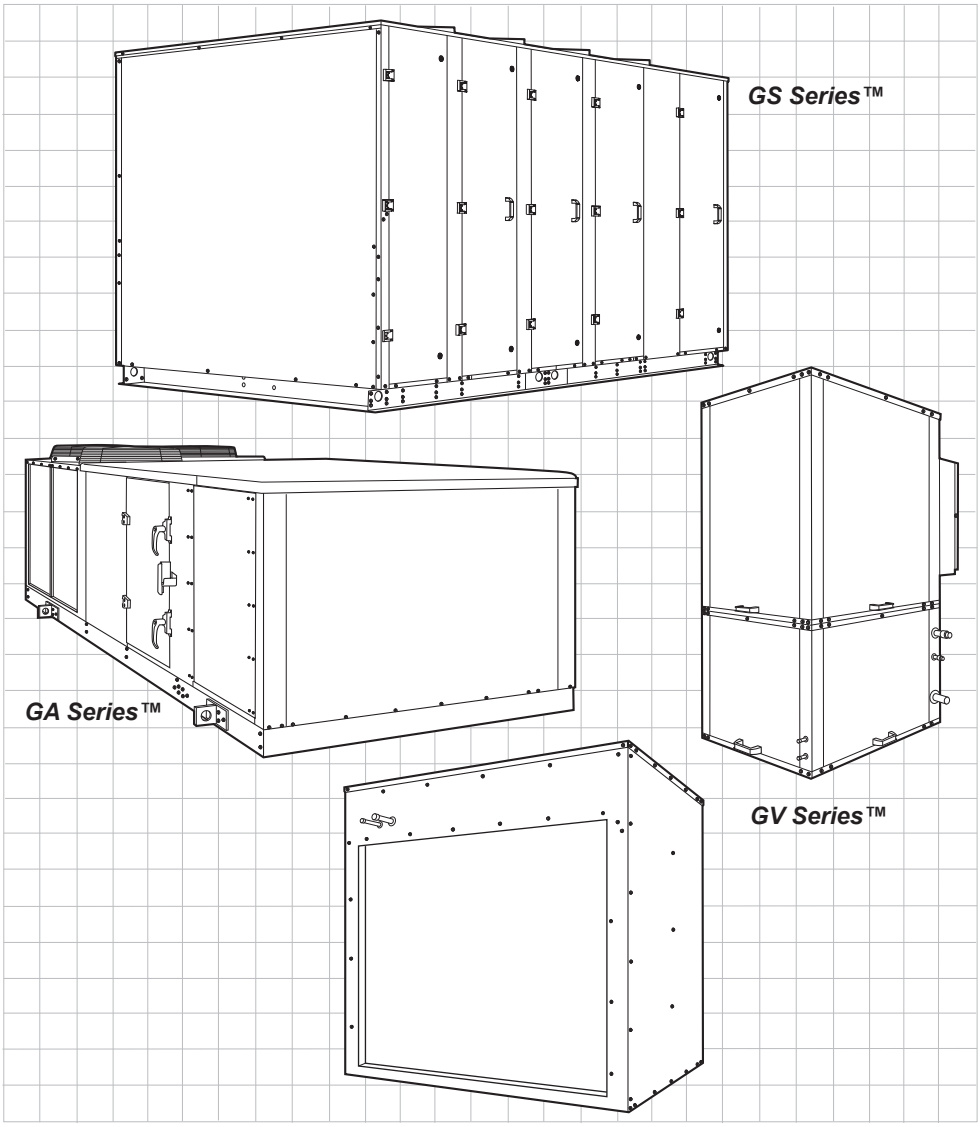
GrowAire®

Climate Control Systems

- ***GS Series™***
- ***GA Series™***
- ***GV Series™***

Installation and Operation Manual

- Climate control systems that provide cooling, dehumidification, and optional auxiliary heating for Controlled Environmental Agriculture in a single, highly efficient package.
- The GrowAire® GA Series climate control system offers a all-in-one packaged rooftop configuration.
- The GrowAire® GS Series climate control system is available in a wide range of indoor and outdoor configurations and sizes to match the application requirements.
- The GrowAire® GV Series climate control system is a high-quality cost-effective system designed for tight spaces



⚠ DANGER

ONLY TRAINED, QUALIFIED PERSONNEL SHOULD INSTALL AND/OR SERVICE DESERT AIRE EQUIPMENT. SERIOUS INJURY, DEATH AND PROPERTY DAMAGE CAN RESULT FROM IMPROPER INSTALLATION/SERVICE OF THIS EQUIPMENT. HIGH VOLTAGE ELECTRICAL COMPONENTS AND REFRIGERANT UNDER PRESSURE ARE PRESENT.

⚠ DANGER

For any unit labeled Class 1, Group D, Division 2, all wiring must be in accordance to Class 1, Group D, Division 2 requirements. Insure that all local, state, national and any other applicable codes are adhered to when connecting any device to this equipment. All electrical connections to units labeled Class 1, Group D, Division 2 must be done with a conduit seal.

Desert Aire
Climate Control Equipment Standard Limited Warranty

Desert Aire warrants the climate control unit to be free from defects in materials and workmanship subject to the terms, conditions and limitations stated herein.

TERMS

Desert Aire warrants all components (except as noted) for a period of two (2) years from the date of shipment. This warranty shall be limited to the supply of new or rebuilt parts for the part which has failed because of defects in workmanship or material, and does not include the cost for labor, transportation or other costs not herein provided for. Replaced parts are warranted only for the remaining portion of the original warranty period.

CONDITIONS

The warranty is subject to the following conditions:

1. The unit must be properly installed and maintained in accordance with the Desert Aire "Installation and Operation Manual" provided with each unit and/or other documentation provided.
2. **The Start-Up Report must be completed and returned to Desert Aire Service for evaluation. If no deficiencies are identified a Warranty Validation Letter will be issued that provides all warranty dates and coverage. If installation or start-up deficiencies are present, these must be corrected and communicated to Desert Aire in order to activate warranty.**
3. This warranty shall not apply to any part that has been tampered with, or has been subject to misuse, negligence or accident. A warranty can be obtained for altered equipment but only with written consent from Desert Aire.
4. The following parts and components are excluded from the warranty: belts, filters, driers, fuses and refrigerant.

5. Refrigerant coils or other components that corrode due to improperly balanced air chemistry or corrosive air quality will not be warranted.
6. All replacements or repairs will be FOB Germantown, WI.
7. This warranty shall be null and void if defects or damages result from unauthorized opening of the refrigerant circuit, tampering with factory set controls, or operating outside the original design conditions.
8. Desert Aire shall not be liable for labor costs incurred in diagnosing the problem, or the removal or replacement of the part or parts being repaired.
9. Desert Aire must preauthorize all warranty coverage described herein.

Extended Warranty:
Your Desert Aire unit may have extended warrantees beyond this Standard Limited Warranty document. Extended warrantees are only available at the time of the purchase of the original equipment. These extended warrantees are covered under a separate document and their terms and conditions are separate from this document. It is mentioned in this document for informational purposes only. Any Extended Warranties will be identified on the Warranty Validation letter.

Any and all incidental or consequential damages are expressly excluded from this warranty. Some states do not allow the exclusion of incidental or consequential damages for personal injury, so the above limitations may not apply to you for certain damages. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. No person or representative is authorized to make any warranty or assume any liability not strictly in accordance with the aforementioned.

Inquiries regarding warranty matters should be addressed to:

Desert Aire Corp c/o Service Manager
N120 W18485 Freistadt Road • Germantown, WI 53022
PH: (262) 946-7400 • FAX: (262) 946-7401 • E-MAIL: service@desert-aire.com

Additional copies of this manual can be purchased for a nominal fee from Desert Aire. Submit requests to the contact information listed above.

Gas Heat Exchanger Ten (10)-Year Prorated Warranty Terms (For GA Series™ units with gas heat only)
Desert Aire offers an extended prorated eight (8)-year warranty for gas heat exchanger. All other heater components are covered under the initial 2 year warranty.

2 Years Parts Only from date of shipment. Prorated from years 3-9 as follows:

Year 3: Desert Aire warrants 70% of replacement price
Year 4: Desert Aire warrants 60% of replacement price
Year 5: Desert Aire warrants 50% of replacement price
Year 6: Desert Aire warrants 40% of replacement price
Year 7: Desert Aire warrants 30% of replacement price
Year 8: Desert Aire warrants 20% of replacement price
Year 9: Desert Aire warrants 10% of replacement price

For Units w/Gas Heat:

For Your Safety Read Before Operating

WARNING: If you do not follow these instructions exactly a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

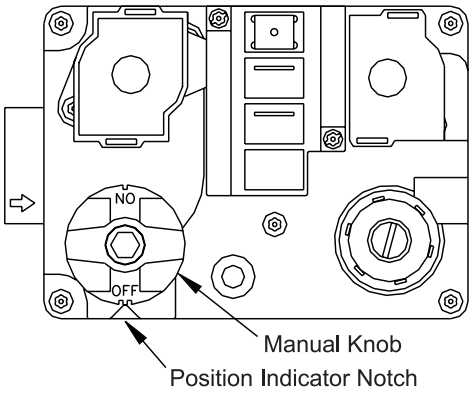
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand.
5. Turn gas control knob clockwise ↷ to "OFF" position.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn gas control knob ↶ counterclockwise to "ON" position.
8. Turn on all electric power to unit.
9. Set thermostat to desired setting.
10. If appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

1. Set thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn gas control knob clockwise ↷ to "OFF" position.

Safety Labels are used throughout this manual. They comply with the ANSI Z535.4 Standard. Please be familiar with the following labels and their definitions.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Caution used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Product Warning for the State of California

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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1. Introduction

Desert Aire climate control units are designed to provide years of reliable service when installed properly. Read these instructions carefully before you install the unit.

1.1. Inspection

Desert Aire inspects and tests each climate control unit before it leaves the factory so that you receive a quality piece of equipment. Unfortunately, equipment may become damaged in transit. Inspect the unit carefully before signing the receiving papers. Check for both visible and concealed damage. Remove crating and inspect the exterior cabinet for damage. Dented panels, broken crating or any fluid leaking from the unit should be documented upon delivery.

1.2. Freight Damage Claims

If the unit has been damaged, document the extent of the damage. Take pictures if possible. Next, obtain a claim form from the carrier. Promptly fill out and return the form.
Carriers may deny claims that you have not filled out within a week of delivery. Notify Desert Aire of any damage. Damaged units must have signed documents at the time of delivery to be eligible for a freight claim.

1.3. Rigging

⚠ WARNING

1. **Failure to observe rigging instructions may lead to equipment damage, personal injury, or death.**
2. **Lifting method and procedure must comply with all local and national codes and regulations.**
3. **The use of safety slings in addition to lifting lugs is required.**
4. **Do not lift the dehumidifier in high winds or above people.**

Desert Aire dehumidifiers are solidly built and can be very heavy. Avoid personal injury and damaging the equipment by planning the installation carefully. Use moving equipment whenever possible.

1.3.1. Rigging the Unit

Depending upon the unit type, various rigging methods are used to best lift the equipment. Please reference the applicable sections below:

- **All Products (GV, GA and GS)**

  Personnel should avoid stepping on the top of the unit. Desert Aire units are not designed to support the weight of a person on all portions of the roof. Damage incurred through caved or distorted top panels will not be covered under warranty. If you must walk on the top panels, carefully walk on the edges where structural integrity is greatest.

- **GV Series™ Products**

  - 4-15 Ton
    Move the unit to the desired installation location with the unit on the wood skid. To remove unit from skid, position fork lift parallel to the boards on the top of the skid. Carefully slide forks between the unit and cross braces to pick the unit off the skid. The unit will have to be carefully removed from the fork lift and placed into the desired location using hand truck equipment dollies or pipe rollers. Use caution to not damage the unit with the fork lift or tip the unit over ensuring it is kept as level as possible.

  - 20-30 Ton
    The base is equipped with a built-in 12 gauge skid. Use a fork lift to move the unit into place. Use caution to not damage the unit with the fork lift or tip the unit over ensuring it is kept as level as possible. In all cases, use appropriate safety practices while lifting the unit. Forklift tie-down clamps, straps, and other restraints where applicable should be used to prevent tipping of the load.

- **GA Series™ and GS Series™ Products**

  GA Series™ and GS Series™ units are equipped with four or more lifting points. Use spreader bars and safety straps when you rig the equipment.

  - Utilize all of the lifting lugs provided when hoisting the unit.

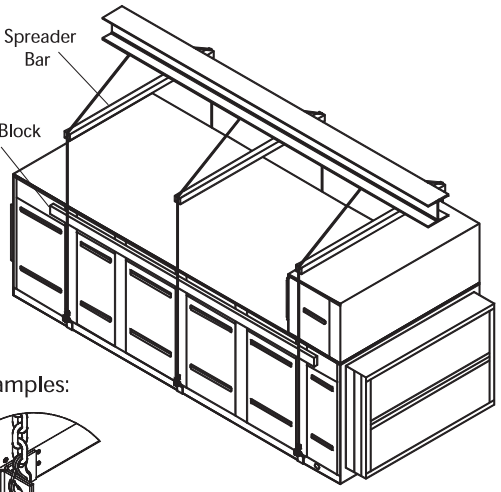
  - Test-lift the unit to verify that it is properly balanced.

  - Refer to diagram below for additional lifting instructions.

Large System Rigging

Notes:

1. The number of lifting points will vary between units. All lifting points must be used to lift unit.
2. Spreader bar must be used. Unit top panel is not designed to handle loading.
3. Lifting method/procedure to comply with all local and national regulations.
4. Use safety slings (not shown) in addition to lifting lugs.
5. Be sure that the lifting hooks do not contact the sides of the unit.
6. Use appropriate lifting strategy for unit. Examples:



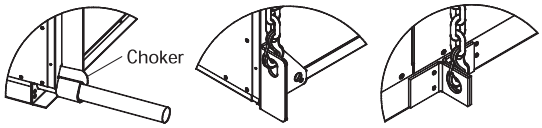


Figure 1 - Typical Rigging for a Large Unit

⚠ CAUTION

1. **Do not tip the unit on its side.**
2. **Avoid dropping the unit down stairways or subjecting it to severe mechanical shock.**

2 Installation

Manual applies to standard unit configurations only.

2.1 Location of Climate Control System

Desert Aire GS Series™ climate control units are configured to allow single-side access. This means you can make your service connections and perform routine maintenance when you must install one side of the unit close to a wall or other restriction. The “service side” is determined when the order is placed at the factory and cannot be changed in the field. It is recommended that clearance be provided on all sides to allow for ease of serviceability in the event large components require replacement. GA Series™ and GV Series™ units may require service access from multiple sides. Refer to the general arrangement drawing for further details.

Allow a minimum of 36 inches of clearance around the service side of the unit for piping, electrical connections, and service access. The non-access side of the unit should contain 12 inches of clearance for large component removal. For packaged units, ensure a minimum of one unit width of clearance is maintained to allow for proper airflow through the condensing section. If three or more walls surround the unit consult the factory for proper unit location to allow for adequate airflow through the condenser section.

Install the unit on a sturdy, level mounting base or platform that will prevent vibration and sound transmission. Never install the unit on a wooden or metal platform without consulting the design engineer for spring isolation requirements and sound control materials. Do not install the unit near occupied rooms such as offices or guestrooms. Do not attempt to conserve installation space by fabricating restrictive ductwork with abrupt bends. You may reduce the operating efficiency and the moisture removal capacity of the unit. See section 5.2 for detailed duct installation instructions.

Units located in unconditioned spaces may form condensation on the exterior of the cabinet. Precautions should be taken for indoor units located within unconditioned spaces to prevent damage resulting from condensation.

Do not install an indoor-rated unit in an outdoor or a wet environment.

If you must install a system outside you must use an outdoor-rated unit. Desert Aire seals and weatherproofs outdoor units to help prevent water infiltration. You can determine whether your unit is outdoor-rated by inspecting the unit rating plate.
See section 5.6 for details.

2.2 Duct Installation

Duct design and installation should conform to the latest ASHRAE and SMACNA low velocity duct standards. See section 5.2 for details. Undersized, restrictive ductwork with abrupt turns or transitions, can decrease the efficiency and the moisture removal capacity of your unit. Size the ductwork for an acceptable air pressure drop at the airflow volume of your unit. Use neoprene flex connectors when you attach ductwork to the unit to prevent transmission of excess vibration and noise.

Select the grilles, registers and diffusers for low static pressure loss, required throw distance, and the specified CFM rating. You can find this information in most grille manufacturer's catalogs. If you are installing the grilles in a corrosive environment, choose components made from anodized aluminum.

If you must install ductwork in an unconditioned area, use fiberglass duct wrap with vapor barrier facing. You must install the outdoor air intake away from all sources of airborne contamination such as exhaust fans or plumbing vents. You can use galvanized sheet metal ducts for most applications. However, you should use aluminum or stainless steel ducts for extreme applications such as chemical-laden environments.

2.3 Condensate Drain Piping

⚠ CAUTION

Condensate drain lines installed in an unconditioned space must be heat taped to prevent freezing. Check the heat tape yearly before winter operation.

The condensate drain connection may be on the side or the bottom of the unit, depending on the size and style of the cabinet used. Use concrete blocks or steel dunnage to raise the unit high enough above the floor to provide clearance for the field-supplied condensate drain trap.

Note: Units with gas heating option may have condensate form inside the furnace heat exchanger since it is located downstream from the cooling coil. On indoor units, you must also connect the heater's drain line (if present) to your field-installed condensate drainage plumbing.

Note: While the supply blower runs, the drain pan area inside the unit operates at a negative pressure. Your unit requires a p-trap in the condensate drain pipe to prevent condensate from being drawn into the cabinet.

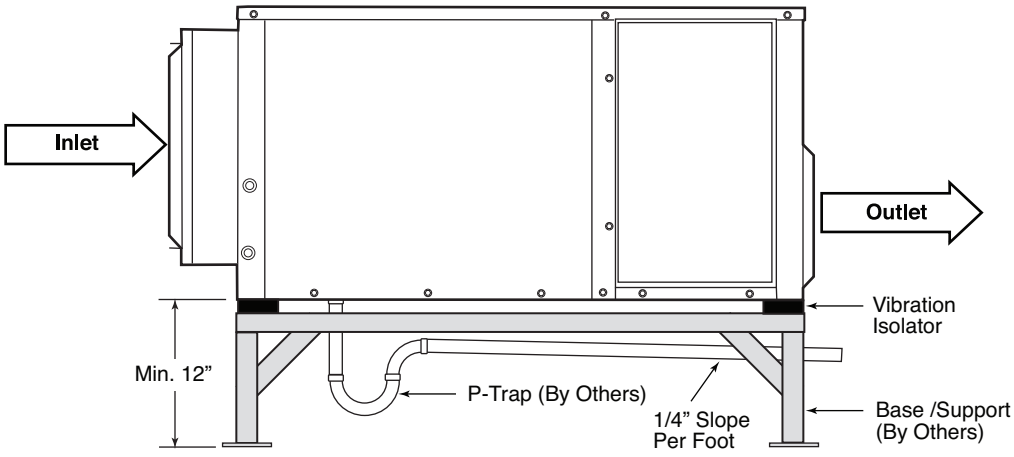


Figure 2 - Condensate Piping (Bottom-Mounted Drain Shown)

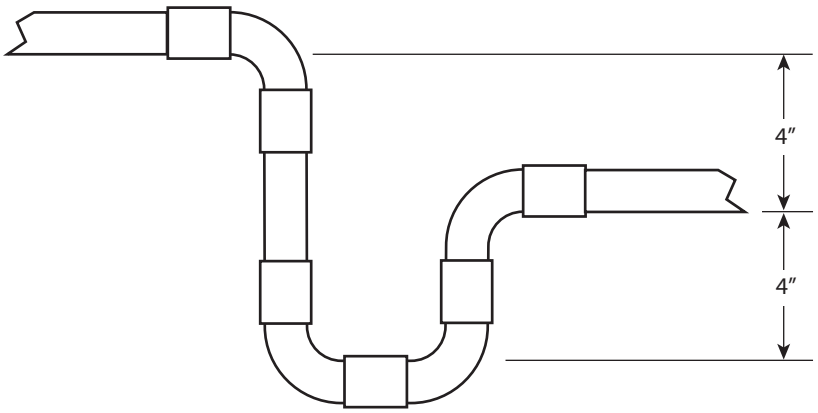


Figure 3 - Sectional View of Condensate Trap Requirements

Trap the condensate as shown in Figure 3. The P-trap dimensions in Figure 3 are sized for a maximum return air static of 2.0” of water. If your return air static exceeds this specification, consult Desert Aire for help in resizing the P-trap.

You may also need to install a cleanout tee or plug near the trap. Note that the drain opening in the drain pan is off-center to simplify its cleaning and servicing. Once you have designed and installed the trap, follow this sequence:

1. Connect the trap to a main drain line with 1/4” of downward pitch per linear foot of run.

2. Support the drain pipe every five feet to prevent sagging.

3. After you install the drain piping, prime the trap by pouring water into the drain pan of the unit.

2.4 Water Piping Installation (Water Cooled Systems Only)

As an option, the unit may be equipped with a tower water condenser. Use industry standard piping practices when connecting to such a unit. Connections are copper stubs. Refer to submittal documentation for specific size per model.

Water Quality and General System Design

A 60 mesh or finer strainer must be installed in the water inlet line. Flush field-installed piping thoroughly before you put the unit into service. A piping system not properly flushed or filtered will cause the brazed-plate heat exchanger to lose efficiency or fail prematurely due to clogging and/or fouling.

To prevent premature failure of the heat exchanger, maintain the water at a pH of 7.4, but never below 6.0. Do not use water with high concentration of sulfur, chlorine, or sodium chloride.

A dedicated circulating pump must be used unless the main pump can develop enough head to overcome the combined resistance of the water condenser and the piping connected to it. See specific Flow Rate section for the required water flow rate and head for your application.

Install an air eliminator at any high point in the water piping. Air trapped in the water circuit of the unit can lead to elevated operating pressures, unexpected service calls, and decreased equipment life.

If the water system is connected to a variable frequency drive or to water loops with multiple units, flow regulating valves should be installed to ensure flow rate is maintained.

⚠ CAUTION

Do not exceed these guidelines as excessive flow rates will erode the condenser and piping.

GS Series™ and GV Series™ Products Flow Rate

The flow rate and antifreeze concentration (if used) will depend on the application. Please refer to Figure 4 and 5 for the required flow rate and temperature limits for the given application and unit type. If the application deviates from these conditions, please contact Desert Aire Service at 262-946-7400 for further review.

Unit Size (Nom. Tons)	Fluid Flow Rate (GPM)	Fluid Pressure Drop (psig)
2	9	0.9
3	15	1.3
4	15	1.7
5	19	2.6
8	20	2.3
10	28	2.8
15	45	2.7
20	57	2.7
25	70	2.7
30	87	2.8
36	99	3.1
40	123	2.8
46	135	2.8
50	143	3.1
56	156	3.1
60	172	3.1

Note: Table allows for antifreeze concentrations up to 30% glycol and entering water temperatures between 35°F & 105°F

Figure 4 - Water Flow Rates

Glycol Percent	Min. Entering Water Temperature (°F)
0	48
5	47
10	45
15	40
20 and up	35

Figure 5 - Glycol Concentration Requirements

2.5 Remote Condenser Installation (Air-Cooled Systems Only)

Important: Refer to the separate Air Cooled Condensers Installation and Operation manual for additional details on line design, traps, clamping, and other condenser installation requirements.

GS Series™ and GV Series™ units installed with remote condensers may require additional oil and refrigerant charge at the time of field installation. Refer to the submittal documentation or label adjacent to the remote condenser connections to confirm the charge and connection tube sizes.

2.6 High Voltage Wiring

⚠ WARNING

1. **Disconnect power before servicing. The unit contains high voltage wiring and moving parts which may cause serious injury or death.**
2. **Failure to properly wire the unit may create the possibility of shock and can lead to premature system failure.**

⚠ DANGER

For any unit labeled Class 1, Group D, Division 2, all wiring must be in accordance to Class 1, Group D, Division 2 requirements. Insure that all local, state, national and any other applicable codes are adhered to when connecting any device to this equipment. All electrical connections to units labeled Class 1, Group D, Division 2 must be done with a conduit seal.

Electrical wiring must comply with all national, state, and local codes. Refer to the wiring diagram located inside the electrical section for all wiring connections. To connect main power, attach the supply wires to the three-pole power block mounted on the electrical panel. Test the phasing by "bumping" the blower contactor. Verify that the blower rotates in the proper direction. If it rotates the wrong direction, switch any two of the three wires at the power block.

2.6.1 High Voltage Connections

On single phase units the power supply must have 3 connections (2 power and 1 ground). On three phase units the power supply must have 4 connections (3 power and 1 ground). Connect the power supply wires to the main power block located in the upper section of the electrical compartment.

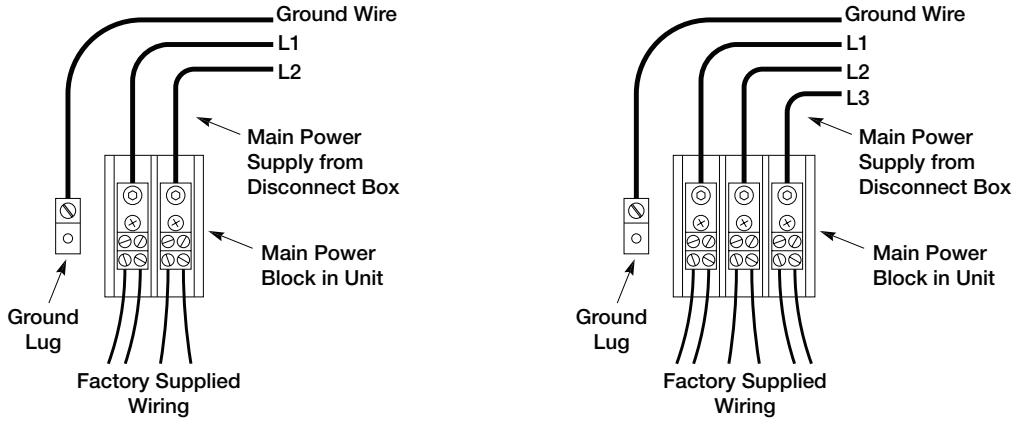


Figure 6 - Single-Phase and Three-Phase System Power Connection

2.6.2 Wire and Fuse Sizing

The field-installed power supply wires and over current devices must be sized to handle the minimum amperage of the unit without exceeding the maximum fuse size rating. Both the minimum amperage and the maximum fuse size are printed on the unit rating plate.

2.7 Controls and Sensors

⚠ DANGER

For any with Intrinsically Safe circuits, wiring to these devices must be done only to Intrinsically Safe terminal strip. Refer to the wiring schematic for details of these devices and wiring parameters. The length, capacitance, resistance, and inductance of the cable used to connect the field wiring of the Intrinsically Safe circuit shall not overload the rating of the Intrinsically Safe barrier.

The standard Desert Aire Grow Room environmental control systems are controlled by a microprocessor controller. This controller is designed for precise monitoring and control of air temperature and relative humidity (RH) within a conditioned environment. A separate controls manual has been provided. Refer to this separate manual for controller and sensor specifications, operation, and options.

Sensors must be installed and wired prior to unit startup. Please refer to the following for general sensor information in addition to the separate controller manual. A general example of sensor location and wiring has been provided below in figure 7.

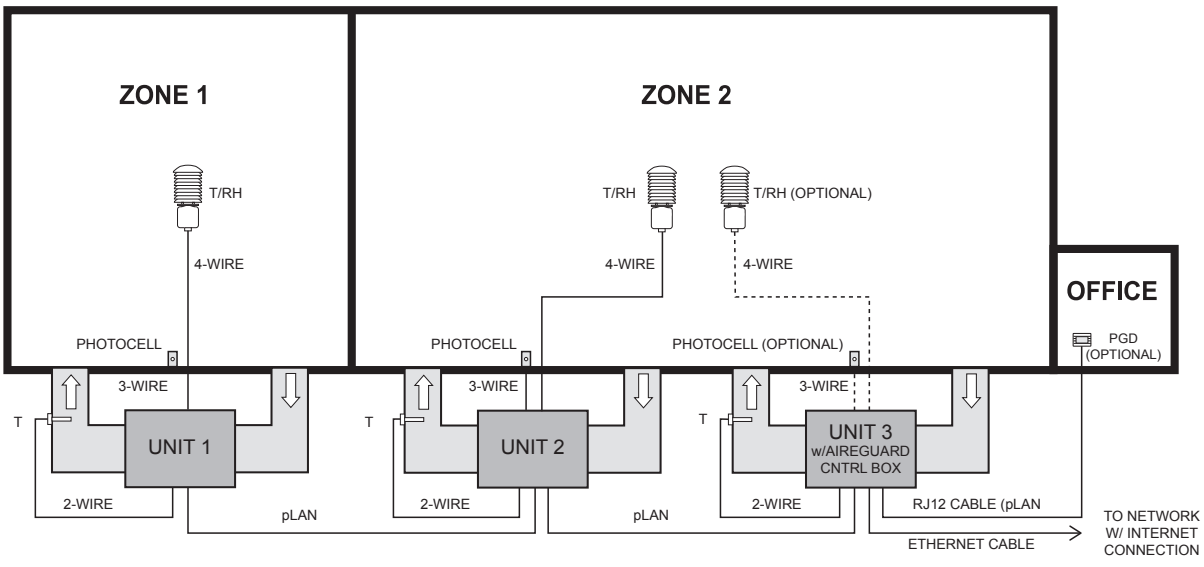


Figure 7 - Wiring and Location of Field Installed Sensors

2.7.1 Supply Air Duct-Mount Temperature Sensor

The supply air duct-mount temperature sensor is used to control the supply air temperature of the unit. This is an NTC temperature sensing bulb with 3 meters of cable that is provided with a duct insertion sensor holder for mounting. This must be mounted in a location that monitors only the supply air for the unit that it is attached to. Install upstream of any duct tees that may connect two or more systems together. If auxiliary heating is installed in the ducts and is to be controlled by the Desert Aire enviromnental control system, the supply air sensor must be installed downstream of the heater.

Figure 8 - Supply Air Duct Mounted Temperature Sensor

2.7.2 Zone Sensor(s)

A temperature and humidity zone sensor is supplied for each room. This will be connected to the unit or one of the units servicing that room.

Some applications may desire redundant sensors. In this case, a room may have multiple sensors located within it (maximum of one sensor for each unit).

Note that only one sensor is active at any time. To activate a different sensor, each unit needs to be reconfigured to respond to the alternate sensor. Rather than installation of additional sensors immediately, it is recommended that these additional sensors are placed in a secure location as spares and field wiring is made conducive for quick and easy replacement should this become necessary. See GrowAire® Users Manual for recommended practices for regular calibration. If additional zone sensors are required, please consult the factory.

- Select a representative location for the sensor close to the plants where you would like the temperature and humidity to be maintained. For example, this may be at the leaves of the plant if that is the most critical and represents the area that your desired settings should control to. If redundant sensors are used, mount all sensors within this general location. **CAUTION:** Do not mount the sensor in a location where false readings may occur due to dead air regions, radiant heat gain from the lighting, location too close to supply air diffusers, or thermal losses in winter.

- Mount the T/RH sensor(s) within the radiant shield(s) per the manufacturer's instructions. Please note the sensor clamp is separate within the packaging and must be installed within the shield.

Figure 9 - Zone Sensor Installed in Radiant Shield

- The temperature/humidity sensor operates on the Modbus platform and comes with 5 meters of cable. If extra length is required, Install four conductor shielded cable of a minimum of 24 gauge to allow a maximum run of 1000 meters from the sensor to the labeled terminal strip in the control panel of the unit. Wire the space temperature/humidity sensor per supplied wiring diagram to one of the units serving the space. Do not run sensor wiring adjacent to, OR in the same conduit as, wires carrying more than 24 VAC.

- Ensure the room has sufficient circulation to minimize micro-climates. Verify temperature reading is consistent through the space and close to that being read by the temperature/humidity sensor.

2.7.3 Photo Sensor

Photo sensor is to be installed within the space and wired per the supplied unit wiring diagram. The photo sensor should be located in close proximity to the grow lights.The purpose of this sensor is to detect when the grow lights are operating. The sensor can be programmed to allow the unit to use separate room temperature and humidity setpoints for lights-on and lights off modes or vice versa, the units can be programmed to use alternate setpoints.

Additionally, the unit will respond more quickly to changes in inputs immediately after the transition from lights-on to lights-off or vice versa. Since the load changes rapidly on these transitions, the quicker response allows for better control in the room during this transition, limiting the amount of temperature fluctuation.

Install three, 18 gauge (0-500 feet) OR three, 24 gauge (0-100 feet) wires from the sensor to the labeled terminal strip in the control panel of the unit. (See your wiring schematic for connection details.) This sensor comes with a 2 1/8” x 4” junction box. Some applications may require redundant sensors. In this case, a room may have multiple sensors located within it and wired one per unit. Note that only one sensor is active at any time. To activate a different sensor, each unit controls need to be reconfigured to look at the alternate sensor. Rather than installation of additional sensors immediately, it is recommended that these additional sensors are placed in a secure location as spares and field wiring is made conducive to quick and easy replacement should this become necessary.

Figure 10 - Photo Sensor

2.7.4 Remote Display Terminal (Optional)

The remote display terminal (RDT) is the optional remote mounted interface with the unit controller. The GrowAire™ units are equipped with either an internal display terminal (IDT), as part of the controller, or a wall-mountable RDT, in cases where the controller mounted display or IDT would prove hard to view or use. The RDT is also available as an option for applications desiring remote access to the unit(s). See the controller manual for details on wiring and environmental limits.

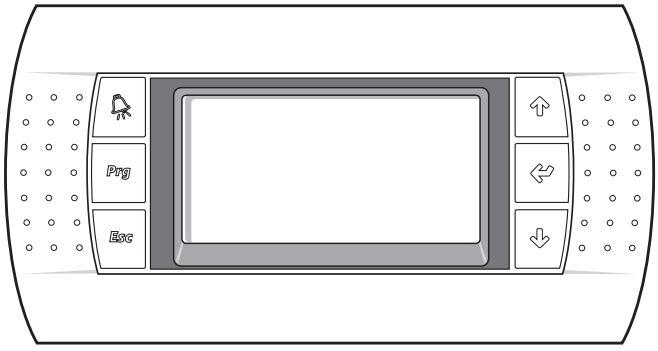


Figure 11 - Remote Terminal Display

2.7.5 CO_2 Enrichment (Optional)

- A carbon dioxide zone sensor is supplied to monitor the level of CO_2 within the grow space. This sensor uses single beam dual wavelength sensor technology to measure CO_2 levels from 0 to 5000 ppm. This needs to be installed on a designated wall within the plant room, roughly 3'- 5' in height above the ground.

Figure 12 - CO_2 Sensor

- The unit is supplied with controls to inject CO_2 into your grow room space. When optioned, a bulkhead fitting ⑤ is installed on the Desert Aire unit. In addition, Desert Aire provides the following for field installation: a pressure and gas flow regulator ②, hose for connection to the CO_2 container ④ and a wall mount CO_2 sensor. Please note the CO_2 and CO_2 tank ① are supplied by the customer.

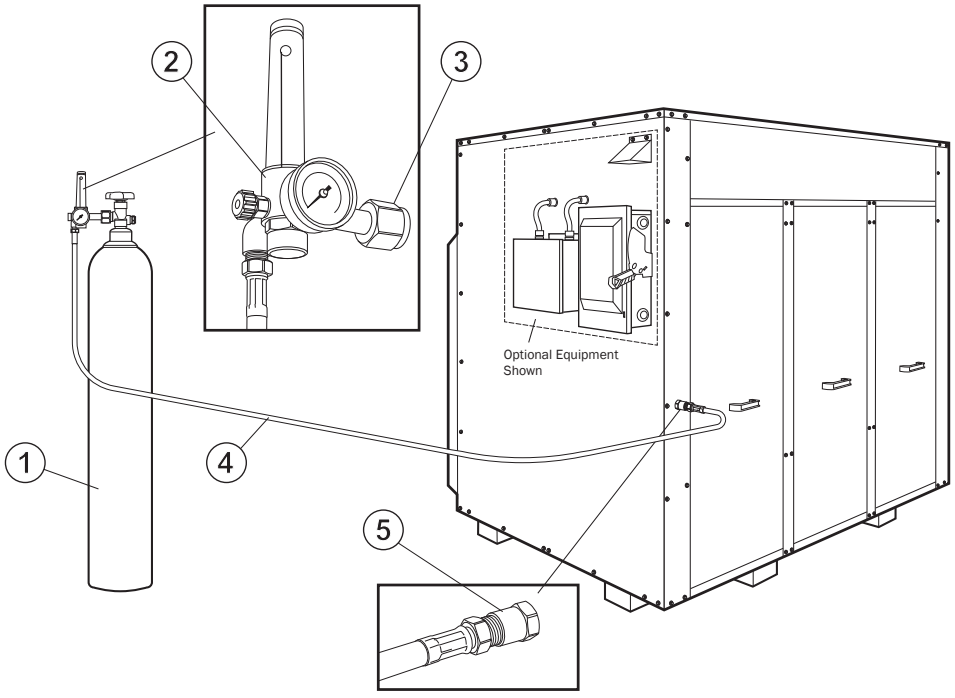


Figure 13 - CO_2 Enrichment Option

- Desert Aire has provided a gas flow regulator ② ③. This needs to be installed in the field on the customer supplied CO_2 tank ①. Install supplied plastic washer into fitting and thread onto tank. Note that additional washers are included in the package. Use only one washer and retain additional washers for later use if the original becomes worn or damaged.

- Desert Aire has provided a connection hose ④. This needs to be installed in the field to connect the customer supplied CO_2 tank ① to the Desert Aire unit at the label "CO_2 Connection" ⑤. Note for GA Series units the connection can be found on a spacer panel just upstream nearest the fan on the opposite side of the electrical section. This allows for the connection hose to either be routed through the cabinet sidewall or through the bottom of the unit depending upon the application.

The customer is responsible for the proper levels of CO_2 going into the space. The customer is also responsible for any room or building warning alarms to notify appropriate personnel if/when CO_2 levels become dangerous.

⚠ WARNING

The DesertAire GrowAire® CO2 control option is intended to control equipment under normal operating conditions. Where failure or malfunction of system components could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory systems) intended to warn or protect against failure or malfunction must be incorporated into and maintained as part of the installation.

Local and national codes and workplace health and safety standards may require additional equipment, warning signs and placards, and handling procedures. Consult your design professional and/or local authority having jurisdiction to ensure that all installation requirements are in place before operating the system. To ensure safety, follow all directions indicated by the supplier of the CO_2 and the storage container manufacturer.

As CO_2 gas is "heavier" than air, it will accumulate or remain at lowest levels in a higher concentration.

2.8 Auxiliary Heating Control Wiring

Note: You must use the Desert Aire control system to control or interlock with the room heating system. This prevents wide fluctuations in room air temperature. It also prevents the heater from trying to heat the room while the unit is running in cooling mode.

2.8.1 Auxiliary Heating – Dry Contact Closure

Desert Aire will provide a dry contact closure to interlock with the building heating system. This contact closure is normally used to interlock with a gas or electric duct heater which has its own power supply transformer. When the room air temperature drops below the setpoint, the dry contact will close to energize the auxiliary heater. See the unit wiring diagram for details.

2.8.2 Auxiliary Heating – Proportional Signal

Desert Aire will provide a proportional signal to modulate a heating coil control valve on units equipped with an integral heating coil.

This signal is reverse acting or direct acting depending on the settings in the controller. It is critical that units with hot water or steam coils be set properly for freeze protection. See controller manual for details on the settings and outputs.

Most proportional valves have either three or four terminals for field-installed wiring.

- Four-terminal valves have two terminals for 24 VAC power and two terminals for the signal input.

- Three-terminal valves have one terminal for the ”hot” 24 VAC input, a second terminal for the “positive” signal input, and a third, common terminal for the “neutral” 24 VAC input and the “negative” signal input.

You must follow the instructions included with the valve cut sheet. Observe the proper polarity, or you may damage both the valve and the Desert Aire controller. See the unit wiring schematic for information on signal wire connection points.

2.9 Gas Heater (Optional)

Several optional gas heater sizes and configurations are available to provide for heating of the outdoor air during cold conditions. Several sizes, heat exchanger designs, and combinations of capacities are available in natural gas or liquid propane fuel. Additionally, custom configurations can be specified. Installation instructions below are guidelines for installation. Refer to the separate gas heat instruction manual for additional instructions.

2.9.1 Gas Heater Installation

The Desert Aire unit may be equipped with an optional Category III gas-fired heater to provide air heating during the winter months. You must read and understand the following guidelines and warnings before you connect the heating section. Failure to follow these guidelines can result in improper and unsafe operation of this equipment, which can cause severe personal injury, death, or substantial property damage. Observe the following precautions:

- Follow all appropriate national and local codes and guidelines when installing gas-heating equipment. Failure to follow CGA, NFPA, and/or ANSI standards may cause equipment damage, personal injury, or death.

- Corrosive environments may reduce heater service life. This furnace is not to be used for temporary heating of buildings or structure under construction. Many of the chemicals used during construction form acid-bearing condensate when burned. This can substantially reduce the life of the heat exchanger.

- Gas heating equipment located indoors requires adequate combustion air. If you install the equipment inside a penthouse or mechanical room, an indoor unit heater and terminal kit must be used.

- Connect this furnace to an approved vent system only. Combustion products must be vented outdoors.

- Use a soap-bubble solution or an electronic detector to check for gas leaks. Never use a lighter or open flame to find leaks.

- The return air duct of the furnace must be sealed air tight to prevent starvation of the combustion air, especially if the furnace is located in a closet or confined area.

- Because of the potential of odorant fade, a gas leak may not be detected by smell. If this equipment is installed below grade, contact your gas supplier for a gas detector.

- Maximum gross stack temperature must not exceed 480°F (249°C) under any circumstances.

- Care must be taken not to wet electronic components during leak test. Wetting the electronic components may damage circuitry and cause a hazardous situation. Dry moisture from all leads and terminals if minor wetting occurs. Wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.

- The gas burner and its individual gas shutoff valve must be disconnected from the gas supply during pressure testing of the gas supply system at pressures in excess of 0.5 psig (14.0” wc).

- Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per 100 cubic ft.) of hydrogen sulfide gas. Check with your gas supplier.

- For initial start-up of the furnace after installation, it may be necessary to purge the air out of the gas line. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because it is heavier than air and may accumulate to a dangerous concentration at the floor level.

2.9.2 Gas Piping

Gas supply piping installation should conform with good practice and to national and local codes. The orifice for the burners are sized for either natural gas (having a heating valve of 1025 BTU per cubic foot and a specific gravity of 0.60) or for liquefied propane gas (with a heating value of 2500 BTU per cubic foot and a specific gravity of 1.53). If the gas at the installation does not meet this specification, consult the factory for proper orificing.

Seal the opening for the gas supply pipe with the grommet provided.

Gas piping must be large enough to provide adequate gas with minimal pressure drop. Use the table below as a guide to capacity. Note that each gas heat module in a GS Series™ unit will have an independent connection. GA Series™ units have a single gas heat connection. Ensure that any branch connection is also properly sized for a minimal pressure drop.

Capacity of Piping

Cubic Feet per Hour based on 0.3" w.c. Pressure Drop

Specific Gravity for Natural Gas - 0.6 (Natural Gas - 1000BTU/Cubic Ft.)

Specific Gravity for Propane Gas - 1.6 (Propane Gas - 2550BTU/Cubic Ft.)

Length of Pipe	Diameter of Piping					
	1/2"		3/4"		1"	
	Natural	Propane	Natural	Propane	Natural	Propane
20'	92	56	190	116	350	214
30'	73	45	152	93	285	174
40'	63	38	130	79	245	149
50'	56	34	115	70	215	131
60'	50	31	105	64	195	119
70'	46	28	96	59	180	110
80'	43	26	90	55	170	104
90'	40	24	84	51	160	98
100'	38	23	79	48	150	92
125'	34	21	72	44	130	79
150'	31	19	64	39	120	73
175'	28	17	59	36	110	67
200'	26	16	55	34	100	61

Length of Pipe	Diameter of Piping					
	1-1/4"		1-1/2"		2"	
	Natural	Propane	Natural	Propane	Natural	Propane
20'	730	445	1100	671	2100	1281
30'	590	360	890	543	1650	1007
40'	500	305	760	464	1450	885
50'	440	268	670	409	1270	775
60'	400	244	610	372	1105	674
70'	370	226	560	342	1050	641
80'	350	214	530	323	990	604
90'	320	195	490	299	930	567
100'	305	186	460	281	870	531
125'	275	168	410	250	780	476
150'	250	153	380	232	710	433
175'	225	137	350	214	650	397
200'	210	128	320	195	610	372

Note: When sizing supply lines, consider possibilities of future expansion and increased requirements.

Refer to National Fuel Gas Code for additional information on line sizing.

Figure 14 - Gas Pipe Capacity in Cubic Feet per Hour

Gas connection sizes are shown in Figure 15. Note that these are connection sizes only. Supply lines must be sized based on pressure drop and capacity as indicated in Figure 14.

Model Size	100 - 250	300 - 400
Natural Gas	1/2”	3/4”
Propane Gas	1/2”	1/2”

Figure 15 - Gas Connection Sizes

Gas piping must conform to all applicable codes and standards. Follow standard gas piping practices, including:

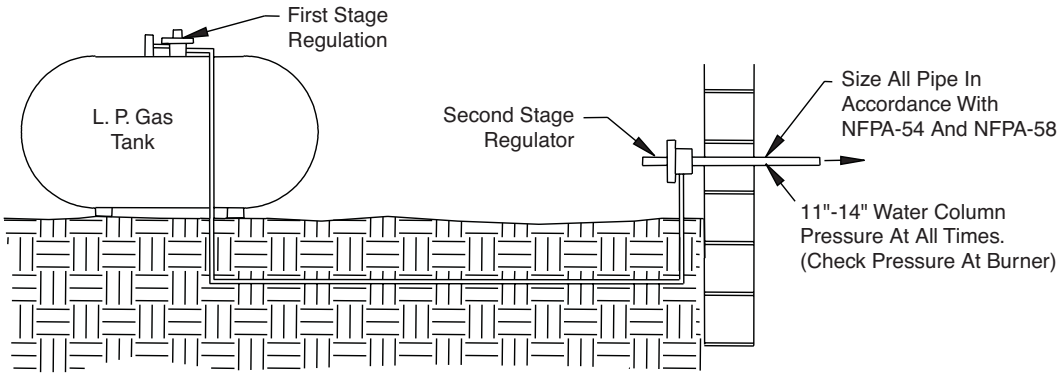
- Pitch gas piping downward in the direction of flow so condensed moisture can drain freely.
- Install a drip leg at the lowest point in the gas line to prevent moisture and debris from clogging the gas train. The National Fuel Gas Code requires the installation of a trap with a minimum of 3” drip leg. Local codes may require a longer drip leg, typically 6”.
- Install a ground joint union and manual shutoff valve in an accessible position close to the equipment.
- Ensure that the pipe and fittings are free from chips and debris. Make sure that the threads are clean and properly cut.
- Seal pipe threads with pipe dope or a suitable joint compound that is compatible with the gas you are using. Do not use Teflon tape to seal gas pipe joints.
- Support gas piping using suitable straps or hangers to avoid stressing the gas valve or manifold.
- Use a backup wrench when you tighten gas pipe and fittings.
- Piping from the natural gas meter to the furnace shall be in accordance with requirements of the local utility. Piping from the LP tank to the furnace must follow the recommendations of the gas supplier.
- A readily accessible, certified manual shut off valve with a non-displaceable rotor member should be installed within six feet of the gas equipment it serves.

A union or flanged connection shall be provided downstream from the manual valve to permit removal of controls. Provide a 1/8" N.P.T. plugged tapping at the inlet of the gas control for connection of a test gauge to check gas supply pressure to the furnace. Unions must be a ground joint type or flanged-jointed using a gasket resistant to LP gas. Pipe dope or sealant certified to be resistant to the action of liquefied petroleum gases should be used on all threaded joints.

- A drip leg must be used on both LP and natural gas installations prior to the furnace to trap oil, condensate and other impurities which might otherwise lodge in the gas valve or plug the burner orifice. When there is excessive condensation between the gas meter and the furnace, a drip leg shall be provided at the outlet of the gas meter. Failure to install a drip leg may void the warranty on the unit.

- High fire manifold gas pressure is regulated by the combination valve to 3.5" wc. Inlet pressure to the valve must be a minimum 5" wc or as noted on the rating plate and maximum of 14" wc for natural gas. **Note:** Always check the rating plate for minimum gas supply pressure. Minimum supply pressure requirements vary based on size of burner and gas control option. Most units require a minimum of 5" wc as stated above, but Sizes 350 and 400 with electronic modulation require a minimum of 6" wc natural gas supply pressure.

- **LP Only:** Experience has proved that the pressure drop in the gas line running from the outside propane gas tank to the gas appliances inside is the most frequent cause of equipment malfunctions. A single pressure regulator, located at the tank, will not reliably regulate the high tank pressures (up to 200 psi) down to 11" wc. Varying pressures will occur at the appliances as outside temperatures and usage demands vary. Two-stage regulation is the only effective method of controlling these variables.



Typical 2-Stage L. P. Gas Piping

Figure 16 - Recommended LP Gas Piping Method

- **LP Only:** Use the following line size chart to size the gas piping or tubing between the LP tank and the second-stage regulator:

<table>
<tr><th colspan="6">Section 1</th><th colspan="7">Section 2</th></tr>
<tr><td></td><td colspan="5">If the length of line between regulators (tank to building) is this long.</td><td></td><td colspan="6">If the length of line between second-stage regulator and furnace is this long.</td></tr>
<tr><td rowspan="6">Use this size tubing to keep pressure drop below 2 lbs. for maximum flow shown.</td><td>Total input load (Btu/h) on line</td><td>25’</td><td>50’</td><td>75’</td><td>100’</td><td rowspan="6">Use this size tubing or pipe to keep pressure drop below 1/2” water column for maximum flow shown.</td><td>Total input load (Btu/h) on line</td><td>10’</td><td>20’</td><td>30’</td><td>40’</td><td>50’</td></tr>
<tr><td>125,000</td><td colspan="4">3/8” O. D. Copper</td><td>75,000</td><td colspan="5">5/8” O. D. Copper</td></tr>
<tr><td>250,000</td><td colspan="3">3/8” O. D. Copper</td><td>1/2” O. D. Copper</td><td>125,000</td><td colspan="2">5/8” O. D. Copper</td><td colspan="3">3/4” Black Pipe</td></tr>
<tr><td>375,000</td><td colspan="4">1/2” O. D. Copper</td><td>187,500</td><td colspan="5">3/4” Black Pipe</td></tr>
<tr><td>500,000</td><td colspan="4">1/2” O. D. Copper</td><td>250,000</td><td colspan="5">3/4” Black Pipe</td></tr>
<tr><td></td><td colspan="4"></td><td>375,000</td><td>3/4” Black Pipe</td><td colspan="4">1” Black Pipe</td></tr>
<tr><td colspan="5"></td><td>500,000</td><td colspan="5">1” Black Pipe</td></tr>
</table>

Figure 17- LP Gas Pipe Sizing Information

- **LP Only:** Seamless copper tubing may only be used with gases that are not corrosive to it. See the note below to check with your LP gas supplier before using copper. Seamless copper tubing must comply with standard type K or L for seamless copper water tube, ASTM B 88; or seamless copper tube for air conditioning field service, ASTM B 280.

- **LP Only:** Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per cubic ft.) of hydrogen sulfide gas. Check with your gas supplier.

- **LP Only:**

  - **GS Series™ units** - maximum supply pressure for liquefied petroleum (LP) gas is 14” wc and minimum supply for purpose of input adjustment is 11” wc.

  - **GA Series™ units** – maximum supply pressure for liquefied petroleum (LP) gas is 13.5” wc and minimum supply for purpose of input adjustment is 11” wc.

Before attempting to measure or adjust high fire manifold gas pressure, the inlet (supply) pressure must be within the specified range for the gas being both used when the heater is in operation and on standby. Incorrect inlet pressure could cause excessive manifold gas

pressure immediately or at some future time. With the manual valve, on the combination valve, positioned to prevent flow to the main burners, connect a manometer to the 1/8" pipe outlet pressure tap on the valve. Open the valve and operate the heater to measure the manifold gas pressure. **Note:** A manometer (fluid filled gauge) is recommended rather than a spring type gauge due to the difficulty of maintaining calibration of a spring type gauge. Normally adjustments should not be necessary to the factory present regulator. If adjustment is necessary, set pressures to above settings by turning regulator screw IN (clockwise) to increase pressure. Turn regulator screw OUT (counter clockwise) to decrease pressure. Consult the valve manufacturer's literature provided with the heater for more detailed information.

2.9.3 Gas Heater Location

The following items must be considered when choosing the size and location of the furnace. Note that units designed for outdoor use are already equipped with combustion air intakes and venting means. Field-installed venting is only required on indoor units.

- All local codes and/or regulations take precedence over the instructions in this manual and should be followed accordingly. In the absence of local codes, installation must conform to these instructions, regulations of the National Fire Protection Association, provisions of National Electrical Code (ANSI/NFPA70 latest edition), and the National Fuel Gas Code (ANSI Z223.1 latest edition).

- **Indoor units only:** The unit should be located as near the vent terminal as practical to minimize the numbers of elbows and the length of any horizontal run of connecting flue pipe which may be required.

- Definitions of "combustible material" and "non-combustible material" as issued by ANSI Z223.1 are as follows:

  - Combustible Material: Material made of or surfaced with wood, compressed paper, plant fibers, plastics or other material that will ignite and burn whether flameproof or not or whether plastered or not.

  - Non-Combustible Material: Material which will not ignite and burn; such materials consisting entirely of steel, iron, brick, concrete, slate, glass, plaster, or combination thereof.

- **Indoor units only:** The unit must be located on a level, dry surface in an area which is free from and protected from excessive drafts or wind. It must be installed so that the electrical components are protected from water. If the area becomes wet or damp at times, the unit should be raised above the floor using concrete blocks or steel dunnage.

- Measures should be taken to prevent the entry of corrosive chemicals or vapors to the combustion and ventilation air supply. Such chemicals include but are not limited to chlorinated and/or fluorinated hydrocarbons such as found in refrigerants, aerosol propellants, dry cleaning fluids, degreasers, and removers. Other harmful compounds may come from bleaches, air fresheners or mastics. Vapors from such products can form acid compounds when burned in a gas flame. Should acid compounds form in your furnace; it may reduce the life of the furnace. Please follow these guidelines for providing outside air directly to the appliance to avoid this problem.

- The return air duct of the unit must be sealed air tight to prevent starvation of the combustion air, especially if the burner is located in a confined area.

All separated combustion, power vented units **MUST BE** equipped with both combustion air and exhaust piping to the outdoors. The unique concentric adapter assembly designed for use with this heater allows for both combustion air and exhaust piping with only one horizontal or vertical penetration hole in the building.

The systems indicated in this manual are the only venting/combustion air systems approved for these separated combustion units. Do not use this concentric adapter box with any other product.

⚠ WARNING

Do not use an existing venting system. This heater REQUIRES installation of the combustion air/vent system supplied with the unit.

Installation should be done by a qualified agency in accordance with these instructions. The qualified service agency installing this separated combustion system is responsible for the installation.

Hazards of Chlorine – The presence of chlorine vapors in the combustion air of gas-fired heating equipment presents a potential corrosive hazard. Chlorine, found usually in the form of Freon or degreaser vapors, when exposed to flame, will precipitate from the compound, and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid which readily attacks all metal including 300 grade stainless steel. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of unit vent terminal and combustion air inlet with regard to exhausters or prevailing wind directions. Remember, chlorine is heavier than air. This fact should be kept in mind when determining installation location of these heaters and building exhaust systems.

⚠ WARNING

Desert Aire units are not designed or approved for use in atmospheres containing flammable vapors or atmospheres highly laden with chlorinated vapors.

The following requirements must be followed when connecting this furnace to a vent system:

- The connection of this burner to the vent system shall be in accordance with the local building codes, the vent manufacturer's instructions and Part 7, venting of equipment, of the National Fuel Gas Code, ANSI Z223.1 (latest edition).

- You must tightly seat all joints of the vent. The inside of the vent should be free of all obstructions.

- All vents and vent connections must fit tightly to avoid air leaks.

- All vent connectors connecting the furnace to the vent must be rigidly supported with hangers and straps, in order to prevent sagging and movement after installation. The vent connector must be supported every four feet for the design and weight of the material used, to maintain clearances, and to prevent physical damage. The vent pipe must slope upward 1/4" minimum for each foot of horizontal run away from the furnace.

- Vent connectors used in connecting the furnace to the vent cannot be channeled through floors, ceilings, and walls without the proper protective construction. This construction must be in accordance with the requirements of the National Fuel Gas Code (ANSI Z223.1 latest edition).

- The venting system must be installed to avoid possible contact with concealed plumbing or electrical wiring.

The addition to following the requirements outlined by local codes, follow the guidelines below when locating the vent terminal to help ensure trouble-free operation of your horizontally vented burner:

- Avoid locating the vent terminal on a wall facing the prevailing winds or wide-open areas. When this is not practical, choose locations that protect the vent from strong wind, such as behind a fence or a hedge. (**Note:** The vent terminal must be located a sufficient distance from bushes, shrubs and vegetation so as not to have the flue products restricted or blocked by such vegetation).

- In areas with considerable snowfall, locate the vent terminal higher than the recommended minimum 12 inches above the ground as protection from blockage by snow accumulation or drifting.

- Locating the vent terminal as close as possible to the outside corner of a building rather than centered on an open wall will also minimize the effect of direct winds. Avoid alcoves and similar areas that may increase wind loading of the vent termination.

Follow these steps outlined in the National Fuel Gas Code, NFPA 54/ANSI Z223.1 – latest edition to resize the vent system to approach the minimum size using the appropriate tables in the Appendix of that code. The National Fuel Gas Code may be obtained by writing the American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131 or the National Fire Protection Association, Batterymarch Park, Quincy, PA 02269.

Refer to the documents located in the heater module for more detail instructions on installation on your specific terminal unit.

2.10 Electric Heater (Optional) For GA Series™ Products

In order to keep the controls of the electrical heater cool, there are two openings in the panel adjacent to the heater. The hoods for rain protection of these openings are shipped with the unit, and the mounting hardware is already in place. Mount the hoods over the heater cooling openings using this hardware.

2.11 Auxiliary Heat Coil Piping (Optional)

The Desert Aire unit may be equipped with an optional hot water or steam air heating coil. This coil, when properly sized, will provide space heating during the winter months. Use proper practice when designing and installing the coil piping to prevent poor coil performance, shortened service life, or damage to the coil.

- The supply connections must not be supported by the coil headers.
- The control valve should be sized according to the pressure and flow rate requirements not by the coil connection size.
- On steam systems, use strainer, dirt pockets, and isolation valves to prevent clogging the control valve and to simplify service.
- Install swing joints in the connection piping to prevent damage to the coil header from thermal expansion.
- Use a backup wrench on the pipe stubs when attaching connections to prevent damage to the header.

2.12 Smoke Alarm Interlock

Desert Aire GrowAire® units are equipped with a set of terminal blocks for interlocking with a smoke alarm (alarm provided and installed by others). The smoke alarm contacts must be rated for at least 15 amps at 24 VAC. The contacts must break when smoke is present. This will shut off the blower(s) and compressors. See the dehumidification wiring diagram for connection details.

2.13 Cover Plates (if applicable)

Cover plates for the lifting bar locations are shipped with outdoor GS Series™ units. The plates can be used to block access under the unit when installed on a curb. Cover plates should be installed after the final positioning of the unit.

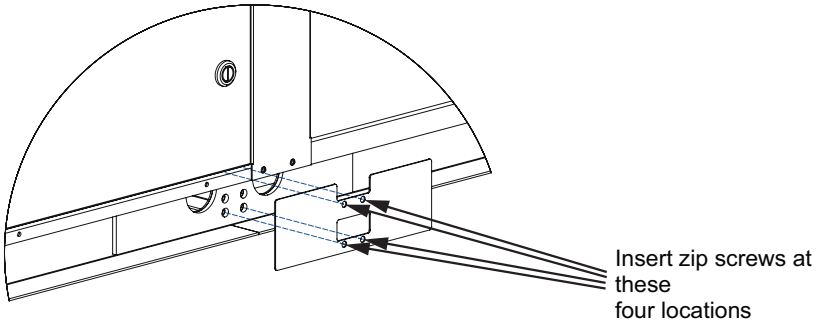


Figure 18 -Cover Plate Installation

1. The Packet should contain items as shown in the Table below, for various Plate Sub-Assemblies. The Plate Sub-Assembly to be used will depend upon size of the Unit. Please check the packet for correctness of items and quantities.

Sub-Assembly	Cover Plates Quantity	Zip Screws Quantity
TA-RAIL PLT 4-2	2	8
TA-RAIL PLT 4-4	4	16
TA-RAIL PLT 4-6	6	24
TA-RAIL PLT 6-2	2	8
TA-RAIL PLT 6-4	4	16
TA-RAIL PLT 6-6	6	24
TA-RAIL PLT 6-8	8	32

Figure 19 -Sub-Assembly Quantities

2. One cover plate is to be used for each channel stiffener. The purpose of installing this plate is to cover the two rigging holes in stiffener to minimize leakage of air through them.

3. Align the cover plate with the channel stiffener as shown in Figure 18. Place the cover plate on the channel stiffener, ensuring that the holes in the cover plate coincide with the four blank holes in the stiffener.

4. Drive four 1/4 x 1 1/4 zip screws through these four holes into the channel behind the stiffener as illustrated in the figure. Tighten the screws until the plate is firmly held against the stiffener.

5. Complete the installation of remaining cover plates following the above procedure.

2.14 Roof Curb w/ Wood Nailer (if applicable)

Certain options for curbs shipped with the GA Series™ units include a treated wood nailer and flashing installed on the side of the curb. This allows for draining of the pan installed under the condenser section. The nailer and flashing should be carefully inspected on final installation of the roof material. Any separation of the flashing from the curb due to transportation and lifting will cause water to penetrate behind the flashing and past the roof materials. Re-caulk as required to close any gaps that may have occurred.

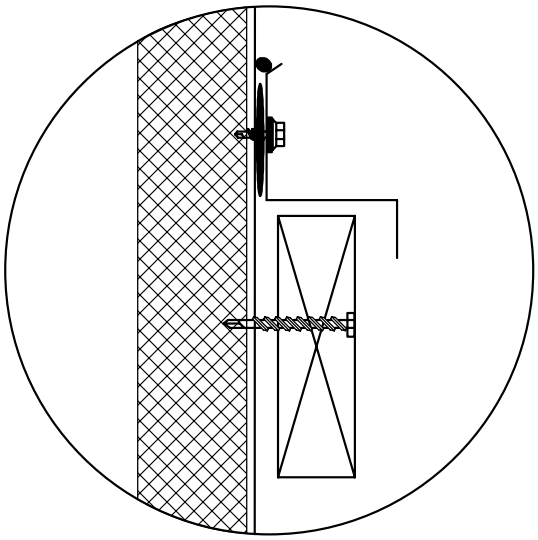


Figure 20 - Wood Nailer

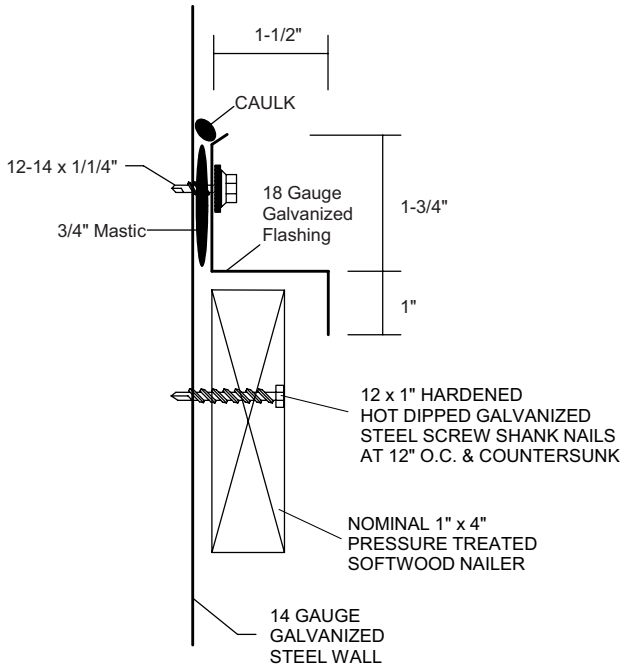


Figure 21 - Wood Nailer Detailed

3 Start-Up Procedure

Read this section thoroughly before attempting to commission the Desert Aire unit.
A complete start-up will minimize operational problems and expensive callbacks. The start-up will be quicker and easier if there is a heat and humidity load present in the space. Energize any external auxiliary heaters before start-up so that the air is at the design temperature.

3.1 Preliminary Inspection

Verify that all contractors have completed their work. Find the Desert Aire Start-Up Report for GrowAire® Models, which is near the end of this manual. You must fill out the start-up report to validate the unit warranty. Check the following items:

- Before starting unit, remove wooden shipping blocks found beneath compressor(s).
- Before starting unit, remove shipping restraining brackets on supply and/or exhaust blower equipped with a spring isolation base, if applicable.
- Make sure that the unit is level and securely mounted so that it cannot shift or transmit vibration to the building.
- Verify that the incoming power supply matches the rating plate of the unit.
  The available power supply voltage must be within ±10% of the voltage printed on the rating plate.
- With the power supply disconnected and locked, tighten all field and factory electrical connections. This includes all connections in the compressor and motors.
- If applicable, check and adjust the belt tension for proper deflection at the mid-point of the blower belt(s).
- The deflection is based on the belt length. The belt length can be found on the belt itself. Determine the force using the Belt Deflection Force table below.

Specified Belt Deflection	
Belt Length	**Deflection**
25” to 50”	0.25”
51” to 70”	0.375”
71” to 110”	0.625”

Figure 22 - Specified Belt Deflection Table

Belt Deflection Force						
	New Belt Force (lbs.)			Used Belt Force (lbs.)		
HP	1 Belt	2 Belts	3 Belts	1 Belt	2 Belts	3 Belts
0.5	3			2 - 2.5		
1						
1.5						
2						
3	7			5 - 6		
5						
7.5						
10	12	7		9 - 10	5 - 6	
15						
20						
25		12			8 - 9	
30			12			8 - 9
40						

Figure 23 - Belt Deflection Force Table

- Inspect the air filters and coils to assure they are clean. If necessary, clean the coils and install new filters.
- Check the field and factory piping for leaks. The internal piping may have been damaged during shipping.
- Purge any air, dirt, or debris from water lines (if used) to avoid clogging the internal passages of optional heating coils or water side heat exchangers.
- Check the drain pan and the condensate piping. Test the drain and prime the p-trap by pouring water into the drain pan.
- Verify that all service valves in the refrigeration lines are fully open.
- If there are multiple units installed servicing a single space, ensure that the units are sited according to the data supplied with the unit order. The controls will be pre-configured to coordinate the units setpoints and zone temperature readings. This is imperitive to ensure proper operation. Should units need to be reconfigured, contact the Desert Aire Service department for reprogramming instructions.
- Ensure that the internal network connection is pulled and properly landed on every unit. Each separate internal network will have one Ethernet connection. Ensure that each Ethernet connection is connected to a router on the customers LAN.

3.2 Gas Heater Start-Up (Optional)

This optional furnace does not have a pilot. It is equipped with an igniter that automatically lights the burner. Do not attempt to light the burner by hand. Check the following items before the initial start-up:

- Check all wiring for loose connections and proper hookup. Leak test the gas piping connections.
- Check the rubber tubing to the inducer fan pressure switch to make sure it is pushed firmly onto the pressure tap.
- Indoor units only: Check all venting connections for tightness and to make sure there is no blockage.

It may be necessary to purge the air out of the gas line for initial start-up of the furnace after installation. This should be done by a qualified heating contractor. If excessive gas escapes when purging the gas supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because it is heavier than air and can accumulate to dangerous concentrations at floor level. Heat exchanger oil will burn off on initial firing creating an unpleasant odor. To prevent this odor from occurring more than once, open doors and windows and run the blower for at least 30 minutes or until odor disappears.

The orifice for the burners was sized for either natural gas (having a heating valve of 1025 BTU per cubic foot and a specific gravity of 0.60) or for liquefied propane gas (with a heating value of 2500 BTU per cubic foot and a specific gravity of 1.53). See the rating plate of your unit to determine which type of fuel the heater is configured for.

To verify the actual input of your natural gas burner, proceed as follows:

- Call your gas supplier and ask for the BTU content (heating value) of one cubic foot of the gas supplied to the installation area. An alternate approach is to assume a value of 1025 BTU/ft3, which is the national average.

- With all other gas appliances turned off, operate the burner for at least ten minutes. After the equipment has warmed up, use a stop watch to clock the time required for the small dial on the gas meter to make one full revolution. A label on the meter will state how many cubic feet have flowed per revolution (usually one, two or five).

  Input BTU/hour = (BTU/ft3 x ft3 x 3600 seconds) / (seconds / revolution)

  EXAMPLE: (1025 BTU/ft3 x 2 ft3 x 3600) / 74.8 seconds = 98,663 BTU Input

Check for the input of the burner, the type of gas, and the required manifold pressure on the rating plate located on the exterior of the unit.

Make sure that the gas supply pressure to the furnace falls within the maximum range of 6” to 14” wc pressure for natural gas and 11.0” to 14.0” wc for LP gas. The pressure to the furnace must be checked while the furnace burner and any other gas appliances on the same supply system are operating.

The burners are equipped with fixed orifices sized for the manifold pressure shown on the rating plate. The input can only be increased or decreased by adjusting the manifold pressure. Remove the 1/8” threaded pipe plug located on the top right side of the gas valve.

Use a U tube manometer or a pressure gauge to measure the pressure. To adjust the pressure, remove the screw from the regulator on the outlet side of the gas valve. Turn the adjustment screw counterclockwise to decrease the pressure or clockwise to increase the pressure. ADJUSTMENTS TO THE LISTED PRESSURE MUST NOT EXCEED 0.3” wc. A 0.3” wc adjustment will increase or decrease the input approximately 0.4%. Replace the screw cap when the adjustment is complete.

Shut off the gas supply to the furnace. Remove the pressure gauge and re-install the pipe plug using a threaded compound resistant to the action of LP gases.

If the rated input cannot be obtained with the present orifice at the correct pressure, your local gas supplier will assist in sizing the proper orifice. The Desert Aire Service Department will gladly help you size the orifice if you provide them with the heating value in BTU per cubic foot and the specific gravity of the gas.

3.2.1 Burner Adjustment

GS Series™ and GA Series™ units only: Burner air shutters are not normally required on natural gas furnaces. Air shutters are required on propane gas units and may require adjustment. Before making any adjustments to the air shutters, allow the heater to operate for about fifteen minutes with the air shutters open. The slotted screw on the end manifold bracket moves the air shutters and adjusts all burners simultaneously. Turning the screw clockwise opens the shutters; counterclockwise closes the shutters. After the furnace has been in operation for 15 minutes, close the air shutters observing the flame for yellow-tipping. Open the shutters until the yellow disappears. A limited amount of yellow tipping is permissible for liquefied petroleum gases. Natural gas should not display any yellow-tipping. When making the adjustment, close the air shutters no more than is necessary to eliminate the problem condition.

After 15 – 20 minutes of continuous operation, the air temperature rise across the burner must be no higher than 85°F. If the outlet or supply duct temperature is too high, you must balance the supply airflow.

3.3 Airflow Balancing

To ensure code compliance and long equipment service life, proper airflow must be verified by a qualified air balancer. Shut off the compressor to prevent the refrigeration from running while you balance the air. If the unit is equipped with a Supply Fan Variable Frequency Drive (VFD) then the blower speed will be modified at the VFD or Electronically Commutated fan then the speed will be controlled by the programming and will be variable depending on the amount of cooling or dehumidification required. Refer to the Controller Manual for the settings and to confirm flow rates with these units.

Unit airflow rate is specified at the time of order. The flow rate each unit has been designed for is indicated on a label near the air balance ports. If the unit does not have VFD or EC fans, a pressure differential across a fixed set of components that corresponds with the flow rate is shown on the label as well. This is a convenient method of setting and checking the flow. Alternatively, external test and balance may be completed with velometer, anemometer, flow hood, or other testing devices. In all cases the flow rate should be set according to the label to ensure appropriate operation and system reliability.

3.3.1 Blower Adjustment Procedure

⚠ WARNING

Disconnect Power to the Unit before you adjust the Blower.

3.3.1.1 Units with Variable Airflow (EC Fan or VFD Equipped)

Airflow is controlled by varying the speed of the blower. This is done by modulating the controller output to the EC fan or VFD from 0-10 V. Airflow monitoring is achieved within the unit based on differential pressure measured by a transducer. For EC fans this pressure drop is taken across the fan venturi and for VFD units the pressure drop is taken across the reheat coil. Airflow rate is maintained by a control loop which varies the signal to the blower in order to achieve the differential pressure associated with the required airflow. Please note that units utilizing a VFD must be operated with the VFD set to run in the automatic mode to allow for full control from the unit controller.

CAUTION: When modifying the VFD settings, the minimum speed is factory set. This should not be modified as it can cause improper operation of the unit. The maximum frequency setting of the blower motor assembly is 75 Hz.

Units are designed for full recirculation without outside air have a single flow path for supply air. Before starting the balancing process check that

the ductwork is clear of any obvious restrictions. Set the unit to operate in cooling mode (compressors off) to allow the unit to reach the highest airflow setting. Once the airflow has reached steady state as read from the unit controller, review the motor current draw. If the current draw is in excess of the current rating listed on the unit nameplate or the drive is unable to achieve the airflow at the maximum setting, the unit may be experiencing external static pressure in excess of the design condition. Check the external static of the ducting to/from the unit and reduce it until it is equal to or less than the design condition indicated on the rating plate. Also, be sure to verify unit airflow with test and balance. If issues persist, consult the Desert Aire Service Department 262-946-7400. Prior to any calls to the Desert Aire Service Department please have the unit serial number and model number available.

3.3.1.2 Single Speed Units (Units without a VFD or EC Fan)

Units are designed for full recirculation without outside air have a single flow path for supply air. Before starting the balancing process check that the ductwork is clear of any obvious restrictions. Verify the unit airflow through the unit controller. If required, change the blower speed by adjusting the motor pulley. To adjust the variable pitch pulley, first loosen the set screw. To slow down the blower, turn the outer pulley face counterclockwise (to decrease its pitch diameter). To speed up the blower, turn the outer pulley face clockwise (to increase its pitch diameter).

After every adjustment be sure to:

- Tighten the set screw against the flat spot on the pulley hub so you don’t damage any threads.
- Adjust the belt tension if needed.
- Check to assure that the blower motor current draw does not exceed the rating printed on the rating plate.

If the blower motor current draw exceeds its rating but your airflow is still too low, the static pressure losses in the ductwork and grilles may be higher than the unit was designed for. A test and balance should be performed to ensure proper unit airflow. If issue persists, consult the Desert Aire Service Department 262-946-7400. Prior to any calls to the Desert Aire Service Department please have the unit serial number and model number.

3.4 Refrigeration Testing

Refrigeration based cooling systems are sometimes referred to as “sealed systems”. This is in reference to the refrigeration system being hermetically sealed, no refrigerant can leave the system and no contaminants are allowed inside. Factory equipment and procedure ensure a clean and tight refrigeration system where only the specified refrigerant and oil are in the system. This is a critical component to the longevity of the system.

Some Desert Aire systems are shipped in sections to allow for installation of some of the sections in a location much different than another. An example is a unit with a remote condenser ready circuit. The unit may be installed indoors near the conditioned space while the remote condenser used to reject waste heat is located outdoors. The piping of the condenser is completed in the field before the unit is commissioned. The design and processing of the field piping is just as important as the factory piping in ensuring the longevity of the system.

Selection of quality components, quality procedures, and full testing help to ensure the sealed system failures are minimized wherever possible. Nonetheless, the mechanical nature of many components creates some unforeseen wear and failure in certain instances. Some units may need service at a point in the life of the product that requires opening of the hermetic refrigeration system. Special care must be taken to ensure that the system is returned to service without contamination.

Whenever servicing Desert Aire equipment, observe the following:

- Use only equipment rated for the pressures of the refrigerant being serviced.
- Use only equipment dedicated to service the refrigerant in the system. Do not use equipment to service multiple refrigerant types.
- Purge all hoses and equipment of non-condensable gasses before connecting to the sealed system.
- Use only original equipment parts or factory approved equivalent for servicing.
- Use required refrigerant system oil.
- Minimize the time the system is open to atmosphere while servicing. Cap all connections when there is no active service work on the system. This is particularly important with units that contain POE oils as moisture will be absorbed quickly and cannot be removed with a vacuum.
- Never open the system while under a vacuum. Should system require opening to repair a leak or other service when in vacuum, fill with dry nitrogen to atmospheric pressure before opening.

- Have a Schrader core replacement tool available when servicing the refrigeration system. Although rare, defective or damaged Schrader valve cores can contribute to refrigerant loss.

- Charge systems only by weight after servicing. Review the rating plate and any field charge labels.

- When servicing, additional liquid line filter dryers and suction filters may be required. This does not apply to installation of remote condensers.

- Charge refrigerant blends, including R-410A and R-407C, with liquid only. Charging should be done into the high side of the system whenever possible. Refer to section 5.5 for additional procedures related to charging.

3.4.1 Dehumidification / Cooling Mode

In order to test the unit in dehumidification / cooling mode, the air temperature entering the DX evaporator must be approximately 50°F or higher. If the condition entering the unit is lower, the unit may experience difficulties resulting in poor operation or shutdown due to low suction pressure.

If a low air temperature condition prevents the unit from running long enough to take data, note this on a startup report. Once the space temperature has risen above 50°F, it is recommended the service contractor should complete the Dehumidification/Cooling Mode section of the startup report.

To perform start-up checks on the compressor, the zone air dewpoint setpoint should be lower than the zone dewpoint by at least 10°F. Zone air humidity setpoint should be lowered until the first compressor is engaged. Lowering the setpoint further will engage additional compressors per circuit. See the Controller IO Manual for instructions on setting the zone setpoints. Note the original setting. Once the setpoint is adjusted, enable the unit.

- It can take up to 15 minutes for the unit to reach steady state. While in steady state operation, record the data required for the start-up report. If the humidity setpoint was adjusted, return it to its original value.

3.5 General Testing

After you balance the airflow and test the refrigeration circuits, verify that the other equipment and accessories connected to the unit work properly. Although this may be difficult, since the unit is usually interlocked with a variety of equipment installed by different contractors, you must not skip this step.

Each of these devices (which may include auxiliary air and water heaters, smoke alarms, circulating pumps, and a building management system) is vital in maintaining the performance of the unit. Many customer complaints are caused by improper interlocks between these devices. Make sure you check the following:

- Check the condensate drain to make sure it has been trapped and primed with water. Verify that it drains freely, with no leaks. If the drain is outside or in an unconditioned space, make sure it has been heat traced. If you installed a condensate pump, make sure it operates properly.
- Check the operation of the remote condenser (on units equipped with this option). Make sure that the fans cycling switches, which are mounted on the condenser, are correctly piped and have been set according to the Desert Aire condenser wiring diagram. Verify that the fans are blowing air vertically upward when they run.
- Check the temperature and humidity readings displayed on the controller. If you think the values are incorrect, check the sensor or its field-installed wiring for damage.
- Check the operation of the auxiliary heaters by temporarily raising the air temperature setpoint on the Desert Aire controller. The duct heater(s) or heating valve should energize.

3.6 Routine Maintenance Schedule

3.6.1 Service Every Month

- Check the air filters and replace them if necessary.
- Check the coils in the unit and the remote condenser. Use compressed air or a commercial coil cleaner if they are dirty or plugged.
- Verify that the air flow around the remote condenser remains unobstructed.

3.6.2 Service Every Six Months

- Check the blower belts for wear or glazing. Tighten or replace them if necessary. Do not use the belt dressing compound.
- Check and tighten all field and factory electrical connections.
- Check for dirty coils in the unit and the optional remote condenser.
- Check and clean the drain pans and blow out the condensate drain line. If the drain is plugged, water will back up into the unit and flood the mechanical room.

- Check and adjust the air flow per specifications. Dirty ducts, filters, and coils may have reduced the total air volume.
- Check the operating pressures of the refrigeration circuits.
- Check the current draw of each blower motor.
- Check the current draw of each compressor
- Lubricate the blower motor(s) - if applicable.
- Lubricate the blower bearings - if applicable.

Suggested Grease Brands and Types

Supplier	Type	Base	Range temperature (min-max)
FINA	Marson HTL 3	Lithium	-30°C / +120°C
SHELL	Alvania Fett 3	Lithium	-20°C / +130°C
ESSO	Beacon 3	Lithium	-20°C / +130°C
MOBIL	Mobilux EP3	Lithium	-30°C / +130°C

3.6.3 Service Every Year

3.6.3.1 Gas Heater (Optional)

Units equipped with optional gas heating should be inspected annually before each heating season. Check the following items:

- Ensure that the vents and air intakes are clean and unobstructed.
- Clean the vent and condensate drain line if necessary. Repair any damaged sections of the vent.
- Inspect the pressure switch tubing connections. Verify that the inducer fan is free of corrosion, warp-age, deterioration, and carbon buildup. If necessary, clean the housing and the blower wheel with a damp cloth. Vacuum any lint or dust from the inducer motor assembly.

See the separate gas heater manual for detailed service information.

Note: Please have the following information available if you need to call the Desert Aire Service Department:

- Model Number
- Serial Number
- Room Temperature

- Relative Humidity
- Operating Refrigeration Pressures
- Water Temperature
- Compressor Amperage
- Blower Motor Amperage(s)

4 Troubleshooting

Although Desert Aire units have been designed for reliable and trouble-free operation, you may occasionally encounter a service-related problem. If you cannot immediately diagnose and fix the problem, do not be intimidated by the apparent complexity of the units. Your common sense and experience can help you solve the majority of these problems.

These problems or complaints are frequently caused by improper interlocks between the unit and the other equipment and accessories at the jobsite. You may need to consult with other contractors who have worked on different portions of this project.

The following list will help you diagnose some of the most obvious symptoms of a system which does not work properly.

4.1 The Blower Does Not Run

POSSIBLE CAUSES	REMEDY
S1 switch is in the open position	Close S1 switch
Loss of main power	Check for tripped circuit breaker or blown fuses
Blower overload has tripped	Correct cause and reset overload
Faulty control wiring	Check for loose or incorrect wires on system and controller

4.2 The Compressor(s) Do Not Run

Note: When the return air does not need mechanical dehumidification, the compressor and the refrigeration circuits of the unit will be locked-out.

POSSIBLE CAUSES	REMEDY
Loss of main power	Check for tripped circuit breaker or blown fuses
Blower overload has tripped	Correct cause of reset overload
Faulty wiring	Check for loose or faulty wiring on system and unit
Compressor overload has tripped	Correct cause and reset overload
Compressor failure may have occurred IF:	
• Compressor draws locked rotor amps	Replace compressor (or check fuses on 3-phase units
• Compressor starts but does not pump	Replace compressor
• Motor windings have shorted	Replace compressor
Compressor delay time	Wait 3 minutes for timer

4.3 High Pressure Alarms / Readings Above High Pressure Trip Setpoint

See CM3500 Series Controller IO Manual for more information.

POSSIBLE CAUSES	REMEDY
Lack of air flow at remote condenser (On units with air-cooled condensers)	Assure coil is clean and no air flow restrictions exist around unit
Remote condenser blower does not run	Check for power at motor leads
Lack of adequate water flow (on units with tower condensers)	Install flow meter or circuit setter to ensure correct flow rate
Excessive incoming water temperature (on units with tower condensers)	If water temp. is above 90°F, consult factory for required flow rates
Excessive air in condenser water lines (on units with tower condenser)	Purge lines thoroughly or install an air eliminator in the system piping
Overload tripped (3 phase only)	Reduce blower speed and reset overload
Contactor faulty	Replace contactor
Blower cycling on internal overload (single phase only)	Reduce blower speed
Service valve closed or not fully open	Fully open service valves
Excessive pressure drop in line sets	Re-evaluate remote condenser installation
Non-condensables in refrigeration system	Properly evacuate and recharge refrigeration system
Note: When the remote condenser is active and the outdoor temperature is above 95°F, normal head pressure can be as high as 480 PSIG.	

4.4 Low Pressure Alarms (Below 97 PSIG) / Evaporator Coil Icing

POSSIBLE CAUSES	REMEDY
Faulty or improperly set hot-gas bypass valve	Set hot-gas valve to maintain 30°F suction (97 PSIG) or replace if defective
Insufficient evaporator air flow rate	Assure coil is clean and belts are tight
Lack of refrigerant	Re-evaluate system charge
Restricted refrigerant filter-drier	Evaluate filter pressure drop and replace if necessary
Defective expansion valve	Evaluate expansion valve performance and replace if necessary
Restriction in refrigeration piping	Check coil for kinks in tubing and check for debris in distributor

5 Appendix

5.1 Compressor Failure

Although some compressors fail because they are mechanically flawed, most failures are due to system-related problems. Compressor failure can be caused by liquid flood back, air/moisture in the refrigeration system, solid contaminants, excessive heat or electrical service malfunctions. To avoid repeated callbacks, you must determine the cause of the failure and then correct it.

If the compressor has failed because its motor has burned out, the refrigerant, oil, and piping may have become severely contaminated. If a burnout has occurred, use the following procedures to replace the compressor and clean the refrigerant system. Use an oil test kit to determine the severity of the burnout. Make sure you use rubber gloves and eye protection, as contaminated refrigerant and oil can cause severe burns!

CAUTION

You must clean the system thoroughly to prevent repeated compressor burnouts.

5.1.1 Compressor Replacement

Desert Aire units are designed with scroll compressors. Scroll compressors are known for operating more reliably than other compressors in air conditioning and dehumidification applications due to their ability to cope with occasional periods of liquid refrigerant return. There are fewer moving parts in a scroll compressor subject to wear compared to alternative compressor designs. Nonetheless, there are still many mechanical and electrical parts with close tolerances. Replacement of the compressor may be required during the normal service life of the unit.

Inspection and Initial Diagnosis

Generally, the compressor will have two basic failure modes, mechanical or electrical. The compressors are a hermetic design, meaning all components, including the motor, are in a sealed shell. It can be very difficult to determine which issue was the root cause of the failure in the field by inspection of the damaged compressor. For example, an initial bearing failure inside the compressor may create debris that contaminates motor windings. High current draw may be related to a bearing issue or a motor winding issue. The initial inspection must be combined with a final analysis of the machine when returned to working order to confirm diagnosis.

Specific items should be noted before the replacement to give the best indications of the failure and complete the diagnosis as the new compressor is installed.
The following data should be taken to assist in diagnosis:

- Current draw for each leg of power (if the compressor will run and pump).
- High side and low side pressure (if the compressor will run and pump).
- Resistance of each leg to leg on three phase compressors or each leg to neutral on single phase compressors.
- Check of continuity from each leg to ground.
- Review of all system alarms including the relative timing of the alarms and mode of operation.

It is important to note that other components or lines may have been damaged if the compressor has failed. At times the internal damage to a compressor creates extreme levels of vibration before complete failure. Refrigerant lines and connections may be damaged before the compressor stops. Inspect tubing and components of the system before completing the compressor replacement.

Compressor Replacement

- Refrigeration oil must be tested for acid and particulate during any compressor replacement. For the initial testing, the compressor sump should be used to sample the oil. Oil can be recovered through the Schrader port on the low point compressor shell or through the suction line connection after the compressor has been removed.
- Use Virginia KMP, New-Calgon Phase III, Sporlan Test-All, or equivalent oil test where oil is sampled into a container. Vapor sampling methods may not show particulate and should not be used.
- Read the oil test kit manufacturer's instructions to determine if there is acid present in the oil. Determine if there are other contaminants by viewing the samples for darkness, cloudiness, or particulate.

The following procedures must be used depending on the results of the test above:

Any Compressor Service

- A new filter dryer must be installed when the system has been opened. If there is no acid or particulates indicated, the new compressor can be installed and run. Proceed to Testing and Final Diagnosis.

Acid Indicated

- Install a suction line filter shell and charcoal activated core such as a Sporlan or Emerson HH core type of equivalent. The acid levels will be monitored and several core changes may be required. Install ball valves on either side of the suction filter to facilitate these changes. Note that larger Desert Aire systems will have suction filter shells installed from the factory. The shell can be used with charcoal activated cores. Note that a “safety screen” may be required with some manufacturer’s cores to prevent small pieces of the core from dislodging and finding their way to the compressor. Follow filter shell core manufacturer’s instructions.

- Review compressor and suction line for area where future oil samples can be taken from the system. If an access fitting exists on the compressor shell below the oil level, no further action is needed. If this is not available, an access fitting can be located at the bottom of a trap in the suction line. Braze in a fitting as required to be able to remove an oil sample. Note: It is acceptable to use acid test kits that sample the refrigerant and connect to Schrader fittings.

- Ensure there are access fittings directly upstream and downstream of the suction filter. There is typically one fitting installed on the suction filter. There may be a bulkhead fitting attached to the compressor suction side.

- Do not use acid neutralizing additives or other chemicals for acid removal. The refrigeration system must contain only oil and refrigerant. Precipitates of additives and acids may be considered contamination in the refrigeration system. Other compounds may be present in additives as carriers. Long-term effects of specific additives or compounds with a particular system or design are unknown without significant controlled testing.

Particulate Indicated

- Install a replaceable core liquid line filter shell. Note that larger Desert Aire systems will have replaceable core liquid line filter shells installed from the factory. The pressure drop levels will be monitored and several core changes may be required. Install ball valves on either side of the filter shell to facilitate these changes.

- Install a secondary filter such as Sporlan FS-series or equivalent 20 micron filter in a replaceable core.

- Ensure there are access fittings directly upstream and downstream of the liquid filter. There is typically one fitting installed on the filter shell. There is

typically a fitting installed on the outlet side of the receiver.

Returning to Service

- See section 5.5 for evacuation and charging.
- Restart unit and set unit to run compressors.
- Record the pressure drop across the suction filter and liquid line filter dryer.
- Check sight-glass indicator for moisture level.
- Monitor pressure drop across the liquid and suction filters during the first hour of operation. Compare the reading taken earlier. If the pressure differential across the filters is 5 PSI or greater, isolate the filters using the valves installed and recover the refrigerant from the filters. Replace cores. If activate carbon filters were installed in the suction side to remove acid, replace with similar cores. If a secondary filter was installed in the liquid line core to remove particulate, install cores and secondary filter in this location.
- Run unit for 24 hours and review acid levels (if found previously) and pressure differentials.
    - If acid is found, replace with activated charcoal cores and test at 24 hour intervals until acids are at acceptable levels. Once acid is no longer detected, replace cores with standard filter elements. Remove outlet screens if they were required by filter manufacturer.
    - If the pressure differential across the liquid line filter is 5 PSI or greater, replace cores and secondary filter with new components and test at 24 hour intervals until pressure drop is at acceptable levels. Once pressure differential is less than 5 PSI, remove secondary filter and replace cores.

Testing and Final Diagnosis

It is of critical importance to ensure that the system is operating as expected before unit is returned to normal service. Complete a Compressor Replacement Form located inside this manual. Validation of this report allows for the continued coverage of the compressor under the original warranty.

It is possible that there was an internal defect in the compressor or normal mechanical wear occurred over time. Compressors longevity generally is a function of load, lubrication, electrical input conditions, and temperatures.

The cause for the compressor failure must be identified before unit is placed back into full service. Both the identification of the cause of compressor failure and the proper cleanup of the system must be addressed to avoid repeat compressor damage.

5.2 Recommended Duct Design

You must use proper duct design to ensure that the unit operates efficiently and without problems. Undersized or restrictive ducts reduce the system airflow, which can cause premature compressor failure. Use the following diagrams as a guide when you design the duct system.

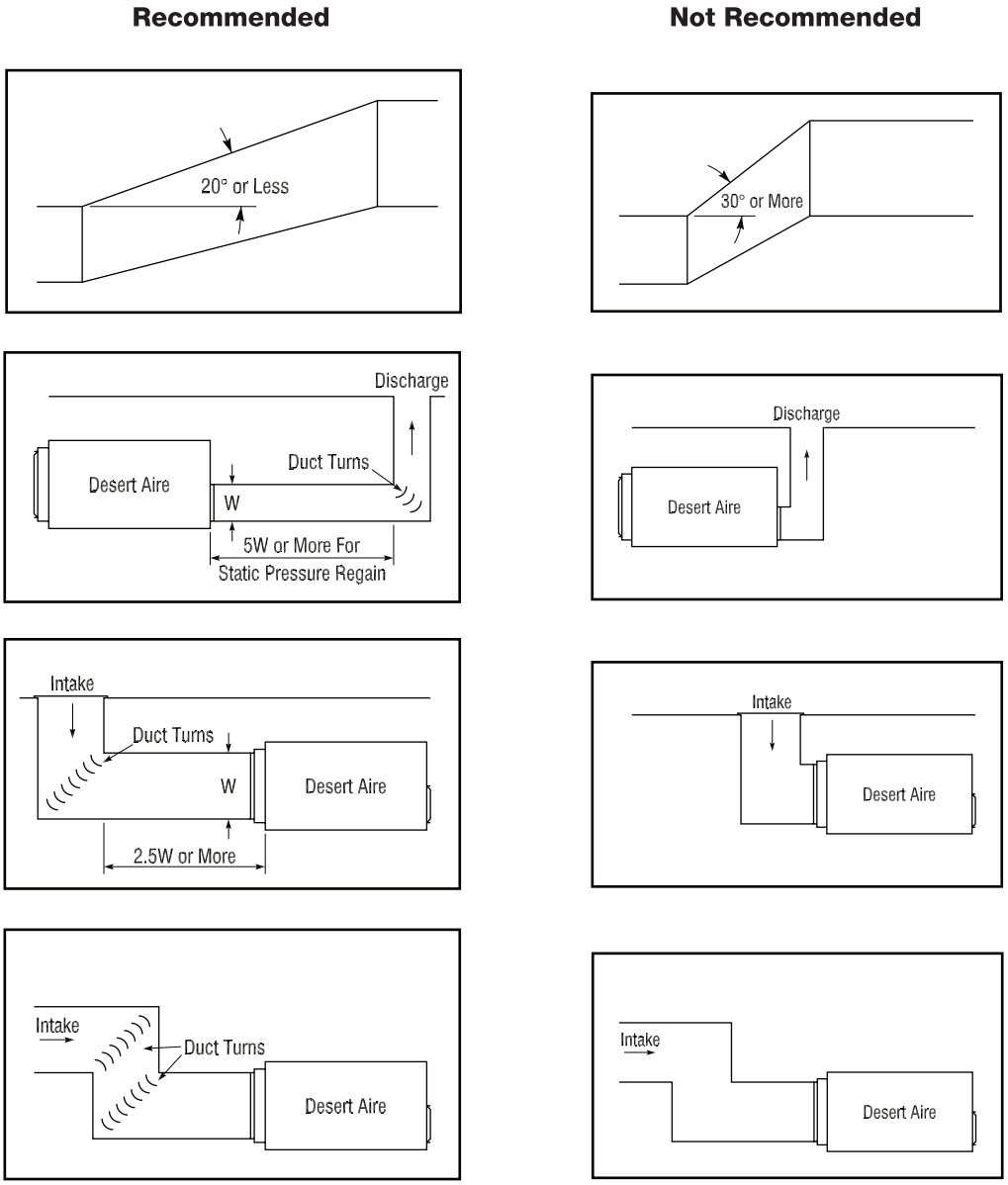


Figure 24 - Recommended Duct Designs for Desert Aire Units

5.3 Recommended Controller Settings

It is important to determine your comfort setpoints and to avoid further controller adjustments. It takes time for the unit to establish equilibrium at a given setpoint. Therefore, continued setpoint adjustments will lead to high energy consumption and user discomfort. Continuous blower operation is recommended. This will reduce air stratification and assure that the refrigeration circuit is activated only when it is necessary.

RECOMMENDED SETPOINT:

- Humidity: Typical dewpoint setpoints range from 50°F to 60°F. Consult the Building Design Engineer for appropriate setting for specific application.
- Normal Suction Pressure Range (R-410A) 100 to 155 PSIG
- Normal Discharge Pressure Range (R410A) 290 to 480 PSIG

5.4 GrowAire® Sequence of Operation

5.4.1 Basic Sequence

GrowAire® products sense the temperature and relative humidity within the zone and at the intake of the DX evaporator. Also provided is a supply air temperature sensor. The active setpoints are then calculated based on the customer's setpoints and the zone temperature and relative humidity conditions. The intake point used is the sensing point to determine unit operation. This ensures stable unit operation and that air delivered to the zone is less than the design dew point while maintaining supply air temperatures. The mode of operation is determined from the intake air temperature and relative humidity sensor as compared to the calculated reset setpoints.

Desert Aire has standardized a control program that features two subroutines. These two subroutines act independently of each other, but together provide for precise humidity and temperature control. The first subroutine determines the basic mode of operation – heating, cooling, or dehumidification, based on the setpoints and intake air conditions. The second subroutine controls the supply air temperature. This is done by measuring the supply air temperature after the unit and adjusting the percentage of reheat to use to achieve the customer's setpoint.

The controller also calculates the dew point from the customer's setpoints and calculates a reset setpoint for dew point. When the intake air conditions are above the calculated dew point reset setpoint, the dehumidification mode will be enabled. With a zone dew point setpoint of 55°F, the supply air dew point will be held at or

below 55°F. Although the dew point will never go above 55°F, during low load conditions the supply air dew points could be lower. Any excess reheat energy not used to warm the supply air is either rejected to the remote condenser or to the water loop.

Since the unit is constantly measuring the zone temperature, an intake temperature below the heating setpoint will place the unit in the heating mode. An intake temperature above the cooling setpoint will place the unit in a cooling mode. When the zone temperature is between the heating and cooling setpoint and dehumidification is not required, un-conditioned air will be provided to the space.

5.4.2 Blower Operation

For the GrowAire® control system the blower operation will run in all cases except when there is a non-refrigeration related alarm condition. If the blower cycles off, the blower will remain off for a minimum of 1 minute to avoid the possibility of rapid cycling, specifically from the automatic reset safety devices.

For the GrowAire® control system the blower operation is variable speed for units equipped with a EC or VFD controlled blower motor. During a call for cooling only, the blower will modulate to the high airflow setting to increase sensible cooling while reducing latent removal. On a call for dehumidification, the blower will modulate to a lower airflow setting to increase latent removal. If the unit calls for dehumidification and cooling, the unit will modulate between the high and low airflow limits to maximize both latent and sensible capacities based on conditions in the zone.

5.4.3 Dehumidification Operation

GrowAire® units operate on a Zone Reset and use a zone and intake sensor to lower the dewpoint of the space. If the zone dew point rises, the calculated supply dew point setpoint is lowered based on a PID control loop. This results in the appropriate staging of compressors. The rate at which the compressors stage on is based on the quantity of units within the space and the number of compressors within those units. This allows for compressors to be cycled to more closely match the unit(s) capacity to the load within the zone. This provides optimal energy efficiency while meeting the design conditions in a very stable manner. The control settings allow for modifying the maximum and minimum dew point setpoint limits. Simultaneously, on a call for dehumidification, the blower will modulate to the low airflow setting to increase latent removal capacity.

Also, while it is recommended to utilize one zone sensor per conditioned space, one sensor can be used per unit, to provide multi-climate control in the space.

5.4.4 Cooling Operation

GrowAire® units operate on a Zone Reset of the supply air temperature and use a zone and supply air temperature sensor to vary the supply air temperature se point. If the zone temperature rises, the supply air temperature setpoint is lowered to provide cooler air to the space and if the zone temperature falls, the supply air temperature setpoint is raised to provide warmer air to the space. The control settings allow for modifying the maximum and minimum SAT setpoint limits. Simultaneously, during a call for cooling, the blower will modulate to the high airflow setting to increase sensible cooling while reducing latent removal to limit the opportunity for over dehumidification.

Also, while it is recommended to utilize one zone sensor per conditioned space, one sensor can be used per unit, to provide multi-climate control in the space.

5.4.5 Heating Operation

Heating operation is enabled when the intake air temperature (air entering the DX evaporator) is below the calculated supply air temperature setpoint less a dead band. At this point, an auxiliary heating contact is energized and a modulating output is controlled based on the supply air temperature setpoint.

5.4.6 Suction Pressure Operation

The suction pressure operation needs to protect the unit when a refrigerant circuit loses its charge. Also, restarting after an unoccupied cold soak condition needs to be addressed. Whenever the suction pressure falls below 22 psig, the unit will stop with an alarm indication and will not be allowed to restart automatically. The suction pressure must rise to above 29 psig and the alarm must be reset by the operator be fore the unit will restart.

When the compressors are running in the dehumidification or cooling modes, the suction pressure will turn the compressors off below 58 psig. The compressors will be allowed to restart when the suction pressure rises to above 106 psig. Note that the compressors will be off for at least 5 minutes on the recycle timer. Also note that the blower will continue to operate during this condition to reduce stratified air.

If the low suction pressure condition occurs 3 (adjustable) times in a 1 (adjustable) hour time period, then an alarm will be indicated and recorded in the alarm history as a multiple suction pressure alarm. This alarm will be reset, by the controller, after a 4 (adjustable) hour delay. This controller reset will be tried only 4 (adjustable) times in a 36 (adjustable) hour period. After the fourth controller reset, if the multiple suction pressure alarm occurs again, an operator initiated reset will be required to restart the unit.

5.5 Component Replacement, Charge, Evacuation, & Leak Instructions

Note that a new liquid line filter dryer will be required any time a refrigeration system is opened for servicing. New dryer should be the same capacity as the original or larger.

Recovery

When there has not been a major refrigeration system leak, the system will contain refrigerant. This refrigerant must be either recovered to separate cylinders appropriate for the refrigerant type or isolated in a portion of the refrigeration system that will not be open for service. In all cases you must comply with Section 608 Refrigerant Recycling Rule of the Clean Air Act.

Recovery of Systems with Refrigeration System Leak

As much refrigerant as possible must be recovered into separate refrigerant cylinders appropriate for the refrigerant being serviced. System pressure near the leak site should be monitored closely to ensure this area is not pulled to a vacuum. Isolated sections of the system as required and recover independently to avoid refrigerant contamination. Uncontaminated refrigerant can be reused in the refrigeration system it was recovered from.

Recovery of Systems without a Leak

System that do not have leaks, but still require refrigeration system service, may have charge isolated in receivers and condensers if these particular components do not require direct service.

Desert Aire units have different receiver sizes depending on the model and size. Condenser sizes and configurations may also vary. In general, larger receivers will come equipped with isolation valves that will allow for a portion of the charge to be contained in the receiver during servicing. Units equipped with remote condensers will have isolation valves located inside the unit cabinet near the area where the connections are made.

The compressor can be used to move refrigerant to the system components that will be used to temporarily hold the charge. Note that cooling a condenser by running as many fans as possible and/or cooling the coil surface with a stream of water can assist in storing charge.

The low side pressure should be monitored closely while using this procedure to store charge. Under no circumstances should a compressor be allowed to run in a vacuum. When most of the refrigerant is isolated in the receiver and/or condensers, recover remaining charge into separate refrigerant cylinders approximate for the refrigerant being serviced. Carefully track the amount of refrigerant charge removed as this exact amount should be placed into the unit when re-charging.

Repair / Component Replacement

- If any portion of the system was at a vacuum, place dry nitrogen in the system until atmosphere pressure is reached.

- It is preferred that components are removed by heating the braze alloy to the re-melt temperature and mechanically moving the component. When this is not possible due to proximity of cabinet structure or other components, a tubing cutter can be used to remove sections of piping. Where new tube is required for replacement, use dehydrated tube where possible. Use the same type of fittings as original. Route the pipe in the exact manner as originally routed.

- Use Type K per ASTM B 88 or ASTM B 819 or Type ACR per ASTM B280 copper tubing or for all tubes 1 1/8" and smaller.

- Tubes 1 3/8" and larger shall use Type K per ASTM B 88 or ASTM B 819.

- Cap sections of tube and components that are not actively being installed to prevent infiltration of moisture and contaminants.

- Use only braze alloy to join tube.

    - The selection of filler metals is highly dependent on the tube fit, clearance, and operator preference for flow. When flux is to be used, care should be taken to ensure that the flux is not introduced to the inside of the tube. It is recommended that phosphorous bearing alloys be considered for copper to copper connections due to their self-fluxing on copper to copper joints. Refer to alloy manufacturer's guidelines for details on compatibility.

- Flow nitrogen into tubing to prevent the formation of copper oxides.

    - Copper oxides form rapidly when copper is heated to temperatures required by the brazing process and exposed to oxygen in the air. Copper oxides flake easily on the inside of the tubing and dislodge easily when the system is filled with refrigerant and oil. The particulate can move throughout the system and cause contamination on valves and other critical components. System filters may become fouled.

    - Flowing nitrogen into the system and ensuring that the inside of the tube is significantly free from oxygen while brazing ensures that oxides do not form. As the last joints of a system are made, additional thought must be made on the location where the nitrogen can escape. Schrader valves are placed throughout the system. These valves can be opened to allow for nitrogen to flow without generating pressure behind the braze joint that is being created.

- See section 5.1.1 for special procedures related to compressor replacement

- Replace liquid line filter dryer as last step in system repair. Note that the dryer will readily absorb moisture from the ambient air and must be open only for as long as required for installation.

- After completion of all repairs, pressure test system using nitrogen pressure decay test or nitrogen with tracer gas and appropriate leak detector.

Evacuation

- Carefully inspect pump and related equipment before connecting to system. Ensuring gaskets are in good condition and pump is capable of low vacuum levels can save time. Connect pump(s) to as many locations as possible ensuring all locations are well sealed. If a field charge will be required, connecting a refrigerant tank to the system with a good valve is recommended. Any hose connections requiring purging of non-condensable can be done at this point.

- Evacuate the line and remote condenser to 400 microns measured at a point on the system furthest away from the pump.

    - Note that a gauge installed on the pump or in close proximity will give a lower reading while the unit is being evacuated.

- A deep vacuum gauge should be used to evaluate the pressure. Compound manifold gauges do not allow for enough accuracy at the pressures required.

    - The system should be able to hold a vacuum under 500 microns for more than 10 minutes.

    - If pressure continuously rises at a rapid rate there is likely a system leak. Re view all piping connections and correct before continuing evacuation.

    - Pressure rising above 500 microns and tending to stabilize at a higher pressure indicates the system has moisture above specifications. Continue evacuation until 500 microns or lower can be held for a minimum of 10 minutes.

Alternative Evacuation Specified by Process

After components have been repaired or replace evacuation procedure should take place. Very small amounts of refrigerant may still be mixed with the oil in the system. Out-gassing of this refrigerant may interfere with the evacuation and vacuum decay testing.

IF, AND ONLY IF, a unit has been previously charged with refrigerant, and standard evacuation method has not been successful after 24 hours minimum using the standard procedure, the following alternative method should be used.

1. Check vacuum level. It should be a maximum of 1,500 microns absolute pressure. If this is not the case, review system for leaks and continue evacuation process until 1,500 microns is achieved.

2. Purge system with nitrogen to atmospheric pressure (0 gauge pressure). Ensure all portions of systems are at this pressure. Seal system and wait 10 minutes.

3. Start vacuum pump and draw system to 1,500 microns or less.

4. Purge system with nitrogen to atmospheric pressure (0 gauge pressure). Ensure all portions of systems are at this pressure. Seal system and wait 10 minutes.

5. Start vacuum pump and draw system to 500 microns. Seal system. System may rise to higher level, but should not rise above 1000 microns in 10 minutes timeframe. If unsuccessful, continue evacuation or check for leaks.

It is anticipated that the system was clean and tight from the original process and refrigerant only is mixed with oil. Alternative process should not be considered if there is chance of free water entering the system or the system was open for any significant time.

Charging

- Charge should be weighed into the system using a scale. In cases where the full charge was recovered, weigh in the charge with the recovered refrigerant and add the appropriate amount to meet the rating plate and field charge (if applicable). This should be placed in the high side of the system at the receiver.

- In cases where the full charge cannot be added to the system high side, the charge can be added to the low side of the system only when compressors are energized. If this is required, the compressors should be energized and the charge should be slowly metered into the suction line as far as possible upstream of the compressor. If the unit is equipped with an accumulator, the charge needs to be added to the port upstream of this location. The bulkhead fittings on the side of the unit should not be used for charge addition. Monitor superheat at the compressor suction inlet

using the bulkhead fitting and a temperature sensor on the suction line near the compressor. Superheat should not drop below 10 degrees during the process of adding charge.

Testing and Final Diagnosis

Check the oil level in the compressor after the system has been running for 24 hours. Oil may have been contained in the liquid refrigerant when recovered from the system. Most of this oil will be returned if the recovered refrigerant is used. If new refrigerant is added, additional oil should be added based on the following ratio:

New Refrigerant Charge Added, lbs. x 0.352 = Oil charge, oz.

It is critically important to ensure that the system is operating as expected before unit is returned to normal service. Test component replaced and function of the system. Many times a separate component in the system may have set a condition that causes a failure of another. Thoroughly test systems to ensure repeat failures do not occur.

Note: Compressors supplied with an oil sight glass should be viewed and filled to 50% capacity.

5.6 System Rating Plate

The system rating plate is attached near the electrical enclosure of the unit.

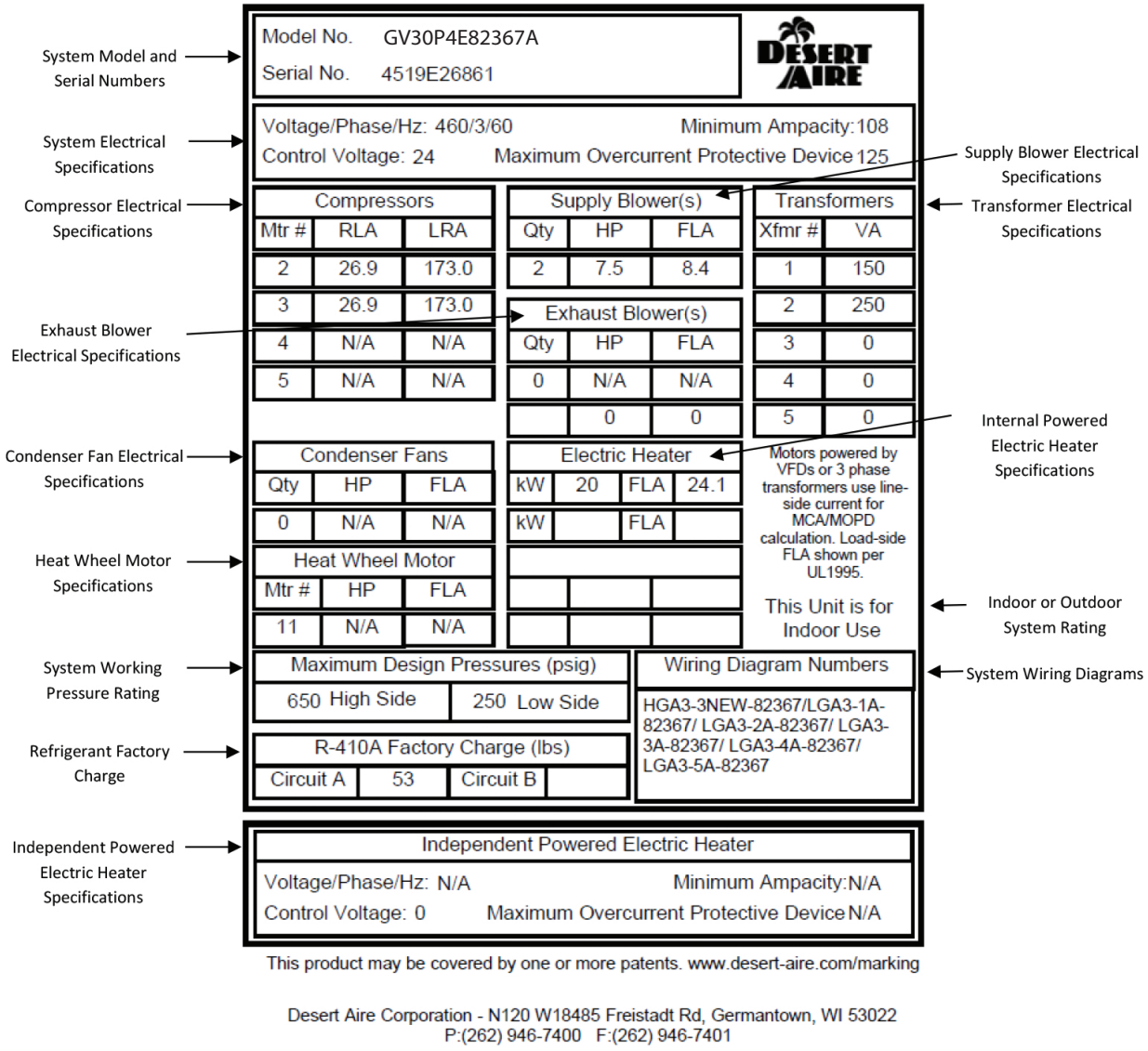


Figure25 - System Rating Plate

5.7 Start-Up Supervision Supplemental Information

A Desert Aire factory start-up is an option which is normally purchased with the equipment. A factory start-up includes several key services:

- The expertise of an accomplished, factory-trained mechanic who will supervise the commissioning of the equipment.
- This Desert Aire representative will assist the installing contractor with filling out the Start-Up Report.
- He will also inspect the installation to make sure that the unit has been properly integrated with the rest of the equipment on the jobsite.
- Finally, he can train the maintenance personnel to operate and service the equipment if necessary.

A factory start-up does not include installation assistance. The installing contractor is responsible for ensuring that the system is ready for start-up when the Desert-Aire representative arrives.

When the installing contractor is confident the system will be ready, he should contact the Desert Aire Sales representative to schedule the start-up. Please call at least two weeks before the desired start-up date to help prevent scheduling conflicts.

5.8 System Start-Up Report

A copy of the system “Start-Up Report” can be found on the following pages. This report needs to be filled out thoroughly by a qualified service technician and returned to Desert Aire for warranty validation. Please ensure that the model and serial number of the unit are noted on this form. The model and serial number can be found on the system’s rating plate located on or near the electrical compartment service door. Failure to complete and return this form will void the unit’s warranty. These reports are also helpful when trying to correct existing problems. Should you need system diagnosis help, fax the completed worksheet to Desert Aire’s Service Department using the number provided. Be sure to include your name and a telephone number where you can be reached.

N120 W18485 Freistadt Road
Germantown, WI 53022
(262) 946-7400 Fax: (262) 946-7401
www.desert-aire.com

Start-up Request Form for GV Series™ / GS Series™ / GA Series™ Grow Room Units Models GA/GS/GV

Factory Assisted Start-Up consists of a Desert Aire Service Department Technician to visit the job-site and provide supervisory experience to installing contractors as they perform the required procedures as outlined in our warranty activation start-up report. The number of field technicians required to assist in the start-up process may vary based upon the volume of units scheduled for commissioning, and will be coordinated with the site manager. The Desert Aire technician will also present an educational review of the unit's operating and maintenance requirements. **Factory Assisted Start-Up is not an installation bid & therefore the system must be ready to run before scheduling.**

CST Start-Up is performed by a local Certified Service Technician who has been trained by Desert Aire. The CST performs all duties listed above. In addition they will supply the "items to be supplied for start-up" as listed below. Please note charges for refrigerant will apply if refrigerant is necessary to complete the start up.

Items to be completed by the installing contractor before any Start-Up can be scheduled:

- ❑ Unit leak checked and inspected for internal concealed damage – remove access panels and inspect the interior of the unit for transit damage. Contact Desert Aire immediately if damage is noted **(800) 443-5276**
- ❑ Unit leveled and properly supported per the installation manuals recommendations.
- ❑ Condensate P Trap installed.
- ❑ Ductwork is complete with all diffusers installed
- ❑ Remote condenser plumbed, leak checked, evacuated, and charged if necessary. Some units require additional field charging. See unit labeling for details. Refrigerant added _____ lbs.(if applicable)
- ❑ All electrical connections terminated and verified for proper voltage at the unit and the condenser (if applicable)
- ❑ All field controls, Sensors are installed with circuits verified. If you have questions, contact Desert Aire for instructions **(800) 443-5276**.
- ❑ Grow room lighting and Irrigation systems are complete and functional.
- ❑ Remote communication (Hortimax, Tera boxes. Etc.) systems installed, addressed and tested for communication

Items to be supplied by the installing contractor (Factory Assisted Start-Up only)

- ❑ Equipped service vehicle, with evacuation and recovery equipment. – Field technicians will be trained and should be able to assist with refrigerant charge adjustments if necessary.
- ❑ Refrigerant manifold gauges
- ❑ 50# of the appropriate refrigerant & scale.
- ❑ Hand pump for adding oil to compressors, and POE oil.

If you are unable to supply any of the required equipment you must contact Desert Aire before returning this document.

I agree that all of the above has been completed as of _____(Date) If a return trip must be scheduled due to insufficient job-site preparation an additional purchase order must be issued to Desert Aire for re-scheduling. **A two week minimum is needed to schedule start-up.** Once the form is completed please fax or email both pages to the Desert Aire service department. Fax (262) 946-7400 Email: service@desert-aire.com

Signature of responsible party: _____ (print) _____ (sign)

Company Name:_____ Phone #: _____

N120 W18485 Freistadt Road
Germantown, WI 53022
(262) 946-7400 Fax: (262) 946-7401
www.desert-aire.com

Start-up Report for GrowAire® units
Models GA/GS/GV

Unit Information

Model # _____

Serial # _____

Jobsite Information

Job Site Name: _____

Job Site Address: _____

_____

Contractor Information

Installing Contractor: _____

Manager's Name: _____ Phone #: _____

Job Site Contact: _____ Cell #: _____

Controls Company Name: _____

Controls Contact: _____ Cell #: _____

Test and Balance Company: _____

Contact: _____ Cell #: _____

Factory use only – To be filled out by Desert Aire

Scheduled Start-up Date: _____

Unit Controls Protocol: JCI Metasys JCI FX Carel Honeywell Other:_____

Diagrams Forwarded to CST: Yes / No email address_____

Installing Contractor Contacted by: _____Date: _____

Network to be operational at time of start up: yes / no T&B to be on site during start up: yes / no

Additional Information:_____

_____

_____

_____

GrowAire® Series Start-up Report With Remote Condenser

Jobsite Information												
Installation Name:				**Completed By:**				**Date:**				
Model #:				**Serial #:**								
Remote Condenser Model #:				**Serial #:**								
Room Use: (Ex. Flower, Veg):				**Room Name/Num:**				**Unit Tag:**				
Controller Settings/Readings												
Room Air Temperature:		°F		**Room Humidity:**		%		**CO_2 Sensor Reading:**		ppm		
Carel Prog #:		**TeraBox SN:**			**TeraBox S.code:**			**Qty of units per room:**				
Controller Address (1-10):		**pGD Add. (21-29, 32):**			**Staging Deadbands Set:**			Yes No				
Lineset Information												
Lineset Length:		ft		**Elevation Change:**				ft				
Hot gas line trapped at every riser:		Yes No		**Inverted trap at top of riser:**				Yes No				
Hot Gas Line Size:	in	**Liq. Retrn Line Size:**	in		**Add. 410A:**	LBS		**Add. Oil:**	OZ			
Condenser Fan Controller Settings												
SENS	SN-1				SN-2			SN-3				
OUTR[1]	ON[1]	OFF[1]	OND[1]	OFD[1]	ONT[1]	OFT[1]	SNF[1]	SENS[1]				
OUTR[2]	ON[2]	OFF[2]	OND[2]	OFD[2]	ONT[2]	OFT[2]	SNF[2]	SENS[2]				
OUTR[3]	ON[3]	OFF[3]	OND[3]	OFD[3]	ONT[3]	OFT[3]	SNF[3]	SENS[3]				
Unit Voltage												
Voltage at power block:	Volts L1-L2		**Control Voltage:**		Volts TFMR 1		VA Rating					
	Volts L2-L3				Volts TFMR 2		VA Rating					
	Volts L1-L3				Volts TFMR 3		VA Rating					
Supply Airflow												
Reheat Condenser Pressure Drop:		"wc		**Supply Duct Pressure :**			"wc					
Reheat + Evap PD (QV small):		"wc		**Return Duct Pressure :**			"wc					
EC Fan PD:	"wc	**High Airflow Setting:**		CFM	**Low Airflow Setting:**		CFM					
Blower Current:	FLA		Amps L1		Amps L2		Amps L3					

Compressors and Refrigeration in Cooling Mode				
	Circuit A		**Circuit B**	
Compressor Motor #:				
Compressor RLA off Nameplate:	amps	amps	amps	amps
Compressor Current (amps):	L1	L1	L1	L1
	L2	L2	L2	L2
	L3	L3	L3	L3
Discharge Press. / Suction Press.:	Psig / Psig		Psig / Psig	
Refrigerant Sight Glass Clear / Oil Level Sight Glass*:	Yes No / ½ ¾ F		Yes No / ½ ¾ F	
Superheat / Subcooling:	°F / °F		°F / °F	

Compressors and Refrigeration in Dehumidification Mode				
	Circuit A		**Circuit B**	
Compressor Motor #:				
Compressor RLA off Nameplate:	amps	amps	amps	amps
Compressor Current (amps):	L1	L1	L1	L1
	L2	L2	L2	L2
	L3	L3	L3	L3
Head Press. / Suction Press.:	Psig / Psig		Psig / Psig	
Refrigerant Sight Glass Clear / Oil Level Sight Glass*:	Yes No / ½ ¾ F		Yes No / ½ ¾ F	
Superheat / Subcooling:	°F / °F		°F / °F	

Auxiliary Electric Heater Information									
Signal:		**L1 Amps:**		**L2 Amps:**		**L3 Amps:**		**Disch. Air Temp:**	°F

*Oil level must be at least ¾ full at completion of start-up.

GrowAire® Series Start-up Report With Water Condenser

Jobsite Information									
Installation Name:		**Completed By:**				**Date:**			
Unit Model #:			**Serial #:**						
Remote Condenser Model #:			**Serial #:**						
Room Use: (Ex. Flower, Veg):		**Room Name/Num:**				**Unit Tag:**			
Controller Settings/Readings									
Room Air Temperature:	°F	**Room Humidity:**	%	**CO_2 Sensor Reading:**	ppm				
Carel Prog #:		**TeraBox SN:**		**TeraBox S.code:**		**Qty of units per room:**			
Controller Address (1-10):		**pGD Add. (21-29, 32):**		**Staging Deadbands Set:**	Yes No				
Unit Voltage									
Voltage at power block:	Volts L1-L2	**Control Voltage:**	Volts TFMR 1	VA Rating					
	Volts L2-L3		Volts TFMR 2	VA Rating					
	Volts L1-L3		Volts TFMR 3	VA Rating					
Supply Airflow									
Reheat Condenser Pressure Drop:	"wc	**Supply Duct Pressure :**	"wc						
Reheat + Evap PD (QV small):	"wc	**Return Duct Pressure :**	"wc						
EC Fan PD:	"wc	**High Airflow Setting:**	CFM	**Low Airflow Setting:**	CFM				
Blower Current:	FLA	Amps L1	Amps L2	Amps L3					

Compressors and Refrigeration in Cooling Mode				
	Circuit A		**Circuit B**	
Compressor Motor #:				
Compressor RLA off Nameplate:	amps	amps	amps	amps
Compressor Current (amps):	L1	L1	L1	L1
	L2	L2	L2	L2
	L3	L3	L3	L3
Discharge Press. / Suction Press.:	Psig /	Psig	Psig /	Psig
Refrigerant Sight Glass Clear / Oil Level Sight Glass*:	Yes No /	½ ¾ F	Yes No /	½ ¾ F
Superheat / Subcooling:	°F /	°F	°F /	°F

Compressors and Refrigeration in Dehumidification Mode				
	Circuit A		**Circuit B**	
Compressor Motor #:				
Compressor RLA off Nameplate:	amps	amps	amps	amps
Compressor Current (amps):	L1	L1	L1	L1
	L2	L2	L2	L2
	L3	L3	L3	L3
Discharge Press. / Suction Press.:	Psig /	Psig	Psig /	Psig
Refrigerant Sight Glass Clear / Oil Level Sight Glass*:	Yes No /	½ ¾ F	Yes No /	½ ¾ F
Superheat / Subcooling:	°F /	°F	°F /	°F

Water Flow Information				
	Circuit A		**Circuit B**	
Pipe Size:	in		in	
Flow Rate:	GPM		GPM	
Water Temp In:	°F	**Water Temp Out:**		°F

Auxiliary Electric Heater Information									
Signal:		**L1 Amps:**		**L2 Amps:**		**L3 Amps:**		**Disch. Air Temp:**	°F

*Oil level must be at least ¾ full at completion of start-up.

Additional Comments:

N120 W18485 Freistadt Road • Germantown, WI 53022 • E-mail: info@desert-aire.com
PH: (262) 946-7400 • Fax: (262) 946-7401 • Website: www.desert-aire.com

Compressor Replacement Form

Location and Unit Information

Installation Name:			
Unit Model #:		Serial #:	
Form Completed By (Print):		Signed:	
Company Name:		Date:	
Company Address:		Phone #:	
		Fax #:	
Defective Comp. Model #:		Serial#:	
(If Tandem Set – Only list the specific failed compressor)			
New Compressor Model #:		Serial#:	

Compressor Condition at Time of Initial Review

Continuity (0 resistance) to Ground on one or more legs	☐	Compressor drawing higher current than design	☐
Continuity (0 resistance) between two or more legs (3 phase units)	☐	Compressor drawing locked rotor current	☐
Other (describe):	☐	Runs without pumping: Pressures: _____ / _____	☐

Continuity (0 resistance) to Ground on one or more legs	☐	Compressor drawing higher current than design	☐
Continuity (0 resistance) between two or more legs (3 phase units)	☐	Compressor drawing locked rotor current	☐
Other (describe):	☐	Runs without pumping: Pressures: _____ / _____	☐

Final Determination of Failure

Liquid Floodback	☐	Low Superheat	☐	Debris	☐	Defective Expansion Valve	☐
Low Sump Oil	☐	Insufficient Motor Cooling	☐	Other (Describe):			☐

Diagnostic/Corrective Action Summary

Describe what corrective action was taken to prevent a repeat failure.

_____

_____

_____

_____

Compressor Replacement Checklist

Required		Choose One		For Test Results Showing Acid or Particulate	
Acid and particulate test completed	☐	Unit Evacuated to 500 microns absolute and vacuum decay passed	☐	HH Cores used – Acid Core	☐
Liquid Line Filter Replaced	☐	Alternate triple evacuation process used	☐	SF filter used	☐

Air Flow Readings: Refer to Installation and Operations manual for correct balancing procedures.

Evaporator Static Pressure Drop	"wc	Supply Duct Static Pressure Drop	"wc
Reheat Condenser Static Pressure Drop	"wc	Return Duct Static Pressure Drop	"wc

Temperature Readings

Room Air Temperature	°F	Water Temp (Circle: **Pool** / **Tower**)	°F	Room Relative Humidity	%
Outdoor Air Temperature	°F	Water Temp (Circle: **Pool** / **Tower**)*	°F	Outdoor Relative Humidity	%

Compressors and Refrigeration in Reheat Mode

	Circuit A – Use both sides for tandem set		**Circuit B** – Use both sides for tandem set	
Motor # (See wiring schematic for details)				
Discharge Pressure	PSIG	PSIG	PSIG	PSIG
Liquid Line Pressure (At access fitting nearest TXV)	PSIG	PSIG	PSIG	PSIG
Suction Pressure (At compressor)	PSIG	PSIG	PSIG	PSIG
Liquid Line Temperature (At access fitting nearest TXV)	°F	°F	°F	°F
Suction Temperature (At Compressor)	°F	°F	°F	°F
Refrigerant Sight Glass Condition (Clear, Intermittent Vapor, Flashing)				
Comp. Oil Level Sight Glass (Shut down comps., wait 5 minutes)	½ ¾ F	½ ¾ F	½ ¾ F	½ ¾ F

Compressors and Refrigeration in Cooling Mode

	Circuit A – Use both sides for tandem set		**Circuit B** – Use both sides for tandem set	
Motor # (See wiring schematic for details)				
Discharge Pressure	PSIG	PSIG	PSIG	PSIG
Liquid Line Pressure (At access fitting nearest TXV)	PSIG	PSIG	PSIG	PSIG
Suction Pressure (At compressor)	PSIG	PSIG	PSIG	PSIG
Liquid Line Temperature (At access fitting nearest TXV)	°F	°F	°F	°F
Suction Temperature (At Compressor)	°F	°F	°F	°F
Refrigerant Sight Glass Condition (Clear, Intermittent Vapor, Flashing)				
Comp. Oil Level Sight Glass (Shut down comps., wait 5 minutes)	½ ¾ F	½ ¾ F	½ ¾ F	½ ¾ F

OPTIMIZING SOLUTIONS THROUGH SUPERIOR DEHUMIDIFICATION TECHNOLOGY

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