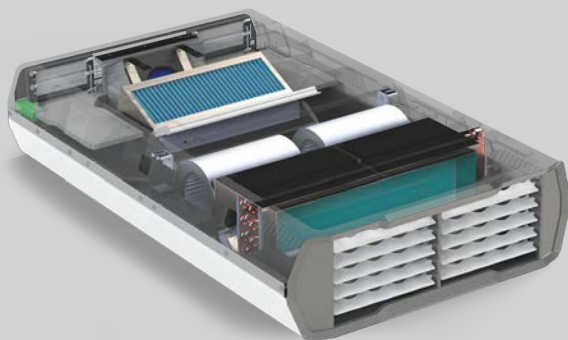




Monodraught



HVR ZERO

Sustainable future, uncompromised comfort



THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2018



We are Pioneering British Greentech

We are pioneers in the design and manufacture of advanced sustainable ventilation, cooling, heating and lighting solutions for new and refurbished commercial and public buildings. We deliver outstanding temperature control and indoor air quality whilst minimising the consumption of both electricity and refrigerants so as to reduce our carbon footprint. Monodraught have over 45 years' experience and our products have saved the equivalent of over 390,000 tonnes CO₂ over the last two decades, which is equivalent to over 3,534 million miles travelled in a small car*.

Monodraught believe that every business has a responsibility to invest in local communities. We purchase over 85% of our materials from suppliers within a 100-mile radius and recycle where possible. Our team supports many charitable causes and Monodraught are proud partners of the local mental health charity, Buckinghamshire Mind.



DESIGNED &
MANUFACTURED
IN BRITAIN

* Based on 110g CO₂ per mile emitted from a typical a small family car.

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Awards & Accreditations

Trading for over 45 years, we are proud to be recognised with many awards.



THE CLIMATE CHANGE REALITY

Greenhouse gas emissions continue to drive global warming and five organisations around the world agree that the last decade has been the warmest on record. Global temperatures rose 1.2°C above the pre-industrial figure in 2020, and is a growing concern.

According to the Committee on Climate Change if global temperatures rise by 2°C, around 2.6 million people in the UK will be impacted by the significant risk of flooding.

The UK government has now legislated for net zero carbon by 2050. Here at Monodraught, we are fully committed to playing our part and live by our green principles.

We aspire to deliver buildings which are resilient to the impacts of our changing climate, conserve natural resources, use responsible, low-carbon resources, minimise carbon emissions, whilst improving people's health and wellbeing.

OUR CHALLENGE

Ventilation Redefined Zero Energy, Zero Carbon

On the journey to zero net carbon by 2050, embodied carbon is an increasingly important consideration as it can contribute up to 60% of the total lifetime carbon usage.

Our aim when designing HVR Zero was to ensure the product would have zero embodied carbon, have exceptionally low running costs and provide very high indoor air quality. We are pleased to have achieved all of these aims and support the move towards zero carbon buildings.



ABOUT HYBRID VENTILATION WITH HEAT RECOVERY

HVR Zero sets a new benchmark for the future generation of low energy hybrid ventilation systems that integrate heat exchange ventilation strategies. It provides natural ventilation, hybrid mixing ventilation and low energy mechanical heat recovery ventilation in one compact unit. The system operates completely autonomously to ensure optimum indoor air quality with the lowest possible energy use - in terms of both the energy consumption of the ventilation system and overall building energy usage.

WHAT IS MONODRAUGHT HVR ZERO?

The original Monodraught HTM hybrid ventilation system was first launched in 2014. Since then, Monodraught have become the market leader and successfully sold and installed thousands of HTM units saving the equivalent of over 18,400 tonnes CO₂.

Our range of ventilation systems are packed with sensors, and all Monodraught products installed over the last ten years have gathered room data on a minute-by-minute basis. This has provided us with one of the largest building performance databases in the UK. From data analysis we have identified the key performance criteria needed to achieve real world low energy solutions.

BENEFITS OF HVR ZERO

Hybrid ventilation with heat recovery is the perfect solution for new or refurbished buildings that require the benefits of low carbon natural ventilation with the additional capacity of boost ventilation at peak times and heat recovery during winter-time. Typical applications include:-

- School classrooms, science rooms, IT suites
- Offices and commercial buildings
- Education lecture halls, libraries
- Healthcare centres
- Amenity centres



HVR ZERO

ZERO ENERGY, ZERO CARBON

HVR Zero is the first hybrid heat recovery system of its kind with zero embodied carbon, which is achieved by careful material selection and through a carbon offset programme. Materials have been selected to minimise embodied CO₂ values, and to ensure they are fully recyclable at end of life thereby supporting the circular economy and minimising waste.

Zero Embodied Carbon

Recognised Life Cycle Assessment methods have been used to calculate the embodied carbon and quantify the residual CO₂ for off-setting purposes. The total carbon footprint of each HVR Zero is 265kgs CO₂ eq. In order to build resilience in the calculation 300kg of CO₂ is offset using a gold standard, UN accredited carbon offset programme

Carbon emissions calculated (IPCC 2013 GWP 100a) utilising established Life Cycle Inventory databases (Ecoinvent3 & USLCI).

Zero Operational Carbon

Monodraught have partnered with a UK based tree planting scheme to off-set the residual operational carbon. One recognised tool to tackle the climate crisis and prevent temperatures from rising above 1.5°C is to plant trees, and our selected partner plants millions of trees around the world each month.

When placing an order with Monodraught, all clients will receive a certificate of the CO₂ offset value and the number of trees planted.



For example, for a typical secondary school comprising of 50 classrooms, with 2 HVR Zero systems in them each, we will offset 30 Tonnes of CO₂ and 100 trees will be planted.

Visit Monodraught's forest at: www.ecologi.com/monodraught

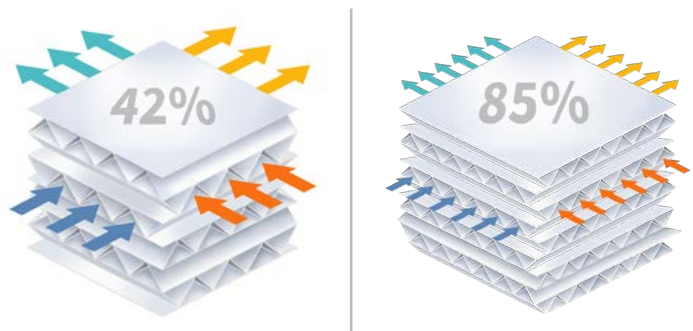


DESIGNING FOR WINTER HEATING PROVISION

Hybrid ventilation has been used in many applications but due to its high efficiency is often used in schools so when designing for schools BB101, Section 4.3 advises that in highly insulated new buildings “mixing ventilation systems provide heat reuse within the space and can have similar seasonal energy efficiencies, in room based ventilation systems, to heat recovery units with heat exchangers”. It goes on to say “the balance point where no heating is required is around 5°C” and explains that the number of occupied hours when the external temperature is below 5°C is small.

Heat Loss Calculations

HVR Zero provides the lowest year round energy consumption. The system balances very low specific fan powers with optimised heat exchanger efficiencies to ensure the lowest possible energy use for heating and ventilation use within the room that it is serving.

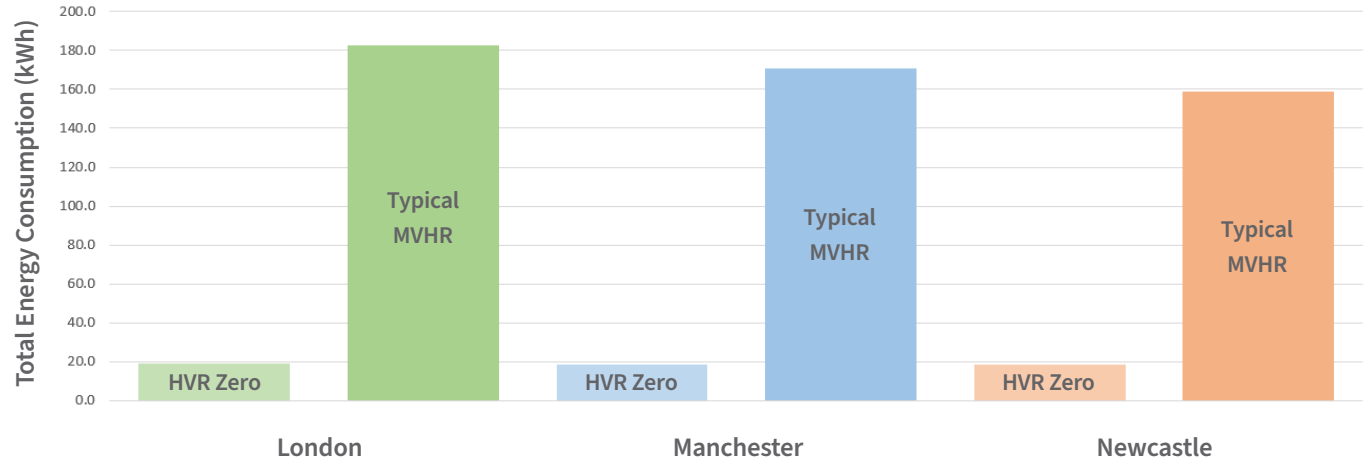


Location	Quantity of occupied hours below 0°C within CIBSE TRY file	Estimated quantity of hours per year of winter time occupied operation	Estimated quantity of hours per year of normal occupied operation	Estimated quantity of hours per year of night time cooling
London	18	95	1505	360
Manchester	56	125	1475	300
Newcastle	68	180	1420	240

HVR Zero	Typical MVHR
0.053 SFP / 6.9W	0.54 SFP / 70.2W
Normal Daytime Operation (@ 130 l/s)	

Location	Ventilation Type	Heat Recovery Efficiency	Winter Time Normal Operation SFP	Winter time daytime energy consumption (kWh)	Normal Daytime Operation SFP	Normal daytime energy consumption (kWh)	Night time cooling SFP	Night time cooling energy consumption (kWh)	TOTAL ESTIMATED ENERGY CONSUMPTION (kWh)
London	HVR Zero X	42%	0.21	2.6	0.053	10.4	0.13	6.1	19.0
	Typical MVHR	85%	0.54	6.7	0.54	105.7	1.5	70.2	182.5
Manchester	HVR Zero X	42%	0.21	3.4	0.053	10.2	0.13	5.1	18.6
	Typical MVHR	85%	0.54	8.8	0.54	103.5	1.5	58.5	170.8
Newcastle	HVR Zero X	42%	0.21	4.9	0.053	9.8	0.13	4.1	18.8
	Typical MVHR	85%	0.54	12.6	0.54	99.7	1.5	46.8	159.1

All values based on 130 l/s flow rates



WHY CHOOSE HVR ZERO

Advantages for Specifiers



A leading-edge product with zero embodied carbon

Helps building designs to meet low/zero carbon objectives. Helps exceed 2021 Building Regulations.



Sustainability in design with low embodied carbon and recycled materials

Contributes towards SBEM / BREEAM points.



Easy to model performance

IES VE modules are readily available for accurate modelling.



Designed for mass manufacture

Meets client cost, energy consumption and sustainability criteria.

Advantages for Building Owners



Low running costs

Very low Specific Fan Power (SFP) means lowest energy usage on the market. Lower load on heating plant. Easy to maintain.



Excellent product performance

Helps achieve improved EPCS and DECS. Comfortable environment for occupiers. Settings can be optimised remotely.



Remote data monitoring

Assures system efficiency and indoor air quality. Settings can be optimised remotely.



Designed for mass manufacture

Assured product quality. Meets capital cost, energy consumption and sustainability criteria.

Advantages for Contractors



Best in class solution

Exceeds toughest specification requirements. Allows reduction in heating system capacity enabling cost saving.



High quality, cost competitive solution

Designed for mass manufacture. Lower installation costs and boiler heating loads for smaller / fewer emitters.



Robust yet lightweight

Designed for quick assembly & installation.



Client satisfaction

High user comfort. Low noise. Easy to use. Intuitive controls. Remote monitoring & updating. Fewer call backs.

Advantages for Occupants



Comfortable environment in winter & summer

Improved learning and working performance. Lower absenteeism. High wellbeing.



Quiet and no noise disruption

Barely audible in operation. Increases productivity and improves wellbeing.



Easy to use

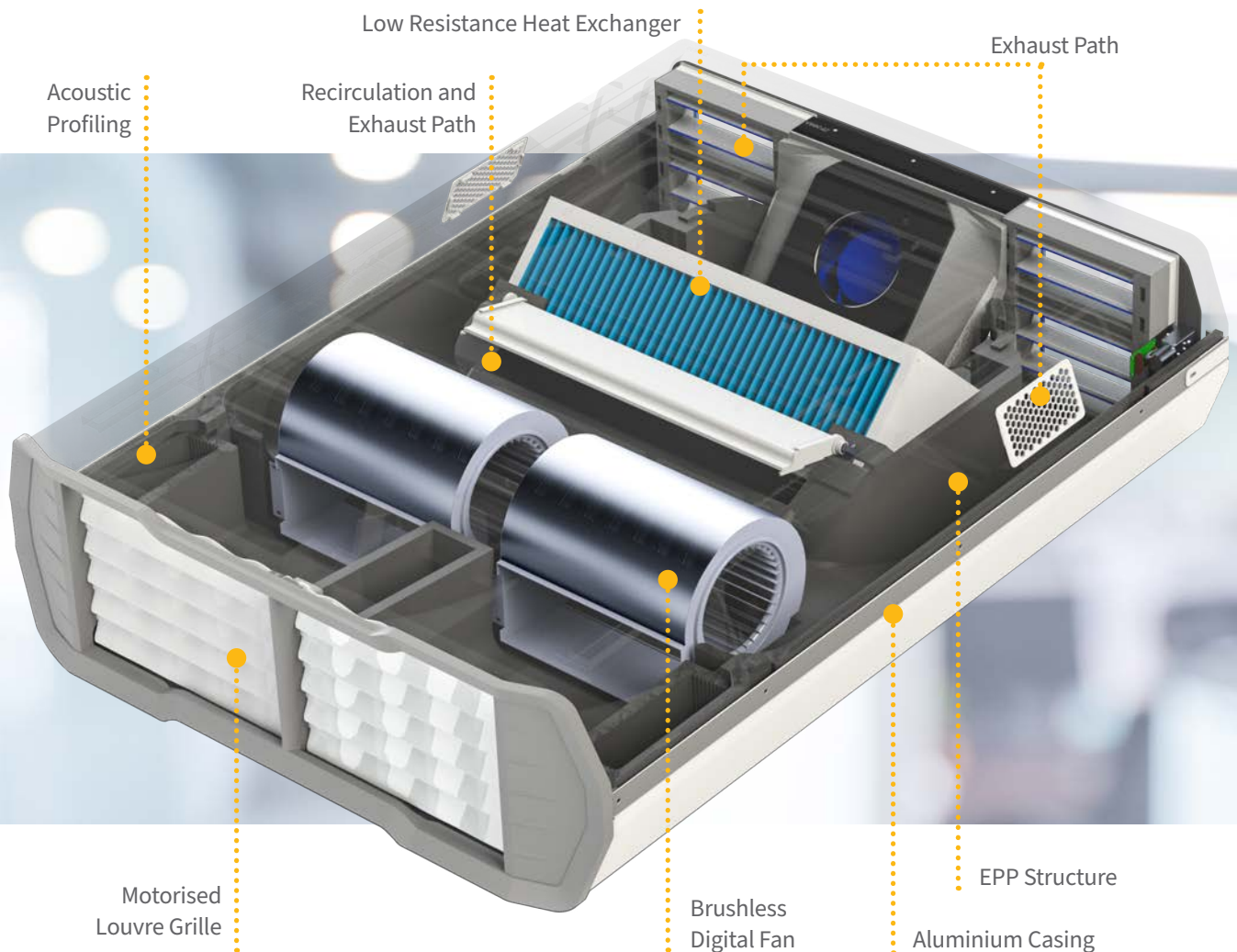
Control is accessible to the user. Higher satisfaction. Reduced callouts and less time wasted to change modes and setting.



Automatic mode operation

No user intervention needed.

CONSTRUCTION FEATURES



- **Acoustic Profiling**

Embedded technologies within the casing reduce fan noise and minimise ventilation air movement noise.
(Patent application 48039GB)

- **EPP Structure**

Flame retardant Expanded Polypropylene (EPP) is steam fused to form the complex airflow paths within the system. It provides acoustic and insulative properties and is fully recyclable.

- **Aluminium Casing**

Aluminium sheets are profiled and then coated in industrial layers of white RAL 9016 powder coating.

- **Motorised Louvre Grille**

A louvred grille directs ventilation air within the room. Incorporating metal geared actuators, the louvred grille allows air flow to be automatically varied dependant on season or on user control.

- **Brushless Digital Fan**

High performance brushless digital fan delivers industry leading ventilation performance to power usage ratio. Large flow volume reduces fan speed to a minimum thus reducing noise output.

- **Low Resistance Heat Exchanger**

Hydrophilic coated aluminium cross flow heat exchanger minimises resistance to airflows, lowering running costs and reducing maintenance.

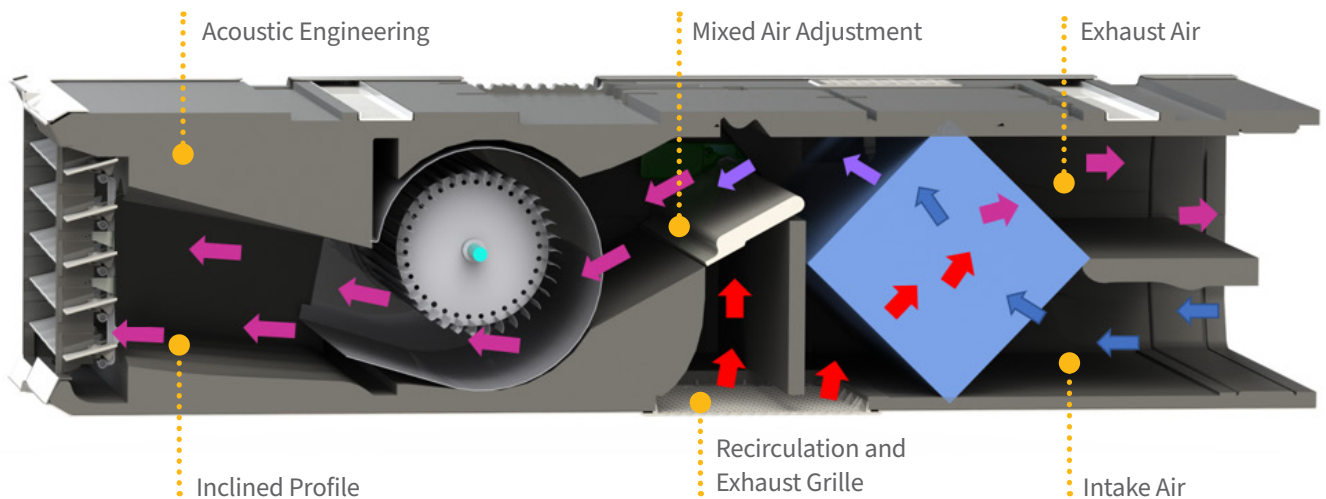
- **Sensors**

Inbuilt temperature sensors continually monitor airflow temperatures and indoor air quality.

- **Ventilation Airways**

Multiple segregated internal airways allow selectable ventilation strategies from natural ventilation, hybrid ventilation and mechanical heat recovery ventilation.
(Patent application 48086GB)

CONSTRUCTION FEATURES



** Exhaust fan and flow control dampers omitted for clarity*

- **Acoustic Engineering**

The density and thickness of the acoustic EPP material vary along the body of the system maximising acoustic properties and air flow through the system

- **Recirculation and Exhaust Grille**

The injection moulded lower grille has a honeycombed structure to maximise airflow through the grille and to minimise resistance and air flow noise.

- **Mixed Air Adjustment**

uPVC volume control blades with integrated seals adjust air flows between natural, hybrid and heat exchange.

- **Exhaust Air**

An upper horizontal profile allows air to be exhausted from the room. This air can either be passed through the heat exchanger or from higher level exhaust grilles.

- **Inclined Profile**

The mounting of the scroll fan maximises exit velocities causing the ventilation air to align along the acoustic surfaces.

- **Intake Air**

A lower horizontal section including a summer bypass brings fresh air into the system.

HOW DOES IT WORK?

HVR Zero is a hybrid ventilation unit that combines the benefits of natural ventilation with mechanical ventilation heat recovery designed specifically to minimise energy usage in the UK market.

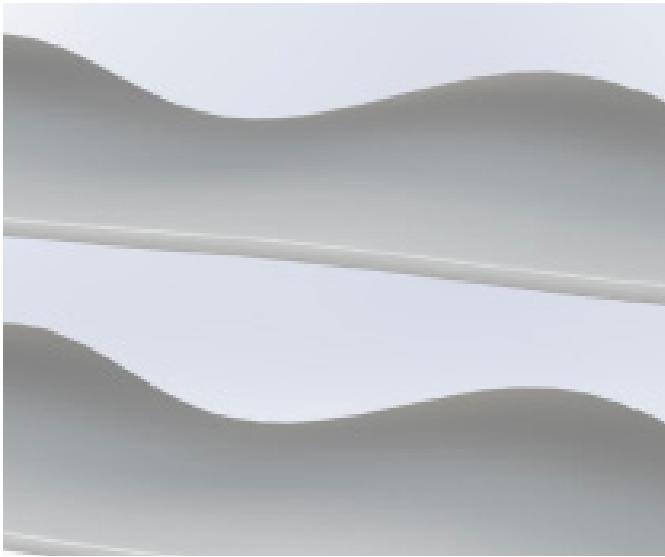
Natural ventilation is low carbon and transfers fresh air without fans making it extremely cheap to run whilst providing a comfortable and healthy indoor environment.

During the summer months, hybrid ventilation switches

on the mechanical fan to boost the natural ventilation and optimise indoor comfort. During winter periods, the hybrid system mixes warm internal air with fresh external air to deliver mixed tempered air, whilst utilising heat recovery to save energy.

HVR Zero can be used in single sided or cross flow ventilation strategies. It has an industry leading specific fan power (SFP), intelligent controls as standard, as well as inbuilt temperature and CO₂ sensors.

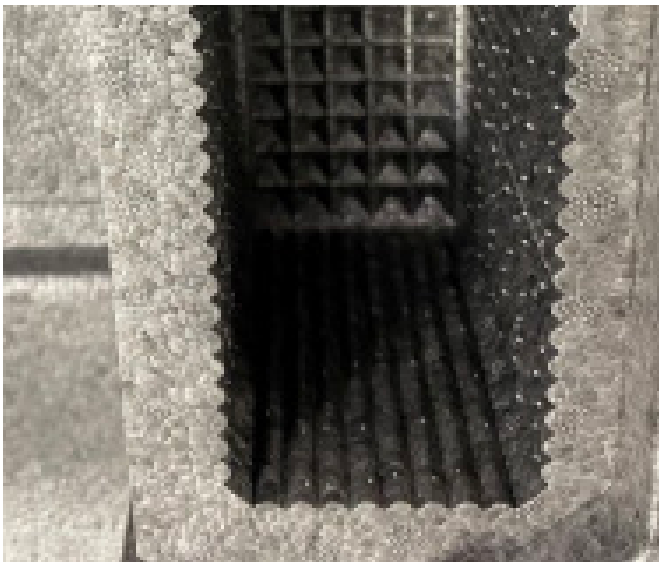
HVR ZERO ACOUSTICS



We did not only want to create a quiet ventilation system, we wanted to showcase what can be achieved with engineered designs, modern manufacturing technologies and the latest material selections available. The sophisticated design encapsulates unwanted noise and eliminates or dampens it to virtually inaudible levels.



The all-aluminium casing provides a hard barrier to internally generated noise. The Expanded Polypropylene (EPP) body is comprised of beads of material steam fused together. This process creates micro pockets of air, increasing sound absorption internally.

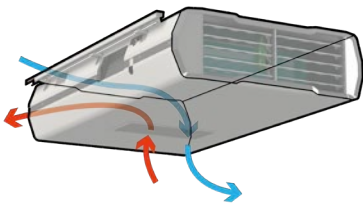


Helmholtz resonance cavities are included at the air outlet side of the HVR Zero. These cavities use the Helmholtz principle to tune the acoustic profile away from frequencies of the human spoken range (1000-2000Hz).



The leading edge of the system uses the principle of an owl's wing to accelerate and decelerate the distributed ventilation air. This unique design reduces the audible noise of the movement of the ventilation air.

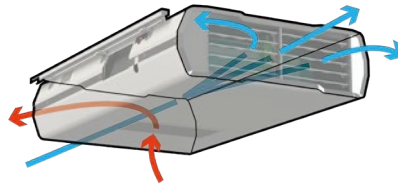
OPERATION MODES



1. Natural Ventilation Mode

Dampers are opened, natural ventilation combined with openable windows expels stale air and ventilates the space with fresh external air.

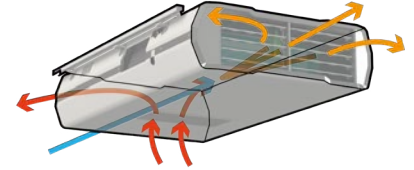
** Applicable to all HVR models*



2. Boost Fan Mode

Dampers are opened and mechanical fan operates to bring fresh air into the room. Especially useful in summer months.

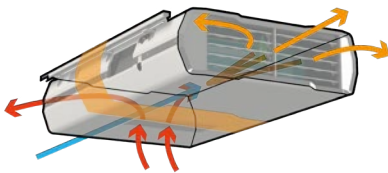
** Applicable to all HVR models*



3. Mixed Recirculation Mode

Dampers are opened, mechanical fan operates, stale indoor air is expelled, warm internal air is recirculated and tempers fresh external air via separate discharge pathways.

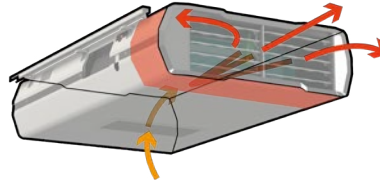
** Applicable for all HVR models*



4. Heat Recovery Mode

During winter periods, the cross flow heat exchanger increases the temperature of the intake outside air by harvesting heat from the indoor environment whilst expelling stale air.

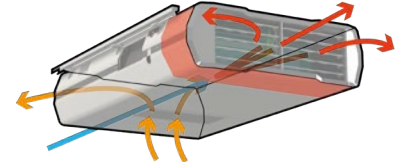
** Applicable only to HVR Zero X and X+ models*



5. Pre-Heating Mode

Recirculates indoor air across the heat exchanger coil to pre-heat the room before the start of the day.

** Applicable only to HVR Zero X+ model*



6. Occupied Heating Mode

When the room is too cool, the off coil temperature is limited, flow rate reduced, and room air is recirculated.

** Applicable only to HVR Zero X+ model*

7. Night-time Cooling

Peak ventilation during summer nights removes warm air from the space ready for the next day.

** Applicable to all HVR types*

OUR HVR Zero PRODUCT RANGE

Model	Ventilation Rate(l/s)			Ventilation Modes	Night-time Purge	Heat Recovery Mode	Heating Mode
	Normal Operation	Max Day	Max Night				
HVR Zero	130	180	250	Natural Ventilation Mixed Mode Boost Fan Mode	Night-time Cooling	Heat Exchange Mode	Heating Mode (via coil)
HVR Zero X	130	180	250	✓	✓	✓	X
HVR Zero X+	130	180	250	✓	✓	✓	✓

ACUITY DESIGN CONNECTIVITY

The new iNvent Acuity control system has been developed from Monodraught's considerable in-house controls experience. It is a connectivity system that links seamlessly and securely with the HVR Zero. This class leading control system has been developed from the ground up and integrates the Internet of Things (IoT) connectivity. Utilising Autonomous Intelligence (AI) automated monitoring software, the control system remotely monitors and diagnoses potential issues before they occur.

Touch Control

Building Management Systems (BMS) are intrinsically linked to the operation of building services. However, they are often considered overly complex for users. The iNvent Acuity with its 10" touch screen and audio feedback provides an elegant system that is easy to use.

Always Safe Operation

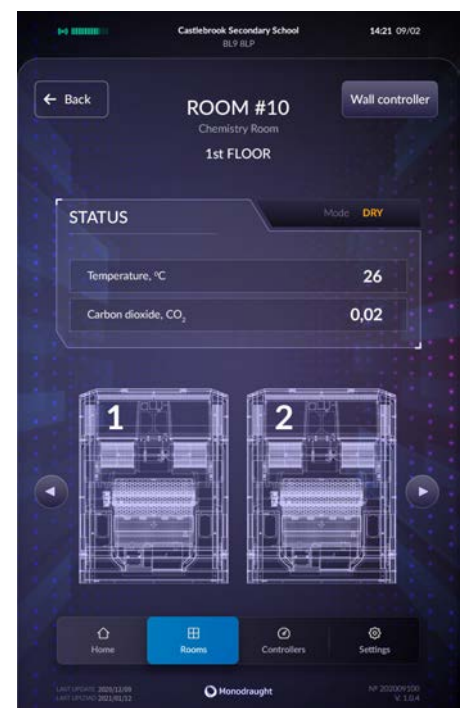
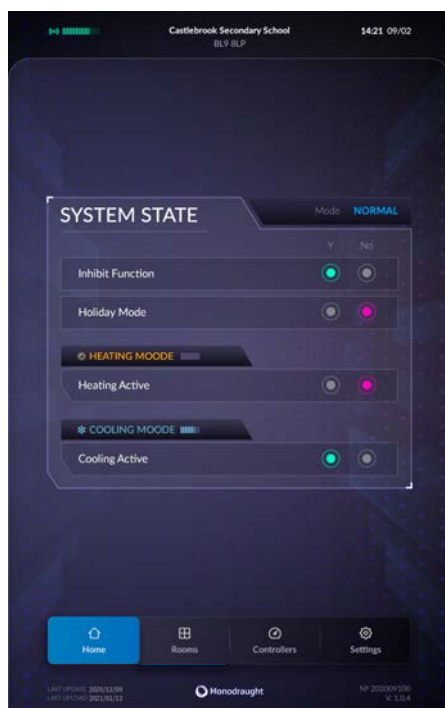
The ability to monitor and inform is a central part of any control system. However, our experience shows that most BMS' not used due to fear of inadvertently causing the system to fail. The iNvent Acuity has an "always safe" security cycle to prevent unintended errors from occurring.

Software-Over-The-Air (SOTA)

Using its own dedicated communication protocol, the iNvent Acuity system sends and receives encrypted communications to transfer data to Monodraught HQ where autonomous software interrogates the data.

Data Analysis

Data sent via dedicated 4G/5G connection to cloud based analysis software.



MODENA USER INTERFACE



HVR Zero is equipped with Monodraught’s latest “Modena” touch screen wall controller. This state-of-the-art user interface provides room occupants with full information and overall control of the ventilation system. Incorporating a 4” touch screen, the controller has calibrated temperature sensors and an air quality CO₂ sensor.



User Experience

4” touch screen displays relevant information quickly without the need for training.

Information

Displays room temperature, air quality level, set point control, seasonal mode, fault indication, information panel.

Ventilation Adjustment

User control of grille position maximises airflow across occupants without discomfort.

Dark Mode Option

User control of display settings for user interfaces.

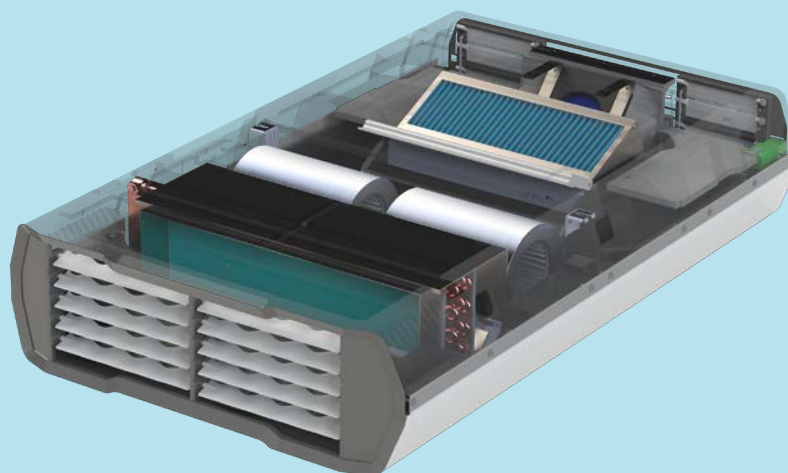


TECHNICAL DETAILS

	Hybrid Ventilation	Hybrid Ventilation with Heat Recovery	Hybrid Ventilation with Heating (via coil)
	HVR Zero	HVR Zero X	HVR Zero X+
Dimensions (mm)	950 (w) x 298 (h) x 1250 (l)	950 (w) x 298 (h) x 1250 (l)	950 (w) x 298 (h) x 1450 (l)
Weight (kg)	35	41	50
Min clear ceiling void (mm) (where required)	310	310	310
External weather louvre minimum free area (m ²)	0.13	0.13	0.13
Hybrid Daytime Flow Rate (l/s)	130	130	130
Hybrid Daytime SFP	0.0459	0.053	0.1177
Night-time Flow Rate (l/s)	250	250	250
Night-time SFP	0.11	0.13	0.23
Wintertime Heat Exchanger Flow Rate (l/s)	n/a	80	80
Wintertime Heat Exchanger SFP	n/a	0.21	0.305
Heating coil capacity (kW) (80/60 at 0.1 l/s)	n/a	n/a	6
Heating coil capacity (kW) (50/40 at 0.1 l/s)	n/a	n/a	3.5
Heat Exchanger efficiency (%)	n/a	42	42
Sensors	<ul style="list-style-type: none"> • External temperature sensor • Recirculation temperature sensor • Mixed air supply temperature sensor • Room temperature sensor (in wall controller) • Room CO₂ sensor (in wall controller) 0-2000 ppm 		

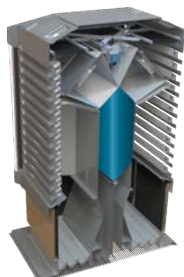
- The HVR Zero X+ model has an integrated 6kW LTHW coil to provide primary heat that eliminates the need for radiators.*
- Heat pump ready
- 5-year warranty for mechanical and 3-year warranty for electrical components
- Fan speeds fully automatically controlled
- 1-minute data logging as standard

* Output 6kW at 70/50°C flow and return temperature. Note that output decreases with lower temperatures.



OUR SUSTAINABLE PRODUCT RANGE

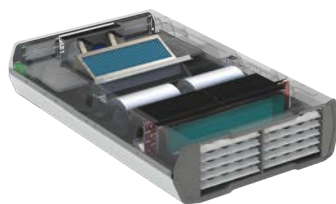
Commercial buildings are utilised in many unique ways and it is essential to design ventilation and cooling strategies that match requirements. Choosing natural ventilation, hybrid ventilation and natural cooling low-carbon solutions and minimising the use of air conditioning is the logical way to meet environmental, sustainability and energy reduction goals. For applications requiring rapid indoor temperature control, sometimes air conditioning will be the most suitable option. By cleverly combining it with the Monodraught low carbon range, it is possible to achieve a balanced approach. Regardless which products are finally selected, Monodraught engineers can provide dynamic modelling and post occupancy monitoring to ensure that indoor comfort is achieved with minimal environmental impact.



A sustainable, low carbon ventilation system that supplies fresh air to a building or room by utilising the passive effects of wind. It does not use fans or pumps making it extremely cheap to run.

Natural Ventilation

Windcatcher®



Combines the benefits of natural ventilation with a traditional mechanical ventilation system to provide low carbon natural ventilation and heating if required.

Hybrid Ventilation Heat Recovery

HVR Zero



An innovative low-energy ventilation and cooling system that uses Phase Change Material (PCM) as a thermal energy store. Uses up to 90% less energy than equivalent conventional cooling systems, does not use refrigerants and has no compressors.

Natural Cooling

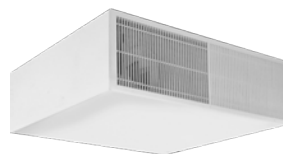
**Cool-phase®
Cool-phase® Hybrid**



Optimised climate control for sensitive applications. We are proud to be approved installers for Daikin, Mitsubishi Electric and Kaysun and these reliable systems are backed up with extended warranties.

Mechanical Cooling

Air Conditioning



Simultaneously supplies tempered fresh air whilst expelling stale air and recovering heat energy to temper incoming air. Includes the Mitsubishi Lossnay heat exchanger core which can be installed in exposed or concealed locations.

Mechanical Ventilation Heat Recovery

MVHR



Channels daylight to indoor areas for a more productive environment whilst reducing electrical lighting costs and carbon footprint. Uses a patented high impact Diamond Dome and a Super-Silver® mirror finished aluminium tube. Available in standard and bespoke.

Natural Lighting

Sunpipe®

Monodraught WITH YOU ALL THE WAY



One home

Our Head Office in High Wycombe is home to our Sales, Design, R&D and factory teams and is where our products are manufactured. Being located close together means our teams support you efficiently throughout your project.

Sales team

Our team works closely to support consultants, specifiers and contractors through the design and procurement process.

Building simulation

Monodraught and IES have developed Performance Components which accurately model our products for heating and IAQ performance, as well as Part L and BREEAM compliance. Our in-house Project Design Engineers use advanced building modelling to propose the most energy efficient and low carbon solutions.

R&D and manufacturing

Our teams continuously challenge boundaries and develop award winning products that deliver best in class solutions for our customers. By integrating advanced controls, our products minimise running costs whilst maximising carbon savings. We are accredited to ISO9001 quality management system and ISO 14001 environmental management system.

Installation and commissioning

Our unique installation service is aligned to your construction programme and delivers over 85% of all Monodraught projects. Having received your order, our dedicated contract managers will coordinate with your programme. Our team of installers across England and Wales, and our partners in Scotland, Ireland and worldwide, visit your site ahead of installation to ensure smooth delivery. Pre-occupancy commissioning and Post Occupancy Evaluation (POE) monitoring ensure trouble-free operation.

After sales

Our range of enhanced service and maintenance packages give peace of mind and ensure continuous operation. Through data monitoring, we can also provide ongoing analysis and assistance to optimise system performance for many years.





Monodraught

We are pioneers in the design and manufacture of advanced sustainable ventilation, cooling, heating and lighting solutions for new and refurbished commercial and public buildings. We deliver outstanding temperature-control and indoor air quality whilst minimising the consumption of both electricity and refrigerants so as to reduce our carbon footprint. Monodraught have over 45 years' experience and our products have saved the equivalent of nearly 390,000 tonnes CO₂ over the last two decades.

HVRPB/03.2021

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