Air Conditioners

Heating & Cooling

CO₂-based VRV®

» First VRV® system using CO₂ (R-744) as a refrigerant
» Global warming potential = 1
» Ozone depletion potential = 0
» Refrigerant cycle optimised for CO₂

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Daikin unveils world’s first CO$_2$-based VRV® system

Daikin Europe N.V. announces the world’s first CO$_2$-based VRV® system. CO$_2$ has one of the lowest GWP$^1$ values (GWP=1) of all existing refrigerants, once again demonstrating Daikin’s pioneering care for the environment.

The launch is one more in a series of world firsts for Daikin. As was the case with the launch of the 1st VRV® generation in the early 1980s, the launch of a CO$_2$-based VRV® system will lead to new installation techniques and certifications. Here again Daikin is fulfilling its pioneering role in this process, paving the way for new technologies and products. The new CO$_2$-based VRV® is part of Daikin’s strategy to limit the impact of air conditioning on the environment and to stay ahead of environmental legislation.

Daikin is worldwide market leader in VRF systems, and intends to keep pursuing various technical challenges, such as the development of the CO$_2$-based VRV® system, to play a responsible role as a leader. At the same time, Daikin intends to perfect its existing HFC$^2$-based VRV® systems, further reducing the TEWI$^3$ impact of both ranges.

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Transcritical refrigerant cycle

CO$_2$ has a very low critical temperature, so for most applications it is used in a transcritical cycle. A transcritical cycle is a cycle where a part of the process takes place at pressures above the critical point and other parts below the critical point. The critical point marks the upper limit for heat transfer processes based on evaporation or condensation. At temperatures and pressures higher than those at the critical point, there is no clear distinction anymore between liquid and vapour and it is technically challenging to control the refrigerant. Daikin is the first in the industry to use CO$_2$ in a VRV® system. All refrigerants have a critical point, however for conventional refrigerants this point is never reached during the entire cycle, this is called a subcritical refrigerant cycle.
Introducing new technologies

- **Dual Stage Intercooler (D.S.I.) circuit**: The D.S.I. circuit enables refrigerant control within the CO₂-based VRV® system and allows downsizing of the piping size.

- **New compressor optimised for CO₂**: The CO₂-based VRV® system is equipped with two new dual swing compressors. These compressors were developed and produced by Daikin to cope with the higher pressure differentials required for the transcritical cycle of CO₂ and to reduce the leak losses.

- **New heat exchanger**: A new three row heat exchanger and pass pattern has been developed for optimum heat exchange in the transcritical point.

- **Expansion valve**: A new electronic expansion valve and a new four way valve have been developed to cope with the higher pressures of CO₂ (up to 12.3MPa).

Features

- **Global Warming Potential = 1**: The Daikin CO₂-based VRV® system is the first VRF system in the market using CO₂ (R-744) as refrigerant. The GWP of CO₂ is 1, making it potentially one of the most environmental conscious refrigerants used.

- **Ozone Depletion Potential = 0**: Like R-410A, CO₂ has no negative impact on the ozone layer when released into the atmosphere.

- **Smaller piping diameters**: Because of the higher pressures of a CO₂ system the piping diameters are smaller. Also the amount of refrigerant in the system is lower.

- **Automatic Test**: When refrigerant charging has ceased, pushing the test operation button on the PCB will initiate a check on the wiring, shut off valves, sensors and refrigerant volume. This test ceases automatically when completed.

- **Night quiet mode**: For some applications the operating sound level of the outdoor unit might be too high. Therefore the sound level can be fixed, via the super silent mode, in order to avoid noise pollution.

- **Connectable to all Daikin Control systems**
Notes: Nominal cooling capacities are based on: indoor temperature: 27°CDB, 19°CWB, outdoor temperature: 35°CDB, equivalent refrigerant piping: 7.5m, level difference: 0m.
Nominal heating capacities are based on: indoor temperature: 20°CDB, outdoor temperature: 7°CDB, 6°CWB, equivalent refrigerant piping: 7.5m (horizontal)

Capacities are net, including a deduction for cooling (an addition for heating) for indoor fan motor heat.

The external static pressure is changeable: change the connectors inside the electrical box, this pressure means:
- High static pressure - standard - low static pressure

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### RXYN-A

**Nominal capacity**
- **cooling** kW: 28.0
- **heating** kW: 31.5

**COP**
- **cooling** COP: 2
- **heating** COP: 3

**Dimensions**
- **height** mm: 1,680
- **width** mm: 930
- **depth** mm: 765

**Weight** kg: 330

**Air Flow Rate (nominal at 230V)**
- **cooling** m³/min: 185

**Refrigerant** type
- **charge** kg: 7.2

**Piping Connections**
- **liquid** diameter (OD) mm: 9.52 (Brazed)
- **gas** diameter (OD) mm: 15.9 (Brazed)

### FXSN-A

<table>
<thead>
<tr>
<th>Capacity</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
<th>63</th>
<th>100</th>
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<tr>
<td><strong>cooling kW</strong></td>
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<td>2.8</td>
<td>3.6</td>
<td>4.5</td>
<td>5.6</td>
<td>7.1</td>
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<td>4.0</td>
<td>5.0</td>
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<td><strong>cooling kW</strong></td>
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<td>0.110</td>
<td>0.114</td>
<td>0.127</td>
<td>0.143</td>
<td>0.234</td>
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<tr>
<td><strong>heating kW</strong></td>
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<td>0.090</td>
<td>0.094</td>
<td>0.107</td>
<td>0.123</td>
<td>0.214</td>
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<td><strong>cooling kW</strong></td>
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<td>95</td>
<td>11.5</td>
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Capacities are net, including a deduction for cooling (an addition for heating) for indoor fan motor heat.

The external static pressure is changeable: change the connectors inside the electrical box, this pressure means:
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### RXYN-A

**Nominal capacity**
- **cooling kW**: 28.0
- **heating kW**: 31.5

**COP**
- **cooling COP**: 2
- **heating COP**: 3

**Dimensions**
- **height** mm: 310
- **width** mm: 310
- **depth** mm: 310

**Weight** kg: 330

**Air Flow Rate** (nominal at 230V)
- **cooling m³/min**: 9

**Refrigerant type** R-744

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### FXSN-A RXYN10A

**Nominal capacity**
- **cooling kW**: 28.0
- **heating kW**: 31.5

**COP**
- **cooling COP**: 2
- **heating COP**: 3

**Dimensions**
- **height** mm: 140
- **width** mm: 380
- **depth** mm: 250

**Weight** kg: 4.5

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Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

VRV® products are not within the scope of the Eurovent certification programme.

VRP products are not within the scope of the Eurovent certification programme.

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