

Upgrading Aged Air Conditioning System



Q series

Application Reference

Dealer

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06/15 AD





P.5 Umeda Center Building



VRV Q series

Application Reference

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OFFICE

HOTEL

SCHOOL

HOSPITAL

OTHERS

Quick, Quality and Economical

Benefits of VRV Q series for Replacement use



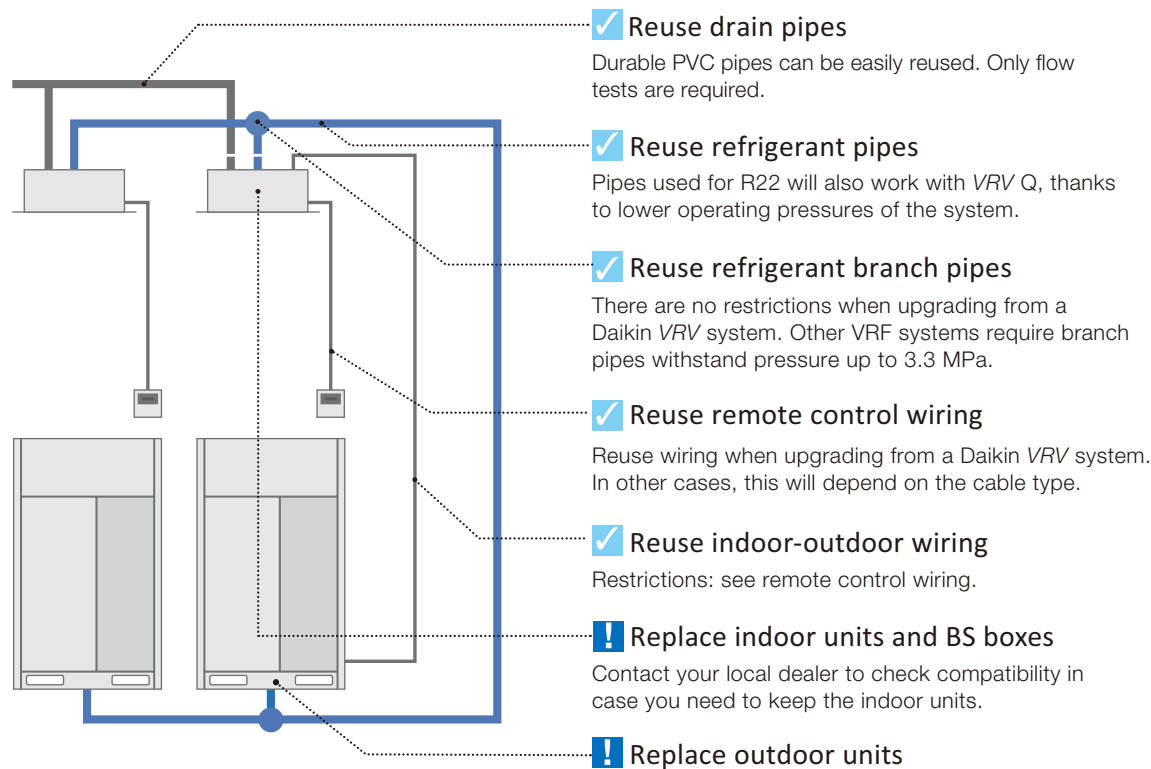
REUSE

Simple use of existing refrigerant piping.

In the past, special equipment and work was needed to clean pipes when using existing piping, but this is no longer required. A new function automatically deals with contamination inside piping during refrigerant charging, eliminating the work involved in cleaning.

Even applicable for non-DAIKIN systems !

The Daikin low-cost upgrade solution



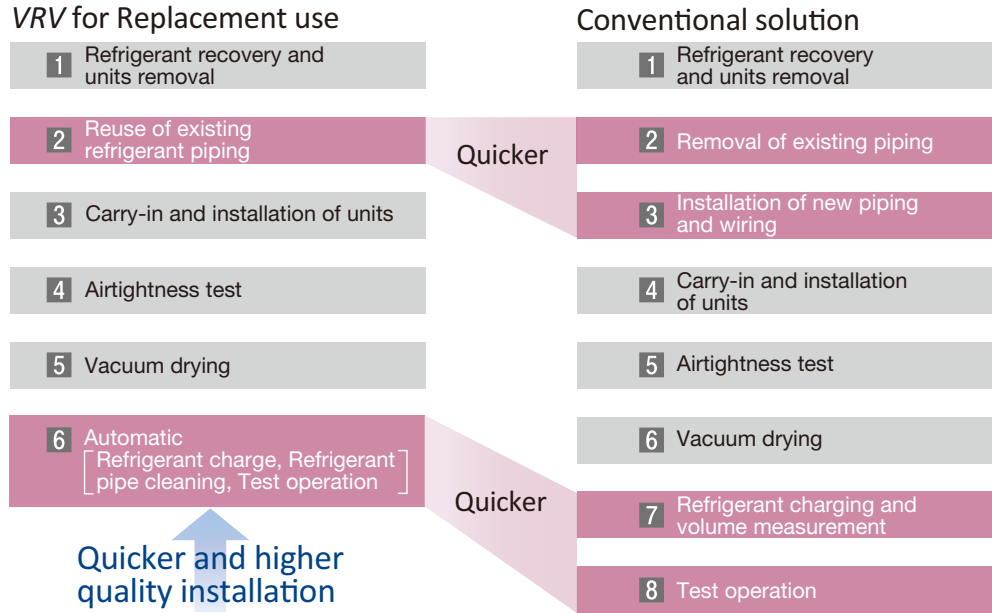
AUTOMATIC

Refrigerant charging, cleaning and test operation done with just a single switch.

The unique automatic refrigerant charge eliminates the need to calculate refrigerant volume and ensures that the system will operate perfectly. Not knowing the exact piping lengths because of changes or mistakes in case you didn't do the original installation or replacing a competitor installation no longer poses a problem. Furthermore, there is no need to clean inside piping as this is handled automatically by the VRV Q unit.

TIME SAVING

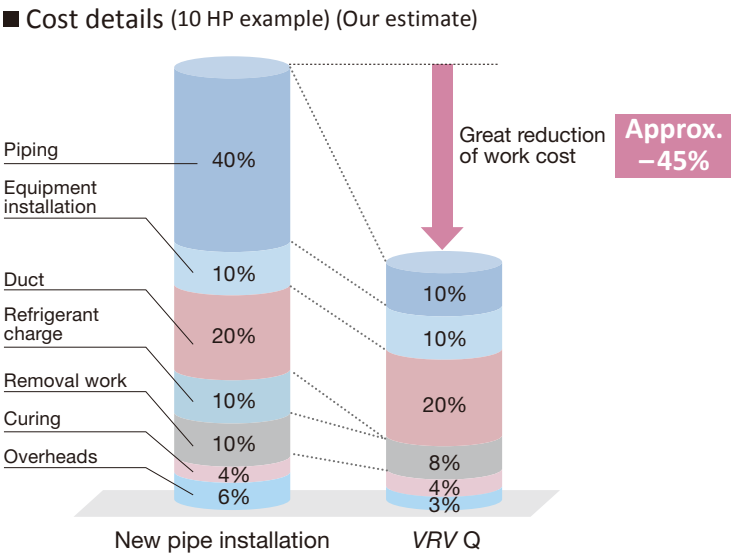
Enables smooth replacement of air conditioning with less effect on operations and users in the building.



* For reuse of existing refrigerant piping, it is possible to use piping or branched piping capable of handling 3.3 MPa or more. Heat insulation is necessary for liquid piping and gas piping.

COST SAVING

Work costs for pipe removal, installation and insulation account for almost 80% of the total cost. By the reuse of existing piping, 45% of cost down can be realized compared to installing new pipes. On top of the benefits from reusing pipes, costs of charging refrigerant to clean the pipes are also saved.



VRV Air Conditioning System is the world's first individual air conditioning system with variable refrigerant flow control and was commercialized by Daikin in 1982. VRV is the trademark of Daikin Industries, Ltd., which is derived from the technology we call "variable refrigerant volume." VRV is a trademark of Daikin Industries, Ltd.



Umeda Center Building

PROJECT OUTLINE

- Location: Osaka, Japan
- Construction Period: 2006-2009
- EHP 1620 HP → VRV Q 2322HP
- 20 years in use

Capacity **UP**



Awarded "SHASE Special Award -Renewal Award-"

An award since 2013 to help promote the development of renovation technology and operation management technology, that is to keep building equipment sustainable in a long term.

Members of SHASE with excellent performance are honored with this award.

*SHASE: A major organization and the only scientific society in the field of heating, air-conditioning and sanitary engineering in Japan with a history of over 80 years. There are more than 20,000 members all over the world as of 2001.

REQUIREMENTS/ISSUES

- Aging equipment
- To cope with increasing cooling load
- To minimize tenant fee loss during replacement
- Not to disturb tenant's working hours
- To organize well managed construction schedule due to a fully occupied building



DAIKIN SOLUTION

- Increased capacity from 60HP to 86HP within same installation space
- Construction done only on weekends not to disturb tenants by the noise and vibration of construction (8days per floor)
- Reuse of existing piping, automatic cleaning and charging refrigerant shortened the construction period

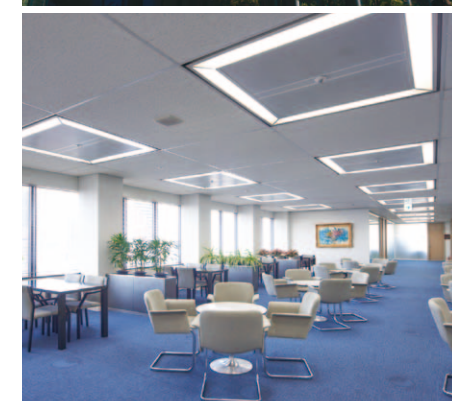
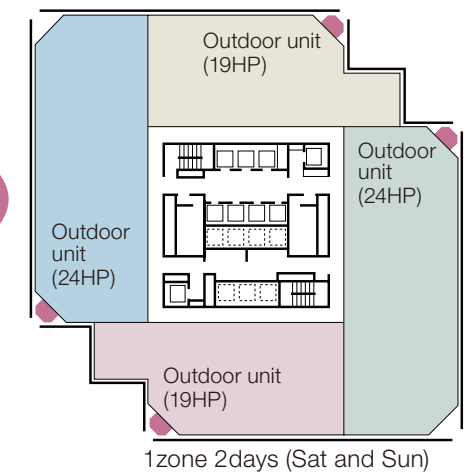
Installation time

8 days / floor

•Detail

Piping work: 3 people, 112 hrs
Ducting: 4 people, 144 hrs
Control: 2 people, 32 hrs
Carrying in: 4 people, 40 hrs
Administration: 2 people, 208 hrs

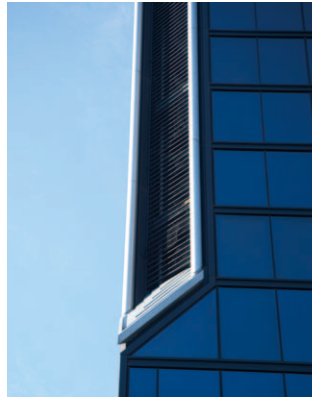
No interruption of
tenant's operation
on week days!



Umeda Center Building

Space saving

Smaller footprint,
less installation space



Outdoor units are installed
in the corners of each floor.
Maintenance space can be
accessed from the door on
the side.

The louver side is painted
black to make the outdoor unit
unnoticed from outside

Before

5HP×3

1987



VRV G

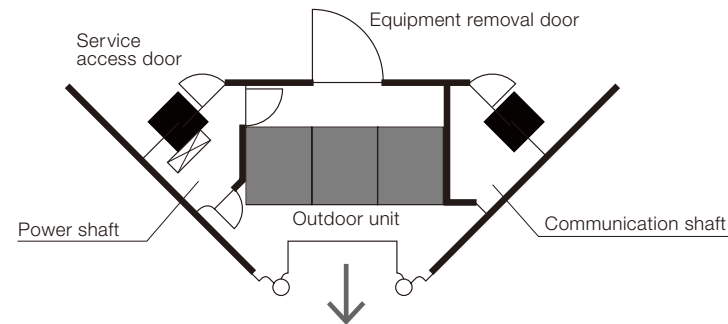
After

6HP×4

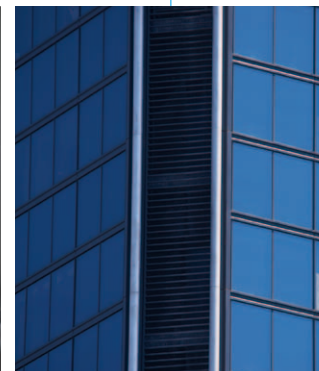
2007



VRV III-Q



•Outdoor unit facing
the louver side



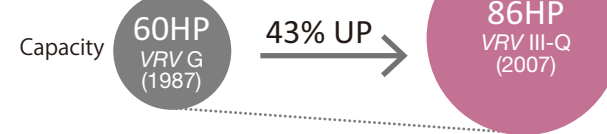
•Exterior of
installation space



•Outdoor unit facing
the indoor side

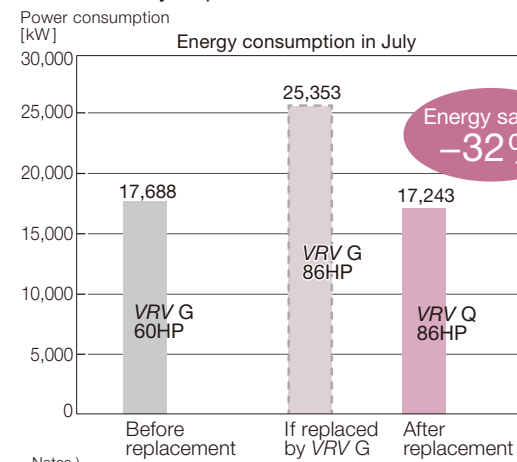
Energy saving

More capacity
less energy consumption

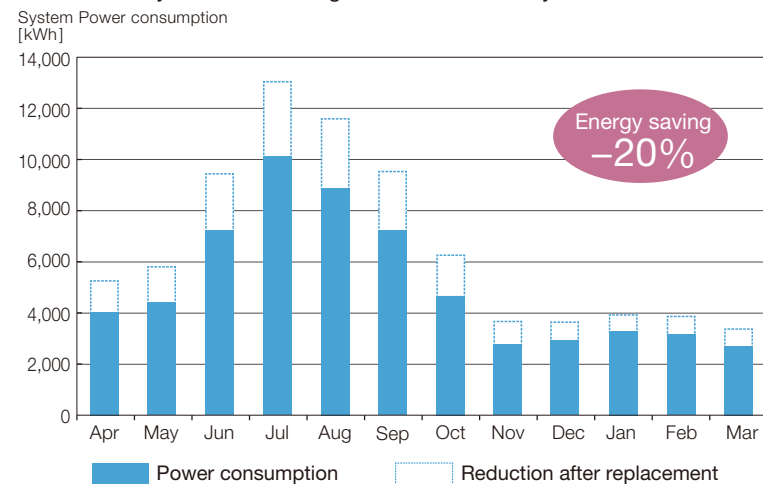


Power Consumption

•Reduction by Replacement



•Reduction by Air Conditioning Network Service System



Installation process



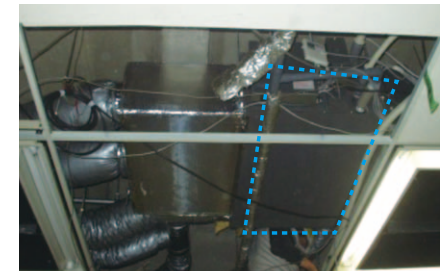
1 Protection of tenant's facilities



2 Removing existing indoor unit



3 Refrigerant recovery



4 Replaced indoor unit



5 Easy to carry in



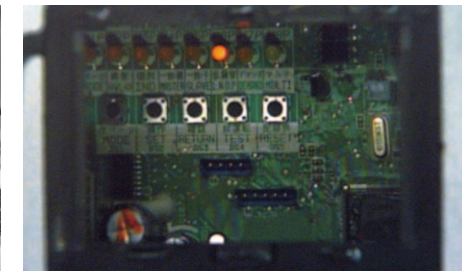
6 Compact size



7 Outdoor unit installation



8 Refrigerant piping



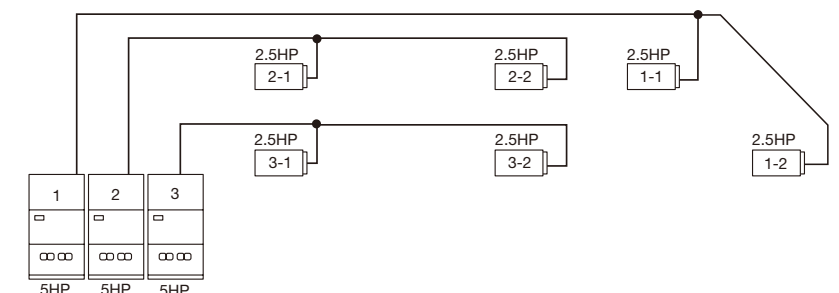
9 Test run

Time/Cost saving

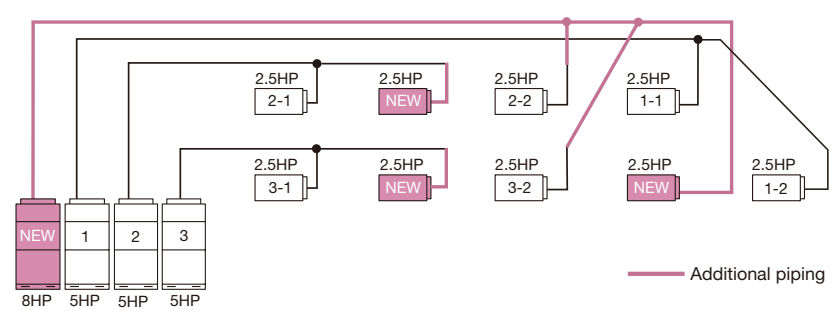
The reuse of existing refrigerant piping, ducting and drain pipes realized
the reduction of time and cost for replacement.

Despite the capacity increase, only few parts needed new piping.

Existing refrigerant piping



Additional refrigerant piping





Torre Tarragona

PROJECT OUTLINE

- Location: Barcelona, Spain
- Construction Period: 14 months
- VRV Q 140 units
- 17 years in use



Background

Entered the site with maintenance contract and offered the replacement of R22 VRV

- Original installation dated back to 1996
- Maintenance contract by DAIKIN Spain since 2005
- Offered replacement since 2011 through maintenance
- Finally achieved replacement order directly from owner

Key of success

- Entering the site with maintenance contract
- Early promotion of R22 replacement
- Continuous sales follow-up
- Direct sales contact to the owner



Torre Serenissima

PROJECT OUTLINE

- Location: Verona, Italy
- Renewal: 2013
- VRV Q 39 units
- 17 years in use

Background

Torre Serenissima is the headquarters of the Brescia Padova Motorway, in Verona, northern Italy.

Why VRV Q?

"The complete replacement of the 17-year-old R22 system resulted in only half-day of missed work for employees.
(Full installation done during weekends)
The improved control of the air flow by the user significantly enhanced comfort while reducing energy consumption by 25%"

Maurizio Casarola (Property Manager)



The original VRV units that ran on R22 were replaced with VRV III-Q units running on R410A.



Thirty-nine VRV III-Q units serve 215 cassette type indoor units and 35 VAM ventilation units.



The VRV III-Q units run on R410A, ensuring compliance with the latest standards.



Installation was carried out during weekends to minimize disruption to business.



A VRV heat recovery system was installed on the top two floors which house a number of individual offices.



VRV allows independent control of climate in different areas of the building.



Shanghai Information Building 39F

(Shanghai information Office renovation)

PROJECT OUTLINE

- Location: Shanghai, China
- Renewal: Jan, 2014
- VRV II → VRV Q 96HP



Background

Due to frequent use, there was serious aging of equipment.
For a high-rise office building renovation, requirements were the following;

- Not to stop office hours
- Not to damage interior
- Not to affect other floors



Shanghai Airport Group Co. Ltd.

PROJECT OUTLINE

- Location: Shanghai, China
- Renewal: 1st phase Dec, 2013
2nd phase Jul, 2014
- VRV II(R22) → VRV Q 24HP

Background

Life of the equipment was approaching, and failure rate had risen.

Replacing indoor units in the ceiling was completed without damage.

Only one weekend required to complete installation.



State Grid Zhejiang Electric Power Company

PROJECT OUTLINE

- Location: Pinghu, China
- Renewal: Oct, 2014
- VRV II(R22) → VRV Q 90HP

Background

Aging equipment of a government project had increased the cost for maintenance and electricity year by year.

Requirements were as follows;

- To protect interior at the fullest
- To minimize construction period
- Not to affect the city power supply

VRV Q easily solved the problem of the installation work in pipe shafts.





PROJECT OUTLINE

- Location: Beijing, China
- 10 years in use
- Construction Period: 38hrs (2days)
- Renovation area: 300m²
- VRV II (R22) → VRV Q 32 HP



REQUIREMENTS/ISSUES

- Cooling capacity deterioration due to aging equipment
- To minimize construction period due to 24 hour call center
- To save cost and increase capacity



DAIKIN SOLUTION

- Reused existing piping and only replaced outdoor unit and indoor unit
- No damage to ceiling

Background

2014-Mar: Obtained information of air conditioning equipment issues from dealer's after-service division.

2014-Apr: Discovered issues related to aging equipment at site. Cooling capacity was decreasing but exchanging compressor was too complicated.

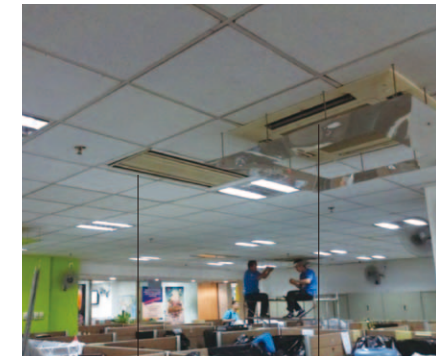
Due to a 24/7 call center, VRV Q was proposed since it could cope with the next four factors;

- 1.Minimizing affection to tenant's operation
- 2.Shortening construction period
- 3.Increasing capacity
- 4.Leaving ceiling unchanged

2014-Jul: Project approved by owner

2014-Aug: Installation completed

Installation Process



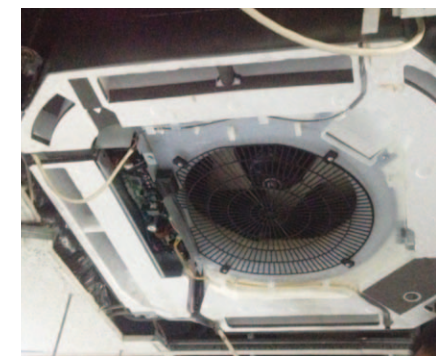
1 FCU of Chiller system VRV Indoor unit



2 Removing indoor unit



3 After removing VRV Indoor unit



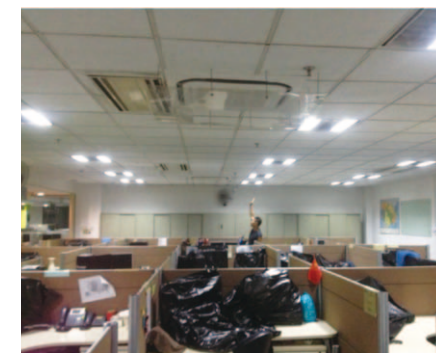
4 Installing new indoor unit



5 Installing outdoor unit



6 Adjusting



7 Test run



8 New VRV Indoor unit



9 New VRV Q installation



Beijing Yuanlong Yato Culture Communications Co. Ltd.

Capacity **UP↑**

NON DAIKIN **DAIKIN**

PROJECT OUTLINE

- Location: Beijing, China
- Construction Period: 108hrs (2weekends)
- EHP 60 HP → VRV Q 80 HP
- Other manufacturer → DAIKIN
- 7years in use
- Renovation area: 1,000m²

REQUIREMENTS/ISSUES

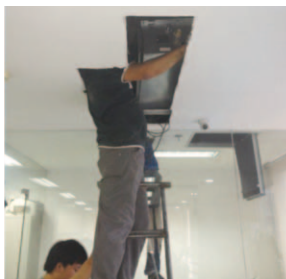
- To Improve frequent malfunctions and lack of heating capacity
- To reduce expensive maintenance fee
- To avoid disturbance of daily operation hours
- To increase capacity



DAIKIN SOLUTION

- Replaced non-DAIKIN system with VRV Q
- Construction done only on weekends
- Used existing piping to save cost
- Smaller footprint more capacity

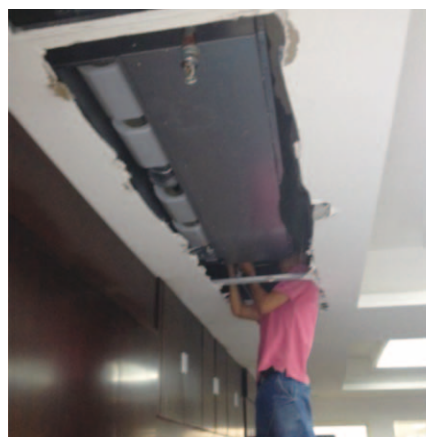
Special Features



Before



After



Oriental Electronic Science and Technology Building

PROJECT OUTLINE

- Location: Beijing, China
- Construction Period: 4 months
- Renewal: 2013
- VRV Q 178HP
- Other manufacturer → DAIKIN
- Renovation area: Approx. 600m²

Background

Oriental Electronic Science and Technology Building is a 9-story building, with a total of 20,000 square meters. After leasing the floors in 2005, tenants had added multiple brands of air conditioners. This had made the total system very complicated and thus the owner had wanted to replace the whole air conditioning system by a single manufacturer once the equipment broke down. Further, aging equipment badly needed replacement. About 1/3 of the whole building had to be renovated, including the improvement of the machine room and air conditioning in the office. Additional renovation for the rest of the building was considered in the future.

The headquarter of the owner's company, located in Hangzhou, was financially strong and wanted to use the best equipment. Since DAIKIN was a well-known reliable company in the local area, owner initially intended to upgrade with DAIKIN's VRV system. Due to a system integration company with busy working hours, closing the office for construction was a great loss. After learning more about user requirements and site visits, DAIKIN recommended VRV Q which could realize short construction period, simple installation and no affection to the user's daily office hours by night-time construction. Owner was interested in the proposal. Initially, they doubted the feasibility of the replacement program. However, through the latest technology and making 7 to 8 site visits with proposals, DAIKIN VRV Q achieved trust from the owner.



Before
Multiple brands installed



After
VRV Q installation



Lunar Sendai

PROJECT OUTLINE

- Location: Miyagi, Japan
- Construction Period: 8 months
- EHP 863 HP → VRV Q 863HP, 134units
- Renewal: Feb, 2015
- 15 years in use



Background

“Lunar Sendai” is a 14-story tenant office building located in the heart of Sendai, the largest city in North Japan.

The following factors were the key of success to achieve the replacement project.

- By adopting the “Crane-free” type VRV Q (Japanese exclusive model), the cost for using huge cranes to carry in outdoor units were reduced. Thanks to its light weight and compact footprint, the units could be carried in just by an elevator and hand carry.
- The building investment company initially had multiple maintenance service contracts with DAIKIN for other buildings. DAIKIN had achieved a high level of satisfaction through the "Air conditioning Network Service System", a maintenance contract with 24/7 online monitoring. Users were highly satisfied not only with this service but also with the general service after replacement that became a huge support for adopting VRV Q for this building.

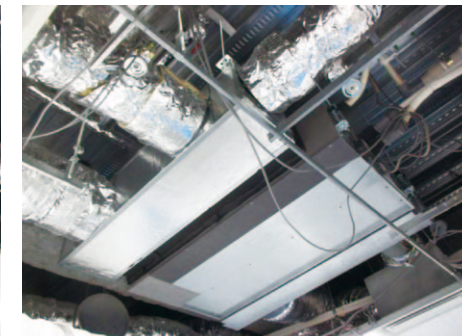
Installation process



1 Old indoor unit



2 After removing existing indoor unit



3 Replaced by new indoor unit



4 Existing outdoor unit.
Based on airflow analysis, the discharge boot was decided to be removed.
This realized a reduction of initial cost.



5 Vibration proof frame



6 Refrigerant pipes under outdoor unit



7 New outdoor unit installation



Hommachi Fuji Building

PROJECT OUTLINE

- Location: Osaka, Japan
- Renewal: 1st phase Oct, 2014
2nd phase Apr, 2015
3rd phase Dec, 2015 (In progress)
- GHP 784 HP → VRV Q 716 HP
- Other manufacturer → DAIKIN
- 15 years in use

NON DAIKIN DAIKIN GHP EHP

Background

Hommachi Fuji building is a 12-story office building located in the heart of busy Osaka city.

Built in year 2000, GHP was adopted for the air conditioning system mainly to save electricity cost.

As the years passed by, malfunctions had increased due to the aging equipment.

This was the perfect timing for DAIKIN to make a replacement proposal as follows;

- Use exsiting piping
- Schedule construction only on weekends to avoid disturbance to tenants
- Offer reliable maintenance contract (Easy to obtain parts)
- Optimize outdoor unit capacity by adjusting connection ratio
- Easy control by intelligent Touch Manager

With all these factors and total cost considered, the owner decided to adopt DAIKIN's VRV Q.



Installation process



Removing old indoor unit



New indoor unit installed



Replacement from GHP to VRV Q in progress



VRV Q installation



intelligent Touch Manager



Entrance Hall



Shiroguchi Building

PROJECT OUTLINE

- Location: Osaka, Japan
- Construction Period: 2 weeks
- EHP 129 HP → VRV Q 119 HP
- 15 years in use

REQUIREMENTS / ISSUES

- Difficult carry-in route to the ad-tower
- Not to disturb tenants
- Decrease capacity to reduce power consumption
- Enhance stability of air conditioning system



DAIKIN SOLUTION

- The compact footprint of VRV Q enabled the outdoor units to be carried in without disassembling the ad-tower
- Construction was done mainly at night time considering operating tenants during weekends
- Indoor construction was done only at night time thanks to the reuse of existing piping and automatic pipe cleaning
- Safe installation was realized since no brazing necessary
- The flexibility of VRV Q realized the outdoor unit size reduction by 10HP while keeping the same indoor unit capacity
- A backup system was implemented in case of malfunction



Background Special Features



1 Previous day



2 Construction during night time



3 Next morning without a trace



Replacement in progress



After Replacement



Outdoor units have moved out of the ad-tower due to renovation (April 2015)



Building F

Capacity **UP**

NON DAIKIN → DAIKIN

REQUIREMENTS / ISSUES

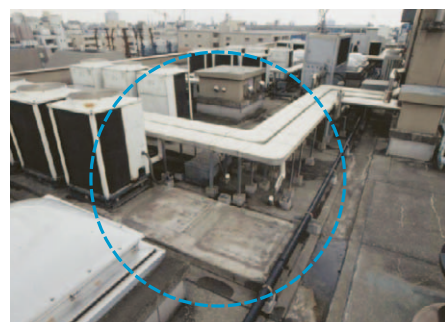
- Increase capacity
- Aging equipment
- To avoid disturbance to other floors
(Replacement only for the 3rd floor)



DAIKIN SOLUTION

- Realized 160% increase of capacity
10HPx2 → 16HPx2 within same space
with the reuse of existing piping

DAIKIN ONLY!



Before

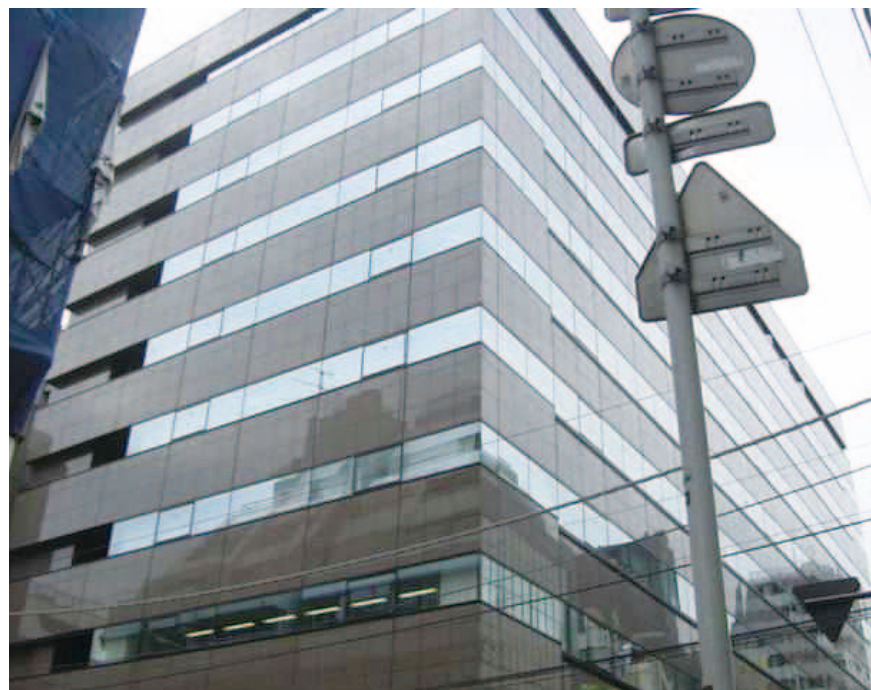


After

- Avoided new piping construction by keeping existing piping
- Pipe cleaning, refrigerant charge, test running done in 75minutes!

PROJECT OUTLINE

- Location: Tokyo, Japan
- Construction Period: 3 days
- EHP20HP → VRV Q 32HP
- Other manufacturer → DAIKIN
- 12 years in use



Installation process



1 Existing unit



2 Removal



3 Opening base holes



4 Vibration prevention



5 Delivery & Installation



6 Piping work



7 Air Tightness Test



8 Test run done by one switch!



Building S

NON DAIKIN → DAIKIN

REQUIREMENTS/ISSUES

- Not to stop heating
- To be flexible to sudden changes of construction schedule
(Existing unit waiting for replacement suddenly broke!)



DAIKIN SOLUTION

- Adjusted construction schedule to each tenant's closed days by repeating partial replacement per system.
- Adjusted schedule on the spot.
This was realized since only indoor and outdoor unit needed to be changed.



Special Features



Reused existing foundation and replaced outdoor unit sequentially.



Existing piping reused from the base of the outdoor unit.



Installed round-flow type indoor units to every room without disturbing working hours.

HOTEL



The Bloomsbury Hotel

PROJECT OUTLINE

- Location: London, UK
- Construction period: 9 months
- VRV Q 56 outdoor units



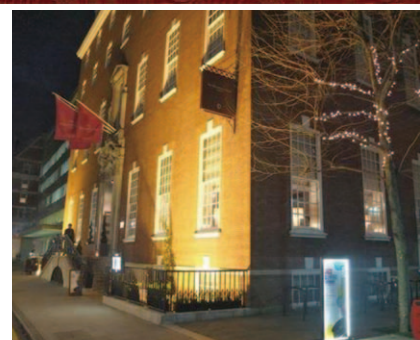
REQUIREMENTS/ISSUES

- To reduce energy usage and CO₂ emissions by 30% while improving comfort levels for guests
- To comply with UK legislation on the use of refrigerant gases
- To work in an operational hotel
- To keep the 9month program to minimize revenue loss



DAIKIN SOLUTION

- VRV Q uses R410A gas which can work at the lower pressures used by R22 systems while delivering much higher efficiencies thus allowing existing pipework to be retained. The system is 40% more efficient in heating and 25% higher in cooling than R22 refrigerant systems.
- VRV systems are modular, which means they are flexible in their application and installation can be phased, further minimizing disruption. On this project, the compact and lightweight units could also be installed without using cranes, reducing costs further and avoiding road closures.
- Although, all the outdoor and indoor units were replaced, along with BS boxes, installation costs were half of the expected cost of complete system replacement. Existing pipework could also be retained, saving time and money. The phased approach meant occupancy rates could be maintained minimizing the effect on revenue.



Helena Resort

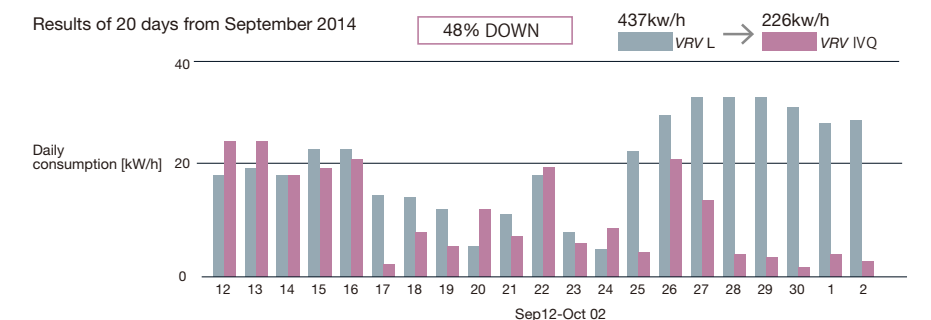
PROJECT OUTLINE

- Location: Sunny Beach, Bulgaria
- Construction Period: In progress
- 1 outdoor unit: replaced
- 44 outdoor units: ready to replace
- 12 years in use



Benefits and Highlights

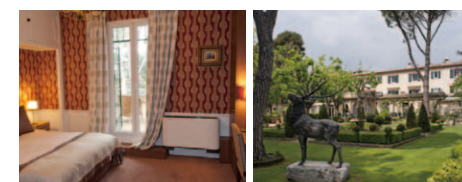
- Real measured VRV replacement system with a result of 38.9 % higher efficiency in cooling mode
- Long term relation with investor turns into new sales opportunities
- No tender !
- Creates opportunities for other projects
- Savings: VRV replacement 40 %
- The original project and the replacement project was done by the same company with high system and design knowledge



Hotel Le Pignonnet

PROJECT OUTLINE

- Location: Aix-en-Provence, France
- Renewal: 2011
- VRV Q 8 units



Replacement of the existing VRV system of a luxury 5 star hotel to anticipate R22 phase out while preserving interior decoration.





East China Normal University

PROJECT OUTLINE

- Location: Shanghai, China
- Renewal: Jun, 2013
- 14 years in use
- SKYFREE*(R22) → VRV Q 406HP
- *VRV made by local joint venture



Background

Equipment needed to be upgraded due to the increase of indoor capacity. Construction was completed during the summer period.



School N

PROJECT OUTLINE

- Location: Okinawa, Japan
- Construction Period: 25 days
- EHP 72 HP → VRV Q 80HP

Capacity **UP**

REQUIREMENTS/ISSUES

- To increase capacity due to additional computers
- Not to disturb school hours
- To minimize extra cost by increasing capacity



DAIKIN SOLUTION

- Possible to reuse existing main pipe and drastically save outdoor unit installation space despite capacity increase
 - Construction of all 8 floors completed during spring vacation
 - Cost for piping material, disposal, interior refurbishment saved, thanks to the reuse of existing piping
- Total construction cost saved



Classroom



Despite capacity increase, saved space of 2 outdoor units due to smaller footprint



Server room



Shanghai Jiading District Committee Party School

PROJECT OUTLINE

- Location: Shanghai, China
- Renewal: Jul, 2014
- VRV II(R22) → VRV Q 318HP

Background

Aging equipment of a government project had increased the cost for maintenance and electricity year by year.

Requirements were as follows;

- To protect interior at the fullest
- To minimize construction period
- To be flexible with construction schedule considering class time

VRV Q easily solved the problem of the installation work in pipe shafts.





Jinan Qilu Hospital

PROJECT OUTLINE

- Location: Jinan, China
- Renewal: Sep, 2014
- VRV K(R22) → VRV Q 796HP

Background

Aging equipment by hospital's long-term operation required an upgrade.
To complete installation without stopping treatment was essential.
Excellent products, excellent service, professional renovation experience gained user's acceptance.



Hospital K

PROJECT OUTLINE

- Location: Kumamoto, Japan
- Construction Period: 1 day
- EHP 10 HP → VRV Q 10 HP
- Other manufacturer → DAIKIN
- 15 years in use

NON DAIKIN → DAIKIN

REQUIREMENTS/ISSUES

- Not to disturb patients(quiet construction)
- Limited installation space



DAIKIN SOLUTION

- Quick and quiet construction realized due to the use of existing piping and no necessity of pipe cleansing
- Limited space used effectively by compact footprint and simple piping construction

Special Features

Fitted perfectly in a narrow space between the existing outdoor units



Suzhou Municipal Hospital in North District

PROJECT OUTLINE

- Location: Suzhou, China
- Renewal: 1st phase Sep, 2013
2nd phase Jun, 2014
- VRV II(R22) → VRV Q 128HP

Background

Due to equipment for laboratories, temperature requirements and stability were demanding.
Partial interior construction was required without stopping experiments.
Flexible construction and phasing further reduced the impact of the replacement.



Zhejiang Province Hangzhou Hospital

PROJECT OUTLINE

- Location: Hangzhou, China
- Renewal: 1st phase Nov, 2013
2nd phase Jun, 2014
- VRV II(R22) → VRV Q 246HP

Background

The original equipment for VIP ward and nursing homes had deteriorated, unable to meet the patient's needs.
By utilizing the time of patients' outdoor activities during the day, the renovation for interior did not disturb them.
Since the effect of replacement was highly valued the hospital will continue to update the rest of its equipment.





The Palace of Westminster

PROJECT OUTLINE

- Location: London, UK
- Renewal: 2012
- VRV Q 3units
- Other manufacturer → DAIKIN
- 17 years in use

NON DAIKIN → DAIKIN



Background

- Up to 50% cost reduction possible when compared with total system replacement by the reuse of existing pipe work.
- Up to 40% reduction of energy consumption possible.
- Fast and effective upgrade was achievable because VRV III-Q was designed to operate at the lower pressures required by existing R22 piping, without compromising high efficiency levels.
- Not only reduces associated CO₂ emissions but also improves energy efficiency by using R410A.

Comment from installer

"VRV III-Q offers a three pipe replacement option, which has the unique ability to reduce operating pressures of R410A down to near those of R22, without loss of performance. The system was flushed, and new refnet joints were fitted into the existing pipework, the new indoor and VRV outdoor units were installed and the system was commissioned. It is anticipated that the new R22 solution will provide in excess of 35% energy savings when compared with the old system, as well as an annual carbon reduction of six tonnes of CO₂.
Mick Langford(All Seasons Climate Control)



Shanghai Qingpu District Library

PROJECT OUTLINE

- Location: Shanghai, China
- Renewal: May, 2014
- VRV II → VRV Q 350HP



Background

The outdoor unit placed by the waterfront was facing serious aging. Construction during the night enabled the replacement for a library of 365-day year-round operation without closing. There was no effect on daily business.

