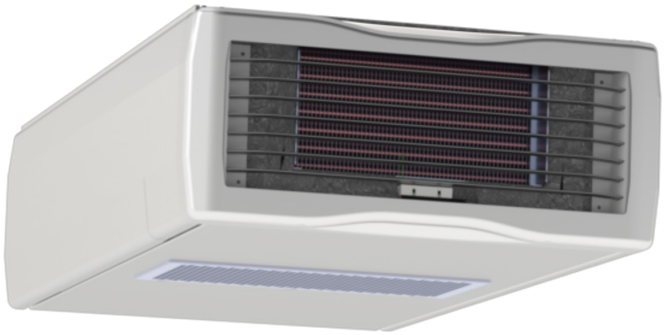
HVR ZERO APX Mini

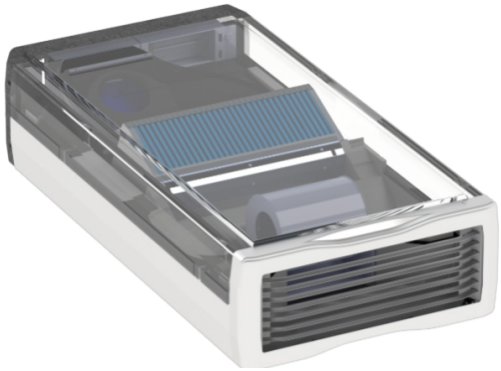
Hybrid Ventilation Heat Recovery, Heating & Cooling

Product Specification Sheet

Monodraught

CIBSE BUILDING PERFORMANCE AWARDS 2023 WINNER





Model illustrated in Polar White colour

Designed to maximise efficiency of Offices, Education and Healthcare

Product Description

The next generation of HVR technology, APX Mini represents a significant step forward in low energy hybrid ventilation systems. Ensuring excellent air quality is more crucial than ever due to its profound impacts on public health, environmental sustainability, social equity, and economic well-being. The system now incorporates an array of additional monitoring tools to enhance Indoor Air Quality (IAQ). These upgraded sensors monitor internal temperature, humidity, Volatile Organic Compounds (VOC), pollution levels (PM2.5), ventilation air flow levels, and CO_2 concentration.

A key feature of the new system is the Passivhaus level of airtightness. The system has been designed to exceed the requirements in the latest CIBSE TM23 guidance which requires ventilation systems to be closed but not sealed during the air testing of buildings, and every system is supplied with an airtightness test certificate.

The system has improved heat recovery and the option for an enhanced two-pipe or four-pipe coil. Specifically designed for compatibility with renewable heating and cooling solutions such as air source or ground source heat pumps. The APX can future proof buildings with the standard ability for cooling either now or in the future.

By seamlessly integrating ventilation, improved heat recovery, exceptional air tightness levels and advanced control over airborne pollutants into a single compact unit, the system significantly reduces overall power consumption in buildings, whilst contributing to unrivalled air quality control. This holistic approach, coupled with a sophisticated automatic IoT control strategy, ensures optimal balance between indoor air quality, thermal comfort, and energy efficiency.

Key Performance Parameters

65	0.09	125	0.10	45	0.15	50.1
Daytime Flow rate (l/s)	Daytime SFP (W/l/s)	Night-time Flow rate (l/s)	Night-time SFP (W/l/s)	Wintertime HX Flow rate (l/s)	Wintertime HX SFP (W/l/s)	Heat Recovery (%)

Features and Benefits

- EPD certified – Zero embodied carbon
- Over 50% heat recovery
- Passivhaus levels of air tightness
- WELL standard IAQ sensor technology
- Active ventilation flow rate monitoring
- IoT remote monitoring technology
- IES modules available for accurate modelling
- Configurable digital wall controller
- Standard colours available: Polar White, Jet Black and Anthracite Grey
- Bespoke colours also available
- Smart services - automatically controlled

Includes:

- Temperature sensor
- CO_2 concentration sensor
- VOC sensor
- Pollution sensor (PM2.5)
- Humidity sensor
- Flow rate sensor
- With or without ducting
- 1-minute data logging as standard
- Fan speeds automatically controlled
- Carbon offsetting certificate

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WHY CHOOSE HVR ZERO APX?

HEAT RECOVERY

By capturing and repurposing excess heat or cold from exhaust air, the system ensures that valuable thermal energy is not lost but instead utilised to preheat or precool incoming fresh air, significantly reducing energy consumption and operating costs. The inclusion of heat recovery is fundamental when utilising heat pump technology.

Energy Savings: The system lowers heating and cooling costs and reduces overall energy consumption.

Improved Indoor Air Quality: The continuous flow of fresh air ensures a healthier indoor environment.

Environmental Sustainability: Introduce sustainable environmental practices with the system's focus on low energy consumption.

The heat exchanger efficiency has been optimised for offices, education and healthcare buildings. APX has the perfect balance between fan energy and the heat exchanger resistance.

AIR TIGHTNESS

Experience unparalleled comfort and energy efficiency with the system's meticulous approach to air tightness. Through precision engineering and innovative construction techniques, it guarantees a well-insulated space that eliminates drafts, minimises heat loss, and maintains consistent temperatures throughout your environment.

Monodraught's commitment to excellence extends to meeting Passivhaus standards of airtightness. The air testing guidance for buildings is detailed within CIBSE TM23, which was updated in January 2022. Buildings designed after this time are required to be air tested with ventilation products closed and not temporarily sealed.

Every HVR Zero APX Mini is tested at factory and provided with a certification of air tightness. The rigorous approach minimises time on site and ensures successful completion of the buildings airtightness test for the ventilation provision.

SENSOR-DRIVEN OPTIMISATION

Through the integration of advanced sensors and cutting-edge technology, Monodraught prioritise monitoring and maintaining an optimal air quality:

- **Temperature Sensor:** Four integrated temperature sensors per unit monitor the ambient temperatures, including water coil temperatures.
- **CO_2 Sensor:** Integrated CO_2 sensors create an average room carbon dioxide level to be monitored ensuring adequate ventilation and avoiding localised CO_2 peaks.
- **VOC Sensor:** Detects Volatile Organic Compounds that can arise from common products, such as new furniture, paints, and cleaning products
- **Pollutants Sensor:** Measures pollutants in the fresh air supply, such as car fumes. The sensor allows greater automatic control of fresh ventilation air during peak traffic periods.
- **Humidity Sensor:** Monitors humidity levels to prevent mold growth
- **Flow Rates Sensors:** Accurately measures the ventilation air flow rates within the system.

ADVANCED CONTROLS

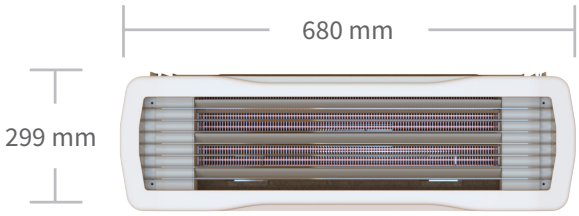
Cutting-edge devices such as Acuity centralised control and Modena wall controllers offer real-time insights into key air quality metrics, empowering informed decision-making and reducing maintenance.

- **Dynamic Data Collection:** The system continuously collects and analyses data on essential air quality parameters.
- **User-Friendly Interface:** The intuitive control interface presents real-time metrics in a clear and actionable format.

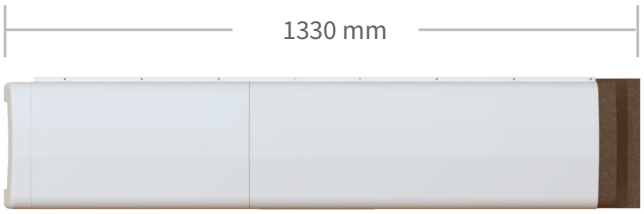
In addition to real-time monitoring, the system offers post occupancy evaluations to assess performance, identify areas for improvement, and fine-tune system settings for optimal functionality.

Variable	Value	
Model reference	APM - 2P	APM - 4P
Dimensions (mm)	680 (w) x 299 (h) x 1330(l)	
Weight (Kg)	39	
Materials	Powder coated aluminium (T6061); Expanded Polypropylene (flame retardant UL94:HF1); Copper piping with aluminium fins	
Minimum clear ceiling void (mm)	310	
External weather louvre min free area (m^2)	0.1	
Louvre panel requirements	Anti-bird mesh grille	
Hybrid daytime flow rate (l/s)	65	
Daytime power (W)	6.1	
Daytime Specific fan power (SFP) (W/l/s)	0.093	
Maximum daytime manual boost flow rate (l/s)	90	
Night-time cooling flow rate (l/s)	125	
Night-time cooling power (W)	13.3	
Night-time SFP (W/l/s)	0.106	
Heating coil capacity (based on 50/40 at 0.1 l/s (max 0.18 l/s)) (kW)	2	1.8
Cooling coil capacity (based on 12/18 at 0.1 l/s (max 0.18 l/s)) (kW)	1.25	1.18
Coil connections (horizontal and vertical options)	¾" Female BSP	
Heat exchanger	Cross flow	
Heat exchanger material	Hydrophilic coated aluminium	
Heat exchanger efficiency (%)	50.1	
Wintertime heat exchanger flow rate (l/s)	45	
Wintertime power (W)	6.9	
Wintertime SFP (W/l/s)	0.15	
Energy recovered at -1°C external temperature (W)	640	
Electrical requirement	230V AC mains with switched fused 3A spur	
Rated current - Peak current	0.9A - 1.1A	
Sensors	• External temperature sensor • Recirculation temperature sensor • Mixed air supply temperature sensor • Coil water temperature sensor • Recirculation CO_2 sensor • Air flow rate sensor • VOC sensor • Humidity sensor • Pollution sensor (PM2.5) • Room temperature sensor (in wall controller) • Room CO_2 sensor (in wall controller) 0-2000 ppm	
Guarantee	5 years	

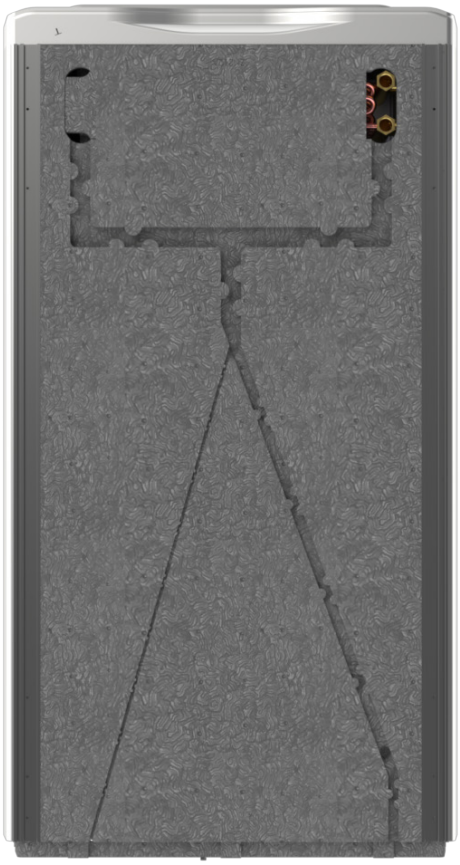
Dimensions



FRONT



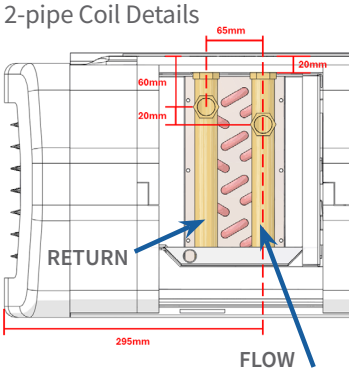
SIDE



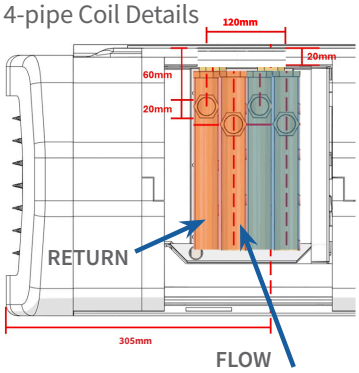
PLAN

Coil Connection Details

2-pipe Coil Details



4-pipe Coil Details



Units can be specified with a coil connection on either the left or right hand side. All units supplied with both vertical or horizontal connection options.

Colour Alternatives

Polar White

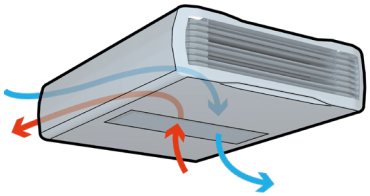
Anthracite Grey

Jet Black

Acoustics

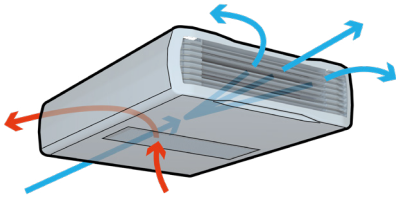
Sound power measurements for a single exposed system									
Airflow (l/s)	Octave Band (Hz) Sound Power Level dB re. 1pW								LwA
	63	125	250	500	1000	2000	4000	8000	
65	32.5	30.4	31.2	28.8	27.8	18.5	15.2	17.5	31.2
*denotes figures corrected for background					#denotes background levels				
System tested with a standard 50mm external louvre arrangement									
Predicted in room noise of 26.4dB with one unit in a 15m² room									

Operation Modes



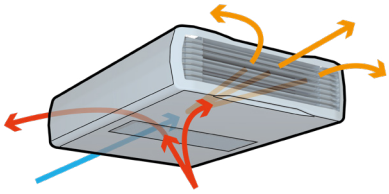
1. Natural Ventilation Mode

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



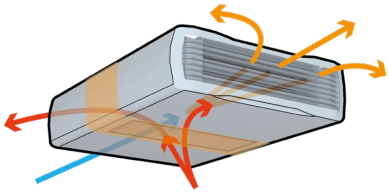
2. Boost Fan Mode

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



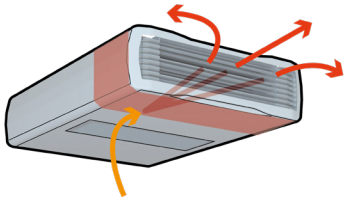
3. Mixed Recirculation Mode

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.



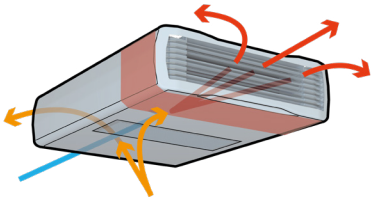
4. Heat Recovery Mode

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.



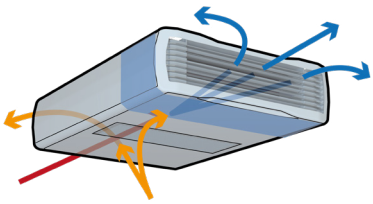
5. Pre-Heating Mode

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



6. Occupied Heating Mode

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



7. Cooling Mode

If the internal temperature of an occupied space is too high, the system will actively cool the space by recirculating room air over the coil. It also has the ability to cool external fresh air should the CO_2 level rise too high.

8. Night-time Cooling

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

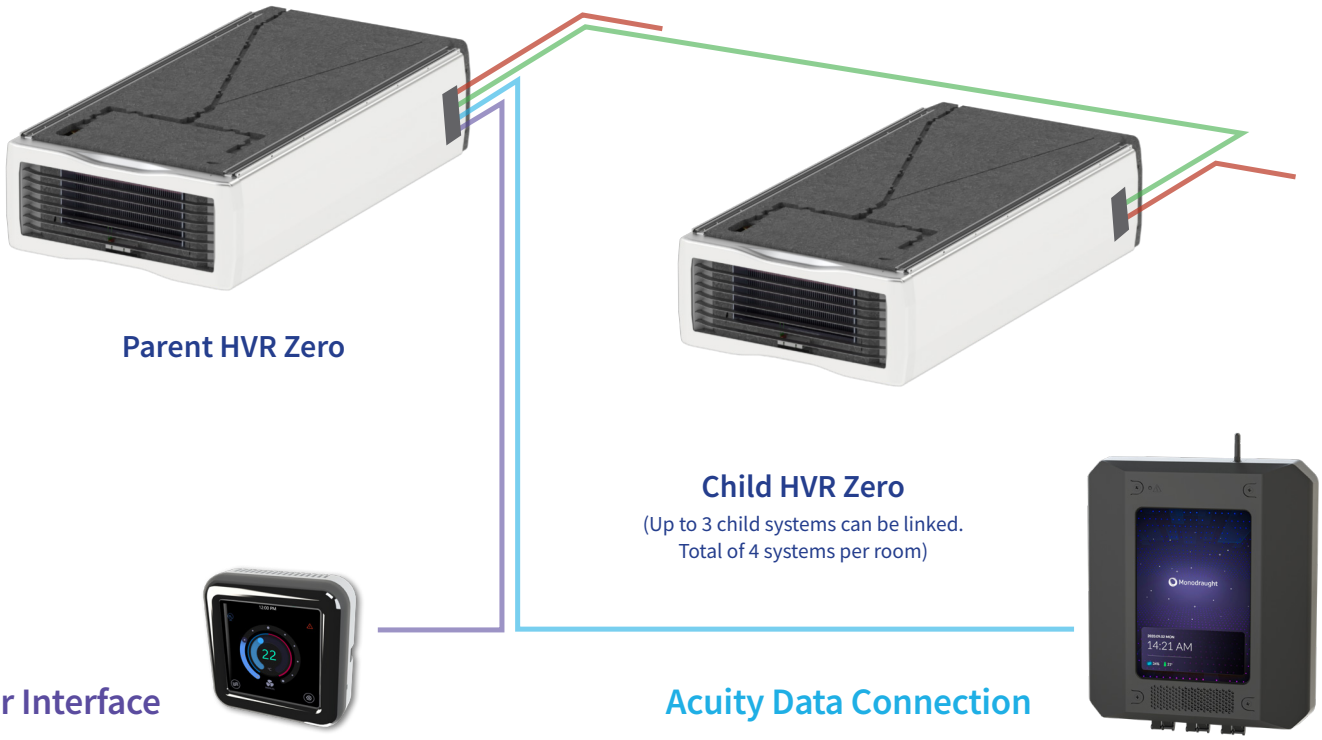
Self-learning Algorithm

The APX model efficiently preheats rooms before occupancy, enabling higher air flow rates, temperatures, and higher air flow rates for more effective heating while maintaining low noise levels when in use. It heats the space by recirculating room air across the heating coil.

Additionally, the system can heat fresh air directly during occupancy hours and ventilate to regulate CO_2 concentration levels.

To conserve energy, the heating control system uses an adaptive algorithm to estimate the time needed to reach the desired temperature, considering weather conditions and room temperatures.

Wiring Diagram



User Interface

To connect the user interface wall controller a 2 pair shielded cable is required from the HVR Zero parent unit to the wall controller.

Cable specification – twisted pair screened cable, 2 pairs, total of 4 cores, 26AWG, 0.14mm^2

Data Interlink

When multiple HVR Zero units are used within the same room a data interlink cable is needed. The cable specification is a screened, 2 pair cable.

Cable specification – twisted pair screened cable, 2 pairs, total of 4 cores, 26AWG, 0.14mm^2

Power Supply

To simplify wiring each HVR Zero requires connection to a dedicated 3A switched fused spur.

Acuity Data Connection

To achieve complete connectivity and to enable linking to third party BMS systems, a data cable is required to be daisy chained from the Acuity system to every Parent HVR Zero unit. Up to 50 HVR Zero parent units can be connected to an Acuity system.

Cable specification – twisted pair RS485 screened cable, 1.5 pairs, total of 3 cores, characteristic impedance of 120 Ω, 24AWG, 0.2mm^2

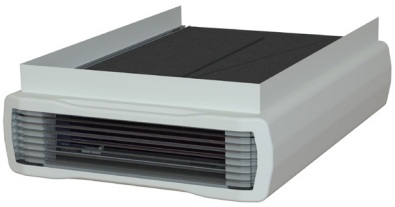
Connection Options

Wall Controller	Modena Touch Screen
Central Control	iNVent Acuity
Fire Alarm	Relay Connection (N/C)
Inhibit/Run	Relay Connection (N/C)
Science Mode	Relay Connection (N/O)

System Requirements

Modulating Actuator	24V DC power, 0-10V modulating control signal

Additional Components



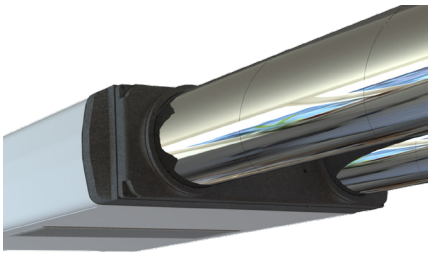
Top Shroud

For concealing fixings and pipework connections between the unit and a suspended ceiling, a white RAL 9003, 3-piece component is available.

Louvre Extension

Designed to extend the rear transition in 100mm increments, this system can support up to four sections, providing the necessary depth for wall installations when combined with the wall plate.

The surface finish aligns seamlessly with the rear transition aesthetics.



Louvre Duct Transition

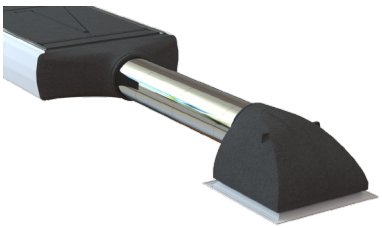
Providing flexibility in positioning HVR Zero APX units within rooms, the Louvre Duct Transition component, when attached to the rear of the unit, allows for the use of 160mm diameter spiral wound ducting to connect the unit to external weather louvres.

Weather Louvre

We recommend including our weather louvre in the specification to guarantee optimal ventilation performance. Our glazed-in weather louvre features a minimum face dimension of 600mm x 300mm, tailored for a glass size of 655m x 355mm with 28mm or 32mm thickness.

The 50mm deep weather louvre comes equipped with anti-bird mesh and is available in various BS or RAL colors.

When supplied by Monodraught, the louvre transition can be pre-fitted to ensure an airtight seal at this junction.



Duct Kit

The duct kit is essential for mounting the unit above a suspended ceiling, enabling the connection from the air outlet to a high-performance ceiling diffuser.

It includes an EPP Swept Duct Transition with integrated silencer pods, a short length of flexible duct, an EPP ceiling grille transition hood with noise-reducing internal profile, and a low-pressure linear ceiling diffuser.

Wall Plate

A White RAL 9003 powder-coated aluminum closure plate is employed to seal brickwork wall openings and the Louvre Extension component.

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 50 years' experience and our products have saved the equivalent of nearly 540,000 tonnes CO_2 over the last two decades.

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