MOJAVE

ArctiDry

Installation and Operation Manual

Intertek

Rev 1.006

Manual Contents

MOJAVE

Brief Introduction

This manual contains the installation and operating instructions for packaged ArctiDry liquid desiccant HVAC systems. Please make sure to read the manual carefully. Improper installation and/or operation can result in unsatisfactory operation or dangerous conditions.

Technical Specifications		
	Cabinet A	**Cabinet B**
Air flow	1,000 – 4,000 CFM	3,000 – 8,000 CFM
Cooling Capacity	Up to 26 tons	25-60 tons
Moisture Removal Rate	Up to 130 lb/hr	Up to 380 lb/hr
Supply Air Conditions	55-75°F DB 35-55°F DP (30-64 gr/lb)	
ISMRE	Up to 12 lb/kWh	
	14 lb/kWh with ERV	
Indirect Gas Heater Options	• 100 MBH • 200 MBH	• 300 MBH • 400 MBH • 600 MBH
Electric Heater Options	20-50kW	40-90kW
Refrigerant	R-454B	
External Static Pressure	3.0 in H2O maximum	
Filtration	Up to 6” Filter Rack	
Electrical	208V / 230V / 460V, 3ph	
Controls	Factory Packaged Controls w/ HMI Modbus, BACnet MS/TP or IP, or LonWorks available	

If you have any questions about the unit or its installation, operation or maintenance don’t hesitate to contact us at:

techsupport@mojavehvac.com

Unit Safety

Dangers, Warnings, and Cautions

Safety is very important to us. Please read carefully and follow all further instructions before installing or servicing this equipment. Failure to do so could result in equipment malfunction, property damage, injury, or death. The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all local and federal applicable codes. It is the responsibility of the installer to determine and follow the applicable regulations and codes.

Hazard Alerting Signs. These signs are classified according to the relative seriousness of the hazardous situation. The classification is based on the probability of being injured if the hazard is not avoided and on the severity of the resulting injury. There are three hazard classifications that are denoted by the signal words “DANGER,” “WARNING,” and “CAUTION.”

- **DANGER**: Indicates a hazardous situation that, if not avoided, will result in serious injury or death.
- **WARNING**: Indicates a hazardous situation that, if not avoided, could result in serious injury or death.
- **CAUTION**: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

DANGER

The manufacturer’s warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories, or devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the HVAC unit.

You should be aware that the use of unauthorized components, accessories, or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories, or devices.

DANGER

Install this unit only in a location and position as specified in the Unit Installation section of these instructions. Provide adequate combustion and ventilation air to the unit space as specified in the Ventilation section of these instructions

DANGER

Never test for gas leaks with an open flame. It can cause an explosion or fire resulting in property damage, personal injury, or death. Use a commercially available soap solution made specifically for the detection of leaks to check all connections, as specified in the Unit Installation section of these instructions

WARNING

Do not use oxygen, acetylene, or air in place of refrigerant and dry nitrogen for leak testing. An explosion may result causing injury or death.

WARNING

Unit contains fans with moving parts that can cause serious injury. Do not open doors until the power to the unit has been disconnected and the fan wheel has stopped rotating.

WARNING

Always use a pressure regulator, valves, and gauges to control incoming pressures when pressure testing a system. Excessive pressure may cause line ruptures, equipment damage or an explosion which may result in injury or death.

WARNING

Lifting equipment capacity shall exceed unit weight by an adequate safety factor. Always test-lift unit not more than 24 inches high to verify proper center of gravity lift point to avoid unit damage, injury, or death.

WARNING

For outdoor use only.

WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

WARNING

The unit should not be fixed to its support using adhesives. Adhesives are not a reliable fixing means.

CAUTION

Sharp edges on sheet metal and fasteners can cause personal injury. This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel. Protective gear is to be worn during installation, operation, and service.

Furthermore, pay special attention to the following statements:

- Installation must be done by a registered installer/contractor qualified in the installation and service of HVAC equipment.
- Protective gear is to be worn during installation, operation, and service in accordance with the Occupational Safety and Hazard Administration guidelines.
- Protective gear used must be in accordance with the latest National Fire Protection Association (NFPA) standards for electrical safety in the workplace (70E).
- This equipment is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the equipment by a person responsible for their safety.
- During installation, testing, servicing, and/or troubleshooting of the equipment it may be necessary to work with live electrical components. Only a qualified licensed electrician or individual properly trained in handling live electrical components shall perform these tasks.
- All field installed wiring must be completed by qualified personnel. Field installed wiring must comply with the National Electric Code (NEC), as well as local and state electrical code requirements.
- Do not bypass the controllers of the variable frequency drives (VFDs) to use in manual mode. Damage to equipment can occur if the unit's VFDs are operated in a way that differs from designed operation.
- Use only the type of gas approved for the heater. Refer to the heater rating plate.
- Provide adequate combustion ventilation air to the heater. If a vent duct extension is used, a class III approved vent is required.
- Always install and operate heater within the intended temperature rise range and duct system external static pressure (ESP) as specified on the unit nameplate.

The installation and operation of this equipment shall follow general concepts of reasonable use and the best building practices. Keep this manual and all literature safeguarded near or on the unit.

Standards and Codes

Refrigerant Handling Practices

The handling, reclaiming, recovering, and recycling of refrigerants, as well as the equipment to be used and the procedures to be followed, must comply with all relevant and applicable international, national and local requirements.

Gas/Fuel

Installation must comply with national and local codes and requirements of the local gas company. Refer to the latest revision of the National Fuel Gas Code (NFPA 54/ANSI Z223.1). Canadian installers, please refer to latest revision of the Canadian Natural Gas and Propane Installation Code (CSA B149.1).

Installation

Installations must be made in accordance with the latest revision of the Standard for the Installation of Air-Conditioning and Ventilating Systems (NFPA 90A). Canadian installers, please refer to latest revision of the Canadian National Fire Codes and the Canadian Heating, Ventilating and Air-Conditioning Codes.

Parking Structures and Repair Garages

Installation in garages must be in accordance with the latest revision of the Standard for Parking Structures (NFPA 88A) and the latest revision of the Code for Motor Fuel Dispensing Facilities and Repair Garages (NFPA 30A). Canadian installers, please refer to latest revision of the Canadian Natural Gas and Propane Installation Code Standard CSA B149.1.

Electrical

Electrical connections must be in accordance with the latest revision of the National Electrical Code (NFPA 70) and local ordinances. Canadian installers, please refer to latest revision of the Canadian Electrical Code CSA C22.1 Part 1.

High Altitude

Please contact us if installation is above 600m (2000 feet).

Installer Responsibilities

The certified contractor(s) hired to install this unit are responsible for:

- Inspecting the unit upon arrival.
- Installing and commissioning the unit, as well as the fuel and electrical supplies, in accordance with applicable specifications and codes. (We recommend the installer contact a local building inspector for guidance.)
- Using the information given in the manual to perform the installation to the best of their abilities.
- Following local installation codes and regulations along with the ones cited in this manual.
- Installing this system in accordance with clearances to combustibles.
- Furnishing all needed materials not furnished as standard equipment.
- Planning the locations for the supports.
- Providing access to the unit(s) for servicing.
- Return this manual to the documentation holder in the unit.
- Ensuring there is adequate air circulation around the unit and to supply air for combustion, ventilation, and distribution in accordance with local codes.
- Assembling or installing any accessories or associated duct work using best building practices.
- Properly installing supports and hanging materials.
- Verifying that the unit is delivering designed airflow by performing an air balancing test.
- Ensuring the system is placed in an approved application.
- Providing building pressure relief fans/dampers to prevent over pressurization of a building, if needed.

Furthermore, the installer is responsible to have:

- A refrigerant technician certification per Section 608 of the US Environmental Protection Agency (EPA) Clean Air Act of 1990 or equivalent certification program.
- All the required equipment to work on direct expansion and/or chilled water air conditioning systems.

Finally, the installer is responsible for installing this system and any accessories or associated duct work using the best building and safety practices.

Product Inspection

All units are inspected prior to shipment. It is best to conduct an additional inspection to rule out any damage during transit and to ensure compatibility with the electrical and fuel supply available. If any damage is found, **do not refuse shipment.** Note it on the carrier's freight bill and file a claim with the transport agency.

Inspection checklist to be done before unloading the unit:

- Look for damage around the crate edges.
- Carefully check all items against bill of lading to make sure all cartons have been received.
- Verify that the specifications on the unit rating plate match the order.
- Verify that the fuel and electrical requirements match the supply available.

Installation Requirements

Required Equipment

The installation technician is responsible for having the appropriate equipment and materials for the safe installation and start-up of a unit. Tools and materials required to commission the unit include, but are not limited to, the following:

- Various screwdriver types and sizes
- Adjustable wrenches
- Torque wrenches
- Gas pipe wrenches
- Drill motor and various drill bits
- U-tube manometer or gas pressure gauge
- Voltmeter
- Clamp style ammeter
- Direct expansion and/or chilled water gauges and accessories.
- Butyl caulk

Clearances

Several clearances need to be taken into consideration prior to installing the unit. Find below a comprehensive list of all the different types of clearances to be followed.

Combustibles

The unit installation should follow NFPA and all applicable local regulations regarding combustible clearances.

Ventilation

To help ensure proper operation, always maintain a **24-inch clearance** minimum from all sides of the unit.

In addition, follow the guidelines below:

- Do not locate the unit under an overhang or near a wall/other equipment that will short circuit hot air to the coil intakes.
- Do not locate the unit within **10 feet** of any exhaust fans or flues.
- Do not locate the unit close to another unit to allow air recirculation.

If the unit is surrounded by a screen, fence and/or walls follow the additional clearances below:

Screen or a Fence

- The bottom of the screen or fence should be at least one foot above the roof surface.
- The distance between the unit and a screen or fence should be at least **6 feet**.
- The distance between any two units within a screen or fence should be at least **10 feet.**

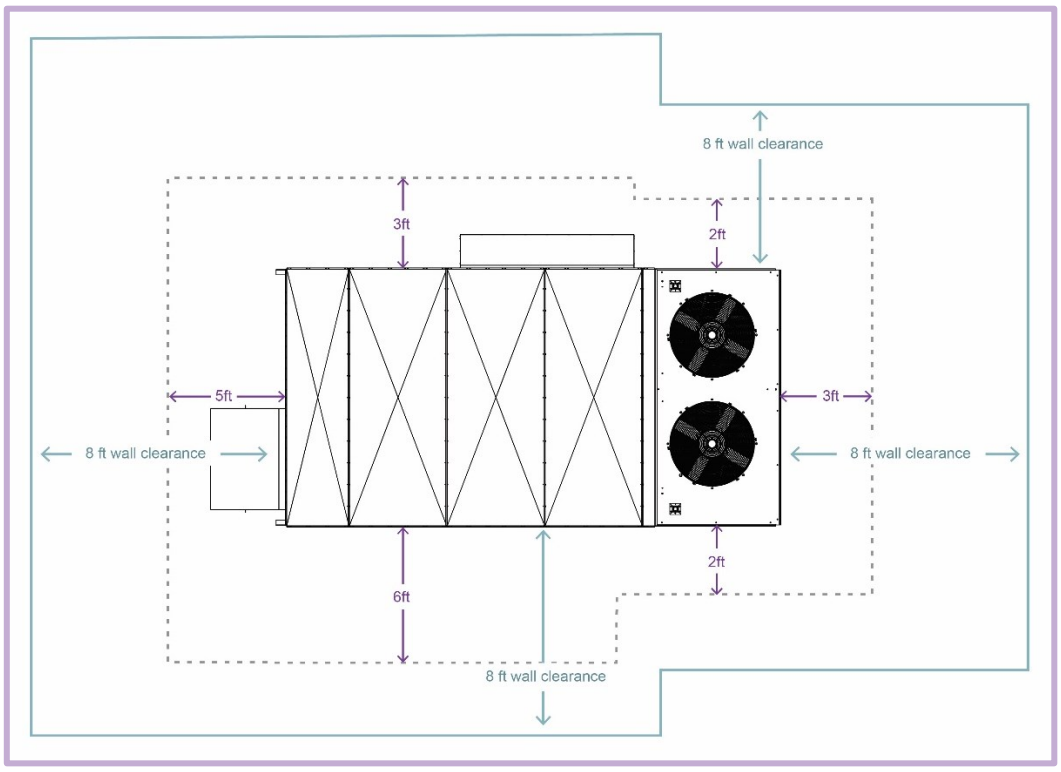
Solid Walls

- If there are walls on one or two adjacent sides of the unit, the walls may be of any height. If there are walls on more than two adjacent sides of the unit, the walls should not be higher than the unit.
- The distance between the unit and the wall should be at least **8 feet** on all sides of the unit.
- The distance between any two units within the walls should be at least **10 feet**.

If the unit is surrounded fully or partially by either screens or solid walls, no overhead obstructions shall be over any part of the unit.

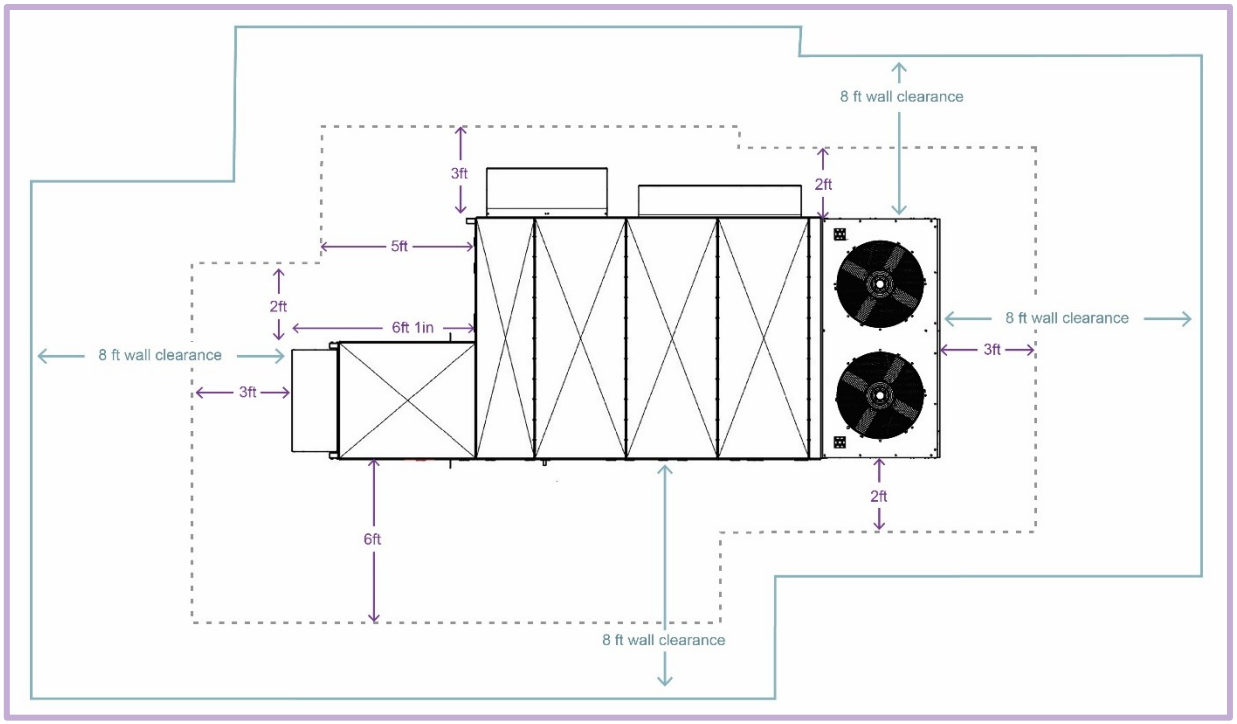
Cabinet A Service Clearances

Please follow the clearances shown in the image below to ensure proper installation.



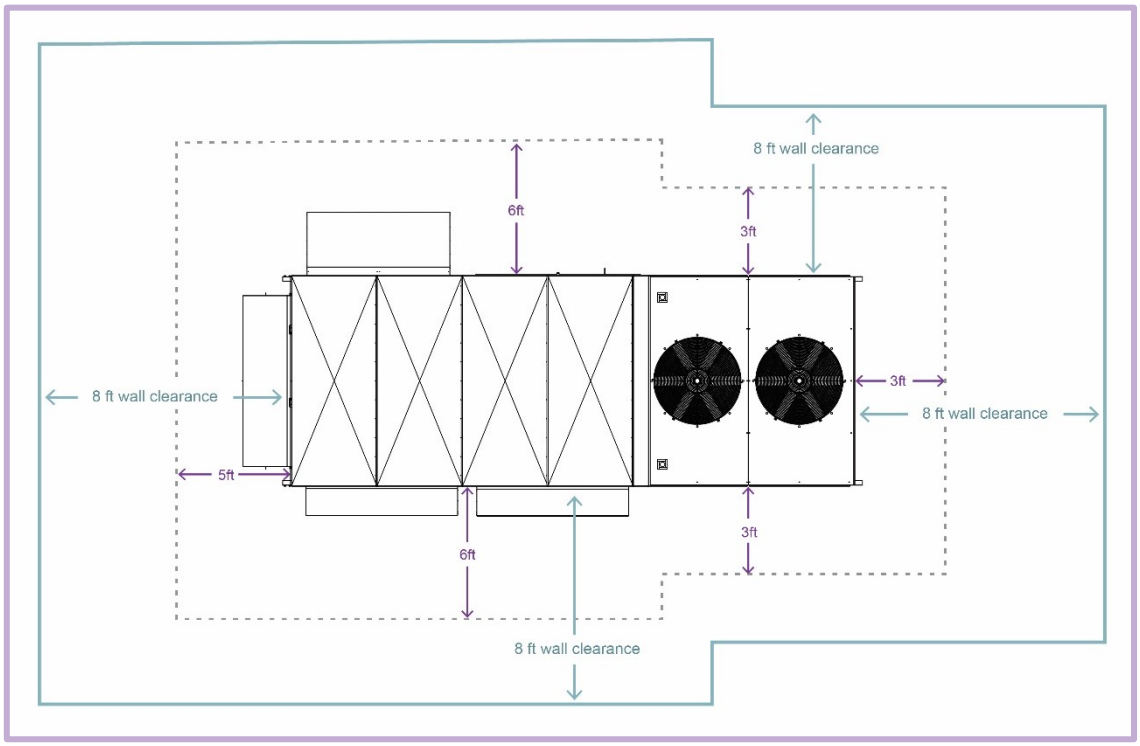
Cabinet A With ERV Service Clearances

Please follow the clearances shown in the image below to ensure proper installation.



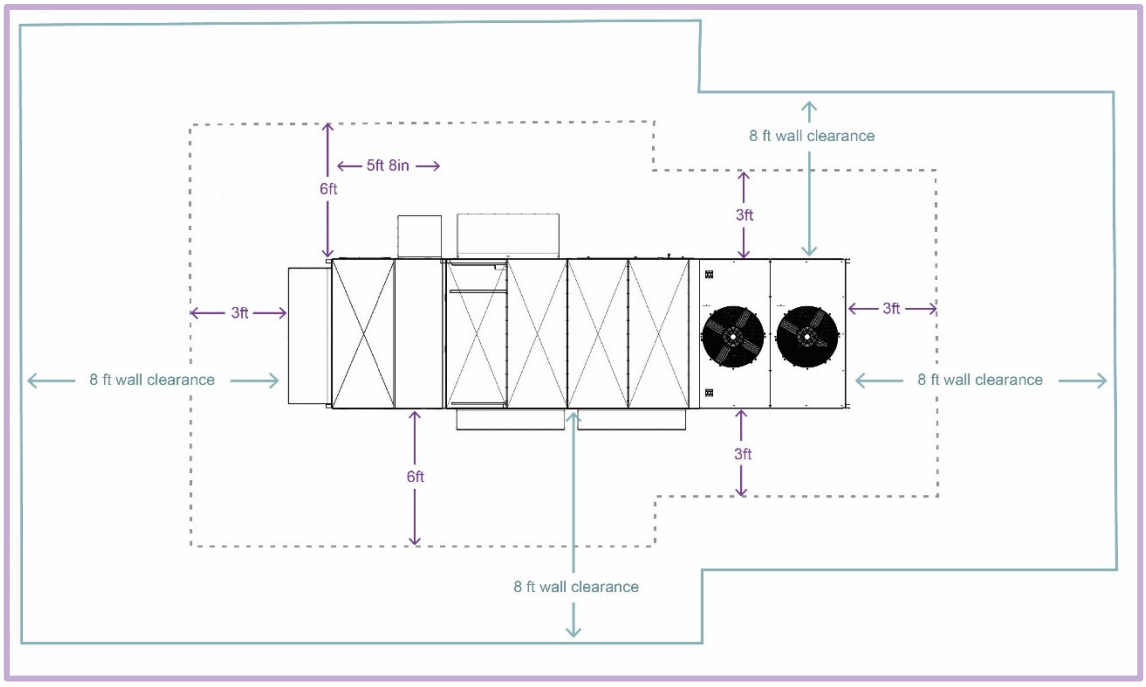
Cabinet B Service Clearances

Please follow the clearances shown in the image below to ensure proper installation.



Cabinet B With ERV Service Clearances

Please follow the clearances shown in the image below to ensure proper installation.



Miscellaneous Requirements

Lastly, keep in mind these additional guidelines:

- Make sure no roof run-off water will pour directly onto the unit, nor excessive snow drifting.
- When installed at ground level, the unit should be mounted on a level concrete slab which should extend at least 2 inches beyond the unit on all sides. The top of the slab should be 2 inches above the ground level.
- Check the snowfall records in the area. Mount unit high enough to be above the maximum snowfall possible for the area.
- Keep areas around the vent, air intake, and A/C condenser fins free and clear of foliage.
- When installing a unit on the roof of a building, the structural members supporting the unit must be sufficiently strong for the weight of the unit and mounting rails.
- For rooftop units, installing a roof walkway that provides access to all serviceable components of the unit is recommended.
- Select a location where external water drainage cannot collect around the unit.

Unit Handling

Forklifting

Mojave ADA units have built-in pockets to aid in forklifting. A minimum fork length of 96" is required. Do not attempt to use forks less than 96” in length. When inserting the forks, use a spotter to ensure the forks have passed completely under the unit, and are firmly in place in the fork pockets on the opposite side of the fork entry point. Refer to the additional instructions below for *Preparing the Unit to be Lifted* and *Lifting the Unit*.

The following units **cannot be forklifted** and must be lifted using a crane:

- ADA units with ERV
- ADA units with powered exhaust
- All ADB units

Lifting the Unit

Please read and follow all instructions before lifting the unit. The unit must be lifted in compliance with all applicable codes. The qualified installer technician must use the best building practices when lifting the unit. Safety is the most important thing to us.

DANGER

Do not attempt to lift the unit from any other point than the lifting points in the base rail. Check stability of rigging before completing the lift. Lifting points may not be symmetrical to the center of gravity of the unit. Ballast or unequal cable lengths may be required. The unit must be kept level during the lift to prevent tipping, twisting, or falling. If lifted improperly, product damage may occur.

DANGER

CRUSH HAZARD. Use proper lifting equipment and practices. Failure to follow these instructions can result in death, injury or property damage.

DANGER

Only trained and qualified personnel should be allowed to rig loads, operate load rated cranes or hoist assembly to lift or maneuver the unit.

Preparing the Unit to Be Lifted

Follow the instructions below prior to lifting the unit.

1. Remove all packaging material.
2. Remove all content shipped inside the unit.
3. Perform a unit inspection. Confirm that:
    a. The unit is not damaged.
    b. The unit is appropriately rated for the utilities available at the installation site.
    c. The lifting points are intact, undamaged, and firmly secured to the unit.

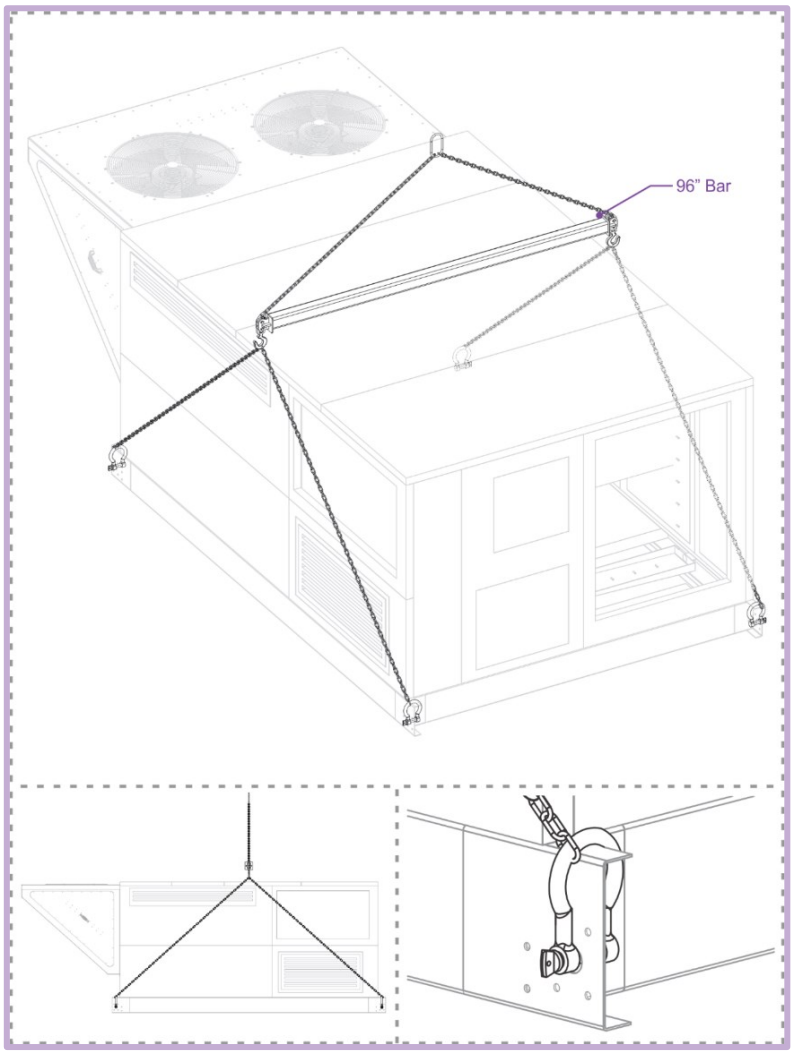
During the Lift the unit must be kept level to prevent tipping, twisting, or falling. The uttermost care must be taken to prevent damage to the cabinet, coils, and condenser fans. Hoist the unit to a point directly above the curb and duct openings. Be sure that the gasket material has been applied to the curb. Carefully lower and align the unit with the utility and duct openings. Lower the unit until the unit skirt fits around the curb. Make sure that the unit is properly seated on the curb and is level.

The outside air hoods may be installed after the unit has been set.

Cabinet A Procedure

1. Use a spreader bar that is a minimum of 96 inches in length.
2. Attach two 5000lbs rated long slings (approximately 8 feet long) to each end of the spreader bar.
3. Connect long slings to all lift points of the unit making use of shackles, as shown below.
4. Double check shackles and slings at all lifting points.
5. Initially, lift the unit only 4 inches to check the stability of the rigging and ensure that the load is balanced.

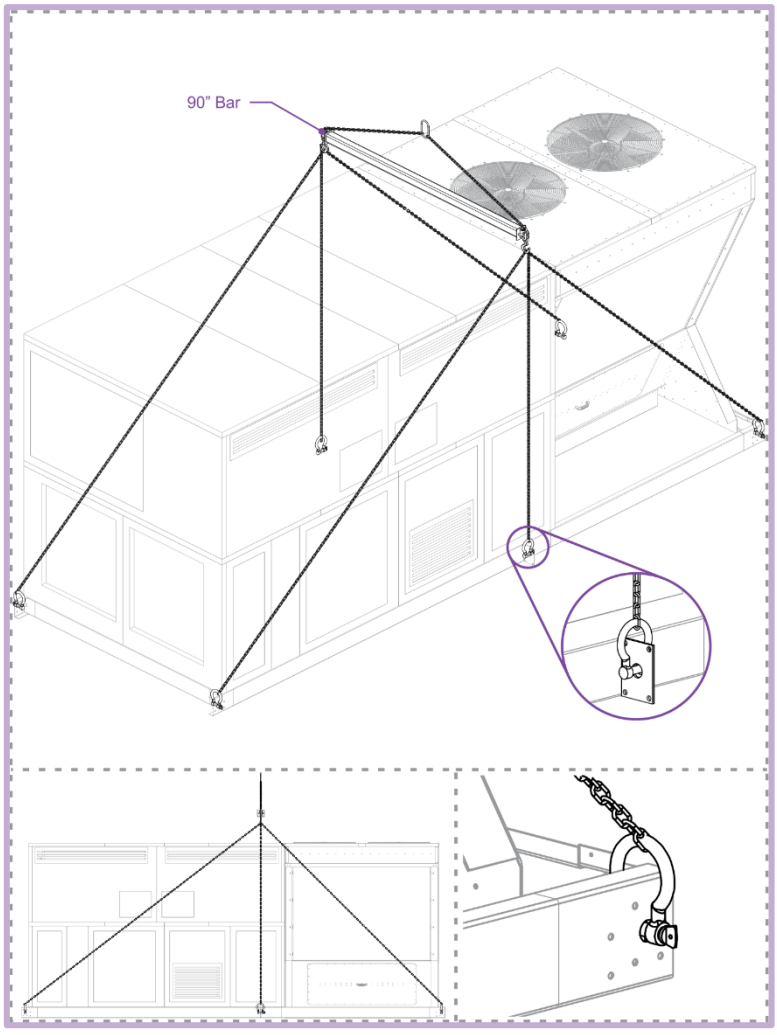
Cabinet A Lift Setup



Cabinet B Procedure

1. Use a spreader bar that is a minimum of 90 inches in length.
2. Attach two 5000lbs rated long slings (approximately 15 feet long) to each end of the spreader bar.
3. Attach a third 5000lbs rated short sling (approximately 10 feet long) to each end of the spreader bar.
4. Connect long slings to the outside lift points of the unit making use of shackles, as shown in the diagram below.
5. Raise the crane slowly until the recently attached slings are tightened and no slack is visible.
6. Connect short slings to the mid lift points of the unit making use of shackles, as shown in the diagram below.
7. Double check shackles and slings at all lifting points.
8. Initially, lift the unit only 4 inches to check the stability of the rigging and ensure that the load is balanced. If the load is unbalanced, extend the higher side with an additional shackle, and re-adjust the center sling.

Cabinet B Lift Setup



Curb

Roof Curb Mounting

After the curb has been installed, the unit may be placed on the curb. Before installation verify that you have the correct roof curb and that all required components are present. It is recommended that a closed cell neoprene insulation is applied to the top of the curb before placing the unit on the curb. The installer is responsible for attaching the unit on the curb per all applicable codes.

Ground Pad Mounting

The unit must be installed on a level concrete slab which should extend at least 2 inches beyond the unit on all sides. The top of the slab should be at least 2 inches above ground level. The depth of the slab below the ground level and its structural design is governed by the type of soil and climatic conditions. The slab must not be in contact with any part of the building wall or foundation. The space between the slab and the building wall prevents the possibility of transmitting vibration to the building.

Best Practices

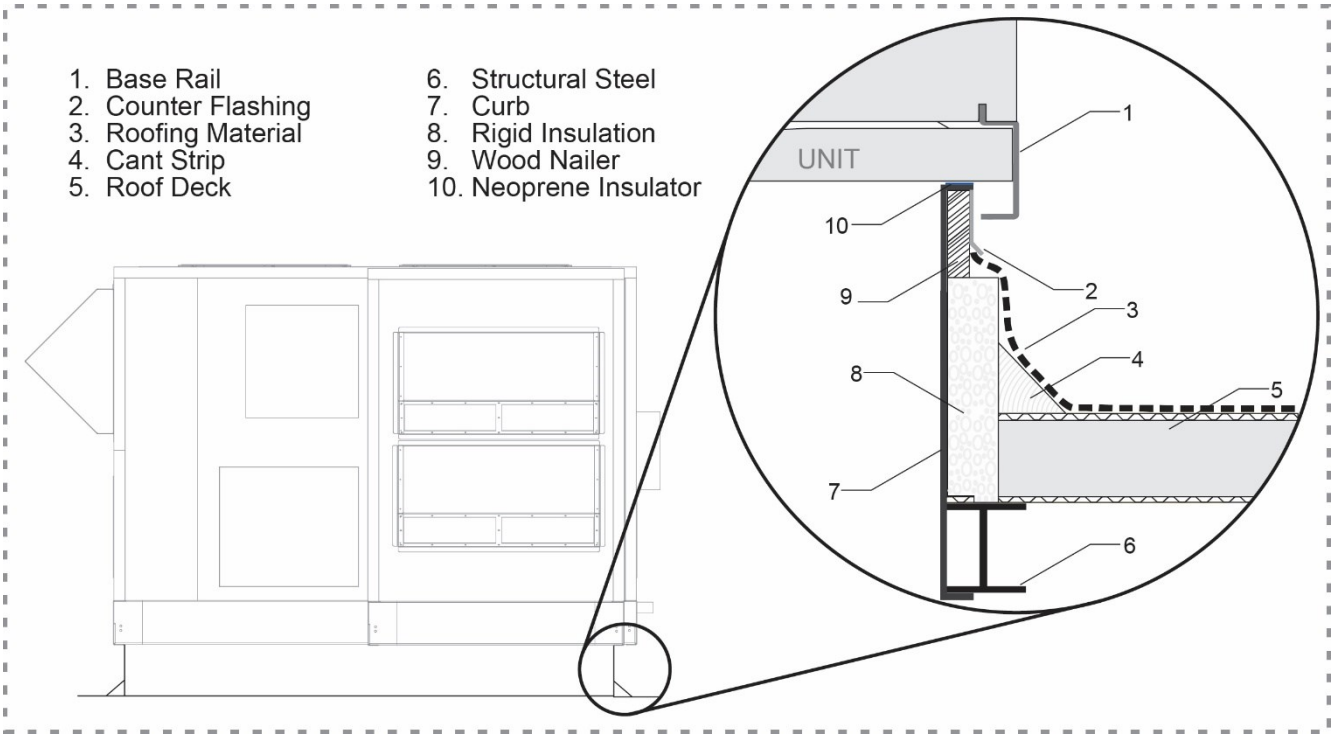
- Hoist the unit to a point directly above the curb and duct openings.
- Carefully lower and align the unit with the utility and duct openings.
- Make sure the unit is properly seated on the curb and is level.

Curb Installation

Follow the guidelines below to ensure proper curb installation. Note that the installer shall provide some installation materials specified below. All applicable installation codes shall be followed.

- Locate the roof curb and unit on a portion of the roof that can support the weight of the unit. The unit must be supported to prevent bending or twisting of the machine.
- Ensure the roof curb is positioned such that the unit is level (plus or minus no more than half an inch) once placed.
- Make sure openings in the roof decking are large enough to allow for duct penetration and workspace, but no larger. It is important to avoid making openings larger than necessary.
- Place the curb on the roof in the position in which it will be installed and that coincides with the openings.
- Check that the diagonal measurements are within 1/16 inch of each other.
- To ensure a weatherproof seal between the unit and the curb, the curb must be level with no twist from end to end.
- The unit must not support the weight of the duct work.
- Inspect the curb to ensure that none of the field piping routed through the curb protrudes above the curb.

Furthermore, it is recommended that a closed cell neoprene insulation is applied to the top surface of the curb to seal against the unit when it is set on the curb. Follow the diagram below for curb installation reference:



All materials shown above are to be field supplied by the installer.

Ductwork

Ductwork should be installed prior to the installation of the ArctiDry HVAC unit. All ductwork should follow SMACNA and ASHRAE recommendations.

In particular, please follow these recommendations:

- It is recommended that flexible duct connections be incorporated into the ductwork design to prevent the transmission of any vibrations, either mechanical or harmonic.
- All ducts should have a straight run of at least 3 hydraulic duct diameters immediately before and after the unit before adding any fittings, elbows, restrictions, etc.
- The unit has been designed to operate at a specific air volume and external static pressure. Static pressure generated by any additional components (i.e. ductwork) beyond the unit's designed operation will affect the performance of the unit and lessen the air volume that can be delivered.
- The unit is not designed to support the weight of ductwork. Ductwork should be attached to the curb prior to setting the unit.
- Use flexible connections between the unit and ductwork to avoid transmission of vibration from the unit to the structure.
- Where return air ducts are not required, connect a sound absorbing T or L section to the unit return to reduce noise transmission to the occupied space.

For ducted applications, supply and return must be ducted directly to the space served by the unit. If a plenum return is to be utilized, the return plenum must be provided with a refrigerant detection system or ventilation in accordance with ASHRAE 15 requirements.

Inlet Ductwork

Inlet ductwork height and width must be no smaller than the unit's inlet height and width, and supply only uncontaminated air to the unit.

Return Air Ductwork

Return air ductwork height and width must be no smaller than the unit's return air opening height and width.

Discharge Ductwork

Discharge air ductwork height and width must be no smaller than the unit discharge air opening height and width.

For units with side discharge, it is recommended that the final 2 feet of duct that is attached to the unit be easily removable for servicing the supply fan.

If building construction allows sound and vibration into the occupied space, locate the unit over a non-critical area. It is the responsibility of the system designer to make adequate provisions for noise and vibration in the occupied space.

Unit Installation

WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater). Do not pierce or burn. Be aware that refrigerants may not contain an odor.

WARNING

Ensure that the area is open or that it is adequately ventilated before breaking into the system and/or conducting hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

WARNING

Ducts connected to the unit shall not contain a potential ignition source.

Note: for appliances using A2L refrigerants, connected via an air duct to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct.

WARNING

This unit uses refrigerant R-454B, an A2L refrigerant. Service shall be performed only by competent personnel qualified to work with A2L refrigerants.

Refrigerant Safety Group A2L

WARNING

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems:

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for use with R-454B. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Follow procedure for refrigerant removal.

NOTICE

Check that cabling will not be subject to wear, corrosion, excessive pressures, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors fans.

Refrigerant Charging

ArctiDry units use **R-454B** refrigerant to operate properly. Make sure that the unit is always provided with the correct refrigerant and that it follows the specifications below:

Refrigerant	
Composition	**R1234yf/R32**
Boiling Point @ 1 ATM	-50.9° C
Critical Temperature	77° C
Ozone Depletion Potential	0
GWP AR5	467
ASHRAE Safety Class	A2L
Temperature Glide	1.5 K
Molecular Weight	62.6 g/Mol
Liquid Density @ 21.1°C	980.5 Kg/M^3

Refrigerant Safety Group A2L

Gas Installation

Gas must be provided to the unit through an outside unit cabinet wall. All piping connections should be made by an experienced technician and must conform to the best building practices, the National Fuel Gas Code (ANSI Z223.1 / NFPA 54) and any applicable local codes.

Piping connections should be made as necessary following the guidelines below:

- A manual shut-off valve must be installed.
- Support piping with hangers and not with the furnace itself.
- Remove all burrs and obstructions from pipe.
- Do not bend pipe; use elbows or other pipe fittings to properly locate.
- Each furnace requires an individual gas connection.
- A high-pressure regulator must be installed.
- Avoid using bushings wherever possible.
- All pipe threads must have a pipe dope which is resistant to the action of LP gas.
- Gas piping must be sized to provide the minimum required pressure at the burner when the burner is operating at maximum input.
- The proper size piping must be run from the meter to the gas burner without reductions.
- **The required gas pressure supplied to units with 100-400 MBH heaters must be 5.0-13.5“ w.c.**
- **The required gas pressure supplied to units with heaters larger than 400 MBH must be 6.0-13.5“ w.c.**

For any questions about gas pressure available, piping pressure drops, and local piping requirements, consult with the local utility provider.

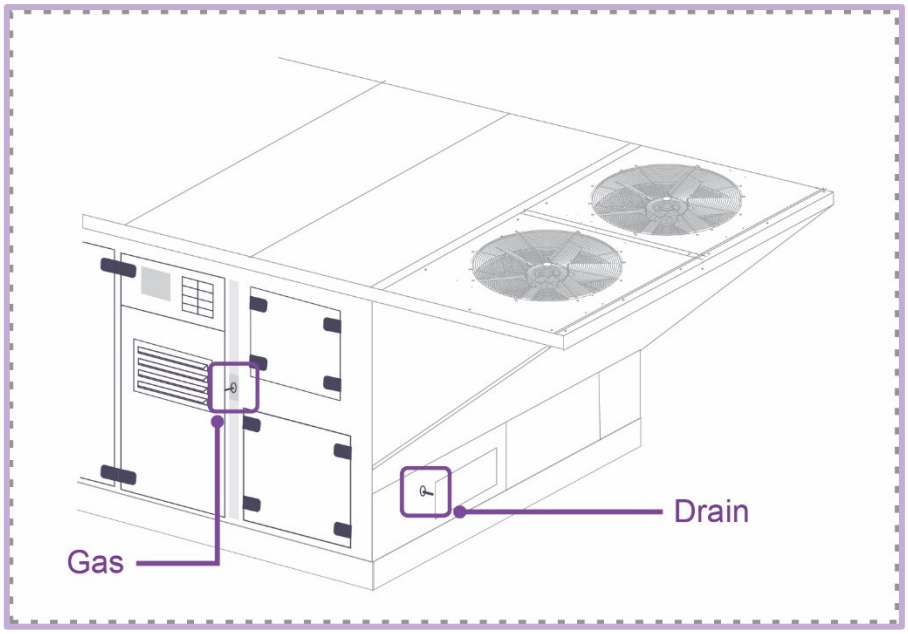
After installation, pressurize the piping as required and test all joints for tightness with a rich soap solution. Any bubbling is considered a leak and must be eliminated. Do not use a match or flame to locate leaks.

Refer to this table for the proper gas line and drain line connection sizes by unit. The diagrams on the following pages show the location of the connections.

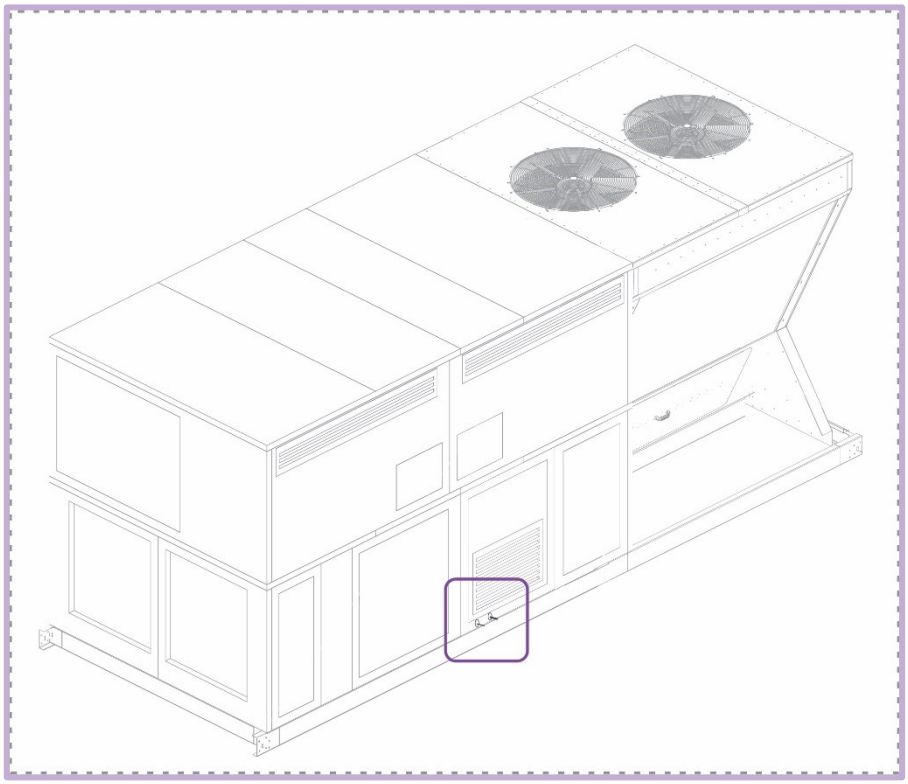
Connection Sizes

Heater Size	Gas Line Connection	Drain Line Connection
100 MBH	¾" NPT	¼" CPVC pipe, SCH 80
200 MBH	¾" NPT	¼" CPVC pipe, SCH 80
300 MBH	¾" NPT	¼" CPVC pipe, SCH 80
400 MBH	¾" NPT	¼" CPVC pipe, SCH 80
500 MBH	¾" NPT	¼" CPVC pipe, SCH 80
600 MBH	1" NPT	¼" CPVC pipe, SCH 80

100 & 200 MBH



300, 400, & 600 MBH



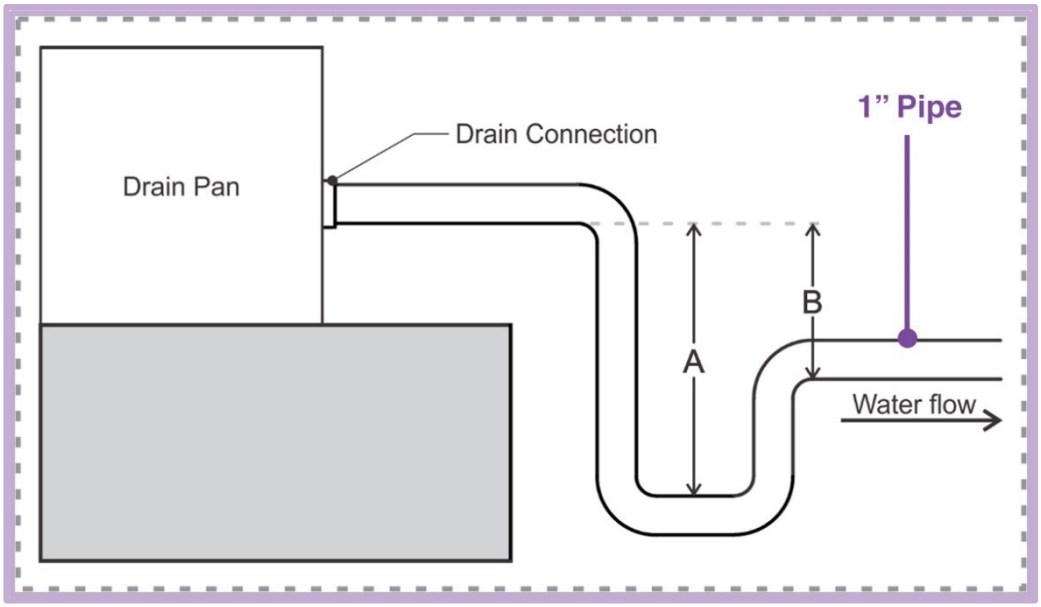
P-Trap Installation

Condensate “P-traps” must be installed based on these guidelines. Failure to follow these guidelines could cause condensate to not drain properly, allowing potential intrusion of water into the space.

- Make sure the unit is level.
- We recommend priming traps before operating them and after long shutdown periods.
- The minimum trap depth should be designed following the diagram below.

P Trap Pipe Size	
Unit	**Pipe Size**
ADA	1”
ADB	1”

Note: P-trap materials must be provided by the installation contractor.



Calculate for distances A and B using the formula below:

$$A = B + \left(\frac{B}{2}\right)$$

$$B = TSP + 1”$$

TSP stands for Total Static Pressure, and it should be provided by the installer in charge of ductwork.

Electrical

All wiring should conform to the latest revision of the National Electrical Code (*NFPA 70*). Canadian installations should refer to the latest revision of the Canadian Electrical Code (*CSA C22.1 Part 1*). Please follow the guidelines below in preparation for the electrical installation of the HVAC unit.

Pre-Installation Checklist:

- Consult the local power company to determine the availability of sufficient power to operate the unit and for correction of improper voltage or phase imbalance.
- The installing contractor must check for proper motor rotation, and assure that the blower motor amperage listed on the motor nameplate is not exceeded.
- An external weather-tight disconnect switch properly sized for the unit total load is required for each unit. The maximum rated overcurrent protection device (MOCP) value appears on the unit nameplate.
- Main power wiring should be sized for the MCA rating shown on the unit rating plate.
- Power leads must be over-current protected (by others) at the point of distribution.
- Use copper conductors for all connections
- If long wires are required, it may be necessary to increase the wire size to prevent excessive voltage drop.
- Wires should be sized for a maximum of 3% voltage drop.
- Supply voltage must not vary by more than 10% from the nameplate.
- Low voltage (24 V - AC/DC) control wiring longer than 100 feet in length should be in its own separate conduit run to prevent interference.

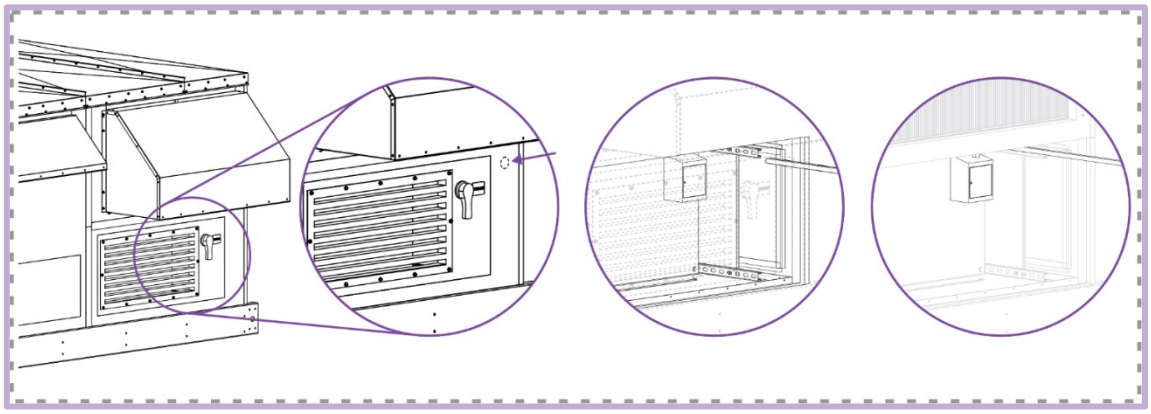
All the unit's internal wiring has been completed by the manufacturer. Any modification to the internal wiring will affect the unit's operation.

Installation Best Practices

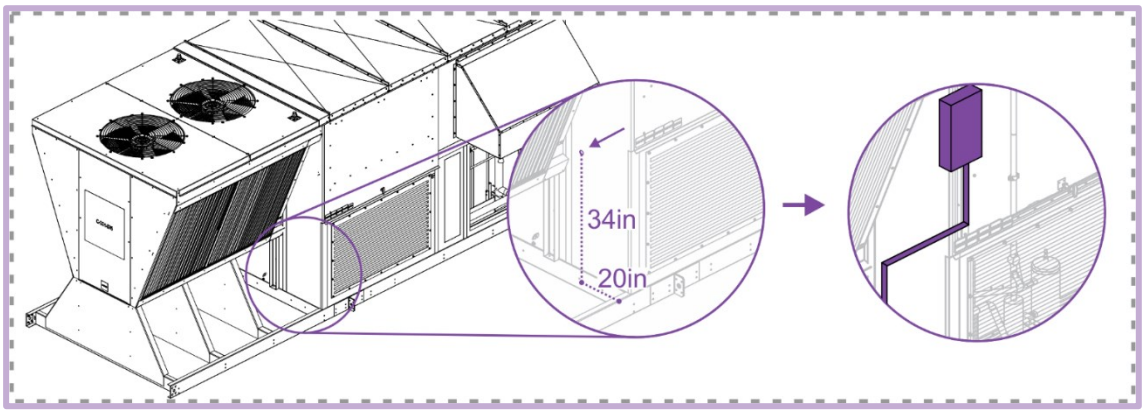
- Do not run power and signal wires in the same conduit.
- Supply conductors must be rated to a minimum of 75°C.
- Make sure that the unit has been properly grounded at the ground lug connection. Do not obstruct service panels or service areas with electrical gear.
- If any of the original control wire supplied with the unit must be replaced, make sure to follow the unit's nameplate specifications listed. If not listed, replace with the equivalent size and type of wire that was originally provided with the unit.
- Refer to the unit's nameplate for the comprehensive electrical specifications of the unit in accordance with the specific configuration and options acquired.

Power Cables Entrance

For Cabinet A, electrical feeder wires must enter through the side of the unit as shown below. This penetration must be made weather tight and have a maximum diameter of 2.5 inches. All cables should be mounted to the electrical cabinet ceiling and connect to the top of the disconnect located in the top right corner of the electrical cabinet. Make wire bends in accordance with applicable local codes.



For Cabinet B, electrical feeder wires must enter through the side of the unit, 20 inches from the outer side wall and 34 inches from the top of the base rail, as shown below. This penetration must be made weather tight and have a maximum diameter of 2.5 inches. All cables should be mounted to the electrical cabinet wall and connect to the bottom of the disconnect located on the left side the electrical cabinet. Make wire bends in accordance with applicable local codes.



Voltage Imbalance

Voltage imbalance is defined as 100 times the maximum deviation from the average voltage divided by the average voltage. Three phase voltage imbalance will cause motor overheating and premature failure. The maximum allowable imbalance is 2%. Check voltage imbalance at the unit disconnect switch and at the compressor terminal following the math formula below.

Case Study

Follow the math calculation below to find the voltage imbalance percentage for three voltages measured of 220V, 215V and 210V:

$$\text{Voltage Imbalance} = \frac{100 \times \left(\text{Maximum Voltage Deviation}\right)}{\text{Average Voltage}}$$

$$\text{Average Voltage} = \frac{\text{Sum of Measured Voltages}}{\text{Times Measured}} = \frac{(220 + 215 + 210)}{3} = 215\text{V}$$

$$\text{Maximum Voltage Deviation} = \text{Highest Voltage Measured} - \text{Average Voltage} = 220 - 215 = 5\text{V}$$

$$\text{Voltage Imbalance} = \frac{100 \times \left(\text{Maximum Voltage Deviation}\right)}{\text{Average Voltage}} = \frac{(100 \times 5)}{215} = 2.3\%$$

In this scenario, the voltage Imbalance is above 2% and the local power company needs to be contacted for a line voltage correction.

Variable Frequency Drives

Variable frequency drives (VFDs) are configured by the onboard unit controller and do not require manual setup. DO NOT attempt to change any VFD parameters. VFDs must not be operated outside the factory determined turndown ratio or frequency range. Contact us if you need detailed specifications about the VFDs embedded in the unit.

Unit Wiring

ArctiDry units are provided with a separate wiring diagram detailing all electrical connections. Please refer to that document for any wiring inquiries.

BACnet Setup

Unit Controller Configuration

BMS Network Screen:

- Verify that the BACnet license is installed. If it is not, contact Mojave.
- Set BMS Protocol to BACnet MS/TP (including for BACnet IP installations, since MS/TP is used between the unit controller and the BACnet router).

BACnet Config Screen:

- Set the BACnet instance according to facility requirements.
- For BACnet/IP: Set MS/TP Station Address to 1, Max Master to 1, and Max Info Frames to 10.
- For BACnet MS/TP: Set Station Address, Max Master, and Max Info Frames according to facility requirements.

BMS2 RS485 Config Screen:

- For BACnet/IP: Set the Baud Rate to 76800.
- For BACnet MS/TP: Set the Baud Rate according to facility requirements.
- (Note: When BACnet MS/TP is the selected BMS Protocol, Parity is automatically set to None, Stop Bits is set to 1, and these cannot be changed.)
- Reboot the unit controller to apply changes to the BMS protocol selection and baud rate.

For BACnet MS/TP:

- Disconnect the RS-485 cable from the BMS2 port on the unit controller.
- Wire the facility BACnet MS/TP bus to this port. (Note: The BMS2 port is isolated. The terminal labeled “GND” is for the RS-485 common wire. It is *not* connected to earth ground, or to any power supply ground in the unit.)

Router Configuration (BACnet IP Only)

1. A laptop with Ethernet port and Ethernet cable are required to configure the BACnet router.
2. Change the laptop’s wired IP address to 192.168.92.2, subnet 255.255.225.0 (or length 24), and gateway (if needed) 192.168.92.1.
3. Connect the laptop directly to the BACnet router with an Ethernet cable.
4. Open http://192.168.92.68/ in a browser to access the router’s configuration page.
5. Log in with username “admin” and password “admin”
6. Changing the password is mandatory. After the router reboots, log in with username “admin” and the new password.
7. Edit the Device Instance according to facility requirements. Note that this is the BACnet instance for the router itself, and it must be different from the BACnet instance assigned to the unit controller.
8. Edit the BACnet/IP UDP Port, Network number, IP address, subnet, and gateway settings according to facility requirements.
9. Edit the MS/TP Network number according to facility requirements.
10. Set MS/TP MAC to 0, Max Masters to 1, Max Info Frames to 100, MS/TP Baudrate to 76800, and MS/TP Tolerance to Strict.

11. Click “Save Changes and Reboot”.
12. Change the laptop’s IP address to a value on the same subnet as the router’s new IP address.
13. Visit the router configuration page at the new IP address and confirm that the new settings have taken effect.
14. Click the “Status” button. Confirm that the unit controller is online (shown by MS/TP address 1 highlighted in green).
15. Disconnect the BACnet router from the Ethernet cable to the laptop. Connect the BAS network Ethernet cable directly to the BACnet router. *Do not connect any building network cable to the unit’s cellular router,* except optionally for a cable directly to the touchscreen HMI.

Note: The router’s IP address and password can be reset to factory defaults by pushing a paper clip in the “Reset IP” hole for at least 5 seconds, then removing and restoring power to the router.

BACnet Points

A full list of BACnet Points is available in the Appendix.

User Terminal Installation

ArctiDry units come with a user-friendly touchscreen terminal designed to operate the unit from a distance while simplifying the unit’s operation. Make sure the installation is done by a qualified installer.

Installer is responsible for providing the following items:

- 1 gang Electrical Box
- 24VDC Class 2/SELV Power supply
- STP CAT5 Ethernet cable

The length of the Ethernet cable will vary depending on the installation site, but it shall not exceed 100 meters in length. Furthermore, make sure to only use shielded Ethernet cables and to only connect the terminal and unit controller directly. Do not use any local internet network cables or devices.

Voltage supply should only be the one specified above. If the terminal’s installation is close to the unit location, the installer may obtain the 24VDC power supply from the unit’s control panel itself (+ terminal to wire 356 and – terminal to wire C305).

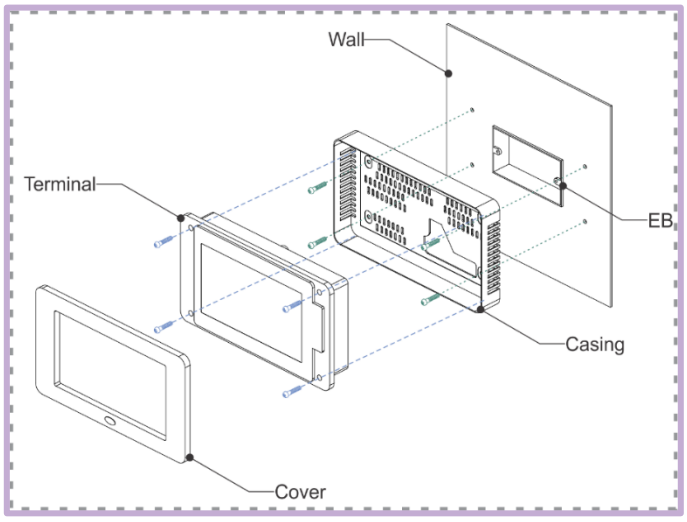
To prevent malfunction of the terminal, make sure that the desired installation location does not possess any of the following characteristics:

- High relative humidity
- Strong vibrations or knocks
- Strong magnetic and/or radio frequency interference
- Large and/or rapid fluctuations in temperature

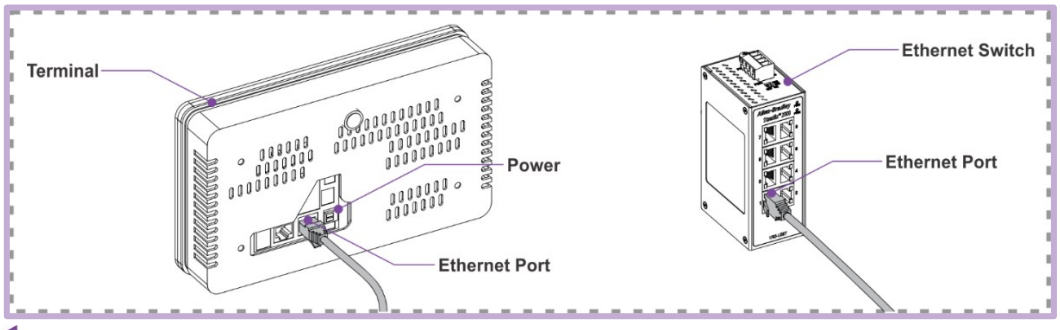
Furthermore, avoid exposure to aggressive and polluting atmospheres (e.g.: fumes, salt spray, smoke) and direct sunlight. The Terminal is not rated for outdoors installations, and terminal operation at low temperatures may cause a noticeable decline in the response speed of the display.

Terminal Wall Installation

Follow the instructions below to install the terminal on a wall. Note that the installer is responsible for communication and power wiring. All applicable codes shall be followed.

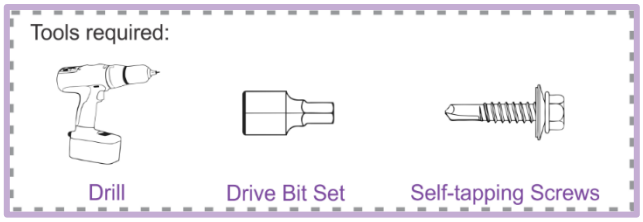


1. Install a 1-gang electrical box in the wall behind the desired location of the terminal. Note that the final location of the terminal is not centered on the electrical box. Use the mounting case as a guide for the electrical box location.
2. Mark the drill hole locations on the wall around the selected electrical box using the mounting casing shown in the diagram above.
3. Install the mounting case to the wall using four screws, and secure it to the electrical box using two screws.
4. Pass the Ethernet cable and power cable from the electrical box through the mounting case opening.
5. Connect 24VDC power to the terminal using the terminal block included in the terminal package.
6. Connect the Ethernet cable to the terminal at port ETH 0, which is the RJ-45 jack adjacent to the power terminal block. Connect the other end of the Ethernet cable to the Ethernet switch on the unit's low voltage control panel.
7. Push the terminal into the mounting case, ensuring that the terminal is right side up. From your point of view, the Power and Ethernet cables should be near your right hand. Secure using the four self-tapping screws provided in the mounting case package.
8. Peel the protective film from the terminal's touch screen. Finish by installing the terminal's cover on top by gently pushing it towards the terminal. Ensure that the side of the cover with holes is on the left to allow room air to circulate over the terminal's integrated temperature and humidity sensors.



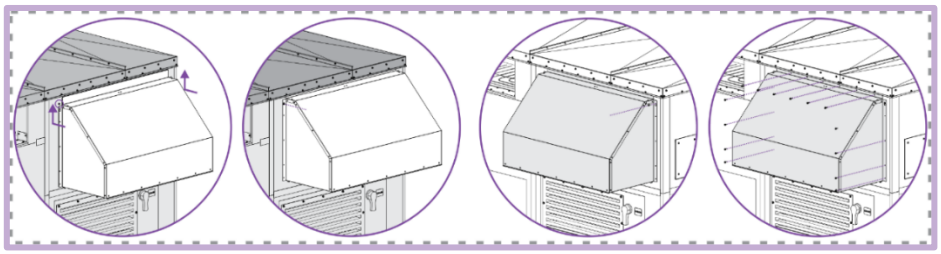
Cabinet A Hoods Installation

Follow the instructions below to install the inlet and outlet hoods. Make sure to perform these instructions only after completing the installation of the unit on the roof. It is recommended that two people perform the steps mentioned below.

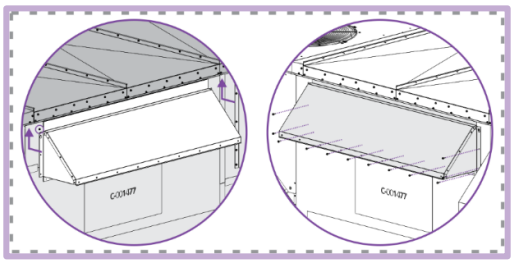


Installation Instructions:

1. Remove and discard all of the packaging material from the inlet and outlet hoods.
2. Set aside the filter's cover bracket for later use.
3. Remove the protective foam that was installed on the unit's coil.
4. Remove the paper backing gasket installed on the inlet hood.
5. Lift the inlet hood up slowly to the installation location. Align the hood's top left keyhole with the pre-installed screw in the corner of the enclosure opening. Perform the latter while tucking the top flange of the hood under the pitched roof edge, as shown.



6. Ensure the hood is level before installing a sheet metal screw in the keyhole of the opposite corner of the hood. Then, install the remaining screws. Along the top edge of the hood, install the screws along the roof cap drip edge at the pre-drilled hole locations.
7. Install the regen hood filter following the instructions stated in Page 64 of this manual.
8. Remove the protective cover blocking the unit's outlet hood opening.
9. Remove the paper backing gasket installed on the outlet hood.
10. Repeat Steps 5 and 6 to install the outlet hood, as shown below:



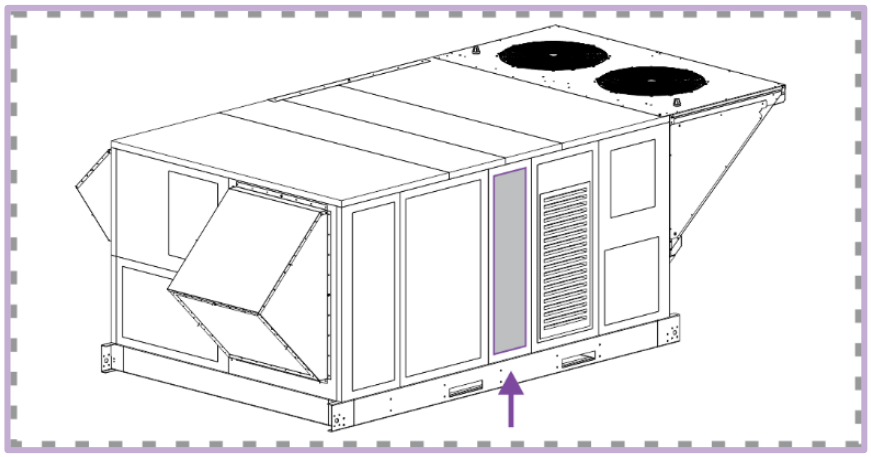
11. For units with 10k salt spray coating, use the factory-provided aerosol touch-up can of clear coat on all locations where screws were installed.

Cabinet A Desiccant Loading

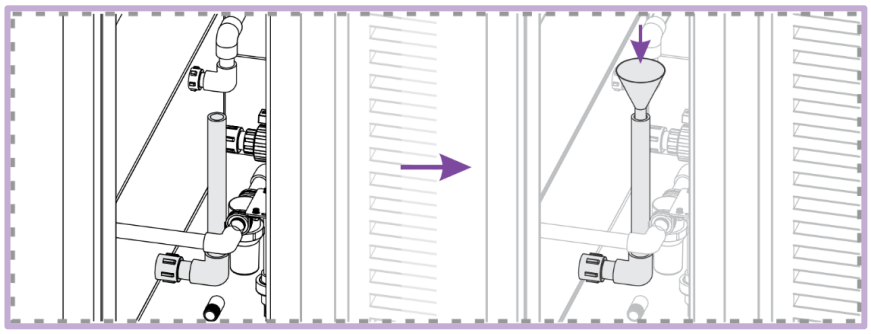
The unit ships from the factory with the desiccant tank empty. Desiccant must be added prior to operating the unit. Follow the instructions below to load desiccant into the unit. The use of personal protective equipment is recommended for this procedure. Rubber gloves and eye protection are required.

Procedure Instructions:

1. Locate the side process absorber maintenance door, highlighted in the diagram below:



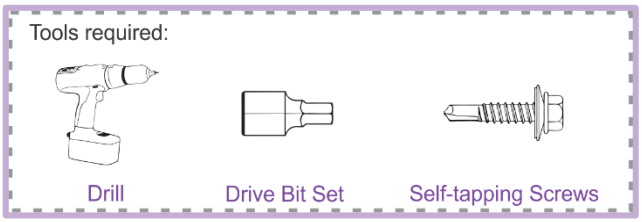
2. Insert plastic funnel into sight glass, as shown:



3. Remove the lid from the desiccant jug and store for later use.
4. Slowly pour desiccant into the funnel. Be sure to do this with utmost care to minimize spills.
5. Add the specific quantity of desiccant. For commissioning, add all of the factory-provided desiccant that shipped with the unit.
6. After filling make sure to wipe up any desiccant spills with clean water using shop towels. Rinse and wipe off any metal surface that may have come in contact with the desiccant.
7. Make sure to put the lid back on the jug and dispose of it as per local requirements.

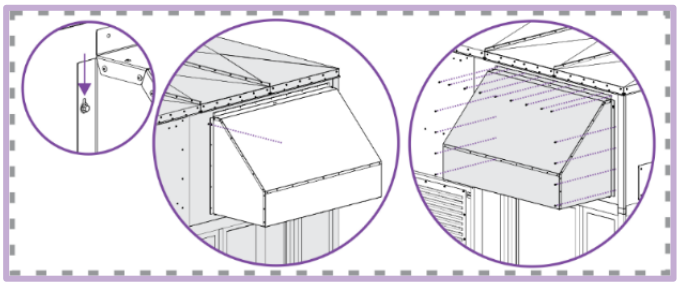
Cabinet B Hoods Installation

Follow the instructions below to install the inlet and outlet hoods. Make sure to perform these instructions only after completing the installation of the unit on the roof. Two people are required to perform the installation.

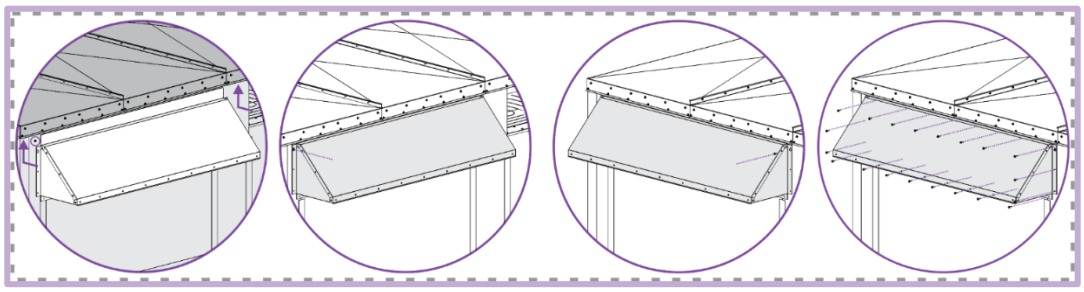


Installation Instructions:

1. Remove and discard all of the packaging material from the inlet and outlet hoods.
2. Set aside the filter's cover bracket for later use.
3. Remove the protective foam installed on the unit's coil, and the paper backing gasket installed on the inlet hood.
4. Lift the inlet hood up slowly to the installation location. Align the hood's top left keyhole with the pre-installed screw in the corner of the enclosure opening.



5. Ensure the hood is level before installing a sheet metal screw in the keyhole of the opposite corner of the hood. Then, install the remaining screws.
6. Install the inlet hood filter following the instructions stated on Page 65 of this manual.
7. Remove the protective cover blocking the left side outlet hood opening on the unit and the paper backing gasket installed on the outlet hoods.
8. Lift one of the two outlet hoods up slowly to the left-side installation location. Align the hood's top left keyhole with the pre-installed screw in the corner of the enclosure opening. Perform the latter while tucking the top flange of the hood under the pitched roof edge, as shown.



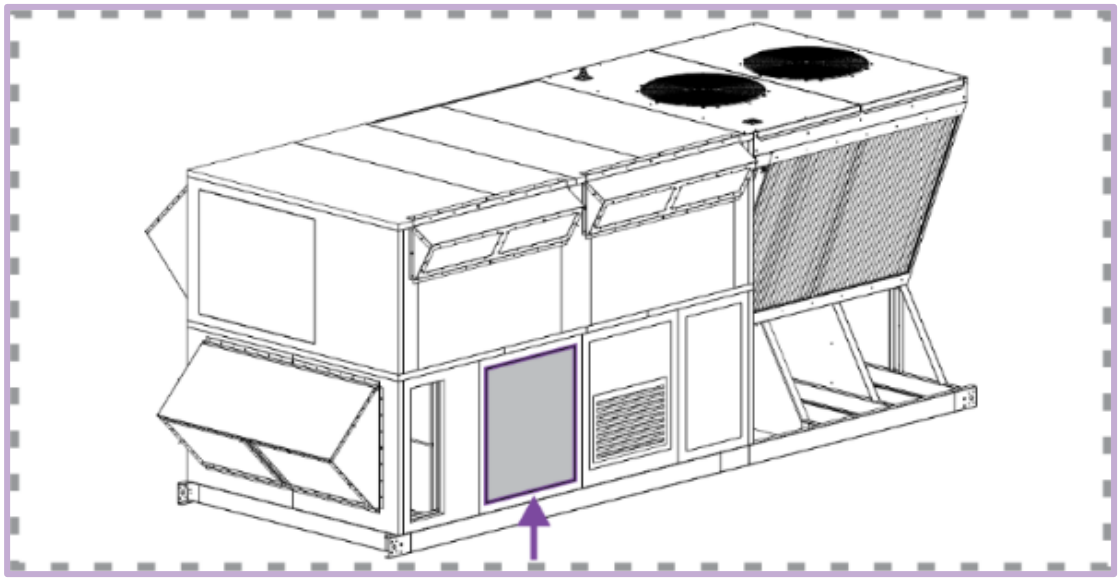
9. Ensure the hood is level before installing a sheet metal screw in the keyhole of the opposite corner of the hood. Install the remaining screws. Along the top edge of the hood, install the screws along the roof cap drip edge at the pre-drilled hole locations.
10. Repeat the procedure outlined in Steps7 through 9 to install the right-side outlet hood.
11. (For units with 10k salt spray coating) Use the factory-provided aerosol touch-up can of clear coat on all locations where screws were installed.

Cabinet B Desiccant Loading

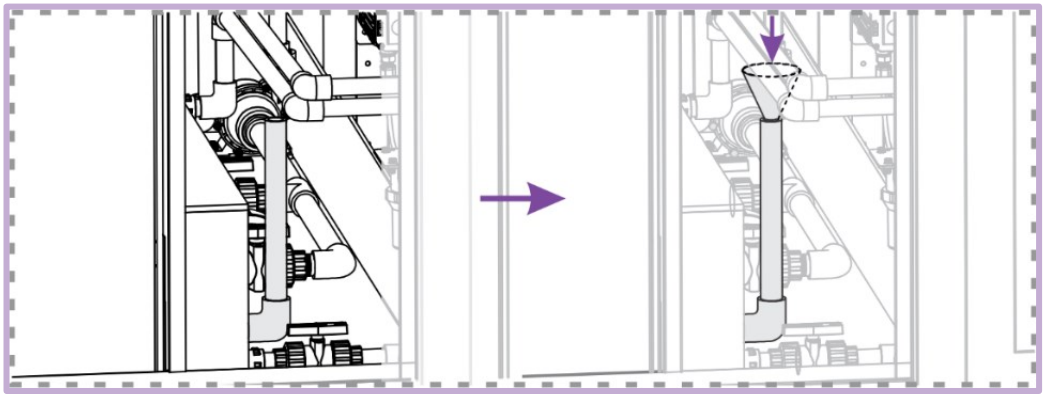
The unit ships from the factory with the desiccant tank empty. Desiccant must be added prior to operating the unit. Follow the instructions below to load desiccant into the unit. The use of personal protective equipment is recommended for this procedure. Rubber gloves and eye protection are required.

Procedure Instructions:

1. Locate the side process absorber maintenance door, highlighted in the diagram below:



2. Insert plastic funnel into sight glass, as shown:



3. Remove the lid from the desiccant jug and store for later use.
4. Slowly pour desiccant into the funnel. Be sure to do this with utmost care to minimize spills.
5. Add the specific quantity of desiccant. For commissioning, add all of the factory-provided desiccant that shipped with the unit.
6. After filling make sure to rinse off any desiccant spills with clean water and wipe the surface dry using shop towels. Rinse and wipe off any metal surface that may have come in contact with the desiccant.
7. Make sure to put the lid back on the jug and dispose of it as per local requirements.

Unit Operation

Starting the Unit

From the Control Terminal

Press the “SETPOINTS” button to navigate to the setpoints screen. In the “Mode” area, select “On” or “Fan” to start the unit. In “On” mode, the unit automatically operates in dehumidification, cooling, ventilation, or heating mode according to the outdoor air conditions and supply air or zone air conditions. In “Fan” mode, the supply fan operates to supply unconditioned outdoor air to the supply duct.

From the Unit Controller

Press the ◉ button to access the Main Menu. Use the “Up” [↑] or “Down” [↓] buttons to navigate the different Modes. Presse the enter [↲] button to select the preferred Mode. Press the enter [↲] button to advance the cursor to Main Mode. Press the “Up” [↑] or “Down” [↓] buttons to navigate to “On”, then press the enter [↲] button to save and activate the change.

Shutting Down the Unit

From the Control Terminal

Press the “SETPOINTS” button to navigate to the setpoints screen. In the “Mode” area, select “Off” to shut down the unit.

From the Unit Controller

Press the ◉ key to access the Main Menu. Use the arrow (↑/↓) and enter (↲) keys to select Modes. Press the enter key to advance the cursor to Main Mode. Press the arrow keys to scroll to Off, and press enter (↲) to save and activate the change.

Operating Mode Selection

The operating mode is selected by the unit controller based on the main mode entered by the user (On, Fan, or Off), the “psychrometric mode” based on the outdoor air conditions and active supply air setpoints, and the level condition of the desiccant sump.

Psychrometric Mode

To control supply air conditions to the set points when On, the unit controller sets the “psychrometric mode” by comparing the set points and the outdoor air conditions as follows:

- If outdoor air dewpoint is greater than the supply air dewpoint setpoint, the controller selects Dehumidification psychrometric mode. The system actively controls both the supply dewpoint and dry bulb temperature. If the system cannot simultaneously reach the desired dew point and dry bulb setpoints, it prioritizes reaching the dew point setpoint.

- If outdoor air dewpoint is less than the supply air dewpoint setpoint, and outdoor air temperature is greater than the supply air dry bulb cooling setpoint, the controller selects Cooling psychrometric mode. The system only actively controls the supply dry bulb temperature.
- If outdoor air dewpoint is less than the supply air dewpoint setpoint, and outdoor air temperature is between the supply air dry bulb heating and cooling setpoints, the controller selects Ventilation psychrometric mode.
- If outdoor air dewpoint is less than the supply air dewpoint setpoint, and outdoor air temperature is less than the supply air dry bulb heating setpoint, the controller selects Heating psychrometric mode.

The psychrometric mode changes automatically occur when the outdoor air condition exceeds a setpoint for more than 30 minutes or by greater than 2°F/1.5°F dewpoint and dry bulb temperature, respectively.

Level Conditions

Under certain conditions of desiccant sump level, the system may operate in a different mode than the psychrometric mode alone indicates. Automatic management of the desiccant concentration may require action by the controller to keep the liquid level in the sump within the allowable range. Some level conditions are expected as part of normal operation. These are not indicated as alarms in the unit controller and require no user intervention. Level conditions that display as alarms may indicate a need for adjustment of the desiccant charge. However, they can also occur as a result of prolonged abnormal weather. Consult Mojave-qualified service personnel before adjusting desiccant charge.

Level Condition			
Level	**Alarm Capability**	**Alarm Reset Type**	**Effect**
Max (overflow protection)	Yes	Manual	All subsystems disabled
HiHi Pumps Off	Yes	Auto	Dehumidify or Off
HiHi	Yes	Manual	All subsystems disabled
Hi	No	-	Modify active supply air dew point set point when dehumidifying
Lo Prohibit Pump Start	No	-	Pumps disabled
Lo	No	-	Modify active supply air temperature set point when dehumidifying
LoLo	Yes	Auto	Pumps disabled (override not allowed)

Operating Mode

Finally, the availability of subsystems required to operate in each operating mode are considered. If a subsystem is tripped or locked out, it is marked as disabled, excluding operating modes that require it. The operating mode is selected as shown in the table below according to user-selected main mode, unit controller-selected psychrometric mode, level conditions, and subsystem disable conditions.

The table below shows which subsystems are active during each operating mode.

Operating Mode				
Subsystem	**Supply Fan**	**Desiccant Pumps**	**Cooling Call**	**Heating Call**
Off	-	-	-	-
Ventilation	✓	-	-	-
Dehumidification	✓	✓	✓	-
Dehumidification with Decreased Dew Point Set Point	✓	✓	✓	-
Dehumidification with Decreased Temperature Set Point	✓	✓	✓	-
Dehumidification by Cooling	✓	-	✓	-
Cooling	✓	-	✓	-
Heating	✓	-	-	✓

Modes			
Main Mode	**Psychrometric Mode**	**Sump Level Condition and/or Subsystem Disabled**	**Operating Mode**
Off	-	-	Off
Fan	-	- Supply Fan Disabled	Ventilation Off
On	Dehumidification	-	Dehumidification
		Level HiHi Pumps Off	Off
		Level Hi	Dehumidification with Decreased Dew Point Set Point
		Level Lo	Dehumidification with Decreased Temperature Set Point
		Level LoLo or Any Pump Disabled	Dehumidification by Cooling
		Cooling Disabled	Off
	Cooling	-	Cooling
		Level HiHi Pumps Off	Dehumidification
		Level HiHi Pumps Off and Any Pump Disabled	Off
		Cooling Disabled	Off
	Ventilation	-	Ventilation
		Level HiHi Pumps Off	Dehumidification
		Level HiHi Pumps Off and Cooling or Any Pump Disabled	Off
		Supply Fan Disabled	Off
	Heating	-	Heating
		Level HiHi Pumps Off	Dehumidification
		Level HiHi Pumps Off and Cooling or Any Pump Disabled	Off
		Heater Disabled	Off
		Supply Fan Disabled	Off

Sequence of Operations

Supply Fan and Dampers – Standard Operation

When the supply fan is called to run, the outdoor air and supply air dampers are commanded to fully open to their stops, and the return air damper is commanded to open to its configured position. After a 20s second delay for damper movement (including when no dampers are installed), the supply fan is commanded to run at its configured nominal speed. The supply fan is an EC fan, and normally takes about 25 seconds to begin accelerating after it receives the run command.

When the run call is removed, the fan decelerates to a stop. Once it has completely stopped, all dampers close.

Desiccant Pumps

When entering an operating mode that calls for pumps as shown in the table above, the absorber pump turns on immediately, and the desorber pump(s) turns on after a 5 second delay. When entering an operating mode that does not call for pumps, all pumps are turned off after 10 seconds. Desiccant will continue to trickle through the contact media and the liquid level in the sump will rise for several minutes after pumps are turned off.

Cooling Call Begin

If the cooling call begins soon after the unit is powered on, the unit controller waits until the stepper motor valve driver completes initialization before proceeding. If valve driver initialization was previously completed, the following sequence begins immediately when the cooling call begins.

The modulating three-way valve is set to 70% open to the regeneration condenser, and the supply fan, regeneration fan, and external condenser fans run. After two minutes, refrigerant pressures and temperatures are checked to determine if additional refrigerant needs to be let in to the evaporator to allow for a successful startup. If so, the electronic expansion valve (EEV) is partially opened to bleed refrigerant as needed. Next, the EEV is moved to the pre-open position, and the compressor turns on and initially runs at a fixed speed of 3600 RPM. When suction superheat is greater than 24°F, automatic control of the EEV is enabled with a superheat setpoint of 25°F. The low superheat alarm threshold is set to 6°F.

One minute after EEV automatic control is engaged, automatic controls of compressor speed, condenser fans, and modulating three-way valve are enabled to target the supply air setpoints. Five minutes later, the superheat setpoint is lowered to 20°F. Two minutes later, the compressor start sequence is complete.

If the compressor is tripped due to low superheat or low suction pressure during the startup sequence, the sequence is restarted up to two times. After a third such trip during startup without an intervening successful start, the compressor will be locked out. Compressor lockout must be cleared manually from the alarms page of the control terminal or unit controller.

Cooling Call End

When the cooling call is removed, the following shutdown sequence begins immediately if a minimum compressor run time of 90 seconds has been met. Otherwise, the request to shutdown will be delayed until the compressor has been running for 90 seconds.

When the shutdown sequence begins, the automatic control loops of speed and valve positions are disabled, and the EEV starts to close while the compressor continues to run. When suction pressure has decreased by 20 psi or is below 140 psi, the compressor speed ramps to a stop. The regeneration fan and external condenser fans continue to run for one minute after the compressor stops before ramping to a stop. If switching to operating mode Off, the supply fan turns off 15 seconds after compressor shutdown.

Crankcase Heater

The crankcase heater is always on when the unit controller is running, except when the compressor is running, the unit controller is in evacuation mode, or the heater has been manually turned off using the unit controller.

Heating Call (Electric Heater Option)

The electric heater is operated by a built-in control board provided by the heating unit manufacturer. It operates in response to heating call and modulating demand signals from the unit controller. Safety switches are air proving (auto reset), over temperature (auto reset), and over temperature (manual reset). Power is not applied to the heating elements until the air proving switch is closed by airflow due to supply fan operation.

Heating Call (Gas Heater Option)

The gas heater is operated by a built-in control board provided by the heating unit manufacturer. It operates in response to heating call and modulating demand signals from the unit controller. Sequence of operations and fault conditions are as described in the gas heater documentation.

Heating Call (Heat Pump Option)

During heat pump operation, the liquid desiccant system and regeneration condenser are idle. Therefore, the desiccant pumps and regeneration fan remain off while the modulating three-way valve is positioned at 0% with full refrigerant flow to the outdoor coil (external condenser), operating as an evaporator.

The initial compressor startup sequence in heating is identical to that of cooling, but with the reversing valve solenoid energized in the heating configuration. One minute after EEV automatic control is engaged, automatic controls of compressor speed and external condenser fans are enabled to target the supply air setpoints. Five minutes later, the superheat setpoint is lowered to 20°F. Two minutes later, the compressor start sequence is complete.

For units with supplemental heat, the heater (gas or electric) is turned on if the supply temperature is below setpoint when the compressor is at maximum speed.

When the heating call is removed, the shutdown sequence is identical to that of cooling.

The minimum outdoor temperature for heat pump operation is 10°F.

Defrost During Heat Pump Heating

If significant ice accumulates on the outdoor coil, a defrost sequence is initiated to melt the ice. Detection of ice build-up is based on evaporating temperature relative to outdoor air temperature. When defrost is triggered, the reversing valve switches to cooling while the compressor is controlled to minimum speed and the external condenser fan is turned off. The defrost runs until the refrigerant temperature leaving the outdoor coil exceeds the defrost complete setpoint or until a timeout. When complete, the compressor turns off for a defrost complete time delay to allow the coil to drip dry before returning to heating. Then the reversing valve switches to heating and the compressor starts up following the same sequence of operations as for the heating call. Throughout the defrost sequence the supply fan remains on.

Supply Fan Calibration

Use the following procedures to determine the necessary supply fan speeds for the installation during test and balance and configure the unit accordingly. Before setting up the fan speed make sure the following are true:

- The inlet hood is installed, if applicable
- Supply ducts are sealed
- The building's internal dampers and fans are set to their occupied positions and speeds
- The unit has air filters installed

Calibration Procedure

1. On the unit controller, press the ◉ key to access the Main Menu. Select Actuators and scroll down to the Supply Fan page.
2. Press enter to move the cursor to the Mode field, and use the arrow keys to select Hand. Dampers in the unit will open before the fan starts, if installed. Press Enter to move the cursor to the Speed Cmd field.
3. Use the arrow keys to change the speed, and press enter to accept the new speed. Measure air flow, and adjust the supply fan speed until the target air flow is reached. If a different air flow is needed for the unoccupied state, repeat the procedure above with other building dampers and fans set to their unoccupied states.
4. Once the speeds have been determined, set the Mode to Auto. If the unit is off, the supply fan will stop and the dampers will close.

To program the unit with the supply fan speeds:

1. Press the ◉ key to access the Main Menu. Select Configuration and scroll down until the Supply Air Volume: Constant Air Volume page is reached.
2. Press enter to move to the cursor to the Occupied fan speed field. Use the up and down keys to adjust, then press enter to save.
3. Press enter to move to the Unoccupied field, up/down to adjust, and enter to save. If the same fan speed is needed for both occupied and unoccupied states, enter the same speed in each field.

If the supply fans speeds need to be adjusted while the unit is running, the speeds may be tuned directly from this screen, instead of running the fan in Hand mode as described in the previous paragraph.

CFM vs ESP tables

Use the following tables as a guide for measuring expected CFM at different speeds at general static pressure. **These tables are indicative only and are not a replacement for a Test and Balance.**

ADA Fan ESP Table

Air Flow (CFM)	NP (280mm Fan) - Available ESP ("WC)							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
1000	43%	49%	55%	61%	66%	71%	76%	80%
1250	51%	56%	61%	66%	70%	75%	79%	85%
1500	61%	65%	69%	73%	77%	81%	86%	88%
1750	70%	74%	77%	81%	84%	88%	91%	94%
2000	79%	83%	86%	89%	92%	95%	98%	-

Air Flow (CFM)	QP (400mm Fan) - Available ESP ("WC)							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
1750	35%	41%	46%	51%	55%	59%	63%	67%
2000	39%	44%	49%	53%	57%	61%	65%	69%
2500	47%	51%	55%	59%	62%	66%	69%	72%
3000	56%	59%	63%	66%	69%	72%	75%	78%
3500	64%	67%	70%	73%	76%	78%	81%	84%
4000	73%	75%	78%	80%	83%	85%	87%	90%
4500	81%	84%	86%	88%	90%	92%	95%	97%

Air Flow (CFM)	OP (355mm Fan) - Available ESP ("WC) - Old Design; Obsoleted in 4K & 8K Design							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
1750	38%	42%	46%	50%	54%	57%	61%	64%
2000	42%	46%	50%	53%	57%	60%	63%	66%
2500	51%	54%	57%	60%	63%	66%	69%	71%
3000	61%	64%	66%	69%	71%	73%	76%	78%
3500	71%	73%	75%	77%	79%	81%	83%	85%
4000	80%	82%	84%	86%	87%	89%	91%	93%
4500	90%	91%	93%	95%	96%	98%	100%	-

ADB Fan ESP Table

Air Flow (CFM)	PP (450mm Fan) - Available ESP ("WC)							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
3000	45%	50%	54%	59%	63%	67%	71%	75%
3500	51%	56%	60%	63%	67%	71%	74%	78%
4000	58%	61%	65%	68%	72%	75%	78%	82%
4500	64%	67%	70%	74%	77%	80%	83%	86%
5000	70%	73%	76%	79%	82%	85%	87%	90%
5500	77%	80%	83%	85%	88%	90%	93%	95%
6000	83%	86%	88%	91%	93%	96%	98%	100%

Air Flow (CFM)	SS (560mm Fan) - Available ESP ("WC)							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
5000	50%	54%	58%	62%	65%	69%	73%	76%
5500	55%	59%	62%	66%	69%	73%	76%	79%
6000	59%	62%	66%	69%	72%	75%	78%	81%
6500	63%	67%	70%	73%	76%	79%	82%	86%
7000	67%	70%	73%	76%	79%	82%	84%	87%
7500	72%	75%	77%	80%	83%	85%	88%	90%
8000	76%	79%	81%	84%	87%	89%	91%	94%

Air Flow (CFM)	SP (560mm Fan) - Available ESP ("WC)							
	0.2	0.6	1	1.4	1.8	2.2	2.6	3
	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd	% cmd
5000	61%	66%	71%	75%	80%	84%	88%	93%
5500	67%	71%	76%	80%	84%	88%	92%	96%
6000	71%	76%	80%	84%	88%	92%	95%	99%
6500	77%	81%	85%	89%	92%	96%	100%	-
7000	82%	85%	89%	93%	96%	100%	-	-
7500	86%	90%	93%	97%	100%	-	-	-
8000	91%	94%	98%	-	-	-	-	-

Thermostat

Thermostat functions are provided through the unit controller's interface and the factory-supplied touchscreen display. The customer can independently set the supply air dew point in the range of 40 – 55°F and supply air dry bulb temperature in the range of 55 – 75°F. The resulting relative humidity of the setpoint must be from 40 – 70% RH, thus the following combinations of setpoints are acceptable:

Supply Air Dewpoint	Supply Air Dry Bulb Temperature																				
	55°	56°	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	71°	72°	73°	74°	75°
40°	56.9%	54.8%	52.9%	51.0%	49.2%	47.5%	45.8%	44.2%	42.7%	41.2%	39.8%	38.5%	37.1%	35.9%	34.7%	33.5%	32.4%	31.3%	30.3%	29.3%	28.3%
41°	59.1%	57.0%	55.0%	53.0%	51.2%	49.4%	47.6%	46.0%	44.4%	42.9%	41.4%	40.0%	38.6%	37.3%	36.0%	34.8%	33.7%	32.5%	31.5%	30.4%	29.4%
41°	59.1%	57.0%	55.0%	53.0%	51.2%	49.4%	47.6%	46.0%	44.4%	42.9%	41.4%	40.0%	38.6%	37.3%	36.0%	34.8%	33.7%	32.5%	31.5%	30.4%	29.4%
42°	61.4%	59.2%	57.1%	55.1%	53.2%	51.3%	49.5%	47.8%	46.1%	44.6%	43.0%	41.6%	40.1%	38.8%	37.5%	36.2%	35.0%	33.8%	32.7%	31.6%	30.6%
42°	61.4%	59.2%	57.1%	55.1%	53.2%	51.3%	49.5%	47.8%	46.1%	44.6%	43.0%	41.6%	40.1%	38.8%	37.5%	36.2%	35.0%	33.8%	32.7%	31.6%	30.6%
43°	63.8%	61.6%	59.4%	57.3%	55.3%	53.3%	51.5%	49.7%	48.0%	46.3%	44.7%	43.2%	41.7%	40.3%	38.9%	37.6%	36.4%	35.2%	34.0%	32.9%	31.8%
43°	63.8%	61.6%	59.4%	57.3%	55.3%	53.3%	51.5%	49.7%	48.0%	46.3%	44.7%	43.2%	41.7%	40.3%	38.9%	37.6%	36.4%	35.2%	34.0%	32.9%	31.8%
44°	66.3%	64.0%	61.7%	59.5%	57.4%	55.4%	53.5%	51.6%	49.8%	48.1%	46.5%	44.9%	43.3%	41.9%	40.5%	39.1%	37.8%	36.5%	35.3%	34.1%	33.0%
44°	66.3%	64.0%	61.7%	59.5%	57.4%	55.4%	53.5%	51.6%	49.8%	48.1%	46.5%	44.9%	43.3%	41.9%	40.5%	39.1%	37.8%	36.5%	35.3%	34.1%	33.0%
45°	68.9%	66.5%	64.1%	61.8%	59.7%	57.6%	55.6%	53.6%	51.8%	50.0%	48.3%	46.6%	45.0%	43.5%	42.0%	40.6%	39.3%	37.9%	36.7%	35.5%	34.3%
45°	68.9%	66.5%	64.1%	61.8%	59.7%	57.6%	55.6%	53.6%	51.8%	50.0%	48.3%	46.6%	45.0%	43.5%	42.0%	40.6%	39.3%	37.9%	36.7%	35.5%	34.3%
46°	71.6%	69.0%	66.6%	64.2%	62.0%	59.8%	57.7%	55.7%	53.8%	51.9%	50.1%	48.4%	46.8%	45.2%	43.7%	42.2%	40.8%	39.4%	38.1%	36.8%	35.6%
46°	71.6%	69.0%	66.6%	64.2%	62.0%	59.8%	57.7%	55.7%	53.8%	51.9%	50.1%	48.4%	46.8%	45.2%	43.7%	42.2%	40.8%	39.4%	38.1%	36.8%	35.6%
47°	74.3%	71.7%	69.1%	66.7%	64.3%	62.1%	59.9%	57.8%	55.8%	53.9%	52.1%	50.3%	48.6%	46.9%	45.3%	43.8%	42.3%	40.9%	39.6%	38.3%	37.0%
47°	74.3%	71.7%	69.1%	66.7%	64.3%	62.1%	59.9%	57.8%	55.8%	53.9%	52.1%	50.3%	48.6%	46.9%	45.3%	43.8%	42.3%	40.9%	39.6%	38.3%	37.0%
48°	77.2%	74.4%	71.8%	69.3%	66.8%	64.5%	62.2%	60.1%	58.0%	56.0%	54.1%	52.2%	50.4%	48.7%	47.1%	45.5%	44.0%	42.5%	41.1%	39.7%	38.4%
48°	77.2%	74.4%	71.8%	69.3%	66.8%	64.5%	62.2%	60.1%	58.0%	56.0%	54.1%	52.2%	50.4%	48.7%	47.1%	45.5%	44.0%	42.5%	41.1%	39.7%	38.4%
49°	80.1%	77.3%	74.5%	71.9%	69.4%	66.9%	64.6%	62.4%	60.2%	58.1%	56.1%	54.2%	52.4%	50.6%	48.9%	47.2%	45.7%	44.1%	42.7%	41.3%	39.9%
49°	80.1%	77.3%	74.5%	71.9%	69.4%	66.9%	64.6%	62.4%	60.2%	58.1%	56.1%	54.2%	52.4%	50.6%	48.9%	47.2%	45.7%	44.1%	42.7%	41.3%	39.9%
50°	83.2%	80.2%	77.4%	74.6%	72.0%	69.5%	67.1%	64.7%	62.5%	60.3%	58.3%	56.3%	54.3%	52.5%	50.7%	49.0%	47.4%	45.8%	44.3%	42.8%	41.4%
50°	83.2%	80.2%	77.4%	74.6%	72.0%	69.5%	67.1%	64.7%	62.5%	60.3%	58.3%	56.3%	54.3%	52.5%	50.7%	49.0%	47.4%	45.8%	44.3%	42.8%	41.4%
51°	86.3%	83.3%	80.3%	77.5%	74.7%	72.1%	69.6%	67.2%	64.8%	62.6%	60.5%	58.4%	56.4%	54.5%	52.7%	50.9%	49.2%	47.5%	46.0%	44.4%	43.0%
51°	86.3%	83.3%	80.3%	77.5%	74.7%	72.1%	69.6%	67.2%	64.8%	62.6%	60.5%	58.4%	56.4%	54.5%	52.7%	50.9%	49.2%	47.5%	46.0%	44.4%	43.0%
52°	89.6%	86.4%	83.3%	80.4%	77.5%	74.8%	72.2%	69.7%	67.3%	65.0%	62.7%	60.6%	58.5%	56.5%	54.6%	52.8%	51.0%	49.3%	47.7%	46.1%	44.6%
52°	89.6%	86.4%	83.3%	80.4%	77.5%	74.8%	72.2%	69.7%	67.3%	65.0%	62.7%	60.6%	58.5%	56.5%	54.6%	52.8%	51.0%	49.3%	47.7%	46.1%	44.6%
53°	92.9%	89.6%	86.4%	83.4%	80.5%	77.6%	74.9%	72.3%	69.8%	67.4%	65.1%	62.9%	60.7%	58.7%	56.7%	54.8%	52.9%	51.2%	49.5%	47.8%	46.3%
53°	92.9%	89.6%	86.4%	83.4%	80.5%	77.6%	74.9%	72.3%	69.8%	67.4%	65.1%	62.9%	60.7%	58.7%	56.7%	54.8%	52.9%	51.2%	49.5%	47.8%	46.3%
54°	96.4%	93.0%	89.7%	86.5%	83.5%	80.5%	77.7%	75.0%	72.4%	69.9%	67.5%	65.2%	63.0%	60.9%	58.8%	56.8%	54.9%	53.1%	51.3%	49.6%	48.0%
55°	100.0%	96.4%	93.0%	89.7%	86.6%	83.5%	80.6%	77.8%	75.1%	72.5%	70.0%	67.6%	65.3%	63.1%	61.0%	58.9%	57.0%	55.1%	53.2%	51.5%	49.8%

Temperature and relative humidity sensors are factory installed inside the unit immediately upstream of the supply air duct opening.

Gas Heater Commissioning

Follow the guidelines below before operating the gas heater:

- Leak test all gas piping up to heater gas valve and smell around the unit for gas.
- Do not try to light burners by hand. This furnace is equipped with a direct spark ignition device that automatically lights the gas burner; it does not have a pilot.
- Only turn gas control knob by hand. Never use tools. If the knob does not operate by hand, replace the gas valve prior to starting the unit.
- Do not attempt to operate unit if there is indication that any part or control has been under water. Any control or component that has been under water must be replaced prior to starting the unit.

DANGER

Using tools to operate gas control knob or attempting to repair the gas valve may result in fire or explosion.

Heater Start-Up Procedure

1. Set the unit's main mode to Off.
2. Turn off gas supply at the manual shut-off valve.
3. Turn off power to the whole unit.
4. Open the unit's control panel door to access heater.
5. Move gas control knob to "Off" position.
6. Install a tapped fitting in the inlet pressure tap for attachment to a manometer or other gauge suitable for 14.0" w.c.
7. Install a tapped fitting in the manifold pressure tap for attachment to a manometer or other gauge suitable for 10.0" w.c.
8. Wait 5 minutes for any gas to clear out. If you smell gas: find leak and correct to then go back to Step 2 above.
9. Turn gas control knob to "On" position.
10. Open all manual gas valves.
11. Turn on power to the whole unit.
12. Lower heating temperature set point to several degrees below outdoor air temperature and set the main mode to On to initiate a call for heat.

After the Start-Up Procedure is completed, the draft inducer will run for 15 to 30 seconds as a pre-purge period. At the end of the pre-purge the direct spark will be energized, and the gas valve will open.

After the gas valve opens, and the initial 30 second warm up has passed, both the low and high fire manifold gas pressures should be checked. To check, attach a manometer to the manifold pressure tap, and command the gas heater to 20%, or minimum fire. Low fire manifold gas pressure should fall between 0.25"-0.32" w.c. Next, command the heater to 100%, or maximum fire. High fire manifold gas pressure should be between 3.4"- 3.5" w.c.

If either setting is out of range, use the following instructions to make adjustments:

1. Command Heater to 20%, or minimum fire. Once flames have stabilized, turn the mod-combo valve adjustment dial clockwise to increase manifold pressure, or counter-clockwise to decrease manifold pressure. See page 52 and refer to the diagram for mod-combo valve location - 36J27 for Cabinet A and 36H27 for Cabinet B.
2. After low fire manifold pressure is set, command the Heater to 100%, or maximum fire. Once the flames have stabilized, use the same the mod-combo valve adjustment dial used to adjust low fire manifold pressure to adjust high fire manifold pressure. Turning the adjustment dial clockwise to increase manifold pressure, or counter-clockwise to decrease manifold pressure.

WARNING

The discharge air temperature leaving the heater should never rise above 120°F. Running the discharge air above 120°F could cause damage to other system components and will likely cause a high temperature cutout. This may mean that high manifold gas pressure cannot be tested during periods where entering air temperatures are above 70°F.

NOTICE

Do not attempt to adjust manifold gas pressure during initial warm up, or while heater is modulating up or down. Only attempt to adjust pressures when the heater has reached a steady state.

The burner should now operate normally. If the burner is operating normally perform the following:

1. Verify inlet gas pressure to the combination gas valve provided. A 1/8 NPT tapping is provided on the valve for measuring inlet pressure. See figure for Gas Valve adjustment locations.
2. Check manifold pressure. The correct heat capacity of the furnace is controlled by the burner orifices and manifold pressure. The manifold pressure was set at the heater factory, but it should be checked during commissioning. All control systems operate at a manifold pressure of 3.40 to 3.50“ w.c. at maximum input on Natural Gas and 10.0“ w.c. on Propane Gas.
3. Check appearance of the main burner flame.

Burner Flames

The flame should be predominately blue in color, well defined and centered at the tube entry as shown in the figures below. See examples of bad looking flames and their respective possible solutions.

Slightly distorted flame or yellow tipping

This may be caused by lint and dirt accumulation inside burner or at burner ports, at air inlet between burner and manifold pipe, or debris in the main burner orifice.

Possible Solutions:

- Clean and vacuum affected areas using a soft brush as needed.

Poorly defined or substantially yellow flames

This may be caused by poor air supply to burners or excessive burner input.

Possible Solutions:

- Verify gas supply type and manifold pressure with rating plate information.
- Inspect for obstructions or blockage in heat exchanger tubes or vent discharge pipe. Clean as necessary to eliminate blockage.
- Vacuum any dirt or loose debris.
- Clean heat exchanger tubes with stiff brush.

General poor flame characteristics

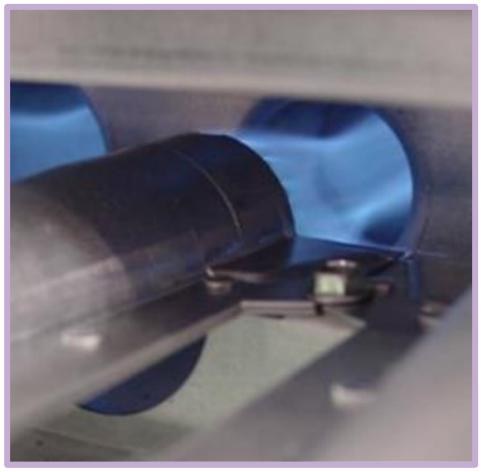
This may be caused by undersized combustion air openings, flue gas recirculation into combustion air supply, or reduced air delivery due to fan blade slippage, dirt accumulation on the fan blade or low voltage to draft inducer motor.

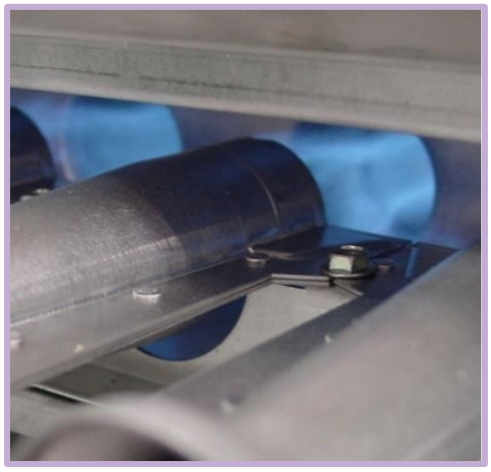
Possible Solutions:

- Increase air opening size.
- Re-direct flue products.

Reduced Air Delivery Solutions:

- Increase Inspect draft fan assembly. Ensure blade is secure to motor shaft.
- Clean fan blade.
- Check line voltage to heater.





Failure to Ignite

On the first start-up procedure, or after unit has been off for long periods of time, the first ignition trial may be unsuccessful. If ignition does not occur on the first trial, the gas and spark are shut-off by the ignition control and the control enters an inter-purge period of 15 to 90 seconds, during which time the draft inducer continues to run. At the end of the inter-purge period, another trial for ignition will be initiated. Control will try to ignite three times before lockout of control occurs.

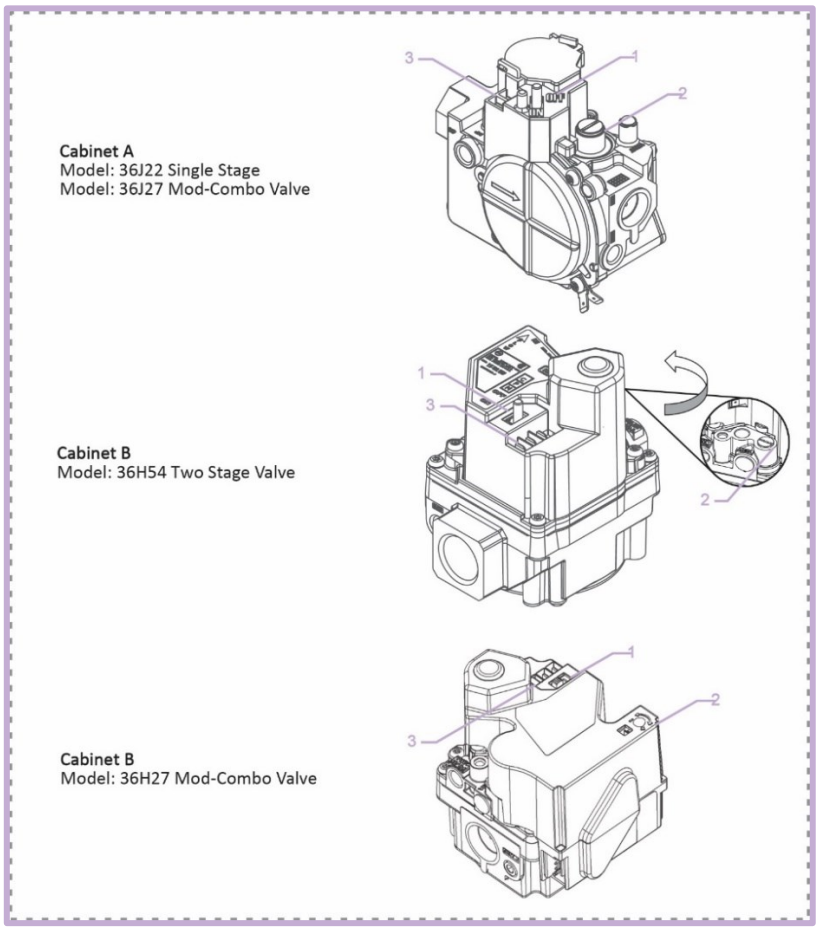
During normal operation, If the thermostat is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call-for-heat sequence. The ignition control may also be manually reset by turning of the gas heater circuit breaker on the unit's low-voltage panel for 5 seconds and then restoring power.

Furnace Operation

Follow the touch terminal operation instructions outlined in Page 39 to operate burner.

Valves Diagrams

Find below diagrams for each valve used in both unit cabinet sizes. The following components: Manual Shut-off (1), Manifold Pressure adjustment (2) and Electrical Connections (3) are represented on each valve diagram. Note that the Manifold Pressure adjustment bolt may have a brass cap that has to be removed before adjusting it. Always use a plastic screw to adjust.



Heater Shutdown

Follow instructions below to turn off heater to complete commissioning:

1. Turn the unit's main mode to off and reset heating temperature set point to a typical value.
2. Turn off electrical supply to unit at disconnect switch.
3. Turn off manual gas supply.
4. Disconnect manifold and inlet pressure taps and install pipe plugs.

Rollout Switch (Manual Reset)

The duct furnace is equipped with manual reset rollout switch(es) in the event of burner flame rollout. The switch will open on temperature rise and shut-off gas supply through the ignition control module. Flame rollout can be caused by insufficient airflow for the burner firing rate (high gas pressure), blockage of the vent system or in the heat exchanger. The furnace module should not be placed back in operation until the cause of rollout condition is identified. The rollout switch can be reset by pressing the button on the top of the switch.

High Limit Switch

The duct furnace is equipped with a fixed temperature high limit switch mounted on the vestibule panel that shuts off gas to the heater through the ignition control module in the event of reduced circulating airflow over the heat exchanger. Reduced airflow may be caused by dirty or blocked filters, restriction of the air inlet or outlet to the unit, or incorrect setting of supply fan speed. The high limit switch will automatically reset when the switch temperature drops to 30°F below its set point. Determine the cause of the reduced air flow and correct.

Start-Up Checklists

All installation and service of Mojave equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Mojave and conform to all requirements set forth in the Mojave manuals and all applicable governmental authorities pertaining to the installation, service operation and labeling of the equipment.

Check installation site to ensure all codes and engineering specifications are correct. Fill out the provided start up sheet as each step of the procedure is performed. This procedure should be completed by the commissioning contractor and returned to Mojave.

Unit Maintenance

WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater) Do not pierce or burn. Be aware that refrigerants may not contain an odor.

WARNING

Ensure that the area is open or that it is adequately ventilated before breaking into the system and/or conducting hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

WARNING

Ducts connected to the unit shall not contain a potential ignition source.

Note: for appliances using A2L refrigerants, connected via an air duct to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct.

WARNING

This unit uses refrigerant R-454B, an A2L refrigerant. Service shall be performed only by competent personnel qualified to work with A2L refrigerants.

WARNING

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems:

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for use with R-454B. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Follow procedure for refrigerant removal.

NOTICE

Check that cabling will not be subject to wear, corrosion, excessive pressures, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors fans.

WARNING

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with R-454B.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

WARNING

Perform safety checks to ensure that the risk of ignition is minimized. Work shall be undertaken under a controlled procedure so as to minimize the risk of flammable gas or vapor being present while the work is being performed.

NOTICE

Intrinsically safe components must be replaced.

WARNING

Sealed electrical components shall be replaced.

NOTICE

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.

When performing maintenance, check the following:

- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
- Refrigerating pipe and components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being corroded.

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering, or purging the system;
- That there is continuity of earth bonding.

Working With A2L Flammable Refrigerants

This appliance is only intended for outdoor operation and service. Only service this unit outdoors or in a well-ventilated indoor space specifically outfitted for working with flammable refrigerants.

That pipework including piping material, pipe routing, and installation shall include protection from physical damage in operation and service and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52.

This unit uses R-454B, an A2L refrigerant, and does not have an integrated refrigerant monitoring system. In order for refrigerant monitoring to not be required, the indoor floor area served by the air duct system attached to the unit must exceed the value in the table below. To use the table, determine the lowest duct height in the indoor space and find the corresponding row in the table (rounding down to the next lower entry if necessary). Then read the indoor area from the column corresponding to the correct ArctiDry unit. If the indoor area served by the unit is less than the value in the table, other refrigerant leak mitigation measures must be used.

Refrigerant R-454B Charge

Unit	lb	kg
ADA-020	17.6	8.0
ADA-025	23.8	10.8
ADB-025	33.4	15.2
ADB-040	38.3	17.4
ADB-T50	50.7	23.0
ADB-T60	60	27.3

Refrigerant Safety Group A2L

Floor Area

Duct height from floor		ADA-020		ADA-025		ADB-025		ADB-040		ADB-T50		ADB-T60	
ft	*m*	*ft²*	*m²*	*ft²*	*m²*	*ft²*	*m²*	*ft²*	*m²*	*ft²*	*m²*	*ft²*	*m²*
2.0	0.6	6,058	563	11,042	1,026	21,871	2,032	28,660	2,663	50,275	4,671	70,293	6,530
3.3	1.0	2,181	203	3,975	369	7,874	731	10,318	959	18,099	1,681	25,306	2,351
5.9	1.8	673	63	1,227	114	2,430	226	3,184	296	5,586	519	7,810	726
7.2	2.2	451	42	821	76	1,627	151	2,132	198	3,739	347	5,228	486
10.0	3.0	235	22	428	40	848	79	1,111	103	1,948	181	2,724	253
12.0	3.7	163	15	297	28	589	55	771	72	1,353	126	1,892	176
15.0	4.6	124	12	190	18	377	35	494	46	866	80	1,211	112

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the unit is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Service to Mojave equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Mojave and conform to all requirements set forth in the Mojave manuals and all applicable governmental authorities pertaining to the installation, service, operation, and labeling of the equipment. Prior to any maintenance or service to the unit, shut off, lockout and tagout the electrical disconnect and gas valve that supplies the unit in accordance with OSHA regulations. After maintenance is performed or the unit is serviced, the unit shall be re-commissioned per the start-up procedure outlined in Page 39.

Maintenance Schedule

Follow the schedule below to ensure timely maintenance.

Maintenance Schedule		
System/Item	**Quarterly**	**Yearly**
Whole Unit	-	Inspect
Fans	-	Inspect
Evaporator Coils	-	Inspect
Air Filters	Replace	-
Desiccant Filters	Inspect	Clean
Coils	-	Inspect
Motors	Inspect	-
ERV Belt	-	Inspect
All Moving Parts	-	Inspect

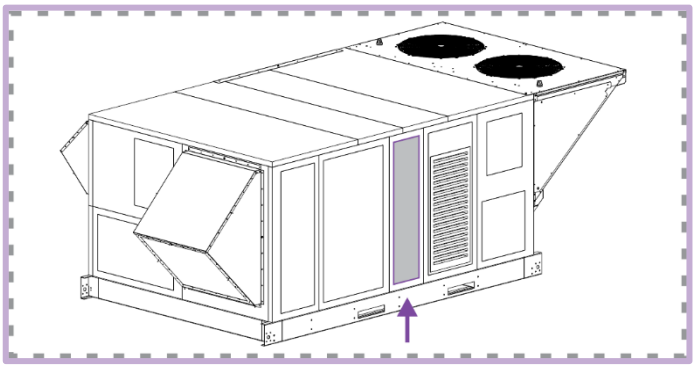
Furthermore, follow the guidelines listed in the following pages to properly maintain each component.

Cabinet A Desiccant Filters

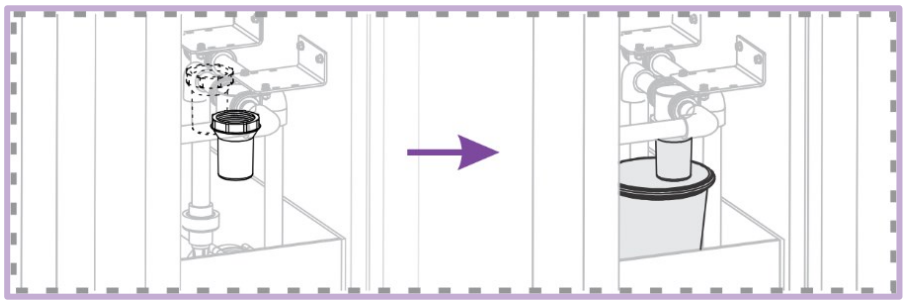
Follow the instructions below to perform a maintenance procedure when indicated by the maintenance schedule. The use of personal protective equipment is recommended for this procedure. Rubber gloves and eye protection are required.

Procedure Instructions:

1. Shut unit off following the Shut Down procedure as explained in Page 39.
2. Wait at least 10 minutes after shutting off the unit before continuing any further to allow the manifold to drain and for desiccant to stop flowing.
3. Locate and open the process side absorber maintenance door shown below:

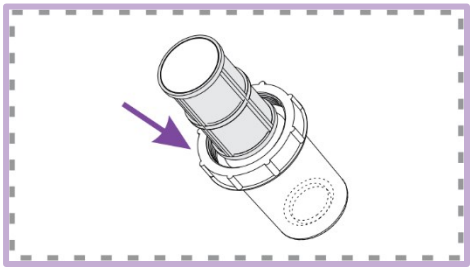


4. Locate the two “T” strainers and place an open bucket directly below both strainers. Slowly unscrew the filter housing from the filter base. Excess desiccant will fall into the buckets.

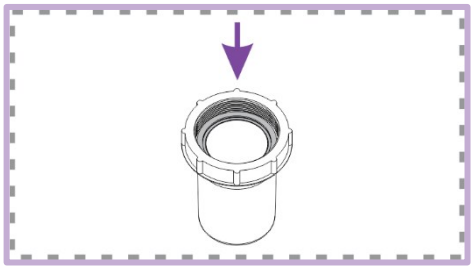


5. Pour out the liquid from the filter housing into the bucket and remove filter screen.
6. Look for any signs of damage on both filters. If the filters are not damaged, proceed to Step 7. If the filters show damage replace them and skip the following steps until Step 10.
7. Temporarily install filter housing back in leaving the filter out for cleaning. This will capture any desiccant during the filter cleaning process.

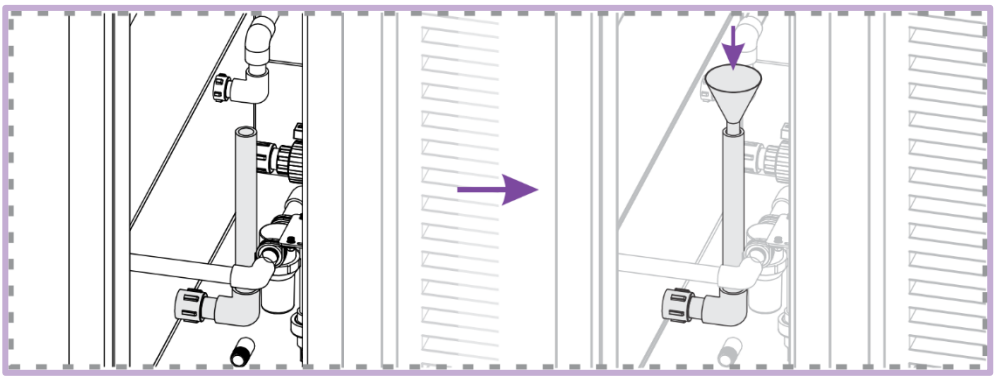
8. Rinse filter screen with water carefully and thoroughly. If you rinse the filter over a metal surface, like a sink, be sure to rinse all desiccant down the drain. As a safety measure, run an additional 1 gallon of water on the sink to rinse off any desiccant remains.
9. Inspect filter carefully. Look for any debris that may be clogging the filter screen. If debris cannot be removed, dispose and replace filter.
10. Install filter basket into filter housing, as shown in the diagram below. Make sure that the filter is tightly installed around the circular base inside the housing. If installed correctly, the filter should stay firmly in place and not be able to fall out of the housing.



11. Double check that the filter is centered in the bowl and the gasket is present, as shown in the diagram below.



12. Screw in housing into filter base by hand tightening it only. **Do not use tools.**
13. Locate sight glass. Pour any desiccant that was captured during this process into the sight glass of the absorber using a plastic funnel.



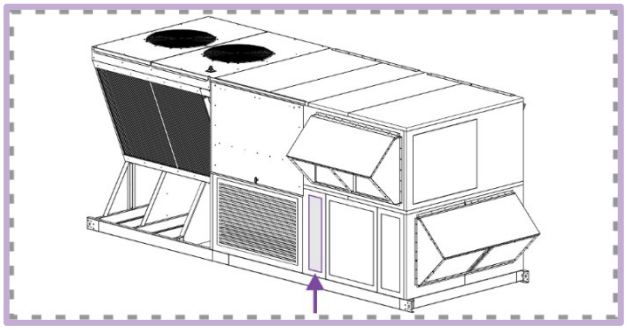
14. Lastly, make sure to rinse off any desiccant spills with clean water and wipe the surface dry using shop towels.

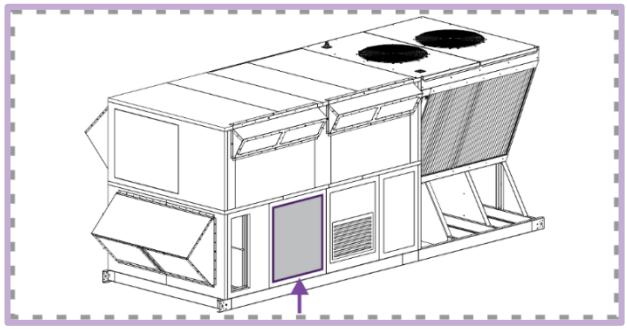
Cabinet B Desiccant Filters

Follow the instructions below to perform a maintenance procedure when indicated by the maintenance schedule. The use of personal protective equipment is recommended for this procedure. Rubber gloves and eye protection are required.

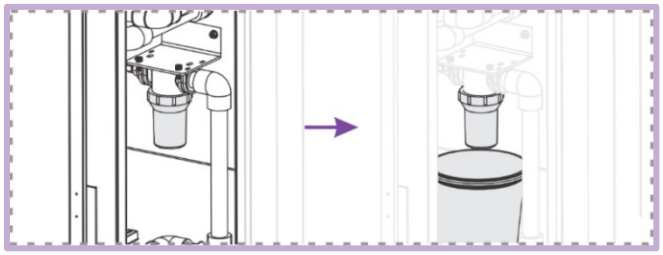
Procedure Instructions:

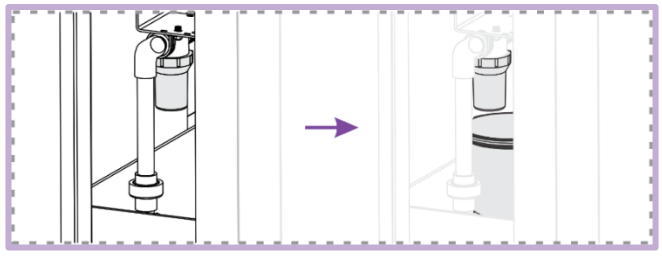
1. Shut unit off following the Shut Down procedure as explained in Page 39.
2. Wait at least 10 minutes after shutting off the unit before continuing any further to allow the manifold to drain and for desiccant to stop flowing.
3. Locate and open the process side absorber maintenance doors shown below:



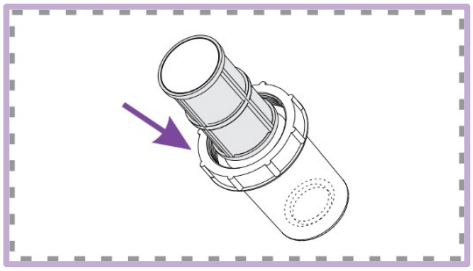


4. Locate the two “T” strainers and place an open bucket directly below both strainers. One will be located by the right side of the unit and the other one on the opposite side, as shown in the diagrams below. Slowly unscrew the filter housing from the filter base. Excess desiccant will fall into the buckets.

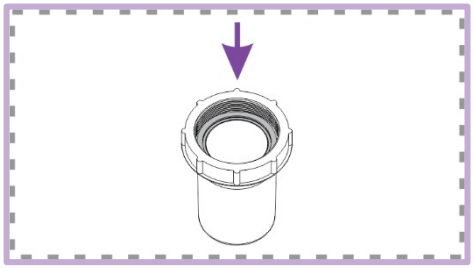




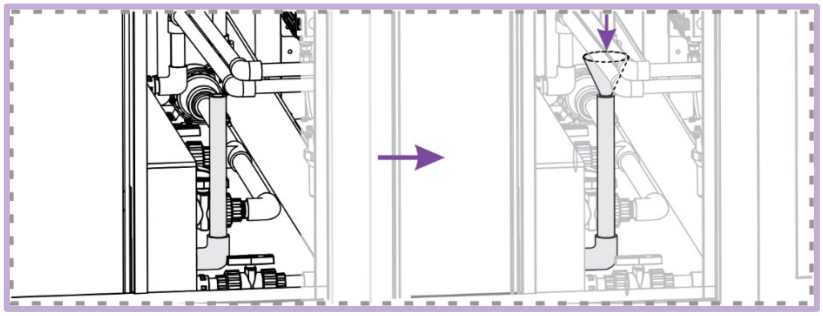
5. Pour out the liquid from the filter housing into the bucket and remove filter screen.
6. Look for any signs of damage on both filters. If the filters are not damaged, proceed to Step 7. If the filters show damage replace them and skip the following steps until Step 10.
7. Temporarily install filter housing back in leaving the filter out for cleaning. This will capture any desiccant during the filter cleaning process.
8. Rinse filter screen with water carefully and thoroughly. If you rinse filter over a metal surface, like a sink, be sure to rinse all desiccant down the drain. As a safety measure, run an additional 1 gallon of water on the sink to rinse off any desiccant remains.
9. Inspect filter carefully. Look for any debris that may be clogging the filter screen. If debris cannot be removed, dispose and replace filter.
10. Install filter basket into filter housing, as shown in the diagram at right. Make sure that filter is tightly installed around the circular base inside the housing. If installed correctly, the filter should stay firmly in place and not be able to fall out of the housing.



11. Double check filter is centered in the bowl and the gasket is present, as shown in the diagram below.



12. Screw in housing into filter base by hand tightening it only. **Do not use tools.**
13. Locate sight glass. Pour any desiccant that was captured during this process into the sight glass of the absorber using a plastic funnel.



14. Lastly, make sure to rinse off any desiccant spills with clean water and wipe the surface dry using shop towels.

Air Filters

Follow the instructions below to perform inspection to each respective coil type.

There is a 6” deep filter rack upstream of the supply air coil and a 2” deep filter rack upstream of the regen air coil. If the unit is equipped with an ERV, it also has 2” deep air filters. Replace filters with filters of equal specification when they appear dirty. Their locations, dimensions and quantities are listed below:

Filter Specifications

Filter	Cabinet A		Cabinet B	
	Dimensions	Quantity	Dimensions	Quantity
2” Prefilter	18” x 36”	3	22” x 36”	4
4” Coil Filter	18” x 36”	3	22” x 36”	4
2” Regen Coil Filter	23” x 25”	2	30” x 36”	2
2” ERV Filter	22” x 26” x 2”	2	29” x 29” x 2”	4
	18” x 20” x 2”	2		

Evaporator Coil Filters

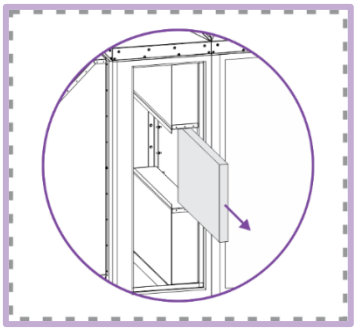
Follow the instructions below for the respective unit you’d like to perform a filter maintenance procedure.

Cabinet A Instructions

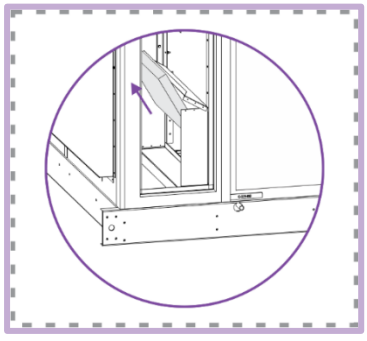
There are six (6) filters in total for Cabinet A’s evaporator coil. All filters can be accessed through one door. To locate this door, face the side of the unit with no hoods and look for the left most door.

1. Open door to access all filters.

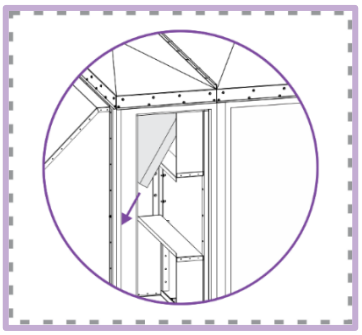
2. On the filter rack, there is a 2” filter and a 4” filter on each shelf. Slide out the filters located on the middle shelf first, removing the 4” filter first, then pulling out the 2” filter, as shown at right:



3. Proceed to remove the filters in the bottom shelf by sliding them out while tilting and pivoting them from the bottom edge while lifting the rack’s top bracket as shown at right. Remove one filter at a time.



4. To remove the filters in the top shelf; slide them out while tilting them and pivoting them from the top edge as shown at right. Remove one filter at a time.



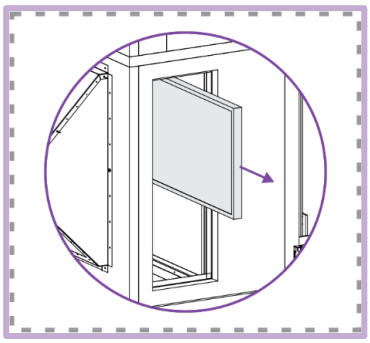
5. Install new or clean filters by following these instructions in reverse order. The 2” filters should sit upstream of the 4” filters.

6. Make sure to close the door once the procedure is completed.

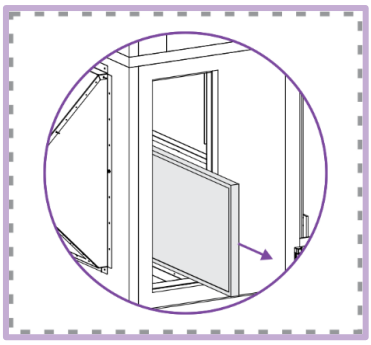
Cabinet B Instructions

There are eight (8) filters in total for Cabinet B’s evaporator coil. Four filters can be accessed on the right side of the unit and the other four on the left side of the unit. To access the filters on the right side of the unit, face the right side of the unit and look for the left most door. To access the filters on the left side of the unit, face the left side of the unit and look for the right most door.

1. Start by opening the access door on the right side of “ the unit.



2. On the filter rack, you’ll find a 2” filter and a 4” filter on each shelf. Remove the filters in the top shelf by simply pulling them towards you and sliding them out, as shown at right. Remove one filter at a time.



3. Then remove the filters in the bottom shelf by sliding them out while tilting and pivoting them from the bottom edge while lifting the rack bracket up as shown at right. Remove one filter at a time.

4. Repeat Steps 1 through 3 to remove filters on the left side of the unit.

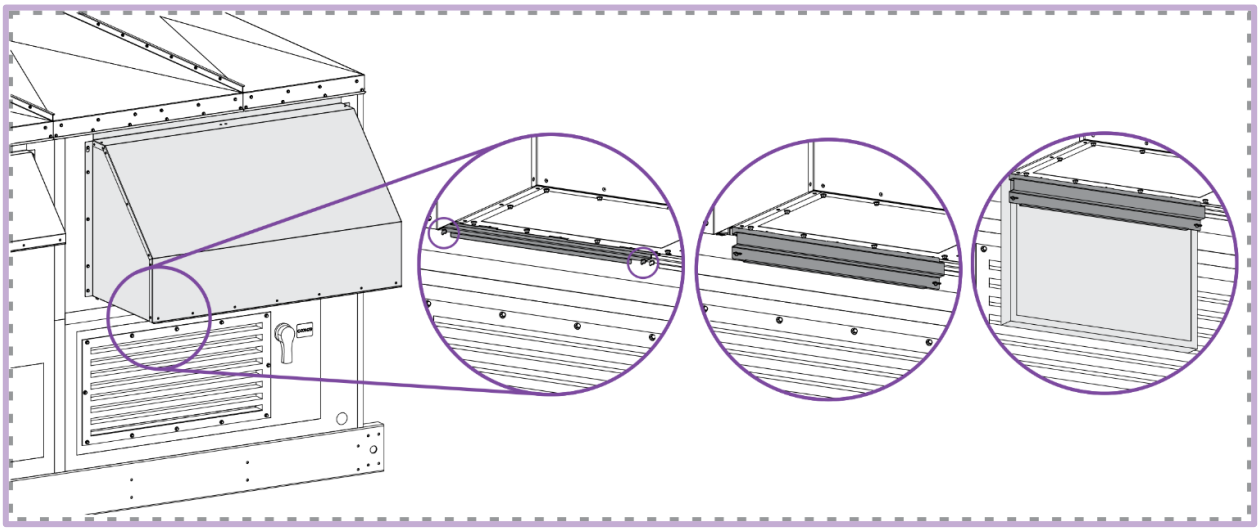
5. Install new or clean filters by following these instructions in reverse order.

6. Make sure to close the door once the procedure is completed.

Regeneration Condenser Coil Filters

Follow the instructions below to perform a Regeneration Condenser Coil filter maintenance procedure for either cabinet. Both cabinets are equipped with two 2” filters, these are located inside the inlet hood just before the Regeneration Condenser Coil.

1. To access the filters, disengage the quarter turn fasteners located at the bottom of the hood, as shown below.
2. Open the filter door towards yourself.
3. Remove filters by sliding them out.
4. Repeat Steps 1 through 3 to remove the second filter.
5. To insert new or clean filters, follow the steps outlined above in reverse order.



Coil Cleaning

All coils should be cleaned when they are dry.

Regen Condenser Coil Cleaning

1. Remove filters from regen inlet hood
2. Inspect the front of the coil for debris, and if the coil is coated with dirt or lint:
    a. Open regen coil cleaning port on the front of the unit
    b. Insert nozzle through cleaning port
    c. Direct compressed air or pressurized water at the back side of the regen coil to remove debris
    d. Do not use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance
    e. If using pressurized water, wait until it is dry before reinstalling the filters

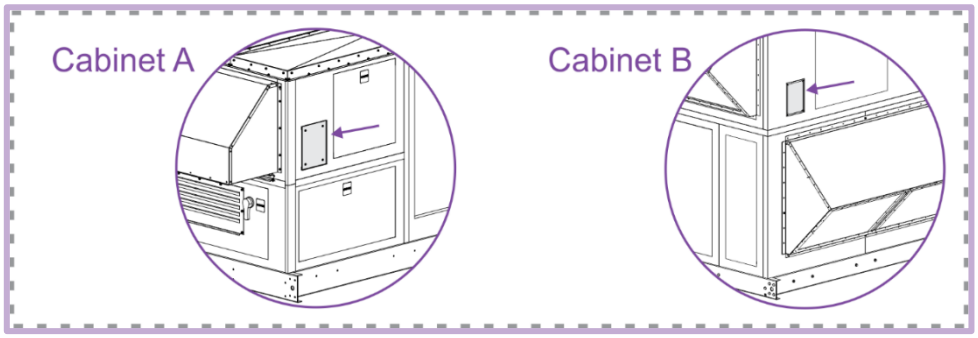
External Condenser Coil Cleaning

1. Inspect the front of the coil for debris
2. If coil is coated with dirt or lint:
    a. Wipe the face of the coil with a cloth or vacuum it with a soft brush attachment. Be careful not to bend the coil fins
    b. Alternatively, enter the external condenser assembly through the access door.
    c. Direct compressed air or pressurized water at the back side of the external condenser coil to remove debris
    d. Do not use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance

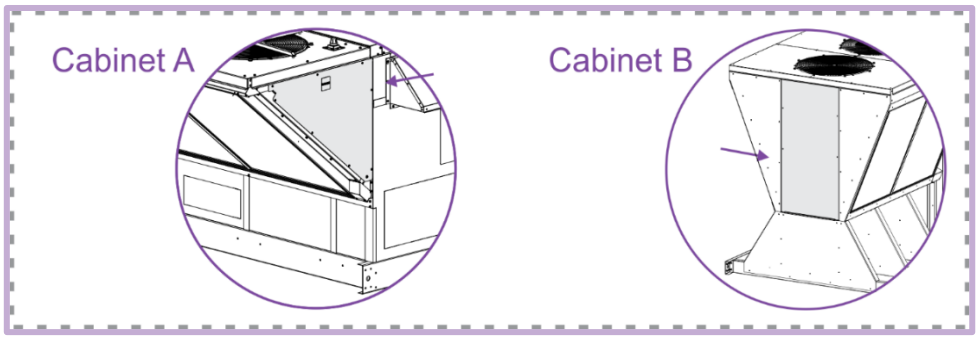
Evaporator Coil Cleaning

1. Remove filters from the process filter rack
2. Inspect the front of the coil for debris and if the coil is coated with dirt or lint:
    a. Wipe the face of the coil with a cloth or vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
    b. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water.
    c. Do not use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance.
    d. Be careful not to splash water excessively into unit or into the absorber or desorber. If necessary, block the entrance to the absorber or desorber with a piece of plywood or sheet metal.

Regen Coil Port Locations



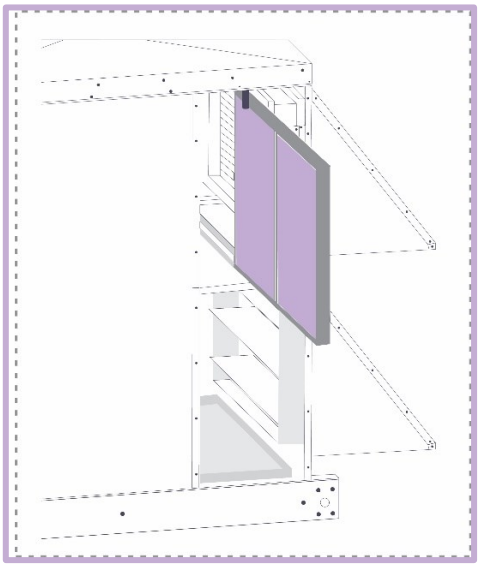
External Condenser Access Door Locations



ERV Filters

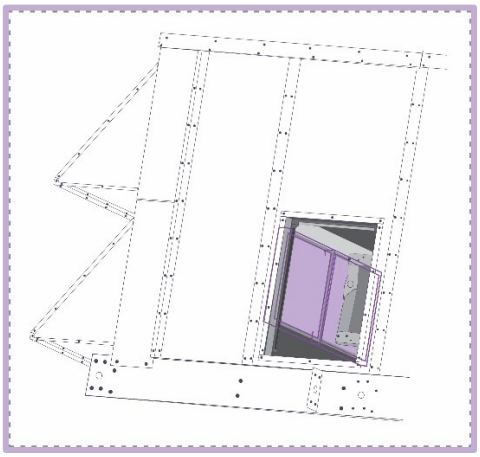
ADA Outside Air Filters:

- Install through door on left side of ERV.
- Slide first filter into channel until contacting the furthest wall of the ERV.
- Slide second filter in channel until it clears the door frame.



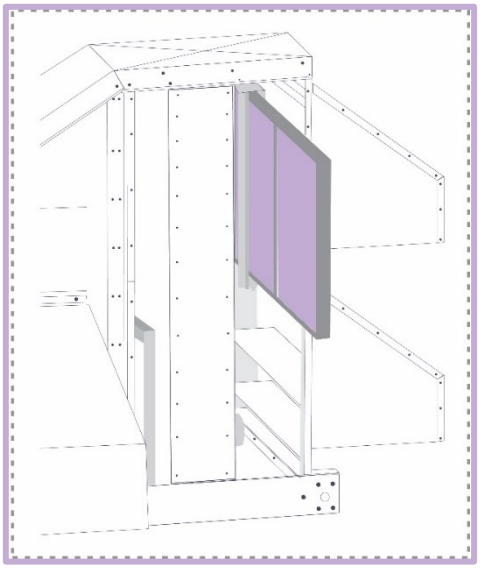
ADA Return Air Filters:

- Install through door on right side of ERV.
- Tilt into filter rack, lift up to clear bottom edge of filter, and then drop filter into place.
- Slide first filter further into unit to make room for the second filter and repeat install steps.



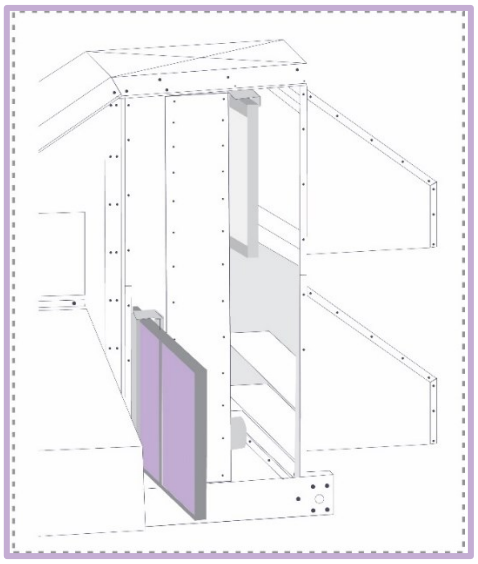
ADB Outside Air Filters:

- Access through large door on left side.
- Slide first filter into channel until contacting the internal wall of the ERV.
- Slide second filter until it contacts the first filter.



ADB Return Air Filters:

- Access through large door on left side.
- Remove outer filter first.
- Use pull tab to remove inner filter.
- Reinsert pull tab before installing new filters.
- Slide first filter into channel until contacting the internal wall of the ERV.
- Slide second filter until it contacts the first filter.



Electric Components Resetting

Motor Protection Circuit Breaker

The Motor Protection Circuit Breaker (MPCB) provides coordinated branch circuit, short circuit protection, a disconnecting means, a motor controller, and motor overload protection. The MPCB trip points are factory set. Do not change unless the motor ampacity changes or the MPCB is replaced with a new device with incorrect setpoint adjustment. Any other non-authorized trip point or setpoint adjustment voids all or portions of the unit's warranty.

Thermal Overload Relay

Designed to provide current-dependent protection for loads with normal starting against impermissibility high temperature rises due to overload, phase asymmetry or phase failure. An increase in motor current beyond the set point can result in an overload or phase failure that will trip the overload and disconnect the motor. The Relay trip points are factory set. Do not change unless the motor ampacity changes, or the Relay is replaced with a new device with incorrect set point adjustment. Any other non-authorized adjustment to the trip points or set points will void all or portions of the unit's warranty.

Circuit Breaker

Circuit breakers are installed all throughout the unit's electrical circuit to provide short-circuit protection. These breakers are not adjustable. If a breaker is tripped, the handle/lever will be halfway between the "OFF" and "ON" positions. To reset a tripped circuit breaker:

1. Press the handle or rotate the lever to the OFF position.
2. Press the handle or rotate the lever the opposite direction to the ON position.

Fuses

Electric heaters use Type K fuses. All other fuses are Type J. The unit's electrical diagram also lists fuse sizes. The following table is provided for reference only.

Variable Speed Compressor Fuses

Unit Configuration Code	Voltage	Size	Fuse
ADA-020C***-****-*****-**-***-*****	208	20 tons	100
ADA-020B***-****-*****-**-***-*****	230	20 tons	100
ADA-020A***-****-*****-**-***-*****	460	20 tons	60
AD*-025C***-****-*****-**-***-*****	208	25 tons	125
AD*-025B***-****-*****-**-***-*****	230	25 tons	125
AD*-025A***-****-*****-**-***-*****	460	25 tons	70
ADB-040C***-****-*****-**-***-*****	208	40 tons	125
ADB-040B***-****-*****-**-***-*****	230	40 tons	125
ADB-040A***-****-*****-**-***-*****	460	40 tons	80

Supply Fan Fuses

Unit Configuration Code	Voltage	Size	Fuse
ADA-***C***-NP**-*****-**-***-*****	208	1.3 kW	6
ADA-***B***-NP**-*****-**-***-*****	230	1.3 kW	6
ADA-***A***-NP**-*****-**-***-*****	460	1.3 kW	3
ADB-***C***-PP**-*****-**-***-*****	208	4.4 kW	20
ADB-***B***-PP**-*****-**-***-*****	230	4.4 kW	20
ADB-***A***-PP**-*****-**-***-*****	460	4.4 kW	10
ADB-***A***-SS**-*****-**-***-*****	460	7.8 kW	15
ADA-***C***-QP**-*****-**-***-*****	208	4.4 kW	20
ADA-***B***-QP**-*****-**-***-*****	230	4.4 kW	20
ADA-***A***-QP**-*****-**-***-*****	460	4.4 kW	10
ADB-***C***-SP**-*****-**-***-*****	208	4.4 kW	20
ADB-***B***-SP**-*****-**-***-*****	230	4.4 kW	20

Fixed Speed Compressor Fuses

Unit Configuration Code	Voltage	Size	Fuse
ADB-T50C***-****-*****-**-***-*****	208	50 tons	80
ADB-T50B***-****-*****-**-***-*****	230	50 tons	80
ADB-T50A***-****-*****-**-***-*****	460	50 tons	50
ADB-T60C***-****-*****-**-***-*****	208	60 tons	115
ADB-T60B***-****-*****-**-***-*****	230	60 tons	115
ADB-T60A***-****-*****-**-***-*****	460	60 tons	80

Regen Fan (EC Motor)

Unit Configuration Code	Voltage	Size	Fuse
ADA-***C***-**QP-*****-**-***-*****	208	1.2 kW	6
ADA-***B***-**QP-*****-**-***-*****	230	1.2 kW	6
ADA-***A***-**QP-*****-**-***-*****	460	1.2 kW	3
ADB-***C***-**RP-*****-**-***-*****	208	3.2 kW	15
ADB-***B***-**RP-*****-**-***-*****	230	3.2 kW	15
ADB-***A***-**RP-*****-**-***-*****	460	3.2 kW	10

Regen Fan (AC Motor)

Unit Configuration Code	Voltage	Size	Fuse
ADA-***C***-**DC-*****-**-***-*****	208	1 hp	10
ADA-***B***-**DC-*****-**-***-*****	230	1 hp	10
ADA-***A***-**DC-*****-**-***-*****	460	1 hp	3.5
ADB-***C***-**FC-*****-**-***-*****	208	3 hp	15
ADB-***B***-**FC-*****-**-***-*****	230	3 hp	15
ADB-***A***-**FC-*****-**-***-*****	460	3 hp	10

External Condenser Fan (EC Motor)

Unit Configuration Code	Voltage	Size	Fuse
ADA-***C***-****-*****-**-***-*****	208	2 x 2.3 kW	10
ADA-***B***-****-*****-**-***-*****	230	2 x 2.3 kW	10
ADA-***A***-****-*****-**-***-*****	460	2 x 2.3 kW	6
ADB-***C***-****-*****-**-***-*****	208	2 x 3.1 kW	20
ADB-***B***-****-*****-**-***-*****	230	2 x 3.1 kW	20
ADB-***A***-****-*****-**-***-*****	460	2 x 3.1 kW	10

External Condenser Fan (AC Motor)

Unit Configuration Code	Voltage	Size	Fuse
ADA-***C***-****-*****-**-***-*****	208	2 x 1.5 hp	15
ADA-***B***-****-*****-**-***-*****	230	2 x 1.5 hp	15
ADA-***A***-****-*****-**-***-*****	460	2 x 1.5 hp	10
ADB-***C***-****-*****-**-***-*****	208	2 x 5 hp	60
ADB-***B***-****-*****-**-***-*****	230	2 x 5 hp	60
ADB-***A***-****-*****-**-***-*****	460	2 x 5 hp	35

Electric Heater

Unit Configuration Code	Voltage	Size	Fuse
ADA-***AE20-****-*****-**-***-*****	460	20 kW	35
ADA-***AE30-****-*****-**-***-*****	460	30 kW	50
ADA-***AE40-****-*****-**-***-*****	460	40 kW	70
ADA-***AE45-****-*****-**-***-*****	460	45 kW	70
AD*-***AE50-****-*****-**-***-*****	460	50 kW	80
ADB-***AE60-****-*****-**-***-*****	460	60 kW	100
ADB-***AE70-****-*****-**-***-*****	460	70 kW	110
ADB-***AE80-****-*****-**-***-*****	460	80 kW	125
ADB-***AE90-****-*****-**-***-*****	460	90 kW	150
ADA-***BE20-****-*****-**-***-*****	230	20 kW	70
ADA-***BE30-****-*****-**-***-*****	230	30 kW	100
ADA-***BE40-****-*****-**-***-*****	230	40 kW	125

Electric Heater (Continued)			
Unit Configuration Code	**Voltage**	**Size**	**Fuse**
ADA-***BE45-****-*****-**-***-*****	230	45 kW	150
ADB-***BE50-****-*****-**-***-*****	230	50 kW	175
ADB-***BE60-****-*****-**-***-*****	230	60 kW	200
ADB-***BE70-****-*****-**-***-*****	230	70 kW	225
ADB-***BE80-****-*****-**-***-*****	230	80 kW	250
ADB-***BE90-****-*****-**-***-*****	230	90 kW	300
ADA-***CE20-****-*****-**-***-*****	208	20 kW	70
ADA-***CE30-****-*****-**-***-*****	208	30 kW	110
ADA-***CE40-****-*****-**-***-*****	208	40 kW	150
ADA-***CE45-****-*****-**-***-*****	208	45 kW	175
ADB-***CE50-****-*****-**-***-*****	208	50 kW	175
ADB-***CE60-****-*****-**-***-*****	208	60 kW	225
ADB-***CE70-****-*****-**-***-*****	208	70 kW	250
ADB-***CE80-****-*****-**-***-*****	208	80 kW	300
ADB-***CE90-****-*****-**-***-*****	208	90 kW	350

Exhaust Fan Fuses			
Unit Configuration Code	**Voltage**	**Size**	**Fuse**
ADA-***C***-****-*****-**-*OP-*****	208	1.3 kW	6
ADA-***B***-****-*****-**-*OP-*****	230	1.3 kW	6
ADA-***A***-****-*****-**-*OP-*****	460	1.3 kW	6
ADB-***C***-****-*****-**-*PP-*****	208	4.4 kW	20
ADB-***B***-****-*****-**-*PP-*****	230	4.4 kW	20
ADB-***A***-****-*****-**-*PP-*****	460	4.4 kW	10
ADB-***A***-****-*****-**-*PP-*****	460	4.4 kW	10
ADB-***A***-****-*****-**-*PP-*****	460	4.4 kW	10
ADB-***A***-****-*****-**-*PP-*****	460	4.4 kW	10

ERV Wheel VFD				
Unit Configuration Code	**Voltage**	**Size**		**Fuse**
ADA-***C***-****-*****-**-[A,C]**-*****	208	0.25	hp	10
ADA-***B***-****-*****-**-[A,C]**-*****	230	0.25	hp	10
ADA-***A***-****-*****-**-[A,C]**-*****	460	0.25	hp	3.5
ADB-***C***-****-*****-**-[B,D]**-*****	208	0.25	hp	10
ADB-***B***-****-*****-**-[B,D]**-*****	230	0.25	hp	10
ADB-***A***-****-*****-**-[B,D]**-*****	460	0.25	hp	3.5

120VAC Transformer				
Unit Configuration Code	**Voltage**	**Size**		**Fuse**
AD*-*******-****-*****-**-***-*****	208	1.5	kVA	15
AD*-*******-****-*****-**-***-*****	230	1.5	kVA	12
AD*-*******-****-*****-**-***-*****	460	1.5	kVA	6

Other	
Unit Configuration Code	**Fuse**
Power Monitor	2
Crankcase Heater	2
Transformer 24VAC	2

Field Wiring Terminals

All field wiring terminals are push-in cage clamp type. Wire connections require inserting 1/2 in of stripped wire into the push-in cage clamp.

Phase Voltage Monitor (PVM)

The phase voltage monitor is designed to protect three-phase loads from damaging power conditions. A microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, its output relay is deactivated after a specified trip delay (Trip Delay). The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (Restart Delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

Bearing Lubrication

All fan motors on the unit are permanently lubricated and require no periodic lubrication.

Vibration Levels

Each unit as shipped is trim balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use accepted industry guidelines for field balancing fans.

NOTE: Excessive vibration from any cause contributes to premature fan and motor bearing failure. Monitor overall vibration levels every six months of operation. An increase in levels is an indication of potential trouble.

Vibration Causes

- Wheel imbalance.
    - Dirt or debris on wheel blades.
    - Loose setscrews in wheel hub or bearing-to-shaft.
    - Wheel distorted from overspeed.
- Bent shaft.
- Bad bearings or loose bearing hold-down bolts.
- Motor imbalance.
- Loose mechanical connection from fan to unit.
- Improper fan wiring.
- Fan section not supported evenly on foundation.
- Operating in an unstable region.

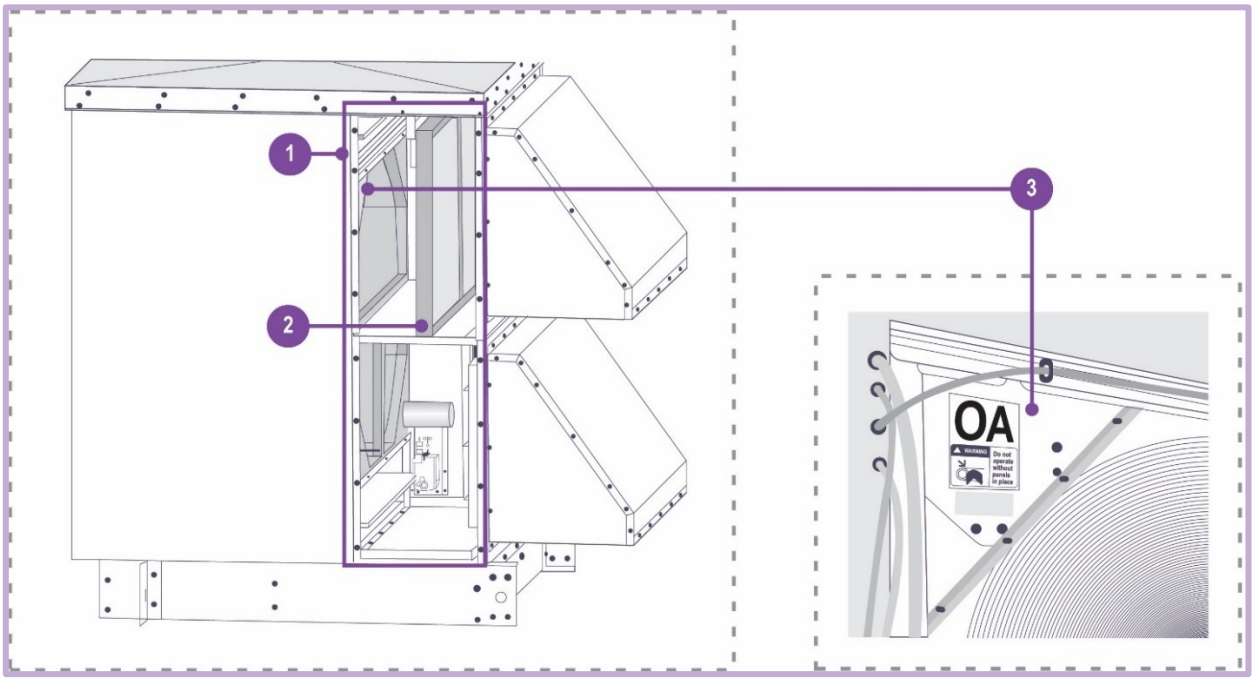
Energy Recovery Wheel

Drive Belts

Inspect the drive belt annually, look for any wear marks or cracks. Additionally, inspect belt annually for proper tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up. If the drive belt slips, it may stop the wheel or render the rotation unstable therefore reducing the heat exchange. Adjust the tensioning spring or adjustable motor mount to maintain proper tension.

ADA ERV Belt Replacement

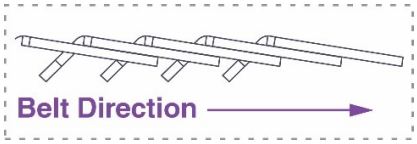
1) Open large door.
2) Remove filters & filter rack panel.
3) Remove tensioner cover plate on the top left corner of the wheel (Outdoor-Air side).



4) Pull the belt off the tensioner.
5) Disconnect and remove the belt.

6) Wrap new belt around the wheel by taping it to the wheel and rotating by hand **ensure correct belt tab direction.**

   Determine direction of drive rotation. Belt must travel following the belt direction arrow (→) with tabs trailing.



7) Re-install, tension, and re-tension per belt manufacturer's instructions.

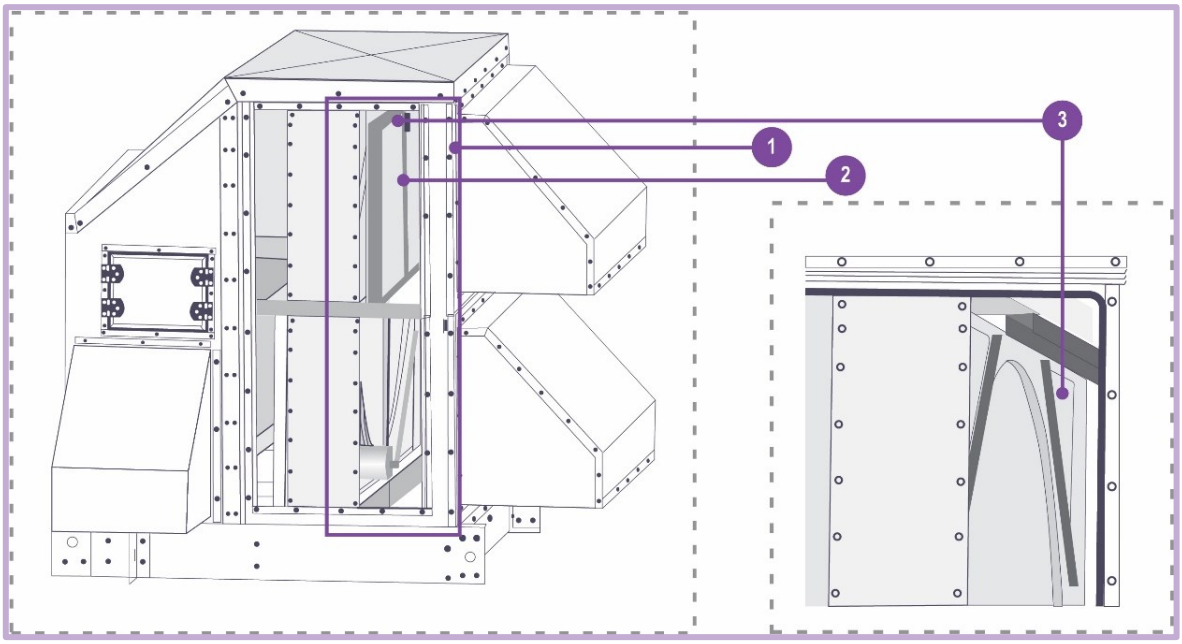
8) Reinstall cover plate, filter rack, filters, and door panel.

ADB ERV Belt Replacement

1) Open large door.

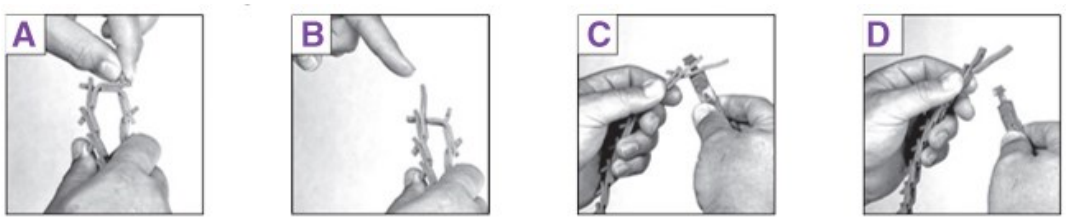
2) Remove filters & filter rack panel.

3) Remove tensioner cover plate on the top right corner of the wheel (Outdoor-Air side).



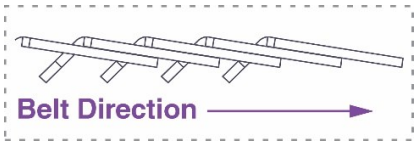
4) Pull the belt off the tensioner.

5) Disconnect and remove the belt.



6) Wrap new belt around the wheel by taping it to the wheel and rotating by hand **ensure correct belt tab direction.**

   Determine direction of drive rotation. Belt must travel following the belt direction arrow (→) with tabs trailing.



7) Re-install, tension, and re-tension per belt manufacturer's instructions.

8) Reinstall cover plate, filter rack, filters, and door panel.

Drive Motor and Reducer

The drive motor is lubricated from factory with grease or oil. Speed reduction gears and an electric motor are supplied pre-assembled in one body. If any abnormal noise, vibration or heating are noticed check the entire drive system. No further lubrication is necessary.

Wheel

Inspect wheel surface quarterly. Look for dust, dirt, lint or any other material. If light dust is present it may be removed with an industrial vacuum cleaner. If a heavier accumulation of dust is present remove it by cleaning with a brush to then use a vacuum or blower. Be careful when doing so to not damage the corrugated structure. Damage to corrugations will reduce the total air flow through the wheel or increase the air velocity through other flutes thereby reducing the wheel effectiveness. If material accumulates on the wheel surface regularly inspect wheel on a shorter frequency. If the latter is true, it is recommended that a higher efficiency filter be installed.

Adjustable Air Seals

Air seals are located around the wheel on structural cross zone separators. These air seals may be contact wiper, full contact brush, or a non-contact multi-pass labyrinth seals. Inspect seal for wear marks. Multi-pass labyrinth seals have a gap between the wheel and the seal, make sure this gap is between 2 to 3mm. A wider gap than the specified will cause significant seal leakage. If the seal condition is bad, replace it with a new one. If a new seal is installed be sure to adjust the purge swing arm. Failure to do the latter will result in a void warranty.

Support Casters

Casters include rollers with two precision life-lubricated ball bearings. The rollers are installed to prevent the wheel from being pushed by the air differential pressure against the seals. The rollers maintain the proper gap between the wheel flange and the multi-pass labyrinth seal. Note that units with multi-pass labyrinth seals and rollers installed usually require much less maintenance inspections. When inspecting, check that the casters are barely touching the flange at its highest point in the wheel rotation by hand-turning with the unit locked out. Look also for excessive wear.

Bearings

Wheel bearings shall be inspected every two quarters. Although bearings are sealed and are designed to perform beyond the lifetime of the rotor itself, it may be necessary to refill the grease through the grease fittings provided on the pillow block housing. While doing so, ensure that the grease gun is squarely on to the fitting to ensure penetration into the bearing. Use the bearing grade grease for low speed power transmission bearings. If abnormal heating, vibrations or noise is present, it may be necessary to replace both bearings. In such cases, check the alignment of the shaft and the pillow blocks. You must find and correct the cause of the baring failure and replace the bearing assemblies. If the shaft is damaged replace bearings along with the new shaft.

Purge Swing Arm and Seal Adjustment

The swing arm of the purge section is factory set to 4 degrees. This is secured by a bolt with flanged/locking nuts and with one or more additional screws along its length. If the purge angle is adjusted the swing arm must be adjusted to the desired angle and re-secured with the factory supplied bolts, nuts and screws. Doing this requires drilling of the triangular purge panel to accommodate re-insertion of the locking sheet metal screws. Failure to adjust and fasten the purge arm in this manner voids the standard and any other warranty on the cassette. In addition, the seal on the swing arm must be adjusted such that it does not come in contact with the rotor face at any point in the rotor's rotation cycle. Failure to adjust the seals in this manner voids the standard warranty.

Dampers

Check linkage when applicable and tighten set screws as required. All moving parts of dampers should be cleaned and then thoroughly lubricated with a light molybdenum oil in aerosol can. Dampers furnished with stainless steel side seals should also have the seals lubricated generously. Dampers should then be manually operated several times until linkages and blades operate freely. Reconnect linkages and check dampers for proper operation.

Cabinet Exterior

After installation, touch up scratches. Periodic painting should be done there-after as required. The caulk around weather enclosures and over field joints should be inspected annually. Re-apply caulk as needed to maintain integrity. Periodic cleaning is recommended to prevent corrosion in installation locations with higher ambient concentrations of chlorides.

Warning labels and logo labels should be legible and accurate. Please contact us if you need replacement warning labels or logo labels.

Storage

Supply Fans

- Once every two weeks, rotate the fan and motor shafts. Mark the shaft positions first to make sure they stop in a different position.
- Depending on local climate conditions, condensate may collect on components inside the units. To prevent surface rust and discoloration, spray all bare metal parts with a rust preventive compound. Pay close attention to fan shafts, sheaves, bearings, and bearing supports.

Cabinet Sections

- Once a month, open a door on each section and verify that no moisture or debris is accumulating in the unit.

Control Compartment

- All electronic control equipment in the unit should be stored in a 5% to 95% RH (non-condensing) environment.
- It may be necessary to put a heat source (light bulb) in the main control panel to prevent the accumulation of atmospheric condensate within the panel. The location and wattage of the heat source is dependent on local environmental conditions.
- Check the control compartment every two weeks to confirm that the heat source is functional and is adequate for current conditions.

Gas Heater

WARNING

If any of the original wiring needs to be replaced it must be replaced with wiring materials suitable for 105°C. Label all wires prior to disconnection when servicing unit. Wiring errors can cause improper or dangerous operation.

Manifold

Periodically check gas control assembly and internal and external piping for leaks. Relief vent lines to outdoors on gas controls should be checked to ensure against blockage caused by insects or any other substance. Clean as required. All gas piping to the air handler must comply with the National Fuel Gas Code- NFPA54, latest edition and all local codes. Verify gas soundness of each SSOV (Safety Shut Off Valve). This test must be repeated after the first 100 hours of operation.

Air Flow Switch

An annual check of the tubes attached to the air flow switch should be made to ensure against blockage caused by insects or any other substance. Clean as required.

Temperature Sensors

Calibrate space, outdoor air, and discharge air sensors as required.

Burner

To ensure proper operation, the furnace should be inspected and serviced annually by a qualified service agency.

Furnace Module Inspection

Follow the instructions below to perform a proper inspection.

1. Turn off all electrical power to the unit.
2. The condition of the burners, heat exchanger, draft inducer, vent system and operating controls should be determined. Check for obvious signs of corrosion, accumulation of dirt and debris and any heat or water related damage. Any damaged or deteriorated parts should be replaced before the unit is put back into service.
3. Clean burners, heat exchanger, draft inducer, and vent ducts.
4. Check heat exchanger for cracks. If any are present, replace the heat exchanger before putting unit back into service.
5. Check electrical wiring for loose connections or deteriorated insulation.
6. Check the attachment point of the furnace module to the cabinet or ducts to verify that they are airtight.
7. Check for gas tightness of all pipe joints and connections.
8. Check the automatic gas valve to ensure that the gas valve seat is not leaking.

If duct furnace is located downstream of cooling coils a condensate drain line should be connected to the flue collector box. Be sure that drain line is not obstructed. Clean any debris or blockage from the line.

Furnace Module Operation Check

After a scheduled inspection is successfully performed, follow the instructions below to make sure the burner is operating as intended.

1. Turn on the power to the unit and set thermostat or heat controller to call for heat, allowing furnace module to operate.
2. Check for proper start-up and ignition as outlined in Page 39.
3. Check the appearance of the burner flame.
4. Return thermostat or heat controller to normal setting.

Refrigerant

DANGER

R-454B is an A2L flammable refrigerant. Ensure the refrigerant charge is fully recovered and the circuit purged with inert gas prior to breaking the refrigeration circuit.

Recovery Procedure

Due to the presence of check valves in the ArctiDry system, recover refrigerant from the service valve on the receiver, which is located downstream of the check valves. You may also recover simultaneously from the suction line access port. Note that the electronic expansion valve is in the fully closed position when the compressor is not running.

NOTICE

Make sure to follow all local and national regulations regarding refrigerant removal. Ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant. Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of R-454B. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt. The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

NOTICE

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil drained from a system, it shall be carried out safely.

Purge the refrigeration circuit with an inert gas prior to breaking the refrigeration circuit or exposing it to naked flames or cutting tools.

Evacuation Procedure

To recover the system fully, it is necessary to open the electronic expansion valve and place the three-way valve in a middle position. Follow these steps:

From the Unit Controller

Press the ◉ key to access the Main Menu. Use the arrow (↑/↓) and enter (↲) keys to select Service. Scroll to the Service Mode page. Press the enter key to advance the cursor to the Active Mode field. Use the arrow keys to scroll the mode to Evacuation, and press enter to save and activate the change. Connect the vacuum pump to the ports on both the suction and discharge lines. Run the vacuum pump until a vacuum of 500 microns is achieved. When 500 microns is reached, the system is considered leak tested and ready for refrigerant charging.

Charging Procedure

Begin by charging liquid refrigerant into the discharge port until the flow stops. Then use a recovery machine to charge refrigerant into the discharge and suction. Continue until the total target charge weight is reached. Do not start the compressor until at least 80% of the refrigerant charge is in the system. Note that the receiver is not sized to hold the full refrigerant charge. Do not attempt to push the full charge into the receiver or high side. The electronic expansion valve is in the fully closed position when the compressor is not running.

Charge Adjustments

Unit is shipped with the correct refrigerant charge. It is not necessary to adjust refrigerant charge to maintain desired subcooling and superheat at operating temperature extremes. If an adjustment is needed for any reason, remove all refrigerant from unit and proceed to add refrigerant back by weight to the amount specified on the nameplate.

Refrigerant Safety Group A2L

Liquid Sub-Cooling Temperature Check

Determine liquid sub-cooling temperature by subtracting the liquid line temperature from the saturated temperature.

Liquid line temperature should always be measured between the suction line heat exchanger and the electronic expansion valve. It is expected that one or both condensers may have low to zero sub-cool given the nature of the refrigeration circuit design which features two parallel condensers that join upstream of the receiver.

To calculate saturated temperature, read the gauge pressure of the closest liquid line to the point where the temperature was taken. Note that discharge pressure will vary from pressure measured at the receiver due to condenser coil pressure drop, hence, only pressure measure at the receiver shall be used to calculate saturated temperature. Convert the pressure obtained to saturated temperature using the appropriate refrigerant temperature-pressure chart.

Optimal liquid sub-cooling temperature should follow the table below.

Evaporator Superheat Temperature Check

Determine superheat temperature by subtracting the saturated temperature from the suction line temperature.

Suction line temperature should always be measured on the suction line closer to the compressor.

To calculate saturated temperature, read the gauge pressure at the suction line access port near the compressor. Convert the pressure obtained to saturated temperature using the appropriate refrigerant temperature-pressure chart.

Optimal superheat temperature should follow the table below.

Acceptable Refrigerant Circuit Values	
Setting	**Temperature**
Sub-cool	3°F - 15°F
Super-heat	18°F - 22°F

Note that the ArctiDry system utilizes an electronic expansion valve, hence, suction superheat is actively controlled by a varying EEV position. Therefore, superheat is controlled to within 1°F of setpoint (20°F by default) when the unit is functioning properly with correct refrigerant charge.

Repair Procedure

Any repair work shall be performed by qualified personnel. Make sure to follow all applying codes. The guidelines below shall be followed prior to conducting any repair work on the refrigerant circuit of the unit:

1. Safely remove the refrigerant following local and national regulations.
2. Evacuate the refrigerant circuit.
3. Purge the refrigerant circuit with oxygen-free nitrogen.
4. Remove the parts to be replaced by cutting or brazing.
5. Continuously flush or purge with inert gas when using flame to open the circuit.
6. Purge the braze point with nitrogen during the brazing procedure required for repair.
7. Carry out a leak test by pressurizing with nitrogen to no higher than 550 psi. If pressure does not decrease in 1 hour, the pressure test is considered successful.
8. Evacuate the system to below 500 microns.

Charge with refrigerant per the Charging procedure.

Restart

After extended storage, perform a complete start up. Inevitable accumulations of dirt, insect nests, etc. can contribute to problems if not cleaned out thoroughly prior to start up. In addition, thermal cycling tends to loosen mechanical and electrical connections.

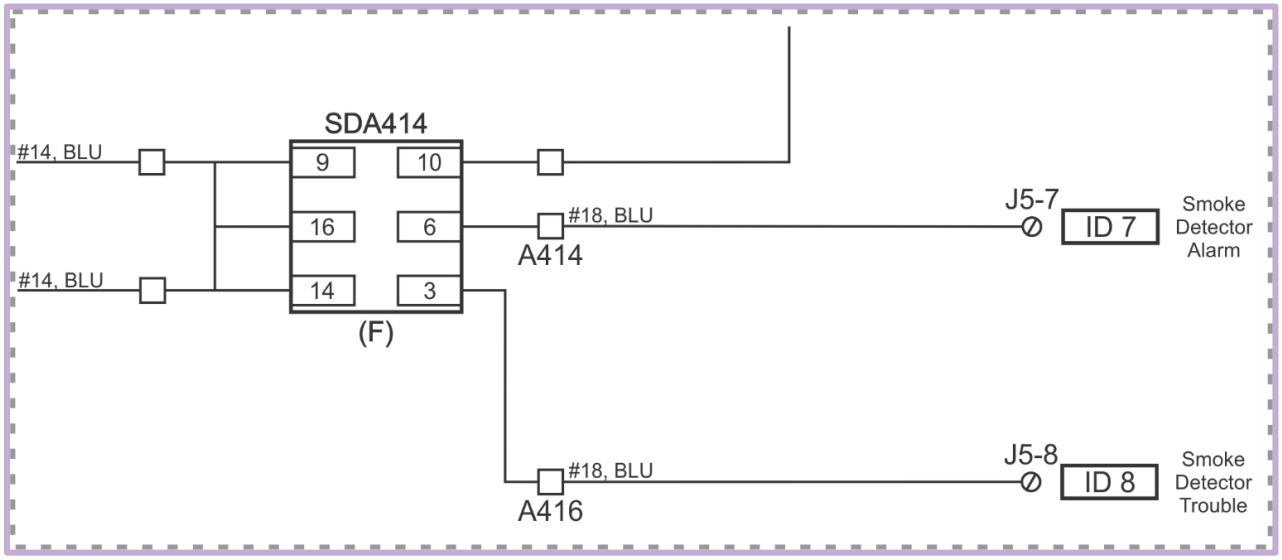
Following the startup procedure below helps discover these and other issues that may have developed during the storage interval.

1. Return all air filters.
2. Ensure no tools or cleaning materials are left inside the unit.
3. Close all doors.

Optional Equipment

Smoke Detector Installation

This unit may be integrated with one or two optional smoke detectors. Smoke detectors shall always be installed inside ductwork. Follow the detector's manufacturers installation manual for detailed instructions. When wiring the detectors make sure to set the proper configuration for dip switches in accordance with a single or dual smoke detector setup. Note that if two smoke detectors are used, they will both be driven by a single power board. The detector's alarm contacts must be closed when no alarm condition exists, and the trouble contacts must be closed when no trouble condition exists. Follow the diagram below to wire the power board to terminal blocks in the unit, removing the factory jumpers for the alarm and trouble inputs. If the detector's trouble contacts are wired to a separate building alarm supervisory system, leave the unit's factory jumper for the trouble input in place.



Decommissioning

WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater) Do not pierce or burn. Be aware that refrigerants may not contain an odor.

WARNING

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with R-454B.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry power or CO2 fire extinguisher adjacent to the charging area.

No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

WARNING

This unit uses refrigerant R-454B, an A2L refrigerant. Service shall be performed only by competent personnel qualified to work with A2L refrigerants.

WARNING

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems:

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for use with R-454B. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Follow procedure for refrigerant removal.

NOTICE

Sealed electrical components shall be replaced.

NOTICE

Check that cabling will not be subject to wear, corrosion, excessive pressures, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors fans.

Before carrying out the decommissioning procedure, it is essential that the technician is completely familiar with the equipment and all its details. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

A. Become familiar with the equipment and its operation.
B. Isolate system electrically.
C. Before attempting the procedure, ensure that:
    a. mechanical handling equipment is available, if required, for handling refrigerant cylinders;
    b. all personal protective equipment is available and being used correctly;
    c. the recovery process is supervised at all times by a competent person;
    d. recovery equipment and cylinders conform to the appropriate standards.
D. Pump down refrigerant system.
E. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
F. Make sure that cylinder is situated on the scales before recovery takes place.
G. Start the recovery machine and operate in accordance with instructions.
H. Do not overfill cylinders (no more than 80% volume liquid charge).
I. Do not exceed the maximum working pressure of the cylinder, even temporarily.
J. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
K. Recovered refrigerant shall not be charged into another system unless it has been cleaned and checked.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Decommissioning Procedure

Follow the instructions below to perform a decommissioning procedure for either cabinet:

1. Remove desiccant as per desiccant maintenance procedure shown in Page 58 for Cabinet A, and Page 60 for Cabinet B.
2. Recover refrigerant as per below.
3. Disconnect condensate drainpipe.
4. Disconnect gas (if applicable).
5. Disconnect power cord.
6. Disconnect data cable (if applicable).
7. Remove any ducting connected to unit.
8. Separate unit from roof curb.
9. Lift off roof using lifting points defined in Lifting procedure shown in Page 17 for Cabinet A, and Page 19 for Cabinet B.
10. Discard as per local state and city regulations.

NOTICE

Equipment shall be labelled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

Make sure the following guidelines are met during decommissioning procedure:

- If there is a risk of refrigerant leak or the unit will be stored indoors, the refrigerant charge shall be removed before decommissioning.
- Recover refrigerant as per the refrigerant removal procedure shown in Page 80.
- Purge the refrigerant circuit with oxygen-free nitrogen for 5 minutes.
- Evacuate the refrigerant circuit.
- Fill with nitrogen up to atmospheric pressure.
- Put a label on the equipment that the refrigerant is removed.

Troubleshooting

Supply Fans		
Issue	**Possible Cause**	**Solution**
Blower motor is not running	High airflow switch tripped	Adjust fan speed. Check for blower in ducting assisting supply airflow
	Motor protections tripped	Tripped condition-reset
	Fuses blown or missing	Replace fuse
	External power source lacking	Have incoming power lines checked
	Motor inoperative	Repair or replace motor
Fans are not supplying enough air flow	Intake filters are dirty	Replace or clean
	Intake obstruction	Check dampers for proper operation and clear all intake passages of obstructions
	Fan wheel loose on shaft	Reposition and tighten
	Access doors and panels not closed	Close doors and panels.
	Excessive discharge resistance	Clean filters and/or re-adjust dampers.
	Incorrect speed setting	Adjust fan speed.
Excessive Fan Noise	Defective fan bearing	Replace fan bearing
	Fan wheel loose on shaft	Reposition wheel and re-tighten
	Fan wheel rubbing	Loosen setscrews, reposition rubbing and tighten
	Fan wheel dirty	Clean wheel
	Loose duct	Tighten and/or re-inforce duct
	Obstruction in fan or duct	Inspect and remove any found obstructions.

Compressor		
Issue	**Possible Cause**	**Solution**
Compressor not starting	Power off Loose electrical connections Fuse box open	Check power source, disconnect switch, fuses and wiring
	Compressor contactor not closing	Check voltage to contactor coil
	Compressor drive protections tripped.	Refer to drive manual for fault information
	Compressor defective	Check compressor for electrical failure.
	High or low pressure switch open or defective	Check calibration of high or low pressure switch
Compressor starts but cuts out on low pressure switch	Low on refrigerant	Check pressure.
	Airflow restricted or supply fan off	Check for dirty evaporator coil, dirty filters, dampers closed, VFD settings, motors amperage or duct design
	Restriction in liquid line	Check head pressure and pressure drop across filter drier.
	Defective low pressure switch	Replace or calibrate switch.
	Manual valve in closed position	Verify discharge ball valve, receiver service valve and suction ball valve are open
Compressor starts but cuts out on high pressure switch	Refrigerant overcharged	Check pressures or charge by subcooling
	Fan motor defective	Check fan motor
	Condenser coil inlet obstructed or dirty	Check coil and inlet clearances for possible air re-circulation
	Air or non-condensables in system	Refrigerant must be reclaimed through a service port. Then re-evacuated to 250-500 microns and recharged. Replace filter drier.
	Defective high-pressure switch	Replace switch
	Restriction in discharge or liquid line.	Check discharge and liquid line pressures.
	Manual valve in closed position	Verify discharge ball valve, receiver service valve and suction ball valve are open

Compressor (Continued)		
Issue	**Possible Cause**	**Solution**
Noisy compressor	Scroll compressors are rotation sensitive	Reverse wiring at disconnect switch. Checked blower for rotation.
	Refrigerant overcharged	Check pressure and subcooling
	Excess or insufficient oil in compressor's crankcase	Check oil level on hermetic compressors. Check total equivalent feet of piping. Add oil as recommended.
	Liquid flood back	Check refrigerant circuit and check for refrigerant overcharge
	Tubing rattle	Dampen by taping or clamping. If possible, bend tubing away from contact.
	Defective compressor	Replace compressor.

Refrigeration Circuit		
Issue	**Possible Cause**	**Solution**
Noisy operation	Air noise	Check ductwork; Air velocity might be too high.
	Chattering contactor	Check for adequate control voltage, shorts or breaks, thermostat malfunction and contactor points.
	Tubing rattle	Dampen by taping or clamping. Bend tubbing away from contact where possible.
High suction pressure	Excessive load on evaporator coil	Check for excessive airflow or high temperature air entering wet bulb
	Suction temperature sensor not secured to suction line	Ensure sensor is thermally connected to pipe and insulated.
	Malfunctioning electronic expansion valve	Check electrical connection, superheat, pressures.

Refrigeration Circuit (Continued)		
Issue	**Possible Cause**	**Solution**
High discharge pressure	Condenser air inlet dirty or obstructed	Inspect for proper clearances and remove any obstructions
	Defective condenser fan motor	Inspect and replace if necessary.
	Incorrect condenser fan control setting	Recalibrate control settings
Low suction pressure	Refrigerant undercharge	Check pressures and subcooling
	Blower running backwards	Interchange power wirings connected to motor.
	Malfunctioning electronic expansion valve	Check superheat.
	Dirty filter	Inspect filter and evaporator coil.
	Too little airflow or low temperature air	Check inlet air wet bulb conditions
	Restriction in suction or liquid line	Inspect refrigerant circuit for restrictions
Low discharge pressure	Insufficient refrigerant charge	Check for leaks and subcooling
	Defective or improperly adjusted expansion valve	Check superheat
	Low suction pressure	See refrigerant troubleshooting section for Low suction pressure.
	Condenser fan control setting	Check condenser fan speed
	Defective compressor	See refrigerant troubleshooting section for high suction pressure.
Liquid line overheated	Refrigerant undercharged	See refrigerant troubleshooting section for high suction pressure.
	High discharge pressure	Inspect for restriction at point of frosting
Suction line frosting	Insufficient evaporator airflow	Check airflow, fan VFD's
	Restriction in suction or liquid line	Inspect for restriction at point of frosting
	Defective expansion valve	Inspect suction line temperature sensor.

Refrigeration Circuit (Continued)		
Issue	**Possible Cause**	**Solution**
Compressor short cycles	Leaking discharge valves in compressor	See refrigerant troubleshooting section for high suction pressure.
	Improper refrigerant charge	Check subcooling and superheat
	Defective high/low pressure control	Inspect pressure switch
	Defective expansion valve	Check superheat
	Poor air distribution	Check ductwork for recirculation
	High discharge pressure	See refrigerant troubleshooting section for high discharge pressure.
High supply air temperature	Refrigerant undercharge or leak in system	Check subcooling. Inspect line for leaks.
	Evaporator plugged with dirt or ice	Inspect filter and evaporator. Adjust airflow.
	Improperly adjusted or defective expansion valve	Check superheat and suction temperature sensor
	Improperly calibrated or defective supply air temperature sensor	Check supply air temperature sensor.
	Defective compressor	Inspect compressor for proper operation
	High discharge pressure	See refrigerant troubleshooting section for high discharge pressure.
	High airflow	Check external static pressure.
Low supply air temperature	Low airflow	Inspect evaporator coil and filter. Check for closed dampers, grills, misalignment, and loose parts. Check external static pressure as well.
	Low return air temperature	Inspect inlet air wet bulb conditions
Blower motor not running	Improper wiring	Double check wiring diagram
	Defective motor	Check motor controller.
	Defective thermostat or control circuit.	Inspect and/or replace thermostat. Inspect control circuit.

Variable Speed Head Pressure Control		
Issue	**Possible Cause**	**Solution**
Fan not operating	Low voltage	Check fan control
	Defective Fan	Inspect and/or replace fan
Fan stopping at top operative pressure range	Wiring issue	Inspect control wiring
Fan not modulating (On/Off operation only)	Wiring issue	Inspect control wiring
Fan starting at full speed	Wiring issue	Inspect control wiring
Erratic fan operation	Wiring issue	Inspect control wiring
	Dirty or blocked condenser coil	Inspect and/or clean coil
Fan motor cycling on thermal overload	Dirty or blocked condenser coil	Inspect and/or clean coil
	Out of spec motor	Replace motor
Erratic pressure control	Defective regulator	Inspect and/or replace
	Defective condenser subcool sensors	Verify condenser subcool sensors are secured and thermally connected to pipe leaving each condenser.
	Malfunctioning check valves	Check temperatures across check valves.
Three-way valve not modulating	Defective valve	Check temperatures at valve outlets.
	Wiring issue	Inspect wiring.

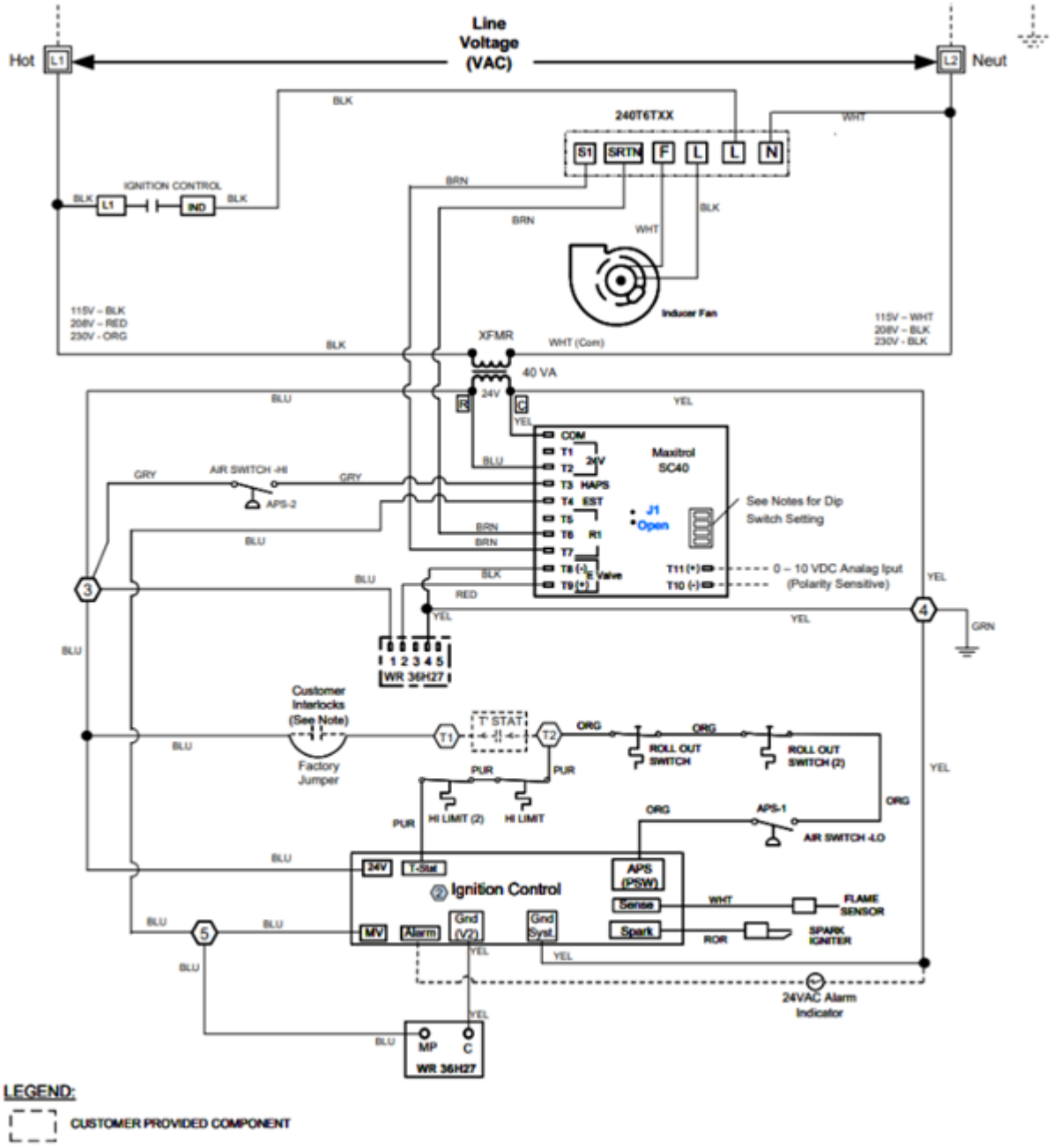
Energy Conservation Wheel		
Issue	**Possible Cause**	**Solution**
Poor wheel performance	Wrong rotation speed	Adjust speed
	Worn wheel media/seals	Inspect wheel. Adjust as needed and/or replace seals.
	Non optimal inlet air conditions	Check air conditions and compare to designed conditions
	Dirty media	Inspect media for dirt and debris.
Improper wheel rotation	Improper motor operation	Inspect the drive motor and wiring.
	Improper VFD sensor operation	Check VFD's temperature and humidity sensors.
High pressure drop	Non optimal air flow	Check air flow and compare to designed conditions
	Dirty filters and/or media	Inspect filters and media for dirt and debris.
Noise	Out-of-place seals	Check seals and adjust
	Worn bearings	Inspect and/or replace

Gas Furnace

Error Codes – Red Flashes	Error Definition	Error Type
1 flash, then pause	No flame in trial time	Lockout
2 flashes, then pause	Flame sensor stuck on	Lockout
3 flashes, then pause	Pilot/Main relay failure	Lockout
4 flashes, then pause	Repetitive flame loss error	Lockout
5 flashes, then pause	Rollout error	Lockout
6 flashes, then pause	APS Airflow error	Lockout
7 flashes, then pause	Internal control error	Lockout
On solid red	Line voltage/frequency error	Standby

Issue	Possible Cause	Solution
Permanently On/Off	Internal control fault	Contact gas furnace manufacturer
Combustion airflow fault	Faulty combustion blower	Inspect power supply and fan connections.
	Airflow switch not closing	Inspect power supply and fan connections.
	Airflow switch open during operation	Inspect power supply and fan connections.
Flame with no call for heat	Ignition control miscommunication	Reset ignition control.
Ignition lockout	Ignition control miscommunication	Reset ignition control.
	Dirty burners	Inspect and clean burners to ensure proper flame carryover
	Faulty spark igniter	Inspect connecting lead and spark igniter. Replace if necessary.
	Faulty flame sensor	Inspect connecting lead and flame probe. Replace if necessary.
	Auxiliary contact not closed	Inspect contact. Replace if necessary.
	Burner/Winter switch closed	Inspect switch. Replace if necessary.
	Tripped high temperature limit switch	Manually reset switch.
	Incorrect gas pressure	Check gas supply
	Faulty gas valve	Inspect valve. Replace if necessary.

Heater Electrical Diagram



Electric Heater		
Issue	**Possible Cause**	**Solution**
No heat	No call for heat	Check heater control settings are correct.
	No power and/or control voltage	Check heater's power supply.
	Faulty heater component	Inspect heater. Contact heater manufacturer.
Not enough heat	Faulty component	Check ampere draw on each component. Inspect and replace components if necessary.
	Short cycling due to low current draw	Check ampere draw on each component. Inspect and replace components if necessary.
Heater cycling on automatic limit	Improper airflow	Inspect return air duct for obstructions, clogged filters and/or evaporator coils.
	Faulty temperature limit switch	Inspect and/or replace.
Open secondary protective device	Stuck contactor	Inspect.
Contactor chatter	Improper wiring	Inspect and/or re-wire.
	Insufficient transformer capacity	Check transformer.
Element failure	Corroded hardware and/or loose connections	Check hardware

Warranty

SERVICE DESIGN VERIFICATION DISCLAIMER

A Mojave Field Service Technician is responsible for one trip to site to ensure the above equipment is operating within design specifications. All equipment must be operational. Additional trips will result in charges to be covered by others.

INSTALLATION BY OTHERS
Mojave Energy Systems requirement for all field hook ups:
Mojave Energy Systems product must be installed in accordance with installation instructions provided with equipment or available on our web site at www.mojavehvac.com.

All conduit fittings must be compression type and fully tightened. All conduit ends must be reamed and deburred and blown clear of debris prior to assembly. All conduit must be fully and robustly supported.

Ductwork must be designed and installed in accordance with AMCA and ASHRAE standards. Hood and Ductwork hanging brackets and angles must be supported as defined in the Installation/Operation Manual (IOM). Reference the IOM provided with the submittal for additional details and limitations of all structural supports.

By Others:
Installation, ductwork, patching, all electrical field wiring, natural gas connection, condensate piping, test and balance, permits.

Note:
Customer is responsible for additional labor charges as a result of equipment layout changes after the release of the order, union labor or prevailing wage charges, or additional trips by fire system distributor caused by jobsite delays, permits, fees or test required by local authority.

WARRANTY

Standard Product Parts Warranty
This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2 years from the date of shipment. The compressor and liquid desiccant system are warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 5 years from the date of shipment. Warranty shall be void if it is determined that a failure has occurred due to unit operation during active construction environment.

Heat Exchanger Warranty
Subject to all terms stated herein, the MANUFACTURER warrants to BUYER the stainless-steel heat exchanger to be free from defects in material and workmanship under normal use and service for 10 years from the date of manufacture and warranty is limited to replacement of the heat exchanger only.

Warranty Instructions

This Standard Product Parts Warranty, and Heat Exchanger Warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the MANUFACTURER'S installation instructions shipped with the product.
2. The equipment is not installed in accordance with federal, state and local codes and regulations.
3. The equipment is misused or neglected, or not maintained per the MANUFACTURER'S maintenance instructions.
4. The equipment is not operated within its published capacity.
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the Standard Product Parts Warranty, Heat Exchanger Warranty, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization, and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

NOTE: To receive warranty coverage, register this product by filling out the Start-up and Maintenance Document and emailing to **service@mojavehvac.com**.

Appendix

BACnet Points

Analog Inputs & Values

Object ID	Point name	Read/ Write	Low Limit	High Limit	Units	Description
AI:1	Outdoor Air Temperature	R	-	-	°F	Hardwired input from factory installed outdoor air temperature sensor
AI:2	Outdoor Air Relative Humidity	R	-	-	%	Hardwired input from factory installed outdoor air relative humidity sensor
AI:3	Mixed Air Temperature	R	-	-	°F	Hardwired input from factory installed mixed air temperature sensor
AI:4	Mixed Air Relative Humidity	R	-	-	%	Hardwired input from factory installed mixed air relative humidity sensor
AI:5	Evaporator Leaving Air Temperature	R	-	-	°F	Hardwired input from factory installed temperature sensor located between evaporator and desiccant absorber
AI:6	Absorber Leaving Air Temperature	R	-	-	°F	Hardwired input from factory installed temperature sensor located between desiccant absorber and supply fan (post-heat option only)
AI:7	Supply Air Temperature	R	-	-	°F	Hardwired input from factory installed supply air temperature sensor
AI:8	Supply Air Relative Humidity	R	-	-	%	Hardwired input from factory installed supply air relative humidity sensor
AI:9	Space Temperature Analog In	R	-	-	°F	Hardwired input from field installed space air temperature sensor
AI:10	Space Relative Humidity Analog In	R	-	-	%	Hardwired input from field installed space air relative humidity sensor
AI:11	Space CO2 Concentration Analog In	R	-	-	ppm	Hardwired input from field installed space CO2 concentration sensor
AI:12	Return Air Temperature	R	-	-	°F	Hardwired input from field installed return air temperature sensor
AI:13	Return Air Relative Humidity	R	-	-	%	Hardwired input from field installed return air relative humidity sensor
AI:14	Supply Air Static Pressure Analog In	R	-	-	inH2O	Hardwired input from field installed supply air static pressure sensor (duct-mounted or space-mounted)
AI:15	Return Air Static Pressure Analog In	R	-	-	inH2O	Hardwired input from field installed return air static pressure sensor (duct-mounted)
AI:16	ERV Wheel Differential Pressure	R	-	-	inH2O	Hardwired input from factory installed ERV wheel differential pressure sensor
AI:17	External Condenser Refrigerant Out Temperature	R	-	-	°F	Hardwired input from factory installed external condenser refrigerant outlet temperature sensor
AI:18	Suction Temperature	R	-	-	°F	Hardwired input from compressor suction temperature sensor
AI:19	Suction Pressure	R	-	-	psi	Hardwired input from compressor suction pressure sensor
AI:20	Discharge Temperature	R	-	-	°F	Hardwired input from compressor discharge temperature sensor
AI:21	Discharge Pressure	R	-	-	psi	Hardwired input from compressor discharge pressure sensor
AV:1	Space Temperature BMS	W	-	-	°F	Communicated space temperature from BMS. Used when MSV:16 is set to BMS.
AV:2	Space Relative Humidity BMS	W	-	-	%	Communicated space relative humidty from BMS. Used when MSV:17 is set to BMS.
AV:3	Space CO2 Concentration BMS	W	-	-	ppm	Communicated space CO2 concentration from BMS. Used when MVS:18 is set to BMS.
AV:4	Supply Air Static Pressure BMS	W	-	-	inH2O	Communicated supply air static pressure from BMS. Used when MSV:19 is set to BMS.
AV:5	Return Air Static Pressure BMS	W	-	-	inH2O	Communicated return air static pressure from BMS. Used when MSV:20 is set to BMS.
AV:6	Space Temperature Room Terminal	R	-	-	°F	Communicated space temperature from HMI terminal. Used when MSV:16 is set to Room Terminal.

BACnet Points

Analog Inputs & Values

Object ID	Point name	Read/ Write	Low Limit	High Limit	Units	Description
AV:7	Space Relative Humidity Room Terminal	R	-	-	%	Communicated space relative humidty from HMI terminal. Used when MSV:17 is set to Room Terminal.
AV:8	Outdoor Air Dew Point	R	-	-	°F	Calculated value of outdoor air dew point
AV:9	Mixed Air Dew Point	R	-	-	°F	Calculated value of mixed air dew point
AV:10	Supply Air Dew Point	R	-	-	°F	Calculated value of supply air dew point
AV:11	Space Temperature	R	-	-	°F	Selected value of space temperature based on value of MSV:16
AV:12	Space Relative Humidity	R	-	-	%	Selected value of space relative humidity based on value of MSV:17
AV:13	Space Dew Point	R	-	-	°F	Calculated value of space dew point
AV:14	Return Air Dew Point	R	-	-	°F	Calculated value of return air dew point
AV:15	Outdoor Air Enthalpy	R	-	-	BTU/lb	Calculated value of outdoor air enthalpy
AV:16	Mixed Air Enthalpy	R	-	-	BTU/lb	Calculated value of mixed air enthalpy
AV:17	Supply Air Enthalpy	R	-	-	BTU/lb	Calculated value of supply air enthalpy
AV:18	Space Enthalpy	R	-	-	BTU/lb	Calculated value of space air enthalpy
AV:19	Return Air Enthalpy	R	-	-	BTU/lb	Calculated value of return air enthalpy
AV:20	Supply Air Flowrate	R	-	-	CFM	Calculated value of supply airflow rate using supply fan piezo pressure
AV:21	Space CO2 Concentration	R	-	-	ppm	Selected value of space CO2 concentration based on value of MSV:18
AV:22	Supply Air Static Pressure	R	-	-	inH2O	Selected value of supply air static pressure based on value of MSV:19
AV:23	Return Air Static Pressure	R	-	-	inH2O	Selected value of return air static pressure based on value of MSV:20
AV:24	Suction Superheat	R	-	-	Δ°F	Calculated value of compressor suction superheat temperature
AV:25	Discharge Superheat	R	-	-	Δ°F	Calculated value of compressor discharge superheat temperature
AV:26	Evaporating Temperature	R	-	-	°F	Calculated value of refrigerant evaporating temperature
AV:27	Condensing Temperature	R	-	-	°F	Calculated value of refrigerant condensing temperature
AV:28	Cooling Temperature Set Point Occupied	W	55	75	°F	Setpoint used to control temperature when in occupied mode and cooling enabled
AV:29	Dew Point Set Point Occupied	W	40	55	°F	Setpoint used to control dew point in occupied mode
AV:30	Heating Temperature Set Point Occupied	W	-	75	°F	Setpoint used to control temperature when in occupied mode and heating enabled
AV:31	Cooling Temperature Set Point Unoccupied	W	55	75	°F	Setpoint used to control temperature when in unoccupied mode and cooling enabled
AV:32	Dew Point Set Point Unoccupied	W	40	55	°F	Setpoint used to control dew point in unoccupied mode
AV:33	Heating Temperature Set Point Unoccupied	W	-	75	°F	Setpoint used to control temperature when in occupied mode and heating enabled

BACnet Points

Analog Inputs & Values

Object ID	Point name	Read/ Write	Low Limit	High Limit	Units	Description
AV:34	Supply Air Temperature Set Point Reset Min Occ	W	-	-	°F	Setpoint value for supply air temperature reset in occupied mode, correlating with max source temperature value AV:37. Select temperature source with MSV:9
AV:35	Supply Air Temperature Set Point Reset Max Occ	W	-	-	°F	Setpoint value for supply air temperature reset in occupied mode, correlating with min source temperature value AV:36. Select temperature source with MSV:9
AV:36	Reset Source Temperature Min Occ	W	-	-	°F	Temperature value for supply air temperature reset in occupied mode, correlating with setpoint value AV:35. Select temperature source with MSV:9
AV:37	Reset Source Temperature Max Occ	W	-	-	°F	Temperature value for supply air temperature reset in occupied mode, correlating with setpoint value AV:34. Select temperature source with MSV:9
AV:38	Supply Air Temperature Set Point Reset Initial Occ	W	-	-	°F	Initial setpoint value for supply air temperature PI reset in occupied mode. Select temperature source with MSV:9
AV:39	Temperature Reset Gain Occ	W	-	-	-	Supply air temperature PI reset in occupied mode gain
AV:40	Temperature Reset Integral Time Occ	W	-	-	0	Supply air temperature PI reset in occupied mode integral time
AV:41	Supply Air Dew Point Set Point Reset Min Occ	W	-	-	°F	Setpoint value for supply air dew point reset in occupied mode, correlating with max source dew point value AV:44. Select dew point source with MSV:12
AV:42	Supply Air Dew Point Set Point Reset Max Occ	W	-	-	°F	Setpoint value for supply air dew point reset in occupied mode, correlating with min source dew point value AV:43. Select dew point source with MSV:12
AV:43	Reset Source Dew Point Min Occ	W	-	-	°F	Temperature value for supply air dew point reset in occupied mode, correlating with setpoint value AV:42. Select dew point source with MSV:12
AV:44	Reset Source Dew Point Max Occ	W	-	-	°F	Temperature value for supply air dew point reset in occupied mode, correlating with setpoint value AV:41. Select dew point source with MSV:12
AV:45	Supply Air Dew Point Set Point Reset Initial Occ	W	-	-	°F	Initial setpoint value for supply air dew point PI reset in occupied mode. Select dew point source with MSV:12
AV:46	Dew Point Reset Gain Occ	W	-	-	-	Supply air dew point PI reset in occupied mode gain
AV:47	Dew Point Reset Integral Time Occ	W	-	-	0	Supply air dew point PI reset in occupied mode integral time
AV:48	Supply Air Cooling Temperature Set Point BMS	W	55	75	°F	Communicated supply air temperature setpoint in cooling mode from BMS. For use when MSV:9, 10, 12, or 13 are set to BMS
AV:49	Supply Air Dew Point Set Point BMS	W	40	55	°F	Communicated supply air dew point setpoint from BMS. For use when MSV:9, 10, 12, or 13 are set to BMS
AV:50	Supply Air Heating Temperature Set Point BMS	W	-	75	°F	Communicated supply air temperature setpoint in heating mode from BMS. For use when MSV:9, 10, 12, or 13 are set to BMS
AV:51	Active Supply Air Temperature Set Point	R	-	-	°F	Selected active value of supply air temperature setpoint
AV:52	Active Supply Air Dew Point Set Point	R	-	-	°F	Selected active value of supply air dew point setpoint
AV:53	Supply Air Nominal Flowrate Occupied	R	1000	8000	CFM	Selected active value of supply air flow rate in occupied mode. Must be set on physical controller
AV:54	Supply Air Nominal Flowrate Unoccupied	R	1000	8000	CFM	Selected active value of supply air flow rate in unoccupied mode. Must be set on physical controller
AV:55	Exhaust Air Nominal Flowrate Occupied	R	1000	8000	CFM	Selected active value of exhaust air flow rate in occupied mode. Must be set on physical controller
AV:56	Exhaust Air Nominal Flowrate Unoccupied	R	1000	8000	CFM	Selected active value of exhaust air flow rate in unoccupied mode. Must be set on physical controller
AV:57	Supply Fan Speed Occupied	R	-	100	%	Selected active value of supply fan speed in occupied mode when MSV:21 is set to Constant Speed. Must be set on physical controller
AV:58	Supply Fan Speed Unoccupied	R	-	100	%	Selected active value of supply fan speed in unoccupied mode when MSV:21 is set to Constant Speed. Must be set on physical controller
AV:59	Exhaust Fan Speed Occupied	R	-	100	%	Selected active value of exhaust fan speed in occupied mode when MSV:22 is set to Constant Speed. Must be set on physical controller
AV:60	Exhaust Fan Speed Unoccupied	R	-	100	%	Selected active value of exhaust fan speed in unoccupied mode when MSV:22 is set to Constant Speed. Must be set on physical controller

BACnet Points

Analog Inputs & Values

Object ID	Point name	Read/ Write	Low Limit	High Limit	Units	Description
AV:61	Supply Air VAV Static Pressure Set Point	W	-	-	inH2O	Setpoint value for static pressure, used to control supply fan speed. Used when MSV:21 is set to Pressure Control.
AV:62	Supply Fan Min. Speed in Pressure Control	W	-	100	%	Setpoint value for minimum supply fan speed when in pressure control. Used when MSV:21 is set to Pressure Control.
AV:63	Supply Fan Max. Speed in Pressure Control	W	-	100	%	Setpoint value for maximum supply fan speed when in pressure control. Used when MSV:21 is set to Pressure Control.
AV:64	Return Air VAV Static Pressure Set Point	W	-	-	inH2O	Setpoint value for static pressure, used to control exhaust fan speed. Used when MSV:22 is set to Pressure Control.
AV:65	Exhaust Fan Min. Speed in Pressure Control	W	-	100	%	Setpoint value for minimum exhaust fan speed when in pressure control. Used when MSV:22 is set to Pressure Control.
AV:66	Exhaust Fan Max. Speed in Pressure Control	W	-	100	%	Setpoint value for maximum exhaust fan speed when in pressure control. Used when MSV:22 is set to Pressure Control.
AV:67	Supply Air VAV CO2 Concentration Set Point	W	-	-	ppm	Setpoint value for CO2 concentration, used to control supply fan speed. Used when MSV:21 is set to CO2 Control.
AV:68	Supply Fan Min. Speed in CO2 Control	W	-	100	%	Setpoint value for minimum supply fan speed when in CO2 control. Used when MSV:21 is set to CO2 Control.
AV:69	Supply Fan Max. Speed in CO2 Control	W	-	100	%	Setpoint value for maximum supply fan speed when in CO2 control. Used when MSV:21 is set to CO2 Control.
AV:70	Supply Fan Design Speed in CO2 Control	W	-	100	%	Setpoint value for nominal supply fan speed when in CO2 control, where fan is delivering as-designed CFM. Used when MSV:21 is set to CO2 Control.
AV:71	Supply Fan Speed	R	-	-	%	Feedback value of supply fan speed to EC motor controller
AV:72	Exhaust Fan Speed	R	-	-	%	Feedback value of exhaust fan speed to EC motor controller
AV:73	ERV Wheel Speed	R	-	-	%	Feedback value of ERV wheel speed from wheel motor VFD
AV:74	Outdoor Air Damper Position	R	-	-	%	Commanded value of outdoor air damper actuator position
AV:75	Supply Air Damper Position	R	-	-	%	Commanded value of supply air damper actuator position
AV:76	Recirculation Air Damper Position	R	-	-	%	Commanded value of recirculation air damper actuator position
AV:77	ERV Bypass Damper Position	R	-	-	%	Commanded value of ERV bypass damper actuator position
AV:78	Return Air Damper Position	R	-	-	%	Commanded value of return air damper actuator position
AV:79	Outdoor Air Damper Position BMS	W	-	100	%	Communicated value of outdoor air damper position from BMS. Used when MSV:23 is set to BMS
AV:80	Recirculation Air Damper Position BMS	W	-	100	%	Communicated value of recirculation air damper position from BMS. Used when MSV:23 is set to BMS
AV:81	Return Air Damper Position BMS	W	-	100	%	Communicated value of return air damper position from BMS. Used when MSV:23 is set to BMS
AV:82	Heater Output	R	-	-	%	Commanded value of heater output
AV:83	Supply Fan Speed BMS	W	-	100	%	Communicated value of supply fan speed from BMS. Used with MSV:21 is set to BMS
AV:84	Exhaust Fan Speed BMS	W	-	100	%	Communicated value of supply fan speed from BMS. Used with MSV:22 is set to BMS
AV:85	Cooling EEV Position	R	-	-	%	Commanded value of cooling electronic expansion valve
AV:86	Heating EEV Position	R	-	-	%	Commanded value of heating electronic expansion valve (heat pump units only)
AV:87	3-way Valve Position	R	-	-	%	Commanded value of 3-way refrigerant valve

BACnet Points

Analog Inputs & Values

Object ID	Point name	Read/ Write	Low Limit	High Limit	Units	Description
AV:88	Compressor Speed	R	-	-	%	Commanded value of compressor 1 speed
AV:89	Compressor 2 Speed	R	-	-	%	Commanded value of compressor 2 speed
AV:90	Supply Air Temperature Set Point Reset Min Unocc	W	-	-	°F	Setpoint value for supply air temperature reset in unoccupied mode, correlating with max source temperature value AV:93. Select temperature source with MSV:10
AV:91	Supply Air Temperature Set Point Reset Max Unocc	W	-	-	°F	Setpoint value for supply air temperature reset in unoccupied mode, correlating with min source temperature value AV:92. Select temperature source with MSV:10
AV:92	Reset Source Temperature Min Unocc	W	-	-	°F	Temperature value for supply air temperature reset in unoccupied mode, correlating with setpoint value AV:91. Select temperature source with MSV:10
AV:93	Reset Source Temperature Max Unocc	W	-	-	°F	Temperature value for supply air temperature reset in unoccupied mode, correlating with setpoint value AV:90. Select temperature source with MSV:10
AV:94	Supply Air Temperature Set Point Reset Initial Unocc	W	-	-	°F	Initial setpoint value for supply air temperature PI reset in unoccupied mode. Select temperature source with MSV:10
AV:95	Temperature Reset Gain Unocc	W	-	-	-	Supply air temperature PI reset in unoccupied mode gain
AV:96	Temperature Reset Integral Time Unocc	W	-	-	0	Supply air temperature PI reset in unoccupied mode integral time
AV:97	Supply Air Dew Point Set Point Reset Min Unocc	W	-	-	°F	Setpoint value for supply air dew point reset in unoccupied mode, correlating with max source dew point value AV:100. Select dew point source with MSV:13
AV:98	Supply Air Dew Point Set Point Reset Max Unocc	W	-	-	°F	Setpoint value for supply air dew point reset in unoccupied mode, correlating with min source dew point value AV:99. Select dew point source with MSV:13
AV:99	Reset Source Dew Point Min Unocc	W	-	-	°F	Temperature value for supply air dew point reset in unoccupied mode, correlating with setpoint value AV:98. Select dew point source with MSV:13
AV:100	Reset Source Dew Point Max Unocc	W	-	-	°F	Temperature value for supply air dew point reset in unoccupied mode, correlating with setpoint value AV:97. Select dew point source with MSV:13
AV:101	Supply Air Dew Point Set Point Reset Initial Unocc	W	-	-	°F	Initial setpoint value for supply air dew point PI reset in unoccupied mode. Select dew point source with MSV:13
AV:102	Dew Point Reset Gain Unocc	W	-	-	-	Supply air dew point PI reset in unoccupied mode gain
AV:103	Dew Point Reset Integral Time Unocc	W	-	-	0	Supply air dew point PI reset in unoccupied mode integral time

BACnet Points

Binary Values

Object ID	Point name	Read/ Write	Active	Inactive	Description
BV:1	BMS Control Enabled	R	Enabled	Disabled	Feedback value indicating if BMS communication is disabled in the technician interface at the unit. Must be set on physical controller
BV:2	Remote Shutdown BMS	W	Shutdown	Normal	Communicated value for remote unit shutdown from BMS
BV:3	Occupancy State BMS	W	Unoccupied	Occupied	Communicated value for occupancy state from BMS. Used when MSV:2 is set to BMS
BV:4	Occupancy State	R	Unoccupied	Occupied	Calculated value of occupancy state
BV:6	ERV Partial Recirculation Enable	R	Enable	Disable	Communicated value for enabling ERV partial recirculation mode from BMS
BV:7	ERV Unoccupied Recirculation Enable	R	Enable	Disable	Communicated value for enabling ERV unoccupied recirculation mode from BMS
BV:8	Aux. Relay 1 BMS	W	Energize	De-energize	Communicated value to actuate auxiliary relay 1 when MSV:24 is BMS
BV:9	Aux. Relay 2 BMS	W	Energize	De-energize	Communicated value to actuate auxiliary relay 2 when MSV:25 is BMS
BV:10	Aux. Relay 3 BMS	W	Energize	De-energize	Communicated value to actuate auxiliary relay 3 when MSV:26 is BMS
BV:11	Aux. Relay 1 State	R	Energized	De-energized	Commanded value to actuate auxiliary relay 1 according to function set by MSV:24
BV:12	Aux. Relay 2 State	R	Energized	De-energized	Commanded value to actuate auxiliary relay 2 according to function set by MSV:25
BV:13	Aux. Relay 3 State	R	Energized	De-energized	Commanded value to actuate auxiliary relay 3 according to function set by MSV:26
BV:14	Reversing Valve	R	Energized	De-energized	Commanded value for refrigerant reversing value (heat pump units only)
BV:15	Manual Reset Alarm Active	R	Raised	Clear	Calculated value indicating if a manually-resettable alarm is active
BV:16	Manual Reset Alarm Resettable	R	Resettable	Not Resettable	Calculated value indicating if a manually-resettable alarm can be reset with current conditions
BV:17	Reset All Alarms	W	Reset	No Action	Commanded value to reset all active alarms
BV:18	Remote Shutdown BMS Alarm	R	Raised	Clear	Alarm indicating BMS-initiated shutdown (BV:2) active
BV:19	Remote Shutdown Din Alarm	R	Raised	Clear	Alarm indicating field-wired digital remote shutdown
BV:20	Dirty Filter Alarm	R	Raised	Clear	Alarm indicating air filters dirty
BV:21	Condensate Overflow Protection Alarm	R	Raised	Clear	Alarm indicating condensate tray is full
BV:22	Smoke Detector Alarm	R	Raised	Clear	Alarm indicating smoke detected
BV:23	Smoke Detector Trouble	R	Raised	Clear	Alarm indicating smoke detector trouble
BV:24	Absorber Leak Alarm	R	Raised	Clear	Alarm indicating leak detected in absorber containment tray
BV:25	Desorber Leak Alarm	R	Raised	Clear	Alarm indicating leak detected in desorber containment tray
BV:26	Sump Overflow Protection Alarm	R	Raised	Clear	Alarm indicating unit trip due to absorber overflow protection switch

BACnet Points

Binary Values

Object ID	Point name	Read/ Write	Active	Inactive	Description
BV:27	High Airflow Alarm	R	Raised	Clear	Alarm indicating high airflow trip. Requires manual reset
BV:28	Phase Monitor Alarm	R	Raised	Clear	Alarm indicating phase monitor fault
BV:29	Compressor Envelope Alarm	R	Raised	Clear	Alarm indicating compressor operating outside of envelope
BV:30	High Discharge Superheat Alarm	R	Raised	Clear	Alarm indicating high compressor discharge superheat
BV:31	High Discharge Pressure Alarm	R	Raised	Clear	Alarm indicating high compressor discharge pressure
BV:32	High Discharge Temperature Alarm	R	Raised	Clear	Alarm indicating high compressor discharge temperature
BV:33	Failure to Start Alarm	R	Raised	Clear	Alarm indicating three consecutive failed starts
BV:34	Too Many Starts Alarm	R	Raised	Clear	Alarm indicating seven recent starts (Counter increments on compressor start and decrements by 1 every 30 minutes.)
BV:35	Sump Level HiHi Alarm	R	Raised	Clear	Alarm indicating desiccant system has entered high regeneration mode due to high sump level
BV:36	Gas Heater Air Proving Alarm	R	Raised	Clear	Alarm indicating gas heater air proving switch is not made
BV:37	Discharge Cut-out Open Alarm	R	Raised	Clear	Alarm indicating that compressor discharge pressure cutout switch is tripped
BV:38	Refrigerant Loss Alarm	R	Raised	Clear	Alarm indicating that refrigerant loss has been detected based on pressure sensors
BV:39	Outdoor Air Sensor Fault	R	Raised	Clear	Outdoor Air Sensor Fault
BV:40	Mixed Air Sensor Fault	R	Raised	Clear	Mixed Air Sensor Fault
BV:41	ELAT Sensor Fault	R	Raised	Clear	ELAT Sensor Fault
BV:42	ALAT Sensor Fault	R	Raised	Clear	ALAT Sensor Fault
BV:43	Supply Air Sensor Fault	R	Raised	Clear	Supply Air Sensor Fault
BV:44	Return Air Sensor Fault	R	Raised	Clear	Return Air Sensor Fault
BV:45	Refrigerant Sensor Fault	R	Raised	Clear	Refrigerant Sensor Fault
BV:46	Desiccant Level Sensor Fault	R	Raised	Clear	Desiccant Level Sensor Fault
BV:47	ERV Wheel Differential Pressure Sensor Fault	R	Raised	Clear	ERV Wheel Differential Pressure Sensor Fault
BV:48	Supply Air Piezo Ring Sensor Fault	R	Raised	Clear	Supply Air Piezo Ring Sensor Fault
BV:49	Supply Air Pressure Sensor Fault	R	Raised	Clear	Supply Air Pressure Sensor Fault
BV:50	Return Air Pressure Sensor Fault	R	Raised	Clear	Return Air Pressure Sensor Fault
BV:51	Space Sensor Fault	R	Raised	Clear	Space Sensor Fault

BACnet Points

Binary Values

Object ID	Point name	Read/ Write	Active	Inactive	Description
BV:52	Space CO2 Sensor Fault	R	Raised	Clear	Space CO2 Sensor Fault
BV:53	Point Expander Offline	R	Raised	Clear	Controller IO expansion module offline
BV:54	Defrost Active	R	Inactive	Defrosting	Calculated value for defrost mode active (heat pump units only)

BACnet Points

Multi-State Variables

Object ID	Point name	Read/ Write	Description	State 1	State 2	State 3	State 4	State 5	State 6	State 6
MSV:1	Main Mode	W	Command to activate unit	Off	Fan	On				
MSV:2	Occupancy Mode	W	Command to set occupancy state source	Schedule	Hold Occupied	Hold Unoccupied	BMS			
MSV:3	Psychrometric Mode	R	Calculated intended unit operating state, resulting from outdoor/mixed air conditions and setpoints	Off	Dehumidifying	Cooling	Ventilation	Heating		
MSV:4	Operating Mode	R	Calculated unit operating state, resulting from Main Mode, Psychrometric Mode, and any fault conditions	Off	Dehumidifying	Cooling	Ventilation	Heating		
MSV:5	ERV Mode	R	Calculated ERV state, resulting from outdoor/return air conditions and setpoints	Undetermined	Bypass	Standard	Unocc Recirc	Partial Recirc	Partial Recirc Bypass	Economizer
MSV:6	ERV Frost Control Mode	R	Calculated ERV defrost state, resulting from differential pressure across wheel and outdoor air conditions	Normal	Defrost	Wheel Off				
MSV:8	BMS Units of Measure	W	Command to set engineering units of measure	IP						
MSV:9	Supply Air Temperature Mode Occ	W	Command to determine supply air temperature control method in occupied mode	Supply Control	Space Reset	Outdoor Reset	Return Reset	BMS		
MSV:10	Supply Air Temperature Mode Unocc	W	Command to determine supply air temperature control method in unoccupied mode	Supply Control	Space Reset	Outdoor Reset	Return Reset	BMS		
MSV:11	Supply Air Temperture Reset Method	W	Command to determine supply air temperature control reset method	Ramp	PI					
MSV:12	Supply Air Dew Point Mode Occ	W	Command to determine supply air dew point control method in occupied mode	Supply Control	Space Reset	Return Reset	BMS			
MSV:13	Supply Air Dew Point Mode Unocc	W	Command to determine supply air dew point control method in unoccupied mode	Supply Control	Space Reset	Return Reset	BMS			
MSV:14	Supply Air Dew Point Reset Method	W	Command to determine supply air dew point control reset method	Ramp	PI					
MSV:15	Supply Air VAV Sensor Type	R	Sensor used for supply fan VAV control. Must be set on physical controller	None	Pressure	CO2				
MSV:16	Space Temperature Source	W	Command to set space temperature measurement source	None	Analog In	BMS	Room Terminal			
MSV:17	Space Relative Humidity Source	W	Command to set space relative humidity measurement source	None	Analog In	BMS	Room Terminal			
MSV:18	Space CO2 Concentraction Source	W	Command to set CO2 concentration measurement source	None	Analog In	BMS				
MSV:19	Supply Air Static Pressure Source	W	Command to set supply air static pressure measurement source	None	Analog In	BMS				
MSV:20	Return Air Static Pressure Source	W	Command to set return air static pressure measurement source	None	Analog In	BMS				
MSV:21	Supply Air Volume Mode	W	Command to set supply fan speed control method	Constant Speed	Pressure Control	CO2 Control	Airflow	Single-Zone VAV	BMS	
MSV:22	Return Air Volume Mode	W	Command to set exhaust fan speed control method	Constant Speed	Pressure Control	Supply Fan Tracking	Damper Tracking	BMS		
MSV:23	Outdoor/Recirc Damper Mode	W	Command to set outdoor and recirculation damper control method	Constant Position	Pressure Control	Space CO2	BMS			
MSV:24	Aux. Relay 1 Function	W	Command to set the function for auxiliary relay 1	BMS						
MSV:25	Aux. Relay 2 Function	W	Command to set the function for auxiliary relay 2	BMS						
MSV:26	Aux. Relay 3 Function	W	Command to set the function for auxiliary relay 3	BMS						

BACnet Points

Bit-Packed Word Strings

Misc Alarm Word

Object ID	Bit	Bit name
PIV:2	1	Remote Shutdown DIn
PIV:2	2	Remote Shutdown BMS
PIV:2	3	Phase Monitor Fault
PIV:2	4	Condensate Overflow Protection
PIV:2	5	High Airflow
PIV:2	6	Supply Dirty Filter
PIV:2	7	Regen Dirty Filter
PIV:2	8	Smoke Detector Alarm
PIV:2	9	Smoke Detector Trouble
PIV:2	10	Heater Safety Chain Lockout
PIV:2	11	Heater Safety Chain Fault

Desiccant Alarm Word

Object ID	Bit	Bit name
PIV:4	0	Absorber Leak
PIV:4	1	Desorber Leak
PIV:4	2	Sump Overflow Protection
PIV:4	3	Sump Level HiHi
PIV:4	4	Sump Level LoLo
PIV:4	5	Sump Level Sensor Fault

Refrigeration Alarm Word

Object ID	Bit	Bit name
PIV:3	0	High Suction Superheat
PIV:3	1	High Discharge Pressure
PIV:3	2	High Discharge Superheat
PIV:3	3	High Discharge Temperature
PIV:3	4	Suction Pressure Cut-out
PIV:3	5	Discharge Pressure Cut-out
PIV:3	6	Pressure Cut-out
PIV:3	7	Pressure Switch Open Circuit
PIV:3	8	Refrigerant Loss
PIV:3	9	Failure to Start
PIV:3	10	Too Many Starts
PIV:3	11	Compressor Not Running
PIV:3	12	Compressor Out of Envelope
PIV:3	13	Suction Pressure Sensor Fault
PIV:3	14	Suction Temp Sensor Fault
PIV:3	15	Discharge Pressure Sensor Fault
PIV:3	16	Discharge Temp Sensor Fault
PIV:3	17	Ext Cond Refrig Out Temp Sensor Fault
PIV:3	18	Regen Cond Refrig Out Temp Sensor Fault

Devices Alarm Word

Object ID	Bit	Bit name
PIV:5	0	Point Expander Offline
PIV:5	1	Point Expander 2 Offline
PIV:5	2	Cooling EEV Initialization Failure
PIV:5	3	Cooling EEV Motor Error
PIV:5	4	Heating EEV Initialization Failure
PIV:5	5	Heating EEV Motor Error
PIV:5	6	3-way Valve Initialization Failure
PIV:5	7	3-way Valve Motor Error
PIV:5	8	Valve Driver Offline
PIV:5	9	Valve Driver 2 Offline
PIV:5	10	Compressor Faulted
PIV:5	11	Compressor Offline
PIV:5	12	Compressor Remote Enable Wiring Fault
PIV:5	13	Compressor STO Wiring Fault
PIV:5	14	Supply Fan Faulted
PIV:5	15	Supply Fan Offline
PIV:5	16	Regen Condenser Fan Faulted
PIV:5	17	Regen Condenser Fan Offline
PIV:5	18	External Condenser Fan Faulted
PIV:5	19	External Condenser Fan Offline
PIV:5	20	Exhaust Fan Faulted
PIV:5	21	Exhaust Fan Offline
PIV:5	22	ERV Wheel Faulted
PIV:5	23	ERV Wheel Offline
PIV:5	24	Heater Faulted
PIV:5	25	Heater Offline

Sensors Alarm Word

Object ID	Bit	Bit name
PIV:6	0	Outdoor Temp Sensor Fault
PIV:6	1	Outdoor Humidity Sensor Fault
PIV:6	2	Mixed Temp Sensor Fault
PIV:6	3	Mixed Humidity Sensor Fault
PIV:6	4	ELAT Sensor Fault
PIV:6	5	ALAT Sensor Fault
PIV:6	6	Supply Temp Sensor Fault
PIV:6	7	Supply Humidity Sensor Fault
PIV:6	8	Space Temp Sensor Fault
PIV:6	9	Space Humidity Sensor Fault
PIV:6	10	Return Air Temp Sensor Fault
PIV:6	11	Return Air Humidity Sensor Fault
PIV:6	14	Space CO2 Sensor Fault
PIV:6	15	Supply Piezometer Diff Pressure Sensor Fault
PIV:6	16	Supply Air Pressure Sensor Fault
PIV:6	17	Return Air Pressure Sensor Fault
PIV:6	18	ERV Wheel Differential Pressure Sensor Fault

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