

Installation, Operations, and Maintenance

AC & HP Systems

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IOM MANUAL

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4. STANDARD 1 YEAR LIMITED PARTS WARRANTY

4.1 Unless a different Limited Warranty is provided by AAT in the Transaction Documents, the express provisions of all warranties of every nature and every kind for and with respect to the Goods and/or the Transaction shall be limited to the Limited Warranty set forth in this Section 4. AAT warrants to the original Buyer (and any assignee approved by AAT in writing prior to the assignment thereof) against defects in materials and/or workmanship with respect to the Goods (collectively a "Defect") for a period of twelve (12) months from the date of shipment from AAT's facility; PROVIDED, HOWEVER, in the event Buyer obtains a successful start-up of the Goods and provides documentation thereof evidenced by AAT's receipt of fully-completed, factory-formatted, start-up documentation (which must be received from Buyer within ninety (90) days from the shipment date, time being of the essence), then the twelve (12)-month Limited Warranty set forth above shall be extended for an additional ninety (90)-day period, and the Limited Warranty provided hereunder will continue for a total of fifteen (15) months following the date of shipment as aforesaid. Buyer's sole and exclusive remedy under this Limited Warranty shall be limited to either the repair or exchange of the warranted products (FOB AAT's factory), at AAT's option. As a material and integral term of this Limited Warranty, no attempt to repair and/or improve the Goods and/or any parts or components thereof by any of AAT's representatives shall change or extend this Limited Warranty.

4.2 NOTWITHSTANDING ANYTHING IN THIS LIMITED WARRANTY AND/OR THESE TERMS AND CONDITIONS TO THE CONTRARY, IT IS UNDERSTOOD AND AGREED THAT THE AGREEMENTS, WARRANTIES, REPRESENTATIONS AND COVENANTS OF AAT HEREUNDER REPRESENT "A LIMITED WARRANTY", AND THEREFORE, AAT'S OBLIGATIONS TO CORRECT AND/OR REPAIR ANY DEFECT ARE LIMITED TO THE TERMS AND CONDITIONS HEREOF. EXCEPT AS SET FORTH HEREIN, IT IS UNDERSTOOD AND AGREED THAT THE PHYSICAL CONDITION OF THE GOODS ARE BEING CONVEYED PURSUANT TO THE P.O. IN "AS IS" CONDITION. THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BUYER ACCEPTS THE LIMITED WARRANTY AS THE SOLE WARRANTY GIVEN BY AAT TO BUYER WITH RESPECT TO THE GOODS. THE SALES AGENTS, EMPLOYEES AND/OR INDEPENDENT CONTRACTORS OF AAT ARE NOT AUTHORIZED TO MODIFY THIS LIMITED WARRANTY OR GIVE ADDITIONAL WARRANTIES BINDING ON AAT. ACCORDINGLY, STATEMENTS MADE IN ADVERTISING OR OTHER PRESENTATIONS OR COMMUNICATIONS, WHETHER ORAL OR WRITTEN, DO NOT CONSTITUTE WARRANTIES BY AAT AND ARE NOT RELIED UPON BY BUYER. UNLESS OTHERWISE PROHIBITED BY APPLICABLE LAW, IN NO EVENT SHALL AAT, IN ANY CASE, BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER SIMILAR DAMAGES CREATED BY, ARISING OUT OF, OR RESULTING FROM BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE OR ANY OTHER LEGAL THEORY, EVEN IF AAT OR AAT'S AGENT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL AAT'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THE P.O. AND THESE TERMS AND CONDITIONS, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO AAT FOR THE GOODS SOLD HEREUNDER.

4.3 Notwithstanding anything in the Transaction Documents to the contrary and as a material and integral term of the Transaction, Buyer expressly agrees that AAT shall not be liable for any indirect, consequential, exemplary, special, incidental or punitive damages, including, without limitation, loss of use, loss of business, revenue, profit or goodwill, downtime costs, damage to associated equipment, cost of substitute goods, facilities or services, or claims of Buyer's customers for such damages, or other commercial or economic damages or costs, that may arise out of, in conjunction with or relate to, the failure of any Goods sold by AAT to Buyer, under any legal theory or cause of action, including, without limitation, tort, contract, warranty, strict liability or federal, state or local statute, ordinance or regulation. In no event shall AAT's liability exceed the Price of the Goods which give rise to the claim. Buyer agrees that if it transfers title to or leases the Goods to any third-party buyer shall obtain such buyer's agreement to the limitations set forth herein. If the Buyer or its agents grants to an end user any warranty which is greater in scope or time period than the Limited Warranty stated herein, AAT shall not be liable beyond the Limited Warranty set forth herein and Buyer shall indemnify and hold AAT harmless with respect thereto.

4.4 No Goods or any portion thereof shall be returned without prior authorization from AAT. Buyer shall prepay all transportation charges for the return of such Goods or any portion thereof to AAT's factory or authorized factory service center. AAT will not accept any charges for labor and/or parts incidental to the removal and remounting of any Goods repaired or replaced under this Limited Warranty. All repair and replacement parts provided under this Limited Warranty will assume the identity, for Limited Warranty purposes, of the part replaced and the Limited Warranty on such replacement parts will expire when the Limited Warranty on the original part would have expired. Claims must be submitted within thirty (30) days of failure or be subject to rejection. This Limited Warranty is not transferable by Buyer unless approved in writing by AAT prior to the assignment or transfer thereof.

4.5 The Limited Warranty set forth above does not cover conditions over which AAT has no control, and therefore, a Defect for purposes hereof shall not include: (i) contamination; (ii) Goods damaged or subjected to excess voltage; (iii) Goods exposed to temperatures, venting requirements and/or flow rates outside of specified range; (iv) accidents, abuse, negligence, improper maintenance and/or misuse after shipment from AAT's factory; (v) Goods altered, disassembled or repaired by anyone other than AAT personnel or persons so designated in writing by AAT prior to the commencement of said work; (vi) damages due to deterioration during periods of storage by the Buyer prior to installation and operation; (vii) damage due to unsuitable fuels, power, selection to the wrong product settings; (viii) damage due to corrosion (including due to water quality, liquids utilized and air), mineral deposits, mold, fungus, abrasion or bacteria; (ix) ordinary wear and tear; (x) any damage caused to the Goods by any portion or component of any system that is not supplied by AAT, regardless of the cause of the failure of such portion or component; (xi) Goods on which payment to AAT is in default; or (xii) any other matter, activity and/or passage of time causing a Defect which are beyond the reasonable control of AAT. In addition, AAT shall not be liable for the acts of Buyer's employees, agents or contractors, nor shall AAT have any responsibility for the performance of Goods not installed in compliance with the installation manual. Whenever possible, each provision of the Limited Warranty shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Limited Warranty shall be prohibited by or invalid under applicable law, such provision shall be ineffective only to the minimum extent of such prohibition or invalidity without invalidating the remainder of such provision or the remaining provisions of this Limited Warranty.

Introduction

Thank you for your purchase of this AboveAir Technologies equipment. AboveAir Technologies is an innovative Maryland based manufacturer of air conditioning systems. Specializing in recpision, high percentage outside air, and supplemental applications, AboveAir Technologies utilizes high quality craftsmanship and materials to produce equipment capable of providing years of trouble free service.

This AboveAir Technologies manual is provided as one component of the documentation for your equipment. The product data sheet (submittal or as-built) and wiring diagram should be referenced for specific performance, technical, and physical data. Supplemental manuals for microprocessors and other system components may be included with your unit based on the features requested.

The information contained in this manual provide basic instructions for the installation, operation, and maintenance of your equipment. The directions contained herein will prevent damage to the system from an improper installation and ensure that your unit performs at its peak efficiency. Deviation from these instructions may result in degraded performance, damage to the system, and potentially void the system warranty. Note: The information contained in this manual in no way absolves the installer of their obligation to meet all applicable codes and comply with other project documentation. In the event of a conflict between these instructions and other project requirements, always observe the most strict requirement.

Safety Information

This AboveAir Technologies unit presents multiple potential hazards, including high voltage electrical services, rotating components, and high pressure gases and liquids. Only professionally trained, qualified, and licensed (where required) personnel should install and/or service this equipment. Property damage and serious injury or death may result from improper installation or maintenance of this equipment.

Prior to performing any service on this unit, familiarize yourself with this manual, the material safety data sheets (MSDS) for any refrigerant or glycol used in this unit, and the location of the main power switch. Before opening the cabinet to perform any service, always lock out the main power disconnect unless power is required for the procedure/diagnostic being performed.

Receiving and Unpacking

To ensure that your equipment has been delivered

without any external or internal indications of damage, make a visual inspection, including inside all access panels, immediately upon delivery. If there is any shipping damage, it must be noted on the freight carrier's delivery forms before signing for the equipment. If the unit has been damaged, obtain a claim form from the carrier. All freight claims and/or lost material claims must be processed through the freight carrier, typically within 5 business days of receipt of equipment. AboveAir technologies should be notified of any damage prior to repair. Components and accessories that are shipped loose will be shipped in separate container(s) and may be found within the unit as space allows. Units must remain in the normal upright position at all times. Units should only be moved by pallet jack or similar device on original or correctly sized pallet (pallet must extend beyond the unit on all sides). Units must never be stacked.

If the equipment is not scheduled for immediate installation upon its arrival at the job site, it should be completely inspected per the instructions above, then re-packed in the original or equivalent packaging and stored in a clean, dry area.

Site Selection

Before the unit is installed, a thorough study of the installation site should be made to verify that the structure is adequate to support the unit's weight. The routing of electrical services, ductwork, and piping must be coordinated in order to maintain accessibility to the unit for maintenance and servicing.

A minimum clearance of 24" is recommended at all access panels to allow for equipment service. Clearances for electrical panels are as required by all applicable codes (typical minimum is 36"); contact your authority having jurisdiction for specific local requirements.

Electrical boxes may be mounted on hinges to facilitate access to internal components. All wiring must be installed with appropriate strain relief and in a manner to allow the electrical box to rotate freely on its hinges.

Refer to your submittal drawings for specific unit layout and custom access configurations, if applicable.

Site Preparation

One of the most significant site factors that can affect the performance of your unit and its ability to maintain space conditions is the insulation and vapor barrier installed in the space. AboveAir Technologies recommends that the insulation and air/vapor barrier installation meet the standards of ASHRAE/ANSI 90.1 or the local code as a

minimum for optimum unit operation. In particular, the air/vapor barrier is vital to properly maintaining space conditions - leakage causes increased heating, cooling, humidification, and dehumidification loads. Failure to provide adequate insulation and a proper air/vapor barrier can lead to unstable room conditions and increased operational costs.

Rigging

Units are shipped on a skid in order to ease movement and are designed to be kept in the orientation in which they are shipped. This orientation must be maintained at all times during installation. AboveAir units should only be moved by pallet jack or other similar device. Refer to unit documentation for weights.

Mounting

Indoor - Ceiling Mounted Equipment

For detailed dimensional data, refer to your submittal drawings. Packaged units are shipped as an integral unit with a cross-member angle attached to both sides of the unit at each of the six mounting channels. Refer to submittal dimensions for mounting system if the evaporator system is separated from the condensing section.

Use 3/8" minimum diameter threaded rod (field-supplied) with proper washers and locknuts to hang equipment. Consult the authority having jurisdiction and/or your project documentation for other requirements. Unit should be lifted into place from underneath. Refer to unit documentation for the unit weight.

Indoor - Floor Mounted Equipment

Floor mounted equipment is designed to be mounted directly on to a slab floor. Consult the local authority having jurisdiction and/or your project documentation for other requirements.

Vibration Isolation

While various internal components may have their own internal vibration isolation, AboveAir Technologies recommends that all of its equipment be provided with external vibration isolation to maximize equipment life and to minimize noise generation.

Floor-mounted units may be mounted on vibration isolation pads or spring isolators. Spring isolators are recommended for ceiling hung units. Vibration isolators may be provided with your unit or field-supplied. Refer to your unit submittal and packing list to determine if vibration isolators have been supplied by the manufacturer.

Condensate Line

Gravity (Units without condensate pumps)

Units have a 3/4" or 1" OD copper condensate drain connection stubbed out through the side of the cabinet. A P-trap is required on the drain line and should be sized by the specifying engineer as required for a draw-through type application. Improperly sizing the trap may result in water being entrained in the air stream or cause the drain pan to overflow. The drain line pipe size should match the connection size. Slope all drain piping away from the unit in accordance with local code and project requirements.

Condensate Pump (Installed in Unit)

Units with a factory mounted condensate pump have a 1/2" OD copper drain stubbed out through the cabinet. A 1/2" copper sweat connection or 1/2" ID vinyl tubing may be used for connection.

Condensate Pump (Field Installed)

Units have a 3/4" or 1" OD copper condensate drain connection stubbed out through the side of the cabinet. A P-trap is recommended on the drain line. In order to ensure proper drainage, the top of the pipe at the inlet to the condensate pump must be below the top of the drain pan. Condensate pump discharge may be 1/2" OD copper or vinyl tubing.

The condensate pump must be independently supported and level. Do not support pump from piping. Do not support from unit panels - supporting from unit structure is acceptable, if other piping requirements can be met.

Condensate Check Valves

All units with condensate pumps require a check valve at the discharge. Your pump may contain an internal check valve: verify prior to making any connection to the condensate system. Check valves are also required in any system where backflow into the unit is possible or as required by the local authority having jurisdiction.

System Piping

Refrigerant Piping

Refer to the split system refrigerant piping guide for pipe sizing, material, and installation requirements.

Water & Steam Piping

AboveAir Technologies recommends Type L copper or Schedule 40 black steel pipe for all water pipe installations and ASTM A53 Schedule 80 black steel pipe for steam and steam condensate. Fittings and joining method should be appropriate to the pressure rating as specified by the supervising engineer. Support pipe with

hangers designed for the appropriate pipe type. Comply with all national and local code requirements.

Insulation is recommended on chilled water, heating water, and steam piping. Refer to project documentation, local, and national codes for additional requirements, insulation types, and thicknesses.

AboveAir units are available with a variety of control valves when designed for chilled water, heating water, and/or steam service; refer to the documentation included with your control valve for installation requirements.

Ductwork

AboveAir Technologies produces units with a variety of airflow patterns, including same-face, straight-thru, and 90° configurations. Connections to the unit should be made with a 1-inch flange. The duct connection to the unit should be the same size as the connection on the unit - do not blank off any portion of the inlet or outlet. Refer to the project documentation for size, material, and other connection requirements.

Note: The unit's blower has been selected based on static pressure requirements included in the project documentation. While the unit is provided with adjustable pulleys for adjustment, significant deviations from the design external static pressure may result in blower stability issues or inadequate airflow. Consult the factory prior to making any changes that might cause significant changes in the external static pressure.

Free Discharge

AboveAir Technologies units are available in a variety of free discharge options. When locating the unit, pay careful to the airflow pattern. Ensure the grille or air device is directed so that airflow is not directed into walls or corners.

Control Installation

AboveAir Technologies units are available with a variety of controls options, from standard thermostats to advanced microprocessor controls systems. Refer to the supplemental documentation included with your unit for specific information based on the options selected with your unit.

Wall-Mount Thermostats, Temperature Sensors, & Temperature/Humidity Sensors

Wall-mounted sensors should be mounted in the space the unit is serving, on an internal wall, and away from direct sunlight. Sensors should be placed so that they will not be obstructed by furniture or any other equip-

ment. Do not place sensors in close proximity to heat generating equipment such as computers, coffee makers, or ovens. Do not mount sensors directly over sinks. Sensors should be mounted 60 inches above the finished floor, unless otherwise directed.

Duct-Mounted Temperature & Dew Point Sensors

Refer to the specific project documentation to determine whether duct mounted sensors are to be installed in the supply or return ductwork.

Duct mounted sensors should be mounted in a straight duct suction at least 3 duct widths downstream from any air mixing or any devices. Supply air sensors must be installed downstream of the unit and any post heat devices; mixed/outside air sensors must be installed upstream of the unit.

Remote Water Detector

Probe Type: Install the remote water detector in the unit's auxiliary drain pan. Adjust the height of the sensing probes as required, ensuring that they do not come into direct contact with the drain pan.

Cable Type: Refer to the directions included with the cable-type water detector to properly install the cable, leader, control interface, and EOL cap.

Smoke Detector

Install the smoke detector with sampling tubes downstream of the unit, with the sampling tubes in the supply air duct.

Firestat

Install the firestat downstream of the unit in the supply air duct. The firestat requires a manual reset after an alarm and must be readily accessible.

Optional Equipment

AboveAir units are available with a variety of optional equipment, including electric heaters, hot-water heating coils, steam heating coils, and humidifiers. This equipment may be unit mounted or duct mounted. Refer to your system's submittal to identify additional equipment and supplemental documentation for additional requirements for options not listed in this manual.

Electrical Connections

High Voltage Power Wiring

AboveAir Technologies units are shipped from the factory with components selected and internally wired for the specified electrical requirements. Refer to the unit's nameplate for the voltage, phase, and frequency information. Prior to beginning wiring, verify that the main

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electrical service to be routed to the unit and the nameplate information are properly coordinated

Check the unit nameplate for the full load amps (FLA), minimum circuit ampacity (MCA), and maximum over-current protection (MOP). Select wire and fuse sizes in accordance with Local and National code requirements.

The main power connection to packaged units or split unit sections must be made through a disconnect. The disconnect may be factory provided or field provided - refer to the submittal for more information.

Refer to the wiring diagram included with the unit for connection to the power distribution block and unit ground lug. Verify that the hot and neutral legs (single phase) or L1, L2, and L3 supply wires (three phase) are connected to the corresponding points on the power block.

Low Voltage Control Wiring

AboveAir Technologies units are shipped from the factory with all internal components pre-wired. Terminals are provided for all field-wired connections.

Control wiring is 24 VAC. Select wire sizes in accordance with Local and National code requirements.

Refer to the wiring diagram included with the unit to identify the components to be field wired and for the terminal connections.

Note: *Unless specifically noted on the wiring diagram, do not use the AboveAir Technologies control transformer(s) to power any additional field supplied devices such as damper actuators or control valves.*

Optional Connections

Your AboveAir Technologies unit may include a variety of features depending on the configuration. These features may include dedicated terminals or relays for control wiring and dedicated power/fuse blocks for power wiring. Refer to the unit's wiring diagram and submittal to identify which features have been provided with your unit.

Remote Stop/Start

Normally closed contacts may be provided to allow remote shutdown of the unit. If the Remote Stop/Start terminals are not utilized, leave the factory installed jumper in place.

Field Installed Condensate Pump

Normally closed contacts for condensate pump auxiliary overflow switch may be provided with the unit. If unit

shutdown on condensate pump auxiliary overflow switch is not desired or no condensate pump is required, the factory installed jumper should be left in place.

Factory supplied condensate pumps may also be power through the unit. In that case, two power wires and a ground wire must be connected to the dedicated power terminals on the fuse block and to the ground stud, respectively. Refer to the unit wiring diagram and wiring diagram included with the condensate pump for to verify points of connection.

Remote Water Detector

The remote water detector requires control wiring to be run to the NC and ground terminals and an additional power connection (provided from the 24 V control wiring or a dedicated 5V power source). Refer to the wiring diagram included with the water detector for more information. Refer to the unit wiring diagram for wiring configuration. Note: Remote water detector control wiring will be wired in series with the condensate pump overflow switch, if provided

Remote Temperature & Temperature/Humidity Sensors
Use shielded, multi-core cable with 3-5 wires for all sensor connections. Wire should be 16-20 AWG. Use the largest acceptable gage wire in order to minimize signal noise. Avoid running the sensor wiring near power cables or near cables running to contactors. Where possible, minimize the length of the cable run. Refer to the wiring diagram for points of connection.

Duct Heaters

Duct heaters may be powered through the unit or powered separately. Control wiring must be connected to the unit. Refer to the documentation included with the duct heater for additional requirements. Refer to the unit wiring and electric heater wiring diagrams for points of connection.

Damper Actuators

Damper actuators are generally powered separately. A dry contact may be provided for power wiring (typically labeled EDR on the wiring diagram). Refer to the wiring diagram for more information.

Smoke/Fire Detector

Smoke/fire detectors may be field-wired or factory-wired. Terminals are provided for connection. Refer to the wiring diagram for more information.

System Charging

R-410a Refrigerant

R-410A is a blended refrigerant (a near azeotropic of R-32 and R-125) formulated as a non-ozone depleting replacement for R-22 in residential and commercial air conditioners and heat pumps. R-410A exhibits higher operating pressures and refrigerant capacity than R-22. Due to the higher pressures, ensure that all service tools used for charging an R-410A system are designed for use with R-410A.

Even though R-410A retains a similar composition in both the liquid and vapor phases, it is recommended that the system be charged with liquid refrigerant only. Refer to the instructions printed on your refrigerant cylinder to verify that the cylinder is oriented properly for charging.

!! Systems utilizing R-410A absolutely cannot be charged to the site glass.

!! R-410A must be charged as a liquid. Charging as a gas may result in refrigerant separation and improper unit operation.

System Charging

Do not attempt to charge the system prior to completion of installation. All interlocking wiring, refrigerant piping, condenser piping, ductwork, and control sensors must be installed for proper system charging. Do not attempt to charge until initial air and water/glycol balancing has been completed. Do not attempt to charge systems at conditions where they would not normally operate.

After completing all system piping connections and prior to introducing any refrigerant in to the system, pressure the system to 150 psig with dry nitrogen. Once the system has been pressurized, monitor the pressure to verify that there are no leaks in the system.

In order to dehydrate the system, a high vacuum pump must be used to pull vacuum. Draw a vacuum of at least 500 microns and hold the vacuum for at least 2 hours. Proper system evacuation is essential to ensure compressor life.

To break vacuum on the system, supply liquid R-410A to the liquid line or receiver port. For split systems, a starting refrigerant charge is typically noted in the mechanical section or shipped with a charge in the condensing section (refer to condenser section labeling). You will need to add additional charge for line sets longer than indicated. If recharging a packaged system, the system charge will be noted on the unit's name plate. Weigh in

the initial charge. The majority of the system's charge should readily be dispensed to the system at this point.

Turn the system on. Offset sensors or set points as necessary to operate the compressor continuously while charging the system. Refer to the controller or thermostat manual for more information.

!! System must be charged slowly. Add charge and allow the system to settle. R-410A can easily be over-charged, particularly when both ambient conditions and evaporator load are high.

Add refrigerant to allow the discharge pressure to rise to 325-420 psig. Note that equipment with flooded head pressure control valves will need to exceed 300 psig in order for the head pressure valve to fully open.

Measure the liquid subcooling near the outlet of the condenser and superheat near the thermal expansion valve's sensing bulb. System should be charged to approximately 10-20°F subcooling with a tolerance of $\pm 3^\circ\text{F}$ (systems with receivers will typically be on the low side). System superheat should be approximately 12-15°F and must not exceed 20°F.

Continue to add liquid refrigerant as necessary meet adequate subcooling requirements.

Hot Gas Reheat

If the unit is equipped with hot gas reheat, the unit's charge must be checked with the hot gas reheat valve open. After completing the initial charging procedure and allowing the unit to settle, open the hot gas reheat valve by offsetting set points/sensor readings or manually through the micro-controller. Adjust system charge if necessary.

Heat Pump Operation

If the unit is a heat pump, switch the unit from cooling to heating operation and verify that the system pressures remain in the acceptable ranges.

Start-Up

Pre-Start-Up Checks

- Verify all control wiring is complete and secure.
- Verify all power wiring is complete and secure.
- Verify system phasing / motor run direction.
- Verify all pumps, chillers, and other associated devices are active.
- Inspect blower drive belts for proper tensioning.

Step by Step Start-Up Instructions

Refer to the supplemental controller IOM manual or the pamphlet included with the thermostat in order to complete the following procedures. Complete the Warranty Registration and Start-up Checklist while going through the start up process.

1. Record the Job Number, Serial Number(s), and Model Number(s) on the start-up sheet. Record rated amp draws for all components.
2. After completing the installation procedure and final pre-start-up checks, and recording the system information, ensure that all tools, meters, and other items are cleared from the unit case. Replace all access panels and ceiling tiles. After verifying fan operation, panels and tiles can be removed as necessary to verify component operation.
3. Move the disconnect switch to the ON position and ensure that the system is enabled for operation per the applicable control documentation.
4. Measure and record the main power and control power voltage readings on the start-up sheet. Verify that they match system rating.
5. Verify that the fan is operating. Airflow should be felt at the unit outlet or air device. Use an amp meter to measure the amp draw of the blower motor and record on the start-up sheet.
6. Verify cooling operation. Offset sensor readings or set points as necessary to create a call for cooling. Record the Return, Supply, and Ambient Air temperature on the start-up sheet.

The chilled water valve should be energized and the air discharge from the unit should be cooler than room temperature. Use a volt meter to check the voltage from the chilled water valve actuator and ground to verify the circuit is operational. Verify that the water temperature has increased after passing through the coil.

7. Verify heating operation (if applicable). Offset sensor readings or set points as necessary to create a call for heating.
 - a) Electric Heaters: Apply an amp meter to the electric heater circuit and record the amp draws on the start-up sheet.
 - b) Steam or Heating Water Heaters: Use a volt meter to check the voltage from the valve actuator to ground to verify the valve is operational. Verify water/steam temperature has decrease after passing through the coil.

8. Verify dehumidification operation (if applicable). Offset sensor readings or set points as necessary to create a call for dehumidification.

9. Verify humidifier operation (if applicable). Offset sensor readings or set points as necessary to create a call for humidification. Verify that the humidifier is activate (cylinder should be warm). Apply an amp meter to the humidifier circuit and record the amp draws on the start-up sheet.

10. Verify the operation of all alarm devices and record as applicable on the start-up sheet.

Final Programming

Refer to the thermostat or microcontroller manual to return any offsets to their normal values and to set all applicable set points to match their specified values.

Maintenance

Performing routine maintenance and inspection of your AboveAir Technologies unit is imperative for maintaining peak operation condition.

Filters

A dirty filter results in increased static pressure and leads to less efficient operation. Do not wait for the dirty filter switch alarm for filter maintenance. Examine the filter monthly, as a minimum, and replace when necessary. Frequency of filter replacement will vary based on specific local conditions and outside air percentage. High outside air units will typically require filter replacement monthly.

Electrical Panels

Biannually, inspect the components in the electrical panel. Confirm that all electrical connections are tight. Check all contacts for pitting.

Blowers

Checks of the blower system should be performed biannually at minimum. Check the blower wheel for any signs of damage. Verify that the blower wheel is mounted tightly on the shaft and does not make contact with the unit housing. The squirrel cage should rotate freely. Check that the blower motor mounts, all housing bolts, and all electrical connections are secure.

The blower motor features permanently lubricated bearings and should not require lubrication during the useful life of the equipment.

Belts

Drive belts should be examined prior to start-up and

then checked monthly for wear and correct tension. An over tensioned belt can cause wear; an under tensioned belt can cause slippage and excessive noise. If the two legs of the belt are pressed in midway between the pulley and the sheave, a properly tensioned belt will result in 1 to 1-1/2 inches of movement. Belt tension can be adjusted by means of the adjusting bolt attached to the motor bracket. Larger units may have motors mounted to a support on the bottom pan, which requires loosening of four nuts to adjust the motor location and change belt position.

Coils

All cooling and heating coils should be maintained biannually. Inspect the coil for bent or damaged fins and repair if necessary. Clear all debris from the coil(s) using industry standard coil cleaning techniques. Check all coil connections for signs of damage or leakage and repair as necessary.

Drain Pan

Prior to start-up, pour a small amount of water into the drain to fill the p-trap to ensure proper drainage and trap seal. Inspect the drain pan monthly to verify it is free from debris and leaks. Verify that the drain is clear and that the drain pan is draining properly.

Refrigerant System

Biannually, inspect the refrigerant system. Check the sight glass to verify adequate charge and to verify that the system is moisture free. Check the suction and discharge pressures to verify proper system operation. Inspect refrigerant piping for signs of damage or leaking.

Air Cooled System

Follow the maintenance recommendations for blowers, belts, and coils. During winter operation with a remote outdoor condenser/condensing unit, do not allow snow to build up on or around the unit.

Water/Glycol System

Biannually, inspect the water or glycol piping and any valves for signs of leakage or corrosion. Check the glycol solution concentration to ensure it meets the system requirements.

Steam/Water System

Biannually, inspect the piping and control valves for any signs of leakage or corrosion.

Condensate Pump

Verify that the float operates freely on a monthly basis. Biannually, clean the condensate pump.

Humidifier

Examine the humidifier cylinder on a monthly basis for build-up. Refer to the supplemental humidifier IOM manual for further information.

Compressor Failure

In DX units, the compressor is the centerpiece of the system; all other refrigerant components are selected and designed to maximize compressor life. AboveAir units contain a number of features to protect the compressor, including filter-driers, high and low pressure switches, and minimum run times. In spite of these protective measures, compressors are still susceptible to failure through a variety of mechanisms.

Compressors may fail by either mechanical or electrical means. The mode of failure will determine the steps necessary to return your AboveAir unit to working order. Electrical failures will be accompanied by a pungent odor at the compressor and the motor will not run. A mechanical failure will not be accompanied by an odor. The motor may run, but operation may be accompanied by abnormal and/or excessive noise. In either case, a new compressor will be required.

In order to determine the proper method of cleaning prior to installing the new compressor, an analysis of the oil in the failed system is recommended. Procure a commercially available acid test kit and follow the instructions to determine if there is acid in the system. In lieu of performing an acid test, a visual comparison of a pristine sample of oil to the oil in the failed compressor may be made. If no acid is detected in the system, perform the following Standard Cleanout Procedure. If the system tests positive for acid contamination, perform the following Acidic Cleanout Procedure.

Note: Improper refrigeration system cleaning following a failure will void the warranty on the replacement compressor. Always consult the factory prior to replacing the compressor.

Standard Cleanout Procedure

Parts required: new compressor, new liquid line filter-drier one size larger than the original.

1. Reclaim the refrigerant from the system.
2. Remove the old compressor and filter-drier.
3. Verify that the replacement compressor is filled with POE oil. Install the new compressor.
4. Install a new filter-drier.
5. Recharge the unit - refer to the System Charging instructions under the Installation section of this IOM manual.
6. Follow the standard Start-Up procedures to restart the unit.

Acidic Cleanout Procedure

Parts required: new compressor, new liquid line filter-drier one size larger than the original, new suction line filter-drier (acid removal model).

1. Reclaim the refrigerant from the system.
2. Remove the old compressor and filter-drier.
3. Examine the sight glass, thermal expansion valve, and all other valves for proper operation. Clean if necessary.
4. Verify that the replacement compressor is filled with POE oil. Install the new compressor.
5. Install the new liquid line filter-drier.
6. Install the new suction line filter-drier designed for acid cleanup duty in the suction line near the inlet of the compressor.
7. Recharge the unit - refer to the System Charging instructions under the Installation section of this IOM manual.
8. Follow the standard Start-Up procedures to restart the unit.
9. Check the pressure drop across the suction line filter-drier at the end of the first hour of operation. If the pressure drop is excessive (refer to documentation included with the suction line filter-drier for guidelines), replace filter-drier.
10. After 24 hours of operation, take an oil sample. Test oil for acidity. If the sample is acidic, replace the suction line filter-drier.
11. After 2 weeks of operation, take an oil sample. Test oil for acidity. If the sample is acidic, replace the filter-drier. Repeat test as necessary in two week increments until the sample is no longer acidic.

Technical Support

AboveAir Technologies is dedicated to supporting its product installations. If a problem arises that cannot be handled through following the directions in this manual or one of the supplemental manuals included with your unit, contact AboveAir at (301) 874-1130 Monday through Friday from 7:00 AM to 4:00 PM Eastern Standard Time.

So that we can provide prompt and accurate support, please have the following information available when you call:

- Your Name/Company/Phone Number
- Job Number (5 digits on the unit nameplate)
- Serial Number (8 digits on the unit nameplate)
- Model Number (printed on the unit nameplate)
- Date of Manufacture (printed on the unit nameplate)
- A brief description of the problem

If a problem occurs outside of the business hours, leave

a message with the aforementioned information and one of our support staff will return your call as soon as possible.

Warranty Parts

All warranty inquiries are handled through technical support. After troubleshooting the unit with a qualified field service technician, a determination will be made on whether a part(s) may be defective. If a part is determined to possibly be defective through the troubleshooting process, a replacement part will be shipped to the address provided by the customer.

A purchase order is required for all warranty parts. The following information is required:

- Customer Contact Name
- Customer Billing Address
- Credit Card Authorization or Approved Credit
- Customer Shipping Address
- Customer Telephone Number
- Date of Order
- Unit Serial Number

A Return Material Authorization (RMA) number will be provided for the defective part(s). Clearly note the RMA number on the address label. The customer is responsible for the shipping cost to return the defective part(s) to the AboveAir Technologies factory. The defective part(s) must be returned within 30 days for evaluation by the service department. If the part is found to be defective after examination by the technical support team, a credit will be issued. Refer to the warranty certificate included in the Introduction section of this IOM manual for further details.

Spare and Replacement Parts

Requests for spare and replacement parts are made through the service department at AboveAir Technologies at (301) 874-1130. Quotes will be provided for the specified parts for a specific unit. Visa and Mastercard or approved credit with AboveAir Technologies are acceptable forms of payment.

Any returned parts sold as spare/replacement items will be subject to a 25% restocking charge. If the part is not a stocked item, a 50% restocking charge will be applied. In order to return a part, contact AboveAir Technologies at (301) 874-1130 for a Return Material Authorization (RMA) number. Parts are eligible for return for 30 days after the original purchase date and must be returned in their original packaging with all associated materials. Spare or replacement parts sales over 30 days are not eligible for return.

TROUBLESHOOTING

Problem	Possible Cause	Checks & Solutions
Unit will not start	System not enabled (MC Controller Only)	Refer to controller operations manual
	System locked out	Verify Remote Stop/Start connection.
		Check alarms and resolve any alarm conditions.
	No power to the unit	Verify disconnect is on.
		Check all fuses and breakers.
Check distribution wiring.		
Unit wiring issue	Verify all field wiring. Verify unused jumpers are still in place.	
Blower does not start	System locked out on alarm	Check alarms and resolve any alarm conditions.
	Fan set in demand mode (MC Controller Only)	Refer to controller operations manual.
	No power to the fan	Verify that the fan holding coil is receiving 24 VAC control power and the relay is pulling in.
Verify power wiring connections to the blower motor.		
No cooling	No cooling call	Check system set points and sequence of operations to verify cooling call.
	Compressor Alarm	Verify compressor is not out on high or low pressure alarm.
	Compressor short cycle prevention	Wait for three minute delay for compressor to reset.
	Low Refrigerant Charge	Verify system operating pressure and temperatures are within standard operating range and add charge as necessary.
	Obstruction in filter-drier	Check filter-drier; if temperature drop across filter-drier is detector, replace filter-drier.
	Faulty TXV	Place TXV bulb in water and verify TXV operation.
No heat/reheat	No heat/reheat call	Check system set points and sequence of operations to verify heat/reheat call.
	No power to heater (electric heater)	Verify that the heater holding coil is receiving 24 VAC control power and the relay is pulling in.
		Verify fuses and power wiring connections to the electric heater.
	No power to heater (SCR electric heater)	Verify that the heater is receiving a 0-10 VDC control signal.
	No/inadequate water or steam flow (HW or steam heat)	Verify flow to valve.
		Verify valve operation (direct, reverse) matches system documentation.
	Entering temperature is too low (HW or steam heat)	Verify heating water/steam system operation.
	No control power to actuator (HW or steam heat)	Verify 0-10 VDC (modulating) or 24 VAC (on/off) signal to the valve.
Faulty actuator (HW or steam heat)	Replace actuator.	

Start-Up Checklist

Warranty Registration & Start-Up Checklist

Fill in the following information for your AboveAir Technologies Chilled Water Equipment. Forward a copy of this registration sheet to productsupport@aboveair.com to register your warranty.

General Information

Job Number: _____	Contractor Name: _____
Unit Serial Number: _____	Project Name: _____
Unit Model Number: _____	AboveAir Rep: _____
Test Technician's Initials: _____	
Date: _____/_____/_____	

Operating Information

Return Air Temp: _____ °F DB
 Supply Air Temp: _____ °F DB
 Ambient Air Temp: _____ °F DB

Refrigerant	Circuit 1	Circuit 2
Suction Pressure:	_____ psi	_____ psi
Suction Temperature:	_____ °F	_____ °F
Superheat:	_____ °F	_____ °F
Discharge Pressure:	_____ psi	_____ psi
Discharge Temperature:	_____ °F	_____ °F
Subcooling:	_____ °F	_____ °F
Charge:	_____ lb	_____ lb

EWT/EGT (Condenser): _____ °F
 LWT/LGT (Condenser): _____ °F

Electrical Components

Cond Pan Switch:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
C1 High Pressure:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
C1 Low Pressure:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
C2 High Pressure:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
C2 Low Pressure:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
Overheat Cutout:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
Program Enable:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
Alarm Contacts:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
Smoke Detector:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
_____:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
_____:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A
_____:	<input type="checkbox"/> Pass	<input type="checkbox"/> N/A

Electrical Measurements

Main Power (Design): _____ / _____ / _____
 Main Power (Measured): _____ V
 Control Voltage (Measured): _____ V

	Line #1 (Amps)	Line #2 (Amps)	Line#3 (Amps)	Rated (Amps)
Blower Motor:	_____	_____	_____	_____
Condenser Motor:	_____	_____	_____	_____
Compressor 1:	_____	_____	_____	_____
Compressor 2:	_____	_____	_____	_____
Humidifier:	_____	_____	_____	_____
Electric Heater 1:	_____	_____	_____	_____
Electric Heater 2:	_____	_____	_____	_____

Notes: _____



Ceiling Air Conditioners

SpotCool™ - 2x4 T-Bar "Spot-Cooler" Comfort & Precision Ceiling Mounted A/C's

HK™ Horizontal - Hi-Static Ducted "Same-Face" Comfort & Precision Ceiling Mounted A/C's

HK-OA™ - Horizontal Up to 100% DOAS High-Percentage Outside Air Ceiling Mounted A/C's

Floor Air Conditioners

VK™ Vertical - SCAV, Vertical Floor Mounted Self-Contained & Split Comfort Constant Air Volume and Variable Air Volume (VAV) A/C's & Heat Pumps

VK-OA™ - Vertical Up to 100% DOAS High-Percentage Outside Air Vertical Floor Mounted A/C's

MissionCritical™ - Precision Vertical Floor Mounted Computer Room A/C's

VK™ Console - Vertical Floor Console Mounted Self-Contained & Split A/C's & Heat Pumps

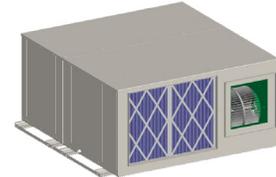
Remote Heat Rejection

FluidCool™ - Indoor & Outdoor Remote Glycol Drycoolers

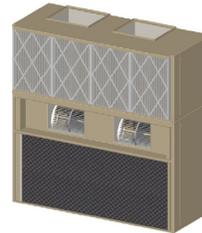
PumpAll™ - Single, Dual & Triplex Standard & Variable (VFD) Speed Glycol Pump Packages



2x4 "Spot-Cooler" Ceiling Mounted A/C's
(1 to 3 Tons)



Ducted "Same-Face" Ceiling Mounted A/C's
(1 to 30 Tons)



Comfort - Packaged & Split Vertical Floor Mounted Air Conditioners
(1 to 30 Tons)



Precision - Vertical Floor Mounted Computer Room Air Conditioners
(1 to 30 Tons)

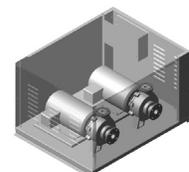


VK-Console™ - Up-Flow & Down-Flow Floor Console Mounted Air Conditioners
(1 to 5 Tons)



Remote Air Cooled Condensers, Condensing Units & Glycol Drycoolers
(1 to 180 Tons of THR)

Single & Dual Glycol Pump Packages
(1/2 to 50 HP)



www.aboveair.com