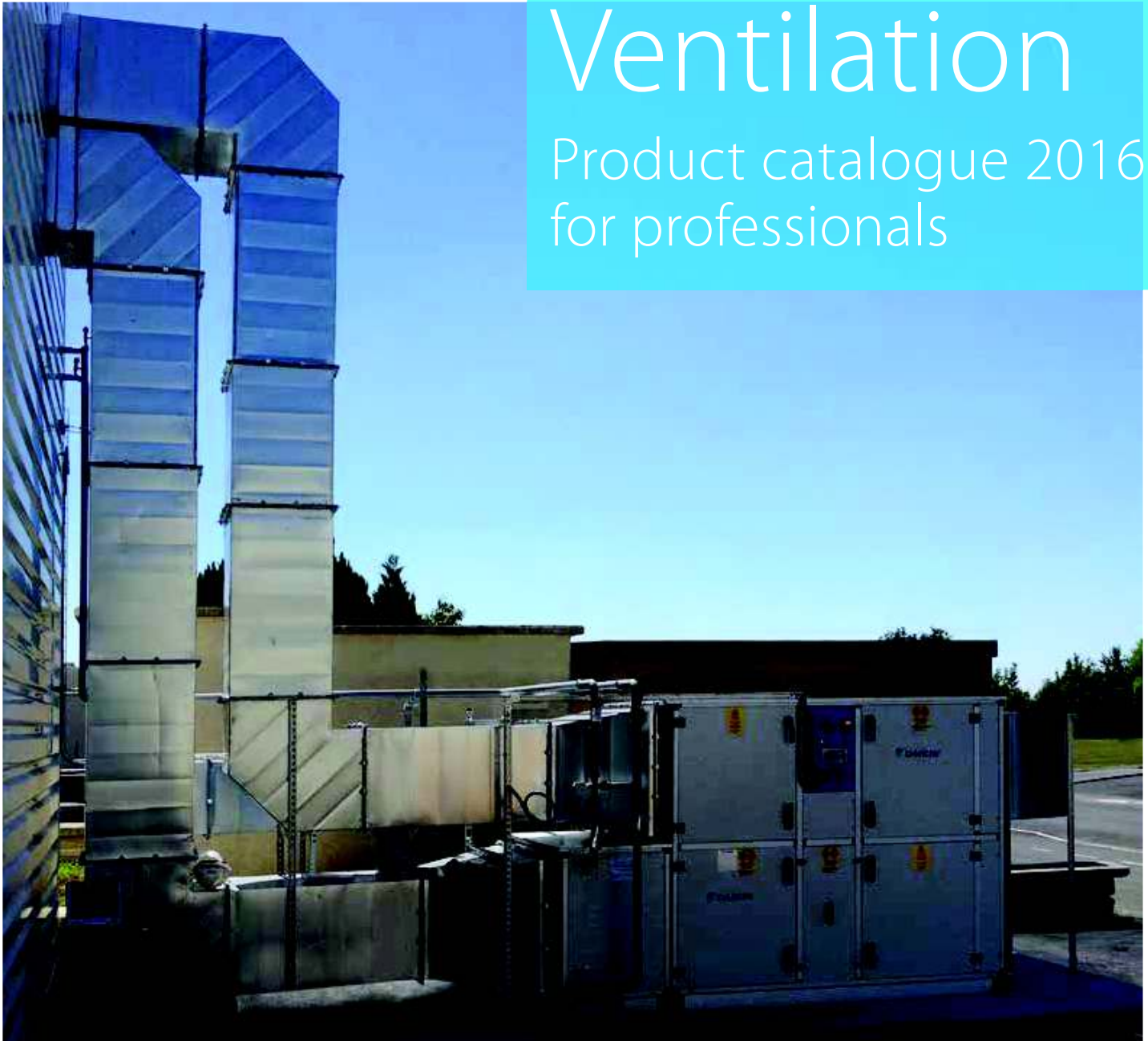


Ventilation

Product catalogue 2016
for professionals



Fresh air for the residential and commercial sector
Heat reclaim ventilation and air handling applications

Daikin

air handling units

Air handling unit applications

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Air handling unit applications

Wide range of air flows

For applications that require big volumes of treated fresh air (large atriums, banquet halls, etc) air handling units represent the ideal solution. Daikin's wide range of air handling units treat air volumes from 500 m³/h up to 144,000 m³/h. The air handling unit can be designed to deliver whatever air flow you require, via the specific dimensions of flow section available at the installation.

Professional

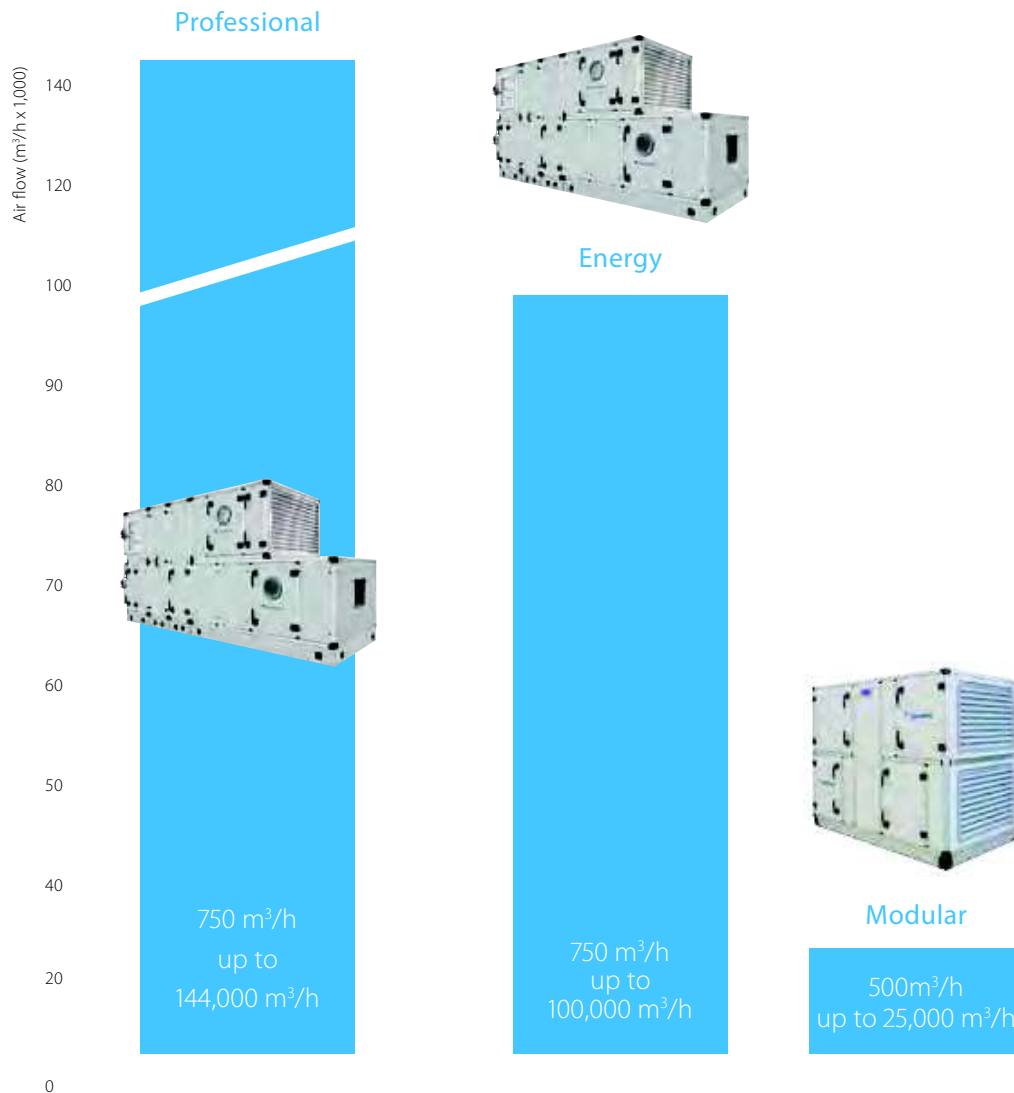
- › Pre-configured sizes
- › Tailored to the individual customer
- › Modular construction

Energy

- › High-end solution for optimised energy consumption
- › High efficiency components
- › Strong Return on Investment

Modular

- › Plug & play, with factory mounted controls
- › Pre-configured sizes
- › EC Fan Technology
- › High Efficiency Heat Wheel
- › Compact Design





Daikin fresh air package - plug & play

The D-AHU Modular series provide a complete solution including unit control (EKEXV, EKEQ, DDC controller) factory mounted and configured, plug & play with our VRV and ERQ condensing units. The easiest solution as you save time and only have one point of contact!

Return on investment

The air handling unit (AHU) is critical to an effective climate control system and the savings generated by our advanced designs and operating efficiencies guarantee a rapid return on the investment made. Our AHU Energy series has been designed to deliver exceptional performance thus driving down the energy consumed and so lowering energy bills. Taken over the expected 15-year life-span of the equipment, this will result in a substantial saving, especially in a time of ever increasing energy prices.

Pre-defined sizes

27 fixed sizes are available, optimised to reach the optimum combination between value for money and manufacturing standardisation. Daikin's section by section design means that units can be sized by 1cm increments and assembled on site, without welding, to suit the space constraints of the installation.

High efficiency components

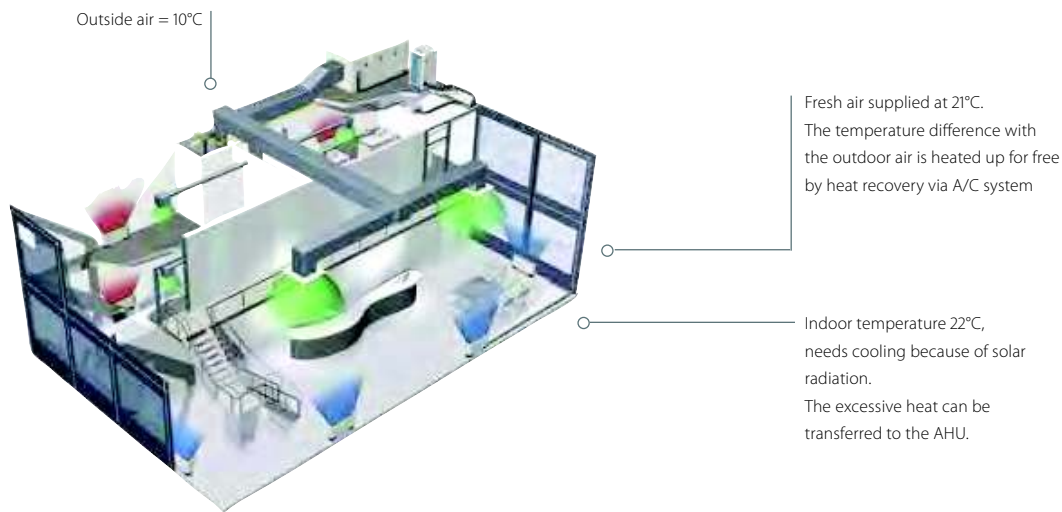
All Daikin air handling units have been designed for optimum energy efficiency. Polyurethane or Mineral wool panels guarantee excellent thermal insulation performance. And the widest range of filters are provided to meet even the most strict demands.

Why use VRV and ERQ condensing units for connection to air handling units?

High Efficiency

Daikin heat pumps are renowned for their high energy efficiency. Integrating the AHU with a heat recovery system is even more effective since an office system can frequently be in cooling mode

while the outdoor air is too cold to be brought inside in an unconditioned state. In this case heat from the offices is merely transferred to heat up the cold incoming fresh air.



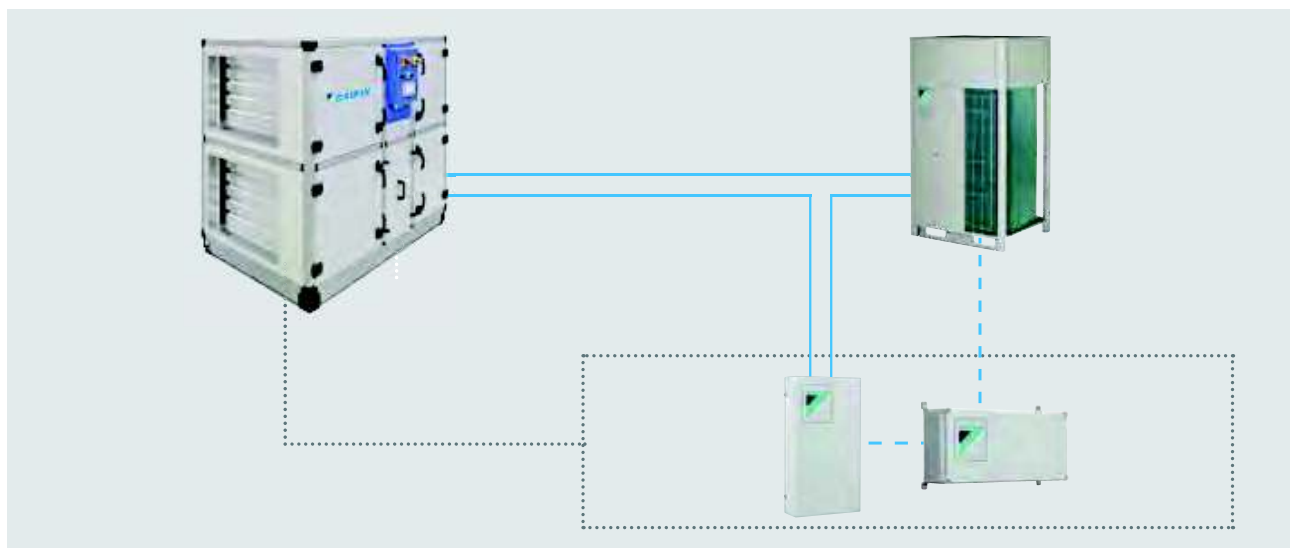
Fast response to changing loads resulting in high comfort levels

Daikin ERQ and VRV units respond rapidly to fluctuations in supply air temperature, resulting in a steady indoor temperature and resultant high comfort levels for the end user. The ultimate is the VRV range which improves comfort even more by offering continuous heating, also during defrost.

Easy Design and Installation

The system is easy to design and install since no additional water systems such as boilers, tanks and gas connections etc. are required. This also reduces both the total system investment and running cost.

Daikin Fresh air package



In order to maximise installation flexibility, 4 types of control systems are offered

W control: Off the shelf control of air temperature (supply air temperature, return air temperature, room temperature) via any DDC controller, easy to setup

X control: Precise control of air temperature (supply air temperature, return air temperature, room temperature) requiring a preprogrammed DDC controller (for special applications)

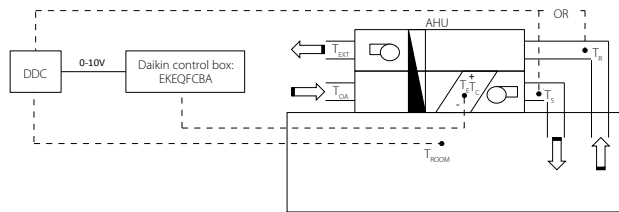
Z control: Control of air temperature (return air temperature, room temperature) via Daikin control (no DDC controller needed)

Y control: Control of refrigerant (T_e/T_c) temperature via Daikin control (no DDC controller needed)

1. W control ($T_s/T_r/T_{ROOM}$ control):

Air temperature control via DDC controller

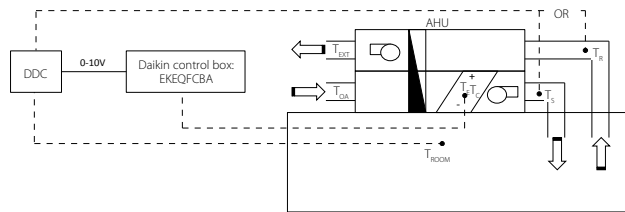
Room temperature is controlled as a function of the air handling unit return air or supply air (customer selection). The DDC controller is translating the temperature difference between set point and return air temperature (or supply air temperature or room temperature) into a proportional 0-10V signal which is transferred to the Daikin control box (EKEQFCBA). This voltage modulates the capacity requirements of the outdoor unit.



2. X control ($T_s/T_r/T_{ROOM}$ control):

Precise air temperature control via DDC controller

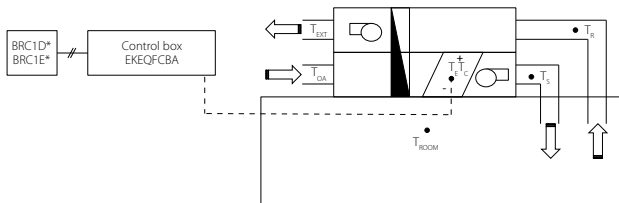
Room temperature is controlled as a function of the air handling unit return air or supply air (customer selection). The DDC controller is translating the temperature difference between set point and return air temperature (or supply air temperature or room temperature) into a reference voltage (0-10V) which is transferred to the Daikin control box (EKEQFCBA). This reference voltage will be used as the main input value for the compressor frequency control.



3. Y control (T_e/T_c control):

By fixed evaporating /condensing temperature

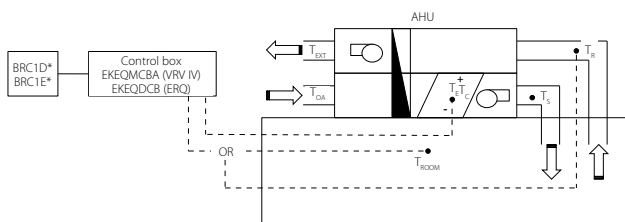
A fixed target evaporating or condensing temperature can be set by the customer. In this case, room temperature is only indirectly controlled. A Daikin wired remote control (BRC1D52 or BRC1E52A/B - optional) have to be connected for initial set-up but not required for operation.



4. Z control (T_r/T_{ROOM} control):

Control your AHU just like a VRV indoor unit with 100% fresh air

Allows the possibility to control the AHU just like a VRV indoor unit. Meaning temperature control will be focused on return air temperature from the room into the AHU. Requires BRC1D52 or BRC1E52A/B for operation. This the only control that allows the combination of other indoor units to the AHU at the same time.



T_s = Supply air temperature	T_r = Return air temperature	T_{OA} = Outdoor air temperature	T_{ROOM} = Room air temperature
T_{EXT} = Extraction air temperature	T_e = Evaporating temperature	T_c = Condensing temperature	

	Option kit	Features
Possibility W	EKEQFCBA	Off-the-shelf DDC controller that requires no pre-configuration
Possibility X		Pre-configured DDC controller required
Possibility Y		Using fixed evaporating temperature, no set point can be set using remote control
Possibility Z	EKEQDCB	Using Daikin infrared remote control BRC1D52 or BRC1E52A/B
	EKFQMCBA*	Temperature control using return air temperature or room temperature (via remote sensor)

* EKEQMCB (for 'multi' application)

VRV - for larger capacities (from 8 to 54HP)

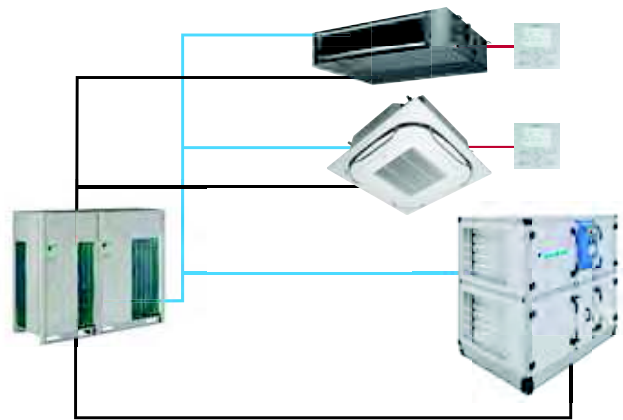
An advanced solution for both pair and multi application

- › Inverter controlled units
- › Heat recovery, heat pump
- › R-410A
- › Control of room temperature via Daikin control
- › Large range of expansion valve kits available
- › BRC1E52A/B is used to set the set point temperature (connected to the EKEQMCBA).
- › Connectable to all VRV heat recovery and heat pump systems

W, X, Y control for VRV IV heat pump



Z control for all VRV outdoor units



— Refrigerant piping
— F1-F2
— other communication



ERQ - for smaller capacities (from 100 to 250 class)

A basic fresh air solution for pair application

- › Inverter controlled units
- › Heat pump
- › R-410A
- › Wide range of expansion valve kits available
- › Perfect for the Daikin Modular air handling unit

The "Daikin Fresh Air Package" provides a complete Plug & Play Solution including AHU, ERQ or VRV Condensing Unit and all unit control (EKEQ, EKEX, DDC controller) factory mounted and configured. The easiest solution with only one point of contact.



Ventilation				ERQ	100AV1	125AV1	140AV1
Capacity range				HP	4	5	6
Cooling capacity Nom.				kW	11.2	14.0	15.5
Heating capacity Nom.				kW	12.5	16.0	18.0
Power input	Cooling	Nom.	kW		2.81	3.51	4.53
	Heating	Nom.	kW		2.74	3.86	4.57
EER					3.99		3.42
COP					4.56	4.15	3.94
Dimensions	Unit		mm		1,345x900x320		
Weight	Unit		kg		120		
Fan-Air flow rate	Cooling	Nom.	m ³ /min		106		
	Heating	Nom.	m ³ /min		102	105	
Sound power level	Cooling	Nom.	dB(A)		66	67	69
Sound pressure level	Cooling	Nom.	dB(A)		50	51	53
	Heating	Nom.	dB(A)		52	53	55
Operation range	Cooling	Min./Max.	°CDB		-5/46		
	Heating	Min./Max.	°CWB		-20/15.5		
	On coil temperature	Heating Min.	°CDB		10		
		Cooling Max.	°CDB		35		
Refrigerant	Type / GWP				R-410A / 2.087,5		
	Charge		kg/ TCO ₂ Eq		4.0/8.4		
Piping connections	Liquid	OD	mm		9.52		
	Gas	OD	mm		15.9		19.1
	Drain	OD	mm		26x3		
Power supply	Phase/Frequency/Voltage		Hz/V		1N~/50/220-240		
Current	Maximum fuse amps (MFA)		A		32.0		

Ventilation				ERQ	125AW1	200AW1	250AW1
Capacity range				HP	5	8	10
Cooling capacity Nom.				kW	14.0	22.4	28.0
Heating capacity Nom.				kW	16.0	25.0	31.5
Power input	Cooling	Nom.	kW		3.52	5.22	7.42
	Heating	Nom.	kW		4.00	5.56	7.70
EER					3.98	4.29	3.77
COP					4.00	4.50	4.09
Dimensions	Unit		mm		1,680x635x765	1,680x930x765	
Weight	Unit		kg		159	187	240
Fan-Air flow rate	Cooling	Nom.	m ³ /min		95	171	185
	Heating	Nom.	m ³ /min		95	171	185
Sound power level	Nom.		dB(A)		72	78	
Sound pressure level	Nom.		dB(A)		54		58
Operation range	Cooling	Min./Max.	°CDB		-5/43		
	Heating	Min./Max.	°CWB		-20/15		
	On coil temperature	Heating Min.	°CDB		10		
		Cooling Max.	°CDB		35		
Refrigerant	Type / GWP				R-410A / 2.087,5		
	Charge		kg/ TCO ₂ Eq		6.2/12.9	7.7/16.1	8.4/17.5
Piping connections	Liquid	OD	mm			9.52	
	Gas	OD	mm		15.9	19.1	22.2
Power supply	Phase/Frequency/Voltage		Hz/V		3N~/50/400		
Current	Maximum fuse amps (MFA)		A		16	25	

Integration of ERQ and VRV in third party air handling units

a wide range of expansion valve kits and control boxes

Combination table

		Control box			Expansion valve kit										Mixed connection with VRV indoor units
		EKEQDCB	EKEQFCBA	EKEQMCBA	EKE XV50	EKE XV63	EKE XV80	EKE XV100	EKE XV125	EKE XV140	EKE XV200	EKE XV250	EKE XV400	EKE XV500	
		Z control	W,X,Y control	Z control	-	-	-	-	-	-	-	-	-	-	Not possible
1-phase	ERQ100	P	P	-	-	P	P	P	P	-	-	-	-	-	
	ERQ125	P	P	-	-	P	P	P	P	-	-	-	-	-	
	ERQ140	P	P	-	-	-	P	P	P	-	-	-	-	-	
3-phase	ERQ125	P	P	-	-	P	P	P	P	P	-	-	-	-	
	ERQ200	P	P	-	-	-	-	P	P	P	P	P	-	-	
	ERQ250	P	P	-	-	-	-	-	P	P	P	P	-	-	
VRV III		-	-	n1	n1	n1	n1	n1	n1	n1	n1	n1	n1	n1	Mandatory
VRV IV H/P / VRV IV W-series / VRV IV S-series		-	P (1 -> 3)	n2	n2	n2	n2	n2	n2	n2	n2	n2	n2	n2	Possible (not mandatory)
VRV IV H/R / VRV IV i-series		-	-	n1	n1	n1	n1	n1	n1	n1	n1	n1	n1	n1	Mandatory

- P (pair application): combination depends on the capacity of the air handling unit.
- n1 (multi application) - Combination of AHUs and VRV DX indoors (mandatory). To determine the exact quantity please refer to the engineering data book.
- n2 (multi application) - Combination of AHUs and VRV DX indoors (not mandatory). To determine the exact quantity please refer to the engineering data book.
- Control box EKEQFA can be connected to some types of VRV IV outdoor units (with a maximum of 3 boxes per unit). Do not combine EKEQFA control boxes with VRV DX indoor units, RA indoor units or hydroboxes.

Capacity table

Cooling

EKE XV Class	Allowed heat exchanger capacity (kW)		
	Minimum	Standard	Maximum
50	5.0	5.6	6.2
63	6.3	7.1	7.8
80	7.9	9.0	9.9
100	10.0	11.2	12.3
125	12.4	14.0	15.4
140	15.5	16.0	17.6
200	17.7	22.4	24.6
250	24.7	28.0	30.8
400	35.4	45.0	49.5
500	49.6	56.0	61.6

Saturated evaporating temperature: 6°C, SH: 5K
Air temperature: 27°C DB / 19°C WB

Heating

EKE XV Class	Allowed heat exchanger capacity (kW)		
	Minimum	Standard	Maximum
50	5.6	6.3	7.0
63	7.1	8.0	8.8
80	8.9	10.0	11.1
100	11.2	12.5	13.8
125	13.9	16.0	17.3
140	17.4	18.0	19.8
200	19.9	25.0	27.7
250	27.8	31.5	34.7
400	39.8	50.0	55.0
500	55.1	63.0	69.3

Saturated condensing temperature: 46°C, SC: 3K
Air temperature: 20°C DB

EKE XV - Expansion valve kit for air handling applications

Ventilation		EKE XV	50	63	80	100	125	140	200	250	400	500
Dimensions	Unit	mm	401x215x78									
Weight	Unit	kg	2.9									
Sound pressure level Nom.		dBA	45									
Operation range	On coil	Heating Min. °CDB	10 (1)									
	temperature	Cooling Max. °CDB	35 (2)									
Refrigerant	Type / GWP		R-410A / 2.087,5									
Piping connections	Liquid OD	mm	6.35				9.52				12.7	15.9

(1) The temperature of the air entering the coil in heating mode can be reduced to -5°CDB. Contact your local dealer for more information. (2) 45% Relative humidity.

EKEQ - Control box for air handling applications

Ventilation		EKEQ	FCBA	DCB	MCBA
Application			See note	Pair	Multi
Outdoor unit			ERQ / VRV	ERQ	VRV
Dimensions	Unit	mm	132x400x200		
Weight	Unit	kg	3.9	3.6	
Power supply	Phase/Frequency/Voltage		Hz/V 1~/50/230		

The combination of EKEQFCBA and ERQ is in pair application. The EKEQFCBA can be connected to some type of VRV IV outdoor units with a maximum of 3 control boxes. The combination with DX indoor units, hydroboxes, RA outdoor units, ... is not allowed. Refer to the combination table drawing of the outdoor unit for details.

Pair application selection

- › **the outdoor unit is connected to ONE COIL (with single circuit or maximum 3 interlaced circuits) using up to 3 control boxes**
- › **indoor unit combination is not allowed**
- › **only works with X, W, Y control**

Step 1: Required AHU capacity

An AHU with double flow, heat recovery and 100% fresh air is to be installed in Europe where the outdoor sizing temperature is 35 °CDB and the target supply air temperature for fresh air is 25 °CDB. Load calculations point to a required capacity of 45kW. By checking on the EKEXV capacity table, for cooling operation, 40kW falls within the 400 class valve. Since 40kW is not the nominal capacity, a class adjustment has to be done. $40/45=0,89$ and $0,89 \times 400=356$. So the capacity class of the expansion valve kit is 356.

Step 2: Outdoor unit selection

For this AHU, a VRV IV heat pump model with continuous heating is going to be used (RYYQ-T series). For a capacity of 40kW at 35 °CDB, an outdoor of 14HP (RYYQ14T). The capacity class of the 14 HP outdoor unit is 350.

Total connection ratio of the system is $356/350=102\%$ hence it falls within the range 90-110%.

Step 3: Control box selection

In this particular case, the control will work with precise air temperature control. Only W or X control allow this. Since the consultant wants to use an "off-the-shelf" DDC module, the EKEQFCBA box with W control allows easy set-up due to pre-set factory values.

→ [Application examples on page 60-61](#)

Multi application selection

- › **the outdoor unit can be connected to MULTIPLE COILS (and their control boxes)**
- › **indoor units are also connectable but not mandatory**
- › **only works with Z control**

Step 1: Required AHU capacity

An AHU with double flow, heat recovery and 100% fresh air is to be installed in Europe where the outdoor sizing temperature is 35 °CDB and the target supply air temperature for fresh air is 25 °CDB. On top of this, for this building, 5 round-flow cassette units FXFQ50A will also be connected to this OU.

Load calculations point to a required capacity of 20kW for the AHU and 22,5 kW for the indoor units.

By checking on the EKEXV capacity table, for cooling operation, 20kW falls within the 200 class valve. Since 22,4 kW is the nominal capacity, a class adjustment has to be done. $20/22,4=0,89$ and $0,89 \times 200=178$. So the capacity class of the expansion valve kit is 178. Total capacity class of the indoor unit system is $178+250=428$

Step 2: Outdoor unit selection

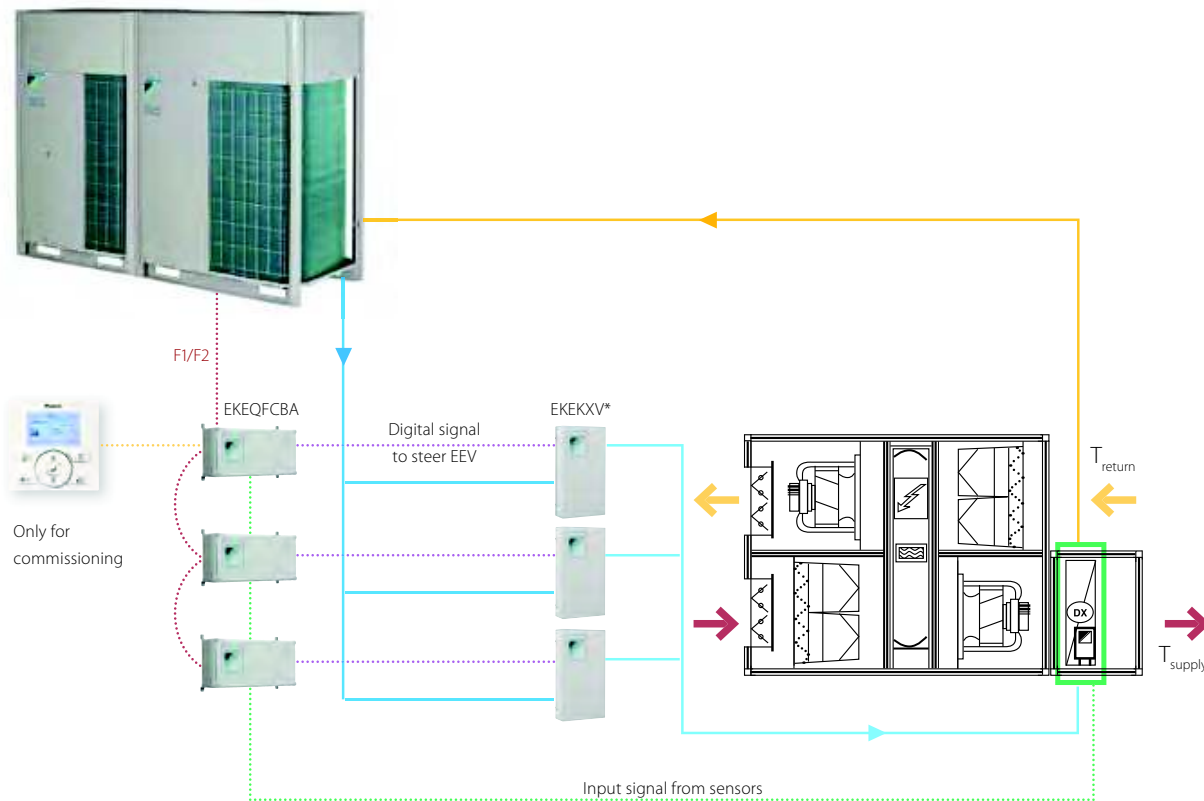
For this system where a AHU is connected with indoor units, it is mandatory to use a heat recovery unit. By consulting the engineering databook for REYQ-T, the total required capacity of 42,5 kW requires a 16HP model REYQ16T. Which will deliver 45kW at the design temperature of 35 °CDB. This unit has a capacity class of 400. Total connection ratio of the system is $428/400=107\%$ hence it falls within the range 50-110%.

Step 3: Control box selection

In this particular case, the only available control is Z control and the combination of AHU and VRV DX indoor units requires EKEQMCBA control box.

→ [Application examples on page 62-63](#)

Pair application layout #2: Example for Y control with EKEQFCBA box



Outdoor unit compatibility

RYQ8T	>	RYQ54T
RXYQ8T	>	RXYQ54T
RWEYQ8T8	>	RWEYQ30T8
ERQ100	>	ERQ250 ¹

(1) Only available in 1 to 1 combination

Connection restrictions

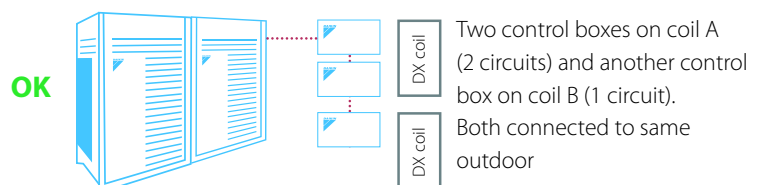
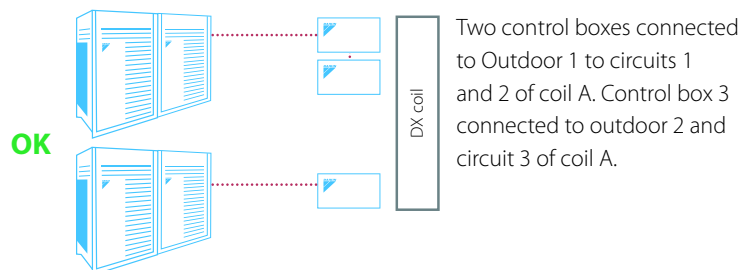
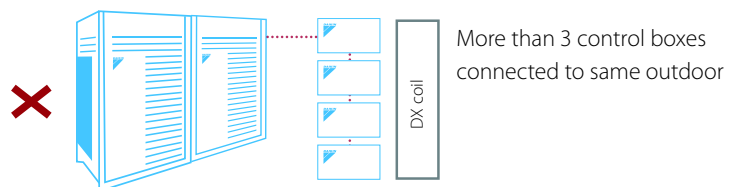
Connection Ratio between 90-110%

Connection Ratio ERQ: between 50-110%

$$CR = \frac{\sum IU CC}{\sum OU CC} = \frac{\sum (CF \times EKEKXV CC)_{1-3}}{\sum OU CC}$$

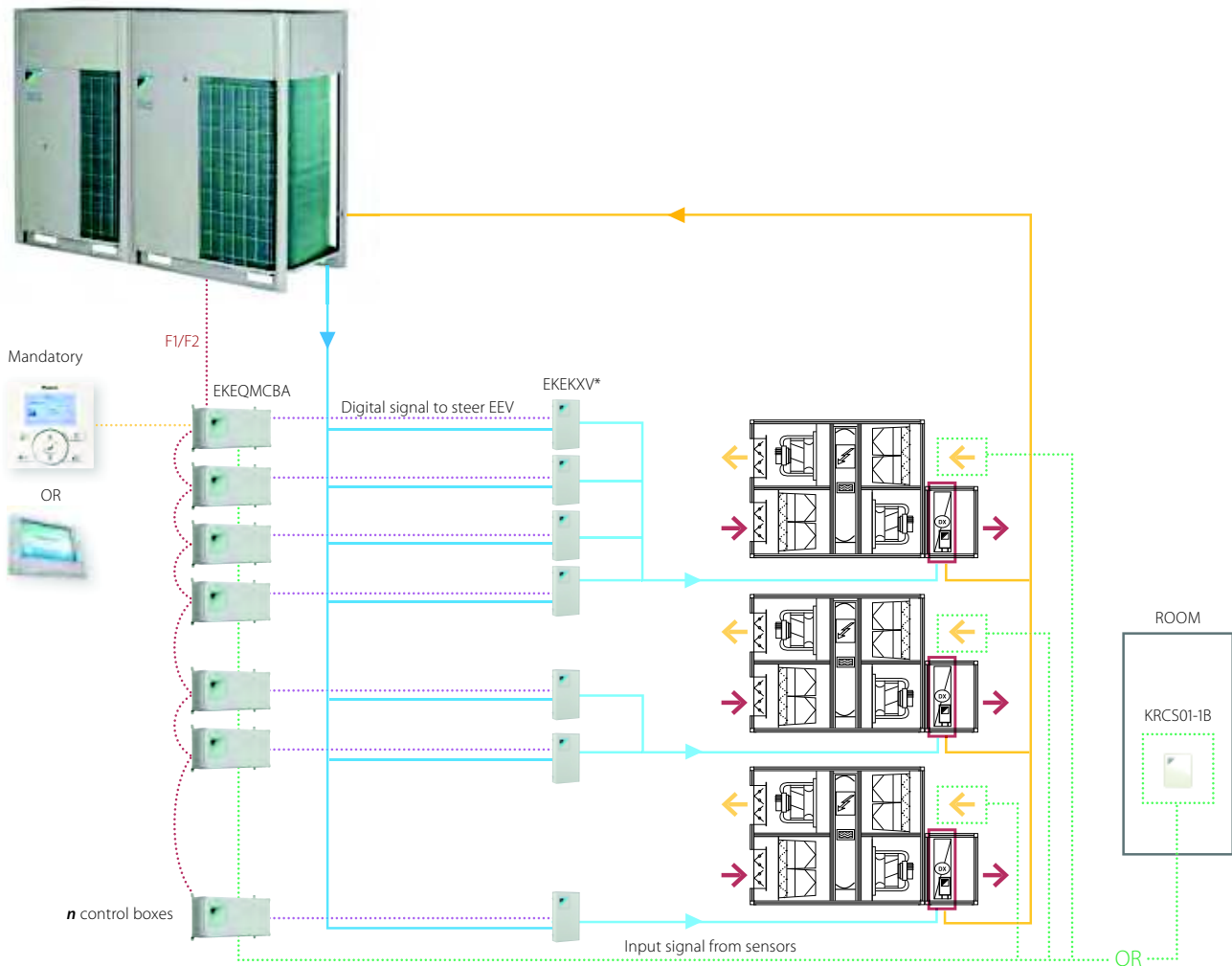
CF is the correction factor

CC is the capacity class



Multi application examples

Multi application layout #1: Example for Z control with EKEQMCBA box and no VRV indoor units



Outdoor unit compatibility

RYYQ8T > RYYQ54T

RXYQ8T > RXYQ54T

RWEYQ8T8 > RWEYQ30T8

EKEQMCBA control box

ERQ100 > ERQ250¹

EKEQDCB control box

(1) Only available in 1 to 1 combination

Connection restrictions

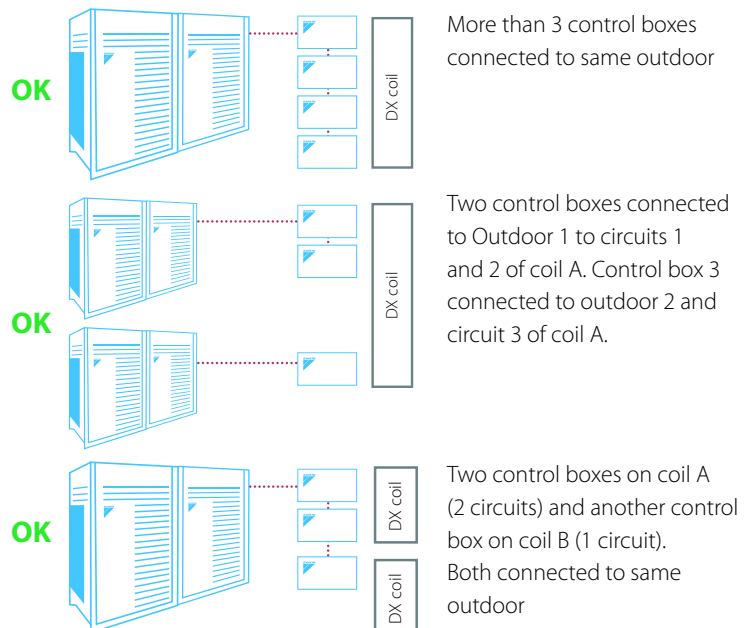
Connection Ratio between 90-110%

Connection Ratio ERQ: between 50-110%

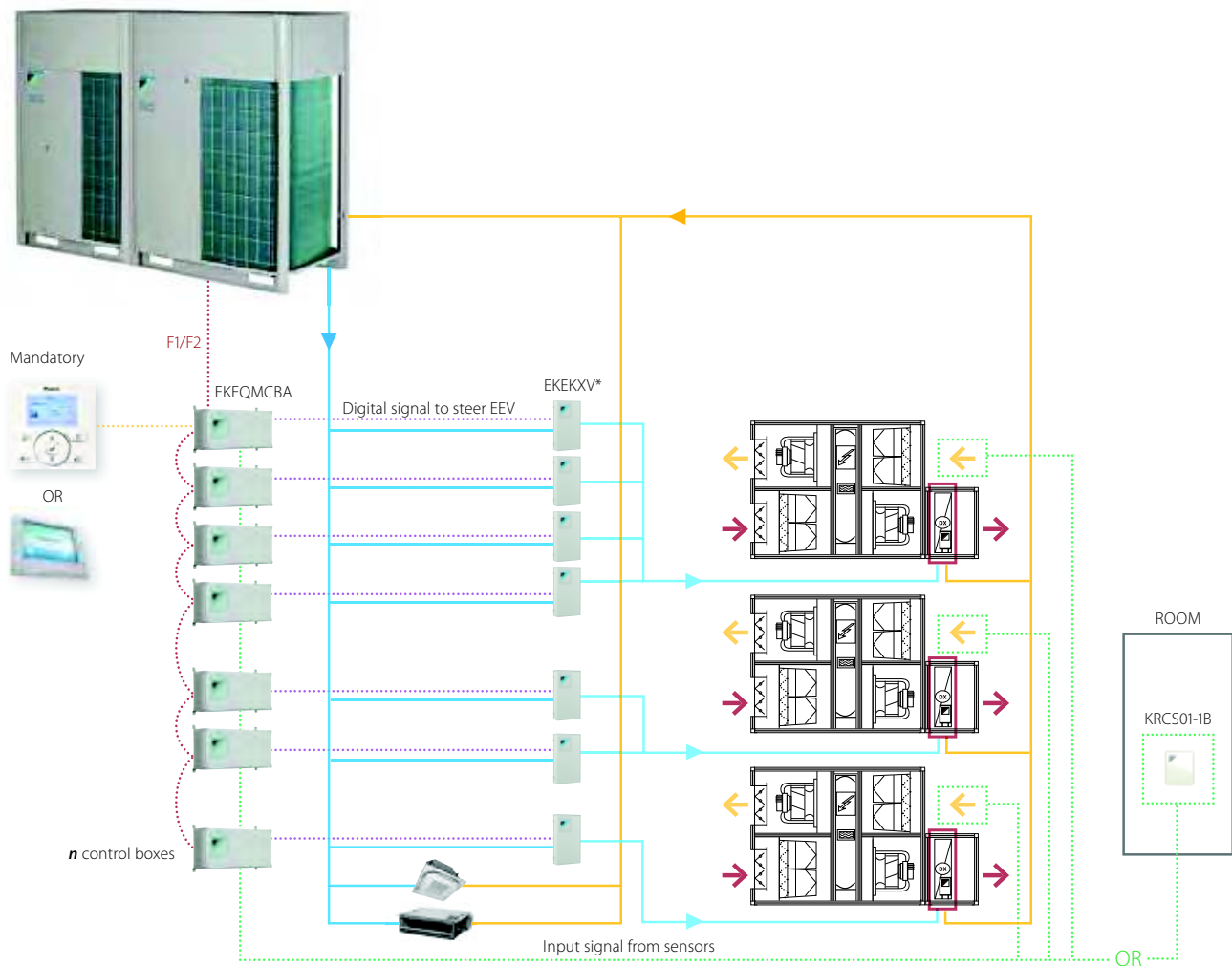
$$CR = \frac{\sum IU CC}{\sum OU CC} = \frac{\sum (CF \times EKEV CC)_{1-n}}{\sum OU CC}$$

CF is the correction factor

CC is the capacity class



Multi application layout #2: Example for Z control with EKEQMCBA box and VRV indoor units



Outdoor unit compatibility

Not mandatory to have VRV DX indoors:

RYYQ8T > RYYQ54T

RXYQ8T > RXYQ54T

RWEYQ8T8 > RWEYQ30T8

Mandatory to have VRV DX indoors:

REYQ8T > REYQ54T

Connection restrictions

Connection Ratio between 50-110%

$$CR = \frac{\sum IU CC}{\sum OU CC} = \frac{\sum (CF \times EKEV CC)_{1-n}}{\sum OU CC}$$

RULES: $\sum EKEV CC$: 0-60% $\sum IU CC$: 50-110%

CF is the correction factor

CC is the capacity class

