

Vent-Axia[®]

AIR HANDLING UNITS

Mini Belt Drive Range



Mini Direct Drive Range



Minislim & Slimline Range



Please read all the instructions carefully before starting the installation

PLEASE LEAVE THESE INSTRUCTIONS WITH END USER

MINI DIRECT DRIVE RANGE

GENERAL

Minislim, Slimline and Mini sizes **D1** to **D6** are fitted with direct drive centrifugal fans with sealed for life ball bearings. All of the fans are suitable for operation from -25~C to +40~C and in relative humidity up to 95%.

SUPPLY

The site supply must be checked to ensure that voltage, frequency, number of phases and power rating comply with the air handling unit.

ELECTRICAL CONNECTION TO MOTORS

All motors are pre-wired to an external terminal box on the side of the unit.

DIRECTION OF ROTATION

The installer must check for correct rotation. Note that if the direction of rotation is incorrect the airflow will still be in the correct direction but at a reduced rate. Three phase fans require a trial connection. To reverse direction interchange any two supply leads. Single phase fans are dispatched with connections made.

PROTECTION

Fuses in the circuit should be regarded as only protecting the wiring against short circuits or earth faults; they are not suitable for overload protection. Fuse ratings must be able to carry starting loads, which can be taken as a maximum of six times the running current for 25 seconds. Motor rated fuses must be used. N.B. when using speed controls with transformers higher surge currents may occur on start up.

N.B. Motors above 0.37KW must be provided with overload protection.

EARTHING

All fans must be earthed in accordance with the requirements of your supply authority or relevant code of practice. The earth conductor must be of adequate rating to conduct the maximum fault current.

ISOLATOR SWITCHES

We recommend that all units should have a local isolator fitted adjacent to the unit.

MAINTENANCE

The only maintenance normally required for these direct drive fans is periodic inspection to check security of fastenings and cleaning of the fan impeller should it become soiled.

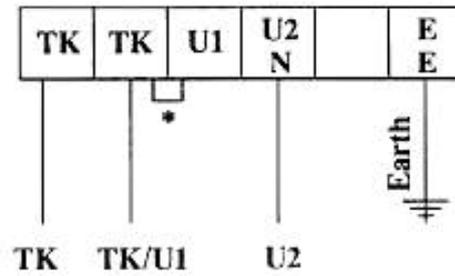
NOTES:

1. Always isolate the fan from the mains supply before carrying out any work.
2. It is the responsibility of the installer and user to ensure that the installation complies with local regulations and codes of practice (in the U.K. the Health & Safety at Work Act 1974 Section 2.1 and 6.3).



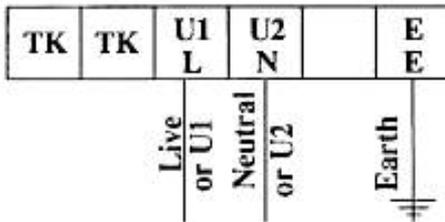
MINI DIRECT DRIVE RANGE (cont...)

WIRING DIAGRAMS FOR ALL SINGLE PHASE UNITS

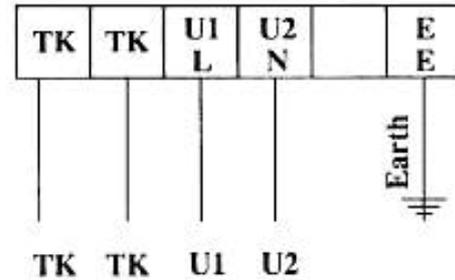


With STE starter

* Link Provided by others

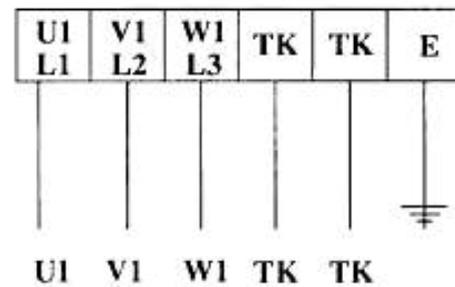
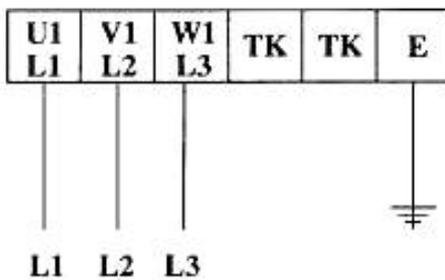


With conventional D.O.L. starter or SPM controller and D.O.L. starter



With RTRE controller

WIRING DIAGRAMS FOR ALL THREE PHASE UNITS



HEATER SECTION (ELECTRIC)

SAFETY

Always fit an isolator switch to protect maintenance staff from accidental re-connection by others. Ensure that the cover is fitted properly and marked with a warning label:

ISOLATE SUPPLY BEFORE REMOVING THIS COVER.

EARTHING

The electric heater must be earthed in accordance with the requirements of your supply authority or relevant code of practice. The earth conductor must be of adequate rating to conduct the maximum fault current.

AIRFLOW

Air velocity across the elements should be greater than 2m / sec to maintain surface temperature of less than 400C and prevent nuisance tripping of the high temperature thermal fuse. The air leaving temperature should never be allowed to exceed 40C.

IMPORTANT: If you wish to use a fan speed controller on a unit with an electric heater please consult our Technical Sales Department.

THE HEATER SHOULD NEVER BE SWITCHED ON WHEN THERE IS NO AIRFLOW

THERMAL FUSE

Electric heaters are fitted as standard with a non re set thermal fuse, this must be connected to the contactor coil or electric heater controller to shut the heater down in the event of over heating in the fan casing, the thermal fuse is set to operate at 80C.

In the event of the thermal fuse operating always investigate and rectify before replacing, check that the filters are not blocked or that the airflow has not been reduced or restricted within the unit or ductwork.

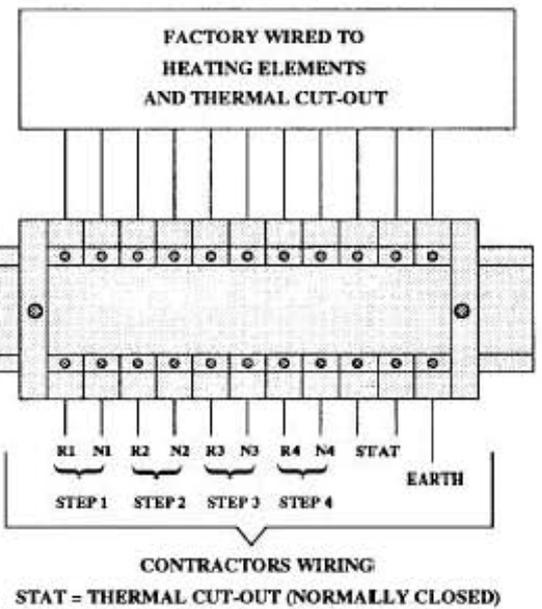
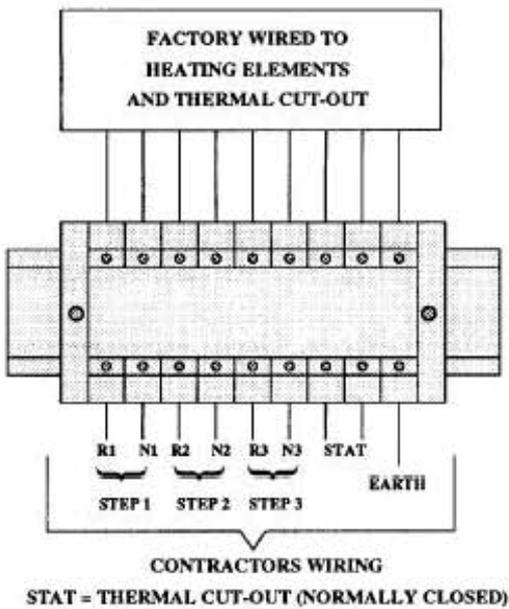
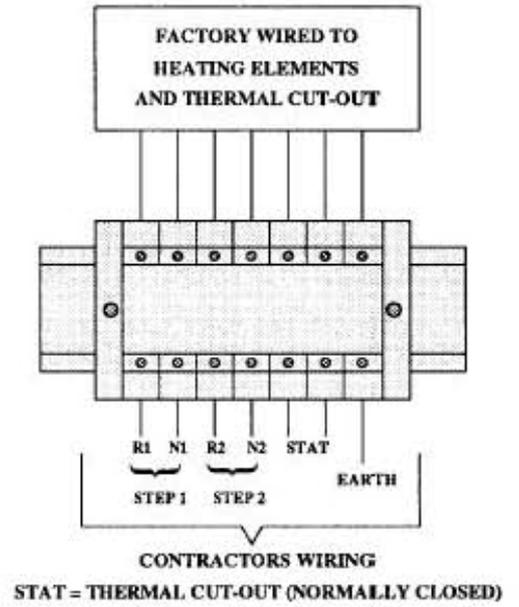
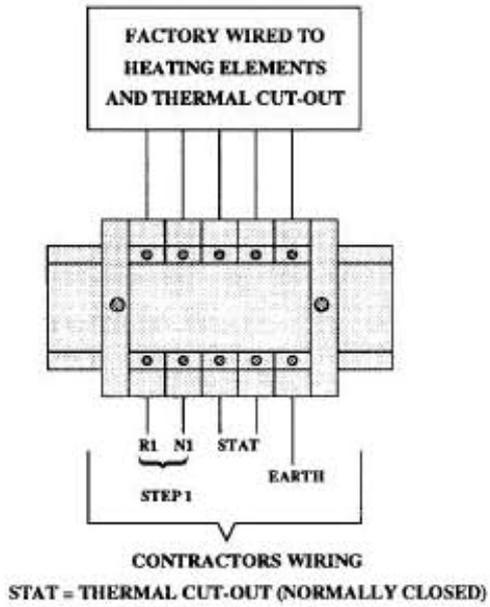
Replacement thermal fuse Part No 456339

FAN OFF DELAY TIMER

All fans supplying electric heaters must be wired to an off delay timer of **at least 2 minutes** to dissipate the residual heat present when the system is shut off. Failure to do this can lead to nuisance tripping of the thermal fuse and possible damage to the filters, insulation and wiring. Higher output heaters may require off delay times of longer duration to allow for heat dissipation. Please consult our Technical Sales Department.

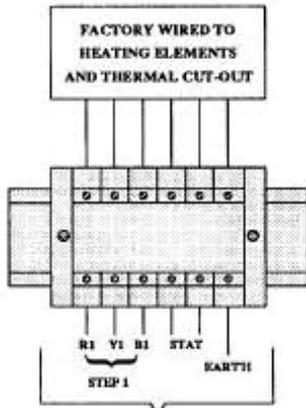
Heater section (Electric)

CONNECTION DIAGRAMS - ELECTRIC AIR HEATERS SINGLE PHASE

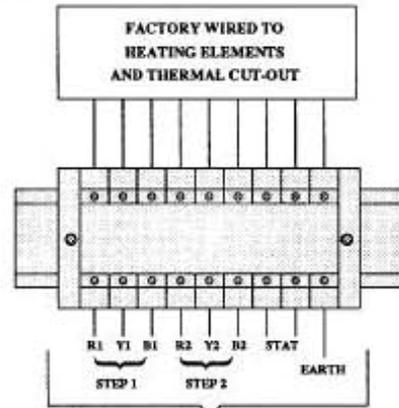


Heater section (Electric)

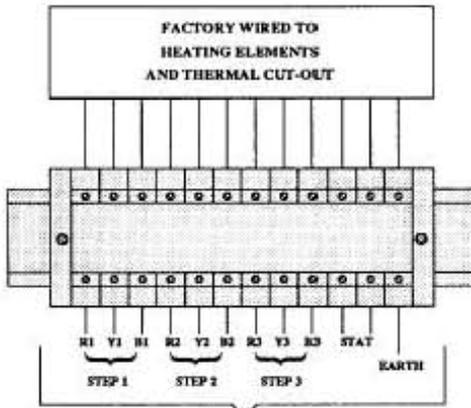
CONNECTION DIAGRAMS - ELECTRIC AIR HEATERS THREE PHASE



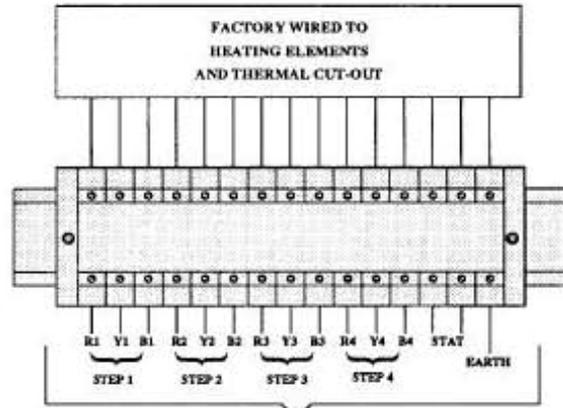
CONTRACTORS WIRING
STAT = THERMAL CUT-OUT (NORMALLY CLOSED)



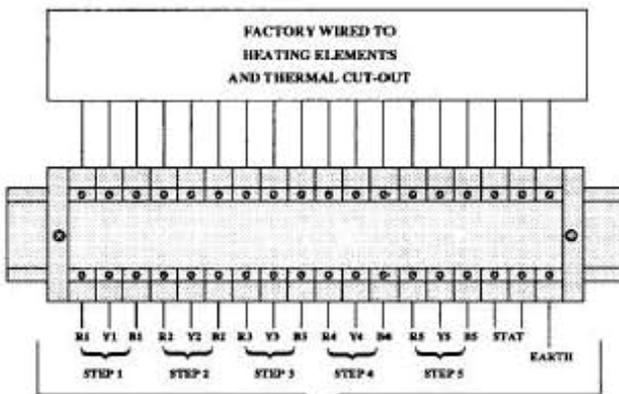
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STAT = THERMAL CUT-OUT (NORMALLY CLOSED)



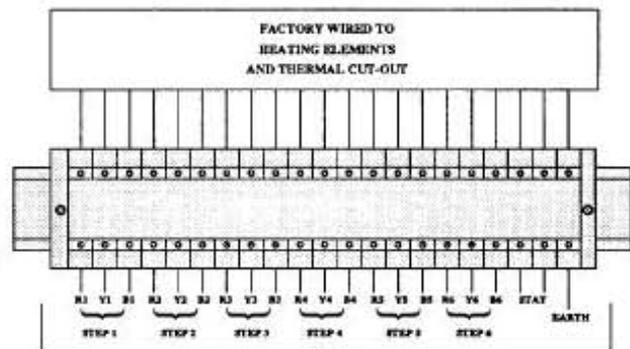
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STAT = THERMAL CUT-OUT (NORMALLY CLOSED)

FILTERS

GENERAL

Air handling units are fitted as standard with disposable, metal framed filters. Dirty filters will reduce the airflow through the system and on units fitted with electric heaters may lead to nuisance tripping of the thermal Cut Out On the heater. Use of a filter monitor or manometer will help to determine when the filters require changing. Instructions are given below for fitting our FLG 1.5 inclined manometer which is available as an optional extra.

INSPECTION & CHANGING

The filters should be periodically inspected and changed when they become heavily soiled or the pressure drop has increased. The period between filter changes will vary depending on the air volume, air quality and periods of operation of the unit and can only be determined by regular inspection on site. The filters should always be inspected prior to the unit first going into service.

FLG 1.5 MANOMETER

GENERAL

The FLG 1.5 gauge is a simple inclined manometer for measuring the pressure drop across filters in air handling systems. Its solid perspex construction makes it tough, attractive and corrosion proof. The gauge comes complete with duct connectors, fluid, tubing and fixing screws.

INSTALLATION & OPERATION

The instrument should be mounted on a vertical surface with the top edge set horizontally (for accuracy use a spirit level). Drill two 4mm diameter holes to take the large fixing screws. Mount the gauge firmly using the fixing screws and washers. The screw heads should be flush with the face of the washers but do not over-tighten and distort the plastic washer. Only remove the red connector caps once the gauge is firmly fixed to avoid spillage.

If the gauge is unfilled, turn the level adjuster at the bottom of the reservoir so that the sealing ring is at the centre of its travel (approximately 4mm above thread end). Fill with manometer fluid through the left-hand pressure connector until the fluid level is approximately at the zero position. If the gauge is already filled or you have just filled it then use the level adjuster to obtain exact zero.

Fix a duct connector each side of the filter making sure that sufficient length of tubing available to reach the gauge. Use a 6mm drill for the nozzle and a 3mm drill for the small fixing screws. Cut the tube into suitable lengths and connect the upstream duct connector to the bottom gauge connector and the downstream side to the top.

MAINTENANCE

The gauge should remain relatively maintenance free. However, it is advisable to check the zero position occasionally and if necessary reset using the level adjuster. If the gauge becomes dirty internally it may be stripped down, emptied and the body washed in a mild detergent solution. Rinse thoroughly, dry completely and reassemble. Ensure the gauge is refilled with clean manometer fluid.

The following manometer fluid only should be used:
Type FLG 1.5 (0 - 1.5 ins wg) Red Manometer Fluid

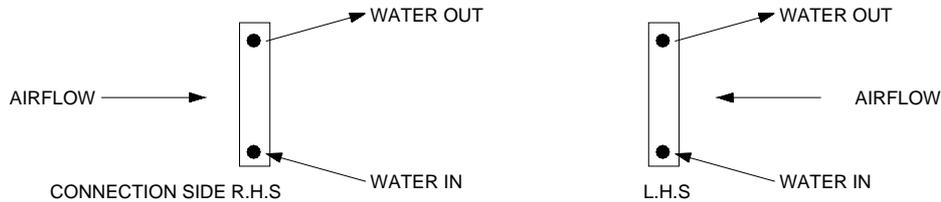
HEATER SECTION (LPHW & STEAM)

LPHW HEATERS

Water Connection (assuming horizontal airflow) Dia. A

The water supply should be connected so that the water enters via the lower connection and leaves via the upper connection. When the coil is filled for the first time it should be thoroughly vented to ensure that all the air has been displaced.

Dia A



Cleaning

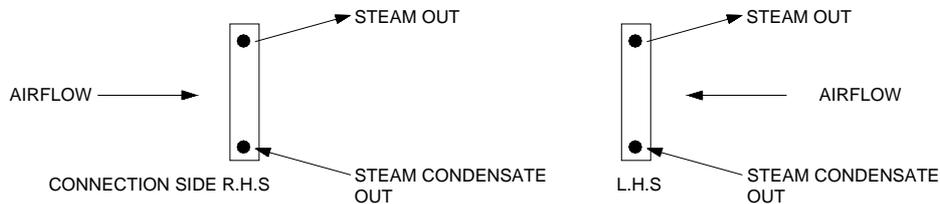
Any deposits or dirt on the heater fins will impair the heat transfer; therefore, the coil should be kept clean. Vacuum cleaning or careful blowing with compressed air in a direction parallel with the fins should carry out cleaning. If the dust is greasy, use a cold degreasing agent suitable for aluminium fins. After cleaning always remove any dust or liquid from the unit before starting the fan.

STEAM HEATERS

Steam Connection (assuming horizontal airflow) Dia. B

The steam supply should be connected so that the steam enters via the top pipe and the steam condensate leaves via the lower pipe.

Dia B



Cleaning

Any deposits or dirt on the heater fins will impair the heat transfer; therefore, the coil should be kept clean. Cleaning should be carried out by vacuum - cleaning or careful blowing with compressed air in a direction parallel with the fins. If the dust is greasy, use a cold degreasing agent suitable for aluminium fins. After cleaning always remove any dust or liquid from the unit before starting the fan.

Condensate Removal

When air, water or another product is heated, the temperature or heat transfer rate can be regulated by a modulating steam pressure control valve. Since pressure and temperature do not vary at the same rate as load, the steam trap capacity, which is determined by the pressure differential between the trap inlet and outlet, may be adequate at full load but not at some lesser load. Analysis shows that steam pressure must be reduced dramatically to achieve a slight lowering of temperature. In most applications this can result in sub-atmospheric pressure in the coil, while as much as 75% of full condensate load has to be handled by the steam trap. This is especially important for coils exposed to outside air, since sub-atmospheric conditions can occur in the coil at outside temperatures below 32°F (0°C) and the coil will freeze if the condensate is not removed. There are detailed methods for determining condensate load under various operating conditions. However, in most cases this load does not need to be calculated if the coils are piped as shown in Fig.1 (overleaf) and this procedure is followed.

HEATER SECTION (LPHW & STEAM) (cont...)

1. The steam trap should be 1 to 3ft (0.3 to 0.9m) below the bottom of the steam coil to provide a hydraulic head of approximately 0.5 to 1.5psig (3.5 to 10.3kPa above atm.). Location of the trap at less than 12ins (300mm) minimum usually results in improper drainage and operating difficulties.

2. Vacuum breakers must be installed between the coil and trap inlet to ensure that the hydraulic head can drain the coil when it is at atmospheric or sub-atmospheric pressure. The vacuum breaker should respond to a differential pressure of no greater than 3ins or water (750Pa). For atmospheric returns, the vacuum breaker should be opened to the atmosphere and the return system must be designed to ensure no pressurisation of the return line. In vacuum return systems, the vacuum breaker should be piped to the return line.

3. Discharge from the trap must flow by gravity, without any lifts in the piping, to the return system, which must be vented properly to the atmosphere to eliminate any back pressure that could prevent the trap from draining the coil. Where the return main is overhead, the trap discharge should flow by gravity to a vented receiver from which it is then pumped to the overhead return.

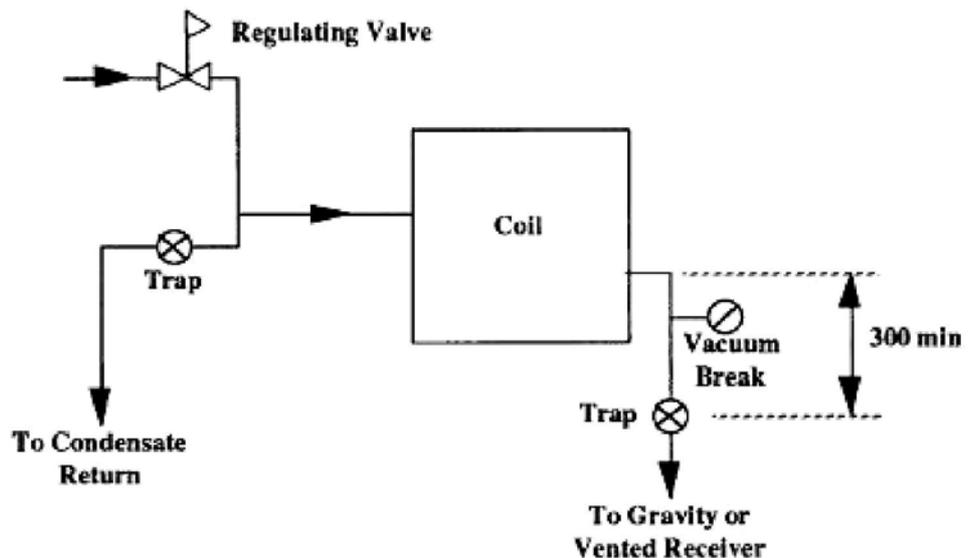
4. Traps must be designed to operate at maximum pressure at the control valve inlet and sized to handle the full condensate load at a pressure differential equal to the hydraulic head between the trap and coil. Since the actual condensate load can vary from the theoretical design load, because of the safety factors used in coil selection and the fact that condensate does not always form at a uniform steady rate, steam traps should be sized according to the following:

a. 0-1psig (0 to 100kPa above atm.) at the control valve inlet: size the trap for twice the full condensate load (coil condensing rate at maximum design conditions) at 0.5psi (3.5kPa) pressure differential.

b. 16-30psig (110 to 200kPa above atm.) at the control valve inlet: size the trap for twice the full condensate load at 2psi (14kPa) pressure differential.

c. 31psig (210kPa above atm.) at the control valve inlet: size the trap to handle triple the full condensate load at a pressure differential equal to half the control valve inlet pressure.

Fig. 1

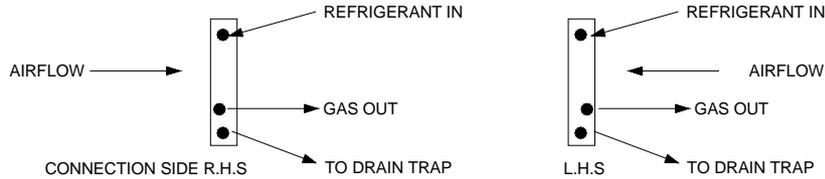


COOLING COILS

DIRECT EXPANSION (DX) TYPE FOR HORIZONTAL AIRFLOW - Dia. C

Direct expansion coils fitted to these air handling units are supplied with their connections sealed and are charged with nitrogen to prevent the ingress of moisture or contaminants. Unless otherwise specified they are supplied in single stage form. Installation of direct expansion coils must be carried out by qualified refrigeration engineers in accordance with the relevant codes of practice.

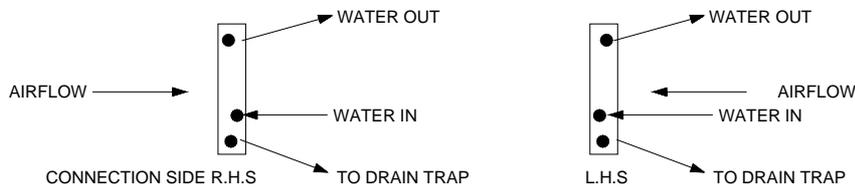
Dia C



CHILLED WATER TYPE FOR HORIZONTAL AIRFLOW - Dia. D

The water supply should be connected so that entering air meets leaving water. When the coil is filled for the first time it must be thoroughly vented to ensure that all the air has been displaced.

Dia D



CONDENSATION & DRAINAGE (BOTH TYPES OF COIL)

As a normal part of the cooling process condensation will form on the coil fins. The air handling units are provided with a drain tray underneath the fin block to collect the condensation. A drain connection is provided on the side of the unit casing, which must be connected to a suitable water trap to prevent air being drawn back into the unit and inhibiting the outward flow of condensate. The following guide can be used to estimate the minimum height of trap required: Minimum Height = 13mm + 10mm per 100Pa of pressure differential.

Air handling units are designed so that the face velocity on cooling coils does not exceed 2.5m/sec at the design duty unless droplet eliminators are fitted in which case velocities of up to 3.5 or 4.0m/sec are permissible. These limitations reduce the risk of condensation being drawn off the fins and being deposited inside the air handling unit.

CLEANING (BOTH TYPES OF COIL)

Fin Block

Any deposits or dirt on the fins will impair the efficiency of the cooling coil. Cleaning should be carried out by vacuum cleaning or careful blowing with compressed air in a direction parallel to the fins. If the dust is greasy use a cold degreasing agent suitable for aluminium fins.

Drain Tray

In the interest of hygiene it is important that the drain tray should be kept clean. Regular cleaning with a suitable detergent or disinfectant is recommended.

MINI BELT DRIVE RANGE

GENERAL

Mini air handling units from size B2 upward are fitted with double inlet centrifugal fans indirectly driven by T.E.F.V. motors.

Standard fans and motors are designed to operate from -25°C to +40°C and in relative humidity of up to 95%.

UNITS B3 TO B6

The fan and motor assembly on these sizes is fitted with a slide rail system which enables the entire assembly to be partly withdrawn from the air handling unit to improve access. The following procedure should be followed:

1. Remove mullions where necessary.
2. Unbolt the discharge flexible connector.
3. Remove the restraining strap.

The fan assembly can now be drawn outwards.



ELECTRICAL CONNECTIONS TO MOTORS

Electrical connections are to be made to the motor mounted terminal box inside the fan section of the air handling unit. Remember to leave sufficient slack in the connecting cable to allow the fan assembly of sizes B3 to B6 to be withdrawn, also ensure that cables do not foul the fan, motor, drive or slide rail system and are kept clear of other functional sections within the unit particularly electric heaters.

SUPPLY

The site supply must be checked to ensure that voltage, frequency, number of phases and power rating comply with the air handling unit.

DIRECTION OF ROTATION

The installer must check for correct rotation. Note that if the direction of rotation is incorrect the airflow will still be in the correct direction but at a reduced rate. Three phase fans require a trial connection. To reverse direction interchange any two supply leads. Single phase fans are dispatched with connections made, but correct rotation should always be confirmed on site.

PROTECTION

Fuses in the circuit should be regarded as only protecting the wiring against short circuits or earth faults; they are not suitable for overload protection. Fuse ratings must be able to carry starting loads, which can be taken as a maximum of six times the running current for 25 seconds. Motor rated fuses must be used.

N.B. Motors above 0.37KW must be provided with overload protection.

EARTHING

All fans must be earthed in accordance with the requirements of your supply authority or relevant code of practice. The earth conductor must be of adequate rating to conduct the maximum fault current.

ISOLATOR SWITCHES

We recommend that all units should have a local isolator fitted adjacent to the unit.

NOTES:

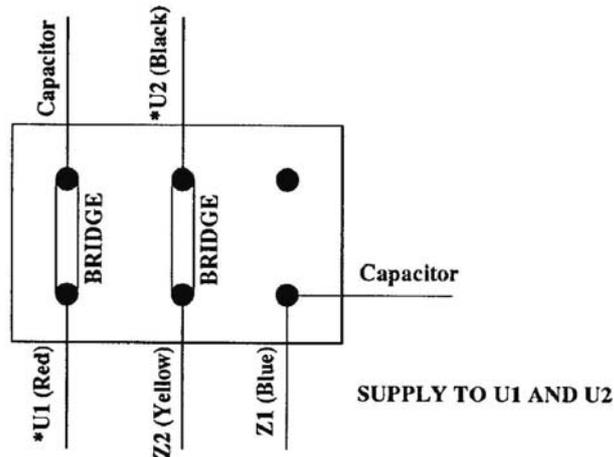
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2. It is the responsibility of the installer and user to ensure that the installation complies with local regulations and codes of practice ((In the U.K. the Health & Safety at Work Act 1974 Section 2.1 and 6.3).

MINI BELT DRIVE RANGE (cont...)

WIRING DIAGRAM FOR STANDARD SINGLE PHASE MOTORS

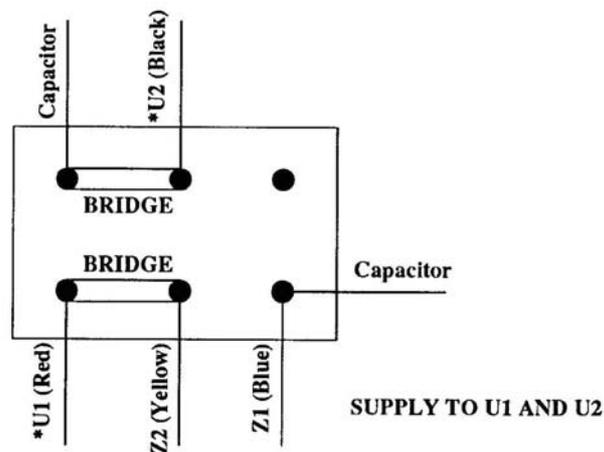
The following diagrams give wiring details for the standard Brook Crompton Parkinson 240v/50Hz/IPh 4-pole motor. If your motor is not one of these or you have any doubts at all about wiring please contact our Customer Services Department. Correct fan rotation must be confirmed on site and details for reversing the motor are given below should this prove necessary.

N.B. If the direction of rotation of the fan is incorrect the airflow will still be in the correct direction but at a reduced rate.



* LIVE AND NEUTRAL SUPPLY CAN BE CONNECTED EITHER WAY ROUND TO U1 AND U2.
EARTH TERMINAL ON TERMINAL BOX CASING

TO REVERSE ROTATION



CHANGE BRIDGES OVER AS SHOWN

* LIVE AND NEUTRAL SUPPLY CAN BE CONNECTED EITHER WAY ROUND TO U1 AND U2.

MINI BELT DRIVE RANGE (cont...)

WIRING DIAGRAM FOR STANDARD THREE PHASE MOTORS

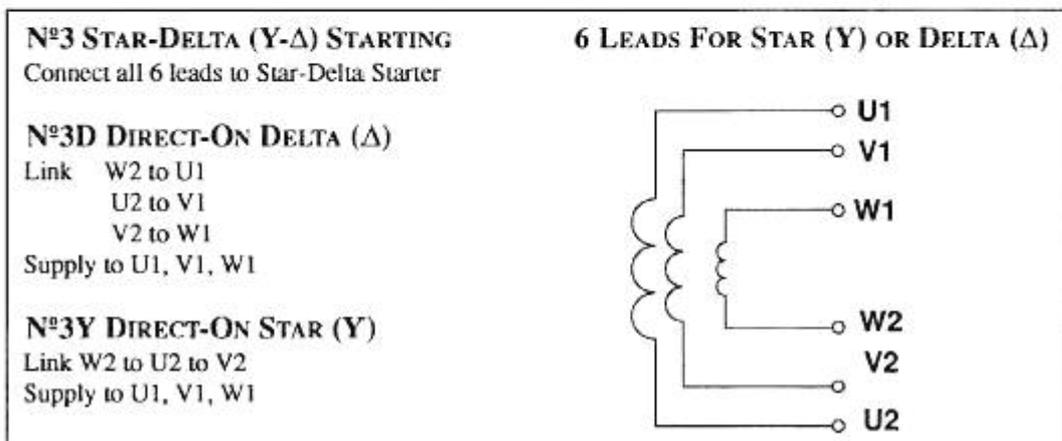
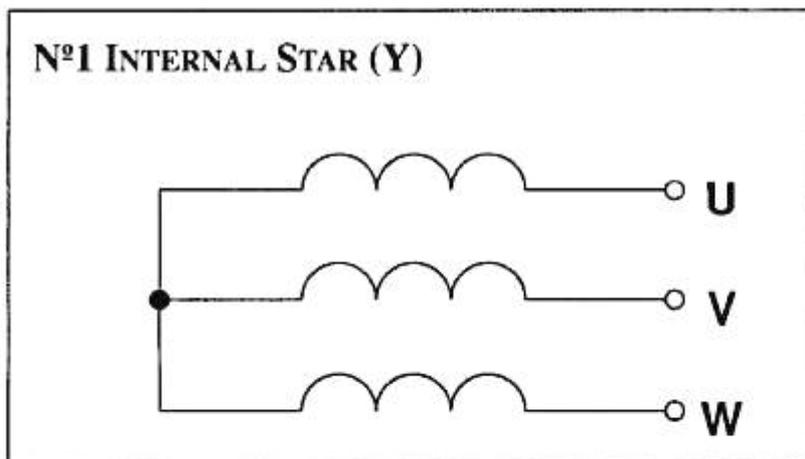
The following diagrams give wiring details for the standard Brook Crompton Parkinson 415v/50Hz/3Ph 4-pole motor. If your motor is not one of these or you have any doubts at all about wiring please contact our Customer Services Department.

Three phase motors require a trial connection to establish correct rotation of the fan. To reverse the direction of rotation change over any 2 supply leads.

N.B. If the direction of rotation of the fan is incorrect the airflow will still be in the correct direction but at a reduced rate.

Rating	Type	Wired		
0.18kw	3 Wire	Internal Star	Dia. 1	
0.25kw	3 Wire	Internal Star	Dia. 1	
0.37kw	Delta Star	Star	Dia. 3Y	(Links Provided)
0.55kW	Delta Star	Star	Dia. 3Y	(Links Provided)
0.75kw	Delta Star	Star	Dia. 3Y	(Links Provided)
1.10kW	Delta Star	Star	Dia. 3Y	(Links Provided)
1.50kW	Delta Star	Star	Dia. 3Y	(Links Provided)
2.20kW	3 Wire	Internal Star	Dia. 1	
3.00kW	3 Wire	Internal Star	Dia. 1	
4.00kW	Star Delta	Star Delta	Dia. 3	

All motors over 4.0kW are Star Delta (**Dia. 3**) and can be wired direct on Delta (**Dia. 3D**) providing the system can handle the starting current.



MINI BELT DRIVE RANGE (cont...)

INSPECTION & CLEANING

The fan should be periodically inspected and cleaned. It is particularly important to keep the impeller clean in order to avoid imbalance and vibration, which can in time cause serious bearing damage.

BELT TENSION & ALIGNMENT

The belt tension and alignment should be checked:

- When fitting new belts, installing a new fan or just prior to starting the fan for the first time.
- After the first 30 minutes of operation.
- At least every six months

BELT ALIGNMENT

Ensure that the pulleys are correctly aligned before checking the belt tension and after any adjustments.

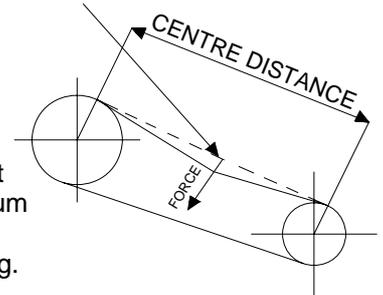


METHOD FOR CHECKING BELT TENSION

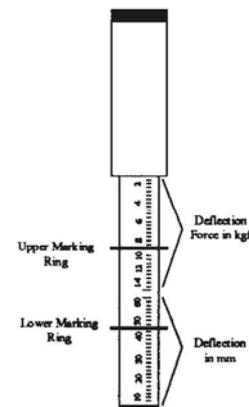
Using a belt tension indicator, with metric calibrations:

- Multiply the centre distance (in meters) by 16 this gives the deflection distance in mm.
- Set the lower marking ring to the deflection distance required in mm on the lower scale.
- Set the upper marker ring against the bottom edge of the top tube.
- Place the tension indicator on top of the belt at the centre of span and apply a force at right angles to the belt deflecting it to the point where the lower marker ring is level with the top edge of the adjacent belt (For single belt drives a straight edge should be placed across the two pulleys to act as a datum for measuring the deflection).
- Read off the force value indicated by the top edge of the upper marking ring.
- Compare this value to the kgf value shown in the table below.

Deflection 16mm per Metre of centre distance



Belt Section	Force required to deflect belt 16mm per metre of span		
	Small Pulley Dia. mm	Newton (N)	Kilogram Force (kgf)
SPZ	67 to 95	10 to 15	1.0 to 1.5
	100 to 140	15 to 20	1.5 to 2.0
SPA	100 to 132	20 to 27	2.0 to 2.7
	140 to 200	28 to 35	2.8 to 3.5
SPB	160 to 224	35 to 50	3.5 to 5.1
	236 to 315	50 to 65	5.1 to 6.6
SPC	224 to 355	60 to 90	6.1 to 9.2
	375 to 560	90 to 120	9.2 to 12.2
DELTA	335 & above	150 to 200	15.3 to 20.4
Z	56 to 100	5 to 7.5	0.5 to 0.8
A	80 to 140	10 to 15	1.0 to 1.5
B	125 to 200	20 to 30	2.0 to 3.1
C	200 to 400	40 to 60	4.1 to 6.1
D	355 to 600	70 to 105	7.1 to 10.7



If measured force falls within the values shown then the drive should be satisfactory. A measured force below the lower value indicates under-tensioning.

ADJUSTMENT

The belt tension can be adjusted by displacing the motor. After any adjustment re-check belt alignment

MINI BELT DRIVE RANGE (cont...)

REPLACEMENT OF DRIVE COMPONENTS

BELTS

The drive belts should be replaced periodically as they become worn.

Method: First move the motor toward the fan by a sufficient amount to allow the belts to be removed from the pulleys. All the belts in a drive should be replaced simultaneously. Ensure that the replacement belts are all matched (i.e. are exactly the same length). The new belts should be re-tensioned and aligned as per previous instructions and checked at the intervals shown.

PULLEYS

Belt drive air handling units supplied by Vent-Axia are normally fitted with taper lock pulleys and bushes.

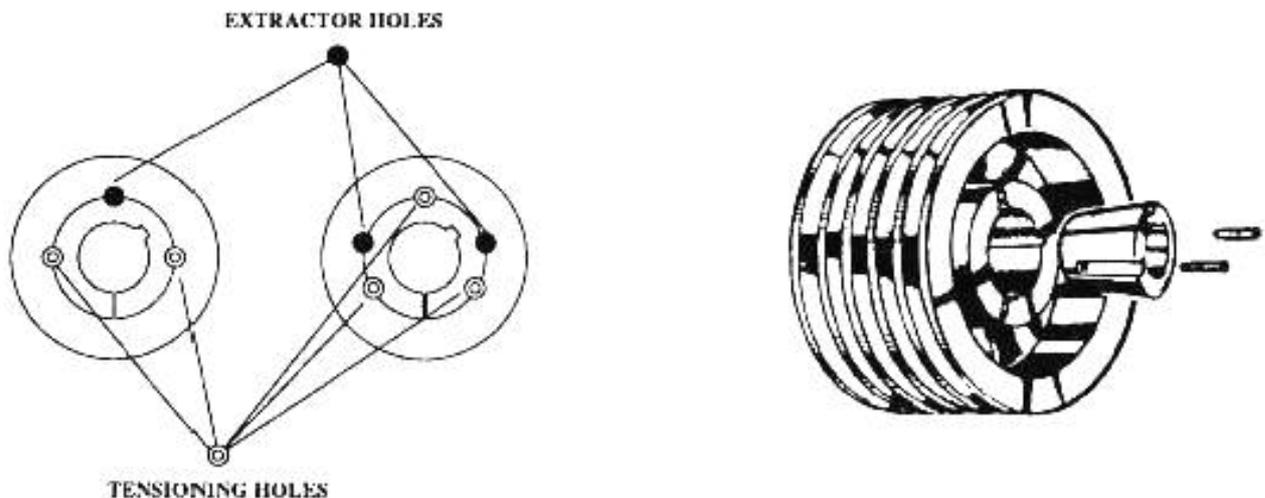
REMOVAL

Remove the grub screws and oil them lightly. Screw one of them into the extractor hole (on larger bushes two extractor holes are provided in which case two grub screws should be used). Tighten the screw (or screws) until the bush is released from the hub of the pulley and the bush is released from the shaft. Pull the bush and pulley from the shaft as one unit.

FITTING

Clean the bore of the pulley and the bush to ensure that all surfaces are free of grease and dirt. Fit the bush into the pulley. Oil the grub screws lightly and screw them by hand into the tapped holes between the pulley and bush. Clean the fan shaft and fit the bush and pulley as one unit. Tighten the grub screws alternately whilst checking that the pulleys are in line until all of the screws are securely tightened.

Fit the belt(s) retention and re-check the alignment of the drive as previously described.



VENT-AXIA CONTACT NUMBERS UK NATIONAL SALES CENTRE

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Industrial

Tele: 01293 441570
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REPUBLIC OF IRELAND

Vent-Axia Ventilation Ltd.
Tele: (01) 450 4133 Fax: (01) 450 4570

UK NATIONAL TECHNICAL SUPPORT

Domestic & Commercial

Tele: 01293 526062
Fax: 01293 551188

Industrial

Tele: 01293 455196
Fax: 01293 455197

Internet site at: www.vent-axia.com

Email: info@vent-axia.com

The Vent-Axia Guarantee

Applicable only to products installed and used in the United Kingdom. For details of the Guarantee outside of the United Kingdom contact your local supplier.

Vent-Axia guarantees this product for two years from the date of purchase against faulty material or workmanship. In the event of any part being found to be defective, the product will be repaired, or at the Company's discretion the product will be replaced without charge, provided that the product:

- 1). Has been installed and used in accordance with the instruction given with each unit.
- 2). The electricity supply complies with the rating label.
- 3). Has not been misused, neglected or damaged.
- 4). Has not been modified or repaired by any person not authorized to do so by Vent-Axia.

If claiming under terms of guarantee

Please return the complete product, carriage paid to your original supplier or nearest vent-axia centre, by post or personal visit. Please ensure that it is adequately packed and accompanied by a letter clearly marked "Guarantee claim" stating the nature of the fault and providing evidence of date and source of purchase.

The guarantee is offered to you as an extra benefit, and does not affect your legal rights

As part of the policy of continuous product improvement
Vent-Axia reserve the right to alter specifications without notice

Vent-Axia

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