DAIKIN

technical data

VRVII Systems

VRVII & VRV-WII Features

VRVII & VRV-WII features
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VRVII & VRV-WII features
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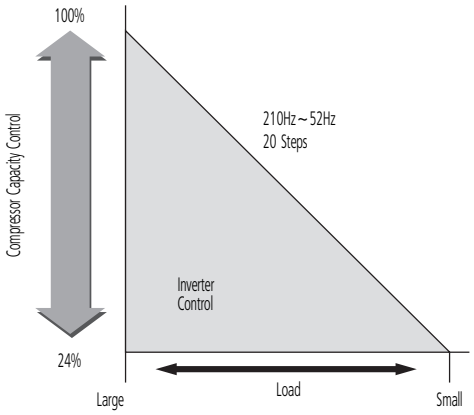
1 Creating maximum comfort

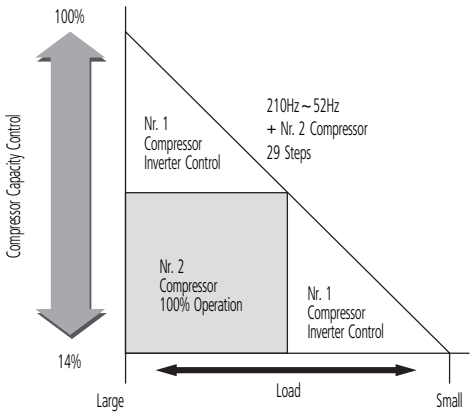
1-1 Inverter technology - VRVII & VRV-WII

The linear VRV system makes use of a variable Proportional Integral (PI) control system which uses refrigerant pressure sensors to give added control over inverter and ON/OFF control compressors in order to abbreviate control steps into smaller units to provide precise control in both small and larger areas.
This in turn enables individual control of up to 40 indoor units of different capacity and type at a ratio of 50~130 % in comparison with outdoor units capacity. 5 HP outdoor units use inverter control compressors only.

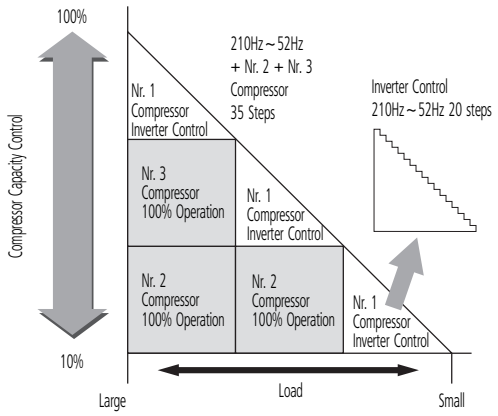
5HP Outdoor Unit



8,10,12HP Outdoor Unit



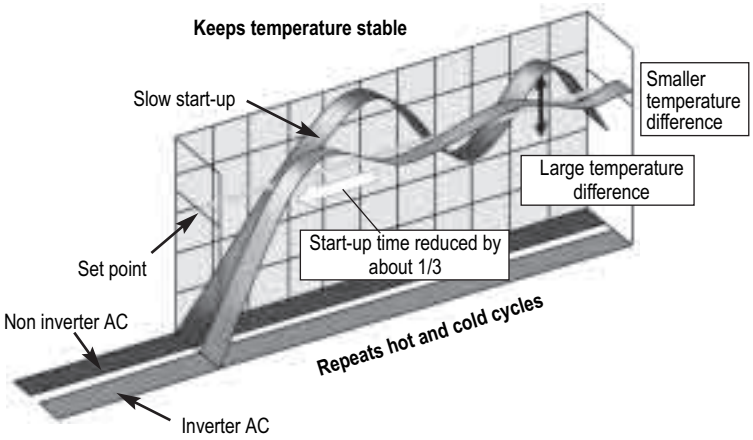
14,16HP Outdoor Unit



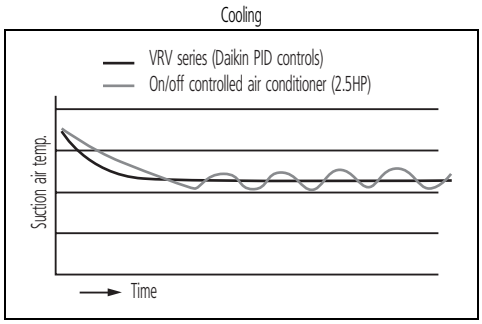
1 Creating maximum comfort

1-2 Smart control brings comfort - VRVII & VRV-WII

An electronic expansion valve, using PID control, continuously adjusts the refrigerant volume in respond to load variations of the indoor units. The VRV system thus maintains comfortable room temperatures at a virtually constant level, without the temperature variations typical of conventional ON/OFF control systems.



The thermostat can control stable room temperature at ± 0.5°C from set point.

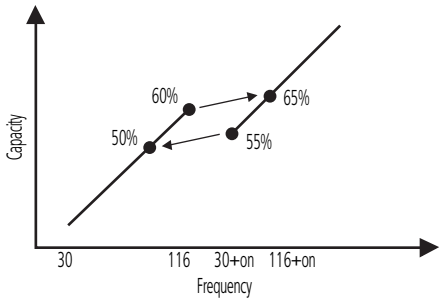


NOTE

1 the graph shows the data, measured in a test room assuming actual heating load.

1-3 Less frequent start/stop cycle - VRVII & VRV-WII

- The technique adopted by Daikin, of regulating the capacity using multiple compressors clearly results in minimum switching losses and power surges because of the overlap in capacity and frequency
- Since Daikin utilises small 5HP inverter compressors, the influence of harmonics is less than that generated by a single large compressor
- The use of multiple compressors by Daikin also ensures a 50 % standby facility
- Smaller compressors are cheaper and faster to replace



1 Creating maximum comfort

1-4 PID control

Proportional Integral Derivative control with an automatic capacity balancing circuit:

– enables the use of lengthy piping up to 100 meters (actual length)

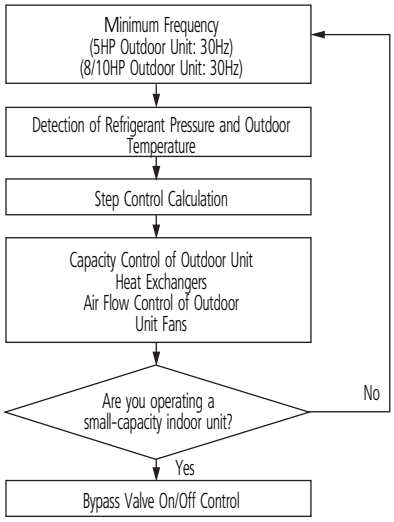
– consists of two control systems:

1 Oil control system that controls the refrigerant oil volume to prevent it from raising or backing up in the pipes

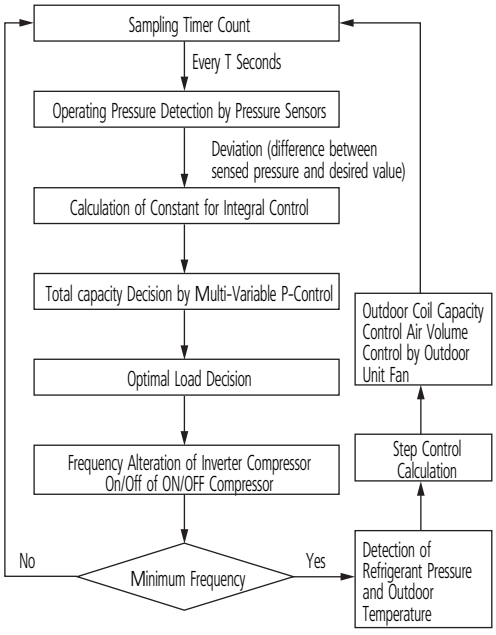
2 Refrigerant flow stabilization mechanism: prevents refrigerant drift, caused by level difference of indoor units in the same system.

1-5 Operation control of small capacity indoor units

If the operating frequency is minimal, the refrigerant pressure and outdoor temperature are detected, the number of control steps are calculated, and capacity of outdoor unit heat exchanger (refrigerant accumulates in coils) and air flow of outdoor unit fans (controls pole change of the two fans) are controlled.
If operating a small-capacity indoor unit, the bypass valve is controlled (ON/OFF), with capacity control being executed at a minimum of 14% for a 5HP outdoor unit (when operating one 20-class indoor unit), or a minimum of 8% for 8 and 10HP outdoor units (when operating one 20-class indoor unit.



1-6 Control flow



2 Energy efficient solution

2-1 Low running costs - VRVII & VRV-WII

- VRV systems have low running costs because it permits each zone to be controlled individually. That is, only those rooms that require air conditioning will be heated or cooled, while the system can be shut down completely in rooms where no air conditioning is required.
- VRV units have the highest COP/EER in the market in the most common operating area

2-2 Most advanced reluctance brushless DC compressor technology - VRVII & VRV-WII

The scroll compressor is driven by the newly developed motor, enabling better performance, higher enery efficiency resulting in higher energy cost savings.

2-3 HRV - Heat Reclaim Ventilation System - VRVII & VRV-WII

- Heat and humidity are exchanged between supply and exhaust air, which

  -brings outdoor air close to indoor air conditions

  - recovers energy loss

  - realises considerable reduction of air conditioning capacity
- The heat exchanger modulates the humidity and temperature of incoming fresh air to match indoor conditions.
- The balance achieved between indoor and outdoor ambients, enables the cooling/heating load placed on the air conditioning system to be reduced. (heat and humidity are exchanged)
- Most energy saving solution as smaller indoor units can be selected:

  -size down of indoor units down to 40 %

  -payback total VAM system: ±2.5 years*

  *conditions: outside cooling conditions: 30°C / outside heating conditions: - 8°C
  inside cooling conditions: 24°C / inside heating conditions: 22°C
  ventilation per room: 150m3/h
- Ideal modular concept to cope with the fresh air requirements

2-4 Auto restart capability - VRVII & VRV-WII

Even after exceptionally long power failures, the built-in auto restart capability ensures automatic system start up. Since the preset memory is not erased by interruptions in power supply, no programme resetting is necessary.

2 Energy efficient solution

2-5 Low operation sound level - VRVII

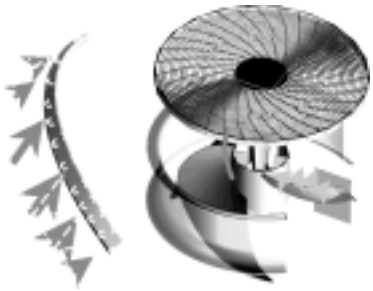
- Continuous research by Daikin into reducing operation sound levels has resulted in the development of a purpose designed inverter scroll compressor and fan.
- The new grille and fan offer low noise, high volume airflow and are housed in a compact casing together with the associated compressor components. The use of this new technology assembly enables a 16hp unit to be housed in a single casing.

Aero spiral fan:

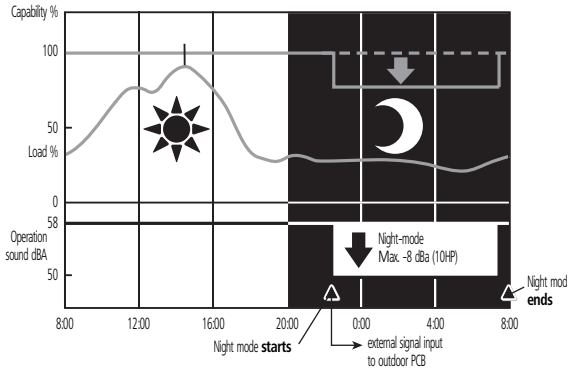
Bending the fan blade edge reduces turbulence, resulting in less pressure loss

Aero fitting grille:

New shape promotes spiral discharge airflow, resulting in reduced pressure loss



- Night quiet function (max. -8dBA)
  During night time, sound level of the outdoor unit can be reduced for a certain period : starting time and ending time can be input



NOTES

1 This function is available in setting at site.

2 The relationship of outdoor temperature (load) and time shown in the graph is just an example.

VRV-WII

Water-cooled air conditioning can be acceptable in certain critical areas in which the operating sound of air-cooled air conditioning could be a little intrusive. This results from:

- the low operating sound level of the condensing unit
- indoor installation capabilities of the unit
- custom engineered sound level of the dry cooler

VRVII & VRV-WII

- Daikin indoor units have very low sound operation levels, down to 25 dBA.

dB(A)	Perceived loudness	Sound
0	Treshold of hearing	-
20	Extremely soft	Rustling leaves
40	Very soft	Quiet room
60	Moderately loud	Normal conversation
80	Very loud	City traffic noise
100	Extremely loud	Symphonic orchestra
120	Threshold of feeling	Jet taking off

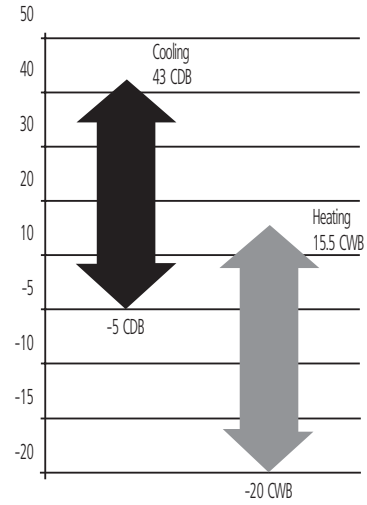
Daikin indoor units

2 Energy efficient solution

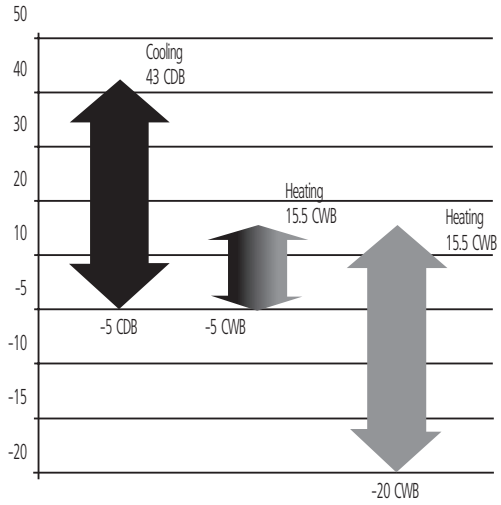
2-6 Operation range of outdoor temperature - VRVII

Standard operation down to -20°C outdoor ambient temperature

Advanced PI control of the outdoor unit enables VRVII heat recovery and Inverter cooling only/heat pump series to operate at outdoor ambients down to -5°C in cooling mode and down to -20°C in heating mode.



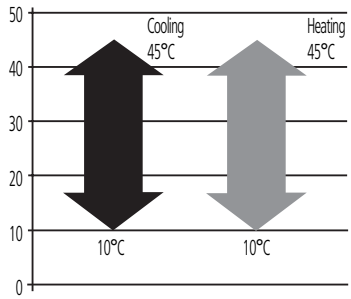
VRV II heat pump



VRVII heat recovery

VRV-WII

Wide operating range of the water-cooled units between 10 C & 45 C, both in cooling and heating.



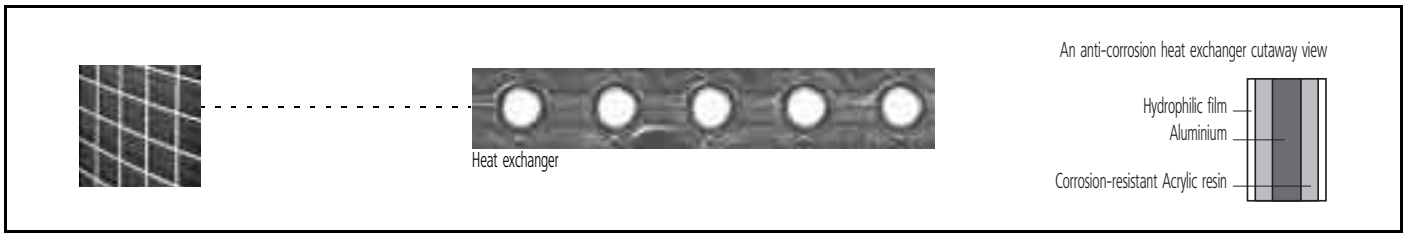
3 High reliability

3-1 Nr. 1 anti-corrosion treatment - VRVII

- Special anti corrosion treatment of the heat exchanger provides 5 to 6 times greater resistance against acid rain and salt corrosion. The provision of rust proof steel sheet on the underside of the unit gives additional protection.

Improvement in corrosion resistance

Corrosion resistance rating		
	Non-treated	Anti-corrosion treated
Salt corrosion	1	5 to 6
Acid rain	1	5 to 6

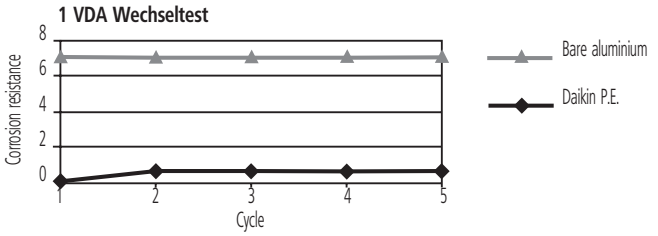


Performed tests

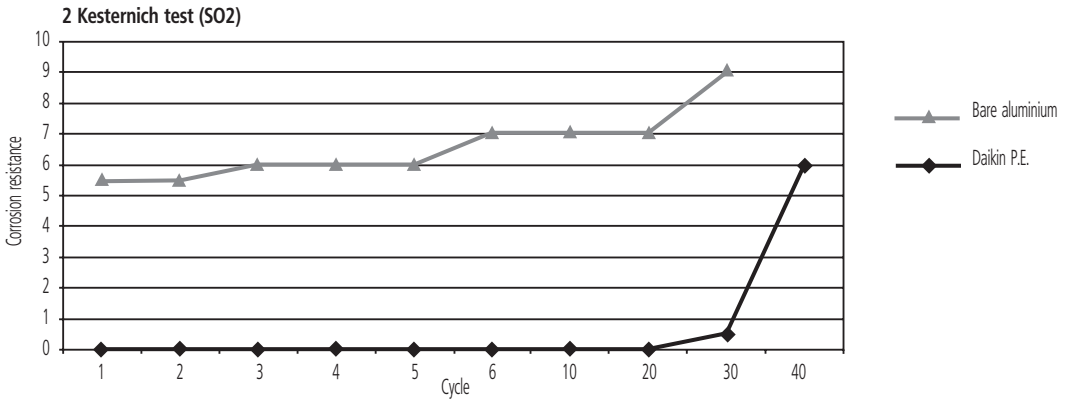
contents of 1 cycle (7 days):

- 24 hours salt spray test SS DIN 50021
- 96 hours humidity cycle test KFW DIN 50017
- 48 hours room temperature & room humidity

testing period : 5 cycles



contents of 1 cycle (48 hours):
according to DIN50018 (0.21)
testing period : 40 cycles



3 High reliability

3-2 Double back-up function - VRVII

In the event of a compressor malfunction, the remotely controlled or field set back-up function in the outdoor unit in question (and also between different outdoor units) will allow emergency operation of another compressor in order to maintain 8 hour maximum interim capacity

3-3 Duty cycling - VRVII & VRV-WII

The cyclical start-up sequence of multiple outdoor unit systems equalises compressor duty and extends operating life.

3-4 Special oil equalising technology

The incorporation of this technology ensures that the optimum quantity of oil is contained in each outdoor unit module in order to maintain compressor reliability. Automatic checks are carried out every 6 minutes on the number of compressors in operation and also to ascertain that there is enough oil to keep them running.

Each compressor in a VRVII outdoor unit is equipped with an internal oil equalising circuit, comprising an oil separator and oil return circuit. This ensures that the maximum quantity of oil is returned to the compressor case before entering the REFNET piping network.

4 Eco friendly

4-1 Lowest refrigerant amount in the total system - VRVII

18 HP	VRV II	Comparable VRF system
Total refrigerant amount in the system*	100 %	160 %

NOTE

* based on average installation

4-2 Dramatic reduction in initial refrigerant charge - VRVII

16 HP	R-22 VRV-K series	R-407C VRV-K series	R-410A VRV II series
Refrigerant charge	100 %	85.6 %	79.5 %

4-3 Optimised R-410A design - VRVII & VRV-WII

Daikin Europe has achieved a quantum leap forward in commercial air conditioning technology by the introduction of its VRVII, the world's first R-410A operated variable refrigerant flow system. Available in cooling only, heat pump and heat recovery versions, the new system, which represents a considerable advance over earlier VRV systems, demonstrates Daikin's innovative application of new technology and the latest HFC refrigerants to its VRV product programmes.

4-4 Less waste and improved re-cycling - VRVII

The lead free, soldered PCB obviates environmental contamination, whilst the re-cyclable galbarium steel bottom plate is designed to last around 6 times longer than the traditional galvanised base.

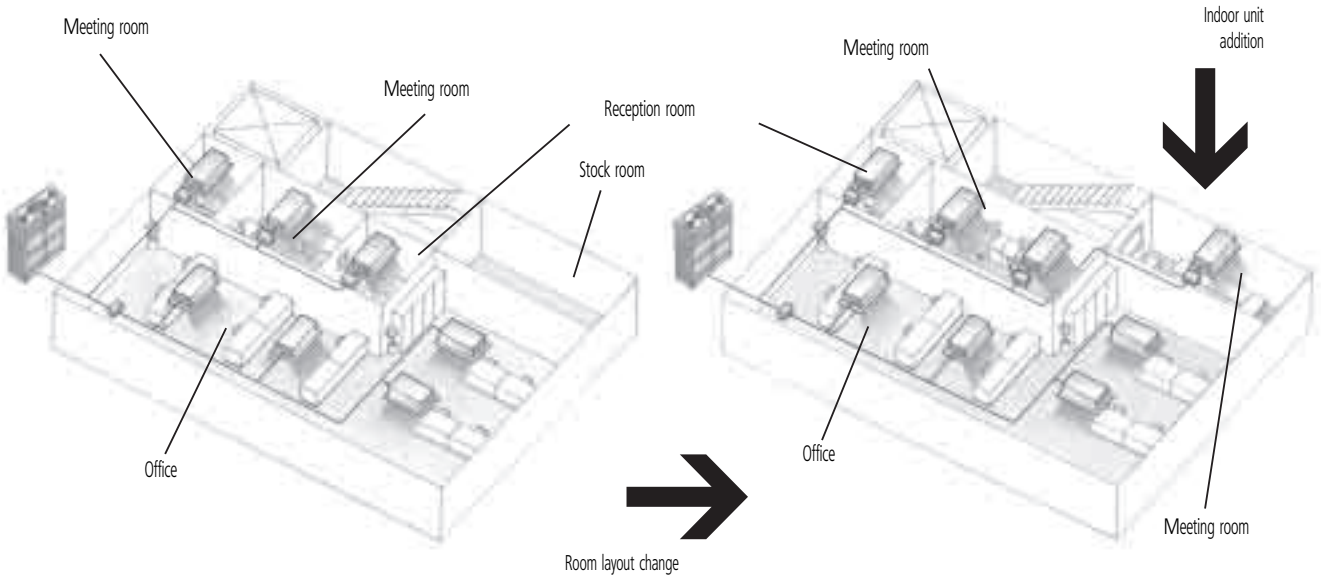
4-5 Refrigerant recovery function - VRVII & VRV-WII

The refrigerant recovery function enables all expansion valves to be opened. In this way the refrigerant can be drained from the piping system and stored in the receiver and the condenser.

5 Easy and flexible design

5-1 Total room layout flexibility - VRVII & VRV-WII

- VRVII systems are easily adaptable to changes in room layout : extra indoor units can be added to a VRV outdoor unit up to a capacity level of 130%.
- Also, since VRVII heat recovery systems offer simultaneous cooling and heating, existing indoor and outdoor units can continue to provide year round air conditioning from their existing locations, even if office layouts are altered or extended.



5-2 Complete flexibility - VRVII & VRV-WII

- The VRVII/VRV-WII system enables different floors or even rooms to be rented to different customers, because each room has independent control of its air conditioning.
- Thanks to inverter technology, as many as 40 indoor units (32 indoor units for VRV-WII) with different types and capacities can be installed in one system. This system automatically and effectively controls each unit to provide individual rooms of different sizes with a comfortable working or living environment.

5-3 Year round cooling and/or heating

VRVII & VRV-WII

- Designed to provide simultaneous year round cooling and/or heating, VRVII heat reovery systems are modular in concept and are therefore, ideal for use in rooms or zones that generate varying thermal loads according to building orientation or local cold or hot spots.

VRVII & VRV-WII

- It is possible for the same meeting room to give rise to differing thermal loads depending on the time of day, number of occupants present, location and usage pattern of lighting and electronic office equipment.

VRVII & VRV-WII

- Until the advent of the VRV, a complex 4-pipe fan coil was needed to meet this requirement. The VRV however, is easier to design and install an in its heat recovery format, can conserve energy in two or more rooms at the same time.

VRV-WII

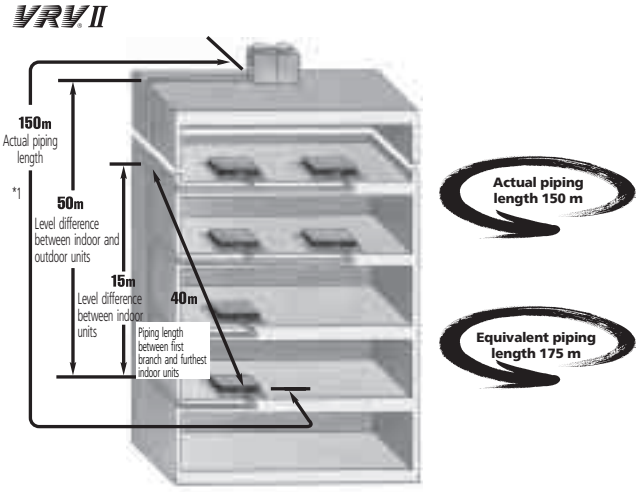
- The colder it is outside, the warmer it needs to be indoors, which means that the capacity of the air-cooled outdoor unit drops. Water-cooled air conditioners are not subject to this problem. The boiler ensures that sufficient enough additional heat is always available indoors.

5 Easy and flexible design

5-4 Longest refrigerant piping run

VRVII

The ability to sustain refrigerant piping in lengths up to 150m (175m equivalent), allows systems to be designed with level differences of 50m between indoor and outdoor units and 15m between individual indoor units. Thus, even with installations in 15 storey buildings, all outdoor units can be located at rooftop level.

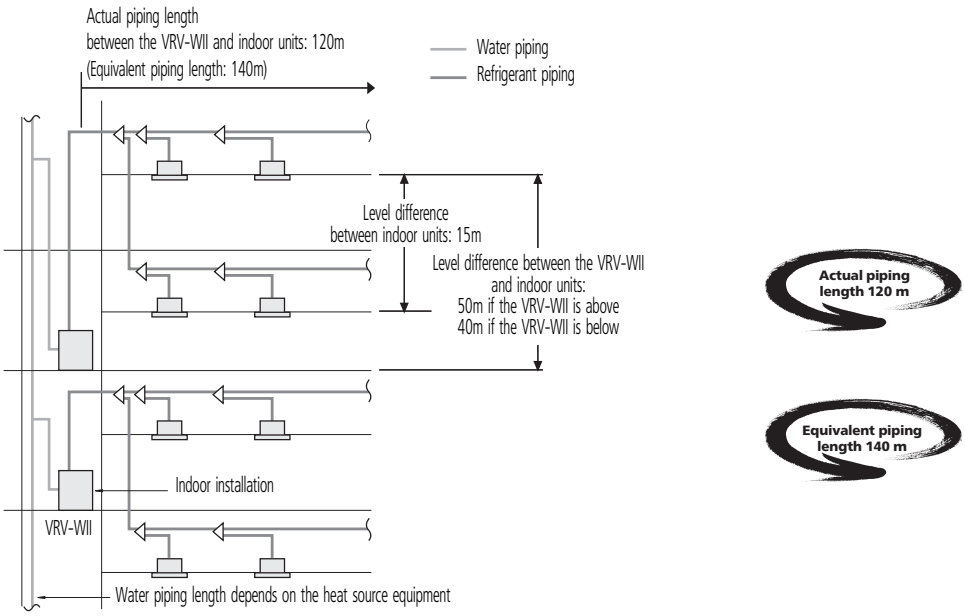


NOTES

1 In this case the outdoor unit is located above the indoor unit. If the outdoor unit is located underneath the indoor unit the level difference is a maximum of 40m.

VRV-WII

- The water-cooled VRV-WII, uses water as its heat source and since there are no limitations on water piping length, is eminently suitable for application to tall multi storey or large buildings. Considerable flexibility is available within the refrigerant circuit since up to 120m actual piping length and 50m* (if the VRV-WII is above the indoor units) in height can exist between the VRV-WII and indoor units. Water piping does not intrude on the occupied spaces, so there are no leakage problems.
- * 40m if the VRV-WII is below the indoor units.



5 Easy and flexible design

5-5 VRV Pro selection programme

A simple to use, Daikin Hi-VRV air conditioning computerised selection programme, designed for use with Windows 95®, Windows 98® and WindowsNT® systems, enables consulting engineers, design and build contractors, property developers and architects etc. to plan a Daikin air conditioning project on a step by step basis, complete with detailed drawings, bills of quantities and costs.

The programme thus enables VRV air conditioning systems to be engineered precisely and economically (without over-sizing units), thereby ensuring optimum operating cycles and maximum energy efficiency.

Features

- The VRV Pro selection programme offers 3 separate modes to accommodate different design formats according to customer requirements. Multi languages are possible.

  1. **Expert mode**

     Once the cooling and heating loads in the different rooms have been calculated, the software will select the most appropriate system plus an estimate of the power consumption

  2. **Quick mode**

     Based on calculated system loads, the software will select the most appropriate system

  3. **Drawing mode**

     Selecting the indoor and outdoor units from a list enables the user to design a system in no time at all

     •AutoCAD and scanned drawings can be used to help draw up a floor plan

     •Piping diameters can be automatically calculated

     •Indoor and outdoor units, headers and joints etc can be automatically selected

Windows95®, Windows98® and WindowsNT® are registered trademarks of Microsoft corporation.

5-6 VRV Xpress

This new super rapid response VRV selection tool is easy to understand, easy to use and enables automated piping and wiring diagrams of up to 3MB to be transmitted via e mail. The package comes complete with single file software and update, requires no installation or drawings and is available in multi language options.

6 Simple and rapid installation

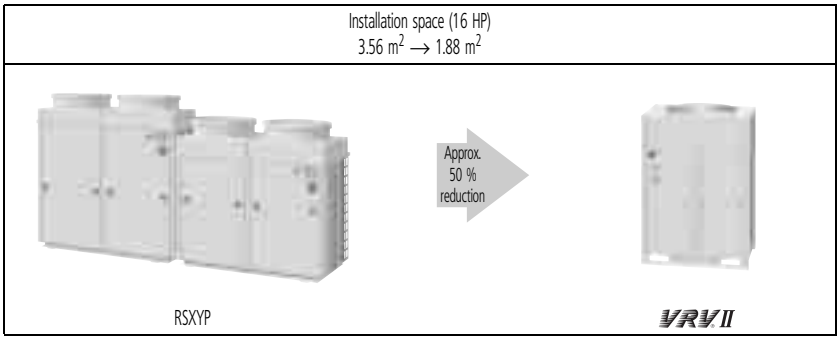
6-1 Short installation time - VRVII & VRV-WII

- Thanks to small bore refrigerant pipes and REFNET piping options, the VRVII/VRV-WII piping system can be installed very easily and quickly.
- Installation of the VRVII/VRV-WII system can also be implemented floor by floor, so that sections of the building can be put into use very quickly, or enabling the air conditioning system to be commissioned and operated in stages, rather than on final completion of the project.

6-2 Dramatic reduction in installation space

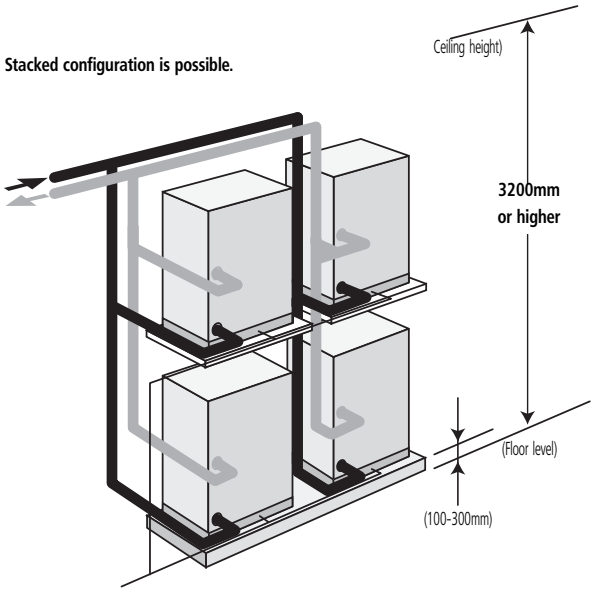
VRVII

VRVII features a dramatic reduction in installation space - for example, the 16hp outdoor unit is housed in a single casing outdoor unit, providing a 50 % reduction in required installation space.



VRV-WII

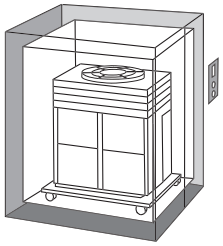
The adoption of a new water heat exchanger and optimization of the refrigerant control circuit has resulted in the industry's most compact and lightweight design. The unit weight of 150kg and height of 1,000mm makes installation easy. Stacked configuration is also possible, contributing further to space savings.



6 Simple and rapid installation

6-3 Modular & lightweight

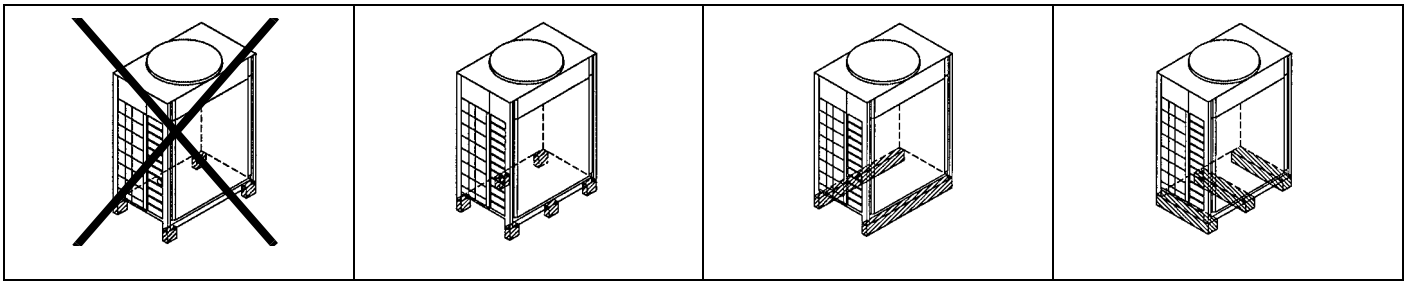
- Modular design enables units to be joined together in rows with an outstanding degree of uniformity.
- The design of the outdoor units is sufficiently compact to allow them to be taken up to the top of a building in a commercial elevator, overcoming site transportation problem, particularly when outdoor units need to be installed on each floor.



10HP	VRV	VRVII	VRV-WII
WEIGHT REDUCTION	100 %	84 %	58 %

6-4 No structural reinforcement necessary - VRVII

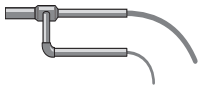
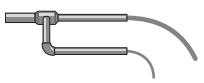
- The galbarium steel allows the use of block foundations. Earlier VRVK and L systems required full beam foundations.
- Thanks to the lightweight and vibration-free construction of the outdoor units, floors do not need to be reinforced, reducing the overall cost of the building.



6 Simple and rapid installation

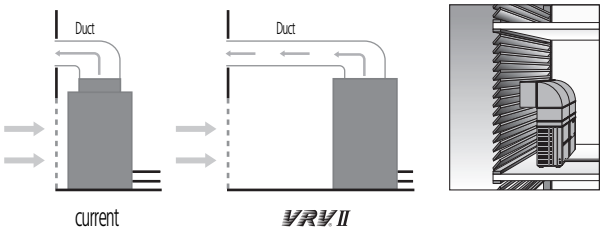
6-5 Unified REFNET piping - VRVII

- The unified Daikin REFNET piping system is especially designed for simple installation
- The use of REFNET piping in combination with electronic expansion valves, results in a dramatic reduction in imbalance in refrigerant flowing between indoor units, despite the small diameter of the piping.
- REFNET joints and headers (both accessories) can cut down on installation work and increase system reliability.
- Compared to regular T-joints, where refrigerant distribution is far from optimal, the Daikin REFNET joints have specifically been designed to optimise refrigerant flow.

REFNET joint	Attached insulators for REFNET joint	REFNET header	Attached insulators for REFNET header	REFNET joint	T-joint
					

6-6 Increased installation flexibility - VRVII

Outdoor units can be installed far back from former location.

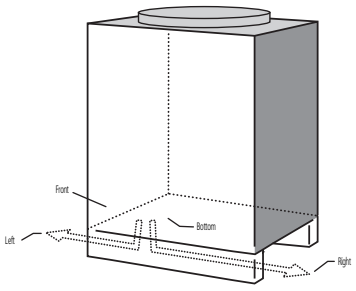


6-7 High external static pressure : 6mm H_2O - VRVII

Daikin now offers high external static pressure as standard to meet requirements of indoor installation.

6-8 4-way piping connection - VRVII & VRV-WII

VRVII series not only offer the possibility to run piping from the front, but also from the left, right or bottom, thus providing greater freedom of layout.



6 Simple and rapid installation

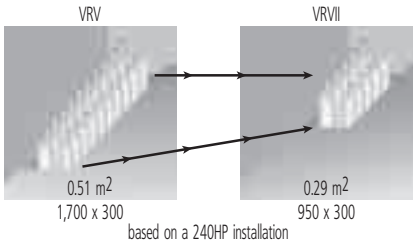
6-9 Downsizing refrigerant piping

- **Reduced piping diameters**

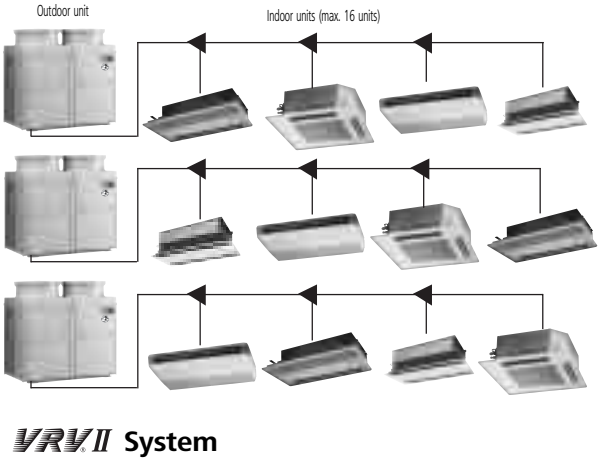
Use of high efficiency R-410A enables the VRVII to operate on a smaller refrigerant charge to be used, leading to a reduction in liquid and gas pipe diameters.

- **Reduced piping costs thanks to modular design**

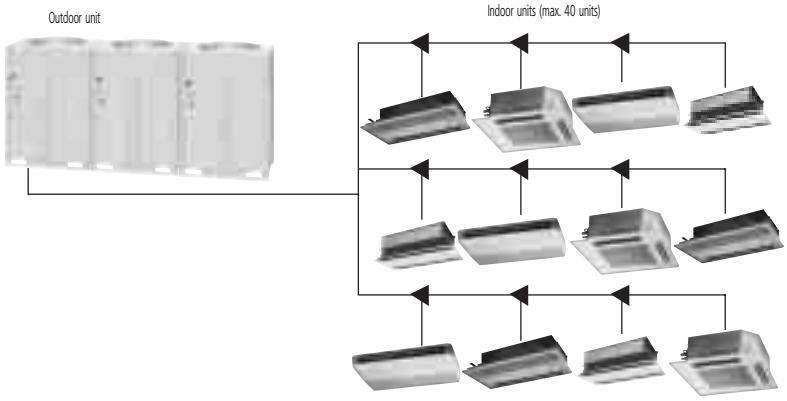
Smaller diameter liquid and gas piping contributes to a reduction in installation space and installation costs.



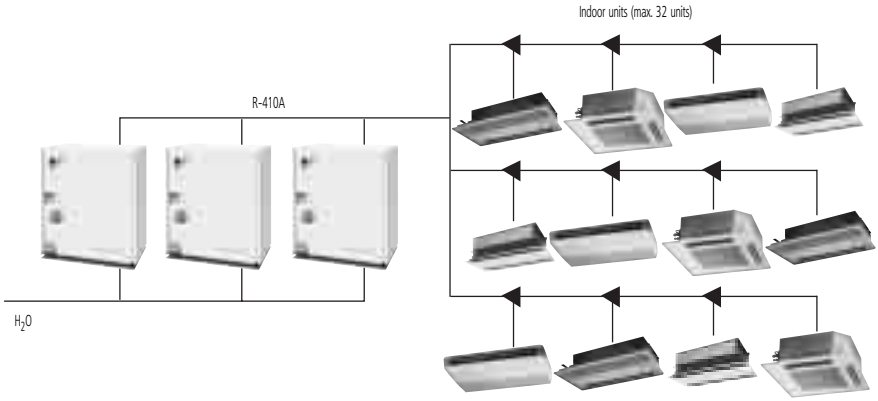
Standard VRV System



VRV II System



VRV-WII System



6 Simple and rapid installation

6-10 Sequential start - VRVII & VRV-WII

Up to 3 outdoor units can be connected to 1 power supply and can be turned on sequentially. This allows the number of breakers and their capacities to remain small and simplifies wiring (for models of 10Hp or less).

6-11 Self diagnosis - VRVII & VRV-WII

Detects malfunctions in major locations of the system and displays the type of malfunction and location, which in turn allows servicing and maintenance to be performed more efficiently.

6-12 Crosswiring check - VRVII & VRV-WII

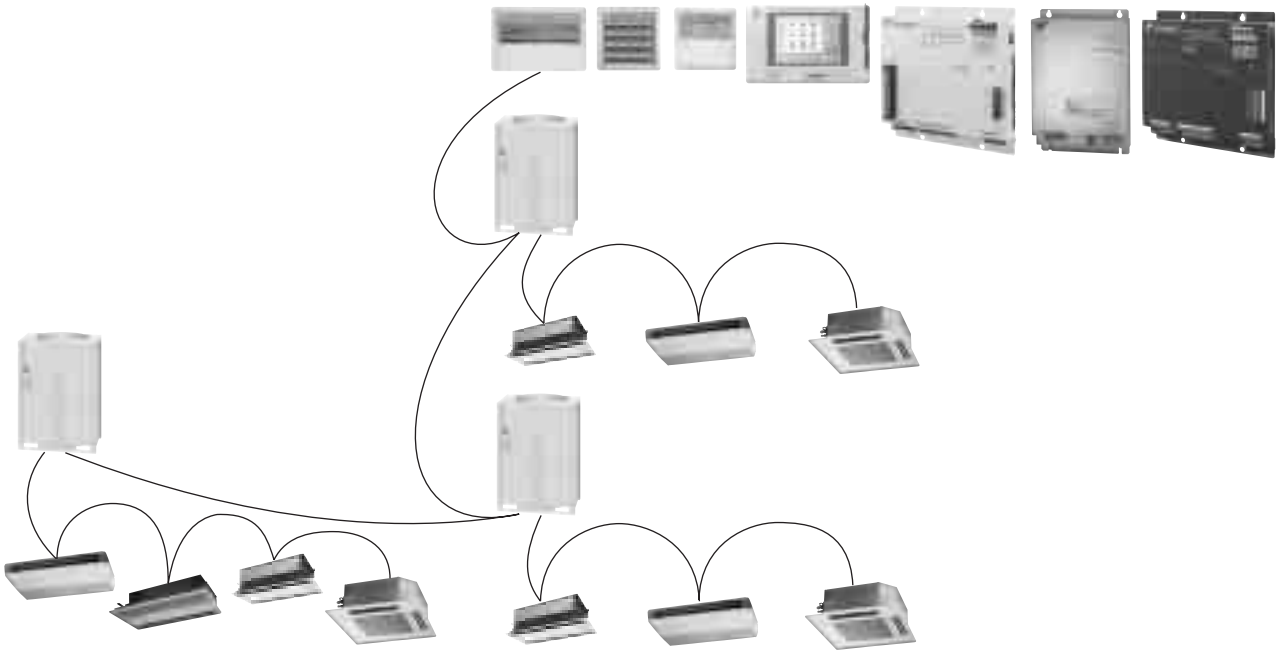
The cross wiring check facility available on the VRVII is the first of its type in the industy to warn operatives of connection errors in interunit wiring and piping. This function identifies and alerts system errors by means of on/off LEDs on the outdoor unit's PC boards.

6-13 Simplified wiring - VRVII & VRV-WII

- A simple 2-wire non-shielded multiplex transmission system links each outdoor unit to multiple indoor units using one 2-core wire, thus simplifying the wiring operation.
- Furthermore, outdoor units have power connection outlets on side and front, resulting in easier installation and maintenance and saving space when rows of units are connected together.

6-14 "Super Wiring" system - VRVII & VRV-WII

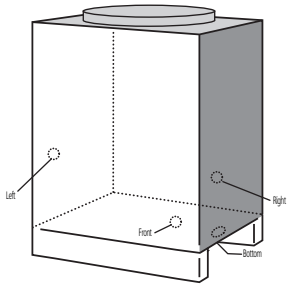
- A Super Wiring system is used to enable the shared use of wiring between indoor units, outdoor units and the centralised remote control.
- This system makes it easy for the user to retrofit the existing system with a centralised remote control, simply by connecting it to the outdoor units.
- Thanks to a non polarity wiring system, incorrect connections become impossible and installation time is reduced.



6 Simple and rapid installation

6-15 4-way wiring connection - VRVII & VRV-WII

Wiring can be fed from the front panel, both left and right side panels or bottom panel of the outdoor unit.



6-16 Auto address setting function - VRVII & VRV-WII

Allows wiring between indoor and outdoor units, as well as group control wiring of multiple indoor units, to be performed without the bothersome task of manually setting each address.

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VRV II Systems

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 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.

CE 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.

Daikin equipment is designed for comfort applications. For use in other applications, please contact your local Daikin representative.

Specifications are subject to change without prior notice

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