

gForce GT

DX 7 to 46 kW

Air and Water/Glycol Cooled

Installation, Operation & Maintenance Manual



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dataaire
Precise by Design

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 INSTALLATION, OPERATION AND MAINTENANCE (IOM) MANUALS FOR OTHER COMPONENTS OF YOUR DATA AIRE PRECISION COOLING SYSTEM INCLUDING DAP™III, AIR COOLED CONDENSERS AND FLUID COOLERS.



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.



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 area where these symbols appear.

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

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1.0 INSTALLATION



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.

1.1 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.

1.2 Inspection

This Data Aire 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.

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, spare belts and spare filters are packed inside the unit. Refer to the yellow shipping tag located on the unit door for details.



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 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" holes in the shipping skid to which casters with 3/4" 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" tubular steel corner posts at the bottom of the unit.



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

1.4 Locating 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" 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" 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. Multiple units should be evenly spaced, as far apart as possible.



Note to Installing Contractor: 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, chilled water and/or hot water. Installation of units above equipment that could sustain water damage should be avoided.

1.4.1 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.

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 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.

1.4.2 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.

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 and "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). See the dap4 operation manual for details and recommended settings.

1.5 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 Installation/Operation and Maintenance 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.

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.

1.6 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 (1-3 PSIG) inert gas, such as nitrogen. This prevents contaminants 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. Finally, verify that all lubrication fresh and full.

2.0 PIPING

2.1 Air Cooled Unit Piping

Refer to the attached line sizing chart on page 29 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. For installations beyond this distance, consult ASHRAE or similar references.

	Standard piping practice must be used to ensure proper oil return and efficient operation. The interconnecting lines to the remote air cooled or condensing unit must be installed by a qualified refrigeration mechanic.
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2.1.1 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 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.



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.

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

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” 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 for R-407C and 9 PSI for R-410A. Recommended gas velocity for proper oil return is 1,000 FPM. Slope horizontal lines downward in the direction of the refrigerant flow (1/2” for every ten feet 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.

2.1.2 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 or 9 PSI for R-410A. The recommended velocity should be between 200 and 300 FPM. To avoid excessive liquid line pressure drop, the air cooled condenser should be located above or at the same level as the evaporator. Insulation of liquid lines is not required but can be useful in preventing excessive sub-cooling or flashing on long exposed pipe runs.

2.1.3 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.

2.1.4 Connection Sizes, Air Cooled Units

Model Number	Hot Gas Line	Liquid Line	Suction Line
GTA*007	1/2" O.D.	1/2" O.D.	3/4" O.D.
GTA*011	1/2" O.D.	1/2" O.D.	3/4" O.D.
GTA*014	1/2" O.D.	1/2" O.D.	3/4" O.D.
GTA*018	1/2" O.D.	1/2" O.D.	3/4" O.D.
GTA*028	N/A	5/8" O.D.	1 3/8" O.D.
GTA*035	N/A	5/8" O.D.	1 3/8" O.D.
GTA*046	N/A	7/8" O.D.	1 3/8" O.D.

* D=Downflow U=Upflow

Note: Units will have a liquid line and either a hot gas or suction line.

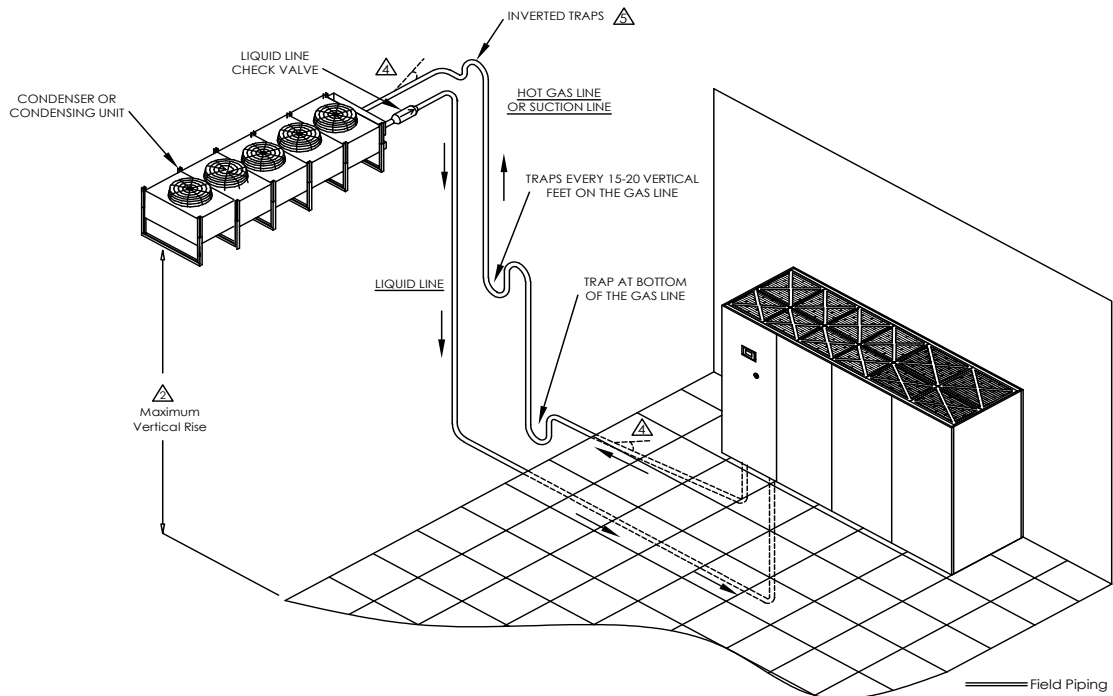


Field connections at the indoor evaporator and remote condenser or condensing unit will not necessarily be the same as the field pipe size required. In some cases these will vary significantly.

2.1.5 Field Piping, Remote Condenser/Condensing Unit Above Evaporator

NOTES:

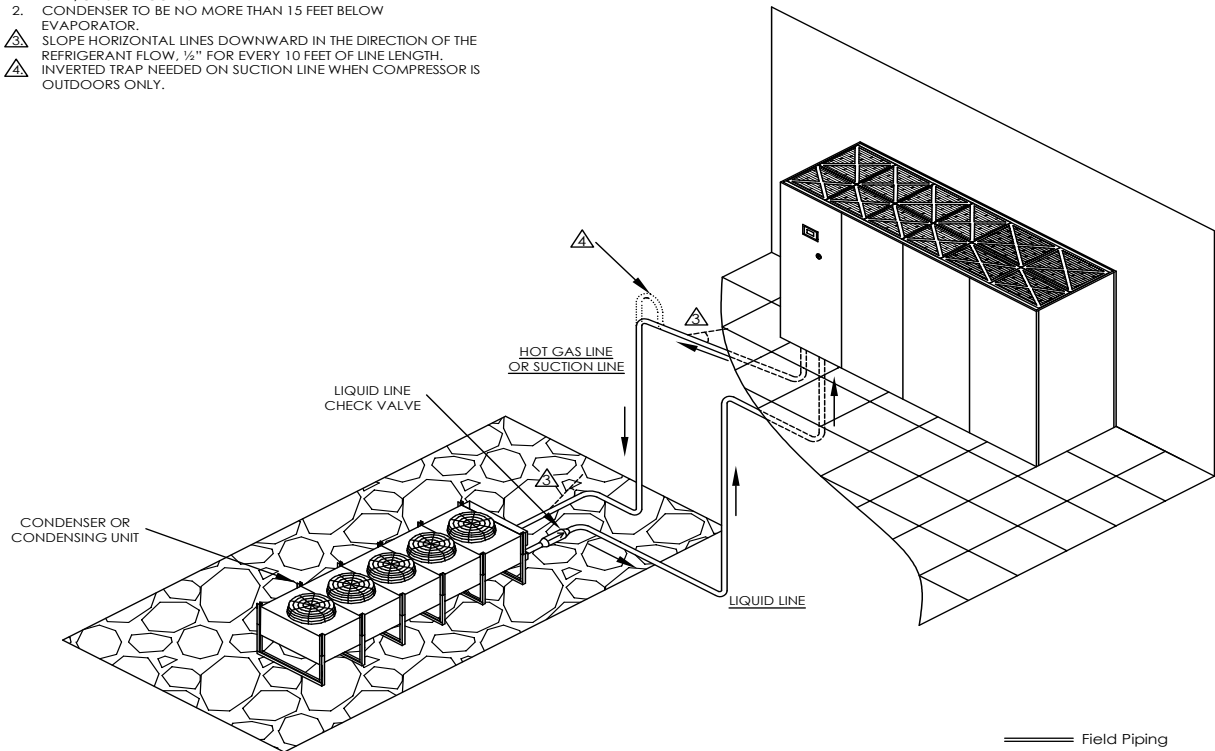
1. THIS IS THE RECOMMENDED PIPING. ALL PIPING TO BE PER LOCAL AND/OR STATE CODE.
2. CONDENSER TO BE NO MORE THAN 60 FEET ABOVE EVAPORATOR.
3. FOR UNITS BUILT AFTER APRIL 2017, THE CHECK VALVES ARE INCLUDED INTERNALLY IN THE EVAPORATOR SECTION.
4. SLOPE HORIZONTAL LINES DOWNWARD IN THE DIRECTION OF THE REFRIGERANT FLOW, 1/8" FOR EVERY 10 FEET OF LINE LENGTH.
5. INVERTED TRAP TO EXTEND 8" ABOVE THE BOTTOM OF THE CONDENSER COIL.



2.1.6 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, 1/4" FOR EVERY 10 FEET OF LINE LENGTH.
- ⚠ INVERTED TRAP NEEDED ON SUCTION LINE WHEN COMPRESSOR IS OUTDOORS ONLY.



2.2 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 2.2.2 and 2.2.3 for connection sizing). This will depend on the length of pipe and the calculated pressure drop of peripheral components.

Water 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.

Shut-off 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.

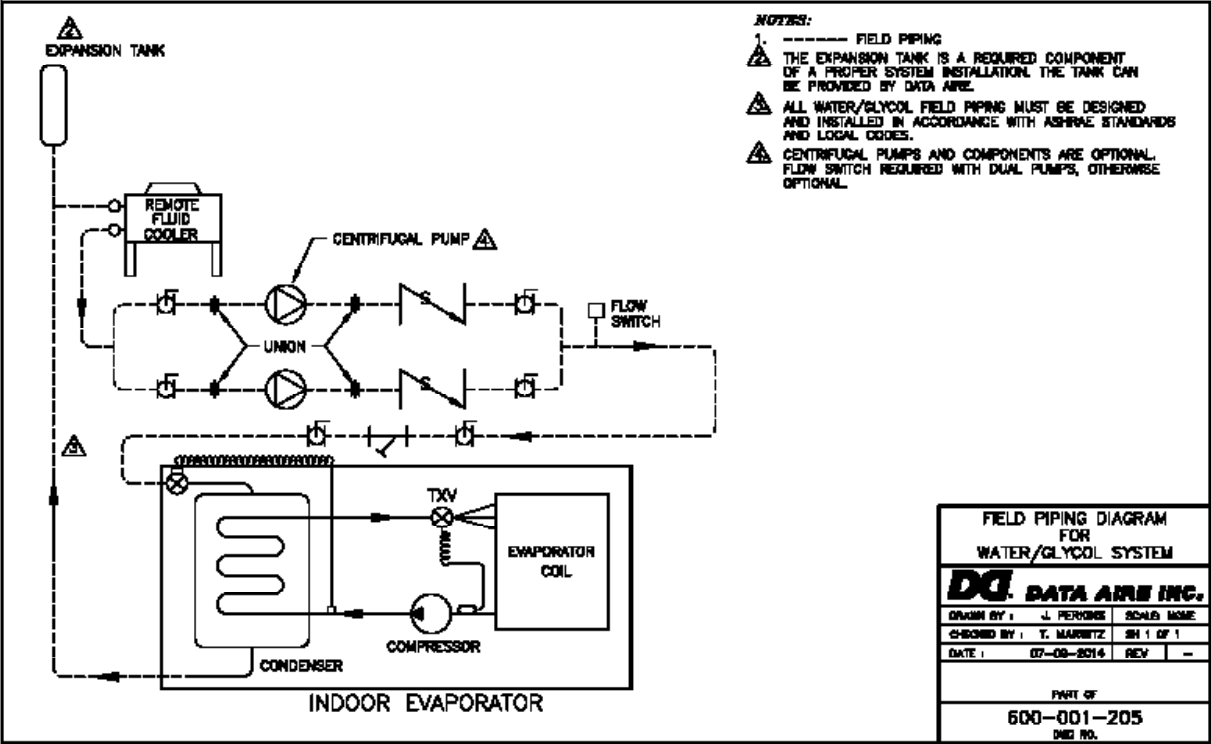
All water/glycol cooled units are shipped with plate/fin heat exchangers as standard equipment. A strainer is shipped loose and is to be field installed in the supply line with shut-off valves (field provided) before and after the strainer. The strainers and water/glycol piping must be cleaned on a periodic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

All water pipes have a cap installed on the end of the pipe 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.

 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.

2.2.1 Field Piping, Glycol System



2.2.2 Connection Sizes, Water/Glycol Cooled Units


Model Number	Water In	Water Out
GTW or G*007	3/4" O.D.	3/4" O.D.
GTW or G*011	3/4" O.D.	3/4" O.D.
GTW or G*014	1-1/8" O.D.	1-1/8" O.D.
GTW or G*018	1-1/8" O.D.	1-1/8" O.D.
GTW or G*028	1-5/8" O.D.	1-5/8" O.D.
GTW or G*035	1-5/8" O.D.	1-5/8" O.D.
GTW or G*046	1-5/8" O.D.	1-5/8" O.D.

* - D - downflow, U - upflow

2.2.3 Connection Sizes, Fluid Coolers

Model Number	Water In/Out	Model Number	Water In/Out
GHFC-21	1-5/8" O.D.	GHFC-130	2-5/8" O.D.
GHFC-25	1-5/8" O.D.	GHFC-141	2-5/8" O.D.
GHFC-32	1-5/8" O.D.	GHFC-156	2-5/8" O.D.
GHFC-39	2-1/8" O.D.	GHFC-176	2-5/8" O.D.
GHFC-53	2-1/8" O.D.	GHFC-200	2-5/8" O.D.
GHFC-60	2-1/8" O.D.	GHFC-215	2-5/8" O.D.

GHFC-74	2-1/8" O.D.	GHFC-264	2-5/8" O.D.
GHFC-84	2-1/8" O.D.	GHFC-281	2-5/8" O.D.
GHFC-99	2-1/8" O.D.	GHFC-310	2-5/8" O.D.
GHFC-106	2-5/8" O.D.	GHFC-352	2-5/8" O.D.

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

2.3 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 on the chart in Section 2.2.2. 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.

2.4 Condensate Drain Piping

Every indoor unit has a 3/4" 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" for each ten feet 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.

2.5 Humidifier Piping

2.5.1 Steam Generator Humidifier

The standard humidifier on gForce systems is a steam generator type with disposable cylinder. The humidifier makeup water should be brought to the humidifier through the field connection opening using 1/4" 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.


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.

2.5.2 Dry Steam Humidifier

The optional dry steam humidifier requires a strainer on the inlet steam line. An outlet connection with field-provided steam trap is also required. Steam pressure is typical 10-15 PSI.


2.6 Leak Testing

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

 In addition to refrigeration system, check all condenser water lines, humidifier water make-up 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.

 Tightening of fittings and valves is the responsibility of the installing contractor.

2.7 Evacuation

Evacuate the refrigerant lines, condenser coil and evaporator coil to 250 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 700 microns. If it does, restart the vacuum pump and evacuate until the system reaches 250 microns. If the system still does not hold the pressure below 700 microns the system needs to be rechecked for leaks.

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 and allow the refrigerant to flow until the system pressure equalizes. At this point the system will have 75 to 80% of the total refrigerant charge. Start the blower and then the compressor checking the operating pressures and temperatures.

DO NOT APPLY POWER TO THE COMPRESSOR WHEN IN A VACUUM

3.0 ELECTRICAL CONNECTIONS



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 service provided by the utility is sufficient to handle the additional load imposed by this equipment. Most units with secondary 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.



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

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 offer 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

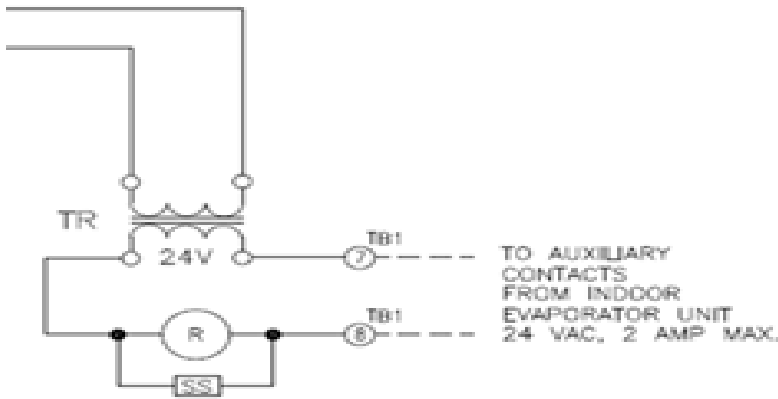
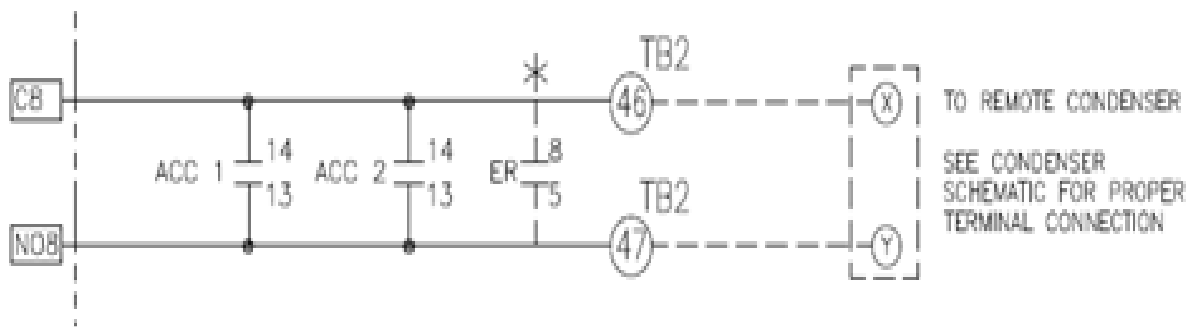


Figure 2 - Typical Indoor Evaporator Interconnection Points



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 unit's controller (dap4) provides a remote alarm output contact that can be field addressed on terminals # 11 and # 13 of terminal block TB1. This is a Normally Open, Close on Alarm, dry contact, intended to be used in a control circuit not exceeding 2 amps at 250 VAC.

This programmable output contact will close on a failure and remain closed until the alarm is no longer present. There are three additional alarm output contacts on the dap4. The terminal designations for these alarms output contact pairs are #40 and #42; #43 and #45; and #48 and #50.

3.8 Remote Sensors

Remote 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.

3.9 Condensate Pumps

Condensate pumps which ship loose normally require a separate source of 110 volt power. Always check the pump power requirements before connecting power. Condensate pumps are available in other voltages.


Condensate pumps may also come unit mounted and powered. While no outside power source is required, field piping is still a requirement.

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. Factory mounted pumps come pre-wired.

3.10 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 of coiled-up wire. The probe is a flat plate that is typically placed below the unit in a location where the water is likely to accumulate.

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.

	Note: Failure to uncoil the length of wire attached to the condensate probe can result in a nuisance water detected alarm. If the probe is not going to be used it should be disconnected.
---	---

3.11 Water Sensing Cable

Another option for water sensing is the Water Detection Cable. This is a long cable that 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.

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):

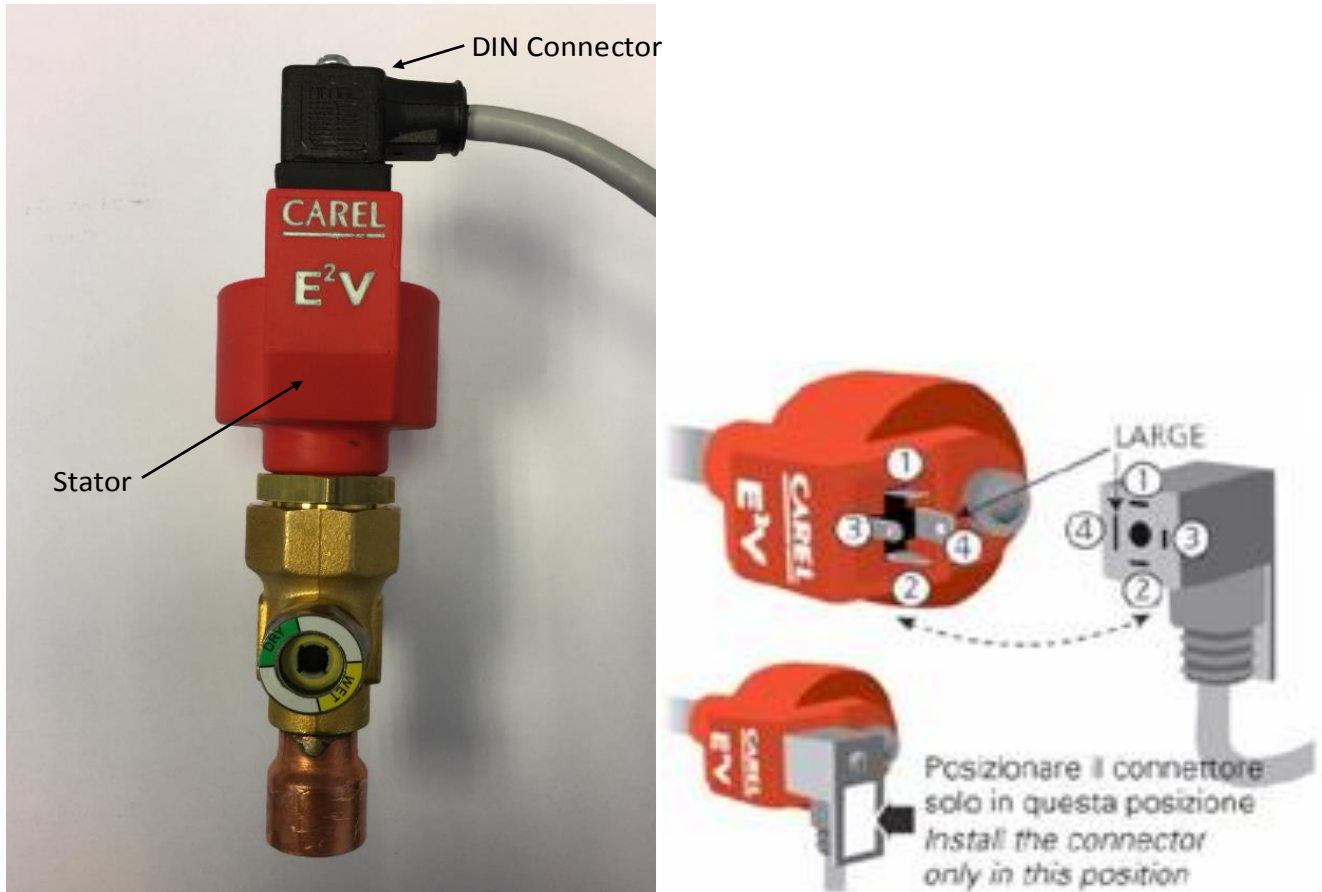


Figure 1 - EEV with Electrical Mating Connector



DO NOT try to mate this connector in any other direction or attempt to use excessive force to make the electrical connection.

4.0 CHARGING

4.1 Voltage Phase Check

4.1.1 Evaporator

Prior to charging, the correct voltage phasing should be checked on the indoor evaporator. Using the manual switch operation will not bring the fans to full speed. Enabling the BLOWER manual mode switch on manual override module engages the contactors powering the high voltage to the plug fans but sets the control signal to 0V.

Enabling any other manual mode switch will likewise disable all control outputs from the dap4 panel resulting in full manual mode operation and setting the plug fans to 0V.

To test the plug fan modules in manual mode, turn on the blower and fan speed on manual override module. This will enable the fan control signal at maximum. The fans will spin at near full speed if the contactors are enabled.

Although scroll compressors are phase dependent, units shipped from the factory are run tested, ensuring the compressor rotation is consistent with evaporator fan motor. However, a field change-out of a compressor may require checking proper phase. An out-of-phase compressor will draw relatively low amps and both the suction and discharge pressures will remain nearly equal.

4.1.2 Secondary Heat Exchanger

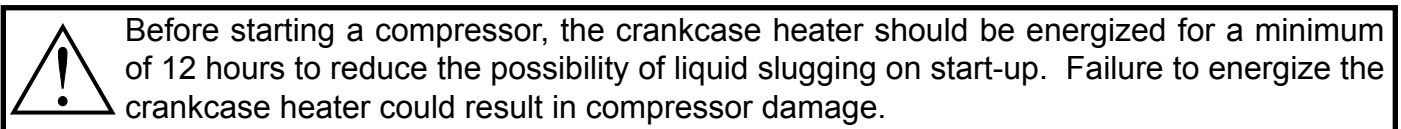
See separate Installation, Operation and Maintenance (IOM) Manual for air cooled condensers or fluid coolers for the detail on the secondary heat exchanger.

4.2 Air Cooled Systems

4.2.1 Fan Speed Control System Charging

The standard air cooled condenser provided with Data Aire gForce equipment has modulating fan speed control (FSC) on the all motors. After field refrigerant piping is properly completed connect the refrigerant drum to the low side and charge with vapor (refer to Section 2.6 LEAK TESTING and Section 2.7 EVACUATION prior to charging the system).

It is likely the more refrigerant will be required to complete the charging procedure (line runs need to be taken into account). Make sure all hoses are properly purged. From a vacuum feed liquid refrigerant into the high side of the system until the pressure equalizes. At this point there will be approximately 70-80% of the total charge in the system.



If the system is charged from a vacuum, the preheating of the compressor is not necessary. Start the system and allow the system to stabilize to room temperature. Bubbles in the sight glass are not

unusual at this point and can be caused by flashing from liquid line pressure drop, low sub-cooling or low charge. It is likely that more refrigerant will be required to complete the charging procedure. Adjust the refrigerant charge until the sub-cooling is between 8-10°F. There may be flashing and/or bubbles in the sight glass when the system is properly charged.

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. The discharge pressure with R-410A should be between 340 -415 PSIG and the sub-cooling should be between 8-10°F depending on ambient conditions. Units with R-407C the discharge pressure should be between 240-295 PSIG. Suction pressure should be 104 PSIG or greater with R-410A and 52 PSIG or greater with R-407C. Measure the superheat at the compressor suction line at least 6 inches away from the compressor. The superheat should be between 8-15°F.



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.

4.2.2 Flooded System Charging

Flooded type systems are supplied with 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 nearly constant receiver pressure. The condenser is partially flooded with liquid refrigerant in cold weather. In warm weather the extra refrigerant is stored in the receiver.

Flooded systems require more refrigerant than fan speed control systems. 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 for liquid feed. Open the refrigerant tank valve and purge the line. Open the high side valve on the manifold only and allow the refrigerant to flow until the system pressure equalizes. At this point the system will have 75-85% of the total refrigerant charge. Start the evaporator motor. Start the compressor and check the operating pressures and temperatures.

A quick and easy way to run the compressor is using the manual switch on the unit's microprocessor. Switch the compressor manual switch to the ON position. All automatic control is disabled but safety switches will remain functional.



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.

Using the manual switch operation will not bring the fans to full speed. Enabling the BLOWER manual mode switch engages the contactors powering the high voltage to the plug fans but sets the control signal to 0V.


Enabling any other manual mode switch will likewise disable all control outputs from the dap4 panel resulting in full manual mode operation and setting the plug fans to 0V.

To test the plug fan modules in manual mode, turn on blower and fan speed switch on manual override modules. This will enable the fan control signal at approximately 90%. The fans will spin at near full speed if the contactors are enabled.

Start the evaporator fan and verify the fan rotation. From a vacuum, add liquid refrigerant to the high side of the system until the pressures equalize. Start the compressor. Check the liquid line sight glass to get a feel for the approximate charge. Bubbles in the sight glass are not unusual at this point and can be caused by flashing from liquid pressure drop, low sub-cooling or low charge. It is likely more refrigerant will be required to complete the charging procedure.

If the receiver (head) pressure is below 322 PSIG with R-410A (230 PSIG R-407C), block part of the condenser coil surface until the pressure rises to 322 PSIG R-410A (230 PSIG R-407C) or higher. If the receiver (head) pressure is below 322 PSIG with R-410A (230 PSIG with R-407C), block part of the condenser coil surface until the pressure rises to 322 PSIG for R-410A (230 PSIG R-407C) or higher. During extremely cold weather all the condenser fan have to be de-energized to maintain head pressure. Add refrigerant to the system until the ball in the sight glass at the 1/3 level.

After the system is allowed to stabilize, the superheat at the compressor suction line (reading from a least 6 inches from the compressor) should be 8-15°F. Units with remote condensing units (DRCU), the superheat should be 20 to 25° F at the compressor.. Remove any blocks that may have been used on the condenser coil. If the ambient temperature while charging is below 70°F, some of the refrigerant will be backed up in the condenser coil causing the liquid level in the receiver to drop (this is normal).

	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.
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4.3 Water/Glycol System

4.3.1 Water/Glycol Cooled System Charging

All water/glycol cooled units are factory charged with refrigerant. The water regulating valve should be adjusted to maintain a condensing temperature of 105 - 119° F. Saturated suction temperature should be 33° F PSIG or higher. The superheat at the compressor suction line at least 6 inches away from the compressor should be between 8-15°F.

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 pressure. Some adjustment charge may be required.

Adjust the refrigerant charge until the sight glass clears or has sparse bubbles. 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 setpoint.

All water/glycol cooled units have a water regulating valve. A head pressure transducer is connected to a Shraeder fitting on the discharge line and water is regulated into the condenser coil (plate fin condensers are standard).



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.

4.4 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 sell and tube condensers or high pressure relief valve options.

4.5 Important Refrigeration Components

4.5.1 Expansion Valve

Each refrigerant circuit has an adjustable thermo 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.

4.5.2 High Pressure Cutout Switch

Each refrigerant circuit is protected by a high pressure cutout switch with manual reset button. The switch is typically located in the evaporator near the compressor.

The high pressure rating for R-410A is 610 PSIG. The high pressure rating for R-407C is 450 PSIG.

4.5.3 Low Pressure Cutout Switch

Each refrigerant circuit has a low pressure cutout switch with automatic reset. The switch is located near the compressor.

The low pressure for R-410A is 50 PSIG. The low pressure rating for R-407C is 28 PSIG.

5.0 GLYCOL SYSTEMS

5.1 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.

5.2 Internal (Fluid) Volume – Downflow Units

EVAPORATOR MODEL	STANDARD UNIT VOLUME (GALLONS)	ENERGY SAVER UNIT VOLUME (GALLONS)
GFGD007	2.0	3.5
GFGD011	2.5	3.5
GFGD014	2.5	5.0
GFGD018	2.5	5.0
GFGD028	4.5	N/A
GFGD035	5.0	N/A
GFGD046	5.5	N/A

5.3 Internal (Fluid) Volume – Upflow Units

EVAPORATOR MODEL	STANDARD UNIT VOLUME (GALLONS)	ENERGY SAVER UNIT VOLUME (GALLONS)
GFGU007	1.6	3.0
GFGU011	1.6	3.0
GFGU014	2.0	4.5
GFGU018	2.0	4.5
GFGU028	4.5	N/A
GFGU035	5.0	N/A
GFGU046	5.5	N/A

5.4 Internal (Fluid) Volume – Fluid Coolers

FLUID COOLER MODEL	VOLUME (GALLONS)	FLUID COOLER MODEL	VOLUME (GALLONS)
GHFC-21	2.5	GHFC-130	13.0
GHFC-25	3.4	GHFC-141	16.3
GHFC-32	4.2	GHFC-155	16.2
GHFC-39	3.3	GHFC-176	20.3
GHFC-53	4.9	GHFC-200	24.6
GHFC-60	6.6	GHFC-215	19.6
GHFC-74	7.4	GHFC-264	26.0
GHFC-84	9.8	GHFC-281	32.6
GHFC-99	12.3	GHFC-310	32.4
GHFC-106	9.8	GHFC-352	40.6

5.5 Internal (Fluid) Volume – Copper Piping

PIPE DIAMETER (INCHES O.D.)	VOLUME/100 FEET (GALLONS)
5/8	1.2
3/4	1.8
7/8	2.5
1-1/8	4.3
1-5/8	9.2
2-1/8	16.1
2-5/8	24.8
3-1/8	35.4
4-1/8	62.2

5.6 Freezing Point of Aqueous Solutions

ETHYLENE GLYCOL percent by VOLUME	FREEZING POINT DEGREES F	PROPYLENE GLYCOL percent by VOLUME	FREEZING POINT DEGREES F
0	32	0	32
10	24	10	27
20	15	20	18
30	4	30	8
40	-13	40	6
50	-33	50	-26

6.0 CONTROLS

6.1 dap4 Microprocessor Control Panel

The standard controller on all gForce GT equipment is the dap4 microprocessor control panel. This state-of-the-art control panel has a separate manual that goes into extensive detail regarding functions, features, programming and troubleshooting.



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.

6.2 Secondary Heat Exchangers

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

6.3 Wiring Diagrams

Every gForce GT unit 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 dap4 control panel as well as peripheral equipment.

Data Aire's chilled water unit wiring diagrams will have a drawing number which starts out with the three letter designation, GFX. An example of a typical diagram, GFX-S-903.

7.0 ELECTRONICALLY COMMUTATED MOTORS (EC MOTORS)

Electronically Commutated (EC) motors with "Plug fan" are standard on all gForce units.



NOTE: The plug fan modules are powered by high voltage input line power (i.e. 208-230V/3PH/60HZ or 460V/3PH/60HZ) and speed is set from 10V DC control signal from the unit's microprocessor controller - Data Alarm Processor 4 (dap4).

Fan speed is factory set based on order.

Fan speed can be changed in 1% increments through the unit's microprocessor control (dap4). See the dap4 operation manual (Menu J Factory Settings) for details and recommended settings.

7.1 START-UP WITH EC MOTORS/PLUG FANS

Using the dap4 manual switch operation will not bring the fans to full speed. Enabling the BLOWER manual mode switch on manual override module engages the contactors powering the high voltage to the plug fans but sets the control signal to 0V.

Enabling any other manual mode switch will likewise disable all control outputs from the dap4 panel resulting in full manual mode operation and setting the plug fans to 0V.

7.2 TESTING

To test the plug fan modules in manual mode, turn on blower and fan speed switch on manual override module. This will enable the fan control signal at maximum. The fans will spin at near full speed if the contactors are enabled.

7.3 PROTECTIVE FEATURES

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 detection,
- Under-voltage detection,
- Short-circuit protection.

If any of the conditions exist, the motor stops electronically and an alarm (NO AIRFLOW) will be energized and displayed on the unit's microprocessor screen. The motor will start up automatically. To reset, the power supply has to be switched OFF for a minimum of twenty seconds.



If for any reason the rotor is blocked, the motor will electronically switch off. Before looking for any blockage make certain to power down the unit. Once the blockage is cleared the motor will automatically restart when powered on.

EC motors have under voltage protection. If the power supply voltage falls below ~150 VAC/3Φ (for 230 volt motors) or ~290 VAC/3Φ (for 460 volt motors) for a minimum of five (5) seconds, the motor will automatically switch off and an alarm (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 sites where a voltage problem is known to exist, the delay can be adjusted to eliminate "nuisance" alarms until the problem is corrected. See Menu K (ALARMS and LIMITS), (NO AIR FLOW ALARM TIME DELAY) in the operation manual.

7.4 MAINTENANCE

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

8.0 REGULAR MAINTENANCE ITEMS

8.1 Air Filters

Air filters should be checked on a regular basis and changed when they become dirty. This will ensure efficient operation of the unit. Although the unit has a dirty filter alarm, this should not be relied on as the only determinant for replacing filters. A maladjusted filter differential pressure switch may not give a proper indication of a clogged filter.

To check the pressure differential switch for proper adjustment, temporarily cover about 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. Doors must remain closed when determining if an adjustment is necessary.

Spare filters should be kept on stock as these tend to be a frequently replaced maintenance item. Filters require changing as often as monthly. Note also that construction dust on new installations will quickly clog new filters.



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

8.2 Humidifier Canisters

Steam generator type humidifier is standard on gForce GT series of equipment. There is no maintenance required other than to replace the canister as required. This frequency will depend on usage and water type. A set of manufacturer's instructions for the humidifier is sent as part of the paperwork placed inside the unit when it ships.

8.3 Fuses

Fuses may occasionally require changing especially with installations where the voltage is not consistent. Drops in voltage can create brief periods of high amps draw, causing fuses to blow. 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.

8.4 Heating Elements

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

8.5 Refrigerant Filter Drier

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

9.0 Warranty Policy

Seller warrants its equipment to Buyer to be free from defects in material and workmanship for a period of eighteen (18) months from date of shipment, as long as equipment is utilized under normal conditions and service and is properly installed; however, the warranty shall not be applicable to any of the following items: refrigerant, belts, filters, humidifier, heaters not regularly cleaned, light bulbs, and any other items either consumed or worn out by normal wear and tear, or by conditions beyond Seller's control, including (without limitation as to generally) polluted or contaminated air or water.

The Seller's obligation under this warranty is limited solely to the repair or replacement, at Seller's options, of any part or parts thereof which shall, within eighteen (18) months from date of shipment of the equipment to the original purchaser be returned to the factory, transportation charges repaid, which upon examination shall disclose to the Seller's satisfaction to have been defective under normal use and service. This agreement to repair or replace defective parts is expressly in lieu of all other warranties, expressed or implied and all other obligations or liabilities on the part of the Seller and Seller neither assumes nor authorizes any other person to assume for it any liability or obligation in connection with the sales or service of its equipment, except said repair or replacement of defective parts set forth above.

This warranty does not include any labor charges for work done outside the factory for replacement of parts, adjustments, repairs, or any other work. Seller's liability does not include any resulting damage to persons, property, equipment, goods or merchandise arising out of any defect in or failure of any equipment of its manufacture and Buyer hereby waives any claim against Seller arising out of such claim. This warranty shall not cover the repair or replacement of any equipment which has been repaired or altered outside the factory in any way or which has been subject to negligence, misuse, or abuse, or to pressures in excess of stated limits.

This warranty applies only to the original purchaser of the equipment and does not extend, expressly or by implication, to the third parties or others without specific written approval and acknowledgment of Seller. Buyer's exclusive remedy and Seller's maximum liability for any and all loss, injury, damage, costs, or expense arising from any defect covered by this warranty shall be limited to the repair or replacement, but not the installation of any defective material, F.O.B., Seller's plant; provided however, that Seller shall not be required to replace any part or component (a) which can be repaired, or (b) unless Buyer has given Seller immediate written notice that replacement or repair. In addition, Seller shall not be liable for any cost or expense of replacement or repair contracted for by Buyer with any third person, unless, and then only to the extent that Seller authorizes in writing, such costs or expense.

Seller shall not be liable for any direct, indirect incidental, consequential, or other form of loss, injury, damage, cost, or expense, whether caused by delay, failure, or performance, breach of warranty, or by any cause whatsoever.

Seller's obligation under this warranty shall be void if Buyer fails: (a) without legal justification to pay Seller, when due, the full purchase price for the equipment sold hereunder, or (b) to have the equipment sold hereunder installed, maintained, and serviced by competent personnel and in accordance with Seller's instructions.

10.0 Contact Data Aire

Address:

Data Aire Inc.
230 W. BlueRidge Avenue
Orange, CA 92865

Phone

714-921-6000
800-347-AIRE (2473) Toll Free

Fax:

714-921-6010 Main
714-921-6011 Engineering
714-921-6022 Part Sales

E-mail:

service@dataaire.com	Service
engineering@dataaire.com	Engineering
sales@dataaire.com	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: _____

RECOMMENDED LINE SIZING for AIR COOLED SPLIT SYSTEMS

HOT GAS LINES – SINGLE CIRCUIT UNITS (Up To 200 Equivalent Feet)

Tonnage	Tons/ Circuit	50 feet	100 feet	150 feet	200 feet
2.5	2.5	5/8	7/8	7/8	7/8
3	3	7/8	7/8	7/8	7/8
4	4	7/8	7/8	7/8	1-1/8
5	5	7/8	1-1/8	1-1/8	1-1/8
8	8	1-1/8	1-1/8	1-3/8	1-3/8
10	10	1-1/8	1-1/8	1-3/8	1-3/8
13	13	1-1/8	1-3/8	1-3/8	1-3/8

LIQUID LINES – SINGLE CIRCUIT UNITS (Up to 200 Equivalent Feet)

Tonnage	Tons/ Circuit	50 feet	100 feet	150 feet	200 feet
2.5	2.5	3/8	1/2	1/2	1/2
3	3	1/2	1/2	1/2	1/2
4	4	1/2	5/8	5/8	5/8
5	5	1/2	5/8	5/8	5/8
8	8	5/8	7/8	7/8	7/8
10	10	5/8	7/8	7/8	7/8
13	13	7/8	7/8	7/8	7/8

SUCTION LINES – SINGLE CIRCUIT UNITS (Up to 200 Equivalent Feet)

Tonnage	Tons/Circuit	50 feet		100 feet		150 feet		200 feet	
		HOR	VERT	HOR	VERT	HOR	VERT	HOR	VERT
2.5	2.5	7/8	7/8	7/8	7/8	7/8	7/8	1-1/8	7/8
3	3	7/8	7/8	1-1/8	7/8	1-1/8	7/8	1-1/8	7/8
4	4	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8
5	5	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
8	8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-5/8	1-3/8
10	10	1-3/8	1-3/8	1-5/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8
13	13	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	1-5/8

HOR = HORIZONTAL VERT = VERTICAL

Monthly Maintenance Inspection Checklist

Model No. _____

Serial No. _____

Prepared by: _____

Date: ___ / ___ / 201__

Air Filters

___ Check for restricted air flow

Air Distribution Section

___ Check for restriction in grille(s)

Compressor

___ Check for leaks

Refrigeration Cycle/Section

___ Check crank case temperature

Air Cooled Condenser (if applicable)

- ___ Condenser coil clean
- ___ Motor mounts tight
- ___ Motor fan bearings in good condition
- ___ Refrigeration lines properly supported

Water/Glycol Fluid Cooler (if applicable)

- ___ Water regulating valve function
- ___ Check for water/glycol leaks (piping area)

Glycol Pump(s)

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

Condensate Drain and Pump (if applicable)

- ___ Check for water leaks
- ___ Check for restricted air flow
- ___ Pump operation

Steam Generating Humidifier

- ___ Check canister for deposits and water level
- ___ Check condition of steam hose and clamps

Electrical Panel

- ___ Check contactor operation
- ___ dap4 control panel operations

Equipment Runtimes

Condenser	_____	hrs
Compressor	_____	hrs
Reheat No. 1	_____	hrs
Reheat No. 2	_____	hrs
Reheat No. 3	_____	hrs
Humidifier	_____	hrs
Dehumidification	_____	hrs
Energy Saver	_____	hrs

___ Reset all to read zero runtimes

Temperature/Humidity set at: ___° ___% RH

Quarterly Maintenance Inspection Checklist

Model No. _____
Prepared by: _____

Serial No. _____
Date: ___ / ___ / 201__

Air Filters

- ___ Check for restricted air flow
- ___ Check filter differential switch
- ___ Wipe filter rack section clean

Air Distribution Section

- ___ Check for restriction in grille(s)

Compressor

- ___ Check for leaks

Refrigeration Cycle/Section

- ___ Check for moisture (site glass)
- ___ Check suction pressure
- ___ Check discharge pressure
- ___ Check hot gas bypass valve operation
- ___ Check thermostatic expansion valve operation
- ___ Check solenoid valve operation

Air Cooled Condenser (if applicable)

- ___ Condenser coil clean
- ___ Motor mounts tight
- ___ Motor fan bearings in good condition
- ___ Refrigeration lines properly supported
- ___ Heated receiver site glass #1 ___ #2 ___

Water/Glycol Fluid Cooler (if applicable)

- ___ Water regulating valve function
- ___ Check solution _____%
- ___ Check for water/glycol leaks (piping area)
- ___ Water/Glycol flow switch operational

Glycol Pump(s)

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

Condensate Drain and Pump (if applicable)

- ___ Check for water leaks and restricted flow
- ___ Pump operation

Steam Generating Humidifier

- ___ Check canister for deposits and water level
- ___ Check condition of steam hose and clamps
- ___ Check drain and fill valve for deposits

Reheat

- ___ Check reheat element(s) for dust
- ___ Check high limit switch operation

Electrical Panel

- ___ Check fuses
- ___ Check contactor operation
- ___ Check all electrical connections
- ___ Check operation sequence
- ___ Check calibration of change over thermostat (Energy Saver System Only)

dap4 control panel operations

- ___ Check calibration of temperature sensor
- ___ Check calibration of humidity sensor
- ___ Check calibration of discharge air sensor

Equipment Runtimes

Condenser	_____	hrs
Compressor	_____	hrs
Reheat No. 1	_____	hrs
Reheat No. 2	_____	hrs
Reheat No. 3	_____	hrs
Humidifier	_____	hrs
Dehumidification	_____	hrs
Energy Saver	_____	hrs

___ Reset all to read zero runtimes

Temperature/Humidity set at: _____° _____% RH

Superheat and Suction Pressure Trouble Shooting Guide

Low Suction Pressure and High Superheat

1. Moisture, dirt, wax
2. Undersized valve*
3. High superheat adjustment
4. Gas charge condensation
5. Dead thermostatic element charge
6. Wrong thermostatic charge
7. Evaporator pressure drop - no external equalizer
8. External equalizer location
9. Restricted or capped external equalizer
10. Low refrigerant charge
11. Liquid line vapor
 - a. Vertical lift
 - b. High friction loss
 - c. Long or small line
 - d. Plugged drier or strainer
12. Low pressure drop across valve
 - a. Same as #11 above
 - b. Undersized distributor nozzle or circuits
 - c. Low condensing temperature

High Suction Pressure - Low Superheat

1. Oversized valve*
2. TXV seat leak
3. Low superheat adjustment
4. Bulb installation
 - a. Poor thermal contact
 - b. Warm location
5. Wrong thermostatic charge
6. Bad compressor - low capacity
7. Moisture, dirt, wax
8. Incorrectly located external equalizer

Low Suction Pressure - Low Superheat

1. Low load
 - a. Not enough air
 - b. Dirty air filters
 - c. Coil icing
2. Poor air distribution
3. Poor refrigerant distribution
4. Improper compressor-evaporator balance
5. Evaporator oil logged
6. Flow from one TXV affecting another's bulb

* Data Aire has ensured that valves are size properly as the unit ships from the factory.

Temperature Pressure Chart

<u>Temperature (°F)</u>	<u>R-407C</u>	<u>R-410A</u>
26	43.6	89.7
27	44.7	91.6
28	45.9	93.5
29	47.1	95.5
30	48.4	97.5
31	49.6	99.5
32	50.9	101.6
33	52.1	103.6
34	53.4	105.7
35	54.8	107.9
36	53.2	110.0
37	57.5	112.2
38	58.9	114.4
39	60.3	116.7
40	61.7	118.9
41	63.1	121.2
42	64.6	123.6
43	66.1	125.9
44	67.6	128.3
45	69.1	130.7
46	70.6	133.2
47	72.2	135.6
48	73.8	138.2
49	75.1	140.7
50	77.1	143.3
55	106.0	156.6
60	116.2	170.7
65	127.0	185.7
70	138.5	201.5
75	150.6	218.2
80	163.5	235.9
85	177.0	254.6
90	191.3	274.3
95	206.4	295.0
100	222.3	316.9
105	239.0	339.9
110	256.5	364.1
115	274.9	389.6
120	294.2	416.4
125	314.5	444.5
130	335.7	474.0
135	357.8	505.0
140	380.9	537.6
145	405.1	571.7
150	430.3	607.6

gForce GT

DX 7 to 46 kW

Air and Water/Glycol Cooled

Installation, Operation & Maintenance Manual



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