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**

<table>
<thead>
<tr>
<th>Speed Ranges</th>
<th>Discrete Speeds</th>
<th>Fully Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEER</td>
<td>~16 – 18</td>
<td>~20+</td>
</tr>
<tr>
<td>HSPF</td>
<td>10-11</td>
<td>10-13</td>
</tr>
</tbody>
</table>

*Typical premium and mid-tier air-to-air profile*
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
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 Currently, We Do Not Quote Variable Speed Systems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%
Enhanced Comfort
Precise Climate Control

Temperature Control

Maintain More Even Temperature
Reduces Hot / Cold Spots

Humidity Control

Decrease Relative Humidity With Systems That Can Achieve Longer Run Cycles

Variable speed compressor vs Standard Air Cond./Heat pump
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

<table>
<thead>
<tr>
<th>Benefits Category</th>
<th>Software / Hardware Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor Control</td>
<td>Speed / Torque Control, Soft Starting, Controlled Shutdown, Power Interrupt Capacity, Stator Heating</td>
</tr>
<tr>
<td>Compressor Protection</td>
<td>Loss of Phase, Over Load/Over Current Condition, Locked Rotor, Scroll/DLT Over Temperature, Input Over/Under Voltage, Compressor Envelope Protection, High Pressure Cutout</td>
</tr>
<tr>
<td>Monitor &amp; Diagnosis</td>
<td>Status Monitor and Fault Diagnosis</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th></th>
<th>Entry-Level Technicians</th>
<th>Experienced Technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Accuracy</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>% Accuracy</td>
<td>17%</td>
<td>63%</td>
</tr>
</tbody>
</table>

- With CoreSense™
- Without CoreSense™
Agenda

1. What Is A Variable Speed System?
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4. Component Changes Of A Typical Variable Speed System
Fixed Speed Vs. Variable Speed Capacity

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

1. What Is A Variable Speed System?
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3. Explanation Of How Variable Speed Matches Building Load Better Than A Traditional System
4. Component Changes Of A Typical Variable Of A Variable Speed System
### System Designs Vary Depending On OEM Specifications

**Premium And Mid-tier Examples**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Mid-Tier System</th>
<th>Premium System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Ranges</td>
<td>Discrete Speeds</td>
<td>Fully Variable</td>
</tr>
<tr>
<td>Indoor Fan</td>
<td>Discrete Speeds</td>
<td>Fully Variable</td>
</tr>
<tr>
<td>Expansion Valve</td>
<td>Thermal</td>
<td>Electronic</td>
</tr>
<tr>
<td>Thermostat</td>
<td>2 Stage or Communicating</td>
<td>Communicating</td>
</tr>
<tr>
<td>Coil Size</td>
<td>Larger</td>
<td>Largest</td>
</tr>
<tr>
<td>SEER</td>
<td>~16 – 18</td>
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</tbody>
</table>

*Typical premium and mid-tier air-to-air profile*
Variable Speed Refrigerant Circuit
Same as Fixed Speed Applications

- Condenser
- Liquid Line
- Metering Device (Thermostatic Expansion Valve)
- Suction Line
- Evaporator
- Compressor
- Discharge Line

*AC Refrigerant Circuit Example
System Communication

VS Compressor
Motor Drive
System Control
Expansion Valve & Control
Outdoor Condensing Unit
Fan
VS Fan & Control
User Interface (Tstat)
Indoor Unit & Air Handler
System Control Monitors System Operation

System Control

Motor Drive / Inverter

Variable Speed Compressor
With BPM Motor
System Communication

Outdoor Condensing Unit

Motor Drive

Fan

VS Compressor

Expansion Valve & Control

System Control

VS Fan & Control

User Interface (Tstat)

Indoor Unit & Air Handler
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.**
Thank You For Attending!

To Learn More On “Getting Comfortable With Designer Air”, Please Visit Our Webpage At emersonclimate.com/designerair

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