VRF Technology Overview / Carbon Free Heating

VINCENT MATARAZZO

VRF & COMMERCIAL SYSTEMS REGIONAL SALES MANAGER.

Key points: Features & Benefits

Heat Pump & Heat Recovery Systems
Cold Weather Operation Heating & Cooling
Efficiency
Low Capacity De-rate
Redundancy
Supplemental Heat Options
Low Maintenance Costs

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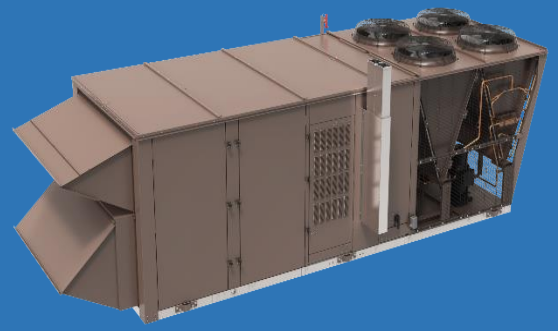
Your Partner for Decarbonization.

All Electric Heating Options----------High Efficiency Gas Heat Options



HIGH EFFICIENCY GAS HEATING UNITS

- Residential Mini Split Heat Pumps
- Residential VRF Heat Pumps
- Commercial VRF Heat Pump
- Commercial VRF Heat Reovery
- Water Source VRF HP & Heat Recovery
- Dual Fuel Systems
- HVAC Controls & BMS / Energy Mgt Systems
- GeoThermal

Heat Pump Scroll Chillers

Johnson Controls

Heating and Cooling Range Heat Pump & VRF

Residential Single Zone Heat Pumps Up to 48,000 BTU:

Z- series Single Zone: Heating Down to Minus 22 F (-22 F) 28 SEER
X- series Single Zone: Heating Down to Minus 4 F (-4 F) 23 SEER
P- series Single Zone: Heating Down to Minus 4 F (-4 F) 18 SEER
R- series Single Zone: Heating Down to 0 F (0 F) 20 SEER

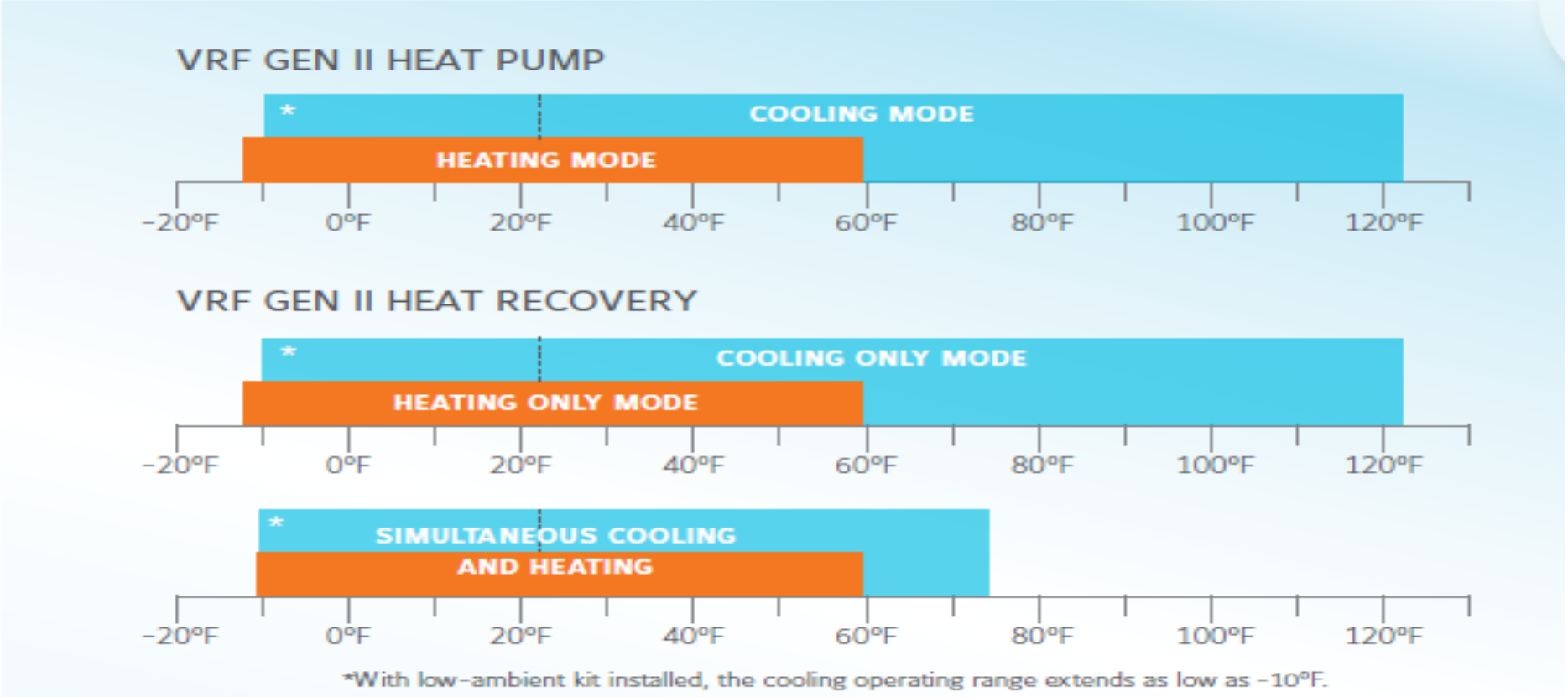
Residential Multi Zone Heat Pumps Up to 42 K BTU:

W- series 5 Zone Heating Down to Minus 4 (-4) 22 SEER
M- series 5 Zone Heating Down to Pos. 5 (+5) 16 SEER

WATER COOLED VRF CAN PROVIDE FULL CAPACITY HEAT AT ANY OUTSIDE TEMP (UNLIMITED)

Very Low Capacity De-rate at Low Ambient Conditions

Product can provide 88% capacity at -13 F



Remarkable Performance – High Part Load Efficiency

PACKAGE UNITS / ROOFTOPS

IEER

Integrated Energy Efficiency Ratio

FEDERAL REGISTER
The Daily Journal of the United States Government

TABLE I–1—AMENDED ENERGY CONSERVATION STANDARDS FOR SMALL, LARGE, AND VERY LARGE COMMERCIAL PACKAGE AIR CONDITIONING AND HEATING EQUIPMENT

Equipment type	Heating type	Proposed energy conservation standard	Compliance date
Small Commercial Packaged AC and HP (Air-Cooled)—≥65,000 Btu/h and <135,000 Btu/h Cooling Capacity:			
AC	Electric Resistance Heating or No Heating.	12.9 IEER	January 1, 2018.
		14.8 IEER	January 1, 2023.
	All Other Types of Heating	12.7 IEER	January 1, 2018.
		14.6 IEER	January 1, 2023.
HP	Electric Resistance Heating or No Heating.	12.2 IEER, 3.3 COP	January 1, 2018.
		14.1 IEER, 3.4 COP	January 1, 2023.
	All Other Types of Heating	12.0 IEER, 3.3 COP	January 1, 2018.
		13.9 IEER, 3.4 COP	January 1, 2023.
Large Commercial Packaged AC and HP (Air-Cooled)—≥135,000 Btu/h and <240,000 Btu/h Cooling Capacity:			
AC	Electric Resistance Heating or No Heating.	12.4 IEER	January 1, 2018.
		14.2 IEER	January 1, 2023.
	All Other Types of Heating	12.2 IEER	January 1, 2018.
		14.0 IEER	January 1, 2023.
HP	Electric Resistance Heating or No Heating.	11.6 IEER, 3.2 COP	January 1, 2018.
		13.5 IEER, 3.3 COP	January 1, 2023.
	All Other Types of Heating	11.4 IEER, 3.2 COP	January 1, 2018.
		13.3 IEER, 3.3 COP	January 1, 2023.
Very Large Commercial Packaged AC and HP (Air-Cooled)—≥240,000 Btu/h and <760,000 Btu/h Cooling Capacity:			
AC	Electric Resistance Heating or No Heating.	11.6 IEER	January 1, 2018.
		13.2 IEER	January 1, 2023.
	All Other Types of Heating	11.4 IEER	January 1, 2018.
		13.0 IEER	January 1, 2023.
HP	Electric Resistance Heating or No Heating.	10.6 IEER, 3.2 COP	January 1, 2018.
		12.5 IEER, 3.2 COP	January 1, 2023.
	All Other Types of Heating	10.4 IEER, 3.2 COP	January 1, 2018.
		12.3 IEER, 3.2 COP	January 1, 2023.

Exceeds DOE 2018 efficiency by up to 39%

Exceeds DOE 2023 efficiency by up to 22%

Efficiencies meet a range of Tier 1, Tier 2, and Advanced Tier depending on selection

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