



# BESPOKE BOXER

## Air Handling Units 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.
- This unit must be earthed.
- 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.
- Isolate from power supply before removing any covers. During installation / maintenance ensure all covers are fitted before switching on the mains supply.
- 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.
- Sharp edges need to be handled with caution; most of the air handling equipment will contain sharp edges on the internal and external surfaces. Care should be taken to ensure that all personnel are aware of this and precautions are implemented to ensure no wounding is caused.
- 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.

## 1.4 Activity Guidelines

**Component parts are usually not fitted with safety guards i.e. fan inlet. The casing of the unit acts as a protective guard for all component parts.**

**Please ensure that prior to commencing any activity, the following guide lines are adhered to:**

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.

During installation, commissioning, operation and maintenance of an air handling unit, operatives may be exposed to hazards including, rotating components, refrigerants and high voltage electricity. If misused or handled improperly, each of these items has the potential to cause bodily injury or death.

Identification and recognition of inherent hazards is the obligation of responsible personnel. They must protect themselves and others by proceeding with care and consideration to health and safety measures.

All risk assessments have been carried out and are in place prior to carrying out any activity.

The relevant protective equipment and attire is worn by each relevant member of staff.

That the unit Nuaire have supplied meets the standards written in the technical specification.

The necessary lifting gear and site plant is available to lift and position the unit in accordance to the technical drawings.

The Plant is fully isolated from the mains supply and allowed to run down for a minimum of five to ten minutes before opening any access door prior to the commencement of any maintenance work.

When maintenance work is finished, please ensure that the unit is left in a clean state, and all access doors /panels are fastened and locked correctly (locked handle returned to holder).

At no point should a unit be used for the storage of tools or working equipment.

## 2.0 INTRODUCTION

The information contained in this document provides details of installation, operation and maintenance for installers and users of the BESPOKE BOXER Air Handling Units.

The BESPOKE BOXER range of units are manufactured from Magnelis corrosion resistant steel, with either 30 or 50mm double skinned panels and anodized aluminium frame; Mechanical strength, D1; Leakage class, L2; Thermal transmittance, T4; Thermal bridging, TB4.

The range has high efficiency centrifugal fans and where applicable, high efficiency thermal wheel, plate heat exchanger or run-around coils. A G4 pre-filter and F7 main filter on supply as standard with M5 filtration of the extract air. BPS range includes optional heating (LPHW, Electric or Gas Fired) and cooling (Chilled water, DX).

A wide selection of ancillaries are available, including attenuators, dampers, frost coils, recirculation modules and weather terminals.

BESPOKE BOXER units are delivered to site control free as standard, allowing them to be integrated with control systems supplied by others.

General information regarding performance and specification for the equipment can be obtained from our technical literature, and/or project specific documentation.

### 2.1 Receipt Of Equipment

**To ensure that the delivery vehicle is loaded according to the planned method of offloading, Nuaire should be notified at order stage to ensure coordination.**

**Where possible, double deck sections leave Nuaire fully assembled. For more information on unit delivery please contact our commercial orders team on 02920 858 200.**

All equipment is inspected prior to despatch and leaves the factory in good condition. Upon receipt of the equipment an inspection should be made and any damage indicated on the delivery note.

Particulars of damage and/or incomplete delivery should be endorsed by the driver delivering the goods before offloading by the purchaser.

No responsibility will be accepted for damage sustained during the offloading from the vehicle or on the site thereafter.

All claims for damage and/or incomplete delivery must be reported to Nuaire within two days of receipt of the equipment.

## 2.2 Handling Of Equipment

The images in Figure 1 show examples of typical lifting methods. Actual lifting plan and risks must be assessed by competent personnel before moving the unit.

When offloading, care must be taken to ensure that the AHU is kept level at all times.

To ensure that no roof damage occurs additional timber packaging must be used.

The weight of the unit modules and palletised items are displayed on the packaging.

Some of the modules have an uneven weight distribution, and this will be indicated by labelling where appropriate.

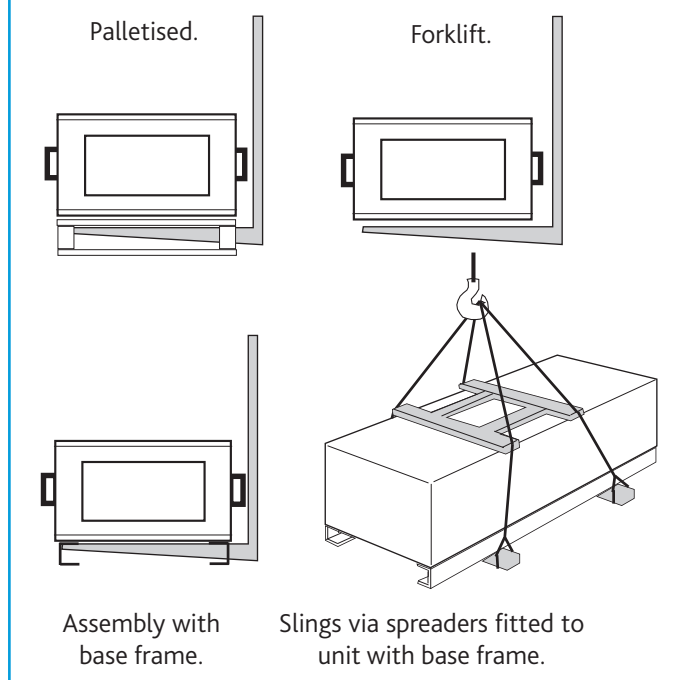
Offloading and positioning of the equipment is the responsibility of the purchaser. Items should only be lifted by competent personnel following appropriate risk assessment.

Spreaders should be used when lifting with slings to avoid damage to the casings. Care must be taken to ensure that slings are correctly positioned to avoid crushing and twisting of the unit casings. Care should be taken to ensure the units remain upright and level at all times.

Where channels and/or support frames are bolted to the underside of the unit casing, slings or fork-lift arms should be positioned in the base frame lifting apertures, full details of which are in the following section.

If lifting lugs / eyes have been supplied / or fitted it is recommended that they are used.

### 1 Lifting Methods

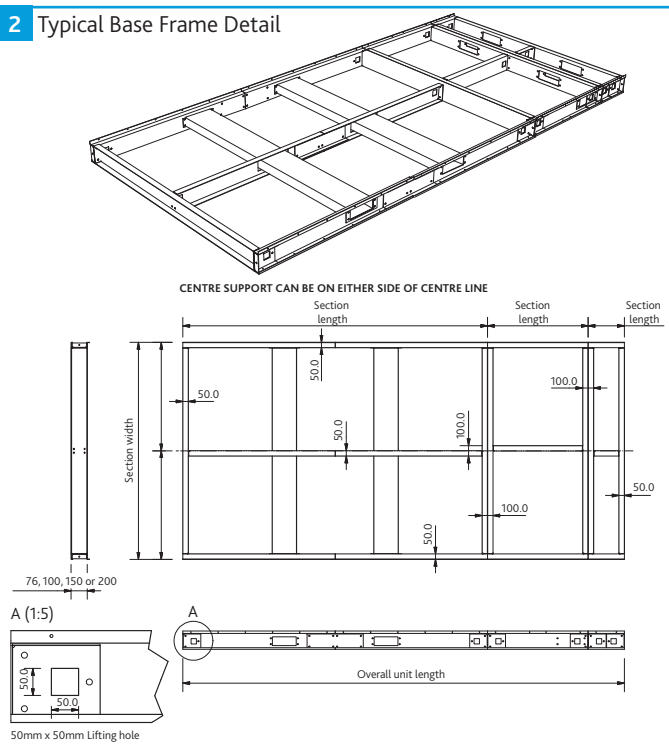


## 2.3 Base Frame Lifting Points

When units are constructed of multiple modules each module will have its own individual base frame, which is then connected to the next to assemble the full system.

All base frame sections will have 50mm square lifting holes at the end of each side to enable lifting. In addition to this, covered fork lifting channels are located across the width of the base frame, if the module length is sufficient to allow this. For shorter modules the fork lifting points will be along the length of the section, without a covered channel (Figure 2).

### 2 Typical Base Frame Detail



## 2.4 Equipment Protection

Unless otherwise specified, unit sections will be delivered to site covered in “shrink wrap” polythene, which should provide a more than adequate level of protection against inclement weather. Should alternative methods of unit protection be required (i.e. timber, Corex, or flame retardant materials), Nuairé should be notified of the specific requirements at the pre- contract stage. Waste must be disposed of by a registered waste carrier in accordance to national regulations.

## 2.5 Equipment Storage

Units that are intended for external locations are generally not fully weatherproofed until their installation, including ductwork connections, is complete.

The equipment must be stored in a dry, internal location. Ductwork connection apertures should be sealed against the ingress of dust, water and vermin. Do not stack units, modules or components that are not designed to be stacked.

Where fans are to be stored or bonded for extensive periods either in warehouse, under site conditions or in the installed state, we make the following additional recommendations:

- Motors should be stored at ambient temperatures between  $-16^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$  and at relative humidity (RH) below 90%RH.
- Fans should be retained in their original packaging and stored on level ground.
- Fans should be protected from damage, excess moisture and ingress of dirt, dust or other contaminants.
- Relax the belt tension on belt driven equipment.
- Turn fan and motor shafts at three monthly intervals to prevent the brinelling effect on the bearings. Brinelling is a flattening or settlement of the shaft in the bearing housing.

The conditions above will apply and any deviation from them could nullify the warranty.

### 3.0 MECHANICAL INSTALLATION

Installation must be carried out by competent personnel, in accordance with good industry practice, with the appropriate authority and in conformance with all statutory and governing regulations.

The unit should stand upright and level on the floor, foundation or supporting steelwork which should be rigid, flat and level and should be capable of supporting the weight of the unit including water or refrigerant in the coils.

Nuaire takes no responsibility for the coordination of support.

#### 3.1 Installation Location

To prevent possible reintroduction of contaminated air through the outside air intake, the unit should be located away from building flue stacks or exhaust ventilators.

Once assembled and in position, sufficient free space must be available adjacent to the unit for future inspection, maintenance, component service, repair and replacement and connection of services.

It is recommended that at least the unit width (vertically arranged units); or half the overall unit width (horizontally arranged units) + 100mm be allowed. **For units with a horizontal layout, access is typically required to both sides of the unit casing.**

**Sufficient clearance for U-traps on condensate drain and overflow connections should also be considered by the purchaser.**

#### 3.2 Air Leakage

Loading, transportation, off loading and site positioning can cause the air handling unit structures to move, therefore panel seals will not always remain fully intact.

It is inevitable that in such cases, re-sealing of the units panels and joints may have to be carried out on site for the air-handling units to achieve the required leakage classification.

Door locking mechanisms may also have to be adjusted.

Nuaire cannot be held responsible for the units failing a site leakage test if the above have not been carried out correctly.

#### 3.3 Modular Unit Section Joints

All sections should be accurately aligned and adjoined prior to bolting together using the fixings and gaskets provided by Nuaire.

Modular units are supplied with matching internal connection plates with a single bolt hole provided to each corner through which the sections are bolted together. Unit access panels must be removed to perform the assembly operation. Plates will either have clearance holes, or one face with a threaded insert and the other with a clearance hole.

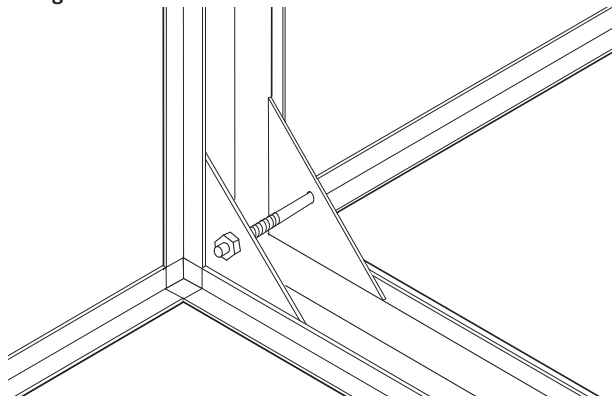
In instances of restricted access to the internal corner bolts, external clamps can be provided to facilitate external connection of modules.

A sealing gasket should be applied as necessary to the mating faces of the unit frames before bolting together.

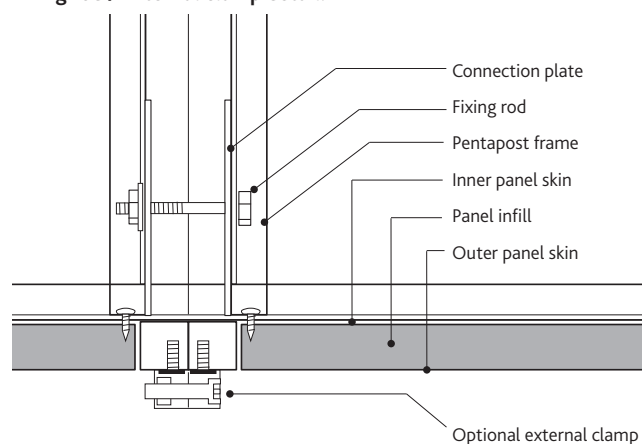
Air leakage, air blow marks to the unit casings and unacceptable noise levels could result if the correct installation procedures are not adhered to.

#### 3 Joint Details

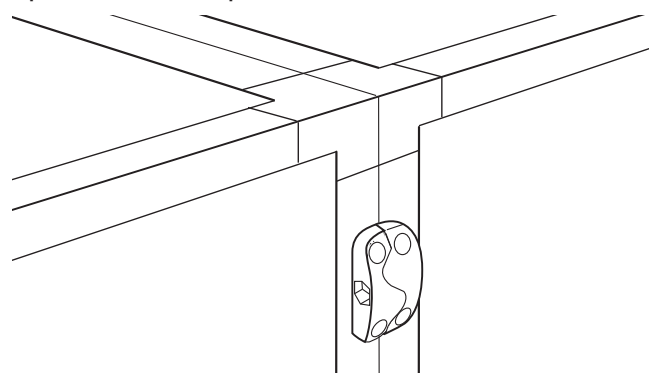
##### Fixing rod.



##### Fixing rod / External clamp detail.



##### Optional external clamp.



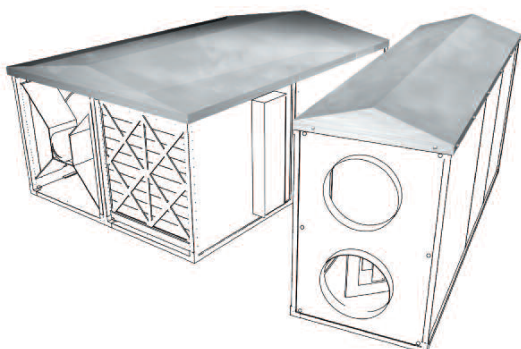
#### 3.4 Weather Resistant Units

Weather resistant units in multiple sections will have sectional roof components that must be fitted and sealed after the unit sections are bolted together. All necessary nuts, bolts, washers and sealant are supplied with each unit and are normally bagged and located within the fan section. Suitable mastic sealant is to be provided by others.

The equipment must not be exposed to the weather in an unassembled or partially assembled state. All ductwork, sealing and assembly work must be completed before the unit can be considered weather resistant.

Where the weatherproof roof assembly of two sections meet, a weatherproof cover strip must be applied to seal the seam, this will be supplied with the unit.

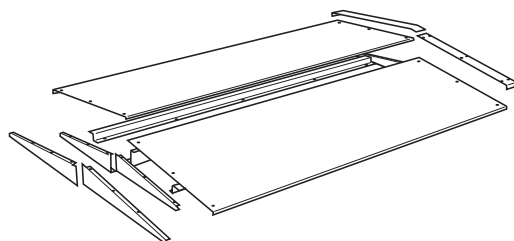
4 Units With Weatherproof Roofs



Above Left: Horizontal unit with weather kit.

Above Right: Vertical (Stacked) unit with weather kit.

Below: Roof assembly detail.



3.5 Thermal Wheel Transport Packing

Thermal wheel modules can be delivered with transport packing blocks, ensure any transport blocks are removed prior to operation of the thermal wheel.

The thermal wheel belt is unhooked to prevent the thermal wheel belt from stretching during transportation.

The thermal wheel motor is attached via a hanging motor bracket. To install the belt lift the spring motor upwards, hook the belt onto the pulley and slowly release the motor.

**Ensure that the rotation sensor is aligned with the sensing studs, as this can become misaligned during transport/installation thus causing a fault signal.**

3.6 Connections

3.6.1 Ductwork

Nuaire do not provide ductwork connections with units, instead the open ended framework should be utilised. Spigots are available as an option; refer to technical documents for information relating specifically to the manufactured unit.

3.6.2 Coils

When connecting coils, special care is needed to allow for expansion and contractions. Prior to any equalising connection, ensure that the thermostatic expansion valve for the DX coil is securely fitted.

Each coil section should be trapped and special care should be taken to ensure that there are no vertical rising condense lines, unless pumped.

**If a frost coil is not fitted then appropriate control methods must be taken to prevent the coils, filters and other equipment from freezing (by others).**

3.6.3 Pipework

Care should be taken to ensure that all pipework is adequately supported, therefore ensuring that no additional weight is added to the unit. Extra precaution should be taken to prevent pipe damage on site, as the fragile pipework will protrude from the side of the unit.

3.6.4 Condensate Drains

Modules that incorporate heat recovery, cooling coils or humidifiers may produce condensation during use. An insulated drip tray and drain connection is provided, and should be connected to a suitable drainage point.

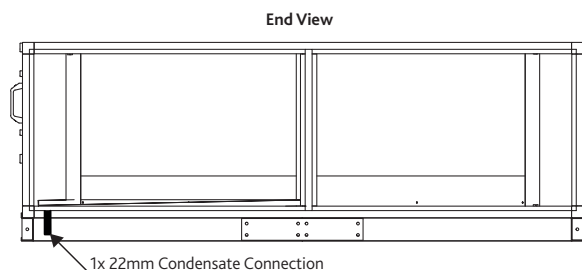
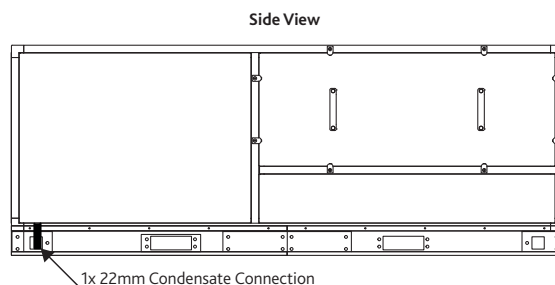
Where plate heat exchangers are in use, condensate drainage points are provided. It is the installers' responsibility to ensure connection to the appropriate trap and drainage. Due to the bespoke nature of these units condensate connection locations can vary during the design process and should be confirmed on an individual basis.

Horizontal plate heat exchangers have 2x 22mm drain connections. Connections are typically located on the underside of the PHX module at the extract inlet and extract outlet (Figure 5).

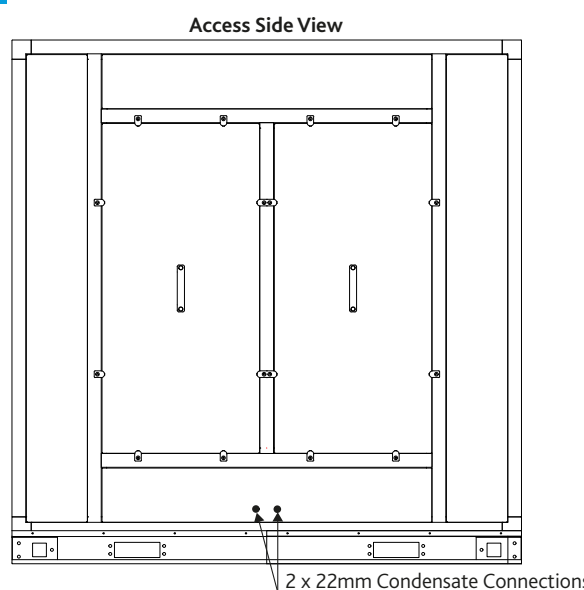
Vertical plate heat exchangers have 2x 22mm drain connections. Connections are typically located at the bottom of the access side of the PHX module (Figure 6).

Provision may be required, and if so, should be made, for the fitting of a correctly sized cleanable trap to each drain connection.

5 Condensate Connections For Horizontal Units With PHX



6 Condensate Connections For Vertical Units With PHX



**Under Negative Pressure**

If the condensate tray is located at the inlet side of the fan (i.e. under negative pressure) then calculate the values of A & B as shown below (Figure 7).

**10Pa = 1mm H2O**

A = Fan inlet pressure (mm H2O) + 25mm (minimum). Allow 100mm for these units if pressure is unknown.

B = A/2 (minimum).

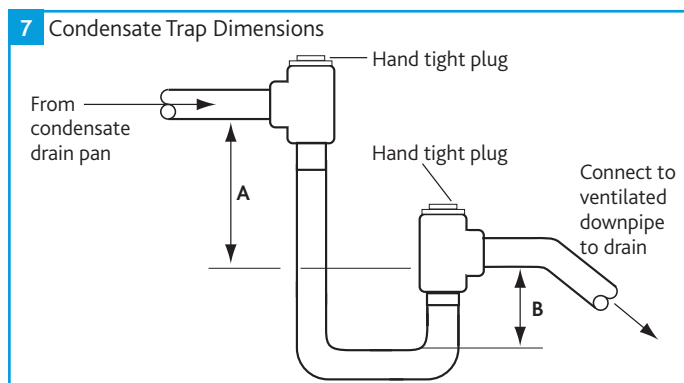
**Under Positive Pressure**

If the condensate tray is located at the outlet side of the fan (i.e. under positive pressure) then calculate the values of A & B as shown below (Figure 7).

A = 25mm (minimum).

B = Fan outlet pressure (mm H2O) + 25mm (minimum).

Allow 100mm for these units if pressure is unknown.



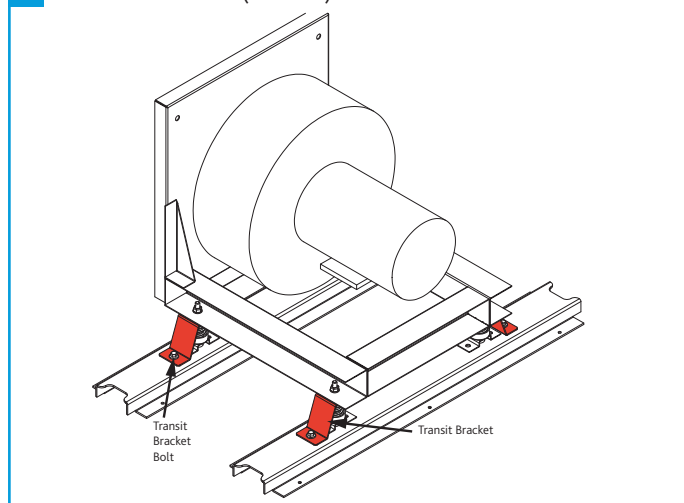
**3.7 Fan Transit Brackets (AC Motors)**

Transit brackets are factory fitted to prevent the blowers moving during transport and must be removed to prevent excessive vibration during operation. The specific location and number of transit brackets varies by unit. Check the unit drawing for the location and number of blowers.

Before use ensure the transit brackets have been removed from each blower within the unit (Figure 8).

- Loosen and remove the transit bracket bolt.
- Remove the transit bracket away from the anti-vibration mount. Repeat for each bolt.
- Store the transit brackets and bolts in a safe location if required for future use.

**8 Fan Transit Brackets (AC Fans)**



**3.8 Filters**

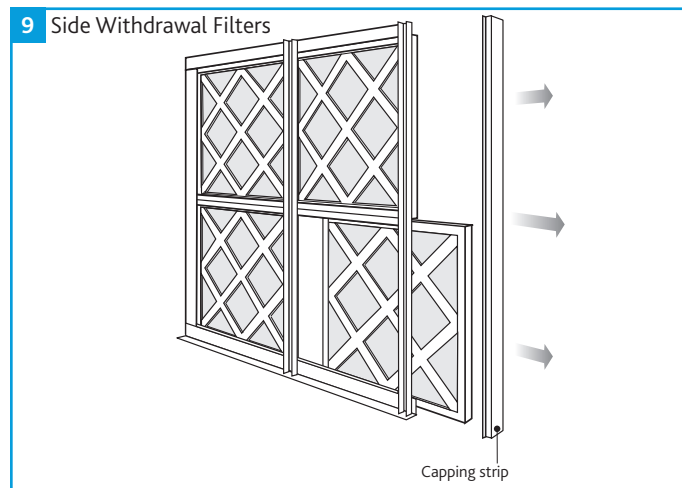
Filters will be provided in banks on suitable slide rails, so that they can be withdrawn. Magnehetic gauges are offered as standard unless otherwise instructed.

**3.8.1 Spare Filters**

If specified with order, spare sets of filters will be provided and should be stored in a clean, dry environment. Should you require spare filter media, please contact Nuaire.

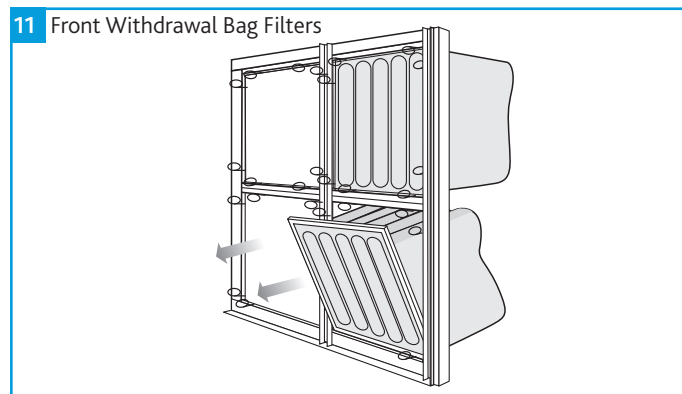
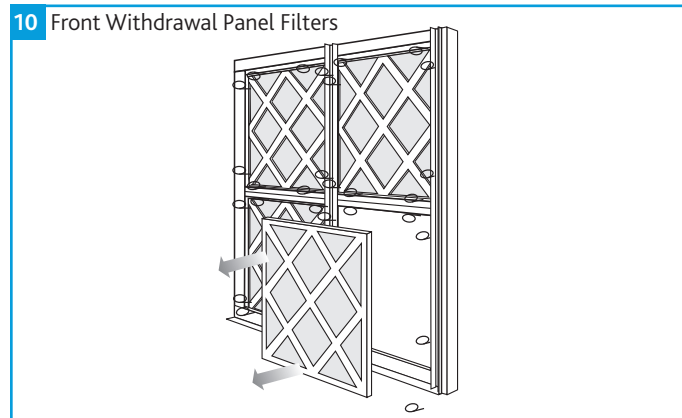
**3.8.2 Panel & Bag Filters with Side Withdrawal**

Insert the filters by sliding them into the railing provided. If specified, blanking filters are fitted at the end of the railing.



**3.8.3 Panel & Bag Filters with Front Withdrawal**

Insert filters squarely into the frames and retain using retaining P-clips.



### 3.9 Control Dampers

Care should be taken to ensure that all spring return actuators have stopped running and completed their stroke. If not, the connection needs to be loosened and the actuator should be left to drive until the motor stops running.

When the unit is powered, dampers should be checked to ensure that they operate freely and close tightly.

### 3.10 Final Inspection

- Thoroughly inspect the unit after installation is complete.
- The inside of the unit should be checked; any objects which may have been left should be cleared.
- Check fan impellers, scrolls and outlets.
- Remove any transit protection fittings that may be attached to the fan or motor base frame, and that all traps are primed.
- Close all access door seals for damage, and replace any panels that have been removed.

## 4.0 ELECTRICAL INSTALLATION

The electrical wiring must be carried out by competent persons, in accordance with good industry practice and should conform to all governing and statutory bodies i.e. IEE, CIBSE etc.

Ensure suitable earth bonding is maintained on all AHU sections.

### 4.1 Wiring (If Applicable)

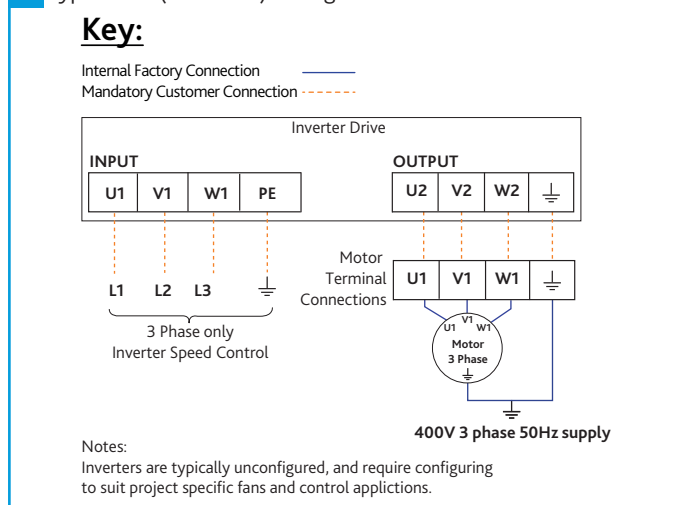
#### 4.1.1 AC Motor Fans

Inverter speed control is required for these units and can be provided by Nuair as optional extras, any inverters should be configured to match the design and running frequency that is provided on the datasheet of each specific fan.

Care should be taken to ensure that the rotation of three phase motors correspond with the direction shown on the frame.

All electrical connections to the fan are to be made using flexible cable and containment materials to allow for the movement of anti-vibration mounts.

#### 12 Typical Fan (AC Motor) Wiring



#### 4.1.2 EC Motor Fans

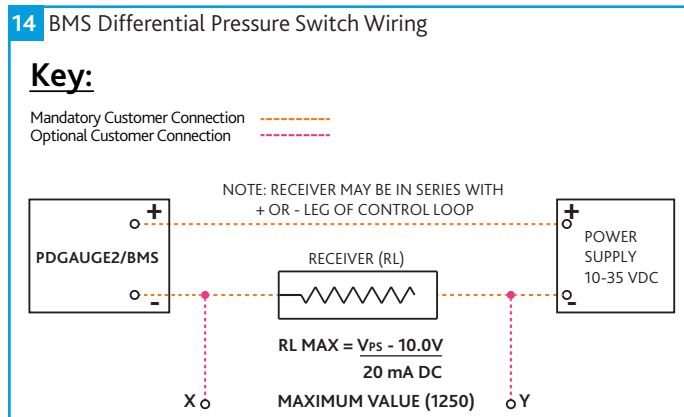
#### 13 Typical Fan (EC Motor) Wiring

No.	Conn.	Desig.	Function / Assignment
KL1	1	L1	Mains supply connection, supply voltage 3~380-480 VAC; 50/60 Hz
KL1	2	L2	Mains supply connection, supply voltage 3~380-480 VAC; 50/60 Hz
KL1	3	L3	Mains supply connection, supply voltage 3~380-480 VAC; 50/60 Hz
PE		PE	Earth connection, PE connection
KL2	1	NO	Status relay, floating status contact; normally open; close with error
KL2	2	COM	Status relay; floating status contact; changeover contact; common connection; contact rating 250 VAC / max. 2 A (AC1) / min. 10 mA
KL2	3	NC	Status relay, floating status contact; break with error
KL3	1	RSA	Bus connection RS-485, RSA, MODBUS RTU; SELV
KL3	2	RSB	Bus connection RS-485, RSA, MODBUS RTU; SELV
KL3	3/10	GND	Signal ground for control interface; SELV
KL3	4	Ain1 U	Analogue input 1, set value: 0-10 V, Ri = 100 kΩ, parametrisable curve, only usable as alternative to input Ain1; SELV
KL3	5	+ 10 V	Fixed voltage output 10 VDC, +10 V ±3%, max. 10 mA, short-circuit-proof, power supply for external devices (e.g. potentiometer); SELV
KL3	6	Ain1 I	Analogue input 1, set value: 4-20 mA; Ri = 100 Ω, parametrisable curve, only usable as alternative to input Ain1 U; SELV
KL3	7	Din1	Digital input 1: enabling of electronics, Enabling: open pin or applied voltage 5-50 VDC. Disabling: bridge to GND or applied voltage <1 VDC. Reset function: triggers software reset after a level change to <1 VDC; SELV
KL3	8	Din2	Digital input 2: parameter set switch 1/2, according to EEPROM setting, the valid/used parameter set can be selected via bus or via digital input DIN2. Parameter set 1: open pin or applied voltage 5-50 VDC. Parameter set 2: bridge to GND or applied voltage <1 VDC; SELV
KL3	9	Din3	Digital input 3: controller function of integrated controller, according to EEPROM setting, the controller function of the integrated controller is normally/inversely selectable per bus or per digital input. Normal: open pin or applied voltage 5-50 VDC. Inverse: bridge to GND or applied voltage <1 VDC; SELV
KL3	11	Ain2 U	Analogue input 2, actual value: 0-10 V, Ri = 100 kΩ, parametrisable curve, only usable as alternative to input Ain2; SELV
KL3	12	+ 20 V	Fixed voltage output 20 VDC, +20 V +25/-10%, max. 50 mA, short-circuit-proof, power supply for external devices (e.g. sensors); SELV
KL3	13	Ain2 I	Analogue input 2, actual value: 4-20 mA, Ri = 100 Ω, parametrisable curve, only usable as alternative to input Ain2 U; SELV
KL3	14	Aout	Analogue output 0-10 VDC, max. 5 mA, output of the current motor level control coefficient / motor speed parametrisable curve; SELV

### 4.1.3 BMS Differential Pressure Switch

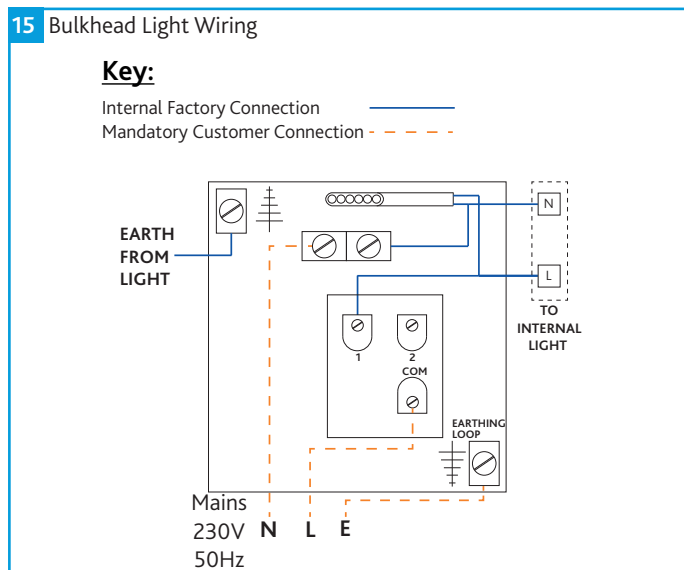
An external power supply delivering 10-35 VDC with a minimum current capability of 40ma must be used to power the control loop in which the PDGAUGE2/BMS is connected.

If the receiver requires a 1-5 volt input, insert a 250 ohm, 1/2 watt resistor in series with the current loop but in parallel with the receiver input (Figure 14). RL becomes the 250 ohm resistor and point X and Y are connected to the receiver input, point X being positive (+) and point Y negative (-) or ground.



### 4.1.4 Bulkhead Lights

Lights are designed for permanent connection to fixed wiring. This should be either a suitable lighting circuit (protected with a 5 or 6 Amp MCB or fuse) or a fused spur (with a 3 Amp fuse) via a fused connection unit.

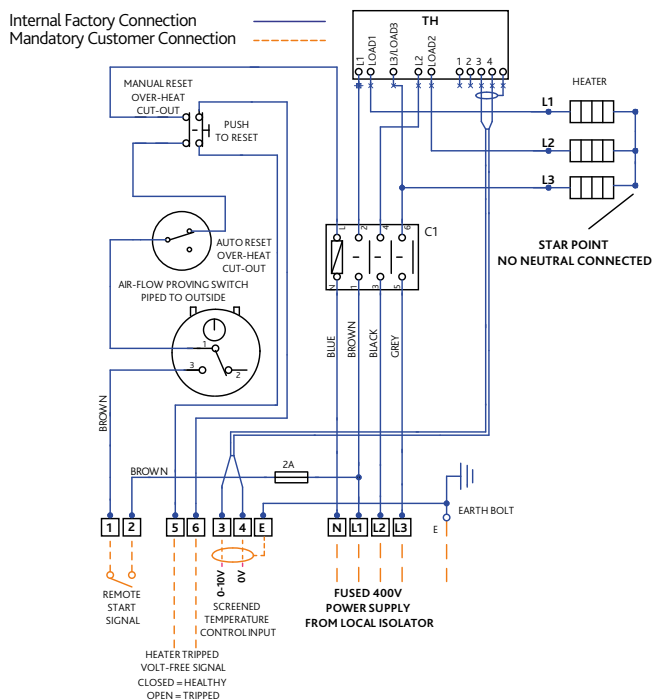


### 4.1.5 Electric Heater Wiring

For models with electric heating, the heating circuit is powered by a higher current, 400Vac 50Hz 3 phase & Neutral supplies. This must be isolated to the unit and fitted with appropriate overcurrent protection. The main supply is still required. Electric heater elements are protected by a fail-safe over-temperature switch which will disconnect the heater supply if a temperature of 80°C is reached. Once the elements cool, the switch will reset but a power cycle is required to reset the heater supply contactor.

### 16 Typical Electric Heater Wiring

**Key:**



### 4.1.6 Thermal Wheel

The thermal wheel incorporates a purge section and is fitted with a rotational drive. Any temperature sensors and enabling signal are to be provided by others.

A frequency converter with a modular design is used as the control unit; it can adjust the speed of three-phase motors. The control unit is delivered ready for operation with the factory-set parameters. Various settings can be changed with an optionally available operating unit. Error messages can be read out directly at a flashing LED.

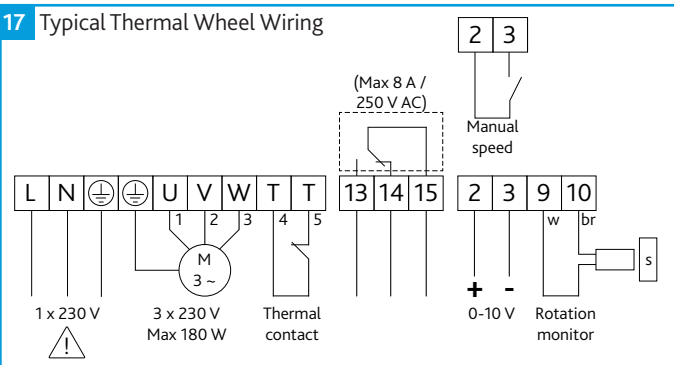
The power unit is protected from under voltage, over voltage or non-approved converter temperature.

Recommended tightening torque on terminals 0.5 Nm; maximum tightening torque 0.8 Nm.

			MicroMax370
Output Motor Side	Maximum motor power	kW	0.37
	Nominal output current	A	1.9
	Maximum output voltage	V	3 x 0-230
	Output frequency	Hz	(Fixed)4...40-100/150
Mains Input	Rated voltage	V	1x230-240 +/--15%
	Mains frequency	Hz	50/60
	Fuses	A T	10
General Data	Protection rating		IP54
	Ambient temperature	°C	-20...45
Dimensions	Air humidity	kg	1.1
	H x W x D	mm	198 x 164 x 60



17 Typical Thermal Wheel Wiring



Terminal	Description
L, N, PE	Input Voltage - Protective earth must always be connected.
U, V, W	Motor - 3Ph induction motor wired for 3x230V. Direction of rotation is changed by switching 2 of the phases.
T, T	Thermal Contact - Protects motor from overheating. Must be jumped if the temperature switch is not connected.
13, 14, 15	Alarm Relay - Closes between 14-15 on Alarm or voltage drop-out. Max 8A resistive load / 250 V AC.
2, 3	Input Signal - 0-10 V. Terminal 2 positive, Terminal 3 negative. Magnet installed with south side (S) towards transmitter. Max. gap 15mm.
9, 10	Rotation Monitor - White to Terminal 2, Brown to Terminal 3
A1, A2	Manual Speed - Max RPM when closed regardless of input signal.

5.0 COMMISSIONING

Before commissioning the unit, ensure that all equipment has been assembled in accordance with the installation procedure all instances where the unit is in operation the access doors should remain closed; at no time, during maintenance or otherwise, should anyone be inside a unit whilst it is in operation.

5.1 Commissioning Checklist

- All equipment received is according to specification/order.
- Any damage to unit identified.
- Fan base shipping restraints / Fixing Brace removed (if applicable).
- The correct installation procedure has been carried out in accordance to Nuair's recommendations.
- Any fan and thermal wheel motor pulleys are properly aligned.
- Anti-vibration mounts are adjusted accordingly.
- Check / adjust fan and thermal wheel belt tension.
- Rotate fan impellers and motors to ensure they run freely.
- Check any additional bearings and couplings (where fitted manually).
- Condensate drain traps are checked. Check all filters are correctly fitted. Ensure ductwork is complete.
- Check electrical supply voltage and tightness of all electrical connections.
- Ensure control damper operation.
- Ensure access panels and doors are fitted properly and secure.
- Check fan motor current draw.

5.2 Fan and Motor

Care should be taken to ensure that the fan and motor run freely and that the fan is rotating in the correct direction.

The electrical current being drawn by motors should not exceed the manufacturers recommendations (specified on the motor plate). If the current exceeds this, check the fan volume flow rate and the static resistance.

Inverters should be configured to match the design and running frequency that is provided on the datasheet of each specific fan.

6.0 MAINTENANCE

**Before commencing work make sure that the unit is electrically isolated from the mains unit and sufficient time has passed to allow the fans to run down.**

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.

Motors are fitted with 'sealed for life' bearings and do not require any lubrication.

6.1 Fans

Please refer to general arrangement drawings for details of the type of fan and drive that is fitted. Maintenance guidelines for all fans are beyond this manual, please contact Nuair for specific documents.

Before any work is carried out, please ensure that:

- The power supply to the motor is switched off.
- The fan impeller is at rest.
- The unit power supply is isolated to prevent uncontrolled running of the fan during maintenance work.

In general, fans should be inspected twice a year, and care should be taken to ensure that any unusual vibration or sound is investigated as an urgent matter. **In cases of heavy duty operation, maintenance intervals are to be established by the operator.**

Access to the fan section is via hinged or lift-off panels. Cable entry must be made through the apertures provided. Screwed glands with cable restraint devices should be used.

6.1.1 General Fan Maintenance

- Access to the fan is normally gained by opening the hinged access doors, in some instances there will be a turn mechanism (1/4 turn) to release and lift panels.
- Care should be taken to remove any build-up of dust (a light vacuum or light brushing will normally take care of this) Do not use a steam or any other high pressure cleaners.
- Inspect the connection between the fan and unit for any damage or wear and tear.
- Check all fixings are secure.
- In accordance with BSEN1886:2007 access doors to the fan modules are lockable. As such, it must be ensured that a padlock is used to prevent access when fan is in operation, or coming to rest (padlock supplied by others).

6.1.2 Bearings

Fan bearings should be manually checked at regular intervals for condition. Standard fan bearings are supplied as 'sealed for life' and have an anticipated life of 40,000 hours.

### 6.1.3 Rotation

Ensure that the directions of rotation of the driving motor are checked and operating correctly.

## 6.2 Filters

When removing the filter access panels, pay attention to the airflow direction marked on the panel, this must be replaced to the exact position prior to being removed. Disposable filters should be checked, and changed when they become fully laden with dust. Washable filters should be removed and washed in a mild detergent, flushed with clean water and allowed to dry before refitting.

## 6.3 Humidifiers

Any areas of corrosion should be identified and repaired, any sediment from the drain tray and connections should also remain clean.

### 6.3.1 Spray Coil/Washer Humidifier Module

All nozzles should be checked and cleaned as necessary.

Care should also be taken to ensure that the pump is handling the correct volume of water and is in smooth and quiet operation. The pump inlet strainer should also be clean. Check for leaks, pay special attention to the shaft seal.

Remove all filters and clean and ensure that the motor is not overheating.

## 6.4 Coils

### 6.4.1 Water

Water coils should be connected to ensure that full counter flow exists i.e. - the entering airflow meets the return connection.

All water coils should be connected with the flow at the bottom and the return at the top unless otherwise advised. Drain and bleed valves are located on the coil, others may be required in the system pipework depending on the installation.

Frost protection must be incorporated on shut down and fresh air conditions to avoid coil freezing. Ideally, where the system is at risk of frost damage, the addition of a proprietary antifreeze solution to the water is recommended.

Pipe-work connections should be made to the unit using appropriate techniques, and must be independently supported. The connections should be pressure tested.

### 6.4.2 DX

Direct expansion coils must be fitted with a correctly sized thermostatic expansion valve with an external equalising connection.

The expansion valve phial must be fitted between the suction header connection and the equalising line. The recommendations of the TE valve manufacturer should be referred to when locating the phial and adjusting the superheat. In all cases, settings should be in accordance with the recommendations of the manufacturer of the refrigeration equipment.

All cooling coil drains must be connected to the sloping drain with a correctly sized trap running to an open tundish or similar.

## 6.5 Gas Fired Heater

If a gas fired heater is intended to be used with low air on temperature please discuss with Nuair prior to order placement to ensure a suitable component selection.

## 6.6 Plate Heat Exchangers

The plate heat exchanger block is normally protected from dust and contamination by upstream pre-filters. It is possible to clean the unit with compressed air in the case of dust deposits or by spraying with a mild detergent solution for grease deposits.

Solvents, strong alkaline, acidic or any products that may be aggressive to aluminium or plastics should not be used. Do not use cleaning water over 50°C.

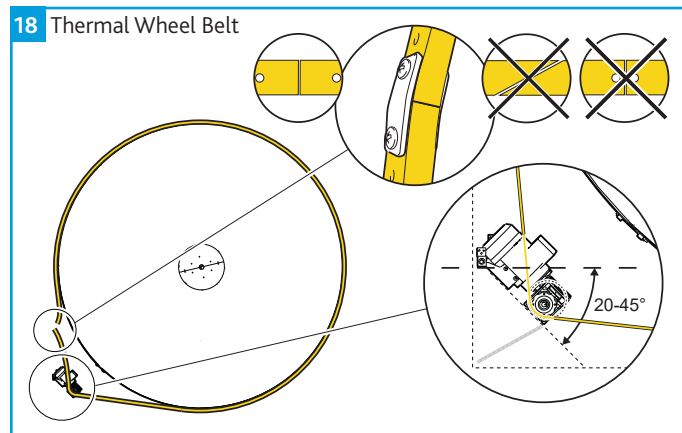
Drain lines should be checked to ensure that they are unobstructed and free draining. Traps should be checked that they are fully primed and functioning.

Drain pans should be flushed out periodically to remove contamination, and chemical treatments may be used to provide protection between service visits.

## 6.7 Thermal Wheel Heat Exchangers

After the 2-3 weeks of operation, and at least once per year, ensure the following maintenance is performed.

- Check that rotor is vertical and centred in casing. Adjust vertical and horizontal position if needed.
- Check the thermal wheel spins freely.
- Adjust sealing to ensure contact with the rotor and side plates. Replace brush sealing if it is worn.
- Check that motor bracket is in 20-45° angle from horizontal line.
- Adjust length of drive belt if needed.
- Check condition of belt and belt lock (joint).



## 6.8 Legionella Check

Legionella risk management should be undertaken by a competent person appointed by the duty holder in accordance with the latest edition of the HSE approved code of practice L8 Legionnaires' disease, the control of legionella bacteria in water systems.

Particular attention should be given to:

- Exhaust heat recovery coil.
- Cooling coil.
- Humidifier condensate drip tray water.
- Evaporative humidifier.
- Cooler drains.
- Water reservoirs.

## 6.9 Electric Heaters

An Air handling unit would normally require no heater maintenance. However a periodic check is advised to ensure that the fasteners and electrical connections are operating correctly.

It is strongly recommended that an airflow switch is incorporated within the control system with a fan run on timer (15 minutes) and an interlock provided between the heater contactor and fan motor starter allowing elements to cool on shut down.

## 6.10 Bulkhead Lights

Ensure that lights are switched off and isolated before checking or changing the lamp.

## 6.11 Specialist Equipment

Contact Nuair for maintenance of specialised equipment that would have been specified during design stage. A breakdown of the component parts can be found on the design specification documents, additional maintenance literature is available, please contact Nuair. This applies to any components not specifically mentioned in this document.

## 6.12 Maintenance Schedule

### 6.12.1 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.
- Any drain trays should be cleaned and repaired if necessary.
- All dampers should be rotated and lubricated as necessary.

### 6.12.2 Every 3 Months

- Check filters and change/clean if required, failure to do so may impair the performance and energy efficiency of this unit.
- Ensure condensate drains are cleaned clear and that water can flow freely from unit.
- Check fin coil banks and heat exchangers. If necessary clean with a soft brush or vacuum. Check for signs of contamination.

### 6.12.3 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.
- Coil faces should be inspected and any dust removed.
- Check any thermal wheel belt, motor, bearings, seals and if necessary clean with a soft brush or vacuum cleaner.

## 7.0 WARRANTY

The 1 year warranty starts from the day of delivery and includes parts and labour for the first year.

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.**

## 8.0 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.**

## 9.0 AFTER SALES AND REPLACEMENT PARTS




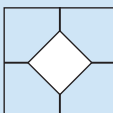

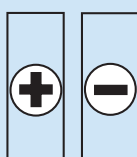

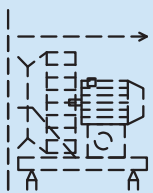
For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

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.

**Telephone 02920 858 400**  
**aftersales@nuair.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.

10.0 SERVICE CHART

Symbol	3 / 9 Month Service			6 Month Service		12 Month Service	
	Action		Date Initials	Action	Date Initials	Action	Date Initials
Damper / Air recirculation section 	Check the damper performance.	3		Check the damper performance.		Clean the damper. Check the damper performance.	
		9					
Filter 	Check the pressure drop and change the filter if necessary.	3		Check the pressure drop and change the filter if necessary.		Check the pressure drop and change the filter if necessary.	
		9					
Thermal Wheel Heat Exchanger 	Rotor Spins Freely. Check condition of belt and belt lock (joint).	3		Adjust sealing to ensure contact with the rotor and side plates. Replace brush sealing if it is worn.  Adjust length of drive belt if needed.		Check that rotor is vertical and centred in casing. Adjust vertical and horizontal position if needed.  Check that motor bracket is in 20-45° angle from horizontal line.	
		9					
Plate Heat Exchanger 	General inspection. Check the damper performance.	3		Clean the heat exchanger unit.		Clean the heat exchanger unit, damper and casing.	
		9					
Heat Pipe Exchanger 	General inspection. Check the damper performance.	3		Clean the finned unit.		Clean the finned unit, damper, drain tray and casing.	
		9					
Air Heaters Air Coolers 	General inspection.	3		Clean the finned unit and the electric heater elements.			
		9					
Humidifier 	Inspect the: Casing, Humidifier fills, Droplet eliminator, Water filter, Water tray, Spray pipes and Water flow.	3		Inspect the: Casing, Humidifier fills, Droplet eliminator, Water filter, Water tray, Spray pipes, Water trap, Water flow and Constant-flow valve.		Inspect the: Casing, Humidifier fills, Droplet eliminator, Water filter, Water tray, Spray pipes, Water trap, Water quality, Water flow and Constant-flow valve.	
		9					
Fans 	General inspection.	3		General inspection.		Clean the fan impeller, casing, unit casing. Check the bearings.	
		9					
Casing						Check that the doors are tight. Clean inside and outside if necessary.	

## 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.

**Signature of manufacture representatives:**

Name:	Position:	Date:
1) C. Biggs 	Technical Director	26. 01. 11
2) A. Jones 	Manufacturing Director	26. 01. 11

Designation of machinery: BOXER  
 Machinery Types: Air Handling Units  
 Relevant EC Council Directives: 2006/42/EC (Machinery Directive)  
 Applied Harmonised Standards: BS EN ISO 12100-1, BS EN ISO 12100-2, BS EN 60204-1, BS EN ISO 9001, BS EN ISO 13857  
 Applied National Standards: BS848 Parts 1, 2.2 and 5

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 2014/30/EU (EMC).  
 To be read in conjunction with the relevant product documentation (see 2.1)

**1.0 GENERAL**

1.1 The equipment referred to in this Declaration of Incorporation is supplied by Nuair 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 Nuair.  
 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 e.g. 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 **Local Environment - Humidity.** Ambient humidity (the humidity at the unit's installed location) shall be within the range: 10 to 95% (for controls, non-condensing).  
 Air humidity (the humidity of the air passing through the unit) shall be within the range: 10 to 95% (for controls, non-condensing).

**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 (e.g. 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.





