DAIKIN

altherma

THE ULTIMATE FLEXIBLE HEATING SOLUTION

For apartment buildings & collective housing

- ✓ Top comfort
- ✓ Heating and cooling
- ✓ Savings on running costs
- ✓ Low CO_2 emissions
- ✓ Flexible installation

www.daikin.eu

Daikin Altherma Flex Type:
a centralised heating system
with individual control
for apartment buildings and
collective housing

DAIKIN ALTHERMA FLEX TYPE: A FLEXIBLE HEATING SOLUTION

Apartment buildings are the most common form of new home construction in Europe, with twice as many apartment units being built than single-family homes. Such buildings deserve high efficient heating systems. To meet this need, Daikin is introducing Daikin Altherma Flex Type. This comfort system heats, cools and produces domestic hot water simultaneously by making optimal use of our VRV® and cascade technology. Daikin Altherma Flex Type represents a further extension of our heating product range that until now has targeted new and refurbished single-family dwellings. Expansion into the apartment and collective housing segment confirms Daikin's position at the cutting edge of residential comfort technology and represents a further realisation of our goal to provide the market with the best in turnkey residential comfort.

Daikin has more than 50 years of experience with heat pumps, and supplies more than one million of them to homes, shops and offices each year. Over 100,000 Daikin Altherma units have been installed throughout Europe. Such success is only possible from a market leader that can guarantee the highest levels of service and quality!

EFFICIENT CLIMATE CONTROL FOR APARTMENT BUILDINGS

Energy efficient heat pump technolgy

The Daikin Altherma Flex Type is today's answer to current and future issues associated with conventional heating systems such as increasing energy costs and unacceptable high environmental impact. With the Daikin Altherma Flex Type, 2/3 of the heat generated comes from the air, recognised as renewable energy source, which is free of charge! Daikin Altherma Flex Type achieves a typical seasonal COP of 3 in the moderate Western and central European climate. Compared to an oil boiler, this results in:

- Up to 36% less running costs*
- Up to 71% reduction of CO_2 emissions*
- Up to 35% % reduction in primary energy use*

* Data calculated taking in account Belgian conditions: SCOP of 3, average energy prices 2007-2010, CO2 emission factor for electricity production

Modular system

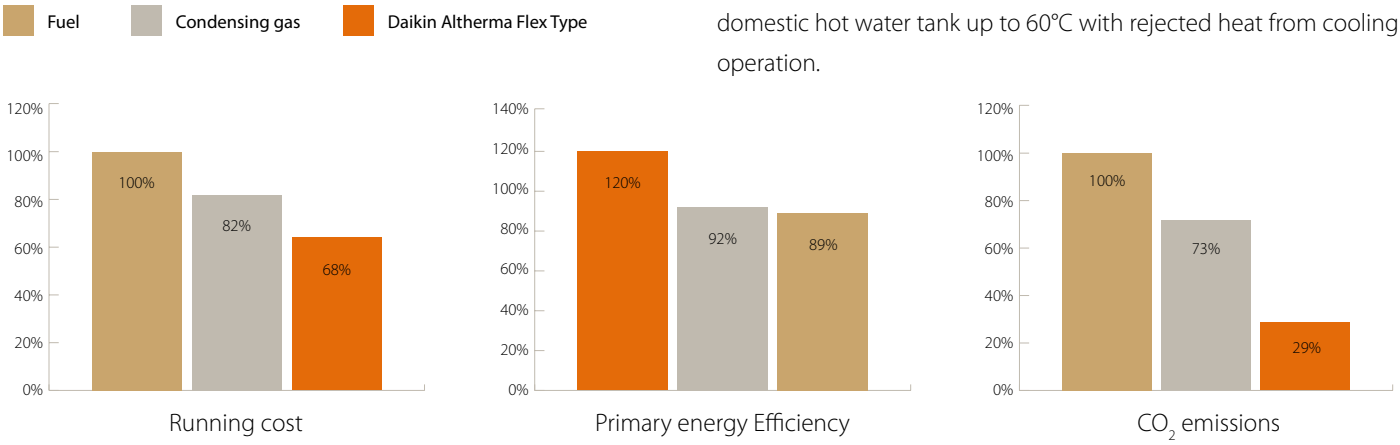
One or more inverter-controlled outdoor heat pump units can provide heating, cooling and domestic hot water to an apartment building, with 1 outdoor unit combined with up to 10 indoor units. Outdoor units between 23 and 45 kW extract the heat from the outdoor air, raise it to an intermediate temperature and transfer this heat energy to the individual indoor units.
A small footprint indoor unit is installed in each individual dwelling. It receives the heat energy from the central outdoor unit, raises the temperature further by means of a second (cascading) heat pump cycle and feeds heated or cooled water to emitters (underfloor elements, heat pump convectors and/or radiators as needed).
Two classes of indoor units are available (6 and 9 kW), ensuring optimum efficiency for any size apartment. Multiple outdoor units can be installed for larger applications.

3-in-1 system

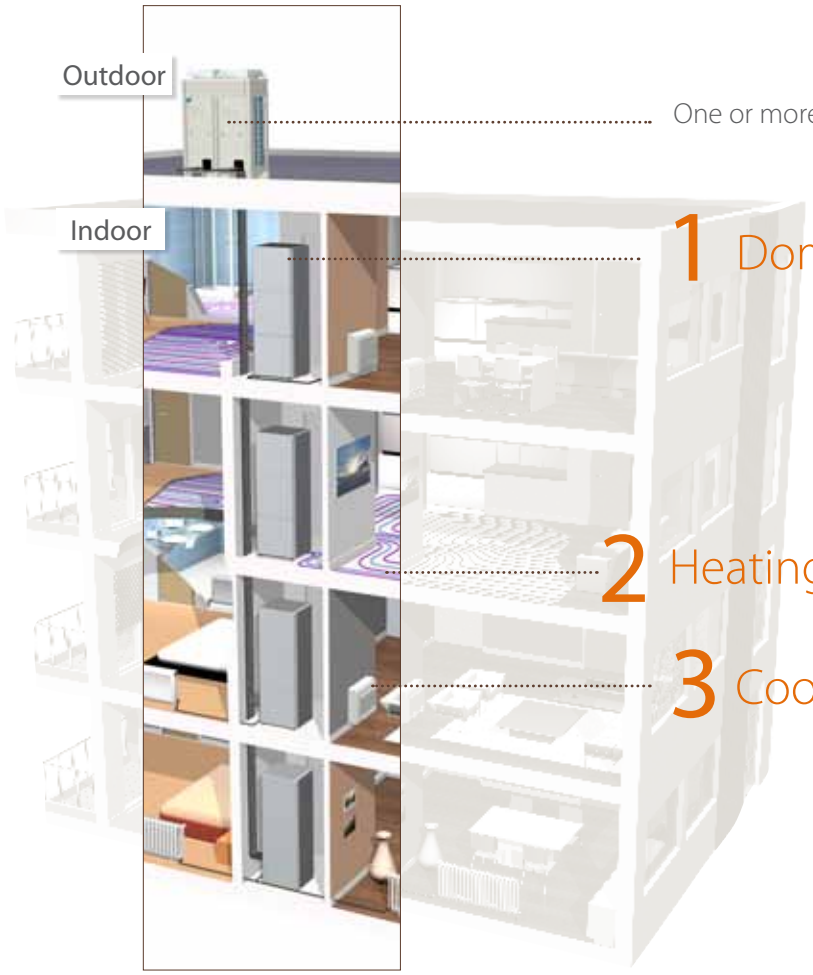
Daikin Altherma Flex Type heats, cools, and produces domestic hot water:

- Heating: leaving water temperatures up to 80° C
- Cooling: leaving water temperatures down to 5° C
- Domestic hot water: tank temperatures up to 75° C

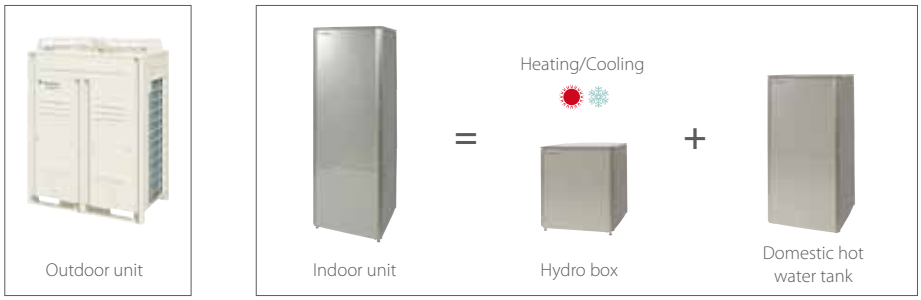
Thanks to its heat recovery function, the system can heat up the domestic hot water tank up to 60°C with rejected heat from cooling operation.



Concept description

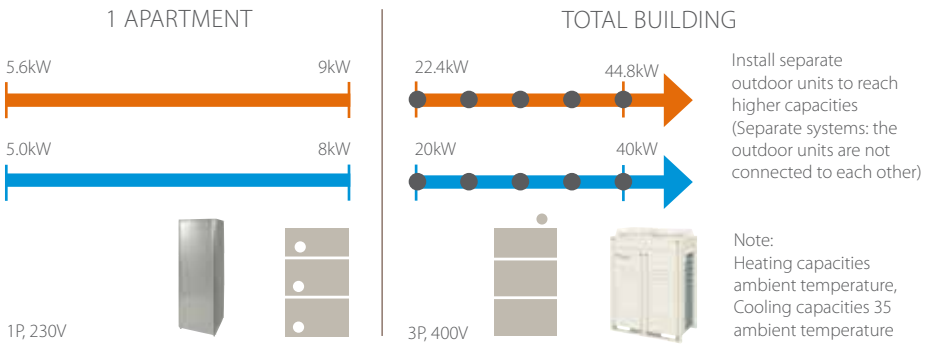


Daikin Altherma Flex Type for apartment buildings and collective housing



1 or more outdoor units + several indoor units >> a modular system

Modular system



TWO DAIKIN TECHNOLOGIES COMBINED

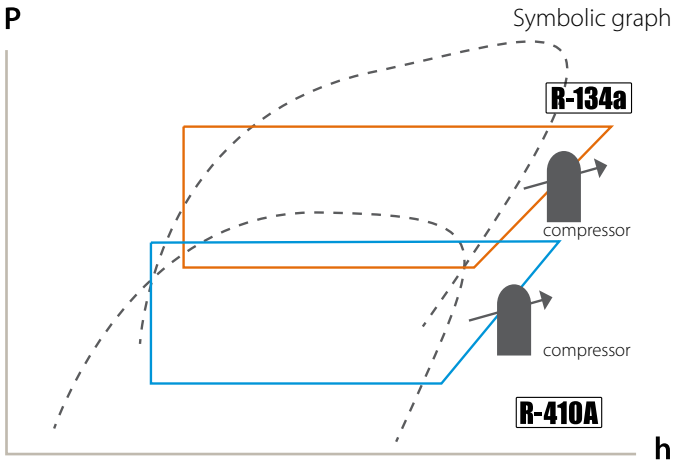
Indoor unit: Daikin Altherma cascade technology

Space heating

Daikin Altherma Flex Type system uses two refrigerant cycles, R410A and R134a, to heat the water circuit. The purpose of a cascade system is to attain or work with pressures and temperatures which cannot be reached by using only one refrigerant cycle. The aim is to get best characteristics out of the two active cycles, both operating under their optimal conditions. The R410A refrigerant circuit has excellent characteristics with respect to low evaporating temperatures, while the R134a circuit has excellent characteristics for high condensing temperatures (see graph).

The advantages of cascade technology versus single refrigerant cycle heat pumps:

- Wide water temperature range (25°C – 80°C): all types of heat emitters can be connected (under floor heating, convectors, radiators), but also compatible with existing radiators
- No drop of efficiency with increasing water temperatures,
- High capacities towards low ambient temperatures, down to -20°C.
- No electrical heater required



Domestic hot water heating

Thanks to the cascade technology, the Daikin Altherma Flex Type can reach water temperatures of 75°C to heat up the domestic hot water tank, which makes it highly efficient for the production of domestic hot water.

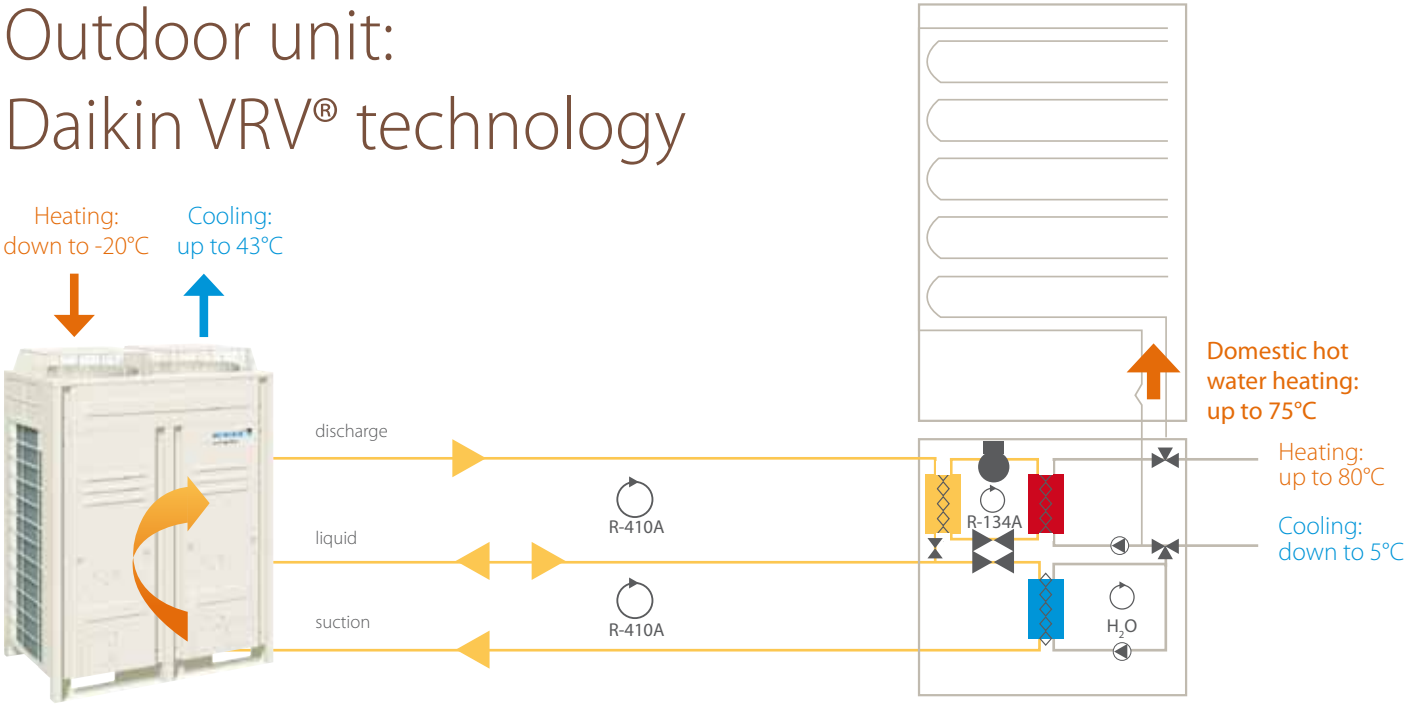
- Domestic hot water can be produced up to 75° C, without the assistance of an electric heater
- No electric heater required for Legionella disinfection
- COP of 3.0 for heating from 15° C to 60° C
- Heat-up time from 15° to 60° C in 70 minutes (200L tank)
- Equivalent hot water volume of 320L at 40° C (without reheat) for a 200L tank at a tank temperature of 60°C. Higher volumes of equivalent hot water are available with the 260l tank, or using a higher tank temperature.

Cooling

The second refrigerant cycle R134a can be bypassed to offer efficient cooling. The R410A refrigerant cycle is reversed, and the cool water circuit can be used to cool the rooms.

- High cooling capacities with water temperatures down to 5°C, in combination with Daikin heat pump convector or Daikin fan coil units
- Under floor cooling is possible, with water temperatures down to 18° C
- Heat from cooling operation can be recovered to heat the domestic hot water tank

Outdoor unit: Daikin VRV® technology



Modular flexibility

The Daikin Altherma makes use of Daikin's renowned VRV® technology. Multiple indoor units can be connected to a single outdoor unit. A combination of Proportional Integral Derivative controlled compressors and electronic expansion valves in the outdoor unit continuously adjust the circulating refrigerant volume in response to load variations in the connected indoor units.
This allows the indoor units to operate independently of each other, assuring total flexibility. Each apartment retains control of its own heating, hot water and cooling.

Inverter compressors

Daikin Altherma owes its remarkable low energy consumption to a unique combination of highly efficient inverter-controlled Daikin compressors with a variable operating point. This allows capacity to be exactly matched to the actual heating demand of the building. The ability to optimally control the heat capacity of the outdoor unit also means maximum comfort and minimum energy consumption.

Heat recovery

Heat absorbed while cooling one apartment, can be recovered instead of being simply released into the air. This recovered heat can be used

- for domestic hot water production in the same apartment
- for space heating and domestic hot water production in other apartments

Maximum use is made of available energy, thus reducing electricity costs.

Small footprint, quick installation

The domestic hot water tanks in the Daikin Altherma Flex Type range are designed to be stacked on the indoor units. The heat pump indoor units themselves are fully equipped with all the required hydraulic components, and thus can be connected directly to the heat distribution system.

Advantages:

- Small footprint: less than 0.6 m^2 per apartment, less than 0.9m wall width
- Reduce installer workload by use of quick-couplings

Installation of outdoor unit

The outdoor units are sufficiently compact to allow easy transportation. Thanks to their lightweight construction and vibration-free operation, floors do not need to be reinforced. Small refrigerant pipes and refnet piping options allow quick and easy installation of the Daikin piping system. Compared to regular T-joints, where refrigerant distribution is far from optimal, the Daikin REFNET joints have specifically been designed to optimise refrigerant flow.

Silent operation

Comfort is more than the perfect indoor climate. The use of a low noise inverter compressor in the indoor units means the units will produce less sound than standard household appliances such as washing machines, dishwashers or refrigerators. In addition, a low noise mode is available to further reduce the sound of the indoor unit.

Easy and flexible cost allocation

Since the individual heat pump indoor units in each apartment share the heat captured by a single outdoor unit, it might be even required to distribute the operational costs of the outdoor units fairly amongst all tenants.

When cost allocation based on the actual energy consumption of each individual tenant is preferred over equal shares, each apartment can be equipped with heat metering equipment.

A Daikin software tool allows you to calculate the correct share in the operational cost of the outdoor unit for each apartment based on the readings of the installed heat metering equipment, and taking into account additional consumption for cooling operation or savings due to heat recovery operation.

This software tool accepts input from most industry standard heat metering equipment, which will also allow you to subcontract the cost allocation to any meter reading company.

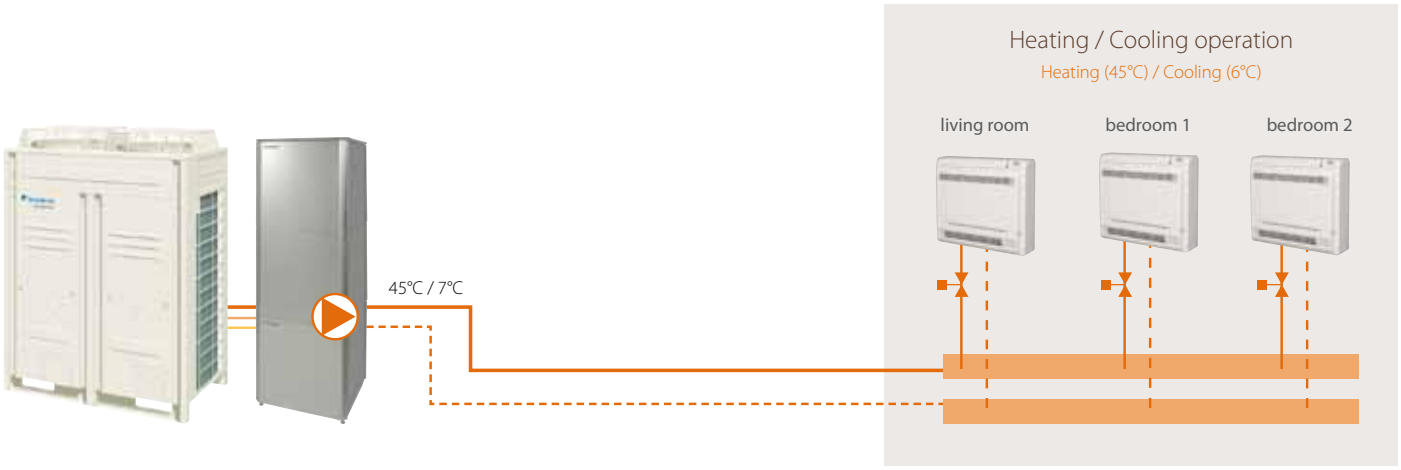
Daikin heat pump convector:

the optimal heat emitter for apartments

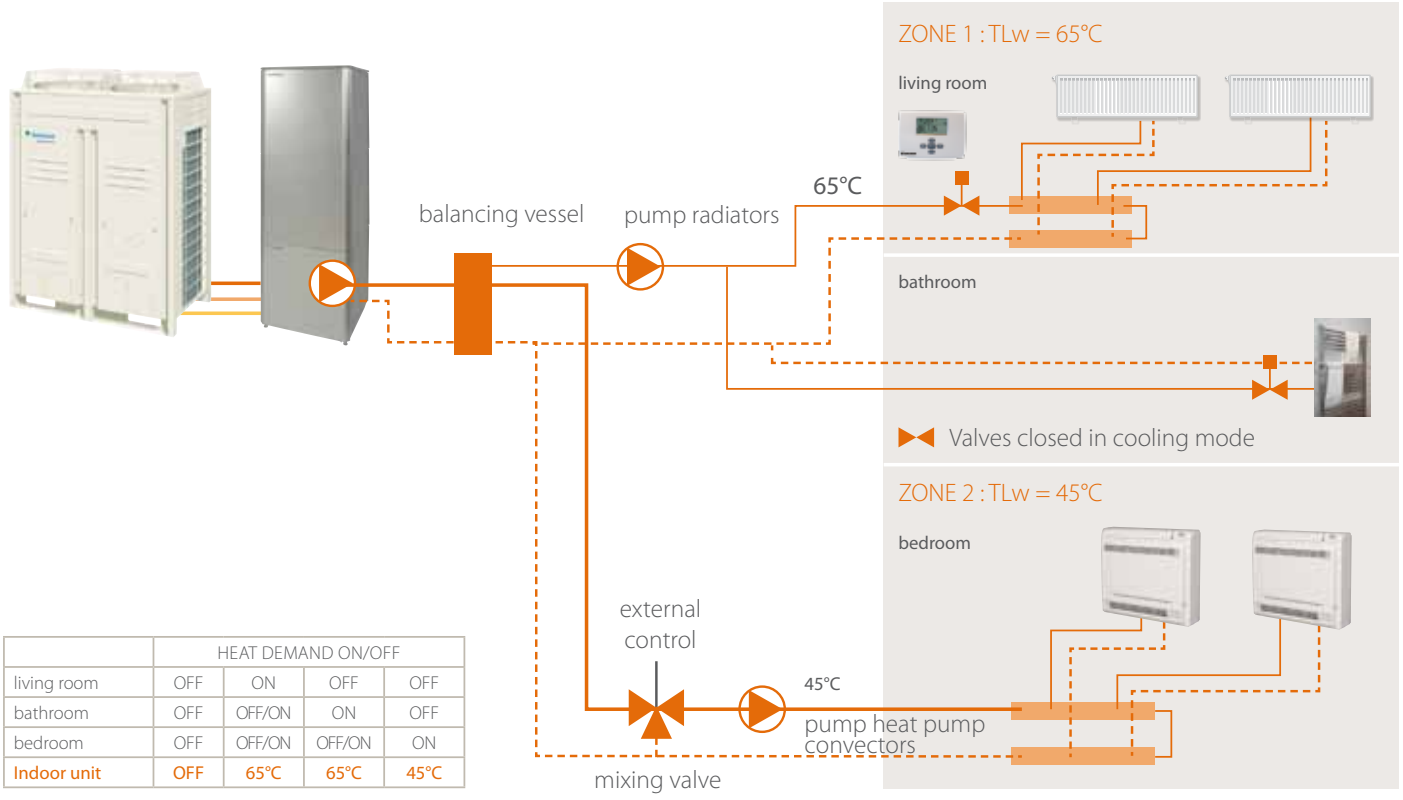
The Daikin heat pump convector operates at typical water temperatures of 45°C, which can be efficiently produced thanks to the Daikin Altherma cascade technology.

The heat pump convector is therefore the ideal heat emitter for apartment applications, providing high comfort levels:

- Small dimensions compared to low temperature radiators: width is reduced with 2/3rd
- Low sound level, optimal for bedroom applications down to 19 dB(A)
- High-capacity cooling with water temperatures down to 6° C



All type of heat emitters can be connected to Daikin Altherma Flex Type, thanks to its wide water temperature range. Daikin Altherma Flex Type is able to work with multiple set points, allowing a combination of different heat emitters operating at different water temperatures. The set point of the indoor unit will be lowered in function of the actual demand of the various heat emitters, ensuring optimum efficiency at all times and under all conditions.



	HEAT DEMAND ON/OFF			
living room	OFF	ON	OFF	OFF
bathroom	OFF	OFF/ON	ON	OFF
bedroom	OFF	OFF/ON	OFF/ON	ON
Indoor unit	OFF	65°C	65°C	45°C

DAIKIN ALTHERMA FLEX TYPE:

A TYPICAL INSTALLATION

Description:

Location: Ostend, Belgium
Number of floors: 8
Floor area for one apartment: 115m^2
Construction year: 2008
Design condition in winter: -8°C
Heat emitters: Daikin heat pump convectors

Outdoor unit: EMRQ16AAY1

Indoor units: 7x EKHVMYD50A

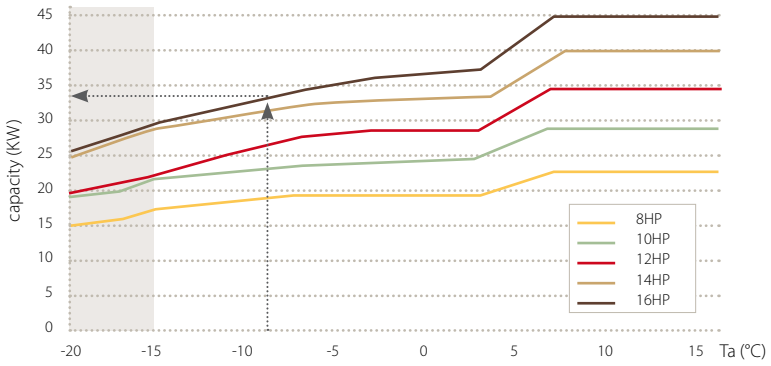
Theoretical calculation

1. Define design temperature

T_{design} = -8°C

2. Define heat loads for each apartment and the appropriate indoor and outdoor units:

	Heat load	Indoor class	Capacity index
Apartment 7	6.0 kW	80 class	80
Apartment 6	4.5 kW	50 class	50
Apartment 5	4.5 kW	50 class	50
Apartment 4	4.5 kW	50 class	50
Apartment 3	4.5 kW	50 class	50
Apartment 2	4.0 kW	50 class	50
Apartment 1	4.5 kW	50 class	50
Total heating capacity:	32.5 kW	Total capacity index:	380



☐ Heating capacity below Ta -15°C not garanteed

T_{design} = -8°C Required heating capacity = 32.5kW

Selected outdoor unit= 16HP

3. Check the capacity index

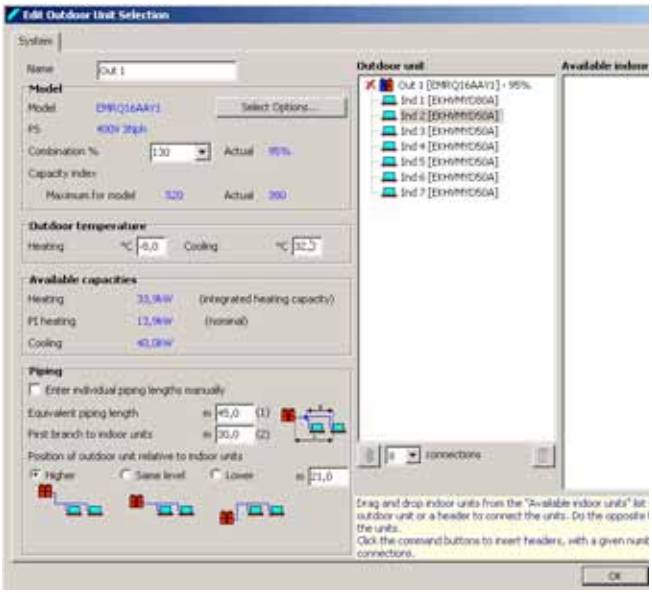
$$\text{Connection ratio} = \frac{\text{total capacity index}}{\text{nominal capacity index}}$$

When selecting an outdoor unit the total capacity index must be as close as possible to the nominal capacity index.

	connection ratio outdoor unit		
	50%	100%	130%
	min	nom	max
8HP	100	200	260
10HP	125	250	325
12HP	150	300	390
14HP	175	350	455
16HP	200	380 400	520

Connection ratio = $\frac{380}{400}$ = 95%

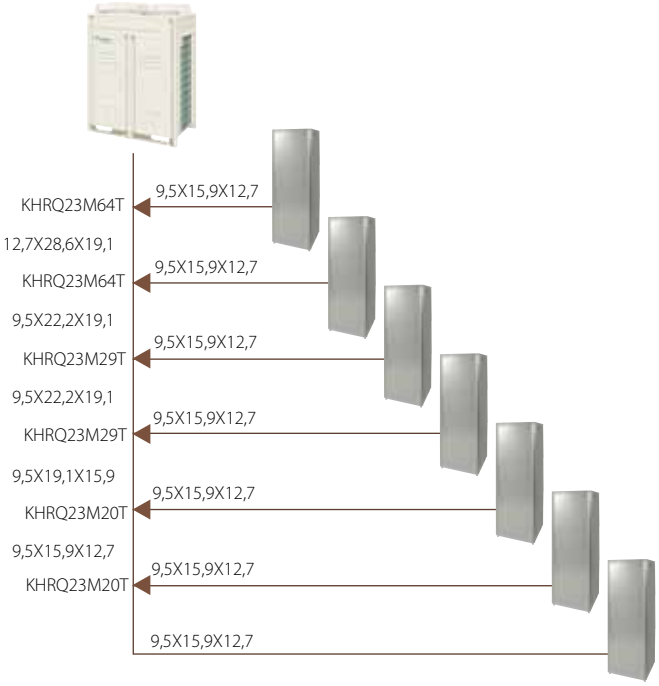
Simulation software



The Daikin Altherma Flex Type simulations software allows dimensioning of a Daikin Altherma Flex Type system in only a few steps. The software provides automatically all the specifications required for dimensioning the whole system, presented in a clear report.

- Selection of indoor units, domestic hot water tank and options
- Selection of appropriate outdoor unit
- Checking piping lengths and height differences
- Installation specifications: refrigerant piping diameters, refnet joints and headers, additional refrigerant charge, wiring diagram.

Calculation



DAIKIN ALTHERMA FLEX TYPE: THE FLEXIBLE HEATING SOLUTION FOR ALL

Daikin Altherma represents added value for any APARTMENT OWNER, with its innovative combination of heating, cooling and domestic hot water production in a single system. It improves on current heating system performance - it makes use of renewable energy, 2/3 of the heat is coming from the air outside - cools when and where necessary, and includes a heat recovery system.

Its efficient, environmentally aware air-to-water heat pump technology makes today's apartment buildings more environmentally sustainable, with lower running costs, reduced CO_2 emissions, and reduced primary energy use.

Daikin Altherma Flex Type is the first product on the market that fully allows the use of renewable energy source for apartment applications.

The modular design of Daikin Altherma Flex Type allows CONSULTANTS and ARCHITECTS to incorporate the system in any development project. A typical installation includes 1 outdoor unit (from 23 to 45 kW) for up to 10 apartment units. Multiple outdoor units can be installed for larger applications.

The outdoor unit extracts heat from the outdoor air, raises and transfers it at intermediate temperature to the individual indoor units (6 and 9 kW). The small footprint indoor unit raises the temperature further and feeds heated water to emitters. Aditionally, the unit can provide cooling. The ideal heat emitter is the Daikin heat pump convector, which offers high capacity heating & cooling in a compact unit and low sound levels.

Improve the comfort levels through heating and cooling possibilities

Reduce the development and execution time of your project!

Daikin Altherma Flex Type combines the best of Daikin's KNOW HOW:

- Daikin VRV® technology continuously adjusts the circulating refrigerant volume in response to load variations in the indoor units. This allows the indoor units to operate independently of each other, assuring total flexibility per apartment, with individual control of heating, hot water and cooling.
- Highly efficient, inverter-controlled compressors with variable operating point optimally control the heat emission temperature, resulting in maximum comfort and minimum energy consumption.
- Heat recovery makes optimum use of the energy consumed and reduces electricity costs.

The Daikin Altherma Flex Type range is designed to be INSTALLED QUICKLY AND FLEXIBLY:

- The indoor units are fully equipped with all the required hydraulic components, and can be connected directly to the heat distribution system. The domestic hot water tanks can be stacked on the indoor units. This limits the footprint (<0.6 m^2 per apartment) and installation workload (quick-couplings).
- The outdoor unit is sufficiently compact to allow easy transportation. Thanks to its lightweight construction and vibration-free operation, floors do not need to be reinforced.
- Daikin's piping system can be installed quickly and easily thanks to its small refrigerant pipes and refnet piping options.

The Daikin Altherma Flex Type guarantees PERFECT INDOOR CLIMATE COMFORT with heating and domestic hot water all year round for the entire family:

- High heating capacities, even at low ambient temperatures, down to -20°C
- High cooling capacities, in combination with Heat pump convector or fan coil units
- Silent operation, thanks to its low-noise inverter compressor

Daikin Altherma Flex Type provides optimal comfort for each apartment building, offering heating, cooling and domestic hot water using our renowned VRV® and cascade heat pump technology.
This 3-in-1 solution allows for flexible integration in property development projects, and contributes to timely completion of your project.

SPECIFICATIONS

INDOOR UNIT

			EKHVMRD50AAV1	EKHVMRD80AAV1	EKHVMYD50AAV1	EKHVMYD80AAV1
Function			Heating only		Heating and cooling	
Dimensions	HxWxD	mm	705x600x695		705x600x695	
Leaving water temperature range	heating	°C	25~80		25~80	
Material			Precoated sheet metal		Precoated sheet metal	
Colour			Metallic grey		Metallic grey	
Sound pressure level	nominal	dB(A)	40[1]/ 43[2]	42[1]/ 43[2]	40[1]/ 43[2]	42[1]/ 43[2]
Weight		kg	92		120	
Refrigerant	Type		R-134a		R-134a	
	Charge	kg	2	2	2	2
Power supply			1~/ 50Hz /220-240V		1~/ 50Hz /220-240V	

1 Sound levels are mesured at:EW 55°C; LW 65°C
2 Sound levels are mesured at:EW 70°C; LW 80°C

OUTDOOR UNIT

			EMRQ8AAY1	EMRQ10AAY1	EMRQ12AAY1	EMRQ14AAY1	EMRQ16AAY1
Nominal capacity	heating	kW	22.4	28	33.6	39.2	44.8
	cooling	kW	20	25	30	35	40
Capacity range		HP	8	10	12	14	16
Dimensions	HxWxD	mm	1680x1300x765				
Weight		kg	331			339	
Sound power level	heating	dB(A)	78		80	83	84
Sound pressure level	heating	°C	58		60	62	63
Operation range	heating	°C	-20°C~20*				
	domestic water	°C	-20°C~35*				
Refrigerant	type	kg	R-410A				
Power supply			3~/50Hz/380-415V				
Piping connections	liquid	mm	9.52		12.7		
	suction	mm	19.1	22.2	28.6		
	high&low pressure gas		15.9	19.1		22.2	
	max total length	m	300				
	level differnce OU-IU	m	40				
Recommended fuses		A	20	25		40	

Heating conditions: Ta = 7°CDB / 6°CWB, 100% connection ratio
Cooling conditions: Ta = 35°CDB, 100% connection ratio
* Capacity not guaranteed between -20°C and -15°C

DOMESTIC HOT WATER TANK

			EKHTS200AB	EKHTS260AB
Water volume		l	200	260
Max. water temperature		°C	75°C	
Dimensions	HxWxD	mm	1,335x600x695	1,610x600x695
Dimensions - integrated on indoor unit	HxWxD	mm	2,010x600x695	2,285x600x695
Material outside casing			Galvanised metal	
Colour			Metallic grey	
Empty weight		kg	70	78

HEAT PUMP CONVECTOR

				FWXV15A	FWXV20A
Capacity	Heating	45°C [1]	kW	1.5	2.0
	Cooling	7°C [2]	kW	1.2	1.7
Dimensions	HxWxD		mm	600x700x210	
Weight			kg	15	
Air flow rate	H/M/L/SL		m3/h	318/228/150/126	474/354/240/198
Sound pressure	M		dB(A)	19	29
Refrigerant				Water	
Power Supply				1~/220-240V/50/60Hz	
Piping connections	Liquid (OD)/Drain			12.7 / 20	

[1] Water inlet temperature = 45°C / Water outlet temperature: 40°C
indoor temperature = 20°CDB
Medium fan speed
[2] Water inlet temperature = 7°C / Water outlet temperature: 12°C
indoor temperature = 27°CDB / 19°CWB
Medium fan speed

In all of us, a green heart

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.

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