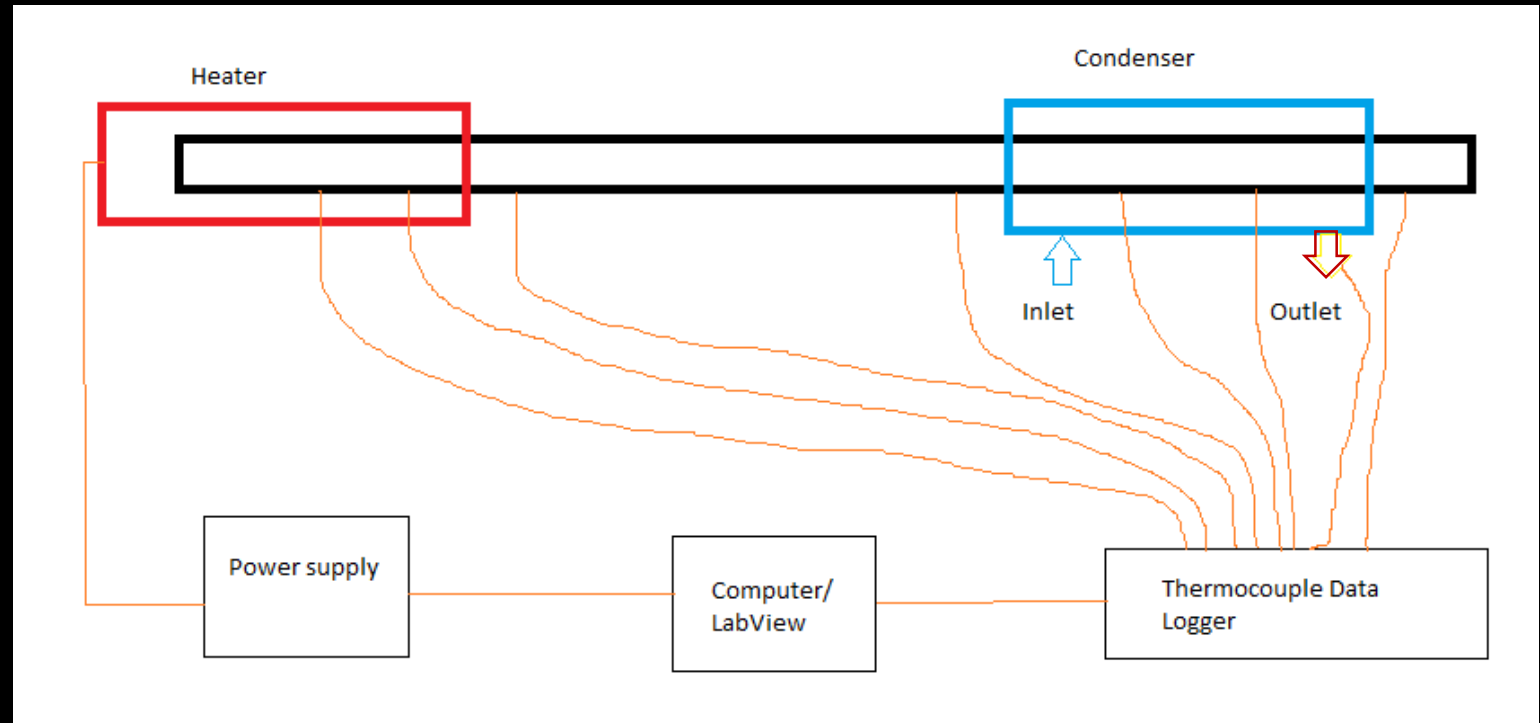
Test the temperature distribution:

1. Heat Pipes
 - Grooved Heat Pipe
 - Meshed Heat Pipe
2. Position
 - Horizontal
 - Vertical
3. Fluid Volumes
 - 1 (~18mL)
 - 2 (~36mL) loads
4. Fluids
 - DI Water
 - Acetone

SYSTEM DIAGRAM

Procedure

1. Vacuum tube
2. Add fluid
3. Turn on system
 - a) Condenser
 - b) Heater
4. Run LabVIEW
5. Change a Variable
6. Clean up



DATA ANALYSIS

- $Q = V * I$ “Power input”
- $h = \frac{Q}{A * (T_{heater} - T_{condenser})}$ “Heat transfer coefficient”
- $R = \frac{(T_{heater} - T_{condenser})}{Q}$ “Resistance of the heat pipe”

Variables: Fill ratio, working fluid, wick and orientation.

Uncertainty Analysis: $T_{real} = T_{read} \pm 1.2 [C]$

OUR DATA

DI WATER

ACETONE

Power Supply

VISA resource name: COM4
Control Mode: Remote
Enable Output (T: Enable): Enable

Serial Configuration
Baud Rate (9600): 9600
Parity (None): None
Data Bits (8): 8
Flow Control (None): None
Stop Bits (1.0): 1.0

Function (0: Voltage): Voltage
Manual Range (0.00): 72.00
Unit (V): V

Measurement Function (0: Voltage): Voltage
Voltage: 51.7265

Measurement Function (0: Current): Current
Current: 1.29810

Measurement Function (0: Power): Power
Power: 67.141

Equations

| Variable | Equation | Value |
|----------|-----------------|---------------------|
| T_1 | P | Q_Power |
| T_2 | V | Average_T_Heater |
| T_3 | t | Average_T_Condenser |
| T_4 | For Calculation | h |

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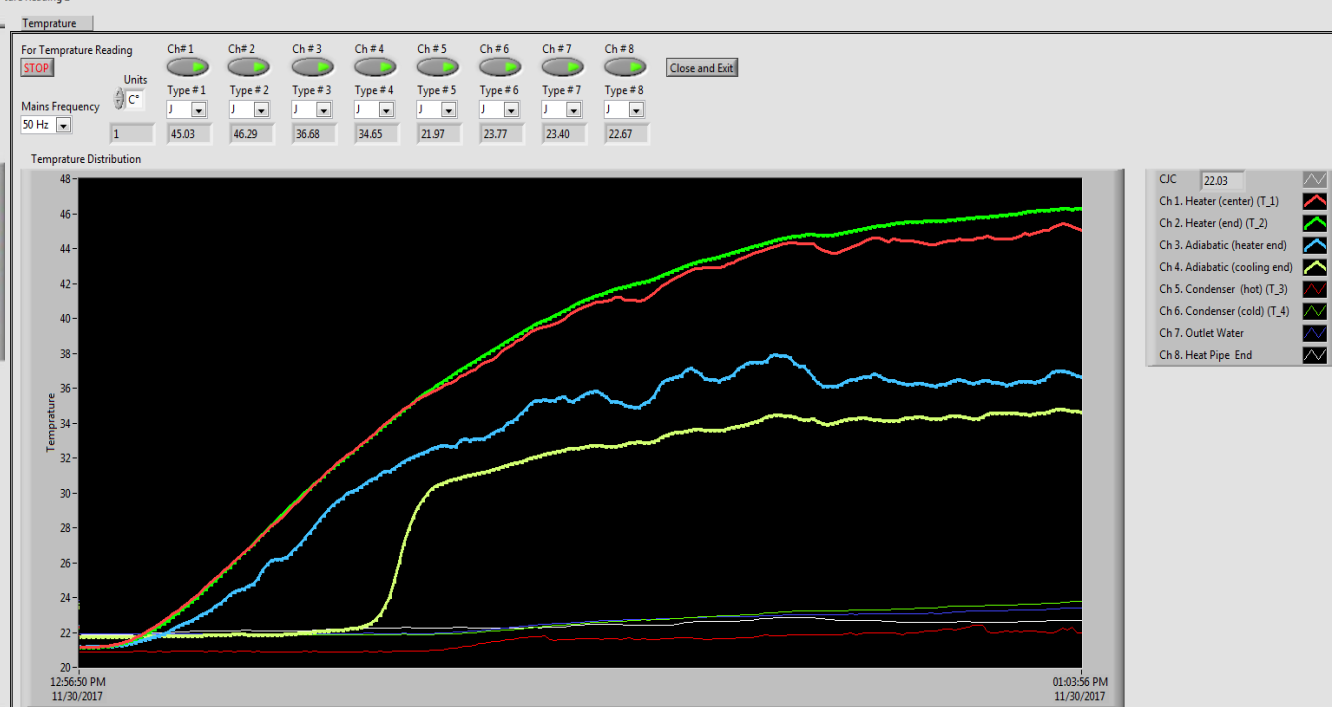
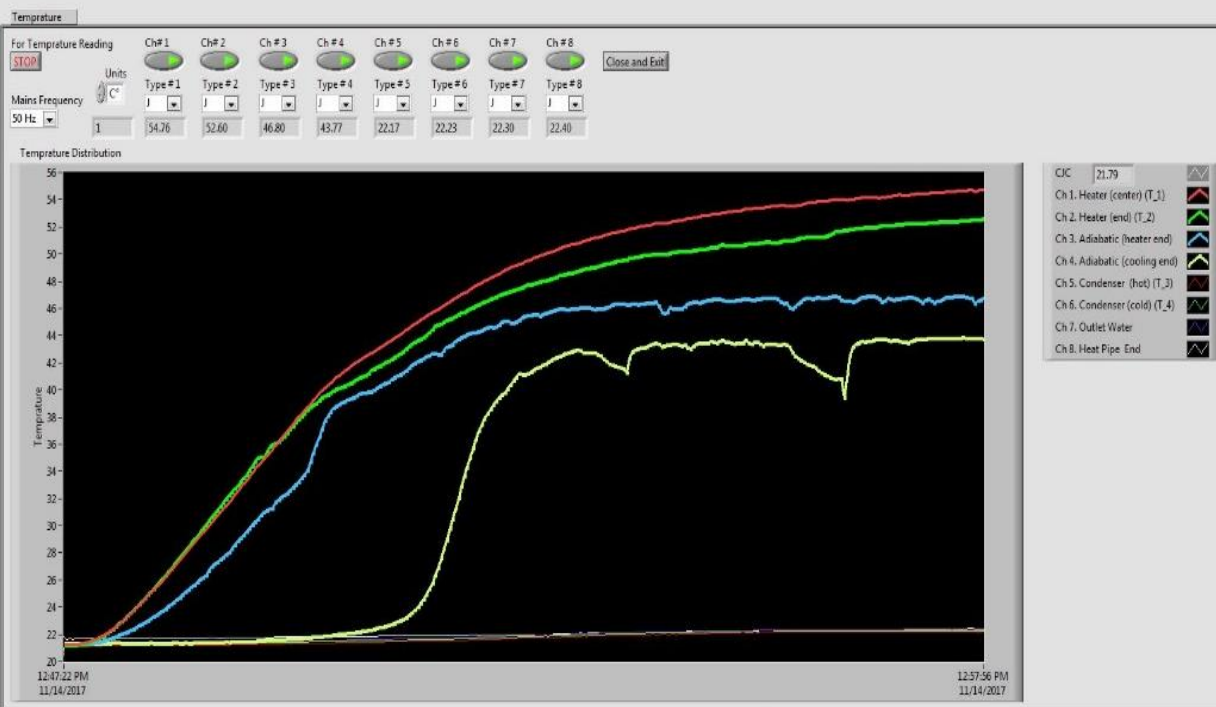
Measurement Function (0: Voltage): Voltage
Voltage: 51.7130

Measurement Function (0: Current): Current
Current: 1.29807

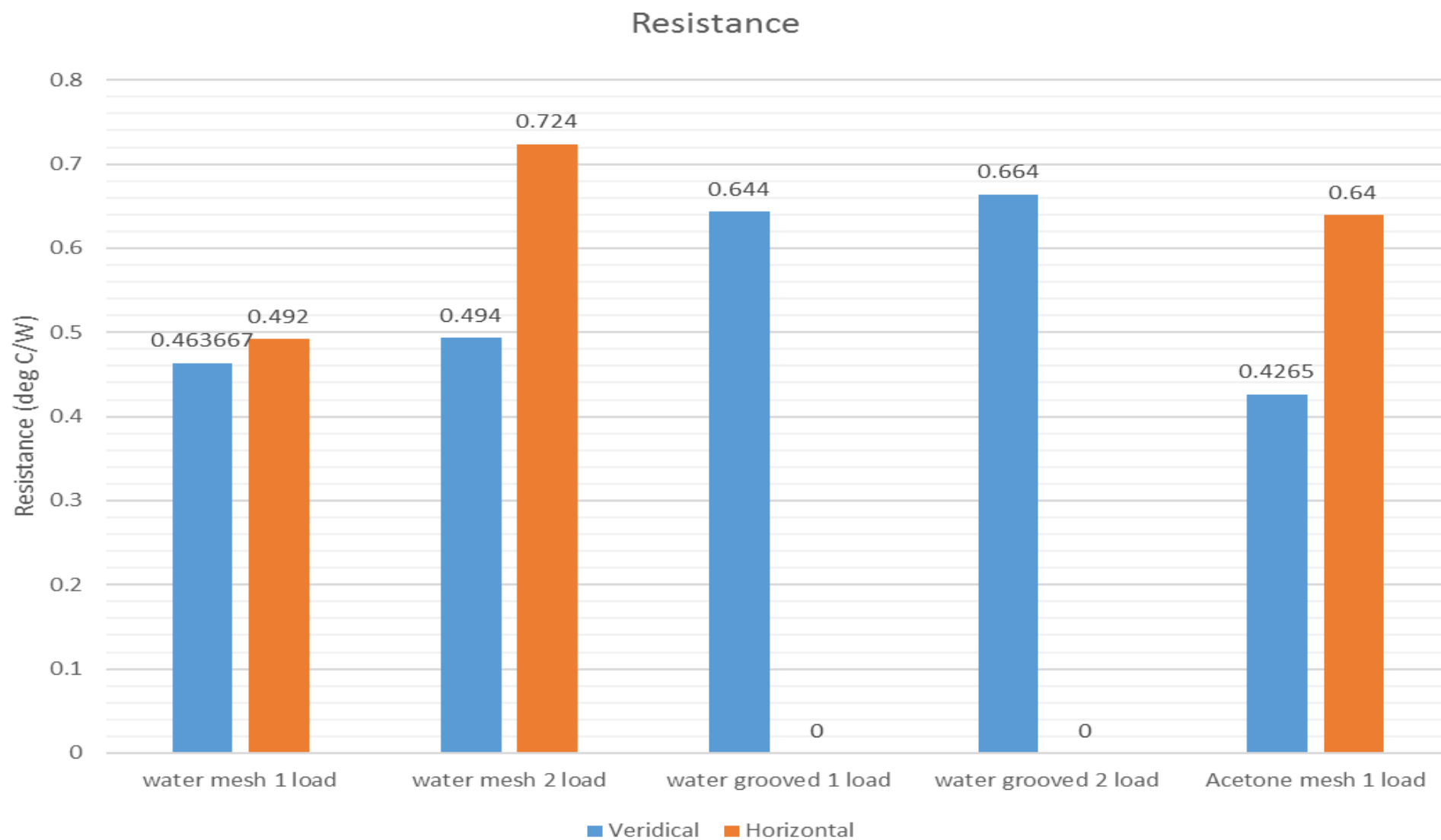
Measurement Function (0: Power): Power
Power: 67.129

Equations

| Variable | Equation | Value |
|----------|----------|---------|
| P | Q_Power | 0 |
| V | m_dot | 0.00542 |
| t | | 120 |



RESULTS



CONCLUSION AND RECOMMENDATION

The vertical mesh heat pipe with acetone is the most efficient.

Recommend redoing the test after getting better fittings.



QUESTIONS?