

**189BNV Evolution® V  
Variable Speed Air Conditioner  
with Puron® Refrigerant**



## **Application Guideline**

The Evolution® V variable speed air conditioner provides a flexible alternative to high-priced variable speed systems on the market today, as well as 2-stage products currently being offered. Its highly efficient, smaller and lighter design offers many benefits to dealers and homeowners alike. This document outlines the recommended application parameters and differences from other products.

### **Overview**

The Evolution® V is an inverter-driven variable speed air conditioner designed for the ducted residential market. Its size and weight advantage makes it easier for dealers to handle and stock, and allows for high-efficiency installations in tighter spaces than previously possible. It is designed to complement the dealer's product offering by adding a new, unique variable speed air conditioner to compete in this expanding market.

### **Benefits of Variable Speed**

Variable speed systems provide several benefits to the homeowner. The capacity range of the system allows it to more closely match the home's needs as conditions change. This increases indoor comfort by running longer comfort cycles at lower speeds thus eliminating up and down temperature swings. Longer cycles at lower speeds also translate into higher efficiency, and lower overall sound levels both indoors and outside. The wide capacity range also improves zoning and dehumidification capability compared to 2-stage and 1-stage systems.

## Comparison to Evolution<sup>®</sup> 17 SEER 2-stage Air Conditioner Systems

With the introduction of the Evolution<sup>®</sup> V air conditioner, you now have a variable speed option in a straight-cool product. This new model offers several benefits compared to two-stage systems. Below is a comparison of the new Evolution<sup>®</sup> V air conditioner compared to the Evolution 17 SEER two-stage model:

|                   | <b>Evolution<sup>®</sup> V air conditioner with Connex<sup>™</sup> Control 189BNV</b>  | <b>Evolution<sup>®</sup> 17 SEER two-stage 187BNA</b>   |
|-------------------|--|---|
| SEER              | Up to 19   | Up to 17  |
| EER               | Up to 12.5   | Up to 13.3  |
| Compressor Type   | Variable-speed Rotary  | 2-stage Scroll  |
| Compressor Stages | 5 stages as low as 25%   | 2 stages as low as 70%  |
| Line length       | Up to 100ft equivalent length  | Up to 250ft equivalent length   |
| Fan motor         | Compact ECM(Brushless DC)<br>No module attached<br>Inverter driven   | Standard PSC  |
| Ambient range     | Cool: 40 <sup>o</sup> -115 <sup>o</sup> F communicating (4.4 <sup>o</sup> -46.1 <sup>o</sup> C)<br>Cool: 55 <sup>o</sup> -115 <sup>o</sup> F non-communicating (12.8-46.1 <sup>o</sup> C)<br>Not initially qualified for Low ambient cooling | Cool: 55 <sup>o</sup> -125 <sup>o</sup> F (12.8 <sup>o</sup> -51.7C)<br><br>Low ambient cooling capable with Evolution Control or kit |
| Sound             | 56dBA – 72 dBA   | 67dBA – 72 dBA  |
| Basepan sizes     | 2 and 3 ton - 23"x23"<br>4 and 5 ton – 31.25" x 31.25"   | 2 ton - 31.25 x 31.25<br>3-5 ton - 35"x35"  |
| AHRI Ratings with | Evolution Communicating indoor for full 5-stage functionality with Connex <sup>™</sup> Control   | Evolution Communicating indoor for 2-stage functionality with Connex <sup>™</sup> Control   |
|                   | Preferred <sup>™</sup> 2-stage indoor for 2-stage functionality with non-communicating 2-stage thermostat  | Preferred <sup>™</sup> 2-stage indoor for 2-stage functionality with non-communicating 2-stage thermostat                             |

## Evolution® V System matching

This air conditioner unit provides the most customer benefit and highest efficiency **when installed as a complete Evolution system including Evolution Connex™ Control.** Acceptable system combinations will be listed in the AHRI and in My Bryant Ratings database on HVACpartners.

For increased system flexibility, and increased replacement opportunities, this outdoor unit is also designed to work with standard non-communicating thermostat inputs. Combination ratings are available with some non-communicating 2-stage indoor units such as the FV4C fan coil and 2-stage furnace/coil combinations. When utilizing this type of indoor unit, a standard non-communicating 2-stage thermostat is required, and the system will operate with 2-stage functionality.

### **Compatibility with existing indoor equipment (also see attached flowchart)**

Because this unit is designed to work with communicating or standard thermostat inputs, it opens up opportunities for replacement applications. However, the indoor components must be of suitable size and configuration.

#### Existing Evolution communicating indoor equipment

The Evolution V is backward compatible with all Evolution communicating indoor equipment. However, the old style Evolution wall control is not compatible with the Evolution V unit in communicating mode (See Figures 1 and 2). The software in the old style control will not recognize the outdoor unit. For full system capability with older indoor equipment, the wall control must be upgraded to the Evolution Connex™ control with appropriate software.

**Figure 1. Old style control**



**Figure 2. Connex™ control**



Check ratings for system matches with FE fan coil. These ratings can be applied to old and new FE fan coils units.

For existing furnace applications, the furnace must have a suitable blower size. Furnace coils built in 2006 or newer can be straight matched to the outdoor unit tonnage or one size larger\*. A Puron® refrigerant TXV is required on the furnace coil. Furnace coils built between 2005 and 1992 may be straight matched, one or two tonnage sizes larger than the outdoor unit tonnage\*. A Puron refrigerant TXV must be added to the indoor coil.

### Existing 2-stage indoor equipment

The Evolution® V is capable of operating with a standard 2-stage thermostat and non-communicating 2-stage indoor equipment. In this case, the outdoor unit will be wired as a 2-stage system, and will operate as a 2-stage system. Combination ratings will be available with some furnace/coil and FV4C fan coil combinations. These ratings will apply to both new and existing equipment of like model numbers.

An older FV4(A,B) of like size may be used. Unlike the Evolution V heat pump, the model plug in the outdoor unit does not need to be changed in straight-cool applications.

An older FK or 40FK fan coil may be used with the addition of a Puron refrigerant TXV. The model plug in the outdoor unit does not need to be changed in straight-cool applications

For existing furnace applications with the Evolution V, the furnace must have a suitable blower size and staging capability. Furnace coils built in 2006 or newer may be straight matched to the outdoor unit tonnage or one size larger\*. A Puron refrigerant TXV is required on the furnace coil. Furnace coils built between 2005 and 1992 may be straight matched, one or two sizes larger than the outdoor unit tonnage\*. A Puron refrigerant TXV must be added to the indoor coil.

#### \* Examples

- Straight matched to outdoor unit tonnage- 3-ton Evolution V with 3-ton furnace or fan coil
- One size larger indoor – 3-ton Evolution V with 3.5 ton furnace or fan coil
- 2 sizes larger indoor – 3-ton Evolution V with older 4 ton furnace coil

## Existing 1-stage indoor equipment

The Evolution<sup>®</sup> V will work with a 1-stage thermostat as a 1-stage system with suitable indoor coil and fan until the indoor components can be upgraded to provide full variable speed functionality.

If the indoor furnace coil was built in 2006 or after, it may be straight matched or one size larger than the outdoor unit tonnage\*. If the furnace coil was built between 2005 and 1992, the coil may be straight matched, one or two sizes larger than the outdoor unit tonnage\*. A Puron<sup>®</sup> refrigerant TXV is required on the indoor coil.

In existing fan coil applications, if the unit was built in 2006 or after, it may be straight matched or one size larger than the outdoor unit tonnage\*. If the fan coil was built between 2005 and 1992, it may be straight matched, or one size larger tonnage than the outdoor unit tonnage\*. A Puron refrigerant TXV is required on the indoor coil.

## Line set limitations

The Evolution V is qualified for line sets up to 100ft. equivalent length

Lift limitations:

Outdoor above indoor: 100 ft.

Outdoor below indoor:

|       |       |       |       |
|-------|-------|-------|-------|
| 2 ton | 3 ton | 4 ton | 5 ton |
| 80ft  | 80ft  | 70ft  | 60ft  |

See Product Data for line set diameter requirements

## Sound

The Evolution V uses a pressure equalizer valve designed to equalize pressures across the rotary compressor. The valve is energized in the off-cycle to ensure easier starting of the rotary compressor. During the equalization process, a hissing sound may be heard by customers. This sound is normal, but the customer should be made aware to avoid nuisance callbacks.

### **Figure 3. Pressure Equalizer Valve**



\* Examples:

- Straight matched to outdoor unit tonnage- 3-ton Evolution V with 3-ton furnace or fan coil
- One size larger indoor – 3-ton Evolution V with 3.5 ton furnace or fan coil
- 2 sizes larger indoor – 3-ton Evolution V with older 4 ton furnace coil

## EER Rating vs. Equipment payback

The published EER rating represents efficiency of cooling products at peak load, or 95°F (35°C). This rating is driven by utility companies that are concerned with power consumption at peak demand periods. In most locations, peak load is experience for a very short time during a year (see charts below). The Evolution<sup>®</sup> V system is designed for high efficiency at lower load conditions, which represents the vast majority of the cooling season. This is why the SEER ratings are high, but the EER is not as high on all sizes as other high-efficiency products. Focusing on SEER allows the smaller unit design, and competitive price compared to high EER variable speed products. Some incentives and local rebates contain an EER requirement, while others do not.

A cost payback analysis should be done to compare benefit of a rebate with higher EER component vs. initial cost and energy savings. Things to consider regarding rebates containing EER requirements:

(Cost of qualifying EER equipment) – (rebate amount) = \_\_\_\_\_

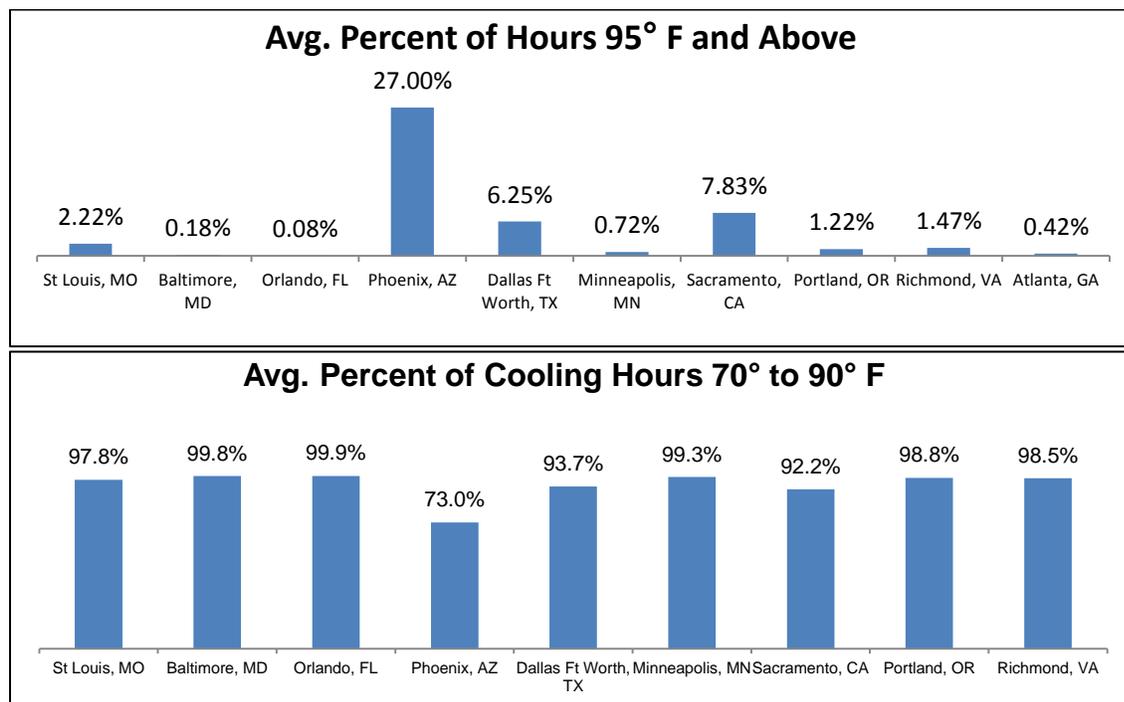
Cost of Evolution V equipment = \_\_\_\_\_

Yearly operating cost of qualifying EER equipment using Opcost calculator = \_\_\_\_\_

Yearly operating cost of V equipment using Opcost calculator = \_\_\_\_\_

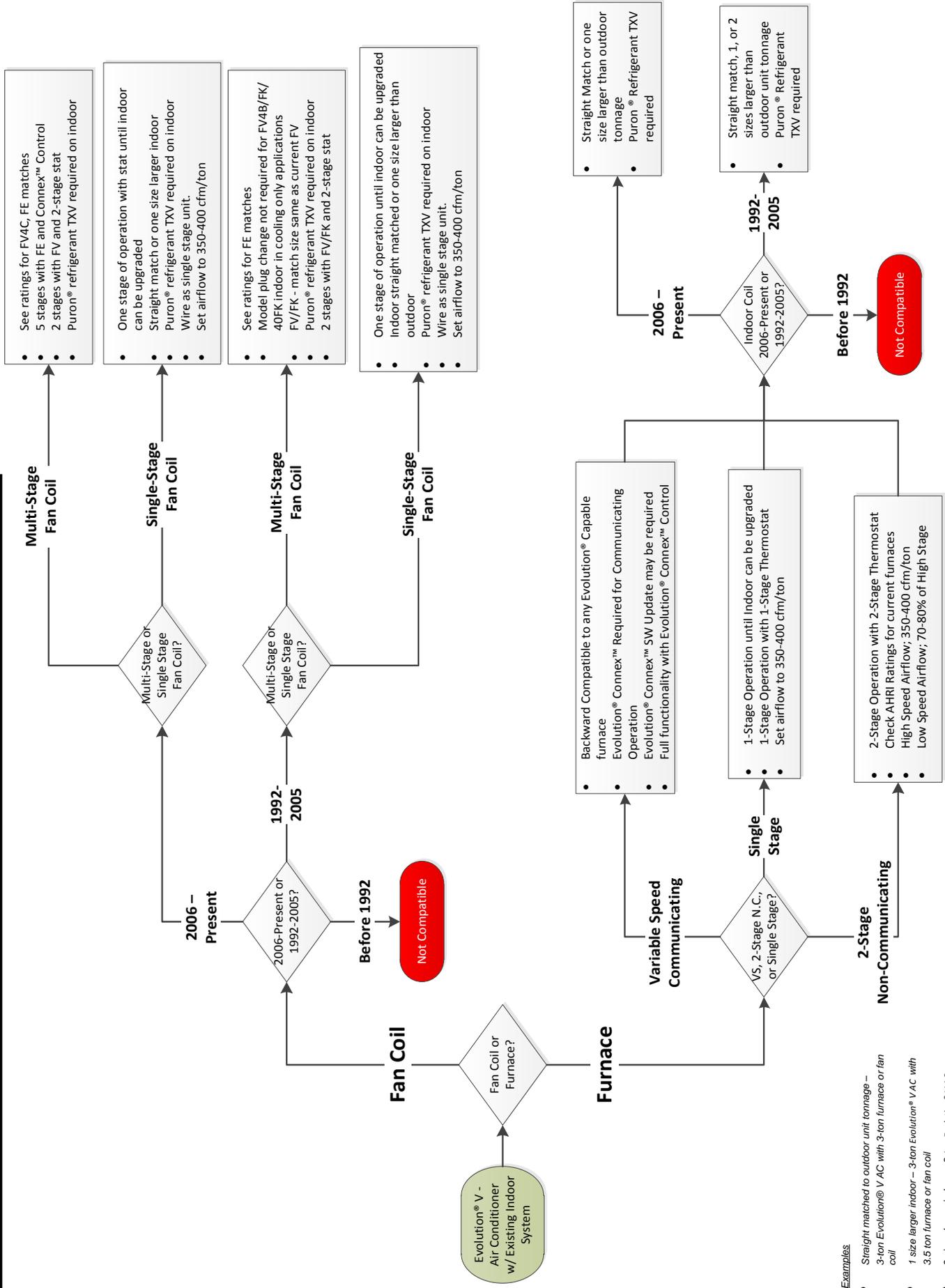
(Difference in system cost) / (yearly operating cost of V – yearly operating cost from high EER equipment) = \_\_\_\_\_

The end number above represents number of years for payback of the additional investment for equipment to achieve the rebate.



Source: TMY3 (typical meteorological year) data sets derived from the 1991- 2005 National Solar Radiation Data Base (NSRDB) update

# Evolution® V Air Conditioner System Matching with Existing Indoor Equipment



\* Examples

- Straight matched to outdoor unit tonnage – 3-ton Evolution® V AC with 3-ton furnace or fan coil
- 1 size larger indoor – 3-ton Evolution® V AC with 3.5 ton furnace or fan coil
- 2 sizes larger indoor – 3-ton Evolution® V AC with older 4 ton furnace coil

