



Natural Ventilation

ε-stack F-Series Facade Based Ventilation System

Installation and Maintenance

Important Notes to Designers and Installers

The ε-stack ventilation system operates under a natural upwards displacement strategy in summer and a high level mixing mode in winter. The winter mode exploits the heat gains in the building to temper the incoming fresh air, reducing the heating energy required for the building.

Winter mode

In winter the system operates under a mixing strategy, where the cold incoming air is mixed with the warm air in the room. The heat gains within heavily occupied spaces (e.g. school classrooms) are often sufficiently high that additional heating is not needed until the external temperature falls to somewhere in the range 5 - 10°C, depending on the U-value for the room. This is in contrast to traditional upwards displacement systems that require heating from much higher external temperatures.

Summer mode

Once the external temperature has increased such that air can be brought in at low level directly onto occupants without pre-heating, the ventilation strategy for the system changes to a natural upwards displacement mode.

This strategy does not require wind to drive the flow, so ventilation is provided throughout the summer, even on still days.

Fans

Although airflow in summer is mainly buoyancy driven, the two low energy fans in the unit (that are primarily used for winter mixing) can be used to boost airflow through the space in warmer weather.

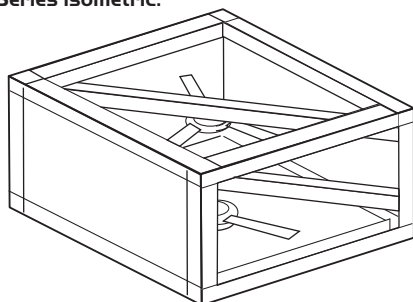
Controlled ventilation

The ventilation system is fully controlled with dedicated temperature and CO₂ sensors in the space, two low-energy fans in the unit and an on-board plc-based controller. This allows the system to optimise the ventilation strategy for comfort and energy use.

School Projects

The units are ideally suited to school areas with their high internal occupancies and heat gains. The units specified are sized to meet the BB101 criteria for typical classrooms, both in terms of meeting the summertime overheating requirements and minimum daily average ventilation of 5 l/s per person to limit room CO₂ levels.

Figure 1. F-Series isometric.



Construction

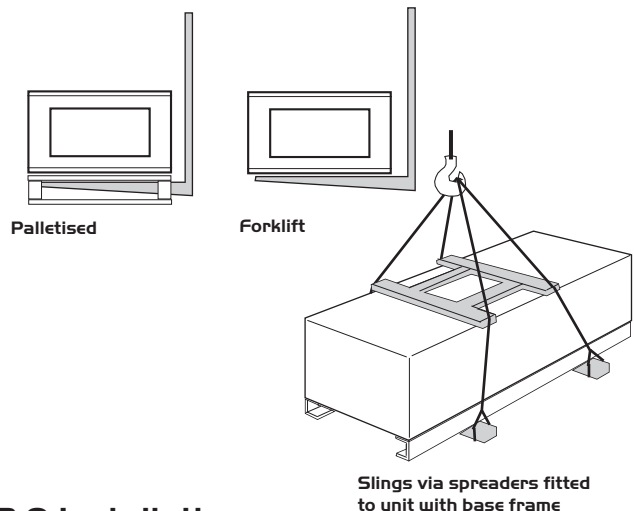
F-Series Ventilation units are constructed with Galvanised or Zintec steel. The units can be supplied in Standard galvanised finish or Zintec powder coated to RAL9010 as standard.

The F-Series units have been acoustically tested in accordance with BS EN 20140-10:1992 and ISO 140-10:1991 and are shown to meet the requirements of BB93 – Acoustic Design of Schools.

I.O Handling

Each ε-stack F-Series unit is delivered to site suitable for forklift handling. (Unit weight approx 60kg).

Figure 2. Lifting examples.



2.0 Installation

Installation must be carried out by competent personnel in accordance with the appropriate authority and conforming to all statutory and governing regulations e.g. I.E.E., CIBSE, COHSE etc.

2.1 Area Provision

To make the most effective use of the ε-stack units specified for this scheme, an opening area at low level of typically around 1 sq.m effective aerodynamic area should be provided per unit, by means of opening windows and/or low-level dampered inlets.

The total opening area at high-level within the room should also typically be around 1 sq.m. This includes the area of openings of the boxed section above the ε-stack unit and the area of the separate actuated window or damper at high-level.

Positioning in the space

The F-Series unit is housed in a bulkhead or visible within the space. A connecting duct is required above the unit to an actuated opening window or actuated vent (see figure 6).

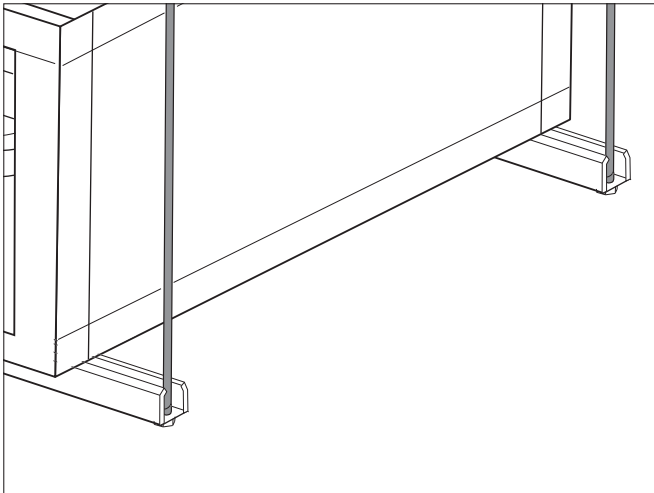
An additional high level opening is required to extract air from the space.

2.2 Installation of the F-Series units

Whilst e-stack provide recommendations for the installation of supports for the units, the sizing and detailed design of the load-bearing supports must be specified and signed off by the structural engineers for the project. Two fixing methods are suggested:

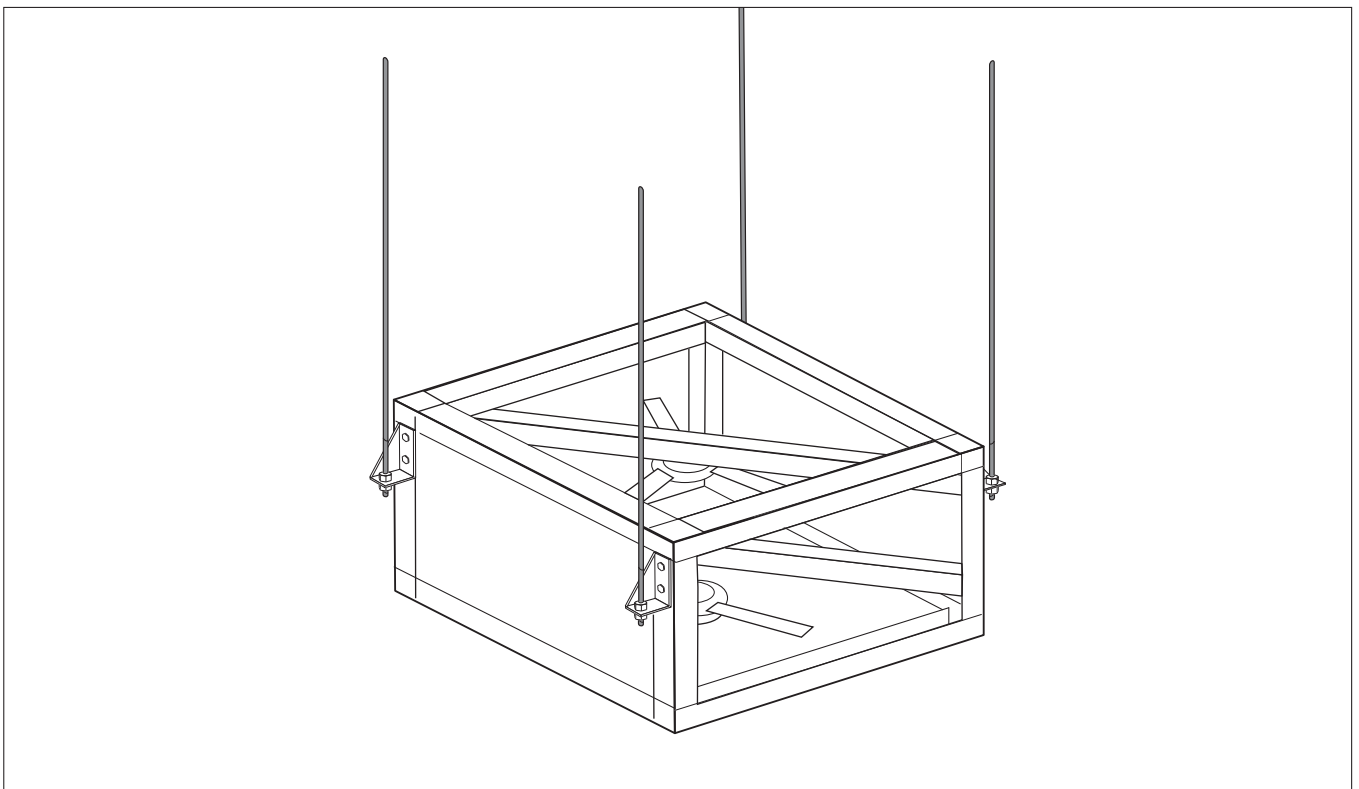
1. Vertical support studding attaches to either side of a cradle which supports the e-stack unit. The cradle can be formed from a unistrut channel.

Figure 3. Option 1. Unistrut channel cradle.



2. e-stack mounting brackets supplied (at additional cost) and used in conjunction with drop-rods to support the units. (see figures 4 and 5).

Figure 4. Option 2, showing drop rods attached to unit.



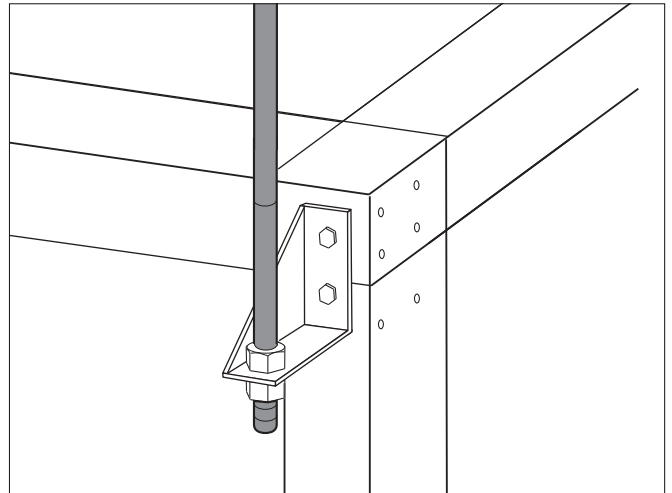
Ventilation unit hangs from 4no. pieces of M12 studding of maximum length 1200mm.

Drop-rods attached to F-Series unit using welded brackets (supplied at additional cost).

The bracket length is 65mm to the centre of the fixing hole.

The unit is lifted into place and four M12 Studding (drop-rods) are brought through the holes on the end of the welded brackets, positioned and secured in place using a pair of M12 full nuts per bracket. (see figure 4).

Figure 5. Option 2, close up of bracket.



Unit to attach to base of boxed-out section using a rubberized seal (provided) on the top outer 80mm flange of the e-stack unit. This is to ensure air-tightness.

2.3 Grille Requirements

e-stack units contain fast moving fans and must have grilles on all open faces when in operation.

- Where the base of the unit is installed less than 2.7m vertical distance from the floor, specific grilles provided by Nuairé must be used.
- Where the unit is installed more than 2.7m vertical distance from the floor, grilles can optionally be provided by Nuairé.

2.4 Installation Guidelines

Figure 6. Typical installation diagram showing general format of the system, assuming the use of a bulkhead the possible layout of the e-stack façade-based units and their operation in winter (mixing) mode.

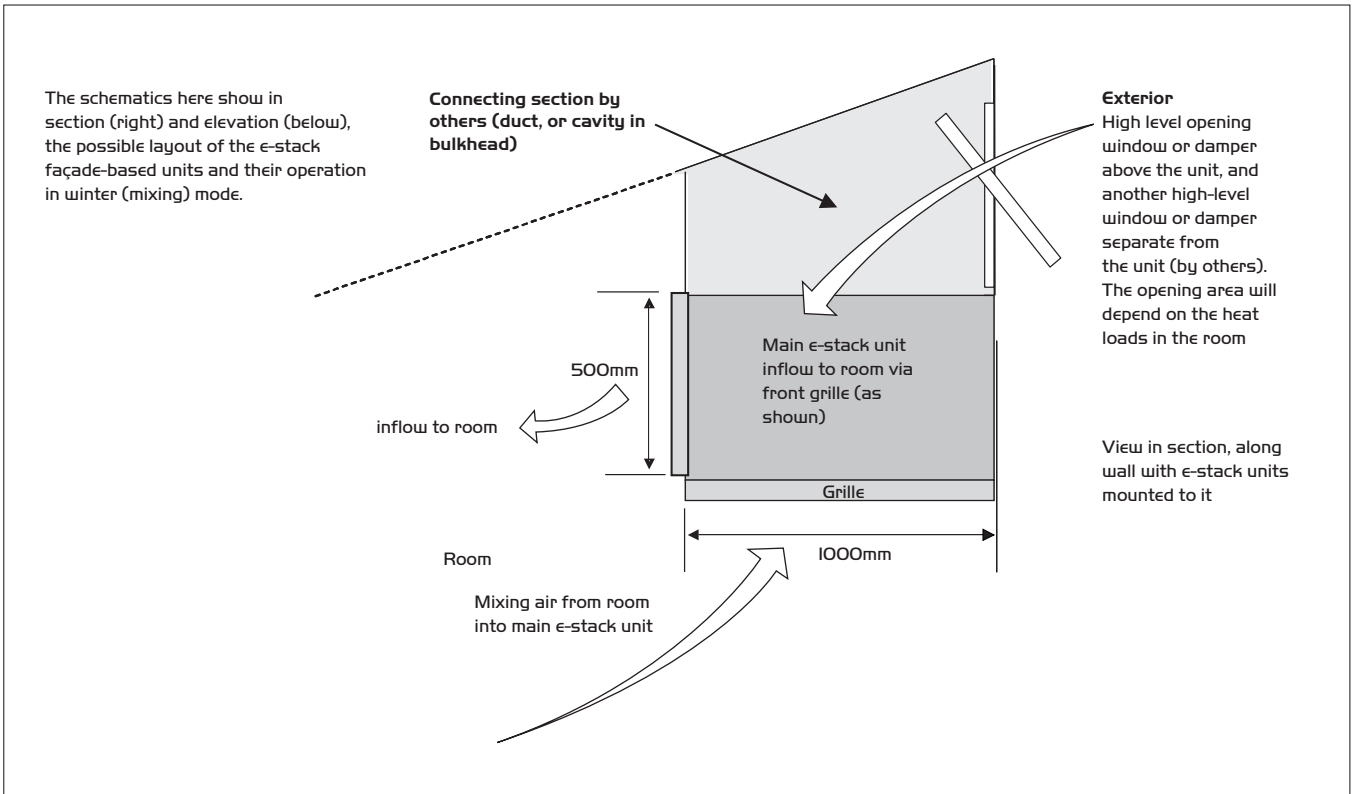
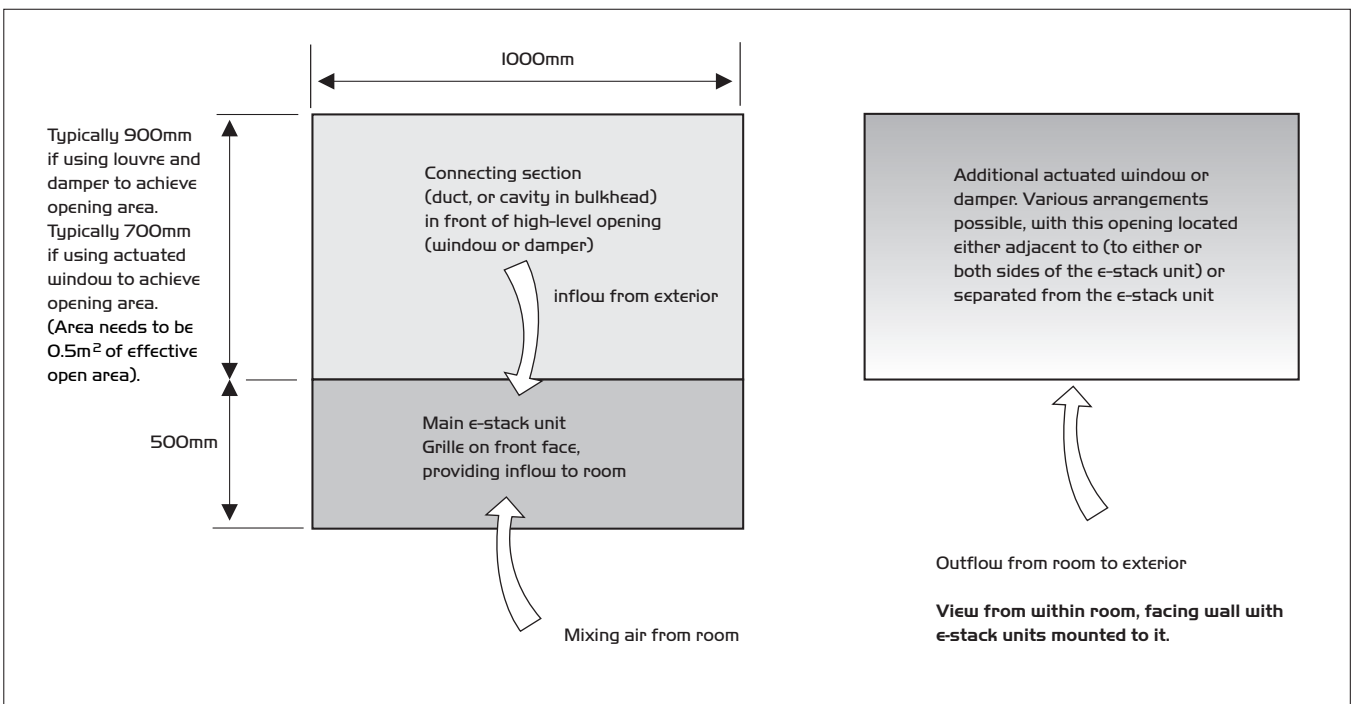


Figure 7. Typical installation diagram, View from within room, facing wall with e-stack units mounted to it.



2.5 Electrical Installation

Installation must be carried out by a qualified electrician in accordance with the appropriate authority and conforming to all statutory and governing regulations.

Wiring Guidelines

The overall wiring schematic for the façade-based unit is shown on the following page. It is similar to the wiring used in our stack-based units, with the exception that the façade-based unit needs to control high level openings on the façade. These consist of an actuated window or VCD in a boxed-out section above the unit, and another window/VCD elsewhere in the room at high level. These are controlled in unison i.e. if one of these openings is open, so is the other.

The unit will provide an analogue signal to control these items – this is usually in the form of a 0-10V DC signal. The dampers and/or actuators should be of the fully modulating type, so that the e-stack unit can regulate the natural ventilation flows. The chosen damper / actuator should be selected bearing in mind any fire regulation constraints that may apply.

The sensors and room interface are the same for these units as for our stack-based units, and are described in more detail later in this document.

2.6 Sensors

Exterior Temperature Sensor

This should be located on the exterior façade, preferably in a permanently shaded position e.g. below roof eaves. If this is not possible, it should be positioned in a location receiving minimal direct sunlight, and not on a south-facing façade where the largest direct solar radiation is observed. The signal from this sensor will need to be hardwired to multiple e-stack units.

Room Temperature and CO₂ Sensors (combined)

This should be mounted at a eye-level and away from windows or doors in frequent use, as these may reduce CO₂ concentrations locally.

2.7 Room Indicator LED Panel

The room interface display on a 2-gang switch plate (one per unit supplied*).

This indicates to the user when to open or close the windows in installations with manually opening façade windows. A blue LED illuminates to show when the user should shut the windows and a red LED when the user should open the windows.

This display should be located where it is most visible to the operator of the low level windows.

*One per room supplied when multiple e-stack units are present in the same room.

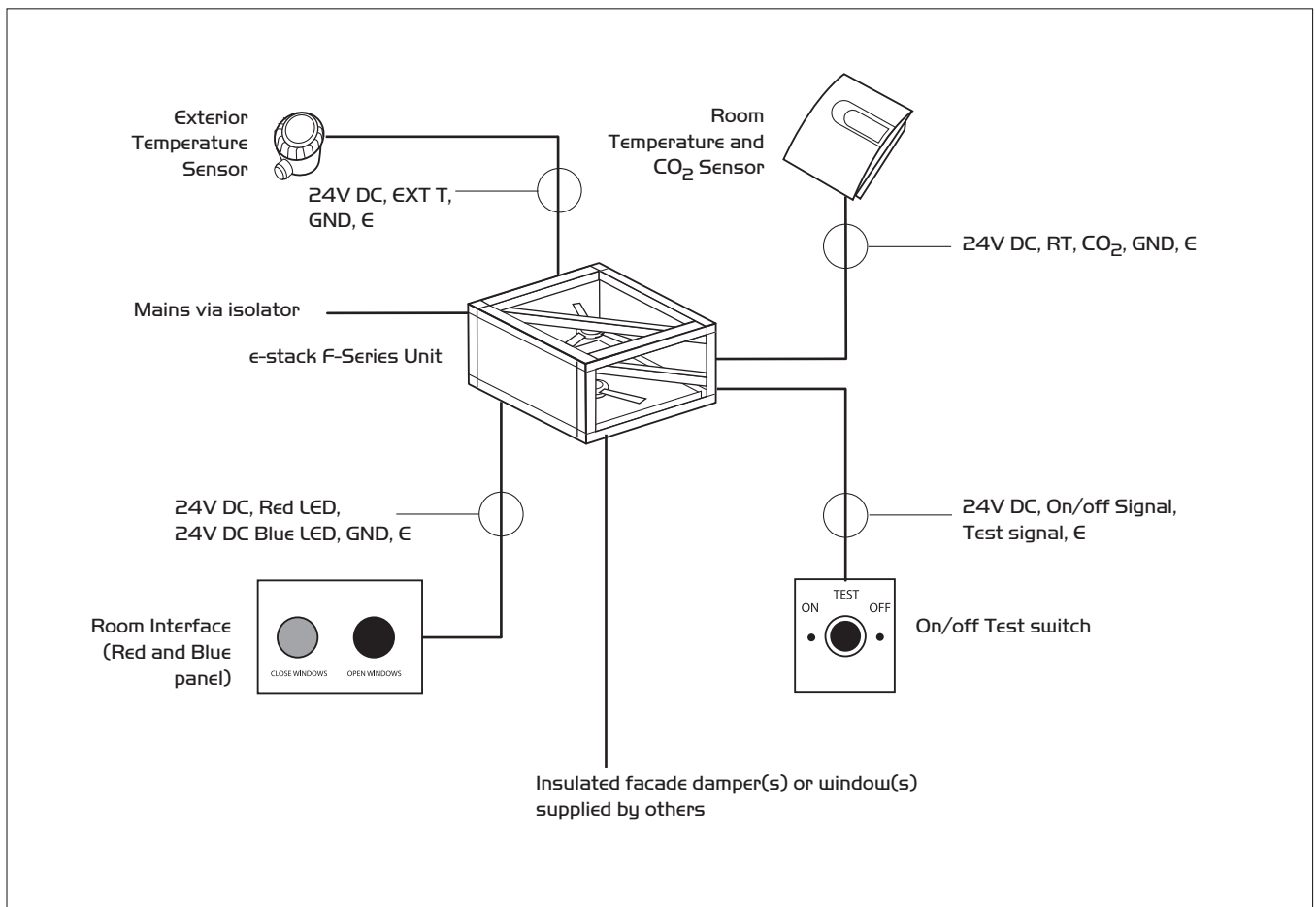
Room Indicator Panel Dimensions (mm)

146mm wide x 85mm high

IMPORTANT

For good EMC engineering practice, any sensor cables or switched live cables should not be placed within 50mm of other cables or on the same metal cable tray as other cables.

Figure 8. The typical wiring layout is shown below.



2.8 Wiring Diagrams

Figure 9. Wiring: Multiple Exterior Temperature Sensors.

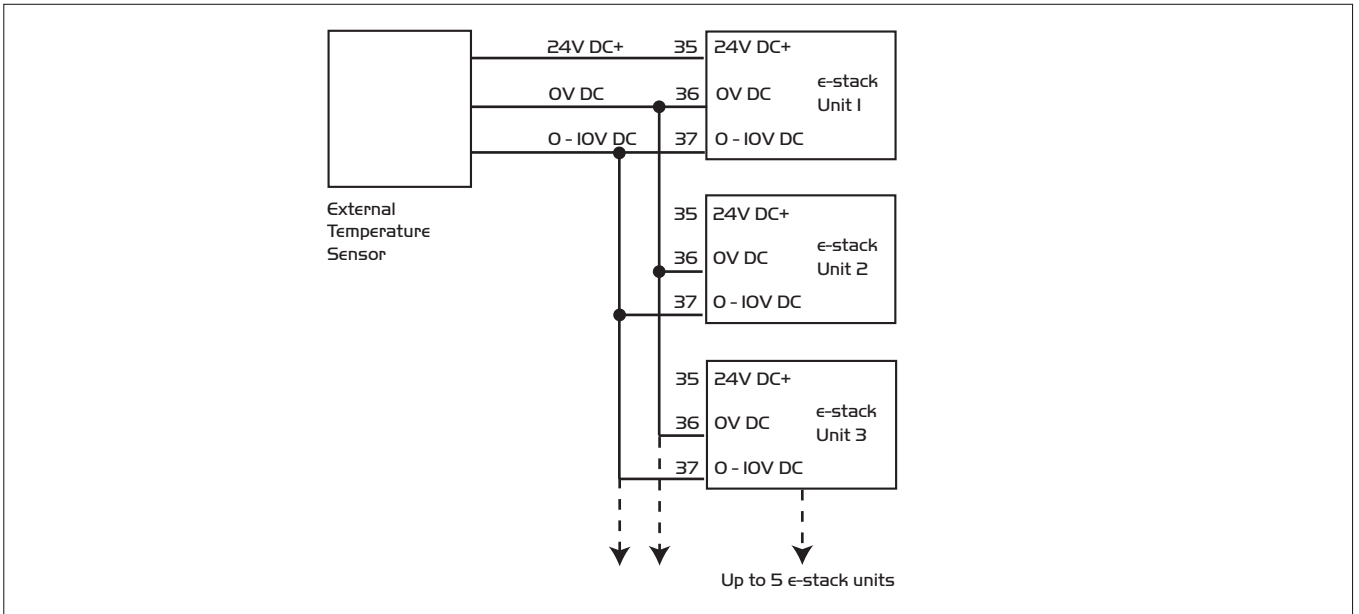
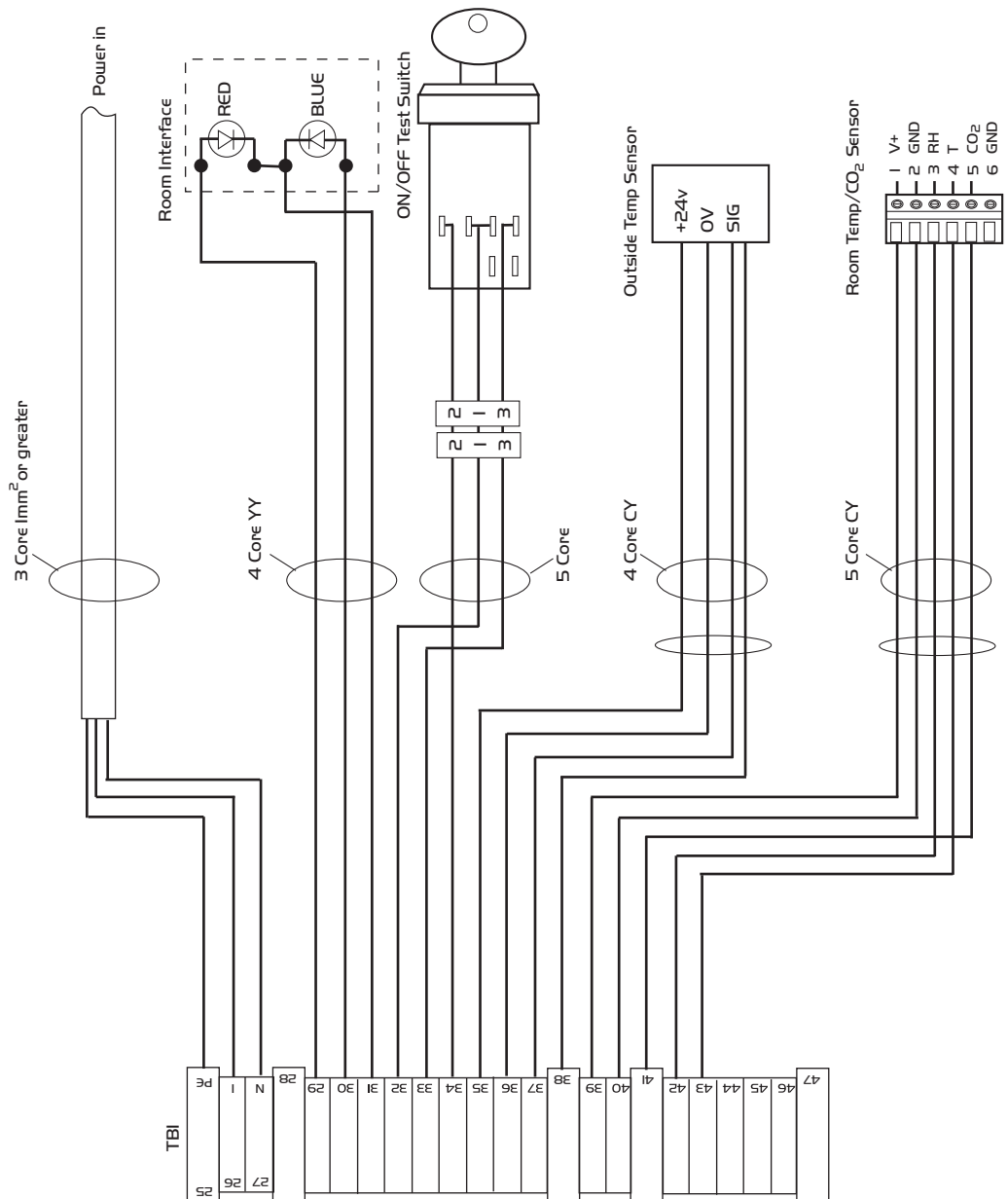
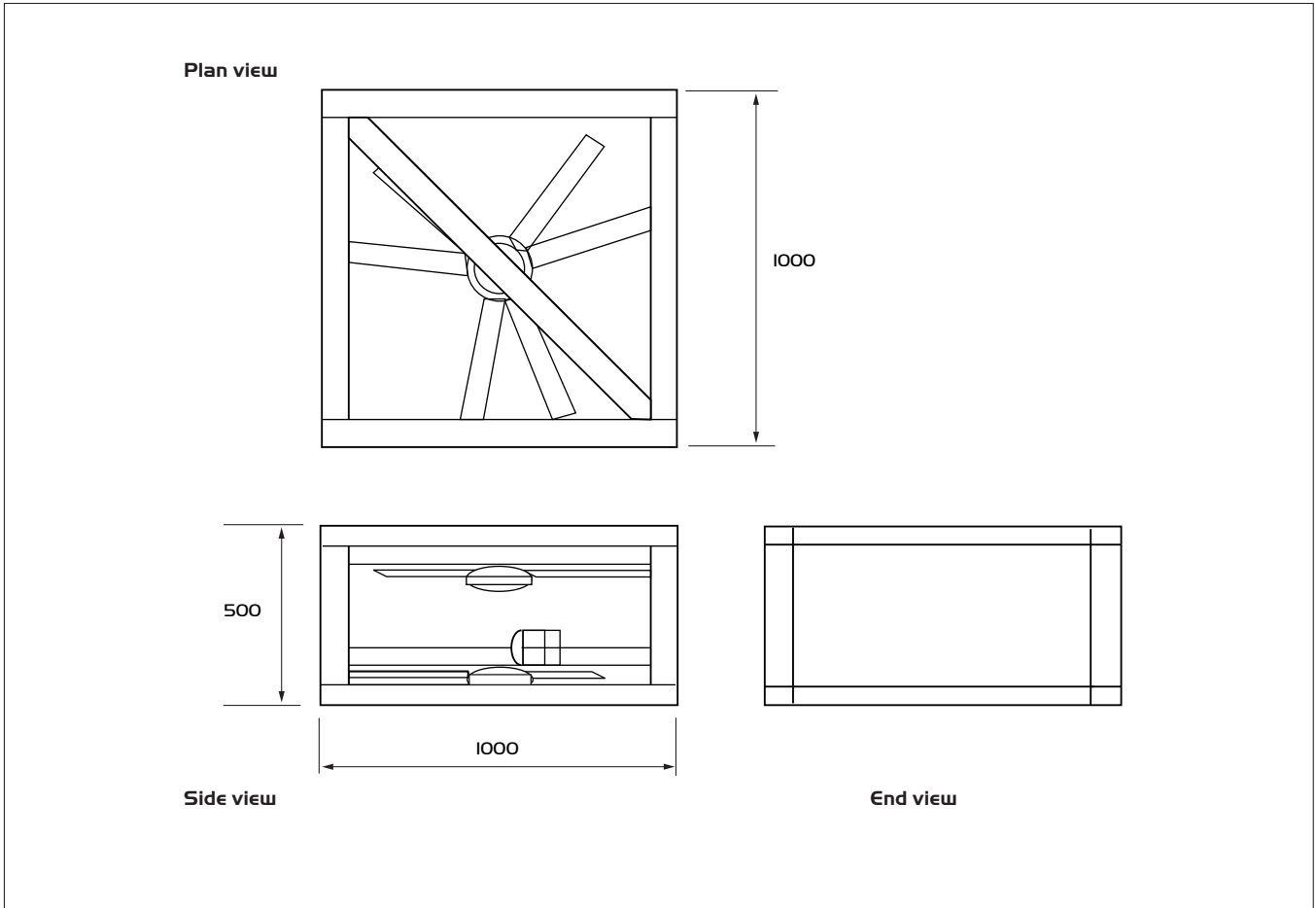


Figure 10. Electrical connections. Lower terminal strip connections are to be wired to by a site electrician when installing the units. Please use MIG compression glands provided for field wiring.



3.0 Dimensions e-stack F-Series (mm)

Figure II.



4.0 Maintenance

A 6 monthly inspection is required and any debris removed.

5.0 Warranty

The 3 year warranty starts from the day of delivery and includes parts and labour for the first year. The remaining 2 years covers parts only. This warranty is conditional on planned maintenance being undertaken.

6.0 Service Enquiries

Nuaire can assist you in all aspects of service. Our service department will be happy to provide any assistance required initially by telephone and if necessary arrange for an engineer to call.



Telephone 029 2085 8400

DECLARATION OF INCORPORATION AND INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE

We declare that the machinery named below is intended to be assembled with other components to constitute a system of machinery. All parts except for moving parts requiring the correct installation of safety guards comply with the essential requirements of the Machinery Directive. The machinery shall not be put into service until the system has been declared to be in conformity with the provisions of the EC Machinery Directive.

Designation of machinery: e-stack F-Series
Machinery Types: Natural Ventilation System
Relevant EC Council Directives: 2006/42/EC (Machinery Directive)
Applied Harmonised Standards: BS EN ISO 12100-1, BS EN ISO 12100-2, EN60204-1, BS EN ISO 9001, BS EN ISO 13857
Applied National Standards: BS848 Parts 1, 2.2 and 5

Signature of manufacture representatives:

Name:	Position:	Date:
1) C. Biggs 	Technical Director	29. 12. 10
2) A. Jones 	Manufacturing Director	29. 12. 10



Note: All standards used were current and valid at the date of signature.

CE DECLARATION OF CONFORMITY

We declare that the machine named below conforms to the requirements of EC Council Directives relating to Electromagnetic Compatibility and Safety of Electrical Equipment.

Designation of machinery: e-stack F-Series
I & M Serial No.: 671531
Machinery Types: Natural Ventilation System
Relevant EC Council Directives: 2004/108/EC (EMC), 2006/95/EC (Low Voltage Directive)
Applied Harmonised Standards: EN55014-1, EN55014-2, EN61000-3-2, EN61000-3-3, EN60335-2-80
Basis of Self Attestation: Quality Assurance to BS EN ISO 9001 BSI Registered Firm Certificate No. FM 149

Signature of manufacture representatives:

Name:	Position:	Date:
1) C. Biggs 	Technical Director	29. 12. 10
2) A. Jones 	Manufacturing Director	29. 12. 10

Nuaire Ltd,
 Western Industrial Estate,
 Caerphilly CF83 1NA.

Note: All standards used were current and valid at the date of signature.

INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE OF NUAIRE VENTILATION EQUIPMENT

To comply with EC Council Directives 2006/42/EC Machinery Directive and 2004/108/EC (EMC).

To be read in conjunction with the relevant Product Documentation (see 2.I)

1.0 GENERAL

1.1 The equipment referred to in this Declaration of Incorporation is supplied by Nuaire to be assembled into a ventilation system which may or may not include additional components.

The entire system must be considered for safety purposes and it is the responsibility of the installer to ensure that all of the equipment is installed in compliance with the manufacturers recommendations and with due regard to current legislation and codes of practice.

2.0 INFORMATION SUPPLIED WITH THE EQUIPMENT

2.1 Each item of equipment is supplied with a set of documentation which provides the information required for the safe installation and maintenance of the equipment. This may be in the form of a Data sheet and/or Installation and Maintenance instruction.

2.2 Each unit has a rating plate attached to its outer casing. The rating plate provides essential data relating to the equipment such as serial number, unit code and electrical data. Any further data that may be required will be found in the documentation. If any item is unclear or more information is required, contact Nuaire.

2.3 Where warning labels or notices are attached to the unit the instructions given must be adhered to.

3.0 TRANSPORTATION, HANDLING AND STORAGE

3.1 Care must be taken at all times to prevent damage to the equipment. Note that shock to the unit may result in the balance of the impeller being affected.

3.2 When handling the equipment, care should be taken with corners and edges and that the weight distribution within the unit is considered. Lifting gear such as slings or ropes must be arranged so as not to bear on the casing.

3.3 Equipment stored on site prior to installation should be protected from the weather and steps taken to prevent ingress of contaminants.

4.0 OPERATIONAL LIMITS

4.1 It is important that the specified operational limits for the equipment are adhered to e.g. operational air temperature, air borne contaminants and unit orientation.

4.2 Where installation accessories are supplied with the specified equipment eg. wall mounting brackets. They are to be used to support the equipment only. Other system components must have separate provision for support.

4.3 Flanges and connection spigots are provided for the purpose of joining to duct work systems. They must not be used to support the ductwork.

4.4 In the event of RF interference the fan may change speed. This is normal and will have no adverse effect on the fan. The speed will return to normal once the interference has subsided.

5.0 INSTALLATION REQUIREMENTS

In addition to the particular requirements given for the individual product, the following general requirements should be noted.

5.1 Where access to any part of equipment which moves, or can become electrically live are not prevented by the equipment panels or by fixed installation detail (eg ducting), then guarding to the appropriate standard must be fitted.

5.2 The electrical installation of the equipment must comply with the requirements of the relevant local electrical safety regulations.

5.3 For EMC all control and sensor cables should not be placed within 50mm or on the same metal cable tray as 230V switched live, lighting or power cables and any cables not intended for use with this product.

6.0 COMMISSIONING REQUIREMENTS

6.1 General pre-commissioning checks relevant to safe operation consist of the following:

Ensure that no foreign bodies are present within the fan or casing.

Check electrical safety. e.g. Insulation and earthing.

Check guarding of system.

Check operation of Isolators/Controls.

Check fastenings for security.

6.2 Other commissioning requirements are given in the relevant product documentation.

7.0 OPERATIONAL REQUIREMENTS

7.1 Equipment access panels must be in place at all times during operation of the unit, and must be secured with the original fastenings.

7.2 If failure of the equipment occurs or is suspected then it should be taken out of service until a competent person can effect repair or examination. (Note that certain ranges of equipment are designed to detect and compensate for fan failure).

8.0 MAINTENANCE REQUIREMENTS

8.1 Specific maintenance requirements are given in the relevant product documentation.

8.2 It is important that the correct tools are used for the various tasks required.

8.3 If the access panels are to be removed for any reason the electrical supply to the unit must be isolated.

8.4 A minimum period of two minutes should be allowed after electrical disconnection before access panels are removed. This will allow the impeller to come to rest.

NB: Care should still be taken however since airflow generated at some other point in the system can cause the impeller to "windmill" even when power is not present.

8.5 Care should be taken when removing and storing access panels in windy conditions.



Western Industrial Estate
Caerphilly United Kingdom
CF83 INA
T: 029 2085 8200
F: 029 2085 8300
E: ahu@nuaire.co.uk
W: www.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.