gForce DX
 DX, Direct Expansion, Dual Circuit
 Air and Water/Glycol Cooled
 21 to 106 kW

Installation, Operation & Maintenance Manual

Data Aire, Inc.
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CONGRATULATIONS ON THE SELECTION OF A DATA AIRE PRECISION ENVIRONMENTAL CONTROL SYSTEM. PROPER INSTALLATION, OPERATION AND MAINTENANCE OF THIS EQUIPMENT WILL ENSURE YEARS OF OPTIMAL PERFORMANCE.

There are separate User Manuals for other components of your Data Aire precision environmental cooling system including dap4™, condenser/condensing unit and fluid cooler.

**NOTE:** This manual is intended to assist trained service personnel by providing necessary guidelines for this particular equipment. Service to Data Aire units should be done by qualified individuals with an adequate background in areas such as HVAC, electrical, plumbing and electronics, as applicable.

**WARNING:** Service performed by unauthorized or unqualified technicians may void manufacturers' warranties and could result in property damage and/or personal injury.

Special care should be given to those areas where these symbols appear.

Data Aire, Inc. reserves the right to make design changes for the purpose of product improvement or to withdraw any design without notice.
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1 INTRODUCTION

1.1 Product Information
The Data Aire gForce GF environmental control, direct expansion, dual circuit Computer Room Air Conditioner (CRAC) equipment provides a high sensible cooling, is self-contained, factory assembled, piped, wired, and factory tested prior to shipment. These units include an enclosure/cabinet assembly, fan section, filter section, cooling coils, controls, and interconnecting piping internal to unit.

The Data Aire CRAC unit provides cooling, reheat, humidification, dehumidification and air filtration. The unit is provided with a Data Aire dap4™ microprocessor controller for precision control. The unit must be operated in a conditioned space within the operating envelope ASHRAE recommends for data centers. Operating outside this envelope can alter the operating performance and decrease equipment reliability. Return air to the unit must be no cooler than the ASHRAE recommendation for proper unit operation. Operating below this can alter the operating performance and decrease equipment reliability. Refer to ASHRAE’s publication, “Thermal Guidelines for Data Processing Environments.”

1.1 Model Identification

1.2 Inspection
This Data Aire CRAC unit has been factory run-tested and has gone through a comprehensive inspection prior to its packaging and shipment to ensure that it arrives in excellent condition. However, shipping damage can occur and a visual inspection of the outer crating immediately upon delivery should be performed. Upon arrival of the unit and before unpacking it, verify that the labeled equipment matches the bill of lading.
**Note:** any external damage or transportation damage on the freight carrier’s forms. Inspect the unit itself for internal damage. A claim should be filed with the shipping company if the equipment is damaged or incomplete.

Loose items such as remote control panels, disconnect switch handles, and spare air filters are packed inside the unit. Refer to the yellow shipping tag located on the unit door for details.

**NOTE:** Freight damage claims are the responsibility of the purchaser. Action to recover losses should be filed immediately. Please notify factory personnel of any claims.

### 1.3 Paperwork

Each Data Aire unit ships with a start-up sheet that should be completed during installation. Also included in the paperwork is a warranty/information packet that provides important wiring diagrams, specific component literature, warranty registration cards and other valuable paperwork, including a copy of this User Manual.

A yellow tag is attached to the outside decorative door to indicate articles that may have been packaged and shipped loose within the unit cabinet. Typically this would be jackstands, condensate pumps and other loose components that are not factory mounted.

**WARNING:** It is the responsibility of the installing contractor to return the start-up sheet and warranty registration card to Data Aire for proper activation of the unit warranty. Failure to do so may cause delays and some cases void the warranty.
2 INSTALLATION

**NOTE:** There is no intent on the part of Data Aire, Inc. to define local codes or statutes which may supersede common trade practices. The manufacturer assumes no responsibility for their interpretation. Consult local building codes and National Electrical Code (NEC) for special installation requirements.

2.1 Installation Checklist

As a precaution, review the following checklist to ensure proper operation:

- Check for any damage
- Check all wiring connections
- Filters are properly positioned in air intake

**WARNING:** Before removing from the packaging inspect the unit for any damage. Report any damage to the carrier and file a damage claim.

2.2 Room Considerations

Precision air conditioning equipment is designed to control spaces within close tolerances of temperature and humidity. However, the room must be built with a proper vapor barrier. A film of polyethylene is often used on walls and ceilings. Walls and floors must also be painted with vapor-seal paint. Failure to provide a vapor barrier can compromise space conditions.

Introduction of outside air into the space should be minimized. Outside air in excess of 5% of the total circulated air volume can have a significant effect on the overall space conditions and result in poor space control.

2.3 Equipment Handling

**WARNING:** Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move the unit, lift it, remove packaging or prepare the unit for installation.

Move the unit in its upright position to the installation site using a forklift or pallet jack. It is recommended that the unit be protected from damage to the decorative doors during any storage or moving.

Keep tines of the forklift level and at a height suitable to fit below the skid and/or unit to prevent exterior and/or underside damage. Make sure the forks are spread to their widest allowable width for proper balance. Do not lift the unit any higher than 4 inches off the ground. If necessary to lift higher than the suggested 4 inches (100mm), exercise great care to ensure proper handling of the unit.

Personnel not involved with the lifting of the unit should keep a safe distance from the unit.

The unit may be too tall to fit through a doorway while on the skid. Measure the unit and doorway heights and refer to the installation plans to verify clearances prior to moving the unit.

**WARNING:** Use care when moving. Improper handling could result in injury. Proper care should be taken when uncrating the unit. The packaging has wrapping bands with sharp edges that are under tension, crating has staples and splinters. Proper protective equipment should be worn by qualified personnel.
2.4 Rigging

Move the unit in its upright position to the installation site. It is recommended that the unit be protected from damage to the decorative doors during any storage or moving. Removal of the decorative doors is easily accomplished and may be done without moving the equipment.

The shipping skid should be left in place if the unit is being moved with a forklift. If the unit is being lifted, use spreader bars to prevent damage to the doors and panels.

The unit has 3/4" (19mm) holes in the shipping skid to which casters with 3/4" (19mm) stems can be attached. This allows easy movement down halls, into elevators and through doorways. If clearance is a problem the casters may be inserted directly into the bottom of the 1" (25mm) tubular steel corner posts at the bottom of the unit.

**WARNING:** Improper lifting or moving of the equipment may result in damage to the decorative doors, panels or frame members.

2.5 Locating the Unit

Verify that the floor is level, solid and sufficient to support the unit. When installing the unit, sufficient space must be allowed for airflow clearance, wiring, plumbing and service access. It is recommended that each side and front have a clearance of at least 36" (914mm) to allow the doors to swing open and for servicing the unit.

The doors on some sides may not require as much service clearance. Refer to the particular unit component breakdown drawings for assistance. Rear clearance is not required, but 1" to 2" (25 to 50mm) of clearance is suggested.

For the best air distribution, the unit should be centered against the longest wall, distributing the cold air as close to heat load as possible, unless the unit is ducted. The unit should not be placed near any corner of the room or at the end of a long, narrow room. Install the units as close as possible to the largest heat load. Multiple units should be evenly spaced, as far apart as possible. It is recommended to install an under-floor water detection system.

**Note:** Condensation formation and frequent humidifier flushing are normal functions of this equipment. Proper drain connections must be made to ensure proper removal. Unit will require water connections for condensate removal and possibly for humidifier makeup water, water/glycol and hot water. Installation of units above equipment that could sustain water damage should be avoided.

2.5.1 Downflow Units

Downflow units will typically sit on an elevated flooring system known as a raised floor. The unit discharges air downward which pressurizes the raised floor and channels upward through perforated floor tiles. Location and quantity of perforated tiles will dictate proper air distribution. If the raised floor is strong enough to support the unit and local codes permit, the unit can be placed directly on top with cutouts made for the discharge openings.

Verify that the raised floor has been properly sized for the unit’s airflow and the room is free of airflow restrictions. Perforated floor tiles in the raised floor should ensure minimal pressure loss. The raised floor must provide 12" (305 mm) of clearance. Ensure that there is adequate clearance above the unit for service, such as replacing filters.

There may be additional support required in the form of adjustable jackstands. These are adjustable, threaded leveling rods which support the unit in each of the corners and in the center on longer length
units. Tighten the locknuts provided with each jackstand. The base plate can rest on the floor or on vibration pads.

Floorstands are also a way of supporting the unit. These are ordered to the height of the floor with leveling rods to allow adjustment. The floorstand has lips in each corner to align with the unit which is placed on top. It is recommended that the unit frame be bolted or screwed to the floorstand from below. Local building codes may dictate this procedure. After installation, the raised floor is typically built around the unit.

The raised floor serves as the distribution plenum for air on downflow units. Cables, piping, wiring raceways, inadequate floor height and any other restrictions can inhibit proper airflow. Care should be taken to avoid restrictions.

2.5.2 Upflow Units

Upflow units will typically be supported by vibration isolation pads and/or floorstands which may also include leveling screws. An air discharge plenum may be factory provided which ships loose and must be attached at the top of the unit frame. For in-room applications with supply and return grilles, several feet of clearance must be maintained at the intake and discharge of the unit.

Alternately, an air distribution plenum must be field fabricated with supply grilles to distribute the air. If a common plenum is utilized to connect the supply air for distribution from multiple units, it is recommended that isolation backdraft dampers be installed on the discharge end of the unit or somewhere prior to the common plenum to prevent cold discharge air from entering units that may be on standby. Alternatively, we offer an AireSeal option which keeps the EC fans running at a selectable speed between 20-50% when the unit is in standby to prevent air from entering the units from the common plenum. Units are shipped with EC (Electronically Commutated) motors often referred to as “plug fans”. Fan speed is factory set based on order. Fan speed can be changed in 1% increments through the unit’s microprocessor controller, Data Alarm Processor 4™ (dap4™) by several different methods. See the dap4™ User Manual for details and recommended settings.

**WARNING:** Do not operate upflow units without installing a plenum, ductwork or guard over the fan opening(s) on the top surface of the cabinet. Ductwork must be connected to the fan(s), or a plenum must be installed on the top of the cabinet for protection from rotating blower wheel(s) on upflow units. Risk of high-speed moving parts can cause injury or death. Disconnect all local and remote electric power supplies before working in the unit.

2.6 Storage

Your Data Aire equipment comes ready for immediate installation. In some instances it may be necessary to store the equipment for a period of time. If you must store the equipment it should be done in a dry area, out of the weather, protected from damage by other equipment in storage or transportation equipment, never stacked, and avoid frequent relocation.

If equipment is stored for longer than 30 days special precautions must be taken to avoid coil damage. All coils should be charged and sealed with a low pressure (i.e., 1 to 3 PSIG, (7 to 21 kPa)) inert gas, such as nitrogen. This prevents contaminates from entering the coils: then when the seal is broken at installation, the rush of escaping gas verifies the coil is leak free. If coils are not charged and sealed condensation mixes with air pollutants forming a weak acid and over time can cause pin hole leaks to develop in the coil tubes.

When equipment is installed after storage, caution should be taken to inspect and replace, if required, rubber components. All moving parts, such as fans and motors, should be hand tested to ensure that they are free and clear prior to start-up.
2.7 Piping

When piping, use copper tubing with appropriate supporting devices (supporting saddles, etc.). All field piping must be installed according to local codes. Avoid piping runs through noise-sensitive areas, such as office walls and conference rooms. Refer to Section 9.0 - Piping for piping guidelines and to the ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping.

All piping below the elevated floor must be located so that it does not restrict airflow. Plan the piping layout under the raised floor to prevent the airflow from being blocked. When installing piping on the subfloor, it is recommended that the pipes be mounted in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel to the airflow.

Ensure that the tubing surfaces to be brazed are clean and that all burrs have been removed from the ends of the tubes. Ensure that all loose material has been cleaned from inside the tubing before brazing. Keep piping clean and dry, especially on units with R-410A refrigerant.

The units may be ordered with top or bottom connections.

2.7.1 Air Cooled Unit Piping

Refer to the attached RECOMMENDED LINE SIZING charts in section 2.7.5 for a guideline for sizing refrigerant lines. The ultimate responsibility for line size selection is that of the installing contractor or design engineer. Data Aire does not assume this responsibility. The chart covers distances up to 200 equivalent feet (61 m). For installations beyond this distance, consult ASHRAE or similar references.

Note: Standard piping practice must be used to ensure proper oil return and efficient operation. The interconnecting lines to the remote air cooled condenser or condensing unit must be installed by a qualified refrigeration mechanic.

2.7.2 Discharge Lines

Discharge lines, also called hot gas lines, should be trapped at the top (inverted) and bottom as well as every 15 to 20 feet (4.6 to 6.1 m) of vertical rise. Discharge check valves are required on all installations, especially those where there are long pipe runs or cold climates. For air-cooled units built after 3/14/2017, the discharge check valves are already installed inside the evaporator section and do not need to be installed external to the unit. For units built before this date, the check valves must be field supplied and installed externally to the evaporator section. If there is doubt as to whether or not the check valve is already installed in the unit, look for it on the hot gas line close to the exit point of the unit (see example picture below). The externally installed check valve should be placed from six (6) to ten (10) feet (1.8 to 3.1 m) from the compressor.

The check valve will prevent flow from the condenser to the compressor during the “off” cycle.

Indoor unit ships with a nitrogen holding charge. Do not vent the evaporator until all refrigerant piping is in place, ready for connection to the unit and condenser. The discharge, suction and liquid lines need to be refrigerant grade copper and in accordance with local code. All refrigeration piping should be installed with high temperature brazed joints. When brazing, a supply of nitrogen gas needs to be fed through the refrigerant lines. Be sure to open the other end of the refrigerant line to allow the nitrogen to bleed off and not pressurize the piping. Prevailing good refrigeration practices should be employed for piping support, leak testing, dehydration and charging the refrigerant circuits. During the installation the lines should be capped off and filled with dry nitrogen at the end of each day’s work or until the system is completed and sealed.

Data Aire recommends a silver/phosphorus/copper alloy with 5 to 15% silver be used to braze the refrigerant line sets to the indoor and outdoor units. Nitrogen needs to be flowing through the lines to eliminate carbon deposit build-up on the inside of the joints. Carbon could contaminate the refrigerant
and restrict the metering device.

Piping must be supported within 18” (457 mm) of the inlet and outlet connections. The inlet connection is located on the top header of all units. The discharge outlet is located at the bottom of the header.

Discharge line pressure drop should not exceed 6 PSI (41 kPa) for R-407C and 9 PSI (62 kPa) for R-410A. Recommended gas velocity for proper oil return is 1,000 FPM (5.1 m/sec). Slope horizontal lines downward in the direction of the refrigerant flow (1/2” (12 mm) for every ten feet (3 m) of line length). Discharge lines do not require insulation but due to the high temperatures of the refrigerant inside the line, the pipes may be insulated to protect against burns to individuals near or around the lines.

![Check Valve Installation Example](image)

Note: Picture is only intended to show an example of a common check valve installation. It may not represent your specific unit, check valve size, location or orientation.

### 2.7.3 Liquid Lines

Liquid line size is determined by pressure drop and velocity. The liquid line pressure drop for R-407C should not exceed 5 PSI (35 kPa) or 9 PSI (62 kPa) for R-410A. The recommended liquid velocity should be between 200 and 300 FPM (1 to 1.5 m/sec). To avoid excessive liquid line pressure drop, the air cooled condenser should be located above or at the same level as the evaporator. Condenser installations more than 15 feet below the evaporator are not recommended. Insulation of liquid lines is not required but can be useful in preventing excessive sub-cooling or flashing on long exposed pipe runs.

### 2.7.4 Suction Lines

Some applications call for the compressor to be mounted as part of the condenser (more commonly referred to as a condensing unit). Condensing units require field piping of liquid and suction lines. Suction lines are trapped similarly to discharge lines. Common practice for suction line selection and installation should be followed. Suction lines should always be insulated.
### 2.7.5 Recommended Line Sizing

#### Hot Gas Lines (Dual Circuit Systems)

<table>
<thead>
<tr>
<th>Unit kW (Tons)</th>
<th>50 (15.2 m)</th>
<th>100 ft (30.5 m)</th>
<th>150 ft (45.7 m)</th>
<th>200 ft (61.0 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HORIZ. &amp; VERTICA L DOWN</td>
<td>VERTICAL UP</td>
<td>HORIZ. &amp; VERTICA L DOWN</td>
<td>VERTICAL UP</td>
</tr>
<tr>
<td>21 (6)</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>28 (8)</td>
<td>7/8&quot;</td>
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<tr>
<td>35 (10)</td>
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<td>46 (13)</td>
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<td>56 (16)</td>
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<td>1-1/8&quot;</td>
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</tr>
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<td>70 (20)</td>
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<td>1-1/8&quot;</td>
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<tr>
<td>91 (26)</td>
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<td>1-1/8&quot;</td>
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<td>106 (30)</td>
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</table>

#### Liquid Lines (Dual Circuit Systems)

<table>
<thead>
<tr>
<th>Unit kW (Tons)</th>
<th>50 (15.2 m)</th>
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<td>21 (6)</td>
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<td>1/2&quot;</td>
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#### Suction Lines (Dual Circuit Systems)

<table>
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<th>100 ft (30.5 m)</th>
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<td>1-1/8&quot;</td>
<td>1-3/8&quot;</td>
<td>1-1/8&quot;</td>
</tr>
</tbody>
</table>

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Note 1: If equivalent piping length falls between two columns above, choose the longer equivalent length.

Note 2: Dual Circuit units should use the same line size on both circuits.

Note 3: If hot gas line or suction line refrigerant flow is upward use, “VERTICAL UP”, if it is downward or horizontal, use “HORIZ. & VERTICAL DOWN”.

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12
2.7.6 Connection Sizes, Air Cooled Units

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Liquid Line (2 per unit)</th>
<th>Hot Gas Line (2 per unit)</th>
<th>Suction Line (2 per unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFA* 021</td>
<td>1/2&quot; (12 mm) O.D.</td>
<td>1/2&quot; (12 mm) O.D.</td>
<td>7/8&quot; (22 mm) O.D.</td>
</tr>
<tr>
<td>GFA* 028</td>
<td>1/2&quot; (12 mm) O.D.</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>7/8&quot; (22 mm) O.D.</td>
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<tr>
<td>GFA* 035</td>
<td>1/2&quot; (12 mm) O.D.</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>1-1/8&quot; (29 mm) O.D.</td>
</tr>
<tr>
<td>GFA* 046</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>1-1/8&quot; (29 mm) O.D.</td>
</tr>
<tr>
<td>GFA* 056</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>3/4&quot; (19 mm) O.D.</td>
<td>1-3/8&quot; (35 mm) O.D.</td>
</tr>
<tr>
<td>GFA* 070</td>
<td>5/8&quot; (16 mm) O.D.</td>
<td>3/4&quot; (19 mm) O.D.</td>
<td>1-3/8&quot; (35 mm) O.D.</td>
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<tr>
<td>GFA* 091</td>
<td>7/8&quot; (22 mm) O.D.</td>
<td>7/8&quot; (22 mm) O.D.</td>
<td>1-3/8&quot; (35 mm) O.D.</td>
</tr>
<tr>
<td>GFA* 106</td>
<td>7/8&quot; (22 mm) O.D.</td>
<td>7/8&quot; (22 mm) O.D.</td>
<td>1-3/8&quot; (35 mm) O.D.</td>
</tr>
</tbody>
</table>

* D=Downflow  U=Upflow

**NOTE:** Units will have a liquid line and either a hot gas (condenser) or suction line (condensing unit).

### Note:
Field connections at the indoor evaporator and remote condenser or condensing unit will not necessarily be the same as the field pipe size required. In some cases these will vary significantly.

2.7.7 Field Piping, Remote Condenser/Condensing Unit Above Evaporator

**NOTES:**

1. This is the recommended piping. All piping to be per local and/or state code.
2. Condenser to be no more than 60 feet above evaporator.
3. For units built after April 2017, the check valves are included internally in the evaporator section.
4. Slope horizontal lines downward in the direction of the refrigerant flow, ½" for every 10 feet of line length.
5. Inverted trap to extend 8" above the bottom of the condenser coil.

[Diagram of field piping connections]
2.7.8 Field Piping, Remote Condenser/Condensing Unit Below Evaporator

**NOTES:**
1. THIS IS THE RECOMMENDED PIPING. ALL PIPING TO BE PER LOCAL AND/OR STATE CODE.
2. CONDENSER TO BE NO MORE THAN 15 FEET BELOW EVAPORATOR.
   - SLOPE HORIZONTAL LINES DOWNWARD IN THE DIRECTION OF THE REFRIGERANT FLOW. 1/2" FOR EVERY 10 FEET OF LINE LENGTH.
   - INVERTED TRAP NEEDED ON SUCTION LINE WHEN COMPRESSOR IS OUTDOORS ONLY.

![Field Piping Diagram]

2.7.9 Water/Glycol Cooled Unit Piping

The required field installed fluid cooler pipe sizes may or may not be the same as the connection sizes on the fluid cooler (refer to the Fluid Cooler User Manual for connection sizing). This will depend on the length of pipe and the calculated pressure drop of peripheral components.

Water/glycol cooled units may also be connected to building water or tower water sources. Pipe size will depend on length of run and the maximum water flow required.

Shutoff valves (field provided) should be installed within a few feet of the inlet and outlet connections of the evaporator to allow the unit to be isolated for service. Drain/fill valves should be located at the lowest point on the connected piping.

All water/glycol cooled units are shipped with plate/fin heat exchangers as standard equipment. A strainer is shipped loose and is to be field installed in the supply line with shut-off valves (field provided) before and after the strainer. The strainers and water/glycol piping must be cleaned on a periodic basis. If the unit is shipped with shell and tube condensers, strainers are not required and not shipped with the unit.

All water pipes have a cap installed on the end of the pipe prior to shipment from the factory for pressure testing the system. These caps need to be removed before installing the piping to the units. Use a tube cutter for smaller pipes and a reciprocating saw with a metal cutting blade for larger pipe sizes or if there is a clearance problem. All connections need to be cleaned before connections are brazed together.
Note: One of the most common problems in a water/glycol system is the presence of air in the condenser water loop. Air vents must be installed in various locations the piping system to purge the air.

Water/glycol system piping may include a centrifugal pump (or pumps for redundancy). Pumps must be primed before operating per the pump manufacturer’s guidelines.

2.7.10 Field Piping, Water/Glycol System
**2.7.11  Connection Sizes, Water/Glycol Cooled Units**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Water In</th>
<th>Water Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFW or G* 021</td>
<td>1-5/8” (41 mm) O.D.</td>
<td>1-5/8” (41 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 028</td>
<td>1-5/8” (41 mm) O.D.</td>
<td>1-5/8” (41 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 035</td>
<td>1-5/8” (41 mm) O.D.</td>
<td>1-5/8” (41 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 046</td>
<td>1-5/8” (41 mm) O.D.</td>
<td>1-5/8” (41 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 056</td>
<td>2-1/8” (54 mm) O.D.</td>
<td>2-1/8” (54 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 070</td>
<td>2-1/8” (54 mm) O.D.</td>
<td>2-1/8” (54 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 091</td>
<td>2-1/8” (54 mm) O.D.</td>
<td>2-1/8” (54 mm) O.D.</td>
</tr>
<tr>
<td>GFW or G* 106</td>
<td>2-1/8” (54 mm) O.D.</td>
<td>2-1/8” (54 mm) O.D.</td>
</tr>
</tbody>
</table>

* D=Downflow  U=Upflow

**2.7.12  Connection Sizes, Fluid Coolers**

The information regarding fluid cooler (or often referred to as a “dry cooler”) connection sizes can be found in the individual *Fluid Cooler User Manuals* which should be referred to for more complete details.

Models GHFC-200 and larger are double-wide units. Although the header connection for each section is 2-5/8” (67 mm), each unit comes with a factory provided header manifold kit with 3-1/8” (79 mm) field connections.

**2.7.13  Auxiliary Chilled Water/Energy Saver Coil Piping**

Units with Auxiliary Chilled Water cooling coil require a separate source of chilled water. These chilled water connection sizes will be equal to the condenser water connection sizes shown in the Fluid Cooler User Manual. Units with an Energy Saver cooling coil have shared piping with the condenser supply and therefore do not require a separate water source.

All chilled water pipes have a cap installed on the end of the pipe for factory pressure testing of the system. These caps need to be removed before installing the water piping to the unit. Use a tube cutter for smaller pipes and reciprocating saw with a metal cutting blade for larger pipes or if there is a clearance problem. All connections need to be cleaned before connections are brazed together.

**2.8  Condensate Drain Piping**

Every indoor unit has a 3/4” (19 mm) copper stub provided for condensate removal. A union is recommended at the field connection which will permit easy disconnection from the unit for cleaning.

A trap should be built into the drain line to prevent air from backing up into the unit. Drain lines should be pitched downward not less than 1/4” (6.35 mm) for each ten (10) feet (3.1 m) of horizontal run. Do not reduce the size of the drain line.

Some applications have no convenient means of allowing a gravity drain. When required, a condensate pump can be used. Condensate pumps are either factory mounted or shipped loose. Factory mounted condensate pumps do not require a separate power source.

Condensate pumps shipped loose (or field provided) typically require a dedicated 110 volt power source. Field pipe connections must be made to the pump discharge connection. A check valve must be installed to prevent short cycling. See condensate pump electrical requirements in Section 3.9.
Do not expose drain line to freezing temperatures. Drain line may contain boiling water therefore use copper or other suitable material. Drain line must comply with local building codes. It is recommended to install under-floor leak detection equipment whenever possible.

Note: Condensation formation and frequent humidifier flushing are normal functions of this equipment. Proper drain connections must be made to ensure proper removal. Unit will require water connections for condensate removal and possibly for humidifier makeup water, condenser water, water/glycol and/or hot water. Installation of units above equipment that could sustain water damage should be avoided.

WARNING: The condensate drain MUST be connected to an external drain line (provided by others) before unit start up.

2.9 Humidifier Piping

2.9.1 Steam Generator Humidifier

The standard humidifier in the systems is a steam generator humidifier type with disposable cylinder. The humidifier makeup water should be brought to the humidifier through the field connection opening using 1/4" (6.4 mm) copper tubing. A compression fitting is provided at the humidifier.

A shutoff valve should be provided outside the air conditioner to allow disconnection for service. An in-line water pressure regulator and strainer should be installed. Water pressure should be set between 20 and 80 PSI (128 and 552 kPa).

The humidifier has a drain at the bottom which is factory piped to the main condensate drain line. The dispersion tube also has a drain line. No additional field piping is required.

Note: Do not supply steam generating humidifier with softened water. Also, do not use hot water source.

2.9.2 Dry Steam Humidifier

2.10 Leak Testing

WARNING: No installation is complete until the entire system has been thoroughly checked for leaks. This includes checking the refrigerant tubing, flare fittings, pressure controls, Schrader fittings and compressor roto-lock service valves. Check both the field and factory connections.

In addition to refrigeration system, check all condenser water lines, humidifier water makeup lines, condensate lines, condensate pumps, chilled water lines, centrifugal pumps and fluid cooler (where applicable).
When handling or recovering refrigerant it is not permissible to release refrigerant into the atmosphere. Many leak-test methods recommended in the past are no longer possible. Current standard practices must be used.

Pressurize the system’s circuit to 150 PSIG (1034 kPa) by using dry nitrogen with a trace of refrigerant. Check the entire system for leaks with a suitable leak finder (per local code) including but not limited to all braze joints, caps, fittings, and flare nuts on both field and factory furnished components. After completion of leak testing, release test pressure and pull a vacuum on the system.

**Note:** Tightening of fittings and valves is the responsibility of the installing contractor.

**WARNING:** With any fluid connection there is risk of leakage. Water leakage could result in property damage to mission critical equipment. A water drain connection is required. Units with optional steam generator humidifiers will require an external potable water supply. Water leakage can result from improper installation and/or practices.

### 3 ELECTRICAL CONNECTIONS

**WARNING:** The Data Aire cooling unit must be connected by a licensed and qualified electrician. Risk of electrical shock could result in injury or death. Disconnect all remote electrical power supplies prior to working on the unit.

**NOTE:** Disconnect switches are optional. The disconnect switch when turned OFF will de-energize the high voltage.

**WARNING:** Before proceeding with the electrical connections, make certain that the volts, hertz and phase correspond to that specified on the unit electrical nameplate. Use copper conductors only.

#### 3.1 Electrical Service

Check to be sure the electrical service provided by the utility is sufficient to handle the additional load imposed by this equipment. Most units with remote heat exchangers will require a separate power source and field provided interconnecting wires (see Section 3.5).

Remote condensers will typically require one power source. Glycol systems with fluid coolers and loose pump(s) typically require one power source for the fluid cooler and will require one additional source for single pump or two additional sources for dual pumps. Systems where the pump(s) are mounted and piped integral to the fluid cooler will usually require a single power source.
3.2 Nameplate Ratings
Refer to the unit electrical nameplate for equipment electrical requirements. Minimum circuit ampacity (MCA), also known as wire sizing amps, will dictate the minimum required wire gauge. Maximum Overcurrent Protection (MOP) device amps will dictate the maximum breaker or fuse size.

3.3 Grounding
The unit cabinet must have an uninterrupted true earth ground. An electrical ground wire of adequate size must be connected to the ground lug provided inside the main electrical box.

3.4 Voltage Tolerance
The supply voltage to the unit must be within 10% of the voltage indicated on the unit electrical nameplate. Phase to phase imbalance must not exceed 3%. The local utility company should be contacted for correction of improper line voltage. Deviation from voltage ratings can cause premature failures and possibly void unit warranties.

WARNING: Check the wiring connections in the unit control panel to ensure they are tight. Screw terminals may become loose in transit. Tightening of wiring connections is the responsibility of the installing contractor.

3.5 Auxiliary Control Wiring for Remote Heat Exchangers
The interconnection of auxiliary control wiring for remote heat exchangers (condensers and fluid coolers) requires the connection of two (2) - 18-gauge wires for installations up to 150 feet (45 m) or 16-gauge wires for installations from 151 feet (46 m) up to 200 feet (61 m) from the electrical control box of the indoor evaporator to the electrical control box of the remote heat exchanger. Condensing units (i.e., where the compressor(s) are mounted in the remote heat exchanger) will typically require (4) or more wiring connection points and may require heavier gauge wire. In this case, the installing contractor must follow the applicable electrical codes to determine the required wire gauge.

Because of the wide variety of indoor evaporators and remote heat exchangers offered by Data Aire, the installing contractor must refer to the schematic which is provided inside the electrical control box of each unit, for the required auxiliary control wiring interconnection terminal points.

Examples:

Figure 1 - Typical Remote Heat Exchanger Interconnection Points
3.6  Remote Shutdown

Every gForce unit has remote shutdown contacts. These are intended for a field supplied dry contact or switch to be wired across two terminals. When the contactor or switch opens, the control circuit power is interrupted and the unit shuts down, including the control panel. The control circuit is 24 VAC and the field provided contact or switch should have a minimum rating of 10 amps.

The remote shutdown contacts are always terminals # 1 and # 2 on the terminal block designated TB1. The unit will ship with factory wired metal jumper clip that connects terminal # 1 to terminal # 2. Remove the clip prior to installing the field wires.

3.7  Remote Alarm Contacts

The dap4™ microprocessor control panel provides four (4) remote alarm output contacts that can be field accessed. The contacts include a Normally Open (NO) or Normally Closed (NC) on Alarm, dry contact, intended to be used in a control circuit not exceeding 5 amps at 24 VAC.

These programmable output contacts will close on a failure and remain closed until the alarm is no longer present. The terminal designations for these alarm output contact pairs are:

<table>
<thead>
<tr>
<th>Remote Alarm Contacts Terminals TB1</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td># 11</td>
<td>Remote Alarm 1 (Common)</td>
</tr>
<tr>
<td># 12</td>
<td>Remote Alarm 1 (Normally Closed)</td>
</tr>
<tr>
<td># 13</td>
<td>Remote Alarm 1 (Normally Open)</td>
</tr>
<tr>
<td># 40</td>
<td>Remote Alarm 2 (Common)</td>
</tr>
<tr>
<td># 41</td>
<td>Remote Alarm 2 (Normally Closed)</td>
</tr>
<tr>
<td># 42</td>
<td>Remote Alarm 2 (Normally Open)</td>
</tr>
<tr>
<td># 43</td>
<td>Remote Alarm 3 (Common)</td>
</tr>
<tr>
<td># 44</td>
<td>Remote Alarm 3 (Normally Closed)</td>
</tr>
<tr>
<td># 45</td>
<td>Remote Alarm 3 (Normally Open)</td>
</tr>
<tr>
<td># 48</td>
<td>Remote Alarm 4 (Common)</td>
</tr>
<tr>
<td># 49</td>
<td>Remote Alarm 4 (Normally Closed)</td>
</tr>
<tr>
<td># 50</td>
<td>Remote Alarm 4 (Normally Open)</td>
</tr>
</tbody>
</table>

3.8  Condensate Pumps (Optional)

A condensate pump is optional. Factory mounted pumps are pre-wired. While no outside power source is required, field piping is still a requirement.
**WARNING:** The condensate drain MUST be connected to an external drain line (provided by others) before unit start up. Without field piping condensate water will damage internal components.

Condensate pumps which ship loose normally require a separate source of power. Always check the pump power requirements before connecting power. Condensate pumps are available in various voltages.

Factory installed condensate pumps are wired to display a “HIGH CONDENSATE WATER LEVEL” alarm. The wiring for this must be done in the field on pumps that ship loose.

### 3.9 Condensate Probe

A condensate probe for sensing under floor water is included with this unit. This comes in a plastic bag with about 15 feet (4.6 m) of coiled-up wire. The condensate probe is a rectangular box that is typically placed below the unit in a location where the water is likely to accumulate. Additional probes are available as an option.

Place the probe flat on the floor on top of a thin layer of non-conductive silicone. Secure the attached wires where necessary. A longer length of wire may be used if required.

**WARNING:** Failure to remove from the plastic bag and uncoil the length of wire attached to the condensate probe can result in a nuisance water detected alarm. Remove/disconnect the probe if it is not to be used.

### 3.10 Water Sensing Cable (Optional)

Some units may be equipped with an optional water detection cable. The cable can sense moisture anywhere along its length. It is typically placed below the unit in a rectangular pattern that matches the perimeter of the unit. The cable is connected to the terminal board and ready for installation. Cable lengths will vary depending on the original order and specifications. Care should be taken when installing the cable. Be sure the cable is not touching metal and/or any debris under the raised floor.

### 3.11 Remote Temperature and Humidity Sensors (Optional)

Remote temperature and humidity sensors are optional. Although existing unit mounted sensors can be removed for remote mounting, the remote sensor option provides a more convenient means of field installation. This is because the sensors are already connected to a predetermined length of cable and come mounted in a remote sensor enclosure. The temperature and humidity sensors require a total of five wires and should be twisted, shielded cable type.
3.12 Manual Override Switches

For testing and during start-up each gForce unit is provided with manual override slide switches. There are seven (7) slide switches. One for each of the following functions:

- Water Valve
- Fan Speed
- Humidifier
- Heat 1
- Cool 2
- Cool 1
- Blower

All automatic control is disabled but the safety switches remain functional. Simply slide the manual switches to energize the fan, compressor, humidification, reheat and other functions (as applicable).

The fan speed of the Electronically Commutated (EC) plug fan motor can be adjusted from 0 to 10 volts DC by adjusting the potentiometer at the left of the Fan Speed switch. The fan speed will increase 10% of the fan base speed for each one (1) volt adjustment (e.g., one (1) volt equals 10% speed). At ten (10) volts the motor is at full speed.

**WARNING:** Do not leave the unit in manual override. Slide the switches to the OFF position when completing testing and/or start-up. An alarm will be activated if units are left in the ON position.

3.13 Wiring Diagrams

Every Data Aire evaporator, condenser, condensing unit or fluid cooler comes with a wiring diagram. These diagrams are ladder type schematics intended for service personnel. The intent is to allow the technician to understand the wiring details associated with the electrical components and how they interface with the controls as well as peripheral equipment (including remote heat exchangers).

The wiring diagram in the evaporator will indicate field interface terminals to the remote heat exchanger. The internal wiring of the heat exchanger is found on a separate diagram which can be found on the inside cover of the heat exchanger electrical box. Both diagram types are also placed inside the shipping/warranty packet secured in the evaporator section.
3.12 Electrical Connection to EEV (Optional Feature)

The Electronic Expansion Valve (EEV) uses an electrical cable assembly with a DIN type connector to interface with EEV valve stator. The connector is indexed by one large blade connection so that the connector can only be properly mate one way. When it is necessary to making this electrical connection, this connector can only properly mate in one position as shown in the picture below (See Figure 1):

![Figure 1 - EEV with Electrical Mating Connector](image)

**WARNING**

**DO NOT** try to mate this connector in any other direction or attempt to use excessive force to make the electrical connection.
4 INSTALLATION OF REMOTE OUTDOOR HEAT EXCHANGER

Air cooled condenser and fluid coolers have individual User Manuals which should be referred to for more complete details.

5 CHARGING

General charging guidelines:

- Check the CRAC unit nameplate for refrigerant type (R-410A or R0407C) to be used
- Unit control configurations differ depending on refrigerant type
- Refrigerant charging requires the unit to be operational
- Calculate the amount of charge for the system
- Care must be taken to prevent over charging the system
- It is recommended to charge the unit using the manual override switches
- The return air temperature to the unit being charged must be stable and must be maintained greater than 65°F (18°C)
- If this is not possible due to lack of heat load, then load banks must be used to offset the cooling load during startup

5.1 Voltage Phase Check

5.1.1 Evaporator Power Phasing

Prior to charging, the correct voltage phasing should be checked on the indoor evaporator. EC plug fans are not dependent on the input power phasing and will always operate in the proper direction.

The correct voltage phasing for the scroll compressors and forward-curved centrifugal blowers must be checked. Both of these components are phase dependent and although our units are factory run tested, it is important to make sure the rotation of these motors is correct in the field.

A quick and easy way to check the scroll compressor rotation on the evaporator section is to momentarily energizing the manual switches on the Manual Override Switch board located next to the microprocessor control module. Switching the manual switches to the ON position will disable the automatic control but leave the safety switches functional.

Slide the Cool 1 and/or 2 switch to the ON position, observe the compressor operation for a short period of time then slide the switch back to the OFF position. An out of phase compressor will draw relatively low amps and both suction and discharge pressures will remain nearly equal. Reverse any two of the three line voltage wires at the line voltage field connection point to change the compressor rotation.

The gForce units include backward curve plenum fans with electronically commutated (EC) motor as a standard feature. The EC motors are phase independent therefore fan rotation will always be in the correct direction.

Although the scroll compressor is phase dependent, units shipped from the factory are run tested ensuring compressor rotation is consistent with the evaporator fan motor. However, a field change-out of the compressor may require checking proper phase.

5.1.2 Remote Heat Exchanger Fan Motor Phasing

The gForce remote heat exchanger (GHRC) (air cooled or dry coolers) are three phase and the individual axial fans with electronically commutated (EC) motors are three phase and will only run in one direction. Check operation by placing a momentary jumper across low voltage terminals # 39 and # 40 which will energize the control circuit.
If an optional remote heat exchanger (DARC) (air cooled or dry coolers) is ordered it can be either single or three phase, but the individual Permanent-Split Capacitor PSC fan motors are single phase and will only run in one direction. Check the operation of the fans by placing a momentary jumper across the low voltage field terminals. On most remote heat exchangers the terminals will be #39 and #40. Check the wiring diagram for the terminal numbers to jumper across. This will energize the control circuit.

**NOTE:** Disconnect pumps on glycol systems unless already filled with water/glycol solution.

The remote heat exchanger fans may not run because the evaporator section has not reached the required head pressure or the thermostat set-point is above the current ambient or water temperature.

Please see the *Air Cooled Condenser or Fluid Cooler User Manuals* for more detailed information regarding the remote heat exchangers.

### 5.2 Evacuation

It is of the utmost importance that proper system evacuation and leak detection procedures be employed. Good evacuation processes include frequent vacuum pump oil changes and large diameter, short hose connections to both high and low sides of the system preferably using copper tubing or bronze braided hose. A deep vacuum gauge capable of registering pressure in microns should be attached to the system for pressure readings. A shut-off valve between the gauge connection and vacuum pump should be provided to allow the system pressure to be checked after evacuation. Do not turn off vacuum pump when connected to an evacuated system before closing shut-off valve.

Evacuate the refrigerant lines, condenser coil and evaporator coil to 500 microns or lower (a micron gauge and 2-stage vacuum pump are required). Valve off and turn off the vacuum pump and wait at least 15 minutes to make sure the micron gauge reading does not go back above 750 microns. If it does, restart the vacuum pump and evacuate until the system reaches 500 microns. If the system still does not hold the pressure below 750 microns the system needs to be rechecked for leaks.

**WARNING:** Do not apply power to the compressor when in a vacuum.

### 5.3 Air Cooled Systems

#### 5.3.1 Fan Speed Control System Charging

Air cooled condensers provided with Data Aire equipment have integral fan speed controls. The fan speed control is programmed at the factory to start the fan at a specific head pressure and increase speed (i.e., airflow) when the sufficient head pressure is developed, the fan will run at full speed. The programming of this fan speed control is based on the refrigerant required by the order. Please see the *Air-Cooled Condenser User Manual* for more detailed information on fan speed control.

**NOTE:** Refer to Section 2.10 Leak Testing and Section 5.2 Evacuation prior to charging the system.
WARNING: Before starting a compressor, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage. If the system is charged from a vacuum, the pre-heating of the compressor is not necessary.

Charging requires the unit the unit operation. A quick and easy way to run the compressor and blowers is to use the manual switches on the unit’s Manual Override Switch board located next to the microprocessor control module. Switching the Fan and Cool 1 or 2 manual switches to the ON position will disable the automatic control of these components but leave the safety switches functional.

After the system has been satisfactorily evacuated the lines can be charged with refrigerant. Connect the pressure gauge manifold set to the high and low ports near the compressor. Connect the charging line to the refrigerant tank and set it for liquid feed. Open the refrigerant tank valve and purge the line at the manifold, then open the high side valve on the manifold only. Add 2.5 pounds (.70 pounds per kW) of refrigerant per nominal ton plus the weight of the refrigerant for the liquid line only. At this point the system will have 75 to 80% of the total refrigerant charge. Start the fans and then the compressor checking the operating pressures and temperatures.

Start operating the system and slowly meter in refrigerant checking the sub-cooling as refrigerant is being added. Charge the system to 8 to 10°F (4.4 to 5.6 °C) of sub-cooling – DO NOT OVER CHARGE THE SYSTEM.

The system should be allowed to stabilize for 15 to 20 minutes before meaningful measurements can be taken. After the system is allowed to stabilize, verification of a few key measurements should be noted. Measure the superheat at the compressor suction line at least 6 inches (152 mm) away from the compressor. A properly charged system operating at typical parameters will have the following pressures:

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Discharge Head Pressure¹</th>
<th>Sub-Cooling² (depending on ambient conditions)</th>
<th>Suction Pressure³</th>
<th>Superheat⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-410A</td>
<td>340 to 415 PSIG (2.34 to 2.86 MPa)</td>
<td>8 to 10°F (4.4 to 5.6 °C)</td>
<td>104 PSIG (0.72 MPa) or greater</td>
<td>8 to 15°F (4.4 to 8.3°C)</td>
</tr>
<tr>
<td>R-407C</td>
<td>245 to 285 PSIG (1.69 to 1.97 MPa)</td>
<td>8 to 10°F (4.4 to 5.6 °C)</td>
<td>52 PSIG (0.36 MPa) or greater</td>
<td>8 to 15°F (4.4 to 8.3°C)</td>
</tr>
</tbody>
</table>

Note: Bubbles in the sight glass are not unusual at this point and there generally will be flashing and/or bubbles in the sight glass when the system is properly charged. A system with fan speed control charged to a clear sight glass is often overcharged.

1  Discharge pressure (also called high side pressure or head pressure) is the pressure generated on the output side of a gas compressor in a refrigeration or air conditioning system. The discharge pressure is affected by several factors: size and speed of the condenser fan, condition and cleanliness of the condenser coil, and the size of the discharge line.

2  Subcooling refers to a liquid existing at a temperature below its normal saturation temperature. Subcooling is normally used so that when the cycling refrigerant reaches the thermostatic expansion valve, its totality is in its liquid form, thus, allowing the valve to work properly.

3  Suction pressure' (also called the low-side pressure) is the intake pressure generated by the system compressor while operating. The suction pressure, along with the suction temperature and the wet bulb temperature of the discharge air are used to determine the correct refrigerant charge in a system.

4  After all of the refrigerant has boiled to a vapor, any additional temperature increase above the boiling point is called superheat.
5.3.2 Flooded System Charging

Flooded type systems are units having refrigerant circuits with an optional liquid receiver and head pressure control valve. When the ambient temperature falls during cold weather, the head pressure control valve will regulate the flow of refrigerant to ensure minimum receiver pressure. The condenser is partially flooded with liquid refrigerant in cold weather to maintain a minimum liquid line pressure. In warm weather the extra refrigerant is stored in the receiver.

Flooded systems require more refrigerant than fan speed control systems due to the receiver added volume. To charge, connect the pressure gauge manifold set to the high and low ports near the compressor. Connect the charging line to the refrigerant tank and set it for liquid feed. Open the refrigerant tank valve and purge the line. Open the high side valve on the manifold only and weigh in the refrigerant until the proper amount of refrigerant is added that is required by the receiver in the system (see Receiver Charging Chart). Receiver storage capacities are based on the liquid occupying no more than 90% of the internal volume when the temperature of the refrigerant is 90°F (32°C) per ASHRAE Standard 15-94.

<table>
<thead>
<tr>
<th>Model</th>
<th>Size kW (ton)</th>
<th>Dual Circuit lbs./circuit (kg/circuit) R-410A</th>
<th>Dual Circuit lbs./circuit (kg/circuit) R-407C</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHRC</td>
<td>021 thru 074 (6 thru 21)</td>
<td>43 (19.5)</td>
<td>48 (21.8)</td>
</tr>
<tr>
<td>DARC</td>
<td>084 thru 130 (24 thru 37)</td>
<td>76 (34.5)</td>
<td>84 (38.1)</td>
</tr>
<tr>
<td>GHRC</td>
<td>141 thru 215 (40 thru 61)</td>
<td>122 (55.3)</td>
<td>135 (61.2)</td>
</tr>
<tr>
<td>DARC</td>
<td>264 thru 352 (75 thru 100)</td>
<td>189 (85.7)</td>
<td>209 (94.8)</td>
</tr>
</tbody>
</table>

At this point the system is only partially charged.

A quick and easy way to run the compressor and fans is to use the manual switches on the unit's microprocessor. Switching the blower and compressor manual switches to the ON position will disable the automatic control of these components but leave the safety switches functional.

**WARNING:** Before starting a compressor, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage. If the system is charged from a vacuum, the pre-heating of the compressor is not necessary.

If the receiver (head) pressure is below the value shown below for the refrigerant used, block part of the condenser coil surface until the pressure rises to the value shown or higher. During extremely cold weather all the condenser fans may have to be de-energized to maintain head pressure. At this point slowly add refrigerant to the system until the ball in the sight-glass on the receiver is at the 1/3 level mark.

The system should be allowed to stabilize for 15 to 20 minutes before meaningful measurements can be taken. The superheat at the compressor suction line (reading from at least 6 inches (152 mm) from the sight glass) should be 8 to 15°F (-13.3 to -9.44°C). After the system is allowed to stabilize, verification of a few key measurements should be noted:
<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Discharge Head Pressure</th>
<th>Saturated Suction Pressure</th>
<th>Superheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-410A</td>
<td>340 to 390 PSIG (2.34 to 2.69 MPa)</td>
<td>107 PSIG (0.74 MPa) or greater</td>
<td>8 to 15°F (4.4 to 8.3°C)</td>
</tr>
<tr>
<td>R-407C</td>
<td>230 to 260 PSIG (1.59 to 1.79 MPa)</td>
<td>72 PSIG (0.50 MPa) or greater</td>
<td>8 to 15°F (4.4 to 8.3°C)</td>
</tr>
</tbody>
</table>

Remove any blocks that may have been used on the condenser coil. If the ambient temperature is below 70°F (21°C), some of the refrigerant will be backed up in the condenser coil causing the liquid level in the receiver to drop (this is normal).

Units with remote condensing units (GHCU), the superheat should be 20 to 25°F (11.1 to 13.9°C) at the compressor.

5.4 Water/Glycol System

5.4.1 Water/Glycol Cooled System Charging

All water/glycol cooled units are factory charged with refrigerant. The superheat at the compressor suction line at least 6 inches (152 mm) away from the compressor. The unit should be allowed to stabilize for several minutes before meaningful measurements can be taken and the conditioned room should be or near the temperature set-point. The water regulating valve should be adjusted to maintain the following conditions:

Field charging of water/glycol systems should be done by referring to the unit’s electrical nameplate. The factory charge is indicated on the nameplate. Although this figure represents the initial factory charge, it is still necessary to measure and note proper unit operation including superheat, head and suction pressures.

All water/glycol cooled units have a water regulating valve. The water regulating valve sensing port is connected to a Schrader fitting on the discharge line and water is regulated into the condenser coil (plate fin condensers are standard).

**WARNING:** Before starting a compressor, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage.

**Note:** Charging to a full liquid line sight glass should never be the sole means of determining the correct refrigerant charge. Other parameters such as superheat, suction pressure, head pressure, sub-cooling and ambient temperature are also important. A system charged to a clear sight glass is often overcharged.
5.5 Refrigerant Handling

The use of recovery/recycling units is required by U.S. Environmental Protection Agency (EPA) regulations. Technicians who service and dispose of air conditioning and refrigeration equipment must recover the refrigerant instead of venting it to the atmosphere.

Except for extremely small releases of refrigerant such as what occurs when disconnecting service hoses, a technician who knowingly releases or vents refrigerant to the atmosphere is in violation of this regulation. Refrigerant purchasers must be certified technicians and have a valid EPA certification card.

*Warning:* Pressure relief lines(s) must be vented to the atmosphere per the latest edition of ASHRAE Standard 15 and/or any local building, fire or mechanical codes. This applies to all units with either shell and tube condensers or high pressure relief valve options.

5.6 Important Refrigeration Components

5.6.1 Expansion Valves

5.6.1.1 Thermal Expansion Valve

Each refrigerant circuit has an adjustable thermal expansion valve (TXV). These are factory adjusted to their normal rating. Any field adjustment should be to “fine tune” a system that has stabilized and already has acceptable operating parameters. Adjusting a TXV to produce large swings in superheat is not recommended.

Proper TXV operation can be determined by measuring superheat. The correct superheat setting is between 8 to 15°F (4.4 to 5.6°C). If too little refrigerant is being fed to the evaporator, the superheat will be high; if too much refrigerant is being supplied, the superheat will be low.

To adjust the superheat setting:

1. Remove the adjustment cap from the valve.
2. Turn the adjusting stem counterclockwise to lower the superheat.
3. Turn the adjusting stem clockwise to increase the superheat.

*Note:* Make no more than one turn of the stem at a time. As long as thirty minutes (30) may be required for the system to re-stabilize.

5.6.1.2 Electronic Expansion Valve (Optional)

The Electronic Expansion Valve (EEV) is an option available for this unit. This high efficiency option provides an Electronic Expansion Valve (EEV) on each circuit in place of the standard thermal expansion valve (TXV). The EEV controls superheat through the dap4 controls by actively measuring suction pressure via a transducer attached to the suction line and suction temperature via a thermal transducer strapped to the suction line. The EEV actively adjusts the orifice size and resulting mass flow of refrigerant to maintain the superheat set-point.

See Section 7.3 Electronic Expansion Valve Drive (EDV) for detailed information regarding the EEV.

5.6.2 High Pressure Cutout Switch

Each refrigerant circuit is protected by a high pressure cutout switch (non-adjustable) with manual reset button. The switch is typically located in the evaporator near the compressor. The high pressure switch rating is:
<table>
<thead>
<tr>
<th>Action</th>
<th>R 410</th>
<th>R 407C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut-out (Open)</td>
<td>575 PSI</td>
<td>450 PSI</td>
</tr>
<tr>
<td>Cut-in (Close)</td>
<td>Manual Reset</td>
<td>Manual Reset</td>
</tr>
</tbody>
</table>

5.6.3 Low Pressure Cutout Switch

Each refrigerant circuit has a low pressure cutout switch (non-adjustable) which features SPST open-low switch action and automatic reset. The switch is typically located in the evaporator near the compressor. The low pressure switch rating is:

<table>
<thead>
<tr>
<th>Action</th>
<th>R 410</th>
<th>R 407C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut-out (Open)</td>
<td>50 PSI</td>
<td>30 PSI</td>
</tr>
<tr>
<td>Cut-in (Close)</td>
<td>90 PSI</td>
<td>50 PSI</td>
</tr>
</tbody>
</table>

5.6.4 Liquid Line Solenoid Valve (Optional)

Liquid line solenoid valve(s) (LLVS) are an option available for this unit. The LLVS are direct acting, NC (normally closed; i.e., closed when de-energized) solenoid operated valve(s). This has the advantage that the valve is closed when the system is not running and when the solenoid valve is not energized. For this reason, an electrical power failure does not lead to any problems with the refrigeration system.

The primary purpose of a solenoid valve in a refrigerant liquid line is to help prevent refrigerant migration (i.e., flow into the evaporator) during the OFF cycle.
6 GLYCOL SYSTEMS

6.1 Glycol Concentration

The system must be filled with water and the appropriate amount of glycol (either ethylene or propylene) to protect against winter freeze-up. To achieve the approximate glycol concentration, it is necessary to know the total system volume. This consists of the sum of the fluid cooler volume, the evaporator unit volume and the volume of the inter-connecting piping.

The following tables can be used for arriving at an approximate system volume. After installation, the glycol percentage should be checked. The glycol percentage should also be checked at regular intervals to ensure freeze protection.

6.2 Internal (Fluid) Volume – Up and Downflow Evaporators

<table>
<thead>
<tr>
<th>Evaporator Model</th>
<th>Standard Unit Volume In Gallons (Liters)</th>
<th>Energy Saver Unit Volume In Gallons (Liters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTGD 021</td>
<td>4.0 (15.1)</td>
<td>8.2 (31.0)</td>
</tr>
<tr>
<td>GTGD 028</td>
<td>4.5 (17.0)</td>
<td>8.7 (32.9)</td>
</tr>
<tr>
<td>GTGD 035</td>
<td>5.0 (18.9)</td>
<td>9.2 (34.8)</td>
</tr>
<tr>
<td>GTGD 046</td>
<td>5.5 (20.8)</td>
<td>9.7 (36.7)</td>
</tr>
<tr>
<td>GTGD 056</td>
<td>7.5 (28.4)</td>
<td>15.9 (60.2)</td>
</tr>
<tr>
<td>GTGD 070</td>
<td>8.0 (30.3)</td>
<td>16.8 (63.6)</td>
</tr>
<tr>
<td>GTGD 091</td>
<td>10.0 (37.9)</td>
<td>16.3 (61.7)</td>
</tr>
<tr>
<td>GTGD 106</td>
<td>12.0 (45.4)</td>
<td>23.1 (87.4)</td>
</tr>
</tbody>
</table>

6.2.1 Brazed-Plate Condensers

Data Aire water cooled units use brazed-plate condensers as a standard. Brazed-plate condensers are constructed of plates brazed together to form an assembly of separate channels. Refrigerant is confined to the space between the welded plates and is exposed to gaskets only at the ports. Such condensers have a higher range of capacity.

The stainless steel plates are configured with a wave pattern, which results in high turbulence and low susceptibility to fouling. Because of the compact design, these condensers requires a low refrigerant charge. The construction of brazed units does not allow mechanical cleaning, and internal leaks usually cannot be repaired. Thus, it is recommended to use closed-loop cooling systems with good filtration or separators to keep the water clean.

Note: Data Aire does not have experience of in-depth knowledge in the field of water treatment and therefore only provides the following information as a general reference. To properly maintain your water system, please consult a water treatment expert.

6.2.1.1 Water Treatment

If impurities are not controlled, they can cause sludge or biological fouling. Simple blowdown (discharging a small portion of the recirculating water to a drain) may be adequate to control scale and corrosion on sites with good-quality makeup water, but it does not control biological contaminants such as Legionella. Chapter 49 of the ASHRAE Handbook—HVAC Applications covers water treatment in more detail. Specific recommendations on water treatment can be obtained from water treatment suppliers.
6.2.1.2 Scale treatment
In daily use, scale accumulates at the water side of heat exchangers therefore regular scale treatment
is a must.

Variations in water quality from place to place and variations in applications of plate heat exchangers
make it difficult to define in simple terms the water quality requirements for minimum maintenance. It is
important to ensure the right water quality and reduce scale by establishing the requirements for local
conditions or utilizing specialist water treatment companies.

The following should be paid attention to in daily maintenance.

6.2.1.2.1 Undissolved solids (turbid water)
If undissolved solids and other fibres are in the water, the channels of the condenser are easily blocked.
Fibrous debris cannot pass the heat exchanger and must be disposed of. To reduce undissolved solids
blocking the condenser, granules should kept smaller than 0.8mm and is recommended to fit a 40-70
mesh strainer. Regular maintenance of this unit is required to ensure continued performance.

6.2.1.2.2 Dissolved products
Under certain circumstance crystallized deposits of calcium and magnesium ion in the water will attach
to the condenser surface and scale. The higher the concentration of Ca²⁺ and Mg⁺ and the water
temperature, the greater the possibility of scale formation. Thick scale will not only gravely affect heat
transfer capability but even block the channels. As a result, never use this kind of water directly and
always carry out water treatment beforehand.

6.2.1.2.3 Cleaning
Although cleaning of in situ condensers is a difficult process, it may be necessary in extreme
circumstances. Fouling of a condenser can be corrected by chemical cleaning, reverse flushing or a
combination of both. Both of these procedures will require temporarily disconnecting the condenser on
the water side and preforming these procedures. Reverse flushing in situ is the simplest option and
may be the only treatment necessary if fouling is predominantly caused by sedimentation. If however,
scaling has occurred, chemical cleaning will be necessary. This should be performed using a weak acid
cleaning liquid pumped through the heat exchanger in reverse flow direction at approximately twice the
normal flow rate. Remember that the cleaning acid should be circulated in reverse flow for usually 24
hours. At the completion of the cleaning process, it is important that the condenser be flushed with
clean water for at least 30 minutes.

6.2.1.3 Corrosion protection
Stainless steel has a high resistance to most chemicals but is sensitive to chloride ion concentration so
this must be limited to 280ppm or less in systems operating at less than 131°F (55°C). The copper used
in the brazing process is mainly sensitive to strong acid and ammonia so the pH must be maintained
between 6 and 8. Hydrochloric acid should never be used to clean the exchangers.
Note: Risk of corrosion can cause equipment damage. Contact a water consultant about water quality, corrosion and freeze protection requirements. Water chemistry varies greatly by location, as do the required additives, called inhibitors that reduce the corrosive effect of the fluids on the piping systems and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Preferably, surface waters that are classified as soft and are low in chloride and sulfate ion content should be employed. Proper inhibitor maintenance must be performed to prevent corrosion of system components. Consult glycol manufacturer for testing and maintenance of inhibitors.

Commercial ethylene glycol, when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

6.3 Internal (Fluid) Volume – Fluid Coolers

6.3.1 Fluid Cooler Information

The information regarding fluid cooler (or often referred to as a “dry cooler”) internal volume, the volume of the inter-connecting piping and the freezing point of aqueous solutions can be found in the individual Fluid Cooler User Manuals which should be referred to for more complete details.
7 CONTROLS

7.1 dap4™ Microprocessor Control Panel

The standard controller on all gForce GT equipment is the dap4™ microprocessor control panel. The panel includes unit control functions and display normal functions and service diagnostics on a backlit liquid crystal display (LCD). The panel allows recall and display of the high and low temperature for the last 24 hours, high and low humidity for the last 24 hours, current percent of capacity and average percent of capacity for the last hour of operation for compressor, reheat, humidification, dehumidification, component runtimes (if applicable) for fan motor(s), reheat, humidification, and dehumidification. This state-of-the-art control panel has a separate manual that goes into extensive detail regarding functions, features, programming and troubleshooting.

Note: The dap4™ microprocessor control panel has an entire manual dedicated to its use and operation. This manual must be referenced to complete a thorough unit installation. Start-up is not complete until the dap4™ control panel settings are established.

7.2 Remote Heat Exchangers

Most of the controls on remote condensers, condensing units and fluid coolers consist of basic electromechanical type components. Remote heat exchangers have a separate User Manual which gives complete details on adjusting thermostat settings, etc. Also refer to Section 3.5 of this manual.

7.3 Electronic Expansion Valve Drive (EDV)

7.3.1 Setup Using Display Panel Guide

EVD Display Panel enables viewing and changing of critical system info:

- Values which can be viewed only:
  - Suction Temperature
  - Electronic Expansion Valve pressure
  - Superheat
- Values that may be changed:
  - Superheat set-point
  - Manual opening/closing of Electronic Expansion Valve (EEV) to a fixed position

WARNING: The information presented here is intended solely for communication with a Data Aire factory technician regarding critical system health for the purpose of enabling Data Aire to offer meaningful technical support.

This guide is not intended to be used as a means of altering the values which are set at the factory. Any changes made must be first discussed with a Data Aire trained technicians.
To change or view Configurations, press the PRG key, and enter password “0066”.

7.3.2 Configuration Menu

**WARNING:** These menu screens are factory settings and are intended to be viewed only, not to be changed. If any values are different than shown here, please consult with Data Aire’s Service Department.
7.3.3 Regulation Menu

- Configuration 10/11
  - Unity Measure
  - Imperial (°F, psig)

- Configuration 11/11
  - Language
  - English

- Auxiliary Refrigerant
  - Same as main regulation

- Regulation 1/9
  - Superheat setpoint
  - 10.0°F
  - Valve opening at start-up
  - 75%

- Regulation 2/10
  - Valve opened in stand-by
  - 1
  - Valve position in stand-by
  - 50%

- Regulation 3/10
  - Start-up delay after defrost
  - 10 min
  - Pre-position time
  - 6 s

- Regulation 5/9
  - PIU proportion.
  - Gain
  - 20.0
  - PIU integral time
  - 100 s
  - PIU derivative time
  - 15.0 s
  - LowSH protect.
  - Threshold
  - 3.0°F
  - LowSH protect.
  - Integral time
  - 15.0 s
7.3.4 How to Manually Open and Close an (EEV)

This can be done in the Regulation Menu as shown below

Step 1: Follow previous screens to the Regulation Menu screen below

Step 2: Change “Enable manual valve position” from 0 to 1 and “Manual valve position from 0stp to a desired step value. There are 480 steps total for the EEV. If you would like the valve to open 62.5%, enter “300stp” such as below:
Step 3: Once all of the changes are done, press ESC on the main screen and verify the valve opening position.

Step 4: Do not forget to revert the control back to automatic by changing the “Enable manual valve position” back to 0 from 1.

7.3.5 Multiple EEV Configuration

For single circuit units, there will be one EEV and it will be shown as valve A. The letter “A” will be displayed on the top right corner of the EVD display screen, near the “ON” status. For a dual circuit units, there will be two EEVs and the second valve will be displayed as valve B. Set up for valve A does not affect settings for valve B, therefore, when the unit has two EEVs, set up for valve B is required.

To setup valve B for circuit #2, press the two furthest keys simultaneously (ALARM + ENTER). The letter “B” will appear on the top right corner of the display. The display will now show the refrigerant status of circuit #2. Valve B must to be configured the same as Valve A in Configuration Menu and Regulation Menu.
8 REGULAR MAINTENANCE ITEMS

8.1 Air Filters

The air filter section is an integral part of the environmental control system, designed within the unit for easy front accessibility. An initial set of filters are factory installed in the unit. The filters are 4-inch (100mm) deep, disposable, pleated design, extended-surface, nonwoven, reinforced cotton fabric; supported and bonded to welded-wire grid; enclosed in cardboard frame design rated not less than MERV 8 per ASHRAE Std. 52.2. A filter differential switch for alarm activation is included.

Air filters should be checked on a regular basis and changed when they become dirty. This will ensure efficient operation of the unit. Spare air filters should be kept in stock as these tend to be a frequently replaced maintenance item. Air filters may require changing as often as monthly dependent on room or space conditions. New installations with construction dust will quickly clog filters requiring new filters.

The dap4™ control panel monitors the air filters status. A dirty filter alarm will be enunciated on the controls display screen. Although the unit may display a dirty filter alarm, this should not be relied on as the only determinant for replacing air filters. A misadjusted air filter differential pressure switch may not give a proper indication of a clogged filter.

To check the air filter pressure differential pressure switch for proper adjustment, temporarily cover approximately 75% of the return air opening using heavy cardboard or similar material. The alarm should energize when 75% of the air is blocked, simulating dirty filters. If the alarm energizes prematurely or does not energize at all, the pressure switch should be adjusted. All side panels must remain closed when determining if an adjustment is necessary.

**WARNING:** Air filters that require changing can restrict airflow and create problems such as coil icing or poor air distribution.

8.2 Fuses

Always replace fuses with those of the equivalent rating with regard to: 1) amperage, 2) voltage, and 3) speed. For instance motors are inductive loads which require time delay fuses. Electric reheat and humidifiers are resistive loads requiring fast acting fuses.

8.3 Electric Reheat

The electric reheat is a finned enclosed, sheath type, fabricated of stainless steel core sheath with plated fins to withstand moist conditions. The reheat is installed on the air discharge side of the cooling coil and has three (3) stages. The reheat is capable of maintaining room dry bulb conditions when the system is calling for dehumidification. The reheat section includes a safety switches to protect the system from overheating. The low-watt density elements eliminate ionization associated with open air electric resistance heating.

Heating elements do not normally require maintenance. However, they may accumulate a film of dust or dirt when unused for extended periods of time. When energized, the burning debris can create smoke or an unpleasant odor. To help avoid a problem, periodic cleaning is recommended.

8.4 Humidifier

The unit is provided with a self-contained, microprocessor-controlled steam generator type humidifier. The steam generating humidifier uses a disposable cylinder with electronic controls. The humidifier discharges pure steam with no material dust carry-over and has a self-regulating automatic flush cycle.
Cylinders are disposable and do not requiring cleaning or maintenance. The humidifier fill level, water conductivity and flush rate automatically adapt, both in frequency and duration, to variations in the incoming water. The humidifier assembly is capacity field-adjustable and includes a high-water probe. Drain duration and drain interval are also field-adjustable.

8.4.1 Humidifier Canisters

The steam generator type humidifier does not require maintenance other than to replace the canister as required. The frequency of change will depend on usage and water type. A set of the humidifier manufacturer’s instructions is included with the paperwork placed inside the unit when it ships.

8.5 Refrigerant Filter Drier

Factory installed refrigerant filter driers do not normally require maintenance. When replacing compressors or other repairs that open the refrigeration system to atmosphere, it is advisable to replace the filter drier. The equivalent type and size should be used.

8.6 Plenum (Plug) Fans

Electronically Commutated (EC) motors with backward-curved plenum (plug) fans are standard on all gForce units.

Maintenance is not required on electronically commutated (EC) motor/plenum fan modules. The motors are sealed, have maintenance free ball bearings and permanent lubrication. The only acceptable service is replacement.

**WARNING:** Due to the use of capacitors in the electronic systems of the plenum fan motor, danger exists even after the input power has been switched OFF. Do not directly touch the energized parts due to the internal circuits remain energized for a short period of time after shutdown or due to faults. The controller housing cover may only be opened when the input power has been switched OFF and a period of three minutes has elapsed since switching it OFF.

8.6.1 Electronically Commutated Motors

**WARNING:** The plug fan modules are powered by high voltage input line power (i.e. 208-230V/3PH/60HZ or 460V/3PH/60HZ). Do not carry out any work on electrically live parts. Even after disconnection, the de-link circuit is still live. Always wait at least 3 minutes.

EC motors have built in protective features that include the following:

- Over-Temperature protection of the (motor) electronics,
- Over-Temperature protection of the motor,
- Locked rotor protection,
- Phase failure protection,
- Under voltage detection,
- Short circuit protection.

If any of the conditions exist, the motor stops electronically and an alarm (FAN FAILURE) will be indicated on the unit’s controller screen.

The motor will not start-up automatically. To reset, the power supply must be switched to OFF for a minimum of twenty (20) seconds.
If for any reason the rotor is blocked, the motor will electronically switch off. Before looking for blockage make certain to remove power from the unit. Once the blockage is cleared the motor will automatically restart when powered on.

If there is an alarm condition indicated as “NO AIRFLOW”, all active functions (cooling, heating and humidification will stop until the alarm is cleared.

EC motors have an under voltage protection. If the power supply voltage falls below 150 VAC/3Ø (for 230 volt motors) 290 VAC/3Ø (for 460 motors) for a minimum of five (5) seconds, the motor will automatically switch off and an alarm condition (NO AIRFLOW) will be energized and displayed. If the power supply voltage returns to the correct values, the motor will automatically restart.

**NOTE:** The unit’s control panel (dap4™) has a time delay before the NO AIRFLOW alarm is energized. It is adjustable from 5 to 180 seconds (in 5 second increments). On site where a voltage problem is known to exist, the delay can be adjusted to eliminate “nuisance” alarms until the problem is corrected.

### 8.6.2 TESTING

To test the plenum fan modules in manual mode, wire a 9 volt battery across the plug fan control signal (see schematic for wiring details). Be certain to disconnect both terminals (+ and -) from the analog output. This will enable the fan control signal at approximately 90%. The fans will spin at near full speed if the contactors are enabled.
CONTACT DATA AIRE

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714-921-6011 Engineering
714-921-6022 Parts Sales

Web Site: www.dataaire.com

Job/Unit Information:

Data Aire Job Number: ________________________________

Evaporator Serial Number: ________________________________

Evaporator Model Number: ________________________________

Condenser/Fluid Cooler Serial Number: ____________________

Condenser/Fluid Cooler Model Number: ____________________

Date installed: _______ / _____ / 20_____

Installing Contractor: ____________________________________
## MAINTENANCE/INSPECTION CHECKLIST

NOTE: Maintenance/inspection items are monthly unless otherwise specified.

<table>
<thead>
<tr>
<th>Maintenance/Inspection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporator Model No.:</td>
<td>Evaporator Serial No.:</td>
</tr>
<tr>
<td>Remote Heat Exchanger Model No.:</td>
<td>Remote Heat Exchanger Serial No.:</td>
</tr>
<tr>
<td>Technician:</td>
<td>Date:</td>
</tr>
<tr>
<td>Temperature/Humidity set at:</td>
<td>______ °F  ______ % RH</td>
</tr>
<tr>
<td>Air Filters (Monthly)</td>
<td>Air Distribution Section</td>
</tr>
<tr>
<td>___ Check for restricted airflow</td>
<td>___ Check restriction of grilles and discharge louvers</td>
</tr>
<tr>
<td>Air Filters (Quarterly)</td>
<td>___ Inspect grille area and ensure unrestricted</td>
</tr>
<tr>
<td>___ Inspect and replace (if required)</td>
<td></td>
</tr>
<tr>
<td>___ Check filter differential switch</td>
<td></td>
</tr>
<tr>
<td>___ Wipe filter rack clean</td>
<td></td>
</tr>
<tr>
<td>Electrical Section (Monthly)</td>
<td></td>
</tr>
<tr>
<td>___ Check operation sequence</td>
<td></td>
</tr>
<tr>
<td>Electrical Section (Quarterly)</td>
<td></td>
</tr>
<tr>
<td>___ Check fuses</td>
<td></td>
</tr>
<tr>
<td>___ Inspect/tighten all wire connections</td>
<td></td>
</tr>
<tr>
<td>___ Check contactor operation</td>
<td></td>
</tr>
<tr>
<td>___ Check calibration of change over thermostat (Energy Saver system only)</td>
<td></td>
</tr>
<tr>
<td>dap4 Controls (Monthly)</td>
<td></td>
</tr>
<tr>
<td>___ Check unit control operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check operation of the following:</td>
</tr>
<tr>
<td></td>
<td>___ High water alarm</td>
</tr>
<tr>
<td></td>
<td>___ Pressure differential switch</td>
</tr>
<tr>
<td></td>
<td>___ Fan current sensing switch</td>
</tr>
<tr>
<td>dap4 Controls (Quarterly)</td>
<td></td>
</tr>
<tr>
<td>___ Check calibration of temperature sensor</td>
<td></td>
</tr>
<tr>
<td>___ Check calibration of humidity sensor</td>
<td></td>
</tr>
<tr>
<td>___ Check calibration of discharge air sensor</td>
<td></td>
</tr>
</tbody>
</table>
**MAINTENANCE/INSPECTION CHECKLIST**

**EC Plug Fan Section:**

___ Check plug fan wheel movement to be free and clear of any debris

Check motor voltage

<table>
<thead>
<tr>
<th>Fan#1</th>
<th>L1</th>
<th>V</th>
<th>L2</th>
<th>V</th>
<th>L3</th>
<th>V</th>
<th>L1</th>
<th>A</th>
<th>L2</th>
<th>A</th>
<th>L3</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan#2</th>
<th>L1</th>
<th>V</th>
<th>L2</th>
<th>V</th>
<th>L3</th>
<th>V</th>
<th>L1</th>
<th>A</th>
<th>L2</th>
<th>A</th>
<th>L3</th>
<th>A</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fan#3</th>
<th>L1</th>
<th>V</th>
<th>L2</th>
<th>V</th>
<th>L3</th>
<th>V</th>
<th>L1</th>
<th>A</th>
<th>L2</th>
<th>A</th>
<th>L3</th>
<th>A</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Check fan wheel speed (RPM) Fan#1: _____ Fan#2: _____ Fan#3: _____

**Refrigeration Piping**

___ Check for lines (leaks/lines secure)

___ Check capillary lines

**Condensate Pan and Pump (if equipped)**

___ Check for leaks

___ Check for debris

___ Inspect/check float operation

___ Check pump operation

**Compressor #1 & #2 (Monthly)**

___ Check oil level

___ Check for oil leaks

___ Check compressor mounting

___ Check wire connections

___ Compressor operation

(Noise or vibration?)

**Compressor (Quarterly)**

<table>
<thead>
<tr>
<th>Comp #1</th>
<th>Comp #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record suction pressure</td>
<td>____ PSIG</td>
</tr>
<tr>
<td>Record discharge pressure</td>
<td>____ PSIG</td>
</tr>
<tr>
<td>Record superheat</td>
<td>____ °F</td>
</tr>
<tr>
<td>Record sub-cooling</td>
<td>____ °F</td>
</tr>
<tr>
<td>Check high pressure cut-out</td>
<td>____ PSIG</td>
</tr>
<tr>
<td>Check low pressure cut-in</td>
<td>____ PSIG</td>
</tr>
<tr>
<td>Check low pressure cut-out</td>
<td>____ PSIG</td>
</tr>
<tr>
<td>Record compressor amp draw</td>
<td>L1</td>
</tr>
</tbody>
</table>

**Water-Cooled Condensers (if applicable)**

___ Check for leaks

___ Water regulating valve function

___ Entering/leaving water temperatures

<table>
<thead>
<tr>
<th>ENT</th>
<th>°F</th>
<th>LVG</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## MAINTENANCE/INSPECTION CHECKLIST

### Reheat (Quarterly)

- ___ Inspect element (and clean if required)
- ___ Check wire connections
- ___ Check high limit switch operation
- ___ Record amps #1 ____ A #2 ____ A #3 ____ A

### Humidifier (Steam Generator) is equipped

- ___ Inspect drain valve/trap/drain line for deposits
- ___ Check for leaks (make-up water/hoses)
- ___ Check humidifier canister for deposits and water level (replace if needed)
- ___ Check operation
- ___ Check condition of steam hoses and clamps
- ___ Record humidifier amp draw L1____ L2 ____ L3 ____

### Air Cooled Condenser (if applicable)

- ___ Inspect coil/clean if required
- ___ Inspect motor/motor mounts
- ___ Inspect fan blade(s)
- ___ Check wire connections
- ___ Inspect piping for leaks
- ___ Heated receiver sight-glass #1 ___ #2 _____

### Dry Cooler (if applicable)

- ___ Inspect coil/clean if required
- ___ Inspect motor/motor mounts
- ___ Inspect fan blade(s)
- ___ Check wiring
- ___ Inspect piping for leaks
- ___ Check glycol solution ____ %
## MAINTENANCE/INSPECTION CHECKLIST

### Glycol Pump (if applicable) (Monthly)
- ___ Glycol leaks (pump area)
- ___ Pump operation
- ___ Auto air vent clean of mineral deposits

### Glycol Pump (if applicable) (Quarterly)

**Record pump pressures:**

<table>
<thead>
<tr>
<th></th>
<th>Pump 1</th>
<th></th>
<th>Pump 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction</td>
<td>_____ PSIG</td>
<td>Discharge</td>
<td>_____ PSIG</td>
<td></td>
</tr>
<tr>
<td>Suction</td>
<td>_____ PSIG</td>
<td>Discharge</td>
<td>_____ PSIG</td>
<td></td>
</tr>
</tbody>
</table>

**Record pump current draw:**

<table>
<thead>
<tr>
<th></th>
<th>Pump 1</th>
<th></th>
<th>Pump 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>_____ A</td>
<td>L2</td>
<td>_____ A</td>
<td>L3</td>
</tr>
<tr>
<td>L1</td>
<td>_____ A</td>
<td>L2</td>
<td>_____ A</td>
<td>L3</td>
</tr>
</tbody>
</table>

### Equipment Runtimes

<table>
<thead>
<tr>
<th>Equipment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blower</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Compressor #1</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Compressor #2</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Condenser</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Reheat #1 (if equipped)</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Reheat #2 (if equipped)</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Reheat #3 (if equipped)</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Humidifier (if equipped)</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Dehumidification</td>
<td>_____ hrs</td>
</tr>
<tr>
<td>Energy Saver (if equipped)</td>
<td>_____ hrs</td>
</tr>
</tbody>
</table>

_____ **Reset all to zero runtimes**
gForce DX
Direct Expansion, Dual Circuit
DX 21 to 106 kW
Air and Water/Glycol Cooled
Installation, Operation & Maintenance Manual

Data Aire, Inc. | 230 W. BlueRidge Avenue | Orange, CA 92865 | www.dataaire.com