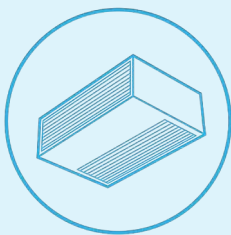




Monodraught



HTM[®]

HYBRID VENTILATION

High-performance, low carbon ventilation



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 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, which is equivalent to over 3,534 million miles 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 caring 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.



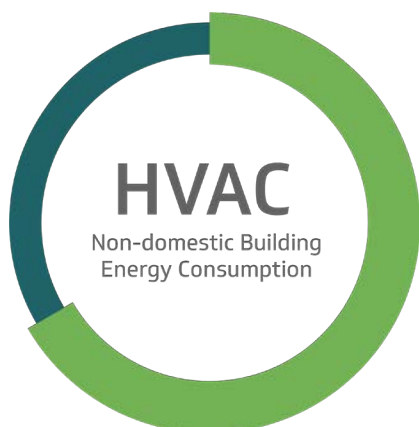
THE CLIMATE CHANGE REALITY

Greenhouse gas emissions continue to drive global warming and the five-year period to 2018 was the hottest ever recorded. The world is nearly one degree warmer than it was before widespread industrialisation, and the 20 warmest years on record have been in the past 22 years according to the World Meteorological Organization (WMO).

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

OUR CHALLENGE

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.



Achieving net zero by 2050 will mean virtually eliminating emissions from the UK's building stock. According to BEIS, two thirds of the energy consumption from the 1.8 million non-domestic buildings in England and Wales was used to provide building services (heating, ventilation, cooling, hot water and lighting).*

Higher standards in design and construction are crucial to drive down carbon emissions. We must urgently transition to low energy ventilation, heating, cooling solutions and Monodraught are here to help.

*Source: BEES Executive Summary BUILDING ENERGY Nov 2016



ABOUT HYBRID VENTILATION

Hybrid Ventilation combines the benefits of natural ventilation with additional support from fans in a traditional mechanical ventilation system.

Low carbon natural ventilation transfers fresh air without fans or pumps making it extremely cheap to run whilst providing a comfortable and healthy indoor environment. During the peak seasons, hybrid ventilation will switch on the mechanical fan to boost the natural ventilation and optimise indoor comfort. During winter peaks, the hybrid system mixes warm internal air with fresh external air to deliver mixed tempered air. During summer peaks, the hybrid system provides boosted daytime ventilation and secure night-time cooling.

WHAT IS MONODRAUGHT HTM

Our Hybrid Ventilation system, known as Hybrid Thermal Mixing (HTM) was first launched in 2014. Since its initial launch, Monodraught have successfully sold and installed thousands of HTM units saving the equivalent of over 18,400 tonnes CO₂.

The Monodraught HTM was originally designed to address the Priority School Building Programme (PSBP) requirements and has since been successfully installed in large numbers of schools as well as many other non-educational applications.

The automatically controlled HTM works in conjunction with low energy natural ventilation, switching the mechanical ventilation between various operating modes. It monitors and responds to the season, external/internal temperature conditions and indoor air quality (IAQ).

The HTM system can be used in single sided or cross flow ventilation strategies. It has an exceptionally low specific fan power (SFP), intelligent controls as standard, a full data logging facility, as well as temperature and CO₂ sensors. Optional BACnet and Modbus modules can deliver key performance data to a central BMS.



HTM benefits

By providing boosted ventilation and the assurance of a comfortable indoor environment during peak seasons all year round, HTM combines the benefits of low-running cost natural ventilation during the bulk building operation hours, together with boost ventilation.

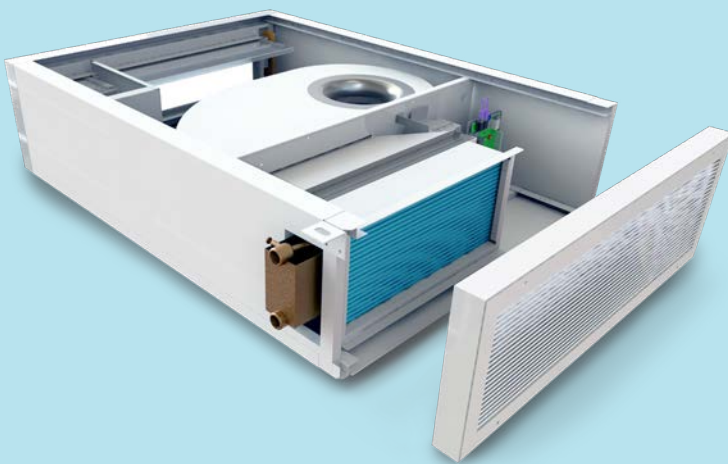
Our Clients



APPLICATIONS

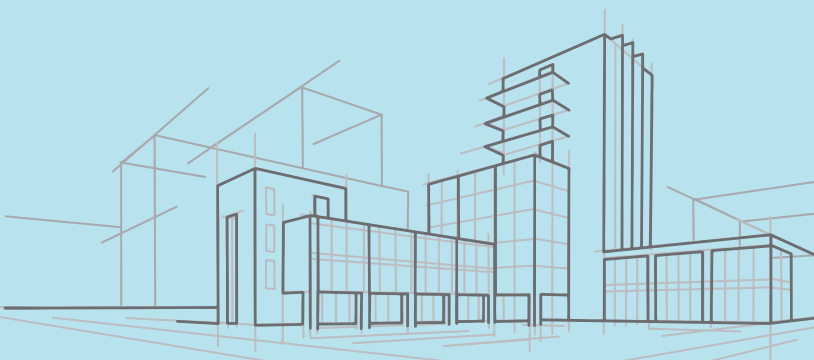
Hybrid ventilation is the perfect solution for new or refurbished buildings that require the benefits of low carbon natural ventilation with the additional capacity of boost ventilation at peak times. They are useful for various applications, e.g.: -

- School classrooms, science rooms, IT suites
- Education lecture halls, libraries
- Day centres and healthcare areas
- Visitor centres
- Offices and commercial buildings



BUILDING SIMULATION

Monodraught has worked closely with IES-VE to develop a performance model of the HTM system. We analysed data collected from component tests and on-site monitoring to produce an accurate model. When our engineers prepare building modelling, we use the standard specified CIBSE weather file for the specific project location to simulate the expected conditions for the building.



WHY CHOOSE HYBRID VENTILATION

Advantages for Specifiers



Contributes towards sustainability and carbon reduction targets

Helps to achieve latest Building Regulations and PSBP funding criteria



Enhances your energy and carbon saving credentials

Ventilation that minimises or eliminates fan usage and refrigerants*, and has no compressors



Helps to meet compliance criteria, e.g. CIBSE A and BB101

Design and operating parameters ensures compliance with key criteria including thermal comfort, indoor air quality, cold draught, and acoustic requirements



Easy to integrate

Various configurations and wide range provide optional heating and cooling too

Advantages for Building Owners



Contributes towards sustainability and carbon reduction targets

Helps to achieve latest Building Regulations and funding criteria



Low running costs

An intelligent control system that monitors conditions to minimise mechanical ventilation operation and ensures low running costs



Fast payback

Low energy costs with easy servicing, maintenance and a long service life give an impressive payback and releases capital for other projects



Data Monitoring

Assures system efficiency and air quality through lifetime

Advantages for Contractors



Enhances your energy and carbon saving credentials

Low energy and low carbon ventilation that minimises energy usage



Easy preparation

A 5A single phase mains supply (depending on model) is all that is required simplifying preparation for our installation team



Easy to install

No complicated duct runs** which minimises time on site and simplifies project planning.



Robust

Powder coated steel frame

Advantages for Occupants



Healthy and productive environment

Continuous CO₂, indoor and outdoor air temperature monitoring ensures a supply of fresh air as required



No draughts

Natural ventilation with boost mechanical support via 8 fan speeds and mixed tempered air during winter all ensure even and draught free air circulation



Quiet and no noise disruption

Minimum mechanical operation together with acoustic panels keeps maximum daytime sound level below 35dB



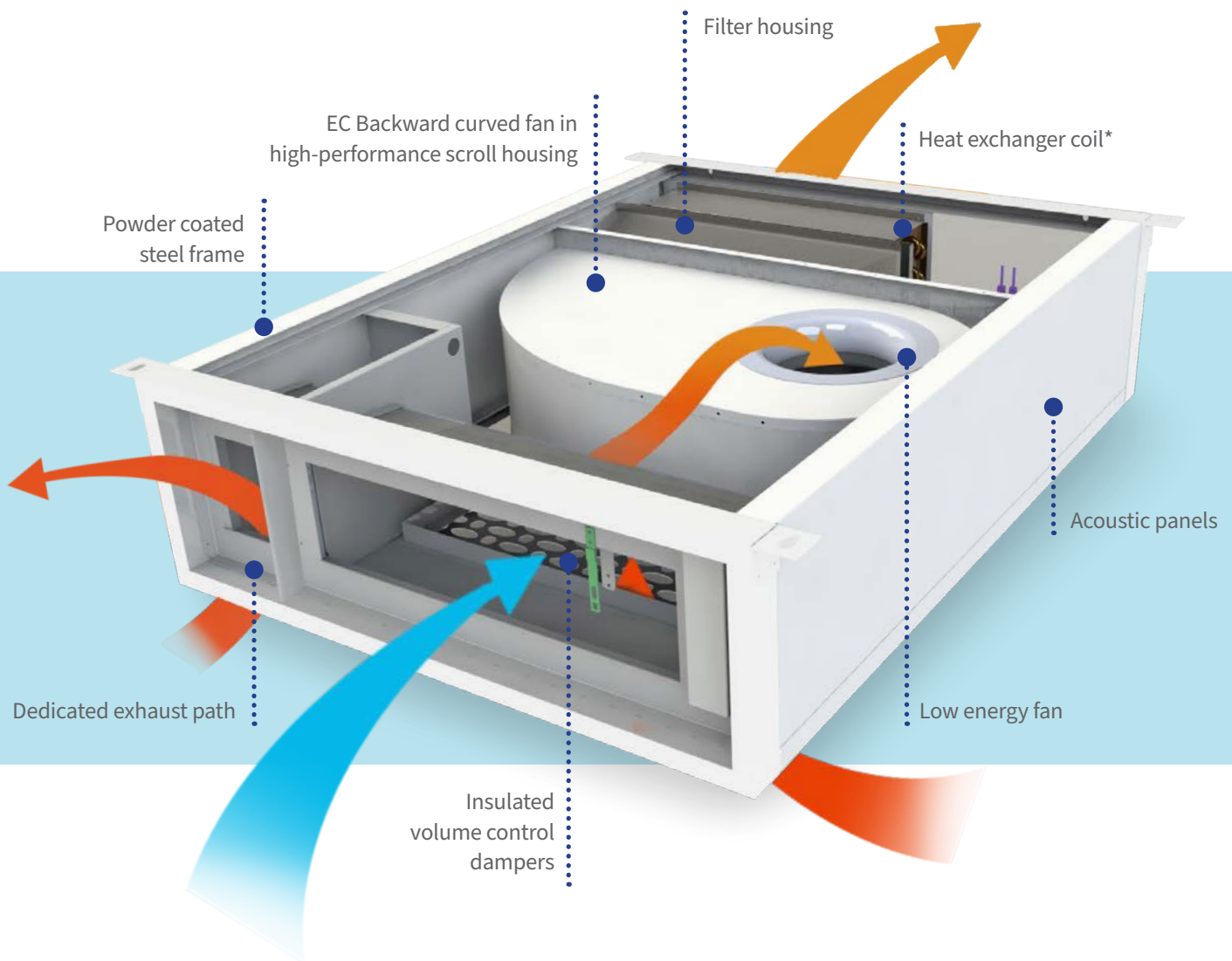
Easy to use

Simple control systems with optional smart screen controller provides occupant autonomy

* Except HTM FS-C

** Façade mounted

CONSTRUCTION FEATURES



* Applicable to HTM F-H, FS-H and FT-H

HOW DOES IT WORK?

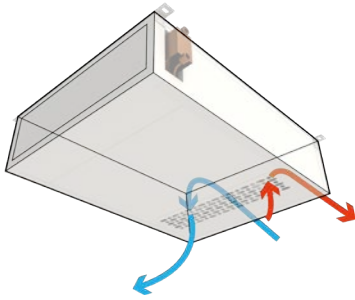
HTM works in conjunction with natural ventilation openings such as manual or automatic window / louvre openings. It provides natural ventilation as the default method of ventilation and indicates when manual windows or automatically opening dampers should be utilised to maximise thermal comfort and Indoor Air Quality (IAQ). The system can be combined with automatic louvres such as Monodraught Ventsair® façade systems.

An integrated exhaust path within the HTM system removes the need for additional exhaust paths, thereby reducing the number of façade openings.

The intelligent control system has different sensors that measure the room, external and mixed air temperatures and CO₂ levels and automatically control the supply air temperature to manage the internal environment. The HTM system incorporates a fully automatic seasonal control strategy which includes a temperature, date and weather compensation algorithm to pick up unseasonal conditions.

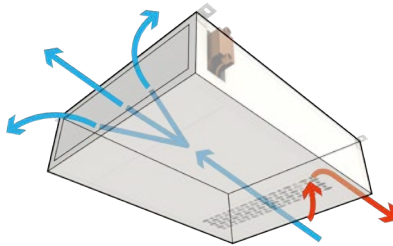
The wall mounted controller houses internal temperature and CO₂ sensors and user override controls are included as standard. Data is recorded each minute as standard via a built-in data card and allows for subsequent analysis to demonstrate system compliance.

OPERATION MODES



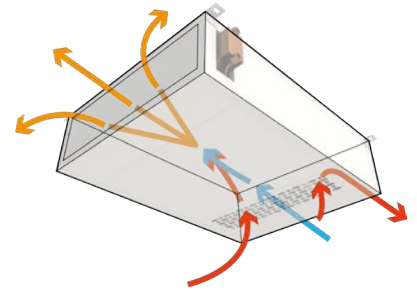
1. Natural Ventilation Mode

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



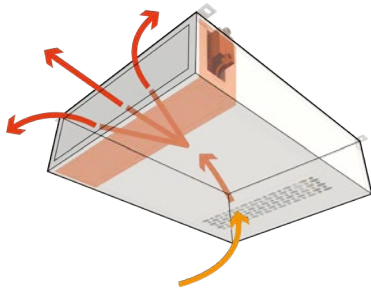
2. Boost Fan Mode

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



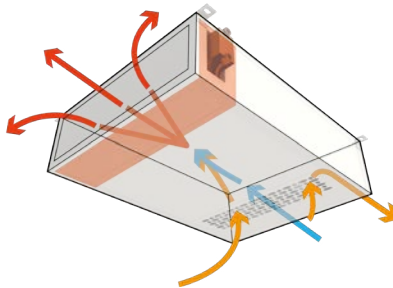
3. Mixed Recirculation Mode

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.



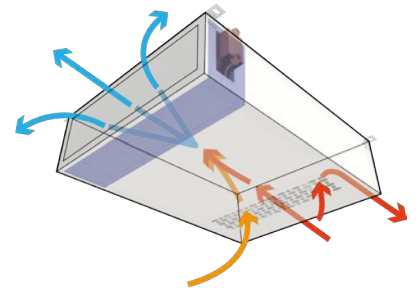
4. Pre-heating Mode

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



5. Occupied Heating Mode

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



6. Cooling Mode

Recirculates indoor air across the heat exchanger coil to cool the room. Fresh external air can also be cooled to reduce both indoor air temperature and CO₂ levels.

7. Night-time Cooling

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

OUR HTM PRODUCT RANGE

Model	Ventilation Rate (l/s)		Ventilation Modes	Night-time Purge	Heating Modes	Cooling Mode
	Max Day	Max Night				
			Natural Ventilation Mixed Mode Boost Fan Mode	Night-time Cooling	Pre-heating Mode Occupied Heating Mode	Cooling Mode
HTM F	350	530	✓	✓	X	X
HTM FS	180	250	✓	✓	X	X
HTM FT	355	510	✓	✓	X	X
HTM F-H	260	530	✓	✓	✓	X
HTM FS-H	130	250	✓	✓	✓	X
HTM FT-H	255	490	✓	✓	✓	X
HTM FS-C	130	250	✓	✓	✓	✓



KEY FEATURES

- Some HTM models have an integrated heat exchanger coil to provide primary heat and eliminate the need for radiators (HTM F-H, FS-H and FT-H).
- The HTM FS-C model eliminates the need for radiators and separate cooling systems. The heat exchanger coil can be used for both heating and cooling (6 kW heating or 3kW cooling) and has an integrated condensate pump. It can be combined with a heat pump or other heat/cool source, via modulating 24VDC actuated valve.
- Note: in heating/cooling modes, the off-coil air temperature and flow rate are limited as to not create an uncomfortable environment.
- 5-year warranty (1-year warranty for mechanical and electrical components)
- 1-minute data logging as standard
- Eight operational fan speeds, fully automatically controlled
- Full independent acoustic testing conducted
- Models (F-H, FS-H, FT-H) with built-in heating coil as standard
- Model (FS-C) with built-in heating and cooling coil and condensate pump as standard

SYSTEM OPTIONS




Various options are available and further details can be provided on request.

A Installation options

- Below or above ceiling mounting
- Primary/Secondary mode to synchronise multiple units in a single zone
- Input to enable/disable HTM interconnection with Fire Alarm circuit
- BACnet or Modbus interface to provide interconnection with BMS
- Attenuator module: powder coated mild steel frame and specialist acoustic panelling
- G4 & F7 filter modules
- Colour matching on request
- For HTM-F: 1kW electric heating element (5A rated current)
- Fixing options: fixing rail, corner brackets (F, FS, F-H, FS-H, FS-C), fixing bar (F, F-H)

B Control Options and Features

Monodraught offer four wall controllers suitable for various room designs, layout and the user's requirements. Each have a self-test mode, and automatic diagnostics test and display. One wall controller is required within each room.

Model	Control Options			
				
	Standard Controller with window override	Standard Controller with louvre Override	Standard Controller with temperature control	Smart Screen LCD touch screen
HTM F	✓	✓	X	✓
HTM FS	✓	✓	X	✓
HTM FT	✓	✓	X	✓
HTM F-H	X	X	✓	✓
HTM FS-H	X	X	✓	✓
HTM FT-H	X	X	✓	✓
HTM FS-C	X	X	✓	✓
Control Features				
Fan speed control	✓	✓	✓	✓
Boost mode	✓	✓	✓	✓
Auto mode	✓	✓	✓	✓
Off mode	✓	✓	✓	✓
Indicates when to open the windows	✓	X	X	✓
Regulate the Ventsair facade opening (if fitted)	X	✓	X	✓
Temperature sensor	✓	✓	✓	✓
Temp set point control	X	X	✓	✓
CO ₂ sensor	✓	✓	✓	✓
Fault mode	✓	✓	✓	✓
Acoustics test mode	✓	✓	✓	✓
Self-test mode	✓	✓	✓	✓

CASE STUDY

LITTLEPORT ACADEMY



EDUCATION



NEW BUILD



Year of installation
2016

Location
Ely, Cambridgeshire

End User
Cambridge County Council

Consultant
Morgan Sindall

M&E Contractor
Imtech G&H (Yorks)

Installed Systems

Hybrid Ventilation

HTM F
HTM FS

Natural Ventilation

Windcatcher X-Air
Ventsair façade

Control Systems

iNVent 2

School complex benefits from wide range of Monodraught ventilation solutions

This BREEAM “very good” rated new school opened in 2016 to accommodate over 650 pupils. It includes a primary school, a 3-storey secondary school and a SEN School.

Monodraught hybrid and natural ventilation systems were designed to meet the tough requirements of the Priority School Building Programme and Education Funding Association (EFA) regulations.

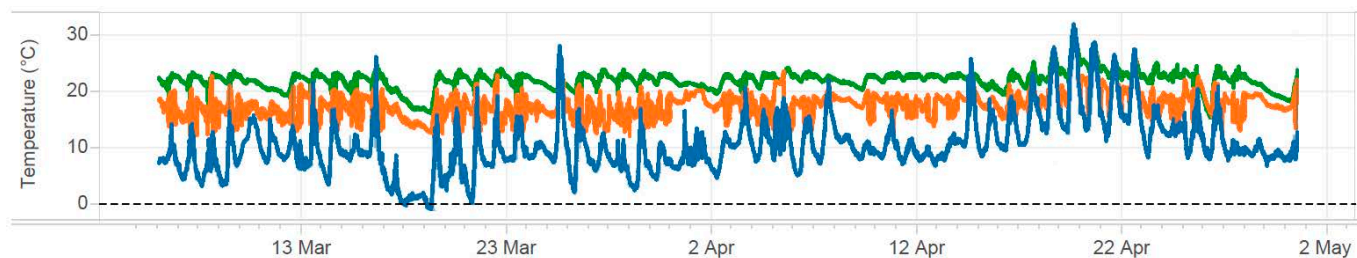
The HTM F and HTM FS models were selected to provide natural ventilation and hybrid ventilation mixed tempered air in winter periods, secure night-time cooling and boosted levels of ventilation during summer.

The school also included an extensive array of Monodraught Windcatcher that provides low energy natural ventilation in the sports halls, dining rooms, staff rooms and reception areas.

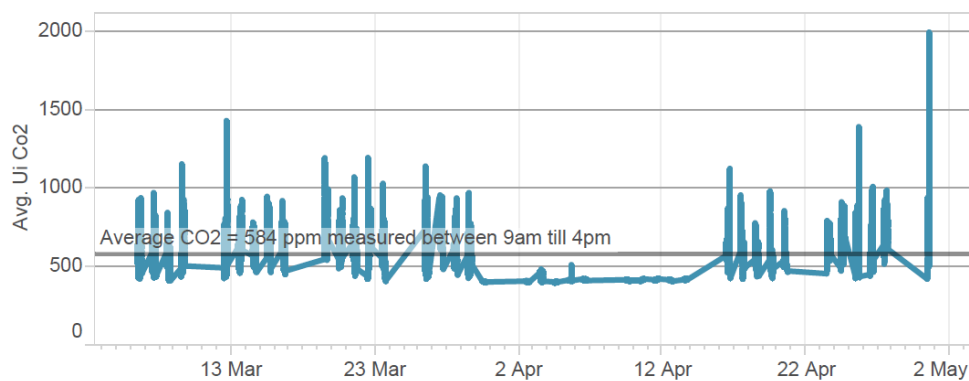
Our experienced team installed the complete systems and also provide ongoing support. Data monitoring during the initial period showed that temperatures and CO₂ levels remained consistent with an average CO₂ of 584ppm during occupied hours and an average mixed supply temperature of 17.7°C.

Temperature and CO₂ overview

■ External Temp. ■ Mixed Supply Temp. ■ Room Temp.



Room air quality



OVERVIEW

Avg. External Temp. (°C)	13
Avg. Mixed Supply Temp. (°C)	17.7
Avg. Room Air Quality (CO ₂ ppm)	584
Avg. Room Temp. (°C)	22



CASE STUDY

HESSLE HIGH SCHOOL



EDUCATION



NEW BUILD



Year of installation
2015

Location
Hull, Yorkshire

End User
East Riding of Yorkshire
County Council

Architects
DLA Design

Main Contractor
Galliford Try

Installed Systems

Hybrid Ventilation
HTM F

Natural Ventilation
Windcatcher X-Air
Ventsair façade

Control Systems
iNvent 2

Simple, innovative ventilation solution for a flagship school

Education spaces must be well ventilated to ensure that air quality within the classroom is appropriate for staff and students. This provides healthy and comfortable spaces to study or relax. Hybrid ventilation offers an energy-efficient way to provide outdoor air ventilation to buildings. In some conditions it can also be used to cool them, so reducing energy required from conventional sources.

Monodraught hybrid and natural ventilation solutions were provided to this PSBP scheme flagship school. The HTM systems were installed throughout the school classrooms, halls and corridors and Windcatcher natural ventilation systems were selected for larger spaces such as the sports, drama, main halls and the dining rooms.

Nick Hopper, Technical Director at Monodraught said “Monodraught were delighted to work with our partners to monitor the systems as Hesse High School for a 12 month period. In this way we validated our performance commitments to the school and our contractors and also provided a feedback loop for product improvements.”

In a year, data monitoring has shown that the systems are performing strongly with low running costs and good air quality. Average temperatures were maintained at between 19-23°C during occupied hours. Total power consumption cost was considerably low at approximately £7.49 per unit. Average air quality was 776 ppm CO₂ which is well within the BB101 guidelines of an average of less than 1,000 ppm.

Hourly average for room temperature and fan speed

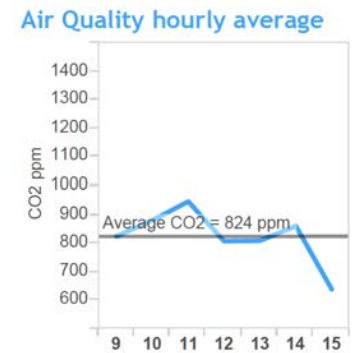


Room Temperature (average room temperature shown on an hourly basis)

Month of date & hour	9	10	11	12	13	14	15	16
January	20.7	20.7	21.4	21.1	21.5	21.1	20.9	20.9
February	21.3	21.6	22.4	22.4	22.5	22.3	22.0	21.5
March	23.7	23.8	24.1	24.1	24.0	24.0	23.8	23.4
April	22.0	22.3	23.0	23.0	23.0	23.3	23.1	23.0
May	22.4	22.8	23.1	23.3	23.4	23.5	23.4	23.3
June	21.0	21.3	21.9	22.0	22.3	23.0	22.6	23.0
July	22.3	22.8	23.1	23.4	24.2	24.3	24.2	24.2
August					23.1	23.3	23.3	23.1
September	22.3	22.7	23.3	23.4	23.9	24.1	23.9	24.0
October	22.0	22.0	22.9	23.1	23.5	23.2	22.9	22.2
November	20.1	19.7	20.3	20.2	20.3	20.2	20.0	19.7
December	19.0	19.4	19.9	20.0	19.7	19.4	19.1	18.9

Room Air Quality

(Average CO₂ ppm shown on an hourly basis)



OVERVIEW

Avg. External Temp. (°C)	14.3
Avg. Mixed Supply Temp. (°C)	18.7
Avg. Room Air Quality (CO ₂ ppm)	824
Avg. Room Temp. (°C)	21.7
Total Power Consumption (kWh)	74.87
Total Power Consumption cost £ @ 10p per kWh	7.49



TECHNICAL DETAILS



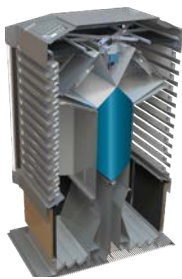
Hybrid Ventilation				
		HTM F	HTM FS	HTM FT
Dimensions (mm)		900 (w) x 500 (h) x 1000 (l)	900 (w) x 300 (h) x 1000 (l)	1800 (w) x 300 (h) x 1000 (l)
Weight (kg)		57	39	78
Min number of supporting fixings		3	3	4
Min ceiling void (mm) - where required		550	350	350
External weather louvre minimum free area (m ²)		0.23	0.14	0.28
Flowrates/SFP	Max Day	350 l/s - SFP: 0.16	180 l/s - SFP: 0.15	355 l/s - SFP: 0.15
	Max Night	530 l/s - SFP: 0.34	250 l/s - SFP: 0.24	510 l/s - SFP: 0.24



Hybrid Ventilation with heating					Hybrid Ventilation with heating/cooling
		HTM F - H	HTM FS - H	HTM FT - H	HTM FS - C
Dimensions (mm)		900 (w) x 500 (h) x 1200 (l)	900 (w) x 300 (h) x 1200 (l)	1800 (w) x 300 (h) x 1200 (l)	900 (w) x 300 (h) x 1200 (l) with electronics tray
Weight (kg)		63	48	94	50
Min number of supporting fixings		3	3	4	3
Min ceiling void (mm) (where required)		550	350	350	350
External weather louvre minimum free area (m²)		0.23	0.14	0.28	0.14
Flowrates/SFP	Max Day	260 l/s - SFP: 0.13	130 l/s - SFP: 0.17	255 l/s - SFP: 0.17	130 l/s - SFP: 0.17
	Max Night	530 l/s - SFP: 0.4	250 l/s - SFP: 0.4	490 l/s - SFP: 0.4	250 l/s - SFP: 0.4
Heat exchanger coil rating		Heating 6kW at 80°C/60°C at 0.1 l/s			Heating 6kW at 80°C/60°C at 0.08 l/s cooling 3kW at 10°C/18°C, 0.08 l/s

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 without pumps.

Hybrid Ventilation

HTM®



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

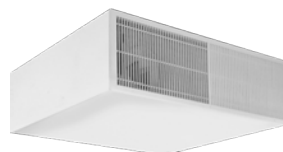
Cool-phase®
Cool-phase® Hybrid



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. We provide 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 develops award winning products that deliver best in class solutions for our customers. By integrating advanced controls, our products deliver outstanding comfort with lowest possible running costs and highest possible carbon savings. We are accredited to ISO9001 quality management system and ISO 14001 environmental management system.

Turnkey 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.





We are pioneers in the design and manufacture of advanced sustainable ventilation, cooling, heating and lighting solutions for new and refurbished commercial 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.

HVPB/06.2020

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