CLIMATEMASTER®

# GLW Series

## Genesis Series
## GLW360
## Large Water to Water Heat Pump

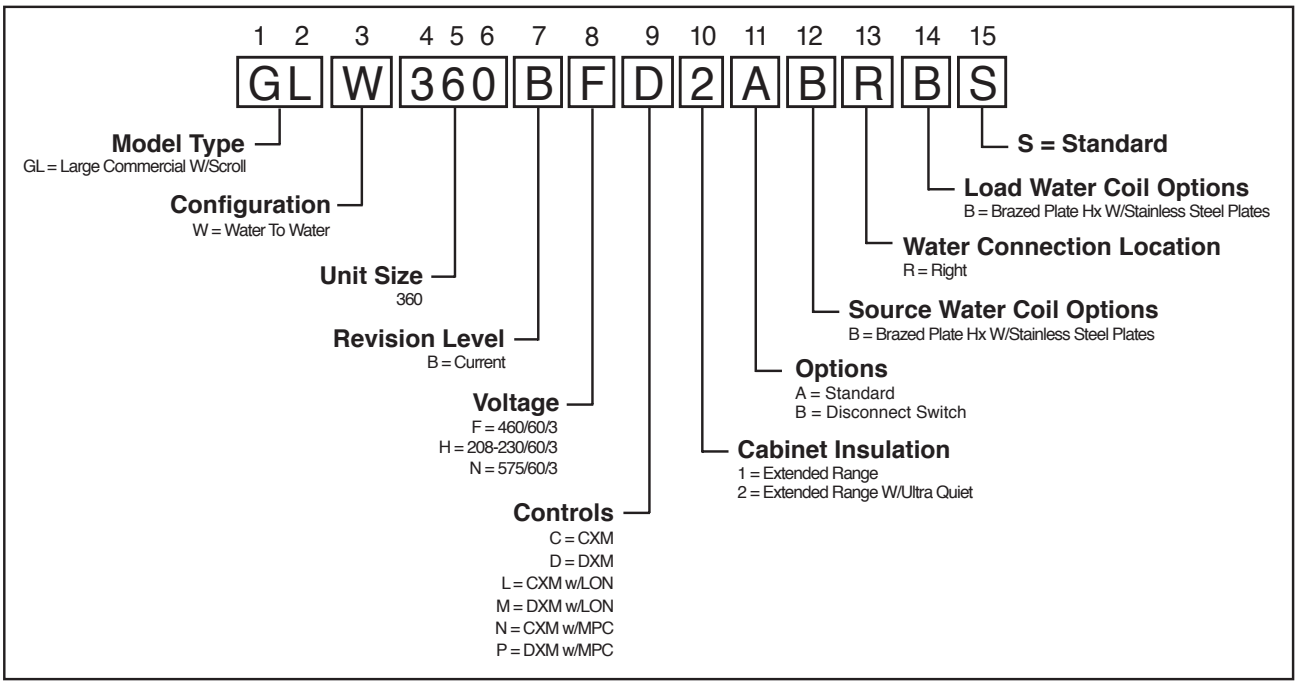
## Installation, Operation & Maintenance Instructions

**97B0029N01**

**Revision: 05/19/05**

## Table of Contents

# MODEL NOMENCLATURE

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# GENERAL INFORMATION

## Inspection

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the carton or crating of each unit, and inspect each unit for damage. Assure 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 the ClimateMaster Traffic Department 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 2 units high.

## Unit Protection

Cover units on the job site with either shipping packaging, vinyl film, 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 trash found in or on these components.

**⚠ 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.

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, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

**⚠ WARNING!**

DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.) Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move units in an upright position. Tilting units on their sides may cause equipment damage.

## Pre-Installation

Installation, Operation, and Maintenance instructions are provided with each unit.. 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 shipping 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.

### GLW Physical Data

| Model | 360 |
|---|---|
| Compressor/qty | Scroll/2 |
| Factory Charge R22: each circuit - (lbs.) [kg] | 9 [4.1] |
| Indoor/Load Water Connection Size | |
| FPT - All Other | 2" |
| **Outdoor/Source Water Connection Size** | |
| FPT - All Other | 2" |
| Weight - Operating - lbs. [kg] | 955 [434] |
| Weight - Packaged - lbs. [kg] | 1005 [457] |

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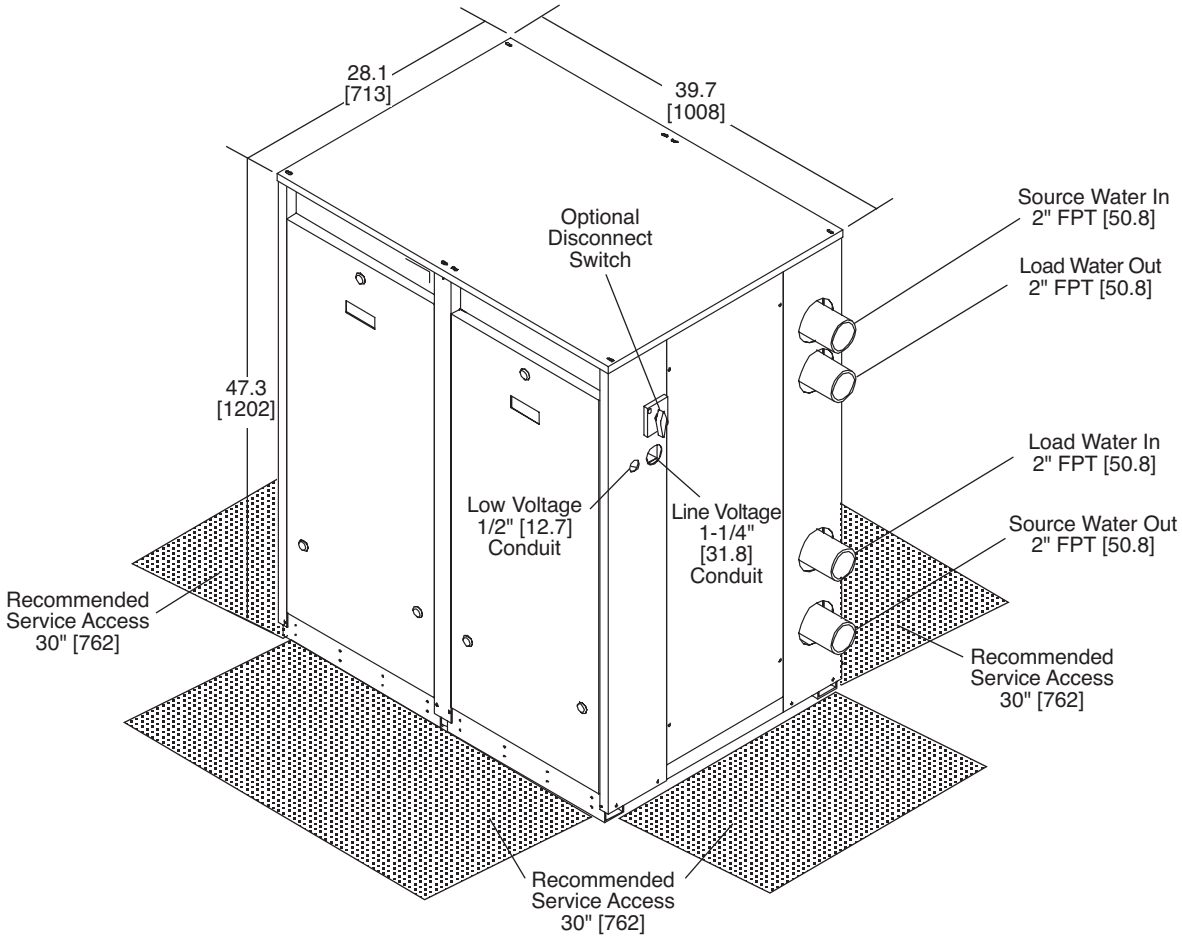
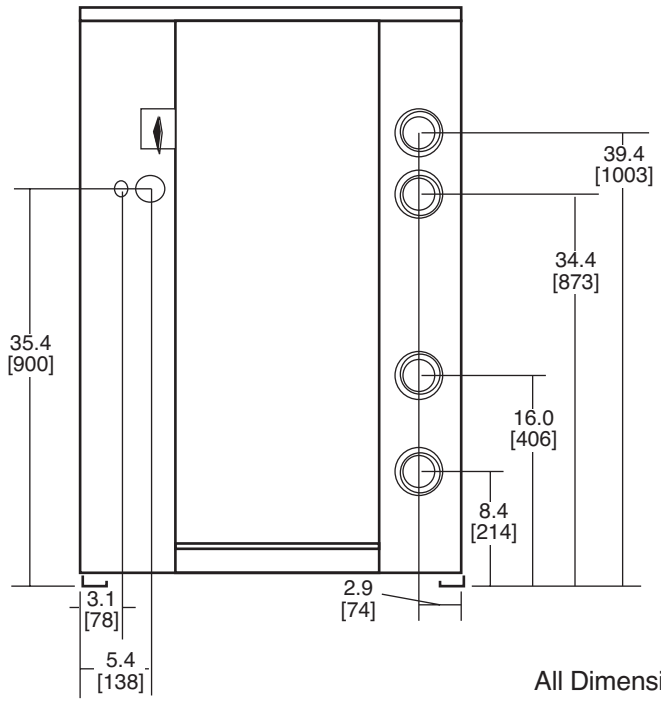
Grommet mounted compressor.
Dedicated heating and cooling expansion valves with filter drier.
Insulated Indoor and Outdoor brazed plate heat exchangers.
Check serial plate for refrigerant type.
Insulated refrigerant and water piping.

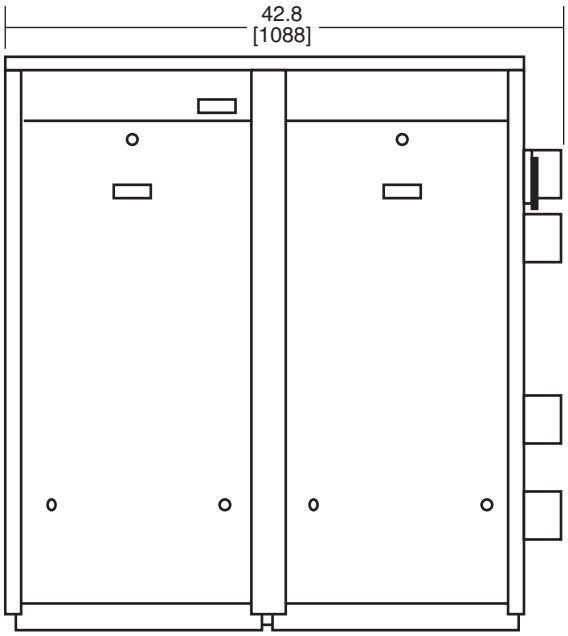
# GLW360 DIMENSIONS




**Front View**




**Left Side View**




All Dimensions in inches [mm]

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# UNIT INSTALLATION

## GLW Unit Location

These 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.

***The installation of water source heat pump units and all associated components, parts and accessories which make up the installation 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.***

Locate the unit in an indoor area that allows easy removal of access panels, and has enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water and electrical connections.. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. These units are not approved for outdoor installation and, therefore, must be installed inside the structure being conditioned. Do not locate in areas where ambient conditions are not maintained within 40-100°F [4-38°C] and up to 75% relative humidity.

# PIPING INSTALLATION

## Installation of Supply and Return Piping

Follow these piping guidelines.

1. Install a drain valve at the base of each supply and return riser to facilitate system flushing.
2. Install shut-off / balancing valves and unions at each unit to permit unit removal for servicing.
3. Place strainers at the inlet of each system circulating pump.
4. Select the proper hose length to allow slack between connection points. Hoses may vary in length by +2% to -4% under pressure.
5. Exceeding the minimum bend radius may cause the hose to collapse which reduces water flow rate. Install an angle adapter to avoid sharp bends in the hose when the radius falls below the required minimum and causes a slight kink.

**⚠ WARNING**

**Load and source piping must include a 20 mesh [0.84mm] filter to control suspended particles flowing through the unit's plate heat exchangers.**

**ClimateMaster provides a 20 mesh (841 micron) strainer in the commercial price list that is a REQUIRED option for all GLW units regardless of application type.**

**⚠ CAUTION**

**Piping must comply with all applicable codes.**

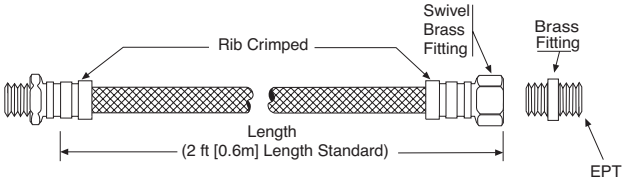
Insulation is not required on loop water piping except where the piping runs through unheated areas or outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient temperature. **Insulation is required if loop water temperature drops below the dew point.**

Pipe joint compound is not necessary when Teflon threaded tape is pre-applied to hose assemblies or when flared-end connections are used. If pipe joint compound is preferred, use compound only in small amounts on the pipe threads of the fitting adapters. Prevent sealant from reaching the flared surfaces of the joint.

**⚠ WARNING!**

**Do not bend or kink supply lines or hoses.**

**Figure 1: Supply/Return Hose Kit**




**Note: When anti-freeze is used in the loop, assure that it is compatible with Teflon tape or pipe joint compound employed.**

Maximum allowable torque for brass fittings is 30 ft-lbs [41 N-m]. If a torque wrench is not available, tighten finger-tight plus one quarter turn. Tighten steel fittings as necessary.

Optional pressure-rated hose assemblies designed specifically for use with ClimateMaster units are available. Similar hoses can be obtained from alternate suppliers. Supply and return hoses are fitted with swivel-joint fittings at one end to prevent kinking during installation.

Refer to Figure 1 for an illustration of a Supply/Return Hose Kit. Male adapters secure hose assemblies to the unit and risers. Install hose assemblies properly and check them regularly to avoid system failure and reduced service life.

**⚠ CAUTION**

**Corrosive system water requires corrosion resistant fittings and hoses and possibly water treatment.**

# LOAD PLUMBING INSTALLATION

## GLW Unit Load Plumbing

The applications are too varied to describe in this document. However, some basic guidelines will be presented. Much of the discussions on water loop applications would be valid for the load plumbing discussion as well. All plumbing should conform to local codes with the following considerations:

*Wide temperature variation applications such as heating/ cooling coils:*

- Employ piping materials that are rated for the maximum temperature and pressure combination. This excludes PVC for most heating applications.
- **EMPLOY A 20 MESH (841 MICRON) [0.84MM] PARTICULATE STRAINER IN BOTH LOAD AND SOURCE PLUMBING TO PROTECT THE PLATE HEAT EXCHANGERS.**
- Insure that load water flow in high temperature heating applications is at least 3 gpm per ton [3.9 l/m per kW] to improve performance and reduce nuisance high pressure faults.
- DO NOT employ plastic to metal threaded joints
- Utilize a pressure tank and air separator vent system to equalize pressure and remove air..

*Swimming Pool Hot Tub Applications:*

- Load coax should be isolated with secondary heat exchanger constructed of anti-corrosion material in all chlorine/bromine fluid applications.

# COMMERCIAL WATER LOOP APPLICATIONS

Commercial systems typically include a number of units plumbed to a common piping system. Any unit plumbing maintenance work can introduce air into the piping system, therefore air elimination equipment is a major portion of the mechanical room plumbing. In piping systems expected to utilize water temperatures below 50°F [10°C], 1/2" [13mm] closed cell insulation is required on all piping surfaces to eliminate condensation. Metal to plastic threaded joints should never be employed due to their tendency to leak over time. Teflon tape thread sealant is recommended to minimize internal fouling of the heat exchanger. Do not overtighten connections and route piping so as not to interfere with service or maintenance access. Hose kits are available from ClimateMaster in different configurations as shown in Figure 2 for connection between the GLW Series and the piping system.

For satisfactory operation of GLW360, it is essential to control the suspended solid particles in water to below 20 mesh (841 micron) [0.84mm] size. It is mandatory that minimum 20 mesh (841 micron) [0.84mm] strainer be used. Installation with a high concentration of solid particles over 20 mesh (841 micron) [0.84mm] size should consider using filters with adequate and scheduled maintenance. The hose kits include shut off valves, P/T plugs for performance measurement, high pressure stainless steel braid hose, "Y" type strainer 20 mesh (841 micron) [0.84mm]) with blowdown valve, and "J" type swivel connection.

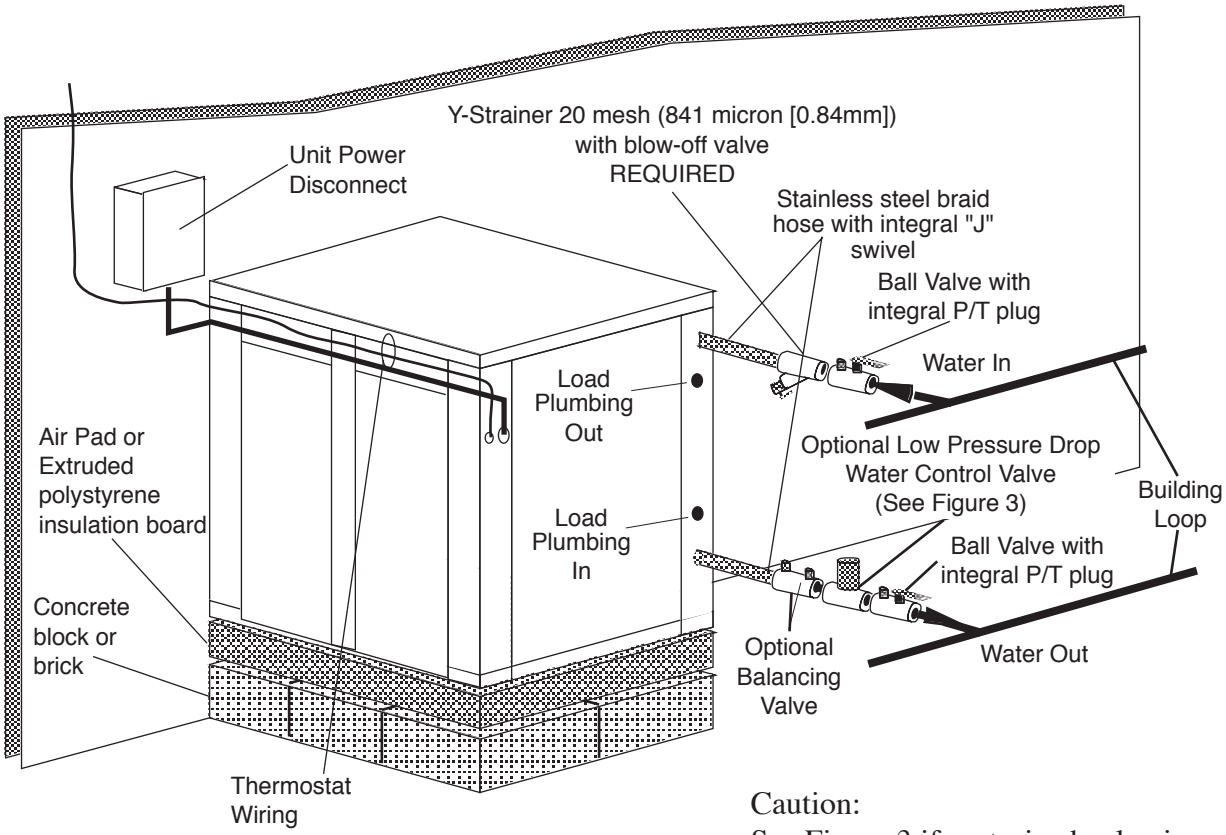
Balancing valves to facilitate the balancing of the system, and an external low pressure drop solenoid valve for use in variable speed pumping systems, may also be included in the hose kit. The piping system should be flushed to remove dirt, piping chips, and other foreign material prior to operation. See page 17 for Piping System Cleaning and Flushing Procedures. The flow rate is usually set between 2.25 gpm and 3 gpm per ton [2.9 l/m and 4.5 l/m per kW] of cooling capacity. ClimateMaster recommends 2.5 gpm per ton [3.2 l/m per kW] for most applications of water loop heat pumps. To insure proper maintenance and servicing, P/T ports are imperative for temperature and flow verification, as well as performance checks.

Cooling Tower/Boiler Systems typically utilize a common loop maintained 60-90°F [16-32°C]. The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

## Low Water Temperature Cutout Setting

CXM or DXM Control:
When an antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (Antifreeze 15°F [-9.4°C]) setpoint to avoid nuisance faults. See Low Water Temperature Cutout - FP1 on page 12.

**Figure 2: Typical Water Loop Application.**




Caution:
See Figure 3 if motorized valve is used.

# OPEN LOOP - GROUND WATER SYSTEMS

Shut off valves should be included in case of servicing. Boiler drains or other valves should be 'tee'd' into the line to allow acid flushing of just the heat exchanger. Pressure temperature plugs should be used so that flow and temperature can be measured. Piping materials should be limited to PVC SCH80 or copper. **Due to the pressure and temperature extremes, PVC SCH40 is not recommended.** Water quantity should be plentiful and of good quality. Consult Table 2 for water quality guidelines.

For satisfactory operation of GLW360, it is essential to control the suspended solid particles in water to below 20 mesh (841 micron) [0.84mm] size. It is mandatory that minimum 20 mesh (841 micron) [0.84mm] strainer be used. Installation with a high concentration of solid particles over 841 micron [0.84mm] size should consider using filters with adequate and scheduled maintenance. The hose kits include shut off valves, P/T plugs for performance measurement, and "Y" type strainer 20 mesh (841 micron) [0.84mm] with blowdown valve.

In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. Heat exchangers may over time lose heat exchange capabilities due to a build up of mineral deposits inside. These can be cleaned only by a qualified service mechanic as acid and special pumping equipment are required.

**Table 2: Water Quality Standards**

| *Water Quality Parameter* | *HX Material* | *Closed Recirculating* | *Open Loop and Recirculating Well* | | |
|---|---|---|---|---|---|
| **Scaling Potential - Primary Measurement** | | | | | |
| Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below. | | | | | |
| pH/Calcium Hardness Method | All | - | **pH < 7.5 and Ca Hardness <100ppm** | | |
| **Index Limits for Probable Scaling Situations - (Operation outside these limits is not recommended)** | | | | | |
| Scaling indexes should be calculated at 150°F for direct use and HWG applications, and at 90°F for indirect HX use. A monitoring plan should be implemented. | | | | | |
| Ryznar Stability Index | All | - | **6.0 - 7.5**<br>If >7.5 minimize steel pipe use. | | |
| Langelier Saturation Index | All | - | **-0.5 to +0.5**<br>If <-0.5 minimize steel pipe use. Based upon 150 °F HWG and Direct well, 85°F Indirect Well HX | | |
| **Iron Fouling** | | | | | |
| Iron Fe $^{2+}$ (Ferrous) (Bacterial Iron potential) | All | - | **<0.2 ppm (Ferrous)**<br>If $Fe^{2+}$ (ferrous)>0.2 ppm with pH 6 - 8, O2<5 ppm check for iron bacteria | | |
| Iron Fouling | All | - | **<0.5 ppm of Oxygen**<br>Above this level deposition will occur. | | |
| **Corrosion Prevention** | | | | | |
| pH | All | **6 - 8.5**<br>Monitor/treat as needed | **6 - 8.5**<br>Minimize steel pipe below 7 and no open tanks with pH <8 | | |
| Hydrogen Sulfide (H2S) | All | - | **<0.5 ppm**<br>At H2S>0.2 ppm, avoid use of copper and copper nickel piping or HX's. Rotten egg smell appears at 0.5 ppm level.<br>Copper alloy (bronze or brass) cast components are OK to <0.5 ppm. | | |
| Ammonia ion as hydroxide, chloride, nitrate and sulfate compounds | All | - | **<0.5 ppm** | | |
| Maximum Chloride Levels | | | Maximum Allowable at maximum water temperature. | | |
| | | | 50°F (10°C) | 75°F (24°C) | 100°F (38°C) |
| | Copper | - | <20ppm | NR | NR |
| | CuproNickel | - | <150 ppm | NR | NR |
| | 304 SS | - | <400 ppm | <250 ppm | <150 ppm |
| | 316 SS | - | <1000 ppm | <550 ppm | < 375 ppm |
| | Titanium | - | >1000 ppm | >550 ppm | >375 ppm |
| **Erosion and Clogging** | | | | | |
| Particulate Size and Erosion | All | <10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. | <10 ppm (<1 ppm "sandfree" for reinjection) of particlesand a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components. | | |

Notes: Rev.: 04/04/04

Closed Recirculating system is identified by a closed pressurized piping system. Recirculating open wells should observe the open recirculating design considerations.
NR - Application not recommended
"-" No design Maximum

**⚠ WARNING**

**Load and source piping must include a 20 mesh [0.84mm] filter to control suspended particles flowing through the unit's plate heat exchangers.**

**ClimateMaster provides a 20 mesh (841 micron) strainer in the commercial price list that is a REQUIRED option for all GLW units regardless of application type.**

In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional acid flushing.

## Expansion Tank and Pump

Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. The expansion tank should be sized to handle at least one minute run time of the pump to prevent premature pump failure using its drawdown capacity rating. Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways depending on local building codes; i.e. 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.

## Water Control Valve

Note the placement of the water control valve. Always maintain water pressure in the heat exchanger by placing water control valves at the outlet of the unit to prevent mineral precipitation. Pilot operated or slow closing valves are recommended to reduce water hammer. If water hammer persists, a mini-expansion tank can be mounted on the piping to help absorb the excess hammer shock. Insure that the total 'VA' draw of the valve can be supplied by the unit transformer. For instance, some slow closing valves can draw up to 35VA. This can overload smaller transformers depending on the other controls employed. A typical pilot operated solenoid valve draws approximately 15VA. Note the special wiring diagram of the AVM valve.

## Flow Regulation

Flow regulation can be accomplished by two methods. First, most water control valves have a built in flow adjustment. By measuring the pressure drop through the unit heat exchanger, flow rate can be determined and compared to Table 6. Since the pressure is constantly varying, two pressure gauges might be needed. Simply adjust the water control valve until the desired flow of 1.5 to 2 gpm per ton [2.0 to 2.6 l/m per kW] is achieved. Secondly, a flow control device may be installed. The devices are typically an orifice of plastic material that is designed to allow a specified flow rate. These are mounted on the outlet of the water control valve. On occasion, these valves can produce a velocity noise that can be reduced by applying some back pressure. This is accomplished by slightly closing the leaving isolation valve of the well water setup.

## Freeze Protection Thermistor

For all open loop systems the 35°F [1.7°C] FP1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See "Low Water Temperature Cutout - FP1" (Page 12).

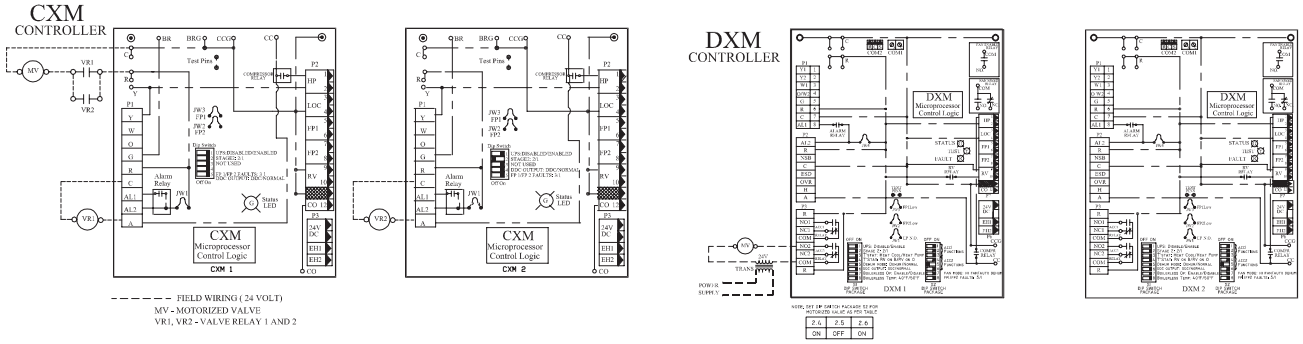
**⚠ CAUTION**

**Freeze protection system will not allow leaving load water temperature (cooling mode) or leaving source water temperature (heating mode) to be below 42°F [5.6°C].**

**⚠ WARNING**

**Never jumper terminal "A" from CXM or DXM board #1 to CXM or DXM board #2. See Figure 3 for motorized valve wiring.**

**Figure 3: Field Wiring of Motorized Valve**



# GROUND LOOP APPLICATIONS

**⚠ CAUTION**

The following instructions represent industry accepted installation practices for Closed Loop Earth Coupled Heat Pump Systems. They are provided to assist the contractor in installing trouble free ground loops. These instructions are recommended only. State 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.

## 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

All earth loop piping materials should be limited to only polyethylene fusion for inground sections of the loop. Galvanized or steel fitting 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 earth coupled applications and a flanged fitting substituted. P/T plugs should be used so that flow can be measured using the pressure drop of the unit heat exchanger in lieu of other flow measurement means. Earth loop temperatures can range between 25 to 110°F [-4 to 43°C], and 2.25 to 3 gpm of flow per ton [2.9 l/m to 3.9 l/m per kW] of cooling capacity is recommended in these applications. Upon completion of the ground loop piping, pressure test the loop to assure a leak free system. Horizontal Systems: Test individual loops as installed. Test entire system when all loops are assembled. Vertical U-Bends and Pond Loop Systems: Test Vertical U-bends and pond loop assemblies prior to installation with a test pressure of at least 100 psi [689 kPa].

## Flushing the Earth Loop

Upon completion of system installation and testing, flush the system to remove all foreign objects and purge to remove all air.

**Table 3: Antifreeze Percentages by Volume**

| Type | Minimum Temperature for Freeze Protection | | | |
|---|---|---|---|---|
| | **10°F [-12.2°C]** | **15°F [-9.4°C]** | **20°F [-6.7°C]** | **25°F [-3.9°C]** |
| Methanol | 25% | 21% | 16% | 10% |
| 100% USP food grade Propylene Glycol | 38% | 30% | 22% | 15% |

## Antifreeze

In areas where minimum entering loop temperatures drop below 40°F [5°C] or where piping will be routed through areas subject to freezing, anti-freeze is needed. Alcohols and glycols are commonly used as antifreezes, however your local sales manager should be consulted for the antifreeze best suited to your area. Freeze protection should be maintained to 15°F [9°C] below the lowest expected entering loop temperature. For example, if 30°F [-1°C] is the minimum expected entering loop temperature, the leaving loop temperature would be 25 to 22°F [-4 to -6°C] and freeze protection should be at 15°F [-10°C] e.g. 30°F - 15°F = 15°F [-1°C - 9°C = -10°C]. All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under water level to prevent fuming. Initially calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in Table 3 for the amount of antifreeze. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

## Freeze Protection Setting

CXM or DXM Control:

When an antifreeze is selected, the FP1 jumper [JW3] should be clipped to select the low temperature (Anti-freeze 15°F [-9.4°C]) setpoint to avoid nuisance faults.

**⚠ WARNING**

**Load and source piping must include a 20 mesh [0.84mm] filter to control suspended particles flowing through the unit's plate heat exchangers.**

**ClimateMaster provides a 20 mesh (841 micron) strainer in the commercial price list that is a REQUIRED option for all GLW units regardless of application type.**

# ELECTRICAL - LINE VOLTAGE

**⚠ 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**

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

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 wiring diagrams for fuse sizes and a schematic of the field connections which must be made by the installing (or electrical) contractor.

Consult the unit wiring diagram located on the inside of the compressor access panel to ensure proper electrical hookup.

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

**Table 4: GLW Electrical Data**

| Model | Rated Voltage | Voltage Min/Max | Compressor | | | Total Unit FLA | Min Circ Amp | Max Fuse/ HACR |
|---|---|---|---|---|---|---|---|---|
| | | | RLA | LRA | Qty | | | |
| GLW360 | 208-230/60/3 | 187/254 | 41.0 | 350.0 | 2.0 | 82.0 | 92.3 | 125 |
| | 460/60/3 | 414/506 | 21.8 | 158.0 | 2.0 | 43.6 | 49.0 | 70 |
| | 575/60/3 | 518/633 | 17.3 | 125.0 | 2.0 | 34.6 | 38.9 | 50 |
| | 380-420/50/3 | 342/462 | 21.8 | 167.0 | 2.0 | 43.6 | 49.0 | 70 |

HACR circuit breaker in USA only

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**⚠ WARNING!**

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

## General Line Voltage Wiring

Be sure the available power is the same voltage and phase as that 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.

## GLW Power Connection

Line voltage connection is made by connecting the incoming line voltage wires to L1, L2, and L3 on power distribution block. Consult Table 4 for correct fuse size.

## 208 Volt Operation

All 208-230 Volt units are factory wired for 208 Volt. The transformers may be switched to 230V operation as illustrated on the wiring diagram by switching the Red (208V) and the Orange (230V) at the contactor terminal L2.

**⚠ CAUTION**

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

# ELECTRICAL - LOW VOLTAGE

## Thermostat Connections

The aquastat/thermostat should be wired directly to the CXM/DXM board #1 . Note: The GLW second stage is wired directly to the CXM #2.

## Low Water Temperature Cutout - FP1

The CXM/DXM control allows the field selection of source fluid low temperature cutout points. The factory setting of FP1 is set for water (35°F [1.7°C]). In cold temperature applications jumper JW3 (FP1- antifreeze 15°F [-9.4°C]) should be clipped as shown in Figure 4 to change the setting to 10°F [-12.2°C], a more suitable temperature when using antifreezes.

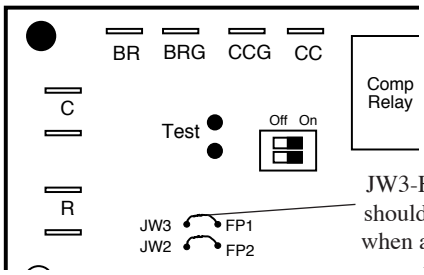
## Accessory Connections

A terminal paralleling the compressor contactor coil has been provided on the CXM/DXM control of the GLW line. "A" has been provided to control accessory devices, such as water valves, electronic air cleaners, humidifiers, etc. **Note: This terminal should be used only with 24 Volt signals and not line voltage signals.** This signal operates with the compressor contactor.

**⚠ WARNING**

**Never jumper terminal "A" from CXM or DXM board #1 to CXM or DXM board #2. See Figure 3 for motorized valve wiring.**

**Figure 4: Changing FP1-Low Water Temperature Cutout Setpoint**

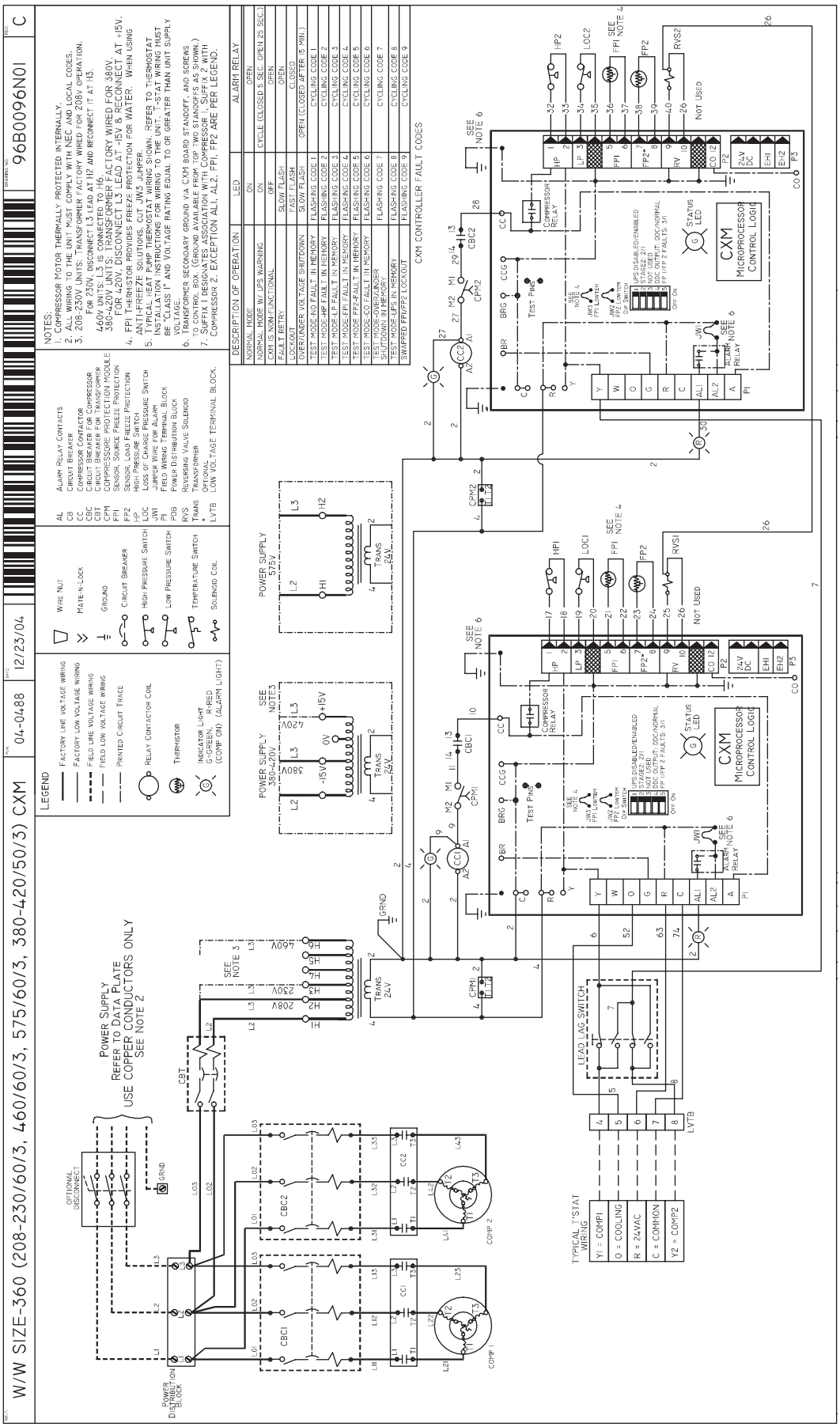



**CXM PCB**

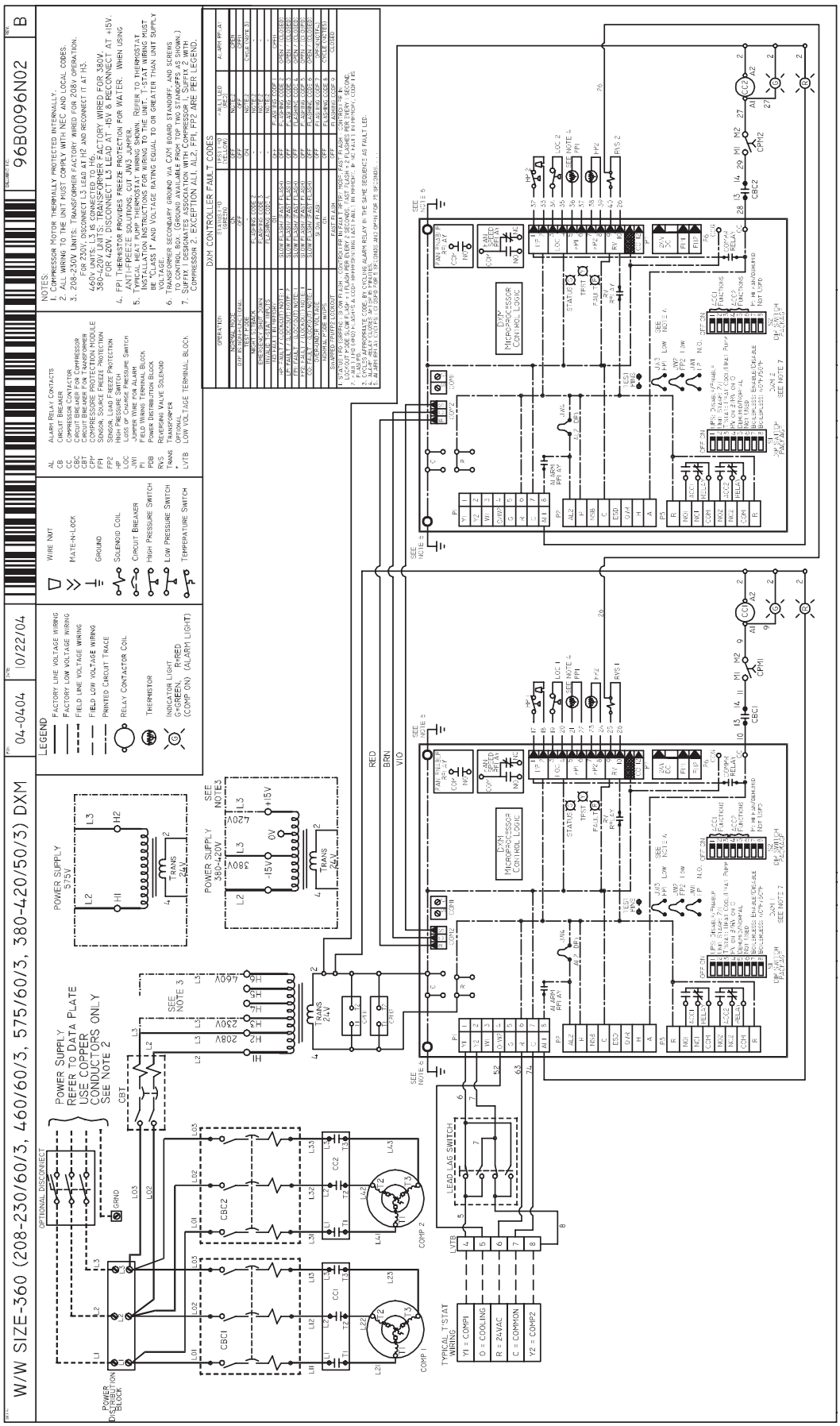
# CXM/DXM, LonWorks, or MPC Control Operation

**Note: See CXM/DXM AOM (part #97B0003N08), Lon Controller AOM (part #97B0013N01) or MPC Controller AOM (part #97B0031N01) on the web at www.climatemaster.com**

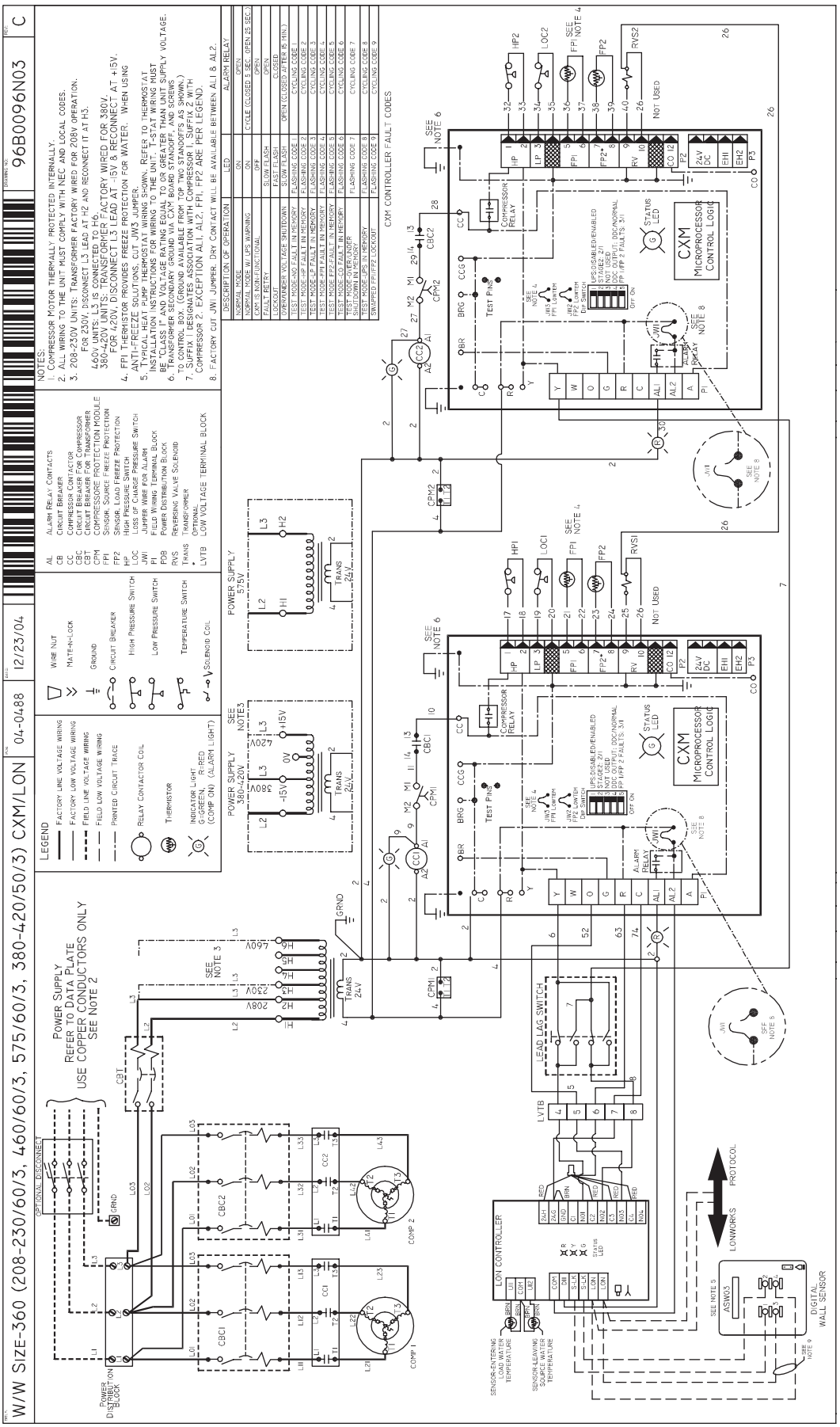
# TYPICAL WIRING DIAGRAM - GLW W/CXM



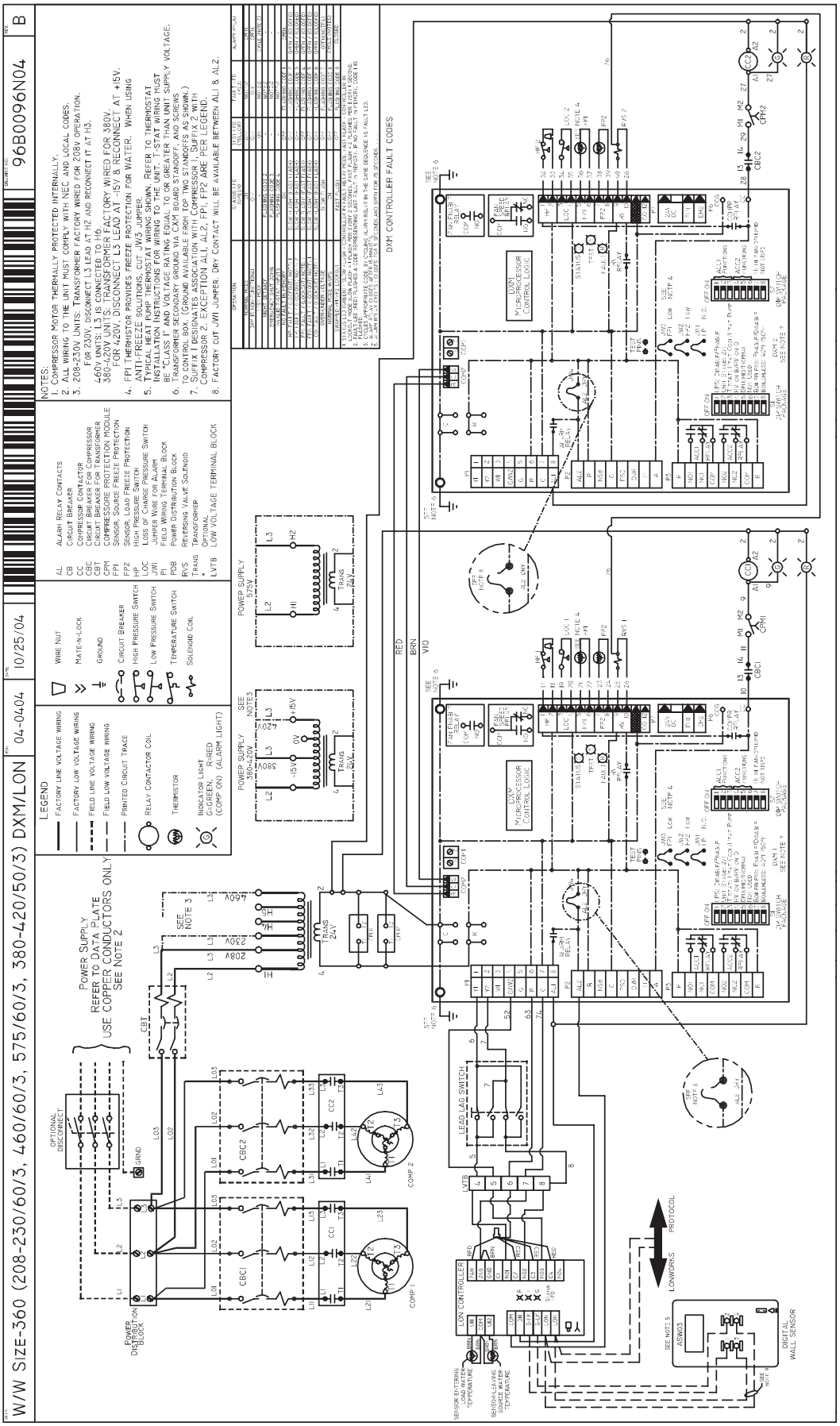
# TYPICAL WIRING DIAGRAM - GLW W/DXM



# TYPICAL WIRING DIAGRAM - GLW W/LON



# TYPICAL WIRING DIAGRAM - GLW W/MPC



# UNIT STARTING AND OPERATING CONDITIONS

## Operating Limits

**Environment** – This unit is designed for indoor installation only.

**Power Supply** – A voltage variation of +/– 10% of nameplate utilization voltage is acceptable.

## Starting Conditions

**GLW Units** – Units start and operate in an ambient of 45°F [7°C] with entering water at 30°F [-1.1°C] and water at the stated flow rates of 3 gpm per ton [3.9 l/m per kW] for initial winter start-up.

**Notes:**

1. These are not normal or continuous operating conditions. It is assumed that winter start-up is to bring the building space up to occupancy temperatures.
2. Voltage utilization range complies with ARI Standard 110.

Determination of operating limits is dependent primarily upon three factors: 1) entering load temperature. 2) entering source 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 ensure proper unit operation.

Extreme variations in temperature and humidity and corrosive water will adversely affect unit performance, reliability, and service life.

**Table 5: Operating Limits**

| **Source Side Water Limits** | **Cooling** | **Heating** |
|---|---|---|
| Min. Entering Liquid | 50°F [10°C] | 20°F [-7°C] |
| Normal Entering Water | 85°F [29°C] | 60°F [15°C] |
| Max Entering Water | 110°F [43°C] | 70°F [21°C] |
| **Load Side Water Limits** | | |
| Min. Entering Water | 50°F [10°C] | 60°F [15°C] |
| Normal Entering Water | 60°F [15°C] | 100°F [38°C] |
| Max Entering Water | 90°F [32°C] | 120°F [49°C] |

# PIPING SYSTEM CLEANING AND FLUSHING

Cleaning and flushing of the WLHP piping system is the single most important step to ensure proper start-up and continued efficient operation of the system.

Follow the instructions below to properly clean and flush the system:

1. Verify electrical power to the unit is disconnected.
2. Install the system with the supply hose connected directly to the return riser valve. Use a single length of flexible hose.
3. Open all air vents. Fill the system with the water. DO NOT allow system to overflow. Bleed all air from the system. Pressurize and check the system for leaks and repair appropriately.
4. Verify all strainers are in place. Start the pumps, and systematically check each vent to ensure all air is bled from the system.
5. Verify make-up water is available. Adjust make-up water appropriately to replace the air which was bled from the system. Check and adjust the water/air level in the expansion tank.
6. Set the boiler to raise the loop temperature to approximately 85°F [29°C]. Open the a drain at the lowest point in the system. Adjust the make-up water replacement rate to equal the rate of bleed.
7. Refill the system and add trisodium phosphate in a proportion of approximately one pound per 150 gallons [1/2 kg per 750 L] of water (or other equivalent approved cleaning agent). Reset the boiler to raise the loop temperature to about 100°F [38°C]. Circulate the solution for a minimum of 8 to 24 hours. At the end of this period, shut off the circulating pump and drain the solution. Repeat system cleaning if desired.
8. When the cleaning process is complete, remove the short-circuited hoses. Reconnect the hoses to the proper supply, and return the connections to each of the units. Refill the system and bleed off all air.
9. Test the system pH with litmus paper. The system water should be slightly alkaline (pH 7.5-8.5). Add chemicals, as appropriate, to maintain acidity levels.
10. When the system is successfully cleaned, flushed, refilled and bled, check the main system panels, safety cutouts and alarms. Set the controls to properly maintain loop temperatures.

**⚠ CAUTION**

**To avoid possible damage to a plastic (PVC) piping system, do not allow temperatures to exceed 110°F [43°C].**

**⚠ CAUTION**

**DO NOT use 'stop leak' or any similar chemical agent in this system. Addition of these chemicals to the loop water will foul the system and inhibit unit operation.**

# UNIT AND SYSTEM CHECKOUT

BEFORE POWERING SYSTEM, please check the following:

## UNIT CHECKOUT

❑ **Balancing/Shutoff Valves:** Ensure all isolation valves are open, water control valves wired and open or coax may freeze and burst.

**⚠ WARNING!**

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

❑ **Line Voltage and Wiring:** Ensure Voltage is within an acceptable range for the unit and wiring and fuses/breakers are properly sized. Low voltage wiring is complete.

❑ **Unit Control Transformer:** Ensure transformer has properly selected control voltage tap. 208-230V units are factory wired for 208V operation unless specified otherwise.

❑ **Entering Water:** Ensure entering water temperatures are within operating limits of Table 6.

❑ **Low Water Temperature Cutout:** Verify low water temperature cut-out on CXM/DXM is properly set.

❑ **Water Flow Balancing:** Verify inlet and outlet water temperatures on both Load and source are recorded for each heat pump upon startup. This check can eliminate nuisance trip outs and high velocity water flows that can erode heat exchangers.

❑ **Unit Controls:** Verify CXM or DXM field selection options are proper and complete.

## SYSTEM CHECKOUT

❑ **System Water Temperature:** Check load and source water temperature for proper range and also verify heating and cooling setpoints for proper operation.

❑ **System pH:** System water pH is 6 - 8.5. Proper pH promotes longevity of hoses and fittings.

❑ **System Flushing:** Verify all hoses are connected end to end when flushing to ensure debris bypasses unit heat exchanger and water valves etc. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Verify all air is purged from the system. Air in the system can cause poor operation or system corrosion.

❑ **Cooling Tower/Boiler:** Check equipment for proper setpoints and operation.

❑ **Standby Pumps:** Verify the standby pump is properly installed and in operating condition.

❑ **System Controls:** Verify system controls function and operate in the proper sequence.

❑ **Low Water Temperature Cutout:** Verify low water temperature cut-out controls are provided for the outdoor portion of the loop or operating problems will occur.

❑ **System Control Center:** Verify control center and alarm panel for proper setpoints and operation.

❑ **Strainers:** Verify 20 mesh (841 micron) [0.84mm] strainers are installed in load and source water piping. Confirm maintenance schedule for strainers.

❑ **Miscellaneous:** Note any questionable aspects of the installation.

**⚠ WARNING!**

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

# UNIT START UP PROCEDURE

Use the procedure outlined below to initiate proper unit start-up:

**⚠ 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.**

1. Adjust all valves to their full open position. Turn on the line power to all heat pump units.
2. Operate each unit in the cooling cycle. Loop water temperature entering the heat pumps should be between 70°F [21°C] and 110° F [43°C].
3. Operate each heat pump in the heating cycle immediately after checking cooling cycle operation. A time delay will prevent the compressor from re-starting for approximately five (5) minutes.
4. Establish a permanent operating record by logging the unit operating conditions at initial start-up for each unit.
5. If a unit fails to operate, conduct the following checks:

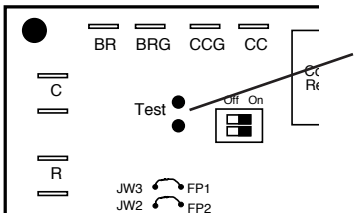
a. Check the voltage and current. They should comply with the electrical specifications described on the unit nameplate.

b. Look for wiring errors. Check for loose terminal screws where wire connections have been made on both the line and low-voltage terminal boards.

**⚠ WARNING!**

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

**Figure 5: Test Mode Pins**




Short test pins together to enter Test Mode and speed-up timing and delays for 20 minutes.

**Table 6: Coax Water Pressure Drop**

***Source/Outdoor Coax***

| Model | GPM | Pressure Drop (psi) | | | |
|---|---|---|---|---|---|
| | | 30°F | 50°F | 70°F | 90°F |
| 360 | 45.0 | 2.6 | 2.4 | 2.4 | 2.3 |
| | 67.5 | 5.6 | 5.1 | 5.1 | 4.8 |
| | 90.0 | 9.5 | 8.7 | 8.7 | 8.2 |

c. Check the supply and return piping. They must be properly connected to the inlet and outlet connections on the unit.

d. If the checks described above fail to reveal the problem and the unit still will not operate, contact a trained service technician to ensure proper diagnosis and repair of the equipment.

**Note: Units have a five minute time delay in the control circuit that can be eliminated on the CXM PCB as shown in Figure 5. See controls description for detailed features of the control.**

**Table 7: Water Temperature Change Through Source Heat Exchanger**

| Water Flow, gpm (l/m) | Rise, Cooling °F (°C) | Drop, Heating °F (°C) |
|---|---|---|
| For Closed Loop: Ground Source or Closed Loop Systems at 3 gpm per ton (3.9 l/m per kw) | 9 - 12 (5 - 6.7) | 4 - 8 (2.2 - 4.4) |
| For Open Loop: Ground Water Systems at 1.5 gpm per ton (2.0 l/m per kw) | 20 - 26 (11.1 - 14.4) | 10 - 17 (5.6 - 9.4) |

## CXM/DXM Safety Control Reset

***Low Water Temperature Cutout - FP1*** - The CXM/DXM control allows the field selection of source fluid low temperature cutout points. The factory setting of FP1 is set for water (35°F [1.7°C]). In cold temperature applications jumper JW3 (FP1- antifreeze 15°F [-9.4°C]) should be clipped as shown in Figure 4 to change the setting to 10°F [-12.2°C], a more suitable temperature when using antifreezes.

***Lockout*** - In Lockout mode, the Status LED will begin fast flashing. The compressor relay is turned off immediately. Lockout mode can be soft reset via the thermostat "Y" input or can be hard reset via the disconnect. The last fault causing the lockout will be stored in memory and can be viewed by going into test mode.

***Fault Retry*** - In Fault Retry mode, the Status LED begins slow flashing to signal that the control is trying to recover from a fault input. The CXM control will stage off the outputs and then "try again" to satisfy the thermostat "Y" input call. Once the thermostat input calls are satisfied, the control will continue on as if no fault occurred. If 3 consecutive faults occur without satisfying the thermostat "Y" input call, then the control will go to Lockout mode. The last fault causing the lockout will be stored in memory and can be viewed by going into test mode.

Consult the CXM/DXM AOM for complete descriptions.

# PREVENTIVE MAINTENANCE

**Water Plate Heat Exchanger Maintenance** –
(Direct Ground Water Applications Only)

If the installation is performed in an area with a known high mineral content (125 P.P.M. or greater) in the water, it is best to establish with the owner a periodic maintenance schedule 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 either the heat exchanger material or 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.

***Clean or replace 20 mesh (841 micron) [0.84mm] strainer/filters on a timely schedule.***

**Water Plate Heat Exchanger Maintenance** –

(All Other Water Loop Applications)

Generally water coil maintenance is not needed however, if the installation is located in a system with a known high dirt or debris content, it is best to establish with the owner a periodic maintenance schedule so the coil can be checked regularly. These dirty installations are a result of the deterioration of iron or galvanized piping or components in the system or open cooling towers requiring heavy chemical treatment and mineral buildup through water use. 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] can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

***Clean or replace 20 mesh (841 micron) [0.84mm] strainer/filters on a timely schedule.***

**Compressors** -

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

**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 for prevention. 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 chart for pressure and temperatures. Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

# NOTES:

# CLIMATE MASTER, INC.
# LIMITED EXPRESS WARRANTY/ LIMITATION OF REMEDIES AND LIABILITY

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climate Master, Inc., a Delaware corporation, ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog or agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CM's opinion or commendation of CM's products. **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. CM MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

**GRANT OF LIMITED EXPRESS WARRANTY**

CM warrants CM products purchased and retained in the United States of America and Canada to be free from defects in material and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating and/or heat pump units built or sold by CM for twelve (12) months from date of unit start-up or eighteen (18) months from date of shipment (from factory), whichever comes first; (2) Repair and replacement parts, which are not supplied under warranty, for nintey (90) days from date of shipment (from factory). All parts must be returned to CM's factory in Oklahoma City, Oklahoma, freight prepaid, no later than sixty (60) days after the date of the failure of the part; if CM determines the part to be defective and within CM's Limited Express Warranty, CM shall, when such part has been either replaced or repaired, return such to a factory recognized dealer, contractor or service organization, F.O.B. CM's factory, Oklahoma City, Oklahoma, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This 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 have been removed or defaced; (5) Products on which payment to CM is or has been in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, alteration or mis application of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CM's printed instructions; or (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CM's products.

CM is not responsible for: (1) The costs of any fluids, refrigerant or other system components, or associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CM's Limited Express Warranty; (2) The costs of labor, refrigerant, materials or service incurred in removal of the defective part, or in obtaining and replacing the new or repaired part (except for the limited labor coverage set forth above); or, (3) Transportation costs of the defective part from the installation site to ClimateMaster or of the return of any part not covered by CM's Limited Express Warranty.

**Limitation:** This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined that other warranties exist, any such express warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty.

**LIMITATION OF REMEDIES**

In the event of a breach of the Limited Express Warranty, CM will only be obligated at CM's option to repair the failed 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 and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR PURCHASER AGAINST CM FOR THE BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

**LIMITATION 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 AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY.**

**OBTAINING WARRANTY PERFORMANCE**

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

Climate Master, Inc. • Customer Service • 7300 S.W. 44th Street • Oklahoma City, Oklahoma 73179 (405) 745-6000

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. 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.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev.: 3/03

LC083

IOM Revision Log:

| Date | Page # | Description |
|---|---|---|
| 05/12/05 | All | Added SI unit equivalents, corrected minor typos |
| 05/12/05 | 2 | Updated decoder for rev B |
| 05/12/05 | 8 | Revised water quality standards table |
| 05/12/05 | 9 | Added LWT notes (caution notes) |
| 05/12/05 | 9 | Added water solenoid valve wiring diagrams |
| 05/12/05 | 10 | Updated entire section on ground loop applications |
| 05/12/05 | 19 | Corrected pressure drop table |
| 05/12/05 | 24 | Added revision log |

CLIMATEMASTER®
7300 S.W. 44th Street
Oklahoma City, OK 73179
Phone: 405-745-6000
Fax: 405-745-6058
www.climatemaster.com

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