CO_2-based VRV®

VRV® SYSTEMS R-744

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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 mean 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.

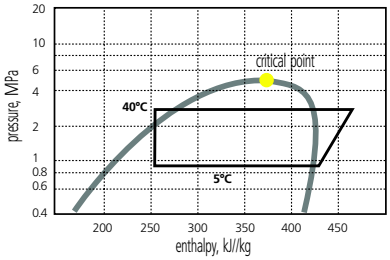
Daikin is worldwide market leader in VRF systems, and intends to keep pursuing various technical challenges, such as the development of the CO_2-based VRV® system, to play a responsible role as a leader. At the same time, Daikin intends to perfect its existing HFC [2]-based VRV® systems, further reducing the TEWI [3] impact of both ranges.

[1]GWP = Global Warming Potential
[2]HFC = HydroFluoroCarbon (e.g.: R410A, R407C)
[3]TEWI: "Total Equivalent Warming Impact": sum of direct (refrigerant) and indirect (energy use) emissions of air conditioning technologies being compared in CO_2 equivalents. TEWI confirms the importance of energy efficiency and emissions reduction for air conditioning systems.

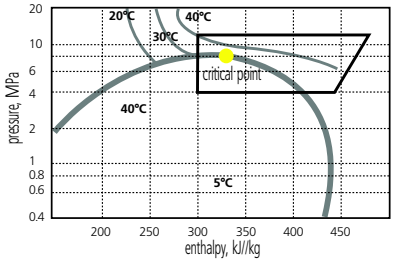
TRANSCRITICAL REFRIGERATION CYCLE

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 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. All refrigerants have a critical point, however for conventional refrigerants this point is never reached during the entire cycle. A refrigerant cycle which is completely below the critical point is called a subcritical refrigeration cycle. In a transcritical cycle part of the process takes place above the critical point. Due to this transcritical cycle a new refrigerant circuit has been designed. This has made it possible to control CO_2 in the VRV® system.

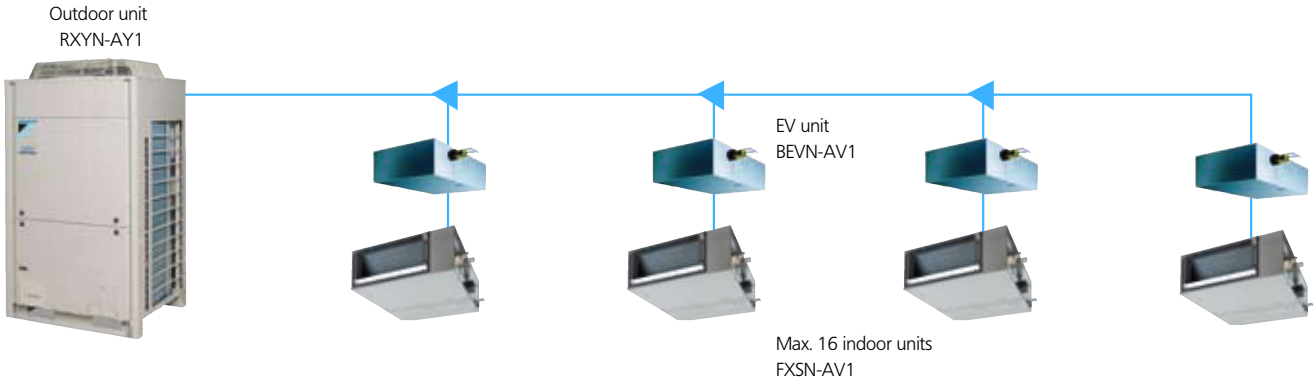
Subcritical
refrigeration cycle:
For example: R-410A



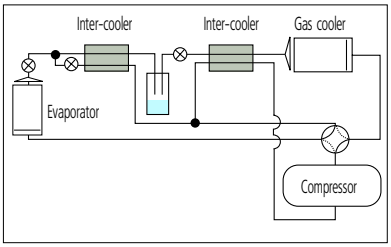
Transcritical
refrigeration cycle:
For example: CO_2



SYSTEM LAYOUT



INTRODUCING NEW TECHNOLOGIES



- **Dual Stage Intercooler (D.S.I.) circuit** : The D.S.I. circuit enables refrigerant control within the CO_2-based VRV® system and allowed downsizing of the piping size.
- **New compressor optimised for CO_2:** The CO_2-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 CO_2 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 and four way valve have been developed to cope with the higher pressures of CO_2 (up to 12.3MPa).

FEATURES

- **Global Warming Potential = 1:** The Daikin CO_2-based VRV® system is the first VRF system in the market using CO_2 (R-744) as refrigerant. The GWP of CO_2 is 1, making it potentially one of the most environmental friendly refrigerants used.
- **Ozone Depletion Potential = 0:** Like R-410A, CO_2 has no negative impact on the ozone layer when released into the atmosphere.
- **Smaller piping diameters:** Because of the higher pressures of a CO_2 system the piping diameters are smaller. Also the amount of refrigerant in the system will be 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. VRV® super silent mode however, allows the sound level to be fixed in order to avoid noise pollution.
- **Connectable to all Daikin Control systems**

SPECIFICATIONS

RXYN-AY1				10 HP
Nominal capacity		cooling	kW	28.0
		heating	kW	31.5
COP		cooling		2
		heating		3
Dimensions	height		mm	1,680
	width		mm	930
	depth		mm	765
Weight			kg	330
Air Flow Rate (nominal at 230V)		cooling	m^3/min	185
Refrigerant	type			R-744
	charge		kg	7.2
Piping Connections	liquid	diameter (OD)	mm	9.52 (Brazed)
	gas	diameter (OD)	mm	15.9 (Brazed)

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, level difference : 0m

FXSN-AV1				20	25	32	40	50	63	100
Capacity		cooling	kW	2.2	2.8	3.6	4.5	5.6	7.1	11.2
		heating	kW	2.5	3.2	4.0	5.0	6.3	8.0	12.5
Power input		cooling	kW	0.110	0.110	0.114	0.127	0.143	0.234	0.242
		heating	kW	0.090	0.090	0.094	0.107	0.123	0.214	0.222
Dimensions	height		mm	300	300	300	300	300	300	300
	width		mm	550	550	550	700	700	1,400	1,400
	depth		mm	800	800	800	800	800	800	800
Weight			kg	31	31	31	34	34	61	61
Air Flow Rate	cooling	high	m^3/min	9	9	9.5	11.5	15	27	28
		low	m^3/min	6.5	6.5	7	9	11	21.5	22
External static pressure (Max)	high		Pa	88	88	64	88	88	113	107
	standard		Pa	39	39	39	49	59	82	75
	low		Pa	20	20	15	20	29	-	-
Refrigerant type				R-744	R-744	R-744	R-744	R-744	R-744	R-744

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

BEVN-AV1				32	50	100
Power input		cooling	kW	0.005		
		heating	kW	0.005		
Dimensions	height		mm	140		
	width		mm	380		
	depth		mm	250		
Weight			kg	4.5		

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.

Daikin Europe N.V. is approved by LRQA for its Quality Management System in accordance with the ISO9001 standard. ISO9001 pertains to quality assurance regarding design, development, manufacturing as well as to services related to the product.

ISO14001 assures an effective environmental management system in order to help protect human health and the environment from the potential impact of our activities, products and services and to assist in maintaining and improving the quality of the environment.

Daikin units comply with the European regulations that guarantee the safety of the product.

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

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