



Geothermal heating and cooling solutions from the earth

Dealer Book



GEOEXCHANGE®

GeoFurnace Mfg. Inc.

605 4th St. SE

De Smet, SD 57231

Phone: 605-854-9205

Fax: 605-854-9285

www.geofurnacemfg.com

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Introduction

Welcome to GeoFurnace: GeoFurnace is a manufacturer of earth coupled heat pumps, also known as geothermal heat pumps (GHP). There are many models and configurations of heat pumps available in the GeoFurnace line. Forced Air models, in vertical or horizontal configuration, start at ½ ton and extends to 6 ton with many energy efficient sizes in between. Water to Water models start at 2 ton and extend to 50 ton with dual compressor configuration on units of 6 ton and larger. In addition to standard units, GeoFurnace offers a Split and Combination configuration unit up to 6 ton for the residential market. GeoFurnace also offers Hydronic Fan Coils, wall mount heat pumps up to 3 ton, pool heating, de-humidification units, and a full line of flow centers and buffer tanks for support equipment. Roof top units, large Water to Water units along with a large selection of Forced Air units are available in the GeoFurnace commercial lineup.

SAFETY STANDARDS: GeoFurnace heat pumps are constructed to comply with NFPA 70. All equipment carries a CSA label for product safety. CSA standards assure that GeoFurnace equipment complies with all the safety requirements including UL 484 and UL 1995.

WARRANTY: GeoFurnace agrees to repair or replace components of water-source heat pumps that fail in materials or workmanship for ten years on residential models, five years on commercial models. Failures include, but are not limited to, refrigeration components. Please reference warranty policy for full description.

GENERAL: All units manufactured by GeoFurnace meet or exceed performance requirements of Energy Star per ARI/ISO/ASHRAE/ANSI Standard 13256-1 and ISO 13256-2. Units are designed to operate throughout the range

of source entering fluid temperature of 25°F to 100°F. Each unit is tested in an ISO lab before leaving the factory to assure proper performance.

BASIC CONSTRUCTION: Forced Air units are available in many air flow arrangements. The heat pumps are fabricated from heavy gauge stainless and galvanized sheet metal dependent on usage and request. All interior surfaces are lined with 1/2 inch, 1-1/2 Ib. acoustic type glass fiber insulation. All fiberglass insulation is coated and meets NFPA 90A. Units are equipped with a filter bracket for use with 1-inch filters, but an optional 2-inch may be requested. Units with a requested 2-inch thick filter bracket will be supplied with a MERV 6 throwaway type filter. Cabinets have separate knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections are brass 1" NFPT o-ring swivel couplers that will connect to copper or PVC NMPT fittings. All units have a stainless steel drain pan with an overflow switch.

FAN & MOTOR ASSEMBLY: All units 6 ton and below have a direct-drive centrifugal fan. The fan motor is an ECM variable speed with thermal overload protection or a PSC three speed, both permanently lubricated. The ECM fan motor varies the speed of the fan to maintain a constant airflow quantity. The fan motor is isolated from the fan housing by torsion ally flexible isolation mounts. The fan and motor assembly are capable of overcoming high external static pressures to meet all specs listed on engineering schedules. External static pressure ratings of the units are based on a wet coil.

REFRIGERANT CIRCUIT: Units have a sealed R-410A refrigerant circuit including a single or two stage hermetic scroll compressor or multiple compressors, ther-

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thermal expansion valve, if requested, an epoxy coated (rated at 1,000 hour salt spray protection) finned tube refrigerant-to-air heat exchanger, a reversing valve, a coaxial (tube-in-tube) refrigerant-to-water heat exchanger, and safety controls including a high pressure switch, a low pressure switch and a flow switch.

The reversing valve is a four-way solenoid activated on a call for cooling, which fails to the heating position. Access fittings are installed on high and low pressure refrigerant lines to facilitate field service along with the fastening of pressure switches. Activation of any safety device prevents compressor operation via the lockout circuit. The lockout circuit allows reset at the thermostat or at the disconnect switch. The Parker Sporlan thermal expansion valve is an adjustable bi-directional valve, which allows in field adjustment when needed. All units are equipped with a bi-directional filter dryer which provides longer system life by filtering the system's lubricant. Danfoss and Copland Ultra hermetic scroll compressors are equipped with internal overload protection and are mounted on rubber isolators, located in an insulated compartment to minimize sound transmission. The American made refrigerant-to-air heat exchanger utilizes enhanced aluminum fins with rifled copper tube construction pre-tested to 600 PSIG refrigerant working pressure. American made Packless refrigerant to-water heat exchanger are constructed of copper for the inner water tube and steel for the outer refrigerant tube, pre-tested to withstand 600 PSIG working refrigerant pressure and 450 PSIG working water pressure.

The two stage Copland Ultra hermetic scroll compressor is activated via a two stage control system. Stage one activates the part load capacity of the compressor for operation at approximately 66% of full load capacity. The GE ECM fan motor automatically reduces the fan speed to maintain a constant air flow quantity at ap-

proximately 70% of the full load air quantity. Stage two activates the full load capacity of the compressor and the ECM fan motor. Units with two compressors are activated via a two stage control system. Stage one activates the first compressor for operation at approximately 50% of full load capacity. Stage two activates the second compressor.

Heat pump units are capable of operating with entering glycol/water temperatures between 50 F and 100 F in cooling mode and between 25°F and 80°F in heating mode.

HOT GAS REHEAT: A hot gas dehumidification system is available on all Forced Air models. This option is factory installed and is considered a custom unit. The hot gas reheat system includes a fully-sized hot gas reheat coil located downstream of the standard refrigerant air coil. Each unit has a reheat valve to control the reheat mode from a humidistat. Each hot gas reheat coil is sized to reheat the supply air at a minimum of 90% of the sensible cooling capacity of the water source heat pump over the cooling operating range. The humidistat activates the hot gas reheat valve. At the same time the compressor cooling circuit activates for full cooling as long as the cooling space temperature set point is satisfied, for full dehumidification. In this mode, the cooling coil will remove moisture from the supply air and the reheat coil adds heat to the air. The dehumidification mode delivers air to the space that is approximately 2°F cooler than the air entering the cooling coil. The hot gas reheat system is "cooling dominant", whereby, the reheat mode is de-activated if the space cooling set point of the thermostat is not satisfied (the cooling set point overrides a call for dehumidification to provide only cooling - no reheat).

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CONTROLS: Each heat pump is equipped with low and high voltage protection. The fan motors and compressors are over current protected. Each unit has an ICM 222 low voltage circuit board that monitors the critical points of the system and provides safety to the heat pump. The board provides a five minute time delay upon a Y call from the thermostat, which can be overridden for servicing. After the time delay expires, the compressor contactor will engage as long as the high and low pressure switches are closed. If either switch is open after the delay expires, the compressor will not energize. If either switch opens while the compressor is energized, it will de-energize immediately and begin the anti-short cycle delay. The compressor will not be allowed to turn on again until the anti-short cycle delay expires and both pressure switches are closed. The flow switch will have a 30 second bypass timer in which the control will ignore an open flow switch for the first 30 seconds. If the flow switch remains open after the 30 second bypass timer expires, the unit will de-energize the compressor and begin the anti-short cycle delay. If the control experiences three high pressures, low pressures or flow switch faults in a 60 minute period, it will lock out the compressor and energize the fault output. A manual reset of power will be required to reset the lockout condition.

The control has a status LED to indicate which type of fault or lockout occurs. If a high pressure fault or lockout occurs, the status LED will blink once. If the low pressure fault or lockout occurs, the status LED will blink twice. If a flow switch fault occurs, the status LED will blink three times.

Two LED's are displayed on the outside of the heat pump cabinet. Green indicates power on, and red indicates fault. The low voltage is powered by a 75 VAC fused transformer.

Special Notice

This manual contains drawings and written material for the sole purpose of providing guidelines for installing GeoFurnace equipment in various configurations on various open and closed loop systems. This material and information presented is not to be construed as construction drawings or construction specifications. Diagrams and schematics shown in this manual may not meet or be in accordance with local, state or federal regulations in effect at time of installation. It is the responsibility of the dealer/installer or designer to familiarize themselves with all regulations and codes. By using guidelines or suggestions of GeoFurnace Mfg., be they written, verbal or published the dealer/installer agrees to defend and hold harmless GeoFurnace Mfg., it's employees or it's designated agents or representatives in any action resulting from the use of said guidelines and/or suggestions.

It is the responsibility of the dealer/installer or designer to determine building loads, soil conditions, water quality and other factors prior to and in conjunction with selecting the appropriate GeoFurnace Mfg. products. Understanding all parts and components of a geothermal system is the key for achieving a successful installation of GeoFurnace products. GeoFurnace Mfg. designs and builds geothermal heat pumps of all sizes and configurations, in addition to accessories and related equipment. GeoFurnace does not perform the functions of a dealer, contractor, installer, designer or engineer. GeoFurnace Mfg. is not responsible for the performance or function of systems that are designed by mechanical engineers, contractors, installers, designers or dealers.

Sales Policies

Orders

All orders must be confirmed by a signed order acknowledgement form (to ensure order accuracy) before GeoFurnace Manufacturing Inc. will proceed with any order. All orders are subject to acceptance by GeoFurnace Manufacturing Inc. No liability shall be incurred by GeoFurnace Manufacturing if manufacture or delivery is prevented or delayed by strikes, fires, delays or carriers or other unavoidable delays beyond its reasonable control, or by inability to obtain materials. Prices quoted supersede all prior price lists and are subject to change without notice. Prices do not include any Federal, Provincial, State and local taxes that may be payable on the manufacture, sale or delivery of the merchandise covered by this product catalog. In cases where we are obliged to collect taxes, the same will be billed to the buyer.

Credit Terms

All accounts must be pre-approved before credit will be extended. Credit terms are 15 days from day of invoicing once a customer has been approved by GeoFurnace Manufacturing Inc. Interest at the rate of 2% per month will be charged on all past due accounts. GeoFurnace Manufacturing Inc. reserves the right to place customer accounts on credit hold if a customer reaches or exceeds their credit limit. Customers will **automatically be placed on credit hold** if open invoices **reach or exceed past due**. Any further product orders will be shipped on **prepaid basis until overdue balance is paid**.

Freight Charges

Prices quoted herein are F.O.B. GeoFurnace Manufacturing Inc. Shipping weights supplied in the product catalog are approximate, for buyer's convenience only, and are not guaranteed. Unless pre-advised arrangements for shipping, GeoFurnace Mfg. will ship the best way.

Delivery

Delivery to the initial carrier shall constitute delivery to the buyer. The seller's responsibility ceases upon delivery in good order to such carrier, and all merchandise is shipped at the buyer's risk. The buyer must examine all deliveries before signing transportation receipts. If merchandise is visibly damaged, the buyer should insist that written confirmation of the damage be noted on the freight bill by the agent of the carrier. If damage is discovered after unpacking, their carrier should be notified at once so that inspection can be made and the claimed damage substantiated by the carrier. Carrier will not be responsible after 15 days after hidden damages.

Sales Policies

Return Material Policy

No material may be returned without prior written authorization from the company. Material arriving at GeoFurnace Manufacturing Inc. without prior authorization will be refused. New material of current manufacture normally stocked, in saleable condition, in original sealed carton may be returned, freight prepaid, after written authorization has been received. In such cases credit will be allowed, less 15% or \$35.00 restocking charge, whichever is greater, provided that the product is received free of shipping or other damage. Goods not received in the original sealed carton will be refused. Customer must request a "Return of Merchandise Authorization" (RMA) request form to be completed prior to issuance of a return of goods number. A "RMA" will subsequently be issued.

Warranty Claims

All warranty claims will be subject to inspection for defect(s) in material and workmanship. If necessary it may be required to return items to GeoFurnace Manufacturing Inc. for final determination. In such cases additional time for processing a claim will be incurred. Manufacturer's warranties generally provide for repair or replacement of components found to be defective. Any advance warranty replacement component will require a purchase order which may be subject to credit pending warranty inspection. If the manufacturer elects to repair a deemed defective item, such item will be returned to the customer and no further allowance will be made.

Order Confirmation and Price Change

Upon placing an order, an "Order Acknowledgement" is automatically emailed/faxed to the purchaser. When receiving GeoFurnace Manufacturing Inc.'s "Order Acknowledgement" it is the responsibility of the purchaser to notify GeoFurnace Manufacturing Inc. of any changes. The order will be shipped as described on confirmation.

GeoFurnace Manufacturing Inc. reserves the right to extend shipping dates according to the quantity of the order. Shipping date will be modified on the "Order Acknowledgement".

Custom Built Product Policy

Custom built product require a signed company purchase order with drawings before GeoFurnace Manufacturing Inc. will proceed. A 30% down payment will be requested in all custom built orders.

GeoFurnace Manufacturing Inc. reserves the right to change prices and specifications without notice.

Reference

- COP = Coefficient of Performance
- EAT = Entering Air Temperature
- EER = Energy Efficiency Ratio
- ELT = Entering Load Fluid Temperature
- EST = Entering Source Fluid Temperature
- EWT = Entering Water Temperature
- FLA = Full Load Amps
- FT = Feet of Head
- GPM = Gallons per Minute
- HC = Heating Capacity
- HE = Heat of Extraction
- HR = Heat of Rejection
- HWG = Hot Water Generator (De-Superheater)
- KW = Power in Kilowatts
- LAT = Leaving Air Temperature
- LC = Latent Cooling Capacity
- LGPM = Load Flow in Gallons per Minute
- LLT = Leaving Load Temperature
- LRA = Locked Rotor Amps
- LST = Leaving Source Temperature
- LWPD = Load Heat Exchanger Water Pressure Drop
- PD = Pressure Drop
- PSI = Pounds per Square Inch
- RLA = Rated Load Amps
- SC = Sensible Cooling Capacity
- S/T = Sensible to Total Cooling Ratio
- TC = Total Cooling Capacity
- WPD = Water Pressure Drop

Forced Air Calculations

Heating Calculations:

$$LWT = EWT - \frac{HE}{GPM \times 500}$$

$$LAT = EAT + \frac{HC}{CFM \times 1.08}$$

Cooling Calculations:

$$LWT = EWT + \frac{HR}{GPM \times 500} \quad LC = TC - SC$$

$$LAT (DB) = EAT (DB) - \frac{SC}{CFM \times 1.08} \quad S/T = \frac{SC}{TC}$$

Water-to-Water Calculations

Heating Calculations:

$$LST = EST - \frac{HE}{GPM \times 500}$$

$$LLT = ELT + \frac{HC}{GPM \times 500}$$

Cooling Calculations:

$$LLT = ELT - \frac{TC}{GPM \times 500}$$

$$LST = EST + \frac{HR}{GPM \times 500}$$

Model Nomenclature

