Heat recovery ventilation
for schools

COMPLIANT PRODUCTS

for all areas

- BB101 and FOS compliant in all operating modes
- Low noise to meet DFE guide BB93 and Building Regulations part E
- Low Specific Fan Powers to help meet Building Regulations part L2
- ErP/EU Ecodesign Directive compliant
- CO_2 monitoring as standard
- High quality double skin case construction to BS EN 1886
- Chassis mounted intelligent controls
- BMS interface via Modbus or BACnet protocol
- BIM files available

Heat recovery ventilation for the education sector

part of a complete range of innovative, flexible products from the HVAC experts

VES

Better air for the built environment

Heat recovery ventilation *for schools*

Overview

In the UK, all new school designs must comply with standard building regulations. Additional school design specifications and guidelines are also in place to ensure best practice.*

VES products and services enable compliance with these guidelines in all spaces throughout the school building, regardless of size or function. Our schools project portfolio extends through both the public and private sectors. Recent work includes Priority School Building Programme schools that have been signed off by the Education Funding Agency as meeting the Facilities Output Specification.

- Almost 10 million pupils attend schools in the UK
- Pupil numbers in state-funded schools are expected to grow by 12% from 2014 to 2023
- Pupils spend almost a third of their formative years in school. Around 70% of that time is spent indoors

Functions of a school ventilation system

- Enable the staff to adjust their environment and maintain a satisfactory level of thermal comfort throughout each term
- Limit the concentration of carbon dioxide in all teaching and learning spaces
- Not be intrusive or disruptive to learning

Working with VES ensures occupant comfort and low operating costs over the lifetime of the ventilation system.

General areas

Areas such as toilet blocks, corridors and small offices may require smaller units with low specific fan power and low volume.

See page: **22**

Kitchen

Kitchens provide opportunities to save energy and reduce running costs. For sites where steam cooking predominates it is possible to recover heat from the air extracted from a kitchen canopy.

See page: **23**

A summary of relevant regulations and guidance is on page 25

Primary school classroom

These classrooms are always located on the ground floor with an external door direct to outside. The heat recovery unit (HRU) requires a LPHW wet coil to offer heating as a top up when external cold air is introduced and prevents the air in the classroom getting too cold while keeping it at a constant temperature.

See pages **6-13**

In poorly ventilated classrooms, students are likely to be less attentive and to concentrate less well on instructions given by teachers.*

Secondary school classroom

These classrooms contain the HRU located in the ceiling void within the teaching space and offer CO_2 monitoring to maintain air quality, and heat recovery to offer constant room temperature. These units work in conjunction with other heating sources, typically radiators.

See pages **6-13**

Science laboratory

These heat recovery units require higher ventilation rates due to increased risk of high CO_2 levels, usually from the use of Bunsen burners. Due to this, the HRUs are larger than the standard classroom units. CO_2 and temperatures are monitored.

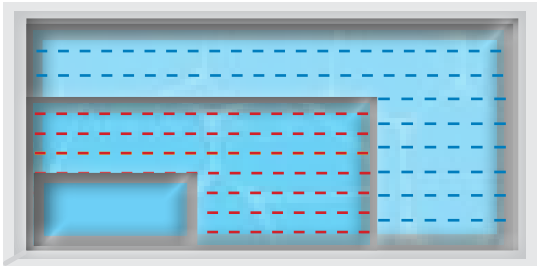
Incorporating a safety interlock — generated by air proving between the gas supply and the heat recovery ventilation unit — ensures the gas will not operate unless the fans are running.

See page **14**

Hall

A larger space with higher potential occupancy requires a larger air handling unit.

See page: **24**



Swimming pool

An area where conditions are critical for comfort and well being. A purpose designed air handling unit can ensure this while keeping running costs down and avoiding damage to the building fabric.

See page: **24**

*Ventilation rates in schools and pupils' performance - Bakó-Biró *et al, 2011*

Ecovent® Counterflow

Ecovent® Counterflow

With a range of low profile heat recovery units designed to fit into shallow ceiling voids, Ecovent Counterflow from VES is an ideal choice for classroom heat recovery ventilation.

- Low SFP to exceed L2 Building Regulations
- Low noise to meet BB93 requirements and E4 Building Regulations
- Compliant with Facilities Output Specification (FOS), BB101 and BB102
- Fully compliant with requirements even in bypass mode
- ErP Lot 6 2018 ready
- Enables mixed mode operation
- Can be customised to suit building layouts

Premium performance with energy efficient operation

To help meet Building Regulations and requirements for schools. Keeps running costs low. EC fans offer maximum efficiency with minimum energy consumption.

Simple installation and maintenance

Save on site costs, maintain safe working practices and reduce lead times though simple connection and pre-installed features.

Carefully designed access and maintenance features minimise downtime and total cost of ownership.

Total control

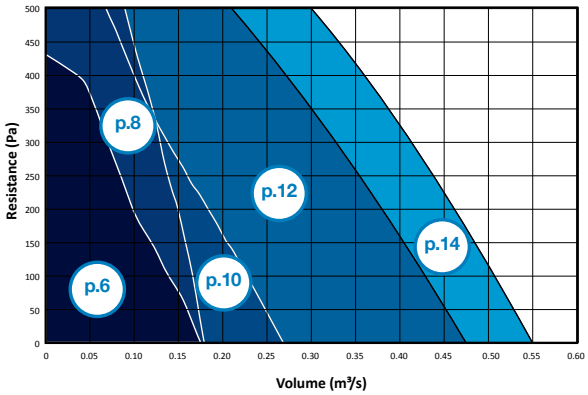
Efficiently controls heat recovery and available free heating / cooling. Fully functional bypass to maintain classroom design conditions. Meets noise requirements in bypass.

Structural integrity

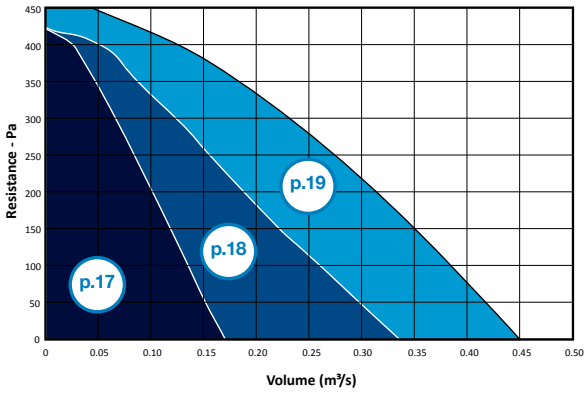
Excellent build quality ensures minimal noise breakout, low SFPs and airtight performance.

Ecovent® Counterflow performance

EVC



EVC-A



BlueSense energy saving ventilation package

Intelligent controls enhance performance while minimising energy costs.
The BlueSense package integrates heat recovery, controls and site assistance to give total peace of mind. VES provides a wide range of measurement sensors for a variety of applications, providing an optimal base for precise and therefore energy and cost-saving control of the entire HVAC system. See pages 20-21 and 26 for more information.

Premium efficiency heat recovery

Designed using Computational Fluid Dynamics simulations airflow across the plate heat exchanger is optimised to enable a true rate of heat transfer and efficiencies of up to 90% to BS EN 308:1997 specification. Zero cross contamination of moisture, smells or fumes. Rigid aluminium construction for durability and reliability.

High performance EC fans

Fully controllable and ErP lot 11 compliant, energy efficient with low SFPs to help achieve L2 Building Regulations. Fully performance tested to BS EN ISO 5801:2008, BS 848-1:2007 (airside performance).

Noise reduction

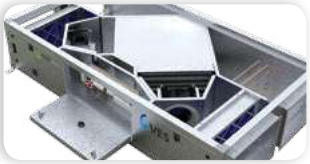
The range has been independently tested at Southampton University's Institute of Sound and Vibration Research (ISVR) to BS EN ISO 3744:2010 and can help meet acoustic requirements for sensitive applications including BB93; Building Bulletin 93 - School Acoustics.

One-piece solution

The unit is pre-wired to an integrated controls package or isolator to reduce onsite wiring requirements. Predefined customer access points reduce installation time and cost.

'Plug & Play' fans

Fan motor assembly is internally anti-vibration isolated and fitted with a quick change plug connector for easy maintenance or replacement.



Multi-access

Units suitable for top and bottom access. Condensate pumps have multipoint access drains and integrated alarm to indicate blockages.

Filter access and maintenance

High efficiency filtration with convenient access panels for easy and safe filter maintenance. If a VES control panel is ordered it will provide condition based servicing information. Brackets enable both drop rod and direct bolting, no need for anti-vibration fixings.

Face & bypass damper

100% bypass ensures purge is always achieved i.e. always meets airflow to disperse carbon dioxide, maintaining good indoor air quality.

Case construction

Double skinned 25 mm or 50 mm cases. All units built with an aluminium tubular frame and galvanised steel sheet panels, with resin bonded mineral wool slab infill. Tested by BSRIA to BS EN 1886.

EVC-A range

As well as our standard Ecovent Counterflow units, VES offers a variant range, the EVC-A, which was originally customised to a specific layout required by a client.

The EVC-A range offers the same features and benefits as outlined on these pages.

More details are available on pages **16-19**

Ecovent Counterflow unit with integral controls

+

EC fan with full control

+

Sensor options

=

BlueSense

The sign of energy saving products, services and expertise

Ecovent® Counterflow

Selection data

Unit EVC073-1

A. Performance

SFP Watts/litres /second = Electrical input power (Watts) / Air volume flow rate (litres/second)

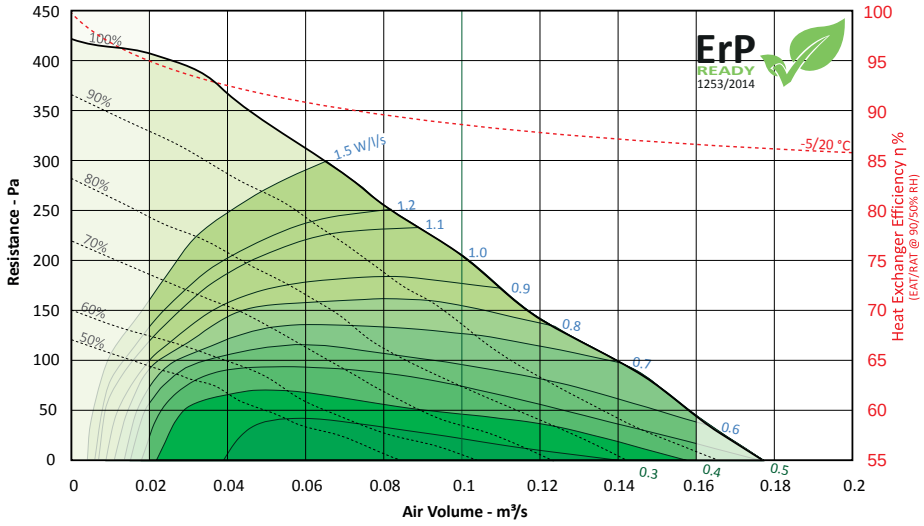
Notes:

SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007 for each of the two fans.

Heat exchanger efficiency is calculated based upon EAT -5 °C and RAT +20 °C.

The fan performance is calculated using standard G4 filters. Alternative F7 can add up to a maximum of 150 Pa.

Tolerances:
On flow rates: +/- 5%
On acoustic power and pressure: Levels: +/- 3 dB
By octave band: +/- 5 dB



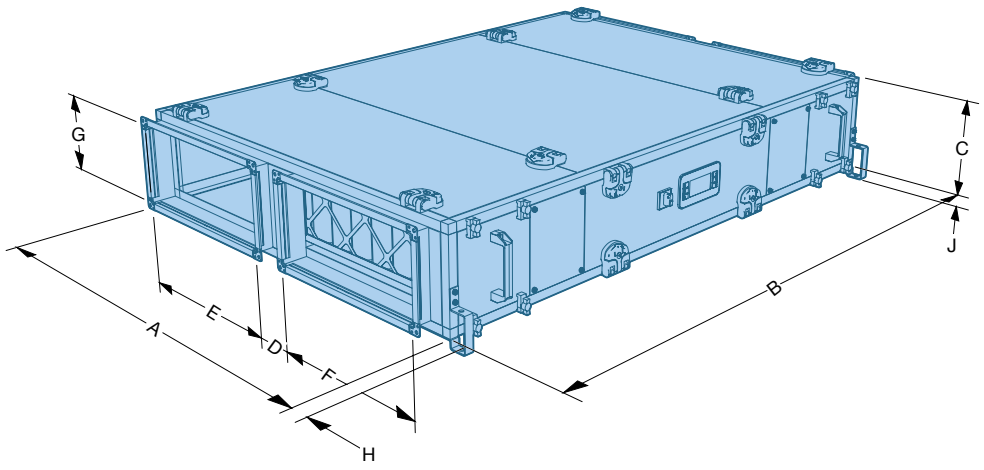
Size	Phase	Motor size	Voltage	Fan speed	Motor full load current	Speed control
EVC073-1	1 Phase	0.1 kW	230 VAC	1410 rpm	0.83 A	EC

B. Configuration

Configuration and handing

EVC073-1 / FP...../ LT RT...../ LB RB

FP Flat plantroom



Note: Contact the sales office for further configuration options on +44(0) 8448 15 60 60.

Unit type	Dimensions mm									Weight kg	Configuration options			
	A	B	C	D	E	F	G	H	J		LT	LB	RT	RB
EVC0 Flat plantroom	1200	1650	280	110	500	500	230	50	25	195	✔	✔	✔	✔

Note: Data for design guidance only. For full details, outline drawings are available upon request.

C. Heating and controls

Heating Controls

EVC073-1 / FP- W / DS / RT / G4 / ISC
E CPSC
null

	Technical data						Heating and control options	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Water flow rate l/s	Water pressure kPa	Coil connection size BSP	Control panel	Valve & actuator kit
LPHW Heating	0.100	32.8	4.6	0.102	7.3	1/2"	CPB0-1/W/P/C	EVCCWKT000
	0.125	31.1	5.5	0.122	10.2			
	0.150	29.6	6.3	0.140	13.3			
	0.175	28.2	7.0	0.157	16.4			

LPHW coil, designed for LPHW 82/71 ^oC, EAT -5 ^oC, LAT +25 ^oC, coil construction copper tubes, aluminium fins, coil connections 1/2" BSP.

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

	Technical data			Heating and control options			
				1ph - Electric heater		3ph - Electric heater	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Electric heater	Control panel	Electric heater	Control panel
Electric thyristor heating	0.100	28.1	4	EHEVC0/4KW/1X1	CPB0-1/6KW-1/P/C	EHEVC0/4KW/1X3	CPB0-1/6KW-3/P/C
	0.125	21.4					
	0.150	28.1	6	EHEVC0/6KW/1X1		EHEVC0/6KW/1X3	
	0.175	23.3					

Air off temperature based upon entering air of -5 ^oC. Power = Air Volume x Constant x Temperature Rise. kW = m^3/s x 1.21 x $\triangle T$ ^oC

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

D. Sound data and silencer

Fan voltage	Fan speed rpm	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)								Casing radiated			
		63	125	250	500	1k	2k	4k	8k	NR @ 1m	NR @ 3m	dBA @ 1m	dBA @ 3m
100%	1410	72	67	56	43	41	39	35	32	35	27	39	32
90%	1269	70	64	54	40	40	37	33	31	32	24	37	30
80%	1128	66	61	50	38	38	34	31	31	29	21	34	27
70%	987	64	59	48	36	36	31	30	31	26	18	32	24
60%	846	60	55	44	33	32	29	29	31	24	17	28	21
50%	705	57	53	41	31	30	28	29	31	24	17	26	19

Silencer option	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)							
EVCVA000/1200/STD	63	125	250	500	1k	2k	4k	8k
Induct Loss	-6	-11	-18	-22	-25	-17	-22	-20

Note: The silencer will add a maximum of 8 Pa to the external resistance.

Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow

Selection data

Unit EVC152-1

A. Performance

SFP Watts/litres /second = Electrical input power (Watts) / Air volume flow rate (litres/second)

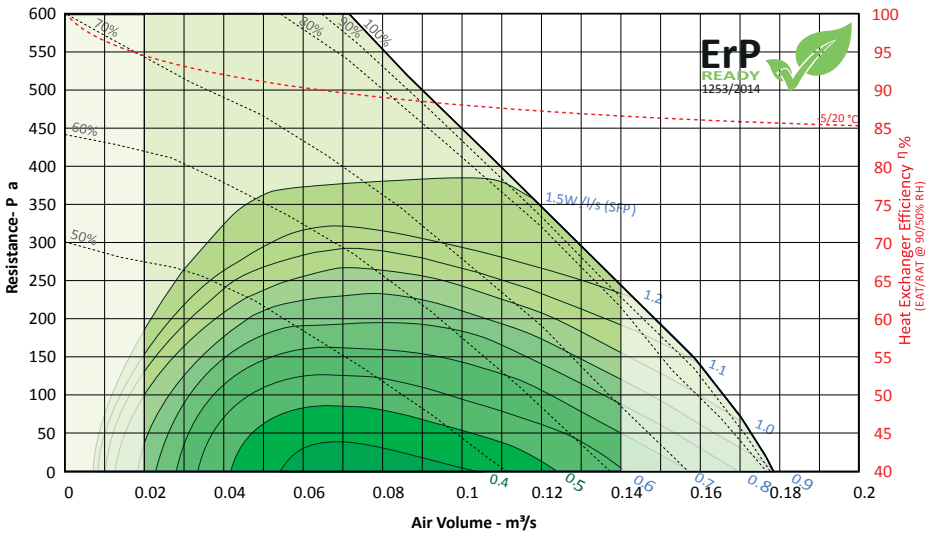
Notes:

SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007 for each of the two fans.

Heat exchanger efficiency is calculated based upon EAT -5 °C and RAT +20 °C.

The fan performance is calculated using standard G4 filters. Alternative F7 can add up to a maximum of 150 Pa.

Tolerances:
On flow rates: +/- 5%
On acoustic power and pressure: Levels: +/- 3 dB
By octave band: +/- 5 dB



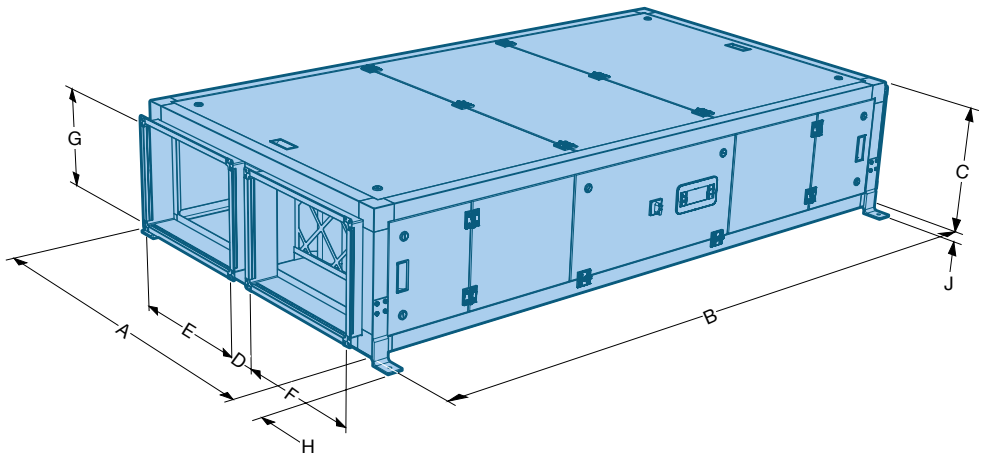
Size	Phase	Motor size	Voltage	Fan speed	Motor full load current	Speed control
EVC152-1	1 Phase	0.169 kW	230 VAC	4120 rpm	1.35 A	EC

B. Configuration

Configuration and handing

EVC152-1 / FP...../ LT RT...../ LB RB

FP Flat plantroom



Note: Contact the sales office for further configuration options on +44(0) 8448 15 60 60.

Unit Type	Dimensions mm									Weight kg	Configuration options			
	A	B	C	D	E	F	G	H	J		LT	LB	RT	RB
EVC1 Flat plantroom	1150	1700	350	290	380	380	250	75	25	213	✔	✔	✔	✔

Note: Data for design guidance only. For full details, outline drawings are available upon request.

C. Heating and controls

Heating / Controls

EVC152-1 / FP- [W / E / null] / EE / RT / G4 / [ISC / CPSC]

	Technical data						Heating and control options	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Water flow rate l/s	Water pressure kPa	Coil connection size BSP	Control panel	Valve & actuator kit
LPHW heating	0.100	33.0	4.6	0.103	9.2	1/2"	CPB0-1/W/P/C	EVCCWKT100
	0.125	31.4	5.5	0.123	13			
	0.150	29.9	6.3	0.141	16.9			
	0.175	28.5	7.1	0.158	21			

LPHW coil, designed for LPHW 82/71 ^oC, EAT -5 ^oC, LAT +25 ^oC, coil construction copper tubes, aluminium fins, coil connections 1/2" BSP.

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

	Technical data			Heating and control options			
				1ph - Electric heater		3ph - Electric heater	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Electric heater	Control panel	Electric heater	Control panel
Electric thyristor heating	0.100	28.1	4	EHEVC1/4KW/1X1	CPB0-1/6KW-1/P/C	EHEVC1/4KW/1X3	CPB0-1/6KW-3/P/C
	0.125	21.4					
	0.150	28.1	6	EHEVC1/6KW/1X1		EHEVC1/6KW/1X3	
	0.175	23.3					

Air off temperature based upon entering air of -5 ^oC. Power = Air Volume x Constant x Temperature Rise. kW = m^3/s x 1.21 x $\triangle T$ ^oC

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

D. Sound data and silencer

Fan voltage	Fan speed rpm	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)								Casing noise breakout			
		63	125	250	500	1k	2k	4k	8k	NR @ 1m	NR @ 3m	dBA @ 1m	dBA @ 3m
100%	4120	65	62	65	68	69	69	66	64	34	27	37	30
90%	4055	64	61	65	68	68	68	65	64	34	27	37	30
80%	4033	64	61	64	67	68	68	65	64	33	25	36	29
70%	3459	61	58	61	64	64	65	62	60	30	22	33	26
60%	2496	57	54	58	60	61	61	58	57	27	19	30	22
50%	2055	50	47	50	53	54	54	51	50	18	10	22	15

Centre frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Case insertion loss (dB)	-2	-6	-7	-24	-27	-30	-31	-28

Silencer option	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)							
EVCVA100/1200/STD	63	125	250	500	1k	2k	4k	8k
Induct loss	-6	-11	-18	-22	-25	-17	-22	-20

Note: The silencer will add a maximum of 8 Pa to the external resistance.

Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow

Selection data

Unit EVC243-1

A. Performance

$$\text{SFP}\ \frac{\text{Watts/litres}}{\text{/second}} = \frac{\text{Electrical input power (Watts)}}{\text{Air volume flow rate (litres/second)}}$$

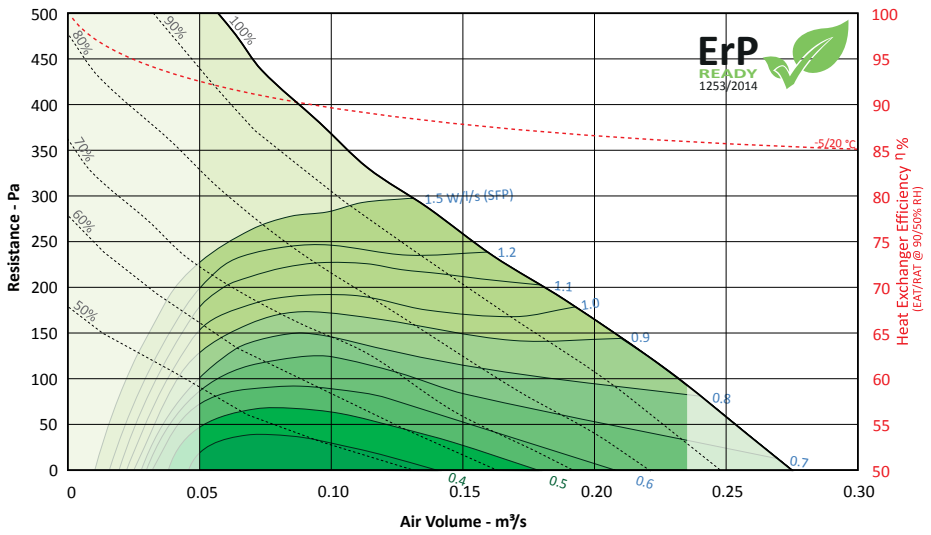
Notes:

SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007 for each of the two fans.

Heat exchanger efficiency is calculated based upon EAT -5 °C and RAT +20 °C.

The fan performance is calculated using standard G4 filters. Alternative F7 can add up to a maximum of 150 Pa.

Tolerances:
On flow rates: +/- 5%
On acoustic power and pressure: Levels: +/- 3 dB
By octave band: +/- 5 dB



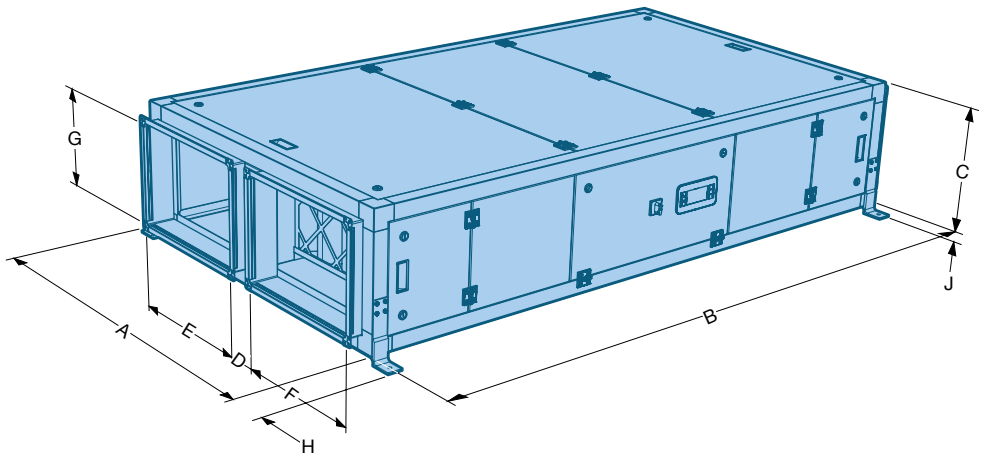
Size	Phase	Motor Size	Voltage	Fan speed	Motor full load current	Speed control
EVC243-1	1 Phase	0.23 kW	230 VAC	3290 rpm	1.65 A	EC

B. Configuration

Configuration and handing

EVC243-1 / FP...../ LT RT...../ LB RB

FP Flat plantroom



Note: Contact the sales office for further configuration options on +44(0) 8448 15 60 60.

Unit type	Dimensions mm									Weight kg	Configuration options			
	A	B	C	D	E	F	G	H	J		LT	LB	RT	RB
EVC2 Flat plantroom	1200	2200	450	100	500	500	350	75	25	305	✔	✔	✔	✔

Note: Data for design guidance only. For full details, outline drawings are available upon request.

C. Heating and controls

Heating / Controls

EVC243-1 / FP- W / E / null / EE / RT / G4 / ISC / CPSC

	Technical data						Heating and control options	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Water flow rate l/s	Water pressure kPa	Coil connection size BSP	Control panel	Valve & actuator kit
LPHW Heating	0.150	35.7	7.4	0.165	5.6	1"	CPB0-1/W/P/C	EVCCWKT200
	0.175	34.8	8.4	0.188	7.1			
	0.200	33.9	9.4	0.210	8.7			
	0.225	33.1	10.4	0.231	10.4			

LPHW coil, designed for LPHW 82/71 °C, EAT -5 °C, LAT +25 °C, coil construction copper tubes, aluminium fins, coil connections 1" BSP.

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

	Technical data			Heating and control options			
				1ph - Electric heater		3ph - Electric heater	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Electric heater	Control panel	Electric heater	Control panel
Electric thyristor heating	0.150	28.1	6	EHEVC2/6KW/1X1	CPB0-1/6KW-1/P/C	EHEVC2/6KW/1X3	CPB0-1/6KW-3/P/C
	0.175	23.3					
	0.200	32.2	9	EHEVC2/9KW/1X1	CPB0-1/9KW-1/P/C	EHEVC2/9KW/1X3	CPB0-1/9KW-3/P/C
	0.225	28.1					

Air off temperature based upon entering air of -5 °C. Power = Air Volume x Constant x Temperature Rise. $kW = m^3/s \times 1.21 \times \triangle T\ ^oC$

Note: If no control panel is purchased the unit will be supplied with a mains isolator.

D. Sound data and silencer

Fan voltage	Fan speed rpm	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)								Casing noise breakout			
		63	125	250	500	1k	2k	4k	8k	NR @ 1m	NR @ 3m	dBA @ 1m	dBA @ 3m
100%	3290	66	67	67	66	66	64	59	54	36	28	37	31
90%	2961	65	67	66	65	65	62	58	53	35	27	37	30
80%	2632	64	66	65	63	64	61	58	52	33	26	36	29
70%	2303	64	64	63	61	63	59	56	51	31	24	34	27
60%	1974	66	61	61	59	54	57	55	48	29	22	32	25
50%	1645	61	59	56	57	56	53	52	46	24	17	27	21

Centre frequency	63	125	250	500	1k	2k	4k	8k
Case insertion loss	-2	-6	-7	-24	-27	-30	-31	-28

Silencer option	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)							
EVCVA200/1200/STD	63	125	250	500	1k	2k	4k	8k
Induct loss	-6	-11	-18	-22	-25	-17	-22	-20

Note: The silencer will add a maximum of 8 Pa to the external resistance.

Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow

Selection data

Unit EVC262-1

A. Performance

$$\text{SFP}_{\text{Watts/litres/second}} = \frac{\text{Electrical input power (Watts)}}{\text{Air volume flow rate (litres/second)}}$$

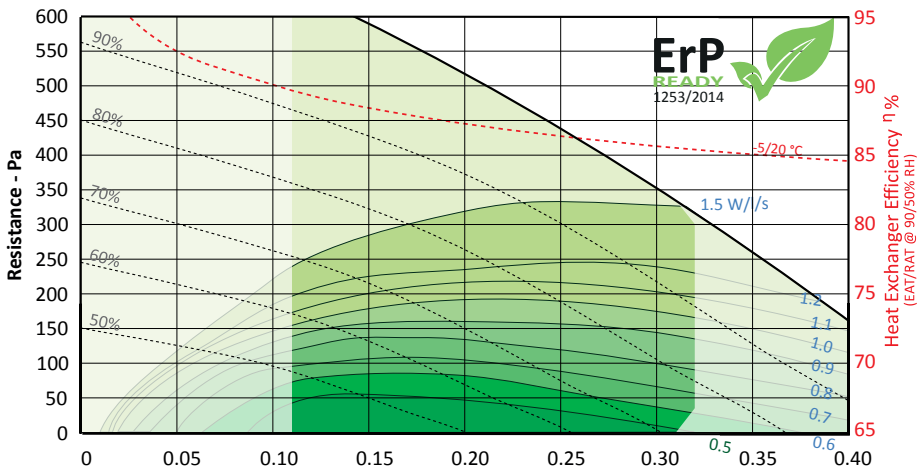
Notes:

SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007 for each of the two fans.

Heat exchanger efficiency is calculated based upon EAT -5 °C and RAT +20 °C.

The fan performance is calculated using standard G4 filters. Alternative F7 can add up to a maximum of 150 Pa.

Tolerances:
On flow rates: +/- 5%
On acoustic power and pressure: Levels: +/- 3 dB
By octave band: +/- 5 dB



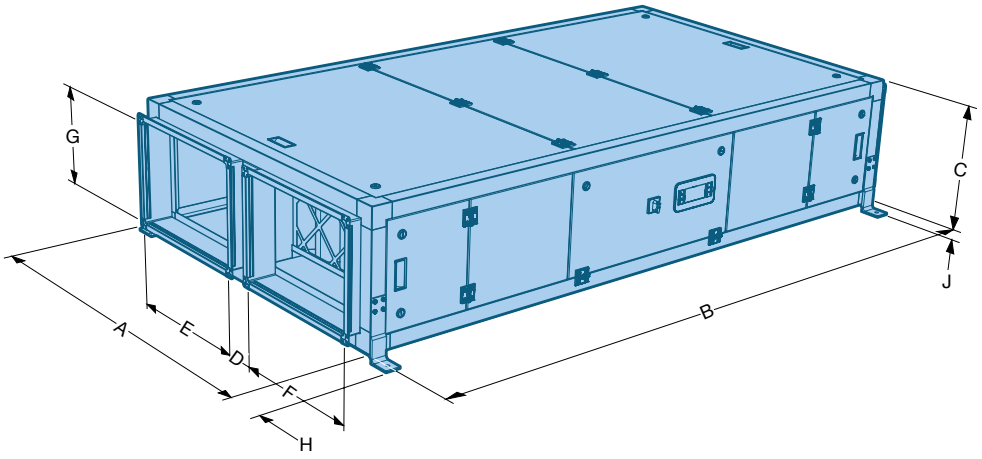
Size	Phase	Motor size	Voltage	Fan speed	Motor full load current	Speed control
EVC262-1	1 Phase	0.50 kW	230 VAC	3000 rpm	2.6 A	EC

B. Configuration

Configuration and handing

EVC262-1 / FP...../ LT RT...../ LB RB

FP Flat plantroom



Note: Contact the sales office for further configuration options on +44(0) 8448 15 60 60.

Unit type	Dimensions mm									Weight kg	Configuration options			
	A	B	C	D	E	F	G	H	J		LT	LB	RT	RB
EVC2 Flat plantroom	1200	2200	450	100	500	500	350	75	25	305	✔	✔	✔	✔

Note: Data for design guidance only. For full details, outline drawings are available upon request.

C. Heating and controls

Heating Controls

EVC262-1 / FP- W E null / EE / RT / G4 / ISC CPSC

	Technical data						Heating and control options	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Water flow rate l/s	Water pressure kPa	Coil connection size BSP	Control panel	Valve & actuator kit
LPHW Heating	0.150	35.7	7.4	0.165	5.6	1"	CPB0-1/W/P/C	EVCCWKT200
	0.175	34.8	8.4	0.188	7.1			
	0.200	33.9	9.4	0.210	8.7			
	0.225	33.1	10.4	0.231	10.4			
	0.250	32.4	11.3	0.252	12.2			
	0.275	31.7	12.2	0.272	14.0			
	0.300	31.0	13.1	0.291	15.9			
	0.325	30.3	13.9	0.309	17.8			
	0.350	29.7	14.7	0.327	19.8			
	0.375	29.0	15.5	0.344	21.7			

LPHW coil, designed for LPHW 82/71 °C, EAT -5 °C, LAT +25 °C, coil construction copper tubes, aluminium fins, coil connections 1" BSP.
Note: If no control panel is purchased the unit will be supplied with a mains isolator.

	Technical data			Heating and control options			
				1ph - Electric heater		3ph - Electric heater	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Electric heater	Control panel	Electric heater	Control panel
Electric thyristor heating	0.150	28.1	6	EHEVC2/6KW/1X1	CPB0-1/6KW-1/P/C	EHEVC2/6KW/1X3	CPB0-1/6KW-3/P/C
	0.175	23.3					
	0.200	32.2	9	EHEVC2/9KW/1X1	CPB0-1/9KW-1/P/C	EHEVC2/9KW/1X3	CPB0-1/9KW-3/P/C
	0.225	28.1					
	0.250	24.8					
	0.275	31.1	12	N/A	N/A	EHEVC2/12KW/1X3	CPB0-1/12KW-3/P/C
	0.300	28.1					
	0.325	25.4					
	0.350	23.3					
	0.375	24.7	18			EHEVC2/18KW/1X3	CPB0-1/18KW-3/P/C

Air off temperature based upon entering air of -5 °C. Power = Air Volume x Constant x Temperature Rise. kW = m^3/s x 1.21 x △T °C
Note: If no control panel is purchased the unit will be supplied with a mains isolator.

D. Sound data and silencer

Fan voltage	Fan speed rpm	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)								Casing noise breakout			
		63	125	250	500	1k	2k	4k	8k	NR @ 1m	NR @ 3m	dBA @ 1m	dBA @ 3m
100%	3000	68	66	74	73	73	74	70	64	43	36	44	37
90%	2700	65	63	70	69	70	71	67	60	39	32	40	33
80%	2400	61	60	67	67	67	68	64	57	36	28	37	30
70%	2100	58	58	64	64	64	65	59	53	32	25	34	27
60%	1800	56	57	62	62	61	62	56	49	30	23	32	25
50%	1500	55	59	58	58	58	57	51	44	26	19	29	22

Centre frequency	63	125	250	500	1k	2k	4k	8k
Case insertion loss	-2	-6	-7	-24	-27	-30	-31	-28

Silencer option	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)							
EVCVA200/1200/STD	63	125	250	500	1k	2k	4k	8k
Induct loss	-6	-11	-18	-22	-25	-17	-22	-20

Note: The silencer will add a maximum of 18 Pa to the external resistance.

Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow

Selection data

Unit EVC362-1

A. Performance

SFP Watts/litres /second = Electrical input power (Watts) / Air volume flow rate (litres/second)

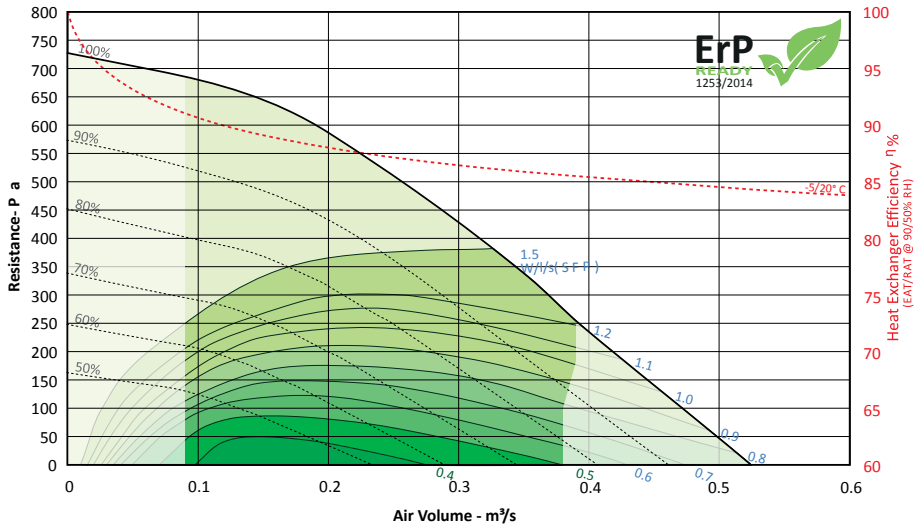
Notes:

SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007 for each of the two fans.

Heat exchanger efficiency is calculated based upon EAT -5 °C and RAT +20 °C.

The fan performance is calculated using standard G4 filters. Alternative F7 can add up to a maximum of 150 Pa.

Tolerances:
On flow rates: +/- 5%
On acoustic power and pressure: Levels: +/- 3 dB
By octave band: +/- 5 dB



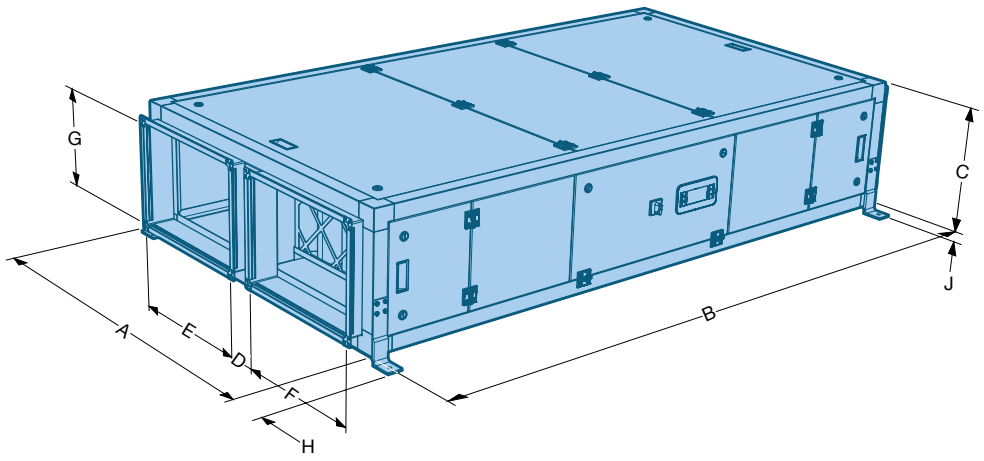
Size	Phase	Motor size	Voltage	Fan speed	Motor full load current	Speed control
EVC362-1	1 Phase	0.50 kW	230 VAC	3000 rpm	2.6 A	EC

B. Configuration

Configuration and handing

EVC362-1 / FP...../ LT RT...../ LB RB

FP Flat plantroom



Note: Contact the sales office for further configuration options on +44(0) 8448 15 60 60.

Unit type	Dimensions mm									Weight kg	Configuration options			
	A	B	C	D	E	F	G	H	J		LT	LB	RT	RB
EVC3 Flat plantroom	1200	2200	600	100	500	500	500	75	25	355	✔	✔	✔	✔

Note: Data for design guidance only. For full details, outline drawings are available upon request.

C. Heating and controls

Heating: W / E / null — Controls: ISC / CPSC

EVC362-1 / FP- [W/E/null] / EE / RT / G4 / [ISC/CPSC]

	Technical data						Heating and control options	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Water flow rate l/s	Water pressure kPa	Coil connection size BSP	Control panel	Valve & actuator kit
LPHW Heating	0.150	37.2	7.7	0.171	3.0	1"	CPB0-1/W/P/C	EVCCWKT300
	0.200	35.4	9.8	0.218	3.0			
	0.250	34.0	11.8	0.263	3.4			
	0.300	32.8	13.7	0.306	4.4			
	0.350	31.8	15.6	0.347	5.4			
	0.400	30.8	17.3	0.386	6.5			
	0.450	29.8	19.0	0.422	7.6			
	0.500	28.9	20.5	0.457	8.7			

LPHW coil, designed for LPHW 82/71 °C, EAT -5 °C, LAT +25 °C, coil construction copper tubes, aluminium fins, coil connections 1" BSP.
Note: If no control panel is purchased the unit will be supplied with a mains isolator.

	Technical data			Heating and control options			
				1ph - Electric heater		3ph - Electric heater	
	Air volume m^3/s	Maximum leaving air temp ^oC	Maximum kW output	Electric heater	Control panel	Electric heater	Control panel
Electric thyristor heating	0.150	28.1	6	EHEVC3/6KW/1X1	CPB0-1/6KW-1/P/C	EHEVC3/6KW/1X3	CPB0-1/6KW-3/P/C
	0.200	32.2	9	EHEVC3/9KW/1X1	CPB0-1/9KW-1/P/C	EHEVC3/9KW/1X3	CPB0-1/9KW-3/P/C
	0.250	24.8					
	0.300	28.1	12	N/A	N/A	EHEVC3/12KW/1X3	CPB0-1/12KW-3/P/C
	0.350	23.3					
	0.400	32.2	18			EHEVC3/18KW/1X3	CPB0-1/18KW-3/P/C
	0.450	28.1					
	0.500	24.8					

Air off temperature based upon entering air of -5 °C. Power = Air Volume x Constant x Temperature Rise. kW = m^3/s x 1.21 x △T °C
Note: If no control panel is purchased the unit will be supplied with a mains isolator.

D. Sound data and silencer

Fan voltage	Fan speed rpm	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)								Casing noise breakout			
		63	125	250	500	1k	2k	4k	8k	NR @ 1m	NR @ 3m	dBA @ 1m	dBA @ 3m
100%	3000	66	64	71	72	74	74	70	64	35	28	39	32
90%	2700	63	61	68	69	71	71	67	61	32	25	36	29
80%	2400	60	59	66	67	68	68	64	58	30	23	34	27
70%	2100	57	57	64	64	64	65	60	53	28	21	31	24
60%	1800	55	56	61	61	61	61	55	49	25	17	28	22
50%	1500	55	59	58	58	58	57	51	44	21	14	26	20

Centre frequency	63	125	250	500	1k	2k	4k	8k
Case insertion loss	-1	-6	-11	-24	-27	-30	-31	-28

Silencer option	Sound spectrum dB re 10^{-12} W PWL centre frequency (Hz)							
EVCVA300/1200/STD	63	125	250	500	1k	2k	4k	8k
Induct loss	-6	-11	-18	-22	-25	-17	-22	-20

Note: The silencer will add a maximum of 14 Pa to the external resistance.

Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow EVC-A

Customisable solutions

In addition to the standard Ecovent Counterflow units, VES offers the EVC-A range.

When a major building contractor required a very **low profile heat recovery solution** to fit into pre-existing classroom designs, they contacted VES. To achieve the required low profile, the spigot arrangement of the **Ecovent Counterflow** was changed from side-by-side to top and bottom. No simple task, as the products still need to achieve airflow and acoustic requirements. Nevertheless, VES succeeded where others had previously failed and the EVC-A range is now available as a standard product.

- Low height for shallow voids
- Low weight
- Low noise: Built in attenuator (size 1 and 2)
- Multi deck fan arrangement increases laminar flow across plate heat exchanger for effective and efficient operation
- On board chassis mounted controls
- CO_2 monitoring
- Smaller filters for even easier maintenance access
- Convenient mounting and access points

Feedback from the contractor has been overwhelmingly positive and in a few short months, several hundred units have been supplied to primary and secondary schools around the country.

Acoustic performance testing

- ✓ In-house by VES
- ✓ Independently at Southampton University's Institute of Sound and Vibration Research (ISVR) to BS EN ISO 3744:2010
- ✓ Independently tested at the Ziehl ABEGG InVent development and technology centre
- ✓ In-situ by HRS Services Ltd, confirming adherence to the Acoustic Performance Standards for the Priority Schools Building Programme and the EFA Facilities Output Specification (EVC-A 2 and 3)

Need something a little different?

VES's experience as a bespoke manufacturer means we can effectively adapt our product designs to meet specific client needs, while meeting the necessary regulatory specifications.

Selection data

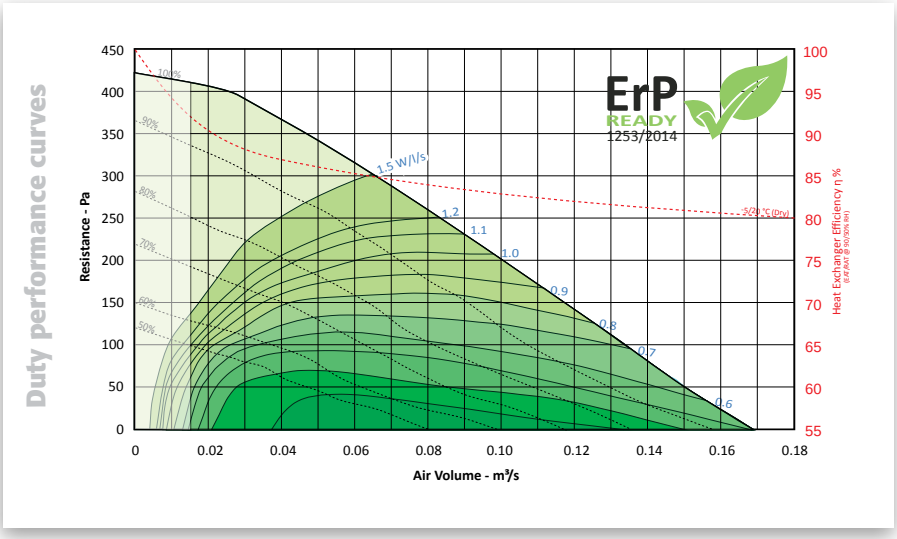
Unit EVCA-1

$$\text{SFP}_{\text{Watts/litres /second}} = \frac{\text{Electrical input power (Watts)}}{\text{Air volume flow rate (litres/second)}}$$

SFP value 1.34 W/l/s (0.15 m³/s @ 50 Pa).

Note: The SFP figures quoted are for the unit (all fans running), based on a balanced airflow, and not single fans.

Note: SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007.



Performance

Size	Phase	Motor power kW	Voltage vac	Fan speed rpm	Motor full load current A	Speed control
EVCA-1	1	0.1	230	1410	0.83	EC

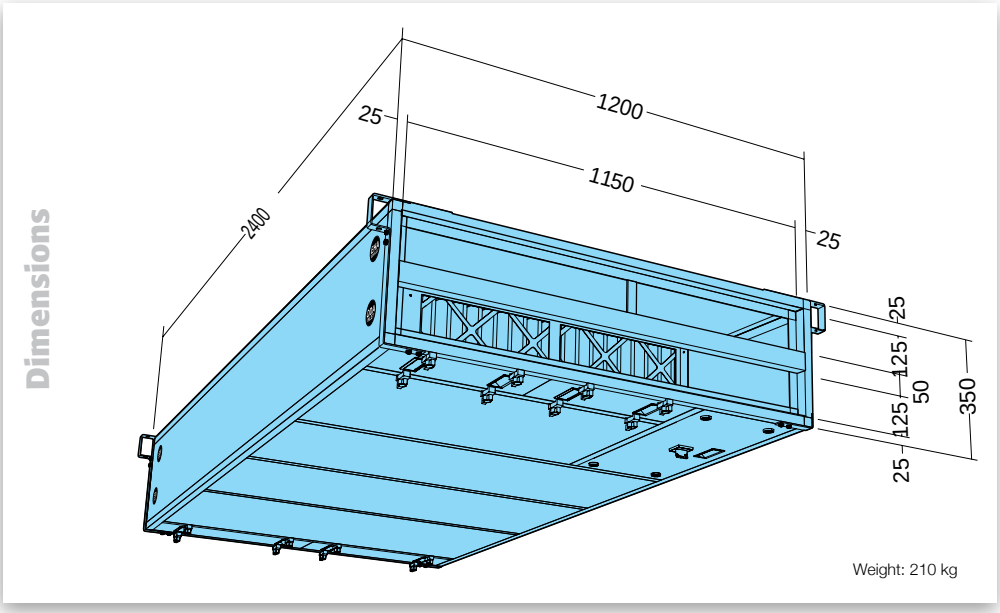
Note: Values are per fan - Unit EVCA-1 has 2 fans in total.

Installed noise data

Fan speed setting	Fan speed rpm	Sound spectrum L_p / dB re 20µPa SWL centre frequency Hz (measured @ 1.5m)								Casing radiated
		63	125	250	500	1k	2k	4k	8k	dBA@1.5 m
100%	1410	59	48	31	15	12	12	10	10	35

Note: Figures above are sound pressure levels measured at 1.5 m from source when unit is installed within suitable classroom bulkhead design. Airflow 0.15 m^3/s

Note: NR levels are dependent upon environmental conditions.
Tolerances: On flow rates: ±5% On acoustic power and pressure: Levels: ±3 dB By octave band: ±5 dB



Note: Data for design guidance only. For full details, outline drawings are available upon request.

Ecovent® Counterflow EVC-A

Selection data

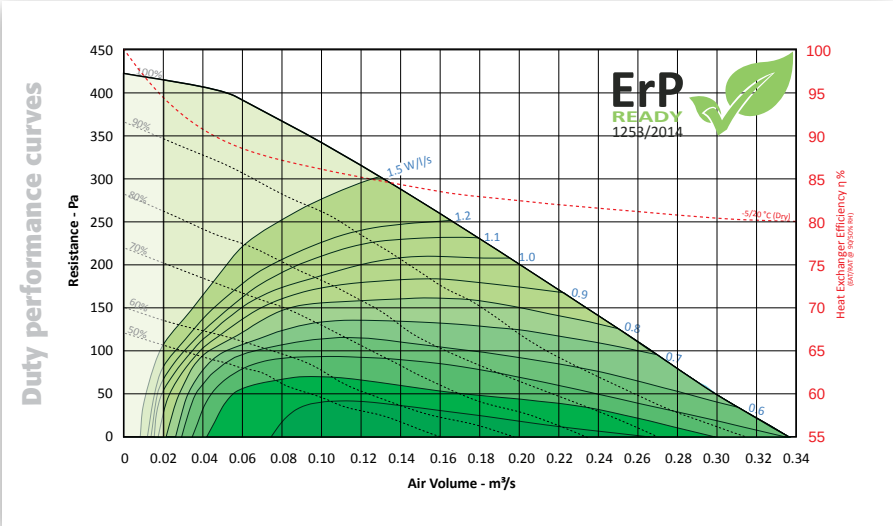
Unit EVCA-2

$$\text{SFP}_{\text{Watts/litres /second}} = \frac{\text{Electrical input power (Watts)}}{\text{Air volume flow rate (litres/second)}}$$

SFP value 1.42 W/l/s (0.28 m³/s @ 80 Pa), 1.30 W/l/s (0.31 m³/s @ 100 Pa).

Note: SFP figures quoted are for the unit (all fans running), based on a balanced airflow, and not single fans.

Note: SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007.



Performance

Size	Phase	Motor power kW	Voltage vac	Fan speed rpm	Motor full load current A	Speed control
EVCA-2	1	0.1	230	1410	0.83	EC

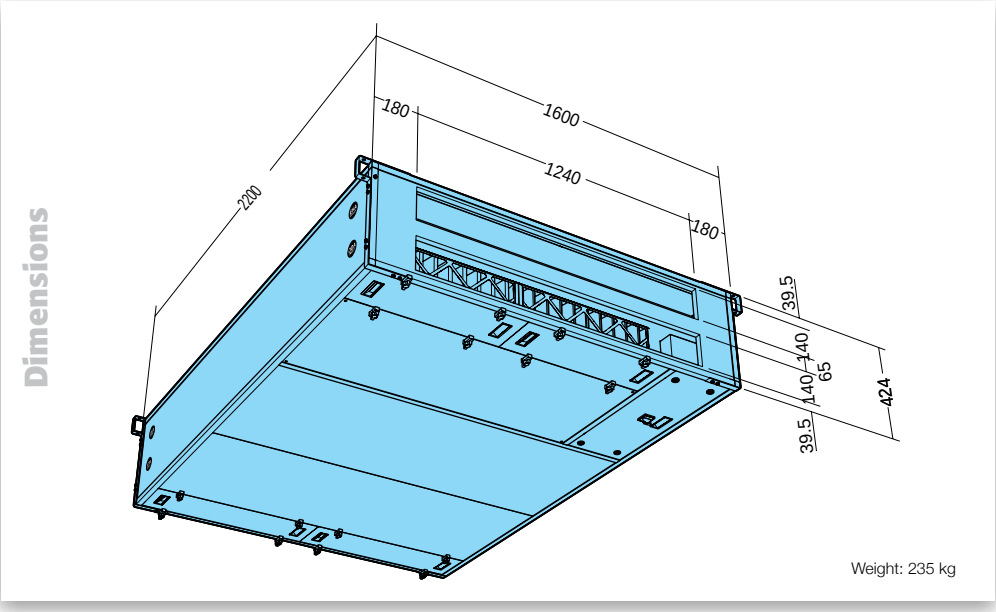
Note: Values are per fan - Unit EVCA-2 has 4 fans in total.

Installed noise data

Fan speed setting	Fan speed rpm	Sound spectrum L_p / dB re 20µPa SWL centre frequency Hz (measured @ 1.5m)								Casing radiated
		63	125	250	500	1k	2k	4k	8k	dBA @ 1.5 m
100%	1410	49	42	30	18	16	13	9	7	34

Note: Figures above are sound pressure levels measured at 1.5 m from source when unit is installed within suitable classroom bulkhead design. Airflow 0.28 m^3/s

Note: NR levels are dependent upon environmental conditions.
Tolerances: On flow rates: ±5% On acoustic power and pressure: Levels: ±3 dB By octave band: ±5 dB



Note: Data for design guidance only. For full details, outline drawings are available upon request.

Selection data

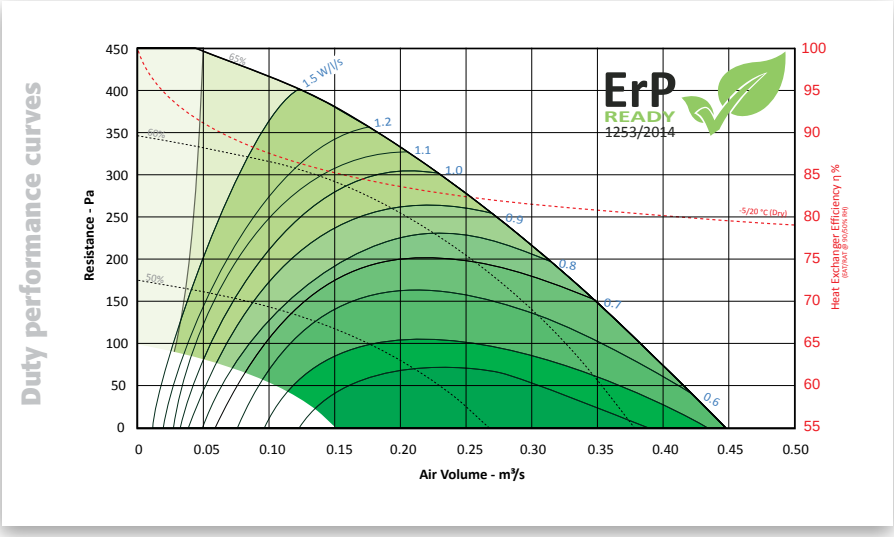
Unit EVCA-3

$$\text{SFP}_{\text{Watts/litres /second}} = \frac{\text{Electrical input power (Watts)}}{\text{Air volume flow rate (litres/second)}}$$

SFP value 1.26 W/l/s (0.385 m³/s @ 100 Pa).

Note: The SFP figures quoted are for the unit (all fans running), based on a balanced airflow, and not single fans.

Note: SFP figures quoted at voltages tested in accordance with BS EN ISO 5801:2008, BS 848-1:2007.



Performance

Size	Phase	Motor power kW	Voltage vac	Fan speed rpm	Motor full load current A	Speed control
EVCA-3	1	0.17	230	4240	1.65	EC

Note: Values are per fan - Unit EVCA-3 has 6 fans in total.

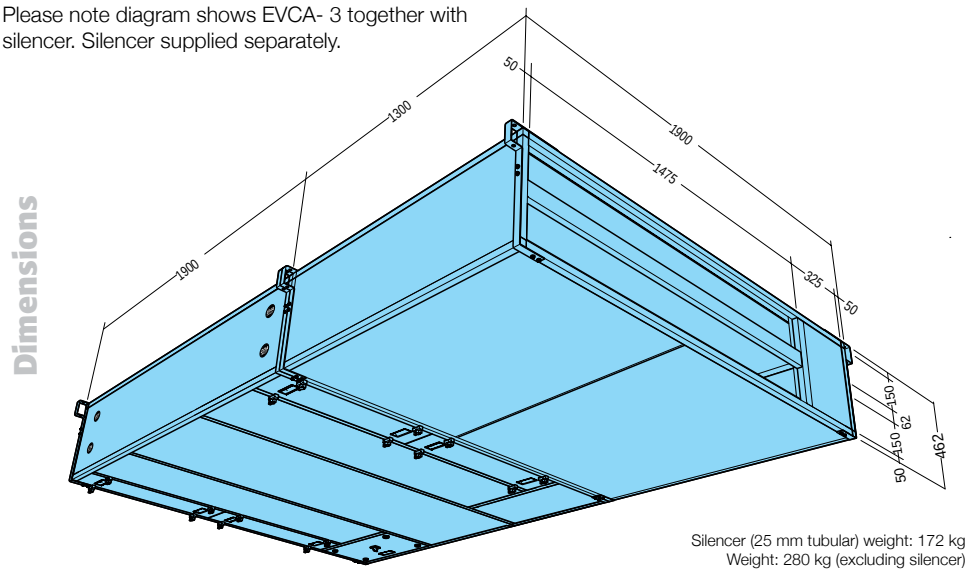
Installed noise data

Fan speed setting	Fan speed rpm	Sound spectrum L_p / dB re 20µPa SWL centre frequency Hz (measured @ 1.5m)								Casing radiated
		63	125	250	500	1k	2k	4k	8k	dBA@1.5 m
65%	2933	50	40	41	34	22	19	15	13	35

Note: Figures above are sound pressure levels measured at 1.5 m from source when unit is installed within suitable classroom bulkhead design. Airflow 0.385 m^3/s

Note: NR levels are dependent upon environmental conditions.
Tolerances: On flow rates: ±5% On acoustic power and pressure: Levels: ±3 dB By octave band: ±5 dB

Please note diagram shows EVCA- 3 together with silencer. Silencer supplied separately.



Silencer (25 mm tubular) weight: 172 kg
Weight: 280 kg (excluding silencer)

Note: Data for design guidance only. For full details, outline drawings are available upon request.

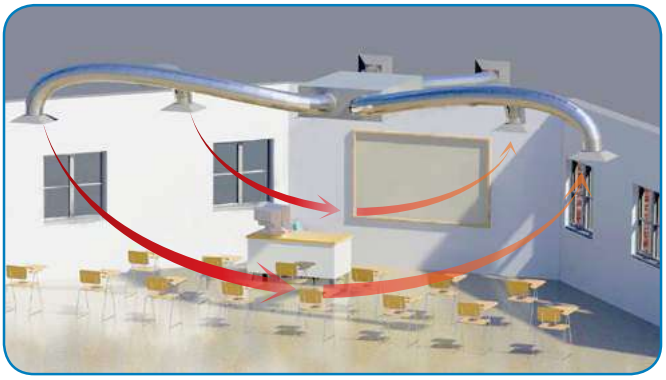
Classroom ventilation *Controls*

Controls and mixed mode operation

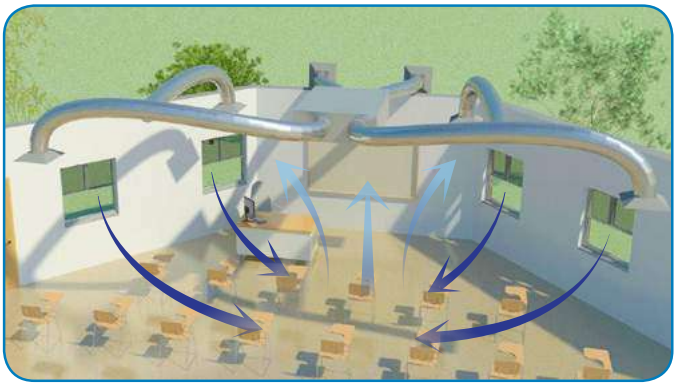
Controls are critical to ensure maximum functionality and efficiency. The philosophy is dependent on what type of ventilation strategy is employed. This can be natural, mechanical or mixed mode. Simple human interaction is not enough to satisfy legislation. Where possible, controls should support a mixed mode approach.

Mixed mode ventilation

This combines the benefits of mechanical and natural ventilation.

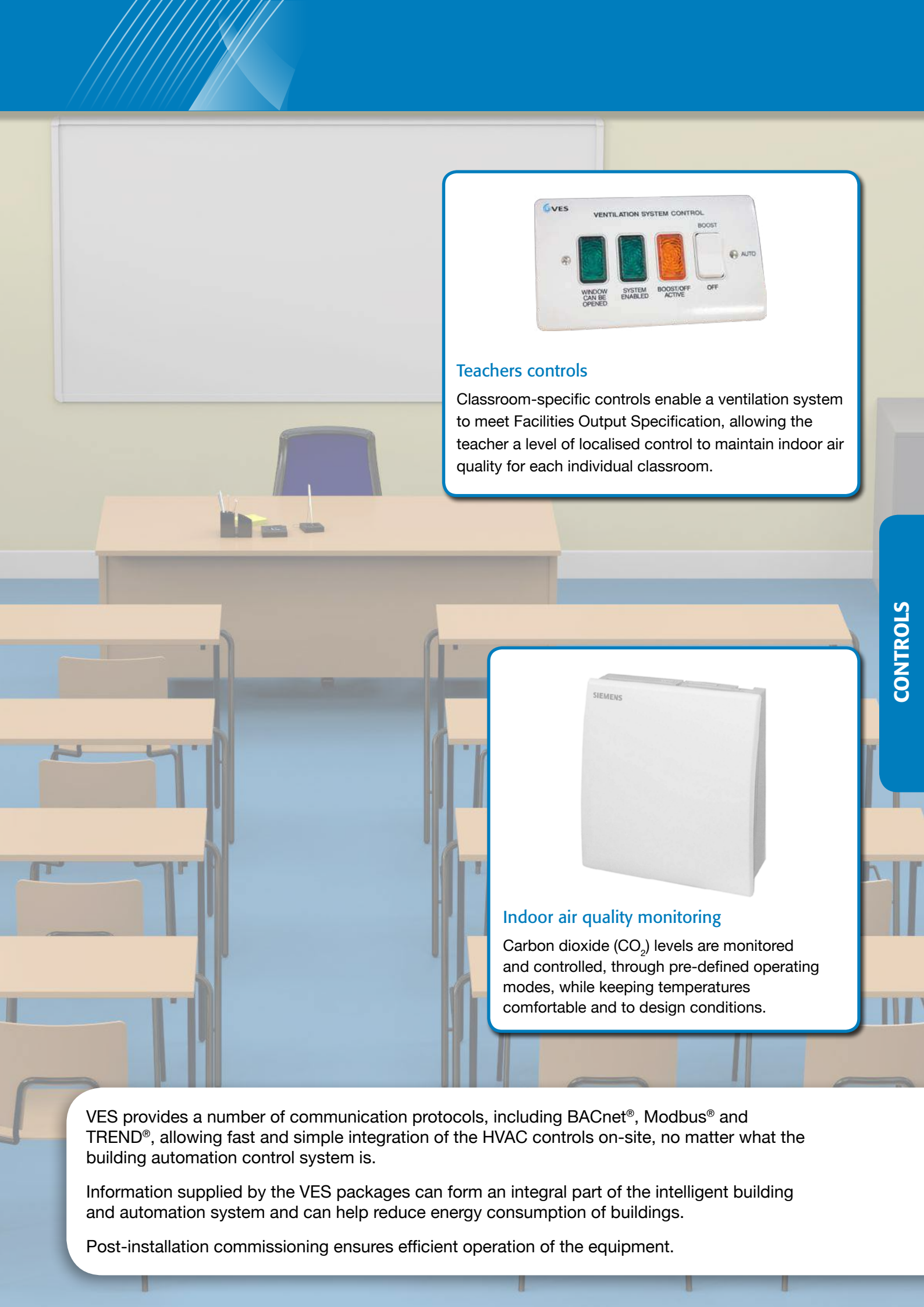


In cold weather conditions, the heat recovery unit maximizes heat recovery from the room, adding top up heating if required.



In warm weather conditions, fresh air cooling can be utilised by opening windows.

It is important that ventilation is controllable to maintain reasonable indoor air quality, and to avoid draughts and waste of energy. BB101,7.2.1



Teachers controls

Classroom-specific controls enable a ventilation system to meet Facilities Output Specification, allowing the teacher a level of localised control to maintain indoor air quality for each individual classroom.

Indoor air quality monitoring

Carbon dioxide (CO_2) levels are monitored and controlled, through pre-defined operating modes, while keeping temperatures comfortable and to design conditions.

CONTROLS

VES provides a number of communication protocols, including BACnet®, Modbus® and TREND®, allowing fast and simple integration of the HVAC controls on-site, no matter what the building automation control system is.

Information supplied by the VES packages can form an integral part of the intelligent building and automation system and can help reduce energy consumption of buildings.

Post-installation commissioning ensures efficient operation of the equipment.

Supply and extract fans

The **Colourfan Acoustic** range of small air handling ventilation units includes Supply, Extract and Twin Extract, designed around a single product platform, with unique and innovative benefits across the range.

Installation and maintenance is simplified through quick change plug connectors and plug and play or pre-wired fitted controls.

Toilet blocks in schools could typically be served by a **Colourfan Acoustic Extract** solution.

Roof extract units

The **Dome roof extract** range is designed around a single product platform, with unique and innovative benefits across the range. Installation and maintenance is simplified through quick change plug connectors and plug and play or pre-wired fitted controls. With energy efficient, ErP Lot 11 compliant fans and robust case construction, the low profile units are suitable for roofs and external locations.

Dome roof extract is the versatile solution for a range of applications, for example circulation spaces, like corridors.

High efficiency heat recovery for low occupancy areas

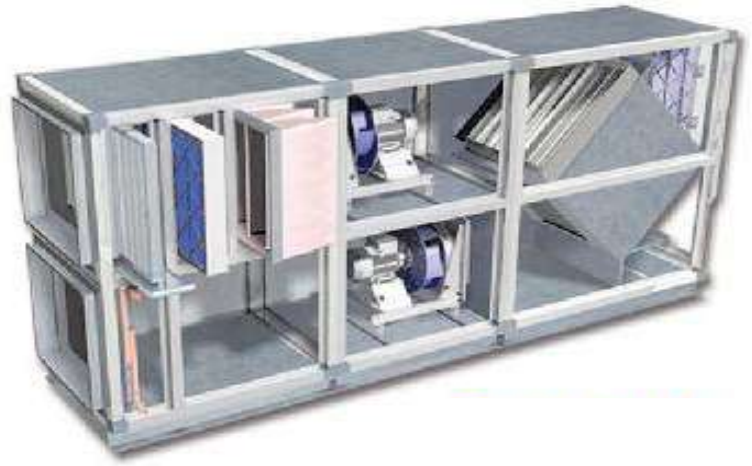
Combining extremely low power consumption and highly efficient heat exchangers, the **MVHR range** of compact heat recovery ventilation units is well-suited to low occupancy spaces like offices, photocopier rooms or small meeting rooms.

School *Kitchens*

Kitchen ventilation provides opportunities to save energy and reduce running costs. For sites where steam cooking predominates such as schools, it is possible to recover heat from the air extracted from a kitchen canopy.

Using a **Max Kitchen** heat recovery unit, extracted air is purged via two to three stages of filtration before being exhausted through a high efficiency plate heat exchanger. The high level of moisture in the extract air in addition to the high temperature ensures that supplementary heating in the supply air is unnecessary while cooking is taking place.

Ventilation systems account for **18%** of a kitchen's energy consumption, so extraction and filtration is naturally a major component for any operator with designs on developing a green kitchen to consider. - Carbon Trust



The filtration section is easy to maintain with side-withdrawal filters and drain pan, and the unit interior is constructed from flush panelled galvanised steel for ease of cleaning.

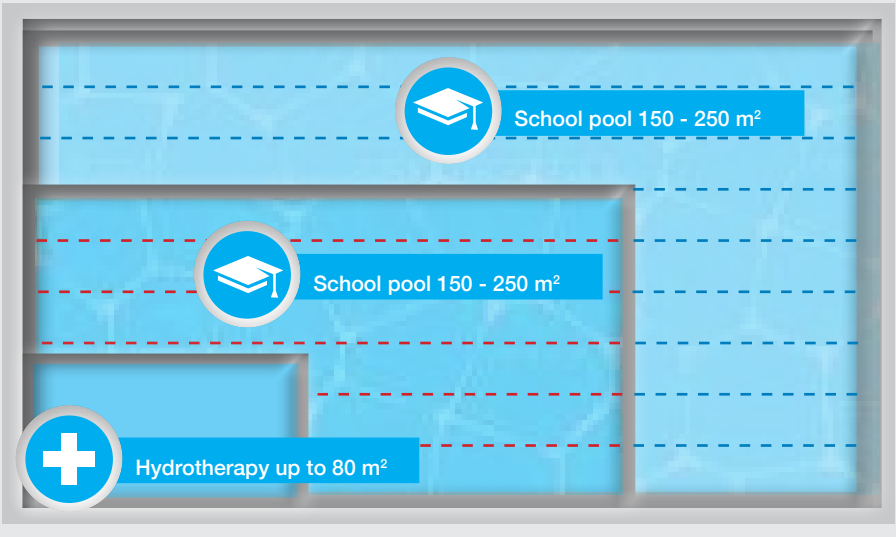
VES also offers a range of high temperature extract fan units, the **T-Line 120**.

School *Halls and pools*

For larger areas like sports, assembly or dining halls, **Max bespoke air handling units** provide a versatile, energy efficient solution.

- Compliant with ErP, L2 Building Regulations and FOS requirements
- Unlimited range of duties
- High efficiency heat recovery thermal wheel, plate heat exchanger or runaround coil heat exchanger
- Variety of cooling and heating options
- Low energy / high efficiency EC fans
- Low noise
- Plantroom or weatherproof units available

- Flat pack option where site access is difficult
- 25 mm or 50 mm double skinned case construction
- Comprehensive range of controls options



For schools with swimming pools, **VES Max Pool** air handling units are designed specifically to deal with this challenging environment.

Close control of humidity, temperature and air quality keeps the environment comfortable and minimises risks to the building fabric.

Regulations and guidelines

Facilities Output Specification (FOS)

Created by the Education Funding Agency (EFA) to provide a Generic Design Brief for all contractors wanting to tender for the Priority School Building Programme (PSBP).
Supported by School Specific Briefs and Area Data Sheets to set out clear guidance for building design.

Building Regulations for England and Wales

- Part E relates to the resistance to the passage of sound. Sub-section E4 relates specifically to acoustic conditions in schools and effectively incorporates BB93 in relation to schools
- Part F relates to the ventilation of occupied spaces
- Part L relates to the conservation of fuel and power

Note: Regulations in Scotland and Northern Ireland are different, however, the Regulations above are considered good practice in relation to schools.
Scotland: www.gov.scot/Topics/Built-Environment/Building/Building-standards
Northern Ireland: www.buildingcontrol-ni.com/regulations

BB101 - Ventilation of school buildings - EFA

Provides the regulatory framework in support of the Building Regulations for the adequate provision of ventilation in schools.

BB102 - Designing for disabled children and children with SEN - EFA

Sets out non-statutory guidance on planning and designing accommodation for new and existing schools in England – all of which will have at least some children or young people with SEN and disabilities.

BB93 - Acoustic design of schools - performance standards - EFA

Building Bulletin 93 (BB93) explains minimum performance standards for the acoustics of school buildings.

In addition, VES products comply with the requirements of the EU Ecodesign Directive.

Technical information

Information on the following pages is provided to assist in your initial system design and product selection.

For more detailed information or assistance, call 08448 15 60 60 or email sales@ves.co.uk.

Specification for control panels for heat recovery applications

The control system can be supplied fully integrated into a VES Ecovent air handling unit to reduce installation time and costs.

- Designed, manufactured and supported by VES engineers
- Default settings for “out of the box” operation and to minimise commissioning time
- Versatile interface and open protocol integration options
- Door isolator and easily identified field terminals to assist installation and maintenance
- Extensive parameter adjustment to optimise installation and further improve system efficiency
- Energy monitoring providing real time energy consumption and heat exchanger efficiency information

Features	
Fitted and pre-wired within Ecovent or traditional loose panel options	✓
Supply fan starter with speed control interlock	✓
Extract fan starter with speed control interlock	✓
Heat recovery damper modulation, free heating and cooling optimisation	✓
Mixing box or heatwheel modulation	O
Heating, modulating control	✓
Frost protection and heating demand output for water coils	✓
Temperature philosophy; supply, return or return + supply limits	✓
7 day time clock	✓
Demand ventilation; Air Quality, constant pressure or volume	✓
Filter dirty indication; inputs for DP switches	✓
Fan run-on and safety interlocks	✓
Remote start / stop via removable link	✓
Common trip indication	✓
Fire alarm shutdown, 24 VDC	✓
Inlet and return damper	✓
DX heat pump and cooling	O
User interface (HMI)	✓
Energy monitoring with real time display	O
Heat recovery efficiency with real time display	O
Integration by Modbus RS485 open protocol	O
Integration by BACnet/IP open protocol	O
Bespoke to suit requirement	O
BlueSense - Energy Saving Package	✓
Energy efficient speed control	✓
Demand Control	✓
Post installation Commissioning	O

O = Option

Noise levels and ventilation rates

Room type	Ambient noise level (Aeq, 30 min)	Airflow
Classroom (primary & secondary)	35dBA	3-8 l/s/person
Science laboratories	40dBA	10 l/s/person
Offices (ancillary spaces)	40dBA	10 l/s/person
Gymnasium	40dBA	8 l/s/person
Atria, circulation spaces	45dBA	1 l/s/m^2
Dining rooms	45dBA	8 l/s/person or 2.5ACH
Kitchen	50dBA	Refer to DW172
Swimming pool	50dBA	10 l/s/m^2 or 12 l/s/person
	Guidance from BB 93	*Guidance from BB 101*

Product code guide

Ecovent Counterflow

Product Code Breakdown						Case Construction				Options			
Product	HREC Type	Unit Size	Fan Type	Fan Size	Phase	Unit Config	Heating	Infill	Handing	Main Filter	Twin Extract Fans	Control Panel Section	Colour
EV	C	1	5	2	-1	/FP	[null]	/EE	/LT	/G4		/ISC	[null]
		2	4	3	-1		-E		/RT	/F7		/CPSC	/R7004
		2	6	2	-1		-W		/LB				
		3	6	2	-1				/RB				
		4	4	5	-1								
		4	4	6	-1								

Ecovent EVC-A

Product	HREC Type	Unit Size	Fan Type	Fan Size	Phase	Unit Config	Heating	Infill	Handing	Main Filter	Control Panel Section	Colour	Powder coat type	Special
EV	CA	1	7	3	-1	/FP	null	/DS	/LB	null	null	null	null	/S
		2	7	3	-1		-E		/RB	/G4	/CPSC	/R7004	/IT	
		3	5	2	-1		-W		/L				/BT	
									/R					

HREC Type
X Crossflow
C Counterflow

Unit Config
/FP Flat Plantroom
/FW Flat Weatherproof
/SP Stacked Plantroom
/SW Stacked Weatherproof

Main Heating
[null]
- E Electric
- W Water

Infill
Size 1-5 DS (25 mm)
Size 6-8 EE (50 mm)
EE (50 mm)

Handing
Flat Plantroom / Flat Weatherproof*
/LT Left Top
/RT Right Top
/LB Left Bottom
/RB Right Bottom

Stacked Plantroom / Stacked Weatherproof
/L Left
/R Right

*Top access only

Main Filter
/G4
/F7

Twin Extract
[null]
TF

Control Panel
/I Isolator only
/CPSC Control Panel and built in Speed Controller

Colour
[null] Galvanised or standard WP
R RAL colours

VES offers a wide range of product types

- *Heat recovery*
- *Supply units*
- *Extract and twin fans*
- *Axial fans*
- *Roof units*
- *Wall and ceiling fans*
- *Controls*
- *Heater batteries*
- *Customised units*

VES offers numerous services including

- *Assistance with design and layout of ventilation systems*
- *Energy saving upgrades*
- *Flatpack supply and installation service where space is limited*
- *Refurbishment of existing equipment*
- *Evaluate energy savings available and offer a costed dilapidation report*
- *Noise reduction and air quality improvement for existing systems*
- *Site surveys*
- *Controls design and installation*
- *Commissioning and post installation service*
- *Maintenance and spares*

Applications

- *Pools and leisure centres*
- *Kitchens*
- *Hospitals*
- *Data centres*
- *Kitchen ventilation*
- *Retail*
- *Offices*
- *Education sector*

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