

# **Alpha Aire**

## Dedicated Outdoor Air System, VAV, Air-Source Heat Pump with Energy Recovery

Installation, Operation and Maintenance Manual









we make life better™



### **Alpha Aire Series**

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## **IMPORTANT NOTICE**

This manual is the property of the owner.

Please be sure to leave it with the owner when you leave the job.

## **USE OF SYMBOLS**

This publication includes warnings, cautions and information icons that point out safety related issues or conditions as well as other pertinent information relative to a safe installation, service or maintenance situation. The following icons should be interpreted as follows:







## **GENERAL INFORMATION**

## **INSPECTION OF EQUIPMENT**

Upon receipt of the unit, inspect for visible or concealed interior / exterior damage. Report any damage to the carrier, and file a damage claim.

Inspect the unit data plate to verify the model unit that was ordered is what has been received.

Some options / accessory items may have been shipped loose in one or more boxes. These may have been delivered to another location, or possibly within the unit. If shipped with the unit there will be a sticker that identifies where in the unit the shipped loose items are located. Confirm that all of these options / accessory items are also available and that no damage has occurred.

## HANDLING

To facilitate handling, the unit is set on a wooden skid so that it may be picked up with a two-wheel hand truck or fork lift. Under no circumstances should the unit or the skid be "walked" on the corners. Use dolly trucks, pipe rollers or suitable means to move the unit to its proper location.

If a crane, cables or slings are used to move a unit or module, spreader bars must be used to protect each section's cabinet structure.

## MOUNTING AND SETTING IN PLACE

#### INFORMATION

Unit should not be located in space subject to freezing temperatures.

The Alpha Aire unit has been designed as a horizontal ceiling or floor mounted cabinet. As a packaged air-cooled system the unit is self contained in either configuration.

Horizontal units are typically suspended using field supplied hanging rods. Care and attention must be given to the structure that the units is being attached to for suitable strength. Attention must be given to floor loading limitations. Floor should be level in both horizontal planes.

Before the unit is installed, a thorough study should be made of the structure and proposed installation location. Careful consideration

must be given to location of wiring, condensate disposal, ductwork and accessibility for maintenance or service. Refer to the section on Service Clearance. Sufficient clearance must be provided to slide the air filter(s) out, either the left or right side.

Consideration must be made for condensate removal, either with a trap or condensate pump.

## **CEILING UNIT MOUNTING**

Typically the cabinets are suspended from the unit structure. When installing the unit on hanging rods (field supplied), use minimum 1/2" diameter threaded rods of the proper length with washers, lock washers, nuts and locking nuts. Observe proper service clearances for the unit.

- 1. Predetermine where the unit will be hung, checking the support structure for proper strength and stability.
- 2. Note the locations / dimensions of the holes for the hanging rods through the corners of the unit.
- **3.** Install the hanging rods at those dimensions in the support structure where the horizontal unit will be hung.
- 4. Using a support lift, carefully lift the unit to the location of installation positioning the pre-hung rods through the hanging rod holes in the unit. Be certain to install vibration isolator-type mounts if required.
- 5. Tighten all mounting hardware and level as required.

#### WARNING

Be certain to completely tighten the hardware to the support structure.

Units may also be slab or floor mounted. Attention must be given to floor loading limitations. Floor should be level in both horizontal planes.

Sufficient height elevation must be available to provide the required condensate trap.



### **OUTDOOR AIR QUALITY**

Outdoor air quality must be investigated and documented. Survey the building site and its immediate surroundings for any possible sources of contamination. This should be accomplished during the period(s) of time that the building is anticipated to be occupied.

Documentation of the possible contaminants, their source and strength should be made. The target concentration and anticipated exposure limits should also be documented.

Filters must be provided on all air inlet streams. United CoolAir recommends a MERV 8 or better filter be utilized.

Dependent upon the air quality there may also be other requirements for treatment of the incoming air, such as the ozone level. Local codes may also require other specific treatment(s).

### **AIR INLET GUIDELINES**

Specific consideration must be exercised when choosing the location of outdoor air intakes in order to minimize indoor air quality problems and maximize the distance from contaminant sources. Minimum separation distances as listed in ASHRAE Standard 62.1—2016 "Ventilation for Acceptable Indoor Air Quality", Table 5.5.1 "Air Intake Minimum Separation Distance" should be adhered to. Any local codes should also be addressed.

Some potential sources of air contaminants would include, but not be limited to, the following:

- Sewer Vents
- · Building Exhaust Air
- Truck Loading Docks
- Bus Loading Areas
- · High Traffic Volumes
- · Cooling Tower Exhaust
- Vehicle Loading Zones

Air inlet velocities should be below 500 FPM to reduce the chance of water or snow penetration. ASHRAE Standard 62.1-2016, Section 5.5.2 provides guidelines for rain entrainment. This standard also points out that any water that does penetrate the inlet device needs to be managed by providing a drainage area and / or moisture removal device.

Areas that have snow need to have the inlet placed or located above the anticipated snow level. Moisture from melting snow must be managed.

Bird screening should be provided that satisfies any applicable codes.

The outdoor air inlet device should not have any construction that would allow birds to nest.

Figure 1 below is an acceptable construction for an inlet hood, while Figure 2 is not acceptable.



INDOOR AIR QUALITY

Outside air units have been designed for treatment of the air being brought into the space. They are typically not intended to provide thermal comfort for the occupants. However, under some conditions this may be possible.

Indoor contaminants and the diverse source of these, has an impact on the resulting indoor air quality. Appendix C of ASHRAE Standard 62.1-2016 states "At present, there is no quantitative definition of acceptable IAQ that can necessarily be met by measuring one or more contaminants." However, it is incumbent that as many efforts as possible be made to help insure the best quality possible, based on today's technology.

### **DUCT DESIGN**

Ducting must be connected from the air inlet side of the unit to an outdoor air grille. Ducting must also be connected from the supply air blower outlet to the main supply air duct distribution system or terminal. Provide a duct length that is 4 to 5 times the diameter of the blower wheel before making the first transition. Provide turning vanes when required.

On units, such as this 100% Outside Air System, it is critically important that the external static pressure (ESP) be determined prior to unit selection. Care must be made that the designed ESP is achieved for the application.

Ducts and louvers must be fabricated to meet the design ESP. Providing less ESP (i.e. too large of a duct system) will allow the unit to move too much CFM which will need to be field adjusted. The result will be poor treatment of the air and thus no benefit towards achieving the designed and desired space conditions.



The duct design must be based on accepted industry practices. These can be found in SMACNA's HVAC Duct Construction Standards—Metal, Flexible and Fibrous. Additionally, standards NFPA 90A and 90B should be satisfied.

It is highly recommended that an air balance be documented for the system.

### **GENERAL DUCTWORK RECOMMENDATIONS**

- 1. Please make sure that all ductwork is connected to the units using field supplied flexible duct connectors.
- **2.** Make sure that all ductwork is supported independently from the equipment.

These two installation requirements are meant to minimize or isolate any unit vibration to help assure that it is not transmitted into the ductwork, to the structure and/or out into the space.

All ductwork must be designed in accordance with industry accepted practices. Consult ASHRAE, AMCA or SMACNA guidelines or standards for details. Use of turning vanes is recommended.

Verify that the designed duct external static pressure is in line with the capability of the unit.

Ducts should be insulated in accordance with applicable industry standards or per local codes, particularly if the unit will be operated during cold weather. It is also best to design for sufficient clearances for servicing the blower motors, expansion valves, filters, and any additional accessories installed.

#### **Louver Location**

Strategically located intake and discharge louvers help to prevent recirculation of discharge and contaminated air into the intake air stream. Airflow around a building and prevailing wind direction can adversely affect the potential for recirculation and should be factored into louver placement.

In some areas, local codes dictate louver location. Maximize the distance of intake louvers from any exhaust outlet and other contaminants, people, property lines, etc. Avoid placing intakes near idling vehicles. The bottom of the intake louver should be raised a minimum of 12" from a horizontal surface (roof, sidewalk, etc.) to prevent blockage from debris. If snow accumulations are expected to be greater than 12", raise the bottom of the louver above the average snowfall depth. When installing any floor mounted unit, it is generally not necessary to provide any unit vibration isolation. However, some form of vibration isolation may be requested.

If spring mounts on Waffle pad or other similar sound vibration materials are going to be used (field supplied). Allow sufficient clearance for any door or panel access that is required to provide field service or maintenance on the unit.



Clearance

If more than one unit will be installed in the same area, then the minimum separation of one unit adjacent to another should be 6 feet. A 10 foot separation distance should be maintained where two units are installed one above the other. It is best to direct discharge air up and away from pedestrian walkways as well.

We do not recommend multiple installations between closely situated buildings where discharge air could collect and be directed back to the intake. Again, recirculation will cause units to trip on high head pressure.



Carefully choosing the right intake/exhaust louvers and determining the best location for them are critical components to a successful installation.

- 1. Select a louver design that will safely separate the discharge from the intake air stream to ensure that air recirculation will not occur.
- 2. The intake louver should be designed to minimize and virtually eliminate water penetration at a reasonable face area velocity (fpm).
- **3.** The discharge duct must be as short and straight as possible but of sufficient length to guarantee uniform airflow distribution through the louver for maximum velocity.
- 4. In most cases, the cross-sectional "free area" of the louver must be equal to or larger than the crosssectional areas of the intake and/or discharge unit openings to allow for optimum velocity and reasonable pressure drop across the louver.
- **5.** Ducts should be insulated if the unit is installed and operating in cold climates.
- **6.** Adequate access to the louver must be available for cleaning purposes.
- **7.** All louver manufacturer instructions, local codes, and industry accepted guidelines must be followed for all installations.

The intake and discharge louver can be in separate frames or combined in one frame.

Louvers may be manufactured of aluminum (14 gauge) or steel (18 gauge). Louver widths of 30 inches or more should have additional bracing midway along the blades to maintain proper blade separation. If the louvers are to be installed in a coastal application or any location with environmental concerns, then the louvers should be treated.

It is also beneficial to angle the bottom of the intake ductwork up from the louver toward the unit opening to minimize the possibility of water carryover reaching the unit and allow for proper drainage (Figure 8). Louvers should be inspected and cleaned on a regular basis. A bird screen is required to deter animals and debris from entering the duct system.



Inlet Louver

### **APPLICATION DATA**

Voltage	208 / 230
Variation	187 / 253

Outside Air	DB (min./max.)	10 / 115
	WB (min./max.)	9 / 82

Return Air	DB (min./max.)	70 / 80
	WB (min./max.)	55 / 65

### INFORMATION

Upon startup unit will run in diagnostic/ purge/defrost mode. Do not adjust any parameters until unit has finished cycle.



**Alpha Aire Series** 

## 

## **Fan Instructions**



CFM	Exhaust Air Volts	Outside Air Volts
100	1.1	1.1
125	1.3	1.4
150	1.6	1.7
175	1.9	2.0
200	2.1	2.2
225	2.4	2.5
250	2.7	2.8
275	2.9	3.1
300	3.2	3.4
325	3.4	3.6
350	3.7	3.9
375	4.0	4.2
400	4.2	4.5
425	4.5	4.8
450	4.8	5.0
475	5.0	5.3
500	5.3 5.6	

## **Generation 1 Fan Potentiometer Adjustment**



CFM	Exhaust Air Volts	Outside Air Volts
100	1.1	1.4
125	1.4	1.7
150	1.7	2
175	2	2.4
200	2.3	2.7
225	2.5	3.1
250	2.8	3.4
275	3.1	3.7
300	3.4	4.1
325	3.7	4.4
350	4	4.8
375	4.2	5.1
400	4.5	5.4
425	4.8 5.8	
450	5.1	6.1
475	5.4	6.5
500	5.7	6.8

NOTE: This applies to both Generation 1 and Generation 2 units. To change the speed of the exhaust and supply fans per CFM or testing requirements requires manipulation of the potentiometer respective to its fan. The potentiometer is adjustable by the + and - buttons above and below each respective digit. The adjustment is more aggressive on the left digit and becomes finer on the middle digit and is precise on the right most digit. The lowest and highest potentiometer setting corresponds to the lowest and highest fan operation, respectively.



## **Installation**

### CONDENSATE DRAIN CONNECTION

Units will require an external condensate trap. Install a field fabricated condensate trap and drain line and/or a condensate pump as required. Units are equipped with two 3/4" FPT connections.

The drain line must be trapped because the coils are located on the positive side of the blower. The purpose of the condensate trap is to neutralize the positive pressure created within the cabinet by the blower.

This positive pressure can vary. The condensate trap must be of sufficient depth in water column to permit the condensate to flow from the drain pan.

The "A" dimension (Figure 10) must equal or exceed the positive static pressure developed by the blowers. If it does not, the condensate will not drain properly.

It is highly recommended that the trap be primed with water prior to unit start-up.

Each trap must be piped to a suitable waste drain.



Figure 10



#### INFORMATION

The condensate line out of the unit must be trapped before going into the condensate pump.

## **CONDENSATE PUMP (OPTIONAL)**

If an optional condensate pump is to be used, it will be mounted external to the unit.

Follow pump manufacturer instructions.

A 115 volt power supply must be field supplied for the pump.

Refer to Figure 11 for the termination of the condensate tubing inside the pump.

Refer to Figure 12 for the inverted "U" trap that is to be installed for the condensate line.

Route the condensate disposal tubing to a suitable location.





## ELECTRICAL



### ELECTRICAL HAZARD

Only a qualified licensed electrician or other individual that is properly trained in handling live electrical components should perform the wiring installation. Failure to follow all electrical safety precautions and industry accepted practices when exposed to live electrical components could result in death or serious injury.



#### INFORMATION

Use Copper Conductors Only. Failure to use copper conductors may result in equipment damage.



### INFORMATION

All electrical wiring must be in accordance with NEC (National Electrical Code), NFPA (National Fire Protection Agency) most current versions as well as any applicable state or local codes.



### INFORMATION

Confirm that the incoming power supply matches the unit data tag.



#### INFORMATION

Unit wiring and components have been designed for the specific unit application and factory assigned controls. Do not use the unit transformers or alter the unit wiring to interface any field supplied accessories or controls.

A factory provided power block is installed internal to the unit's electrical control panel. Route the main power wires in accordance with all codes from the disconnect to the unit power block.

A proper ground termination lug has been provided in the unit control panel.



#### ELECTRICAL HAZARD

Conduit is not an acceptable grounding source. A separate ground conductor must be connected from Earth Ground to the factory supplied grounding lug internal to the unit.

### TRANSFORMER

Dual voltage units, 208/230, are wired from the factory for the 208 volt power supply. If the power supply will be consistently above 220 volts the transformer should be wired on the 230 volt tap.

## WIRING

- 1. Refer to the wiring diagram that was included with the unit.
- 2. Units are completely internally wired at the factory.
- 3. All units are provided with terminal blocks.
- 4. Check the unit data tag for the required voltage, minimum circuit ampacity and maximum fuse size.
- **5.** Route the power wiring through one of the holes provided in the cabinet.
- **6.** Power wiring must comply with all National or Local codes. The power supply must be suitably fused for wire protection.
- **7.** Use copper conductors only. The unit must be earth grounded using the ground lug provided in the electrical box.

## **PRESSURE SWITCHES**

#### **High Pressure**

This switch shuts down the compressor in the event of excessive high pressure (approx. 630 psig) in the discharge line. A manual reset is required at the high pressure switch.

#### Low Pressure

This switch shuts down the compressor in the event of low pressure (approx. 30 psig) in the suction line. This switch is will auto-reset when the pressure rises above 60 psig.



## System Options

## SMOKE DETECTOR

A field-mounted control that is installed in the return air duct and wired to the unit control panel. Upon detection of smoke, the control will terminate unit operation

## **BUCK BOOST TRANSFORMER**

Small single phase transformer designed to reduce (buck) or raise (boost) line voltage from 5 to 20%. Used with UCA units where 277 volts need to be reduced to 230 v..

## **PAINTED CABINET (Exterior Only)**

A polyester wrinkle finish electrostatically sprayed on heavy duty G90 steel components. It is both a decorative and a protective finish with a film thickness in the 2.5-4.0 mil range and it has a salt spray resistance of 1500+ hours 1/8" vertical scribe in accordance with ASTM B117. Color is Rohm & Haas, Corvel 244-0253 Storm Gray.

## NON-FUSED DISCONNECT (Indoor)

A main non-fused disconnect that is shipped loose for field mounting. Disconnects are sized base on MOP for the unit and its selected options.

## E-COAT COATED COIL

A flexible epoxy polymer coating that is uniformly applied to all coil surfaces. Application is by immersion and computer controlled cathodic deposition which produces a film thickness of 0.6-1.2 mils on fin surfaces and edges. It can withstand 325 deg. F. and no less than 5000 hours salt spray test to ASTM Specification B117-90.

## **CONDENSATE PUMP**

A field-mounted condensate pump consisting of an ABS reservoir, small centrifugal pump, and necessary controls to automatically collect and remove condensate. Units are available in 115 volt models and come with a 6' power cord. An internal float-activated switch both operates the pump and provides a high water alarm when required

## 2" & 4" MERV 8, 11 or 13 Combination

Nominal 2" or 4" depth pleated throwaway type panel filters with galvanized expanded metal backing and moisture resistant enclosing frame. These filters have an average dust spot efficiency of 90% and an average dust arrestance of 98% or greater based on ASHRAE test standard 52.1-92.

## **VOC SWITCH**

Wall mounted switch for unit operation

## **CO<sub>2</sub> SWITCH**

Wall mounted non-dispersive infrared carbon dioxide (CO2) sensor shall be factory provided for unit or field (duct or wall) installation

## **OCCUPANCY SWITCH**

Wall mounted switch for unit operation

## **FLOOR STAND**

A 12" steel base provided for the entire unit to rest in for installation.





## **Refrigerant Circuit Components**

## SIGHT GLASS

A liquid sight glass is located in the liquid line between the outlet of the liquid receiver and the inlet of the thermostatic expansion valve. Flashing (bubbles) will appear in the sight glass during the first minute or two of operation until the expansion valve fully adjusts. If flashing is constant during the compressor operation, it may be an indication the unit is short of refrigerant.

## THERMOSTATIC EXPANSION VALVE

The 100% outside air systems utilize an MOP type thermal expansion valve. The Maximum Operating Pressure (MOP) or pressure limiting valve provides several benefits and

functions for 100% outside air applications. The units will see a wide variety of operating conditions. The TXV will open only slightly to maintain the pressure at 100 psig or less. This helps to keep the compressor operation stable and avoids the superheat from going too high and causing the compressor thermal overload from taking the system off line. After several minutes of operation the refrigerant circuit has stabilized and the valve will start to control based on the superheat setting.

## HOT GAS REHEAT COIL

The hot gas reheat coil is used to increase dehumidification capacity.





## **Maintenance Procedures**



#### ELECTRICAL HAZARD

Turn OFF power and lockout service before conducting any maintenance. Keep hands, clothing and tools clear of electrical terminals.

### ENERGY RECOVERY WHEEL

See: MODEL H INSTALLATION



## WARNING

Make sure to keep hands and clothing clear of any moving belts, blowers and motors while performing any maintenance. Failure to do so could result in death or serious bodily injury.



#### CAUTION

Any maintenance should be conducted by qualified HVAC service personnel only. Potentially hazardous situations which may result in personal injury, equipment or property damage.

## FILTERS

Do NOT run unit without filters.

Throwaway filters are supplied which are pleated extended surface type. Filters should be checked monthly for dirt accumulation and changed when necessary. Replacement filters must be the same type as originally supplied.



## WARNING

Unit must be shut off at the disconnect switch before the filters are serviced. Be sure to check that the air flow direction arrows on the filters point in the correct direction of air flow.

## **BLOWERS**

Disconnect power and lockout the service before doing any blower service or maintenance.

## **BLOWER MOTORS**

All blower motors are equipped with thermal overload protectors.



#### WARNING

Open disconnects to unit before doing any service or maintenance. A motor that is off on thermal overload can start any time when the automatic thermal overload resets.

### **BLOWER SPEED ADJUSTMENT**

Blower speed may be changed by adjusting the potentiometers.

#### INFORMATION

Reduction of airflow through excessive external air friction losses, lowered blower speed operation with dirty filters, or obstructed air flow may result in excessive condensation at air outlets, short cycling, or total unit shutdown due to evaporator coil icing.

#### INFORMATION

Verify that the motor current draw does not exceed the motor nameplate current by more than 10%.

## PLATE HEAT EXCHANGER

See: MODEL E INSTALLATION

#### **Alpha Aire Series**



## **REFRIGERANT SYSTEMS**

The sight glass contains a moisture indicator which changes color when moisture is present in the refrigerant circuit. This indicator is the circular dot in the center of the sight glass. If the color of this indicator is blue, the refrigerant is okay. When the indicator is pink or purple, an abnormal condition exists, servicing is required.



#### INFORMATION

After installation and during equipment start -up, the sight glass may appear pink or purple. This occurs during prolonged periods of non-operation and should turn blue after several hours (up to 12) of operation.

## **EVAPORATOR AND CONDENSER COILS**

The finned coils in a unit should be checked at least every six (6) months or more frequently based on experience of the specific application.

Evaporator finned coils can become "fouled" due to a build up of contaminants in the air path that are not caught or captured in the air filters. Over time this build up on the fin surface can reduce heat transfer and increased resistance to air flow. The end result might be higher operating costs or occupant discomfort.

A dirty condenser coil will cause high condensing pressures, resulting in higher power consumption and possibly system shut-down by high pressure safety control. A dirty evaporator coil will reduce unit capacity and eventually will cause system shut-down by the low pressure safety control.

## FINNED COIL CLEANING

Before cleaning any finned coils, remove the filters. Remove any large debris or visible dirt accumulation.



## WARNING

Make sure to follow all safety precautions when cleaning any coil with a commercially available coil cleaner. Follow all recommendations for safety clothing and gear. Failure to follow all safety instructions could result in death or serious injury.



#### CAUTION

Clean coils only with cold water and a suitable detergent or a commercially available coil cleaner. DO NOT use hot water or steam to clean a coil containing refrigerant as this may cause a high pressure situation that could damage the coil and associated safety devices or refrigerant components.

Rinse all coils thoroughly after any coil cleaning.

Use a suitable fin comb after the coil cleaning to straighten any bent fins.



#### CAUTION

Confirm that any coil cleaning agents, detergents or solutions are suitable for use on a copper tube/aluminum fin coil. If the cleaning agent is to acidic or alkaline, damage to the coil fins may result..

## HARD START KIT

A start assist device is utilized on all single phase units. The purpose of this device is to assist the compressor in starting under low voltage conditions.

A capacitor in conjunction with a Positive Temperature Coefficient (PTC) relay is installed across the run and start windings of the motor. The PTC device utilizes a ceramic element with a predictable thermal response to the introduction of electric current. When the compressor is called upon to start, the start capacitor provides a voltage boost to the start winding of the motor and causes the motor to turn. As the starting current is introduced across the start windings, the PTC element begins to warm. When the PTC device reaches approximately 250° F (corresponding to 0.6 - 0.8 seconds), the resistance in the element increases and creates an open switch that releases the start winding from the circuit and the motor continues to run. If the compressor does not start before the device heats to 250° F, it will not start until the PTC device cycles through a cool-down period (usually 2 - 3 minutes). A compressor off-cycle timer is included in the electrical circuit for this purpose.

The time delay also helps the refrigerant system pressures to equalize at the end of the run cycle. This helps the compressor during the starting process in that it is not attempting to start against a high discharge pressure.

#### INFORMATION



Verify that this timer is set for 3 or more minutes.



## MODEL H INSTALLATION & MAINTENANCE FOR ALPHA AIRE UNITS

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## DISCLAIMER, COPYRIGHT NOTICE, AND DECLARATION OF INCORPORTATION

This is information is available upon request from Heatex Inc., or via the complete Heatex General Design Information for AHU Manufacturers Manual, available on Heatex's website. The herein manual is tailored to only include information pertinent to the Model H plate exchanger included in this Alpha Aire Unit.

## General

The model H plate heat exchanger included in this Alpha Aire product is as follows, and pictured in picture 1:

Product Code: AR01497

Model Code: HA0300-0600-022-2AOO-2-0-0-0600



Picture 1. Plate exchanger unit drawing



#### **Alpha Aire Series**

## **ALLOWED PRESSURE DIFFERENCE**

The following maximum allowed pressure differences apply to H300 heat exchanger is 700 Pa (2.8" WC). The listed pressure difference is the maximum values the heat exchanger can manage without permanent deformation of the channels. The pressure drop in the channels will however be influenced by pressure differences below these values. Heatex Select can calculate this effect if the differential pressure is entered.

## MATERIALS AND CORROSION RESISTANCE

Heatex heat exchangers of type H are manufactured in aluminum. The aluminum material standard is listed below:

Alloy	8006/8009/8011/8111/1200
Temper	H00/H19

The aluminum plate heat exchangers have end plates made of Aluzinc or aluminum depending of size. Corner profiles are made of aluminum.

Standard sealant material on all aluminum heat exchangers is a silicone free sealant. This can be used for air temperatures up to  $90^{\circ}C$  ( $190^{\circ}F$ ). The physical and chemical properties of non-silicone sealant are listed below:

Туре:	MS-hybrid polymer, 1-component	MS-hybrid polymer, 2-component	
Colors:	Grey	Grey	
Contains fungicide:	No	No	
Consistency	Paste, thixotropic	Paste, thixotropic	
Specific gravity:	approx. 1.50 kg/liter (12.52 lb/gal)	approx. 1.49 kg/liter (12.43 lb/gal)	

#### **Corrosion Resistance**

Table 4 is a guide for choosing material when different substances are present in the airstream. We recommend that when possible actual tests are made to verify that the chosen material will work in the real application.

The information in Table 4 is accurate to the best of our knowledge and experience but no guarantee is expressed nor implied in application or services over which we have no control.

Resistance to Fumes at Normal Temperatures				
A - Excellent	P = Cood	C – Eoir	D - Door	*= No
A = Excellent	Б – 6000		D - P001	Information

Substance	Formula	Aluminum	MS Polymer
Acetic Acid	CH₃COOH	A	С
Acetone	C₃H₀O	A	С
Ammonium Hydroxide	NH₄OH	D	В
Ammonium Sulfate	$(NH_4)_2SO_4$	С	В
Bakery Vapors		A	А
Beer		A	С
Benzene	C <sub>6</sub> H <sub>6</sub>	A	*
Boric Acid	H <sub>3</sub> BO <sub>3</sub>	A	*
Calcium Chloride	CaCl <sub>2</sub>	В	В
Carbon Dioxide	CO <sub>2</sub>	A	А
Carbon Tetrachloride	CCI <sub>4</sub>	В	D
Carbonic Acid	$H_2CO_3$	A	*
Chlorine, water		С	В
Chloroform	CHCl <sub>3</sub>	*	D
Chromic Acid	CrO <sub>3</sub>	В	D
Citric Acid	C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	В	*
Copper Cyanide	CuCN	D	*
Creosote		*	*
Diesel Oil		A	D
Ethyl Alcohol	C₂H₅OH	A	D
Ethylene Dichloride	$C_2H_4CI_2$	*	*
Fatty Acids		В	*
Ferric Chloride	FeCl <sub>3</sub>	D	*
Fluorine Gas	$F_2$	D	*
Formaldehyde	CH <sub>2</sub> O	*	*
Fruit Vapors		A	А
Fuel Oil		A	В
Gasoline		A	*
Glycerin	C <sub>3</sub> H <sub>8</sub> O <sub>3</sub>	A	С
Glycol	$C_2H_6O_2$	A	*
Hydrochloric Acid	HCI	D	D
Hydrocyanic Acid	HCN	*	*
Hydrofluoric Acid	HF	D	*
Hydrogen Peroxide	H <sub>2</sub> O <sub>2</sub>	С	D
Hydrogen Sulfide	$H_2S$	D	D
Jet Fuel		A	D
Kerosene		A	D



**Alpha Aire Series** 

Substance	Formula	Aluminum	MS Polymer
Lactic Acid	CH₃CHOHCOOH	С	С
Lube Oils		А	*
Mercury	Hg	*	*
Milk		А	В
Mineral Thinner		А	*
Molasses		А	*
Nitric Acid	HNO <sub>3</sub>	В	D
Oils & Fats		В	В
Oleic Acid	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>7</sub> CHCH(CH <sub>2</sub> ) <sub>7</sub> COOH	В	*
Oxalic Acid	$C_2 C I_2 O_2$	С	D
Petroleum Oils		А	С
Phosphoric Acid	H <sub>3</sub> PO <sub>4</sub>	*	В
Photographic Chemicals		*	*
Potassium Permanganate	KMnO <sub>4</sub>	*	*
Silver Cyanide	AgCN	*	*
Soaps		С	В
Sodium Hydroxide	NaOH	D	D
Sodium Hypochlorite	CIONa	D	D
Stearic acid	C <sub>18</sub> H <sub>36</sub> O <sub>2</sub>	В	*
Sulfur Dioxide	SO <sub>2</sub>	D	*
Sulfuric Acid	H <sub>2</sub> SO <sub>4</sub>	С	D
Sulfurous Acid	H <sub>3</sub> SO <sub>3</sub>	С	*
Syrups		А	В
Tannic Acid	C <sub>76</sub> H <sub>52</sub> O <sub>46</sub>	С	*
Tetrahydrofuran	C <sub>4</sub> H <sub>8</sub> O	*	*
Toluene	C <sub>7</sub> H <sub>8</sub>	А	*
Tricresyl phosphate	(CH <sub>3</sub> C <sub>6</sub> H4O) <sub>3</sub> PO	В	*
Turpentine		А	*
Urine		D	С
Vegetable Oils		А	В
Vegetable Vapors		А	А
Vinegar		D	*
Vinyl Acetate	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	*	*
Water, Fresh		А	В
Water, salt		D	В
Whiskey		А	С
Wine		*	С
Xylene	C <sub>8</sub> H <sub>10</sub>	А	*
Zinc Sulfate	ZnSO <sub>4</sub>	D	*

 Table 4. Corrosion resistance table.



## 4. HANDLING INSTRUCTIONS FOR PLATE HEAT EXCHANGERS

## 4.1. Lifting

Heat exchangers from Heatex are designed for an optimal function with a frame that allows high performance. Heat exchangers with a size that makes it necessary to use some kind of lifting device must be handled according to the picture below.



Figure 5. Recommended placement of slings.

### 4.1. Transportation

The heat exchangers should preferably be transported with the plates oriented in a vertical position. The plates are to be protected by cardboard or plastic wrapping during transportation. Make sure not to top-load in a way that can damage the plates and/or deform the framework.

## 4.2. Deformation

A framework that is not straight, irregular channels or any other deformation to the heat exchanger may seriously influence the performance of the heat exchanger.

## 4.3. Installation

If ducts shall be directly connected to the heat exchanger it is recommended that self-tapping screws or pop rivets are used. Make sure that the length is chosen so that the fastener does not penetrate the heat exchanger channels. In case of welding care must be taken not to melt or damage the sealant. The aluminum heat exchangers must never be submitted to larger pressure differences than those allowed during start-up or normal running.

## 5. MAINTENANCE AND CLEANING

## 5.1. General

All Heatex plate heat exchangers have been designed to prevent dirt from coming into contact with the heat transfer surfaces. Most of the dirt and pollutants in the air will just pass through the heat exchanger. Substances which have the highest risk of fouling the exchanger are sticky substances that condense on surfaces and fibers from, for example, dry tumblers.

From the heat exchanger point of view it is preferable to use a filter before the exchanger to prevent dirt from depositing, but it is however not necessary except in a few special applications. The disadvantage of using filters is that they need to be changed regularly. There is also a hygienic risk because the filters will collect particles, which otherwise would leave the building (or process) with the exhaust airstream.

Experience has shown that the buildup of dirt in a heat exchanger is often limited to the first 50 mm (1.97") in the exchanger, which simplifies cleaning. For normal ventilation applications, it is most of the time sufficient to clean the inlet and outlet with a brush.

For dirtier applications, compressed air or high pressure water cleaning and disinfection may be necessary. For instructions regarding cleaning and disinfection, see below.

Please observe that high pressure cleaning must not be made directly against the plates and the pressure must be kept below 100 bar. Make sure that the plates do not deform or brake when removing dirt mechanically.

## **5.2. Recommended Cleaning Products**

The detergent recommended for cleaning is YES/Fairy. The detergent shall be sprayed on the heat exchanger with a low pressure sprayer. The detergent can be diluted with up to 75% water. YES/Fairy is available in grocery stores and can also be purchased through Heatex. Heatex article number: 42715.

The disinfectant recommended for disinfection is LIV +45 (45% Concntration Isopropyl Alcohol).





## Plate Heat Exchanger Cleaning Procedure:

1. Place the nozzle at a distance of approximate 300 mm (11") from the heat exchanger to not damage the plates.



Figure 6. YES/Fairy detergent.



Figure 7. LIV +45

## 5.3. Cleaning

The cleaning process consists of three steps. First, rinse the heat exchanger with water using a high pressure cleaner to remove dust, particles, deposits etc. Then, use detergent to clean the heat exchanger. As a third step, remove the detergent with water. Make sure that the nozzle of the high pressure cleaner is adjusted to a plain jet. 2. Have the nozzle adjusted to plane jet



3. Clean the heat exchanger plates by spraying water into the area between the plates.



4. Vary the spray angle between + 30 and - 30 degrees from the openings at a distance of 300 mm (11") from the entrance.



5. Repeat point 3 and 4 on one of each entrance.



6. Spray the heat exchanger with detergent (YES/Fairy detergent) with a low pressure sprayer.

- 7. Repeat point 1-5 in order to remove all detergent.
- 8. Let the heat exchanger air dry.

### **5.4. Disinfection**

The disinfection process consists of two steps. First, spray the heat exchanger with disinfectant LIV +45 and leave to dry. Then, rinse the heat exchanger with water using a high pressure water cleaner. The disinfectant LIV +45 is used on both the plate and rotary heat exchangers. LIV +45 is used undiluted.

## Plate Heat Exchanger Disinfection Procedure:

1. Spray generously of disinfectant into the heat exchanger at a distance of 50-100 mm (1-4"). Use the standard LIV +45 bottles with easy spray tap.

2. Spray both plates in every channel and spray into all four sides of the heat exchanger.

3. Let the heat exchanger air dry for 30 minutes.

4. Clean the heat exchanger in the same way as before (but without detergent) to assure all disinfectant has been removed.

## 6. DISPOSAL

Plate heat exchangers can consist of up to 98 % aluminum depending on size and configuration.

Different material such as Aluzinc or galvanized steel may be used as gables.

## **6.1. Aluminum Plate Material**

Heatex heat exchangers consist of pure aluminum marked with an A in the product code as the second letter.

Example:

HA = Pure aluminum

## 6.2. Gables

Gables can be of aluminum or carbon steel and should be disposed as metal, either they are coated with aluzinc, galvanized or painted. Local country regulations apply.

## 6.3. Glue

The glue used to hold the aluminum plates to the gable and corner profiles comply with combustible waste and can be sent with the aluminum waste and removed during fragmentation if needed.

## 7. SUPPORT

For questions or information, please state order number, product name and message. Heatex is available for support during office hours, 8 am - 4.30 pm (EST) on weekdays.



## MODEL E INSTALLATION & MAINTENANCE FOR ALPHA AIRE UNITS

## NORTH AMERICAN ADDRESS AND CONTACT DATA

Mailing Address:

Heatex INC.

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USA

Physical Address:

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www.heatex.com

## DISCLAIMER, COPYRIGHT NOTICE, AND DECLARATION OF INCORPORTATION

This is information is available upon request from Heatex Inc., or via the complete Heatex General Design Information for AHU Manufacturers Manual, available on Heatex's website. The herein manual is tailored to only include information pertinent to the Model H plate exchanger included in this Alpha Aire Unit.

## 1. GENERAL

The rotary heat exchanger included in this Alpha Aire product is as follows, and pictured in picture 1:

Product Code: AF00733

Rotor Model: EM0600X0600-0500V-020-2D0CI-6BR0-A

Drive Model: Brother Gear Motors - GL15N007-BMRE5N – 220V/1Phase/60Hz



Picture 1. Rotor unit drawing.

A rotary heat exchanger with casing and drive is "partly completed machinery" as defined in Directive 2006/42/EC. This product is delivered in compliance with the Directive 2006/42/EC but when installed in the complete machinery it is up to the installer to make sure that the final product complies with the directive.

Special attention should be paid to sharp edges (risk of cuts) and that when the wheel is rotating the rotating parts may cause injuries.

The surfaces of the drive motor and gear can be hot and attention should be paid to the risk of burn injuries.

The sound level from the heat exchanger is less than 70 dB (A).

Subject to change without notice.



## 2. Transport

• Always transport the exchanger vertically.

• Lift the exchanger in the upper two corner distance pipes according to Picture 1.



#### Picture 2. Lift the casing at the corner distance pipes.

• It is important that all transport and handling is carried out by qualified staff.



### CAUTION

All transport and handling shall be carried out by qualified staff.

## 3. STORAGE

Adsorption wheels are sensitive to moisture. Please make sure that you store the wheels to avoid the conditions described above.

Furthermore, the unit is to be placed on a horizontal and even surface. Please note that an uneven surface can warp the rotor and affect the factory adjustments.



### CAUTION

Placing the unit on an uneven surface may warp the rotor.

Always make sure that the heat exchanger is supported and secured during transport, handling, storage and installation so it cannot fall over and cause damage or injuries.

### CAUTION



Heat exchanger may fall over if not secured.

Please observe that there may be sharp edges and a risk for cuts so we recommend that gloves should be used when the heat exchanger is handled.

## CAUTION

Use gloves when handling the heat exchanger.

Always make sure that the storage temperature is kept above 0°C (32°F).

## 4. Installation

• Prior to initial operation, please make sure no objects are blocking the rotors movement. The rotor should move evenly and smoothly around its shaft.

• Rotor may only be installed either in a vertical or a horizontal position according to design, not tilted unless approved by Heatex. In case of horizontal rotors, check that rotor is ordered and manufactured as a horizontal rotor.



**Picture 3. Rotor positions** 



Pressure difference and pressure drop should under no circumstances exceed the limits. Please refer to Application Limits for further information.

## 5. ADJUSTMENTS

• If necessary, adjust the brush sealing to minimize leakage.

• If the belt slides adjust belt tension.

• The round belt should have a tension of 3%. For adjustments, see maintenance instructions below.

## 6. MAINTENANCE

### 6.1. Matrix

To secure the function and performance, the face of the rotor has to be inspected regularly for dust and dirt. In most cases, the rotor is self-cleaning due to counter flow and rotation of the matrix and this makes manual cleaning unnecessary. If the self-cleaning is insufficient dirt or/and dust can appear in the matrix.

Depending on the degree of soiling it is recommended to use following cleaning:

1. For only a small amount of easily removable dirt, Heatex recommends to use a vacuum cleaner.

2. For heavier dirt it is also possible to use compressed air but with caution.

3. Firmly attached dirt in the rotor is easiest removed by using hot water and a mild detergent. The mild detergent may be removed with high-pressure water cleaner with the nozzle placed 50-100 mm from the matrix.

4. If required, Heatex recommends disinfection with the substance known as LIV +45 (isopropanol based substance).

## **6.2. Adsorption and Enthalpy Wheels**

The adsorption material is aluminum coated with molecular sieve 3Å coating. There is a small amount of surplus material that might leave the matrix during the first usage. This will NOT affect the hygroscopic properties. The excess powder is harm- less and easy to remove using a vacuum cleaner.

Just as for the adsorption wheel, a small amount of surplus material might leave the matrix during the first usage.

### 6.3. Round Belt

In addition, the round belt may need adjustment during its lifetime. If adjustment is needed the belt must be cut, shortened and joined together again with a joining pin. Belt tension should be 4-6%.

## 6.4. Brush Sealings

Tightness between brush sealings and casing has to be checked during inspection. The brush sealings are easily adjusted by unscrewing the screws and moving the brush sealing into the right position.

## **6.5. Application Limits**

Recommended temperature limits for rotary heat exchanger Model E are -40°C (-40°F) to +65°C (149°F).

It is however important not to exceed the temperature limits on mounted components:

Component	Min	Max
Bearings	-40°C (-40°F)	110°C (230°F)
Yellow belt	-30°C (-22°F)	66°C (150°F)
Constant motor	-10°C (14°F)	40°C (104°F)
Standard seals	-25°C (13°F)	90°C (190°F)

Maximum and recommended pressure drop as well as differential pressure for rotary heat exchanger:

- Pressure drop max 300 Pa (1.2" WC) up to outer diameter 1600 mm (62.99"), even during start up and maintenance.
- Recommended pressure drop 100-200 Pa (0.4-0.8" WC) (normal operation).
- Differential pressure max 600 Pa (2.4" WC).

#### INFORMATION



NOTE! The temperature inside the casing is approximately the mean temperature of supply and exhaust air temperatures.



## 6.6. Troubleshooting

If the rotary heat exchanger does not rotate properly, please follow these steps to solve/locate the problem.

- 1. If the motor runs properly, please jump to step 5.
- **2.** If there is a controller installed please check controller technical specifications, chapter trouble shooting.
- **3.** If there is a constant drive installed: Please check that the drive is correctly connected. Note that all electrical maintenance and installation must be performed by qualified personal.
- **4.** The position of the pulley should be placed as near the center of the rotor as possible.
- 5. Disconnect the belt. Is the motor running correctly?
- **6.** If the belt is sliding, please tighten the belt according to maintenance instruction.
- 7. Rotate the wheel by hand in the indicated direction (belt disconnected from the motor). Is it possible to

smoothly rotate the wheel or does the wheel interact with the casing? If there is excessive friction between the wheel and the casing (making it hard to rotate), please locate the position.

8. Make sure the connected ducts do not press on the casing making it squeeze against the wheel. Make sure the diagonal measures of the casing side where the motor is positioned are equal.

## 7. SUPPORT

For questions or information regarding this product, please communicate your order number and product code along with your message.

Heatex is available for support during office hours: 8 am – 4.30 pm (EST) on weekdays

NOTE! The temperature inside the casing is approximately the mean temperature of supply and exhaust air temperatures.



## **TROUBLESHOOTING GUIDE**

A	ELECTRICAL HAZARD	Turn OFF power to unit before conducting any troubleshooting, unless the tests you are performing require system operation. Keep hands, clothing and tools clear of electrical terminals.
	WARNING	Make sure to keep hands and clothing clear of any moving belts, blowers and motors while performing any tests. Failure to do so could result in death or serious bodily injury.
	CAUTION	Any troubleshooting or test procedures are to be conducted by qualified HVAC service personnel or electricians only. Potentially hazardous situations which may result in personal injury, equipment or property damage.
	INFORMATION	For operating and troubleshooting instructions for microprocessor controller, refer to specific controller instructions that accompany the unit.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Control is erratic	<ol> <li>Control wiring not installed correctly</li> <li>Loose control connections</li> <li>Broken wiring</li> </ol>	<ol> <li>Check wiring connections against schematic.</li> <li>Check all connections for tightness.</li> <li>Check wire continuity.</li> </ol>
Blower fails to start	<ol> <li>Controller not set properly</li> <li>Motor failure</li> <li>Defective contactor</li> </ol>	<ol> <li>Turn on and set controller for desired operation</li> <li>Replace motor</li> <li>Replace contactor</li> </ol>
Compressor fails to start	<ol> <li>Controller not set properly</li> <li>Loss of refrigerant charge</li> <li>High head pressure</li> <li>Low line voltage</li> </ol>	<ol> <li>Turn on and set controller for desired operation</li> <li>Repair leak, evacuate and recharge refrigerant system</li> <li>Confirm proper fluid flow quantity through condenser</li> <li>Confirm acceptable fluid temperatures entering the condenser</li> <li>Resolve incoming voltage issue</li> <li>[Note: Compressor internal overload may require an extended period of time (1 hour or more) to reset]</li> </ol>
Compressor short cycles	<ol> <li>Reduced air flow</li> <li>Loss of refrigerant charge</li> <li>Short cycling of conditioned air</li> <li>Drain pan switch open</li> </ol>	<ol> <li>Check filters and coil for any blockages</li> <li>Replace filters if dirty</li> <li>Repair leak, evacuate and recharge refrigerant system</li> <li>Make sure that supply air is not short cycling back into return air stream</li> <li>Confirm that unit condensate is draining properly.</li> </ol>



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Evaporator coil ices Noisy compressor	<ol> <li>Lack of air flow</li> <li>Low inlet air temperature</li> <li>Loss of refrigerant charge</li> <li>Expansion valve stuck open</li> <li>Worn or scarred compressor bearings</li> <li>Excessive head pressure</li> <li>Broken compressor valve (compressor knocking)</li> <li>Liquid slugging</li> </ol>	<ol> <li>Check filters and coil for any blockages</li> <li>Replace filters if dirty</li> <li>Repair leak, evacuate and recharge refrigerant system</li> <li>Ensure thermal expansion valve bulb is tight on suction line</li> <li>Confirm thermal expansion valve bulb is located properly on suction line</li> <li>Check superheat</li> <li>Replace compressor</li> <li>Reduce head pressure</li> <li>System overcharged. Reclaim excess refrigerant from the high side of the system.</li> </ol>
System short of capacity	<ol> <li>Flash gas in liquid line</li> <li>Expansion valve stuck open or possibly obstructed</li> <li>Clogged filter drier</li> <li>Iced or clogged evaporator coil</li> <li>Head pressure control valve not operating properly</li> <li>Condenser needs cleaned</li> </ol>	<ol> <li>Check for refrigerant leaks</li> <li>Repair leak, evacuate and recharge refrigerant system</li> <li>Check sub-cooling</li> <li>Ensure thermal expansion valve bulb is tight on suction line</li> <li>Confirm thermal expansion valve bulb is located properly on suction line</li> <li>Replace thermal expansion valve</li> <li>Replace filter drier</li> <li>Check filters and coil for any blockages</li> <li>Replace filters if dirty</li> <li>Confirm proper fluid flow quantity through condenser</li> <li>Clean condenser</li> </ol>
Head pressure too high	<ol> <li>Possible non-condensable in system</li> <li>Overcharge of refrigerant</li> <li>Condenser entering fluid temperature too hot</li> <li>Condenser air intake, duct or coil blocked.</li> </ol>	<ol> <li>Repair leak, evacuate and recharge refrigerant system. Install new filter drier.</li> <li>Reclaim excess refrigerant from high side of system</li> <li>Confirm proper fluid flow quantity through condenser</li> <li>Confirm acceptable fluid temperatures entering the condenser</li> <li>Verify that head pressure control valve is operational</li> <li>Reset high pressure safety switch if tripped</li> <li>Clean away debris from condenser air circuit.</li> </ol>
Head pressure too low	<ol> <li>Entering fluid temperature too low</li> <li>Excessive air flow across condenser.</li> </ol>	<ol> <li>Confirm acceptable fluid temperatures entering the condenser</li> <li>Confirm proper air flow amount. Adjust potentiometers as necessary.</li> </ol>
Suction pressure too low	<ol> <li>Flash gas in liquid line</li> <li>Obstructed expansion valve</li> <li>Loss of fluid in expansion valve bulb</li> <li>Clogged filter drier</li> <li>Lack of air flow</li> <li>Entering WB too low</li> </ol>	<ol> <li>Check for refrigerant leak</li> <li>Repair leak, evacuate and recharge refrigerant system.</li> <li>Replace thermal expansion valve</li> <li>Replace filter drier</li> <li>Check filters and coil for any blockages</li> <li>Confirm that entering return air conditions fall within acceptable range</li> <li>Reset low pressure safety switch if necessary</li> </ol>



PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
No cooling	<ol> <li>Controller not set properly</li> <li>Control wiring issue</li> <li>Controls in an alarm condition</li> <li>High or low pressure switch open</li> <li>Compressor thermal overload open</li> </ol>	<ol> <li>Turn on and set controller for desired operation</li> <li>Check wiring connections against schematic.</li> <li>Check all connections for tightness.</li> <li>Check wire continuity.</li> <li>Refer to controller troubleshooting</li> <li>Reset high or low pressure switch</li> <li>Compressor internal overload may require an extended period of time (1 hour or more) to reset</li> </ol>
Condensate carry over	1. Air flow too high	1. Reduce air flow
Condensate pump does not run	<ol> <li>Check to see that power to the pump is present</li> <li>Confirm that float is moves freely</li> <li>Confirm that dirt or algae is not interfering with float action</li> </ol>	<ol> <li>Locate and repair electric issue.</li> <li>Clean float and sump</li> </ol>
Condensate pump runs with no discharge	<ol> <li>Tubing blocked or kinked</li> <li>Check valve blocked</li> <li>Impeller blocked</li> <li>Tubing elevation or run exceeds head capability.</li> </ol>	<ol> <li>Inspect, clean or straighten as necessary.</li> <li>Clean check valve</li> <li>Remove debris from pump impeller</li> <li>Verify tubing run is within pump head limitations.</li> </ol>



#### **Alpha Aire Series**

## **LIMITED WARRANTY**

### **IMPORTANT NOTICE!**

This Limited Warranty specifically provides that all installation, operation and repairs of product and parts covered under this limited warranty must be made with authorized parts and by a licensed HVAC service provider. The product(s) must be properly installed, and maintained by a licensed HVAC service provider in accordance with the installation, operation, and maintenance instructions provided by United CoolAir Corporation. Failure to conform to such specifications and/or instructions shall void this limited warranty. United CoolAir may request written documentation showing the proper preventative maintenance.

United CoolAir warrants this product to be free from defects in factory workmanship and material under normal use and service and will, at its option, repair or replace any parts that prove to have such defects within a period of one (1) year from the date of product installation. This warranty extends only to the original consumer purchaser in accordance with the then current Terms and Conditions and is nontransferable.

For this warranty to apply, the product must be installed according to United CoolAir recommendations and specifications, and in accordance with all local, state, national and provincial codes. The product must not be moved from its original place of installation. The replacement part assumes the unused portion of this warranty.

This limited warranty applies only to products installed in the continental United States, Alaska, Hawaii and Canada.

### **EXCLUSIONS**

This Limited Warranty does not cover any:

- **1.** Shipping, labor or material charges.
- **2.** Damages resulting from transportation, installation or servicing.
- **3.** Damages resulting from accident, abuse, fire, flood, alteration or acts of God.
- 4. Tampering with, altering, defacing or removing the product serial number will serve to void this warranty.
- 5. Damages resulting from use of the product in a corrosive atmosphere (such as concentrations of acids or halogenated hydrocarbons).
- **6.** Damages resulting from inadequacy or interruption of electrical service, improper voltage conditions, blown fuses, or other like circumstances.
- 7. Cleaning or replacement of filters or belts.
- 8. Damages resulting from failure to properly and regularly clean air and/or water side of condenser and evaporator.
- 9. Damages resulting from: (I) freezing of condenser water or condensate; (II) use of corrosive water; (III)

fouling or restriction of the air/water circuit by foreign material or like causes.

- **10.** Damages resulting from operation with inadequate or interrupted supply of air or water.
- **11.** Damages resulting from use of components or accessories not approved by United CoolAir.
- **12.** This warranty does not apply to the installation, plumbing and wiring not integral to the product.
- **13.** Damages resulting from improper application or sizing of unit.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose.

Some states (provinces) do not allow the disclaimer of implied warranty, so that the above disclaimer may not apply to you.

Some states (provinces) allow only a partial limitation on implied warranties to limit the duration of implied warranties to the duration of the express warranty. In such states (provinces), the duration of implied warranties is hereby expressly limited to the duration of the express warranty on the face hereof.

In no event, whether as a result of breach of warranty or contract, tort (including negligence) strict liability or otherwise, shall United CoolAir be liable for special, incidental, or consequential damages, including but not limited to loss of use of the equipment or associated equipment, lost revenues or profits, cost of substitute equipment or cost of fuel or electricity. The above limitations shall inure to the benefit of United CoolAir's suppliers and subcontractors. The above limitation on consequential damages shall not apply to injuries to persons in the case of consumer goods.

Some states (provinces) do not allow the exclusion or limitation of liability for consequential damages, or for strict liability in tort, so that the above exclusions and limitations may not apply to you.

United CoolAir does not assume, or authorize any other person to assume for United CoolAir, any other liability for the sale of this product.

This warranty gives you specific legal rights. You may also have other rights which vary from state to state (province to province).

## **TO OBTAIN WARRANTY SERVICE**

Contact the installing or servicing contractor with the details of the problem. Provide the model number, serial number and date of installation. Warranty requests directed to the factory will be referred back through the local distribution network.

Date of Installation:

Model:

Serial Number:



## LIMITED WARRANTY FOR HERMETIC COMPRESSORS

United CoolAir warrants the hermetic compressor in this product to be free from defects in factory workmanship and material under normal use and service and will, at its option, repair or replace the hermetic compressor if it proves to have such defects within a period of five (5) years from the date of product installation. This warranty extends only to the original consumer purchaser in accordance with the then current Terms and Conditions and is non-transferable. If a United CoolAir unit is matched with another manufacturers unit the compressor warranty is limited to 1 year form the date of product installation.

For this warranty to apply, the product must be installed according to United CoolAir recommendations and specifications, and in accordance with all local, state, national and provincial codes. The product must not be moved from its original place of installation. The replacement part assumes the unused portion of this warranty.

This limited warranty applies only to products installed in the continental United States, Alaska, Hawaii and Canada.

## **EXCLUSIONS**

This Limited Warranty does not cover any:

- 1. Shipping, labor or material charges.
- **2.** Damages resulting from transportation, installation or servicing.
- **3.** Damages resulting from accident, abuse, fire, flood, alteration or acts of God.
- **4.** Tampering with, altering, defacing or removing the product serial number will serve to void this warranty.
- Damages resulting from use of the product in a corrosive atmosphere (such as concentrations of acids or halogenated hydrocarbons).
- 6. Damages resulting from inadequacy or interruption of electrical service, improper voltage conditions, blown fuses, or other like circumstances.
- 7. Cleaning or replacement of filters or belts.
- 8. Damages resulting from failure to properly and regularly clean air and/or water side of condenser and evaporator.
- Damages resulting from: (I) freezing of condenser water or condensate; (II) use of corrosive water; (III) fouling or restriction of the air/water circuit by foreign material or like causes.
- **10.** Damages resulting from operation with inadequate or interrupted supply of air or water.
- Model: \_\_\_\_\_

Serial Number: \_\_\_\_\_

- **11.** Damages resulting from use of components or accessories not approved by United CoolAir.
- **12.** This warranty does not apply to the installation, plumbing and wiring not integral to the product.
- **13.** Damages resulting from improper application or sizing.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose.

Some states (provinces) do not allow the disclaimer of implied warranty, so that the above disclaimer may not apply to you.

Some states (provinces) allow only a partial limitation on implied warranties to limit the duration of implied warranties to the duration of the express warranty. In such states (provinces), the duration of implied warranties is hereby expressly limited to the duration of the express warranty on the face hereof.

In no event, whether as a result of breach of warranty or contract, tort (including negligence) strict liability or otherwise, shall United CoolAir be liable for special, incidental, or consequential damages, including but not limited to loss of use of the equipment or associated equipment, lost revenues or profits, cost of substitute equipment or cost of fuel or electricity. The above limitations shall inure to the benefit of United CoolAir's suppliers and subcontractors. The above limitation on consequential damages shall not apply to injuries to persons in the case of consumer goods.

Some states (provinces) do not allow the exclusion or limitation of liability for consequential damages, or for strict liability in tort, so that the above exclusions and limitations may not apply to you.

United CoolAir does not assume, or authorize any other person to assume for United CoolAir, any other liability for the sale of this product.

This warranty gives you specific legal rights. You may also have other rights which vary from state to state (province to province).

## **TO OBTAIN WARRANTY SERVICE**

Contact the installing or servicing contractor with the details of the problem. Provide the model number, serial number and date of installation. Warranty requests directed to the factory will be referred back through the local distribution network.

Date of Installation:



## **START-UP PROCEDURES**



#### ELECTRICAL HAZARD

Make certain that all power is disconnected at the main power circuit breaker or service disconnect before starting any of this procedure.

Some of the numbered items below are referenced on the Start Up Form that needs to be completed.

This procedure has been created based on utilizing a standard wall thermostat. If another controller is being utilized some of the steps below may need to be altered.

- 1. Start up must be performed by a qualified HVAC Technician.
- 2. Check all electrical screw terminals and wiring lugs for tightness internal to the equipment. Components may have loosened due to vibration during transit or handling. Verify that the main power block lug connections made in the field are tight and secure.

### WIRING

Follow the diagram to locate the main power connections for the unit and supply the 208/230-1-60 electrical power to the unit on the L1 and L2. Locate the ground lug in the top left corner for the ground connection.

- **3.** Confirm that the voltage rating of the equipment data tag coincides with the power that will be delivered to the unit.
- 4. Verify that the circuit protection for the unit satisfies Local and National Codes according to the unit data tag Minimum Circuit Ampacity (MCA) and Maximum Overload Protection (MOP).
- **5.** Locate the unit thermostat and check all electrical terminations against the unit electrical diagram and for the unit thermostat and condensers.

No additional wiring from the field is required however there are 2 remote switches that can be installed on the unit that will ship with jumpers installed.

Where:

SD1 and SD2 must be jumped if no smoke detector is supplied.

Y to CP must be jumped if there is no condensate pump interlock installed

CP to DP must be jumped if there is no external wet or drain pan overflow switch.

SF POT to SF0-10 must be jumped if there is no BMS control output of 0-10VDC to the supply fan.

EF POT to EF0-10 must be jumped if there is no BMS control output of 0-10VDC to the exhaust fan.

- 6. Leak check the refrigerant system. While the unit was leak checked at the factory, leaks can develop during transit and / or handling.
- 7. Confirm that both condensate outlets have been adequately trapped and taken to a suitable point for disposal.
- **8.** Verify that both sets of filters are in place, clean and usable.
- 9. Switch the unit thermostat to the "OFF" position.
- **10.** Apply power to the unit. Switch the circuit breaker or field supplied electrical service disconnect switch to the on position.
- 11. Record the voltage at the unit terminals.
- **12.** If possible with the thermostat provided, switch the evaporator blower to the RUN position. Verify that the evaporator blower is activated.
- 13. To change the speed of the exhaust and supply fans per CFM requirements or testing requirements require manipulation of the potentiometer respective to its fan. The potentiometer is adjustable by the + and – buttons next to each respective digit. The adjustment is more aggressive on the left digit and becomes finer on the middle digit and is precise on the right most digits. The fans lowest and highest operational setting is for the lowest operation and for the highest operation.
- 14. Before conducting the following start up sections connect a suitable refrigerant gauge set to the unit Schrader connections. Install temperature sensors to record the appropriate refrigerant line temperatures. Service gauge access ports have been provided in the compressor compartment so that the gauge line hoses can be run outside the cabinet with the access panels installed.
- **15.** Navigate the thermostat located inside the units control box to choose to operate the unit in heat pump mode or cooling mode based on the operation chosen to run.
- **16.** To set the MODE of the unit IE heat pump or cooling use the selection button below the screen under MODE, select the desired mode and press the accept button.

#### Continued on next page



## **START-UP PROCEDURES** (R-410a Systems) Continued:

- **17.** To set the temperature, simply press the up or down button and the set point temp slide will appear. Then simply press the accept button to temporary hold the option or select the permanent hold option.
- 18. Set the thermostat switch to a temperature set point approximately 5° lower than the space temperature. Set the thermostat fan switch to the AUTO position. Set the thermostat operating mode to the COOL position. This should energize the compressor and both blowers. Dependent upon the options and/or the thermostat, there may be a delay for the compressor operation.
- **19.** Make sure all the unit access panels are in place when taking these readings.
- **20.** While waiting for the compressor(s) to stabilize, record the External Static Pressure (ESP) for both the evaporator and condenser blowers.
- **21.** Record the return air and supply air temperatures. (The unit should have operated for at least 15 minutes before taking these readings).
- **22.** Record the outdoor discharge air temperature.
- **23.** Record the suction line pressure and the suction line temperature near the compressor.
- **21.** Using an appropriate pressure / temperature chart for R-410A refrigerant, look up and record the saturation temperature corresponding to the suction pressure.
- **22.** Calculate and record the suction superheat by taking the difference between the suction line temperature and the saturation temperature corresponding to the suction pressure.
- **23.** Record the liquid line pressure and the liquid line temperature.

- **24.** Using an appropriate pressure / temperature chart for R-410A refrigerant, look up and record the saturation temperature corresponding to the liquid line pressure.
- **25.** Calculate and record the liquid sub-cooling for each circuit by taking the difference between the liquid line temperature and the saturation temperature corresponding to the liquid line pressure.
- **26.** Record the Amps for the evaporator blower motor, each compressor and the condenser blower motor.
  - **a.** Make sure the pressures on each compressor circuit are within the proper limits:
    - i. 290 550 Discharge
    - ii.100 140 psig Suction
  - **b.** Compressor Amperage is below the RLA Amps listed on the unit data tag.
    - i. The maximum compressor operating current (amps) at start up depends a lot on the system loading. The lower the load, the less the current. The higher the load, the higher the current.
  - **c.** The blower motor FLA values should never be exceeded.
    - i. If the FLA value is exceeded, shut the unit off and check the duct design, or make sure there is no blockage / obstruction in the duct or filters.
- **27.** Document any additional information deemed appropriate for the specific application or installation.
- **28.** Shut the system down and remove all test instruments and test sensors.
- **29.** Leave the system in the operating mode as appropriate for the customer and the application.



START-UP PROCEDURES				
Complete the form by listing your	Job Name:		Date:	
name, company name, phone and fax number. Sign and date the form	Address:			
and provide a copy as required to all	City:	State: _	ZIP	
interested parties.	Country:			
	Unit Model No.:			
	Unit Serial No.:			
Screw Lugs & Terminals OK?		Yes	No	
Describe any loose connections and acti	on(s) taken:			
Power Supply Correct Voltage and Phas	e?	Yes	No	
If not in agreement with unit data tag cont	act the Distributor.			
Is the Circuit Protection the correct type a	and does it meet		Ne	
the unit data tag requirements?		Yes	NO	
	e been taken to correct:			
Linit controller wiring verified?		Ves	No	
Unit look checked QK2			No	
If leak was located describe where and h	now repaired:			_
Condenante tranned 9 run te e cuitable e	dianagal point?	Vaa	No	·····
Condensate trapped & run to a suitable of	uisposal point?	Yes	NO	
Filters are in place, clean & usable?		Yes	NO	
Single Phase Unit Measured Voltage	L1-L2	L1-GND	L2-GND	

Continued on Next Page



Outside Air External Static Pressure	(ESP): _	In. WG
Exhaust External Static Pressure	(ESP): _	In. WG

	Compressor
Suction Pressure:	psi
Suction Line Temperature:	°F
Saturation Temperature:	°F
Suction Superheat:	o
Liquid Line Pressure:	psi
Saturation Temperature:	°F
Liquid Line Temperature:	°F
 Sub-cooling:	o

## ELECTRICAL

Evap. Motor Amps	.L1
Compressor Amps	.L1
Cond. Motor Amps	.L1
HEAT PUMP MODE	

System Air Temperatures	Return: °F	_ Supply: °F
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## **DEHUMIDIFICATION MODE**

Air Temperatures	Return:	°F Supply: °F		
Outdoor: °F	Exhaust: °F			
Notes:				
Technician (print name):			·····	
Company:				
Phone:		Email:		

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Installation, Operation and Maintenance Manual



**Alpha Aire Series** 

## Alpha Aire Basic Model Designation

EXAMPI	$\begin{array}{cccc} \mathbf{LE:} & \mathbf{AA} & \mathbf{H} & 1 \\ 1 & 2 \end{array}$	$\frac{1}{3}  \frac{1}{4}  \frac{1}{5}  \frac{1}{6}  \frac{1}{7}  \frac{1}{8}  \frac{1}{9}  -  \frac{1}{10}  \frac{1}{10}$
1.	"AA"	Outside Air Type
2.	"H" or "V"	Horizontal or Vertical Configuration
3.	"100","200", etc.	Series
4.	"G"	Common to All
5.	1	208-230V, 1 PH 60 Hz
6.	"AS"	Single Circuit Refrigerant
7.	"T"	Traditional Cabinet
8.	"A"	Refrigerant R-410a
9.	"1","2", etc.	Generation
10.	"X"	Special Configuration





**VertiCool Classic** Vertical, 3 - 30 Ton



**VertiCool Aurora** Vertical, 3 - 35 Tons



**VariCool®** VAV, 9 - 70 Tons



VariCool® EZ-Fit VAV, 12 - 90 Tons



**Alpha Aire** 100 – 500 CFM



**Portable Cooling and Heating Units** 3-30 Tons



**C13-Series Horizontal** 2 - 10 Tons



**C-Series Horizontal** 1 - 15 Tons

Special Configuration Engineered to Order



100% Outside Air 150 – 3000 CFM

Authorized Distributor:

#### LIMITED WARRANTY

United CoolAir Units are backed by a 1 year limited warranty on parts and a 5 year limited warranty on the compressor (labor not included). Maintenance items such as filters and belts are excluded under this limited warranty.

### FACTORY TESTED

All units are functionally run tested before shipment to ensure a trouble-free start-up and unit commissioning. Industry proven components are used throughout to enhance system reliability and peace of mind.



Scan to learn more about all of our products!



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