

Established in
1974



Mechanical Ventilation Heat Recovery System

Providing Fresh Air Ventilation



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Engineering
delivered
naturally™

Monodraught has been at the forefront of designing and manufacturing low energy, low carbon, and sustainable solutions for over 40 years. Our company is focused around three product sets in which we are recognised as market leaders: natural and hybrid lighting, natural cooling and natural and hybrid ventilation.

Our products can be found anywhere from a residential build looking to increase its natural light through to a high impact architectural building such as the Copperbox Arena (formerly the Olympics Handball stadium). A key sector for Monodraught is in Education where our products can deliver real dividends in terms of lower energy and carbon footprint and improved environments for students and teachers.

**We design, manufacture, install
and maintain low energy ventilation
and cooling systems to create low
energy, low carbon and sustainable
buildings for healthier and more
productive occupants**

From R&D to Maintenance

Monodraught is proud of our history of developing products from R&D right through to installation and maintenance, all here in the UK and where possible using suppliers local to our head office base.

Our experience in installation means we can support your project wherever the location. With our own health & safety accredited installation personnel we are able to provide a complete package including commissioning and maintenance. We also have the experience to offer support and advice on installations to be carried out.



Manufacture

The large R&D team are continually challenging the boundaries developing new products to ensure customers continue to receive the market leading products for which Monodraught are renowned. These products are all manufactured within our High Wycombe factory and as R&D is in the same location as production then the highest levels of quality can be ensured.



Installation

We have a team of contract managers who will work with you and your clients from order creation through to delivery and beyond to maintenance if required. Our own team of installers work across England with partner agencies installing in Scotland, Ireland and worldwide. We will visit your site ahead of installation to ensure that all the details are covered and ensure that everything goes smoothly.



Building Simulation

To help architects and consultants deliver low maintenance, energy efficient designs within the built environment, Monodraught and building performance analysis specialist IES have developed Performance Components – a revolutionary way of modelling natural ventilation systems using the Virtual Environment Suite.



Maintenance

We can provide on-going service and maintenance of our installed products and this helps provide performance data for our customers and structured feedback that can assist product development, resulting in a system running at optimum performance and costs that are kept to a minimum.



Our Project Design Engineers are able to work with you to create the right design for your building.



Recognised as Industry Leaders

Monodraught are widely recognised as market leaders in sustainable low energy and low carbon solutions in natural ventilation, natural lighting and natural cooling. We are proud of our accreditations from prestigious independent organisations such as CIBSE and Ashden amongst others.



Awards & Accreditations

- CIBSE Building Performance Awards 2017 Shortlist-COOL-PHASE Hybrid
- Best Product/Service Range Category at the 2016 Best Business Awards
- Company of the Year 2016 Award – Buckinghamshire Business First
- Best Business in Wycombe District 2016 Award – Buckinghamshire Business First
- LUX, FX Design and Edie Awards 2015 shortlist - Sunpipe LuxLoop
- The Energy Awards 2015 finalist - Sunpipe LuxLoop
- Investors in People – The Standard for People Management
- Ashden – Award for Energy Innovation for COOL-PHASE
- ISO 9001 and ISO 14001: Established quality management and environmental management certificates.
- BSI (British Standards Institute) Members
- CIBSE Building Performance Award 2012 - COOL-PHASE



Corporate Citizenship

Monodraught are committed to working in an ethical and responsible manner. Our products and services are low-carbon and low-energy solutions, which help people be in a healthier natural built environment, and as such, we are also keen to extend these strong ethical credentials into ways to contribute to our local and wider community.

Monodraught: A place that benefits people

Our staff are one of our biggest assets and in 2015 we became a Living Wage Accredited Employer. This means that every member of our staff in our organisation earns not just the minimum wage but the Living Wage. We are always looking at ways to improve our impact on employee wellbeing and how we can help in our local community.

Community Relationships are vital and we are pleased to build on our relationship with Bucks Mind and support them in targeted strategic activities. We continue to source our materials within a 100 mile radius of High Wycombe, with 60% of our suppliers within a 50 mile radius, thereby investing in the local economy and supporting employment opportunities.



More skills, more opportunities

Our main focus in this area is in attracting, developing and retaining people through investment in skills. The Investors in People accreditation is a good example of this. Our Research and Development team also have close links with UK Universities, in particular [Brunel University](#) and [Coventry University](#) and we look forward to working with more placement students this summer.

Positive Environment

Our product set can help our customers create a more positive environment through reduced energy usage and carbon footprint. Across all our product sets we continue to look at ways to innovate and improve the built environment.

Mechanical Ventilation Heat Recovery (MVHR)

MVHR drives down building energy costs and reduces their CO₂ emissions

The MVHR systems supply tempered fresh air to any built space ensuring the correct oxygen levels are maintained whilst expelling stale air.

By simultaneously recovering heating or cooling energy to temper incoming air, the systems are able to significantly reduce power consumption and associated building running costs.

The MVHR unit automatically provides trickle ventilation, heat recovery ventilation and secure night time cooling. It also boosts levels of ventilation during summer or during periods of high CO₂. It can complement natural ventilation provided by being integrated with manual or automatic windows/louvres, either via a single sided or cross flow ventilation strategy.

The MVHR system comprises an intelligent and fully automatic control system which switches between operational modes dependent on external/internal temperature conditions and indoor air quality (IAQ).

The MVHR system can be installed in a range of exposed or concealed locations, such as direct façade or ducted applications.



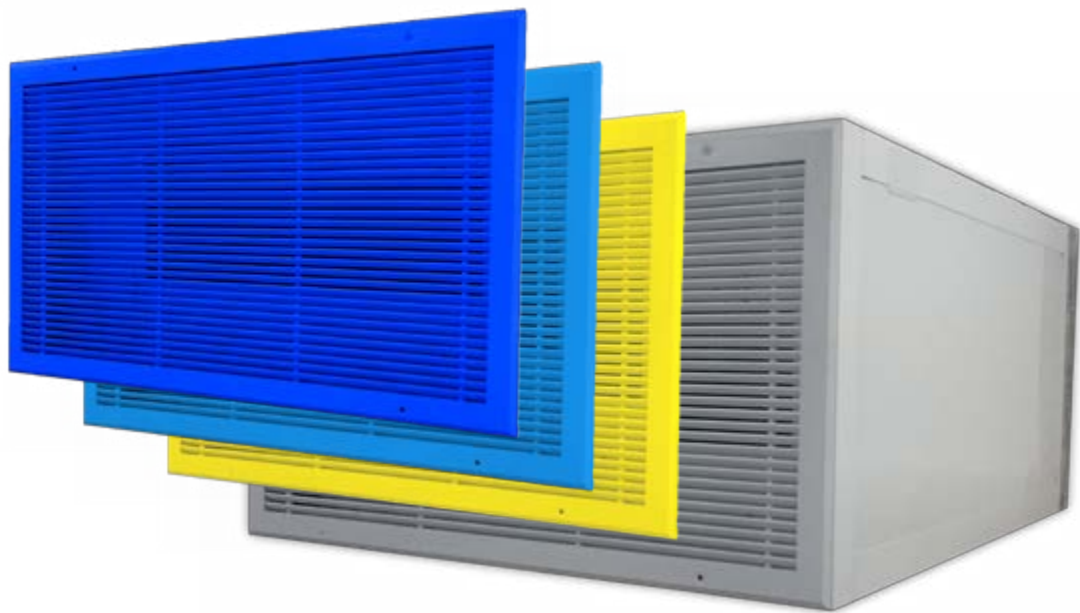
The Benefits of Fresh Air

Whilst more focus has been placed on sealing modern buildings for energy efficiency, it is still important to maintain good indoor air quality (IAQ). Poor indoor air quality can be a contributing factor to internal problems in a building. Damp, rot and mould can be caused by humidity from poor ventilation. VOCs which are widely found in household products are also sealed within the building and can contribute to, or exacerbate health problems, such as asthma and eczema. Research has also shown that poor air quality can affect concentration and morale, leading to a feeling of tiredness if CO₂ levels are not managed effectively.

- ✓ It is proven to give you more energy and a sharper mind leading to better concentration
- ✓ Promotes mental wellbeing
- ✓ It improves your blood pressure and heart rate
- ✓ It strengthens your immune system and cleans your lungs

Key Features

- ✓ Control options include: CO₂, PIR, VOC, BACnet, MODBUS and BMS integration
- ✓ Low temperature hot water (LTHW) heating available 2KW-12KW
- ✓ Filter options including M5, F7, F9 (with G3 as standard)
- ✓ Pre-heater option for low temperatures
- ✓ Acoustic shrouds and fascias for below ceiling non-ducted applications
- ✓ Attenuation pods
- ✓ Colour options
- ✓ Weatherproof housings



- ✓ Ten models supplying air from 10-1,000 L/s
- ✓ High efficiency total heat exchange (sensible and latent)
- ✓ Low power consumption and SFP's from 0.30 W/(L/s)
- ✓ Modes include: Summer Bypass for direct ventilation, Trickle Ventilation, secure night time cooling and Boosted Ventilation
- ✓ Can be located in exposed or concealed locations with or without ducting
- ✓ No condensation drain required
- ✓ High efficiency variable speed fan motor
- ✓ Adjustable set points and weekly timer



Legislation

ErP Directive

The European Ecodesign Directive for Energy Related Products were published in 2014. The ErP Directive measures the energy impact of a product from design through to implementation as part of the CE Marking system. The ultimate goal is to drive down carbon consumption as part of the 2020 Carbon Reduction Goals. An energy related product is one which has an impact on energy usage and in the case of Mechanical Heat Recover this refers to fans. The next phase of implementation is due in 2018.



Part F

Part F of Building Regulations focus on indoor air quality (IAQ) or ventilation in both domestic and commercial buildings and was first published in 2010. Part F stipulates the importance of ventilation in increasingly air-tight buildings. It stipulates that ventilation be considered from the beginning of the design process and outlines requirements through to installation and maintenance with specific air flow rates required for minimum ventilation for the benefit of occupants.

Part L

Part L of Building Regulations closely align with Part F. Part L covers energy efficiency and power usage and requires that new buildings limit heat gain and losses, this can often be achieved through effective commissioning and controls. Products and services that are installed should be checked at point of commissioning to ensure that they use no more additional power than should reasonably be required. To effectively manage consumption levels there is a maximum level of Specific Fan Power (SPF) allowed. Plate heat exchangers used as part of heat recovery systems in non-domestic buildings are required to be at least 50% efficient.



Applications

Monodraught MVHR can be installed in new buildings or retrofitted to existing ones, from small modular areas to large open plan rooms. The system can be suspended below a ceiling (a floor to ceiling height of 2.6 m or greater is recommended), within a false ceiling void, or to an exposed void.



Education

Each MVHR system includes CO₂ monitoring as standard and can accurately control the level of fresh air within classrooms to provide the ideal teaching environment. The MVHR-100 meets the requirements of BB101 and Priority School Building Programme (PSBP).

Retail

Retailers are under increasing demand to slash their energy consumption. Due to its heat recovery capability the MVHR is seen to provide a cost effective ventilation approach.

Corporate

The MVHR system can operate on its own to provide fresh air ventilation to provide a comfortable environment that even the most demanding client might expect, but still reduce running costs.

Offices

The MVHR system has been designed to meet the requirements of clients who wish to have a fresh and comfortable environment with low energy and maintenance costs. With a wide range of system sizes and performance the ideal system for any sized office can be selected.

MVHR-100SE for Classrooms

The MVHR system meets the Facilities Output Specification requirements in a cost efficient manner. The MVHR-100SE has additional sound attenuation built into it's casing

What is the Facility Output Specification?

This document forms the basis for the design of the PSBP Schools. It has become the definitive guide to school design.

In addition, to meet the required ventilation levels, whenever spaces are occupied, purpose provided ventilation should provide external air supply to all teaching and learning spaces of:

- Meet the acoustic requirements for BB93 - 35 dB(A) (mechanical ventilation noise plus an extra 5 dB(A) allowance for noise breakthrough from outside)

BB101

- A minimum of 3 l/s per person (90 l/s)
- A minimum daily average of 5 l/s per person at any occupied time
- Provide capacity to achieve 8 l/s per person for night time purge during summer

PSBP

- Average CO₂ of 1,000 ppm
- Individual room control

What is the Priority School Building Programme?

The Priority School Building Programme (PSBP) is a centrally managed programme set up to address the needs of the schools most in need of urgent repair.

Through the programme, 261 schools will be rebuilt or have their condition needs met by the Education Funding Agency (EFA). All schools within the programme will be delivered by the end of 2017. In May 2014, the Government announced a further phase of school development, known as PSBP2, which is a five year programme operating between 2015 to 2021 and will undertake major rebuilding and refurbishment projects in schools and sixth form colleges in the very worst condition.

Monodraught		MVHR - 100 SE					
Dimensions (mm)		1500 wide, 470 high, 1260 deep					
Weight (Kg)		85					
Ventilation Mode		Winter Recovery Mode			Summer Bypass Mode		
Fan Speed		Night Mode	Day Boost	Max. Day	Night Mode	Day Boost	Max. Day
Running Current (A)		2.5	1.2	0.5	2.5	1.2	0.5
Input Power (W)		420	200	75	420	200	75
Air Volume	(m ³ /h)	1296	1026	703	1296	1026	703
	(L/s)	360	285	195	360	285	195
Temperature exchange efficiency (%)		80	83	86.5	-	-	-
Enthalpy ex-change efficiency	Heating	72.5	74	78	-	-	-
	Cooling	71	73	77	-	-	-
Noise (dB) (Measured at 1.5m under the centre of unit in an anechoic chamber)		35	29	21	36	30	22
Specific Fan Power (W/l/s)		1.51	0.96	0.54	1.51	0.96	0.54
Installation Process		Monodraught supplied and installed					
Filter Required		Yes - G3 (supplied)					
Power Supply		10 amp fused spur					

How the MVHR unit works

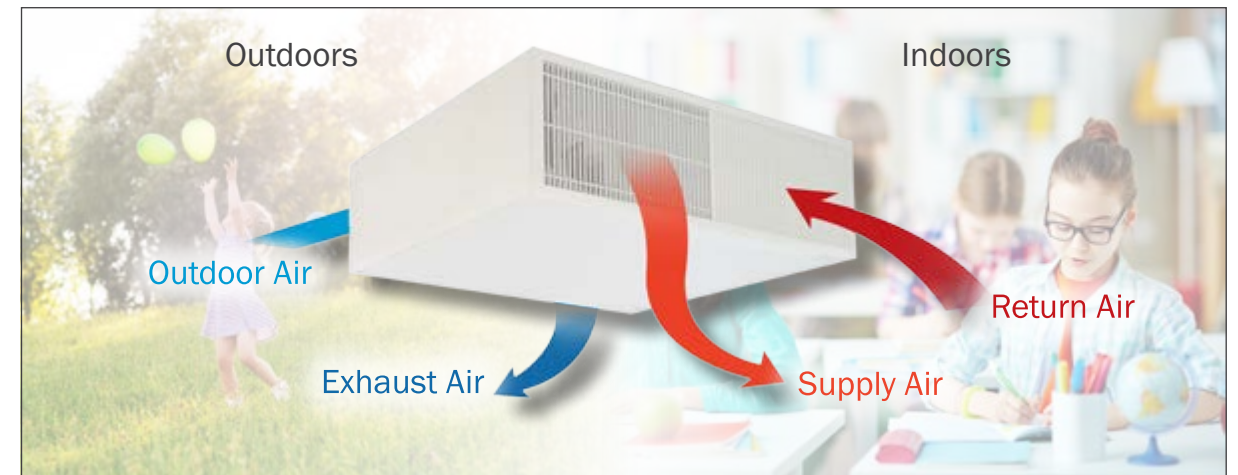
Monodraught's MVHR unit works in two ways. First it extracts stuffy or stale air from a building. Then it uses a membrane heat exchanger core to recover heating or cooling energy from the stale air. Lastly it mixes it with tempered fresh air from outside the building.

The heat exchanger is the core element within the MVHR unit and enables exchange of both latent heat (humidity/moisture) and sensible heat (temperature). It is designed to maximise heat recovery by being made of an ultra-thin membrane and by being constructed in a cross flow format. It is also constructed to prevent supply and exhaust air streams mixing and ensure only fresh air is introduced into a building.

As the heat exchanger achieves a high enthalpy exchange efficiency and has high moisture permeability, it removes the requirement for a condensation drain.

Combined with accurately controlled fans and dampers, a comfortable internal environment can be attained whilst energy consumption is minimised.

The MVHR pre-heats fresh air in the winter months and cools air in the summer



The supply air is first filtered before it is passed through the core.

To ensure a good distribution and reduce the risk of air contamination within the space, the system's inlet and exhaust are angled away from each other. When installed with the Acoustic shroud, a direction grille pushes the fresh air around the room until it reaches the other side at which point it is drawn back into the system and extracted.

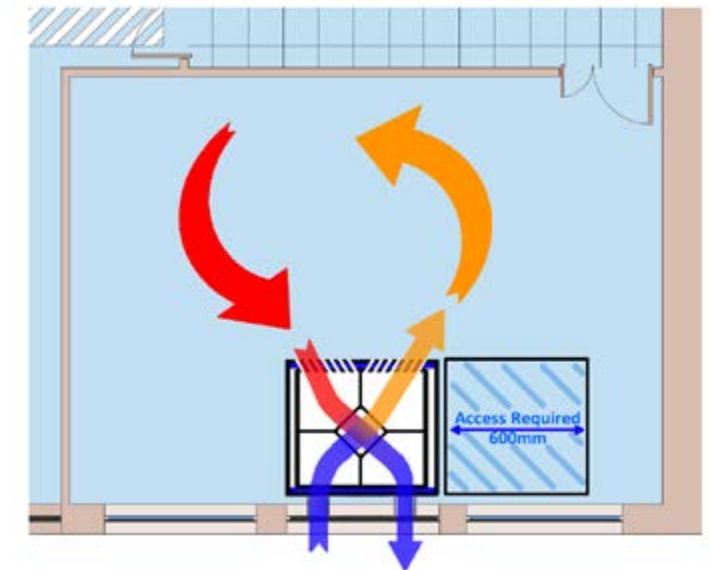


Ventilation Modes

Heat Recovery Mode

When fresh air is required in the winter season, the MVHR draws heat energy from the exhausted air and uses this energy to preheat the cooler fresh air before it enters the room.

It has been demonstrated that if the air within the space is 20 °C and the external air being drawn in is 7 °C, the MVHR will be able to supply fresh air at 14.5 °C and therefore this air only requires heating by 5.5 °C to be brought back up to room temperature, rather than the 13 °C of heating that would be required should the fresh air be brought directly into the space. Similarly, if the air within the space is 20 °C and the external air being drawn in is 24 °C, the MVHR system will be able to supply fresh air at 21.7 °C.

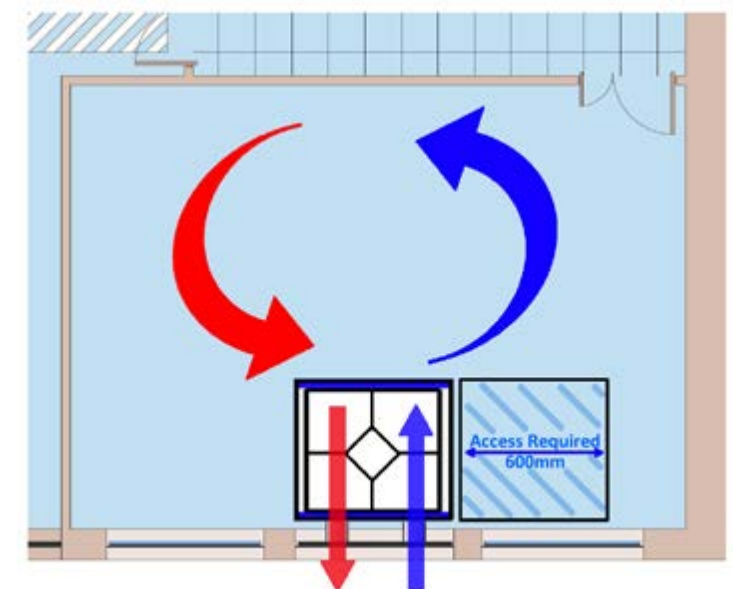


Night Purge

During the summer season, when the external night time air is a lower temperature than the internal air, the MVHR system will provide night time cooling until the space is cooled to a pre-set temperature. It is possible for the system to provide this cooling at a greater flow rate than during the day time as noise restrictions are not in place. This purge effect helps to reduce the temperature of the fabric of the building and reduces the load on any cooling systems at the start of the day.

Summer Bypass Mode

When fresh air is required in the summer season and the external air temperature is lower than the outside temperature, the MVHR draws fresh air directly into the space. When used in conjunction with Monodraught's Acoustic shroud and grille, this cooler fresh air is introduced to the space at a 45° horizontal angle from the system pushing it around the room. At the same time, warm stale exhaust air is drawn into the system at the opposing angle creating a circular air plume within the space.



User Interfaces with Integrated CO₂ Controllers

Office Controller



Education Controller

Boost Mode:

Pressed once will activate Max. Daytime Ventilation, pressed twice in 30 seconds will activate Boost Mode.

ON/Auto Mode:

Turns the system ON or reverts the mode to Automatic.

OFF Mode:

Turns the system off until the next timed cycle.

LED:

Illuminates to notify users when it is necessary to open window.



Temperature and CO₂ sensor

BMS Connections

The MVHR has two main BMS connections:

Fault Indicator – This can be connected to allow a BMS to monitor whether the MVHR unit is working correctly. The fault circuit is normally open when there is No fault and is closed to signal a fault has occurred.

Remote On/Off – It is possible to remotely turn the MVHR unit On/Off via BMS system connected to the MVHR system. To remotely turn the system On/Off the BMS will require two dedicated relays.

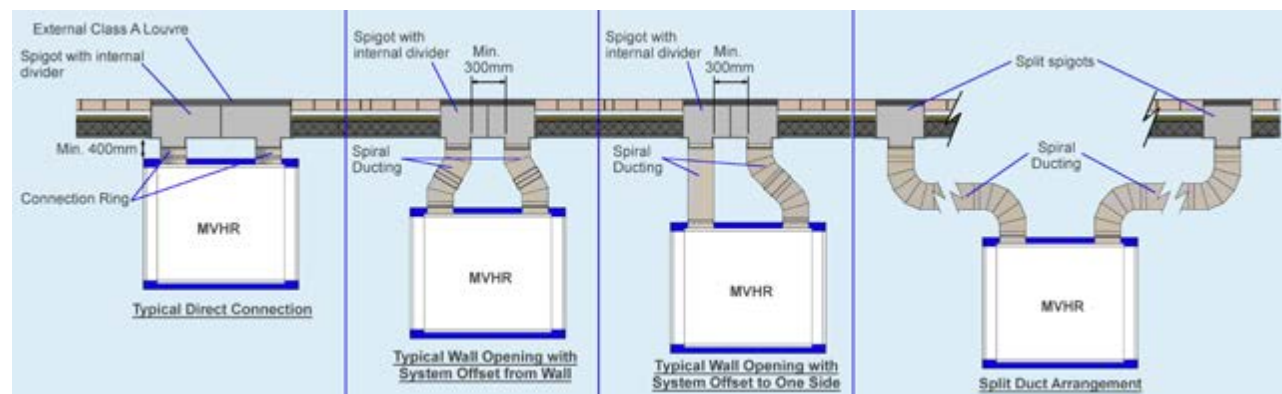
Note: Remote On/Off via a BMS, on a daily/weekly basis, is not recommended. Activation of the systems should only be prohibited during prolonged unoccupied periods, such as school holidays or as part of the fire alarm. Doing so can affect the system's ability to perform and the MVHRs are pre-set for demand control ventilation ensuring the system operates when necessary only.

Low Temperature Hot Water Heating (LTHW)

The MVHR is available with LTHW Heating Modules (2 KW - 12 KW) that are mounted within on the side of the system, within the acoustic shroud. The LTHW coil allows the MVHR to provide the primary heat source within the space removing the requirement for additional radiators. The system is designed to pre-heat the room before the occupied periods keeping noise to a minimum.

The system is supplied with a thermostatically controlled actuated bypass valve and adjustable thermostat to allow the user control over the temperature, between 19°C and 25°C, within the space. The system is easily connected into the building's heating system via the two male connections (3/4" BSPT).

External Ducting



There are endless arrangements in which the MVHR can be connected to an external open. Above four possible solutions are detailed. Details which must be considered in each instance are:

- ✓ The Intake and Exhaust must always be kept separated to avoid contamination. A minimum distance of 300mm is required from the closest edges of both ducts. If one large Plenum is being used an internal divider is essential and must run the entire length of the spigot and reach the internal edge of the louvre.
- ✓ All external spigots must be acoustic and thermally insulated.
- ✓ A minimum distance must be left between the intake side of the system and any permanent obstacles as the cores will require removal for filter changes. This distance will differ for each system.
- ✓ If additional ducting is used to serve the system duct loss calculation should be done to ensure system performance.
- ✓ A downward gradient of 1/30 or more (towards the external façade) must be allowed to the ducting to prevent the ingress of rain water.

Monodraught's suggested arrangement is the Typical Direct Connection

Monodraught's suggested arrangement is the Typical Direct Connection, in this case the MVHR is connected to the external air source by the minimum length of ducting possible therefore reducing the possibility of pressure loss. A 400mm gap must be left between the external wall and system to allow fixings to be installed. This gap can be boxed in at a later date.

Other connection types are possible dependent upon the project specifics. The system can be offset from the external façade using duct lengths. This may cause pressure losses within the system that must be accounted for. It is also possible to provide a Split Duct Arrangement to separate the Intake and Exhaust paths. This arrangement will ensure there is no contamination between the air paths but care must be taken to ensure these do not contaminate the air paths of a system located in the adjacent space.

It is also possible to attach duct to the internal side of the system to spread the air sources around the space. Monodraught have designed the MVHR in a way that this shouldn't be required, if however, this is deemed necessary duct loss calculations should be carried out.

Duct Pressure Drops and System Flow Rates

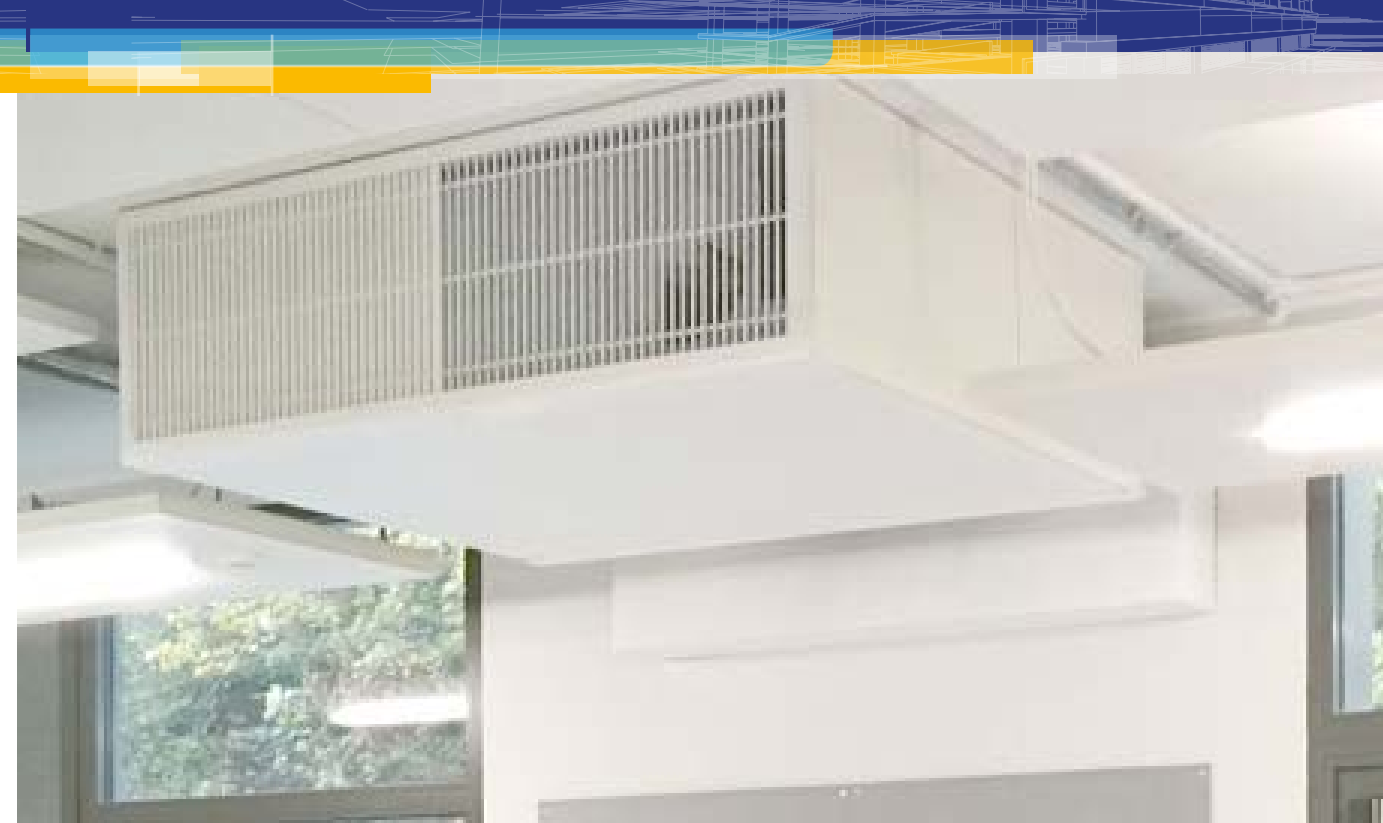
Monodraught have developed a bespoke in-house pressure loss calculator allowing them to accurately calculate the flowrates for systems with or without duct runs. The calculator allows them to add features such as diffusers, louvres, varying angled bends and various ducting types to create a full run. They are then able to enter the required flow rates and select the most suitable MVHR system to ensure the required flow rate is met at a suitable fan speed. This also allows Monodraught to check whether selected systems will be able to meet their required flowrate when installed with ducting allowing a quick and reliable way to ensure suitability.

MVHR Case Study -OLOG Project

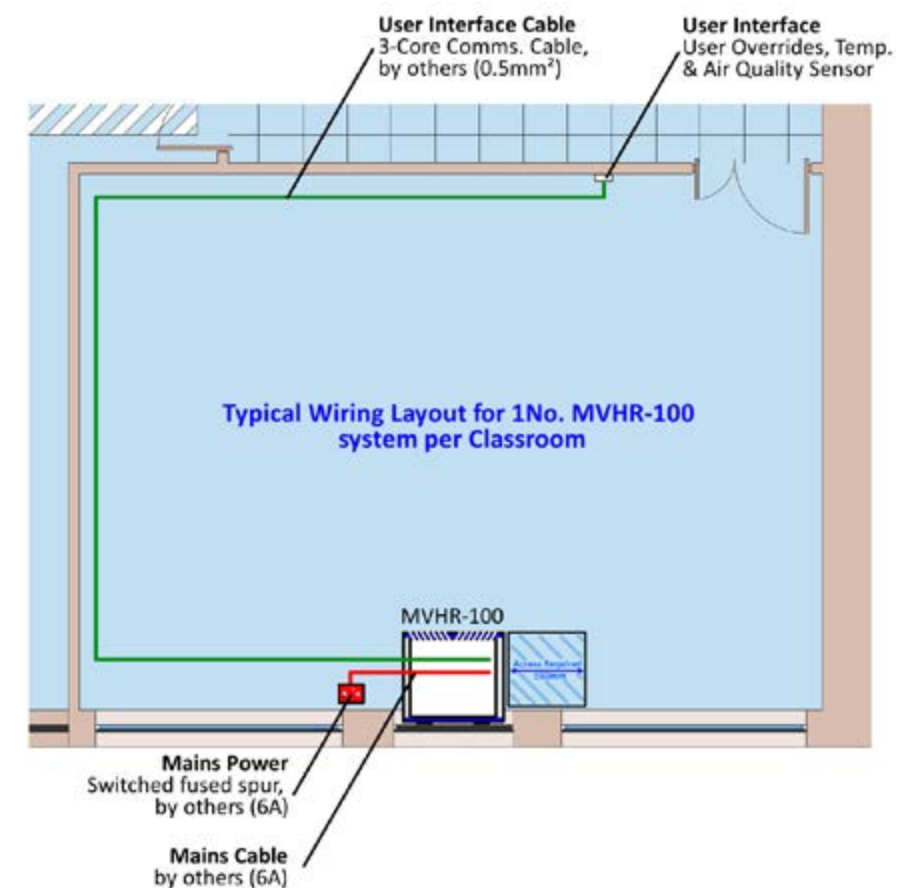
Monodraught were asked to provide a mechanical ventilation solution to Our Lady of Grace School, Charlton, London

In November 2016, fourteen of Monodraught MVHR-100 systems were installed to the new build classrooms of Our Lady of Grace School, Charlton, London.

These systems were install by Monodraught on behalf of Galliford Try and were Monodraught's first MVHR project and initial feedback has been positive. The systems were supplied to simultaneously supply tempered fresh air to each classroom ensuring the correct oxygen levels were maintained whilst stale air is expelled. The air quality was ensured by the use of Monodraught's bespoke integrated CO₂ sensor and additional summer time ventilation can be provided via the manually openable windows within each classroom.



Typical MVHR Wiring Detail



Mechanical Ventilation Heat Recovery Building Simulation

Within the **IES-VE software**, Monodraught has developed a **performance model of the MVHR**, utilising the data that has been collected from component tests and on site monitoring, to produce an accurate representation for modelling.

A typical school has been prepared, considering all aspects of **occupancy, solar gain, and sensible and latent heat gains**, based around the design requirements stated within the **Facilities Output Specification**.

Monodraught’s standard approach is to consider the total heat gains in the area and provide a natural ventilation strategy to dissipate this heat gain. Furthermore, the aim is to provide sufficient fresh air to the occupants of the area so that indoor air quality and thermal comfort are maintained.

The suitable **CIBSE DSY weather file** for the project location is utilised to provide the expected local environmental conditions to the building being modelled.

1. Building Construction Inputs

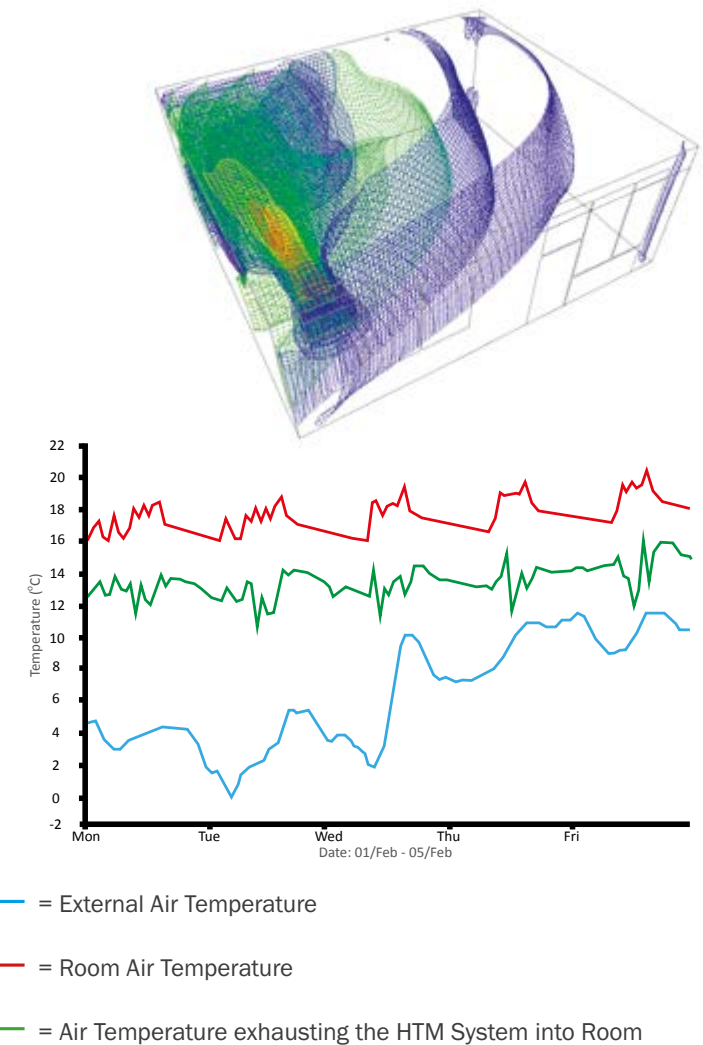
Item		Construction Data
Construction U Values & Thermal Mass (Cm)	Walls	0.26 W/m ² .K, 180 kJ/(m ² .K)
	Floor	0.22 W/m ² .K, 100 kJ/(m ² .K)
	Roof	0.18 W/m ² .K, 180 kJ/(m ² .K)
	Glazing	0.16 W/m ² .K
Glazing g-Value		0.4
Infiltration Rate		0.25 Air Changes per Hour
Floor Area		55 m ²
Internal Room Height		3.1 m
Glazing Area		9.3 m ²
Effective Low Level Opening		0.93 m ²
Heating Set Point		18.0 °C
Occupancy (people)		34 No.
Occupancy Heat Gain		75 W(sensible), 55 W(latent)
Occupied Hours		08:30 - 12:30, 13:30 - 16:00
Lighting		10.0 W/m ²
Equipment		15.0 W/m ²

2. Hybrid Ventilation Performance

The MVHR system is designed to operate to utilise the internal low energy fan, during peak summer day time periods and summer night time periods.

3. Analysis of Winter Performance


For the MVHR operation during the heating season, Monodraught are able to demonstrate tempering of the incoming fresh air.





Monodraught are the market leaders in providing natural ventilation, natural daylight, and low energy cooling solutions

Range Specifications

Monodraught		MVHR-15	MVHR-25	MVHR-35	MVHR-50	MVHR-65	MVHR-80	MVHR-100	MVHR-150	MVHR-200	MVHR-250
Dimensions (mm)		1260 (L) x 475 (h) x 1050 (w)		1260 (L) x 475 (h) x 1260 (w)		1260 (L) x 475 (h) x 1500 (w)			1760 (L) x 565 (h) x 2300 (w)		
Weight (Kg)		55	55	60	64	70	80	85	185	190	240
Ventilation Rate (l/s) (m³/h)	Max. Day Time	25 (90)	42 (150)	58 (210)	82 (300)	108 (390)	133 (480)	195 (703)	208 (750)	278 (1000)	347 (1250)
	Day Boost	37 (135)	62 (225)	87 (315)	124 (450)	162 (585)	200 (720)	285 (1026)	313 (1125)	417 (1500)	521 (1875)
	Night Mode	50 (180)	82 (300)	116 (420)	166 (600)	210 (780)	266 (960)	360 (1296)	417 (1500)	556 (2000)	694 (2500)
Running Current (Amps)	Max. Day Time	0.15	0.16	0.26	0.26	0.4	0.36	0.5	1.1	1.1	1.4
	Day Boost	0.24	0.28	0.54	0.59	0.9	0.83	1.2	2.4	2.7	3.6
	Night Mode	0.4	0.5	0.98	1.15	1.65	1.82	2.5	4.2	5.4	7.6
Input Power (W)	Max. Day Time	14	16	31	32	49	60	75	176	197	244
	Day Boost	28	33	70	78	131	151	200	421	494	687
	Night Mode	49	62	140	165	252	335	420	792	1000	1446
Temperature exchange efficiency (%)	Max. Day Time	83	82	86	83	84	84	86.5	81	82	80
	Day Boost	81	80	82	81	81	82	83	80	81	79
	Night Mode	80	79	80	78	77	79	80	80	80	77
Enthalpy exchange efficiency - Heating/Cooling (%)	Max. Day Time	78/78	76/74	78/67	75/72	76/74	78/78	78/77	73/72	77/74	74/71
	Day Boost	75/74	72/70	74/73	71/68	71/69	73/72	74/73	71/70	73/71	71/69
	Night Mode	73/71	69/68	71/71	69/66	68/66	71/70	72/71	70/69	72/70	68/65
Noise (dB) (Measured at 1.5m under the centre of unit in an anechoic chamber)	Max. Day Time	19	20	20	19	22	23	21	30	28	32
	Day Boost	24	22	28	28	30	30	29	36	36	39
	Night Mode	28	27	32	34	35	35	35	40	40	43
Specific Fan Power (W/L/s)	Max. Day Time	0.67	0.46	0.63	0.46	0.54	0.54	0.54	0.9	0.7	0.7
	Day Boost	0.9	0.63	0.96	0.75	0.97	0.9	0.96	1.4	1.2	1.3
	Night Mode	1.17	0.9	1.44	1.19	1.39	1.51	1.51	1.9	1.8	2
Duct Size (mm)		Ø100	Ø150	Ø150	Ø200	Ø200	Ø250	Ø250	250 x 750	250 x 750	250 x 750
Installation Process		Monodraught supplied and installed									
Power Supply		6 amp fused spur							10 amp fused spur		
Filter Required		Yes - G3 (supplied) - Range of optional filters including F7 and carbon filters									
Heat Exchanger Material		Special treated membrane plate heat exchanger									
Cladding and Casing		Galvanized steel sheet, powder coated steel sheet, specialist acoustic panels									
Heat Insulation Material		Self-extinguishing urethane foam									
Motor and Fan		245mm diameter centrifugal fan									
Ambient Air		Shall be between -10°C and 40°C, 80% RH or less									
Suction Air Condition		Shall be lower than 40°C, 80% RH									
Supply fan operation under low outdoor temperature		-10°C to -15°C : Intermittent operation 60 min ON, 10 min OFF -15°C or less : Intermittent operation 55 min OFF, 5 min ON									
Control Options		Decentralised CO ₂ or Temperature as standard. Options: PIR, VOC, BACnet, Modbus, BMS integration, fault, run									
LTHW Heating (KW)		Range: 2KW-12KW									

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