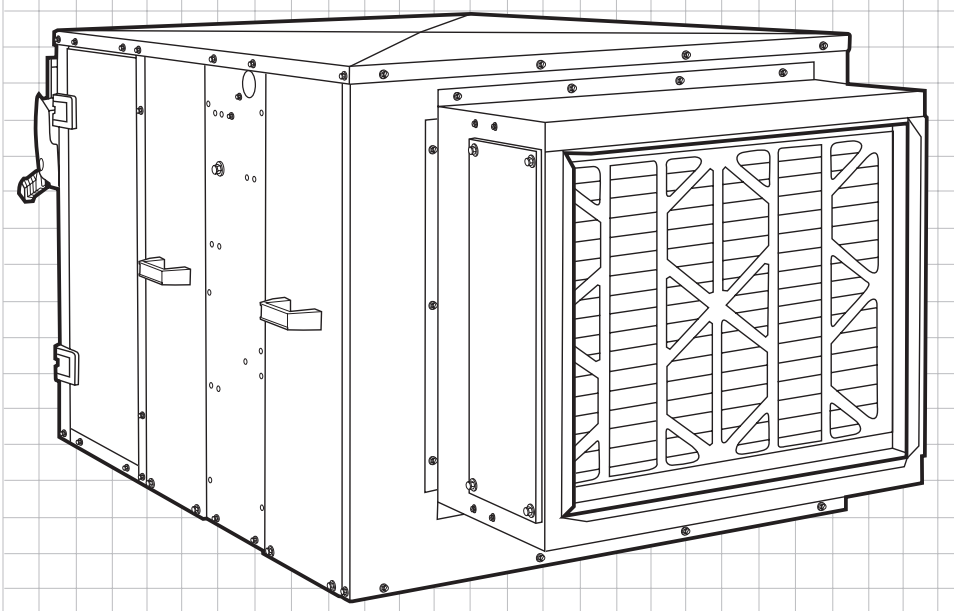
DESERT AIRE
POOL DEHUMIDIFICATION
DEDICATED OUTDOOR AIR SYSTEMS

ER (RecoverAire™) Energy Recovery Unit

Installation and Operation Manual

- Exhaust air energy recovery unit
- High efficiency heat pump cycle recovers energy to pool water
- Electronically-commutated variable-speed plenum fan
- Internal airflow measurement and PLC fan control ensures constant flow in each mode
- Standard ElectroFin® E-Coat coil coating
- Scroll compressors for high efficiency and longevity.
- Galvanneal cabinet with high impact, textured powder coating
- Operates stand-alone or communicating with dehumidifier



RECOVERAIRE™
by Desert Aire

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AHRI MEMBER

⚠ 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.

Desert Aire
Dehumidification Equipment Standard Limited Warranty

Desert Aire warrants the dehumidifying 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 pool 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. Desert Aire also posts the most current revision of our I/O Manuals on our website. For a digital copy of the I/O Manual for your unit revision, please submit request to the contact information listed.

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

The RecoverAire™ unit by Desert Aire is an exhaust air energy recovery device. The Desert Aire model number is prefaced by the nomenclature “ER”. “RecoverAire” and “ER” are used interchangeably throughout this manual.

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

The RecoverAire™ unit is a dedicated energy recovery product. It must be used in conjunction with dehumidification and cooling equipment for space conditioning. The ER unit is often sized to recover enough energy to maintain the pool water temperature without the use of auxiliary pool water heating equipment, however, the amount of energy in the exhaust air, the size of the pool, desired water temperature, and occupancy times are highly variable. Additionally, when first filled, the pool water temperature will be very cool. Use of the exhaust air energy recovery may take significant time to heat the pool to operating temperature. The installation of an auxiliary pool heater is recommended.

1.1 Purpose of Operation

ER units are designed to accomplish two goals: 1) to help remove noxious vapors outgassed from the pool, and 2) to transfer the energy from the exhaust air into the pool water. This is accomplished by drawing the air through an air-to-refrigerant cooling coil and rejecting the heat into a water-to-refrigerant heat exchanger. Since both removal of the exhaust air and heating of the pool water are required functions, combining them and maximizing energy recovery is highly beneficial.

1.2 Sequence of Operation

Whenever exhaust air is required, the ER fan will run to exhaust air. While the fan is running, if air and water conditions indicate energy recovery is needed and is possible, the compressor will run to remove energy from the exhaust air and return it to the pool water. The system monitors the intake temperature and humidity to determine if engaging the recovery system is efficient. Actual airflow rate is also monitored within the unit.

Energy recovery to the pool water will take place when all of the following are true:

- Pool requiring heating
- Airflow measured at the fan inlet venture is greater than the minimum for the model (see section 2.2 for minimum of each model)
- Energy of the incoming air (enthalpy) is greater than the factory set minimum

1.3 Airflow Arrangements and Use with Other Equipment

The RecoverAire™ unit has the capability to be installed in conjunction with several different types of dehumidification units. The connections and setup will vary depending on the type of dehumidifier and method of outdoor air introduction that will be used in the poolroom. When selecting a dehumidifier to serve the same space as the RecoverAire™ unit it is recommended that a new Desert Aire dehumidifier be used as there are several built-in communication features that allow for ease of setup and monitoring.

⚠ CAUTION

The Desert Aire RecoverAire™ units and SelectAire™ with exhaust fan units contain operational controls that assist in maintaining the poolroom envelope at a negative static pressure. Proper setup allows these controls to operate as intended; however, these are not safety controls. It is the responsibility of the owner/operator to ensure that proper space pressurization of the envelope occurs. It is recommended that the pressurization be checked on a regular basis to ensure proper operation of all building systems and any issues corrected immediately.

1.3.1 RecoverAire™ Installed with Desert Aire SelectAire™ (SA) unit with Exhaust Air Fan

When the RecoverAire™ unit is installed with a SelectAire™ unit equipped with exhaust air, the SA provides primary dehumidification of the space and a portion of the air energy recovery. The SelectAire™ energy recovery gives priority to requirement for air heating when applicable. Adding the RecoverAire™ to the system recovers the additional energy from the separate low exhaust system directly to the pool water. The two systems work together to recover the maximum amount of exhaust air energy to both the air and the pool. The SelectAire™ unit also controls zone pressurization to help ensure that moisture is not driven into walls or adjacent spaces.

The ER controller is connected to the SA controller via network connection. The SA controller is primary and controls the ER unit's operation. The modes of operation are activated by the SA unit's internal time clock, the remote occupancy contact closure (by others), or the BMS system connected to the SA unit. Up to five unique exhaust flow rates can be programmed that are commanded by the dehumidifier mode of operation. These may include the following:

- Unoccupied*
- Occupied
- Event
- Purge
- Max. Outdoor Air (activated with VOC or Economizer options)

*Note that outdoor air in unoccupied is manually balanced at the SelectAire™ during setup if desired.

A VOC sensor (if equipped) and building pressurization sensors are wired to the SA unit. The SA exhaust fan modulates to control zone pressurization (up to a programmed maximum exhaust airflow rate).

1.3.2 RecoverAire™ Installed with Desert Aire SelectAire™ (SA) with Outside Air Only

When the RecoverAire™ unit is installed with a SelectAire™ unit equipped with outside air only, the SA provides primary dehumidification of the space. Adding the RecoverAire™ to the system recovers the energy from the separate low exhaust system directly to the pool water. The RecoverAire™ unit controls zone pressurization to help ensure that moisture is not driven into walls or adjacent spaces.

The ER controller is connected to the SA controller via network connection. The modes of operation are activated by the SA unit's internal time clock, the remote occupancy contact closure (by others), or the BMS system connected to the SA unit. The building pressurization sensors are connected to the ER. The ER exhaust fan modulates to control zone pressurization (up to a programmed maximum exhaust airflow rate). The ER's maximum airflow for each mode can be input either in the SA or the ER.

1.3.3 RecoverAire™ Installed with Desert Aire ExpertAire™ (LV or LC Models)

When the RecoverAire™ unit is installed with an ExpertAire™ unit equipped with outside air, the ExpertAire™ provides dehumidification of the space. Adding the RecoverAire™ to the system recovers the energy from the separate low exhaust system directly to the pool water. The modes of operation are activated by the ExpertAire™ unit's internal time clock, the remote occupancy contact closure (by others), or the BMS system connected to the ExpertAire™ unit. The RecoverAire™ unit recovers energy and controls zone pressurization to help ensure that moisture is not driven into walls or adjacent spaces.

The ER controller is connected to the ExpertAire™ controller by low voltage connections. A contact closure commands the ER to be in occupied or unoccupied mode. The ER's unit modulates based on the zone pressurization to a pre-programmed maximum airflow for each respective mode.

1.3.4 RecoverAire™ Installed without Desert Aire Dehumidifier

When the RecoverAire™ unit is installed in conjunction with other space conditioning equipment and not connected to a Desert Aire dehumidifier, it must be interlocked with the equipment introducing outdoor air.

Building pressurization sensors are utilized to control the building pressure with the ER exhaust fan (up to a programmed maximum exhaust airflow rate). Occupancy mode can be controlled via a contact closure (by others) or via Modbus protocol.

1.4 Water Arrangements and Use with Other Equipment

1.4.1 Connected to Desert Aire SelectAire™ Dehumidifier with Water Condenser

When linked to a Desert Aire Dehumidifier SelectAire™ with Water Condenser, the temperature sensor that is connected to the SelectAire™ unit communicates to the RecoverAire™ unit. Both units are set for the same water temperature set point at their respective displays. Whenever there is a call for pool heating, energy recovery from the exhaust air at the SelectAire™, RecoverAire™, or both units are possible.

The auxiliary water heater will be connected to either the SelectAire™ or the RecoverAire™ unit. The staging, differential, and deadband of this heater will be set at the dehumidifier where the heater is connected.

1.4.2 ExpertAire™ or Standalone RecoverAire™ Installation

If the ER is in an installation with an ExpertAire™ unit or other dehumidifier, the auxiliary heater should be connected to the ER unit. This ensures proper staging and that energy recovery is the preferred source of heating. The RecoverAire™ unit will be the first stage of heating. The auxiliary heater will be staged second.

In very rare circumstances it may be possible to install an ExpertAire™ unit with water condenser or other dehumidifier with pool heating. These units do not have provisions for communication of the temperature to the RecoverAire™ unit. The individual pool temperature sensors should be calibrated as closely as possible to one another and set points should be set to the same value in each piece of equipment.

1.4.3 Operation of Optional Pump Starts

Refer to the Controls User Manual and electrical schematic for instructions on programming water pump start command(s) if required. Dry contact will close when there is a call for energy recovery.

1.5 Inspection

Desert Aire inspects and tests each product before it leaves the factory so that you receive a quality piece of equipment. Unfortunately, equipment may become damaged in transit. Inspect the ER 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 fluids leaking from the unit should be documented upon delivery.

1.6 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 equipment is solidly built and can be very heavy. Avoid personal injury and damaging the equipment by planning the installation carefully. Use moving equipment whenever possible.

1.6.1 Moving and Rigging the ER Unit

Depending upon the unit type, various rigging methods are used to best move or lift the equipment. Personnel should avoid stepping on the top of the unit. Desert Aire products 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.

The ER unit is shipped on a skid or a pallet. If moving by fork lift, use the pallet to move to the installation location and carefully lift from the pallet at that location. If using a crane to move, ensure proper rigging and safety slings are used.

⚠ CAUTION

1. **Do not tip the dehumidifier 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. See manual addendums for custom requested features if applicable.

2.1 Location of ER Unit

Desert Aire ER units require both left and right side service access to the unit for service. Allow a minimum of 36 inches of clearance around the service sides of the ER unit for piping, electrical connections, and service access. Consult local, state, and national electrical codes for other minimum service clearances.

Install the unit on a sturdy, level mounting base or platform that will prevent vibration and sound transmission. Never install the ER unit on a wooden platform without consulting the design engineer for 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 of the ER unit. See section 6.2 for detailed duct installation instructions.

The unit can be floor mounted on dunnage or a concrete housekeeping pad if desired. Ensure that there is sufficient elevation over the adjacent surface for the proper depth of the trap. See condensate piping requirements in section 2.2.1 of this manual for details on required field supplied and installed trap.

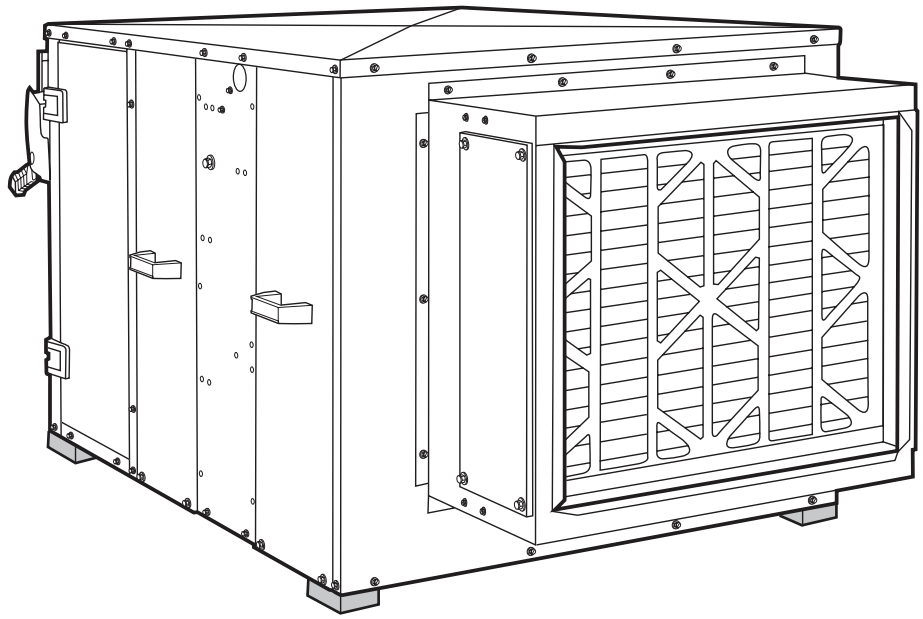


Figure 1 - Typical Floor Installation

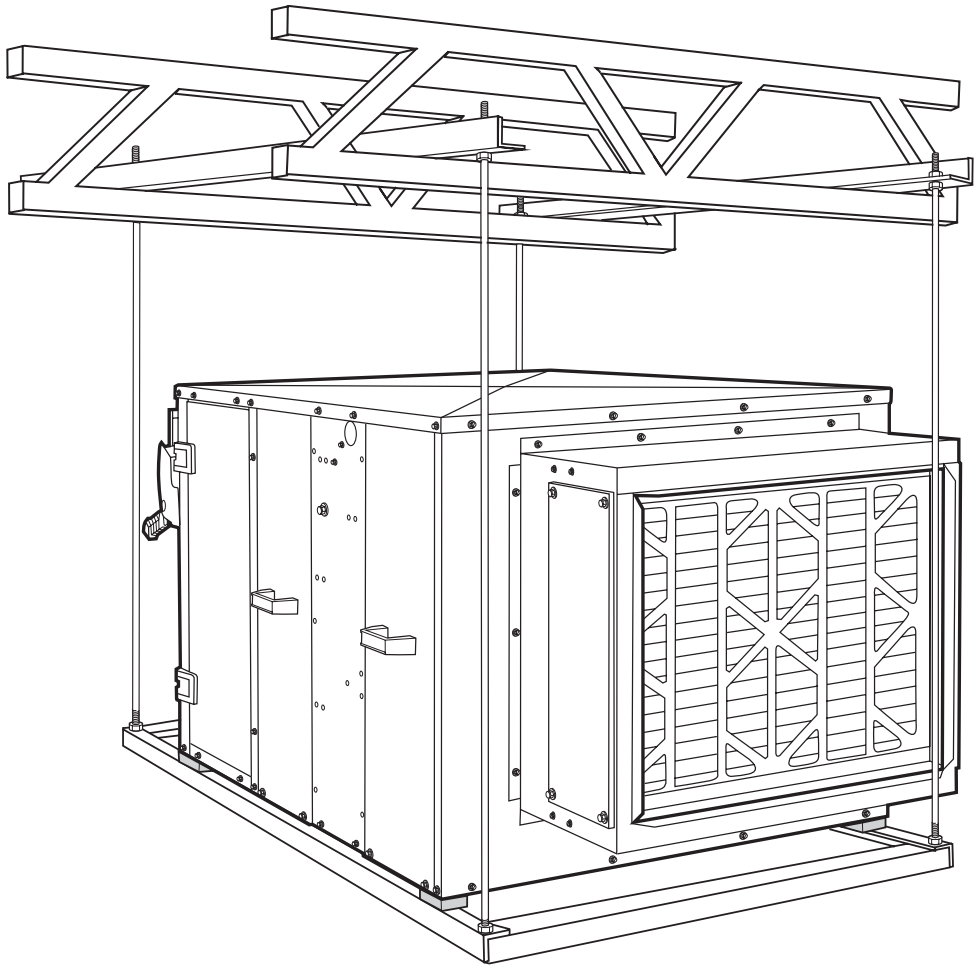


Figure 2 - Typical Suspended Installation

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

Standard ER units must not be installed in an unconditioned space or where ambient temperatures can fall below 45°F. If ER unit must be installed outside or in an unconditioned space, such as an attic, an outdoor-rated unit must be used. Desert Aire equips outdoor-rated ER units with weatherproofing and thicker insulation. You can determine whether your unit is outdoor-rated by inspecting the unit rating plate. See section 6.5 for details.

2.2 Duct Installation

Duct design and installation should conform to the latest ASHRAE and SMACNA low velocity duct standards. See section 6.2 for details. Undersized restrictive ductwork with abrupt turns or transitions can decrease the efficiency of your ER unit and may lead to unit failure. Size the ductwork for an acceptable air pressure drop at the airflow

volume of your ER unit. Use neoprene flex connectors when attaching ductwork to the ER unit to prevent transmission of excess vibration and noise.

Airflows for the unit are specified at the time of design and vary based on the mode of operation. Refer to specifications provided by the design professional to determine the air flow rates for any particular application. At all times the flow rates should fall within the following ranges:

RecoverAire™ Airflow (ACFM)

Size	Min	Max
02	550	3190
03	800	3390
04	1100	3770
05	1400	3770
06	1900	5550
08	2080	5550
10	2500	6870
12	3400	7230

Figure 3 - Standard Unit Airflow Specification

If using Desert Aire FreshAire Evacuator benches, follow the design and installation guides to ensure proper airflow distribution and intake velocities. If no benches are used, select grilles and registers for low static pressure loss, low velocity, and the specified CFM rating. This information can be found in most grille manufacturer's catalogs. If grilles are being installed in a corrosive environment, choose components made from anodized aluminum.

Exhaust air grilles should always be installed low and distributed properly. Design of this system is critical to success. In general, the exhaust air locations should be along one side of the pool opposite of the supply air in the room. This should also be the same wall as the return air grille(s) to the dehumidifier. Refer to the project documents or the design professional to ensure that the system is installed as intended.

If a portion of the ductwork must be installed in an unconditioned area, use fiberglass duct wrap with vapor barrier facing. Galvanized sheet metal ducts may be used for most applications, however, aluminum or PVC ducts should be considered where there is higher risk of pool chemistry causing highly corrosive environments.

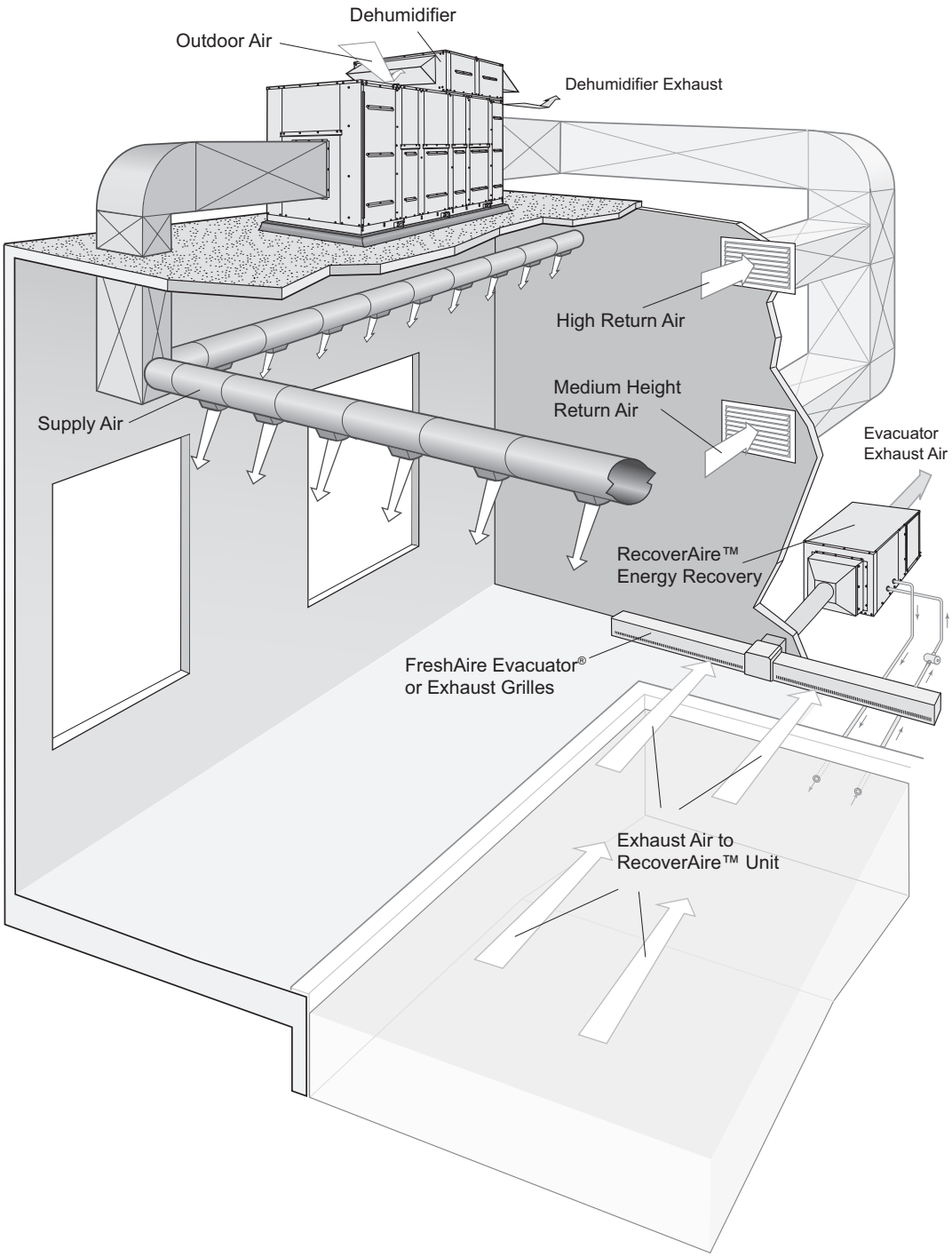


Figure 4 - Exhaust Recovery System Layout

2.2.1 Condensate Drain Piping

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

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

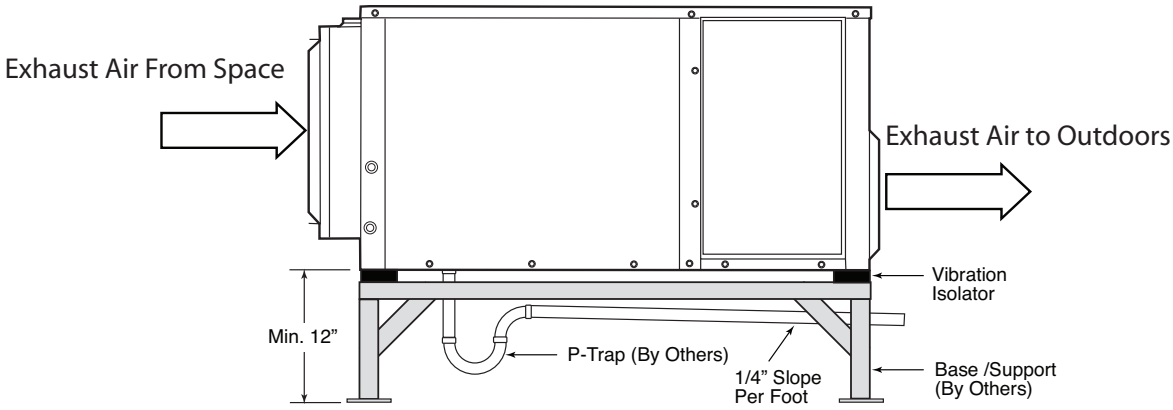


Figure 5 - Condensate Piping

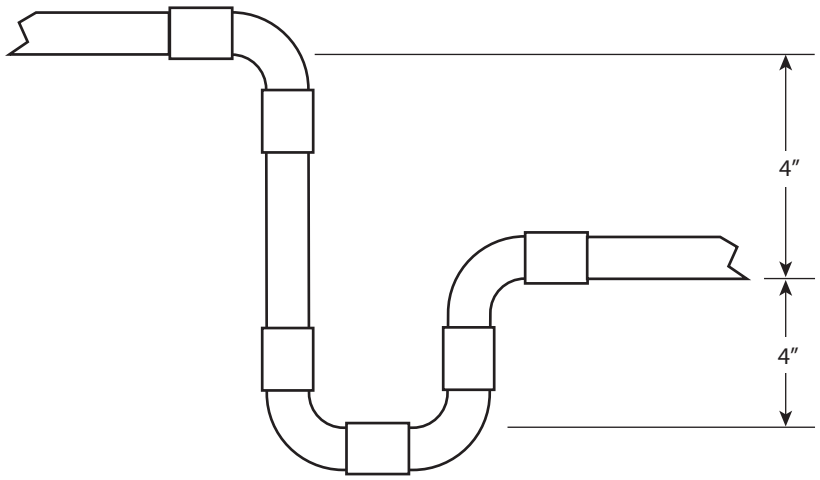


Figure 6 - Sectional View of Condensate Trap Requirements

Trap the condensate as shown in Figure 5. The P-trap dimensions in Figure 6 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.

A cleanout tee or plug may also need to be installed near the trap. Note that the drain opening in the drain pan is off-center to simplify its cleaning and servicing. Once the trap has been designed and installed, follow this sequence:

1. Connect the trap to the 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 the drain piping is installed, prime the trap by pouring water into the drain pan of the ER unit.

⚠ CAUTION

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

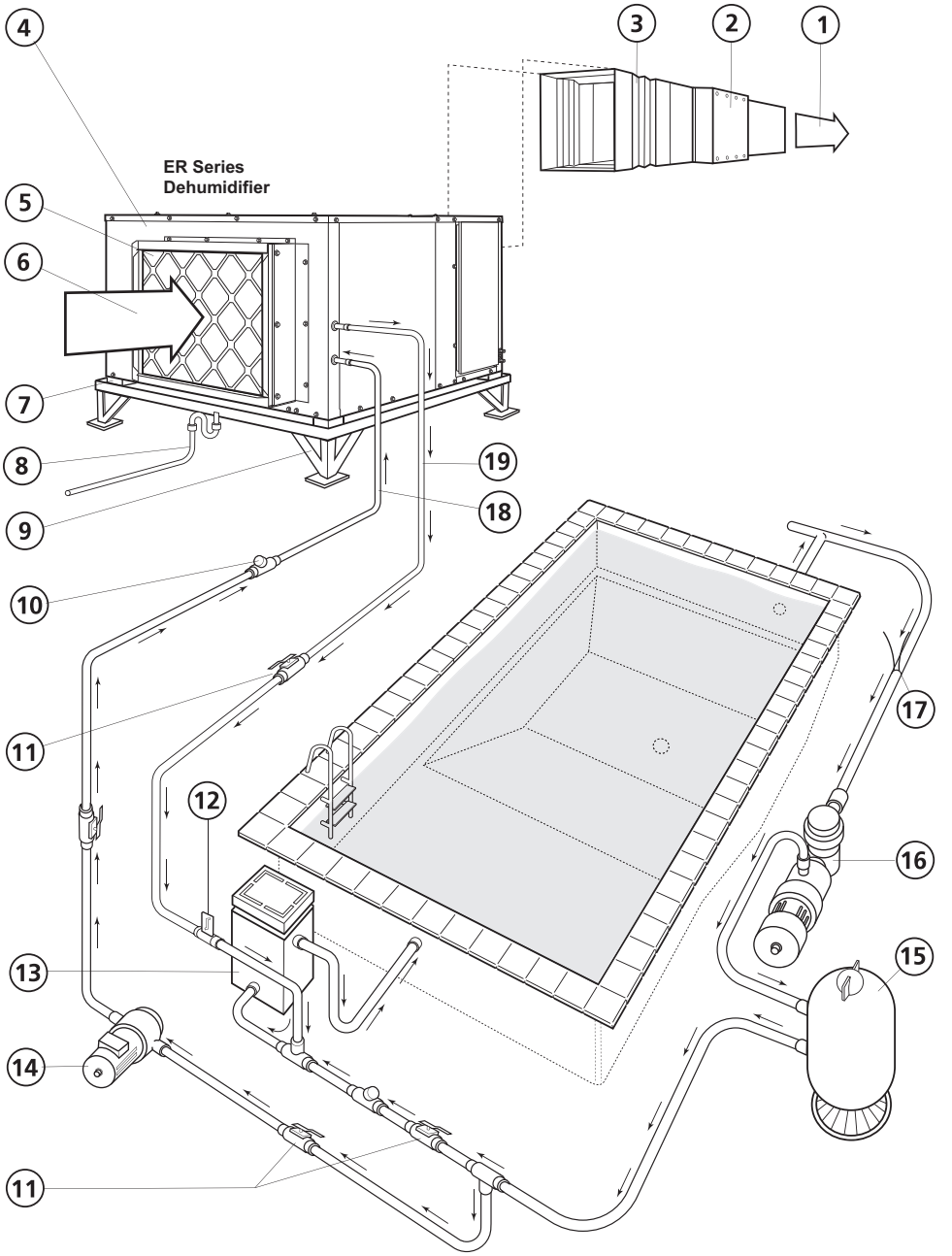
3 Water

3.1 Water Piping Connections

Desert Aire ER units are equipped with pool water heating condensers that must be connected to pool water filtration lines to operate as intended. The ER unit water supply circuit must tap into the main pool water line downstream from the main filter. If the main pool circulating pump is large enough, a manual throttling valve may be used to divert a portion of the water to the ER unit. Normally, an auxiliary water pump must be sized and installed such that it can handle the unit's required water flow rate, which is listed in Figure 7.

Model Size	Water Flow Rate and Pressure Drop Pool Application
01	2 GPM @ 5.5 ft W.C.
02	4 GPM @ 6.9 ft W.C.
03	6 GPM @ 5.3 ft W.C.
04	8 GPM @ 6.1 ft W.C.
05	10 GPM @ 5.7 ft W.C.
06	12 GPM @ 9.2 ft W.C.
08	16 GPM @ 9.0 ft W.C.
10	20 GPM @ 5.7 ft W.C.
12	24 GPM @ 7.4 ft W.C.

Figure 7 - Standard Unit Water Flow Rates for ER Units



LEGEND

1	Exhaust Air to Outdoors
2	Duct Heater (Gas, Electric, Etc.)
3	Flex Duct Connector
4	Desert Aire LC Dehumidifier
5	Filter Rack Assembly with Filters
6	Exhaust Air from Poolroom
7	Vibration Isolators
8	P-Trap
9	Base (If Required)
10	Check Valve

11	Ball Valve
12	Flow Meter
13	Main Pool Heater
14	Auxiliary Pump
15	Filter Assembly
16	Main Pool Pump
17	Water Temp Sensor (Dry Well)
18	Water Inlet
19	Water Outlet

Figure 8 – Proper Pool Water Heating Installation for Desert Aire ER units

A typical water circuit arrangement is shown in Figure 8. To simplify the commissioning and servicing of this job, a flow meter and isolation valves should be installed in the pool water lines which feed the ER unit.

3.2 Low Water Flow Protection

Desert Aire ER units are equipped with a factory-installed water flow switch. This switch prevents the unit from running if there is a loss of water flow.

3.3 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 dehumidifier may create the possibility of shock and can lead to premature system failure.**

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 for three phase or two-pole power block for single phase units mounted on the electrical panel. Test the phasing of the three phase unit by “bumping” the compressor contactor. Verify the suction and discharge pressure before and after the “bump” have changed by at least 10 psi. If no appreciable change in pressure is observed, switch any two of the three wires at the power block. For a single phase unit the motors must be re-wired according to the wiring diagrams included with the motor.

To assist in compliance with NEC and local codes, a second lug connected to the service panel in equipment with pool water condensers is provided. This lug is intended to be connected to the pool equipotential bonding grid in the field when required by code. This also removes the possibility of differences in potential between metals in the pool water and the water condenser that may accelerate corrosion. The bonding lug should be connected to the equipotential grid with 8 AWG or larger solid copper conductor.

3.3.1 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.

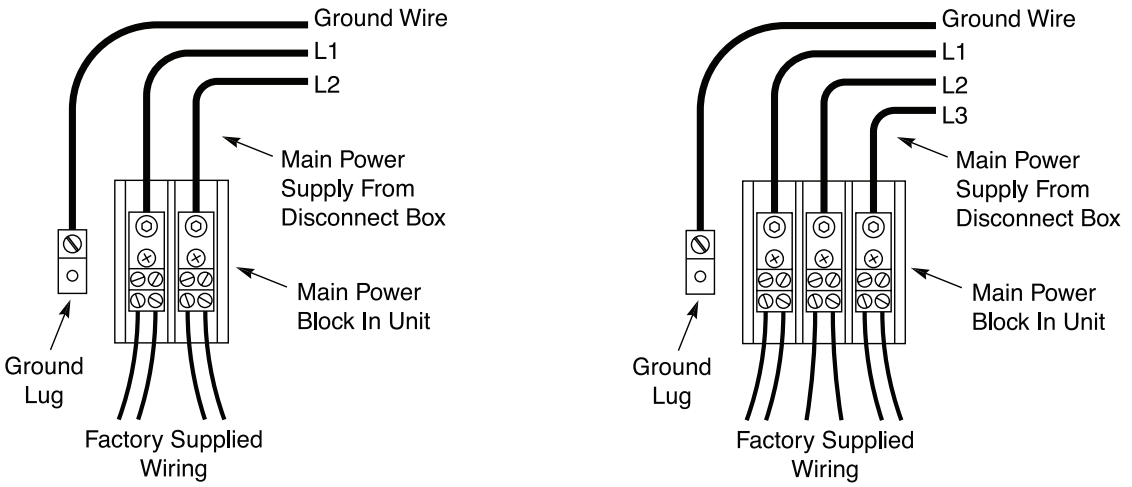


Figure 9 - Single-Phase and Three Phase System Power Connection

3.3.2 Wire and Fuse Sizing

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

3.4 Controls and Sensors

The standard Desert Aire ER units are controlled by a microprocessor controller. This controller is designed for precise monitoring of incoming air temperature and relative humidity (RH) and incoming pool water temperature. Based on those conditions, the unit will operate to remove heat from the air and reject it into the pool water loop. See separate controller I&O Manual for screen layouts and specifications.

3.4.1 Water Temperature Sensor

Water temperature sensor should be installed in the main pool water loop upstream of all pumps. This ensures that any circulator pumps that drive the water to the ER unit can remain inactive if there is no call for heat to the pool water, thereby further saving energy.

Screw the well into the adapter fitted into the pool water piping. The well is equipped with a 1/2” MPT connection. Install the sensor upstream from the ER such that the inlet water temperature is sensed. If a separate circulating pump is installed for the ER unit flow, install the sensor in the main pool line. The sensor must be installed in a location where it will accurately sense the pool water temperature. This means you must have continuous water flow at the sensor location.

The auxiliary pool water heater should not be installed upstream of the dehumidifier. Install heater downstream or in parallel with dehumidifier.

3.4.2 Air Pressure Transducer Pickups

Units being installed along with a SelectAire™ unit that includes an exhaust fan have zone pressure sensors installed in that unit. No transducer connections are available or required on the RecoverAire™ unit when ordered in that configuration.

In pool applications, it is critical to maintain negative space pressurization relative to adjacent spaces and the outside ambient. This prevents moisture laden air from being driven into the wall cavities and condensing. The RecoverAire™ unit includes provisions to measure the differential in static pressure between the space and the outdoors and helps to maintain this negative static pressure in the space.

3.4.3 Indoor Static Sensor Installation

The indoor static pressure sensor should be mounted in a location not subject to damage from occupants. Place the sensor as far as practical from doors, grilles, and operable windows that may cause pressure fluctuations. Locate a minimum of 3’ above the floor level in the pool area. Note that in rooms with extremely high ceilings (greater than 30’) it is preferable to locate the sensor a minimum of halfway up the wall. This is due to building stack effect where the pressure may become higher at the ceiling than at the floor. The sensor can be mounted directly to drywall or to a standard single gauge electrical box. 50’ of 1/8” clear pressure tubing is supplied with the sensor. Route the tubing such that it will not be subject to damage. Do not directly attach the tube to surfaces that may become very cold as suction lines or supply ducts as condensation may occur in the tubing. Connect the tubing to the static pressure differential transducer in the unit. The correct port is labeled for the indoor air sensor.

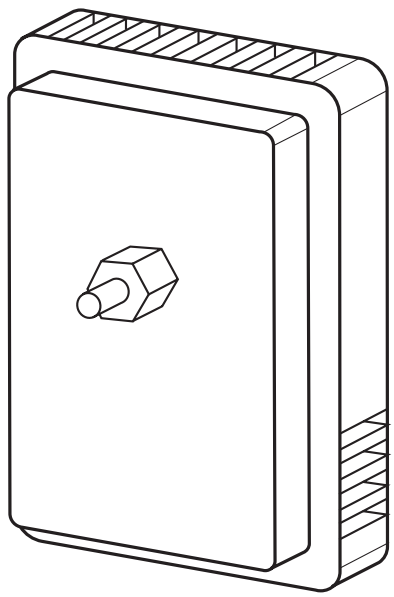


Figure 10 - Indoor Static Pressure Sensor (rear view)

3.4.4 Outdoor Static Sensor

A complication in measuring the building static pressure is the dynamic action of the wind. Measuring the wind's pressure instead of the true outdoor static pressure will alter the actual static pressure reading. Proper mounting of the outdoor static sensor will help ensure accurate readings. The outdoor air static pressure sensor should be mounted at least 12 inches above surrounding obstacles and a minimum of 24 inches from a wall or Air Handling Unit. Do not mount under awnings or other projections within fifteen feet. Do not mount near economizers, intakes or exhaust fans, or barometric dampers. Do not mount within 10' of building corners or parapet walls.

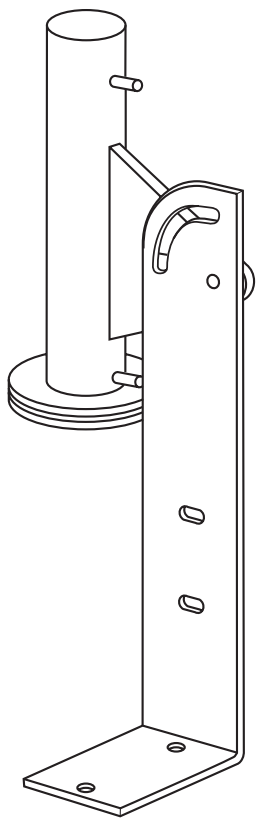


Figure 11 - Outdoor Static Pressure Sensor

A detailed drawing of the outdoor static sensor assembly is included with the package. Assemble mounting bracket and tubing per this drawing. 50' of 1/8" opaque pressure tubing is supplied with the sensor. Route the tubing such that it will not be subject to damage. Do not directly attach the tube to surfaces that may become very cold such as suction lines or supply ducts as condensation may occur in the tubing. It is recommended that all of the tubing length be used as this helps buffer any fluctuation in the sensor readings due to wind gusts. Excess tubing should be coiled at some convenient location rather than cut. Connect the tubing to the static pressure differential transducer in the unit. The correct port is labeled for the outdoor air sensor. Closely observe that the indoor static pressure sensor and outdoor static pressure sensor are installed on the proper ports as labeled.

3.5 Smoke Alarm Interlock

Desert Aire ER units are equipped with a set of terminal blocks for interlocking with a smoke alarm (alarm provided and installed by others). The contacts must break when smoke is present. This will shut off the blower and compressors. See the wiring diagram for connection details.

3.6 Occupancy Contact

An occupancy contact is provided to allow for occupancy signal to the unit via a dry contact closure. If the ER is in an installation with a Desert Aire SelectAire™ with Outside Air Only or an ExpertAire™ unit, the two wire connection can be made with the terminals labeled “Exhaust Fan” in those units.

The ER can also be commanded to occupancy mode by a ModBus connection or connection with a SelectAire unit equipped with Exhaust Air. When this connection is made the occupancy contact should be left open.

4. Start-up Procedure

Read this section thoroughly before attempting to commission the Desert Aire ER 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 auxiliary heaters before start-up so that the air is at the design temperature.

It should be noted that the ER unit contains a lockout to ensure that operation of the compressor system is energy efficient and that the air is at a condition that is safe for the compressor system to run. Low zone conditions may prevent the unit from being fully commissioned.

4.1 Preliminary Inspection

Verify that all contractors have completed their work. Find the Desert Aire "ER Start-up Report," which is normally placed inside this manual within the electrical compartment of the ER unit. Start-up report must be filled out to validate the ER 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 blower equipped with 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 ER unit. The available power supply voltage must be within +/- 5% of the voltage printed on the rating plate.
- With the power supply disconnected and locked, tighten all field and factory electrical connections.
- 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 to avoid clogging the internal passages of water side heat exchangers.
- Check the drain pan and the condensate piping. Test the drain and prime the Ptrap by pouring water into the drain pan.
- Verify that all service valves in the refrigeration lines are fully open.

4.2 Zone Pressure Transducer Check and Calibration

⚠ CAUTION

The Desert Aire RecoverAire™ units and SelectAire™ with exhaust fan units contain operational controls that assist in maintaining the poolroom envelope at a negative static pressure. Proper setup allows these controls to operate as intended; however, these are not safety controls. It is the responsibility of the owner/operator to ensure that proper space pressurization of the envelope occurs. It is recommended that the pressurization be checked on a regular basis to ensure proper operation of all building systems and any issues corrected immediately.

Check to ensure that the zone pressure transducer is operating properly and calibrated. Remove the tubes that were connected to the transducer in the electrical panel from the zone and outdoor air pressure pickups. Ensure there is no significant influence of wind or fans at the open transducer ports. Use the controller display to view the pressure differential. The value should be at 0.000” w.g. A reading from -0.020” w.g. to + 0.020” w.g. is generally acceptable. Should calibration be required, an offset can be programmed in the controller through the Service Menu on the display. Refer to the Controller Installation and Operation Manual if additional details are required on this procedure.

4.3 Airflow Balancing

To ensure code compliance and long equipment service life, proper airflow must be verified by a qualified air balancer. Disable the compressor to prevent the refrigeration system from running while you balance the air.

The ER units use an EC direct drive motor. No belt or sheave adjustment is necessary. Additionally, a pressure transducer is used to determine the velocity pressure through the fan venturi which is used to calculate the airflow. Airflow balancing requires setting the unit airflow at the display and verifying the airflow output is correct in each mode. Some blower acceleration or deceleration should be apparent when switching modes, but these should stabilize after a few minutes as the fan adjusts to the new airflow and static pressure settings.

The default setting for zone pressurization is -0.050” w.g. This is user adjustable. Note that maintaining a negative zone pressure in a poolroom is critical to longevity of the building insulation and structure. The zone pressurization algorithms in Desert Aire equipment will ramp exhaust fan speeds to achieve the values, but it should be noted that there are mechanical limits of the equipment. Poolrooms that have high air infiltration rates under low negative static pressures will cause exhaust fans to ramp to higher flow rates. Although maximum flow rates can be programmed in each mode to reduce the flow, it is highly recommended to find and repair the areas in the building where high infiltration occurs such that the programmed pressurization is able to be achieved.

The procedure for setting and confirming airflow is slightly different based on the type of space conditioning equipment that the unit is being installed with.

4.3.1 RecoverAire™ Installed with a SelectAire™ (SA) that includes Exhaust Fan

Balance the supply airflow of the SelectAire™ unit in unoccupied mode first. See the installation and operations manual for that unit for details. Enter the desired outdoor air and exhaust flow rate for each mode at the SelectAire™ unit display for both the SelectAire™ unit and the ER unit. Note that these modes will be pre-programmed at the factory as ordered, but should be checked against the design documents.

Both the RecoverAire™ unit and the SelectAire™ unit have measurement and control devices imbedded to automate airflow. Check the airflow rates at the outdoor air, SelectAire™ exhaust, and RecoverAire™ exhaust in each mode of operation to ensure that the desired amount entered for each mode is achieved. Refer to the SelectAire™ manual for exhaust airflow balancing screen operation.

It should be noted that in this configuration that the RecoverAire™ unit will modulate the fan output to achieve the pre-programmed flow rate for each mode. The SelectAire™ unit will introduce the programmed amount of outdoor air in each mode and modulate the exhaust fan to achieve a negative zone pressure. A maximum amount of exhaust can be programmed for each mode if desired.

4.3.2 RecoverAire™ Installed with a SelectAire™ (SA) without Exhaust Air or ExpertAire™ (LC or LV)

Balance the supply airflow, bypass air flow rate, and outdoor airflow of the SelectAire™ or ExpertAire™ unit in both occupied and unoccupied mode. Refer to the dehumidifier I&O Manual for details.

In this configuration that the RecoverAire™ unit will modulate the exhaust fan to achieve a negative zone pressure automatically. A maximum amount of exaust fan be programmed for each mode if desired at the ER controller. Check the exhaust airflow rate in each mode to ensure that the value meets or exceeds the design documents.

It should be noted that the maximum amount of flow for each mode was preprogrammed at the factory based on the flow rate indicated at the time of order. The unit may have additional capability for higher exhaust flow rates should the negative pressure in the zone is not able to be achieved. Should the pressure in the zone be higher than the desired set point (less negative), first check for any obvious areas for infiltration such as open doors or windows or incomplete construction of the building envelope. If no obvious issues are found, increasing the maximum exhaust airflow rate should be considered.

4.3.3 RecoverAire™ Installed with Other Dehumidifier

Refer to design documents and/or installation manuals of the primary HVAC equipment and ensure that units are airflow balanced.

It should be noted that in this configuration that the RecoverAire™ unit will modulate the exhaust fan to achieve a negative zone pressure automatically. A maximum amount of exhaust can be programmed for each mode if desired. Check the exhaust airflow rate in each mode to ensure that the value meets or exceeds the design documents.

4.3.4 Air Systems Operational Checks

Upon completion of airflow balancing, ensure that the units are operating as expected. Check to ensure that the unit controlling zone pressurization is able to achieve the programmed set point for zone pressurization. Cross check this with a separate calibrated manometer.

Check the exhaust fan speed of each of the units. It is recommended that the initial speed in each mode be 90% or lower. The exhaust fans will increase speed as the filters load to ensure constant flow. Ensuring that the initial speed is less than 90% allows for some filter loading.

4.4 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 procedures 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.

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 any contamination.

Whenever servicing Desert Aire equipment, observe the following:

- Use only equipment rated for the pressures and the refrigerant being serviced.
- Use only equipment dedicated to service of the refrigerant in the system. Do not use equipment to service multiple refrigerant types.
- Purge all hoses and equipment of non-condensable the sealed system.

- Use only original equipment parts or factory approved equivalent for servicing.
- Use only 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 the system require opening to repair a leak or other service when in a 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.
- 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 6.4 for additional procedures related to charging.

Note that the superheat should be stable and within 4 degrees of fluctuation. Minimum values for superheat at compressor in all modes:

Superheat Minimum Values Chart Temp (°F)							
Relative Air Temperature (°F)		60.0 - 65.0	65.1 - 70.0	70.1 - 75.0	75.1 - 80.0	80.1 - 85.0	85.1 - 90.0
Relative Air Humidity (%RH)	30.0 - 40.0	12	13	14	15	15	16
	40.1 - 50.0	13	14	15	15	16	18
	50.1 - 60.0	13	14	15	16	18	18
	60.1 - 70.0	14	15	15	16	18	19
	70.1 - 80.0	14	15	16	18	19	20

Figure 12 - Superheat Minimum Values Chart

4.5 General Testing

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

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 a condensate pump has been installed, make sure it operates properly.

- Check the temperature and humidity readings displayed on the controller. If the values seem incorrect, check the sensor or its field-installed wiring for damage.

4.6 Routine Maintenance Schedule

4.6.1 Service Every Month

- Check the air filters and replace them if necessary.

- Check the coils in the ER unit. Use compressed air or a commercial coil cleaner if they are dirty or plugged.

4.6.2 Service Every Six Months

- Check and tighten all field and factory electrical connections.

- Check for dirty coils in the ER unit.

- Check and clean the drain pans and blow out the condensate drain line. If the drain is plugged, water will back up into the ER 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.

4.6.3 Pool Water Chemistry

Pool chemistry must be maintained to ensure the proper pH, total alkalinity, calcium hardness and free chlorine. NSPI recommends the following levels for pool chemistry:

pH	7.4-7.6
Total Alkalinity	100-150 ppm
Calcium Hardness	200-250 ppm (Plaster Pool)
	175-225 ppm (Vinyl or Painted Pool)
Free Chlorine	1.0-3.0 ppm

Excessive chemical levels in the pool can be dangerous to users and can damage pool hardware, including the energy recovery system. **Service problems caused by excessive chemical levels are not covered under warranty.**

5. Troubleshooting

Although Desert Aire ER 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 ER unit. 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 ER 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.

5.1 The Blower Does Not Run

POSSIBLE CAUSE	REMEDY
Zone pressure reads low causing fan to slow	Check operation of other exhaust fans that may be installed. Calibrated the zone pressure sensor.
Smoke Alarm Tripped	Check smoke alarm contact (by others) operation. Jumper the contact if no smoke alarm is required.
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 the system and controller.

5.2 The Compressor Does Not Run

NOTE: Under some circumstances the compressor will not run even though the humidity in the room may be too high. See section 1.2 for more information on the control sequence for the ER unit.

POSSIBLE CAUSE	REMEDY
Compressor delay-timer	Wait 3 minutes for timer.
Entering air condition is below minimum enthalpy	Normal operation. Compressor will start when exhaust air condition is in range for efficient energy recovery.
Fan speed is below minimum	Check zone pressure transducer calibration. Note that required exhaust air flow rates may be very slow in unoccupied mode and unit will lock out compressor. This is normal operation. Indexing to occupied mode will open outdoor air dampers throughout the system and will increase exhaust flow rates and fan will rise above minimum threshold for compressor operation.
Loss of main power	Check for tripped circuit breaker or blown fuse(s).
Blower overload has tripped	Correct cause and reset overload.
Faulty wiring	Check for loose or faulty wiring on system and controller.
Compessor overload has tripped	Correct cause and reset overload.
Comp. failure may have occurred if: A) Comp. draws locked rotor amps B) Comp. starts but does not pump C) Motor windings have shorted	A) Replace compressor (or check fuses on three-phase units). B or C) Replace Compressor.

5.3 Evaporator Coil Ices Up

POSSIBLE CAUSE	REMEDY
Entering air below 70°F	Raise entering air temperature
Insufficient evaporator airflow rate	1) Evaluate system airflow. 2) Check evaporator bypass damper. 3) Check for dirty filters or restricted ductwork. 4) Assure coils are clean.
Lack of refrigerant	Re-evaluate system charge.
Restrictive 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	1) Check coil for kinks in tubing. 2) Evaluate debris in distributor.

5.4 Head Pressure is Too High

POSSIBLE CAUSE	REMEDY
Excessive refrigerant charge	Re-evaluate system charge.
Non-condensables in system	Evaluate or purge system.
Defective refrigeration valves	Check flooding, and solenoid valves for sticking.
Restriction in refrigeration piping	1) Check coil and tubing for kinks. 2) Replace dirty drier filter.
Refrigeration system is overloaded	1) Reduce entering air temperature or relative humidity. 2) Check register locations for short cycling of air.
Low water flow	Evaluate water flow rate for application.

5.5 Pool Water Heating Problems

Note:

1. A water proving switch is included to confirm water flow before the water heating is activated.
2. Lack of water heating may be a symptom of another refrigeration or controls problem not related to the water circuit.
3. Under normal conditions the water temperature rise across the ER unit should be between 4 and 15°F.

- LOW WATER TEMPERTAURE RISE is a symptom of excessive water flow rate. Excessive water flow can erode the water condenser and cause premature equipment failure.
- HIGH WATER TEMPERATURE RISE is a symptom of insufficient water flow. This can be caused by an undersized pump, insufficient water diversion or restrictions in the water piping such as dirty filter(s). This would also lead to high refrigerant discharge operating pressures in the water heating mode.

6. Appendix

6.1 Compressor Failure

Although most 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, the cause of the failure must be determined and corrected.

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!

6.1.1 Compressor Replacement

Desert Aire ER 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 ER 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.

- 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 compressor 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 Sporlan or Emerson HH core type or 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 and 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. Longterm 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 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 the 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.

Returning to Service

- See section 6.4 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 activated 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 unit 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 an ER Compressor Replacement Form located in the back of 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. Compressor 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.

6.2 Recommended Duct Design

Proper duct design must be used to ensure that the ER 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.

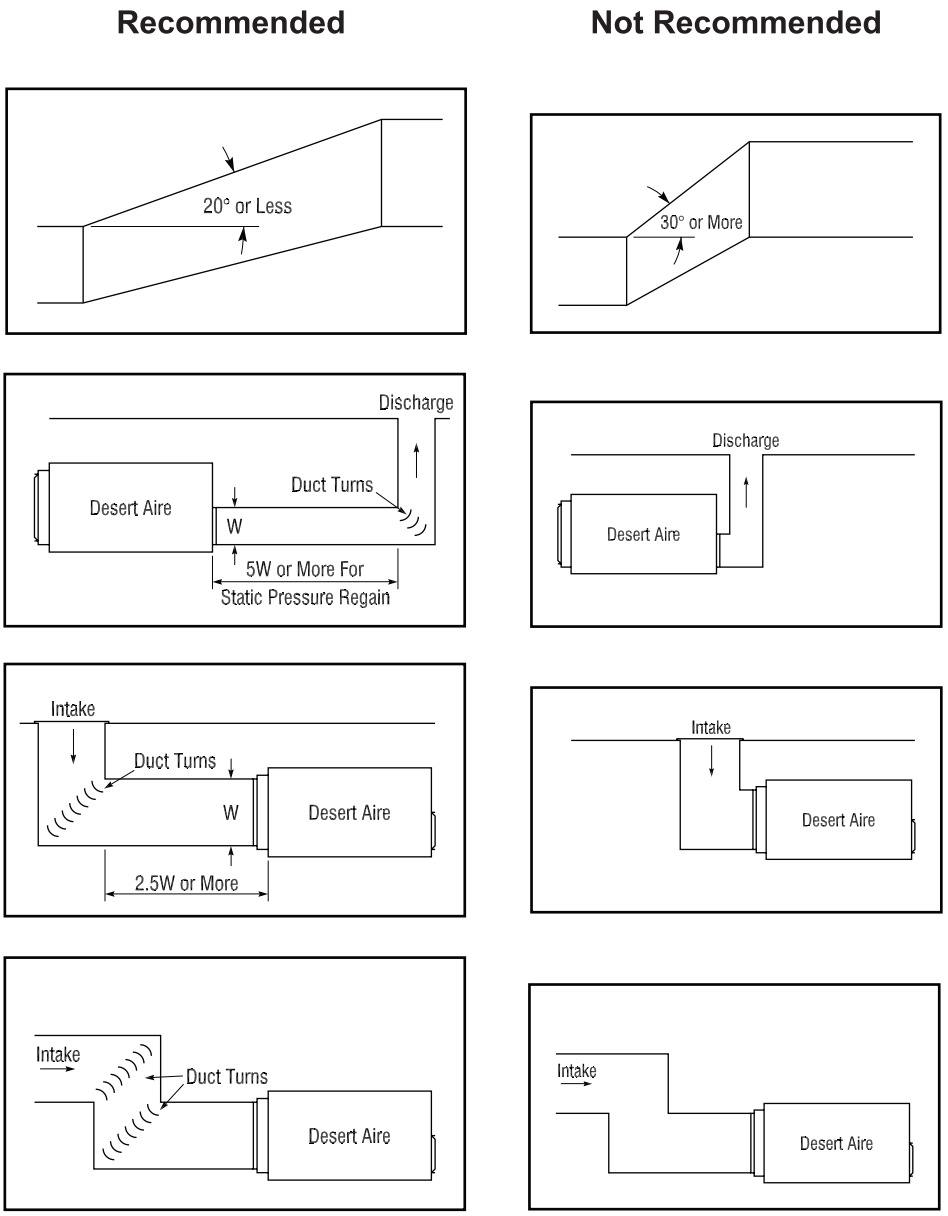


Figure 13 – Recommended Duct Design for Desert Aire ER Units

6.3 System Guidelines

6.3.1 Recommended Controller Settings

The ER unit is designed to reduce energy costs by recovering energy, thereby reducing the amount of energy input required. To that end, it would be counterproductive for the unit to run compressors when little or no energy recovery will take place, nor will it be beneficial to run the compressors if too much energy will end up in the system. Therefore, in order to meet the goal of maximizing overall system efficiency the compressors will not run below a set incoming air enthalpy.

Typical air conditions:

- Air Temperature 80-86°F
- Humidity 50-60% RH

Water temperature operating range for the ER unit is dependent on the system arrangement. This information is detailed in section 5.5.

6.3.2 Refrigeration System Pressures

Many factors affect refrigeration pressures on a given day. Such factors include ambient temperature, water temperature, airflow volume and relative humidity. Directly measure suction / discharge temperatures will differ due to suction / discharge superheat. However, for the sake of troubleshooting:

- Normal Suction Temperature Range 32° to 40°F
- Normal Discharge Temperature Range 95° to 130°F

6.3.3 Water Temperature Rise Across Unit

- Typical water temperature rise across unit 17° to 27°F

6.4 Component Replacement, Charge, Evacuation, and 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 of 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 a 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

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

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 condensers, recover remaining charge into separate refrigerant cylinders appropriate for the refrigerant being serviced. Carefully track the amount of refrigerant charge removed as this exact amount should be placed into the units when recharging.

Repair / Component Replacement

- If any portion of the system was at a vacuum, place dry nitrogen in the system until atmospheric pressure is reached.
- It is preferred that components are removed by heating the braze allow 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 B 280 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 allow 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 6.1.1 for special procedures related to compressor replacements

- 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 to 400 microns measure 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. Review 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 replaced 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 system 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 1,000 microns in 10 minutes timeframe. If unsuccessful, continue evacuation or check or 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.

- 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 contaminated 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 of critical importance to ensure that the system is operating as expected before the 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 75% capacity.

6.5 Rating Plate

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

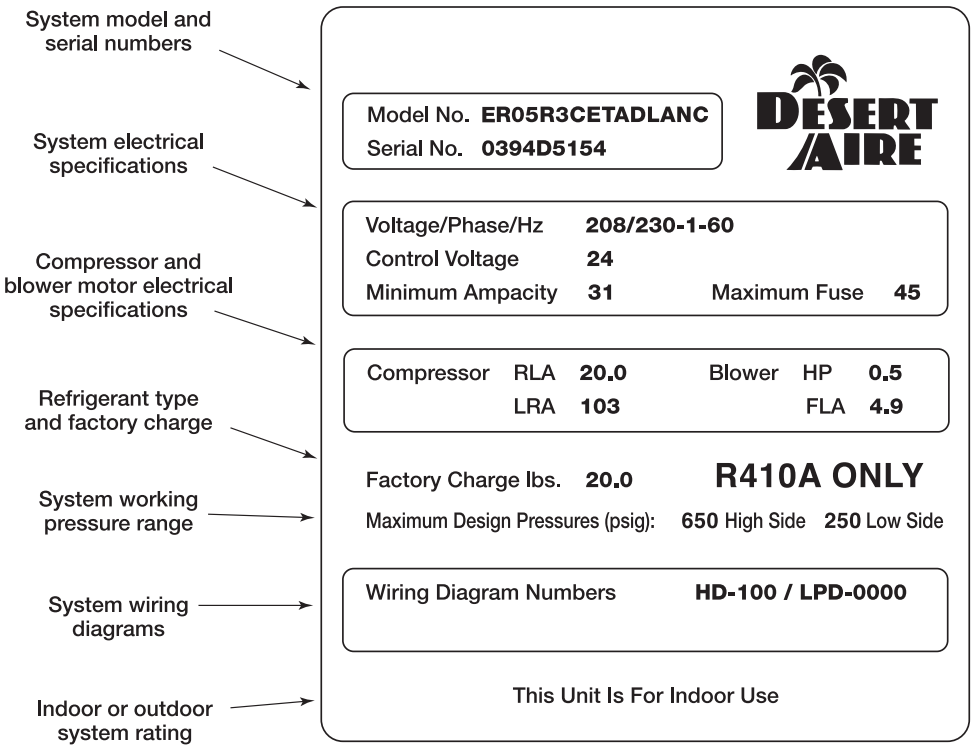


Figure 14 – System Rating Plate

6.6 Start-up Supervision Supplemental Information (Optional)

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

- The expertise of an accomplished, factory-trained technician who will supervise the commissioning of the equipment.
- The Desert Aire representative will assist the installing contractor with filling out the Start-Up Report.
- He will also inspect the installation to make sure the ER 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 technician arrives.

When the installing contractor is confident the system will be ready, they 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.

6.7 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.

SERVICE BULLETIN 010
LC / LV FACTORY START-UP SUPERVISION

A Factory Start-Up requires a Desert Aire Service Department Technician to visit the jobsite and provide supervisory experience to installing contractors as they perform the required procedures as outlined in our warranty activation Start-Up Report. The company technician will also present an educational review of the dehumidifier's operating and maintenance requirements.
A CST Start-Up is performed by a local Certified Service Technician who has been trained by Desert Aire. The CST performs all duties of commissioning and also trains responsible parties on the proper maintenance and operation of the unit.

"Factory Start-Up is not an installation bid & therefore the system must be ready to run before scheduling."

The Desert Aire Service Dept. will advise contractors of their responsibilities and coordinate all site visits. This start-up procedure may be performed by Desert Aire OR an authorized Certified Service Technician. This document requires a signature and must be returned to Desert Aire before the Factory- or CST-supervised start-up can be scheduled. Desert Aire will confirm the start-up dates upon receipt of the pre-start-up checklist. **If a return trip must be scheduled due to insufficient jobsite preparation, a second P.O. # must be issued to Desert Aire for re-scheduling.**

The following list of items will apply to all start-ups and is the responsibility of the installing contractor. If you are unable to supply any of the following equipment, you must contact Desert Aire before signing this document. You can reach Desert Aire at (262) 946-7400.

Items needed for Start-Up:

- ❑ Equipped service vehicle and service technician – Technician will be trained.
- ❑ Refrigerant manifold gauges – 2 sets
- ❑ Air balancing equipment (Magnehelic® or manometer differential pressure gauge)
- ❑ Volt/Amp/OHM meters in working order.
- ❑ Digital thermometer w/clamp on sensors OR laser type temperature probe
- ❑ 50# of refrigerant & weigh in scale
- ❑ Hand pump for adding oil to compressor (Copeland Scroll) 9-ton compressor & larger (R-22 requires 150 viscosity 3 GS mineral oil. R-410A requires Copeland's POE Genetron® AZ20/Suva® 9100 for new start-ups.)

Items to be completed before Start-Up:

- ❑ Dehumidifier leak checked (with halogen leak detector) 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. **(262) 946-7400**
- ❑ Dehumidifier leveled and properly supported per the installation manuals recommendations.
- ❑ Outdoor air duct filters and damper installed (if applicable). – See installation manual.
- ❑ Condensate P Trap installed with heat trace for winter operation.
- ❑ Remote condenser plumbed and inspected for freight damage (If applicable).
- ❑ Remote condenser circuit leak checked, evacuated and charged (if applicable). – See installation manual for refrigerant weights and condenser locations.
- ❑ All electrical connections terminated and verified for proper voltage at the unit.
- ❑ All field controls and sensors installed and circuits verified that they are wired correctly. If there are any questions, contact Desert Aire Service at **(262) 946-7400.**
- ❑ Pool filled and water and air temperatures at a minimum of 80° (if applicable).
- ❑ Pool water heating circuit connected to dehumidifier with flow meter and balancing valves installed in circuit (if applicable).
- ❑ Verify the installation of the booster pool water heating pump and purge air from the water lines (if applicable).
- ❑ Verify that voltage matches nameplate design for the condenser and the dehumidifier.

A MINIMUM TWO WEEK LEAD TIME IS NEEDED TO SCHEDULE START-UP

Desert Aire Corporation • N120 W18485 Freistadt Road • Germantown, WI 53022 • (262) 946-7400 • Fax (262) 946-7401

SERVICE BULLETIN 010

LC / LV FACTORY START-UP SUPERVISION

Please complete and sign this two page document and return it to Desert Aire for start-up scheduling. Dates will be scheduled after this form is received. Please type or print clearly.

Unit Information

Model # _____

Serial # _____

Contractor Information

Installing Contractor _____

Address _____

_____

Phone # _____

Jobsite Information

Jobsite Address _____

_____

Jobsite Contact _____ Cell # _____

Jobsite Phone # _____

Signature, Jobsite Supervisor _____ Date _____

Test & Balance

Contractor Name _____

Technicians Name _____ Phone # _____

Test & Balance Completion Date _____

Desert Aire Sales Representative

Company Name _____

A MINIMUM TWO WEEK LEAD TIME IS NEEDED TO SCHEDULE START-UP

Desert Aire Corporation • N120 W18485 Freistadt Road • Germantown, WI 53022 • (262) 946-7400 • Fax (262) 946-7401

Start up Report

Important – To ensure warranty validation and continued customer satisfaction, complete this form and return it to Desert Aire immediately after start-up. Validation of this report activates the warranty.

Desert Aire Corporation
c/o Service and Warranty Department
N120W18485 Freistadt Road
Germantown, WI 53022
(800) 443-5276

Instructions

- **Warning** – Only trained, qualified personnel should install and service Desert Aire equipment. Serious Injury or death can result from improper handling of this equipment. High voltage electrical components and refrigeration under pressure are present.
- Before continuing, read the Installation and Operations manual. If you do not fully understand the manual contact the Desert Aire Service Department. Please be prepared with the model and serial numbers located on the rating plate of the unit.
- Use one start up report per unit. Print or type all information. If there is not enough space available for readings or comments please attach additional pages directly to the start up report.

Location and Unit Information

Installation Name: _____

Installation Address: _____

Desert Aire Representative: _____

Dehumidifier Model #: _____ Serial #: _____

Remote Condenser Model #: _____ Serial #: _____

Form Completed By (Print): _____ Signed: _____

Company Name: _____ Date: _____

Company Address: _____ Telephone #: (____) _____

_____ Fax #: (____) _____

Owners Email Address: _____

Application (Pool, Spa, Other): _____

**** Denotes that this is a model dependant item***

Proper Installation Checklist		
☐ Installation manual read and understood	☐ Tighten all field and factory wiring	☐ Open all refrigeration service valves and tighten packing nuts
☐ Dehumidifier installed and leveled properly	☐ Adjust and tighten blower belts if necessary	☐ Check field and factory piping for leaks
☐ Condensate drain trapped and primed	☐ Check rotation of blower on 3 phase units	☐ Inspect air filters. Clean or replace as necessary
☐ Verify that the power supply matches the rating plate	☐ Check rotation of remote condenser fans.	☐ 120 volt circuit run to heat trace and powered up.

Unit Power Supply – Check transformer for proper primary wiring before powering up.				
Voltage at power block - No motors running	L1-L2	Control Voltage - No Motors running	Transformer 1	VA Rating
	L2-L3		Transformer 2	VA Rating
	L1-L3		Transformer 3	VA Rating

Line-set Installation ***Refer to Installation and operation manuals for instructions***			
Line Sizes	Hot Gas		
	Liquid Return		
Lineset Length		Elevation Change	ABOVE / BELOW
Hot gas line trapped at every riser	Yes / No	Check Valve installed in hot gas line at remote condenser	Yes / No
Line-set pitched in direction of flow	Yes / No	Line-set Clamped per I/O Manual	Yes / No
Additional R410A Added	LBS	Additional Oil Added	OZS
Flush Cycle Enabled	Yes / No		

Fan Cycle Controller Settings – Refer to Air Cooled-Condenser manual for instructions						
SENS	SN-1		SN-2		SN-3	
OUTR^1	ON^1	OFF^1	ONT^1	OFT^1	SNF^1	SENS^1
OUTR^2	ON^2	OFF^2	ONT^2	OFT^2	SNF^2	SENS^2
OUTR^3	ON^3	OFF^3	ONT^3	OFT^3	SNF^3	SENS^3
OUTR^4	ON^4	OFF^4	ONT^4	OFT^4	SNF^4	SENS^4

Air Flow Readings: Refer to Installation and Operations manual for correct balancing procedures.					
		Unoccupied Mode		**Occupied Mode**	
Evaporator Static Pressure Drop			“wc		“wc
Reheat Condenser Static Pressure Drop			“wc		“wc
Supply Duct Static Pressure			“wc		
Return Duct Static Pressure			“wc		
OA Damper Setpoint			%		%
Evap Bypass Damper Setpoint			%		%
Blower FLA (off nameplate)	amps	Actual	L1	L2	L3

Temperature Readings			
Room Air Temperature	°F	Room Relative Humidity	°F
Outdoor Air Temperature	°F	Outdoor Relative Humidity	°F
Water Temp (main pool)	°F	Water temp (spa or other)*	°F

Compressors and Refrigeration in Reheat Mode		
Motor #		
Compressor RLA off nameplate	amps	amps
Amperage	L1	L1
	L2	L2
	L3	L3
Head Pressure	Psig	
Suction Pressure	Psig	
Refrigerant Sight Glass Clear	Yes / No	
Superheat	°F	
Subcooling	°F	
Compressor Oil Level Sight Glass (level should be at least 3/4 full at completion of the start up)	½ ¾ F	

Compressors and Refrigeration in Pool Water Heating Mode*	
Head Pressure	Psig
Suction Pressure	Psig
Water Inlet Temperature	°F
Water Outlet Temperature	°F

Compressors and Refrigeration in Cooling Mode* (Remote Condenser Active)	
Head Pressure	Psig
Suction Pressure	Psig
Refrigerant Sight Glass Clear	Yes / No
Superheat	°F
Subcooling	°F
Compressor Oil Level Sight Glass (level should be at least 3/4 full at completion of the start up)	½ ¾ F

Auxiliary Water / Steam Coil Information*				
	Signal	Inlet Temp	Outlet Temp	Discharge Air Temp
Water Coil		°F	°F	°F

Auxiliary Electric Heater Information*					
	Signal	L1 Amps	L2 Amps	L3 Amps	Discharge Air Temp
Electric Heater					°F

Building Management System Information*		
Communication Type (circle one)	BACnet MS/TP - BACnet Ethernet - Modbus - Lon - N/A	
BACnet MS/TP	Device Instance	
	MAC Address	
	Baud Rate	
BACnet Ethernet	IP Address	
	Netmask	
	Gateway	
Modbus	Baud Rate	
	Address	

Additional Comments:_____

DESERT AIRE
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:			
Dehumidifier 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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