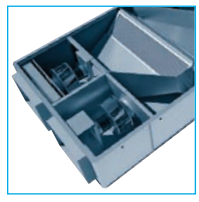
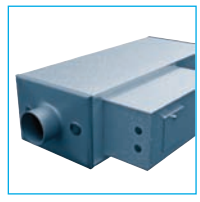
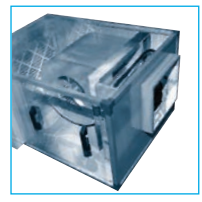
AIR HANDLING UNITS CATALOGUE



FOR THE COMPLETE VENTILATION SOLUTION

Uniclass	EPIC
CI/SfB (57.6)	

OUR **COMPANY**

OUR **PRODUCTS**

OVERVIEW OF NUAIRE'S
HISTORY AND PEDIGREE

NUAIRE. THE AIR OF TRUE INNOVATORS

Nuaire is a world leader in the innovation, development and manufacture of fans and ventilation systems. Despite its name, the company isn't new. In fact, Nuaire's innovative approach has its origins in the 1930s, while its tradition of excellence in ventilation goes back to 1963. Since then, the Nuaire name has been at the forefront of innovation in the industry, so much so that today the company is recognised worldwide for its expertise, commitment to innovation and the outstanding quality of its products and customer service.

SETTING NEW STANDARDS

There's more to Nuaire than technological innovations. Nuaire's people make these innovations possible. The company has over 400 committed and talented staff at its UK headquarters and its French subsidiary, with technical sales engineers in every major city in Britain, as well as dedicated partners across the globe. Nuaire's staff include industry-leading experts who are constantly setting new standards by developing innovative products at the company's research and development unit, the largest and most advanced in the UK. The passion of our people and their commitment to excellence has produced a large, loyal and growing customer base. Professional bodies have also recognised the company's landmark achievements with numerous industry awards.

ecosmart

A SMARTER, MORE ECO-FRIENDLY APPROACH TO VENTILATION

Research tells us that over 80% of the life cycle cost of a ventilation system comes from energy usage. As the leading energy-saving ventilation controls technology system on the market today, Ecosmart uses less electricity and operates only when needed, dramatically reducing energy costs year on year and over the system's natural life.

FRESH APPROACH

Like the fresh, clean environments its products create, Nuaire's fresh approach to ventilation has brought its own rewards. Business is growing, with innovative new products being developed all the time, setting new standards in energy efficiency and reduced carbon emissions.

CUSTOM DESIGN

The latest manufacturing technology and accredited test facilities enable us to take a flexible approach to the design and build of the right fan solution. More importantly we consider the interface with the client's equipment and processes, which can usually lead to a reduction in assembly costs.

COMMITMENT TO QUALITY

At Nuaire, quality control and a commitment to constant improvement are ingrained in everything we do. We were not only the first fan manufacturer to achieve the quality standard ISO9001 but we are also currently approved to BS EN ISO 9000:2000, the very latest quality standard.

PROVEN TRACK RECORD
COMPLETE SOLUTIONS

INTERFACING WITH THE CUSTOMER'S EQUIPMENT, INTERFACING WITH THE CUSTOMER

At Nuaire, we pride ourselves on working closely with our customer at every stage of the development process, while the latest manufacturing technology and accredited test facilities enable us to offer a flexible approach to the design and build of the right fan solution.

We don't believe in focussing solely on the ventilation system. A key aspect of Nuaire's approach consists of the way we interface with our customer's equipment and manufacturing process leading, in the majority of cases, to a significant reduction in assembly costs. With this approach we achieve great results and the satisfaction of our customers. The following examples demonstrate not just how we approach things but some of the results we achieve.

PUTTING CUSTOM SOLUTIONS INTO CIRCULATION: THE MOST FLEXIBLE AHU RANGE ON THE MARKET TODAY

The XBOXER range offers a solution for every conceivable application and environment, whether inside a plant room or on a roof. There are XBOXER solutions for applications in industrial premises and public buildings as well as domestic dwellings, schools, offices, shops and hospitals.

CASE STUDIES

MANCHESTER SCHOOLS

Ventilation: XBOXER heat recovery

XBOXER 55 high efficiency plate heat exchangers were installed below classroom ceilings to provide enhanced air quality and improve energy efficiency within the school. The units required a high quality paint finish, low depth, high performance with tested & approved noise levels to meet client and relevant regulations.

SWISS RE, LONDON

Ventilation: Ecosmart Boxer

The iconic Swiss Re was designed to provide an energy efficient alternative to other office buildings. The steel and glass design maximises daylight penetration and minimises the requirement for artificial light. Light level and movement sensors prevent unnecessary lighting helping to reduce energy consumption and cooling loads. Ecosmart Boxer provided the required high levels of ventilation whilst being one of the most energy efficient AHUs on the market.

HOLIDAY INN, BIRMINGHAM INTERNATIONAL AIRPORT

Ventilation: XBOXER thermal wheel

The 141 room hotel at Birmingham Airport recently underwent a multi-million pound refurbishment programme. Nuaire's XBOXER thermal wheel size T6 was installed on the roof top. The inclusion of the unit in the hotel's mechanical design not only provides year round savings in heating and cooling costs, it also helps to increase the indoor air quality.

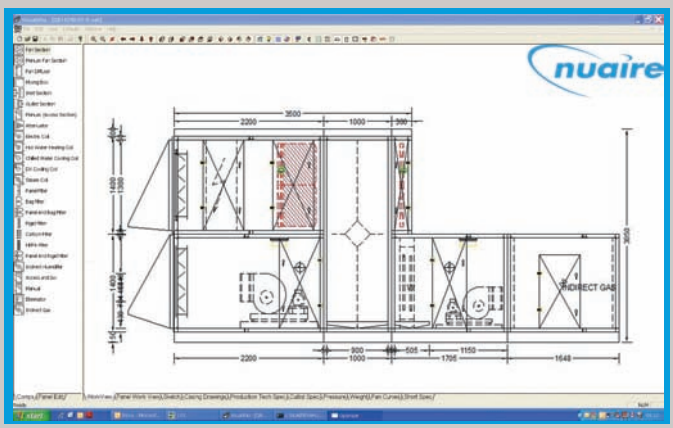
MORE THAN
JUST FANS

INNOVATION IN THE AIR

Nuaire has built a loyal customer base over the years and not just because of the quality of its fans. The fact is, the company also has a long and successful history in heat recovery and has been developing and manufacturing AHUs for many years. In order to ensure quality control and optimum energy conservation, the company manufactures the majority of the components itself.

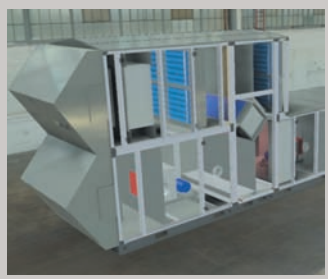
Contemporary AHUs are called upon to meet all conceivable air handling requirements and standards throughout Europe. Every AHU in the Nuaire range meets the requirements laid down by the classification in the CEN standard and is manufactured in a factory that has been certified for its quality control (ISO 9001) and environmental policy (ISO 14001).

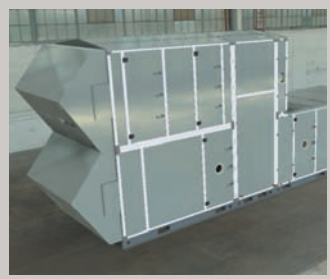
PUTTING OUR QUALITIES TO THE TEST



The company's rigorous product testing regime is unrivalled in the industry, which is hardly surprising given multi-million pound test facilities considered to be amongst the most modern and comprehensive in the world. It's all designed to ensure that our customers benefit from the best ventilation solutions on the market today. The facilities have been designed to meet the latest industry standards and carry the appropriate approvals including those from the British Standards Institute and the Air Movement and Controls Association.

The two reverberant chambers at the facility (Type D and Type A configurations) test for both aerodynamic and acoustic performance, allowing Nuaire to self-certify products, including those for the French market, as well as ensuring that products meet the high standards consistent with Nuaire's reputation.



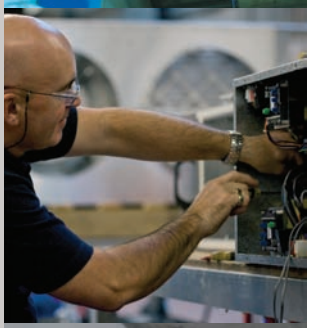


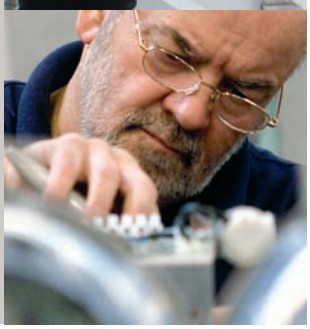
No two AHUs are the same whether you need to satisfy the most budget demanding contract or the most sophisticated, energy conscious, bespoke project the XBOXER range can fulfil your requirements. Nuaire's experienced team can provide technical information and support for any project that requires an AHU.

The team utilise the latest parametric quoting software and can provide quick and accurate estimates. The software also reduces time during specification changes.

The team comprise of specialist engineers, project managers and technical estimators all highly trained to ensure that your AHU project runs as smoothly as possible from enquiry through to installation.

OPTIONAL ON-SITE
SERVICES





The Nuaire Group offer a number of optional services, details of which can be found below. Please contact us to obtain further information on the available options.

ON-SITE PRODUCT ASSEMBLY

Avoid costly cranage, road closures and failing deadlines.
Products prepared during manufacture for disassembly on site, shifted to final location and reassembly by trained and qualified engineers.
Discuss product & project applications with trained and qualified engineers.

AHU's & HEAT RECOVERY & ECOSMART CONTROLS

- Final connection of interfacing electrical components and sensors.
- Pre commission and configuring.
- Functional demonstration.

CHANGES IN SYSTEM PERFORMANCE

If your final commissioning is indicating the system is under or over performing:

- Send us your 'as fitted' drawings and commissioning results.
- We'll reselect, up rate, de rate, select an alternative unit and arrange to get the work done with trained and qualified service teams.

ACCESS AND SPIGOT PROBLEMS

Duct spigot in the wrong location?
Our site engineers will modify the fan case in situ.

- A variety of spigot options on most fans.
- Twinfans supplied with conventional top access can be converted to bottom access.
- We'll reselect and arrange to get the work done with trained and qualified service teams.

PRODUCT REFURBISHMENT

Ageing equipment can be refurbished in situ.
Modernised with efficient fans and controls.
We'll reselect and arrange to get the work done with trained and qualified service teams.

PLANNED MAINTENANCE

All plant and equipment requires a maintenance regime:

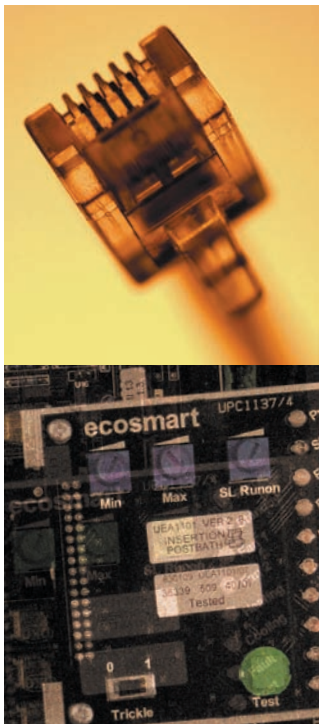
1. To ensure continued system efficiency.
2. To extend product working life.
3. To maintain regulatory compliance.
4. To maintain health & safety standards.
5. Modernised with efficient fans and controls.

We'll reselect and arrange to get the work completed with trained and qualified service teams.
All work certified.

OLD FANS FOR NEW

- We'll conduct a site survey dilapidation report and advise on the best solution.
- We'll quote for modern efficient fans with energy conscious controls.
- Regulation compliant.
- We'll attend to all the site works, set to work and commission.
- We'll follow up with the first maintenance visit free and recommend frequency of future planned maintenance.

ECOSMART ENERGY SAVING CONTROLS



Ecosmart plug-in system and control example.

Nuaire's Ecosmart energy saving ventilation control is the most flexible system on the market with full BMS interface. All controls are pre-assembled, configured and installed directly into the fan or air handling unit, this includes 3-port motorised valves and actuators, pipework, off coil thermostats and sensors, frost protection, etc. Site time is kept to a minimum, and quality and efficiency is maintained.

SIMPLE, PRECISE COMMISSIONING
As recommended in Part L, Ecosmart enables the system to be accurately commissioned via an integrated speed control, minimum and maximum speeds easily adjusted via commissioning panel integral to the control.

QUIETER SYSTEMS
With Ecosmart your system is only at maximum design duty when absolutely necessary. The noise levels within your systems are lower because the fans or air handling units are rarely at full speed.

IMPROVED LIFECYCLE
Ecosmart enables the fan or air handling unit to be run at lower speeds. This reduces the maximum load and wear and therefore increases the overall working life of the units.

DEMAND VENTILATION
Only ventilates the area when you want it to - why fully ventilate a room when it's not occupied - maximum savings possible achieved.

HEALTHY ATMOSPHERE
Ecosmart has a trickle function as standard which when activated, via a simple switch, enables you to set a background ventilation rate, keeping the rooms fresh when unoccupied, whilst still saving energy. System will boost or ramp to maximum design duty when triggered by an Ecosmart or other external device.
Ecosmart has a 5 year warranty.

OTHER CONTROL OPTIONS AVAILABLE
Refer to Commercial catalogue.

Touch screen user control.

ES-PIR2 sensor.

ES-CO_2 RM sensor.

ECOSMART INCLUDES A WIDE RANGE OF OPTIONS

Simple SELV wired, plug-in 'enablers' start and stop the fan, when activated from either start-up or trickle ventilation mode. These 'enablers' include time clocks, infra-red detectors, switch live contacts, humidistats, thermostats and BMS contacts.

All systems must include at least one enabler. (NB. When used, BMS control and time clocks take over all other enablers). Integrated speed control (inverter or electronic) is included with all Ecosmart controlled fans and air handlers. ES-ISC are external to some fans and need to be hard wired e.g. SQF, Airmover.

Once the fan is activated the sensor takes over. They will maintain comfort/design conditions by automatically adjusting fan speed up and down and power or flows through elements or heating/cooling coils. The sensors include temperature, relative humidity, CO_2 or as determined by the BMS.

Stylish and simple to operate user control facilitates manual operation where desired.

BMS

0-10V dc signal to activate the system and modulate fan speed. Select/Deselect H&C.
Note: this will override any other devices (eg. ES-UCF) fitted (except in Constant Pressure fans).

ECOSMART ENABLERS & DETECTORS

Simple Plug-in System

Simple low voltage sensors complete with pre-plugged cable means that any control function is easily achieved. You decide which conditions to monitor and the system will operate at the optimum speed.

ES-PIR2 (Passive Infra-Red)

Detects movement and activates system. Incorporates a system status LED, overrun timer and timer adjustment.

ES-LCD

Touch screen user control in white incorporating time clock facility. This can control the function of the fan by manual setting or using a set of timed programs.

ES-LCDM

Touch screen user control in metal incorporating time clock facility. This can control the function of the fan by manual setting or using a set of timed programs.

ES-HUMIDISTAT2

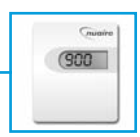
Activates the system when the RH level is above set point. Incorporates two system status LEDs (Green = OK, Red = Failure) and RH set point level adjustment.

ES-THERMOSTAT2

Activates the system when the temperature is above set point. Incorporates two system status LEDs (Green = OK, Red = Failure) and temperature set point level adjustment.

ES-AVI2

When fan failure occurs the AVI will flash a warning. Supplied with pre-plugged 10m length of communication cable.



ES-CO2RM & ES-CO2RMPP

Surface mounted room carbon dioxide (CO_2) sensors which incorporate a temperature sensor. RM = SELV option, RMPP is complete with SELV ac power supply.

ES-HTCSIG

Signal conditioning circuit for humidity, temperature and CO_2 sensors.

ECOSMART SPEED CONTROLLING SENSORS

ES-TEMP2 Temperature Sensor

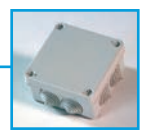
Modulate fan speed based on room temperature. Incorporates two system status LEDs (Green = OK, Red = Failure) and temperature set point level adjustment.

ES-RH2 Relative Humidity Sensor

Modulate fan speed based on RH level. Incorporates two system status LEDs (Green = OK, Red = Failure) and RH set point level adjustment.

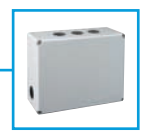
ES-UCF Manual user control

Manual 'on' and 'off' system user/speed control. Incorporates two system status LEDs (Green = OK, Red = Failure).



ES-CI Semi-automatic user control

Fan, heating & cooling selected by external volt free switch, speed selected by 0-10V signal.



ES-JB Junction box

Designed to be compatible with Ecosmart System this unit is supplied with a pre-plugged 10 metre length of communications cable and has 8 further ports.

ES-CO2 Sensor

Duct mounted sensor to modulate fan speed based on CO_2 levels. Connect to fan directly. Pre-wired with 2m cable (not adjustable).

Switched Live by others

Any mains voltage signal connected to the switched live terminal (S/L) in the unit. This affects the connected fan only.

ECOSMART, BMS AND COMMISSIONING CONTROL OPTIONS

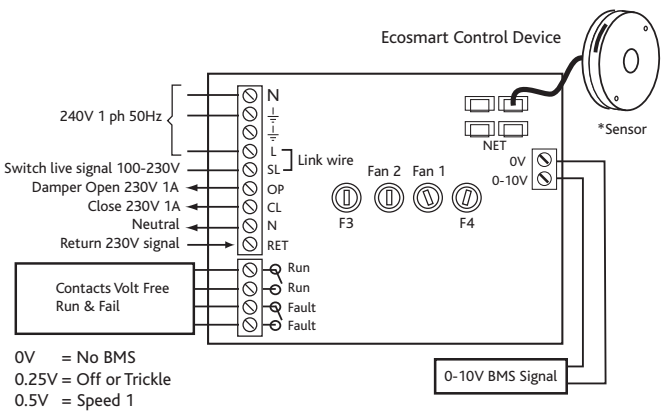
Nuaire fans and Air Handling Units can be provided with the following pre-selected control options, simply and easily by adding letters to the end of the fan code, there is no need to select or specify the controls individually if one of these options are chosen :

ES Ecosmart controls

The compact Ecosmart control module comes complete with a factory fitted Ecosmart PCB which will control the fan unit within the desired design parameters and provide the interface between all external control devices detailed on these pages.

The Ecosmart control module has the following energy saving components integrally mounted, pre-wired to interface with the purpose made PCB, all components pre-wired, configured and factory fitted by the manufacturer: (Not pre-wired to eg. SQF, Airmover).

- Integral Frequency inverter/speed controller.
- Integral maximum and minimum speed adjustment for commissioning.
- Integral adjustable run on timer.
- Integral BMS interfaces - 0- 10V speed adjustment.
- Integral BMS interfaces - Volt free failure and status indication.
- Integral background ventilation switch (trickle switch).
- Multiple IDC sockets for interconnection of sensors or fans using pre-plugged 4-core low voltage cable.
- Pre-programmed with soft start function.

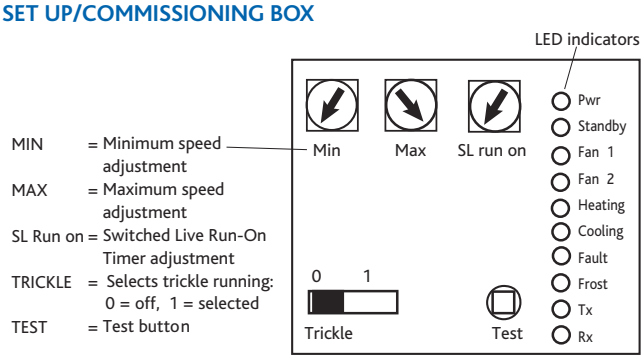


0V = No BMS
0.25V = Off or Trickle
0.5V = Speed 1
0.75V = Speed 1 & Cooling
1V = Speed 1 & Heating
Heat & cool signal via NET to ES-VF

Important: The Fan will not control external Heating/cooling equipment, will only provide ON/OFF Signal

*Not included as standard.

SET UP/COMMISSIONING BOX



The Ecosmart control module has the following two options fitted as standard.

BMS interfaces

The Ecosmart control module can be pre-configured to provide the following integrated BMS interfaces.

- 0 - 10 volt input to provide a full BMS interface.
  This will enable the following functions:-
  Switch the unit ON/OFF.
  Switch heating or cooling ON/OFF (AHUs with relevant coils).
  Switch from low speed to high speed - variable.
  Switch from low speed to high speed - trickle and boost principle.
  Full speed control facility.
- 2 No. Volt free contacts to provide fan run and failure indication to provide system status.
- An integrated commissioning/speed control to accurately commission the system, with minimum and maximum speeds easily adjusted via a miniature dial, as recommended in Part L. This will enable the unit to be configured to run between set parameters thus saving motor power and limiting noise.
- Pre-programmed with soft start function.

COMMISSIONING SET UP

The Ecosmart control module can be pre-configured to provide the following integrated commissioning features only.

- Integrated commissioning/speed control to accurately commission the system, as recommended in Part L, This will enable the unit to be configured to run between set parameters thus saving motor power and limiting noise.
- Minimum and max speeds easily adjusted via miniature dial.
  The commissioning set up facility directly controls the integrated speed control/frequency inverter.
- Pre-programmed with soft start function.

ENABLING SENSOR

ES-PIR2 Sensor

The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. The ES-PIR sensor will activate the system when movement is detected. An adjustable 1-60 minute timer is incorporated to provide a run on facility. Up to 10m directly in front of lens and up to 2m at 40° to the lens axis.

When adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS.

For example 1 green flash and 5 red flashes show you that the PIR timer is set to fifteen minutes.

ES-Thermostat2

The ES-Thermostat will enable the fan when the ambient temperature is 1°C above the set point and will stop the fan when the temperature is at or below set point. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. Adjusting the sensor set points. Adjustable temperature setting 10 - 35°C.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 2 green flashes and 3 red flashes show a temperature set point of 23°C.

ES-Humidistat2

The ES-Humidistat will enable the Ecosmart fan when the measured humidity level is 2% above the set point and will stop the fan when the humidity is at or below set point. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable. Adjusting the sensor set points - Adjustable RH setting 65 - 85%.

After adjustments are made to the sensor, the LED light on the sensor will flash indicating via a small aperture on the side of the sensor the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS. For example 7 green flashes and 3 red flashes show a RH set point of 73%.

SPEED CONTROLLING DEVICES

ES-RH2 Humidity Sensor

The ES-RH Sensor will vary the ventilation rate automatically according to the measured humidity. Voltage (SELV) with power supplied from the fan unit via the communications cable. The sensor has an adjustable 65 - 85% RH set point.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS.

For example 7 green flashes and 5 red flashes show a set point of 75% RH.

Note: fan speed = 0 (i.e. off) at or below the set point.

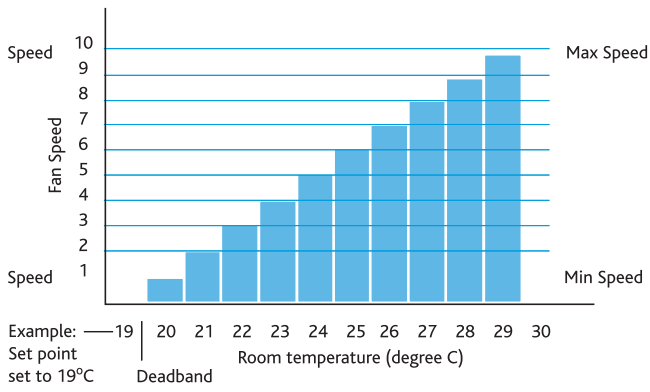
ES-TEMP2

This will modulate fan speed based on room temperature. The sensor operates with Safe Extra Low Voltage (SELV) with power supplied from the fan unit via the communications cable.

After adjustments are made to the sensor, the LED light on the sensor front will flash on and off to show the set point. First, green flashes will indicate the set point in TENS, then red flashes will indicate UNITS.

For example 2 green flashes and 3 red flashes show a temperature set point of 23°C.

Note: fan speed = 0 (i.e. off) at or below the set point.



Sensor Response - Normal operation (Proportional band over ten 10°C steps)

When temperature RISES, the fans will increase speed. (See above) which shows a set point at 19°C. For single phase fans, the speed steps are approximate and actual running speeds will be dictated by the operating pressure of the system and the type of impeller used in the blower. Fan is switched off at set point unless the trickle switch is selected.

ES-CO2 Carbon Dioxide Sensor - Operation

The CO_2 Sensor will adjust the fan speed in response to the CO_2 concentration in the airflow. The fan speed is divided into 10 steps from minimum (step 1) to maximum (step 10). See table below for response details.

Speed	1	2	3	4	5	6	7	8	9	10
CO_2 PPM	502	580	659	737	834	902	980	1059	1137	1215

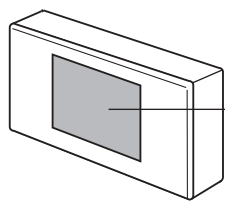
ES-LCD and ES-LCDM (Time clock included)

The ES-LCD/M Time clock will switch the system on and off at pre-determined times set by the user. This digital time clock will override the user control for effective on/off operation or any other enabling device eg. PIR. The time clock operates on Safe Extra Low Voltage and is powered from the fan control module. The connection is made into any 'NET' socket on the fans integral control module. See I&M for further details.

ES-LCD and ES-LCDM includes:

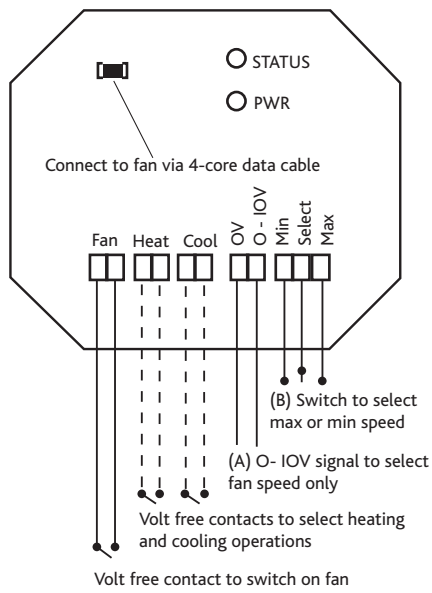
Ventilation, Automatic Heating & Cooling Enable/Disable.

Temperature is set at main control of unit.



ES-CI (Ecosmart control interface)

Enables any Ecosmart unit to be controlled via any remote non Ecosmart switching device or item of plant.



ES-CO2RM AND ES-CO2RMPP CO_2 SENSOR

ES-CO2 RM

CO_2 and temperature sensor requires SELV power supply by others.

ES-CO2 RMPP

CO_2 and temperature sensor supplied with SELV ac power supply.

The sensor will monitor the carbon dioxide (CO_2) and temperature (see note 1) within the room. If either reading reaches the low threshold values (i.e. C1 & T1) see opposite, then a signal will be sent to start running the fan at minimum speed.

As the room CO_2 and temperature rises, the fan speed will progressively increase in steps until the upper threshold values are reached. When both CO_2 and temperature readings are in operation, whichever reading that results in higher fan speed will be used by the fan unit.

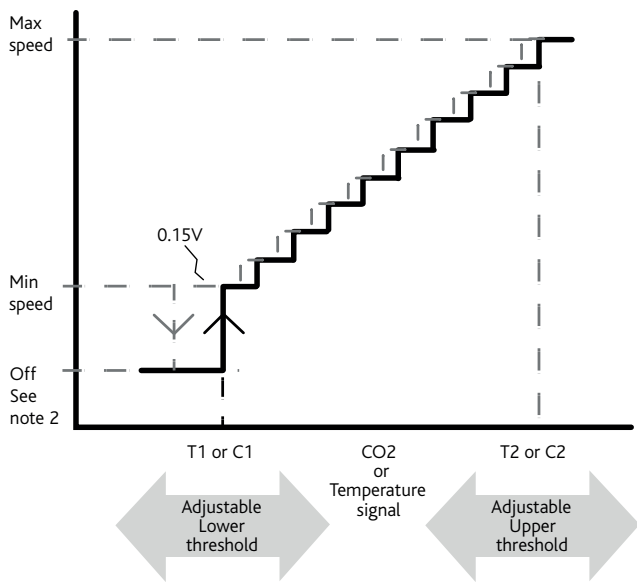
The threshold values and other operations can be adjusted by setting DIL switches on the PCB to different positions.

Note 1: As supplied; the default operation of the sensor will be based on carbon dioxide reading. If operation with both carbon dioxide and temperature is desirable then change position of switch 7 to 'ON'.
Note 2: use switch 8 to change the off state (see table below).

TEMPERATURE THRESHOLD SWITCHES 1-9

Switch settings	3	2	1	Threshold temperatures T1 (°C)	T2 (°C)
	Off	Off	Off	25	28
	Off	Off	On	24	28
	Off	On	Off	23	28
	Off	On	On	22	28
	On	Off	Off	25	30
	On	Off	On	24	30
	On	On	Off	23	30
	On	On	On	22	30

The lower and upper threshold values can be adjusted as shown in the following tables below and overleaf.



Note: Default operation is CO_2 only. To select temperature option as well please refer to I&M.

CONTROL CHECKLIST - WHAT'S INCLUDED

The controls indicated in the checklist are incorporated in the units as standard, enabling you to co-ordinate your controls to avoid duplication and reduce costs. Please refer to this when checking the controls specification.
www.nuaire.co.uk/specifications

Fan Code	Fan Type	BMS compatible	Commissioning control	Run/Fail signal (volt free)	Inverter control (3 phase)	Speed control (single phase)	Pre-piped coil (c/w DRV)	Motorised control valve (c/w actuator)	Air off Temp stat	Frost protection	Heat dissipation run on	Plug in sensors (see overleaf)	Trickle and Boost switch	Automatic Bypass
Ecosmart Boxer LPHW	Air Handling	●	●	●	●	●			●	●	●	●	●	
Ecosmart Boxer Electric	Air Handling	●	●	●	●	●			●		●	●	●	
Ecosmart Squrbo	Supply Unit	●	●	●		●	●	●	●	●	●	●	●	
Ecosmart Squrbo Extract	Inline Single fan	●	●	●		●						●	●	
Quietscroll EST	Twin Fan	●	●	●	●	●						●	●	
Constant Pressure	Twin/Single Fan	●	●	●	●							●	●	
Extractor ESX	Inline Single fan	●	●	●	●	●						●	●	
Ecosmart Airmover ESAM*	Inline Single fan	●	●	●	●	●						●	●	
Ecosmart Squif*	Inline Single fan**	●	●	●	●	●						●	●	
Ecosmart Twin Squif*	Inline Twin fan**	●	●	●	●	●						●	●	
Ecosmart Axus*	Inline Single fan	●	●	●	●	●						●	●	
XBOXER Plate heat exchanger	Heat Recovery	●	●	●	●	●	●	●	●	●	●	●	●	●
XBOXER Thermal wheel (size 4 to 6)	Heat Recovery	●	●	●	●	●	****	****	●	●	●	●	●	●
XBOXER Thermal wheel (size 1 to 3)	Heat Recovery	●	●	●	●	●	●	●	●	●	●	●	●	●
XBOXER Run around coil	Heat Recovery	●	●	●	●	●	●	●	●	●	●	●	●	●
ES-OPUS (Not compatible with ES-LCD)	Inline/surface/recessed	●	●	●		●						●	●	

* ESAM, Squif, Twin Squif and Axus have a separate Ecosmart control pack that needs to be hard wired.
** Motor out of airstream.
*** Does not apply to 'NC' (no control) XBOXER units.
**** Supplied by others.

Ecosmart fans and Air Handling Units are pre-programmed and use simple plug and go control interfaces reducing the need for complicated controls.

Ecosmart enables multiple fans to be interconnected & controlled by the same sensors.

Fully BMS compatible using 0-10V interfaces and volt free contacts, simplifying all your control requirements.

Ecosmart ES-OPUS. For units with heating/cooling coils provided with Ecosmart control. An enable signal needs to be provided for heating/cooling to operate ie. ES-LCD, BMS O-10V and ES-CI.

Note: For other control options refer to Commercial catalogue.

NATURAL VENTILATION - SAVING MONEY COMES NATURALLY

OUR NATURAL VENTILATION SOLUTION USES A COMBINATION OF NATURAL VENTILATION TECHNIQUES TO KEEP BUILDINGS SUPPLIED WITH FRESH CLEAN AIR 365 DAYS A YEAR WHILST REDUCING ENERGY COSTS.

By employing upward displacement in the summer and a patented mixing mode solution in the winter, e-stack uses natural ventilation to reduce CO_2 levels and energy bills while helping to maintain a constant room temperature, enabling occupants to work more efficiently and more healthily.

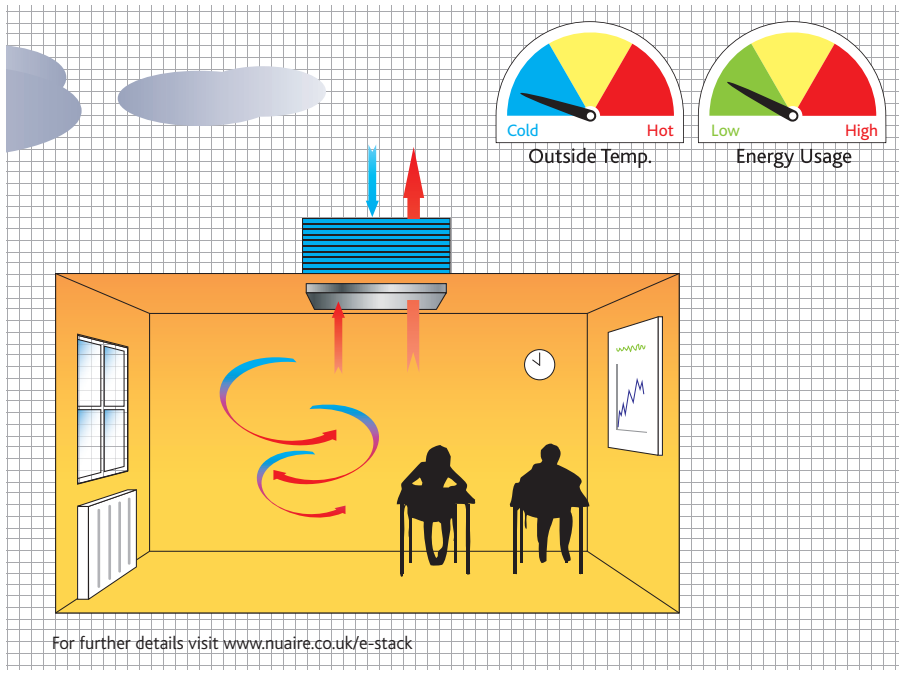
IN SUMMER

Natural displacement ventilation can be utilised allowing opening windows/louvres to provide make up air for the natural stack effect through the e-stack unit. This can be boosted in very high temperatures to purge the rooms and return the space to a comfortable level. In night cooling mode the system allows cool air in through the e-stack unit to take advantage of the thermal mass and again can be boosted to provide additional supply air and cooling.

IN WINTER

Fresh air is allowed to enter the space via the divided shaft in the e-stack unit where it is mixed with warm room air in the mixing box section. The mixed air is then distributed in to the space at the desired temperature avoiding cold drafts by constantly measuring internal and external temperatures. The remaining warm stale air is allowed to rise from the space to the atmosphere. Internal CO_2 sensors ensure the system operates within building regulations 365 days a year.

The combination of natural ventilation and mixed mode systems ensure ideal room conditions for the occupants 365 days a year by intelligently monitoring and controlling the ventilation system. We believe that using this combination you can create environments that are perfectly suited for all applications and buildings.



Intelligent all-year-round ventilation.

A-Series e-stacks: innovative low energy approach for buildings where rooms are connected to a central atrium.

R-Series e-stacks: Designed specifically for rooms occupied by 10 to 35 people, ideal for classrooms and offices.

S-Series e-stacks: Suited to spaces with higher heat gains and for rooms with more than 35 occupants, such as halls and theatres.

F-Series e-stacks: Designed for spaces which have access to the external wall and where sloping roofs are used for high level windows.

For further details refer to the Commercial catalogue.

NATURAL & MECHANICAL VENTILATION AT THE HUB BUDMOUTH COLLEGE

CLIENT: DORSET COUNTY COUNCIL
ARCHITECT: ATKINS
BUILDING SERVICES: DORSET COUNTY COUNCIL
CONTRACTOR: INTERSERVE

Tim Pestridge Architectural Photography LLP (CSCS compliant). Members of the British Institute of Professional Photographers (BIPP).

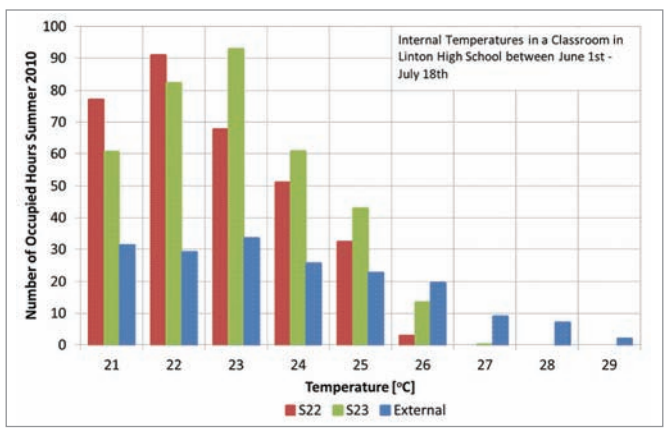
The state-of-the-art hi-tech hub which was designed by Atkins and installed by Interserve, encompasses 14 laboratories, four ICT suites, 30 teaching spaces, and associated administration and ancillary features, spanning in total 6,500m^2.

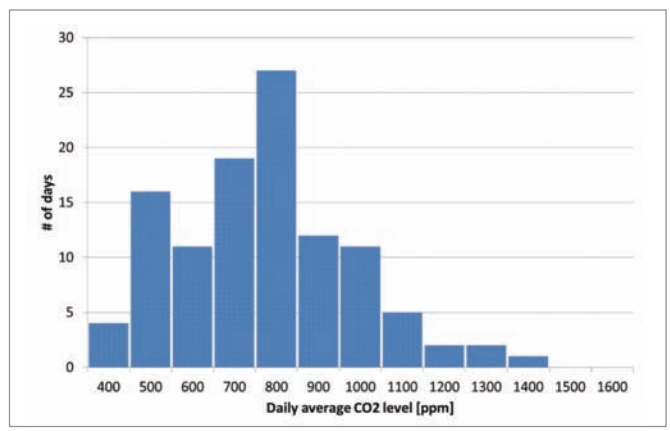
The hub's main atria provides an avenue between two teaching blocks and is a weatherised space serviced by low velocity fans.

Mechanical ventilation housed in the buildings' roof voids includes stacked Xboxer heat recovery, while constant pressure twin fans were chosen to aid ventilation in other areas including ICT suites, toilets and administrative facilities.

A series stacks situated on the roofs are served by shafts taken through the building, which serve all classrooms and laboratories, delivering fresh air efficiently and quietly to ensure that students and staff are not disturbed during lesson time.

Both the natural and mechanical systems are designed to work throughout the year.





LINTON COLLEGE, CAMBRIDGESHIRE

At Linton College in Cambridgeshire, the effectiveness of the e-stack system was highlighted through its ability to limit internal temperatures even when external temperatures soared.

Through a combination of passive and assisted night cooling as well as controlled daytime ventilation rates, the peak internal temperature observed was 27.5°C even when external temperatures exceeded 29°C (BB101 allows up to 120 hours over 28°C, and a peak temperature of 32°C).

As you would expect in summer, CO_2 levels remained well below those required to meet BB101. Additional savings were observed in winter due to the heat gains in the space being used to temper incoming air in a reliable, controllable manner.

The limited amount of thermal mass available for temperature buffering was maximised, and the low energy fans in the units were only activated when the internal spaces benefitted from increased airflow through the rooms.

This low energy mixing negates the need for preheating of air, which causes many naturally ventilated buildings to actually consume more energy than their mechanically ventilated counterparts. In fact, space heating is only required for pre-heating prior to occupancy, and in the coldest weather.

As buildings become increasingly well insulated and air-tight, the e-stack system becomes an ever-increasingly attractive option from an energy perspective.

OUR **SPECIFICATION** 17

- A GUIDE TO COMMERCIAL BUILDING SERVICES LEGISLATION
- INSTALLATION GUIDELINES
- USEFUL INFORMATION

BUILDING REGULATIONS PART L2 (CONSERVATION OF FUEL AND POWER IN NON-DOMESTIC DWELLINGS) EFFECTIVE FROM OCTOBER 2010

The new part L2 Part A for new buildings and Part B for work on existing buildings came into force in October 2010.

To fall in Line with the EU Energy Performance in Buildings Directive (EPDB), the new L2 2010 , Part F (Northern Ireland – update due 2012) and the Technical Handbook - Section 6 (Scotland) 2011 documents require a major change in the way buildings are to be assessed for compliance with energy efficiency and carbon emission standards.

The new approach taken is to compare the CO_2 emissions for the actual building (Building Emission rate – BER) with those of a notional building of the same size and shape, and constructed to a concurrent specification laid down in the National Calculation Methodology (NCM) – the approved procedure for demonstrating compliance with the UK building regulations – (Target Emission rate – TER).

This approach has been adopted because of the variations in improvement potential across a variety of building types. Extensive research was carried out into the main building categories, and appropriate levels of CO_2 emission reductions were identified based on the cost of achieving them in the various building types. When factored together with the likely build mix and build rates, the aggregate CO_2 emissions reduction over 2006 emissions rates is 25 %.

Part L requires a reasonable provision for the conservation of fuel and power in buildings by:

a. limiting heat gains and losses:
i. through thermal elements and other parts of the building fabric: and;
ii. from pipes, ducts and vessels used for space heating and space cooling and hot water services:
b. providing and commissioning energy efficient fixed building services that are fitted with effective controls and;
c. providing the building owner with sufficient information about the building and the fixed building services and their maintenance requirements, to allow their efficient operation.

Approved Documents offer technical guidance on means of compliance with the Buildings regulations. They are not intended to represent the only methods available, but they do provide reference points that are useful in the practical process of compliance. If the guidance is followed, there is a presumption that the compliance requirements will be met.

Approved Document Part L2A covers work on new non-domestic buildings and major extensions to existing non-domestic buildings – i.e. where the additional useful floor area is greater than 100m2 and 25% of the original building's floor area.

Approved Document Part L2B addresses works on existing buildings including extensions (smaller than those mentioned above), change of building use, provision or extension of controlled services and fittings, replacement of thermal elements and consequential improvements. The latter being general fabric or services upgrades triggered by a complex set of criteria related to intended works.

The new regulations require the submission of a checklist that demonstrates that compliance has been met against five defined criteria. These criteria are detailed in Approved Document L2A.

Criteria1 is mandatory and refers directly to Building regulation 17C. Criteria 2-5 are considered as guidance.

Criteria Main Points

1. The Building emission rate (BER) must be less than the Target emissions rate (TER) as calculated under the approved methodology.
2. The performance of the building fabric and heating, hot water and fixed lighting systems should achieve reasonable overall standards of energy efficiency. To avoid a situation where poorly performing systems or construction details are compensated for by other means, **limits on design flexibility** are imposed for building fabric and services. For building services, this includes the use of appropriate controls, equipment with minimum efficiency levels (verified by testing to acceptable standards) see "Associated Documents" below, and appropriate levels of metering and monitoring.

3. The building shall be provided with appropriate passive control measures to limit solar gains – to reduce the need for, or capacity of air conditioning systems. (note that compliance with the suggested assessment method does not imply that acceptable levels of comfort will be achieved in the space.
4. The performance of the building, as built, is consistent with the BER. Credits are given in the emissions calculation procedures where this can be demonstrated. Particular attention is required to building air-tightness, where extensive guidance exists and to the continuity of thermal insulation, for which it is suggested that reference be made to accredited construction details and third party verification of design detail. Building services are required to be commissioned effectively (where possible) according to the approved procedures in CIBSE guide M – Commissioning Management. Documentary evidence of the use of the approved procedure is required for Building Control to issue a final compliance certificate. Air leakage testing of ductwork may be required, depending on the classification claimed in the BER calculation.
5. The necessary provisions for energy-efficient operation of the building are put in place. This is best achieved by using the guidance in CIBSE TM31 – Building Log Book toolkit. Information on the building services equipment may be cross referenced to the specification documentation and the manufacturers' operation and maintenance manuals. Data used to calculate the TER and BER should be included in the Log Book along with the recommendations for improvements that are generated by the assessment software package used.

ASSESSMENT TOOLS - SOFTWARE

The carbon emissions calculation methodology required when generating the BER, TER and the compliance checklist, is implemented in the Simplified Building Energy Model (SBEM) with its user interface - iSBEM – freely obtainable from the National Calculation Methodology web site. Local authorities are authorised to accept calculations only from persons deemed by Building Control Bodies as suitably competent.

Several dynamic thermal modelling software tools have also been approved for the purpose of assessment and are commercially available, and offer additional functionality.

Note that it is required to provide Building Control with the design based TER / BER calculations, together with details of the building specifications upon which they have been based, prior to the commencement of construction works.

At the end of construction, calculations based on the completed design, and details of changes in construction method or specification must also be submitted.

ASSOCIATED DOCUMENTS

Because of the large amount of technical data and information that is now required to prove compliance with the Building Regulations, and the relative inflexibility of the Approved document as a design tool, it has become necessary to refer to additional documentation for much of the technical detail. These associated documents again offer guidance on requirements without necessarily providing absolute limits of performance. In many cases, reference is made to a wide variety of relevant harmonised European technical standards that exist to support the important EU directives such as the Energy performance in Buildings Directive, and the Energy Using / Energy Related Products Directive.

For building services products, the Non Domestic Building Services Compliance Guide describes performance standards for the majority of equipment types that are encountered in current designs, including heating, cooling, hot water, pipe and duct insulation, lighting, pumping and, of most relevance to Nuaire products – Section 10: Air Distribution systems.

This guidance considers the following system types :-
Central air conditioning systems, central mechanical ventilation systems with heating, cooling or heat recovery, all "other" central systems, zonal supply and extract systems where the fan is remote from the zone and ducting is required – for example in a ceiling void or on the roof, and local systems serving one room directly (un-ducted) such as a window mounted fans.

The principal means of efficiency regulation for ventilation systems is the use of limiting Specific Fan Power (SFP).

As a straight-forward, easily calculated location and duty specific measure, this single figure reference effectively combines the actual efficiency rating of the product, and the adequacy of the actual system design. Calculated as the mains delivered power (W) divided by the system delivered airflow (l/s), the guide provides SFP limits for each system type.

The variations shown are related to assumptions made about the efficiencies of the available impellers / motors / drives employed, and the aerodynamic resistances of the internal components – for example coils and filters – within air handling units, and of the distribution ductwork etc.

Additional SFP allowances are given for various system elements.

Some of the application classes defined are extremely tightly specified in this regard, and this leads to a situation where fan types that may have practical benefits (for example in acoustic properties) cannot be used.

There are practical limits to the efficiency of commercially available components, and this will ultimately constrain the types of distribution systems that may be used in terms of the operational system resistance.

The latest edition of the Scottish Technical handbook Section 6, includes limiting values for external system resistance (this was also planned for the England and Wales version, but deleted late on in the process).

The guide very clearly states (10.3 Key Terms) that the specific fan power of an air distribution system should be calculated according to the procedure given in BS EN 13779 2007 Annex D:- *Ventilation for Non-residential buildings – Performance requirements for ventilation and room conditioning systems*.

This important and informative standard describes in Annex D: - the SFP value for the entire building, defined as the weighted average of the SFPE values of individual units and fans.

For variable air volume flow systems, the SFPE shall be defined at a partial operating air flow and related external pressure drop - specified for the fan or air handling unit.

If the operating profile (of flow rate with respect to time) of the unit is known, then this can be used to establish the partial flow rate, and if not known, then a default value of 65% of design maximum is suggested as "a realistic mean annual value for normal comfort ventilation.

Additional design criteria are defined for the equipment: - for SFP at 25% of maximum duty to be no more than that at full speed; provision of variable speed drives for fans with motors of over 1100 W; and for the enclosure leakage grade to be L2 as defined in BS EN 1886:2007 *Ventilation for buildings - Air handling units - Mechanical performance*.

Ducting leakage standards are also defined.

Minimum control packages are suggested for each system type, and it is stated that Heat recovery devices should be included where supply and extract ventilation systems include heating and/or cooling.

PART F – BUILDINGS OTHER THAN DWELLINGS

Almost in complete contrast to the extreme detail given concerning residential ventilation systems, Approved Document F sets out guidance for the following non-domestic buildings – offices, car parks & "other" building types.

General guidance is given on indoor air quality criteria to facilitate the development of alternative ventilation solutions (from first principles).

Guidance is given on provision for maintenance access, and the necessity to ensure the cleanliness of ventilation systems and the security of a clean fresh air supply for the protection of occupant health.

For office ventilation (for which a considerable amount of technical research exists) several outline methods are proposed for system design.

Alternative approaches (including natural and mixed mode ventilation) are referred to via the appropriate CIBSE guides.

For Car Parks, including those below ground simple criteria are expressed for the provision of adequate ventilation by means of accurate Carbon Monoxide level control. Although not referred to in ADF, CO based ventilation alone may not control visual contamination levels, particularly where diesel engined vehicles predominate.

Approved Document B is also very relevant to car parks and should be cross referenced.

An alternative approach using natural ventilation openings is given, and also mechanical systems with simple air change rate limits are described, and references given to additional sources of guidance.

For "other" buildings, Table 6.3 details an extensive list of reference documents covering the ventilation requirements of a wide range of buildings.

For more details about ventilation systems that can help you meet part F contact Nuaire on 02920 858 200.

SCHOOL BUILDINGS.

Compared to most other types of buildings, schools and hospitals are extreme environments. They have high occupancy levels and house many different activities and functions within them. Areas include offices, classrooms/study areas, canteens, commercial kitchens and accommodation – a great mix and more varied than most buildings.

Part F of the Building regulations applies to schools. Ventilation provisions in schools can be made in accordance with the guidance in DfES Building Bulletin. BB101 exists as a complete design guide to ventilation in schools, covering design rules for natural and mechanical ventilation systems and concepts involved.

All major school building projects must now undergo formal environmental assessment using the Building Research Establishment's environmental assessment method BREEAM schools and the application of new building regulations should reduce carbon emissions significantly.

HOSPITAL BUILDINGS

Nuaire has been supplying ventilation systems to hospitals for many years and are aware of the issues for ventilating clinical environments.

Health Technical Memorandum 03-01 'specialised ventilation in healthcare premises' (published in two parts):

i part A deals with the design and installation of ventilation systems
ii part B covers operational management.

The guidance applies to new installations and major refurbishments of existing installations.

The above memorandum also includes a revision to reflect current guidance on theatre suite layout and room sizes whilst including other key issues such as:
Issues relating to patient comfort and the prevention of health care associated infections. Specialist systems play important roles in these areas.

- Methods of controlling the casual exposure of staff to anaesthetic substances
- The design and acceptance testing of general and ultra-clean ventilation (UCV) systems.
- Setting out the minimum requirements for the design of air-handling units with the regards to the control of Legionella and other dangerous contaminants, and safe access for routine inspection and maintenance.

For further details on school and hospital ventilation system please contact Nuaire on 02920 858 200.

NUAIRE PRODUCTS

ACOUSTIC GUIDELINES

IT IS AT LEAST TEN TIMES MORE EXPENSIVE TO CORRECT AN ACOUSTIC PROBLEM THAN TO PREVENT IT.

All Nuaire products are tested in accordance with UK, European and International industry Standards for performance and sound levels.

These laboratory test standards are designed to provide a consistent test method and which to a limited extent that simulate the ways that a fan may be used in a variety of installations.

Nuaire generally quote the noise levels separately for the unit inlet, outlet and casing radiated (or breakout) sources, to enable the system designer to properly evaluate the product in the application.

The noise level measured on site, for example during the commissioning process, is the sound pressure level – and this cannot be directly compared with the sound power levels quoted in our fan selection tools (Nuaire catalogue and Fan Selector).

Nuaire typically also quote a free field dBA level at 3m, and this figure, whilst useful for comparison with other products, has a very specific definition – and cannot be used for acoustic design purposes.

The dBA@3m figure quoted will never correspond to a dBA measurement taken at 3m from a product in a real building.

Acoustics is a complicated subject and must be treated with caution as part of the services design process. Our sales engineers and technical support staff will often be able to offer advice on appropriate product types for an application, but it is often necessary to refer to acoustic specialists for a definitive design solution.

Nuaire have put together the following bullet points for your information and assistance :-

SYSTEM DESIGN – GENERAL AND COMMON SENSE ISSUES

- Position the fan for minimum noise impact
- Position grilles and diffusers for minimum noise impact
- Design the system for low pressure drop and smooth air flow = low velocity ducting and grilles etc.
- Where appropriate, use barriers and enclosures of a suitable specification – ensuring that they are properly installed (eg ceiling tiles and bulkheads). Special acoustic grade materials are generally available, and the first principle is to add mass to the system – eg layers of plasterboard.
- Use appropriately specified attenuators and Anti-Vibration mounts – again - properly installed and not bridged to the support structure.
- Flexible or lightweight supporting structures, or slow running fans, can require higher levels of mechanical isolation, and this can only be achieved with high deflection spring type mounts.
- Flexible Connectors are often a particular source of breakout noise – if they must be used in sensitive areas, then an acoustic grade should be specified.
- Single skinned rectangular attenuators can also be vulnerable to breakout at the fan connection – consider this carefully in your specification. Ideally, use attenuators that have been specified with breakout protection, and fit the flexible connectors at inlet attenuator entry and outlet attenuator exit. Any deviation from a straight inlet/outlet condition, whether by crumpled flexible connectors, bends, or offset transformation pieces, will lead to an increase in the quoted in-duct noise levels.
- Specify the correct duty with minimal allowances - and commission the systems properly.

As a very rough "rule of thumb", due to the combined effects of an acoustic room property known as "directivity" and a distance correction for a real room situation, it is possible that the dBA level measured in a room with a ceiling void mounted fan above it, can be increases of 8-9 dBA up to 14 dBA higher than the Free Field figure.

In general terms, a specification of NR 35 or 40 dBA represents a very acceptable level for most people in an office environment.

A requirement to achieve levels of NR 30 or 35 dBA or less in a working space, can be considered as challenging, and may require specialist acoustic assistance. At the very least, with such a specification, the acoustic requirements should be a major design consideration.

Designated "Quiet" areas and bedrooms will need to operate at these levels and preferably lower.

A final note: It is at least ten times more expensive to correct an acoustic problem than prevent it.

USEFUL INFORMATION

RULES OF THUMB

Plant/System	Selection requirement	Rule of thumb
Ductwork	Typical duct velocities	
	– Low velocity systems	3 – 5 m/s
	– High velocity systems	7.5 – 15 m/s
	– Inlet louvres	2.5m/s through free areas
Ductwork	Maximum pressure drop rates	
	– Low velocity systems	1 Pa/m run
	– High velocity systems	8 Pa/m run
Ductwork	Typical system resistances (including air handling plant)	
	– Low velocity supply	900 Pa
	– Low velocity extract	300 Pa
	– High velocity supply	1.5 – 2kPa
	Air leakage allowance	5% in low velocity systems

Environmental Building Application Factor	Rule of thumb
Comfort Noise Levels:	
Recommended maximum background noise levels for:	
• very quiet rooms, eg concert halls, sound studios	NR20
• quiet rooms, eg bedrooms, theatres, churches	NR25
• private rooms, eg small offices, libraries, living rooms	NR30
• public rooms, eg general offices, classrooms, small shops	NR35
• general areas, eg reception areas, restaurants	NR40
• work areas, eg kitchens, computer rooms, large shops	NR45
Intelligibility of telephone conversations at background noise levels of:	
• up to NR50	Satisfactory
• up to NR60	Slightly difficult
• up to NR75	Difficult
• up to NR75	Unsatisfactory

VENTILATION RATES

The points which affect this are:

(a) the size of the building or room
(b) the purpose for which it is used
(c) the number of occupants
(d) the type of work they are doing
(e) heat gains from other sources, e.g., electric motors and equipment
(f) the amount of steam, dust and odours from production processes
(g) whether the customer has any particular temperature requirement for the building

The table of recommended ACH given in information leaflets, and the more extensive and detailed list given for different types of rooms and buildings is based on a combination of practical experience and theory, and can safely be used as a guide for all normal conditions in this country.

ACH = Air changes per hour

AIR CHANGE RATINGS

The simplest method of determining the ventilation rate required is to make use of the accumulated experience of the industry expressed in a table of air change rates.

The volume in cubic metres (m3) of the space to be ventilated is calculated and multiplied by the number of air changes per hour to give the ventilation rate in the m3 per hour. Division by 3.6 converts this to litres per second.

$$\text{Ventilation rate (litres/s)} = \frac{\text{Volume (m3) x air changes per hour}}{3.6}$$

USEFUL INFORMATION

RECOMMENDED AIR CHANGES

While the Building Regulations detail the level of ventilation required in specific premises many engineers will also refer to the 'Recommended Air Change Rates' detailed within the CIBSE (Chartered Institute of Building Services Engineers) guides.

Application	Air changes per hour
Banks	4 to 6
Cafes/Coffee Bars	10 to 12
Cellars	3 to 10
Changing Rooms	6 to 10
Cinemas/Theatres	6 to 10
Conference Rooms	8 to 10
Dance Halls	10 to 12
Dark rooms	10 to 15
Dental Surgeries	12 to 15
Entrance Halls	3 to 5
Factories/worshops	8 to 10
Garages	6 to 10
Gymnasiums	6 to 8
Hospital Wards	6 to 8
Kitchens – commercial	15 to 30
Laundries	10 to 15
Libraries	3 to 4
Offices	4 to 6
Public House Bars	6 to 10
Restaurants	10 to 15
Schoolrooms	4 to 6
Shops/supermarkets	8 to 10
Showers/Bathrooms	15 to 20
Stores/Warehouses	3 to 6
Swimming Baths	15 to 20
Toilets – public	6 to 8
Utility rooms	15 to 20

RULES OF THUMB FOR AIR TIGHTNESS

The Building Regulations require all commercial and industrial buildings with a gross floor area greater than 500m^2 to be tested for air tightness to a minimum standard of 10m3/h.m^2 at 50 Pascals.

Note that many passive and low energy comfort control systems, such as Termodeck, require values of fabric airtightness considerably better than required by the Building Regulations for them to perform optimally.

Source: Building regulations

USEFUL INFORMATION

BENCHMARKS FOR GOOD PRACTICE ENERGY CONSUMPTION

(kWh/m²/y treated floor area)

	Cellular natural ventilation	Open plan natural ventilation	Standard air conditioned	Prestige air conditioned
Gas				
Good practice	79	79	97	114
Typical	151	151	178	210
Electricity				
Good practice	33	54	128	234
Typical	54	85	226	358

Source: BSRIA Blue Book 2008 www.bsria.co.uk

ENERGY BENCHMARKS

Offices

Energy efficiency rating (kWh/m² per year)	Good	Fair	Poor
Air conditioned over 2000m²	<250	250-410	>410
Air conditioned 2000m² or under	<220	220-310	>310
Computer centre	<340	340-480	>480
Natural ventilation over 2000m²	<230	230-290	>290
Natural ventilation 2000m² or under	<200	200-250	>250

Source: BSRIA Blue Book 2007 www.bsria.co.uk

HISTORIC U VALUES (W/M²/K)

Non-domestic buildings

	2002	1985	1972	1965	1958
Walls	0.35	0.6	1.7	1.7	1.7
Roof	0.16	0.6	1.42	1.42	–
Floor	0.25	0.6	1.42	1.42	–

Source: BSRIA Blue Book 2008 www.bsria.co.uk

ENERGY CONSUMPTION BREAKDOWN

Offices

	Naturally ventilated (%)	Air Conditioned (%)
Space heating	60	48
Lighting	20	16
Hot water	12	6
Cooling	0	10
Other electricals	8	20

Source: BSRIA Blue Book 2008 www.bsria.co.uk

COST OF M&E SERVICES

Type of building and service

Type of building	Type of Service and Building	M&E services £/m³
Offices	Air conditioned (owned)	480
	Air conditioned (let)	411-426
	Not air conditioned (owned)	291-301
	Not air conditioned (let)	260-270
Factory	Purpose built for owner	120-180
Warehouse	High bay (owned)	95-185
Education	Secondary/middle school	180-350
Hospitals	District general	425-600
	Private	630-650

Source: BSRIA Blue Book 2008 www.bsria.co.uk

USEFUL INFORMATION

THERMAL LOADS

Thermal load	Type of Building or load	Load per unit area
Heating load	Offices	70 W/m^2
	Industrial	80 W/m^2
	Educational	100 W/m^2
	Retail	110 W/m^2
	Residential	60 W/m^2
Total cooling load	General office	125 W/m^2
	Interior zones (more than 7m from windows)	75 W/m^2
	Perimeter zones – 65% glazing	180 W/m^2
	60% glazing	120 W/m^2
Typical buildings	Retail	140 W/m^2
	Banks	160 W/m^2
	Restaurants	220 W/m^2
	Hotels	150-300 W/m^2
	Computer suites	400 W/m^2
Solar Heat gains	Windows with internal blinds south facing, June-Sept	250W/m^2 of glass
	Windows with internal blinds east-west facing, June-Sept	150W/m^2 of glass
Other heat gains	Metabolic	10 W/m^2
	Lighting	12 W/m^2
	Office machinery	15 W/m^2

Source: Rules of Thumb, BG 14/2003. BSRIA Blue Book 2008 www.bsria.co.uk

HEATING DEGREE DAYS

10 year average – September to May

Area	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Thames Valley	52	132	226	315	313	276	228	177	100
South East	71	158	248	332	334	302	252	201	124
Southern	62	134	217	302	307	277	246	199	114
South West	54	123	201	280	285	254	235	194	114
Severn Valley	43	120	200	294	293	257	219	178	97
Midlands	78	169	254	348	349	298	264	213	135
West Pennines	79	165	250	341	341	289	259	203	129
North West	95	182	271	354	358	308	288	227	147
Borders	99	179	262	343	346	292	281	238	179
North East	90	173	259	345	348	285	273	229	166
East Pennines	77	167	260	350	353	293	260	206	133
East Anglia	70	152	257	345	346	311	270	213	135
West Scotland	103	190	269	361	351	300	285	226	154
East Scotland	106	194	282	367	367	309	290	234	177
N E Scotland	115	202	284	375	361	312	303	253	198
Wales	68	140	216	296	310	271	254	211	143
N Ireland	96	174	254	333	337	288	273	221	153
N W Scotland	117	199	259	326	327	298	305	255	199

Source: BSRIA Blue Book 2008 www.bsria.co.uk

USEFUL INFORMATION

RECOMMENDED COMFORT CRITERIA

Building/room type	Winter dry resultant temperature (°C)	Summer dry resultant temperature (°C)	Suggested air supply (l/s/person)	Maintained illuminance (lux)
Offices				
Executive	21-23	22-24	10	300-500
General	21-23	22-24	10	300-500
Open-Plan	21-23	22-24	10	300-500
Retail				
Shopping Malls	12-19	21-25	10	50-300
Small Shops	19-21	21-23	10	500
Supermarkets	9-21	21-23	10	750/1000
Banks, building societies, post office				
Counters	19-21	21-23	10	500
Public areas	19-21	21-23	10	300
Relative humidity for comfort	40-60%			

Source: CIBSE Guide A 2006

ANNUAL SERVICE CHARGES
(lettable areas)

Design area	Application	Other information	Rule of thumb*
Offices (let)[1]	Air-conditioned for heating and air conditioned maintenance	Average service charge	£1.29/ft^2
	Non air-conditioned	Average service charge for heating maintenance	£0.67/ft^2
	Lifts	Averageservice charge for lift maintenance	£0.23/ft^2
Shopping centres[2]	Average service charge by size, location and type	Enclosed air-conditioned	
		• small	£4.60-£5.30/ft^2
		• medium	£5.45-£6.96/ft^2
		• large	£4.60-£5.30/ft^2
		Enclosed non air-conditioned	
		• small	£3.48-£4.51/ft^2
		• medium	£3.98-£5.28/ft^2
		• large	£3.48-£4.51/ft^2

Source: 1 Office Oscar 2006, Jones Lange LaSalle
2 Retail/Oscar 2006, Jones Lange LaSalle. As referenced BSRIA Blue Book 2008

ANNUAL M&E MAINTENANCE COSTS
(Gross floor area)

Design area	Application	Rule of thumb
M&E maintenance	Factories	£800/100m^2
	Factory/office	£800/100m^2
	Warehouses	£700/100m^2
	Offices – air conditioned	£2250/100m^2
	Offices – non air conditioned	£1300/100m^2
	Call centres	£2400/100m^2
	Banks/building societies	£2150/100m^2
	Shopping centres – air conditioned	£950/100m^2
	Shopping centres – non air conditioned	£750/100m^2
	Supermarkets	£1550/100m^2
	Shops (non food)	£1100/100m^2
	Hospitals	£1800/100m^2
	Nursing homes and hospices	£1100/100m^2
	Swimming pools	£1900/100m^2
	Sports centres	£1400/100m^2
	Sports centres with swimming pools	£1850/100m^2
	Primary schools	£1250/100m^2
	Secondary Schools	£950/100m^2
	Universities	£1500/100m^2
	Museums	£1400/100m^2
	Libraries	£1700/100m^2
	Computer buildings	£2400/100m^2

Source: BSRIA Blue Book 2008 www.bsria.co.uk

USEFUL INFORMATION

CONVERSION FACTORS

Length	25.4mm	0.039in
	0.3048m	3.28ft
	1609m	0.00062 miles
Area	6.4516cm^2	0.155in^2
	0.0929m^2	10.76ft^2
	16.39cm^3	0.061m^3
	28.32dm^3	0.035ft^3
	0.7646m^3	1.307yd^3
	0.4047 hectares	2.471 acres
Capacity	4.4546dm^3	0.224 UK gallon
Speed	0.3048m/s	3.28ft/s
	0.00508m/s	196.85ft/min
Mass	0.45359kg	2.205lb
	1.016 tonne	0.984imperial ton
Density	16.019kg/m3	0.062lb/ft^3
Fuel Consumption	0.354km/litre	2.82mpg
Force	91 807N	0.0000108kgf
Energy	3.6 MJ	0.278kWh
	1055J	0.239callT
	1055J	0.00095btu
	105.5MJ	0.0095therm
Power	745.7W	0.00134hp
	0.2931W	3.412btu/h
	3.517kW	0.284ton refrigeration
	746.08W	0.00134hp
Specific Energy	2326J/kg	0.00043btu/lb
Heat Content (volume basis)	37.259kJ/m^3	0.0269btu/ft^3
Specific Heat Capacity	4187J/KgK	0.00024btu/lb°f

Source: BSRIA Blue Book 2008 www.bsria.co.uk

USEFUL INFORMATION

KEY INDUSTRY CONTACTS

American Society for Heating, Refrigerating & Aircon Engineers (ASHRAE)
T: 0800 962130 www.ashrae.org

Asbestos Removal Contractors' Association (ARCA)
T: 01283 531 126 www.arca.org.uk

Association for Consulting and Engineering (ACE)
T: 0207 222 6557 www.acenet.co.uk

Association for Environment Conscious Building
T: 0845 4569773 www.aecb.net

Association for the Conservation of Energy
T: 0207 359 8000 www.ukace.org

Association of Fire Consultants
T: 08700 114 514 www.afc.eu.com

Association of Noise Consultants
T: 01727 896092 www.association-of-noise-consultants.co.uk

BRE Environmental Assessment Method (BREEAM)
T: 01923 664 000 www.bre.co.uk

British Approvals for Fire Equipment
T: 0208 541 1950 www.bafe.org.uk

British Automatic Sprinkler Association Ltd
T: 01353 659187 www.basa.org.uk

British Council for Offices (BCO)
T: 0207 283 0125 www.bco.org.uk

British Institute of Facilities Management
T: 0845 058 1356 www.bifm.org.uk

British Refridgeration Association
T: 0118 940 3416 www.feta.co.uk/bra

Building Research Establishment (BRE)
T: 01923 664 000 www.bre.org.uk

British Standards Institution
T: 0208 996 9000 www.bsi-global.com

Building Services Research and Information Association (BSRIA)
T: 01344 456 600 www.bsria.co.uk

Climate Change Action Plan
T: 0207 983 4100 www.london.gov.uk

The Carbon Trust
T: 0800 085 2005 www.carbontrust.co.uk

Chartered Institute of Building
T: 01344 630700 www.ciob.org.uk

Chartered Institution of Building Services Engineers
T: 0208 6755211 www.cibse.org

Commissioning Specialists' Association
T: 01403 754133 www.csa.org.uk

Construction Design and Management Regulations 2007 (CDM) – HSE
T: 0745 345 0055 www.hse.gov.uk

Construction Industry Research & Information Association
T: 0207 549 3300 www.ciria.org.uk

Energy Institute
T: 0207 467 7100 www.energyinst.org.uk

Energy Saving Trust
T: 0207 222 0101 www.est.org.uk

Environment Agency
T: 01454 624400 www.environment-agency.gov.uk

Heat Pump Manufacturers Association
T: 0118 940 3416 www.heatpumps.org.uk

Heating and Hot Water Information Council
T: 0845 600 2200 www.centralheating.co.uk

Heating and Ventilating Contractors Association
T: 0207 313 4900 www.hvca.org.uk

HEVAC Association
T: 0118 9403416 www.feta.co.uk/hevac

Institute of Acoustics
T: 01727 848195 www.ioa.org.uk

Institute of Maintenance & Building Management
T: 01252 710994 www.imbm.org.uk

Institute of Swimming Pool Engineers
T: 01603 499959 www.ispe.co.uk

Institution of Engineering and Technology
T: 0207 2401871 www.theiet.org

Institution of Mechanical Engineers
T: 0207 222 7899 www.imeche.org.uk

Institution of Structural Engineers
T: 0207 235 4535 www.istructe.org.uk

Lifetime Homes for Individual and Community Well Being
T: 0207 822 8700 www.lifetimehomes.org.uk

Lift and Escalator Industry Association
T: 0207 935 3013 www.leia.co.uk

The London Plan
T: 0207 983 4100 www.london.gov.uk

National Association of Chimney Engineers
T: 01526 322555 www.nace.org.uk

Royal Institute of British Architects
T: 0207 580 5533 www.riba.org

Royal Institution of Chartered Surveyors
T: 0207 222 7000 www.rics.org

Smoke Control Association
T: 0118 9403416 www.feta.co.uk

Solar Trade Association
T: 01908 442290 www.greenenergy.org.uk/sta

Specification Expert
T: 01344 899280 www.barbour.info

The Climate Group
T: 0207 960 2970 www.theclimategroup.org.uk

UK Thermography Association
T: 01604 630124 www.ukta.org

Source: BSRIA Blue Book 2008 www.bsria.co.uk

TYPICAL APPLICATION

ALL BUILDINGS HAVE THEIR OWN UNIQUE REQUIREMENTS FOR VENTILATION. WITH THE NEW GOVERNMENT GUIDELINES ON ENERGY EFFICIENCY IT IS MORE DIFFICULT TO MAINTAIN A COMFORTABLE, HEALTHY ENVIRONMENT WHILST PROVIDING AN ENERGY EFFICIENT SOLUTION.

NATURAL VENTILATION

Provides low energy ventilation systems, using the principles of natural mixing ventilation in the winter and natural upward displacement in the summer.

MECHANICAL EXTRACT FOR OFFICES & COMMUNAL AREAS

Extract fans are the simplest form of ventilation for office and communal environments. Whether duct, wall, window or ceiling mounted these fans will extract moisture from wet rooms and offices to provide continuous fresh air.

STAIRWELL PRESSURISATION & SMOKE EXTRACT FOR MULTI-FLOOR REQUIREMENTS

Nuaire have manufactured smoke and car park ventilation for over 30 years and a design service is available to complement the complete range of smoke pressurisation and extract fans (duct or roof mounted) for 300/400°C for 1 & 2 hours, certified to EN12101-3 2002.

CAR PARK EXTRACT

The comprehensive range of AXUS smoke fans together with the Impulse car park fan meets the ever increasing need to provide smoke extract for car parks.

SMOKE SOLUTIONS

STAIRWELL PRESSURISATION & SMOKE EXTRACT APPLICATIONS

AXUS SMOKE & AXT

High temperature & ambient axial extract fans up to 85m³/s.

XS RANGE

Wall, window, ceiling and roof extract fans (up to 530l/s).

MULTI-ROOM VENTILATION

CONSTANT PRESSURE VARIABLE VOLUME

Twin fan - high performance extract up to 2.65m³/s.

CONSTANT PRESSURE VOLUME

Control damper - energy efficient volume damper for use with constant pressure twin fan.

E-STACK (F, A, S & R SERIES UNITS)

Range of low energy systems developed as a solution for use in new buildings.

NUAIRE HAS OVER 40,000 PRODUCT LINES TO SELECT FROM WHATEVER YOUR REQUIREMENTS. WE HAVE THE SOLUTION FROM A SMALL EXTRACT FAN TO LARGE AIR HANDLING UNITS.

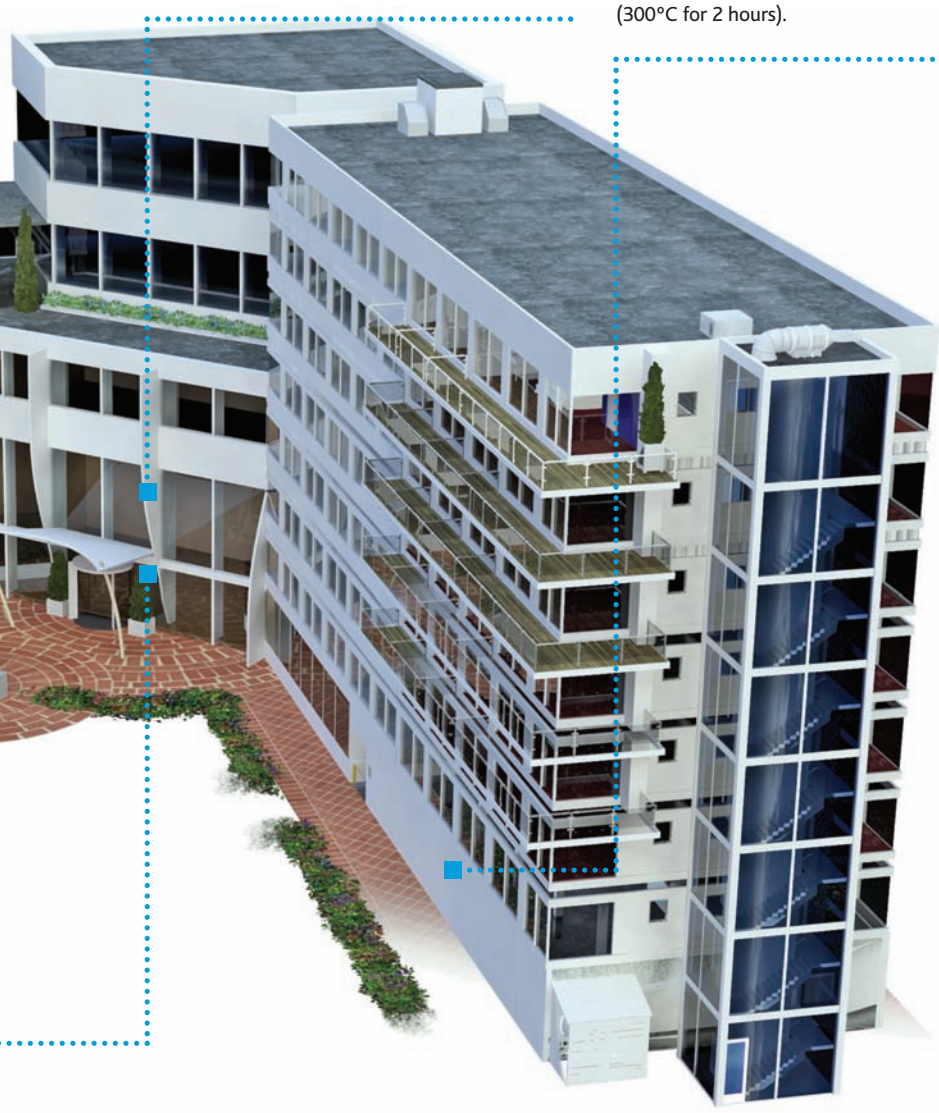
XBOXER TAILOR MADE AHUS

23 sizes covering airflow range up to 20m³/s.

CAR PARK EXTRACT OPTIONS

IMPULSE HIGH TEMPERATURE EXTRACT

Powerful impulse fan certified to EN12101-3 (300°C for 2 hours).



MECHANICAL EXTRACT FOR OFFICES AND COMMUNAL AREAS

ES-OPUSDC

Energy efficient range of inline, surface and recessed fans up to 115l/s.

ECOSMART SQURBO

Energy efficient make up air supply and extract units up to 0.5m³/s.

XTRACTOR

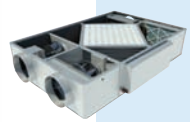
High efficiency centrifugal fan up to 6.2m³/s.

TERMINATOR

Horizontal discharge roof extract fan.

XBOXER THERMAL WHEELS

Available in 6 sizes up to 10m³/s.



XBOXER PACKAGED HEAT RECOVERY

Low depth, high performance range up to 5m³/s.

SQUIF RANGE

Run and standby units ideal for 'out of airstream' applications such as commercial kitchens. Twin fan option.

MRXBOX95 WALL & LOFT HEAT RECOVERY

High efficiency up to 95% efficient.