Tranquility® 16 ⟨TC⟩ Series

Commercial Horizontal & Vertical Packaged Water-Source Heat Pumps

50Hz-HFC-410A

Installation, Operation & Maintenance

97B0075N02
Revised: 24 January, 2023

CLIMATEMASTER®
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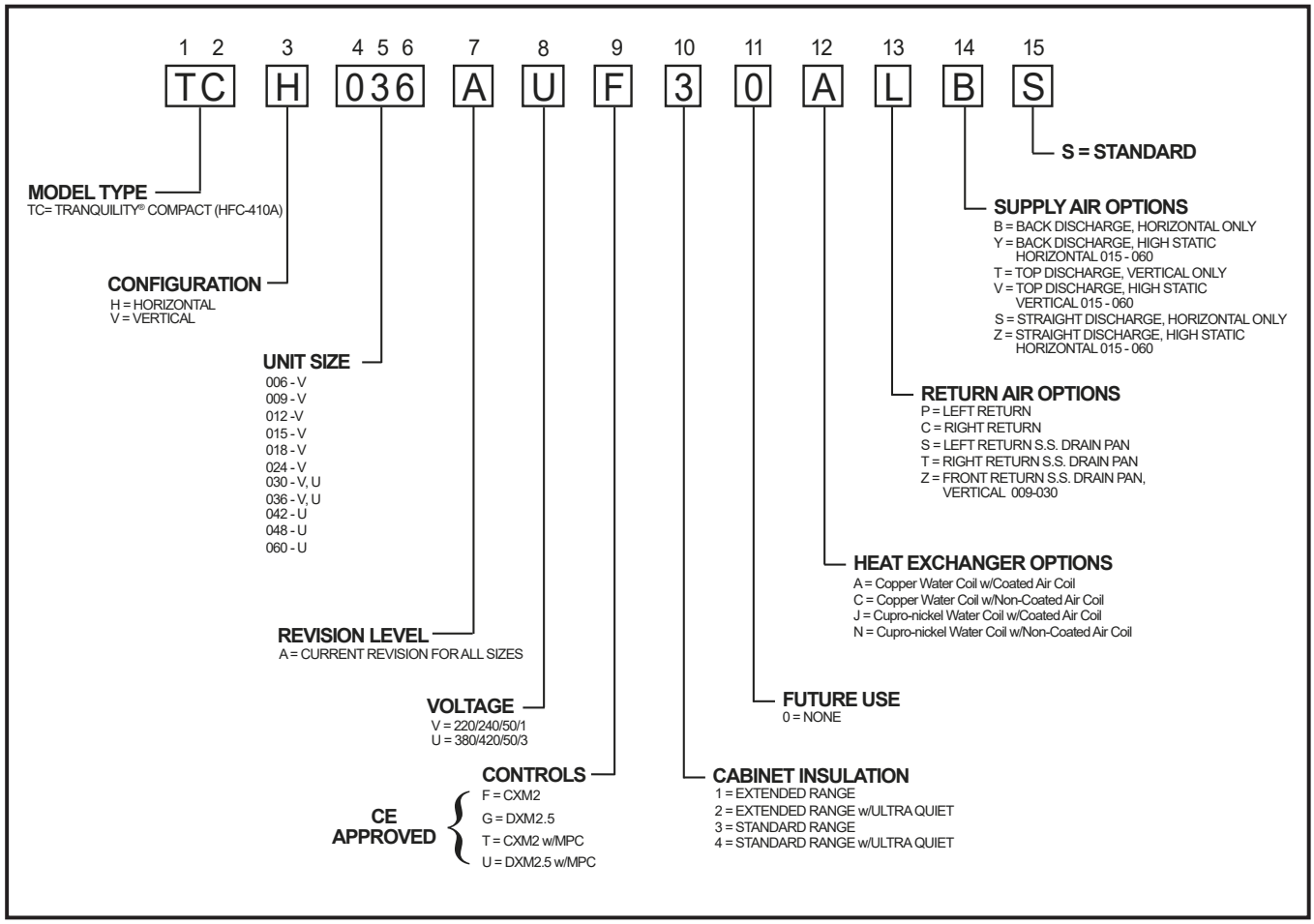
Model Nomenclature – General Overview



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General Information

Saftey
Warnings, cautions, and notices appear throught this manual. Read these items carefully before attempting any installation, service, or troubeshooting 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 an immediate hazardous situation, which if not avoided will 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 with product or property damage.

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

⚠ WARNING! ⚠

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

⚠ WARNING! ⚠

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

⚠ CAUTION! ⚠

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.

⚠ 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.

⚠ 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.

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

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

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

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

General Information, Cont'd.

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

Prepare units for installation as follows:

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

⚠ 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.

⚠ 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 the polymer drain pan, may cause the drain pan to leak. The polymer drain pan should never come in contact with POE oil as system failures and property damage may result.

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Unit Physical Data

Tranquility® 16 (TC) Series (50 Hz)

TC Series	006	009	012	015	018	024	030	036	042	048	060
Compressor (1 Each)		Rotary				Scroll					
Factory Charge HFC-410A - kg	0.54	0.52	0.65	0.99	1.22	1.13	1.36	1.42	1.98	2.10	2.32
ECM Fan Motor & Blower											
Fan Motor (Watts)	186			249		373				746	
Blower Wheel Size (Dia x W) mm	127 x 127	152 x 127		229 x 178				229 x 203		254 x 254	305 x 254
PSC Fan Motor & Blower											
Fan Motor Type/Speeds	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3
Fan Motor (Watts)	19	75		53		149	249	249			
Blower Wheel Size (Dia x W) mm	127 x 127	152 x 127		229 x 178			229 x 178	229 x 203		254 x 254	305 x 254
Water Connection Size											
FPT	1/2"					3/4"				1"	
Coax Volume (liters)	0.29	0.37	0.50	0.68	0.79	0.68	1.13		1.83	1.54	2.32
Vertical											
Air Coil Dimensions (H x W) mm	254 x 381 3Row			508 x 438 3Row				610 x 553 3Row		610 x 718 3Row	
Filter Standard - 25.4mm Throwaway mm	254 x 457			508 x 508				610 x 610		457 x 610 356 x 610	
Weight - Operating kg	47	48	52	70	72	86	90	92	99	120	126
Weight - Packaged kg	51	52	56	72	74	88	92	95	102	123	130
Horizontal											
Air Coil Dimensions (H x W) mm	254 x 381 3Row			406 x 559 3Row				508 x 635 3Row			
Filter Standard - 25.4mm Throwaway mm	254 x 457			406 x 635		457 x 635		356 x 508 (2)		356 x 508 508 x 610	
Weight - Operating kg	47	48	52	70	72	79	83	92	99	120	126
Weight - Packaged kg	51	52	56	72	74	81	85	95	102	123	130

Notes:
All units have dual isolation compressor mounts for quiet operation, thermal expansion valves for refrigerant metering, and 22.2mm & 28.6mm electrical knock-outs to accommodate field wiring.
FPT - Female Pipe Thread
Condensate Drain Connection is rubber coupling that couples to 3/4” schedule 40/80 PVC.

Unit Maximum Water Working Pressure	
Options	Max Pressure kPa
Base Unit	3447

Horizontal Installation

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

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figure 3 for an illustration of a typical installation. Refer to unit submittal data or engineering design guide for dimensional data.

Conform to the following guidelines when selecting unit location:

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

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.

Mounting Horizontal Units
Horizontal units have 4 hanger brackets partially attached at the factory, one at each corner. Enclosed within the unit there is a hanger kit hardware bag containing vibration isolation grommets, washers, screws and a hanger installation instruction page. One additional screw from the hardware bag must be added to each hanger bracket before unit installation.Tighten each screw to 75 in-lbs (8.5 Nm). See Figure 1. Refer to the hanger installation instruction page contained in the hardware bag for details of final hanger bracket attachment and unit suspension. See Figure 1a.

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

Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 8.8 kW) ensure that unit pitch does not cause condensate leaks inside the cabinet.

Figure 1: Hanger Bracket

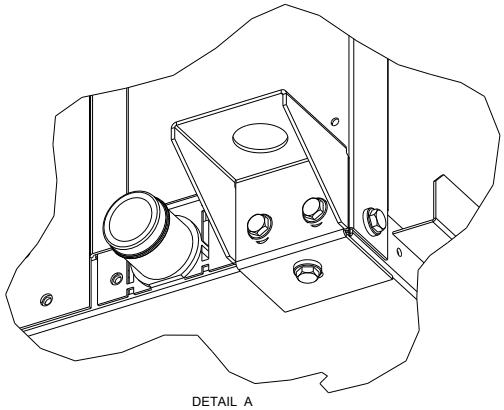
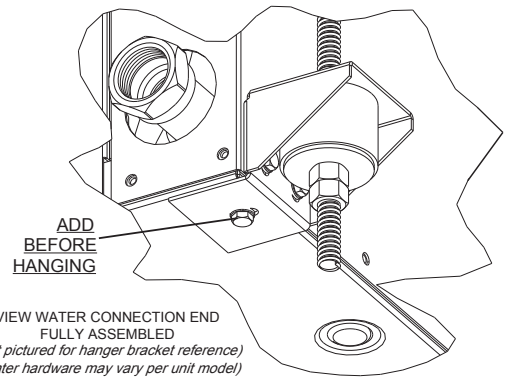


Figure 1a:



Horizontal Installation, Cont'd.

Figure 2: Horizontal Unit Pitch

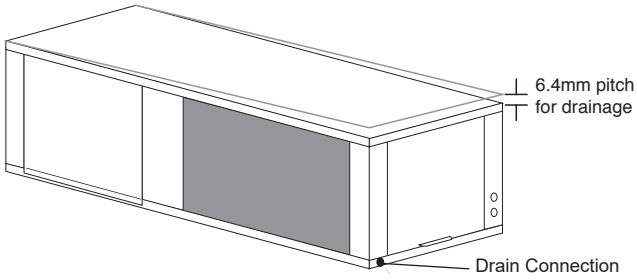
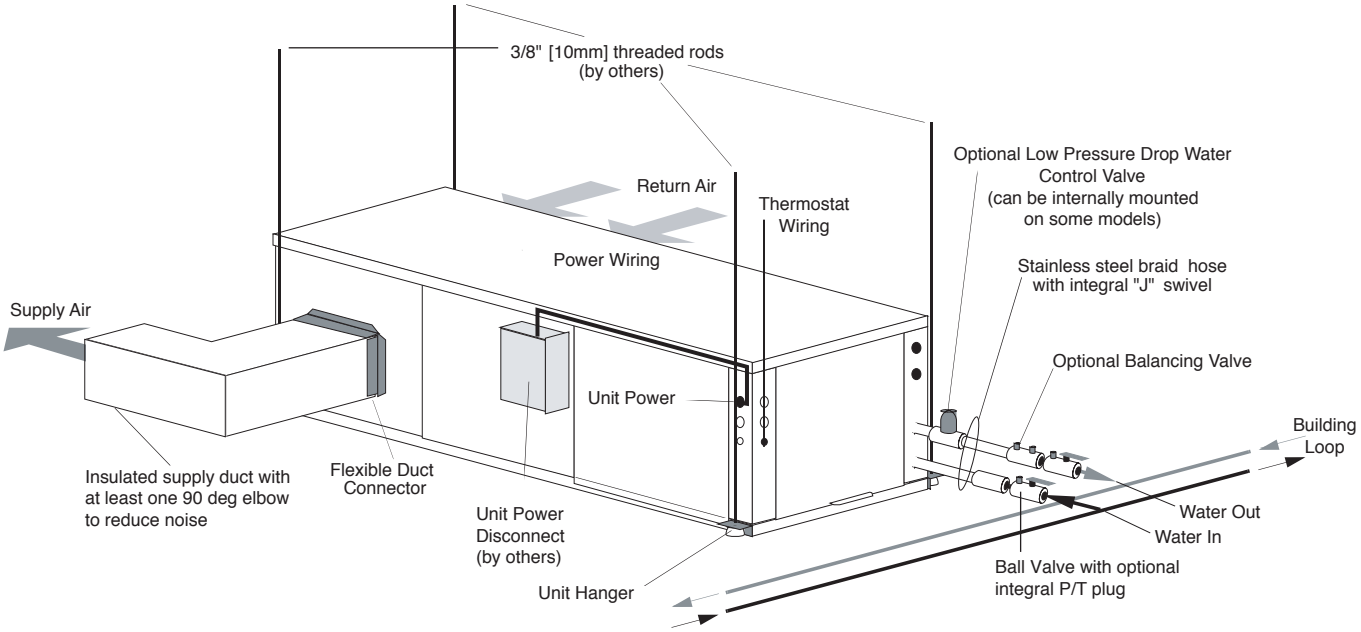


Figure 3: Typical Horizontal Unit Installation

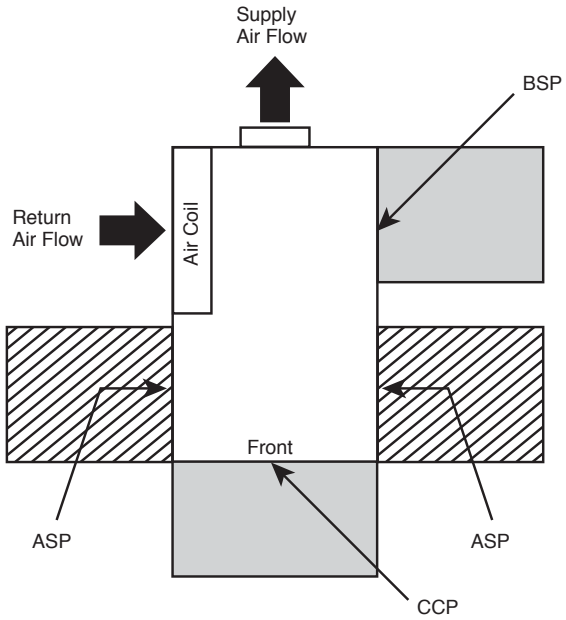


Air Coil - To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended for both sides of the coil. A thorough water rinse should follow. UV based anti-bacterial systems may damage coated air coils.

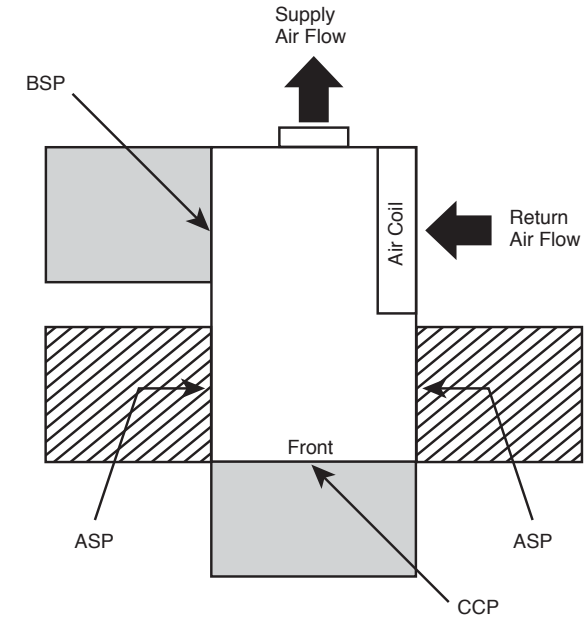
Notice! Installation Note - Ducted Return: Many horizontal WSHPs are installed in a return air ceiling plenum application (above ceiling). Vertical WSHPs are commonly installed in a mechanical room with free return (e.g. louvered door). Therefore, filter rails are the industry standard and are included on ClimateMaster commercial heat pumps for the purposes of holding the filter only. For ducted return applications, the filter rail must be removed and replaced with a duct flange or filter frame. Canvas or flexible connectors should also be used to minimize vibration between the unit and ductwork.

Horizontal Installation, Cont'd.

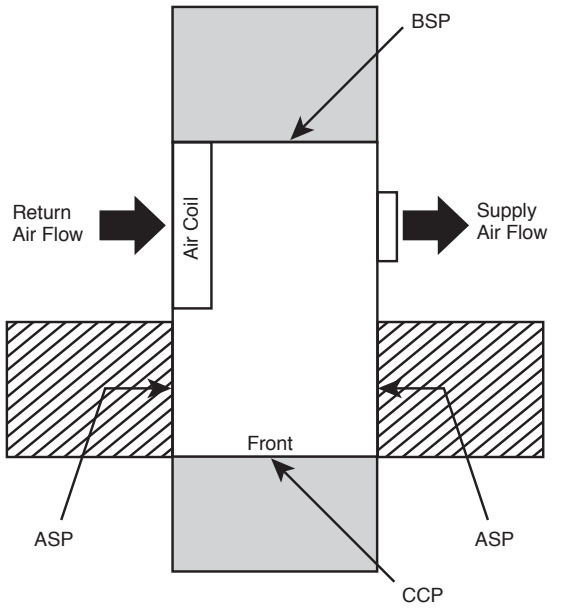
Left Return Back Discharge



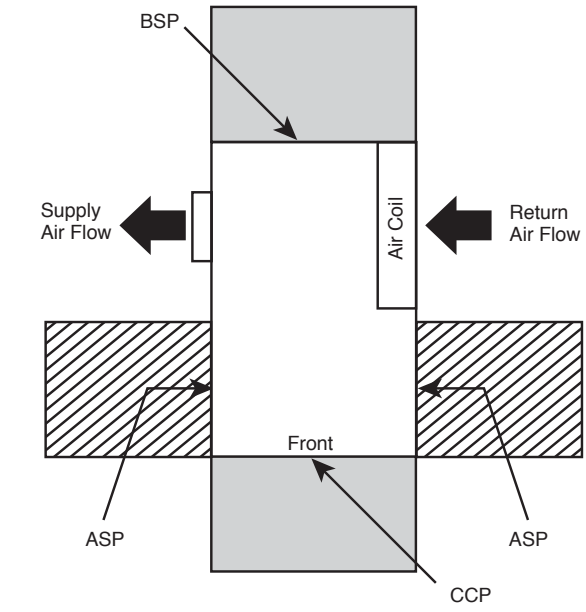
Right Return Back Discharge



Left Return Straight Discharge



Right Return Straight Discharge



= mandatory 61 cm service access

= (optional) additional 61 cm service access

Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. CCP and BSP requires 61 cm service access.
3. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.
4. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

Legend:

CCP = Control/Compressor Access Panel
BSP = Blower Service Panel
ASP = Additional Service Panel (not required)

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Field Conversion of Air Discharge

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

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

Preparation - Field conversion must be completed on the ground. If the unit is already hung it should be taken down for the field conversion. Place in a well-lighted area. Conversion should only be attempted by a qualified service technician.

Side to Back Discharge Conversion

1. Remove back panel and side access panel
2. Loosen 2 motor slide nuts, raise motor slide assembly and remove belt and motor sheave.
3. Remove blower sheave. Remove motor bolts and carefully remove motor.
4. Remove 2 motor clips and reattach to opposite side.
5. Unbolt (3 per side) complete housing assembly.
6. Rotate complete assembly into new position. Locate over mounting holes in base, reattach using 3 bolts per side.
7. Mount motor, motor sheave, blower sheave and belt. Make sure wires are not pinched and not over sharp edges. Adjust motor downward to tighten belt. Raise or lower motor slide assembly with adjusting bolt and retighten 2 slide nuts. Check for correct tension (See Tensioning V-Belt Drives page). Rewire motor (at contactor) for correct rotation. Spin blower wheel to ensure wheel is not obstructed.
8. Replace 2 panels.

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

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

Figure 4: Left Return Side to Back

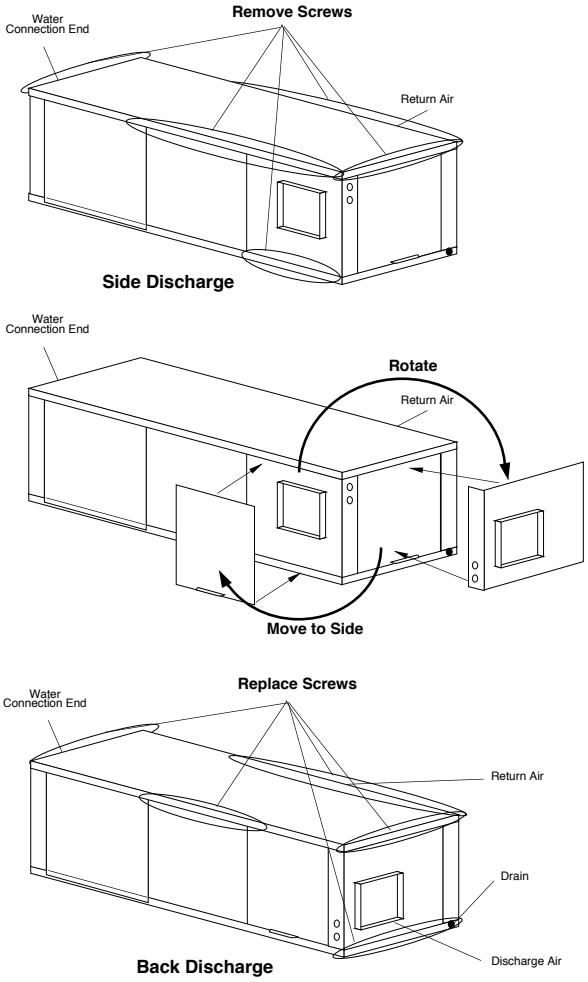
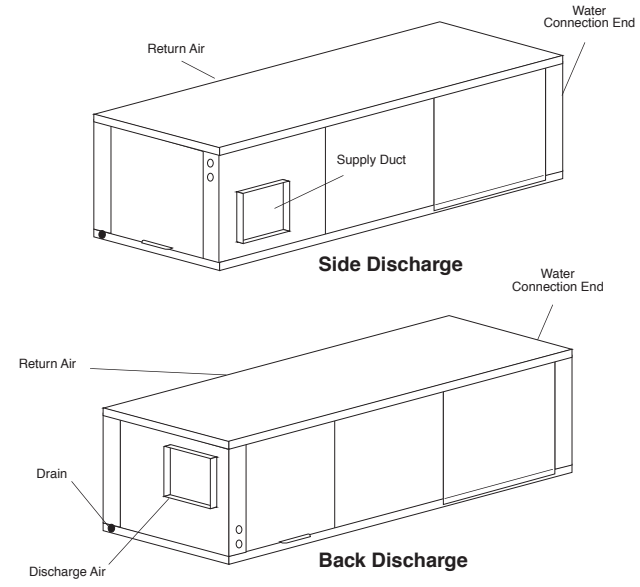


Figure 5: Right Return Side to Back



Horizontal Installation

Condensate Piping - Horizontal Units - A condensate drain line must be installed and pitched away for the unit to allow for proper drainage. This connection must meet all local plumbing/building codes.

Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 8.8 kW), ensure that unit pitch does not cause condensate leaks inside the cabinet.

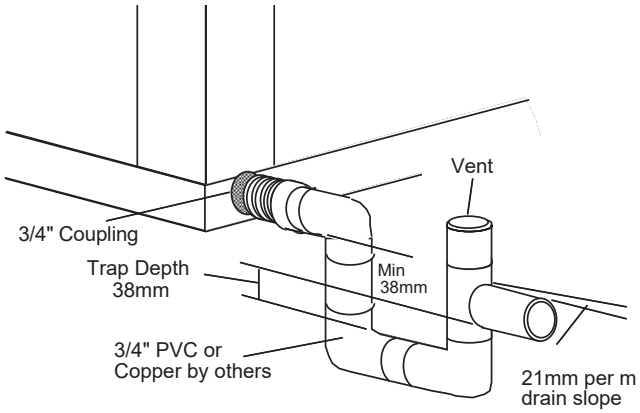
Install condensate trap at each unit with the top of the trap positioned below the unit condensate drain connection as shown in Figure 6. Design the depth of the trap (water-seal) based upon the amount of ESP capability of the blower (where 51mm of ESP capability requires 51mm of trap depth). As a general rule, 38mm trap depth is the minimum.

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

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

Condensate drain connection is a rubber coupling that couples to 3/4” schedule 40/80 PVC. Use hose clamps to secure the pipe inside the coupling. If the connection is not secure, the connection may leak. Instructions for coupling the condensate drain to the trap are included in the bag that includes the coupling and hose clamps.

Figure 6: Horizontal Condensate Connection



⚠ CAUTION! ⚠

CAUTION! Ensure condensate line is pitched toward drain 21mm per m of run.

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Duct System Installation

Duct System Installation - Proper duct sizing and design is critical to the performance of the unit. The duct system should be designed to allow adequate and even airflow through the unit during operation. Air flow through the unit MUST be at or above the minimum stated airflow for the unit to avoid equipment damage. Duct systems should be designed for quiet operation. Refer to Figure 3 for horizontal duct system details or Figure 8 for vertical duct system details. A flexible connector is recommended for both discharge and return air duct connections on metal duct systems to eliminate the transfer of vibration to the duct system. To maximize sound attenuation of the unit blower, the supply and return plenums should include internal fiberglass duct liner or be constructed from ductboard for the first few feet. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended, as the unit's performance may be adversely affected.

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

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

Vertical Installation

Vertical Unit Location

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

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figures 7 and 8 for typical installation illustrations. Refer to unit submittal data or engineering design guide for dimensional data.

1. Install the unit on a piece of rubber, neoprene or other mounting pad material for sound isolation. The pad should be at least 10mm to 13mm in thickness. Extend the pad beyond all four edges of the unit.
2. Provide adequate clearance for filter replacement and drain pan cleaning. Do not block filter access with piping, conduit or other materials. Refer to unit submittal data or engineering design guide for dimensional data.
3. Provide access for fan and fan motor maintenance and for servicing the compressor and coils without removing the unit.
4. Provide an unobstructed path to the unit within the closet or mechanical room. Space should be sufficient to allow removal of the unit, if necessary.
5. In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing (TC units only).
6. Provide access to water valves and fittings and screwdriver access to the unit side panels, discharge collar and all electrical connections.

Figure 7: Typical Vertical Unit Mounting

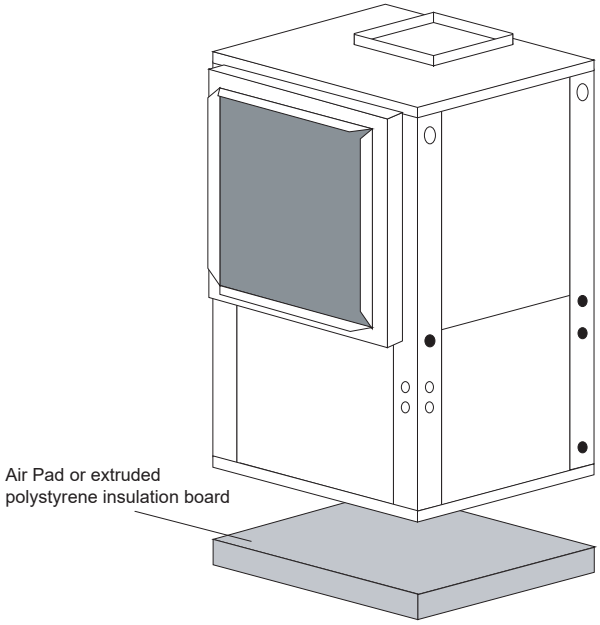
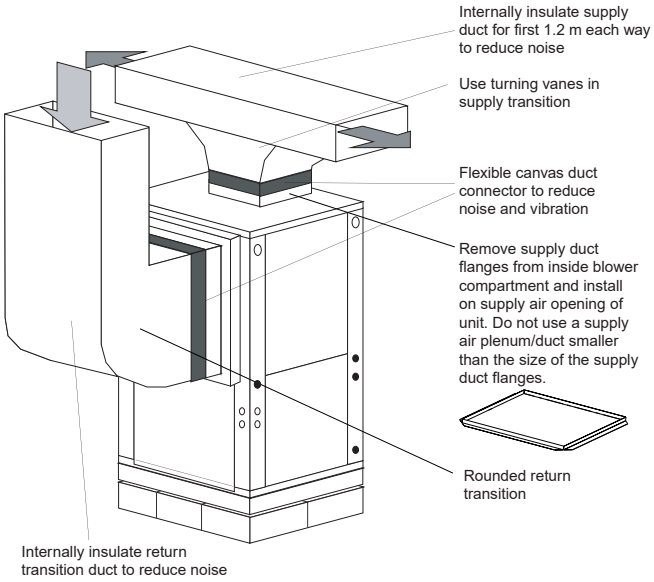


Figure 8: Typical Vertical Unit Installation Using Ducted Return Air



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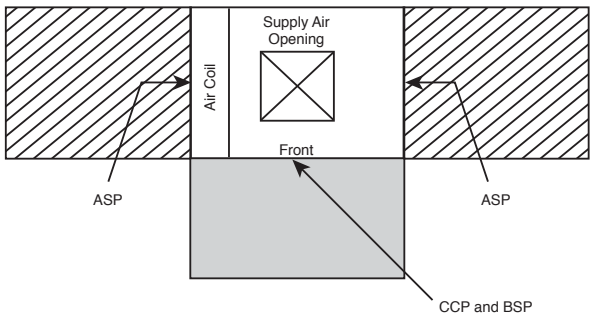
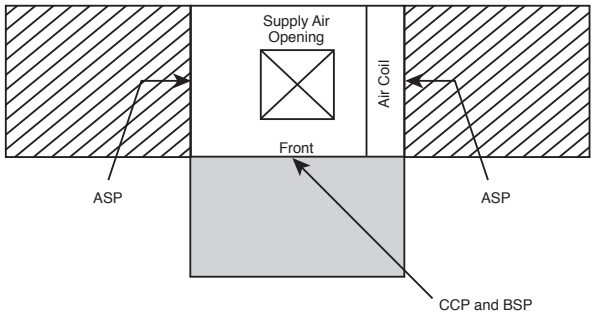
Vertical Installation, Cont'd.

Left Return



Right Return



= mandatory 61 cm service access

= (optional) additional 61 cm service access

Notes:

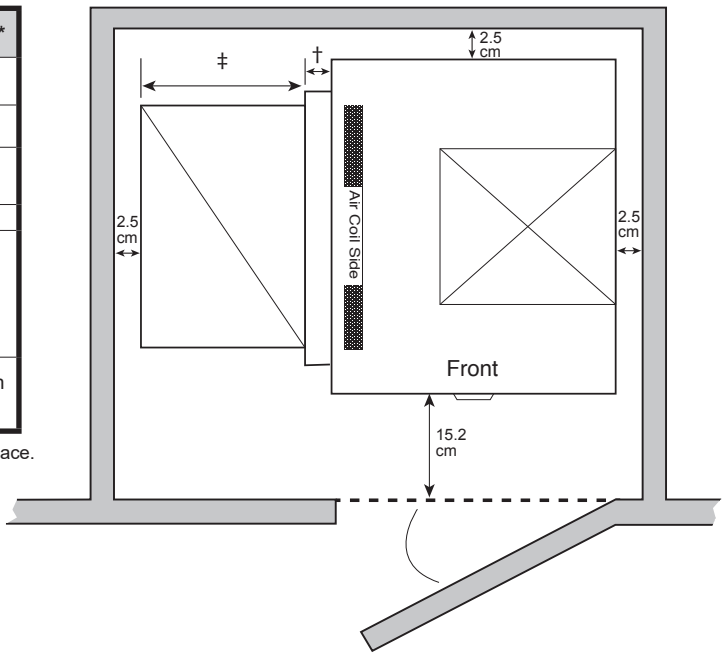
1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front & Side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available. (Except on units with front return air).
3. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.
4. Top supply air is shown, the same clearances apply to bottom supply air units.
5. Front return units (not shown) require front access for controls/compressor and left side access for blower.

Legend:

CCP = Control/Compressor Access Panel
BSP = Blower Service Panel
ASP = Additional Service Panel (not required)

Recommended Minimum Installation Clearances for Vertical Units*	
2.5 cm	Back of unit
	Side opposite return air
15.2 cm	Front if hard piped
Return Air Side	
2.5 cm	Ducted return - ‡ Add for duct width - † Add 5.0 cm for 2.5 cm filter frame/rail or 7.6 cm for 5.0 cm filter frame/rail
	Free (open) return - calculate required dimension for a maximum velocity of 3.0 m/s

*Field installed accessories (hoses, air cleaners, etc.) may require additional space. Top supply air is shown, the same clearances apply to bottom supply air units.

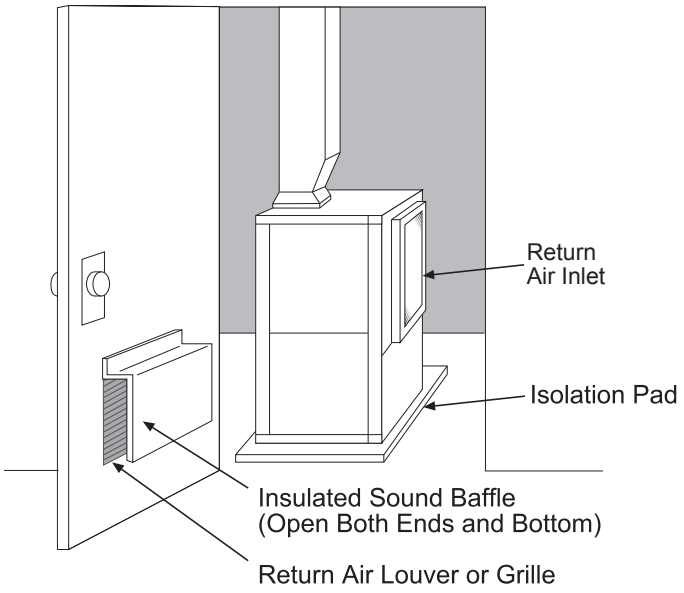


Vertical Installation, Cont'd.

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

1. Mount the unit so that the return air inlet is 90° to the return air grille. Refer to Figure 9. Install a sound baffle as illustrated to reduce line-of sight sound transmitted through return air grilles.
2. Mount the unit on a rubber or neoprene isolation pad to minimize vibration transmission to the building structure.

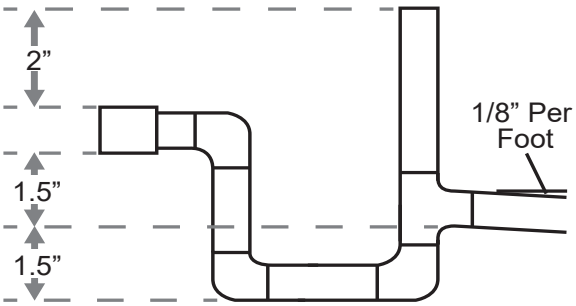
Figure 9: Vertical Sound Attenuation



Units with clear plastic drain lines should have regular maintenance (as required) to avoid buildup of debris, especially in new construction.

Condensate Piping for Vertical Units - A condensate line must be installed and pitched away from the unit to allow for proper drainage. This connection must meet all local plumbing/building codes. Vertical units utilize a condensate hose inside the cabinet as a trapping loop; therefore an external trap is not necessary. Figure 10a shows typical condensate connections. Figure 10b illustrates the internal trap for a typical vertical heat pump. Each unit must be installed with its own individual vent (where necessary) and a means to flush or blow out the condensate drain line. Do not install units with a common trap and/or vent.

Figure 10: Vertical Condensate Drain



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. Refer to Table 1. Do not exceed the minimum bend radius for the hose selected. 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.

Insulation is not required on loop water piping except where the piping runs through unheated areas, outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient conditions. Insulation is required if loop water temperature drops below the dew point (insulation is required for ground loop applications in most climates).

Pipe joint compound is not necessary when Teflon® thread 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 external pipe threads of the fitting adapters. Prevent sealant from reaching the flared surfaces of the joint.

Note: When antifreeze is used in the loop, ensure that it is compatible with the Teflon tape or pipe joint compound that is applied.

Maximum allowable torque for brass fittings is 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 11 for an illustration of a typical supply/return hose kit. Adapters secure hose assemblies to the unit and risers. Install hose assemblies properly and check regularly to avoid system failure and reduced service life.

A backup wrench is required when tightening water connections to prevent water line damage for TC Series equipment. TS Series equipment has water connections secured to the corner post.

⚠ 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 may require water treatment.

⚠ CAUTION! ⚠

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

⚠ CAUTION! ⚠

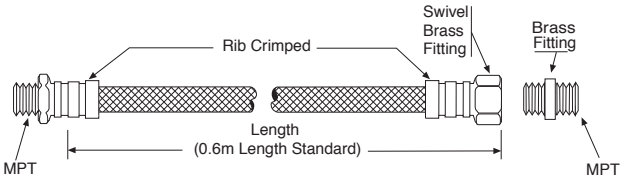
CAUTION! Piping must comply with all applicable codes.

Table 1: Metal Hose Minimum Bend Radii

Hose Diameter	Minimum Bend Radii
12.7mm	6.4cm
19.1mm	10.2cm
25.4mm	14cm
31.8mm	17.1cm

NOTICE! Do not allow hoses to rest against structural building components. Compressor vibration may be transmitted through the hoses to the structure, causing unnecessary noise complaints.

Figure 11: Supply/Return Hose Kit



Water-Loop Heat Pump Applications

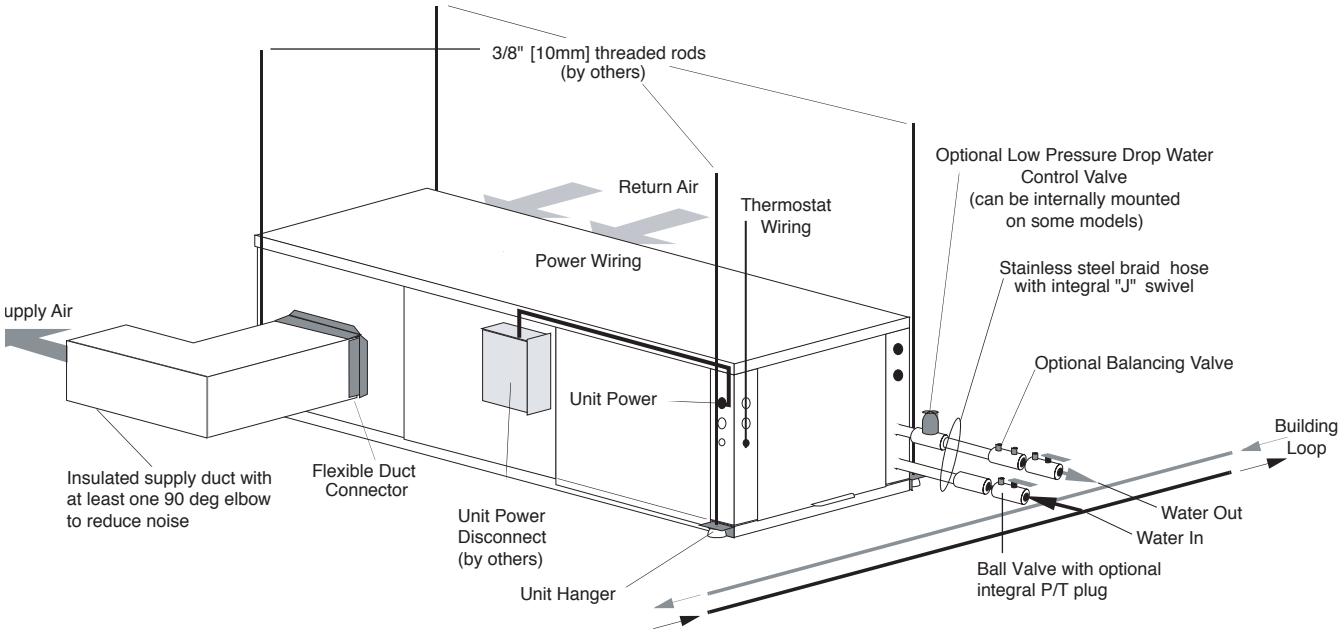
Commercial Water Loop Applications
Commercial systems typically include a number of units connected to a common piping system. Any unit plumbing maintenance work can introduce air into the piping system; therefore air elimination equipment is a major portion of the mechanical room plumbing. Consideration should be given to insulating the piping surfaces to avoid condensation. ClimateMaster recommends unit insulation any time the water temperature is expected to be below 15.6°C. Metal to plastic threaded joints should never be used due to their tendency to leak over time.

Teflon® tape thread sealant is recommended to minimize internal fouling of the heat exchanger. Do not over tighten 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 12 for connection between the unit and the piping system. Depending upon selection, hose kits may include shut off valves, P/T plugs for performance measurement, high pressure stainless steel braided hose, "Y" type strainer with blow down valve, and/or "J" type swivel connection. Balancing valves 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" in this manual). The flow rate is usually set between 2.9 and 4.5 l/m per kW of cooling capacity. ClimateMaster recommends 3.9 l/m per kW for most applications of water loop heat pumps. To ensure proper maintenance and servicing, P/T ports are imperative for temperature and flow verification, as well as performance checks.

Water loop heat pump (cooling tower/boiler) systems typically utilize a common loop, maintained between 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.

Figure 12: Typical Water-Loop Application



Low Water Temperature Cutout Setting
CXM2 - When antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (antifreeze -12.2°C) setpoint and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual). **Note: Low water temperature operation requires extended range equipment.**

Ground-Loop Heat Pump Applications

⚠ CAUTION! ⚠

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

⚠ CAUTION! ⚠

CAUTION! Ground loop applications require extended range equipment and optional refrigerant/water circuit insulation.

Pre-Installation

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

Piping Installation

The typical closed loop ground source system is shown in Figure 13. All earth loop piping materials should be limited to polyethylene fusion only for in-ground sections of the loop. Galvanized or steel fittings should not be used at any time due to their tendency to corrode. All plastic to metal threaded fittings should be avoided due to their potential to leak in earth coupled applications. A flanged fitting should be substituted. P/T plugs should be used so that flow can be measured using the pressure drop of the unit heat exchanger.

Earth loop temperatures can range between -4 to 43°C. Flow rates between 2.41 to 3.23 l/m per kW of cooling capacity is recommended in these applications.

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

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.

Antifreeze

In areas where minimum entering loop temperatures drop below 5°C or where piping will be routed through areas subject to freezing, antifreeze is required. Alcohols and glycols are commonly used as antifreeze; however your local sales office should be consulted to determine the antifreeze best suited to your area. Freeze protection should be maintained to 9°C below the lowest expected entering loop temperature. For example, if -1°C is the minimum expected entering loop temperature, the leaving loop temperature would be -4 to -6°C and freeze protection should be at -10°C. Calculation is as follows: -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 the water level to prevent fumes. 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 needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

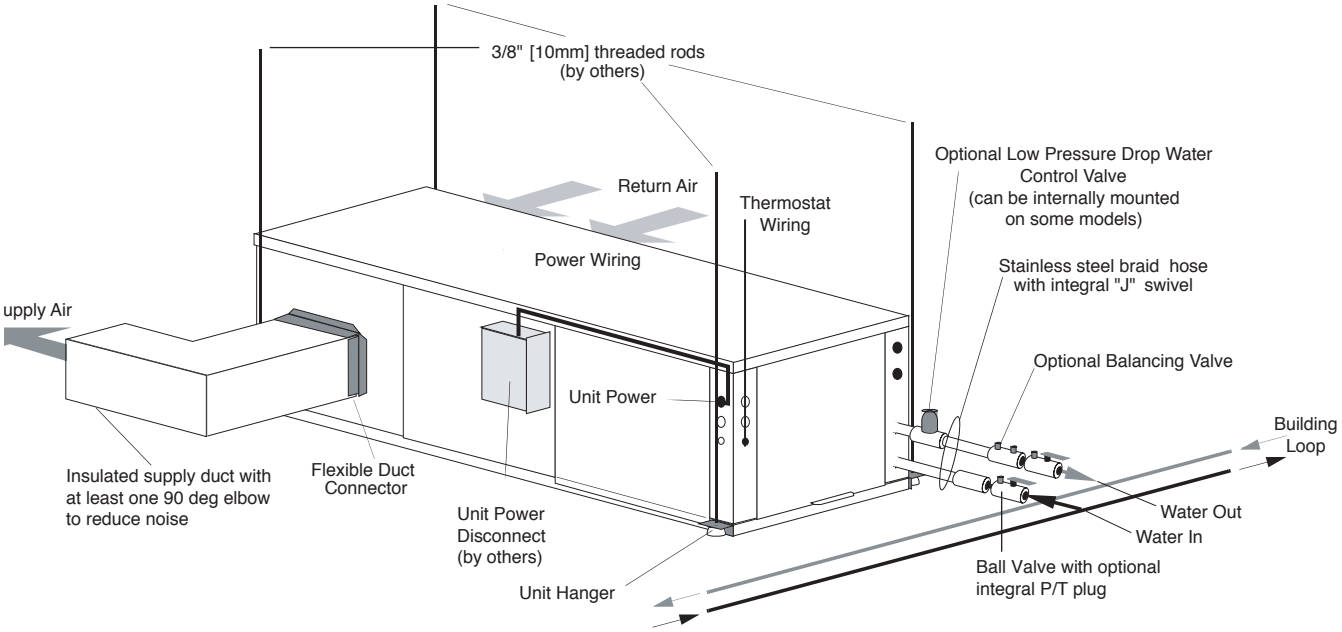
Table 2: Antifreeze Percentages by Volume

Type	Minimum Temperature for Low Temperature Protection			
	-12.2°C	-9.4°C	-6.7°C	-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

Ground-Loop Heat Pump Applications, Cont'd.

Figure 13: Typical Ground-Loop Application



Ground-Water Heat Pump Applications

Open Loop - Ground Water Systems
Typical open loop piping is shown in Figure 14. Shut off valves should be included for ease of servicing. Boiler drains or other valves should be "tee'd" into the lines to allow acid flushing of the heat exchanger. Shut off valves should be positioned to allow flow through the coax via the boiler drains without allowing flow into the piping system. P/T plugs should be used so that pressure drop and temperature can be measured.

⚠ 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.

Water quantity should be plentiful and of good quality. Consult table 3 for water quality guidelines. The unit can be ordered with either a copper or cupro-nickel water heat exchanger. Consult Table 3 for recommendations. 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, an open loop system is not recommended. Heat exchanger coils may over time lose heat exchange capabilities due to build up of mineral deposits. Heat exchangers must only be serviced by a qualified technician, as acid and special pumping equipment is required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional acid flushing. In some cases, the desuperheater option should not be recommended due to hard water conditions and additional maintenance required.

Water Quality Standards
Table 3 should be consulted for water quality requirements. Scaling potential should be assessed using the pH/Calcium hardness method. If the pH <7.5 and the calcium hardness is less than 100 ppm, scaling potential is low. If this method yields numbers out of range of those listed, the Ryznar Stability and Langelier Saturation indecies should be calculated. Use the appropriate scaling surface temperature for the application, 66°C for direct use (well water/open loop) and DHW (desuperheater); 32°C for indirect use.

A monitoring plan should be implemented in these probable scaling situations. Other water quality issues such as iron fouling, corrosion prevention and erosion and clogging should be referenced in Table 3.

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

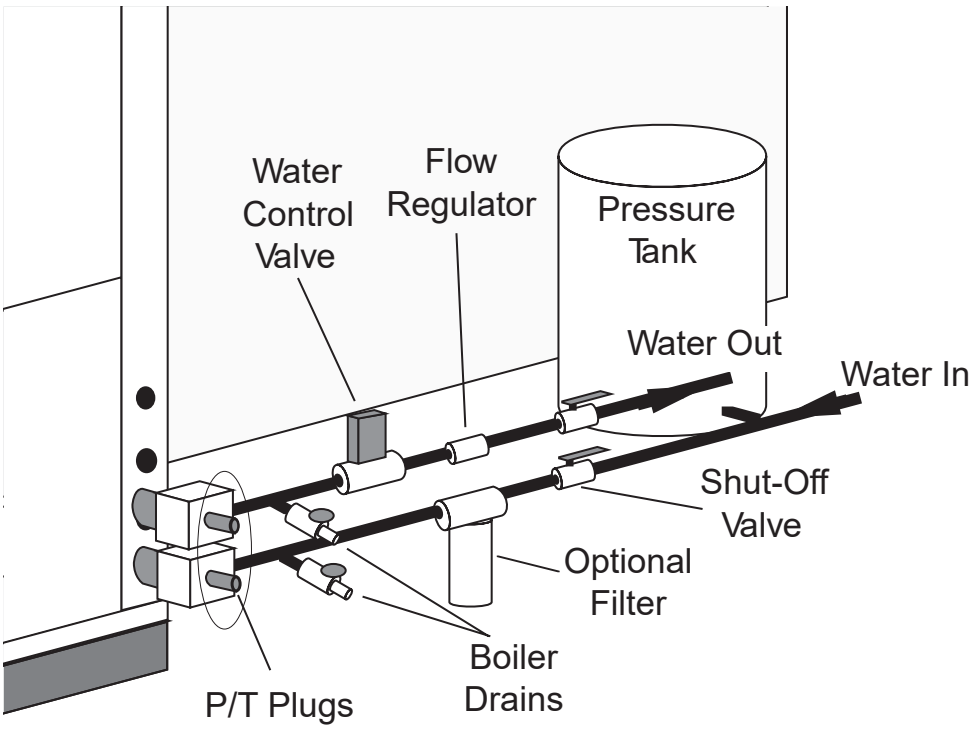
Water Control Valve
Note the placement of the water control valve in Figure 14. Always maintain water pressure in the heat exchanger by placing the water control valve(s) on the discharge line to prevent mineral precipitation during the off-cycle. Pilot operated slow closing valves are recommended to reduce water hammer. If water hammer persists, a mini-expansion tank can be mounted on the piping to help absorb the excess hammer shock. Ensure that the total 'VA' draw of the valve can be supplied by the unit transformer. For instance, a slow closing valve can draw up to 35VA. This can overload smaller 40 or 50 VA transformers depending on the other controls in the circuit. A typical pilot operated solenoid valve draws approximately 15VA (see Figure 21). NOTE: the special wiring diagrams for slow closing valves (Figures 22 & 23).

Flow Regulation
Flow regulation can be accomplished by two methods. One method of flow regulation involves simply adjusting the ball valve or water control valve on the discharge line. Measure the pressure drop through the unit heat exchanger, and determine flow rate from Tables 8a through 8e. Since the pressure is constantly varying, two pressure gauges may be needed. Adjust the valve until the desired flow of 2.0 to 2.6 l/m per kW is achieved. A second method of flow control requires a flow control device mounted on the outlet of the water control valve. The device is typically a brass fitting with an orifice of rubber or plastic material that is designed to allow a specified flow rate. On occasion, flow control devices may produce velocity noise that can be reduced by applying some back pressure from the ball valve located on the discharge line. Slightly closing the valve will spread the pressure drop over both devices, lessening the velocity noise. **NOTE: When EWT is below 10°C, 2.6 l/m per kW is required.**

Ground-Water Heat Pump Applications, Cont'd.

Water Coil Low Temperature Limit Setting
For all open loop systems the -1.1°C FP1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See "Low Water Temperature Cutout Selection" in this manual for details on the low limit setting.

Figure 14: Typical Open Loop/Well Application



Tranquility 16 (TC) Series
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Water Quality Standards

Table 3: 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 66°C for direct use and HWG applications, and at 32°C for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	-	**6.0 - 7.5** If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	-	**-0.5 to +0.5** If <-0.5 minimize steel pipe use. Based upon 66°C HWG and Direct well, 29°C Indirect Well HX		
Iron Fouling					
Iron Fe $^{2+}$ (Ferrous) (Bacterial Iron potential)	All	-	**<0.2 ppm (Ferrous)** 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** Above this level deposition will occur.		
Corrosion Prevention					
pH	All	**6 - 8.5** Monitor/treat as needed	**6 - 8.5** Minimize steel pipe below 7 and no open tanks with pH <8		
Hydrogen Sulfide (H_2S)	All	-	**<0.5 ppm** At H_2S>0.2 ppm, avoid use of copper and copper nickel piping or HX's. Rotten egg smell appears at 0.5 ppm level. 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.		
			10°C	24°C	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 1.8 m/s Filtered for maximum 841 micron [0.84 mm, 20 mesh] size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particles and a maximum velocity of 1.8 m/s. Filtered for maximum 841 micron 0.84 mm, 20 mesh] size. Any particulate that is not removed can potentially clog components.		

The ClimateMaster Water Quality Table provides water quality requirements for ClimateMaster coaxial heat exchangers and fluid coolers. The water should be evaluated by an independent testing facility comparing to this Table and when properties are outside of these requirements, an external secondary heat exchanger must be used to isolate the equipment from the unsuitable water. Failure to do so will void the warranty for the coaxial heat exchanger and any other components damaged by a leak.

Notes:
- 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.

Electrical – Line Voltage

Electrical – Line Voltage - All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

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

⚠ 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.

Transformer
On dual voltage units the installer must confirm that the power supply and unit transformer wiring match. Installer must rewire as needed. Refer to the unit wiring diagram for proper connections.

⚠ CAUTION! ⚠

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

⚠ WARNING! ⚠

WARNING! This appliance must be installed by a qualified electrician who is fully aware of current safety and installations regulations. Pursuant to IEC 60335-1 Section 22.2, the installer is required to connect this appliance to the electricity supply by means of an all-pole disconnect.

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Electrical Data

TCH/V Standard Unit

TC Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse
				QTY	RLA	LRA				
006	V	220/240/50/1	209/252	1	2.8	15.0	0.4	3.2	3.9	15
009	V	220/240/50/1	209/252	1	3.1	18.8	0.7	3.8	4.6	15
012	V	220/240/50/1	209/252	1	4.0	21.0	0.7	4.7	5.7	15
015	V	220/240/50/1	209/252	1	4.7	23.0	0.9	5.6	6.7	15
018	V	220/240/50/1	209/252	1	5.9	24.0	0.9	6.8	8.2	15
024	V	220/240/50/1	209/252	1	9.0	52.0	1.3	10.3	12.6	20
030	V	220/240/50/1	209/252	1	11.2	60.0	2.7	13.9	16.7	25
	U	380/420/50/3	361/436	1	3.9	28.0	1.7	5.6	6.6	15
036	V	220/240/50/1	209/252	1	13.5	67.0	2.0	15.5	18.9	30
	U	380/420/50/3	361/436	1	5.4	38.0	1.2	6.6	8.0	15
042	U	380/420/50/3	361/436	1	6.0	46.0	1.7	7.7	9.2	15
048	U	380/420/50/3	361/436	1	6.1	43.0	1.8	7.9	9.4	15
060	U	380/420/50/3	361/436	1	7.8	51.5	2.5	10.3	12.3	20

All fuses Class RK-5

TCH/V High Static Unit

TC Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse
				QTY	RLA	LRA				
015	V	220/240/50/1	209/252	1	4.7	23.0	0.9	5.6	6.7	15
018	V	220/240/50/1	209/252	1	5.9	24.0	1.3	7.2	8.7	15
024	V	220/240/50/1	209/252	1	9	52.0	2.7	11.7	14.0	20
030	V	220/240/50/1	209/252	1	11.2	60.0	2.7	13.9	16.7	25
	U	380/420/50/3	361/436	1	3.9	28.0	1.7	5.6	6.6	15
036	V	220/240/50/1	209/252	1	13.5	67.0	2.7	16.2	19.6	30
	U	380/420/50/3	361/436	1	5.4	38.0	1.7	7.1	8.5	15
042	U	380/420/50/3	361/436	1	6	46.0	1.7	7.7	9.2	15
048	U	380/420/50/3	361/436	1	6.1	43.0	2.5	8.6	10.1	15
060	U	380/420/50/3	361/436	1	7.8	51.5	2.6	10.4	12.4	20

All fuses Class RK-5

TCH/V ECM Motor Unit

TC Model	Voltage Code	Rated Voltage	"Voltage Min/Max"	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse
				Qty	RLA	LRA				
006	V	220-240/50/1	206.8 / 254.4	1	2.14	15.0	2.30	4.4	5.0	15
009	V	220-240/50/1	206.8 / 254.4	1	3.10	18.8	2.30	5.4	6.2	15
012	V	220-240/50/1	206.8 / 254.4	1	4.05	21.0	2.30	6.4	7.4	15
015	V	220-240/50/1	206.8 / 254.4	1	4.70	23.0	2.60	7.3	8.5	15
018	V	220-240/50/1	206.8 / 254.4	1	5.90	24.0	2.60	8.5	10.0	15
024	V	220-240/50/1	206.8 / 254.4	1	9.00	52.0	4.60	13.6	15.9	20
030	V	220-240/50/1	206.8 / 254.4	1	11.20	60.0	4.60	15.8	18.6	25
	U	380-420/50/3	357.2 / 445.2	1	3.90	28.0	1.10	5.0	6.0	15
036	V	220-240/50/1	206.8 / 254.4	1	13.50	67.0	4.60	18.1	21.5	30
	U	380-420/50/3	357.2 / 445.2	1	5.40	38.0	1.10	6.5	7.9	15
042	U	380-420/50/3	357.2 / 445.2	1	6.00	46.0	1.10	7.1	8.6	15
048	U	380-420/50/3	357.2 / 445.2	1	6.10	43.0	2.10	8.2	9.7	15
060	U	380-420/50/3	357.2 / 445.2	1	7.80	51.5	2.10	9.9	11.9	15

All fuses Class RK-5

Eletrical – Power Wiring

⚠ WARNING! ⚠

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

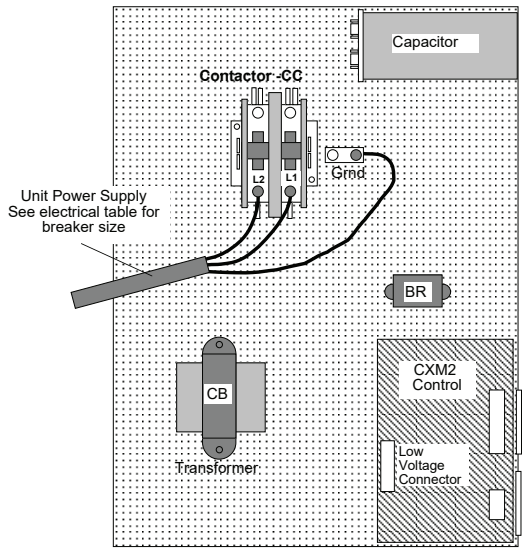
⚠ CAUTION! ⚠

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

Electrical – Line Voltage - All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

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

Figure 16: TC Single Phase Line Voltage Field Wiring. Three phase wiring is similar except that all three power wires are directly connected to the contactor.



Power Connection
Line voltage connection is made by connecting the incoming line voltage wires to the "L" side of the contactor as shown in Figures 16. Consult electrical tables for correct fuse size.

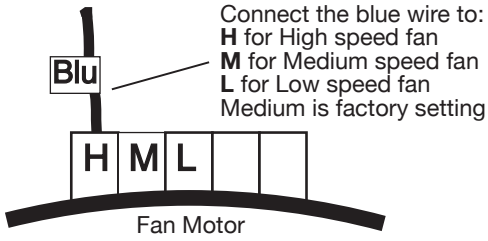
Transformer
On dual voltage units the installer must confirm that the power supply and unit transformer wiring match. Installer must rewire as needed. Refer to the unit wiring diagram for proper connections.

Blower Speed Selection – Units with PSC Motor
PSC (Permanent Split Capacitor) blower fan speed can be changed by moving the blue wire on the fan motor terminal block to the desired speed as shown in Figure 17. Most ClimateMaster units are shipped on the medium speed tap. Consult submittal data or engineering design guide for specific unit airflow tables. Typical unit design delivers rated airflow at nominal static 37Pa on medium speed and rated airflow at a higher static 100 to 125 Pa on high speed for applications where higher static is required. Low speed will deliver approximately 85% of rated airflow at 25 Pa. An optional high static blower is available on some models.

Electrical – Power & Low Voltage Wiring

Special Note for AHRI Testing: To achieve rated airflow for AHRI testing purposes on all PSC products, it is necessary to change the fan speed to "HI" speed. When the heat pump has experienced less than 100 operational hours and the coil has not had sufficient time to be "seasoned", it is necessary to clean the coil with a mild surfactant such as Calgon to remove the oils left by manufacturing processes and enable the condensate to properly "sheet" off of the coil.

Figure 17: PSC Motor Speed Selection



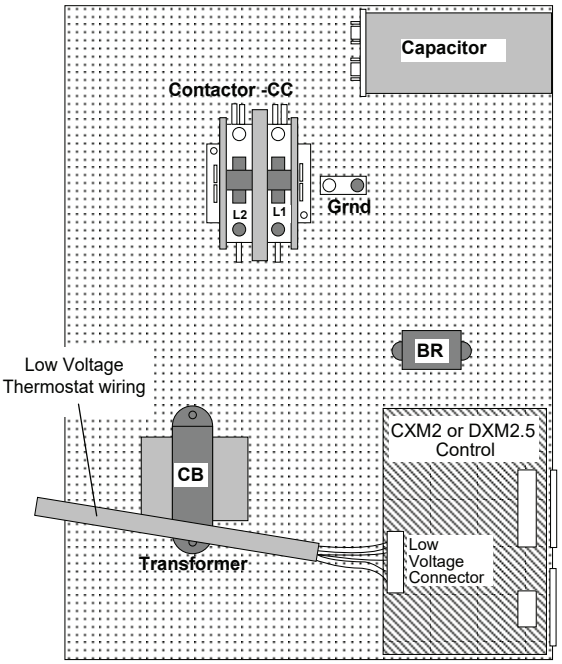
ELECTRICAL - LOW VOLTAGE WIRING

Thermostat Connections
The thermostat should be wired directly to the CXM2 or DXM2.5 board. Figure 19 shows low voltage wiring. See "Electrical – Thermostat" for specific terminal connections. Review the appropriate AOM (Application, Operation and Maintenance) manual for units with DDC controls.

Low Water Temperature Cutout Selection
The CXM2/DXM2.5 control allows the field selection of low water (or water-antifreeze solution) temperature limit by clipping jumper JW3, which changes the sensing temperature associated with thermistor FP1. Note that the FP1 thermistor is located on the refrigerant line between the coaxial heat exchanger and expansion device (TXV or cap tube). Therefore, FP1 is sensing refrigerant temperature, not water temperature, which is a better indication of how water flow rate/ temperature is affecting the refrigeration circuit.

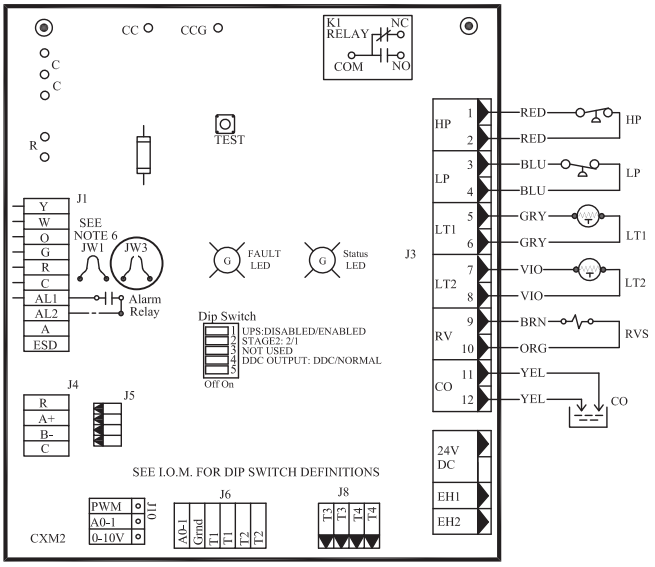
The factory setting for FP1 is for systems using water -1.1°C refrigerant temperature). In low water temperature (extended range) applications with antifreeze (most ground loops), jumper JW3 should be clipped as shown in Figure 20 to change the setting to -12.2°C refrigerant temperature, a more suitable temperature when using an antifreeze solution. All ClimateMaster units operating with entering water temperatures below 15°C must include the optional water/refrigerant circuit insulation package to prevent internal condensation.

Figure 19: Low Voltage Field Wiring



Electrical – Low Voltage Wiring

Figure 20: FP1 Limit Setting



Accessory Connections

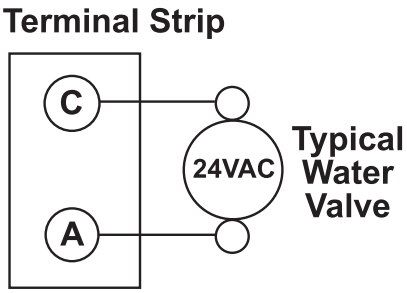
A terminal paralleling the compressor contactor coil has been provided on the CXM2/DXM2.5 control. Terminal "A" is designed to control accessory devices, such as water valves. Note: This terminal should be used only with 24 Volt signals and not line voltage. Terminal "A" is energized with the compressor contactor. See Figure 19 or the specific unit wiring diagram for details.

Low Voltage VA Ratings

Component	VA
Typical Blower Relay	6 - 7
Typical Reversing Valve Solenoid	4 - 6
30A Compressor Contactor	6 - 9
Subtotal	16 - 22
+ CXM2 board (5 - 9 VA)*	21 - 31
Remaing VA for Accessories	19 - 29
+ DXM2.5 board (8 - 12 VA)*	24 - 34
Remaing VA for Accessories	41 - 51

*Standard transformer for CXM2 board is 50VA.
Optional DXM2.5 board and/or DDC controls include 75VA transformer.

Figure 21: Accessory Wiring



Water Solenoid Valves - An external solenoid valve(s) should be used on ground water installations to shut off flow to the unit when the compressor is not operating. A slow closing valve may be required to help reduce water hammer. Figure 19 shows typical wiring for a 24VAC external solenoid valve. Figures 20 and 21 illustrate typical slow closing water control valve wiring for Taco 500 series (ClimateMaster P/N AVM) and Taco SBV series valves. Slow closing valves take approximately 60 seconds to open (very little water will flow before 45 seconds). Once fully open, an end switch allows the compressor to be energized. Only relay or triac based electronic thermostats should be used with slow closing valves. When wired as shown, the slow closing valve will operate properly with the following notations:

1. The valve will remain open during a unit lockout.
2. The valve will draw approximately 25-35 VA through the "Y" signal of the thermostat.

Note: This valve can overheat the anticipator of an electromechanical thermostat. Therefore, only relay or triac based thermostats should be used.

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

Blower Performance Data – Standard Unit

Airflow in l/s with wet coil and clean air filter

Model	Fan Speed	Rated Airflow (l/s)	Min Airflow (l/s)	Airflow (l/s) at External Static Pressure (Pa.)										
				0	25	50	75	100	125	150	175	200	225	250
TCH/V 006	HI	79	54		112	105	98	83	65					
	MED				94	87	76	68						
	LOW				76	68	58							
TCH/V 009	HI	121	85		145	134	124	113	99					
	MED				138	127	113	102	92					
	LOW				120	114	106	92						
TCH/V 012	HI	144	108		170	162	155	144	137	116				
	MED				151	144	137	130	123					
	LOW				130	126	116	112						
TCH/V 015	HI	192	140		269	255	248	230	195	163				
	MED			248	241	234	223	212	184					
	LOW			219	212	205	198	184	163					
TCH/V 018	HI	230	167		269	255	248	230	195					
	MED			248	241	234	223	212	184					
	LOW			219	212	205	198	184						
TCH/V 024	HI	274	241					343	319	298	264			
	MED			346	340	329	316	302	285	264				
	LOW			281	274	268	261	250						
TCH/V 030	HI	343	285				398	377	353	326	288			
	MED			429	412	394	374	357	333	305				
	LOW			384	367	353	336	319	298					
TCH/V 036	HI	412	350	532	518	501	480	462	424	389				
	MED			424	399	396	392	385	364					
	LOW			354	350									
TCH/V 042	HI	480	406	563	542	521	497	470	443	408				
	MED			511	494	477	460	436	408	384				
	LOW													
TCH/V 048	HI	549	484			679	655	617	576	511				
	MED			665	652	638	607	587	549	484				
	LOW			607	593	580	566	539	497					
TCH/V 060	HI	686	603	793	789	778	750	729	711	694	665	633		
	MED			725	722	704	686	669	648	630	605			
	LOW			655	651	640	630	612						

Black areas denote ESP where operation is not recommended.
Units factory shipped on medium speed. Other speeds require field selection.
All airflow is rated and shown above at the lower voltage if unit is dual voltage rated, e.g. 220V for 220-240V units.
Performance stated is at the rated power supply, performance may vary as the power supply varies from the rated.

Blower Performance Data – High Static Unit

Model	Fan Speed	Rated Airflow (l/s)	Min Airflow (l/s)	Airflow (l/s) at External Static Pressure (Pa.)										
				0	25	50	75	100	125	150	175	200	225	250
TCH/V 015	HI	192	140			276	269	258	244	230	188			
	MED			265	255	248	237	234	223	212	173			
	LOW			237	226	219	212	205	202	188				
TCH/V 018	HI	230	167			276	269	258	244	230	188			
	MED			265	255	248	237	234	223	212	173			
	LOW			237	226	219	212	205	202	188				
TCH/V 024	HI	274	241						353	326	288			
	MED							357	333	305	257			
	LOW					353	336	319	298	271	244			
TCH/V 030	HI	343	285						398	357	316			
	MED							388	353	319				
	LOW			360	353	340	329	312	288					
TCH/V 036	HI	412	350					536	515	490	452	410		
	MED			476	469	462	455	441	431	403	375			
	LOW			361	354	350								
TCH/V 042	HI	480	406	0	0	532	521	504	497	473	425			
	MED			477	470	463	453	446	429	405	370			
	LOW													
TCH/V 048	HI	549	484					707	689	672	645	614	569	518
	MED			703	700	683	665	648	628	611	587	556	511	
	LOW			635	631	621	611	593	573	549	518			
TCH/V 060	HI	686	603	849	846	839	828	814	793	778	754	729	701	669
	MED			764	761	757	736	722	715	701	683	665	527	619
	LOW			683	679	676	669	665	655	648	637	619		

Black areas denote ESP where operation is not recommended.
Units factory shipped on medium speed. Other speeds require field selection.
All airflow is rated and shown above at the lower voltage if unit is dual voltage rated, e.g. 220V for 220-240V units.
Performance stated is at the rated power supply, performance may vary as the power supply varies from the rated.

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

ECM Motor – Blower Performance Data – Standard Unit

Airflow in l/s with wet coil and clean air filter

Model	Fan Speed	Rated Airflow (l/s)	Min Airflow (l/s)		External Static Pressure (Pa.)										
					0	25	50	75	100	125	150	175	200	225	250
TCH/V 006	4	79	53	Airflow (l/s)		128	119	111	101	94	88	82			
				Speed (RPM)		1236	1312	1401	1499	1600	1695	1785			
				Power (W)		37	40	42	45	49	52	56			
	3			Airflow (l/s)		117	108	99	92	85	79	74			
				Speed (RPM)		1205	1287	1389	1490	1588	1684	1770			
				Power (W)		33	35	38	41	44	47	51			
	2			Airflow (l/s)		111	99	90	82	74	67	61	58		
				Speed (RPM)		1156	1207	1321	1428	1534	1623	1709	1802		
				Power (W)		29	30	33	36	39	41	44	48		
	1			Airflow (l/s)		91	80	70	60	53					
				Speed (RPM)		992	1112	1237	1351	1454					
				Power (W)		20	22	24	27	29					
TCH/V 009	4	121	87	Airflow (l/s)		185	178	171	165	157					
				Speed (RPM)		1581	1644	1706	1767	1820					
				Power (W)		79	83	86	90	91					
	3			Airflow (l/s)		170	163	156	149	142					
				Speed (RPM)		1487	1550	1614	1678	1768					
				Power (W)		65	68	71	74	79					
	2			Airflow (l/s)		153	145	139	131	122	115				
				Speed (RPM)		1369	1438	1516	1603	1695	1774				
				Power (W)		51	54	57	61	64	68				
	1			Airflow (l/s)		127	118	107	97	89					
				Speed (RPM)		1195	1276	1385	1476	1563					
				Power (W)		34	36	40	42	44					
TCH/V 012	4	144	104	Airflow (l/s)		202	196	190	184	179	174				
				Speed (RPM)		1588	1627	1672	1718	1764	1811				
				Power (W)		109	112	115	118	121	124				
	3			Airflow (l/s)		182	175	169	162	156	150	144			
				Speed (RPM)		1469	1514	1561	1608	1659	1711	1778			
				Power (W)		84	87	89	92	95	98	102			
	2			Airflow (l/s)		165	158	151	145	138	131	125	118	110	
				Speed (RPM)		1364	1413	1467	1522	1582	1644	1707	1767	1819	
				Power (W)		67	69	72	74	77	80	84	87	89	
	1			Airflow (l/s)		142	134	126	118	110					
				Speed (RPM)		1205	1264	1328	1393	1469					
				Power (W)		46	49	51	53	56					

Black areas denote ESP where operation is not recommended.
Units factory shipped on speeds 2 and 1 for sizes 06-12; 3 and 2 for sizes 15-60. Other speeds require field selection.
All airflow is rated and shown above at the lower voltage.
Performance stated is at the rated power supply, performance may vary as the power supply varies from the rated.

ECM Motor – Blower Performance Data – High Static Units

Airflow in l/s with wet coil and clean air filter

Model	Fan Speed	Rated Airflow (l/s)	Min Airflow (l/s)		External Static Pressure (Pa.)										
					0	25	50	75	100	125	150	175	200	225	250
TCH/V 015	5	192	142	Airflow (l/s)		297	281	275	254	241	228				
				Speed (RPM)		918	942	974	1066	1114	1159				
				Power (W)		105	107	110	120	125	130				
	4			Airflow (l/s)		274	260	248	229	216	199	176			
				Speed (RPM)		862	884	953	1025	1074	1134	1202			
				Power (W)		87	89	95	102	106	112	118			
	3			Airflow (l/s)		250	240	220	205	188	164	146			
				Speed (RPM)		805	831	930	984	1043	1119	1173			
				Power (W)		72	74	81	86	91	97	101			
	2			Airflow (l/s)		237	227	205	190	165	146				
				Speed (RPM)		770	814	904	961	1030	1100				
				Power (W)		63	67	73	78	84	88				
	1			Airflow (l/s)		221	205	186	168	142					
				Speed (RPM)		725	803	875	940	1022					
				Power (W)		54	59	64	68	74					
TCH/V 018	5	230	178	Airflow (l/s)		322	309	303	282	267					
				Speed (RPM)		1016	1034	1070	1160	1209					
				Power (W)		110	112	116	125	129					
	4			Airflow (l/s)		302	291	283	259	247	232				
				Speed (RPM)		969	989	1043	1130	1174	1211				
				Power (W)		95	96	101	109	113	116				
	3			Airflow (l/s)		291	281	266	247	234	219				
				Speed (RPM)		937	969	1031	1101	1148	1193				
				Power (W)		86	88	94	100	104	108				
	2			Airflow (l/s)		264	253	231	217	201	181				
				Speed (RPM)		860	899	995	1046	1098	1158				
				Power (W)		66	70	76	80	84	88				
	1			Airflow (l/s)		243	229	208	192						
				Speed (RPM)		801	867	949	1003						
				Power (W)		54	58	64	67						
TCH/V 024	5	274	234	Airflow (l/s)		413	394	377	363	348	328	301	278		
				Speed (RPM)		840	894	932	977	1024	1082	1156	1207		
				Power (W)		139	147	153	159	166	175	185	193		
	4			Airflow (l/s)		378	362	346	330	312	286	259	246		
				Speed (RPM)		808	850	893	938	992	1068	1129	1161		
				Power (W)		117	123	128	134	141	151	159	163		
	3			Airflow (l/s)		351	334	318	302	277	246				
				Speed (RPM)		767	808	854	903	977	1052				
				Power (W)		99	104	109	115	123	132				
	2			Airflow (l/s)		335	316	297	275	239					
				Speed (RPM)		717	764	819	884	975					
				Power (W)		83	88	94	101	110					
	1			Airflow (l/s)		307	288	269	237						
				Speed (RPM)		693	740	796	881						
				Power (W)		71	76	81	89						
TCH/V 030	5	343	295	Airflow (l/s)		481	471	457	444	432	419	407			
				Speed (RPM)		934	979	1028	1073	1110	1144	1182			
				Power (W)		195	204	213	221	228	235	243			
	4			Airflow (l/s)		443	429	414	401	388	373	357			
				Speed (RPM)		868	914	964	1004	1048	1092	1145			
				Power (W)		155	163	171	177	184	191	199			
	3			Airflow (l/s)		405	390	375	356	345	328	303			
				Speed (RPM)		806	859	909	953	1006	1061	1132			
				Power (W)		124	131	138	144	151	159	168			
	2			Airflow (l/s)		357	340	325	310						
				Speed (RPM)		748	806	855	909						
				Power (W)		96	103	109	115						
	1			Airflow (l/s)		341	323	306							
				Speed (RPM)		710	768	822							
				Power (W)		80	86	92							

Black areas denote ESP where operation is not recommended.
Units factory shipped on speeds 2 and 1 for sizes 06-12; 3 and 2 for sizes 15-60. Other speeds require field selection.
All airflow is rated and shown above at the lower voltage.
Performance stated is at the rated power supply, performance may vary as the power supply varies from the rated.

Table Continued on Next Page

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

ECM Motor – Blower Performance Data – High Static Units, Cont'd.

Table Continued from Previous Page

Airflow in l/s with wet coil and clean air filter

Model	Fan Speed	Rated Airflow (l/s)	Min Airflow (l/s)		External Static Pressure (Pa.)										
					0	25	50	75	100	125	150	175	200	225	250
TCH/V 036	5	412	340	Airflow (l/s)		574	561	546	533	518	503				
				Speed (RPM)		939	983	1033	1079	1122	1169				
				Power (W)		269	280	292	303	314	325				
	4			Airflow (l/s)		527	513	498	484	468	450	433			
				Speed (RPM)		877	926	979	1025	1071	1119	1167			
				Power (W)		213	224	234	244	254	264	274			
	3			Airflow (l/s)		484	468	452	435	416	399	379	354		
				Speed (RPM)		824	879	932	981	1035	1082	1137	1197		
				Power (W)		167	177	187	196	205	213	222	233		
	2			Airflow (l/s)		442	424	407	386	367	347				
				Speed (RPM)		766	828	884	942	995	1051				
				Power (W)		132	141	149	158	166	175				
	1			Airflow (l/s)		399	379	357							
				Speed (RPM)		704	769	834							
				Power (W)		99	107	116							
TCH/V 042	5	480	411	Airflow (l/s)		615	604	588	574	560					
				Speed (RPM)		1025	1063	1109	1161	1205					
				Power (W)		272	280	289	301	312					
	4			Airflow (l/s)		572	559	545	531	518	506				
				Speed (RPM)		977	1019	1072	1120	1161	1201				
				Power (W)		228	236	245	255	263	270				
	3			Airflow (l/s)		534	521	506	491	478	465				
				Speed (RPM)		938	985	1039	1088	1130	1172				
				Power (W)		197	204	213	221	228	235				
	2			Airflow (l/s)		481	465	450	436	421					
				Speed (RPM)		854	911	965	1011	1057					
				Power (W)		152	159	166	172	178					
	1			Airflow (l/s)		421									
				Speed (RPM)		790									
				Power (W)		120									
TCH/V 048	5	549	472	Airflow (l/s)		768	745	722	698	674	653	628	599	577	
				Speed (RPM)		887	924	963	1006	1046	1081	1124	1167	1201	
				Power (W)		322	333	345	358	370	380	394	407	418	
	4			Airflow (l/s)		711	684	659	634	610	583	552	530	508	484
				Speed (RPM)		832	877	921	965	1006	1051	1098	1130	1166	1200
				Power (W)		266	278	289	300	311	323	336	344	354	364
	3			Airflow (l/s)		656	627	601	575	549	519	494			
				Speed (RPM)		788	835	882	926	972	1019	1057			
				Power (W)		223	233	244	254	264	275	283			
	2			Airflow (l/s)		594	566	539	510	476					
				Speed (RPM)		738	787	835	883	934					
				Power (W)		182	192	201	210	220					
	1			Airflow (l/s)		538	508	478							
				Speed (RPM)		689	744	793							
				Power (W)		152	161	169							
TCH/V 060	5	686	600	Airflow (l/s)		886	860	828	811	786	759	745	715	693	669
				Speed (RPM)		815	850	898	921	971	1010	1028	1083	1119	1215
				Power (W)		412	427	448	458	480	496	505	526	541	559
	4			Airflow (l/s)		831	812	781	762	735	711	692	664	639	
				Speed (RPM)		790	816	873	893	945	985	1003	1060	1102	
				Power (W)		353	363	390	393	418	436	440	465	481	
	3			Airflow (l/s)		800	774	740	721	693	668	648	617		
				Speed (RPM)		744	780	841	863	913	955	979	1038		
				Power (W)		302	315	335	344	364	375	387	408		
	2			Airflow (l/s)		753	724	693	669	647	617				
				Speed (RPM)		715	757	815	847	883	933				
				Power (W)		263	276	293	304	315	330				
	1			Airflow (l/s)		711	680	652	622						
				Speed (RPM)		686	732	789	828						
				Power (W)		230	242	257	268						

Black areas denote ESP where operation is not recommended.
Units factory shipped on speeds 2 and 1 for sizes 06-12; 3 and 2 for sizes 15-60. Other speeds require field selection.
All airflow is rated and shown above at the lower voltage.
Performance stated is at the rated power supply, performance may vary as the power supply varies from the rated.

Electrical – Thermostat Wiring

Figure 22: AMV Valve Wiring

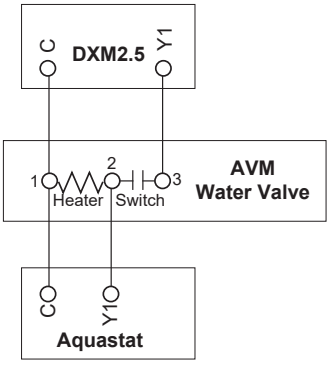
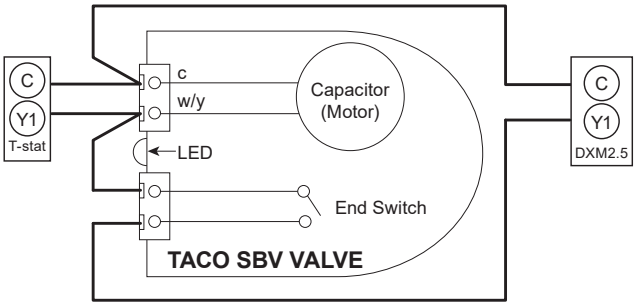


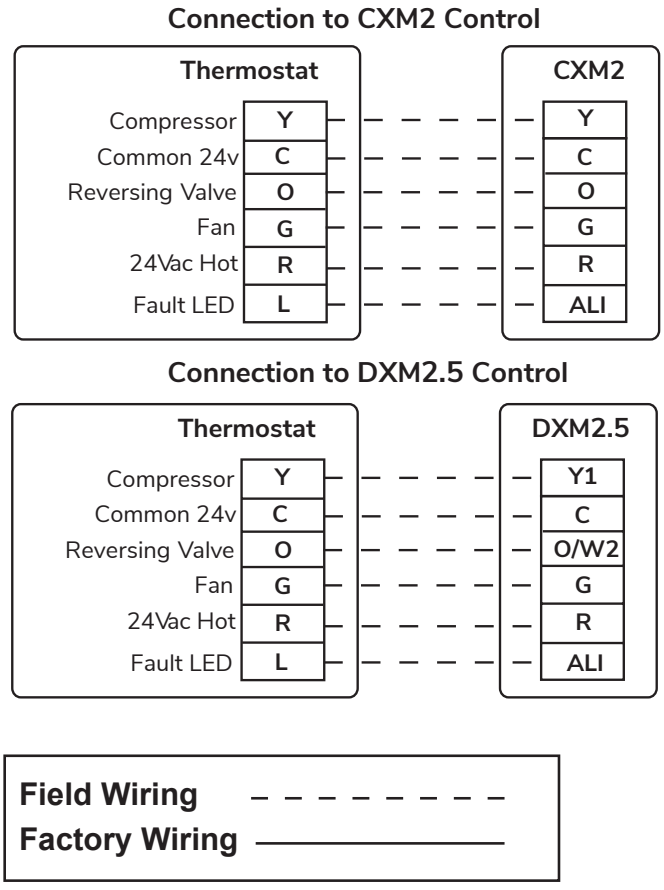
Figure 23: Taco SBV Valve Wiring



Thermostat Installation

The thermostat should be located on an interior wall in a larger room, away from supply duct drafts. DO NOT locate the thermostat in areas subject to sunlight, drafts or on external walls. The wire access hole behind the thermostat may in certain cases need to be sealed to prevent erroneous temperature measurement. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate. Mark the position of the back plate mounting holes and drill holes with a 3/16" (5mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire. Wire the appropriate thermostat as shown in Figure 25a to the low voltage terminal strip on the CXM2 or DXM2.5 control board. Practically any heat pump thermostat will work with ClimateMaster units, provided it has the correct number of heating and cooling stages.

Figure 25a: Units With PSC Fan And CXM2



Tranquility 16 (TC) Series
Rev.: 24 January, 2023

TC- Horizontal – Dimensional Data

Horizontal Model		Overall Cabinet		
		A Width	B Length	C Height
006 - 012	in	19.1	34.1	11.1
	cm	48.5	86.6	28.2
015 - 018	in	20.1	43.1	17.0
	cm	51.1	109.5	43.2
024 - 030	in	20.1	43.1	18.3
	cm	51.1	109.5	46.5
036 - 042	in	20.1	47.1	21.0
	cm	51.1	119.6	53.3
048 - 060	in	24.1	54.1	21.0
	cm	61.2	137.4	53.3

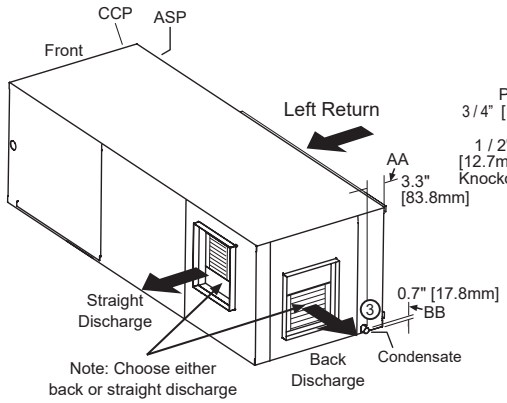
Horizontal Model		Electrical Knockouts	
		J 1/2"	K 3/4"
		Low Voltage	Power Supply
006 - 012	in	5.1	2.1
	cm	13.0	5.4
015 - 018	in	9.9	6.9
	cm	25.2	17.5
024 - 030	in	11.1	8.1
	cm	28.2	20.6
036 - 060	in	13.9	10.9
	cm	35.3	27.7

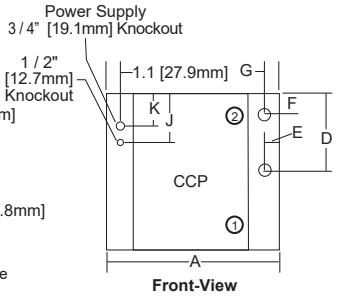
Horizontal Model		Water Connections						
		①		②		③		Loop In/Out FPT
		Loop In D	Loop In E	Loop Out F	Loop Out G	AA	BB	
006 - 012	in	5.6	1.1	1.6	1.1	3.3	0.7	1/2"
	cm	14.2	2.7	4.1	2.7	8.4	1.8	
015	in	15.1	1.4	3.2	1.4	3.3	0.7	1/2"
	cm	38.4	3.4	8.1	3.5	8.4	1.8	
018	in	15.1	1.4	4.1	1.4	3.3	0.7	1/2"
	cm	38.4	3.4	10.4	3.5	8.4	1.8	
024	in	16.4	1.4	4.4	1.4	3.3	0.7	3/4"
	cm	41.7	3.4	11.3	3.5	8.4	1.8	
030	in	16.4	1.4	3.1	1.4	3.3	0.7	3/4"
	cm	41.7	3.4	7.8	3.5	8.4	1.8	
036	in	19.1	1.4	5.3	1.4	3.3	0.7	3/4"
	cm	48.5	3.4	13.4	3.5	8.4	1.8	
042	in	19.1	1.4	4.4	1.4	3.3	0.7	3/4"
	cm	48.5	3.4	11.3	3.5	8.4	1.8	
048	in	19.1	1.4	4.4	1.4	3.3	0.7	1"
	cm	48.5	3.4	11.1	3.5	8.4	1.8	
060	in	19.1	1.4	3.8	1.4	3.3	0.7	1"
	cm	48.5	3.4	9.7	3.5	8.4	1.8	

Horizontal Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Using Return Air Opening			
		L	M Supply Height	N Supply Width	O	P	Q Return Width	R Return Height	S	T
006 - 012	in	0.8	8.9	6.7	6.0	1.3	16.1	9.8	1.1	0.6
	cm	1.9	22.7	17.0	15.2	3.3	41.0	25.0	2.7	1.5
015 - 018	in	2.6	13.3	9.9	4.1	1.3	23.0	15.0	1.1	1.0
	cm	6.6	33.8	25.1	10.5	3.3	58.4	38.1	2.8	2.5
024 - 030	in	2.6	13.3	9.9	4.1	1.3	23.0	16.3	1.1	1.0
	cm	6.6	33.8	25.1	10.5	3.3	58.4	41.4	2.8	2.5
036 - 042	in	2.5	16.1	11.0	3.0	2.5	25.9	19.0	1.1	1.0
	cm	6.3	40.9	27.9	7.7	6.4	65.8	48.3	2.8	2.5
048	in	3.7	16.1	13.7	4.1	1.3	35.9	19.0	1.1	1.0
	cm	9.5	41.0	34.8	10.3	3.2	91.2	48.3	2.8	2.5
060	in	1.7	18.1	13.7	4.1	1.3	35.9	19.0	1.1	1.0
	cm	4.4	46.0	34.8	10.3	3.2	91.2	48.3	2.8	2.5

TC - Horizontal – Dimensional Data, Cont'd.

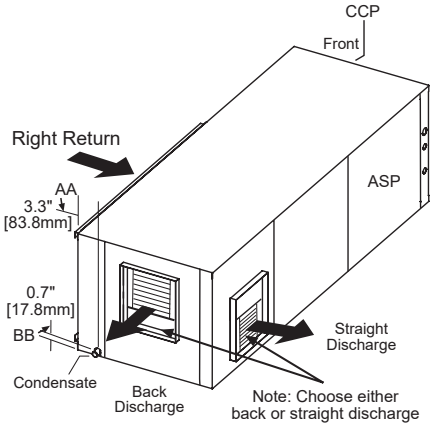
LEFT RETURN



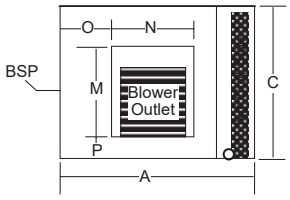


Front-View

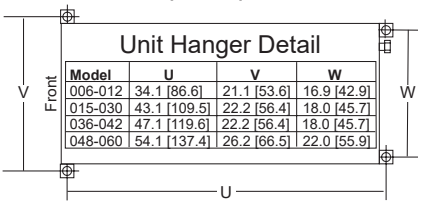
RIGHT RETURN

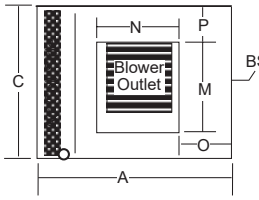


Note: Blower service panel requires 2' service access

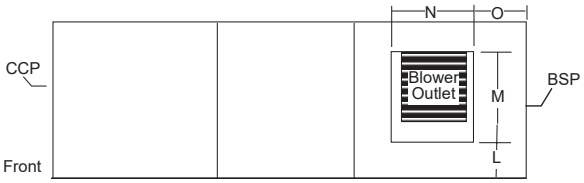


Left Return Back Discharge

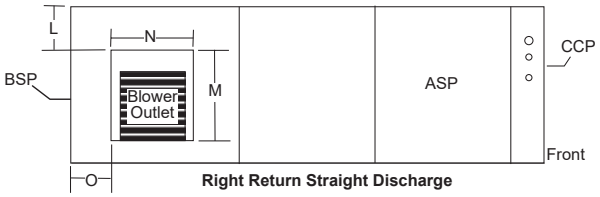




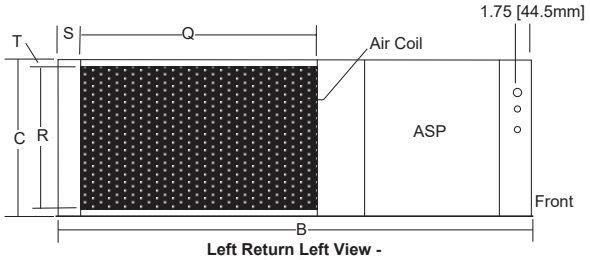
Right Return Back Discharge



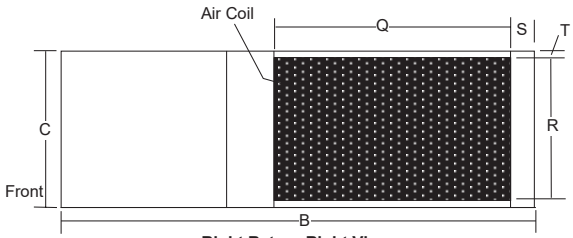
Left Return Straight Discharge



Right Return Straight Discharge



Left Return Left View - Air Coil Opening



Right Return Right View - Air Coil Opening

Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Units are shipped with air filter rails that are not suitable for supporting return air ductwork. An air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for futher information on this frame.
3. Discharge flange and hanger brackets are factory installed.
4. Condensate fitting on Polymer drain pan is rubber coupling that couples to ¾" schedule 40/80 PVC, S.S. drain pan is 3/4" MPT.
5. Blower service panel requires 2' service access.
6. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.

Legend:
CCP = Control/Compressor Access Panel.
BSP = Blower Service Panel.
*ASP = Additional Service Panel (not required).

Note:
*ASP are removable panels that provide additional access to the units interior.
Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

TC - Vertical Upflow – Dimensional Data

Vertical Upflow Model		Overall Cabinet		
		A Width	B Depth	C Height
006 - 012	in	19.1	19.1	22.0
	cm	48.5	48.5	55.9
015 - 030, 041	in	21.5	21.5	40.0
	cm	54.6	54.6	101.6
036 - 042	in	21.5	26.0	45.0
	cm	54.6	66.0	114.3
048 - 060	in	24.0	32.5	46.0
	cm	61.0	82.6	116.8

Vertical Model		Electrical Knockouts	
		J 1/2”	K 3/4”
		Low Voltage	Power Supply
006 - 012	in	5.9	8.9
	cm	14.9	22.5
015 - 060	in	7.1	10.1
	cm	18.1	25.7
041	in	7.1	11.1
	cm	18.0	28.2

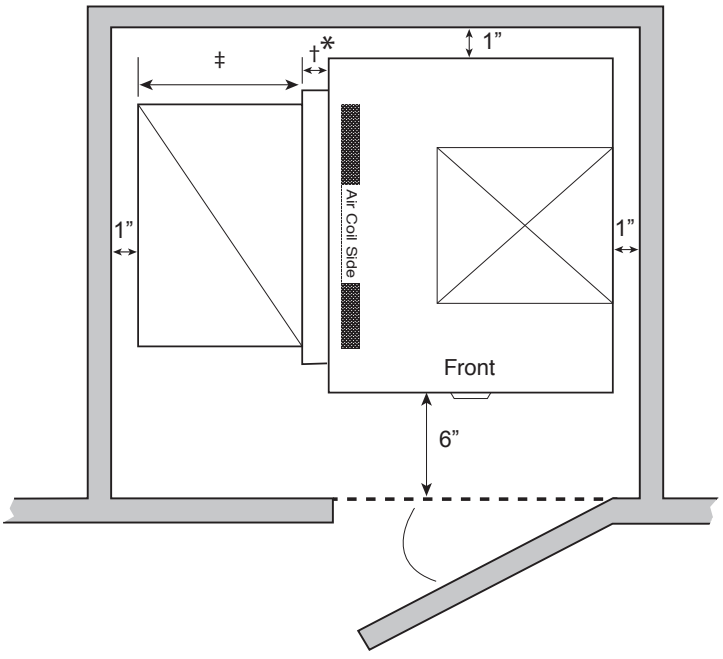
Vertical Upflow Model		Water Connections - Standard Units						
		①		②		③		
		Loop In D	Loop In E	Loop Out F	Loop Out G	H	I	Loop In/Out FPT
006 - 012	in	1.5	1.5	9.5	1.5	11.7	1.4	1/2”
	cm	3.8	3.8	24.1	3.8	29.7	3.6	
015	in	1.9	1.4	13.8	1.4	19.7	1.4	1/2”
	cm	4.8	3.6	35.1	3.6	50.0	3.6	
018	in	1.9	1.4	13.8	1.4	19.7	1.4	1/2”
	cm	4.8	3.6	35.1	3.6	50.0	3.6	
024	in	1.9	1.4	13.8	1.4	19.7	1.4	3/4”
	cm	4.8	3.6	35.1	3.6	50.0	3.6	
030	in	1.9	1.4	15.2	1.4	19.7	1.4	3/4”
	cm	4.8	3.6	38.6	3.6	50.0	3.6	
036	in	1.9	1.4	15.2	1.4	20.6	1.4	3/4”
	cm	4.8	3.6	38.6	3.6	52.3	3.6	
041	in	3.6	2.3	14.0	2.3	18.3	2.3	3/4”
	cm	4.8	5.8	35.6	5.8	46.5	5.8	
042	in	1.9	1.4	16.6	1.4	20.6	1.4	3/4”
	cm	4.8	3.6	42.0	3.6	52.3	3.6	
048	in	2.0	1.4	16.9	1.4	21.6	1.4	1”
	cm	5.1	3.6	42.9	3.6	54.9	3.6	
060	in	2.0	1.4	17.4	1.4	21.6	1.4	1”
	cm	5.1	3.6	44.2	3.6	54.9	3.6	

Notes:
1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. 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. (Except on TCV 009-030 and 041 with front return) Units with the front return require left side access for the fan.
3. Discharge flange is field installed.
4. Condensate fitting on Polymer drain pan is rubber coupling that couples to ¾” schedule 40/80 PVC, S.S. drain pan is 3/4” MPT.
5. Units are shipped with air filter rails that are not suitable for supporting return air ductwork. An air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for futher information on this frame.

Legend:
CCP = Control/Compressor Access Panel
BSP = Blower Service Panel
ASP = Alternative Service Panel

Recommended Minimum Installation Clearances for Vertical Units*	
1”	Back of unit
	Side opposite return air
6”	Front if hard piped
Return Air Side	
1”	Ducted return - ‡ *Add for duct width - † Add 2” for 1” filter frame/rail or 3” for 2” filter frame/rail
	Free (open) return - calculate required dimension for a maximum velocity of 600 fpm

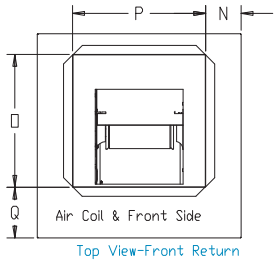
*Field installed accessories (hoses, air cleaners, etc.) and factory WSE option will require additional space. Top supply air is shown, the same clearances apply to bottom supply air units.



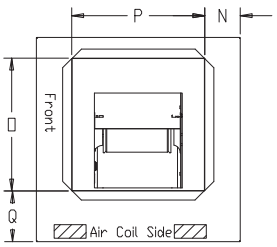
TCV - Vertical Upflow – Dimensional Data, Cont'd.

Vertical Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Using Return Air Opening			
		M	N	O Supply Width	P Supply Depth	Q	R	S Return Depth	T Return Height	U
006 - 012	in	8.9	5.1	9.0	9.0	5.5	2.1	16.2	9.9	0.7
	cm	22.7	12.9	22.9	22.9	14.0	5.3	41.1	25.1	1.9
015 - 018	in	6.4	3.8	14.0	14.0	5.3	2.3	18.3	20.9	0.7
	cm	16.1	9.5	35.6	35.6	13.6	5.8	46.5	53.1	1.9
024 - 030	in	6.4	5.0	14.0	14.0	5.8	2.0	18.5	19.3	0.9
	cm	16.3	12.7	35.6	35.6	14.7	5.1	47.0	49.0	2.3
036 - 042	in	6.4	3.8	14.0	14.0	5.1	2.3	22.8	23.9	0.7
	cm	16.1	9.5	35.6	35.6	13.1	5.8	57.9	60.7	1.9
048 - 060	in	6.9	7.3	16.0	18.0	5.1	2.3	29.3	22.5	0.7
	cm	17.4	18.4	40.6	45.7	13.1	5.8	74.4	57.0	1.9

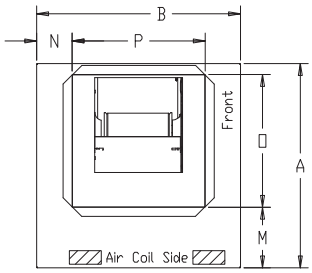
Front Return - N = 4.8 in (12.2 cm), Q = 6.4 in (16.3 cm).
Right Return - N = 3.8 in (9.7 cm), Q = 5.5 in (14.0 cm).
Left Return - M = 6.4 in (16.3 cm), N = 2.8 in (7.1 cm).



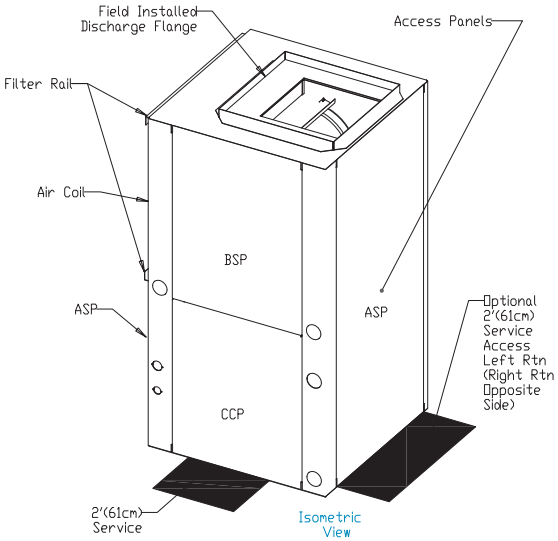
Top View-Front Return



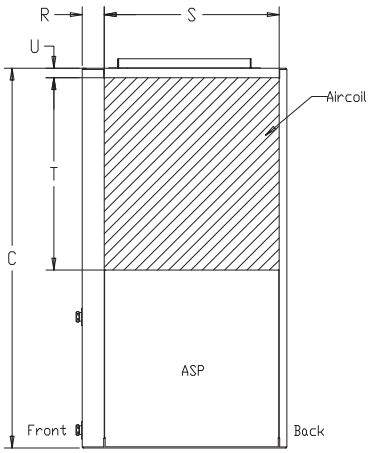
Top View-Right Return



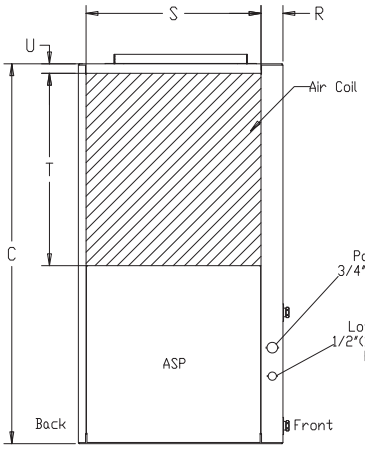
Top View-Left Return



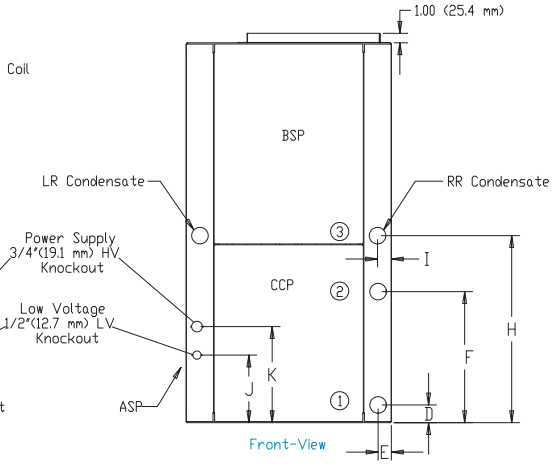
Isometric View



Right Return Right View - Air Coil Opening



Left Return Left View - Air Coil Opening



Front-View

Units are shipped with air filter rails that are not suitable for supporting return air ductwork. An air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for further information on this frame.

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

TC 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 'Small Packaged Units'
3. Select the TC product series
4. Click the Wire Diagrams tab in the middle of the page
5. Select your voltage and controls

	DIGITS			V		U
WIRE DIAGRAMS	9	12	14	TC006. 009.012	TC015.018. 024.030.036	TC0030.036. 042.048.060
CXM2 - 50 HZ	F	A.C.J.N	T.B.S.V.Y.Z	96B0514N41		96B0514N51
DXM2.5 - 50 HZ	G			96B0514N42		96B0514N52
Auxiliary WD for MPC	T, U	-	-	96B0147N14		
Control Box Layouts	-	-	-	96B0500N00		

Unit Controller	Fan Motor	220-240/50/1	380-420/50/3
		006-036	030-060
CXM2	PSC	96B0514N41	96B0514N51
	CT ECM	96B0514N42	96B0514N52
DXM2.5	PSC	96B0480N12	96B0480N22
	CT ECM	96B0228N93	96B0230N64
Auxiliary WD for MPC Controls		96B0147N14	

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.

Tranquility 16 (TC) Series
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Operating Limits

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

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

Determination of operating limits is dependent primarily upon three factors: 1) return air temperature. 2) water temperature, and 3) ambient temperature. When any one of these factors is at minimum or maximum levels, the other two factors should be at normal levels to ensure proper unit operation. Extreme variations in temperature and humidity and/or corrosive water or air will adversely affect unit performance, reliability, and service life. Consult Table 9a for operating limits.

Comissioning Conditions
Starting conditions are based upon the following notes:

Notes:
1. Conditions in Table 9b are not normal or continuous operating conditions. Minimum/maximum limits are start-up conditions to bring the building space up to occupancy temperatures. Units are not designed to operate under these conditions on a regular basis.
2. Voltage utilization range complies with AHRI Standard 110.

Table 9a: Operating Limits

	TC	
	Cooling	Heating
Air Limits		
Min. ambient air, DB	7ºC	4ºC
Rated ambient air, DB	27ºC	20ºC
Max. ambient air, DB	43ºC	29ºC
Min. entering air, DB/WB	18/10ºC	7.2ºC
Rated entering air, DB/WB	27/19ºC	20ºC
Max. entering air, DB/WB	35/24ºC	27ºC
Water Limits		
Min. entering water	-1ºC	-6.7ºC
Normal entering water	10-43ºC	-1 to 21ºC
Max. entering water	49ºC	32ºC
Normal Water Flow	1.6 to 3.2 l/m per kW	
Maximum Altitude	3048 m	

Table 9b: Commissioning Limits

	TC	
	Cooling	Heating
Air Limits		
Min. ambient air, DB	7ºC	4ºC
Rated ambient air, DB	27ºC	20ºC
Max. ambient air, DB	43ºC	29ºC
Min. entering air, DB/WB	10/7ºC	4.5ºC
Rated entering air, DB/WB	27/19ºC	20ºC
Max. entering air, DB/WB	43/28ºC	27ºC
Water Limits		
Min. entering water	-1ºC	-6.7ºC
Normal entering water	10-43ºC	-1 to 21ºC
Max. entering water	49ºC	32ºC
Normal Water Flow	1.6 to 3.2 l/m per kW	
Maximum Altitude	3048 m	

Piping System Cleaning and Flushing

Piping System Cleaning and Flushing - Cleaning and flushing 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. Ensure that 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 water. DO NOT allow system to overflow. Bleed all air from the system Pressurize and check the system for leaks and repair as appropriate. ClimaDry®-equipped units have a manual air bleed valve at the top of the reheat coil. This valve must be used to bleed the air from the reheat coil after filling the system, for ClimaDry® to operate properly.
4. Verify that all strainers are in place (ClimateMaster recommends a strainer with a #20 stainless steel wire mesh). Start the pumps, and systematically check each vent to ensure that all air is bled from the system.
5. Verify that make-up water is available. Adjust make-up water as required 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 30°C. Open 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 1/2 kg per 750 l of water (or other equivalent approved cleaning agent). Reset the boiler to raise the loop temperature to 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 in the range of pH 6.0 - 8.5 (see table 3). Add chemicals, as appropriate to maintain neutral pH 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! ⚠

DO NOT use “Stop Leak” or similar chemical agent in this system. Addition of chemicals of this type to the loop water will foul the heat exchanger and inhibit unit operation.

⚠ CAUTION! ⚠

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.

Unit Starting and Operating Conditions

⚠ 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.

Unit and System Checkout

BEFORE POWERING SYSTEM, please check the following:

UNIT CHECKOUT

- ❑ Balancing/shutoff valves: Ensure that all isolation valves are open and water control valves are wired.
- ❑ Line voltage and wiring: Verify that voltage is within an acceptable range for the unit and wiring and fuses/breakers are properly sized. Verify that low voltage wiring is complete.
- ❑ Unit control transformer: Ensure that transformer has the properly selected voltage tap.
- ❑ Entering water and air: Ensure that entering water and air temperatures are within operating limits of Table 8a-b.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out on the CXM2/DXM2.5 control is properly set.
- ❑ Unit fan: Manually rotate fan to verify free rotation and ensure that blower wheel is secured to the motor shaft. Be sure to remove any shipping supports if needed. DO NOT oil motors upon start-up. Fan motors are pre-oiled at the factory. Check unit fan speed selection and compare to design requirements.
- ❑ Condensate line: Verify that condensate line is open and properly pitched toward drain.
- ❑ Water flow balancing: Record inlet and outlet water temperatures for each heat pump upon startup. This check can eliminate nuisance trip outs and high velocity water flow that could erode heat exchangers.
- ❑ Unit air coil and filters: Ensure that filter is clean and accessible. Clean air coil of all manufacturing oils.
- ❑ Unit controls: Verify that CXM2 or DXM2.5 field selection options are properly set.

SYSTEM CHECKOUT

- ❑ System water temperature: Check water temperature for proper range and also verify heating and cooling setpoints for proper operation.
- ❑ System pH: Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes longevity of hoses and fittings (see table 3).
- ❑ System flushing: Verify that all hoses are connected end to end when flushing to ensure that debris bypasses the unit heat exchanger, water valves and other components. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Verify that 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 that the standby pump is properly installed and in operating condition.
- ❑ System controls: Verify that system controls function and operate in the proper sequence.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out controls are provided for the outdoor portion of the loop. Otherwise, operating problems may occur.
- ❑ System control center: Verify that the control center and alarm panel have appropriate setpoints and are operating as designed.
- ❑ Miscellaneous: Note any questionable aspects of the installation.

⚠ CAUTION! ⚠

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

⚠ CAUTION! ⚠

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

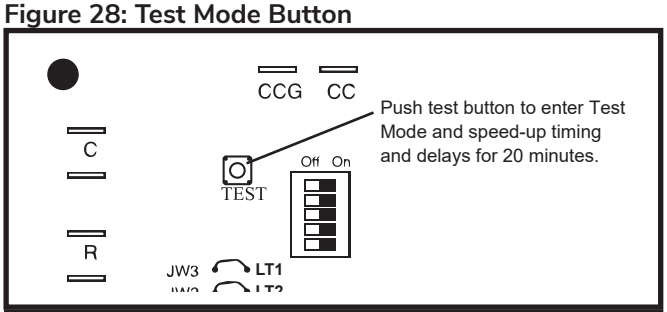
Unit Start-Up Procedure

Unit Start-up Procedure

1. Turn the thermostat fan position to “ON”. Blower should start.
2. Balance air flow at registers.
3. Adjust all valves to their full open positions. Turn on the line power to all heat pumps.
4. Room temperature should be within the minimum-maximum ranges of table 9. During start-up checks, loop water temperature entering the heat pump should be between 16°C and 35°C.
5. Two factors determine the operating limits of ClimateMaster heat pumps, (a) return air temperature, and (b) water temperature. When any one of these factors is at a minimum or maximum level, the other factor must be at normal level to insure proper unit operation.
   a. Adjust the unit thermostat to the warmest setting. Place the thermostat mode switch in the “COOL” position. Slowly reduce thermostat setting until the compressor activates.
   b. Check for cool air delivery at the unit grille within a few minutes after the unit has begun to operate. Note: Units have a five minute time delay in the control circuit that can be eliminated on the CXM2/DXM2.5 control board as shown below in Figure 28. See controls description for details.
   c. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using the P/T plugs and comparing to table 10.
   d. Check the elevation and cleanliness of the condensate lines. Dripping may be a sign of a blocked line. Check that the condensate trap is filled to provide a water seal.
   e. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in tables 10b and c. Heat of rejection (HR) can be calculated and compared to submittal data capacity pages. The formula for HR for systems with water is as follows:
   HR (kW) = TD x l/s x 4.18,where TD is the temperature difference between the entering and leaving water, and l/s is the flow rate, determined by comparing the pressure drop across the heat exchanger to table 10.
   f. Check air temperature drop across the air coil when compressor is operating. Air temperature drop should be between 8°C and 14°C.
   g. Turn thermostat to “OFF” position. A hissing noise indicates proper functioning of the reversing valve.
6. Allow five (5) minutes between tests for pressure to equalize before beginning heating test.
   a. Adjust the thermostat to the lowest setting. Place the thermostat mode switch in the “HEAT” position.
   b. Slowly raise the thermostat to a higher temperature until the compressor activates.
   c. Check for warm air delivery within a few minutes after the unit has begun to operate.
   d. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in table 10. Heat of extraction (HE) can be calculated and compared to submittal data capacity pages. The formula for HE for systems with water is as follows:
   HE (kW) = TD x l/s x 4.18, where TD is the temperature difference between the entering and leaving water, and l/s is the flow rate in U.S. GPM, determined by comparing the pressure drop across the heat exchanger to table 10.
   e. Check air temperature rise across the air coil when compressor is operating. Air temperature rise should be between 11°C and 17°C.
   f. Check for vibration, noise, and water leaks.
7. If unit fails to operate, perform troubleshooting analysis (see troubleshooting section). If the check described fails to reveal the problem and the unit still does not operate, contact a trained service technician to insure proper diagnosis and repair of the equipment.
8. When testing is complete, set system to maintain desired comfort level.
9. BE CERTAIN TO FILL OUT AND FORWARD ALL WARRANTY REGISTRATION PAPERS TO CLIMATEMASTER.

Note: If performance during any mode appears abnormal, refer to the CXM2/DXM2.5 section or troubleshooting section of this manual. To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended.

Figure 28: Test Mode Button



⚠ 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.

⚠ CAUTION! ⚠

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

Table 10: TC Coax Water Pressure Drop

Model	l/s	Pressure Drop, kPa			
		-1°C	10°C	21°C	32°C
006	0.05	3.7	2.3	1.6	1.6
	0.07	5.3	3.5	2.7	2.2
	0.09	8.8	6.1	4.8	4.0
009	0.07	9.0	4.4	2.8	1.9
	0.11	14.1	9.4	7.4	6.2
	0.14	24.3	17.9	14.7	12.7
012	0.09	12.8	7.6	5.3	4.1
	0.15	25.0	17.8	14.3	12.1
	0.19	46.1	34.3	28.3	24.5
015	0.12	6.9	4.4	3.4	2.8
	0.18	12.4	9.3	7.6	6.9
	0.24	22.7	17.5	14.7	13.1
018	0.14	14.5	9.9	7.6	6.2
	0.21	23.4	17.6	14.7	12.4
	0.28	40.6	31.5	26.9	23.4
024	0.19	15.2	11.6	9.6	8.3
	0.28	27.6	22.2	19.3	17.2
	0.38	49.6	40.6	35.8	32.4
030	0.24	9.0	6.1	4.8	4.1
	0.35	15.8	12.5	10.3	9.6
	0.47	28.9	23.2	20	17.9
036	0.28	12.4	9.6	8.3	6.9
	0.43	21.4	16.8	14.7	13.1
	0.57	37.2	30.0	26.2	23.4
042	0.33	15.8	12.1	10.3	9.0
	0.50	29.6	24.2	26.4	19.3
	0.66	54.4	44.8	39.3	35.8
048	.038	12.4	10.1	9.0	8.3
	0.57	23.4	20.4	18.6	17.9
	0.76	42.7	37.9	35.1	35.1
060	0.47	23.4	19.2	16.5	15.2
	0.71	46.9	40.8	37.2	34.5
	0.95	86.8	76.8	71.0	66.1

Table 17: Water Temperature Change Through Heat Exchanger

Water Flow, l/m	Rise, Cooling °C	Drop, Heating °C
For Closed Loop: Ground Source or Closed Loop Systems at 3.2 l/m per kW	5 - 6.7	2.2 - 4.4
For Open Loop: Ground Water Systems at 1.6 l/m per kW	11.1 - 14.4	5.6 - 9.4

Preventive Maintenance

Water Coil Maintenance
(Direct ground water applications only)
If the system is installed in an area with a known high mineral content (125 P.P.M. or greater) in the water, it is best to establish a periodic maintenance schedule with the owner so the coil can be checked regularly. Consult the well water applications section of this manual for a more detailed water coil material selection. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. Therefore, 1.6 l/m per kW is recommended as a minimum flow. Minimum flow rate for entering water temperatures below 10°C is 2.2 l/m per kW.

Water Coil Maintenance
(All other water loop applications)
Generally water coil maintenance is not needed for closed loop systems. However, if the piping is known to have high dirt or debris content, it is best to establish a periodic maintenance schedule with the owner so the water coil can be checked regularly. Dirty installations are typically the result of deterioration of iron or galvanized piping or components in the system. Open cooling towers requiring heavy chemical treatment and mineral buildup through water use can also contribute to higher maintenance. 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 3.9 l/m per kW can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

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

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

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

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

Fan Motors
All units have lubricated fan motors. Fan motors should never be lubricated unless obvious, dry operation is suspected. Periodic maintenance oiling is not recommended, as it will result in dirt accumulating in the excess oil and cause eventual motor failure. Conduct annual dry operation check and amperage check to insure amp draw is no more than 10% greater than indicated on serial plate data.

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

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

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

⚠ 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.

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Functional Troubleshooting

Fault	Htg	Clg	Possible Cause	Solution
Main power problems	X	X	Green Status LED Off	Check line voltage circuit breaker and disconnect.
				Check for line voltage between L1 and L2 on the contactor.
				Check for 24VAC between R and C on CXM2/DXM2.5'
				Check primary/secondary voltage on transformer.
HP Fault Code 2 **High Pressure**		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow adjust to proper flow rate.
		X	Water Temperature out of range in cooling	Bring water temp within design parameters.
	X		Reduced or no air flow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Dirty Air Coil- construction dust etc.
				Too high of external static. Check static vs blower table.
	X		Air temperature out of range in heating	Bring return air temp within design parameters.
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table.
	X	X	Bad HP Switch	Check switch continuity and operation. Replace.
LP/LOC Fault Code 3 **Low Pressure / Loss of Charge**	X	X	Insufficient charge	Check for refrigerant leaks
	X		Compressor pump down at start-up	Check charge and start-up water flow.
LT1 Fault Code 4 **Water coil low temperature limit**	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter. Clean or replace..
				Check water flow adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper temperature limit setting (30°F vs 10°F [-1°C vs -2°C])	Clip JW3 jumper for antifreeze (10°F [-12°C]) use.
	X		Water Temperature out of range	Bring water temp within design parameters.
	X	X	Bad thermistor	Check temp and impedance correlation per chart
LT2 Fault Code 5 **Air coil low temperature limit**		X	Reduced or no air flow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static. Check static vs blower table.
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
		X	Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Normal airside applications will require 30°F [-1°C] only.
	X	X	Bad thermistor	Check temp and impedance correlation per chart.
Condensate Fault Code 6	X	X	Blocked drain	Check for blockage and clean drain.
	X	X	Improper trap	Check trap dimensions and location ahead of vent.
		X	Poor drainage	Check for piping slope away from unit.
				Check slope of unit toward outlet.
				Poor venting. Check vent location.
		X	Moisture on sensor	Check for moisture shorting to air coil.
	X	X	Plugged air filter	Replace air filter.
	x	X	Restricted Return Air Flow	Find and eliminate restriction. Increase return duct and/or grille size.
Over/Under Voltage Code 7 **(Auto resetting)**	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size.
				Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer tap for correct power supply voltage.
	X	X	Over Voltage	Check power supply voltage and 24VAC before and during operation.
				Check 24VAC and unit transformer tap for correct power supply voltage.
Unit Performance Sentinel Code 8	X		Heating mode FP2>125°F [52°C]	Check for poor air flow or overcharged unit.
		X	Cooling Mode FP1>125°F [52°C] OR FP2< 40ºF [4ºC])	Check for poor water flow, or air flow.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Operates".
	X	X	Compressor overload	Check and replace if necessary.
	X	X	Control board	Reset power and check operation.
Unit Short Cycles	X	X	Dirty air filter	Check and clean air filter.
	X	X	Unit in "test mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor overload	Check and replace if necessary
Only Fan Runs	X	X	Thermostat position	Ensure thermostat set for heating or cooling operation.
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor Overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for Line voltage across BR contacts.
	X	X		Check fan power enable relay operation (if present).
	X	X	Fan motor	Check for line voltage at motor. Check capacitor.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC on RV coil and at CXM2/DXM2.5 board.
				If RV is stuck, run high pressure up by reducing water flow and while operating engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	Check for 'O' RV setup not 'B'.
		X	Thermostat wiring	Check O wiring at heat pump. Jumper O and R for RV coil 'click'.
		X	Thermostat wiring	Put thermostat in cooling mode. Check 24 VAC on O (check between C and O); check for 24 VAC on W (check between W and C). There should be voltage on O, but not on W. If voltage is present on W, thermostat may be bad or wired incorrectly.

Performance Troubleshooting

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

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Functional Troubleshooting – S-I Units

HEATING CYCLE ANALYSIS -

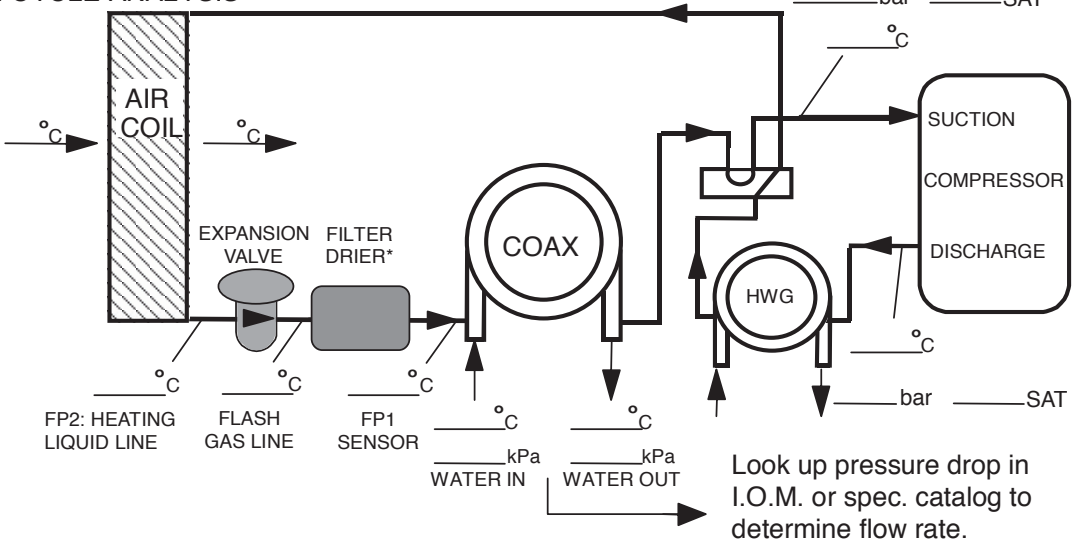
Refrigerant Type:

HFC-410A

Voltage: _____

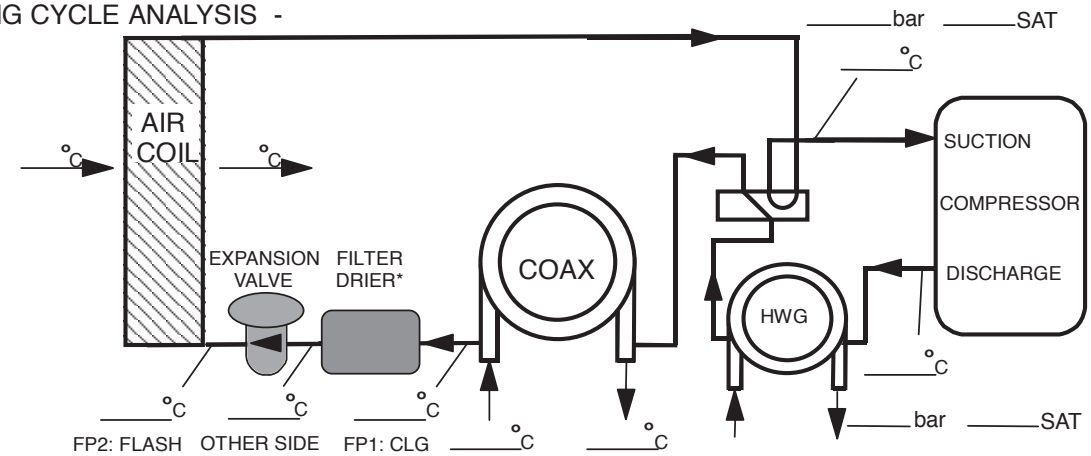
Comp Amps: _____

Total Amps: _____



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

COOLING CYCLE ANALYSIS -



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

Heat of Extraction (Absorption) or Heat of Rejection =

_____flow rate (l/s) x _____ temp. diff. (deg. C) x _____ fluid factor† = _____ (kW)

Superheat = Suction temperature - suction saturation temp. = _____ (deg C)

Subcooling = Discharge saturation temp. - liquid line temp. = _____ (deg C)

† Use 4.18 for water, 4.05 for antifreeze

Rev. 11/06

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

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

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

Notes:

Notes:

Tranquility 16 (TC) Series
Rev.: 24 January, 2023

Revision History

Date	Item	Description
24 January, 2023	Various	Changed CXM and DXM2 to CXM2 and DXM2.5
8 July, 2021	All	All
25 July, 2017	Page 7	Hanger and mounting details
16 May, 2017	Page 39	Added Maximum Altitude and changed limits description on operating limits tables
23 October, 2015	Page 4	Added a safety warning
18 August, 2015	All	First Published

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