Tranquility® Modular Water-to-Water (TMW) Series

Commercial EarthPure® Water-Source Heat Pumps 60Hz

Installation, Operation & Maintenance

97B0059N03
Revised: March 14, 2024

CLIMATEMASTER®
A NIBE GROUP MEMBER

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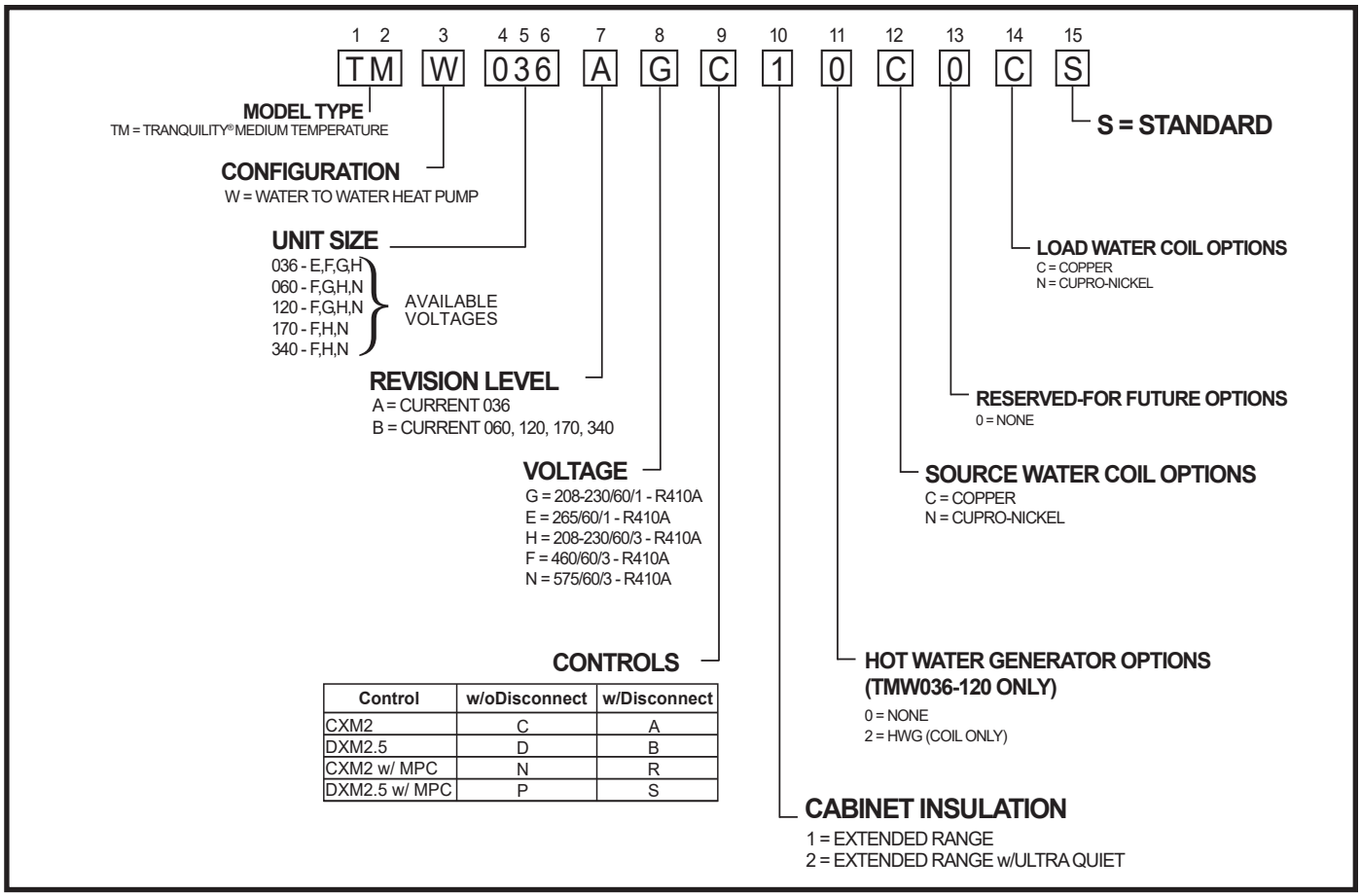
Model Nomenclature



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.

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! 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.

⚠ 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.

⚠ WARNING! ⚠

WARNING! The installation of water-source heat pumps 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.

⚠ WARNING! ⚠

WARNING! Children Being Supervised are NOT to play with the appliance.

⚠ WARNING! ⚠

WARNING! This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

⚠ 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 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. Do not stack TMW170 or 340. The stack limit for TMW036, 060 and 120 is three.

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.

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 Twith 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.

⚠ CAUTION! ⚠

CAUTION! All three phase scroll compressors must have direction of rotation verified at start-up. Verification is achieved by checking compressor Amp draw. Amp draw will be substantially lower compared to nameplate values. Additionally, reverse rotation results in an elevated sound level compared to correct rotation. Reverse rotation will result in compressor internal overload trip within several minutes. Verify compressor type before proceeding.

⚠ CAUTION! ⚠

CAUTION! 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 and store units in an upright position. Tilting units on their sides will 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.

Tranquility® Water-to-Water (TMW) Series

Rev.: March 14, 2024

Unit Physical Data

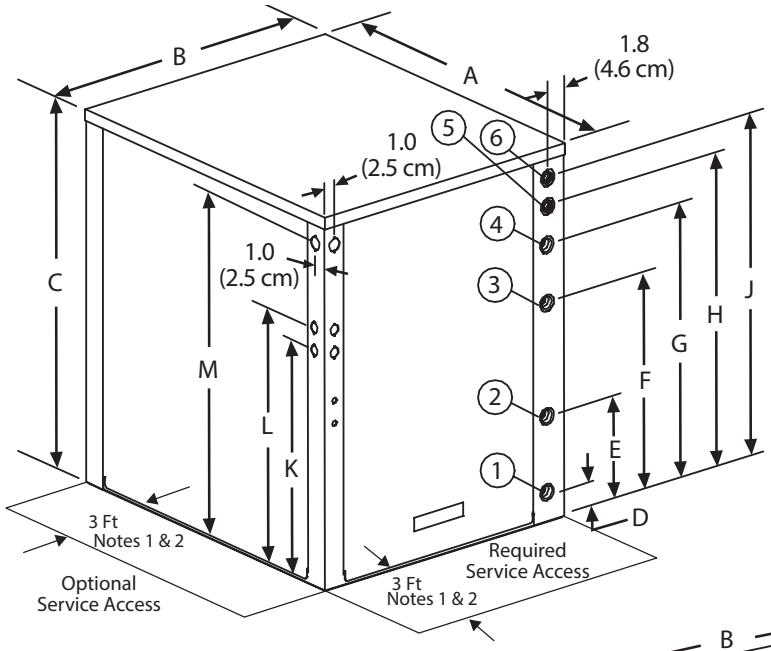
Model	TMW036	TMW060	TMW120	TMW170	TMW340
Compressor (qty)	Scroll (1)		Scroll (2)	Scroll (1)	Scroll (2)
Factory Charge R410A (lbs) [kg] / Circuit	4.5 [2.04]	5.5 [2.49]	5.5 [2.49]	14.9 [6.75]	14.9 [6.75]
Indoor / Load Water connection sizes FPT (in)	3/4”	1”	1-1/2”	2”	
Outdoor / Source Water connection Size FPT (in)	3/4”	1”	1-1/2”	2”	
HWG Water In/Out IPT (in)	1/2”			N/A	
Weight - Operating (lbs) [kg]	348 [158]	360 [163]	726 [329]	790 [358]	1330 [603]
Weight - Shipping (lbs) [kg]	373 [169]	385 [175]	770 [349]	800 [363]	1340 [608]
Water Volume (Source)					
Gallons (LIters)	0.96 (3.64)	1.33 (5.04)	2.65 (10.02)	3.50 (13.27)	6.72 (25.44)

Dual isolated compressor mounting
Balanced port expansion valve (TXV)
Compressor on (green) and fault (red) light

Dual isolated compressor mounting
Balanced port expansion valve (TXV)
Insulated Source and Load Water Coils standard
Insulated Refrigerant Circuit standard
Compressor on (green) and fault (red) light

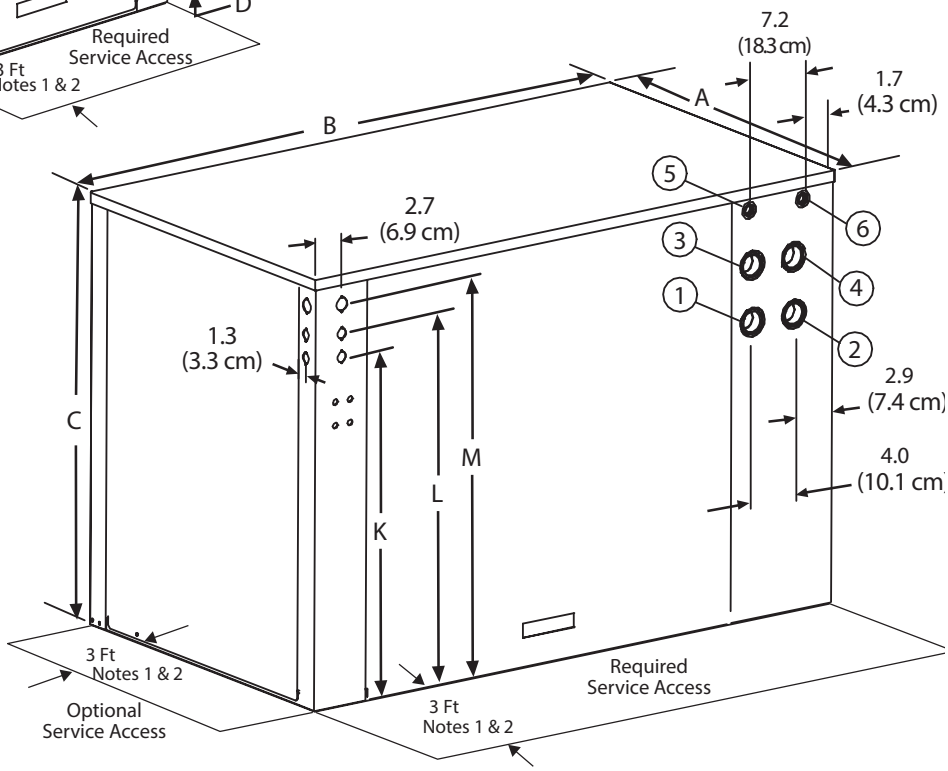
Unit Maximum Water Working Pressure	
Options	**Max Working Pressure PSIG [kPa]**
Base Unit	300 [2,068]
Motorized Valves	400 [2,758]

TMW036-120 – Unit Dimensional Data



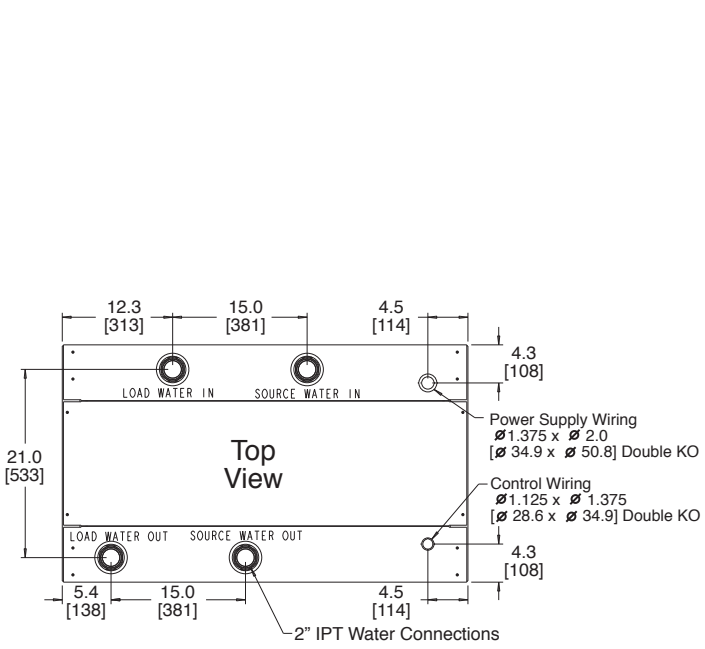
Notes:

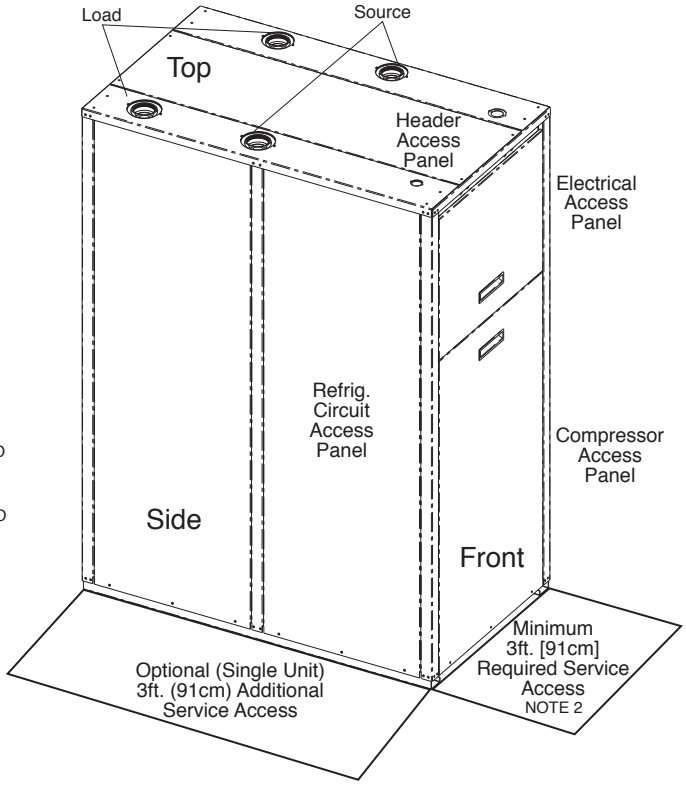
1. Front & side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available.
2. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field services.

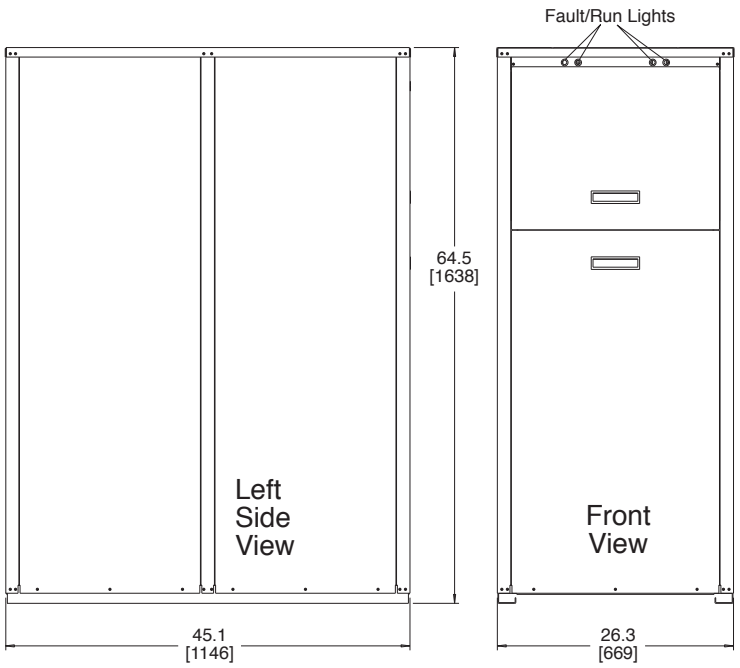


Water to Water		Overall Cabinet			Water Connections						Electric Access Plugs		
					1	2	3	4	5	6			
		A Depth	B Width	C Height	D Source (Outdoor) Water In	E Source (Outdoor) Water Out	F Load (Indoor) Water In	G Load (Indoor) Water Out	H HWG Water In	J HWG Water Out	K Low Voltage	L External Pump	M Power Supply
036-060	in.	30.6	25.4	33	2.7	9.4	19.4	24.5	27.9	30.4	20.9	22.9	30.9
	cm.	77.8	64.5	83.8	6.9	23.9	49.3	62.2	70.9	77.2	53.1	58.2	78.5
120	in.	30.6	52.9	37	25.2	25.2	30.1	30.1	34.9	34.9	29.9	31.9	34.4
	cm.	77.8	134.4	94	64.0	64.0	76.5	76.5	88.6	88.6	75.9	81.0	87.4

TMW170 & 340 – Unit Dimensional Data







Notes: 1. Dimensions shown in inches and [millimeters].
2. For multiple units placed side by side, allow sufficient space front or back to remove unit.

Unit Installation

TMW 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].

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.

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.

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.

⚠ WARNING! ⚠

WARNING! Piping must comply with all applicable codes.

⚠ WARNING! ⚠

WARNING! Do not bend or kink supply lines or hoses.

Piping Installation

⚠ 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.

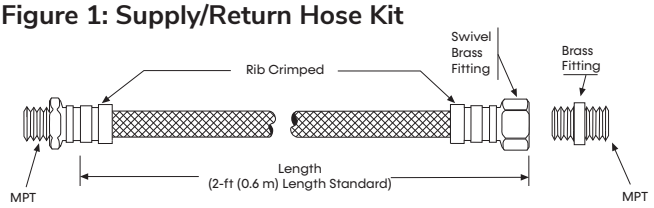
⚠ CAUTION! ⚠

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

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.

Figure 1: Supply/Return Hose Kit



LOAD PLUMBING INSTALLATION

TMW 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.
- 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:

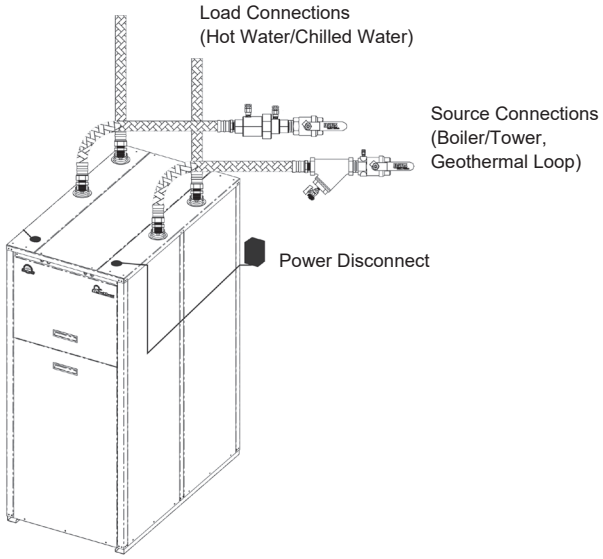
- Load coax should be isolated with secondary heat exchanger constructed of anti-corrosion material in all chlorine/bromine fluid applications.

Potable Water Applications:

- Potable water systems require field supplied external secondary heat exchanger.
- Insure load water flow in high temperature heating applications is at least 3 gpm per ton to improve performance & reduce nuissance to high pressure faults.

Note: The manufacturer strongly recommends all piping connections, both internal and external to the unit, be pressure tested by an appropriate method prior to any finishing of the interior space or before access to all connections is limited. Test pressure may not exceed the maximum allowable pressure for the unit and all components within the water system. The manufacturer will not be responsible or liable for damages from water leaks due to inadequate or lack of a pressurized leak test, or damages caused by exceeding the maximum pressure rating during installation.

Figure 2: Typical Water Loop Application



Water-Loop Heat Pump 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 for FPT water connections (commercial class) 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 TMW Series and the piping system. 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 Piping System Cleaning and Flushing Procedures later in this document. 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 - CXM2 or DXM2.5 Control: When an antifreeze is selected, the LT1 jumper (JW3) should be clipped to select the low temperature (Antifreeze 15°F [-9.4°C]) setpoint to avoid nuisance faults. See Figure 4: Low Water Temperature Cutout - LT1.

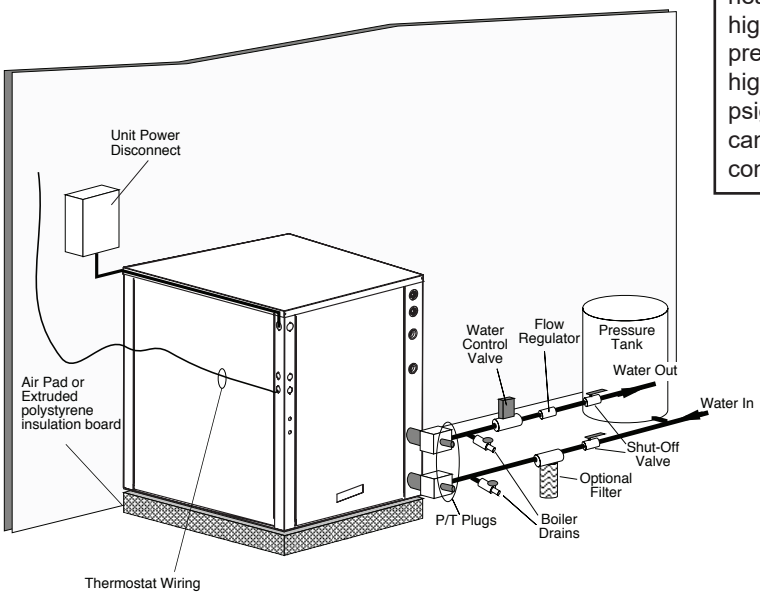
⚠ WARNING! ⚠

WARNING! Never jumper terminal "A" from CXM2 or DXM2.5 board #1 to CXM2 or DXM2.5 board #2 on multi-compressor/control bound units. See Figure 5 in electrical section of this document for motorized valve wiring.

⚠ CAUTION! ⚠

CAUTION! Many units are installed with a factory or field supplied manual or electric shut-off valve. DAMAGE WILL OCCUR if shut-off valve is closed during unit operation. A high pressure switch must be installed on the heat pump side of any field provided shut-off valves and connected to the heat pump controls in series with the built-in refrigerant circuit high pressure switch to disable compressor operation if water pressure exceeds pressure switch setting. The field installed high pressure switch shall have a cut-out pressure of 300 psig and a cut-in pressure of 250 psig. This pressure switch can be ordered from ClimateMaster with a 1/4" internal flare connection as part number 39B0005N02.

Figure 3: Typical Open Loop/Well Application



Ground-Water Heat Pump Applications

Typical open loop piping is shown in Figure 3. 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. Supply and return water piping materials should be limited to copper, PE, or similar material. PVC or CPVC should never be used as they are incompatible with the POE oils used in HFC-410A products and piping system failure and property damage may result.

Water quantity should be plentiful and of good quality. Consult Table 1 for water quality guidelines. The unit can be ordered with either a copper or cupro-nickel water heat exchanger. Copper is recommended for closed loop systems and open loop ground water systems that are not high in mineral content or corrosiveness. In conditions anticipating heavy scale formation or in brackish water, a cupro-nickel heat exchanger is recommended.

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. It is recommended to install an intermediate heat exchanger to isolate an open loop from the heat pump loop on open well systems. 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.

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.

⚠ 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.

⚠ WARNING! ⚠

WARNING! Never jumper terminal "A" from CXM2 or DXM2.5 board #1 to CXM2 or DXM2.5 board #2 on multi-compressor/control bound units. See Figure 5 in electrical section of this document for motorized valve wiring.

Low Water Temperature Cut-Out Setting - For all open loop systems the 35°F [1.7°C] LT1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See Figure 4: "Low Water Temperature Cutout - LT1".

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 Taco slow closing valve's solenoid 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 the Taco slow closing valve can draw up to 35VA. This can overload smaller 40 or 50 VA transformers depending on the other controls employed. A typical pilot operated solenoid valve draws approximately 15VA.

Ground-Water Heat Pump Applications, Cont'd.

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 Tables 7 and 8. 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 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.

⚠ CAUTION! ⚠

CAUTION! Many units are installed with a factory or field supplied manual or electric shut-off valve. DAMAGE WILL OCCUR if shut-off valve is closed during unit operation. A high pressure switch must be installed on the heat pump side of any field provided shut-off valves and connected to the heat pump controls in series with the built-in refrigerant circuit high pressure switch to disable compressor operation if water pressure exceeds pressure switch setting. The field installed high pressure switch shall have a cut-out pressure of 300 psig and a cut-in pressure of 250 psig. This pressure switch can be ordered from ClimateMaster with a 1/4" internal flare connection as part number 39B0005N02.

⚠ CAUTION! ⚠

CAUTION! Low temperature limit 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].

Ground-Loop Heat Pump Applications

⚠ CAUTION! ⚠

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 recommendations 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. Flush the loop first with the unit isolated to avoid flushing debris from the loop into the unit heat exchanger.

Table 1: 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	25%	21%	16%	10%
100% USP food grade Propylene Glycol	38%	25%	22%	15%
Ethanol*	29%	25%	20%	14%

* Must not be denatured with any petroleum based product

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. Low temperature 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 low temperature 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 2 for the amount of antifreeze. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Low Water Temperature Cut-Out Setting - CXM2 or DXM2.5 Control: When an antifreeze is selected, the LT1 jumper [JW3] should be clipped to select the low temperature (Antifreeze 15°F [-9.4°C]) setpoint to avoid nuisance faults. See Figure 4.

Ground-Loop Heat Pump Applications, Cont'd.

Water Control Valve - Note the placement of the water control valve. Always maintain water pressure in the heat exchanger by installing water control valves at the source out of the unit to prevent mineral precipitation. Position water high pressure switch between unit and valve. 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.

Flow Regulation - Install on source in of unit. 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 2.5 to 3 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.

⚠ WARNING! ⚠

WARNING! Never jumper terminal "A" from CXM2 or DXM2.5 board #1 to CXM2 or DXM2.5 board #2 on multi-compressor/control bound units. See Figure 5 in electrical section of this document for motorized valve wiring.

⚠ CAUTION! ⚠

CAUTION! Many units are installed with a factory or field supplied manual or electric shut-off valve. DAMAGE WILL OCCUR if shut-off valve is closed during unit operation. A high pressure switch must be installed on the heat pump side of any field provided shut-off valves and connected to the heat pump controls in series with the built-in refrigerant circuit high pressure switch to disable compressor operation if water pressure exceeds pressure switch setting. The field installed high pressure switch shall have a cut-out pressure of 300 psig and a cut-in pressure of 250 psig. This pressure switch can be ordered from ClimateMaster with a 1/4" internal flare connection as part number 39B0005N02.

Tranquility® Water-to-Water (TMW) Series

Rev.: March 14, 2024

Water Quality Requirements

Table 2: 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 standards listed in this table.

WATER QUALITY REQUIREMENTS

For Closed-Loop and Open-Loop Systems

				Heat Exchanger Type			
				Closed Loop Recirculating	Open Loop, Tower, Ground Source Well		
	Description	Symbol	Units	All Heat Exchanger Types	COAXIAL HX Copper Tube in Tube	COAXIAL HX Cupronickel	Brazed Plate HX 316 SS
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	($HCO3^-$)	ppm - $CaCO_3$ 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	(CaCO3)	ppm - CaCO3 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 - $CaCO_3$ equiv.	<1000	<1000	<1000	<1500
	Sulfate	(SO_4^{2-})	ppm	<200	<200	<200	<200
	Nitrate	(NO_3^-)	ppm	<100	<100	<100	<100
	Chlorine (free)	(Cl)	ppm	<0.5	<0.5	<0.5	<0.5
	Chloride (water < 80°F)	(Cl^-)	ppm	<20	<20	<150	<150
	Chloride (water > 120°F)		ppm	<20	<20	<125	<125
	Hydrogen Sulfide[α]	(H_2S)	ppb	<0.5	<0.5	<0.5	<0.5
	Carbon Dioxide	(CO_2)	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_3)	ppm	<0.05	<0.1	<0.1	<0.1
	Chloramine	(NH_2CL)	ppm	0	0	0	0
Fouling & Biological	Iron Bacteria		cells/mL	0	0	0	0
	Slime Forming Bacteria		cells/mL	0	0	0	0
	Sulfate reducing bacteria		cells/mL	0	0	0	0
	Suspended Solids[β]	(TSS)	ppm	<10	<10	<10	<10
Electrolysis All HX types	Earth Ground Resistance[χ]		Ohms	0	Consult NEC & local electrical codes for grounding requirements		
	Electrolysis Voltage[δ]		mV	<300	Measure voltage internal water loop to HP ground		
	Leakage Current[δ]		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.

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

α Hydrogen Sulfide has an odor of rotten eggs. If one detects this smell, a test for H2S must be performed. If H2S 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.

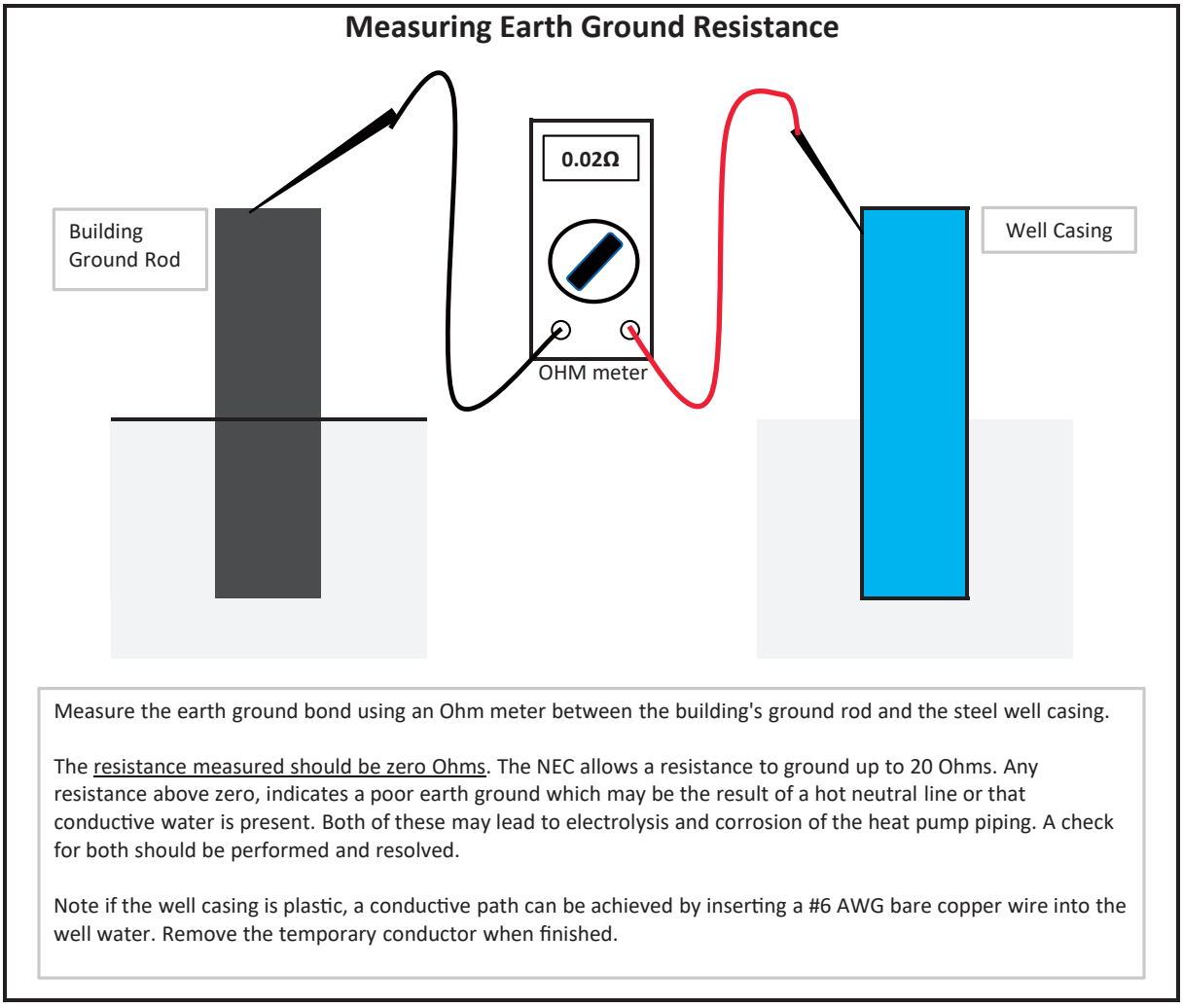
β Suspended solids and particulates must be filtered to prevent fouling and failure of heat exchangers. Strainers or particulate filters must be installed to provide a maximum particle size of 600 micron (0.60 mm, 0.023 in.) using a 20 to 30 mesh screen size. When a loop is installed in areas with fine 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.

Water Quality Requirements, Cont'd.



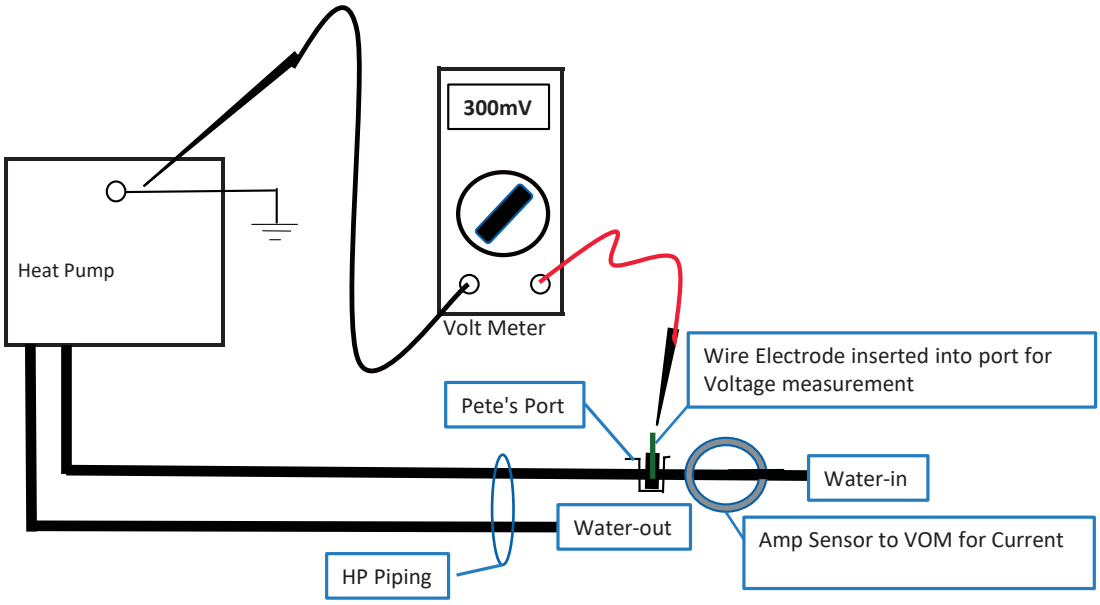
Measure the earth ground bond using an Ohm meter between the building's ground rod and the steel well casing.

The resistance measured should be zero Ohms. The NEC allows a resistance to ground up to 20 Ohms. Any resistance above zero, indicates a poor earth ground which may be the result of a hot neutral line or that conductive water is present. Both of these may lead to electrolysis and corrosion of the heat pump piping. A check for both should be performed and resolved.

Note if the well casing is plastic, a conductive path can be achieved by inserting a #6 AWG bare copper wire into the well water. Remove the temporary conductor when finished.

Water Quality Requirements, Cont'd.

Measuring Electrolysis Voltage and Current



Measure the electrolysis voltage using a volt meter between the heat pump ground and a #14 AWG solid copper wire electrode inserted into the water using a Pete's style access port.

The HP must be operating and the water stream flowing.

The voltage measured should be less than 300mV (0.300 V). If higher than 500mV electrolysis will occure and corrosion will result.

If voltage is measured, the cause is a high resistance earth ground or current on the neutral conductor. Remedial measures should be performed.

Measure the current flowing through the piping system by using an amp clamp probe on the water-in line. The HP must be operating and the water stream flowing.

There should be zero amps measured. If current is present, there is leakage current to the plumbing system and it must be rectified to prevent pipe corrosion.

Electrical – Line Voltage

⚠ CAUTION! ⚠

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

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.

TMW Power Connection - Line voltage connection is made by connecting the incoming line voltage wires to L1, L2, and L3 on power distribution block. Consult electrical data table 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.

⚠ WARNING! ⚠

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

⚠ 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.

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.

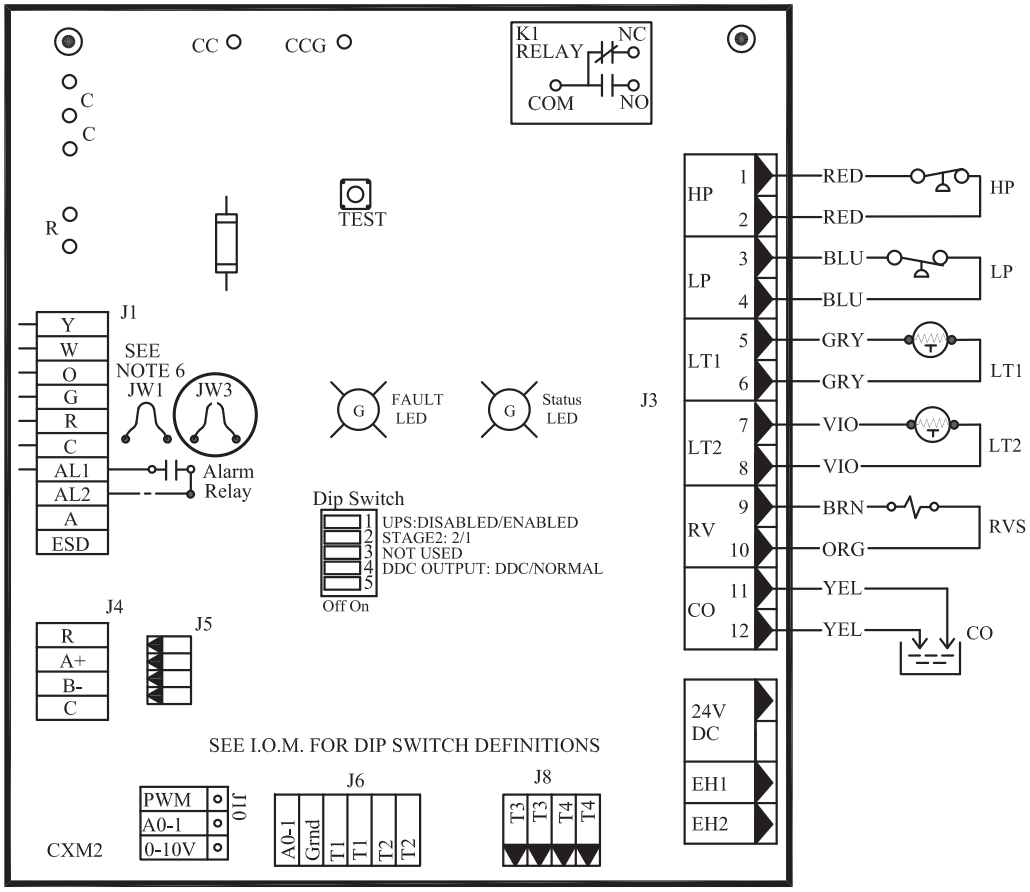
Consult the unit wiring diagram located on the inside of the compressor access panel to ensure proper electrical hookup. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

TMW Electrical Data

Model	Voltage Code	Volatge	Voltage Min/Max	Compressor			Total Unit FLA	Min Circuit Amps	SCCR rms Symetrical	SCCR Volts Maximum	Max Fuse/ HACR
				Qty	RLA	LRA					
TMW036	G	208-230/60/1	187/254	1	16.7	79	16.7	20.8	5	600	35
	E	265/60/1	239/292	1	13.5	72	13.5	16.8	5	600	30
	H	208-230/60/3	187/254	1	10.4	73	10.4	13.1	5	600	20
	F	460/60/3	414/506	1	5.8	38	5.8	7.2	5	600	15
	N	575/60/3	518/633	1	3.8	36.5	3.8	4.7	5	600	15
TMW060	G	208-230/60/1	187/254	1	26.3	134	26.3	32.9	5	600	50
	H	208-230/60/3	187/254	1	15.6	110	15.6	19.5	5	600	35
	F	460/60/3	414/506	1	7.8	52	7.8	9.8	5	600	15
TMW120	G	208-230/60/1	187/254	2	26.3	134	52.6	59.2	5	600	80
	H	208-230/60/3	187/254	2	15.6	110	31.2	35.1	5	600	50
	F	460/60/3	414/506	2	7.8	52	15.6	17.6	5	600	25
TMW170	H	208-230/60/3	187/254	1	53.6	245	53.6	67.0	5	600	110
	F	460/60/3	414/506	1	20.7	125	20.7	25.9	5	600	45
	N	575/60/3	518/633	1	16.4	100	16.4	20.5	5	600	35
TMW340	H	208-230/60/3	187/254	2	53.6	245	107.2	120.6	5	600	150
	F	460/60/3	414/506	2	20.7	125	41.4	46.6	5	600	60
	N	575/60/3	518/633	2	16.4	100	32.8	36.9	5	600	50

Electrical – Low Voltage

Figure 4: Changing LT1-Low Water Temperature Cutout Setpoint



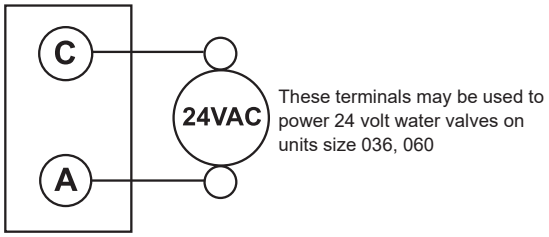
Thermostat Connections - The aquastat/thermostat should be wired directly to the CXM2/DXM2.5 board #1. Note: The TMW second stage is wired directly to the CXM2 #2.

Low Water Temperature Cutout - LT1 - The CXM2/DXM2.5 control allows the field selection of source fluid low temperature cutout points. The factory setting of LT1 is set for water (35°F [1.7°C]). In cold temperature applications jumper JW3 (LT1- 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. Never clip JW3 prior to antifreeze being added to the loop.

Electrical – Accessories

Accessory Connections - A terminal paralleling the compressor contactor coil has been provided on the CXM2/DXM2.5 control of the TMW line. "A" has been provided to control accessory devices, such as water valves, electronic air cleaners, humidifiers, etc. Note: This terminal must be used only with 24 Volt signals and not line voltage signals. This signal operates with the compressor contactor. See Figure 8 or the wiring schematic for details.

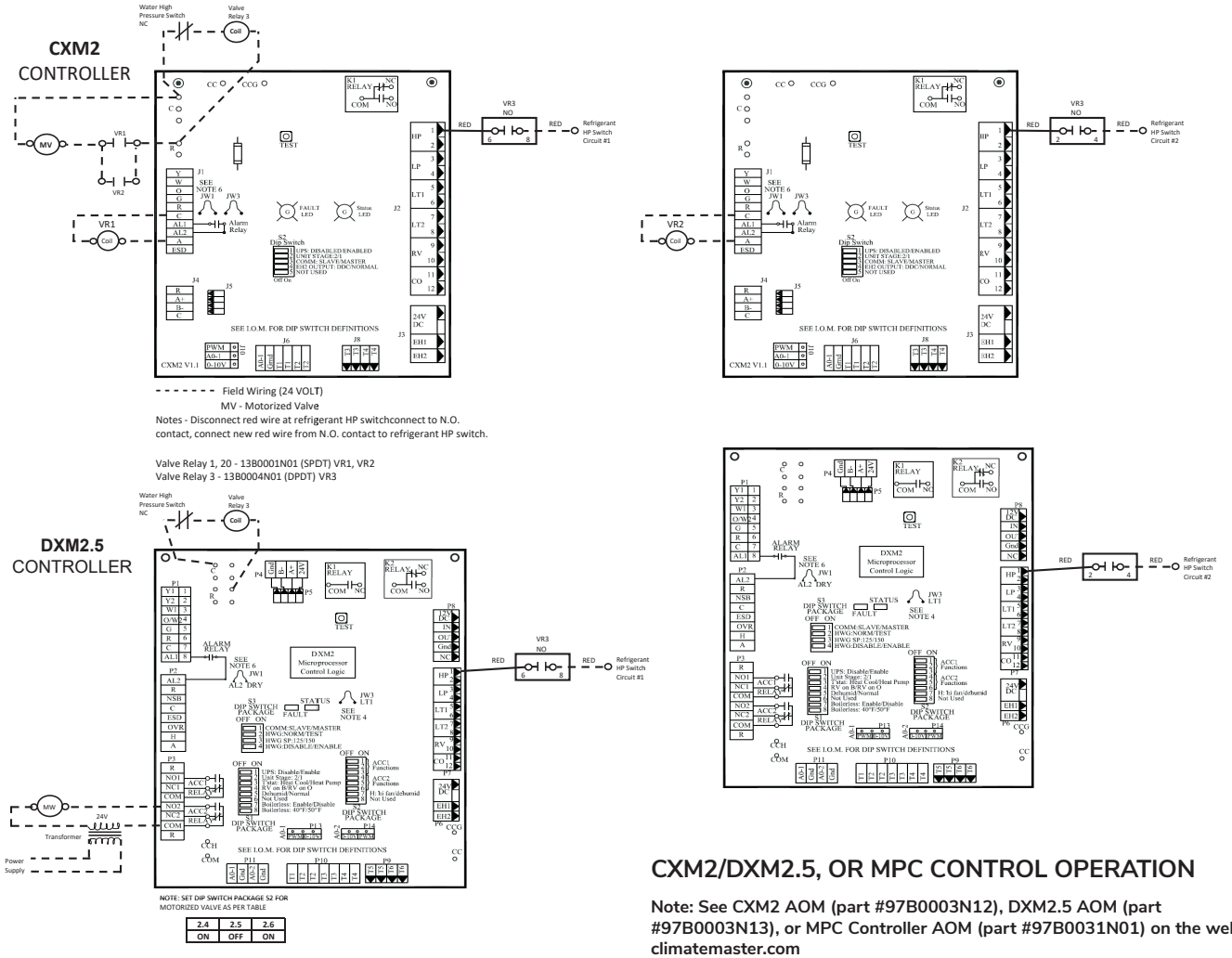
24 Volt Accessory Wiring
CXM2/DXM2.5 Terminal Strip



⚠ WARNING! ⚠

WARNING! Never jumper terminal "A" from CXM2 or DXM2.5 board #1 to CXM2 or DXM2.5 board #2 on multi-compressor/control bound units. See Figure 5 in electrical section of this document for motorized valve wiring.

Figure 5: Field Wiring of 24 Volt Motorized Valve for Units Size 120-340



CXM2/DXM2.5, OR MPC CONTROL OPERATION

Note: See CXM2 AOM (part #97B0003N12), DXM2.5 AOM (part #97B0003N13), or MPC Controller AOM (part #97B0031N01) on the web at climatemaster.com

ALL wiring diagrams are available at climatemaster.com

Electrical – Line Voltage

All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes.

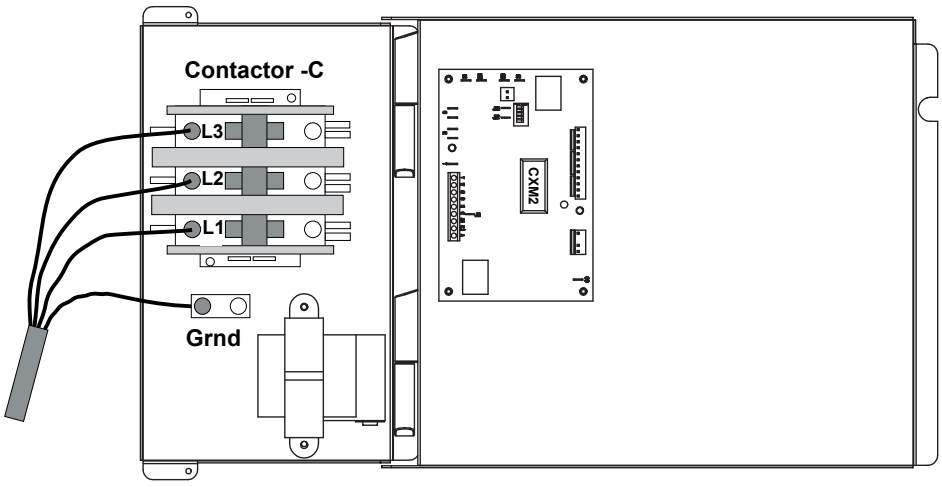
Refer to the unit wiring diagrams for fuse sizes and a schematic of the field connections which must be made by the installing (or electrical) contractor.

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

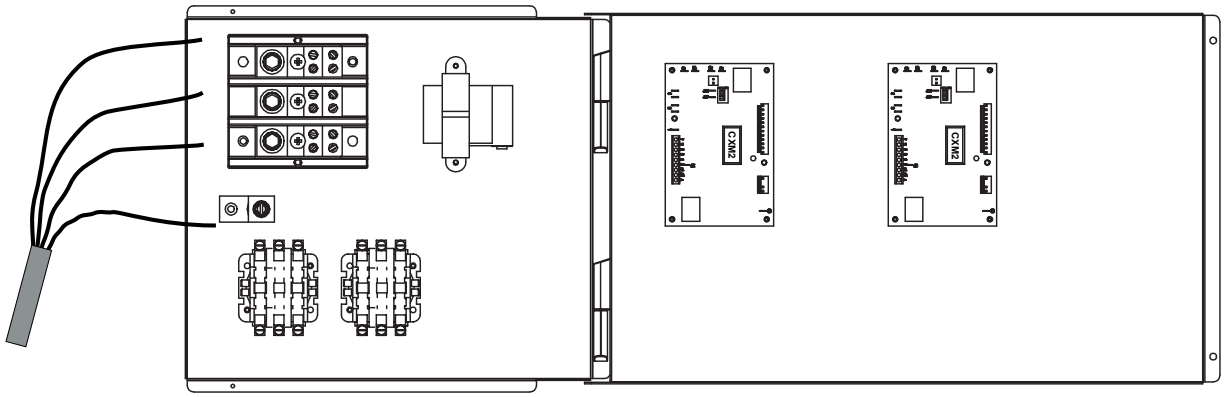
All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

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 (230V) and the Orange (208V) at the contactor terminal L2.

TMW036-060 Series Line Voltage Field Wiring Commercial Class (3 phase shown)



TMW120 Series Line Voltage Field Wiring Commercial Class



ALL wiring diagrams available at climatemaster.com

Electrical – Low Voltage

Thermostat Connections - The aquastat/thermostat should be wired directly to the CXM2/DXM2.5 board as shown in Figure 6a for TMW036-060 and Figure 6b for the TMW120. Note the TMW second stage is wired directly to the CXM2 #2.

Figure 6a. TMW036-060 Low Voltage Field Wiring (CXM2 shown)

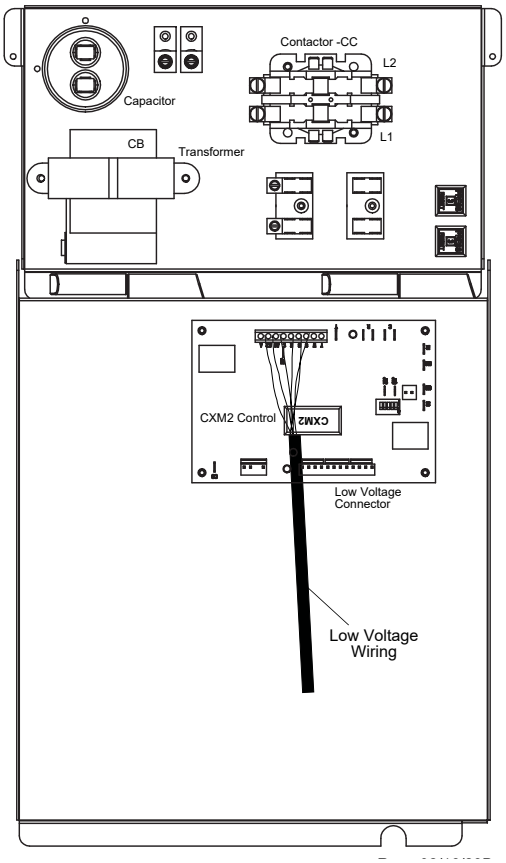
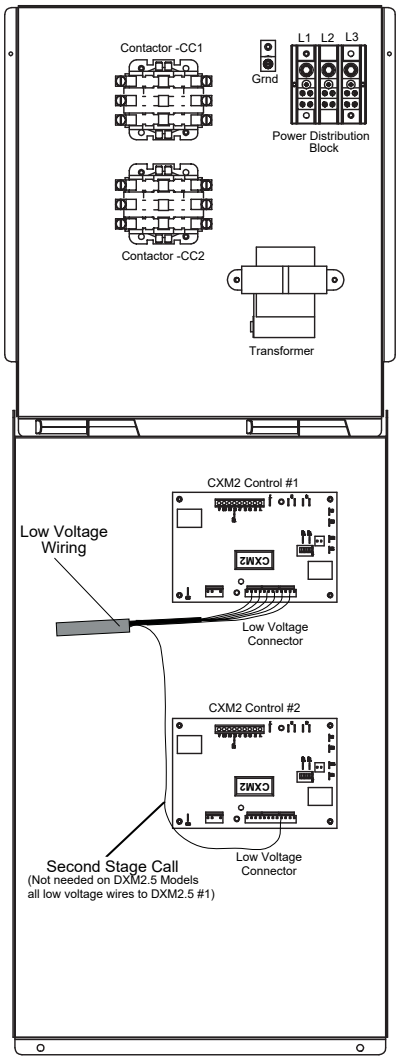
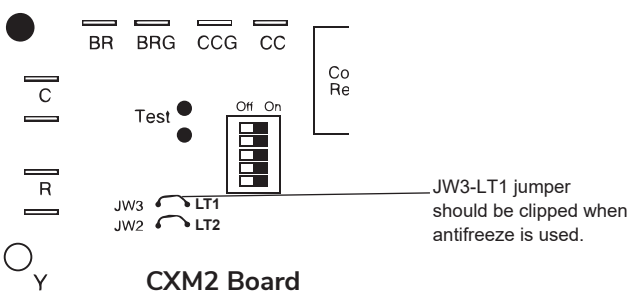


Figure 6b: TMW120 Low Voltage Field Wiring (CXM2 shown)



Low Water Temperature Cutout - LT1 - The CXM2/DXM2.5 control allows the field selection of source fluid low temperature cutout points. The factory setting of LT1 is set for water (30°F). In cold temperature applications jumper JW3 (LT1- antifreeze 10°F) should be clipped as shown in Figure 7 to change the setting to 10°F, a more suitable temperature when using antifreezes. It should be noted that the extended range option should be specified to operate the TMW Series at entering water temperatures below 60°F.

Figure 7: Changing LT1-Low Water Temperature Cutout Setpoint



TMW Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com.
Click 'Commercial Professional'.

1. Click 'Products' in the main navigation
2. Select 'Water-to-Water Series'
3. Select the TMW product series
4. Click the Wire Diagrams tab in the middle of the page
5. Select your voltage and controls

Unit Controller	Voltage	Size			
		TMW036-060	TMW170	TMW120	TMW340
CXM2	208-230/60/1, 265/60/1	96B0401N52		96B0401N58	
	208-230/60/3, 460/60/3, 575/60/3	96B0401N53	96B0401N61	96B0401N59	96B0401N69
AUX WD CXM2 w/MPC	All	96B0146N14	96B0401N76	96B0146N16	96B0401N76
DXM2.5	208-230/60/1, 265/60/1	96B0402N38		96B0402N41	
	208-230/60/3, 460/60/3, 575/60/3	96B0402N39	96B0402N44	96B0402N42	96B0402N50
AUX WD DXM2 w/MPC	All	96B0146N14	96B0402N56	96B0146N16	96B0402N56

Piping System Cleaning & 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.

⚠ CAUTION! ⚠

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

8. When the cleaning process is complete, remove the short-circuited hoses. Reconnect the hoses to the proper supply, and return 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! ⚠

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.

Controls – CXM2 and DXM2.5

CXM2 Controls

For detailed controller information, see the CXM2 Application, Operation, and Maintenance (AOM) manual (part # 97B0137N01). To confirm the controller type of your particular unit, refer to digit 9 on the unit model number and the unit nomenclature diagram found on page 3 of this manual.

DXM2.5 Controls

For detailed controller information, see the DXM2.5 Application, Operation, and Maintenance (AOM) manual (part # 97B0142N01). To confirm the controller type of your particular unit, refer to digit 9 on the unit model number and the unit nomenclature diagram found on page 3 of this manual.

Unit & System Checkout

⚠ WARNING! ⚠

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.

Note: The manufacturer strongly recommends all piping connections, both internal and external to the unit, be pressure tested by an appropriate method prior to any finishing of the interior space or before access to all connections is limited. Test pressure may not exceed the maximum allowable pressure for the unit and all components within the water system. The manufacturer will not be responsible or liable for damages from water leaks due to inadequate or lack of a pressurized leak test, or damages caused by exceeding the maximum pressure rating during installation.

⚠ 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.

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.
- ❑ 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 CXM2/DXM2.5 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 CXM2 or DXM2.5 field selection options are proper and complete.

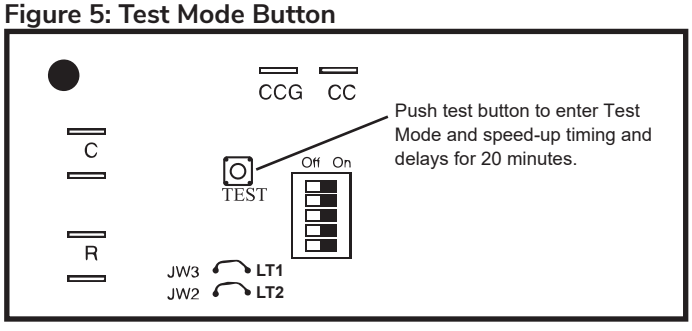
SYSTEM CHECKOUT

- ❑ 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! ⚠

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.

Figure 5: Test Mode Button



CXM2 BOARD

Unit Start-Up Procedure

⚠ 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.

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.
   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.

⚠ WARNING! ⚠

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.

Operating and Commissioning Limits

Building Commissioning						
	Cooling			Heating		
Unit Size	036	060/120	170/340	036	060/120	170/340
Source Min/Max	50/110	50/120	50/90	30/80	30/80	50/70
Load Min/Max	60/80	60/90	60/90	60/120	60/120	80/120
Ambient Min/Max	45/110			39/85		
Building Operating						
	Cooling			Heating		
Unit Size	036	060/120	170/340	036	060/120	170/340
Source Min/Max	50/120	50/120	50/110	20/80	20/80	20/70
Load Min/Max	50/90	50/90	50/90	60/130	60/130	60/120
Ambient Min/Max	45/110			39/85		

Note: Units have a five minute time delay in the control circuit that can be eliminated on the CXM2 PCB as shown in Figure 5. See controls description for detailed features of the control.

Table 6: 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]

Table 7: Coax Water Pressure Drop TMW170/340

Model	GPM	Pressure Drop PSI (FT)			
		30°F	50°F	70°F	90°F
Source/Outdoor Coax					
340	35 53 70	1.6 (3.7) 4.0 (9.3) 7.2 (16.6)	1.2 (2.7) 3.6 (8.3) 6.5 (15.0)	1.0 (2.3) 3.3 (7.6) 5.9 (13.6)	0.9 (2.0) 3.0 (7.0) 5.5 (12.6)
170	18 27 35	0.8 (1.9) 2.7 (6.3) 4.8 (11.2)	0.4 (1.0) 1.7 (3.9) 3.3 (7.6)	0.2 (0.4) 1.5 (3.4) 3.0 (6.9)	0.1 (0.3) 1.4 (3.1) 2.8 (6.4)
Model	**l/s**	Pressure Drop kPa			
		0°C	10°C	20°C	30°C
Source/Outdoor Coax					
340	2.21 3.34 4.42	11.03 26.88 48.95	8.27 24.82 44.82	7.22 23.10 41.36	6.29 21.29 38.47
170	1.1 1.67 2.21	4.82 17.92 32.40	2.76 11.72 22.75	1.72 11.38 21.37	.88 9.47 19.30

Table 8: Coax Water Pressure Drop TMW036-120

Model	GPM	Pressure Drop PSI			
		30°F	50°F	70°F	90°F
Source/Outdoor Coax					
036	4.5 6.8 9.0	1.7 4.1 7.1	1.3 3.4 6.0	1.0 2.8 5.1	0.8 2.4 4.5
060	7.5 11.3 15.0	1.5 4.0 6.9	1.3 3.4 6.2	1.1 3.0 5.5	0.9 2.7 5.0
120	15.0 22.5 30.0	1.7 4.4 7.6	1.4 3.8 6.8	1.2 3.3 6.1	0.9 2.7 5.0
Load/Outdoor Coax					
036	4.5 6.8 9.0		0.6 1.4 2.6	0.5 1.3 2.4	0.3 1.1 2.2
060	7.5 11.3 15.0		1.4 3.5 6.2	1.3 3.2 5.8	1.2 3.0 5.5
120	15.0 22.5 30.0		1.6 3.8 6.8	1.4 3.5 6.4	1.3 3.3 6.0

Must use antifreeze if operation falls in grey area

Operation not recommded

Multiply PSI x 2.31 to determine ft of hd

Operating Pressures

TMW036-340 (TMW120, 340 Per Circuit)								
Source Entering Water Temp ºF	Source Water Flow GPM/ ton	Cooling						
		Load EWT F @ 1.5-3.0 GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Rise ºF Source	Water Temp Drop ºF Load
50	1.5	50	99-106	230-234	11-18	18-25	20-28	7-15
		60	111-122	241-243	11-18	18-25		8-17
		70	122-137	251-253	17-25	18-25		8-19
		80	126-145	254-258	26-35	18-25		9-20
	2.3	50	98-105	212-214	18-23	14-20	13-18	7-15
		60	106-117	218-220	18-23	14-20		8-17
		70	114-129	225-227	24-32	14-20		9-19
		80	117-135	228-230	32-41	14-20		9-20
	3.0	50	87-101	199-203	12-18	12-18	9-12	8-16
		60	91-113	203-207	12-18	12-18		8-17
		70	95-124	204-216	16-34	12-18		9-19
		80	107-128	212-217	33-35	12-18		9-20
80	1.5	50	104-111	343-348	9-14	18-25	19-28	7-14
		60	121-132	355-360	9-14	18-25		7-16
		70	138-152	367-373	9-14	18-25		8-18
		80	148-161	377-381	12-23	18-25		9-20
	2.3	50	103-111	320-325	8-14	14-21	13-18	7-14
		60	118.-129	328-334	8-14	14-21		8-16
		70	132-147	336-344	12-20	14-21		8-18
		80	140-172	343-353	19-29	14-21		9-20
	3.0	50	94-110	305-314	9-13	12-18	8-12	7-15
		60	112-121	313-319	9-13	12-18		8-16
		70	121-146	317-329	12-20	12-18		9-18
		80	131-151	324-333	18-27	12-18		9-20
110	1.5	50	109-116	483-497	9-13	17-23	18-26	5-11
		60	128-135	494-511	9-13	17-23		6-13
		70	147-154	505-525	9-13	17-23		7-15
	2.3	50	109-116	459-473	9-13	15-20	14-17	5-11
		60	127-135	466-484	9-13	15-20		6-13
		70	153-159	473-495	9-13	15-20		7-15
	3.0	50	100-112	444-431	9-14	12-17	8-13	5-12
		60	120-130	449-467	9-14	12-17		6-14
		70	131-152	454-474	9-14	12-17		7-15
		80	153-164	463-479	13-21	12-17		8-17

Operating Pressures, Cont'd.

TMW036-340 (TMW120, 340 Per Circuit)								
Source Entering Water Temp ºF	Source Water Flow GPM/ ton	Heating						
		Load EWT F @ 1.5-3.0 GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Drop ºF Source	Water Temp Rise ºF Load
20	3.0	60	56-63	199-228	4-14	6-14	2-6	5-14
		80	58-65	286-297	4-14	6-14		5-14
		90	59-66	310-344	4-14	6-14		4-14
		100	61-65	360-385	4-14	6-14		4-14
		120	64-69	459-510	4-14	6-14		4-13
50	1.5	60	85-95	212-224	6-11	7-11	9-16	6-17
		80	91-99	290-310	6-11	7-11		6-17
		90	92-101	326-338	6-11	7-11		6-17
		100	96-103	381-399	6-11	7-11		5-17
		120	100-108	474-488	6-11	7-11		4-16
	2.3	60	95-102	215-228	6-13	7-11	6-12	7-18
		80	98-106	299-313	6-13	7-11		6-18
		90	99-108	329-341	6-13	7-11		6-18
		100	102-110	384-401	6-13	7-11		6-17
		120	106-114	475-491	6-13	7-11		5-17
	3.0	60	95-107	215-256	6-14	7-15	5-9	7-19
		80	101-110	310-326	6-14	7-15		7-19
		90	103-112	329-376	6-14	7-15		6-19
		100	105-114	399-414	6-14	7-15		6-18
		120	108-118	476-524	6-14	7-15		5-17
80	1.5	60	109-129	225-237	14-26	5-14	15-21	8-18
		80	123-138	314-327	14-26	5-14		8-19
		90	130-142	343-357	10-15	5-14		7-19
		100	137-147	402-415	10-15	5-14		7-19
		120	150-157	493-504	10-15	5-14		6-20
	2.3	60	111-132	227-239	14-38	6-15	10-15	8-20
		80	135-147	315-330	14-38	6-15		8-20
		90	143-152	344-360	10-16	6-15		8-20
		100	145-154	405-418	10-16	6-15		7-20
		120	156-163	494-507	10-16	6-15		6-20
	3.0	60	110-149	227-279	19-44	6-18	7-12	9-21
		80	135-150	286-332	19-44	6-18		8-21
		90	145-166	345-408	13-23	6-18		8-21
		100	148-158	405-420	13-23	6-18		8-21

Preventive Maintenance

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 2.5 gpm per ton [2.0 l/m per kW] is recommended as a minimum flow.

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.

If the refrigerant circuit is opened for any reason, a new liquid line filter-drier must be installed.

A NIBE GROUP MEMBER

CLIMATE MASTER, INC.
LIMITED EXPRESS WARRANTY /LIMITATION OF REMEDIES AND LIABILITY
(FOR INTERNATIONAL CLASS PRODUCTS)

Disclaimer: It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climate Master, Inc., a Delaware corporation, U. S. A. ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog, this or any other agreement or other materials, 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 AND TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, CM MAKES NO WARRANTY AS TO ANY OF CM'S PRODUCTS, AND CM MAKES NO WARRANTY AGAINST LATENT DEFECTS OR ANY 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 installed outside the United States of America ("U.S.A.") and Canada to be free from material defects in materials and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating 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 CM's factory), whichever comes first; and, (2) Repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from factory).

Warranty parts shall be furnished by CM if ordered through an authorized sales representative of CM ("Representative") within sixty (60) days after the failure of the part. If CM determines that a parts order qualifies for replacement under CM's warranty, such parts shall be shipped freight prepaid to the Representative or the ultimate user, as requested by Representative. All duties, taxes and other fees shall be paid by the ultimate user through the Representative.

If requested by CM, all defective parts shall be returned to CM's factory in Oklahoma City, Oklahoma, U.S.A, freight and duty prepaid, not later than sixty (60) days after the date of the request. If the defective part is not timely returned or if CM determines the part to not be defective or otherwise not to qualify under CM's Limited Express Warranty, CM shall invoice Customer the costs for the parts furnished, including freight. 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 by Customer to CM or its distributors or Representatives, or the Customer's seller is in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or from parts or components manufactured by others; or are caused by accident, misuse, negligence, abuse, fire, flood, lightning, alteration or misapplication 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 flow rates, or unauthorized opening of the refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products, parts or components 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; (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application, installation, or use of CM's products; or (14) Electricity or fuel costs, or any increases or unrealized savings in same, for any reason.

CM is not responsible for: (1) The cost of any fluids, refrigerant or other system components, or the 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 cost of labor, refrigerant, materials or service incurred in diagnosis and removal of the defective part, or in obtaining and replacing the new or repaired part; (3) Transportation costs of the defective part from the installation site to CM or of the return of any part not covered by CM's Limited Express Warranty; or (4) The costs of normal maintenance.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined by a court or other qualified judicial body that other warranties exist, any such warranty, including without limitation any express warranty or any implied warranty of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty. This Limited Express Warranty does not exclude any warranty that is mandatory and that may not be excluded under applicable imperative law.

LIMITATION OF REMEDIES

In the event of a breach of this Limited Express Warranty or any warranty that is mandatory under applicable imperative law, CM will only be obligated at CM's option to either 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, U.S.A. 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. **TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AGAINST CM FOR 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, allocation, shortages of transportation, fuel, materials, or labor, acts of God or any other reason beyond the sole control of CM. TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW AND SUBJECT TO THE NEXT SENTENCE, CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR LOSS OF PROFITS, LOSS OF BUSINESS OR GOODWILL, CONSEQUENTIAL, INCIDENTAL, SPECIAL, LIQUIDATED, OR PUNITIVE DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY. Nothing in this Agreement is intended to exclude CM's liability for death, personal injury or fraud.

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 Representative. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 S.W. 44th Street • Oklahoma City, Oklahoma, U.S.A. 73179 • (405) 745-6000 • FAX (405) 745-6068

NOTE: Some countries 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 country to country.

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

LC079

Created: 10/09

Warranty (U.S. & Canada)

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 any other 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 ninety (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 parts 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 misapplication 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; or, (3) Transportation costs of the defective part from the installation site to CM 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 warranties, 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 THEIR PURCHASER AGAINST CM FOR 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:

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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.: 11/09

LC083

Start-Up Log Sheet

Installer: Complete unit and system checkout and follow unit start-up procedures in the IOM. Use this form to record unit information, temperatures and pressures during start-up. Keep this form for future reference.

Job Name:_____ **Street Address:**_____

Model Number:_____ **Serial Number:** _____

Unit Location in Building:_____

Date:_____**Sales Order No:**_____

In order to minimize troubleshooting and costly system failures, complete the following checks and data entries before the system is put into full operation.

Temperatures: F or C

Antifreeze: _____%
Type of Antifreeze: _____

		Cooling Mode	Heating Mode
Source	Entering Fluid Temperature		
	Leaving Fluid Temperature		
	Temperature Differential		
	Pressure In		
	Pressure Out		
	Pressure Differential		
Load	Entering Fluid Temperature		
	Leaving Fluid Temperature		
	Temperature Differential		
	Pressure In		
	Pressure Out		
	Pressure Differential		
Compressor	Amps		
	Volts		
	Discharge Line Temperature (6” from Compressor Outlet)		

Allow unit to run 15 minutes in each mode before taking data.

Do not connect gauge lines

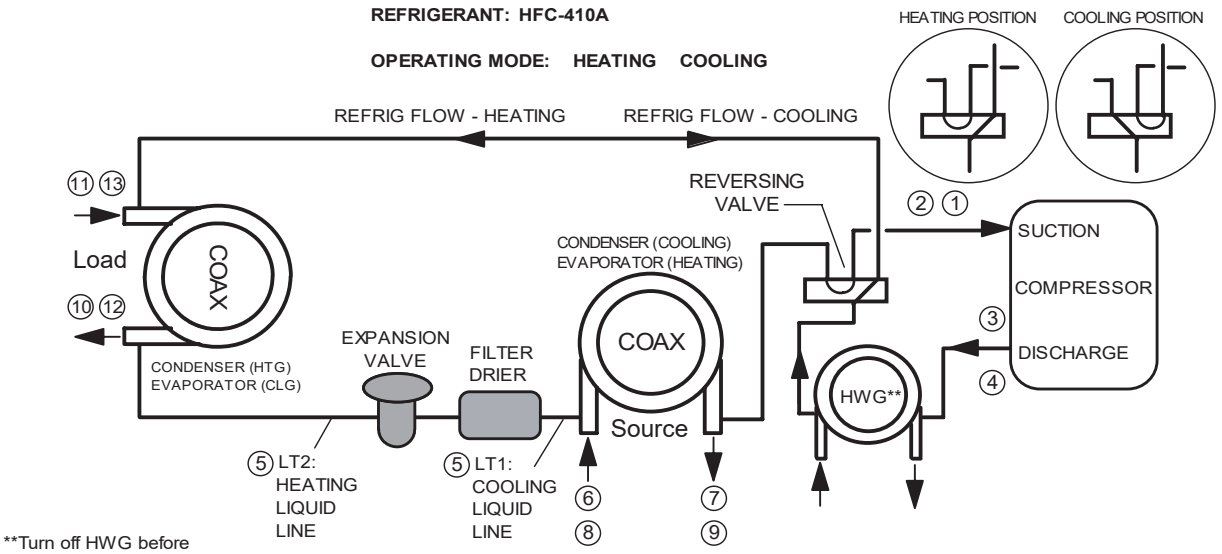
Refrigeration Troubleshooting Form

Water-to-Water Units

Customer: _____ Loop Type: _____ Startup Date: _____

Model #: _____ Serial #: _____ Antifreeze Type & %: _____

Complaint: _____



**Turn off HWG before troubleshooting.

	Description	Heating	Cooling	Notes
	Voltage			
	Compressor Amps			
1	Suction Temp			
2	Suction Press			
2a	Saturation Temp			
2b	Superheat			
3	Discharge Temp			
4	Discharge Press			
4a	Saturation Temp			
4b	Subcooling			
5	Liquid Line Temp			
6	Source Water In Tmp			
7	Source Water Out Tmp			Temp Diff. =
8	Source Water In Pres			
9	Source Water Out Pres			
9a	Press Drop			
9b	Flow Rate GPM [l/s]			
10	Load Water In Temp			
11	Load Water Out Temp			Temp Diff. =
12	Load Water In Pres			
13	Load Water Out Pres			
13a	Press Drop			
13b	Flow Rate GPM [l/s]			

Heat of Extraction (Absorption) or Heat of Rejection:

HE or HR =

Fluid Factor: (for Btuh)	Fluid Factor: (for kW)
500 (Water); 485 (Antifreeze)	4.18 (Water); 4.05 (Antifreeze)

_____ Flow Rate x _____ Temp. Diff x _____ Fluid Factor

NOTES:

NOTES:

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Tranquility® Water-to-Water (TMW) Series

Rev.: March 14, 2024

Revision History

Date:	Item:	Action:
3/14/24	Added commissioning and operating conditions	Updated
2/28/23	Transitioned CXM to CXM2 unit controls. Introduced DXM2.5 unit controls.	Updated
10/01/21	Water Quality Standards, LON Control removed	Updated
	Format - Ground Water Data, Ground Loop Data, Electrical Data	Updated
3/10/21	Eletrical Table (pg.16)	Updated
6/12/20	Decoder	Updated
6/11/20	Unit Physical and Electrical Data	Updated
06/10/20	Format - All Pages	Updated
07/14/17	Potable Water Statement	Updatedp
04/15/16	Text	Updated
10/16/15	Wiring Diagram Matrix	Updated
06/23/14	Water Quality Table	Updated
11/09/12	POE Oil Warning	Added
	Water Quality Table	Updated
11/14/11	TMW170 & 340 Unit Dimensional Data	Updated
08/09/11	Unit Maximum Working Water Pressure	Updated to Reflect New Safeties
01/03/11	Format - All Pages	Updated
10/06/10	Start-Up Log Sheet	Added
07/26/10	Wiring Diagrams	Updated
06/11/10	Format - All Pages	Updated
04/08/10	Electrical and Operating Pressures Tables	Updated
11/05/09	Warranty	Updated
09/15/09	Safety Features - CXM/DXM Control Section	Updated
06/01/09	Operating Pressures Heating Table	Updated
05/07/09	'Unit Starting & Operating Conditions' Section & Table	Edited and renamed 'Unit Commissioning and Operating Conditions'
04/21/09	Physical Data Table	Water Volume Data Updated
04/21/09	Water-Loop & Ground-Loop Heat Pump Applications Sections, Electrical Line Voltage Section, Safety Feature Section	Verbiage Updated

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