mixed mode cooling systems

natural ventilation and air conditioning working together to bring you the

best of both worlds





Natural ventilation and air conditioning working together to bring you the best of both worlds Leading air conditioning manufacturer Mitsubishi Electric have joined forces with natural ventilation experts, Passivent to develop a mixed mode system to satisfy the growing demand for low energy building comfort.

The latest targets, as set out in Part L2 of the Building Regulations, are designed to further reduce CO₂ emissions by at least another 25%. With the added obligation to demonstrate that buildings are airtight yet won't overheat, the need for effective ventilation and air conditioning systems has never been so great.

Our continual product development and commitment to energy efficiency enables us to provide the ideal solutions for the ever increasing design challenges that lie ahead. It's a known fact that natural ventilation uses less energy than fully air conditioned systems, but can be prone to overheating. So, by adding comfort cooling to passive ventilation, Mitsubishi Electric and Passivent have developed a mixed mode system, that really does offer the best of both worlds.



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Natural Ventilation

Passivent's approach to natural ventilation provides an array of benefits to ensure the cost effective comfort of buildings:

- Low energy
- Maintenance free
- A regular, reliable supply of fresh air via Aircool and high capacity technology
- Good airflow rates
- Effective control of CO2 levels that are well below CIBSE guidelines

Used alone however, a natural ventilation system subject to higher heat gains can be prone to overheating, so our newly designed mixed mode system combines natural ventilation with air conditioning to ensure optimum comfort for minimal cost.

Air Conditioning

Mitsubishi Electric's City Multi VRF uses the latest technology with R410A refrigerant and as such is one of the most efficient air conditioning systems ever. Offering the highest levels of efficiency at full or part loads, these powerful systems are perfect for large offices, apartment blocks and shopping centres alike. Using two pipe technology unique to Mitsubishi Electric, the City Multi range is available as a Heat Pump, Heat Recovery or Water Cooled Heat Recovery or even Water Cooled Heat Pump as standard.





How the Mixed Mode System Works

This diagram shows how natural ventilation combines with air conditioning to provide our new mixed mode system. It gives an indication of how the two technologies work together in the winter and summer months.



Whatever the mixed mode application, from schools to shopping centres, new-build or refurbishment, our system proves an ideal solution that's both reliable, predictable and energy saving too.

Features and Benefits of a Mixed Mode System

By combining the high performance of Mitsubishi Electric air conditioning with the low energy benefits of the natural ventilation systems offered by Passivent, you have an unbeatable system offering an array of benefits.

Reduced Energy Consumption

Natural Ventilation

Fresh air is supplied to the indoor environment via the natural ventilation system, without the need for any mechanical power consumption.

Free Cooling

When the ambient temperature is suitably lower than the indoor temperature, natural ventilation will provide free cooling from outdoors when required.

Night Cooling

Night cooling works during unoccupied hours to remove unwanted heat from the building. It is possible that night cooling can reduce the need for energy consumption by almost 40% on the following day. (Source: Brunell University)

Air Quality & Comfort

Indoor Temperature

Maintained to predetermined levels of comfort, the indoor temperature is controlled using a combination of natural ventilation and air conditioning.

Indoor Air Quality

As well as removing any indoor pollutants, the system will also provide accurate control of indoor CO2 levels, keeping them well within the recommended CIBSE guidelines.

Fresh Room

During known unoccupied periods, our mixed mode system can purge a space with fresh air prior to it being used. This is especially useful in school applications during changeover periods.

Occupant Satisfaction

Mixed mode applications are proven to provide excellent occupant satisfaction levels. By utilising the external environment, natural ventilation gives occupants the perception of being more in touch with the world outside.

Maintenance

The City Multi range has one of the lowest maintenance requirements in the air conditioning industry today. Combined with virtually maintenance free ventilation, our system ensures costs and disruption are kept to a minimum.



Ultimate Control

Our mixed mode system is made possible by the use of a Programmable Logic Controller (PLC) which combines natural ventilation and mechanical air conditioning using the latest software jointly developed by Mitsubishi Electric and Passivent.

This innovative system is simple to use, yet provides some of the most advanced control and monitoring available in the industry today. In order to use the mixed mode system to it's best advantage, it's important for the controller to be fully informed of the internal and external environment and to know how best to match the needs accordingly. Use of the highly advanced PLC ensures all products work in harmony to bring the utmost control and the most cost effective comfort ever.

Easy to Use and Understand

Information is provided on a touchscreen in an easy to understand format. Control throughout the building is simplicity itself.

Simple User Interface

Users can override the ventilation and air conditioning systems through individual room control units, or by using internet-based desktop PC controls. The system is programmed to revert back to automatic mode after a predetermined time, to optimise system performance.

Energy Performance and Comfort Levels

A simple format profile table allows users to select minimum to maximum environmental comfort levels, whilst knowing that this is a trade-off against energy consumption.

Fully Integrates with Major BEMS

This system is able to fully integrate with leading BEMS manufacturers via standard interfaces such as LonWorks[®] and BACnet[®], or directly by using an individual gateway.

Modular Design

For optimum flexibility our system is designed in a building block style which allows additional zones to be added to the PLC Controller with ease.

Remote Monitoring

Via the internet, it is possible to view all data in realtime, look back at historic data and change the systems parameters, providing ultimate control either on or off site.

Additional Features

Noise Sensor	- reduces	indoor	noise	levels	

- Wind Sensor prevents excessive air flow, maintaining constant ventilation rate
- Rain Sensor eliminates water ingress, where required



Mixed Mode Cooling Provides Unrivalled Efficiency

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Monday Mixed Mode

The following charts demonstrate the energy consumption and load profiles of the mixed mode systems when compared to mechanical systems.



Monday Tuesday Mechanical Mixed Mode

Energy Consumption for Mixed Mode Vs Full Mechanical System

(Typical Cooling Season Week Mid July)



Tuesday Wednesday Wednesday Mechanical Mixed Mode Mechanical

Thursday Mixed Mode

Thursday Mechanical

Friday Friday Mixed Mode Mechanical

Cooling Load Profile for Mixed Mode Vs Full Mechanical System

(Typical Cooling Season Day Mid July)

Annual Energy Consumption for Mixed Mode Vs Full Mechanical System



In summary, the array of benefits offered by our Mixed Mode System are second to none, and more than satisfy the increasingly difficult design and efficiency challenges of today.

- Reduced energy consumption
- Fresh air and free cooling
- Night cooling
- The highest air quality and comfort
- Unrivalled occupant satisfaction
- Extremely low maintenance
- Ultimate control and simple to use
- Fully integrates with major BEMS
- Modular design for flexibility
- Remote monitoring
- Stable internal temperature control



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