INSTALLATION

GT SERIES

AND MAINTENANCE MANUAL

TABLE OF CONTENTS

MODEL NOMENCLATURE

GT 036 -1 VT C - F L T

SERIES:
GT-GEOTHERMAL

NOMINAL CAPACITY:

VOLTAGE DESIGNATION:
0 - 115/1/60
1-208/1/60 & 230/1/60
2-277/1/60
3-208/3/60 & 230/3/60
4-460/3/60
5-575/3/60

CABINET CONFIGURATION:
VT - VERTICAL
HZ - HORIZONTAL
CF - COUNTERFLOW

HEAT EXCHANGER MATERIAL:
C - COPPER
N - CUPRO-NICKEL

WATER CONNECTION LOCATION
F - FRONT

RETURN AIR LOCATION:
L - LEFT
R - RIGHT
B - BACK
F - FRONT

SUPPLY AIR LOCATION:
T - TOP
F - FRONT
R - REAR
S - STRAIGHT THRU
E - END BLOW
B - BOTTOM

INITIAL INSPECTION:

Be certain to inspect all cartons or crates on each unit as received at the job site before signing the freight bill. Verify that all items have been received and that there are no visible damages; note any shortages or damages on all copies of the freight bill. In the event of damage or shortage, remember that the purchaser is responsible for filing the necessary claims with the carrier. Concealed damages not discovered until after removing the units from the packaging must be reported to the carrier within 15 days of receipt.

GENERAL DESCRIPTION:

The GT Water-to-Air Heat Pumps provide the best combination of performance and efficiency available. Safety devices are built into each unit to provide the maximum system protection possible when properly installed and maintained.

The GT Water-to-Air Heat Pumps are Underwriters Laboratories (UL) and (cUL) listed for safety. The water-to-Air Heat Pumps are designed to operate with entering fluid temperature between 25°F to 75°F in the heating mode and between 50°F to 110°F in the cooling mode.

NOTE: 50°F Min. EWT for well water applications with sufficient water flow to prevent freezing. Antifreeze solution is required for all closed loop applications. Cooling Tower/Boiler and Earth Coupled (Geo Thermal) applications should have sufficient antifreeze solution to protect against extreme conditions and equipment failure. Frozen water coils are not covered under warranty.

WARNING: This product should not be used for temporarily heating/cooling during construction. Doing so may effect the units warranty.

MOVING AND STORAGE:

If the equipment is not needed for immediate installation upon its arrival at the job site, it should be left in its shipping carton and stored in a clean, dry area. Units must only be stored or moved in the normal upright position as indicated by the "UP" arrows on each carton at all times. If unit stacking is required, stack units as follows: Vertical units less than 6 tons, no more than two high. Horizontal units less than 6 tons, no more than three high. "Do not stack units larger than 6 tons."

SAFETY CONSIDERATIONS:

Installation and servicing of this equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service the equipment. Untrained personnel can perform basic functions of maintenance such as cleaning coils and replacing filters.

WARNING: Before performing service or maintenance operations on the system, turn off main power to the unit. Electrical shock could cause personal injury or death.

When working on equipment, always observe precautions described in the literature, tags, and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing, and place a fire extinguisher close to the work area.

LOCATION:

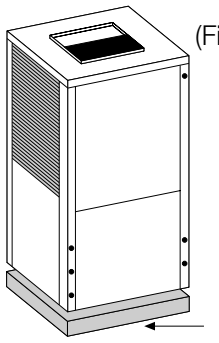
Locate the unit in an indoor area that allows easy removal of the filter and access panels, and has enough room for service personnel to perform maintenance or repair. Provide sufficient room to make fluid, electrical, and duct connection(s). If the unit is located in a confined space such as a closet, provisions must be made for return air to freely enter the space. On horizontal units, allow adequate room below the unit for a condensate drain trap and do not locate the unit above supply piping. These units are not approved for outdoor installation; therefore, they must be installed inside the structure being conditioned. Do not locate in areas that are subject to freezing.

INSTALLATION:

WARNING: Remove all shipping blocks under blower housing. Loosen compressor mounting bolts.

MOUNTING VERTICAL UNITS:

Vertical units up to five tons are available in left, right, front, or rear air return configurations. Vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to minimize vibration transmission to the building structure. It is not necessary to anchor the unit to the floor. (See Figure #1).

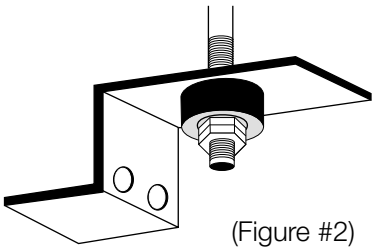


(Figure #1)

Vertical units larger than five tons should be vibration isolated according to the design engineers specifications.

MOUNTING HORIZONTAL UNITS:

While horizontal units may be installed on any level surface strong enough to hold their weight, they are typically suspended above a ceiling by threaded rods. The rods are usually attached to the unit corners by hanger bracket kits (P/N 930-004, 006). (See Figure #2). The rods must be securely anchored to the ceiling. Refer to the hanging bracket assembly and installation instructions for details. Units larger than six

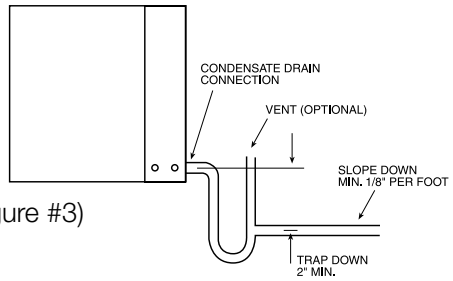

(Figure #2)

tons include an integral angle iron frame with mounting holes present. (See unit horizontal detail drawing). Horizontal units installed above the ceiling must conform to all local codes. An auxiliary drain pan if required by code, should be at least four inches larger than the bottom of the heat pump. Plumbing connected to the heat pump must not come in direct contact with joists, trusses, walls, etc..

Some applications require an attic floor installation of the horizontal unit. In this case the unit should be set in a full size secondary drain pan on top of a vibration absorbing mesh. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing mesh. In both cases, a 3/4" drain connected to this secondary pan should be run to an eave at a location that will be noticeable. If the unit is located in a crawl space, the bottom of the unit must be at least 4" above grade to prevent flooding of the electrical parts due to heavy rains.

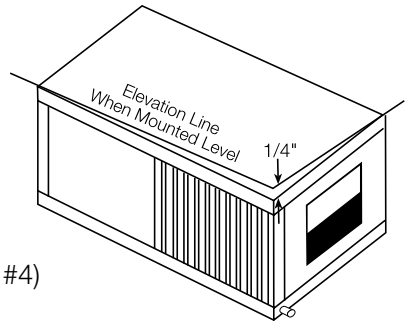
CONDENSATE DRAIN:

WARNING: If equipped with float style condensate overflow switch, final adjustment must be made in the field.



(Figure #3)

A drain line must be connected to the heat pump and pitched away from the unit a minimum of 1/8" per foot to allow the condensate to flow away from the unit.
This connection must be in conformance with local plumbing codes. A trap must be installed in the condensate line to insure free condensate flow. (Heat Pumps are not internally trapped). A vertical air vent is sometimes required to avoid air pockets. (See Figure #3). The length of the trap depends on the amount of positive or negative pressure on the drain pan. A second trap must not be included.



(Figure #4)

The horizontal unit should be pitched approximately 1/4" towards the drain in both directions, to facilitate condensate removal. (See Figure #4)

DUCT SYSTEM:

All GT models are provided with a return air duct flange, while a supply air outlet collar is provided on all models except the 6 thru 12 ton horizontal models to facilitate duct connections. Refer to the individual data specification sheet for physical dimensions of the collar and flange.

A flexible connector is recommended for supply and return air connections on metal duct systems. All metal ducting should be insulated with a minimum of one inch duct insulation to avoid heat loss or gain and prevent condensate forming during the cooling operation. Application of the unit to uninsulated duct work is not recommended as the unit's performance will be adversely affected. Do not connect discharge ducts directly to the blower outlet. The factory provided air filter must be removed when using a filter back return air grill. The factory filter should be left in place on a free return system.

If the unit will be installed in a new installation with new duct work, the installation should be designed using current ASHRAE procedures for duct sizing. If the unit will be connected to an existing duct system, a check should be made to assure that the duct system has the capacity to handle the air required for the unit application. If the duct system is too small, larger duct work must be installed. Be certain to check for existing leaks and repair.

The duct system and all diffusers should be sized to handle the designed air flow quietly. To maximize sound attenuation of the unit blower, the supply and return air plenums should be insulated. There should be no direct straight air path thru the return air grille into the heat pump. The return air inlet to the heat pump must have at least one 90 degree turn away from the space return air grille. If air noise or excessive air flow are a problem, the blower speed can be changed to a lower speed to reduce air flow.

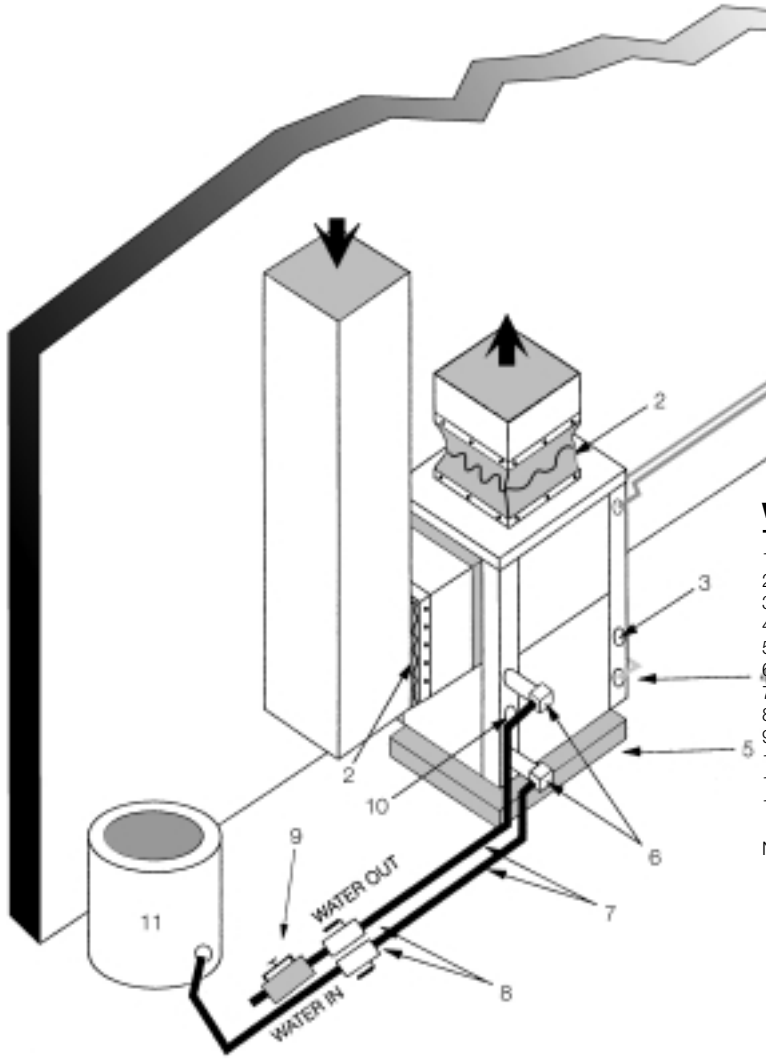
ELECTRICAL:

All field wiring must comply with local and national fire, safety and electrical codes. Power to the unit must be within the operating voltage range indicated on the unit's nameplate. On three phase units, phases must be balanced within 2%.

Properly sized fuses or HACR circuit breakers must be installed for branch circuit protection. See equipment rating plate for maximum size. The unit is supplied with an opening for attaching conduit. Be certain to connect the ground lead to the ground lug in the control box. Connect the power leads as indicated on the unit wiring diagram.

PIPING:

Supply and return piping must be as large as the unit connections on the heat pump (larger on long runs). Never use flexible hoses of a smaller inside diameter than



WELL WATER APPLICATIONS (50°F EWT MIN.)

1. LINE VOLTAGE DISCONNECT (UNIT)
2. FLEX DUCT CONNECTION
3. LOW VOLTAGE CONTROL CONNECTION
4. LINE VOLTAGE CONNECTION
5. VIBRATION PAD
6. P/T PORTS
7. HOSE KITS (Optional)
8. BALL VALVES
9. SOLENOID VALVE SLOW CLOSING
10. CONDENSATE DRAIN CONNECTION
11. PRESSURE TANK (Optional)
12. LINE VOLTAGE DISCONNECT (ELECTRIC HEATER)

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

(Figure #5)

that of the fluid connections on the unit. GT Units are supplied with either a copper or optional cupro-nickel condenser. Copper is adequate for ground water that is not high in mineral content. Should your well driller express concern regarding the quality of the well water available or should any known hazards exist in your area, we recommend proper testing to assure the well water quality is suitable for use with water source equipment. In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended.
Both the supply and discharge water lines will sweat if subjects to low water temperature. These lines should be insulated to prevent damage from condensation.

All manual flow valves used in the system must be ball valves. Globe and gate valves must not be used due to high pressure drop and poor throttling characteristics. Never exceed the recommended water flow rates. Serious damage or erosion of the water to refrigerant heat exchanger could occur.

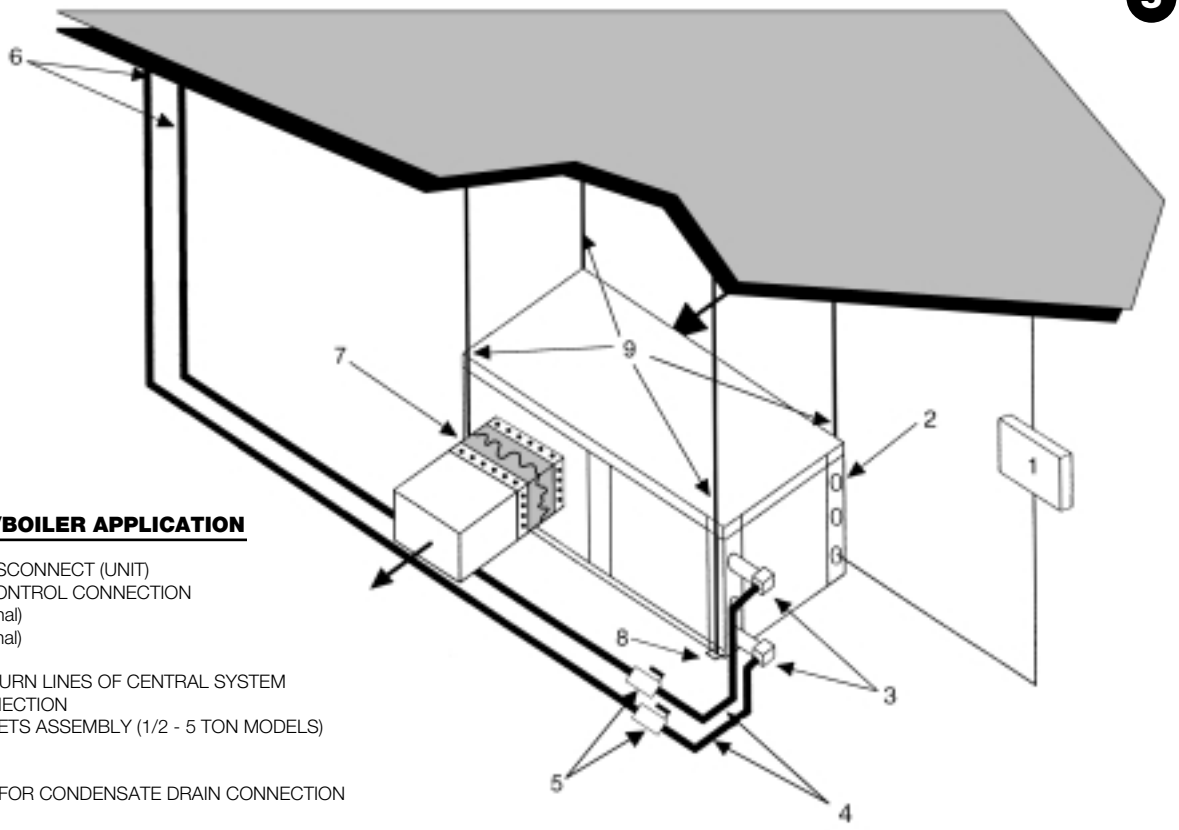
Always check carefully for water leaks and repair appropriately. Units are equipped with female pipe thread fittings. Consult the specification sheets for sizes. Teflon tape sealer should be used when connecting water piping connections to the units to insure against leaks and possible heat exchanger fouling. Do not overtighten the connections. Flexible hoses should be used between the unit and the rigid system to avoid possible vibration. Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing.

WELL WATER SYSTEMS: (50°F EWT Min.)
(Figure #5)

When a water well is used exclusively for supplying water to the heat pump, the pump should operate only when the heat pump operates. A double pole single throw (DP/ST) contactor can be used to operate the well pump with the heat pump.

When two or more units are supplied from one well, the pump can be wired to operate independently from either unit. An upsized VA transformer may be required in either case.

The discharge water from the heat pump is not contaminated in any manner and can be disposed of in various ways depending on local codes (i.e. discharge well, dry well, storm sewer, drain field, stream, pond, etc.)



COOLING TOWER/BOILER APPLICATION

1. LINE VOLTAGE DISCONNECT (UNIT)
2. LOW VOLTAGE CONTROL CONNECTION
3. P/T PLUGS (Optional)
4. HOSE KITS (Optional)
5. BALL VALVES
6. SUPPLY AND RETURN LINES OF CENTRAL SYSTEM
7. FLEX DUCT CONNECTION
8. HANGING BRACKETS ASSEMBLY (1/2 - 5 TON MODELS)
9. THREADED ROD

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

(Figure #6)

COOLING TOWER / BOILER APPLICATION: (Figure #6).

To assure adequate cooling and heating performance, the cooling tower and boiler fluid loop temperature should be maintained between 50° F to 75° F in the heating mode and 60° F to 110° F in the cooling mode. In the cooling mode, heat is rejected from the unit into the water loop. A cooling tower provides evaporative cooling to the loop fluid; thus, maintaining a constant supply temperature to the unit. When utilizing an open cooling tower, chemical water treatment is mandatory to ensure the water is free of corrosive materials.
A secondary heat exchanger (plate frame between the unit and the open cooling tower) may also be used. It is imperative that all air is eliminated from the closed loop side of the heat exchanger to prevent condenser fouling.

In the heating mode, heat is absorbed from the water loop to the unit. A boiler can be utilized to maintain the loop within the proper temperature range.

Before final connection to the unit, the supply and return hoses must be connected together and the system flushed to remove any dirt, piping chips, or any other foreign material.

Pressure / temperature ports are recommended in both the supply and return lines for system flow balancing. The water flow can be accurately set by measuring the water-to-refrigerant heat exchangers water side pressure drop. See the unit specification sheets for the water flow and pressure drop information.

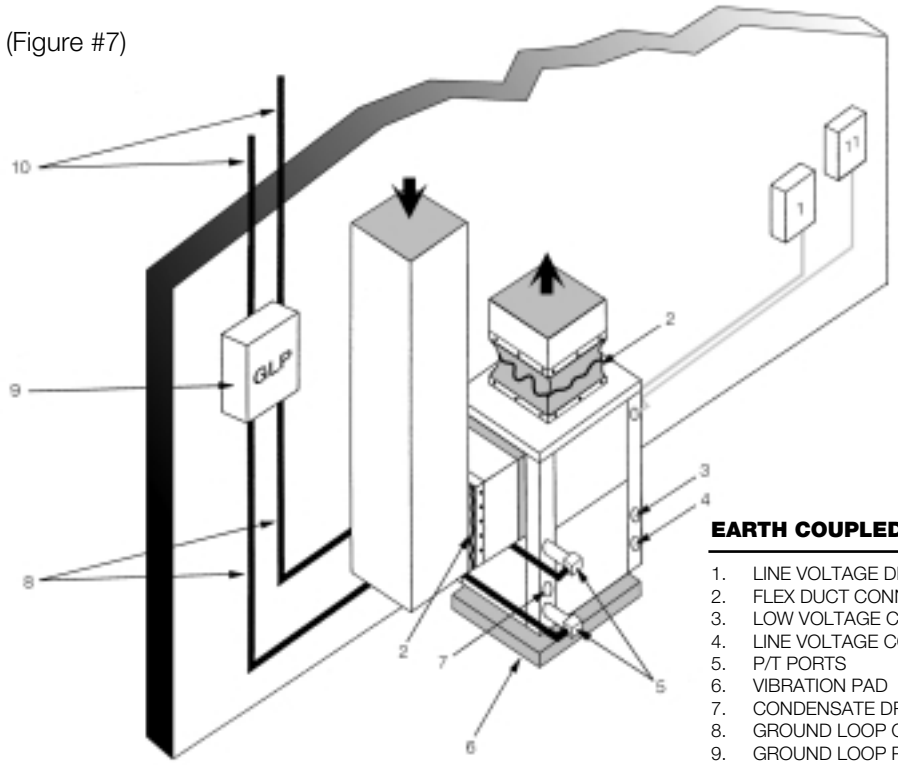
EARTH COUPLED SYSTEMS: (Figure #7)

Closed loop earth coupled Geothermal applications require specialized design knowledge. No attempt at these installations should be made unless the dealer has received specialized training.
Utilizing Ground Loop Pumping Package (GLP), makes the installation easy. Anti-freeze solutions should always be used in Geothermal applications.

SYSTEM CHECKOUT:

- After completing the installation, and before energizing the unit, the following system checks should be made:
- Verify that the supply voltage to the heat pump is in accordance with the nameplate ratings.
- Make sure that all electrical connections are tight and secure.
- Check the electrical fusing and wiring for the correct size.
- Verify that the low voltage wiring between the thermostat and the unit is correct.
- Verify that the water piping is complete and correct.
- Check that the water flow is correct, and adjust if necessary.
- Check the blower for free rotation, and that it is secured to the shaft.
- Verify that vibration isolation has been provided.
- Unit is serviceable. Be certain that all access panels are secured in place.

(Figure #7)



EARTH COUPLED APPLICATION

1. LINE VOLTAGE DISCONNECT (UNIT)
2. FLEX DUCT CONNECTION
3. LOW VOLTAGE CONTROL CONNECTION
4. LINE VOLTAGE CONNECTION (UNIT)
5. P/T PORTS
6. VIBRATION PAD
7. CONDENSATE DRAIN
8. GROUND LOOP CONNECTION KIT (550-016, 017)
9. GROUND LOOP PUMPING PACKAGE (GL001-1 or 002-1)
10. POLYETHELENE WITH INSULATION
11. LINE VOLTAGE DISCONNECT (ELECTRIC HEATER)

NOTE: SEE FIGURE #3 FOR CONDENSATE DRAIN CONNECTION

UNIT START-UP:

1. Set the thermostat to the highest setting.
2. Set the thermostat system switch to "COOL", and the fan switch to the "AUTO" position. The reversing valve solenoid should energize. The compressor and fan should not run.
3. Reduce the thermostat setting approximately 5 degrees below the room temperature.
4. Verify the heat pump is operating in the cooling mode.
5. Turn the thermostat system switch to the "OFF" position. The unit should stop running and the reversing valve should deenergize.
6. Leave the unit off for approximately (5) minutes to allow for system equalization.
7. Turn the thermostat to the lowest setting.
8. Set the thermostat switch to "HEAT".
9. Increase the thermostat setting approximately 5 degrees above the room temperature.
10. Verify the heat pump is operating in the heating mode.
11. Set the thermostat to maintain the desired space temperature.
12. Check for vibrations, leaks, etc...
13. Instruct the home owner on the unit and thermostat operation.

MAINTENANCE:

1. Filter changes or cleanings are required at regular intervals. The time period between filter changes will depend upon type of environment the equipment is used in. In a single family home, that is not under construction, changing or cleaning the filter every 60 days is sufficient. In other applications such as motels, where daily vacuuming produces a large amount of lint, filter changes may be need to be as frequent as biweekly.

WARNING: Equipment should never be used during construction due to likelihood of wall board dust accumulation in the air coil of the equipment which permanently affects the performance and may shorten the life of the equipment.

2. A bi-yearly “checkup” is recommended by a licensed refrigeration mechanic. Recording the performance measurements of volts, amps, and water temperature differences (both heating and cooling) is recommended. This data should be compared to the information on the unit’s data plate and the data taken at the original startup of the equipment.

3. Lubrication of the blower motor is not required, however may be performed on some motors to extend motor life. Use SAE-20 non-detergent electric motor oil.

4. The condensate drain should be checked biannually by cleaning and flushing to insure proper drainage.

5. Periodic lockouts almost always are caused by air or water flow problems. The lockout (shutdown) of the unit is a normal protective measure in the design of the equipment. If continual lockouts occur call a mechanic immediately and have them check for: water flow problems, water temperature problems, air flow problems or air temperature problems. Use of the pressure and temperature charts for the unit may be required to properly determine the cause.

GT MODEL	HEATER MODEL	KW	HEATER AMPS		CIRCUIT	MCA		MAX FUSE		AWG MIN
			208V	240V		208V	240V	208V	240V	
❍ GT010	HP035-1XT	3.4	16.4	19.1	L1/L2	18.4	20.5	20	25	10
	HP050-1XT	4.8	17.3	20.0	L1/L2	24.4	27.8	25	30	8
❍ GT018 thru 042	HP050-1XS	4.8	17.3	20.0	L1/L2	27.1	30.4	30	30	8
❍ GT048 thru 070	HP050-1XM	4.8	17.3	20.0	L1/L2	27.1	30.4	30	30	8
❍ GT018 thru 042	HP075-1XS	7.2	23.6	30.0	L1/L2	34.9	42.9	40	45	8
❍ GT048 thru 070	HP075-1XM	7.2	23.6	30.0	L1/L2	35.7	43.8	40	45	8
❍ GT026 thru 042	HP100-1XS	9.6	34.7	40.0	L1/L2	48.8	55.4	50	60	6
❍ GT048 thru 070	HP100-1XM	9.6	34.7	40.0	L1/L2	49.5	56.3	50	60	6
❍ GT048 thru 070	HP150-1XM	14.4	52.0	60.0	SINGLE	71.2	81.3	80	90	4
	HP150-1XM	14.4	34.7	40.0	L1/L2	49.5	56.3	60	60	6
			17.3	20.0	L3/L4	21.7	25.0	25	25	10
❍ GT048 thru 070	HP200-1XM	19.2	69.3	80.0	SINGLE	92.9	106.3	100	110	2
	HP200-1XM	19.2	34.7	40.0	L1/L2	49.5	56.3	50	60	6
			34.7	40.0	L3/L4	43.4	50.0	45	50	6

All heaters rated single phase 60hz, and include unit fan load. All fuses type "D" time delay or HACR type breaker or HRC FORM 1 Wire size based on 60 deg. C copper conductors.

ELECTRIC HEATER PACKAGE OPTION:

Factory or field installed internal heater packages are available for all GT Series units with the exception of horizontal straight through configuration models.

Two power supplies are required when utilizing the heater package option.

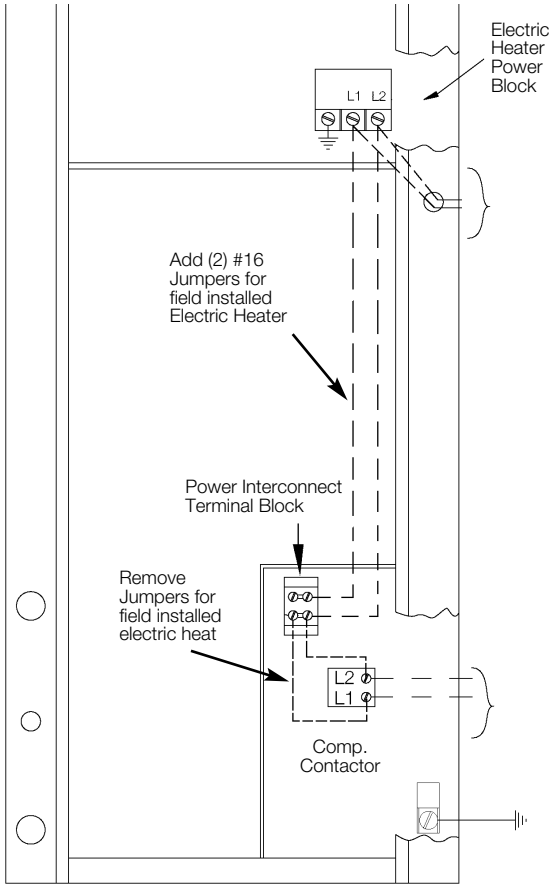
Disconnect all power supplies when servicing or installing heater packages or heat pumps. Failure to do so could result in serious injury or even death.

When a heater package is utilized the power supply to the heater package also powers the heat pumps control transformer primary and the blower motor. This allows control circuit and motor operation in case of the heat pumps compressor or associated power supply failure.

When field installing heater packages, remove the two factory jumper wires between the comp. contactor (L1 and L2) and the power interconnect terminal block. Connect (2) two #16 gauge wires to the power interconnect terminal block and the electric heater power block (L1 and L2). (Figure #8).

The heater package power supply is connected to L1 and L2 in the heater package electrical control box and the heat pump power supply is connected to L1 and L2 of the compressor contactor. (See figure #8)

Each GT Series heat pump has specific heater packages available. Name plate information for wire sizing and fusing are shown in the above table. All heater packages are 208/240 volt single phase only. For three phase requirements an inline duct heater from an independent heater manufacturer is recommended.



(Figure #8)

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power, close disconnect.
	Blown fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Broken or loose wires	Replace or tighten the wires.
	Voltage supply low	If voltage is below minimum voltage specified on unit data plate, contact local power company.
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower or compressor run in all three cases, the thermostat could be miswired or faulty.To ensure miswired or faulty thermostat verify 24 volts is available on the condensing section low voltage terminal strip between "R" and "C", "Y" and "C", and "O" and "C". If the blower does not operate, verify 24 volts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
BLOWER OPERATES BUT COMPRESSOR DOES NOT	Thermostat	Check setting, calibration, and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor, or contactor.
	Safety controls	Check CCM board red default L.E.D. for Blink Code
	Compressor overload open	If the compressor is cool and the overload will not reset, replace compressor.
	Compressor motor grounded	Internal winding grounded to the compressor shell. Replace compressor. If compressor burnout, install suction filter dryer.
	Compressor windings open	After compressor has cooled, check continuity of the compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL	Discharge pressure too high	In "COOLING" mode: Lack of or inadequate water flow. Entering water temperature too warm. Scaled or plugged condenser.
	Refrigerant charge	The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
	High pressure	Check for defective or improperly calibrated high pressure switch.
UNIT OFF ON LOW PRESSURE CONTROL	Suction pressure too low	In "COOLING" mode: Lack of or inadequate air flow. Entering air temperature too cold. Blower inoperative, clogged filter, or restrictions in ductwork. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or plugged condenser.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factory recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low pressure switch.
UNIT SHORT CYCLES	Unit oversized	Recalculate heating and or cooling loads.
	Thermostat	Thermostat installed near a supply air grill, relocate thermostat. Readjust heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heating and or cooling loads. If excessive, possibly adding insulation and shading will rectify the problem.
	Loss of conditioned air by leaks	Check for leaks in duct work or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate air flow or improper distribution of air. Replace dirty filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	TXV	Check TXV for possible restriction or defect. Replace if necessary.
	Moisture, noncondensables	The refrigerant system may be contaminated with moisture or noncondensables. Reclaim refrigerant, evacuate and recharge with factory recommended charge. Note: a liquid line dryer may be required.