Variable Speed Scroll Compressor and Drive Solutions

Emerson Commercial and Residential
Customers’ Concerns and Advantages of Emerson Solutions

Customer Concern 1
Too much communication and coordination as the core components of the variable speed system are provided by various manufacturers.

Emerson Solutions Advantage 1
Provide one-stop shopping of all core components. (Compressor/drive/controller/sensors/valves etc.)

Customer Concern 2
Project delayed as being lacking of efficient technical support during system development
System time-to-market requirements are strict, delays may result in tremendous negative impact

Emerson Solutions Advantage 2
Set up a dedicated system solution team and regional application engineer to provide customers with point-to-point complete technical support and services

Customer Concern 3
The development of variable speed system is much difficult and the cycle is long. Developed by inexperienced engineers, product after putting into the market may have quality issue, which is unacceptable.

Emerson Solutions Advantage 3
Pre-qualified package. All components are fully verified by Emerson design standards and labs.
Control logic, system protection, parameter optimization fully integrated

Customer Concern 4
Need full range variable speed products

Emerson Solutions Advantage 4
Developed 4 ~ 15HP full range of variable speed compressor and drive solutions
Emerson Integrated Solutions Advantage 1
- Provide One-stop shopping of All Core Components According to System Application Requirements (5hp air source heat pump as example)

**System Controller**
- Integrated dual EXV Drive
- Built In optimized control logic for optimal performance and reliability
- Over a 150 configurable parameters for customized solution

**Drive**
- Optimized for Copeland Scroll Compressors
- Plug and Play Compressor Compatibility
- Built-in compressor protection further enhances reliability

**Double EXV**
- Complete ranges of valves
- Accurate control of Refrigerant Pressure

**Variable Speed**
- Cover 4-8HP
- Vapor injection Design For heating
- High COP and IPLV
- Low Operating Noise
- Wide operating range with ambient temperature of -25C

**Temp/Pressure sensors**
- Enables precise system control

Emerson Fully Integrates The Core Components Required by The Variable Speed System and Provides a One-stop Purchasing Experience.
Emerson Integrated Solutions Advantage 2

- Providing Complete Technical Support and Services Ranging From Unit Selection, Design Optimization to Market Promotion

Throughout The Project Development Cycle, Emerson Provides Complete Technical Support

Marketing, Sales, AE

Sales, AE

Provide Guideline

Integrated Team

- System Expert
- Drive Expert
- System Expert

AE Follow-Up

1. Technical Communication
2. Integrated Solution Offer
3. System Prototype
4. Performance Test
5. Oil Management Test
6. Reliability Test
7. Certification Test
8. Mass Product
9. Field Support

Customer
**Emerson Integrated Solutions Advantage 3**  
-Fully Integrated Control Logic, System Protection, and Parameter Optimization

- **Reduce customer system design cycle and cost**
  - The integrated solution verified by Emerson Design Standard
  - No need to consider the matching of drive and compressor
- **Enhancing Energy Efficiency Ratio and reliability**
  - Optimization of variable speed drive and motor parameters
  - Ensure system reliability through system protection and control logic
  - Perfect compressor operation protection
  - Optimized electronic expansion valve
  - Precise system oil return protection

**Robust Reliability**

Continuous Reliability  
Running For 1000 hours
- Operation Temperature  
25C~65C  
- The voltage range continues to fluctuate
- Maintain Maximum Current Operation

**Perfect Matched with Emerson VS Compressor**

Over 200 hours Test In Compressor Testing Stand
- Compressor Full Envelope Testing
- Optimum Control Logic
  - Compressor start-up control
  - Compressor shut down control
Emerson Integrated Solutions Advantage 4
Full Range of Variable Speed Scroll Compressor and Drive Solutions

Emerson Has Developed a Full Range of 4HP ~ 15HP Compressor and Drive Integrated Solutions (Manufactured in Suzhou)
Variable Speed Drives Platform and Certification

<table>
<thead>
<tr>
<th>Capacity</th>
<th>20kW</th>
<th>30kW</th>
<th>40kW</th>
<th>45kW</th>
<th>50kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>5.5kW</td>
<td>8.0kW</td>
<td>11.0kW</td>
<td>15.0kW</td>
<td>18.0kW</td>
</tr>
<tr>
<td>Displacement</td>
<td>30</td>
<td>30</td>
<td>38</td>
<td>50</td>
<td>66</td>
</tr>
<tr>
<td>1PH 220Vac</td>
<td>5.5kW</td>
<td>8.0kW</td>
<td></td>
<td>5.5kW</td>
<td>8.0kW</td>
</tr>
<tr>
<td>3PH 208Vac</td>
<td></td>
<td>8.0kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3PH 380Vac</td>
<td></td>
<td></td>
<td>15.0kW</td>
<td>18.0kW</td>
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</tr>
<tr>
<td>3PH 460Vac</td>
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<td></td>
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</tr>
</tbody>
</table>

Certification
- CE
- UL
- CQC

The Drive Is Perfectly Matched with The Compressor, Covering The Complete Application of Air Conditionings and Heat Pumps
EVD Drive Products
-Designed For Asia HVAC Market

Single Phase Drive

Filter Board + Drive + Choke

Three Phase Drive

Filter Board + Capacitor Board + Drive + Choke
EVD Drive Technology Features

Three-phase Drive

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Current</th>
<th>Output Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVD1180B-D1-111</td>
<td>38Arms</td>
<td>38Arms</td>
</tr>
</tbody>
</table>

* The maximum current is based on the ambient temperature of the driver board at 60°C and the wind speed of the heat sink outlet is 3m/s;

Technology Features

1. Sine wave vector control

2. Three-phase four-wire and three-phase three-wire compatible power input

Single-phase Drive

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Current</th>
<th>Output Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVD2080B-C1-113</td>
<td>35Arms</td>
<td>25Arms</td>
</tr>
</tbody>
</table>

* The maximum current is based on the ambient temperature of the driver board at 60°C and the wind speed of the heat sink outlet is 3m/s;

Technology Features

1. Sine wave vector control

2. Active PFC function
Successful Case (Precision Cooling Air-conditioning)

China Mobile Air-cooled Precision Cooling Procurement Project

Project Background

- Recent Centralized purchase of China Mobile Published 8 system manufacturer to win bidding to share 6kpcs Air Cooled Precision Cooling Units
- Part of Selected OEMs work with Emerson on VS and Integrated Solution for bidding

Customer Values

- Emerson VS Technology and Solution Enable Precise Temperature and Humidity Control while Improving Energy Efficiency.
- Integrated Drive Solution For Reduced Design Time Cost & Speed To The Market
- Active Customer Engagement and End User Influence Activity Planned For More Wins

Emerson Successfully Support Precision Customers To Win The Bid for China Mobile’s Centralized Procurement Project with Our Integrated Solutions Offering
Emerson Provides Solutions from Components to Integrated Solutions Applicable for Wide Array of Applications