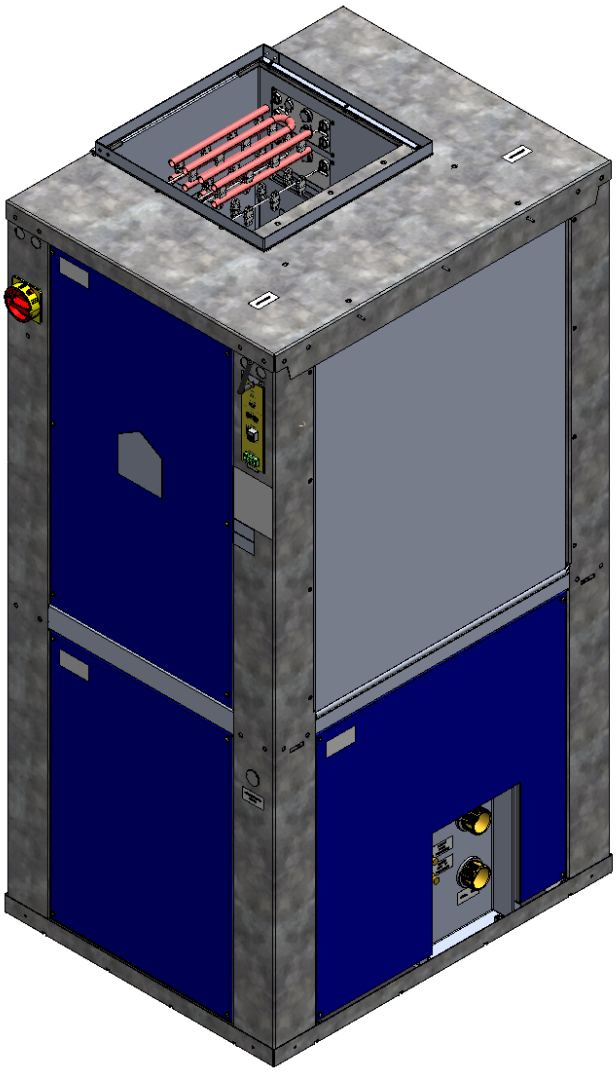
Dandelion Geo

Installation & Operations Manual v1.3

Packaged Water Source Heat Pump Units 3, 4, 5, & 6 Ton Models



DANDELION GEOTHERMAL

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TABLE OF CONTENTS

FIGURES & TABLES

SECTION 1: MODEL IDENTIFICATION

Understanding Dandelion Model and Specification Data

Use the nomenclature decoder below to understand your unit's initial specifications. Each Geo unit's model type and specifications are mounted just below the gateway module/gateway blank on both the front and back side of the unit.

Nomenclature Decoder

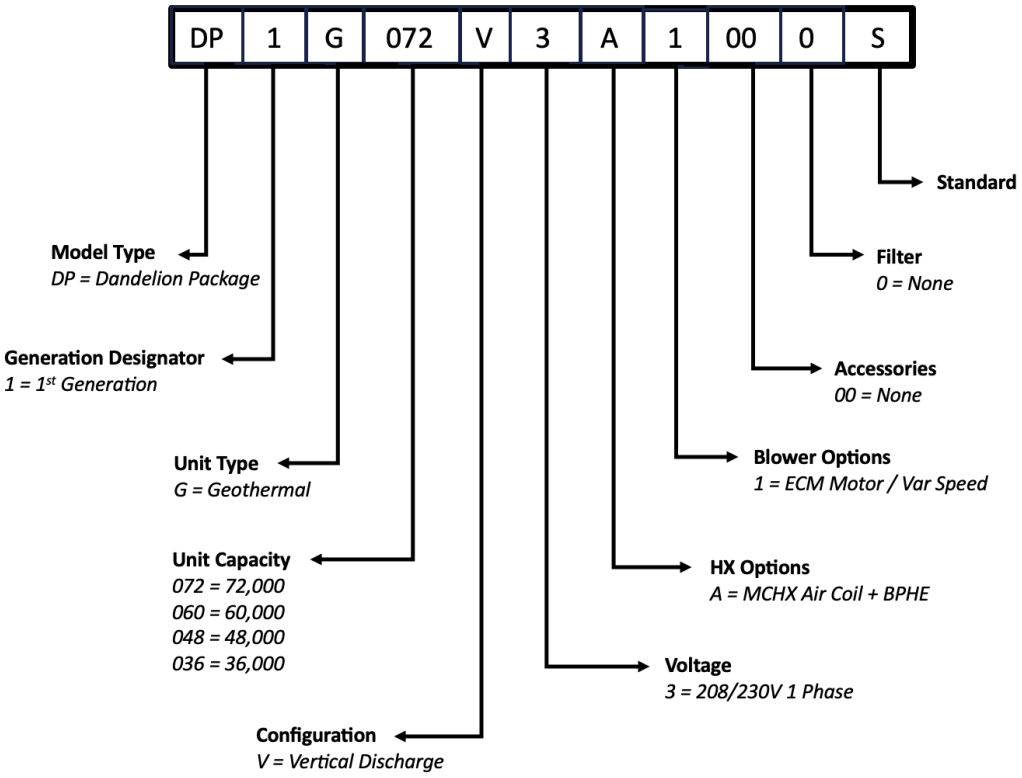


Figure 1 Geo model nomenclature decoder

Model Type: **DP** denotes "Dandelion Package".

Generation Designator: 1-9, where **1** denotes "1st Generation".

Unit Type: G denotes "Geothermal".

Unit Capacity: The nominal tonnage, in MBtu/hr.

Configuration: Configuration type where **V** denotes "Vertical".

Voltage: **3**, denotes **"**1 Phase 208/230V Power".

Heat Exchanger Options: **A** denotes "Microchannel Air Coil" + "Brazed Plate Water Coil".

Blower Options: **1** denotes "ECM Motor with Variable Speed".

Accessories: **00** denotes "None" and is the default configuration.

Filter Option: 0 denotes no filter. **1** denotes a 2" MERV 11 filter.

Trim Option: **S** denotes "Standard".

SECTION 1: MODEL IDENTIFICATION

Serial Number Specifications

The serial number will encode four (4) potential values to identify the device, where it was made, tonnage of unit, Manufacturing Date Code, and Serial Sequence off the line.

Table 1 Serial number specifications

Description	Format	Example
Factory ID code. Unique to each manufacturing location.	2 characters, numeric 1st character is non-zero	10
Tonnage of unit	1 character	6
Date code: ID month and year of manufacturing.	4 characters, numeric	0123
Serial sequence: unique sequence starting at zero. Does not reset with new date codes, but does reset with new factory ID codes.	7 characters, hex	0001234
Build type: Signifies Prototype Builds. This will not be populated on Production build units.	3 characters	P1B
Full example:	10601230001234-P1B	
Meaning:	**Made at factory 10** **Tonnage of Unit, 6** **Month / Year, 01-23** **Unique sequence is “0001234”** **Prototype Build Type**	

Geo Model Identifier

Table 2 Geo model identification

DP1G036 (3T)	DP1G048 (4T)	DP1G060 (5T)	DP1G072 (6T)
Dandelion Package, 1st Generation, Geo Unit 3 Tons	**Dandelion Package, 1st Generation, Geo Unit 4 Tons**	**Dandelion Package, 1st Generation, Geo Unit 5 Tons**	**Dandelion Package, 1st Generation, Geo Unit 6 Tons**

For a complete list of common and model specific components, see SECTION 8 MAINTENANCE AND SERVICE

SECTION 2: UNIT INSTALLATION

Introduction

The Dandelion Geo (geothermal water-to-air unit) is a ground source heat pump that comes in size increments of 3 to 6 Tons. It is designed for heating-dominant environments, providing higher output heat at lower CFMs. Internal constant CFM fans, variable speed internal ground pumps, Flo-Link ground loop connections, and a built-in P-trap provides a simple and easy installation process. The unit also includes auxiliary and emergency heat - all in a single, permanently connected, point of power requiring under 10 amps of total service per nominal ton.

The Dandelion heat pump and circulating fluid continuously transfers heat. During summer months, the geothermal system draws heat from the air in your home and transfers it to the ground. During winter months, it draws heat from the ground and transfers it to your home. Concise engineering and consistent quality control are built into every Dandelion geothermal unit. The performance capabilities of each unit relies on correct installation and proper system application.

Each model size is designed to correspond with housing or facility square footage, providing geothermal heating and cooling with the following additional benefits:

Dandelion Geo Features

- **Energy Independence** Eliminates the need for fuel oil based heating systems by utilizing year-round constant temperatures found beneath the ground.
- **2-in-1 Heating and Cooling** A single installation point for HVAC, connected and centralized for easy management.
- **Lower Operational Costs** Predictable, year-round operating costs.
- **Reduced Maintenance** Provides consistent operation with less need for service calls or fuel deliveries.
- **Increased Home Value** Equips home with value-added investment and incentives.
- **Improved Safety** No flames, fumes, or furnaces. Reduced health hazards from carbon, sulfur, and nitrogen-based emissions.
- **Renewable Energy** Less dependency on fossil fuels, reduced air pollution.
- **Equipment Resilience** Up to 20-25 years operation for heat pumps and up to 50 years for ground loops.
- **Tax Incentives** Qualify for federal, state, and utility tax incentives to lower costs.
- **Better Efficiency** Up to 4x more efficiency gained per dollar spent vs. traditional HVAC.

SECTION 2: UNIT INSTALLATION

Inspection and Packaging

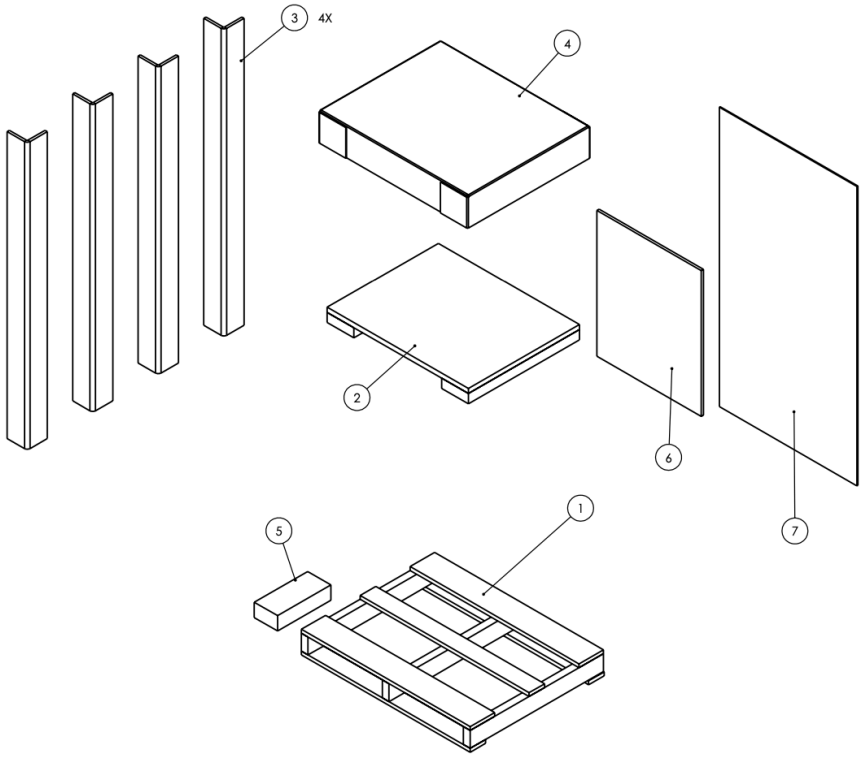
Unit Inspection

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 and units for damage.

Unit Packaging Removal

Dandelion Geo units are mounted to wooden pallets for easy handling during shipment and installation. Units are protected during shipment. Upon receipt of the unit, carefully remove the packaging. Use caution to not damage the finished surface of the unit.

Figure 2 Packaging inventory



ITEM NO.	QTY.	Material	Description	PAGE
1	1	WOOD	CUSTOM PALLET #1HT	3
2	1	FOAM	TOP FOAM CAP	3
3	4	CORNER BOARD	CORNERBOARD 3X3X60-.225	4
4	1	275# C KRAFT	BOTTOM TRAY	2
5	1	1.7# PE WHITE	MOTOR FOAM	4
6	1	1.7# PE WHITE	BACK PAD	4
7	1	32 ECT C KRAFT	CORR PAD	4

SECTION 2: UNIT INSTALLATION

Inspection and Packaging (cont.)

Accessory Kit Contents

Dandelion Geo units are provided with a set of components that are intended for field install. These items are contained inside of a plastic bag that's included with the unit. Inspect and inventory the kit for the following contents:

Table 3 Accessory kit contents

ITEM #	QTY	Dandelion PN	DESCRIPTION
1	1	56-0001-00	Dandelion Geo Installation and Operation Manual
2	1	20-0157-00	Gateway Tray, Blank
3	6	31-0146-00	Plastic Push-in Rivet
4	1	34-0093-00	PVC Fitting, ¾ Barb to ¾ Cement
5	2	34-0094-00	Clamp, Worm Drive
6	1	25-0034-00	P-trap, Condensate Tube
7	1	43-0007-00	Antenna
8	2	47-0006-00	Thermistor, for Return and Supply Air Temperature Sensing
9	1	42-0070-00	Disconnect switch parts (screws, handle, faceplate)

SECTION 2: UNIT INSTALLATION

General Information

The **Dandelion Geo** units are designed for indoor installation only. Units are assembled, wired, charged, and run-tested at the factory.

Certification of Cooling Models

a. Certified as a domestic central air conditioner with electrically operated compressors.
b. Certified for indoor installation only.
c. Certified with refrigerant R-410A coils.

Codes and Ordinances

Dandelion geothermal units have been tested and certified by ETL, in accordance with UL Safety Standard 60335-2-40.

The system should be sized in accordance with the American Society of Heating, Refrigeration and Air Conditioning Engineers Handbook.

Installation of units must conform to the ICC standard of the International Mechanical Code, the International Building Code, Installation of Air Conditioning and Ventilating Systems Standard, NFPA 90A, and local building, plumbing, and waste water codes. All appliances must be electrically grounded in accordance with local codes, or in the absence of local codes, the current National Electric Code, ANSI/NFPA 70.

Receiving the Unit

When the unit arrives, it should be checked for damage that might have occurred in transit. The unit will be secured to a pallet and covered with a cardboard top cap. The coil is protected by a cardboard side cover and the entire unit is plastic wrapped. The nameplate should be checked to ensure the correct model sizes and voltages have been received to match the job requirements. If installation is conducted by a third party team, the following should be observed:

1. If repairs must be made to damaged goods, then Dandelion should be notified before any repair action is taken in order to protect the warranty.
2. Certain equipment alteration, repair, and manipulation of equipment without Dandelion's consent may void the product warranty.
3. Contact the Dandelion Warranty Department for assistance with damaged goods, repairs, freight claims or installation questions.

Storage

If the Geo installation does not occur immediately following delivery, store equipment in a dry, protected area away from construction traffic and in the proper orientation as marked on the packaging. Keep all internal packaging in place. Secure all loose-shipped items.

SECTION 2: UNIT INSTALLATION

Safety

NOTICES, CAUTIONS, WARNINGS, NOTES, & DANGERS

Attention should be paid to the following statements:

“NOTICE” is a notification of installation, operation, or maintenance information which is important, but 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 a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

“DANGER” specifies an immediately hazardous situation which, if not avoided, WILL result in death or serious injury.

“NOTE” Notes are intended to clarify the unit installation, operation, and maintenance.

READ THE ENTIRE INSTALLATION, OPERATION, AND MAINTENANCE MANUAL. OTHER IMPORTANT SAFETY PRECAUTIONS ARE PROVIDED THROUGHOUT THIS MANUAL.

TAKE PRECAUTIONS DURING THE INSTALLATION OF THIS SYSTEM

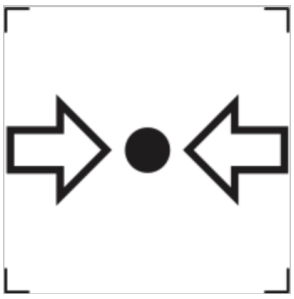
1. The appliance must be installed in accordance with national wiring regulations.
2. The space necessary for the correct installation of the appliance must allow for the minimum permissible distance to adjacent structures.
3. Keep all units covered on the job site with either the original packaging or protective covering to prevent damage or contamination from foreign materials.
4. Cap or recap unit connections and all piping until the unit is installed.
5. All geothermal units should be stored inside original packaging in a clean, dry location.
6. Units should be stored in an upright position at all times and not stacked unless specially noted on the packaging.
7. Geothermal units removed from service should have all components, oils, antifreeze, and refrigerants properly disposed of according to all local and national environmental recycling codes, regulations, standards, and rules.

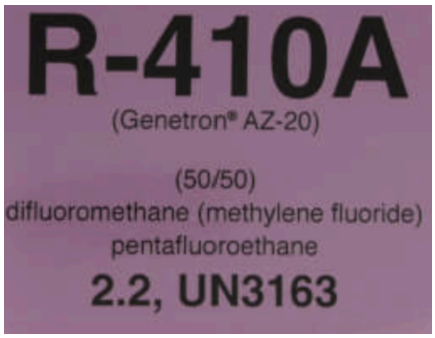
SECTION 2: UNIT INSTALLATION

Safety (cont.)

8. The appliance is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge unless they have been given supervision or instruction. Children being supervised are not to play with the appliance.

9. The system contains refrigerant under very high pressure and must only be serviced by qualified persons.





R-410A Max Pressure = 4.2 MPa

10. This system uses R-410A refrigerant and has been tested for safe use where the maximum pressure as determined in Annex EE (UL 60335-2-40) is **4.2 MPa**.

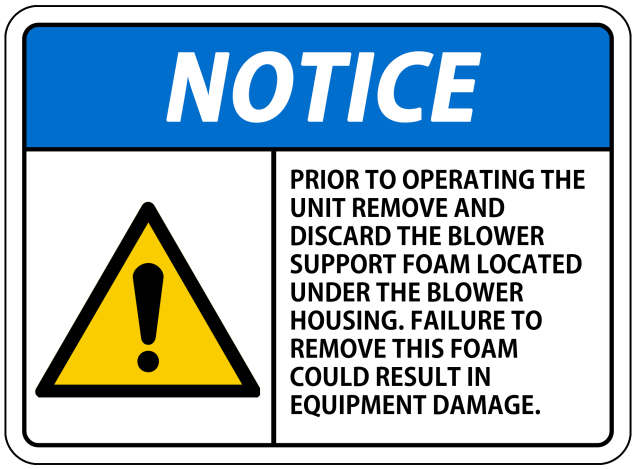
11. All systems are factory assembled, leak tested, and run tested.

12. Startup and service must be performed by a factory trained Service Technician.

13. The unit is for indoor use only.

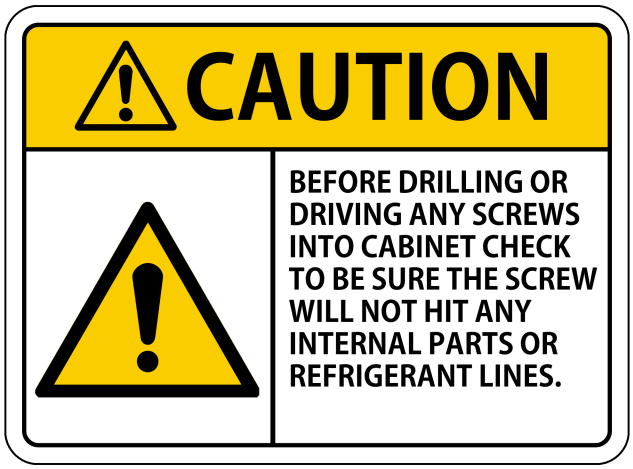
14. Every unit has a unique equipment nameplate with electrical, operational, and unit clearance specifications. Always refer to the unit nameplate for specific ratings unique to the model you have purchased.

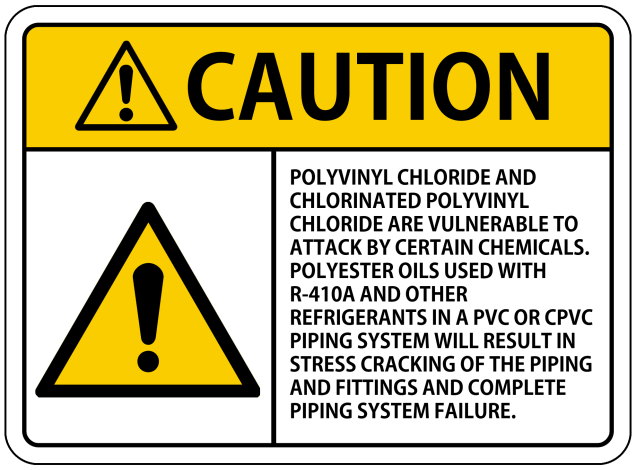
15. Always control the unit from the thermostat or control panel, never at the main power supply, except for emergency or complete shutdown of the unit.

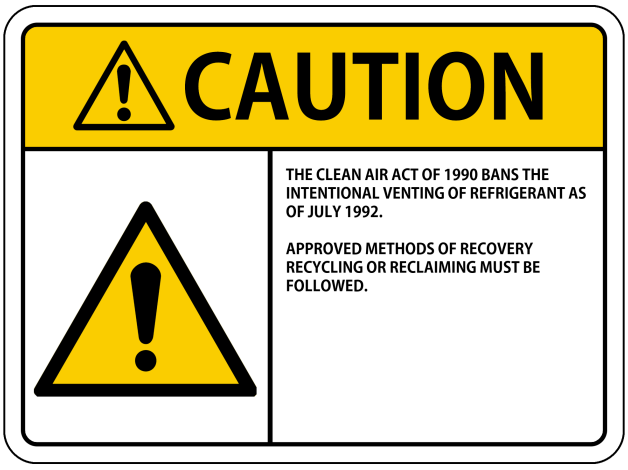

NOTICE
PRIOR TO OPERATING THE UNIT REMOVE AND DISCARD THE BLOWER SUPPORT FOAM LOCATED UNDER THE BLOWER HOUSING. FAILURE TO REMOVE THIS FOAM COULD RESULT IN EQUIPMENT DAMAGE.

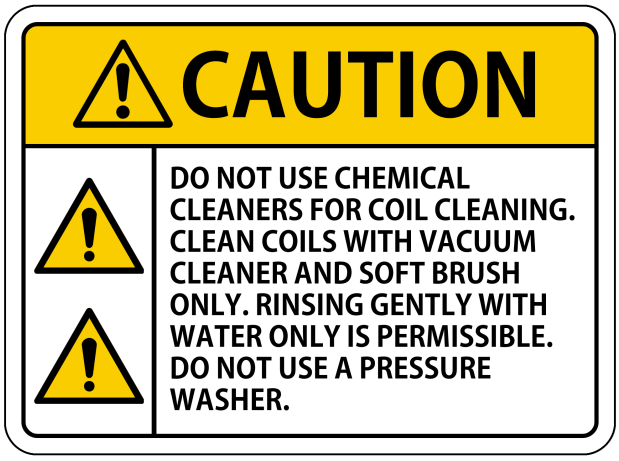

CAUTION
ALL GEOTHERMAL EQUIPMENT UNLESS SPECIFIED OUTDOOR IS DESIGNED FOR INDOOR INSTALLATION ONLY. DO NOT INSTALL OR STORE UNIT IN A CORROSIVE ENVIRONMENT OR IN A LOCATION WHERE TEMPERATURE AND HUMIDITY ARE SUBJECT TO EXTREMES. USE OF EQUIPMENT NOT CERTIFIED AND MARKED FOR OUTDOOR APPLICATION WILL VOID ALL WARRANTIES.

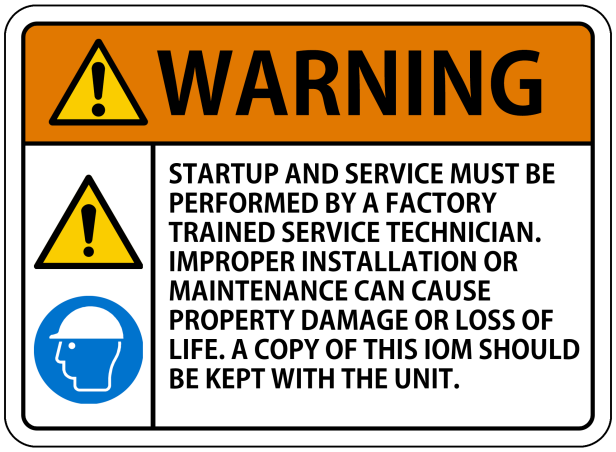

CAUTION
DO NOT OPERATE THE GEOTHERMAL HEAT PUMP UNIT DURING BUILDING CONSTRUCTION PHASE.

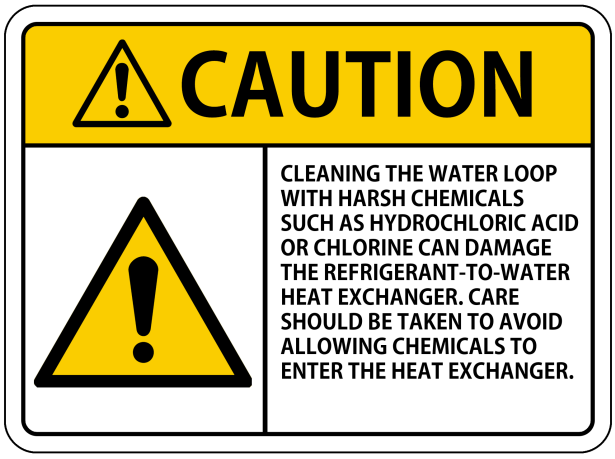

CAUTION
BEFORE DRILLING OR DRIVING ANY SCREWS INTO CABINET CHECK TO BE SURE THE SCREW WILL NOT HIT ANY INTERNAL PARTS OR REFRIGERANT LINES.


CAUTION
POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE ARE VULNERABLE TO ATTACK BY CERTAIN CHEMICALS. POLYESTER OILS USED WITH R-410A AND OTHER REFRIGERANTS IN A PVC OR CPVC PIPING SYSTEM WILL RESULT IN STRESS CRACKING OF THE PIPING AND FITTINGS AND COMPLETE PIPING SYSTEM FAILURE.


CAUTION
THE CLEAN AIR ACT OF 1990 BANS THE INTENTIONAL VENTING OF REFRIGERANT AS OF JULY 1992.
APPROVED METHODS OF RECOVERY RECYCLING OR RECLAIMING MUST BE FOLLOWED.

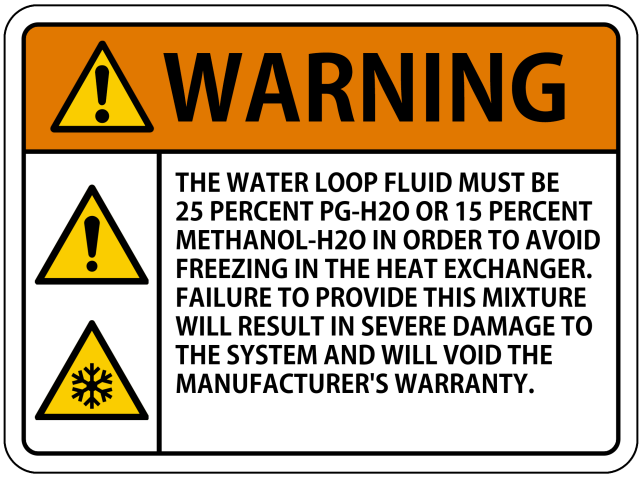

CAUTION
DO NOT USE CHEMICAL CLEANERS FOR COIL CLEANING. CLEAN COILS WITH VACUUM CLEANER AND SOFT BRUSH ONLY. RINSING GENTLY WITH WATER ONLY IS PERMISSIBLE. DO NOT USE A PRESSURE WASHER.

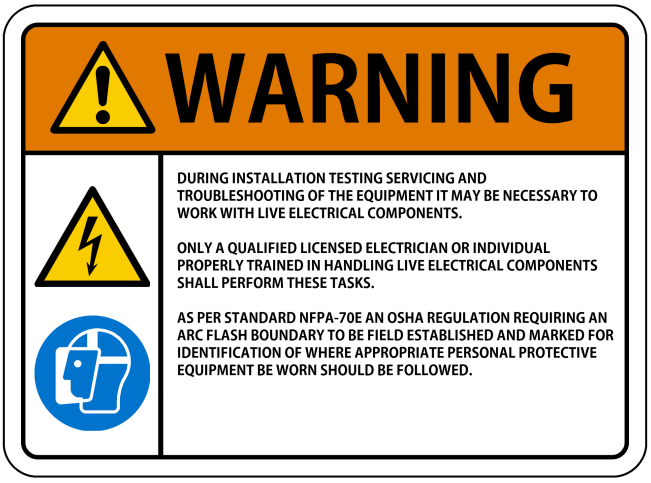

WARNING
STARTUP AND SERVICE MUST BE PERFORMED BY A FACTORY TRAINED SERVICE TECHNICIAN. IMPROPER INSTALLATION OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE OR LOSS OF LIFE. A COPY OF THIS IOM SHOULD BE KEPT WITH THE UNIT.

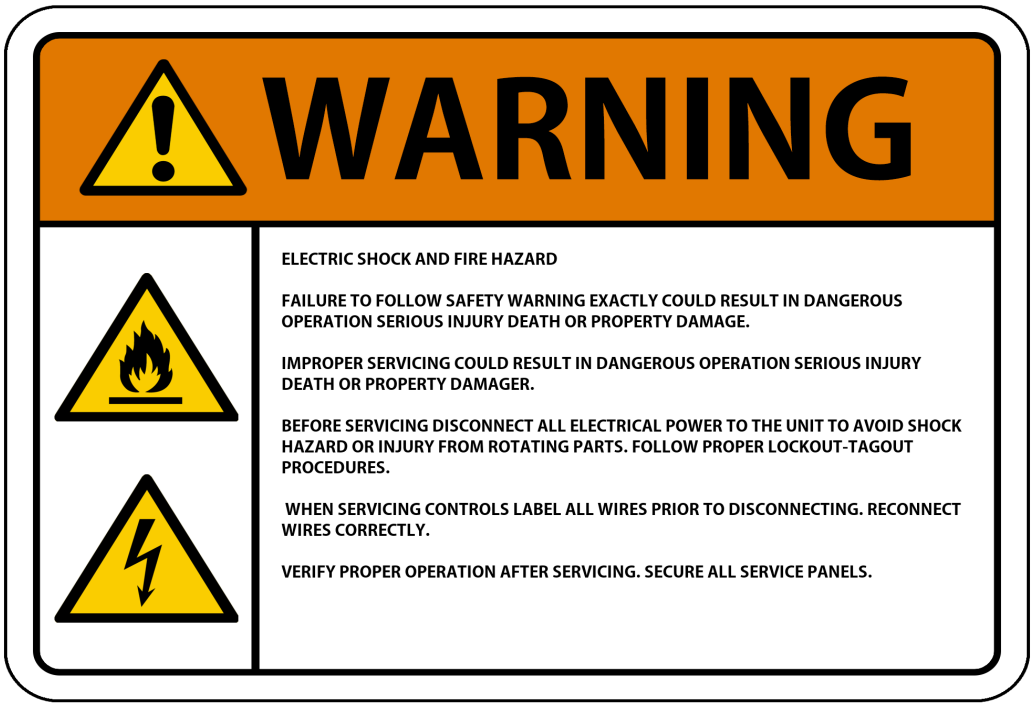

CAUTION
CLEANING THE WATER LOOP WITH HARSH CHEMICALS SUCH AS HYDROCHLORIC ACID OR CHLORINE CAN DAMAGE THE REFRIGERANT-TO-WATER HEAT EXCHANGER. CARE SHOULD BE TAKEN TO AVOID ALLOWING CHEMICALS TO ENTER THE HEAT EXCHANGER.

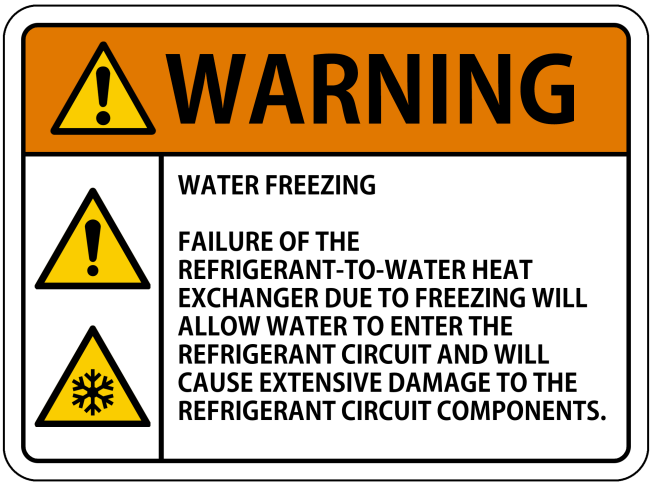

WARNING
DO NOT WORK IN A CLOSED AREA WHERE REFRIGERANT OR NITROGEN GASSES MAY BE LEAKING. A SUFFICIENT QUANTITY OF VAPORS MAY BE PRESENT AND CAUSE INJURY OR DEATH.


WARNING
IF THE INFORMATION IN THIS MANUAL IS NOT FOLLOWED EXACTLY A FIRE MAY RESULT CAUSING PROPERTY DAMAGE PERSONAL INJURY OR LOSS OF LIFE.


WARNING
THE WATER LOOP FLUID MUST BE 25 PERCENT PG-H2O OR 15 PERCENT METHANOL-H2O IN ORDER TO AVOID FREEZING IN THE HEAT EXCHANGER. FAILURE TO PROVIDE THIS MIXTURE WILL RESULT IN SEVERE DAMAGE TO THE SYSTEM AND WILL VOID THE MANUFACTURER'S WARRANTY.


WARNING
DURING INSTALLATION TESTING SERVICING AND TROUBLESHOOTING OF THE EQUIPMENT IT MAY BE NECESSARY TO WORK WITH LIVE ELECTRICAL COMPONENTS.
ONLY A QUALIFIED LICENSED ELECTRICIAN OR INDIVIDUAL PROPERLY TRAINED IN HANDLING LIVE ELECTRICAL COMPONENTS SHALL PERFORM THESE TASKS.
AS PER STANDARD NFPA-70E AN OSHA REGULATION REQUIRING AN ARC FLASH BOUNDARY TO BE FIELD ESTABLISHED AND MARKED FOR IDENTIFICATION OF WHERE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT BE WORN SHOULD BE FOLLOWED.


WARNING
ELECTRIC SHOCK AND FIRE HAZARD
FAILURE TO FOLLOW SAFETY WARNING EXACTLY COULD RESULT IN DANGEROUS OPERATION SERIOUS INJURY DEATH OR PROPERTY DAMAGE.
IMPROPER SERVICING COULD RESULT IN DANGEROUS OPERATION SERIOUS INJURY DEATH OR PROPERTY DAMAGER.
BEFORE SERVICING DISCONNECT ALL ELECTRICAL POWER TO THE UNIT TO AVOID SHOCK HAZARD OR INJURY FROM ROTATING PARTS. FOLLOW PROPER LOCKOUT-TAGOUT PROCEDURES.
WHEN SERVICING CONTROLS LABEL ALL WIRES PRIOR TO DISCONNECTING. RECONNECT WIRES CORRECTLY.
VERIFY PROPER OPERATION AFTER SERVICING. SECURE ALL SERVICE PANELS.


WARNING
WATER FREEZING
FAILURE OF THE REFRIGERANT-TO-WATER HEAT EXCHANGER DUE TO FREEZING WILL ALLOW WATER TO ENTER THE REFRIGERANT CIRCUIT AND WILL CAUSE EXTENSIVE DAMAGE TO THE REFRIGERANT CIRCUIT COMPONENTS.

SECTION 2: UNIT INSTALLATION

Common Component Description: 3, 4, 5, 6-TON Models

Main Control Board: Primary circuit board assembly for heat pump energization, monitoring, and control.

Voltage Sense Board: Circuit board assembly to measure the unit's electric current, voltage and power.

Gateway Thermostat Board: Internet-connected thermostat circuit board assembly for real-time monitoring of heat pump performance.

Transformer: Primary transformer for the unit's low voltage electrical distribution.

Low Voltage Resettable Breaker: Prevents electrical overcurrent on 24VAC circuit

Compressor Contactor: Enables high voltage current for operation of the compressor.

Primary Float Switch: Electronic water sensor for the unit that prevents condensate pan overflow.

Safety Contactor: Regulates on or off state of compressor or emergency heater.

Soft Start: Supplement to AC electric motor that reduces strain during the compressor power-up phase.

Line Temperature Sensor: NTC Type III 10k ohm thermistors, placed on refrigerant lines and water lines to monitor system performance.

Air Coil: Aluminum Microchannel heat exchanger with built-in channels that house and distribute refrigerant.

Ground Pumps: Electronically controlled, recirculating water pumps.

Bi-Flow Filter Drier: Absorbs any excess dirt, moisture, or particulates in order to maintain clean refrigerant.

Reversing Solenoid Valve: Allows directional change in refrigerant flows for cooling and heating modes.

Pressure Transducers: Electronic pressure sensors, placed on the discharge (high) side and suction (low) side of the refrigeration system.

Low-Pressure Switch: Low voltage switch that senses suction pressure in refrigerant lines.

High-Pressure Switch: Low voltage switch that senses discharge pressure in refrigerant lines.

Freeze Protection Switch: Low voltage temperature switch that protects evaporator coils from freezing.

SECTION 2: UNIT INSTALLATION

PART 1: Pre-Installation

Special care should be taken in locating the geothermal unit. The installation location chosen should include adequate service clearance around the unit. All vertical units should be placed on a formed plastic air pad or a high-density, closed-cell polyethylene pad slightly larger than the base of the unit. Flex connectors should also be installed in between the ductwork and 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.

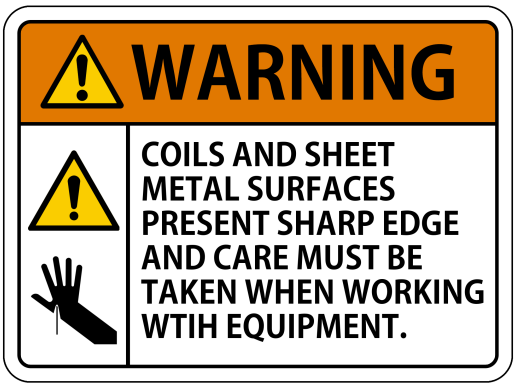
A trained and licensed installer or technician must perform this product's installation, start-up, and commissioning. Read the entire installation manual and make yourself comfortable with the installation standards and sequence of operation.

Other safety precautions and steps are provided throughout. Always refer to the nameplate of the unit for electrical and installation specifications unique to each model. Consider the placement of the unit in relationship to electrical utilities, plumbing, condensation management, and ductwork.

This is a multi-positional, vertical package unit with service access doors on all four of its sides. Access to the controller is provided by removing the panel immediately below the air coil.

PART 2: Checklist

- ☐ Compare the electrical nameplate specification with the installation design specification.
- ☐ Remove the screws and brackets that secures the unit to its shipping pallet (**Figure 3**).
- ☐ Remove packaging wrap from around the unit.
- ☐ Check for sheet metal defects on the unit's exterior.
- ☐ Remove return side shipping covers and check plumbing connections.
- ☐ Remove the coil protection cover from the return side.
- ☐ Remove Top Discharge Supply air cover.
- ☐ Read and become familiar with installation guidelines and sequence of operations.



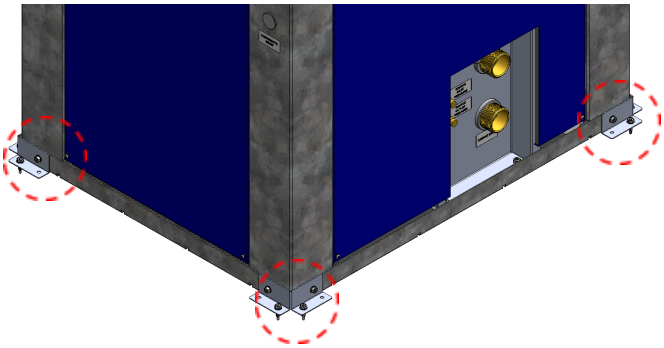


Figure 3 Shipping brackets

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations

Unit Placement

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

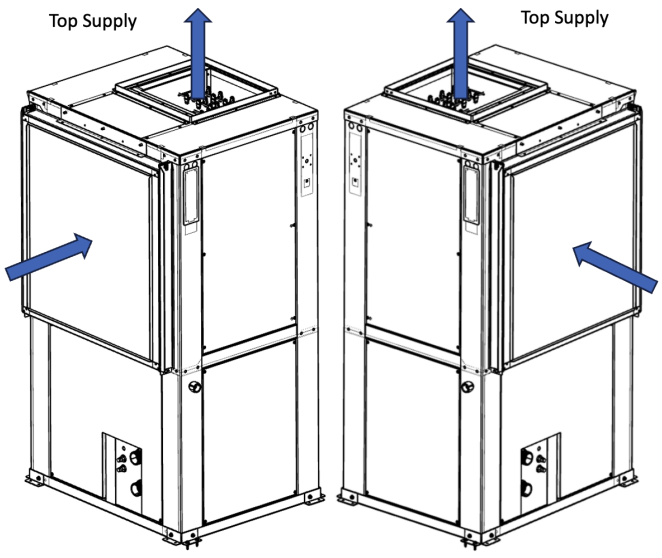
- ☐ **Service Access and Installation Space**
  A minimum service clearance is required. A general rule of thumb is at least 2 to 2-½ feet on the front and air coil sides depending on return ductwork size. A minimum of 1” clearance on all other sides is required. The unit can not be located next to any combustible materials.

- ☐ **Unit Air Pad**
  All vertical geothermal heating and cooling equipment should be placed on either a formed plastic air pad or a high-density, closed-cell polyethylene pad. This helps eliminate vibration noise that could be transmitted through the floor. The use of corner pads alone is not recommended (**Figure 5**).

- ☐ **Verify Infrastructure Components**
  The installer has verified that all applicable wiring, ductwork, piping, and accessories are correct and on the job site.

- ☐ **Verify Air Pattern Location**
  Determine left or right side return air pattern before the unit assembly and installation (**Figure 4**).

Figure 4 Return air pattern direction



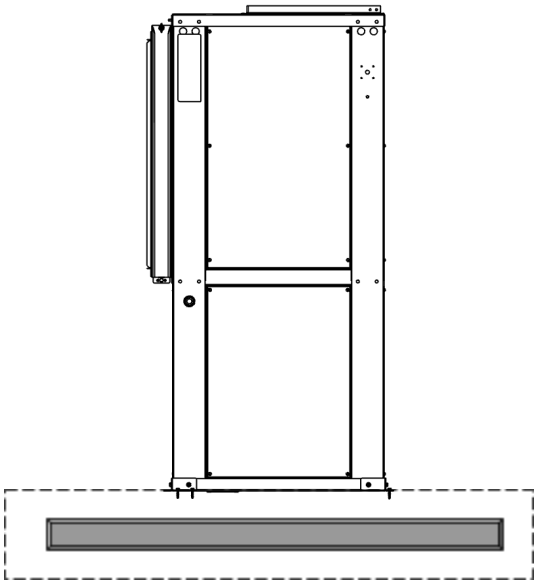


Figure 5 Unit air pad

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations (cont.)

☐ **Review Access Door Locations**

This is a multi-positional, vertical package unit. Service access doors are on all four (4) sides of the unit. The control box can be accessed by removing the panel under the air coil (**Figure 6**). A minimum of 28" of access is required at the front OR the rear in order to permit filter changes.

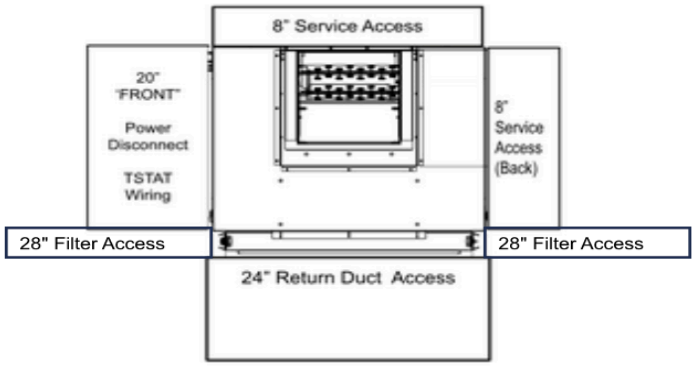


Figure 6 Access door locations

☐ **Determine Emergency Stop (Disconnect) Switch Location**

The Emergency Stop (disconnect) switch is installed on the front side of the unit. The front side is determined at the time of installation and depends on the desired direction of the return air duct. The switch can be installed on either the front or rear side, depending on unit positioning. **All Emergency Stop switch components must be integrated at the time of heat pump installation.**

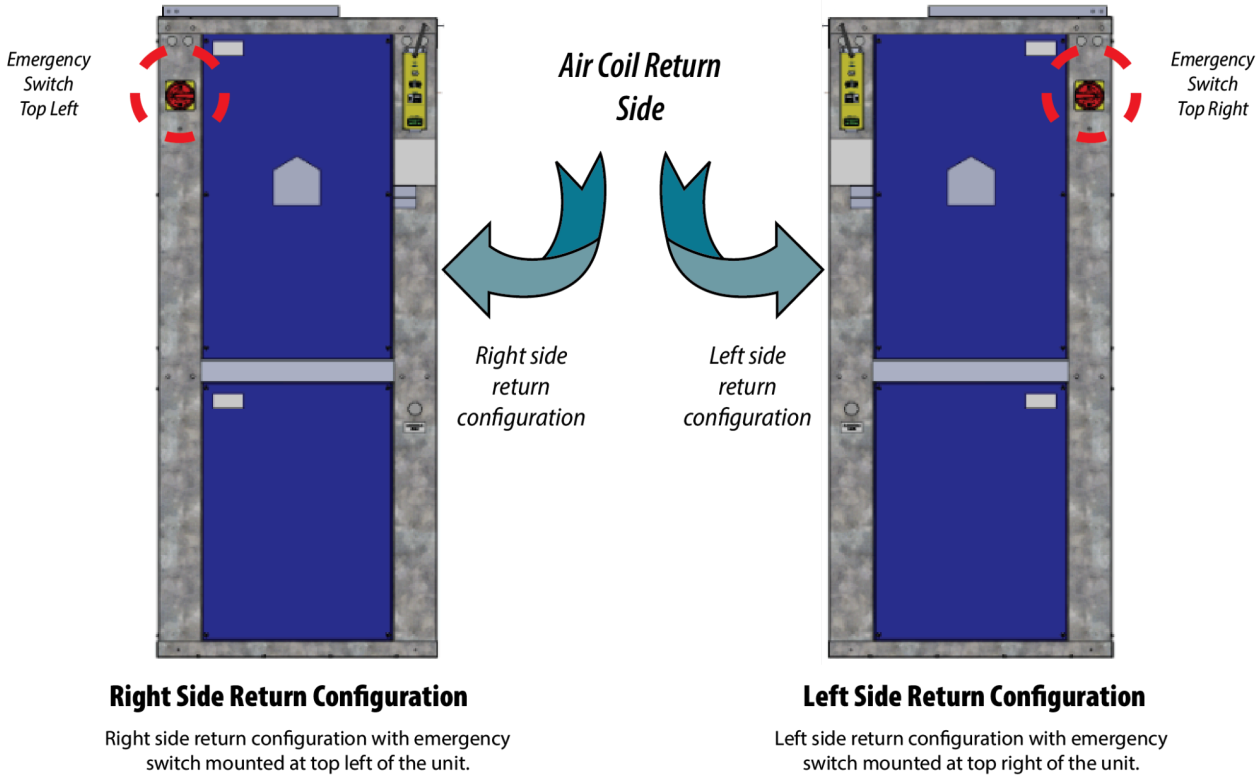


Figure 7 Emergency stop switch placement

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations (cont.)

Additional Installation Notes

1. The Dandelion Geo is designed for indoor use only.
2. Unit should not be operated on or around active construction sites.
3. Unit should be stored in an upright position at all times.

Duct Work

All new ductwork shall be designed as outlined in Sheet Metal and Air Conditioning Contractors National Association (SMACNA) or Air Conditioning Contractors of America (ACCA) or American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) handbooks. In summary:

1. All models do not have more than 2% air leakage. All supply / return plenums should be isolated from the unit by a flexible connector (canvas) or equivalent to prevent the transfer of vibration noise to the ductwork.
2. The flex connector should be designed so as not to restrict airflow. A radius should be used on any transition with airflow over 500 CFM.
3. If the unit is being installed with existing ductwork, the ductwork must be designed to handle the air volume required by the unit being installed.
4. When running a cooling or heating load on a building, size ductwork according to the building design load and heat pump CFM.

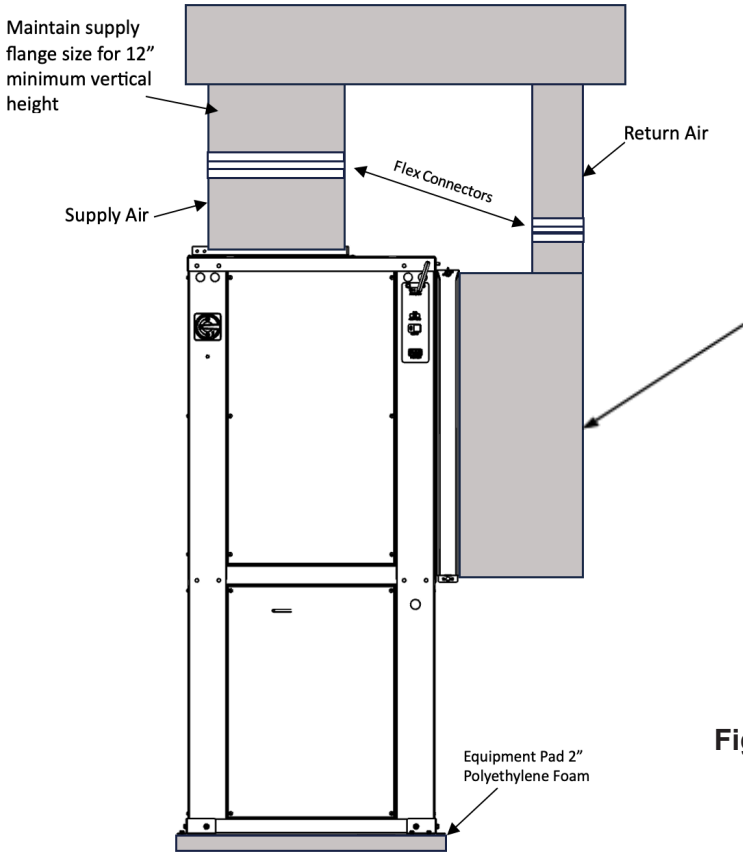


Figure 8 Ductwork configuration

Figure 9 Ductwork configuration with radius

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations (cont.)

Electrical Considerations

Fuse and Circuit Breaker Information

The Dandelion Geo heat pump system runs off 208/230V and the current rating for the system is 10A per nominal ton. There are no in-line fuses for the system. The only circuit breaker for the system is by way of the user's circuit breaker located at their home breaker panel. There is a low voltage circuit breaker in the Geo unit that handles the 24VAC control voltage.

Voltage Connection Points

High voltage connection point and thermostat connection point as shown here.

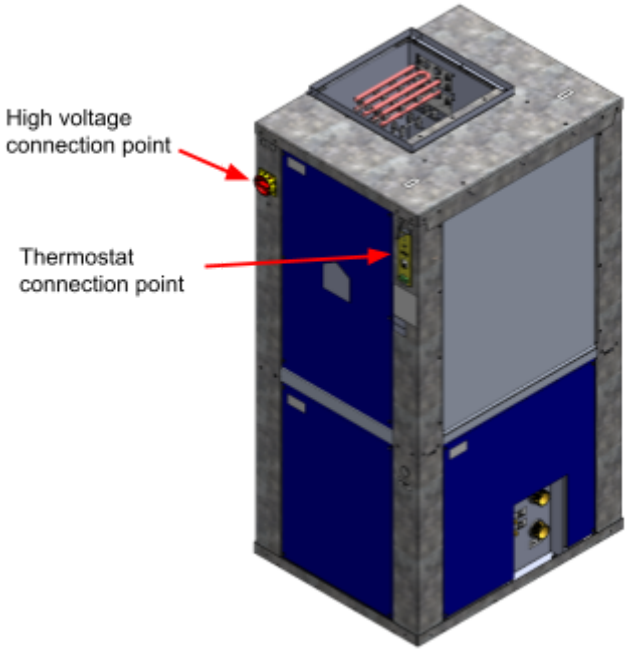


Figure 10 Voltage connections

Warning Labels

All Dandelion Geo panels with access to areas with high voltage or uninsulated live parts are marked with a hazardous warning label as shown here. These are located on all removable exterior panels.

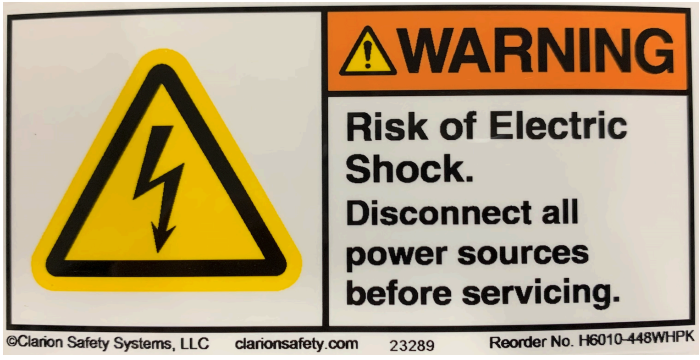


Figure 11 Electrical warning labels

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations (cont.)

National Electrical Code (NEC)

When wiring HVAC systems, it is important to follow the best practices according to the National Electrical Code (NEC), which is the standard for electrical safety in the United States. The NEC provides requirements for the selection and installation of conductors, overcurrent protection devices, grounding and bonding, wiring methods, and equipment for HVAC systems. Some of the key aspects of the NEC that apply to HVAC wiring are:

- The conductors must have an ampacity not less than 125% of the motor full-load current or the branch-circuit selection current, whichever is greater. This is based on NEC Table 430.248 or Table 430.250, as well as NEC 430.22(A) for single motors or NEC 430.24 for several motors or a combination load.

- The overcurrent protection devices must be sized according to the motor nameplate current rating or the NEC tables, and must not exceed 250% of the motor full-load current for non-time-delay fuses or inverse time circuit breakers, or 300% for dual-element fuses. This is based on NEC 430.32(A)(1) and NEC Table 430.52.

- The grounding and bonding of HVAC equipment must comply with NEC Article 250, which covers the methods and materials for connecting electrical systems to earth and to each other. This is based on NEC 250.2, 250.4, and 250.50 through 250.70.

- The wiring methods and raceways must be suitable for the location and environment of the HVAC installation, and must comply with NEC Articles 300 to 399, which cover the general requirements and specific types of wiring methods. This is based on NEC 300.1 through 300.50, and NEC Chapter 3.

- The equipment for HVAC systems must be listed and labeled for the intended use, and must be installed in accordance with the manufacturer's instructions and the NEC requirements. This is based on NEC 110.3(A) and (B), and NEC Chapter 4.

- The branch circuit conductors must be protected from physical damage by using suitable raceways or cables, such as rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit, electrical metallic tubing, electrical nonmetallic tubing, type MC cable, type AC cable, or type UF cable.

- The branch circuit overcurrent protection device must be sized according to the maximum current rating of the heat pump unit, and must not exceed 175% of the motor full-load current for non-time-delay fuses or inverse time circuit breakers, or 225% for dual-element fuses.

- The branch circuit conductors and overcurrent protection device must be capable of carrying the starting current of the heat pump unit, which may be higher than the running current.

- The branch circuit conductors must be properly grounded and bonded according to NEC Article 250, which covers the methods and materials for connecting electrical systems to earth and to each other.

SECTION 2: UNIT INSTALLATION

PART 3: Installation Considerations (cont.)

- The branch circuit conductors must be terminated at the heat pump unit using pressure connectors or lugs that are suitable for the conductor material and size.

- The branch circuit conductors must be identified by color coding or marking according to NEC 200.6 and 200.7, which specify the colors for grounded conductors (white or gray), ungrounded conductors (black, red, blue, etc.), and equipment grounding conductors (green, green with yellow stripe, or bare).

By following these best practices, you can ensure a safe and reliable HVAC installation that meets the NEC standards.

Additional considerations for geothermal heat pump systems:

- The heat pump unit must be connected to a dedicated branch circuit with a separate means for disconnecting.

- The disconnecting means must be located within sight of and readily accessible from the heat pump unit, and must have a lockable handle or a provision for locking.

- The branch circuit conductors must be sized according to the minimum ampacity rating of the heat pump unit, and must have a temperature rating of at least 75°C (167°F).

SECTION 2: UNIT INSTALLATION

PART 4: Dandelion Geo Installation Steps

1. After inspection, temporarily add the shipping covers on the return side of the unit to protect it during transportation to the installation point.
2. The unit must be set on a vibration isolation or air pad. Make sure the unit orientation is correct for the supply and return duct access. Ensure there is access to the front of the unit to allow for an electrical connection to both the Emergency Stop (Disconnect) switch and the Gateway Module.
3. Once the unit is set in place, remove all shipping covers and any remaining packaging.
4. Access the blower cabinet by removing the top front access panel. Remove the blower shipping foam support and blower motor shipping support bracket (**Figure 12** and **12a**). Find and remove the accessory kit located inside the airbox compartment.
5. Carefully turn the blower with your hand to confirm it turns freely.
6. Assemble and attach the air filter kit **(14-0011-00, Figure 13**), inserting the hooks from the filter rack into the openings provided below the return air coil, and rotate into place at the top, allowing the 3 pre-installed studs in the top of the chassis frame to protrude through the mating slots on the filter rack. Secure the top of the rack to the unit using 3 x 8-32 flange nuts provided. ***Detailed installation instructions are included in the Air Filter Kit box.***
7. Remove the filter rack door by loosening the thumb screw fastener at the top and bottom (**Figure 13**).
8. Slide in the 2” Merv 11 pleated filters included from the factory and re-attach the filter rack door. *Note the performance/pressure drop data* (see **Filter Performance**, **page 41**).
9. Secure the return plenum with vibration break onto the filter rack (**Figures 8** and **9**, **page 21**).
10. Secure the supply plenum transition onto the supply air flange with a vibration break. A 90-degree elbow is best off supply transition for noise reduction (**Figures 8** and **9**, **page 21**).

NOTE: DO NOT INSTALL ADDITIONAL SCREWS NEAR THE AIR COIL - DOING SO WILL DAMAGE/RUPTURE THE AIR COIL

SECTION 2: UNIT INSTALLATION

Part 4: Dandelion Geo Installation Steps (cont.)

Figure 12 Blower shipping foam & bracket location

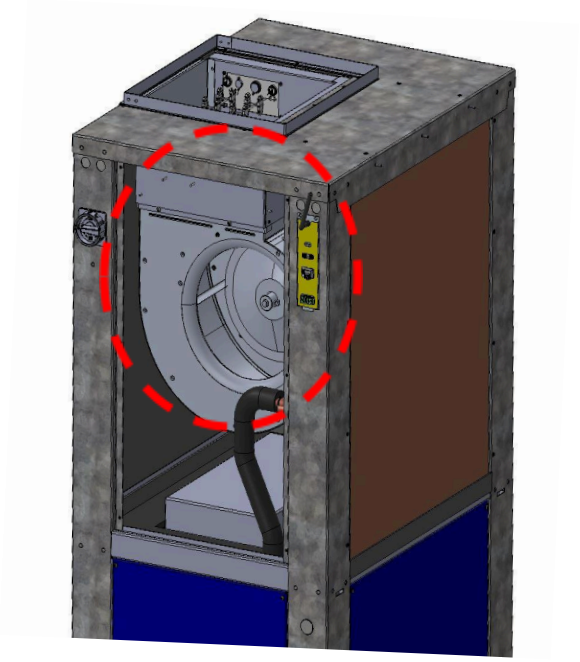


Figure 12a Blower bracket removal

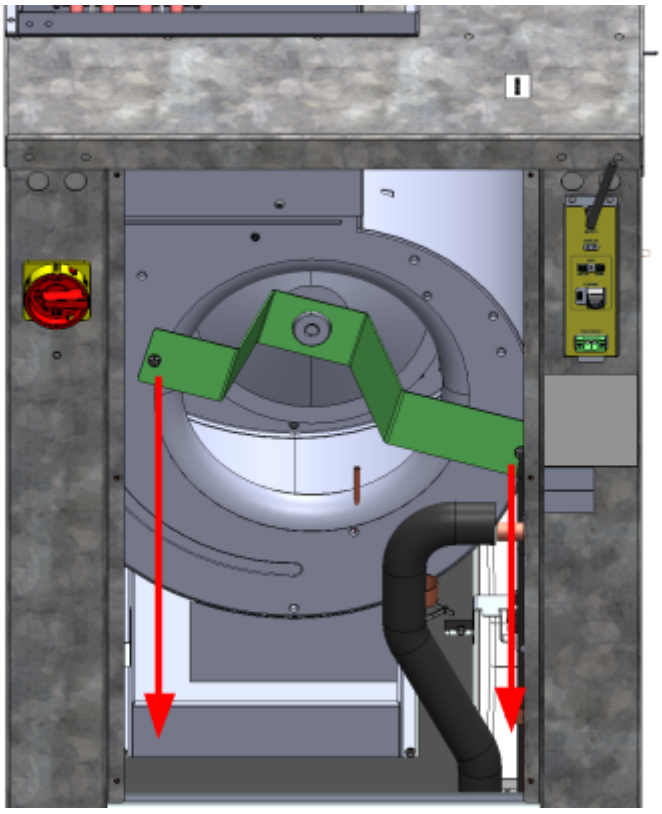
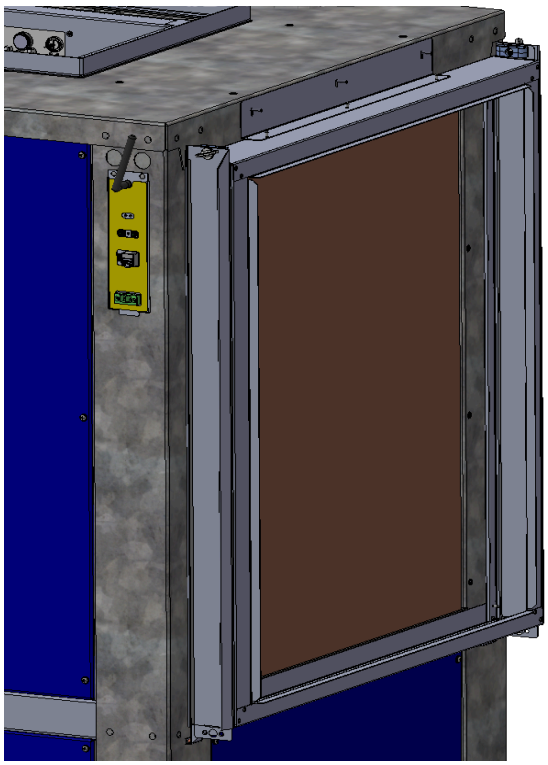


Figure 13 Air filter kit



SECTION 2: UNIT INSTALLATION

Part 4: Dandelion Geo Installation Steps (cont.)

11. **Route main power line to the unit** (**Figure 14**):
    a. Knock-out a conduit connector hole at the top corner of the unit where power entry is best located for the particular installation.
    b. Install ½" conduit connector rated for the gauge of wire to be used.
    c. Route wires into the unit through the conduit connector.

12. **Land high voltage wires to the power disconnect switch and attach to the unit:**
    a. Remove the power disconnect switch from the chassis of the unit by removing the four (4) phillips head screws that secure the switch to the corner post.
    b. Land high voltage wires (**L1**, **L2**) to the disconnect switch.
    c. Land ground wire to the ground terminal block located on the inside of the chassis corner.
    d. Re-attach disconnect to chassis using four (4) phillips head screws, while adding the yellow disconnect faceplate (faceplate included in the accessory kit).
    e. Attach the red disconnect knob (included in the accessory kit) to the post of the disconnect switch.

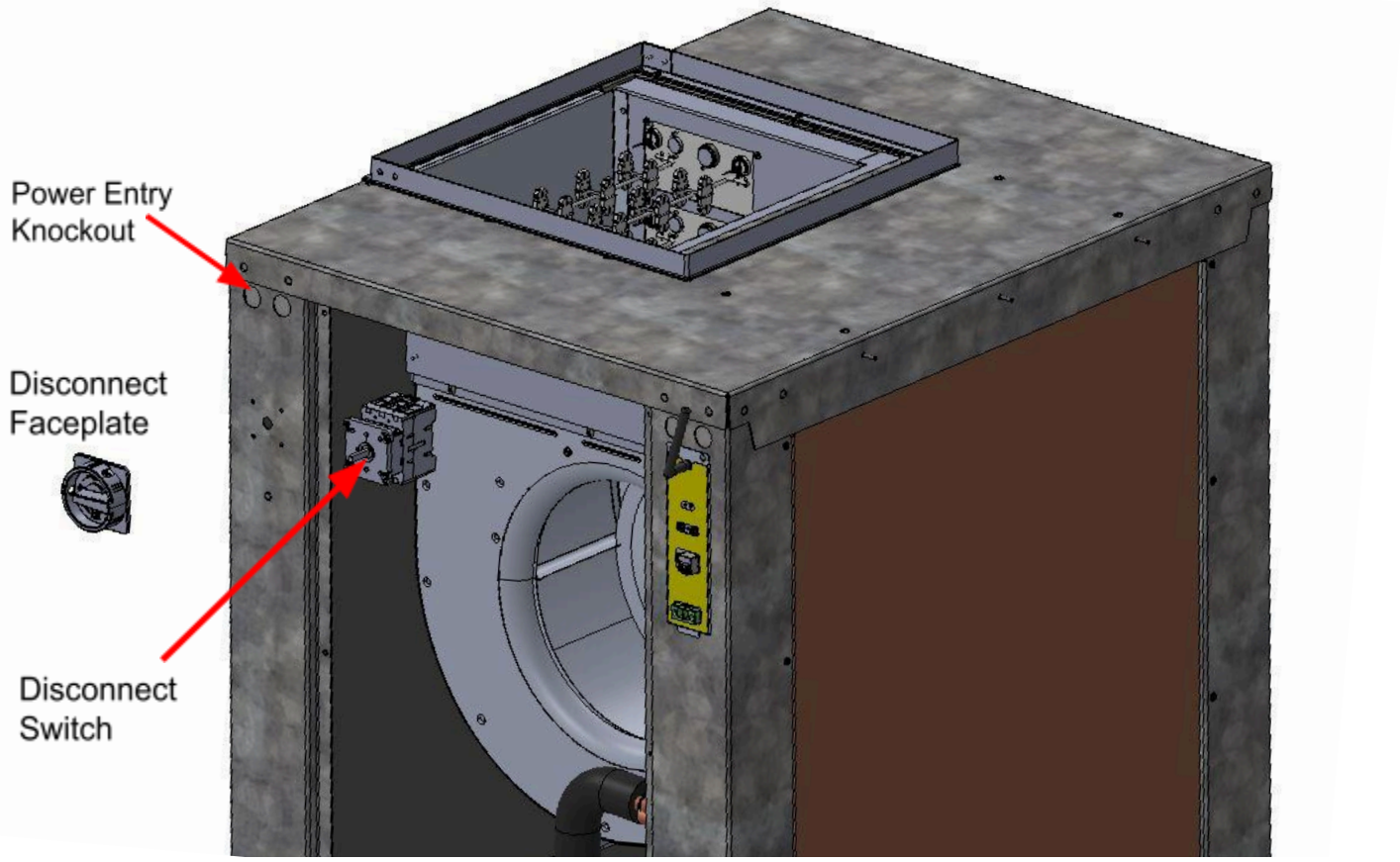


Figure 14 Main power line to unit connection

SECTION 2: UNIT INSTALLATION

Part 4: Dandelion Installation Steps (cont.)

13. **Route thermostat wires & supply/return air temperature sensors to gateway** (**Figure 15**):
    a. Determine which side of the unit is best for mounting the gateway for your installation. Remove the blank panel covering the opening (if necessary - one side has the blank installed).
    b. Retrieve the gateway module from the accessory kit.
    c. Find the gateway cable inside the airbox, route it through the gateway opening and attach it to the gateway card.
    d. Add strain relief to the top of the unit over the gateway card opening, route the thermostat wires through the strain relief and land the low voltage wires from the thermostat (**Figure 16**).
    e. Field-install the supply and return air sensors into the ductwork.
    f. Route the air sensor leads through the strain relief at the top of the gateway card block and attach the air sensor wires to the gateway card block.
    g. Attach the gateway module to the unit by engaging the tab into the sheet metal at the bottom of the slot, then using plastic push-pins (also included in the accessory kit) to push through the holes in the module and the chassis.
    h. If a zone control board is being utilized, there are optional 24VAC power leads provided on the front of the gateway module.

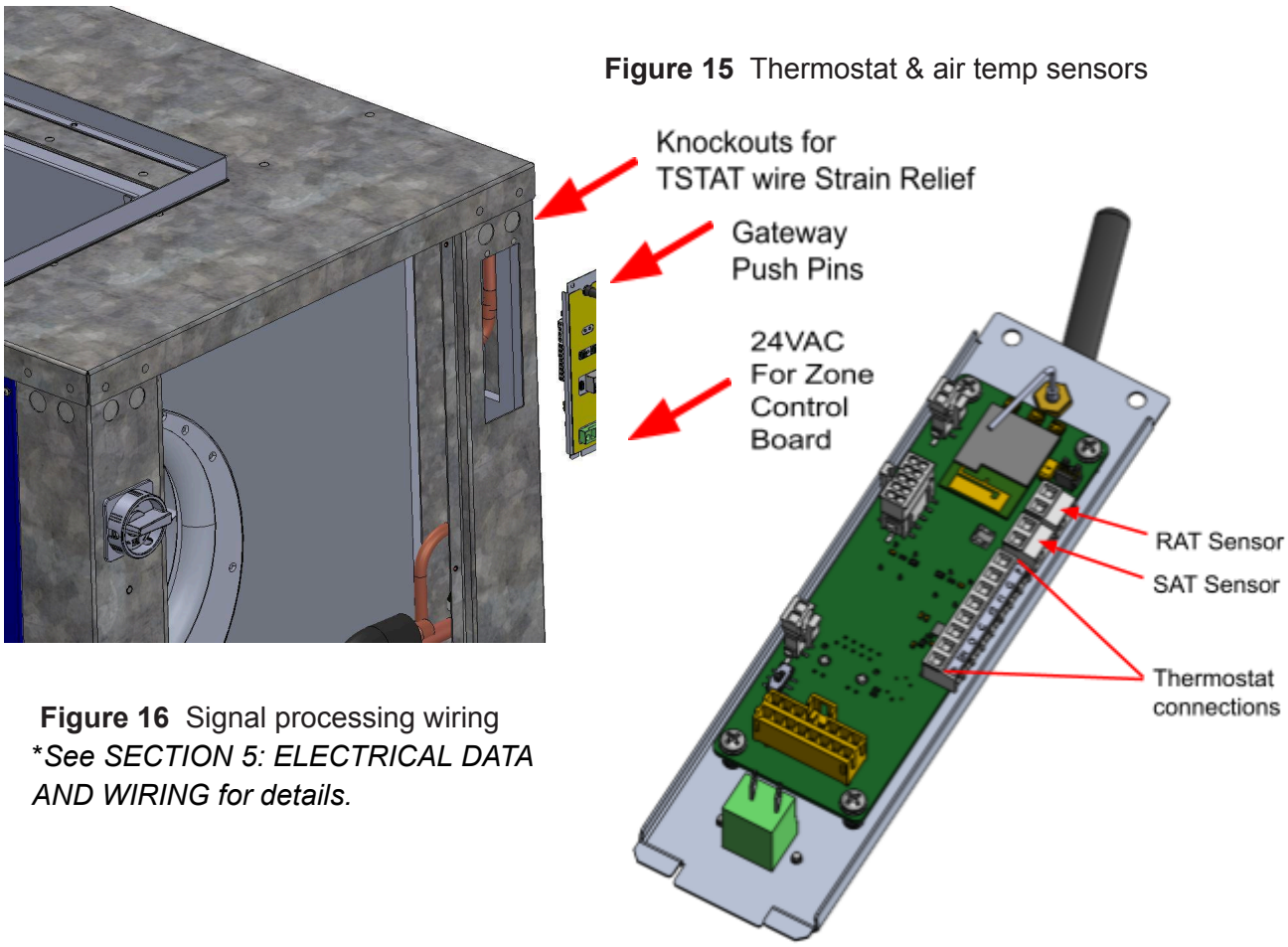


Figure 15 Thermostat & air temp sensors

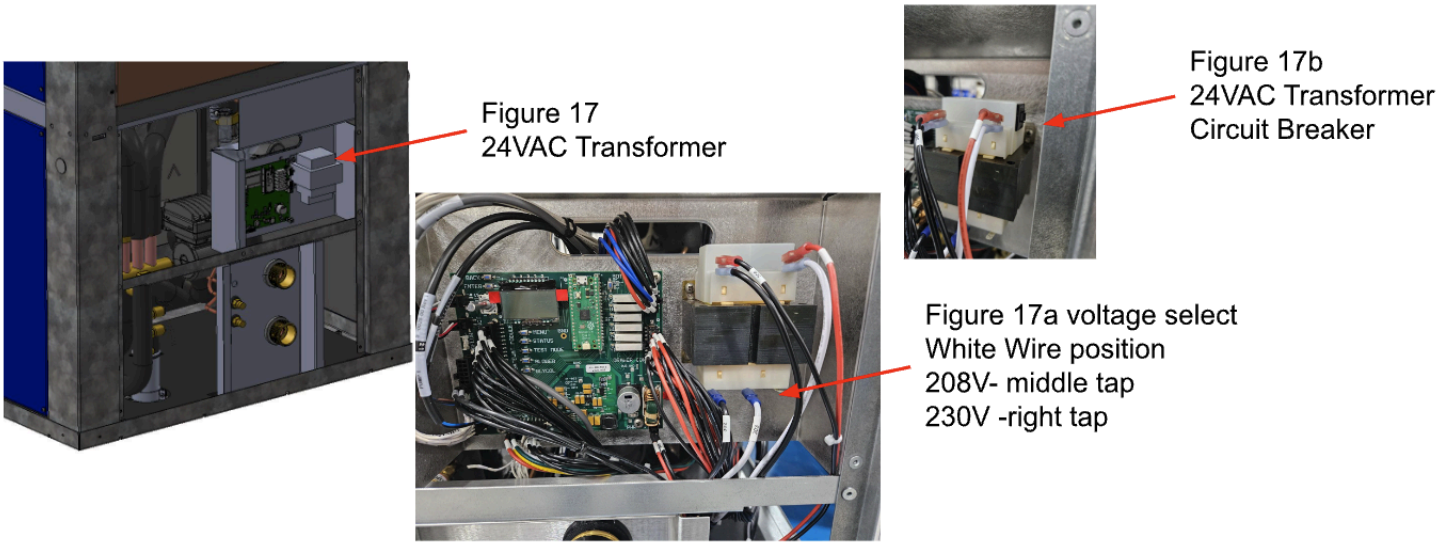
Figure 16 Signal processing wiring
**See SECTION 5: ELECTRICAL DATA AND WIRING for details.*

SECTION 2: UNIT INSTALLATION

Part 4: Dandelion Installation Steps (cont.)

14. **Set voltage taps on the 24VAC control transformer** (**Figures 17, 17a,** and **17b**):
    a. Remove the access panel below the return duct to expose the main controller and 24VAC transformer.
    b. Ensure the transformer has the properly selected voltage tap of 208/230 VAC (located in the control panel drawer).
    c. Replace access panel.

Figures 17, 17a, and 17b 24VAC Control transformer voltage taps

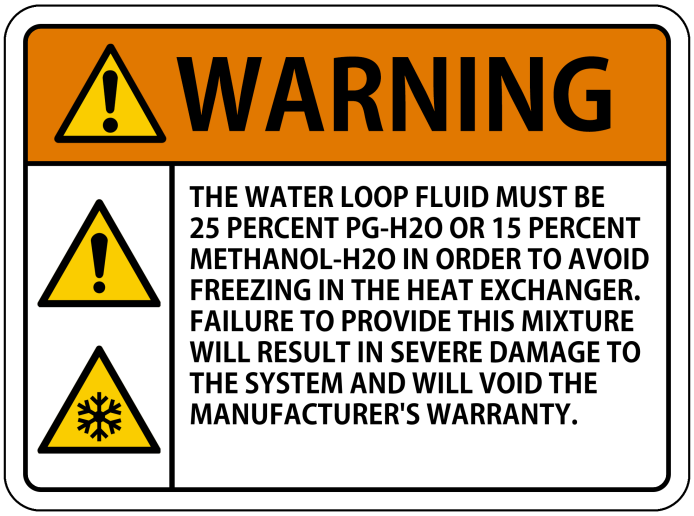


15. **Ground source (water) connection (Figure 18):** Male Flo-Link connectors are provided at the ground loop water in and out. These are labeled **Source Inlet** and **Source Outlet**.
    a. Ensure ground loop and trim kit connections are leak tested.
    b. Flush ground loop and trim kit with flush cart to remove dirt, particulate and all air bubbles.
    c. Connect the female Flo-Link adapters from the ground loop/trim kits to the corresponding “Inlet” and “Outlet” ports on the unit.

Figure 18 Ground source water connections

Part 4: Dandelion Installation Steps (cont.)

d. Fill system with clean H2O/PG mix per IGSHPA & Geo Water Content Standards in this manual (**Pages 32-33**).



e. Pressurize the system between 20 and 50 PSI.

16. **Condensate drain line connection**: Outlet ports for the condensate connection (**Figure 19**) are provided on either side of the unit. A P-trap hose, hose barb connector, and hose clamp are included in the accessory kit:

a. Connect the P-trap side of the hose to the hose barb from the condensate tray.
b. Position the hose to align with the desired condensate outlet point.
c. Push the hose barb connector through the hole within the chassis and continue into the hose.
d. Using the hose clamps, secure both ends of the P-trap hose to the hose barbs.
e. Connect 3/4” PVC tube x (desired fitting) to the external port to route condensate to a floor drain or external condensate pump (not supplied).

Part 4: Dandelion Installation Steps (cont.)

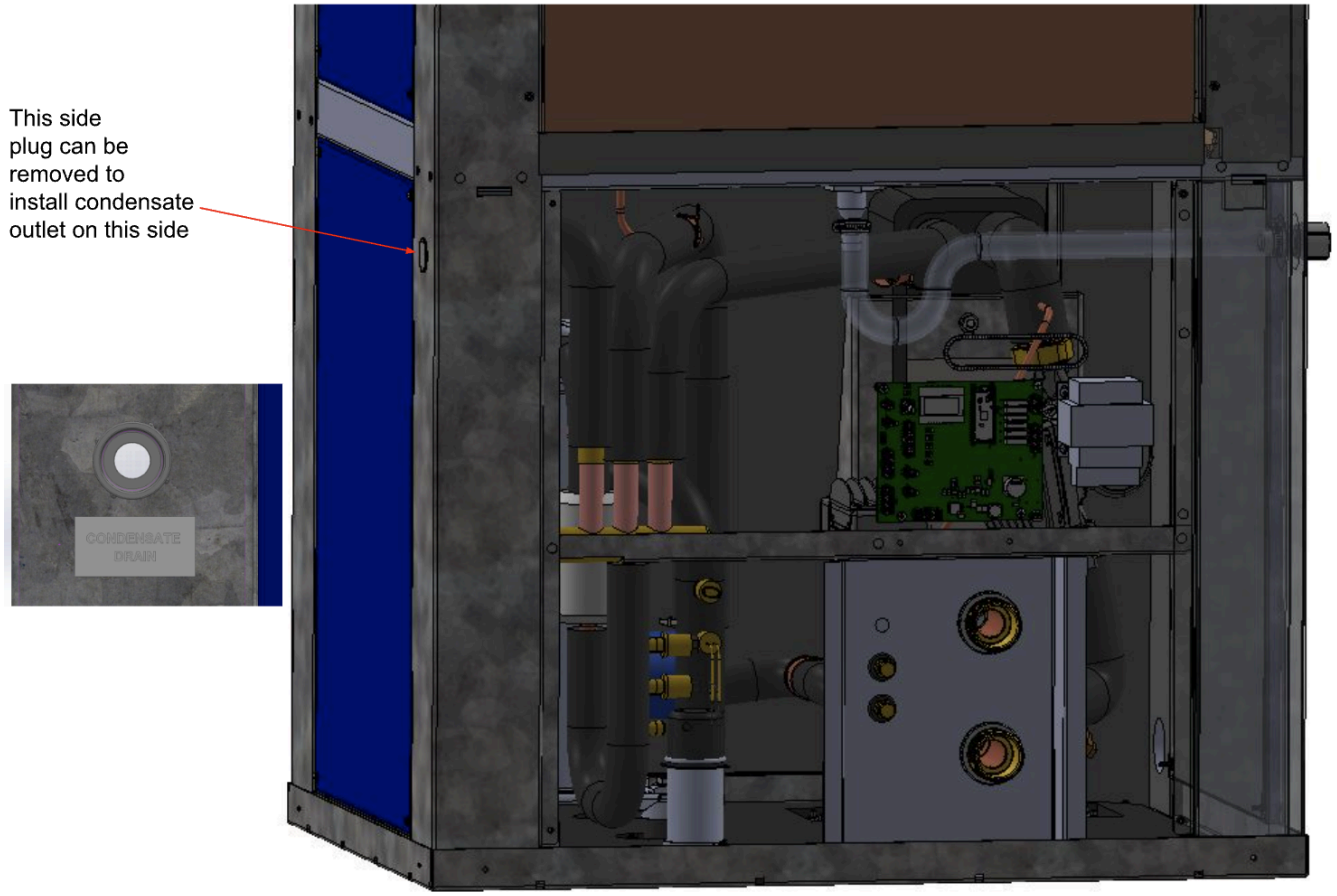


Figure 19 Condensate drain line
**Electrical box metal hidden in this view*

SECTION 3: UNIT PIPING INSTALLATION

Understanding Local Water Quality

In order to prevent corrosion and scaling of wetted internal surfaces of the heat pump and/or biological growth, water of high quality must be used in the ground loop. This water must also be mixed with an anti-freeze (propylene glycol) to prevent freezing. The antifreeze should also contain inhibitors to help prevent corrosion, scaling and biological growth.

Poor water quality will not only cause scaling and corrosion problems, but could also prevent corrosion inhibitors in the glycol from providing protection.

Hardness levels in water with high ion content (Ca2+, Mg2+, and Fe2+) can cause corrosion. In addition, higher hardness levels result in increased electrical conductivity and total dissolved solids (TDS), ultimately contributing to scaling and corrosion. Alternatively, softer water may have a low buffering capacity and lead to corrosion. When hardness levels are outside the recommended range, parameters such as oxygen content, conductivity, and pH should be considered to evaluate corrosion risks.

Chlorides and sulfates produce high concentrations of corrosive ions that can destroy the corrosion protection provided by inhibitors.

Sulfates and nitrates act as inhibitors for pitting corrosion caused by chlorides in pH-neutral environments.

Electrical conductivity and oxygen content play an important role in accelerating corrosion. In general, if conductivity is above 100 mS/cm, oxygen content should stay below 0.02 ppm.

pH levels below 6 increases corrosion risk while pH levels above 7.5 decreases corrosion risk.

Ferric cation (Fe3+) and **Manganese ion** (Mn4+) are strong oxidants and may increase the risk for localized corrosion on stainless steels in combination with brazing material copper.

Determining Ground Loop Water Quality

Under ideal conditions, antifreeze diluted with demineralized water removes both corrosive and hardness ions. However, local or municipal water will vary in content and hardness. It's important to understand the integrity of your local water supply. The Department of Natural Resources or your local municipality can direct you to the proper testing agency in order to understand your water content and its quality limitations to a ground loop system.

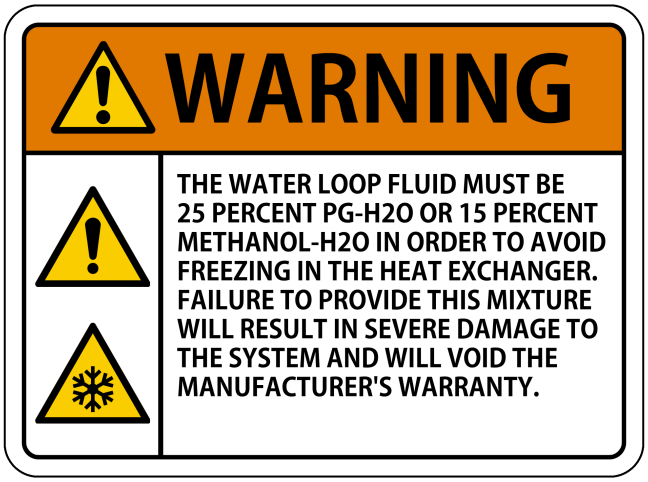
Recommended Glycol/H_2O Mixture

The Geo installation team will combine glycol with the water available on-site. The Dandelion Geo is engineered to be used with a ground loop heat exchanger, designed and installed per International Ground Source Heat Pump Association (IGSHPA) guidelines for ground loop systems.

To prevent freezing in the heat pump heat exchanger, a minimum of 25% PG/H2O should be used to charge the ground loop. An inhibited propylene glycol designed for ground source heat pump loops must be used to prevent corrosion and bacterial growth. Dandelion recommends **CoreChem GlycoChill+ PD200HD.** More information on **CoreChem GlycoChill +PD200HD** can be found here:

https://corecheminc.com/product/glycochill-p200hd-inhibited-propylene-glycol-heat-transfer-fluid/

Source water and/or fill water, must be filtered to prevent fouling/clogging of the heat pump heat exchanger. Particulates larger than **0.8mm (800 microns)** must be filtered from the ground loop fluid before connecting to the unit. This will ensure long term reliability of circulation components in the Dandelion Geo system, especially valves and pumps.



IGSHPA & Geo Water Content Standards

IGSHPA provides a baseline standard for ensuring the quality, efficiency, performance, and safety of closed-loop/geothermal heat pump systems. As such, the IGSHPA committee has established baseline water quality results listed below from its 2017 Design and Installation Standards which can be found here:

https://igshpa.org/wp-content/uploads/2017-IGSHPA-Standards-restricted.pdf

The Dandelion Geo water quality specifications are shown below in **Table 4**.

Table 4 Geo water quality specifications

WATER CONTENT	Goal (ppm)	Allowable* (ppm)
Alkalinity (HCO_3^-)	70-300	> 300
Sulphate (SO_4^{2-})	<70	<300
HCO_3^-/SO_4^{2-}	>1	<1
Electrical Conductivity [2]	10-500 mS/cm	
pH [3,4]	7.5-10	>10
Ammonimum (NH_4^+)	<2	<20
Chlorides (Cl^-)	< 700	
Free Chlorine (Cl_2)	<1	<5
Hydrogen Sulfide (H_2S)	<0.05	
Free (aggressive) CO_2	<5	<20
Total hardness [5]	4.0 -11 °dH 70-200 mg/l $CaCO_3$	
Nitrate (NO_3^-) [1]	< 100	>100
Iron (Fe) [6]	<0.2	>0.2
Aluminum (Al)	<0.1	>0.1
Manganese (Mn)[6]		
** Allowable if most other factors are within goal ratings*		

Footnotes

[1] Sulfates and nitrates act as inhibitors for pitting corrosion caused by chlorides in pH-neutral environments.

[2] If Electrical conductivity above 100 mS/cm, Oxygen content should be below 0.02 ppm

[3] In general low pH (below 6) increases corrosion risk and high pH (above 7.5) decreases corrosion risk.

[4] In District Energy systems, due to good control over water quality, pH values up to 10 are considered safe: +

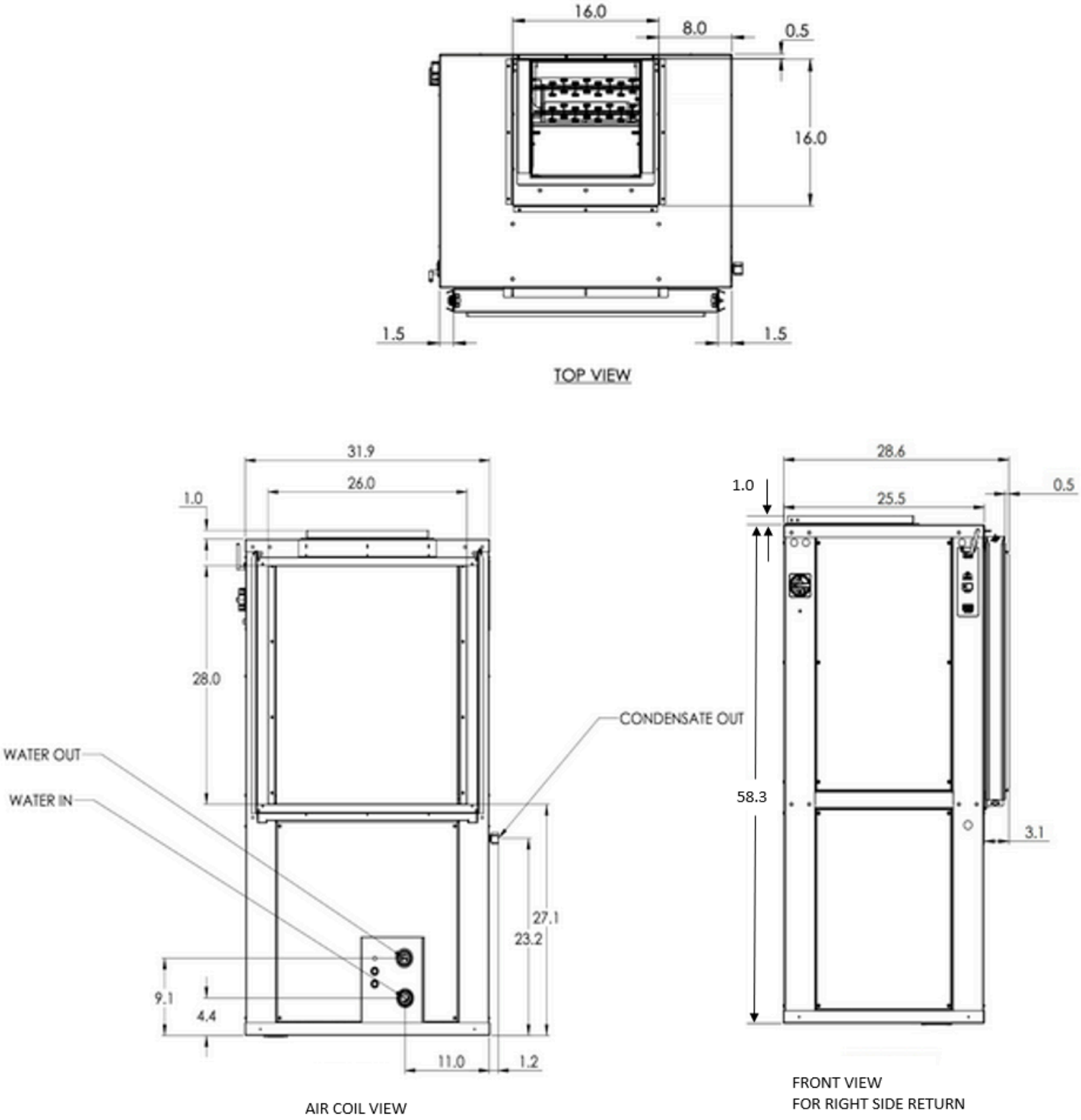
[5] Total Hardness/corrosion: water with high hardness can cause corrosion problems due to its high ion content (Ca+2, Mg+2, Fe+2) which also means a high electrical conductivity as well as a high total dissolved solid (TDS). For this reason, too high hardness values should be avoided not only due to higher risk of scaling but also for corrosion risk.
On the other hand, soft water, but not necessarily cation exchange softened water, may in contrast have a low buffering capacity and so be more corrosive. If the hardness values are outside the recommended range, other parameters such as oxygen content, conductivity and pH values should be considered to evaluate the corrosion risk.

[6] Fe3+ and Mn4+ are strong oxidants and may increase the risk for localized corrosion on stainless steels in combination with brazing material copper.

SECTION 4: UNIT DATA

Unit Dimensional Data

Figure 20 Unit dimensional data (inches)



Unit Clearances - Dimensional Data

Figure 21 Optimal service & operating clearances - dimensional data (inches)

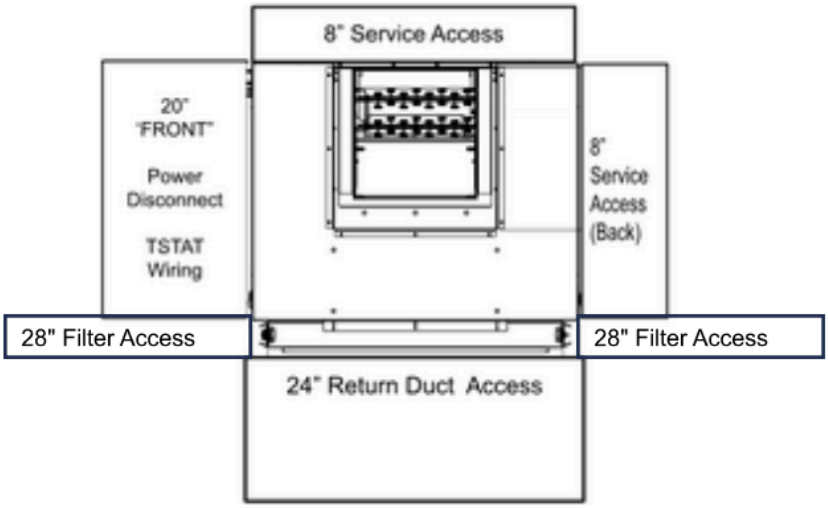
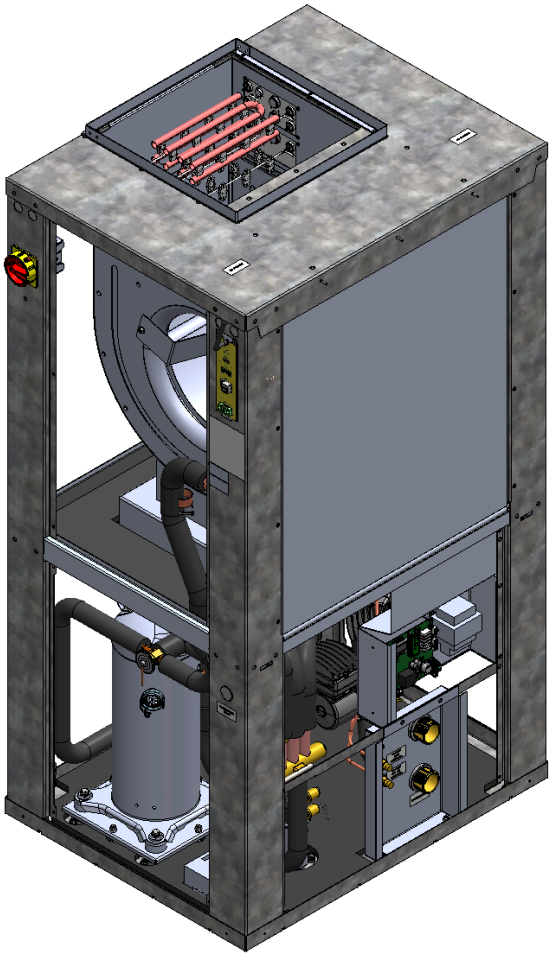


Figure 22 Isometric view without panels



SECTION 4: UNIT DATA

Unit Specifications by Model

Table 5 Unit specifications summary by model

Electrical	DP1G036 (3T)	DP1G048 (4T)	DP1G060 (5T)	DP1G072 (6T)
Total Unit				
Voltage	208/230	208/230	208/230	208/230
MCA	28.1 A	40.3 A	46.9 A	52.9 A
MOP	40	50	60	70
Compresor				
Voltage	208/230	208/230	208/230	208/230
FLA	14.1 A	20.4 A	22.8 A	27.6 A
RPM	3500	3500	3500	3500
Stages	2	2	2	2
Blower				
Voltage	208/230	208/230	208/230	208/230
FLA	4.2 A	6.3 A	7.6 A	7.6 A
Fan Motor	0.5 HP	0.75 HP	1 HP	1 HP
Max ESP	1.2” w.c.	1.15” w.c.	1.1” w.c.	0.95” w.c.
RPM	1050	1050	1050	1050
Blower Wheel Housing	9R - 9 x 11”	9R - 9 x11”	11R - 11 x 12”	11R - 11 x 12”
Ground Pumps (ea)				
Voltage	208/230	208/230	208/230	208/230
RLA	1.42	1.42	1.42	1.42
Electric Heat				
Aux Heat	1 KW	1.5 KW	1.8 KW	1.8 KW
Emergency Heat	3 KW	4 KW	6 KW	6 KW
Water Connections				
Ground Loop	Flo-Link Double O-Ring 1”	Flo-Link Double O-Ring 1”	Flo-Link Double O-Ring 1”	Flo-Link Double O-Ring 1”
Condensate	3/4” PVC Tubing	3/4” PVC Tubing	3/4” PVC Tubing	3/4” PVC Tubing
Weight				
Unpackaged	370 lbs	380 lbs	390 lbs	400 lbs
Packaged	400 lbs	400 lbs	400	400

NOTE: Source water loop - residential modules use 1” double o-ring fittings.All measurements are in inches. Electrical connections are 1/2” conduit for 220V power wires, ⅜”conduit for 24VAC control wires

SECTION 4: UNIT DATA

Unit Electrical Data & Ratings

Table 6 Unit electrical data

	60 Hz Power		Compressor		Fan Motor	Pump*	AUX HTR	EMG HTR**	TOTAL UNIT FLA	Minimum Circuit AMPS	MOP
Model	Volts	Phase	LRA	RLA	FLA	FLA					
Geo 036	208/230	1	84.2	14.1	3.9	1.42	4.2	12.5	23.6	28.1	40
Geo 048	208/230	1	122.1	20.4	5.6	1.42	6.3	16.7	33.7	40.3	50
Geo 060	208/230	1	147.4	22.8	7.6	1.42	7.5	25.0	39.3	46.9	60
Geo 072	208/230	1	189.9	27.6	7.6	1.42	7.5	25.0	44.1	52.9	70

NOTE: *There are 2 pumps per unit. **EMG HTR (Emergency Heater) is only used when the compressor is disabled.

ACRONYMS

LRA (**LOCKED ROTOR AMPS)**: The current a motor will draw if the motor becomes locked/cannot turn.

RLA (**RATED LOAD AMPS)** The maximum current a motor can draw under ANY rated load condition.

FLA (**FULL LOAD AMPS)** The current a motor draws as its rated horsepower. Also, the current a heater draws at its rated voltage.

TOTAL UNIT FLA The cum of all motor and heater full load amps.

Minimum Circuit Ampacity (MCA) The minimum current carrying capacity of electrical service to the unit. Also, the minimum breaker size that will avoid nuisance trips.

MOP (**Maximum Overcurrent Protection)** The largest breaker size that can be used to properly protect the equipment under fault conditions.

Table 7 Auxiliary and emergency heater electrical power data @ *220V*

Model	AUX HTR	EMG HTR
	Watts	Watts
Geo 036	1000	3000
Geo 048	1500	4000
Geo 060	1800	6000
Geo 072	1800	6000

SECTION 4: UNIT DATA

ECM Fan Performance - Two-Stage Compressor Units

Table 8 Fan performance data

Fan Performance Data

Model	Max ESP (W.C.)	Heating Mode		Min Airflow Heating		Cooling Mode		Dehumidify Mode		Min Airflow Cooling	Fan Only	AUX/EMG Heat
		H2	H1	H2	H1	C2	C1	C2	C1	CL*		
DP1G036	1.2	1350	1130	690	690	1400	1130	1210	970	720	804	1350
DP1G048	1.15	1600	1300	920	920	1680	1420	1400	1150	940	1072	1700
DP1G060	1.1	1900	1500	1150	1150	2000	1600	1600	1300	1175	1340	2000
DP1G072	0.95	2300	1800	1380	1380	2300	1800	1900	1500	1420	1600	2400

NOTE: **CL is minimum allowable airflow in cooling - Stage 1 only and min EAT is 68F*

Table 9 AHRI performance data

Dandelion GEO AHRI Performance Data

Model	Full Cooling		Full Heating		Partial Cooling		Partial Heating	
	Btu/Hr	EER	Btu/Hr	COP	Btu/Hr	EER	Btu/Hr	COP
DP1G036	39200	19.8	31000	4.6	29100	24.8	25000	5.1
DP1G048	51500	18.8	41500	4.4	37200	23.5	32700	4.9
DP1G060	62000	17.0	53000	4.5	47000	25.0	42000	4.7
DP1G072	70000	17.5	61000	4.3	57000	24.5	49000	4.6
AHRI Conditions								
EAT DB (F)	80.6		68		80.6		68	
EAT WB (F)	66.2		59		66.2		59	
EWT (F)	77		32		68		41	

Table 10 Geo heating at 30F and 35F EWT

Model	30F EWT, Btu/Hr		35F EWT, Btu/Hr	
	Heating Capacity	Max Heating for 90% Sizing	Heating Capacity	Max Heating for 90% Sizing
DP1G036	31540	35044	33870	37633
DP1G048	41670	46300	44790	49767
DP1G060	52680	58533	56660	62956
DP1G072	60540	67267	65120	72356

Table 11 Geo operating limits

PARAMETER	COOLING	HEATING
MIN EAT	60F*	45F
MAX EAT	100F	80F
MIN EWT	50F	20F
MAX EWT	110F	90F
MIN WATER FLOW	2.5 GPM/TON	
MAX WATER FLOW	3.5 GPM/TON	

Filter Performance

The blower performance data listed below takes into account performance WITHOUT A FILTER. In order to determine the approximate blower performance WITH FILTER, apply the filter pressure drop value for the filter being used or calculate the pressure as follows.

Below is typical filter performance data and should only be used as a guideline. Actual performance may vary between manufacturers.

Table 12 Filter performance data

	Return Size		
Model	**Height (in.)**	**Width (in.)**	**Area (ft^2)**
DP1G036	28	24	4.66
DP1G048			
DP1G060			
DP1G072			
Filter Type	**Thickness (in.)**	**Rated Velocity (fpm)**	**Initial Resistance (in. w.c.)**
MERV 8	2	500	0.19
MERV 11	2	500	0.30
MERV 13	2	500	0.30

To determine the Total ESP of a unit with the filter in place, follow the steps below:

1. Select the filter type and determine **Rated Velocity** and **Initial Resistance**.
2. For the model being considered, determine **Max ESP**, **CFM** and **Return Area**.
3. Determine filter pressure drop (ΔPs) using the equation below (**Figure 23**).
4. Measure (or calculate) the ESP without a filter in place.
5. Calculate **Total ESP = Measured ESP + Filter Pressure Drop**.
6. Total ESP should be less than or equal to Max ESP.

To calculate filter pressure drop:

$$Filter\ \Delta Ps = \left[\frac{\left|\frac{CFM}{Area}\right|}{Rated\ Velocity}\right] \times Initial\ Resistance$$

Figure 23 Filter pressure drop formula

SECTION 4: UNIT DATA

Filter Information

The filter rack on the Dandelion Geo accommodates 2” filters. Filters are factory default, industry standard sizes and can be easily sourced from local hardware stores.

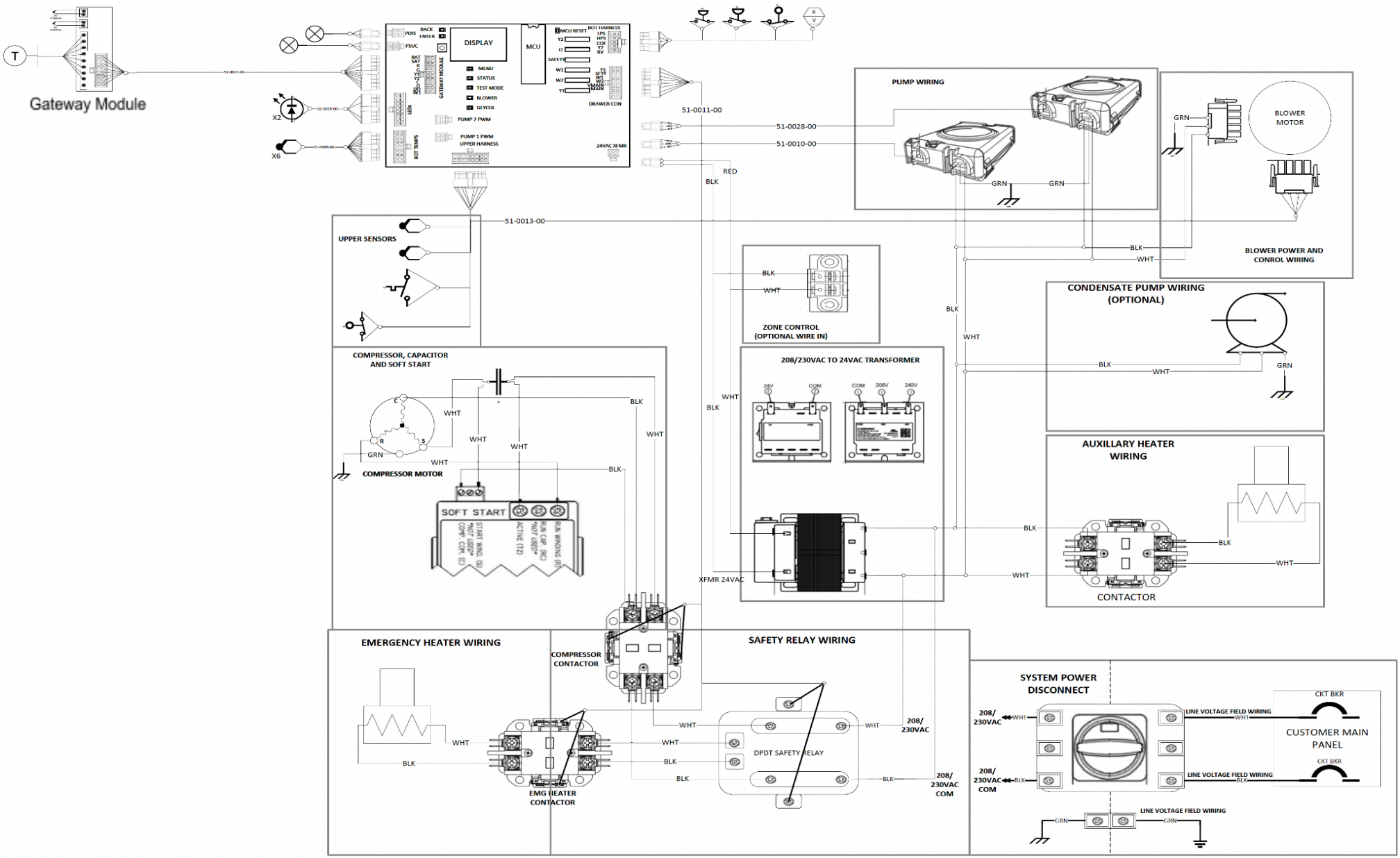
Table 13 Recommended filters

Nominal Size (W x H x D)	Style	Filter Quantity
28” x 30” x 2”	Pleated Merv 11	1

CALCULATIONS

SECTION 5: ELECTRICAL DATA AND WIRING

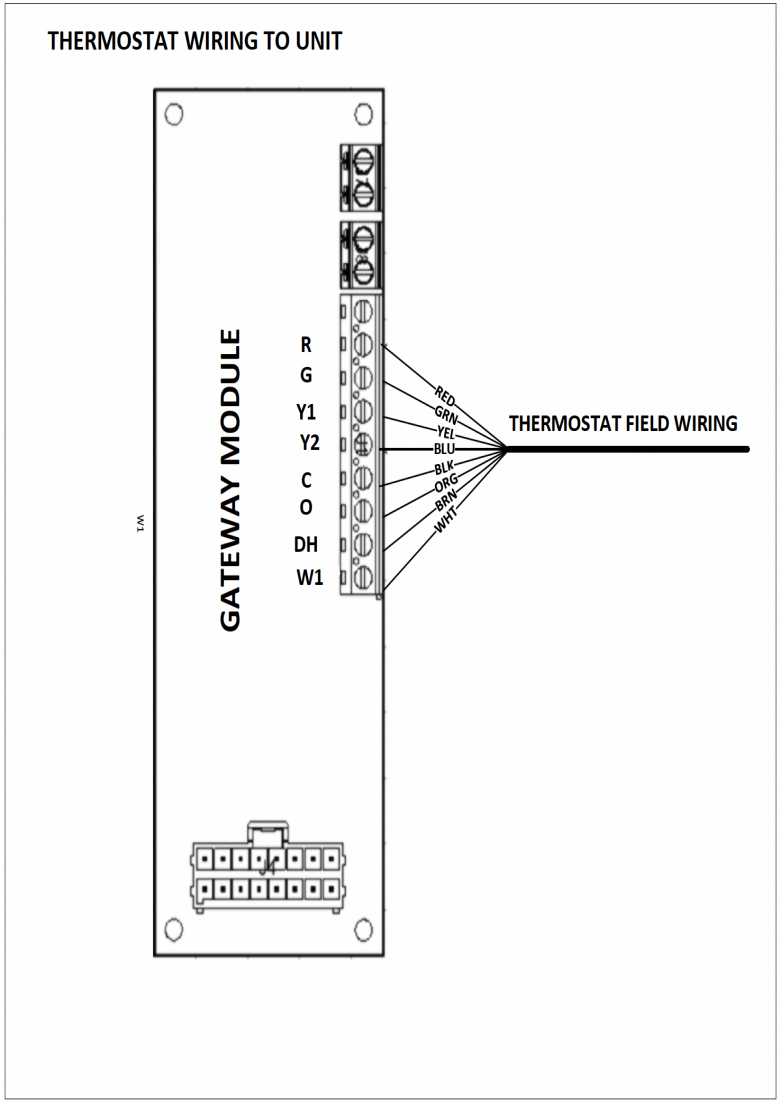
Figure 24 Full system wiring breakout

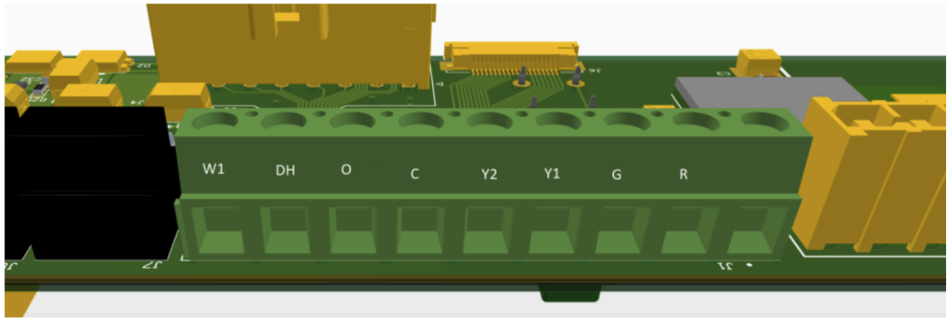


SECTION 5: ELECTRICAL DATA & WIRING

Thermostat Connections & Field Wiring

Figure 25 Thermostat wiring



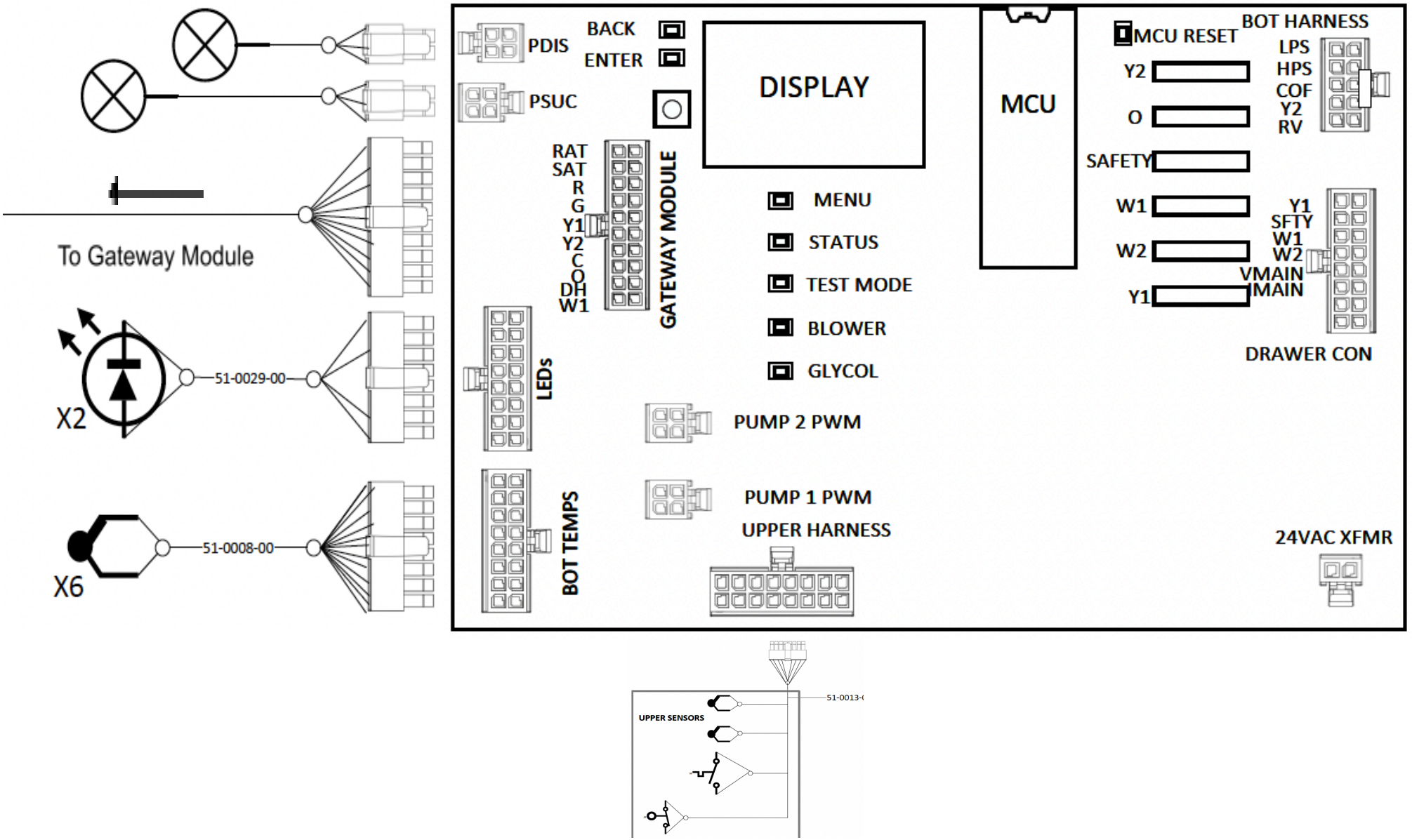


NOTES:

- Drawings represent a typical installation using wiring input knockouts marked on the outside of the control box cover.
- National and local electrical codes must be followed during installation of this unit.
- Use caution to avoid damaging the wiring and components during installation.
- Wiring shall be routed to avoid contact with other connections and temperature sensitive components.
- Assure all connections are securely fastened and routed to their proper locations.
- Install the thermostat per the manufacturer's instructions provided with that unit.

Control Box Board

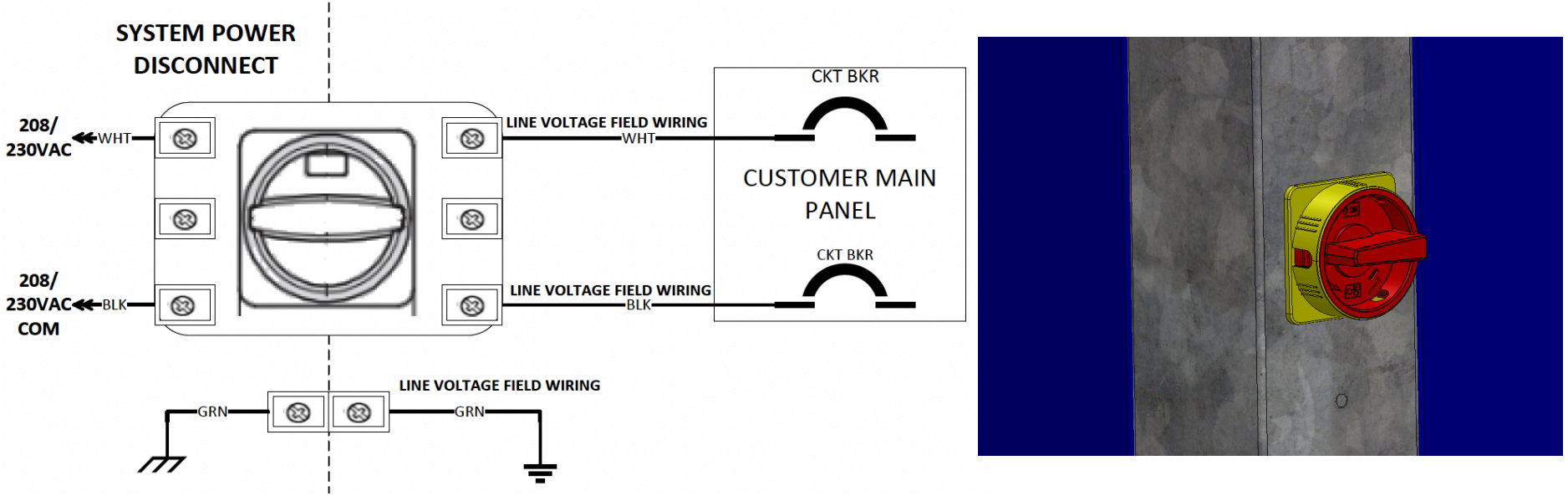
Figure 26 Control box wiring



Emergency Stop (Disconnect) Switch

In the event of overvoltage or other emergency conditions, the Dandelion Geo unit includes an **Emergency Stop** switch. The switch enables full contact separation in all poles and complete disconnection from the supply mains.

Figure 27 System disconnect wiring



SECTION 6: CONTROLS

Buttons

Rotary Dial
Used for scrolling through lists, making selections, and changing configuration values.

Enter
Select menu item or confirm configuration change.

Back
Return to the parent menu. If used during adjusting a setting, the setting will return to its previous value.

Menu
Displays menu of all functions available on the LCD display.

Status
Button advances through status screens. Status screens display operating mode, sensor readings, and faults present.

Test Mode
Button toggles test mode on and off. When test mode is enabled, all delays enforced by the controller are disabled. Turns off after 30 minutes of inactivity.

Blower
Configure blower flow rates. Typically set to match duct capacity. Pressing this button brings up a display on the controller that allows the installer to customize all airflows for Stage 1 and Stage 2 Heating and Cooling. Airflow can be adjusted anywhere between the min and max settings provided in **Table 8**, but it's recommended that the airflow be set as high as possible to maximize unit efficiency.

NOTE: If airflow for cooling is set below the dehumidifier settings (see **Table 8**), Stage 2 cooling will lock-out and the unit will only run the compressor in Stage 1 for cooling, thereby allowing for cooling down to a minimum 68°F EAT.

Glycol
Configure glycol percentage/freeze protection threshold.

WARNING: Never set this below the freezing point of the ground loop. This setting must only be adjusted AFTER adding an antifreeze agent to the ground loop and verifying concentration. If this is set too low, operating the heat pump in heating mode may cause the ground loop to freeze and damage the unit.

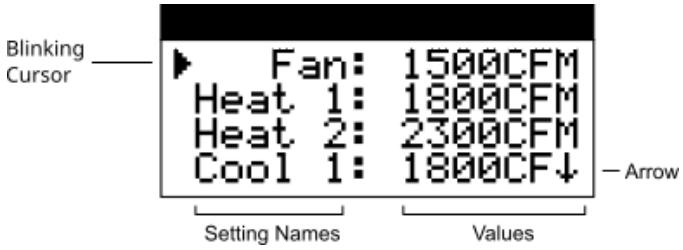
Blower + Glycol
Pressing both buttons displays the pump configuration screen, allowing for manual pump speed adjustment. There is an adjustment knob next to the display. To increase flow, turn the knob clockwise. To decrease flow, turn the knob counter-clockwise. During adjustment the display updates to show the pump setting. The pumps automatically run while adjusting this setting.

SECTION 6: CONTROLS

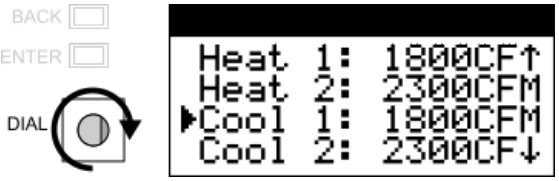
LCD Interface Example

Many LCD screens are lists of parameters that can be adjusted. In this screen the list extends past the end of the screen indicated by the down arrow on the bottom right.

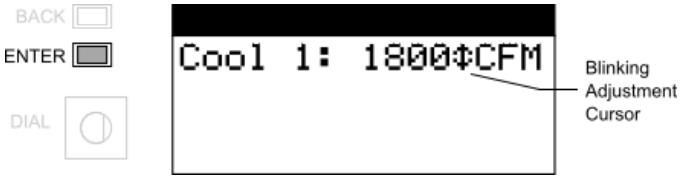
Figure 28 LCD overview



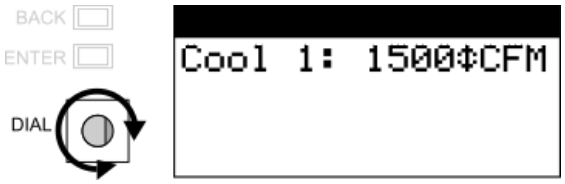
Turning the dial moves the cursor to the desired setting to view or change.



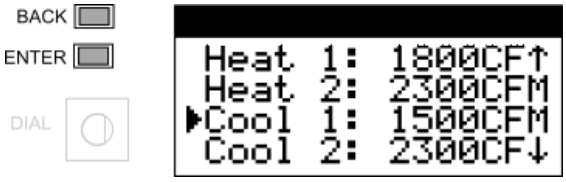
Pressing **ENTER** selects the setting for editing.



The dial adjusts the setting up or down.



Press **ENTER** to apply this change, or **BACK** to discard the change.



SECTION 6: CONTROLS

Features and Operations

Startup/Random Start
When the unit powers up, before the compressor or blower can power on, the controller waits for the minimum compressor off duration plus a random duration between 3 and 60 seconds. This delay minimizes current draw from multiple heat pumps being energized at the same time.

Test Mode
All delays enforced by this controller are disabled in test mode for use in troubleshooting. After 30 minutes of inactivity, test mode turns off.

Fan Only
When the thermostat calls for fan (**G**), the blower operates at low speed.

Heating Stage 1
When the thermostat calls for stage 1 heating (**Y1**), the controller waits for any minimum off durations or inter-stage delays to expire. It then starts the blower at low speed and the ground loop pumps before finally turning on the compressor at 67% capacity. Reversing valve is set to heat.

Heating Stage 2
When the thermostat calls for stage 2 heating (**Y1 + Y2**), the controller waits for any minimum off durations or inter-stage delays to expire. It then starts the blower at high speed and the ground loop pumps before finally turning on the compressor at 100% capacity. Reversing valve is set to heat.

Cooling Stage 1
When the thermostat calls for stage 1 cooling (**Y1 + O**), the controller waits for any minimum off durations or inter-stage delays to expire. It then starts the blower at low speed and the ground loop pumps before finally turning on the compressor at 67% capacity. Reversing valve is set to cool.

Cooling Stage 2
When the thermostat calls for stage 1 cooling (**Y1 + Y2 + O**), the controller waits for any minimum off durations or inter-stage delays to expire. It then starts the blower at high speed and the ground loop pumps before finally turning on the compressor at 100% capacity. Reversing valve is set to cool.

Dehumidification
When the thermostat calls for stage 2 cooling (**Y1 + Y2 + O**), the controller waits for any minimum off durations or inter-stage delays to expire. It then starts the blower at low speed and the ground loop pumps before finally turning on the compressor at 100% capacity. Reversing valve is set to cool.

Auxiliary Heat (W1)
When the thermostat calls for auxiliary heating (**W1**), the controller will set the blower for high speed and close the contacts to enable the auxiliary heater coil to become energized. If the thermostat does not call for the compressor (not **Y1**) then the emergency heater coil is also energized to supplement the auxiliary heater.

Emergency Heat
When the thermostat calls for both the compressor and electric heat (**Y1** and **W1**) AND a safety fault has occurred in the system (see **Faults** section on next page), the system will automatically divert power from the compressor to the emergency heater. Auxiliary heating will also be engaged if the thermostat calls for auxiliary heat (**Y1** + **Y2** + **W1**) during a safety fault.

SECTION 6: CONTROLS

Faults

Faults listed below are monitored by a series of mechanical switches in series with the compressor relay. When any of these switches open indicating a fault condition, the compressor contactor will not engage and the compressor remains off. The controller LCD display reports information about fault. When multiple faults are present, only the first fault is displayed.

Emergency Electrical Heat
During the fault if there is a call for heating with the compressor, the controller will instead engage an emergency electrical heat strip. This emergency heat is only used when the compressor is disabled. If the thermostat calls for **W1** (boost electric heat) during a fault condition, then the boost electric heat will be energized as well.

Retries
The controller will retry starting the compressor 3 times before locking out the unit. All faults must clear before the controller attempts a retry.

High Discharge Pressure
The pressure in the compressor's refrigerant discharge line exceeds normal operating range. Compressor is disabled to ensure refrigerant lines do not over-pressurize.

Low Suction Pressure
The pressure in the compressor's suction line is below normal operating range. Compressor is disabled to avoid ingesting liquid refrigerant.

Internal Condensate Overflow
The Condensate switch inside the airbox's condensate tray is triggered. The condensate drain may be clogged. Compressor is disabled to avoid generating additional condensate.

Freeze Protection / Low Ground Loop Temperature
When the ground loop temperature is below the freeze protection threshold, the compressor is disabled to prevent freezing in the water heat exchanger.

Freeze Protection / Low Air Coil Temperature
Air Coil refrigerant temperature is below the freeze protection threshold. Compressor is disabled to avoid freezing the air coil.

SECTION 6: CONTROLS

Alarm States

When any of these faults occur, the safety chain that is routed in series through the **Y1** 24VAC thermostat signal wire breaks the 24VAC control voltage and deactivates the compressor contactor, locking it out until main power is cycled to the unit.

Table 14 Alarm state table

Safety Switch	Trip Point
High Pressure	Discharge Pressure > 610 PSI
Low Pressure / Water Freeze Protection	Suction Pressure < 50 PSI
Coil Freeze Protection	Air coil Temperature < 35 F
Condensate Overflow 1	Main condensate pan level high

Operating State Modes by Component

Table 15 Operating state modes by component

Operating State Modes by Component

Mode	Comp Stage 1	Comp Stage 2	Rev Valve	Blwr	Ground Pumps	Aux Heat	Emg. Heat
Idle	OFF	OFF	N/C	OFF	OFF	OFF	OFF
Heating Stage 1	ON	OFF	OFF	Partial*	100%	OFF	OFF
Heating Stage 2	ON	ON	OFF	Full**	100%	OFF	OFF
Max Heat w/ Aux	ON	ON	OFF	Full**	100%	ON	OFF
Cooling Stage 1	ON	OFF	ON	Partial*	100%	OFF	OFF
Cooling Stage 2	ON	ON	ON	Full**	100%	OFF	OFF
Fan Only	OFF	OFF	OFF	67% of Full***	OFF	OFF	OFF
Dehum.	ON	OFF	ON	75% of Full****	100%	OFF	OFF
Emg. Heat	OFF	OFF	OFF	Full**	OFF	ON	ON

*Refer to Table 3 Fan Performance Data for actual settings by model.
**Refer to Table 3 Fan Performance Data for actual settings by model.
***Fan Only Setting is 67% of Full. Refer to Table 7 Fan Performance Data for actual settings by model.
****Dehumidifier is 75%. Refer to Table 7 Fan Performance Data for actual settings by model.

SECTION 6: CONTROLS

Main Control Board Firmware Update

Use the most up-to-date controller firmware for access to the latest features. Follow the instructions that come with the firmware file – instructions provided below are for reference only:

1. Connect your computer to the main control board using a Micro-USB cable.
2. Hold down ***Reset*** and ***Bootsel*** buttons at the same time. Release the ***Reset*** button first. Then release the ***Bootsel*** button.
3. You should see the control board show up as a USB storage device named **RPI-RP2** on your computer.
4. Copy the firmware file into the USB storage device.
5. After the copy operation completes, the control board will automatically reboot and start running the new firmware.

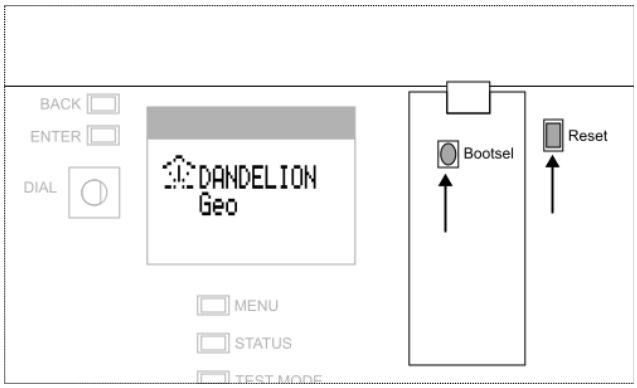


Figure 29 Control board firmware

Gateway Wi-Fi Setup

The gateway board connects the heat pump with the Dandelion cloud for remote monitoring. It supports:

1. **Hardwired Ethernet Connection** Connect the gateway board to a hardwired network by plugging an ethernet cable into the RJ45 jack on the gateway.

2. **Wi-Fi Connection** Connect the gateway board to a wireless hotspot by configuring the gateway using the Dandelion Wi-Fi Setup application

If connecting via Wi-Fi, follow the instructions that come with the Dandelion Wi-Fi Setup application – instructions provided below are for reference only:

1. Connect your computer to the gateway card using a USB-C cable.
2. Launch the Dandelion Wi-Fi Setup application.
3. Connect to the gateway device.
4. Wait for the Wi-Fi scan to complete.
5. Choose a Wi-Fi network and enter the corresponding password and connect.

SECTION 6: CONTROLS

Fan Control

1. Supply fan is enabled by 24VAC on the "**G**" contact unless an alarm prevents the fan from operating.
2. It is on for at least 10 seconds prior to heating/cooling operation and remains on 10 seconds after heating/cooling ends.
3. It is a constant CFM fan that maintains programmed CFM at each operating state up to ESP limits.

Pump Control

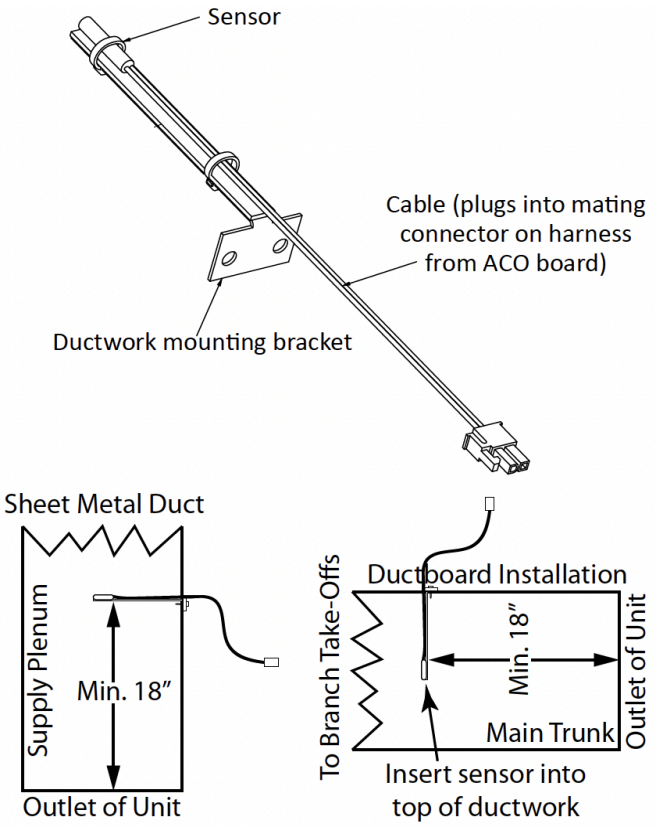
1. The pumps can run at either a fixed flow rate[1] (default) or fixed speed as configured on the control board. The unit comes factory configured to provide constant flow at 3 GPM per nominal ton up to maximum rated external pressure loss (see **Table 18**). This enables sharing of the ground loop with other heat pumps operating on the same loop. If using the factory default fixed flow rate, flow rate should still be verified via pressure drop as described on **Page 56**.

Connected Controls and Duct Sensor Setup and Installation

Installation of Hardware

The supply and return air sensors must be field installed at least 18" from the outlet of the unit (farther away is preferred) to provide proper mixing.

Figure 30 Ductwork sensor



[1] Pump flow control uses pump speed and power feedback to estimate flow through the ground loop.

SECTION 7: EQUIPMENT START-UP PROCEDURES

Equipment Startup-Process

Check the following before power is applied to the equipment.
CAUTION: Do not start-up the unit until the new structure is ready to be occupied.

Electrical:

- ☐ High voltage wiring and breakers are properly sized and installed.
- ☐ Low voltage wiring is correct and completely installed.
- ☐ Source voltage is correct and matches the data plate.

Plumbing:

- ☐ Loop piping is completed, properly sized, and purged of all air and debris.
- ☐ Correct amount of antifreeze has been added.
- ☐ All valves are open.
- ☐ Condensate is trapped and properly piped to drain.

Mechanical:

- ☐ Filter is installed and clean.
- ☐ Packaging and shipping foam are removed from the blower assembly.
- ☐ Blower turns freely.
- ☐ Canvas connections installed on supply plenum & return drop.
- ☐ Replace all service panels and screws.

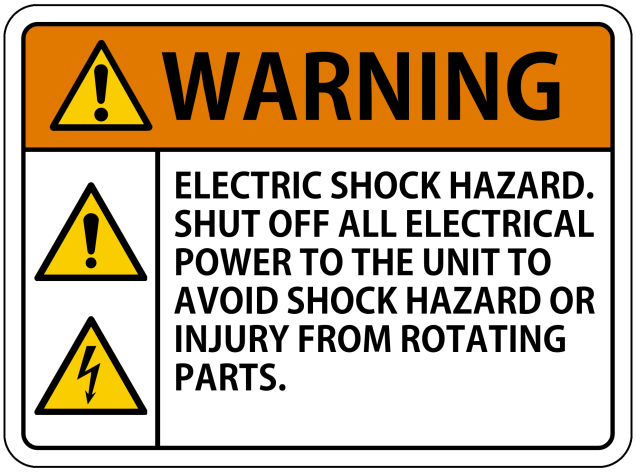
Equipment Start-Up:

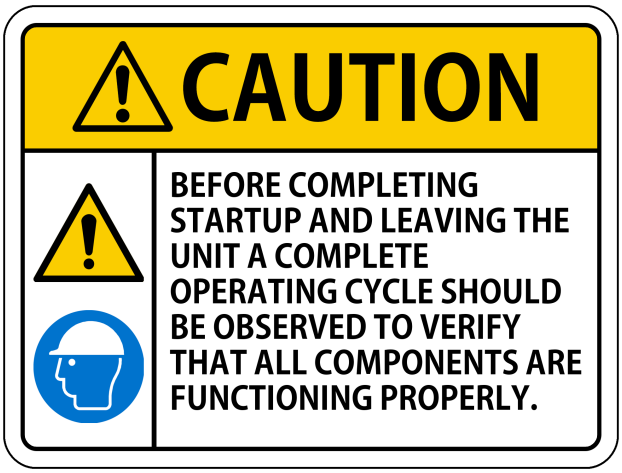
1. Energize the geothermal unit with high voltage.
2. Make sure secondary/low voltage is between 20V and 29V. Check the transformer's primary connections at the main contactor for the correct voltage (right tap = 230V; white wire position = center for 208V). Correct any possible voltage drops in the main voltage.
3. Connect gateway to Wi-Fi using the Dandelion W-Fi Setup application.
4. Update controller to newest firmware version for latest features.
5. Set the **Freeze Protection** setting on the ground loop**.** Press the **GLYCOL** button on the controller to bring up the **Glycol %** display. Turn the adjustment knob to set the% glycol in the ground loop (25% is the recommended Dandelion concentration).
6. Set the thermostat to **HEAT** or **COOL**. Adjust the set point to energize the unit. System will energize after delays expire (typically a 2 minute delay).
7. Check water flow with pressure drop conversion. Pressure drop tables must be used to convert the pressure drop to GPM. The pressure drop can be obtained by checking water pressure in and water pressure out at the P/T ports. Adjust flow up or down using the controller functions for adjusting flow (see **Figure 28**, **page 47**). Refer to **Page 56** and **Table 19** for proper flow if using this method.
8. Check the geothermal unit's electrical readings listed in **Table 6**.
9. Check the source water temperature in and out at the P/T ports (use an insertion probe). Allow 10 minutes of operation before recording temperature drop.
10. Calculate the heat of extraction or heat of rejection.
11. Check the temperature difference of the load air coil (water-to-air). The line temperatures can be used to check the temperature difference.

Equipment Startup-Process (cont.)

12. Check the data in the opposite mode as the previous tests. Amp draws as well as temperature differences and flow rate should be recorded.

13. Check auxiliary heat operation by adjusting the thermostat set point 5°F above the room temperature in **HEAT** mode or set thermostat to **EMERGENCY**. Record voltage, amperage, and air temperature.





SECTION 7: EQUIPMENT START-UP PROCEDURES

Equipment Start-Up Form

Equipment Start Up Form

Customer Name _____

Customer Address _____

Model Number: _____ Serial Number _____

Contractor Name _____ Start Up Date: _____

Installer _____ Install Date _____

GROUND LOOP DATA	COOLING	HEATING
Source Inlet Pressure (psi)		
Source Outlet Pressure (psi)		
Flow Rate* (gpm)		
Source Water Temp In (F)		
Source Water Temp Out (F)		
Heat of Rejection/Extraction (BTU/hr)**		
Unit Amps (A)		

Unit Electrical Data	
Line Voltage	
Unit Full Load Amps	
Compressor RLA	
Unit MCA	
Wire Size	
Circuit Breaker Size	

* From table 18 in IOM

** GPM x (Temp In-Temp Out) X 485 - Compare the calculated values to Performance Data values in Section 10 of the Geo IOM

AIRFLOW DATA	COOLING	HEATING*	HEATING + AUX
Supply Duct Pressure "H2O)			
Return Duct Pressure "H2O)			
Flow Rate** (CFM)			
Supply Air Temp (F)			
Return Air Temp (F)			
Total Cooling/Heating (BTU/hr)***			
Unit Amps (A)			

* Aux and emergency heat must be de-energized for the heating check

** CFM can be read from the control display

*** CFM x (SAT-RAT) x 1.08 Compare the calculated HEATING value to Performance Data values in Section 10 of the Geo IOM

Note: Calculated COOLING value will only reflect sensible cooling so the cooling value may be lower than the cooling values in Section 10.

AUXILLARY AND EMERGENCY HEATING DATA*	AUX ONLY	AUX + EMERG
Flow Rate** (CFM)		
Supply Air Temp (F)		
Return Air Temp (F)		
***Heating Watts (W)		
Unit Amps (A)		

* Compressor is Disabled

**CFM can be read from the controller display

*** CFM x (SAT - RAT) x 0.3165

SECTION 7: EQUIPMENT START-UP PROCEDURES

Water Flow Calculations and Selection

Proper flow rate is crucial for reliable operation of geothermal heat pumps. The performance data tables in **SECTION 10: UNIT PERFORMANCE DATA** show two flow rates for each entering water temperature (EWT column). A “general rule of thumb” when selecting flow rates is to use a nominal (optimum) closed loop system flow rate of (3.0 gpm/ton).

At install water flow needs to be set and the nominal flow rate of (3 GPM per ton) achieved in all modes of operation by a qualified geothermal professional. Not doing so can cause noise and performance issues and can potentially void the equipment warranty. This is particularly important when the unit is configured with multiple heat pumps on the same ground loop.

Minimum Flow Rate: Minimum closed loop system flow rate (2.5 gpm/ton)
Nominal Flow Rate: Nominal (optimum) closed loop system flow rate (3.0 gpm/ton)

Flow Performance Check

Record information on the **Equipment Start-up Form** from **page 55**.

Equipment should be in full load operation for a minimum of 10 minutes in either mode.

1. Determine flow rate in gallons per minute.
    a. Check the water temperature.
    b. Check entering water pressure at the corresponding pressure tap.
    c. Check the leaving water pressure at the corresponding pressure tap.

2. After the information is recorded, refer to **Table 19.**
    a. Find the corresponding entering water temperature column in the pressure drop vs flow table.
    b. Find pressure differential in PSI column.
    c. Read the GPM column to determine flow in GPM.

3. Adjust the water flow of the unit if needed:
    a. Push the **BLOWER** and **GLYCOL** buttons on the controller to put the controller in flow adjustment mode.
    b. Turn the knob clockwise to increase flow or counterclockwise to decrease flow. Verify the new flow rate using the same pressure measurement method.

NOTE: A 10% variance from the table is allowed. Always use the same pressure gauge & temperature measuring device as calibration errors between different gauges will cause errors in flow adjustment. Water flow must be above the minimum flows as shown in the table.

SECTION 7: EQUIPMENT START-UP PROCEDURES

Reference Tables

Table 16 Water Max/Min operating temperatures & pressures

Max/Min Water or Brine Operating Temperature & Pressure

Model	Pump Qty	TEMP High °F	TEMP Low °F	PSIG High	PSIG Low
DP1G036	2	105	25	60	10
DP1G048	2	105	25	60	10
DP1G060	2	105	25	60	10
DP1G072	2	105	25	60	10
**All values are for 25% PG/H2O at 30°F EWT*					

Table 17 R-410A refrigerant maximum/minimum allowable pressures

Refrigerant System Data

Model	Refrigerant Type	Mass	PSIG High	PSIG Low
DP1G036	R410	5.3	650	60
DP1G048	R410	6	650	60
DP1G060	R410	6	650	60
DP1G072	R410	6	650	60

Table 18 Ground loop flow vs. pressure

Ground Loop Flow vs. Pressure by Model

Model		Nominal Flow, gpm	Internal Loss (ft H2O)*	Max External dP (ft H2O)*
DP1G036	Minimum	7.5	3.1	75.3
	Nominal	9	4.4	70
DP1G048	Minimum	10	4.8	66.1
	Nominal	12	6.1	57.9
DP1G060	Minimum	12.5	5.8	56.4
	Nominal	15	7.7	46.5
DP1G072	Minimum	15	6.1	48.1
	Nominal	18	8.6	36.6
**All values are for 25% PG/H2O at 30°F*				

Reference Tables (cont.)

Table 19 Pressure tap pressure drop vs. loop flow

Internal dP Table for Pressure Taps

Model	Flow (gpm)	dP at 30F (psi)	dP at 80F (psi)	
6T	18	2	1.4	Nominal
	15	1.4	1	Minimum
	12	0.9	0.58	Low
	9	0.6	0.34	
5T	15	1.9	1.3	Nominal
	12.5	1.4	0.9	Minimum
	10	0.94	0.56	Low
	7.5	0.6	0.33	
4T	12	1.9	1.2	Nominal
	10	1.4	0.85	Minimum
	8	0.94	0.56	Low
	6	0.59	0.32	
3T	9	1.3	0.84	Nominal
	7.5	0.95	0.6	Minimum
	6	0.65	0.37	Low
	4.5	0.46	0.24	

SECTION 8: MAINTENANCE AND SERVICE

Air Filter Replacement

Dandelion recommends regular replacement of the air filter, every six (6) months or whenever the airflow in the system starts to decrease. The air filter type used by the Geo system is listed on **page 41**.

To replace the air filter:

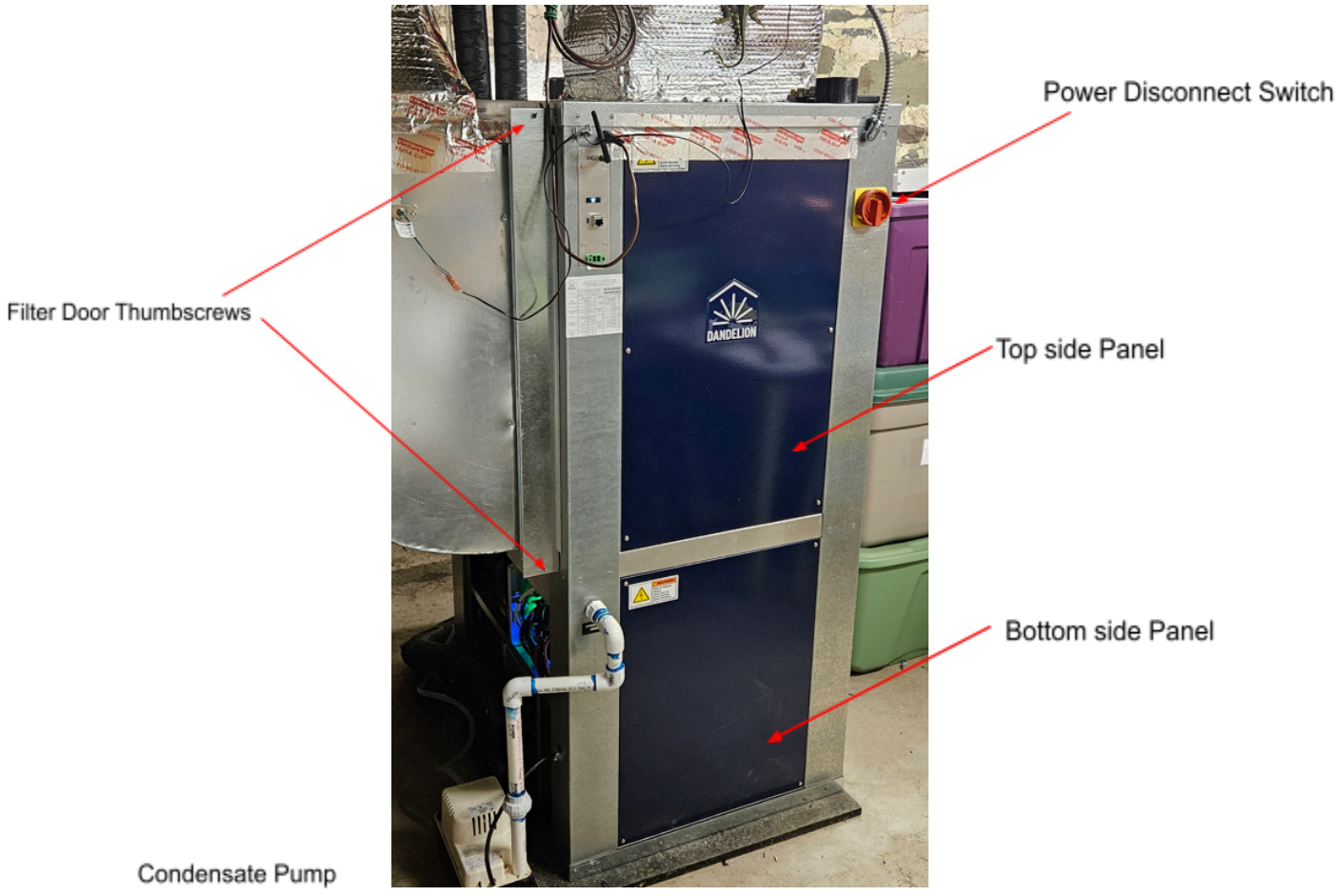
1. Remove power from the unit by turning the red power disconnect switch to the **OFF** position.
2. Locate the filter access door on the side of the air filter kit.
3. Loosen the thumbscrews on the top and the bottom of the door and remove the door.

   NOTE: The thumbscrews are captive. **DO NOT** completely remove them from the door.

4. Slide out the old air filter
5. Slide in the new air filter
   a. The 30” long edge of the filter should be vertical.
   b. Be sure to orient the filter with the arrow pointed towards the heat pump (airflow direction).

6. Replace the door and tighten the thumbscrews by hand.
7. Restore power to the unit by turning the red power disconnect switch to the **ON** position.

Figure 31 Dandelion Geo external panels



SECTION 8: MAINTENANCE AND SERVICE

Condensate Pan/P-trap Cleaning

Dandelion recommends yearly cleaning of the condensate pan and associated internal 'P-trap'. Doing so will prevent unwanted buildup of organic material and associated clogging/overflow of the condensate management system.

Dandelion also recommends periodically adding an EPA-approved antimicrobial agent to the condensate pan to prevent sludge build-up in the condensate system between preventative maintenance.

To clean the condensate system:

1. Remove power from the unit by turning the red power disconnect switch to the 'OFF' position.

2. Locate the side of the unit that has the condensate drain. On that same side of the unit (as referenced in **Figure 31**) remove the top side panel (with the Dandelion logo) by loosening the six (6) phillips head screws that secure the door to the unit. Remove the bottom side panel in the same manner.

   NOTE: These screws are captive so do not completely remove them.

3. Using water, a brush, and/or cleaning cloth, clean out any organic matter or scaling that may have accumulated in the condensate pan. Be careful not to interfere or move the condensate pan float switch while cleaning the condensate pan **(**see **Figure 32).**

4. Using a long bottle brush, run the bristles of the brush down into the drain hole of the P-trap and push along until the brush has run the entire length of the P-trap to clear any debris in the trap.

5. Remove the brush. Visually inspect for any remaining debris in the P-trap. See **Figure 19** for details on the P-trap line.

6. *Perform externally to the unit* - remove the condensate line drain cap and push the brush down the external pipe to the condensate pump base. Replace the cap.

7. Using a pitcher, add water to the condensate pan to make sure the water drains all the way to the external condensate pump (which also primes the P-trap).

8. Check the P-trap contains water (i.e. is primed) by visually inspecting.

9. Add an antimicrobial agent to the drain pan, following the manufacturer's guidelines for the cleaning and maintenance of HVAC drain pans and lines. The agent should contain ammonium chloride as the active ingredient. Recommended antimicrobial agents:

   a. Sta-Clean® Antimicrobial Tablets
   b. Totaline® Condensate Pan Strip P902-3800X (size appropriately for system tonnage)

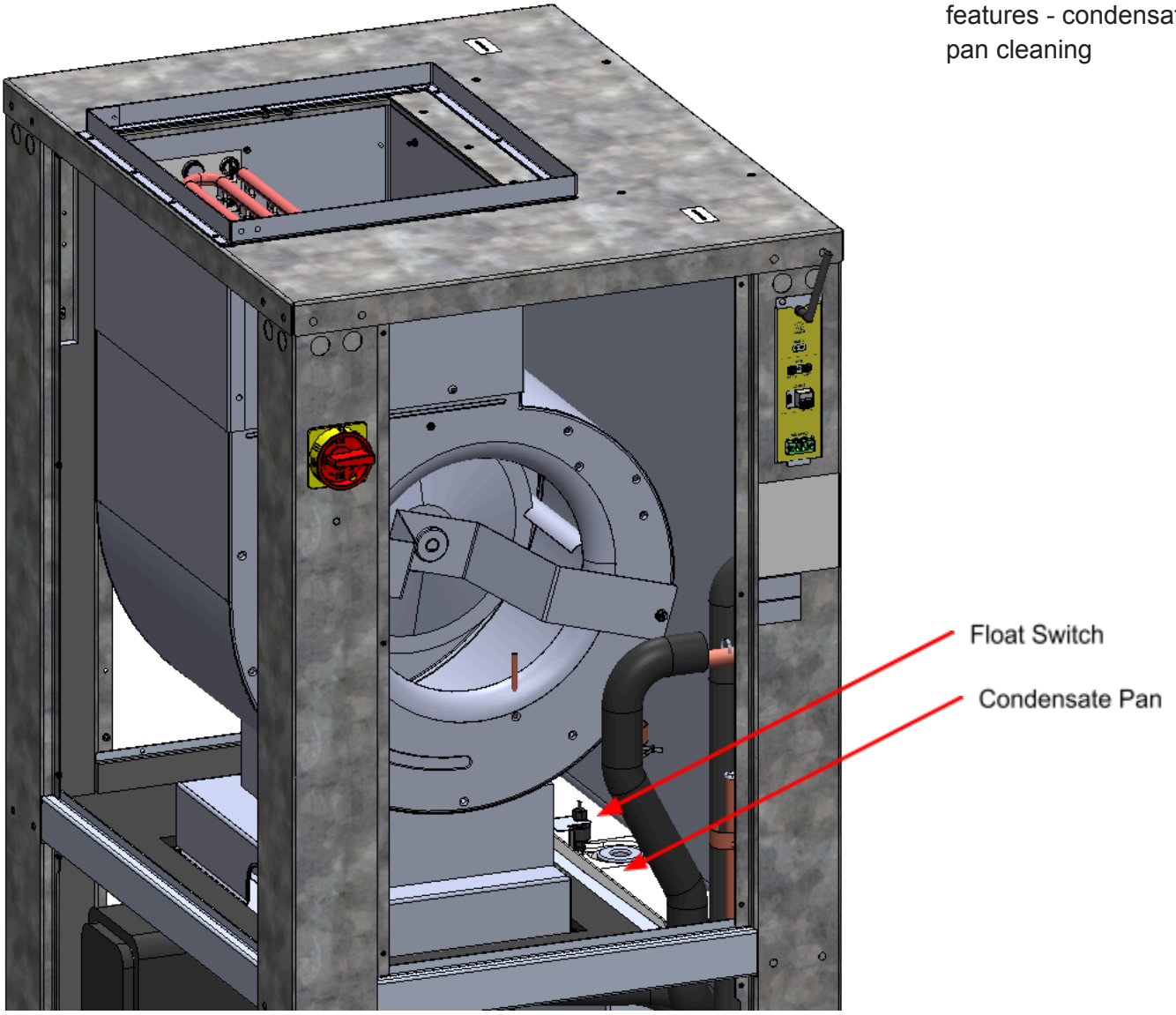
10. Replace the top and bottom panels and secure the phillips head screws that hold them in place.

Condensate Pan/P-trap Cleaning (cont.)

NOTE: A snug tightness is sufficient. **DO NOT** overtighten! If your installation includes a condensate pump, follow the manufacturer's instructions for cleaning out the condensate pump.

11. Restore power to the unit by turning the red power disconnect switch to the **ON** position.

Figure 32 Internal features - condensate pan cleaning



SECTION 8: MAINTENANCE AND SERVICE

Common Parts

Table 20 Major Service Components - Common to all Models

Part	Description	Dandelion Part #
Main Control Board	HEAT PUMP MAIN PCBA	41-0002-00
Voltage Sense Board	AC SENSE PCBA MODULE	41-0004-00
Gateway Thermostat Board	GATEWAY PCBA MODULE	41-0003-00
Transformer	TRANSFORMER, 208/230VAC TO 24V, 100VA	42-0071-00
Low Voltage Breaker	5 amp	42-0071-00
Compressor Contactor	600V POWER RELAY CONTACTOR, 40A, 24V COIL	40-0028-00
Primary Float Switch	SWITCH, NC, FLOAT	47-0009-00
Safety Contactor	RELAY, DPDT, 24VAC, 40A, OPEN	42-0066-00
Soft Start	System Soft Start SS1B16-32SN	40-0010-00
Line Temperature Sensor	THERMISTOR, 10 kOHM NTC, 1/4" OD SS SHEATH, SURFACE MOUNT	47-0012-00
Air Coil	3/6 MICROCHANNEL AIR COIL, 25 X 36", ALUM	37-0004-00
Ground Pumps	RECIRCULATING WATER PUMP, 12.5 M, 180W	33-0001-00
Bi-Flow Filter Drier	FILTER DRIER BIDIRECTIONAL , 5-6 TON	37-0003-02
Reversing Valve Solenoid	COIL KIT REVERSING VALVE, 24VAC 5 WATTS	37-0007-00
Pressure Transducer	PRESSURE TRANSDUCER, 0-667PSI 0-4.5VDC	37-0009-00
Low Pressure Switch	LOW, PRESSURE SWITCH	47-0013-00
High Pressure Switch	PRESSURE SWITCH, 610 PSI OPEN	47-0014-00
Air coil Freeze Protection Switch	SWITCH, LOW TEMPERATURE, SNAP ACTING, 35F	47-0008-00
Subcool Coil	AIR COIL, AUX SUBCOOLER	37-0013-00
Check Valve	CHECK VALVE, MAGNETIC	37-0021-00
Water Inlet Strainer	1" Lead Free Brass Wye Strainer	34-0082-00

SECTION 8: MAINTENANCE AND SERVICE

3 Ton (DP1G036) Model Parts

Table 21 Major Service Components - 3 Ton Model

Part	Description	Dandelion Part #
Compressor	SCROLL COMPRESSOR, 2 STAGE, R410A, 3 TON	37-0001-03
Capacitor	370V / 45 MFD Run Cap	40-0036-00
Bi-Flow TXV	EXPANSION VALVE, R410A BI DIRECTIONAL, 3 TON NOMINAL	37-0015-03
Reversing Valve Kit	REVERSING VALVE, ASSY, 3T	11-0014-03
Braze Plate	PLATE HX, 36 PLATE, SS, 3 TON	37-0019-03
Blower Motor	BLOWER MOTOR, 48Y FRAME, .5 HP	39-0006-03
Auxiliary Boost Heat Strips	HEATER ASSEMBLY, BOOST, 1.0kW	11-0008-10
Aux Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Aux Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00
Emergency Heat Strips	HEATER ASSEMBLY, BACKUP, 3.0kW	11-0008-30
Emergency Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Emergency Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00

SECTION 8: MAINTENANCE AND SERVICE

4 Ton (DP1G048) Model Parts

Table 22 Major Service Components - 4 Ton Model

Part	Description	Dandelion Part#
Compressor	SCROLL COMPRESSOR, 2 STAGE, R410A, 4 TON NOMINAL	37-0001-04
Capacitor	370V / 35 MFD Run Cap	40-0034-00
Bi-Flow TXV	EXPANSION VALVE, R410A BI DIRECTIONAL, 4 TON NOMINAL	37-0015-04
Reversing Valve Kit	REVERSING VALVE, ASSY, 4T	11-0014-04
Braze Plate	PLATE HX, 40 PLATE, SS, 4 TON	37-0019-04
Blower Motor	BLOWER MOTOR, 48Y FRAME, .75 HP	39-0006-02
Auxiliary Boost Heat Strips	HEATER ASSEMBLY, BOOST, 1.5kW	11-0008-15
Aux Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Aux Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00
Emergency Heat Strips	HEATER ASSEMBLY, BACKUP, 4.0kW	11-0008-40
Emergency Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Emergency Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00

SECTION 8: MAINTENANCE AND SERVICE

5 Ton (DP1G060) Model Parts

Table 23 Major Service Components - 5 Ton Model

Part	Description	Dandelion Part #
Compressor	SCROLL COMPRESSOR, 2 STAGE, R410A, 5 TON NOMINAL	37-0001-05
Capacitor	440vac / 40 mfd +/- 6%	40-0037-00
Bi-Flow TXV	EXPANSION VALVE, R410A BI DIRECTIONAL, 5 TON NOMINAL	37-0015-05
Reversing Valve Kit	REVERSING VALVE, ASSY, 5T	11-0014-05
Braze Plate	PLATE HX, 50 PLATE, SS, 5 TON	37-0019-05
Blower Motor	BLOWER MOTOR, 48Y FRAME, 1 HP	39-0006-01
Auxiliary Boost Heat Strips	HEATER ASSEMBLY, BOOST, 1.8kW	11-0008-18
Aux Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Aux Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00
Emergency Heat Strips	HEATER ASSEMBLY, BACKUP, 6.0kW	11-0008-60
Emergency Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Emergency Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00

SECTION 8: MAINTENANCE AND SERVICE

6 Ton (DP1G072) Model Parts

Table 24 Major Service Components - 6 Ton Model

Part	Description	Dandelion Part #
Compressor	SCROLL COMPRESSOR, 2 STAGE, R410A, 6 TON NOMINA	37-0001-06
Capacitor	440vac / 40 mfd +/- 6%	40-0037-00
Bi-Flow TXV	EXPANSION VALVE, R410A BI DIRECTIONAL, 6 TON NOMINAL	37-0015-06
Reversing Valve Kit	REVERSING VALVE, ASSY, 6T	11-0014-06
Braze Plate	PLATE HX, 60 PLATE, SS, 6 TON	37-0019-06
Blower Motor	BLOWER MOTOR, 48Y FRAME, 1 HP	39-0006-01
Auxiliary Boost Heat Strips	HEATER ASSEMBLY, BOOST, 1.8kW	11-0008-18
Aux Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Aux Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00
Emergency Heat Strips	HEATER ASSEMBLY, BACKUP, 6.0kW	11-0008-60
Emergency Heat Limit 1	SWITCH, 1-SHOT CUTOUT, 175F OPEN	40-0024-00
Emergency Heat Limit 2	SWITCH, AUTO RESET, 145 F OPEN, 115F CLOSE	40-0029-00

SECTION 9: UNIT WARNING MARKINGS

Warning markings physically located on the unit can be found here.

Electrical Warning Label

Located on the top left corner of all seven Geo removable panels.

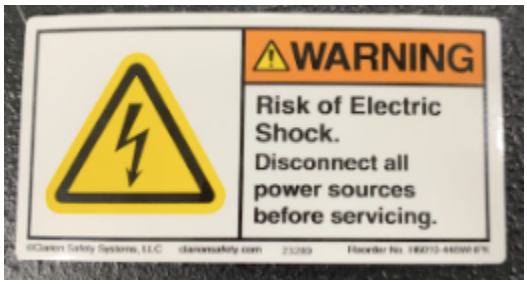


Figure 33 Electrical warning label

Packaging Fragile Warning

Located along the top of each side of the Geo unit's packaging.

Figure 34 Packaging fragile warning

R-410A Refrigerant Label

Located directly on the compressor.

Figure 35 R-410A refrigerant label

SECTION 10: UNIT PERFORMANCE DATA

GP1G036 Full Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	7.5	75.3	690	27.81	20.15	2.24	3.64
			1350	28.53	20.75	2.22	3.76
	9	70	690	28.71	20.63	2.16	3.90
			1350	29.35	21.18	2.20	3.90
30	7.5	75.3	690	29.76	22.78	2.28	3.83
			1350	30.46	23.47	2.26	3.96
	9	70	690	30.66	22.37	2.22	4.05
			1350	31.54	23.27	2.26	4.09
40	7.5	75.3	690	34.51	25.78	2.37	4.27
			1350	35.16	26.55	2.34	4.40
	9	70	690	35.55	26.31	2.35	4.44
			1350	36.20	27.09	2.32	4.57
50	7.5	75.3	690	38.77	29.49	2.43	4.67
			1350	39.38	30.38	2.40	4.80
	9	70	690	39.86	30.77	2.43	4.81
			1350	40.27	30.77	2.39	4.94
60	7.5	75.3	690	44.64	35.00	2.59	5.05
			1350	45.19	36.05	2.55	5.20
	9	70	690	45.99	35.72	2.57	5.25
			1350	46.53	36.79	2.52	5.40
70	7.5	75.3	690	50.76	40.54	2.75	5.40
			1350	51.25	41.75	2.70	5.57
	9	70	690	52.31	41.36	2.73	5.62
			1350	52.78	42.61	2.67	5.79
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

	COOLING - 80/67F EAT					
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not recc						
7.5	75.3	1210	37.97	45.08	1.92	19.74
		1400	38.98	46.62	2.06	18.94
9	70	1210	39.68	46.71	1.94	20.42
		1400	40.73	48.31	2.08	19.59
7.5	75.3	1210	36.92	44.40	2.01	18.35
		1400	37.89	45.92	2.15	17.61
9	70	1210	38.57	46.01	2.03	18.98
		1400	39.60	47.58	2.17	18.21
7.5	75.3	1210	34.99	43.49	2.20	15.88
		1400	35.90	44.98	2.36	15.24
9	70	1210	36.60	45.08	2.23	16.44
		1400	37.52	46.62	2.38	15.78
7.5	75.3	1210	32.70	41.73	2.34	13.94
		1400	33.54	43.15	2.51	13.38
9	70	1210	34.17	43.24	2.37	14.42
		1400	35.05	44.72	2.53	13.84
7.5	75.3	1210	31.10	41.17	2.59	11.99
		1400	31.89	42.58	2.77	11.51
9	70	1210	32.51	42.67	2.62	12.40
		1400	33.34	44.12	2.80	11.90
7.5	75.3	1210	29.66	40.76	2.79	10.64
		1400	30.41	42.15	2.98	10.21
9	70	1210	31.00	42.24	2.82	11.00
		1400	31.79	43.68	3.01	10.56

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

GP1G036 Part Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	7.5	75.3	690	20.28	14.01	1.62	3.67
			1130	20.37	14.14	1.72	3.47
	9	70	690	19.93	13.99	1.58	3.69
			1130	20.37	14.28	1.69	3.53
30	7.5	75.3	690	21.78	15.61	1.62	3.94
			1130	21.85	15.75	1.72	3.72
	9	70	690	21.72	15.84	1.58	4.03
			1130	21.80	15.99	1.68	3.80
40	7.5	75.3	690	25.12	19.14	1.57	4.68
			1130	25.14	19.32	1.68	4.40
	9	70	690	25.77	19.63	1.64	4.61
			1130	25.78	19.80	1.74	4.34
50	7.5	75.3	690	28.67	23.13	1.56	5.37
			1130	28.64	22.74	1.71	4.90
	9	70	690	28.85	23.13	1.60	5.30
			1130	28.67	22.74	1.75	4.81
60	7.5	75.3	690	32.38	26.19	1.67	5.70
			1130	32.30	25.75	1.82	5.21
	9	70	690	32.44	26.19	1.70	5.59
			1130	32.36	25.75	1.85	5.12
70	7.5	75.3	690	35.93	29.50	1.78	5.91
			1130	35.80	29.00	1.93	5.43
	9	70	690	36.01	29.50	1.82	5.80
			1130	35.87	29.00	1.97	5.34
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

	COOLING - 80/67F EAT					
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
7.5	75.3	970	27.05	31.37	1.28	21.09
		1130	28.18	32.82	1.37	20.61
9	70	970	28.03	32.28	1.32	21.28
		1130	29.20	33.76	1.40	20.82
7.5	75.3	970	25.99	30.58	1.33	19.60
		1130	27.07	31.98	1.41	19.17
9	70	970	26.93	31.46	1.36	19.78
		1130	28.05	32.91	1.45	19.36
7.5	75.3	970	25.32	30.83	1.50	16.93
		1130	26.36	32.25	1.59	16.61
9	70	970	26.24	31.71	1.49	17.65
		1130	27.33	33.17	1.63	16.78
7.5	75.3	970	25.29	31.41	1.63	15.56
		1130	26.33	32.85	1.72	15.31
9	70	970	26.20	32.31	1.67	15.69
		1130	27.29	33.80	1.77	15.44
7.5	75.3	970	23.72	30.83	1.83	12.96
		1130	24.69	32.24	1.93	12.78
9	70	970	24.59	31.71	1.88	13.06
		1130	25.59	33.17	1.99	12.89
7.5	75.3	970	22.06	29.89	1.98	11.13
		1130	22.95	31.26	2.09	10.99
9	70	970	22.86	30.75	2.04	11.22
		1130	23.79	32.16	2.15	11.08

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

GP1G048 Full Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	10	66.1	920	36.96	26.64	3.12	3.47
			1600	37.64	27.43	3.05	3.62
	12	57.9	920	38.17	27.27	3.00	3.73
			1600	38.75	27.99	3.02	3.76
30	10	66.1	920	39.58	30.11	3.17	3.66
			1600	40.23	31.02	3.09	3.81
	12	57.9	920	40.78	29.57	3.09	3.87
			1600	41.67	30.75	3.10	3.94
40	10	66.1	920	45.93	34.08	3.30	4.08
			1600	46.52	35.10	3.21	4.24
	12	57.9	920	47.33	34.77	3.27	4.24
			1600	47.91	35.81	3.19	4.41
50	10	66.1	920	51.63	38.98	3.39	4.46
			1600	52.16	40.15	3.30	4.63
	12	57.9	920	53.10	40.68	3.38	4.60
			1600	53.36	40.68	3.28	4.76
60	10	66.1	920	59.49	46.27	3.61	4.83
			1600	59.94	47.66	3.50	5.02
	12	57.9	920	61.31	47.21	3.58	5.02
			1600	61.74	48.63	3.47	5.22
70	10	66.1	920	67.69	53.58	3.84	5.17
			1600	68.06	55.19	3.71	5.38
	12	57.9	920	69.76	54.68	3.80	5.38
			1600	70.11	56.32	3.68	5.59
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

COOLING - 80/67F EAT						
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not recc						
10	66.1	1400	49.95	59.69	2.60	19.18
		1680	51.35	61.72	2.81	18.28
12	57.9	1400	52.19	61.85	2.63	19.83
		1680	53.66	63.96	2.84	18.90
10	66.1	1400	48.56	58.79	2.73	17.82
		1680	49.92	60.79	2.94	16.99
12	57.9	1400	50.74	60.92	2.75	18.42
		1680	52.16	63.00	2.97	17.57
10	66.1	1400	46.04	57.59	2.99	15.39
		1680	47.32	59.55	3.22	14.69
12	57.9	1400	48.15	59.69	3.02	15.92
		1680	49.44	61.73	3.25	15.20
10	66.1	1400	43.02	55.25	3.19	13.50
		1680	44.20	57.14	3.43	12.89
12	57.9	1400	44.95	57.25	3.22	13.95
		1680	46.20	59.21	3.47	13.33
10	66.1	1400	40.93	54.52	3.53	11.59
		1680	42.05	56.38	3.80	11.08
12	57.9	1400	42.77	56.49	3.57	11.98
		1680	43.95	58.42	3.84	11.45
10	66.1	1400	39.03	53.97	3.80	10.27
		1680	40.09	55.81	4.08	9.82
12	57.9	1400	40.79	55.93	3.84	10.61
		1680	41.91	57.83	4.13	10.15

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

GP1G048 Partial Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	10	66.1	920	26.28	18.14	2.20	3.51
			1350	26.27	18.31	2.23	3.46
	12	57.9	920	25.83	18.11	2.15	3.52
			1350	26.27	18.49	2.19	3.52
30	10	66.1	920	28.25	20.21	2.20	3.77
			1350	28.21	20.39	2.23	3.71
	12	57.9	920	28.17	20.52	2.14	3.86
			1350	28.14	20.71	2.17	3.79
40	10	66.1	920	32.61	24.79	2.14	4.48
			1350	32.51	25.01	2.17	4.39
	12	57.9	920	33.46	25.42	2.22	4.41
			1350	33.34	25.65	2.26	4.33
50	10	66.1	920	37.26	29.96	2.12	5.15
			1350	37.09	29.45	2.22	4.90
	12	57.9	920	37.50	29.95	2.17	5.07
			1350	37.13	29.45	2.27	4.80
60	10	66.1	920	42.11	33.92	2.26	5.46
			1350	41.87	33.34	2.36	5.20
	12	57.9	920	42.20	33.92	2.31	5.36
			1350	41.96	33.34	2.41	5.11
70	10	66.1	920	46.76	38.20	2.42	5.67
			1350	46.46	37.55	2.52	5.41
	12	57.9	920	46.85	38.20	2.47	5.56
			1350	46.55	37.55	2.57	5.31
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

	COOLING - 80/67F EAT					
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
10	66.1	1150	34.60	40.37	1.72	20.14
		1420	36.07	42.23	1.82	19.78
12	57.9	1150	35.85	41.54	1.76	20.32
		1420	37.38	43.45	1.87	19.97
10	66.1	1150	33.24	39.35	1.78	18.72
		1420	34.65	41.16	1.88	18.39
12	57.9	1150	34.44	40.48	1.82	18.88
		1420	35.91	42.35	1.93	18.57
10	66.1	1150	32.38	39.67	2.00	16.15
		1420	33.75	41.50	2.12	15.92
12	57.9	1150	33.56	40.81	1.99	16.84
		1420	34.98	42.69	2.18	16.07
10	66.1	1150	32.34	40.42	2.18	14.84
		1420	33.71	42.28	2.30	14.66
12	57.9	1150	33.51	41.58	2.24	14.96
		1420	34.93	43.50	2.36	14.78
10	66.1	1150	30.34	39.67	2.46	12.35
		1420	31.62	41.50	2.59	12.23
12	57.9	1150	31.44	40.81	2.53	12.45
		1420	32.77	42.69	2.66	12.33
10	66.1	1150	28.21	38.46	2.66	10.61
		1420	29.39	40.23	2.80	10.51
12	57.9	1150	29.24	39.57	2.74	10.69
		1420	30.46	41.39	2.88	10.60

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

GP1G060 Full Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	12.5	56.4	1150	47.46	33.78	4.07	3.42
			1900	47.52	34.80	3.95	3.53
	15	46.5	1150	49.00	34.59	3.92	3.66
			1900	48.94	35.51	3.91	3.66
30	12.5	56.4	1150	50.80	38.19	4.14	3.60
			1900	50.83	39.34	4.01	3.71
	15	46.5	1150	52.33	37.51	4.03	3.80
			1900	52.68	39.01	4.02	3.84
40	12.5	56.4	1150	58.92	43.22	4.31	4.01
			1900	58.87	44.52	4.17	4.14
	15	46.5	1150	60.70	44.10	4.27	4.17
			1900	60.64	45.43	4.13	4.30
50	12.5	56.4	1150	66.19	49.44	4.43	4.38
			1900	66.07	50.93	4.28	4.53
	15	46.5	1150	68.07	51.59	4.42	4.52
			1900	67.61	51.59	4.26	4.66
60	12.5	56.4	1150	76.23	58.68	4.72	4.74
			1900	76.01	60.44	4.54	4.91
	15	46.5	1150	78.55	59.88	4.67	4.93
			1900	78.31	61.68	4.50	5.10
70	12.5	56.4	1150	86.70	67.96	5.01	5.07
			1900	86.38	70.00	4.81	5.26
	15	46.5	1150	89.35	69.35	4.97	5.27
			1900	89.00	71.43	4.77	5.47
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

COOLING - 80/67F EAT						
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
60F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
12.5	56.4	1600	60.18	73.02	3.40	17.72
		2000	61.78	75.52	3.69	16.74
15	46.5	1600	62.88	75.67	3.43	18.31
		2000	64.56	78.26	3.73	17.31
12.5	56.4	1600	58.51	71.93	3.56	16.44
		2000	60.06	74.38	3.86	15.55
15	46.5	1600	61.13	74.53	3.60	16.99
		2000	62.76	77.08	3.90	16.08
12.5	56.4	1600	55.47	70.46	3.91	14.18
		2000	56.93	72.86	4.24	13.43
15	46.5	1600	58.02	73.03	3.96	14.66
		2000	59.49	75.52	4.28	13.90
12.5	56.4	1600	51.84	67.60	4.17	12.42
		2000	53.18	69.90	4.52	11.78
15	46.5	1600	54.17	70.05	4.22	12.84
		2000	55.58	72.44	4.57	12.17
12.5	56.4	1600	49.32	66.70	4.63	10.65
		2000	50.58	68.98	5.00	10.11
15	46.5	1600	51.54	69.12	4.68	11.00
		2000	52.87	71.48	5.06	10.45
12.5	56.4	1600	47.04	66.03	4.99	9.42
		2000	48.23	68.28	5.39	8.95
15	46.5	1600	49.16	68.42	5.05	9.74
		2000	50.42	70.76	5.45	9.26

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

GP1G060 Partial Load Performance Data

	HEATING - 70F EAT							COOLING - 80/67F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP	FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
25	12.5	56.4	1150	33.73	23.05	2.93	3.38							
			1500	33.55	23.26	2.92	3.37							
	15	46.5	1150	33.14	23.01	2.87	3.39							
			1500	33.55	23.49	2.87	3.43							
30	12.5	56.4	1150	36.26	25.67	2.93	3.62							
			1500	36.04	25.90	2.92	3.62							
	15	46.5	1150	36.16	26.06	2.86	3.71							
			1500	35.96	26.31	2.85	3.70							
40	12.5	56.4	1150	41.86	31.49	2.85	4.31							
			1500	41.56	31.78	2.84	4.29							
	15	46.5	1150	42.95	32.29	2.97	4.24							
			1500	42.64	32.58	2.96	4.23							
50	12.5	56.4	1150	47.83	38.05	2.83	4.96							
			1500	47.45	37.41	2.91	4.78							
	15	46.5	1150	48.13	38.05	2.89	4.88							
			1500	47.50	37.41	2.97	4.69							
60	12.5	56.4	1150	54.06	43.09	3.01	5.26							
			1500	53.60	42.36	3.09	5.08							
	15	46.5	1150	54.17	43.09	3.08	5.16							
			1500	53.70	42.36	3.16	4.98							
70	12.5	56.4	1150	60.03	48.53	3.23	5.45							
			1500	59.48	47.71	3.31	5.27							
	15	46.5	1150	60.15	48.53	3.30	5.35							
			1500	59.60	47.71	3.38	5.18							
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended							80F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
90								12.5	56.4	1300	43.87	51.42	2.24	19.54
										1600	45.68	53.79	2.38	19.22
100								15	46.5	1300	45.45	52.90	2.31	19.70
										1600	47.33	55.33	2.44	19.39
110								12.5	56.4	1300	42.16	50.12	2.32	18.15
										1600	43.89	52.42	2.46	17.86
								15	46.5	1300	43.68	51.56	2.39	18.29
										1600	45.48	53.93	2.52	18.02
								12.5	56.4	1300	41.07	50.53	2.63	15.61
										1600	42.75	52.85	2.77	15.41
								15	46.5	1300	42.56	51.98	2.61	16.28
										1600	44.31	54.37	2.85	15.54
								12.5	56.4	1300	41.02	51.48	2.86	14.32
										1600	42.70	53.85	3.02	14.15
								15	46.5	1300	42.50	52.96	2.95	14.42
										1600	44.25	55.40	3.10	14.27
								12.5	56.4	1300	38.50	50.52	3.24	11.89
										1600	40.06	52.85	3.40	11.78
								15	46.5	1300	39.89	51.98	3.33	11.98
										1600	41.51	54.37	3.50	11.87
								12.5	56.4	1300	35.81	48.98	3.51	10.20
										1600	37.24	51.24	3.68	10.11
								15	46.5	1300	37.11	50.39	3.61	10.27
										1600	38.60	52.71	3.79	10.19

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP. COP/EER calculations here include blower and pump power.

GP1G072 Full Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	15	48.1	1380	54.34	38.88	4.70	3.39
			2300	54.61	40.05	4.57	3.50
	18	36.6	1380	56.11	39.81	4.52	3.63
			2300	56.24	40.87	4.53	3.64
30	15	48.1	1380	58.19	43.96	4.78	3.57
			2300	58.42	45.28	4.64	3.69
	18	36.6	1380	59.95	43.17	4.65	3.78
			2300	60.54	44.90	4.65	3.82
40	15	48.1	1380	67.53	49.74	4.97	3.98
			2300	67.67	51.24	4.82	4.12
	18	36.6	1380	69.58	50.76	4.93	4.14
			2300	69.70	52.28	4.77	4.28
50	15	48.1	1380	75.90	56.91	5.11	4.35
			2300	75.96	58.61	4.95	4.50
	18	36.6	1380	78.06	59.38	5.10	4.49
			2300	77.72	59.38	4.92	4.63
60	15	48.1	1380	87.46	67.54	5.44	4.71
			2300	87.39	69.57	5.25	4.88
	18	36.6	1380	90.13	68.92	5.39	4.90
			2300	90.04	70.99	5.20	5.07
70	15	48.1	1380	99.51	78.22	5.78	5.04
			2300	99.33	80.57	5.56	5.23
	18	36.6	1380	102.55	79.82	5.73	5.25
			2300	102.34	82.21	5.51	5.44
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

COOLING - 80/67F EAT						
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
15	48.1	1900	67.90	82.05	3.77	18.01
		2300	69.72	84.85	4.07	17.12
18	36.6	1900	70.94	85.03	3.81	18.62
		2300	72.86	87.93	4.12	17.71
15	48.1	1900	66.01	80.82	3.95	16.72
		2300	67.78	83.58	4.26	15.90
18	36.6	1900	68.97	83.75	3.99	17.28
		2300	70.83	86.61	4.31	16.45
15	48.1	1900	62.58	79.17	4.34	14.43
		2300	64.24	81.87	4.67	13.75
18	36.6	1900	65.45	82.06	4.38	14.93
		2300	67.13	84.86	4.72	14.22
15	48.1	1900	58.47	75.95	4.62	12.65
		2300	60.01	78.55	4.98	12.06
18	36.6	1900	61.10	78.71	4.67	13.08
		2300	62.72	81.40	5.03	12.47
15	48.1	1900	55.63	74.95	5.12	10.86
		2300	57.08	77.50	5.51	10.35
18	36.6	1900	58.14	77.66	5.18	11.22
		2300	59.66	80.31	5.57	10.70
15	48.1	1900	53.06	74.19	5.52	9.61
		2300	54.42	76.72	5.93	9.17
18	36.6	1900	55.45	76.88	5.58	9.94
		2300	56.89	79.51	6.00	9.48

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP. COP/EER calculations here include blower and pump power.

GP1G072 Partial Load Performance Data

	HEATING - 70F EAT						
EWT F	FLOW GPM	Dp, max FT	AIFLOW CFM	HC MBtu/hr	HE MBtu/hr	Power kW	COP
25	15	48.1	1380	39.39	26.73	3.49	3.31
			1800	39.18	26.97	3.48	3.30
	18	36.6	1380	38.70	26.68	3.42	3.32
			1800	39.18	27.24	3.42	3.36
30	15	48.1	1380	42.34	29.78	3.50	3.55
			1800	42.09	30.04	3.49	3.54
	18	36.6	1380	42.22	30.23	3.41	3.63
			1800	42.00	30.51	3.40	3.62
40	15	48.1	1380	48.87	36.53	3.40	4.22
			1800	48.53	36.85	3.39	4.20
	18	36.6	1380	50.14	37.45	3.54	4.15
			1800	49.79	37.79	3.53	4.14
50	15	48.1	1380	55.83	44.14	3.37	4.85
			1800	55.40	43.39	3.47	4.68
	18	36.6	1380	56.19	44.13	3.45	4.78
			1800	55.46	43.39	3.54	4.59
60	15	48.1	1380	63.11	49.97	3.59	5.14
			1800	62.57	49.12	3.69	4.97
	18	36.6	1380	63.23	49.97	3.67	5.05
			1800	62.69	49.12	3.77	4.88
70	15	48.1	1380	70.07	56.29	3.85	5.34
			1800	69.44	55.33	3.94	5.16
	18	36.6	1380	70.21	56.29	3.93	5.24
			1800	69.57	55.33	4.03	5.06
80	MAX EVAP IS 55F - Operation in heating above 70F is not recommended						
90							
100							
110							

	COOLING - 80/67F EAT					
FLOW GPM	Dp, max FT	AIFLOW CFM	TC MBtu/hr	HR MBtu/hr	Power kW	EER
80F is T,min for condensing - Operation in cooling below 60F EWT is not reco						
15	48.1	1500	53.22	61.54	2.48	21.48
		1800	55.51	64.37	2.62	21.23
18	36.6	1500	55.13	63.32	2.55	21.66
		1800	57.52	66.23	2.69	21.42
15	48.1	1500	51.15	59.98	2.56	19.95
		1800	53.34	62.74	2.70	19.73
18	36.6	1500	52.99	61.71	2.63	20.12
		1800	55.27	64.55	2.78	19.90
15	48.1	1500	49.82	60.48	2.90	17.18
		1800	51.95	63.26	3.05	17.03
18	36.6	1500	51.63	62.21	2.88	17.91
		1800	53.85	65.07	3.13	17.18
15	48.1	1500	49.76	61.61	3.16	15.77
		1800	51.90	64.45	3.32	15.65
18	36.6	1500	51.56	63.39	3.25	15.89
		1800	53.77	66.30	3.41	15.78
15	48.1	1500	46.70	60.47	3.56	13.11
		1800	48.69	63.25	3.74	13.04
18	36.6	1500	48.39	62.21	3.67	13.20
		1800	50.46	65.07	3.84	13.13
15	48.1	1500	43.44	58.63	3.86	11.25
		1800	45.28	61.32	4.04	11.19
18	36.6	1500	45.01	60.31	3.97	11.32
		1800	46.92	63.09	4.16	11.28

Abbreviations

HC = Heating Capacity
HE = Heat Extracted from Ground Loop
TC = Total Cooling
HR = Heat Rejected to Ground Loop

NOTES:

Power data includes blower work at 0.6” H2O static and pump work at 10 ft. ground loop dP.
COP/EER calculations here include blower and pump power.

SECTION 11: THIRD PARTY SOFTWARE

Raspberry Pi Pico SDK

MicroPython

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pico-flashloader

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SECTION 12: DOCUMENT REVISION HISTORY

Document Revision Table

Date	Revision	Revision Description	Page #(s)
12-Feb-24	Draft	Dandelion Geo Manual v1.0 Full Version creation.	
21-Feb-24	1.0	Merv 11 Filter - standard Corrected various typographical error Pages 20.34 - updated filter clearance to 28” Page 33 updated mechanical dimensions - dims are in inches Page 36- defined electrical acronyms Page 45 - added descriptions for Aux and Emergency heat operation Pages 62-69 - Explained Chart Abbreviations,added notes for Power, COP and EER	
28-Feb-24	1.1	Removed Energy Star Logo	
8-April-24	1.2	Updated Model and Serial Info, Added Table 3- Shipping Kit Info Added Table 11, Added Energy Star Logo and ETL Logo Updated Table 8 for Blower Settings low-airflow cooling mode. Updated Equipment Start-up Form Added instructions for Firmware update and Wifi connect Added Filter Changing and Condensate Cleaning in Section 8	
4-April-24	1.3	General updates for full release	

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