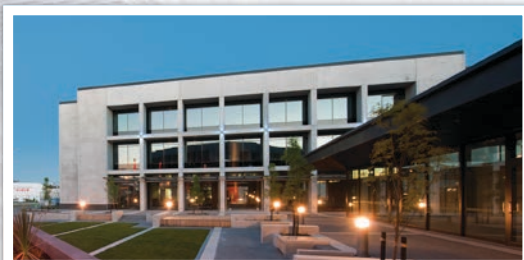
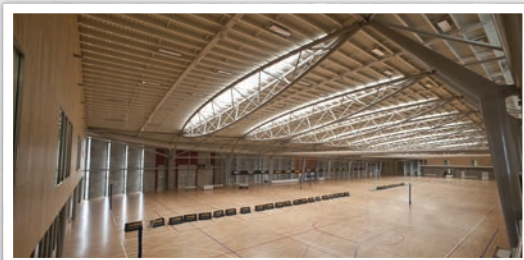


# CITY MULTI

New Zealand Showcase





Mitsubishi has been a trusted name for many years. Founded in 1921, the company known today as Mitsubishi Electric quickly rose to the forefront of the air conditioning industry - a position still enjoyed today. Mitsubishi Electric takes pride in offering some of the most energy efficient systems available in the market.

Known for exceeding the expectations of today's market, Mitsubishi Electric invests 4% of global turnover in product design and development. Ensuring that the air conditioning systems produced are the most advanced and efficient products available.

Mitsubishi Electric is dedicated to creating superior technologies while having as little impact on the environment as possible. The company is the only air conditioning manufacturer recognised in the top five companies in the world for their sustainable environmental policy. The policies and practices meet the demanding requirements of Portfolio 21; a US mutual investments fund that invests only in companies with an explicit commitment to sustainable business practices.

This constant investment in product development enables Mitsubishi Electric to produce the most efficient equipment possible, whilst helping to protect the environment at the same time.



BDT is the exclusive distributor of Mitsubishi Electric in New Zealand, celebrating 30 years of partnership in 2011.

Founded in 1981 by Ron Woodrow, Black Diamond Technologies Limited (formerly Melco New Zealand) is a leader in the New Zealand air conditioning market, both residentially and commercially. Close factory relationships established over three decades ensure that we are able to influence design to tailor products specifically to the New Zealand market.

BDT is 100% New Zealand owned and is committed to supplying New Zealand consumers and businesses with superior, energy efficient technologies.

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# Commercial Air Conditioning | CITY MULTI

*Mitsubishi Electric's industry leading City Multi VRF technology is designed for today's building needs. With emphasis placed on energy efficiency, adaptability, reliability and control, City Multi addresses the most current market issues. Utilising integrated air conditioning, hot water, ventilation and control solutions City Multi is the benchmark in VRF technology.*

## Heat Interchange Circuit

The unique Heat Interchange Circuit (HIC) enhances efficiency by providing additional sub-cooling. This allows the expansion device to effectively control the refrigerant distribution. This increases the operating efficiency and reduces the volume of refrigerant in each system.

## Intelligent Power Module (IPM) Technology

Mitsubishi Electric's YJM-A range provides precise control of energy input, through its Intelligent Power Module (IPM) technology. Using this technology it is possible to closely match the building requirements, achieving more accurate control of the occupied space. Using incremental 1Hz steps of capacity control, the amount of power input required is significantly reduced, resulting in greatly improved COP's.

IPM technology ensures effective performance under partial load conditions, a condition that most systems will be in for the majority of their normal working life. By taking account of the efficiency at both part load and peak load conditions, R410A City Multi is designed to provide unbeatable year-round efficiency.

## More efficient refrigerant

Governments in many countries are enforcing a ban of HCFC-based refrigerants for new installations. The most popular choice for chillers, R22, an HCFC-based refrigerant, has been targeted by the Montreal Protocol to be phased out in new equipment. Because of these restrictions, R410A (a blend of HFCs, which do not deplete the ozone) refrigerants are desirable.

R410A is a more efficient refrigerant as it has a higher specific heat capacity when compared to R407C or R22. This higher energy carrying capacity allows for smaller pipe sizes, longer pipe runs and reduces the volume of refrigerant within a system. This is a major factor for safety and environmental requirements in the design, manufacture, installation, operation, maintenance and disposal of refrigerating systems.

## Water-Cooled - Unique to Mitsubishi Electric

Combining the features of VRF and a water circuit using CITY MULTI WR2/WY, heat is rejected to a water source rather than to the outside air. The advantage of water cooled systems is that the water can be delivered at optimised temperatures and volumes, which allows even greater flexibility and increased COP.

## WR2 (Heat Recovery)

Mitsubishi Electric now offers double heat recovery operation. The first heat recovery is within the refrigerant system, where simultaneous cooling and heating operation is available with heat recovery performed between indoor units.

The second is within the water loop, where heat recovery is performed between the PQRY units. This double heat recovery operation substantially improves energy efficiency and makes the system the ideal solution for modern office buildings, where areas require cooling even in winter.

## Inverter driven technology

Striving to continually meet the increasing demands of our customers, Mitsubishi Electric was the first in the industry to offer inverter-driven systems. Using inverter technology, systems produce precise output, matching exact requirements of any building. Working efficiently to ensure no valuable energy is wasted by over-heating or over-cooling; greatly reducing running costs.

## Increased COP Performance

COP or "Coefficient of Performance" is a measure of the useful energy a system can deliver compared to the energy it consumes. It is calculated by dividing the energy output by the energy input of a system. The higher the figure, the more efficient the system is deemed to be. Mitsubishi Electric VRF models, the world's highest energy-efficient air conditioners, will undoubtedly reduce millions of tons of CO<sub>2</sub> emissions.

Not only does Mitsubishi Electric provide some of the most efficient R2 series, simultaneous heating and cooling systems on the market, they have developed a high COP range of condensers as well. The PURY-EP range of condensers (available in eleven sizes) has a full load COP of 4.1 in cooling and 4.3 in heating.

If your client is after the highest efficiency possible for their project, then look no further than the Mitsubishi Electric high COP, EP series of air conditioning.



# The world's only two-pipe system

Mitsubishi Electric City Multi VRF (variable refrigerant flow) is the cutting edge in commercial air-conditioning technology – the only two-pipe simultaneous heating and cooling system in the world. Proven in the field under rigorous conditions, two-pipe technology is not only cheaper to install, but is durable, reliable, energy efficient and provides superior levels of control accuracy.

## Benefits of Two Pipe VRF

### 1. Less Pipe Connections

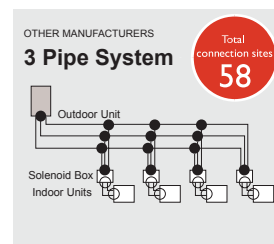
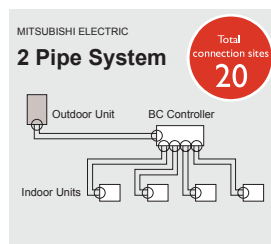
On a City Multi R2 Series VRF with four indoor unit system, there are 20 refrigerant joints, compared to an equivalent three-pipe system with 58 connections. Each extra joint requires extra labour, materials and time. Copper prices have risen significantly and less copper pipe means much less capital cost for equivalent projects. This makes City Multi R2 a significantly cheaper product to install. There are also no expensive proprietary branch fittings required. Fewer pipe connection sites also mean less potential leak sites.

### 2. No-Oil Recovery Cycle

Unlike three-pipe systems, R2 systems do not require regular oil recovery cycles. With less refrigerant volumes and velocities during mode change over, oil recovery is minimized. This prevents zone-temperature drift during recovery cycles and improves energy efficiency and control accuracy.

### 3. Tight Dead Band Control

Two-pipe architecture allows for quick, individual changeover of indoor units from heating to cooling. Due to the unique engineering of the BC (branch control) box, +/- 1°C of set point is possible with +/- 1.5°C dictating changeover mode.



○ = 2 sites    ● = 3 sites

### 4. Heat Recovery in the BC Box

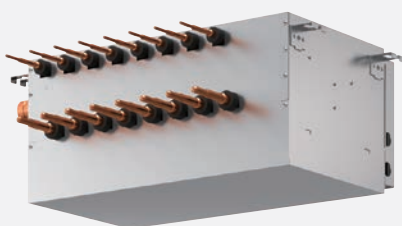
Heat recovery between indoor units is carried out in the BC boxes. This allows pinch technology (heat integration) energy recovery to be diverted, reducing pipe transmission losses. Heat is redirected in the valve blocks, directly to the branch that requires it, reducing overall running costs and lifting operational COP's.

### 5. Less Electrical Connection Sites

Two-pipe VRF has significantly less electrical termination points than equivalent three-pipe systems. This reduces complexity of the initial wiring process and simplifies fault finding; reducing installation cost, time and materials. Fewer components in the system mean less plant to potentially fail in the future.

### 6. Flexibility for Future Alterations

Two-pipe architecture makes future proofing and servicing of the VRF system simpler, reducing through-life costing. Alterations and additions to individual branches are made easy by installing branch ball valves at the time of installation. This allows individual branches to be worked on while the rest of the system is still in service. All BC connections are brazed, reducing further possible leakage sites. Future additions to the system can be engineered and added while the system is still in operation.



## How do City Multi systems work with only two pipes?

The secret of City Multi Heat Recovery Systems lies in the BC Controller. The BC Controller houses a liquid/gas separator, allowing the outdoor unit to deliver a mixture (2 phase) of hot gas for heating and liquid for cooling, all through the same pipe. Three-pipe systems allocate a pipe to each of these phases. When this mixture arrives at the BC Controller, it is separated and the correct phase delivered to each indoor unit depending on the individual requirement of either heating or cooling.

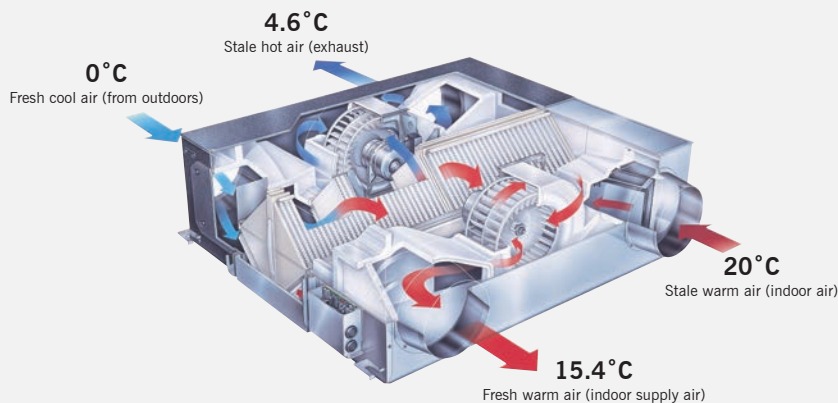
## Lossnay - Fresh air without wasting heat

*Fresh, clean air is an essential ingredient in any climate control system. Good ventilation ensures that the air inside a building is constantly replaced with fresh air from outside. Usually, the outside air is warmer or cooler than the air inside the building. Circulating fresh air through a building can significantly increase the air conditioning system's energy consumption.*

Providing adequate ventilation to buildings has traditionally compromised heat levels. Mitsubishi Electric's Lossnay unit resolves this issue by transferring heat from stale exhaust air to fresh incoming air. Inside the Lossnay, a heat exchanger transfers heat between the inlet and exhaust ducts, recovering up to 84% of the heat energy from the exhaust air.

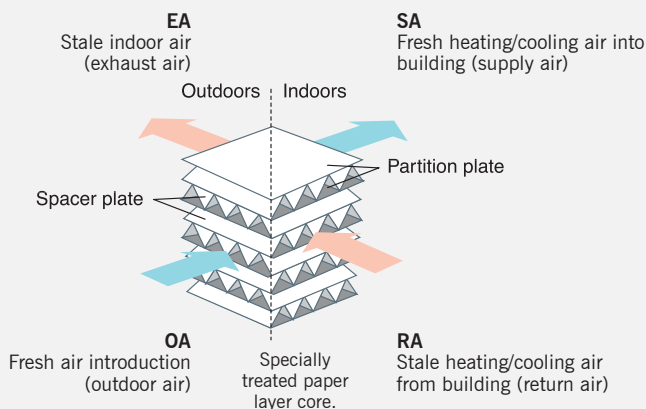
For more information on Lossnay go online to [www.mitsubishi-electric.co.nz/citymulti](http://www.mitsubishi-electric.co.nz/citymulti)

### How Lossnay fresh air energy recovery works

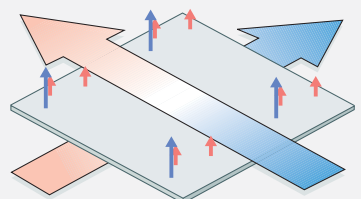


*In this example the energy efficient Lossnay system provides an indoor temperature of 15.4°C, the air conditioning system only needs to raise the temperature by 4.6°C, rather than working to provide the full 20°C.*

### Two paths ventilation



### Total energy transfer



- Sensible heat transfer** (indicated by red arrows)
- Latent heat transfer** (indicated by blue arrows)
- Conventional systems, on cooling, would normally dry the air significantly
- With Lossnay's fresh air system, moisture from outdoor air is retained not lost





## The City Multi - Air Handling Unit Controller

*The fresh air requirements for commercial buildings, gymnasiums, halls or wherever there are large numbers of people inside, can be huge, often many cubic metres. With such large volumes of fresh outside air, comes the need to temper it, normally to around 18°C.*

For very large air volumes or where the application of Lossnay is not possible to return-duct the exhaust air, you are faced with the job of heating the air in a 'once through total loss' system. Traditionally this has been done using an Air Handling Unit (AHU) with either hot water coils or electric element banks, neither of these options providing a COP greater than 1.

### Example

- Required = 3m<sup>2</sup>/s at 18°C indoors
- Outside air temperature = 0°C
- Required heating capacity = 65.34kW

In the past, unless there has been a central boiler plant handy, electric elements have been seen as the only viable option. In this case, the heating load would add just fewer than 100 amps load per phase to the building mains, increasing the load capacity, not to mention the additional electricity charges associated with maximum demand.

### The New Solution – The City Multi AHU Controller

The AHU Controller unit enables the connection of our standard range of City Multi outdoor units, to DX coils mounted in the AHU or ductwork.

The key is the sophisticated City Multi inverter controls and R410a refrigerant – the system can handle a coil air-on condition as low as -10°C. The control logic is factory set to provide leaving-air temperature control, making these units perfect for full, fresh air supply. The leaving-air temperature control is very stable as the inverter driven outdoor unit adjusts to meet the load. The COP in heating you can expect from our standard units is 3.8 to 4, and when using the high COP models – 4.3 to 4.4!

Not only does this system provide unbeatable energy efficiency in heating mode, it is able to run in cooling mode to 'pre-cool' fresh air in summer, reducing load on the air conditioning equipment installed.

The application of this product is not limited to new buildings, as it offers very significant opportunities for retro-fitting energy efficiency into existing systems. Savings in annual running costs, over electric element banks, will almost always be in the order of 75%, providing payback on capital expenditure that most customers would expect.

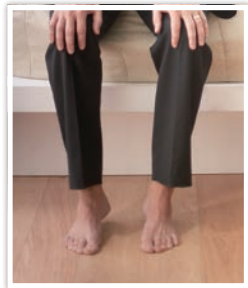
BDT now has available a very accurate energy logger to assist with identifying and verifying opportunities for retro fits of this product. If you have an opportunity that you wish to explore please contact a member of our City Multi team.

# Hot Water Heat Pumps

*VRF Water Heating Units are the latest technology breakthrough from the Mitsubishi Electric City Multi Range with the ability to heat water more efficiently than ever before. Mitsubishi Electric's City Multi Series has the flexibility to adapt efficiently to any building requirement. A wide line up of indoor units and simple piping systems enable an easy fit to even the most complex configurations. Both R2 and Y Series systems can be simply operated through a central controller. With it's flexible system architecture, easy operation and energy saving technology City Multi offers an ideal blend of comfort, efficiency and economy.*

## Underfloor Heating

Underfloor Heating Systems are used in many applications to heat either the entire space, or in specific areas as required. These systems use warm water circulated through pipes buried in the floor slab and deliver radiant energy to heat controlled spaces, providing the ultimate in comfort for the occupants.



Connecting a Mitsubishi Electric Hot Water Heat Pump to an Underfloor Heating System is simple, as most existing Underfloor Systems include the necessary in-floor water pipes, distribution manifolds, pumps and controls. The water from the Hot Water Heat Pump is piped to the underfloor heating panel, and is circulated through the Underfloor Heating System. The space heating temperature is controlled by the underfloor system controller, which is supplied by the heating installer. The Mitsubishi Electric Hot Water Heat Pump wall-mounted controller allows the water flow temperatures to be set for the individual system modes and set up requirements. ie. Heating / Heating Eco / Hot Water.

## Sanitary Hot Water

The new Mitsubishi Electric PWFY-P~AU and PWFY-P~BU Water Heating Units allow water to be pre-heated and even fully heated by using the waste heat energy normally lost into the atmosphere from a commercial air conditioning system. It is also possible to provide the same heating from a stand alone PWFY system to heat water up to 70°C. Depending on the system required and whether an existing system is used to recover energy, this offers energy savings from 300 – 550%.



## Swimming Pools

Many swimming pools are used in only the warmest summer months and often remain unused for the rest of the year. Installing a Hot Water Heat Pump can enable you to enjoy your swimming pool year-round!



When connecting a Mitsubishi Electric Hot Water Heat Pump to a swimming pool it is recommended that a secondary heat exchanger and circulating pump be installed to prohibit corrosion caused by any aggressive chemical treatment in the water.

## Hydroponics

Most hydroponic growing systems require the water or nutrient solutions to be heated to a specific temperature dependant on the crop. The heated water is then pumped around the growing beds to provide both heat and nutrients to the plants. As the Heat Pump controller can be set to accurately control the water temperature, sensitive crops are easily cared for. With the ability to alter the temperature remotely, the Heat Pump can be interfaced with most green house controllers and hydroponic growing systems. The advanced "Eco Mode" allows flow temperature compensation based on outside air temperature to ensure the highest possible energy efficiency.

## Aquaculture

Aquaculture systems often require both heating and cooling depending on the species and time of year. For example, Paua cultivated on land and indoors will require some heat in winter and often an amount of cooling in summer time.

## Water Chilling

Water chilling is available down to a flow temperature of 6°C from a capacity of 20kW in the PWFY range. The systems require external pumps and, depending on application, a brine or antifreeze solution will be required to prevent freezing of the plate heat exchanger. Applications include small process and liquid data cooling, and chilled water for selected fan coil units.





## VRF Hot Water Heat Pump Range

### PWFY-P~BU Series 12.5 kW



The PWFY-P~BU indoor module can be installed in conjunction with standard City Multi VRF air conditioning indoor units creating huge potential for heat recovery.

Available in one size PWFY-P100VM-E-BU (12.5kW heating) is modular, to create larger solutions. Sanitary water heating is ideal for; residences and hotels, commercial kitchens and laundries, office buildings, industry such as food processing plants, heat recovery from air conditioning systems into sanitary water storage and direct sanitary water heating is also an option.

The BU Series water heating unit is perfect for sanitary hot water with excellent heat recovery possibilities. It houses a second compressor running on R134A refrigerant creating a cascade circuit between two plate heat exchangers. With the ability to sense flow or return water temperature with a dipswitch setting, these units can only be connected onto R2 City Multi outdoor units. (The smallest stand alone VRF hot water system is therefore 25kW of heating).

Heat recovery from air conditioning systems into sanitary water storage and direct sanitary water heating is also possible. Heat recovery technology taps into and utilises otherwise wasted heat energy, extracted from areas of a building that require cooling, providing heating for hot water. Recovering the heat in this manner maximises the efficiency of the system all year round, therefore increasing energy savings and substantially lowering running costs.

### PWFY-P~AU Series 12.5 kW and 25.0kW



The PWFY-P~AU indoor modules can be installed in conjunction with standard City Multi VRF Air Conditioning Indoor Units creating huge potential for heat recovery.

Available in two sizes: PWFY-P100VM-E-AU (12.5kW heating / 11.2kW cooling) and PWFY-P200VM-E-AU (25.0kW heating / 22.4kW cooling) which are modular to create large solutions.

Suitable applications of pre-heating of sanitary water (Through energy recovery); swimming pools; under-floor heating; low temperature hot water for fan coil units and convectors; hydroponics; aquaculture and water chilling.

The AU Series water heating and cooling unit utilise a 316 stainless steel plate heat exchanger with the ability to sense flow or return water temperature with a dip-switch setting. PWFY-P~AU units can be connected onto either Y or R2 series City Multi outdoor units.



#### PWFY-P100VM-E-BU

Heating: 12.5 kW

#### PWFY-P100VM-E-AU

Heating: 12.5 kW

Cooling: 11.2 kW

#### PWFY-P200VM-E-AU

Heating: 25.0 kW

Cooling: 22.4 kW



#### PAR-W21

LCD Wall Mounted

7 Day Timer/Controller

# Controllers

*Controllers are one of the most important and familiar devices in an air conditioning system. Not only do they provide system control from a common point, but also provide a platform to minimise running costs and conserve energy.*

## Management from Anywhere

- Building managers can control all their sites from a central location by simply having an internet connection.
- Mitsubishi Electric's AG-150 Controller - provides connection to one building site
- Mitsubishi Electric's TG-2000A System - controls multiple sites

## Web Based controller

- View and control your air conditioning systems using Internet Explorer.
- In the unlikely event of a fault, receive emails direct to your maintenance team.
- Ultimately, the ease of access to controllers enables frequent fine tuning of system performance for greater energy efficiency.

## Monitoring Energy Consumption

Accurately monitor building energy consumption down to specific areas and individual indoor units. Mitsubishi Electric's control systems allow building managers to limit energy consumption by adjusting the cooling and heating set point unit operation or by load shedding.

## Remote Controllers

We offer the choice of simple wireless infrared or wired remote controllers to manage to all standard features. Functions can be limited or locked to ensure that the system is not misused and operates in an energy efficient manner.

## BMS

Whether new build or refurbishment, Mitsubishi Electric's control systems readily integrate with industry standard BMS protocols – BACnet® and LonWorks® providing a single management system covering all aspects of building services.

## CASE STUDY : Online Control - Wellington to Nelson

While Nelson is the sun capital of New Zealand, this does not mean that it is forever summer! The Abel Tasman region is also a winter haven and as such, heating was a key consideration for a corporate Wellington family when building their holiday home at Kaiteriteri Beach near Nelson. City Multi VRF Air Conditioning Systems quietly and efficiently take care of not only the room heating and cooling but also the hot water used for underfloor heating of polished concrete floors on both levels of this house.

The Mitsubishi Electric AG-150A Control System has a large colour LCD panel for controlling all the aspects of the home's heating and ventilation systems, including the underfloor heating system. This web enabled controller has allowed the owners to maintain complete control of their remote residence, through the control system's online accessibility.

The system's remote controllability and high operating efficiency means pre-heating or even pre-cooling the home is both simple and cost effective.



AG-150A Centralised and Web Central Controller with LCD Touch Screen, also available in white.



## Central Controller Options

*Any of these central controllers can be interfaced to any Mitsubishi Electric air conditioning system in our current range, allowing these central controllers to be utilised in residential homes through to large commercial developments.*

The **AG-150A** is our most popular central controller to date due to its large 9 inch backlit colour liquid crystal display. Each indoor group is represented by an icon that represents the type of indoor it is. A colour floor plan can also be loaded onto the screen as well as loading a different floor plan to represent the different levels of your clients building or residence. As standard it is designed to control up to 50 indoor groups, but with the addition of expansion modules, this can be extended to 150.



### **AG-150A**

*Touch Screen  
Central Controller*

The **AG-150A** central controller is also web accessible. This allows the central controls to be monitored and adjusted from a net worked managers desktop via internet explorer, or even allow your client to remotely turn the air conditioning on at home before they leave work or jump on the plane. The 365 day time schedule option also allows you to pre-programme off times for public holidays, saving running costs when the air conditioning is not required.



### **GB-50ADA**

*Central Controller*

The **GB-50ADA** is very similar to the **AG-150A** but without a touch screen. This controller is designed to give you all the features you require, with access through a building's data network. The perfect solution for when you don't want to give centralised control to the tenant, and are happy for it to be locked away in a switchboard.

The **AT-50A** is a simplified version of the **AG-150A**, but still gives you full control of the indoor functions available on the local wall controllers. It's designed for applications where you want a very simple central controller without all the bells and whistles and access via the internet is not necessary.



### **AT-50A**

*Touch Screen  
Central Controller*

The touch screen is a smart 5 inch backlit colour liquid crystal display. It comes with a 7 day programmable timer and can control up to 50 indoor groups, each being represented by an icon on the main screen.

A standard feature of these central controllers is the night setback function. This allows you to set an upper and lower temperature limit to ensure the building does not cool down or overheat in periods when the air conditioning is switched off. If the lower or upper temperature limit is reached, the air conditioning will turn on and control to this preset temperature, resulting in a lowered operating load the next time the air conditioning is scheduled to come on. This is one of many energy efficient and temperature comfort features that our central controllers offer.



### **PAC-YG66DCA**

*(DIDO) control module*

The **PAC-YG66DCA** digital input / output (DIDO) control modules also gives you the ability to manually, or via time schedule, start and stop external equipment that are not part of the Mitsubishi Electric range. This gives you the flexibility to build a control system with all the functionality of a small BMS where you may want to interlock supply / extract fans with the air conditioning system, or turn on / off lighting or irrigation zones in a residential setting.

The level of control across all Mitsubishi Electric Air Conditioning products is second to none when one of our central controllers is included in the system. We have demonstration cases set up with these controllers mounted in them to help show how simple these controllers are to use and also show the high level of control you can achieve over the system. Please contact your local Mitsubishi Electric representative to arrange a viewing. We are even happy to set up a demonstration with you and your client!

# New Zealand Case Studies

## AUCKLAND

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**Carlaw Park  
Redevelopment**

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**Stanley St Building**

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**101 Carlton Gore Road**

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## WELLINGTON

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**Royal Thai Embassy**

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**Wellington Indoor  
Sports Centre**

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**Datam**

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**Aorangi House**

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## MOUNT COOK

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**The Hermitage Hotel**

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## CHRISTCHURCH

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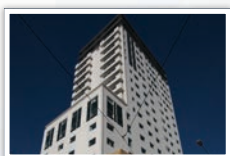
**Southern Institute of Technology**

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**Hazeldean Business Park**

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**Pacific Tower**

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## CENTRAL OTAGO

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**Cromwell Medical Centre**

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## QUEENSTOWN

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**Hilton Hotel Kawarau Falls**

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**Mountaineer Building Complex**

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**Post Office Precinct**

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**Remarkables Primary School**

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## INVERCARGILL

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**WHK Office Building**

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## Carlaw Park Redevelopment

*Carlaw Park was the renowned home of rugby league in Auckland for many decades. However, it remained abandoned for 8 years after closing in 2002 due to health and safety reasons. The new development includes; 10,000 m<sup>2</sup> of office space, 450 m<sup>2</sup> of cafes and retail stores.*

### TOTAL CAPACITY

Heating Capacity: 2376 kW

Cooling Capacity: 2145 kW

### OUTDOOR UNITS

25 x PURY-YHM-A Heat Recovery Units

### INDOOR UNITS

340 x PDFY-VM-E Ducted Units

### WALL CONTROLLERS

340 x PAC-YT51CRB-J Wall Controllers

### CENTRAL CONTROLLER

8 x G50A Central Controllers

1 x TG2000 PC

1 x BACnet Interface PC

### CONTRACTOR



### The Challenge

An effective green-field approach was taken, but such a large site required careful management to allow every stage to be built while previously completed stages were being occupied.

Buildings on the site were all new build with a design requirement being a minimum 4 star green building rating but with the target to achieve 5 star.

To achieve this rating requires commitment from the principle, design team, main contractor, sub-contractors, tradesmen and finally building occupants. Great care is required for materials and plant selection, manufacture, construction and commissioning as well as handover and maintenance to ensure sustainability targets are met.

### The Solution

City Multi R2 Heat Recovery Systems were used throughout the site. These would mean that fresh, conditioned air would be provided to all areas, without high energy usage.

One of the key factors in ensuring a building is energy efficient is control. G50 central controllers were installed, with an umbrella TG2000 for overall control, energy management and maintenance operations. Finally, a BACnet interface system to the Building Management System has been used.

Ducted indoor units were installed in most office areas, giving some flexibility for the tenant fit out as the buildings became let. All condensing units were roof mounted to minimise ground level noise and visual impact.

There are two other buildings on the site, both fitted with City Multi VRF.





# Stanley St Building

*Part of the Carlaw Park Site re-development.*

## The Challenge

The specification provided by Thurston Consulting Ltd clearly required a VRF solution. While Mitsubishi Electric was nominated as the supplier the specification itself was performance specified; it was up to each contractor to submit their design kilowatt selections and unit quantities. This meant ensuring each offer complied with the specification and was also a cost effective workable system. There were a number of tenancy fit outs to be completed as part of the build.

## The Solution

City Multi R2 heat recovery systems were used throughout the site.

G50 central controls with umbrella TG2000 for overall control, energy management and maintenance operations were selected along with a BACnet interface to BMS.

Ducted indoor units used in most offices areas giving some flexibility to tenant fit out as the buildings became let. Rolling commissioning during the project allowed for a stress free hand over on time at the completion of the project with all systems meeting the performance criteria of the specification.

All condensing units were roof mounted to minimize ground level noise and visual impact.



### TOTAL CAPACITY

Heating Capacity: 940 kW

Cooling Capacity: 850 kW

### OUTDOOR UNITS

11 x PURY-YHM-A Heat Recovery Units

### INDOOR UNITS

129 x PDFY-PVM-E Ducted Units

### WALL CONTROLLERS

129 x PAC-YT51CRB-J Wall Controllers

### CENTRAL CONTROLLERS

4 x G50A Central Controllers

1 x TG2000 PC

1 x BACnet Interface PC

### CONTRACTOR







# 101 Carlton Gore Road

*Upgrade of a failed VRF system.*

## The Challenge

The prime factor attributed to the premature failure of the previously installed three-pipe VRF rooftop condensing units was the location of the building – close to the coast, high-traffic and with industrial plants in the area.

Careful consideration of the most appropriate replacement systems had to be made, taking into account factors such as; whole of life costs, roof plant space and staged implementation of the refurbishment. Another significant factor taken into account was that the building would be occupied during the refurbishment. Therefore, finding a system that had the flexibility to be staged correctly and meet the tenant's requirements was paramount.

Management had also requested that they wanted only limited control to be provided to the room occupants (such as temperature adjustment within defined limits).

## The Solution

Several options were considered and after consultation with both the building owner and tenant, the Mitsubishi Electric R2 Series two-pipe VRF system was agreed upon, with an additional factory applied BS coating that would provide superior corrosion protection for the outdoor sections of plant.

BDT worked very closely with both Jackson Engineering Advisers and Chillex Services (the nominated contractor) to put together the right configuration for the planned upgrade. The two-pipe architecture of the Mitsubishi Electric VRF gave both the designers and installers the flexibility and ease of installation everyone required for the project. The resulting installation has met the tenants staged requirements with minimal disruptions throughout, and due to careful planning; the installation has proven to be relatively fast and simple.

Each area is controlled via local simple wall controllers with an AG-150A touch screen, central controller. The controller manages; the time scheduling of the air conditioning plant, outdoor air and extract fans via DIDO modules. The controller provides only limited control to the room occupants (such as temperature adjustment within defined limits), with more advanced functions such as mode adjustment confined to the AG-150A central controller, accessible by service staff only.

Even though the Mitsubishi Electric outdoor units are delivered as standard with corrosion protection, additional, factory applied, BS treatment provides added protection for very corrosive environments. Considered essential for this project, its use is equally applicable for other coastal or geothermal areas throughout New Zealand. The treatment includes; additional coatings to the coils and fins of the outdoor condensing units, thicker paintwork and protective coating for internal components such as PC Boards.

The partnership approach taken by Jackson Engineering and Mitsubishi Electric, will provide many years of trouble-free service from this system.

*Building owned by Goodman Property Trust*

### TOTAL CAPACITY

Heating Capacity: 495 kW

Cooling Capacity: 446 kW

### OUTDOOR UNITS:

7 x PURY-YJM-A-BS Heat Recovery Units

### INDOOR UNITS

82 x PEFY-VMA-E Ducted Units

### WALL CONTROLLERS

82 x PAC-YT51CRB Wall Controllers

### CENTRAL CONTROLS

1 x AG-150A Colour Touch Panel

### CONTRACTOR





# Royal Thai Embassy

*The new site for the Royal Thai Embassy saw Fletcher Construction completely gut the existing two storey tavern (which had become a blot on the local landscape after 15 years of abandonment) and add a third level extension providing function space and accommodation.*

## The Challenge

This building is mainly office space, but the extension houses large function and pre function spaces, a commercial kitchen on the ground floor and four two bedroom apartments above. All of which require heating, cooling and adequate ventilation.

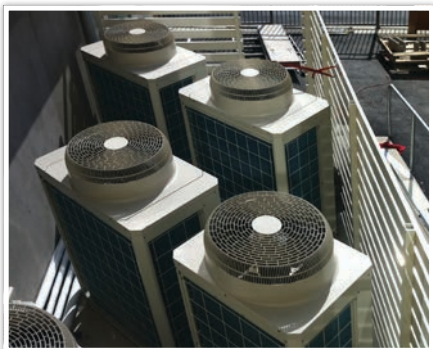
The challenge was to design an air conditioning system that suited the many different spaces and purposes. The building required a number of different products to ensure that all spaces were provided with the heating or cooling they needed. Added to this, the outdoor condenser plant decks were very tight – so finding a logical site would require its own solution.

Added to the practical nature of the project was the challenge of ensuring that our customer, Aquaheat, was made to feel like we were on top of the project the entire time as we were the main supplier for most of the building's mechanical services.

## The Solution

230kW of City Multi R2 Series simultaneous heating and cooling condensers were installed to serve the office areas. These office areas are exposed to all four orientations creating a huge potential for heat recovery. The indoors are primarily low profile (250mm) mid static ducted units, offering up to 150Pa of external static pressure. Three four way blow cassettes have been installed in a detailed ceiling within the reception area.

A further 134kW of S and Y Series condensers have been used for the remainder of the building. The Y series condensers have been utilised to build large 28kW ducted split systems, one in each of the 3 conferences spaces. A portion of tempered fresh air is brought onto the rear of these indoors to meet the building code. The S Series condensers have been utilized to build a three-headed multi to service the living room, and 2 bedrooms in each of the four apartments. To address the tightness of the plant decks it was decided that two separate spaces on the site were required.



### TOTAL CAPACITY

Heating Capacity: 322 kW

Cooling Capacity: 284 kW

### OUTDOOR UNITS

7 x PURY-YHM-A Heat Recovery Units

3 x PUHY-YHM-A Heat Pump Units

4 x PUMY-YHMB Heat Pump Units

### INDOOR UNITS

4 x PLFY-VBM-EBA Four Way Cassettes

2 x PLFY-VCM-E Four Way Cassettes

31 x PEFY-VMAL-E Ducted Units

12 x PKFY-VBM-E Wall Mount Units

### WALL CONTROLLERS

46 x PAR-20MAA-G Remote Controls

3 x PAC-SE41TS-E Remote Sensors

1 x AG-150A Colour Touch Panel

### CONTRACTOR







#### TOTAL CAPACITY

Heating Capacity: 194.5 kW

Cooling Capacity: 173.5 kW

#### OUTDOOR UNITS

4 x PURY-YJM-A-BS Heat Recovery Units

#### INDOOR UNITS

26 x PEFY-VMA-E Ducted Units

2 x LGH-RX5-E Lossnay

#### WALL CONTROLLERS

23 x PAR-21MAA-J Remote Control

2 x BAC-HD150-E

#### CONTRACTORS



Abode Air Conditioning

## Wellington Indoor Sports Centre

### The Challenge

This very large (10,500m<sup>2</sup>) facility houses 12-15 indoor netball, basketball, and volleyball courts. The building offices were originally designed using Mitsubishi Electric split systems. However, as the project increased in size the system needed to be adjusted to match.

The site itself is positioned near Evan's Bay and Wellington Airport, exposing it to salty air, high winds and jet fuel. Factors that needed to be taken into consideration.

### The Solution

The main mechanical consultant was eCubed Building Workshop on behalf of Sinclair Knight Merz (SKM) Consulting, who originally designed this project using Mitsubishi Electric split systems. As the project increased in size, the logical decision was to change the design to a Mitsubishi Electric two-pipe simultaneous heat recovery VRF system. This was mainly due to the varied usage and orientation of the offices, which offered heat recovery potential between the spaces, resulting in lower energy usage.

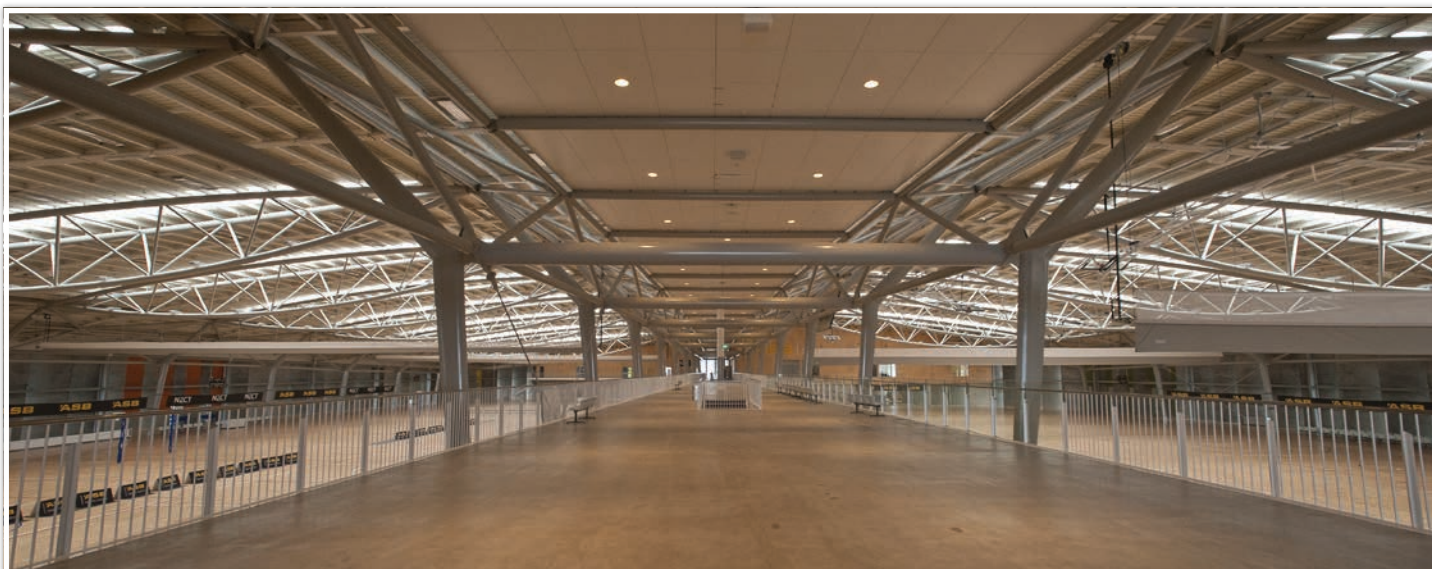
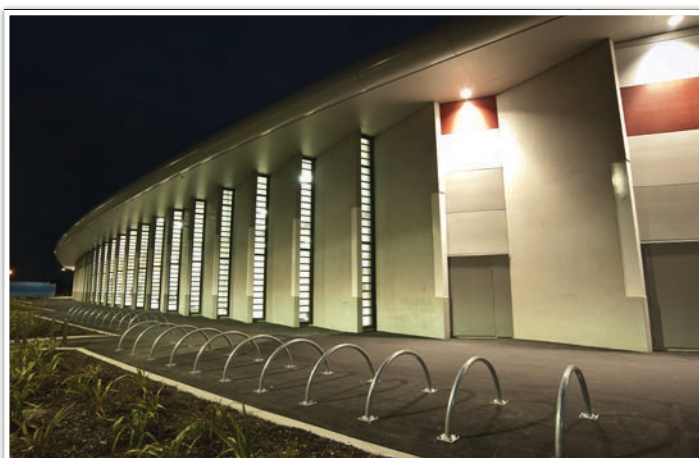
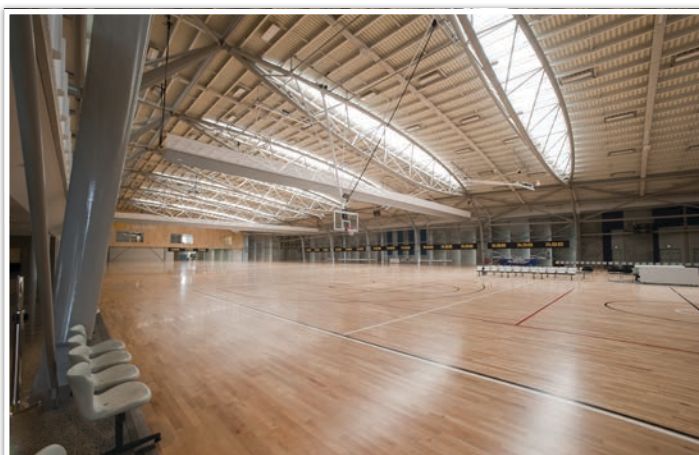
Fresh air is also introduced to these spaces via Mitsubishi Electric LGH-RX5 Lossnay units. This offers a balanced air solution as the incoming, fresh air is preheated via the outgoing warm, stale air. This eliminates the need for electric elements to pre-heat the fresh air, offering further energy savings.

Due to the building's close proximity to the sea, a decision was made by the consultants to specify the outdoor condensers with Mitsubishi Electric's BS coating. The coating is an additional level of protection, applied at the time of manufacture, which helps to prevent sea salt corrosion on the condenser components. As a result this should increase the life of the condenser if correctly maintained.

Command Services are the main contractor for the first stage of the Wellington Indoor Community Centre, and the second stage that the High Performance Sports Facility will occupy, was completed by Abode.











#### TOTAL CAPACITY

Heating Capacity: 0 kW

Cooling Capacity: 280 kW

#### OUTDOOR UNITS

10 x PUHY-P250YHM-A

#### INDOOR UNITS

5 x PFD-P500VM-E Close Control Units

#### WALL CONTROLLERS

Included in PFD Unit

#### CONTRACTOR



## Datam

*Process cooling of the printing floor area.*

### The Challenge

Unlike most process cooling jobs this project actually has a variable load due to the stop start nature of the printing process and also regular addition of unconditioned paper to the room. Not to mention the large number of people in the space from time to time and also the fresh air requirement that comes with this.

It was essential to maintain the space at a suitable temperature to allow the electronic printing machinery to operate and also control the humidity to prevent issues with the paper.

The project also had the added challenge of needing to be completed without disruption to the companies' core business – printing.

### The Solution

City Multi Close Control Process Coolers in conjunction with the Y Series condensing units were used on the site. Each system has one indoor process cooler connected to one set of Y Series condensing units. This allows not only for staged installation but provides high levels of equipment redundancy too.

Each unit has the ability to operate in either close control mode (without dehumidifying the air) or standard mode (to purposefully dehumidify) as and when required by connection to a humidistat.

As the condensing units all use inverter driven compressors this system can ramp up or down to accurately match the load present, without suffering the wear and tear that the previously installed fixed speed compressor system did.







# Aorangi House

*Aorangi House was an existing high rise office block with a dated appearance and equally dilapidated mechanical services. A complete make over of the building was required to attract new tenants. In a market where office space is plentiful, a standard fit out and décor just wasn't going to cut the mustard...*

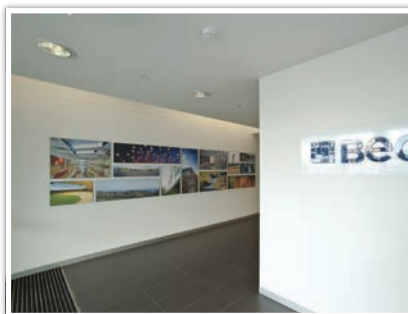
## The Challenge

As with all existing building refits, there were space restrictions for new plant and in the case of this building the need to work within a maximum electrical load as well. On top of this the designers wanted the 'industrial' look with services exposed including ducted units, ducting, pipe work etc. This meant that the workmanship on site had to be second to none but also that our equipment breakout noise had to be very low indeed.

## The Solution

Working closely with BECA consulting, who would also eventually occupy 6 of the 8 office floors equipment was selected from our R2 range. Careful consideration was given to indoor unit size, particularly height. Breakout noise was a key concern as there is no actual ceiling in the office spaces, only some architectural panels below the units.

As there was some concern about the possible maximum electrical demand for the building this VRF system was fitted with load shedding demand control plugs which allow the turn down of outdoor unit capacity based on building electrical load. This meant rather than switching off certain units, all would keep running but with a lesser output.



## TOTAL CAPACITY

Heating Capacity: 361 kW

Cooling Capacity: 401 kW

## OUTDOOR UNITS

5 x PURY-YHM-A-BS Heat Recovery Units

## INDOOR UNITS

9 x PDFY-VM-E Ducted Units

31 x PEFY-P40VMH-E Ducted Units

## CONTROLLERS

32 x PAR-21MAA Wall Controllers

1 x Bacnet Interface PC

## CONTRACTOR

**HotChilly**





## TOTAL CAPACITY

Heating Capacity: 530 kW

Cooling Capacity: 480 kW

## OUTDOOR UNIT

17 x PURY - Heat Recovery Systems

## INDOOR UNITS

PDFY-VM - Mid Static Ducted

PLFY-VBM - 4-way Cassettes

PEFY-VMH - Hi Static Ducted Systems

## WALL CONTROLLERS

PAC-YT51 Simple Wall Controllers

PAR-20 Wall Controllers

## CENTRAL CONTROLS

1 x MJ-180 Main Controller

## CONTRACTOR



# The Hermitage Hotel

*Providing luxurious comfort, even in sub zero conditions.*

## The Challenge

The Hermitage offers luxury accommodation to tourists from around the globe. Set against a backdrop of clean, unspoilt scenery at the foot of New Zealand's highest mountain, the hotel is pivotal to Mount Cook Village's role as a gateway to the mountains and glaciers of Aoraki Mount Cook National Park.

The mountain landscape is well-known for environmental extremes. In Mount Cook Village, the temperature can soar into the high thirties and night-time temperatures can fall below -10°C. When the Hermitage was renovated a six-storey accommodation wing was constructed. The sixty luxurious rooms offer floor-to-ceiling views of Aoraki (Mount Cook) and it was important to the client that guests be able to enjoy the view in comfort.

The challenge of catering to a world audience is the varying definition of comfort. European tourists like those from Switzerland are conditioned to room temperatures of eighteen or nineteen degrees whereas guests from the Indian subcontinent are more accustomed to warmer temperatures.

Energy efficiency was a top priority for the client. The required system would need to be multi faceted. It needed to allow guests to control the temperature of their own rooms, be economical, and have minimal environmental impact. The efficiency of heat pump technology was recognised but few systems would cope with the icy night-time temperatures.

Finally, being a hotel, sound levels would be a key concern and due to fluctuating occupancy the system would need to cope with varying loads.

## The Solution

City Multi R2 outdoor units were chosen for this project. These units can extract heat from air as cold as -20°C, ensuring that guests can enjoy their beautiful surrounds in comfort.

The simple and effective two-pipe architecture and BC controller allow rapid transition between heating and cooling modes. The system can easily cope with even the most dramatic of daily temperature fluctuations.

Control is essential in hotels. Wall controllers were installed in every room, easily adapting to the individual needs of each guest. And, the hotel staff uses a central controller to reduce air conditioning power to unoccupied rooms.

To further address the energy efficiency brief, Mitsubishi Electric's heat recovery technology transfers heat between rooms, maximising efficiency.

Mitsubishi Electric's outdoor units are among the quietest in the industry. With its compressor isolated in its own compartment and with the compressor and fan designed for minimum noise, the City Multi indoor units are also very quiet. Providing the ultimate quiet comfort so the guests can enjoy the hotel and the landscape – in peace.

This project was one of the first VRF systems sold in New Zealand to Airtech NZ. To date the system has had zero break downs which is impressive in the harsh conditions Mt Cook offers. This is due to reliable equipment and regular service and maintenance that Airtech offers to this site.



# Southern Institute of Technology

*This new training facility provides trade and pre-trade courses for the automotive, electrical, refrigeration and building trades, along with non trade courses including call centre training and a diploma in mental health.*

## The Challenge

The site itself is large, consisting of an older commercial building which has been extended and re-fitted with office space, classrooms, workshops and also staff and student café areas. The teaching areas and offices needed to be air conditioned and very well ventilated, requiring large fresh air quantities. The solutions chosen needed to not only be effective, but also energy efficient.

## The Solution

The fresh air for teaching and office areas of approximately 1500m<sup>2</sup> is provided by a MC150 air handling unit fitted with a purpose made DX coil, piped to a Mitsubishi Electric PUHY-P700YSHM-A City Multi condensing outdoor unit. The air handling unit duty is 3.6m<sup>3</sup>/s of fresh air and the DX coil / City Multi combination provides around 80kW of tempering. Compared to traditional methods such as electric element heating, this type of installation can save up to 75% on running costs and substantially reduce KVA charges, not to mention switchboard and cable size.

The interface between the condensing unit and the DX coil is three City Multi PAC-AH250M-H air handling unit (AHU) controllers. These units are specifically designed to allow connection of non-Mitsubishi Electric coils to the range of City Multi DX condensing units. These controllers are designed to be suitable for full fresh air applications due to the -10°C minimum coil air on temperature and the ability to control on leaving air temperature. Connection of these units is possible on both the standard and Zubadan 'low ambient' condensing unit range. As with all City Multi product, this unit offers a fully modulating capacity to accurately meet the desired set point while using the least possible amount of electricity.

The air conditioning for the teaching areas is provided using Mitsubishi Electric SLZ cassettes. These along with the Air Handling unit and City Multi condenser are controlled via a City Multi AG-150A LCD colour touch panel controller.

In the extremes of summer the City Multi PAC-AH250M-H AHU controllers with City Multi condensing units can also be used to pre-cool the incoming fresh air. This prevents additional cooling load on the space air conditioning systems, simply by changing the mode of the outdoor unit via the AG-150A central controller. Traditional methods of using electric elements in fresh air systems do not allow this functionality.

When considering energy efficient solutions for fresh air, the AHU Controller with City Multi condensing units is an ideal solution when heat recovery ventilation products are not practical due to large fresh air quantities, or building layout restrictions.



## TOTAL CAPACITY

Heating Capacity: 88 kW

Cooling Capacity: 80 kW

## OUTDOOR UNIT

1 x PUHY-P700

## INDOOR UNITS

3 x PAC-AH250M-H AHU Controller Fitted.

1 x MC150 Clever AHU (provided by EPI)

## CENTRAL CONTROLS

1 x AG-150A

## CONTRACTOR







● Christchurch

#### TOTAL CAPACITY

Heating Capacity: 1549 kW

Cooling Capacity: 1400 kW

#### OUTDOOR UNITS

21 x PURY-YHM-A Heat Recovery Units

#### INDOOR UNITS

293 x PDFY-VM-E Ducted Units

#### VENTILATION

44 x LGH-RX4 Lossnay Heat Recovery Ventilators

#### WALL CONTROLLERS

293 x PAR-21MAA Wall Controllers

#### CENTRAL CONTROLLERS

7 x GB50A Central Controller

1 x TG2000 PC

#### CONTRACTOR

**HADEN**  
EXPERTISE • COMMITMENT • RESULTS

## Hazeldean Business Park

*Hazeldean Business Park in Christchurch is situated on the former PDL Industries site in Hazeldean Rd. It is a commercial office complex comprising of several multi level buildings supported by a campus style cafeteria facility and multi level car parking building.*

### The Challenge

The largest of three buildings on this site had to be designed to attain a 4 Star Greenstar rating from the New Zealand Green Building Council.

Haden and BDT would have to pool their expertise to ensure the integration of the heating, cooling, and ventilation requirements exceeded the requirements of this rating system, maximizing the owner's Greenstar application.

The buildings have ample glazing on all sides which will offer good natural light but with this comes both solar gain and chilling load.

### The Solution

The HVAC services to each building are made up of several separate, floor by floor, VRF simultaneous heating and cooling systems. Fresh air is provided with Lossnay heat and enthalpy recovery systems to ensure efficient and economic delivery of the fresh air to the building by recovering the heat from the exhaust air and using this to pre-heat the incoming fresh air supply.

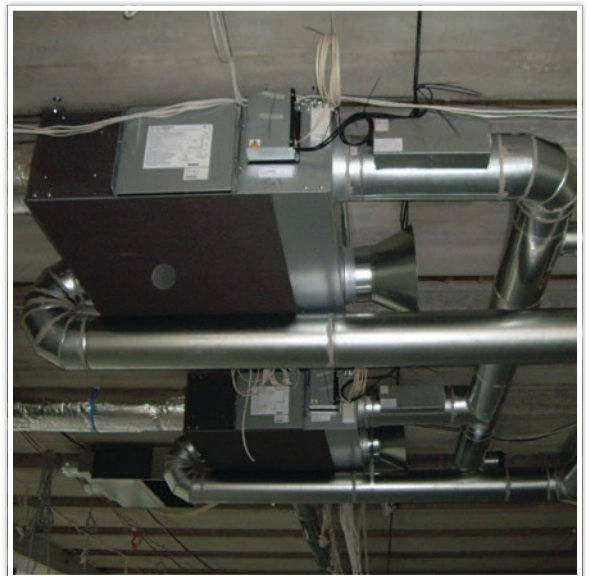
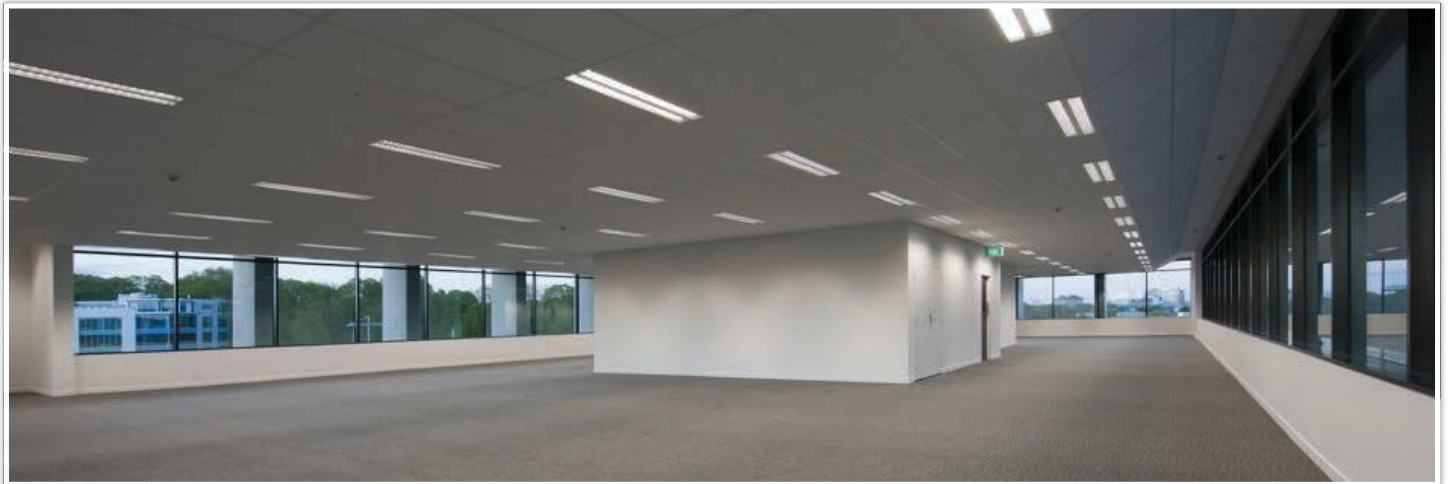
Buildings on the site currently number three, excluding the car parking building. All office buildings include VRF air conditioning and Lossnay. The site overall has an installed cooling capacity of more than 1200kW, so energy consumption is a very important consideration.

Since the final commissioning Mitsubishi Electric has offered its TG2000 computer and software package to compliment the project with individual tenant energy monitoring and billing capabilities. This will be linked to the existing web based central control system based around 7 of the GB50A central control units. Having the ability to monitor energy usage and charge tenants accordingly makes good economic sense for the building owner and tenants alike and also promotes energy efficiency for HVAC services from a heat recovery, temperature control and time scheduling perspective.

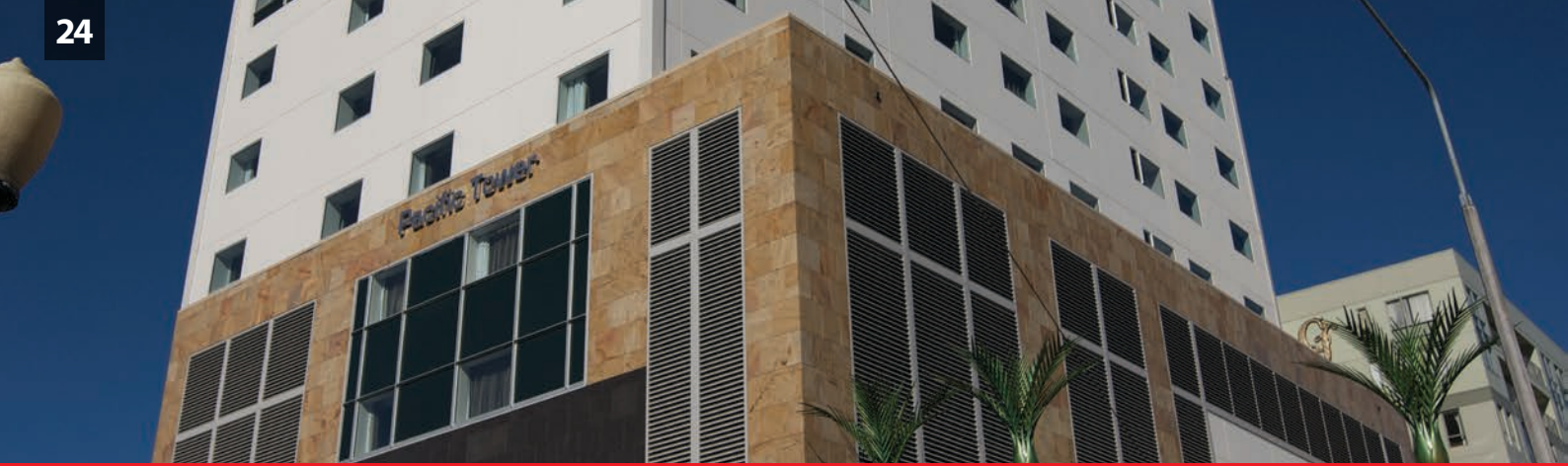
The 2 pipe architecture of the Mitsubishi Electric VRF system not only allows simultaneous heating and cooling with heat recovery but the savings in labour and materials over other systems ensure the cost savings of the system efficiency are maximized and realized by the building owner and also tenants as early in the building life-cycle as possible.

The application of the Lossnay energy recovery ventilation and its control integration with the City Multi VRF Air Conditioning means that fresh air is introduced as and when required without the need for additional controls. Pre-heating of the fresh air using this technology is now commonplace in this type of HVAC installation but what is also important is the ability to offer free cooling when outside air conditions permit and also pre-cooling of the fresh air on days when the outside ambient air temperature is above that of the conditioned space air. All this adds to the system efficiency, ensuring the lowest possible running cost and of course a fresh comfortable working environment for the building tenants.









Christchurch

#### TOTAL CAPACITY

Heating Capacity: 846 kW

Cooling Capacity: 757 kW

#### OUTDOOR UNITS

15 x PURY-YGM-A Heat Recovery Units

#### INDOOR UNITS

12 x PLFY-VCM-E Four Way Cassettes

8 x PLFY-VAM-E Four Way Cassettes

7 x PLFY-VLMD-E Two Way Cassettes

160 x PLFY-VBM-E One Way Cassettes

4 x PKFY-VAM-E Hi Wall Units

1 x PCFY-P40VGM-E Under Ceiling Units

14 x PEFY-P32VMS-E Ducted Units

#### WALL CONTROLLERS

34 x PAR-21MAA

160 x YT51-CRA

#### CENTRAL CONTROLLERS

6 x G50A Central Controllers

1 x TG2000 PC

#### CONTRACTOR

Bedford Mechanical

## Pacific Tower

*This 23 storey building close to the centre of Christchurch's CBD is Christchurch's tallest. The building tenants include Rendezvous Hotel and restaurant, apartments and a penthouse office on the top floor.*

### The Challenge

The project was a design build and BDT had significant involvement right from the start. Budgetary concerns were always important but there were bigger challenges such as finding sufficient plant space for condensing units serving the lower floors while avoiding issues with boundary noise levels or taking up precious car park space. Floor to ceiling height is always an issue in this type of high rise building.

There was also the need to be able to provide energy billing for the air conditioning systems to the various tenants and overall control of the whole system without involving a BMS company.

### The Solution

The City Multi R2 System was used throughout the building. The condensers for ground to level 13 were placed on level 4 internal balcony plant decks which were open to the car park six-storey stacking machine inside the building. Suitable ventilation was provided to the car park levels by the entrance ramp and a large array of wall louvers on the west and south of the building. The condensers cannot be seen or heard from outside the building. The remaining condensers for levels 14 to 23, were placed on the roof.

With floor height restrictions and a directive from the architect that 'high wall units shall not be used in the hotel rooms' PLFY 1 way cassettes were selected and proved to be a very successful and cost effective solution.

A TG2000 was installed to umbrella the six G50A controllers and provide a 'BMS' style front end while at the same logging and billing the electricity consumed by the various tenants.







# Cromwell Medical Centre

*A new medical centre servicing the township of Cromwell including all medical disciplines usually found in a community.*

## The Challenge

The design brief was to provide a highly energy efficient building that would best suit the needs of a variety of medical professions all housed under one roof. The air conditioning and ventilation system needed to be able to provide comfort with economy all year round which is no mean feat when outside ambient temperatures range from a winter low of  $-10^{\circ}\text{C}$  to summer high over  $35^{\circ}\text{C}$ .

## The Solution

City Multi R2 Systems were largely used throughout the building to provide the air conditioning but the largest system also had a PWFY-BU water heating unit to provide heat recovery from the air conditioning load into the sanitary hot water system. As the clinic has many basins hot water usage is high, so this was a good example of 'time of use based energy savings'. The foyer and server room were kept to individual Y Series to maintain system integrity and also keep install costs in check.

There was a considerable fresh air requirement for this building and to ensure the 'energy efficiency' theme was carried through here, City Multi Y Series Zubadan condensing units were teamed up with the new AHU controller fitted to purpose built air handlers providing all of the fresh air, either pre heated or pre-cooled.

An AG150A provides central control functions on this site and with the addition of a DIDO controller also took care of switching the various extract fans.



## TOTAL CAPACITY

Heating Capacity: 287 kW

Cooling Capacity: 258 kW

## OUTDOOR UNITS

3 x PURY-YHM-A Heat Recovery Unit

2 x PUHY-HP250YHM-A

## INDOOR UNITS

13 x PLFY-VCM-E Four Way Cassettes

19 x PLFY-VBM-E Four Way Cassettes

4 x PKFY-P100VKM-E Hi Wall Units

1 x PMFY-VBM-E One Way Cassette

1 x PEFY-VMH-E Ducted Units

1 x PWFY-P100BU-E Water Heating Unit

2 x PAC-AH250H-J AHU Controller Units

## WALL CONTROLLERS

36 x PAR-21MAA

1 x PAR-W21MAA

## CENTRAL CONTROLLERS

1 x AG-150A Central Controller

## CONTRACTOR

## Central Refrigeration





### TOTAL CAPACITY

Heating Capacity: 2142 kW

Cooling Capacity: 1904 kW

### CONDENSERS:

34 x PQRY-P500YGM-A Water Sourced  
Condensing Units

### INDOOR UNITS

56x PEFY-VMH-E Ducted Units

173 x PDFY-VM-E Ducted Units

34 x PEFY-VMH-E-F Ducted Units

59 x PLFY-VCM-E Four Way Cassettes

25 x PLFY-P40VCM-E

25 x PKFY-VBM-E Hi Wall Units

### WALL CONTROLLERS

260 x PAR-20MAA-G

7 x PAC-SE41TS-E

### CENTRAL CONTROLLERS

8 x G-50A-J

8 x PAC-SC50KUA-F

1 x BACnet BMS Interface Computer

### CONTRACTOR



## Hilton Hotel - Kawarau Falls

### The Challenge

Queenstown's high influx of tourists every year creates high demand for 4-5 star luxury accommodation. Over the past 3 years, BDT has been involved in the design, construction, and commissioning aspects of Kawarau Falls Station Reserve, BDT's second largest VRF project in New Zealand.

### The Solution

The Reserve North building was BDT's very first water sourced condenser order of just over 2.1MW. This building was originally specified with another brand's water sourced condensers, but the Mitsubishi Electric alternative proved to offer better low temperature performance, resulting in BDT securing the order. We believe that Reserve North is the largest water sourced job in the Southern Hemisphere. All of the systems have been commissioned by BDT in-house engineers to ensure the project is successfully set up right from the start. The hotel is finished to a very high standard and is rated as a 5 star hotel.

The second building on this site, Kingston West, is home to 96 MSZ-GE35VA High Wall Heat Pumps and achieves a 4 star hotel rating. To date, Mitsubishi Electric is the only air conditioning brand installed in Kawarau Falls Station reserve, supplying just over 2.4MW worth of equipment.











### TOTAL CAPACITY

Heating Capacity: 340 kW

Cooling Capacity: 303 kW

### OUTDOOR UNITS

6 x PURY-YJM-A R2 Series Heat Recovery Units

### INDOOR UNITS:

10 x PLFY-VCM-E 4 Way Cassettes

22 x PLFY-VBM-E 4 Way Cassettes

1 x PKFY-P63VFM-E Hi Wall Unit

27 x PFFY-VKM-E Compact Floor Mounted Units

### VENTILATION

2 x PEFY-P250VMH-E-F Full Fresh Air Ducted Units

### WALL CONTROLLERS

27 x PAR-21MAA

### CENTRAL CONTROLS

2 x PAC-YG60MCA PI Modules

2 x G50A Central Controller

1 x TG2000 PC

### CONTRACTOR

**CAMPBELL**  
refrigeration

# Mountaineer Building

*The Mountaineer is a retail complex building known under this name since 1885.*

## The Challenge

The existing building on the site was a protected historic building. It was therefore a requirement that the front façade was to remain, and the rest of the building was designed to accommodate this.

The developer had originally hoped to use water sourced condensers to minimise plant space requirements. However, unfortunately the low lying water table of the nearby lake caused huge issues at the time of construction and soaked up a lot of time and money.

Being a retail complex housing a lot of individual retail spaces, it also meant that control had to be thought out carefully and limited to certain areas.

## The Solution

The developer eventually had to choose air sourced condensers as an alternative to water. These were placed on the roof of the building. While not being able to use the water sourced units was a disappointment, the air sourced units are doing a great job.

The Mountaineer had two central control systems installed which communicate back to a TG2000A for proportioning the power to each tenant. There is also a BACnet interface computer to the main building BMS.





# Post Office Precinct

## The Challenge

Snowfall in Queenstown is guaranteed and frequent during the winter months, creating a huge demand for heat pumps and tempered fresh air. However, the equipment used must be able to perform when the conditions are icy outdoors.

The site consists of four buildings; home to the local Court House, a restaurant & bar, and two commercial office blocks. The land and property is owned by Ngai Tahu, one of New Zealand's largest Maori Iwi.

## The Solution

Queenstown was a perfect place to demonstrate unique, New Zealand first products such as Zubadan Condensers, and AHU controllers in place of electric elements tempering fresh air systems.

The complex has been fitted with a total of 630kW of Mitsubishi Electric VRF and split systems. Added to this, Building 1 houses BDT's very first set of Zubadan outdoor units, and AHU controller.

The building 1 fresh air system proved to be very successful demonstrating good energy savings, with Building 4's AHU electric elements likely be replaced by a DX coil in the existing AHU, connected back to a set of Zubadan condensers in the near future.



### TOTAL CAPACITY

Heating Capacity: 630 kW

Cooling Capacity: 500 kW

### OUTDOOR UNITS:

9 x PURY-YGM-A Heat Recovery Units

1 x PUHY-HP400YSHM-A Zubadan Heat Pump Unit

### INDOOR UNITS

74 x PDFY-VM-E Ducted Units

18 x PEFY-VMH-E Ducted Units

2 x PAC-AH200M-H AHU Controller Units

### WALL CONTROLS:

82 x PAR21-MAA

### CENTRAL CONTROLS:

7 x PAC-YG66DCA DIDO Modules

3 x PAC-YG60MCA PI Modules

3 x G50A Central Controllers

1 x TG 2000 PC

### CONTRACTORS

**HADEN**  
EXPERTISE • COMMITMENT • RESULTS

**CAMPBELL**  
refrigeration





## Remarkables Primary School

*The newly built enviro-school is amongst the most technically advanced schools in New Zealand that fully integrates with the surrounding landscape. Set between Lake Wakatipu and The Remarkables, this primary school is situated on one of the most sought after spots in Queenstown.*

### TOTAL CAPACITY

Heating Capacity: 220.5 kW

Cooling Capacity: 196 kW

### OUTDOOR UNITS

7 x PURY-P250YHM-A R2 Series Heat Recovery Units

### INDOOR UNITS

21 x PCFY-P63VKM-E Under Ceiling Units

4 x PKFY-VBM-E Hi Wall Units

1 x PLFY-VCM-E 4 Way Cassette

7 x PLFY-VBM-E 4 Way Cassette

### VENTILATION

22 x LGH-RX4-E Lossnay Heat Recovery Ventilators

### WALL CONTROLLERS

31 x PAC-YT51CRB-J

### CENTRAL CONTROLLERS

1 x AG-150A-J Central Controller

2 x PAC-YG50ECA-J Expansion Modules

1 x PAC-YG66DCA-J DIDO Module

### The Challenge

While the setting of the site is spectacular, it is approximately half the size of a typical primary school site. However, the gross floor area of the school is 3030m<sup>2</sup> which includes 1820m<sup>2</sup> of classroom space. A large environment to heat, cool and ventilate, with different areas having different needs, control was also a major consideration.

The school is also located in close proximity to the Queenstown International Airport. With Ministry of Education requirements stipulating that acoustics of learning spaces must be under 35dBA it would require quiet equipment to ensure that the environment was kept at regulation sound as aircraft noise at boundary level is around 90dBA.

### The Solution

In order to service the needs of the whole building, 200kW of Mitsubishi Electric R2 simultaneous heating and cooling has been installed. Lossnay fresh air ventilators provide fresh air to each of the classrooms and the administration block. In order to address the noise, Lossnay units were fitted with noise attenuators, and the main indoors units are PCFY under ceiling units, and PLFY cassettes.

The school also has an AG150A with two expansion controllers, controlling all of the air conditioning and Lossnay systems. A DIDO module has also been installed to allow the AG150A to time schedule the toilet extract fans. The AG150A has a floor plan loaded in for each of the classrooms and administration block to create a small BMS.

There is also a small pre-school located on this site which is independent of the school, but still fitted out with Mitsubishi Electric split systems.

Photos kindly provided by Babbage Consultants



### CONTRACTOR











#### TOTAL CAPACITY

Heating Capacity: 458 kW

Cooling Capacity: 410 kW

#### OUTDOOR UNITS

5 x PURY-YHM-A-BS Heat Recovery Units

2 x PUHY-YHM-A-BS Heat Pump Units

#### INDOOR UNITS

72 x PEFY-VMH-E Ducted Units

2 x PAC-AH250H-J AHU Controller Units

#### WALL CONTROLLERS

1 x PAR-21MAA

72 x YT-51CRB

#### CENTRAL CONTROLLERS

1 x AG-150A Central Controller

2 x YG50ECA-2 Expansion Controllers

1 x BAC-HD150 Bacnet Interface

1 x TG2000 PC

#### CONTRACTOR



## WHK Office Building

*A new office building to house all of WHK's Invercargill staff.*

### The Challenge

The design brief was to provide a highly energy efficient building and to provide a fresh and comfortable environment for the WHK Invercargill staff all housed under one roof. The air conditioning and ventilation system needed to be able to provide comfort with economy all year round in an environment that sees bitterly cold winters, cool spring and autumn and even some cool days in summer. As well as this there is salt air drift from the sea offering another twist to the equipment selection.

### The Solution

City Multi R2 Systems were used throughout the building to provide all of the air conditioning for the WHK office space. There were two areas that were set aside for other tenants which had standard split type units. The server room was also kept to individual split type units to maintain system integrity and also keep install costs in check.

There was a considerable fresh air requirement for this building and to ensure the 'energy efficiency' theme was carried through, City Multi Y Series condensing units were teamed up with the new AHU controller fitted to a purpose build air handler providing all of the fresh air, pre heated, as there is unlikely to be the need to pre-cool air here!

An AG-150A provides central control functions on this site and with the addition of a DIDO controller also took care of switching the various extract fans too. The site required power logging and power apportionment billing so a TG2000 PC was included. Just to top of the controls there was also a BMS on site so we provided a BACnet interface as well.









**Black Diamond Technologies**

Exclusive distributor of Mitsubishi  
Electric products in New Zealand.

**AUCKLAND**

**// LOCAL OFFICE**

Unit 1, 4 Walls Road  
PO Box 12726  
Penrose, Auckland 1642

Phone (09) 526 9347  
Fax (09) 526 9369

**WELLINGTON**

**// HEAD OFFICE**

1 Parliament Street  
PO Box 30772  
Lower Hutt 5040

Phone (04) 560 9147  
Fax (04) 560 9133

**CHRISTCHURCH**

**// LOCAL OFFICE**

44 Halwyn Drive  
PO Box 16904  
Hornby, Christchurch 8441

Phone (03) 341 2837  
Fax (03) 341 2838