

# Getting Comfortable with Designer Air

The Architect Outdid Himself.  
So Did The HVAC Guy.

Want To Learn How?



# Today's Presenters



**Katrina Yohey**

- **Product Manager, Variable Speed - Air Conditioning**
- **10+ Years Experience In Marketing**
- **1+ Year With Emerson**
- **Responsible For Compressor And Electronics Product Marketing For Unitary Variable Speed Air Conditioning Applications**



**Dan DeLand**

- **Senior Project Engineer, Variable Speed - Air Conditioning**
- **8 Years Experience In HVACR Industry**
- **Responsible For Implementation And Trouble Shooting Of Unitary Variable Speed Platforms**
- **Specializing In Air Conditioning System Design And Testing**

# Agenda

- 1** What Is A Variable Speed System?
- 2** Variable Speed Technology Benefits?
- 3** Explanation Of How Variable Speed Matches Building Load Better Than A Traditional System
- 4** Component Changes Of A Typical Variable Speed System

# System Designs Vary Depending On OEM Specifications

## Premium And Mid-tier Examples



Speed Ranges	Discrete Speeds	Fully Variable
SEER	~16 – 18	~20+
HSPF	10-11	10-13

**\*Typical premium and mid-tier air-to-air profile**

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- 4 **Component Changes Of A Typical Variable Speed System**

# Polling Question:

**On Average, How Many Variable Speed Systems Do You Typically Quote Per Year?**

1. Currently, We Do Not Quote Variable Speed Systems
2. Between 1 – 10 Systems
3. Between 11 – 25 Systems
4. Between 26 – 50 Systems
5. 50+ Systems



# Enhanced Energy Efficiency

Variable Speed Systems Reduce Energy Costs Up To 40%

**Location Selection:** Dayton, OH

**System Configuration:** Heat Pump → Heat Pump

**SEER:** 10 (Current) vs 16 (User Selection)

**HSPF:** 8.2 (Current) vs 9 (User Selection)

**Calculate Savings**

**Energy Costs:** Electric \$(Kw/Hr) 0.1, Oil \$(Gal) 1.82, Propane \$(Gal) 1.48, Natural Gas \$(MCF) 9.68

**Logos:** SAVER, EMERSON Climate Technologies



# Enhanced Comfort

## Precise Climate Control

### Temperature Control

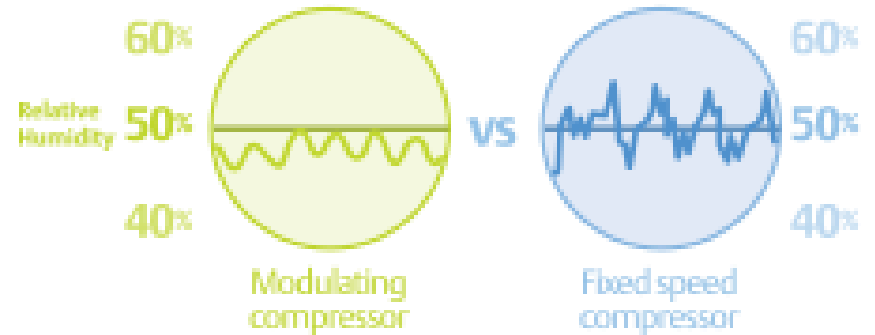


- Variable speed compressor
- Standard Air Cond./Heat pump

**Maintain More Even Temperature**

**Reduces Hot / Cold Spots**

### Humidity Control

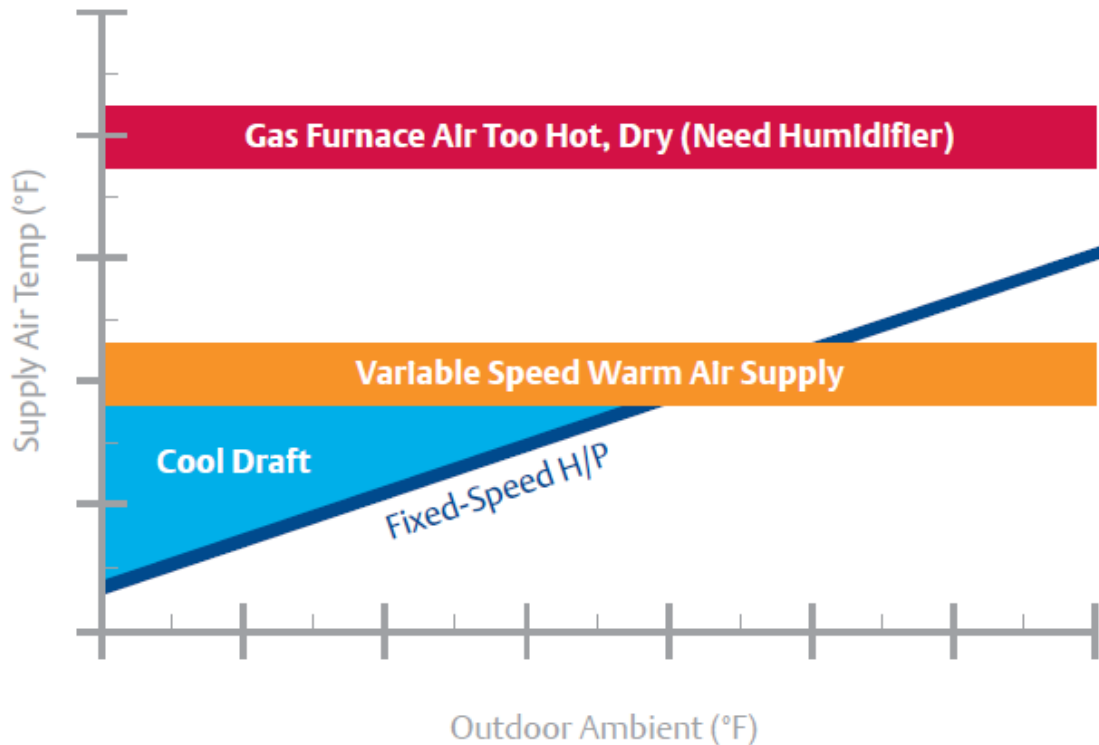


**Decrease Relative Humidity With Systems That Can Achieve Longer Run Cycles**



# Enhanced Comfort

## Hotter Supply Air in Heat Pumps\*\*



Compressor Design Enables Heat Pumps to Supply Hotter Air During Cold Winter Conditions

**\*Some Variable Speed Systems**

# Additional Homeowner Benefits

(Not All Systems)

- **Advanced Connectivity Through Communicating T-stats**
- **Quiet Operation**
  - Sound Blankets
  - Soft Start
  - Controlled Shutdown
- **More Effective Zoning**



# Polling Question:

**How Many Variable Speed Systems Do You Typically Install On An Annual Basis?**

1. Currently, We Do Not Sell Variable Speed Systems
2. Between 1 – 10 Systems
3. Between 11 – 25 Systems
4. Between 26 – 50 Systems
5. 50+ Systems



# Contractor Benefits

- **Test Mode For Charging**
- **Upsell Potential With Higher Value Product**
  - Indoor/Outdoor Replacement
- **Longer Warranties**
- **Premium/Advanced Diagnostics**



**\* Adhere To Manufacturers Instructions For Installation**

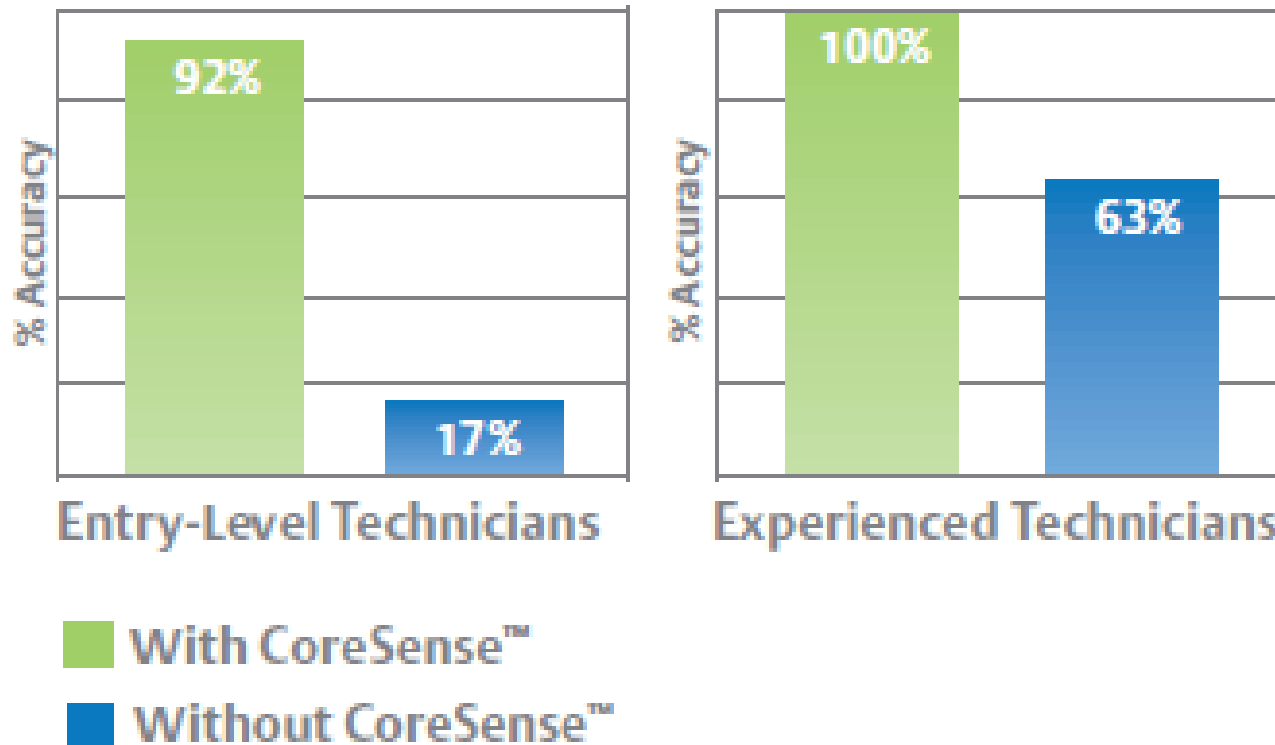
# Diagnostics Increases Reliability

Benefits Category	Software / Hardware Features	
<b>Compressor Control</b>	Speed / Torque Control	
	Soft Starting	
	Controlled Shutdown	
	Power Interrupt Capacity	
	Stator Heating	
<b>Compressor Protection</b>	Loss of Phase	<b>Common to Most Drives</b>
	Over Load/Over Current Condition	
	Locked Rotor	
	Scroll/DLT Over Temperature	
	Input Over/Under Voltage	
	Compressor Envelope Protection	
<b>Monitor &amp; Diagnosis</b>	Status Monitor and Fault Diagnosis	

- **Protects Compressor And System From Running Outside Of Design Parameters**
- **Reduced Compressor Cycling Improves Reliability**

## Example: Diagnostics Increases Compressor Reliability

### Problem-Solving Accuracy – Troubleshooting Air Conditioning System Faults

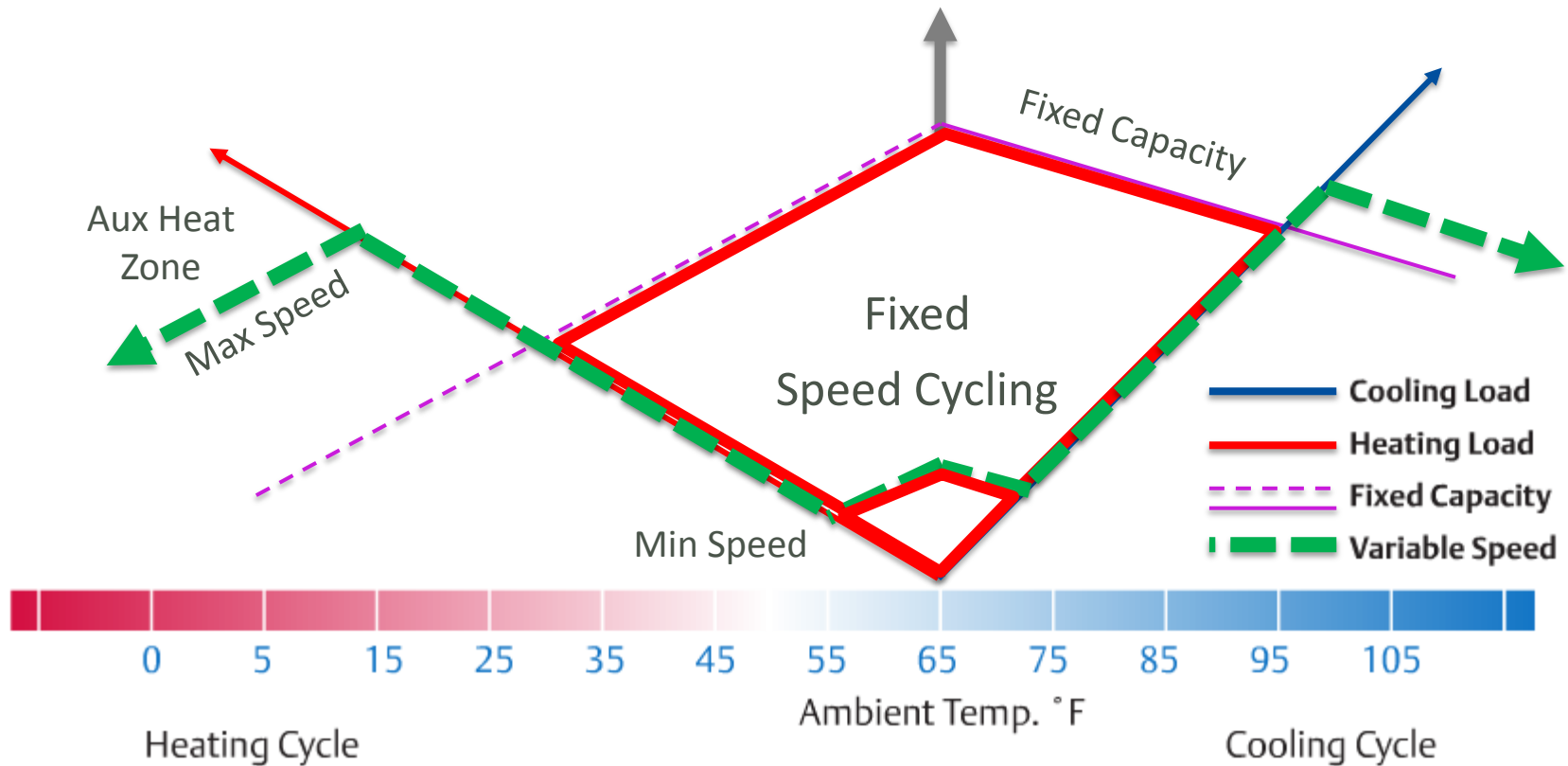


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# Fixed Speed Vs. Variable Speed Capacity

How Does A Variable Speed System Match Capacity Of The Building?





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# System Designs Vary Depending On OEM Specifications

## Premium And Mid-tier Examples

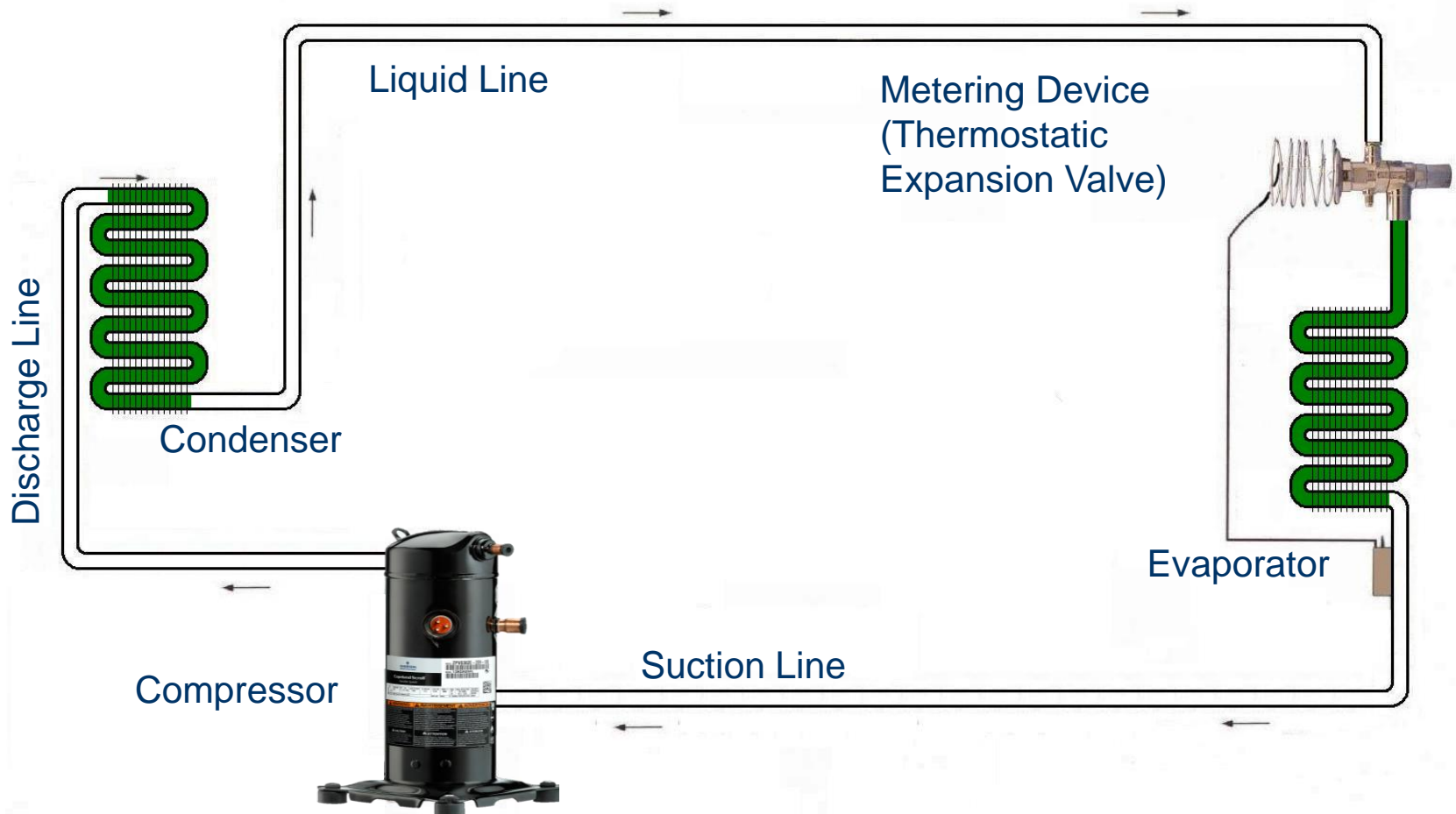


Speed Ranges	Discrete Speeds	Fully Variable
Indoor Fan	Discrete Speeds	Fully Variable
Expansion Valve	Thermal	Electronic
Thermostat	2 Stage or Communicating	Communicating
Coil Size	Larger	Largest
SEER	~16 – 18	~20+

**\*Typical premium and mid-tier air-to-air profile**

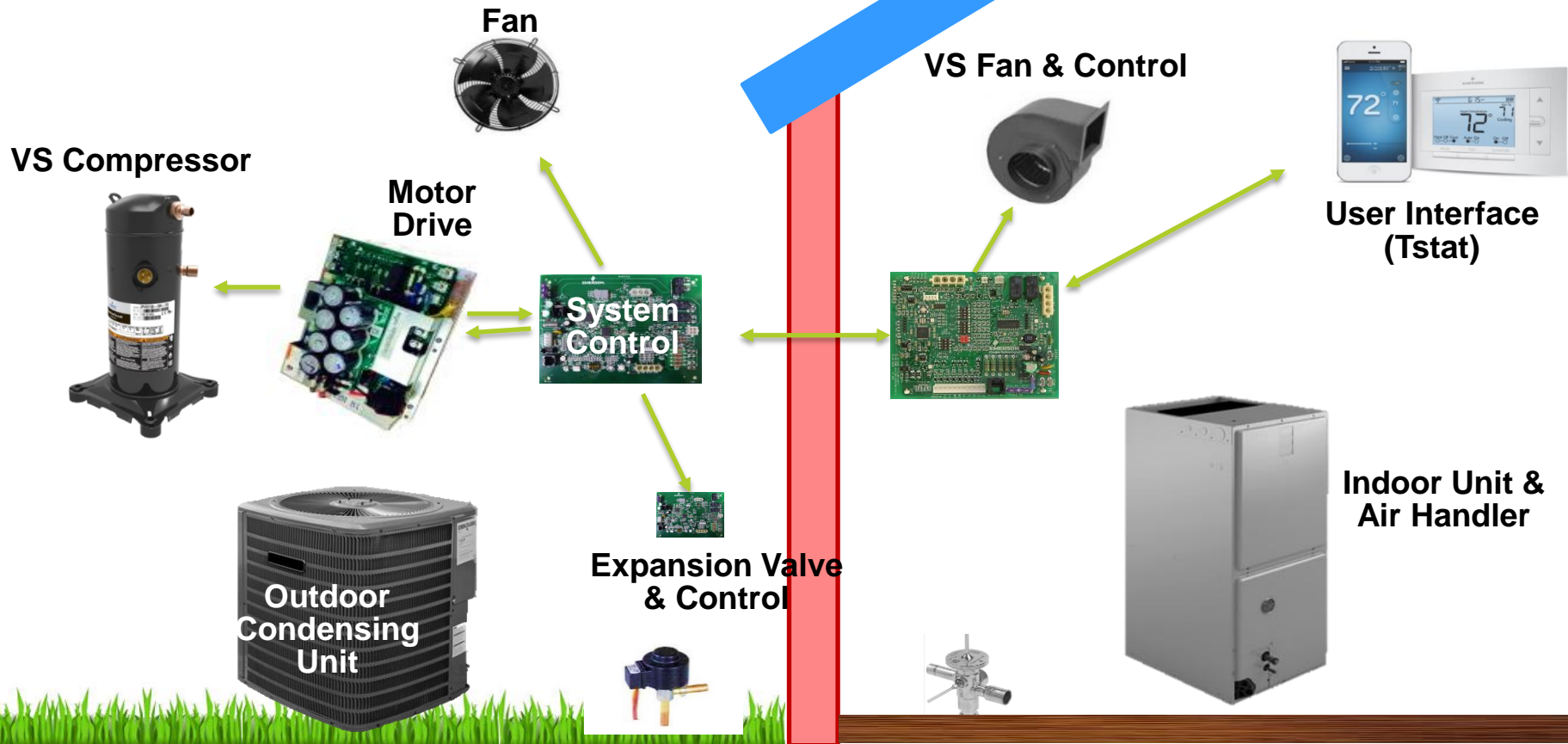
# Variable Speed Refrigerant Circuit

Same as Fixed Speed Applications

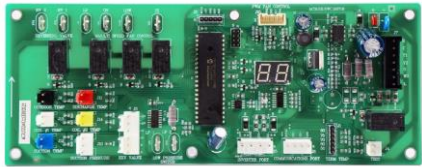


\*AC Refrigerant Circuit Example

# System Communication



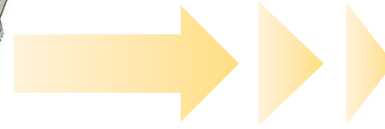
# System Control Monitors System Operation



System Control

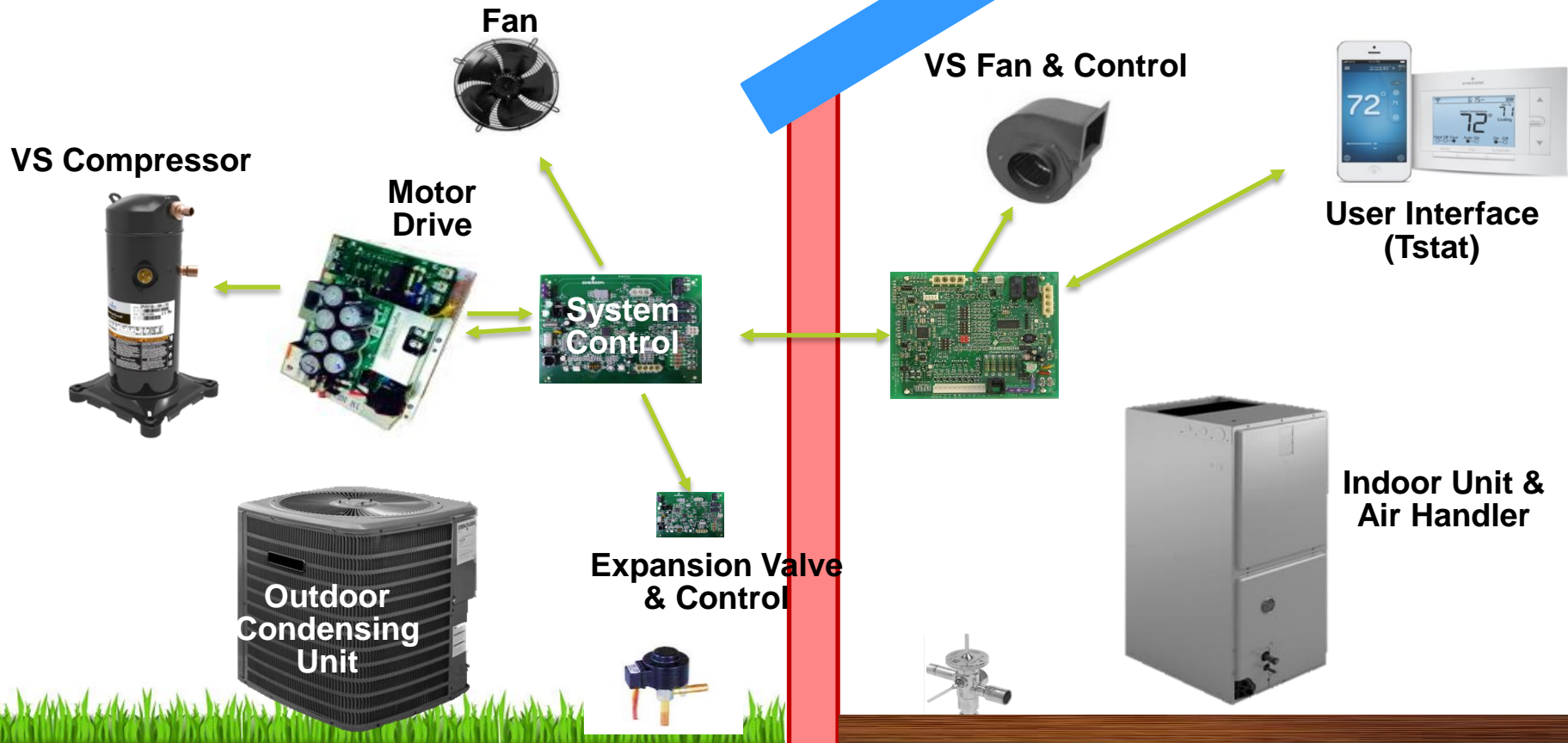


Motor Drive / Inverter



Variable Speed Compressor  
With BPM Motor

# System Communication



# Minimal Components Differences From Fixed Speed

## Not Required with Variable Speed



Contactor



Start Components

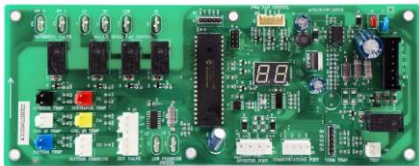


Run Capacitor



Crank Case Heater

## Additional Variable Speed Components



Outdoor Controller



Filter, Inverter, Choke



Sensors

# Summary



## **Understand The Differences Between Available Systems**

- Premium And Mid-tier Variable Speed Systems Vary Dramatically In Design



## **Consider How Variable Speed Can Satisfy Customer Needs**

- Homeowner Benefits: Enhanced Comfort, Energy Efficiency And Reliability
- Contractor Benefits: Built In Reliability, Advanced Diagnostics



**Explained system differences Between Variable and Fixed Speed Systems with regards to both operation and their components.**





INTRODUCING DESIGNER AIR

**Thank You For Attending!**

To Learn More On “*Getting Comfortable With Designer Air*”, Please Visit Our Webpage At [emersonclimate.com/designerair](http://emersonclimate.com/designerair)

Stay Tuned For More Emails Containing Information And Timing On Our Next Webinar!

