

# CITY MULTI Case Study

**HOTELS**

**OFFICES**

**SCHOOLS**

**LEISURE FACILITIES**

**HOSPITAL & HEALTHCARE FACILITIES**

**CULTURAL FACILITIES**





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## Unsurpassed air conditioning from Mitsubishi Electric

In today's competitive world, it can be difficult to detect differences between products. Yet sometimes, these differences can safely remain unseen – because some products just become part of our lives and beyond comparison. These are the products that satisfy our needs – products that improve life by making it simpler.

At Mitsubishi Electric, we design and manufacture all our products believing that concepts such as technological innovation, inspiration, and comfort, can be translated into a single word: satisfaction.

And this makes one of our most inspiring challenges – building solutions that meet the needs of every client. Discover why a Mitsubishi Electric project is always emblematic.

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## Hotels and Residences

A hotel is measured by its excellence. Mitsubishi Electric air conditioning systems are built not only with excellence in mind but also with the latest in design and technological innovation. Our expertise adds another star to a hotel. We further raise quality by bringing together technology and excellence in the same space. The ease of installation of our products maximizes the aesthetic qualities of the hotel.



### Hotels |

- Japan
- U.S.A.
- Canada
- France
- Spain
- United Kingdom
- Bulgaria

### Residences |

- Australia

01



Ultra  
Low Noise  
Operation



**Installed System**

Total Capacity  
198.9kW, 678,600BTU

**Outdoor unit**

Air-cooled Y system  
Air-cooled R2 system



PUHY P140 × 1  
PUHY P160 × 3  
PUHY P224 × 10  
PUHY P280 × 2  
PUHY P335 × 7  
PUHY P400 × 1  
PUHY P450 × 8  
PURY P224 × 1

**Indoor unit**

Ceiling Concealed



PEFY × 223  
Others × 41

**Controller**

Simple Remote Controller



**Daiwa Roynet Hotel,  
Wakayama, Japan**

**The Challenge**

Located in the capital of Wakayama Prefecture, Daiwa Roynet Hotel overlooks the Wakayama castle. In addition to the 221 guest rooms, the hotel has a banquet hall and a restaurant. The hotel required a total air conditioning system that will satisfy guest's needs and offer a pleasant stay.

**The Solution**

To satisfy these demands, Mitsubishi Electric's PEFY indoor units play an important role in providing the guests a comfortable environment. The PEFY ceiling concealed models are designed to be neither seen nor heard but to perform. They are also flexible in design which allows variety of installation adapting to different room layouts. To give the guest their own control of temperature to suit their needs, the guest room air conditioning are switched on with the room key card.



Perfect for  
Deluxe  
Renovation  
Needs



**Installed System**

**Outdoor unit**

Air-cooled R2 system



PURY P72  
PURY P96  
PURY P108

Total 14 units

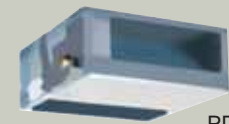
**Indoor unit**

Ceiling Cassette



PMFY

Ceiling Concealed



PDFY



PEFY

Wall mounted



PKFY

Total 135 units

**Controller**

Centralized Controller



G-50A

Centralized Control Software

TG-2000A



**Hotel deLuxe,  
Portland, Oregon, U.S.A.**

**The Challenge**

Each floor carrying a Hollywood theme, Hotel deLuxe has all the luxuries and technologies that would appeal to Portland's business and leisure travelers. The hotel has been seeking comfort to compliment the extremely high standards. One of the most important comforts envisioned was to outfit the deLuxe with a state-of-the-art, advanced cooling and heating solution; however, the 94-year-old hotel building was not designed for air conditioning.

**The Solution**

In 2005, the construction manager put the HVAC contract out for bid. After reviewing proposals from many Portland area firms, the Hotel gave the nod to Mitsubishi Electric. Mitsubishi Electric's CITY MULTI advantage was that this turn-of-the century building was not designed for air conditioning.

Significant savings were realized because CITY MULTI refrigerant piping and electrical wiring requires only a small footprint. No other HVAC competitor could provide the deLuxe installation with such advantages and cost savings. With a single exception, none of the other major names in the industry have a 8, 10, 12HP split system. The one competitor that makes a 8 or 10HP outdoor unit requires three pipes versus CITY MULTI's two pipes, causing the installation costs to approximately double.

Which would have meant that on the deluxe roof, the Hotel would have had to install twice as many outdoor mini-split units requiring an entirely new roof system.





## Pleasant Working Environment



### Installed System

Total Capacity  
28.0kW, 95,500BTU

#### Outdoor unit

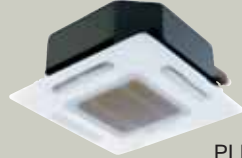
Water-cooled WR2 system



PQRY P250 X 1

#### Indoor unit

##### Ceiling Cassette



PLFY X 1

##### Ceiling Suspended



PCFY X 6

##### Wall mounted



PKFY X 4

#### Controller

##### Centralized Controller

MJ-103MTRA



## Sheraton Gateway Hotel, Toronto International Airport, Canada

### The Challenge

The Sheraton Gateway Hotel is a 4-diamond hotel located in Toronto's Pearson International Airport. The hotel has 474 guest rooms and 24 conference rooms and a variety of other amenities offering guests a comfortable stay after or before a busy day of traveling and meetings.

The facility was heated or cooled using a ducted zone control system; however, there was a problem with air-conditioning in conference rooms. The only way for the building operator to manage this problem using the pre-existing ducted-zoned system was to first heat the conference rooms that require heat while closing the duct dampers for zones that require cooling. Then, the process was reversed by shutting off the airflow to the heated zones, changing the system to cooling. At the end of the day, no one was satisfied with the room conditions.

### The Solution

In order to resolve this problem, the client needed the ability to heat or cool each conference room as and when required. After reviewing several alternatives, the client selected CITY MULTI water-cooled WR2 series system for several reasons. The CITY MULTI WR2 series offers simultaneous heating and cooling capabilities, double heat recovery, centralized and local thermostat control, ease of installation, energy efficiency and not only these but also a low investment cost.



## CITY MULTI takes over Water Chiller System



### Installed System

#### Controller

Centralized Controller



G-50A

Centralized Control software

TG-2000A



## Le Domaine de Lonvilliers, Saint-Martin, France

### The Challenge

St. Martin is the smallest island in the world to be shared by two countries: France and the Netherlands Antilles. Facing the quiet water of Anse Marcel Cove, the hotel "Le Domanie de Lonvilliers" offers a casual and elegant island life. Caressed by the Trade Winds, the isle of Saint-Martin enjoys a mild but often humid climate throughout the year. When this resort was being renovated, the concern was to choose the most efficient air-conditioning system in terms of comfort, energy saving & maintenance, among the new technologies available.

### The Solution

The Domaine de Lonvilliers was equipped with a chilled water air conditioning system, showed signs of deterioration due to the high level of prevailing humidity. Consequently, this 4-star luxury hotel implemented a vast program.

The choice fell naturally on Mitsubishi Electric's CITY MULTI. The chilled water tubes have been replaced by CITY MULTI tubes. The replacement was undertaken without restrictions or additional work. Each building (five buildings and 200 to 300 m apart) now has a G-50A, each unit being linked by optical fiber to a TG-2000A at the welcome desk.





## Key to Flexible Installation



### Installed System

Total Capacity  
356.0kW, 1,214,700BTU

#### Outdoor unit

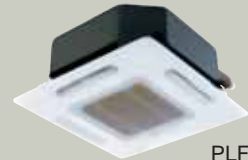
Air-cooled Y system



PUHY P400 × 1  
PUHY P500 × 1  
PUHY P700 × 1  
PUHY P750 × 1  
PUHY P800 × 1

#### Indoor unit

##### Ceiling Cassette



PLFY × 14

##### Ceiling Concealed



PEFY × 185

#### Controller

##### Centralized Controller



G-50A

##### Centralized Control Software TG-2000A



## Hotel Golf Balneario Augas Santas, Panton, Lugo, Spain

### The Challenge

Hotel Golf Balneario Augas Santas is a modern 4-star spa hotel located in the province of Lugo, which has 105 guestrooms distributed over three floors. A spa with therapeutic waters for hydrotherapy and heating therapy and an 18-hole golf course undoubtedly add delight to the guests.

To ensure that the guests spend their time in a comfortable air environment, the hotel manager wanted the quietest possible air-conditioning system for all the spaces in the building.

### The Solution

The project was designed to incorporate Mitsubishi Electric's CITY MULTI system. This choice enabled a flexible design by offering high performance, despite the considerable distances between units. Low profile ducting designed especially for hotels gave an element of flexibility, and with its ideal sound level, CITY MULTI was able to provide all guests a first-class comfort.



## Major Refurbishment Shows off the Flexibility of VRF Air-Conditioning



### Installed System

#### Outdoor unit

Air-cooled Y system



PUHY



## Russell Hotel, London, United Kingdom

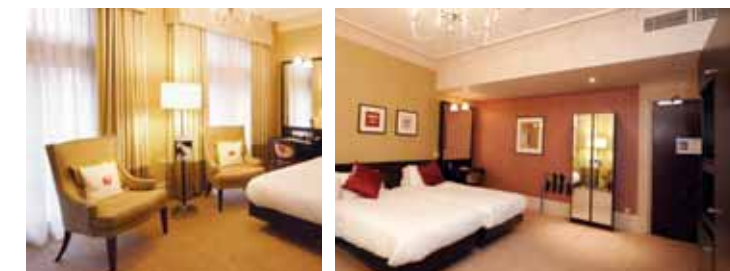
### The Challenge

Few working hotels can afford the luxury of a complete shut down whilst refurbishment work is carried out. In the case of The Russell Hotel careful scheduling and meticulous planning was needed, to ensure that the hotel was still able to function and guests could still book in and enjoy their stay unaware that any building work was taking place. To make the job even more challenging, the hotel is a Grade II listed building, with no room for false floors or ceilings and little room available for pipework, plant or controlling equipment.

### The Solution

The backwards compatibility of our VRF system meant that the contractors were able to link the older models to the new with ease. This flexibility of design ensures that older equipment in a building only needs to be replaced when it has finally reached the end of its productive life.

That is the simplicity of our VRF system, it can be installed in separate stages so that



any project, large or small can be phased in to match building schedules or budgets.



Stylish city hotel benefits from the latest space saving air conditioning



## Zenter Hotel, London, United Kingdom

### The Challenge

To meet the objects of the stylish refurbishment of The Zenter Hotel in the heart of London City, the architects needed an air conditioning system that was energy efficient, sustainable and avoided using the valuable roof space, earmarked for profit-making penthouse suites. A dominant feature of the rooms are the large sash windows, which on the south side of the building, can leave rooms hot as the guests walk in, so it is vital for the air conditioning to cool quickly to a comfortable level.

### The Solution

Mitsubishi Electric's WR2 Water-Cooled VRF system links to the hotel's water loop and offers great efficiency by transferring heating or cooling energy from water pumped from a bore-hole in a lake 130m below ground. This unique 2-pipe system is easily installed and provides simultaneous heating and cooling to cope with varied temperature requirements throughout the hotel.

In addition to using this water to take away excess heat from the air conditioning systems, the Zetter Hotel filters it and offers it to guests in the form of bottled spring water, too!



System Chosen for Uniquely Designed Layout



## Les Fleurs, Sofia, Bulgaria

### The Challenge

Situated in the heart of Sofia, Les Fleures is a new Boutique hotel with a stunning design. The new Les Fleures Hotel has appeared with its floral concept as a result of refurbishment of the building with one of the earliest modern structures in Sofia. It offers 31 non-smoking rooms, each room with its own floral theme. As a result, each room is different from the others in terms of size, form, materials, and colors.

### The Solution

The system chosen for this uniquely designed layout was Mitsubishi Electric's CITY MULTI R2 series for its first and only "2-pipe" simultaneous cooling and heating system. Ensuring personalized comfort and individual climate control adds the joy of staying at a stylish accommodation.



### Installed System

**Outdoor unit**  
Water-cooled WR2 system



**Indoor unit**  
Floor standing



**Controller**  
Centralized Controller



### Installed System

**Total Capacity**  
220.0kW, 750,300BTU

**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Concealed



**Wall mounted**

PKFY × 1

**Controller**  
Centralized Controller



**Others**  
LOSSNAY





# State-of-the-Art Centralized Control



## Installed System

**Outdoor unit**  
Air-cooled R2 system



PURY P250  
PURY P500  
Total 17 units

**Indoor unit**  
Ceiling Concealed



PDFY X 96

**Controller**  
Centralized Controller



G-50A

**Centralized Control Software**  
TG-2000A



## Oaks Horizon, Adelaide, Australia

### The Challenge

As a new development, the opportunity existed to incorporate air conditioning into the Oaks Horizons complex from the very beginning. However, as the apartments were to be individually owned, the challenge was how the operating costs could be fairly distributed to the owners. As this was to be a residential complex, noise was also a major concern, as were simple controls and the ability to get good performance while saving energy.

### The Solution

The best solution for Oaks Horizons was Mitsubishi Electric's CITY MULTI R2 series, combined with the G-50A centralized controller and TG-2000A centralized control software.

Assistant manager at Oaks Horizons described the system as very user friendly, explaining "Using the G-50A controller gives us complete access and control at the hit of a button."

As the apartments are individually owned, the ability to charge based on usage in a fair and equitable way was important.







## Offices

Office spaces have special requirements because they are often open plan. As a result, the inevitable refurbishments in the years ahead must always be taken into account. Air conditioning systems supplied by Mitsubishi Electric play an important role in preserving flexibility, by enabling control to be maintained of the whole building, as well as independent control of floors and spaces. In this way, whatever changes lie ahead, everyone can be guaranteed the right temperature at each moment.



## Commercial Offices |

- Japan
- Spain
- United Kingdom
- Germany
- Singapore
- U.S.A.

## Official Organizations |

- Spain
- United Kingdom

# 02



# CITY MULTI R2 for High-Profile Landmark Tower

02

## Installed System

### Outdoor unit

Air-cooled R2 system



PURY X 353

### Indoor unit

Ceiling Concealed

Total 1,960 units

Packaged Type

Total 2 units

Mr.Slim

Total 3 units

### Controller

Centralized Controller



G-50A



## Nagoya Lucent Tower Nagoya, Japan

### Voice from Ushijima District Redevelopment Union

Central Air-conditioning Systems are commonly used for this size of building; however, to make it possible to run simultaneous cooling or heating operations whenever they are required, even during overtime or on weekends, we chose Mitsubishi Electric's CITY MULTI R2 series. We were worried about where to install the outdoor units; however, great space saving was realized by installing the outdoor units collectively on a balcony on each floor.

We would say it is a must to have an open network for this size of building, therefore, We adopted a BACnet® building network system.

### Outline of Building



Name	: Nagoya Lucent Tower
Site area	: 14,100.54m <sup>2</sup>
Business owner	: Ushijima District Redevelopment Union
Design & supervision	: Nikken Sekkei Ltd.
Constructed by	: TAISEI Corporation
Completed in	: January 2007
Structure	: Steel construction, partly reinforced concrete
Height	: Building height 180m
Number of floors	: 3 floors underground, 40 floors above ground
Application	: Offices, Shops, Parkings
Building area	: 115,200.34m <sup>2</sup>
Air-conditioning system	: Mitsubishi Electric Air-heat source CITY MULTI R2 system
Zoning	: Temperature control 80-150m <sup>2</sup> per unit OA processing units : 2 units per floor Outdoor units : 6-8 units per floor



**Easy installation**  
600mm-square grid ceiling makes it easy to change the position of the partition.

**Comfort**  
Ceiling concealed indoor unit  
To provide high-quality air, pre-filter and high-performance filter (disposable) (NBS 65%) are equipped with all indoor units.

**Source saving**  
Reusable filter frame is used to reduce waste.

**Heat reflection glass**  
The heat load is reduced by reflecting the sunlight entering the room.

**Discreet indoor unit matching the interior décor.**  
Either cooling or heating operation according to each user's individual preferences.

**Energy saving**  
Efficient operation  
Reduction in the amount of electricity

**BC controller**  
The world's first and the only "2-pipe" system. The system does not stop between cooling/heating changeover.

**Comfort + Energy saving**  
Compatible with the Building Management System, BACnet®

**Convenience**  
With the use of G-50, charge calculation for each tenant is possible.

**Error prevention measures can be taken by checking the status of each unit.**

**All the units within a building can be controlled centrally using a personal computer.**

**OA processing package unit**  
The heat load is reduced by collecting the heat exhausted from the room and using it to heat ventilating air entering the room.

**Installed on each floor**  
New HFC refrigerant, zero ozone depletion potential, is used.

**Exhaust air duct for outdoor unit can be concealed in the grille.**

**The outdoor units are installed in the northwest direction to avoid the great heat load generated from the sunlight from the west.**

**High-static pressure outdoor units are installed on the balcony in the northwest or the southwest direction.**

**The simultaneous cooling/heating operation is possible. The energy efficiency is enhanced with the heat recovery operation under cooling/heating mixed operation.**

**■ CITY MULTI R2 COP at heat recovery operation**

Heating ratio (%)	Cooling main (COP)	Both cooling/heating (COP)	Heating main (COP)	Models that do not support simultaneous operation (COP)
0	~4.5	~4.5	~4.5	~4.5
20	~4.5	~5.5	~4.5	~4.5
40	~4.5	~6.5	~4.5	~4.5
60	~4.5	~7.5	~4.5	~4.5
80	~4.5	~6.5	~4.5	~4.5
100	~4.5	~4.5	~4.5	~4.5

BACnet® : NSI/ASHRAE 135-1995. A Data Communication Protocol for Building Automation and Control Networks



# Blending with World-Famous and Architectural Icon

02

## Installed System

Total Capacity  
2878.4kW, 9,817,400BTU

### Outdoor unit

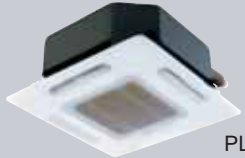
Air-cooled Y system  
Air-cooled R2 system



PUHY P200 × 4  
PURY P200 × 7  
PURY P250 × 94

### Indoor unit

#### Ceiling Cassette



PLFY × 2

#### Ceiling Concealed



PDFY × 787

#### Wall mounted



PKFY × 35

#### Floor standing



PFFY × 4

### Controller

#### Centralized Controller



G-50A

Centralized Control Software  
TG-2000A

B.M.S.(Building Management System)



## Torre Agbar, Barcelona, Spain

### The Challenge

From the moment that Jean Nouvel made his first freehand sketch, the Agbar Tower (Torre Agbar) was destined to become world-famous and an icon for architectural design in Barcelona in the 21st century. However, the tower represented a special challenge for specialists in many different fields of construction and engineering. The air conditioning requirements for such a unique building specified modularity, flexibility, adaptation, and ease of installation.

### The Solution

Mitsubishi Electric, as leader in air conditioning systems, rose to the challenge. The project was planned with two-pipe heat recovery system, thereby considerably reducing the installation costs and connection distances, while offering a combined heating and cooling system. The compact size of the condensation units meant that they could all be fitted comfortably into the three floors intended for the purpose. In addition, the system included an efficient centralised control system that was open in design and enabled users to control the temperature from their workplaces.





# A Cutting Edge Development Programmed to Save Money



## Installed System

**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Concealed



**Controller**  
Centralized Controller



**Centralized Control Software**  
TG-2000A

**Others**  
LOSSNAY



## Birmingham Business Park in Solihull, Birmingham, United Kingdom

### The Challenge

This new state-of-the-art office development is a two-story building. The owners of the building wanted the ability to monitor the energy consumption of individual tenants within the office complex. It was crucial for the relevant landlords within the complex, to be able to provide accurate, tenanted billing.

### The Solution

Each floor of the complex is controlled by our comprehensive G-50A controller linked to the highly advanced, yet user-friendly TG-2000A software system, giving the utmost control and almost limitless functionality.

As well as monitoring energy consumption to ensure accurate billing facility for tenants, the system also boasts the ability to save tenants money by limiting their power consumption throughout the total site.



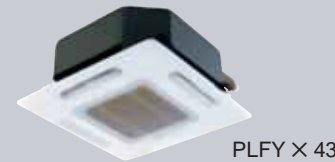
# Unique Building needs its Own Solution



## Installed System

**Outdoor unit**  
Total 4 units

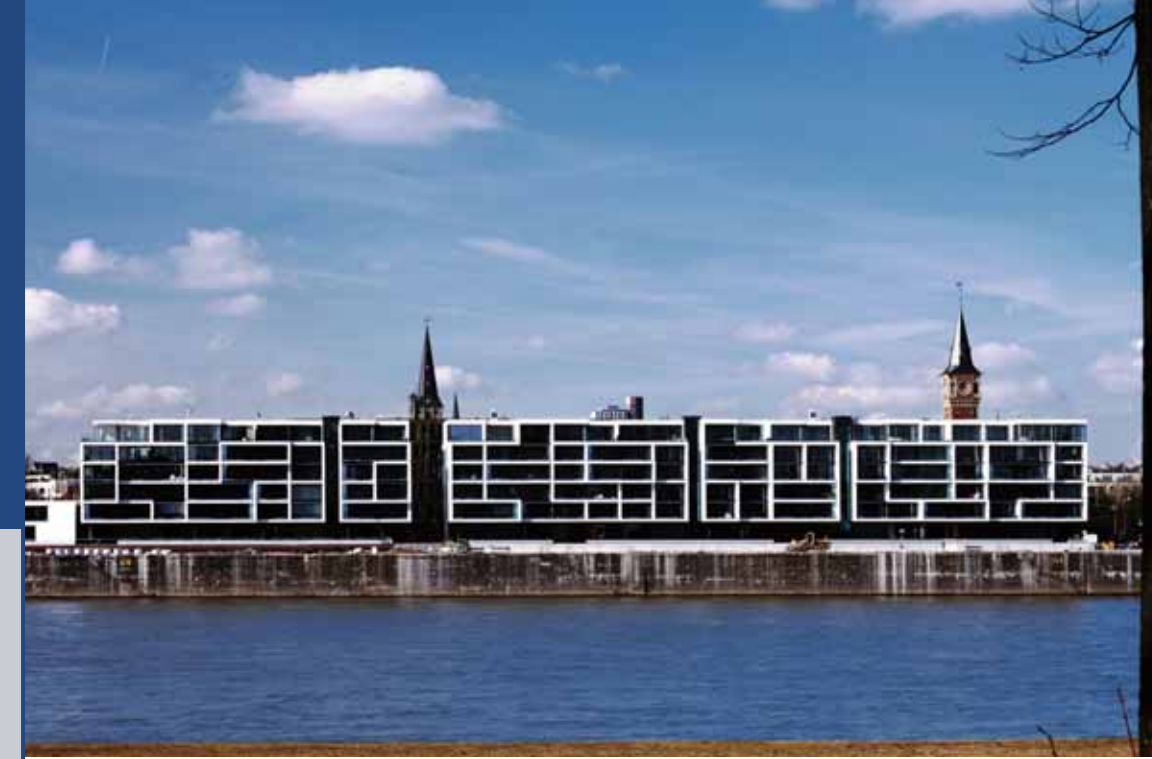
**Indoor unit**  
Ceiling Cassette



**Controller**  
Centralized Controller



**Centralized Control Software**  
TG-2000A



## Rheinauhafen, Cologne, Germany

### The Challenge

In 2005, Architects Oxen + Römer, designed two buildings consisting of forward and rearward jutting cubes that open out completely toward the water through large glass façades. This 170m long building has been used extensively for residential and commercial purposes, shops and offices on the first floor and five floors for residents.

### The Solution

Because the building was designed for an exclusive residential and commercial purpose, a precise control system was needed that would be both easy to install, highly reliable and economical. A side-by-side comparison of the concepts quickly revealed the advantages of the CITY MULTI climate control system. The manufacturer, Mitsubishi Electric, offered sales and technical support to the engineering office planning the project and to the company installing the system.





## Long Piping Length Increases Installation Flexibility



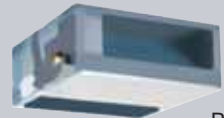
### Installed System

#### Outdoor unit

Total 18 units

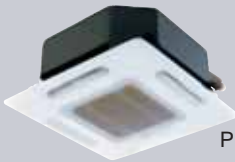
#### Indoor unit

Ceiling Concealed



PDFY X 94

Ceiling Cassette



PLFY X 13

#### Controller

Centralized Controller



G-50A

Centralized Control Software

TG-2000A



## Regent Motors Car Showroom Singapore

### The Challenge

A five-story building owned by Regent Motors, a Singapore Agent for motor vehicle brands of FORD, LAND ROVER, and PEUGEOT, had not only wanted to ensure the highest standards of comfort but also concerned with the installation work and energy consumption. Specifically, for this Motor Vehicle Center for offices and showroom, the main demand was to install an air conditioning system that will provide an efficient air environment with a small number of outdoor units.

### The Solution

The initial design proposed with a R22 VRF system was dismissed because it required about 26 units. In order to reduce the amount of main pipes and units, a CITY MULTI R410A VRF system was proposed. With this, only 18 outdoor units were required meaning 30% reduction was achieved. Resulting in small installation space and cost saving for installers. The CITY MULTI system met the challenges of keeping free space and also ensured capability of providing ample air conditioning.



## Solutions For High Heat Loads



### Installed System

Total Capacity  
58.6kW, 200,000BTU

#### Outdoor unit

Air-cooled Y system



PUHY 100 X 2

#### Indoor unit

Wall mounted



PKFY X 10



## New England Executive Park, Burlington, Massachusetts, U.S.A.

### The Challenge

Built in the early 1980s, 3 New England Executive Park is one of a 13-building master-planned office park.

In spring 2004, Sona Laser Centers, Inc. leased 10,000 square feet on the first floor. A pioneer in the laser hair removal industry, Sona is a franchise operation with centers from coast to coast. Because of unusually high heat loads caused by the personal care laser equipment, the heating and air-conditioning requirements were substantial.

### The Solution

To combat high heat loads, CITY MULTI was the best solution. Because of its ability for ductless installation, its unique, patented INVERTER technology and personalized zone comfort system, which no other manufacturer could supply.

The president of the installation company said, "This equipment is extremely well engineered. To my knowledge, there is no other manufacturer that can touch this technology. What's really impressive is the excellent engineering on the variable speed compressor: it works like clockwork.

What's more, one can hold a normal conversation standing right next to the compressor - the sound levels are that good!"





## Without Disturbing the External Appearance

02



## Clever Use of Water-Cooled System helps Bank to Heat and Cool

02



### Installed System

Total Capacity  
375.2kW, 1,279,800BTU

#### Outdoor unit

Air-cooled Y system



PUHY P200 X 3  
PUHY P250 X 10



PUMY P125 X 2

#### Indoor unit

Ceiling Concealed



PEFY X 35

Floor standing



PFFY X 115

#### Controller

Centralized Controller



G-50A

## Real Casa de Postas, Madrid, Spain

### The Challenge

The major refurbishment of a historical administrative office for a Mayor of Madrid had to be accomplished with maintaining the integrity of the building's classical looks. Therefore, the air conditioning system had to respect the interior decoration and external appearances. An advanced control system was also required to centrally monitor air conditioning usage.

### The Solution

The CITY MULTI matched the request to preserve the character of the building and at the same time provided a perfect solution with the G-50A. It provided the most controllable and comfortable environment with additional failure detection system to guarantee maximum reliability.



### Installed System

#### Outdoor unit

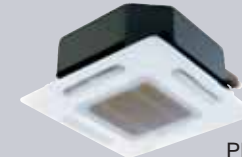
Water-cooled WR2 system



PQRY X 2

#### Indoor unit

Ceiling Cassette



PLFY

Wall mounted



PKFY

Total 15 units

## Halifax Bank of Scotland (HBOS) London Mayfair Branch, London, United Kingdom

### The Challenge

When the Halifax Bank of Scotland (HBOS) refurbished its London Mayfair branch, the new air conditioning system had to be taken into consideration. Due to the strict planning regulations in this area, visual and noise restrictions proved the main challenge when designing the air conditioning system. The main constraint was that no condensers were allowed to be sited on the outside of the building.

In addition to the design challenges, the installation had to be critically managed too. As the busy bank had to stay open throughout the whole refurbishment period, all installation work had to be carried out in the evenings and at weekends, which, in turn, presented its own problems with the need for noise levels to be kept to a minimum.

### The Solution

The ideal solution for this application by far was deemed to be Mitsubishi Electric's unique WR2 heat recovery condensers.

By connecting our highly efficient condensers to the landlords water circuit via a heat exchanger, we were able to provide effective simultaneous heating and cooling throughout the branch without the need to site any equipment outside.

The bank now has two Mitsubishi Electric WR2 systems conveniently sited in the basement plant room of this London building, which are connected to 15 indoor units, both cassettes and wall-mounted, to ensure comfort throughout the building. Use of the unique water-cooled system overcame the challenge presented by not being able to site units on the outside of the building.







## Schools

Learning means improving every day. At Mitsubishi Electric we learn every day. For this reason, our products offer the best solutions for schools. For every type of schools we have an air conditioning system that offers clean, fresh air every moment of the day.



Schools |  
U.S.A.  
Austria  
Spain

03



# A Comfortable Learning Environment



## Installed System

Total Capacity  
58.6kW, 200,000BTU

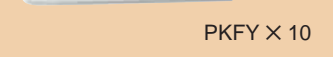
**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Concealed



**Wall mounted**



## Emory University, Atlanta, U.S.A

### The Challenge

In 2003, the Emory's manager of HVAC operations and refrigerant compliance, Lawrence Kicak, needed to replace the 30-year-old, antiquated, 2-pipe hot water and chiller system on the ground floor.

He was searching for a ductless HVAC system that could provide simultaneous cooling and heating to 20 different classrooms and offices; a system that would have the flexibility to give the occupants individual controls to their environment; a system that was quiet, efficient - one that would ease his energy bills; and finally, a system that could handle his humidity and IAQ (indoor air quality) concerns.

### The Solution

There was only one system in the world that could stand up to these challenging demands - the CITY MULTI R2 series.

"This system is fantastic," Emory's manager said. "Teachers love the individual zone control. There is almost no noise, and with virtually zero pollutants and reduced humidity, our indoor air quality is greatly improved." a representative from a manufacturer exclaimed, "the installation was flawless, with minimum interruption to the teachers and students. There has not been one system-related service call in 18 months!"



# Internet Control Air Conditioning



## Installed System

Total Capacity  
507.0kW, 1,729,900BTU

**Outdoor unit**  
Air-cooled Y system



**Indoor unit**  
Ceiling Cassette



**Ceiling Concealed**



**Wall mounted**



**Ceiling Suspended**



**Controller**  
Centralized Controller



## Brisbane Girls Grammar School, Brisbane, Australia

### The Challenge

Brisbane Girls Grammar was built in 1875, moved to its present site in 1883. It has grown from just one to 10 buildings and today has over 1100 pupils. The original school building is heritage listed.

The actual requirement was a central control system that still offered individual control to the classrooms but connected to a PC where the school's facility manager could monitor and control the system.

### The Solution

The CITY MULTI series and G-50A central controller was selected for the school. It suited each classroom giving control in accordance with how much cooling or heating is required. The zoning of the system is very important for energy efficiency especially in schools because a classroom may be totally empty one minute and full of students the next. With a central controller like G-50A, it is simple to operate with a range of functions that are effective for energy monitoring, demand control and provides yearly scheduling.

The system has met the School's expectations from day one, and the installation went smoothly and there were no real challenges. They were installed over four weeks during the mid-year break in June/July last year. The units in the classrooms were installed over the school holidays to ensure the least disruption to teaching with much



of the roof preparation being carried out during the school term.





**Tight  
Deadline -  
not more than  
two months**



**Installed System**

**Total Capacity**  
382.5kW, 1,305,000BTU

**Outdoor unit**

Air-cooled Y system



PUHY P250 × 1  
PUHY P350 × 1  
PUHY P450 × 1  
PUHY P500 × 1  
PUHY P550 × 1  
PUY P250 × 4  
PUY P300 × 1

**Indoor unit**

**Ceiling Cassette**



PLFY × 8



PMFY × 5

**Ceiling Concealed**



PEFY × 30

**Wall mounted**



PKFY × 25

**Floor standing**



PFFY × 15

**Control**

**Centralized controller**



G-50A

**Others**

**LOSSNAY**



LGH × 7



**Universidad de Vigo,  
Vigo, Spain**

**The Challenge**

The University of Vigo needed a complete air-conditioning installation finished in little more than two months. The system had to be installed and operating before the university summer vacation finished.

**The Solution**

To meet the tight deadline imposed by the university, it was decided to present a project based on the installation of CITY MULTI as they did not require additional elements such as pumps, tanks, and valves. The only elements required were refrigerant connections a drainage network, and lines for transmission and power. This simplicity of installation results in a quicker start-up and more reliable maintenance, which was the key factor when the contract was awarded to Mitsubishi Electric.



**Meeting the  
Diversified  
Energy Needs**



**Installed System**

**Total Capacity**  
411kW, 1,402,100BTU

**Outdoor unit**

Air-cooled Y system  
Air-cooled R2 system



PUHY P250 × 4  
PUHY P300 × 2  
PUHY P350 × 2  
PUHY P400 × 2  
PUY P350 × 1

**Packaged Type**



PUHZ RP250 × 1

**Indoor unit**

**Ceiling Cassette**



PLFY × 12

**Ceiling Concealed**



PEFY × 15



PEH × 1

**Wall mounted**



PKFY × 14

**Ceiling Suspended**



PCFY × 3



**Escuela Superior d'  
Hosteleria de Barcelona,  
Barcelona, Spain**

**The Challenge**

The Barcelona School of Hotel Management required various installations: including kitchens, lecture rooms, receptions, and meeting rooms. The installation project had to respond to the differing energy needs of each spaces.

**The Solution**

CITY MULTI was chosen for this challenge. Taking into account the diversity of usage and occupancy, CITY MULTI was the best solution for the challenge. With its zoning advantage, zones can be added, changed, or removed later, depending on requirements. Therefore, there are no energy wastes resulting savings in operating costs and an increase in profitability.





# Comfort for Wilcox Elementary School

03

## Installed System

**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Concealed



**Control**  
Simple remote controller



**Centralized controller**



## Wilcox Elementary School, Portland, Oregon, U.S.A

### The Challenge

In fall 2004, Pam Brown, Portland Public Schools (PPS) director for facility maintenance and asset management, contacted a special projects manager for American Heating, Portland, Ore, in regards to mounting maintenance issues with an aging 45-year-old boiler/radiant heat system.

Wilcox teachers and specialists identified ways PPS could provide a better learning environment one of which was a first-time request for air conditioning.

### The Solution

As an 39-year HVAC expert, the manager especially enjoyed the challenge of finding solutions for older buildings and outdated HVAC systems.

"CITY MULTI's ability to simultaneously cool and heat is an ideal solution for Wilcox," he notes. "The teachers and specialists in this building are independent-each desiring control of his/her own room temperature. Another special concern was the need for a quiet teaching environment. Once again, CITY MULTI gave the optimal solution. CITY MULTI's indoor units are quiet enough to be placed directly under windows. He laughed and added, "When we were showing the teachers how the outdoor units operate they had to actually place their hands on the units to determine which ones were running."

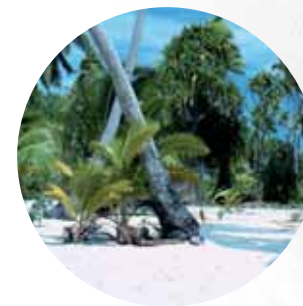






## Leisure Facilities

CITY MULTI systems incorporate the latest technological advances so that an optimum and intelligently controlled environment can be obtained in any type of space. Leisure facilities are not the exception. Mitsubishi Electric systems are versatile and offer the most advanced control on the market providing the maximum comfort for everyday life.



## Leisure Facilities |

U.S.A.  
Bahrain  
France

# 04



# Historic Building Finds HVAC Solution



# Combination with a Building Management System



## Installed System

Total Capacity  
205.1kW, 700,000BTU

### Outdoor unit

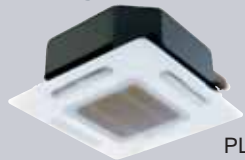
Air-cooled R2 system



PURY 100 X 7

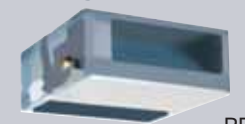
### Indoor unit

#### Ceiling Cassette



PLFY X 9

#### Ceiling Concealed



PDFY X 13

#### Wall mounted



PKFY X 10

## Vento Trattoria Restaurant, New York, U.S.A.

### The Challenge

Built in the 1880s as a meatpacking plant, the triangular building had a long, colorful history before being purchased by the B.R. Guest Company, New York, in 2003 for the site of their newest Italian restaurant.

With a tough, unique, triangular foot print, thick walls, absolutely no space for mechanical equipment and piping over three stories, and no room on the roof for the outdoor compressor units, the building required a tough, challenging installation design demands.

### The Solution

The largest challenge was how to camouflage the outdoor units to comply with the zoning limits. Seven outdoor units were installed on the steel plate of a large outdoor billboard occupying the entire roof. The refrigerant piping and wiring were run down an old chimney flue reaching all floors.

Lacking a solution to cool and heat a unique triangular building, CITY MULTI was called on to meet the requirements to provide restaurant guests with a comfortable dining environment.



## Installed System

Total Capacity  
192.4kW, 656,400BTU

### Outdoor unit

Air-cooled Y system



PUHY 200 X 1  
PUHY 500 X 1  
PUHY P400 X 1  
PUHY P600 X 1

## Formula-1 Bahrain International Circuit, Bahrain

### The Challenge

Formula-1 is the first international circuit in the Arabian Peninsula in Bahrain. Not only is it a home ground for motor sports, it is designed to operate for various motor sports, corporate, social and community events throughout the year.

### The Solution

CITY MULTI was selected for this world's premier motor sport facility. The CITY MULTI series takes advantage of inverter technology; capable of providing precise amount of cooling and heating to each block in Formula-1. Furthermore, wide line-up of indoor units was connected with a flexible piping system configuring for wide range of applications.





# CITY MULTI Clears Up All Problems

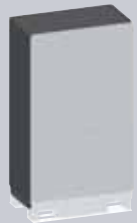


## Installed System

Total Capacity  
112.0kW, 382,000BTU

Outdoor unit

Water-cooled WY system



PQHY 250 X 4



## Relais Château Eden Rock, St Barth, France

### The Challenge

The prestigious Eden Rock on St-Barth is located on a listed rocky headland washed by a warm, turquoise sea. It's a wonderful setting for its young chef, Jean-Claude Dufour, who prepares his dishes in several air conditioned kitchens.

On this island, demand for electricity is high. Electricity production cannot always cope with high fluctuations in consumption, so a solution had to be found to optimize the consumption of electricity needed to produce hot water for the kitchens.

### The Solution

The condensation unit of the air conditioner allows the domestic hot water to be preheated from 20°C to 40-45°C (68°F to 104-113°F). Furthermore, the energy saving is optimal because the Inverter compressors supplied by Mitsubishi Electric consume up to 8 times less current than a standard compressor at start-up.



# Flawless Performance Delivers a Standing Ovation



## Installed System

Total Capacity  
58.6kW, 200,000BTU

Outdoor unit

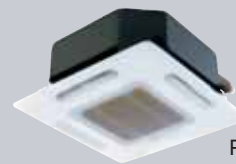
Air-cooled R2 system



PURY 100 X 2

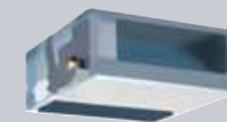
### Indoor unit

#### Ceiling Cassette



PLFY X 6

#### Ceiling Concealed



PDFY X 1

#### Wall mounted



PKFY X 8

### Control

#### Centralized Controller



G-50A



## Ephrata Playhouse, Ephrata, Pennsylvania, U.S.A.

### The Challenge

Located in the heart of Pennsylvania's Amish Country, the Ephrata Playhouse in the Park is a remodeled historic barn. Known for its superior entertainment, the historic pavilion had an unfortunate reputation for inadequate indoor comfort levels.

Especially for the lobby and 450-square-meter (5,000-square-foot) lower level of the barn, where it was divided into small rooms presenting a further challenge and it was apparent that the different requirements of each room demanded variable loads; running ductwork was totally impractical because of the old barn support beams; that quiet operation was essential; and that flexibility was paramount to make this installation a success.

### The Solution

CITY MULTI R2 series was selected for this project, because of its ability to simultaneously cool and heat independent spaces, quiet operation and individualized climate control capabilities. Without question, the system ideally suited for maintaining the integrity of old buildings, it is a masterful employment of 21<sup>st</sup> century advanced technology that quietly delivers a high degree of comfort.







## Hospital & Healthcare Facilities

A hospital should be a center for health and rest – as well as comfort, well-being, and silence. At Mitsubishi Electric we create solutions for the needs of every hospital and medical centre. Solutions that incorporate the latest technology and guarantee efficiency and quality: together with reduced installation and energy costs.



## Hospital & Healthcare Facilities

U.S.A.  
Germany  
Spain

# 05



# Comfort Solution for RMH Patients

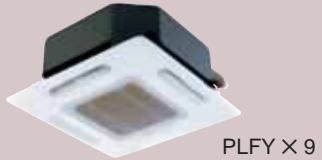
05

## Installed System

**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Cassette



**Controller**  
Local Remote Controller



**Simple remote controller**



**Centralized Controller**



G-50A



## Ronald McDonald House, New Haven, Connecticut, U.S.A.

### The Challenge

Today, the RMH host 12 guest rooms where families can stay at no cost if unable to pay, or reside for a modest sum while a child is being treated at a nearby health facility.

By the year 2000, complaints began to surface regarding inadequate ventilation and temperature. Compounding the HVAC dilemma were the issues experienced by children with special medical conditions and those undergoing radiation treatments. There were constant complaints from the guests about the temperature being either too hot or too cold. The air-conditioning system was impossible to regulate.

### The Solution

The RMH chose to install CITY MULTI R2 series to provide individual room control, effective energy usage, cost savings and improved Indoor Air Quality (IAQ).

The CITY MULTI R2 series uses INVERTER-driven compressor technology to provide highly responsive cooling and heating performance. By responding to indoor and outdoor temperature fluctuations, the system varies power consumption by adjusting the compressor speed to optimize energy usage.

The systems have performed flawlessly, and there has not been a single complaint.



# Significantly Lower Installation Cost

05

## Installed System

**Outdoor unit**  
Air-cooled R2 system



**Indoor unit**  
Ceiling Concealed



**Controller**  
Local Remote Controller



**Others**  
LOSSNAY



## St. Anna Klinikum, Sulzbach-Rosenberg, Germany

### The Challenge

The St. Anna Clinic with its philosophy, "The caring hospital with competence", expanded its facilities last year to include a computer tomography practice rented to a specialist. For accounting reasons, the existing system could not be expanded for the new tenant without incurring significant expense. For that reason, the decision was taken to purchase an additional system that would be used to cool and heat both the MRI examination room and the treatment rooms. The temperature in the control room also had to be maintained year-round without major fluctuations (max. 24°C to min. 22°C). In addition to climate control, all of the rooms had to be ventilated with fresh air in a way that efficiently recovered heat.

### The Solution

State-of-the-art Mitsubishi Electric air conditioning control technology was installed in order to fit this tall order while at the same time creating a comfortable atmosphere for the patients. The costs even ended up being significantly lower than the version originally planned. Furthermore, the CITY MULTI R2 series perfectly met the clinic's requirements. The biggest selling point of the simultaneous system is that the heat energy is recovered from one space and sent to another resulting in no energy waste and is highly economical for users.





## Ideal Level of Comfort for Each Area



### Installed System

Total Capacity  
551.4kW, 3,277,900BTU

#### Outdoor unit

Air-cooled Y system  
Air-cooled R2 system



PUHY P200 × 5  
PUHY P250 × 9  
PURY P200 × 2  
PUH P4 × 1  
PUH P5 × 1  
PUH P6 × 5  
PUH P8 × 1  
PUY P3 × 1

#### Indoor unit

##### Ceiling Cassette



PLFY × 86

##### Ceiling Concealed



PEFY × 85



PEH × 82

PEAD × 12

##### Wall mounted



PKFY × 83

#### Controller

##### Centralized Controller



G-50A

##### Centralized Control Software

TG-2000A



## Clínica Sagrada Família, Barcelona, Spain

### The Challenge

The surgery office building of the Sagrada Familia Clinic contains a number of medical consulting rooms with varied opening hours. The objective of the project was to install a system to optimise consumption while satisfying the individual air conditioning requirements of each medical office.

### The Solution

Mitsubishi Electric's CITY MULTI was selected for the project. Its modularity and ability to localise consumption means that the surgery offices are only serviced when they are in use. Additionally, the independent operation of the indoor units means that each office can set its own ideal level of comfort.



## CITY MULTI: The Perfect Solution



### Installed System

Total Capacity  
58.6kW, 200,000BTU

#### Outdoor unit

Air-cooled R2 system



PURY 100 × 2

#### Indoor unit

##### Ceiling Concealed



PDFY × 14  
Others × 15



## Brentwood, Rice Lake, Wisconsin, U.S.A.

### The Challenge

Opened in January 2004, Brentwood is a 35, 100-square-foot, 29 indoor unit residential care apartment complex located in Rice Lake, Wisconsin. It may be the only assisted living facility in the state with a concrete storm shelter which also served as the facility chapel.

For this long-term facility, a "sophisticated", "smart", and "intelligent" air-conditioning system was a must to provide each guest an ideal comfort.

### The Solution

CITY MULTI R2 series was introduced. The system was a perfect solution for Brentwood to provide the exact amount of cooling or heating required for each 29 indoor units varying the compressors speed in the outdoor units. The system also provided "whisper-quiet" personalized comfort controls in each room. The LCD (liquid crystal display) remote control for each unit was considerably cost saving and benefits in giving guests their very own climate control.







## Cultural Facilities

At Mitsubishi Electric we strive to install our equipment with the minimum possible intrusion. This objective can present a real challenge in historic buildings. We find the specific solutions for each building to ensure that our installations remain hidden from view, because we understand the importance of protecting our national heritage. Music and art enjoyed in comfort with Mitsubishi air conditioning.



Cultural Facilities |  
Canada  
Spain  
U.S.A.

06



# Ultra-quiet Operation Suitable for Church

06

## Installed System

Total Capacity  
89.6kW, 305,600BTU

### Outdoor unit

Air-cooled Y system



PUY 200 X 4

### Indoor unit

Wall mounted



PKFY X 8

### Controller

Group Remote Controller



Schedule Timer



## St. Luke's Roman Catholic Church, Quebec, Canada

### The Challenge

St. Luke's Roman Catholic Church is located in Hamilton, Ontario and has a parish community of over 1,600 families who use the church for daily Mass, weddings and a variety of social functions.

St. Luke's needed a cooling system which was extremely quiet, economical to operate and reliable. The church contracted P.T. Engineering of Hamilton, Ontario to find a solution for this unique project.

### The Solution

P.T. Engineering selected CITY MULTI series for a number of reasons. The inverter compressor ensured fast cool down times compared to conventional systems. It also features staggered soft-start and is designed to adapt to different air-conditioning loads depending on the number of people in the building. More over, the installation of the ductless PKFY wall mounted indoor units are quick and easy and the ultra-quiet operation satisfied one of the most important requirements for this project.



# Preserving the Building's Beautiful Exterior

06

## Installed System

Total Capacity  
217.9kW, 1,130,900BTU

### Outdoor unit

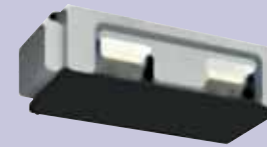
Air-cooled Y system  
Air-cooled R2 system



PURY P200 X 2  
PURY P250 X 1  
PURY P350 X 1  
PUH P6 X 2  
PUH P8 X 2  
PUH P10 X 4  
PU P4 X 2  
PU P1.6 X 1

### Indoor unit

Ceiling Concealed



PEH X 3  
PEAD X 1

Floor standing



PFFY X 46

### Controller

Centralized Controller



G-50A



## Palau Català Valeriola, Valencia, Spain

### The Challenge

The Català Valeriola Palace is an historic building and any alteration must be minimal. To achieve this, any air conditioning system must result in the least possible impact on the building structure and appearance.

### The Solution

Mitsubishi Electric was chosen having had proposed an interesting and innovative installation. The outdoor units were installed on the rooftop to preserve the building's aesthetically pleasing appearance. Moreover, floor standing indoor units with a sophisticated design were selected to match the interior décor.





## Pre-sale and Post-sale Consultancy Service

06



## Palau de la Música Catalana, Barcelona, Spain

### The Challenge

The Palace of Catalan Music is one of the most famous buildings in the city of Barcelona and was declared a UNESCO World Heritage Site in 1987. The project was a major challenge, as every detail of the building had to be carefully studied to avoid altering its appearance.

### The Solution

The project was an opportunity for Mitsubishi Electric to demonstrate its accumulated skill and experience in technically challenging projects. Indeed, the key to winning the tender for this prestigious project was Mitsubishi Electric's dedicated engineering team that offered an extensive pre-sale and post-sale consultancy service.



## Comfort with a Tight Budget

06



## Doylestown Presbyterian Church, Doylestown, Pennsylvania, U.S.A.

### The Challenge

The Doylestown Church was built in 1872 and currently houses a congregation of 2,000 members who are served by two pastors.

The intended chilled-water, air-conditioning project was sent out to 10 contractors who received walk-through tours and were asked to bid. Eight out of the 10 declined to submit a proposal for the installation. They called the project too difficult, citing the building's age, stonework and lack of equipment access as issues too large to overcome. Additionally, the church's limited budget posed another problem, as it operates on a not-for-profit basis.

### The Solution

Two contractors did answer the call, and CITY MULTI was chosen over the competitor's bid because it presented the most creative cooling alternative that would meet the financial, logistical and comfort requirements of the church. The use of CITY MULTI also satisfied a desire for energy-effective operation, another key issue for the church, given its limited operating budget.

What's more, CITY MULTI helped the church keep heating costs down in the winter, thanks to its ability to simultaneously cool and heat.



### Installed System

Total Capacity  
190.8kW, 650,900BTU

#### Outdoor unit

Air-cooled Y system



PUHY P200 × 2  
PUHY P400 × 2  
PUHY P500 × 1

#### Indoor unit

Ceiling Concealed



PEFY × 31

#### Controller

Centralized Controller

MB-300

### Installed System

#### Outdoor unit

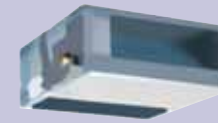
Air-cooled R2 system



PURY × 1

#### Indoor unit

Ceiling Concealed



PDFY × 5

Wall mounted



PKFY × 8

#### Controller

Centralized Controller



G-50A



MEMO

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MEMO

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MEMO

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FM33568 / ISO 9001;2000

The Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of Quality management for the production of refrigeration and air conditioning equipment.

**ISO Authorization System**

The ISO 9000 series is a plant authorization system relating to quality management as stipulated by the ISO. ISO 9001 certifies quality management based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.



EC97J1227

The Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

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