

# Natural Refrigerant Training Summit

Building a Sustainable Workforce

---

## Adiabatic Cooling

Gregory Martell

Baltimore Aircoil



# Natural Refrigerant Training Summit

## Thank you to our sponsors!

### Premium Sponsors

---



### Basic Sponsors

---



# Who We Are

A 501c3 nonprofit working to create a sustainable future for supermarket refrigeration by removing barriers to natural refrigerant adoption.




**160+**  
member  
companies



**55K+**  
food retail  
locations



# Goals

-  Build a sustainable technician workforce
-  Increase funding for natural refrigerant equipment
-  Improve technology options, education, and awareness

## What are Natural Refrigerants?

$\text{CO}_2$

**R744**  
Carbon Dioxide

$\text{C}_3\text{H}_8$

**R290**  
Propane

$\text{NH}_3$

**R717**  
Ammonia





# Adiabatic Cooling TrilliumSeries™ Condenser



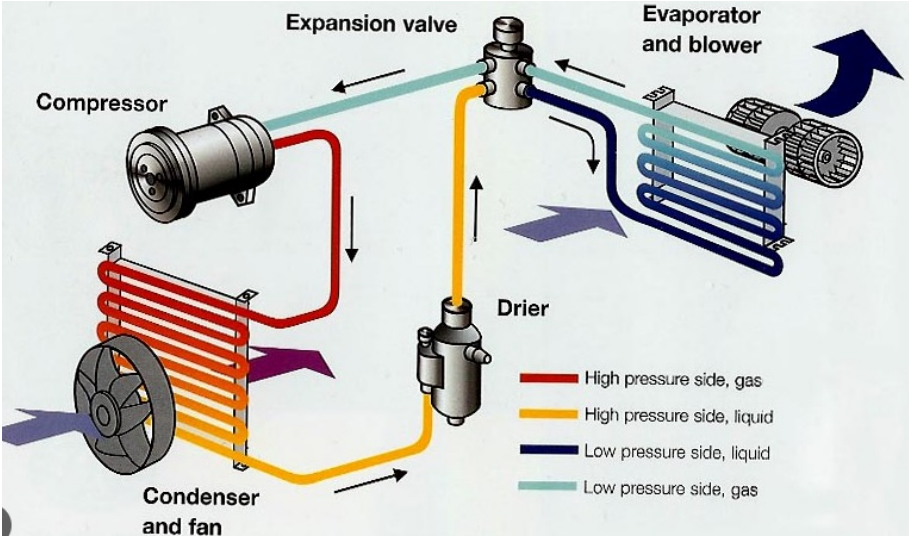


# Agenda

- Introduction
- Types of Condensers
- Adiabatic Cooling
- Adiabatic Condenser



# Refrigeration



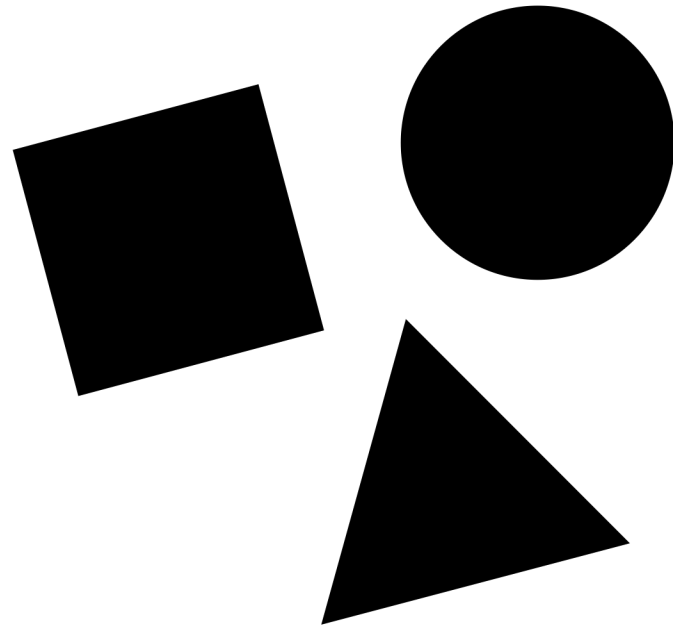


# Refrigeration



# Types of Condensers

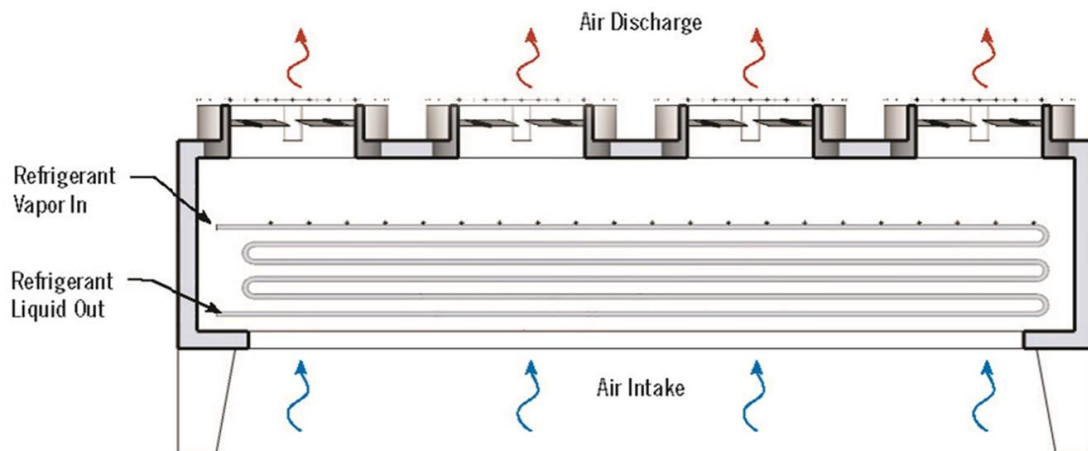
- Air Cooled
- Evaporative
- Adiabatic



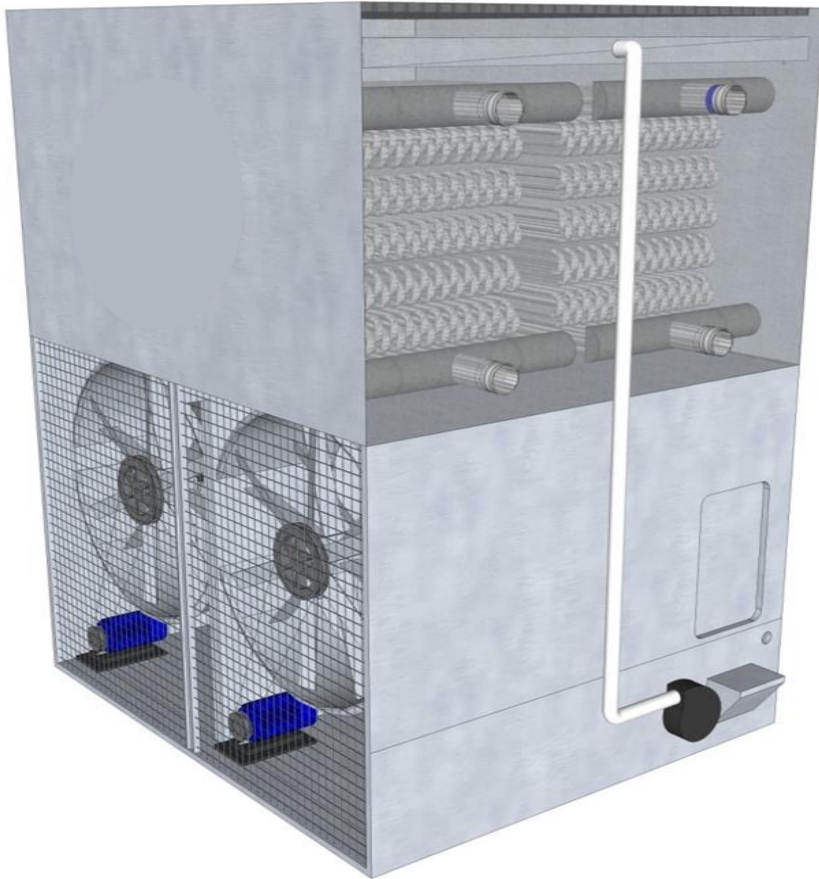


# Air Cooled

- Constrained by the OAT
- Larger footprint



# Evaporative Cooling



- Not limited by the OAT
- Smallest footprint
- Requires large amounts of water

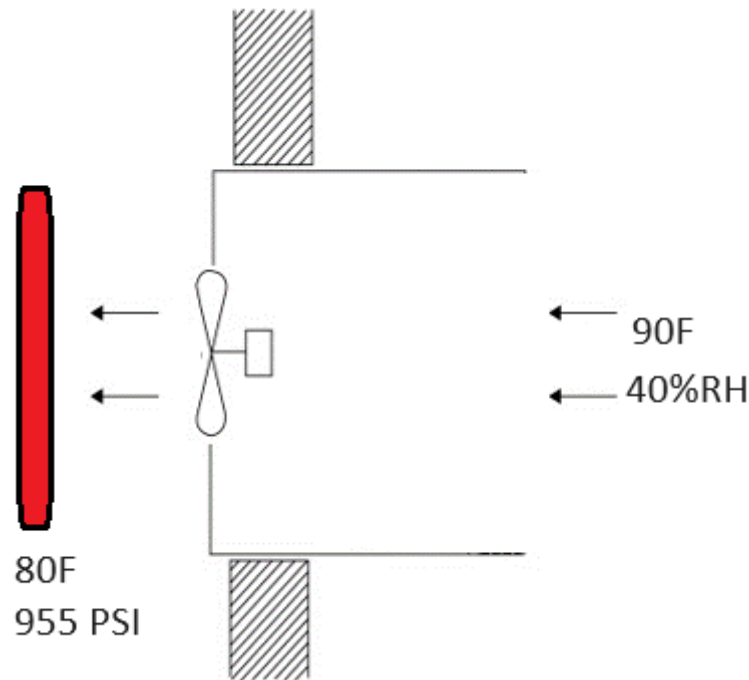
# Adiabatic Cooling



- Not limited by the OAT
- Medium footprint
- Requires small amounts of water



# What is Adiabatic Cooling?





# The Adiabatic Condenser



# Trillium Series Condenser



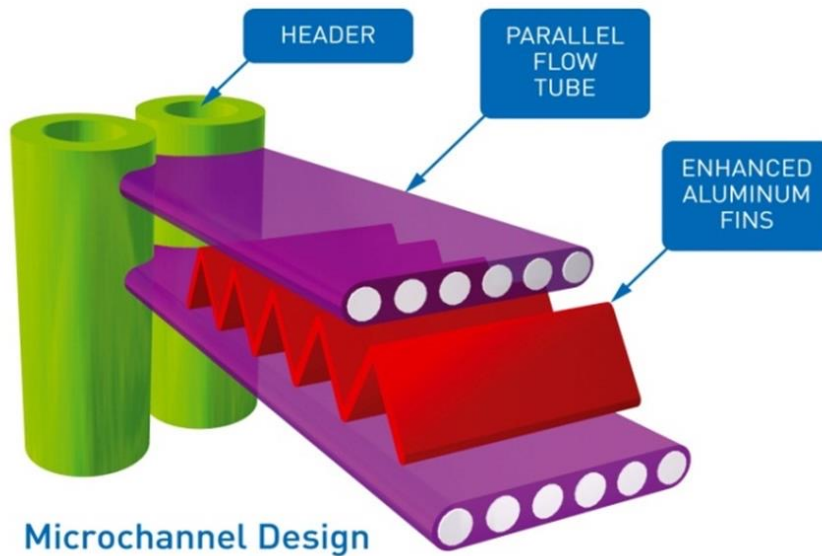
- Components
- Sequence of Operation
- Controls
- Controls Tuning
- Maintenance



# Components

## Coils

- HFC – Microchannel → Low Refrigerant Charge
- NH<sub>3</sub> – Microchannel → Low Refrigerant Charge
- HFC – Tube/Fin → Customer Preference
- R744 – Tube/Fin → Transcritical CO<sub>2</sub>
- Glycol/Water – Tube/Fin





# Components

- Spray Branches (2 types)





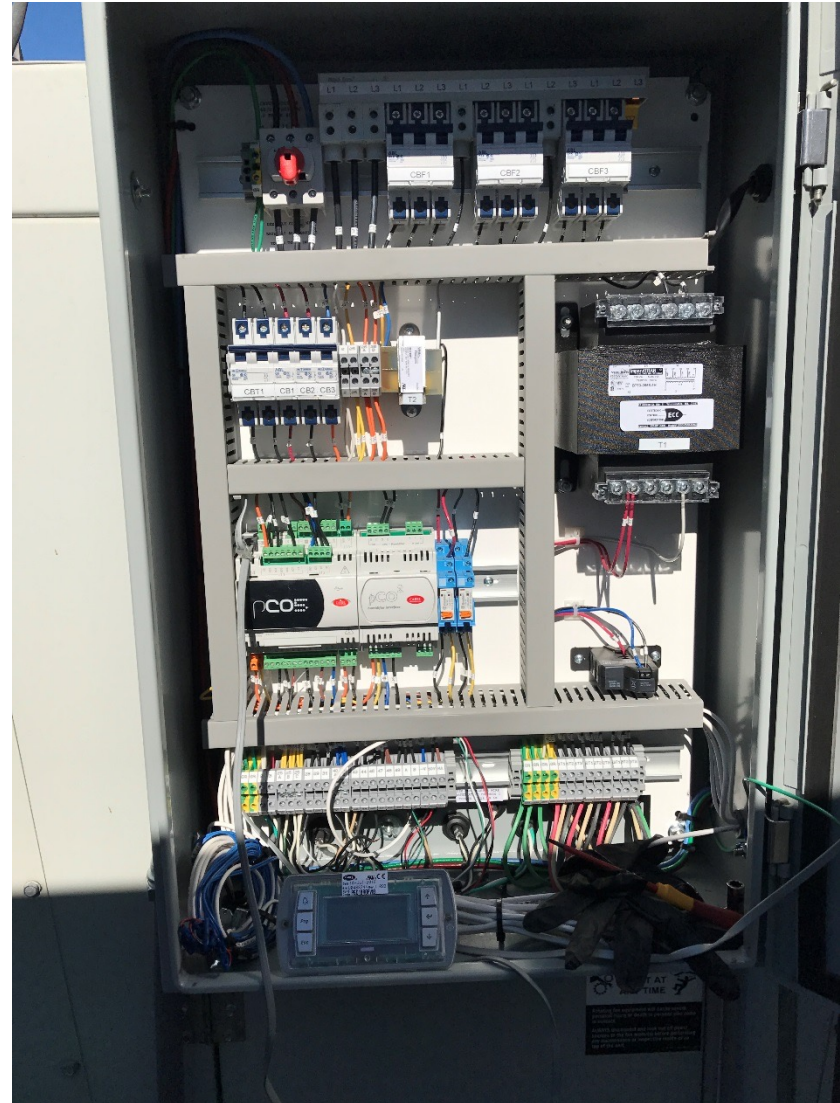
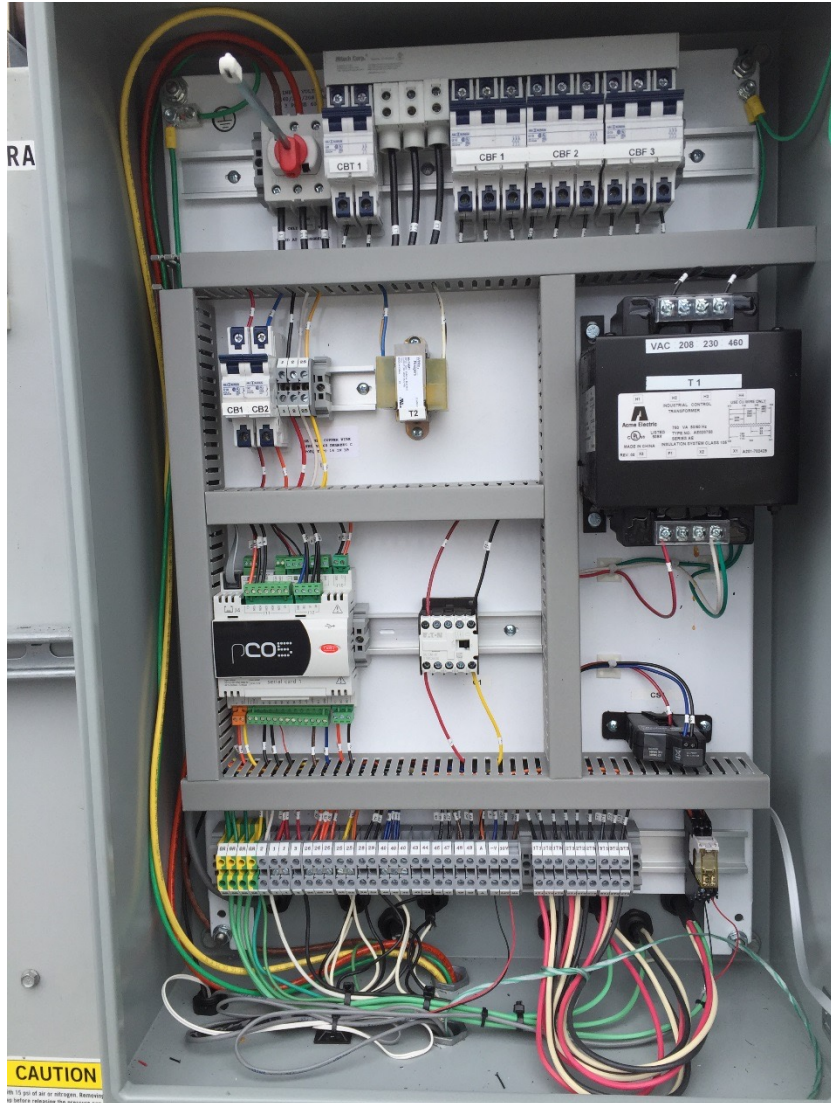
# Components

- Pads

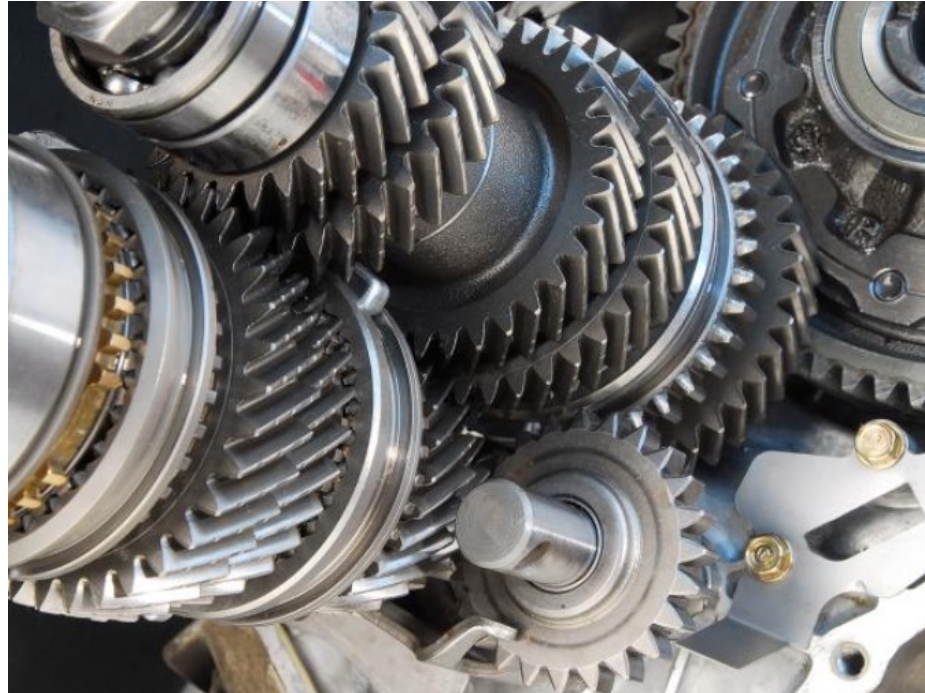




# Components

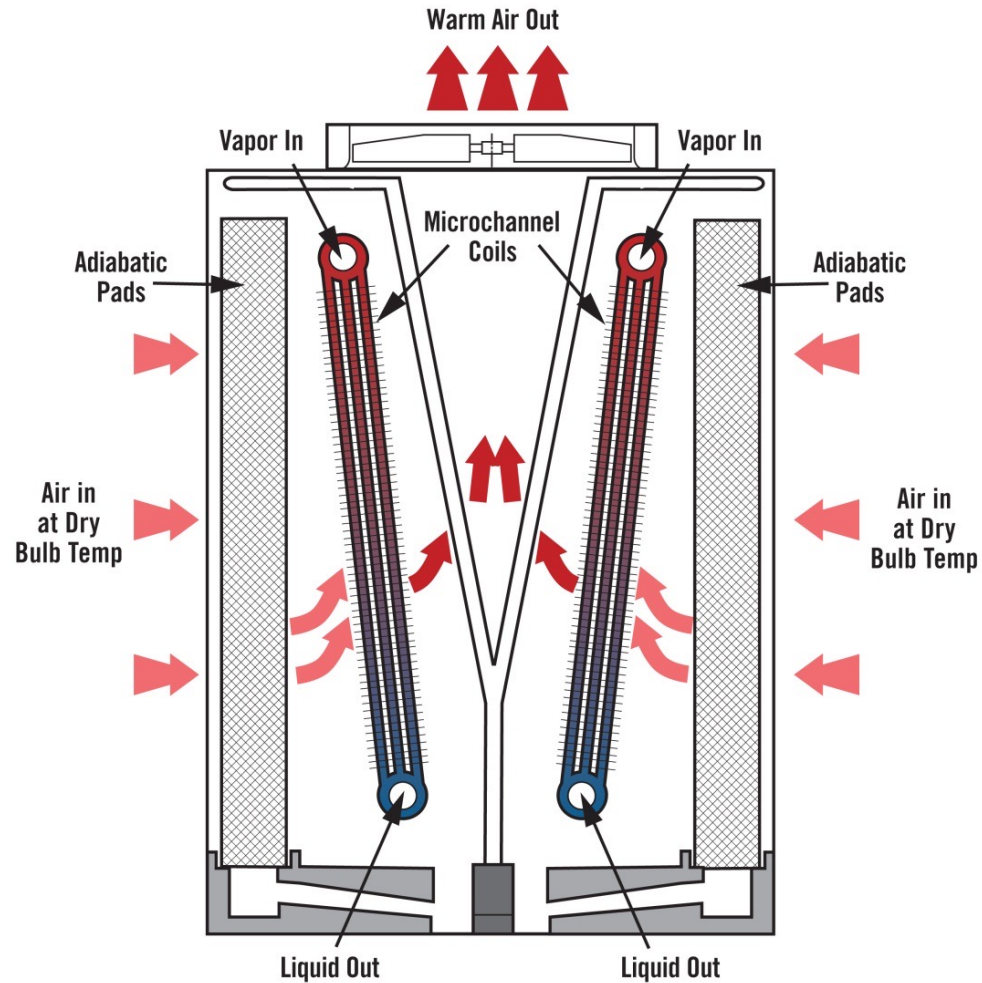


# Modes of Operation



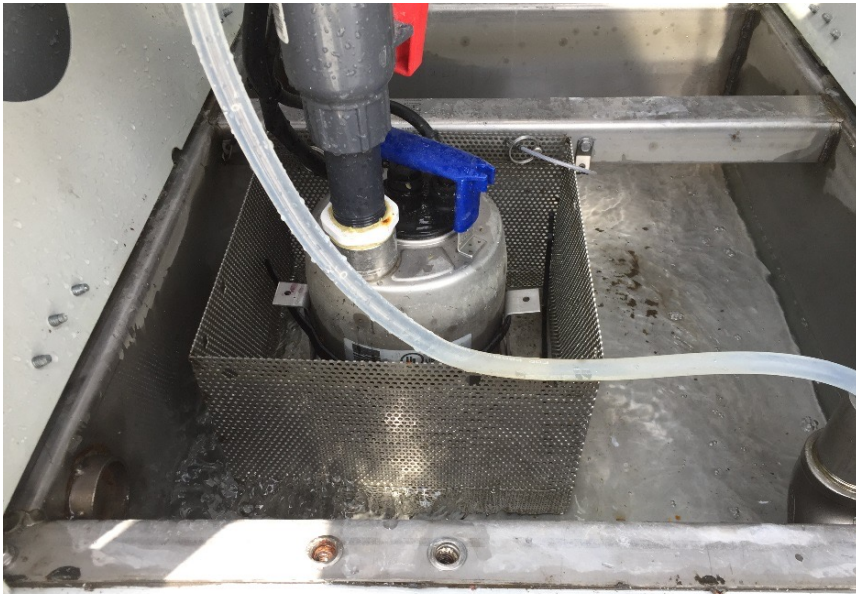


# Dry Operation





# Pre Cool Mode Operation



- **Periodic Drain:** Every 2 hours of Pre-cool operation
  - Drain valve opens for 2 minutes
    - Periodicity and duration can be adjusted
  - Dependent on local water quality
- **Daily Drain** (every 24 hours)
  - Pad drying time adjustable
    - 2:00 – 6:00am (default)
  - Sump and distribution system are completely drained
- **Conductivity Based** (as needed)
- **Bleed line**
  - Installed at discharge of pump
  - Allows customers to increase bleed on-site

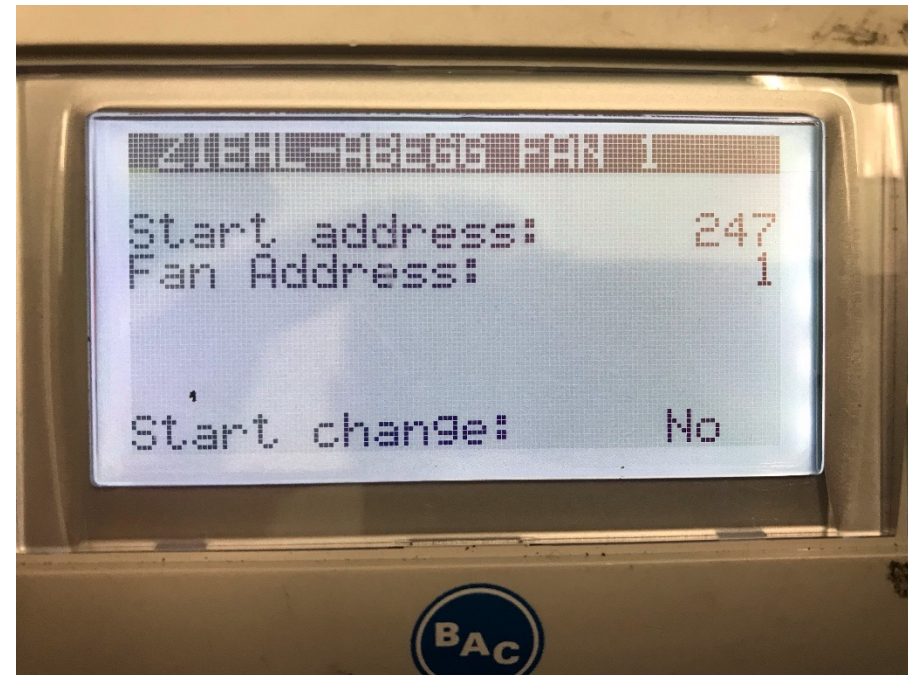
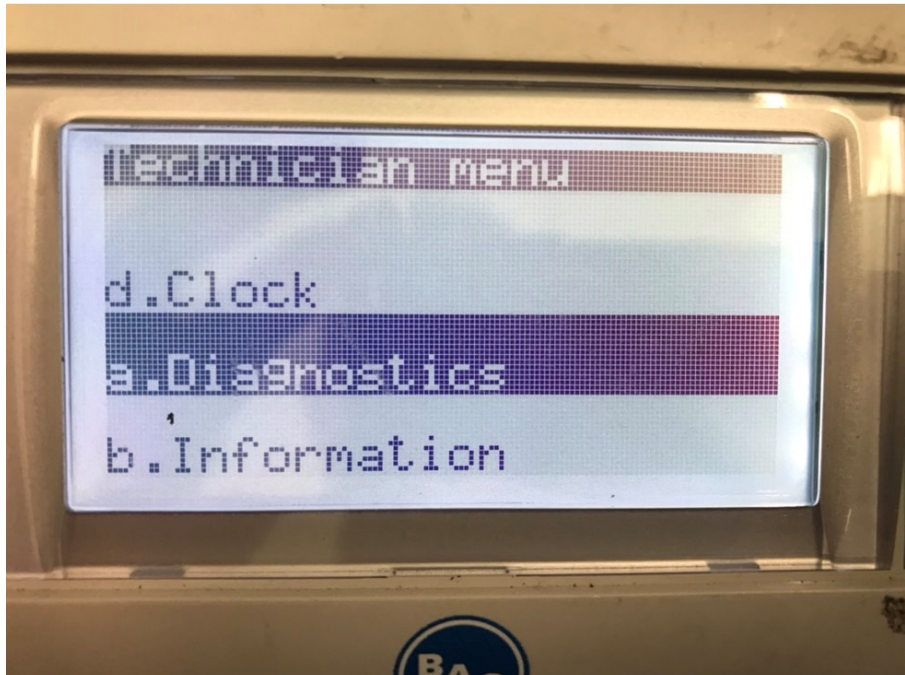
# Controls

- Basic settings
- Fan Addressing
- Tuning



# Fan Addressing

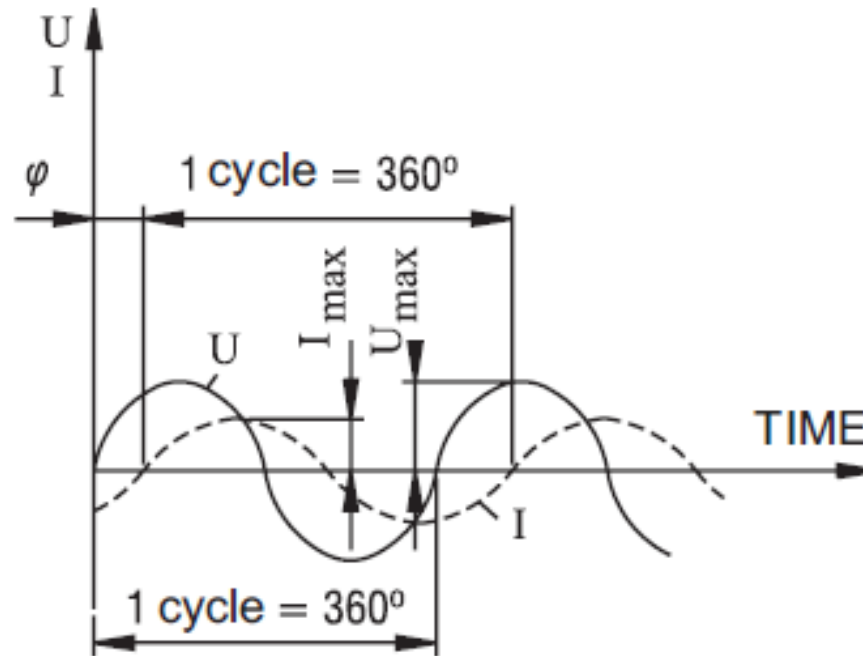
- Required on all fan replacement
- Fan #1 is always the closest to the Control Panel
- Fan Power must be cycled after the addressing procedure is completed



# Controls Tuning

TRILLIUMSERIES™ ADIABATIC CONDENSER

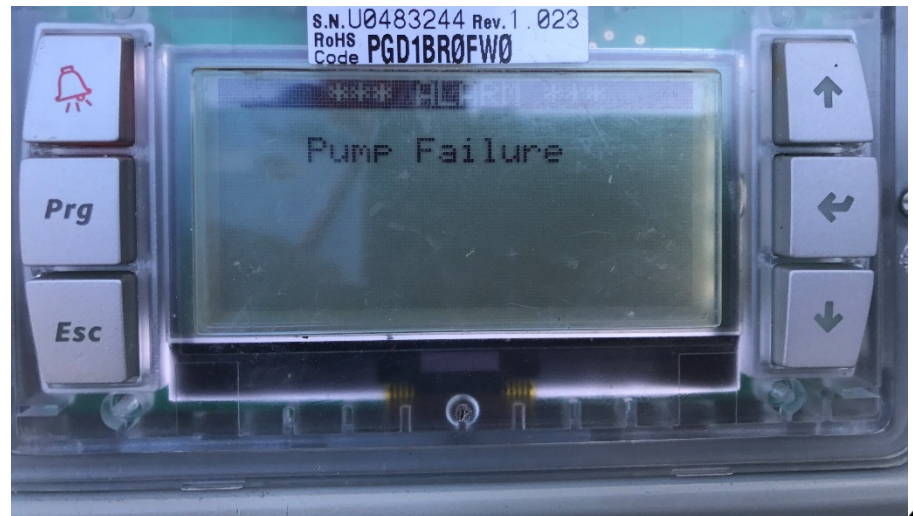
## Appendix: Danfoss and Emerson CPC Rack Controllers





# Maintenance

- Coils
- Pads
- Basin





# Pad Installation

Always install the narrow pad as indicated by the label on the unit!





# Replacing a Pump



- Check the float
- Ensure a new pump is being installed (Ebara)
- Ensure the correct orifice plate is installed

