VRV IV

360° efficiency

VRV IV heat pump

VRV IV =

3 revolutionary standards

› Variable refrigerant temperature
› Continuous comfort during defrost
› VRV configurator

+ VRV IV technologies

+ Integrated climate control

+ VRV IV heat recovery technologies

3 intelligent efficiency improvements

Improved operational efficiency

› Improved efficiency during heat recovery mode with 15%
› Free heating or hot water by recovering heat from areas requiring cooling
› Optimal comfort for everybody by simultaneous cooling spaces while heating others

Improved design efficiency

› Integrated climate control covering all thermal loads in the building
› Free combination of outdoor units, single and multi BS boxes
› Unique range of single and multi BS boxes

Improved installation efficiency

› Fully redesigned multi BS boxes, smaller and up to 70% lighter
› No limit on number of unused ports
› Connect indoor units up to 28kW to a single and multi BS box

Variable refrigerant temperature

Customise your VRV for best seasonal efficiency and comfort

Thanks to its revolutionary variable refrigerant temperatue technology (VRT), VRV IV continuously adjusts both the inverter compressor speed and the refrigerant temperature, providing the necessary capacity to meet the building load with the highest seasonal efficiency at all times!

- **Seasonal efficiency increased by 28%**
- **The first weather compensating control on the market**
- **Customer comfort is assured thanks to higher outblow temperatures (preventing cold draughts)**

How does it work?

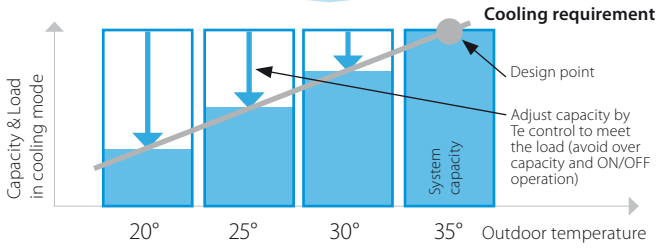
VRF standard
Capacity is controlled only with the variance of the inverter compressor

Daikin VRV IV
Variable Refrigerant Temperature control for energy saving in partial load condition.
The capacity is controlled by the inverter compressor AND variation of the evaporating (Te) and condensing (Tc) temperature of the refrigerant in order to achieve the highest seasonal efficiency.

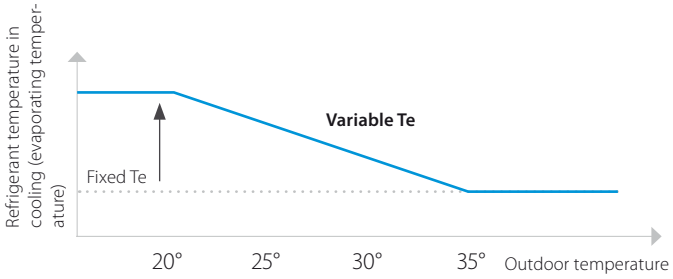
Calculate the benefit of variable refrigerant temperature for your project in our seasonal solutions calculator:

http://extranet.daikineurope.com/en/software/downloads/solutions-seasonal-simulator/default.jsp

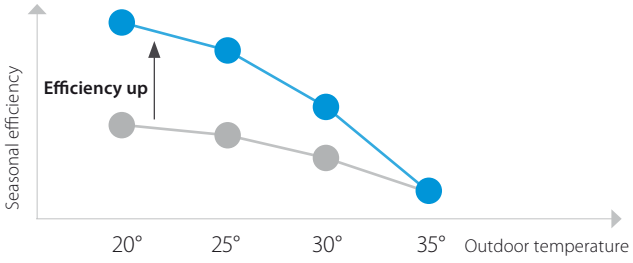
The colder it gets, the lower the load on the building and the lower the capacity need



The lower the capacity need the higher the refrigerant temperature can be



A higher refrigerant temperature results in a higher seasonal efficiency and higher comfort



Success story

Live test: up to 46% less energy consumed

A field trial was carried out at a fashion store chain in Germany and showed that the innovative Daikin VRV IV delivers dramatically better energy efficiency compared with previous models.

The trial results showed that the new VRV IV system consumed up to 60% less energy than the VRV III system, particularly during cooling. Overall energy savings during heating averaged 20%.

How effective is the VRV IV heat pump technology?

The trial demonstrated that by using air, an infinitely renewable and free energy source, the VRV IV system provides a complete and environmentally sustainable solution for heating, cooling and ventilation in commercial applications. The trial also showed that only by monitoring climate control systems carefully and intelligently businesses can identify and control energy waste. This is a service which Daikin also offers.

Different modes to maximise efficiency and comfort

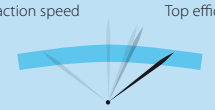
For maximum energy efficiency and customer satisfaction, the outdoor unit needs to adapt the evaporating/condensing temperature at the optimum point for the application.

Check on YouTube

https://www.youtube.com/DaikinEurope

How to set the different modes?

6 patents

Set up the main operation mode of the system	Define how the system reacts to changing loads	
Step 1	**Step 2**	
Automatic* Quick reaction speed — Top efficiency  The perfect balance: Achieves top efficiency throughout the year, reacts quickly on the hottest days	Powerful	Where a quick increase of load is expected such as conference rooms. Quick reaction speed to changing load has priority, with temporarily colder outblow as a result.
	Quick	Same as above but slower response than the powerful mode.
	Mild *	This mode would be suitable for most office applications and it is the factory set mode. The perfect balance: Slower reaction speed with top efficiency
High sensible (User selection) Quick reaction speed — Top efficiency  Year round top efficiency	Powerful	Gives customer choice for fixing coil temperature which avoids cold draughts. A quick reaction speed to changing load has priority, with temporarily colder outblow as a result.
	Quick	Same as above but slower response.
	Mild	The air off temperature remains fairly constant. Suitable for low ceiling rooms.
	Eco	Coil temperature would not change due to fluctuating load. Suitable for computer rooms. Suitable for low ceiling rooms.
Basic Current VRF standard	No submodes	This is how most other VRF systems work and can be used for all general type of applications. Suitable for computer rooms. Suitable for low ceiling rooms.

* Factory setting

	VRV III 20HP (2 modules)	VRV IV 18HP (1 module)
Period	March 2012 - February 2013	March 2013 - February 2014
Avg (kWh/Month)	2.797	1.502
Total (KWh)	33.562	18.023
Total (€)	6.041	3.244
Yearly (operation cost/m² (€/m²)	**9,9**	**5,3**
	46% savings = € 2.797	

Measured data

Fashion store Unterhaching (Germany)

› Floor space: 607m²
› Energy cost: 0,18 €/kWh
› System taken into account for consumption:
- VRV IV heat pump with continuous heating
- Round flow cassettes (without auto cleaning panel)
- VAM for ventilation (2x VAM2000)
- Biddle Air curtain.

Continuous heating

during defrost mode

Pure comfort

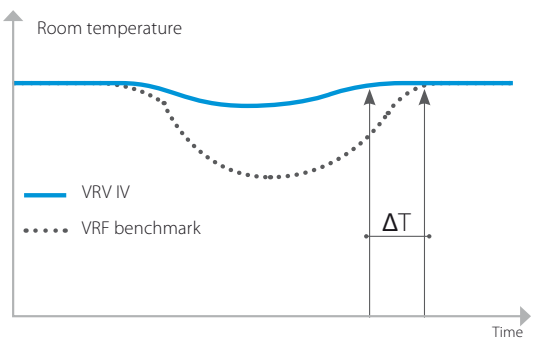
VRV IV continues to provide heating even when in defrost mode, providing an answer to any perceived disadvantages of specifying a heat pump as a monovalent heating system.

- **Indoor comfort not affected either via the unique heat accumulating element or alternate defrost**
- **The best alternative to traditional heating systems**

Check on YouTube

https://www.youtube.com/DaikinEurope

Heat pumps are known for their high energy efficiency in heating, but they accumulate ice during heating operation and this must be melted periodically using a defrost function that reverses the refrigeration cycle. This causes a temporary temperature drop and reduced comfort levels inside the building.
Defrosting can take over 10 minutes (depending on the size of the system) and occurs mostly between -7 and +7°C when there is most moisture in the air, which freezes to the coil, and this has a significant impact on the perceived indoor comfort levels and runningcosts.
The VRV IV has changed the heating paradigm by providing heat even during defrost operation thus eliminating the temperature drop inside and providing comfort at all times.



How does it work?

Heat accumulating element

For the VRV IV heat pump single models a unique heat-accumulating element is used. This element, based upon phase change materials, provides the energy to defrost the outdoor unit. The energy needed for defrosting is stored in the element during normal heating operation.

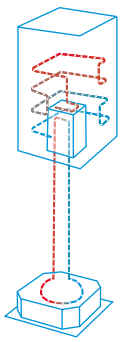
Alternate defrost

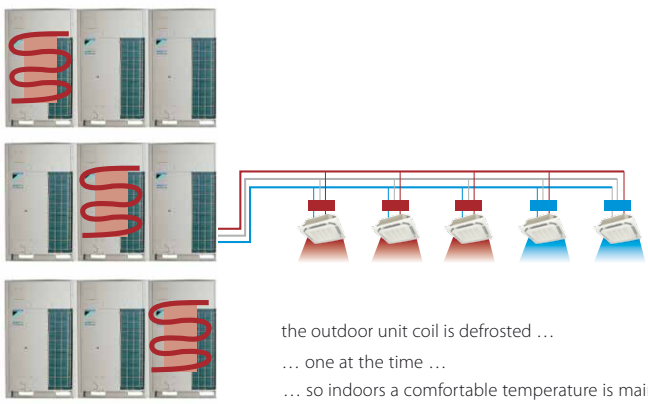
On all our multi model combinations only 1 outdoor coil is defrosted at a time, ensuring continuous comfort during the whole process.

The outdoor unit coil is defrosted …

… with the energy stored in the heat accumulating element …

… while indoors a comfortable temperature is maintained.





the outdoor unit coil is defrosted …

… one at the time …

… so indoors a comfortable temperature is maintained

Software for simplified commissioning, configuration and customisation

VRV
configurator software

- **Graphical interface**
- **Manage systems over multiple sites in exactly the same way**
- **Retrieve initial settings**

Simplified commissioning

The VRV configurator is an advanced software solution that allows for easy system configuration and commissioning.

- Less time is required on the roof to configure the outdoor unit
- Multiple systems at different sites can be managed in exactly the same way, providing simplified commissioning for key accounts
- Initial settings on the outdoor unit can be easily retrieved

Simplified servicing

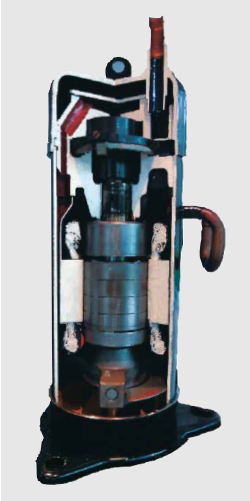
The user-friendly display for outdoor units simplifies basic servicing tasks.

- Easy-to-read error report
- Easy-to-understand menu indicates quick and easy on-site settings
- Easy-to-follow parameters for checking basic functions: high pressure, low pressure, frequency and operation time, compressor history, temperature of discharge/suction pipe.

User-friendly interface instead of push buttons

3-digit 7-segment display

Unique VRV IV core technologies



Newly developed compressor

37 patents

Full inverter

› Enabling variable refrigerant temperature and low start-up currents
› Stepless capacity control

Reluctance brushless DC motor

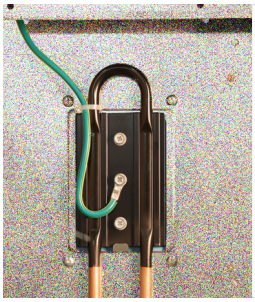
› increased efficiency compared to AC motors by simultaneously using normal and reluctance torque
› Powerful neodymium magnets efficiently generate high torque
› High-pressure oil reduces thrust losses

High efficiency J-type 6-pole motor

› 50% stronger magnetic field and higher rotation efficiency

Thixocasting process

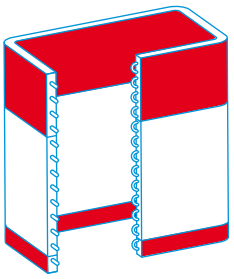
› Compression volume is increased by 50% thanks to a new high-durability material cast in a semi-molten state



Refrigerant-cooled PCB

› Reliable cooling because it is not influenced by ambient air temperature
› Smaller switchbox for smoother air flow through the heat exchanger increasing heat exchange efficiency with 5%

6 patents



4-sided, 3-row heat exchanger

› Heat exchange surface up to 50% larger
› (up to 235m²), leading to 30% more efficiency

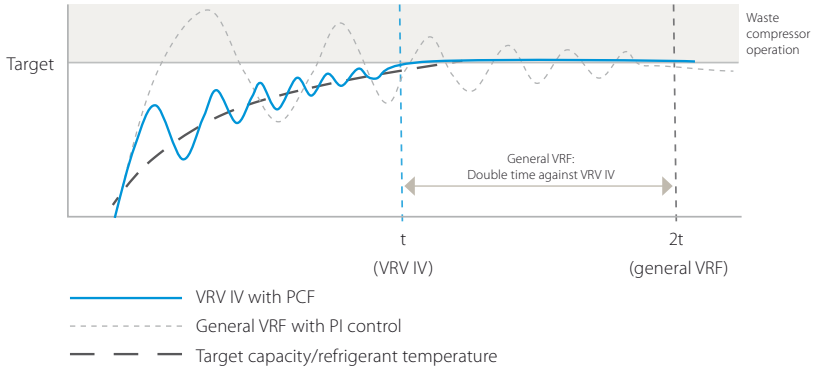
10 patents

UNIQUE

Predictive Control Function (PCF)

› Reaches the target capacity/refrigerant temperature faster
› Reaches the target without overshooting, so there is no waste, leading to improved efficiency
› Three capacity settings give more precise control for user comfort

The large number of Daikin systems already in operation and which are monitored by our i-Net software put us in the unique position of being able to analyse this data and develop the predictive compressor control function.



VRV IV: PCF
Compressor works with predictive data for the control

› result: quick convergence to the target temperature and reduction of waste operation of the compressor

Half time against general VRF

General VRF: Pi control
Compressor works with feedback only for the control

› result: waste operation and longer time before reaching target set point

DC fan motor

UNIQUE

Outer rotor DC motor for higher efficiency

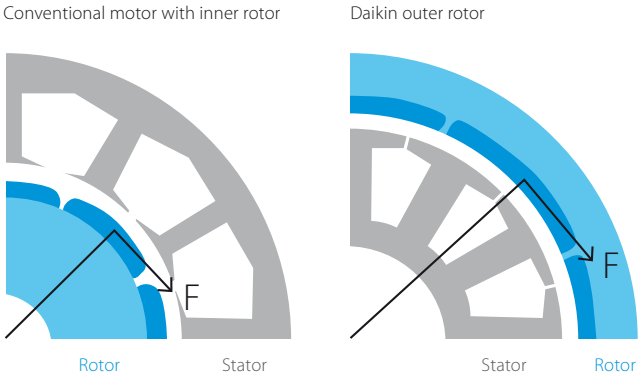
› Larger rotor diameter results in greater force for the same magnetic field, leading to better efficiency
› Better control, resulting in more fan steps to match the actual capacity

Sine wave DC inverter

Optimizing the sine wave curve results in smoother motor rotation and improved motor efficiency.

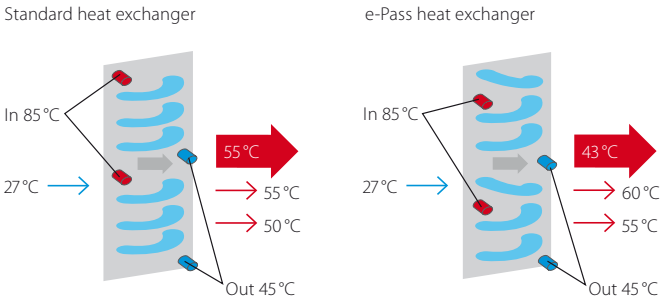
DC fan motor

The use of a DC fan motor offers substantial improvements in operating efficiency compared to conventional AC motors, especially during low speed rotation.



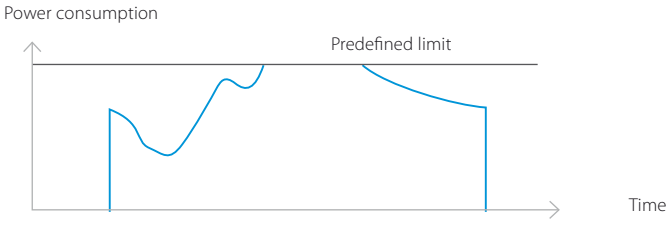
E-Pass heat exchanger

Optimising the heat exchanger's path layout prevents heat being transferred from the overheated gas section to the sub-cooled liquid section which is a more efficient way to use the heat exchanger.



I-demand function

Limit maximum power consumption.
The newly introduced current sensor minimizes the difference between the actual power consumption and the predefined power consumption.



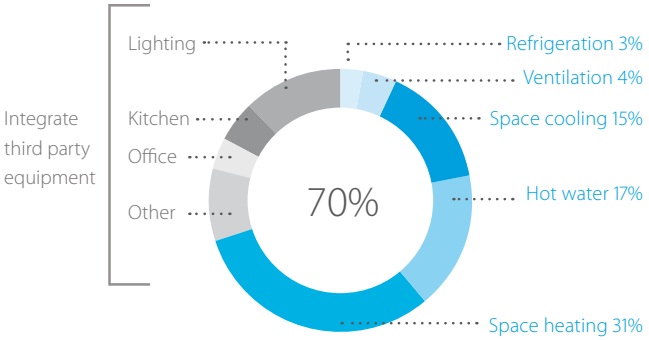
The total solution

Typically, many buildings today rely on several separate systems for heating, cooling, air curtain heating and hot water. As a result energy is wasted. To provide a much more efficient alternative, VRV technology has been developed into a total solution managing up to 70% of a buildings energy consumption giving large potential to cost saving.

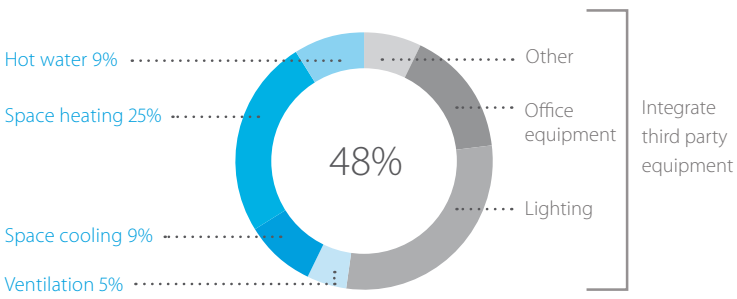
- **Heating and cooling**
  for year round comfort
- **Hot water**
  for efficient production of hot water
- **Underfloor heating /cooling**
  for efficient space heating/cooling
- **Ventilation**
  for high quality environments
- **Air curtains**
  for optimum air separation
- **Controls**
  for maximum operating efficiency

Combine up to 70% of your building's energy consumption

Average hotel energy consumption



Average office energy consumption



VRV IV outdoor unit
products overview

REYQ-T

VRV IV

VRV IV heat recovery

- Fully integrated solution with heat recovery for maximum efficiency with COPs of up to 8!
- Covers all thermal needs of a building via single point of contact: accurate temperature control, ventilation, hot water, air handling units and Biddle air curtains
- 'Free' heating and hot water through heat recovery
- Perfect personal comfort for guests/tenants via simultaneous cooling and heating
- Incorporates VRV IV standards and technologies such as variable refrigerant temperature and continuous heating
- Unique range of single- and multi BS boxes

RYYQ-T

RXYQ-T(9)

VRV IV

VRV IV heat pump

- Covers all thermal needs of a building via a single point of contact: accurate temperature control, ventilation, hot water, air handling units and Biddle air curtains
- Can be connected to stylish indoor units (Daikin Emura, Nexura)
- Incorporates VRV IV standards and technologies such as variable refrigerant temperature and continuous heating

RXYQQ-T

VRV IV Q-series

Replacement VRV IV

- Cost-effective and fast replacement through re-use of existing piping
- Up to 40% more efficient than R-22 systems
- No interuption of daily business while replacing your system
- Replace Daikin and other manufacturers' systems safely
- Incorporates VRV IV standards and technologies such as variable refrigerant temperature

RWEYQ-T

VRV IV W-series

Water cooled VRV IV

- Reduces CO_2 emissions by using geothermal energy as an energy source
- Geothermal mode eliminates need for an external heating or cooling source
- Covers all thermal needs of a building via a single point of contact: accurate temperature control, ventilation, hot water, air handling units and Biddle air curtains
- Compact and lightweight design can be stacked for maximum space saving
- Incorporates VRV IV standards and technologies such as variable refrigerant temperature
- Variable water flow control option increases flexibility and control

RYYQ-T / RXYQ-T

Outdoor system					RYYQ/RXYQ	8T/8T9	10T	12T	14T	16T	18T	20T
Capacity range					HP	8	10	12	14	16	18	20
Cooling capacity	Nom.				kW	22.4 (1) / 22.4 (2)	28.0 (1) / 28.0 (2)	33.5 (1) / 33.5 (2)	40.0 (1) / 40.0 (2)	45.0 (1) / 45.0 (2)	50.4 (1)	56.0 (1)
Heating capacity	Nom.				kW	22.4 (3) / 22.40 (4)	28.0 (3) / 28.00 (4)	33.5 (3) / 33.50 (4)	40.0 (3) / 40.0 (4)	45.0 (3) / 45.0 (4)	50.4 (3)	56.0 (3)
	Max.				kW	25.0 (3)	31.5 (3)	37.5 (3)	45.0 (3)	50.0 (3)	56.5 (3)	63.0 (3)
Power input - 50Hz	Cooling	Nom.			kW	5.21 (1) / 4.47 (2)	7.29 (1) / 6.32 (2)	8.98 (1) / 8.09 (2)	11.0 (1) / 9.88 (2)	13.0 (1) / 12.10 (2)	15.0 (1)	18.5 (1)
	Heating	Nom.			kW	4.75 (3) / 4.47 (4)	6.29 (3) / 5.47 (4)	7.77 (3) / 6.59 (4)	9.52 (3) / 9.30 (4)	11.1 (3) / 9.8 (4)	12.6 (3)	14.5 (3)
		Max.			kW	5.51 (3)	7.38 (3)	9.10 (3)	11.2 (3)	12.8 (3)	14.6 (3)	17.0 (3)
EER						4.30 (1) / 5.01 (2)	3.84 (1) / 4.43 (2)	3.73 (1) / 4.14 (2)	3.64 (1) / 4.05 (2)	3.46 (1) / 3.73 (2)	3.36 (1)	3.03 (1)
ESEER - Automatic						7.53	7.20	6.96	6.83	6.50	6.38	5.67
ESEER - Standard						6.37	5.67	5.50	5.31	5.05	4.97	4.42
COP - Max.						4.54 (3)	4.27 (3)	4.12 (3)	4.02 (3)	3.91 (3)	3.87	3.71
COP - Nom.						4.72 (3) / 5.01 (4)	4.45 (3) / 5.12 (4)	4.31 (3) / 5.08 (4)	4.20 (3) / 4.30 (4)	4.05 (3) / 4.59 (4)	4.00	3.86
Maximum number of connectable indoor units						64 (5)						
Indoor index connection	Min./Nom./Max.					100/200/260	125/250/325	150/300/390	175/350/455	200/400/520	225/450/585	250/500/650
Dimensions	Unit	HeightxWidthxDepth			mm	1,685x930x765			1,685x1,240x765			
Weight	Unit				kg	243	252		356		391	
Fan	Air flow rate	Cooling	Nom.		m^3/min	162	175	185	223	260	251	261
Sound power level	Cooling	Nom.			dBA	78	79	81		86		88
Sound pressure level	Cooling	Nom.			dBA	58		61		64	65	66
Operation range	Cooling	Min.~Max.			°CDB	-5~43						
	Heating	Min.~Max.			°CWB	-20~15.5						
Refrigerant	Type					R-410A						
	Charge				kg	5.9	6	6.3	10.3	10.4	11.7	11.8
					tCO_2eq	12.3	12.5	13.2	21.5	21.7	24.4	24.6
	GWP					2,087.5						
Piping connections	Liquid	OD			mm	9.52		12.7		15.9		
	Gas	OD			mm	19.1	22.2	28.6				
	Total piping length	System	Actual		m	1,000						
Power supply	Phase/Frequency/Voltage				Hz/V	3N~/50/380-415						
Current - 50Hz	Maximum fuse amps (MFA)				A	20	25	32		40		50

Outdoor system					RYYQ/RXYQ	22T	24T/24T9	26T	28T	30T	32T	34T	36T	38T/38T9
System	Outdoor unit module 1					10T	8T	12T			16T			8T
	Outdoor unit module 2					12T	16T	14T	16T	18T	16T	18T	20T	10T
	Outdoor unit module 3					-								20T
Capacity range					HP	22	24	26	28	30	32	34	36	38
Cooling capacity	Nom.				kW	61.5	67.4	73.5	78.5	83.9	90.0	95.4	101.0	106.3
Heating capacity	Nom.				kW	61.5	67.4	73.5	78.5	83.9	90.0	95.4	101.0	106.3
	Max.				kW	69.0	75.0	82.5	87.5	94.0	100.0	106.5	113.0	119.0
Power input - 50Hz	Cooling	Nom.			kW	16.27	18.2	20.0	22.0	24.0	26.0	28.0	31.5	29.2
	Heating	Nom.			kW	14.06	15.85	17.29	18.87	20.4	22.2	23.7	25.6	25.1
		Max.			kW	16.48	18.31	20.30	21.90	23.7	25.6	27.4	29.8	29.2
EER						3.77	3.70	3.68	3.57	3.5	3.46	3.4	3.21	3.6
ESEER - Automatic						7.07	6.81	6.89	6.69	6.60	6.50	6.44	6.02	6.36
ESEER - Standard						5.58	5.42	5.39	5.23	5.17	5.05	5.01	4.68	5.03
COP - Max.						4.19	4.10	4.06	4.00		3.91	3.9	3.79	4.1
COP - Nom.						4.37	4.25		4.16	4.1	4.05	4.0	3.95	4.2
Maximum number of connectable indoor units						64								
Indoor index connection	Min./Nom./Max.					275/550/715	300/600/780	325/650/845	350/700/910	375/750/975	400/800/1,040	425/850/1,105	450/900/1,170	475/950/1,235
Piping connections	Liquid	OD			mm	15.9		19.1						
	Gas	OD			mm	28.6	34.9						41.3	
	Total piping length	System	Actual		m	1,000								
Current - 50Hz	Maximum fuse amps (MFA)				A	63				80				100

Outdoor system					RYYQ/RXYQ	40T	42T	44T	46T	48T	50T	52T	54T
System	Outdoor unit module 1					10T		12T	14T		16T		18T
	Outdoor unit module 2					12T	16T					18T	
	Outdoor unit module 3					18T	16T				18T		
Capacity range					HP	40	42	44	46	48	50	52	54
Cooling capacity	Nom.				kW	111.9	118.0	123.5	130.0	135.0	140.0	145.8	151.2
Heating capacity	Nom.				kW	111.9	118.0	123.5	130.0	135.0	140.0	145.8	151.2
	Max.				kW	125.5	131.5	137.5	145.0	150.0	156.0	163.0	169.5
Power input - 50Hz	Cooling	Nom.			kW	31.3	33.3	35.0	37.0	39.0	40.7	43.0	45.0
	Heating	Nom.			kW	26.7	28.49	29.97	31.72	33.3	34.6	36.3	37.8
		Max.			kW	31.1	32.98	34.70	36.8	38.4	40.0	42.0	43.8
EER						3.6	3.54		3.51	3.46	3.44	3.4	3.40
ESEER - Automatic						6.74	6.65	6.62	6.60	6.50	6.46	6.42	6.38
ESEER - Standard						5.29	5.19	5.17	5.13	5.05	5.02	4.99	4.97
COP - Max.						4.0	3.99	3.96	3.94	3.91		3.90	
COP - Nom.						4.2	4.14	4.12	4.10	4.05		4.0	
Maximum number of connectable indoor units						64							
Indoor index connection	Min./Nom./Max.					500/1,000/1,300	525/1,050/1,365	550/1,100/1,430	575/1,150/1,495	600/1,200/1,560	625/1,250/1,625	650/1,300/1,690	675/1,350/1,755
Piping connections	Liquid	OD			mm	19.1							
	Gas	OD			mm	41.3							
	Total piping length	System	Actual		m	1,000							
Current - 50Hz	Maximum fuse amps (MFA)				A	100				125			

Outdoor unit module for RYYQ combinations					RYMQ	8T	10T	12T	14T	16T	18T	20T
Dimensions	Unit	Height/Width/Depth			mm	1,685/930/765			1,685/1,240/765			
Weight	Unit				kg	188	195		309		319	
Fan	Air flow rate	Cooling	Nom.		m^3/min	162	175	185	223	260	251	261
Sound power level	Cooling	Nom.			dBA	78	79	81		86		88
Sound pressure level	Cooling	Nom.			dBA	58		61		64	65	66
Operation range	Cooling	Min.~Max.			°CDB	-5~43						
	Heating	Min.~Max.			°CWB	-20~15.5						
Refrigerant	Type					R-410A						
	Charge				kg	5.9	6	6.3	10.3	10.4	11.7	11.8
					tCO_2eq	12.3	12.5	13.2	21.5	21.7	24.4	24.6
	GWP					2,087.5						
Power supply	Phase/Frequency/Voltage				Hz/V	3N~/50/380-415						
Current - 50Hz	Maximum fuse amps (MFA)				A	20	25	32		40		50

(1) Nominal cooling capacities are based on: indoor temperature: 27°CDB, 19°CWB, outdoor temperature: 35°CDB, equivalent refrigerant piping: 5m, level difference: 0m. Data for standard efficiency series (2) Nominal heating capacities are based on: indoor temperature: 20°CDB, outdoor temperature: 7°CDB, 6°CWB, equivalent refrigerant piping: 5m, level difference: 0m. Data for high efficiency series, Eurovent certified (3) Nominal heating capacities are based on: indoor temperature: 20°CDB, outdoor temperature: 7°CDB, 6°CWB, equivalent refrigerant piping: 5m, level difference: 0m. Data for standard efficiency series (4) Nominal cooling capacities are based on: indoor temperature: 27°CDB, 19°CWB, outdoor temperature: 35°CDB, equivalent refrigerant piping: 5m, level difference: 0m. Data for high efficiency series, Eurovent certified (5) Actual number of connectable indoor units depends on the indoor unit type (VRV indoor, Hydrobox, RA indoor, etc.) and the connection ratio restriction for the system (50% <= CR <= 130%) | The STANDARD ESEER value corresponds with normal VRV4 Heat Pump operation, not taking into account advanced energy saving operation functionality | The AUTOMATIC SEER value corresponds with normal VRV4 Heat Pump operation, taking into account advanced energy saving operation functionality (variable refrigerant temperature control operation)

VRV IV Heat Recovery

360° efficiency

installation efficiency

design efficiency

operational efficiency

FAST design + QUICK installation + MORE free heat + MAX comfort

Daikin Europe N.V. Naamloze Vennootschap Zandvoordestraat 300 · 8400 Oostende · Belgium · www.daikin.eu · BE 0412 120 336 · RPR Oostende (Responsible Editor)

MIX Paper from responsible sources FSC® C109049

ECPEN15-206A 500 · 03/15

ISO 9001 · ISO 14001

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Daikin Europe N.V. participates in the Eurovent Certification programme for Liquid Chilling Packages (LCP), Air handling units (AHU), Fan coil units (FCU) and variable refrigerant flow systems (VRF) Check ongoing validity of certificate online: www.eurovent-certification.com or using: www.certiflash.com

The present publication is drawn up by way of information only and does not constitute an offer binding upon Daikin Europe N.V. Daikin Europe N.V. has compiled the content of this publication to the best of its knowledge. No express or implied warranty is given for the completeness, accuracy, reliability or fitness for particular purpose of its content and the products and services presented therein. Specifications are subject to change without prior notice. Daikin Europe N.V. explicitly rejects any liability for any direct or indirect damage, in the broadest sense, arising from or related to the use and/or interpretation of this publication. All content is copyrighted by Daikin Europe N.V.

The present publication supersedes ECPEN14-115. Printed on non-chlorinated paper. Prepared by Platzer Kommunikation, Germany.