With the launch of Daikin’s latest VRV system, many technological enhancements were incorporated to optimize the system’s performance in heating operation.
Extended Heating Operation Range Down to -13°F Outdoor Temperature

Daikin VRV IV heat recovery systems can provide heating inside the building even when the outside air temperature is as low as -13°F as standard. Heat pump systems provide heating down to -4°F. This enables enhanced application flexibility and use of the system in colder regions.

Minimizing the Factors that Can Reduce Heating Capacity

It is important to remember that the total system heating capacity is determined considering the ambient operating conditions, applied piping lengths as well as any associated defrost correction factors. Without these considerations, you will only see an inflated perspective of how the system will perform. Daikin is a global leader in the development of Heat Pump systems and Refrigerant Control and Optimization strategies. It’s because of this rich legacy, that Daikin has been able to realize very capable, high performance solutions for lower ambient heating operation and ensure that the system designer is aware of all factors via truth and clarity in the published engineering data. The facts are as follows:

<table>
<thead>
<tr>
<th>Capacity corrections for ambient temperature</th>
<th>Only applicable for condensing unit performance. Selection tools utilize the same factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Heating Capacity Correction for Piping Length*</td>
<td>Smooth refrigerant flow in 3-pipe system thanks to 2 smaller gas pipes resulting in improved delivered performance</td>
</tr>
<tr>
<td>Defrost Correction Factors</td>
<td>Disturbed refrigerant flow in large gas pipe on 2-pipe system results in bigger pressure drop thus correction factors apply</td>
</tr>
<tr>
<td>Minimized correction between 19.5°F DB and 41°F DB only</td>
<td></td>
</tr>
</tbody>
</table>

* B-T modules are subject to minimal corrections only when 200ft of equivalent length is exceeded due to U.S. refrigerant pipe size availability

Continuous Heating During Defrost**

Interruptions to indoor comfort heating operation are minimized with Daikin’s alternate “continuous heat during defrost” function.

Heating Efficiency is Maintained

The proof of an effective system for heating is not just the heating capacity, but also the efficiency that the system delivers. VRV IV maintains very efficient COP ratings all the way down to -13°F ambient conditions and delivers a COP up to 14% higher than minimum COP requirements at 17°F.

Variable Refrigerant Temperature (VRT) is often understood to only benefit the cooling performance and comfort of a VRV system. With Daikin systems that incorporate VRT, it is also possible to enhance the overall heating performance — particularly important for heating dominant areas — using VRT. The “Powerful” VRT setting can be enabled in heating mode to enhance the heat up function of the system. In this case, the target condensing temperature is increased from 115°F (46°C) to 120°F (49°C) during peak load situations delivering enhanced heating capacities. As the load on the indoor units becomes more moderate, the system will return to normal operation and eventually further reduce the target condensing conditions to maintain comfort but also save energy.

Enhanced Heating Performance with VRT
Daikin’s standard technologies accomplish superior performance in heating conditions.

Daikin Advanced Scroll Compressor Technology (J-Type)

**Full Inverter**
- Enabling variable refrigerant temperature and low start-up currents
- Up to 170 steps of Inverter capacity control per module

**Brushless DC Reluctance Motor**
- Increased efficiency compared to AC motors by simultaneously using normal and reluctance torque
- Powerful neodymium magnets efficiently generate high torque
- High-pressure oil reduces thrust losses

**High Efficiency J-Type 6-Pole Motor**
- 50% stronger magnetic field and higher rotation efficiency*

**Thixocasting Process**
- Compression volume is increased by 50% thanks to a new high durability material cast in a semi-molten state*

3-Pipe Heat Recovery System Minimizes Piping Correction Factors

Daikin 3-pipe technology needs less energy to recover heat, meaning significantly higher efficiency during heat recovery mode*. Our system can recover heat at a low condensing temperature because it has dedicated gas, liquid and discharge pipes.

In a 2-pipe system, gas and liquid travel as a mixture so the condensing temperature needs to be higher in order to separate the mixed gas and liquid refrigerant. The higher condensing temperature means more energy is used to recover heat resulting in lower efficiency.

Optimized Heat Exchanger

The Heat Exchanger features circuit optimization for improved* seasonal efficiency in heat recovery mode.

Vertically divided heat exchanger, with an optimized ratio for simultaneous heating and cooling operation, improves heat recovery efficiency by reducing* radiation losses.

Optimized Defrost

Defrost operation purely on a time basis are a thing of the past with VRV IV. Defrost is now triggered based on system demand and will occur at the time where the least impact to the overall system will be seen. The defrost operation length can also be optimized during commissioning to better reflect the climate where the system is installed.

* When compared to previous VRV III series
To ensure optimum capacity, performance and correct defrost in cold, snowy or high winter humidity areas, the following 3-point plan should be considered in the design of your VRV system:

1. **Installation Location**
   Wherever possible locate the outdoor condensing unit in a location not in direct contact with the prevailing wind. If this is not possible, it is recommended to construct baffle plates as shown in Figure 1.

2. **Considerations for Condensate Drainage**
   When systems defrost, condensate is generated. Ensure that condensate can adequately escape from the outdoor condensing unit bottom plate by utilizing a mounting stand preventing the trapping or build up of condensate underneath the unit that could freeze in harsh climates. Make sure drainage water is routed away from walkways, etc. — to prevent slipping or other ground hazards if it becomes frozen.

3. **Considerations for Snow**
   Install the units on a pedestal or mounting stand at a sufficient height from ground level and clearances from walls to address regional snow or drift levels.

   In areas where snow fall or drift is minimal, install field fabricated baffle plate approach in addition to a canopy placed above the outdoor condensing unit (Figure 2).

   In areas where snow fall or drift is more significant, install field fabricated snow hoods to the outdoor condensing units using the Daikin provided snow hood drawings (Figure 3.1, 3.2).

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**Notes:**
- These illustrations are for reference only.
- For more details contact your local Daikin representative or contractor.

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**FIND OUT MORE ABOUT DAIKIN VRV.**
Contact your local dealer or manufacturer’s representative.

**Additional information**
Before purchasing this appliance, read important information about its estimated annual energy consumption, yearly operating cost, or energy efficiency rating that is available from your retailer.