DAIKIN NORTH AMERICA LLC
1645 Wallace Drive, Suite 110
Carrollton, TX 75006 USA

TEL: 866-4DAIKIN
FAX: 972-245-1038
www.daikinac.com

VRV Modeling With eQuest

DAIKIN NORTH AMERICA LLC
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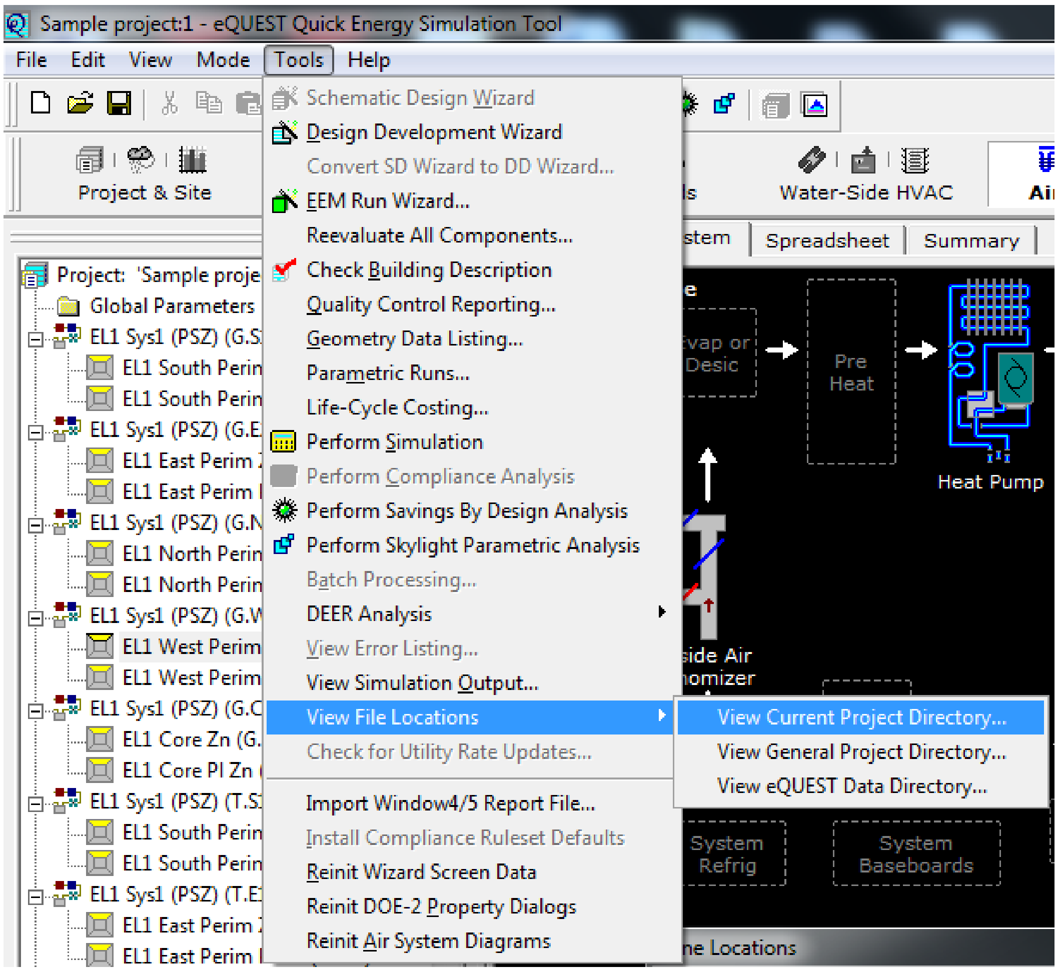
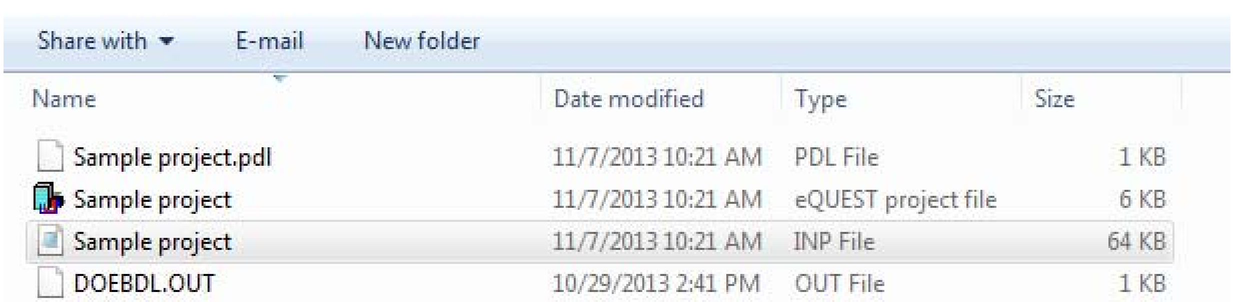
Curve Creation

Importing the VRV efficiency curves requires the user to edit the project .inp file within eQuest. The file location of the .inp file can be easily located by clicking *Tools→View File Locations→ View Current Project Directory.*



Navigate to the project's .inp file and open using Notepad. Once the .inp file is opened, scroll to the section labeled *Performance Curves*. This can also be done easily be using ctrl+f and searching for "Performance".



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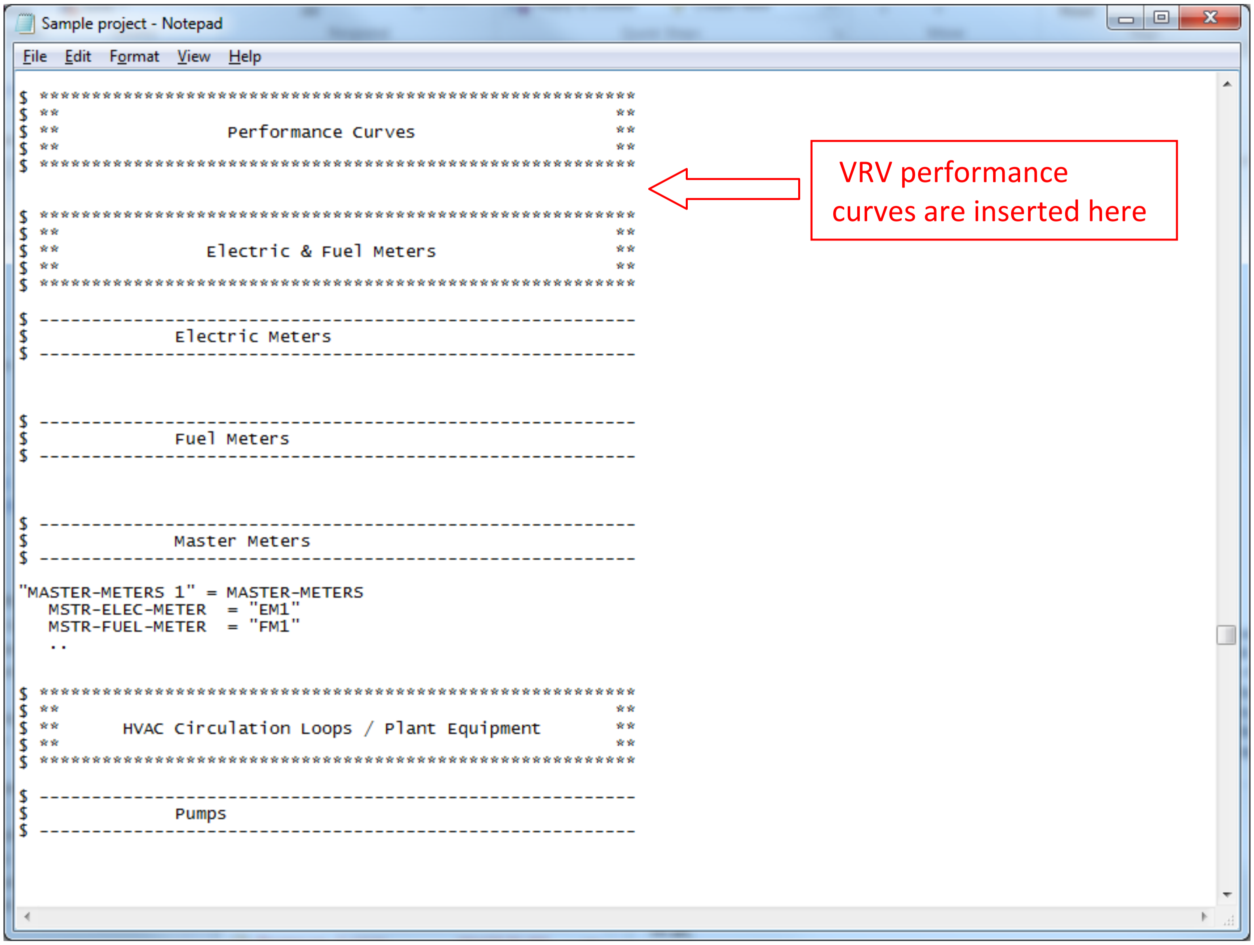


Sample project - Notepad

File Edit Format View Help

```
$ **********************************************************
$ **                                                      **
$ **                 Performance Curves                   **
$ **                                                      **
$ **********************************************************

$ **********************************************************
$ **                                                      **
$ **               Electric & Fuel Meters                 **
$ **                                                      **
$ **********************************************************

$ ----------------------------------------------------------
$              Electric Meters
$ ----------------------------------------------------------


$ ----------------------------------------------------------
$              Fuel Meters
$ ----------------------------------------------------------


$ ----------------------------------------------------------
$              Master Meters
$ ----------------------------------------------------------

"MASTER-METERS 1" = MASTER-METERS
   MSTR-ELEC-METER  = "EM1"
   MSTR-FUEL-METER  = "FM1"
   ..

$ **********************************************************
$ **                                                      **
$ **      HVAC Circulation Loops / Plant Equipment        **
$ **                                                      **
$ **********************************************************

$ ----------------------------------------------------------
$              Pumps
$ ----------------------------------------------------------
```


Insert the Daikin performance curve data by copy-pasting the text from the *Performance Curves* section of the *VRV performance curves.inp* file. This text will populate the appropriate curve coefficients within eQuest.

Once the text has been inserted, save and close the .inp file. Save the project within eQuest, then close and reopen the project file. This is necessary to incorporate the changes made to the .inp.

System Modeling

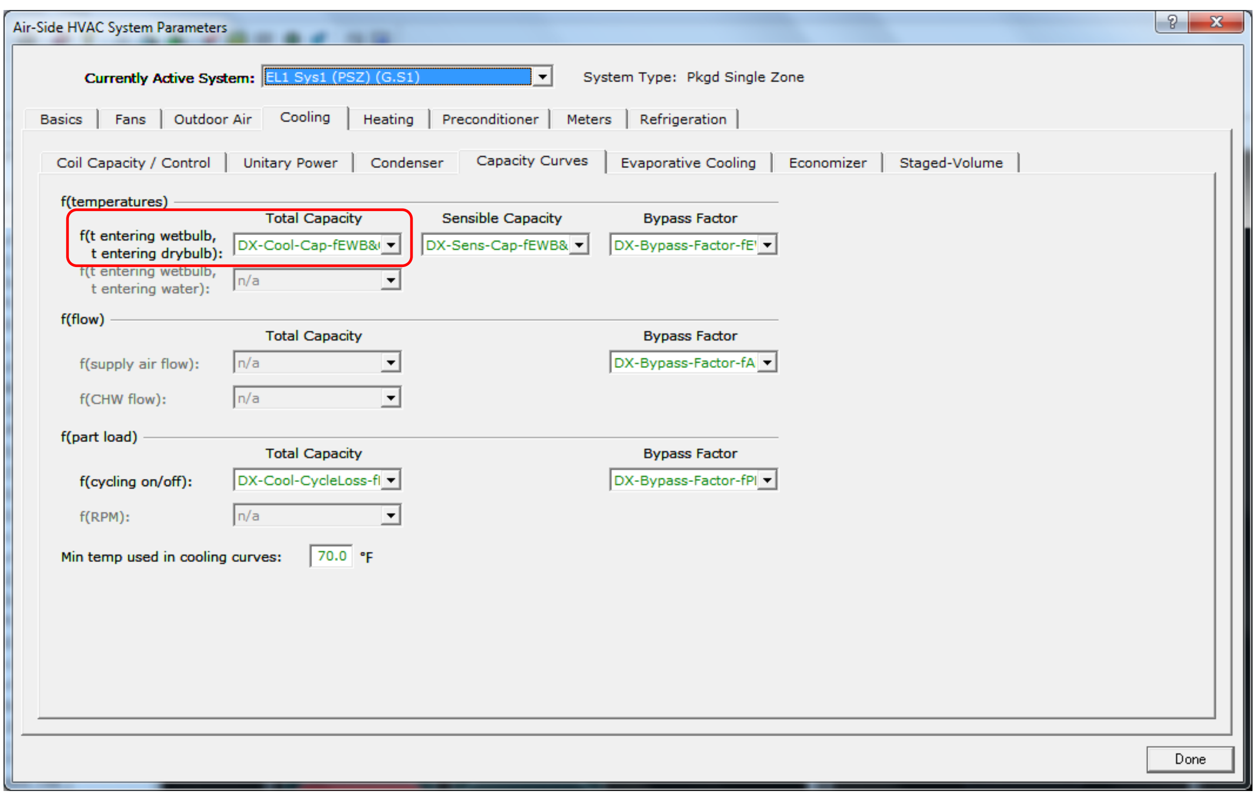
eQuest does not incorporate a VRF specific system-type within the program. This example utilizes the Packaged Single Zone system type for purposes of modeling the system. It is up to the software user to evaluate the calculation methodology of the various system types within eQuest.

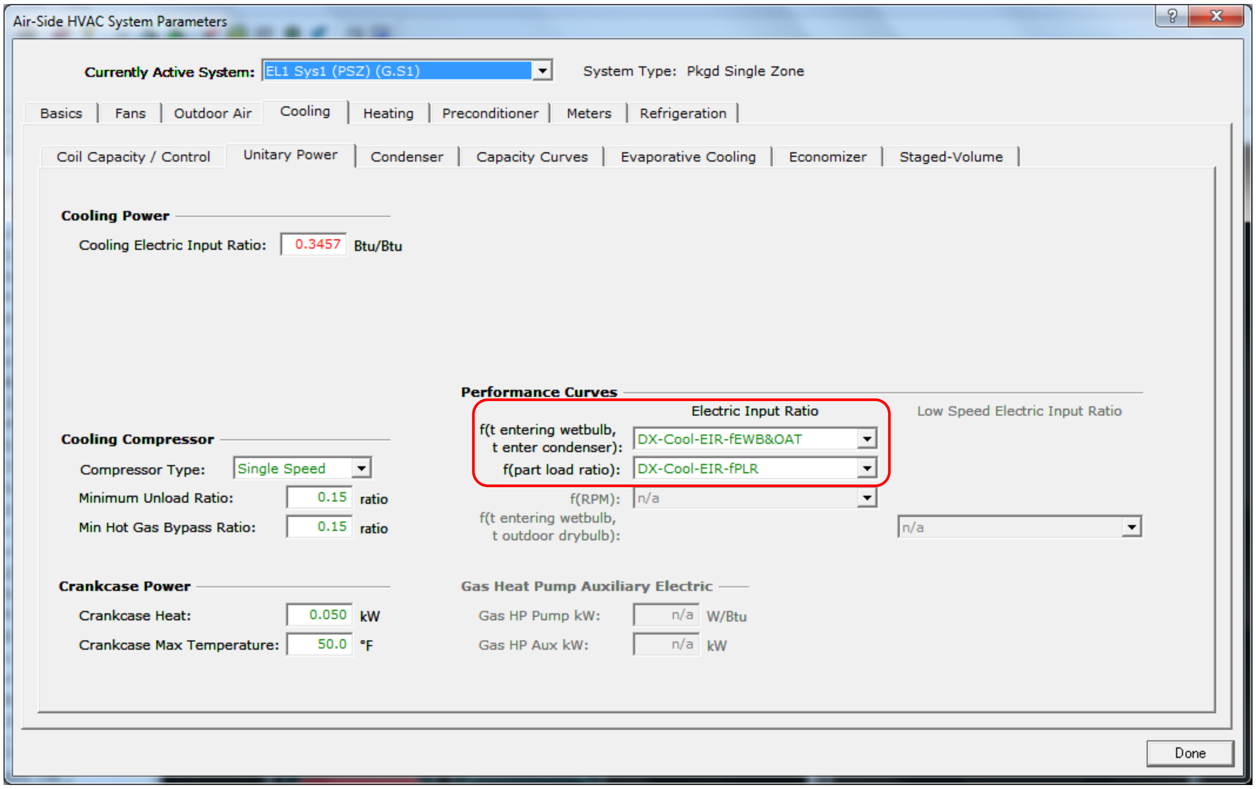
It is necessary to add (6) curves for modeling each VRV system. There are (3) cooling curves required for each system and (3) heating curves for each system.

Cooling Curves

The cooling curves are:

- *Total Capacity; f(t entering wetbulb, t enter condenser)*
  This curves models equipment capacity based on ambient and indoor unit temperature conditions. This curve can be found on the *Cooling* tab under *Capacity Curves*. Input the total system capacity at AHRI rated conditions and 100% connection ratio under the *Coil Capacity/Control* tab.
- *Electric Input Ratio; f(t entering wetbulb, t enter condenser)*
  This curve models equipment power input based on ambient and indoor unit temperature conditions. This curve can be found on the *Cooling* tab under *Unitary Power*. Input the system's cooling input power ratio on this tab.
- *Electric Input Ratio; f(part load ratio)*
  This curve adjusts system power input based on the part load ratio of the condensing unit. This curve can be found on the *Cooling* tab under *Unitary Power*.



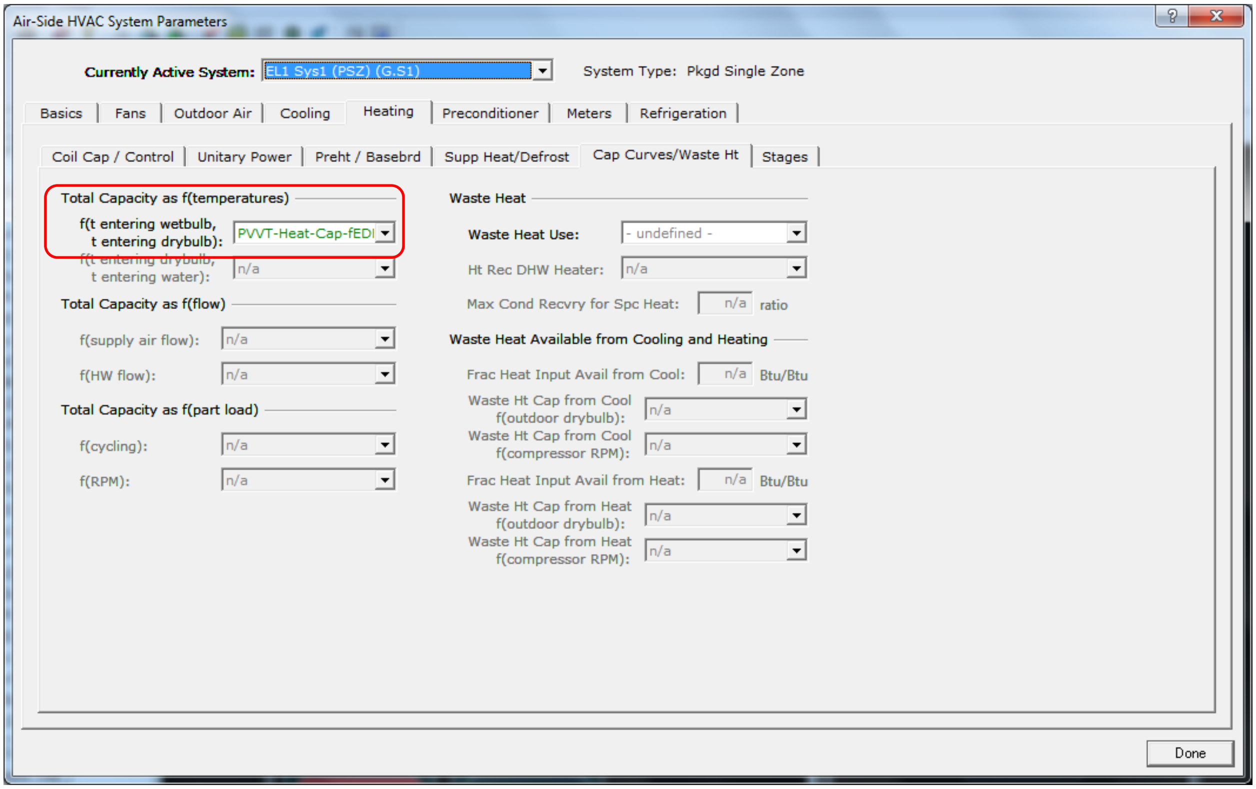


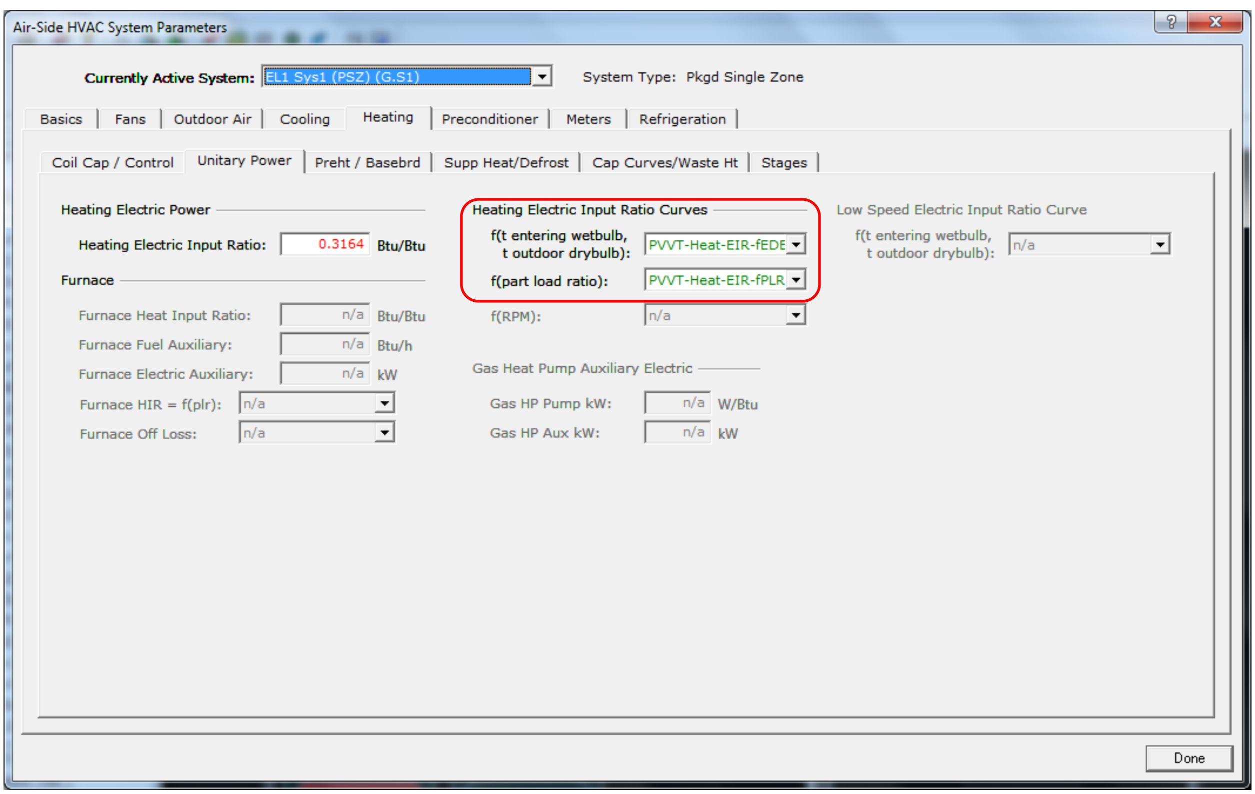
Ensure that Crankcase Power is set to 0 kW; crankcase heat energy is already included within the power input values in the engineering data tables. Ensure the Cooling Compressor is modeled as Single Speed. Changing the Cooling Compressor to Variable Speed would require the creation of a curve based on compressor RPM data; the curves included in the .inp file are derived from the published data in the engineering data manual rather than compressor RPM speed.

Heating Curves

The heating curves are:

- *Total Capacity; f(t entering wetbulb, t enter condenser)*
  This curves models equipment capacity based on ambient and indoor unit temperature conditions. This curve can be found on the *Heating* tab under *Cap Curves/Waste Heat*. Input the system heating capacity at AHRI rated conditions and 100% connection ratio under the *Coil Capacity/Control* tab.
- *Electric Input Ratio; f(t entering wetbulb, t enter condenser)*
  This curve models equipment power input based on ambient and indoor unit temperature conditions. This curve can be found on the *Heating* tab under *Unitary Power*. Input the system's heating input ratio on this tab.
- *Electric Input Ratio; f(part load ratio)*
  This curve adjusts system power input based on the part load ratio of the condensing unit. This curve can be found on the *Heating* tab under *Unitary Power*.


Air-Side HVAC System Parameters
Currently Active System: EL1 Sys1 (PSZ) (G.S1)
System Type: Pkgd Single Zone
Basics
Fans
Outdoor Air
Cooling
Heating
Preconditioner
Meters
Refrigeration
Coil Cap / Control
Unitary Power
Preht / Basebrd
Supp Heat/Defrost
Cap Curves/Waste Ht
Stages
Total Capacity as f(temperatures)
f(t entering wetbulb, t entering drybulb): PVVT-Heat-Cap-fEDI
f(t entering drybulb, t entering water): n/a
Total Capacity as f(flow)
f(supply air flow): n/a
f(HW flow): n/a
Total Capacity as f(part load)
f(cycling): n/a
f(RPM): n/a
Waste Heat
Waste Heat Use: - undefined -
Ht Rec DHW Heater: n/a
Max Cond Recvry for Spc Heat: n/a ratio
Waste Heat Available from Cooling and Heating
Frac Heat Input Avail from Cool: n/a Btu/Btu
Waste Ht Cap from Cool f(outdoor drybulb): n/a
Waste Ht Cap from Cool f(compressor RPM): n/a
Frac Heat Input Avail from Heat: n/a Btu/Btu
Waste Ht Cap from Heat f(outdoor drybulb): n/a
Waste Ht Cap from Heat f(compressor RPM): n/a
Done


Air-Side HVAC System Parameters
Currently Active System: EL1 Sys1 (PSZ) (G.S1)
System Type: Pkgd Single Zone
Basics
Fans
Outdoor Air
Cooling
Heating
Preconditioner
Meters
Refrigeration
Coil Cap / Control
Unitary Power
Preht / Basebrd
Supp Heat/Defrost
Cap Curves/Waste Ht
Stages
Heating Electric Power
Heating Electric Input Ratio: 0.3164 Btu/Btu
Furnace
Furnace Heat Input Ratio: n/a Btu/Btu
Furnace Fuel Auxiliary: n/a Btu/h
Furnace Electric Auxiliary: n/a kW
Furnace HIR = f(plr): n/a
Furnace Off Loss: n/a
Heating Electric Input Ratio Curves
f(t entering wetbulb, t outdoor drybulb): PVVT-Heat-EIR-fEDE
f(part load ratio): PVVT-Heat-EIR-fPLR
f(RPM): n/a
Gas Heat Pump Auxiliary Electric
Gas HP Pump kW: n/a W/Btu
Gas HP Aux kW: n/a kW
Low Speed Electric Input Ratio Curve
f(t entering wetbulb, t outdoor drybulb): n/a
Done

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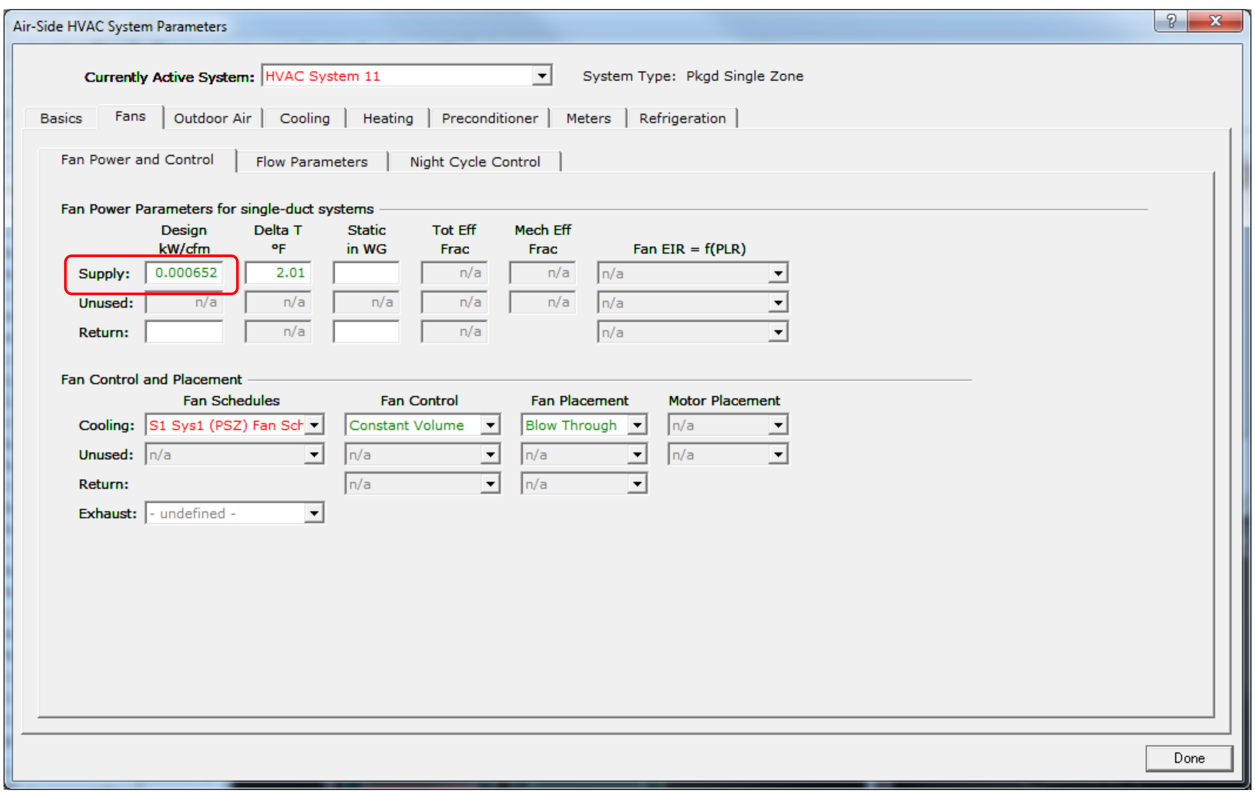
The naming convention given to the Daikin-specific curves is as follows:

*VRV Cooling Capacity AC**
*VRV Cooling Capacity WC72***
*VRV Cooling Capacity WC84****
*VRV Heating Capacity AC**
*VRV Heating Capacity WC72***
*VRV Heating Capacity WC84****
*VRV Cooling PLR AC**
*VRV Cooling PLR WC72***
*VRV Cooling PLR WC84****

*VRV Cooling EIR-F-EWB/ODB AC**
*VRV Cooling EIR-F-EWB/ODB WC72***
*VRV Cooling EIR-F-EWB/ODB WC84****
*VRV Heating EIR-F-EWB/ODB AC**
*VRV Heating EIR-F-WEB/ODB WC72***
*VRV Heating EIR-F-WEB/ODB WC84****
*VRV Heating PLR AC**
*VRV Heating PLR WC72***
*VRV Heating PLR WC84****

*Use for all air- cooled model numbers
**Use for all water-cooled systems based on the RWEYQ72 module, i.e. RWEYQ72, 144, 216
***Use for all water-cooled systems based on the RWEYQ84 module, i.e. RWEYQ84, 168, 252

Indoor unit fan energy consumption can be modeled on a kW/CFM basis on the *Fan Power and Control* tab for each system. The indoor unit CFM and power input during operation can be found in the electrical characteristics section of the engineering data manual.



For example, the FXMQ48PVJU has a nominal HH speed CFM of 1377, with a corresponding input of 460W. This results in a kW/CFM of 0.000334.

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Power Input Ratio						
Model	**Cooling Cap (btu/h)**	**Power Input (kW)**	**Input Ratio (btu/btu)**	**Heating Cap (btu/h)**	**Power Input (kW)**	**Input Ratio (btu/btu)**
RXYQ72PBTJ	72,000	4.62	0.2189	81,000	5.91	0.2489
RXYQ96PBTJ	96,000	7.22	0.2566	108,000	7.92	0.2502
RXYQ120PBTJ	120,000	9.08	0.2582	135,000	10.10	0.2553
RXYQ144PBTJ	144,000	9.24	0.2189	162,000	11.80	0.2485
RXYQ168PBTJ	168,000	11.60	0.2356	188,000	13.80	0.2505
RXYQ192PBTJ	192,000	13.70	0.2435	216,000	16.00	0.2527
RXYQ216PBTJ	216,000	16.00	0.2527	243,000	18.00	0.2527
RXYQ240PBTJ	240,000	18.20	0.2587	270,000	20.20	0.2553
RXYQ264PBTJ	264,000	19.00	0.2456	297,000	21.70	0.2493
RXYQ288PBTJ	288,000	20.70	0.2452	324,000	23.90	0.2517
RXYQ312PBTJ	312,000	22.80	0.2493	351,000	26.10	0.2537
RXYQ336PBTJ	336,000	25.10	0.2549	378,000	28.10	0.2536
RXYQ360PBTJ	360,000	27.20	0.2578	405,000	30.30	0.2553
RXYQ72PBYD	72,000	4.62	0.2189	81,000	5.91	0.2489
RXYQ96PBYD	96,000	7.22	0.2566	108,000	7.92	0.2502
RXYQ120PBYD	120,000	9.08	0.2582	135,000	10.10	0.2553
RXYQ144PBYD	144,000	11.00	0.2606	162,000	12.40	0.2612
RXYQ168PBYD	168,000	11.60	0.2356	188,000	13.80	0.2505
RXYQ192PBYD	192,000	13.70	0.2435	216,000	16.00	0.2527
RXYQ216PBYD	216,000	16.00	0.2527	243,000	18.00	0.2527
RXYQ240PBYD	240,000	18.20	0.2587	270,000	20.20	0.2553
RXYQ264PBYD	264,000	19.00	0.2456	297,000	21.70	0.2493
RXYQ288PBYD	288,000	20.70	0.2452	324,000	23.90	0.2517
RXYQ312PBYD	312,000	22.80	0.2493	351,000	26.10	0.2537
RXYQ336PBYD	336,000	25.10	0.2549	378,000	28.10	0.2536
RXYQ360PBYD	360,000	27.20	0.2578	405,000	30.30	0.2553
REYQ72PBTJ	72,000	4.52	0.2142	81,000	5.60	0.2359
REYQ96PBTJ	96,000	7.35	0.2612	108,000	8.30	0.2622
REYQ120PBTJ	120,000	9.41	0.2676	135,000	10.50	0.2654
REYQ144PBTJ	144,000	11.00	0.2606	162,000	12.40	0.2612
REYQ168PBTJ	168,000	12.70	0.2579	188,000	14.40	0.2613
REYQ192PBTJ	192,000	15.60	0.2772	216,000	16.90	0.2670
REYQ216PBTJ	216,000	18.70	0.2954	243,000	19.50	0.2738
REYQ240PBTJ	240,000	21.80	0.3099	270,000	22.00	0.2780
REYQ264PBTJ	264,000	22.50	0.2908	297,000	22.90	0.2631
REYQ288PBTJ	288,000	23.60	0.2796	324,000	25.40	0.2675
REYQ312PBTJ	312,000	26.70	0.2920	351,000	27.90	0.2712
REYQ336PBTJ	336,000	29.60	0.3006	378,000	30.50	0.2753

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Power Input Ratio						
Model	**Cooling Cap (btu/h)**	**Power Input (kW)**	**Input Ratio (btu/btu)**	**Heating Cap (btu/h)**	**Power Input (kW)**	**Input Ratio (btu/btu)**
RWEYQ72PTJU	72,000	4.20	0.1990	81,000	4.00	0.1685
RWEYQ84PTJU	84,000	5.60	0.2275	94,500	5.40	0.1950
RWEYQ144PTJU	144,000	8.40	0.1990	162,000	8.00	0.1685
RWEYQ168PTJU	168,000	11.20	0.2275	189,000	10.80	0.1950
RWEYQ216PTJU	216,000	12.60	0.1990	243,000	12.00	0.1685
RWEYQ252PTJU	252,000	16.80	0.2275	283,000	16.20	0.1953
RWEYQ72PYDN	72,000	4.20	0.1990	81,000	4.00	0.1685
RWEYQ84PYDN	84,000	5.60	0.2275	94,500	5.40	0.1950
RWEYQ144PYDN	144,000	8.40	0.1990	162,000	8.00	0.1685
RWEYQ168PYDN	168,000	11.20	0.2275	189,000	10.80	0.1950
RWEYQ216PYDN	216,000	12.60	0.1990	243,000	12.00	0.1685
RWEYQ252PYDN	252,000	16.80	0.2275	283,000	16.20	0.1953