



97B0045N04

Residential Horizontal, Vertical & Downflow  
Packaged Geothermal Heat Pumps

Installation, Operation &  
Maintenance Instructions

Rev.: March 20, 2023

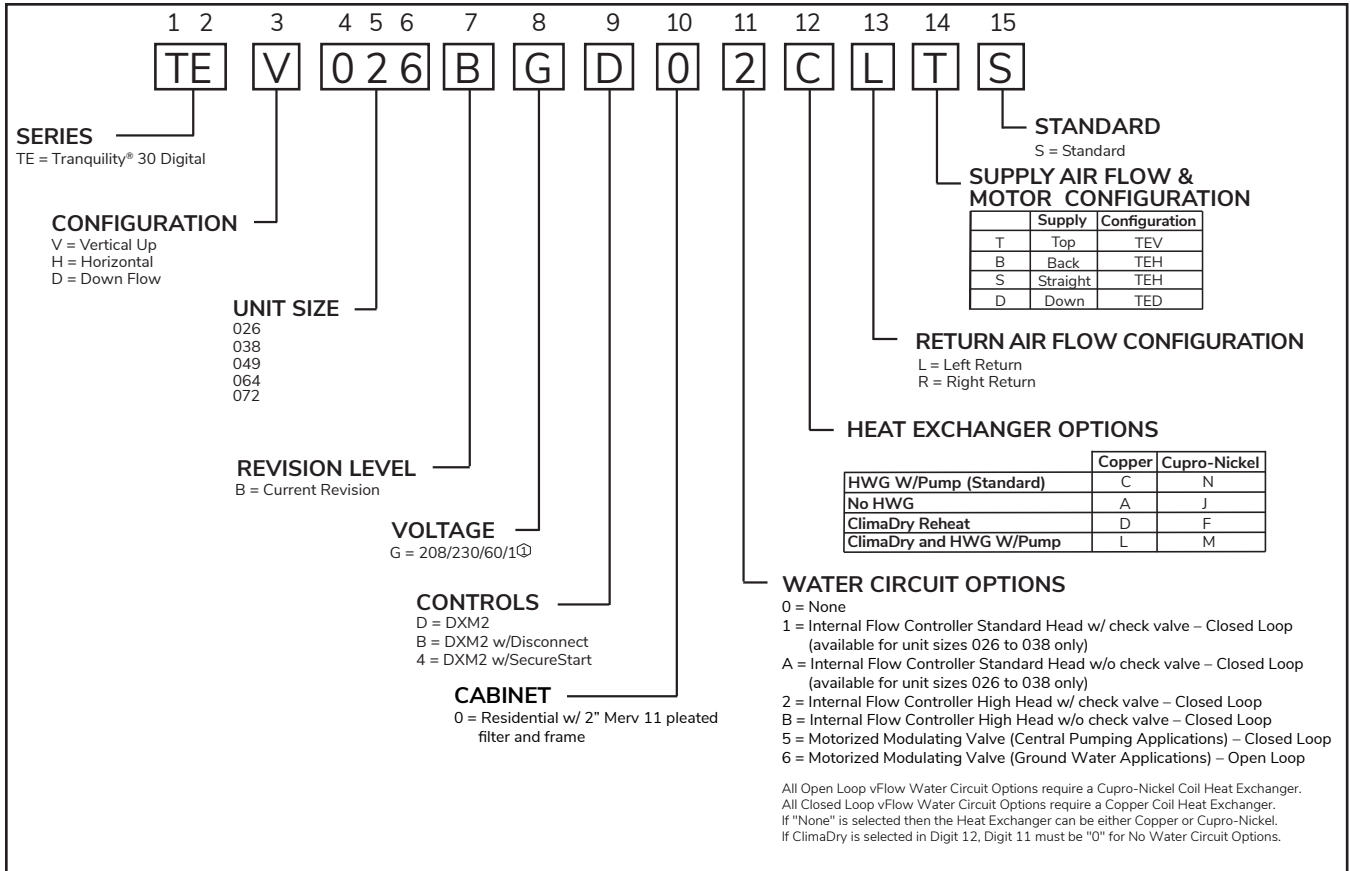


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# Model Nomenclature



NOTE: Above model nomenclature is a general reference. Consult individual specification sections for detailed information.

## General Information

### SAFETY

Warnings, cautions and notices appear throughout this manual. Read these items carefully before attempting any installation, service, or troubleshooting of the equipment.

**DANGER:** Indicates an immediate hazardous situation, which if not avoided will result in death or serious injury. DANGER labels on unit access panels must be observed.

**WARNING:** Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

The following warning complies with State of California law, Proposition 65.

#### **WARNING!**

**WARNING!** This product can expose you to chemicals including Carbon Black, which is known to the State of California to cause cancer and Methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

#### **WARNING!**

**WARNING!** The EarthPure® Application and Service Manual should be read and understood before attempting to service refrigerant circuits with HFC-410A.

#### **WARNING!**

**WARNING!** To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state, and federal proficiency requirements.

**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.

**NOTICE:** Notification of installation, operation or maintenance information, which is important, but which is not hazard-related.

#### **WARNING!**

**WARNING!** All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state, and federal statutes for the recovery and disposal of refrigerants. If a compressor is removed from this unit, refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, refrigerant lines of the compressor must be sealed after it is removed.

#### **CAUTION!**

**CAUTION!** To avoid equipment damage, DO NOT use these units as a source of heating or cooling during the construction process. The mechanical components and filters can quickly become clogged with construction dirt and debris, which may cause system damage and void product warranty.

## General Information, Cont'd.

### INSPECTION

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units and accessories have been received. Inspect the packaging of each unit, and inspect each unit for damage. Insure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and completes a common carrier inspection report. Concealed damage not discovered during unloading must be reported to the carrier within 15 days of receipt of shipment. If not filed within 15 days, the freight company can deny the claim without recourse. **NOTE: It is the responsibility of the purchaser to file all necessary claims with the carrier. Notify your equipment supplier of all damage within fifteen (15) days of shipment.**

### STORAGE

Equipment should be stored in its original packaging in a clean, dry area. Store units in an upright position at all times. Stack units a maximum of 3 units high.

### UNIT PROTECTION

Cover units on the job site with either the original packaging or an equivalent protective covering. Cap the open ends of pipes stored on the job site. In areas where painting, plastering, and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the units and contamination by foreign material. Physical damage and contamination may prevent proper start-up and may result in costly equipment clean-up.

Examine all pipes, fittings, and valves before installing any of the system components. Remove any dirt or debris found in or on these components.

### PRE-INSTALLATION

Installation, Operation, and Maintenance instructions are provided with each unit. Horizontal equipment is designed for installation in an attic or crawl space. Other unit configurations are typically installed in a mechanical closet or basement. The installation site chosen should include adequate service clearance around the unit. Before unit start-up, read all manuals and become familiar with the unit and its operation. Thoroughly check the system before operation.

### PREPARE UNITS FOR INSTALLATION AS FOLLOWS:

1. Compare the electrical data on the unit nameplate with ordering and shipping information to verify that the correct unit has been shipped.
2. Keep the cabinet covered with the original packaging until installation is complete and all plastering, painting, etc. is finished.
3. Verify refrigerant tubing is free of kinks or dents and that it does not touch other unit components.
4. Inspect all electrical connections. Connections must be clean and tight at the terminals.
5. Remove any blower support packaging (water-to-air units only).
6. Locate and verify any hot water generator (HWG), hanger, or other accessory kit located in the compressor section or blower section.

### CAUTION!

**CAUTION! DO NOT** store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., rooftops, etc. See Tables 12a and 12b for acceptable temperature ranges). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move and store units in an upright position. Tilting units on their sides may cause equipment damage.

### CAUTION!

**CAUTION! CUT HAZARD** - Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

### INSTALLATION BEST PRACTICES

The installation of geothermal heat pump units and all associated components, parts and accessories which make up the GHP system shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

### DUCT SYSTEM INSTALLATION

The duct system should be sized to handle the design airflow quietly. Refer to Figure 6 for horizontal duct system details or Figure 1 for vertical duct system details. A flexible connector is recommended for both discharge and return air duct connections on metal duct systems to eliminate the transfer of vibration to the duct system. To maximize sound attenuation of the unit blower, the supply and return plenums should include internal fiberglass duct liner or be constructed from duct board for the first few feet. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended, as the unit's performance will be adversely affected.

At least one 90° elbow should be included in the supply duct to reduce air noise. If air noise or excessive air flow is a problem, the blower speed can be changed. For airflow charts, consult catalog specifications for the series and model of the specific unit.

If the unit is connected to existing ductwork, a previous check should have been made to insure that the ductwork has the capacity to handle the airflow required for the unit. If ducting is too small, as in the replacement of a heating only system, larger ductwork should be installed. All existing ductwork should be checked for leaks and repaired as necessary.

## Vertical Installation

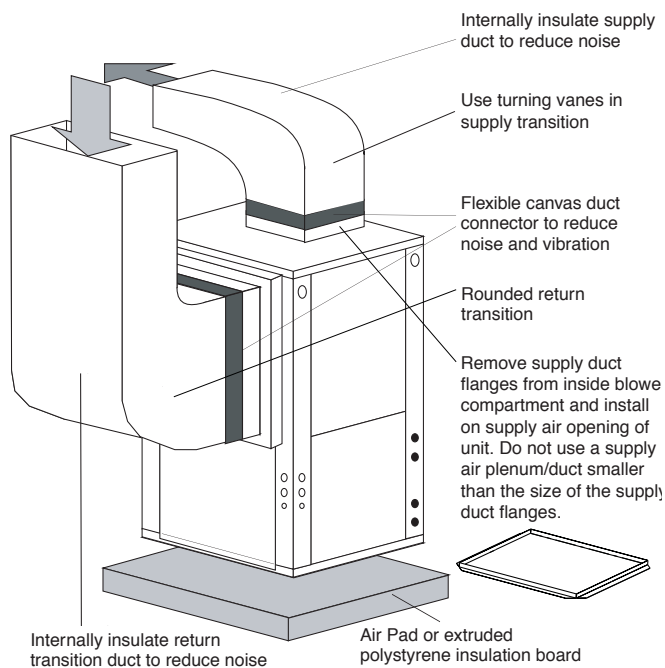
### VERTICAL UNIT LOCATION

Packaged units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing the unit from the installed location. Vertical units are typically installed in a mechanical closet or basement. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Also, provide sufficient room to make water, electrical, and duct connection(s).

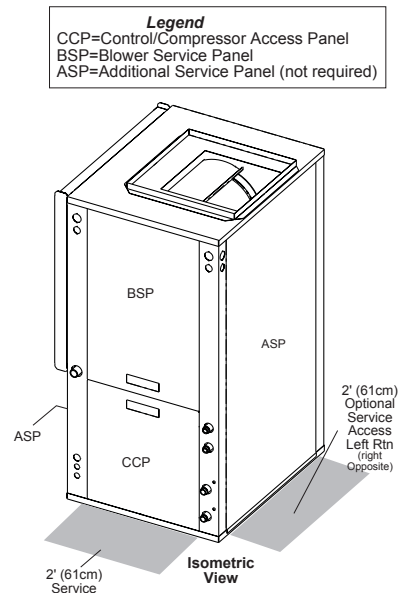
If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door or other method. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figures 1 and 2 for typical installation illustrations. Refer to unit catalog specifications for dimensional data.

1. Install the unit on a piece of rubber, neoprene or other mounting pad material for sound isolation. The pad should be at least 3/8 inches [10 mm] to 1/2 inches [13 mm] in thickness. Extend the pad beyond all four edges of the unit.
2. Do not block filter access with piping, conduit or other materials. Refer to unit catalog specifications for dimensional data.
3. Provide access to water valves and fittings and screwdriver access to the unit side panels, discharge collar and all electrical connections.

**Figure 1: Vertical Unit Mounting Using Ducted Return**



**Figure 2: Service Access**

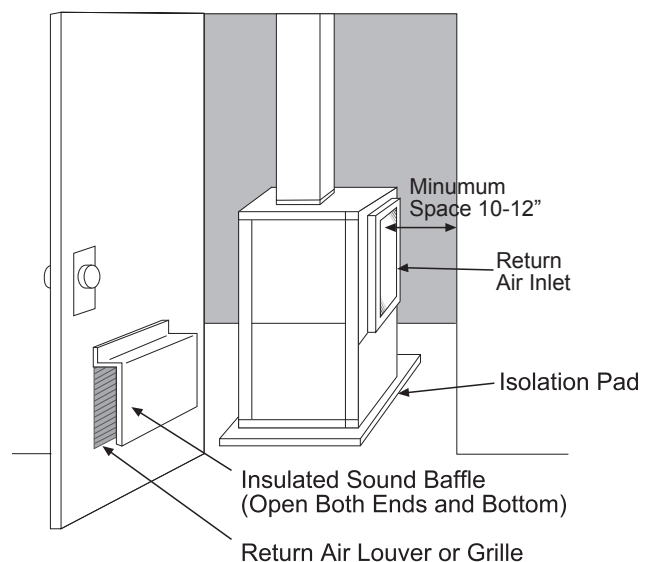


### SOUND ATTENUATION FOR VERTICAL UNITS

Sound attenuation is achieved by enclosing the unit within a small mechanical room or a closet. Additional measures for sound control include the following:

1. If free return, mount the unit so that the return air inlet is 90° to the return air grille (refer to Figure 3). Install a sound baffle as illustrated to reduce line-of sight sound transmitted through return air grilles.
2. Mount the unit on a Tranquility® Unit Isolation Pad to minimize vibration transmission to the building structure. For more information on Tranquility® Unit Isolation Pads, contact your distributor.

**Figure 3: Vertical Sound Attenuation - Free Return**



## Horizontal Installation

### HORIZONTAL UNIT LOCATION

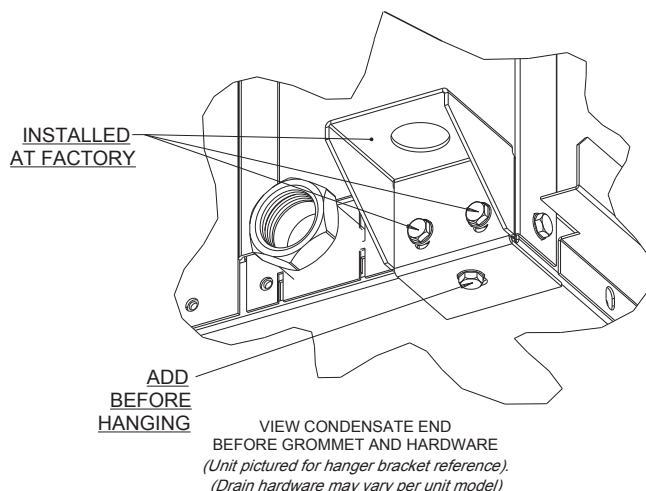
Packaged units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the ceiling. Horizontal units are typically installed in an attic or crawl space. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Consideration should be given to access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door or return duct. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figure 6 for an illustration of a typical installation. Refer to unit catalog specifications for dimensional data.

Conform to the following guidelines when selecting a unit location:

1. Provide a hinged access door in concealed-spline or plaster ceilings. Provide removable ceiling tiles in T-bar or lay-in ceilings. Refer to horizontal unit dimensions for specific series and model in unit catalog specifications. Size the access opening to accommodate the service technician during the removal or replacement of the compressor, control, or blower assembly.
2. Provide access to hanger brackets, water valves and fittings. Provide screwdriver clearance to access panels, discharge collars and all electrical connections.
3. DO NOT obstruct the space beneath the unit with piping, electrical cables and other items that prohibit future removal of components or the unit itself.
4. Use a manual portable jack/lift to lift and support the weight of the unit during installation and servicing.

Figure 4: Hanger Bracket



### MOUNTING HORIZONTAL UNITS

Horizontal units have 4 hanger brackets partially attached at the factory, one at each corner. Enclosed within the unit there is a hanger kit hardware bag containing vibration isolation grommets, washers, screws and a hanger installation instruction page. One additional screw from the hardware bag must be added to each hanger bracket before unit installation. Tighten each screw to 75 in-lbs (8.5 Nm). See Figure 4. Refer to the hanger installation instruction page contained in the hardware bag for details of final hanger bracket attachment and unit suspension. See Figure 4a.

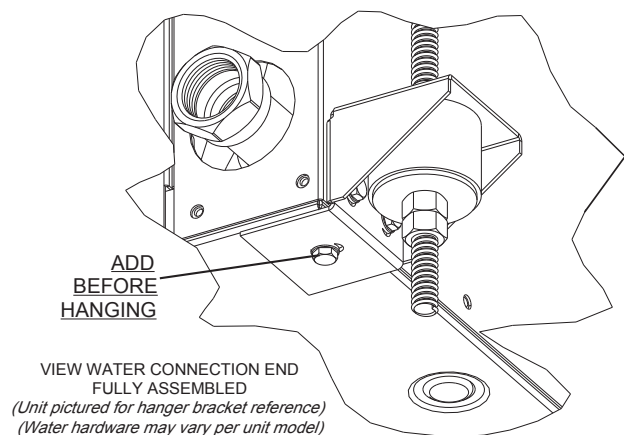
Use four (4) field supplied threaded rods and factory provided vibration isolators to suspend the unit. Safely lift the unit into position supporting the bottom of the unit. Ensure the top of the unit is not in contact with any external objects. Connect the top end of the 4 all-thread rods, slide rods through the brackets and grommet then assemble washers and double nuts at each rod. Ensure that the unit is approximately level and that the threaded rod extends past the nuts.

Pitch the unit toward the drain as shown in Figure 5 to improve the condensate drainage. On small units (less than 2.5 Tons/8.8 kW) ensure that unit pitch does not cause condensate leaks inside the cabinet.

Horizontal units may also be installed on a base. When installed on a base or platform the horizontal unit should be set in a secondary drain pan on top of a vibration absorbing pad. This is required by many codes. The secondary drain pan prevents damage to the building structure by possible condensate overflow or water leakage.

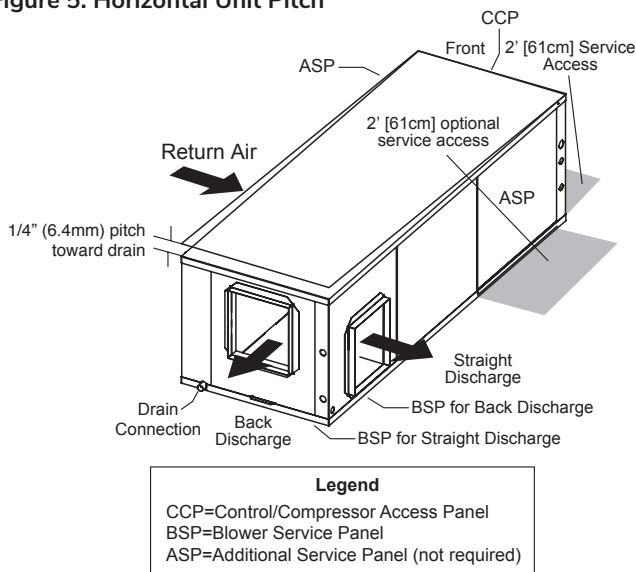
**NOTE: The top panel of a horizontal unit is a structural component. The top panel of a horizontal unit must never be removed from an installed unit unless the unit is properly supported from the bottom. Otherwise, damage to the unit cabinet may occur.**

Figure 4a:



# Horizontal Installation, Cont'd.

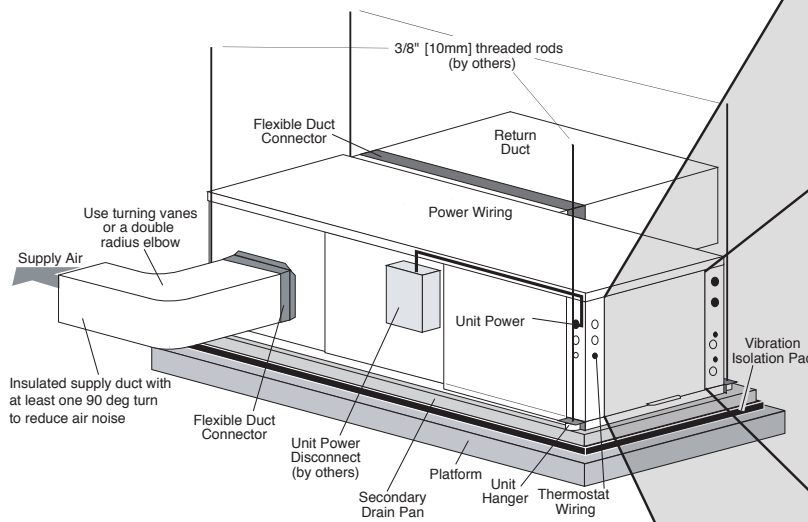
**Figure 5: Horizontal Unit Pitch**



**Notes:**

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Blower service panel requires 2' service access.
3. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.

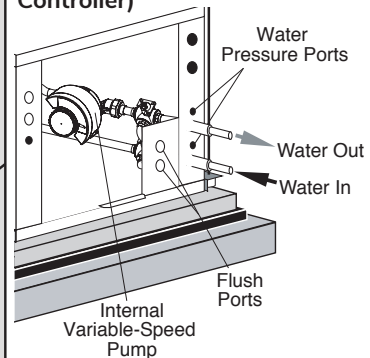
**Figure 6: Horizontal Unit Mounting**



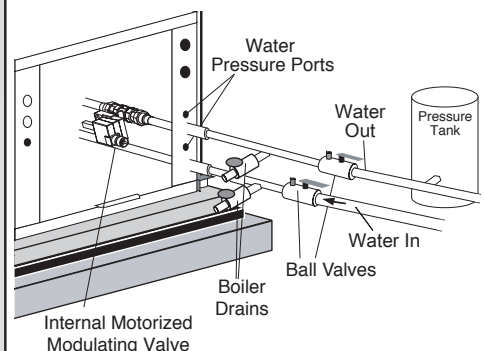
**AIR COIL**

To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended for both sides of the coil. A thorough water rinse should follow.

**Figure 6a: Typical Closed Loop Horizontal Unit Installation (with Internal Flow Controller)**



**Figure 6b: Typical Ground Water Horizontal Unit Installation (with Internal Motorized Modulating Valve)**





## Horizontal Installation, Cont'd.

## Field Conversion of Air Discharge

## OVERVIEW

Horizontal units can be field converted between side (straight) and back (end) discharge using the instructions below.

**NOTE: It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes.**

## PREPARATION

It is best to field convert the unit on the ground before hanging. If the unit is already hung it should be taken down for the field conversion.

## SIDE TO BACK DISCHARGE CONVERSION

1. Place unit in well lit area. Remove the screws as shown in Figure 7 to free top panel and discharge panel.
2. Lift out the access panel and set aside. Lift and rotate the discharge panel to the other position as shown, being careful with the blower wiring.
3. Check blower wire routing and connections for tension or contact with sheet metal edges. Reroute if necessary.
4. Check refrigerant tubing for contact with other components.
5. Reinstall top panel and screws noting that the location for some screws will have changed.
6. Manually spin the fan wheel to ensure that the wheel is not rubbing or obstructed.
7. Replace access panels.

## BACK TO SIDE DISCHARGE CONVERSION

If the discharge is changed from back to side, use above instruction noting that illustrations will be reversed.

## LEFT VS. RIGHT RETURN

It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes. However, the conversion process of side to back or back to side discharge for either right or left return configuration is the same. In some cases, it may be possible to rotate the entire unit 180 degrees if the return air connection needs to be on the opposite side. Note that rotating the unit will move the piping to the other end of the unit.

Figure 7: Left Return Side to Back

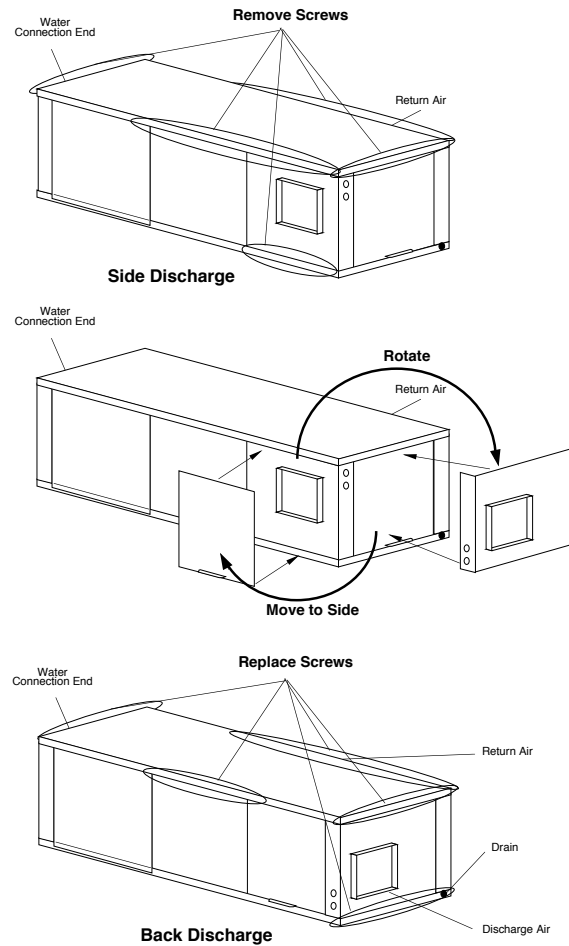
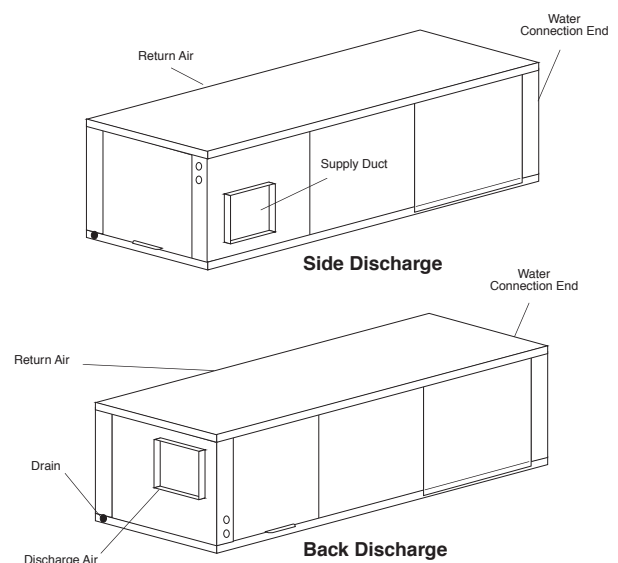


Figure 8: Right Return Side to Back



## Condensate and Water Connection

### CONDENSATE PIPING

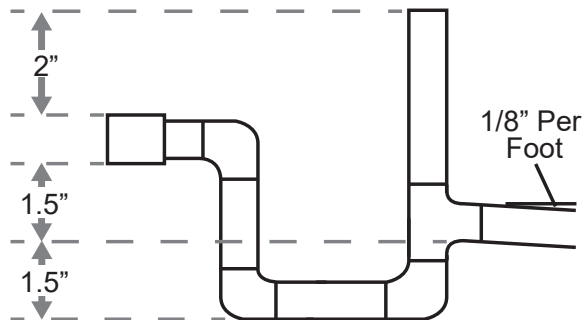
Pitch the unit toward the drain as shown in Figure 5 to improve the condensate drainage. On small units (less than 2.5 tons/8.8 kW), insure that unit pitch does not cause condensate leaks inside the cabinet.

Install condensate trap at each unit with the top of the trap positioned below the unit condensate drain connection as shown in Figure 9. Design the depth of the trap (water-seal) based upon the amount of External Static Pressure (ESP) capability of the blower (where 2 inches [51 mm] of ESP capability requires 2 inches [51 mm] of trap depth). As a general rule, 1-1/2 inch [38 mm] trap depth is the minimum.

Each unit must be installed with its own individual trap and connection to the condensate line (main) or riser. Provide a means to flush or blow out the condensate line. **DO NOT** install units with a common trap and/or vent.

Always vent the condensate line when dirt or air can collect in the line or a long horizontal drain line is required. Also vent when large units are working against higher external static pressure than other units connected to the same condensate main since this may cause poor drainage for all units on the line. **WHEN A VENT IS INSTALLED IN THE DRAIN LINE, IT MUST BE LOCATED AFTER THE TRAP IN THE DIRECTION OF THE CONDENSATE FLOW.**

Figure 9: Condensate Connection



### ! CAUTION! !

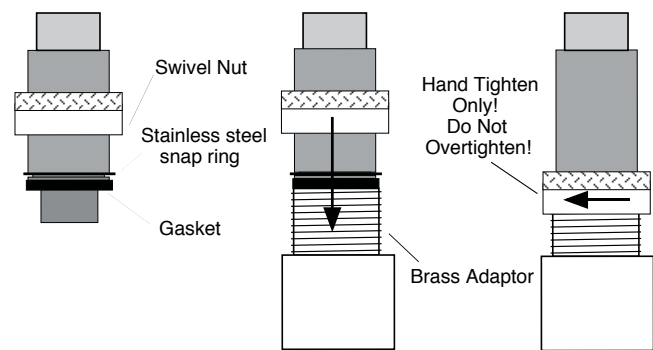
**CAUTION!** Ensure condensate line is pitched toward drain 1/8 inch per ft [11 mm per m] of run.

### WATER CONNECTIONS

Swivel piping fittings are used for water connections that are rated for 450 psi (3101 kPa) operating pressure. The connections have a rubber gasket seal similar to a garden hose gasket, which when mated to the flush end of most 1" threaded male pipe fittings provides a leak-free seal without the need for thread sealing tape or joint compound. Check for burrs and ensure that the rubber seal is in the swivel connector prior to attempting any connection (rubber seals are shipped attached to the swivel connector). **DO NOT OVER TIGHTEN** or leaks may occur.

The female locking ring is threaded onto the pipe threads which holds the male pipe end against the rubber gasket, and seals the joint. **HAND TIGHTEN ONLY! DO NOT OVERTIGHTEN!**

Figure 10: Water Connections



### ! WARNING! !

**WARNING!** Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with HFC-410A refrigerant. POE oil, if it ever comes in contact with PVC or CPVC piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water source heat pump products containing HFC-410A as system failures and property damage may result.

## vFlow® Heat Pump Applications Overview

vFlow® is a revolutionary new, intelligent, and efficient way to circulate water (or water plus antifreeze) using INTERNAL, variable water flow control. The factory-installed high-efficiency variable-speed pump uses 60%-80% less wattage than a traditional fixed speed pump. vFlow technology improves performance of the unit by reducing the amount of energy required to optimize the flow of water throughout a GHP System and also reduces the space, cost, and labor required to install external water flow control mechanisms (flow controllers, solenoid and flow control valves).

### vFlow® Configurations

(Optional - Model Digit 12 must be 2, 5, or 6):

#### 1. INTERNAL FLOW CONTROLLER – FOR CLOSED LOOP APPLICATIONS

This is the most common configuration for closed loops. With this factory-installed option, the unit is built with an Internal Variable Speed Pump and other components to flush and operate the unit correctly (including an expansion tank, flush ports and flushing valves). The pump speed is controlled by the DXM2.5 control based on the difference in entering and leaving water temperatures ( $\Delta T$ ). The Internal Flow Controller pump includes an internal check valve for multiple unit installations. A copper water coil is standard with this option.

**NOTE: Internal Flow Controllers are also very suitable for multiple unit installations depending on pump performance requirements.**

#### 2. INTERNAL MODULATING MOTORIZED VALVE – FOR LARGE CLOSED LOOP APPLICATIONS (EXTERNAL CENTRAL PUMPING)

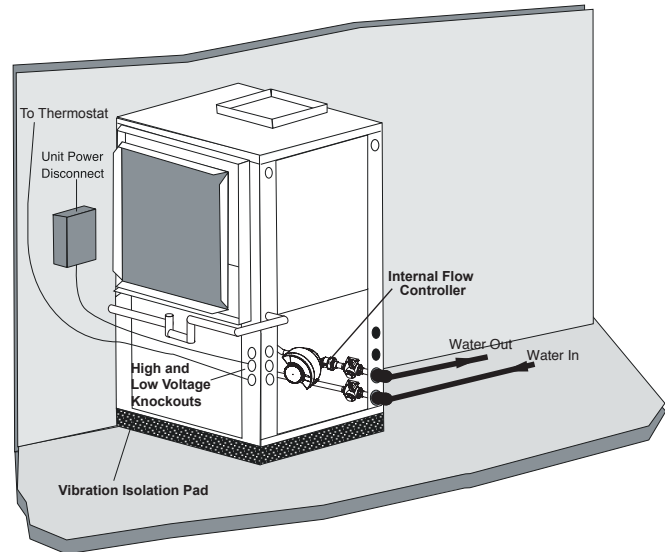
Primarily for use on multi-unit closed loop applications with central pumping. With this factory-installed option, the unit includes a low pressure drop modulating motorized valve that is controlled by the DXM2.5 microprocessor control based on the difference in the entering and leaving water temperatures ( $\Delta T$ ). A Copper Water Coil is standard with this option. The modulating valve in this option has a higher Cv than the open loop option.

#### 3. INTERNAL MODULATING MOTORIZED VALVE – FOR OPEN LOOP APPLICATIONS

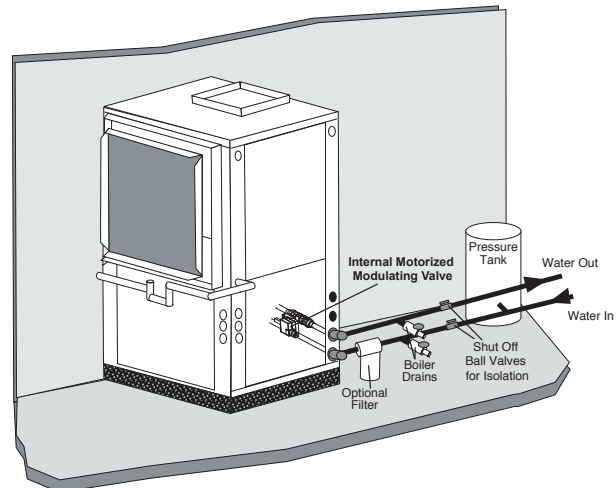
For use on open loop applications. With this factory-installed option, the unit is built with an internal modulating motorized valve controlled by the Communicating DXM2.5 control board based on entering and leaving water temperatures ( $\Delta T$ ). A low Cv modulating motorized valve is used for this application to provide more precise control against the higher system pressure differential of open loop applications. A Cupro-Nickel water coil comes standard with this option.

Details on these options are included in the following sections on ground loop and ground water applications.

**Figure 11a: Typical Closed-Loop Application (with Internal Flow Controller Shown)**



**Figure 11b: Typical Open-Loop Application (with Internal Modulating Motorized Valve Shown)**  
For use on applications using external source for flow



## ⚠ CAUTION! ⚠

**CAUTION!** The following instructions represent industry accepted installation practices for closed loop earth coupled heat pump systems. Instructions are provided to assist the contractor in installing trouble free ground loops. These instructions are recommendations only. State/provincial and local codes **MUST** be followed and installation **MUST** conform to ALL applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

## Closed Loop Heat Pump Applications w/Internal Flow Controller

Units with internal flow control come with a built-in variable speed pump, an expansion tank, flushing ports and three-way valves (used to flush the unit). The variable speed pump is controlled by the Communicating DXM2.5 board based on the difference between the entering and leaving water temperature ( $\Delta T$ ). For operation outside of the normal entering water temperature range (50° or 60°F - 110°F for cooling, 30°F-70°F for heating) the DXM2.5 controller may automatically adjust the control  $\Delta T$  to account for the abnormal entering water temperatures, maintaining an appropriate flow rate for proper unit operation. When entering water temperatures are abnormally low for cooling, or abnormally high for heating, the DXM2.5 controller will maintain a constant leaving water temperature which will allow the unit to operate properly under those conditions. The internal expansion tank helps to maintain constant loop pressure despite the natural expansion and contraction of the loop as the seasons and loop temperatures vary. The expansion tank also helps to avoid flat loop callbacks.

### PRE-INSTALLATION

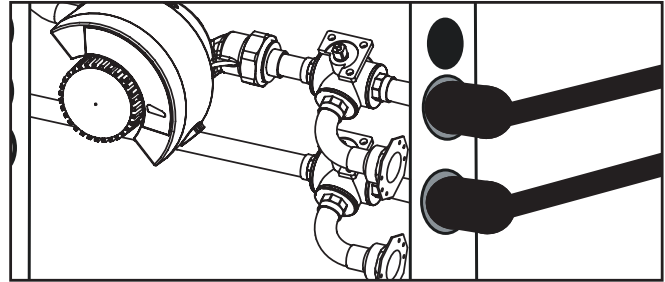
Prior to installation, locate and mark all existing underground utilities, piping, etc. Install loops for new construction before sidewalks, patios, driveways, and other construction has begun. During construction, accurately mark all ground loop piping on the plot plan as an aid in avoiding potential future damage to the installation.

### PIPING INSTALLATION

The typical closed loop ground source system is shown in Figures 6a and 11a. All earth loop piping materials should be limited to polyethylene fusion only for in-ground sections of the loop and it is also recommended for inside piping. Galvanized or steel fittings should not be used at any time due to their tendency to corrode. All plastic to metal threaded fittings should be avoided due to their potential to leak in ground loop applications. Loop temperatures can range between 25 and 110°F [-4 to 43°C]. Flow rates between 2.25 and 3 gpm per ton [2.41 to 3.23 l/m per kW] of cooling capacity is recommended in these applications.

Test individual horizontal loop circuits before backfilling.  
Test vertical U-bends and pond loop assemblies prior to installation. Pressures of at least 100 psi [689 kPa] should be used when testing. Do not exceed the pipe pressure rating.  
Test entire system when all loops are assembled.

Figure 12: Internal Flow Controller



### ⚠ NOTICE! ⚠

**NOTICE!** If installing MULTIPLE vFlow® Internal Variable Speed Flow Controller units (in parallel) on one loop, please refer to section 'Multiple Unit Piping and Flushing' (later in this document).

The following section will help to guide you through flushing a unit with internal flow control.

### WATER PRESSURE SCHRADER PORTS

The pressure ports built in to the unit are provided as a means of measuring pressure drop through the water-to-refrigerant heat exchanger. The water pressure ports are schrader ports smaller than refrigerant schrader ports. They are the same size as tire schrader ports. A digital pressure gauge is recommended for taking pressure readings through these ports. The water flow through the unit can be determined by measuring the water pressure at the "water pressure out" port and subtracting it from the water pressure at the "water pressure in" port. Comparing the pressure differential to the pressure drop table in Table 12 in this manual will determine the flow rate through the unit.

### Digital Tire Pressure Gauge



## Closed Loop Heat Pump Applications w/Internal Flow Controller, Cont'd.

Figure 13: Standard Head Variable Pump Performance

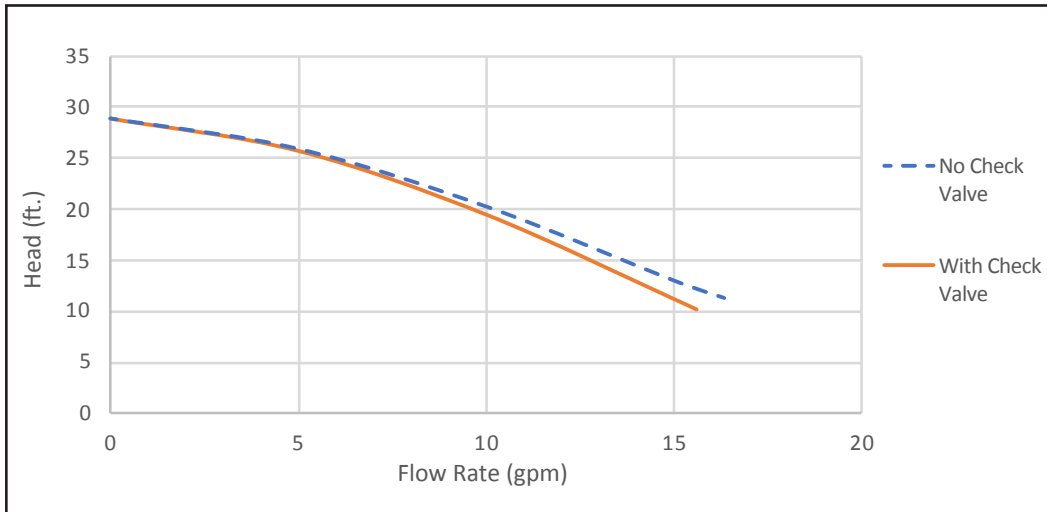
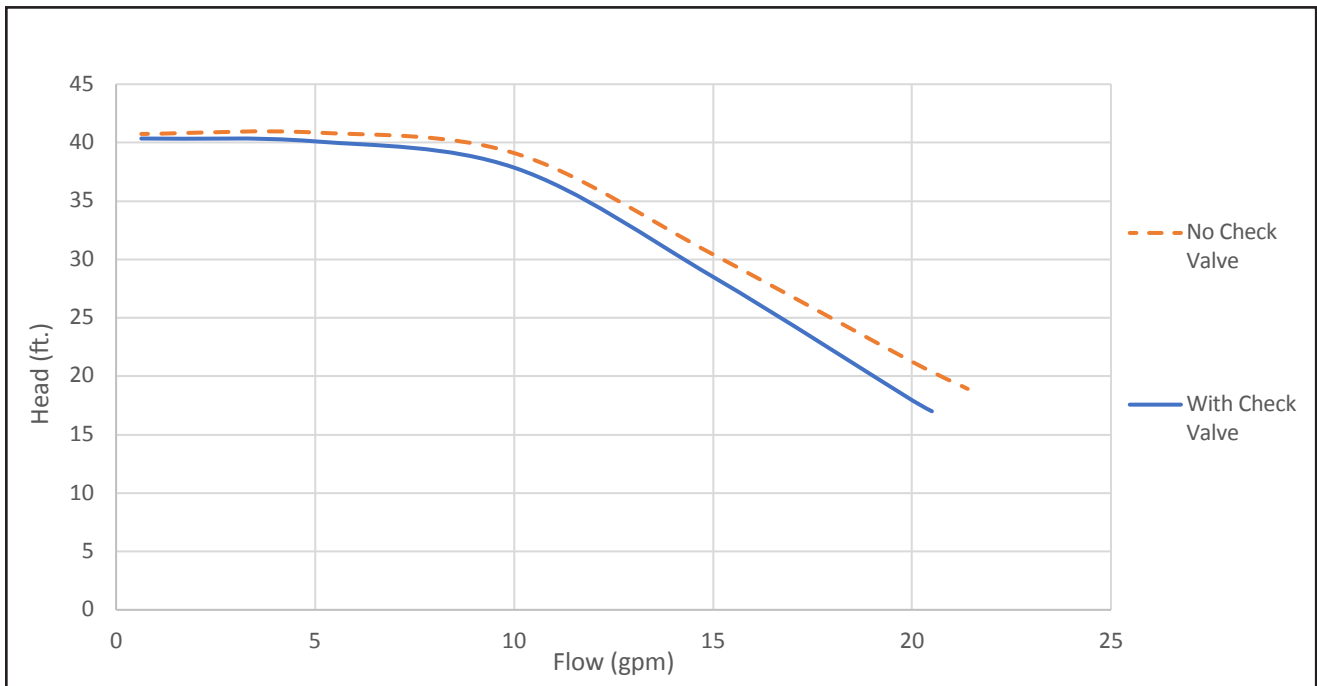


Figure 13a: High Head Variable Pump Performance



## Flushing the Earth Loop

Once piping is completed between the unit and the ground loop, final purging and charging of the loop is needed.

A flush cart (at least a 1.5 hp [1.1 kW] pump) is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop itself. Antifreeze solution is used in most areas to prevent freezing. All air and debris must be removed from the earth loop piping system before operation, **Flush the loop with a high volume of water at a high velocity (2 fps [0.6 m/s] in all piping)**, using a filter in the loop return line, of the flush cart to eliminate debris from the loop system. Filtration of at least 100 microns should be used during the flushing process to ensure any debris that might clog/damage the heat exchanger or pump is removed. See Table 1 for flow rate required to attain 2 fps [0.6 m/s]. The steps below must be followed for proper flushing.

**Table 1: Minimum Flow Required to Achieve 2 ft/sec Velocity**

PE Pipe Size	Flow (GPM)
3/4"	4 [4.3 L/M per KW]
1"	6 [6.5 L/M per KW]
1 1/4"	10 [10.8 L/M per KW]
1 1/2"	13 [14.0 L/M per KW]
2"	21 [22.6 L/M per KW]

Units with internal variable speed pumps also include a check valve internal to the pump. It is not possible to flush backwards through this pump. Care must be taken to connect the flush cart hoses so that the flush cart discharge is connected to the "water in" flushing valve of the heat pump.

### LOOP FILL

Fill loop (valve position A, see Figure 15a) with water from a garden hose through flush cart before using flush cart pump to ensure an even fill and increase flushing speed. When water consistently returns back to the flush reservoir, switch to valve position B (Figure 15b).

Isolate expansion tank for flushing procedure using the ball valve. During dead heading of flush cart pump, isolation will prevent compression of bladder in the expansion tank and flush cart fluid level dropping below available capacity.

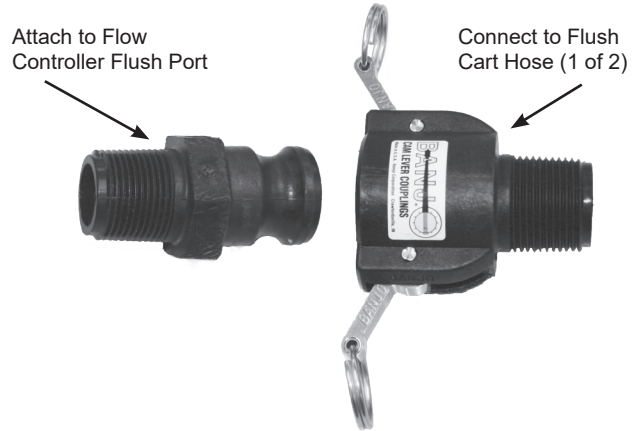
**Figure 14a: Typical Cleanable Flush Cart Strainer (100 mesh [0.149 mm])**



**⚠ WARNING! ⚠**

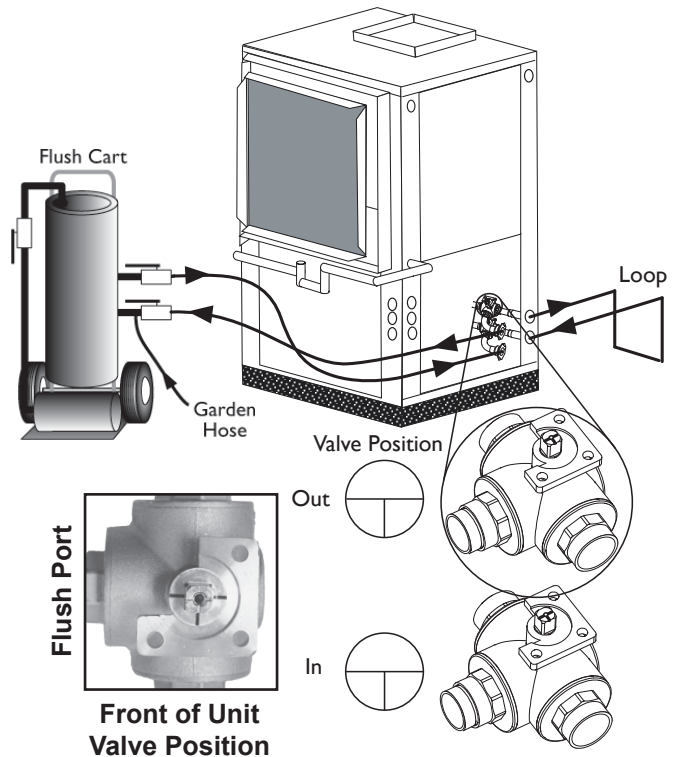
**WARNING!** Disconnect electrical power source to prevent injury or death from electrical shock.

**Figure 14b: Cam Fittings for Flush Cart Hoses**



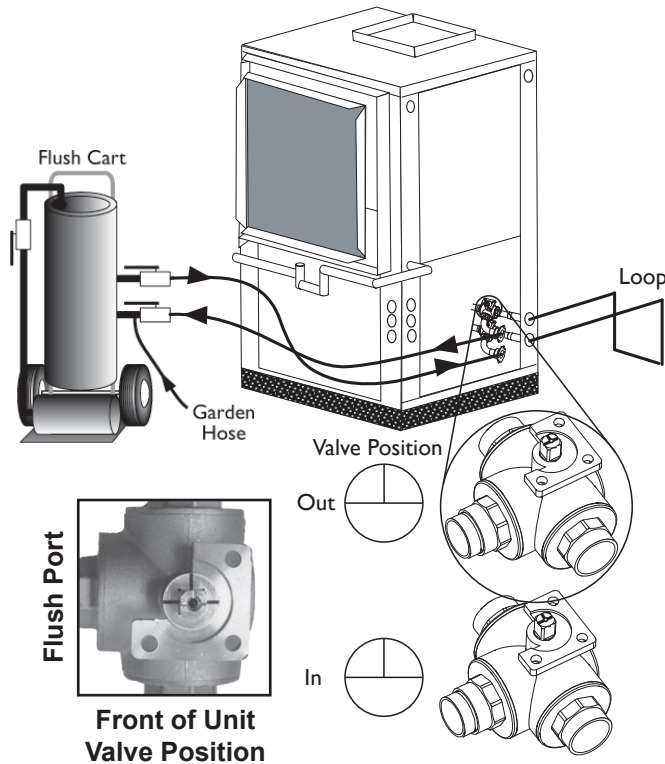
**NOTICE:** A hydrostatic pressure test is required on ALL piping, especially underground piping before final backfill per IGSHA and the pipe manufacturers recommendations.

**Figure 15a: Valve Position A – Loop Fill/Flush**



## Flushing the Earth Loop, Cont'd.

Figure 15b: Valve Position B – Unit Fill/Flush

**UNIT FILL**

Unit fill valves should be switched to Position B while flush cart is pumping to fill the unit heat exchanger (see Figure 15b). The valves position should be maintained until water is consistently returned into the flush reservoir.

**LOOP FLUSH**

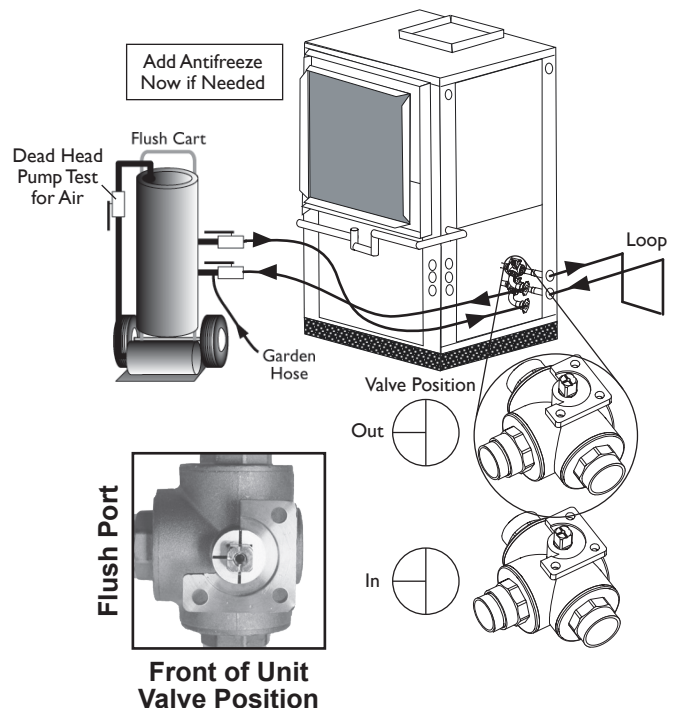
Switch to valve Position A. The supply water may be shut off and the flush cart turned on to begin flushing. Once the flush reservoir is full, do not allow the water level in the flush cart tank to drop below the pump inlet line or air can be pumped back out to the earth loop. Try to maintain a fluid level in the tank above the return tee so that air can not be continuously mixed back into the fluid. Surges of 50 psi [345 kPa] can be used to help purge air pockets by simply shutting off the flush cart return valve going into the flush cart reservoir. This process 'dead heads' the pump to 50 psi [345 kPa]. To dead head the pump until maximum pumping pressure is reached, open the valve back up and a pressure surge will be sent through the loop to help purge air pockets from the piping system. Notice the drop in fluid level in the flush cart tank. If all air is purged from the system, the level will drop only 3/8 inches in a 10 inches [25.4 cm] diameter PVC flush tank (about a half gallon [1.9 liters]) since liquids are incompressible. If the level drops more than this level, flushing should continue since air is still being compressed in the loop fluid. Do this a number of times.

**NOTICE:** Actual flushing time require will vary for each installation due to piping length, configuration, and flush cart pump capacity. 3/8 inches or less fluid level drop is the **ONLY** indication that flushing is complete.

Switch valves to Position B to flush the unit. Flush through the unit until all air pockets have been removed.

Move valves to position C. By switching both valves to this position, water will flow through the loop and the unit heat exchanger. Finally, the dead head test should be checked again for an indication of air in the loop. Fluid level drop is your only indication of air in the loop.

Figure 15c: Valve Position C – Full Flush

**PRESSURIZE AND OPERATE**

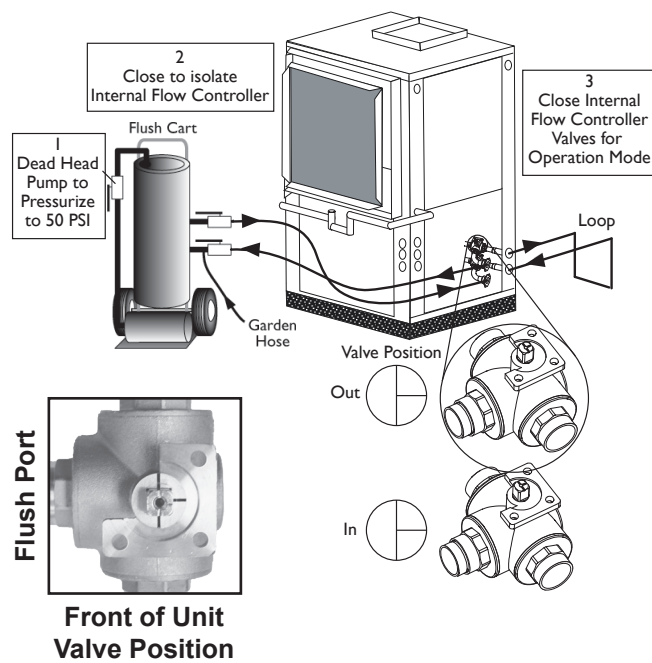
As shown in Figure 15d, close the flush cart return valve to pressurize the loop to at least 50 psi [345 kPa], not to exceed 75 psi [517 kPa]. Open the isolation valve to the expansion tank and bleed air from the expansion tank piping using the schrader valve located in front of the expansion tank. This will allow loop pressure to compress the expansion tank bladder, thus charging the expansion tank with liquid. After pressurizing, close the flush cart supply valve to isolate the flush cart. Move the Flow Controller valves to Position D.

## Flushing the Earth Loop, Cont'd.

Loop static pressure will fluctuate with the seasons and pressures will be higher in the winter months than during the cooling season. This fluctuation is normal and should be considered when charging the system initially. Unhook the flush cart from the Internal Flow Controller. Install Flow Controller caps to ensure that any condensation/leakage remains contained within the Flow Controller package.

If the loop pressure is between 50 and 75 psi [345 to 517 kPa] upon completion of flushing, pressures should be sufficient for all seasons.

**Figure 15d: Valve Position D – Pressurize and Operation**



**NOTICE:** It is recommended to run the unit in the cooling, then heating mode for 15-20 minutes each to 'temper' the fluid temperature and prepare it for pressurization. This procedure helps prevent the periodic "flat" loop condition of no pressure.



## Multiple Unit Piping and Flushing

Often projects require more than one heat pump. Where possible, it makes sense for multiple units to share a common ground loop. Common ground loops for multiple units bring new challenges including the need to avoid backward flow through inactive units, increased pumping requirements, and more complex flushing needs. Three types of multiple unit systems are described below along with guidelines for installation of each type.

vFlow® internal variable flow technology is a great assist for systems with multiple units. vFlow is available in three different configurations:

1. Internal variable-speed pump for closed loops
2. Internal modulating valve for closed loops
3. Internal modulating valve for open loops

The internal modulating valve for closed loops version is a low system pressure drop valve that in most cases is not suitable for open loop systems.

The internal modulating valve for open loops version is a high system pressure drop valve that in most cases is not suitable for closed loop systems.

The internal variable speed pump version of vFlow includes an internal variable speed circulator controlled by the DXM2.5 microprocessor, internal 3-way flushing valves, an internal bladder type expansion tank, and front-mounted pressure ports that allow access to the pressure drop across the coaxial heat exchanger only. The pump includes an internal check valve. The pump curves are shown in Figures 13 and 13a. The internal expansion tank will operate as a pressure battery for the geothermal system. It will absorb fluid from the loop when loop pressure rises and inject fluid into the loop when loop pressure falls. In this way the expansion tank will help to maintain a more constant loop pressure and avoid flat loops due to seasonal pressure changes in the loop.

When using the internal variable speed pump as the loop pump in multiple unit installations it is important to ensure that the variable speed pump can provide adequate flow through the heat pump against the loop head when all units are operating.

Units with the standard head pump should not be combined with units with high head pumps on the same loop. Standard head pumps are best suited for small applications with a single unit.

It may be possible to flush a multiple unit system through the unit's flushing valves. Flushing pressure drop of the valve may be calculated to determine if it is acceptable. Engineering data for the 3-way flushing valves can be found in Table 2.

**Table 2: Internal 3-Way Flushing Valve Data**

Model	Flushing Connection	Straight Flow Cv	90° Flow Cv
TE026 - 038	3/4" FPT	25	10.3
TE049 - 072	1" FPT	58	14.5

For example, if a system includes two 2-ton units and four ¾ loop circuits we can calculate the flushing pressure drop as follows. From Table 1 we know that it will take 4 gpm to flush each ¾" circuit. If there is no provision to isolate the circuits for flushing, we will have to flush with a minimum of 4 circuits x 4 gpm/circuit = 16 gpm total. A check of other piping sizes used must be done to ensure that 16 gpm total flow will flush all piping.

Pressure drop through the flushing valve can be calculated using the following formula.

$$\Delta P = (\text{GPM}/\text{Cv})^2 \text{ where,}$$

$\Delta P$  = pressure drop in psi through the valve while flushing

GPM = flushing flow in gallons per minute

Cv = valve Cv in flushing mode

We know from Table 2 that the Cv for the flushing valve in a TE026 is 10.3 in the flushing mode (90° flow). Therefore,  $\Delta P = (\text{GPM}/\text{Cv})^2 = (16/10.3)^2 = 2.4$  psi per valve (there are two flushing valves). So long as the flushing pump is able to provide 16 gpm at the flushing pressure drop of the loop plus the  $2.4 \times 2$  valves = 4.8 psi of the flushing valves, the internal flushing valves may be used. If the flushing pump is not able to overcome the pressure drop of the internal flushing valves, then larger external flushing valves must be used.

### UNIT CONFIGURATION

Multiple vFlow® units with internal variable-speed flow controller and check valve, piped in parallel sharing a common loop **MUST** be configured for 'VS PUMP PARALLEL' in Installer Settings Menu.

UNIT CONFIGURATION	
CURRENT CONFIG	TE026
HEAT PUMP FAMILY	TE
HEAT PUMP SIZE	026
BLOWER TYPE	ECM
LOOP CONFIG	VS PUMP PARALLEL
SELECT OPTION ▲ ▼	
◀ PREVIOUS	SAVE ▶

Installer Settings ➡ System Config ➡ Unit Config ➡ Loop Config

## Multiple Unit Piping and Flushing, Cont'd.

### MULTIPLE UNITS w/INTERNAL FLOW CONTROLLERS

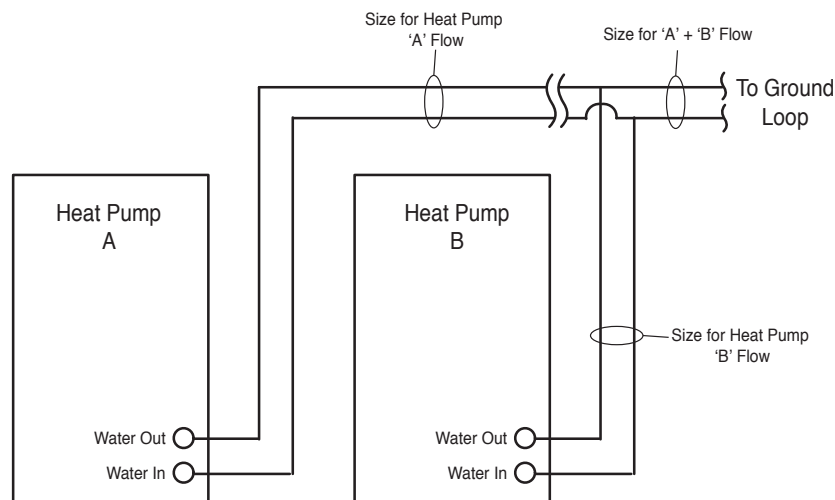
The simplest multiple unit system is one with two (or more) units utilizing internal Flow Controllers with no external pumps or flushing valves. In this case the units are piped in parallel and use the internal flushing valves to flush the system. The variable speed pump includes an internal check valve to prevent back (short circuiting) flow through the units.

In this case, flush the loop through the internal flushing valves in the unit farthest from the loop first. Once the loop is flushed, then change the internal flushing valves to flush the heat pump. Next, move the flushing cart to the next closest unit to the loop.

Again, flush the loop through the internal flushing valves. This is important as there may be air/debris in the lines from this unit to the common piping. Once flushing begins the air will be move into the loop and will need to be flushed out. After the loop is flushed through the second unit, change the flushing valves to flush the second unit. This process should be repeated for additional units working from the farthest from the loop to the closest to the loop.

This type of application can generally be employed for systems to 12 tons depending on loop design. However, it is important perform appropriate calculations to confirm that the variable speed pump can provide adequate flow through all heat pumps against the loop head when all units are operating.

**Figure 16a: Multiple Units with Internal Flow Controllers**



### MULTIPLE UNITS WITH INTERNAL FLOW CONTROLLERS AND EXTERNAL FLUSHING VALVES

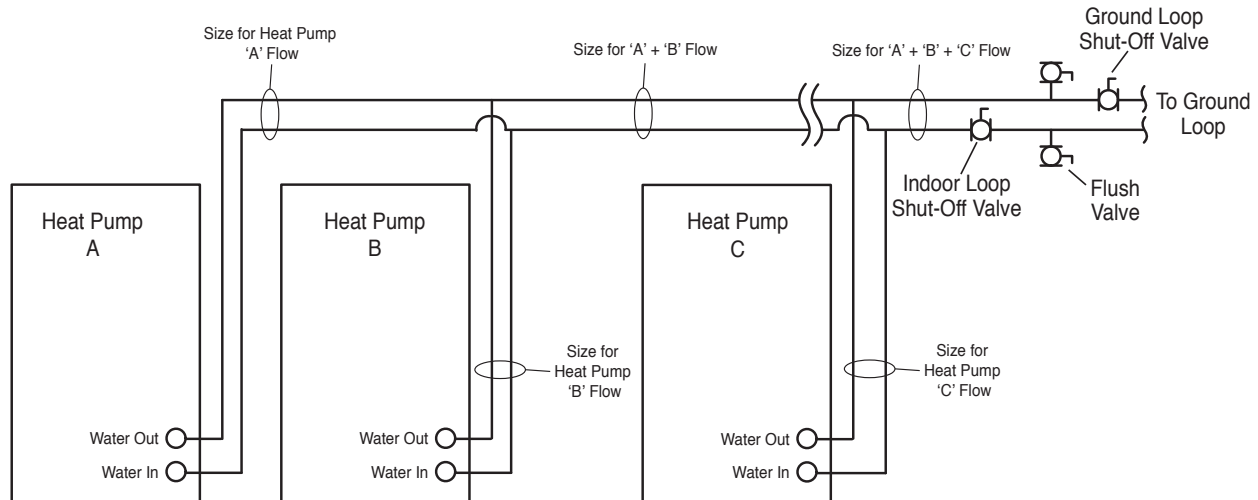
When the number of units or flushing requirements reaches a point where it is no longer feasible to flush through the internal valves (generally systems of more than 12 tons depending on loop design), external flushing valves should be installed. In this case, three-way flushing valves should be used or additional isolation valves must be installed to be able to isolate the loop during flushing.

First, flush the ground loop. The installer should close the indoor loop shut-off valve (or the internal flushing valves in all units) and open the ground loop shut-off valve to prevent flow through the indoor loop while flushing the ground loop.

Once the ground loop is flushed, close the ground loop shut-off valve and open the indoor loop valve(s) to flush the units and indoor piping. Remember that there is an internal check valve in the variable speed pump and that backward flow the unit is not possible.

## Multiple Unit Piping and Flushing, Cont'd.

Figure 16b: Multiple Units with Internal Flow Controllers and External Flushing Valves

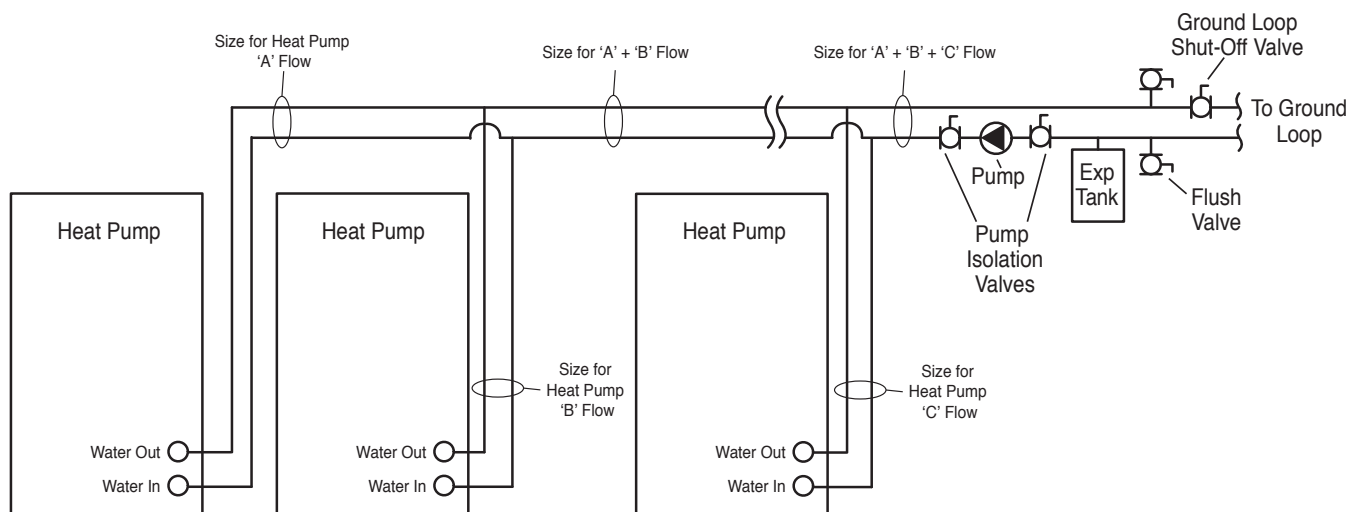
**MULTIPLE UNITS WITH INTERNAL MODULATING VALVES AND CENTRAL PUMP**

This is an application where multiple units are used in conjunction with a central, variable speed pump. In this case, units with closed loop modulating valves are used (do not use open loop modulating valves on a closed loop system). External flushing valves are required. This application is for larger systems, including commercial.

Before flushing, the installer should manually open all modulating valves as detailed in Closed Loop – External Central Pumping section of this manual. Next, flush the ground loop. The installer should close a pump isolation valve and open the ground loop shut-off valve to prevent flow through the indoor loop while flushing the ground loop.

Once the ground loop is flushed, close the ground loop shut-off valve and open the pump isolation valve to flush the units and indoor piping. Once the system is flushed remember to return the modulating valves to their normal operating position.

Figure 16c: Multiple Units with Internal Modulating Valves and Central Pump



## Flushing/Purging Units with ClimaDry® II

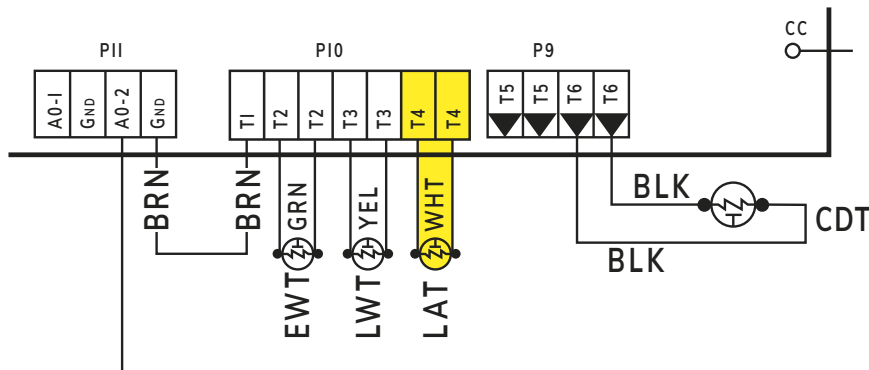
When flushing/purging units equipped with ClimaDry® II the unit should be fully flushed/purged before attempting to flush/purge the ClimaDry II coil. Once the unit is flushed, energize the modulating three-way dehumidification valve to allow flow through the ClimaDry II hydronic circuit.

The unit must be powered (but not operating) during flushing/purging. Unit power is required to operate the three-way modulating valve during flushing.

Disable the ClimaDry II sensor located in the supply air stream by removing the white wire from the P10 terminal strip located on the DXM2.5 control board, as described below in Figure 17. Energize the modulating three-way dehumidification valve by removing the red wire from the ACC1 'NO' terminal on the DXM2.5 control board, and connect it to the ACC1 'NC' terminal as shown in Figure 18. Once energized, the valve will take 45 – 75 seconds to fully shift. Continue flushing during this time. After the valve has completed its shift, use the air bleed from the top of the reheat coil to purge air from the coil.

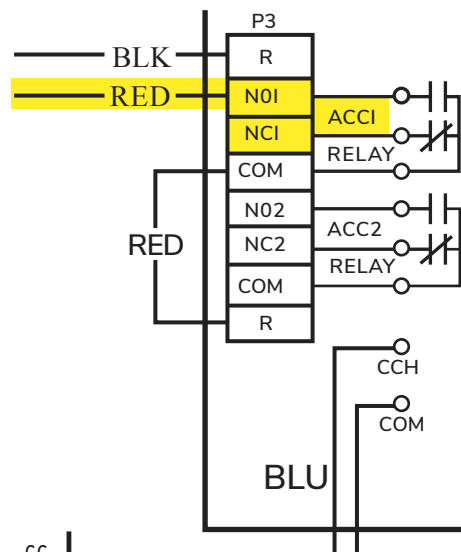
De-energize the valve by removing the red wire from the ACC1 'NC' terminal on the DXM2.5 board. The valve will spring return to its normal position in just a few seconds. After the valve has fully returned, repeat the process of running the valve through its cycle and purging air from the reheat coil.

**Figure 17: LAT Sensor Connection to P10 Terminal Strip**



Under extreme circumstances this procedure may be required multiple times to purge all air from the circuit. After completing the flushing/purging procedure, reconnect the red wire to the ACC1 'N.O.' terminal on the DXM2.5 for normal operation. Reconnect the white sensor wire to the P10 terminal block of the DXM2.5 control board, as described in Figure 17 below. If air is allowed to collect in the ClimaDry II piping, nuisance trips may occur. Additional flush/purge cycles may be used when required.

**Figure 18: Energizing the Modulating Valve**



## Ground-Loop Heat Pump Applications

### ANTIFREEZE SELECTION - GENERAL

In areas where minimum entering loop temperatures drop below 40°F [4.4°C] or where piping will be routed through areas subject to freezing, antifreeze is needed. Alcohols and glycols are commonly used as antifreeze solutions. Your local representative should be consulted for the antifreeze best suited to your area. Freeze protection should be maintained to 15°F [8.5°C] below the lowest expected entering loop temperature.

Initially calculate the total volume of fluid in the piping system using Table 3. Then use the percentage by volume shown in Table 4 for the amount of antifreeze. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Table 3: Fluid Volume

Fluid Volume (gal [liters] per 100' [30 meters] Pipe)		
Pipe	Size	Volume (gal) [liters]
Copper	1"	4.1 [15.3]
	1.25"	6.4 [23.8]
	2.5"	9.2 [34.3]
Polyethylene	3/4" IPS SDR11	2.8 [10.4]
	1" IPS SDR11	4.5 [16.7]
	1.25" IPS SDR11	8.0 [29.8]
	1.5" IPS SDR11	10.9 [40.7]
	2" IPS SDR11	18.0 [67.0]
Unit Heat Exchanger	Typical	1.0 [3.8]
Flush Cart Tank	10" Dia x 3 ft tall [25.4 cm x 91.4 cm tall]	10 [37.9]

### ⚠ WARNING! ⚠

**WARNING!** Always dilute alcohols with water (at least 50% solution) before using. Alcohol fumes are flammable and can cause serious injury or death if not handled properly.

When handling methanol (or any alcohol), always wear eye protection and rubber gloves as alcohols are easily absorbed through the skin.

Table 4: Antifreeze Percentages by Volume

Type	Minimum Temperature for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	21%	17%	13%	8%
Propylene Glycol	29%	24%	18%	12%
Ethanol*	23%	20%	16%	11%

\* Must not be denatured with any petroleum based product

Contact your ClimateMaster distributor if you have any questions as to antifreeze selection.

### ⚠ WARNING! ⚠

**WARNING!** Always use properly marked vehicles (D.O.T. placards), and clean/suitable/properly identified containers for handling flammable antifreeze mixtures. Post and advise those on the job site of chemical use and potential dangers of handling and storage.

**NOTICE: DO NOT use automotive windshield washer fluid as antifreeze. Washer fluid contains chemicals that will cause foaming.**

### ⚠ CAUTION! ⚠

**CAUTION!** Always obtain MSDS safety sheets for all chemicals used in ground loop applications including chemicals used as antifreeze.

### ANTIFREEZE CHARGING

It is highly recommended to utilize premixed antifreeze fluid where possible to alleviate many installation problems and extra labor.

The following procedure is based upon pure antifreeze and can be implemented during the Full Flush procedure with three way valves in the Figure 15c - Valve Position C. If a premixed mixture of 15°F [-9.4°C] freeze protection is used, the system can be filled and flushed with the premix directly to prevent handling pure antifreeze during the installation.

1. Flush loop until all air has been purged from system and pressurize to check for leaks before adding any antifreeze.
2. Run discharge line to a drain and hook up antifreeze drum to suction side of pump (if not adding below water level through approved container). Drain flush cart reservoir down to pump suction inlet so reservoir can accept the volume of antifreeze to be added.
3. Calculate the amount of antifreeze required by first calculating the total fluid volume of the loop from Table 3. Then calculate the amount of antifreeze needed using Table 4 for the appropriate freeze protection level. Many southern applications require freeze protection because of exposed piping to ambient conditions.
4. Isolate unit and prepare to flush only through loop (see Figure 15a). Start flush cart, and gradually introduce the required amount of liquid to the flush cart tank (always introduce alcohols under water or use suction of pump to draw in directly to prevent fuming) until attaining the proper antifreeze protection. The rise in flush reservoir level indicates amount of antifreeze added (some carts are marked with measurements in gallons or liters). A ten inch [25.4 cm] diameter cylinder, 3 foot [91.4 cm] tall holds approximately 8 gallons [30.3 liters] of fluid plus the hoses (approx. 2 gallons, [7.6 liters], which equals about 10 gallons [37.9 liters] total. If more than one tankful is required, the tank should be drained immediately by opening the waste valve of the flush

# Ground-Loop Heat Pump Applications, Cont'd.

cart noting the color of the discharge fluid. Adding food coloring to the antifreeze can help indicate where the antifreeze is in the circuit and prevents the dumping of antifreeze out the waste port. Repeat if necessary.

5. Be careful when handling methanol (or any alcohol). Always wear eye protection and rubber gloves. The fumes are flammable, and care should be taken with all flammable liquids. Open flush valves to flush through both the unit and the loop and flush until fluid is homogenous and mixed. It is recommended to run the unit in the heating and cooling mode for 15-20 minutes each to 'temper' the fluid temperature and prepare it for pressurization. Devoting this time to clean up can be useful. This procedure helps prevent the periodic "flat" loop condition.
6. Close the flush cart return valve; and immediately thereafter, close the flush cart supply valve, leaving a positive pressure in the loop of approximately 50 psi [345 kPa]. This is a good time to pressure check the system as well. Check the freeze protection of the fluid with the proper hydrometer to ensure that the correct amount of antifreeze has been added to the system. The hydrometer can be dropped into the flush reservoir and the reading compared to Chart 1a for Methanol, 1b for Propylene Glycol, and 1c for Ethanol to indicate the level of freeze protection. Do not antifreeze more than a +10°F [-12.2°C] freeze point. Specific gravity hydrometers are available in the residential price list. Repeat after reopening and flushing for a minute to ensure good second sample of fluid. Inadequate antifreeze protection can cause nuisance low temperature lockouts during cold weather.

**⚠ WARNING! ⚠**

**WARNING!** Always dilute alcohols with water (at least 50% solution) before using. Alcohol fumes are flammable and can cause serious injury or death if not handled properly.

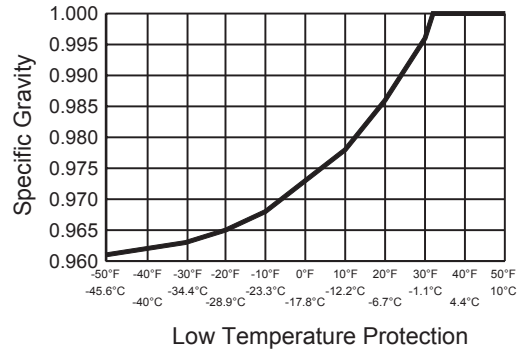
When handling methanol (or any alcohol), always wear eye protection and rubber gloves as alcohols are easily absorbed through the skin.

7. Close the flush cart return valve; immediately thereafter, close the flush cart supply valve, shut off the flush cart leaving a positive pressure in the loop of approximately 50-75 psi [345-517 kPa]. Refer to Figure 15d for more details.

### LOW WATER TEMPERATURE CUTOUT SETTING – DXM2.5 CONTROL

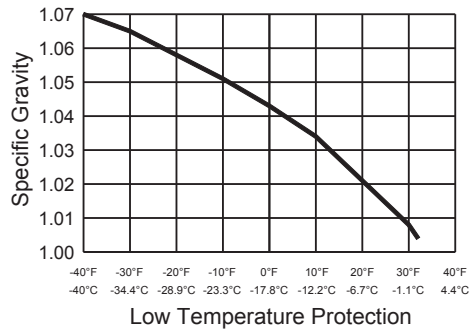
When antifreeze is selected, the LT1 jumper (JW3) should be clipped to select the low temperature (antifreeze 10°F [-12.2°C]) set point and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual).

**Chart 1a: Methanol Specific Gravity**



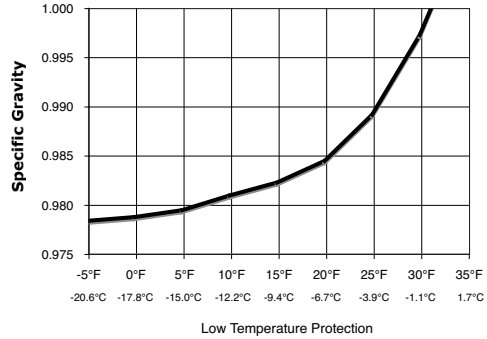
Low Temperature Protection

**Chart 1b: Propylene Glycol Specific Gravity**



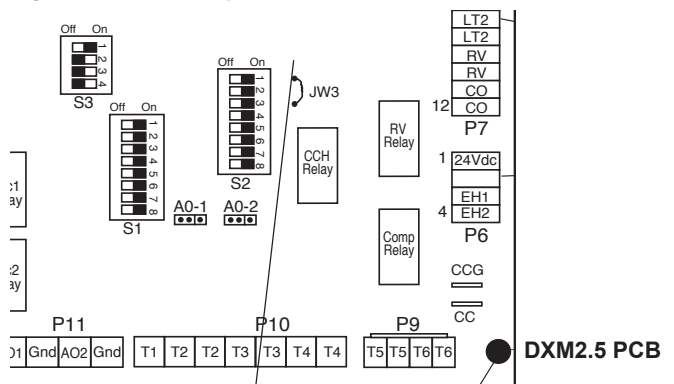
Low Temperature Protection

**Chart 1c: Ethanol Specific Gravity**



Low Temperature Protection

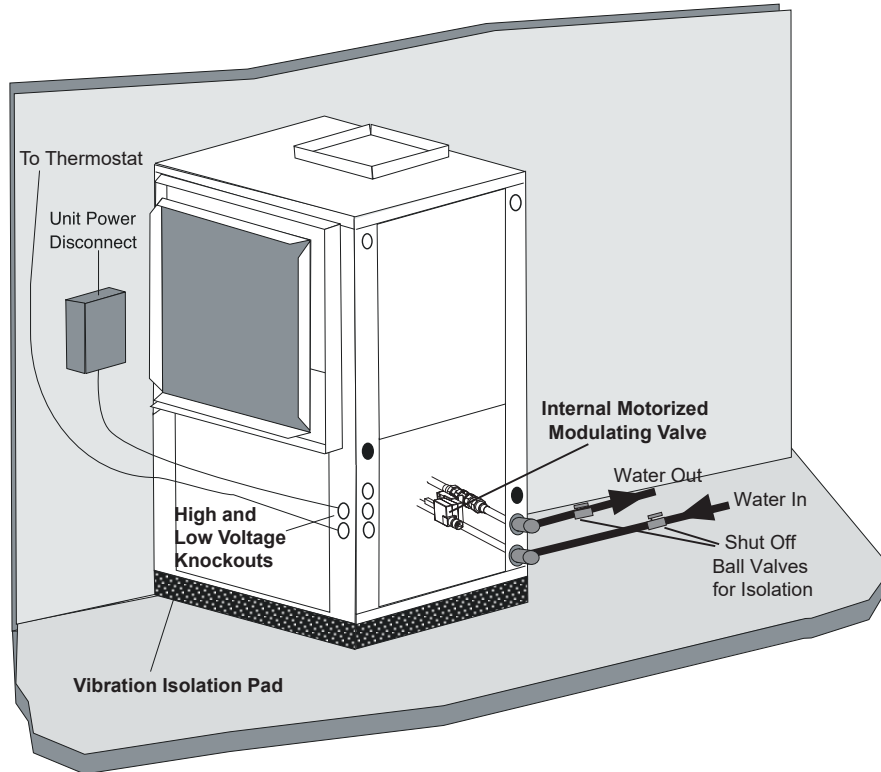
**Figure 19: Low Temperature Cutout Selection**



**JW3-LT1 jumper should be clipped for low temperature operation. Do not clip JW3-LT1 in open-loop applications**

## Closed Loop – External Central Pumping Applications

Figure 20: Typical Closed Loop with Central Pumping Application (with Internal Modulating Motorized Valve Shown)



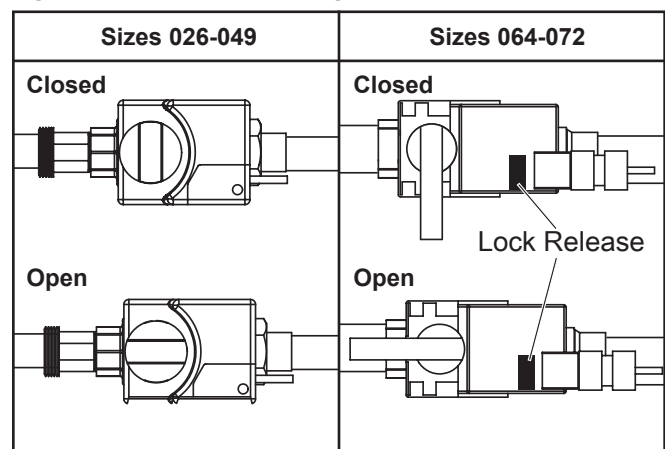
Tranquility® Digital packaged units are available with a modulating water valve option for closed-loop applications with external central pumping (designated by a 5 in the 11th position of the unit model number). With this option, the Modulating Valve is regulated by the Communicating DXM2.5 board based on entering and leaving water temperature ( $\Delta T$ ). The DXM2.5 board outputs a 0-10v signal to determine valve position (flow rate). The modulating valve defaults to closed position if it loses signal but still has 24V power running to it. If the motorized modulating valve loses both signal from the DXM2.5 board AND 24V power, it will remain in the same position it was in when it lost 24V power.

**NOTE: The Cv (flow coefficient) of the valve used in these units is DIFFERENT that the Cv of the valve used in the open loop unit. It is not advisable for use in open loop applications as sound/noise issues may result. Units with the water circuit for closed loop, central pumping option are only available with a copper water coil.**

To manually open the internal modulating motorized water valve in TE026–049 push down on the handle to unlock it. Then rotate the handle to the open position as shown in Figure 21. This fully opens the valve for flushing. Once flushing is complete, return the valve handle to its normally closed position.

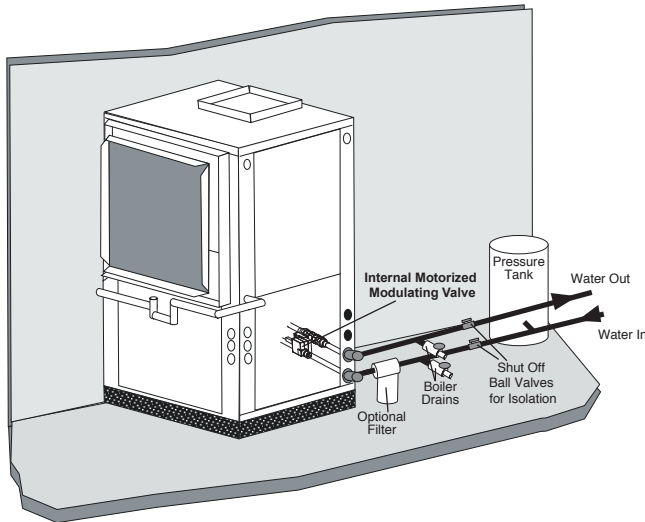
To manually open the internal modulating motorized water valve in TE064–072, push down on the lock release button while turning the handle to the open position as shown in Figure 21. This fully opens the valve for flushing. Once flushing is complete, press the lock release again and return the valve handle to its normally closed position.

Figure 21: Internal Modulating Motorized Valve Positions



# Open Loop or Ground-Water Heat Pump Applications

Figure 22: Typical Open Loop/Well Application



**CAUTION!** Refrigerant pressure activated water regulating valves should never be used with this equipment.

Tranquility® Packaged Units are available with a water circuit option for open loop applications (designated by a 6 in the 11th position of the unit model number).

The Motorized Modulating Valve is regulated by the Communicating DXM2.5 board based on entering and leaving water temperature ( $\Delta T$ ). The DXM2.5 board gives a 0-10v signal to determine flow rate. The motorized modulating valve defaults to closed position if it loses signal but still has 24V power running to it. If the motorized modulating valve loses both signal from the DXM2.5 board AND 24V power, it will remain in the same position it was in when it lost 24V power. **DO NOT USE** open loop units in closed loop applications due to significant pressure drop through the open loop motorized modulating valve. This option is only available with Cupro-Nickel Water Coil.

To manually open the internal modulating motorized water valve in TE026 – 049 push down on the handle to unlock it. Then rotate the handle to the open position as shown in Figure 21. This fully opens the valve for flushing. Once flushing is complete, return the valve handle to its normally closed position.

To manually open the internal modulating motorized water valve in TE064–072, push down on the lock release button while turning the handle to the open position as shown in Figure 21. This fully opens the valve for flushing. Once flushing is complete, press the lock release again and return the valve handle to its normally closed position.

## OPEN LOOP – GROUND WATER SYSTEMS

Typical open loop piping is shown in Figure 22. Shut off valves should be included for ease of servicing. Boiler drains or other valves should be “tee’d” into the lines to allow acid flushing of the heat exchanger. Shut off valves should be positioned to allow flow through the coax via the boiler drains without allowing flow into the piping system. Schrader ports built into unit may be used to measure heat exchanger pressure drop. Water temperature can be viewed on the communicating thermostat. Supply and return water piping should be limited to copper, HPDE, or other acceptable high temperature material. Note that PVC or CPVC material is not recommended as they are not compatible with the polyolester oil used in HFC-410A products.

Water quantity should be plentiful and of good quality. Consult Table 5 for water quality requirements. vFlow® units for open loop applications always come with Cupro-Nickel coils. In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, an open loop system is not recommended. Heat exchanger coils may over time lose heat exchange capabilities due to build up of mineral deposits. Heat exchangers must only be serviced by a qualified technician, as acid and special pumping equipment is required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional acid flushing. In some cases, the desuperheater option should not be recommended due to hard water conditions and additional maintenance required.

## WATER QUALITY REQUIREMENTS

Table 5 should be consulted for water quality requirements. Scaling potential should be assessed using the pH/Calcium hardness method. If the pH < 7.5 and the Calcium hardness is less than 100 ppm, scaling potential is low. If this method yields numbers out of range of those listed, a monitoring plan should be implemented in these probable scaling situations. Other water quality issues such as iron fouling, corrosion prevention and erosion and clogging should be referenced in Table 5.



## Open Loop or Ground-Water Heat Pump Applications, Cont'd.

### **PRESSURE TANK AND PUMP**

Use a closed, bladder-type pressure tank to minimize mineral formation due to air exposure. The pressure tank should be sized to provide at least one minute continuous run time of the pump using its drawdown capacity rating to prevent pump short cycling. Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local building codes (e.g. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

The pump should be sized to handle the home's domestic water load (typically 5-9 gpm [23-41 l/m]) plus the flow rate required for the heat pump. Pump sizing and expansion tank must be chosen as complimentary items. For example, an expansion tank that is too small can cause premature pump failure due to short cycling. Variable speed pumping applications should be considered for the inherent energy savings and smaller pressure tank requirements.

### **WATER COIL LOW TEMPERATURE LIMIT SETTING**

For all open loop systems the 30°F [-1.1°C] LT1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See "Low Water Temperature Cutout Selection" (Figure 19) in this manual for details on the low limit setting.

# Water Quality Requirements

**Table 5: Water Quality Requirements**

Clean water is essential to the performance and life span of water source heat pumps. Contaminants, chemicals, and minerals all have the potential to cause damage to the water heat exchanger if not treated properly. All closed water loop systems should undergo water quality testing and be maintained to the water quality requirements listed in this table.

WATER QUALITY REQUIREMENTS							
For Closed-Loop and Open-Loop Systems							
	Description	Symbol	Units	Heat Exchanger Type			
				Closed Loop Recirculating	Open Loop, Tower, Ground Source Well		
					All Heat Exchanger Types	COAXIAL HX Copper Tube in Tube	COAXIAL HX Cupronickel
Scaling Potential	pH - Chilled Water <85°F			7.0 to 9.0	7.0 to 9.0	7.0 to 9.0	7.0 to 9.0
	pH - Heated Water >85°F			8.0 to 10.0	8.0 to 10.0	8.0 to 10.0	8.0 to 10.0
	Alkalinity	(HCO <sub>3</sub> <sup>-</sup> )	ppm - CaCO <sub>3</sub> equiv.	50 to 500	50 to 500	50 to 500	50 to 500
	Calcium	(Ca)	ppm	<100	<100	<100	<100
	Magnesium	(Mg)	ppm	<100	<100	<100	<100
	Total Hardness	(CaCO <sub>3</sub> )	ppm - CaCO <sub>3</sub> equiv.	30 to 150	150 to 450	150 to 450	150 to 450
	Langelier Saturation Index	LSI		-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5
Ryznar Stability Index	RSI		6.5 to 8.0	6.5 to 8.0	6.5 to 8.0	6.5 to 8.0	
Corrosion Prevention	Total Dissolved Solids	(TDS)	ppm - CaCO <sub>3</sub> equiv.	<1000	<1000	<1000	<1500
	Sulfate	(SO <sub>4</sub> <sup>2-</sup> )	ppm	<200	<200	<200	<200
	Nitrate	(NO <sub>3</sub> <sup>-</sup> )	ppm	<100	<100	<100	<100
	Chlorine (free)	(Cl)	ppm	<0.5	<0.5	<0.5	<0.5
	Chloride (water < 80°F)	(Cl <sup>-</sup> )	ppm	<20	<20	<150	<150
	Chloride (water > 120°F)	(Cl <sup>-</sup> )	ppm	<20	<20	<125	<125
	Hydrogen Sulfide <sup>a</sup>	(H <sub>2</sub> S)	ppb	<0.5	<0.5	<0.5	<0.5
	Carbon Dioxide	(CO <sub>2</sub> )	ppm	0	<50	10 to 50	10 to 50
	Iron Oxide	(Fe)	ppm	<1.0	<1.0	<1.0	<0.2
	Manganese	(Mn)	ppm	< 0.4	<0.4	<0.4	<0.4
	Ammonia	(NH <sub>3</sub> )	ppm	<0.05	<0.1	<0.1	<0.1
	Chloramine	(NH <sub>2</sub> CL)	ppm	0	0	0	0
	Fouling & Biological	Iron Bacteria		cells/mL	0	0	0
Slime Forming Bacteria			cells/mL	0	0	0	0
Sulfate reducing bacteria			cells/mL	0	0	0	0
Suspended Solids <sup>b</sup>		(TSS)	ppm	<10	<10	<10	<10
Electrolysis All HX types	Earth Ground Resistance <sup>x</sup>		Ohms	0	Consult NEC & local electrical codes for grounding requirements		
	Electrolysis Voltage <sup>5</sup>		mV	<300	Measure voltage internal water loop to HP ground		
	Leakage Current <sup>5</sup>		mA	<15	Measure current in water loop pipe		
	Building Primary Electrical Ground to unit, must meet local diameter and penetration length requirements Do not connect heat pump to steel pipe unless dissimilar materials are separated by using Di-electric unions. Galvanic corrosion of heat pump water pipe will occur.						

## Water Quality Requirements, Cont'd.

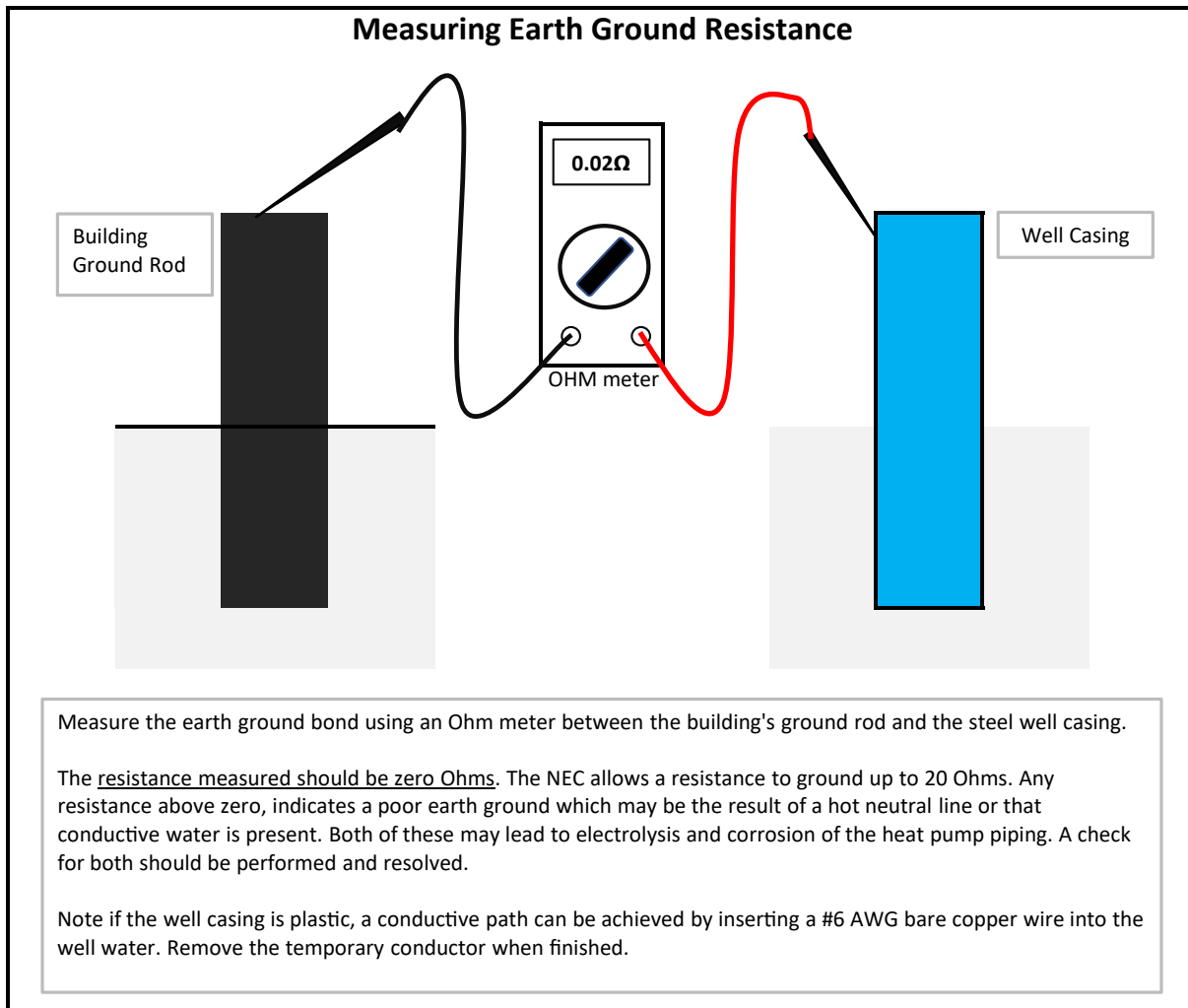
1. The ClimateMaster Water Quality Table provides water quality requirements for coaxial & brazed plate heat exchangers.
  2. The water must be evaluated by an independent testing facility comparing site samples against this Table. When water properties are outside of these parameters, the water must either be treated by a professional water treatment specialist to bring the water quality within the boundaries of this specification, or an external secondary heat exchanger must be used to isolate the heat pump water system from the unsuitable water. Failure to do so will void the warranty of the heat pump system and will limit liability for damage caused by leaks or system failure.
  3. Regular sampling, testing and treatment of the water is necessary to assure that the water quality remains within acceptable levels thereby allowing the heat pump to operate at optimum levels.
  4. If closed-loop systems are turned off for extended periods, water samples must be tested prior to operating the system.
  5. For optimal performance, it is recommended that the closed-loop piping systems are initially filled with de-ionized water.
  6. Well water with chemistry outside of these boundaries, and salt water or brackish water requires an external secondary heat exchanger. Surface/Pond water should not be used.
  7. If water temperature is expected to fall below 40°F, antifreeze is required. Refer to the heat pump IOM for the correct solution ratios to prevent freezing.
- α Hydrogen Sulfide has an odor of rotten eggs. If one detects this smell, a test for H<sub>2</sub>S must be performed. If H<sub>2</sub>S is detected above the limit indicated, remediation is necessary (Consult with your Water Testing/Treatment Professional) or a secondary heat exchanger is required using appropriate materials as recommended by the heat exchanger supplier.
  - β Suspended solids and particulates must be filtered to prevent fouling and failure of heat exchangers. Strainers or particulate filters must be installed to provide a maximum particle size of 600 micron (0.60 mm, 0.023 in.) using a 20 to 30 mesh screen size. When a loop is installed in areas with fine material such as sand or clay, further filtration is required to a maximum of 100 micron. Refer to the Strainer / Filter Sizing Chart to capture the particle sizes encountered on the site.
  - χ An electrical grounding system using a dedicated ground rod meeting NEC and Local Electrical codes must be installed. Building Ground must not be connected the WSHP piping system or other plumbing pipes.
  - δ Refer to IOM for instructions on measuring resistance and leakage currents within water loops.

**Do not use PVC pipe for water loop (compressor POE oil and glycols damage PVC) use of HDPE pipe is recommended.**

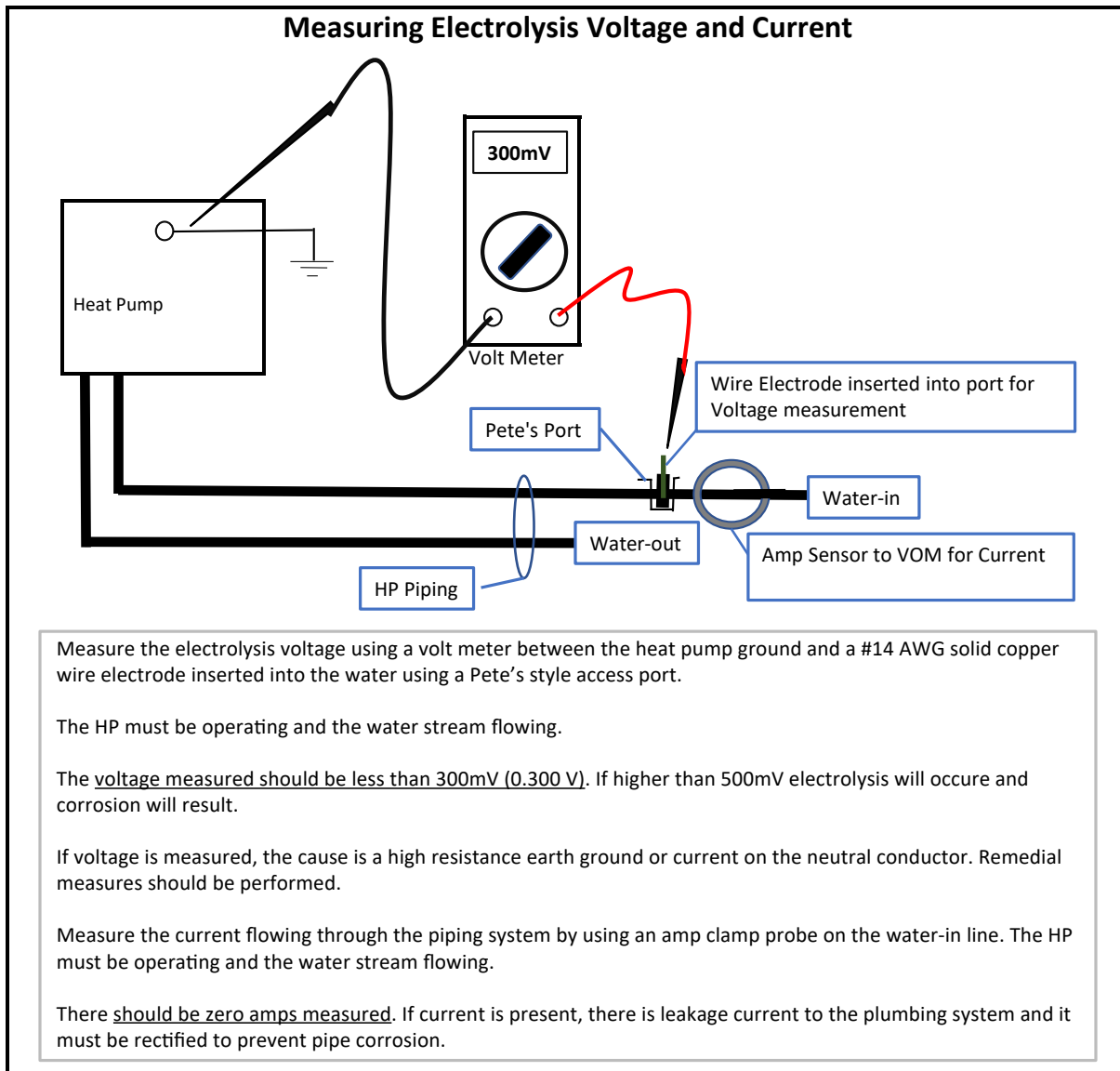
Strainer / Filter Sizing			
Mesh Size	Particle Size		
	Microns	MM	Inch
20	840	0.840	0.0340
30	533	0.533	0.0210
60	250	0.250	0.0100
100	149	0.149	0.0060
150	100	0.100	0.0040
200	74	0.074	0.0029

ppm = parts per million  
ppb = parts per billion

## Water Quality Requirements, Cont'd.



## Water Quality Requirements, Cont'd.



# Hot Water Generator

The HWG (Hot Water Generator) or desuperheater option provides considerable operating cost savings by utilizing heat energy from the compressor discharge line to help satisfy domestic hot water requirements. The HWG is active throughout the year, providing virtually free hot water when the heat pump operates in the cooling mode or hot water at the COP of the heat pump during operation in the heating mode. Actual HWG water heating capacities are provided in the appropriate heat pump performance data.

Heat pumps equipped with the HWG option include a built-in water to refrigerant heat exchanger that eliminates the need to tie into the heat pump refrigerant circuit in the field. The control circuit and pump are also built in for residential equipment. Figure 23 shows a typical example of HWG water piping connections on a unit with built-in circulating pump. This piping layout prevents sludge/debris from the bottom of the tank being pulled into the HWG pump.

The temperature set point of the HWG is field selectable to 125°F or 150°F. The 150°F setpoint allows more heat storage from the HWG. For example, consider the amount of heat that can be stored by the HWG when using the 125°F set point, versus the amount of heat that can be generated by the HWG when using the 150°F set point.

In a typical 50 gallon two-element electric water heater the lower element should be turned down to 100°F, or the lowest setting, to get the most from the HWG. The tank will eventually stratify so that the lower 80% of the tank, or 40 gallons, becomes 100°F (controlled by the lower element). The upper 20% of the tank, or 10 gallons, will be maintained at 125°F (controlled by the upper element).

Using a 125°F set point, the HWG can heat the lower 40 gallons of water from 100°F to 125°F, providing up to 8,330 btu's of heat. Using the 150°F set point, the HWG can heat the same 40 gallons of water from 100°F to 150°F and the remaining 10 gallons of water from 125°F to 150°F, providing a total of up to 18,743 btu's of heat, or more than twice as much heat as when using the 125°F set point.

Electric water heaters are recommended. If a gas, propane, or oil water heater is used, a second preheat tank must be installed (Figure 24). If the electric water heater has only a single center element, the dual tank system is recommended to insure a usable entering water temperature for the HWG.

Typically a single tank of at least 50 gallons (189 liters) is used to limit installation costs and space. However, a dual tank, as shown in Figure 24, is the preferred system, as it provides the maximum storage and temperate source water to the HWG.

It is always advisable to use water softening equipment on domestic water systems to reduce the scaling potential and lengthen equipment life. In extreme water conditions, it may be necessary to avoid the use of the HWG option since the potential cost of frequent maintenance may offset or exceed any savings. Consult Table 5 for scaling potential tests.

**⚠ WARNING! ⚠**

**WARNING!** A 150°F setpoint may lead to scalding or burns. The 150°F setpoint must only be used on systems that employ an approved anti-scald valve.

Figure 23: Typical HWG Installation

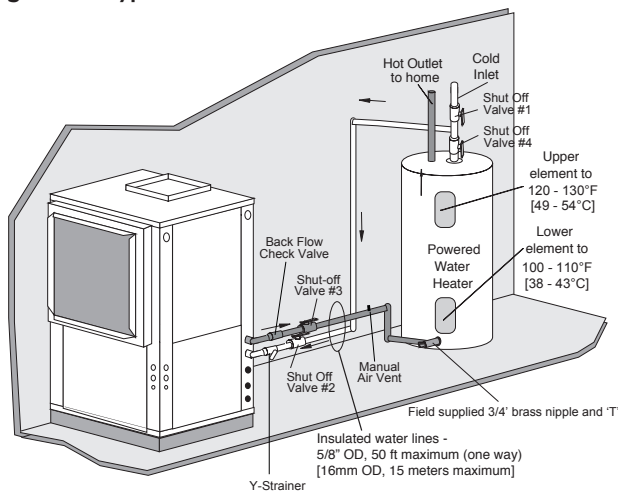
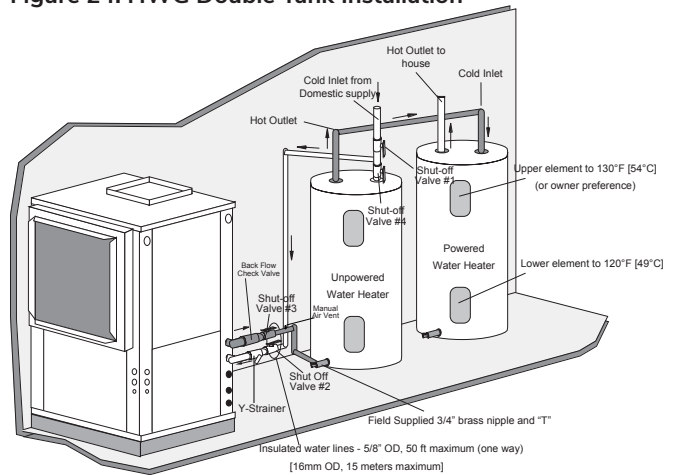


Figure 24: HWG Double Tank Installation



## Hot Water Generator, Cont'd.

### INSTALLATION

The HWG is controlled by two sensors and the DXM2.5 microprocessor control. One sensor is located on the compressor discharge line to sense the discharge refrigerant temperature. The other sensor is located on the HWG heat exchanger's "Water In" line to sense the potable water temperature.

### ⚠ WARNING! ⚠

**WARNING!** Under no circumstances should the sensors be disconnected or removed. Full load conditions can drive hot water tank temperatures far above safe temperature levels if sensors are disconnected or removed.

The DXM2.5 microprocessor control monitors the refrigerant and water temperatures to determine when to operate the HWG. The HWG will operate any time the refrigerant temperature is sufficiently above the water temperature. Once the HWG has satisfied the water heating demand during a heat pump run cycle, the controller will cycle the pump at regular intervals to determine if an additional HWG cycle can be utilized.

When the control is powered and the HWG pump output is active for water temperature sampling or HWG operation, the DXM2.5 status LED will slowly flash (On 1 second, Off 1 second).

If the control has detected a HWG fault, the DXM2.5 status LED will flash a numeric fault code as follows:

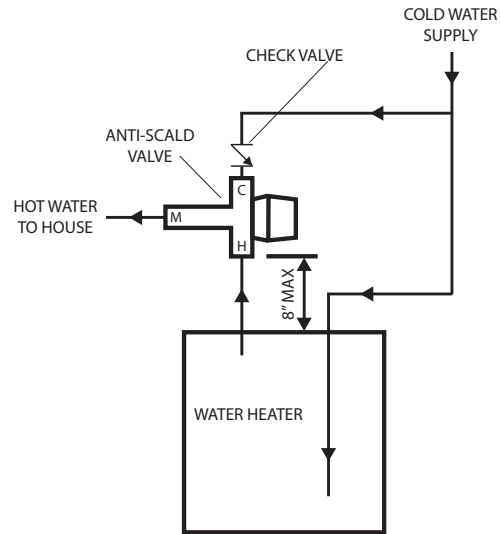
High Water Temperature (> 160°F)	5 flashes
Hot Water Sensor Fault	6 flashes
Compressor Discharge Sensor Fault	6 flashes

Fault code flashes have a duration of 0.3 seconds with a 10 second pause between fault codes. For example, a "Compressor Discharge sensor fault" will be six flashes 0.3 seconds long, then a 10 second pause, then six flashes again, etc.

### ⚠ WARNING! ⚠

**WARNING!** Using 150°F setpoint on the HWG will result in water temperatures sufficient to cause severe physical injury in the form of scalding or burns, even when the hot water tank temperature setting is visibly set below 150°F. The 150°F HWG setpoint must only be used on systems that employ an approved anti-scald valve (part number (AVAS4) at the hot water storage tank with such valve properly set to control water temperatures distributed to all hot water outlets at a temperature level that prevents scalding or burns.

Figure 25: Anti-Scald Valve Piping Connections



Hot Water Generator settings are determined by DIP switches 3-2, 3-3, and 3-4.

DIP 3-2 controls the HWG Test Mode. It provides for forced operation of the HWG output, activating the HWG pump for up to five minutes.

ON = HWG test mode, OFF = normal HWG operation.

The control will revert to standard operation after five minutes regardless of switch position.

DIP 3-3 determines HWG set point temperature. It provides for selection of the HWG operating set point.

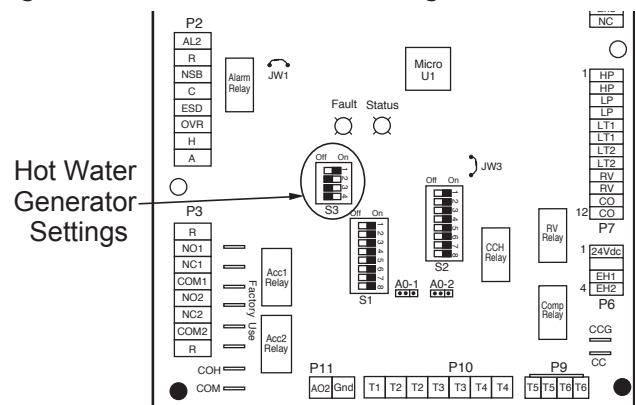
ON = 150°F (66°C), OFF = 125°F (52°C).

DIP 3-4 is for the HWG status. It provides HWG operation control.

ON = HWG mode enabled, OFF = HWG mode disabled.

Units are shipped from the factory with this switch in the OFF position.

Figure 26: Hot Water Generator Settings



## Hot Water Generator, Cont'd.

### **WARNING!**

**WARNING!** The HWG pump is fully wired from the factory. Use extreme caution when working around the microprocessor control as it contains line voltage connections that presents a shock hazard that can cause severe injury or death!

The heat pump, water piping, pump, and hot water tank should be located where the ambient temperature does not fall below 50°F [10°C]. Keep water piping lengths at a minimum. DO NOT use a one way length greater than 50 ft. (one way) [15 m]. See Table 6 for recommended piping sizes and maximum lengths.

All installations must be in accordance with local codes. The installer is responsible for knowing the local requirements, and for performing the installation accordingly. DO NOT activate the HWG (turn DIP 3-4 to the ON position) until "Initial Start-Up" section, below is completed. Powering the pump before all installation steps are completed will damage the pump.

#### WATER TANK PREPARATION

1. Turn off power or fuel supply to the hot water tank.
2. Connect a hose to the drain valve on the water tank.
3. Shut off the cold water supply to the water tank.
4. Open the drain valve and open the pressure relief valve or a hot water faucet to drain tank.
5. When using an existing tank, it should be flushed with cold water after it is drained until the water leaving the drain hose is clear and free of sediment.
6. Close all valves and remove the drain hose.
7. Install HWG water piping.

#### HWG WATER PIPING

1. Using at least 1/2 inches [12.7 mm] I.D. copper, route and install the water piping and valves as shown in Figures 21 or 22. Install an approved anti-scald valve if the 150°F HWG setpoint is or will be selected. An appropriate method must be employed to purge air from the HWG piping. This may be accomplished by flushing water through the HWG (as in Figures 21 and 22) or by installing an air vent at the high point of the HWG piping system.
2. Insulate all HWG water piping with no less than 3/8 inches [10 mm] wall closed cell insulation.
3. Open both shut off valves and make sure the tank drain valve is closed.

#### WATER TANK REFILL

1. Close valve #4. Ensure that the HWG valves (valves #2 and #3) are open. Open the cold water supply (valve #1) to fill the tank through the HWG piping. This will force water flow through the HWG and purge air from the HWG piping.
2. Open a hot water faucet to vent air from the system until water flows from faucet; turn off faucet. Open valve #4.

3. Depress the hot water tank pressure relief valve handle to ensure that there is no air remaining in the tank.
4. Inspect all work for leaks.
5. Before restoring power or fuel supply to the water heater, adjust the temperature setting on the tank thermostat(s) to insure maximum utilization of the heat available from the refrigeration system and conserve the most energy. On tanks with both upper and lower elements and thermostats, the lower element should be turned down to 100°F [38°C] or the lowest setting; the upper element should be adjusted to 120-130°F [49-54°C]. Depending upon the specific needs of the customer, you may want to adjust the upper element differently. On tanks with a single thermostat, a preheat tank should be used (Fig 21).
6. Replace access cover(s) and restore power or fuel supply.

#### INITIAL START-UP

1. Make sure all valves in the HWG water circuit are fully open.
2. Turn on the heat pump and allow it to run for 10-15 minutes.
3. Set S3-4 to the "ON" position (enabled) to engage the HWG. See Figure 26.
4. The HWG pump should not run if the compressor is not running.
5. The temperature difference between the water entering and leaving the HWG coil should be approximately 5-10°F [3-6°C].
6. Allow the unit to operate for 20 to 30 minutes to insure that it is functioning properly.

Table 6: HWG Water Piping Sizes and Length

Unit Nominal Tonnage	Nominal HWG Flow (gpm)	1/2" Copper (max length*)	3/4" Copper (max length*)
2.0	0.8	50	-
2.5	1.0	50	-
3.0	1.2	50	-
3.5	1.4	50	-
4.0	1.6	45	50
5.0	2.0	25	50
6.0	2.4	10	50

\*Maximum length is equivalent length (in feet) one way of type L copper.

### **CAUTION!**

**CAUTION!** Use only copper piping for HWG piping due to the potential of high water temperatures for water that has been in the HWG heat exchanger during periods of no-flow conditions (HWG pump not energized). Piping other than copper may rupture due to high water temperature and potable water pressure. CPVC, PEX, or other plastic pipe should not be used HWG piping.



## Electrical – Line Voltage

### ⚠ WARNING! ⚠

**WARNING!** To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

### ⚠ CAUTION! ⚠

**CAUTION!** Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

**Table 7a: Tranquility® 30 (TE) Series Electrical Data**

Model	Compressor			HWG Pump FLA	External Loop Pump FLA	Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max/ Fuse HACR
	RLA	LRA	Qty						
026	11.7	58.3	1	0.5	4.0	3.9	20.1	23.0	30
038	15.3	83.0	1	0.5	4.0	3.9	23.7	27.5	40
049	21.2	104.0	1	0.5	4.0	6.9	32.6	37.9	50
064	27.1	152.9	1	0.5	4.0	6.9	38.5	45.2	70
072	29.7	179.2	1	0.5	4.0	6.9	41.1	48.5	70

Rated Voltage of 208/230/60/1

Min/Max Voltage of 197/254  
All fuses Class RK-5

**Table 7b: Tranquility® 30 (TE) Series Electrical Data with High Head Internal Flow Controller**

Model	Compressor			HWG Pump FLA	Loop Pump FLA	Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max/ Fuse HACR
	RLA	LRA	Qty						
026	11.7	58.3	1	0.5	1.44	3.9	17.5	20.4	30
038	15.3	83.0	1	0.5	1.44	3.9	21.1	24.9	40
049	21.2	104.0	1	0.5	1.44	6.9	30.0	35.3	50
064	27.1	152.9	1	0.5	1.44	6.9	35.9	42.7	70
072	29.7	179.2	1	0.5	1.44	6.9	38.5	45.9	70

Rated Voltage of 208/230/60/1

Min/Max Voltage of 197/254  
All fuses Class RK-5

**Table 7c: Tranquility® 30 (TE) Series Electrical Data with Standard Head Internal Flow Controller**

Model	Compressor			HWG Pump FLA	Loop Pump FLA	Fan Motor FLA	Total Unit FLA	Min Circuit Amps	Max/ Fuse HACR
	RLA	LRA	Qty						
026	11.7	58.3	1	0.5	0.7	3.9	16.8	19.7	30
038	15.3	83.0	1	0.5	0.7	3.9	20.4	24.2	35

Rated Voltage of 208/230/60/1

Min/Max Voltage of 197/254  
All fuses Class RK-5

### ⚠ WARNING! ⚠

**WARNING!** Disconnect electrical power source to prevent injury or death from electrical shock.

### ⚠ CAUTION! ⚠

**CAUTION!** Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

### ELECTRICAL – LINE VOLTAGE

All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor.

All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

### GENERAL LINE VOLTAGE WIRING

Be sure the available power is the same voltage and phase shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

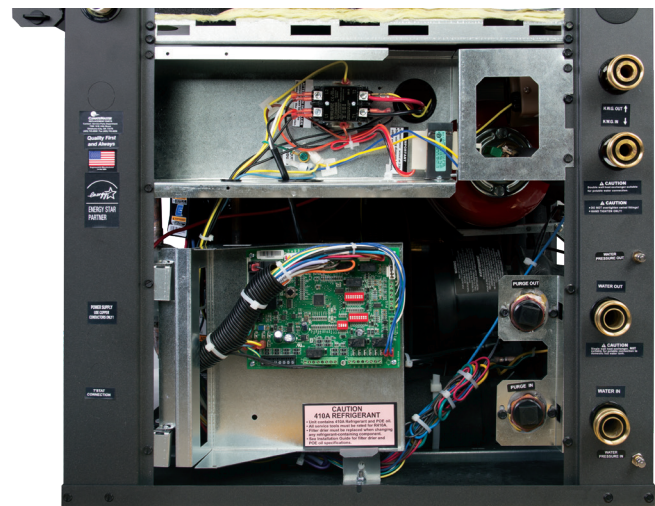
### POWER CONNECTION

Line voltage connection is made by connecting the incoming line voltage wires to the “L” side of the contactor as shown in Figure 27. Consult Tables 7a through 7c for correct fuse size. **NOTE: always refer to the unit data plate for unit electrical data.**

### 208 VOLT OPERATION

All residential 208/230 Volt units are factory wired for 230 Volt operation. The transformer may be switched to the 208V tap as illustrated on the wiring diagram by switching the red (208V) and the orange (230V) wires at the contactor terminal.

**Figure 27: Tranquility Single Phase Line Voltage Field Wiring**



### Unit Power Supply

(see electrical tables 7a - 7c for minimum circuit amps and maximum breaker size)

## Electrical – Low Voltage Wiring

Figure 28: Tranquility Low Voltage Field Wiring

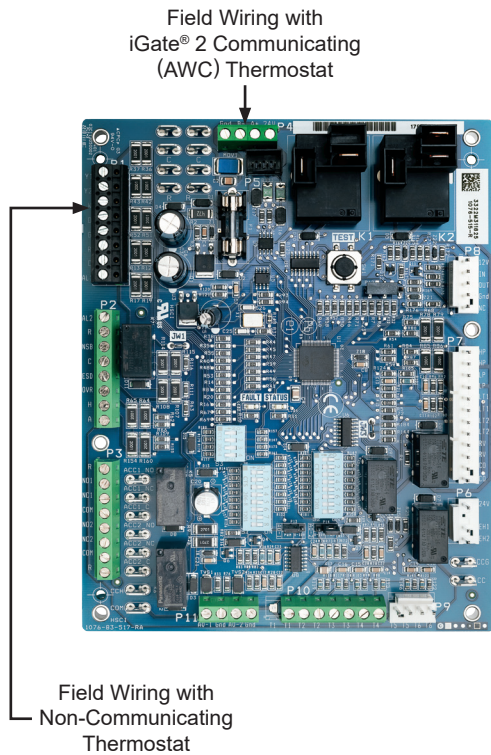
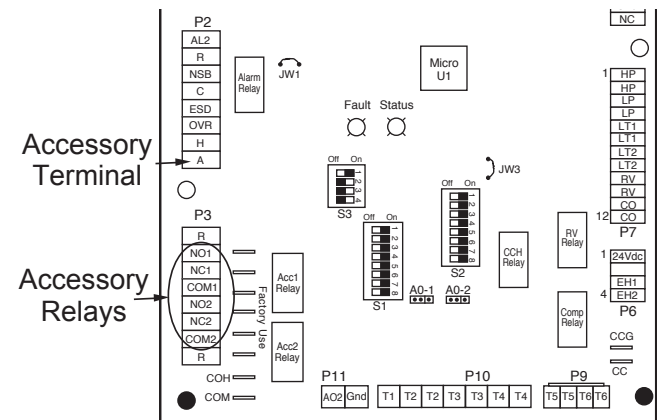


Table 9: Accessory Relay 2 Configuration

DIP 2.4	DIP 2.5	DIP 2.6	ACC2 Relay Option
ON	ON	ON	Cycle with compressor
OFF	ON	ON	N/A for Residential Applications
ON	OFF	ON	Water valve – Slow opening
OFF	OFF	ON	Humidifier
ON	ON	OFF	Outside air damper

All other DIP combinations are invalid

Figure 29: Accessory Connections



### ACCESSORY CONNECTIONS

A terminal paralleling the compressor contactor coil has been provided on the DXM2.5 control. Terminal “A” is designed to control accessory devices. **NOTE: This terminal should be used only with 24 Volt signals and not line voltage.** Terminal “A” is energized with the compressor contactor (see Figure 29).

The DXM2.5 controller includes two accessory relays ACC1 and ACC2. Each relay includes a normally open (NO) and a normally closed (NC) contact. Accessory relays may be configured to operate as shown in Tables 8 and 9.

Table 8: Accessory Relay 1 Configuration

DIP 2.1	DIP 2.2	DIP 2.3	ACC1 Relay Option
ON	ON	ON	Cycle with fan
OFF	ON	ON	N/A for Residential Applications
ON	OFF	ON	Water valve – Slow opening
ON	ON	OFF	Outside air damper
OFF	ON	OFF	ClimaDry® II option – Dehumidistat
OFF	OFF	OFF	ClimaDry® II option – Humidistat
OFF	OFF	ON	N/A for Residential Applications
ON	OFF	OFF	N/A for Residential Applications

All other DIP combinations are invalid

## Electrical – Thermostat Wiring

### THERMOSTAT INSTALLATION

The thermostat should be located on an interior wall in a larger room, away from supply duct drafts. DO NOT locate the thermostat in areas subject to sunlight, drafts or on external walls. The wire access hole behind the thermostat may in certain cases need to be sealed to prevent erroneous temperature measurement due to air infiltration through the wall cavity. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate. Mark the position of the back plate mounting holes and drill holes with a 3/16" (5 mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG or larger wire. Wire the appropriate thermostat as shown in Figures 28a and 28b to the low voltage terminal strip on the DXM2.5 control board. Practically any heat pump thermostat will work with these units, provided it has the correct number of heating and cooling stages. However, using the iGate® 2 Communicating (AWC) Thermostat is highly recommended for on-site, easier configuration, monitoring and diagnosis.

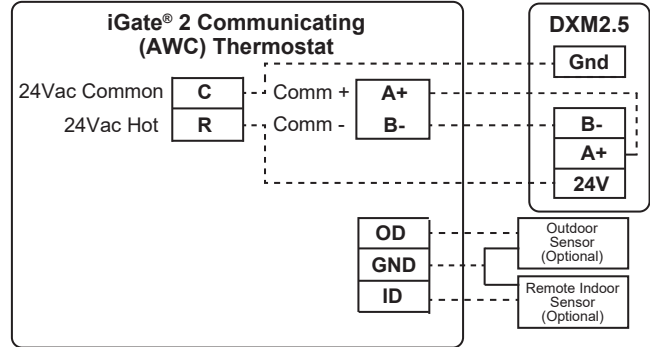
**⚠ CAUTION! ⚠**

**CAUTION!** Refrigerant pressure activated water regulating valves should never be used with ClimateMaster equipment.

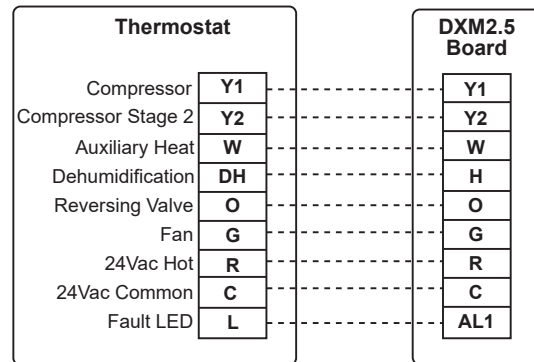
**⚠ CAUTION! ⚠**

**CAUTION!** If communicating thermostat is not installed, a communicating service tool must be used to configure and diagnose this system.

**Figure 30a: iGate® 2 Communicating (AWC) Thermostat Connection to DXM2.5 Control**

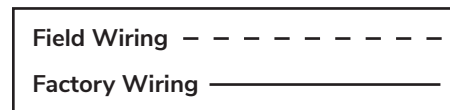


**Figure 30b: Conventional 3 Heat / 2 Cool Thermostat Connection to DXM2.5 Control**

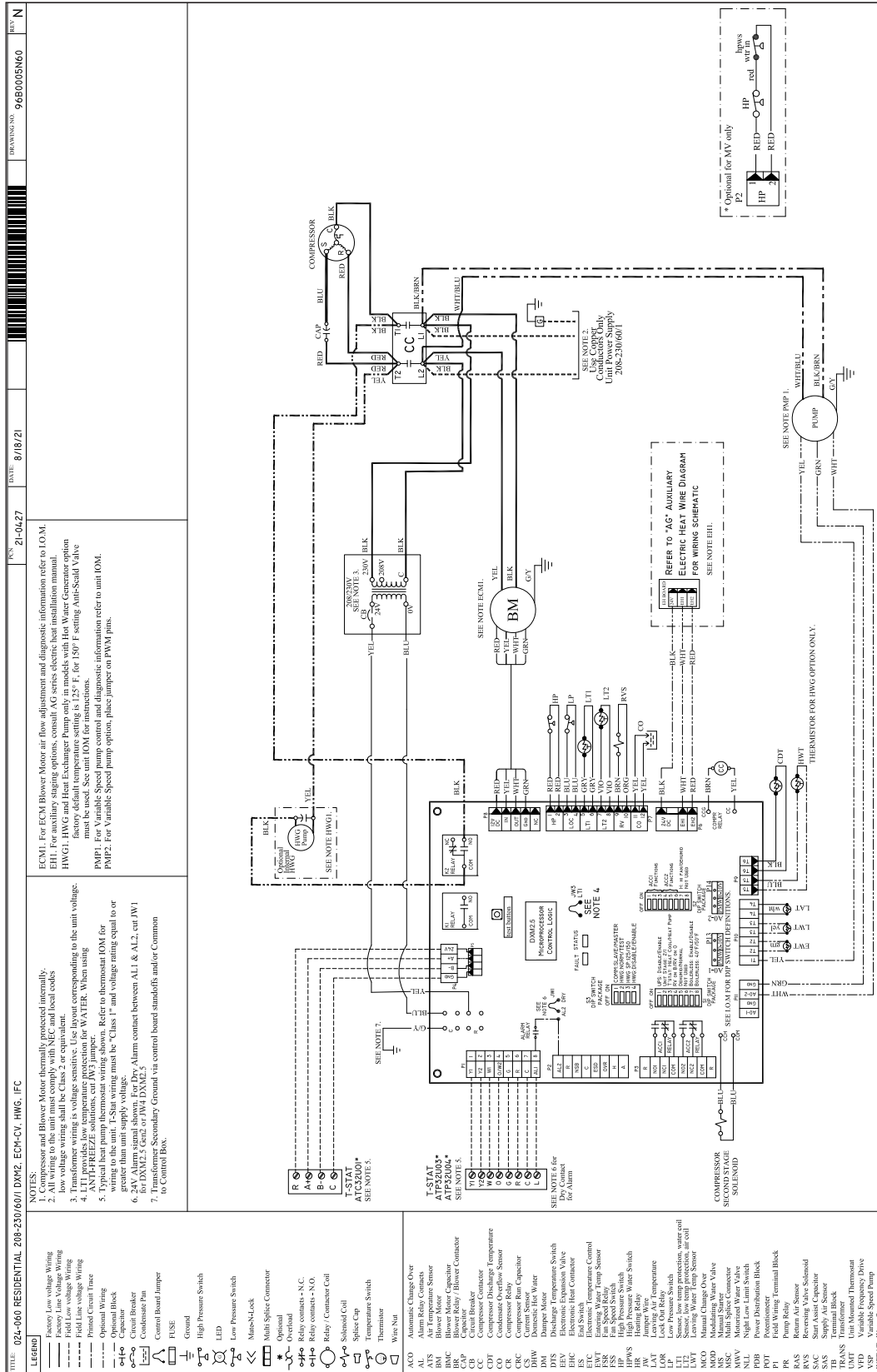


**NOTES:**

- 1) ECM automatic dehumidification mode operates with dehumidification airflows in the cooling mode when the dehumidification output from thermostat is active. Normal heating and cooling airflows are not affected.
- 2) DXM2.5 board DIP switch S2-7 must be in the auto dehumidification mode for automatic dehumidification.
- 3) DH connection not possible with units with internal variable speed pump. Use iGate® 2 Communicating (AWC) Thermostat.
- 4) Only use iGate® 2 Communicating (AWC) Thermostat when using Humidifier (H Input) in units with internal variable speed pump.

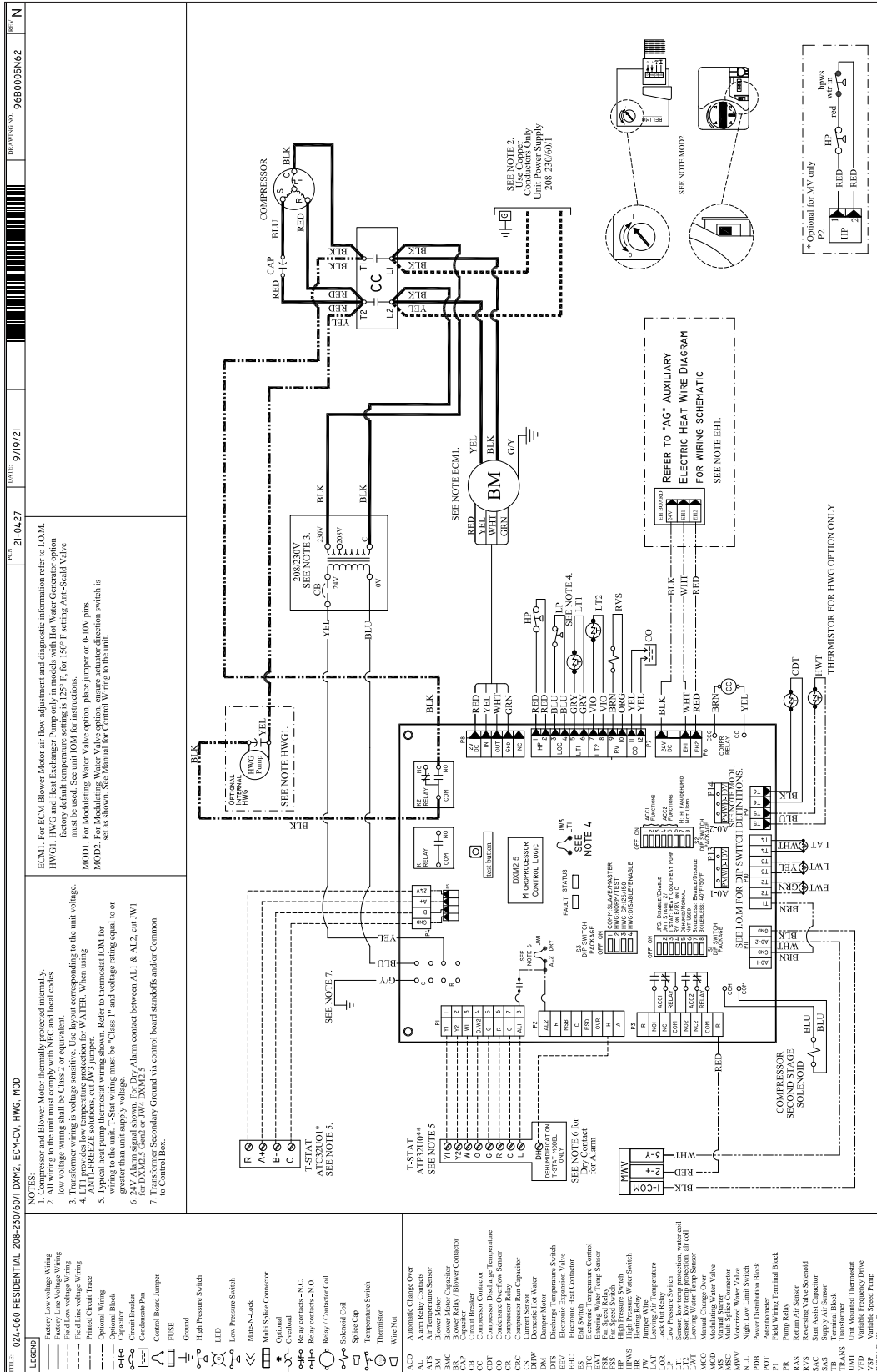


# DXM2.5 Wiring Diagram w/Internal Flow Controller – 96B0005N60



This diagram includes typical wiring details but is not applicable to all units.  
For specific unit wiring, refer to the diagram or the units' control panel.

# DXM2.5 Wiring Diagram w/Motorized Modulating Water Valve – 96B0005N62



This diagram includes typical wiring details but is not applicable to all units.  
For specific unit wiring, refer to the diagram or the units' control panel.



## Constant Volume (CV) ECM

**The Intelligent Constant Volume (CV) ECM blower motor** provides unmatched functionality that saves installing and service technicians time while also providing increased comfort levels to occupants.

CV ECM's are programed to maintain a constant CFM across a wide range of external static pressures (ESP). This functionality differs from traditional PSC or even Constant Torque (CT) ECM's. With traditional PSC and CT ECM fan motors, as ESP is increased CFM is reduced. To increase or decrease the speed of the fan motor requires a fan motor switch or a technician to wire into a different motor tap. CT ECM's provide increased efficiency over PSC motors but with no additional functionality. With a CV ECM, as changes in ESP occur the fan motor will adjust its speed to deliver the desired CFM (within its operating range). This ensures the system is delivering the airflow and capacity it was designed for.

A major benefit of the CV ECM over other fan motor types is its ability to adjust airflow remotely through the iGate® 2 web portal/mobile app or directly at the unit with a communicating diagnostic service tool or thermostat. Airflow levels can be adjusted in increments of 25 CFM from the units minimum and maximum CFM range (see CV ECM configuration table for details). This functionality allows technicians to dial in airflow during start-up and commissioning via an easy to use service tool. During operation occupants may have a desire for airflow adjustments. Reducing CFM can reduce airflow sound levels and increase cooling dehumidification (latent capacity). Technicians can easily make these adjustments without making wiring changes reducing service time with minimal disruption to the occupants.

The fan motor operating modes include:

- First Stage Cooling (Y1 & O)
- Second Stage Cooling (Y1, Y2, & O)
- First Stage Heating (Y1)
- Second Stage Heating (Y1 & Y2)
- Fan (G with no Y1, Y2, or W)

The CV ECM motor includes “soft start” and “ramp down” features. The soft start feature gently increases the motors rpm at blower start up resulting quieter blower start cycles. Likewise, the ramp down feature allows the blower to slowly decrease rpm to a full stop resulting in a quieter end to each blower cycle. The ramp down feature (also known as the heating or cooling “Off Delay”) also has the functionality to be field selected by the technician in the allowable range of 0 to 255 seconds.



**Airflow Configuration Screen on Mobile App**

## Blower Performance Data

**Table 10: Tranquility® 30 (TE) Series CV ECM Blower Performance Data Table**

Airflow in CFM with wet coil and clean air filter

Model	Max ESP (in wg)	Fan Motor (hp)	Range	Cooling Mode		Dehumid Mode		Heating Mode		Fan Only Mode
				Stg 2	Stg 1	Stg 2	Stg 1	Stg 2	Stg 1	
026	1.0	1/2	Default	700	525	550	425	750	600	350
			Maximum	1000	800	800	600	1000	850	1000
			Minimum	600	450	550	400	600	450	300
038	0.9	1/2	Default	1050	800	850	650	1100	850	550
			Maximum	1500	1100	1200	900	1500	1100	1500
			Minimum	900	600	825	550	900	600	450
049	1.0	1	Default	1400	1050	1100	850	1500	1150	700
			Maximum	2000	1500	1600	1200	2000	1500	2000
			Minimum	1200	900	1100	825	1200	900	600
064	0.7	1	Default	1750	1300	1400	1050	1875	1450	875
			Maximum	2300	1900	2000	1500	2300	1900	2300
			Minimum	1500	1100	1375	1000	1500	1100	750
072	0.7	1	Default	1900	1450	1650	1250	2000	1650	950
			Maximum	2300	2200	2000	1800	2300	2200	2300
			Minimum	1800	1350	1650	1250	1800	1350	900

Airflow is controlled within +/- 5% up to Max ESP shown with wet coil and standard 1" fiberglass filter. ClimaDry® II equipped units are factory set to operate in stage 2 airflow.

### Tranquility 30 Digital (TE) Series with ClimaDry® II

All Tranquility 30 Digital (TE) units have an ECM fan motor. The small amount of additional pressure drop of the ClimaDry II coil causes the ECM motor to slightly increase RPM to overcome the added pressure drop and maintain selected CFM up to the maximum ESP.

Unit minimum operating temperature when in the dehumidification or cooling mode is 65°F DB. Operation below this minimum may result in nuisance faults.



## Controls – DXM2.5



### **DXM2.5 CONTROLS**

For detailed control information, see the DXM2.5 Application, Operation, and Maintenance (AOM) manual (part # 97B0142N01).

## ClimaDry® II Modulating Reheat Option

### CLIMADRY® II SEQUENCE OF OPERATION

A heat pump equipped with ClimaDry® II can operate in three modes, cooling, cooling with reheat, and heating. The cooling/heating modes are like any other ClimateMaster WSHP. The reversing valve ("O" signal) is energized in cooling, along with the compressor contactor(s) and blower relay. In the heating mode the reversing valve is de-energized. Almost any thermostat will activate the heat pump in heating or cooling modes. The DXM2.5 microprocessor board, will accept either heat pump (Y ,O) thermostats or non-heat pump (Y, W) thermostats.

The reheat mode requires either a separate humidistat/dehumidistat or a thermostat that has an integrated dehumidification function for activation. The DXM2.5 board is configured to work with either a humidistat or dehumidistat input to terminal "H" (DIP switch settings for the DXM2.5 board are shown in Table 11). Upon receiving an "H" input, the DXM2.5 board will activate the cooling mode and engage reheat. Table 11 shows the relationship between thermostat input signals and unit operation.

There are four operational inputs for single stage units and six operational inputs for dual stage units:

- Fan Only
- 1st Stage Cooling
- 2nd Stage Cooling
- 1st Stage Heating
- 2nd Stage Heating
- Reheat Mode

**Fan Only:** A (G) call from the thermostat to the (G terminal of the DXM2.5 control board will bring the unit on in fan only mode.

**1st Stage Cooling:** A simultaneous call from (G), (Y1), and (O) to the (G), (Y1), (O/W2) terminals of the DXM2.5 control board will bring the unit on in 1st Stage Cooling.

**2nd Stage Cooling:** A simultaneous call from (G), (Y1), (Y2), and (O) to the (G), (Y1), (Y2), and (O/W2) terminals of the DXM2.5 control board will bring the unit on in 2nd Stage Cooling. When the call is satisfied at the thermostat the unit will continue to run in 1st Stage Cooling until the 1st Stage Cooling call is removed or satisfied, shutting down the unit.

**1st Stage Heating:** A simultaneous call from (G) and (Y1) to the (G) and (Y1) terminals of the DXM2.5 control board will bring the unit on in 1st Stage Heating.

**2nd Stage Heating:** A simultaneous call from (G), (Y1), and (Y2) to the (G), (Y1), and (Y2) terminals of the DXM2.5 control board will bring the unit on in 2nd Stage Heating. When the call is satisfied at the thermostat the unit will continue to run in 1st Stage Heating until the call is removed or satisfied, shutting down the unit.

**Reheat Mode:** A call from the Humidistat/Dehumidistat to the (H) terminal of the DXM2.5 control board will bring the unit on in Reheat Mode if there is no call for cooling at the thermostat. When the Humidistat Dehumidification call is removed or satisfied the unit will shut down. Note: Cooling always overrides Reheat Mode. In the Cooling mode, the unit cools and dehumidifies. If the cooling thermostat is satisfied but there is still a call for dehumidification, the unit will continue to operate in Reheat Mode.

### CLIMADRY® II COMPONENT FUNCTIONS

The ClimaDry II option consists of the following components:

- Proportional Controller
- Supply Air Sensor
- Motorized Valve
- Loop Pump
- Hydronic Coil

The Proportional Controller operates on 24 VAC power supply and automatically adjusts the water valve based upon the Supply Air Sensor. The Supply Air Sensor senses supply air temperature at the blower inlet providing the input signal necessary for the proportional control to drive the motorized valve during the reheat mode of operation. The Motorized Valve is a proportional actuator/three-way valve combination used to divert the condenser water from the coax to the hydronic reheat coil during the reheat mode of operation. The proportional controller sends a signal to the motorized valve based on the supply air temperature of the supply air sensor.

## ClimaDry® II Modulating Reheat Option, Cont'd.

The Loop Pump circulates condenser water through the hydronic reheat coil during the reheat mode of operation. In this application, the loop pump is only energized during the reheat mode of operation. The Hydronic Coil is utilized during the reheat mode of operation to reheat the air to the setpoint of the proportional controller. Condenser water is diverted by the motorized valve and pumped through the hydronic coil by the loop pump in proportion to the control setpoint. The amount of reheating is dependent on the setpoint and how far from setpoint the supply air temperature is. The factory setpoint is 70–75°F [21–24°C], generally considered “neutral” air.

### ClimaDry® II Application Considerations

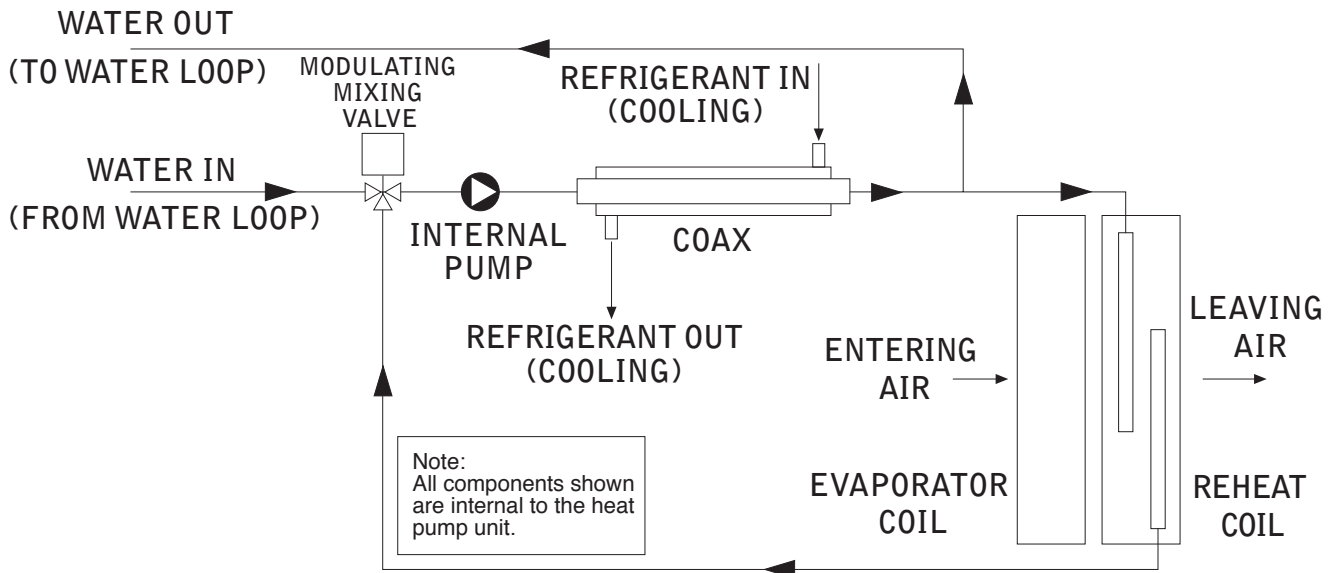
Unlike most hot gas reheat options, the ClimaDry® II option will operate over a wide range of EWTs. Special flow regulation (water regulating valve) is not required for low EWT conditions. However, below 55°F [13°C], supply air temperatures may not be maintained at 72°F [22°C] because the cooling capacity exceeds the reheat coil capacity at low water temperatures. Below 55°F [13°C], essentially all

water is diverted to the reheat coil (no heat of rejection to the building loop). Although the ClimaDry II option will work fine with low EWTs, over cooling of the space may result with well water systems or on rare occasions with ground loop (geothermal) systems (**NOTE: Extended range units are required for well water and ground loop systems**). Since dehumidification is generally only required in cooling, most ground loop systems will not experience over cooling of the supply air temperature. If over cooling of the space is a concern (e.g. computer room well water application), auxiliary heating may be required to maintain space temperature when the unit is operating in the dehumidification mode.

Unit minimum entering air temperature while in the dehumidification or cooling, mode is **65°F DB**. Operation below this minimum may result in nuisance faults.

Water-Source Heat Pumps with ClimaDry II should not be used as make-up air units. These applications should use equipment specifically designed for makeup air.

### ClimaDry® II Schematic



## ClimaDry® II Modulating Reheat Option, Cont'd.

**Table 11a: Humidistat/Dehumidistat Logic & DXM2.5 (2.1, 2.2., 2.3) DIP Settings**

Sensor	2.1	2.2	2.3	Logic	Reheat (ON) - H	Reheat (OFF) - H
Humidistat	OFF	OFF	OFF	Reverse	0 VAC	24 VAC
Dehumidistat	OFF	ON	OFF	Standard	24 VAC	0 VAC

**Table 11b: ClimaDry® II Operating Modes**

Mode	Input					Output				
	O	G	Y1	Y2 <sup>3</sup>	H	O	G	Y1	Y2 <sup>3</sup>	Reheat
No Demand	ON/OFF	OFF	OFF	OFF	OFF	ON/OFF	OFF	OFF	OFF	OFF
Fan Only	ON/OFF	ON	OFF	OFF	OFF	ON/OFF	ON	OFF	OFF	OFF
Cooling 1st Stage	ON	ON	ON	OFF	OFF	ON	ON	ON	OFF	OFF
Cooling 2nd Stage	ON	ON	ON	ON	OFF	ON	ON	ON	ON	OFF
Cooling & Dehumidistat <sup>1</sup>	ON	ON	ON	ON/OFF	ON	ON	ON	ON	ON/OFF	OFF
Dehumidistat Only	ON/OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON
Heating 1st Stage	OFF	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
Heating 2nd Stage	OFF	ON	ON	ON	OFF	OFF	ON	ON	ON	OFF
Heating & Dehumidistat <sup>2</sup>	OFF	ON	ON	ON/OFF	ON	OFF	ON	ON	ON/OFF	OFF

<sup>1</sup>Cooling input takes priority over dehumidify input.

<sup>2</sup>DXM2.5 is programmed to ignore the H demand when the unit is in heating mode.

<sup>3</sup>N/A for single stage units; Full load operation for dual capacity units.

<sup>4</sup>ON/OFF = Either ON or OFF.

## Operating & Commissioning Limits

### OPERATING LIMITS

**Environment** – Units are designed for indoor installation only. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air).

**Power Supply** – Voltage utilization shall comply with unit data plate.

Determination of operating limits is dependent primarily upon three factors: 1) return air temperature. 2) water temperature, and 3) ambient temperature. When any one of these factors is at minimum or maximum levels, the other two factors should be at normal levels to insure proper unit operation. Extreme variations in temperature and humidity and/or corrosive water or air will adversely affect unit performance, reliability, and service life. Consult Table 12a for operating limits.

Table 12a: Operating Limits

Operating Limits	Unit	
	Cooling	Heating
<b>Air Limits</b>		
Min. Ambient Air, DB	45°F [7°C]	39°F [4°C]
Rated Ambient Air, DB	80.6°F [27°C]	68°F [20°C]
Max. Ambient Air, DB	130°F [54°C]	85°F [29°C]
Min. Entering Air, DB/WB	65/45°F [18/7°C]	50°F [10°C]
Rated Entering Air, DB/WB	80.6/66.2°F [27/19°C]	68°F [20°C]
Max. Entering Air, DB/WB	100/75°F [38/24°C]	80°F [27°C]
<b>Water Limits</b>		
Min. Entering Water	20°F [-6.7°C]	20°F [-6.7°C]
Normal Entering Water	50-110°F [10-43°C]	30-70°F [-1 to 21°C]
Max. Entering Water	120°F [49°C]	120°F [49°C]
<b>Normal Water Flow</b>	1.5 to 3.0 gpm/ton [1.6 to 3.2 l/m per kW]	

### COMMISSIONING LIMITS

Consult Table 12b for commissioning limits. Starting limits vary depending upon model and are based upon the following notes:

#### NOTES:

- Conditions in Table 12b are not normal or continuous operating limits. Minimum/maximum limits are start-up conditions to bring the building space up to occupancy temperatures. Units are not designed to operate under these limits on a regular basis.
- Voltage utilization complies with AHRI Standard 110.

Table 12b: Commissioning Limits

Commissioning Limits	Unit	
	Cooling	Heating
<b>Air Limits</b>		
Min. Ambient Air, DB	45°F [7°C]	39°F [4°C]
Rated Ambient Air, DB	80.6°F [27°C]	68°F [20°C]
Max. Ambient Air, DB	130°F [54°C]	85°F [29°C]
Min. Entering Air, DB/WB	60/45°F [16/7°C]	40°F [4.5°C]
Rated Entering Air, DB/WB	80.6/66.2°F [27/19°C]	68°F [20°C]
Max. Entering Air, DB/WB	110/83°F [43/28°C]	80°F [27°C]
<b>Water Limits</b>		
Min. Entering Water	20°F [-6.7°C]	20°F [-6.7°C]
Normal Entering Water	50-110°F [10-43°C]	30-70°F [-1 to 21°C]
Max. Entering Water	120°F [49°C]	120°F [49°C]
<b>Normal Water Flow</b>	1.5 to 3.0 gpm/ton [1.6 to 3.2 l/m per kW]	

## Unit & System Checkout



**CAUTION!** Verify that ALL water valves are open and allow water flow prior to engaging the compressor. Freezing of the coax or water lines can permanently damage the heat pump.



**CAUTION!** To avoid equipment damage, DO NOT leave system filled in a building without heat during the winter unless antifreeze is added to the water loop. Heat exchangers never fully drain by themselves and will freeze unless winterized with antifreeze.

### Unit and System Checkout

BEFORE POWERING SYSTEM, please check the following:

#### UNIT CHECKOUT

- Shutoff valves:** Insure that all isolation valves are open.
- Line voltage and wiring:** Verify that voltage is within an acceptable range for the unit and wiring and fuses/breakers are properly sized. Verify that low voltage wiring is complete.
- Unit control transformer:** Insure that transformer has the properly selected voltage tap. Residential 208-230V units are factory wired for 230V operation unless specified otherwise.
- Loop/water piping is complete and purged of air. Water piping is clean.
- Antifreeze has been added if necessary.
- Entering water and air:** Insure that entering water and air temperatures are within operating limits of Tables 12a and 12b.
- Low water temperature cutout:** Verify that low water temperature cut-out on the DXM2.5 control is properly set.
- Unit fan:** Manually rotate fan to verify free rotation and insure that blower wheel is secured to the motor shaft. Be sure to remove any shipping supports if needed. DO NOT oil motors upon start-up. Fan motors are pre-oiled at the factory. Check unit fan CFM selection and compare to design requirements.
- Condensate line:** Verify that condensate trap is installed and pitched.
- HWG is switched off at SW 3-4 unless piping is completed and air has been purged from the system.
- Unit air coil and filters:** Insure that filter is clean and accessible. Clean air coil of all manufacturing oils.
- Unit controls:** Verify that DXM2.5 field selection options are properly set. Low voltage wiring is complete.
- Blower CFM and Water  $\Omega$ T is set on communicating thermostats or diagnostic tool.
- Service/access panels are in place.

#### SYSTEM CHECKOUT

- System water temperature:** Check water temperature for proper range and also verify heating and cooling set points for proper operation.
- System pH:** Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes system longevity (see Table 5).
- System flushing:** Verify that all air is purged from the system. Air in the system can cause poor operation or system corrosion. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Some antifreeze solutions may require distilled water.
- Internal Flow Controller:** Verify that it is purged of air and in operating condition.
- System controls:** Verify that system controls function and operate in the proper sequence.
- Low water temperature cutout:** Verify that low water temperature cut-out controls are set properly (LT1 - JW3).
- Miscellaneous:** Note any questionable aspects of the installation.

# Unit Start-Up Procedure

## UNIT START-UP PROCEDURE

1. Turn the thermostat fan position to "ON." Blower should start.
2. Turn Blower off.
3. Ensure all valves are adjusted to their full open position. Ensure line power to the heat pump is on.
4. Room temperature should be within the minimum-maximum ranges of listed in the unit IOM. During start-up checks, loop water temperature entering the heat pump should be between 30°F [-1°C] and 95°F [35°C].
5. It is recommended that water-to-air units be first started in the cooling mode, when possible. This will allow liquid refrigerant to flow through the filter-drier before entering the TXV, allowing the filter-drier to catch any debris that might be in the system before it reaches the TXV.
6. Two factors determine the operating limits of geothermal heat pumps, (a) return air temperature, and (b) entering water temperature. When either of the factors is at a minimum or maximum level, the other factor must be at normal levels to insure proper unit operation.
  - a. Place the unit in Manual Operation. When in manual mode activate Y1,Y2, and O to initiate the cooling mode. Also manually increase CFM until desired cooling CFM is achieved. Next adjust pump speed % until desired loop temperature difference (leaving water temperature minus entering water temperature) is achieved. (For modulating valve adjust valve %).

MANUAL OPERATING MODE			
Y1	COMM	OUTPUT	OFF
Y2	COMM	OUTPUT	OFF
W	COMM	OUTPUT	OFF
O	COMM	OUTPUT	OFF
G	COMM	OUTPUT	OFF
H	COMM	OUTPUT	OFF
DH	COMM	OUTPUT	OFF
ECM	AIRFLOW		0
PUMP	SPEED		0%
TEST	MODE		OFF
SELECT OPTION ▲ ▼			
◀ PREVIOUS		SELECT ▶	

- b. Check for cool air delivery at the unit grille within a few minutes after the unit has begun to operate.

**NOTE: Units have a five minute time delay in the control circuit that can be bypassed on the DXM2.5 control board by placing the unit in the "Test" mode as shown in the unit IOM. Check for normal air temperature drop of 15°F to 25°F (cooling mode).**

- c. Verify that the compressor is on and that the water temperature rise (cooling mode) is within normal range.

Water Flow, gpm (l/m)	Rise, Cooling °F
<b>For Closed Loop:</b> Ground Source or Closed Loop Systems at 3 gpm per ton (3.9 l/m per kw)	9 - 12
<b>For Open Loop:</b> Ground Water Systems at 1.5 gpm per ton (2.0 l/m per kw)	20 - 26

- d. Check the elevation and cleanliness of the condensate lines. Dripping may be a sign of a blocked line. Check that the condensate trap is filled to provide a water seal.
  - e. Turn thermostat to "OFF" position. A hissing noise indicates proper functioning of the reversing valve.
7. Allow five (5) minutes between tests for pressure to equalize before beginning heating test.
    - a. Go into Manual Mode activate Y1, and Y2 for Heating. Also manually increase CFM until desired heating CFM is achieved. Next adjust pump speed % until desired loop temperature difference (entering water temperature minus leaving water temperature) is achieved. (For modulating valve adjust valve %).
    - b. Check for warm air delivery at the unit grille within a few minutes after the unit has begun to operate.

**NOTE: Units have a five minute time delay in the control circuit that can be bypassed on the DXM2.5 control board by placing the unit in the "Test" mode as shown in the unit IOM. Check for normal air temperature rise of 20°F to 30°F (heating mode).**

INSTALLER SETTINGS
THERMOSTAT CONFIG
SYSTEM CONFIG
ACCESSORY CONFIG
INPUT DEALER INFO
HUMIDITY CONFIG
TEMPERATURE ALGORITHM
DEMAND REDUCTION CNFG
<b>SERVICE MODE</b>
RESTORE DEFAULTS
AWC99U01
SELECT OPTION ▲ ▼
◀ PREVIOUS

SERVICE MODE
<b>MANUAL OPERATION</b>
CONTROL DIAGNOSTICS
DIP SWITCH CONFIG
FAULT HISTORY
CLEAR FAULT HISTORY
SELECT OPTION ▲ ▼
◀ PREVIOUS
SELECT ▶

## Unit Start-Up Procedure, Cont'd.

Water Flow, gpm (l/m)	Drop, Heating °F
<b>For Closed Loop:</b> Ground Source or Closed Loop Systems at 3 gpm per ton (3.9 l/m per kw)	4 - 8
<b>For Open Loop:</b> Ground Water Systems at 1.5 gpm per ton (2.0 l/m per kw)	10 - 17

- c. Verify that the compressor is on and that the water temperature fall (heating mode) is within normal range.
  - d. Check for vibration, noise, and water leaks.
8. If unit fails to operate properly, perform troubleshooting analysis (see troubleshooting section in the unit IOM). If the check described fails to reveal the problem and the unit still does not operate, contact a trained service technician to insure proper diagnosis and repair of the equipment.
  9. When testing is complete, exit the Installer Menu and set thermostat to maintain desired comfort level for normal operation.
  10. BE CERTAIN TO FILL OUT AND RETURN ALL WARRANTY REGISTRATION PAPERWORK.

Unit performance may be verified by calculating the unit heat of rejection and heat of extraction. Heat of Rejection (HR) can be calculated and compared to the performance data pages in this IOM. The formula for HR is as follows:

$$HR = TD \times GPM \times 500 \text{ (or 485 for antifreeze solutions),}$$

where TD is the temperature difference between the entering and leaving water, and GPM is the flow rate in U.S. GPM determined by comparing the unit heat exchanger pressure drop to Table 13.

Heat of Extraction (HE) can also be calculated and compared to the performance data pages in this IOM. The formula for HE is as follows:

$$HE = TD \times GPM \times 500 \text{ (or 485 for antifreeze solutions),}$$

where TD is the temperature difference between the entering and leaving water, and GPM is the flow rate in U.S. GPM determined by comparing the unit heat exchanger pressure drop to Table 13.

If performance during any mode appears abnormal, refer to the DXM2.5 section or troubleshooting section of this manual.

**NOTE: To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended.**

**⚠ WARNING! ⚠**

**WARNING!** When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with energized equipment.



## Unit Operating Conditions

**Table 13: TE Coax Water Pressure Drop**

Model	GPM	Pressure Drop (psi)			
		30°F	50°F	70°F	90°F
026	2.3	0.47	0.41	0.40	0.40
	3.0	0.68	0.60	0.57	0.57
	3.4	0.79	0.70	0.67	0.66
	4.5	1.14	1.01	0.95	0.93
038	6.0	1.75	1.56	1.45	1.40
	3.0	0.91	0.79	0.79	0.82
	4.5	1.52	1.30	1.24	1.24
	6.0	2.21	1.89	1.76	1.72
	6.8	2.62	2.25	2.06	1.99
049	9.0	3.92	3.41	3.13	3.00
	4.5	0.24	0.11	0.10	0.12
	6.0	0.89	0.72	0.66	0.65
	6.8	1.19	1.00	0.93	0.90
064	9.0	2.13	1.87	1.75	1.68
	12.0	3.82	3.48	3.29	3.19
	6.0	0.9	0.2	0.2	0.3
	7.5	1.7	0.9	0.7	0.8
	9.0	2.5	1.5	1.3	1.4
072	11.3	3.7	2.6	2.3	2.3
	12.0	4.1	3.0	2.6	2.6
	15.0	6.1	4.7	4.1	4.0
	7.0	1.4	0.7	0.5	0.7
072	8.5	2.2	1.3	1.1	1.2
	10.5	3.3	2.2	1.9	2.0
	12.8	4.6	3.4	3.0	2.9
	14.0	5.4	4.1	3.6	3.5
	17.0	7.6	6.0	5.4	5.2

**Table 14: ClimaDry® II Option Corrections  
(When Operating in Non-ClimaDry® II Mode)**

Model	Additional WPD		
	GPM	PSI	FT
015	1.8	0.32	0.73
	2.8	0.77	1.77
018	2.3	0.52	1.20
	3.4	1.13	2.62
024	3.0	0.88	2.04
	4.5	1.98	4.58
030	3.8	0.62	1.44
	5.6	1.35	3.12
036	4.5	0.87	2.02
	6.8	1.99	4.60
042	5.3	1.21	2.80
	7.9	2.69	6.21
048	6.0	1.55	3.58
	9.0	3.49	8.06
060	7.5	1.49	3.45
	11.3	3.39	7.82

**Table 15: Water Temperature Change Through Heat Exchanger**

Water Flow, gpm (l/m)	Rise, Cooling °F	Drop, Heating °F
<b>For Closed Loop:</b> Ground Source or Closed Loop Systems at 3 gpm per ton (3.9 l/m per kw)	9 - 12	4 - 8
<b>For Open Loop:</b> Ground Water Systems at 1.5 gpm per ton (2.0 l/m per kw)	18 - 24	10 - 17

# Unit Operating Conditions, Cont'd.

**Table 16: TE Series Typical Unit Operating Pressures and Temperatures**

TE026		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30*	1.5							72-83	273-293	6-11	3-8	5.9-7.9	16-22
	2.25							75-85	275-295	6-11	3-8	4.2-6.2	17-23
	3							78-88	277-297	6-11	3-8	2.7-4.7	18-24
50	1.5	128-138	186-206	18-23	8-13	16.3-18.3	19-25	102-112	302-322	8-12	6-11	8.9-10.9	22-28
	2.25	128-138	172-192	18-23	6-11	12.1-14.1	20-26	106-116	303-323	8-12	6-11	6.7-8.7	23-29
	3	128-138	158-178	18-23	6-11	7.8-9.8	20-26	110-120	305-325	8-12	6-11	4.5-6.5	23-29
70	1.5	136-146	281-301	7-12	7-12	15.7-17.7	19-25	128-138	330-350	10-15	8-13	11.3-13.3	27-34
	2.25	136-146	267-287	7-12	5-10	11.6-13.6	19-25	134-144	332-352	10-15	8-13	8.5-10.5	28-35
	3	136-146	253-273	7-12	4-9	7.6-9.6	19-25	141-151	334-354	10-15	8-13	5.8-7.8	28-35
90	1.5	139-149	368-388	6-11	7-12	14.9-16.9	18-24	162-172	367-387	14-19	10-15	14.4-16.4	33-41
	2.25	139-149	354-374	6-11	5-10	11-13	18-24	166-176	372-392	15-20	10-15	10.8-12.8	34-42
	3	139-149	340-360	6-11	5-10	7.2-9.2	18-24	171-181	377-397	17-22	10-15	7.1-9.1	34-42
110	1.5	143-153	465-485	6-11	7-12	13.9-15.9	17-23						
	2.25	143-153	450-470	6-11	5-10	10.2-12.2	17-23						
	3	143-153	433-453	6-11	5-10	6.5-8.5	17-23						

\*Based on 15% Methanol antifreeze solution

TE038		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30*	1.5							69-79	293-313	7-12	14-19	8.9-10.9	17-23
	2.25							73-83	297-317	7-12	14-19	6.7-8.7	18-24
	3							76-86	300-320	7-12	14-19	4.5-6.5	19-25
50	1.5	129-139	225-245	15-20	10-15	21.9-23.9	18-24	96-106	322-342	10-15	17-22	12.2-14.2	23-29
	2.25	128-138	211-231	15-20	9-14	16.1-18.1	19-25	100-110	326-346	10-15	17-22	9.3-11.3	24-30
	3	128-138	197-217	15-20	9-14	10.3-12.3	19-25	105-115	331-351	10-15	17-22	6.4-8.4	24-30
70	1.5	136-146	302-322	9-14	13-18	21.5-23.5	18-24	123-133	352-372	11-16	19-24	15-17	28-35
	2.25	135-145	283-303	9-14	12-17	15.8-17.8	19-25	129-139	358-378	11-16	19-24	11.6-13.6	29-36
	3	135-145	265-285	9-14	12-17	10-12	19-25	135-145	364-384	11-16	19-24	8.2-10.2	30-37
90	1.5	140-150	390-410	7-12	13-18	20.5-22.5	17-23	157-167	390-410	13-18	18-23	21-23	36-44
	2.25	140-150	369-389	8-13	8-13	14.9-16.9	17-23	169-179	399-419	13-18	16.5-21.5	15.5-17.5	37-45
	3	140-150	349-369	8-13	8-13	9.3-11.3	17-23	181-191	408-428	14-19	15-20	10.5-12.5	39-47
110	1.5	145-155	488-508	7-12	13-18	19-21	17-23						
	2.25	145-155	467-487	8-13	8-13	14-16	17-23						
	3	145-155	447-467	8-13	8-13	9-11	17-23						

\*Based on 15% Methanol antifreeze solution

TE049		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30*	1.5							66-76	286-306	7-12	8-13	8-10	18-24
	2.25							69-79	289-309	7-12	9-14	6-8	19-25
	3							72-82	292-312	7-12	9-14	4-6	19-25
50	1.5	125-135	242-262	13-18	10-15	20.9-22.9	19-25	93-103	314-334	8-13	10-15	11.5-13.5	23-29
	2.25	123-133	224-244	13-18	9-14	15.6-17.6	19-25	98-108	320-340	8-13	10-15	8.7-10.7	24-30
	3	122-132	205-225	14-19	7-12	10.2-12.2	19-25	103-113	326-346	8-13	10-15	5.9-7.9	25-31
70	1.5	133-143	310-330	8-13	8-13	20.5-22.5	19-25	123-133	344-364	9-14	9-14	15-17	28-35
	2.25	132-142	290-310	8-13	7-12	15.2-17.2	19-25	130-140	354-374	9-14	9-14	11.5-13.5	29-36
	3	131-141	270-290	9-14	5-10	9.9-11.9	19-25	137-147	361-381	9-14	9-14	7.9-9.9	30-37
90	1.5	138-148	396-416	7-12	7-12	19.2-21.2	18-24	165-175	390-410	13-18	8-13	19.6-21.6	37-45
	2.25	137-147	374-394	7-12	6-11	14.3-16.3	18-24	175-185	401-421	15-20	8-13	15-17	38-46
	3	136-146	352-372	7-12	4-9	9.3-11.3	18-24	185-195	413-433	17-22	8-13	10.3-12.3	39-47
110	1.5	144-154	497-517	7-12	5-10	18-20	17-23						
	2.25	143-153	472-492	7-12	4-9	13.3-15.3	17-23						
	3	142-152	447-467	7-12	3-8	8.5-10.5	17-23						

\*Based on 15% Methanol antifreeze solution

## Unit Operating Conditions, Cont'd.

**Table 16, Cont'd.: TE Series Typical Unit Operating Pressures and Temperatures**

TE064		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30*	1.5							66-76	282-302	10-16	9-14	8-10	19-25
	2.25							69-79	285-305	10-16	9-14	6-8	19-25
	3							72-82	289-309	10-16	10-15	4-6	20-26
50	1.5	128-138	238-258	16-21	14-19	20.5-22.5	21-27	90-100	310-330	11-17	12-17	11.3-13.3	24-30
	2.25	126-136	222-242	21-26	13-18	14.9-16.9	21-27	95-105	313-333	11-17	12-17	8.5-10.5	25-31
	3	125-135	205-225	26-31	12-17	9.2-11.2	21-27	99-109	316-336	11-17	12-17	5.7-7.7	26-32
70	1.5	135-145	315-335	10-15	14-19	21-23	22-28	115-125	337-357	12-18	14-19	14-16	28-35
	2.25	134-144	296-316	12-17	13-18	15.5-17.5	22-28	120-130	341-361	12-18	14-19	10.6-12.6	29-36
	3	133-143	276-296	15-20	11-16	10-12	22-28	126-136	345-365	12-18	15-20	7.3-9.3	30-37
90	1.5	139-149	408-428	10-15	15-20	20.1-22.1	21-27	157-167	390-410	15-20	14-19	18.2-20.2	37-45
	2.25	138-148	386-406	10-15	13-18	14.8-16.8	21-27	161-171	394-414	15-20	14-19	13.9-15.9	38-46
	3	138-148	364-384	10-15	11-16	9.5-11.5	21-27	166-176	398-418	15-20	15-20	9.6-11.6	39-47
110	1.5	144-154	515-535	8-13	14-19	19-21	20-26						
	2.25	143-153	493-513	8-13	13-18	14-16	20-26						
	3	142-152	469-489	8-13	12-17	9-11	20-26						

\*Based on 15% Methanol antifreeze solution

TE072		Full Load Cooling - without HWG active						Full Load Heating - without HWG active					
Entering Water Temp °F	Water Flow GPM/ton	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30*	1.5							61-71	292-312	11-16	13-18	7.2-9.2	19-25
	2.25							65-75	296-316	11-16	14-19	5.4-7.4	20-26
	3							68-78	300-320	10-15	15-20	3.5-5.5	21-27
50	1.5	131-141	210-230	10-15	12-17	18.5-20.5	22-28	89-99	327-347	10-15	19-24	10.9-12.9	26-32
	2.25	130-140	205-225	11-16	12-17	14-16	23-29	98-108	337-357	10-15	14-19	8.3-10.3	28-34
	3	129-139	200-220	13-18	12-17	9.5-11.5	24-30	106-116	348-368	10-15	9-14	5.7-7.7	30-36
70	1.5	135-145	300-320	10-15	15-20	17.6-19.6	23-29	119-129	365-385	10-15	21-26	14.7-16.7	33-39
	2.25	131-141	295-315	11-16	14-19	13.8-15.8	23-29	132-142	380-400	10-15	16-21	11.3-13.3	36-42
	3	128-138	290-310	13-18	14-19	10-12	23-29	144-154	395-415	10-15	11-16	7.9-9.9	38-44
90	1.5	139-149	390-410	10-15	16-21	16.7-18.7	22-28	162-172	418-438	10-15	19-24	19.4-21.4	43-49
	2.25	137-147	370-390	10-15	14-19	12.6-14.6	22-28	172-182	430-450	10-15	19-24	14.7-16.7	45-51
	3	135-145	350-370	10-15	13-18	8.5-10.5	22-28	182-192	444-464	11-16	19-24	10.1-12.1	47-53
110	1.5	145-155	490-510	10-15	16-21	15.9-17.9	20-27						
	2.25	145-155	470-490	10-15	14-19	11.7-13.7	20-27						
	3	144-154	452-472	9-14	13-18	7.4-9	20-27						

\*Based on 15% Methanol antifreeze solution

**Table 17: Antifreeze Correction**

Antifreeze Type	Antifreeze %	Cooling			WPD Corr. Fct. EWT 40°F
		EWT 40°F			
		Total Cap	Sens Cap	Power	
Propylene Glycol	15	0.968	0.968	0.990	1.210
	25	0.947	0.947	0.983	1.360
Methanol	15	0.968	0.968	0.990	1.160
	25	0.949	0.949	0.984	1.220
Ethanol	15	0.944	0.944	0.983	1.300
	25	0.917	0.917	0.974	1.360
Ethylene Glycol	15	0.980	0.980	0.994	1.120
	25	0.966	0.966	0.990	1.200























## Preventive Maintenance

### WATER COIL MAINTENANCE

*(Direct ground water applications only)*

If the system is installed in an area with a known high mineral content (125 P.P.M. or greater) in the water, it is best to establish a periodic maintenance schedule with the owner so the coil can be checked regularly. Consult the well water applications section of this manual for a more detailed water coil material selection. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. Therefore, 1.5 gpm per ton [2.0 l/m per kW] is recommended as a minimum flow. Minimum flow rate for entering water temperatures below 50°F [10°C] is 2.0 gpm per ton [2.6 l/m per kW].

### WATER COIL MAINTENANCE

*(All other water loop applications)*

Generally water coil maintenance is not needed for closed loop systems. However, if the piping is known to have high dirt or debris content, it is best to establish a periodic maintenance schedule with the owner so the water coil can be checked regularly. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with both the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. However, flow rates over 3 gpm per ton (3.9 l/m per kW) may produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

### HOT WATER GENERATOR COILS

See water coil maintenance for ground water units. If the potable water is hard or not chemically softened, the high temperatures of the desuperheater will tend to scale even quicker than the water coil and may need more frequent inspections. In areas with extremely hard water, a HWG is not recommended.

### FILTERS

Filters must be clean to obtain maximum performance. Filters should be inspected every month under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

Washable, high efficiency, electrostatic filters, when dirty, can exhibit a very high pressure drop for the fan motor and reduce air flow, resulting in poor performance. It is especially important to provide consistent washing of these filters (in the opposite direction of the normal air flow) once per month using a high pressure wash similar to those found at self-serve car washes.

### CONDENSATE DRAIN

In areas where airborne bacteria may produce a “slimy” substance in the drain pan, it may be necessary to treat the drain pan chemically with an algacide approximately every three months to minimize the problem. The condensate pan may also need to be cleaned periodically to insure indoor air quality. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect the drain twice a year to avoid the possibility of plugging and eventual overflow.

### COMPRESSOR

Conduct annual amperage checks to insure that amp draw is no more than 10% greater than indicated on the serial plate data.

### FAN MOTORS

All residential units have permanently lubricated fan motors. Further lubrication is not recommended. Conduct annual amperage check to insure amp draw is no more than 10% greater than indicated on serial data plate.

### AIR COIL

The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Care must be taken not to damage the aluminum fins while cleaning.

**CAUTION: Fin edges are sharp.**

### CABINET

Do not allow water to stay in contact with the cabinet for long periods of time to prevent corrosion of the cabinet sheet metal. Generally, vertical cabinets are set up from the floor a few inches [7 - 8 cm] to prevent water from entering the cabinet. The cabinet can be cleaned using a mild detergent.

### REFRIGERANT SYSTEM

To maintain sealed circuit integrity, do not install service gauges unless unit operation appears abnormal. Reference the operating charts for pressures and temperatures. Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

# Troubleshooting

## GENERAL

If operational difficulties are encountered, perform the preliminary checks below before referring to the troubleshooting charts.

- Verify that the unit is receiving electrical supply power.
- Make sure the fuses in the fused disconnect switches are intact.

After completing the preliminary checks described above, inspect for other obvious problems such as leaking connections, broken or disconnected wires, etc. If everything appears to be in order, but the unit still fails to operate properly, refer to the “DXM2.5 Functional Troubleshooting Flow Chart” or “Functional Troubleshooting Chart.”

## DXM2.5 BOARD

DXM2.5 board troubleshooting in general is best summarized as verifying inputs and outputs. After inputs and outputs have been verified, board operation is confirmed and the problem must be elsewhere. Below are some general guidelines for troubleshooting the DXM2.5 control.

## FIELD INPUTS

Conventional thermostat inputs are 24VAC from the thermostat and can be verified using a voltmeter between C and Y1, Y2, W, O, G. 24VAC will be present at the terminal (for example, between “Y1” and “C”) if the thermostat is sending an input to the DXM2.5 board.

Proper communications with a thermostat can be verified using the Fault LED on the DXM2.5. If the control is NOT in the Test mode and is NOT currently locked out or in a retry delay, the Fault LED on the DXM2.5 will flash very slowly (1 second on, 5 seconds off), if the DXM2.5 is properly communicating with the thermostat.

## SENSOR INPUTS

All sensor inputs are ‘paired wires’ connecting each component to the board. Therefore, continuity on pressure switches, for example can be checked at the board connector. The thermistor resistance should be measured with the connector removed so that only the impedance of the thermistor is measured. If desired, this reading can be compared to the thermistor resistance chart shown in Table 18. An ice bath can be used to check the calibration of the thermistor.

**Table 18: Nominal resistance at various temperatures**

Temp (°C)	Temp (°F)	Resistance (kOhm)	Temp (°C)	Temp (°F)	Resistance (kOhm)
-17.8	0.0	85.34	55	131.0	2.99
-17.5	0.5	84.00	56	132.8	2.88
-16.9	1.5	81.38	57	134.6	2.77
-12	10.4	61.70	58	136.4	2.67
-11	12.2	58.40	59	138.2	2.58
-10	14.0	55.30	60	140.0	2.49
-9	15.8	52.38	61	141.8	2.40
-8	17.6	49.64	62	143.6	2.32
-7	19.4	47.05	63	145.4	2.23
-6	21.2	44.61	64	147.2	2.16
-5	23.0	42.32	65	149.0	2.08
-4	24.8	40.15	66	150.8	2.01
-3	26.6	38.11	67	152.6	1.94
-2	28.4	36.18	68	154.4	1.88
-1	30.2	34.37	69	156.2	1.81
0	32.0	32.65	70	158.0	1.75
1	33.8	31.03	71	159.8	1.69
2	35.6	29.50	72	161.6	1.64
3	37.4	28.05	73	163.4	1.58
4	39.2	26.69	74	165.2	1.53
5	41.0	25.39	75	167.0	1.48
6	42.8	24.17	76	168.8	1.43
7	44.6	23.02	77	170.6	1.39
8	46.4	21.92	78	172.4	1.34
9	48.2	20.88	79	174.2	1.30
10	50.0	19.90	80	176.0	1.26
11	51.8	18.97	81	177.8	1.22
12	53.6	18.09	82	179.6	1.18
13	55.4	17.26	83	181.4	1.14
14	57.2	16.46	84	183.2	1.10
15	59.0	15.71	85	185.0	1.07
16	60.8	15.00	86	186.8	1.04
17	62.6	14.32	87	188.6	1.01
18	64.4	13.68	88	190.4	0.97
19	66.2	13.07	89	192.2	0.94
20	68.0	12.49	90	194.0	0.92
21	69.8	11.94	91	195.8	0.89
22	71.6	11.42	92	197.6	0.86
23	73.4	10.92	93	199.4	0.84
24	75.2	10.45	94	201.2	0.81
25	77.0	10.00	95	203.0	0.79
26	78.8	9.57	96	204.8	0.76
27	80.6	9.16	97	206.6	0.74
28	82.4	8.78	98	208.4	0.72
29	84.2	8.41	99	210.2	0.70
30	86.0	8.06	100	212.0	0.68
31	87.8	7.72	101	213.8	0.66
32	89.6	7.40	102	215.6	0.64
33	91.4	7.10	103	217.4	0.62
34	93.2	6.81	104	219.2	0.60
35	95.0	6.53	105	221.0	0.59
36	96.8	6.27	106	222.8	0.57
37	98.6	6.01	107	224.6	0.55
38	100.4	5.77	108	226.4	0.54
39	102.2	5.54	109	228.2	0.52
40	104.0	5.33	110	230.0	0.51
41	105.8	5.12	111	231.8	0.50
42	107.6	4.92	112	233.6	0.48
43	109.4	4.72	113	235.4	0.47
44	111.2	4.54	114	237.2	0.46
45	113.0	4.37	115	239.0	0.44
46	114.8	4.20	116	240.8	0.43
47	116.6	4.04	117	242.6	0.42
48	118.4	3.89	118	244.4	0.41
49	120.2	3.74	119	246.2	0.40
50	122.0	3.60	120	248.0	0.39
51	123.8	3.47	121	249.8	0.38
52	125.6	3.34	122	251.6	0.37
53	127.4	3.22	123	253.4	0.36
54	129.2	3.10			

## Troubleshooting, Cont'd.

### OUTPUTS

The compressor and reversing valve relays are 24VAC and can be verified using a voltmeter. For units with ECM blower motors, the DXM2.5 controls the motor using serial communications, and troubleshooting should be done with a communicating thermostat or diagnostic tool. The alarm relay can either be 24VAC as shipped or dry contacts for use with DDC controls by clipping the JW1 jumper. Electric heat outputs are 24VDC “ground sinking” and require a voltmeter set for DC to verify operation. The terminal marked “24VDC” is the 24VDC supply to the electric heat board; terminal “EH1” is stage 1 electric heat; terminal “EH2” is stage 2 electric heat. When electric heat is energized (thermostat is sending a “W” input to the DXM2.5 controller), there will be 24VDC between terminal “24VDC” and “EH1” (stage 1 electric heat) and/or “EH2” (stage 2 electric heat). A reading of 0VDC between “24VDC” and “EH1” or “EH2” will indicate that the DXM2.5 board is NOT sending an output signal to the electric heat board.

### TEST MODE

Test mode can be entered for 20 minutes by pressing the Test push button. The DXM2.5 board will automatically exit test mode after 20 minutes.

### ADVANCED DIAGNOSTICS

To properly troubleshoot advanced control features, and to aid in troubleshooting basic control features, a communicating thermostat or diagnostic tool must be used.

### SERVICE MODE

The Service Mode provides the installer with several functions for troubleshooting, including Manual Operation, Control Diagnostics, Control Configuration, and Fault History.

**Manual Operation** – The Manual Operation mode allows the installer to bypass normal thermostat timings and operating modes, to directly activate the thermostat inputs to the DXM2.5, activate the DXM2.5 Test mode, and directly control the ECM blower, internal flow center, and proportional valve.

**Control Diagnostics** – The Control Diagnostics menus allow the installer to see the current status of all DXM2.5 control switch inputs, values of all temperature sensor inputs, control voltage, ECM blower, internal flow center, and proportional valve operating status and parameters.

**DIP Switch Configuration** – The DIP Switch Configuration menus allow the installer to easily see the current DXM2.5 control configuration.

**Fault History** – In addition to the fault code, the DXM2.5 stores the status of all control inputs and outputs when a fault condition is detected. The fault history covering the last five lockout conditions is stored and may be retrieved from the DXM2.5. After a specific fault in the fault history is selected, the operating mode and time when the fault occurred are displayed, with options to select specific control status values when the lockout occurred.

**Fault Temp Conditions** – This option displays the DXM2.5 temperature and voltage values when the lockout occurred.

**Fault Flow Conditions** – This option displays the DXM2.5 ECM blower, pump, and valve operating parameters when the lockout occurred.

**Fault I/O Conditions** – This option displays the status of the DXM2.5 physical and communicated inputs and the relay outputs when the lockout occurred.

**Fault Configuration Conditions** – This option displays the status of the DXM2.5 option selections when the lockout occurred.

**Fault Possible Causes** – This option displays a list of potential causes of the stored fault.

**Clear Fault History** – The Clear Fault History option allows the fault history stored in the non-volatile memory of the DXM2.5 to be cleared.

### DXM2.5 FUNCTIONAL TROUBLESHOOTING FLOW CHART

The “DXM2.5 Functional Troubleshooting Flow Chart” is a quick overview of how to start diagnosing a suspected problem, using the fault recognition features of the DXM2.5 board. The “Functional Troubleshooting Flow Chart” on the following page is a more comprehensive method for identifying a number of malfunctions that may occur, and is not limited to just the DXM2.5 controls. Within the chart are five columns:

- The “Fault” column describes the symptoms.
- Columns 2 and 3 identify in which mode the fault is likely to occur, heating or cooling.
- The “Possible Cause column” identifies the most likely sources of the problem.
- The “Solution” column describes what should be done to correct the problem.

## **WARNING!**

**WARNING! HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.**

Failure to disconnect power before servicing can cause severe personal injury or death.

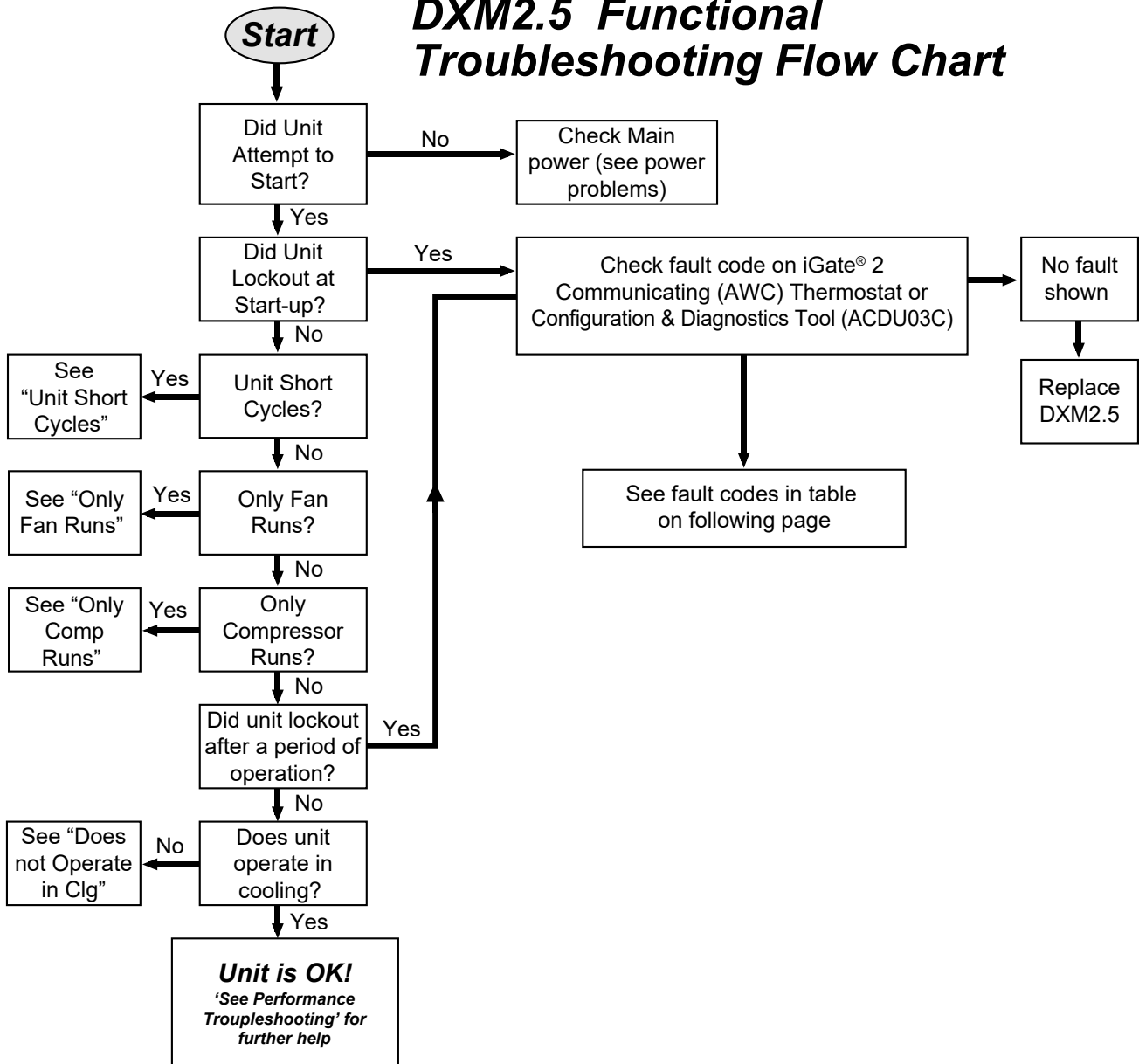


# DXM2.5 Functional Troubleshooting Flow Chart

**⚠ WARNING! ⚠**

**WARNING! HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.**  
Failure to disconnect power before servicing can cause severe personal injury or death.

## DXM2.5 Functional Troubleshooting Flow Chart



# Functional Troubleshooting

Fault	Htg	Clg	Possible Cause	Solution
<b>Main Power Problems</b>	X	X	Green Status LED Off	Check line voltage circuit breaker and disconnect.
				Check for line voltage between L1 and L2 on the contactor.
				Check for 24VAC between R and C on DXM2.5
				Check primary/secondary voltage on transformer.
<b>HP Fault Code 2 High Pressure</b>		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting. Check water flow adjust to proper flow rate.
		X	Water Temperature out of range in cooling	Bring water temp within design parameters.
	X		Reduced or no airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Dirty Air Coil - construction dust etc.
				Too high of external static? Check static vs blower table.
	X		Air temperature out of range in heating	Bring return air temp within design parameters.
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table.
X	X	Bad HP Switch	Check switch continuity and operation. Replace.	
X		Frozen water heat exchanger	Thaw heat exchanger.	
<b>LP/LOC Fault Code 3 Low Pressure / Loss of Charge</b>	X	X	Insufficient charge	Check for refrigerant leaks
	X		Compressor pump down at start-up	Check charge and start-up water flow.
<b>LT1 Fault Code 4 Water Low Temperature</b>	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter? Clean or replace.
				Check water flow. Adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper low temperature setting (30°F vs 10°F)	Clip LT1 jumper for antifreeze (10°F) use.
X		Water temperature out of range	Bring water temp within design parameters.	
<b>LT2 Fault Code 5 Low Air Temperature</b>		X	Reduced or no airflow in cooling	Check for dirty air filter and clean or replace.
		X		Check fan motor operation and airflow restrictions.
		X		Too high of external static? Check static vs blower table.
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
	X	X	Improper low temperature setting (30°F vs 10°F)	Normal airside applications will require 30°F only.
<b>Condensate Fault Code 6 High Condensate Level</b>	X	X	Blocked drain	Check for blockage and clean drain.
	X	X	Improper trap	Check trap dimensions and location ahead of vent.
		X	Poor drainage	Check for piping slope away from unit.
		X		Check slope of unit toward outlet.
		X		Poor venting? Check vent location.
		X	Moisture on sensor	Check for moisture shorting to air coil.
	X	X	Plugged air filter	Replace air filter.
X	X	Restricted return airflow	Find and eliminate restriction. Increase return duct and/or grille size.	

Table continued on next page.

## Functional Troubleshooting, Cont'd.

Table continued from previous page.

Fault	Htg	Clg	Possible Cause	Solution
Over/Under Voltage Code 7 (Auto resetting)	X	X	Under voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size.
	X	X	Over voltage	Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer. Tap for correct power supply voltage.
Unit Performance Sentinel Code 8	X		Heating mode LT2 > 125°F	Check for poor airflow or overcharged unit.
		X	Cooling Mode LT1 > 125°F OR LT2 < 40°F	Check for poor water flow or airflow.
Unit Performance Test/ Swapped Thermistor Code 9	X	X	LT1 and LT2 swapped	Reverse position of thermistors
ECM Fault Code 10	X	X	Blower does not operate	Check blower line voltage.
				Check blower low voltage wiring.
	X	X	Blower operating with incorrect airflow	Wrong unit size selection.
				Wrong unit family selection.
Low Air Coil Pressure Fault (ClimaDry® II) Code 11		X	Reduced or no airflow in cooling or ClimaDry® II	Wrong motor size.
				Incorrect blower selection.
		X	Air temperature out of range	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
	X	Bad pressure switch	Too high of external static? Check static vs blower table.	
Low Air Coil Temperature Fault (ClimaDry® II) Code 12		X	Reduced airflow in cooling, ClimaDry® II, or constant fan	Too much cold vent air? Bring entering air temp within design parameters.
				Check switch continuity and operation. Replace.
		X	Air temperature out of range	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
	X	Bad thermistor	Too high of external static? Check static vs blower table.	
IFC Fault Code 13  Internal Flow Controller Fault	X	X	No pump output signal	Check DC voltage between A02 and GND. Voltage should be between 0.5 and 10 VDC with pump active.
				Check line voltage to the pump.
	X	X	No pump feedback signal	Check DC voltage between T1 and GND. Voltage should be between 3 and 4 VDC with pump OFF and between 0 and 2 VDC with pump ON.
				Replace pump if the line voltage and control signals are present at the pump and the pump does not operate.
ESD - ERV Fault (DXM2.5 Only) Green Status LED Code 3	X	X	ERV unit has fault (Rooftop units only)	Troubleshoot ERV unit fault.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Operates".
	X	X	Compressor overload	Check and replace if necessary.
	X	X	Control board	Reset power and check operation.
Unit Short Cycles	X	X	Dirty air filter	Check and clean air filter.
	X	X	Unit in "Test Mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor overload	Check and replace if necessary
Only Fan Runs	X	X	Thermostat position	Ensure thermostat set for heating or cooling operation.
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at DXM2.5. Put in test mode and jumper Y1 and R to give call for compressor.

# Performance Troubleshooting

Symptom	Htg	Clg	Possible Cause	Solution
<b>Insufficient Capacity/ Not Cooling or Heating Properly</b>	X	X	Dirty filter	Replace or clean.
	X		Reduced or no airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs blower table.
		X	Reduced or no airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs blower table.
	X	X	Leaky duct work	Check supply and return air temperatures at the unit and at distant duct registers. If significantly different, duct leaks are present.
	X	X	Low refrigerant charge	Check superheat and subcooling per chart.
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
		X	Defective reversing valve	Perform RV touch test.
X	X	Thermostat improperly located	Check location and for air drafts behind stat.	
X	X	Unit undersized	Recheck loads & sizing. Check sensible cooling load and heat pump capacity.	
X	X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.	
X	X	Inlet water too hot or too cold	Check load, loop sizing, loop backfill, ground moisture.	
<b>High Head Pressure</b>	X		Reduced or no airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and air flow restrictions.
				Too high of external static? Check static vs blower table.
		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow. Adjust to proper flow rate.
		X	Inlet water too hot	Check load, loop sizing, loop backfill, ground moisture.
	X		Air temperature out of range in heating	Bring return air temperature within design parameters.
		X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
X	X	Unit overcharged	Check superheat and subcooling. Re-weigh in charge.	
X	X	Non-condensables in system	Vacuum system and re-weigh in charge.	
X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.	
<b>Low Suction Pressure</b>	X		Reduced water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter? Clean or replace.
				Check water flow. Adjust to proper flow rate.
	X		Water temperature out of range	Bring water temperature within design parameters.
		X	Reduced airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
			Too high of external static? Check static vs blower table.	
	X	Air temperature out of range	Too much cold vent air? Bring entering air temperature within design parameters.	
X	X	Insufficient charge	Check for refrigerant leaks.	
<b>Low Discharge Air Temperature in Heating</b>	X		Too high of airflow	Check fan motor speed selection and airflow chart.
	X		Poor performance	See 'Insufficient Capacity'.
<b>High humidity</b>		X	Too high of airflow	Check fan motor speed selection and airflow chart.
		X	Unit oversized	Recheck loads & sizing. Check sensible cooling load and heat pump capacity.

Table continued on next page.

## Performance Troubleshooting, Cont'd.

Table continued from previous page.

Symptom	Htg	Clg	Possible Cause	Solution
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation. Check thermostat wiring at DXM2.5. Put in test mode and then jumper Y1 and W1 to R to give call for fan, compressor, and electric heat.
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for line voltage across blower relay contacts. Check fan power. Enable relay operation (if present).
	X	X	Fan motor	Check for line voltage at motor. Check capacitor.
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC on RV coil. If RV is stuck, run high pressure up by reducing water flow and, while operating, engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	For DXM2.5, check for "O" RV setup, not "B".
		X	Thermostat wiring	Check O wiring at heat pump. DXM2.5 requires call for compressor to get RV coil "Click".
Modulating Valve Troubleshooting	X	X	Improper output setting	Verify the AO-2 jumper is in the 0-10V position.
	X	X	No valve output signal	Check DC voltage between AO2 and GND. Should be 0 when valve is OFF and between 3.3v and 10v when valve is ON.
	X	X	No valve operation	Check voltage to the valve. Replace valve if voltage and control signals are present at the valve and it does not operate.

# Troubleshooting Form

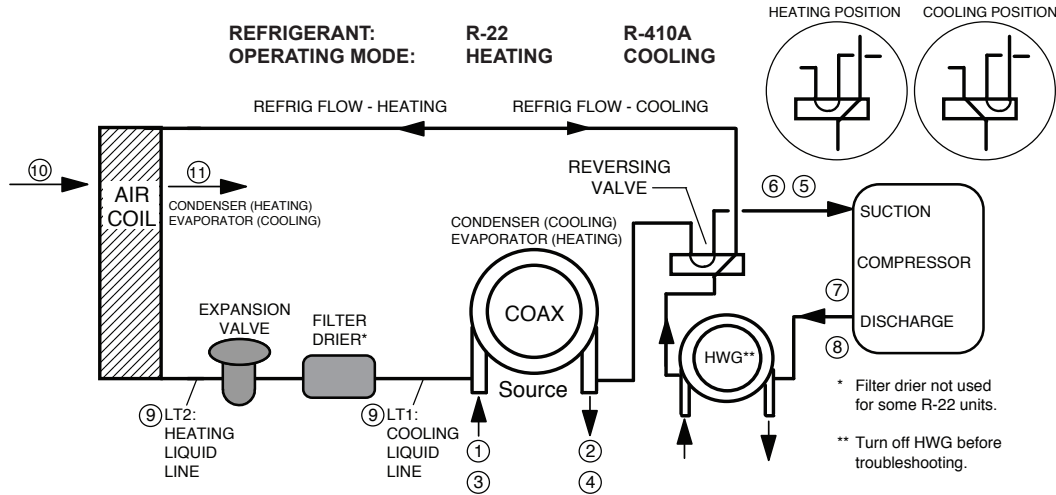
## Packaged Water-to-Air Troubleshooting Form

RP929

Customer: \_\_\_\_\_ Loop Type: \_\_\_\_\_ Startup Date: \_\_\_\_\_

Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_ Antifreeze Type & %: \_\_\_\_\_

Complaint: \_\_\_\_\_



Description	Heating	Cooling	Notes
<b>Water Side Analysis</b>			
1 Water In Temp.			
2 Water Out Temp.			Temp. Diff. =
3 Water In Pressure			
4 Water Out Pressure			
4a Pressure Drop			
4b GPM			
Heat of Extraction (Absorption) or Heat of Rejection:			<b>Fluid Factor:</b> 500 (Water); 485 (Antifreeze)
HE or HR (Btuh) = _____ Enter HE or HR: _____			
_____ Flow Rate (GPM) x _____ Temp. Diff (deg F) x _____ Fluid Factor			
<b>Refrigerant Analysis</b>			
5 Suction Temp.			
6 Suction Pressure			
6a Saturation Temp.			
6b Superheat			
7 Discharge Temp.			
8 Discharge Pressure			
8a Saturation Temp.			
8b Subcooling			
9 Liquid Line Temp			
10 Return Air Temp.			
11 Supply Air Temp.			Temp. Diff. =
Voltage			
Compress Amps			

**Note:** Never connect refrigerant gauges during startup procedures. Conduct water-side analysis using P/T ports to determine water flow and temperature difference. If water-side analysis shows poor performance, refrigerant troubleshooting may be required. Connect refrigerant gauges as a last resort.

## Warranty



**CLIMATE MASTER, INC.  
LIMITED EXPRESS WARRANTY AND LIMITATION OF LIABILITY AND  
REMEDIES FOR RESIDENTIAL CLASS PRODUCTS WITH LABOR ALLOWANCE**

**This Limited Express Warranty And Remedies Affects Your Legal Rights And Should Be Read Carefully In Its Entirety.** Subject to the terms and conditions below, Climate Master, Inc. ("CM") extends a limited warranty ("Limited Warranty") for Residential Class heating and cooling equipment manufactured or sold by CM ("Products"), that was purchased on or after May 1, 2010 (this would generally include CM Units with serial numbers beginning with "N118" and higher), and installed in a one or two family residential dwelling, for personal, household or family purposes in the United States of America or Canada, ("Application"), to be free from defects and workmanship under normal use and maintenance. If you are unsure if this Limited Warranty applies to a Product you have purchased, contact CM at the phone number or address reflected below.

This Limited Warranty DOES NOT cover commercial applications of the Products. Commercial applications include any application other than installation in a one or two family residential dwelling for personal, household or family purposes. Refer to ClimateMaster Commercial Limited Express Warranty for details. Full copies are available for download at ClimateMaster.com.

This Limited Warranty provides a complete statement of CM's responsibilities to purchasers of the Products. No oral or written statement made by CM, any person or entity associated with CM, or by any person or entity claiming to be associated with CM, including but not limited to statements made in sales literature, catalogs, or agreements to purchase or install the Products, is intended to provide an express or implied warranty, or to modify, amend, alter, or modify the scope or terms of this Limited Warranty.

**EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CM'S PRODUCTS. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS, OF MERCHANTABILITY OF THE PRODUCTS OR OF THE PRODUCTS OR OF THE PRODUCTS OR OF THE PRODUCTS.**

**FOR ANY PARTICULAR PURPOSE.**

**TERM:** This Limited Warranty shall commence on the earliest to occur of the following dates: (i) proof of date of off-peak occupancy; (ii) proof of date of start-up of the Product by a qualified and trained HVAC contractor; or (iii) six (6) months from the shipment date of the Product from CM if items (i) or (ii) are not available ("Warranty Inception Date"). The Limited Warranty shall extend as follows:

**Costs of Repair or Replacement of Covered Product Parts**

- (1) Ten (10) years from the Warranty Inception Date for air conditioning, heating and/or heat pump units built or sold by CM ("CM Units");
- (2) Ten (10) years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units;
- (3) One (1) year from the date of shipment from CM for any other accessories or parts built or sold by CM, when installed with CM Units; and
- (4) Ninety (90) days from the date of shipment from CM for all repair or replacement parts that are not supplied under this warranty.

**Costs of Labor to Install, Repair or Replace Covered Product Parts**

- (1) Five (5) years from the Warranty Inception Date for CM Units;
- (2) Five (5) years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units;

This Limited Warranty does not cover labor costs for installation of other accessories or parts built or sold by CM or any repair or replacement parts that are not supplied under this Limited Warranty.

**WHO IS COVERED:** This Limited Warranty is provided only to the original owner of the one or two family residential dwelling in which the Products are first installed. This Limited Warranty is not transferable. CM reserves the right to request any documentation necessary in its sole discretion to determine the date of purchase and occupancy of the residential dwelling on the date of installation and start-up of the Product(s). For the avoidance of any doubt, this Limited Warranty shall not extend to and shall provide no remedies whatsoever for any distributor or installer of the Products.

**CLAIM PROCESS:** To make a claim under this warranty, the Product or parts must be returned to CM in Oklahoma City, Oklahoma, at eight prepaid, no later than ninety (90) days after the date of the failure of the part. If CM determines the Product or part to be defective and covered by this Limited Warranty, CM will either repair or replace the Product or part and send it to a CM-recognized distributor, dealer or service organization, FOB CM, Oklahoma City, Oklahoma, freight prepaid. The Limited Warranty on any Product or part repaired or replaced under this Limited Warranty extends only through the original warranty period.

**WHAT IS COVERED:** Subject to the terms, this Limited Express Warranty covers the (i) the cost of repair or replacement of any covered Product or Product parts; and (ii) the cost of labor incurred by CM authorized service personnel in connection with the installation of a repaired or replaced Product or Product part.

If a Product part is not available, CM will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the claimant towards the retail purchase price of a new CM product. All labor costs are subject and limited to amounts specifically set forth in the then existing labor allowance schedule provided by CM's Warranty Department. Actual labor costs are not covered by this Limited Warranty to the extent they: (i) exceed the amount allowed under the allowance schedule; (ii) are not specifically provided for in the allowance schedule; (iii) are not performed by CM authorized service personnel; (iv) are incurred in connection with installation of a part not covered by this Limited Warranty; or (v) are incurred outside the Term.

**WHAT IS NOT COVERED:** This Limited Warranty does not cover and does not apply to: (1) air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels, or rating labels, have been removed or defaced; (5) Products on which the unit identification tags or labels, or rating labels, have been removed or defaced; (6) Products which have not been installed and maintained by a qualified and trained HVAC contractor; (7) Products installed in violation of applicable building codes or regulations including but not limited to wiring or voltage conditions; (8) Products subjected to accident, misuse, negligence, abuse, fire, flood, freezing, lightning, unauthorized alteration, misapplication, contaminated or corrosive air or liquid supply, operation at abnormal air or liquid temperatures or flow rates, or opening of the refrigerant circuit by unqualified personnel; (9) mold, fungus or bacteria damages; (10) corrosion or abrasion of the Product; (11) products supplied by others; (12) Products that have been operated in a manner contrary to CM's printed instructions; (13) Products which have insufficient performance as a result of improper system design, sizing or the improper application, installation, or use of CM's products; (14) electricity or fuel costs, or any increases or unrealized savings in same, for any reason whatsoever; or (15) operating any water storage tanks when they are empty or partially empty (i.e. dry firing), at temperatures exceeding the maximum setting of the operating or high limit controls, at pressures greater than those shown on the rating label, with non-potable water, with alterations or attachments (including energy savings devices) not specifically authorized in writing by CM, or without the free circulation of water. CM may request written documentation showing compliance with the above limitations.

In connection with repair or replacement of covered Product parts, CM is not responsible for: (1) the costs of any fluids, refrigerant or system components supplied by others, or associated labor to repair or replace the same, which is incurred as a result of repair or replacement of a covered Product part; (2) the costs of labor, refrigerant, materials or service incurred in diagnosis and removal of a covered Product part subject to repair or replacement under this Limited Warranty; (3) shipping costs incurred in sending a claimed defective part from the installation site to CM; (4) shipping costs to return a claimed defective part from CM to the installation site if the part is not covered by this Limited Warranty; (5) removal or disposal costs associated with the repair or replacement of covered Product Parts; or (6) the costs of normal maintenance.

**OTHER WARRANTY LIMITATIONS:** This Limited Warranty is given in lieu of all other warranties express or implied, in law or in fact. If notwithstanding the disclaimers contained herein, it is determined that other warranties apply, any such warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited in time to the term of this Limited Warranty.

**LIMITATIONS OF REMEDIES:** In the event of a breach of the Limited Warranty, a claimant's remedies will be limited to repair or replacement of a part or unit, or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure, and a reasonable number of attempts by CM to correct the defect, malfunction or other failure, the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold goods). Said refund shall be the maximum liability of CM. THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR THEIR PURCHASER AGAINST CM FOR ANY ACTION FOR BREACH OF CONTRACT, BREACH OF ANY WARRANTY, PATENT INFRINGEMENT OR FOR CM'S NEGLIGENCE OR STRICT LIABILITY. NO ACTION ARISING OUT OF ANY CLAIMED BREACH OF THIS LIMITED WARRANTY MAY BE BROUGHT MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS ARISEN.

**LIMITATIONS OF LIABILITY:** CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM.

CM EXPRESSLY DISCLAIMS ANY LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL, AND/OR PUNITIVE DAMAGES BASED ON ANY THEORY IN CONTRACT, BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, PATENT INFRINGEMENT OR IN TORT, WHETHER FOR CM'S NEGLIGENCE OR AS STRICT LIABILITY AND REGARDLESS OF WHETHER CM IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

**OBTAINING WARRANTY PERFORMANCE:** Normally, the dealer or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized distributor, dealer or service organization. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 SW 44th Street • Oklahoma City, Oklahoma 73179 • (405) 745-6000 • e-service@climatemaster.com

NOTE: Some states or Canadian provinces do not allow the exclusion or limitation of implied warranties or the limitation of consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. Where the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights, which may vary depending on local law. IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS DETERMINED TO BE A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. § 2301, ET SEQ.) OR OTHER APPLICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY FOR THE SAME TERM SET FORTH ABOVE (ONE YEAR) AS PROVIDED UNDER APPLICABLE LAW. The portions of this Limited Warranty and limitation of liability shall be considered fully severable, and all portions which are not disallowed by applicable law shall remain in full force and effect.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province. Refer to your local laws for your specific rights under this Limited Warranty. Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Part No.: RP851

Rev.: 3/20

## Revision History

Date:	Item:	Action:
21 Mar., 23	All	Added ClimaDry Reheat
18 Nov., 22	All	Upgraded DXM2 to DXM2.5 unit controls and replaced the ATC thermostat with the AWC thermostat
5 Oct., 21	Pgs. 25-28	Updated Water Quality Standard
4 June, 20	Pgs. 32-33	Wiring Diagrams
29 Oct., 19	Pgs. 3, 13, 17, 38	Decoder and pump curve updates, misc. text edits
23 Jan. 19	Pgs. 13, 29	High Head variable pump update
12 Dec. 18	All	Added performance data pages
21 Aug., 18	Pg. 4	Added Warning
25 July, 17	Pg. 6	Updated hanger mounting instructions
07 Oct., 16	Pg. 7	Text Update
6 Jan., 2016	Pg. 60	replaced old certification logos and new AHRI
18 Dec., 15	Pg. 10	Updated Text - Removed Standard for vFlow
29 May, 15	Pgs. 28 & 29	Updated Figures 25 & 26
12 Feb., 15	Pg. 28	Add External Pump Data
02 Oct., 14	All, Pg. 58	Update for No vFlow™ Unit, Updated Troubleshooting Form
10 Sept., 14	Pgs. 9 & 22	Polyolester Oil Information
28 July, 14	Pgs. 39, 45-49	Updated Min. Entering Air Temperature and Water Pressure Drop Data
14 July, 14	All	Update for Rev. B
18 June, 14	Pgs. 23 & 38	Updated Oper. Limits Table and Water Quality Table
27 Feb., 13	All	Figure and Table Numbers Corrected
17 Jan., 13	All	'Preliminary' Removed from Header
3 Aug., 12	Various	Content Revised
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7300 S.W. 44th Street  
 Oklahoma City, OK 73179  
 Phone: 405-745-6000  
 Fax: 405-745-6058  
 climatemaster.com

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