UNITED COOLAIR

OmegaAir™ Series

Dedicated Outside Air Systems (DOAS)

Installation, Operation and Maintenance Manual

Effective April 2022

Vertical and Horizontal
Water-Cooled and Air-Cooled

MEMBER AHRI AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE

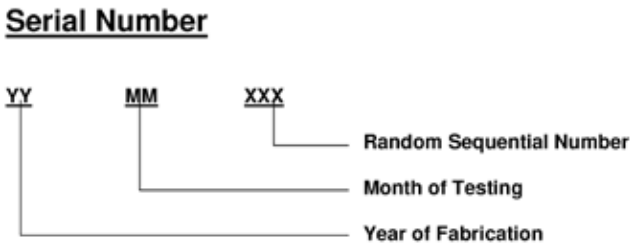
we make life better™

Contents

Wiring Diagram

United CoolAir provides a wiring schematic for each unit produced. To retrieve the diagram for your unit please visit **www.unitedcoolair.com**, on your computer or mobile device, scroll to the footer section or Home/industry-resources, enter your serial number in the **Serial Search** field and press return to retrieve your product-wiring diagram.

Your serial number is a combination of the year, month and sequential order of build date.



This action will return the Model number, Job Number and the wiring diagram for viewing as well as downloading.

1 results

Serial Number	Model Number	Job Number	Wiring Diagram
1802030	B2G3ASHA	28168-002	View

NOTE: Only units shipped since November 2016 are available on the site, for older units please contact the factory directly at 717-843-4311.

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:

ELECTRICAL HAZARD

The electrical hazard icon indicates the presence of an electrical hazard which could result in electrical shock or death.

WARNING

The warning icon indicates a potentially hazardous situation which could result in death or serious bodily injury if not avoided.

CAUTION

The caution icon indicates a potentially hazardous situation which may result in minor or moderate injury if not avoided.

INFORMATION

The information icon indicates a situation that may result in equipment or property damage. The information provided alerts the reader to relevant facts and/or conditions.

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

CAUTION

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

The OmegaAir unit has been designed as either a vertical floor mount cabinet or a horizontal ceiling mounted cabinet. As a water-cooled system the unit is self contained in either configuration. When used as an air-cooled system, there will be a remote air-cooled condenser.

Vertical units are to be mounted on a solid floor or supported on a full 100% perimeter frame. Attention must be given to floor loading limitations. Floor should be level in both horizontal planes.

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.

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.

The horizontal style units might be shipped as a single package or they might be shipped split. Units that have been ordered with the optional resealable refrigerant fittings can be split in the field to accommodate moving into position. Sections are also bolted together.

When re-assembling the evaporator section to the condensing section, use a sling or other suitable means that is sufficient to hold the weight of the section. Use spreader bars to keep the cabinet from being deformed.

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. These can be included with the unit from the factory or they can be placed in the incoming ductwork as a field provided and installed item. 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—204 “Ventilation for Acceptable Indoor Air Quality”, Table 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

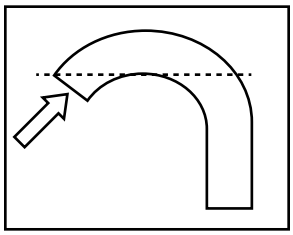
Air inlet velocities should be below 500 FPM to reduce the chance of water or snow penetration. ASHRAE Standard 62.1-2004, Section 5.6.2 provides guidelines for rain entrainment. This standard also points out that any water that does penetrate the inlet device needs to be managed by providing a drainage 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.

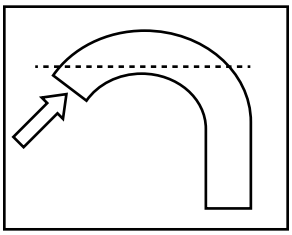
Bird screening should be provided that satisfies any applicable codes.

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.



Acceptable
Figure 1



Not Acceptable
Figure 2

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. Spaces that permit smoking will require additional outside air above and beyond what is specified in ASHRAE Standard 62.1-2004. Research continues as to the concentration of smoke that provides a reasonable or acceptable risk to occupants.

Appendix B of ASHRAE Standard 62.1-2004 states “At present, there is no quantitative definition of acceptable indoor air quality 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. 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. 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.

Vertical Unit Vibration Isolation

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. Please note that the unit frames have not been designed for corner point only loading with vibration isolation methods.

1. If spring mounts are to be used, fabricate a frame to provide support around the entire perimeter of the unit. Allow sufficient clearance for any door or panel access that is required to provide field service or maintenance on the unit. The frame will also need to be designed with suitable cross bracing. (Figure 3)
2. If waffle pad or other similar sound vibration materials are going to be used (field supplied), the material needs to be placed under the entirety of the unit base.

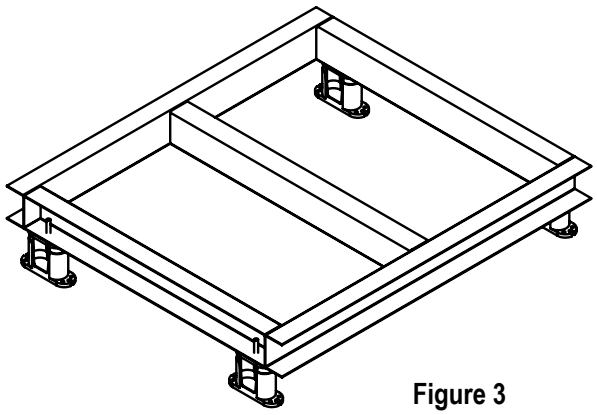


Figure 3

Horizontal Unit Mounting

Typically the horizontal style cabinets are suspended from the unit structure. When installing the horizontal unit on hanging rods (field supplied), use minimum 3/8" 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 support rails in 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 support rails. 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.

Horizontal 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.

1. Do not remove the unit support rails.
2. If waffle pad or other similar sound vibration materials are going to be used (field supplied), the material needs to be placed under the ends of the support rails. Refer to Figure 4 for the recommended locations.

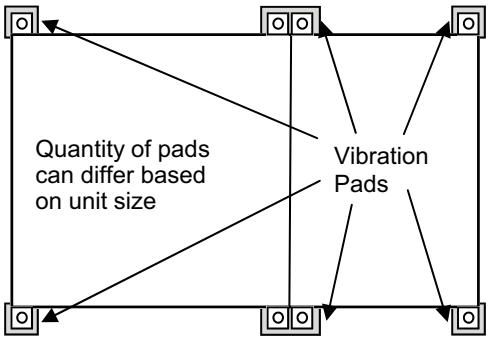
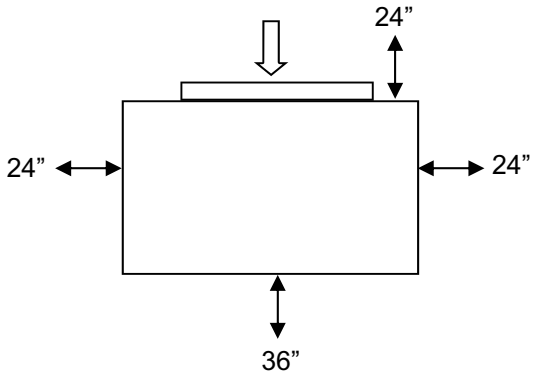
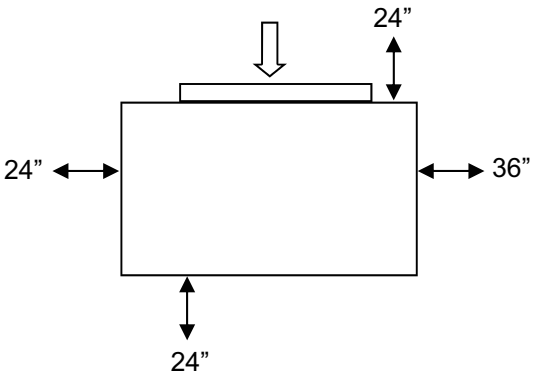


Figure 4

Clearance



Vertical Service Clearances
Figure 5



Horizontal Service Clearances
Figure 6

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.

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.

Remote condenser louver and ducting

Carefully choosing the right condenser section 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 cross-sectional 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 condenser coil as well as 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.

INFORMATION

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

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

Combination Intake/Discharge

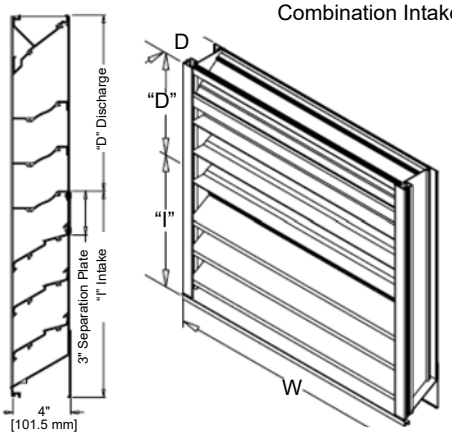


Figure 7

The combination intake/discharge louver design (Figure 7) offers an advantage over separate louvers because it requires only one wall opening which decreases installation costs. However, the blades cannot be of uniform configuration (i.e. the same blade design and angle). The discharge louver blades should be angled to direct the airflow straight out horizontally from the unit and the intake blades should be angled down at approximately 45°.

It is critical that the two air streams be directed in different directions so that no recirculation of discharge air is allowed to enter the inlet air stream. In some cases it may be necessary to provide a deflector vane or separator between the two air streams. If recirculation of the discharge air does occur, the unit will likely trip on high head pressure and continue to fail until the louver design is corrected.

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.

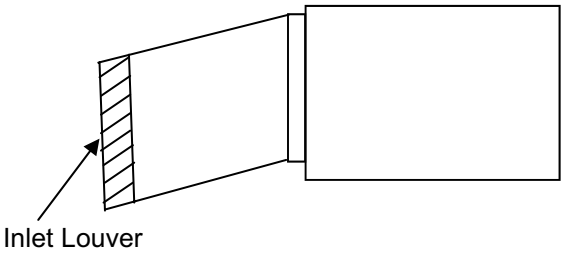


Figure 8

Length of Ductwork for Discharge Air

The unit should be located a minimum distance from the louvered wall to maximize efficiency of the blower. Certain conditions and obstructions at the fan inlet and outlet adversely affect fan performance (i.e. elbows, guards, dampers, etc.). "System Effect" is a term used by the industry to describe these adverse conditions. It is best to design the inlet and discharge ductwork to provide minimum sufficient straight length of duct to reduce system effect and allow for uniform air discharge.

Figure 9 below illustrates the discharge air velocity profile at various distances from the centrifugal blower. It is important to determine the 100% Effective Duct Length to ensure uniform air discharge.

Based on formulas in ASHRAE Fundamentals – Duct Design, Chapter 34, the following minimum intake and discharge 100% Effective Duct Lengths (EDL) are recommended:

Up to 5 tons = 3.5 feet

6 thru 8 tons = 4 feet

9 thru 15 tons = 5.5 feet

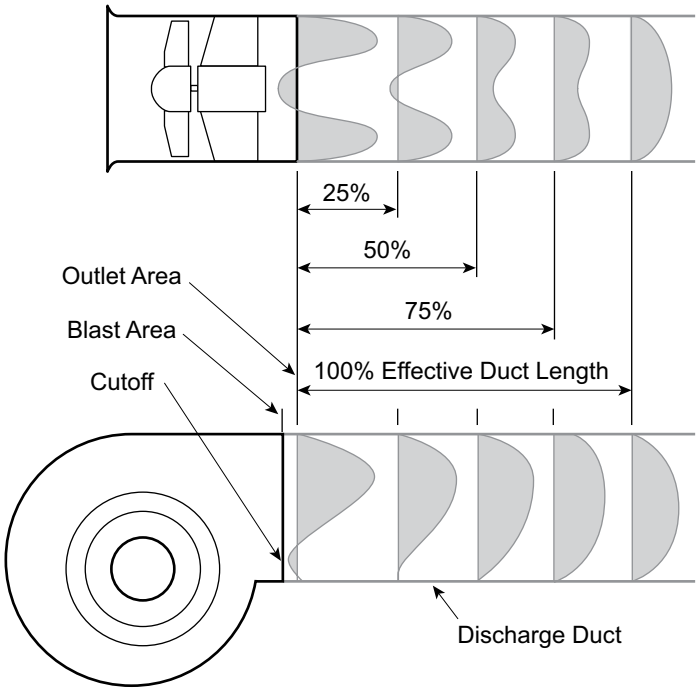


Figure 9

The units are supplied with a motor and drive package which provides approximately 0.25" ESP. Upgrades (optional) are available that can raise this capability to a higher ESP. The drive packages have some ability to be adjusted in the field. You must know the overall duct design in order to determine what drive package will be required. Normal start-up procedures should be followed including balancing the system following the completed unit installation.

Application Data

Voltage	208 / 230	460
Variation	187 / 253	414 / 504

Cooling (Air Entering Evaporator)	DB (min./max.)	65 / 110
	WB (min./max.)	57 / 82

Water-Cooled	GPM / Ton (min./max.)	2.5 / 3.5
	Leaving Water (min./max.)	60 / 115

Note: Not all combinations may be valid.

Installation

General Ductwork Recommendations

1. Please make sure that all ductwork, outside air inlet and supply air and for air-cooled units the condensing section inlet and discharge air, 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 blower / motor provided.

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.

Condensate Drain Connection

Vertical style units include an internal drain trap; therefore, there is no requirement for an external condensate trap. Horizontal units will require an external condensate trap.

Install a field fabricated condensate trap and drain line or a condensate pump as required. Units are equipped with a single 7/8" OD copper tube evaporator drain connection.

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

This negative pressure can vary from less than 1" up to 2" column. 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 negative static pressure developed by the supply air blower. If it does not, the condensate will not drain properly and may overflow the drain pan. The trap must be at least 2-1/2" deep to maintain a water seal under all operating conditions, especially during blower start-up.

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.

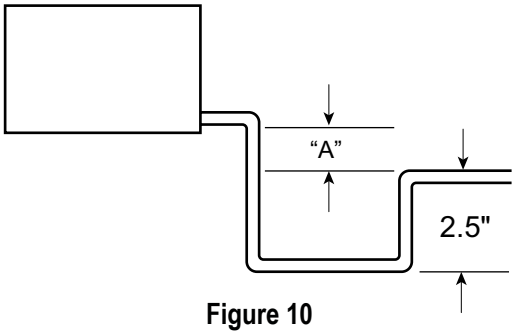


Figure 10

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 (next page) for the inverted "U" trap that is to be installed for the condensate line.

Route the condensate disposal tubing to a suitable location.

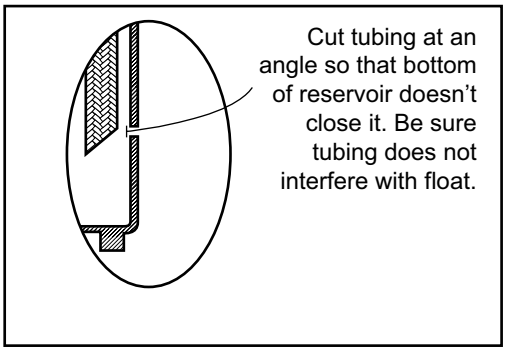


Figure 11

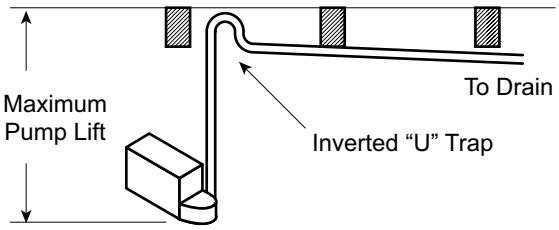


Figure 12

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

The correct phase sequence of the incoming power supply is a requirement. If the phase sequence is not correct it could cause damage or failure to electrical components. Reverse the incoming wiring to resolve the issue. Do not switch any internal unit wiring.

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.
8. Units are provided with the OA3 microprocessor control system. Refer to the OA3 Installation and Operation Manual for proper wiring.

Three Phase Power

On units with three phase power supply, check for proper blower rotation. If they are running backwards, interchange two of the incoming power leads.

Do not rewire any components inside the unit.

Voltage Unbalance

Voltage unbalance occurs when the RMS line voltages on a 3-phase power supply are unequal. Voltages are never balanced between phases, but if the level of the unbalance becomes excessive it will create problems for not only motors but also controls.

The maximum desirable voltage unbalance is 2.0%.

When testing for voltage unbalance, the phase-to-phase voltages should be measured rather than the phase-to-neutral voltages since 3-phase motors are connected across phases. Use the following formula to determine the percent of voltage unbalance:

Percent Voltage Unbalance = 100 x (Maximum Voltage Deviation / Average Voltage)

Example:

Phase-Phase voltages

A-B = 479V

B-C = 472V

C-A = 450V

Average Voltage = (479 + 472 + 450) / 3 = 467

Maximum Voltage Deviation from Average =

467 - 450 = 17 (Must always be positive)

Voltage Unbalance = 100 x (17/467) = 3.6%

In this example the percent of voltage unbalance exceeds the desired maximum of 2%. Additional checks should be made at the unit disconnect to confirm the values. Use accepted industry practices to check or test the quality of the power supply. Often, it is just a matter of repairing malfunctioning equipment or redistributing loads to improve the unbalance.

If no cause can be located and resolved for the unit power supply, the building manager or owner should be notified of the issue to get the proper power supplied to the unit.

It should be noted that the inclusion of a variable frequency drive (VFD) with an unbalanced power supply may result in nuisance tripping and 3rd harmonic currents.

Pressure Switches

High Pressure

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

Please note that the evaporator blower will continue to operate when either pressure switch is activated.

Split System

Low Voltage Wiring

INFORMATION

Make sure to use the appropriate gauge of low voltage wire based on the total wire length so that no more than a 1.2 volt drop is experienced.

Water-Cooled units

INFORMATION

Do not reduce the water inlet or outlet connection size as this will restrict water flow and increase water pressure drop.

CAUTION

Ensure that the water pressure to the unit does not exceed any valve rating.

INFORMATION

All field installed piping must conform to applicable local, state and federal laws.

CAUTION

The condensate drain line should not be connected to the condenser outlet, as flooding will occur.

INFORMATION

It is advantageous to record the inlet and water outlet temperatures and the heat exchanger pressure drop during the unit start-up procedure. These are then a valid reference point for maintenance considerations in the future.

INFORMATION

Field supplied water piping must include a pet cock or other suitable means at the highest point to bleed air from the water piping.

INFORMATION

High inlet water temperature or low water flow rate may result in nuisance tripping of the refrigerant high pressure switch.

INFORMATION

Water-cooled units with a glycol cooling fluid will require a higher GPM / Ton flow rate. Contact the factory for details.

WARNING

Water-cooled units have been designed for use with fresh water application only. Do not use for brackish water or salt water unless appropriate condenser and water piping has been applied.

INFORMATION

Units have been tested at the factory before shipment. The test fluid at the factory contains a glycol mixture. It is important to flush the internal unit piping and heat exchangers at the job site prior to start-up or connection to the cooling fluid circuit being used.

The following items are to be field supplied and applied:

A. Water shut-off valves (Gate or Ball Type) on both the inlet and outlet water pipes. This is needed for maintenance, long periods of unit shutdown and / or condenser replacement.

B. Install and connect a fresh water strainer (field supplied) to the water inlet line. Strainer should be readily accessible for periodic cleaning. Shut off valves on both strainer inlet and outlet are recommended to facilitate cleaning.

The condenser heat exchangers are co-axial type. These are tube-in-tube type that are chemically cleanable. The inner tube carries the water and the outer tube the refrigerant. When designing and installing the water piping, some consideration for the chemical cleaning should be made, if desired, for future maintenance.

All units water connections are FPT.

Water-cooled units are provided with a 2-way, 150 psig head pressure control valve. Optional valves include both 350 psig and / or 3-way types. Confirm that the valve pressure rating is correct for the facility water pressure.

Air-Cooled Split Systems

Refrigerant Connections

Systems with Remote Air-Cooled Condensers require connections with interconnecting refrigerant piping (field supplied). Once the outside air section and the remote air-cooled condenser are poisoned at their location of installation, the interconnecting refrigerant lines should be installed.

The resealable fittings will be male on both sections. The interconnect kit will consist of the matching female fittings. An interconnect kit is required for each refrigerant circuit for the installer to connect refrigerant lines between both sections.

The interconnect kit also contains four (4) Schrader fittings. The installer can place at least one in each refrigerant line or at one end of the refrigerant line. These enable the refrigerant line to be evacuated and charged as needed, based on the size and length.

INFORMATION

On units with more than one refrigerant circuit, be careful not to intermix liquid, suction and/or hot gas lines of the various circuits.

In some situations, the desired refrigerant line size may differ from the resealable fitting size provided. The line size should be reduced or enlarged at the resealable fittings as necessary.

All units are shipped from the factory with a full factory refrigerant charge. The resealable refrigerant fittings must be connected and properly tightened to facilitate refrigerant flow between the evaporator / compressor section and the condenser section.

Figure 13 below illustrates a typical piping arrangement for factory ordered split systems

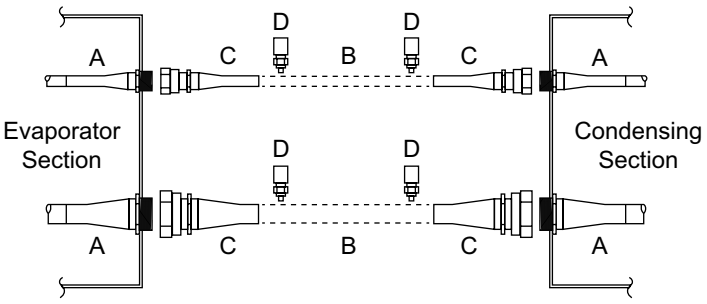


Figure 13

A - Male self-sealing fittings on unit sections

B - Refrigerant piping between sections (field-supplied)

C - Female self-sealing fittings in interconnect kit (4)

D - Schrader fittings in interconnect kit (4)

The resealable refrigerant fittings must be connected as follows:

1. Temporarily hand thread the female halves of the resealable fittings (supplied with the interconnect kit) onto the male couplings, approximately 1 to 1-1/2 turns. This is to make sure that the interconnecting tubing will be routed and brazed with the resealable fittings in their final proper location, so that there will be no difficulty when the final coupling assembly is made. (refer to Figure 14)
2. Size refrigerant lines per industry accepted practices.
3. Run the interconnecting tubing required. Always follow accepted industry practices for sizing refrigerant lines based on line length and elevation differences. Disconnect the resealable fittings that were temporarily installed in step 1 above.
4. Install the Schrader valve fittings into the tubing before brazing the couplings onto the ends of the tubing. Use a 1/4” hole to mount the valve. Clean and debur the tubing before doing any brazing to ensure that no chips or debris are left in the refrigerant circuit. Remove the Schrader valve cap and core before doing any brazing.
5. Braze the interconnecting tubing to the female resealable fittings.

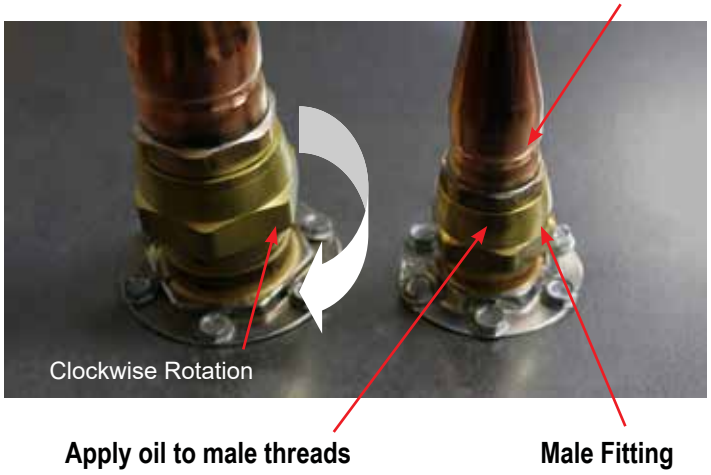


Figure 14 - Resealable Fittings

INFORMATION

When brazing tubing to the self-sealing couplings, use a water soaked wet rag, running water bath or chill blocks on the quick-connects to prevent overheating the valves and damaging the seals. Always apply heat toward the field installed refrigerant line. Do not apply heat toward the coupling valve and seal.

6. After brazing the tubing to the resealable fitting halves, leak check line sets with nitrogen at 500 psig.
7. Evacuate each line to 300 microns. Check to make sure that each line holds a vacuum after removal of the vacuum pump (indicating no leaks) (micron level should not go above 500 microns within 10 minutes).
8. Wipe off coupling seals and threaded surfaces with a clean cloth to prevent the inclusion of dirt or foreign material into the system. Lubricate rubber seal and metal seal in the male halves with refrigeration oil. Thread coupling halves together by hand to insure proper mating of threads. Continue to hand-thread each half-coupling to its mating half until resistance is felt (approximately 1-1/2 to 1-3/4 turns). Complete the connection of the mating half-couplings with a wrench. If the resealable fittings still feel loose, tighten a bit more as required.

INFORMATION

Count the number of threaded rotations. Use Table 1 to determine how many total rotations are required for proper sealing of the fittings.

Size	Wrench	Full Turns Required
3/8”	1-3/16”	6
1/2”	1-3/16”	6
5/8”	1-5/8”	7-3/4
3/4”	1-5/8”	7-3/4
7/8”	1-5/8”	8
1-1/8”	2”	8

Table 1 - Resealable Fitting Turns

9. Refrigerant piping shall be insulated in accordance with local codes and / or applicable ASHRAE Standards. Insulation exposed to weather shall be suitable for outdoor use. Provide protection from water and shielding from solar radiation as necessary.
10. **Max. total equivalent line length is 100 feet. (a) Max. elevation difference between Evap. And Cond. Is 40 feet.**
    - **a.** Contact the factory for installations with elevation differences greater than 40 feet or total equivalent lengths greater than 100 feet. Alternate line sizes and specific additional refrigerant circuit components may be required.
    - **b.** If condenser section is 20 feet or more above the evaporator an oil separator is to be included for each circuit.
11. Split must contain refrigerant circuit items as follows:

	Equivalent Feet	Oil Separator	Liquid Line Solenoid Valve
Discharge Line	> 100	X	
Liquid Line Net Down	> 50		X

12. Add the appropriate charge of R-410a Refrigerant using the Schrader valves to compensate for the additional interconnecting tubing as follows:
    a. For 3/8” liquid line – add 0.6 oz. per foot
    b. For 1/2” liquid line – add 1.2 oz. per foot
    c. For 5/8” liquid line – add 1.8 oz. per foot
    d. For 7/8” liquid line – add 2.4 oz. per foot

INFORMATION

If low refrigerant pressure is evident during the start-up process, check the tightness of all resealable fittings. A fitting that is not fully open will restrict refrigerant flow.

System Options

OmegaAir Section

Unit Mounted Display / Keypad

If the optional unit mounted display / keypad has been ordered there will be no wall mounted display / keypad or interconnecting cable. Refer to OA3 instructions.

Dirty Filter Switch

This switch monitors the pressure drop across the filters. When it is activated it will provide an alarm through the OA3 microprocessor controls. The system will continue to operate. Refer to the OA3 instructions.

Firestat

This optional device will be shipped loose for field mounting in the ductwork. Upon activation it will shut down the system and provide an alarm through the OA3 microprocessor controls. Refer to OA3 instructions.

Smoke Detector

This optional device will be shipped loose for field mounting in the ductwork. Upon activation it will shut down the system and provide an alarm through the OA3 microprocessor controls. Refer to OA3 instructions.

Drain Pan Overflow Switch

This device will be activated in the event that condensate is not drained away from the drain pan. Upon activation it will shut down the system and provide an alarm through the OA3 microprocessor controls. Refer to OA3 instructions.

Phase Reversal Sensor

A phase reversal sensor is supplied to monitor the phase rotation in a 3 phase power supply. When main power supply to the unit is out of phase, the unit will not start in any mode. Swapping any two leads of the incoming power at the unit terminal block will correct this situation.

The unit is supplied from the factory properly phased for all the components. Under no circumstances should internal unit wiring be changed to rectify a phase reversal situation.

Freezestat

This device monitors the temperature of the evaporator coil. When activated it will shut down the compressor. The evaporator blower will continue to operate. When the freezestat resets, the compressor will restart.

Auxiliary Coils (Hot Water or Steam)

A hot water coil or steam coil (Non-Freeze type, less than 10 psig), used as heat, will be located in the return air stream between the filters and the evaporator coil. These are typically installed at the factory.

If an optional hot water valve is ordered, this will be shipped loose for installation in the field.

Control wiring will need to be installed from the hot water valve back to the unit control panel. Follow all National Electrical Codes and Local Codes as required.

Any steam valves and other adjunct steam components are to be field supplied and installed by others.

Control wiring will need to be installed from the steam valve back to the unit control panel. Follow all National Electrical Codes and Local Codes as required.

Pipe the hot water coil or steam coil per industry accepted practices.

Hot Water Coil Valves

Hot water valves, if supplied by United CoolAir, are typically 2-way. The optional valves are shipped loose for installation in the field. The valves are to be mounted in the outlet line of the coil.

Buck Boost Transformer

A Buck Boost Transformer is utilized when the power supply available is 277-1-60. The transformer is shipped loose for field mounting and wiring.

The unit will be wired from the factory for 230-1-60 power supply coming from the transformer.

Condenser Section

Liquid Line Solenoid Valve

Used when the liquid line will be more than 50 equivalent feet down to the evaporator. Valve will close during the off cycle. This valve is for liquid line shut off only, not system pump down.

Oil Separator

Used when the discharge line will be more than 100 equivalent feet.

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. When the unit is operating in hot gas reheat and / or hot gas bypass mode there will be flashing in the sight glass.

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 maintain supply air or space air temperature at space neutral conditions. In order to do this, if the unit is operating in the dehumidification mode and the air temperature leaving the evaporator coil is less than the set point (supply temperature or space temperature depending on the OA3 control setup), the control opens the hot gas reheat valve to reject heat energy back into the supply air through the hot gas reheat coil to try and maintain the temperature set point.

The modulating hot gas reheat valve is a balanced port design. This means that the valve will maintain equal pressure in both the condenser coil and reheat coil to maximize the reheat capability. This also provides more stability and closer control over the leaving air temperature.

In the vertical configuration the reheat coil is sloped so that any oil in the coil will drain out. In the horizontal configuration the reheat coil is mounted vertically in the cabinet with the manifold at the bottom so that the oil will drain out.

Additionally, the OA3 controls will periodically provide a “flush” cycle to make sure no oil has accumulated in the reheat coil. All the refrigerant from the hot gas reheat coil is routed through the condenser coil to assure that it is all turned back into liquid refrigerant.

Flooded Condenser (Remote Air-Cooled Condenser Only)

When the outdoor ambient temperature falls, the condensing pressure falls. This causes the discharge pressure to fall. Since the pressure differential across the thermostatic expansion valve port affects the rate of refrigerant flow, low discharge pressure generally causes insufficient refrigerant to be fed to the evaporator. Failure to have sufficient head pressure will result in low suction pressure and/or iced evaporator coils.

The purpose of a flooded condenser is to hold back enough of the condensed liquid refrigerant so that some of the condenser coil surface is rendered inactive. This reduction of active condensing surface results in a rise in condensing pressure and sufficient liquid line pressure for normal system operation.

The effective range for this option is down to –30° F.

A three–way modulating valve and a receiver tank make up the flooded condenser refrigerant components.

The valve is placed in the liquid line after the condenser coil. The receiver is downstream of the valve. The valve limits the flow of liquid refrigerant from the condenser while at the same time regulating the flow of discharge gas around the condenser to the receiver.

During periods of low ambient operation, the receiver pressure falls until it approaches the setting of the control point of the valve (typically 295 psig for R-410a). The valve then throttles to restrict the flow of liquid from the condenser. This raises the condenser pressure. Since it is the receiver pressure that is being maintained, the valve will then start to throttle open the discharge port when the differential between the condensing pressure and the receiver pressure exceeds 20 psi. The hot discharge gas serves to heat up the cold liquid being passed from the condenser to the receiver. Thus the liquid reaches the receiver warm and with sufficient pressure to assure proper expansion valve operation.

The receiver is required to hold all the excess/additional liquid refrigerant in the system, since the refrigerant will be returned to the receiver when the high ambient conditions exist.

In the off-cycle the refrigerant can “migrate” to the condenser, during periods of low outdoor ambient. On a call for start-up, the evaporator pressure may not build up to the cut-in point of the low pressure control. The result may be a failure of the compressor to start or to short cycle. To eliminate this potential problem, a time delay is added to bypass the low pressure switch during start-up to allow the discharge pressure to build, in turn increasing the suction pressure.

Maintenance Procedures

ELECTRICAL HAZARD

Turn OFF power and lockout service before conducting any maintenance. 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 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.

INFORMATION

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.

Cleaning the water-cooled condenser

Any fluid that is used to carry the heat away through the condenser contains, minerals, dust from a cooling tower or other foreign materials. Over time these contaminants will build up on the walls of the heat exchanger.

This scale or fouling will result in a reduction in water flow, less water temperature difference between inlet and outlet, high condensing temperature and higher fluid pressure drop. All of these affect the operating performance and efficiency of the system and need to be addressed.

Cleaning a water-cooled condenser helps to improve the heat transfer rate, reduce operational cost, restore efficiency, prolong heat exchanger life and reduce pressure drop pumping costs. Deposits from water or water treatments, such as scale, lime, rust or mud are removed.

Each installation is unique. Therefore, the fluid quality and operating conditions will dictate when the heat exchanger needs to be cleaned.

During the start-up process record the water pressure drop across the heat exchanger. Also record the inlet and outlet water temperatures. After a period of time these values can be checked to see how much loss of operating performance has occurred. If a 10% or greater change has occurred, it would be beneficial to clean the heat exchanger.

There are a number of commercially available products for cleaning a heat exchanger. Follow all industry practices to safely and effectively clean the heat exchanger.

Blowers

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

Air-cooled condensers are provided with adjustable belt drive blower packages as well.

Check that the blower wheel is tight on the shaft and does not contact the housing. Bearings are permanently sealed, but should be checked periodically for signs of wear. Check for restrictions or foreign material in the air circuit. The drive may be adjusted for different static pressures. If such an adjustment is made, check that the motor current draw does not exceed the motor nameplate current by more than 10%.

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 variable diameter sheave provided on the blower drive motor. Sheave may be adjusted by removing the belt and loosening the setscrew located in the hub of the outer flange. With the setscrew loosened, the flange may be turned clockwise to increase blower speed or counter-clockwise to reduce blower speed.

Typically the motor and drive packages have been sized and designed for the specific CFM and external static pressure (ESP) of the application. Before making any changes confirm what the performance was designed for and what the actual performance is.

INFORMATION

Setscrew must be positioned directly above the flat section of the threaded sheave shaft before tightening to hold adjustment.

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%.

Blower bearing lubrication

INFORMATION

Unit must be shut off at the disconnect switch before the blowers are serviced.

Bearings on the smaller units are permanently sealed, but should be checked periodically for signs of wear.

Larger units have pillow block bearings (Optional on some condensers). Bearings will need to be lubricated based on the use of the equipment.

Duty	Grease Interval
Low Usage	12 Months
Periodic	6 Months
Continuous	1 – 2 Months

Use a high quality lithium grease for blower pillow block bearings. Wipe off the “Zerk” fitting with a rag before adding grease so as not to introduce dirt into the bearing.

Slowly rotate the shaft while pumping it in. Pump the grease in slowly so as not to blow out the bearing seal. When the grease starts to “seep” out of the bearing you have put in enough new lubricant.

Over lubricating can cause a bearing to fail from overheating or it can blow out the seal.

Both excessive or inadequate grease may cause premature failure. Provided there is some grease in the bearings for lubrication, under lubrication is better than over lubrication as grease can easily be added but not removed. Always allow a slight bead around the circumference of the seals to protect the bearing from foreign matter and helps flush out the bearing as well.

Wipe off the “Zerk” fitting with a rag after adding grease.

Belts

Excessive belt tension is the number one cause for blower bearing failure. Proper belt tension and pulley alignment are essential for trouble free operation.

Deflection is the amount the belt gives when force is applied, usually by finger, to the belt at the approximate center point to the belt span.

Insufficient deflection indicates that the belt tension is entirely too tight, and if not loosened somewhat, noise due to excessive vibration, premature bearing failure, shortened belt life, and a reduction in supply air blower performance may result. Tight belts may also overload the motor and cause the efficiency to drop considerably or even premature motor failure as well.

Excessive deflection is an indication that the belt is not tight enough. If not corrected, slippage may occur causing loss of blower speed and belt failure. The belts will glaze then crack or even break due to increased temperatures caused by slippage. Belts may slip during start-up, but slipping should stop as soon as the fan reaches full speed.

If the midpoint (midway between the blower and motor shaft) of the belt is pressed inward, there should be about 1/2” to a 1” of deflection when the belt is properly tensioned.

Refer to Figure 15 – Belt Tensioning below.

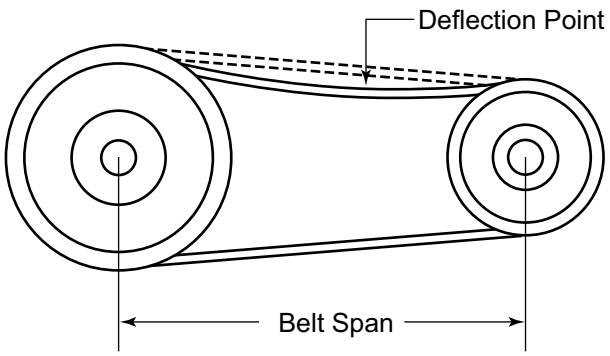


Figure 15 – Belt Tensioning

For proper tensioning, an excellent method to use is listed in the following equation.

$$\text{Deflection} = \frac{\text{Belt Span}}{64}$$

Belt span is in inches from center pulley to center pulley (see Figure 15 on previous page).

Belt tension is adjusted by using the adjusting bolt on the end of the motor mounting frame.

Check the alignment of the sheaves to make sure that the sheave faces are in the same plane. Check this by placing a straight edge across the face of the sheaves. Any gap between the edge and sheave faces indicates misalignment

Note: This alignment method is only valid when the width of the surfaces between the belt edges is the same for both sheaves. When they are not equal or when using adjustable pitch pulleys, adjust so that the belts have approximately equal tension. Both shafts should be at right angles to the belt. Check the setscrew and/or bushing bolt tightness.

Belts tend to stretch somewhat after installation. Recheck belt tension after several hours of operation.

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 air-cooled 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.

Water valves

At least once a quarter check the water vales to make sure that no leaks are present. Look at the valve stem and all piping joints.

If any leaks are found follow the manufacturers recommendations for tightening any seals or replacing any gaskets.

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.

1. Connect a calibrated thermocouple lead to the outlet line at the hot gas bypass valve. Tie wrap and insulate the lead.
2. Connect a low pressure refrigerant gauge to the suction line.
3. Connect a high pressure refrigerant gauge to the liquid line.
4. Operate the air conditioner in the cooling mode until the system is stabilized. (Approximately 15 minutes)
5. If the high side pressure is not at or above 400 psig, block off the condenser inlet air stream until the pressure is above this threshold. This will simulate system performance level close to the design condition of 95° F ambient.
6. The hot gas bypass valve setting is 104 psig.
   a. If the suction pressure is 104 psig the thermocouple reading should be approximately 117° F or higher. Please note that it may be necessary to block off some of the evaporator air in order to check this condition.
   b. If the suction pressure is above 104 psig the thermocouple reading should be less than 117° F.
   c. If the suction pressure is below 104 psig the hot gas bypass valve should be adjusted to raise the pressure.

Adjustment of hot gas bypass valve

The function of the hot gas bypass valve is to prevent the suction pressure from falling below a predetermined set point, thereby balancing the system. The set point is typically 104 psig (R-410a).

1. Connect a low pressure refrigerant gauge to the suction line.
2. Operate the air conditioner in the cooling mode until system is stabilized. (Approximately 15 minutes)
3. Remove the seal cap that covers the adjustment screw of the hot gas bypass valve.
4. Adjust the valve by turning the stem. A CLOCKWISE turn will increase the pressure setting. A COUNTERCLOCKWISE turn will decrease the pressure setting. One complete turn is equal to approximately 4 psi change.

Adjustments should be made in small increments, allowing the system to stabilize after each turn.

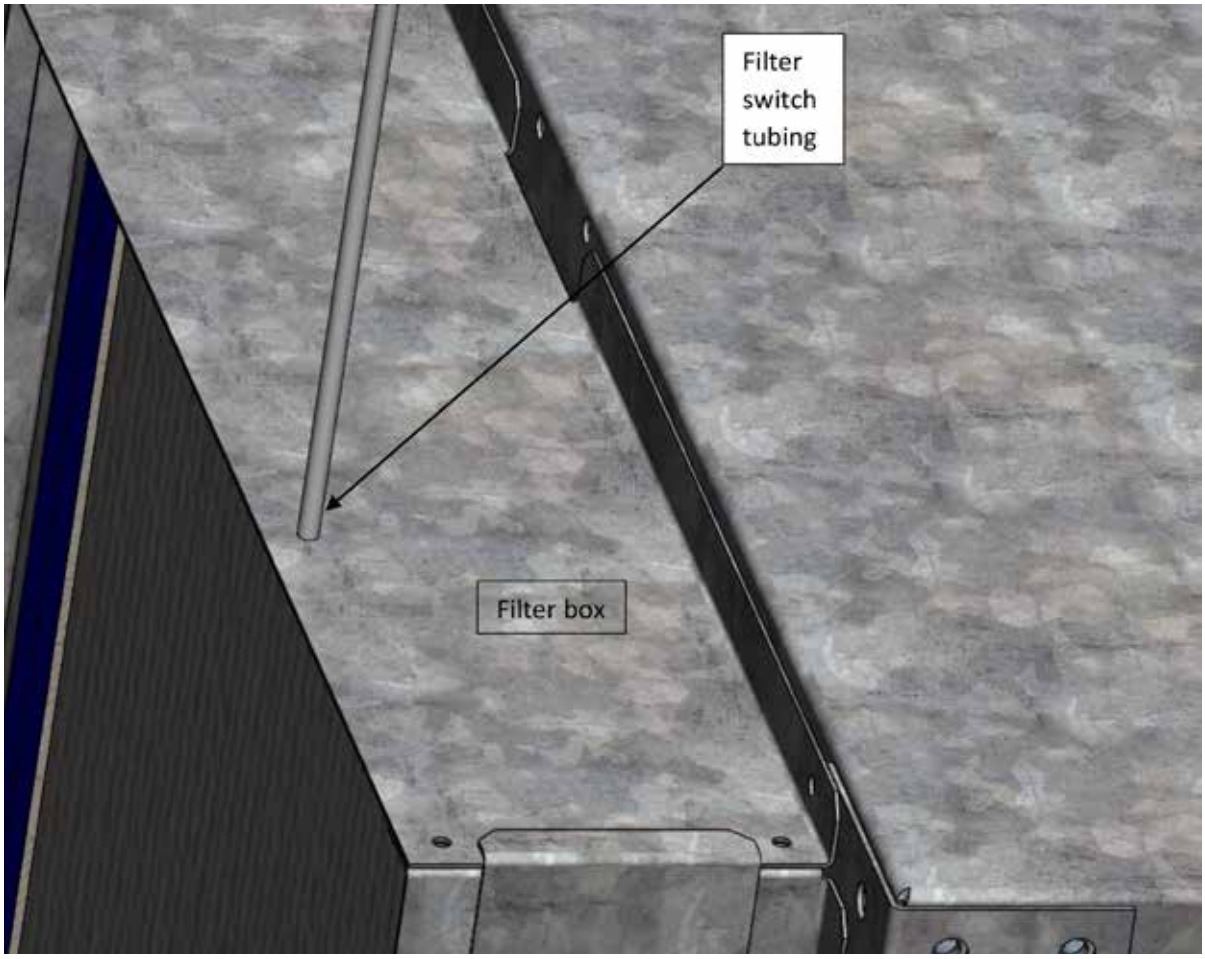
5. Vary the evaporator load to test at various conditions that the suction pressure does not fall below the set point (104 psig for R-410a).
6. Replace the seal cap on the hot gas bypass valve.

Filter Switch Tubing Requirements Addendum

For use with all applicable units with filter switch alarms.

When confronted with a United Coolair product that has a dirty filter switch alarm, there may be considerations required before attaching return ductwork. The image below depicts the typical placement of a filter switch tube. If a return duct is required to attach to the filter there may be issues with the amount of metal available to attach the return duct. If this becomes an issue the following 2 solutions are available.

1. The Return duct can simply be notched back with sheet metal shears so more of the return can slide over the filter box.
2. The dirty filter suction tube can be removed from the filter box, and once the return is placed on the filter box a new hole can be drilled at the approximate location of the original tube placement and placed inside.



Filter Switch Tubing Requirements Addendum 3/4/2016

Troubleshooting Guide

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	**1.** Control wiring not installed correctly **2.** Loose control connections **3.** Broken wiring	**1.** Check wiring connections against schematic. **2.** Check all connections for tightness. **3.** Check wire continuity.
Blower fails to start	**1.** Controller not set properly **2.** Motor failure **3.** Defective contactor **4.** Overload tripped **5.** Controller alarm	**1.** Turn on and set controller for desired operation **2.** Replace motor **3.** Replace contactor **4.** Check cause and resolve then reset manual overload (internal overloads will have to reset themselves) **5.** Resolve alarm condition
Compressor fails to start	**1.** Controller not set properly **2.** Loss of refrigerant charge **3.** High head pressure **4.** Low line voltage **5.** Controller alarm	**1.** Turn on and set controller for desired operation **2.** Repair leak, evacuate and recharge refrigerant system **3.** Confirm proper fluid flow quantity through condenser **4.** Confirm acceptable fluid temperatures entering the condenser **5.** Resolve incoming voltage issue **6.** Resolve alarm condition **[Note: Compressor internal overload may require an extended period of time (1 hour or more) to reset]**
Compressor short cycles	**1.** Reduced air flow **2.** Loss of refrigerant charge **3.** Short cycling of conditioned air **4.** Drain pan switch open	**1.** Check filters and coil for any blockages **2.** Replace filters if dirty **3.** Repair leak, evacuate and recharge refrigerant system **4.** Make sure that supply air is not short cycling back into return air stream **5.** Confirm that unit condensate is draining properly.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Evaporator coil ices	**1.** Lack of air flow **2.** Low inlet air temperature **3.** Loss of refrigerant charge	**1.** Check filters and coil for any blockages **2.** Replace filters if dirty **3.** Verify that blower is rotating in the proper direction **4.** Repair leak, evacuate and recharge refrigerant system
Noisy compressor	**1.** Expansion valve stuck open **2.** Worn or scarred compressor bearings **3.** Excessive head pressure **4.** Broken compressor valve (compressor knocking) **5.** Liquid slugging	**1.** Ensure thermal expansion valve bulb is tight on suction line **2.** Confirm thermal expansion valve bulb is located properly on suction line **3.** Check superheat **4.** Replace compressor **5.** Reduce head pressure **6.** System overcharged. Reclaim excess refrigerant from the high side of the system.
System short of capacity	**1.** Flash gas in liquid line **2.** Expansion valve stuck open or possibly obstructed **3.** Clogged filter drier **4.** Iced or clogged evaporator coil **5.** Head pressure control valve not operating properly **6.** Condenser needs cleaned	**1.** Check for refrigerant leaks **2.** Repair leak, evacuate and recharge refrigerant system **3.** Check sub-cooling **4.** Ensure thermal expansion valve bulb is tight on suction line **5.** Confirm thermal expansion valve bulb is located properly on suction line **6.** Replace thermal expansion valve **7.** Replace filter drier **8.** Check filters and coil for any blockages **9.** Replace filters if dirty **10.** Verify that blower is rotating in the proper direction **11.** Confirm proper fluid flow quantity through condenser **12.** Confirm acceptable fluid temperatures entering the condenser **13.** Clean condenser
Head pressure too high	**1.** Possible non-condensable in system **2.** Overcharge of refrigerant **3.** Condenser water flow not adequate **4.** Condenser entering fluid temperature too hot **5.** Condenser air intake, duct or coil blocked. **6.** Condenser blower not operating or running backwards.	**1.** Repair leak, evacuate and recharge refrigerant system. Install new filter drier. **2.** Reclaim excess refrigerant from high side of system **3.** Confirm proper fluid flow quantity through condenser **4.** Confirm acceptable fluid temperatures entering the condenser **5.** Verify that head pressure control valve is operational **6.** Reset high pressure safety switch if tripped **7.** Clean away debris from condenser air circuit. **8.** Check phase of incoming power to unit (3 ph units only). Reverse any two incoming power supply wires (except ground).
Head pressure too low	**1.** Condenser water flow too high **2.** Entering fluid temperature too low **3.** Excessive air flow across condenser.	**1.** Confirm proper fluid flow quantity through condenser **2.** Confirm acceptable fluid temperatures entering the condenser **3.** Confirm proper air flow amount. Adjust blower drive package as necessary.
Suction pressure too low	**1.** Flash gas in liquid line **2.** Obstructed expansion valve **3.** Loss of fluid in expansion valve bulb **4.** Clogged filter drier **5.** Lack of air flow **6.** Entering WB too low **7.** Evaporator blower running backwards	**1.** Check for refrigerant leak **2.** Repair leak, evacuate and recharge refrigerant system. **3.** Replace thermal expansion valve **4.** Replace filter drier **5.** Check filters and coil for any blockages **6.** Verify that blower is rotating in the proper direction **7.** Confirm that entering return air conditions fall within acceptable range **8.** Reset low pressure safety switch if necessary **9.** Check phase of incoming power to unit (3 ph units only). Reverse any two incoming power supply wires (except ground).

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
No cooling	**1.** Controller not set properly **2.** Control wiring issue **3.** Controls in an alarm condition **4.** High or low pressure switch open **5.** Compressor thermal overload open	**1.** Turn on and set controller for desired operation **2.** Check wiring connections against schematic. **3.** Check all connections for tightness. **4.** Check wire continuity. **5.** Refer to controller troubleshooting **6.** Reset high or low pressure switch **7.** Compressor internal overload may require an extended period of time (1 hour or more) to reset
Condensate carry over	**1.** Air flow too high	**1.** Reduce air flow
Condensate pump does not run	**1.** Check to see that power to the pump is present **2.** Confirm that float is moves freely **3.** Confirm that dirt or algae is not interfering with float action	**1.** Locate and repair electric issue. **2.** Clean float and sump
Condensate pump runs with no discharge	**1.** Tubing blocked or kinked **2.** Check valve blocked **3.** Impeller blocked **4.** Tubing elevation or run exceeds head capability.	**1.** Inspect, clean or straighten as necessary. **2.** Clean check valve **3.** Remove debris from pump impeller **4.** Verify tubing run is within pump head limitations.

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 non-transferable.

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.

Model: _____ Serial Number: _____ Date of Installation: _____

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.
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.

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.

Model: _____ Serial Number: _____ Date of Installation: _____

Limited Warranty Condensing Section

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, to begin no later than six (6) months after product shipment from the factory. This warranty extends only to the original consumer purchaser in accordance with the then current Terms and Conditions and is non-transferable.

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, Puerto Rico 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.
14. In the event that the refrigerant type is changed, as a result of a compressor failure and the same type of compressor is not available, any subsequent refrigerant circuit component failures will not be covered under the Limited Warranty.

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

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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.

Continued on Next Page

Model: _____ Serial Number: _____ Date of Installation: _____

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 one (1) year from the date of product installation, to begin no later than six (6) months after product shipment from the factory. This warranty extends only to the original consumer purchaser in accordance with the then current Terms and Conditions and is non-transferable.

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. A second compressor failure in the same refrigerant circuit is indicative of an application issue and will not be covered under the Limited Warranty.

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

EXCLUSIONS

This Limited Warranty does not cover:

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.
14. Discharge air temperature control, if not provided by the factory, will void the compressor Limited Warranty.
15. In the event that the refrigerant type is changed, as a result of a compressor failure and the same type of compressor is not available, any subsequent compressor failures will not be covered under the Limited Warranty.

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

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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.

Model: _____ Serial Number: _____ Date of Installation: _____

Air-Cooled Unit

Pre Startup Checklist

Installing contractor should verify the following items.		
1. Is there any visible shipping damage?	☐ Yes	☐ No
2. Is the unit level?	☐ Yes	☐ No
3. Is proper vibration isolation provided in accordance with IOM?	☐ Yes	☐ No
4. Are the unit clearances adequate for service and operation?	☐ Yes	☐ No
5. Do all access doors open freely and are the handles operational?	☐ Yes	☐ No
6. Have all shipping braces been removed?	☐ Yes	☐ No
7. Have all electrical connections been tested for tightness?	☐ Yes	☐ No
8. Does the electrical service correspond to the unit nameplate?	☐ Yes	☐ No
9. On 208/230V units, has transformer tap been checked?	☐ Yes	☐ No
10. Has overcurrent protection been installed to match the unit nameplate requirement?	☐ Yes	☐ No
11. Do all fans rotate freely?	☐ Yes	☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☐ Yes	☐ No
13. Is all copper tubing isolated so that it does not rub?	☐ Yes	☐ No
14. Are air filters installed with proper orientation?	☐ Yes	☐ No
15. Have condensate drain and p-trap been connected?	☐ Yes	☐ No
16. Is the TXV sensing bulb in the correct location?	☐ Yes	☐ No
17. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes	☐ No
18. Confirm ship loose items required for proper installation	☐ Yes	☐ No

Start-Up Procedures (R-410a Systems)

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. Make certain that all power is disconnected at the main power circuit breaker or service disconnect before starting any of this procedure.
3. 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.
4. Confirm that the voltage rating of the equipment data tag coincides with the power that will be delivered to the unit.
5. 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 Fuse Size (MFS).
6. Locate the unit thermostat and check all electrical terminations against the unit electrical diagram and for the unit thermostat.

Note: If using a digital thermostat with a "C" (Common) terminal, this terminal MUST be terminated to the "C" terminal in the unit. Failure to do so will result in the thermostat shorting out and being destroyed.

7. Leak check the refrigerant system. While the unit was leak checked at the factory, leaks can develop during transit and / or handling.
8. Confirm that the unit condensate has been adequately trapped and taken to a suitable point for disposal.
9. Verify that the filters are in place, clean and usable.
10. Switch the unit thermostat to the "OFF" position.
11. Apply power to the unit. Switch the circuit breaker or field supplied electrical service disconnect switch to the on position.

Note: If the unit has the flooded condenser option the scroll compressors will have crankcase heaters. If the outdoor ambient is 70˚ F or lower, let the compressors sit for approximately 24 hours before proceeding.

12. Record the voltage at the unit terminals.
13. If possible with the thermostat provided, switch the evaporator blower to the RUN position. Verify that the evaporator blower is activated.
14. Verify that the evaporator blower is rotating in the correct direction (three phase units only).

Note: If the evaporator blower motor runs backwards, shut off all power to the unit. Switch any two of the incoming power leads at the unit terminal block. The unit has been wired and phased properly at the factory. DO NOT change any factory wiring to correct for a phase problem.

Note: 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 cabinet corner posts so that the gauge line hoses can be run outside the cabinet with the access panels installed.

15. 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(s) and both blowers.

Note: Dependent upon the options and/or the thermostat, there may be a delay for the compressor(s) operation.

16. Verify that the condenser blower rotation is correct.
17. While waiting for the compressor(s) to stabilize, record the External Static Pressure (ESP) for both the evaporator and condenser blowers.

Note: Make sure all the unit access panels are in place when taking these readings.

18. Record the return air temperature to the evaporator coil along with the supply air temperature. (The unit should have operated for at least 15 minutes before taking these readings).
19. Record the outdoor ambient entering the condenser coil along with the discharge air temperature of the condensing section.
20. Record the suction line pressure and the suction line temperature for each circuit near the compressor.

Continued on next page

Start-Up Procedures (R-410a Systems) **Continued:**

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 for each circuit 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 for each circuit near the condenser coil outlet.

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. If the system is single phase, use L1 and L2 only.

- **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, sheave turns open 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.

Optional Heating Start Up:

30. If the system has any optional heat, set the room thermostat approximately 5° higher than the actual room temperature. Set the controller operating mode to the HEAT position.

31. Dependent upon the heating source the heating valve or switch / contactor should be activated.

32. After several minutes of operation, record the return air temperature and the supply air temperature.

33. Based on the heating source, document the appropriate temperatures, pressures, voltage or amp values.

Air-Cooled Unit

Start-Up Procedures

Complete the form by listing your name, company name, phone and fax number. Sign and date the form and provide a copy as required to all interested parties.

Job Name: _____ **Date:**_____
Address: _____
City:_____ **State:** _____**ZIP**_____
Country: _____
Unit Model No.: _____
Unit Serial No.:_____

Screw Lugs & Terminals OK?.....Yes _____ No _____
Describe any loose connections and action(s) taken:

_____

_____

Power Supply Correct Voltage and Phase? .....Yes _____ No _____
If not in agreement with unit data tag contact the Distributor.

_____

Is the Circuit Protection the correct type and does it meet
the unit data tag requirements?.....Yes _____ No _____
If not correct describe what action(s) have been taken to correct:

_____

_____

Unit controller wiring verified? .....Yes _____ No _____
"C" Terminal hooked up if necessary? .....Yes _____ No _____

_____

Unit leak checked OK?.....Yes _____ No _____
If leak was located describe where and how repaired:

_____

_____

Condensate trapped & run to a suitable disposal point?.....Yes _____ No _____

_____

Filters are in place, clean & usable?.....Yes _____ No _____

_____

Single Phase Unit
Measured Voltage.....L1-L2 _____ L1-GND_____ L2-GND _____
Three Phase
Measured Voltage.....L1-L2 _____ L2-L3_____ L1-L3 _____

_____

Evaporator Blower Motor Rotation OK? .....Yes _____ No _____
If three phase power and rotation is not correct describe action(s) taken to correct:

_____

_____

Condenser Blower Motor Rotation OK? .....Yes _____ No _____
If three phase power and rotation is not correct describe action(s) taken to correct:

_____

_____

Continued on Next Page

Evaporator External Static Pressure .....(ESP): _____ In. WG _____

Condenser External Static Pressure .....(ESP): _____ In. WG _____

Cooling Mode

System Air Temperatures .....Return: °F _____ Supply: °F_____

Condenser Coil.....Outdoor Ambient: °F _____ Condenser Discharge: °F _____

	Compressor 1	Compressor 2
Suction Pressure:	psi _____	psi _____
Suction Line Temperature:	°F_____	°F_____
Saturation Temperature:	°F_____	°F_____
Suction Superheat:	° _____	° _____
Liquid Line Pressure:	psi _____	psi _____
Saturation Temperature:	°F_____	°F_____
Liquid Line Temperature:	°F_____	°F_____
Sub-cooling:	° _____	° _____

Electrical

Evap. Motor Amps ..... L1 _____ L2 _____ L3 _____

Compressor 1 Amps..... L1 _____ L2 _____ L3 _____

Compressor 2 Amps..... L1 _____ L2 _____ L3 _____

Cond. Motor Amps..... L1 _____ L2 _____ L3 _____

Heating Mode (Optional)

System Air Temperatures .....Return: °F _____ Supply: °F_____

Entering Water Temperature:.....Return: °F _____Fluid Type:_____

Leaving Water Temperature: .....Return: °F _____

Steam Pressure:.....psi _____

Electric:

kW: _____ Voltage: _____

Amps: Stage1..... L1 _____ L2 _____ L3 _____

Stage2..... L1 _____ L2 _____ L3 _____

Misc. _____

Technician (print name): _____

Company: _____

Phone: _____ Fax: _____

Signature: _____ Date: _____

Water-Cooled Unit

Pre Startup Checklist

Installing contractor should verify the following items.		
1. Is there any visible shipping damage?	☐ Yes	☐ No
2. Is the unit level?	☐ Yes	☐ No
3. Is proper vibration isolation provided in accordance with IOM?	☐ Yes	☐ No
4. Are the unit clearances adequate for service and operation?	☐ Yes	☐ No
5. Do all access doors open freely and are the handles operational?	☐ Yes	☐ No
6. Have all shipping braces been removed?	☐ Yes	☐ No
7. Have all electrical connections been tested for tightness?	☐ Yes	☐ No
8. Does the electrical service correspond to the unit nameplate?	☐ Yes	☐ No
9. On 208/230V units, has transformer tap been checked?	☐ Yes	☐ No
10. Has overcurrent protection been installed to match the unit nameplate requirement?	☐ Yes	☐ No
11. Do all fans rotate freely?	☐ Yes	☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☐ Yes	☐ No
13. Is all copper tubing isolated so that it does not rub?	☐ Yes	☐ No
14. Are air filters installed with proper orientation?	☐ Yes	☐ No
15. Have condensate drain and p-trap been connected?	☐ Yes	☐ No
16. Is the TXV sensing bulb in the correct location?	☐ Yes	☐ No
17. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes	☐ No
18. Confirm ship loose items required for proper installation	☐ Yes	☐ No

Start-Up Procedures (R-410a Systems)

1. Start up must be performed by a qualified HVAC Technician.
2. Make certain that all power is disconnected at the main power circuit breaker or service disconnect before starting any of this procedure.
3. 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.
4. Confirm that the voltage rating of the equipment data tag coincides with the power that will be delivered to the unit.
5. 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 Fuse Size (MFS).
6. Locate the unit thermostat and check all electrical terminations against the unit electrical diagram and for the unit thermostat.

Note: If using a digital thermostat with a "C" (Common) terminal, this terminal MUST be terminated to the "C" terminal in the unit. Failure to do so will result in the thermostat shorting out and being destroyed.

7. Leak check the refrigerant system. While the unit was leak checked at the factory, leaks can develop during transit and / or handling.
8. Confirm that the unit condensate has been adequately trapped and taken to a suitable point for disposal.
9. Verify that the filters are in place, clean and usable.
10. Switch the unit thermostat to the "OFF" position.
11. Apply power to the unit. Switch the circuit breaker or field supplied electrical service disconnect switch to the on position.

Note: If the unit has crankcase heaters and the surrounding ambient is 70˚ F or lower, let the compressors sit for approximately 24 hours before proceeding.

12. Record the voltage at the unit terminals.
13. If possible with the thermostat provided, switch the evaporator blower to the RUN or ON position. Verify that the evaporator blower is activated.
14. Verify that the evaporator blower is rotating in the correct direction (three phase units only).

Note: If the evaporator blower motor runs backwards, shut off all power to the unit. Switch any two of the incoming power leads at the unit main power terminal block. The unit has been wired and phased properly at the factory. DO NOT change any factory wiring to correct for a phase problem.

Note: 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.

15. 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(s) and evaporator blower.

Note: Dependent upon the options and/or the thermostat, there may be a delay for the compressor(s) operation.

16. While waiting for the compressor(s) to stabilize, record the External Static Pressure (ESP) for the evaporator blower.

Note: Make sure all the unit access panels are in place when taking these readings.

17. Verify that the incoming water / fluid pressure does not exceed the rating for the water / fluid control valves.
18. Verify that the unit piping and heat exchangers will not be subjected to freezing conditions.
19. Confirm that no joints are leaking in the cooling fluid circuit(s).
20. Document the type of fluid being used as the cooling medium. If glycol is being used, make sure the mixture is adequate for any low ambient conditions that may be possible.
21. If possible, record the fluid flow rate (GPM).
    a. Make sure the flow rate is within the proper limits:
        i. Minimum 2.5 GPM / Ton
        ii. Maximum 3.5 GPM / Ton

Continued on next page

Start-Up Procedures (R-410a Systems) **Continued:**

22. Record the entering and leaving fluid temperatures.

b. Make sure the leaving fluid temperature is within the proper limits:

i. Minimum 60˚ F

ii. Maximum 115˚ F

23. Record the pressure drop of the water / fluid across the unit.

24. Verify that all valves on each fluid circuit function properly.

25. Check the head pressure adjustment, DO NOT assume that this has been set at the factory. Typically this value is to be 360 psi when 85˚ F water is supplied to the unit at 3 GPM/Ton.

26. Record the return air temperature to the evaporator coil along with the supply air temperature. (The unit should have operated for at least 15 minutes before taking these readings).

27. Record the suction line pressure and the suction line temperature for each circuit near the compressor.

28. Using an appropriate pressure / temperature chart for R-410a refrigerant, look up and record the saturation temperature corresponding to the suction pressure.

29. Calculate and record the suction superheat for each circuit by taking the difference between the suction line temperature and the saturation temperature corresponding to the suction pressure.

30. Record the liquid line pressure and the liquid line temperature for each circuit near the condenser heat exchanger outlet.

31. Using an appropriate pressure / temperature chart for R-410a refrigerant, look up and record the saturation temperature corresponding to the liquid line pressure.

32. 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.

33. Record the Amps for the evaporator blower motor and each compressor. If the system is single phase, use L1 and L2 only.

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 value should never be exceeded.

i. If the FLA value is exceeded, shut the unit off and check the duct design, sheave turns open or make sure there is no blockage / obstruction in the duct or filters.

34. Document any additional information deemed appropriate for the specific application or installation.

35. Shut the system down and remove all test instruments and test sensors.

36. Leave the system in the operating mode as appropriate for the customer and the application.

Optional Heating Start Up:

37. If the system has any optional heat, set the room thermostat approximately 5° higher than the actual room temperature. Set the thermostat operating mode to the HEAT position.

38. Dependent upon the heating source the heating valve or switch / contactor should be activated.

39. After several minutes of operation, record the return air temperature and the supply air temperature.

40. Based on the heating source, document the appropriate temperatures, pressures, voltage or amp values.

Water-Cooled Unit

Start-Up Procedures

Complete the form by listing your name, company name, phone and fax number. Sign and date the form and provide a copy as required to all interested parties.

Job Name: _____ **Date:**_____
Address: _____
City:_____ **State:** _____**ZIP**_____
Country: _____
Unit Model No.: _____
Unit Serial No.:_____

Screw Lugs & Terminals OK?.....Yes _____ No _____
Describe any loose connections and action(s) taken:

_____

_____

Power Supply Correct Voltage and Phase? .....Yes _____ No _____
If not in agreement with unit data tag contact the Distributor.

_____

Is the Circuit Protection the correct type and does it meet
the unit data tag requirements?.....Yes _____ No _____
If not correct describe what action(s) have been taken to correct:

_____

_____

Unit controller wiring verified? .....Yes _____ No _____
"C" Terminal hooked up if necessary? .....Yes _____ No _____

_____

Unit leak checked OK?.....Yes _____ No _____
If leak was located describe where and how repaired:

_____

_____

Condensate trapped & run to a suitable disposal point?.....Yes _____ No _____

_____

Air Filters are in place, clean & usable? .....Yes _____ No _____

_____

Single Phase Unit
Measured Voltage.....L1-L2 _____ L1-GND_____ L2-GND _____
Three Phase
Measured Voltage.....L1-L2 _____ L2-L3_____ L1-L3 _____

_____

Evaporator Blower Motor Rotation OK? .....Yes _____ No _____
If three phase power and rotation is not correct describe action(s) taken to correct:

_____

_____

Evaporator External Static Pressure .....(ESP): _____In. WG _____

_____

Verify that incoming fluid pressure does not exceed .....Yes _____ No _____
rating for the fluid control valves.

_____

Continued on Next Page

Verify that unit piping and heat exchangers will not be subject to freezing conditions. ..... Yes _____ No _____

No cooling fluid leaks..... Circuit 1 _____ Circuit 2_____

Cooling Fluid Type
If Glycol what percentage of mix:. _____ Good to a temperature of _____

Water / Fluid flow rate..... GPM _____

Entering Water Temperature (EFT): °F _____ Leaving Water Temperature (LFT): °F _____

Water / Fluid Pressure Drop across unit:..... PSI _____

Verify that all valves on each circuit are functioning properly. ..... Yes _____ No _____

Verify water/fluid discharge pressure set point. ..... Yes _____ No _____

Cooling Mode

System Air Temperatures ..... Return: °F _____ Supply: °F_____

	Compressor 1	Compressor 2
Suction Pressure:	psi _____	psi _____
Suction Line Temperature:	°F_____	°F_____
Saturation Temperature:	°F_____	°F_____
Suction Superheat:	° _____	° _____
Liquid Line Pressure:	psi _____	psi _____
Saturation Temperature:	°F_____	°F_____
Liquid Line Temperature:	°F_____	°F_____
Sub-cooling:	° _____	° _____

Electrical

Evap. Motor Amps ..... L1 _____ L2 _____ L3 _____

Compressor 1 Amps ..... L1 _____ L2 _____ L3 _____

Compressor 2 Amps ..... L1 _____ L2 _____ L3 _____

Heating Mode (Optional)

System Air Temperatures ..... Return: °F _____ Supply: °F_____

Entering Water Temperature:..... Return: °F _____ Steam Pressure: psi_____

Leaving Water Temperature: ..... Return: °F _____

Electric kW: _____ Voltage:_____

Amps: Stage1..... L1 _____ L2 _____ L3 _____

Stage2..... L1 _____ L2 _____ L3 _____

Misc. _____

_____

Technician (print name): _____

Company: _____

Phone: _____ Fax: _____

Signature: _____ Date: _____

OmegaAir
Product Nomenclature

EXAMPLE:	**OS**	**W**	**V**	**3**	**G**	**3**	**ASF**	**T**	**A**	**10**	**-**	**T**	**X**	**OmegaAir Section**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		**11**	**12**	

1.	"OS"	Outside Air Type
2.	"W"	Water-Cooled
	"A"	Air-Cooled with Remote Condenser
3.	"V"	Vertical Configuration
	"H"	Horizontal Configuration
4.	"1", "1.5", "2", "2.5", "3", "4", "5", "6", "7", "8", "9", "10", "11", "12", "13.5", "15"	
		Nominal Tons
5.	"G"	Common to all
6.	"1", "2", "3", "4", "5", "6", "7", "8", "9", "10" Indicates Voltage	
	"1"	208-230V, 1 PH 60 Hz
	"2"	208-230V, 3 PH 50 Hz
	"3"	208-230V, 3 PH 60 Hz
	"4"	460V, 3 PH 60 Hz
	"5"	575V, 3 PH 60 Hz
	"6"	380V, 3 PH 60 Hz
	"7"	277V, 1 PH 60 Hz
	"8"	380V, 3 PH 50 Hz
	"9"	110V, 1 PH 60 Hz
	"10"	220V, 1 PH 50 Hz
7.	"ASF", "ASD", "ASV", "AF", "AD", "ADF", "AVF" Quantity of Refrigerant Circuits/Compressor Type	
	"ASF"	Indicates 1 Circuit Fixed Speed Compressor
	"ASD"	Indicates 1 Circuit Digital Compressor
	"ASV"	Indicates 1 Circuit Variable Speed Compressor
	"AF"	Indicates 2 Circuits Fixed Speed Compressors
	"AD"	Indicates 2 Circuits Digital Compressors
	"ADF"	Indicates 2 Circuits Digital (Lead Circuit), Fixed Speed Compressor (Lag Circuit)
	"AVF"	Indicates 2 Circuits Variable Speed (Lead Circuit), Fixed Speed Compressor (Lag Circuit)
8.	"T"	Traditional Cabinet
	"C"	Custom Cabinet
9.	"A", "C"	Refrigerant Type
	"A"	Refrigerant R-410a
	"C"	Refrigerant R-407c
10	"2 thru 70"	kW Electric Heat
11.	"-T", "-F", "-B"	Air Path Configuration
	"-T"	Top Discharge
	"-F"	Front Discharge
	"-B"	Bottom Discharge
12.	"X"	Special Configuration

Not all combinations of unit Product Nomenclature are valid. Check with the factory for correct model identification.

Air-Cooled Centrifugal Condenser
Product Nomenclature

EXAMPLE:	**BC**	**3**	**G**	**3**	**AS**	**T**	**A**	**-**	**X**	**Air-Cooled Centrifugal Condenser**
	1	**2**	**3**	**4**	**5**	**6**	**7**		**8**	

1.	"BCSP"	Air-Cooled Condenser Section (1 or 1-1/2 Ton, Centrifugal)
	"BC"	Air-Cooled Condenser Section (2 thru 15 Tons, Centrifugal)
2.	"1", "1.5", "2", "3", "4", "5", "6", "8", "10", "12", "15"	Nominal Tons
3.	"G"	Common to all
4.	"1", "2", "3", "4", "5", "6", "7", "8", "9", "10"	Indicates Voltage
	"1"	208-230V, 1 PH 60 Hz
	"2"	208-230V, 3 PH 50 Hz
	"3"	208-230V, 3 PH 60 Hz
	"4"	460V, 3 PH 60 Hz
	"5"	575V, 3 PH 60 Hz
	"6"	380V, 3 PH 60 Hz
	"7"	277V, 1 PH 60 Hz
	"8"	380V, 3 PH 50 Hz
	"9"	110V, 1 PH 60 Hz
	"10"	220V, 1 PH 50 Hz
5.	"AS" or "A"	Quantity of Refrigerant Circuits
	"AS"	Indicates 1 Circuit
	"A"	Indicates 2 Circuits
6.	"T"	Traditional Cabinet
7.	"A", "C"	Refrigerant Type
	"A"	Refrigerant R-410a
	"C"	Refrigerant R-407c
8.	"X"	Special Configuration

Not all combinations of unit Product Nomenclature are valid. Check with the factory for correct model identification.

Air-Cooled Propeller Condenser
Product Nomenclature

EXAMPLE:	**PBC/PBD**	**3**	**G**	**3**	**AS**	**T**	**A**	**-**	**X**	**Air-Cooled Propeller Condenser**
	1	**2**	**3**	**4**	**5**	**6**	**7**		**8**	

1.	"PBC"	Air-Cooled Condenser Section with "Inline" Fan Arrangement
	"PBD"	Air-Cooled Condenser Section with "Duplex" Fan Arrangement
2.	Nominal Tons of THR @ AHRI Conditions	
	For PBC	"2", "3", "4", "5", "6", "7", "10", "13", "15", "18", "21", "23", "26", "28", "31"
	For PBD	"20", "27", "30", "36", "42", "46", "52", "56", "62", "69", "76"
3.	"G"	Common to all
4.	"1", "2", "3", "4", "5", "6", "7", "8", "9", "10"	Power Supply
	"1"	208-230V, 1 PH 60 Hz
	"2"	208-230V, 3 PH 50 Hz
	"3"	208-230V, 3 PH 60 Hz
	"4"	460V, 3 PH 60 Hz
	"5"	575V, 3 PH 60 Hz
	"6"	380V, 3 PH 60 Hz
	"7"	277V, 1 PH 60 Hz
	"8"	380V, 3 PH 50 Hz
	"9"	110V, 1 PH 60 Hz
	"10"	220V, 1 PH 50 Hz
5.	"AS", "A", "B", "D"	Quantity of Refrigerant Circuits
	"AS"	Indicates 1 Circuit
	"A"	Indicates 2 Circuits
	"B"	Indicates 3 Circuits
	"D"	Indicates 4 Circuits
6.	"T"	Traditional Cabinet
7.	"A", "C"	Refrigerant Type
	"A"	Refrigerant R-410a
	"C"	Refrigerant R-407c
8.	"X"	Special Configuration

Not all combinations of unit Product Nomenclature are valid. Check with the factory for correct model identification.

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. United CoolAir Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed HVAC technician.

Entry Date	Action Taken	Name/Tel.

Note: United CoolAir service contact information: Phone (717) 843-4311
Please have the serial number of the unit, service team members are available Monday through Friday from 7:00 AM to 5:00 PM Eastern Standard Time.

After hours tech support available Monday — Friday till 7:00 PM Eastern Standard Time.
Saturday 8:00 AM — 4:00 PM
Call: (717) 843-4311 and Dial extension 165

NOTES:

NOTES:

NOTES:

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.

UNITED COOLAIR

491 East Princess Street, York, PA 17403 Phone: 717-843-4311 Fax: 717-854-4462
web: www.unitedcoolair.com

MEMBER AHRI AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE
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