

ICP Inverter Air Conditioner Application Guideline

The ICP inverter 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 application parameters and differences from other products.

Overview

The ICP inverter 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 install, 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 wide 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 17 SEER 2-stage Air Conditioner Systems

This new model offers several benefits compared to two-stage systems. Below is a comparison of the new ICP inverter variable speed model compared to the 17 SEER two-stage model:

	ICP Inverter with Observer Control *VA9	17 SEER two-stage *CA7
SEER	Up to 19	Up to 17.5
EER	Up to 13	Up to 13.5
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) No module attached Inverter driven	Standard PSC
Ambient range	Cool: 40 ^o -115 ^o F communicating (4.4 ^o -46.1 ^o C) Cool: 55 ^o -115 ^o F non-communicating (12.8-46.1 ^o C) Not initially qualified for low ambient cooling	Cool: 55 ^o -125 ^o F (12.8 ^o -51.7C) Low ambient cooling capable with kit
Sound	56 dBA – 72 dBA	67dBA – 72 dBA
Basepan sizes	24, 25 and 36 sizes - 23"x23" 37, 48 and 60 sizes - 31.25" x 31.25" 49 size – 35"x35"	24 size - 31.25 x 31.25 36, 48, 60 sizes - 35"x35"
AHRI Ratings with	Observer compatible communicating indoor for full 5-stage functionality with Observer Control	Observer compatible communicating indoor for 2-stage functionality with Observer Control
	2-stage indoor for 2-stage functionality with 2-stage non-communication thermostat	2-stage indoor for 2-stage capability with 2-stage non-communicating thermostat

ICP Inverter Variable Speed System matching

This air conditioner unit provides the most customer benefit and highest efficiency **when installed as a complete Observer® communicating system including Observer Wall Control**. Acceptable system combinations will be listed in the AHRI directory and in the online ratings database, accessible through the Go websites.

For increased system flexibility, and increased replacement opportunities, this outdoor unit is also designed to work with standard non-communicating thermostat inputs. Combination ratings will be available with some non-communicating 2-stage indoor units such as the FVM4 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 Observer communicating indoor equipment

The ICP inverter unit is backward compatible with all Observer communicating indoor equipment. However, the non-WiFi® Observer wall control is not compatible with the inverter unit in communicating mode. The software in the non-WiFi Observer will not recognize the outdoor unit, and cannot be upgraded in the field.

A software update to the Wifi Observer control to version 5.0 is planned for August 2015 to add inverter unit functionality. WiFi Observer controls built before this date may be upgraded in the field to version 5.0 software or newer in order to be use with an inverter outdoor unit.

For full system capability with older indoor Observer-capable equipment, the wall control must be upgraded to the Observer control with appropriate software.

Observer Model	Compatible with Inverter	Upgradable in the Field
TSTAT0201CW	Yes, with software version 5.0 or newer	Yes
TSTAT0101SC	No – replace with current version	No

Check ratings for system matches with FCM4 fan coil. These ratings can be applied to old and new FCM4 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*. An R410A 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*. An R410A TXV must be added to the indoor coil.

Existing 2-stage indoor equipment

The ICP inverter unit 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 FVM4 fan coil combinations. These ratings will apply to both new and existing equipment of like model numbers.

For existing furnace applications with the ICP inverter outdoor units, 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*. An R410A 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*. An R410A TXV must be added to the indoor coil.

* Examples

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

Existing 1-stage indoor equipment

The ICP inverter 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 furnace coil may be straight matched, one or two sizes larger than the outdoor unit tonnage*. An R410A 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*. An R410A refrigerant TXV is required on the indoor coil.

Line set limitations

The ICP Inverter unit 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 Specifications for line set diameter requirements

Sound

The ICP inverter unit uses a pressure equalizer valve (see Figure 1). It is designed to equalize pressures across the rotary compressor in the off-cycle to ensure easier starting. 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 1. Pressure Equalizer Valve



*Examples

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

EER Rating vs. Equipment payback

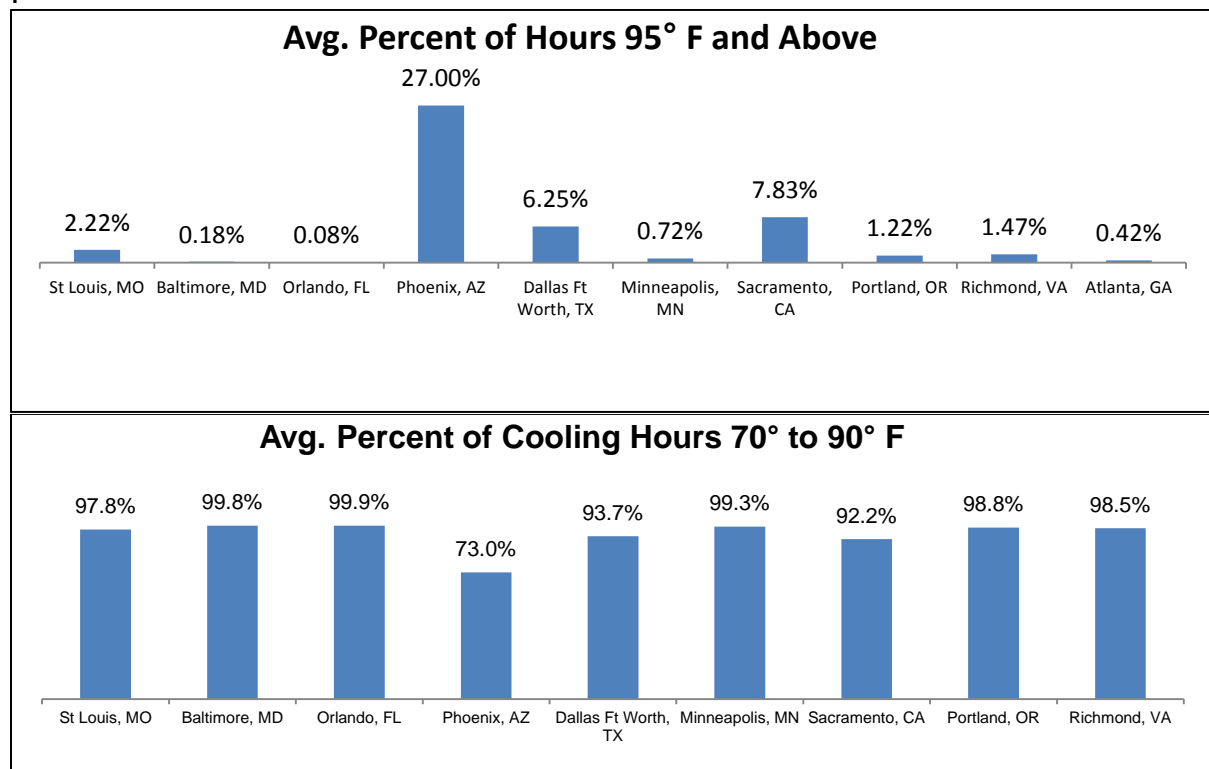
The published EER rating represents efficiency of cooling products at peak load, or 95°F (35°C). This rating is driven by utility companies that are concerned with power consumption at peak demand periods. In most locations, peak load is experienced for a very short time during a year (see charts below). The even-size ICP inverter units are 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 as other high-efficiency products. 2015 Regional Standards for the Southwest require higher EER ratings as well as some local incentives and rebates, however many regions do not require a higher EER rating. The even-model sizes focus on high SEER ratings which allows for smaller unit design and competitive price. For the Southwest region and other markets requiring higher EER ratings, the odd-size units will be available for these applications.

A cost analysis should be done to compare benefit of a rebate with higher EER models vs. the cost of the lower EER models. Things to consider regarding rebates containing EER requirements:

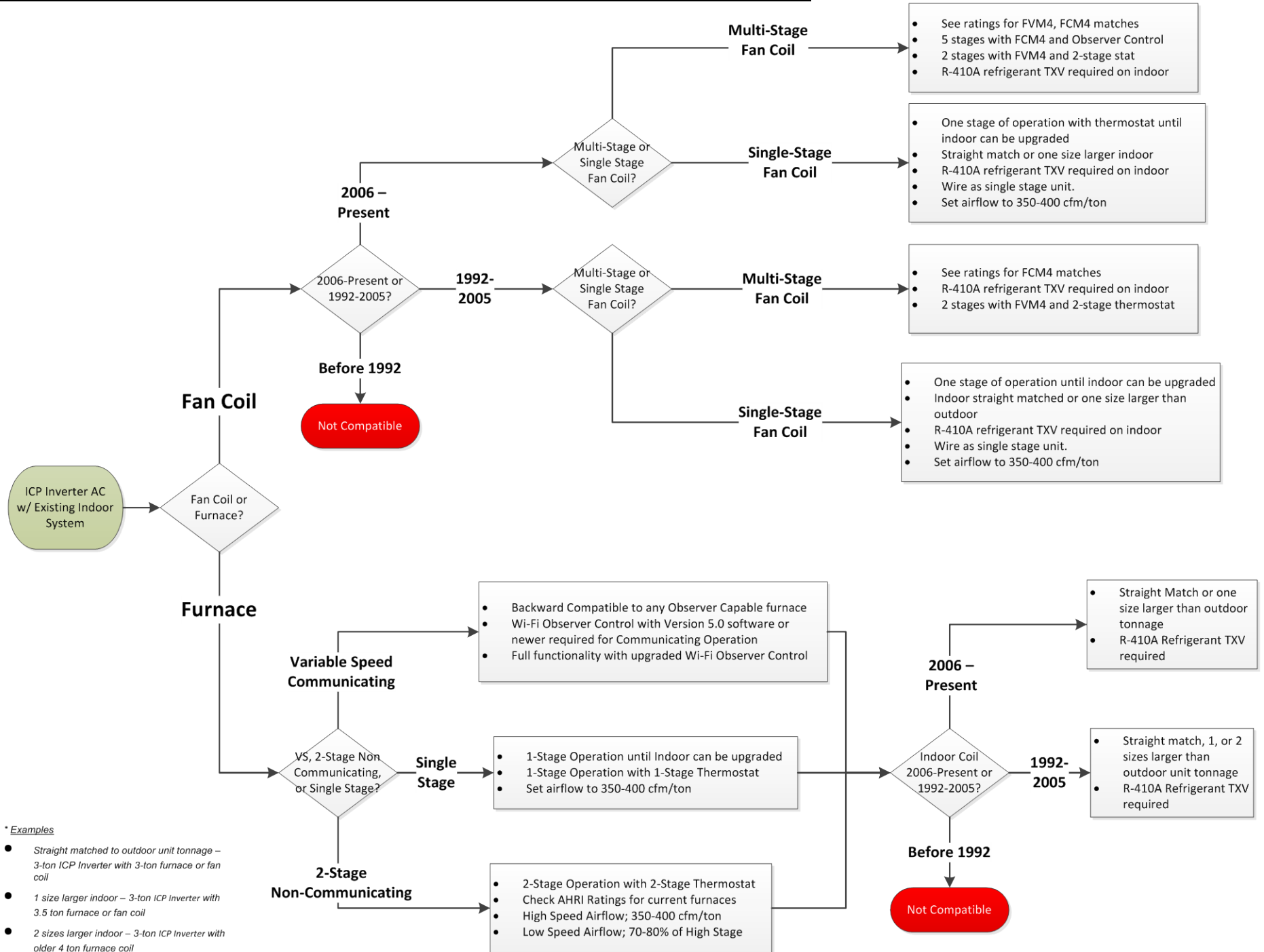
(Cost of qualifying EER equipment) – (rebate amount) = _____

Cost of ICP Inverter equipment = _____

In many cases, the cost of the even-size ICP inverter product may be less than a competitive product less the rebate.



ICP Inverter® Air Conditioner System Matching with Existing Indoor Equipment



*** Examples**

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