

AVS

Indoor Use Single Fans with Ecosmart Control Installation Manual



1.0 SAFETY INFORMATION

- The provision of the electrical supply and the connection of the unit to the electrical supply must be carried out by a qualified electrician.
- Isolate from power supply before removing any covers. During installation / maintenance ensure all covers are fitted before switching on the mains supply.
- All-pole disconnection from the mains as shown in the wiring diagram must be incorporated within the fixed wiring and shall have a minimum contact separation of 3mm in accordance with latest edition of the wiring regulations.
- This unit must be earthed.
- Ducting must be securely fixed with screws to the spigot to prevent access to live parts. Duct runs terminating close to the fan must be adequately protected by suitable guards.
- This appliance should not be used by children or persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning the safe use of the appliance by a person responsible for their safety. Children shall not play with the appliance. Cleaning and user maintenance shall not be carried out by children.

1.1 Symbols



GENERAL WARNING

Signifies a general warning regarding hazard specified by supplementary information.



ELECTRIC SHOCK

This unit must be completely electrically isolated before any panels are removed. Check mains supply and control connections.



ROTATING PARTS

This unit contains fast moving rotational parts which may start automatically. It is the sole responsibility of the installer to adequately guard these components.



REFER TO INSTRUCTION MANUAL

Read and understand the installation and maintenance manual before installing, operating or maintaining this product.

1.2 Important Information

This manual contains important information on the safe and appropriate assembly, transport, commissioning, operation, maintenance, disassembly and simple troubleshooting of the product.

While the product has been manufactured according to the accepted rules of current technology, there is still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings contained in these instructions are not complied with.

- **Read these instructions completely and thoroughly before working with the product.**
- **Keep these instructions in a location where they are accessible to all users at all times.**
- **Always include the operating instructions when you pass the product on to third parties.**

1.3 Personal Protective Equipment

The following minimum Personal Protective Equipment (PPE) is recommended when interacting with Nuaire product:

- **Protective Steel Toed Shoes** - when handling heavy objects.
- **Full Finger Gloves (Marigold PU800 or equivalent)** - when handling sheet metal components.
- **Semi Fingerless Gloves (Marigold PU3000 3DO or equivalent)** - when conducting light work on the unit requiring tactile dexterity.
- **Safety Glasses** - when conducting any cleaning/cutting operation or exchanging filters.
- **Reusable Half Mask Respirators** - when replacing filters which have been in contact with normal room or environmental air.

Nuaire would always recommend a site specific risk assessment by a competent person to determine if any additional PPE is required.

2.0 INTRODUCTION

AVS units are rectangular in section and shall be double skinned with 35mm infill panels and shall be manufactured from heavy gauge, corrosion resistant Aluzinc steel, internally lined with acoustic material. Four matching mounting feet are supplied with the unit. Units have circular rigid spigots at each end. The spigot ends are fully detachable for relocation onto matching attenuators. The fan should be with an 'inline assembly', positioned in series for optimum performance.

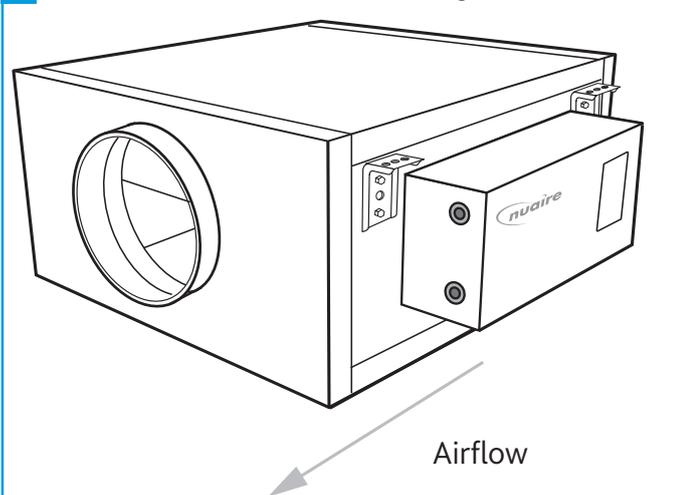
Units incorporate fully detachable top or bottom panels for maintenance and inspection purposes. **AVS 1 units have a loose control module for surface mounting up to 1 metre away from main unit.** AVS 8 and 9 units incorporate split access panels.

2.1 Code Description:

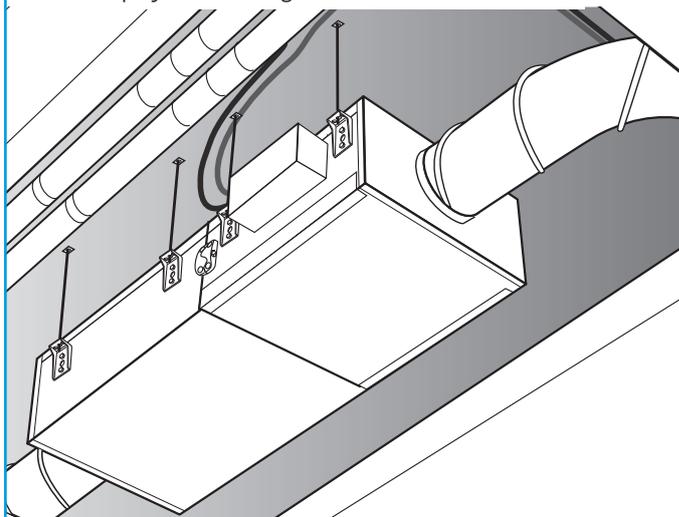
1	2	3	4
AV	S	CP	1

- 1. Range: **Aire-Volve**
- 2. Fan Type: **S = Single Fan**
- 3. Constant Pressure: **CP = Constant Pressure**
No Affix = No Constant Pressure
- 4. Unit Size: **1, 2, 3, 4, 4L, 5, 6, 7, 8, 9**

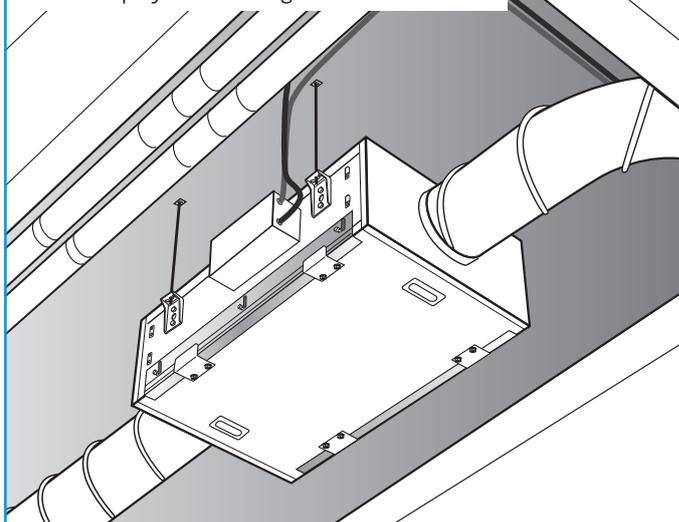
1 General View Of A Standard AVS Unit Configuration



2 Typical AVS Unit (2-6) With Silencer And Four Mounting Feet Employed For Ceiling Void Installation



3 Typical AVS-A Unit (2-6) With Four Mounting Feet Employed For Ceiling Void Installation



3.0 HANDLING

Upon receipt of the equipment, an inspection should be made. Before commencement of lifting, ensure that normal equipment safety checks have been carried out.

A unit / module should be removed from the vehicle using a fork lift or crane. Always handle with care to avoid damage and distortion, and where lifting slings are employed use spreaders to ensure slings do not come into contact with the unit case, or control pack. Correctly position slings to avoid twisting of the unit case and observe the centre of gravity before the final lift is made. **The weight of the unit is available on the unit rating plate.**

Dependent on model and size, units may be supplied in single or multi-modular sections. Handle each section individually do not stack for lifting or storage.

4.0 MECHANICAL INSTALLATION

Installation must be completed by competent persons, in accordance with good industry practice and should conform to all governing and statutory bodies i.e. IEE, CIBSE, etc.

The units are supplied for installation into In-line ductwork (internal) applications only. All ductwork connections must be airtight to prevent loss of performance.

The unit has an external case side mounted control module / terminal box and is supplied ready for connection into the electrical supply. Typically the control is mounted on the side of the unit as standard (AVS2-9).

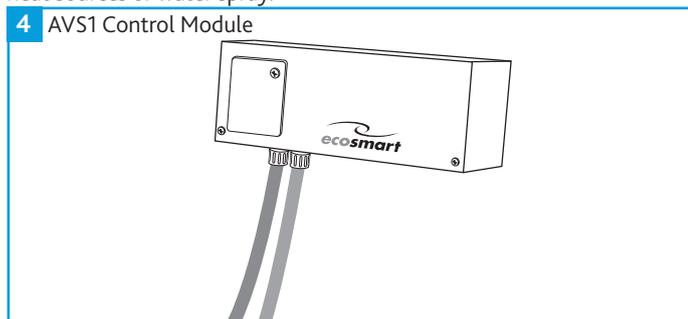
The method of mounting used is the responsibility of the installer. **The units can be mounted in any attitude** enabling alternative control positions. Access to the blower for maintenance can still be achieved for annual maintenance once orientation is changed, however if the motor requires replacing, the unit will have to be lowered to ground level if installed in non-standard configuration.

4.1 Umbilical Cord Kits (AVS1-8 Only)

As an option, an umbilical cord can be purchased for remote mounting up to 1m away (Figure 5). **1m Umbilical Cord Kit Code: AVT-CK.**

4.2 Surface Mounting Control Module (AVS1 Only)

The fan unit control module/terminal box is supplied loose for mounting up to 1 metre away from main unit (Figure 4). The unit must be mounted on a secure, vibration free vertical surface away from direct heat sources or water spray.



4.3 Surface Mounted Units

Utilising four matching anti-vibration (AV) mounting feet (Figure 1). **AV mounts isolate the fan only, silencers / back draught dampers and other "significant mass" accessories should form part of the fixed ductwork after the flexible connection.**

4.4 Units Suspended With Drop Rods

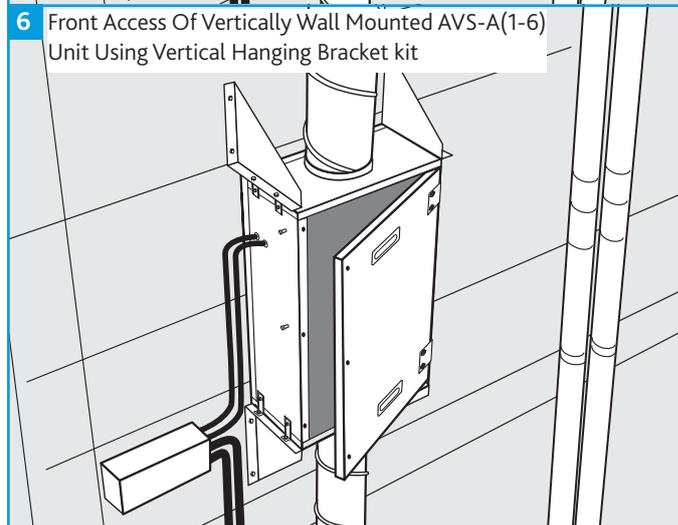
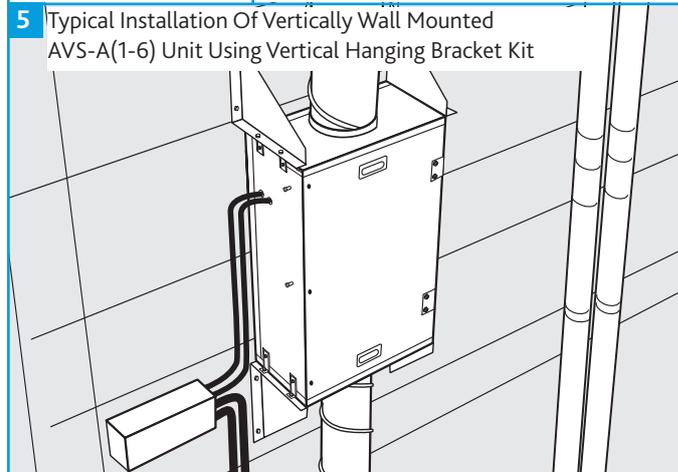
From the ceiling or in the ceiling void using four AV mounting feet supplied, with access panel positioned for underside access (Figure 2 & 3).

4.5 Vertically Wall Mounted (Rigid) Units

Utilising the Aire-Volve Vertical Hanging Bracket kit that includes wall hanging brackets and hinges (Figures 5 and 6). The unit case has captive M8 nuts which can be used after removing the M8 'plugging' screws. Units should always be positioned with sufficient space to allow the access panel to extend forward. **Only suitable for topside and underside detachable access panel units mounted indoors.**

Aire-Volve Unit Size	Aire-Volve Vertical Hanging Bracket Kit
1	AVT1-VK
2	AVT2-VK
3	AVT3-VK
4	AVT4-VK

Aire-Volve Unit Size	Aire-Volve Vertical Hanging Bracket Kit
4L	AVT4L-VK
5	AVT5-VK
6	AVT6-VK



4.6 Anti-Vibration (AV) Mounts

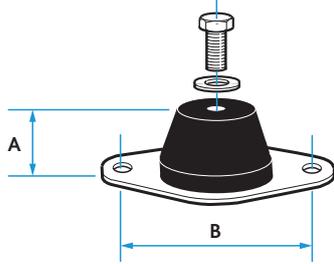
AV mounts should not be fitted to a fan/silencer assembly unless there are flexible connectors fitted between the assembly and associated duct work. AV mounts should be installed with the matched mounting feet and positioned such that they carry an equal proportion of the assembly weight. This is particularly important where fans and silencers are installed on suspension rods. Suspension rods and fixing screws are not supplied.

Resilient rubber anti-vibration mounting kits (NAV) are available, the correct selection and type employed will depend on the accurate calculation of the weight of the assembly to be supported.

The large round washers included with the NAV(2-5) are for fitting above or below the resilient mounting as required to safeguard the installation against break-up of, or damage to, a mounting. In the event of a resilient mounting failure, the washer will support the weight of the unit. Fans using size NAV 6 upwards require supporting steelwork to be designed (by others) for suspended applications.

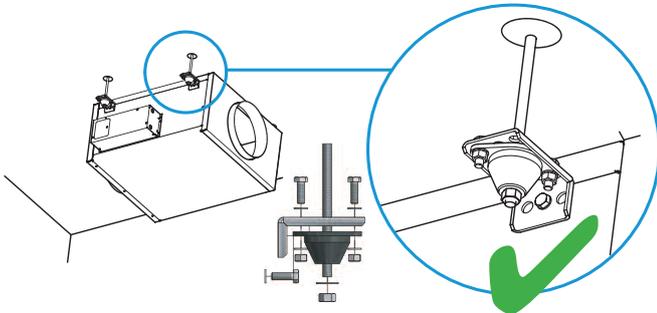
AV mounts must only be subjected to compressional forces and MUST NOT be used in a configuration that places these parts under tension or shear force.

7 NAV2-5 Dimensions

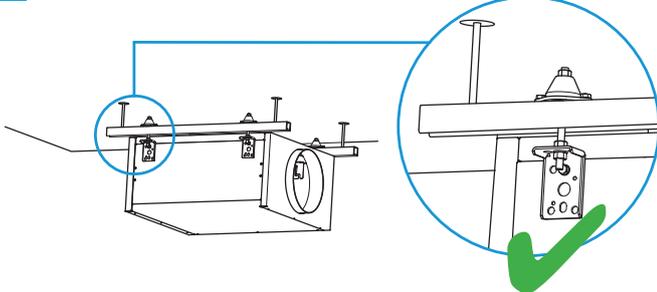


Anti-Vibration Mounting Kit	A (mm)	B (mm)	Max. Supporting Weight (kg)
NAV2	40	75	80
NAV3	40	75	180
NAV4	40	75	260
NAV5	40	75	130

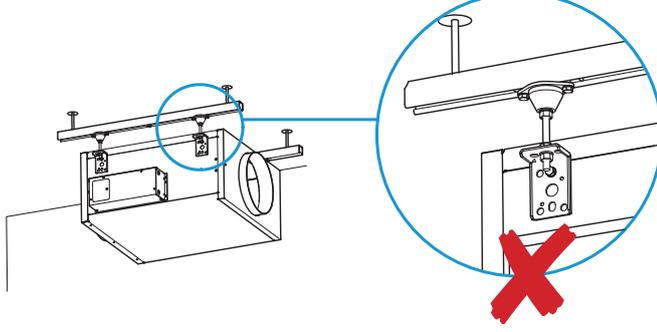
8 Correctly Installed NAV(2-5) - Suspended Application



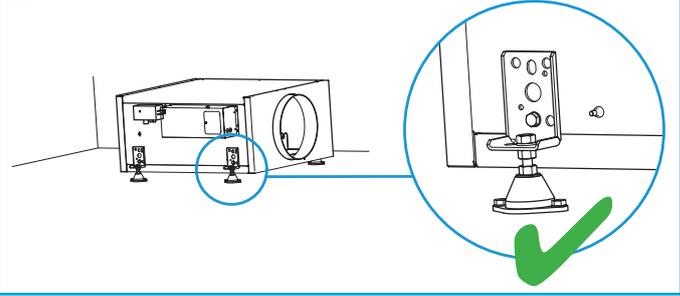
9 Correctly Installed NAV(2-5) - Suspended Application



10 Incorrectly Installed NAV(2-5) - Suspended Application



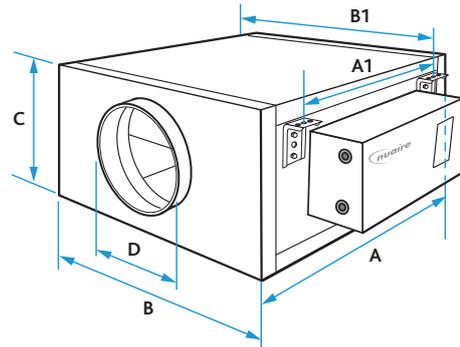
11 Correctly Installed NAV(2-5) - Floor Mounted Application



4.7 Dimensions (mm) & Weights (kg)

4.7.1 AVS Units

12 AVS Dimensions



Unit Code	A [†]	A1 (Bracket Centre Points)	B [‡]	B1 (Bracket Centre Points)	C	D	Weight (kg)
AVS1	580	344	535*	576	246	200	27
AVS2	615	380	535	646	281	200	24
AVS3	745	510	672	713	329	250	43
AVS4	788	553	672	713	373	315	47
AVS4L	914	678	818	860	391	315	67
AVS5	914	678	818	860	428	315	66
AVS6	1087	851	911	953	541	400	90
AVS7	1180	942	1008	1050	571	400	106
AVS8	1338	1101	1233	1275	611	500	157
AVS9	1338	1101	1233	1275	611	500	141

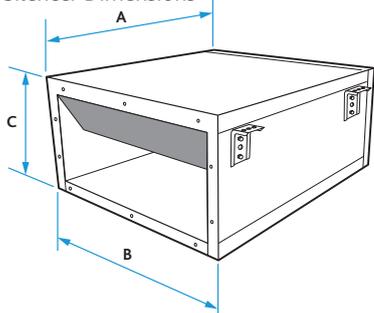
[†] Add 85mm for unit + spigot length.

[‡] Add 108mm for unit width.

* AVS1 control supplied loose from unit with umbilical cord.

4.7.2 Matched AVS Silencers

13 AVS Matched Silencer Dimensions



Unit Code	Silencer Code	Size	A	B	C	Weight (kg)
AVS1	AVS1-MSM	Mini	500	535	250	27
	AVS1-MSS	Standard	1000	535	250	32
	AVS1-MSL	Large	1500	535	250	45
AVS2	AVS2-MSM	Mini	500	535	285	27
	AVS2-MSS	Standard	1000	535	285	32
	AVS2-MSL	Large	1500	535	285	45
AVS3	AVS3-MSM	Mini	500	6672	334	27
	AVS3-MSS	Standard	1000	672	334	39
	AVS3-MSL	Large	1500	672	334	56
AVS4	AVS4-MSM	Mini	500	672	376	34
	AVS4-MSS	Standard	1000	672	376	39
	AVS4-MSL	Large	1500	672	376	56
AVS4L	AVS4L-MSM	Mini	500	822	376	34
	AVS4L-MSS	Standard	1000	822	376	39
	AVS4L-MSL	Large	1500	822	376	56
AVS5	AVS5-MSM	Mini	500	822	428	43
	AVS5-MSS	Standard	1000	822	428	64
	AVS5-MSL	Large	1500	822	428	89
AVS6	AVS6-MSM	Mini	500	915	545	43
	AVS6-MSS	Standard	1000	915	545	64
	AVS6-MSL	Large	1500	915	545	89
AVS7	AVS7-MSM	Mini	500	1013	575	43
	AVS7-MSS	Standard	1000	1013	575	41
	AVS7-MSL	Large	1500	1013	575	98
AVS8	AVS8-MSM	Mini	500	1237	615	51
	AVS8-MSS	Standard	1000	1237	615	83
	AVS8-MSL	Large	1500	1237	615	114
AVS9	AVS9-MSM	Mini	500	1237	615	51
	AVS9-MSS	Standard	1000	1237	615	92
	AVS9-MSL	Large	1500	1237	615	125

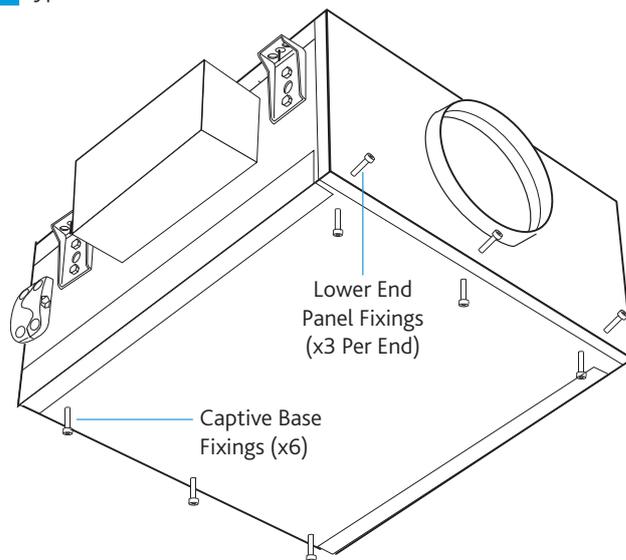
4.8 Unit Access

Unit can be installed inverted for ease of access to control (e.g. control opposite side). **If inverted it will restrict access to blower. Split panels on AVS 8 and 9.**

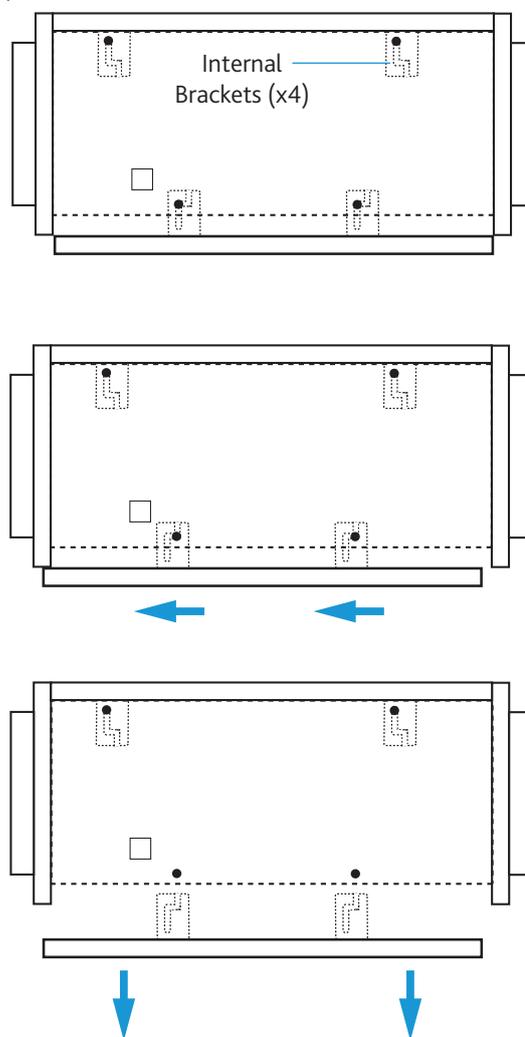
1. Release base fixings (captive).
2. Release lower end panel fixings (each end of the unit).
3. Lower panel, 4 internal brackets will prevent the panel from releasing.
4. Support the weight of the panel and slide access panel.

Continuing to support the weight of the panel then lower the access panel to gain access to the unit interior. Assistance will be required to support weight of access panel.

14 Typical Underside View Of AVS1-6 Unit Access



15 Typical Side View Of AVS1-6 Unit Access

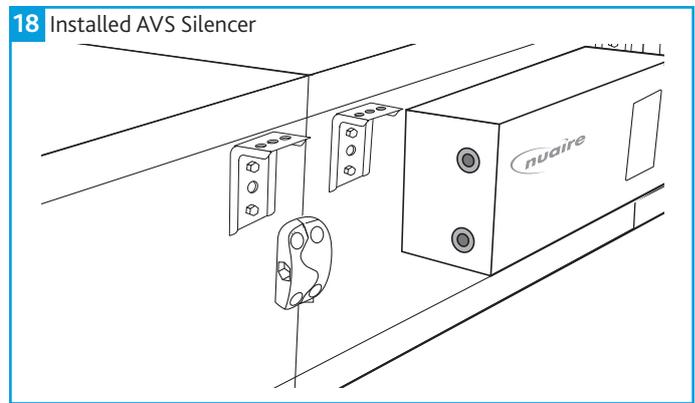
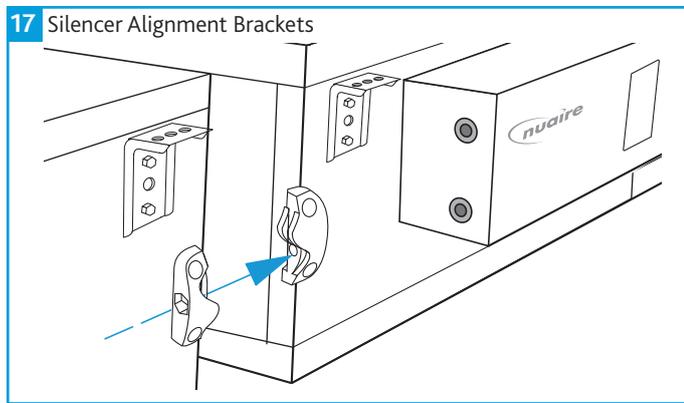
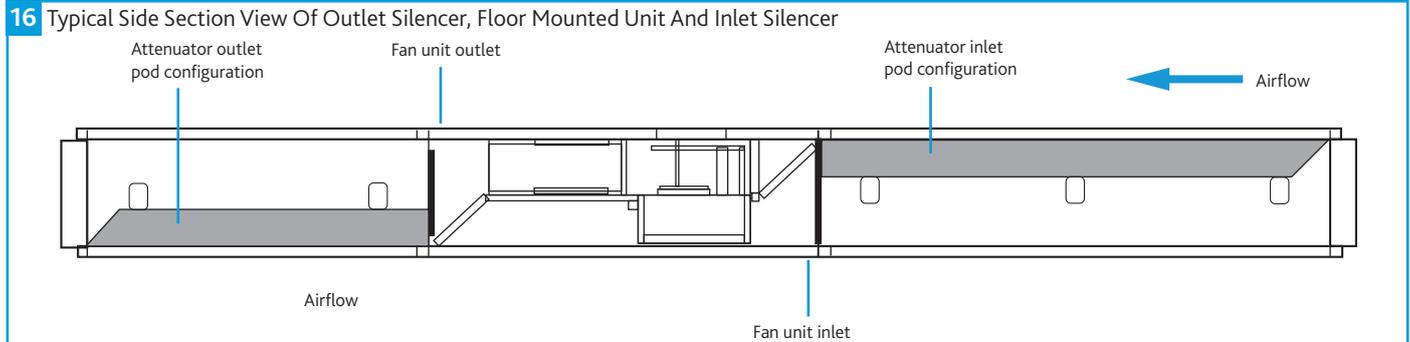


Unit Code	Access Panel Weight (kg)	Unit Code	Access Panel Weight (kg)
AVS1	6	AVS5	7
AVS2	6	AVS6	17
AVS3	9	AVS7	21
AVS4	10	AVS8	14 (per panel)
AVS4L	7	AVS9	14 (per panel)

4.9 Fitting Matched Silencers

Ensure that the attenuator pods are in the correct orientation (Figure 16). To change orientation of attenuator pod just roll silencer over 180° before fitting and use fixing brackets.

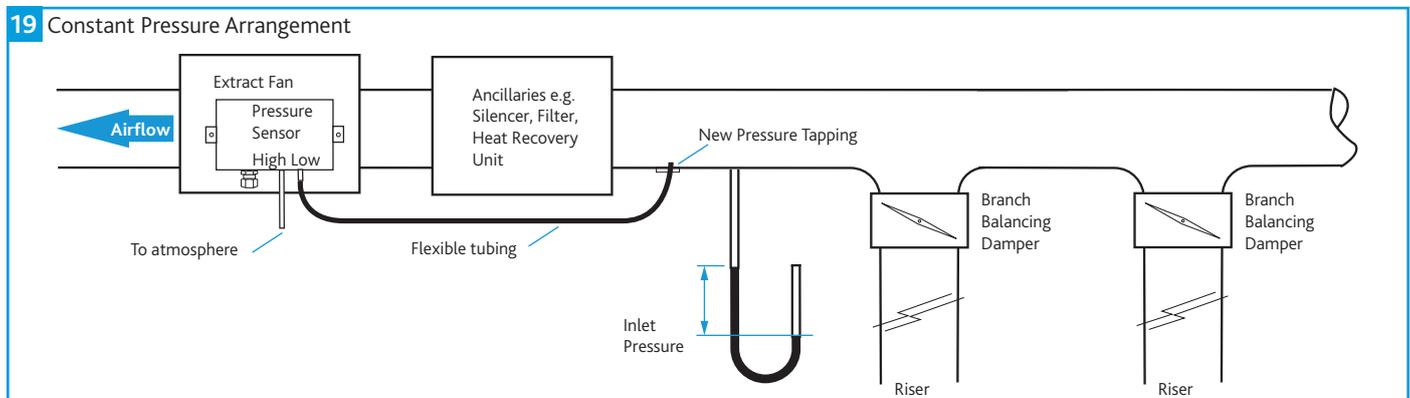
Correctly align fixing brackets halves (Figure 17) and assemble using M8 cap head bolt and nut supplied with bracket. Tighten bolts to ensure a full seal between silencer and unit is achieved (Figure 18).



4.10 AVSCP Constant Pressure Range

Ecosmart constant pressure extract fans are supplied to control the static pressure at the fan inlet.

This set up is suitable for the majority of applications. However, when ancillaries with high pressure losses are fitted to the fan's inlet side, the low pressure tapping needs to be moved from the fan chamber to a location upstream of the ancillaries (Figure 19). **Failure to do this will result in excessive pressure being applied to the dampers at the rooms when the system is running in trickle mode.**



5.0 ELECTRICAL INSTALLATION

Before commencing work make sure that the unit, switched live and Nuaire control are electrically isolated from the mains supply.

Because the run and start currents depend upon the duty and associated ductwork of an individual unit, run currents will be exceeded if the unit is operated with its cover removed. It is therefore recommended that the unit is not run for prolonged periods in this condition.

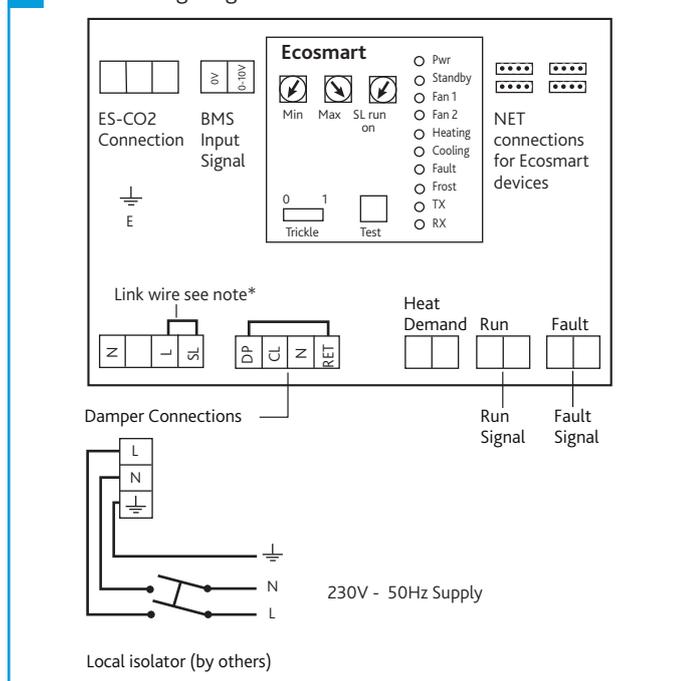
5.1 Wiring Diagrams

All inter-connections between circuit boards, blowers and sensors are made at the factory. These diagrams only show the essential field wiring points for clarity.

*Remove link wire if switched live signal, an enabler or BMS signal is connected.

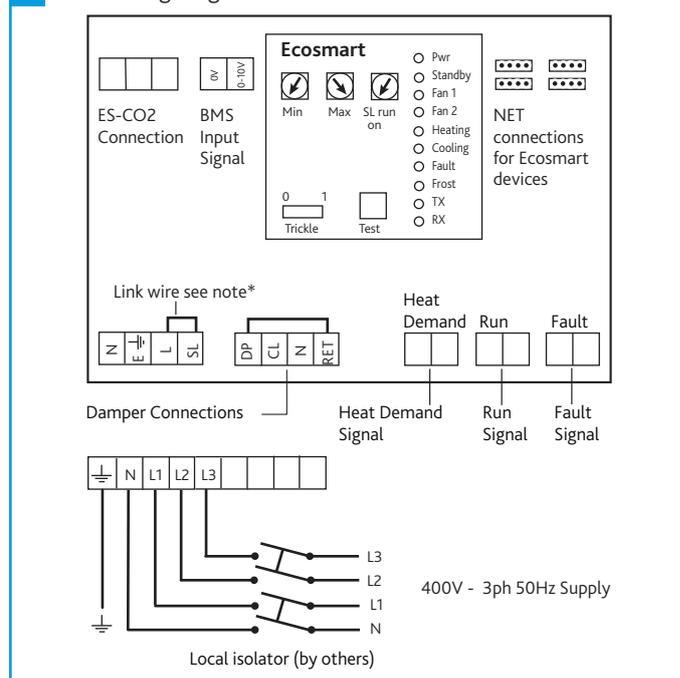
5.1.1 AVS1-8

20 AVS1-8 Wiring Diagram



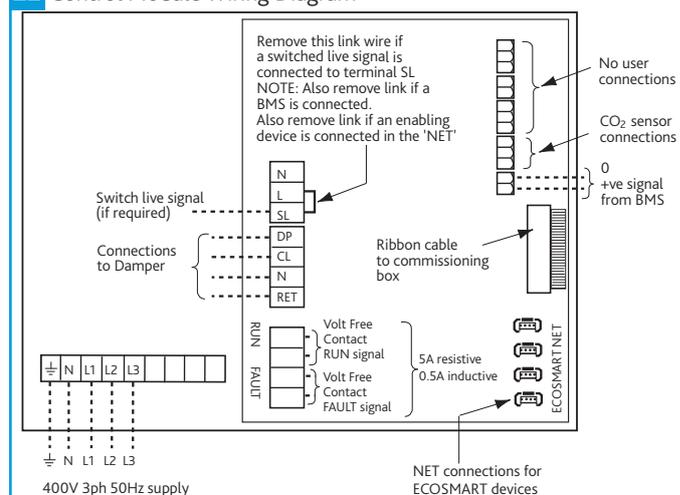
5.1.2 AVS9

21 AVS9 Wiring Diagram



5.1.3 Control Module

22 Control Module Wiring Diagram



5.2 Post Installation Testing

- Ensure that the fan unit and any specified controls are fitted securely according to the instructions.
- Switch on the mains supply.
- Push the test button to run the unit fan and check it runs satisfactorily.
- If a switched live signal is used, activate this signal and check that the fan runs. De-activate the switched live signal and check the run-on time; adjust if necessary.
- Adjust the set point of any sensors and PIR; check they function correctly.
- Adjust the maximum and minimum airflow (if required) by following the commissioning procedures.

5.3 Wiring Connections

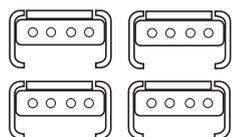
5.3.1 Mains Connections

Mains cables should be suitably sized and terminated at terminals shown on the appropriate diagram.

5.3.2 Control Connections

NET - 4 IDC plug-in connectors are provided for the connection of compatible sensors, manual controls and for linking the fans together under a common control. If more than 4 connections are required, the junction box (product code ES-JB) should be used (see data cable installation).

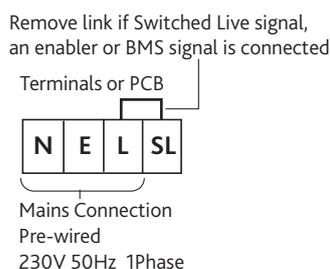
23 Control Connections



5.3.3 Switched Live (SL) Terminal

A signal of 100-230V a.c. will activate the fan from either its off state or trickle state (see setting to work-trickle switch). When the SL is disconnected the fan will over-run (see setting to work-timer adjustment). **Do not take this signal from an isolating transformer.**

24 Switched Live Terminal



5.3.4 Damper Connections

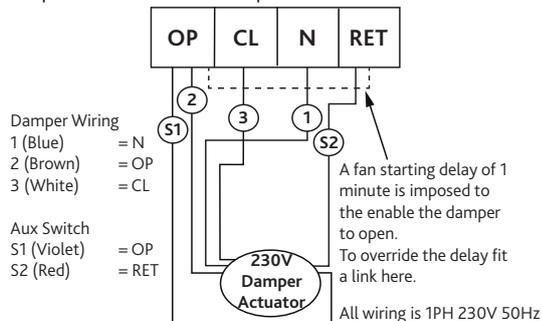
OP - 230V 50Hz 1A max supply to open the damper

CL - 230V 50Hz 1A max supply to close the damper

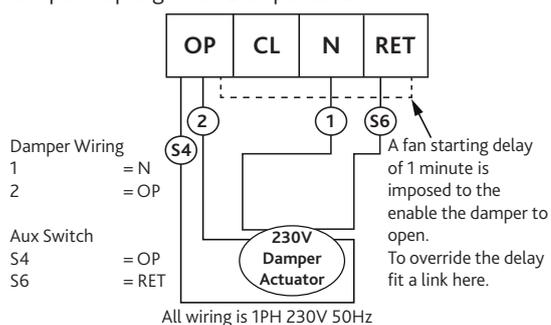
N - Neutral supply to damper

RET - 230V ac return signal from the damper limit switch indicates the damper has reached its operating position. If the return signal is not present, the fan will wait for 1 minute before starting. **If a damper is not fitted, connect a link wire from OP to RET. This will cancel the delay.**

25 Drive Open / Drive Close Damper Connection

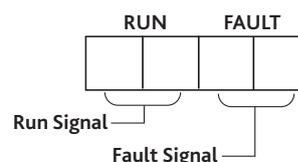


26 Drive Open / Spring Close Damper Connection



5.3.5 Volt Free Relay Contacts

27 Volt Free Relay Contacts



5.3.6 Data Cable Installation

A 4-core SELV data cable is used to connect devices such as sensors to the fan and for interconnecting multiple fan units.

For good EMC engineering practice, any sensor or low voltage data cables should not be placed within 50mm of mains cables or placed on the same cable tray or conduit as mains cables.

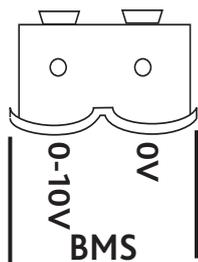
The maximum cable run between any two devices is 300m when it is installed in accordance with the instructions. The total data cable length used in any system must be less than 1000m. Keep the number of cable joints to a minimum to ensure the best data transmission efficiency between devices + 50m or less for ES-LCD.

5.3.7 Maximum Number Of Devices

The maximum number of devices (including fans) that can be connected together via the data cable is 32, irrespective of their functions.

5.4 BMS Input Signals

28 BMS Connector



BMS Input Signals and other low voltage cables should Follow the basic principles set out in (Section 5.3.6).

The BMS connection is made with a plug-in connector via the socket (Figure 28). To ensure the connection is made only by suitably qualified and authorised personnel, the plug is not supplied. It is available from R S Components, Part No. 403-875 or Farnell, Part No. 963-021. Reversal of the BMS connection will damage the control.

The system’s response to a 0-10V dc BMS signal is given in the table below. The voltage tolerance is +/- 125mV and is measured at the fans terminal. **The BMS signal will override any sensors and user control connected in the system.**

	Ventilation Mode	Cooling Mode*	Heating Mode*
Local Control	0.00	-	-
OFF/ Trickle	0.25	-	-
Speed 1	0.50	0.75	1.00
Speed 2	1.50	1.75	2.00
Speed 3	2.50	2.75	3.00
Speed 4	3.50	3.75	4.00
Speed 5	4.50	4.75	5.00
Speed 6	5.50	5.75	6.00
Speed 7	6.50	6.75	7.00
Speed 8	7.50	7.75	8.00
Speed 9	8.50	8.75	9.00
Speed 10	9.50	9.75	10.00

* Only available on relevant unit.

6.0 CONTROLS

6.1 LED Indication

- PWR** GREEN: Power on & OK. RED: To much power is taken by peripherals or there is a short circuit in the net cable. Check the cable and use a junction box (ES-JB) to connect some of the peripherals
- Standby** LED on when fan is not running.
- Fan 1** GREEN: Fan 1 is running, RED: Fan 1 faulty.
- Fan 2** GREEN: Fan 2 is running, RED: Fan 2 faulty.
- Heating*** GREEN: Heating selected RED: Heating faulty.
- Cooling*** Not applicable. See note.
- Fault** LED on when a fault is present on unit.
- Frost*** Not applicable. See note.
- TX** LED on when the controller is transmitting data.
- RX** LED on when the controller is receiving data.

* The control panel is common to all the Ecosmart products and will have indicators for functions that are not available in this particular fan. However these indicators will not be illuminated.

A Commissioning Procedure document (Document No. 671153) is available on request from Nuair.

29 Commissioning Panel Details

MIN = Minimum speed adjustment

MAX = Maximum speed adjustment

SL run on = Switched Live Run-On Timer adjustment

TRICKLE = Selects trickle running: 0 = off, 1 = selected

TEST = Test button

6.2 Using Test Button

The test button allows the individual blowers within the unit to be checked for its operation. If the fan is running already, press the button once to stop the fan, press again to switch on the standby fan, press again to stop and so on. **The fan will return to normal operation after 30 seconds.**

6.3 Setting Unit Airflow

6.3.1 Maximum Airflow

Ensure the power supply is switched off and that a link wire is connected from the supply L to the SL terminal. Unplug all items connected to the 'Net' connectors.

Switch on the power supply. **Ensure unit cover is securely attached.**

Wait for the fan to complete its self-test operation.

Remove the cover of the units external commissioning box. Measure the airflow using standard commissioning instruments at a suitable point in the ductwork. If adjustment is required, rotate the pot marked 'MAX' to obtain the desired airflow.

6.3.2 Minimum Trickle (Nominally 40%)

Repeat the same procedure as for maximum airflow above but without the link wire between supply L and SL terminal. Ensure the trickle switch is in the 'ON' position. The adjustment must be made on the pot marked 'Min'.

The minimum setting (nominally 40%) must be below the maximum setting, otherwise minimum setting will be automatically set to be the same as the maximum.

After setting the airflows, re-connect all the items disconnected previously. Ensure that the cover over the mains terminals is replaced and that the cover of the controls enclosure is securely fastened.

7.0 MAINTENANCE

It is important that maintenance checks are recorded and that the schedule is always adhered to, in all cases, the previous report should be referred to.

7.1 Routine Maintenance

- Clean all areas of unit and treat any areas of corrosion.
- Check all access doors for leakage and if necessary locks should be adjusted and any replacement gasket materials should be replaced as required.

7.2 Annually

- Thoroughly inspect the unit and its components for corrosion, acting immediately to treat/restore any damaged areas.
- All electrical terminals within the unit should be tightened.
- Check all earth connections.
- Check control dampers blades.
- Check operation of damper actuators and linkages and adjust as necessary.

8.0 WARRANTY

The 5 year warranty starts from the day of delivery and includes parts and labour for the first year. The remaining period covers replacement parts only.

This warranty is void if the equipment is modified without authorisation, is incorrectly applied, misused, disassembled, or not installed, commissioned and maintained in accordance with the details contained in this manual and general good practice.

The product warranty applies to the UK mainland and in accordance with Clause 14 of our Conditions of Sale. Customers purchasing from outside of the UK should contact Nuair International Sales office for further details.

Failure to maintain the unit as recommended will invalidate the warranty.

9.0 END-OF-LIFE AND RECYCLING

Where possible Nuair use components which can be largely recycled when the product reaches its end-of-life:

- Fans, motors, controls, actuators, cabling and other electrical components can be segregated into WEEE recycling streams.
- Sheet metal parts, aluminium extrusion, heating/cooling coils and other metallic items can be segregated and fully recycled.
- EPP, plastic ducting, nylon corner pieces, plastic heat exchangers, packaging material and other plastic components can be segregated into mixed plastic and widely recycled.
- Cardboard packaging, wood, used filters and other paper components can be largely recycled or fully processed in energy from waste centres.
- Remaining Items can be further segregated and processed in accordance with the zero waste hierarchy. Please call After Sales Support for further information on items not listed above.

Ensure that Nuair product is made safe from any electrical / water / refrigerant supplies before dismantling commences. This work should only be undertaken by a qualified person in accordance with local authority regulations and guidelines, taking into account all site based risks.

10.0 AFTER SALES AND REPLACEMENT PARTS

For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

If ordering spares please quote the serial number of the unit together with the part number, if the part number is not known please give a full description of the part required. The serial number will be found on the identification plate attached to the unit casing.

10.1 Replacing Fan / Motor

The only items of the fan units unit likely to require replacement are the fan/motor assemblies due to a failed motor or damaged impeller or damper actuator.

Remove the access cover. Disconnect the incoming wiring from the connection box (located on the fan scroll) on the particular fan/motor assembly to be removed.

Remove the fan/motor fixings completely, other than the two slotted hole fixings. Support the fan/motor assembly and loosen the slotted hole fixings. The fan/motor assembly can now be turned and withdrawn from the unit.

After replacing the faulty item, refit the fan motor/assembly using the slotted hole fixings to assist in supporting the assembly. Re-connect the wiring. Replace the access cover.

Telephone 02920 858 400
aftersales@nuaire.co.uk

Technical or commercial considerations may, from time to time, make it necessary to alter the design, performance and dimensions of equipment and the right is reserved to make such changes without prior notice.

