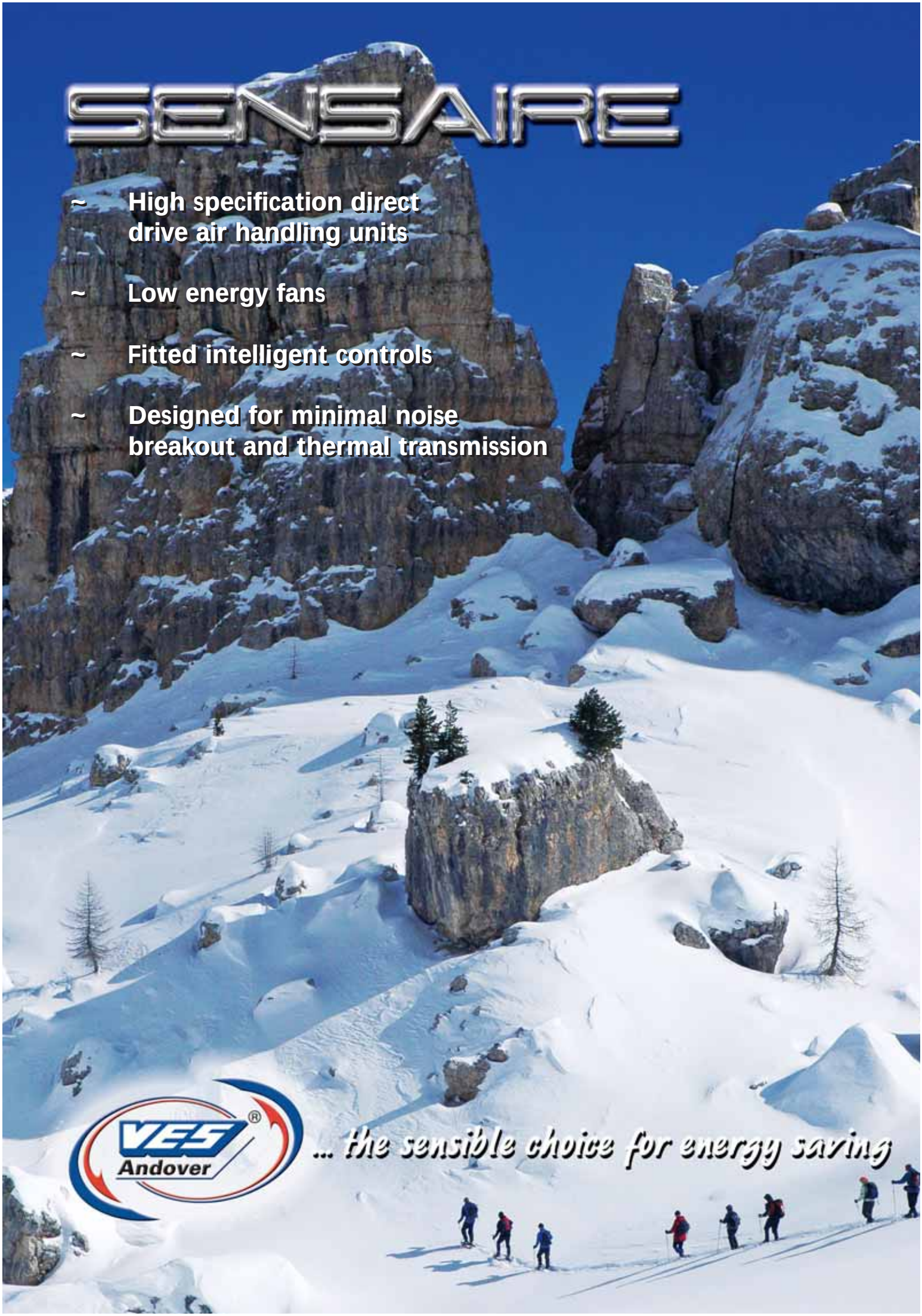
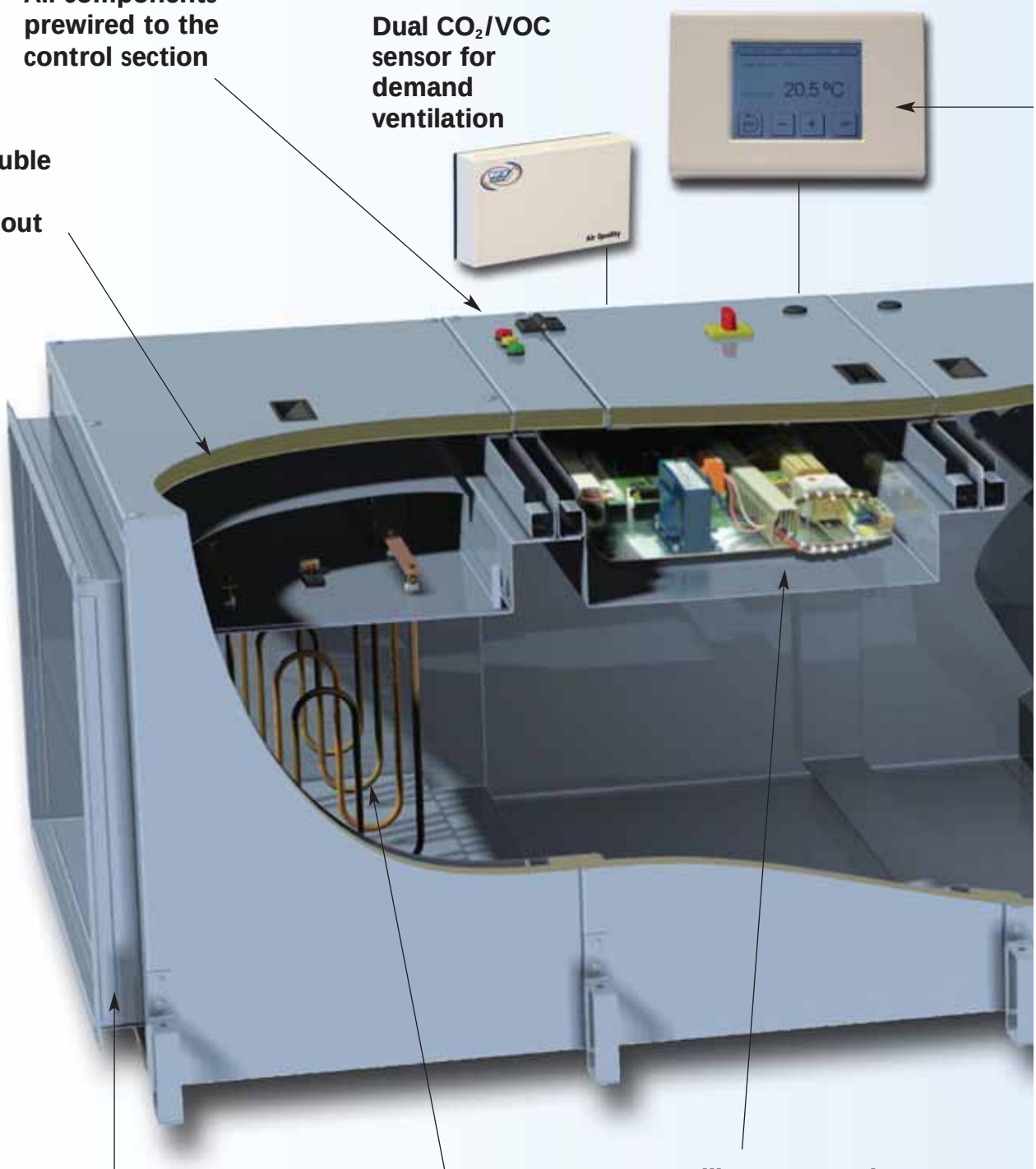

SENSAIRE
~ High specification direct drive air handling units
~ Low energy fans
~ Fitted intelligent controls
~ Designed for minimal noise breakout and thermal transmission
VES Andover
... the sensible choice for energy saving

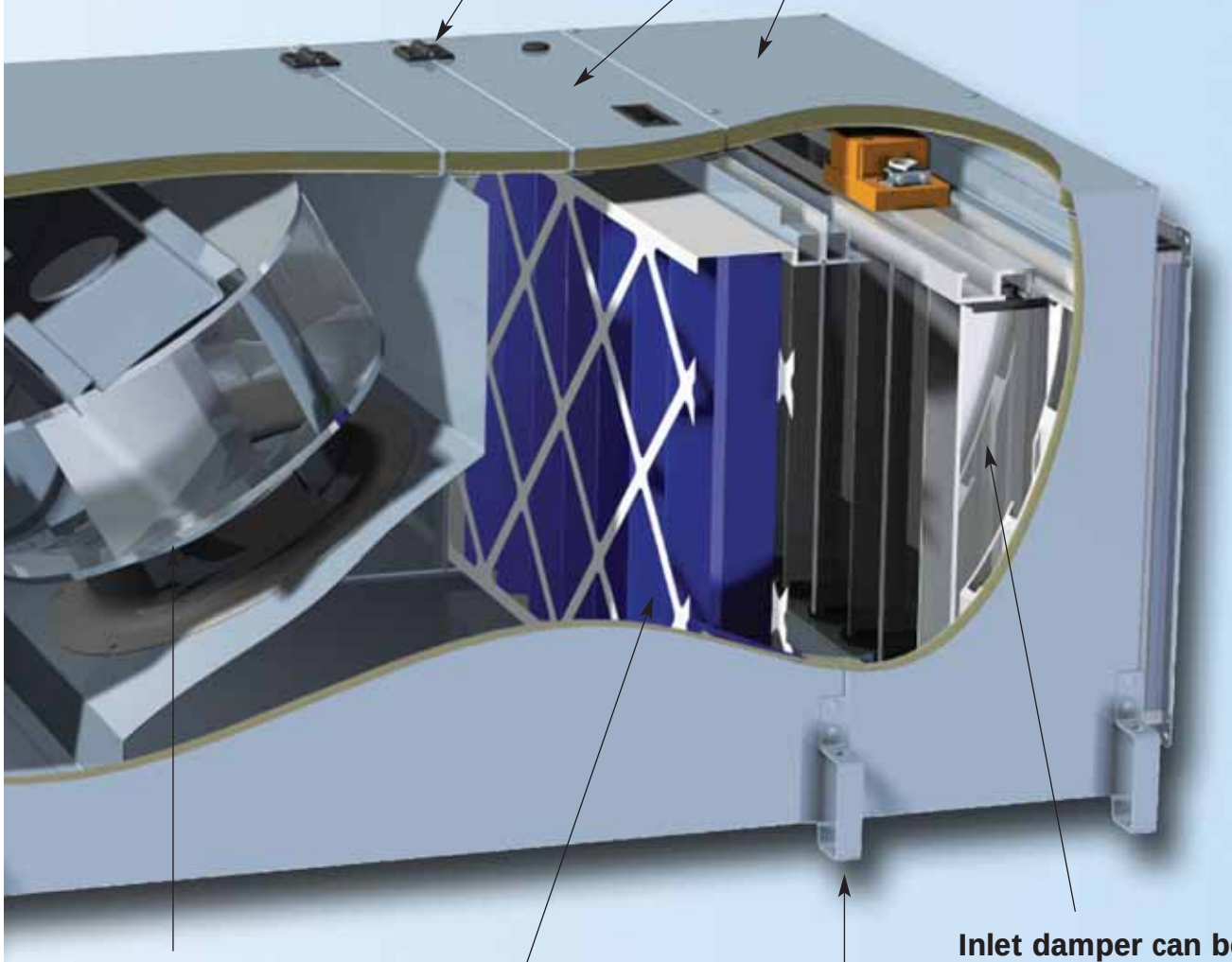
Air Handling Units ~ Features



Unit functions are programmed on easy to use touch screen remote controller

Access sections have hinged doors with quick release fasteners

Case built up from separate sections, these lock together providing a completely sealed unit with low noise and thermal leakage.
Units can be delivered in sections for easy assembly on site



Powerful, lower energy fans, fully vibration isolated within case

Standard filter is pleated type grade G4. Additional filters up to grade F8 can be supplied

Mounting feet suitable for base location or drop rod support

Inlet damper can be hand operated or motorised

Sensaire ~ packed with all the features you need

Air Handling Units

Sensaire energy saving air handlers and extract fans have been designed to assist the designer of ventilation systems in meeting the requirements of Part L or the Building Regulations, and in particular, sub-section L2(a) and (b). The Specific Fan Power (SFP) is detailed for all units.

How?

- By fitting intelligent close controls for minimal energy use.
- By using the best fans available in the world today - backward curved with external rotor motors. These use as little as half the energy of conventional direct driven fans.
- By providing an airtight double skinned case for minimal noise and heat leakage. Heavy weight case infill available for noise critical applications.

Components available:

Mixing box

Inlet damper

Panel filter G4

High efficiency pleated filters

Fan section

Cooling coil - chilled water or DX, plus heat pump

Electric heater

Hot water heater

Fitted silencer

Where there are site restrictions VES can provide matching bend sections and other bespoke parts for a tailored solution to meet design requirements.

Note: hinged access panels can be removed completely if necessary.

Quick Fit assembly

The outlet spigot on each section fits into the next section, and the units are bolted together on the inside. The end spigots are fitted with a 20mm Mez flange for connection to ductwork. Flexible connectors are not necessary.

Control system

Designed to minimise energy use, be easy to install and operate.
Built-in controls mean the unit is fully prewired and tested before despatch.
There will be far less site wiring required.

The touch screen remote controller allows adjustment and monitoring of temperature and time clock. Many other functions available, and because they are all programmed into the system, no special design work is necessary at VES at production stage.

- Intelligent start up - the unit monitors the start up time over a period of time and automatically adjusts start time each day to meet room temperature requirements.
- Electric heating in up to 9 steps of control.
- Fully modulating hot water heating with frost protection.
- DX or chilled water cooling control.
- Extract fan control; the fan motor will require wiring across to the control panel on site.
- Fan speed controller - these will be supplied loose or fitted to the top, bottom or side of unit as required and prewired into the control system.
- 3-way mixing box damper control.
- Trickle vent control.
- Service interval reminder.
- On screen alarm advising fault.
- Up to 3 temperature sensors will be supplied depending on features required. Each sensor supplied with 10 metres of cable.
- If fitted controls supplied, the airflow pressure switch, plus in the case of electric heating, two high temperature safety cutouts, will be fitted and prewired.

Controls have hinged access with isolator and status lights.

Typical touch screen displays are easy to programme.

AQ sensor

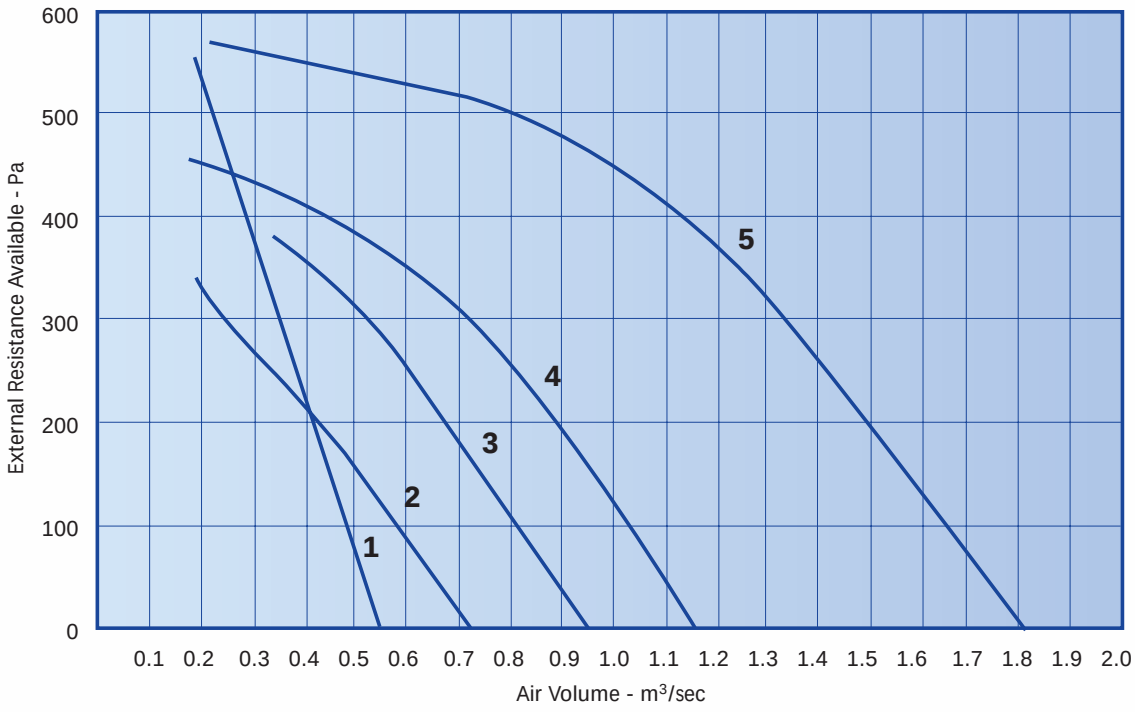
Demand Ventilation

The AQ Sensor measures both CO_2 and VOC (volatile organic compounds), and provides an output signal to adjust the air volume and other functions. This 'demand ventilation' can provide energy savings of up to 50%.

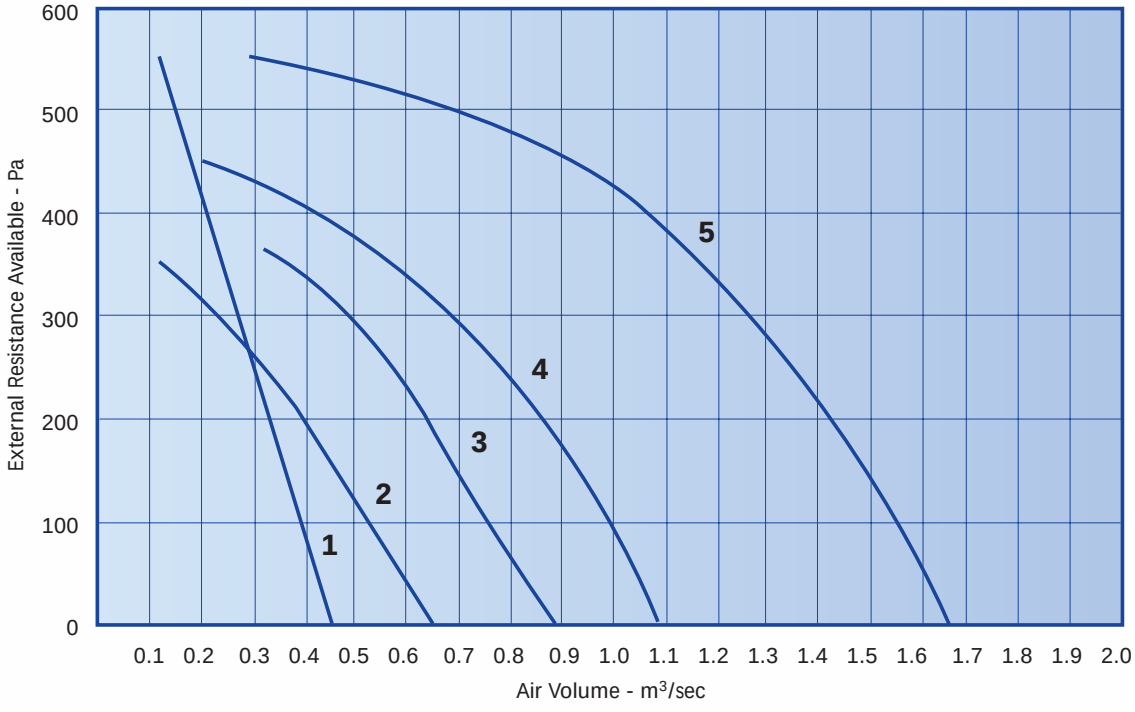
The AQ unit has some desirable features:

- Adjustment of the weighting between 100% CO_2 and 100% VOC, and proportions in between, i.e. 25/75, 50/50 etc. VOC weighting should be used for environments with odours such as smoking, cooking, toilets, garage exhaust fumes etc. CO_2 weighting should be used where people occupancy varies, i.e. shops, offices, sports clubs etc. Default setting 50/50%.
- Normal range of operation for CO_2 450 - 1250 ppm, the defined range from clean fresh air to unpleasant air. This band width can be reduced if required for a faster response.
- The AQ unit sends a 0-10 volt signal direct to the fan speed controller. For 1 phase fans this is the MS 10 controller, for 3 phase fans to the inverter.
- The AQ sensor is suitable for room location model AQ-R, and duct mounting using model AQ-D.
- The AQ unit has further advanced adjustments available for specialised environments.

Units with G4 panel filter and electric heater



Units with G4 panel filter and hot water heater

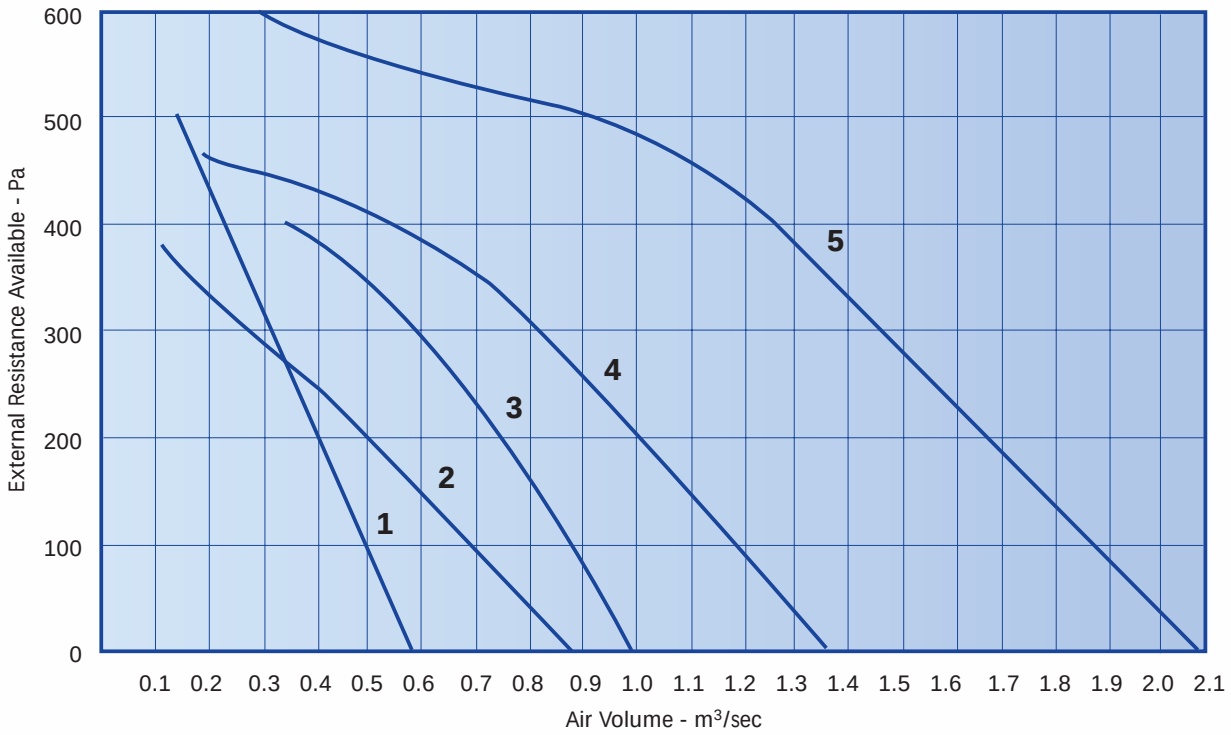


Notes:

Add to your external resistance the air pressure drop of any extra components you require -

- Electric frost heaters have negligible resistance to airflow.
- Hot water frost coil will not exceed 20Pa - see page 11.
- Silencer resistances - see page 15.
- High efficiency filters - see page 13.
- Cooling coil resistances - see page 12.

Extract fan unit



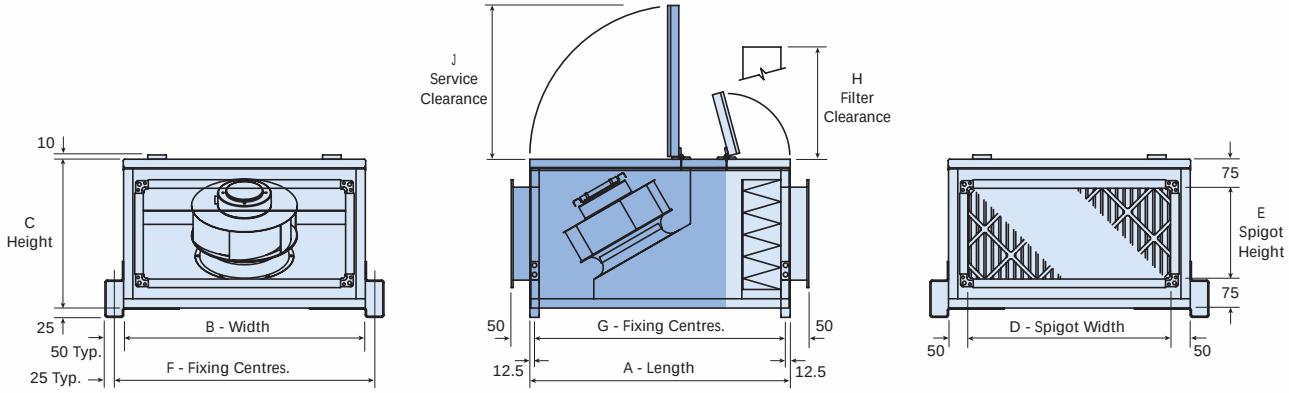
Specific Fan Power (SFP) watts/litre/second

	230 volt 1 Phase					400 volt 3 Phase			
m³/sec	Size 1	Size 2	Size 3	Size 4	Size 5	Size 2	Size 3	Size 4	Size 5
0.1						1.28			
0.2	2.35	1.62				1.01			
0.3	1.59	1.10	1.48	2.05		0.70	1.15	1.66	
0.4	1.24	0.97	1.18	1.62		0.51	0.89	1.23	1.72
0.5	1.05	0.80	1.00	1.36	2.20	0.41	0.75	1.00	1.50
0.6		0.66	0.87	1.19	1.96	0.35	0.63	0.88	1.33
0.7		0.55	0.73	1.05	1.75	0.27	0.55	0.78	1.18
0.8		0.46	0.62	0.94	1.58	0.25	0.47	0.70	1.05
0.9			0.52	0.83	1.40		0.40	0.62	0.97
1.0			0.43	0.72	1.33		0.34	0.54	0.89
1.1				0.62	1.20			0.48	0.80
1.2				0.56	1.14			0.42	0.74
1.3				0.50	1.03			0.39	0.69
1.4					0.95				0.65
1.5					0.87				0.57
1.6					0.78				0.51
1.7					0.71				0.47
1.8					0.65				0.43
1.9					0.59				0.36
2.0					0.51				0.34

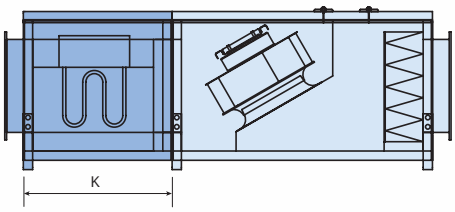
Component Selection and Dimensions

The spigot on the end of each section either locates into the next section, or is fitted with a Mez flange for ductwork connection.

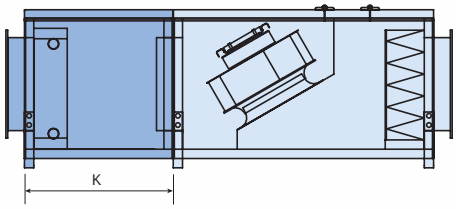
The fan section has space for a filter or damper.



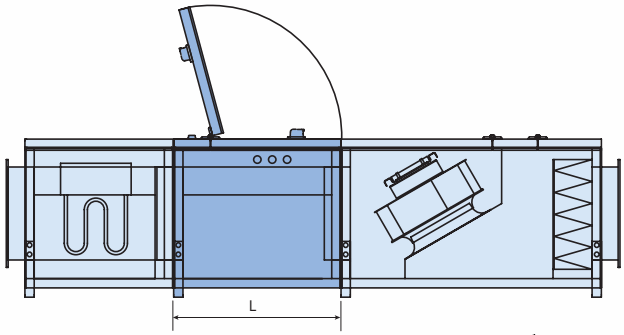
Add an electric heater



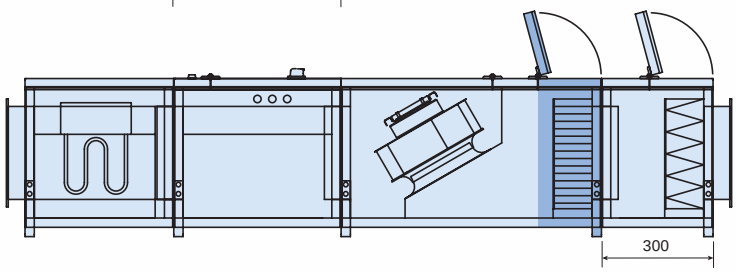
Or hot water heater



A fitted control panel is fully prewired to the other components within the unit.



Add a high efficiency filter, F5, F6, F7, F8. These can be fitted immediately before the fan, with an additional filter section added to house the G4 prefilter.



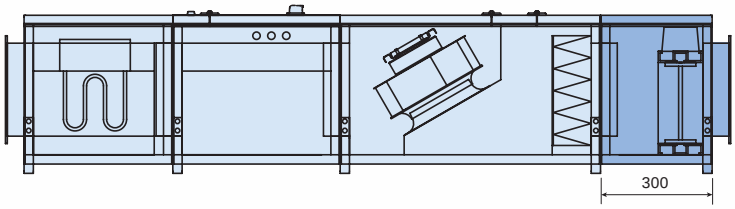
Dimensions

Sensaire Model	All dimensions in mm													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
1	700	650	400	550	250	700	675	305	415	500	450	550	250	700
2	850	700	500	600	350	750	825	405	565	525	450	600	350	750
3	850	750	550	650	400	800	825	450	565	550	450	650	400	800
4	900	850	600	750	450	900	875	495	565	550	550	750	450	900
5	1000	950	700	850	550	1000	975	595	665	600	550	850	550	1000

For guidance: fixing centres of feet are 12.5mm from end of section.

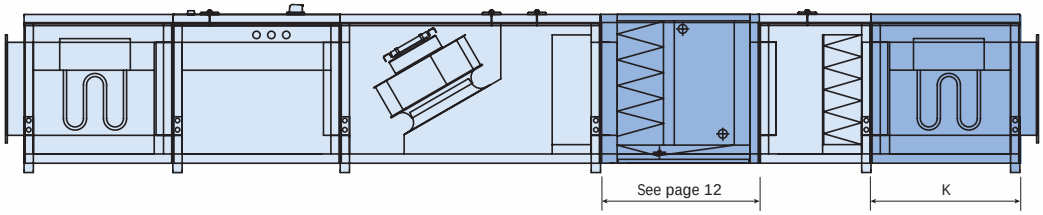
Component Selection and Weights

An inlet damper can be supplied for motorised or hand operation.
The motor can be supplied fitted as part of the controls package.

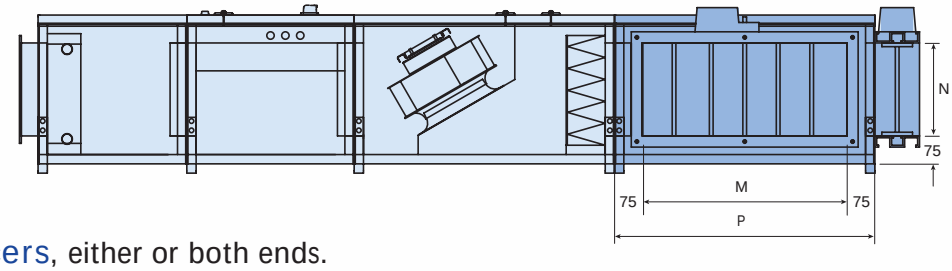


A preheater may be required as frost protection before filter or cooling coil. This can be electric or a hot water coil.

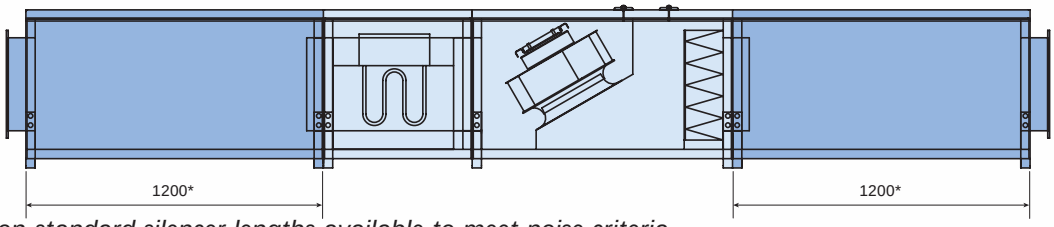
Cooling coil section: it may be necessary to go to a larger unit due to face velocity restrictions and high air pressure drop through coil. The section length is determined by the coil duty. More details page 12.



A mixing box can be supplied with dampers to sides, top, bottom or end as required.



Add silencers, either or both ends.



**Non-standard silencer lengths available to meet noise criteria.*

Section Weights

Sensaire Model	Fan Only	Fan & Filter	Electric Heater	Water Heater	Control Panel	Pre-filter	Inlet Damper	Cooling Coil	Mixing Box	Standard Silencer
1	45	46	29	24	30	23	23	22	33	55
2	54	55	37	29	32	27	27	22	38	62
3	56	57	38	31	33	28	28	24	40	71
4	64	65	46	37	45	33	33	39	47	78
5	120	121	78	61	58	55	56	48	80	94

For heavy weight infill in the double skinned case add 33% to above weights.

Electric Heaters

To calculate the size of heater output required:

Air Volume	x	Constant	x	Temperature Rise	=	Heat Output
m^3/sec	x	1.21	x	△T°C	=	kW

The maximum size of electric heater each unit can accommodate is as follows:

SNS 1 . . . . . 12.0 kW
SNS 2 . . . . . 18.0 kW
SNS 3 . . . . . 27.0 kW
SNS 4 . . . . . 36.0 kW
SNS 5 . . . . . 54.0 kW

Safety features

In the event of airflow failure or restricted airflow the electric heater must shut down. VES strongly recommend that an airflow pressure switch is fitted with probes each side of the fan, plus a high temperature cutout within the unit set at 70°C, and the standard high temperature cutout within the electric heater rated at 130°C.

If the controls package is specified all these will be wired in series providing complete safety of operation.

Fan run on timers should always be incorporated into the control system where electric heaters are used.

Electric heater sizes and steps

The following EHB sizes are those available for use with the standard fitted control panels. Other kW outputs and steps are available for remote control panels.

Size 1

kW Rating	230 volt single phase steps				
	2	3	4	5	6
3.0	✔	✔			
4.5	✔	✔			
6.0	✔	✔	✔		✔
7.5		✔		✔	✔
9.0		✔	✔		✔
12.0			✔		✔

Size 2

kW Rating	230 volt single phase steps					415 volt 3 phase steps (star)	
	2	3	4	5	6	2	3
6.0	✔	✔	✔		✔	✔	
9.0		✔	✔		✔	✔	✔
12.0			✔		✔	✔	✔
15.0				✔	✔	✔	✔
18.0					✔	✔	✔

Sizes 3, 4 and 5

Unit Size	kW Rating	230 volt single phase steps								415 volt 3 phase steps (star)				
		2	3	4	5	6	7	8	9	2	3	4	5	6
3,4 & 5	6.0	✔	✔	✔		✔				✔				
	9.0		✔	✔		✔				✔	✔			
	12.0			✔		✔				✔	✔			
	15.0				✔	✔				✔	✔			
	18.0					✔				✔	✔			
	21.0						✔				✔			
	24.0							✔		✔	✔	✔		
	27.0								✔		✔	✔		
4 & 5	30.0											✔	✔	✔
	36.0											✔		✔
5	45.0											✔	✔	✔
	54.0											✔		✔

It is possible to have a 3 phase fan with the electric heater having 1 phase steps spread over the 3 phases.

Performance Data
Based on EAT -5°C
Low pressure hot water LPHW 82 / 71°C
VES Technical Department can advise coil data for other conditions

Model	Air Volume m³/sec	Maximum Leaving Air Temp °C	Maximum kW Output	Water Flow Rate l/sec	Water Pressure Drop KPa
1	0.10 0.20 0.30 0.40	40 40 37 32	5.50 10.8 14.0 17.9	0.12 0.24 0.32 0.40	2 4 6 8
2	0.30 0.40 0.50 0.60 0.70	40 38 35 33 30	16.3 20.6 24.5 27.0 29.4	0.37 0.47 0.55 0.61 0.66	3 4 5 6 7
3	0.50 0.60 0.70 0.80 0.90	37 34 31 29 27	25.0 27.5 30.0 32.5 35.0	0.56 0.61 0.67 0.72 0.77	6 7 8 9 10
4	0.80 0.90 1.00 1.10 1.20	33 32 30 29 28	37.0 39.5 42.0 44.5 47.0	0.82 0.88 0.94 1.00 1.05	10 11 12 14 15
5	0.80 1.00 1.20 1.40 1.60	38 34 32 30 28	41.0 47.0 53.0 58.0 63.0	0.90 1.05 1.20 1.30 1.40	5 6 8 9 10

The above coils consist of two rows of copper tubes mechanically bonded into plate type aluminium fins. The headers and return bends are also copper, terminating in standard BSP connections. Air vent and drain fitted outside of unit.

Coil Connection Sizes:	
Model	
1	**¾" BSP**
2	**1" BSP**
3	**1" BSP**
4	**1" BSP**
5	**1" BSP**

Frost Heater

Frost preheater coil will have two rows of tubes with aluminium fins spaced at 6.35mm (4 per inch). This will provide a minimum 10°C air temperature rise, i.e. -5°C to +5°C. For design purposes allow an air pressure drop of 20 Pa and coil water pressure drop of 10 kPa. The VES sales office will confirm exact figures for duty required.

VES can supply the control valve and actuator to match the coil duty.

Cooling Coils

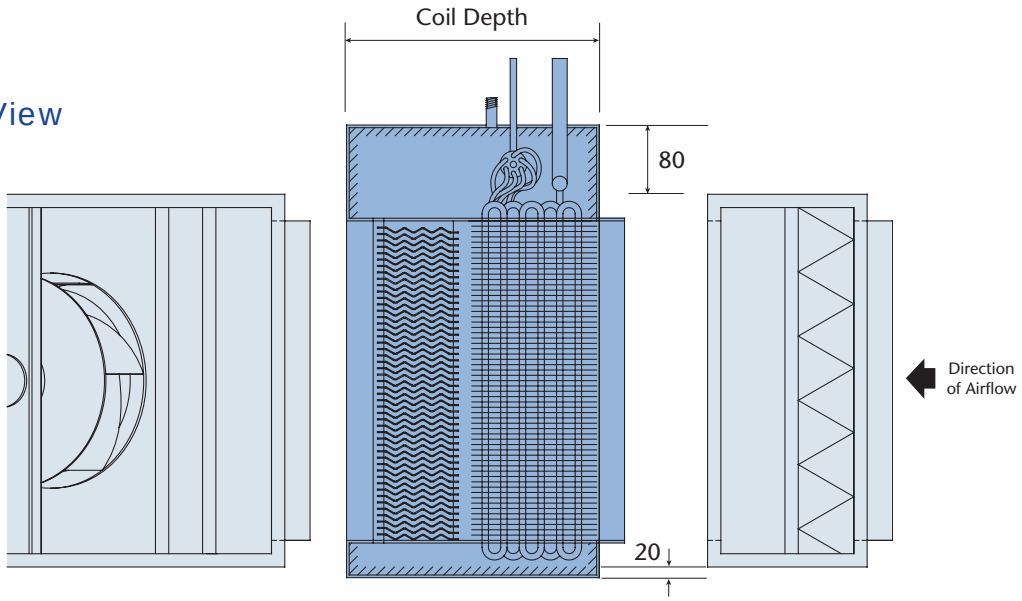
Cooling coils will be selected to meet the required duty.
DX and chilled water coils are available.
The limiting factor is the resistance to airflow produced by the coil and moisture eliminator. It is sometimes necessary to go to the next size Sensaire unit to reduce the face velocity and achieve the cooling duty required.

For DX coils a matching Vecon condensing unit is available. Refer to Vecon leaflet or website.

All VES cooling coils have **fully boxed and insulated cases**, with **moisture eliminators** fitted as standard. Coil block has 1/2" copper tubes and aluminium fins. The drain pan will require trapping to the drain line, trapping details available on request.

To maximise the coil face area, the cooling coil will be the same height as the standard Sensaire unit, but wider, to accommodate the coil headers and return bends.

Plan View



Sensaire Model	Face Size W x H	Face Area m²	Suggested max air volume m³/sec
1	550 x 254	0.14	0.30
2	600 x 350	0.21	0.50
3	650 x 410	0.27	0.60
4	750 x 444	0.33	0.80
5	850 x 550	0.47	1.20

DX coils can also be supplied for **inverter driven condensing unit,** and for **heat pump** operation. The fitted control section would be longer than standard, or some of the controls fitted on the side of the unit. Matching heat pump and inverter condensers can be supplied. NB: A heat pump coil must have a preheater.

The following selections have been based on an entering air temperature of 29°C db, 20°C wb, with R407C evaporating at 5°C.

Sensaire Model	Coil LAT°C db / wb	Duty kW	Resistance Pa	Refrigeration Sections	Coil Depth mm	Coil wt kgs	Matching Vecon Condenser
1	15.0 / 13.5	7.0	59	1	540	22	H 24 / C-1
2	16.5 / 14.5	10.0	62	1	500	22	H 36 / C-1
3	16.5 / 14.5	12.0	64	1	500	24	H 48 / C-3
4	17.0 / 15.0	14.8	56	2	500	28	2no. H 24 / C-1
4	14.5 / 13.3	19.3	82	2	540	39	2no. H 36 / C-1
5	16.0 / 14.3	25.2	85	2	540	42	2no. H 48 / C-3
5	14.0 / 12.8	30.8	97	2	580	48	2no. H 65 / C-3

High Efficiency Pleated Filters

- **Grade F5 - F6 - F7 - F8**
- **All sections 300mm long in direction of airflow.**
- **Top or bottom access.**
- **Resistance stated is for clean filter.**

Sensaire Unit	Air Volume m^3/sec	Resistance to airflow - Pa			
		F5	F6	F7	F8
1	0.15	25	40	40	50
	0.25	55	65	65	100
	0.35	90	100	100	160
2	0.30	35	50	50	65
	0.40	60	70	70	110
	0.50	75	85	85	135
3	0.40	40	60	60	80
	0.50	60	70	70	110
	0.60	70	80	80	130
4	0.50	40	60	60	80
	0.60	50	70	70	95
	0.70	60	80	80	120
	0.80	75	90	90	140
5	0.80	50	65	65	85
	1.00	60	85	85	125
	1.20	80	95	95	140
	1.40	100	110	110	175

Specification Details

Quality Standards VES are members of the British Standards Institution, operating a quality management system in accordance with BS EN ISO 9001, certificate no Q5375. All units tested to BS 848 Part 1.

Case Double skinned construction throughout, from galvanised sheet steel with mineral fibre slab infill. Mez flanges fitted to end spigots. Suitable for top or bottom access, requirement to be advised at time of order. Access panels are hinged and have quick release quarter turn fasteners. The mounting brackets are suitable for fixing down to a base or hanging with drop rods.

Fans Vibration isolated backward curved single inlet impellor with external rotor motor. All units available with 230 volt 1 phase or 400 volt 3 phase motors, except Unit 1 which is only available 1 phase. DC motors are also available. The motors are IP54 rated, class F insulation, and have high temperature thermal cutout protection wired into control system.

Controls The fitted controls are fully prewired to the internal electrical components, the remote controller is wired on site by others. Separate controls are also available, refer to the Powerstation controls leaflet for options available.

Fan Speed Control The 3 phase fans can be speed controlled using an inverter with a remote pot controller, or trickle vent mode from control panel signal. The 1 phase fans can all be speed controlled using a matching transformer speed controller. Note that transformer speed control provides the best reduction in noise when compared with any other type of speed controller used on AC fans. They also provide proportional energy saving as the fan speed is reduced. When the AQ air quality sensor is used for demand ventilation, this will drive an MS 10 single phase fan speed controller, and an inverter for three phase fans.

Dampers Inlet and mixing box dampers have aerofoil section blades with rubber edge seals, and can be supplied with 230 volt or 24 volt actuators if required, or suitable for hand operation.

Filters The standard G4 panel filter is pleated synthetic type. The high efficiency filters are close pleated glassfibre sealed into a frame.

Noise Levels

Sensaire Noise Data

Sensaire Model	Sound Power Level Spectrum dB re 10^{-12}w PWL							
	Centre Frequency - Hz							
	63	125	250	500	1k	2k	4k	8k
1	67	66	76	75	71	64	58	53
2	59	69	64	59	54	49	45	39
3	64	74	69	64	59	54	50	44
4	75	78	77	71	65	62	60	59
5	69	79	80	69	67	62	59	57

Note: The above figures are for 1 phase units which are slightly noisier than 3 phase fans.

Noise Breakout

Sensaire Model	Distance from unit - metres	Sound Pressure Level - dB									
		NR level	dBA	Centre Frequency - Hz							
				63	125	250	500	1k	2k	4k	8k
1	1	45	47	34	41	46	44	43	39	31	21
	3	40	42	30	39	41	39	39	36	26	20
2	1	35	36	28	42	35	31	30	30	30	23
	3	30	32	24	39	31	26	24	24	24	20
3	1	40	41	33	47	40	36	35	35	35	28
	3	35	37	29	44	36	31	29	29	29	23
4	1	45	49	43	52	48	42	40	42	40	38
	3	40	43	39	48	44	37	34	36	34	34
5	1	45	48	37	53	51	40	42	42	39	37
	3	40	44	33	49	47	35	36	36	33	32

NB: Noise breakout can be further reduced if heavy weight infill is fitted within the double skinned case.

The following items should be considered to ensure a successful installation:

- If possible locate plant away from occupied areas.
- If the unit is to be located in a ceiling void above occupied areas, consider oversizing the unit and running the fan at reduced speed. For a 25% reduction the noise produced is typically 8dB lower, and at half speed 15dB lower.
- Room side silencers are usually necessary to achieve the required NR level within the conditioned space.
- Undersized ducting and grilles generate noise.
- Check the distance from wall or roof terminals to nearby properties and fit atmosphere side silencers if necessary.
- Acoustic problems are best dealt with at design stage. Once installation is complete they are expensive and time consuming to put right.

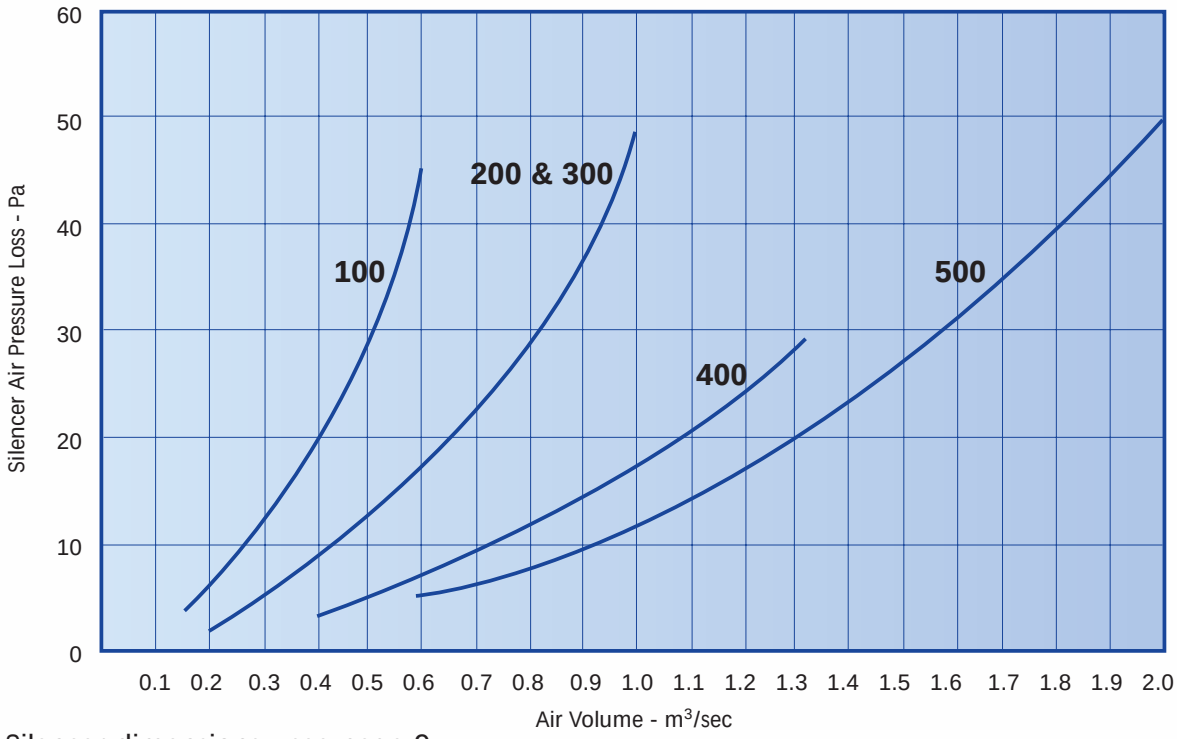
VES engineers can assist you with advice and calculations to ensure the required noise criteria is met.

Sensaire Standard Silencer Attenuation
Insertion Loss - dB

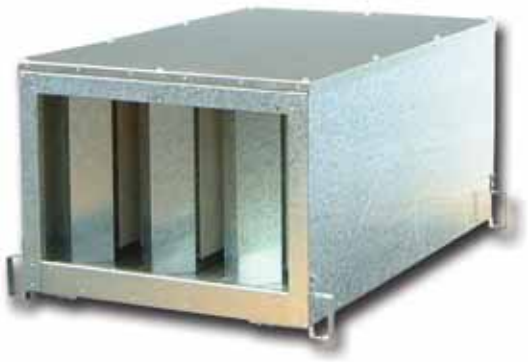
Sensaire Model	Silencer Model	Centre Frequency - Hz							
		63	125	250	500	1k	2k	4k	8k
1	SNS VA100	6	11	19	33	43	43	35	29
2	SNS VA200	5	8	15	28	35	35	25	17
3	SNS VA300	5	10	18	32	42	42	34	28
4	SNS VA400	5	8	15	28	35	35	25	17
5	SNS VA500	5	9	16	30	37	37	27	19

Non-standard silencers available for special requirements.

Silencer Air Pressure Loss



Silencer dimensions - see page 9.



SENSAIRE Electrical Details

230 volt 1 phase fans

Sensaire Model	Maximum Fan Speed	Motor Input Watts	Current - amps		Speed Controllers	
			FLC	SC	Manual	0-10 volt
1	2720	510	2.2	5.2	T4	MS 10
2	1050	490	2.2	5.0	T4	MS 10
3	1350	490	2.2	5.0	T4	MS 10
4	1230	730	3.3	7.0	T4	MS 10
5	1320	1300	5.7	15.0	T8	MS 10

400 volt 3 phase fans

Sensaire Model	Maximum Fan Speed	Motor Input Watts	Current - amps		Inverter Speed Controller
			FLC	SC	
1	n/a	n/a	n/a	n/a	n/a
2	1050	320	0.51	0.97	SNS INV-1
3	1330	450	0.86	2.90	SNS INV-1
4	1210	690	1.30	3.40	SNS INV-1
5	1330	1150	2.00	8.60	SNS INV-1

Speed Controller Model	Dimensions - mm		
	Width	Height	Depth
T4	120	200	100
T8	160	230	120
SNS INV-1	118	132	146
SNS INV-1 Enclosure	190	220	165
MS 10	200	300	150

T4

T8

SNS INV-1

MS 10

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