The Renewable Solutions Provider

Making a World of Difference

Ventilation

Airtech
Air Conditioning & Building Services

MITSUBISHI ELECTRIC

Air Conditioning | Heating
Ventilation | Controls

Why do we need fresh air ventilation?

Poor indoor air quality can be attributed to many problems inside a building. Excess humidity causes dampness, rot and mould, whilst pollutants are known to be a major cause of damaging health issues such as asthma and eczema. Stale air is also believed to lead to a loss in productivity and low morale.

As the demand for improved energy efficiency results in increasingly airtight buildings, natural ventilation proves less effective and drives the need for mechanical ventilation. With increasing legislation, the challenge for designers, installers and occupiers of any building is to find a ventilation solution that's both effective and energy efficient.

Mitsubishi Electric meets this need with a range of ventilation products covering mechanical ventilation with heat recovery units (MVHR), air handling units (AHU's) and AHU control interfaces. These systems have been designed to deliver a fresh air supply to a building whilst simultaneously extracting stale air in the most energy efficient manner possible through utilising heat recovery technology.

The name Mitsubishi is synonymous with excellence

Founded in 1921, Mitsubishi Electric is now a global, market leading environmental technologies manufacturer. In the UK, we provide pioneering solutions that heat, cool, ventilate and control our buildings in some of the most energy efficient ways possible."

We believe that global climate challenges need local solutions. Our aim is to help individuals and businesses reduce the energy consumption of their buildings and their running costs.

At Mitsubishi Electric we have evolved and today we offer advanced environmental systems that really can **make a world of difference**.

*1 Source: The World Health Organisation

With 90%[*1] of our time spent indoors, good air quality within buildings is vital

Legislation - driving the need for effective ventilation

In line with Government targets, changes to building regulations have been introduced to improve energy efficiency and reduce carbon emissions.

Part L

Part L of the Building Regulations calls for buildings to be more airtight and energy efficient.

As a result, maintaining good indoor air quality through effective ventilation is vital and MVHR & AHU's are perfectly placed to achieve this in an energy efficient manner. Part L gives guidance on the maximum amount of electricity that an air distribution system should use and more specifically what the fan motors in a unit should use, known as Specific Fan Power (SFP).

Furthermore, figures for minimum energy efficiency for heat exchangers in heat recovery ventilation systems are outlined for non-domestic buildings. Currently Part L calls for heat recovery systems with plate heat exchangers, installed in non-domestic buildings, to be at least 50% efficient.

Part F

Part F of the Building Regulations focuses on ventilation systems and indoor air quality in both domestic and commercial buildings.

It covers all aspects of specifying and designing a ventilation system and gives guidance on installation, commissioning, operation and maintenance.

Minimum ventilation rates are also advised within the document, e.g. a minimum air supply rate of 10l/s/person (litres per second, per person) is advised in offices.

ErP Directive

The Ecodesign Directive for Energy Related Products (ErP) is European legislation adopted in 2009 to improve the environmental performance of any products that use energy or that are related to energy consumption.

All fans, including those integrated into other products, with an electrical power input between 125W and 500kW are subject to this legislation which has been implemented over two stages. The implementation of the first stage took place on the 1st January 2013 and set out the first tier of minimum energy efficiency requirements.

The second stage has been effective since the 1st January 2015 and called for a higher level of minimum energy efficiency requirements for fans.

Mechanical ventilation with heat recovery can help reduce overheating in buildings and decrease both heating and cooling loads

Lossnay - the perfect solution from Mitsubishi Electric

Mitsubishi Electric utilises Lossnay heat recovery paper cores within its MVHR and packaged AHU systems to provide excellent ventilation alongside a heating and/or cooling system, ensuring a healthy and comfortable environment, whatever the building.

Developed and refined over the past 35 years, our Lossnay heat exchanger cores have perfected mechanical ventilation with the recovery of heat energy that would have otherwise been wasted. This helps to reduce overall energy costs by extracting stale air and then recovering the heating or cooling energy to either warm or cool incoming fresh air.

The benefits of Lossnay include:

- **Clean, fresh air**
- **Improved air quality and comfort**
- **Increased climate control**
- **Energy efficient heat recovery**
- **Reduced energy bills**

Utilising recoverable energy, **Lossnay is able to save up to 30%** on the capital outlay by reducing the heating and cooling loads within an occupied space

How **Lossnay** works

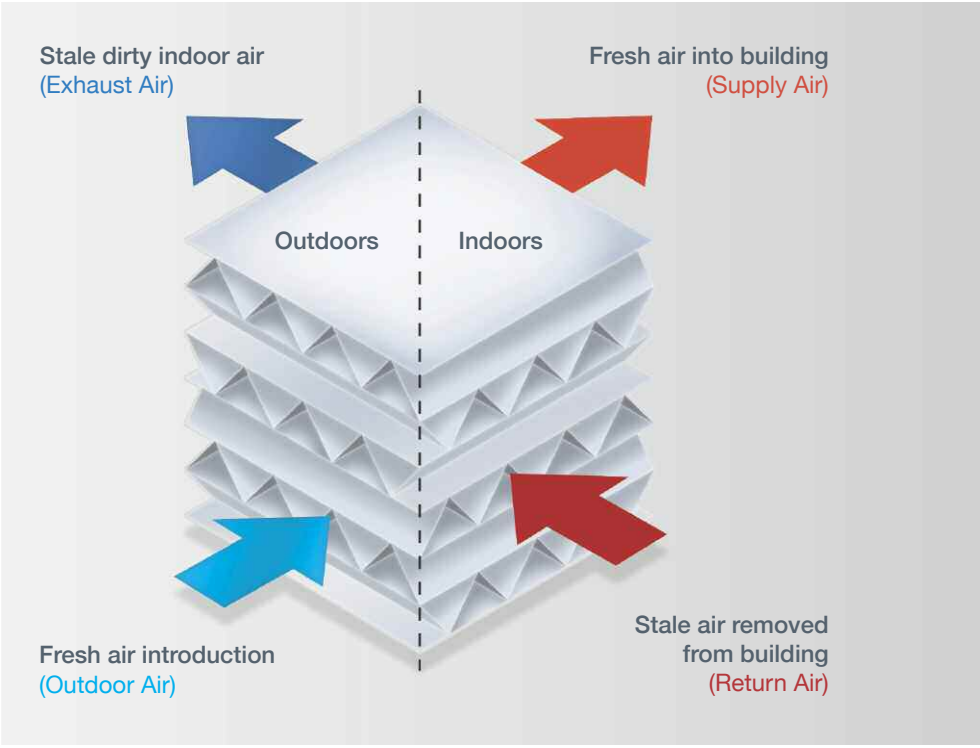
The technology behind the energy efficiency of the Lossnay core lies in its construction, which enables exchange of both latent heat (humidity/moisture) and sensible heat (temperature) to maintain a comfortable internal environment with minimal energy consumption.

The Lossnay core is made from ultra-thin paper and sits at the heart of the system. Constructed in a corrugated form and layered in alternate directions, the core allows a cross airflow to maximise heat recovery without the supply and exhaust air mixing, ensuring only fresh air is introduced into a building.

The use of ultra-thin paper enables the unit to achieve high enthalpy exchange efficiency and dramatically increases moisture permeability, whilst acting as a barrier against air leakage.

As stale air is extracted from a building, heat energy is recovered through the Lossnay paper core and transferred to the incoming fresh air

Lossnay's Dynamic Paper Heat Exchanger Core

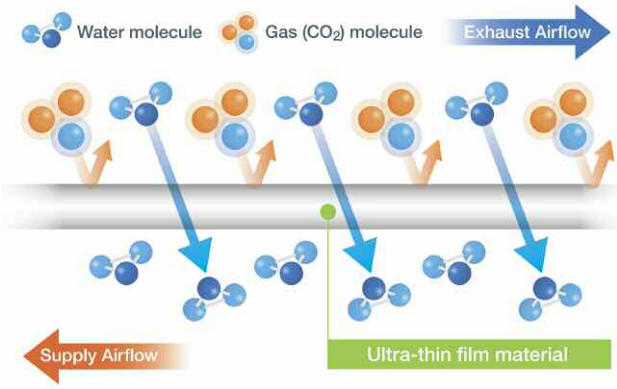


How **Lossnay** works

Energy efficient ‘Hyper-Eco’ paper core

The Lossnay core is essentially a diaphragm made of specially processed paper which fully separates the inlet and exhaust air supplies, ensuring that only fresh air is introduced to the indoor environment.

The microscopically small pores of the diaphragm decrease the rate at which water soluble gases, such as ammonia and hydrogen, pass through. The specially processed paper used to make the core has been developed with high moisture permeability characteristics which aids the transfer of moisture and improves the effectiveness of shielding unwanted gases, resulting in highly efficient energy transfer.



The paper used in the Lossnay core is one of the thinnest in the world

The benefits of **Lossnay**

Traditional plate heat exchangers use plastic or metal cores which only allow sensible heat recovery; Lossnay paper cores allow total heat recovery including both sensible and latent heat.

Sensible heat is transferrable heat that causes a rise or fall in air temperature. Latent heat is transferrable heat that causes a change in the humidity level or moisture content in the air, and it's this latent heat transfer that enables the Lossnay core to recover more heat energy than a 'sensible only' heat exchanger. This is because water has a higher specific heat capacity than air, meaning it can transfer, or recover, more heat than air.

Total heat exchangers provide a comfortable air temperature within a room. The energy saved by using Lossnay contributes towards lowering the heating or cooling requirement within the building, therefore reducing the energy consumption and running costs.

Further benefits of total heat exchangers include:

- **Pre-cooled / pre-heated fresh air**
- **Controlled humidity levels**
- **Dry eye and dry throat prevention**
- **Static reduction**
- **Higher heat transfer efficiency**

Lossnay Mechanical Ventilation with Heat Recovery (MVHR)

Our range of Lossnay MVHR units have been developed to suit both commercial and domestic applications and have Lossnay total heat exchanger cores within them, ensuring effective fresh air ventilation whatever the building type.

Lossnay VL-100

The wall mounted VL-100 total heat exchangers are suitable for single room applications such as small offices and homes.

These compact and easy-to-install units offer a supply of fresh clean air alongside the removal of stale air, efficiently recovering the heating / cooling energy in the process. This enables a fresh, clean and healthy internal environment to be maintained whilst reducing heating / cooling costs.

DC Lossnay

The DC Lossnay unit benefits from DC fan motors which consume minimal energy, allowing for highly efficient, effective fresh air ventilation.

The fan motors have also been designed to operate at low noise levels making them particularly suitable for schools, offices and homes. With five different fan speeds, a free cooling function and the option of integrating with a CO_2 sensor, the DC Lossnay units operate to maximise air quality and occupant comfort in an energy efficient manner.

Lossnay RVX

With nine sizes available, the Lossnay RVX MVHR units cover a wide range of air volumes making them suitable for most commercial applications.

These highly efficient total heat exchangers utilise the Lossnay heat recovery core to provide fresh air to a building, whilst removing stale air and pollutants with minimal heat lost. Efficiency is further enhanced with the units using highly efficient DC fan technology. Energy saving features such as the free cooling function, which lowers the cooling demand of a building and therefore saves on running costs, also enable increased efficiency.

Lossnay RVX - High Efficiency DC Fan Motor

The new Lossnay RVX units incorporate DC fan motors. Benefits of this include:

1. **Reduced power consumption**
2. **Reduced Specific Fan Power (SFP)**
3. **Greater energy saving**
4. **Wider range of air volume**

Low Power Consumption

The adoption of more efficient DC fan motors means that the new Lossnay RVX units are able to offer a significant reduction in power consumption.

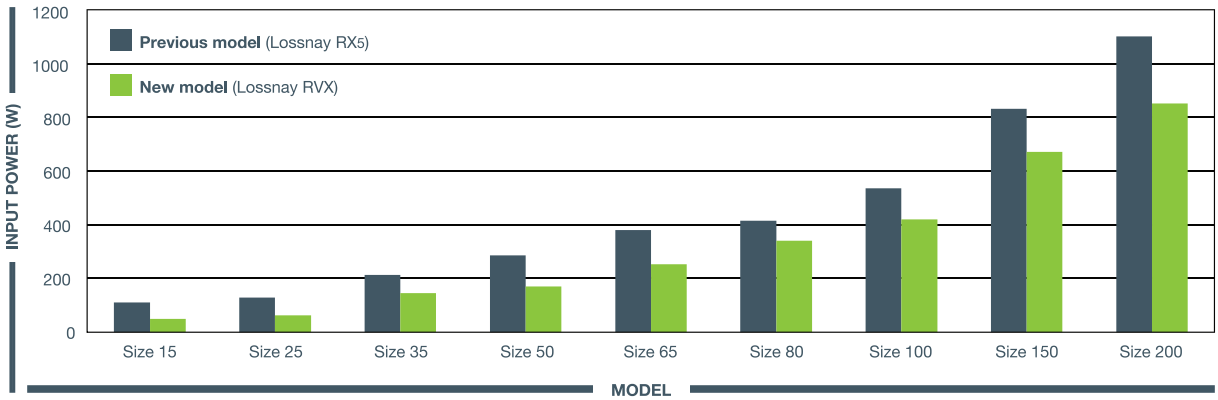
Low Specific Fan Power

This reduction enables the Lossnay RVX units to benefit from significantly lower SFP's. With SFP's ranging from as low as 0.30 W/(l/s) up to a maximum of 1.61 W/(l/s) across the entire range, the Lossnay RVX units comply with Building Regulations and legislation, saving energy and reducing carbon emissions.

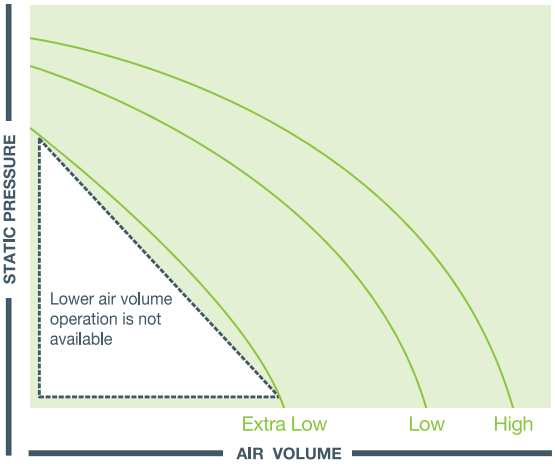
Improved Air Volume

The new units benefit from a wider range of air volumes, with four distinct and selectable fan speeds compared to the three fan speeds on the previous models. Each fan speed is 25%, 50%, 75% and 100% of the rated air volume of each unit, allowing more precise air volume control.

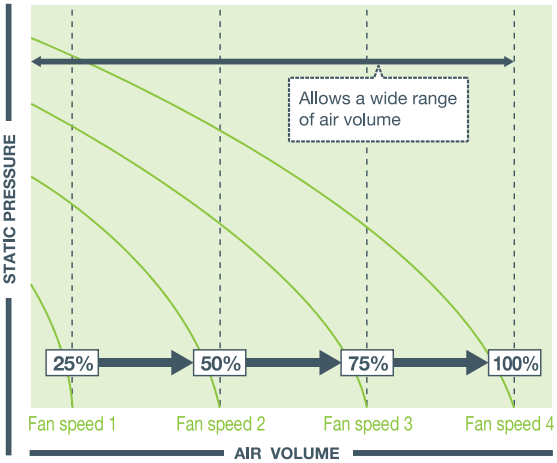
COMPARISON BETWEEN NEW RVX AND PREVIOUS RX5 POWER CONSUMPTION (New Model: Fan speed 4, Previous Model: Extra High)



PREVIOUS LOSSNAY RX5 MODEL FAN CHARACTERISTIC CURVES



NEW LOSSNAY RVX MODEL FAN CHARACTERISTIC CURVES



PZ-61DR-E Remote Controller

The design of the new PZ-61DR-E Lossnay controller has been unified with our PAR-31MAA air conditioning controller, including a full-dot backlit LCD screen making it easy to view and use.

The controller has a vast range of new functionality allowing for flexibility on application and increased energy saving.

An example of this, the weekly timer function (shown below) now allows all four fan speeds to be programmed into the schedule, not just at different times of the day but also for different days of the week.

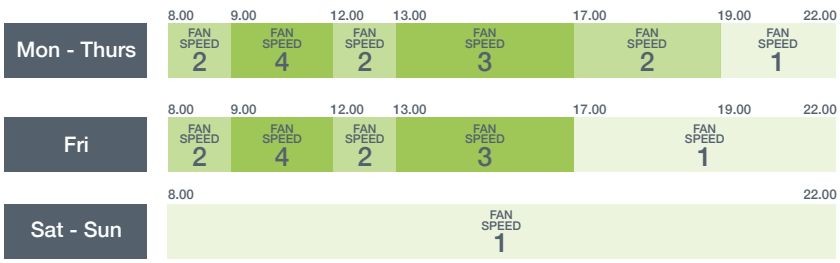
During summer nights the night purge function of the Lossnay units allows cooler fresh air to be brought into the building via the bypass damper to reduce internal temperatures and cool the building fabric, therefore reducing the load on the air conditioning system the next morning. This function on the new RVX units has been made more flexible whereby, it is now possible to select the operation start conditions, air volume and operation time to suit different applications.

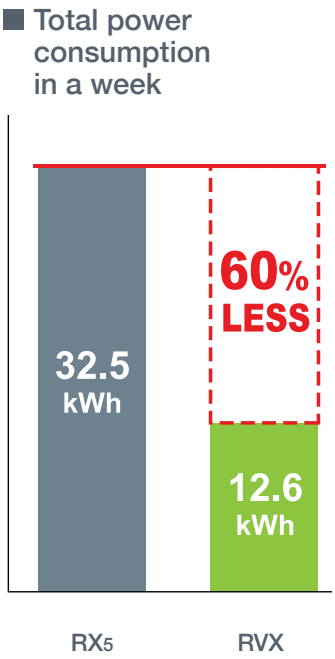
Auto ventilation mode, a function which automatically switches the Lossnay units between heat recovery mode and bypass mode dependent on indoor and outdoor conditions, has also been improved and now includes a 'free' setting allowing the conditions of bypass mode to be individually selected for each application. This is in addition to the two existing pre-defined factory settings.

Example: Weekly Timer Function

Fan speeds - Previous Lossnay RX5 Model (3 fan speeds)

Fan speeds - New Lossnay RVX Model (4 fan speeds)



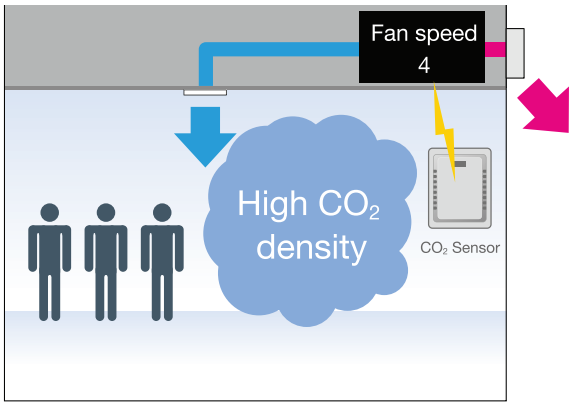


*Comparison of LGH-100RX5-E and LGH-100RVX-E

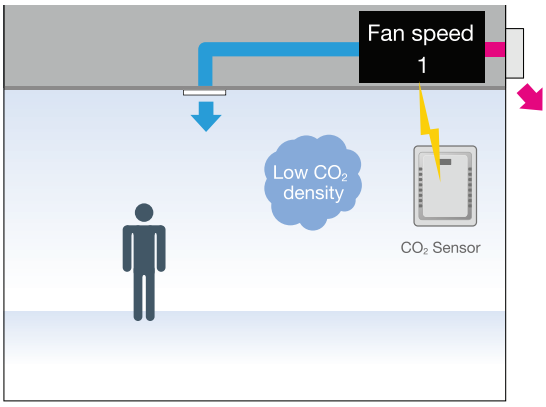
Third Party Connection

Connection to the PCB of a third party pre/post-heater with operation functionality is now available. Additionally external fan speed control using 0-10V DC signal is possible across all four fan speeds, automatically allowing fan speed control using a third party CO_2 sensor of a Building Energy Management System (BEMS).

■ Fan speed 4

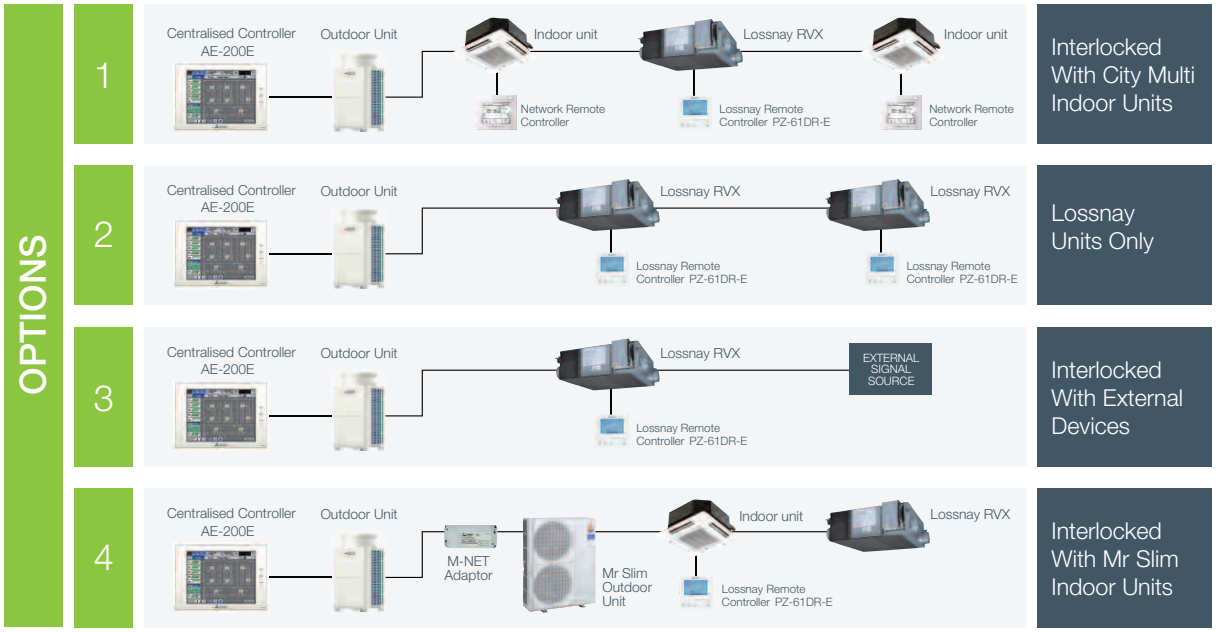


■ Fan speed 1

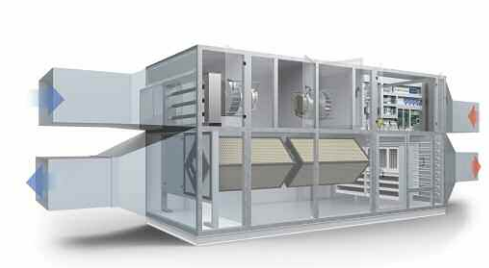


Centralised Control

As well as being able to interlock with Mitsubishi Electric Mr Slim and City Multi air conditioning systems, the new Lossnay RVX units can be centrally controlled using an AE-200E centralised controller with optional energy monitoring functionality.



Lossnay Kanzen Air Handling Units (AHU)



The Lossnay Kanzen range of units are highly efficient packaged Air Handling Units (AHU's) that provide a tempered fresh air supply to commercial buildings alongside an air conditioning system.

The AHU's are connected to Mr Slim Power Inverter heat pump units, allowing fresh air to be heated or cooled via a DX coil before being supplied to the internal environment as required. With the added benefit of total heat recovery using the Lossnay cores and a fully integrated controls package, Lossnay Kanzen AHU's are designed to operate at peak efficiency.

The Lossnay Kanzen units offer a free cooling function whereby in cooling mode, at a certain preset temperature, the AHU will stop the operation of the outdoor units and open the bypass damper to allow cooler ambient air to bypass the Lossnay cores and lower the internal temperature of the building, reducing the load on the air conditioning system.

With an integrated controls system that includes an interface that uses M2M technology, the Lossnay Kanzen units offer a high level of in-built control to ensure that the demand for a comfortable supply of fresh air within a building is met, whilst making sure that the units are working in the most energy efficient manner possible.

BEMS control of the Lossnay Kanzen units and up to 49 City Multi indoor units (On/Off, Mode, Setpoint, Fault and Return Air) via the AE-200E centralised controller is also possible.

Available in 5 different sizes and with a large range of optional extras, the Lossnay Kanzen units are customisable and therefore suitable for most commercial applications

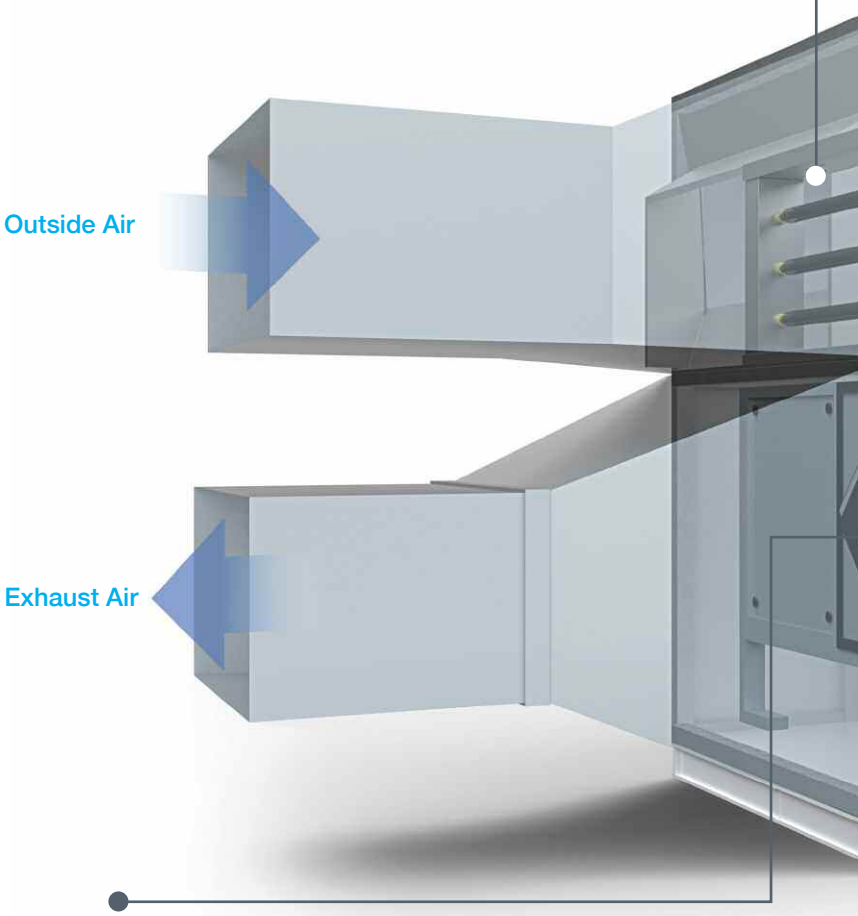
Kanzen

Standard Lossnay Kanzen AHU Package

Kanzen

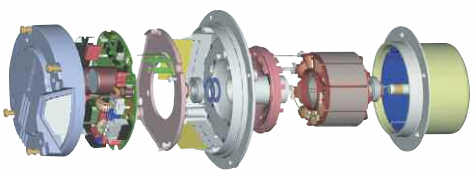
Pre-heater

- Activated at external temperatures from 0ºC to -5ºC
- Modulated control



Electric Motor

- High efficiency adjustable E.C. electric motor
- Low noise electronic switching technology
- Motor mated directly to external fan rotor

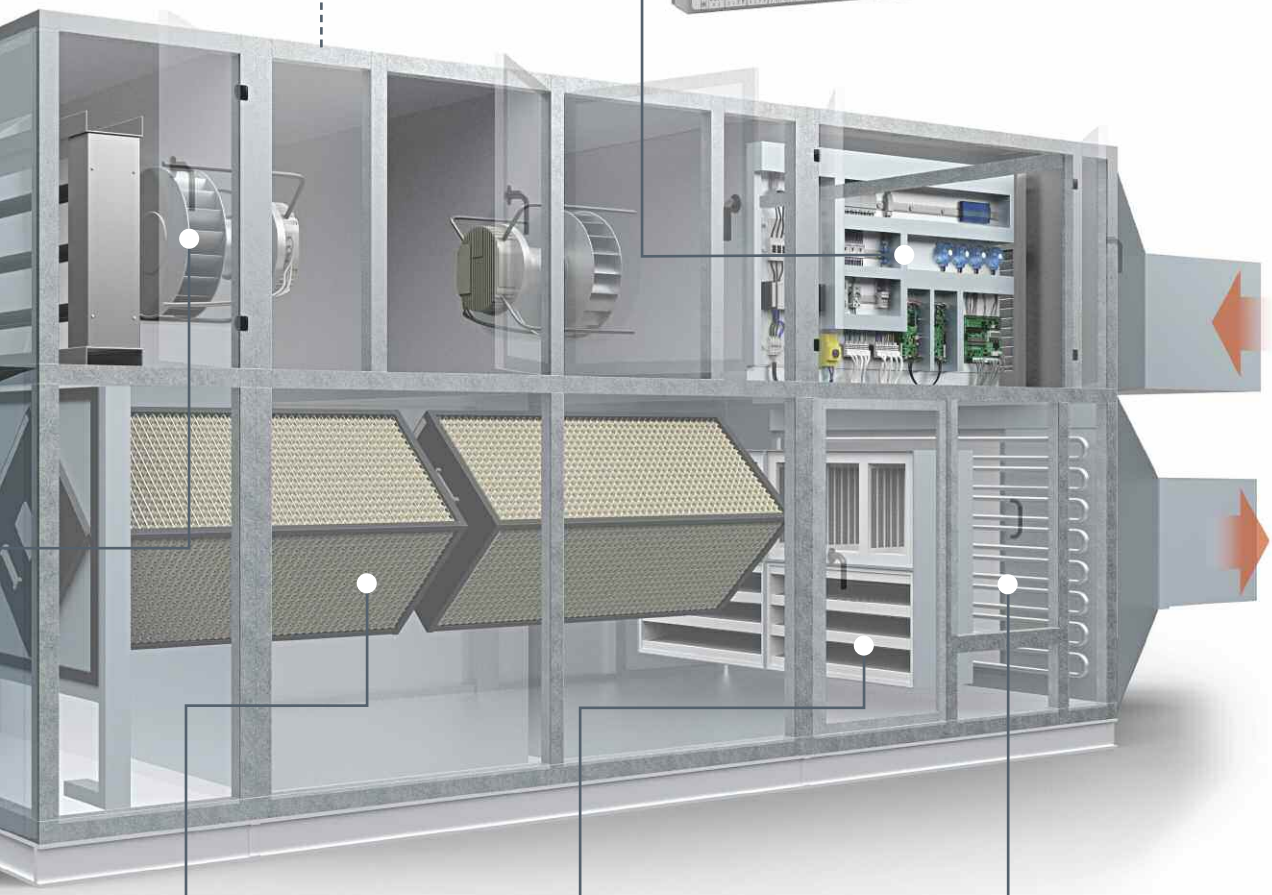


Free Cooling Damper

- Free cooling & night purge shutter
- Energy saving feature that uses cool outdoor air to lower the internal temperature

Integrated Controls System

- Electronic panel with integrated regulation systems
- Blue light backlit display
- Operating parameters display
- Error display
- Optional ON/OFF and time-clock schedule using AE-200E and PAC-YG66DCA
- Control interface that uses M2M technology
- BEMS control available



Lossnay Core

- High efficiency Lossnay core
- Total heat recovery (sensible & latent)
- Cross-flow plate fin structure
- Paper core

High Efficiency Active Carbon Filter Section

- F7 active carbon bag filter upstream of the DX coil
- G4 filters (outdoor air & return air) protect the Lossnay cores

Direct Expansion Coil

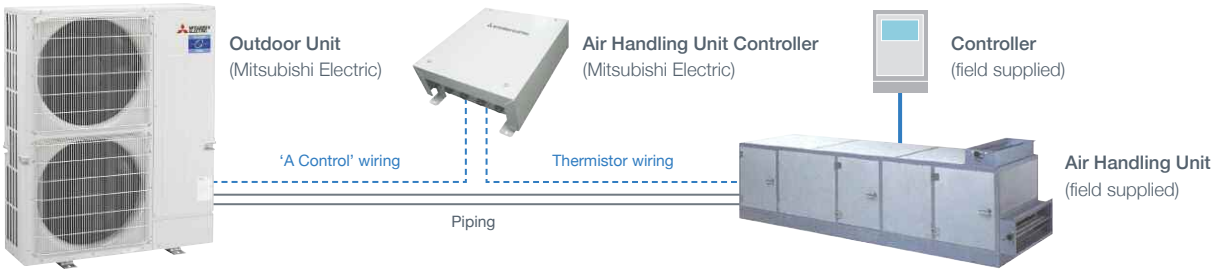
- R410A refrigerant direct expansion coil
- Copper tubing with Blu-Fin V Waffle louver fins in corrosion resistant aluminium
- 46 bar rated pressure

Air Handling Unit Controllers

Mitsubishi Electric's Air Handling Unit Controllers allow further flexibility within our AHU offering. These interfaces allow connection to third party manufacturer AHU's and can be used in conjunction with Mr Slim outdoor units, providing an ideal, energy efficient solution when a unique AHU application is required.

Mr Slim Air Handling Unit Controller (PAC-IF012B-E)

The Mr Slim AHU interface is controlled using either a supply or return air temperature and works in conjunction with Mr Slim outdoor units. With auto-step control available, the units work to meet the demand on the system precisely in the most energy efficient manner possible.



Ventilation Applications and Case Studies

Domestic Applications

Maintaining a healthy and comfortable environment within our homes.

Providing fresh air into our homes is essential for ensuring a high level of air quality and therefore a healthy and comfortable internal environment.

The causes and effects of poor ventilation are becoming increasingly well known and modern construction techniques mean that new build homes are highly airtight, making it difficult for air to enter or leave naturally. As a result indoor air quality has significantly deteriorated leading to higher rates of asthma, allergic rhinitis and eczema.

If it's Lossnay MVHR

- Lossnay MVHR units work to provide fresh air whilst simultaneously extracting stale air, allowing a high level of indoor air quality to be maintained at all times
- Minimal heat loss due to total heat recovery using the Lossnay cores - enables the heating system to run less, reducing running costs
- Free cooling energy saving function allows fresh cool air to bypass the Lossnay core and cool the internal environment during summer months
- Quiet operation due to high efficiency fan motors allows the system to run in the background with minimal disturbance

Lossnay

Case Study

5 Bedroomed Home, Northumberland

DC Lossnay provides a renewable energy solution to poor air quality

Faced with the problem of overheating and poor air circulation at night within this 5 bedroomed home, the owners sought to improve the air quality throughout their home.

Their chosen solution was a DC Lossnay system from Mitsubishi Electric which was installed to provide clean, fresh air throughout the home with minimal heat loss and running costs.

Installation Summary

5 bedroom house in Northumberland

DC Lossnay mechanical ventilation heat recovery unit installed

The homeowner benefited from improved air quality and reduced running costs

The unit was installed in the loft area of this 207m^2 property in a day, including the installation of all ductwork and supply and extract grilles. The bedrooms and bathrooms now benefit from a constant fresh air supply through the supply grilles, whilst the stale air is removed via the extract grilles.

Due to its low energy consumption (19W at low fan speed), the DC Lossnay runs most of the time maintaining a clean, fresh internal environment with humidity control.

Barely audible at low speed and extremely quiet at high speed, the DC Lossnay significantly improves air quality in the home with hardly any noise disruption.

> “We are highly satisfied with the installation which runs quietly in the background and definitely recovers energy we would otherwise be throwing away.”

DC Lossnay has a bypass mode for when the outside air is lower than the internal temperature, meaning freely available cooler outdoor air can be used to supply fresh, cool air into the home.

Further cost savings were made by linking the Lossnay bypass function to a (previously installed) Mitsubishi Electric Ecodan heat pump in this home to maximise heat recovery whenever the heating is running.

School Applications

Creating the best possible environment for our children to succeed.

No matter how good a school's curriculum, no matter how positive and enthusiastic the teacher, a child who does not feel well will have a hard time learning.

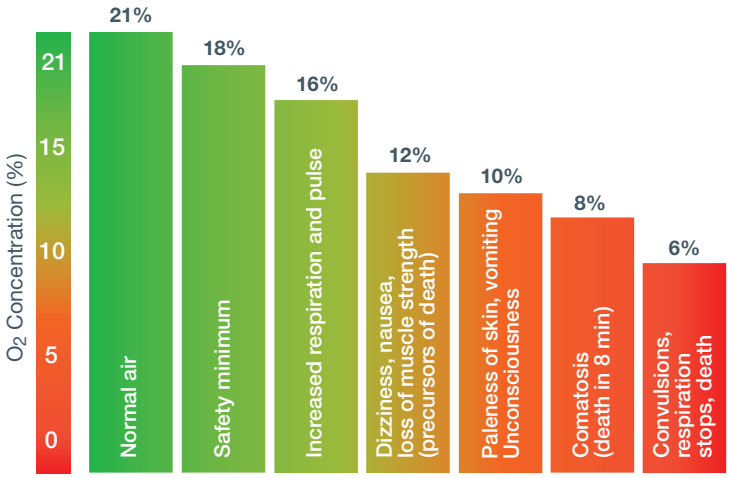
A constant flow of fresh air is essential in our schools. In classrooms where large numbers of students are gathered for long periods of time, carbonic gases have the tendency to accumulate, decreasing the levels of oxygen that are vital for alertness and concentration.

This is especially true during the winter months when windows tend to remain closed. Lossnay MVHR units ventilate fresh outdoor air into classrooms to replenish the supply of oxygen and expel not only carbon dioxide, but also other pollutants and odours that inevitably sully the air.

If it's Lossnay MVHR

- The continuous influx of fresh, outdoor air and the exhaust of stale, indoor air ensure that the indoor oxygen level is maintained at just the right balance for comfort and health
- Occupants have the luxury of breathing fresh air at all times, even in highly air-tight buildings
- The Lossnay core's sound attenuation qualities prevent outside noise from penetrating into the room, helping to maintain a quiet environment for productive study
- Heat-exchange technology prevents fluctuations in temperature and humidity, creating significant energy savings when either heating or cooling a room

O_2 Concentration and Deficiency



Lossnay

Case Study

Chapelford Village Primary School

School aims to score ‘Very Good’ in BREEAM rating with heat recovery technology

A new state-of-the-art Primary School has opened its doors in Cheshire to offer pupils and staff a fresh, comfortable and highly energy efficient place of learning.

Chapelford Village Primary School, near Warrington is a £4.3 million building project which has relocated the existing and aging facility at nearby Sycamore Lane Primary.

Installation Summary

New state-of-the-art Primary School in Cheshire

£4.3 million building project

18 x LGH-100 Lossnay mechanical heat recovery ventilation units installed

4 x Ecodan CAHV heat pumps and 6 x Mr Slim air conditioning units installed

The entire building has been constructed to the latest standards of thermal insulation to ensure it is energy efficient, with the local authority targeting a ‘Very Good’ BREEAM rating.

Modern buildings are almost airtight and this can lead to problems with the build-up of stale air. For Chapelford, this has been solved with the installation of 18 LGH-100 Lossnay mechanical heat recovery ventilation units. These keep the classrooms full of fresh air, without wasting all the energy used to heat the spaces.

The LGH-100 works by extracting up to 80% of the heat energy from the outgoing air and transferring it to heat up the incoming air flow. This significantly reduces the amount of energy needed to bring the fresh outdoor air up to room temperature and keeps the classrooms fresh and airy all year round.

A bypass mode also allows cool fresh air to be introduced during the hot summer months effectively giving the classrooms free cooling during the summer term.

The school is also benefiting from four Ecodan CAHV heat pumps which heat the building’s underfloor heating system. Six Mr Slim air conditioning units are also installed in various hot spots throughout the school, such as the server room and the teachers’ common room.

Office Applications

Fresh air - improving the overall quality of working life.

Many office buildings are heavily insulated, air-tight structures with little or no natural ventilation. The unnatural environment created by air conditioners without added ventilation can be a breeding ground for bacteria. Factor this in with the accumulation of pollutants and odours in the form of formaldehyde, pollen, dust, carbon dioxide and the necessity of ventilation becomes ever more apparent. In fact, poorly ventilated buildings can give rise to Sick Building Syndrome, a malady that is known to cause headaches, sore eyes, itching and loss of concentration.

This results not only in discomfort at best and sickness at worst for the building's occupants, but also the reduced productivity of the workforce. Fresh air, effectively ventilated throughout the building is therefore essential to the overall quality of working life.

If it's Lossnay Kanzen AHU's

- Lossnay Kanzen units work alongside the building's air conditioning to provide a tempered fresh air supply whilst exhausting stale, pollutant air to the outside, maintaining a healthy and comfortable internal environment
- Advanced technology such as Lossnay total heat recovery cores, Mr Slim Power Inverter outdoor units and M2M control ensure a highly efficient and cost saving operation
- Free cooling is available which enhances energy efficiency and allows cool outdoor air to be introduced into the indoor environment, reducing the air conditioning load
- A large number of optional extras allow the units to be customisable to suit different office applications

Lossnay

Case Study

Office Building - Hatfield

New approach allows significant energy savings

The Mitsubishi Electric range of Lossnay Kanzen AHU's can deliver significant energy savings and offers features as standard that are only available as add-ons with other air handling units.

At Mitsubishi Electric's Hatfield headquarters the Lossnay Kanzen system has been used to replace the existing chiller / boiler AHU system, and is one of the reasons that the office block has gone from an energy rating of 'E' to a 'B' rated building.

The 3-storey, 1980's, steel-framed, fully glazed building means that natural ventilation is difficult to install, and the potential exists for the build-up of stale air, leading to sickness and tiredness in the 300 office workers.

Installation Summary

1 x LK-1000 & 1 x LK-1250 Lossnay Kanzen AHU's installed

Replaced existing chiller and gas boiler AHU system

AHU's work alongside the buildings VRF air conditioning system to provide a fresh air supply in an energy efficient manner

Two Lossnay Kanzen units were installed in the plant room on the roof to work alongside the building's existing City Multi VRF air conditioning system. Lossnay Kanzen offers complete flexibility of configuration and for the Hatfield installation, the units were broken down into six sections to allow easy delivery to the rooftop plant room.

The long ductwork runs needed within the building meant that the units were customised with optional high static pressure fans to best suit the office environment, and the Lossnay Kanzen now provides tempered fresh air onto the back of the local fan coil units.

The unique Lossnay core at the heart of the system allows for the recovery of both latent and sensible heat from the outgoing air ensuring the highest levels of efficiency and freshness. The reverse is also true in that the Lossnay core can cool the incoming air during particularly hot days. Further efficiencies are available through the use of the free cooling damper, this damper is opened when the building is in cooling mode and the outdoor temperature is lower than the building setpoint. By allowing the return air to exhaust through this damper, prior to entering the Lossnay core, no heat is transferred to the incoming air thus reducing the cooling load requirement.

Both the Lossnay Kanzen and the VRF air conditioning system's fan coil units are controlled by a Modbus BEMS, which is a standard offering with this new AHU range. Overall, the system is working much more efficiently than the previous chiller and gas boiler AHU system and the building's occupant's benefit from a controlled, constant supply of fresh air to deliver the best possible working environment.

Restaurant Applications

A restaurant can never be too clean and its air never too fresh.

The atmosphere of a restaurant is crucial to securing and retaining customers. Cleanliness is the key to an attractive atmosphere and restaurants devote significant effort to ensuring their premises are as such. Sanitation and cleanliness, however, are not enough.

No matter how clean a restaurant may look, if there are unwanted odours lingering in the air, all those efforts go to waste and the restaurant's clean image is tarnished.

Flexibility when designing a system is also key, as fresh air requirements vary depending on the type of restaurant and its layout. Mitsubishi Electric's Air Handling Unit Controllers allow restaurants to benefit from a fresh air supply and a pleasant environment for guests at all times, whilst enabling flexibility on design to ensure that the ventilation system is best suited for each restaurant's fresh air requirement and unique attributes.

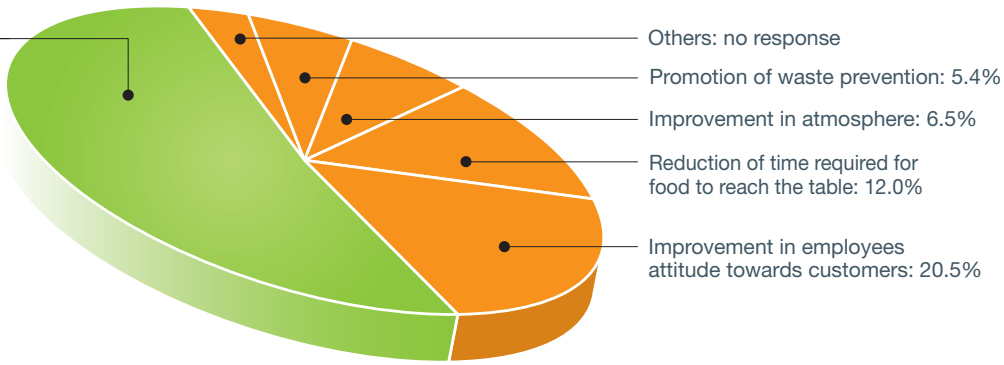
If it's Air Handling Unit Controllers

- DX coils within third party AHU's are connected to Mitsubishi Electric heat pump outdoor units ensuring energy efficient operation
- Able to connect to third party AHU's, the Mitsubishi Electric AHU controllers are suitable for a large number of commercial applications
- Units work to remove stale air from the kitchen and dining areas and supply fresh, clean air

What would you most like to see improved in restaurants?

52.3%

Improvement in overall cleanliness



1996 Foodstuffs Consumption Monitor, Second Periodic Survey
(Ministry of Agriculture, Forestry and Fisheries, Japan)

McDonald's ventilation system has cut restaurant running costs by over £4,500 per year

McDonald's Restaurants Ltd are using a new heating and ventilation system that has cut running costs by over £4,500 a year for each site, whilst also significantly reducing carbon emissions and improving the indoor environment for customers.

The unique Air Handling Unit (AHU) solution has been developed by manufacturers Mitsubishi Electric and Nordair Niche for McDonald's Restaurants Ltd, which has over 1,200 sites in the UK.

"We have three and a half years of data and we now know that performance exceeds what Mitsubishi Electric and Nordair Niche said it would do at the design stage"

Dave Holden
Capital Investment Manager for McDonald's Restaurants Ltd Service Department.

Installation Summary

AHU system linked to Air Source Heat Pumps
Replacing traditional gas-fired or electric rooftop packages
Over £4,500 running cost reductions per site
2 year payback period

Nearly 250 restaurants now have the new Air Handling System, with each delivering an average 35 per cent reduction in energy consumption for cooling, heating and ventilation, with the added benefit of free cooling. McDonald's Restaurants Ltd is converting around 100 more sites each year as existing equipment ages.

When Mitsubishi Electric and Nordair Niche agreed to work together McDonald's Restaurants Ltd gave them a wish list of requirements. Between our two companies, we then developed an innovative solution that would reduce running costs, be transferable across sites and improve customer experiences.

By combining Nordair Niche's IDF Air Handling Units with Mitsubishi Electric's Air Source Heat Pumps, all controlled by a Trend Building Energy Management System, we were able to achieve maximum operating efficiency.

McDonald's Restaurants Ltd conducted two trial sites before committing to the system. "Our own trial data demonstrated that the new system gave each restaurant an annual cost saving of £4,515 per year and emits on average 20 tonnes less CO_2," said Dave Holden.

The systems initial capital outlay is more expensive than the previous system, however due to the efficiencies in the system the payback is a little over 2 years*3.

The solution was designed to accommodate a variety of standard sized Air Handling Units previously installed so that the replacement solution could be rolled out across all restaurants. This provides savings for McDonald's Restaurants Ltd and comfortable environments for its customers.

*3 Based on the average site requiring four Mr Slim, PUHZ-RP200 condensing units across two 120 Nordair Niche AHUs

Technical Specifications

Lossnay VL-100

The wall mounted VL-100 single room total heat exchangers are particularly suited to small offices which require the introduction of fresh, clean air along with removal of stale air with minimal heat loss.

Key Features

- Effective fresh air ventilation
- Efficient recovery of heating / cooling energy
- Improved air quality & comfort
- Good sound attenuation
- Reduces heating / cooling costs
- Low power consumption
- Simple installation
- Low maintenance

MODEL		VL-100(E)U$_5$-E
ELECTRICAL POWER SUPPLY		220-240v, 50Hz
PHASE		Single
POWER CONSUMPTION (W)	Low	17
	High	34
AIRFLOW (m^3/h)	Low	61
	High	106
SOUND PRESSURE LEVEL (dBA)	Low	27
	High	38
TEMPERATURE EXCHANGE EFFICIENCY (%)	Low	79
	High	72
WEIGHT (kg)		7.5
DIMENSIONS (mm)	Width	620
	Depth	200
	Height	265
DUCT SIZE (mm)		2 x Ø75
FUSE RATING (BS88) - HRC (A)		6
MAINS CABLE No. Cores		3

Notes:
The VL-100U$_5$-E includes a pull cord switch to control the unit.
The VL-100EU$_5$-E is available without a pull cord switch and with the option to fit a field supplied external wall switch.
Extension pipe kit available as an optional extra.

Product Information

LGH-50RSDC-E1

DC Lossnay

The DC Lossnay is ideal for schools, homes and offices.

The efficient DC fan motors are highly robust and designed to consume minimal energy to ensure the highest levels of efficiency and control with quiet operation whatever the fan speed.

Key Features

- Effective fresh air ventilation
- Efficient recovery of heating / cooling energy
- Hyper Eco Paper Core facilitates total heat exchange (both sensible and latent heat)
- Reduces heating / cooling costs
- Improved air quality & comfort
- DC fan motors - low power consumption & low noise
- 5 variable fan speeds
- Bypass mode for 'free cooling', including new power bypass mode to supply a greater volume of fresh, cool air - for instance during summer nights
- Low maintenance
- Fan speed optimisation based on CO_2 levels using the Procon Lossnay-5-FSC interface accessory
- Listed on the Product Characteristics Database (PCDB) under SAP Appendix Q
- ECA eligible (Lossnay core only)

MODEL		LGH-50RSDC-E1										
ELECTRICAL POWER SUPPLY		220-240v, 50Hz										
STARTING CURRENT (A)		2.5										
VENTILATION MODE		LOSSNAY					BYPASS					
FAN SPEED		1	2	3	4	5	POWER	1	2	3	4	5
INPUT POWER (W)		165	90	41	22	14	265	164	90	40	21	14
AIRFLOW (m^3/h)		395	305	215	144	90	468	395	305	215	144	90
AIRFLOW (l/s)		110	85	60	40	25	130	110	85	60	40	25
EXTERNAL STATIC PRESSURE (Pa)		100	60	30	15	7	135	100	60	30	15	7
SOUND PRESSURE LEVEL (dBA)		31	26.5	21	18	18	35	31	26.5	21	18	18
TEMPERATURE EXCHANGE EFFICIENCY (%)		77.5	81.5	85.5	88	90	-	-	-	-	-	-
ENTHALPY EXCHANGE EFFICIENCY (%)	Heating	71	75	79	82	84	-	-	-	-	-	-
	Cooling	68	72.5	77	80.5	83	-	-	-	-	-	-
WEIGHT (kg)		48										
DIMENSIONS (mm)	Width	1099 + 73										
	Depth	898										
	Height	302										
DUCT SIZE (mm)		200										
FUSE RATING (BS88) - HRC (A)		6										
MAINS CABLE No. Cores		3										

LGH-RVX
Commercial Series

Lossnay Mechanical Ventilation Heat Recovery (MVHR) systems are designed to supply fresh air into any commercial building, whilst simultaneously extracting stale air and, most importantly, recovering valuable heat energy for maximum efficiency.

Key Features

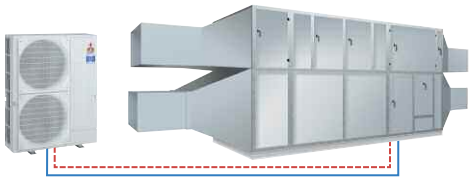
- Clean, fresh air
- Improved air quality and comfort
- Improved climate control
- Reduced energy bills
- Energy efficient heat recovery
- Significantly reduced power consumption and SFP's
- Free cooling function
- Total heat exchange (sensible and latent)

MODEL			LGH15RVX-E	LGH25RVX-E	LGH35RVX-E	LGH50RVX-E	LGH65RVX-E	LGH80RVX-E	LGH100RVX-E	LGH150RVX-E	LGH200RVX-E
ELECTRICAL POWER SUPPLY			220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz
RUNNING CURRENT (A)		SP1	0.10	0.10	0.12	0.13	0.15	0.15	0.17	0.29	0.33
		SP2	0.15	0.16	0.26	0.26	0.39	0.36	0.50	0.70	0.88
		SP3	0.24	0.28	0.54	0.59	0.90	0.83	1.20	1.75	2.20
		SP4	0.40	0.48	0.98	1.15	1.65	1.82	2.50	3.71	4.88
INPUT POWER (W)		SP1	7	8	11	12	15	18	21	38	42
		SP2	14	16	31	32	49	60	75	123	153
		SP3	28	33	70	78	131	151	200	311	400
		SP4	49	62	140	165	252	335	420	670	850
AIRFLOW (m^3/h)*2		SP1	38	63	88	125	163	200	250	375	500
		SP2	75	125	175	250	325	400	500	750	1000
		SP3	113	188	263	375	488	600	750	1125	1500
		SP4	150	250	350	500	650	800	1000	1500	2000
AIRFLOW (l/s)*2		SP1	10	17	24	35	45	56	69	104	139
		SP2	21	35	49	69	90	111	139	208	278
		SP3	31	52	73	104	135	167	208	313	417
		SP4	42	69	97	139	181	222	278	417	556
SPECIFIC FAN POWER (W/(l/s)		SP1	0.70	0.47	0.46	0.34	0.33	0.32	0.30	0.37	0.30
		SP2	0.67	0.46	0.63	0.46	0.54	0.54	0.54	0.59	0.55
		SP3	0.90	0.63	0.96	0.75	0.97	0.90	0.96	0.99	0.96
		SP4	1.17	0.90	1.44	1.19	1.39	1.51	1.51	1.61	1.53
EXTERNAL STATIC PRESSURE (Pa)		SP1	6	5	10	8	8	10	11	11	10
		SP2	24	21	40	30	30	38	43	44	38
		SP3	54	48	90	68	68	85	96	98	84
		SP4	95	85	160	120	120	150	170	175	150
SOUND PRESSURE LEVEL (dBA)		SP1	17	17	17	18	18	18	18	18	18
		SP2	19	20	20	19	22	23	23	24	28
		SP3	24	22	28	28	29	30	31	32	36
		SP4	28	27	32	34	34.5	34.5	37	39	40
TEMPERATURE EXCHANGE EFFICIENCY (%)		SP1	84	86	88.5	87	86	85	89.5	85	89.5
		SP2	83	82	86	83.5	84	84	86.5	84	86.5
		SP3	81	80	82.5	81	81	82.5	83	82.5	83
		SP4	80	79	80	78	77	79	80	80	80
ENTHALPY EXCHANGE EFFICIENCY (%)	Heating	SP1	79	83	83.5	82.5	82	81	87	81	87
		SP2	78	76	78.5	75	76	78	78	78	78
		SP3	75.5	72	74	71	71	73.5	74	73.5	74
		SP4	73	69.5	71.5	69	68.5	71	72.5	72	72.5
	Cooling	SP1	79	83	82	82	81	81	85.5	81	85.5
		SP2	78	74.5	78	72.5	74	78	77	78	77
		SP3	74.5	70	73	68	69.5	72.5	73	72.5	73
		SP4	71	68	71	66.5	66	70	71	70.5	71
WEIGHT (kg)			20	23	30	33	38	48	54	98	110
DIMENSIONS (mm)	Width x Depth x Height		780 x 610 x 289	780 x 735 x 289	888 x 874 x 331	888 x 1016 x 331	908 x 954 x 404	1144 x 1004 x 404	1144 x 1231 x 404	1144 x 1004 x 808	1144 x 1231 x 808
DUCT SIZE (mm)			100	150	150	200	200	250	250	(SA,RA)250 (OA,EA)270 x 700	(SA,RA)250 (OA,EA)270 x 700
STANDARD FILTER*1			EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3
FUSE RATING (BS88) – HRC (A)			6	6	6	6	6	6	6	10	10

Notes: Running Current, Input Power and Recovery Efficiency are based on the above Airflow Rate, Power Supply 240v, 50Hz. Sound Pressure Level measured at 1.5m.

*1: EU-F7 filter available as optional parts. *2: Airflow tested to Japan industrial standard JIS B 8628. SP1, SP2, SP3 & SP4 relate to the fan speeds of the Lossnay RVX units i.e. fanspeed 1, 2, 3 & 4.

Lossnay Kanzen
Air Handling Units



The Lossnay Kanzen Air Handling Units (AHU's) utilise Mr Slim Power Inverter heat pump technology, Lossnay heat recovery technology and an integrated controls system making them highly advanced and efficient.

Key Features

- Mr Slim Power Inverter heat pump technology
- Total heat recovery with Lossnay cores
- Integrated controls
- High efficiency system
- Flexible installation / configuration
- Compatible with Modbus (RS485)
- Customisable units with extensive optional extras available

MODEL			LK-500	LK-750	LK-1000	LK-1250	LK-1500
Rated Airflow		m^3/h	5,000	7,500	10,000	12,500	15,000
		m^3/s	1.39	2.08	2.78	3.47	4.17
Airflow Range		m^3/h	3,500 - 5,000	5,500 - 7,500	8,000 - 10,000	10,500 - 12,500	13,000 - 15,000
		m^3/s	0.97 - 1.39	1.53 - 2.08	2.22 - 2.78	2.92 - 3.47	3.61 - 4.17
Max. Static Pressure (factory settings)		Pa	250	250	250	250	250
Max. Static Pressure (configuration option)*1		Pa	400	400	400	400	400
Cooling (Rated)	Coil Capacity	kW	21.3	26.6	42.3	46.0	51.5
	Recovery Module Capacity	kW	15.3	22.9	30.6	38.2	45.9
	Total Capacity	kW	36.6	49.5	72.9	84.2	97.4
Heating (Rated)	Coil Capacity	kW	25.0	31.5	47.5	50.7	57.0
	Recovery Module Capacity	kW	36.3	54.4	72.6	90.7	108.9
	Total Capacity	kW	61.3	85.9	120.1	141.4	165.9
Sensible Heat Recovery Efficiency		%	72	72	72	72	72
Total Heat Recovery Efficiency	Cooling / Heating	%	62 / 67	62 / 67	62 / 67	62 / 67	62 / 67
Number of Lossnay Heat Recovery Modules			4	6	8	10	12
Power Input (Rated/Max)	Supply Fan(s) (250Pa)	kW	2.1 / 2.7	2.9 / 3.1	3.7 / 4.7	4.5 / 4.7	5.8 / 6.2
	Return Fan(s) (250Pa)	kW	1.6 / 2.7	1.6 / 2.7	2.9 / 3.1	3.6 / 4.7	4.6 / 5.4
	Auxillary Transformer	kW	0.15	0.15	0.2	0.2	0.3
	Total for Lossnay Kanzen	kW	3.85 / 5.55	4.65 / 5.95	6.8 / 8.0	8.3 / 9.6	10.4 / 11.9
EER / COP			4.23 / 7.01	4.63 / 7.88	4.44 / 7.23	4.40 / 7.27	4.10 / 6.86
Filter Section			Rigid pocket, Class F7 (EU7)				
Outdoor Unit	Mr Slim Heat Pump		PUHZ-RP200YKA	PUHZ-RP250YKA	2 x PUHZ-RP200YKA	PUHZ-RP200YKA + PUHZ-RP250YKA	2 x PUHZ-RP250YKA
Unit Dimensions	Monobloc*2 (WxDxH)	mm	4450 x 1200 x 2300	4450 x 1870 x 2300	4550 x 1870 x 2300	5150 x 2000 x 2300	5090 x 2780 x 2300
	6 Sections (WxDxH)	mm	4870 x 1200 x 2430	4450 x 1870 x 2430	4950 x 1870 x 2430	5500 x 2000 x 2430	5090 x 2780 x 2430
Unit Weight	Monobloc*2	kg	1950	2380	2540	2760	3190
	6 Sections	kg	2150	2650	2800	2960	3210
Outdoor Unit Dimensions	(WxDxH)	mm	1050 x 330 + 30 x 1338	1050 x 330 + 30 x 1338	2 x (1050 x 330 + 30 x 1338)	2 x (1050 x 330 + 30 x 1338)	2 x (1050 x 330 + 30 x 1338)
Outdoor Unit Weight		kg	135	141	135 + 135	135 + 141	141 + 141

CONFIGURATION OPTIONS			LK-500	LK-750	LK-1000	LK-1250	LK-1500
Supply Fan (400Pa) Power Input*1	Rated/Max	kW	2.9 / 5.5	3.7 / 5.5	5.7 / 11.0	6.4 / 11.0	7.3 / 11.0
Return Fan (400Pa) Power Input*1	Rated/Max	kW	1.9 / 2.7	2.9 / 3.0	3.5 / 4.7	4.4 / 4.7	5.8 / 6.0
Auxillary Transformer		kW	0.15	0.15	0.20	0.20	0.30
Total for Lossnay Kanzen	Rated/Max	kW	4.95 / 8.35	6.75 / 8.65	9.30 / 15.90	11.00 / 15.90	13.40 / 17.30

ACCESSORIES			LK-500	LK-750	LK-1000	LK-1250	LK-1500
Vapour Humidification Section		kg/h	15	18	25	35	45
	Power Input	kW	11.2	13.5	18.7	26.2	33.7
Electric Pre-heating Coil	Power Input	kW	8	12	16	20	24
Electric Post-heating Coil	Power Input	kW	8	12	16	20	24

RATED CONDITIONS	Summer			Winter		
	Indoor	21°C DB	50% RH	Indoor	21°C DB	50% RH
	Outdoor	27°C DB	50% RH	Outdoor	2.5°C DB	50% RH

Rated flow capacity for Lossnay Kanzen - Effective static pressure for Lossnay Kanzen: 250Pa
*1 At rated conditions *2 The LK-1500 unit is not available as a monobloc version and comes in 3 sections as standard.

PAC-IF012B-E
Air Handling Unit Controller

The Air Handling Unit Controller is an interface to allow connection to third party manufacturer equipment.

Mitsubishi Electric Mr Slim outdoor units can be used with this interface box, creating an ideal solution when a unique air handling unit is required.

Key Features

- No need for expansion device
- Error, operation and defrost output
- Demand control by analogue or digital inputs (0-10Ω, 4-20mA, 1-5V, 0-10V, Step, Auto-Step)
- Includes a third thermistor to enable Auto-Step

PAC-IF012B-E			SIZE 35	SIZE 50	SIZE 60	SIZE 71	SIZE 100	SIZE 125	SIZE 140	SIZE 200	SIZE 250
CAPACITY (kW)	Heating (nominal)		4.1	6.0	7.0	8.0	11.2	14.0	16.0	22.4	27.0
	Cooling (nominal)		3.6	5.0	6.0	7.1	10.0	12.5	14.0	19.0	22.0
AUTO STEP	PUHZ-ZRP		VKA	VKA	VKA	VKA	VKA/YKA	VKA/YKA	VKA/YKA	-	-
	PUHZ-RP		-	-	-	-	-	-	-	YKA	YKA
	PUHZ-P		-	-	-	-	VHA4/YHA2	VHA3/YHA	VHA3/YHA	YHA3	YHA3
	SUZ-KA		VA4	VA4	VA4	VA4	-	-	-	-	-
	PUHZ-SHW		-	-	-	VHA	VHA/YHA	YHA	-	-	-
MANUAL STEP	PUHZ-ZRP		VKA	VKA	VKA	VKA	VKA/YKA	VKA/YKA	VKA/YKA	-	-
	PUHZ-RP		-	-	-	-	-	-	-	YKA	YKA
	PUHZ-SHW		-	-	-	VHA	VHA/YHA	YHA	-	-	-
PIPE SIZE mm (in)	PUHZ-(Z/R)P/SHW	Gas	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	28.58 (1 1/8")	28.58 (1 1/8")
		Liquid	6.35 (1/4")	6.35 (1/4")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")
	SUZ-KA	Gas	9.52 (3/8")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	-	-	-	-	-
		Liquid	6.35 (1/4")	6.35 (1/4")	6.35 (1/4")	9.52 (3/8")					
HEAT EXCHANGER	Max Capacity		1050	1500	1800	2130	3000	3750	4200	6000	7500
	Min Capacity		350	500	600	710	1000	1250	1400	2000	2500
DIMENSIONS (mm)	Width x Depth x Height		336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278	336 x 69 x 278
WEIGHT (kg)			2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Notes: One air handling unit controller is required per air handling unit.
Cooling: Indoor 27ºC DB/19ºC WB, Outdoor 35ºC DB/24ºC WB.
Heating: Indoor 20ºC DB, Outdoor 7ºC DB/6ºC WB.

DC Lossnay Accessories

Lossnay-5-FSC Interface

The Procon Lossnay-5-FSC interface is able to control up to 16 Lossnay units and enables automatic fan speed control based on CO_2 levels when used in conjunction with a third party CO_2 sensor.

A PIR sensor / BEMS can also be connected to the Lossnay units to allow the unit to only run when a building / room is occupied.

DC-5 Fan Speed Controller

The DC-5 Fan Speed Controller allows the DC Lossnay to be controlled at five different speeds.

Lossnay RVX Accessories

PZ-61DR-E Lossnay Controller

One Lossnay PZ-61DR-E controller can control up to 15 Lossnay RVX units.

Key Features

- Weekly timer function

  This function gives the ability to pre-set air volume requirements at different intervals. For instance users can set different fan speeds for different times of the day according to requirement, which in turn aids in reducing power consumption. It is also possible to set different daily fan speed patterns for different days of the week.

- Night purge

  This is a key feature of the controller and can be used during the summer months to automatically ventilate and cool a room at night, where heat energy may accumulate while the air conditioning is switched off, reducing the air conditioning load the next morning.

- Fan speed selection
- Ventilation mode selection
- Error indication
- Maintenance indication

Lossnay RVX Accessories

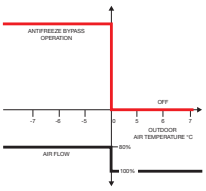
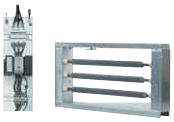
High Efficiency Filter

MODEL	LOSSNAY UNIT
PZ-15RFM	LGH-15RVX-E
PZ-25RFM	LGH-25RVX-E
PZ-35RFM	LGH-35RVX-E
PZ-50RFM	LGH-50RVX-E
PZ-65RFM	LGH-65RVX-E
PZ-80RFM	LGH-80 RVX-E / LGH-150RVX-E (2 sets)
PZ-100RFM	LGH-100 RVX-E / LGH-200RVX-E (2 sets)

The High Efficiency Filter (colorimetric method 65% EU-F7) can be incorporated inside the Lossnay LGH-RVX-E unit easily.

Weather-proof Lossnay Housings are also available, please contact Mitsubishi Electric for further information.

Lossnay Kanzen Accessories / Optional Extras

FUNCTION	TYPE	DESCRIPTION	
Vapour Humidification System	Configuration option - specifiable at order	Maintains relative ambient humidity at approximately 50% with external temperatures as low as -5°C and at rated capacity. This function is only enabled in heating mode and activates when a relative humidity of less than 50% is measured in the internal environment.	
External Anti-freeze Bypass Function	Configuration option - specifiable at order	Available only in heating mode, this function raises the temperature at the inlet of the heat recovery module to approximately 0°C to prevent damage to the module itself. The system bypasses 1/5 of the rated airflow, exiting the direct expansion coil and feeds it upstream of the supply fans, mixing it with external air. The system is activated at ambient air temperatures from -5°C to 0°C.	
Combined Anti-freeze Bypass / Pre-heating Coil System	Configuration option - specifiable at order	Available only in heating mode, this function is intended for extremely cold climates and offers an extended operating range of -10°C to 0°C.	
Post-heating System	Accessory	Raises the supply air temperature by approximately 5°C (at rated capacity) at certain conditions.	
Two Speed System	Accessory	Allows the supply and return air fans to be switched between 2 fan speeds by an external field supply switch as follows: 1) High Speed (rated capacity) - default factory setting 2) Low Speed (capacity between min and max).	
High Static Pressure	Configuration option - specifiable at order	Allows the supply and return fans to be specified with high static pressure (400Pa).	
High Efficiency Filter Section (Class F9)	Configuration option - specifiable at order	High efficiency F9 (EU9) filter which improves the filtration performance of the Lossnay Kanzen (average colorimetric efficiency 95%).	
Left-hand Connection	Configuration option - specifiable at order	Connections for the direct expansion coil, access to the electrical panel and inspection hatch can be moved to the left hand side of the unit (viewed from air supply side).	
Unit in 6 Sections	Configuration option - specifiable at order	Unit is supplied in a configuration subdivided into 6 sections.	

Responsible, sustainable manufacturing

As a leading provider of environmental technologies, Mitsubishi Electric prides itself on using responsible, sustainable manufacturing processes that take energy use, efficiency and the impact on the environment very seriously.

Our production facilities are committed to sustainable business practices such as energy and resource efficiency, minimising ecological impacts and reducing greenhouse gas emissions.

In line with our aim to improve all round performance and energy efficiency throughout all our operations, we set and adhere to the highest environmental standards to protect the world in which we live.

Global Environmental Vision 2021

Mitsubishi Electric's Global Environmental Vision 2021 sets a goal for a lower emission future that influences all our policy decisions.

mitsubishielectric.com/eco

Green Gateway

Green Gateway is Mitsubishi Electric Living Environmental System's commitment to the environment. It strives to instill positive changes in Mitsubishi Electric's own operations as well as seeking to influence those of its customers.

greengateway.mitsubishielectric.co.uk

ECA

The DC Lossnay core is listed on the Carbon Trust Energy Technology List and is eligible for the Enhanced Capital Allowance (ECA) tax benefit.

etl.decc.gov.uk/etl

Product Characteristics Database, PCDB

The DC Lossnay is PCDB listed and therefore allows for additional CO_2 savings benefits above the standard SAP MHRV default values, by allowing you to enter performance data specific to that particular product rather than the default values.

ncm-pcdb.org.uk/sap

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www.greengateway.mitsubishielectric.co.uk

Mitsubishi Electric UK's commitment to the environment