



2506 South Elm Street  
Greenville, IL 62246  
www.enertechmfg.com  
(618)-664-9010

# Installation, Operation & Maintenance: Water-to-Water Series Units

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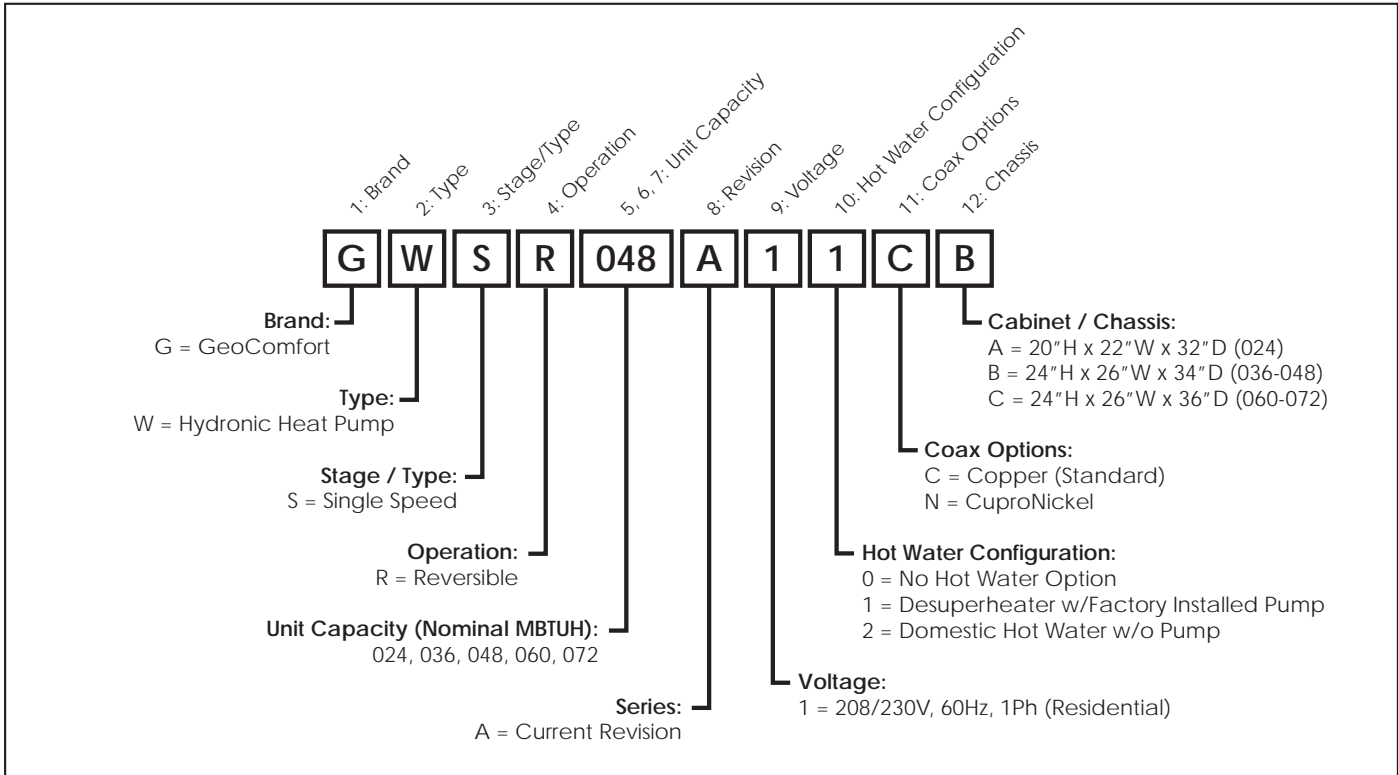
## Guide Revision Table:

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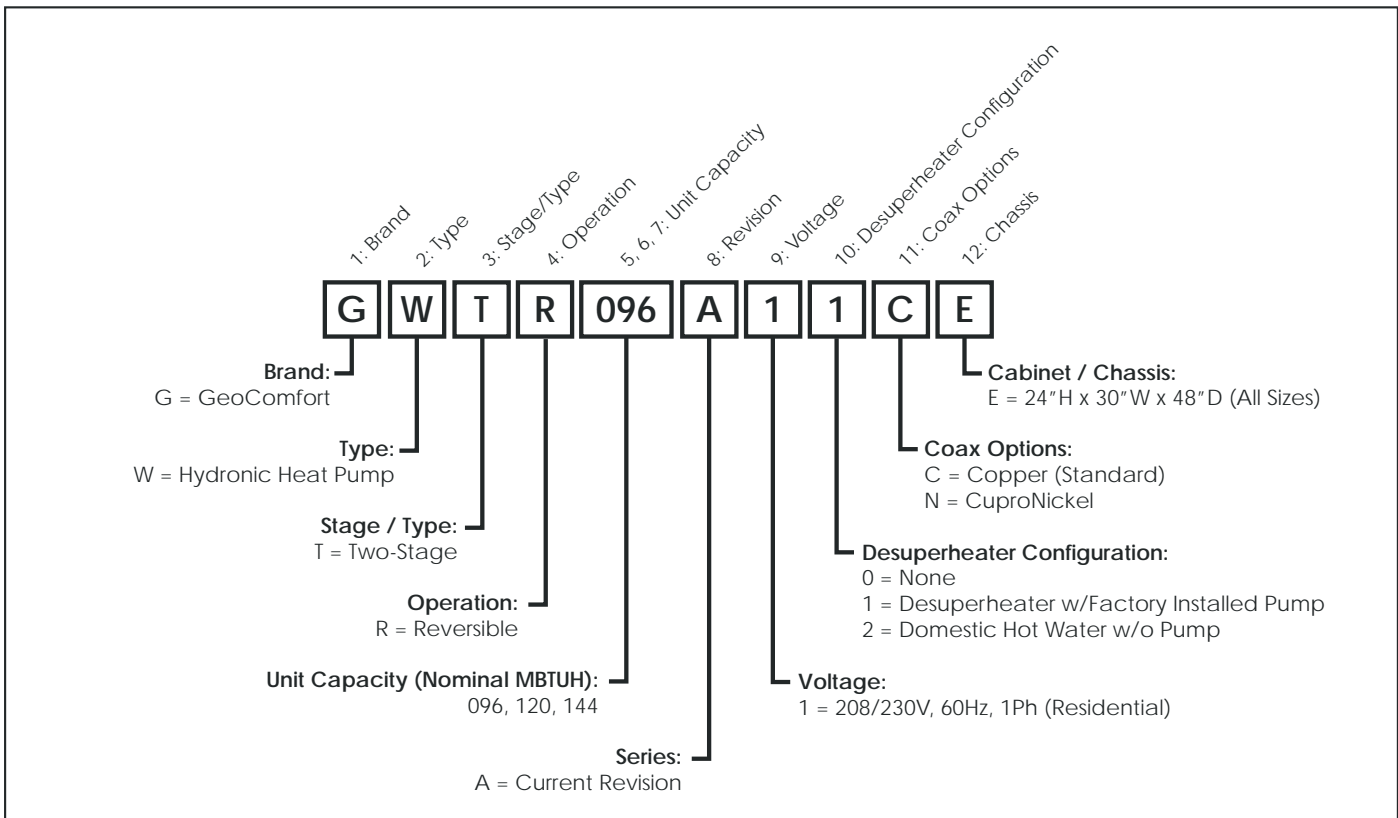
# Section 1a: GeoComfort® Series Model Nomenclature

## Single Compressor Units



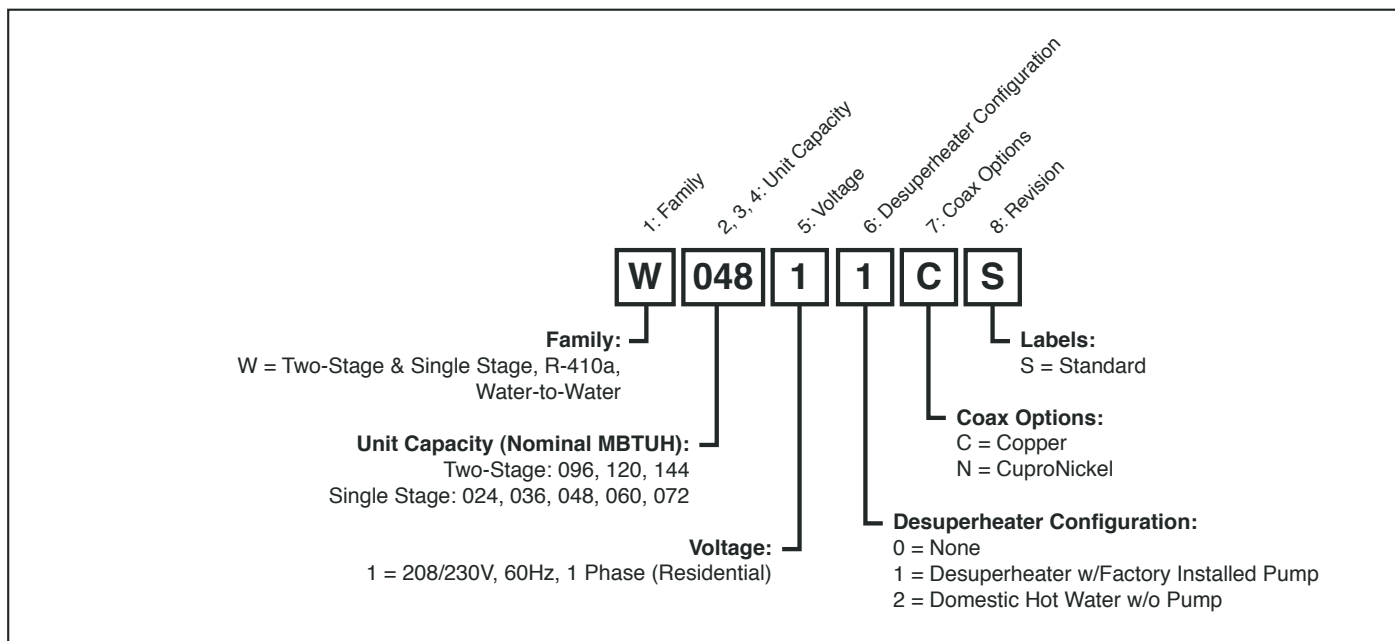
Rev.: 11 March, 2008D

## Dual Compressor Units



Rev.: 08 October, 2008D

## Section 1b: Hydron Module® Series Model Nomenclature



Rev.: 20 Feb, 2009D

## Section 2: Introduction

### INTRODUCTION

This geothermal heat pump provides heated water and chilled water as well as optional domestic water heating capability. Engineering and quality control is built into every geothermal unit. Good performance depends on proper application and correct installation.

### Notices, Cautions, Warnings, & Dangers:

**“NOTICE”** Notification of installation, operation or maintenance information which is important, but which is NOT hazard-related.

**“CAUTION”** Indicates a potentially hazardous situation or an unsafe practice which, if not avoided, COULD result in minor or moderate injury or product or property damage.

**“WARNING”** Indicates potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

**“DANGER”** Indicates an immediate hazardous situation which, if not avoided, WILL result in death or serious injury.

### Inspection

Upon receipt of any geothermal equipment, carefully check the shipment against the packing slip and the freight company bill of lading. Verify that all units and packages have been received. Inspect the packaging of each package and each unit for damages. Insure that the carrier makes proper notation of all damages or shortage on all bill of lading papers. Concealed damage should be reported to the freight company within 15 days. If not filed within 15 days the freight company can deny all claims.

**Note:** Notify Enertech Manufacturing, LLC shipping department of all damages within 15 days. It is the responsibility of the purchaser to file all necessary claims with the freight company.

### Unit Protection

Protect units from damage and contamination due to plastering (spraying), painting and all other foreign materials that may be used at the job site. Keep all units covered on the job site with either the original packaging or

equivalent protective covering. Cap or recap unit connections and all piping until unit is installed. Precautions must be taken to avoid physical damage and contamination which may prevent proper start-up and may result in costly equipment repair.

### CAUTION

**DO NOT OPERATE THE GEOTHERMAL HEAT PUMP UNIT DURING BUILDING CONSTRUCTION PHASE.**

### Storage

All geothermal units should be stored inside in the original packaging in a clean, dry location. Units should be stored in an upright position at all times. Units should not be stacked unless specially noted on the packaging.

### Pre-Installation

Special care should be taken in locating the geothermal unit. Installation location chosen should include adequate service clearance around the unit. All units should be placed on a vibration-absorbing pad (air pad) slightly larger than the base of the unit. If units are being placed on racking, the unit must be placed on a solid foundation. All units should be located in an indoor area where the ambient temperature will remain above 55°F and should be located in a way that piping and ductwork or other permanently installed fixtures do not have to be removed for servicing and filter replacement.

### Pre-Installation Steps:

1. Compare the electrical data on the unit nameplate with packing slip and ordering information to verify that the correct unit has been shipped.
2. Inspect all electrical connections and wires. Connections must be clean and tight at the terminals, and wires should not touch any sharp edges or copper pipe.
3. Verify that all refrigerant tubing is free of dents and kinks. Refrigerant tubing should not be touching other unit components.

## Section 2: Introduction

4. Before unit start-up, read all manuals and become familiar with unit components and operation. Thoroughly check the unit before operating.

### ⚠ CAUTION ⚠

ALL GEOTHERMAL EQUIPMENT IS DESIGNED FOR INDOOR INSTALLATION ONLY. DO NOT INSTALL OR STORE UNIT IN A CORROSIVE ENVIRONMENT OR IN A LOCATION WHERE TEMPERATURE AND HUMIDITY ARE SUBJECT TO EXTREMES. EQUIPMENT IS NOT CERTIFIED FOR OUTDOOR APPLICATIONS. SUCH INSTALLATION WILL VOID ALL WARRANTIES.

### ⚠ WARNING ⚠

FAILURE TO FOLLOW THIS CAUTION MAY RESULT IN PERSONAL INJURY. USE CARE AND WEAR APPROPRIATE PROTECTIVE CLOTHING, SAFETY GLASSES AND PROTECTIVE GLOVES WHEN SERVICING UNIT AND HANDLING PARTS.

### ⚠ CAUTION ⚠

BEFORE DRILLING OR DRIVING ANY SCREWS INTO CABINET, CHECK TO BE SURE THE SCREW WILL NOT HIT ANY INTERNAL PARTS OR REFRIGERANT LINES.

**Terminal Strip:** Provides connection to the thermostat or other accessories to the low voltage circuit.

**Transformer:** Converts incoming (source) voltage to 24V AC.

**Low Voltage Breaker:** Attached directly to transformer, protects the transformer and low voltage circuit.

**Reversing Valve:** Controls the cycle of the refrigerant system (heating or cooling). Energized in cooling mode.

**High Pressure Switch:** Protects the refrigerant system from high refrigerant pressure, by locking unit out if pressure exceeds setting.

**Low Pressure Switch:** Protects the refrigerant system from low suction pressure, if suction pressure falls below setting.

**Flow Switch (Freeze Protection Device):** Protects the water heat exchanger from freezing, by shutting down compressor if water flow decreases.

**Compressor (Copeland Scroll):** Pumps refrigerant through the heat exchangers and pressurizes the refrigerant, which increases the temperature of the refrigerant.

## Components

**Master Contactor:** Energizes Compressor and optional Hydronic Pump and/or Desuperheater package.

**Logic Board:** Logic Board operates the compressor and protects unit by locking out when safety switches are engaged. It also provides fault indicator(s).

### Section 3: Installation Considerations

**Consumer Instructions:** Dealer should instruct the consumer in proper operation, maintenance, filter replacements, thermostat and indicator lights. Also provide the consumer with the manufacturer's Owner's Manual for the equipment being installed.

**Equipment Installation:** Special care should be taken in locating the unit. All units should be placed on a vibration absorbing pad (air pad) slightly larger than the base of the unit. All units should be located in an indoor area where the ambient temperature will remain above 55°F and should be located in a way that piping and ductwork or other permanently installed fixtures do not have to be removed for servicing and filter replacement.

**Electrical:** All wiring, line and low voltage, should comply with the manufacturer's recommendations, The National Electrical Code, and all local codes and ordinances.

**Thermostat:** Thermostats should be installed approximately 54 inches off the floor on an inside wall in the return air pattern and where they are not in direct sunlight at anytime.

**Loop Pumping Modules:** Must be wired to the heat pump's electric control box. A special entrance knockout is provided below the thermostat entrance knockout. A pump module connection block, connected to the master contactor, is provided to connect the Pump Module wiring.

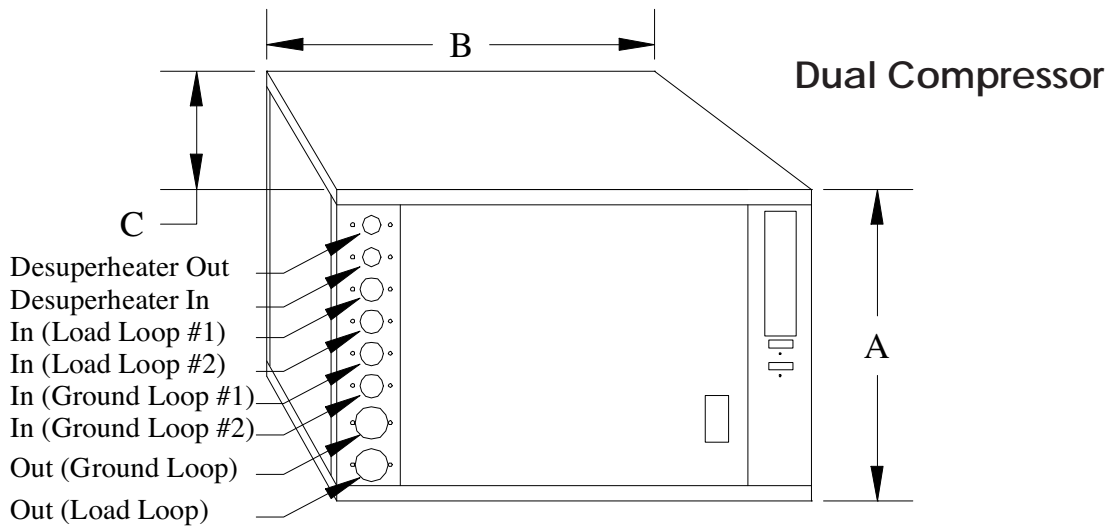
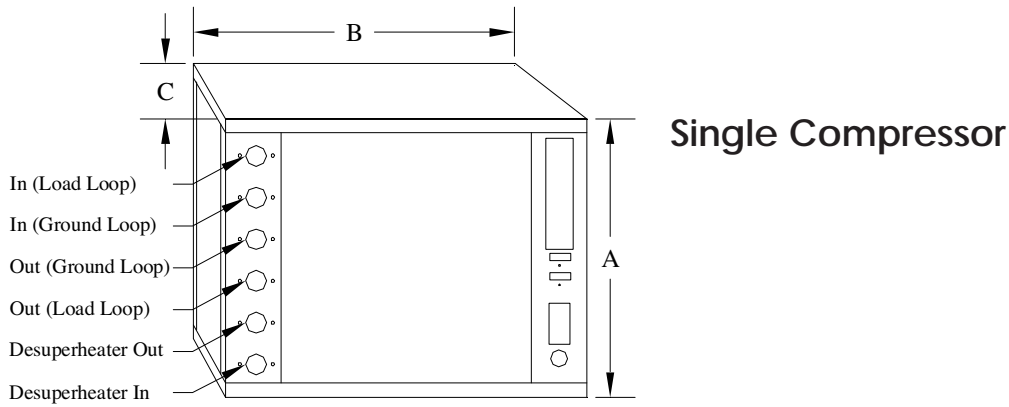
**Desuperheater Package:** Water heating is standard on all residential units (units may be ordered without). It uses excess heat during both heating and cooling cycles, to provide hot water for domestic needs. A desuperheater exchanger (coil) located between the compressor and the reversing valve, extracts superheated vapor to heat domestic water; still satisfying its heating and cooling needs. The water circulation pump comes pre-mounted in all residential units, but must be electrically connected to the master contactor. Leaving it unconnected ensures that the pump is not run without a water supply.

The Desuperheater package can make up to 60% (depending on heat pump usage) of most domestic water needs, but a water heater is still recommended.

**Desuperheater Piping:** All copper tubes & fittings should be 5/8" O.D (1/2" nom) minimum with a maximum of 50ft separation. Piping should be insulated with 3/8" wall closed cell insulation.

**Note:** Copper is the only approved material for piping the desuperheater.

## Section 4: Water-to-Water Equipment Physical Dimensions



Single Compressor Units								
Model	Dimensional Data			Ground Loop**		Load Loop		Weight
	A	B	C	IN	OUT	IN	OUT	
024	20	22	32	0.75"	0.75"	0.75"	0.75"	200
036	24	26	34	1"	1"	1"	1"	280
048	24	26	34	1"	1"	1"	1"	300
060	24	26	36	1"	1"	1"	1"	350
072	24	26	36	1"	1"	1"	1"	350
Dual Compressor Units								
Model	Dimensional Data			Ground Loop		Load Loop		Weight
	A	B	C	IN*	OUT	IN*	OUT	
096	24	30	48	1"	1.25"	1"	1.25"	550
120	24	30	48	1"	1.5"	1"	1.5"	670
144	24	30	48	1"	1.5"	1"	1.5"	670

\* There are two "IN" connections, but only one "Out" connection

\*\* Near future Double O-Ring fittings

## Section 5a: Single Compressor Unit Electrical Data

Model	Power		Compressor		Total Unit FLA	Minimum Circuit Ampacity	Maximum Fuse Size
	Volts	Phase	RLA	LRA			
024	208-230	1	10.6	64.0	10.6	15	20
	208-230	3	7.4	63.0	7.4	10	15
	460	3	3.6	28.0	3.6	5	10
	575	3	2.9	22.5	2.9	5	10
036	208-230	1	16.3	112.0	16.3	20	30
	208-230	3	10.9	88.0	10.9	15	20
	460	3	5.4	44.0	5.4	10	10
	575	3	4.1	34.0	4.1	10	10
048	208-230	1	21.8	134.0	21.8	30	45
	208-230	3	14.4	123.0	14.4	20	25
	460	3	6.2	46.0	6.2	10	10
	575	3	5.0	37.0	5.0	10	10
060	208-230	1	24.7	158.0	24.7	35	55
	208-230	3	16.3	155.0	16.3	20	30
	460	3	8.0	75.0	8.0	10	15
	575	3	6.5	54.0	6.5	10	10
072	208-230	1	25.7	148.0	25.7	35	55
	208-230	3	18.2	149.0	18.2	25	40
	460	3	9.1	75.0	9.1	15	20
	575	3	7.3	54.0	7.3	10	15

**Note:**

Make sure compressors do not run backwards on three phase equipment.



## Section 5b: Dual Compressor Unit Electrical Data

Model	Power		Compressor		Total Unit FLA	Minimum Circuit Ampacity	Maximum Fuse Size
	Volts	Phase	RLA	LRA			
096*	208-230	1	21.8 Each	134.0 Each	43.6	60	80
	208-230	3	14.4 Each	123.0 Each	28.8	40	50
	460	3	6.2 Each	46.0 Each	12.4	20	30
	575	3	5.0 Each	37.0 Each	10.0	20	30
120*	208-230	1	24.7 Each	158.0 Each	49.4	70	90
	208-230	3	16.3 Each	155.0 Each	32.6	40	60
	460	3	8.0 Each	75.0 Each	16.0	20	30
	575	3	6.5 Each	54.0 Each	13.0	20	30
144*	208-230	1	25.7 Each	148.0 Each	51.4	70	90
	208-230	3	18.2 Each	149.0 Each	36.4	50	70
	460	3	9.1 Each	75.0 Each	18.2	25	40
	575	3	7.3 Each	54.0 Each	14.6	20	30

**Note:**

\* 096 thru 144 Models comes with two compressors, separate refrigerant systems. Separate electrical circuits should be installed with these models. 096 thru 144 units may be operated as two-stage equipment in either heating or cooling mode. Make sure compressors do not run backwards on three phase equipment.

## Section 6: Unit Placement

### UNIT PLACEMENT

When installing a geothermal heating and cooling unit, there are several items the installer should consider before placing the equipment.

1. **Service Access.** Is there enough space for service access? A general rule of thumb is at least 2 feet in the front and 2 feet on at least one side.
2. **Unit Air Pad.** All geothermal heating and cooling equipment should be placed on either a formed plastic air pad, or a high density, closed cell polystyrene pad. This helps eliminate vibration noise that could be transmitted through the floor.
3. If units are being placed on racking, the unit must be placed on a solid foundation.
4. The installer has verified that all applicable wiring, piping, and accessories are correct and on the job site.

### PRE-INSTALLATION

Before you fully install the geothermal equipment, it is recommended you go through this quick checklist before placing the equipment.

- Fully inspect the unit after unpacking.
- Locate the Unit Start-Up form from this manual and have it available as the unit installation proceeds.

## Section 7: Unit Piping Installation

### Open Loop Piping

Placement of the components for an open loop system are important when considering water quality and long term maintenance. The water solenoid valve should always be placed on the outlet of the heat pump, which will keep the heat exchanger under pressure when the unit is not operating. If the heat exchanger is under pressure, minerals will stay in suspension. Water solenoid valves are also designed to close against the pressure, not with the pressure. Otherwise, they tend to be noisy when closing.

A flow regulator should be placed after the water solenoid valve. Always check the product specification catalog for proper flow rate. A calculation must be made to determine the flow rate, so that the leaving water temperature does not have the possibility of freezing.

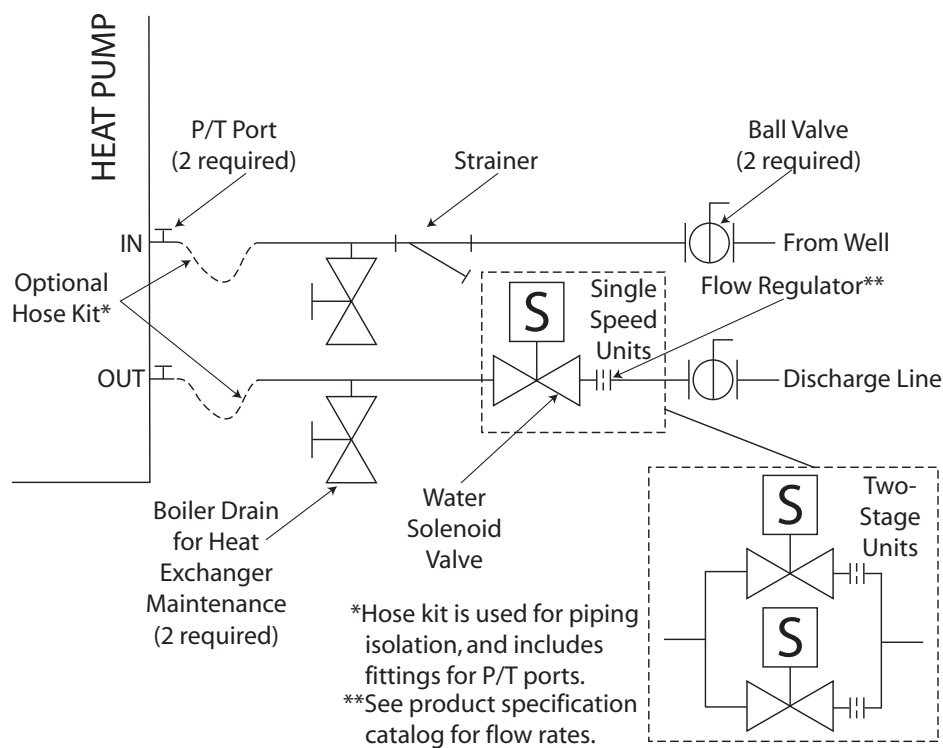
Other necessary components include a strainer, boiler drains for heat exchanger flushing, P/T ports and ball valves. Ball valves allow the water to be shut off for service, and also help when velocity noise is noticeable through the flow regulator. Spreading some of the pressure drop across the ball valves will lessen the

velocity noise. Always double check flow rate at the P/T ports to make sure the ball valve adjustments have not lowered water flow too much, and essentially taken the flow regulator out of the equation. It's a good idea to remove the ball valve handles once the system is completed to avoid nuisance service calls.

Hose kits are optional, but make for an easier installation, since the P/T ports and connections are included. The hose also helps to isolate the heat pump from the piping system.

Two-stage units typically include two water solenoid valves, since the heat pump can operate at lower water flow on first stage, saving water. The flow regulators should be sized so that when one valve is open the unit operates at first stage flow rate, and when both valves are open, the unit operates at full load flow rate. For example, a 4 ton unit needs approximately 4 GPM on first stage, and approximately 7 GPM at full load. The flow regulator after the first valve should be 4 GPM, and the flow regulator after the second valve should be 3 GPM. When both valves are open, the unit will operate at 7 GPM.

Figure 1: Open Loop Piping Example



## Section 7: Unit Piping Installation

### Water Quality

The quality of the water used in geothermal systems is very important. In closed loop systems the dilution water (water mixed with antifreeze) must be of high quality to ensure adequate corrosion protection. Water of poor quality contains ions that make the fluid "hard" and corrosive. Calcium and magnesium hardness ions build up as scale on the walls of the system and reduce heat transfer. These ions may also react with the corrosion inhibitors in glycol based heat transfer fluids, causing them to precipitate out of solution and rendering the inhibitors ineffective in protecting against corrosion. In addition, high concentrations of corrosive ions, such as chloride and sulfate, will eat through any protective layer that the corrosion inhibitors form on the walls of the system.

Ideally, de-ionized water should be used for dilution with antifreeze solutions since de-

ionizing removes both corrosive and hardness ions. Distilled water and zeolite softened water are also acceptable. Softened water, although free of hardness ions, may actually have increased concentrations of corrosive ions and, therefore, its quality must be monitored. It is recommended that dilution water contain less than 100 PPM calcium carbonate or less than 25 PPM calcium plus magnesium ions; and less than 25 PPM chloride or sulfate ions.

In an open loop system the water quality is of no less importance. Due to the inherent variation of the supply water, it should be tested prior to making the decision to use an open loop system. Scaling of the heat exchanger and corrosion of the internal parts are two of the potential problems. The Department of Natural Resources or your local municipality can direct you to the proper testing agency. Please see Table 1 for guidelines.

**Table 1: Water Quality**

Potential Problem	Chemical(s) or Condition	Range for Copper Heat Exchangers	Range for Cupro-Nickel Heat Exchangers
Scaling	Calcium & Magnesium Carbonate	Less than 350 ppm	Less than 350 ppm
Corrosion	pH Range	7 - 9	5 - 9
	Total Dissolved Solids	Less than 1000 ppm	Less than 1500 ppm
	Ammonia, Ammonium Hydroxide	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonium Chloride, Ammonium Nitrate	Less than 0.5 ppm	Less than 0.5 ppm
	Calcium Chloride / Sodium Chloride	Less than 125 ppm	Less than 125 ppm - Note 4
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm
	Hydrogen Sulfide	None Allowed	None Allowed
Biological Growth	Iron Bacteria	None Allowed	None Allowed
	Iron Oxide	Less than 1 ppm	Less than 1 ppm
Erosion	Suspended Solids	Less than 10 ppm	Less than 10 ppm
	Water Velocity	Less than 8 ft/s	Less than 12 ft/s

**Notes:**

1. Hardness in ppm is equivalent to hardness in mg/l
2. Grains/gallon = ppm divided by 17.1
3. Copper and cupro-nickel heat exchangers are not recommended for pool applications for water outside the range of the table. Secondary heat exchangers are required for applications not meeting the requirements shown above.
4. Saltwater applications (approx. 25,000 ppm) require secondary heat exchangers due to copper piping between the heat exchanger and the unit fittings.

## Section 7: Unit Piping Installation

### Interior Piping

All interior piping must be sized for proper flow rates and pressure loss. Insulation should be used on all inside piping when minimum loop temperatures are expected to be less than 50°F. Use the table below for insulation sizes with different pipe sizes. All pipe insulation should be a closed cell and have a minimum wall thickness of 3/8". All piping insulation should be glued and sealed to prevent condensation and dripping. Interior piping may consist of the following materials: HDPE, copper, brass, or rubber hose (hose kit only). **PVC is not allowed on pressurized systems.**

**Table 2: Pipe Insulation**

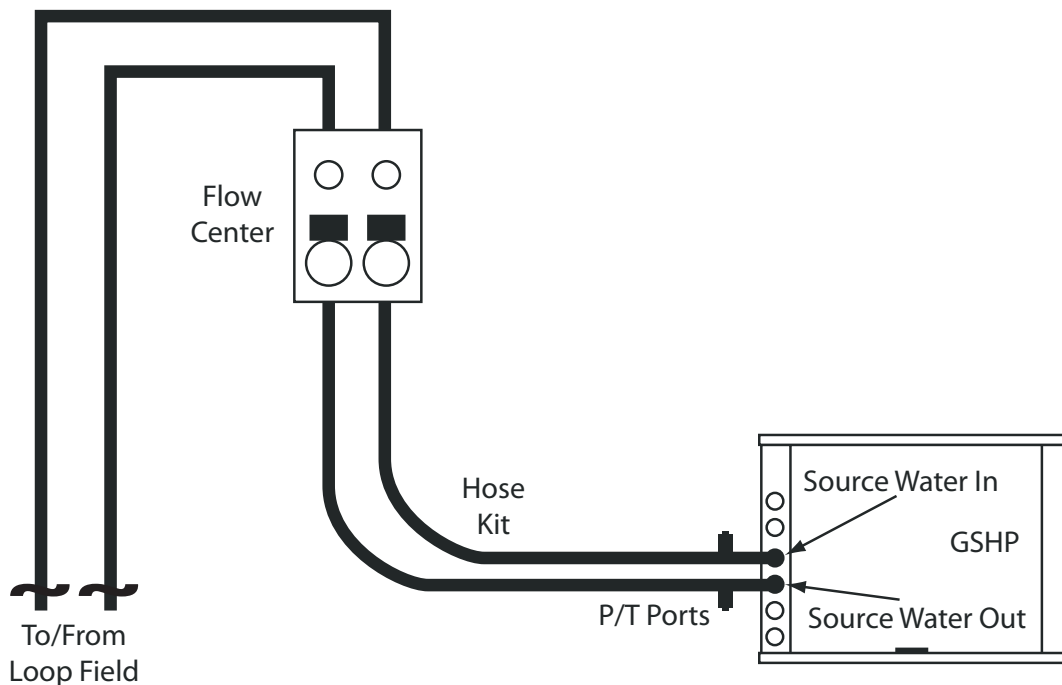
Piping Material	Insulation Description
1" IPS Hose	1-3/8" ID - 3/8" Wall
1" IPS PE	1-1/4" ID - 3/8" Wall
1-1/4" IPS PE	1-5/8" ID - 3/8" Wall
2" IPS PD	2-1/8" ID - 3/8" Wall

### Typical Pressurized Flow Center Installation

The flow centers are insulated and contain all flushing and circulation connections for residential and light commercial earth loops that require a flow rate of no more than 20 gpm. 1-1/4" fusion x 1" double o-ring fittings (AGA6PES) are furnished with the AGFC\_A flow centers for HDPE loop connections. Various fittings are available for the AGFC\_A flow centers for different connections. A typical installation will require the use of a hose kit. Hose kits AGHK\_A come with the AGA5INS adapter to transition from the AGFC\_A double o-ring connection to 1" hose connection.

*Note:* AGFC\_B flow centers all have 1" FPT connections. AGHK\_B hose kits come with the AGBA55 adapter needed to transition from 1" FPT to 1" hose.

**Figure 2: Typical Single Unit Piping Connection (Pressurized Flow Center)**



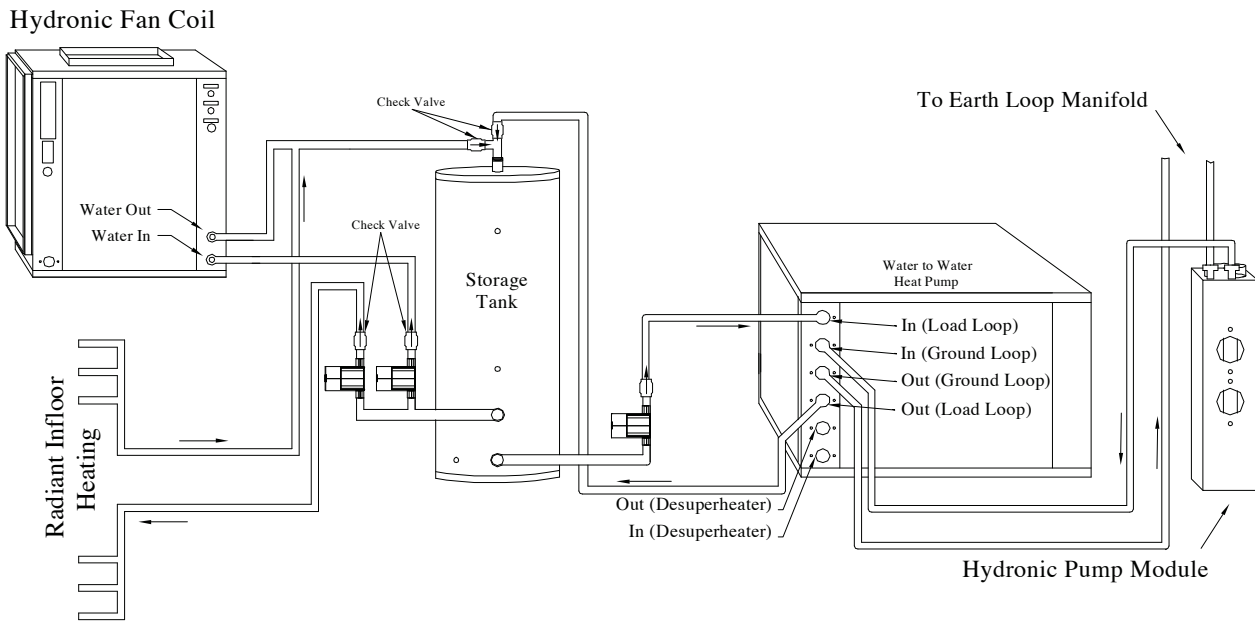
## Section 7: Unit Piping Installation

### Typical Non-Pressurized Flow Center Installation

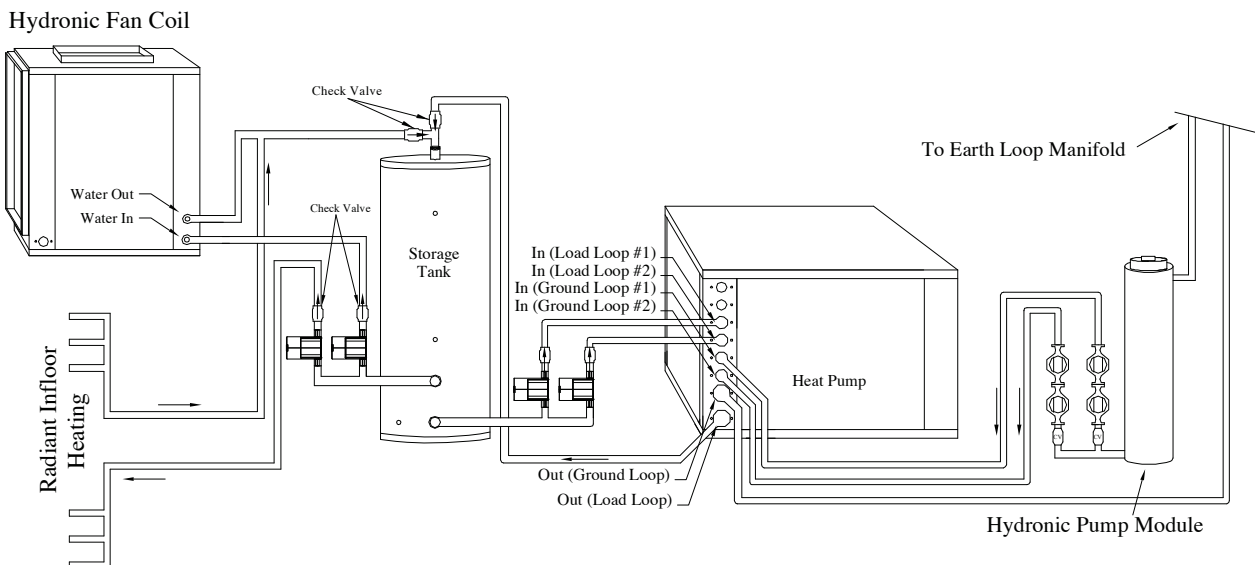
Standing column flow centers are designed to operate with no static pressure on the earth loop. The design is such that the column of water in the flow center is enough pressure to prime the pumps for proper system operation and pump reliability. The flow center does have a cap/seal, so it is still a closed system, where the fluid will not evaporate. If the earth loop header is external, the loop system will still need to be

flushed with a purge cart. The non-pressurized flow center needs to be isolated from the flush cart during flushing because the flow center is not designed to handle pressure. Since this is a non-pressurized system, the interior piping can incorporate all the above-mentioned pipe material options (see interior piping), including PVC. The flow center can be mounted to the wall with the included bracket or mounted on the floor as long as it is properly supported.

**Figure 3: Typical Single Compressor Unit Piping Connection (Non-Pressurized Flow Center)**

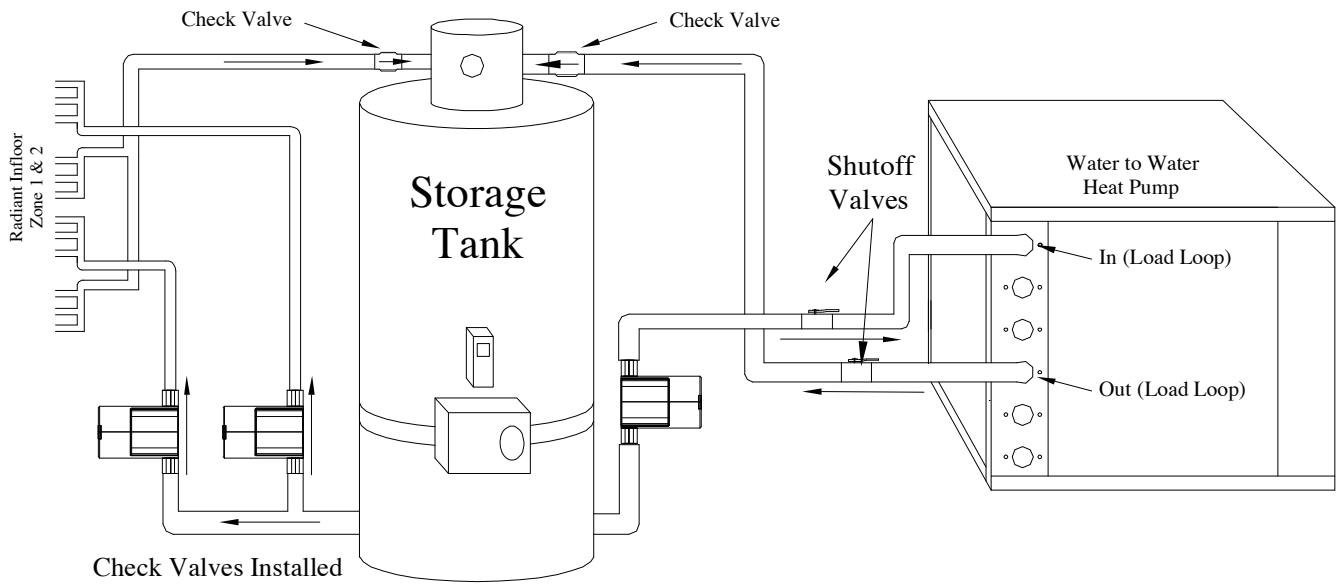


**Figure 4: Typical Dual Compressor Unit Piping Connection (Non-Pressurized Flow Center)**



## Section 7: Unit Piping Installation

Figure 5: Typical Storage Tank Piping For Radiant Floor Heating



## Section 8: Antifreeze

### Antifreeze Overview

In areas where minimum entering loop temperatures drop below 40°F, or where piping will be routed through areas subject to freezing, antifreeze is required. Alcohols and glycols are commonly used as antifreeze. However, local and state/provincial codes supersede any instructions in this document. The system needs antifreeze to protect the coaxial heat exchanger from freezing and rupturing. Freeze protection should be maintained to 15°F below the lowest expected entering loop temperature. For example, if 30°F is the minimum expected entering loop temperature, the leaving loop temperature could be 22 to 25°F. Freeze protection should be set at 15°F (30-15 = 15°F). To determine antifreeze requirements, calculate how much volume the system holds. Then, calculate how much antifreeze will be needed by determining the percentage of antifreeze required for proper freeze protection. See Tables 3 and 4 for volumes and percentages. The freeze protection should be checked during installation using the proper hydrometer to measure the specific gravity and freeze protection level of the solution.

### Antifreeze Characteristics

Selection of the antifreeze solution for closed loop systems require the consideration of many important factors, which have long-term implications on the performance and life of the equipment. Each area of concern leads to a different "best choice" of antifreeze. *There is no "perfect" antifreeze.* Some of the factors to consider are as follows (Brine = antifreeze solution including water):

**Safety:** The toxicity and flammability of the brine (especially in a pure form).

**Cost:** Prices vary widely.

**Thermal Performance:** The heat transfer and viscosity effect of the brine.

**Corrosiveness:** The brine must be compatible with the system materials.

**Stability:** Will the brine require periodic change out or maintenance?

**Convenience:** Is the antifreeze available and easy to transport and install?

**Codes:** Will the brine meet local and state/provincial codes?

The following are some general observations about the types of brines presently being used:

**Methanol:** Wood grain alcohol that is considered toxic in pure form. It has good heat transfer, low viscosity, is non-corrosive, and is mid to low price. The biggest down side is that it is flammable in concentrations greater than 25%.

**Ethanol:** Grain alcohol, which by the ATF (Alcohol, Tobacco, Firearms) department of the U.S. government, is required to be denatured and rendered unfit to drink. It has good heat transfer, mid to high price, is non-corrosive, non-toxic even in its pure form, and has medium viscosity. It also is flammable with concentrations greater than 25%. Note that the brand of ethanol is very important. Make sure it has been formulated for the geothermal industry. Some of the denaturants are not compatible with HDPE pipe (for example, solutions denatured with gasoline).

**Propylene Glycol:** Non-toxic, non-corrosive, mid to high price, poor heat transfer, high viscosity when cold, and can introduce micro air bubbles when adding to the system. It has also been known to form a "slime-type" coating inside the pipe. Food grade glycol is recommended because some of the other types have certain inhibitors that react poorly with geothermal systems. A 25% brine solution is a minimum required by glycol manufacturers, so that bacteria does not start to form.

**Ethylene Glycol:** Considered toxic and is not recommended for use in earth loop applications.

**GS4 (POTASSIUM ACETATE):** Considered highly corrosive (especially if air is present in the system) and has a very low surface tension, which causes leaks through most mechanical fittings. This brine is not recommended for use in earth loop applications.



## Section 8: Antifreeze

### Notes:

1. Consult with your representative or distributor if you have any questions regarding antifreeze selection or use.
2. All antifreeze suppliers and manufacturers recommend the use of either de-ionized or distilled water with their products.

### Antifreeze Charging

Calculate the total amount of pipe in the system and use Table 3 to calculate the amount of volume for each specific section of the system. Add the entire volume together, and multiply that volume by the proper antifreeze percentage needed (Table 4) for the freeze protection required in your area. Then, double check calculations during installation with the proper hydrometer and specific gravity chart (Figure 6) to determine if the correct amount of antifreeze was added.

Table 3: Pipe Fluid Volume

Type	Size	Volume Per 100ft US Gallons
Copper	1" CTS	4.1
Copper	1.25" CTS	6.4
Copper	1.5" CTS	9.2
HDPE	.75 SDR11	3.0
HDPE	1" SDR11	4.7
HDPE	1.25" SDR11	7.5
HDPE	1.5: SDR11	9.8
HDPE	2" SDR11	15.4

Additional component volumes:

Unit coaxial heat exchanger = 1 Gallon

Flush Cart = 8-10 Gallons

10' of 1" Rubber Hose = 0.4 Gallons

## ⚠ CAUTION ⚠

Use extreme care when opening, pouring, and mixing flammable antifreeze solutions. Remote flames or electrical sparks can ignite undiluted antifreezes and vapors. Use only in a well ventilated area. Do not smoke when handling flammable solutions. Failure to observe safety precautions may result in fire, injury, or death. Never work with 100% alcohol solutions.

## Section 8: Antifreeze

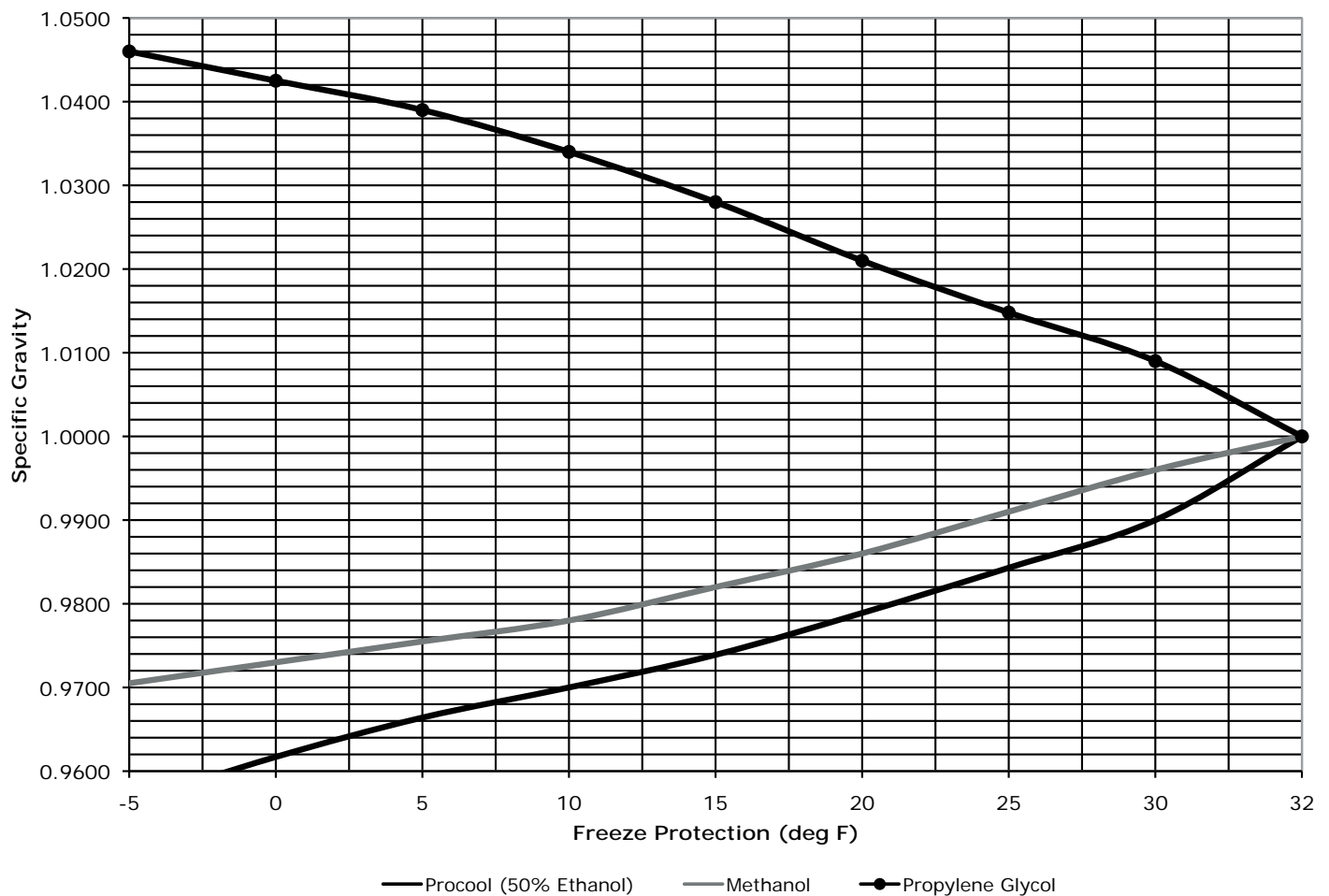
Table 4: Antifreeze Percentages by Volume

Type of Antifreeze	Minimum Temperature for Freeze Protection			
	10°F (-12.2°C)	15°F (-9.4°C)	20°F (-6.7°C)	25°F (-3.9°C)
ProCool (Ethanol)	25%	22%	17%	12%
Methanol	25%	21%	16%	10%
Propylene Glycol	38%	30%	22%	15%

All antifreeze solutions are shown in pure form - not premixed

**NOTE:** Most manufacturers of antifreeze solutions recommend the use of de-ionized water. Tap water may include chemicals that could react with the antifreeze solution.

Figure 6: Antifreeze Specific Gravity



## Section 9: Desuperheater Installation

### Desuperheater Installation

Units that ship with the desuperheater function also ship with a connection kit.

**Note:** Desuperheater capacity is based on 0.4 GPM Flow per nominal ton at 90°F entering hot water temperature.

**Note:** Units that are shipped with a desuperheater do not have the desuperheater pump wires connected to the electrical circuit, to preclude accidentally running the pump while dry. Pump has to be connected to the electric circuit (master contactor) when the lines from the water heater are installed & air is removed.

#### CONTENTS OF THE DESUPERHEATER FITTING KIT:

- (1) p/n 23-23-0024-001, Installation Instructions
- (1) p/n 11-08-0004-001, 3/4"x 3/4"x 3/4" FPT Brass Tee
- (1) p/n 11-08-0003-001, 3/4" Boiler Drain Valve
- (1) p/n 11-08-0005-001, 3/4" MPT x 3-1/2" Brass Nipple
- (3) p/n 11-08-0006-001, 1/2" SWT x 3/4" MPT Copper Adaptor
- (1) p/n 11-08-0007-001, 3/4" x 3/4" x 1/2" SWT Copper Tee

#### Plumbing Installation:

**NOTE: All plumbing and piping connections must comply with local plumbing codes.**

*TIP: Measure the distance above the floor or shelf that the water heater is setting on, to where the drain valve is located. This distance must be greater than one-half the width of the tee you're about to install, or you won't be able to thread the tee on to the water heater.*

**Note:** Copper is the only material approved for piping the desuperheater.

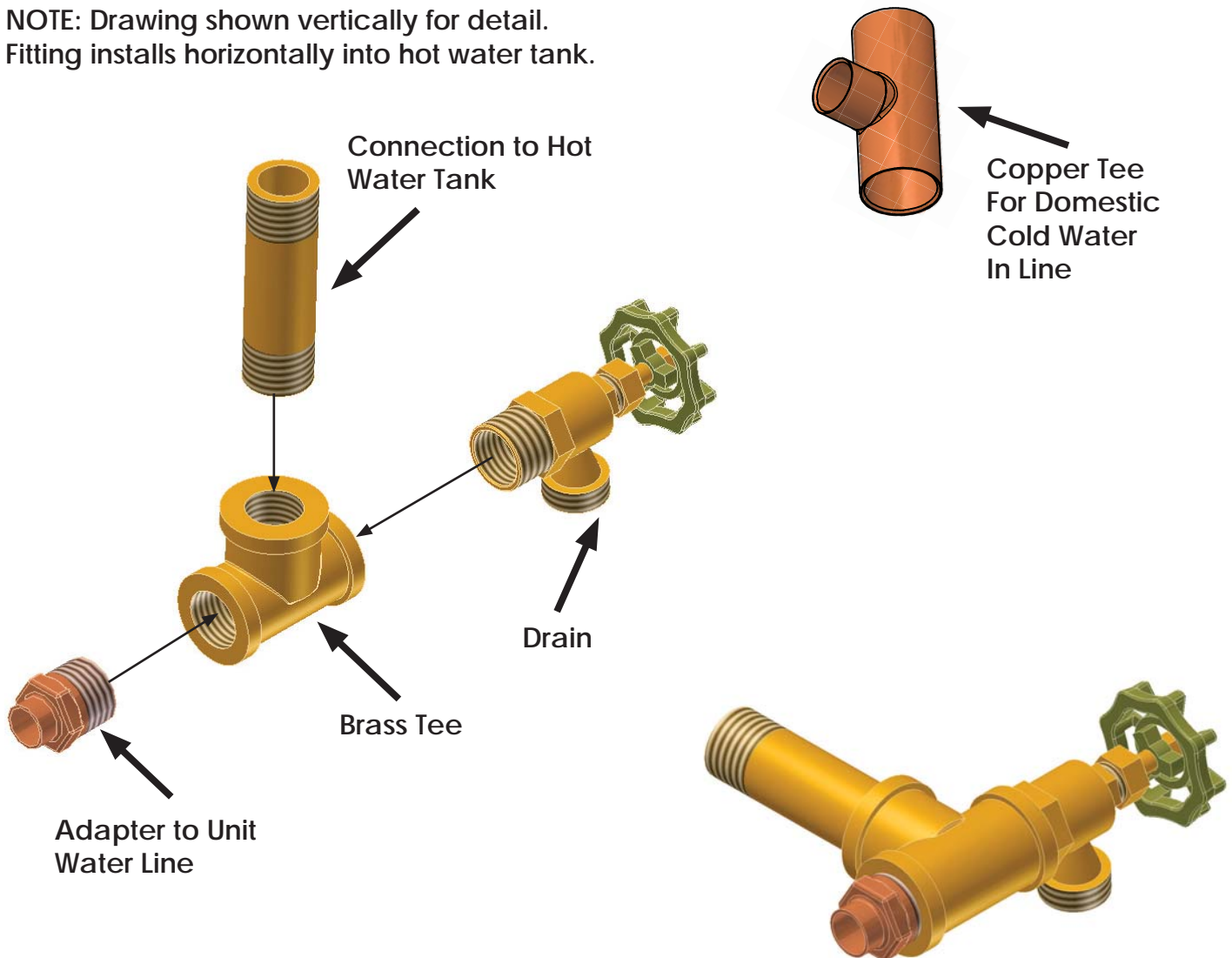
1. Disconnect electricity to water heater.
2. Turn off water supply to water heater.
3. Drain water heater. Open pressure relief valve.
4. Remove drain valve and fitting from water heater.
5. Thread the 3/4" MPT x 3-1/2" nipple into the water heater drain port. Use Teflon tape, or pipe dope on threads.
6. Thread the center port of the 3/4" brass tee to the other end of the nipple.
7. Thread one of the copper adaptors into the end of the tee closest to the heat pump.
8. Thread the drain valve into the other end of the nipple. See Figure 7.
9. Above the water heater, cut the incoming cold water line. Remove a section of that line to enable the placement of the copper tee.
10. Insert the copper tee in the cold water line. See Figure 8.
11. Thread the remaining two 1/2" SWT x 3/4" MPT copper adaptors into the 3/4" FPT fittings on the heat pump, marked HOT WATER IN and HOT WATER OUT.
12. Run interconnecting 1/2" copper pipe from the HOT WATER OUT on the heat pump, to the copper adaptor located on the tee at the bottom of the water heater (Step 7).
13. Run interconnecting 1/2" copper pipe from the HOT WATER IN on the heat pump, to the copper tee in the cold water line (Step 10).
14. Install an air vent fitting at the highest point of the line from step 13 (assuming it's the higher of the two lines from the heat pump to the water heater). See Figure 8.
15. Turn the water supply to the water heater on. Fill water heater.

## Section 9: Desuperheater Installation

16. Flush the interconnecting lines, and check for leaks.
17. Install 3/8" closed cell insulation on the lines connecting the heat pump to the water heater.
18. Reconnect electricity to water heater.

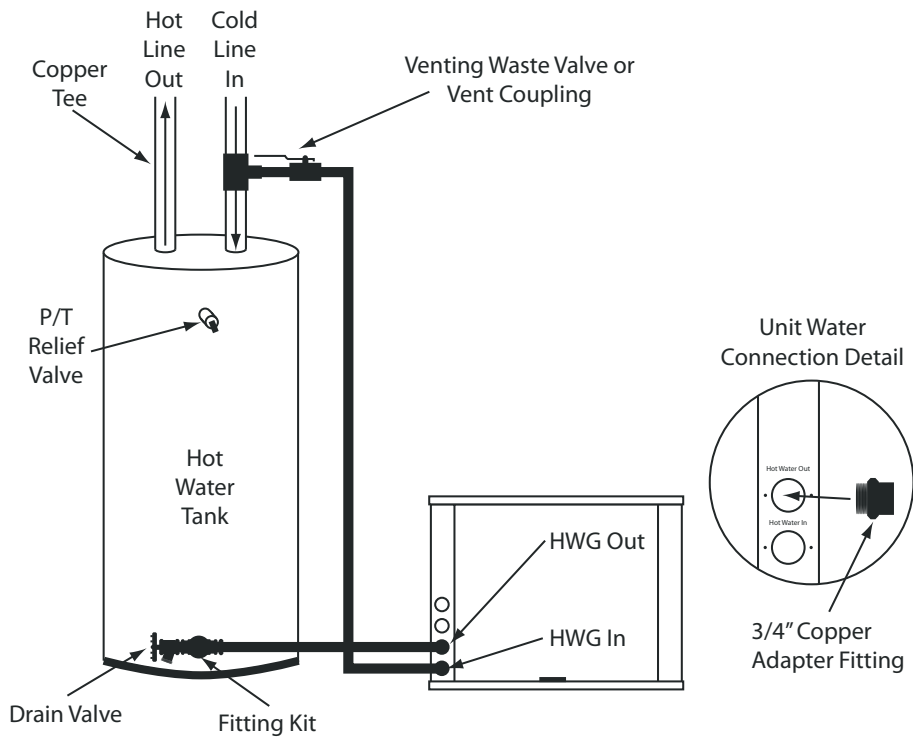
**Figure 7: Water Heater Connection Kit Assembly for Bottom of Water Heater**

**NOTE:** Drawing shown vertically for detail. Fitting installs horizontally into hot water tank.

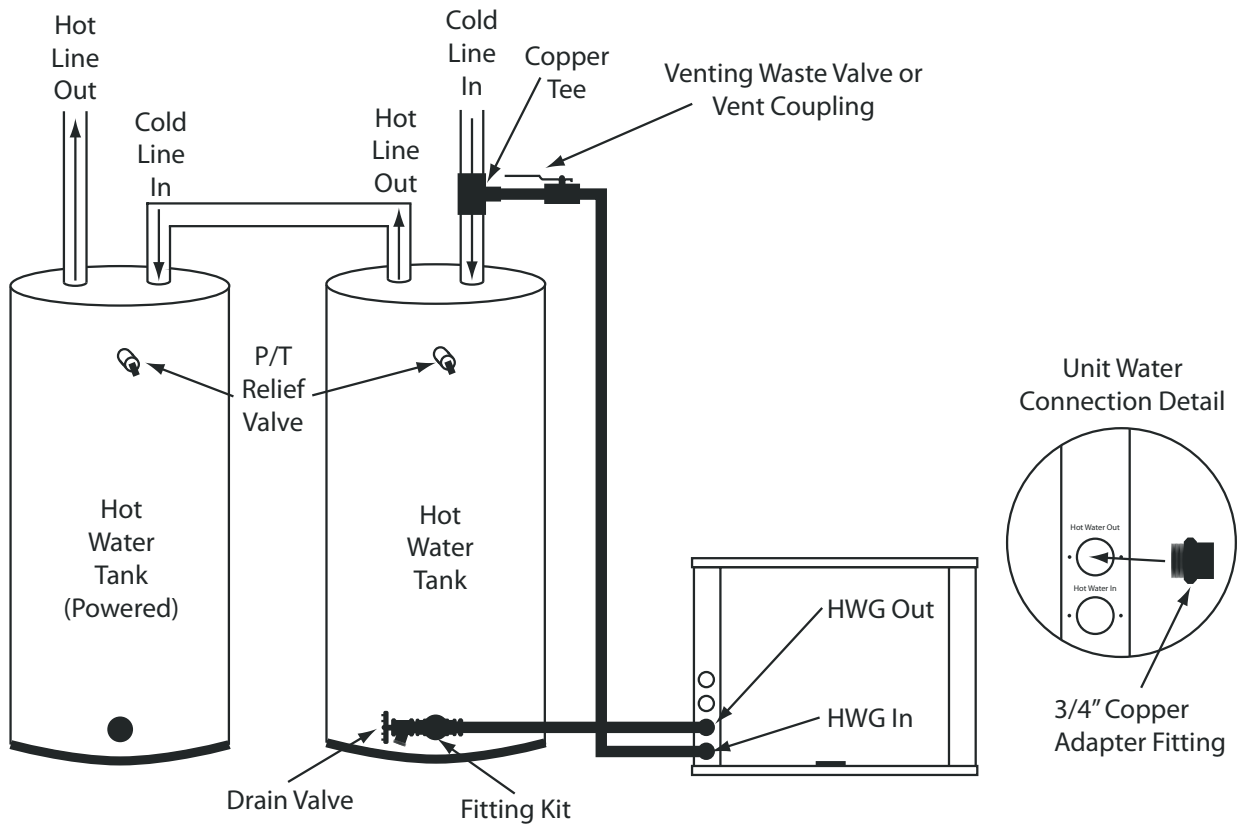


## Section 9: Desuperheater Installation

### Figure 8: Typical Desuperheater Installation

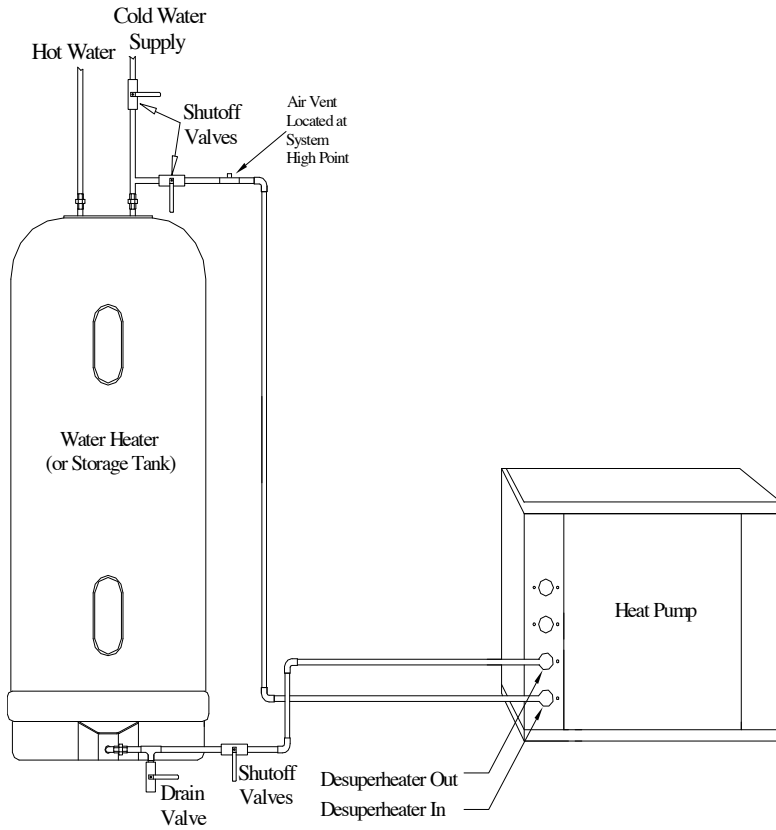


### Figure 9: Desuperheater Installation in Preheat Tank

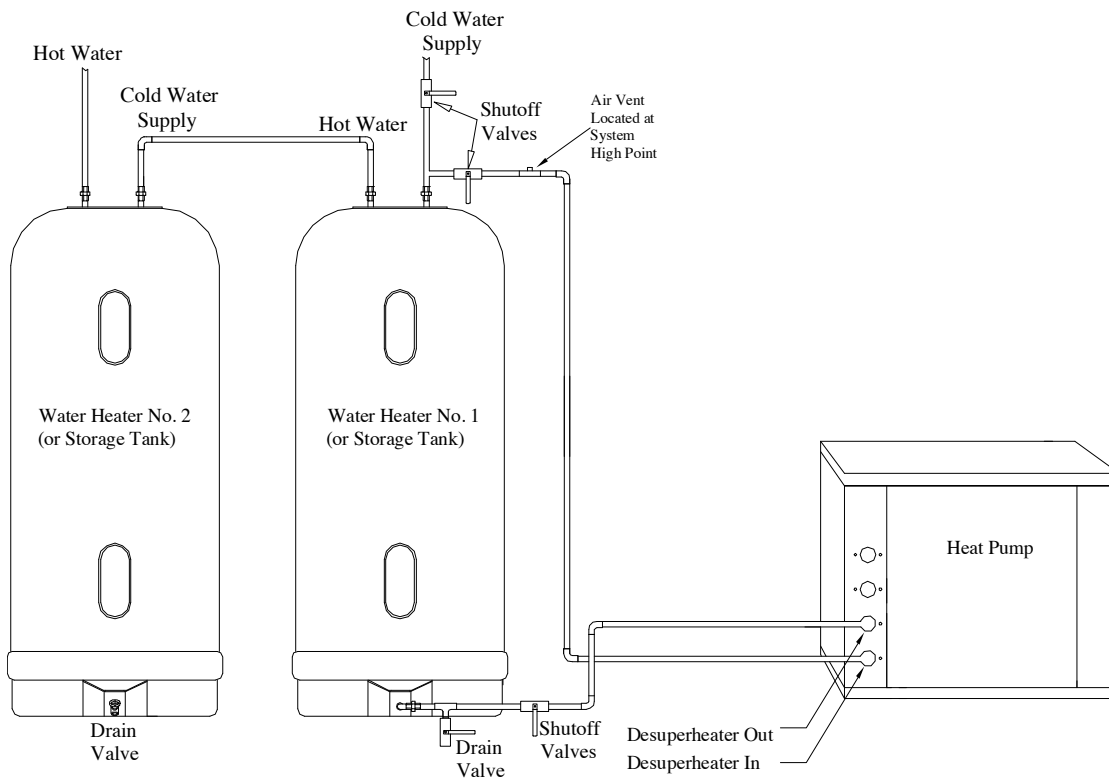


## Section 9: Desuperheater Installation

### Figure 10: Typical Desuperheater Installation using Marathon Hot Water Tanks



### Figure 11: Desuperheater Installation in Preheat Tank using Marathon Hot Water Tanks



## Section 10: Controls

### 01CB28 CONTROL BOARD (SINGLE STAGE UNITS AND TWO COMPRESSOR UNITS)

(01CB28) is a microprocessor-based printed circuit board. It is located in the unit control box for convenient accessibility. This control board is specially design for the geothermal unit. The Board provides control of the unit as well as outputs for status modes, faults and diagnostics.

#### Startup

The unit will not operate until all inputs and safety controls are checked for normal conditions.

#### Fault Retry & Diagnostics

All faults are retried three times, with 5 minute delay between each attempt, before finally locking the unit out.

- 1 Blink for high pressure switch
- 2 Blinks for low pressure switch
- 3 Blinks for flow switch

#### Safety Controls

The control receives separate signals for a high pressure switch for safety, a low pressure switch to prevent loss/lo refrigerant charge damage & a flow switch for freeze protection.

#### Testing

The control allows service personal to shorten timing delays for fast diagnostics. If jumper is set to "No" positions, timing is set to standard. If jumper is set to "Yes" position; timing is reduced for service and startup.

#### Flow Switch (Freeze Protection) Operation

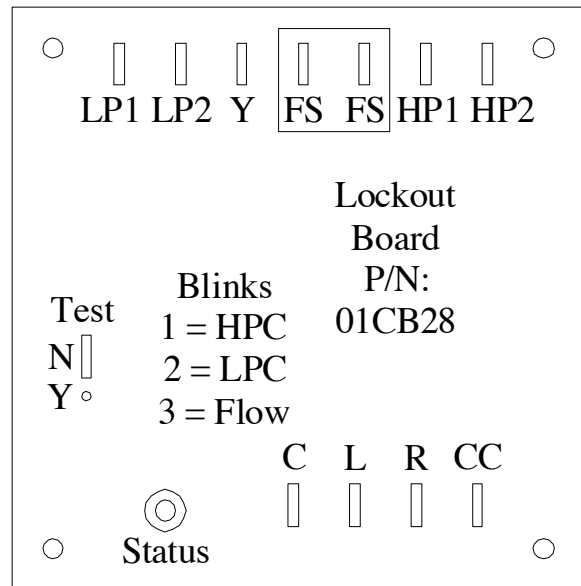
When 24vac is applied to the Y terminal, the control monitors the flow switch input. If the flow switch opens (no water flow), the control board will energize the compressor contactor, and start the compressor, after the random start is over. If the flow switch is still open after the 30 seconds, the control will de-energize the compressor contactor. The control board won't start the sequence again unless the flow switch closes. If the flow switch opens while the compressor is energized, the control board will keep the compressor contactor energized for a minimum time period of 30 seconds. After 30 seconds, the control board will de-energize the compressor contactor and go into a soft lockout. The control board will

not energize the compressor contactor unless the flow switch closes and the anti-short cycle time has expired. If the flow switch opens three times within 1 hour, the control board will go into manual lockout and the fault indicator will energize. When the flow switch is open, or if in lockout mode, the status led on the control board will blink, three times.

#### Anti-Short Cycle Operation

If all safety controls are satisfactory, the compressor contactor will energize when the control board receives 24VAC on the thermostat input "Y" terminal. If 24VAC on the "Y" terminal is removed, the control board will de-energize the compressor contactor and go into a 300 second anti-short cycle. If 24VAC is reapplied to the "Y" terminal again, the control board will not energize the compressor contactor until after the 300 second anti-short cycle is over.

Figure 12: Single Stage Lockout Board



LP1 - Low Pressure  
 LP2 - Low Pressure  
 Y - H/C Call  
 FS - Flow Switch  
 FS - Flow Switch  
 SS - Contactor

HP1 - High Pressure  
 HP2 - High Pressure  
 C - Common  
 L - Fault  
 R - Power

## Section 10: Controls

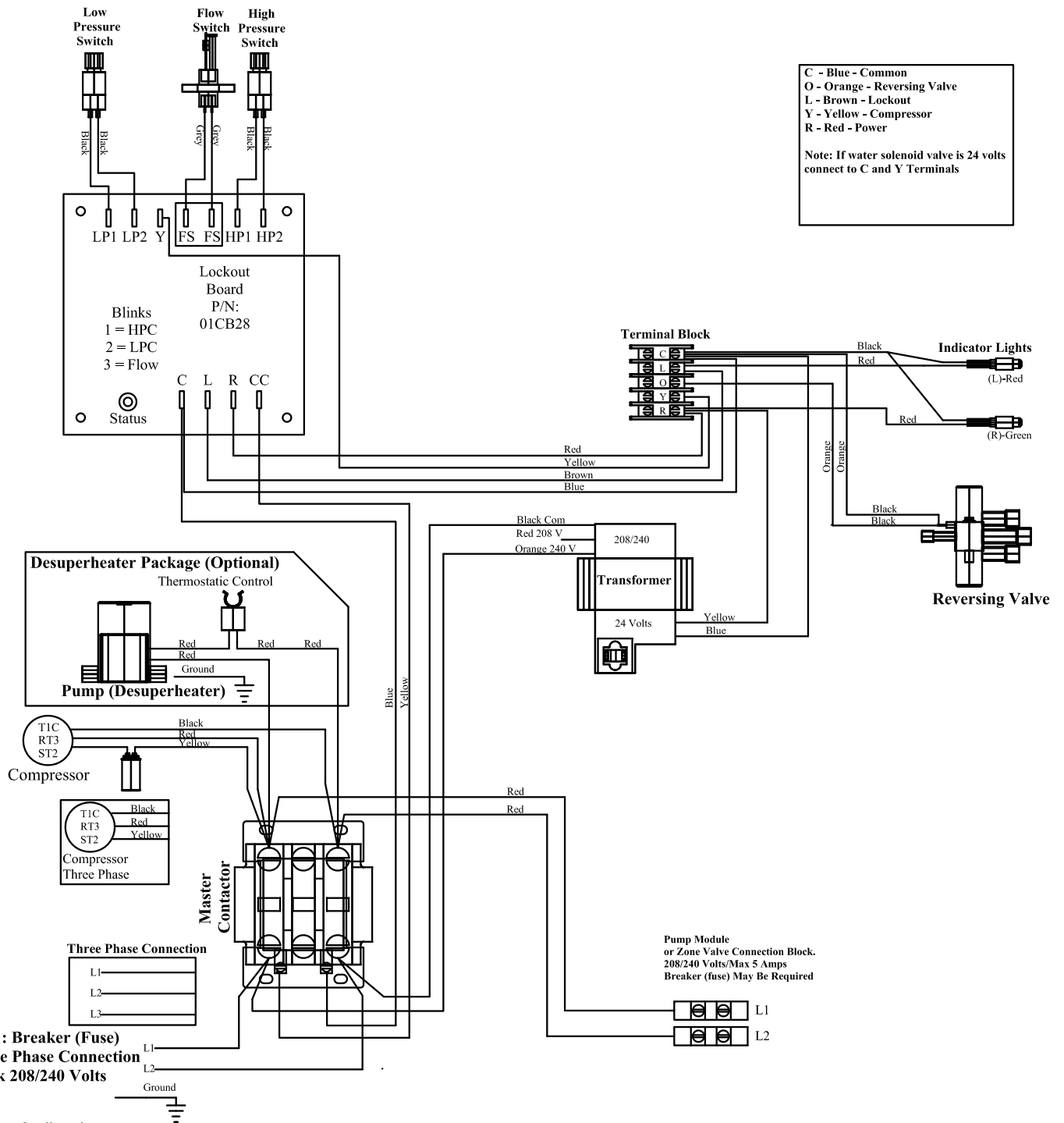
### High & Low Pressure Safety Operation

When 24vac is applied to the "Y" terminal, the control board monitors the high and low pressure switch input to make sure that they are closed. The control board won't start the sequence unless the high & Low pressure switch are closed. If the high or low pressure switch opens while the compressor contactor is energized, the control will de-energize the compressor contactor and go into a soft lockout. The control board will not energize the compressor contactor unless the high or low pressure switch closes and the anti-short cycle time has expired. If the high or low pressure switch opens three times with in 1 hour, the control board will go into manual lockout and the fault contact will energize. When the high or low pressure switch opens or if in lockout mode, the status led on the control board will board will blink, one for high, and two for low pressure switch.



# Section 10: Controls

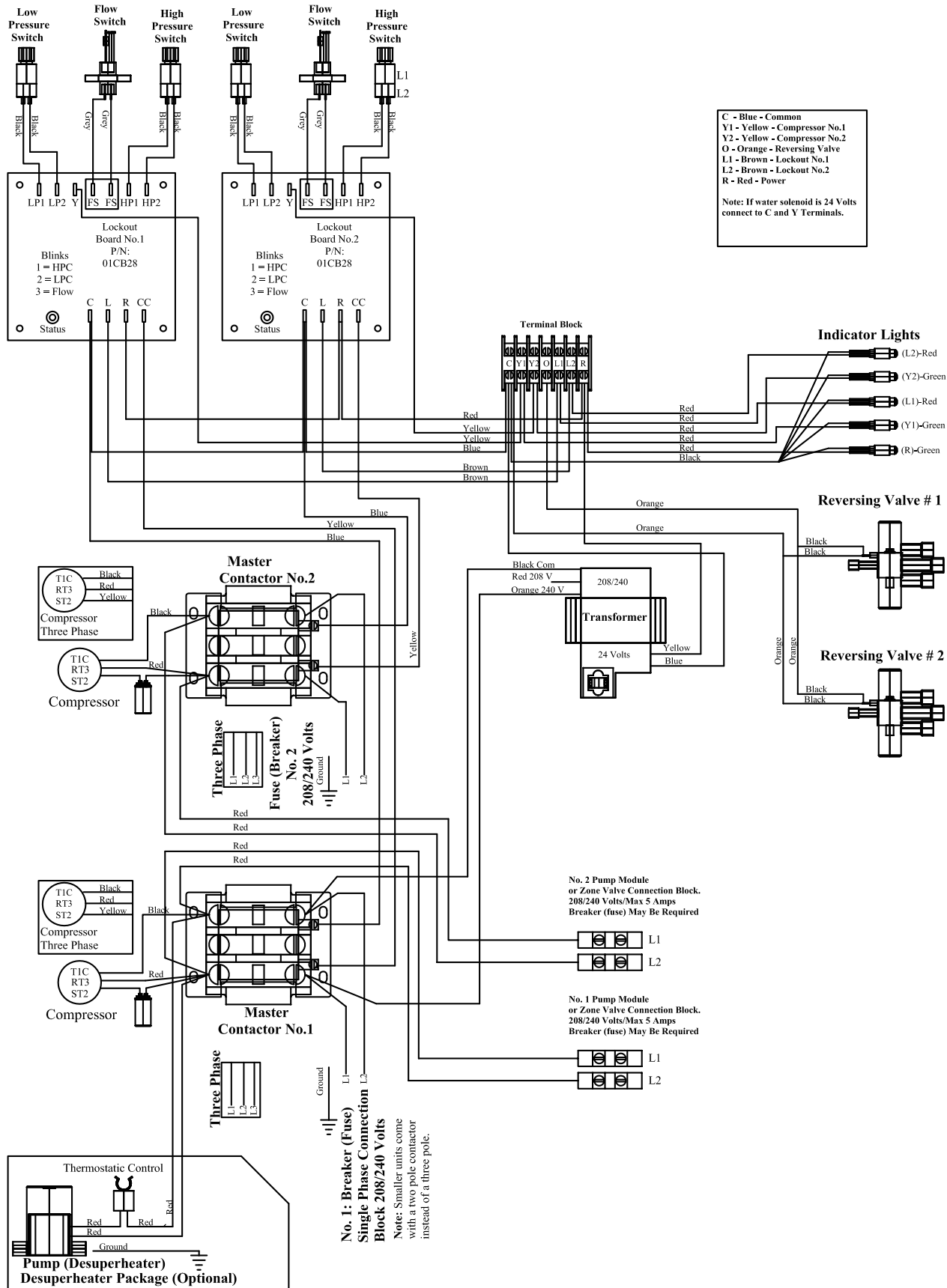
## Single Compressor Unit Wiring Diagram



Note: Smaller units come with a two pole contactor instead of a three pole.

Section 10: Controls

Dual Compressor Unit Wiring Diagram



## Section 11: Accessories

### AP SMA PUMP SHARING MODULE

The pump sharing module, part number APSMA, is designed to allow two units to share one flow center. With the APSMA module, either unit can energize the pump(s). Connect the units and flow center as shown in Figure 13, below. Figure 14 includes a schematic of the board. The module must be mounted in a NEMA enclosure or inside the unit control box. Local code supersedes any recommendations in this document.

Figure 13: APSMA Module Layout

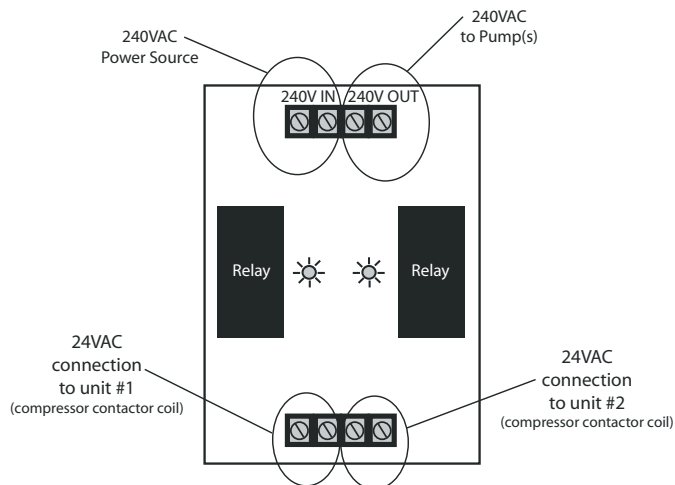
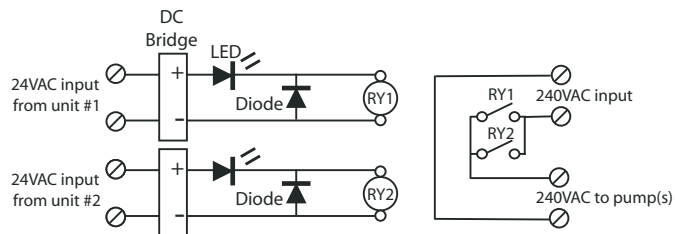


Figure 14: APSMA Module Wiring Schematic



## Section 12: Troubleshooting

**Table 5: Two-Stage Unit Heat of Extraction/Rejection Data (Full Load)**

Two-Stage (Dual Systems) Water-to-Water Units (95°F ELT Heating; 45°F ELT Cooling)							
Heat of Extraction/Rejection-Full Load Operation* (Mbtuh) -- DSP Disconnected							
EWT	Flow Rate	096		120		144	
°F	GPM/Ton	HE	HR	HE	HR	HE	HR
30	1.5	57.8		64.7		79.4	
	2.25	60.2		67.3		82.7	
	3	61.7		68.9		84.7	
50	1.5	80.8	113.0	90.3	126.3	110.9	155.1
	2.25	84.9	113.2	94.8	126.5	116.5	155.4
	3	87.0	113.9	97.3	127.3	119.4	156.4
70	1.5	102.1	109.8	114.1	122.8	140.1	150.8
	2.25	107.6	110.4	120.2	123.4	147.6	151.5
	3	110.9	111.0	124.0	124.0	152.2	152.3
90	1.5	120.2	105.8	134.4	118.2	165.0	145.1
	2.25	127.7	106.3	142.7	118.8	175.2	145.9
	3	132.2	106.5	147.7	119.0	181.4	146.2
110	1.5		100.7		112.6		138.3
	2.25		100.9		112.8		138.5
	3		100.9		112.8		138.5

\* Full load/high heating or cooling (both compressors operating)

**Table 6: Two-Stage Unit Heat of Extraction/Rejection Data (Part Load)**

Two-Stage (Dual Systems) Water-to-Water Units (95°F ELT Heating; 45°F ELT Cooling)							
Heat of Extraction/Rejection-Part Load Operation** (Mbtuh) -- DSP Disconnected							
EWT	Flow Rate	096		120		144	
°F	GPM/Ton	HE	HR	HE	HR	HE	HR
30	1.5	28.9		32.3		39.7	
	2.25	30.1		33.7		41.3	
	3	30.8		34.5		42.3	
50	1.5	40.4	56.5	45.2	63.1	55.4	77.5
	2.25	42.4	56.6	47.4	63.3	58.2	77.7
	3	43.5	57.0	48.6	63.7	59.7	78.2
70	1.5	51.0	54.9	57.0	61.4	70.1	75.4
	2.25	53.8	55.2	60.1	61.7	73.8	75.8
	3	55.5	55.5	62.0	62.0	76.1	76.2
90	1.5	60.1	52.9	67.2	59.1	82.5	72.6
	2.25	63.8	53.2	71.3	59.4	87.6	73.0
	3	66.1	53.2	73.9	59.5	90.7	73.1
110	1.5		50.4		56.3		69.1
	2.25		50.5		56.4		69.3
	3		50.5		56.4		69.3

\*\* Part load/low heating or cooling (one compressor operating)

## Section 12: Troubleshooting

**Table 7: Two-Stage Unit Heat Exchanger Pressure Drop (Full Load)**

Two-Stage (Dual Systems) Water-to-Water Units						
Heat Exchanger Pressure Drop						
Full Load Operation*		Pressure Drop at Entering Water Temp. Listed Below				
Model	Flow Rate GPM	30°F PSI	50°F PSI	70°F PSI	90°F PSI	110°F PSI
096	14.5	2.2	2.0	2.0	1.9	1.8
	20.2	4.0	3.7	3.6	3.3	3.3
	26.0	6.5	6.0	5.8	5.3	5.3
120	15.6	2.3	2.1	2.1	2.0	1.9
	21.8	4.3	4.0	3.8	3.5	3.5
	28.0	6.8	6.4	6.1	5.6	5.5
144	17.8	2.3	2.2	2.2	2.0	2.0
	24.9	4.4	4.1	3.9	3.6	3.6
	32.0	7.0	6.6	6.2	5.8	5.7

\* Full load/high heating or cooling (both compressors operating)

**Table 8: Two-Stage Unit Heat Exchanger Pressure Drop (Part Load)**

Two-Stage (Dual Systems) Water-to-Water Units						
Heat Exchanger Pressure Drop						
Part Load Operation**		Pressure Drop at Entering Water Temp. Listed Below				
Model	Flow Rate GPM	30°F PSI	50°F PSI	70°F PSI	90°F PSI	110°F PSI
096	7.2	2.1	2.0	2.0	1.8	1.8
	10.1	3.9	3.6	3.5	3.2	3.2
	13.0	6.3	5.9	5.6	5.2	5.1
120	8.3	2.2	2.0	2.0	1.9	1.8
	11.7	4.0	3.7	3.6	3.3	3.3
	15.0	6.5	6.0	5.8	5.3	5.3
144	10.0	2.2	2.0	2.0	1.9	1.8
	14.0	4.0	3.7	3.6	3.3	3.3
	18.0	6.5	6.0	5.8	5.3	5.3

\*\* Part load/low heating or cooling (one compressor operating)

## Section 12: Troubleshooting

### Table 9: Single Stage Unit Heat of Extraction/Rejection Data

Single-Stage Water-to-Water Units (95°F ELT Heating; 45°F ELT Cooling)											
Heat of Extraction/Rejection-Full Load Operation (Mbtuh) -- DSP Disconnected											
EWT °F	Flow Rate GPM/Ton	024		036		048		060		072	
		HE	HR	HE	HR	HE	HR	HE	HR	HE	HR
30	1.5	13.6		20.4		28.9		32.3		39.7	
	2.25	14.2		21.3		30.1		33.7		41.3	
	3	14.5		21.8		30.8		34.5		42.3	
50	1.5	19.0	26.6	28.5	39.9	40.4	56.5	45.2	63.1	55.4	77.5
	2.25	20.0	26.6	30.0	39.9	42.4	56.6	47.4	63.3	58.2	77.7
	3	20.5	26.8	30.7	40.2	43.5	57.0	48.6	63.7	59.7	78.2
70	1.5	24.0	25.8	36.0	38.8	51.0	54.9	57.0	61.4	70.1	75.4
	2.25	25.3	26.0	38.0	39.0	53.8	55.2	60.1	61.7	73.8	75.8
	3	26.1	26.1	39.1	39.2	55.5	55.5	62.0	62.0	76.1	76.2
90	1.5	28.3	24.9	42.4	37.3	60.1	52.9	67.2	59.1	82.5	72.6
	2.25	30.0	25.0	45.1	37.5	63.8	53.2	71.3	59.4	87.6	73.0
	3	31.1	25.1	46.7	37.6	66.1	53.2	73.9	59.5	90.7	73.1
110	1.5		23.7		35.6		50.4		56.3		69.1
	2.25		23.7		35.6		50.5		56.4		69.3
	3		23.7		35.6		50.5		56.4		69.3

## Section 12: Troubleshooting

Table 10: Single Stage Unit Heat Exchanger Pressure Drop

Single-Stage Water-to-Water Units						
Heat Exchanger Pressure Drop						
Model	Flow Rate GPM	Pressure Drop at Entering Water Temp Listed Below				
		30°F PSI	50°F PSI	70°F PSI	90°F PSI	110°F PSI
024	3.3	1.4	1.3	1.3	1.2	1.1
	4.7	2.5	2.3	2.3	2.1	2.1
	6.0	4.1	3.8	3.6	3.4	3.3
036	5.0	1.8	1.7	1.7	1.6	1.5
	7.0	3.4	3.1	3.0	2.8	2.8
	9.0	5.4	5.0	4.8	4.5	4.4
048	7.2	2.2	2.0	2.0	1.9	1.8
	10.1	4.0	3.7	3.6	3.3	3.3
	13.0	6.5	6.0	5.8	5.3	5.3
060	8.3	2.2	2.0	2.0	1.9	1.8
	11.7	4.0	3.7	3.6	3.3	3.3
	15.0	6.5	6.0	5.8	5.4	5.3
072	10.0	2.3	2.2	2.0	2.0	2.0
	14.0	4.4	4.1	3.9	3.6	3.6
	18.0	7.0	6.6	6.2	5.8	5.7

## Section 12: Troubleshooting

Table 11: Unit Operating Pressures (R-410a)

Heating - Without Desuperheater						
EWT (°F)	GPM Per Ton	Discharge Pressure (PSIG)	Suction Pressure (PSIG)	Sub Cooling (°F)	Super Heat (°F)	Water Temperature Drop (°F)
30	1.5	285-310	68-76	4-10	8-12	5-8
	3	290-315	70-80	4-10	8-12	3-6
50	1.5	315-345	100-110	6-12	9-14	7-10
	3	320-350	105-115	6-12	9-14	5-8
70	1.5	355-395	135-145	7-12	10-15	9-12
	3	360-390	140-150	7-12	10-15	7-10
Cooling - Without Desuperheater						
EWT (°F)	GPM Per Ton	Discharge Pressure (PSIG)	Suction Pressure (PSIG)	Sub Cooling (°F)	Super Heat (°F)	Water Temperature Rise (°F)
50	1.5	220-235	120-130	10-16	12-20	19-23
	3	190-210	120-130	10-16	12-20	9-12
70	1.5	280-300	125-135	8-14	10-16	18-22
	3	250-270	125-135	8-14	10-16	9-12
90	1.5	360-380	130-145	8-14	10-14	17-21
	3	330-350	130-140	8-14	10-14	8-11

### PERFORMANCE CHECK:

Heat of Extraction(HE)/Rejection(HR)  
Record information on the Unit Start-up Form

Equipment should be in operation for a minimum of 10 minutes in either mode – **WITH THE HOT WATER GENERATOR TURNED OFF.**

1. Determine flow rate in gallons per minute
  - a. Check entering water temperature
  - b. Check entering water pressure
  - c. Check leaving water pressure

Once this information is recorded, find corresponding entering water temperature column in Specification Manual for unit. Find pressure differential in PSI column in Spec Manual. Then read the GPM column in Spec Manual to determine flow in GPM.

2. Check leaving water temperature of unit.

FORMULA: [GPM x water temp diff, x 485 (antifreeze)] /500 (fresh water) = HE or HR in BTU/HR

A 10% variance from Spec Manual is allowed. Always use the same pressure gauge & temperature measuring device. Water flow must be in range of Specification Manual. If system has too much water flow, performance problems should be expected



## Section 12: Troubleshooting

### A: UNIT WILL NOT START IN EITHER CYCLE

Thermostat	Set thermostat on heating and highest temperature setting. Unit should run. Set thermostat on cooling and lowest temperature setting. Unit should run. Set fan to On position. Fan should run. If unit does not run in any position, disconnect wires at heat pump terminal block and jump R, G, Y. Unit should run in heating. If unit runs, replace thermostat with correct thermostat only.
Loose or broken wires	Tighten or replace wires.
Blown Fuse/ Tripped Circuit Breakers	Check fuse size, replace fuse or reset circuit breaker. Check low voltage circuit breaker.
Low Voltage Circuit	Check 24 volt transformer. If burned out or less than 24 volt, replace. Before replacing, verify tap setting and correct if necessary.
Water Flow	If water flow is low (less than 1 GPM), unit will not start. Make sure Pump Module or solenoid valve is connected (see wiring diagram). Water has to flow through the heat exchanger in the right direction (see labels at water fitting connections) before the compressor can start. If water flow is at normal flow, use an ohmmeter to check if you get continuity at the flow switch. If no switch is open and flow is a normal flow, remove switch and check for stuck particles or bad switch.

### B: UNIT RUNNING NORMAL, BUT SPACE TEMPERATURE IS UNSTABLE

Thermostat	Thermostat is getting a draft of cold or warm air. Make sure that the wall or hole used to run thermostat wire from the ceiling or basement is sealed, so no draft can come to the thermostat. Faulty Thermostat (Replace).
------------	--

### C: NO WATER FLOW

Pump Module	Make sure Pump Module is connected to the control box relay (check all electrical connections). For non-pressurized systems, check water level in Pump Module. If full of water, check pump. Close valve on the pump flanges and loosen pump. Take off pump and see if there is an obstruction in the pump. If pump is defective, replace. For pressurized systems, check loop pressure. Repressurize if necessary. May require re-flushing if there is air in the loop.
Solenoid valve	Make sure solenoid valve is connected. Check solenoid. If defective, replace.

### D: IN HEATING OR COOLING MODE, UNIT OUTPUT IS LOW

Water	Water flow & temperature insufficient.
Airflow	Check speed setting, check nameplate or data manual for proper speed, and correct speed setting. Check for dirty air filter—Clean or replace. Restricted or leaky ductwork. Repair.
Refrigerant charge	Refrigerant charge low, causing inefficient operation. Make adjustments only after airflow and water flow are checked.
Reversing valve	Defective reversing valve can create bypass of refrigerant to suction side of compressor. Switch reversing valve to heating and cooling mode rapidly. If problem is not resolved, replace valve. Wrap the valve with a wet cloth and direct the heat away from the valve. Excessive heat can damage the valve. Always use dry nitrogen when brazing. Replace filter/drier any time the circuit is opened.

### E: IN HEATING OR COOLING MODE, UNIT OUTPUT IS LOW

Heat pump will not cool but will heat. Heat pump will not heat but will cool.	Reversing valve does not shift. Check reversing valve wiring. If wired wrong, correct wiring. If reversing valve is stuck, replace valve. Wrap the valve with a wet cloth and direct the heat away from the valve. Excessive heat can damage the valve. Always use dry nitrogen when brazing. Replace filter/drier any time the circuit is opened.
Water heat exchanger	Check for high-pressure drop, or low temperature drop across the coil. It could be scaled. If scaled, clean with condenser coil cleaner.
System undersized	Recalculate conditioning load.

### F: WATER HEAT EXCHANGER FREEZES IN HEATING MODE

Water flow	Low water flow. Increase flow. See F. No water flow.
Flow Switch	Check switch. If defective, replace.

### G: EXCESSIVE HEAD PRESSURE IN COOLING MODE

Inadequate water flow	Low water flow, increase flow.
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## Section 12: Troubleshooting

### H: EXCESSIVE HEAD PRESSURE IN HEATING MODE

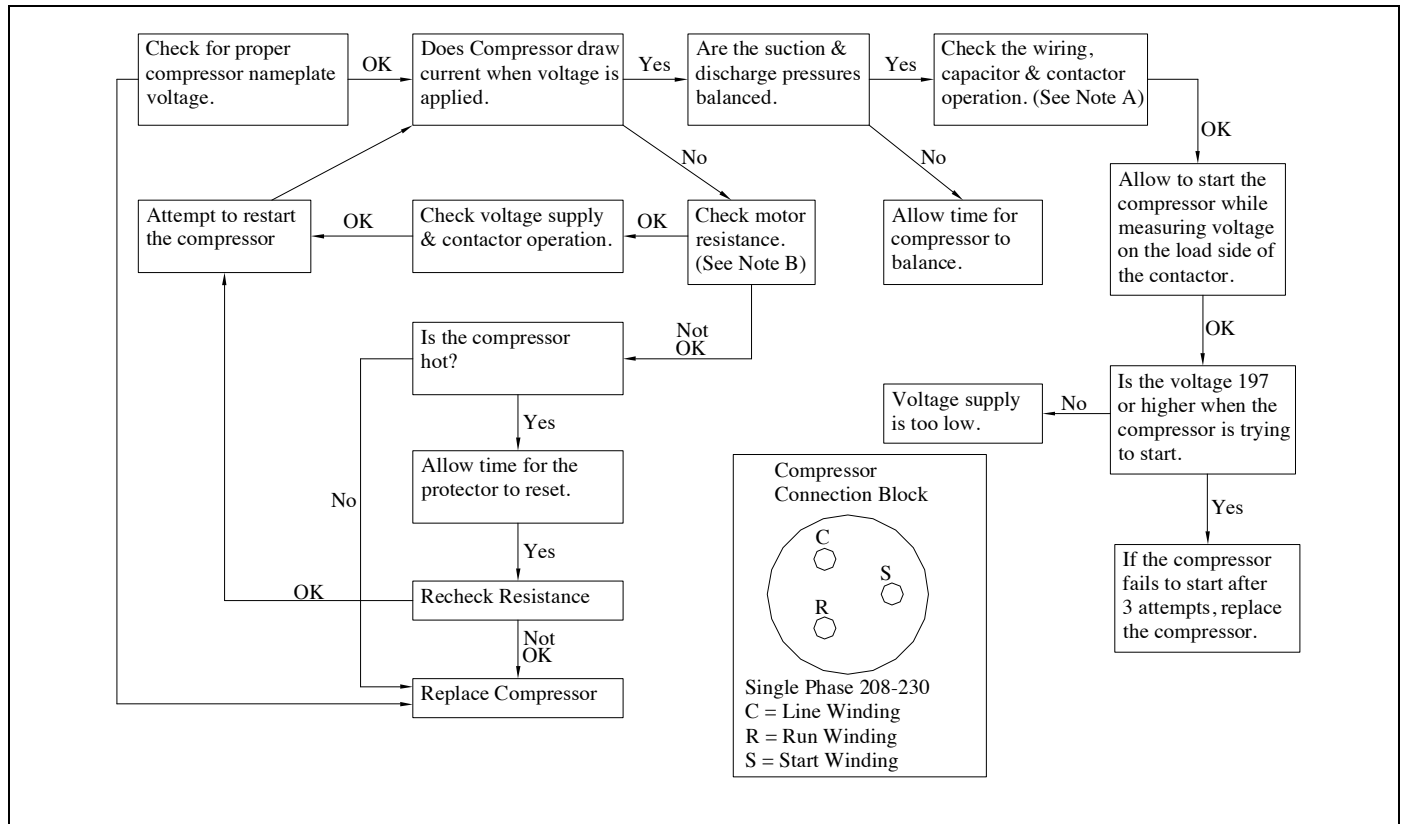
Low air flow	See E: Noisy blower and low air flow.
--------------	---------------------------------------

### I: WATER DRIPPING FROM UNIT

Unit not level	Level unit.
Condensation drain line plugged	Unplug condensation line.
Water sucking off the air coil in cooling mode	Too much airflow. Duct work not completely installed. If duct work is not completely installed, finish duct work. Check static pressure and compare with air flow chart in spec manual under specific models section. If ductwork is completely installed it may be necessary to reduce CFM.
Water sucking out of the drain pan	Install an EZ-Trap or P-Trap on the drain outlet so blower cannot suck air back through the drain outlet.

## Section 12: Troubleshooting

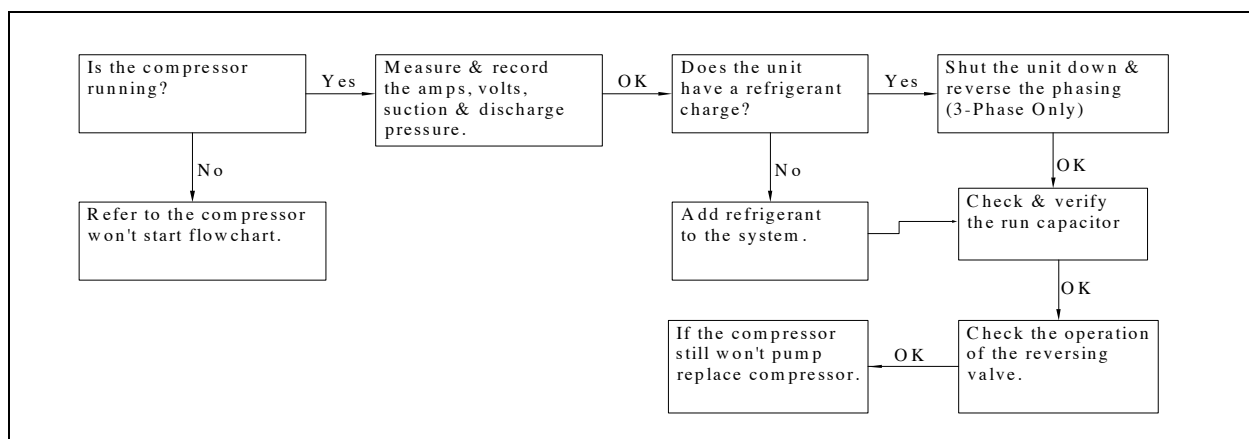
### J: COMPRESSOR WON'T START



A: Check all terminals, wires & connections for loose or burned wires and connections. Check contactor and 24 Volt coil. Check capacitor connections & check capacitor with capacitor tester.

B: If ohm meter reads 0 (short) resistance from C to S, S to R, R to C or from any one of these terminals to ground (shorted to ground), compressor is bad.

### K: COMPRESSOR WON'T PUMP CHART



## Section 12: Troubleshooting

Table 12: Refrigeration Troubleshooting

System Faults		Air Flow	Water Flow	Under Charge	Over Charge	Super Heat	Subcooling
Head Pressure Too High	Heat	P - Too Low			P		
	Cool		P - Too Low		P		
Head Pressure Too Low	Heat		P - Too Low	P		High	Low
	Cool	P - Too Low	S - Too High	P		High	Low
Suction Pressure Too High	Heat	P - Too Low					High
	Cool				P		High
Suction Pressure Too Low	Heat		P - Too Low	P		High	Low
	Cool	P - Too Low		P		High	Low
Liquid Refrigerant Flood Back	Heat				P		High
	Cool				P		High
Air Coil Frosting	Heat						
	Cool	P - Too Low		P		High	Low
Compressor Runs Inadequate. Or No Cooling/Heating	Heat	S - Too High	P - Too Low	P		High	Low
	Cool	S - Too High	P - Too Low	P		High	Low

P - Primary causes (most common problems) S - Secondary causes (problems that occur, but are not common)

# Section 13: Forms - Troubleshooting

Customer/Job Name: \_\_\_\_\_ Date: \_\_\_\_\_

Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_

Antifreeze Type: \_\_\_\_\_

$HE \text{ or } HR = GPM \times TD \times \text{Fluid Factor}$   
 (Use 500 for water; 485 for antifreeze)

SH = Suction Temp. - Suction Sat.  
 SC = Disch. Sat. - Disch. Temp.

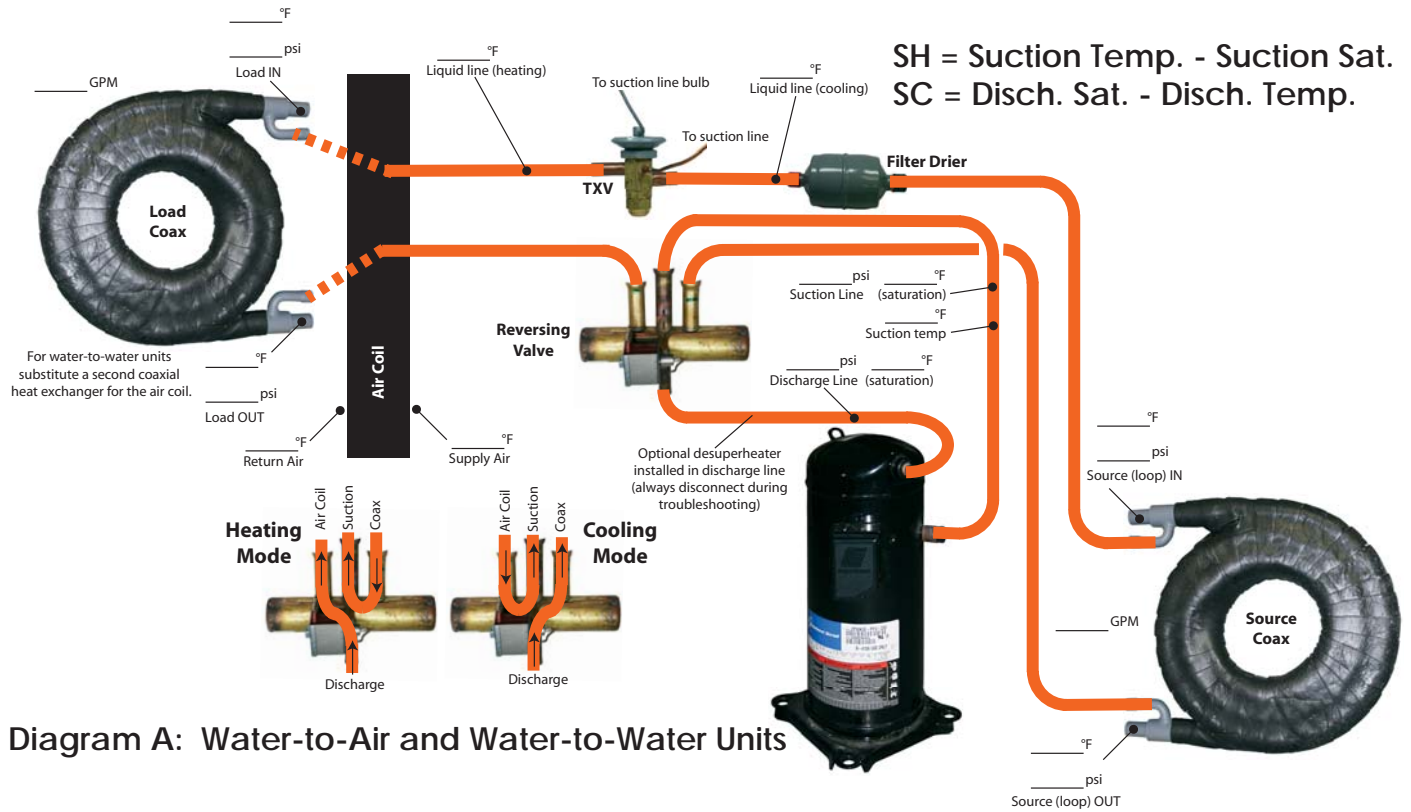


Diagram A: Water-to-Air and Water-to-Water Units

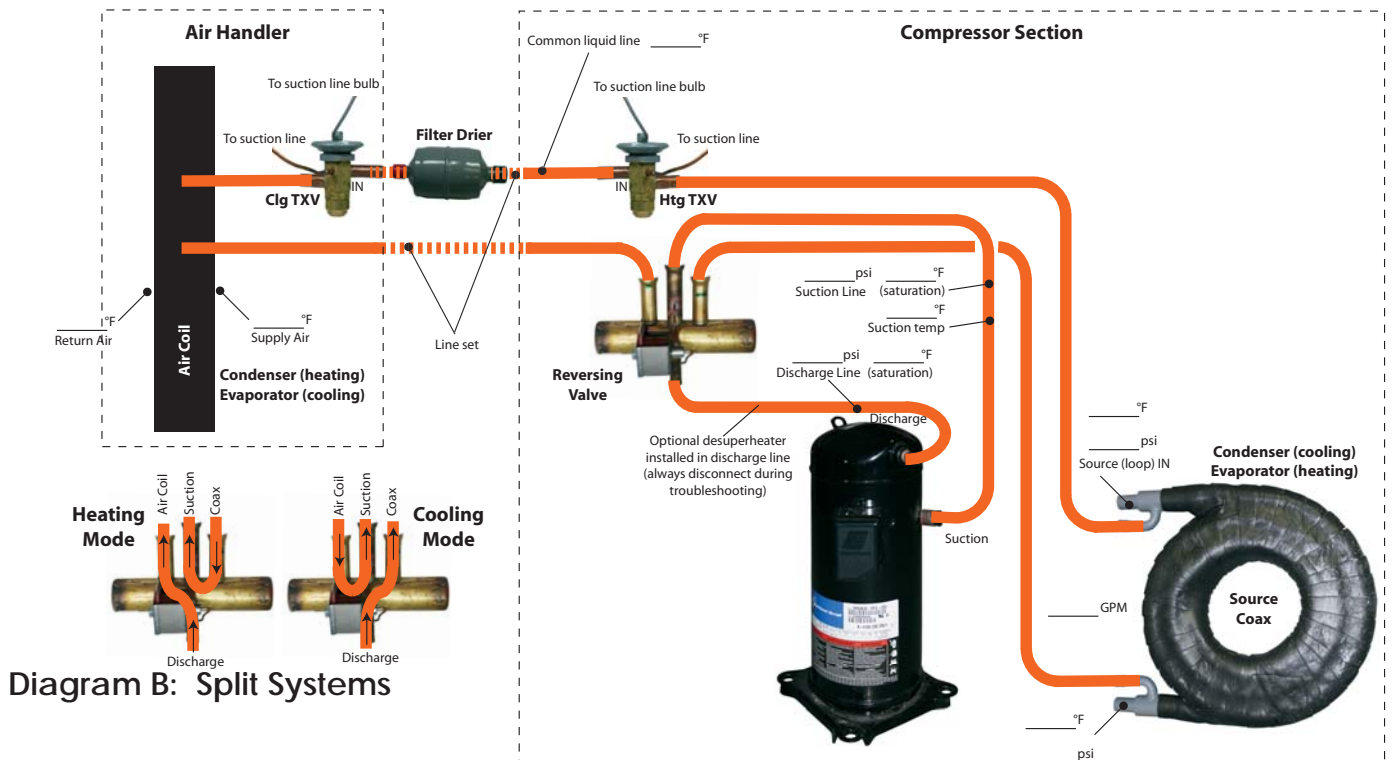


Diagram B: Split Systems



# EQUIPMENT START-UP FORM

Customer/Job Name: \_\_\_\_\_ Date: \_\_\_\_\_

Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_

Dealer Name: \_\_\_\_\_

## Check the following before power is applied to the equipment

Note: Start-Up should not occur until the structure is ready to be occupied

### ELECTRICAL:

- High voltage wiring is installed correctly
- High voltage wiring & breaker are the correct size
- Auxiliary electric heaters are wired and installed correctly
- Circulating pumps are wired and fused (if necessary) correctly
- Desuperheater pump (if applicable) is NOT wired, unless piping is complete and all air is purged
- Low voltage wiring is correct and completely installed

### PLUMBING:

- Pipe and pump sizes are correct
- Air is purged from all lines
- Antifreeze is installed
- All valves are open, including those on the pump kit
- Condensate is trapped and piped to the drain

### DUCTWORK:

- Filter is installed and clean
- Packaging is removed from the blower assembly
- Blower turns freely

## Equipment Start-Up

Note: Steps should be followed in order

Note: Equipment operation will vary with thermostat brand and model. Refer to thermostat instructions

1. Energize equipment with high voltage.
2. Be sure all pumps and valves are open.
3. Set thermostat settings to correspond with application, and set thermostat to "Heat". Place set point above room temperature. Compressor will start after thermostat time delay expires.
4. Check water flow via one or a combination of these 3 methods:
  - A:  $\Delta T$  (temp difference):
    1. Source (5°-10° F) \_\_\_\_\_
  - B: Flowmeter:
    1. 3 gpm (gallons per minute) per nominal ton of equipment. (Open Loop 1.5 to 2 GPM).
  - C: Pressure Drop:
    1. Refer to Table 13.
5. Check  $\Delta T$  of return and discharge air.
  1. (18°-30°F) \_\_\_\_\_
6. If system is two stage or dual capacity, increase set point and verify that second stage engages (increasing air flow).  $\Delta T$  will remain the same.
7. If system has auxiliary heat, increase set point and verify that auxiliary heat engages  $\Delta T$  will increase.
8. Switch thermostat to off, Compressor will shutoff.
9. Place thermostat in "Cooling" and decrease set point below room temperature. Compressor will start after thermostat time delay expires.
10. Check water flow via and one or combination of these 3 methods:
  - A.  $\Delta T$ (temp difference).
    1. Source (6°-12° F) \_\_\_\_\_.
  - B. Flowmeter.
    1. 3 GPM (gallons per minute) per nominal ton of equipment. (Open Loop 1.5 to 2 GPM).
  - C. Pressure Drop.
    1. Refer to Table 13.
11. Check  $\Delta T$  of return and discharge air.
  1. 16°-25° F
12. If system is two stage or dual capacity, increase set point and verify that second stage engages (increasing air flow).  $\Delta T$  will remain the same.
13. If, at anytime, there is excessive noise or vibration, the problem should be fixed and testing resumed.

Note: If a problem occurs during start-up, please do the following:

1. Refer to the troubleshooting sections contained within the unit Installation, Operation, and Maintenance Manual
2. Contact Technical Support at your distributor.

Installer/Technician: \_\_\_\_\_ Date: \_\_\_\_\_

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2506 South Elm Street  
 Greenville, IL 62246  
 www.enertechmfg.com  
 (618)-664-9010

# Owner's Manual: Water-to-Water Series Units

Rev.: 19 Feb, 2009D  
 P/N: 23-23-0032-001

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## Guide Revision Table:

Date	By	Page	Note
19 Feb, 2009	DS	All	First published

Enertech Manufacturing is continually working to improve its products. As a result, the design and specifications of each product may change without notice and may not be as described herein. For the most up-to-date information, please visit our website, or contact our Customer Service department at (618)-664-9010. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely Enertech Manufacturing's opinion or commendation of its products.

## Section 1: Introduction

### WELCOME!

You're made the smart investment in a geothermal system. We understand the number of available options you could of chose from, and we thank you for choosing us. Not only are you going to enjoy better comfort, but noticeable energy savings as well. On top of it all, you're the proud owner of one of the most environmentally friendly technologies around.

The purpose of this manual is to acquaint you with some of the features of your new geothermal system, as well as cover a few basic maintenance items that will ensure you'll be enjoying your system for years to come.

If at anytime you have a question regarding your system, contact your installer listed below.

Dealer/Installer	
Address	
Phone:	
Email:	
Date of Installation:	

## Section 2: Maintenance

### MAINTENANCE

Each unit contains a high pressure and low-pressure limit sensor to shut the unit down in case an unusual or abnormal condition exists. Should a sensor need to be reset more than once in a 24-hour period or if resetting becomes regular (repeatedly once a week or more) contact your Dealer/Installer.

For units with Hot Water Exchangers, follow suppliers' service and maintenance recommendations for all external pumps, circulators, valves and accessories.

### OWNER REMINDERS

1. Know which switch/fuse or circuit breakers feed the unit. Shut the unit off and contact your Installer Service Tech anytime you suspect malfunction. Check the disconnect switch/fuse or circuit breaker whenever the unit stops and its thermostat or control signal is on. Report any repeated outages to your Installer-Service Tech. Shut the unit off during any power outage. Switch it on only after you are assured electrical service is continuous and voltage is proper.
2. For systems on open wells, it is recommended to have your local dealer examine your heat exchanger at least once a year to insure there is no sediment buildup in the system.

### **WARNING**

Warning: There are no user serviceable components in or on any of the equipment. Do not attempt to service or repair this equipment. Only skilled and certified technical technicians should attempt such service and/or repair. Your attempt to service or repair this equipment could result in serious injury or even death.

### Section 3: Warranty Registration

#### **IMPORTANT WARRANTY INFORMATION FOR END-USER**

In order to validate your warranty, your installer must fill out the warranty registration form, included with this information package, or via our online form at [www.enertechmfg.com](http://www.enertechmfg.com).

You, as the end-user, must endorse the registration form via the online form, or mail the form to the address below, or fax to 618-664-4597.

Enertech Manufacturing, LLC  
Attn: Warranty & Claims Dept.  
P.O. Box 573  
Greenville, IL 62246

We have a fine warranty and want you to be able to take full advantage of its benefits; however, we ask that you do your part to help us serve you better.

A Warranty Registration Form must be filed within 10 days of equipment start-Up. Exceptions may be made under certain circumstances and at the sole discretion of Enertech Manufacturing, LLC.



**WARRANTY REGISTRATION FORM**

**IMPORTANT:** This form (one for each unit) or our online form, must be completed by the Dealer (Installer), endorsed by the original purchaser and mailed to Enertech Manufacturing, LLC. within ten days after installation, to put the warranty into effect.

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_ Brand. \_\_\_\_\_

Date of Sale: \_\_\_\_\_ Delivery Date: \_\_\_\_\_ Installation Date: \_\_\_\_\_

1. **APPLICATION:**  Office Building  School/College  Industrial Bldg  Town House  Store or Mall  
 Hospital  Gov. Bldg.  Apartment  Restaurant  Church  Condominium  House  Comm. Laundry  
 Auditorium  Swimming Pools  Other: \_\_\_\_\_

2. **USE:**  Comfort Conditioning  Computer Room  Ice Rink  Water Heating  Swimming Pool  
 Humidity Control  Radiant Heating  Other: \_\_\_\_\_

3. **SOURCE:**  Well Water  Geothermal Earth Loop  Lake/Pond  Other: \_\_\_\_\_

4. **BACKUP:**  None  Electric  Gas  Oil  Wood  Other: \_\_\_\_\_

PURCHASER-USER: \_\_\_\_\_ Phone: (\_\_\_\_\_) \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State \_\_\_\_\_ Zip: \_\_\_\_\_

Dealer (Installer): \_\_\_\_\_ Phone: (\_\_\_\_\_) \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

I have supervised the installation and start-up in accordance with Enertech Manufacturing, LLC. installation instructions.

This unit is performing? Satisfactorily Not Satisfactorily, if not explain: \_\_\_\_\_

To the best of my knowledge the above information is accurate and I request the Warranty be put into effect.

Dealer (Installer): \_\_\_\_\_ Date: \_\_\_\_\_

Customer / End User: \_\_\_\_\_ Date: \_\_\_\_\_

**For Enertech Manufacturing, LLC use only:**

Date Received: \_\_\_\_\_ By: \_\_\_\_\_

Invoice #: \_\_\_\_\_ Dated: \_\_\_\_\_

Optional Extended Warranty p/n: \_\_\_\_\_

Electrical / Parts & Labor Warranty effective through: Month: \_\_\_\_\_ Date: \_\_\_\_\_ Year: \_\_\_\_\_

Refrigerant / Compressor Warranty effective through: Month: \_\_\_\_\_ Date: \_\_\_\_\_ Year: \_\_\_\_\_

Mail This Form to:  
Enertech Manufacturing LLC  
P.O. Box 573  
Greenville, IL 62246

Fax This Form to:  
Enertech Manufacturing LLC  
(618)-664-4597

Register online at [www.enertechmfg.com](http://www.enertechmfg.com)

Cut along this line







**Enertech Manufacturing, LLC., for brand: "Hydron Module" Residential Single Family 10-YEAR LIMITED WARRANTY (10/10/10)**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner.

Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner. However, accessories (thermostat, flow center, electric heater, (EWC) zoning), if purchased from Enertech Manufacturing, LLC. are not transferable.

Enertech Manufacturing, LLC. warrants its Hydron Module brand cabinets (stainless steel) and heat exchanger coax for life, to the original purchaser-user, against defect in materials and workmanship, excluding damage due to rough handling, abuse, accident or casualty loss; exposure to outdoor elements/outdoor installment, including but not limited to, salt air exposure, damage caused by exposure to the following (whether indoors or outdoors): chlorine, airborne contaminants, other corrosive elements in the atmosphere, swimming pools, or hot tubs.

Enertech Manufacturing, LLC. warrants the service labor allowances for nine (9) years (second through tenth years, with dealer/installer warranting the first year) from the date of delivery to the original purchaser-user, transferable to new owner, for the servicing, removing or reinstalling parts for the refrigerant system, or for any defect in materials and workmanship inside the unit as set forth above. Labor allowances may not cover the full amount of labor charged, depending upon the servicing contractor.

**CONDITIONS AND EXCLUSIONS:**

The Limited Warranty only applies if the following conditions are met:

- A. This Limited Warranty will not apply and shall be null and void if the Enertech Manufacturing, LLC. serial number has been altered, defaced or removed.
- B. This Limited Warranty shall be null and void if the Enertech Manufacturing, LLC. unit has been disconnected or removed from the location of original installation, or if dealer/seller has not been paid in full for the unit.
- C. This Limited Warranty shall not apply to unit failure or defect caused by improper installation, field modification, improper voltage, improper maintenance or misuse including operation during building construction, corrosion caused by airborne contaminants, chlorine or salt air exposure, corrosive liquids or water, abuse, neglect, Act of God, outdoor installation, damage from abuse, accident, fire, flood and the like, or to defects or damage caused by the use of any attachment, accessory or component not authorized by Enertech Manufacturing, LLC.
- D. Replacement or repaired parts and components are warranted only for the remainder of the original warranty period, as stated above.
- E. This Limited Warranty applies only to Enertech Manufacturing, LLC. units sold and installed by a factory trained, independent, Dealer of Enertech Manufacturing, LLC., in the United States or Canada, and subjected to normal usage as described and rated on the applicable descriptive sheet for such unit. This warranty shall not be valid if equipment is not installed in accordance with methods prescribed in our data and technical manuals and in compliance with local codes. Dealer must complete the warranty registration card supplied with the Enertech Manufacturing, LLC. unit, which must then be endorsed by original purchaser-user and mailed within ten (10) days after initial installation. If warranty card is not returned, warranty shall commence at date unit was shipped from Enertech Manufacturing, LLC.
- F. The obligation for Enertech Manufacturing, LLC. under this Limited Warranty is expressly limited to replacement of any parts or components as specified and found within the cabinet. Enertech Manufacturing, LLC. reserves the right to replace defective components under warranty with new or reconditioned parts. Except as set forth above, this warranty does not cover any labor expenses for service, nor for removing or reinstalling parts. Accessory, peripheral and ancillary parts and equipment or not covered by this warranty.
- G. Enertech Manufacturing, LLC. does not warrant equipment which has been custom built or modified to purchaser-user specifications. Likewise, any field modification of any equipment shall also void this, and any and all warranties.

Notice: Outdoor or unconditioned space installation of any equipment shall cause this and all warranties to be deemed void.

SHIPPING COSTS: The purchaser-user will be responsible for the cost of shipping warranty replacement parts from the Enertech Manufacturing, LLC. factory to the distributor of the parts. Purchaser-user is also responsible for any shipping cost of returning the failed part to the distributor.

THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (AND IMPLIED CONDITIONS IN CANADA), EXPRESSED, IMPLIED AND STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED AND SHALL NOT APPLY TO THE GOODS SOLD. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE GOODS EXCEPT TO THE EXTENT SET FORTH HEREIN.

(Some states do not allow exclusion or limitation of implied warranties or liability for incidental or consequential damage). For additional information or assistance, contact the WARRANTOR, which is: Enertech Manufacturing, LLC., P.O. Box 573, 2506 South Elm Street, Greenville, IL 62246.

Form: 23-23-0018-002  
Page 1 of 2

**Enertech Manufacturing, LLC., for brand: "Hydron Module" Residential Single Family  
OPTIONAL RESIDENTIAL EXTENDED WARRANTIES**

See form 23-23-0018-002 page 1 of 2, for standard Residential Warranty details. The following optional extended warranties, if purchased, modify the standard Residential Warranty.

**Part # WHDEDUCT Hydron Module Residential geothermal units. (3/5/10)**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner. Part # WHDEDUCT does not change this section of the warranty.

Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner. However, accessories (thermostat, flow center, electric heater, (EWC) zoning), if purchased from Enertech Manufacturing, LLC. are not transferable. Part # WHDEDUCT changes this section of the warranty to be for five (5) years in lieu of ten (10).

Enertech Manufacturing, LLC. warrants its Hydron Module brand cabinets (stainless steel) and heat exchanger coax for life, to the original purchaser-user, against defect in materials and workmanship, excluding damage due to rough handling, abuse, accident or casualty loss; exposure to outdoor elements/outdoor installment; including but not limited to, salt air exposure, damage caused by exposure to the following (whether indoors or outdoors): chlorine, airborne contaminants, other corrosive elements in the atmosphere, swimming pools, or hot tubs. Part # WHDEDUCT does not change this section of the warranty.

Enertech Manufacturing, LLC. warrants the service labor allowances for nine (9) years (second through tenth years, with dealer/installer warranting the first year) from the date of delivery to the original purchaser-user, transferable to new owner, for the servicing, removing or reinstalling parts for the refrigerant system, or for any defect in materials and workmanship inside the unit as set forth above. Labor allowances may not cover the full amount of labor charged, depending upon the servicing contractor. Part # WHDEDUCT changes this section of the warranty to be for three (3) years in lieu of ten (10), by changing the wording to: "...two (2) years (second and third years, with dealer/installer warranting the first year)..."

Form: 23-23-0018-002  
Page 2 of 2

**Enertech Manufacturing, LLC., for brand: "GeoComfort" Residential Single Family  
10-YEAR LIMITED WARRANTY (3/5/10)**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, coaxial exchanger, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner.

Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for five (5) years from the date of delivery to the original purchaser-user, transferable to new owner. However, accessories (thermostat, flow center, electric heater, (EWC) zoning), if purchased from Enertech Manufacturing, LLC. are not transferable.

Enertech Manufacturing, LLC. warrants service labor allowances for two (2) years (second & third years, with dealer/installer warranting the first year) from the date of delivery to the original purchaser-user, transferable to new owner, for the servicing, removing or reinstalling parts for the refrigerant system, or for any defect in materials and workmanship inside the unit as set forth above. Labor allowances may not cover the full amount of labor charged, depending upon the servicing contractor.

**CONDITIONS AND EXCLUSIONS:**

The Limited Warranty only applies if the following conditions are met:

- A. This Limited Warranty will not apply and shall be null and void if the Enertech Manufacturing, LLC. serial number has been altered, defaced or removed.
- B. This Limited Warranty shall be null and void if the Enertech Manufacturing, LLC. unit has been disconnected or removed from the location of original installation, or if dealer-seller has not been paid in full for the unit.
- C. This Limited Warranty shall not apply to unit failure or defect caused by improper installation, field modification, improper voltage, improper maintenance or misuse including operation during building construction, corrosion caused by airborne contaminants, chlorine or salt air exposure, corrosive liquids or water, abuse, neglect, Act of God, outdoor installation, damage from abuse, accident, fire, flood and the like, or to defects or damage caused by the use of any attachment, accessory or component not authorized by Enertech Manufacturing, LLC.
- D. Replacement or repaired parts and components are warranted only for the remainder of the original warranty period, as stated above.
- E. This Limited Warranty applies only to Enertech Manufacturing, LLC. units sold and installed by a factory trained, independent, Dealer of Enertech Manufacturing, LLC., in the United States or Canada, and subjected to normal usage as described and rated on the applicable descriptive sheet for such unit. This warranty shall not be valid if equipment is not installed in accordance with methods prescribed in our data and technical manuals and in compliance with local codes. Improper installation may endanger the occupants of the dwelling. Dealer must complete the warranty registration card supplied with the Enertech Manufacturing, LLC. unit, which must then be endorsed by original purchaser-user and mailed within ten (10) days after initial installation. If warranty card is not returned, warranty shall commence at date unit was shipped from Enertech Manufacturing, LLC.
- F. The obligation for Enertech Manufacturing, LLC. under this Limited Warranty is expressly limited to replacement of any parts or components as specified and found within the cabinet. Enertech Manufacturing, LLC. reserves the right to replace defective components under warranty with new or reconditioned parts. Except as set forth above, this warranty does not cover any labor expenses for service, nor for removing or reinstalling parts. Accessory, peripheral and ancillary parts and equipment or not covered by this warranty.
- G. Enertech Manufacturing, LLC. does not warrant equipment which has been custom built or modified to purchaser-user specifications. Likewise, any field modification of any equipment shall also void this, and any and all warranties.

Notice: Outdoor or unconditioned space installation of any equipment shall cause this and all warranties to be deemed void.

SHIPPING COSTS: The purchaser-user will be responsible for the cost of shipping warranty replacement parts from the Enertech Manufacturing, LLC. factory to the distributor of the parts. Purchaser-user is also responsible for any shipping cost of returning the failed part to the distributor.

THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (AND IMPLIED CONDITIONS IN CANADA), EXPRESSED, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED AND SHALL NOT APPLY TO THE GOODS SOLD. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE GOODS EXCEPT TO THE EXTENT SET FORTH HEREIN.

(Some states do not allow exclusion or limitation of implied warranties or liability for incidental or consequential damage). For additional information or assistance, contact the WARRANTOR, which is: Enertech Manufacturing, LLC., P.O. Box 573, 2506 South Elm Street, Greenville, IL 62246.

Form: 23-23-0017-002  
Page 1 of 2



**Enertech Manufacturing, LLC., for brand: "GeoComfort" Residential Single Family**

**OPTIONAL RESIDENTIAL EXTENDED WARRANTIES**

See form 23-23-0017-02 page 1 of 2, for standard Residential Warranty details. The following optional extended warranties, if purchased, are additive to the standard Residential Warranty.

Part # WGT-SC-1010B Serenity GT Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGT2-SC-1010B Serenity GT Series Combination Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGS-SC-1010B Serenity GS Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGTC-SC-1010B Serenity GT Split Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGSC-SC-1010B Serenity GS Split Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGSE-SC-1010B GSE Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGWS-SC-1010B GWS Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGWT-DC-1010B GWT Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

Part # WGHFC-DC-1010B GHFC Series Residential Extended Warranty - 10 Year Parts and Labor Allowance  
Extends five (5) year geothermal unit, including accessories, and 3 year service labor allowances, to ten (10) years.

**Enertech Manufacturing, LLC., for brands: “GeoComfort” and “Hydron Module” Commercial or Non-Single Family 1-YEAR LIMITED WARRANTY**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, coaxial exchanger, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of one (1) year from the date of delivery to the original purchaser-user. Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for one (1) year from the date of delivery to the original purchaser-user.

**CONDITIONS AND EXCLUSIONS:**

The Limited Warranty only applies if the following conditions are met:

- A. This Limited Warranty will not apply and shall be null and void if the Enertech Manufacturing, LLC. serial number has been altered, defaced or removed.
- B. This Limited Warranty shall be null and void if the Enertech Manufacturing, LLC. unit has been disconnected or removed from the location of original installation, or if dealer-seller has not been paid in full for the unit.
- C. This Limited Warranty shall not apply to unit failure or defect caused by improper installation, field modification, improper voltage, improper maintenance or misuse including operation during building construction, corrosion caused by airborne contaminants, chlorine or salt air exposure, corrosive liquids or water, abuse, neglect, Act of God, outdoor installation, damage from abuse, accident, fire, flood and the like, or to defects or damage caused by the use of any attachment, accessory or component not authorized by Enertech Manufacturing, LLC.
- D. Replacement or repaired parts and components are warranted only for the remainder of the original warranty period, as stated above.
- E. This Limited Warranty applies only to Enertech Manufacturing, LLC. commercial and/or multi-family use (i.e. non-residential-single-family) units sold and installed by a trained independent, contractor-customer of Enertech Manufacturing, LLC., or an authorized representative and/or distributor, in the United States or Canada, and subjected to normal usage as described and rated on the applicable descriptive sheet for such unit. This warranty shall not be valid if equipment is not installed in accordance with methods prescribed in our data and technical manuals and in compliance with local codes. Improper installation may endanger the occupants of the dwelling. Contractor-customer must complete the warranty registration card supplied with the Enertech Manufacturing, LLC. unit, which must then be endorsed by original purchaser-user and mailed within ten (10) days after initial installation. If warranty card is not returned, warranty shall commence at date unit was shipped from Enertech Manufacturing, LLC.
- F. The obligation for Enertech Manufacturing, LLC. under this Limited Warranty is expressly limited to replacement of any parts or components as specified and found within the cabinet. Enertech Manufacturing, LLC. reserves the right to replace defective components under warranty with new or reconditioned parts. This warranty does not cover any labor expenses for service, nor for removing or reinstalling parts. Accessory, peripheral and ancillary parts and equipment or not covered by this warranty.
- G. Enertech Manufacturing, LLC. does not warrant equipment which has been custom built or modified to purchaser-user specifications. Likewise, any field modification of any equipment shall also void this, and any and all warranties.

Notice: Outdoor or unconditioned space installation of any equipment shall cause this and all warranties to be deemed void.

SHIPPING COSTS: The purchaser-user will be responsible for the cost of shipping warranty replacement parts from the Enertech Manufacturing, LLC. factory to the distributor of the parts. Purchaser-user is also responsible for any shipping cost of returning the failed part to the distributor.

THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (AND IMPLIED CONDITIONS IN CANADA), EXPRESSED, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED AND SHALL NOT APPLY TO THE GOODS SOLD. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE GOODS EXCEPT TO THE EXTENT SET FORTH HEREIN.

(Some states do not allow exclusion or limitation of implied warranties or liability for incidental or consequential damage). For additional information or assistance, contact the WARRANTOR, which is: Enertech Manufacturing, LLC., P.O. Box 573, 2506 South Elm Street, Greenville, IL 62246

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**Enertech Manufacturing, LLC., for brands: “GeoComfort” and “Hydron Module” Commercial or Non-Single Family**

**OPTIONAL COMMERCIAL EXTENDED WARRANTIES**

See part number 23-23-0003-03 page 1 of 2, for standard Commercial Warranty details. The following optional extended warranties, if purchased, are additive to the standard Commercial Warranty.

**Part# CPW COMMERCIAL EXTENDED WARRANTY - FIVE YEAR INTERNAL COMPONENTS LIMITED WARRANTY**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, coaxial exchanger, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of one (1) year from the date of delivery to the original purchaser-user. Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for one (1) year from the date of delivery to the original purchaser-user. **Extended warranty part number CPW extends the refrigerant system components and geothermal warranty by four (4) years, or five (5) years total from date of delivery to the original purchaser-user.**

**Part # CRW COMMERCIAL EXTENDED WARRANTY - FIVE YEAR REFRIGERANT CIRCUIT LIMITED WARRANTY**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, coaxial exchanger, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of one (1) year from the date of delivery to the original purchaser-user. Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for one (1) year from the date of delivery to the original purchaser-user. **Extended warranty part number CRW extends the refrigerant system components warranty by four (4) years, or five (5) years total from date of delivery to the original purchaser-user.**

**Part # CCW COMMERCIAL EXTENDED WARRANTY - FIVE YEAR COMPRESSOR LIMITED WARRANTY**

Enertech Manufacturing, LLC. warrants the refrigerant system components, to include the compressor, coaxial exchanger, air coil, expansion valve and reversing valve, to be free from defects in material and workmanship for a period of one (1) year from the date of delivery to the original purchaser-user. Enertech Manufacturing, LLC. warrants its geothermal unit against defect in materials and workmanship for one (1) year from the date of delivery to the original purchaser-user. **Extended warranty part number CCW extends the compressor warranty by four (4) years, or five (5) years total from date of delivery to the original purchaser-user.**

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